Endura AZ25 oxygen analyzer
Combustion gas analysis
Measurement made easy
Superior technology and quality from the world leader in oxygen measurement

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**Dependable**
- Measurement of $O_2$ in a wide variety of processes
- Virtually instantaneous response
- Resistance to sulphurous reducing atmospheres

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**Versatile**
- 600 to 1,250 mm (2 to 4 ft) lengths
- Choice of protective sheath materials
- Integral thermocouple for automatic temperature compensation
- High temperature operation up to 1,400 °C (2,552 °F)

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**Low cost-of-ownership**
- In situ measurement
- No sampling system required
- Automatic calibration functionality as standard
- Optional automatic calibration hardware
**Introduction**

The Endura AZ25 combustion oxygen analyzer is the latest in a long line of high-quality, combustion gas analyzers from ABB. The AZ25 is designed to measure oxygen concentration in high temperature furnace atmospheres.

The sensor, based on a zirconium oxide cell, is mounted at the tip of the probe that is inserted directly into the furnace. The resulting direct, in-situ measurement provides an accurate and rapid oxygen reading, for combustion control / optimization and process quality control purposes.

The in-situ technique provides a true oxygen measurement inside the process. It eliminates ‘equilibrium shift’ that is common to systems in which gas samples are extracted and cooled before measurement.

Reference air (500 to 1,000 mL/min [1 to 2 ft³/h]) is required for accurate operation and can be supplied from an ABB mains-powered pump unit or a flow regulator unit.

**Applications**

- Furnace atmosphere monitoring
- Annealing furnace
- Sintering of metals
- Ferrite sintering
- Whiteheart malleablizing
- Combustion measurement and control in:
  - Soaking pits
  - Process heaters
  - Fluidized bed boilers
  - High temperature incinerators
- All other combustion processes where the flue gas temperature is in excess of 600 °C (1,112 °F)

**Probe lengths up to 1250 mm (49 in)**

A wide range of probe insertion lengths allows for optimum sensor positioning within the furnace or flue duct to ensure accurate and representative oxygen measurement.

A comprehensive range of mounting flanges, provide simple installation when plant-wide standard flanges are required or when replacing existing probes.

The remote transmitter can be mounted up to 100 m (328 ft.) from the probe. Probe locations are often high temperature, hostile and inaccessible areas, the flexibility of long cable lengths permits appropriate siting of the remote transmitter.

**Sheath material options**

To ensure material compatibility with the process conditions there is a choice of three sheath materials:

- **Aluminous porcelain**
  - Entry level sheath material suitable for applications with temperatures up to 1250 °C (2,282 °F).
  - Limited resistance to corrosive chemicals and mechanical and thermal stress.

- **Recrystallized alumina**
  - Suitable for applications with temperatures up to 1400 °C (2,552 °F).
  - Resistant to corrosive chemicals and severe mechanical and thermal stress.

- **Incoloy 800**
  - Suitable for applications with temperatures up to 850 °C (1,562 °F) when mounted horizontally and up to 1000 °C (1,832 °F) when mounted vertically.
  - Limited resistance to corrosive chemicals but resistant to mechanical and thermal stress.
Unique integrated automatic calibration

The Endura AZ25 automatic calibration system eliminates the need for the expensive ancillary equipment required for automatic calibration on traditional flue gas oxygen analyzer systems.

ABB’s fully integrated, automatic calibration feature controls the test gas sequence and detects test gas availability, eliminating incorrect calibrations due to loss of test gas. Integrated automatic calibration secures the oxygen measurement, providing complete confidence in the analyzer’s performance.

Long-term operation without technician intervention minimizes operating costs, total cost-of-ownership and optimizes system accuracy. A significant proportion of service visits to an analyzer result in ‘no fault found’. Endura AZ25’s high-quality manufacture, advanced diagnostics and automatic calibration is targeted at reducing this wasted effort and cost.
**Advanced transmitter**

The Endura AZ25 transmitter incorporates the most up-to-date design and technology available today. ABB's universal human/machine interface (HMI) with its large, clear, backlit graphical display, 'through-the-glass' control and intuitive menu structure simplifies transmitter configuration and operation.

The user-friendly interface enables fast, easy data entry for all parameters and the 'Easy Setup' menu speeds and simplifies system commissioning.

Advanced diagnostics, in accordance with NAMUR NE107, classify alarms and warnings as 'Maintenance Required', 'Check Function', 'Failure' and 'Out-of-Specification'. Cell performance is monitored by the transmitter; indicators such as cell impedance, rate-of-response to test gasses and changes in calibration offset/factor are recorded and analyzed. The current cell ‘quality’ is displayed by the transmitter as a visual indication of the measurement confidence; providing the operator all the information required to keep the monitor operating at peak performance.

The performance log holds up to 100 time-stamped events. When the log is full, the oldest data is overwritten by new entries. The log contains details of measurements and coefficients for all calibrations and accuracy checks.

2 relay outputs and a traditional analog output are fitted as standard, with the option of adding a second analog output or 2 digital inputs/outputs (I/O).

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**Probe connections**
- Cell
- Thermocouple
- ACJC

**AutoCal control**
- 2 solenoid valve outputs
- 2 test gas detection input

**HART communications**

**Analog output**
- Galvanically isolated
- Programmable over 4 to 20 mA

**Relay outputs**
- 2 x Relays
- Normally closed contacts
- 5 A @ 230 V AC, 30 V DC

**Digital I/O**
- 2 User-configurable as input or output
- Input: volt-free contacts
- Output: 30 V DC @ 220 mA

The Endura AZ25 transmitter is equipped with HART communication as standard, supported by a full Device Type Manager (DTM) to enable remote access to the analyzer through a user-friendly graphical interface. The DTM provides full access to the transmitter setup, logged data and diagnostics information as well as live data.

The IrDA standard infrared communication port can also be used with the DTM to upload and download device configurations. In addition, it enables data logged values and diagnostics to be viewed on a hyper-terminal interface or a PC. The device’s firmware can also be upgraded using this port.

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System location requirements

Endura AZ25 system without AutoCal

**IP66 (NEMA 4)**

- Endura AZ25 remote transmitter
- Endura AZ25 probe

Multipoint connection

- Mains supply
- Relays
- Output signals
- 6-core screened sensor cable (coded option) – maximum length 100 m (328 ft.)

*Maximum temperature is sheath-dependant – see 'Sheath material options' on page 3.*

Endura AZ25 system with AutoCal

**IP66 (NEMA 4)**

- Endura AZ25 remote transmitter
- Endura AZ25 AutoCal unit
- Endura AZ25 probe

Multipoint connection

- Mains supply
- Relays
- Output signals
- ABB 14-core screened cable (coded option)
- 6-core screened sensor cable (coded option)

Maximum cable length (combined 6-core and 14-core runs) length 100 m (328 ft)

*Maximum temperature is sheath-dependant – see 'Sheath material options' on page 3.*
System options
Endura AZ25 system without AutoCal

Reference air inlet connection
Reference air supplied to probe using:
ABB reference air pump*

OR

ABB 5 µm / oil coalescing filter regulator**

Air in

Test gas connection (6 mm stub)
– see pages 9, 10 and 11 for pneumatic requirements

Metal M16 gland or
½ in NPT adaptor

Endura AZ25 probe

Flue

Endura AZ25 remote transmitter

Mains supply Relays

Output signals

Endura AZ25 6-core screened sensor cable*
(coded option) – maximum length 100 m (328 ft.)

*Refer to page 25 for ABB part numbers
**Clean dry instrument air free from hydrocarbons
...System options
Endura AZ25 system with AutoCal

Reference air inlet connection: reference air supplied to probe using:
- ABB reference air pump*
- OR
  - ABB 5 µm / oil coalescing filter regulator* / **

Test gas connection (6 mm stub)
- see pages 9, 10 and 11 for pneumatic requirements

Metals M16 gland or ½ in. NPT adaptor

Test gas(es) out (from AutoCal VENT connection)
to test gas inlet at probe

6-core screened sensor cable – probe to AutoCal unit (length coded option)

Test gas 2 in
Test gas 1 in

Maximum combined cable length 100 m (328 ft)

*Refer to page 23 for ABB part numbers
**Clean dry instrument air free from hydrocarbons
Test gas and reference air supply configurations –
AutoCal systems with restrictors

System using air as test gas 1 and bottled gas as (optional) test gas 2

Endura AZ25 AutoCal unit
Test gas supply: restrictor in probe limits flow to 1 L/min (2.118 scfh) at 1 bar (15 psi)

Endura AZ25 probe

Reference air supply: restrictor in probe limits flow to 0.3 to 0.5 L/min (0.64 to 1.06 scfh) at 1 bar (15 psi)

Non-return valve

Clean dry oil-free instrument air
INPUT: 10 bar (145 psi) max.
OUTPUT: 1 bar (15 psi) max.

5 µm / oil-coalescing filter-regulator

Test gas 1
1 bar (15 psi)

Test gas 2 (optional) from bottled gas – adjusted to 1 bar (15 psi) output

System using 2 bottled test gases

Endura AZ25 AutoCal unit
Test gas supply: restrictor in probe limits flow to 1 L/min (2.118 scfh) at 1 bar (15 psi)

Endura AZ25 probe

Reference air supply: restrictor in probe limits flow to 0.3 to 0.5 L/min (0.64 to 1.06 scfh) at 1 bar (15 psi)

Non-return valve

Clean dry oil-free instrument air
INPUT: 10 bar (145 psi) max.
OUTPUT: 1 bar (15 psi) max.

5 µm / oil-coalescing filter-regulator

Test gas 1 from bottled gas – adjusted to 1 bar (15 psi) output

Test gas 2 (optional) from bottled gas – adjusted to 1 bar (15 psi) output

Reference air pump

OR
...Test gas and reference air supply configurations –
AutoCal systems without restrictors

System using air as test gas 1 and bottled gas as (optional) test gas 2

Endura AZ25
AutoCal unit

Test gas supply:
1 L/min (2.118 scfh)

Non-return valve

Test gas 1

ABB flowmeter adjusted to 1 L/min (2.118 scfh)

Clean dry oil-free instrument air
INPUT: 10 bar (145 psi) max.
OUTPUT: 1 bar (15 psi) max.

TG2

TG1

Test gas 2 (optional) / bottled gas adjusted to 1 bar (15 psi) output

Endura AZ25 probe

Reference air supply:
0.3 to 0.5 L/min
(0.64 to 1.06 scfh)

ABB flowmeter adjusted to 0.3 to 0.5 L/min
(0.64 to 1.06 scfh) STP

System using 2 bottled test gases

Endura AZ25
AutoCal unit

Test gas supply:
1 L/min (2.118 scfh)

Non-return valve

Test gas 1 / bottled gas adjusted to 1 bar (15 psi) output

ABB flowmeter adjusted to 1 L/min (2.118 scfh)

5 µm / oil-coalescing filter-regulator

Clean dry oil-free instrument air
INPUT: 10 bar (145 psi) max.
OUTPUT: 1 bar (15 psi) max.

Reference air pump

OR

ABB flowmeter adjusted to 0.3 to 0.5 L/min
(0.64 to 1.06 scfh) STP

Endura AZ25 probe

Test gas 2 (optional) / bottled gas adjusted to 1 bar (15 psi) output

ABB flowmeter adjusted to 1 L/min (2.118 scfh)
Test gas and reference air supply configurations – non-AutoCal systems without restrictors

System using air as test gas 1 and bottled gas as (optional) test gas 2

System using 2 bottled test gases

Endura AZ25 probe

Reference air supply: 0.3 to 0.5 L/min (0.64 to 1.06 scfh)

Shut-off valve for test gas runs >10 m (33 ft)

Test gas supply – 1 L/min (2.118 scfh)

ABB flowmeter adjusted to 0.3 to 0.5 L/min (0.64 to 1.06 scfh) STP

Test gas 2 (optional) / bottled gas adjusted to 1 bar (15 psi) output

Clean dry oil-free instrument air
INPUT: 10 bar (145 psi) max.
OUTPUT: 1 bar (15 psi) max.

3-way valve

5 µm / oil-coalescing filter-regulator

Endura AZ25 probe

Reference air supply: 0.3 to 0.5 L/min (0.64 to 1.06 scfh)

Shut-off valve for test gas runs >10 m (33 ft)

Test gas supply – 1 L/min (2.118 scfh)

ABB flowmeter adjusted to 1 L/min (2.118 scfh) STP

Test gas 1 / bottled gas adjusted to 1 bar (15 psi) output

Clean dry oil-free instrument air
INPUT: 10 bar (145 psi) max.
OUTPUT: 1 bar (15 psi) max.

3-way valve

5 µm / oil-coalescing filter-regulator

OR

Reference air pump

ABB flowmeter adjusted to 0.3 to 0.5 L/min (0.64 to 1.06 scfh) STP

Test gas 2 (optional) / bottled gas adjusted to 1 bar (15 psi) output
Overall dimensions

Probe

Dimensions in mm (in)

Termination head
Reference air entry
Test gas entry

Probe length
Probe insertion length
500 mm (23.62 in) 556 mm (21.89 in)
700 mm (27.56 in) 701 mm (27.60 in)
800 mm (31.50 in) 801 mm (31.53 in)
900 mm (35.43 in) 901 mm (35.47 in)
1,000 mm (39.37 in) 956 mm (37.64 in)
1,250 mm (49.21 in) 1,251 mm (49.25 in)

*Fixing holes in mounting flange to be drilled by customer – see page 14 for flange details

Transmitter (standard gland shown)

Dimensions in mm (in)

*Fixing holes in mounting flange to be drilled by customer – see page 14 for flange details

Transmitter (standard gland shown)

Dimensions in mm (in)
AutoCal unit (with wall / pipe-mounting bracket)

Dimensions in mm (in)

Wall-mount arrangement
2 x M8 fixings through bracket

Pipe-mount arrangement using U-bolt / pipe clamp
Minimum clamping dia. 42 (1.65)
Maximum clamping dia. 60 (2.36)

Use only ABB-supplied bolts – M8 x 1.25 pitch x 35 mm (SS hex. head)
...Overall dimensions

Probe flanges (all probe lengths) and mounting plates for standard probe flanges

Dimensions in mm (in)

The pressure ratings for these flanges do not apply.

### Table 1: 4-hole probe flanges

<table>
<thead>
<tr>
<th>Flange type</th>
<th>A (Ø)</th>
<th>B (Ø)</th>
<th>C (Ø)</th>
<th>D (PCD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI 2 in 150</td>
<td>152.4 (6.00)</td>
<td>12 (0.47)</td>
<td>19 (0.75)</td>
<td>120.6 (4.75)</td>
</tr>
<tr>
<td>ANSI 2.5 in 150</td>
<td>177.8 (7.00)</td>
<td>12 (0.47)</td>
<td>19 (0.75)</td>
<td>139.7 (5.50)</td>
</tr>
<tr>
<td>ANSI 3 in. 150</td>
<td>190.5 (7.50)</td>
<td>12 (0.47)</td>
<td>19 (0.75)</td>
<td>152.4 (6.00)</td>
</tr>
<tr>
<td>DIN 65 PN16</td>
<td>185 (7.28)</td>
<td>12 (0.47)</td>
<td>18 (0.70)</td>
<td>145 (5.70)</td>
</tr>
<tr>
<td>JIS 65 5K</td>
<td>155 (6.10)</td>
<td>12 (0.47)</td>
<td>15 (0.59)</td>
<td>130 (5.12)</td>
</tr>
<tr>
<td>JIS 80 5K</td>
<td>180 (7.08)</td>
<td>12 (0.47)</td>
<td>19 (0.75)</td>
<td>145 (5.71)</td>
</tr>
</tbody>
</table>

### Table 2: ABB 6-hole probe flanges

<table>
<thead>
<tr>
<th>Flange type</th>
<th>A (Ø)</th>
<th>B (Ø)</th>
<th>C (Ø)</th>
<th>D (Ø)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI 4 in. 150</td>
<td>228.6 (9.0)</td>
<td>12 (0.47)</td>
<td>19 (0.75)</td>
<td>190.5 (7.50)</td>
</tr>
<tr>
<td>DIN 80 PN16</td>
<td>200 (7.87)</td>
<td>12 (0.47)</td>
<td>18 (0.70)</td>
<td>160 (6.30)</td>
</tr>
<tr>
<td>DIN 100 PN16</td>
<td>220 (8.66)</td>
<td>12 (0.47)</td>
<td>18 (0.70)</td>
<td>180 (7.08)</td>
</tr>
<tr>
<td>JIS 100 5K</td>
<td>200 (7.87)</td>
<td>12 (0.47)</td>
<td>19 (0.75)</td>
<td>165 (6.50)</td>
</tr>
</tbody>
</table>

### Table 3: 8-hole probe flanges

<table>
<thead>
<tr>
<th>Flange type</th>
<th>A (Ø)</th>
<th>B (Ø)</th>
<th>C (Ø)</th>
<th>D (Ø)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI 4 in. 150</td>
<td>228.6 (9.0)</td>
<td>12 (0.47)</td>
<td>19 (0.75)</td>
<td>190.5 (7.50)</td>
</tr>
<tr>
<td>DIN 80 PN16</td>
<td>200 (7.87)</td>
<td>12 (0.47)</td>
<td>18 (0.70)</td>
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</tr>
<tr>
<td>DIN 100 PN16</td>
<td>220 (8.66)</td>
<td>12 (0.47)</td>
<td>18 (0.70)</td>
<td>180 (7.08)</td>
</tr>
<tr>
<td>JIS 100 5K</td>
<td>200 (7.87)</td>
<td>12 (0.47)</td>
<td>19 (0.75)</td>
<td>165 (6.50)</td>
</tr>
</tbody>
</table>

### Table 4: ABB flange mounting plate – part no. AZ200 796

<table>
<thead>
<tr>
<th>Mounting plate</th>
<th>A (Ø)</th>
<th>B (Ø)</th>
<th>C (Ø)</th>
<th>D (Ø)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABB standard</td>
<td>160 (6.3)</td>
<td>160 (6.3)</td>
<td>7 (0.27)</td>
<td>16 (0.63)</td>
</tr>
</tbody>
</table>

Comprising: mounting plate, gasket, 6 each: M6 / M10 shakeproof washers, plain washers and nuts

### Table 5: ABB blank (heritage) flange

<table>
<thead>
<tr>
<th>Blank flange</th>
<th>A (Ø)</th>
<th>B (Ø)</th>
<th>C (Ø)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZGP2 heritage</td>
<td>125 (4.92)</td>
<td>5 (0.2)</td>
<td>Fixing holes (location / quantity) drilled by customer</td>
</tr>
</tbody>
</table>

### Table 6: NPT / 1 in BSP mounting flange

<table>
<thead>
<tr>
<th>Flange type</th>
<th>A (Ø)</th>
<th>B (Ø)</th>
<th>C (Ø)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 in NPT / BSP</td>
<td>69.8 (2.74)</td>
<td>15 (0.59)</td>
<td>45 (1.77)</td>
</tr>
</tbody>
</table>
## Weights (excluding flanges)

<table>
<thead>
<tr>
<th>Transmitter-only / AutoCal unit</th>
<th>Transmitter-only – unpacked</th>
<th>AutoCal unit only – packed / unpacked</th>
<th>AutoCal unit with bracket – unpacked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitter / AutoCal unit</td>
<td>4.4 kg (8.8 lb)</td>
<td>8.5 kg (18.7 lb) / 3.0 kg (6.6 lb)</td>
<td>11.0 kg (24.5 lb)</td>
</tr>
</tbody>
</table>

### Probe with aluminous porcelain sheath

<table>
<thead>
<tr>
<th>Probe version</th>
<th>Total probe length</th>
<th>Probe-only – packed / unpacked</th>
<th>Probe + Tx – packed / unpacked</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 mm (23.62 in)</td>
<td>686 mm (27.01 in)</td>
<td>3.9 kg (8.6 lb) / 1.4 kg (3.0 lb)</td>
<td>6.4 kg (14.0 lb) / 3.9 kg (8.5 lb)</td>
</tr>
<tr>
<td>700 mm (27.56 in)</td>
<td>831 mm (32.72 in)</td>
<td>4.1 kg (9.0 lb) / 1.6 kg (3.5 lb)</td>
<td>6.6 kg (14.5 lb) / 4.1 kg (9.0 lb)</td>
</tr>
<tr>
<td>800 mm (31.50 in)</td>
<td>931 mm (36.56 in)</td>
<td>4.2 kg (9.2 lb) / 1.7 kg (3.7 lb)</td>
<td>6.7 kg (14.7 lb) / 4.2 kg (9.2 lb)</td>
</tr>
<tr>
<td>900 mm (35.43 in)</td>
<td>1,031 mm (40.59 in)</td>
<td>4.3 kg (9.4 lb) / 1.8 kg (3.9 lb)</td>
<td>6.8 kg (14.9 lb) / 4.3 kg (9.4 lb)</td>
</tr>
<tr>
<td>1,000 mm (39.37 in)</td>
<td>1,086 mm (42.76 in)</td>
<td>4.4 kg (9.6 lb) / 1.9 kg (4.1 lb)</td>
<td>6.9 kg (15.1 lb) / 4.4 kg (9.6 lb)</td>
</tr>
<tr>
<td>1,250 mm (49.21 in)</td>
<td>1,381 mm (54.37 in)</td>
<td>5.8 kg (12.8 lb) / 2.1 kg (4.5 lb)</td>
<td>8.3 kg (18.3 lb) / 4.6 kg (10.0 lb)</td>
</tr>
</tbody>
</table>

### Probe with Incoloy 800 (1.4876) sheath

<table>
<thead>
<tr>
<th>Probe version</th>
<th>Total probe length</th>
<th>Probe-only – packed / unpacked</th>
<th>Probe + Tx – packed / unpacked</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 mm (23.62 in)</td>
<td>686 mm (27.01 in)</td>
<td>4.7 kg (10.2 lb) / 2.2 kg (4.7 lb)</td>
<td>7.2 kg (15.7 lb) / 4.7 kg (10.2 lb)</td>
</tr>
<tr>
<td>700 mm (27.56 in)</td>
<td>831 mm (32.72 in)</td>
<td>5.0 kg (10.9 lb) / 2.5 kg (5.4 lb)</td>
<td>7.5 kg (16.4 lb) / 5.0 kg (10.9 lb)</td>
</tr>
<tr>
<td>800 mm (31.50 in)</td>
<td>931 mm (36.56 in)</td>
<td>5.2 kg (11.3 lb) / 2.7 kg (5.8 lb)</td>
<td>7.7 kg (16.8 lb) / 5.2 kg (11.3 lb)</td>
</tr>
<tr>
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<td>1,031 mm (40.59 in)</td>
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<td>5.6 kg (12.7 lb) / 3.1 kg (6.7 lb)</td>
<td>8.1 kg (17.7 lb) / 5.6 kg (12.2 lb)</td>
</tr>
<tr>
<td>1,250 mm (49.21 in)</td>
<td>1,381 mm (54.37 in)</td>
<td>7.2 kg (15.8 lb) / 3.5 kg (7.6 lb)</td>
<td>9.7 kg (21.3 lb) / 6.0 kg (13.1 lb)</td>
</tr>
</tbody>
</table>

### Probe with recrystallized alumina sheath

<table>
<thead>
<tr>
<th>Probe version</th>
<th>Total probe length</th>
<th>Probe-only – packed / unpacked</th>
<th>Probe + Tx – packed / unpacked</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 mm (23.62 in)</td>
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<td>8.7 kg (19.1 lb) / 4.9 kg (10.8 lb)</td>
</tr>
</tbody>
</table>

### Cable – AutoCal cable / probe (sensor) cable

<table>
<thead>
<tr>
<th>Cable length</th>
<th>AutoCal cable (14-core) – unpacked</th>
<th>Probe (sensor) cable (6-core) – unpacked</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 m (16 ft)</td>
<td>1 kg (2.2 lb)</td>
<td>0.2 kg (0.44 lb)</td>
</tr>
<tr>
<td>10 m (33 ft)</td>
<td>3 kg (6.6 lb)</td>
<td>0.4 kg (0.88 lb)</td>
</tr>
<tr>
<td>25 m (82 ft)</td>
<td>7 kg (15.4 lb)</td>
<td>0.9 kg (1.98 lb)</td>
</tr>
<tr>
<td>50 m (164 ft)</td>
<td>15 kg (33 lb)</td>
<td>1.8 kg (2.2 lb)</td>
</tr>
<tr>
<td>75 m (246 ft)</td>
<td>22 kg (48.4 lb)</td>
<td>2.7 kg (7.92 lb)</td>
</tr>
<tr>
<td>100 m (328 ft)</td>
<td>N/A</td>
<td>3.6 kg (7.92 lb)</td>
</tr>
</tbody>
</table>
# Electrical connections

6-core screened sensor cable connections – remote transmitter to probe (non-AutoCal system)

<table>
<thead>
<tr>
<th>Sensor cable wire colors</th>
<th>Terminal connections at remote Endura AZ25 transmitter terminal block</th>
<th>Terminal connections at Endura AZ25 probe terminal block (outer connectors)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>TC+ (green wire to green connector)</td>
<td>TC+ (green wire)</td>
</tr>
<tr>
<td>White</td>
<td>TC– (white wire to white connector)</td>
<td>TC– (white wire)</td>
</tr>
<tr>
<td>Red</td>
<td>Cell + (red wire to red connector)</td>
<td>Cell + (red wire)</td>
</tr>
<tr>
<td>Black</td>
<td>Cell – (black wire to black connector)</td>
<td>Cell – (black wire)</td>
</tr>
<tr>
<td>Orange</td>
<td>ACJC (orange wire to violet connector)</td>
<td>ACJC (orange wire)</td>
</tr>
<tr>
<td>Blue</td>
<td>ACJC (blue wire to grey connector)</td>
<td>ACJC (blue wire)</td>
</tr>
<tr>
<td>Screen (drain)</td>
<td>SCN – not used, drain connected to transmitter internal earth stud</td>
<td>Screen, screen foil and drain at probe head cut back and isolated – not connected at probe</td>
</tr>
</tbody>
</table>

**User-made connections – 6-core sensor cable to Endura AZ25 transmitter**

![Diagram of Endura AZ25 probe](image)

**Terminal block connections at Endura AZ25 probe**

- T/C +
- T/C –
- Cell +
- Cell –
- ACJC
- ACJC

**Factory-made connections – 6-core sensor cable to transmitter**

- Green
- White
- Red
- Black
- Orange
- Blue

**Screen /screen foil / drain of 6-core sensor cable at Endura AZ25 probe cut back and isolated**

**Terminal block connections at Endura AZ25 remote transmitter**

- Cell + (Red)
- Cell – (Black)
- ACJC (Violet)
- ACJC (Grey)
- T/C + (Green)
- T/C – (White)
- SCN (Screen)** – not used

**Drain at Endura AZ25 transmitter end connected to transmitter internal earth stud only**

**Cut back and isolate the screen, screen foil and drain at the probe head – do not connect it to the probe**

**Connect the 6-core sensor cable drain to the transmitter’s internal earth stud only – do not connect it to the transmitter’s SCN terminal**
### 14-core screened cable connections – AutoCal unit to remote transmitter

<table>
<thead>
<tr>
<th>Connection at remote transmitter terminal block (label color)</th>
<th>Connection at AutoCal unit (outer) removable terminal block (label color)</th>
<th>Connection type</th>
<th>Cable color</th>
</tr>
</thead>
<tbody>
<tr>
<td>White / Yellow</td>
<td>White / Yellow</td>
<td>PS2 (test gas 2)</td>
<td>White / Yellow</td>
</tr>
<tr>
<td>White / Black</td>
<td>White / Black</td>
<td>P COM</td>
<td>White / Black</td>
</tr>
<tr>
<td>White / Orange</td>
<td>White / Orange</td>
<td>PS1 (test gas 1)</td>
<td>White / Orange</td>
</tr>
<tr>
<td>White / Green</td>
<td>White / Green</td>
<td>SV2</td>
<td>White / Green</td>
</tr>
<tr>
<td>White / Red</td>
<td>White / Red</td>
<td>SV COM</td>
<td>White / Red</td>
</tr>
<tr>
<td>White / Blue</td>
<td>White / Blue</td>
<td>SV1</td>
<td>White / Blue</td>
</tr>
<tr>
<td>Red</td>
<td>Red</td>
<td>Cell + (oxygen input)</td>
<td>Red</td>
</tr>
<tr>
<td>Black</td>
<td>Black</td>
<td>Cell – (oxygen input)</td>
<td>Black</td>
</tr>
<tr>
<td>Violet</td>
<td>ACJC</td>
<td></td>
<td>Violet</td>
</tr>
<tr>
<td>Gray</td>
<td>Gray</td>
<td></td>
<td>ACJC (Gray)</td>
</tr>
<tr>
<td>Green</td>
<td>Green</td>
<td></td>
<td>Green</td>
</tr>
<tr>
<td>White</td>
<td>T/C +</td>
<td></td>
<td>White</td>
</tr>
<tr>
<td>Brown (not used)</td>
<td>Brown (not used)</td>
<td></td>
<td>Brown (wire cut back)</td>
</tr>
<tr>
<td>Blue (not used)</td>
<td>Blue (not used)</td>
<td></td>
<td>Blue (wire cut back)</td>
</tr>
</tbody>
</table>

- **ACJC (Violet)**
- **ACJC (Gray)**
- **Cell + (Red)**
- **Cell – (Black)**
- **T/C + (Green)**
- **T/C – (White)**
- **SCN (Screen)**

---

**Connections from 6-core sensor cable**

- **P2 (White / Yellow)**
- **P COM (White / Black)**
- **P1 (White / Orange)**
- **SV1 (White / Green)**
- **SV COM (White / Red)**
- **SV2 (White / Blue)**

**Factory-made (internal) connections**

- **Brown**
- **Blue (not used)**

**14-core transmitter cable connections**

- **Endura AZ25 AutoCal unit**
- **Endura AZ25 remote transmitter**

---

**Terminal block connections at Endura AZ25 AutoCal unit**

**Terminal block connections at Endura AZ25 remote transmitter**

---

**Drain at Endura AZ25 transmitter end connected to transmitter internal earth stud only**

**Connect the 14-core cable drain to the AutoCal unit’s outer SCN terminal only**

**Connect the 14-core cable drain to the transmitter’s internal earth stud only – do not connect it to the transmitter’s SCN terminal or the transmitter external earth**
...Electrical connections

6-core screened sensor cable connections – probe to AutoCal unit

<table>
<thead>
<tr>
<th>6-core screened sensor cable terminal connections at probe (outer terminal connections)</th>
<th>6-core screened sensor cable terminal connections at AutoCal unit (inner terminal connections)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC+ (green wire)</td>
<td>TC+ (green wire)</td>
</tr>
<tr>
<td>TC- (white wire)</td>
<td>TC- (white wire)</td>
</tr>
<tr>
<td>Cell+ (red wire)</td>
<td>Cell+ (red wire)</td>
</tr>
<tr>
<td>Cell– (black wire)</td>
<td>Cell– (black wire)</td>
</tr>
<tr>
<td>ACJC (orange wire)</td>
<td>ACJC (orange wire)</td>
</tr>
<tr>
<td>ACJC (blue wire)</td>
<td>ACJC (blue wire)</td>
</tr>
</tbody>
</table>

Screen / screen foil / drain of 6-core sensor cable at Endura AZ25 probe cut back and isolated (not connected at probe)

<table>
<thead>
<tr>
<th>SCN (drain from 6-core sensor cable must be connected to this SCN only)</th>
</tr>
</thead>
</table>

### Endura AZ25 probe

- User-made connections – 6-core sensor cable to Endura AZ25 AutoCal unit
- Factory-made connections (at probe inner terminal connectors)
- Screen / screen foil / drain of 6-core sensor cable at Endura AZ25 probe cut back and isolated*

### Endura AZ25 AutoCal unit

- Connections from 6-core sensor cable
- Terminal block connections at Endura AZ25 Probe

#### Terminal block connections at Endura AZ25 AutoCal unit

- From 6-core sensor cable
  - ACJC (Orange)
  - ACJC (Blue)
  - Cell + (Red)
  - Cell - (Black)
  - T/C + (Green)
  - T/C - (White)
  - SCN (Screen)**

*Cut back and isolate the screen, screen foil and drain at the probe head – do not connect it to the probe

**Connect the 6-core sensor cable drain to the AutoCal unit’s inner SCN terminal only
Transmitter power supply and output connections

Mains

<table>
<thead>
<tr>
<th>L/L1</th>
<th>L/L2</th>
<th>N</th>
<th>C</th>
<th>U</th>
<th>U</th>
<th>U</th>
</tr>
</thead>
</table>

Relay 1

<table>
<thead>
<tr>
<th>L/L1</th>
<th>L/L2</th>
<th>N</th>
<th>C</th>
<th>U</th>
<th>U</th>
<th>U</th>
</tr>
</thead>
</table>

Relay 2

<table>
<thead>
<tr>
<th>L/L1</th>
<th>L/L2</th>
<th>N</th>
<th>C</th>
<th>U</th>
<th>U</th>
<th>U</th>
</tr>
</thead>
</table>

Current output
(4 to 20 mA)
HART

Option board connections*

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

Fuse F1 (AC) 1.0 A Type F
100 to 240 V AC (±10 %)
50/60 Hz

*Option board connections

Analog output

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

Digital I/O

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIO1</td>
<td>DIO2</td>
<td>COM</td>
</tr>
</tbody>
</table>
**System specification**

**Measurement performance**

Range:
- 0 to 25 \( \% \) \( \text{O}_2 \)

Test gas response time
- Initial dead time 3 seconds
- \( T_{90} < 10 \) seconds

System accuracy
- \( < \pm 2.0 \% \) of reading or 0.2 \( \% \) \( \text{O}_2 \), whichever is the greater (reference conditions)

Drift
- \( < \pm 1 \% \) maximum \% \( \text{O}_2 \) range value per month (without calibration)
- \( < \pm 0.2 \% \) typical

**Environmental data**

Ambient operating temperature
- Transmitter: \(-20\) to \(55 \) \( ^\circ \text{C} \) (\(-4\) to \(131 \) \( ^\circ \text{F} \))
- Probe standard cable: \(-20\) to \(100 \) \( ^\circ \text{C} \) (\(-4\) to \(212 \) \( ^\circ \text{F} \))

Storage temperature
- \(-40\) to \(85 \) \( ^\circ \text{C} \) (\(-40\) to \(185 \) \( ^\circ \text{F} \))

Operating humidity
- Up to 95 \% RH, non-condensing

Sunlight
- Store and operate out of direct sunlight

Ingress protection
- Electronics / AutoCal enclosures: IP66 (NEMA 4)

**Power supply**

- AC power supply: 100 to 240 V AC \( \pm 10 \% \) (90 V min. to 264 V max.) 50 / 60 Hz
- Electronics: \(< 10 \) W

**EMC**

- Emissions and immunity: Conforms to EN61326-1:2006

**Safety**

- General safety: Conforms to EN61010-1: 2001
- Approvals and safety certification: CE mark
Probe specification

Physical

Probe insertion lengths
- 556 mm (21.89 in)
- 700 mm (27.60 in)
- 800 mm (31.53 in)
- 900 mm (35.47 in)
- 956 mm (37.64 in)
- 1,250 mm (49.25 in)

Process connection
All probe lengths
- ANSI B16.5 150 lb
- 2, 2.5, 3, 4 in
- DIN2501 Part 1
- 65, 80, 100 mm
- JIS B2238 5K
- 65, 80, 100 mm
- 1 in NPT
- 1 in BSP
  (flange pressure ratings do not apply)
- ABB pattern heritage flange

Probe body material
- Aluminous porcelain
- Incoloy 800
- Recrystallized alumina

Mounting angle
Horizontal to vertically down

Process conditions

Process temperature
- Aluminous Porcelain:
  - 600 to 1,250 °C (1,112 to 2,282 °F)
- Incoloy 800:
  - 600 to 850 °C (1,112 to 1,562 °F)
- Probe mounted horizontally – Incoloy 800:
  - 600 to 1,000 °C (1,112 to 1,832 °F)
- Probe mounted vertically down – recrystallized alumina:
  - 600 to 1,400 °C (1,112 to 2,552 °F)

Process pressure
5 kPa (0.7 psi) positive or negative (Nernstian response)

Operating requirements

Reference air
- Regulated supply:
  - probes with restrictors:
    - reference air supply set to 1 bar (15 psi), gives flow of 0.3 to 0.5 L/ min (0.64 to 1.06 scfh) flowmeters not required
  - probes without restrictors:
    - 1 bar (15 psi) flowmeters required with flow set to 0.3 to 0.5 L/ min (0.64 to 1.06 scfh)
- Pumped supply:
  - probes with / without restrictors:
    - preset flow: 0.3 to 0.5 L/ min (0.64 to 1.06 scfh)

Test gas
User-selectable, 25 to 0.1 % O₂ balance N₂ and / or air
(ar 20.95 % is recommended as one of the test gases)
- AutoCal system with restrictors:
  - 1 bar (15 psi) – flowmeters not required as restrictors
  - preset flow to 1 L/min (2.118 scfh)
- systems without restrictors:
  - 1 bar (15 psi) flowmeters required, set to 1 L/min (2.118 scfh)

Calibration
Manual, semiautomatic or automatic
(controlled by Endura AZ25 transmitter)

Automatic calibration

AutoCal hardware
- Optional standalone unit with built-in solenoid valves
  for control of test gas flow
- Built-in pressure switches to detect presence of
  test gases
Transmitter specification

Transmitter enclosures
Remote
• Wall, pipe or stand-mounted
  4 gland entries
• Optional ½ in NPT, M20
Integral
• Head-mounted
  3 gland entries
• Optional ½ in NPT, M20

Automatic calibration
AutoCal hardware
• Isolated solenoid valve control as standard, 24 V @ 2 W per valve*
• Dedicated isolated digital inputs to monitor pressure switch contacts as standard – voltage-free, normally closed with gas present

Display and switches
Display type
  Graphical 128 x 64 pixel LCD
Display backlight
  Green LED
Operator switches
  4 capacitive switches (operated through the front glass)

Relay outputs
Number
  2 standard
Type
  Normally closed, 5 A @ 230 V AC
or 30 V DC (non-inductive)
Functions
  User-configurable – can be activated by one or more of the following signals:
  • Process alarm 1, 2, 3, 4
  • Calibration in progress
  • Calibration failed
  • Out of test gas 1, 2
  • Test gas 1 valve control
  • Test gas 2 valve control
  • Failure diagnostic
  • Out-of-specification diagnostic
  • Maintenance required diagnostic
  • Function check diagnostic

Analog outputs
Standard
• 1 isolated current output
• Programmable to retransmit oxygen (linear or logarithmic) or temperature
• Programmable over 4 to 20 mA
• Over-range capability to indicate system failure programmable from 4 to 22 mA
Optional
• 1 isolated current output
• Programmable to retransmit oxygen (linear or logarithmic) or temperature
• Programmable over 0 to 20 mA
• Over-range capability to indicate system failure programmable from 0 to 22 mA

Digital inputs / outputs
Number
  2 (optional)
Type
  User-configurable as either input or output
Input
  Volt-free contact
Output
  • Transistor switch capable of sinking 220 mA
  • Low output, < 2 V DC
  • Switch voltage 30 V DC maximum
Isolation
  Not isolated from each other or from other circuitry
Input functions
  User-configurable for:
  • Automatic calibration start
  • Automatic calibration stop
  • Automatic calibration start / stop
Functions
  User-configurable – can be activated by one or more of the following signals:
  • Process alarm 1, 2, 3, 4
  • Calibration in progress
  • Calibration failed
  • Out of test gas 1
  • Out of test gas 2
  • Test gas 1 valve control
  • Test gas 2 valve control
  • Failure diagnostic
  • Out-of-specification diagnostic
  • Maintenance required diagnostic
  • Function check diagnostic

*For driving internal automatic calibration (AutoCal) probes or can be used to drive external calibration units on remote transmitters only.
Hart communications
Integration
- Device Type Manager (DTM) and Electronic Device Description (EDD)
- Provide online / offline device configuration, online monitoring of measurement values and diagnostic states

Version
5.7 as standard

DTM
- FDT v1.2.1 compliant
- Works with FDT framework packages (for example, ABB Asset Vision Basic)

EDD
Compliant with suitable framework tools (for example, SDC 625 and Simatic PDM tools)

Infrared service port
Accessibility
Through front face
Type:
  IrDA standard
Baud rate
  Up to 115 K baud
Functions
- Firmware update
- Remote HMI
- Diagnostic log download
- Datalog output
- HART via IrDA

Languages
English

Calibration
Manual calibration
  - 1 point (offset)
  - 1 point (factor)
  - 2 point (offset + factor)
Automatic calibration
  - 1 point (offset)
  - 2 point (offset + factor)
Calibration control
- Front panel controls
- Digital inputs
- HART commands
- User-defined schedule
Calibration scheduler
User-defined schedule enables automatic calibration frequency to be set from 1 day to 12 months

Spares and accessories
Transmitter spares

<table>
<thead>
<tr>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ200 750</td>
<td>A220 Transmitter cartridge</td>
</tr>
<tr>
<td>AZ200 751</td>
<td>• Standard + Analog O/P</td>
</tr>
<tr>
<td>AZ200 752</td>
<td>• Standard + Digital O/P</td>
</tr>
<tr>
<td>AZ200 758</td>
<td>Remote (type 4)</td>
</tr>
</tbody>
</table>

Transmitter backplane

Infrared service port

<table>
<thead>
<tr>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ200 770</td>
<td>ABB reference air pump</td>
</tr>
<tr>
<td>AZ200 771</td>
<td>• ¼ BSP (metric) 230 V AC 50 / 60 Hz</td>
</tr>
<tr>
<td>AZ200 772</td>
<td>• ¼ BSP (metric) 115 V AC 50 / 60 Hz</td>
</tr>
<tr>
<td>AZ200 773</td>
<td>• ¼ NPT (Imperial) 230 V AC 50 / 60 Hz</td>
</tr>
<tr>
<td>AZ200 774</td>
<td>• ¼ NPT (Imperial) 115 V AC 50 / 60 Hz</td>
</tr>
</tbody>
</table>

ABB flowmeter

<table>
<thead>
<tr>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ200 785</td>
<td>USB to IrDA adaptor kit</td>
</tr>
</tbody>
</table>

Connection cables

<table>
<thead>
<tr>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E35</td>
<td>• Type K</td>
</tr>
<tr>
<td>E37</td>
<td>• Type R</td>
</tr>
<tr>
<td>YBM 1178</td>
<td>• Signal cable</td>
</tr>
</tbody>
</table>

Probe tool kit*

<table>
<thead>
<tr>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ200 798</td>
<td>• NPT (AZ220)</td>
</tr>
<tr>
<td>AZ200 799</td>
<td>• BSP (AZ220)</td>
</tr>
</tbody>
</table>

* Included with probe as standard

Spares and accessories
Transmitter spares

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<td>AZ200 752</td>
<td>• Standard + Digital O/P</td>
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<td>AZ200 758</td>
<td>Remote (type 4)</td>
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Transmitter backplane

Infrared service port

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Probe tool kit*

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</tr>
<tr>
<td>AZ200 799</td>
<td>• BSP (AZ220)</td>
</tr>
</tbody>
</table>

* Included with probe as standard
### Ordering information

<table>
<thead>
<tr>
<th>TX</th>
<th>Probe</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ25</td>
<td>X X X X X X X X X X X X 0 X /STD</td>
</tr>
</tbody>
</table>

**Transmitter options**
- None
- Standard
- Standard + 2nd analog output
- Standard + 2 digital inputs / outputs

**Transmitter entry type**
- None (no transmitter required)
- Metric (M20)
- Imperial (NPT)

**Transmitter system type**
- None (no transmitter required)
- Remote

**Probe type**
- None (no probe required)
- Standard

**Probe entry type**
- None (no probe required)
- Metric (M16)
- Imperial (1/2 in NPT)

**Insertion length**
- None (no probe required)
- 0.5 m (2 ft)
- 0.7 m (2.3 ft)
- 0.8 m (2.6 ft)
- 0.9 m (3 ft)
- 1.0 m (3.3 ft)
- 1.25 m (4.1 ft)

**Protective sheath material**
- None (no probe required)
- Aluminous porcelain, standard
- Incoloy 800 (1.4876)
- Recrystallised alumina

**Thermocouple type**
- None (no probe required)
- Type R Pt/Pt 13% Rh EN60584.1 Pt 2
- Type K NiCr/NiAl EN60584.1 Pt 4
- Type S Pt/Pt 10% Rh EN60584 Pt 1
- Type B Pt 30% Rh/Pt 6% Rh EN60584.1 Pt 7

Continued on next page...
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<th>Flange type</th>
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<td>1 in BSP</td>
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