Measuring Instruments Line-Up

Providing the best measurement system solution

Electronic Transmitters  Ultrasonic Flowmeters  Gas Analyzers  Radiation Instruments  Recorders  Temperature Controllers
Rely on Fuji Electric, because we know all about measurement.

Product Panorama

Sensors

- [Pressure]
  - FCX-AII Series Transmitters

- [Differential Pressure/Flow Rate]
  - FCX-AII Series Transmitters

- [Water Level]
  - Water Level Transmitter

- [Liquid Level]
  - FCX-AII Series Transmitters

- [Ultrasonic Flowmeters]

Environmental Instruments

- [Gas Analyzer Systems]
  - Infrared Gas Analyzer System

- [NDIR Gas Analyzers]
  - Compact NDIR Gas Analyzer
  - Hydrogen Gas Analyzer
  - Double Beam NDIR Gas Analyzer
  - Biomass Gas Analyzer
  - Laser Gas Analyzers
  - Single Beam NDIR Gas Analyzer
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<td>16</td>
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</tbody>
</table>

### Control System

**Programmable display**

- MICREX-SPF
- MICREX-SX
- MICREX-View XX

### Environmental Instruments

**[Gas Analyzers]**

- CO₂ CO CH₄ – CP Gas Analyzer
- CO₂ Controller
- Ex-Proof Type
- Compact Type Paramagnetic Gas Analyzer
- Compact type Infrared Gas Analyzer
- Zirconia Oxygen Analyzers
- Paramagnetic Oxygen Analyzers
- Thermal Conductivity Gas Analyzers

**[Temperature Controllers and Recorders]**

- PXF9
- PXF5
- PXF4
- PXR4 Socket type
- PXI9
- PUM Module Type
- RPDA
- PXR3
- PXE4
- Paperless Recorders
- PHU
- PHL
- PHF
- Strip Chart Recorder
- PHC
- PHA

**[PLC, DCS]**

- MICREX-SX

**Environmental Instruments**
Field Instruments

Electronic Transmitters

For highly precise and accurate measurement of flow, level, differential and other pressures

Fuji Electric has long delivered Electronic Transmitters, incorporating the micro-capacitance silicon sensor, to our customers worldwide. The FCX-AII series Transmitters feature compact design, high accuracy and performance, long-term stability. They also offer wide measuring range and provide a variety of diaphragm materials.

Wide range of diaphragm seals available
SUS316L (as standard), Hastelloy-C, Monel, Tantalum, Titanium, Zirconium, Hydrogen permeation prevention (Gold & ceramic coating or gold-plated SUS316L)

Common features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>Accuracy rating</td>
<td>Up to ±0.065% (standard) / ±0.04% (option)</td>
</tr>
<tr>
<td>Stability</td>
<td>±0.1% for 10 years</td>
</tr>
<tr>
<td>Output signal (2-wire)</td>
<td>4 to 20mA DC (HART and Fuji protocol supported)</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>10.5 to 45V DC</td>
</tr>
<tr>
<td>Update rate</td>
<td>60 ms or less</td>
</tr>
<tr>
<td>Enclosure structure</td>
<td>JIS C 0920 Waterproof (equivalent to IEC IP67, NEMA6/6P)</td>
</tr>
<tr>
<td>Housing structure</td>
<td>Type L or T</td>
</tr>
<tr>
<td>Hazardous approvals</td>
<td>TIIS, ATEX, FM, CSA, IECEx, NEPSI</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-40 to 85°C (excluding explosion-proof type)</td>
</tr>
</tbody>
</table>

Hydrogen permeation barrier coating

Micro capacitance silicon sensor

- Electrostatic capacitance type silicon sensor used for over a million transmitters. The crystal silicon material has reduced the size of the hysteresis, achieving excellent stability and reproducibility.
- Optimizing the configuration has helped realize output stability and long-term stability.

New advanced floating cell

- The advanced floating cell protects the sensor from various severe environmental conditions, assuring stability. The downsized sensor has facilitated handling in the field and has superior properties in terms of temperature, static pressure, and excessive pressure in comparison to our conventional model.
<table>
<thead>
<tr>
<th>Field Instruments</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Absolute Pressure Transmitter</strong> (Type: FKH)</td>
<td><strong>Span, Operating pressure</strong></td>
<td><strong>Span limit</strong> (kPa abs)</td>
<td><strong>Operating pressure</strong> (kPa abs)</td>
</tr>
<tr>
<td></td>
<td>8.125 to 130</td>
<td>0 to 130</td>
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<tr>
<td></td>
<td>31.25 to 500</td>
<td>0 to 500</td>
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<td></td>
<td>187.5 to 3000</td>
<td>0 to 3000</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Diaphragm material</strong></td>
<td>SUS316L</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Process connections</strong></td>
<td>NPT1/2 (can be converted to Rc1/4, Rc1/2, or NPT1/4 with optional adapters)</td>
<td></td>
</tr>
<tr>
<td><strong>Pressure Transmitter</strong> (Type: FKP)</td>
<td><strong>Span, Operating pressure</strong></td>
<td><strong>Span limit</strong> (kPa)</td>
<td><strong>Operating pressure</strong> (MPa)</td>
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<tr>
<td></td>
<td>8.125 to 130</td>
<td>0.1 to 0.13</td>
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<td></td>
<td>31.25 to 500</td>
<td>0.1 to 0.5</td>
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<td></td>
<td>187.5 to 3000</td>
<td>0.1 to 3</td>
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<td></td>
<td>625 to 10000</td>
<td>0.1 to 10</td>
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<td><strong>Diaphragm material</strong></td>
<td>SUS316L</td>
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<tr>
<td></td>
<td><strong>Process connections</strong></td>
<td>NPT1/2 (can be converted to Rc1/4, Rc1/2, or NPT1/4 with optional adapters)</td>
<td></td>
</tr>
<tr>
<td><strong>Absolute Pressure Transmitter</strong> (Type: FKA)</td>
<td><strong>Span, Operating pressure</strong></td>
<td><strong>Span limit</strong> (kPa abs)</td>
<td><strong>Operating pressure</strong> (kPa abs)</td>
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<tr>
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<td>1.6 to 16</td>
<td>0 to 16</td>
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<tr>
<td></td>
<td>1.6 to 130</td>
<td>0 to 130</td>
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<tr>
<td></td>
<td>5 to 500</td>
<td>0 to 500</td>
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<tr>
<td></td>
<td>20 to 3000</td>
<td>0 to 3000</td>
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<td><strong>Diaphragm material</strong></td>
<td>SUS316L, Hastelloy-C, Monel, Tantalum</td>
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<tr>
<td><strong>Pressure Transmitter</strong> (Type: FKG)</td>
<td><strong>Span, Operating pressure</strong></td>
<td><strong>Span limit</strong> (kPa abs)</td>
<td><strong>Operating pressure</strong> (MPa)</td>
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<tr>
<td></td>
<td>1.3 to 130</td>
<td>0.1 to 0.13</td>
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<tr>
<td></td>
<td>5 to 500</td>
<td>0.1 to 0.5</td>
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<td>50 to 3000</td>
<td>0.1 to 3</td>
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<td></td>
<td>100 to 10000</td>
<td>0.1 to 10</td>
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<td>500 to 50000</td>
<td>0.1 to 50</td>
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<td><strong>Diaphragm material</strong></td>
<td>SUS316L, Hastelloy-C, Monel, Tantalum</td>
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<td><strong>Gold plated SUS316L, Gold and ceramic coating</strong></td>
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<tr>
<td><strong>Differential Pressure (flow) Transmitter</strong> (Type: FKC)</td>
<td><strong>Span, Operating pressure</strong></td>
<td><strong>Span limit</strong> (kPa)</td>
<td><strong>Operating pressure</strong> (kPa)</td>
</tr>
<tr>
<td></td>
<td>0.1 to 1</td>
<td>0.1 to 3.2</td>
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<tr>
<td></td>
<td>0.1 to 6</td>
<td>0.1 to 10</td>
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<tr>
<td></td>
<td>0.32 to 32</td>
<td>0.1 to 10/16/42</td>
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<td></td>
<td>1.3 to 130</td>
<td>0.1 to 10/16/42</td>
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<td>5 to 500</td>
<td>0.1 to 10/16/42</td>
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<tr>
<td></td>
<td>30 to 3000</td>
<td>0.1 to 16/30</td>
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</tr>
<tr>
<td><strong>Level transmitter</strong> (Type: FKE)</td>
<td><strong>Span (kPa)</strong></td>
<td><strong>Span</strong> (30 to 3000)</td>
<td><strong>Operating pressure</strong> (kPa)</td>
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<td>0.32 to 32</td>
<td>500 to 50000</td>
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<td>1.3 to 130</td>
<td>10 to 10000</td>
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<td>5 to 500</td>
<td>3 to 5000</td>
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<tr>
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<td><strong>Flange size and rating</strong></td>
<td>• ANSI/JPI 150LB, 300LB (1/2 in or 3/4 in for each)</td>
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<td></td>
<td></td>
<td>• Screw type/Wafer type</td>
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<td><strong>Diaphragm material</strong></td>
<td>SUS316L, Hastelloy-C, Monel, Tantalum</td>
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<td><strong>Titanium, Zirconium, Gold plated SUS316L</strong></td>
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<tr>
<td><strong>Remote Seal Type Pressure Transmitter</strong> (Type: FKB)</td>
<td><strong>Span (kPa)</strong></td>
<td><strong>Span</strong> (1.3 to 130)</td>
<td><strong>Operating pressure</strong> (MPa)</td>
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<td>5 to 500</td>
<td>0.1 to 0.13</td>
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<td>30 to 3000</td>
<td>0.1 to 0.5</td>
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<td>100 to 10000</td>
<td>0.1 to 3</td>
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<td>500 to 50000</td>
<td>0.1 to 10</td>
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<td><strong>Flange size and rating</strong></td>
<td>• ANSI/JPI 150LB, 300LB, 600LB (1/2 in or 3/4 in or 1.5 in or 2 in or 3 in or 4 in for each)</td>
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<td><strong>Diaphragm material</strong></td>
<td>SUS316L, Hastelloy-C, Monel, Tantalum</td>
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<td><strong>Titanium, Zirconium, Gold plated SUS316L</strong></td>
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<tr>
<td><strong>Remote Seal Type Differential Pressure Transmitter</strong> (Type: FKD)</td>
<td><strong>Span (kPa)</strong></td>
<td><strong>Span</strong> (1.3 to 130)</td>
<td><strong>Operating pressure</strong> (MPa)</td>
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<td>30 to 3000</td>
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<td>0.1 to 10</td>
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<td><strong>Flange size and rating</strong></td>
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<td><strong>Diaphragm material</strong></td>
<td>SUS316L, Hastelloy-C, Monel, Tantalum</td>
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<td><strong>Titanium, Zirconium, Gold plated SUS316L</strong></td>
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<tr>
<td><strong>Differential Pressure (flow) Transmitter</strong> Foundation Fieldbus (Type: FDC)</td>
<td><strong>Span, Operating pressure</strong></td>
<td><strong>Span limit</strong> (kPa)</td>
<td><strong>Operating pressure</strong> (MPa)</td>
</tr>
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<td>0.1 to 1</td>
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<td>30 to 3000</td>
<td>0.1 to 16/30</td>
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<td><strong>Gold plated SUS316L, Gold and ceramic coating</strong></td>
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<td><strong>Pressure Transmitter</strong> Foundation Fieldbus (Type: FDG)</td>
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<td><strong>Span limit</strong> (kPa)</td>
<td><strong>Operating pressure</strong> (MPa)</td>
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<td>30 to 3000</td>
<td>0.1 to 3</td>
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<td>500 to 50000</td>
<td>0.1 to 50</td>
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<td><strong>Diaphragm material</strong></td>
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<td></td>
<td><strong>Gold plated SUS316L, Gold and ceramic coating</strong></td>
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<tr>
<td><strong>Remote Seal Type Pressure Transmitter</strong> Foundation Fieldbus (Type: FDB...F)</td>
<td><strong>Span (kPa)</strong></td>
<td><strong>Span</strong> (1.3 to 130)</td>
<td><strong>Operating pressure</strong> (kPa)</td>
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<tr>
<td></td>
<td>5 to 500</td>
<td>3 to 5000</td>
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<td>30 to 3000</td>
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<td>500 to 50000</td>
<td>30 to 30000</td>
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<tr>
<td></td>
<td><strong>Flange size and rating</strong></td>
<td>• ANSI/JPI 150LB, 300LB, 600LB (1/2 in or 3/4 in or 1.5 in or 2 in or 3 in or 4 in for each)</td>
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<td></td>
<td></td>
<td>• Screw type/Wafer type</td>
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<td></td>
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<td><strong>Diaphragm material</strong></td>
<td>SUS316L, Hastelloy-C, Monel, Tantalum</td>
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<tr>
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<td></td>
<td><strong>Titanium, Zirconium, Gold plated SUS316L</strong></td>
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<tr>
<td><strong>Remote Seal Type Differential Pressure Transmitter</strong> Foundation Fieldbus (Type: FDD...F)</td>
<td><strong>Span (kPa)</strong></td>
<td><strong>Span</strong> (0.32 to 32)</td>
<td><strong>Operating pressure</strong> (kPa)</td>
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<td>1.3 to 130</td>
<td>5 to 500</td>
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<tr>
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<tr>
<td></td>
<td></td>
<td><strong>Titanium, Zirconium, Gold plated SUS316L</strong></td>
<td></td>
</tr>
</tbody>
</table>
Ultrasonic Flowmeters & Water Level Transmitter

Easy and non-intrusive installation on existing pipe!

<Features>
- Clamp-on sensor can be mounted outside the pipe
- Fast response within a second
- Independent of fluid temperature and pressure
- Wide range of models meet various needs
- Ultrasonic flowmeter for air also available

<Ultrasonic flowmeter line-up>
- Portable type (FSC)
- Standard type TIME DELTA-C (FSV)
- Hybrid type Duosonics (FSH)
- Compact type M-Flow (FLR)
- Advanced type (FSV)
- Ultrasonic Flowmeter for Air (FWD)

With ultrasonic pulses propagated diagonally between the upstream and downstream sensors, flow rate is measured by detecting the time difference generated by the flow.

System configuration example

Fluid types and piping conditions

<table>
<thead>
<tr>
<th>Fluid type</th>
<th>Uniform liquid in which ultrasonic waves can propagate (water, sea water, oil, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbidity</td>
<td>10,000 mL/min or less</td>
</tr>
<tr>
<td>Piping materials</td>
<td>Carbon steel, stainless steel, cast iron, PVC, FRP, copper, aluminum, acrylic, etc.</td>
</tr>
<tr>
<td>Lining materials</td>
<td>No lining, tar epoxy, mortar, rubber, Teflon, etc.</td>
</tr>
<tr>
<td>Fluid condition</td>
<td>Uniform flow in a filled pipe with no swirl</td>
</tr>
</tbody>
</table>

Simultaneous measurement of dual-channel flow with one transmitter

Capable of measuring flow rate in 2 separate pipes, and calculating average, totalized value, and difference.
**Field Instruments**

**New Portable Type Ultrasonic Flowmeter (Type: FSC, FSS)**
- Small and lightweight (IP66 type front dimension: 142x170mm)
- Highly bubble resistant
- Power supply: built-in rechargeable battery (Battery life: 12 hours)
- Others: PC loader software (equipped as standard)
- Option: Flow velocity profile display, printer

**Consumed Energy Calculation Function**
- Calculates the thermal energy received and sent with fluid transfer in cooling and heating.

**Consumed Thermal Energy**
- q = K \( \frac{Q}{T_s - T_r} \)
- K: Thermal coefficient (for heating, K = 4.186; for cooling, K = 4.123)

**Water Level Transmitter (Type: FQK)**
- The micro-capacitance silicon sensor of the detector suspended in water detects the water pressure applied to the diaphragm and convert it into a current output signal.
- Measurement range: 0 to 1.5…50m
- Output signal: 4 to 20mA DC (2-wire)
- Power supply voltage: 24VDC (10.5 to 32V)
- Tolerance: ±0.2%
- Error: ≤0.2%
- Detector: SUS316L or for sewage water
- High rate: PVC or PE covering
- Hollow cable length: Up to 100m
- Option: Detector stand, chain

**Ultrasonic Flowmeters**

**TIME DELTA-C**
- Small and lightweight (IP66 type front dimension: 142x170mm)
- Highly bubble resistant
- Power supply: built-in rechargeable battery (Battery life: 12 hours)
- Others: PC loader software (equipped as standard)
- Option: Flow velocity profile display, printer

**Hybrid Type Duosonics**
- Pulse doppler method + transit time method
- Automatic switching according to flow condition

**Advanced Type Ultrasonic Flowmeter (Type: FSV, FSS)**
- Consumed energy calculation
- Simultaneous flow measurement of 2 pipes with one transmitter
- High accuracy measurement by 2-path system for 1 pipe

**Portable Type Ultrasonic Flowmeter for Air (Type: FWD)**
- No pressure loss with no obstructions inside pipe
- Pipe size: 25mm to 200mm

**Ultrasonic Flowmeter M-Flow PW/ BTU Meter (Type: FLR, FSS)**
- Small and lightweight (front dimension: 140x130mm)
- Highly bubble resistant
- Power supply: built-in rechargeable battery (Battery life: 12 hours)
- Others: PC loader software (equipped as standard)
- Option: Flow velocity profile display, printer

**Water Level Transmitter**
- The micro-capacitance silicon sensor of the detector suspended in water detects the water pressure applied to the diaphragm and convert it into a current output signal.
- Measurement range: 0 to 1.5…50m
- Output signal: 4 to 20mA DC (2-wire)
- Power supply voltage: 24VDC (10.5 to 32V)
- Tolerance: ±0.2%
- Error: ≤0.2%
- Detector: SUS316L or for sewage water
- High rate: PVC or PE covering
- Hollow cable length: Up to 100m
- Option: Detector stand, chain

**Ultrasonic Flowmeters**

**FLR, FSS**
- Transformer
- Small type (φ13 to 300mm)
- High temperature (φ50 to 4000mm)
- Low temperature (φ50 to 1200mm)
- High pressure (up to 8000mm)
- others: PC loader software (equipped as standard)
- Option: Flow velocity profile display, printer

**Advanced Type Ultrasonic Flowmeter**
- detection method:渴sultant value, total value, trend graph, logger, waveform, etc.
- Display function: Instantaneous value, total value, trend graph, logger, waveform, etc.
- Power supply: 100 to 240VAC, 50/60Hz or 10 to 30VDC
- Output signal: 4 to 20mA DC, Total pulse output, RS485 communication
- Accuracy: ±1% of rate

**Ultrasonic Flowmeter for Air (Type: FWD)**
- Detection method: Transformer
- Transformer
- Small type (φ13 to 300mm)
- High temperature (φ50 to 4000mm)
- Low temperature (φ50 to 1200mm)
- High pressure (up to 8000mm)
- others: PC loader software (equipped as standard)
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- Power supply: built-in rechargeable battery (Battery life: 12 hours)
- Others: PC loader software (equipped as standard)
- Option: Flow velocity profile display, printer
Spool Piece Ultrasonic Flowmeter (FST) for liquid applications

Measuring principle: parallel three-path, transit time difference method

The sensors placed on upstream and downstream emit ultrasonic pulse in turn, and detect the transit time difference of the pulse to calculate the flow rate.

Advanced Features for a Wide Range of Applications

- **Accuracy**: ±0.2% of rate
- **Easy-to-operate**
- **Low maintenance**

**Reliability. Safety. Convenience.**

**Reliability**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero point adjustment</td>
<td>When the flow is stopped, the zero point can be adjusted with a single push of a button.</td>
</tr>
<tr>
<td>Damping</td>
<td>Used to reduce fluctuation of measured values. Setting range: 0 to 100 s (in 0.1 second steps)</td>
</tr>
<tr>
<td>Low flow cut-off</td>
<td>Output can be cut off when the flow rate is low. Setting range: 0 to 5 m/s (in 0.01 m/s steps)</td>
</tr>
</tbody>
</table>

**Safety**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event-triggered alarms</td>
<td>Alarm output is activated upon instances of hardware error and/or process error.</td>
</tr>
<tr>
<td>Output burnout</td>
<td>When there is no fluid in the pipe or there are air bubbles in the fluid, the flowmeter holds the analog output and emits a contact output.</td>
</tr>
</tbody>
</table>

**Convenience**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit selection</td>
<td>m/s, L/s, L/min, L/h, L/d, KL/d, ML/d, m³/s, m³/min, m³/h, m³/d, Km³/d, or Mm³/d</td>
</tr>
<tr>
<td>Bi-directional range</td>
<td>User can configure a range for each of forward flow and reverse flow. Operating range can be emitted as contact output.</td>
</tr>
<tr>
<td>Auto-switchable ranges</td>
<td>User-defined two ranges can be switched automatically.</td>
</tr>
</tbody>
</table>

**Unit Selection**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>m/s</td>
<td>V</td>
<td>Velocity</td>
</tr>
<tr>
<td>L/s</td>
<td>A</td>
<td>Area</td>
</tr>
<tr>
<td>L/min</td>
<td>Q</td>
<td>Flow rate</td>
</tr>
<tr>
<td>L/d</td>
<td>Q</td>
<td>Flow rate</td>
</tr>
<tr>
<td>KL/d</td>
<td>Q</td>
<td>Flow rate</td>
</tr>
<tr>
<td>ML/d</td>
<td>Q</td>
<td>Flow rate</td>
</tr>
<tr>
<td>m³/s</td>
<td>Q</td>
<td>Flow rate</td>
</tr>
<tr>
<td>m³/min</td>
<td>Q</td>
<td>Flow rate</td>
</tr>
<tr>
<td>m³/h</td>
<td>Q</td>
<td>Flow rate</td>
</tr>
<tr>
<td>m³/d</td>
<td>Q</td>
<td>Flow rate</td>
</tr>
<tr>
<td>Km³/d</td>
<td>Q</td>
<td>Flow rate</td>
</tr>
<tr>
<td>Mm³/d</td>
<td>Q</td>
<td>Flow rate</td>
</tr>
</tbody>
</table>

**Flow Velocity**

\[ V = K \cdot (T_2 - T_1) \]

**Pipe Cross-sectional Area**

\[ A = \pi D^2 / 4 \]

**Flow Rate**

\[ Q = A \cdot V \]

**Flow Switch**

Contact output is emitted when the instantaneous flow rate has reached the high or low limit.

**Total Switch**

Contact output is emitted when the total flow rate (forward direction) has reached the high limit.
Electronic Personal Dosimeter DOSE-i

- Small and Lightweight
- Easy-to-Read Display
- Simple Operation

Electronic Personal Dosimeter NRF Series

- Compact and Lightweight
- Long Battery Life
- Colour Backlight
- Large Display

Portable Neutron Survey Meter NSN3

- Lightweight
- No \(^{3}\)He or BF\(^{3}\)
- Wide Range Measurement
- 3-Way Power Supply

Dosimeter Reader

Reads entry/exit information, and writes the setting information received from computer system into the dosimeter

Nuclear Transmitter

- Smart or analog pressure transmitter (gauge or differential pressure) with remote seals.
- Referentials:
  - ISO 9001 v.2008
  - ISO 14001
  - HAF604
  - ATEX
  - QN100/QN200/QN300
  - RCC-E ed. 2007 et 2012
- “K3-A, K3-AD classified version”, smart and analog pressure transmitter (absolute, gauge or differential pressure).
Our solutions include both paperless and inkjet Strip Chart recorders.

Industrial recorders are used to record process values such as temperature, pressure, flow rate in various industrial plants. Fuji Electric provides 100mm/180mm wide color inkjet recorders, and paperless recorders capable of storing data of approx. 4 years in a memory card. The paperless recorders can accept up to 36 inputs and allows you to view data in a wide variety of formats, including a bar graph, digital display, event summary, historical trend, etc.

**Paperless Recorders**
- Data of 4 years worth can be stored in a Memory card
- Wide variety of display mode
- Ethernet and RS485 communication available

**Inkjet Strip Chart Recorder**
- 6-color high quality trace

**Panel Instruments**
**Paperless Recorders**

**PHU: front dimension 300 x 300 mm**

- **Real-time data indication**
- **Large capacity data storage in Compact Flash**
- **Factory configuration model**
- **Accept 9 to 36 inputs**
- **Large display**

**Paperless Recorder (Type: PHU)**

<table>
<thead>
<tr>
<th>Input points</th>
<th>9, 18, 27, 36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input signal</td>
<td>Thermocouple (12 types), RTD (2 types), DC voltage/current</td>
</tr>
<tr>
<td>Scan rate</td>
<td>100ms/200ms/300ms/600ms/900ms/900 dots</td>
</tr>
<tr>
<td>Calculation function</td>
<td>Integration, F-value calculation, square root extraction</td>
</tr>
<tr>
<td>Display</td>
<td>13.1&quot; TFT color LCD (900 x 600 dots)</td>
</tr>
<tr>
<td>Display contents</td>
<td>Trend, bar graph, digital, historical trend, event summary, tag amount of memory used, analog meter, parameter settings</td>
</tr>
<tr>
<td>Recording medium</td>
<td>Compact Flash card (1GB max.)</td>
</tr>
<tr>
<td>Data format</td>
<td>ASCII or Binary</td>
</tr>
<tr>
<td>PC Support software</td>
<td>Data viewer software, loader software for parameter setting/ change</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>100 to 240V AC 50/60Hz</td>
</tr>
<tr>
<td>Outer dimensions</td>
<td>144×144×175mm (panel mount)</td>
</tr>
<tr>
<td>Mass</td>
<td>Approx. 6.2 kg (full option)</td>
</tr>
<tr>
<td>Option</td>
<td>Alarm output (9 points)/ DI (5), Ethernet</td>
</tr>
</tbody>
</table>

**Microjet Recorder-E 100mm wide (Type: PHE)**

- **100mm wide, 6-color inkjet recording**
- **Factory configuration model**
- **Accept 9 to 36 inputs**
- **Large display**

**Microjet Recorder-E 100mm wide (Type: PHE)**

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**Mechanism of inkjet printing**

With voltage applied to the piezo elements, the shape of the elements changes as shown in the diagram, and ink particles are ejected from the tip of the nozzle. These particles are very small and fast, and draw a series of very small dots of about 0.3mm diameter on the chart paper. These small dots are combined together to form characters and trace lines for clear visible recording.

(a) Initial state
(b) Deformation of piezo element
(c) Ink drop ejection
Temperature Controllers

We have all you need for temperature control in our comprehensive product families.

- **Color LCD type PXF**
  - PXF9 (96 × 96mm)
  - PXF5 (48 × 96mm)
  - PXF4 (48 × 48mm)

- **Economy type PXE**
  - PXE (48 × 48mm)

- **Low-cost type PXR**
  - PXR3 (24 × 48mm)

- **Socket type PXR**
  - PXR4 (48 × 48mm)

- **On/off contact output < Digital Thermostat >**
  - PXR3 (24 × 48mm)

- **Single Loop Process PXH**
  - PXH (96 × 96mm)

- **Multi Loop Programable RPDA**
  - RPDA (72 × 144mm)

- **Current Detector for heater break alarm**
  - CTL

### Applied products of Temperature Controllers

- **Digital panel meter (PXR3)**
  - 1 input signal
  - Communication signal (optional)

- **Signal converter with display (PXR3)**
  - 1 input signal
  - Communication signal (optional)

- **Multi-loop module type Temperature Controller <PUM series>**

#### Variations

- **Control Module (PUMA/B)**
- **Analog Input/Output Module (PUMI)**
- **CC-LINK Communication Module (PUMCL)**
- **PLC Communication Module (PUMCM)**
- **PROFIBUS Communication Module (PUMCP)**
- **Ethernet Communication Module (PUMCE)**

- **Control Module (PUMA/B)**
  - Event Input/Output Module (PUME)
  - CC-LINK Communication Module (PUMCL)
  - PLC Communication Module (PUMCM)
  - PROFIBUS Communication Module (PUMCP)
  - Ethernet Communication Module (PUMCE)

- **Smart!**
  - Heater break alarm CT (8 points)
  - Programless host communication
  - Detachable terminal
  - Simple loader operation
  - High-speed data communication (230.4kbps)
  - Hi-speed data sampling

- **User-friendly!**
  - Modular design
  - Easy installation
  - Compact size

- **Fast!**
  - Quick response
  - High accuracy

### Applied Products

- **Plastic extrusion machine**
  - Programmable operation display
  - Mitsubishi PLC
  - Temperature control
  - Air flow rate control

- **Reflow oven**
  - Programmable operation display
  - Mitsubishi PLC
  - Temperature control
  - Air flow rate control

- **Plastic injection machine**
  - Programmable operation display
  - Mitsubishi PLC
  - Temperature control

- **Flat panel display baking furnace**
  - Programmable operation display
  - Mitsubishi PLC
  - Temperature control

- **Relay output**
  - 1 output signal
  - 4 to 20mA (DC 1 to 5VDC)

### Applied Instruments

- **Low-cost type PXR**
  - Single Loop
  - Multi Loop Programable
  - Optional contact output

- **Economy type PXE**
  - Single Loop
  - Multi Loop Programable

- **Current Detector for heater break alarm**
  - Single Loop
  - Multi Loop Programable

- **Digital panel meter (PXR3)**
  - Single Loop
  - Multi Loop Programable

- **Signal converter with display (PXR3)**
  - Single Loop
  - Multi Loop Programable

### Variations

- **Temperature Controllers**
  - PXE (48 × 48mm)
  - PXH (96 × 96mm)
  - RPDA (72 × 144mm)
  - CTL
Multiloop Programmable Controller

**PID Controller**

Analog input signal: 7
[DC voltage, DC current, thermocouple (option), RTD (option)]
Two thermocouple inputs or two RTD inputs are selectable.

Digital input signal: 10
[No-voltage contact or transistor contact ON/0 V, OFF/24 V, ON current/about 8 mA
Isolated from the internal circuit by photocoupler. Not isolated between each digital input and output.]

Analog Output Signal: 1, 2, or 4

Digital output signal: 10
[Transistor open collector 1V max. at ON, 10µA max at OFF. Isolated from the internal circuit by photocoupler. Not isolated between each digital input and output.]

- Four cascade controls are available
- Control and computation function dependent
- High Reliability for Demanding Process Use
  Control, display and I/O functions are managed by independent CPUs for enhanced security and reliability.
  Peer-to-peer communication to expand number of I/Os
- New Generation of Programmable PID Controller
  Large Fine color graphic LCD
  DCS in instruments format - Advanced computation and sequential control functions
  Ample I/O numbers with a wide selection of signal types
  Easy setting of various engineering functions
- Fully Programmable Multi-function
- Auxiliary Panel Instruments

Bargraph Indicating Alarm
Independent bargraph for four analog inputs. Four alarm trip indication and outputs.

- Powerful Engineering Tools to Help You Explore the Full Capability of the Controller
- Independent hardware buttons for manual control operation
- Manual Loader optional
- Ideal for Replacing Existing Instruments
  IEC/DIN format panel cutout size (W72 X H144mm)
  Fully compatible in functions with existing PID controllers
- PC Configuration Software SCCFG
  Used to configure display setting, PV and network parameters. Used to program advanced computation and sequential control function setting.

**Functional Diagram:**
Application Examples of Temperature Controllers

Controlling the flow rate of dry gas

Low selection control

PID Palette and SV select

Soft start

Position feedback control

Air-conditioning control

Energy saving in cattle shed

Temperature control of oven

Both heating and cooling are controlled with only one temperature controller utilizing its 2 control outputs.

Power consumption can be curbed by controlling a cooling fan motor with inverter.

Operators can adjust a setpoint using digital inputs.

Changeover of 4 set values (front SV, SV1 to 3) can be commanded externally.
Module type Temperature Controllers

- Designed to be easily built into your equipment
- High-performance combined with detachable terminal structure, various control functions, and high-speed data communication
- Dedicated PC loader software facilitates parameter setting and checking control status.

**Smart!**
3-phase heater break alarm
Heater break alarm CT (8 points)
A break in a three-phase heater can be detected by using 2 points CT per channel.

**User friendly!**
Detachable terminal structure
The terminal is attachable and detachable without using a screw driver. Wiring time for maintenance is reduced substantially.

**Fast!**
Programless communication with upper device
You can rest easy with the multi-loop controller thanks to hi-speed communication of 230.4kbps with no time-lag.

Programless communication with upper device
High-speed communication is possible because it is only assigned important data.

**Basic system**
Control module + Event/Analog input/output module

Control module (PUMA/B) 2 or 4 loop
Enhanced Communication Module (PUMCP) PROFIBUS
Enhanced Communication Module (PUMCL) CC-link
Event Input/Output Module (PUME) 8 DI & 8DO
Enhanced Communication Module (PUMCM) Programless communication with Mitsubishi PLC
Analog Input/Output Module (PUMV/N/T) 4 AI & 4AO
Ethernet Communication Module (PUMCE)

Easy to attach to DIN rail
Locking tabs on rear side enable DIN rail mount and inter-module connection

High-speed sampling time
200msec sampling time enable it to apply to not only temperature measurement but also process measurement such as pressure control, flow control, etc.

**Extended system**
Basic system + Enhanced communication module

Control module (PUMA/B) up to 16 units, 64 loops maximum
Event input/output module PUME Up to 16 units
Windows PC Loader software

Simple loader
Simple loader is available to change all module parameter setting without changing each loader connection. With “favorite function,” the frequently-used parameters can be edited preferentially.

Detachable terminal structure
The terminal is attachable and detachable without using a screw driver. Wiring time for maintenance is reduced substantially.

Simple loader is available to change all module parameter setting without changing each loader connection.

With “favorite function,” the frequently-used parameters can be edited preferentially.

Easy to attach to DIN rail
Locking tabs on rear side enable DIN rail mount and inter-module connection

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A break in a three-phase heater can be detected by using 2 points CT per channel.

High-speed sampling time
200msec sampling time enable it to apply to not only temperature measurement but also process measurement such as pressure control, flow control, etc.
### Functions

<table>
<thead>
<tr>
<th>Front size mm</th>
<th>Set point control type</th>
</tr>
</thead>
<tbody>
<tr>
<td>48×24</td>
<td>PXF4, 5, 9</td>
</tr>
<tr>
<td>48×48</td>
<td>○</td>
</tr>
<tr>
<td>48×96</td>
<td>○</td>
</tr>
<tr>
<td>72×72</td>
<td>○</td>
</tr>
<tr>
<td>96×96</td>
<td>○</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indication accuracy</th>
<th>±0.2%</th>
<th>±0.5%</th>
<th>±0.5%</th>
<th>±0.5%</th>
<th>±0.1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control cycle</td>
<td>0.05 sec.</td>
<td>0.5 sec.</td>
<td>0.5 sec.</td>
<td>0.2 sec.</td>
<td>0.05 sec.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>External terminal structure</th>
<th>M3 screw terminal</th>
<th>Plug-in terminal</th>
<th>Socket</th>
<th>M3 screw terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>24V DC power supply</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Fuzzy control</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Auto/manual switchover</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Remote SV input</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Re-transmission output</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Communication</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Motorized valve control</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Transmitter power supply</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Remote set point</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Ramp/soak</td>
<td>64 steps</td>
<td>8 steps</td>
<td>8 steps</td>
<td>64 steps</td>
</tr>
<tr>
<td>LCD display</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Heater burnout alarm</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Front water-proof structure</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

#### Common functions (some are not applicable for all models)
- Auto-tuning PID
- Input signal (thermocouple, resistance thermometer, DC voltage/current)
- Control output (relay contact output, SSR/SSC drive output, 4 to 20mA current output)
- Heating/cooling control (excluding some models)
- Alarm relay output (optional)

#### Re-transmission output (optional)
A cost corresponding to one temperature sensor can be reduced just by connecting a PV transfer signal to a recorder.

#### Communication function (optional)
Communication with PC, programmable operation display, and PLC is available via an RS-485 interface.

#### PID + self-tuning, PID + fuzzy control
Auto-tuning and self-tuning functions enable calculation of optimal PID parameters. In addition, fuzzy control function is offered as standard to prevent overshoot and suppress undershoot due to disturbance. These functions ensure optimal control for various application.

#### Self-tuning
Tuning is made automatically to re-optimize PID parameters at the following situation: at power on, when set value is changed, or during external disturbance.

#### Fuzzy control
Suppress overshoot without wasting start-up time. Also, quickly reverts to set points at the event of external disturbances.

#### Ramp/soak function (optional)
Temperature rise/fall pattern is controlled by setting a heat pattern having a gradient. (8-step for PXR, 64-step for PXF and PXH)
### Typical Applications

<table>
<thead>
<tr>
<th>Application Fields and Plants</th>
<th>Target Gases</th>
<th>Applicable Model Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmospheric pollution</td>
<td>Waste incinerators</td>
<td>SO\textsubscript{x}, NO\textsubscript{x}, CO, CO\textsubscript{2}, O\textsubscript{2}</td>
</tr>
<tr>
<td></td>
<td>Desulfurization and denitrification of exhaust gas</td>
<td>SO\textsubscript{x}, NO\textsubscript{x}, O\textsubscript{2}, HCl, NH\textsubscript{3}</td>
</tr>
<tr>
<td></td>
<td>General incinerator (including boilers)</td>
<td>SO\textsubscript{x}, NO\textsubscript{x}, O\textsubscript{2}, HCl</td>
</tr>
<tr>
<td></td>
<td>Diesel power generation</td>
<td>SO\textsubscript{x}, NO\textsubscript{x}, O\textsubscript{2}</td>
</tr>
<tr>
<td></td>
<td>Vehicle exhaust gas</td>
<td>CO, HC, CO\textsubscript{2}, O\textsubscript{2}</td>
</tr>
<tr>
<td>Biochemistry (microbes)</td>
<td>Fermentation</td>
<td>Methanol, CO\textsubscript{2}</td>
</tr>
<tr>
<td></td>
<td>Incubator</td>
<td>CO\textsubscript{2}, O\textsubscript{2}</td>
</tr>
<tr>
<td>Food and vegetable storage and ripening</td>
<td></td>
<td>CO\textsubscript{2}, Ar, He, CO, O\textsubscript{2}</td>
</tr>
<tr>
<td>Enzyme lab</td>
<td>gas separation</td>
<td>CO\textsubscript{2}, Ar, He, CO, O\textsubscript{2}</td>
</tr>
<tr>
<td>Steel-Thermal treatment</td>
<td>Shaft furnaces, converters</td>
<td>CO, CO\textsubscript{2}, H\textsubscript{2}, O\textsubscript{2}</td>
</tr>
<tr>
<td></td>
<td>Heating furnace</td>
<td>CO, CO\textsubscript{2}, O\textsubscript{2}</td>
</tr>
<tr>
<td></td>
<td>Gas generator</td>
<td>CO\textsubscript{2}</td>
</tr>
<tr>
<td></td>
<td>Carburizing furnace, annealing furnace</td>
<td>CO, CO\textsubscript{2}, O\textsubscript{2}</td>
</tr>
<tr>
<td></td>
<td>Nitrogenation ovens</td>
<td>NH\textsubscript{3}</td>
</tr>
<tr>
<td>Energy saving</td>
<td>Boiler and Furnaces</td>
<td>O\textsubscript{2}, CO, CO\textsubscript{2}</td>
</tr>
<tr>
<td>Ceramic industry</td>
<td>Tunnel kiln</td>
<td>CO, O\textsubscript{2}</td>
</tr>
<tr>
<td></td>
<td>Coal calcining</td>
<td>CO</td>
</tr>
<tr>
<td></td>
<td>Cement</td>
<td>CO, CO\textsubscript{2}, O\textsubscript{2}</td>
</tr>
<tr>
<td>Water and sewerages</td>
<td>sewer systems sludge incinerators (exhaust gas)</td>
<td>SO\textsubscript{x}, NO\textsubscript{x}, N\textsubscript{2}O, O\textsubscript{2}</td>
</tr>
<tr>
<td>Agriculture/horticulture</td>
<td>Facility gardening</td>
<td>CO</td>
</tr>
<tr>
<td></td>
<td>Photosynthesis studies</td>
<td>CO\textsubscript{2}</td>
</tr>
<tr>
<td>Environment</td>
<td>Concentration in tunnel</td>
<td>CO</td>
</tr>
<tr>
<td></td>
<td>Parking lot</td>
<td>CO, CO\textsubscript{2}</td>
</tr>
<tr>
<td></td>
<td>Building management, air conditioning</td>
<td>CO\textsubscript{2}</td>
</tr>
</tbody>
</table>

Fuji Electric developed the first infrared gas analyzer in Japan using mass-flow sensors. Since then, we have supplied customers with various types of gas analyzers to support environmental preservation and control efforts. These efforts include measurement of atmospheric pollution and detection of low-density SO\textsubscript{x} and NO\textsubscript{x}, generated by incinerating facilities and boilers. Fuji Electric gas analyzers are commonly used to monitor the atmosphere to help maintain a clean natural environment.

Our new product, insertion type laser gas analyzer for stack gas is the first analyzer in Japan which can measure HCl, NH\textsubscript{3}, O\textsubscript{2}, H\textsubscript{2}O, CO, CO\textsubscript{2}, and CH\textsubscript{4}. The 5-component analyzer capable of simultaneously measuring concentration of NO\textsubscript{x}, SO\textsubscript{x}, CO, CO\textsubscript{2}, and O\textsubscript{2} contained in flue gas is housed in space-saving enclosure and can be maintained from front side.
CO/O₂ Gas Analyzer for stack gas (Type: ZSQ)
- **Applications**: Incinerators
- **Measurable components and ranges**
  - CO (0 to 20…200 ppm)
  - O₂ (0 to 25%)  
- **Measuring principle**: Infrared, zirconia
- **Display**: LCD with backlight
- **Japanese pattern approval No.**: SAC984, SE981
- **Outer dimensions**: 1550×730×650mm
- **Structure**: For outdoor/indoor applications
- **Mass**: Approx. 140kg

Gas analyzer for stack gas (1 to 5-Component Analyzer) (Type: ZSU)
- **Applications**: Boilers, incinerators, etc.
- **Measurable components**
  - SO₂, NOX, CO, CO₂, O₂
  - Simultaneous measurement (N₂O + CH₄ possible)
- **Measuring principle**: Double-beam infrared, zirconia, paramagnetic
- **Display**: LCD with backlight
- **Japanese pattern approval No.**: SAS992-1, SE981, SF011, SAC992-1, SAN991-1
- **Outer dimensions**: 1710×800×615mm
- **Structure**: For outdoor/indoor applications
- **Mass**: Approx. 300kg

Gas analyzer for stack gas (7-component analyzer) (Type: ZSU-7)
- **Applications**: Boilers, incinerators, etc.
- **Measurable components and range**
  - NOx, SO₂, CO, CO₂, O₂, HCl, Dust
- **Measuring principle**: Infrared, zirconia, laser, electrostatic induction
- **Display**: LCD with backlight
- **Japanese pattern approval No.**
- **Outer dimensions**: 1780×1215×700mm
- **Structure**: For outdoor/indoor applications
- **Mass**: 300kg

Compact Type Infrared Gas Analyzer (Type: ZSVF)
- **Applications**: Heat-treatment furnaces, research facilities on biogas or plant cultivation, etc.
- **Measurable components with minimum ranges**
  - NOX: 0 … 500 … 5000 ppm
  - SO₂: 0 … 500 ppm … 1%
  - CO₂: 0 … 200 ppm … 100%
  - CO: 0 … 200 ppm … 100%
  - CO₂: 0 … 1000 ppm … 100%
  - O₂: 0 … 5/10/25%
- **Repeatability**: ±0.5% FS
- **Number of measurable components**: up to 5

In-situ Zirconia Oxygen Analyzer (Type: ZSB)
- **Applications**: Industrial boilers and furnaces, etc.
- **Measurable component and range**
  - O₂ (0 to 2…50vol% manual configuration)
- **Reproducibility**: ±0.5% FS
- **Response time**: 10 sec. for 90%
- **Automatic calibration and manual/auto blow-down functions**
- **Outer dimensions**: 1500×530×550mm (self-standing)
  - 700×400×180mm (wall-mounting)
- **Automatic calibration and manual/auto blow-down functions**

Direct Insertion Laser Gas Analyzer (Type: ZSS)
- **Applications**: Incinerators, denitration facilities, heat-treatment furnace
- **Measurable components and ranges**
  - NH₃, HCl, H₂O, O₂, CO, CO₂, and CH₄ gas concentrations can be measured at high speed by directly installing transmitter unit and receiver unit in the stack.
  - NH₃, HCl, H₂O, O₂, CO, CO₂, and CH₄ gas concentrations can be measured at high speed by directly installing transmitter unit and receiver unit in the stack.
  - NH₃, HCl, H₂O, O₂, CO, CO₂, and CH₄ gas concentrations can be measured at high speed by directly installing transmitter unit and receiver unit in the stack.
  - NH₃, HCl, H₂O, O₂, CO, CO₂, and CH₄ gas concentrations can be measured at high speed by directly installing transmitter unit and receiver unit in the stack.
  - NH₃, HCl, H₂O, O₂, CO, CO₂, and CH₄ gas concentrations can be measured at high speed by directly installing transmitter unit and receiver unit in the stack.
  - NH₃, HCl, H₂O, O₂, CO, CO₂, and CH₄ gas concentrations can be measured at high speed by directly installing transmitter unit and receiver unit in the stack.
  - NH₃, HCl, H₂O, O₂, CO, CO₂, and CH₄ gas concentrations can be measured at high speed by directly installing transmitter unit and receiver unit in the stack.
  - NH₃, HCl, H₂O, O₂, CO, CO₂, and CH₄ gas concentrations can be measured at high speed by directly installing transmitter unit and receiver unit in the stack.
  - NH₃, HCl, H₂O, O₂, CO, CO₂, and CH₄ gas concentrations can be measured at high speed by directly installing transmitter unit and receiver unit in the stack.
- **Measuring method**: Cross-stack system (path system)
- **Laser class**: CLASS 1M
- **Display**: LCD with backlight
- **Output signal**: 4 to 20mADC or 0 to 1VDC
- **Response speed**: 1 to 5 sec. or 1 to 2 sec.
- **Zero drift**: ±2.0%FS for 6 months
  
  5) CO = CO₂
  6) No sampling involved
  7) No preconditioning
  8) No filter
  9) No catalyst
Environmental Instruments

NDIR Gas Analyzers

From low range (0–5 ppm) to 100%
Low-concentration measurement and drift-less measurement available

Features
- Wide measurement range: from 0–5 ppm to 100%
- Excellent zero-point stability: ±0.5% FS per week (ZPB, ZPG)
- Simultaneous and continuous measurement of up to 5 components (ZPA, ZPB)
- Compact and lightweight: 483 (W) x 133 (H) x 382 (D) mm, ≤ 13 kg
- Simple structure for ease of maintenance
- Built-in magnetic or galvanic O₂ sensor (optional)

Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Standard type</th>
<th>Drift-less type</th>
<th>Low-concentration measurement type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>ZPA</td>
<td>ZPB</td>
<td>ZPG</td>
</tr>
<tr>
<td>Principle</td>
<td>NDIR (single beam)</td>
<td>O₂: magnetic, galvanic, or external zirconia analyzer</td>
<td></td>
</tr>
<tr>
<td>Number of measurable components</td>
<td>Up to 5 (including O₂)</td>
<td>Up to 2 (including O₂)</td>
<td></td>
</tr>
<tr>
<td>Measurable components and ranges</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min</td>
<td>Max</td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>NO</td>
<td>0 … 200 ppm</td>
<td>0 … 1000 ppm</td>
<td>0 … 50 ppm</td>
</tr>
<tr>
<td>SO₂</td>
<td>0 … 200 ppm</td>
<td>0 … 10 vol%</td>
<td>0 … 50 ppm</td>
</tr>
<tr>
<td>CO₂</td>
<td>0 … 100 ppm</td>
<td>0 … 100 vol%</td>
<td>0 … 50 ppm</td>
</tr>
<tr>
<td>CO</td>
<td>0 … 200 ppm</td>
<td>0 … 100 vol%</td>
<td>0 … 50 ppm</td>
</tr>
<tr>
<td>CH₄</td>
<td>0 … 600 ppm</td>
<td>0 … 100 vol%</td>
<td>-</td>
</tr>
<tr>
<td>O₂ (built-in galvanic analyzer)</td>
<td>0 … 50 vol%</td>
<td>0 … 25 vol%</td>
<td>0 … 10 vol%</td>
</tr>
<tr>
<td>O₂ (built-in magnetic analyzer)</td>
<td>0 … 100 vol%</td>
<td>0 … 50 vol%</td>
<td>0 … 100 vol%</td>
</tr>
<tr>
<td>O₂ (external zirconia analyzer)</td>
<td>0 … 10 vol%</td>
<td>0 … 25 vol%</td>
<td>0 … 10 vol%</td>
</tr>
<tr>
<td>O₂ (built-in zirconia analyzer)</td>
<td>0 … 100 vol%</td>
<td>0 … 50 vol%</td>
<td>0 … 100 vol%</td>
</tr>
<tr>
<td>No. of measurement ranges</td>
<td>Up to 2 ranges per component</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>±0.5% FS</td>
<td>±0.5% FS per week</td>
<td></td>
</tr>
<tr>
<td>Linearity</td>
<td>±1% FS</td>
<td>±2% FS per week</td>
<td></td>
</tr>
<tr>
<td>Zero drift</td>
<td>±2% FS per week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time (90%)</td>
<td>10 s … 30 s</td>
<td>30 s</td>
<td></td>
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<tr>
<td>Output signal</td>
<td>4–20 mA DC or 0–1 V DC (ZPA and ZPB: ≤ 12 points, ZPG: ≤ 4 points)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>LED backlit LCD, instant value, O₂ corrected instant value, O₂ corrected average value, O₂ average</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range switching</td>
<td>by key operation, automatic, or remotely (option)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact input (option)</td>
<td>Voltage input; remote range-switching, auto-calibration remote start, remote hold, average reset</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact output (option)</td>
<td>SPDT relay contact: analyzer error, calibration error, range identification, during auto-calibration, solenoid valve operation for auto-calibration, H/L limit alarm, CO peak alarm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atmospheric pressure correction (option)</td>
<td>Provided as needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard functions</td>
<td>Output hold, auto/manual range switching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optional functions</td>
<td>Auto calibration, auto calibration remote start, remote output hold, range identification contact output, H/L limit alarm, O₂ correction, O₂ corrected average values, average resetting contact input, CO peak alarm contact output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication (option)</td>
<td>RS-485 (Modbus)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample gas flow checker</td>
<td>Not provided</td>
<td>Provided</td>
<td></td>
</tr>
<tr>
<td>Gas inlet/outlet</td>
<td>Rs 1/4 or NPT 1/4 internal thread</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purge gas flow rate</td>
<td>1 L/min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference gas</td>
<td>Not required</td>
<td>Required (dry N₂ or dry air)</td>
<td></td>
</tr>
<tr>
<td>Operating environment</td>
<td>-20°C … +60°C, RH 90% or lower (no condensation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting</td>
<td>19-inch rack mount</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>100–240 V AC, 50/60 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>Approx. 100 VA</td>
<td>Approx. 120 VA</td>
<td>Approx. 100 VA</td>
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<tr>
<td>Dimensions</td>
<td>483 (W) x 133 (H) x 382 (D) mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 11 kg</td>
<td>Approx. 13 kg</td>
<td>Approx. 11 kg</td>
</tr>
</tbody>
</table>
Environmental Instruments

Double-beam system Infrared Gas Analyzer <5-Component Analyzer> (Type: ZFKE, ZKME)
- Applications: Boilers and industrial furnaces
  - Measurement range:
    | Component | Minimum range | Maximum range |
    |-----------|---------------|---------------|
    | O2 (zirconia) | 0 ... 5 vol% | 0 ... 25 vol% |
    | O2 (paramagnetic) | 0 ... 50 ppm | 0 ... 10 vol% |
    | CO | 0 ... 50 ppm | 0 ... 100 vol% |
    | CH4 | 0 ... 10 ppm | 0 ... 100 vol% |
    | CO2 | 0 ... 50 ppm | 0 ... 100 vol% |
- Repeatability: ±0.5%FS
- Number of measurable components: up to 5
- Mass: Approx. 22kg
- Option: RS232C communication

Infrared CO2 Controller (Type: ZPF9)
- Applications: Greenhouses, ventilation systems for building and parking lot, CA (Controlled Atmosphere) storage facilities
  - Measurable component and range:
    | Component | Minimum range | Maximum range |
    |-----------|---------------|---------------|
    | CO2 | 0 ... 500 ppm | 0 ... 5000 ppm |
- Repeatability: ±0.5%FS
- Mass: Approx. 3kg
- Response time: 4 to 7 sec. for 90%
- Output signal: 4 to 20mADC or 0 to 1VDC
- Power supply voltage: 100 to 240VAC or 200 to 240VAC

Flameproof Type Thermal Conductivity Gas Analyzer (Type: ZAFE)
- Applications: Air separation plants, semiconductor equipment, baking furnace
  - Measurable components and ranges:
    | Component | Minimum range | Maximum range |
    |-----------|---------------|---------------|
    | H2 | 0 to 10 vol% | 0 to 100 vol% |
    | CO | 0 to 1 vol% | 0 to 50 vol% |
    | CH4 | 0 to 1 vol% | 0 to 50 vol% |
    | N2 | 0 to 1 vol% | 0 to 50 vol% |
- Repeatability: ±1% FS
- Mass: Approx. 22kg
- Option: RS232C communication, auto-calibration, linearized output, concentration alarm output

Flameproof Type Zirconia Oxygen Analyzer (Type: ZFKE, ZKME)
- Applications: Combustion control in boilers and heating furnaces with explosive atmosphere
  - Measurable component and range:
    | Component | Minimum range | Maximum range |
    |-----------|---------------|---------------|
    | O2 | 0 to 2...50% | 0 to 100% |
- Repeatability: ±0.5%FS
- Mass flow sensor equipped
- Response time: ±0.5%FS/6 months
- Zero drift: ±1%FS
- Outer dimensions: 257 x 220 x 85mm
- Mass: Approx. 10 Kg.

Biomass Gas Analyser Single beam InfraRed Gas Analyser (Type: ZPAF)
- Components and ranges:
<table>
<thead>
<tr>
<th>Component</th>
<th>Minimum range</th>
<th>Maximum range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH4</td>
<td>0 to 1000 ppm</td>
<td>0 to 2000 ppm</td>
</tr>
<tr>
<td>CO</td>
<td>0 to 500 ppm</td>
<td>0 to 1000 ppm</td>
</tr>
<tr>
<td>CO2</td>
<td>0 to 1000 ppm</td>
<td>0 to 2000 ppm</td>
</tr>
<tr>
<td>H2</td>
<td>0 to 10 ppm</td>
<td>0 to 100 ppm</td>
</tr>
<tr>
<td>He</td>
<td>0 to 10 ppm</td>
<td>0 to 50 ppm</td>
</tr>
</tbody>
</table>
- Repeatability: ±10%FS/6 months
- Mass: Approx. 6kg
- Outer dimensions: 438 (W) x 133 (H) x 382 (D) mm
- Option: CP (Carbon Potential) calculation

Zirconia Oxygen Analyzer Flameproof Type (Type: ZFKE, ZKME)
- Applications: Air separation plants, semiconductor equipment, baking furnace
  - Measurable components and ranges:
    | Component | Minimum range | Maximum range |
    |-----------|---------------|---------------|
    | O2 | 0 to 2...50% | 0 to 100% |
- Repeatability: ±0.5%FS
- Mass: Approx. 9kg
- Power supply voltage: 100-240 V AC, 50/60 Hz
- Output signal: 4 to 20mADC or 0 to 1VDC
- RS232C communication

Portable Type Infrared Gas Analyzer (Type: ZSVS)
- Applications: Heat treatment furnaces
  - Measurable components and ranges:
    | Component | Minimum range | Maximum range |
    |-----------|---------------|---------------|
    | CO2 | 0 to 2000ppm | 0 to 10000 ppm |
    | CH4 | 0 to 1000 ppm | 0 to 5000 ppm |
    | O2 | 0 to 5 vol% | 0 to 25 vol% |
- Repeatability: ±0.5%FS
- Output signal: 4 to 20mADC, 0 to 1VDC, RS232C communication
- Outer dimensions and mass: 365 x 211 x 527 mm / Approx. 12kg
- Option: CP (Carbon Potential) calculation

Paramagnetic Oxygen Analyzer (Type: ZKG)
- Applications: Process control, environmental monitoring
  - Measurable component and range:
    | Component | Minimum range | Maximum range |
    |-----------|---------------|---------------|
    | O2 | 0 to 15, 25, 50 | 0 to 250 |
- Repeatability: ±0.5%FS
- Response time: 15 sec. for 90%
- Output signal: 4 to 20mADC or 0 to 1VDC
- Power supply voltage: 85 to 264VAC 50/60Hz
- Outer dimensions: 190 (W) x 240 (H) x 234 (D) mm

double-beam system
infrared gas analyzer
<5-component analyzer>
(type: zfke, zkme)

applications
boilers and industrial furnaces

measurement range

<table>
<thead>
<tr>
<th>component</th>
<th>minimum range</th>
<th>maximum range</th>
</tr>
</thead>
<tbody>
<tr>
<td>co2</td>
<td>0 ... 5 ... 100 %</td>
<td>0 ... 100 %</td>
</tr>
<tr>
<td>co</td>
<td>0 ... 0.5 ... 100 %</td>
<td>0 ... 100 %</td>
</tr>
<tr>
<td>ch4</td>
<td>0 ... 1 ... 100 %</td>
<td>0 ... 100 %</td>
</tr>
<tr>
<td>o2 (zirconia)</td>
<td>0 ... 5 vol%</td>
<td>0 ... 25 vol%</td>
</tr>
<tr>
<td>o2 (paramagnetic)</td>
<td>0 ... 50 ppm</td>
<td>0 ... 10 vol%</td>
</tr>
<tr>
<td>co2</td>
<td>0 ... 50 ppm</td>
<td>0 ... 100 vol%</td>
</tr>
<tr>
<td>ch4</td>
<td>0 ... 50 ppm</td>
<td>0 ... 100 vol%</td>
</tr>
</tbody>
</table>

repeatability
±0.5%fs

number of measurable components
up to 5

mass
approx. 22 kg

option
rs232c communication

infrared co2 controller
(type: zpf9)

applications
greenhouses, ventilation systems for building and parking lot, ca (controlled atmosphere) storage facilities

measurable component and range

<table>
<thead>
<tr>
<th>component</th>
<th>minimum range</th>
<th>maximum range</th>
</tr>
</thead>
<tbody>
<tr>
<td>co2</td>
<td>0 ... 500 ppm</td>
<td>0 ... 5000 ppm</td>
</tr>
</tbody>
</table>

repeatability
±0.5%fs

mass flow sensor equipped

response time
±0.5%fs/6 months

zero drift
±1%fs

outer dimensions
257 x 220 x 85mm

mass
approx. 10 kg

flameproof type thermal conductivity gas analyzer
(type: zafe)

applications
air separation plants, semiconductor equipment, baking furnace

measurable components and ranges

<table>
<thead>
<tr>
<th>component</th>
<th>minimum range</th>
<th>maximum range</th>
</tr>
</thead>
<tbody>
<tr>
<td>h2</td>
<td>0 to 10 vol%</td>
<td>0 to 100 vol%</td>
</tr>
<tr>
<td>co</td>
<td>0 to 1 vol%</td>
<td>0 to 50 vol%</td>
</tr>
<tr>
<td>ch4</td>
<td>0 to 1 vol%</td>
<td>0 to 50 vol%</td>
</tr>
<tr>
<td>n2</td>
<td>0 to 1 vol%</td>
<td>0 to 50 vol%</td>
</tr>
</tbody>
</table>

repeatability
±1%fs

mass
approx. 22 kg

option
rs232c communication, auto-calibration, linearized output, concentration alarm output

paramagnetic oxygen analyzer
(type: zkg)

applications
process control, environmental monitoring

measurable component and range

<table>
<thead>
<tr>
<th>component</th>
<th>minimum range</th>
<th>maximum range</th>
</tr>
</thead>
<tbody>
<tr>
<td>o2</td>
<td>0 to 15, 25, 50</td>
<td>0 to 250</td>
</tr>
</tbody>
</table>

repeatability
±0.5%fs

response time
15 sec. for 90%

output signal
4 to 20madc or 0 to 1vdc

power supply voltage
85 to 264vac 50/60hz

outer dimensions
190 (w) x 240 (h) x 234 (d) mm

portable type infrared gas analyzer
(type: zsvs)

applications
heat treatment furnaces

measurable components and ranges

<table>
<thead>
<tr>
<th>component</th>
<th>minimum range</th>
<th>maximum range</th>
</tr>
</thead>
<tbody>
<tr>
<td>co2</td>
<td>0 to 2000ppm</td>
<td>0 to 10000 ppm</td>
</tr>
<tr>
<td>ch4</td>
<td>0 to 1000 ppm</td>
<td>0 to 5000 ppm</td>
</tr>
<tr>
<td>o2</td>
<td>0 to 5 vol%</td>
<td>0 to 25 vol%</td>
</tr>
</tbody>
</table>

repeatability
±0.5%fs

output signal
4 to 20madc, 0 to 1vdc, rs232c communication

outer dimensions and mass
365 x 211 x 527 mm / approx. 12 kg

option
cp (carbon potential) calculation

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Gas Analyzers

Paramagnetic Oxygen Analyzer (Type: ZAJ)
- **Applications**: Process control, environmental monitoring
- **Fast response within 2 seconds**
- **Tolerant to interference from other gas (H2, CO2, etc.)**
- **Suppressed ranges available** (e.g., 21–100%O2)
- **No moving parts—low maintenance**
- **Automatic calibration, communication (option)**
- **Mass**: Approx. 16kg
- **Repeatability ±1% FS**
- **Measurement Range**
  - When reference gas is air: 21…23…100% O2
  - When reference gas is 100% O2: 100…98…0% O2

Direct Insertion Type Zirconia Oxygen Analyzer (Type: ZFK8, ZKM)
- **Applications**: Combustion control in boilers, heating furnaces
- **Measurable components and ranges**
  - O2 (0 to 2…100% (user configurable))
- **Repeatability ±0.5% FS**
- **Response time**: 4 to 7 sec. for 90%
- **Output signal**: 4 to 20mA DC or 0 to 1V DC
- **Converter structure**: IP66 or IP67
- **Others**: Replaceable zirconia element
  - Auto-calibration, HART/RS485 communication

**System diagram of Zirconia Oxygen Analyzer**

**Gas Sampling Devices**

Gas Extractor (Type: ZBA)
- **For flue gas extraction**
- **Electric heating system, with built-in SUS mesh filter**
- **up to 1300°C**

Gas Filter (Type: ZBB)
- **For elimination of dust and SO3 mist from sample gas**
- **Mist filter, membrane filter, gas filter**
- **Component eliminator**

Gas Cooler (Type: ZBC)
- **Dehumidification of sample gas**
- **Electronic type**
- **Outlet gas dew point**: 1 to 3°C
- **Sample flow rate**: 1.5L/min

Flowmeter and Regulator (Type: ZBD)
- **Gas pressure and flow rate adjustment**
- **Needle Valve (ZBD2)**
- **Flowmeter (ZBD4, 5)**
- **Pressure Regulator for standard gas (ZBD6)**

Gas Converter (Type: ZDL)
- **Conversion of gas components**
  - NO—NO Conversion
  - CO—CO2 Conversion

Other Sampling Devices
- **Gas Drier (ZBJ)**
- **Flow Path Switching Valve (ZBF)**
- **Drain Pot, Trap (ZBH)**
- **Gas Aspirator (ZBG)**
Environmental Instruments

Application Examples

Refuse Incineration Plants
Gas analyzers are necessary for continuous emission monitoring required by laws and regulations; furthermore, they enable optimal combustion control.

Large Industrial Boilers
Gas analysis enables optimal combustion control of boilers, which leads to reduction of both the fuel cost and pollutant.

Converter Furnaces in Steelmaking Process
Monitoring the concentration of CO2, CO, O2, and H2 can ensure the recovery of converter gas that can be reused as fuel. It also enables oxygen amount control and decarburizing status check, which can lead to quality management of molten steel.
Most recommended for energy saving in air-conditioning of buildings is a CO₂ controller!

The CO₂ gas concentration in a room is required to be within 1,000 ppm by law in Japan. To meet this, the fresh outdoor air is always taken in. Control of the air intake at an appropriate level will save energy to run the air-conditioner for cooling and heating.

Infrared CO₂ and O₂ gas analyzer for storage of foodstuffs such as vegetable and fruit

Foodstuffs can be kept fresh by controlling the CO₂ and O₂ concentrations properly in a storage house.
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