AZ100 Series
Zirconia Oxygen Analyzer for Small Boiler Applications

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:

\[ E (\text{mV}) = 0.0496T \log_{10} \frac{P_{0}}{P_{1}} \pm \text{C mV} \]

Where:
- \(T\) = Absolute temperature
- \(P_{0}\) = Reference O2 partial pressure
- \(P_{1}\) = Sample O2 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. The probe has options of male thread NPT or BSPT mountings. 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.

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 \(\rightarrow\) 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 \(\uparrow\) switch is used to select the various programming pages, while the \(\downarrow\) and \(\rightarrow\) 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
Alarms 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

Accuracies

Oxygen concentration (display and retransmission)
≤±3% of reading or ±0.1% O₂ (whichever is the greater)

Display resolution
±1 digit

Environmental Data

Operating temperature limits
−5 to 55°C (23 to 131°F) all functions
−20° to 70°C (−4 to 158°F) retransmission

Storage temperature
−25 to 75°C (−13 to 131°F)

Operating humidity limits
Up to 95% RH non-condensing

Power Supply

Voltage requirements
100 to 130V, 200 to 260V 50/60 Hz
Nom. 115/230V AC 50/60Hz

Power consumption (total system)
113VA at start up (sensor)
6VA at start up (transmitter)
47VA operational

Insulation
Mains to earth (line to ground) 2kV RMS

Outputs and Set Points

No. of relays
Two

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

Insulation
2kV 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 10mA, 0 to 20mA or 4 to 20mA user-programmable

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

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

Output loop test
Output loop test at 0%, 25%, 50%, 75% and 100% of output span
...Specification – Transmitter

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

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

System Accuracy

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

Retransmission
≤3% of reading or ±0.1% O₂ (whichever is the greater),
for 30°C 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 100m
(81.25, 162.5 or 325 ft.)

Thermocouple
NiCr/NiAl Pt.4 BS4937 Type K

Mechanical Data

Insertion lengths
200, 350, 500 or 650mm (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 10

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

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

**Note.** The probe and transmitter earth must be common at the Junction Box.

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**Mains Supply Connections**

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**System Connections**
Overall Dimensions

Dimensions in mm (in.)

Wall-mount Transmitter

Panel-mount Transmitter

Dimensions in mm (in.)

Probe

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

ø1.25 in. NPS SCH5 (ø42.16mm)
## Ordering Information

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