# Zirconia Oxygen Analyzer

- **Cost effective solution**
  – for low temperature applications
- **NEMA 4X/IP66 protection**
  – reliable operation in demanding environments
- **User programmable**
  – for maximum flexibililty
- **Comprehensive diagnostics facility with in-built software protection**
  – ensures security and confidence in operation
- **Linear or logarithmic ranges**
  – enables programming to suit a wide variety of applications
- **English, French, German and Spanish software**
  – simple, user-selection of display language


***A low or high temperature oxygen analyzer offering advanced functionality, simple operation and reliability in harsh environments***

ABB Instrumentation

## Introduction

The ZDT Analyzer/Alarm unit is a versatile microprocessor-based oxygen analyzer designed primarily to meet the requirements of the medium sized boiler and furnace market, utilizing high quality zirconia oxygen probes, for energy management.

The low temperature version of the ZDT is designed to operate with the Model ZFG2 low temperature oxygen probe. The probe sensor is controlled at 700°C.

The high temperature version of the ZDT is designed to operate with the Model ZGP2 oxygen probe. The probe sensor is temperature compensated from 600° to 1400°C. In the event of probe thermocouple failure the temperature of the process can be preset in the ZDT.

The standard analyzer has high/low alarm relays and a single linear or logarithmic isolated retransmission. Display features include $\%O_2$, cell temperature, heater control output, cell mV, alarm set points, calibration sequence diagnostics and output settings.

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

$$E(mV) = 0.0496\ T\ (\log_{10} \frac{P_0}{P_1}) \pm C\ (mV)$$

Where
- $T$ = Absolute temperature (°K)
- $P_0$ = Partial pressure reference $O_2$ (air)
- $P_1$ = Partial pressure sample $O_2$
- $C$ = Cell constant
- 0.0496 = Faraday's Gas Constant

The reference air supply to the probe can be by optional integral pump within the ZDT or by external regulated instrument air. Flow rate of the integral pump is approximately 1l/min. (0.264 gal/min.).

## Construction and Operation

The ZDT Zirconia Analyzer is housed in a sheet steel enclosure, environmentally protected to NEMA 4X (IP66) and meets the requirements of Generic Emission Standard (EN50081-1) for residential, commercial and light industry and the Generic Immunity Standard (EN50082-2) for industrial environments.

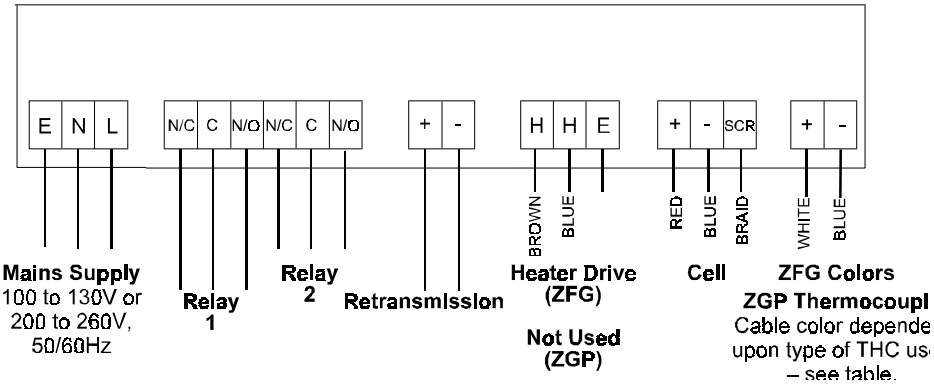
The analyzer is based on the proven 4600 Series transmitter and has the type display with four tactile membrane switches. The measured value display is 5-digit, 7-segment green back-lit l.c.d. while the information display is 16-character, single-line, dot-matrix, green back-lit l.c.d.

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

The [↵] switch allows movement from the 'Operating Page' to the oxygen calibration sequence. Use of the appropriate security code allows further access to the pages for 'Set Up Outputs' and 'Electrical Calibration'. The [↵] switch is used to select the various programming pages, while the [▲] and [▼] switches change programmable values.

In the Oxygen Calibration Page the user code is required to proceed beyond the diagnostic information to the calibration sections.

## Electrical Connections




| Type of Thermocouple | Compensating Cable | | | | | |
|---|---|---|---|---|---|---|
| | BS4937 Part No. 30 | | | DIN 43714 | | |
| | + | — | Case | + | — | Case |
| Ni-Cr/Ni-Al (**Type K**) | Green | White | Green | Red | Green | Green |
| Pt/Pt-Rh (**Types R and S**) | Orange | White | Orange | Red | White | White |

# Specification

## Display

**Measured value**
5-digit x 7-segment back-lit l.c.d.

**Information**
16-character, single line, dot matrix, back-lit l.c.d.

**Parameters**
$\%O_2$ (0 to 25%)
Cell temperature
Cell mV
Two $O_2$ alarm set points – alarm 2 can be configured as a common failure alarm for any of the following:

- THC open circuit
- Cell under temperature (ZGP2)
- Cell warming up (ZFG2)
- Calibration failed
- Cell stability check (ZFG2)
- Power failure

## Accuracies

**Oxygen Concentration (display and retransmission)**
- 2% of reading or ±0.1% $O_2$ whichever is greater

**Display resolution**
±1 digit

## System accuracy *

**Display**
- 2% of reading
or ±0.1 $O_2$ whichever is greater

**Retransmission**
- ± 2% of reading
or ± 0.1% $O_2$ whichever is greater

**Error due to power supply variation**
Less than 0.1% for +6% –20% variation from nominal supply voltage

## 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 limits**
–25° to 55°C (–13° to 131°F)

**Operating humidity limits**
Upto 95% RH non-condensing

## Power Supply

**Voltage requirements**
100 to 130V, 200 to 260V 50/60Hz

**Power consumption**
110VA

**Insulation**
Mains to earth (line to ground) 2kV r.m.s.

## Outputs and Set Points

**No. of relays**
Two.

**Relay contacts**
Single pole changeover.

| | | |
|---|---|---|
| Rating | 250V a.c. | 250V d.c. max. |
| | 3A a.c. | 3A d.c. max. |
| Loading (non-inductive) | 750VA | 30W max. |
| (inductive) | 75VA | 3W max. |

**Insulation:**
2kV r.m.s. contacts to earth (ground).

**No. of set points**
Two

**Set point adjustment**
Programmable.

**Set point hysteresis**
±1% of set point (fixed)

**Local set point annunciation**
Red l.e.d.

## Retransmission

One fully isolated retransmission
Programmable for any range within
0 to 25% $O_2$ (linear)
(5% minimum span)
0.01 to 25% $O_2$ (logarithmic)
(Programmable for any two decades within 0.01 to 25%)

**Output current**
0 to 10mA, 0 to 20mA or 4 to 20mA programmable.

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

**Max. load resistance**
750 ohm (20mA max.).

**Output loop test**
Output loop test at 0%, 25%, 50%, 75% and 100% of output span

## Mechanical Data

**Mounting**
Wall mounting

**Protection**
NEMA 4X (IP66 )

**Dimensions**
252mm (9.9 in) wide x 453mm (17.8 in) high x 150mm (5.9 in ) deep.

**Weight**
9kg approx.

* ZDT with a ZGP2, Z-FG2 or Z-FG probe when calibrated against a certified test gas

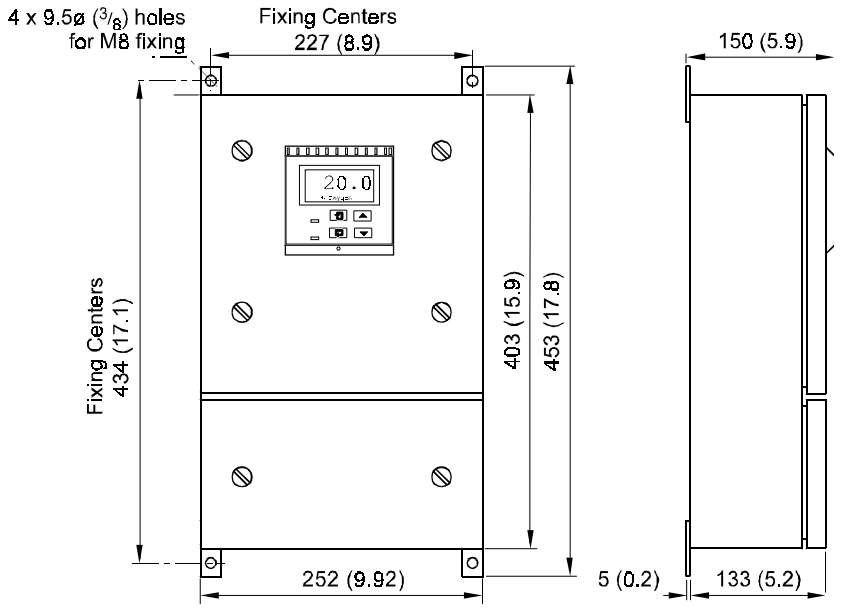
## Ordering Guide

| ZDT Oxygen Analyzer | ZDT/ | 0 | 1 | X | X |
|---|---|---|---|---|---|
| Probe Type | ZFG2 | 0 | | | |
| Thermocouple Type | Type K | | 1 | | |
| Reference Air Supply | None | | | 0 | |
| | External Output | | | 1 | |
| | Internal Output | | | 2 | |
| Mains Voltage | 230V 50/60Hz | | | | 0 |
| | 110V 50/60Hz | | | | 1 |

| ZDT Oxygen Analyzer | ZDT/ | 1 | X | X | X |
|---|---|---|---|---|---|
| Probe Type | ZGP2 | 1 | | | |
| Thermocouple Type | None | | 0 | | |
| | Type K | | 1 | | |
| | Type R | | 2 | | |
| | Type S | | 3 | | |
| Reference Air Supply | None | | | 0 | |
| | External Output | | | 1 | |
| | Internal Output | | | 2 | |
| Mains Voltage | 230V 50/60Hz | | | | 0 |
| | 110V 50/60Hz | | | | 1 |

## Overall Dimensions

Dimensions in mm (in.)




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

© 1997 ABB Instrumentation Inc

SS ZDT 97.1

**ABB Kent-Taylor Ltd.**
St. Neots,
Cambs.
England, PE19 3EU
Tel: (01480) 475321
Fax: (01480) 217948

**ABB Kent-Taylor Ltd.**
**Analytical & Flow Group**
Stonehouse, Glos.
England, GL10 3TA
Tel: (01453) 826661
Fax: (01453) 826358

**ABB Instrumentation Inc.**
PO Box 20550, Rochester
New York 14602-0550
USA
Tel: (716) 292 6050
Fax: (716) 273 6207

**ABB Kent-Taylor SpA**
22016 Lenno
Como
Italy
Tel: (0344) 58111
Fax: (0344) 56278