

# NDIR TYPE INFRARED GAS ANALYZER

## (5-COMPONENT ANALYZER)

DATA SHEET

ZKJ

The gas analyzer ZKJ simultaneously measures up to five components; four components among NO, SO<sub>2</sub>, CO<sub>2</sub>, CO, CH<sub>4</sub>, N<sub>2</sub>O measured by NDIR sensor, and O<sub>2</sub> by built-in paramagnetic sensor or external zirconia analyzer. By the use of twin mass-flow sensors that is hardly affected by interference gas, it delivers highly reliable measurement. It features high accuracy, functionality, and ease of use.

ZKJ is best suited to waste incineration plants, industrial furnaces and boilers.



### FEATURES

1. Simultaneous and continuous measurement of up to 5 components  
Four components among NO, SO<sub>2</sub>, CO, CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, in addition to O<sub>2</sub>
2. Tolerant to cross interference  
The twin mass-flow sensors that has high sensitivity offers reliable measurement
3. High functionality  
O<sub>2</sub> conversion, average calculation, auto calibration, high/low alarm, remote switchover of measurement ranges, range identification signal output, etc.
4. Easy to use  
You can check the measured values and calculated values at glance on the easy-to-see large LCD, and can edit the settings in an interactive way.
5. Easy to install  
19-inch rack mount structure and unitized I/O terminals allow you to construct an analyzing system easily
6. User-configurable ranges with a maximum range ratio of 1 : 25
7. Zero drift for ranges above 0–200 ppm: ±1% FS per week
8. Conforms to the RoHS directive

### SPECIFICATIONS

#### Standard Specifications

#### Measurement principle:

- NO, SO<sub>2</sub>, CO<sub>2</sub>, CO, CH<sub>4</sub>, N<sub>2</sub>O;  
Non-dispersive infrared (NDIR) method,  
Single light source and double beams (double-beam system)
- O<sub>2</sub>;  
Built-in paramagnetic O<sub>2</sub> sensor or external zirconia O<sub>2</sub> analyzer

#### Measurable gas components and measuring 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%
N <sub>2</sub> O	0–200 ppm	0–2000 ppm
O <sub>2</sub> (built in)	0–5 vol%	0–25 vol%
O <sub>2</sub> (External Zirconia)	0–5 vol%	0–25 vol%

- Max. 5 components measurement including O<sub>2</sub>.
- Measuring range ratio ≤ 1:5 (O<sub>2</sub>)  
≤ 1:25 (except for O<sub>2</sub>)
- Measuring ranges are changeable between the specified minimum and maximum range.  
Settable 1 range or 2 ranges.
- If you measure N<sub>2</sub>O only, do not let any other components be included in the sample gas.  
If you measure multiple components including N<sub>2</sub>O, the measurement ranges of N<sub>2</sub>O are fixed to 0–200 ppm and 0–500 ppm. If the measuring objects are N<sub>2</sub>O and CO<sub>2</sub>, the measurement ranges of CO<sub>2</sub> are fixed to 0–10% and 0–20%.
- \* For measurable components and possible combinations of measuring ranges, refer to Tables 1-(1) to (8).

#### Measured value indication:

- Digital indication in 4 digits (LCD with LED back light)
- Instantaneous value of each component
- Instantaneous value after O<sub>2</sub> conversion (only in NO, SO<sub>2</sub>, CO measurement with O<sub>2</sub>)
- Average value after O<sub>2</sub> conversion (only in NO, SO<sub>2</sub>, CO measurement with O<sub>2</sub>)
- O<sub>2</sub> average value

#### Analog output signals:

- \* Inputs/outputs of analog signals are possible by combining with the input/output terminal module.  
4 to 20mA DC or 0 to 1V DC, isolated internally from circuit and ground. Output lines are non-isolated each other; 12 points max.  
max.load 550Ω for 4 to 20 mA DC  
min.load 100kΩ for 0 to 1V DC
- \* Refer to Table 2 for channel allocation for each component.

**Analog input signal:**

- Signal from external O<sub>2</sub> analyzer;  
 (1) Signal from Fuji zirconia O<sub>2</sub> analyzer (ZFK7)  
 (2) 0 to 1 V DC full-scale signal
- Input section is not isolated.
  - External O<sub>2</sub> analyzer is a separate order item.

**Relay contact output:**

- 1a contact (250V AC/2A, resistive load)  
 Instrument error, calibration error, range identification, auto calibration status, pump ON/OFF, peak alarm.  
 1c contact (250V AC/2A, resistive load selectable 6 outputs)  
 High/Low limit alarm contact output.  
 Power disconnection alarm.

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

**Contact input:**

- No-voltage contact (ON/0V, OFF/5V DC, 5mA flowing at ON)  
 Remote range switch, auto calibration remote start, remote holding, average value resetting, pump ON/OFF  
 Isolated from the internal circuit with photocoupler. Contact inputs are not isolated from one another.

**Transmission output:**

- Solenoid valve drive signal for automatic calibration.  
 Transistor output (100mA or less)

**Power supply:**

- Voltage rating; 100V to 240V AC  
 Allowable range; 85V to 264V AC  
 Frequency ; 50Hz/60Hz  
 Power consumption; 250VA max.  
 Inlet; Conform to EN60320, Protection Class 1

**Operating conditions:**

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

**Storage conditions:**

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

**Dimensions (H x W x D):**

- Analyzer main unit; 177 × 483 × 599mm  
 Input/output terminal module; 164 × 316 × 55mm

**Mass:**

- Approx. 22 kg (only Analyzer)

**Finish color:**

- Front panel; Light gray (Munsell N7.2 or equivalent)  
 Casing; Plating, Steel-blue (gray)

**Enclosure:**

- Steel casing, for indoor use

**Material of gas-contacting parts:**

- Gas inlet/outlet/purging; SUS304 or resin  
 Sample cell; SUS304, chloroprene rubber  
 Infrared-ray transmitting window; CaF<sub>2</sub>  
 O<sub>2</sub> sensor sample cell; SUS316  
 Internal piping; vinyl chloride, PTFE, Polypropylene

**Gas inlet/outlet:**

- Rc1/4 or NPT1/4 internal thread

**Purge gas flow rate:**

- 1L/min (when required)

**Standard Functions****Output signal holding:**

Enables you to hold the output signal during calibration to the value right before the calibration is started or the user-specified value. Values indicated on LCD will not be held.

**Remote output holding:**

Applying the specified voltage on the dedicated terminal allows you to hold the output signal to the last value or the user-specified value. Holding is effective while the voltage is applied. Values indicated on LCD are not held.

**Range changeover:**

You can change between ranges by manually, automatically, or remotely.

Manual: by key operation

Auto: When the measured value reaches above 90% FS of the 1st range, the range automatically switches to the 2nd range. When the measured value goes down below 80% FS of the 1st range, the range automatically switches from the 2nd range to the 1st range.

Remote: by the no-voltage contact input. When the remote range changeover input terminal dedicated for each component is closed, the 1st range is effective. When the terminal is opened, the 2nd range becomes effective.

**Range identification signal:**

You can check which range is in use. When the 1st range is used, the range identification signal output terminal allocated for each component is closed. When the 2nd range is used, the terminal is opened.

**Auto calibration:**

This function requires standard gas cylinders for zero and span calibration and solenoid valves for opening/closing the gas flow line. When this function is activated, the analyzer opens and closes the solenoid valve driving contact periodically at preset cycle.

Auto calibration cycle setting:

- 1 hour to 99 hours (in increments of 1 hour)
- or 1 day to 40 days (in increments of 1 day).

Gas flow time setting:

- The time during which calibration gas is supplied.
- 60 seconds to 900 seconds (in increments of 1 second)

**Auto calibration remote start:**

You can start one-time auto calibration if you open the auto calibration remote start input terminal for 1.5 seconds or longer and then close it. Calibration gas is drawn for the time set in the "gas flow time setting" for Auto calibration (see the previous item).

**Auto zero calibration:**

This function requires a standard gas cylinder for zero calibration and a solenoid valve for opening/closing the gas flow line. When this function is activated, the analyzer opens and closes the solenoid valve driving contact periodically at preset cycle. The cycle for the auto zero calibration and that for the auto calibration can be different.

Auto zero calibration cycle setting:

- 1 hour to 99 hours (in increments of 1 hour) or 1 day to 40 days (in increments of 1 day).

Gas flow time setting:

- The time during which calibration gas is supplied
- 60 seconds to 900 seconds (in increments of 1 second)

**High/low limit alarm:**

When a measured value has gone beyond the upper limit or below the lower limit, the analyzer closes the contact to emit an alarm signal.

**Instrument error contact output:**

The contact is closed when an analyzer error (error No. 1 or 10) occurs.

**Calibration error contact output:**

The contact is closed if a calibration error (error No. 4, 5, 6, 7, or 9) occurs.

**Auto calibration status contact output:**

The contact is closed during auto calibration.

**Pump ON/OFF contact output:**

The contact is closed during measurement, and opened during calibration so that the sample gas flow is stopped during calibration

**Optional Functions****O<sub>2</sub> conversion:**

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

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

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

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

O<sub>s</sub>: Measured O<sub>2</sub> concentration (limit configurable within 1–20%)

O<sub>n</sub>: Reference O<sub>2</sub> concentration (configurable within 0–19%)

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

The analyzer can take measurement every 30 seconds, and calculate the moving average of:

- the instantaneous concentrations after O<sub>2</sub> correction or
- the instantaneous O<sub>2</sub> concentrations.

You can set the period for averaging in the range of 1–59 min (in one-minute increment) or 1–4 hour (in one-hour increment).

The analyzer transmits the moving average output every 30 seconds.

**Average value resetting:**

You can reset the average values by short-circuiting the average value resetting input terminal for 1.5 seconds or longer. You can start averaging over by opening it.

**CO concentration peak count alarm:**

(available option only for CO and O<sub>2</sub> analyzer)

The analyzer counts the number of times that the CO instantaneous value has reached the concentration limit you set. When the count per hour has reached the limit you set, the alarm is triggered.

**Communication function:**

RS-232C

9-pin D-sub connector

Half-duplex bit serial, Start-stop synchronization

Modbus RTU™ protocol

The communication function allows the analyzer to read and write parameters, and read measured concentration values and instrument status.

For connection to RS-485 interface, an RS232C–RS485 converter is required.

**Performance****Repeatability:**

±0.5% of full scale

±1% of full scale (for ranges below 0–50 ppm)

**Linearity:**

±1% of full scale

**Zero drift:**

±1% of full scale per week

±2% of full scale per week (for ranges between 0–50 ppm and 0–200 ppm)

±2% of full scale per day (for ranges below 0–50 ppm)

**Span drift:**

±2% of full scale per week

±2% of full scale per day (for ranges below 0–50 ppm)

**Response time for 90% FS response:**

15 seconds electrical response

- Response time when the gas flow rate is 0.5 L/min is within 60 seconds including replacement time of sample gas.
- Gas replacement time depends on the number of measuring components and range.

**Standard Requirements for Sample Gas****Flow rate:**

0.5L / min ±0.2L / min

**Temperature:**

0 to 50°C

**Pressure:**

10 kPa or less (Gas outlet should be opened to the atmospheric air.)

**Dust:**

100 µg/Nm<sup>3</sup> or less in particle size of 0.3 µm or less

**Mist:**

Unallowable

**Moisture:**

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

**Corrosive component:**

1 ppm or less

**Standard gas for calibration:**

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

Span gas; a component same as the measuring target, having concentration of 90–100% of its measuring range (recommended). Gas beyond a concentration of 100% FS is unusable.

In the case where an external zirconia O<sub>2</sub> analyzer is installed and calibration is carried out on the same calibration gas line as the other components:

Zero gas; Dry air or atmospheric air (Atmospheric air is not allowed if your measuring target includes CO<sub>2</sub>.)

Span gas; For other than O<sub>2</sub> measurement, use a gas that has concentration of 90–100% of its measuring range. For O<sub>2</sub> measurement, use 1–2 vol% O<sub>2</sub>.

**Installation Requirements**

- Indoor use. Select a place where the analyzer does not receive direct sunshine, wind and rain, or radiation from hot substances. If such a place cannot be found, a roof or cover should be prepared for protection.
- Avoid a place where the analyzer receives heavy vibration.
- Select a place where atmospheric air is clean.
- Discharge the exhaust gas to the safe place to the atmosphere.
- Do not use the analyzer in hazardous area.
- Altitude: up to 2187 yards (2000 m)

**EU Directive Compliance****LVD (2014/35/EU)**

EN 61010-1

EN 62311

**EMC (2014/30/EU)**

EN 61326-1 (Table 2)

EN 55011 (Group 1 Class A)

EN 61000-3-2 (Class A)

EN 61000-3-3

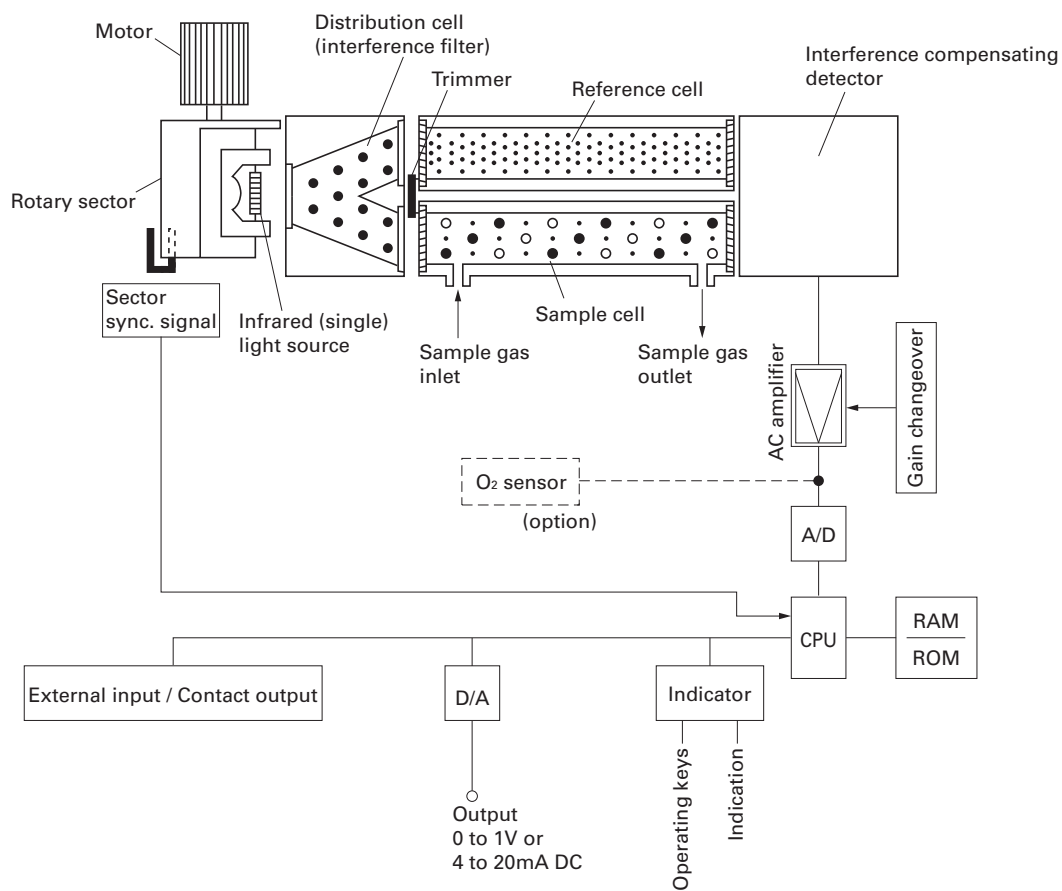
EN 61326-2-3

\*The analyzer conforms to the EMC requirements only when installed in a steel cabinet.

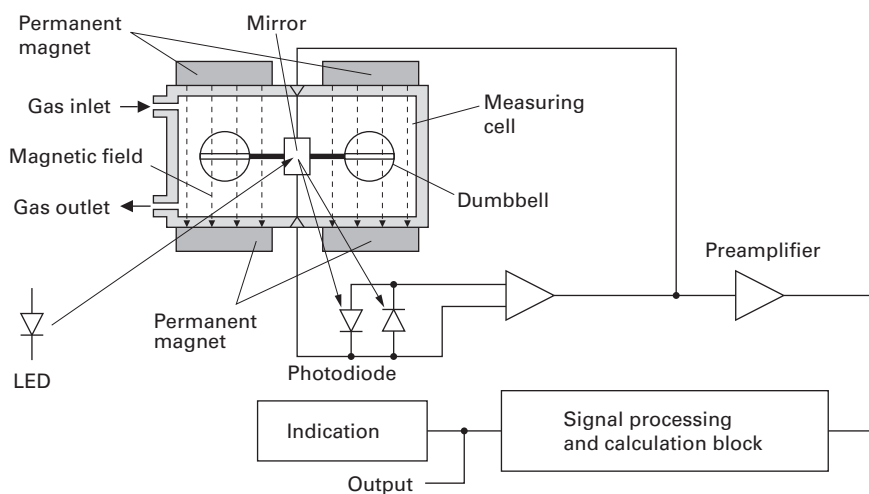
**RoHS (2011/65/EU)**

EN 50581

### Principle diagram of NDIR type measurement (For NO, SO<sub>2</sub>, CO<sub>2</sub>, CO, CH<sub>4</sub>, N<sub>2</sub>O)



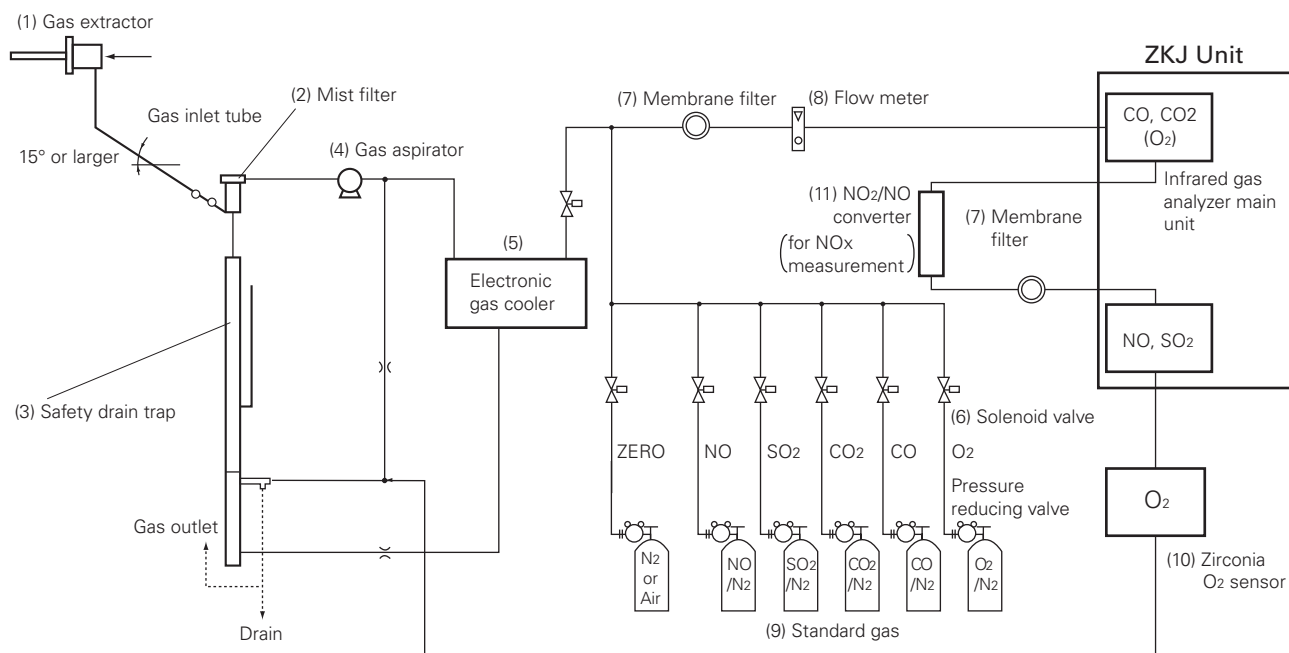
### Principle diagram of paramagnetic type measurement (For O<sub>2</sub>)



## Example configuration of gas sampling system

The following illustrates a typical system configuration for 5 component gas measurement for monitoring combustion exhaust gas from boiler, refuse incinerator, etc.

Contact FUJI ELECTRIC for system configuration matching the particular use or further information.



### Functions of Individual Components

- (1) Gas extractor:  
Gas extractor with a heating type stainless steel filter of standard mesh 40 $\mu$ m
- (2) Mist filter:  
For separation of drain and removal of dust and mist
- (3) Safety drain trap:  
Prevention of drain from being sucked and composite operation of constant-pressure bubbler
- (4) Gas aspirator:  
For aspiration of sample gas (sample gas flow rate approx. 2L/min)
- (5) Electronic gas cooler:  
Dries the moisture in sample gas to a dew point of approx. 2°C.
- (6) Solenoid valve:  
Used for introducing calibration gas.
- (7) Membrane filter:  
PTFE filter used to eliminate fine dust particles and permit monitoring of dust adhering condition on the front panel of the gas analyzer.
- (8) Flow meter:  
Adjusts and monitors the flow rate of sample gas.
- (9) Standard gas:  
Reference gas used for calibrating zero and span of the analyzer. Total 6 cylinders required for zero (N<sub>2</sub> or air) and span (NO<sub>x</sub>, SO<sub>2</sub>, CO<sub>2</sub>, CO, O<sub>2</sub>) calibration.
- (10) Zirconia O<sub>2</sub> sensor:  
(This is not necessary in case when the O<sub>2</sub> sensor is built-in.)  
External zirconia oxygen sensor used for measuring the oxygen concentration (0 to 25%) in sample gas.
- (11) Converter:  
Added to NO<sub>x</sub> analyzer.  
A special catalyst material for efficient conversion of NO<sub>2</sub> gas to NO is used.

\*(Note) Refer to the separate Data Sheet for each gas sampling device.

## SCOPE OF DELIVERY

- Gas analyzer ... 1 unit
- Input/output terminal module for external mounting... 1 set
- Connection cable (1m) between main unit and input/output terminal module ... 1 pc
- Power cord (standard inlet type 2m) ... 1 pc
- Spare fuses (250V, 3.15A AC, delay type) ... 2 pcs
- Cell mounting tool (when using the block cell) ... 1 pc
- Instruction manual ... 1 copy
- Relay board ... 1 pc (when the version with relay board is selected)
- Cable for relay board ... 1 pc (when the version with relay board is selected)
- Housing ... 8 pc (when the version with relay board is selected)
- Contact ... 16 pc (when the version with relay board is selected)

## ORDERING INFORMATION

1. Code symbols
2. Application and composition of sample gas (when "Z" is selected at the 23th digit)

## Items to be prepared separately

- Various sampling devices (refer to Data Sheets for the sampling devices)
- Dedicated zirconia O<sub>2</sub> sensor (see Page 16)



Digit	Description	note	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	← Digit No. of code
17	<Measuring range> 4th component	note 4	Z	K	J	F		6																		
18	Minimum range	Maximum range																								
	None	None																		Y	Y					
	0 to 50ppm	0 to 1000ppm																		A	F					
	0 to 100ppm	0 to 2000ppm																		B	G					
	0 to 200ppm	0 to 500ppm																		C	E					
	0 to 200ppm	0 to 2000ppm																		C	G					
	0 to 200ppm	0 to 5000ppm																		C	H					
	0 to 500ppm	0 to 1%																		E	J					
	0 to 1000ppm	0 to 2%																		F	K					
	0 to 5000ppm	0 to 10%																		H	M					
	0 to 1%	0 to 20%																		J	N					
	0 to 2%	0 to 50%																		K	P					
	0 to 10%	0 to 20%																		M	N					
	0 to 10%	0 to 100%																		M	R					
19	<O <sub>2</sub> analyzer, 1st range>	note 4																								
20	Minimum range	Maximum range																								
	None	None																				Y	Y			
	0 to 5%	0 to 25%																				L	V			
	0 to 10%	0 to 25%																				M	V			
	Other																					Z	Z			
21	<Output>																									
	4 to 20mA DC																									
	0 to 1V DC																									
	4 to 20mA DC + Communication function																									
	0 to 1V DC + Communication function																									
22	<O <sub>2</sub> conversion and O <sub>2</sub> average value output>	note 6 note 7																								
	None																									
	With O <sub>2</sub> conversion output																									
	With peak alarm																									
	With O <sub>2</sub> conversion output and peak alarm																									
23	<Adjustment, Range designation>																									
	For combustion exhaust gas (specified range)	note 8a)																								
	For combustion exhaust gas																									
	For combustion exhaust gas (specified range)	note 8a)b)																								
	Unit mg/m <sup>3</sup>																									
	For combustion exhaust gas, Unit mg/m <sup>3</sup>	note 8b)																								
	Others	note 9																								

- Note 1** a) When "B" is specified at the 6th digit, O<sub>2</sub> sensor signal has to be set as 0-1V DC linear corresponding to full scale.  
b) External Zirconia O<sub>2</sub> sensor and external O<sub>2</sub> analyzer are not included in the scope of supply, and has to be separately ordered.
- Note 2** Resin coupling with purging cannot be manufactured.
- Note 3** Rated voltage, plug type and applicable standard of the attached power cord is different depending on the code "J", "E", "U" and "C" in the 10th digit.  
Select appropriate cord according to operating power supply voltage in the final destination.
- Note 4** Measuring range can be selected within either the minimum or maximum range.  
(Within min. or max. range, you can change the actual range settings locally.)  
Initial setting from Fuji factory is Min. range for the 1st range, and Max. range for the 2nd range.  
When range preset at Fuji factory is required, please select "specified range" at 23rd digit and inform Fuji of specified range table.  
Refer to Table 1, for possible combination of measuring components and ranges in the data sheet.
- Note 5** "1E" can be specified at 11th & 12th digits, ONLY for CO<sub>2</sub> measurement.  
In this case, be sure to select "with purging" at 7th digit.
- Note 6** O<sub>2</sub> conversion is calculated only for NO, SO<sub>2</sub> and CO.  
Both average value output after O<sub>2</sub> calculation and O<sub>2</sub> average value output are provided at the same time.  
a) Peak count alarm can be added only for CO measurement.
- Note 7** When "Y" is specified at the 6th digit, 22nd digit always has to be specified as "Y".
- Note 8** a) If you would like Fuji to deliver ZKJ analyzer with specific range setting, select "specified range" and separately inform Fuji of the actual range of each component together with your purchase order.  
b) In case that the measurement unit is specified as "mg/m<sup>3</sup>", it is necessary to select "unit : mg/m<sup>3</sup>" (Code "F" or "G") at the 23rd digit.  
Please refer to the table shown below for the corresponding range code based on "mg/m<sup>3</sup>".

Range code	Corresponding range in mg/m <sup>3</sup> or g/m <sup>3</sup>							
	In ppm		NO		SO <sub>2</sub>		CO	
	Min. range	Max. range	Min. range	Max. range	Min. range	Max. range	Min. range	Max. range
<b>AF</b>	0-50ppm	0-1000ppm	0-70mg/m <sup>3</sup>	0-1300mg/m <sup>3</sup>	0-150mg/m <sup>3</sup>	0-2800mg/m <sup>3</sup>	0-65mg/m <sup>3</sup>	0-1250mg/m <sup>3</sup>
<b>BG</b>	0-100ppm	0-2000ppm	0-140mg/m <sup>3</sup>	0-2600mg/m <sup>3</sup>	0-300mg/m <sup>3</sup>	0-5500mg/m <sup>3</sup>	0-130mg/m <sup>3</sup>	0-2500mg/m <sup>3</sup>
<b>CH</b>	0-200ppm	0-5000ppm	0-280mg/m <sup>3</sup>	0-6600mg/m <sup>3</sup>	0-600mg/m <sup>3</sup>	0-14g/m <sup>3</sup>	0-250mg/m <sup>3</sup>	0-6250mg/m <sup>3</sup>

- Note 9** When "Z" is specified at the 23rd digit, a gas composition table of actual measured gas has to be sent to Fuji together with your purchase order.
- Note 10** When only N<sub>2</sub>O analyzer is used, make sure not to contain any components other than N<sub>2</sub>O.  
Multicomponent analyzers including N<sub>2</sub>O analyzer + CO<sub>2</sub> analyzer are used for sludge incineration.  
In this case, the range of N<sub>2</sub>O is 0 to 200ppm/500ppm, and the range of CO<sub>2</sub> is 0 to 10%/20%.

**Table 1. Measurable component and range – availability check table –**

**(1) Components of single-component analyzer and double-component analyzer (NO/CO), and CO of 3-component analyzer (NO/SO<sub>2</sub>/CO)**

As shown in the range code, when “P”, “A”, “D”, “B”, and “E” are specified at 5th digit, each component is given at 11th and 12th digits. When “H” is specified, NO is given at 11th and 12th digits and CO at 13th and 14th digits. When “L” is specified, CO is given at 15th and 16th digits.

Code symbol 5th digit	Range code Range	1E	AF	BG	CH	EJ	FK
		0-20ppm 0-500ppm	0-50ppm 0-1000ppm	0-100ppm 0-2000ppm	0-200ppm 0-5000ppm	0-500ppm 0-1%	0-1000ppm 0-2%
P,H	NO		○	○	○		
A	SO <sub>2</sub>		○	○	○	○	
D	CO <sub>2</sub>	○	○	○	○	○	○
B,H,L	CO		○⊙	○⊙	○⊙	○	○
E	CH <sub>4</sub>				○	○	○

Code symbol 5th digit	Range code Range	GL	HM	JN	KM	KP	MR	CG
		0-2000ppm 0-5%	0-5000ppm 0-10%	0-1% 0-20%	0-2% 0-10%	0-2% 0-50%	0-10% 0-100%	0-200ppm 0-2000ppm
P,H	NO							
A	SO <sub>2</sub>				○			
D	CO <sub>2</sub>	○	○	○		○	○	
B,H,L	CO		○	○		○	○	
E	CH <sub>4</sub>	○	○	○		○	○	
Q	N <sub>2</sub> O							○

○ : Single component analyzers (5th code P, A, D, B, E), NO of NO/CO analyzer (5th code H)  
 ⊙ : CO of NO/CO analyzer (5th code H) , CO of NO/SO<sub>2</sub>/CO analyzer (5th code L)

**(2) NO/SO<sub>2</sub> of double-component analyzer (NO/SO<sub>2</sub>), three-component analyzer (NO/SO<sub>2</sub>/CO) and 4-component analyzer (NO/SO<sub>2</sub>/CO<sub>2</sub>/CO)**

Measurable components	Code symbol, 11th, and 12th digits.	Measurable components		2nd component SO <sub>2</sub>		
		Code symbol, 13th, and 14th digits.	AF	BG	CH	
1st component, NO	AF	1st 0-50ppm 0-1000ppm	2nd 0-50ppm 0-1000ppm	○	○	
	BG	0-100ppm 0-2000ppm		○	○	
	CH	0-200ppm 0-5000ppm				○

○ : Combination is available.

**(3) CO<sub>2</sub>/CO of 2-component analyzer (CO<sub>2</sub>/CO) and 4-component analyzer (NO/SO<sub>2</sub>/CO<sub>2</sub>/CO)**

When “G” is specified at 5th digit, CO<sub>2</sub> is given at 11th and 12th digits, and CO at 13th and 14th digits. When “M” is specified, CO<sub>2</sub> is given at 15th and 16th digits, and CO at 17th and 17th digits.

Measurable components	Range code	2nd	2nd component, CO								
			AF	BG	CH	EJ	FK	HM	JN	KP	MR
1st component, CO <sub>2</sub>	AF	0-50ppm 0-1000ppm	○⊙	○⊙	○⊙						
	BG	0-100ppm 0-2000ppm	○⊙	○⊙	○⊙	○					
	CH	0-200ppm 0-5000ppm	○⊙	○⊙	○⊙	○					
	EJ	0-500ppm 0-1%				○	○				
	FK	0-1000ppm 0-2%					○				
	GL	0-2000ppm 0-5%						○			
	HM	0-5000ppm 0-10%						○	○		
	JN	0-1% 0-20%							○	○	
	KP	0-2% 0-50%								○	
	MR	0-10% 0-100%									○
MN	0-10% 0-20%	○⊙	○⊙	○⊙	○						

○ : CO<sub>2</sub>/CO analyzer (5th code G)  
 ⊙ : NO/SO<sub>2</sub>/CO<sub>2</sub>/CO analyzer (5th code M)



(4) N<sub>2</sub>O/CO<sub>2</sub> of 2-component analyzer N<sub>2</sub>O/CO<sub>2</sub>, 3-component analyzer NO/N<sub>2</sub>O/CO<sub>2</sub>, SO<sub>2</sub>/N<sub>2</sub>O/CO<sub>2</sub>, N<sub>2</sub>O/CO<sub>2</sub>/CO, CH<sub>4</sub>/N<sub>2</sub>O/CO<sub>2</sub> and 4-component analyzer (NO/SO<sub>2</sub>/N<sub>2</sub>O/CO<sub>2</sub>)

Range code: When code symbol is "R" or "U", N<sub>2</sub>O is 11th and 12th digit, CO<sub>2</sub> is 13th and 14th digit.  
 When code symbol is "S", "T" or "V", N<sub>2</sub>O is 13th and 14th digit, CO<sub>2</sub> is 15th and 16th digit  
 When code symbol is "W", N<sub>2</sub>O is 15th and 16th digit, CO<sub>2</sub> is 17th and 18th digit

		Measurable components	2nd component, CO <sub>2</sub>
		Range code	MN
Measurable components	Range code	/	0-10% 0-20%
1st component, N <sub>2</sub> O	CE	0-200ppm 0-500ppm	○

○ : Combination is available.

(5) CO<sub>2</sub> range selection of 3-component analyzer (N<sub>2</sub>O/CO<sub>2</sub>/CO)

Range code: N<sub>2</sub>O is 11th and 12th digit, CO<sub>2</sub> is 13th and 14th, CO is 15th and 16th digit.  
 The range code of CO<sub>2</sub> is "MN".

		Measurable components	2nd component, CO
		Range code	BF
Measurable components	Range code	/	0-100ppm 0-1000ppm
1st component, N <sub>2</sub> O	CE	0-200ppm 0-500ppm	○

○ : Combination is available.

(6) SO<sub>2</sub> range selection of 3-component analyzer (SO<sub>2</sub>/N<sub>2</sub>O/CO<sub>2</sub>)

Range code: SO<sub>2</sub> is 11th and 12th digit, N<sub>2</sub>O is 13th and 14th, CO<sub>2</sub> is 15th and 16th digit.  
 The range code of CO<sub>2</sub> is "MN".

		Measurable components	2nd component, N <sub>2</sub> O
		Range code	CE
Measurable components	Range code	/	0-200ppm 0-500ppm
1st component, SO <sub>2</sub>	AF	0-50ppm 0-1000ppm	○

○ : Combination is available.

(7) CH<sub>4</sub> range selection of 3-component analyzer (CH<sub>4</sub>/N<sub>2</sub>O/CO<sub>2</sub>)

Range code: CH<sub>4</sub> is 11th and 12th digit, N<sub>2</sub>O is 13th and 14th, CO<sub>2</sub> is 15th and 16th digit.  
 The range code of CO<sub>2</sub> is "MN".

		Measurable components	2nd component, N <sub>2</sub> O
		Range code	CE
Measurable components	Range code	/	0-200ppm 0-500ppm
1st component, CH <sub>4</sub>	CH	0-200ppm 0-5000ppm	○

○ : Combination is available.

(8) NO/SO<sub>2</sub>/N<sub>2</sub>O range selection of 4-component analyzer (NO/SO<sub>2</sub>/N<sub>2</sub>O/CO<sub>2</sub>)

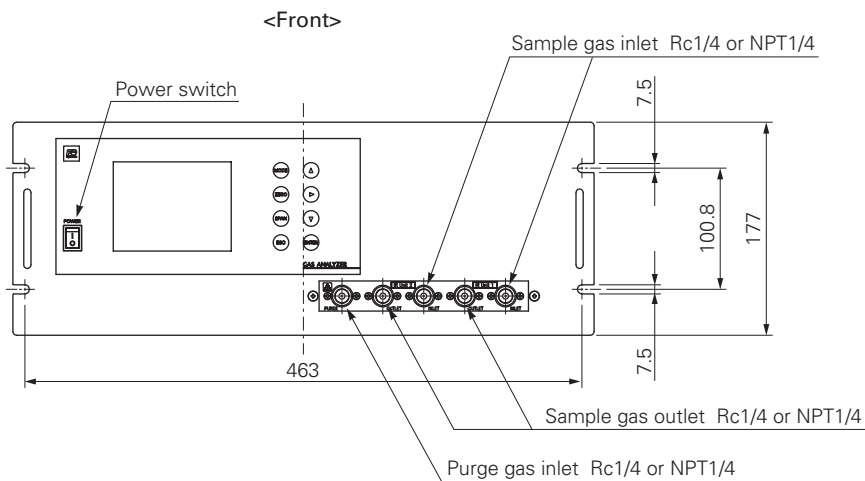
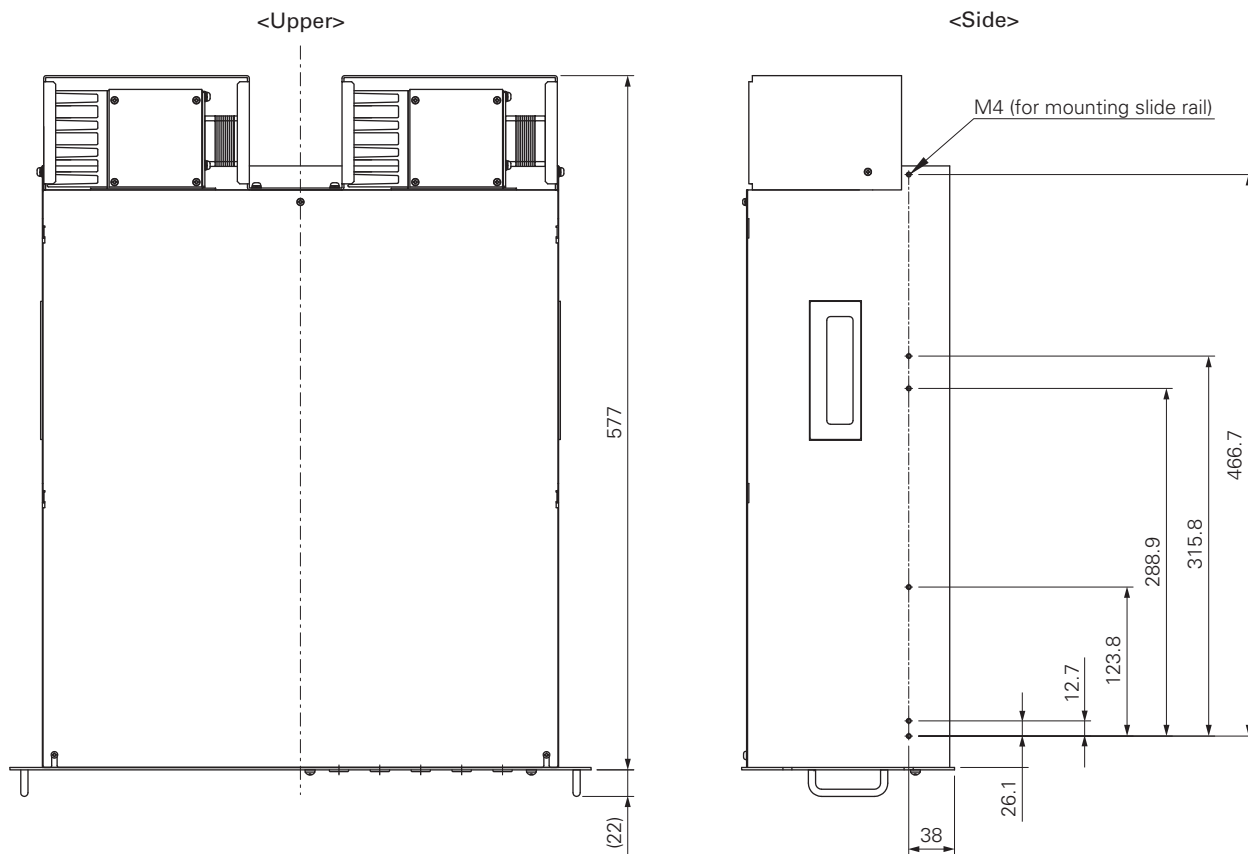
Range code: NO is 11th and 12th digit, SO<sub>2</sub> is 13th and 14th, N<sub>2</sub>O is 15th and 16th, CO<sub>2</sub> is 17th and 18th digit.  
 The range code of CO<sub>2</sub> is "MN".

		Measurable components	2nd component, SO <sub>2</sub>	3rd component, N <sub>2</sub> O
		Range code	AF	CE
Measurable components	Range code	/	0-50ppm 0-1000ppm	0-200ppm 0-500ppm
1st component, NO	AF	0-50ppm 0-1000ppm	○	○
	BG	0-100ppm 0-2000ppm	○	○

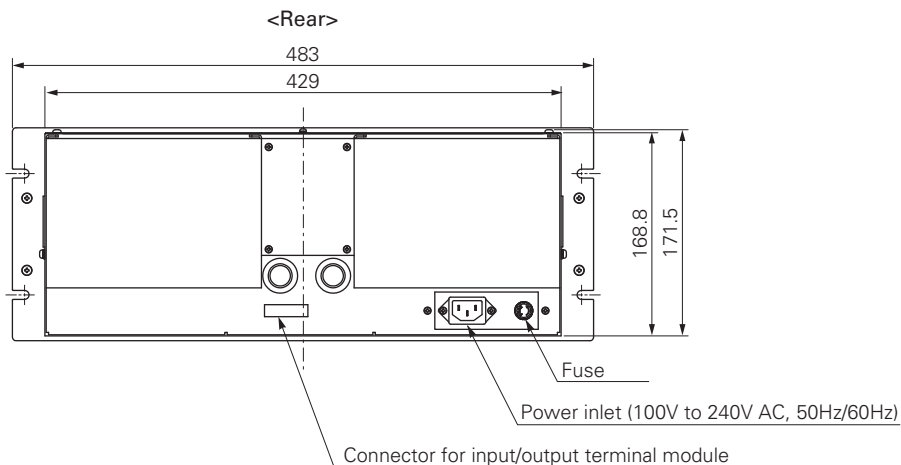
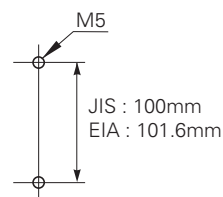
○ : Combination is available.

# OUTLINE DIAGRAM (Unit: mm)

<Analyzer main unit>

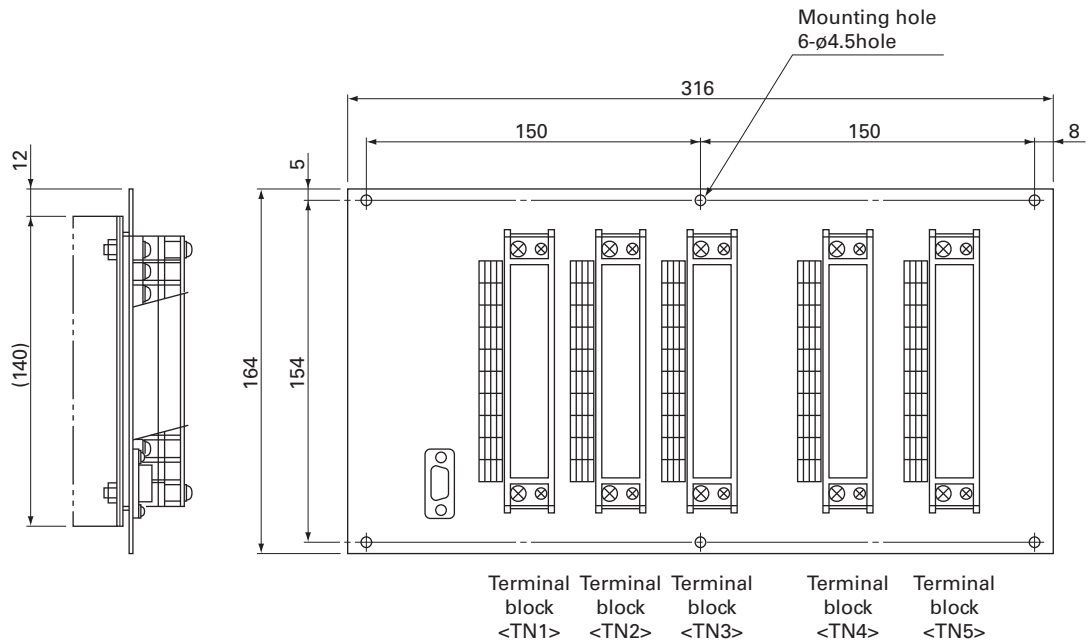


<Rack mounting hole>

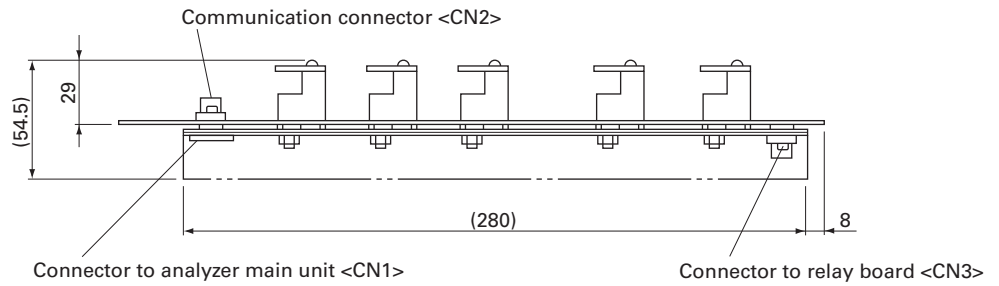


<Input / output terminal module>

(Accessory)

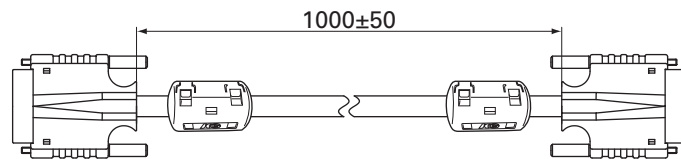


Screw terminals M3.5

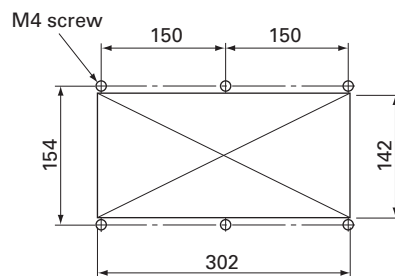


<Cable for connecting input / output terminal>

(Accessory)



<Dimensions for mounting input / output terminal module>

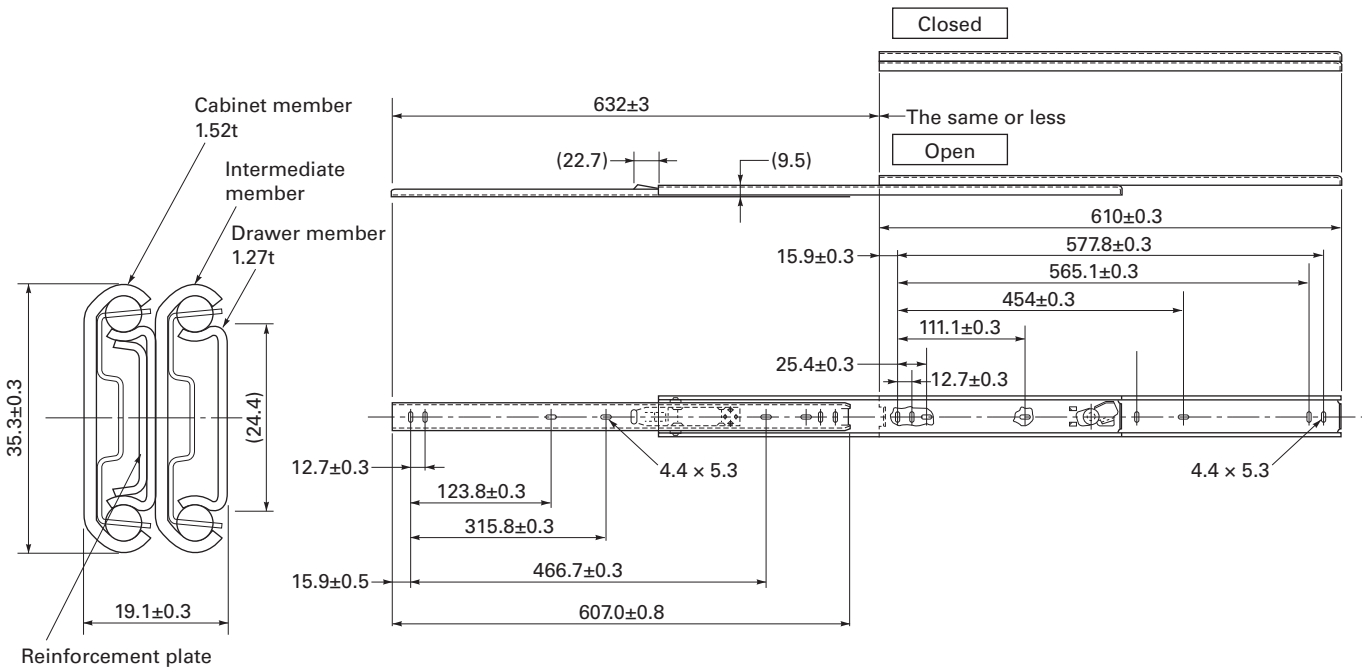


Cut M4 screw holes at 6 positions.  
Drill a rectangular hole of 302 x 142mm or more in the center.

# OUTLINE DIAGRAM OF ACCESSORY SLIDE RAIL (Unit: mm)

\* If you selected C or D in the 9th digit of the code symbol, the analyzer comes with the slide rails attached by screws.

Model : 3532-24/SUGATSUNE KOGYO



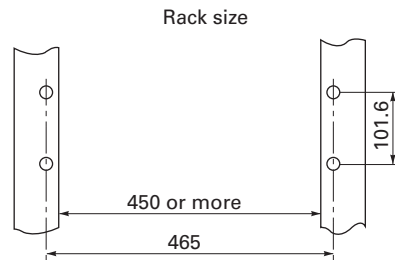
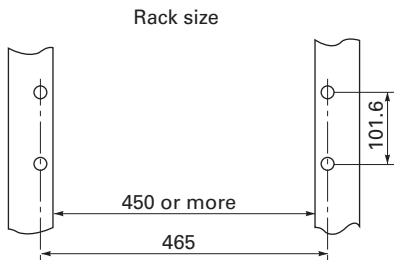
## 19-inch rack mounting method:

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

Also, for facilitate maintenance, a structure which allows extraction of the main unit by using the slide rail is recommended.

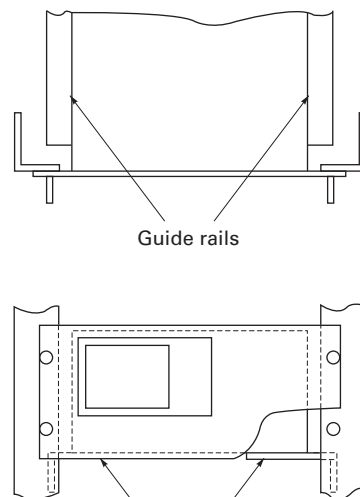
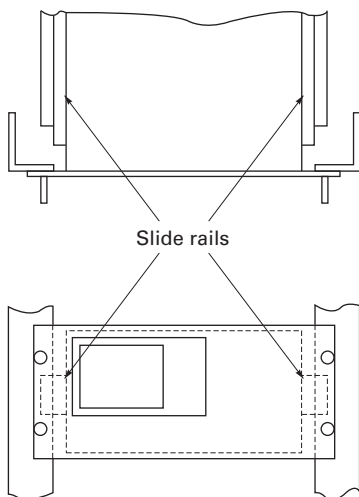
Slide rail mounted type

Guide rail mounted type



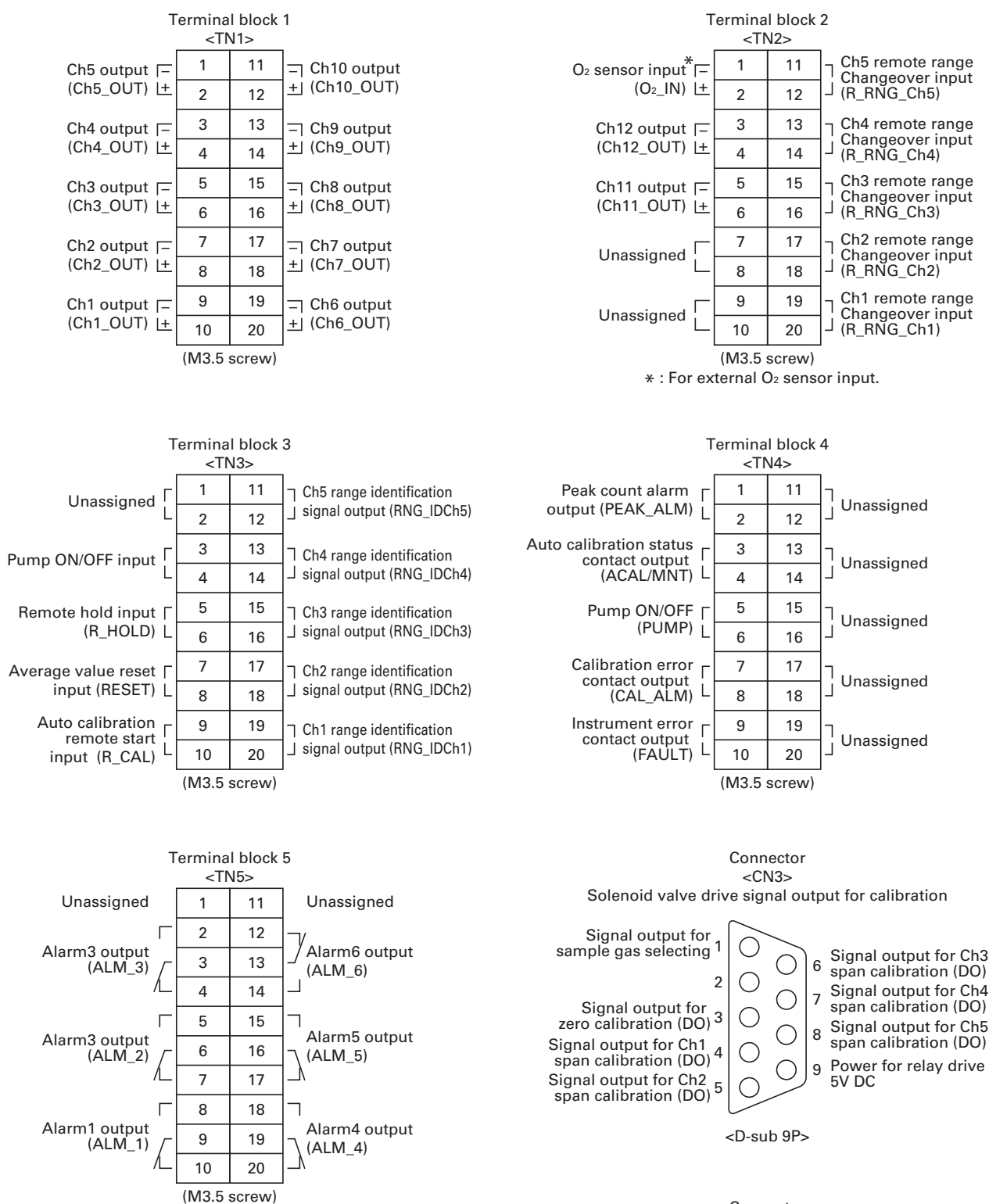
Mounting diagram

Mounting diagram



**Guide rails**  
For the guide rail mounted type, a maintenance space (200mm or more) should be provided upper the main unit.

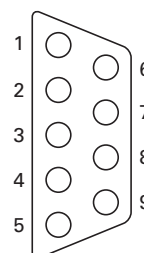
# EXTERNAL CONNECTION DIAGRAM



Note 1) Unassigned terminals are used for internal connection. So they should not be used as repeating terminals either.

Note 2) The allocation of each Channel (Ch1 to Ch12) depends on measured gas components. Refer to Table 2.

**Connector**  
<CN2>  
For serial communication

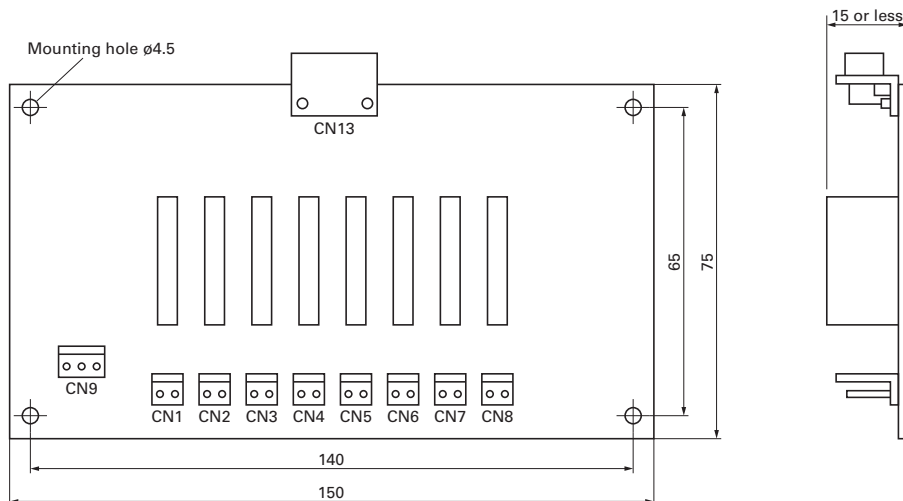


## Dedicated relay board

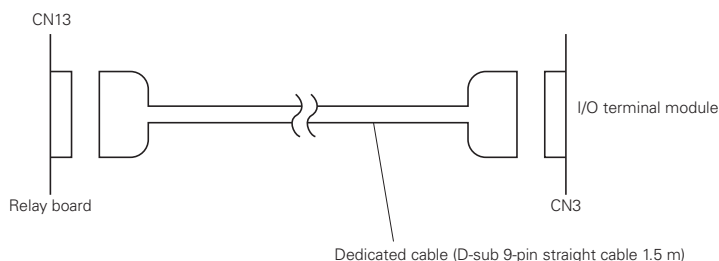
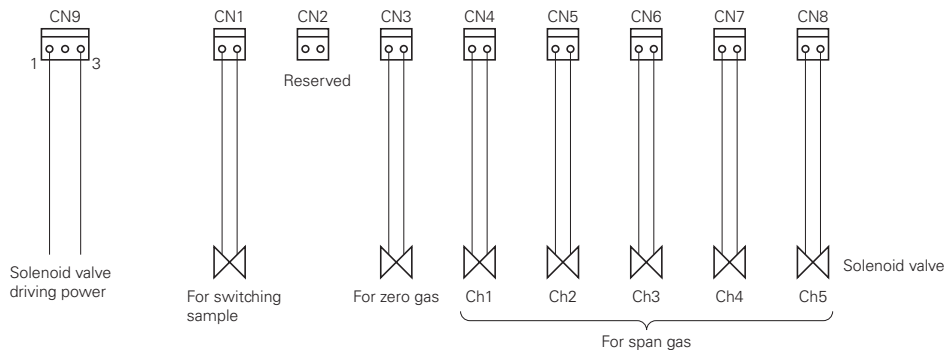
This relay board receives signals from connector CN3 of the ZKJ I/O terminal module and activates the calibration solenoid valve directly.

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

## OUTLINE DIAGRAM (Unit: mm)



## CONNECTIONS



## Recommended connector

- CN1 to CN8 : Housing ; VHR-2N  
(Nihon Solderless Terminal)
- CN9 : Housing ; VHR-3N  
(Nihon Solderless Terminal)  
Contact ; SVH-21T-1.1  
(Nihon Solderless Terminal)

When "A" or "D" is specified at the 9th digit, housing and contact are attached.

## Contact action

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

## Table 2. Correspondence between measurement channels and measured value

The following table gives measurement channels and their contents according to the code symbols.

Code symbol			Contents
5th digit	6th digit	22nd digit	
P	Y	Y	Ch1: NO
A	Y	Y	Ch1: SO <sub>2</sub>
D	Y	Y	Ch1: CO <sub>2</sub>
B	Y	Y	Ch1: CO
E	Y	Y	Ch1: CH <sub>4</sub>
F	Y	Y	Ch1: NO, Ch2: SO <sub>2</sub>
H	Y	Y	Ch1: NO, Ch2: CO
G	Y	Y	Ch1: CO <sub>2</sub> , Ch2: CO
L	Y	Y	Ch1: NO, Ch2: SO <sub>2</sub> , Ch3: CO
M	Y	Y	Ch1: NO, Ch2: SO <sub>2</sub> , Ch3: CO <sub>2</sub> , Ch4: CO
P	A, B, C	A	Ch1: NO <sub>x</sub> , Ch2: O <sub>2</sub> , Ch3: Converted NO <sub>x</sub> , Ch4: Converted NO <sub>x</sub> average, Ch5: O <sub>2</sub> average
A	A, B, C	A	Ch1: SO <sub>2</sub> , Ch2: O <sub>2</sub> , Ch3: Converted SO <sub>2</sub> , Ch4: Converted SO <sub>2</sub> average, Ch5: O <sub>2</sub> average
B	A, B, C	A	Ch1: CO, Ch2: O <sub>2</sub> , Ch3: Converted CO, Ch4: Converted CO average, Ch5: O <sub>2</sub> average
F	A, B, C	A	Ch1: NO <sub>x</sub> , Ch2: SO <sub>2</sub> , Ch3: O <sub>2</sub> , Ch4: Converted NO <sub>x</sub> , Ch5: Converted SO <sub>2</sub> , Ch6: Converted NO <sub>x</sub> average, Ch7: Converted SO <sub>2</sub> average, Ch8: O <sub>2</sub> average
H	A, B, C	A	Ch1: NO <sub>x</sub> , Ch2: CO, Ch3: O <sub>2</sub> , Ch4: Converted NO <sub>x</sub> , Ch5: Converted CO, Ch6: Converted NO <sub>x</sub> average, Ch7: Converted CO average, Ch8: O <sub>2</sub> average
G	A, B, C	A	Ch1: CO <sub>2</sub> , Ch2: CO, Ch3: O <sub>2</sub> , Ch4: Converted CO, Ch5: Converted CO average, Ch6: O <sub>2</sub> average
L	A, B, C	A	Ch1: NO <sub>x</sub> , Ch2: SO <sub>2</sub> , Ch3: CO, Ch4: O <sub>2</sub> , Ch5: Converted NO <sub>x</sub> , Ch6: Converted SO <sub>2</sub> , Ch7: Converted CO, Ch8: Converted NO <sub>x</sub> average, Ch9: Converted SO <sub>2</sub> average, Ch10: Converted CO average, Ch11: O <sub>2</sub> average
M	A, B, C	A	Ch1: NO <sub>x</sub> , Ch2: SO <sub>2</sub> , Ch3: CO <sub>2</sub> , Ch4: CO, Ch5: O <sub>2</sub> , Ch6: Converted NO <sub>x</sub> , Ch7: Converted SO <sub>2</sub> , Ch8: Converted CO, Ch9: Converted NO <sub>x</sub> average, Ch10: Converted SO <sub>2</sub> average, Ch11: Converted CO average, Ch12: O <sub>2</sub> average
B	A, B, C	B	Ch1: CO, Ch2: O <sub>2</sub>
H	A, B, C	B	Ch1: NO, Ch2: CO, Ch3: O <sub>2</sub>
G	A, B, C	B	Ch1: CO <sub>2</sub> , Ch2: CO, Ch3: O <sub>2</sub>
L	A, B, C	B	Ch1: NO, Ch2: SO <sub>2</sub> , Ch3: CO, Ch4: O <sub>2</sub>
M	A, B, C	B	Ch1: NO, Ch2: SO <sub>2</sub> , Ch3: CO <sub>2</sub> , Ch4: CO, Ch5: O <sub>2</sub>
B	A, B, C	C	Ch1: CO, Ch2: O <sub>2</sub> , Ch3: Converted CO, Ch4: Converted CO average, Ch5: O <sub>2</sub> average
H	A, B, C	C	Ch1: NO <sub>x</sub> , Ch2: CO, Ch3: O <sub>2</sub> , Ch4: Converted NO <sub>x</sub> , Ch5: Converted CO, Ch6: Converted NO <sub>x</sub> average, Ch7: Converted CO average, Ch8: O <sub>2</sub> average
G	A, B, C	C	Ch1: CO <sub>2</sub> , Ch2: CO, Ch3: O <sub>2</sub> , Ch4: Converted CO, Ch5: Converted CO average, Ch6: O <sub>2</sub> average
L	A, B, C	C	Ch1: NO <sub>x</sub> , Ch2: SO <sub>2</sub> , Ch3: CO, Ch4: O <sub>2</sub> , Ch5: Converted NO <sub>x</sub> , Ch6: Converted SO <sub>2</sub> , Ch7: Converted CO, Ch8: Converted NO <sub>x</sub> average, Ch9: Converted SO <sub>2</sub> average, Ch10: Converted CO average, Ch11: O <sub>2</sub> average
M	A, B, C	C	Ch1: NO <sub>x</sub> , Ch2: SO <sub>2</sub> , Ch3: CO <sub>2</sub> , Ch4: CO, Ch5: O <sub>2</sub> , Ch6: Converted NO <sub>x</sub> , Ch7: Converted SO <sub>2</sub> , Ch8: Converted CO, Ch9: Converted NO <sub>x</sub> average, Ch10: Converted SO <sub>2</sub> average, Ch11: Converted CO average, Ch12: O <sub>2</sub> average
Q	Y	Y	Ch1:N <sub>2</sub> O
R	Y	Y	Ch1:N <sub>2</sub> O, Ch2:CO <sub>2</sub>
S	Y	Y	Ch1:NO, Ch2:N <sub>2</sub> O, Ch3:CO <sub>2</sub>
T	Y	Y	Ch1:SO <sub>2</sub> , Ch2:N <sub>2</sub> O, Ch3:CO <sub>2</sub>
U	Y	Y	Ch1:N <sub>2</sub> O, Ch2:CO <sub>2</sub> , Ch3:CO
V	Y	Y	Ch1:CH <sub>4</sub> , Ch2:N <sub>2</sub> O, Ch3:CO <sub>2</sub>
W	Y	Y	Ch1:NO, Ch2:SO <sub>2</sub> , Ch3:N <sub>2</sub> O, Ch4:CO <sub>2</sub>
S	A, B, C	Y	Ch1:NO, Ch2:N <sub>2</sub> O, Ch3:CO <sub>2</sub> , Ch4:O <sub>2</sub>
T	A, B, C	Y	Ch1:SO <sub>2</sub> , Ch2:N <sub>2</sub> O, Ch3:CO <sub>2</sub> , Ch4:O <sub>2</sub>
U	A, B, C	Y, B	Ch1:N <sub>2</sub> O, Ch2:CO <sub>2</sub> , Ch3:CO, Ch4:O <sub>2</sub>
V	A, B, C	Y	Ch1:CH <sub>4</sub> , Ch2:N <sub>2</sub> O, Ch3:CO <sub>2</sub> , Ch4:O <sub>2</sub>
W	A, B, C	Y	Ch1:NO, Ch2:SO <sub>2</sub> , Ch3:N <sub>2</sub> O, Ch4:CO <sub>2</sub> , Ch5:O <sub>2</sub>
S	A, B, C	A	Ch1:NO <sub>x</sub> , Ch2:N <sub>2</sub> O, Ch3:CO <sub>2</sub> , Ch4:O <sub>2</sub> , Ch5:Converted NO <sub>x</sub> , Ch6:Converted NO <sub>x</sub> average, Ch7:O <sub>2</sub> average
T	A, B, C	A	Ch1:SO <sub>2</sub> , Ch2:N <sub>2</sub> O, Ch3:CO <sub>2</sub> , Ch4:O <sub>2</sub> , Ch5:Converted SO <sub>2</sub> , Ch6:Converted SO <sub>2</sub> average, Ch7:O <sub>2</sub> average
U	A, B, C	A, C	Ch1:N <sub>2</sub> O, Ch2:CO <sub>2</sub> , Ch3:CO, Ch4:O <sub>2</sub> , Ch5:Converted CO, Ch6:Converted CO average, Ch7:O <sub>2</sub> average
V	A, B, C	A	Ch1:CH <sub>4</sub> , Ch2:N <sub>2</sub> O, Ch3:CO <sub>2</sub> , Ch4:O <sub>2</sub> , Ch5:O <sub>2</sub> average
W	A, B, C	A	Ch1:NO <sub>x</sub> , Ch2:SO <sub>2</sub> , Ch3:N <sub>2</sub> O, Ch4:CO <sub>2</sub> , Ch5:O <sub>2</sub> , Ch6:Converted NO <sub>x</sub> , Ch7:Converted SO <sub>2</sub> , Ch8:Converted NO <sub>x</sub> average, Ch9:Converted SO <sub>2</sub> average, Ch10:O <sub>2</sub> average

Note

Note: When the 22nd digit code is A or C, the component of the NO analyzer is displayed as NO<sub>x</sub>.

## Zirconia O<sub>2</sub> analyzer (to be purchased separately)

### Measuring method:

Zirconia system

### Measurable component and measuring range:

Measurable component		Range
O <sub>2</sub>	Oxygen	0 to 25vol%

- 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 ± 0.25L / min

#### Notes:

- If process gas is combustible, measurement error may occur due to oxygen contained in the process gas.
- If process gas is corrosive (for example, SO<sub>2</sub> beyond 250 ppm range), the service life of zirconia sensor may be shortened.

### Gas inlet/outlet size:

Rc<sup>1</sup>/<sub>4</sub> or NPT<sup>1</sup>/<sub>4</sub>

**Power supply:** Rated voltage ; 100 to 115V AC or 200 to 240V AC

Rated frequency ; 50Hz/60Hz  
Max. rated power ; 215VA (at start up)  
65VA (during normal operation)

**Enclosure:** Steel casing, for indoor application  
**Indication:** Temperature indication (LED)

**Temperature alarm output:**  
Contact output 1 from A contact,  
Contact capacity 220V AC, 1A (resistive load)

**Outer dimensions (H x W x D):**  
141 x 170 x 190mm

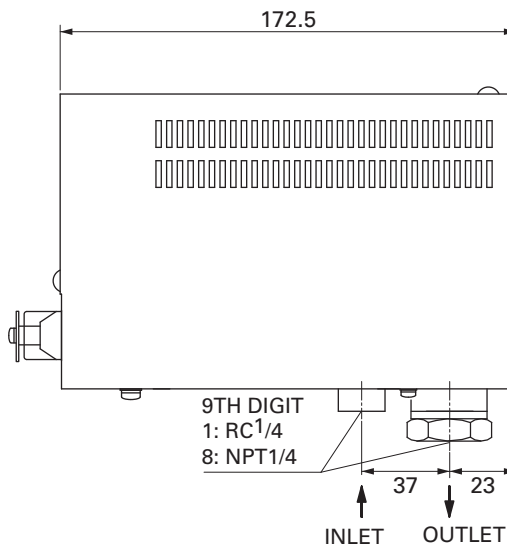
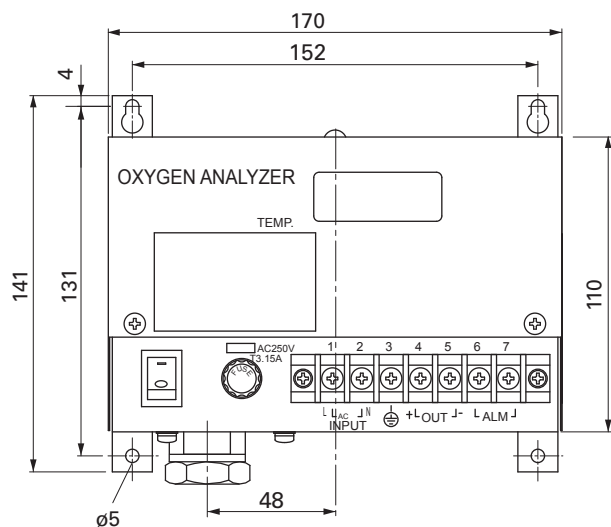
**Weight:** Approx. 3kg

**Finish color:** Munsell 5Y 7/1

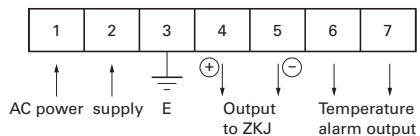
## CODE SYMBOLS

1	2	3	4	5	6	7	8	9	10	11	12	13	Description
Z	F	K	7	Y	Y	4	-	Y	0	Y	Y		Measuring method
													Zirconia method
								9					Power supply
								B					100 to 115V AC 50/60Hz(Standard)
								C					200 to 240V AC 50/60Hz(Standard)
													200 to 240V AC 50/60Hz(CE mark)
													Gas inlet/outlet size
													1: Rc 1/4
													8: NPT 1/4

## DIMENSIONS (Unit: mm)



## EXTERNAL CONNECTION DIAGRAM



Information in this catalog is subject to change without notice.  
Read the instruction manuals thoroughly before using the products.

**F** Fuji Electric Co., Ltd.

www.fujielectric.com

**Instrumentation & Sensors Planning Dept.**

Gate City Ohsaki, East Tower, 11-2, Osaki 1-chome, Shinagawa-ku, Tokyo 141-0032, Japan

Phone: +81-3-5435-7021 Fax: +81-3-5435-7475

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