

Rosemount™ 5081FG

Two-Wire In Situ Oxygen Analyzer (550 to 1400 °C)



- Intrinsically safe
 - ATEX, Zone1, EEx ia IIC T4
 - Class I, Div. 1, Gr. A, B, C, D T4
- Operates at high temperatures 550 to 1400 °C (1022 to 2550 °F)
- Assists in low NO_x operation
- Calibration check ability
- Fast response - no flame arrestors
- HART®/AMS communications
- Accuracy: ±1.5% of reading

Measures closer to the flame while maintaining intrinsic safety

Traditional in situ oxygen flue gas analyzers use zirconium oxide sensors to measure excess oxygen in process flue gas. These zirconium oxide sensors use a principle of operation based on the Nernst equation. This principle requires that the sensor cell be maintained at a high operating temperature using a heater that is powered via the analyzer's electronics.

Many operators of combustion processes have applications that involve hazardous gases in the process itself or in the ambient gases in the area where the analyzer's electronics are installed. These operators are often concerned that the cell heater can serve as an ignition source to these hazardous gases inside the process or that the electronics can provide ignition to hazardous process or ambient gases that may be present. As a result of these concerns, these operators must purchase oxygen analyzers with costly protection features.

In addition, traditional in situ oxygen analyzers use metallic alloys that are also limited to temperatures in the range of 701 °C (1300 °F). This process temperature limitation prohibits the analyzer from being inserted close to the actual combustion process. Many operators prefer to measure flue gas oxygen close to the furnace or radiant section for a more representative oxygen measurement. Improved analyzer accuracy often results in significant fuel savings or improved process throughput.

The Rosemount™ 5081FG Two-Wire In Situ Oxygen Analyzer uses a zirconium oxide sensor to measure excess oxygen in combustion processes. The cost-effective design enables it to accurately measure excess oxygen in process temperatures ranging from 550 to 1400 °C (1022 to 2550 °F). In addition, the Rosemount 5081FG is designed so that both its oxygen probe and electronics are intrinsically safe without requiring costly design modifications such as flame arrestors. The oxygen probe is constructed of ceramic materials capable of withstanding high process temperatures. Also, the analyzer eliminates the use of the cell heater, using the higher process temperatures to heat the zirconium oxide sensor cell to the temperature required by the Nernst equation principle of operation.

The Rosemount 5081FG analyzer's electronics are intrinsically safe, powered by the 4-20 mA signal wires. In addition, the electronics permit configuration, operation, and diagnostics with an easy-to-use hand-held infrared remote control (IRC). Only one IRC is required to communicate with any number of Rosemount 5081FG Two-Wire In Situ Oxygen Analyzers at your location. To

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communicate with any specific Rosemount 5081FG Analyzer, aim the IRC beam directly at the electronics and enter its factory or user ID number at the prompt. This instrument can also communicate over the 4-20 mA signal wires with a HART communicator or Emerson™ AMS software.

Applications

- Process heaters - hazardous areas
- Reactor furnaces - hazardous areas
- Boiler radiant zones
 - Measures before air leaks
 - Tuning individual burners
 - NO_x reduction
- Sulfur recovery furnaces
- Hazardous waste incinerators
- Steel reheat furnaces
- Glass furnaces
- Carburizing furnaces

Rosemount 5081FG Two-Wire In Situ Oxygen Analyzer features and benefits

Features	Benefits
Both the analyzer's in situ probe and electronics are intrinsically safe.	Provides protection from hazardous process or ambient gases, preventing explosions without requiring field-mounted electrical barriers, flame arrestors, or special enclosures. Explosion-proof conduit is not required for cabling.
Operates in process gases ranging from 550 to 1400 °C (1022 to 2550 °F).	Provides accurate oxygen flue gas analysis closer to the flame in boiler applications; enables accurate flue gas analysis in high temperature process heater or furnace applications.
Provides HART/AMS communications.	Provides convenient and cost-effective operator access to key analyzer parameters; provides analyzer diagnostic capabilities from the terminations room, instrument maintenance shop, or control room.
Provides accuracy of ±1.5% of reading.	Best accuracy specification for analyzer of its type in the industry; enables tighter energy control in process which helps you reduce energy costs; improves process throughput.

Rosemount 5081FG operator interface

The Rosemount 5081FG Oxygen Two-Wire In Situ Analyzer is also an Emerson SMART instrument.

Operators can communicate with the Rosemount 5081FG analyzer using the Model 375 HART Communicator and any other host that supports HART communication protocol, such as Emerson's AMS system. Using AMS, operators may diagnose and communicate with the Rosemount 5081FG analyzer from a centrally located PC, which may also be communicating with all HART-compatible instruments within the operator's plant.

Calibration check capability

The Rosemount 5081FG can flow calibration gases to the probe for calibration check. This feature helps ensure that your Rosemount 5081FG analyzer is performing within calibration and its specifications, providing accurate oxygen flue gas measurements to help you save fuel and improve process throughput.

Specifications

General

Net O₂ range	0-25%
System accuracy	±1.5% of reading or 0.05% O ₂ , whichever is greater
System speed response in flue gas	Initial response - less than 3 seconds T ₉₀ response - less than 10 seconds

Probe

Lengths	508 mm (20 in.) 660 mm (26 in.) 965 mm (38 in.)								
Process temperature limits	550 to 1400 °C (1022 to 2550 °F)								
Ambient temperature limits	-40 to 149 °C (-40 to 300 °F)								
Materials of construction	<table> <tr> <td>Process wetted parts</td> <td>Zirconia</td> </tr> <tr> <td>Inner probe</td> <td>Alumina (1600 °C [2912 °F] limit)</td> </tr> <tr> <td>Outer protection tube</td> <td>Iconel (1000 °C [1832 °F] limit)</td> </tr> <tr> <td>Probe junction box</td> <td>Cast aluminum</td> </tr> </table>	Process wetted parts	Zirconia	Inner probe	Alumina (1600 °C [2912 °F] limit)	Outer protection tube	Iconel (1000 °C [1832 °F] limit)	Probe junction box	Cast aluminum
Process wetted parts	Zirconia								
Inner probe	Alumina (1600 °C [2912 °F] limit)								
Outer protection tube	Iconel (1000 °C [1832 °F] limit)								
Probe junction box	Cast aluminum								
Speed of installation/withdrawal	25.4 mm (1 in.) per minute								
Hazardous area certification	Intrinsically safe per EN50 014 (1977), clause 1.3 ⁽¹⁾								
Reference air requirement	100 ml per minute (2.119 scfh) of clean, dry instrument air; 1/4 in. tube fittings								
Calibration check gas fittings	1/4 in. tube fittings								
Cabling	Two twisted pairs, shielded								

Electronics

Enclosure	IP 65 (NEMA 4X) weatherproof and corrosion-resistant
Materials of construction	Low copper aluminum
Ambient temperature limits	-20 to 65 °C (-4 to 149 °F)
Relative humidity	95% with covers sealed
Power supply and load requirements	See graph below
Inputs (from O₂ probe)	Two wires - O ₂ signal

(1) Thermocouple and O₂ probe cell are both unpowered, developing a millivolt emf, and are considered a simple apparatus by certifying agencies.

	Two wires - type B thermocouple
Output	One 4-20 mA signal with superimposed digital HART signal
Hazardous area certification	ATEX EEx ia IIC T4 or T5 ⁽²⁾ NEC Class I Div. I Group B, C, D
Power transient protection	IEC 801-4
Shipping weight	4.5 kg (10 lb)

Infrared remote control

Power requirements	Three AAA batteries
Hazardous area certification	ATEX EEx ia IIC Class I, Div. I Group A, B, C, D

Figure 1: Rosemount 5081FG Probe Mounting Dimensions

Note

Dimensions are in millimeters with inches in parentheses unless otherwise noted.

Figure 2: Rosemount 5081FG Electronics Mounting Dimensions

Note

Dimensions are in millimeters with inches in parentheses unless otherwise noted.

Ordering information

Model	Description
5081FG	In-Situ Oxygen Analyzer - Hi-temp 2-wire HART smart (550 - 1600 °C) (5081FG)
Level 1: Sensing probe length	
1	20 in. probe, 1/4 in. tube fittings
2	26 in. probe, 1/4 in. tube fittings
3	38 in. probe, 1/4 in. tube fittings
Level 2: Probe outer tube material - maximum operating temperature	
1	Alumina - 1600 °C maximum - 1 1/4 NPT mounting
2	Inconel alloy - 1000 °C maximum - 1 1/4 NPT mounting
Level 3: Mounting adapter (stack side)	
0	No adapter plate required; uses 1 1/4 NPT
1	New flanged installation - square weld plate with studs
2	Westinghouse model 450 mounting
3	Competitor's mount
Level 4: Mounting adapter (probe side)	
0	No adapter plate
1	ANSI 2 in. 150 lb flange to 1 1/4 NPT adapter

(2) Dependent on ambient temperature limits.

2	DIN to 1 1/4 NPT adapter
3	JIS to 1 1/4 NPT adapter
4	Model 450 to 1 1/4 NPT adapter
5	Competitor's mounting flange
Level 5: Electronics and housing - intrinsically safe, NEMA 4X IP 66	
00	HART, no certification
H0	HART electronics
H1	HART electronics - CENELEC EEx ia IIC T4
H2	HART electronics - CSA Class I, Div. 1, Groups B, C, D
H3	HART electronics - FM Class I, Div. 1, Groups B, C, D
Level 6: Housing mounting	
00	Surface or wall mounting
01	1/2 to 2 in. pipe mounting
Level 7: Communications (HART standard)	
0	No remote control
1	Infrared remote control (LCD display through cover)
Level 8: Calibration accessories	
0	No hardware
1	Cal/ref flowmeters and ref pressure regulator
Special armored length	
00	No cable
11	20 ft (6 m)
12	40 ft (12 m)
13	60 ft (18 m)
14	80 ft (24 m)
15	100 ft (30 m)
16	150 ft (45 m)
17	200 ft (61 m)
18	300 ft (91 m)
19	400 ft (122 m)
20	500 ft (152 m)

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