

# General Specifications

GS 11M12A01-01E

Model ZR22G, ZR402G, and ZR202G  
Direct In Situ Zirconia Oxygen Analyzers and  
High Temperature Humidity Analyzers



## 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.

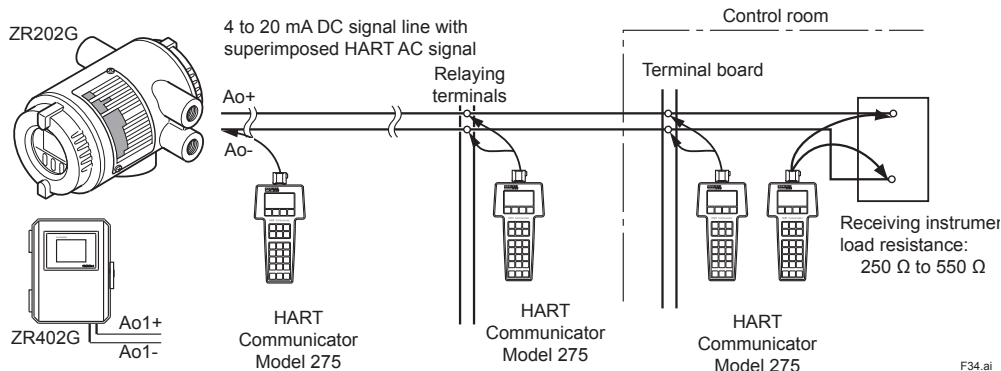
Separate type and integrated type Zirconia High Temperature Humidity Analyzers are used to measure the humidity of hot gases continuously in driers which use an electrical heater or hot gas as the heat source. They can also be used in a variety of manufacturing applications in humidifiers, as well as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

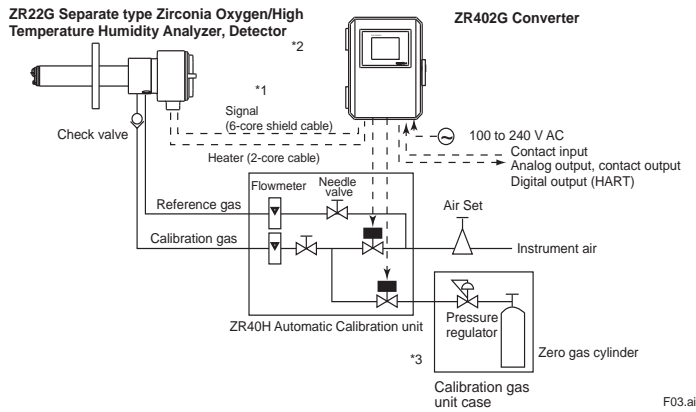


## Basic System Configuration

### System configuration - Separate type

**System configuration Example 1 of Separate type Analyzer**

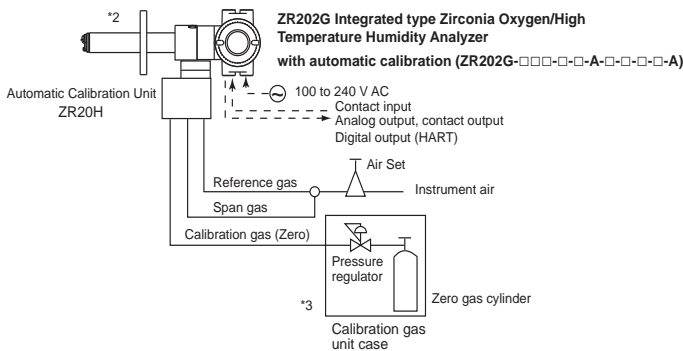
- Automatic calibration system uses instrument air for reference gas.  
For the calibration gas, a standard gas cylinder may be used for more accurate calibration.
- Applications: Oxygen concentration monitoring and control in large boilers (for private power generation and for business use) and in heating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



### System configuration - 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.

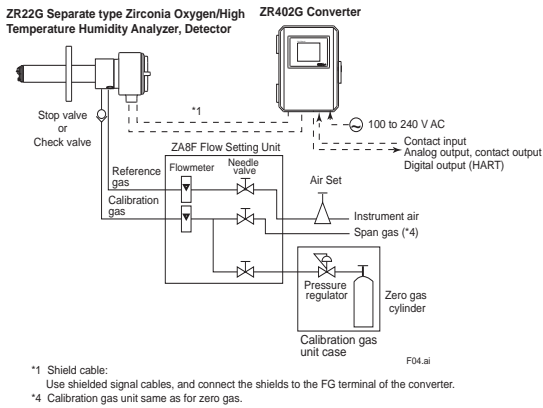
- \*1 Shield cable:  
Use shielded signal cables, and connect the shields to the FG terminal of the converter.
- \*2 Select the desired probe from the Probe Configuration table on page 4.
- \*3 When a zirconia oxygen analyzer is used, 100% N<sub>2</sub> gas cannot be used as the zero gas. Use approx. 1 vol% O<sub>2</sub> gas (N<sub>2</sub>-balanced).

## Basic System Configuration

### System configuration — Separate type

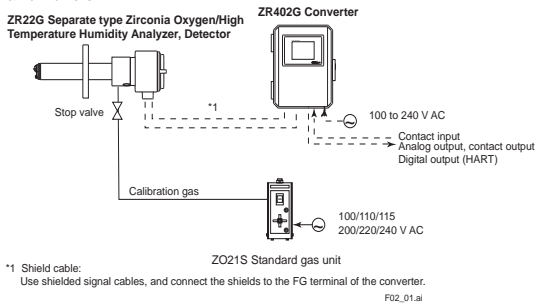
#### System configuration Example 2 of Separate type Analyzer

- 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 3 of Separate type Analyzer

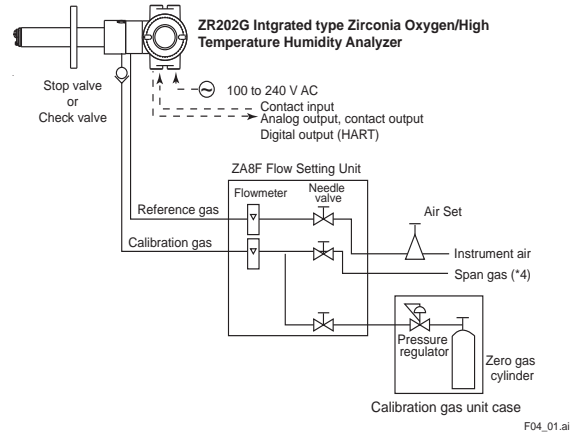
- Ambient air is used as the reference gas. A portable standard gas unit (ZO21S) is used for the calibration. This unit is connected only when the calibration is made.
- Application example:  
Oxygen concentration monitoring and control in packaged boilers  
Humidity monitoring and control in drying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



### System configuration — Integrated type

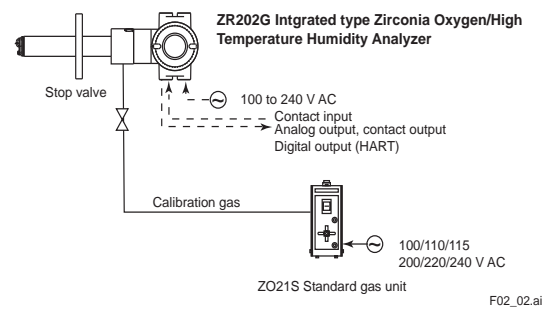
#### System configuration Example 2 of Integrated type Analyzer

- 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 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.

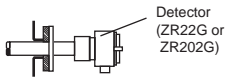
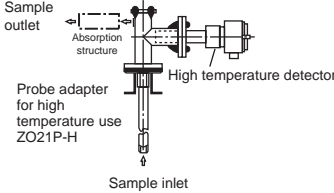
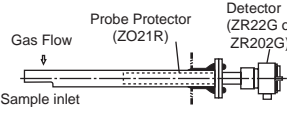
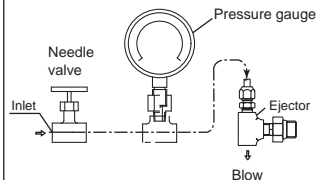

### System Components

| System Components |   | Separate type  |      |      | Integrated type |      |      |
|-------------------|---|----------------|------|------|-----------------|------|------|
|                   |   | System config. |      |      | System config.  |      |      |
|                   |   | Ex.1           | Ex.2 | Ex.3 | Ex.1            | Ex.2 | Ex.3 |
| 1                 | Model ZR22G Separate type Zirconia Oxygen / High Temperature Humidity Analyzers, Detector               | ●              | ●    | ●    |                 |      |      |
| 2                 | Model ZR402G Separate type Zirconia Oxygen / High Temperature Humidity Analyzer, Converter(*1)          | ●              | ●    | ●    |                 |      |      |
| 3                 | Model ZR202G Integrated type Zirconia Oxygen / High Temperature Humidity Analyzers                      |                |      |      | ●               | ●    | ●    |
| 4                 | Model ZO21P High Temperature Probe Adapter for separate type Zirconia Oxygen Analyzer                   | ○              | ○    | ○    |                 |      |      |
| 5                 | E7046EC, E7046EN Auxiliary Ejector Assembly for High Temperature Probe of separate type Oxygen Analyzer | ○              | ○    | ○    |                 |      |      |
| 6                 | Model ZO21R Probe Protector for Zirconia Oxygen Analyzers   | ○              | ○    | ○    | ○               | ○    | ○    |
| 7                 | K9471UA Dust Filter for Oxygen Analyzer   | ○              | ○    | ○    | ○               | ○    | ○    |
| 8                 | K9471UC Dust Guard Protector  | ○              | ○    | ○    | ○               | ○    | ○    |
| 9                 | Model ZH21B Dust Protector for High Temperature Humidity Analyzers                                      | ○              | ○    | ○    | ○               | ○    | ○    |
| 10                | Model ZO21S Standard Gas Unit   |                |      | ●    |                 |      | ●    |
| 11                | Model ZA8F Flow Setting Unit for manual calibration   |                | ●    |      |                 | ●    |      |
| 12                | Model ZR40H Automatic Calibration Unit for Separate type Analyzers                                      | ●              |      |      |                 |      |      |
| 13                | Model ZR20H Automatic Calibration Unit for Integrated type Analyzers (*2)                               |                |      |      | ●               |      |      |
| 14                | L9852CB, G7016XH Stop Valve for Calibration gas line  |                | (●)  | ●    |                 | (●)  | ●    |
| 15                | K9292DN, K9292DS Check Valve for Calibration gas line   | ●              | (●)  |      |                 | (●)  |      |
| 16                | G7003XF/K9473XK, G7004XF/K9473XG Air Set  | ●              | ●    |      | ●               | ●    |      |
| 17                | G7001ZC Zero gas Cylinder   | ●              | ●    |      | ●               | ●    |      |
| 18                | G7013XF, G7014XF Pressure Regulator for Gas Cylinder  | ●              | ●    |      | ●               | ●    |      |
| 19                | E7044KF Case Assembly for Calibration gas Cylinder  | ●              | ●    |      | ●               | ●    |      |
| 20                | ZR22A, ZR202A Heater Assembly for Spare Parts   | ○              | ○    | ○    | ○               | ○    | ○    |

- : 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 speified , ZR20H is installed in ZR202G.

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### Detector Components

| Sample gas temperature 0 to 700°C |                  |  |  | Sample gas temperature 700 to 1400°C  |                 |
|-----------------------------------|------------------|--|--|---|-----------------|
| Mounting                          | Insertion length | General-use Probe  | Application  | High temperature detector   | Application     |
| Horizontal to vertical            | 0.4 to 2 m       |                                   | Boiler<br>Heating furnace  |  <p>Temperature:<br/>Probe material; SUS310S 800°C<br/>Probe material; SiC 1400°C<br/>Mounting: Vertical downwards<br/>Insertion length: 1.0 m, 1.5 m<br/>When duct pressure is atmospheric or negative, attach air ejector.<br/>High temperature auxiliary ejector assembly (E7046EC, E7046EN)</p> | Heating furnace |
| Vertical                          | 2.5 m or more    |  |  |   |                 |
| Horizontal to vertical            | 3 m or less      |                                   | For pulverized coal boiler with gas flow velocity 10 m/sec or more |   |                 |
| Horizontal to vertical            | 0.4 to 2 m       | Dust filter for Oxygen Analyzer (K9471UA)<br>or<br>Detector(ZR22G or ZR202G)   | Black liquid recovery boiler<br>Cement Kiln                        |   |                 |
| Vertical                          | 2.5 m or more    | Dust guard protector (K9471UC) +  |  |   |                 |

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## 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 (excluding inflammable gases may not be applicable corrosive gas such as ammonia, chlorine is present-check with YOKOGAWA.

Measurement System: Zirconia system

Measurement Range: 0.01 to 100 vol% O<sub>2</sub>

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% O<sub>2</sub> (in 1 vol% O<sub>2</sub>), or partial range

Digital Communication (HART): 250 to 550 Ω, depending on number of field devices connected to the loop (multi-drop mode).

Display Range: 0 to 100 vol% O<sub>2</sub>

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% O<sub>2</sub> or more and less than 0 to 25 vol% O<sub>2</sub> range  
± 1% Maximum value of set range; range from 0 to 25 vol% O<sub>2</sub> or more and up to 0 to 100 vol% O<sub>2</sub> range

Linearity: (Excluding standard gas tolerance)  
(Excluding the case where the reference gas is by natural convection)  
(Use oxygen of known concentration (with in the measuring range) as the zero and span calibration gases.)  
± 1% Maximum value of set range; 0 to 5 vol% O<sub>2</sub> or more and less than 0 to 25 vol% O<sub>2</sub> range  
(Sample gas pressure: within ± 4.9 kPa)  
± 3% Maximum value of set range; 0 to 25 vol% O<sub>2</sub> or more and less than 0 to 50 vol% O<sub>2</sub> range  
(Sample gas pressure: within ± 0.49 kPa)  
± 5% Maximum value of set range; 0 to 50 vol% O<sub>2</sub> or more and up to 0 to 100 vol% O<sub>2</sub> range  
(Sample gas pressure: within ± 0.49 kPa)

Drift: (Excluding the first two weeks in use)  
(Excluding the case where the reference gas is by natural convection.)  
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 and EMC conforming 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.

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), EN 61326-2-3, EN 61000-3-2 EMC Regulatory Arrangement in Australia and New Zealand Korea Electromagnetic Conformity Standard



### CAUTION

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.

## 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 ZA8F 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 NI/min  
Wetted Material: SUS316 (JIS), Zirconia, SUS304 (JIS) (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 × 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)  
/ 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)

Insertion length of 3.6 m: approx. 17 kg (JIS 5K 65)  
/ approx. 22 kg (ANSI 150 4)

Insertion length of 4.2 m: approx. 19 kg (JIS 5K 65)  
/ approx. 24 kg (ANSI 150 4)

Insertion length of 4.8 m: approx. 21 kg (JIS 5K 65)  
/ approx. 26 kg (ANSI 150 4)

Insertion length of 5.4 m: approx. 23 kg (JIS 5K 65)  
/ approx. 28 kg (ANSI 150 4)

## 2. ZR402G Separate type Zirconia Oxygen Analyzer, Converter

### Oxygen 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

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 mm<sup>2</sup> cable or equivalent is used, 300 m or less.)

Construction: Outdoor installation, 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 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.

|   |  |
|---|--|
| <p><b>Setup Functions:</b><br/>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.</p> <p><b>Self-diagnosis:</b><br/>This function diagnoses conditions of the converter or the detector and indicates when any abnormal condition occurs.</p> <p><b>Password Functions:</b><br/>Enter your password to operate the analyzer excepting data display. Individual passwords can be set for maintenance and setup.</p> <p><b>Display and setting content:</b><br/>Measuring Related Items: Oxygen concentration (vol% O<sub>2</sub>), output current value (mA), air ratio, moisture quantity (in hot gases) (vol% H<sub>2</sub>O)<br/>Display Items: Cell temperature (°C), thermocouple reference junction temperature (°C), maximum/minimum/average oxygen concentration (vol% O<sub>2</sub>), 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)<br/>Calibration Setting Items: Span gas concentration (vol% O<sub>2</sub>), zero gas concentration (vol% O<sub>2</sub>), 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)<br/>Equipment Related Items: Measuring gas selection<br/>Output Related Items: Analog output/output mode selection, output conditions when warming-up/maintenance/calibrating (during blowback)/abnormal, oxygen concentration at 4 mA/20 mA (vol% O<sub>2</sub>), time constant.<br/>Alarm Related Items: Oxygen concentration high alarm/ high-high alarm limit values (vol% O<sub>2</sub>), oxygen concentration low alarm/ low-low alarm limit values (vol% O<sub>2</sub>), oxygen concentration alarm hysteresis (vol% O<sub>2</sub>), oxygen concentration alarm detection, alarm delay (seconds)<br/>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.)<br/>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 250 Ω).</p> | <p><b>Range:</b> Any setting between 0 to 5 through 0 to 100 vol% O<sub>2</sub> in 1 vol% O<sub>2</sub>, or partial range is available (Maximum range value/minimum range value 1.3 or more)<br/>For the log output, the minimum range value is fixed at 0.1 vol% O<sub>2</sub>.<br/>4 to 20 mA DC linear or log can be selected. Input/output isolation.</p> <p><b>Output damping:</b> 0 to 255 seconds. Hold/non-hold selection, preset value setting possible with hold.</p> <p><b>Contact Output:</b> Four points, contact capacity 30 V DC 3 A, 250 V AC 3 A (resistive load).<br/>Three of the output points can be selected to either normally energized or normally deenergized status.<br/>Delayed functions (0 to 255 seconds) and hysteresis function (0 to 9.9 vol% O<sub>2</sub>) can be added to high/low alarms.<br/>The following functions are programmable for contact outputs.<br/>(1) Abnormal, (2) High-high alarm, (3) High alarm, (4) Low-low alarm, (5) Low alarm, (6) Maintenance, (7) Calibration, (8) Range switching answer-back, (9) Warm-up, (10) Calibration gas pressure decrease (answer-back of contact input), (11) Temperature high alarm, (12) Blowback start, (13) Flameout gas detection (answer-back of contact input), (14) Calibration coefficient alarm, (15) Startup power stabilization timeout alarm<br/>Contact output 4 is set to normally operated, and fixed error status.</p> <p><b>Contact Input:</b> Two points, voltage-free contacts.<br/>The following functions are programmable for contact inputs:<br/>(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</p> <p><b>Contact capacity:</b> Off-state leakage current; 3 mA or less</p> <p><b>Self-diagnosis:</b> Abnormal cell, abnormal cell temperature (low/high), abnormal calibration, defective A/D converter, defective digital circuit</p> <p><b>Calibration:</b> Method; Zero/span calibration<br/>Calibration mode; automatic, semi-automatic and manual (All are operated interactively with an LCD touchscreen). Either zero or span can be skipped.<br/>Zero calibration gas concentration setting range; 0.3 to 100 vol% O<sub>2</sub> (minimum setting: 0.01 vol% O<sub>2</sub>).<br/>Span calibration gas concentration setting range; 4.5 to 100 vol% O<sub>2</sub> (minimum setting: 0.01 vol% O<sub>2</sub>).<br/>Use N<sub>2</sub>-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.<br/>Calibration interval; date/time setting: maximum 255 days</p> |
|---|--|

### 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 (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 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 NI/min

Wetted Material: SUS316 (JIS), Zirconia, SUS304 (JIS) (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% O<sub>2</sub>), output current value (mA), air ratio, moisture quantity (in hot gases) (vol% H<sub>2</sub>O), Cell temperature (°C), thermocouple reference junction temperature (°C), maximum/minimum/average oxygen concentration (vol% O<sub>2</sub>), 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% O<sub>2</sub>), zero gas concentration (vol% O<sub>2</sub>), 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% O<sub>2</sub>), 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% O<sub>2</sub>), oxygen concentration low alarm/ low-low alarm limit values (vol% O<sub>2</sub>), oxygen concentration alarm hysteresis (vol% O<sub>2</sub>), 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, calibrating, 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% O<sub>2</sub> in 1 vol% O<sub>2</sub>, 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% O<sub>2</sub>.  
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% O<sub>2</sub>) can be added to high/low alarms.  
The following functions are programmable for contact outputs.  
(1) Abnormal, (2) High-high alarm, (3) High alarm, (4) Low-low alarm, (5) Low alarm, (6) Maintenance, (7) Calibration, (8) Range switching answer-back, (9) Warmup, (10) Calibration-gas pressure decrease (answer-back of contact input), (11) Flameout gas detection (answer-back of contact input).
- 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% O<sub>2</sub> (minimum setting: 0.01 vol% O<sub>2</sub>).  
Span calibration gas concentration setting range; 4.5 to 100 vol% O<sub>2</sub> (minimum setting: 0.01 vol% O<sub>2</sub>).  
Use N<sub>2</sub>-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% O<sub>2</sub>, 0 to 100 vol% H<sub>2</sub>O 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% O<sub>2</sub> (in 1 vol% O<sub>2</sub>), or partial range.

Moisture quantity; 0 to 25 through 0 to 100 vol% H<sub>2</sub>O (in 1 vol% H<sub>2</sub>O), or partial range.

Mixture ratio; 0 to 0.2 through 0 to 1.000 kg/kg (in 0.001 kg/kg), or partial range.

Digital Communication (HART): 250 to 550 Ω, depending on number of field devices connected to the loop (multi-drop mode).

Display Range: Oxygen concentration; 0 to 100 vol% O<sub>2</sub>,  
Moisture quantity; 0 to 100 vol% H<sub>2</sub>O  
Mixture ratio; 0 to 1 kg/kg  
Relative humidity; 0 to 100% RH (Note)  
Dew point; -40 to 370°C (Note)

Note: These values are affected by temperature and absolute pressure, so accurate temperature and pressure values must be inputted to the converter.

Warm-up Time: Approx. 20 min.

These characteristics are calculated by oxygen concentration measured in air which include water vapor.

Repeatability: (see Note 1)  
± 1 vol% H<sub>2</sub>O; (Sample gas pressure 2 kPa or less)

Linearity: (Excluding standard gas tolerance) (see Note 1), (Use oxygen of known concentration (in the measuring range) as the zero and span calibration gas.)  
± 2 vol% H<sub>2</sub>O; (Sample gas pressure: within ± 0.49 kPa)  
± 3 vol% H<sub>2</sub>O; (Sample gas pressure: 2 kPa or less)

Drift: (Excluding the first two weeks in use) (see Note 1)  
Both zero and span ± 3 vol% H<sub>2</sub>O/month

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 and EMC conforming 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)  
EN 61326-2-3, EN 61000-3-2  
EMC Regulatory Arrangement in Australia and New Zealand  
Korea Electromagnetic Conformity Standard



### CAUTION

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.

## 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 NI/min

Wetted Material: SUS316 (JIS), Zirconia, SUS304 (JIS) (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)

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 mm<sup>2</sup> cable or equivalent is used, 300 m or less.)

Construction: Outdoor installation, 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.

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.

#### Setup Functions:

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.

#### Self-diagnosis:

This function diagnoses conditions of the converter or the detector and indicates when any abnormal condition occurs.

#### Password Functions:

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

## Display and setting content:

Measuring Related Items: Oxygen concentration (vol% O<sub>2</sub>), moisture quantity (vol% H<sub>2</sub>O), mixture ratio (kg/kg), relative humidity (%RH) and dew point (°C)

Display Items: Oxygen concentration (vol% O<sub>2</sub>), moisture quantity (vol% H<sub>2</sub>O), mixture ratio (kg/kg), relative humidity (%RH), dew point (°C), cell temperature (°C), thermocouple reference junction temperature (°C), maximum/minimum/average oxygen concentration (vol% O<sub>2</sub>), maximum/minimum/average moisture quantity (vol% H<sub>2</sub>O), 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% O<sub>2</sub>), zero gas concentration (vol% O<sub>2</sub>), 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 warmingup/maintenance/calibrating/abnormal, oxygen concentration at 4 mA/20 mA (vol% O<sub>2</sub>), moisture quantity at 4 mA/20 mA (vol% H<sub>2</sub>O), mixture ratio at 4 mA/20 mA (kg/kg), time constant.

Alarm Related Items: Oxygen concentration high alarm/ high-high alarm limit values (vol% O<sub>2</sub>), oxygen concentration low alarm/low-low alarm limit values (vol% O<sub>2</sub>), moisture quantity high alarm/high-high alarm limit values (vol% H<sub>2</sub>O), moisture quantity low alarm/ low-low alarm limit values (vol% H<sub>2</sub>O), mixture ratio high alarm/high-high alarm limit value (kg/kg), mixture ratio low alarm/low-low alarm limit values (kg/kg), oxygen concentration alarm hysteresis (vol% O<sub>2</sub>), moisture quantity alarm hysteresis (vol% H<sub>2</sub>O), 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, high 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% O<sub>2</sub>, 0 to 25 through 0 to 100 vol% H<sub>2</sub>O, 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% O<sub>2</sub> for the oxygen concentration, 0.1 vol% H<sub>2</sub>O 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. Delayed functions (0 to 255 seconds) and hysteresis function (0 to 9.9 vol% O<sub>2</sub>) can be added to high/low alarms. The following functions are programmable for contact outputs.

(1) Abnormal, (2) High-high alarm, (3) Highalarm, (4) Low low alarm, (5) Low alarm, (6) Maintenance, (7) Calibration, (8) Range switching answer-back, (9) Warm-up, (10) Calibration gas pressure decrease (answer-back of contact input), (11) Temperature high-alarm, (12) Blowback start, (13) Flameout gas detection (answer-back of contact input), (14) Calibration coefficient alarm, (15) Startup power stabilization timeout alarm. Contact output 4 is set to normally operated, and fixed error status.

Converter Input: Thermal input one point (4 to 20 mA DC)

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

(1) Calibration gas pressure decrease alarm, (2) Range switching - fixed range if use 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% O<sub>2</sub> (minimum setting: 0.01 vol% O<sub>2</sub>).

Span calibration-gas concentration setting range; 4.5 to 100 vol% O<sub>2</sub> (minimum setting: 0.01 vol% O<sub>2</sub>).  
Use N<sub>2</sub>-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 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 +55°C (- 5 to +70°C on the case surface)  
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.  
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 NI/min  
Wetted Material SUS316 (JIS), Zirconia, SUS304 (JIS) (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 5.6BG3.3/2.9)  
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, 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% O<sub>2</sub>), moisture quantity (vol% H<sub>2</sub>O), mixture ratio(kg/kg), relative humidity(%RH), dew point (°C), cell temperature (°C), thermocouple reference junction temperature (°C), maximum/minimum/average oxygen concentration (vol% O<sub>2</sub>), maximum/minimum/average moisture quantity (vol% H<sub>2</sub>O), 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% O<sub>2</sub>), zero gas concentration (vol% O<sub>2</sub>), 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% O<sub>2</sub>), moisture quantity at 4 mA/ 20 mA (vol% H<sub>2</sub>O), 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% O<sub>2</sub>), oxygen concentration low alarm/low-low alarm limit values (vol% O<sub>2</sub>), moisture quantity high alarm/ high-high alarm limit values (vol% H<sub>2</sub>O), moisture quantity low alarm/ low-low alarm limit values (vol% H<sub>2</sub>O), 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% O<sub>2</sub>), moisture quantity alarm hysteresis (vol% H<sub>2</sub>O), 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% H<sub>2</sub>O, 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% O<sub>2</sub> for the oxygen concentration, 0.1 vol% H<sub>2</sub>O 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 can be selected. Delayed functions (0 to 255 seconds) and hysteresis function (0 to 9.9 vol% O<sub>2</sub>) can be added to high/low alarms. The following functions are programmable for contact outputs.

- (1) Abnormal, (2) High-high alarm,
- (3) Highalarm, (4) Low-low alarm,
- (5) Low alarm, (6) Maintenance,
- (7) Calibration, (8) Range switching answer-back, (9) Warm-up,
- (10) Calibration gas pressure decrease (answer-back of contact input),
- (11) Flameout gas detection (answer-back of contact input).

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)

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% O<sub>2</sub> (minimum setting: 0.01 vol% O<sub>2</sub>).

Span calibration gas concentration setting range; 4.5 to 100 vol% O<sub>2</sub> (minimum setting: 0.01 vol% O<sub>2</sub>).

Use N<sub>2</sub>-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

## ■ OPTIONS

### 4. ZO21P-H High Temperature Probe Adapter for separate type Oxygen Analyzer

Measuring O<sub>2</sub> 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% O<sub>2</sub> 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) (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 construction

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.

#### 5.1 Needle Valve

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

#### 5.2 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))

#### 5.3 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)

### 6. 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) (Flange)  
Weight: 1.05 m; Approx. 6/10/8.5 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 Class150 4 FF equivalent. (However, flange thickness is different.)  
Material: SiC, SUS316 (JIS), SUS304 (JIS) (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

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. 686 kPa G (at 35°C)  
Composition: 0.95 to 1.0 vol% O<sub>2</sub> (N<sub>2</sub>-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 controls 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 ZR402G), Power consumption: Approx. 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. 3.5 kg

Ambient Temperature: -20 to +55°C, no condensing and freezing

Ambient Humidity: 0 to 95%RH

Storage Temperature: -30 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 to +55°C, no condensing and freezing

Ambient Humidity: 0 to 95%RH

Storage Temperature: -30 to +65°C

**14. L9852CB/G7016XH Stop Valve**

The stop valve is mounted on the calibration gas line. It is attached when the suffix code (/SV) is selected for the Zirconia Oxygen Analyzer/High Temperature Humidity Analyzer prove ZR22G or the Zirconia Oxygen Analyzer/High Temperature Humidity Analyzer ZR202G.

Connection: Rc1/4 or 1/4 NPT (Female)

Material: SUS316 (JIS)

Weight: Approx. 80 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.

Connection: Rc1/4 or 1/4 NPT (Female)

Material: SUS304 (JIS)

Pressure: Between 70 kPa G or more 350 kPa G or less

Weight: Approx. 40 g

**16. Air Set****G7003XF/K9473XK**

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% O<sub>2</sub> (N<sub>2</sub>-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**

Primary Pressure: Max. 14.8 MPa G,  
 Secondary Pressure; 0 to 0.4 MPa G  
 Connection: Inlet W22 14 threads, right hand screw  
 Outlet Rc1/4 or 1/4 NPT (Female)  
 Material: Brass body

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

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

**20. ZR22A, ZR202A Heater Assembly**

ZR22A: Spare Parts for ZR22G  
 ZR202A: Spare Parts for ZR202G  
 (Note) Yokogawa shall not guarantee the heater assembly after its replacement.

**STANDARD ACCESSORIES**

ZR402G

| Item               | Parts. No. | Q'ty | Description                       |
|--------------------|------------|------|-----------------------------------|
| Fuse               | A1113EF    | 1    | 3.15 A                            |
| Bracket            | F9554AL    | 1    | For pipe, panel, or wall mounting |
| Screws for Bracket | F9123GF    | 1    |                                   |

ZR22G

| Item         | Parts. No. | Q'ty | Description    |
|--------------|------------|------|----------------|
| Allen wrench | L9827AB    | 1    | For lock screw |

ZR202G

| Item         | Parts. No. | Q'ty | Description    |
|--------------|------------|------|----------------|
| Fuse         | A1113EF    | 1    | 3.15 A         |
| Allen wrench | L9827AB    | 1    | For lock screw |

**■ Model and Code**

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

| Model              | Suffix code                | Option code                               | Description   |
|--------------------|----------------------------|---|---|
| ZR402G             | -----                      | -----                                     | Separate type Zirconia Oxygen Analyzer, Converter   |
|                    | -P<br>-G<br>-M<br>-T       | -----<br>-----<br>-----<br>-----          | G1/2<br>Pg13.5<br>M20x1.5<br>1/2NPT   |
| Display            | -J<br>-E<br>-G<br>-F<br>-C | -----<br>-----<br>-----<br>-----<br>----- | Japanese<br>English<br>German<br>French<br>Chinese  |
| Instruction manual | -J<br>-E<br>-C             | -----<br>-----<br>-----                   | Japanese<br>English<br>Chinese  |
| —                  | -A                         | -----                                     | Always -A   |
| Option             |                            | /HS                                       | Set for Humidity Analyzer (*1)  |
|                    |                            | /H  | Hood (*3)   |
|                    | Tag plate                  | /SCT<br>/PT                               | Stainless steel tag plate (*2)<br>Printed tag plate (*2)  |
|                    | NAMUR NE43 complian        | /C2<br><br>/C3                            | Failure alarm down-scale:<br>Output status at CPU failure and hardware error is 3.6 mA or less (*4)<br><br>Failure alarm up-scale:<br>Output status at CPU failure and hardware error is 21.0 mA or more (*4) |

- \*1 For humidity measurements, be sure to specify /HS options.
- \*2 Specify either /SCT or /PT option code.
- \*3 Sun shield hood is still effective even if scratched.
- \*4 Output signal limits: 3.8 to 20.5 mA. Specify either /C2 or /C3 option code.
- (Note) If AC line voltage is 125 V AC or greater, or in the EEC, the ZO21D cannot be used with the ZR402G.

| Language   | Japanese | English | German  | French  |
|------------|----------|---------|---------|---------|
| Model      |          |         |         |         |
| ZA8C       | K9290LF  | K9290KF | K9290MF | K9290MG |
| HA400 (kg) | K9293HT  | K9293HU | K9293HW | K9293HV |
| HA400 (%)  | K9293HP  | K9293HQ | K9293HS | K9293HR |
| AV8V       | K9296CN  | K9296CN | K9296CN | K9296CN |

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.

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

Style : S2

| Model                 | Suffix code | Option code                     | Description   |                                |
|-----------------------|-------------|---------------------------------|---|--------------------------------|
| ZR22G                 | -----       | -----                           | Separate type Zirconia Oxygen/ High Temperature Humidity Analyzer, Detector |                                |
| Length                | -015        | -----                           | 0.15 m (for high temperature use) (*1)                                      |                                |
|                       | -040        | -----                           | 0.4 m   |                                |
|                       | -070        | -----                           | 0.7 m   |                                |
|                       | -100        | -----                           | 1.0 m   |                                |
|                       | -150        | -----                           | 1.5 m   |                                |
|                       | -200        | -----                           | 2.0 m   |                                |
|                       | -250        | -----                           | 2.5 m (*2)  |                                |
|                       | -300        | -----                           | 3.0 m (*2)  |                                |
|                       | -360        | -----                           | 3.6 m (*2)  |                                |
|                       | -420        | -----                           | 4.2 m (*2)  |                                |
|                       | -480        | -----                           | 4.8 m (*2)  |                                |
|                       | -540        | -----                           | 5.4 m (*2)  |                                |
| Wetted material       | -S          | -----                           | Stainless steel   |                                |
|                       | -C          | -----                           | Stainless steel with Inconel calibration gas tube (*10)                     |                                |
| Flange (*3)           | -A          | -----                           | ANSI Class 150 2 RF SUS304 (JIS)  |                                |
|                       | -B          | -----                           | ANSI Class 150 3 RF SUS304 (JIS)  |                                |
|                       | -C          | -----                           | ANSI Class 150 4 RF SUS304 (JIS)  |                                |
|                       | -E          | -----                           | DIN PN10 DN50 A SUS304 (JIS)  |                                |
|                       | -F          | -----                           | DIN PN10 DN80 A SUS304 (JIS)  |                                |
|                       | -G          | -----                           | DIN PN10 DN100 A SUS304 (JIS)   |                                |
|                       | -K          | -----                           | JIS 5K 65 FF SUS304 (JIS)   |                                |
|                       | -L          | -----                           | JIS 10K 65 FF SUS304 (JIS)  |                                |
|                       | -M          | -----                           | JIS 10K 80 FF SUS304 (JIS)  |                                |
|                       | -P          | -----                           | JIS 10K 100 FF SUS304 (JIS)   |                                |
|                       | -Q          | -----                           | JIS 5K 32 FF SUS304 (JIS) (for high temperature use) (*4)                   |                                |
|                       | -R          | -----                           | JPI Class 150 4 RF SUS304 (JIS)   |                                |
| -S                    | -----       | JPI Class 150 3 RF SUS304 (JIS) |   |                                |
| -W                    | -----       | Westinghouse                    |   |                                |
| Reference gas         | -C          | -----                           | Natural convection  |                                |
|                       | -E          | -----                           | External connection (Instrument air) (*11)                                  |                                |
|                       | -P          | -----                           | Pressure compensated (*11)  |                                |
| Gas Thread            | -R          | -----                           | Rc1/4   |                                |
|                       | -T          | -----                           | 1/4NPT(Female)  |                                |
| Connection box thread | -P          | -----                           | G1/2  |                                |
|                       | -G          | -----                           | Pg13.5  |                                |
|                       | -M          | -----                           | M20 x1.5  |                                |
|                       | -T          | -----                           | 1/2 NPT   |                                |
|                       | -Q          | -----                           | Quick connect (*9)  |                                |
| Instruction manual    | -J          | -----                           | Japanese  |                                |
|                       | -E          | -----                           | English   |                                |
|                       | -C          | -----                           | Chinese   |                                |
| --                    | -A          | -----                           | Always -A   |                                |
| Options               | /C          | -----                           | Inconel bolt (*5)   |                                |
|                       | Valves      | /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)  |                                |

\*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.

### 3. Integrated type Zirconia Oxygen / High temperature Humidity Analyzer

| Model                 | Suffix code   | Option code   | Description   |                                |
|-----------------------|---|---|---|--------------------------------|
| ZR202G                | -----   | -----   | Integrated type Zirconia Oxygen/ High Temperature Humidity Analyzer   |                                |
| Length                | -040<br>-070<br>-100<br>-150<br>-200<br>-250<br>-300  | -----<br>-----<br>-----<br>-----<br>-----<br>-----<br>-----   | 0.4 m<br>0.7 m<br>1.0 m<br>1.5 m<br>2.0 m<br>2.5 m (*1)<br>3.0 m (*1)   |                                |
| Wetted material       | -S<br>-C  | -----<br>-----  | Stainless steel<br>Stainless steel with Inconel calibration gas tube (*10)  |                                |
| Flange (*2)           | -A<br>-B<br>-C<br>-E<br>-F<br>-G<br>-K<br>-L<br>-M<br>-P<br>-R<br>-S<br>-W                          | -----<br>-----<br>-----<br>-----<br>-----<br>-----<br>-----<br>-----<br>-----<br>-----<br>-----<br>-----<br>----- | ANSI Class 150 2 RF SUS304 (JIS)<br>ANSI Class 150 3 RF SUS304 (JIS)<br>ANSI Class 150 4 RF SUS304 (JIS)<br>DIN PN10 DN50 A SUS304 (JIS)<br>DIN PN10 DN80 A SUS304 (JIS)<br>DIN PN10 DN100 A SUS304 (JIS)<br>JIS 5K 65 FF SUS304 (JIS)<br>JIS 10K 65 FF SUS304 (JIS)<br>JIS 10K 80 FF SUS304 (JIS)<br>JIS 10K 100 FF SUS304 (JIS)<br>JPI Class 150 4 RF SUS304 (JIS)<br>JPI Class 150 3 RF SUS304 (JIS)<br>Westinghouse |                                |
| Auto Calibration      | -N<br>-A<br>-B  | -----<br>-----<br>-----   | Not required<br>Horizontal mounting (*8)<br>Vertical mounting (*8)  |                                |
| Reference gas         | -C<br>-E<br>-P  | -----<br>-----<br>-----   | Natural convection<br>External connection (Instrument air) (*11)<br>Pressure compensated (*11)  |                                |
| Gas Thread            | -R<br>-T  | -----<br>-----  | Rc1/4<br>1/4 NPT (Female)   |                                |
| Connection box thread | -P<br>-G<br>-M<br>-T  | -----<br>-----<br>-----<br>-----  | G1/2<br>Pg 13.5<br>M20x1.5<br>1/2 NPT   |                                |
| Instruction manual    | -J<br>-E<br>-C  | -----<br>-----<br>-----   | Japanese<br>English<br>Chinese  |                                |
| --                    | -A  | -----   | Always -A   |                                |
| Options               |   | /C  | Inconel bolt (*3)   |                                |
|                       |   | /HS   | Set for Humidity Analyzer (*4)  |                                |
|                       |   | Valves  | /CV   | Check valve (*5)               |
|                       |   |   | /SV   | Stop valve (*5)                |
|                       |   | /H  | Hood (*9)   |                                |
|                       |   | Tag plates  | /F1   | Dust Filter (*6)               |
|                       |   |   | /F2   | Dust Guard Protector (*6)      |
|                       |   | NAMUR NE43 compliant  | /SCT  | Stainless steel tag plate (*7) |
|                       |   |   | /PT   | Printed tag plate (*7)         |
|                       |   | /C2   | Failure alarm down-scale:<br>Output status at CPU failure and hardware error is 3.6 mA or less (*12)  |                                |
| /C3                   | Failure alarm up-scale:<br>Output status at CPU failure and hardware error is 21.0 mA or more (*12) |   |   |                                |

\*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.

#### 4. High Temperature Probe Adapter for Separate type Oxygen Analyzer

| Model            | Suffix code  | Option code  | Description  |
|------------------|--|--|--|
| ZO21P            | -H   | -----  | High Temperature Probe Adapter   |
| Material         | -A<br>-B   | -----<br>-----   | SiC<br>SUS 310S (JIS)  |
| Insertion length | -050<br>-060<br>-070<br>-080<br>-090<br>-100<br>-150     | -----<br>-----<br>-----<br>-----<br>-----<br>-----<br>-----                            | 0.5 m<br>0.6 m<br>0.7 m<br>0.8 m<br>0.9 m<br>1.0 m<br>1.5 m  |
| Flange           | -J<br>-N<br>-M<br>-L<br>-A<br>-R<br>-Q<br>-T<br>-S<br>-E | -----<br>-----<br>-----<br>-----<br>-----<br>-----<br>-----<br>-----<br>-----<br>----- | JIS 5K 50 FF SUS304 (JIS)<br>JIS 10K 65 FF SUS304 (JIS)<br>JIS 10K 80 FF SUS304 (JIS)<br>JIS 10K 100 FF SUS304 (JIS)<br>ANSI Class 150 4 RF SUS304 (JIS)<br>ANSI Class 150 2 1/2 RF SUS304 (JIS)<br>ANSI Class 150 3 RF SUS304 (JIS)<br>JPI Class 150 3 RF SUS304 (JIS)<br>JPI Class 150 4 RF SUS304 (JIS)<br>DIN PN10 DN50 A SUS304 (JIS) |
| Style code       | *B   | -----  | Style B  |
| Option           | Ejector<br>Tag plate                                     | /EJ1<br>/EJ2<br>/SCT   | Ejector Assy with E7046EC<br>Ejector Assy with E7046EN<br>Stainless steel tag plate  |

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

#### High Temperature Probes (Spare Parts)

| Part No. | Description                           |
|----------|---------------------------------------|
| K9292TP  | SiC, insertion length 0.5 m           |
| E7046CF  | SiC, insertion length 0.6 m           |
| K9292TQ  | SiC, insertion length 0.7 m           |
| E7046CG  | SiC, insertion length 0.8 m           |
| E7046CH  | SiC, insertion length 0.9 m           |
| E7046AL  | SiC, insertion length 1.0 m           |
| E7046BB  | SiC, insertion length 1.5 m           |
| K9292TV  | SUS310S (JIS), insertion length 0.5 m |
| E7046CR  | SUS310S (JIS), insertion length 0.6 m |
| K9292TW  | SUS310S (JIS), insertion length 0.7 m |
| E7046CS  | SUS310S (JIS), insertion length 0.8 m |
| E7046CT  | SUS310S (JIS), insertion length 0.9 m |
| E7046AP  | SUS310S (JIS), insertion length 1.0 m |
| E7046AQ  | SUS310S (JIS), insertion length 1.5 m |

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

| Part No. | Description   |
|----------|---|
| E7046EC  | Needle valve; Rc1/4, Pressure gauge; R1/4, Ejector; $\varnothing 6/\varnothing 4$ mm TUBE joint: SUS304 (JIS) |
| E7046EN  | Needle valve; 1/4 NPT(F), Pressure gauge; 1/4 NPT(M), Ejector; 1/4 TUBE joint: SUS304 (JIS)                   |

#### 6. Probe Protector for Zirconia Oxygen Analyzers

| Model            | Suffix code          | Option code             | Description   |
|------------------|----------------------|-------------------------|---|
| ZO21R            | -L                   | -----                   | Probe Protector (0 to 700°C)                                  |
| Insertion length | -100<br>-150<br>-200 | -----<br>-----<br>----- | 1.05 m<br>1.55 m<br>2.05 m                                    |
| Flange (*1)      | -J<br>-A             | -----<br>-----          | JIS 5K 65 FF SUS304 (JIS)<br>ANSI Class 150 4 FF SUS304 (JIS) |
| Style code       | *B                   | -----                   | Style B   |

\*1 Thickness of flange depends on dimensions of flange.

#### 7. Dust Filter for Zirconia Oxygen Analyzers

| Part No. | Description |
|----------|-------------|
| K9471UA  | Filter      |
| K9471UX  | Tool        |

#### 8. Dust Guard Protector

| Part No. | Description          |
|----------|----------------------|
| K9471UC  | Dust guard protector |

#### 9. Dust Protector for High Temperature Humidity Analyzers

| Model            | Suffix code | Option code    | Description  |
|------------------|-------------|----------------|--|
| ZH21B            | -----       | -----          | Dust Protector (0 to 600°C)  |
| Insertion length | -040        | -----          | 0.440 m  |
| Flange           | -J<br>-A    | -----<br>----- | JIS 5K 80 FF SUS304 (JIS) *(1)<br>ANSI Class 150 4B FF SUS304 (JIS) *(2) |
| Style code       | *B          | -----          | Style B  |

\* The flange thickness varies.

Specify the probe ZR22G-040-□-K or ZR202G-040-□-K in case of (1)  
ZR22G-040-□-C or ZR202G-040-□-C in case of (2)

#### 10. Standard Gas Unit

| Model        | Suffix code                      | Option code  | Description  |
|--------------|----------------------------------|--|--|
| ZO21S        | -----                            | -----  | Standard gas unit  |
| Power supply | -2<br>-3<br>-4<br>-5<br>-7<br>-8 | -----<br>-----<br>-----<br>-----<br>-----<br>----- | 200 V AC 50/60 Hz<br>220 V AC 50/60 Hz<br>240 V AC 50/60 Hz<br>100 V AC 50/60 Hz<br>110 V AC 50/60 Hz<br>115 V AC 50/60 Hz |
| Panel        | -J<br>-E                         | -----<br>-----                                     | Japanese version<br>English version  |
| Style code   | *A                               | -----  | Style A  |

### 11. Flow Setting Unit for manual calibration (Needs instrument air.)

| Model      | Suffix code | Option code    | Description                       |
|------------|-------------|----------------|-----------------------------------|
| ZA8F       | -----       | -----          | Flow setting unit                 |
| Joint      | -J<br>-A    | -----<br>----- | Rc1/4<br>With 1/4 NPT (F) adapter |
| Style code | *C          | -----          | Style C                           |

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

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

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

| Model                 | Suffix code | Option code    | Description                              |
|-----------------------|-------------|----------------|--|
| ZR20H                 | -----       | -----          | Automatic calibration unit for ZR202G *1 |
| Gas piping connection | -R<br>-T    | -----<br>----- | Rc1/4<br>1/4 NPT (F)                     |
| Reference air *2      | -E<br>-P    | -----<br>----- | Instrument air<br>Pressure compensated   |
| Mounting              | -A<br>-B    | -----<br>----- | Horizontal mounting<br>Vertical mounting |
| -                     | -A          | -----          | Always -A                                |

\*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

| Part No. | Description                                |
|----------|--|
| L9852CB  | Joint: Rc1/4, Material: SUS316 (JIS)       |
| G7016XH  | Joint: 1/4 NPT (F), Material: SUS316 (JIS) |

| Part No. | Description                             |
|----------|---|
| G7209XA  | Nipple: R1/4, Material: SUS304 (JIS)    |
| K9470ZN  | Nipple: 1/4 NPT, Material: SUS304 (JIS) |

### 15. Check Valve for Calibration-gas line

| Part No. | Description                                |
|----------|--|
| K9292DN  | Joint: Rc1/4, Material: SUS304 (JIS)       |
| K9292DS  | Joint: 1/4 NPT (F), Material: SUS304 (JIS) |

### 16. Air Set

| Part No. | Description   |
|----------|---|
| G7003XF  | Joint: Rc1/4, Material: Zinc alloy                    |
| K9473XK  | Joint: 1/4 NPT (F), Material: Zinc alloy with adapter |
| G7004XF  | Joint: Rc1/4, Material: Zinc alloy                    |
| K9473XG  | Joint: 1/4 NPT (F), Material: Zinc alloy with adapter |

### 17. Zero gas Cylinder

| Part No. | Description   |
|----------|---|
| G7001ZC  | 3.4 l container, 0.95 to 1.0 vol % O <sub>2</sub> , N <sub>2</sub> -balanced. |

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

### 18. Pressure Regulator for Gas Cylinder

| Part No. | Description                                |
|----------|--|
| G7013XF  | Inlet: W22 14 threads, Outlet: Rc1/4       |
| G7014XF  | Inlet: W22 14 threads, Outlet: 1/4 NPT (F) |

### 19. Case Assembly for Calibration-gas Cylinder

| Part No. | Description               |
|----------|---------------------------|
| E7044KF  | Calibration gas unit case |

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

## 20. Heater Assembly

Style: S2

| Model              |  | Option code  | Description   |
|--------------------|--|--|---|
| ZR22A              | -----  | -----  | Heater Assembly for ZR22G   |
| Length (*1)        | -015<br>-040<br>-070<br>-100<br>-150<br>-200<br>-250<br>-300 | -----<br>-----<br>-----<br>-----<br>-----<br>-----<br>-----<br>----- | 0.15 m<br>0.4 m<br>0.7 m<br>1 m<br>1.5 m<br>2 m<br>2.5 m<br>3 m   |
| Jig for change     | -A<br>-N   | -----<br>-----   | with Jig (*2)<br>None   |
| Reference gas (*3) | -A<br>-B<br>-C   | -----<br>-----<br>-----  | Natural convention,<br>External connection (Instrument air)<br>Pressure compensated (for ZR22G S2)<br>Pressure compensated (for ZR22G S1) |

\*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.

| Model          | Suffix code  | Option code   | Description   |
|----------------|--|---|---|
| ZR202A         | -----  | -----   | Heater Assembly for ZR202G                            |
| Length (*1)    | -040<br>-070<br>-100<br>-150<br>-200<br>-250<br>-300 | -----<br>-----<br>-----<br>-----<br>-----<br>-----<br>----- | 0.4 m<br>0.7 m<br>1 m<br>1.5 m<br>2 m<br>2.5 m<br>3 m |
| Jig for change | -A<br>-N   | -----<br>-----  | with Jig (*2)<br>None                                 |
| —              | -A   | -----   | Always -A   |

\*1 Suffix code of length should be selected as same as ZR202G installed.

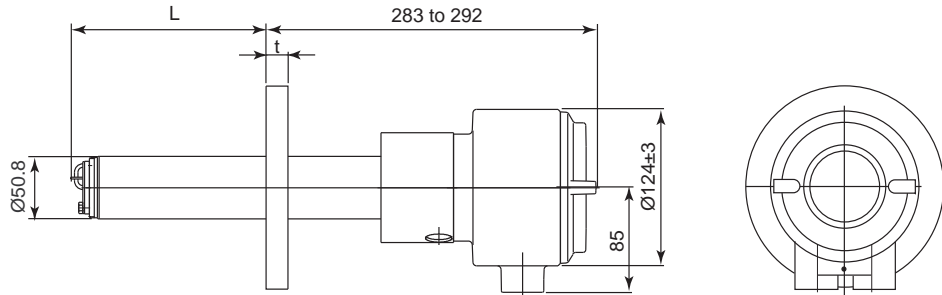
\*2 Jig part no. is K9470BX to order as a parts after purchase.

(Note) The heater is made of ceramic, do not drop or subject it to pressure stress.

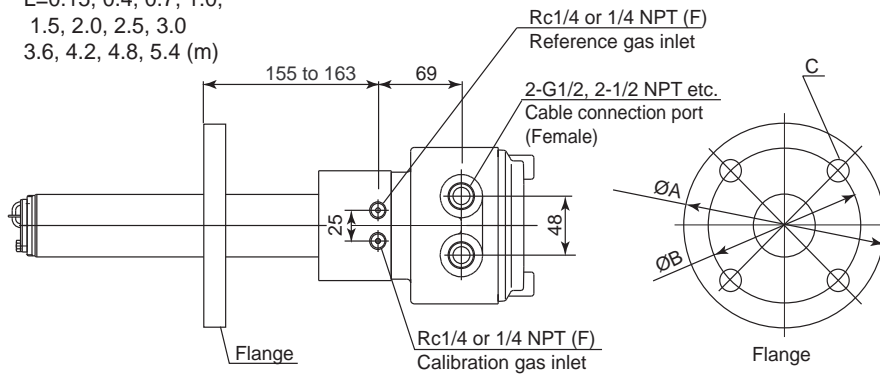
**EXTERNAL DIMENSIONS**

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

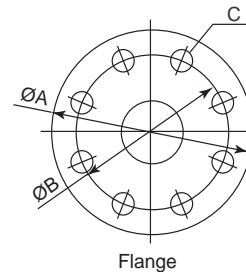
Unit : mm



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)



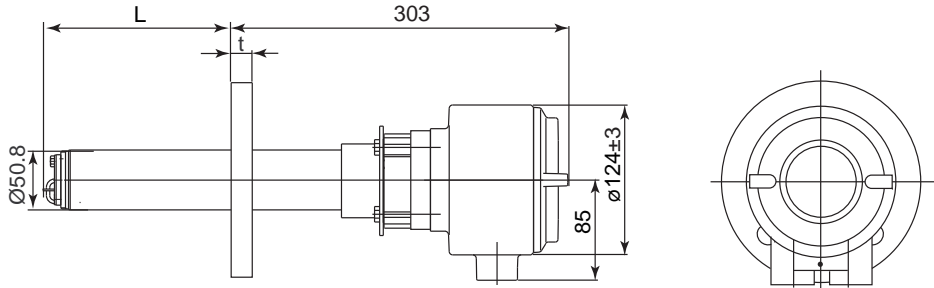
| Flange                     | A     | B     | C         | t  |
|----------------------------|-------|-------|-----------|----|
| ANSI Class 150 2 RF SUS304 | 152.4 | 120.6 | 4 - Ø19   | 19 |
| ANSI Class 150 3 RF SUS304 | 190.5 | 152.4 | 4 - Ø19   | 24 |
| ANSI Class 150 4 RF SUS304 | 228.6 | 190.5 | 8 - Ø19   | 24 |
| DIN PN10 DN50 A SUS304     | 165   | 125   | 4 - Ø18   | 18 |
| DIN PN10 DN80 A SUS304     | 200   | 160   | 8 - Ø18   | 20 |
| DIN PN10 DN100 A SUS304    | 220   | 180   | 8 - Ø18   | 20 |
| JIS 5K 65 FF SUS304        | 155   | 130   | 4 - Ø15   | 14 |
| JIS 10K 65 FF SUS304       | 175   | 140   | 4 - Ø19   | 18 |
| JIS 10K 80 FF SUS304       | 185   | 150   | 8 - Ø19   | 18 |
| JIS 10K 100 FF SUS304      | 210   | 175   | 8 - Ø19   | 18 |
| JIS 5K 32 FF SUS304        | 115   | 90    | 4 - Ø15   | 5  |
| JPI Class 150 4 RF SUS304  | 229   | 190.5 | 8 - Ø19   | 24 |
| JPI Class 150 3 RF SUS304  | 190   | 152.4 | 4 - Ø19   | 24 |
| Westinghouse               | 155   | 127   | 4 - Ø11.5 | 14 |



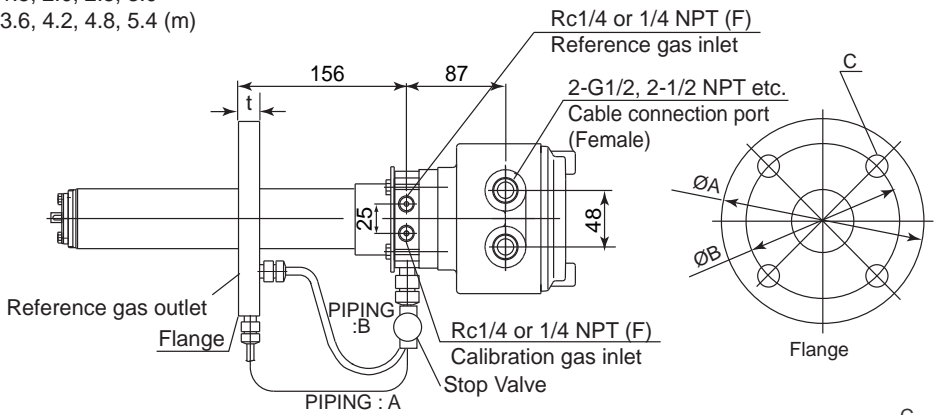
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**Model ZR22G...-P (with pressure compensated) Separate type Zirconia Oxygen / High Temperature Humidity Analyzer, Detectors**

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)



| Flange                     | A     | B     | C         | t  | PIPING |
|----------------------------|-------|-------|-----------|----|--------|
| ANSI Class 150 2 RF SUS304 | 152.4 | 120.6 | 4 - Ø19   | 19 | A      |
| ANSI Class 150 3 RF SUS304 | 190.5 | 152.4 | 4 - Ø19   | 24 | B      |
| ANSI Class 150 4 RF SUS304 | 228.6 | 190.5 | 8 - Ø19   | 24 | B      |
| DIN PN10 DN50 A SUS304     | 165   | 125   | 4 - Ø18   | 18 | A      |
| DIN PN10 DN80 A SUS304     | 200   | 160   | 8 - Ø18   | 20 | B      |
| DIN PN10 DN100 A SUS304    | 220   | 180   | 8 - Ø18   | 20 | B      |
| JIS 5K 65 FF SUS304        | 155   | 130   | 4 - Ø15   | 14 | A      |
| JIS 10K 65 FF SUS304       | 175   | 140   | 4 - Ø19   | 18 | A      |
| JIS 10K 80 FF SUS304       | 185   | 150   | 8 - Ø19   | 18 | B      |
| JIS 10K 100 FF SUS304      | 210   | 175   | 8 - Ø19   | 18 | B      |
| JPI Class 150 4 RF SUS304  | 229   | 190.5 | 8 - Ø19   | 24 | B      |
| JPI Class 150 3 RF SUS304  | 190   | 152.4 | 4 - Ø19   | 24 | B      |
| Westinghouse               | 155   | 127   | 4 - Ø11.5 | 14 | A      |

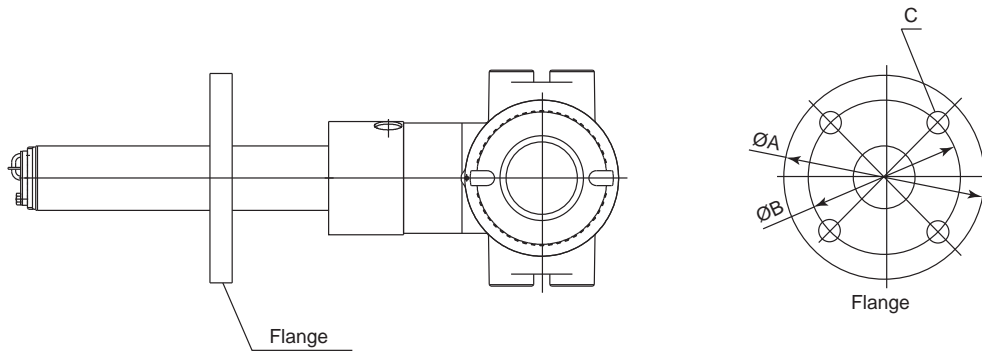
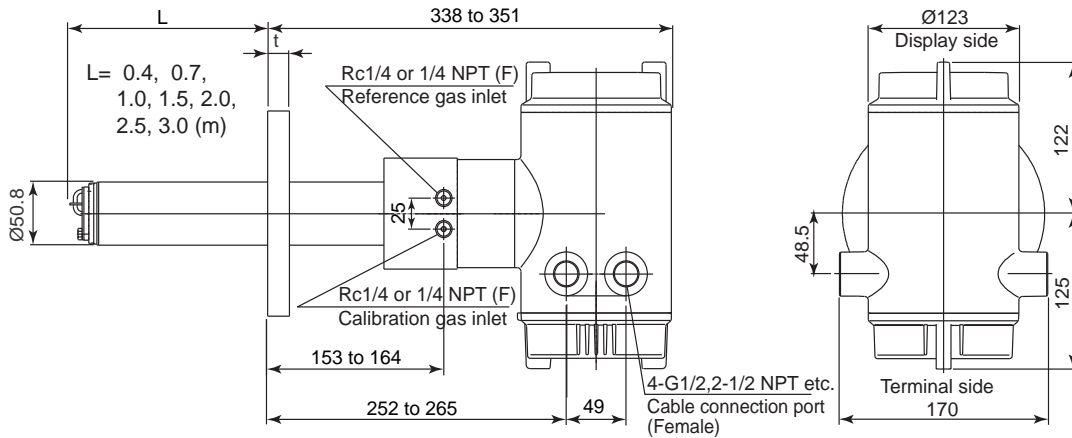
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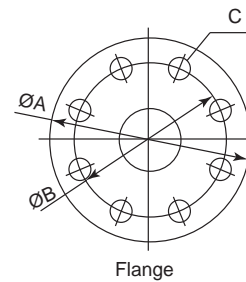


3. Model ZR202G Integrated type Zirconia Oxygen/ High Temperature Humidity Analyzers

Unit: mm



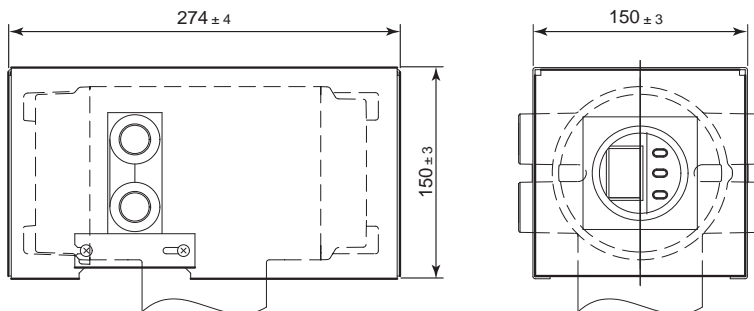
| Flange                     | A     | B     | C         | t  |
|----------------------------|-------|-------|-----------|----|
| ANSI Class 150 2 RF SUS304 | 152.4 | 120.6 | 4 - Ø19   | 19 |
| ANSI Class 150 3 RF SUS304 | 190.5 | 152.4 | 4 - Ø19   | 24 |
| ANSI Class 150 4 RF SUS304 | 228.6 | 190.5 | 8 - Ø19   | 24 |
| DIN PN10 DN50 A SUS304     | 165   | 125   | 4 - Ø18   | 18 |
| DIN PN10 DN80 A SUS304     | 200   | 160   | 8 - Ø18   | 20 |
| DIN PN10 DN100 A SUS304    | 220   | 180   | 8 - Ø18   | 20 |
| JIS 5K 65 FF SUS304        | 155   | 130   | 4 - Ø15   | 14 |
| JIS 10K 65 FF SUS304       | 175   | 140   | 4 - Ø19   | 18 |
| JIS 10K 80 FF SUS304       | 185   | 150   | 8 - Ø19   | 18 |
| JIS 10K 100 FF SUS304      | 210   | 175   | 8 - Ø19   | 18 |
| JPI Class 150 4 RF SUS304  | 229   | 190.5 | 8 - Ø19   | 24 |
| JPI Class 150 3 RF SUS304  | 190   | 152.4 | 4 - Ø19   | 24 |
| Westinghouse               | 155   | 127   | 4 - Ø11.5 | 14 |



F11\_01.ai

●With sun shield hood (option code /H)

Unit : mm

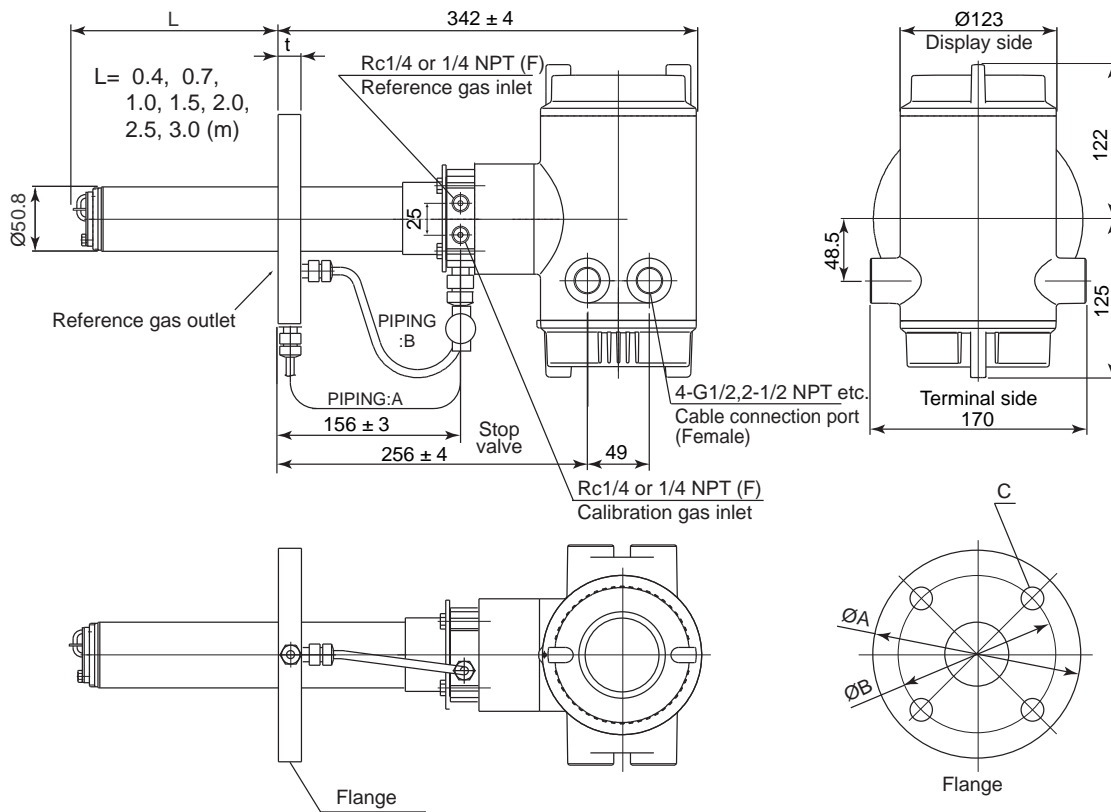


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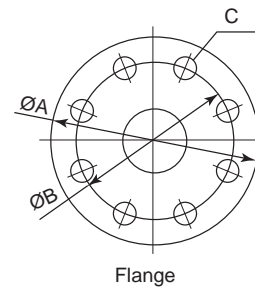
Material of HOOD : Aluminum

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

Unit: mm



| Flange                     | A     | B     | C                      | t  | PIPING |
|----------------------------|-------|-------|------------------------|----|--------|
| ANSI Class 150 2 RF SUS304 | 152.4 | 120.6 | 4 - $\varnothing 19$   | 19 | A      |
| ANSI Class 150 3 RF SUS304 | 190.5 | 152.4 | 4 - $\varnothing 19$   | 24 | B      |
| ANSI Class 150 4 RF SUS304 | 228.6 | 190.5 | 8 - $\varnothing 19$   | 24 | B      |
| DIN PN10 DN50 A SUS304     | 165   | 125   | 4 - $\varnothing 18$   | 18 | A      |
| DIN PN10 DN80 A SUS304     | 200   | 160   | 8 - $\varnothing 18$   | 20 | B      |
| DIN PN10 DN100 A SUS304    | 220   | 180   | 8 - $\varnothing 18$   | 20 | B      |
| JIS 5K 65 FF SUS304        | 155   | 130   | 4 - $\varnothing 15$   | 14 | A      |
| JIS 10K 65 FF SUS304       | 175   | 140   | 4 - $\varnothing 19$   | 18 | A      |
| JIS 10K 80 FF SUS304       | 185   | 150   | 8 - $\varnothing 19$   | 18 | B      |
| JIS 10K 100 FF SUS304      | 210   | 175   | 8 - $\varnothing 19$   | 18 | B      |
| JPI Class 150 4 RF SUS304  | 229   | 190.5 | 8 - $\varnothing 19$   | 24 | B      |
| JPI Class 150 3 RF SUS304  | 190   | 152.4 | 4 - $\varnothing 19$   | 24 | B      |
| Westinghouse               | 155   | 127   | 4 - $\varnothing 11.5$ | 14 | A      |

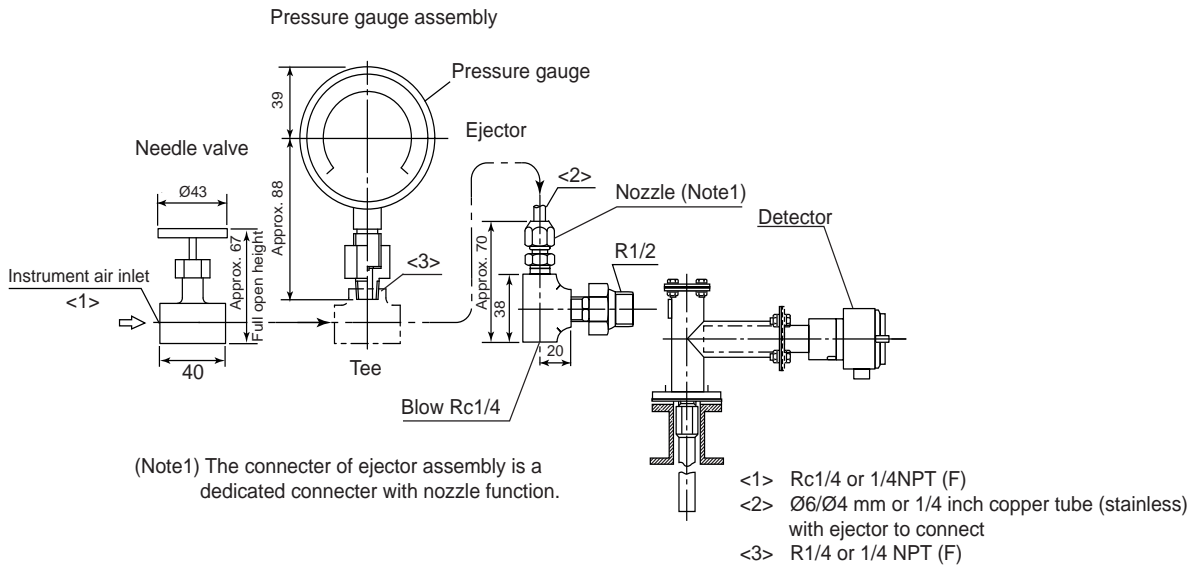


F11\_02.EPS



**5. E7046EC, E7046EN Auxiliary Ejector Assembly for High Temperature Detector of separate type Oxygen Analyzer**

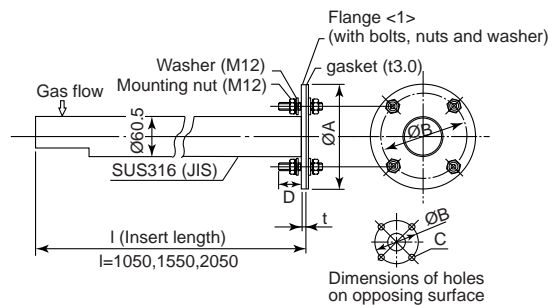
Unit : mm



F19.ai

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

Unit: mm

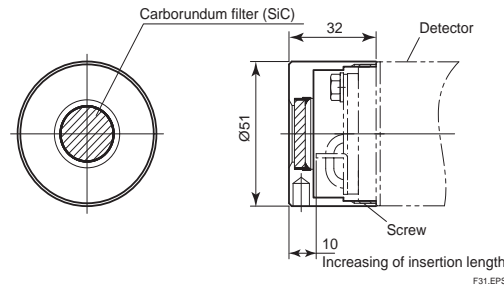


| Flange<1>                        | A     | B     | C       | t  | D  |
|----------------------------------|-------|-------|---------|----|----|
| JIS 5K 65 FF SUS304 (JIS)        | 155   | 130   | 4 - Ø15 | 5  | 40 |
| ANSI Class 150 4 FF SUS304 (JIS) | 228.6 | 190.5 | 8 - Ø19 | 12 | 50 |

F17.ai

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

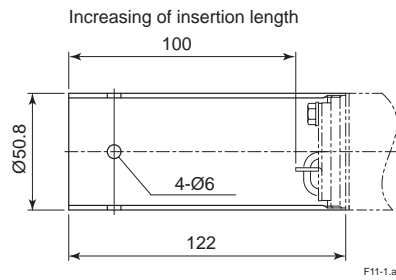
Unit : mm



F31.EPS

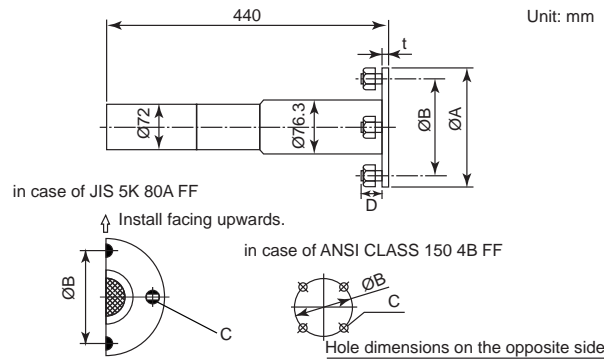
8. K9471UC Dust Guard Protector

Unit : mm



9. Model ZH21B Dust Protector for High Temperature Humidity Analyzers

Unit: mm

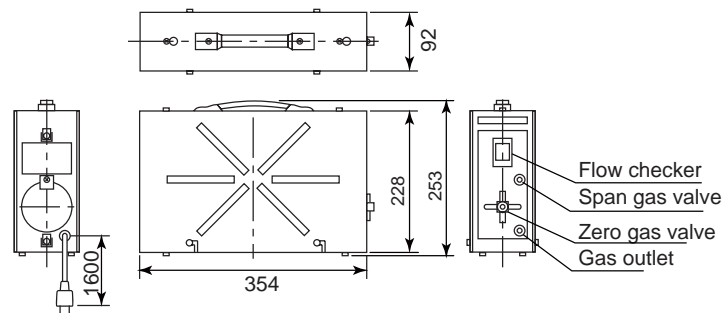


| Flange                            | A     | B     | C     | t  | D  |
|-----------------------------------|-------|-------|-------|----|----|
| JIS 5K 80 FF SUS304 (JIS)         | 180   | 145   | 4-Ø19 | 14 | 40 |
| ANSI Class 150 4B FF SUS304 (JIS) | 228.5 | 190.5 | 8-Ø19 | 12 | 50 |

F09.ai

10. Model ZO21S Standard Gas Unit

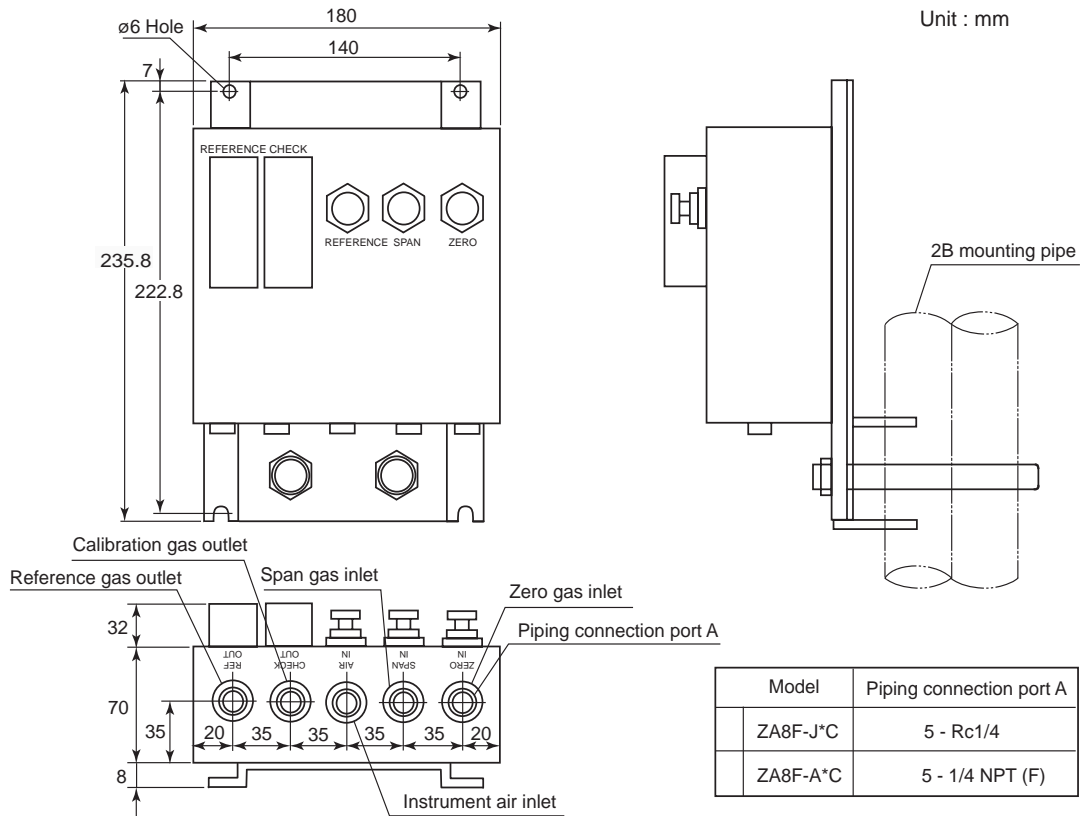
Unit : mm



Zero gas cylinder (6 cylinder): E7050BA

F24.ai

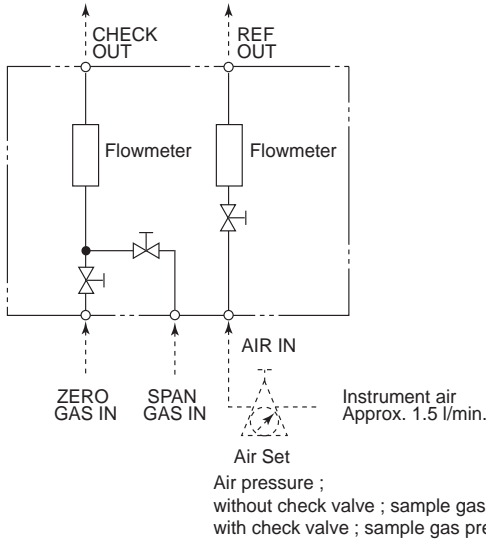
11. Model ZA8F Flow setting unit for manual calibration



| Model    | Piping connection port A |
|----------|--------------------------|
| ZA8F-J°C | 5 - Rc1/4                |
| ZA8F-A°C | 5 - 1/4 NPT (F)          |

Weight : Approx. 2.3 kg

PIPING INSIDE THE FLOW SETTING UNIT



F2.6E.ai



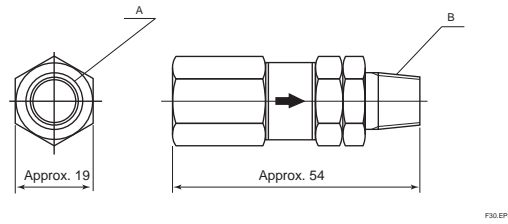




**15. K9292DN /K9292DS Check Valve for Calibration-gas line**

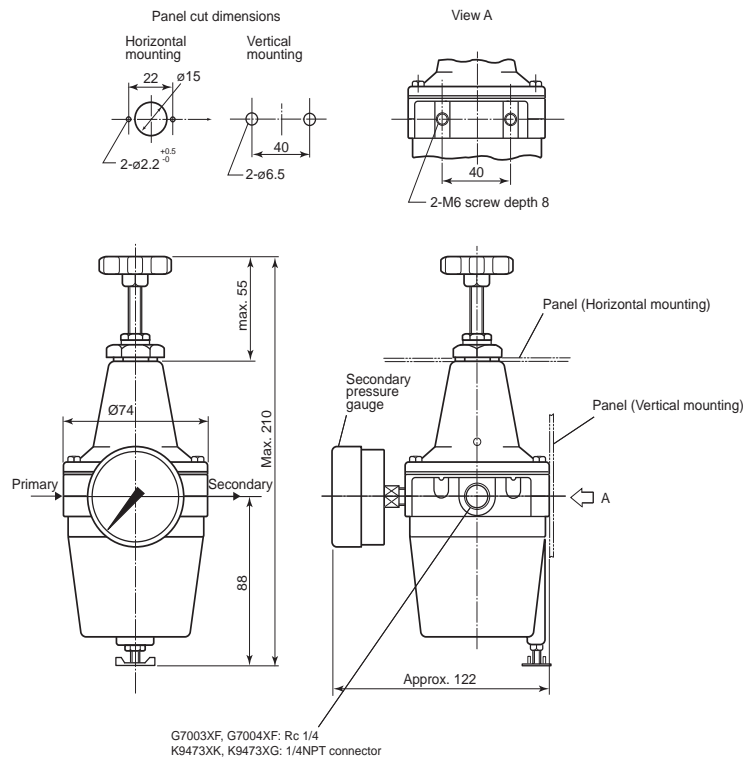
Unit: mm

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



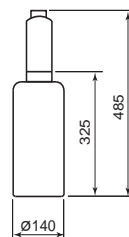
**16. G7003XF/K9473XK, G7004XF/K9473XG Air Set**

Unit : mm



**17. G7001ZC Zero gas Cylinder**

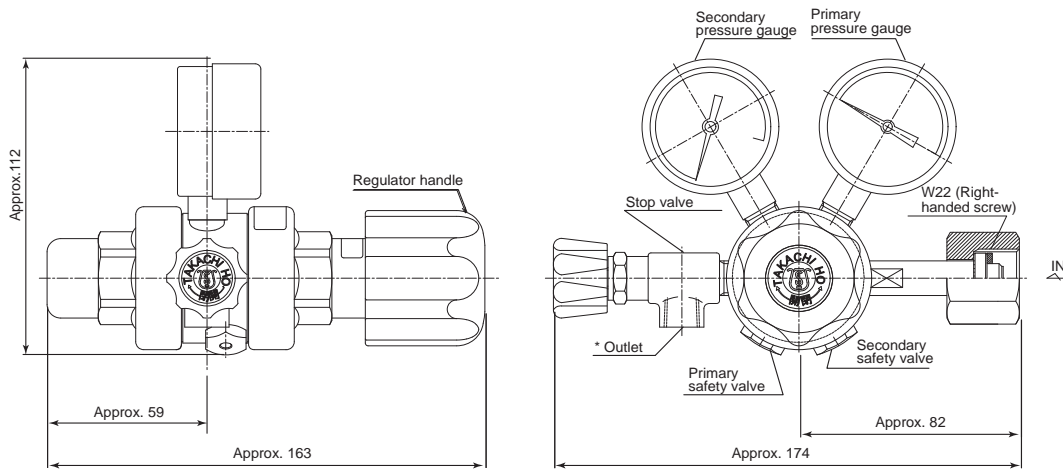
Unit : mm



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

**18. G7013XF, G7014XF Pressure Regulator for Gas Cylinder**

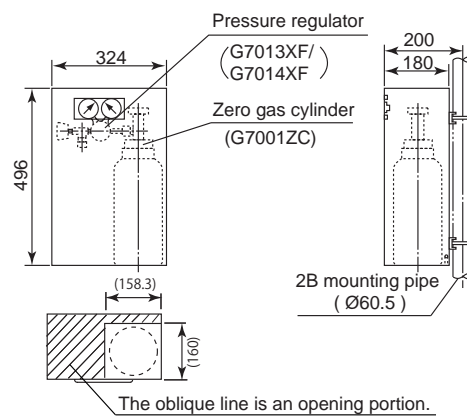
Unit: mm



| Part No. | * Outlet    |
|----------|-------------|
| G7013XF  | Rc1/4       |
| G7014XF  | 1/4 NPT (F) |

**19. E7044KF Case Assembly for Calibration gas Cylinder**

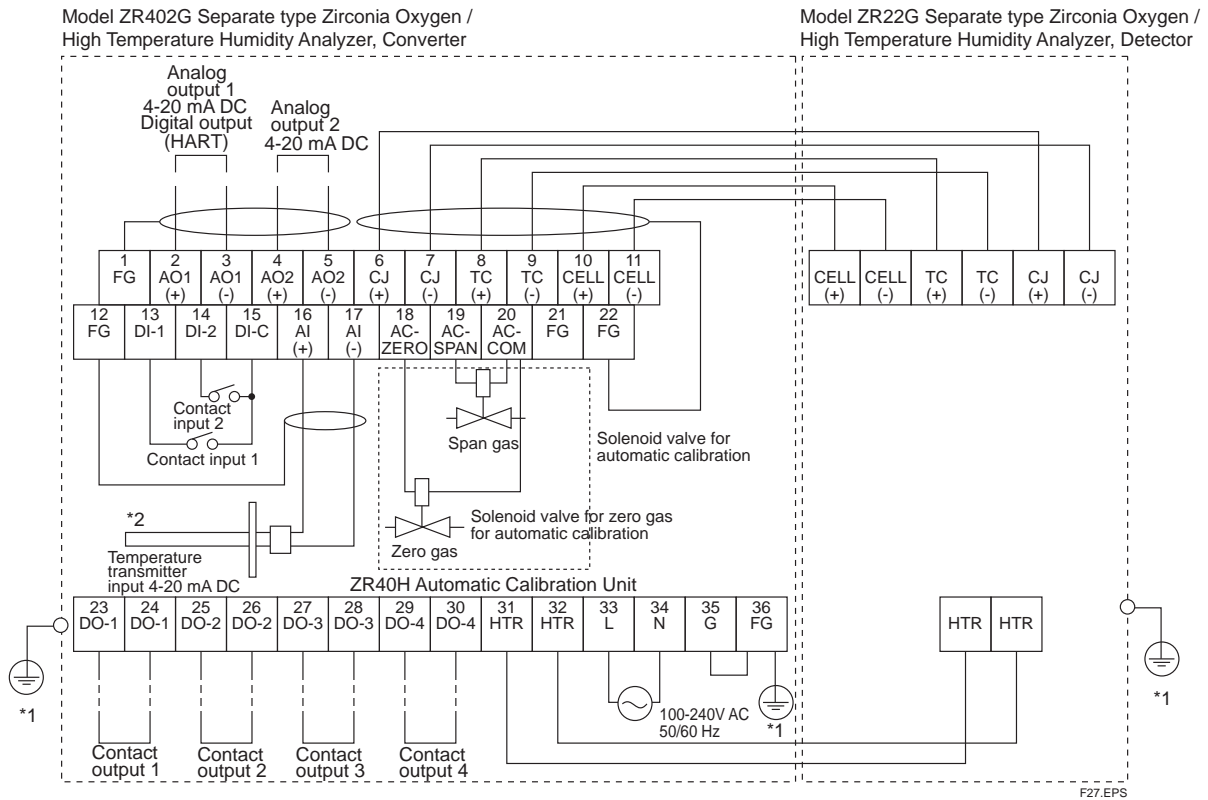
Unit : mm



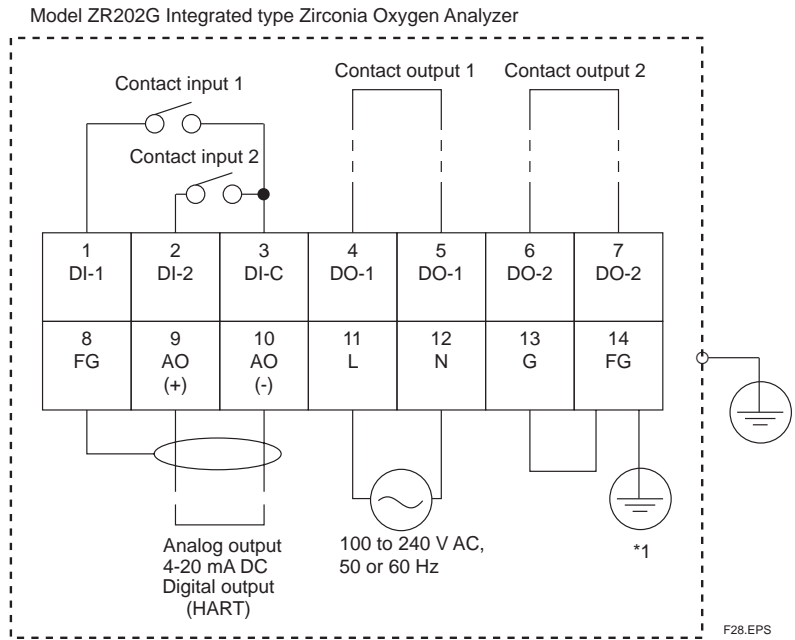
(Note) The zero gas cylinder and the regulator valve are not included in the E7044KF (case assembly)

F23.ai

**WIRING CONNECTIONS**



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



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 _____                | Type of analyzer : <input type="checkbox"/> Oxygen Analyzer <input type="checkbox"/> High Temperature Humidity Analyzer                      |
| Destination of delivery _____ | <input type="checkbox"/> Separate type <input type="checkbox"/> Integrated type  |
| Plant name _____              | Object : <input type="checkbox"/> indication <input type="checkbox"/> record <input type="checkbox"/> control <input type="checkbox"/> alarm |
| Measurement points _____      | Fuel : <input type="checkbox"/> gas <input type="checkbox"/> oil <input type="checkbox"/> coal <input type="checkbox"/> _____                |
|                               | Power requirements _____V AC _____Hz   |

2. Process conditions

2.1 Measurement gas components \_\_\_\_\_

|                          |  |            |                   |  |
|--------------------------|--|------------|-------------------|--|
| 2.2 Oxygen concentration | Nor. _____   | Min. _____ | Max. _____        | <input type="checkbox"/> vol% O <sub>2</sub> , <input type="checkbox"/>        |
| Moisture contents        | Nor. _____   | Min. _____ | Max. _____        | <input type="checkbox"/> kg/kg, <input type="checkbox"/> Vol% H <sub>2</sub> O |
| 2.3 Temperature          | Nor. _____   | Min. _____ | Max. _____        | <input type="checkbox"/> °C, <input type="checkbox"/>                          |
| 2.4 Pressure             | Nor. _____   | Min. _____ | Max. _____        | <input type="checkbox"/> kPa, <input type="checkbox"/>                         |
| 2.5 Gas flow             | Nor. _____   | Min. _____ | Max. _____        | <input type="checkbox"/> m/sec, <input type="checkbox"/>                       |
| 2.6 Dust type, Size      | Nor. _____   | Min. _____ | mm quantity _____ | <input type="checkbox"/> g/Nm <sup>3</sup> , <input type="checkbox"/>          |
| 2.7 Corrosive gas        | <input type="checkbox"/> No gas <input type="checkbox"/> Gas _____ | _____      | quantity _____    | <input type="checkbox"/> ppm, <input type="checkbox"/>                         |
|                          |  |            | quantity _____    | <input type="checkbox"/> ppm, <input type="checkbox"/>                         |
| 2.8 Combustible gas      | <input type="checkbox"/> No gas <input type="checkbox"/> Gas _____ | _____      | quantity _____    | <input type="checkbox"/> ppm, <input type="checkbox"/>                         |
|                          |  |            | quantity _____    | <input type="checkbox"/> ppm, <input type="checkbox"/>                         |

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 |  | Quantity | Description   |
|-----------|--|----------|---|
| Probe     | Model ZR22G General-use Probe  |          | Refer to the Probe Configuration for probe selection. |
|           | Model ZO21P-H High Temperature Probe Adapter                                     |          |   |
|           | E7046EC /E7046EN Ejector Assembly for high temperature use.                      |          |   |
|           | Options (for general use)  |          |   |
|           | Model ZH21B Dust Protector for High Temperature Humidity Analyzer.               |          |   |
|           | Model ZO21R Probe Protector for Oxygen Analyzer                                  |          |   |
|           | K9471UA Filter for Oxygen Analyzer   |          |   |
|           | Model ZR402G Separate type Analyzer, Converter                                   |          |   |
|           | Model ZR202G Integrated type Zirconia Oxygen /High Temperature Humidity Analyzer |          |   |
|           | 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  |          | Not required if probe options are specified.          |
|           | K9292DN /K9292DS Check Valve (*1)  |          |   |
|           | G7003XF/K9473XK, G7004XF/K9473XG Air Set   |          |   |
|           | G7001ZC Zero Gas Cylinder (*2)   |          |   |
|           | G7013XF /G7014XF Pressure Regulator  |          |   |
|           | ZR22A, ZR202A Heater Assembly (Spare Parts)                                      |          |   |

\*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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