Overview

This analyzer consists basically of a probe and a converter that are used as both a Zirconia Oxygen Analyzer and High Temperature Humidity Analyzer. The probe is of direct insertion type, and the converter uses a digital display.

Two types of analyzers are available: separate type and integrated type. As its name implies, the integrated type combines probe and converter.

Separate and integrated type Zirconia oxygen analyzers need not use a sampling device, and allow direct installation of the probe in the wall of a flue or furnace to measure the concentration of oxygen in the stack gas. The converter displays the cell temperature and cell emf in addition to the oxygen concentration.

This analyzer is most suitable for monitoring the oxygen concentration of combustion gases in large or small boilers, various industrial furnace and combustion devices, or for the control of low-oxygen combustion.

Separate type and integrated type Zirconia High Temperature Humidity Analyzers are used to measure the humidity of hot gases continuously in driers which use an electrical heater or hot gas as the heat source. They can also be used in a variety of manufacturing applications in humidifiers, as well as in driers, for humidity measurement and control. They can help improve productivity in these application fields.

Features:

- The built-in heater assembly of the probe can be replaced on site, reducing maintenance costs.
- The probe uses a long-life, high-reliability Zirconia sensor.
- The probe uses three-reference gas supply methods (natural air convection, instrument air, and pressure compensated) in its applications.
- The separate type converter incorporates a LCD touchscreen for ease of operation.
- This converter can be used as an oxygen analyzer as well as a high temperature humidity analyzer.
- The integrated type integrates both probe and converter, to reduce wiring, piping, and installation costs. This type of unit uses an optical switch for ease of operation at the site.
- Remote maintenance using digital communications (HART) reduces maintenance costs. *1

*1: HART is a registered trademark of HART Communication Foundation
Basic System Configuration

System configuration - Separate type

System configuration Example 1 of Separate type Analyzer

- Automatic calibration system uses instrument air for reference gas.
- For the calibration gas, a standard gas cylinder may be used for more accurate calibration.
- Applications: Oxygen concentration monitoring and control in large boilers (for private power generation and for business use) and in heating furnaces, and the like. Humidity monitoring and control in drying furnaces and humidifiers.

System configuration Example 1 of Separate type Analyzer

Applications: Oxygen concentration monitoring and control in large boilers (for private power generation and for business use) and in heating furnaces, and the like. Humidity monitoring and control in drying furnaces and humidifiers.

System configuration - Integrated type

System configuration Example 1 of Integrated type Analyzer

- Automatic calibration system uses instrument air for reference gas.
- For the calibration gas, a standard gas cylinder may be used for more accurate calibration.
- Applications: Oxygen concentration monitoring and control in large boilers (for private power generation and for business use) and in heating furnaces, and the like. Humidity monitoring and control in drying furnaces and humidifiers.

Note:
The installation temperature limits range for integrated type analyzer is -20 to 55°C.

*1 Shield cable:
Use shielded signal cables, and connect the shields to the FG terminal of the converter.

*2 Select the desired probe from the Probe Configuration table on page 4.

*3 When a zirconia oxygen analyzer is used, 100% N\(_2\) gas cannot be used as the zero gas. Use approx. 1 vol% O\(_2\) gas (N\(_2\)-balanced).
Basic System Configuration

System configuration — Separate type

- Instrument air is used as the reference gas. A standard gas cylinder can be used for the calibration gas for more accurate calibration.
- Application example: Oxygen concentration monitoring and control in large boilers (for private power generation and for business use) and in heating furnaces. Humidity monitoring and control in drying furnaces and humidifiers.

**System configuration Example 2 of Separate type Analyzer**

- ZR22G Separate type Zirconia Oxygen/High Temperature Humidity Analyzer, Detector
- ZR402G Converter
- Reference gas
- Calibration gas
- Needle valve
- Flowmeter
- Instrument air
- Air Set
- Pressure regulator
- Zero gas cylinder
- Calibration gas unit case

1. Shield cables: Use shielded signal cables, and connect the shields to the FG terminal of the converter.
2. Calibration gas unit same as for zero gas.

**System configuration Example 3 of Separate type Analyzer**

- Ambient air is used as the reference gas. A portable standard gas unit (ZO21S) is used for the calibration. This unit is connected only when the calibration is made.
- Application example:
  - Oxygen concentration monitoring and control in packaged boilers
  - Humidity monitoring and control in drying furnaces or a humidifiers

**System configuration — Integrated type**

- Instrument air is used as the reference gas. A standard gas cylinder can be used for the calibration gas for more accurate calibration.
- Application example: Oxygen concentration monitoring and control in large boilers (for private power generation and for business use) and in heating furnaces. Humidity monitoring and control in drying furnaces and humidifiers.

**System configuration Example 2 of Integrated type Analyzer**

- ZR202G Integrated type Zirconia Oxygen/High Temperature Humidity Analyzer
- ZR21S Standard gas unit

**System configuration Example 3 of Integrated type Analyzer**

- Ambient air is used as the reference gas. A portable standard gas unit (ZO21S) is used for the calibration. This unit is connected only when the calibration is made.
- Application example:
  - Oxygen concentration monitoring and control in packaged boilers
  - Humidity monitoring and control in drying furnaces or a humidifiers

Note: The installation temperature limits range for integrated type analyzer is -20 to 55°C.
### System Components

<table>
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<th></th>
<th>Separate type</th>
<th>Integrated type</th>
</tr>
</thead>
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<td>Model ZR22G Separate type Zirconia Oxygen / High Temperature Humidity Analyzers, Detector</td>
<td></td>
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<tr>
<td>2</td>
<td>Model ZR402G Separate type Zirconia Oxygen / High Temperature Humidity Analyzer, Converter(*)1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Model ZR202G Integrated type Zirconia Oxygen / High Temperature Humidity Analyzers</td>
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<td>Model ZO21P High Temperature Probe Adapter for separate type Zirconia Oxygen Analyzer</td>
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<td>K9471UA Dust Filter for Oxygen Analyzer</td>
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<td>16</td>
<td>G7003XF/K9473XX, G7004XF/K9473XG Air Set</td>
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<td>G70012C Zero gas Cylinder</td>
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<td>G7013XF, G7014XF Pressure Regulator for Gas Cylinder</td>
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<td>19</td>
<td>E7044KF Case Assembly for Calibration gas Cylinder</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>ZR22A, ZR202A Heater Assembly for Spare Parts</td>
<td></td>
</tr>
</tbody>
</table>

- : Items required for the above system example
- : To be selected depending on each application. For details, refer to Chapter of Options.
- : Select either
- (*)1: When used as a high temperature humidity analyzer, specify /HS options.
- (*)2: When Automatic Calibration of (-A) or (-B) code is specified, ZR20H is installed in ZR202G.
- (*)3: When ZR22G or ZR202G specifies Stop valve (/SV) or Check valve (/CV) as an option code, they are correspondingly installed in the equipment.

### Detector Components

<table>
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<th>Mounting</th>
<th>Insertion length</th>
<th>General-use Probe</th>
<th>Application</th>
<th>Sample gas temperature 0 to 700°C</th>
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<td>Boiler Heating furnace</td>
<td>Sample outlet</td>
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<td>Vertical</td>
<td>2.5 m or more</td>
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<td>Horizontal to vertical</td>
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<td>Probe Protector (Z021R)</td>
<td>For pulverized coal boiler with gas flow</td>
<td>High temperature detector for probe use (Z021P-H)</td>
<td>Sample inlet</td>
</tr>
<tr>
<td>Vertical</td>
<td></td>
<td></td>
<td>10 m/sec or more</td>
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<td></td>
</tr>
<tr>
<td>Horizontal to vertical</td>
<td>0.4 to 2 m</td>
<td>Dust filter for Oxygen Analyzer (K9471UA) or Dust guard protector (K9471UC)</td>
<td>Black liquid recovery boiler</td>
<td>High temperature detector for probe use (Z021P-H)</td>
<td>Black liquid recovery boiler Cement Kiln</td>
</tr>
<tr>
<td>Vertical</td>
<td>2.5 m or more</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
**STANDARD SPECIFICATIONS (Oxygen Analyzer)**

**Example of Application**
Separate and integrated type Zirconia Oxygen Analyzers
- Large, medium and small boilers (boilers for power generation: heavy oil, gas or coal)
- Various industrial furnaces (refinery process/iron manufacture heating furnace, coal kiln, and black liquid recovery boilers) For other applications, contact Yokogawa Electric Corporation.
- May not be applicable corrosive gas such as ammonia, chlorine is present-check with YOKOGAWA.

**General Specifications**

**Oxygen Analyzer**
- **Measurement Object:** Oxygen concentration in combustion exhaust gas and mixed gas
- **Measurement System:** Zirconia system
- **Measurement Range:** 0.01 to 100 vol% O₂
- **Output Signal:** 4 to 20 mA DC (maximum load resistance 550 Ω)
- **Setting Range:** Any setting in the range of 0 to 5 through 0 to 100 vol% O₂ (in 1 vol% O₂), or partial range
- **Display Range:** 0 to 100 vol% O₂
- **Warm-up Time:** Approx. 20 min.
- **Repeatability:** (Excluding the case where the reference gas is by natural convection)
  - ± 0.5% Maximum value of set range; range from 0 to 5 vol% O₂, or more and less than 0 to 25 vol% O₂ range
  - ± 1% Maximum value of set range; range from 0 to 25 vol% O₂, or more and up to 0 to 100 vol% O₂ range
- **Linearity:** (Excluding standard gas tolerance)
  - (Excluding the case where the reference gas is by natural convection)
  - ± 1% Maximum value of set range; 0 to 5 vol% O₂, or more and less than 0 to 25 vol% O₂ range
  - (Sample gas pressure: within ± 4.9 kPa)
  - ± 3% Maximum value of set range; 0 to 25 vol% O₂, or more and less than 0 to 50 vol% O₂ range
  - (Sample gas pressure: within ± 0.49 kPa)
  - ± 5% Maximum value of set range; 0 to 50 vol% O₂, or more and up to 0 to 100 vol% O₂ range
- **Drift:** (Excluding the first two weeks in use)
  - Both zero and span ± 2% Maximum value of set range/month

Response Time: Response of 90% within 5 seconds. (Measured after gas is introduced from calibration gas inlet and analog output starts changing.)

**Safety:** EMC and RoHS conformity standards for the ZR22G, ZR402G and ZR202G
- **Installation altitude based on IEC 61010:** 2000 m or less
- **Category based on IEC 61010:** II (Note)
- **Pollution degree based on IEC 61010:** 2 (Note)

Note: Installation category, called over-voltage category, specifies impulse withstand voltage.
- Category II is for electrical equipment.
- Pollution degree indicates the degree of existence of solid, liquid, gas or other inclusions which may reduce dielectric strength.
- Degree 2 is the normal indoor environment.

**EMC:**
- **RoHS:** EN 50581

**Information of the WEEE Directive**
- This product is purposely designed to be used in a large scale fixed installations only and, therefore, is out of scope of the WEEE Directive. The WEEE Directive does not apply.
- The WEEE Directive is only valid in the EU.

1. **ZR22G Separate type Zirconia Oxygen Analyzer, Detector**

**Oxygen Analyzer**
- **Sample Gas Temperature:** 0 to 700°C (Probe only)

It is necessary to mount the cell using Inconel cell-bolts when the temperature is greater than 600°C.
For high temperature sample gas (700 to 1400°C), apply 0.15 m length probe and High Temperature Probe Adapter ZO21P-H.

**Sample Gas Pressure:** - 5 to + 250 kPa
(When the pressure in the furnace exceeds 3 kPa, it is recommended to use pressure compensated type. When the pressure in the furnace exceeds 5 kPa, pressure compensated type is required.)
For 0.15 m probe, - 0.5 to + 5 kPa. No pressure fluctuation in the furnace should be allowed.

Note: When the detector is used in conjunction with a check valve and the ZAF8 Flow Setting Unit, the **maximum pressure of sample gas is 150 kPa**.
When with a check valve and the ZR40H Automatic Calibration Unit, it is 200 kPa. If the pressure of your sample gas exceeds these limits, consult with Yokogawa.

**Probe Length:** 0.15, 0.4, 0.7, 1.0, 1.5, 2.0, 2.5, 3.0, 3.6, 4.2, 4.8, 5.4 m
**Probe Material:** SUS316 (JIS)

**Ambient Temperature:** -20 to +150°C

**Reference Gas System:** Natural Convection, Instrument Air, Pressure compensated (other than for probe length 0.15 m)
Instrument Air System (excluding Natural Convection):
Pressure: 200 kPa + the pressure inside the furnace. (It is recommended to use air which has been dehumidified by cooling to dew point -20°C or less, and dust or oil mist are removed.)
Consumption; Approx. 1 Nl/min

Wetted Material: SUS316 (JIS), Zirconia, SUS304 (JIS) or ASTM grade 304 (flange), Hastelloy B, (Inconel 600, 601)

Construction: Heater and thermocouple replaceable construction. Non explosion-proof JIS C0920 / equivalent to IP44D. Equivalent to NEMA 4X/IP66 (Achieved when the cable entry is completely sealed with a cable gland in the recirculation pressure compensated version.)

Terminal Box Case: Material; Aluminum alloy
Terminal Box Paint Color: Case; Mint green (Munsell 5.6BG3.3/2.9)
Cover; Mint green (Munsell 5.6BG3.3/2.9)

Finish: Polyurethane corrosion-resistance coating
Gas Connection: Rc1/4 or 1/4 NPT (Female)
Wiring Connection: G1/2, Pg 13.5, M20 x 1.5, 1/2 NPT
Installation: Flange mounting
Probe Mounting Angle: Horizontal to vertically downward.
When the probe insertion length is 2 m or less, installing at angles from horizontal to vertically downward is possible.
When the probe insertion length is 2.5 m or more, mount vertically downward (within ±5°) and use a probe protector.

Weight:
- Insertion length of 0.4 m: approx. 6 kg (JIS 5K 65)
- Insertion length of 1.0 m: approx. 8 kg (JIS 5K 65)
- Insertion length of 1.5 m: approx. 10 kg (JIS 5K 65)
- Insertion length of 2.0 m: approx. 12 kg (JIS 5K 65)
- Insertion length of 3.0 m: approx. 15 kg (JIS 5K 65)
- Insertion length of 3.6 m: approx. 17 kg (JIS 5K 65)
- Insertion length of 4.2 m: approx. 19 kg (JIS 5K 65)
- Insertion length of 4.8 m: approx. 21 kg (JIS 5K 65)
- Insertion length of 5.4 m: approx. 23 kg (JIS 5K 65)
- Insertion length of 6.0 m: approx. 25 kg (JIS 5K 65)
- Insertion length of 6.6 m: approx. 28 kg (JIS 5K 65)

Storage Temperature: -30 to +70°C
Ambient Humidity: 0 to 95% RH (non-condensing)
Power Supply Voltage: Ratings; 100 to 240 V AC
Acceptable range: 85 to 264 V AC
Power Supply Frequency: Ratings; 50/60 Hz
Acceptable range: 45 to 66 Hz
Power Consumption: Max. 300 W, approx. 100 W for ordinary use.
Maximum Distance between Detector and Converter: Conductor two-way resistance must be 10 Ω or less (when a 1.25 mm² cable or equivalent is used, 300 m or less.)
Construction: Equivalent to NEMA 4X/IP66 (with conduit holes completely sealed with a cable gland)

Wiring Connection: G1/2, Pg 13.5, M20 x 1.5, 1/2 NPT (with plug), eight holes
Installation: Panel, wall or 2-inch pipe mounting
Case: Aluminum alloy
Paint Color: Door: Silver gray (Munsell 3.2PB7.4/1.2)
Case: Silver gray (Munsell 3.2PB7.4/1.2)
Finish: Polyurethane corrosion-resistance coating
Weight: Approx. 6 kg

Functions

Display Functions:
- Value Display; Displays values of the measured oxygen concentration, etc
- Graph Display; Displays trends of measured oxygen concentration
- Data Display; Displays various useful data for maintenance, such as cell temperature, reference junction temperature, maximum/minimum oxygen concentration, or the like
- Status Message; Indicates an alarm or error occurrence by flashing of the corresponding icon. Indicates status such as warming-up, calibrating, or the like by the marks.
- Alarm, Error Display; Displays alarms such as “Abnormal oxygen concentration” or errors such as “Abnormal cell e.m.f.” when any such status occurs.

Calibration Functions:
- Automatic Calibration; Requires the ZR40H Automatic Calibration Unit. It calibrates automatically at specified intervals.
- Semi-automatic Calibration; Requires the ZR40H Automatic Calibration Unit. Input calibration direction on the touchscreen or contact, then it calibrates automatically afterwards.

Manual Calibration; Calibration with opening/closing the valve of calibration gas in operation interactively with an LCD touchscreen.

Blowback Function:
- Output through the contact in the set period and time. Auto/Semi_Auto selectable.

Maintenance Functions:
- Can operate updated data settings in daily operation and checking. Display data settings, calibration data settings, blowback data settings, current output loop check, input/output contact check.
Display and setting content:

**Password Functions:**
Enter your password to operate the analyzer excepting data display. Individual passwords can be set for maintenance and setup.

**Self-diagnosis:**
This function diagnoses conditions of the analyzer or the detector and indicates when any abnormal condition occurs.

**Display and setting content:**

- **Measuring Related Items:**
  - Oxygen concentration (vol% O₂), output current value (mA), air ratio, moisture quantity (in hot gases) (vol% H₂O)
  - Cell temperature (°C), thermocouple reference junction temperature (°C), maximum/minimum/average oxygen concentration (vol% O₂), cell e.m.f. (mV), cell internal resistance (Ω), cell condition (in four grades), heater on-time rate (%), calibration record (ten times), time (year/month/day, hour/minute)

- **Calibration Setting Items:**
  - Span gas concentration (vol% O₂), zero gas concentration (vol% O₂), calibration mode (automatic, semi-automatic, manual), calibration type and method (zero-span calibration, zero calibration only, span calibration only), stabilization time (min. sec), calibration interval (day/hour), starting time (year/month/day, hour/minute)

- **Equipment Related Items:**
  - Measuring gas selection
  - Analog output/output mode selection, output conditions when warming-up/maintenance/calibrating (during blowback)/abnormal, oxygen concentration at 4 mA/20 mA (vol% O₂), time constant.

- **Alarm Related Items:**
  - Oxygen concentration high alarm/ high-high alarm limit values (vol% O₂); oxygen concentration low alarm/ low-low alarm limit values (vol% O₂); oxygen concentration alarm hysteresis (vol% O₂); oxygen concentration alarm detection, alarm delay (seconds)

- **Contact Related Items:**
  - Selection of contact input 1 and 2, selection of contact output 1 to 4 (abnormal, high-high alarm, high alarm, low alarm, low-low alarm, maintenance, calibrating, range switching, warming-up, calibration gas pressure decrease, temperature high alarm, blowback, flameout gas detection, calibration coefficient alarm, stabilization timeout.)

- **Converter Output:**
  - Two points mA analog output (4 to 20 mA DC (maximum load resistance of 550Ω)) and one of two mA outputs is with digital output (HART) (minimum load resistance of 250Ω).

**Range:**
Any setting between 0 to 5 through 0 to 100 vol% O₂ in 1 vol% O₂, or partial range is available (Maximum range value/minimum range value 1.3 or more)
For the log output, the minimum range value is fixed at 0.1 vol% O₂.
4 to 20 mA DC linear or log can be selected. Input/output isolation.

**Output damping:**
0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.

**Contact Output:**
Four points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load).
Three of the output points can be selected to either normally energized or normally deenergized status.
Delayed functions (0 to 255 seconds) and hysteresis function (0 to 9.9 vol%O₂) can be added to high/low alarms.
The following functions are programmable for contact outputs:
Contact output 4 is set to normally operated, and fixed error status.

**Contact Input:**
Two points, voltage-free contacts.
The following functions are programmable for contact inputs:
(1) Calibration gas pressure decrease alarm, (2) Range switching, (3) External calibration start, (4) Process alarm (if this signal is received, the heater power turns off), (5) Blowback start

**Contact capacity:**
Off-state leakage current; 3 mA or less

**Self-diagnosis:**
Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit

**Calibration:**
Method; Zero/span calibration
Calibration mode; automatic, semi-automatic and manual (All are operated interactively with an LCD touchscreen). Either zero or span can be skipped.
Zero calibration gas concentration setting range; 0.3 to 100 vol% O₂ (minimum setting: 0.01 vol% O₂).
Span calibration gas concentration setting range; 4.5 to 100 vol% O₂ (minimum setting: 0.01 vol% O₂).
Use N₂-balanced mixed gas containing 0 to 10% scale of oxygen, and 80 to 100 % scale of oxygen for standard zero gas and standard span gas respectively.
Calibration interval; date/time setting; maximum 255 days.
3. ZR202G Integrated type Zirconia Oxygen Analyzer

Oxygen Analyzer
Can be operated in the field without opening the cover using optical switches.

Display: 6-digit LCD
Switch: Three optical switches
Output Signal: 4 to 20 mA DC, one point (maximum load resistance 550 Ω)
Digital Communication (HART): 250 to 550 Ω, depending on number of field devices connected to the loop (multi-drop mode).
Contact Output Signal: Two points (one is fail-safe, normally open)
Contact Input Signal: Two points
Sample Gas Temperature: 0 to 700°C
It is necessary to mount the cell using inconel cell-bolts when the temperature is greater than 600°C.
High temperature service - greater than 700°C - is not available.
Sample Gas Pressure: -5 to +250 kPa (When the pressure in the furnace exceeds 3 kPa, it is recommended to use pressure compensated type. When the pressure in the furnace exceeds 5 kPa, pressure compensated type is required.)
No pressure fluctuation in the furnace should be allowed.

Note: When the detector is used in conjunction with a check valve and the ZA8F Flow Setting Unit, the maximum pressure of sample gas is 150 kPa. When with a check valve and the ZR20H Automatic Calibration Unit, it is 200 kPa. If the pressure of your sample gas exceeds these limits, consult with Yokogawa.

Probe Length: 0.4, 0.7, 1.0, 1.5, 2.0, 2.5, 3.0 m
Probe Material: JIS SUS316 stainless steel
Ambient Temperature: -20 to +55°C (-5 to +70°C on the case surface)
Storage Temperature: -30 to +70°C
Ambient Humidity: 0 to 95 %RH
Power Supply Voltage: Ratings; 100 to 240 V AC
Acceptable range; 85 to 264 V AC
Power Supply Frequency: Ratings; 50/60 Hz
Acceptable range; 45 to 66 Hz
Power Consumption: Max. 300 W, approx. 100 W for ordinary use.
Reference Gas System: Natural Convection, Instrument Air, or Pressure Compensated
Instrument Air System (excluding Natural Convection): Pressure; 200 kPa plus the pressure inside the furnace (It is recommended to use air which is dehumidified by cooling to dew point -20°C or less, and dust or oil mist are removed.)
Consumption; Approx. 1 Nl/min
Wetted Material: SUS316 (JIS), Zirconia, SUS304 (JIS) or ASTM grade 304 (flange), Hastelloy B, (Inconel 600, 601)
Construction: Heater and thermocouple replaceable construction. Non explosion proof JIS C0920 / equivalent to IP44D. Equivalent to NEMA 4X/IP66 (Achieved when the cable entry is completely sealed with a cable gland in the recirculation pressure compensated version.)

Gas Connection: Rc1/4 or 1/4 NPT(Female)
Wiring Connection: G1/2, Pg 13.5, M20 × 1.5, 1/2 NPT select one type (4 pieces)
Installation: Flange mounting
Probe Mounting Angle: Horizontal to vertically downward. When the probe insertion length is 2 m or less, installing at angles from horizontal to vertical downward is available. When the probe insertion length is 2.5 m or more, mount vertically downward (within ±5°) and use a probe protector.

Case: Aluminum alloy
Paint Color/Cover: Mint green (Munsell 5.6BG3.3/2.9)
Case; Mint green (Munsell 5.6BG3.3/2.9)
Finish: Polyurethane corrosion-resistance coating
Weight:
- Insertion length of 0.4 m: approx. 8 kg (JIS 5K 65) / approx. 13 kg (ANSI 150 4)
- Insertion length of 1.0 m: approx. 10 kg (JIS 5K 65) / approx. 15 kg (ANSI 150 4)
- Insertion length of 1.5 m: approx. 12 kg (JIS 5K 65) / approx. 17 kg (ANSI 150 4)
- Insertion length of 2.0 m: approx. 14 kg (JIS 5K 65) / approx. 19 kg (ANSI 150 4)
- Insertion length of 3.0 m: approx. 17 kg (JIS 5K 65) / approx. 22 kg (ANSI 150 4)

Functions

Display Function: Displays values of the measured oxygen concentration, etc.
Alarm, Error Display: Displays alarms such as “AL-06” or errors such as “Err-01” when any such status occurs.

Calibration Functions:
Automatic Calibration; Requires the ZR20H Automatic Calibration Unit. It calibrates automatically at specified intervals.
Semi-automatic Calibration; Requires the ZR20H Automatic Calibration Unit. Input calibration start signal by optical switch or contact, then it calibrates automatically afterwards.
Manual Calibration; Calibration with opening/closing the valve of calibration gas in operation interactively with the optical switch.

Maintenance Functions:
Can operate updated data settings in daily operation and checking. Display data settings, calibration data settings, test settings (current output loop check, input/output contact check).

Setup Functions:
Initial settings suit for the plant conditions when installing the converter. Current output data settings, alarm data settings, contact data settings, other settings.
Display and setting content:

Display Related Items: Oxygen concentration (vol% O₂), output current value (mA), air ratio, moisture quantity (in hot gases) (vol% H₂O), Cell temperature (°C), thermocouple reference junction temperature (°C), maximum/minimum/average oxygen concentration (vol% O₂), cell e.m.f. (mV), cell internal resistance (Ω), cell condition (in four grades), heater on-time rate (%), calibration record (ten times), time (year/month/day/hour/minute).

Calibration Setting Items: Span gas concentration (vol% O₂), zero gas concentration (vol% O₂), calibration mode (automatic, semi-automatic, manual), calibration type and method (zero-span calibration, zero calibration only, span calibration only), stabilization time (min/sec), calibration time (min/sec), calibration interval (day/hour), starting time (year/month/day/hour/minute).

Output Related Items: Analog output/output mode selection, output conditions when warming-up/maintenance/calibrating/abnormal, oxygen concentration at 4 mA/20 mA (vol% O₂), time constant, preset values when warming-up/maintenance/calibrating/abnormal, output preset values on abnormal alarm.

Alarm Related Items: Oxygen concentration high alarm/high-high alarm limit values (vol% O₂), oxygen concentration low alarm/low-low alarm limit values (vol% O₂), oxygen concentration alarm hysteresis (vol% O₂), oxygen concentration alarm detection, alarm delay (seconds).

Contact Related Items: Selection of contact input 1 and 2, selection of contact output 1 and 2 (abnormal, high-high alarm, high alarm, low alarm, low-low alarm, maintenance, calibration, range switching, warming-up, calibration gas pressure decrease, flameout gas detection (answer-back of contact input).

Converter Output: One mA analog output point (4 to 20 mA DC (maximum load resistance of 550 Ω)) with mA digital output point (HART) (minimum load resistance of 250 Ω).

Range: Any setting between 0 to 5 through 0 to 100 vol% O₂ in 1 vol% O₂, and partial range is available (Maximum range value/minimum range value 1.3 or more). For the log output, the minimum range value is fixed at 0.1 vol% O₂. 4 to 20 mA DC linear or log can be selected. Input/output isolation.

Output damping: 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.

Contact Output: Two points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load) One of the output points can be selected to either normally energized or normally de-energized status. Delayed functions (0 to 255 seconds) and hysteresis function (0 to 9.9 vol% O₂) can be added to high/low alarms. The following functions are programmable for contact outputs.


Contact Input: Two points, voltage-free contacts. The following functions are programmable for contact inputs.

(1) Calibration gas pressure decrease alarm, (2) Range switching (switched range is fixed), (3) External calibration start, (4) Process alarm (if this signal is received, the heater power turns off).

Self-diagnosis: Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit.

Calibration: Method; Zero/span calibration. Calibration mode; Automatic, semi-automatic and manual (All are operated using optical switches). Either zero or span can be skipped.

Zero calibration gas concentration setting range; 0.3 to 100 vol% O₂ (minimum setting: 0.01 vol% O₂).

Span calibration gas concentration setting range; 4.5 to 100 vol% O₂ (minimum setting: 0.01 vol% O₂). Use N₂-balanced mixed gas containing 0 to 10% scale of oxygen for standard zero gas, and 80 to 100% scale of oxygen for standard span gas.

Calibration interval; date/time setting: maximum 255 days.
STANDARD SPECIFICATIONS (High Temperature Humidity Analyzer)

Examples of Application
Separate/Integrated type Zirconia High Temperature Humidity Analyzer
- Coloring processes in the textile industry
- Steam curing processes for concrete products
- Manufacturing processes in the cigarette, food, paper or pulp industries
- Drying processes in various manufacturing of building materials, lumber, plasterboard, food or the like
- Humidifying processes in various manufacturing of food or the like
Please contact us for other applications.

General Specifications
High Temperature Humidity Analyzer
Oxygen concentration in mixed gas which consists of water vapor and air is proportional to the volumetric ratio of oxygen in the air, so the volumetric ratio of water vapor can be calculated from the oxygen concentration.

Measurement Object: Water vapor (in vol%) in mixed gases (air and water vapor)
Measurement System: Zirconia system
Measurement Range: 0.01 to 100 vol% O₂, 0 to 100 vol% H₂O or 0 to 1.000 kg/kg
Output Signal: 4 to 20 mA DC (maximum load resistance 550 Ω)
Setting Range: Any setting in the range of 0 to 5 through 0 to 100 vol% O₂ (in 1 vol% O₂), or partial range.
Moisture quantity: 0 to 25 through 0 to 100 vol% H₂O (in 1 vol% H₂O), or partial range.
Mixture ratio: 0 to 0.2 through 0 to 1.01 kg/kg (in 0.001 kg/kg), or partial range.

Digital Communication (HART): 250 to 550 kΩ, connected to the loop (multi-drop mode).
Display Range: Oxygen concentration; 0 to 100 vol% O₂,
Moisture quantity; 0 to 25 through 0 to 100 vol% H₂O (in 1 vol% H₂O), or partial range.
Mixture ratio; 0 to 0.2 through 0 to 1.000 kg/kg (in 0.001 kg/kg), or partial range.

Wetted Material: JIS SUS316 (JIS), Zirconia, JIS ASTM grade 304 (flange), Hastelloy B, (Inconel 600, 601)

Response Time: Response of 90% within 5 seconds.
(Measured after gas is introduced from calibration gas inlet and analog output starts changing.)
(Note 1) These tolerances do not apply to the pressure compensated version, or where natural convection is used for the reference gas.

Safety, EMC and RoHS conformity standards for the ZR402G and ZR202G
Installation altitude based on IEC 61010: 2000 m or less
Category based on IEC 61010: II (Note)
Pollution degree based on IEC 61010: 2 (Note)
Note: Installation category, called over-voltage category, specifies impulse withstand voltage.
Category II is for electrical equipment.
Pollution degree indicates the degree of existence of solid, liquid, gas or other inclusions which may reduce dielectric strength. Degree 2 is the normal indoor environment.

Safety: EN 61010-1, EN 61010-2-030, CAN/CSA-C22.2 No. 61010-1, UL Std. No. 61010-1
EMC: EN 61326-1 Class A, Table 2 (For use in industrial locations)
EMC Regulatory Arrangement in Australia and New Zealand
Korea Electromagnetic Conformity Standard
Note: This instrument is a Class A product, and it is designed for use in the industrial environment.
Please use this instrument in the industrial environment only.

RoHS: EN 50581

Information of the WEEE Directive
This product is purposely designed to be used in a large scale fixed installations only and, therefore, is out of scope of the WEEE Directive. The WEEE Directive does not apply.
The WEEE Directive is only valid in the EU.

1. ZR22G Separate type Zirconia High Temperature Humidity Analyzer, Detector

High Temperature Humidity Analyzer
Sample Gas Temperature: 0 to 700°C (Probe only)
It is recommended to mount the cell using inconel cell-bolts when the temperature is greater than 600°C.
Sample Gas Pressure: -5 to +20 kPa (When the pressure in the furnace exceeds 3 kPa, it is recommended to use pressure compensated type. When the pressure in the furnace exceeds 5 kPa, pressure compensated type is required.)
No pressure fluctuation in the process should be allowed.
Probe Length: 0.4, 0.7, 1.0, 1.5, 2.0, 2.5, 3.0 m
Probe Material: JIS SUS316 stainless steel
Ambient Temperature: -20 to +150°C
Reference Gas System: Natural Convection, Instrument Air, or Pressure compensated
Instrument Air System (excluding Natural Convection):
Pressure: 200 kPa plus the pressure inside the furnace. (It is recommended to use air which has been dehumidified by cooling to dew point -20°C or less, and dust or oil mist are removed.)
Consumption: Approx. 1 Nl/min
Wetted Material: SUS316 (JIS), Zirconia, SUS304 (JIS) or ASTM grade 304 (flange), Hastelloy B, (Inconel 600, 601)
Operated using an LCD touchscreen on the converter. Non explosion proof JIS C0920 / equivalent to IP44D. Equivalent to NEMA 4X/IP66 (Achieved when the cable entry is completely sealed with a cable gland in the recirculation pressure compensated version.)

Terminal Box Case: Material: Aluminum alloy
Terminal Box Paint Color: Case: Mint green (Munsell 5.6BG3.3/2.9) Cover: Mint green (Munsell 5.6BG3.2/9)

Gas Connection: Rc1/4 or 1/4 NPT (Female) Wiring Connection: G1/2, Pg 13.5, M20 × 1.5, 1/2 NPT
Installation: Flange mounting
Probe Mounting Angle: Horizontal to vertically downward. When the probe insertion length is 2 m or less, installing at angles from horizontal to vertically downward is available. When the probe insertion length exceeds 2.5 m, mount vertically downward (within ± 5°) and use a probe protector.

Weight:
- Insertion length of 0.4 m: approx. 6 kg (JIS 5K 65) / approx. 11 kg (ANSI 150 4)
- Insertion length of 1.0 m: approx. 8 kg (JIS 5K 65) / approx. 13 kg (ANSI 150 4)
- Insertion length of 1.5 m: approx. 10 kg (JIS 5K 65) / approx. 15 kg (ANSI 150 4)
- Insertion length of 2.0 m: approx. 12 kg (JIS 5K 65) / approx. 17 kg (ANSI 150 4)
- Insertion length of 3.0 m: approx. 15 kg (JIS 5K 65) / approx. 20 kg (ANSI 150 4)

2. ZR402G Separate type Zirconia High Temperature Humidity Analyzer, Converter

**High Temperature Humidity Analyzer**

Operated using an LCD touchscreen on the converter.
Display: LCD display of size 320 by 240 dot with touchscreen.
Output Signal: 4 to 20 mA DC, two points (maximum load resistance 550 Ω)
Contact Output Signal: Four points (one is fail-safe, normally open)
Contact Input: Two points
Analog Input: One point (thermal input 4-20 mA)
Automatic Calibration Output: Two points (for dedicated automatic calibration unit)
Ambient Temperature: -20 to +55°C
Storage Temperature: -30 to +70°C
Ambient Humidity: 0 to 95 %RH (non-condensing)
Power Supply Voltage: Ratings: 100 to 240 V AC
Acceptable range: 85 to 264 V AC
Power Supply Frequency: Ratings: 50/60 Hz
Acceptable range: 45 to 66 Hz
Power Consumption: Max. 300 W, approx. 100 W for ordinary use.

Maximum Distance between Detector and Converter: Conductor two-way resistance must be 10 Ω or less (when a 1.25 mm² cable or equivalent is used, 300 m or less.)
Construction: Equivalent to NEMA 4X/IP66 (with conduit holes completely sealed with a cable gland)

Wiring Connection: G1/2, Pg 13.5, M20 × 1.5, 1/2 NPT (with plug), eight holes
Installation: Panel, wall or pipe mounting
Case: Aluminum alloy
Paint Color: Door: Silver gray (Munsell 3.2PB7.4/1.2) Case: Silver gray (Munsell 3.2PB7.4/1.2)
Finish: Polyurethane corrosion-resistance coating
Weight: Approx. 6 kg

**Functions**

Display Functions:
- Value Display: Displays values of the measured oxygen concentration, moisture quantity, mixture ratio, etc
- Graph Display: Displays trends of measured oxygen concentration, moisture quantity, mixture ratio, etc
- Data Display: Displays various useful data for maintenance, such as cell temperature, reference junction temperature, maximum/minimum moisture quantity, or the like
- Status Message: Indicates an alarm or error occurrence by flashing of the corresponding icon. Indicates status such as warming-up, calibrating, or the like by the marks.
- Alarm, Error Display: Displays alarms such as “Abnormal moisture quantity” or errors such as “Abnormal cell e.m.f.” when any such status occurs.

Calibration Functions:
- Automatic Calibration: Requires the ZR40H Automatic Calibration Unit. It calibrates automatically at specified intervals.
- Semi-automatic Calibration: Requires the ZR40H Automatic Calibration Unit. Input calibration direction on the touchscreen or contact, then it calibrates automatically afterwards.

Blowback Function: Output through the contact in the set period and time. Auto/Semi_Auto selectable.

Maintenance Functions:
- Can operate updated data settings in daily operation and checking. Display data settings, calibration data settings, blowback data settings, current output loop check, input/output contact check.
- Initial settings suit for the plant conditions when installing the converter. Equipment settings, current output data settings, alarm data settings, contact data settings, other settings.
- This function diagnoses conditions of the converter or the detector and indicates when any abnormal condition occurs.
- Individual passwords can be set for maintenance and setup.
Display and setting content:

**Measuring Related Items:** Oxygen concentration (vol% O₂), moisture quantity (vol% H₂O), mixture ratio (kg/kg), relative humidity (%RH) and dew point (°C)

**Display Items:** Oxygen concentration (vol% O₂), moisture quantity (vol% H₂O), mixture ratio (kg/kg), relative humidity (%RH), dew point (°C), cell temperature (°C), thermocouple reference junction temperature (°C), maximum/minimum/average oxygen concentration (vol% O₂), maximum/minimum/average moisture quantity (vol% H₂O), maximum/minimum/average mixture ratio (kg/kg), cell e.m.f. (mV), output 1, 2 current (mA), cell response time (seconds), cell internal resistance (Ω), cell condition (in four grades), heater on-time rate (%), calibration record (ten times), time (year/month/day/hour/minute)

**Calibration Setting Items:** Span gas concentration (vol% O₂), zero gas concentration (vol% O₂), calibration mode (automatic, semi-automatic, manual), calibration type and method (zero-span calibration, zero calibration only, span calibration only), stabilization time (min/sec), calibration time (min/sec), calibration interval (day/hour), starting time (year/month/day/hour/minute)

**Output Related Items:** Analog output/output mode selection, output conditions when warmup/maintenance/calibrating/abnormal, oxygen concentration at 4 mA/20 mA (vol% O₂), moisture quantity at 4 mA/20 mA (vol% H₂O), mixture ratio at 4 mA/20 mA (kg/kg), time constant.

**Alarm Related Items:** Oxygen concentration high alarm/low-low alarm limit values (vol% O₂), oxygen concentration low alarm/low-low alarm limit values (vol% O₂), moisture quantity high alarm/high-high alarm limit values (vol% H₂O), moisture quantity low alarm/low-low alarm limit values (vol% H₂O), mixture ratio high alarm/high-high alarm limit values (kg/kg), mixture ratio low alarm/low-low alarm limit values (kg/kg), oxygen concentration alarm hysteresis (vol% O₂), moisture quantity alarm hysteresis (vol% H₂O), mixture ratio alarm hysteresis (kg/kg), oxygen concentration/moisture quantity/mixture ratio alarm detection, alarm delay (seconds)

**Contact Related Items:** Selection of contact input 1 and 2, selection of contact output 1 to 4 (abnormal, high-high alarm, alarm, low alarm, low-low alarm, maintenance, calibrating, range switching, warming-up, calibration gas pressure decrease, temperature high alarm blowback, flameout gas detector calibration, coefficient alarm, stabilization timeout)

**Converter Output:** Two points mA analog output (4 to 20 mA DC (maximum load resistance of 550 Ω)) and one of two mA outputs is with digital output (HART) (minimum load resistance of 250 Ω)

**Range:** Any setting between 0 to 5 through 0 to 100 vol% O₂, 0 to 25 through 0 to 100 vol% H₂O, 0 to 0.200 through 0 to 1.000 kg/kg or partial range is available. For the log output, the minimum range values are fixed to 0.1 vol% O₂ for the oxygen concentration, 0.1 vol% H₂O for the moisture quantity, and 0.01 kg/kg for the mixture ratio. 4 to 20 mA DC linear or log can be selected. Input/output isolation.

**Output damping:** 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.

**Contact Output:** Four points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load). Three of the output points can be selected to either normally energized or normally deenergized status.

**Self-diagnosis:** Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit

**Calibration:** Method; Zero/span calibration

**Output damping:** 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.

**Contact Output:** Four points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load). Three of the output points can be selected to either normally energized or normally deenergized status.

**Self-diagnosis:** Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit

**Calibration:** Method; Zero/span calibration

**Output damping:** 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.

**Contact Output:** Four points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load). Three of the output points can be selected to either normally energized or normally deenergized status.

**Self-diagnosis:** Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit

**Calibration:** Method; Zero/span calibration

**Output damping:** 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.

**Contact Output:** Four points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load). Three of the output points can be selected to either normally energized or normally deenergized status.

**Self-diagnosis:** Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit

**Calibration:** Method; Zero/span calibration

**Output damping:** 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.

**Contact Output:** Four points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load). Three of the output points can be selected to either normally energized or normally deenergized status.

**Self-diagnosis:** Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit

**Calibration:** Method; Zero/span calibration

**Output damping:** 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.

**Contact Output:** Four points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load). Three of the output points can be selected to either normally energized or normally deenergized status.

**Self-diagnosis:** Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit

**Calibration:** Method; Zero/span calibration

**Output damping:** 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.

**Contact Output:** Four points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load). Three of the output points can be selected to either normally energized or normally deenergized status.

**Self-diagnosis:** Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit

**Calibration:** Method; Zero/span calibration

**Output damping:** 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.

**Contact Output:** Four points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load). Three of the output points can be selected to either normally energized or normally deenergized status.

**Self-diagnosis:** Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit

**Calibration:** Method; Zero/span calibration

**Output damping:** 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.

**Contact Output:** Four points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load). Three of the output points can be selected to either normally energized or normally deenergized status.

**Self-diagnosis:** Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit

**Calibration:** Method; Zero/span calibration

**Output damping:** 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.

**Contact Output:** Four points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load). Three of the output points can be selected to either normally energized or normally deenergized status.

**Self-diagnosis:** Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit

**Calibration:** Method; Zero/span calibration

**Output damping:** 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.

**Contact Output:** Four points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load). Three of the output points can be selected to either normally energized or normally deenergized status.

**Self-diagnosis:** Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit

**Calibration:** Method; Zero/span calibration

**Output damping:** 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.

**Contact Output:** Four points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load). Three of the output points can be selected to either normally energized or normally deenergized status.

**Self-diagnosis:** Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit

**Calibration:** Method; Zero/span calibration

**Output damping:** 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.
Span calibration-gas concentration setting range; 4.5 to 100 vol% O₂ (minimum setting: 0.01 vol% O₂).
Use N₂-balanced mixed gas containing 0 to 10% scale of oxygen for standard zero gas, and 80 to 100% scale of oxygen for standard span gas.
Calibration interval; date/time setting: maximum 255 days

3. ZR202G Integrated type Zirconia High Temperature Humidity Analyzer

High Temperature Humidity Analyzer
Can be operated in the field without opening the cover using optical switches.
Display: 6-digit LCD
Switch: Three optical switches
Output Signal: 4 to 20 mA DC; one point (maximum load resistance 550 Ω)
Digital Communication (HART): 250 to 550 Ω, depending on number of field devices connected to the loop (multi-drop mode).
Contact Output Signal: Two points (one is fail-safe, normally open)
Contact Input Signal: Two points
Sample Gas Temperature: 0 to 700°C
It is necessary to mount the cell using inconel cell-bolts when the temperature is 80°C.
Sample Gas Pressure: -5 to +20 kPa. (When the pressure in the furnace exceeds 3 kPa, it is recommended to use pressure compensated type. When the pressure in the furnace exceeds 5 kPa, pressure compensated type is required.)
No pressure fluctuation in the process should be allowed.
Probe Length: 0.4, 0.7, 1.0, 1.5, 2.0, 2.5, 3.0 m
Probe Material: JIS SUS316 stainless steel
Ambient Temperature: -20°C to +55°C (-5 to +70°C on the case surface)
Storage Temperature: -30°C to +70°C
Ambient Humidity: 0 to 95% RH (non-condensing)
Power Supply Voltage: Ratings; 100 to 240 V AC
Acceptable range: 85 to 264 V AC
Power Supply Frequency: Ratings; 50/60 Hz
Acceptable range: 45 to 66 Hz
Power Consumption: Max. 300 W, approx. 100 W for ordinary use.
Reference Gas System: Natural Convection, Instrument Air, or Pressure Compensated
Instrument Air System (excluding Natural Convection); Pressure: 200 kPa plus the pressure inside the process. (It is recommended to use air which is dehumidified by cooling to dew point -20°C or less, and dust or oil mist are removed.)
Consumption; Approx. 1 Nl/min
Wetted Material SUS316 (JIS), Zirconia, SUS304 (JIS) or ASTM grade 304 (flange), Hastelloy B, (Inconel 600, 601)
Construction: Heater and thermocouple replaceable construction. Non-explosion-proof JIS C0920 / equivalent to IP44D. Equivalent to NEMA 4X/IP66 (Achieved when the cable entry is completely sealed with a cable gland in the recirculation pressure compensated version.)
Gas Connection: Rc1/4 or 1/4 NPT (Female)
Wiring Connection: G1/2, Pg 13.5, M20 × 1.5, 1/2 NPT select one type (4 pieces)
Installation: Flange mounting
Probe Mounting Angle: Horizontal to vertically downward. When the probe insertion length is 2 m or less, installing at angles from horizontal to vertically downward is available. When the probe insertion length is 2.5 m or more, mount vertically downward (within ± 5°) and use a probe protector.
Case: Aluminum alloy
Paint Color: Cover; Mint green (Munsell 5.6BG3.2/3.9)
Paint Color: Inner; Mint green (Munsell 5.6BG3.2/3.9)
Finish: Polyurethane corrosion-resistance coating
Weight:
Insertion length of 0.4 m: approx. 8 kg (JIS 5K 65) / approx. 13 kg (ANSI 150 4)
Insertion length of 1.0 m: approx. 10 kg (JIS 5K 65) / approx. 15 kg (ANSI 150 4)
Insertion length of 1.5 m: approx. 12 kg (JIS 5K 65) / approx. 17 kg (ANSI 150 4)
Insertion length of 2.0 m: approx. 14 kg (JIS 5K 65) / approx. 19 kg (ANSI 150 4)
Insertion length of 2.5 m: approx. 17 kg (JIS 5K 65) / approx. 22 kg (ANSI 150 4)

Functions
Display Function: Displays values of the measured oxygen concentration, moisture quantity, mixture ratio etc
Alarm, Error Display: Displays alarms such as “AL-06” or errors such as “Err-01” when any such status occurs.
Calibration Functions:
Automatic Calibration: Requires the ZR20H Automatic Calibration Unit. It calibrates automatically at specified intervals.
Semi-automatic Calibration: Requires the ZR20H Automatic Calibration Unit. Input calibration start signal by optical switch or contact, then it calibrates automatically afterwards.
Manual Calibration: Calibration with opening/closing the valve of calibration gas in operation interactively with the optical switch.
Maintenance Functions:
Can operate updated data settings in daily operation and checking. Display data settings, calibration data settings, test settings (current output loop check, input/output contact check).
Setup Functions:
Initial settings suit for the plant conditions when installing the converter. Current output data settings, alarm data settings, contact data settings, other settings.
Display and setting content:

Display Related Items: Oxygen concentration (vol% O₂), moisture quantity (vol% H₂O), mixture ratio (kg/kg), relative humidity (%RH), dew point (°C), cell temperature (°C), thermocouple reference junction temperature (°C), maximum/minimum/average oxygen concentration (vol% O₂), maximum/minimum/average moisture quantity (vol% H₂O), maximum/minimum/average mixture ratio (kg/kg), cell e.m.f. (mV), output 1, 2 current (mA), cell response time (seconds), cell internal resistance (Ω), cell condition (in four grades), heater on-time rate (%), calibration record (ten times), time (year/month/day/hour/minute).

Calibration Setting Items: Span gas concentration (vol% O₂), zero gas concentration (vol% O₂), calibration mode (automatic, semi-automatic, manual), calibration type and method (zero-span calibration, zero calibration only, span calibration only), stabilization time (min.sec), calibration time (min.sec), calibration interval (day/hour), starting time (year/month/day/hour/minute).

Output Related Items: Analog output/output mode selection, output conditions when warming-up/maintenance/calibrating/abnormal, oxygen concentration at 4 mA/20 mA (vol% O₂), moisture quantity at 4 mA/20 mA (vol% H₂O), mixture ratio at 4 mA/20 mA (kg/kg), time constant, preset values when warming-up/maintenance/calibrating/abnormal, output preset values on abnormal.

Alarm Related Items: Oxygen concentration high alarm/ high-high alarm limit values (vol% O₂), oxygen concentration low alarm/low-low alarm limit values (vol% O₂), moisture quantity high alarm/ high-high alarm limit values (vol% H₂O), moisture quantity low alarm/low-low alarm limit values (vol% H₂O), mixture ratio high alarm/high-high alarm limit values (kg/kg), mixture ratio low alarm/low-low alarm limit values (kg/kg), oxygen concentration alarm hysteresis (vol% O₂), moisture quantity alarm hysteresis (vol% H₂O), mixture ratio alarm hysteresis (kg/kg), oxygen concentration/moisture quantity/mixture ratio detection, alarm delay (seconds).

Contact Related Items: Selection of contact input 1 and 2, selection of contact output 1 and 2 (abnormal, high-high alarm, high alarm, low alarm, low-low alarm, maintenance, calibrating, range switching, warming-up, calibration gas pressure decrease, flameout gas detection.

Converter Output: One mA analog output point (4 to 20 mA DC (maximum load resistance of 550 Ω)) with mA digital output point (HART) (minimum load resistance of 250 Ω).

Range: Any setting between 0 to 25 through 0 to 100 vol% H₂O, and partial range is available (Maximum range value/minimum range value 1.3 or more) For the log output, the minimum range values are fixed to 0.1 vol% O₂ for the oxygen concentration, 0.1 vol% H₂O for the moisture quantity, and 0.01 kg/kg for the mixture ratio. 4 to 20 mA DC linear or log can be selected. Input/output isolation.

Output damping; 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.

Contact Output: Two points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load) Normally energized or normally de-energized contact, and can be selected. Delayed functions (0 to 255 seconds) and hysteresis function (0 to 9.9 vol% O₂) can be added to high/low alarms. The following functions are programmable for contact outputs.

- Abnormal, High-high alarm, High alarm, Low alarm, Maintenance,
- Calibration, Range switching answer-back, Warm-up,
- Calibration gas pressure decrease answer-back of contact input),
- Flameout gas detection (answer-back of contact input).

Contact Input: Two points, voltage-free contacts

The following functions are programmable for contact inputs.

- Calibration-gas pressure decrease alarm, Range switching (switched range is fixed), External calibration start, Process alarm (if this signal is received, the heater power turns off)

Contact capacity: Off-leakage current; 3 mA or less.

Self-diagnosis: Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit

Calibration: Method; Zero/span calibration

Calibration mode; automatic, semi-automatic and manual (All are operated using optical switches). Either zero or span can be skipped.

Zero calibration gas concentration setting range; 0.3 to 100 vol% O₂ (minimum setting: 0.01 vol% O₂).

Span calibration gas concentration setting range; 4.5 to 100 vol% O₂ (minimum setting: 0.01 vol% O₂).

Use N₂-balanced mixed gas containing 0 to 10% scale of oxygen for standard zero gas, and 80 to 100% scale of oxygen for standard span gas.

Calibration interval; date/time setting: maximum 255 days.
4. ZO21P-H High Temperature Probe Adapter for separate type Oxygen Analyzer

Measuring O₂ in the high temperature gases (exceeds 700°C) requires a general-use probe ZR22G of 0.15 m length and a high temperature probe adapter.

- Sample gas temperature: 0 to 1400°C (when using SiC probe) 0 to 800°C (when using SUS310S probe adapter)
- Sample gas pressure: -0.5 to + 5 kPa. When using in the range of 0 to 25 vol% O₂ or more, the sample gas pressure should be in the range of -0.5 to +0.5 kPa. (Where the sample gas pressure for the high-temperature probe is negative, an ejector assembly is necessary.)
- Insertion length: 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.5 m
- Material in Contact with Gas: SUS316 (JIS), SiC or SUS310S, SUS304 (JIS) or ASTM grade 304 (flange)
- Probe Material: SiC, SUS310S (JIS)
- Installation: Flange mounting (FF type or RF type)
- Probe Mounting Angle: Vertically downward within ±5°. Where the probe material is SUS310S, horizontal mounting is available.
- Construction: Non explosion-proof. Rainproof

Weight (example): Insertion length of 1.0 m: approx. 5.3 kg (JIS) / approx. 11.3 kg (ANSI)
Insertion length of 1.5 m: approx. 5.8 kg (JIS) / approx. 11.8 kg (ANSI)

5. E7046EC/E7046EN Ejector Assembly for High Temperature Detector of separate type Oxygen Analyzer

For use in cases where pressure of sample gas for high temperature detector is negative.

- Needle Valve
  - Connection: Rc1/4 or 1/4 NPT (Female)
  - Material: SUS316 (JIS)
  - (Note) Pipes and connectors are not provided.

- Pressure Gauge Assembly
  - Material in Contact with Gas: SUS316 (JIS)
  - Case Material: Aluminum alloy (Paint color; black)
  - Scale: 0 to 100 kPa G
  - Connection: R1/4 or 1/4 NPT, SUS304 (JIS)
    (with Bushing G3/8 x R1/4 or 1/4 NPT (Female))

- Ejector
  - Ejector Inlet Air Pressure: 29 to 68 kPa G
  - Air Consumption: Approx. 30 to 40 l/min
  - Suction gas flow rate: 3 to 7 l/min
  - Connection: Rc1/4, SUS304 (JIS)
  - Tube Connection: (ø6/ø4 mm or 1/4 inch copper tube or stainless tube)

- ZO21R Probe Protector for Zirconia Oxygen Analyzer

Used when sample gas flow velocity is approx. 10m/sec or more and dust particles wears the detector in cases such as pulverized coal boiler of fluidized bed furnace (or burner) to protect the detector from wearing by dust particles. When probe insertion length is 2.5 m or more and horizontal installation, specify the ZO21R-L-200-□*B to reinforce the probe.

- Insertion Length: 1.05, 1.55, 2.05 m.
- Flange: JIS 5K 65A FF equivalent. ANSI Class 150 4 FF (without serration) equivalent. However, flange thickness is different.
- Material: SUS316 (JIS), SUS304 (JIS) or ASTM grade 304 (Flange)
- Weight: 1.05 m: Approx. 8/10/8.5 kg (JIS/ANSI), 1.55 m: Approx. 9/13/11.5 kg (JIS/ANSI), 2.05 m: Approx. 12/16/14.5 kg (JIS/ANSI)
- Installation: Bolts, nuts, and washers are provided for detector, probe adapter and process-side flange.

7. K9471UA Dust Filter for Oxygen Analyzer

This filter is used to protect the cell from corrosive dust components or high velocity dust in recovery boilers and cement kiln. Sample gas flow rate is needed to be 1m/sec or more to replace gas inside zirconia sensor.

- Mesh: 30 microns
- Material: SiC (Filter), SUS316 (JIS)
- Weight: Approx. 0.2 kg

8. K9471UC Dust Guard Protector

Recommended to be used when sample gas is likely to flow directly into the cell due to its flow direction in the stack or the like, flammable dust may go into the cell, or water drops are likely to fall and remain in the cell during downtime or the like due to the installation position.

- Material: SUS316 (JIS)
- Weight: Approx. 0.3 kg

9. ZH21B Dust Protector for High temperature Humidity Analyzer

This protector is designed to protect the probe output from dust agitation (i.e., to prevent combustible materials from entering the probe cell) where humidity measurements are made under dusty environments.

- Insertion length: 0.440 m
- Flange: JIS 5K 80 FF equivalent or ANSI Class 150 4 FF equivalent. (However, flange thickness is different.)
- Material: SiC, SUS316 (JIS), SUS304 (JIS) or ASTM grade 304 (flange)
- Weight: Approx. 6 kg (JIS), approx. 8.5 kg (ANSI)
- Mounting: Mounted on the probe or process flange withbolts and the associated nuts and washers.

10. ZO21S Standard Gas Unit

The ZO21S does not conform to CE marking.

- Function: Portable unit for calibration gas supply consisting of span gas (air) pump, zero gas cylinder with sealed inlet, flow rate checker and flow rate needle valve.
- Sealed Zero Gas Cylinders (6 provided): E7050BA
  - Capacity: 1 l
  - Filled pressure: Approx. 868 kPa G (at 35°C)
  - Composition: 0.95 to 1.0 vol% O₂ (N₂-balanced)
  - Power Supply: 100, 110, 115, 200, 220, 240V AC ± 10%, 50/60 Hz
  - Power Consumption: Max. 5 VA
  - Paint Color: Mainframe: Munsell 2.0 GY3.1/0.5 equivalent
    Cover: Munsell 2.8 GY6.4/0.9 equivalent
  - Weight: Approx. 3 kg
11. ZA8F Flow Setting Unit

Used when instrument air is provided.

This unit consists of flowmeter and flow control valve to control flow rates of calibration gas and reference gas.

- **Flowmeter Scale:** Calibration gas; 0.1 to 1.0 l/min.
  Reference gas; 0.1 to 1.0 l/min.
- **Construction:** Dust-proof and rainproof construction
- **Case Material:** SPCC (Cold rolled steel sheet)
- **Painting:** Baked epoxy resin, Dark-green (Munsell 2.0 GY 3.1/0.5 or equivalent)
- **Tube Connections:** Rc1/4 or 1/4 NPT (Female)
- **Reference Gas Pressure:** Clean air supply of sample gas pressure plus approx. 50 kPa G (or sample gas pressure plus approx. 150 kPa when a check valve is used.) Pressure at inlet of the flow setting unit. (Max. 300 kPa G)
- **Air Consumption:** Approx. 1.5 l/min
- **Weight:** Approx. 2.3 kg

12. ZR40H Automatic Calibration Unit (for Separate type)

Used when automatic calibration is required for the separate type and instrument air is provided. The solenoid valves are provided as standard.

- **Construction:** Dust-proof and rainproof construction
  - NEMA 4X/IP67 - only for case coating
  - Solenoid valve, not flowmeter (excluding flowmeter)
- **Mounting:** 2-inch pipe or wall mounting, no vibration
- **Materials:** Body: Aluminum alloy, Piping: SUS316 (JIS), SUS304 (JIS), Flowmeter: MA (Methacrylate resin) Bracket : SUS304 (JIS)
- **Finish:** Polyurethane corrosion-resistance coating, Mint green (Munsell 5.6BG3.3/2.9)
- **Piping Connection:** Rc1/4 or 1/4 NPT (Female)
- **Power Supply:** 24V DC (from ZR202G), Power consumption: 1.3 W
- **Reference Gas Pressure:** Sample gas pressure plus approx. 150 kPa (690 kPa max.), Pressure at inlet of automatic calibration unit
- **Air Consumption:** Approx. 1.5 l/min
- **Weight:** Approx. 5.2 kg
- **Ambient Temperature:** -20°C to +55°C, no condensing and freezing
- **Ambient Humidity:** 0 to 95%RH
- **Storage Temperature:** -30°C to +65°C

13. ZR20H Automatic Calibration Unit (for Integrated type)

Used when automatic calibration is specified for the integrated type and instrument air is provided.

Equipped with the analyzer when automatic calibration is specified in the suffix code of the ZR202G Integrated type by selecting either "-A (Horizontal mounting)" or "-B (Vertical mounting)." The ZR20H should be arranged when automatic calibration is to be required after the ZR202H has been installed. Ask Yokogawa service station for its mounting.

- **Construction:** Dust-proof and rainproof construction
  - NEMA 4X/IP67 (excluding flowmeter)
- **Mounting:** Mounted on ZR202G, no vibration
- **Materials:** Body: Aluminum alloy, Piping: SUS316 (JIS), SUS304 (JIS), Flowmeter: MA (Methacrylate resin)
- **Finish:** Polyurethane corrosion-resistance coating
- **Case:** Mint green (Munsell 5.6BG3.3/2.9)
- **Cover:** Mint green (Munsell 5.6BG3.3/2.9)
- **Piping Connection:** Rc1/4 or 1/4 NPT (Female)
- **Power Supply:** 24V DC (from ZR202G), Power consumption: 1.3 W
- **Reference Gas Pressure:** Sample gas pressure plus approx. 150 kPa (690 kPa max.), Pressure at inlet of automatic calibration unit
- **Air Consumption:** Approx. 1.5 l/min
- **Weight:** Approx. 2 kg
- **Ambient Temperature:** -20°C to +55°C, no condensing and freezing
- **Ambient Humidity:** 0 to 95%RH
- **Storage Temperature:** -30°C to +65°C

14. L9852CB/G7016XH Stop Valve

The stop valve is mounted on the calibration gas line. To include Nipple Stop Valve with the product, select the suffix code (/SV) for ZR22G Separate type Zirconia Oxygen/High Temperature Humidity Analyzer, Detector or ZR202G Integrated type Zirconia Oxygen/High Temperature Humidity Analyzer.

- **Connection:** Rc1/4 or 1/4 NPT (Female)
- **Material:** SUS316 (JIS)
- **Weight:** Approx. 150 g

15. K9292DN/K9292DS Check Valve

This is used to prevent entry of sample gas into calibration gas line. Purpose is the same as stop valve, but is convenient, as it does not need to be opened or closed for calibration.

- **Mount directly on calibration gas inlet of detector in place of stop valve. However as source pressure of 150 kPa G or more is needed, standard gas unit cannot be used.
- **When option code “/CV” of the ZR22G or the ZR202G is specified, check valve is provided.

16. Air Set

**G7003XF/K9473XX**
- **Primary Pressure:** Max. 1 MPa G
- **Secondary Pressure:** 0.02 to 0.2 MPa G
- **Connection:** Rc1/4 or 1/4 NPT (F) with joint adapter

**G7004XF/K9473XG**
- **Primary Pressure:** Max. 1 MPa G
- **Secondary Pressure:** 0.02 to 0.5 MPa G
- **Connection:** Rc1/4 or 1/4 NPT (F) with joint adapter

17. G7001ZC Zero Gas Cylinder

- **Capacity:** 3.4 l
- **Filled pressure:** 9.8 to 12 MPa G
- **Composition:** 0.95 to 1.0 vol% O2 (N2-balanced)

(Note) Export of such high pressure filled gas cylinders to most countries is prohibited or restricted.
18. **G7013XF/G7014XF Pressure Regulator for Gas Cylinder**

<table>
<thead>
<tr>
<th>Primary Pressure: Max. 14.8 MPa G, Secondary Pressure: 0 to 0.4 MPa G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection: Inlet W22 14 threads, right hand screw Outlet Rc1/4 or 1/4 NPT (Female)</td>
</tr>
<tr>
<td>Material: Brass body</td>
</tr>
</tbody>
</table>

19. **E7044KF Case Assembly of Calibration Gas Cylinder**

<table>
<thead>
<tr>
<th>Case Paint: Baked epoxy resin, Jade green (Munsell 7.5 BG 4/1.5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation: 2B pipe mounting</td>
</tr>
<tr>
<td>Weight: Approx. 10 kg</td>
</tr>
<tr>
<td>(Note) Export of such high pressure filled gas cylinders to most countries is prohibited or restricted.</td>
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</table>

20. **ZR22A, ZR202A Heater Assembly**

<table>
<thead>
<tr>
<th>ZR22A: Spare Parts for ZR22G</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZR202A: Spare Parts for ZR202G</td>
</tr>
<tr>
<td>(Note) Yokogawa shall not guarantee the heater assembly after its replacement.</td>
</tr>
</tbody>
</table>

### STANDARD ACCESSORIES

**ZR402G**

<table>
<thead>
<tr>
<th>Item</th>
<th>Parts No.</th>
<th>Q’ty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuse</td>
<td>A1113EF</td>
<td>1</td>
<td>3.15 A</td>
</tr>
<tr>
<td>Bracket</td>
<td>F9554AL</td>
<td>1</td>
<td>For pipe, panel, or wall mounting</td>
</tr>
<tr>
<td>Screws for Bracket</td>
<td>F9123GF</td>
<td>1</td>
<td></td>
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</tbody>
</table>

**ZR22G**

<table>
<thead>
<tr>
<th>Item</th>
<th>Parts No.</th>
<th>Q’ty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allen wrench</td>
<td>L9827AB</td>
<td>1</td>
<td>For lock screw</td>
</tr>
</tbody>
</table>

**ZR202G**

<table>
<thead>
<tr>
<th>Item</th>
<th>Parts No.</th>
<th>Q’ty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuse</td>
<td>A1113EF</td>
<td>1</td>
<td>3.15 A</td>
</tr>
<tr>
<td>Allen wrench</td>
<td>L9827AB</td>
<td>1</td>
<td>For lock screw</td>
</tr>
</tbody>
</table>

---

### Model and Code

#### 1. Separate type General Purpose Zirconia Oxygen / High Temperature Humidity Analyzer, Converter

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZR402G</td>
<td>- - - - - -</td>
<td>-</td>
<td>Separate type Zirconia Oxygen Analyzer, Converter</td>
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<table>
<thead>
<tr>
<th>Converter thread</th>
<th>-P</th>
<th>-G</th>
<th>-M</th>
<th>-T</th>
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<td>G1/2</td>
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<table>
<thead>
<tr>
<th>Display</th>
<th>-J</th>
<th>-E</th>
<th>-G</th>
<th>-F</th>
<th>-C</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Japanese</td>
<td>English</td>
<td>German</td>
<td>French</td>
<td>Chinese</td>
</tr>
</tbody>
</table>

**Instruction manual**

- **-J** Japanese
- **-E** English
- **-C** Chinese
- **-A** Always -A

**Option**

- **/HS** Set for Humidity Analyzer (**1)**
- **/H** Hood (**3)**

**Tag plate**

- **/SCT** Stainless steel tag plate (**2)**
- **/PT** Printed tag plate (**2)**

**NAMUR NE43 compliant**

- **/C2** Failure alarm down-scale: Output status at CPU failure and hardware error is 3.6 mA or less (**4**)
- **/C3** Failure alarm up-scale: Output status at CPU failure and hardware error is 21.0 mA or more (**4**)

**Standard**

- **/EQ** EAC with PA (**5**)
- **/ER** EAC (**5**)

---

**Note**

- For humidity measurements, be sure to specify /HS options.
- Specify either /SCT or /PT option code.
- Sun shield hood is still effective even if scratched.
- Output signal limits: 3.8 to 20.5 mA. Specify either /C2 or /C3 option code.
- "/EQ" is EAC with Pattern Approval for Russia. /ER is EAC for Kazakhstan and Belarus. (Note) If AC line voltage is 125 V AC or greater, or in the EEC, the ZO21D cannot be used with the ZR402G.

**Language**

<table>
<thead>
<tr>
<th>Model</th>
<th>Japanese</th>
<th>English</th>
<th>German</th>
<th>French</th>
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<tr>
<td>ZA8C</td>
<td>K9290LF</td>
<td>K9290KF</td>
<td>K9290MF</td>
<td>K9290MG</td>
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<td>K9293HT</td>
<td>K9293HU</td>
<td>K9293HW</td>
<td>K9293HV</td>
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<td>HA400 (%)</td>
<td>K9293HP</td>
<td>K9293HQ</td>
<td>K9293HS</td>
<td>K9293HR</td>
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<td>AV8V</td>
<td>K9296CN</td>
<td>K9296CN</td>
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<td>K9296CN</td>
</tr>
</tbody>
</table>

Note for ZR22G combination use with existing older model converters

When the ZR22G is used with existing older model converters, ZA8C, AV8C and HA400, ROM replacement and addition of a cold junction temperature compensation board are required.

The part numbers of each language version of ROM refer to table below.

The part numbers of cold junction temperature compensation boards are K9471JA for the ZA8C.

For replacing the ROM by using ROM extraction tool (Part No. K9471JT) and mounting the cold junction temperature compensation board, it is recommended that you ask Yokogawa service station.

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# 2. Separate type Zirconia Oxygen / High Temperature Humidity Analyzer, Detectors

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Option code</th>
<th>Description</th>
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<tbody>
<tr>
<td>ZR22G</td>
<td>-015</td>
<td>-</td>
<td>Separate type Zirconia Oxygen / High Temperature Humidity Analyzer, Detector</td>
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<tr>
<td></td>
<td>-040</td>
<td>-</td>
<td>0.15 m (for high temperature use) (*1)</td>
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<tr>
<td></td>
<td>-070</td>
<td>-</td>
<td>0.4 m</td>
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<tr>
<td></td>
<td>-100</td>
<td>-</td>
<td>0.7 m</td>
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<td></td>
<td>-150</td>
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<td>1.0 m</td>
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<td>-</td>
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<tr>
<td></td>
<td>-300</td>
<td>-</td>
<td>2.5 m (*2)</td>
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<td>-360</td>
<td>-</td>
<td>3.0 m (*2)</td>
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<td>-</td>
<td>3.6 m (*2)</td>
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<td>-480</td>
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<td>4.2 m (*2)</td>
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<td>-540</td>
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<td>4.8 m (*2)</td>
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<table>
<thead>
<tr>
<th>Wetted material</th>
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<th>Stainless steel</th>
<th>Stainless steel with Inconel calibration gas tube (*10)</th>
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<tbody>
<tr>
<td>Flange</td>
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<td>-B</td>
<td>ANSI Class 150 2 RF</td>
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<td>-C</td>
<td>-D</td>
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<td>-J</td>
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<td>JIS 5K 80 FF</td>
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<td>-K</td>
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<td>JIS 10K 65 FF</td>
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<td>-M</td>
<td>-N</td>
<td>JIS 10K 100 FF</td>
<td>JIS 5K 32 FF (for high temperature use) (*4)</td>
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<td>Reference gas</td>
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<td>External connection (Instrument air) (*11)</td>
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<td>External connection (Instrument air)</td>
<td>Pressure compensated (*11)</td>
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<td>Gas Thread</td>
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<td>-S</td>
<td>Rc1/4</td>
<td>1/4NPT (Female)</td>
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<td>-T</td>
<td>-U</td>
<td>1/4NPT (Female)</td>
<td>1/4NPT (Female)</td>
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<td>-Q</td>
<td>G1/2</td>
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<td>-S</td>
<td>Pg13.5</td>
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<td>-T</td>
<td>-U</td>
<td>M20 x1.5</td>
<td>1/2 NPT</td>
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<td></td>
<td>-N</td>
<td>-O</td>
<td>-P</td>
<td>-A</td>
</tr>
</tbody>
</table>

**Options**

- **Valves**
  - /C: Inconel bolt (*5)
  - /CV: Check valve (*6)
  - /SV: Stop valve (*6)

- **Filter**
  - /F1: Dust Filter (*7)
  - /F2: Dust Guard Protector (*7)

- **Tag plates**
  - /SCT: Stainless steel tag plate (*8)
  - /PT: Printed tag plate (*8)

- **Standard**
  - /EQ: EAC with PA (*12)
  - /ER: EAC (*12)

---

*1 Used with the ZO21P High Temperature Probe Adapter. Select flange (-Q).
*2 When installing horizontally the probe whose insertion length is 2.5 m or more, use the Probe Protector. Be sure to specify ZO21R-L-200-□. Specify the flange suffix code either -C or -K.
*3 The thickness of the flange depends on its dimensions.
*4 Not used in conjunction with —P (pressure compensation) for reference gas. The flange thickness does not conform to JIS specification.
*5 Inconel probe bolts and U shape pipe are used. Use this option for high temperature use (ranging from 600 to 700 °C).
*6 Specify either /CV or /SV option code.
*7 Not used with the high temperature humidity analyzer.
*8 Specify either /SCT or /PT option code.
*9 Not waterproof, avoid rain. Operating maximum temperature is 80°C. Available only in the U.S.
*10 Recommended if sample gas contains corrosive gas like chlorine.
*11 piping for reference gas must be installed to supply reference gas constantly at a specified flow rate.
*12 "/EQ" is EAC with Pattern Approval for Russia. "/ER" is EAC for Kazakhstan and Belarus.
### 3. Integrated type Zirconia Oxygen / High temperature Humidity Analyzer

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZR202G</td>
<td>-040</td>
<td>0.4 m</td>
<td>Integrated type Zirconia Oxygen/ High Temperature Humidity Analyzer</td>
</tr>
<tr>
<td></td>
<td>-070</td>
<td>0.7 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-100</td>
<td>1.0 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-150</td>
<td>1.5 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-200</td>
<td>2.0 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-250</td>
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</tr>
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<td></td>
<td>-300</td>
<td>3.0 m</td>
<td></td>
</tr>
<tr>
<td>Wetted material</td>
<td>-S</td>
<td>Stainless steel</td>
<td>With Inconel calibration gas tube</td>
</tr>
<tr>
<td></td>
<td>-C</td>
<td>Stainless steel</td>
<td></td>
</tr>
<tr>
<td>Flange (*2)</td>
<td>-A</td>
<td>ANSI Class 150 2 RF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-B</td>
<td>ANSI Class 150 3 RF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-C</td>
<td>ANSI Class 150 4 RF</td>
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</tr>
<tr>
<td></td>
<td>-E</td>
<td>DIN PN10 DN50 A</td>
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<tr>
<td></td>
<td>-F</td>
<td>DIN PN10 DN80 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-G</td>
<td>JIS 5K 65 FF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-H</td>
<td>JIS 10K 65 FF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-I</td>
<td>JIS 10K 80 FF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-J</td>
<td>JPI Class 150 4 RF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-K</td>
<td>JPI Class 150 3 RF</td>
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</tr>
<tr>
<td></td>
<td>-L</td>
<td>Westinghouse</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-M</td>
<td>Vertical mounting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-P</td>
<td>Horizontal mounting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-R</td>
<td>Pressure compensated</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-S</td>
<td>Natural convection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-W</td>
<td>External connection (Instrument air)</td>
<td></td>
</tr>
<tr>
<td>Auto Calibration</td>
<td>-N</td>
<td>Not required</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-A</td>
<td>Vertical mounting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-B</td>
<td>Horizontal mounting</td>
<td></td>
</tr>
<tr>
<td>Reference gas</td>
<td>-C</td>
<td>Natural convection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-E</td>
<td>External connection (Instrument air)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-P</td>
<td>Pressure compensated</td>
<td></td>
</tr>
<tr>
<td>Gas Thread</td>
<td>-R</td>
<td>Rc1/4</td>
<td>1/4 NPT (Female)</td>
</tr>
<tr>
<td></td>
<td>-T</td>
<td>G1/2</td>
<td></td>
</tr>
<tr>
<td>Connection box thread</td>
<td>-P</td>
<td>Pg 13.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Q</td>
<td>M20x1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-M</td>
<td>1/2 NPT</td>
<td></td>
</tr>
<tr>
<td>Instruction manual</td>
<td>-J</td>
<td>Japanese</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-C</td>
<td>Chinese</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-A</td>
<td>Always -A</td>
<td></td>
</tr>
<tr>
<td>Options</td>
<td>/C</td>
<td>Inconel bolt</td>
<td></td>
</tr>
<tr>
<td></td>
<td>/HS</td>
<td>Check valve</td>
<td></td>
</tr>
<tr>
<td></td>
<td>/CV</td>
<td>Stop valve</td>
<td></td>
</tr>
<tr>
<td></td>
<td>/SV</td>
<td>Hood</td>
<td></td>
</tr>
<tr>
<td></td>
<td>/P</td>
<td>Dust Filter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>/F1</td>
<td>Dust Guard Protector</td>
<td></td>
</tr>
<tr>
<td></td>
<td>/F2</td>
<td>Stainless steel tag plate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>/SCT</td>
<td>Printed tag plate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>/PT</td>
<td>EAC with PA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>/ER</td>
<td>EAC</td>
<td></td>
</tr>
</tbody>
</table>

*1 For the horizontally installed probe whose insertion length is 2.5 m or more, use the Probe Protector. Be sure to specify ZO21R-L-200-□. Specify the flange suffix code either -C or -K.
*2 The thickness of the flange depends on its dimensions.
*3 Inconel probe bolts and U shape pipe are used. Use this option for high temperature use (ranging from 600 to 700°C).
*4 For humidity measurements, be sure to specify /HS options. Pressure compensation of reference gas can not be selected.
*5 Specify either /CV or /SV option code.
*6 Not used with the high temperature humidity analyzer.
*7 Specify either /SCT or /PT option code.
*8 No need to specify the option codes, /CV and /SV, since the check valves are provided with the Automatic Calibration Unit. Automatic calibration cannot be used when natural convection is selected as reference air.
*9 Sun shield hood is still effective even if scratched. Hood is necessary for outdoor installation out of sun shield roof.
*10 Recommended if sample gas contains corrosive gas like chlorine.
*11 Piping for reference gas must be installed to supply reference gas constantly at a specified flow rate.
*12 Output signal limits: 3.8 to 20.5 mA. Specify either /C2 or /C3 option code.
*13 "/EQ" is EAC with Pattern Approval for Russia. "/ER" is EAC for Kazakhstan and Belarus.
*14 When Pressure Compensated is specified with "-A" or "-B" in Auto Calibration, consult with Yokogawa.
4. High Temperature Probe Adapter for Separate type Oxygen Analyzer

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZO21P</td>
<td>-H</td>
<td></td>
<td>High Temperature Probe Adapter</td>
</tr>
<tr>
<td>Material</td>
<td>-A</td>
<td>-B</td>
<td>SiC SUS 310S (JIS)</td>
</tr>
<tr>
<td>Insertion length</td>
<td>-050</td>
<td>-060</td>
<td>0.5 m</td>
</tr>
<tr>
<td></td>
<td>-070</td>
<td>-080</td>
<td>0.7 m</td>
</tr>
<tr>
<td></td>
<td>-090</td>
<td>-100</td>
<td>0.9 m</td>
</tr>
<tr>
<td></td>
<td>-150</td>
<td></td>
<td>1.5 m</td>
</tr>
<tr>
<td>Flange</td>
<td>-J</td>
<td>-N</td>
<td>JIS 5K 50 FF</td>
</tr>
<tr>
<td></td>
<td>-M</td>
<td>-L</td>
<td>JIS 10K 65 FF</td>
</tr>
<tr>
<td></td>
<td>-A</td>
<td>-R</td>
<td>ANSI Class 150 4 RF</td>
</tr>
<tr>
<td></td>
<td>-Q</td>
<td>-T</td>
<td>ANSI Class 150 3 RF</td>
</tr>
<tr>
<td></td>
<td>-S</td>
<td>-E</td>
<td>ANSI Class 150 3 RF</td>
</tr>
<tr>
<td>Style code</td>
<td>*B</td>
<td></td>
<td>Style B</td>
</tr>
<tr>
<td>Option</td>
<td>Ejector</td>
<td></td>
<td>Ejector Assy with E7046EC</td>
</tr>
<tr>
<td>Tag plate</td>
<td>/EJ1</td>
<td>/EJ2</td>
<td>Stainless steel tag plate</td>
</tr>
</tbody>
</table>

Note: For this high-temperature use probe adapter, be sure to specify the ZR22G probe of its insertion length 0.15 meters.

5. Ejector Assembly or High Temperature Use of separate type Oxygen Analyzer

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>K9292TP</td>
<td>SIC, insertion length 0.5 m</td>
</tr>
<tr>
<td>E7046CF</td>
<td>SIC, insertion length 0.6 m</td>
</tr>
<tr>
<td>K9292TQ</td>
<td>SIC, insertion length 0.7 m</td>
</tr>
<tr>
<td>E7046CG</td>
<td>SIC, insertion length 0.8 m</td>
</tr>
<tr>
<td>E7046CH</td>
<td>SIC, insertion length 0.9 m</td>
</tr>
<tr>
<td>E7046AL</td>
<td>SIC, insertion length 1.0 m</td>
</tr>
<tr>
<td>E7046BB</td>
<td>SIC, insertion length 1.5 m</td>
</tr>
<tr>
<td>K9292TV</td>
<td>SUS310S (JIS), insertion length 0.5 m</td>
</tr>
<tr>
<td>E7046CR</td>
<td>SUS310S (JIS), insertion length 0.6 m</td>
</tr>
<tr>
<td>K9292TW</td>
<td>SUS310S (JIS), insertion length 0.7 m</td>
</tr>
<tr>
<td>E7046CS</td>
<td>SUS310S (JIS), insertion length 0.8 m</td>
</tr>
<tr>
<td>E7046CT</td>
<td>SUS310S (JIS), insertion length 0.9 m</td>
</tr>
<tr>
<td>E7046AP</td>
<td>SUS310S (JIS), insertion length 1.0 m</td>
</tr>
<tr>
<td>E7046AQ</td>
<td>SUS310S (JIS), insertion length 1.5 m</td>
</tr>
</tbody>
</table>

6. Probe Protector for Zirconia Oxygen Analyzers

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZO21R</td>
<td>-L</td>
<td></td>
<td>Probe Protector (0 to 700°C)</td>
</tr>
<tr>
<td>Insertion length</td>
<td>-100</td>
<td>-150</td>
<td>1.05 m</td>
</tr>
<tr>
<td></td>
<td>-200</td>
<td></td>
<td>2.05 m</td>
</tr>
<tr>
<td>Flange (*1)</td>
<td>-J</td>
<td>-A</td>
<td>JIS 5K 65 FF</td>
</tr>
<tr>
<td>Style code</td>
<td>*B</td>
<td></td>
<td>Style B</td>
</tr>
</tbody>
</table>

Note: For this high-temperature use probe adapter, be sure to specify the ZR22G probe of its insertion length 0.15 meters.

6. High Temperature Probe Adapter for Separate type Oxygen Analyzer

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZO21P</td>
<td>-H</td>
<td></td>
<td>High Temperature Probe Adapter</td>
</tr>
<tr>
<td>Material</td>
<td>-A</td>
<td>-B</td>
<td>SiC SUS 310S (JIS)</td>
</tr>
<tr>
<td>Insertion length</td>
<td>-050</td>
<td>-060</td>
<td>0.5 m</td>
</tr>
<tr>
<td></td>
<td>-070</td>
<td>-080</td>
<td>0.7 m</td>
</tr>
<tr>
<td></td>
<td>-090</td>
<td>-100</td>
<td>0.9 m</td>
</tr>
<tr>
<td></td>
<td>-150</td>
<td></td>
<td>1.5 m</td>
</tr>
<tr>
<td>Flange</td>
<td>-J</td>
<td>-N</td>
<td>JIS 5K 50 FF</td>
</tr>
<tr>
<td></td>
<td>-M</td>
<td>-L</td>
<td>JIS 10K 65 FF</td>
</tr>
<tr>
<td></td>
<td>-A</td>
<td>-R</td>
<td>ANSI Class 150 4 RF</td>
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<tr>
<td></td>
<td>-Q</td>
<td>-T</td>
<td>ANSI Class 150 3 RF</td>
</tr>
<tr>
<td></td>
<td>-S</td>
<td>-E</td>
<td>ANSI Class 150 3 RF</td>
</tr>
<tr>
<td>Style code</td>
<td>*B</td>
<td></td>
<td>Style B</td>
</tr>
<tr>
<td>Option</td>
<td>Ejector</td>
<td></td>
<td>Ejector Assy with E7046EC</td>
</tr>
<tr>
<td>Tag plate</td>
<td>/EJ1</td>
<td>/EJ2</td>
<td>Stainless steel tag plate</td>
</tr>
</tbody>
</table>

Note: For this high-temperature use probe adapter, be sure to specify the ZR22G probe of its insertion length 0.15 meters.

7. Dust Filter for Zirconia Oxygen Analyzers

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>K9471UA</td>
<td>Filter</td>
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<tr>
<td>K9471UX</td>
<td>Tool</td>
</tr>
</tbody>
</table>

8. Dust Guard Protector

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>K9471UC</td>
<td>Dust guard protector</td>
</tr>
</tbody>
</table>

9. Dust Protector for High Temperature Humidity Analyzers

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZH21B</td>
<td>-</td>
<td>-040</td>
<td>Dust Protector (0 to 600°C)</td>
</tr>
<tr>
<td>Insertion length</td>
<td>-040</td>
<td></td>
<td>0.440 m</td>
</tr>
<tr>
<td>Flange</td>
<td>-J</td>
<td>-A</td>
<td>JIS 5K 60 FF *(1)</td>
</tr>
<tr>
<td>Style code</td>
<td>*B</td>
<td></td>
<td>Style B</td>
</tr>
</tbody>
</table>

Note: For this high-temperature use probe adapter, be sure to specify the ZR22G probe of its insertion length 0.15 meters.

10. Standard Gas Unit

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZO21S</td>
<td>-</td>
<td>-2</td>
<td>Standard gas unit</td>
</tr>
<tr>
<td>Power supply</td>
<td>-2</td>
<td>-3</td>
<td>200 V AC 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>-4</td>
<td>-5</td>
<td>240 V AC 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>-7</td>
<td>-8</td>
<td>100 V AC 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>110 V AC 50/60 Hz</td>
</tr>
<tr>
<td>Panel</td>
<td>-J</td>
<td>-E</td>
<td>Japanese version</td>
</tr>
<tr>
<td>Style code</td>
<td>*A</td>
<td></td>
<td>Style A</td>
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</table>

Note: For this high-temperature use probe adapter, be sure to specify the ZR22G probe of its insertion length 0.15 meters.
11. Flow Setting Unit for manual calibration (Needs instrument air.)

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZA8F</td>
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<td>Flow setting unit</td>
</tr>
<tr>
<td>Joint</td>
<td>-J</td>
<td>-A</td>
<td>Rc1/4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>With 1/4 NPT (F) adapter</td>
</tr>
<tr>
<td>Style code</td>
<td>C</td>
<td></td>
<td>Style C</td>
</tr>
</tbody>
</table>

12. Automatic Calibration Unit for Separate type Analyzer (Needs instrument air.)

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZR40H</td>
<td></td>
<td></td>
<td>Automatic calibration unit for ZR402G</td>
</tr>
<tr>
<td>Gas piping connection</td>
<td>-R</td>
<td>-T</td>
<td>Rc1/4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1/4 NPT (F)</td>
</tr>
<tr>
<td>Wiring connection</td>
<td>-P</td>
<td>-G</td>
<td>G1/2</td>
</tr>
<tr>
<td></td>
<td>-M</td>
<td>-T</td>
<td>Pg 13.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>M20 x 1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-A</td>
<td>Always -A</td>
</tr>
</tbody>
</table>

13. Automatic Calibration Unit for Integrated type Analyzer (Needs instrument air.)

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Option code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZR20H</td>
<td></td>
<td></td>
<td>Automatic calibration unit for ZR202G *1</td>
</tr>
<tr>
<td>Gas piping connection</td>
<td>-R</td>
<td>-T</td>
<td>Rc1/4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1/4 NPT (F)</td>
</tr>
<tr>
<td>Reference air</td>
<td>-E</td>
<td>-P</td>
<td>Instrument air Pressure compensated</td>
</tr>
<tr>
<td>Mounting</td>
<td>-A</td>
<td>-B</td>
<td>Horizontal mounting Vertical mounting</td>
</tr>
<tr>
<td></td>
<td>-A</td>
<td></td>
<td>Always -A</td>
</tr>
</tbody>
</table>

*1 Ask Yokogawa service station for additional mounting of ZR20H to the preinstalled ZR202G.

*2 Select the appropriate reference gas of ZR20H according to the one of ZR202G.

14. Stop Valve for Calibration gas line

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L9852CB</td>
<td>Joint: Rc1/4, Material: SUS316 (JIS)</td>
</tr>
<tr>
<td>G7016XH</td>
<td>Joint: 1/4 NPT (F), Material: SUS316 (JIS)</td>
</tr>
</tbody>
</table>

15. Check Valve for Calibration-gas line

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>K9292DN</td>
<td>Joint: Rc1/4, Material: SUS304 (JIS)</td>
</tr>
<tr>
<td>K9292DS</td>
<td>Joint: 1/4 NPT (F), Material: SUS304 (JIS)</td>
</tr>
</tbody>
</table>

16. Air Set

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G7003XF</td>
<td>Joint: Rc1/4, Material: Zinc alloy</td>
</tr>
<tr>
<td>K9473XK</td>
<td>Joint: 1/4 NPT (F), Material: Zinc alloy with adapter</td>
</tr>
<tr>
<td>G7004XF</td>
<td>Joint: Rc1/4, Material: Zinc alloy</td>
</tr>
<tr>
<td>K9473XG</td>
<td>Joint: 1/4 NPT (F), Material: Zinc alloy with adapter</td>
</tr>
</tbody>
</table>

17. Zero gas Cylinder

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G7001ZC</td>
<td>3.4 l container, 0.95 to 1.0 vol % O2, N2-balanced.</td>
</tr>
</tbody>
</table>

(Note) Export of such high pressure filled gas cylinders to most countries is prohibited or restricted.

18. Pressure Regulator for Gas Cylinder

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
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<tbody>
<tr>
<td>G7013XF</td>
<td>Inlet: W22 14 threads, Outlet: Rc1/4</td>
</tr>
<tr>
<td>G7014XF</td>
<td>Inlet: W22 14 threads, Outlet: 1/4 NPT (F)</td>
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</table>

19. Case Assembly for Calibration-gas Cylinder

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<tbody>
<tr>
<td>E7044KF</td>
<td>Calibration gas unit case</td>
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(Note) Export of such high pressure filled gas cylinders to most countries is prohibited or restricted.

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20. Heater Assembly

### Style: S2

<table>
<thead>
<tr>
<th>Model</th>
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<th>Natural convention, External connection (Instrument air)</th>
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</tr>
<tr>
<td></td>
<td>-C</td>
<td>Pressure compensated (for ZR22G S1)</td>
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*1 Suffix code of length should be selected as same as ZR22G installed.
*2 Jig part no. is K9470BX to order as a parts after purchase.
*3 Select appropriately among "-A", "-B", "-C" according to the reference gas supply method and style.
(Note) The heater is made of ceramic, do not drop or subject it to pressure stress.

---

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<tr>
<td></td>
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<table>
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<th>with Jig (*2)</th>
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</thead>
<tbody>
<tr>
<td></td>
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</table>

| Reference gas (*3) | -A | Always -A     |

*1 Suffix code of length should be selected as same as ZR220G installed.
*2 Jig part no. is K9470BX to order as a parts after purchase.
(Note) The heater is made of ceramic, do not drop or subject it to pressure stress.
■ EXTERNAL DIMENSIONS

1. Model ZR22G Separate type Zirconia Oxygen / High Temperature Humidity Analyzer, Detectors

![Diagram of external dimensions](image)

<table>
<thead>
<tr>
<th>Flange</th>
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<th>B</th>
<th>C</th>
<th>D</th>
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<td>19</td>
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<td>ANSI Class 150 3 RF</td>
<td>190.5</td>
<td>152.4</td>
<td>4 - Ø19</td>
<td>24</td>
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<tr>
<td>ANSI Class 150 4 RF</td>
<td>228.6</td>
<td>190.5</td>
<td>8 - Ø19</td>
<td>24</td>
</tr>
<tr>
<td>DIN PN 10 DN 50 A</td>
<td>165</td>
<td>125</td>
<td>4 - Ø18</td>
<td>18</td>
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<tr>
<td>DIN PN 10 DN 80 A</td>
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<td>8 - Ø18</td>
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<td>DIN PN 10 DN 100 A</td>
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<tr>
<td>Westinghouse</td>
<td>155</td>
<td>127</td>
<td>4 - Ø11.5</td>
<td>14</td>
</tr>
</tbody>
</table>

Unit: mm

L = 0.15, 0.4, 0.7, 1.0, 1.5, 2.0, 2.5, 3.0, 3.6, 4.2, 4.8, 5.4 (m)
Model ZR22G...-P (with pressure compensated) Separate type Zirconia Oxygen / High Temperature Humidity Analyzer, Detectors

Flange

<table>
<thead>
<tr>
<th>Flange</th>
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<th>B</th>
<th>C</th>
<th>l</th>
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<td>165</td>
<td>127</td>
<td>4 - Ø11.5</td>
<td>14</td>
<td>A</td>
</tr>
</tbody>
</table>

-Check Valve (option code /CV), Stop valve (option code /SV) -specified Calibration gas inlet

with Stop Valve (option: /SV)

with Check Valve (option: /CV)
2. Model ZR402G Separate type Zirconia Oxygen/ High Temperature Humidity Analyzer, Converter

With sun shield hood (option code /H)

Material of HOOD : Aluminum

Unit: mm
3. Model ZR202G Integrated type Zirconia Oxygen/ High Temperature Humidity Analyzers

### Flange Specifications

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<tr>
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Model ZR202G...-P (with pressure compensated) Integrated type Zirconia Oxygen / High Temperature Humidity Analyzers

### Flange Specifications

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<td>127</td>
<td>4 - Ø11.5</td>
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<td>A</td>
</tr>
</tbody>
</table>

**Unit**: mm
● With sun shield hood (option code /H)

![Diagram of sun shield hood]

Material of HOOD: Aluminum

Unit: mm

● Check Valve (option code /CV), Stop valve (option code /SV) -specified Calibration gas inlet

![Diagram of calibration gas inlet with stop valve and check valve]

Unit: mm

- Approx. 100
- 40 Ø48
- Calibration gas inlet Rc1/4 or 1/4NPT
- Full open height 58
- Detector case

with Stop Valve (option: /SV)

- 19
- Calibration gas inlet Rc1/4 or 1/4NPT
- Detector case

with Check Valve (option: /CV)
4. Model ZO21P Adapter for High Temperature Probe of separate type Oxygen Analyzer

Unit: mm

(Note 1) L= 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.5(m)
(Note 2) Sample gas outlet
(if the sample gas pressure is negative, connect the auxiliary ejector.)

<table>
<thead>
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<th>&lt;1&gt; Flange</th>
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<th>B</th>
<th>C</th>
<th>t</th>
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<tr>
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<td>140</td>
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<td>JIS 10K 80 FF</td>
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<td>165</td>
<td>125</td>
<td>4</td>
<td>0.18</td>
</tr>
</tbody>
</table>
5. **E7046EC, E7046EN Auxiliary Ejector Assembly for High Temperature Detector of separate type Oxygen Analyzer**

(Unit: mm)

(Note1) The connector of ejector assembly is a dedicated connector with nozzle function.

6. **Model ZO21R Probe Protector for Zirconia Oxygen Analyzers**

(Unit: mm)

7. **K9471UA Dust Filter for Oxygen Analyzer**

(Unit: mm)
8. **K9471UC Dust Guard Protector**

![Diagram of K9471UC Dust Guard Protector]

Unit: mm

9. **Model ZH21B Dust Protector for High Temperature Humidity Analyzers**

![Diagram of Model ZH21B Dust Protector]

<table>
<thead>
<tr>
<th>Flange</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>t</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>JIS 5K 80 FF</td>
<td>180</td>
<td>145</td>
<td>4-Ø19</td>
<td>14</td>
<td>40</td>
</tr>
<tr>
<td>ANSI Class 150 4B FF</td>
<td>228.5</td>
<td>190.5</td>
<td>8-Ø19</td>
<td>12</td>
<td>50</td>
</tr>
</tbody>
</table>

Install facing upwards.

10. **Model ZO21S Standard Gas Unit**

![Diagram of Model ZO21S Standard Gas Unit]

Unit: mm

Zero gas cylinder (6 cylinder): E7050BA
11. Model ZA8F Flow setting unit for manual calibration

**Piping Inside the Flow Setting Unit**

- **REFERENCE/OUT**
- **REF/OUT**
- **CHECK OUT**
- **AIR IN**
- **ZERO GAS IN**
- **SPAN GAS IN**
- **Instrument air**

**Calibration Gas Outlet**
- **Reference Gas Outlet**
- **Span Inlet**
- **Zero Inlet**

**Unit**: mm

- **Model**
  - ZA8F-J°C: 5 - Rc1/4
  - ZA8F-A°C: 5 - 1/4 NPT (F)

**Weight**: Approx. 2.3 kg
12. Model ZR40H Automatic Calibration Unit for Separate type Analyzer

2B pipe mounting example

- **Wiring inlet**: 2-G1/2, Pg 13.5, M20 X 1.5 or 1/2 NPT(F)
  - (wiring inlet is at same position on rear)

*1 with four ISO M6 screws can wall-mount

**Unit**: mm

- **Calibration gas outlet**: Rc1/4 or 1/4 NPT(F)
- **Zero gas inlet**: Rc1/4 or 1/4 NPT(F)
- **Reference gas inlet**: Rc1/4 or 1/4 NPT(F)
- **Reference gas outlet**: Rc1/4 or 1/4 NPT(F)

**Flowmeter**

**Needle valve**

**Setting Valve for calibration gas**

**Setting Valve for reference gas**

**2B mounting pipe**

**Connection port**

**Terminal box**

**Conduit outlet ; 2-G1/2, Pg 13.5, M20 X 1.5 or 1/2 NPT(F)**

**Flowmeter Flowmeter**

**Solenoid valve EV1, 2**

**CHECK OUT**

**REF OUT**

**ZERO GAS IN**

**AIR IN**

**Instrument air Approx. 1.5 l/min.**

*1 Needle valve is supplied as accessory with flowmeter
13. Model ZR20H Automatic Calibration Unit for Integrated type Analyzer

Horizontal mounting on the ZR202G (-A)

Terminal box side

Display side

Span gas inlet
Rc1/4 or 1/4 NPT(F)

Reference gas inlet
Rc1/4 or 1/4 NPT(F)

Zero gas inlet
Rc1/4 or 1/4 NPT(F)

Unit: mm

Vertical mounting on the ZR202G (-B)

14. L9852CB /G7016XH Stop Valve for Calibration gas line

Unit: mm
15. K9292DN /K9292DS Check Valve for Calibration-gas line

K9292DN : Rc1/4(A), R1/4(B)
K9292DS : 1/4 NPT(A), 1/4 NPT(Male)(B)

16. G7003XF/K9473XK, G7004XF/K9473XG Air Set

Panel cut dimensions
Horizontal mounting
Secondary pressure gauge
Panel (Horizontal mounting)
View A
Secondary pressure gauge
Panel (Vertical mounting)

G7003XF, G7004XF: Rc 1/4
K9473XK, K9473XG: 1/4NPT connector

17. G7001ZC Zero gas Cylinder

(Note): Export of such high pressure filled gas cylinders to most countries is prohibited or restricted.
18. G7013XF, G7014XF Pressure Regulator for Gas Cylinder

Regulator handle

Approx. 163
Approx. 59

Approx. 174
Approx. 82

Part No.
G7013XF
G7014XF

* Outlet
Rc1/4
1/4 NPT (F)

Unit: mm

19. E7044KF Case Assembly for Calibration gas Cylinder

Pressure regulator

Zero gas cylinder

2B mounting pipe

(Unit: mm)

(Note) The zero gas cylinder and the regulator valve are not included in the E7044KF (case assembly)
WIRING CONNECTIONS

Model ZR402G Separate type Zirconia Oxygen / High Temperature Humidity Analyzer, Converter

Model ZR22G Separate type Zirconia Oxygen / High Temperature Humidity Analyzer, Detector

1. FG
2. AO1 (+)
3. AO1 (-)
4. AO2 (+)
5. AO2 (-)
6. CJ (+)
7. CJ (-)
8. TC (+)
9. TC (-)
10. CELL (+)
11. CELL (-)
12. TC
13. AO2
14. AO1
15. TC
16. AO1
17. AO2
18. CJ
19. CJ
20. FG
21. FG
22. FG
23. DO-1
24. DO-1
25. DO-2
26. DO-2
27. DO-3
28. DO-3
29. DO-4
30. DO-4
31. HTR
32. HTR
33. L
34. N
35. G
36. FG

*1 Grand resistance is 100 ohm or less.
*2 Option (Temperature transmitter provide by user) for humidity measurement.

Model ZR202G Integrated type Zirconia Oxygen Analyzer

Contact input 1
Contact input 2
Contact output 1
Contact output 2

1. DI-1
2. DI-2
3. DI-C
4. DO-1
5. DO-1
6. DO-2
7. DO-2
8. FG
9. AO (+)
10. AO (-)
11. L
12. N
13. G
14. FG

Analog output 4-20 mA DC
Digital output 4-20 mA DC

The protective grounding for the analyzer shall be connected either the protective ground terminal in the equipment or the ground terminal on the case.
Standard regarding grounding: Ground to earth, ground resistance: 100Ω or less.
Inquiry Sheet for Models ZR22G, ZR402G, and ZR202G Direct In Situ Zirconia Oxygen Analyzers and High Temperature Humidity Analyzers

Please place checkmarks in the appropriate boxes and fill in the necessary information in the blanks.

1. General information
   - Customer
   - Destination of delivery
   - Plant name
   - Measurement points
   - Type of analyzer: ☐ Oxygen Analyzer  ☐ High Temperature Humidity Analyzer
   - Separate type  ☐ Integrated type
   - Object: ☐ indication  ☐ record  ☐ control  ☐ alarm
   - Fuel: ☐ gas  ☐ oil  ☐ coal  ☐ others
   - Power requirements: _____ V  AC  ______ Hz

2. Process conditions
   2.1 Measurement gas components
   - 2.2 Oxygen concentration
     - Nor.  Min.  Max.  □ vol% O₂,  □
     - Moisture contents
     - □ kg/kg,  □ Vol% H₂O
   - 2.3 Temperature
     - Nor.  Min.  Max.  □ °C,  □
   - 2.4 Pressure
     - Nor.  Min.  Max.  □ kPa,  □
   - 2.5 Gas flow
     - Nor.  Min.  Max.  □ m/sec,  □
   - 2.6 Dust type, Size
     - Nor.  Min.  □ mm,  □ quantity  □ g/Nm³,  □
   - 2.7 Corrosive gas
     - □ No gas  □ Gas,  □ quantity,  □ ppm,  □
   - 2.8 Combustible gas
     - □ No gas  □ Gas,  □ quantity,  □ ppm,  □
   - 2.9 Others
     - □

3. Installation site conditions
   - 3.1 Ambient temperature
     - 1. Around Probe temp. from  to °C,  2. Around Converter temp. from  to °C
     - 3.2 Vibration
     - □ No vibration  □ Vibration
     - 3.3 1 Probe installation location
     - □ Furnace  □ Stack  □ Others
     - 2 Probe position
     - □ Horizontal  □ Vertical  □ Others
     - □ Indoor  □ Outdoor  □ Covered
     - 3 Probe insertion length (m) (Note)
     - □ 0.4,  □ 0.7,  □ 1.0,  □ 1.5,  □ 2.0,  □ 2.5,  □ 3.0,  □ 3.6,  □ 4.2,  □ 4.8,  □ 5.4
     - 4 Flange
     - □ DIN  □ ANSI  □ Others
   - 3.4 Instrument air supply
     - □ Cannot be used.  □ Can be used.  □ kPa
   - 3.5 Converter location
     - □ Indoor  □ Outdoor  □ Covered (under roof)
   - 3.6 Cable length between probe and converter
     - □ meters
   - 3.7 Calibration method
     - □ Manual  □ Automatic
   - (Note) 3.6m or more is available only in the U.S.

4. Quotation data
   - Quotation Options (for general use)
     - Model ZR22G General-use Probe
     - Model ZO21P-1 High Temperature Probe Adapter
     - E7046EN, E7046EN Ejector Assembly for high temperature use.
   - Model ZR402G Separate type Analyzer, Converter
     - Model ZH21B Dust Protector for High Temperature Humidity Analyzer
     - Model ZO21R Probe Protector for Oxygen Analyzer
     - K9471UA Filter for Oxygen Analyzer
     - Model ZR40H, ZR20H Automatic Calibration Unit
   - Model ZO21S Standard Gas Unit
     - Select any one of Model ZO21S, ZA8F, ZR40H, ZR20H.
   - Model ZA8F Flow Setting Unit
     - Model ZR40H, ZR20H Automatic Calibration Unit
     - L9852CB /G7016XH Stop Valve
     - K9292DN /K9292DS Check Valve (*1)
     - G7001ZC Zero Gas Cylinder (*2)
     - G7001ZF /G7014ZF Pressure Regulator
     - G9013SF /G7014XH Pressure Regulator
     - ZR22A, ZR202A Heater Assembly (Spare Parts)
   - Model ZA8F, ZR40H, ZR20H
     - L9852CB /G7016XH Stop Valve
     - K9292DN /K9292DS Check Valve (*1)
     - G7001ZC Zero Gas Cylinder (*2)
     - G7001ZF /G7014ZF Pressure Regulator
     - G9013SF /G7014XH Pressure Regulator
     - ZR22A, ZR202A Heater Assembly (Spare Parts)
     - Not required if probe options are specified.
   - *1 When Automatic Calibration of "-A" or "-B" code is specified, ZR20H is installed in ZR202G.
   - *2 Export of such high pressure filled gas cylinders to most countries is prohibited or restricted.

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