

## ZIRCOMAT *Zirconia Oxygen Analyzers*

- ***Direct insertion system eliminates gas sampling devices***
- ***High-speed response***
- ***Modular detector design for easy field replacement of zirconia element***
- ***One-person maintenance, even with long probes***
- ***High reliability, high system availability***
- ***Twelve programmable alarm functions including Fuel Rich mode***



### SYSTEM DESCRIPTION

Controlling excess oxygen in the flue gas to reduce fuel consumption is a well established control tool that's well understood by energy management and process engineers worldwide. Field proven in over 25 years of service, the revolutionary, modular ZIRCOMAT system provides important installation, operation and service benefits when compared to other analyzers of conventional design.

A complete ZIRCOMAT Oxygen analyzer system includes a probe, detector, transmitter, connecting cable and user's manual - ready for installation on site. All units feature a special oxygen detector that will mount to any model or length of probe during installation. This unique patented design allows the oxygen detector and sample gas filter to be field serviced by the user without the need for probe removal from the hot gas stream. One person can quickly detach the detector from the probe mounting flange. The detector can be used as a spare for all probe lengths regardless of probe type - drastically reducing space and inventory cost compared to other length and temperature specific designs from other vendors.

The Oxygen detector mounts to the probe flange and can be quickly detached from the probe for any routine maintenance, including sample gas filter replacement. A ¼" (0.64 cm) tube connection

is provided for on-line calibration. The same detector is used with any one of the five types of sample probes.

The ZKM transmitter is a full featured single channel transmitter with menu driven software - keypad interface that includes auto-calibration, twelve programmable alarm functions (including fuel rich mode), programmable air purge (with memory hold) for sample gas filter - the unit is also fully self-diagnostic with LCD message center, event log, password data protection and can be remote mounted in a convenient location up to 1000 feet from the probes.

Combustion efficiency and RS-485 MODBUS communication are available options. Rich mode is a display function with alarm contact for fuel rich conditions that can occur when the oxygen content in the flue gas is at or below zero.

The ZIRCOMAT provides a high degree of safety by automatically cutting power to the detector on failure of the thermocouple in the sensor or by means of an external emergency contact input. A keylock function prevents operational errors.

### ZKM Transmitter

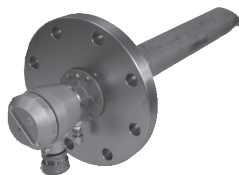
Features a local display with interactive message center and keypad. User programmable measuring ranges, 0-2% to 50%, in 1% steps and includes manual or automatic calibration at user programmable intervals, self diagnostic check of eleven parameters with fault alarm, hi-lo alarm contacts and 4-20mA DC isolated output signal. The NEMA 4X enclosure is suitable for wall or 2" pipe mounting in a convenient location.

### IN-SITU PROBES

Select a Sample probe from the five types to suit your combustion fuel type, stack gas temperature range and insertion length. All probes are self-cleaning in applications where the fuel fired is oil or gas. For Coal or other applications with high fly ash, the sample gas filter is cleaned with a user programmable air purge – all without the need for operator involvement.

### ZFK Probe

Suitable for oil or gas applications with flue gas temperatures up to 1150°F, the ZFK probe is available in nine standard lengths from 12" to 140". The probe design uses the natural flue gas flow to create a differential pressure across a unique divided flow path - from the end of the probe - past the oxygen detector and back out. Damage protection from any flying debris in the flue gas duct is provided by the probe tube.



### ZTB Probe

Specified for fuels with high fly ash - all coal applications up to 1150°F, the ZTB probe is available in lengths from 12" to 140". On dirty and abrasive applications, the probe tube also serves as an abrasive shield and the flow path past the heated oxygen detector also eliminates any cold end corrosion between the probe and flange that can occur on other units. A blow back feature cleans the probe and sample gas filter in-process and the air solenoid valve is controlled by the ZKM transmitter.



### ZFK-ST Probe

Designed for process heater and other oil or gas applications up to 2200°F, a choice of 24" or 44" probes provide cost effective oxygen measurement at high temperatures.

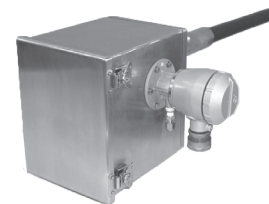


### ZTB-ST Probe

The ZTB-ST probe has the same specifications as the ZFK-ST but with the addition of the blow back feature for use with high fly-ash content fuels typically found in incinerators and other high temperature applications

### ZTA Probe

High temperature applications up to 2900°F are covered by the ZTA probe. With a choice of four probes up to 60" long, they are suitable for all fuel types and can be used with the blow back cleaning feature. The detector and sample gas filter are fully serviceable without probe removal from the process. A port is provided to view the inside of the probe/ furnace during normal operation.



### Optional Accessories

A full range of optional accessories are available and includes an Automatic Calibration module unit for use with the ZKM transmitter - fully piped and wired in a weatherproof enclosure for easy installation by the customer at the job site.

Special ISA type "Z" purge or explosion proof packages or a process gas flame arrester for the detector is available for applications in areas classified as hazardous by the NEC and NFPA.



Class 1, Div 1 Explosion-Proof Transmitter & Detector

### ORDERING INFORMATION

|   | ZKM                                   | 04 | 05  | 06 | 07                           | B           |
|---|---------------------------------------|----|---|----|------------------------------|-------------|
|   | 01 - 03                               |    |   |    |                              | 08          |
| BASE INSTRUMENT<br>ZKM Transmitter with ZFK Oxygen Detector   | ZKM                                   |    |   |    |                              |             |
| PROBE TYPE<br>Oil or gas applications, flue gas temperatures up to 1150°F (304SS or 316 SS)<br>Oil or gas applications, flue gas temperatures up to 2200°F (304SS or 316SS)<br>Coal and high fly ash fuels, flue gas temperatures up to 1150°F (304SS or 316SS)<br>Coal and high fly ash fuels, flue gas temperatures up to 2200°F. Includes blowback feature (304SS or 316SS)<br>All fuel types, high temperature applications up to 2900°F (for 316 SS contact factory)   | ZFK<br>ZFK-ST<br>ZTB<br>ZTB-ST<br>ZTA |    |   |    |                              |             |
| PROBE LENGTH (note not all lengths available with all probe types)<br>12 inches (30.48 cm) - ZFK or ZTB probe<br>20 inches (50.8 cm) - ZFK, ZTB or ZTA probe<br>24 inches (60.96 cm) - ZFK-ST or ZTB-ST probe<br>30 inches (76.2 cm) - ZFK, ZTB or ZTA probe<br>40 inches (101.6 cm) - ZFK or ZTB probe<br>40 inches (101.6 cm) - ZTA probe<br>60 inches (152.4 cm) - ZFK or ZTB probe<br>60 inches (152.4 cm) - ZTA probe<br>80 inches (203.2 cm) - ZFK or ZTB probe<br>100 inches (254 cm) - ZFK or ZTB probe<br>120 inches (304.8 cm) - ZFK or ZTB probe<br>140 inches (355.6 cm) - ZFK or ZTB probe |                                       |    | 12<br>20<br>24<br>30<br>40<br>40<br>60<br>60<br>80<br>100<br>120<br>140 |    |                              |             |
| TRANSMITTER OPTIONS<br>None - no blowdown or automatic calibration (manual calibration only)<br>Blowdown and Automatic Calibration (required for ZTB, ZTB-ST and ZTA probes with blowdown)<br>Communication (RS-485), Combustion Efficiency Display, blowdown and automatic calibration   |                                       |    |   |    | N<br>B<br>C                  |             |
| CONNECTING CABLE<br>20 feet (6.1 meters) with terminals. Supplied without flexible conduit.<br>Extra connecting cable without conduit, up to 1000 feet (300 meters)   |                                       |    |   |    | 20<br><i>indicate length</i> |             |
| OPTIONAL EQUIPMENT<br>None<br>Manual Calibration Panel with 3-way valve for use with Transmitter Option "N"<br>Auto Calibration Unit for use with Transmitter Auto Calibration option "B" or "C"  |                                       |    |   |    |                              | N<br>M<br>A |

**Accessories:**

|   |
|---|
| ZFK Detector 220V Power (specify on order)  |
| Extra connecting cable, 250ft spool   |
| Extra connecting cable, 500 spool   |
| Solenoid valve (4.0 CV) for ZTB series and ZTA self-cleaning probes for use with transmitter Blow Down option "B" |
| "Z" Purge kit for ZKM transmitter for Class 1 Group 2 hazardous areas   |
| Oxygen Detector configured for hazardous areas: Class 1, Div 2, Group B,C&D                                       |
| ZKME Explosion Proof Enclosure  |
| Pipe Mounting Bracket for Transmitter   |
| Additional users manual   |

## SPECIFICATIONS

### General

**Measurement method:** Direct insertion type zirconia  
**Measuring range:** 0.2 - 50% configurable in 1.0% steps  
**Accuracy:** ±1.0% reading or 0.05% O<sub>2</sub> if greater  
**Repeatability:** ±0.5% full scale/max output  
**Linearity:** ± 2% full scale  
**Response time:** 7 sec./90% (initial response 0.1 sec)  
**Output signal:** 4-20mA isolated, 500 ohm max load  
**Power supply:** 90-100VAC, 50/60Hz  
**Power consumption:** 70 VA (normal), 250VA (max)  
**Enclosure rating:** NEMA 4X (IEC IP 66 equivalent)  
**Electrical & Safety Approvals:** CE, FM, TÜV (EN 15267-1, TÜV 25932/2010), C<sub>FMUS</sub>

### Detector

**Measured gas temperature:** -20 to +600°C (general use); -20 to +1500°C (high temperature)  
**Material (wetted):** 316 SS  
**Material (probe):** 304 SS or 316 SS  
**Sample gas pressure:** ±12" H<sub>2</sub>O (±306 mm H<sub>2</sub>O)  
**Operating temperature:** -20 to +100°C  
**Storage temperature:** -20 to +70°C  
**Mounting:** Horizontal plane ±45°

### Transmitter

**Display:** 4-digit digital indication  
**Alarm contacts:** 6 configurable (NO, 3 amps @ 250V)  
**Contact inputs:** 3  
**Calibration gas:** O<sub>2</sub>/N<sub>2</sub> (¼" tube fitting)  
**Recommended calibration gas concentration:**  
 Zero: 0.25 to 2.0% O<sub>2</sub>  
 Span: 20.6 to 21.0% O<sub>2</sub>  
**Blowdown cycle (option):** 0 to 99:59 minutes  
**Blowdown time (option):** 0 to 999 seconds  
**Communication:** RS-485 Modbus (option)  
**Operating temperature:** -10 to +55°C ambient  
**Operating humidity:** 95% RH, non condensing  
**Storage temperature:** -30 to +70°C  
**Dimensions:** 10"W x 10"H x 4"D (244mm x 244mm x 95mm)  
**Weight:** 10 lbs (4.5 kg)  
**Mounting:** Flush on panel or wall, or on pipe

| Probes | Length                 | Flue Gas Temp      | Probe/Flange                    | Fuels                     | Weight (approx) | Probe Diameter | Flange Size |
|--------|------------------------|--------------------|---------------------------------|---------------------------|-----------------|----------------|-------------|
| ZFK    | 12 - 140" (0.3 - 3.5m) | 0-1150°F (600°C)   | 304SS- 304SS<br>316SS-316SS     | Oil & Gas                 | 18 lbs          | .2.38"         | 4.0"        |
| ZFK-ST | 24 or 44" (0.5 or 1m)  | .0-2200°F (1200°C) | Ceramic-304SS<br>Ceramic-316SS  | Oil & Gas                 | 19 lbs          | 1.0"           | 4.0"        |
| ZTA    | 20 to 60" (0.5-1.5m)   | .0-2900°F (1590°C) | Ceramic-304SS                   | Oil, Gas,<br>Coal & solid | 35 lbs          | 1.25"          | 3.0"        |
| ZTB    | 12 to 140" (0.3-3.5m)  | .0-2200°F (1200°C) | Ceramic-304SS<br>Ceramic-316SS  | Oil, Gas,<br>Coal & solid | 19 lbs          | 2.38"          | 4.0"        |
| ZTB-ST | 24 or 44" (0.5or1m)    | .0-2200°F (1200°C) | Ceramic- 304SS<br>Ceramic-316SS | Oil, Gas,<br>Coal & solid | 20 lbs          | 1.0"           | 4.0"        |

The Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

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