Direct insertion type

Zirconia Oxygen Gas Analyzers

Detector type: ZFK8 / Converter type: ZKM

Modular detector design allows easy field replacement of zirconia element

Enhanced safety design with integrated and remote power isolation functions

High-speed response of 4 to 7 seconds

Explosion-proof case structure available in addition to IP66 and IP67

You can operate ZKM1 and ZKME without opening the cover

Direct insertion system eliminates the need for gas sampling devices

Fuji Electric Co., Ltd.

ECNO:341b
Energy Saving and Environmentally Friendly

Fuji’s zirconia oxygen gas analyzers are widely used; not only in industries of high energy consumption, such as steel, power, petroleum/petrochemicals, ceramics, paper/pulp, food, and textile industries, but also in various combustion facilities, such as garbage incinerators and medium-to-small sized boilers, as combustion controllers, achieving a significant energy-saving effect. The oxygen concentration control ensures complete combustion, thus reducing CO2, SOx, and NOx emissions and helping prevent global warming and air pollution.

The transmitter is available in two case structures: IP66 and IP67.

High safety level

(1) Detecting a break of the thermocouple for heater control in the sensor unit, the analyzer stops the power supply to the detector.
(2) The power supply to the detector may also be stopped by external contact input in an emergency.
(3) The key lock function prevents operational errors.

Easily replaceable zirconia element

Settings may be made from the front panel without opening the cover

Application 1
Example of measurement in a waste incinerator

Application 2
Example of boiler combustion control

Principle of the detector
No need for gas sampling devices and a rapid response

Response speed: 4 to 7 sec.

The flow guide tube design ensures a rapid response of 4 to 7 sec.

An ejector is available for high-temperature measurement (up to 1,500°C).

Various flow guide tubes, including one with a blow-down nozzle for high particulate levels, and models made of anti-corrosive materials, are available.

**System diagram**

- **Detector**: Type ZFK8
- **Transmitter**: Type ZKM1
- **Output signal**: 4 to 20mA DC
- **Power supply voltage**: Contact input signal 3 points (Automatic calibration start, Automatic blow-down)
- **Dedicated cable (signal, heater power)** (up to 100m)
- **Blow-down air pressure inlet**
- **Reference air inlet**
- **Reference air inlet option**
- **Ejector**: (Type: ZTA)
- **Flow guide tube Detector Plate**
- **Zirconia oxygen analyzer**

**Code symbols**

- **Detector**
- **Converter**
- **Ejector**

**Description**

- Cal. gas inlet
- Connection for φ6 mm tube (SUS)
- Ball valve
- Flow guide tube
  - Flange application length
  - SUS304 general use 300mm
  - SUS304 general use 500mm
  - SUS304 general use 750mm
  - SUS304 general use 1000mm
  - SUS316 for corrosive gas 300mm
  - SUS316 for corrosive gas 500mm
  - SUS316 for corrosive gas 750mm
  - SUS316 for corrosive gas 1000mm
- SUS316 with blow-down nozzle
- SUS316 with blow-down nozzle 300mm
- SUS316 with blow-down nozzle 500mm
- SUS316 with blow-down nozzle 750mm
- SUS316 with blow-down nozzle 1000mm

**Power supply**

- AC100 to 120V
- AC200 to 240V

**Code symbols**

- ZFK8Y15-0Y0YY-0YY
- ZFK8Y35-0Y0YY-0YY

**Filter spec.**

- Standard
- For high temperatures (+1500°C max.)

**Instruction manual language**

- Japanese
- English
- Chinese

**Specification name plate**

- Standard 100 to 120V AC 50/60Hz
- Standard 200 to 240V AC 50/60Hz

**Power supply**

- 100V/115V AC 50/60Hz
- 200V/220V AC 50/60Hz
- 230VAC 50/60Hz
Flame-proof type available for explosive atmospheres
TIIS Exd IIB T6, NEPSI/Eexd IIC T6 ExII2G

**Zirconia oxygen detector**
(Type: ZFKE)

**Converter (Type: ZKME)**

---

### Code symbols

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZFK</td>
<td>Zirconia oxygen detector (Type: ZFKE)</td>
</tr>
<tr>
<td>ZKME</td>
<td>Converter (Type: ZKME)</td>
</tr>
</tbody>
</table>

---

### Detector

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZFKE</td>
<td>Detector with flow guide tube (Type: ZFKE)</td>
</tr>
</tbody>
</table>

---

### Converter

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZKME</td>
<td>Converter with flow guide tube (Type: ZFKE)</td>
</tr>
</tbody>
</table>

---

### Flow guide tube

- **None**
- **JIS 5K 65A**
- **JIS 5K 80A**
- **JIS 5K 100A**
- **JIS 10K 65A**
- **JIS 10K 80A**
- **JIS 10K 100A**
- **ANSI 150LB 2B**
- **ANSI 150LB 3B**
- **ANSI 150LB 4B**
- **DIN DN50 PN10**
- **DIN DN80 PN10**

---

### Power supply

- **100 to 120VAC 50/60Hz**
- **200 to 240VAC 50/60Hz**

---

### Cal. gas inlet

- **Non (G3/8 female screw)**
- **For φ 6mm tube**
- **For φ 1/4 inch tube**
- **Ejector for φ 6mm tube**
- **Ejector for φ 1/4 inch tube**

---

### Flow guide tube

- **None**
- **JIS 5K 65A**
- **JIS 5K 80A**
- **JIS 5K100A**
- **JIS 10K 65A**
- **JIS 10K 80A**
- **JIS 10K100A**
- **ANSI 150LB 2B**
- **ANSI 150LB 3B**
- **ANSI 150LB 4B**
- **DIN DN50 PN10**
- **DIN DN80 PN10**

---

### Reference gas inlet

- **Non (G3/8 female screw)**
- **For φ 6mm tube**
- **For φ 1/4 inch tube**

---

### Filler

- **Standard**
- **For high particular**

---

### Instruction manual language

- **Japanese**
- **English**
- **Chinese**

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### Specification name plate

- **Standard**
- **Ex Standard**
  - **NEPSI**
  - **TIIS**

---

### Output signal

- **4 to 20mA DC**
- **0 to 1V DC**

---

### Communication function

- **RS-232C**
- **RS-485**

---

### Optional Functions

- **Combustion efficiency display function**
- **Blowdown**
- **Auto calibration**
- **Combustion efficiency indication + Blowdown**
- **Combustion efficiency indication + Auto calibration**
- **Blowdown + Auto calibration**
- **Combustion efficiency indication + Blowdown + Auto calibration**
- **Blowdown + Auto calibration + Combustion efficiency indication**

---

### Mounting Option

- **None**
- **With valve**
- **With valve + flowmeter**

---

### Number of Cable Gland

- **3**
- **4**
- **5**
- **6**
- **7**

---

### Ex Standard

- **NEPSI**
- **TIIS**

---

### Note 1:

When you select this display, a K or R type thermocouple is required to measure temperature.

---

### Power supply

- **AC100 to 120V**
- **AC200 to 240V**

---

### Code symbols

- **ZFK8Y**
- **Y15-0YY-YY-YY**
- **Y0YY-0YY-0YY**
- **YYY-0YY-0YY**
- **Y0YY-YY-YY**
- **Y0YY-YY-YY**
- **Y0YY-YY-YY**
- **Y0YY-YY-YY**
- **Y0YY-YY-YY**

---

### Instruction manual language

- **Japanese**
- **English**
- **Chinese**

---

### Optional Functions

- **Combustion efficiency display function**
- **Blowdown**
- **Auto calibration**
- **Combustion efficiency indication + Blowdown**
- **Combustion efficiency indication + Auto calibration**
- **Blowdown + Auto calibration**
- **Combustion efficiency indication + Blowdown + Auto calibration**
- **Blowdown + Auto calibration + Combustion efficiency indication**
### General specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring object</td>
<td>Oxygen in non-combustible gas</td>
</tr>
<tr>
<td>Measurement method</td>
<td>Direct insertion type zirconia method</td>
</tr>
<tr>
<td>Measurable range</td>
<td>Settable within a range from 0-2 to 50 vol%O₂</td>
</tr>
<tr>
<td>Repeatability</td>
<td>±0.5% FS or less</td>
</tr>
<tr>
<td>Linearity</td>
<td>±2% FS or less</td>
</tr>
<tr>
<td>Zero/Span drift</td>
<td>Within ±2% of full scale/month</td>
</tr>
<tr>
<td>Response time</td>
<td>4 to 7 seconds (from the calibration gas inlet)</td>
</tr>
<tr>
<td>Analog output</td>
<td>4 to 20mA DC or 0 to 1V DC, insulation</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>100 to 120V AC or 200 to 240V AC</td>
</tr>
</tbody>
</table>

### Detector specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured gas temperature</td>
<td>-10 to +600°C (for the flow guide tube type)</td>
</tr>
<tr>
<td>Measured gas pressure</td>
<td>-3 to +3 kPa</td>
</tr>
<tr>
<td>Filter</td>
<td>Alumina, quartz paper, SUS316 for explosion-proof type</td>
</tr>
<tr>
<td>Structure</td>
<td>Equivalent to ordinary type IP55, or explosion-proof type (as specified)</td>
</tr>
<tr>
<td>Weight</td>
<td>Ordinary type: Approx. 1.6 kg (excluding the flow guide tube)</td>
</tr>
<tr>
<td></td>
<td>Explosion-proof type: Approx. 3 kg (excluding the flow guide tube)</td>
</tr>
</tbody>
</table>

### Converter specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement concentration display</td>
<td>Digital 4 digits with backlight</td>
</tr>
<tr>
<td>Contact output signal</td>
<td>Relay contact output 6 points</td>
</tr>
<tr>
<td>Contact input</td>
<td>No-voltage contact 3 points</td>
</tr>
<tr>
<td>Communication functions</td>
<td>RS-485 (MODBUS) or RS-232C (MODBUS)</td>
</tr>
<tr>
<td>Function</td>
<td>Thermocouple break detection, key lock sensor diagnostic function</td>
</tr>
<tr>
<td>Output hold function</td>
<td>Output is held during calibration and blow-down.</td>
</tr>
<tr>
<td>Option</td>
<td>Optional combustion efficiency display, blow-down, auto calibration, cock, sensor recovery function, flow meter</td>
</tr>
<tr>
<td>Structure</td>
<td>IP66, IP67, or flameproof (as specified)</td>
</tr>
</tbody>
</table>

### Flow guide tube specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>General-purpose, anti-corrosive, with blow-down nozzle, for high particulate concentrations</td>
</tr>
<tr>
<td>Length</td>
<td>300 mm to 1,000 mm (as specified)</td>
</tr>
<tr>
<td>Mounting flange</td>
<td>JIS5K 65A (80A for high particulate concentrations)</td>
</tr>
</tbody>
</table>

#### Device Configuration

**<General type>**

The device to be combined differ according to the conditions of the gas to be measured. Select the devices to be combined with reference to the following table.

<table>
<thead>
<tr>
<th>Measured gas</th>
<th>Device configuration</th>
<th>Detector type</th>
<th>Converter type</th>
<th>Ejector type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>Temperature</td>
<td>Gas Flow</td>
<td>DUST</td>
<td>Protection cover</td>
</tr>
<tr>
<td>------------</td>
<td>------------</td>
<td>----------</td>
<td>-----</td>
<td>-----------------</td>
</tr>
<tr>
<td>General-use (boiler)</td>
<td>600°C or less</td>
<td>5 to 20m/s</td>
<td>Less than 0.2g/Nm³</td>
<td>—</td>
</tr>
<tr>
<td>For corrosive gas (refuse incinerator)</td>
<td>600°C or less</td>
<td>5 to 20m/s</td>
<td>Less than 1g/Nm³</td>
<td>—</td>
</tr>
<tr>
<td>General-use (boiler)</td>
<td>800°C or less</td>
<td>Less than 1m/s</td>
<td>Less than 1g/Nm³</td>
<td>—</td>
</tr>
<tr>
<td>1500°C or less</td>
<td>Less than 1m/s</td>
<td>Less than 1g/Nm³</td>
<td>—</td>
<td>SUS316 tube with blow down</td>
</tr>
</tbody>
</table>

#### <Explosion-proof type>

The device to be combined differ according to the conditions of the gas to be measured. Select the devices to be combined with reference to the following table.

<table>
<thead>
<tr>
<th>Measured gas</th>
<th>Device configuration</th>
<th>Detector type</th>
<th>Converter type</th>
<th>Ejector type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>Temperature</td>
<td>Gas Flow</td>
<td>DUST</td>
<td>Note</td>
</tr>
<tr>
<td>------------</td>
<td>------------</td>
<td>----------</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>General-use (boiler)</td>
<td>600°C or less</td>
<td>5 to 20m/s</td>
<td>Less than 0.2g/Nm³</td>
<td>Fuel; gas, oil</td>
</tr>
<tr>
<td>For corrosive gas (refuse incinerator)</td>
<td>600°C or less</td>
<td>5 to 20m/s</td>
<td>Less than 1g/Nm³</td>
<td>Contained low moisture</td>
</tr>
<tr>
<td>General-use (boiler)</td>
<td>800°C or less</td>
<td>Less than 1m/s</td>
<td>Less than 1g/Nm³</td>
<td>Contained low moisture with blow down</td>
</tr>
<tr>
<td>1500°C or less</td>
<td>Less than 1m/s</td>
<td>Less than 1g/Nm³</td>
<td>Contained low moisture with blow down</td>
<td>ZFK8R</td>
</tr>
</tbody>
</table>

Note 1. Dust volume is approximate value.
Note 2. Instrument quality air or bottled air is available as reference air by selecting detector with reference air inlet.
**Converter (ZKME)**

- **Mounting hole 4-Ø14**
- **Lock screw M6**
- **Ground terminal M4**
- **Cable gland for flame proof φ9 - Ø12 / close-up plug (To order)**
- **View A**
- **View B**
- **Exclusive Cable gland (For power supply)**
- **Exclusive Cable gland (For signal)**
- **Filter**
- **Approx. 215**
- **Calibration gas inlet (To order)**
  - SUS316, for ø6mm tube (the 6th digit is “A”)
  - Or 1/4 inch tube (the 6th digit is “B”)
  - Not provided if the 6th digit is “Y”
- **Ejector gas outlet**
  - SUS316, for ø6mm tube (the 6th digit is “A”)
  - Or 1/4 inch tube (the 6th digit is “B”)
- **Approx. 185**
- **Approx. 57**
- **Approx. 47**
- **Approx. 37**
- **Approx. 21**
- **Approx. 78**
- **View B**
- **Filter**
- **View B**
- **Approx. 185**
- **Approx. 78**
- **Approx. 40**
- **Gas inlet**
- **Gas outlet**
- **6-M5 detector side**
- **ZFKE MTG. position**
- **Approx. L**
- **Approx. 40**
- **Code 11th**
  - 3
  - 5
  - 7
  - 1
  - Z
- **L (m)**
  - 0.3
  - 0.5
  - 0.75
  - 1.0
- **M(9)**
  - 3.3
  - 4.5
  - 6.1
  - 7.6 (To order)

**Detector (ZFKER Y)**

- **Approx. 215**
- **View B**
- **Exclusive Cable gland (For power supply)**
- **Exclusive Cable gland (For signal)**
- **External ground terminal M4**
- **Explosion-proof name plate**
- **Lock screw M6**
- **View A**
- **Calibration gas inlet (To order)**
  - SUS316, for ø6mm tube (the 6th digit is “A”)
  - Or 1/4 inch tube (the 6th digit is “B”)
- **Ejector gas inlet**
  - SUS316, for ø6mm tube (the 6th digit is “A”)
  - Or 1/4 inch tube (the 6th digit is “B”)
- **Approx. 155**
- **Approx. 140**
- **Approx. 90**

**Detector (ZFKER A)**

- **Approx. 215**
- **View B**
- **Exclusive Cable gland (For power supply)**
- **Exclusive Cable gland (For signal)**
- **External ground terminal M4**
- **Explosion-proof name plate**
- **Lock screw M6**
- **View A**
- **Calibration gas inlet**
  - SUS316, for ø6mm tube (the 6th digit is “A”)
  - Or 1/4 inch tube (the 6th digit is “B”)
- **Ejector gas inlet**
  - SUS316, for ø6mm tube (the 6th digit is “A”)
  - Or 1/4 inch tube (the 6th digit is “B”)
- **Approx. 155**
- **Approx. 140**
- **Approx. 90**

**Flow guide tube (Flange size JIS 5K 65A)**

- **ZFKE MTG. position**
- **Approx. L**
- **Approx. 40**
- **Code 11th**
  - 3
  - 5
  - 7
  - 1
  - Z
- **L (m)**
  - 0.3
  - 0.5
  - 0.75
  - 1.0
- **M(9)**
  - 3.3
  - 4.5
  - 6.1
  - 7.6 (To order)