

- **Hazardous area certification**
 - ATEX II 2G EEx d IIB T3 (T amb -20° to +50°C)
- **In situ probe for high speed measuring of excess oxygen**
 - continuous uninterrupted on-line measurement giving low installation/maintenance costs and reduced downtime
- **Fully site-serviceable probe**
 - metallurgically bonded cell giving enhanced life and reliability
- **Integral thermocouple (type R) fitted on high temperature probes**
 - providing automatic temperature compensation, eliminating expensive and problematical cooling tubes.
- **Range of system variants available**
 - for all applicational needs



Superior technology and quality from
the world leader in oxygen
measurement

Models EXFG & EXGP


The Hazardous Area Oxygen systems from ABB give the superior quality and reliability of the standard ZFG2 & ZGP2 systems with unrivalled safety enhancements to match the requirements of Zone 1 hazardous areas.

Principle of Operation

The detector cell is constructed from stabilized zirconia employing integral platinum electrodes for optimum oxygen measuring performance. 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.

EXFG Probe

(process temperatures 0 to 600°C)

The EXFG probe is certified to ATEX  II 2G EEx d IIB T3

(T_{amb} -20 to +55°C [-4 to 131°F]). It includes the same high quality sensing cell as the standard ZFG2 probe with designs founded on innovative electrode technology and the concept of full on-site serviceability. Our probes are the most reliable, flexible and cost-effective available. This full on-site serviceability in no way affects the certificate validity – maximizing your on-line availability.

Like all ABB products the range is manufactured to the highest levels of quality.

ZGP2 Probe

(process temperatures 600° to 1400°C)

The probe comprises a ceramic detector cell housed in a protective sheath. A thermocouple is fitted within the probe to enable the process temperature to be monitored and provide automatic temperature compensation. A connector head (protected to IP56) enables connection of the cell output, thermocouple and reference air connections.

The sheath material can be:

- **Aluminous porcelain**

For oxidizing atmospheres at temperatures up to 1250°C (2284°F) where limited amounts of corrosive chemicals are present

- **Recrystallized alumina**


For reducing/oxidizing atmospheres at temperatures up to 1400°C (2552°F) and where corrosive chemicals are present

- **Incoloy 800**

For reducing/oxidizing atmospheres at temperatures up to 850°C (1562°F) when mounted horizontally and up to 1000°C (1832°F) when mounted vertically

A calibration gas inlet port is provided to enable the probe to be checked using test gas mixtures without removing it from the process.

Flexible Electronics Configuration

The field-based Interface Unit is certified to ATEX  II 2G EEx d IIB T6 and is an intelligence-based electronics unit providing a 4 to 20mA output relating to 0.25% to 25% oxygen for EXFG systems and with the addition of temperature (0 to 1400°C [32° to 2552°F]) for EXGP systems.



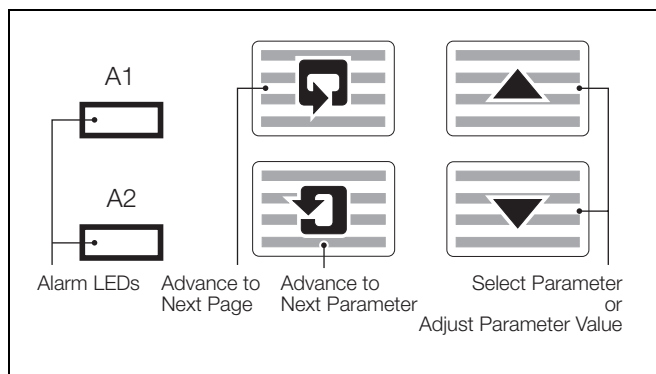
Calibration Pots (EXFG)



Display (EXFG)

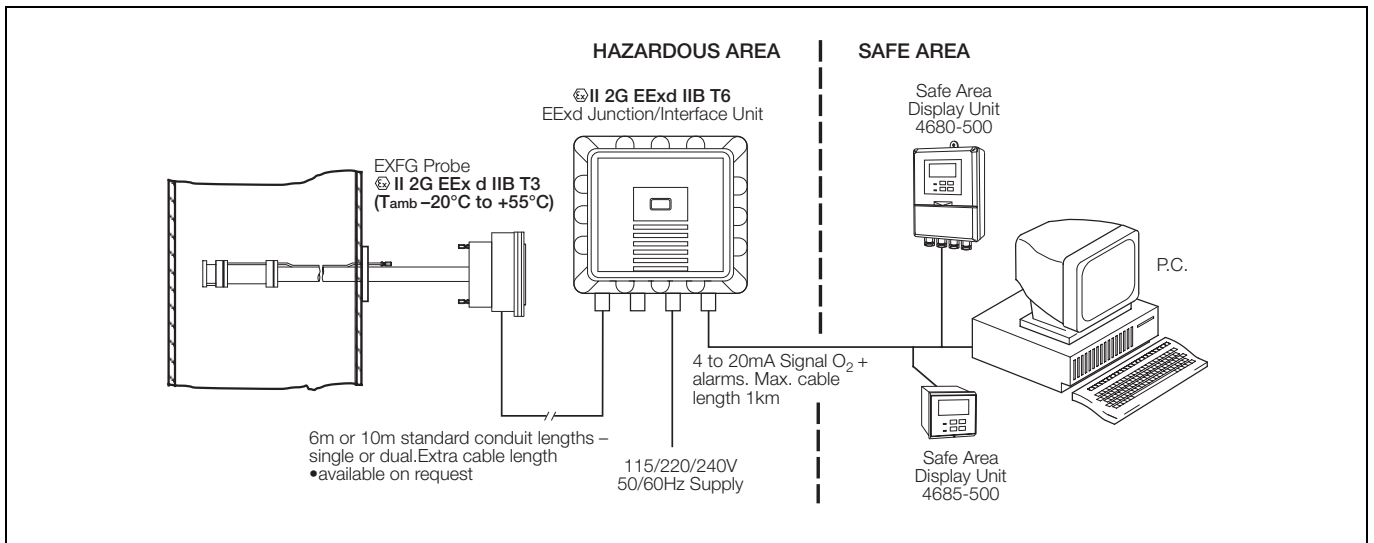
For the EXFG system, calibration is made easy by the display on the Interface/Transmitter Unit of current output. The zero and span pots located on the side of the unit enable the user to adjust the 4 to 20mA signal to give higher accuracy in calibration and provide easy indication of any possible problems. This live calibration does not require a 'Hot Works Certificate'. LED alarms are located over the display for cell temperature control, under-temperature alarm and over-temperature trip with a manual reset (T3 fail-safe).

The 4680 safe area indicator offers the flexibility of finger membrane touch pad switches with custom designed, easy-to-read backlit liquid crystal display (LCD) as a % O₂ value for EXFG or O₂ and temperature for EXGP systems. A process retransmission signal and two alarm relay outputs are provided as standard. Included, as standard, is a five language software package, to display information in English, French, German, Italian or Spanish.

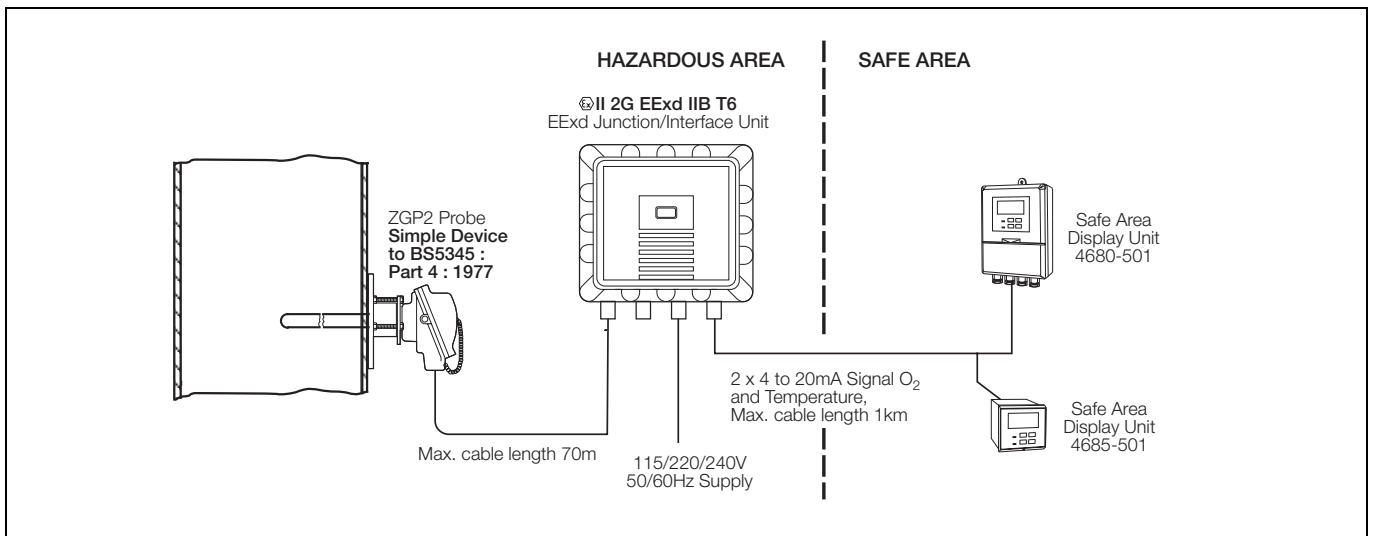


Available in wall-mounting or 1/4 DIN panel-mounting versions, the Indicator/Transmitter Unit is protected to IP66/NEMA4X, ensuring reliable operation in the most demanding situations. The same level of protection is maintained during programming and calibration.

Available Systems



Low Temperature Applications (0 to 600°C)



High Temperature Applications (600 to 1400°C)

Unique Features

EXFG Probe

- T3 (200°C [392°F]) approval for the complete probe inside and outside of stack.
- Fail-safe over temperature thermocouple
- Field-repairable probe
- Field replaceable zirconia cell
- Probe/cell withstands high sulphur concentrations
- Site serviceable over the whole life of the probe, even when sensing end is seized
- Live calibration not requiring 'Hot Works Certificate'

ZGP2 Probe

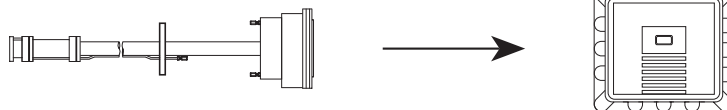
- Patented electrode protection system
- Integral thermocouple (Type R) for automatic temperature compensation
- No requirement for expensive and problematical cooling tubes
- Choice of protective sheaths – aluminous porcelain, Incoloy 800, recrystallized alumina.

Cable and Gland Specifications

Note. All cables must conform to BS5345 for flameproof 'd' type enclosures for mechanical construction only. The specifications below are the system electrical requirements.

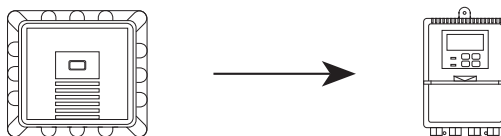
The M20 gland entries at the interface must conform to BS5501 Parts 1 and 5 (EN50014, EN50019 and EN50281) for 'd' flameproof enclosures.

EXFG Probe / Interface Unit



Gland Specification (ABB supply with conduit)	Conduit (ABB supply)
Probe – M25 single certified 'd' – M25 + M20 dual certified 'd'	Single (signal) – 6 or 10m length Dual (signal + power) – 6 or 10m length

EXFG Interface Unit / 4600 Display Unit



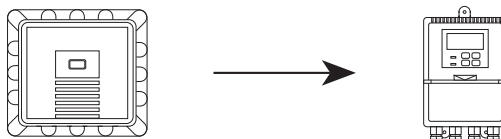
Gland Specification (non ABB supply)	Signal	Cable Specification (non ABB supply)
Interface unit – M20 certified 'd'	Retransmission (mA) output signal (oxygen) Logic Temperature alarm	16/0.2mm ² , 4-core copper, overall screened
Interface unit – M20 certified 'd'	Mains power supply	3-core, 0.5mm ² MSW copper

EXGP Probe / Interface Unit



Gland Specification (non ABB supply)	Signal	Cable Specification (non ABB supply)
Probe – M16 non-certified Interface unit – M20 certified 'd'	R type thermocouple (mV) input signal	16/0.2mm ² , 2-core, overall screened, R type thermocouple compensating cable conforming to EN60584.3
Probe – M16 non-certified Interface unit – M20 certified 'd'	Oxygen (mV) input signal	16/0.2mm ² , 2-core copper, overall screened

EXGP Interface Unit / 4600 Display Unit



Gland Specification (non ABB supply)	Signal	Cable Specification (non ABB supply)
Interface unit – M20 certified 'd'	'Retransmission (mA) output signal (oxygen) Logic Temperature alarm	16/0.2mm ² , 4-core copper, overall screened
Interface unit – M20 certified 'd'	Mains power supply 3-core,	0.5mm ² MSW copper

Specifications - Models 4680 & 4685 Transmitter/Indicator Unit

Environmental rating

NEMA4X (IP66)

Ambient temperature range

-20° to 55°C (-4° to 130°F)

Inputs

1 current input (O₂ from field-based interface unit)

1 current input (temperature) – EXGP only

Output current

Oxygen – 0 to 10mA, 0 to 20mA or 4 to 20mA programmable logarithmic or linear

O₂ indication

0.25 to 25% oxygen

Alarms

Alarm 1 O₂ set point

Alarm 2	Malfunction alarm Over temperature	EXGP >1400°C (2552°F)	EXFG 750°C (1382°F)
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	Under temperature	< 600°C (1112°F)	690°C (1274°F)
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– Power failure

– O₂ overrange (> 25.1% O₂)

– O₂ underrange (< 0.2% O₂)

– Calibration failed (EXGP only)

Electrical noise

Meets EMC requirements for RFI immunity.

Power supply

103 to 127V AC

207 to 253V AC

Power consumption

< 10VA

Communications

RS 422/485

Instrument speed of response

< 1s

Resolution sensitivity

0.1% O₂

Indicator

16-character, single line backlit LCD

Measured value

5-digit x 7-segment backlit LCD

Shipping weight

2kg (4.4lb)

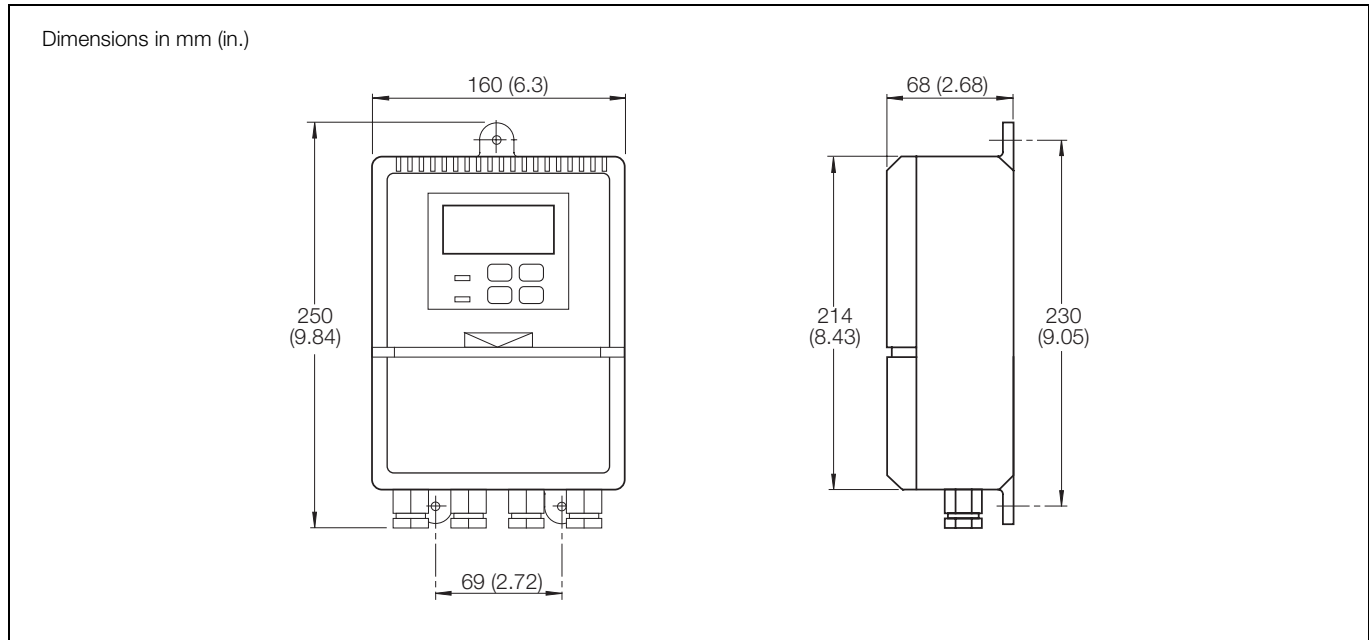
Instrument accuracy

Typically better than ± 1% reading

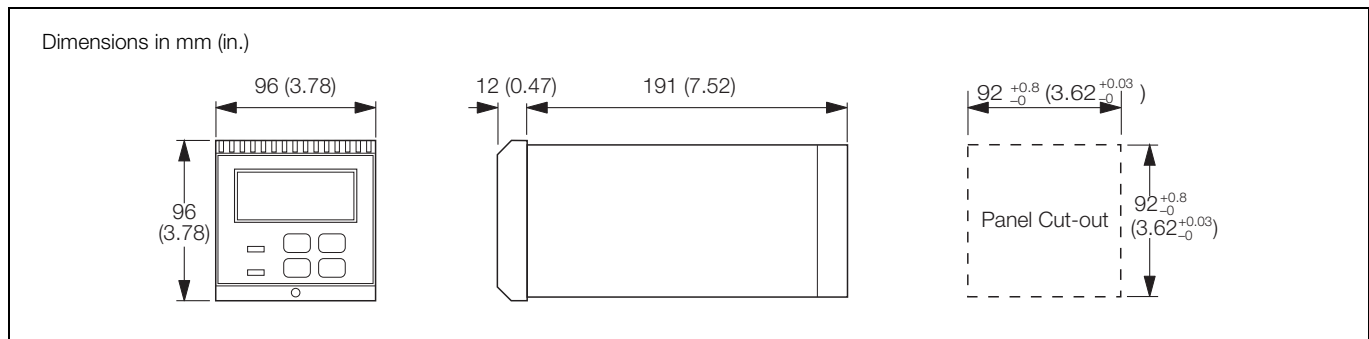
Languages Available

English, German, Italian, Spanish and French

Overall Dimensions



Model 4680 Wall-mounting Transmitter/Indicator Unit



Model 4685 Panel-mounting Transmitter/Indicator Unit

Ordering Information

4600 Transmitter/Indicator Unit (Safe Area)	46	XX	XX	X
Mounting Version				
Wall mounting		80		
Panel mounting		85		
Serial Communications				
None			50	
Model				
EXFG Low temperature				0
EXGP High temperature				1

Specification – Field-based ATEX II 2G EExd Transmitter/Interface Unit

Housing classification

EExd IIB T6 Tamb 50°C

Ambient temperature range

-20° to 50°C (-4° to 122°F)

External

Enclosure environmental rating

NEMA 4X (IP66)

Power supply

100/115/230V ±10% AC at 50/60Hz

Power Requirements

EXGP – 30W max. EXFG – 250W max.

EXGP – Inputs

Probe oxygen signal mV (0.25 to 25% O₂)

Probe thermocouple mV (Type R only, 0° to 1400°C)

EXGP – Analog outputs

2 isolated

4 to 20mA corresponding to 0° to 1400°C (non-linearized)

4 to 20mA corresponding to -20 to 180mV (O₂ mV)

EXFG – Inputs

Control THC mV signal (K)

Trip THC mV signal (K)

Probe oxygen signal mV (0.25 to 25% O₂)

EXFG – Analog outputs

1 isolated – 4 to 20mA corresponding to (0.25 to 25% O₂)

Electrical entries

4 x 20mm conduit entries

1 x 25mm conduit entry

System speed of response (amplifier)

Less than 1 second

EXFG – Cell temperature control

700°C ±3° K type THC front panel LED indication

EXFG – Over temperature trip

Safety feature to guarantee 'T' rating (failsafe)

750°C preset (K type THC) locks out oven supply if oven overheats.

Manually reset LED indication on front panel

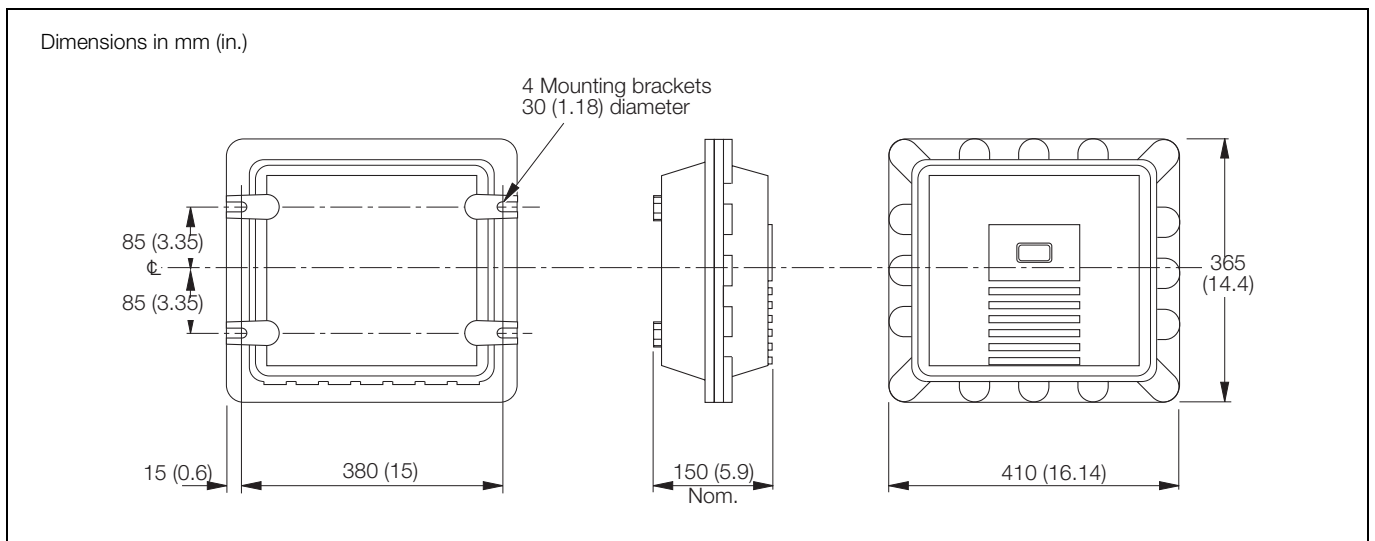
EXFG – Calibration

Span and zero pots for on-site gas calibration of probe/junction box

Shipping weight approx.

20kg (44lb)

Overall Dimensions



Field-based ATEX II 2G EExd Transmitter/Interface Unit

Ordering Information

Electronics Unit	EX	XX	/	0	0	0	X	X	X
Version									
Low Temperature		FG							
High Temperature		GP							
Interface Electronics									
None							0		
For EXFG Probe							1		
For EXGP Probe							2		
Mains Supply									
None								0	
230V 50/60Hz								1	
115 50/60Hz								2	
Alarms									
None									0
Non 4600*									1
4600 (Logic)*									2

* EXFG Probe only

Specification – EXFG Oxygen Probe

Housing Classification

ATEX II 2G EEx d II B T3
(T amb -20°C to +55°C [-4° to 131°F])

Temperature limits for probe in process

20° to 600°C (68° to 1112°F).

Cell speed of response

1ms.

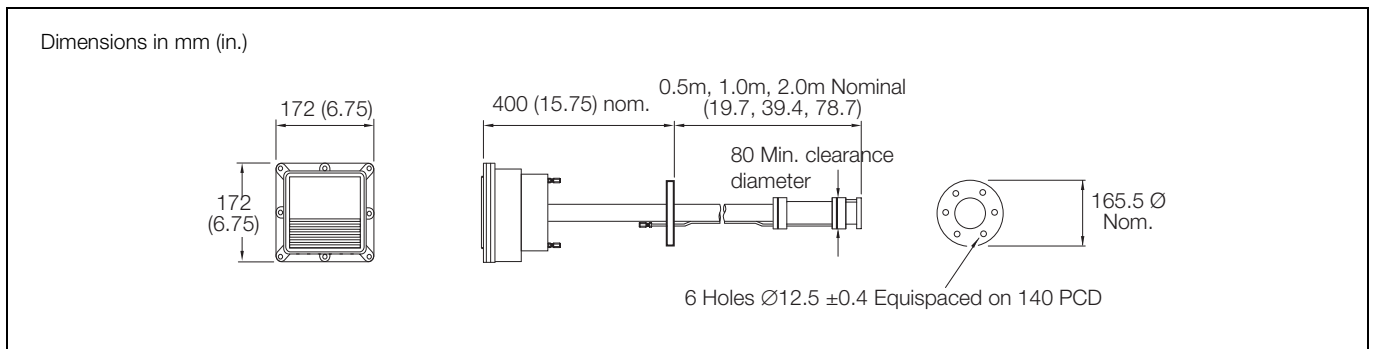
Probe reference air to be supplied

Clean dry instrument quality air 30 to 100mBar (12" to 40" W.G.)
pressure [100mBar (40" W.G.) maximum]

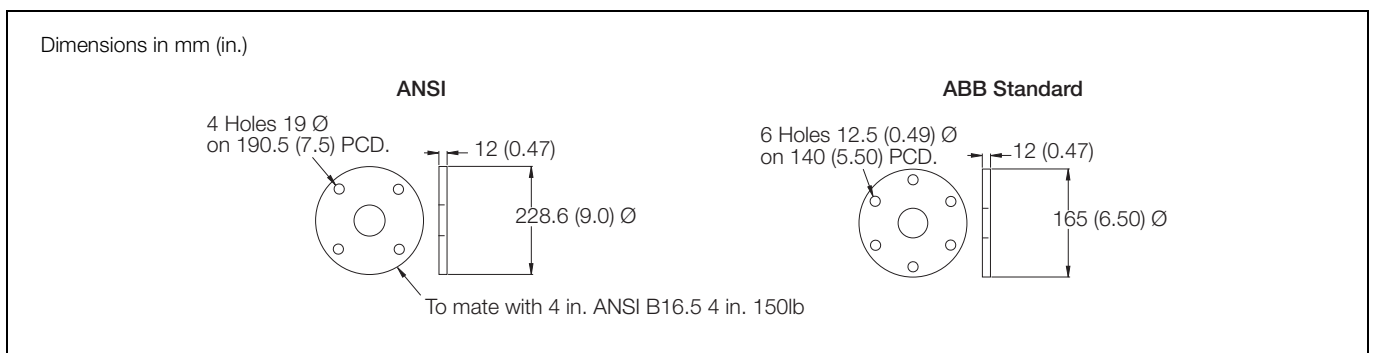
Calibration

One point using clean air (cell zero)
Two point using certified test gas (span).

Overall Dimensions



EXFG Oxygen Probe



Flanges for EXFG Oxygen Probe

Ordering Information

EXFG Probe	EXFG/	X	X	X	0	0	0
Probe Insertion Length							
None		0					
0.5m (19.5 in.). Standard flange		1					
1/0m (39 in.). Standard flange		2					
2.0m (78 in.). Standard flange		3					
0.5m (19.5 in.). ANSI flange		4					
1/0m (39 in.). ANSI flange		5					
2.0m (78 in.). ANSI flange		6					
Conduit Entry							
None			0				
1 x 6m (19.5 ft) Conduit			1				
1 x 10m (32.5 ft) Conduit			2				
2 x 6m (19.5 ft) Conduit			3				
2 x 10m (32.5 ft) Conduit			4				
Mounting PLate Assembly							
No mounting plate assembly				0			
With mounting plate assembly - ABB standard				1			
With mounting plate assembly - ANSI flange				2			

Specification – ZGP2 Probe – Simple Device

Temperature range

600° to 1250°C (1112° to 2282°F) or 1400°C with reduced life

Oxygen range

0.25 to 25% O₂ for EExd Interface

Response rate – typical values

Cell speed of response < 1ms

< 42s to 63% of final value, < 47s to 90% of final value

Reference air supply

Clean oil-free air. Flow rate 500 to 1000ml/minute

(1 to 2ft³/hr)

Construction

Solid electrolyte – stabilized zirconia oxide.

Protective sheath – aluminous porcelain or Incoloy 800

Recrystallized alumina

Head

Twin entry (2 x 16mm entries)

Mounting

Vertical or horizontal 42mm (1.65in) minimum hole diameter

Connecting cable

Not supplied

2-core copper, overall screened for probe output.

2-core compensating cable – EN600584.3

Thermocouple

Pt/Pt 13% Rh – EN 60584.1 Pt2 type R

[600° to 1250°C (1112° to 2282°F)]

Insertion length

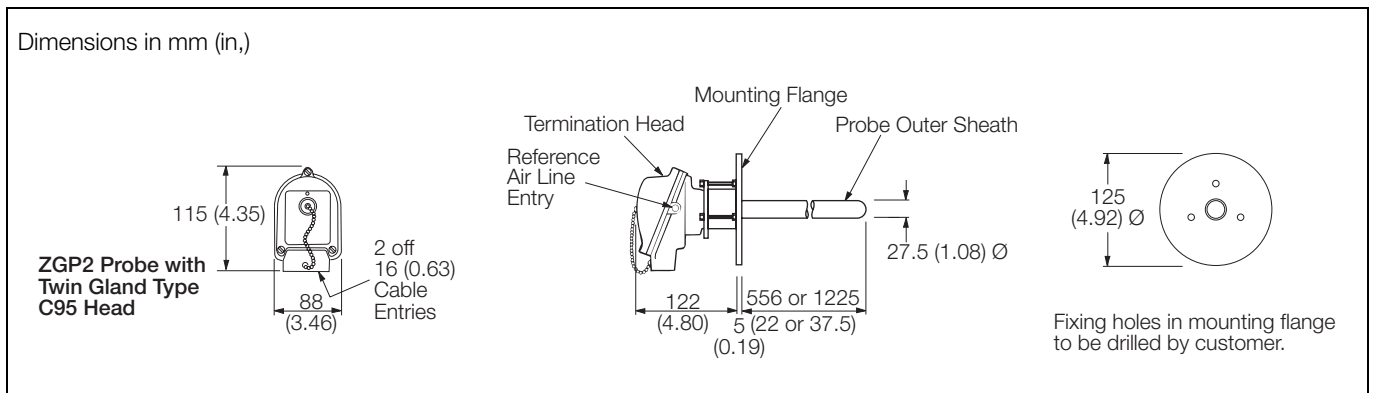
556mm to 1225mm (22 in or 48 in)

Shipping weight

5.5kg (600mm probe) [12lb (22in probe)]

6.0kg (1000mm probe) [13.2lb (37.5in probe)]

Overall Dimensions



ZGP2 Probe – Simple Device

Ordering Information

ZGP2 Series High Temperature Zirconia Oxygen Probe	ZGP2/	X	X	X	X	X
Nominal Insertion Length mm (in.)						
600 (23.6)		1				
1000 (39.4)		2				
700 (27.6)		3				
800 (31.5)		4				
900 (35.4)		5				
1250 (42.2)		6				
Special		9				
Thermocouple						
Pt/Pt 13% Rh EN 60584.1 Pt2 Type R			1			
Sheath						
Aluminous porcelain (Standard)					1	
Incoloy 800					2	
Recrystallised alumina					3	
Special					9	
Mounting						
Standard						1
1 in. NPT						2
Special						9
Termination Head						
Twin-gland Type C95						1

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ABB Limited
Oldends Lane, Stonehouse
Gloucestershire
GL10 3TA
UK
Tel: +44 (0)1453 826661
Fax: +44 (0)1453 829671

ABB Inc.
Analytical Instruments
9716 S. Virginia St., Ste. E
Reno, Nevada 89521
USA
Tel: +1 775 850 4800
Fax: +1 775 850 4808