General Specifications

GS 11G02M01-01E

IR200
NDIR TYPE INFRARED GAS ANALYZER (4-COMPONENT ANALYZER)

The IR200 infrared gas analyzer is capable of measuring the concentrations of CO_2, CO, CH_4, SO_2, NO and O_2 components in sample gas.

CO_2, CO, CH_4, SO_2 and NO are measured by non-dispersive infrared method (NDIR), while O_2 is measured by paramagnetic or zirconia method. A maximum of 4 components including O_2 (up to 3 components except for O_2 measurement) are simultaneously measurable.

A high-sensitivity mass flow sensor is adopted in the detection unit for the infrared method. Due to use of single beam system for measurement, maintenance is easy and an excellent stability is ensured for a long period of time. In addition, the IR200 includes a microprocessor and has a large-size liquid crystal display, providing easy operation, high accuracy and multiple functions.

This analyzer is thus optimum for combustion control of various industrial furnaces, botanical study and global atmospheric research.

■ FEATURES

1. Simultaneous measurement of up to 4 components including O_2
   O_2 and 3 components selected from among CO_2, CO, CH_4, SO_2, and NO.
   The analyzer receives signal input from an external oxygen analyzer and displays the measured value.
2. Excellent long-term stability
   A unique optics system minimizes drift particularly due to contamination of measurement cell, ensuring excellent long-term stability.
3. Minimal interference from other gas components
   The dual cell type of transmission detector minimizes interference from other gas components.
4. Low maintenance
   Single beam system allows for simple measurement unit construction and requires no adjustment of optical balance, resulting in low maintenance.
5. Easy operation
   Large LCD provides easy interactive operation.
6. Extensive functions
   Highly precise zero/span calibration is achieved by simply pressing calibration keys. Automatic calibration is also available.
   Self-diagnostic function detects abnormality and displays an error massage.
   Other functions include remote range switching, range identification signal output, output signal hold, and upper/lower limit alarm.

■ SPECIFICATIONS

Measurement principle:
CO_2, CO, CH_4, SO_2, NO: Non-dispersive infrared method
Single light source-single beam
O_2: Paramagnetic type (built-in), or zirconia type (external)

Measurable gas components and measuring ranges:

Component \ Range	Minimum range	Maximum range
CO_2	0 – 500 ppm	0 – 100 vol%
CO	0 – 200 ppm	0 – 100 vol%
CH_4	0 – 1000 ppm	0 – 100 vol%
SO_2	0 – 500 ppm	0 – 5000 ppm
NO	0 – 500 ppm	0 – 5000 ppm
O_2 (paramagnetic)	0 – 5 vol%	0 – 100 vol%
O_2 (zirconia)	0 – 5 vol%	0 – 25 vol%

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- Measurement of up to 4 components including O_2.
- 1 or 2 measuring ranges per component.
- Measuring range ratio:
  ≤1:5 (except built-in paramagnetic O_2 analyzer)
  ≤1:20 (built-in paramagnetic O_2 analyzer)

For measurable components and possible combinations of measuring ranges, see pages 9 and 10.

Display: Digital, 4-digit LCD with CFL backlight
- Instantaneous value of each component
- Instantaneous value after O_2 correction (only in CO, SO_2, NO with O_2 measurement)
- Average value after O_2 correction (only in CO, SO_2, NO with O_2 measurement)
- Average O_2 value

Analog output signal:
4 to 20 mA DC or 0 to 1 V DC, non-isolated, 8 points max.
Analog output corresponds one-to-one with measured value indication.

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Permissible load resistance:
550 V max. for 4 to 20 mA DC
100 kΩ min. for 0 to 1 V DC
*See Table 9 on page 11 for channel numbers of displayed values and analog output signals.

Analog input signal:
For signal input from external O2 analyzer
Signal requirement:
(1) Signal from Yokogawa's zirconia O2 sensor
(Model ZX8D Style C)
(2) 0 to 1 V DC from an O2 sensor
Input section is not isolated. This feature is when built-in O_2 sensor is not used.
* External O2 sensor should be purchased separately.

Relay contact output:
1a contact (250 V AC/2 A, resistive load)
Instrument error, calibration error, range identification, auto calibration status, solenoid valve drive for auto calibration, pump ON/FF.
1c contact (250 V AC/2 A, resistive load)
Upper/lower alarm contact output.

Peak count alarm contact output.

* All relay contacts are isolated mutually and from the internal circuit.

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
Isolated from the internal circuit with a photocoupler. Contact inputs are not isolated from one another.
*Only M3.5 screw terminals are used for all signal inputs and outputs. Fordetails, see External Connection Diagram on page 14.

Power supply: Voltage rating; 100 to 240 V AC
Allowable range; 85 to 264 V AC
Frequency; 50/60 Hz
Power consumption; 70 VA max.
Inlet; Conform to EN60320
Protection Class 1

Operating conditions:
Ambient temperature; –5 to 45°C
Ambient humidity; 90% RH max., non-condensing

Storage conditions:
Ambient temperature; –20 to 60°C
Ambient humidity; 90% RH max., non-condensing

Dimensions (H × W × D):
19-inch rack mounting type;
177 × 483 × 493 mm (500 max.)

Weight: Approx. 10 kg

Finish color: Front panel; Off-white (Munsell 10Y7.5/0.5 or equivalent)
Casing; Steel-blue

Enclosure: Steel casing, for indoor use

Material of gas-contacting parts:
Gas inlet/outlet; SUS304
Sample cell; SUS304/neoprene rubber
Infrared-ray transmitting window; CaF_2
Internal tubing; Toaron tube

Gas inlet/outlet: Rc1/4 or 1/4NPT internal thread

Purge gas flow rate:
1 L/min (when required)

Installation altitude: 2000 m or less

Safety and EMC conforming standards:
Safety; EN61010-1
Pollution degree; 2
Installation category; II
EMC; EN61326:
EN61000-3-2
EN61000-3-3

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 by short-circuiting the remote output holding input terminals.
Holding is maintained while the terminals are short-circuited. Indication values will not be held.

Remote range changeover:
Measuring range can be changed according to an external signal when remote range changeover input is received.
Changeover is effective only when remote range setting is turned on. In this case, measuring range cannot be changed manually.
When the contact input terminals for each component are short-circuited, the first range is selected, and it is changed over to the second range when the terminals are open.

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 599 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 cyclic auto calibration.
Calibration starts by opening the auto calibration remote start input terminals after short-circuiting for 1.5 seconds or longer. Auto calibration is started when the contacts open.

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 599 seconds (in increments of 1 second)

Upper/lower limit alarm:
Alarm contact output turns on when the preset upper or lower limit alarm value is reached.
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_2 correction: Conversion of measured CO, SO_2 and NO gas concentrations into values at reference O_2 concentration.

$$\text{Correction formula: } C = \frac{21 - On}{21 - Os} \times Cs$$

Where:
C: Sample gas concentration after O_2 correction
Cs: Measured concentration of sample gas
Os: Measured O_2 concentration
On: Reference O_2 concentration (value changeable by setting)
* The upper limit value of the fractional part in this calculation is 4.
The result of calculation is indicated and output in an analog output signal.

Average value after O_2 correction and O_2 average value calculation:
The result of O_2 correction or instantaneous O_2 value can be output 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_2 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
Linearity: ±1% of full scale
Zero drift: ±2% of full scale/week
Span drift: ±2% of full scale/week
Response time (for 90% FS response):
1 or 2 component measurement;
Within 15 seconds including replacement time of sample gas
More than 2 component measurement;
Within 30 seconds including replacement time of sample gas

Interference from other gases:

Interference component	CO_2 analyzer	CO analyzer	CH_4 analyzer	SO_2 analyzer	NO analyzer	Built-in paramagnetic O_2 analyzer
CO 1000 ppm	≦ 1%FS	—	≦ 1%FS	≦ 1%FS	≦ 1%FS	—
CO_2 15%	—	≦ 1%FS (for 200 ppm analyzer, ≦ 2.5%FS)	≦ 1%FS	≦ 1%FS	≦ 1%FS	≦ 2% FS
H_2O saturation at 20°C	≦ 1%FS	≦ 1%FS (for 500 ppm analyzer, ≦ 2.5%FS)	≦ 1%FS	—	—	—
H_2O saturation at 2°C	—	≦ 2.5%FS (for 200 ppm analyzer	—	* ≦ 50ppm ≦ 2%FS with interference compensation	* ≦ 60ppm ≦ 2%FS with interference compensation	—
CH_4 1000 ppm	≦ 1%FS	≦ 1%FS	—	≦ 50ppm	—	—

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*The H_2O interference of NO and SO_2 analyzer can be reduced by the interference compensation.

Standard Requirements for Sample Gas

Flow rate: 1 L/min ±0.5 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^3 or less in particle size of 0.3 µm or less
Mist: Unallowable
Moisture: Below a level where saturation occurs at room temperature (condensation unallowable).
Below the level where saturation occurs at 2°C for CO measurement in 0 to 200 ppm range, NO measurement, and SO_2 measurement.
Corrosive component: HCl 1 ppm or less
Standard gas for calibration:
Zero gas; Dry N_2
Span gas; Each sample gas having concentration 90 to 100%FS of its measuring range (recommended).
Gas beyond concentration 100%FS is unusable.
In case a zirconia O_2 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_2 sensor)
Span gas; For other than O_2 measurement, each sample gas having concentration 90 to 100% of its measuring range
For O_2 measurement, O_2 gas of 1 to 2 vol%
It is understood that a large quantity of hydrogen, helium, or argon in sample gas affects the calibration model of an infrared gas analyzer (pressure broadening). When measuring such sample gas, use a gas which has similar composition to the sample gas as a span gas.

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 (CO_2, CO, CH_4, SO_2, NO)

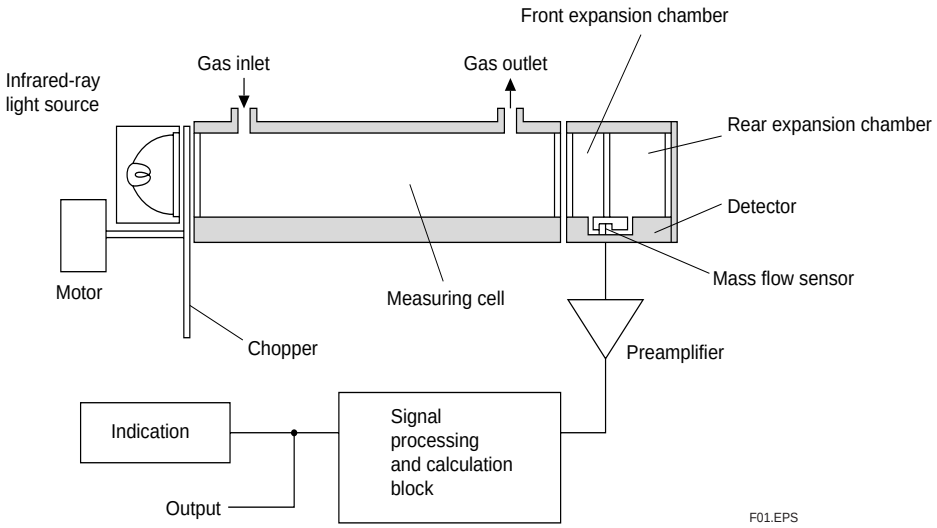
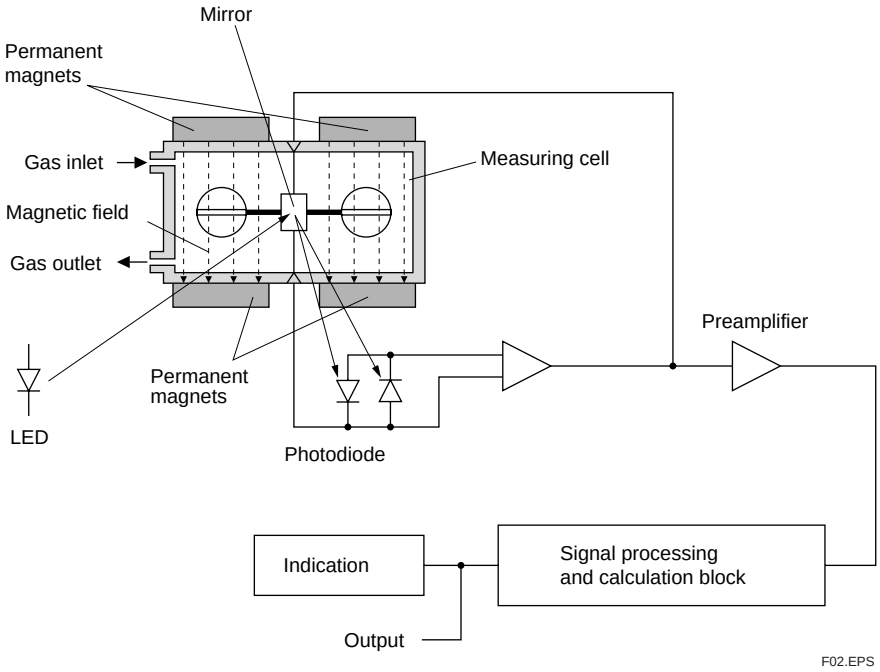


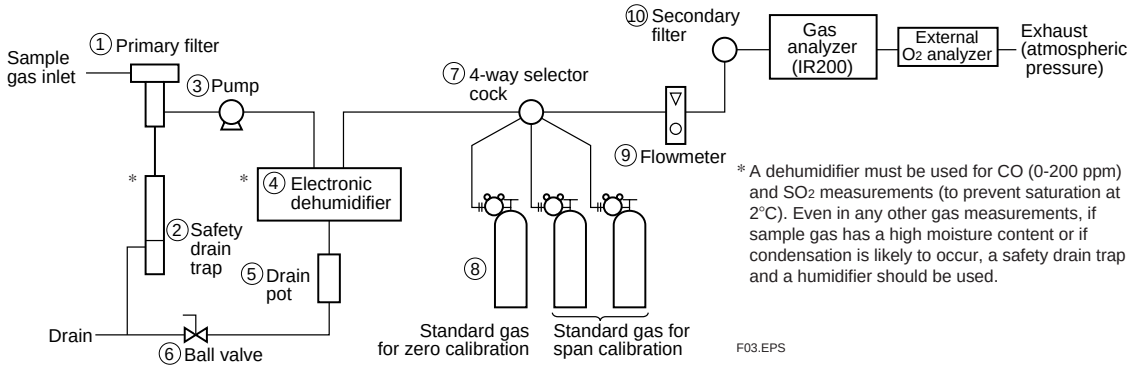
Diagram of measurement principle of paramagnetic oxygen analyzer



Examples of sampling system configuration

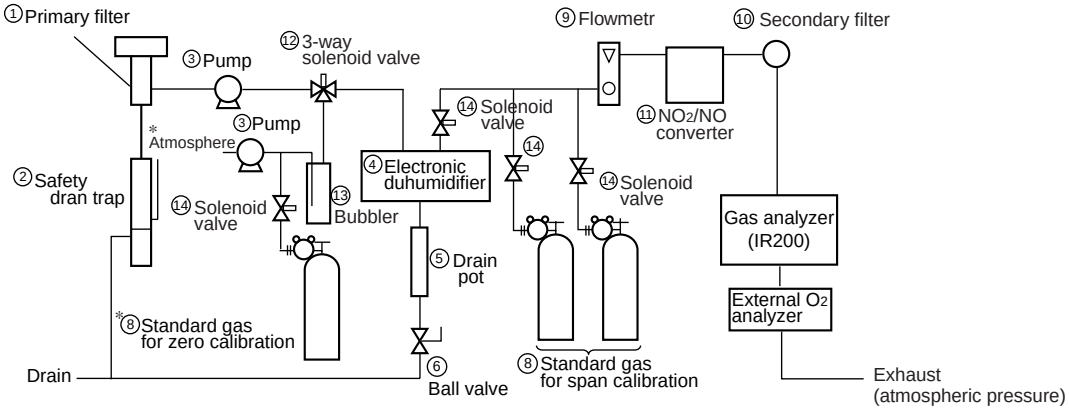
Typical examples are shown below. The system configuration may vary depending on sample gas. Consult with Yokogawa.

Measurement of sample gas with low moisture content (room-temperature saturation level or below):
CO, CO_2 and CH_4 measurement



* A dehumidifier must be used for CO (0-200 ppm) and SO_2 measurements (to prevent saturation at 2°C). Even in any other gas measurements, if sample gas has a high moisture content or if condensation is likely to occur, a safety drain trap and a humidifier should be used.

Measurement of sample gas with high moisture content or NO, SO_2, or CO (0-200 ppm range) measurement



*A dehumidifier must be used for NO, SO_2, and CO (0-200 ppm) measurements (to prevent saturation at 2°C). Use either atmospheric air or cylinder gas as a zero calibration gas and supply it through a bubbler (humidifying) to reduce interference of water.

Typcal sampling system components

No.	Item	Description
①	Primary filter (mist filter)	Removes dust and mist.
②	Safety drain trap	Separates and dischages drain.
③	Pump	Sucks in sample gas.
④	Electronic dehumidifier	Ddhumidifies sample gas.
⑤	Drain pot	Cellcts discharged water from dehumidifier.
⑥	Ball valve	Used for discharging drain.
⑦	4-way selector cock	Used for switching sampling and calibration lines.
⑧	Standard gas for calibration	Used for zero/span calibration.
⑨	Flowmeter	Adjust and monitors sample gas flow rate.
⑩	Secondary filter (membrane filter)	Removes fine dust.
⑪	NO_2/NO converter	Converter NO_2 gas into NO gas.
⑫	3-way solenoid valve	Used for introducing humidified gas.
⑬	Bubbler	Humidifies calibration gas.
⑭	Solenoid valve	Used for switching sampling and calibration lines.

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MODEL AND SUFFIX CODE

[Style: S3]

Model	Suffix code	Option code	Description
IR200			Infrared gas analyzer 19-inch rack mounting type with slide rail
Measurable components (note 8)	-A		SO_2
	-B		CO
	-C		CO_2
	-D		CH_4
	-E		NO
	-F		$CO_2 + CO$
	-G		$CH_4 + CO$
	-H		$CO_2 + CH_4$
	-J		$CO_2 + CO + CH_4$
	-K		$NO + SO_2$
	-L		NO + CO
	-M		$NO + SO_2 + CO$
O_2 analyzer	N		Without O_2 analyzer
	1		External zirconia type O_2 sensor (purchase separately: ZX8D)
	2		External O_2 analyzer (note 1)
	3		Built-in paramagnetic type O_2 sensor
1st Component 1st Range (note 2)	A		0−200 ppm (note 3)
	B		0−500 ppm (note 4)
	C		0−1000 ppm
	D		0−2000 ppm
	E		0−2500 ppm
	F		0−5000 ppm
	G		0−1%
	H		0−2%
	J		0−3%
	K		0−5%
	L		0−10%
	M		0−20%
	P		0−25%
	Q		0−40%
	R		0−50%
	S		0−70%
	T		0−100%
1st Component 2nd Range (note 2)	B		0−500 ppm
	C		0−1000 ppm
	D		0−2000 ppm
	E		0−2500 ppm
	F		0−5000 ppm
	G		0−1%
	H		0−2%
	K		0−5%
	L		0−10%
	M		0−20%
	P		0−25%
	R		0−50%
	T		0−100%
	N		Not available
2nd Component 1st Range (note 2)	B		0−500 ppm
	C		0−1000 ppm
	D		0−2000 ppm
	E		0−2500 ppm
	F		0−5000 ppm
	G		0−1%
	H		0−2%
	J		0−3%
	K		0−5%
	L		0−10%
	M		0−20%
	P		0−25%
	Q		0−40%
	R		0−50%
	S		0−70%
	T		0−100%
	N		Not available

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MODEL AND SUFFIX CODE (Continued)

Model	Suffix code	Option code	Description
IR200	−□□□□□		Infrared gas analyzer 19-inch rack mounting type with slide rail
2nd Component 2nd Range (note 2)	C D E F G H K L M P R T N		0−1000 ppm 0−2000 ppm 0−2500 ppm 0−5000 ppm 0−1% 0−2% 0−5% 0−10% 0−20% 0−25% 0−50% 0−100% Not available
3rd Component 1st Range (note 2)	B C D E F G H J K L M P Q R S T N		0−500 ppm 0−1000 ppm 0−2000 ppm 0−2500 ppm 0−5000 ppm 0−1% 0−2% 0−3% 0−5% 0−10% 0−20% 0−25% 0−40% 0−50% 0−70% 0−100% Not available
3rd Component 2nd Range (note 2)	C D E F G H K L M P R T N		0−1000 ppm 0−2000 ppm 0−2500 ppm 0−5000 ppm 0−1% 0−2% 0−5% 0−10% 0−20% 0−25% 0−50% 0−100% Not available
O_2 Analyzer 1st Range (note 2)	1 2 3 4 5 N		0−5% 0−10% 0−25% 0−50% 0−100% Not available
O_2 Analyzer 2nd Range (note 2)	2 3 4 5 N		0−10% 0−25% 0−50% 0−100% 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 6)	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_2 Correction and O_2 Average (note 5) Peak count alarm (note 5) Communication Internal Purge	/K /A /C /P	With O_2 correction and O_2 average value With peak count alarm (CO gas Only) RS−232C (note 7) Analyzer internal purging

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Footnotes:
1: A signal from the external O_2 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 measurement.
4: Only available for CO_2, CO, SO_2 or NO measurements.
5: O_2 correction is available only for CO, SO_2, and NO. Both average value output after O_2 correction and average O_2 value output are provided at the same time.
A peak count alarm can be provided only for CO measurement.
6: 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.
7: Should be specified when using Modbus™ communication.
8: For NOx measurement, a NO_2/NO converter (P/N K9350LE or K9350LF) should be purchased separately.

Measurable components and ranges - availability check table -

Table 1. Single-component analyzer (CO_2, CO, CH_4, SO_2, NO)

1st range \ 2nd range		B	C	D	E	F	G	H	K	L	M	R	T
		0−500ppm	0−1000ppm	0−2000ppm	0−2500ppm	0−5000ppm	0−1%	0−2%	0−5%	0−10%	0−20%	0−50%	0−100%
A	0−200ppm	○	○	—	—	—	—	—	—	—	—	—	—
B	0−500ppm	—	◎○□☆	◎○□☆	◎○□☆	—	—	—	—	—	—	—	—
C	0−1000ppm	—	—	◎○△□☆	◎○△□☆	◎○△□☆	—	—	—	—	—	—	—
D	0−2000ppm	—	—	—	◎○△□☆	◎○△□☆	◎○△	—	—	—	—	—	—
E	0−2500ppm	—	—	—	—	◎○△□☆	◎○△	—	—	—	—	—	—
F	0−5000ppm	—	—	—	—	—	◎○△	◎○△	—	—	—	—	—
G	0−1%	—	—	—	—	—	—	◎○△	◎○△	—	—	—	—
H	0−2%	—	—	—	—	—	—	—	◎○△	◎○△	—	—	—
J	0−3%	—	—	—	—	—	—	—	◎○△	◎○△	—	—	—
K	0−5%	—	—	—	—	—	—	—	—	◎○△	◎○△	—	—
L	0−10%	—	—	—	—	—	—	—	—	—	◎○△	◎○△	—
M	0−20%	—	—	—	—	—	—	—	—	—	—	◎○△	◎○
P	0−25%	—	—	—	—	—	—	—	—	—	—	◎○△	◎○
Q	0−40%	—	—	—	—	—	—	—	—	—	—	◎○△	◎○△
R	0−50%	—	—	—	—	—	—	—	—	—	—	—	◎○△
S	0−70%	—	—	—	—	—	—	—	—	—	—	—	◎○△
T	0−100%	—	—	—	—	—	—	—	—	—	—	—	◎○△

◎: CO_2 analyzer measurable range ○: CO analyzer measurable range △: CH_4 analyzer measurable range
□: SO_2 analyzer measurable range ☆: NO analyzer measurable range
*Note:Single range is also available.

Table 2. Two-component analyzer (CO_2 and CO)

1st component ↓ (CO_2), 1st range \ 2nd component (CO), 1st range → CO		B	C	D	E	F	G	H	K	L	M	P	R	T
		0−500ppm	0−1000ppm	0−2000ppm	0−2500ppm	0−5000ppm	0−1%	0−2%	0−5%	0−10%	0−20%	0−25%	0−50%	0−100%
CO_2	F 0−5000ppm	—	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○
	G 0−1%	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○
	H 0−2%	◎	◎	◎	◎	◎	◎	◎	◎	◎	○	○	◎	○
	K 0−5%	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○
	L 0−10%	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○
	M 0−20%	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○
	R 0−50%	—	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○
	T 0−100%	—	○	○	○	○	○	○	○	○	○	○	○	○

○: Available as single range, ◎: 2 ranges of 2 and 2.5 times each range available

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Table 3. Two-component analyzer (CH_4 and CO)

1st component ↓ (CH_4),1st range \ 2nd component (CO), 1st range → CO		B	C	D	E	F	G	H	K	L	M	P	R	T
		0−500ppm	0−1000ppm	0−2000ppm	0−2500ppm	0−5000ppm	0−1%	0−2%	0−5%	0−10%	0−20%	0−25%	0−50%	0−100%
CH_4	F 0−5000ppm	—	◎	◎	◎	◎	◎	○	◎	◎	◎	◎	—	—
	G 0−1%	—	◎	◎	◎	◎	◎	○	◎	◎	◎	◎	○	○
	H 0−2%	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○
	K 0−5%	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○
	L 0−10%	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○
	M 0−20%	—	—	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○
	R 0−50%	—	—	—	—	◎	◎	◎	◎	◎	◎	◎	◎	○
	T 0−100%	—	—	—	—	—	○	○	○	○	○	○	○	○

○: Available as single range, ◎: 2 ranges of 2 and 2.5 times each range available

T07.EPS

Table 4. Two-component analyzer (CO_2 and CH_4)

		2nd component (CH_4), 1st range →	C	D	E	F	G	H	K	L	M	P	R	T
1st component ↓(CO_2),1st range			0 – 1000ppm	0 – 2000ppm	0 – 2500ppm	0 – 5000ppm	0 – 1%	0– 2%	0 – 5%	0 – 10%	0 – 20%	0 – 25%	0 – 50%	0 – 100%
CO_2	D	0 – 2000ppm	—	—	—	◎	◎	◎	◎	◎	—	—	—	—
	E	0 – 2500ppm	—	—	—	◎	◎	◎	◎	◎	—	—	—	—
	F	0 to 5000ppm	—	—	—	◎	◎	◎	◎	◎	◎	—	—	—
	G	0 – 1%	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	—	—
	H	0 – 2%	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	—
	K	0 – 5%	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○
	L	0 – 10%	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○
	M	0 – 20%	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○
	R	0 – 50%	—	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	○
	T	0 – 100%	—	○	○	○	○	○	○	○	○	○	○	○

T08.EPS

○ : Available as single range, ◎: 2 ranges of 2 and 2.5 times each range available

Table 5. Two-component analyzer (NO and SO_2)

		2nd component (SO_2), 1st range →	B	C	D	E	F
↓ 1st component (NO),1st range			0−500ppm	0−1000ppm	0−2000ppm	0−2500ppm	0−5000ppm
NO	B	0−500ppm	○	○	○	○	○
	C	0−1000ppm	○	○	○	○	○
	D	0−2000ppm	○	○	○	○	○
	E	0−2500ppm	○	○	○	○	○
	F	0−5000ppm	○	○	○	○	○

T05-1

○:Two components measurable range. 1st component ; NO, 2nd component ; SO_2

∗ 1st range (low range) must meet the combination in above table.
2nd range, both NO and SO_2 measurements are up to 5 times of the 1st range, and 2nd max. range is 0 to 5000ppm.

Table 6. Two-component analyzer (NO and CO)

		2nd component (CO), 1st range →	A	B	C	D	E	F	G
↓ 1st component (NO),1st range			0−200ppm	0−500ppm	0−1000ppm	0−2000ppm	0〜2500ppm	0−5000ppm	0−1%
NO	B	0−500ppm	○	○	○	○	○	○	○
	C	0−1000ppm	○	○	○	○	○	○	○
	D	0−2000ppm	○	○	○	○	○	○	○
	E	0−2500ppm	○	○	○	○	○	○	○
	F	0−5000ppm	—	○	○	○	○	○	○

T05-2

○ :Two components measurable range. 1st component ; NO, 2nd component ; CO

∗ 1st range (low range) must meet the combination in above table.
2nd range, both NO and CO measurements are up to 5 times of the 1st range.
2nd max. range of NO is 0 to 5000ppm.
2nd max. range of CO_2 is 0 to 1%.

Table 7. Three-component analyzer (CO_2 + CO + CH_4 and NO + SO_2 + CO)

See Table 4 for CO_2 + CH_4 measurement of three-component analyzer (CO_2 + CO + CH_4) and Table 5 for NO + SO_2 measurement of three-component analyzer (NO + SO_2 + CO). See Table 1 for CO measurement.

Table 8. O_2 analyzer

2nd range / 1st range		2	3	4	5
		0−10%	0−25%	0−50%	0−100%
1	0−5%	○△	○△	○	—
2	0−10%	—	○△	○	○
3	0−25%	—	—	○	○
4	0−50%	—	—	—	○
5	0−100%	—	—	—	○

T09.EPS

○: Built-in O_2 analyzer measurable range,
△: External zirconia type O_2 analyzer (in this case, Yokogawa′s ZX8D Style C) measurable range

∗ O_2 analyzer is selectable indifferently to combination with other components.

Table 9. Measurable Components and Their Corresponding Channel Numbers

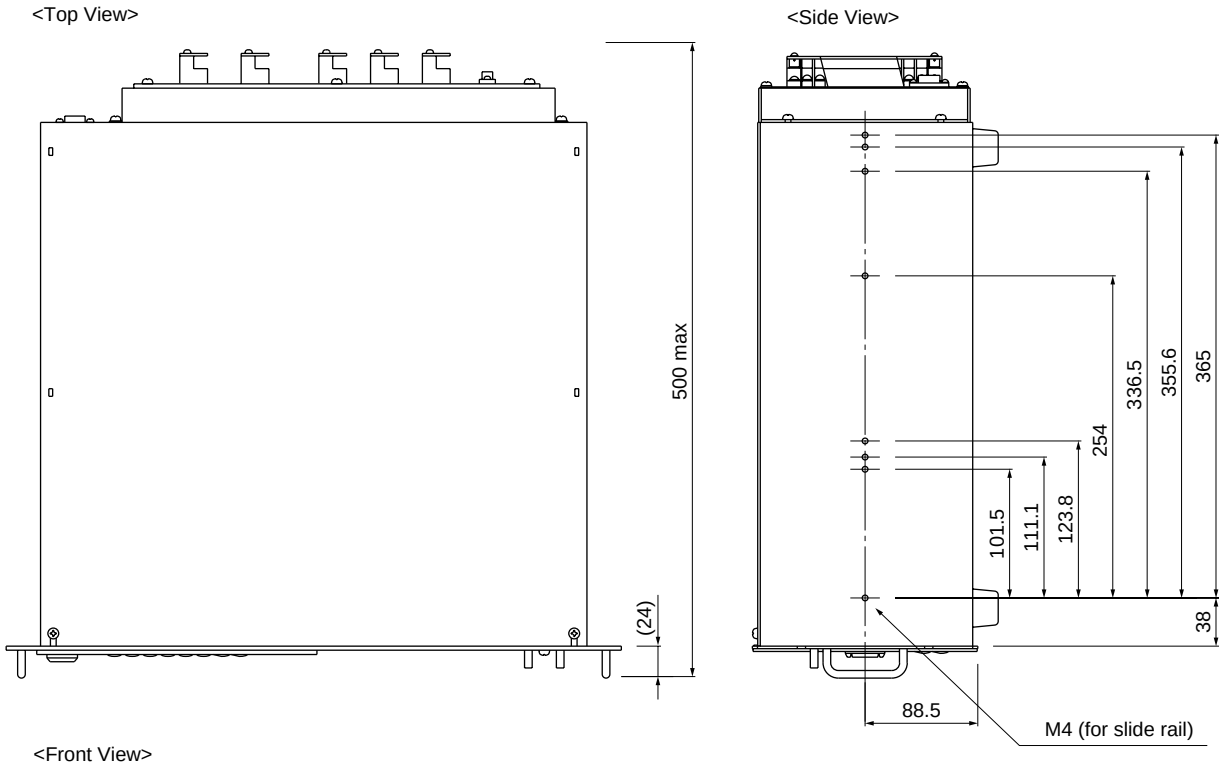
Suffix/Option Code			Output and Corresponding Channel							
Measurable component	O_2 analyzer	O2 correction	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
- A	N	Not specified	SO_2							
- B	N	Not specified	CO							
- C	N	Not specified	CO_2							
- D	N	Not specified	CH_4							
- E	N	Not specified	NO							
- F	N	Not specified	CO_2	CO						
- G	N	Not specified	CH_4	CO						
- H	N	Not specified	CO_2	CH_4						
- J	N	Not specified	CO_2	CO	CH_4					
- K	N	Not specified	NO	SO_2						
- L	N	Not specified	NO	CO						
- M	N	Not specified	NO	SO_2	CO					
- A	1, 2, 3	Not specified	SO_2	O_2						
- B	1, 2, 3	Not specified	CO	O_2						
- C	1, 2, 3	Not specified	CO_2	O_2						
- D	1, 2, 3	Not specified	CH_4	O_2						
- E	1, 2, 3	Not specified	NO	O_2						
- F	1, 2, 3	Not specified	CO_2	CO	O_2					
- G	1, 2, 3	Not specified	CH_4	CO	O_2					
- H	1, 2, 3	Not specified	CO_2	CH_4	O_2					
- J	1, 2, 3	Not specified	CO_2	CO	CH_4	O_2				
- K	1, 2, 3	Not specified	NO	SO_2	O_2					
- L	1, 2, 3	Not specified	NO	CO	O_2					
- M	1, 2, 3	Not specified	NO	SO_2	CO	O_2				
- A	1, 2, 3	/K	SO_2	O_2	Correct SO_2	Correct SO_2 av.	O_2 av.			
- B	1, 2, 3	/K	CO	O_2	Correct CO	Correct CO av.	O_2 av.			
- E	1, 2, 3	/K	NO_X	O_2	Correct NO_X	Correct NO_X av.	O_2 av.			
- F	1, 2, 3	/K	CO_2	CO	O_2	Correct CO	Correct CO av.	O_2 av.		
- G	1, 2, 3	/K	CH_4	CO	O_2	Correct CO	Correct CO av.	O_2 av.		
- J	1, 2, 3	/K	CO_2	CO	CH_4	O_2	Correct CO	Correct CO av.	O_2 av.	
- K	1, 2, 3	/K	NO_X	SO_2	O_2	Correct NO_X	Correct SO_2	Correct NO_X av.	Correct SO_2 av.	O_2 av.
- L	1, 2, 3	/K	NO_X	CO	O_2	Correct NO_X	Correct CO	Correct NO_X av.	Correct CO av.	O_2 av.
- M	1, 2, 3	/K	NO_X	SO_2	CO	O_2	Correct NO_X	Correct SO_2	Correct CO	O_2 av.

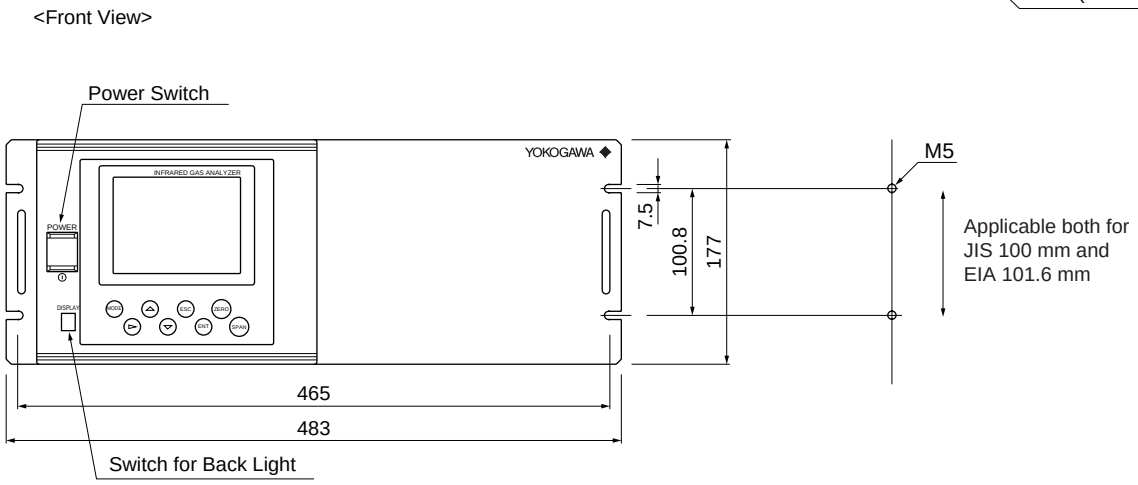
* How to Read the Table

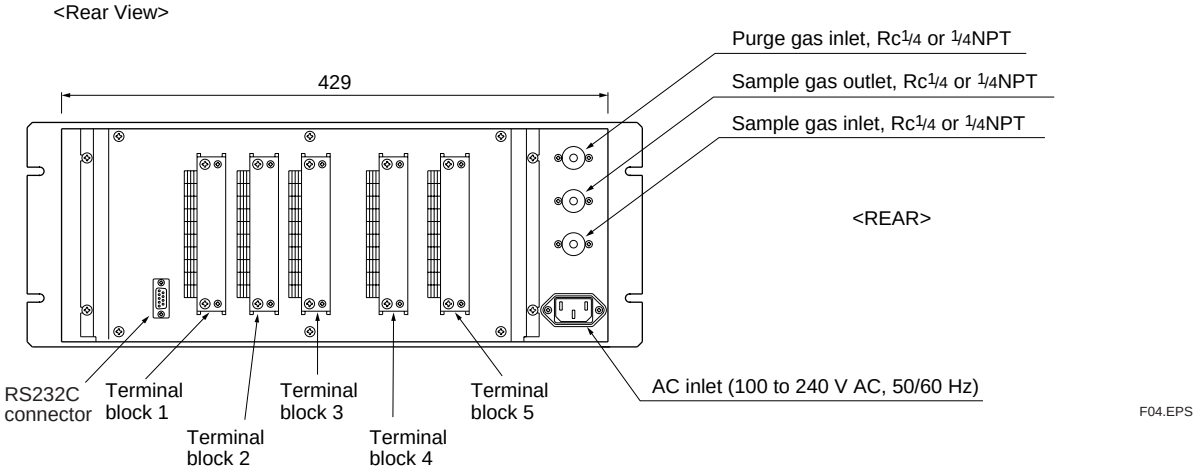
"SO_2" in the CH1 column means that the display and output of CH1 correspond to SO_2 component. "Correct XX" means an instantaneous XX value after O2 correction, "Correct XX av." an average XX value after O_2 correction, and "O_2 av." an average O_2 value.

EXTERNAL DIMENSIONS

Unit: mm







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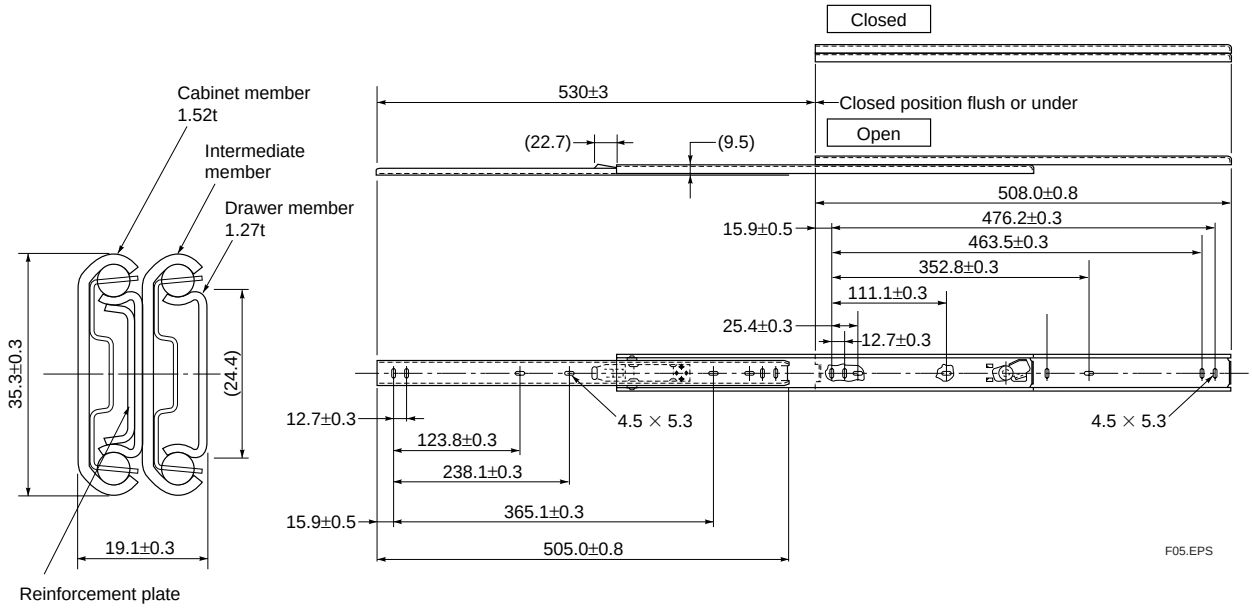
EXTERNAL DIMENSIONS OF ACCESSORY SLIDE RAIL

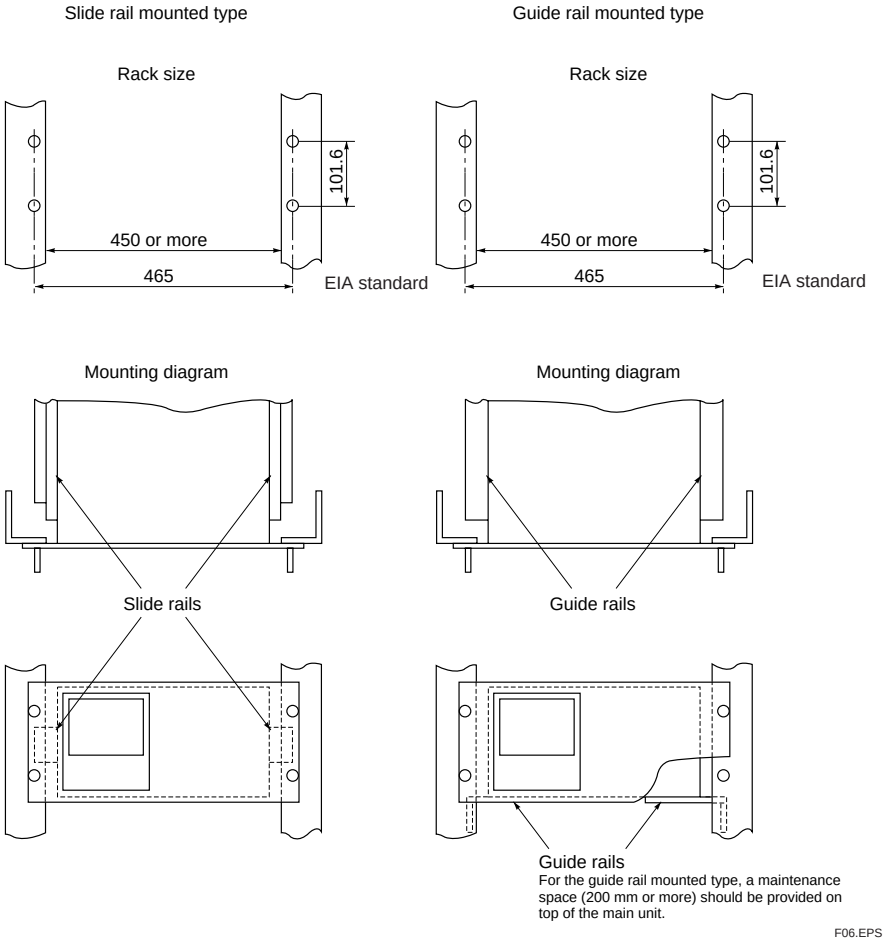
Unit: mm

Model: 305A-20/Accuride International Inc.

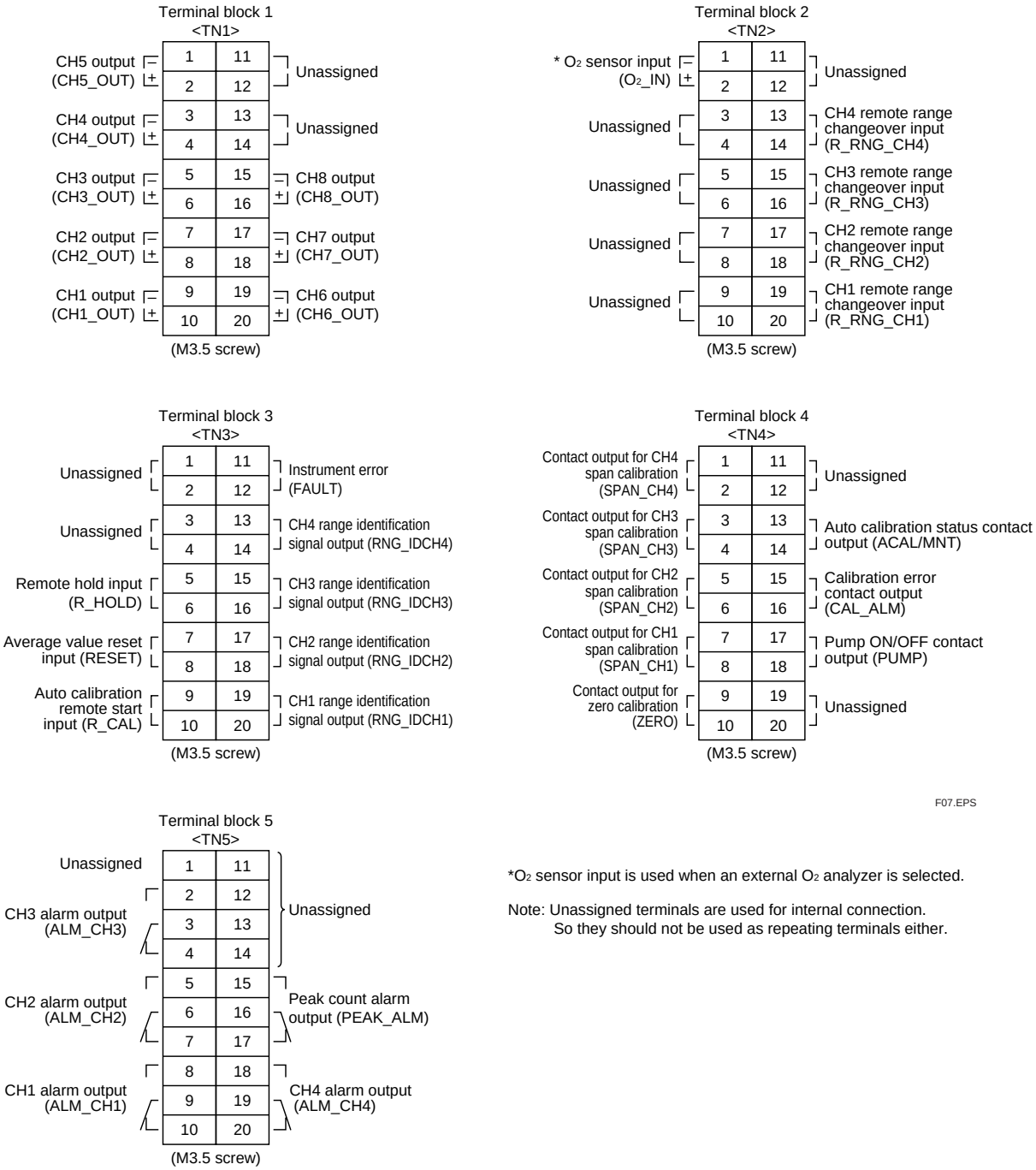


19-inch rack mounting method:

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 methed to allow withdrawing alog the slide rail.



EXTERNAL CONNECTION DIAGRAM



*O_2 sensor input is used when an external O_2 analyzer is selected.

Note: Unassigned terminals are used for internal connection.
So they should not be used as repeating terminals either.

STANDARD ACCESSORIES

Item	Part No.	Description	Qty
Power cable	K9218SA	Standard inlet type (2.5 m)	1
Fuse	K9218RB	Replacement fuse (250 V AC, 1 A, delay type) x1	2
Slide rail	K9218RC	Slide rail x1	2

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Note: Quantity in this table is the number of accessories supplied as standard.
For instance, two K9218RC parts, i.e., two slide rails, are supplied as standard.
When ordering separately, the required number of parts should be considered

Dedicated Zirconia O_2 Sensor (to be purchased separately)

For O_2 correction, the IR200 can accept linealized 0 to 1 V DC signal coming from an analyzer calibrated to 0 to 25% O_2 of full scale. Dedicated zirconia O_2 sensor, Model ZX8D, is available from Yokogawa.

Measuring method: Zirconia system

Measurable component and measuring range:

Measurable component	Minimum range	Maximum range
Oxygen (O_2)	0−5 vol%	0−25 vol%

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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)
Sample gas flow rate: 0.5 ±0.25 L/min
Note: The Zirconia system, due to its principle, may produce a measuring error depending on the relative concentration versus the combustible O_2 gas concentration. Also, a corrosive gas (SO_2 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:
Safety; EN61010-1
Pollution degree; 2
Installation category; II
EMC; EN61326:
EN61000-3-2
EN61000-3-3
Dimensions (H x W x 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_2 sensor
Power supply	−5	--------	90−126 V AC, 50/60 Hz
	−3	--------	200−240 V AC, 50/60 Hz
Style code	*C	--------	Style C (Non-CE conformity)
	*D	--------	Style D (CE conformity)

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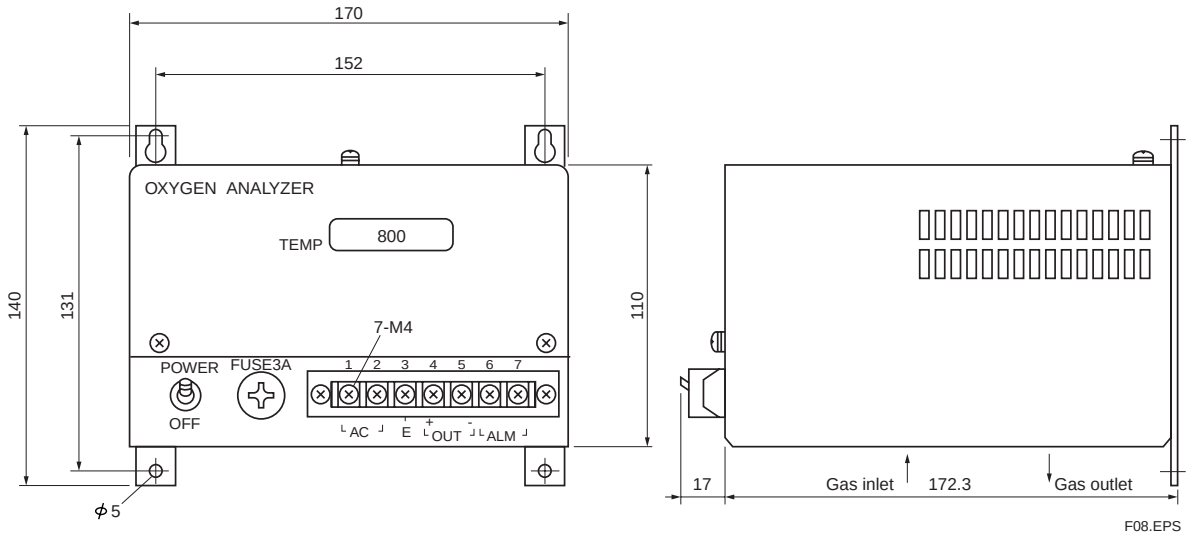
External Dimensions of ZX8D

Unit: mm



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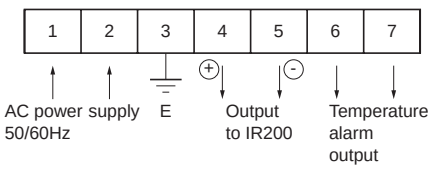
External Connection Diagram



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⚠ Caution on Safety
Before using this product, be sure to read its instruction manual in advance.

NO_2/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^3
Replacement cycle; Approx. 12 months (at flow rate of 0.3 L/min with 5% O_2, 10 ppm NO)
Temperature setpoint; 210 ±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 VAC, 50/60 Hz (K9350LE)
100 to 240 VAC, 50/60 Hz (K9350LF)
Power consumption: Approx. 85 VA
Safety conforming standards:
Safety; EN61010-1
Pollution degree; 2
Installation category; II
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_2/NO converter	K9350LP	2
Glass wool for NO_2/NO converter	K9350LQ	2
Fitting for NO_2/NO converter	K9350LV	2

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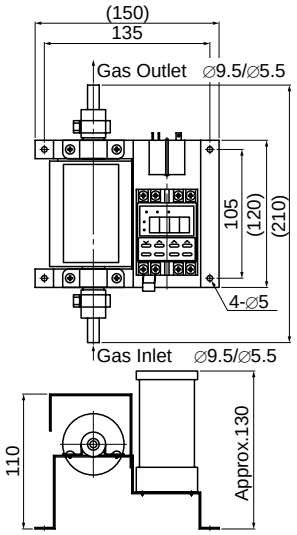
External Dimensions

Unit: mm

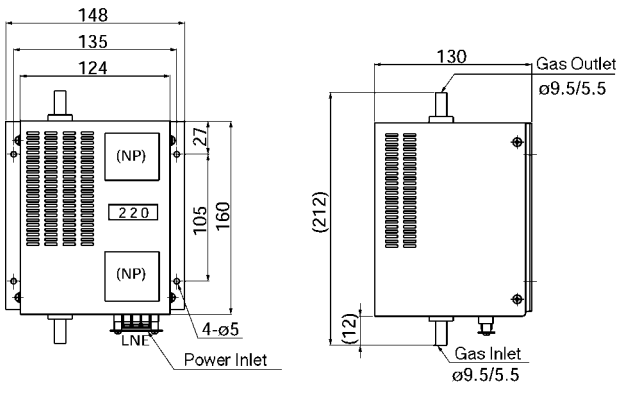


Wiring Diagram

100V AC
(Shared with internal wiring)

K9350LE

Unit: mm



Front View Side View

K9350LF

Inquiry Sheet for IR200 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 : _____

Contact person : _____ Section : _____ (Phone No. _____)

Plant name : _____ Measurement location : _____

Purpose : ☐ Indication reading, ☐ Recording, ☐ Telemeter transmission, ☐ Alarm, ☐ Control, ☐ Other_____

2. Requirements

Measurable component:

- ☐ SO_2
- ☐ CO
- ☐ CO_2
- ☐ CH_4
- ☐ NO
- ☐ CO_2 + CO
- ☐ CH_4 + CO
- ☐ CO_2 + CH_4
- ☐ NO + SO_2
- ☐ NO + CO
- ☐ CO_2 + CO + CH_4
- ☐ NO + SO_2 + CO

O_2 Analyzer:

- ☐ Without O_2 analyzer
- ☐ External zirconia type sensor (use ZX8D Style C)
- ☐ External O_2 analyzer
- ☐ Built-in paramagnetic type O_2 sensor

Range:

1st component, 1st range	1st component, 2nd range	2nd component, 1st range	2nd component, 2nd range
☐ 0 – 200 ppm	☐ 0 – 500 ppm	☐ 0 – 500ppm	☐ 0 – 1000 ppm
☐ 0 – 500 ppm	☐ 0 – 1000 ppm	☐ 0 – 1000 ppm	☐ 0 – 2000 ppm
☐ 0 – 1000 ppm	☐ 0 – 2000 ppm	☐ 0 – 2000 ppm	☐ 0 – 2500 ppm
☐ 0 – 2000 ppm	☐ 0 – 2500 ppm	☐ 0 – 2500 ppm	☐ 0 – 5000 ppm
☐ 0 – 2500 ppm	☐ 0 – 5000 ppm	☐ 0 – 5000 ppm	☐ 0 – 1%
☐ 0 – 5000 ppm	☐ 0 – 1%	☐ 0 – 1%	☐ 0 – 2%
☐ 0 – 1%	☐ 0 – 2%	☐ 0 – 2%	☐ 0 – 5%
☐ 0 – 2%	☐ 0 – 5%	☐ 0 – 3%	☐ 0 – 10%
☐ 0 – 3%	☐ 0 – 10%	☐ 0 – 5%	☐ 0 – 20%
☐ 0 – 5%	☐ 0 – 20%	☐ 0 – 10%	☐ 0 – 25%
☐ 0 – 10%	☐ 0 – 25%	☐ 0 – 20%	☐ 0 – 50%
☐ 0 – 20%	☐ 0 – 50%	☐ 0 – 25%	☐ 0 – 100%
☐ 0 – 25%	☐ 0 – 100%	☐ 0 – 40%	☐ Not available
☐ 0 – 40%	☐ Not available	☐ 0 – 50%	
☐ 0 – 50%		☐ 0 – 70%	
☐ 0 – 70%		☐ 0 – 100%	
☐ 0 – 100%		☐ Not available	

3rd component, 1st range	3rd component, 2nd range	O_2 Analyzer, 1st range	O_2 Analyzer, 2nd range
☐ 0 – 500 ppm	☐ 0 – 1000 ppm	☐ 0 – 5%	☐ 0 – 10%
☐ 0 – 1000 ppm	☐ 0 – 2000 ppm	☐ 0 – 10%	☐ 0 – 25%
☐ 0 – 2000 ppm	☐ 0 – 2500 ppm	☐ 0 – 25%	☐ 0 – 50%
☐ 0 – 2500 ppm	☐ 0 – 5000 ppm	☐ 0 – 50%	☐ 0 – 100%
☐ 0 – 5000 ppm	☐ 0 – 1%	☐ 0 – 100%	☐ Not available
☐ 0 – 1%	☐ 0 – 2%	☐ Not available	
☐ 0 – 2%	☐ 0 – 5%		
☐ 0 – 3%	☐ 0 – 10%		
☐ 0 – 5%	☐ 0 – 20%		
☐ 0 – 10%	☐ 0 – 25%		
☐ 0 – 20%	☐ 0 – 50%		
☐ 0 – 25%	☐ 0 – 100%		
☐ 0 – 40%	☐ Not available		
☐ 0 – 50%			
☐ 0 – 70%			
☐ 0 – 100%			
☐ Not available			

Output	: ☐ 4 – 20 mA DC	☐ 0 – 1 V DC	☐ RS-232C
O_2 Correction and O_2 Average	: ☐ Yes	☐ No	
Peak count alarm	: ☐ Yes	☐ 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^3]
(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.)

Composition	Concentration range		
CO	to	☐%	☐ppm
CO_2	to	☐%	☐ppm
CH_4	to	☐%	☐ppm
H_2	to	☐%	☐ppm
O_2	to	☐%	☐ppm
N_2	to	☐%	☐ppm
SO_2	to	☐%	☐ppm
H_2O	to	☐%	☐ppm
NO	to	☐%	☐ppm
	to	☐%	☐ppm
	to	☐%	☐ppm