Superior technology and quality from the world leader in oxygen measurement

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
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

**HAZARDOUS AREA**

**EXFG Probe**
- 6m or 10m standard conduit lengths – single or dual.
- Extra cable length available on request.

**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.

**SAFE AREA**

**P.C.**

### Low Temperature Applications (0 to 600°C)

**HAZARDOUS AREA**

**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**
- 2 x 4 to 20mA Signal \(O_2\) and Temperature, Max. cable length 1km

**SAFE AREA**

**Safe Area Display Unit 4685-500**

### High Temperature Applications (600 to 1400°C)

**HAZARDOUS AREA**

**EXFG Probe**
- 115/220/240V 50/60Hz Supply

**ZGP2 Probe**
- 2 x 4 to 20mA Signal \(O_2\) and Temperature, Max. cable length 1km

**SAFE AREA**

**Safe Area Display Unit 4685-501**
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**

<table>
<thead>
<tr>
<th>Gland Specification (ABB supply with conduit)</th>
<th>Conduit (ABB supply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probe – M25 single certified ‘d’</td>
<td>Single (signal) – 6 or 10m length</td>
</tr>
<tr>
<td>– M25 + M20 dual certified ‘d’</td>
<td>Dual (signal + power) – 6 or 10m length</td>
</tr>
</tbody>
</table>

**EXFG Interface Unit / 4600 Display Unit**

<table>
<thead>
<tr>
<th>Gland Specification (non ABB supply)</th>
<th>Signal</th>
<th>Cable Specification (non ABB supply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface unit – M20 certified ‘d’</td>
<td>Retransmission (mA) output signal (oxygen) Logic Temperature alarm</td>
<td>16/0.2mm², 4-core copper, overall screened</td>
</tr>
<tr>
<td>Interface unit – M20 certified ‘d’</td>
<td>Mains power supply</td>
<td>3-core, 0.5mm² MSW copper</td>
</tr>
</tbody>
</table>

**EXGP Probe / Interface Unit**

<table>
<thead>
<tr>
<th>Gland Specification (non ABB supply)</th>
<th>Signal</th>
<th>Cable Specification (non ABB supply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probe – M16 non-certified</td>
<td>R type thermocouple (mV) input signal</td>
<td>16/0.2mm², 2-core, overall screened, R type thermocouple compensating cable conforming to EN60584.3</td>
</tr>
<tr>
<td>Interface unit – M20 certified ‘d’</td>
<td>Oxygen (mV) input signal</td>
<td>16/0.2mm², 2-core copper, overall screened</td>
</tr>
</tbody>
</table>

**EXGP Interface Unit / 4600 Display Unit**

<table>
<thead>
<tr>
<th>Gland Specification (non ABB supply)</th>
<th>Signal</th>
<th>Cable Specification (non ABB supply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface unit – M20 certified ‘d’</td>
<td>Retransmission (mA) output signal (oxygen) Logic Temperature alarm</td>
<td>16/0.2mm², 4-core copper, overall screened</td>
</tr>
<tr>
<td>Interface unit – M20 certified ‘d’</td>
<td>Mains power supply</td>
<td>3-core, 0.5mm² MSW copper</td>
</tr>
</tbody>
</table>
## Specifications - Models 4680 & 4685 Transmitter/Indicator Unit

### Environmental rating

**NEMA4X (IP66)**

### Ambient temperature range

\(-20^\circ\text{C} \text{ to } 55^\circ\text{C} (\text{-}4^\circ\text{F} \text{ to } 130^\circ\text{F})\)

### 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

<table>
<thead>
<tr>
<th>Alarm 1</th>
<th>O2 set point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm 2</td>
<td>Malfunction alarm</td>
</tr>
<tr>
<td>Over temperature</td>
<td><strong>EXGP</strong></td>
</tr>
<tr>
<td>&gt;1400°C (2552°F)</td>
<td>750°C (1382°F)</td>
</tr>
<tr>
<td>Under temperature</td>
<td>&lt; 600°C (1112°F)</td>
</tr>
</tbody>
</table>

- 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
- French
Overall Dimensions

Dimensions in mm (in.)

Model 4680 Wall-mounting Transmitter/Indicator Unit

Model 4685 Panel-mounting Transmitter/Indicator Unit

Ordering Information

<table>
<thead>
<tr>
<th>4600 Transmitter/Indicator Unit (Safe Area)</th>
<th>46</th>
<th>XX</th>
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<tr>
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<td>Panel mounting</td>
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<tr>
<td>EXFG Low temperature</td>
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<tr>
<td>EXGP High temperature</td>
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</tbody>
</table>
Specifications – Field-based ATEX II 2G EEExd Transmitter/Interface Unit

**Housing classification**
EEExd IIB T6 Tamb 50°C

**Ambient temperature range**
–20° to 50°C (–4° to 122°F)

**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**

Dimensions in mm (in.)

![Field-based ATEX II 2G EEExd Transmitter/Interface Unit](image_url)
## Ordering Information

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<td><strong>Alarms</strong></td>
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<td>4600 (Logic)*</td>
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</tbody>
</table>

* EXFG Probe only
Specification – EXFG Oxygen Probe

Housing Classification
ATEX II 2G Ex 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

Probe conduit options
Conduit length 10m or 6m (32 or 20ft) as fitted.
Single conduit (power/signal)
Twin conduit (separate power and signal conduits)

Probe insertion length
0.5m, 1.0m and 2.0m (19.7in, 39.4in and 78.7in).

Shipping weight
0.5m – 13.7kg (30lb)
1.0m – 20.7kg (45lb)
2.0m – 26.8kg (59lb)

Probe head
NEMA4X (IP66)

Flanges for EXFG Oxygen Probe
## Ordering Information

<table>
<thead>
<tr>
<th>EXFG Probe</th>
<th>EXFG/XX</th>
<th>Probe Insertion Length</th>
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<tbody>
<tr>
<td></td>
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<td>0.5m (19.5 in.). Standard flange</td>
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<tr>
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<td></td>
<td>1.0m (39 in.). Standard flange</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.0m (78 in.). Standard flange</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5m (19.5 in.). ANSI flange</td>
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<tr>
<td></td>
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<td>1.0m (39 in.). ANSI flange</td>
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<tr>
<td></td>
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<td>2.0m (78 in.). ANSI flange</td>
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</table>

<table>
<thead>
<tr>
<th>Conduit Entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
</tr>
<tr>
<td>1 x 6m (19.5 ft) Conduit</td>
</tr>
<tr>
<td>1 x 10m (32.5 ft) Conduit</td>
</tr>
<tr>
<td>2 x 6m (19.5 ft) Conduit</td>
</tr>
<tr>
<td>2 x 10m (32.5 ft) Conduit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mounting PLate Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>No mounting plate assembly</td>
</tr>
<tr>
<td>With mounting plate assembly - ABB standard</td>
</tr>
<tr>
<td>With mounting plate assembly - ANSI flange</td>
</tr>
</tbody>
</table>
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

Dimensions in mm (in.)

ZGP2 Probe with Twin Gland Type C95 Head

Termination Head
Reference Air Line Entry

Mounting Flange

Probe Outer Sheath

27.5 (1.08) Ø

115 (4.35)

88 (3.46)

2 off 16 (0.63) Cable Entries

122 (4.80) 5 (22 or 37.5) (0.19)

556 or 1225

125 (4.92) Ø

Fixing holes in mounting flange to be drilled by customer.

ZGP2 Probe – Simple Device
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