

# General Specifications

## IR400 NDIR TYPE INFRARED GAS ANALYZER (5-COMPONENT ANALYZER)

GS 11G02N01-01E

The IR400 infrared gas analyzer is capable of measuring the concentrations of NO, SO<sub>2</sub>, CO<sub>2</sub>, CO, CH<sub>4</sub> and O<sub>2</sub> components in sample gas.

NO, SO<sub>2</sub>, CO<sub>2</sub>, CO and CH<sub>4</sub> are measured by non-dispersive infrared method (NDIR), while O<sub>2</sub> is measured by built-in paramagnetic sensor or external zirconia sensor. A maximum of 5 components including O<sub>2</sub> (up to 4 components except for O<sub>2</sub> measurement) are simultaneously measurable.

The mass flow type twin detector of high sensitivity and reliability adopted in the infrared ray method detection unit makes the measurement hardly affected by interfering components.

In addition, the IR400 includes a microprocessor and has a large-size liquid crystal display, providing easy operation, high accuracy and multiple functions.

Optimum as an analyzer unit of measurement system for combustion exhaust gas from refuse incinerator and boiler, or gas from different industrial furnaces.

### ■ FEATURES

1. Simultaneous and continuous measurement of up to 5 components including O<sub>2</sub>  
O<sub>2</sub> and 4 components selected from among NO, SO<sub>2</sub>, CO, CO<sub>2</sub>, and CH<sub>4</sub>.
2. Minimal interference from other gas components  
The mass flow type twin detector of high sensitivity and reliability minimizes interference from other gas components, ensuring excellent stability.
3. Extensive functions  
Incorporating O<sub>2</sub> correction, average value computing, automatic calibration, one touch calibration, upper/lower limit alarm, remote measurement range changeover, range identification signal output, etc., the analyzer accommodates different application requirements.
4. Easy-to-read, large LCD  
Large LCD provides clear indications of all measured components and computed values and easy interactive operation.
5. 19-inch rack mounting  
Unitized construction of the main body on the 19-inch rack and of the signal input/output terminal module allows easy configuration of a gas analyzer system.
6. Maximum measuring range ratio  
A maximum range ratio of 1:25 is achieved.



### ■ SPECIFICATIONS

#### Standard Specifications

Measurement principle:

NO, SO<sub>2</sub>, CO<sub>2</sub>, CO, CH<sub>4</sub>: Non-dispersive infrared method  
Single light source-double beams

O<sub>2</sub>: Paramagnetic type (built-in), or zirconia type (external)

Measurable gas components and measuring ranges:

Component	Range	Minimum range	Maximum range
NO		0 – 50 ppm	0 – 5000 ppm
SO <sub>2</sub>		0 – 50 ppm	0 – 10 vol%
CO <sub>2</sub>		0 – 20 ppm	0 – 100 vol%
CO		0 – 50 ppm	0 – 100 vol%
CH <sub>4</sub>		0 – 200 ppm	0 – 100 vol%
O <sub>2</sub> (paramagnetic)		0 – 5 vol%	0 – 25 vol%
O <sub>2</sub> (zirconia)		0 – 5 vol%	0 – 25 vol%

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- Measurement of up to 5 components including O<sub>2</sub>.
- 1 or 2 measuring range per component.
- Measuring range ratio ≤ 1:5 (O<sub>2</sub> analyzer)  
≤ 1:25 (except O<sub>2</sub> analyzer)

For measurable components and possible combinations of measuring ranges, refer to Tables 1-(1) to (7).

Display:

Digital indication in 4 digits (LCD with backlight)

- Instantaneous value of each component
- Instantaneous value after O<sub>2</sub> correction (only in NO, SO<sub>2</sub>, CO with O<sub>2</sub> measurement)
- Average value after O<sub>2</sub> correction (only in NO, SO<sub>2</sub>, CO with O<sub>2</sub> measurement)
- Average O<sub>2</sub> value

Analog output signal:

\* Input/Output of analog signals is available in combination with the input/output terminal module.

4 to 20 mA DC or 0 to 1 V DC, non-isolated, 12 points max.

Analog output corresponds one-to-one with measured value indication.

<p>Permissible load resistance; 550 Ω max. for 4 to 20 mA DC 100 kΩ min. for 0 to 1 V DC</p> <p>* Refer to Table 8 for the channel numbers of displayed values and analog output signals.</p> <p>Analog input signal: For signal input from external O<sub>2</sub> analyzer. Signal requirement; (1) Signal from Yokogawa's zirconia O<sub>2</sub> sensor (Model ZX8D*C or ZX8D*D) (2) 0 to 1V DC from an O<sub>2</sub> sensor Input section is not isolated. This feature is effective when built-in O<sub>2</sub> sensor is not used. (An input signal triggers measured concentration indication and O<sub>2</sub> correction.)</p> <p>* External O<sub>2</sub> sensor should be purchased separately.</p> <p>Relay contact output: 1a contact (250 V AC/2 A, resistive load) Instrument error, calibration error, range identification, auto calibration status, pump ON/OFF, peak alarm. 1c contact (250 V AC/2 A, resistive load) Selectable 6 outputs. High/Low limit alarm contact output (for each channel). Power disconnection alarm.</p> <p>* All relay contacts are isolated mutually and from the internal circuit.</p> <p>Contact input: Non-voltage contact (ON/0 V, OFF/5 V DC, 5 mA flowing at ON). Remote range changeover, auto calibration remote start, remote hold, average value reset, pump ON/OFF. Isolated from the internal circuit with photocoupler. Contact inputs are not isolated from one another.</p> <p>Transmission output: Solenoid valve drive signal for automatic calibration. Transistor output (100 mA or less) * For details, see External Connection Diagram on page 15.</p> <p>Power supply: Voltage rating; 100 to 240 V AC Allowable range; 85 to 264 V AC Frequency; 50/60 Hz Power consumption; 250 VA max. Inlet; Conform to EN60320 Protection Class 1</p> <p>Operating conditions: Ambient temperature; -5 to 45°C Ambient humidity; 90%RH max., non-condensing.</p> <p>Storage conditions: Ambient temperature; -20 to 60°C Ambient humidity; 90%RH max., non-condensing</p> <p>Dimensions (H × W × D): Analyzer main unit; 177 × 483 × 578 mm Input/Output terminal module; 164 × 316 × 55 mm</p>	<p>Weight: Approx. 22 kg (only analyzer)</p> <p>Finish color: Front panel; Off-white (Munsell 10Y7.5/0.5 or equivalent) Casing; Plating, Steel-blue (gray)</p> <p>Enclosure: Steel casing, for indoor use</p> <p>Material of gas-contacting parts: Gas inlet/outlet; SUS304 Sample cell; SUS304/neoprene rubber Infrared-ray transmitting window; CaF<sub>2</sub> O<sub>2</sub> sensor sampling cell: SUS316 Internal piping; Toaron tube, Teflon tube</p> <p>Gas inlet/outlet: Rc1/4 or 1/4 NPT internal thread</p> <p>Purge gas flow rate: 1 L/min (when required)</p> <p>Safety and EMC conforming standards: Installation altitude: 2000 m or less Pollution degree; 2 (Note) Installation category; II (Note) Note: Installation category, called over-voltage category, specifies impulse with standing voltage. Category II is for electrical equipment. Pollution degree indicates the degree of existence of solid, liquid, gas or other inclusions which reduce dielectric strength. Degree 2 is the normal indoor environment.</p> <p>Safety; EN61010-1 EMC ; EN61326-1 Class A, Table 2, EN61326-2-3, EN61000-3-2, EN61000-3-3 EMC Regulatory Arrangement in Australia and New Zealand (RCM) EN61326-1 Class A Note: The product mounted in a steel enclosure conforms to the requirements of EMC directive.</p>
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### CAUTION

The 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.

### Standard Functions

#### Output signal hold:

Output signals are held during manual and auto calibrations by activation of holding (turning "ON" its setting). The values to be held are the ones just before start calibration mode. Indication values will not be held.

#### Remote output hold:

Output signal is held at the latest value or setting value by short-circuiting the remote output holding input terminals. Holding is maintained while the terminals are short-circuited. Indication values will not be held.

#### Switch range :

The range changeover is available in manual, auto, and remote modes. Only preset changeover method is effective.

Manual; Allows range to switch by key operation.

**Auto;** Allows range to switch from low to high range when 90%FS or more is available in the low range.  
Allows range to switch from high to low range when 80%FS or less is available in the low range.

**Remote;** Non-voltage contact input (for measurable components)  
Allows range to switch via an external signal when remote range changeover input is received.

**Range identification signal:**  
The present measuring range is identified by a contact signal.  
The contact output terminals for each component are short-circuited when the first range is selected, and when the second range is selected, the terminals are open.

**Auto calibration:**  
Auto calibration is carried out periodically at the preset cycle.  
When a standard gas cylinder for calibration and a solenoid valve for opening/closing the gas flow line are prepared externally by the customer, calibration will be carried out with the solenoid valve drive contacts for zero calibration and each span calibration turned on/off sequentially at the set auto calibration timing.

**Auto calibration cycle setting;**  
Auto calibration cycle is set.  
Setting is variable within 1 to 99 hours (in increments of 1 hour) or 1 to 40 days (in increments of 1 day).

**Gas flow time setting;**  
The time for flowing each calibration gas in auto calibration is set.  
Settable within 60 to 900 seconds (in increments of 1 second)

**Auto calibration remote start:**  
Auto calibration is carried out only once according to an external input signal. Calibration sequence is settable in the same way as the general auto calibration.  
Auto calibration is started by opening the auto calibration remote start input terminals after short-circuiting for 1.5 seconds or longer.

**Auto zero calibration:**  
Auto zero calibration is carried out periodically at the preset cycle.  
This cycle is independent of "Auto calibration" cycle.  
When zero calibration gas and solenoid valve for opening/closing the calibration gas flow line are prepared externally by the customer, zero calibration will be carried out with the solenoid valve drive contact for zero calibration turned on/off at the set auto zero calibration timing.

**Auto zero calibration cycle setting;**  
Auto zero calibration cycle is set.  
Setting is variable within 1 to 99 hours (in increments of 1 hour) or 1 to 40 days (in increments of 1 day)

**Gas flow time setting;**  
The time for flowing zero gas in auto zero calibration is set.  
Settable 60 to 900 seconds (in increments of 1 second)

**Upper/lower limit alarm:**  
Alarm contact output turns on when measurement value reach the preset upper or lower limit alarm value.  
Contacts close when the instantaneous value of each component becomes larger than the upper alarm limit value or smaller than the lower alarm limit value.

**Instrument error contact output:**  
Contacts close at occurrence of analyzer error No. 1, 3 or 10.

**Calibration error contact output:**  
Contacts close at occurrence of manual or auto calibration error (any of errors No. 4 to 9).

**Auto calibration status contact output:**  
Contacts close during auto calibration.

**Pump ON/OFF contact output:**  
During measurement, contacts close.  
While calibration gas is flowing, contacts open. Contacts are connected in power supply of pump, and stop the sample gas while calibration gas is flowing.

### Optional Functions

**O<sub>2</sub> correction:** Conversion of measured NO, SO<sub>2</sub> and CO gas concentrations into values at reference O<sub>2</sub> concentration.

$$\text{Correction formula: } C = \frac{21 - O_n}{21 - O_s} \times C_s$$

Where:

C: Sample gas concentration after O<sub>2</sub> correction

C<sub>s</sub>: Measured concentration of sample gas

O<sub>s</sub>: Measured O<sub>2</sub> concentration (limit setting: 1 to 20%O<sub>2</sub>, default 17% )

O<sub>n</sub>: Reference O<sub>2</sub> concentration (value changeable by setting: 0 to 19%O<sub>2</sub>, default 4%)

The result of calculation is indicated and output in an analog output signal.

**Average value after O<sub>2</sub> correction and O<sub>2</sub> average value calculation:**

The result of O<sub>2</sub> correction or instantaneous O<sub>2</sub> value can be outputted as an average value in the determined period of time.

Used for averaging is the moving average method in which sampling is carried out at intervals of 30 seconds. (Output is updated every 30 seconds. It is the average value in the determined period of time just before the latest updating.)

Averaging time is settable within 1 to 59 minutes (in increments of 1 minute) or 1 to 4 hours (in increments of 1 hour).

**Average value reset:**

The above-mentioned output of average value is started from the initial state by opening the average value resetting input terminals after short-circuiting for 1.5 seconds or longer.

Output is reset by short-circuiting and restarted by opening.

**CO concentration peak count alarm:**

(available only for CO + O<sub>2</sub> measurement)

Alarm output turns on according to the preset concentration and count.

Whenever the instantaneous value of CO exceeds the preset concentration value, count increments. If the count exceeds the preset value in one hour, the alarm contacts close.

**Communication function:**

RS-232C (9 pins D-sub)

Half-duplex bit serial

Start-stop synchronization

Modbus™ protocol

Contents: Read/write parameters

Read measurement concentration and instrument status

Remark: When connecting via RS-485 interface, a RS-232C ↔ RS-485 converter should be used.

**Performance**

Repeatability: ±0.5% of full scale (±1% of full scale for range less than 0-50 ppm)

Linearity: ±1% of full scale

Zero drift: ±1% of full scale/week (±2% of full scale/week for range equal to or more than 50 ppm and less than 200ppm) (±2% of full scale/day for range less than 0-50 ppm)

Span drift: ±2% of full scale/week (±2% of full scale/day for range less than 0-50 ppm)

Response time (for 90%FS response) :

Within 60 seconds including replacement time of sample gas (when gas flow rate is 0.5 L/min). Gas replacement time depends on the number of measuring components, and measuring range effects of interfering gases.

**Effects of interfering gases**

When sample gas contains gas components listed below, the measurement accuracy may suffer. Consult Yokogawa for countermeasures or effect on accuracy.

Analyzer	Interference gas	Effect
SO <sub>2</sub> analyzer	NO <sub>2</sub>	50 ppm of NO <sub>2</sub> is equivalent to -6 ppm of SO <sub>2</sub>
CO analyzer	CO <sub>2</sub>	15% of CO <sub>2</sub> is equivalent to 7 to 10 ppm of CO
	N <sub>2</sub> O	1000 ppm of N <sub>2</sub> O is equivalent to 80 ppm of CO
CH <sub>4</sub> analyzer	CO <sub>2</sub>	15% of CO <sub>2</sub> is equivalent to approx. 3 ppm of CH <sub>4</sub>

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**Standard Requirements for Sample Gas**

Flow rate: 0.5±0.2 L/min

Temperature: 0 to 50°C

Pressure: 10 kPa or less (Gas outlet side should be open to the atmospheric air.)

Dust: 100 µg/Nm<sup>3</sup> or less in particle size of 1 µm or less

Mist: Unallowable

Moisture: Below a level where saturation occurs at 2°C (condensation unallowable).

Corrosive component: HCl 1 ppm or less

Standard gas for calibration:

Zero gas; Dry N<sub>2</sub>

Span gas; Each sample gas having concentration 90 to 100% of its measuring range (recommended).

Gas beyond concentration 100%FS is unusable.

In case a zirconia O<sub>2</sub> analyzer is installed externally and calibration is carried out on the same calibration gas line:

Zero gas; Dry air or atmospheric air (provided without CO<sub>2</sub> sensor)

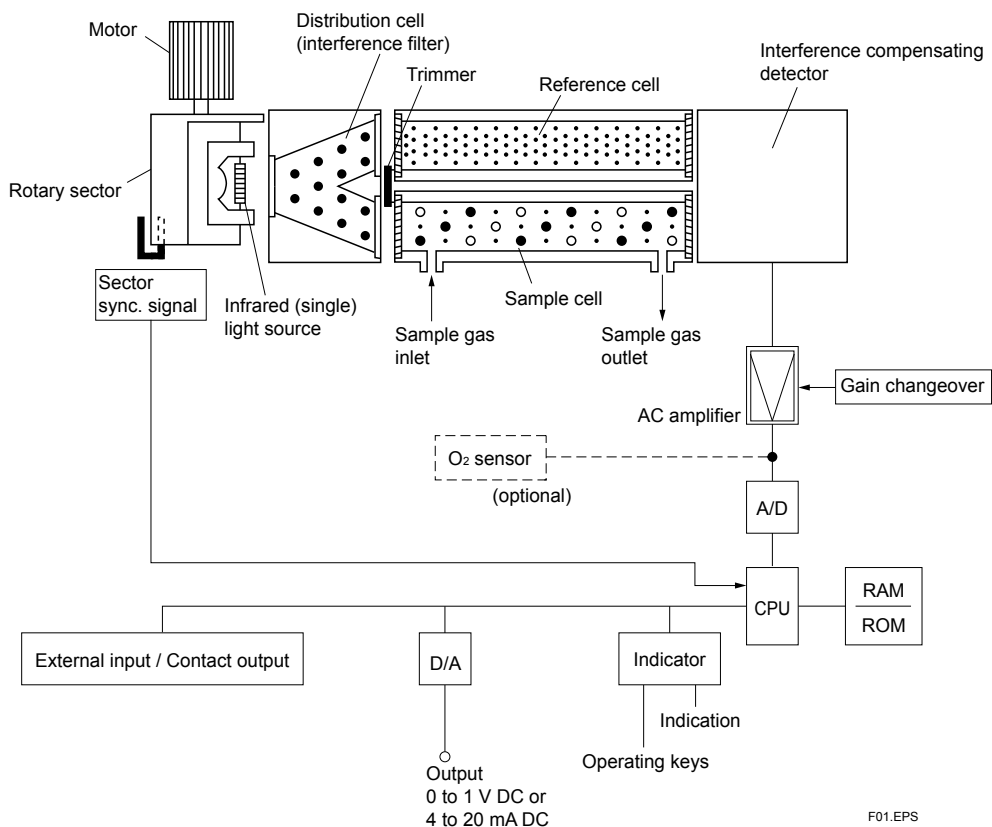
Span gas; For other than O<sub>2</sub> measurement, each sample gas having concentration 90 to 100% of its measuring range.

For O<sub>2</sub> measurement, O<sub>2</sub> gas of 1 to 2 vol%.

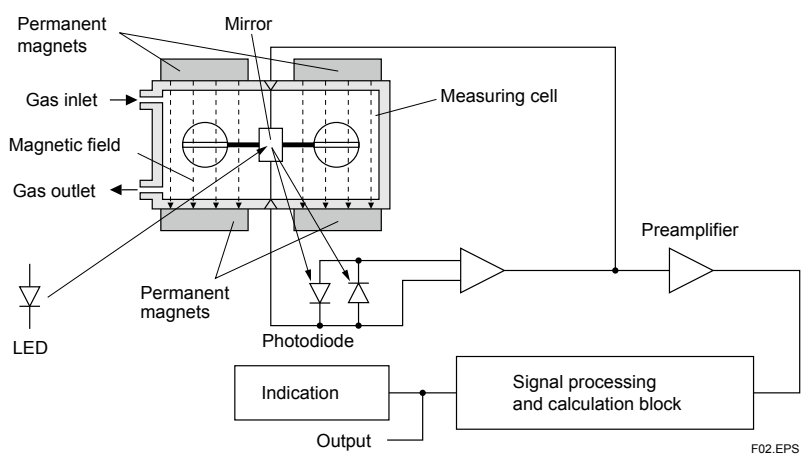
**Installation Requirements**

- Indoor use: Avoid exposure to direct sunlight, weather, and radiant heat from hot substances. Where exposure to such conditions are unavoidable, a protective hood or cover should be prepared.
- Minimal vibration
- A clean atmosphere

### Diagram of measurement principle of infrared gas analyzer (NO, SO<sub>2</sub>, CO<sub>2</sub>, CO, CH<sub>4</sub>)

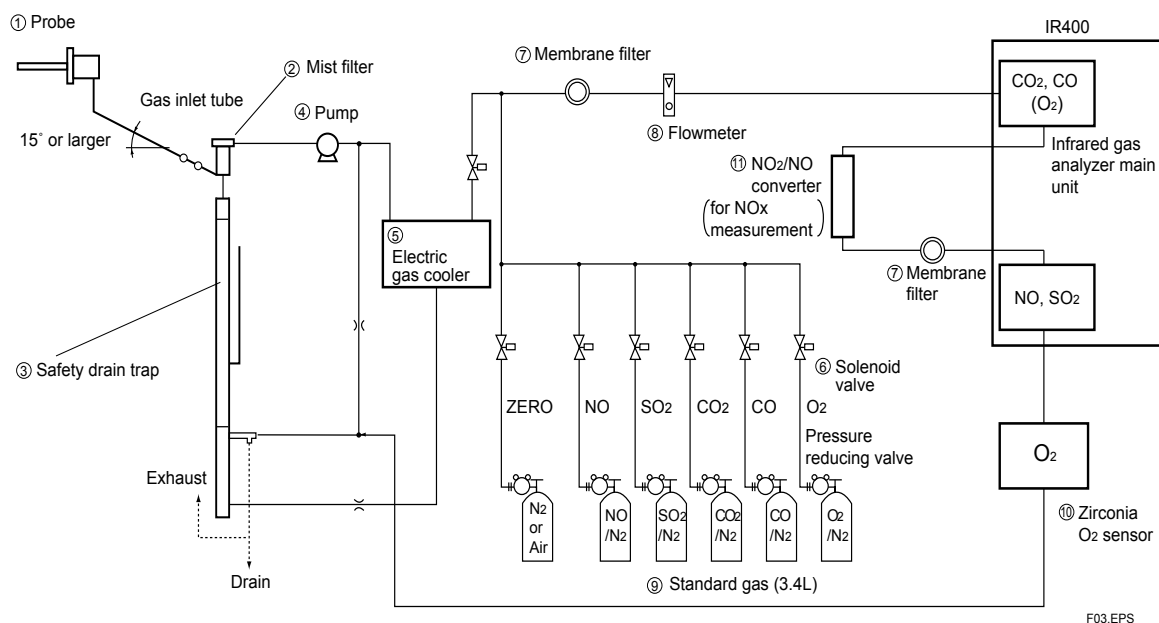


### Diagram of measurement principle of paramagnetic oxygen analyzer



## Example of gas sampling system configuration

The following illustrates a typical system configuration for five component gas measurement for monitoring combustion exhaust gas from boiler, refuse incinerator, etc. Contact Yokogawa for system configuration matching the particular use or further information.



Typical sampling system components

No.	Item	Description
①	Probe	With a heating type stainless steel filter. Standard pore size: 40 $\mu$ m
②	Mist filter	Separates drain and removes dust and mist.
③	Safety drain trap	Prevents drain from being sucked. Composite operation of constant-pressure bubbler.
④	Pump	Sucks in sample gas. Sample gas flow rate: approx. 2 L/min
⑤	Electric gas cooler	Dehumidifies sample gas.
⑥	Solenoid valve	Used for introducing calibration gas.
⑦	Membrane filter	Glass fiber or PTFE filter removes fine dust. Dust buildup conditions can be monitored through front panel of analyzer.
⑧	Flowmeter	Adjusts and monitors sample gas flow rate.
⑨	Standard gas	Used for zero/span calibration. Zero, NO, SO <sub>2</sub> , CO, CO <sub>2</sub> , and O <sub>2</sub> gas cylinders.
⑩	Zirconia O <sub>2</sub> sensor	Not required when built-in type is used. Installed externally. Measures O <sub>2</sub> concentration (0 to 25%) of sample gas.
⑪	NO <sub>2</sub> /NO converter	Required for NO <sub>x</sub> measurement. Converts NO <sub>2</sub> to NO gas efficiently using special catalyst.

For each sampling component, consult with Yokogawa.

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## MODEL AND SUFFIX CODES

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Model	Suffix code	Option code	Description			
IR400			Infrared gas analyzer 19-inch rack mounting type with slide rail			
Measurable component (note 8)	-A -B -C -D -F -G -H -J -K -L		1st	2nd	3rd	4th
			NO SO <sub>2</sub> CO <sub>2</sub> CO CH <sub>4</sub> NO NO CO <sub>2</sub> NO NO	SO <sub>2</sub> CO CO SO <sub>2</sub> SO <sub>2</sub>	CO CO <sub>2</sub>	CO
O <sub>2</sub> Analyzer	N 1 2 3		Without O <sub>2</sub> analyzer			
			External zirconia type O <sub>2</sub> sensor (purchase separately: ZX8D) (note 10)			
			External O <sub>2</sub> analyzer (note 1) Built-in paramagnetic type O <sub>2</sub> sensor			
1st Component 1st Range (note 2)	V		0-20 ppm (note 3)			
	A		0-50 ppm			
	B		0-100 ppm			
	C		0-200 ppm			
	D		0-250 ppm			
	W		0-300 ppm			
	E		0-500 ppm			
	F		0-1000 ppm			
	G		0-2000 ppm			
	H		0-5000 ppm			
	J		0-1%			
	K		0-2%			
	L		0-3%			
	M		0-5%			
	P		0-10%			
	Q		0-20%			
	R		0-40%			
S		0-50%				
T		0-70%				
U		0-100%				
1st Component 2nd Range (note 2)	A		0-50 ppm			
	B		0-100 ppm			
	C		0-200 ppm			
	D		0-250 ppm			
	W		0-300 ppm			
	E		0-500 ppm			
	F		0-1000 ppm			
	G		0-2000 ppm			
	H		0-5000 ppm			
	J		0-1%			
	K		0-2%			
	L		0-3%			
	M		0-5%			
	P		0-10%			
	Q		0-20%			
	R		0-40%			
	S		0-50%			
T		0-70%				
U		0-100%				
N		Not available				
2nd Component 1st Range (note 2)	A		0-50 ppm			
	B		0-100 ppm			
	C		0-200 ppm			
	D		0-250 ppm			
	W		0-300 ppm			
	E		0-500 ppm			
	F		0-1000 ppm			
	G		0-2000 ppm			
	H		0-5000 ppm			
	J		0-1%			
	K		0-2%			
	L		0-3%			
	M		0-5%			
	P		0-10%			
	Q		0-20%			
	R		0-40%			
	S		0-50%			
T		0-70%				
U		0-100%				
N		Not available				

To be continued.

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## MODEL AND SUFFIX CODES

Model	Suffix code	Option code	Description
IR400			Infrared gas analyzer 19-inch rack mounting type with slide rail
2nd Component 2nd Range (note 2)	B C D W E F G H J K L M P Q R S T U N		0-100 ppm 0-200 ppm 0-250 ppm 0-300 ppm 0-500 ppm 0-1000 ppm 0-2000 ppm 0-5000 ppm 0-1% 0-2% 0-3% 0-5% 0-10% 0-20% 0-40% 0-50% 0-70% 0-100% Not Available
3rd Component 1st Range (note 2)	A B C D W E F G H J K L M P Q R S T U N		0-50 ppm 0-100 ppm 0-200 ppm 0-250 ppm 0-300 ppm 0-500 ppm 0-1000 ppm 0-2000 ppm 0-5000 ppm 0-1% 0-2% 0-3% 0-5% 0-10% 0-20% 0-40% 0-50% 0-70% 0-100% Not Available
3rd Component 2nd Range (note 2)	B C D W E F G H J K L M P Q R S T U N		0-100 ppm 0-200 ppm 0-250 ppm 0-300 ppm 0-500 ppm 0-1000 ppm 0-2000 ppm 0-5000 ppm 0-1% 0-2% 0-3% 0-5% 0-10% 0-20% 0-40% 0-50% 0-70% 0-100% Not Available
4th Component 1st Range (note 2)	A B C D W E F G H J K L M P Q R S T U N		0-50 ppm 0-100 ppm 0-200 ppm 0-250 ppm 0-300 ppm 0-500 ppm 0-1000 ppm 0-2000 ppm 0-5000 ppm 0-1% 0-2% 0-3% 0-5% 0-10% 0-20% 0-40% 0-50% 0-70% 0-100% Not Available

To be continued.

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## MODEL AND SUFFIX CODES

Model	Suffix code	Option code	Description
IR400			Infrared gas analyzer 19-inch rack mounting type with slide rail
4th Component 2nd Range (note 2)	B C D W E F G H J K L M P Q R S T U N		0-100 ppm 0-200 ppm 0-250 ppm 0-300 ppm 0-500 ppm 0-1000 ppm 0-2000 ppm 0-5000 ppm 0-1% 0-2% 0-3% 0-5% 0-10% 0-20% 0-40% 0-50% 0-70% 0-100% Not available
O <sub>2</sub> Analyzer 1st Range (note 2)	1 2 3 N		0-5% 0-10% 0-25% Not available
O <sub>2</sub> Analyzer 2nd Range (note 2)	2 3 N		0-10% 0-25% Not available
Output	-4 -1		4-20 mA DC, non-isolation 0-1 V DC, non-isolation
Piping	R T		Rc 1/4 1/4 NPT
Indication, Power Cable (note 7)	J E U		Japanese, Power Cable; rated voltage 125 V AC English, Power Cable; rated voltage 125 V AC (UL) English, Power Cable; rated voltage 250 V AC (CEE)
Option	O <sub>2</sub> correction and O <sub>2</sub> average (note 4)  Communication Internal purge (note 5) Relay board (note 6)	/K /A /C /P /R	With O <sub>2</sub> correction and O <sub>2</sub> average value With peak count alarm (note 4) RS2232C (note 9) Analyzer internal purging With dedicated cable

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### Footnotes:

- 1: A signal from the external O<sub>2</sub> analyzer should be 0-1 V DC linear to full scale.
- 2: Possible combinations of ranges are specified in separate tables.
- 3: Only available for CO<sub>2</sub> measurement. Option code "/P," Analyzer internal purging, must be specified.
- 4: O<sub>2</sub> correction is available only for NO, CO, and SO<sub>2</sub>. Both average value output after O<sub>2</sub> correction and average O<sub>2</sub> value output are provided at the same time.  
A peak count alarm can be provided only for CO measurement.
- 5: When internal purging is specified with 3- or 4-component analyzers, only one set of gas inlet/outlet can be used and thus NO<sub>2</sub>/NO converter cannot be connected between two measurement sections.
- 6: Should be specified when using a solenoid valve for automatic calibration.
- 7: Suffix Codes "E" and "U" are power cables with different voltage rating and plug type. Select appropriate code according to the operating power supply voltage to be used in the field.  
Suffix Code "E" is of the North American plug type and "U" of the European type.
- 8: For NO<sub>x</sub> measurement, a NO<sub>2</sub>/NO converter (P/N K9350LE or K9350LF) should be purchased separately.
- 9: Should be specified when using Modbus™ communication.
- 10: ZX8D style D is specified for CE marking.

## Measurable components and ranges – availability check table –

Table 1. Single-component analyzer (NO, SO<sub>2</sub>, CO<sub>2</sub>, CO, CH<sub>4</sub>)

2nd range 1st range	A	B	C	D	W	E	F	G	H	J
	0-50ppm	0-100ppm	0-200ppm	0-250ppm	0-300ppm	0-500ppm	0-1000ppm	0-2000ppm	0-5000ppm	0-1%
V 0-20ppm	⊙	⊙	⊙	⊙	⊙	⊙	—	—	—	—
A 0-50ppm	—	★□⊙○	★□⊙○	★□⊙○	★□⊙○	★□⊙○	★□⊙○	★□⊙○	—	—
B 0-100ppm	—	—	★□⊙○	★□⊙○	★□⊙○	★□⊙○	★□⊙○	★□⊙○	—	—
C 0-200ppm	—	—	—	★□⊙○△	★□⊙○△	★□⊙○△	★□⊙○△	★□⊙○△	★□⊙○△	—
D 0-250ppm	—	—	—	—	—	—	★□⊙○△	★□⊙○△	★□⊙○△	—
W 0-300ppm	—	—	—	—	—	—	★□⊙○△	★□⊙○△	★□⊙○△	—
E 0-500ppm	—	—	—	—	—	—	★□⊙○△	★□⊙○△	★□⊙○△	□⊙○△
F 0-1000ppm	—	—	—	—	—	—	—	★□⊙○△	★□⊙○△	□⊙○△
G 0-2000ppm	—	—	—	—	—	—	—	—	★□⊙○△	□⊙○△
H 0-5000ppm	—	—	—	—	—	—	—	—	—	□⊙○△
J 0-1%	—	—	—	—	—	—	—	—	—	—
K 0-2%	—	—	—	—	—	—	—	—	—	—
L 0-3%	—	—	—	—	—	—	—	—	—	—
M 0-5%	—	—	—	—	—	—	—	—	—	—
P 0-10%	—	—	—	—	—	—	—	—	—	—
Q 0-20%	—	—	—	—	—	—	—	—	—	—
R 0-40%	—	—	—	—	—	—	—	—	—	—
S 0-50%	—	—	—	—	—	—	—	—	—	—
T 0-70%	—	—	—	—	—	—	—	—	—	—
U 0-100%	—	—	—	—	—	—	—	—	—	—

T03-1.ai

2nd range 1st range	K	L	M	P	Q	R	S	T	U
	0-2%	0-3%	0-5%	0-10%	0-20%	0-40%	0-50%	0-70%	0-100%
V 0-20ppm	—	—	—	—	—	—	—	—	—
A 0-50ppm	—	—	—	—	—	—	—	—	—
B 0-100ppm	—	—	—	—	—	—	—	—	—
C 0-200ppm	—	—	—	—	—	—	—	—	—
D 0-250ppm	—	—	—	—	—	—	—	—	—
W 0-300ppm	—	—	—	—	—	—	—	—	—
E 0-500ppm	—	—	—	—	—	—	—	—	—
F 0-1000ppm	□⊙○△	—	—	—	—	—	—	—	—
G 0-2000ppm	□⊙○△	□⊙○△	—	—	—	—	—	—	—
H 0-5000ppm	□⊙○△	□⊙○△	□⊙○△	□⊙○△	—	—	—	—	—
J 0-1%	□⊙○△	□⊙○△	□⊙○△	□⊙○△	⊙○△	—	—	—	—
K 0-2%	—	□⊙○△	□⊙○△	□⊙○△	⊙○△	⊙○△	—	—	—
L 0-3%	—	—	□⊙○△	□⊙○△	⊙○△	⊙○△	⊙○△	—	—
M 0-5%	—	—	—	□⊙○△	⊙○△	⊙○△	⊙○△	⊙○△	⊙○△
P 0-10%	—	—	—	—	⊙○△	⊙○△	⊙○△	⊙○△	⊙○△
Q 0-20%	—	—	—	—	—	⊙○△	⊙○△	⊙○△	⊙○△
R 0-40%	—	—	—	—	—	—	⊙○△	⊙○△	⊙○△
S 0-50%	—	—	—	—	—	—	—	⊙○△	⊙○△
T 0-70%	—	—	—	—	—	—	—	—	⊙○△
U 0-100%	—	—	—	—	—	—	—	—	⊙○△

⊙:CO<sub>2</sub> analyzer measurable range    ○:CO analyzer measurable range    △:CH<sub>4</sub> analyzer measurable range  
 □:SO<sub>2</sub> analyzer measurable range    ★:NO analyzer measurable range

T03-2.ai

**Table 2. Two-component analyzer (NO and SO<sub>2</sub>)**

1st component ↓ (NO), 1st range		2nd component (SO <sub>2</sub> ), 1st range → SO <sub>2</sub>								
		A 0-50ppm	B 0-100ppm	C 0-200ppm	D 0-250ppm	W 0-300ppm	E 0-500ppm	F 0-1000ppm	G 0-2000ppm	H 0-5000ppm
NO	A 0-50ppm	○ <sup>1</sup>	○ <sup>2</sup>	○ <sup>2</sup>	○ <sup>2</sup>	○ <sup>2</sup>	○ <sup>2</sup>	○ <sup>2</sup>	○ <sup>2</sup>	—
	B 0-100ppm	○ <sup>3</sup>	○ <sup>4</sup>	○ <sup>4</sup>	○ <sup>4</sup>	○ <sup>4</sup>	○ <sup>4</sup>	○ <sup>4</sup>	○ <sup>4</sup>	—
	C 0-200ppm	○ <sup>3</sup>	○ <sup>4</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>
	D 0-250ppm	○ <sup>3</sup>	○ <sup>4</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>
	W 0-300ppm	○ <sup>3</sup>	○ <sup>4</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>
	E 0-500ppm	○ <sup>3</sup>	○ <sup>4</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>
	F 0-1000ppm	○ <sup>3</sup>	○ <sup>4</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>
	G 0-2000ppm	○ <sup>3</sup>	○ <sup>4</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>
	H 0-5000ppm	—	—	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>	○ <sup>5</sup>

○: Double components measurable range. 1st component ; NO, 2nd component ; SO<sub>2</sub>. T04.EPS

- 1st range (low range) must meet the combination in above table.  
 \*1. 2nd range of both NO and SO<sub>2</sub> measurements are available up to 1000 ppm.  
 \*2. 2nd range of NO and SO<sub>2</sub> measurements are available up to 1000 ppm and 2000 ppm, respectively.  
 \*3. 2nd range of NO and SO<sub>2</sub> measurements are available up to 2000 ppm and 1000 ppm, respectively.  
 \*4. 2nd range of both NO and SO<sub>2</sub> are available up to 2000 ppm.  
 \*5. 2nd range of both NO and SO<sub>2</sub> are available up to 5000 ppm.

**Table 3. Two-component analyzer (NO and CO)**

Both NO and CO analyzer must meet the range in Table 1; Single component analyzer.

**Table 4. Two-component analyzer (CO<sub>2</sub> and CO)**

1st component ↓ (CO <sub>2</sub> ), 1st range		2nd component (CO), 1st range → CO									
		A 0-50ppm	B 0-100ppm	C 0-200ppm	D 0-250ppm	W 0-300ppm	E 0-500ppm	F 0-1000ppm	G 0-2000ppm	H 0-5000ppm	J 0-1%
CO <sub>2</sub>	A 0-50ppm	○	○	○							
	B 0-100ppm	○	○	○	○	○	○				
	C 0-200ppm	○	○	○	○	○	○				
	D 0-250ppm						○				
	W 0-300ppm						○				
	E 0-500ppm						○	○			
	F 0-1000ppm							○			
	G 0-2000ppm		□ × 2.5	□ × 2.5	□ × 2.5	□ × 2.5	□ × 5	□ × 10	□ × 10	○	○
	H 0-5000ppm		□ × 1	□ × 1	□ × 1	□ × 1	□ × 2	□ × 4	□ × 4	○	○
	J 0-1%						□ × 1	□ × 2	□ × 2	□ × 10	○
	K 0-2%							□ × 1	□ × 1	□ × 5	□ × 10
	L 0-5%									□ × 2	□ × 5
	M 0-10%	□ × 2	□ × 2	□ × 2	□ × 2	□ × 2	□ × 2	△ × 2 × 10	△ × 2 × 5	□ × 2	□ × 5
	N 0-20%	□ × 1	□ × 1	□ × 1	□ × 1	□ × 1	□ × 1	△ × 1 × 10	△ × 1 × 5	□ × 1	□ × 2.5

○□△: Double components measurable. 1st component ; CO<sub>2</sub>, 2nd component ; CO. IR400ble.ai

- Note: 1st range (low range) must meet the combination in above table. (For 0-200 ppm range, measurement is available up to 25 times.)  
 2nd range, ○ is specified; both CO<sub>2</sub> and CO measurements are available up to 20 times of the 1st range.  
 □ is specified; CO measurement is available up to 20 times of the 1st range.  
 CO<sub>2</sub> measurement is available up to the ratio written after the □ mark.  
 △ is specified; both CO<sub>2</sub> and CO measurements are available up to ratio written after the △ mark.  
 The ratio, first value is for CO<sub>2</sub>, second value is for CO.  
 example: △ × 2 × 5 means, 2nd range of CO<sub>2</sub> is available up to double of 1st range, 2nd range of CO is available up to 5 times of 1st range.  
 × 1 means only 1st range.

**Table 5. Three-component analyzer (NO + SO<sub>2</sub> + CO)**

See Table 2 for NO + SO<sub>2</sub> measurement of three-component analyzer (NO + SO<sub>2</sub> + CO). See Table 1 for CO measurement.

**Table 6. Four-component analyzer (NO + SO<sub>2</sub> + CO<sub>2</sub> + CO)**

See Table 2 for NO + SO<sub>2</sub> measurement and Table 4 for CO<sub>2</sub> + CO measurement.

**Table 7. O<sub>2</sub> analyzer**

1st range \ 2nd range		2	3
		0-10%	0-25%
1	0-5%	○△	○△
2	0-10%	—	○△
3	0-25%	—	○△

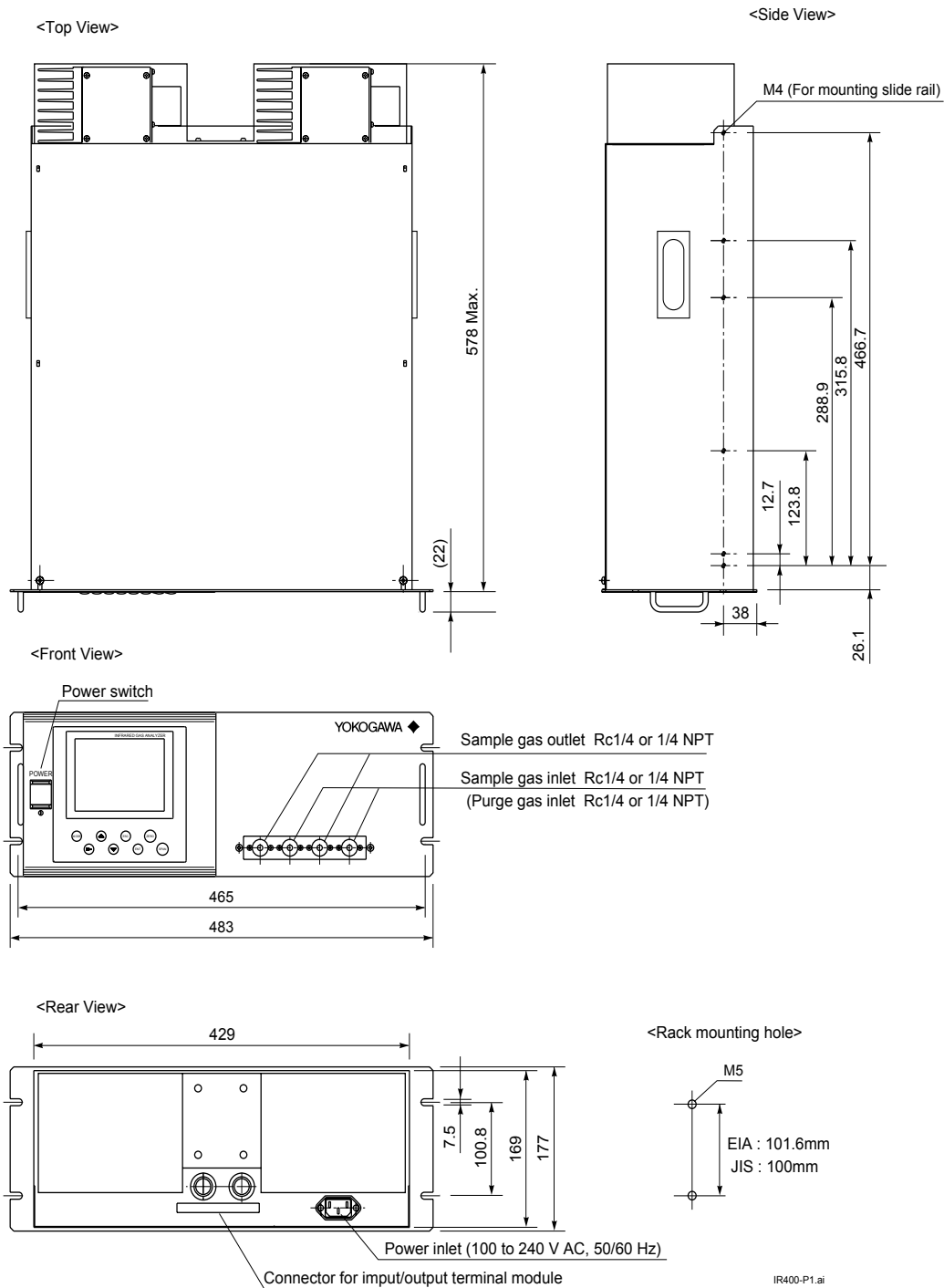
○: Built-in O<sub>2</sub> analyzer measurable range  
 △: External zirconia type O<sub>2</sub> analyzer (in this case, Yokogawa's ZX8D) measurable range

\*O<sub>2</sub> analyzer is selectable independently of combination with other components.

## EXTERNAL DIMENSIONS

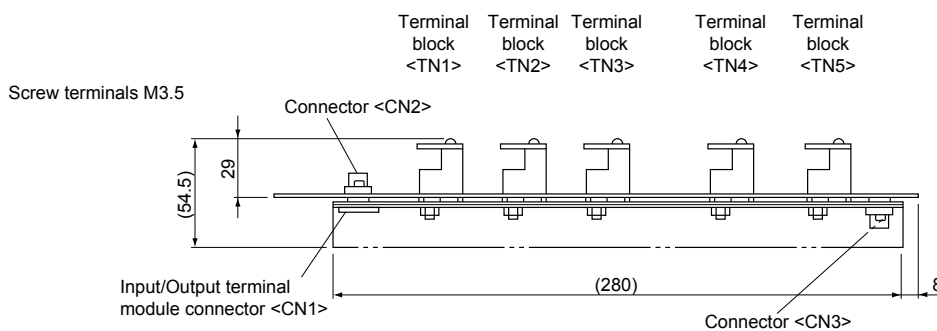
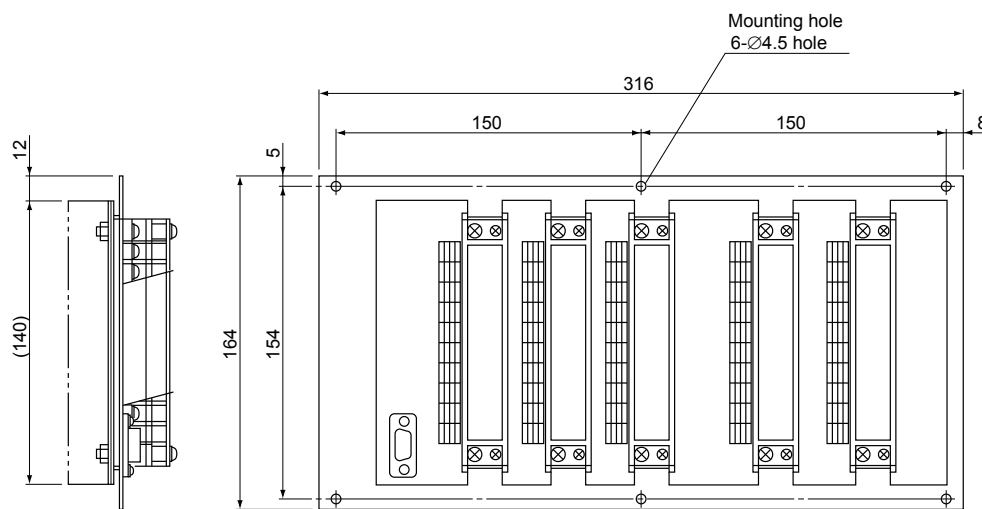
Analyzer Main Unit

Unit: mm

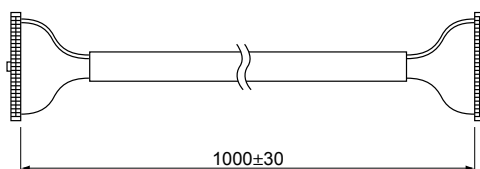


Input/Output Terminal Module: K9218SC (Accessory)

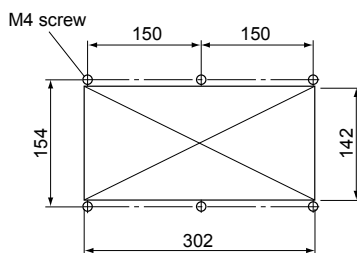
Unit: mm



Cable for Connecting Input/Output Terminal: K9218SD (Accessory)



Dimensions for Mounting Input/Output Terminal Module



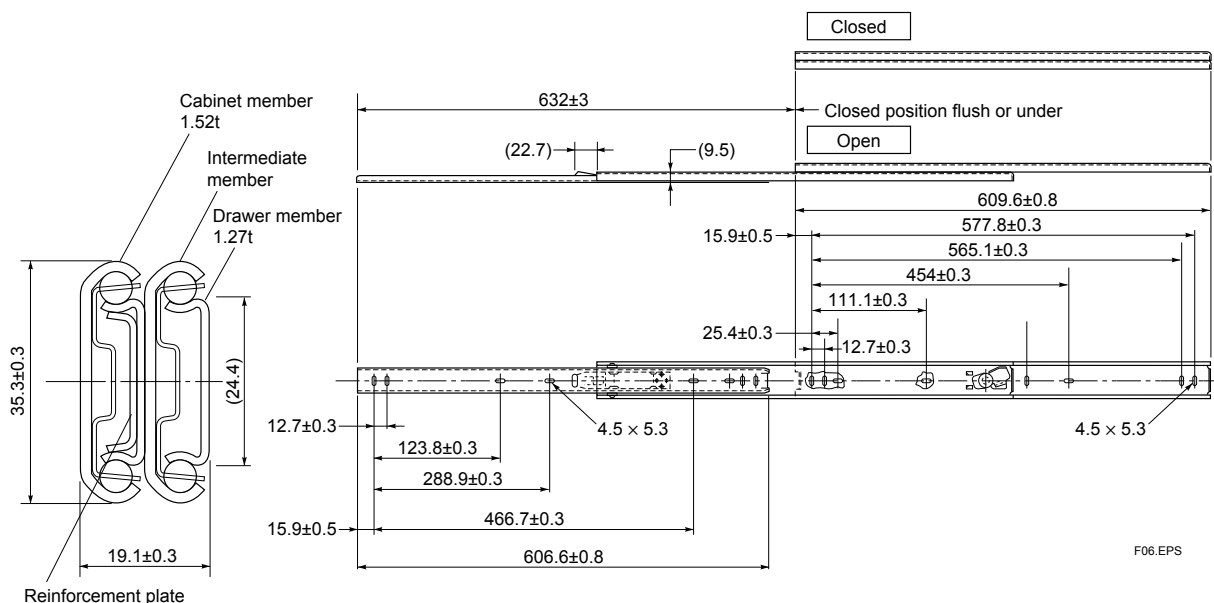
Cut M4 screw holes at 6 positions.  
Drill a rectangular hole of 302 x 142 mm or more in the center.

F05.ai

**EXTERNAL DIMENSIONS OF ACCESSORY SLIDE RAIL**

Unit: mm

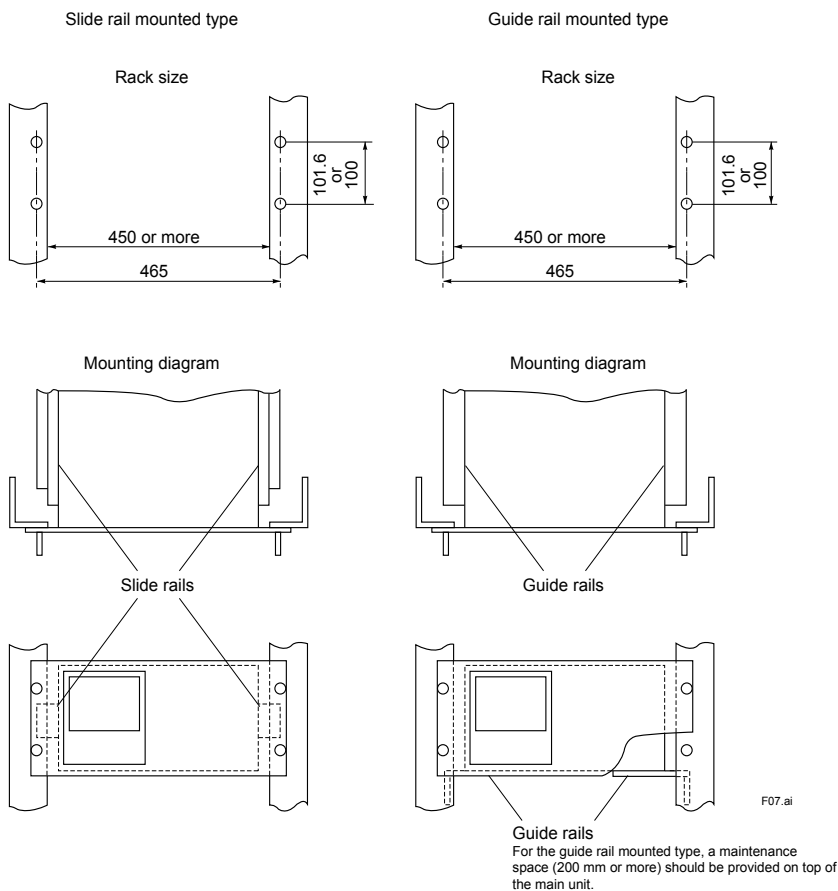
Model: 305A-24/Accuride International Inc.



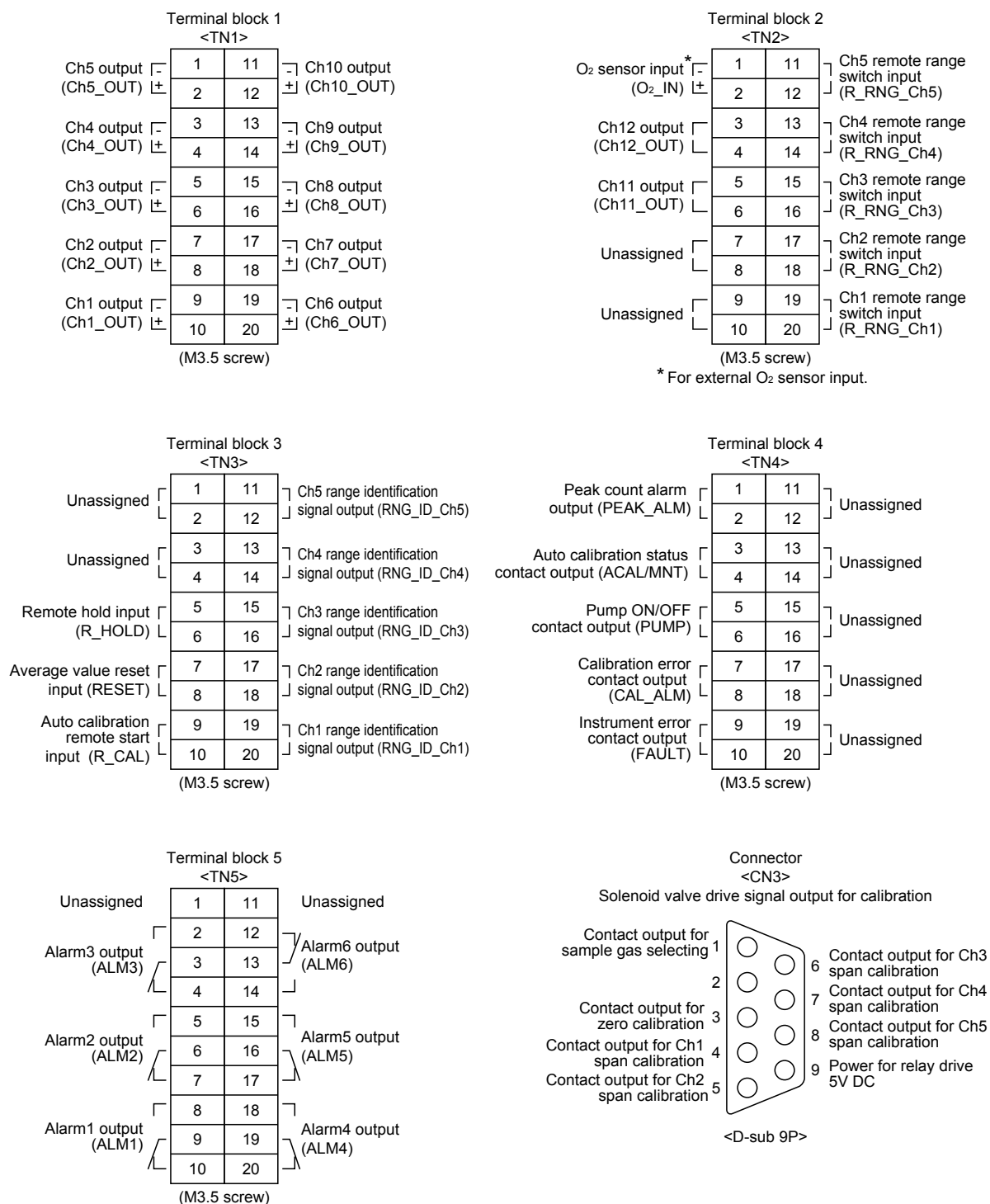
**19-inch rack mounting method:**

The instrument weight should be supported at the bottom of the unit (or the side of the unit when mounted with the slide rails).

For easy maintenance, it is recommended to select the method to allow withdrawing along the slide rail.



## EXTERNAL CONNECTION DIAGRAM



F08.EPS

**Table 8. Measurable Components and Their Corresponding Channel Numbers**

Suffix/Option Code			Output and Corresponding Channel											
Measurable component	O <sub>2</sub> analyzer	O <sub>2</sub> correction	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	CH11	CH12
-A	N	Not specified	NO											
-B	N	Not specified	SO <sub>2</sub>											
-C	N	Not specified	CO <sub>2</sub>											
-D	N	Not specified	CO											
-F	N	Not specified	CH <sub>4</sub>											
-G	N	Not specified	NO	SO <sub>2</sub>										
-H	N	Not specified	NO	CO										
-J	N	Not specified	CO <sub>2</sub>	CO										
-K	N	Not specified	NO	SO <sub>2</sub>	CO									
-L	N	Not specified	NO	SO <sub>2</sub>	CO <sub>2</sub>	CO								
-A	1, 2, 3	/K	NOx	O <sub>2</sub>	Correct NOx	Correct NOx av.	O <sub>2</sub> av.							
-B	1, 2, 3	/K	SO <sub>2</sub>	O <sub>2</sub>	Correct SO <sub>2</sub>	Correct SO <sub>2</sub> av.	O <sub>2</sub> av.							
-D	1, 2, 3	/K	CO	O <sub>2</sub>	Correct CO	Correct CO av.	O <sub>2</sub> av.							
-F	1, 2, 3	/K	CH <sub>4</sub>	O <sub>2</sub>	O <sub>2</sub> av.									
-G	1, 2, 3	/K	NOx	SO <sub>2</sub>	O <sub>2</sub>	Correct NOx av.	Correct SO <sub>2</sub>	Correct NOx av.	Correct SO <sub>2</sub> av.	O <sub>2</sub> av.				
-H	1, 2, 3	/K	NOx	CO	O <sub>2</sub>	Correct NOx	Correct CO	Correct NOx av.	Correct CO av.	O <sub>2</sub> av.				
-J	1, 2, 3	/K	CO <sub>2</sub>	CO	O <sub>2</sub>	Correct CO <sub>2</sub> av.	Correct CO av.	O <sub>2</sub> av.						
-K	1, 2, 3	/K	NOx	SO <sub>2</sub>	CO	O <sub>2</sub>	Correct NOx	Correct SO <sub>2</sub>	Correct CO	Correct NOx av.	Correct SO <sub>2</sub> av.	Correct CO av.	O <sub>2</sub> av.	
-L	1, 2, 3	/K	NOx	SO <sub>2</sub>	CO <sub>2</sub>	CO	O <sub>2</sub>	Correct NOx	Correct SO <sub>2</sub>	Correct CO	Correct NOx av.	Correct SO <sub>2</sub> av.	Correct CO av.	O <sub>2</sub> av.
-D	1, 2, 3	except /K	CO	O <sub>2</sub>										
-H	1, 2, 3	except /K	NO	CO	O <sub>2</sub>									
-J	1, 2, 3	except /K	CO <sub>2</sub>	CO	O <sub>2</sub>									
-K	1, 2, 3	except /K	NO	SO <sub>2</sub>	CO	O <sub>2</sub>								
-L	1, 2, 3	except /K	NO	SO <sub>2</sub>	CO <sub>2</sub>	CO	O <sub>2</sub>							

□ : No measurement in this area is displayed as NOx.

Notes: Peak count alarm is a contact out put.

\*Correct XX\* means an instantaneous XX value after O<sub>2</sub> correction, \*Correct XX av.\* an average XX value after O<sub>2</sub> correction, and O<sub>2</sub> av.\* an average O<sub>2</sub> value.

T08.EPS

**STANDARD ACCESSORIES**

Name	Part Number	Description	Qty
Power cable	K9218SA	standard inlet type (2.5 m)	1
Fuse	K9218SB	replacement fuse (250 V AC, 3.15 A, delay type) ×1	2
Input/output terminal module	K9218SC	External terminal module	1
Cable	K9218SD	Connection cable between main unit and input/output terminal module (1 m)	1
Slide rail	K9218SE	Slide rail	2

T09.EPS

Note: Quantity in this is number of accessories supplied as standard. For instance, two K9218SE parts, i.e., two slide rails, are supplied as standard. When ordering separately, the required number of should be considered.

**Dedicated Zirconia O<sub>2</sub> Sensor (to be purchased separately)**

For O<sub>2</sub> correction, the IR400 can accept linearized 0 to 1 V DC signal coming from an analyzer calibrated to 0 to 25% O<sub>2</sub> of full scale. Dedicated zirconia O<sub>2</sub> sensor, Model ZX8D, is available from Yokogawa.

Measuring method: Zirconia system

Measurable component and measuring range:

Measurable component	Minimum range	Maximum range
Oxygen (O <sub>2</sub> )	0-5 vol%	0-25 vol%

T11.EPS

Repeatability: Within ± 0.5% of full scale

Linearity: Within ± 1% of full scale

Zero drift: Within ± 1% of full scale/week

Span drift: Within ± 2% of full scale/week

Response time: Approx. 20 seconds (for 90% response)

Measured gas flow rate: 0.5 ± 0.25 L/min

Remark: The Zirconia system, due to its principle, may produce a measuring error due to relative concentration versus the combustible O<sub>2</sub> gas concentration. Also, a corrosive gas (SO<sub>2</sub> of 250 ppm or more, etc.) may affect the life of the sensor.

Gas inlet/outlet size: Rc1/4

Power supply: 90 to 126 V AC or 200 to 240 V AC, 50/60 Hz

Enclosure: Steel casing, for indoor application

Indication: Temperature indication (LED)

Temperature alarm output:

Contact output 1a contact,  
Contact capacity 220 V AC, 1 A  
(resistive load)

Safety and EMC conforming standards:

Installation altitude: 2000 m or less

Pollution degree; 2 (Note)

Installation category; II (Note)

Note: Installation category, called over-

voltage category, specifies impulse with standing voltage. Category II is for electrical equipment. Pollution degree indicates the degree of existence of solid, liquid, gas or other inclusions which reduce dielectric strength.

Degree 2 is the normal indoor environment.

Safety; EN61010-1

EMC ; EN61326-1 Class A, Table 2 (For use in industrial locations), EN61326-2-3, EN61000-3-2, EN61000-3-3  
EMC Regulatory Arrangement in Australia and New Zealand

Note: The product mounted in a steel enclosure conforms to the requirements of EMC directive.



The 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.

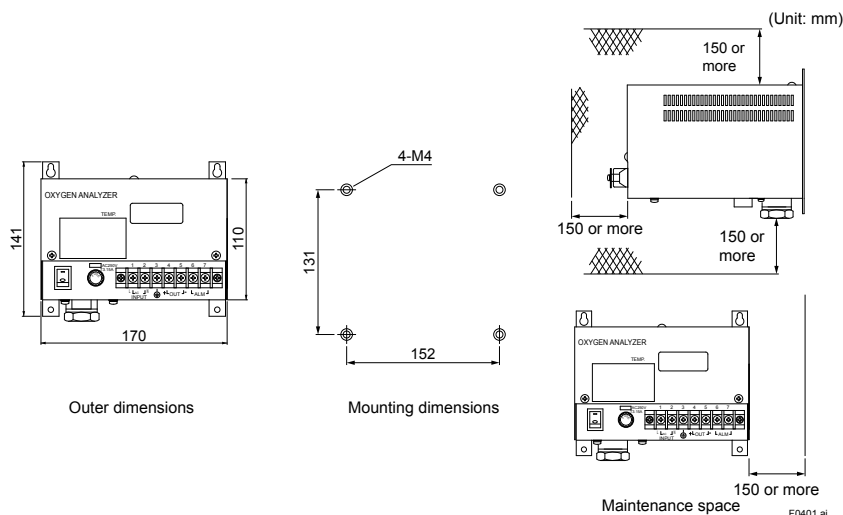


Dimensions (H × W × D): 140 × 170 × 190 mm  
 Weight: Approx. 3 kg  
 Finish color: Munsell 5Y 7/1

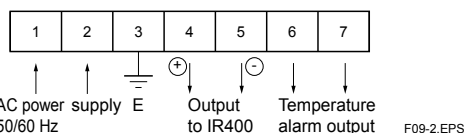
Model	Suffix code	Option code	Description
ZX8D	-----	-----	Dedicated zirconia O <sub>2</sub> sensor
Power supply	-5	-----	90–126 V AC, 50/60 Hz
	-3	-----	200–240 V AC, 50/60 Hz
Style code	*C	-----	Non-CE conformity
	*D	-----	CE conformity

T13.EPS

### External Dimensions of ZX8D



### External Connection Diagram



### Dedicated relay board (Option code: /R)

This relay board receives signals from connector CN3 of the IR400 I/O terminal module and activates the calibration solenoid valve directly.

- Relay contact : 1 normally closed contact, contact capacity; 250 V AC/2 A (resistive load)

#### Part Numbers

Item	Part No.	Description	Qty
Relay board	K9218SF	For external contact point	1
Cable	K9218SG	For relay board	1

T10.EPS

### Contact action

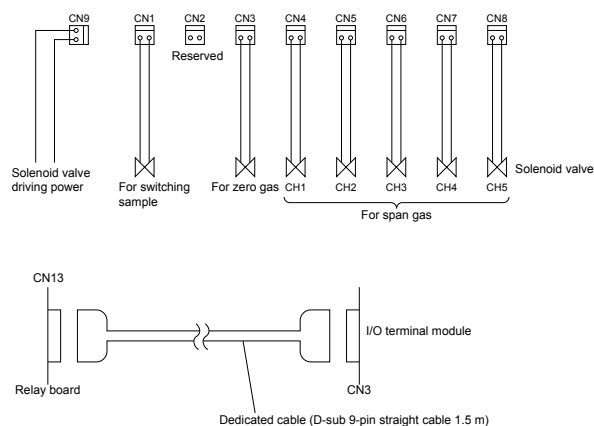
- During measurement: CN1; ON  
Others; OFF
- During calibration: CN1; OFF  
Others; Contact corresponding to calibration timing is ON

### Recommended Connector

- CN1 to CN9: Housing; VHR-2N (Japan Solderless Terminals (JST))  
Contact; SVH-21T-1.1 (Japan Solderless Terminals (JST))

### External Dimensions

#### Connections



F11.EPS

## NO<sub>2</sub>/NO Converter

Part number: K9350LE (Non-CE conformity)  
K9350LF (CE conformity)

Mounting: Indoor surface mounting

Target Gases: General boiler exhaust gas,  
atmosphere

Catalyst: Amount; 2 cm<sup>3</sup>  
Replacement cycle; Approx. 8 months  
(at flow rate of 0.5 L/min with 5% O<sub>2</sub>,  
10 ppm NO<sub>2</sub>)  
Temperature set-point; 220 ±10°C  
(Sensing tip: K thermocouple)

Wetted materials: Ceramic, Viton, glass filter,  
SUS316

Conversion efficiency: 90% or higher, conforms to  
JIS

Gas Flow Rate: 0.5 L/min

Ambient Temperature: -5 to 45°C

Power Supply: 100 V AC, 50/60 Hz (K9350LE)  
100 to 240 V AC, 50/60 Hz (K9350LF)

Weight: Approx. 1.1 kg (K9350LE)  
Approx. 1.2 kg (K9350LF)

Sample gas requirements:  
Dust/drain removed, gas temperature at  
150°C or less

### One-year-Use Spare Parts

Item	Part No.	Qty
Catalyst for NO <sub>2</sub> /NO converter	K9350LP	2
Glass wool for NO <sub>2</sub> /NO converter	K9350LQ	2
Fitting for NO <sub>2</sub> /NO converter	K9350LV	2

T15.eps

### Safety conforming standards:

Installation altitude: 2000 m or less

Pollution degree; 2 (Note)

Installation category; II (Note)

Note: Installation category, called over-voltage category, specifies impulse with standing voltage. Category II is for electrical equipment. Pollution degree indicates the degree of existence of solid, liquid, gas or other inclusions which reduce dielectric strength.

Degree 2 is the normal indoor environment.

Safety; EN61010-1

EMC ; EN61326-1 Class A, Table 2 (For use in industrial locations), EN61326-2-3, EN61000-3-2, EN61000-3-3  
EMC Regulatory Arrangement in Australia and New Zealand

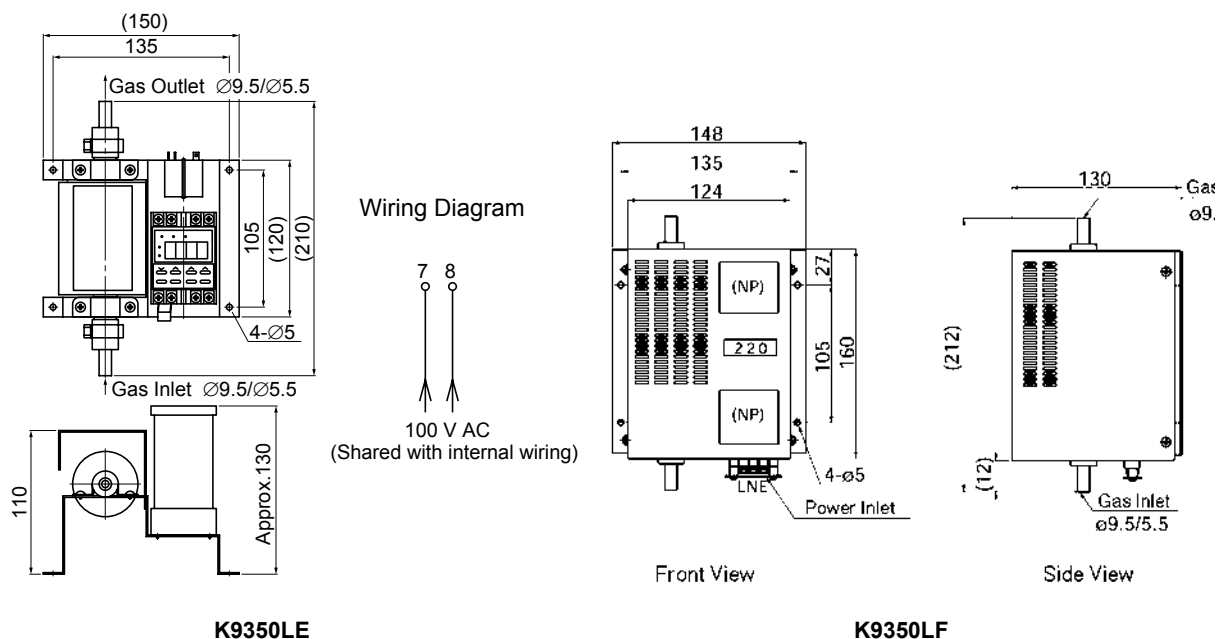
Note: The product mounted in a steel enclosure conforms to the requirements of EMC directive.

## CAUTION

The 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.

Unit: mm

## External Dimensions



## Inquiry Sheet for IR400 NDIR Type Infrared Gas Analyzer

Place a checkmark ✓ in the appropriate box and fill in the specific information in the blanks for your reference.

### 1. General Information

Company: \_\_\_\_\_ Delivery destination: \_\_\_\_\_  
 Responsible person: \_\_\_\_\_ Section: \_\_\_\_\_ (Phone No. \_\_\_\_\_)  
 Plant name: \_\_\_\_\_ Measurement location: \_\_\_\_\_  
 Purpose:  Indication reading,  Recording,  Alarm,  Control

### 2. Requirements

Measurable component:

	1st	2nd	3rd	4th
<input type="checkbox"/>	NO			
<input type="checkbox"/>	SO <sub>2</sub>			
<input type="checkbox"/>	CO <sub>2</sub>			
<input type="checkbox"/>	CO			
<input type="checkbox"/>	CH <sub>4</sub>			
<input type="checkbox"/>	NO	SO <sub>2</sub>		
<input type="checkbox"/>	NO	CO		
<input type="checkbox"/>	CO <sub>2</sub>	CO		
<input type="checkbox"/>	NO	SO <sub>2</sub>	CO	
<input type="checkbox"/>	NO	SO <sub>2</sub>	CO <sub>2</sub>	CO

O<sub>2</sub> Analyzer:

- Without O<sub>2</sub> analyzer
- External zirconia type sensor (use ZX8D)
  - Style C (Non-CE conformity)
  - Style D (CE conformity)
- External O<sub>2</sub> analyzer
- Built-in paramagnetic type O<sub>2</sub> sensor

NO<sub>2</sub>/NO Converter

- With NO<sub>2</sub>/NO converter
  - K9350LE (non-CE conformity)
  - K9350LF (CE conformity)
- Without NO<sub>2</sub>/NO converter

Range:

1st component, 1st range range	1st component, 2nd range	2nd component, 1st range	2nd component, 2nd
<input type="checkbox"/> 0 – 20 ppm	<input type="checkbox"/> 0 – 50 ppm	<input type="checkbox"/> 0 – 50 ppm	<input type="checkbox"/> 0 – 100 ppm
<input type="checkbox"/> 0 – 50 ppm	<input type="checkbox"/> 0 – 100 ppm	<input type="checkbox"/> 0 – 100ppm	<input type="checkbox"/> 0 – 200 ppm
<input type="checkbox"/> 0 – 100 ppm	<input type="checkbox"/> 0 – 200 ppm	<input type="checkbox"/> 0 – 200 ppm	<input type="checkbox"/> 0 – 250 ppm
<input type="checkbox"/> 0 – 200 ppm	<input type="checkbox"/> 0 – 250 ppm	<input type="checkbox"/> 0 – 250 ppm	<input type="checkbox"/> 0 – 500 ppm
<input type="checkbox"/> 0 – 250 ppm	<input type="checkbox"/> 0 – 500 ppm	<input type="checkbox"/> 0 – 500 ppm	<input type="checkbox"/> 0 – 1000 ppm
<input type="checkbox"/> 0 – 500 ppm	<input type="checkbox"/> 0 – 1000 ppm	<input type="checkbox"/> 0 – 1000 ppm	<input type="checkbox"/> 0 – 2000 ppm
<input type="checkbox"/> 0 – 1000 ppm	<input type="checkbox"/> 0 – 2000 ppm	<input type="checkbox"/> 0 – 2000 ppm	<input type="checkbox"/> 0 – 5000 ppm
<input type="checkbox"/> 0 – 2000 ppm	<input type="checkbox"/> 0 – 5000 ppm	<input type="checkbox"/> 0 – 5000 ppm	<input type="checkbox"/> 0 – 1%
<input type="checkbox"/> 0 – 5000 ppm	<input type="checkbox"/> 0 – 1%	<input type="checkbox"/> 0 – 1%	<input type="checkbox"/> 0 – 2%
<input type="checkbox"/> 0 – 1%	<input type="checkbox"/> 0 – 2%	<input type="checkbox"/> 0 – 2%	<input type="checkbox"/> 0 – 3%
<input type="checkbox"/> 0 – 2%	<input type="checkbox"/> 0 – 3%	<input type="checkbox"/> 0 – 3%	<input type="checkbox"/> 0 – 5%
<input type="checkbox"/> 0 – 3%	<input type="checkbox"/> 0 – 5%	<input type="checkbox"/> 0 – 5%	<input type="checkbox"/> 0 – 10%
<input type="checkbox"/> 0 – 5%	<input type="checkbox"/> 0 – 10%	<input type="checkbox"/> 0 – 10%	<input type="checkbox"/> 0 – 20%
<input type="checkbox"/> 0 – 10%	<input type="checkbox"/> 0 – 20%	<input type="checkbox"/> 0 – 20%	<input type="checkbox"/> 0 – 40%
<input type="checkbox"/> 0 – 20%	<input type="checkbox"/> 0 – 40%	<input type="checkbox"/> 0 – 40%	<input type="checkbox"/> 0 – 50%
<input type="checkbox"/> 0 – 40%	<input type="checkbox"/> 0 – 50%	<input type="checkbox"/> 0 – 50%	<input type="checkbox"/> 0 – 70%
<input type="checkbox"/> 0 – 50%	<input type="checkbox"/> 0 – 70%	<input type="checkbox"/> 0 – 70%	<input type="checkbox"/> 0 – 100%
<input type="checkbox"/> 0 – 70%	<input type="checkbox"/> 0 – 100%	<input type="checkbox"/> 0 – 100%	<input type="checkbox"/> Not available
<input type="checkbox"/> 0 – 100%	<input type="checkbox"/> Not available	<input type="checkbox"/> Not available	

3rd component, 1st range	3rd component, 2nd range	4th component, 1st range	4th component, 2nd range
<input type="checkbox"/> 0 – 50 ppm	<input type="checkbox"/> 0 – 100 ppm	<input type="checkbox"/> 0 – 50 ppm	<input type="checkbox"/> 0 – 100 ppm
<input type="checkbox"/> 0 – 100 ppm	<input type="checkbox"/> 0 – 200 ppm	<input type="checkbox"/> 0 – 100 ppm	<input type="checkbox"/> 0 – 200 ppm
<input type="checkbox"/> 0 – 200 ppm	<input type="checkbox"/> 0 – 250 ppm	<input type="checkbox"/> 0 – 200 ppm	<input type="checkbox"/> 0 – 250 ppm
<input type="checkbox"/> 0 – 250 ppm	<input type="checkbox"/> 0 – 500 ppm	<input type="checkbox"/> 0 – 250 ppm	<input type="checkbox"/> 0 – 500 ppm
<input type="checkbox"/> 0 – 500 ppm	<input type="checkbox"/> 0 – 1000 ppm	<input type="checkbox"/> 0 – 500 ppm	<input type="checkbox"/> 0 – 1000 ppm
<input type="checkbox"/> 0 – 1000 ppm	<input type="checkbox"/> 0 – 2000 ppm	<input type="checkbox"/> 0 – 1000 ppm	<input type="checkbox"/> 0 – 2000 ppm
<input type="checkbox"/> 0 – 2000 ppm	<input type="checkbox"/> 0 – 5000 ppm	<input type="checkbox"/> 0 – 2000 ppm	<input type="checkbox"/> 0 – 5000 ppm
<input type="checkbox"/> 0 – 5000 ppm	<input type="checkbox"/> 0 – 1%	<input type="checkbox"/> 0 – 5000 ppm	<input type="checkbox"/> 0 – 1%
<input type="checkbox"/> 0 – 1%	<input type="checkbox"/> 0 – 2%	<input type="checkbox"/> 0 – 1%	<input type="checkbox"/> 0 – 2%
<input type="checkbox"/> 0 – 2%	<input type="checkbox"/> 0 – 3%	<input type="checkbox"/> 0 – 2%	<input type="checkbox"/> 0 – 3%
<input type="checkbox"/> 0 – 3%	<input type="checkbox"/> 0 – 5%	<input type="checkbox"/> 0 – 3%	<input type="checkbox"/> 0 – 5%
<input type="checkbox"/> 0 – 5%	<input type="checkbox"/> 0 – 10%	<input type="checkbox"/> 0 – 5%	<input type="checkbox"/> 0 – 10%
<input type="checkbox"/> 0 – 10%	<input type="checkbox"/> 0 – 20%	<input type="checkbox"/> 0 – 10%	<input type="checkbox"/> 0 – 20%
<input type="checkbox"/> 0 – 20%	<input type="checkbox"/> 0 – 40%	<input type="checkbox"/> 0 – 20%	<input type="checkbox"/> 0 – 40%
<input type="checkbox"/> 0 – 40%	<input type="checkbox"/> 0 – 50%	<input type="checkbox"/> 0 – 40%	<input type="checkbox"/> 0 – 50%
<input type="checkbox"/> 0 – 50%	<input type="checkbox"/> 0 – 70%	<input type="checkbox"/> 0 – 50%	<input type="checkbox"/> 0 – 70%
<input type="checkbox"/> 0 – 70%	<input type="checkbox"/> 0 – 100%	<input type="checkbox"/> 0 – 70%	<input type="checkbox"/> 0 – 100%
<input type="checkbox"/> 0 – 100%	<input type="checkbox"/> Not available	<input type="checkbox"/> 0 – 100%	<input type="checkbox"/> Not available
<input type="checkbox"/> Not available		<input type="checkbox"/> Not available	

O <sub>2</sub> Analyzer, 1st range	O <sub>2</sub> Analyzer, 2nd range
<input type="checkbox"/> 0 – 5%	<input type="checkbox"/> 0 – 10%
<input type="checkbox"/> 0 – 10%	<input type="checkbox"/> 0 – 25%
<input type="checkbox"/> 0 – 25%	<input type="checkbox"/> Not available
<input type="checkbox"/> Not available	

Output:	<input type="checkbox"/> 4 – 20 mA DC	<input type="checkbox"/> 0 – 1 V DC	<input type="checkbox"/> RS-232C
O <sub>2</sub> correction and O <sub>2</sub> average:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Peak count alarm:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Relay board:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	

### 3. Sample gas conditions

Fuel:  Gas,  Oil,  Coal,  Refuse,  Other fuel \_\_\_\_\_

(1) Temperature: \_\_\_\_\_ to \_\_\_\_\_, Normal temperature \_\_\_\_\_ [°C]

(2) Pressure: \_\_\_\_\_ to \_\_\_\_\_, Normal pressure \_\_\_\_\_ [MPa]

(3) Humidity: \_\_\_\_\_ [vol%]

(4) Dust: \_\_\_\_\_ [mg/Nm<sup>3</sup>]

(5) Corrosive gas:  Yes \_\_\_\_\_  No

Composition (Detailed composition of sample gas should be provided. This is important for the purpose of knowing the effect of interference gases)

Contents	Concentration range			
		to	<input type="checkbox"/> %	<input type="checkbox"/> ppm
CO		to	<input type="checkbox"/> %	<input type="checkbox"/> ppm
CO <sub>2</sub>		to	<input type="checkbox"/> %	<input type="checkbox"/> ppm
CH <sub>4</sub>		to	<input type="checkbox"/> %	<input type="checkbox"/> ppm
H <sub>2</sub>		to	<input type="checkbox"/> %	<input type="checkbox"/> ppm
O <sub>2</sub>		to	<input type="checkbox"/> %	<input type="checkbox"/> ppm
N <sub>2</sub>		to	<input type="checkbox"/> %	<input type="checkbox"/> ppm
SO <sub>2</sub>		to	<input type="checkbox"/> %	<input type="checkbox"/> ppm
NO <sub>x</sub>		to	<input type="checkbox"/> %	<input type="checkbox"/> ppm
H <sub>2</sub> O		to	<input type="checkbox"/> %	<input type="checkbox"/> ppm