Now with Integral Autocal

6888

In Situ Flue Gas Oxygen Transmitter

- **World-Class**™ performance
- **Outstanding accuracy**
  - ±0.75% of reading or ±0.05% O_2
- **Digital communications**
  - HART® 7 EDDL standard
  - FOUNDATION Fieldbus™
  - AMS/PlantWeb® compatible
- **Optional Xi** local operator interface
  - large backlit LCD display
  - advanced software features
- **Adaptable** to any existing O_2 probe installation
  - Westinghouse World Class
  - Rosemount Oxymitter
  - Most competitive O_2 Probe installations
- **Advanced sensor diagnostics**
  - calibration recommended diagnostic
  - plugged diffuser/filter diagnostic
- **Fully field-repairable**
- **Variable** probe insertion option
- **HART® wireless** communication from probe or Xi

Xi Electronics shown with optional Smart Wireless THUM™ adapter

The new standard for combustion flue gas analysis

The 6888 in situ O_2 transmitter provides accurate measurement of the oxygen remaining in the flue gases coming from any combustion process. Optimal combustion efficiency can be obtained by maintaining the ideal level of oxygen in the flue gases coming from these processes and the lowest level of NO_x, CO and CO_2 are produced.

Easy to use and easy to integrate. This in situ analyzer was designed with customer ease-of-use in mind. There are no moving parts or sampling apparatus resulting in an extremely reliable probe that requires very little maintenance.

ROSEMOUNT® Analytical

EMERSON™ Process Management

The latest breakthrough for combustion flue gas analysis

The 6888 in situ O_2 analyzer provides accurate measurement of the oxygen remaining in the flue gases coming from any combustion process, including:

- Boilers
- Incinerators
- Industrial Heating Furnaces
- Kilns
- Process Heaters

By maintaining the ideal level of oxygen, the flue gases coming from these processes, optimal efficiency is gained, and the lowest level of NOx, CO, and CO_2 are produced.

This in situ design places a zirconium oxide sensing element at the end of a probe, which inserts directly into a flue gas stream. There are no moving parts or sampling apparatus, resulting in an extremely reliable analyzer that requires very little maintenance. Probe lengths are available from 18" to 12', and a slip mounting option provides the ability to mount a long probe at any insertion depth. Heavy-wall probe tubes are available for applications where fly-ash erosion is a problem. Accessories are available for process temperatures above 700°C to 1050°C.

Calibrations may be performed on-line, while the furnace is in operation, and fully automated calibration with solenoid switching is also available.

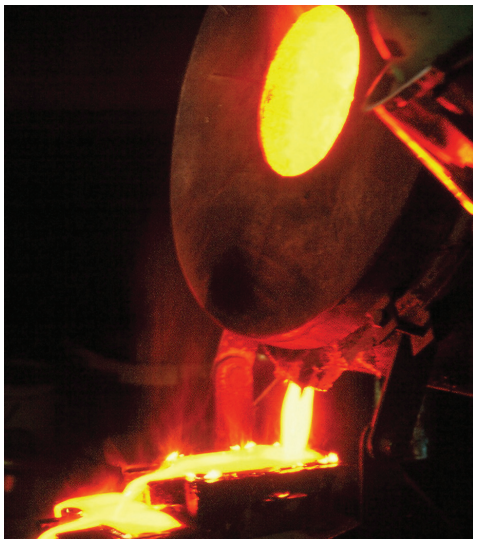
The 6888 is fully field repairable. All active components can be replaced, including the diffuser/filter, sensing cell, heater and thermocouple, and all electronics cards.

Signal conditioning electronics reside in the head of each probe, eliminating the need for expensive signal cable. A dual-channel operator interface unit provides an easy-to-use method of setting up the instrument, calibrating, and diagnosing failures.

Lime/Cement

Power

Refining



Steel

General Purpose 6888

Variable Insertion Option

Lengths from 18" (.5m) to 12' (3.65m) the new variable insertion option permits ideal placement of the probe into the flue gas duct. Probe can be adjusted at any time on-line to characterize stratification across large ducts. Installation may be vertical or horizontal.

On-board electronics

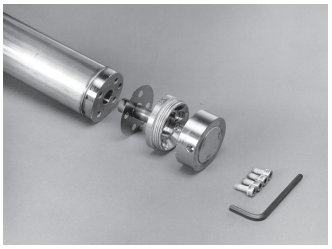
On-board electronics provides heater control and signal conditioning, resulting in a linear 4-20 mA signal representing flue gas oxygen. Electronics temperature specification is 85°C (185°F). No special signal cable is required. HART® 475 communicator or AMS can be used for setup, calibration, and diagnostics. Traditional architecture arrangement with remote electronics is also offered.

The 6888 oxygen transmitter is completely field-repairable.

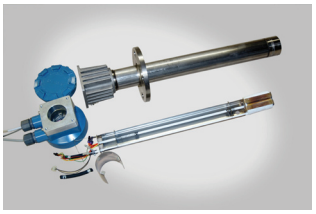
Diffusion Filter and Sensor Cell Assembly

- Outstanding accuracy– + or - .75% of reading or .05% O_2
- Special cells for tough service in SO_2 and HCL
- Rugged steel cell holder – cells will not crack

Heater/Thermocouple assembly



Diffuser and sensing cell are interchangable with previous Oxymitter and World Class products.



Heater strut and probe body are interchangable with Oxymitter products.

Optional Xi

The Xi Operator Interface provides a bright back-lit display, easy-to-use keypad in a NEMA 4X (IP 66) enclosure. Dual channel capability provides interface to two probes. Xi Electronics also offers advanced features, including automatic calibration, extended process temperature, plugged diffuser diagnostic, stoichiometer indications in reducing conditions, and programmable reference feature for measuring at near-ambient levels.

Traditional Architecture systems are also available. A “direct replacement” probe with no electronics sends raw millivolt (mV) signals for sensing cell and thermocouple to a single-channel (only) Xi electronics, which does all heater control, signal conditioning, calibrations, diagnostics, and advanced features. Probe can operate with most competitive electronics.

Advanced Features

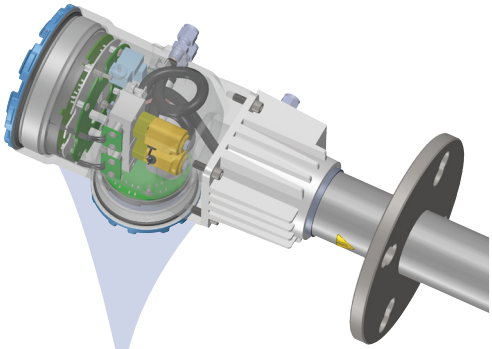
Integal automatic calibration - available with Xi electronics

Plant personnel often ask how frequently an oxygen analyzer requires calibration. The answer is very application-dependent based upon the fuels being burned, the normal levels of oxygen, and the sulfur content in the flue gases. The Xi addresses this concern by providing an on-line diagnostic that determines when a calibration should be conducted, eliminating many unneeded calibrations and the technician and gas resources they consume. The electronics has an on-line impedance measurement for the sensing cell.

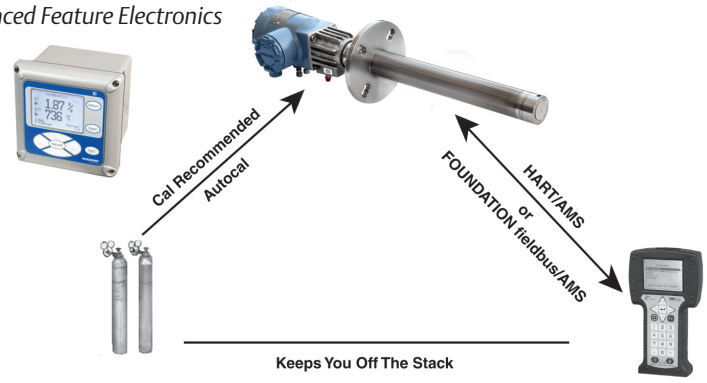
This feature can trigger a fully automatic calibration by sequencing solenoids inside the probe to introduce calibration gases to the sensing cell. Many needless calibrations based on “time in service” are eliminated. A contact closure notifies the control room when a calibration is taking place. The oxygen output signal can be held at its last value, or released during calibration. The 6888 can also initiate calibrations by traditional methods:

- Time since last calibration
- Manually, via the Xi enhanced interface
- Manually, via HART® /FF /AMS

6888 probe with integral autocal solenoids



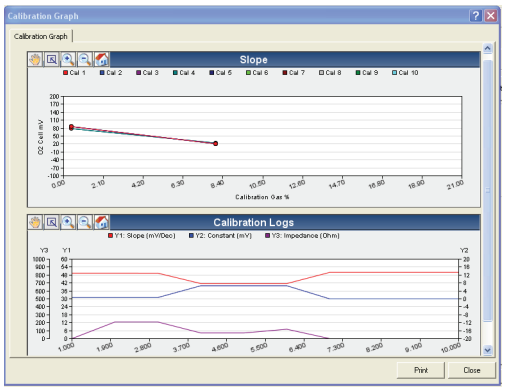
Xi Operator Interface and Advanced Feature Electronics



Model 475 Handheld Communicator

Wireless

Optional Smart Wireless THUM™ adapter transmits the O_2 signal, along with all HART® information from the probe electronics or Xi.



With the Wireless THUM™, AMS has never been easier to implement. The above trends track the past 10 probe calibrations.

Advanced Software features

(available with the Xi electronics)

Heaterless operation

The 6888 oxygen analyzer employs a heater and thermocouple to maintain a temperature setpoint at either 550°C (1022°F) or 736°C (1357°F). Temperature control is maintained within ±1°C. At process temperatures above the selected temperature setpoint, the probe heater remains off and the electronics calculates O_2 based on process temperature.

It should be noted that cell life will be reduced by continuous operation at temperatures above 800°C (1472°F). If process temperatures are expected to be continuously above 750°C, we recommend the use of a bypass or probe mounting jacket accessory.

Stoichiometer

Process upsets can sometimes cause a combustion process to go into substoichiometric or reducing conditions. The oxygen readings from one or more probes may decline all the way to zero. Operators frequently misinterpret a 0% O_2 indication as a failed analyzer. The stoichiometer cell will measure the amount of oxygen deficiency during these reducing conditions. The trends in your DCS can be set up for a lower range limit of -1 or -2% oxygen to depict the level of oxygen deficiency.

The operator can see that:

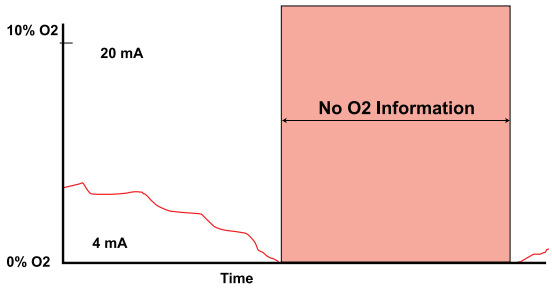
the O_2 reading is alive

his or her process is in reducing conditions

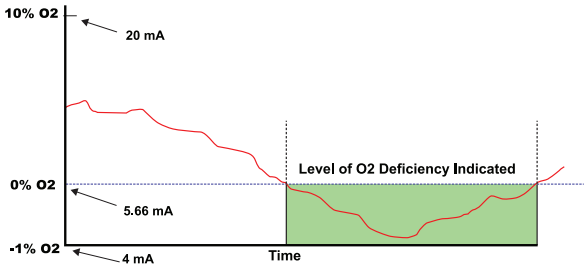
and if his or her control actions to recover are having the desired effect.

These types of events do not occur frequently, but knowing the parameters of the situation prevents overcorrecting while coming out of the reducing condition.

Acid-Resistant Stoichiometer Cell



Typical DCS Trend During a Reducing Process Event



DCS Trend With Stoichiometer Feature

Plugged Diffuser Diagnostic

For use in applications where there is a heavy particulate loading in the flue gas stream. This feature notes the “return to process” time after calibration gases are turned off. As this time extends after multiple calibrations over many months, a diagnostic will indicate that the diffuser should be replaced in the near future.

Programmable Reference

The zirconium oxide sensing technology has historically measured process oxygen by using ambient or instrument air as a reference (20.95% oxygen). The sensor develops most of its signal at the low oxygen levels typically found in combustion flue gases (2-4% oxygen) and is most accurate at these levels. When measuring at levels near ambient, however, the sensor develops only a few millivolts of signal and accuracy degrades.

The programmable reference feature permits the user to use a bottled reference gas of low oxygen value (.4% oxygen recommended). When measuring at or near 21% oxygen, a strong negative oxygen signal results with much improved accuracy. A bottle of reference gas typically lasts about a month at the low flows required.

Typical applications include:

Flue Gas Recirculation – controlling the mixing of flue gases into the burner windbox prior to the burner to reduce NOx emissions.

Moisture Monitoring – measuring the amount of moisture coming off of industrial dryers by noting the dilution effect water vapor has on the normal 20.95% ambient drying air.

Enriched Oxygen Combustion – pure oxygen is sometimes mixed in with the combustion air to increase heat at the flame. This is used in steel and other metals reduction processes and also in some catalyst regenerators.

Specifications[1]

Measurement Specifications

Net O_2 range
variable 0-10% to 0-50%
(Xi electronics offer 0-50% O_2 range)

Accuracy in oxidizing conditions
±0.75% of reading or 0.05% O_2, whichever is greater

Lowest detectable limit
0.02% O_2

Process temperature effect
less than 0.05% O_2 from 100-700°C

System speed of response to calibration gas
Initial response in less than 3 seconds, T90 in less than 8 seconds. Response to process gas changes will vary, depending on process gas velocity and particulate loading of the diffuser

Calibration validity
Presentation of calibration gases matches the bottle value to within ±0.02% O_2

Accuracy in reducing conditions (stoichiometer feature, only)
±0.1% of reading, or 0.1% O_2, whichever is greater

System response in reducing conditions (stoichiometer feature, only)
going from oxidizing to reducing -T90 in 120 sec.
going from reducing to oxidizing -T90 in 30 sec.

Environmental Specifications

Transmitter probe

Transmitter probe
Process-wetted materials are 316L or 304 stainless steel

Process temperature limits
0 to 705°C (32-1300°F)
550-825C with Xi "heaterless operation" feature *
reduced cell life can be expected if operated continuously at temperatures above 705°C (1300°F)
optional bypass and jacket accessories permit operation to 1050°C (1922°F)

[1] All static performance characteristics are with operating variables constant. Specifications subject to change without notice.

Probe electronics

Probe electronics ambient temperature limits
-40° to 70°C (-40° to 158°F)

Temperature limit as measured inside probe electronics
-40° to 85°C (-40° to 185°F)

Optional Xi Electronics

Optional Xi Electronics
NEMA 4X, Polycarbonite Material

General Purpose Certifications

Xi Ambient temperature limits
-20° to 55°C (-4° to 131°F)

Xi Temp. limits as measured inside the electronics housing
-20° to 70°C (-4° to 158°F)

Installation Specifications

Probe mounting flange
vertical or horizontal — 2" 150# (4.75" (121mm) bolt circle)
DIN (145mm (5.71") bolt circle)

Note: flanges are flat-faced, and for mounting only. Flanges are not pressure-rated. A 2.5" diameter hole in the process is required.

Spool piece P/N 3D39761G02 is available, to offset probe electronics housing from hot ductwork.

Many adapter flanges are available to mate to existing flanges.

Probe lengths and approximate shipping weights

18 in. (457 mm) package:	16 pounds (7.3 kg)
3 foot (0.91 m) package:	21 pounds (9.5 kg)
6 foot (1.83 m) package:	27 pounds (12.2 kg)
9 foot (2.74 m) package:	33 pounds (15.0 kg)
12 foot (3.66 m) package:	39 pounds (17.7 kg)

Reference air (optional)
2 scfh (1l/m), clean, dry, instrument quality air (20.95% O_2), regulated to 2.5 psi (34kPa)

Calibration
Semi-automatic or automatic

Cal gases
.4% and 8% O_2, balance N_2 recommended.
Instrument air may be used as a high cal gas, but is not recommended.
100% nitrogen cannot be used as the low cal gas.

Specifications (cont)

Cal gas flow
5 scfh (2.5 l/m)

Heater electrical power
100 - 240V, ±10% 50/60 Hz 1/2″— 14″ NPT conduit ports

Traditional architecture cable
200 foot (61m) maximum length

Power consumption of probe heater
776VA maximum during warm-up

Electrical power of optional Xi electronics
100 to 240V, ±10% 50/60 Hz

Power consumption of Xi
10 watts maximum

Xi alarms relays
2 provided - 2 amps, 30 VDC

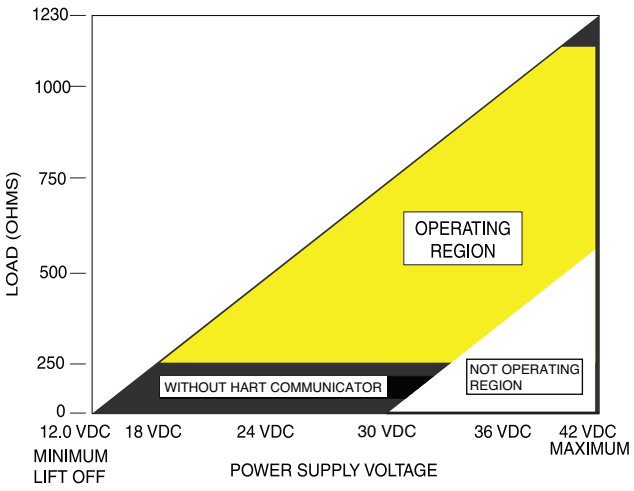
Xi optional loss of flame contact
Removes heater power

Electrical Noise:
Meets EN 61326, Class A

Traditional architecture cable
200ft (61m) maximum length

Power Consumption of Probe Heater
776VA maximum during warm-up

Transmitter electrical power
12 – 42VDC, (loop-powered from the control room or from the Xi box)



Power Supply and Load Requirements

Electrictical power for Xi
100-240V ±10%, 50-60Hz

Power consumption of Xi
12VA maximum or 776VA maximum with Traditional Architecture, 120V, Probes. 450VA maximum with Traditional Architecture, 44V Probes

Alarm relay outputs
Two provided - 2 Amperes, 30 VDO, Form-C

Optional loss of flame input
internally powered input to remove heater power, actuated via dry contact output from prove of flame device.

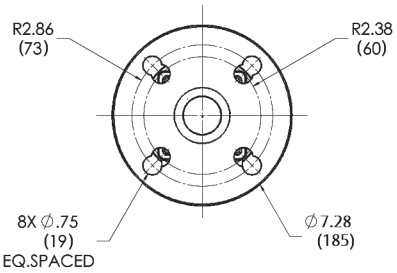
CE Emerson Process Management has satisfied all obligations coming from the European legislation to harmonize the product requirements in Europe.

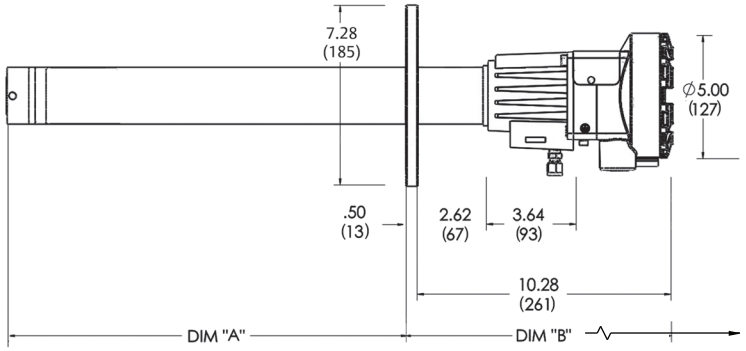
C US

Dimensional Drawings

Probe Installation Dimensions

Note: All dimensions are in inches
with millimeters in parantheses





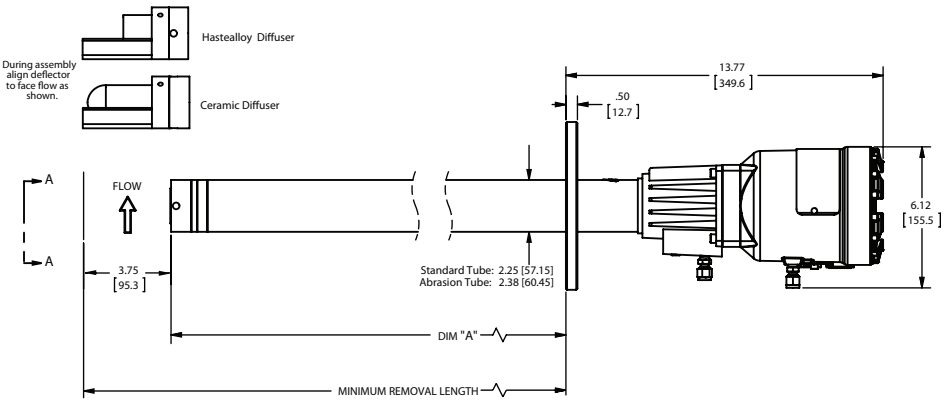


Table 1. Mounting Flange

	ANSI	DIN
Flange Dia	7.28 (185)	
Hold dia	.75 (20)	
(4) Holes Eq Sp on BC	4.75 (121)	5.71 (145)

Table 2. Removal/Installation*

Probe Length	DIM "A" Insertion Depth	DIM "B" Removal Envelope Standard Housing	DIM "B" Removal Envelope Accessory Housing
18 in. (457) Probe	16.10 (409)	27 (686)	29.87 (759)
3 ft. (0.91) Probe	32.52 (826)	46.6 (1182)	50.1 (1271)
6 ft. (1.83) Probe	68.52 (1740)	82.6 (2097)	86.1 (2186)
9 ft. (2.74) Probe	104.52 (2655)	118.6 (3011)	122.1 (3100)
12 ft. (3.66) Probe	140.52 (3569)	154.6 (3926)	158.1 (4015)

* Add 3.80 (96) to DIM "A" and DIM "B" for probe with ceramic or Hastealloy™ diiffuser

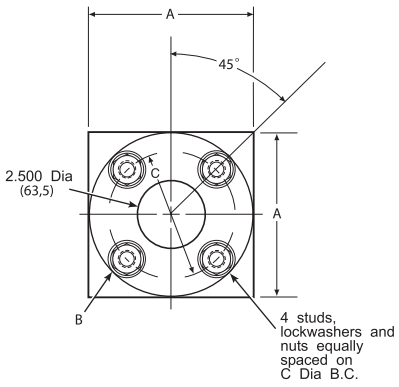
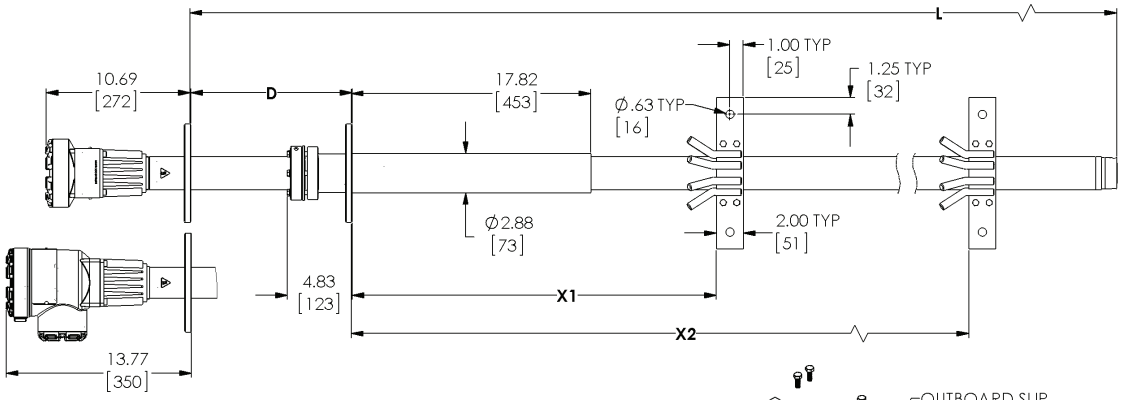


Table 3. Installation Weld Plate Outline

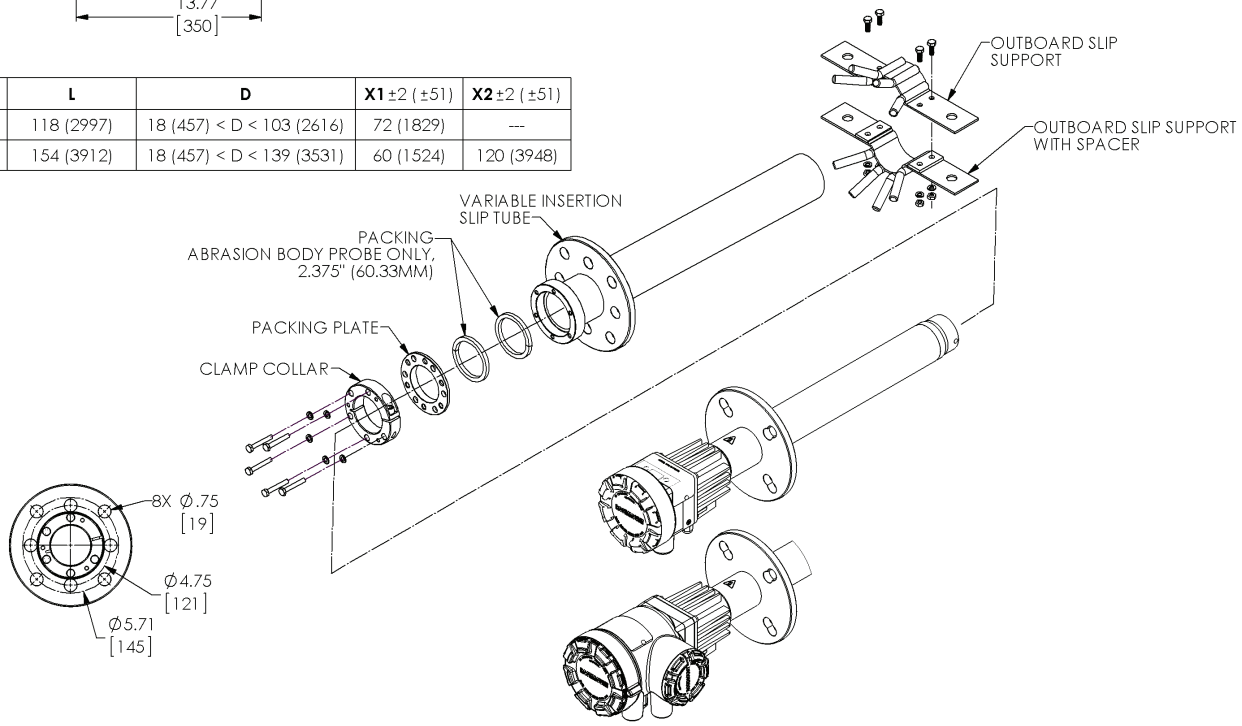
	ANSI	DIN
"A"	6.00 (153)	7.5 (191)
"B" Thread	.625 (11)	(M-16x2)
"C" Dia	4.75 (121)	5.708 (145)

Dimensional Drawings

Optional Variable Insertion



PROBE SIZE	L	D	X1 ±2 (±51)	X2 ±2 (±51)
9 ft. (2.73)	118 (2997)	18 (457) < D < 103 (2616)	72 (1829)	---
12 ft. (3.64)	154 (3912)	18 (457) < D < 139 (3531)	60 (1524)	120 (3948)



Probe Size	L	D	X1 2 (51)	X2 2 (51)
9 ft. (2.73)	118 (2997)	18 (457) < D < 103 (2616)	72 (1829)	—
12 ft. (3.64)	154 (3912)	18 (457) < D < 139 (3531)	60 (1524)	120 (3948)

Ordering information

6888 O_2 Transmitter Probe - General Purpose In Situ Flue Gas Oxygen Probe System. For Hazardous Area versions, see Oxymitter product data sheet, PDS 106-340C.

Model	Product Description
6888A	O_2 Transmitter Probe
Measurement	
1OXY	Oxygen, Standard Sensing Cell
2OXY	Oxygen, Acid-Resistant Stoichiometric Sensing Cell
Probe Length	
1	18" Probe, Standard Probe Tube
2	18" Probe, Standard Probe Tube with Abrasive Shield
3	18" Probe, Abrasion Resistant Probe Tube
4	3' Probe, Standard Probe Tube
5	3' Probe, Standard Probe Tube with Abrasive Shield
6	3' Probe, Abrasion Resistant Probe Tube
7	6' Probe, Standard Probe Tube
8	6' Probe, Standard Probe Tube with Abrasive Shield
9	6' Probe, Abrasion Resistant Probe Tube
A	9' Probe, Abrasion Resistant Probe Tube
AA	9' Probe, Abrasion Resistant Probe Tube with Abrasive Shield
B	12' Probe, Abrasion Resistant Probe Tube
BA	12' Probe, Abrasion Resistant Probe Tube with Abrasive Shield
Diffuser	
1	Snubber 400°C (752°F)
1A	Snubber w/Dust Seal 400°C (752°F) (Used w/Abrasive Shields)
1F	Snubber w/Flashback Arrestor 400°C (752°F)
2	Ceramic 825°C (1517°F)
2A	Ceramic w/Dust Seal 825°C (1517°F) (Used w/Abrasive Shields)
2F	Ceramic w/Flashback Arrestor 705°C (1292°F)
3	Hastelloy, 40 um 705°C (1292°F)
3A	Hastelloy w/Dust Seal, 40 um 705°C (1292°F) (Used w/Abrasive Shields)
Housing & Electronics	
1HT	Standard Housing, Transmitter Electronics, HART® Communications
2HT	Integral Autocal Housing, Transmitter Electronics, HART® Communications
4FF	Integral Autocal Housing, Transmitter Electronics, Fieldbus Communications
5DR	Standard Housing, Direct Replacement, No Electronics Communications
6DRY	Standard Housing, Direct Replacement, for use with YEW Electronics

Ordering information (cont)

6888 O_2 Transmitter Probe - General Purpose In Situ Flue Gas Oxygen Probe System. For Hazardous Area versions, see Oxymitter product data sheet, PDS 106-340C.

Mounting Plate	
00	None
04	New Installation - Square Weld Plate with ANSI 2”-150# Studs & Flange (2.5″ process hole required)
05	New Installation - Square Weld Plate with DIN Studs & Flange (2.5″ process hole required)
06	New Installation - Variable Insertion Mount; Abrasion Resistant Probe Only
07	New Installation - Variable Insertion Mount, Mounted to Existing OXT/WC Abrasive Shield Mounts; Abrasion Resistant Probe Only
08	Adapter to Existing ANSI 3”, 150# Flange
09	Adapter to Existing ANSI 4”, 150# Flange
10	Adapter to Existing ANSI 6”, 150# Flange
11	Adapter to Existing ANSI 3”, 300# Flange
12	Adapter to Existing ANSI 4”, 300# Flange
99	Special Adapter - provide existing flange dimensions, including thru-hole diameter
Manual Calibration Accessories	
00	None
01	Calibration & Reference Gas Flowmeters & Reference Regulator/Filter
02	Manual Calibration/Reference Panel
Stoichiometer - FOUNDATION Fieldbus versions only (For HART versions order this feature with Xi electronics)	
0	No
1	Yes
Programmable Reference Funtion - FOUNDATION Fieldbus versions only (For HART versions order this feature with Xi electronics)	
0	No
1	Yes
Extended Temperature Function - FOUNDATION Fieldbus versions only (For HART versions order this feature with Xi electronics)	
0	No
1	Yes
Diffuser Warning - FOUNDATION Fieldbus versions only (For HART versions order this feature with Xi electronics)	
0	No
1	Yes

Ordering information

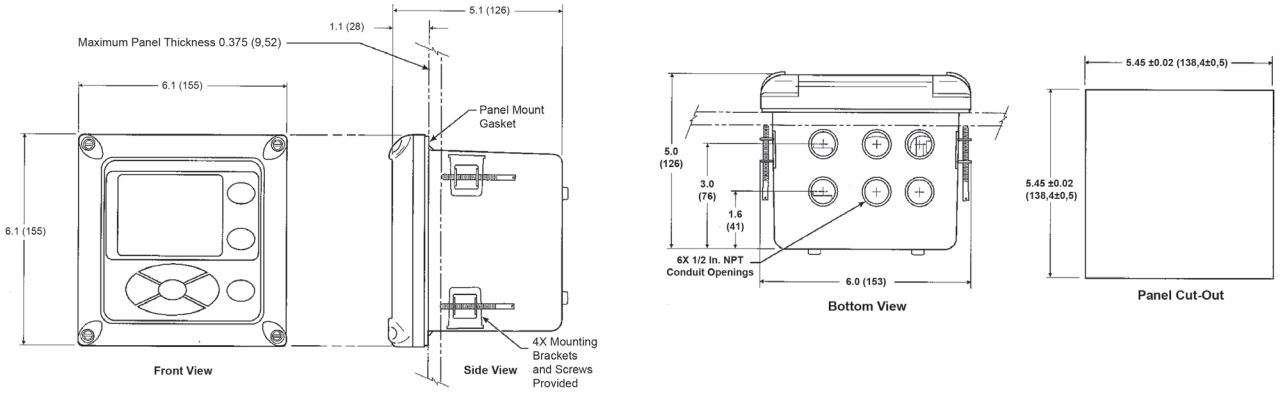
6888 Xi Advanced Electronics

Model	Product Description
6888Xi	Advanced Electronics
Remote Type	
1OXY	Single Channel O_2
2OXY	Single Channel O_2 withFlame Safety Interlock for Heater
3OXY	Dual Channel O_2
4OXY	Single Channel O_2, Traditional Architecture for 120V Probes*
Mounting	
00	No Hardware
01	Panel Mount Kit with Gasket
02	2” Pipe/Wall Mount Kit
Cable	
00	No Cable
10	20’ (6m) Cable, use with Traditional Architecture Probe only
11	40’ (12m) Cable, use with Traditional Architecture Probe only
12	60’ (18m) Cable, use with Traditional Architecture Probe only
13	80’ (24m) Cable, use with Traditional Architecture Probe only
14	100’ (30m) Cable, use with Traditional Architecture Probe only
15	150’ (45m) Cable, use with Traditional Architecture Probe only
Stoichiometer Functions for O_2	
00	No
01	Single Channel
02	Dual Channel
Programmable Reference Function for O_2	
00	No
01	Single Channel
02	Dual Channel
Extended Temperature Function for O_2	
00	No
01	Single Channel
02	Dual Channel
Plugged Diffusser Diagnostics	
00	No
01	Single Channel
02	Dual Channel

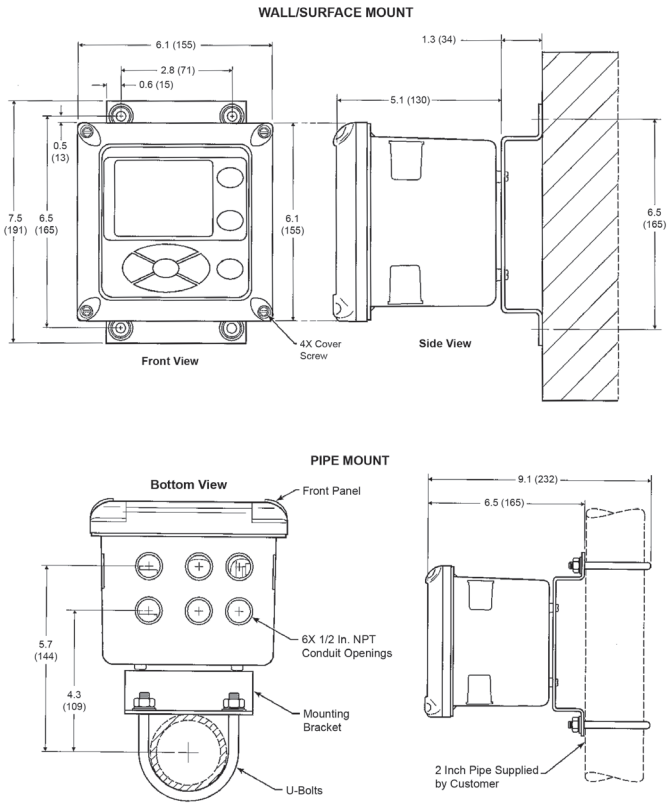
* Note: The 6888 Xi does not support World Class 44V probes.
The X-STREAM Xi will support World Class 44V probes.

Dimensional Drawings

Xi Enhanced Interface - Panel Mounting Details



Xi Enhanced Interface - Wall/Surface and Pipe Mounting Details

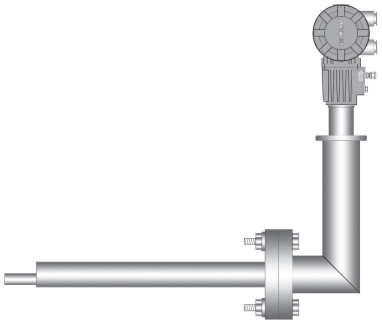


6888 Accessories

HART® Hand-held 475 Communicator

The FOUNDATION™ fieldbus 475 Communicator is an interface device that provides a common communication link to HART®/ FOUNDATION fieldbus compatible instruments, such as the Sulfur-Resistant Oxymitter. HART® Communications Protocol permits all the information available from the Sulfur-Resistant Oxymitter electronics to be transmitted over standard 4-20 mA signal wires or FOUNDATION fieldbus wires. By attaching the hand-held communicator at a termination point along the signal line, a technician can diagnose problems and configure and calibrate the Sulfur-Resistant Oxymitter as if he or she were standing in front of the instrument.

Bypass Packages



The specially designed Rosemount Analytical Bypass Package for oxygen analyzers has proven to withstand the high temperatures (to 1050°C/1922°F) in process heaters while providing the same advantages offered by the in situ sensor. Inconel tubes provide effective resistance to corrosion, and the other components common to other sampling systems.

O_2 Calibration Gas Kits pn. 6296A27G01

Rosemount Analytical's O_2 Calibration Gas and Service Kits have been carefully designed to provide a more convenient and fully portable means of testing, calibrating, and servicing Rosemount Analytical's oxygen analyzers. These lightweight, disposable gas cylinders eliminate the need to rent gas bottles.

Smart Wireless THUM™ Adapter

The Smart Wireless THUM™ Adapter converts the standard 4-20mA signal from the probe or Xi electronics to a wireless signal. All HART® information is transmitted in addition to the process O_2 value.

For more information, call Rosemount Analytical at 1-800-433-6076.

Special Arrangements

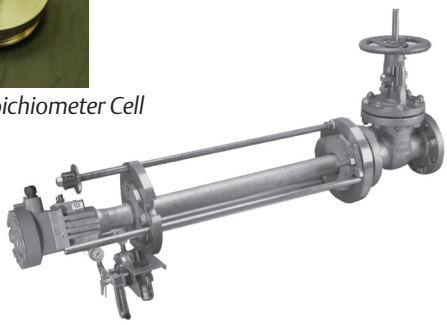
Special Cells for High Acid Service

Many combustion processes use fuels that contain sulfur of HCI. Special cells provide extended life in these difficult applications.

Acid-Resistant Stoichiometer Cell

Catalyst Regeneration

Measure O_2 in regenerators at pressures up to 50 psi. In situ design resists plugging due to catalyst fines Class I, Div. I, Group B, C and D. Optional pressure balancing arrangement. Optional isolation valving system permits installation and withdrawal while the process is running. Specified by UOP. See Application Data Sheet ADS 106-300F.A01.



Pressure balanced in situ O_2 probe with optional isolation valving system (probe withdrawn)

https://www.facebook.com/EmersonRosemountAnalytical

http://www.analyticexpert.com

https://twitter.com/raihome

http://www.youtube.com/user/rosemountanalytical

Scan this QR code to open the 6888 product information web page.

Analytical Headquarters
Emerson Process Management
Rosemount Analytical
Headquarters & Liquid Analytical
2400 Barranca Parkway
Irvine, CA 92606
United States
Phone: 1.800.854.8257
Fax: 1.949.474.7250

Gas Chromatograph
Center of Excellence
Emerson Process Management
Rosemount Analytical
10241 West Little York, Suite 200
Houston, Texas 77040
United States
Phone: 1.866.422.3683
Fax: 1.713.827.3865

Combustion Center of Excellence
Emerson Process Management
Rosemount Analytical
6565-P Davis Industrial Pkwy
Solon, OH 44139
United States
Phone: 1.800.433.6076
Fax: 1.440.914.1262

Latin America Center of Excellence
Emerson Process Management
Rosemount Analytical
10241 West Little York, Suite 200
Houston, Texas 77040
United States
Phone: 1.713.396.8759
Fax 1.713.827.3328

Europe Center of Excellence
Emerson Process Management AG
Blegistrasse 21
PO Box 1046
CH 6341 Baar
Switzerland
Phone: 41.41.768.6111
Fax: 41.41.761.8740

Middle East and Afirca
Center of Excellence
Emerson Process Management
Emerson Building
P.O. Box 17033
Jebe Ali Free Zone
Dubai, United Arab Emirates
Phone: +971.4.8835235
Fax: +971.2.8835312

Asia Pacific Center of Excellence
Emerson Process Management
Asia Pacific Private Ltd.
1 Pandan Crescent
Singapore 128461
Republic of Singapore
Phone: 65.6.777.8211
Fax: 65.6.777.0947

Flame and Gas Detection
Center of Excellence
Emerson Process Management
Net Safety Monitoring
2721 Hopewell Place N.E.
Calgary, AB T1Y 7J7 Canada
Phone: 1.403.219.0688
Phone: 1.866.347.3427
Fax: 1.403.219.0694
Safety.csc@emerson.com

ROSEMOUNT® Analytical

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