AZ100 series
Zirconia oxygen analyzer
for small boiler applications
Measurement made easy
Economic, efficient and environmentally friendly combustion control

Ideal for small gas/oil fired boilers

Cost-effective solution
- for OEM outlets with a quick return on end-user investment

Continuous on-line measurement
- at less than the price of a spot check portable instrument

Provides EN14001 performance data
- at an affordable price

NEMA 4X / IP66 protection
- for the probe

Linear or logarithmic ranges
- 0 to 5 % up to 0 to 25 % linear
- 2 decades logarithmic from 0.01 to 25 %

Comprehensive diagnostics and built-in software protection
- ensures security and confidence in operation
**Introduction**

The AZ100 Zirconia Oxygen Analyzer is a versatile system designed primarily for the OEM boiler and burner controls market.

The system is a low-temperature type designed to work in process temperatures up to 800 °C (1472 °F) and with a maximum sensor mounting flange temperature of 400 °C (752 °F).

The analyzer provides oxygen computation, with readout and retransmission, based on the probe mV output signal. The output signal (E mV) is Nernstian in form and follows the equation:

\[ E \text{ (mV)} = 0.0496 T \log_{10} \left( \frac{P_0}{P_1} \right) \pm C \text{mV} \]

Where:
- \( T \) = Absolute temperature
- \( P_0 \) = Reference \( \text{O}_2 \) partial pressure
- \( P_1 \) = Sample \( \text{O}_2 \) partial pressure
- \( C \) = Cell constant (mV zero offset)
- 0.0496 = Faraday’s gas constant

**Probe design**

The probe uses the proven and innovative ABB electrode and cell design technology which has been so reliable in other ABB zirconia probe designs.

The flexible probe design gives a range of intake tube lengths to suit all applications and an optional filter/flame arrester making it safe for use where groups IIB and IIC gases may occur in the process being measured. As with all previous ABB designs of low temperature probes, the AZ100 probe is site-serviceable.

As the sensor housing is located on the outside of the duct wall, diffusion of reference air into the sensor housing is sufficient; thus eliminating the need for an air pump or instrument air supply.

The reference air diffuses into the housing through a porous membrane which restricts entry to air only and maintains the IP66 (NEMA 4X) protection.

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**Transmitter design**

The transmitter has, as standard, high/low alarm relays and a single linear or logarithmic isolated retransmission. Display features include %O2, cell temperature, heater control output, cell mV, alarm set points, calibration sequence diagnostics and output settings.

At system startup the transmitter controls the level of power to the mains-powered heater within the probe to eliminate the risk of thermal shock to the sensor.

Based on the proven 4600 Series of transmitters, the AZ100 transmitters are environmentally protected to NEMA 4X (IP65)*, and meet the requirements EN61326 for industrial locations.

The AZ100 transmitters have a green, backlit LCD display and four tactile membrane switches for operation and programming. The measured value display is a 5-digit, 7-segment LCD, while the information display is a 16-character, single line, dot-matrix.

The information display can be user-programmed for display in English, French, German or Spanish.

The switch enables movement from the ‘Operating Page’ to the oxygen calibration sequence. Use of the appropriate security code allows further access to the pages for ‘Setup Outputs’ and ‘Electrical Calibration’. The switch is used to select the various programming pages, while the and switches change the programmable values.

* Refer to Specification – Transmitter for full details.
## Specification – transmitter

### Display
- Measured value: 5-digit x 7-segment, backlit LCD
- Information: 16-character, single-line, dot-matrix, backlit LCD

### Parameters
- % O₂ (0 to 25 %)
- Cell temperature
- Cell mV
- Two alarm set points
- Alarm 2 can be configured as a general alarm for any of the following:
  - THC open circuit + check THC open circuit, short circuit or reversed
  - Cell warming up
  - Calibration failed
  - Cell stability check
  - Power failure

### Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Oxygen concentration (display and retransmission)</td>
<td>≤±3 % of reading or ≤±0.1% O₂ (whichever is the greater)</td>
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<tr>
<td>Display resolution</td>
<td>±1 digit</td>
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<td>Operating temperature limits</td>
<td>–5 to 55 °C (23 to 131 °F) for all functions</td>
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<tr>
<td>Storage temperature</td>
<td>–25 to 75 °C (–13 to 131 °F)</td>
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<td>Operating humidity limits</td>
<td>Up to 95 % RH non-condensing</td>
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<td>Power supply</td>
<td>Voltage requirements: 100 to 130 V, 200 to 260 V 50 / 60 Hz, Nom. 115 / 230 V AC 50 / 60 Hz</td>
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<tr>
<td>Power consumption (total system)</td>
<td>113 VA at start up (sensor), 6 VA at start up (transmitter), 47 VA operational</td>
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<tr>
<td>Insulation</td>
<td>Mains to earth (line to ground) 2 kV RMS</td>
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</tbody>
</table>

## Outputs and set points

### No. of relays
- Two

### Relay contacts
- Single pole changeover
- Rating: 3 A 250 V AC, 3 A 250 V DC
- Loading (non-inductive): 750 VA, 30 W
- Loading (inductive): 75 VA, 3 W

### Insulation
- 2 kV RMS contacts to earth (ground)

### No. of alarm set points
- Two

### Set point adjustment
- Programmable

### Set point hysteresis
- ±1 % of set point (fixed)

### Local set point annunciation
- Red LED

### Retransmission
- One fully isolated retransmission output
- Linear output
  - Range: 0 to 25 % O₂ programmable
  - Minimum span: 5 %
- Logarithmic output
  - Range: 0.1 to 25 % O₂ programmable
  - Minimum span: any 2 decades in range

### Output current
- 0 to 10 mA, 0 to 20 mA or 4 to 20 mA user-programmable

### Resolution
- 0.1 % at 10 mA, 0.05 % at 20 mA

### Max. load resistance
- 750 Ω (20 mA max.)

### Output loop test
- Output loop test at 0 %, 25 %, 50 %, 75 % and 100 % of output span
Mechanical data

Mounting options
- Wall-mount
- Post-mount
- Panel-mount

Protection to NEMA 4X (IP65)
- Wall / post mount transmitter
- Panel-mount transmitter (front only)

Overall dimensions
- Wall-mount transmitter:
  160 wide x 214 high x 68 mm deep
  (6.3 wide x 8.43 high x 2.68 in. deep)
- Panel-mount transmitter:
  96 x 96 x 191 mm deep
  (3.78 x 3.78 x 7.52 in. deep)

Weight
- Wall-mount transmitter: 2.0 kg (4.4 lb)
- Panel-mount transmitter: 1.5 kg (3.3 lb)
- Post-mount kit: 1.5 kg (3.3 lb)

System Accuracy

Display
≤2 % of reading or ±0.1 % O₂ (whichever is the greater),
for 30 °C (86 °F) ambient temperature change

Retransmission
≤3 % of reading or ±0.1 % O₂ (whichever is the greater),
for 30 °C (86 °F) ambient temperature change

Error due to power supply variation
<0.1 % O₂ for ±10 % variation from normal supply voltage

Error due to flue wall temperature change
0.017 % of reading/°C (0.008 % of reading/°F)
* for 2 point calibration against certified test gases
Specification – Probe

**Environmental data**

**Process gas temperature**
–20 to 800 °C (–4 to 1472 °F)

**Maximum sensor flange temperature**
–400 °C (–752 °F)

**Ambient air temperature**
–20 to 70 °C (–4 to 158 °F)

**Environmental protection**
NEMA 4X / IP66 (hose down)

**Electrical data**

**Signal cable**
6-way, multicore, screened cable with copper conductors available in standard lengths of 25, 50 or 100 m (81.25, 162.5 or 325 ft.)

**Thermocouple**
NiCr/NiAl Pt.4 BS4937 Type K

**Mechanical Data**

**Insertion lengths**
200, 350, 500 or 650 mm (7.9, 13.8, 19.7 or 25.6 in.)

**Response time**
• 3s
• Time to t90 35s (typical)

**Mountings**
2 in. NPT, 2 in. BSPT or Adapter/Standoff spool to suit the 0.4m ZFG2 mounting plate

**Overall dimensions**
See page 8

**Weight**
Probe complete with mounting flange and the following length intakes:
• 200 mm (7.9 in.) 4.8 kg (10.6 lb)
• 350 mm (13.8 in.) 5.1 kg (11.2 lb)
• 500 mm (19.7 in.) 5.4 kg (11.9 lb)
• 650 mm (25.6 in.) 5.7 kg (12.5 lb)

**Serviceability**
Site-serviceable (replaceable sensor / oven assembly, filter / flame arrester and intake tubes)
### Electrical connections

**Probe**

- **Cell**
- **THC**
- **HTR**
- **Ctrl**
- **Screen**
- **Brown**
- **Red**
- **Green**
- **Black**
- **Blue**
- **White**
- **G/Yellow**
- **Red**

**Transmitter (wall-mount shown for example only)**

- **TB1**
- **TB3**
- **TB7**
- **Mains supply junction box**
- **Mains power**
- **Cell heater control**
- **Screen**
- **White**
- **Black**
- **Red**
- **Blue**
- **Green**
- **G/Yellow**

**Note.** The probe and transmitter earth must be common at the junction box.

**Mains supply connections**

- **Relay 1**
- **Relay 2**
- **Screen**
- **Link**
- **Cell heater control**
- **Cell heater control**

**Wall-/Pipe-mounted transmitter connections**

- **Relay 1**
- **Relay 2**
- **Screen**
- **Link**
- **Cell heater control**
- **Cell heater control**

**Panel-mounted transmitter connections**

- **Relay 1**
- **Relay 2**
- **Screen**
- **Link**
- **Cell heater control**

**System connections**

- **Mains supply**
- **To probe**
- **To probe**

**Retransmission output**

- **A**
- **B**
- **Blue**
- **Brown**
- **Green**
- **G/Yellow**
- **White**
Overall dimensions
Dimensions in mm (in.)

Wall-mount transmitter

Panel-mount transmitter

Dimensions in mm (in.)

Nominal insertion length
200, 350 or 650 (7.87, 13.78 or 25.6)

Mounting adapter
2 in. NPT or 2 in. BSPT taper thread

Probe
## Ordering information

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