

- **Environmental Certification**
 - MCERTS SIRA Certificate MC990001
- **Combustion monitoring control**
 - true wet measurement of net excess oxygen
 - in situ measurement
- **Low cost-of-ownership**
 - fully site-serviceable probe
- **Versatile**
 - four insertion lengths:
0.4 m (16 in), 1.0 m (39 in), 1.5 m (58 in)
and 2 m (78 in)
 - flame trap for gas-fired boiler applications
 - soot filter as standard
 - fast response options



Superior technology and
quality from the world leader
in oxygen measurement

Introduction

The ZFG2 Flue Gas Oxygen Probe is one of the most advanced in the world. A simplified design makes all the component parts easily accessible and field serviceable. This innovative probe construction gives the ultimate system flexibility while retaining all the features, benefits and reliability of the previous generation.

The in situ probe is inserted directly into the boiler smoke box, or flue duct, eliminating the need for high-maintenance costly sampling installations.

Operating in the process temperature range of 20 to 600 °C (68 to 1112 °F) the system gives true wet analysis of net excess oxygen in combustion gases. When the probe is fitted with the standard flame arrester and mounted in an application as shown in the installation instructions (Section 3) all parts of the probe that are wetted by the measured gas are safe against causing ignition of the gases. This applies to all Group IIB gases with ignition temperatures below 200 °C which generally includes all conventional combustion fuels. This makes the probe completely safe for continuous use even through 'startup' and 'flame out' conditions without the need for power down interlocks.

Installation and commissioning are particularly easy and the level of in-service maintenance is extremely low.

Principle of Operation

The detector cell is constructed from stabilized zirconia featuring integral platinum electrodes and is specific to oxygen. Air is supplied to the internal (reference) electrode to provide a constant partial pressure of oxygen while the measured gases are in contact with the outer electrode, producing a potential proportional to O₂ concentration.

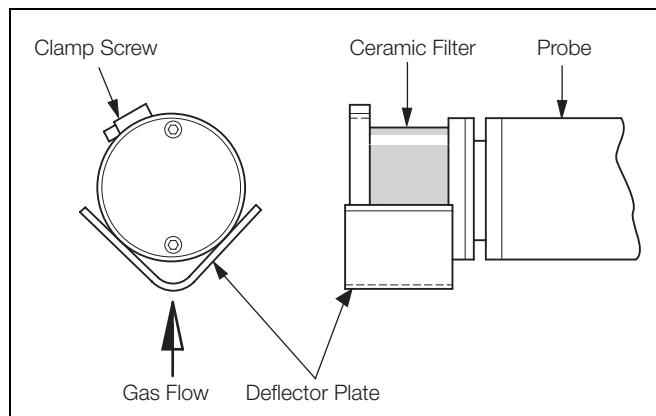
The Probe

The zirconia probes, constructed from 316 stainless steel, house a ceramic dust filter, flame trap, detector cell, cell heater and thermocouple. Wiring and reference-air tube between the electronics unit and the probe can be carried in a single flexible conduit up to 20 m (66 ft) in length. Standard options include dual conduit to separate signal/power cables and IP65 rated versions. For other non-standard options contact ABB. The standard probe insertion lengths are 0.4, 1.0, 1.5 and 2.0 m (16, 39, 58 and 78 in) and fixing to the duct or smoke box is by means of a drilled flange. Standoff fixings can be used to reduce the insertion length for smaller ducts. An alternative 2¹/₂ in screwed bush is also available for fixing the 0.4 m (16 in) probe to the duct or smoke box. A Deflector Plate can be fitted if excessive dust flows are experienced in the flue.

All components of the probe are easily removable and can be replaced on-site without the use of special tools or bonding agents. Replacement of the zirconia oxygen sensor can be made without the need for recalibration of the electronics unit.

A calibration gas inlet port is fitted to the probes to enable accuracy checks to be made without removal of the probes from their mountings.

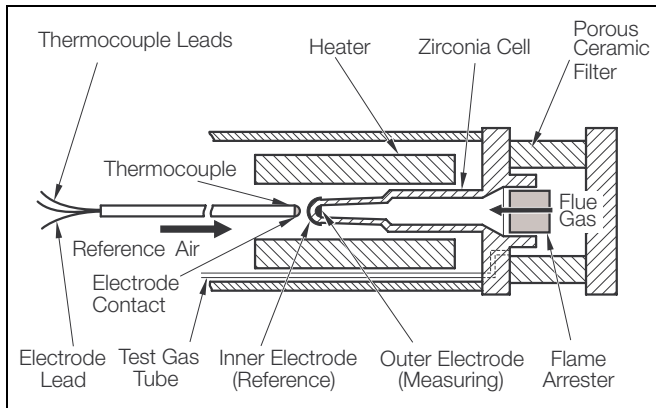
Where a faster response is necessary the probe can be supplied with a fast response cell adaptor that replaces the filter and flame arrester.



Deflector Plate fitted to ZFG2 Zirconia Oxygen Probe

Probe Construction

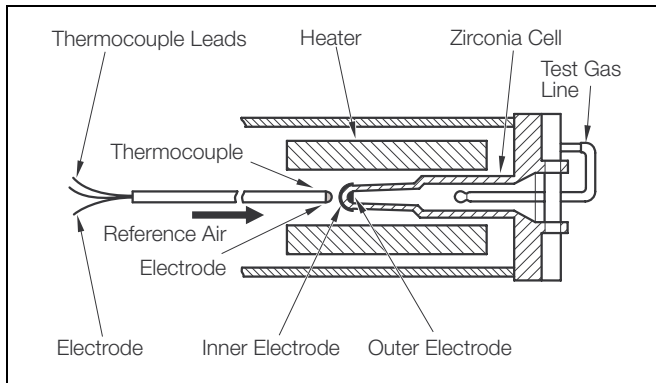
Standard Cell



Applications include:

- Industrial boilers, all fuel types
- Utility boilers, all fuel types
- Recovery boilers
- Waste incinerators

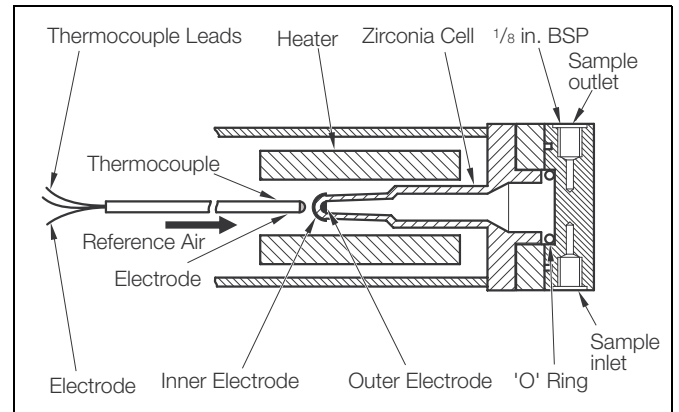
Fast Response Cell



Applications include:

- Industrial boilers, clean fuels only
- Utility boilers, clean fuels only

Flow-through Cell



Application:

The Flow-through cell adaptor enables the 0.4 m (16 in) probe to be used as an extractive (dry) O₂ analyzer system.

Note. If protection against ignition of flammable gas mixtures during flame-out conditions is required when using the fast response adapter two methods of protection can be implemented:

- Using the burner flame-out alarm, to cut off the probe power supply through a lock-out mains switch.
- Using the burner flame-out alarm to apply 'calibration test gas' as a purge to prevent flammable gases reaching the hot sensor. Test gas should be at 3 l/min and have 21 % O₂ (air) or less with nitrogen balance.

Specification

General

Calibration (in situ)

- One point using clean air
- Two point using certified test gas and air

Flue temperature

20 ... 600 °C (68 1112 °F) at 20 °C (68 °F)

Pressure

Suitable for all normal positive or negative flue pressures

Dimensions

See Overall Dimensions on Page 6

Probe fixing

Flange (or 2¹/₂ in NPT screwed fitting for ZFG2 0.4 m [16 in])

Probe insertion

0.4, 1.0, 1.5 or 2.0 m (16, 39, 58 or 78 in)

Flange options

Note. The Flange types listed are **NOT** pressure retaining.

0.4 m (16 in) ZFG2 Standard

- 6.0 ±0.4 mm thick x 101.0 ±1 mm dia.
- 6 holes 7.3 mm dia. equispaced on 80.0 ±0.2 mm PCD

1.0, 1.5 and 2.0 m (39, 58 and 78 in) ZFG2 Standard

- 12.0 ±1 mm thick x 165.0 ±2 mm dia.
- 6 holes 12.5 ±0.5 mm dia. equispaced on 140 mm PCD

Rosemount/Westinghouse Model 132 equivalent

- 6.0 ±0.4 mm thick x 127.0 ±1 mm dia.
- 4 holes 9.5 mm (0.375 in) dia. equispaced on 99.0 ±0.2 mm PCD

ANSI B 16.5 (2 in) 150 lb

- 12.0 ±1 mm thick x 185.0 ±0.5 mm dia.
- 4 holes 18 mm dia. equispaced on 145.0 ±0.2 mm PCD

DIN 2501 Part 1 DN605 PN 16, 25 and 4

- 12.0 ±1 mm thick x 153 ±0.5 mm dia.
- 4 holes 20.0 ±0.2 mm equispaced on 121.0 ±0.2 mm PCD

JIS B 2238 DN65 5K

- 12.0 ±1 mm thick x 155.0 ±0.5 mm dia.
- 4 holes 15 equispaced on 130.0 ±0.2 mm PCD

Cable length

6 m, 10 m, 15 m and 20 m (20 ft 33 ft, 49 ft or 66 ft) fitted.
For 15 m and 20 m options (49 ft and 66 ft) contact ABB.

Maximum cable length between the probe and the electronics unit
100 m (328 ft) using EXFG/0194 signal cable and EXFG/0195 power cables.

Probe weight

- 0.4 m (16 in) – 6 kg (13.2 lb) [including 6 m (20 ft) cable]
- 1.0 m (39 in) – 10.8 kg (23.7 lb) [including 6 m (20 ft) cable]
- 1.5 m (58 in) – 11.6 kg (25.5 lb) [including 6 m (20 ft) cable]
- 2.0 m (78 in) – 12.5 kg (27.5 lb) [including 6 m (20 ft) cable]

Measuring Range

Response Range

Typical response to introducing test gas
< 10 s to t₉₀ (less than 10 s to 90% of step change)
Probe response to process gas is application and probe configuration dependent

Reference gas

Clean, oil-free air. Flow rate 150 to 1000 cc/minute

Construction

316 stainless steel and ceramic

Thermocouple

NiCr/NiAl EN 60584.1 PE4 Type K

Insertion length

0.4 m, 1.0 m, 1.5 m or 2.0 m (16 in, 39 in, 58 in, 78 in)

Protection class

Meets requirements of NEMA 4X/IP65

Environmental data

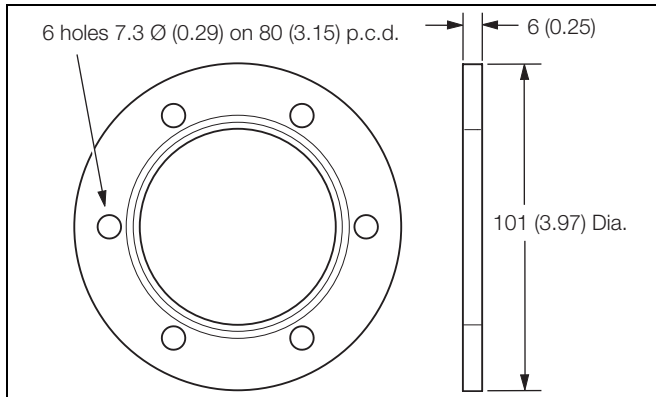
Storage
–25 °C to 55 °C (–13 to 131 °F)
Up to 95 % humidity (non condensing)

Flanges & Fittings

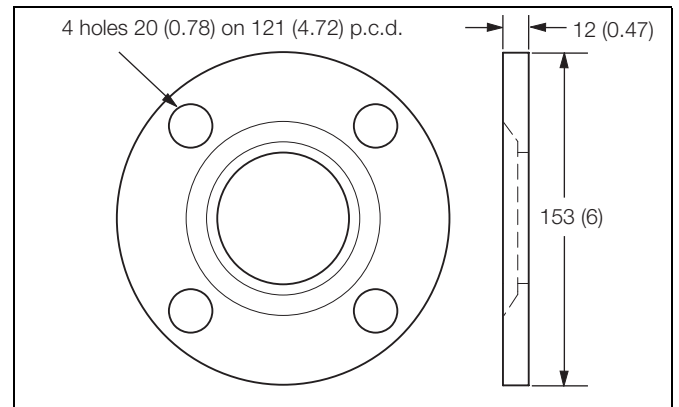
(Dimensions in mm [in])

Note. The flange types listed are **NOT** pressure retaining.

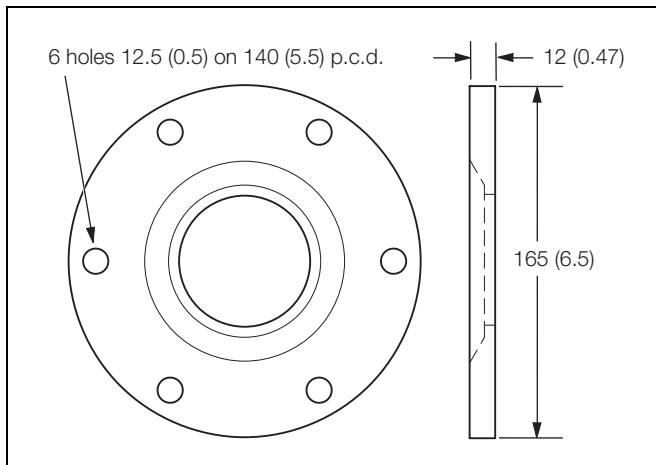
Standard Mounting Flange 0.4 m (16 in) Probe



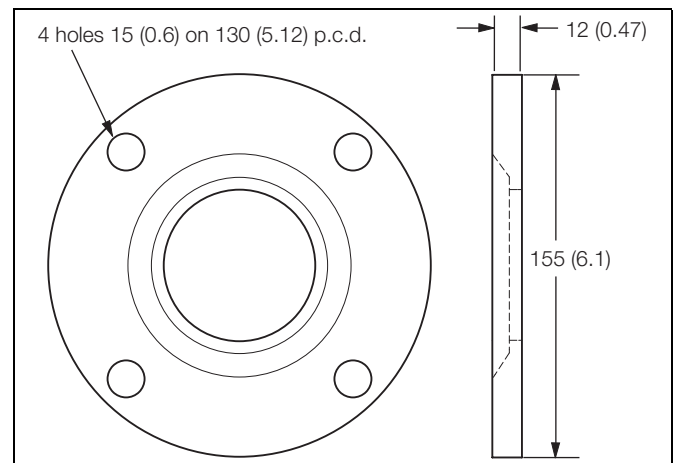
Mounting Flange – mates with ANSI B16.5 (2 in) 150 lb (All Probes)



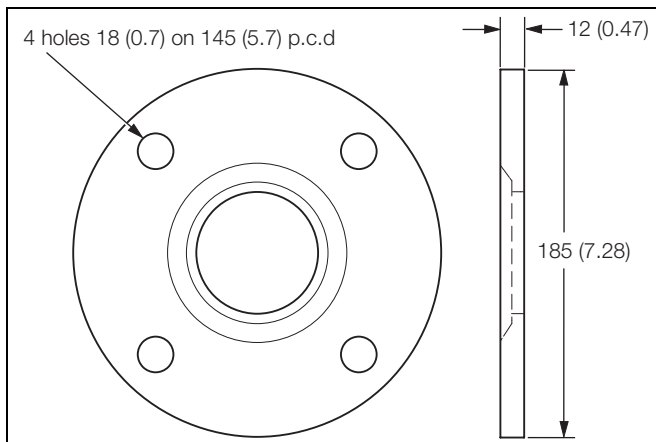
Standard Mounting Flange 1.0 m, 1.5 m & 2.0 m (39 in, 58 in & 78 in) Probes



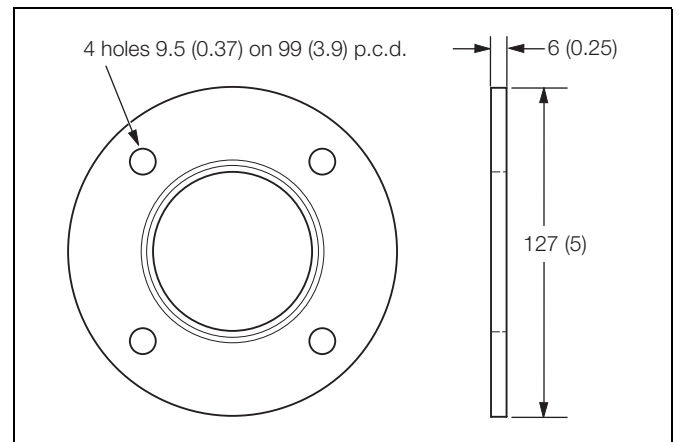
JIS Mounting Flange – mates with JIS B2238 DN65 5K (all Probes)



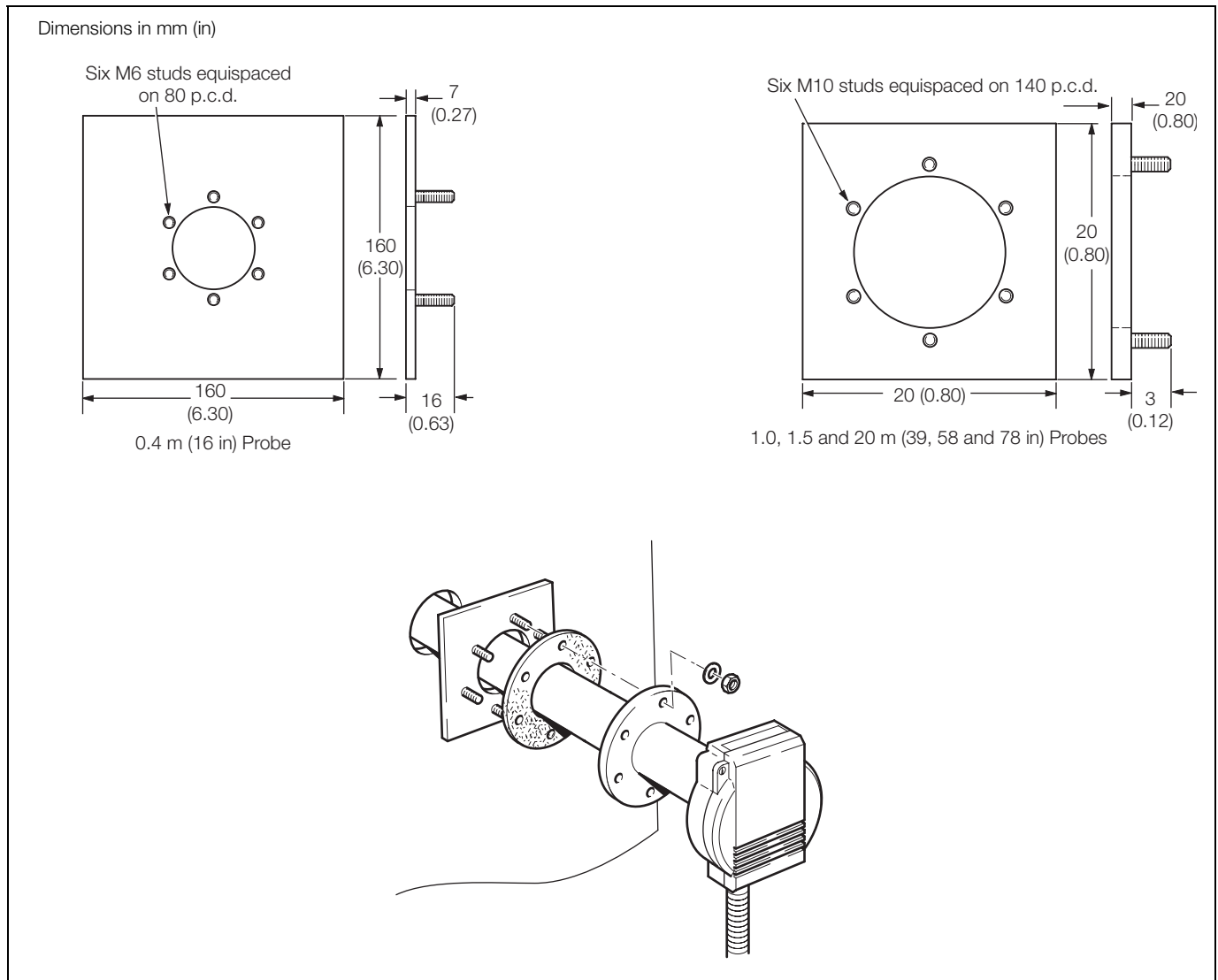
DIN Mounting Flange – mates with DIN 2501 Part 1 DN65 PN 16, 25 and 40 (all Probes)



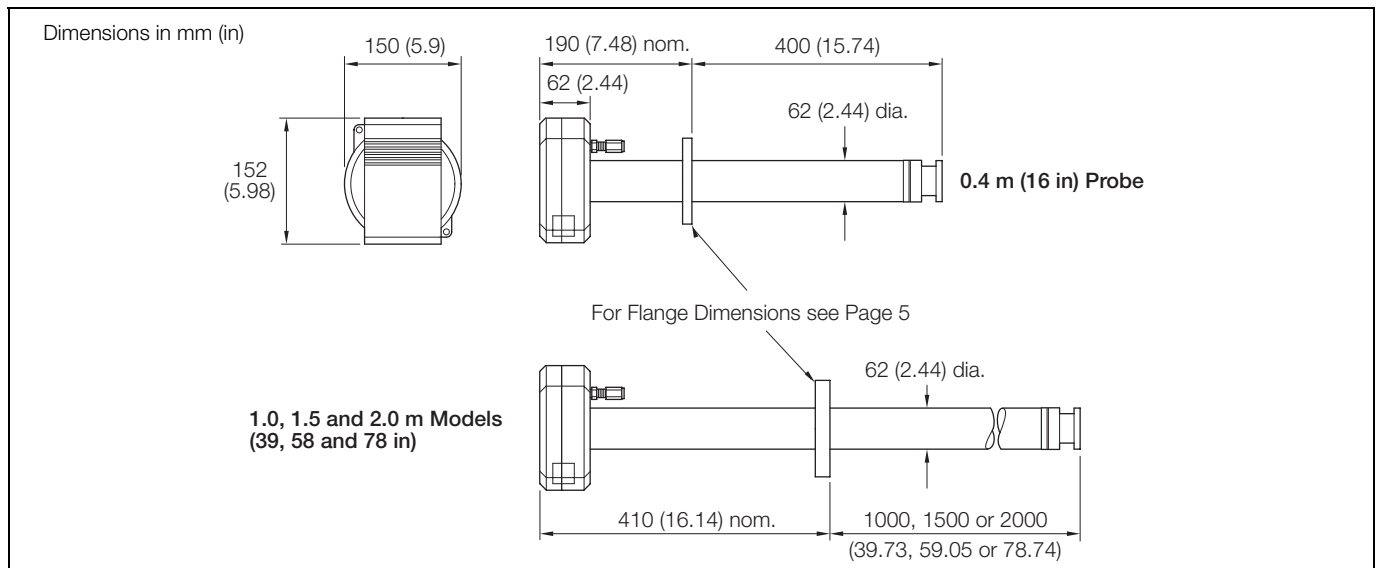
Model 132 Mounting Flange 0.4 m (16 in) Probe



Mounting Plates



Overall Dimensions



Ordering Information

ZFG2 Zirconia Oxygen Probe		ZFG2	X	X	X	X	X	X	X	X
Insertion length										
0.4m (16 in)		1								
1.0m (39 in)		2								
1.5m (58 in)		3								
2.0m (78 in)		4								
Flange Type										
Standard		1								
DIN		2								
ANSI		3								
JIS		4								
Model 132		5								
Special		9								
Conduit										
Entry Type	20 mm (0.78 in)			1						
	1/2 in NPT			2						
Quantity	None					0				
	One standard					1				
	Two standard					2				
	One IP65					3				
	Two IP65					4				
Length	None					0				
	6 m (20 ft)					1				
	10 m (32 ft)					2				
Cell										
Standard cell								1		
Flow-through cell								2		
Fast response cell								3		
Flame Arrester										
None								0		
Flame arrester*								1		
Reference Air										
Internal									1	
External									2	
Mounting Plate Assembly										
None										0
Standard (0.4 m [16 in] probes) (ABB standard flange only)										1
Standard (long probes) (ABB standard flange only)										2
2 1/2 in NPT 0.4 m (16 in) probe only										9

*Available for Standard cell only.

Ordering Example

ZFG2 Zirconia Oxygen Probe	ZFG2	2	1	1	2	1	1	1	1	2
Insertion length – 1.0 m (16 in)										
Flange type – standard										
Conduit entry type – 20 mm (0.78 in)										
Number of conduits – two										
Conduit length – 6 m (20 ft)										
Cell type – standard										
Flame arrester – fitted										
Reference air – internal tubing (within conduit)										
Mounting plate assembly – standard (long probes)										

Transmitters

For details of transmitters for use with the ZFG2 probe see data sheets SS/ZMT and SS/ZDT/FG.

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