Fuji Electric

Innovating Energy Technology

INFRARED GAS ANALYZER

Type: ZRE

A maximum of 5 gas components (of NOx, SO_2, CO, CO_2, CH_4, and O_2) can be measured simultaneously and continuously.

Simultaneous and continuous measurement of the concentration of up to 5 gas components

Excellent prolonged stability

Compact size and simple operation

Virtually unaffected by the interference of moisture.

Substantial functions, including automatic calibration, communications, and alarms (Option)

Measurement of 5 components with just one unit

21C1-E-0078a

Compact body packed with abundant functions
Fuji infrared gas analyzer

Sample gas flowmeter

19" rack mount structure
Panel-mount and desktop types are also available.

Power switch

USB connector (Type B) for RS-485 (Modbus) communications

Large LCD (with auto OFF function)

Simple key operation

Mode select switch
Used to switch modes.

Zero calibration key
Used for manual zero calibration.

Span calibration key
Used for manual span calibration

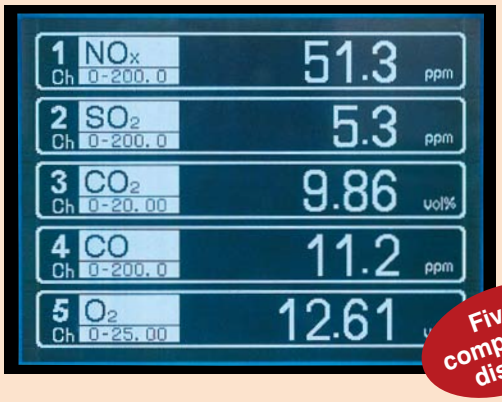
Enter key
Used to confirm the selected items and numeric values.

Up/down key
Used to switch the items to be selected.

Escape key
Used to return to the previous screen or abort setting midway.

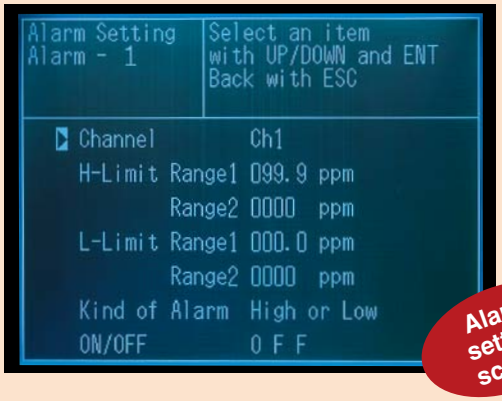
Easy-view large LCD

Instruction in Engrish facilitates operation.

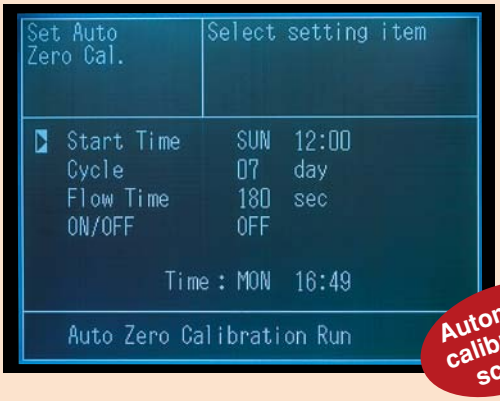


Five-component display

Menu screen

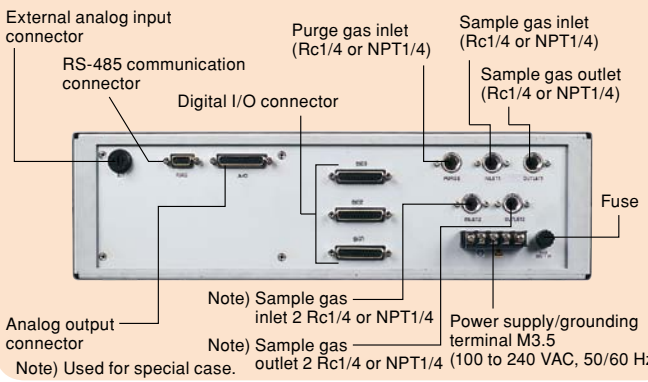


Alarm setting screen



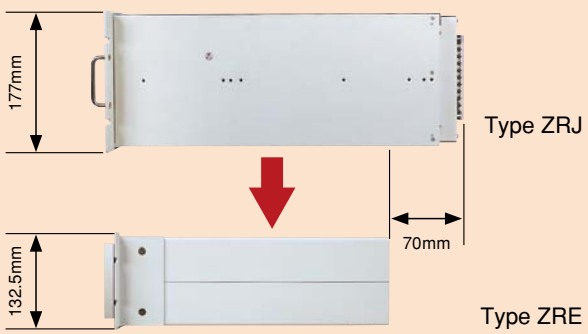
Automatic calibration screen

Neat rear face to facilitate connection



Short depth

Light weight (approximately 8 kg)

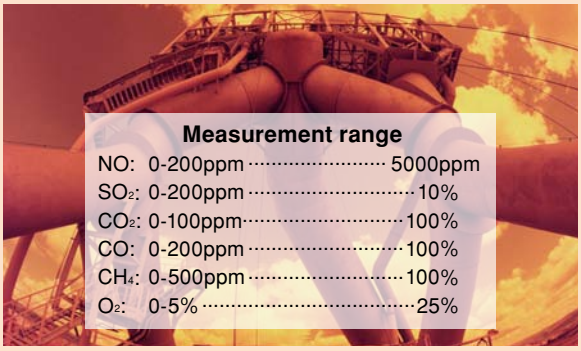


Adoption of our unique infrared ray single-beam system

Measures the concentration of up to 5 gas components simultaneously and continuously.

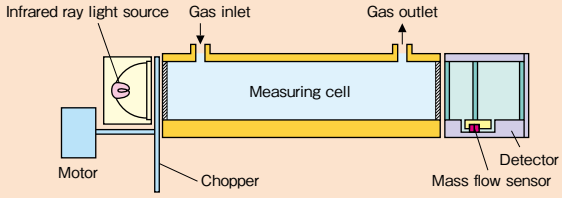
The concentration of five gas components (of SO_2, NOx, CO, CO_2, CH_4, and O_2) can be measured. For example, the components in flue exhaust gas (SO_2, NOx, CO, CO_2, and O_2) can be measured simultaneously and continuously.

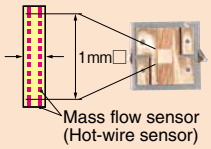
	NO	SO_2	CO	CO_2	CH_4	O_2
Single-component analyzer	○	○	○	○	○	Can be added by designation
Double-component analyzer	○ ○	○	○ ○ ○	○ ○	○ ○	Can be added by designation
Three-component analyzer	○	○	○ ○	○	○	Can be added by designation
Four-component analyzer	○	○	○	○		Can be added by designation



Excellent prolonged stability, easy maintenance, and high-precision measurement with repeatability of 0.5%

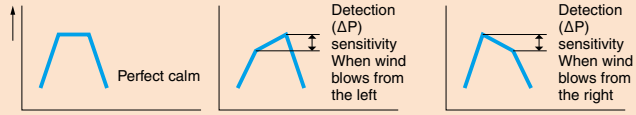
Principle The amount of infrared ray absorbed in the measuring cell is detected with the mass flow sensor.





<Mass flow sensor>
The mass flow sensor, with low impedance, has excellent noise resistance, while the sensor, with no movable parts, is impervious to vibration and can be used on a semi-permanent basis.

Hot-wire temperature



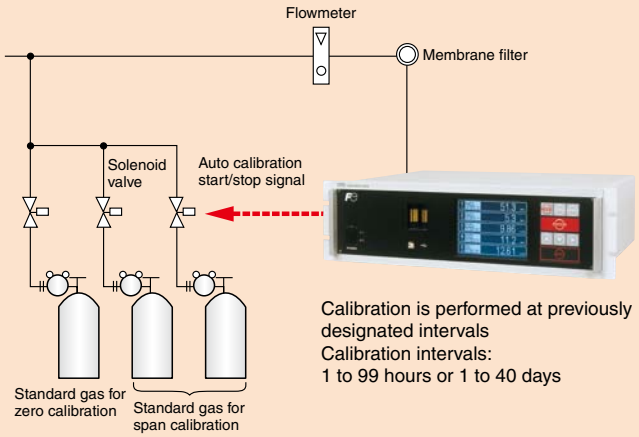
Communication with a PC achieved with RS485 (Modbus) communication function (Option)

RS-485 (Modbus) communication

With the USB connector (gage on the front face), RS485 connector for communication on the rear face

Details of communication: Read/write of various settings, output of measured concentration value and instrument status

Zero/span auto calibration function (option) eliminates irksome calibration work.



Calibration is performed at previously designated intervals
Calibration intervals:
1 to 99 hours or 1 to 40 days

Virtually unaffected by the interference of moisture

Analysis is almost unaffected by any moisture present in the sample gas. Our unique interference correcting function has significantly reduced the effect of moisture.

Interference component	CO_2sensor	COsensor	CH_4sensor	SO_2sensor	NOsensor
H_2O saturation at 20˚C	1% or lower	1% or lower	1% or lower	–	–
H_2O saturation at 2˚C	–	2.5% or lower	–	2% or lower	2% or lower
CO 1000ppm	1% or lower	–	1% or lower	1% or lower	1% or lower
CO_2 15%	–	1% or lower	1% or lower	1% or lower	2% or lower
CH_4 1000ppm	1% or lower	1% or lower	–	50ppm or lower	–

Abundant digital I/O signals (Option)

External digital input signal

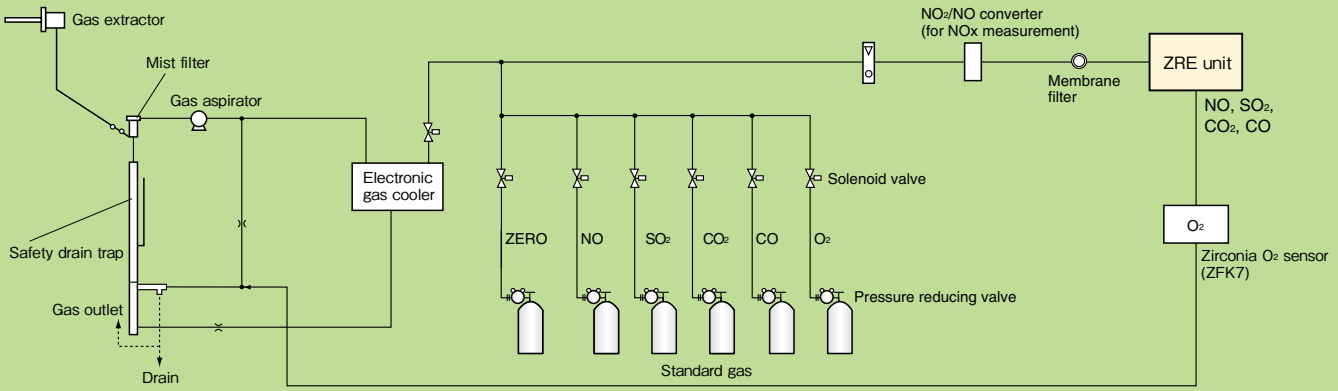
Range switching, auto calibration start, output signal hold, average value reset

Digital output signal (1c relay contact)

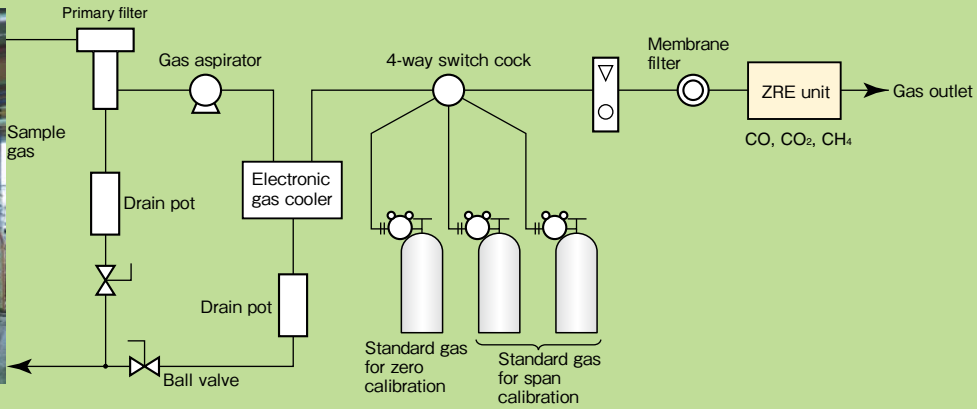
Identification of each component range, instrument failure, calibration error, auto calibration in progress, upper/lower limit alarm for each component, pump ON/OFF, solenoid valve drive for auto calibration

Simple gas sampling system backed by a substantial track record

Example of measurement of exhaust gas from a boiler or refuse incinerator (NO, SO_2, CO, CO_2, and O_2 measurement)



Example of measurement of CO, CH_4, and CO_2 from an industrial furnace



Easy installation to equipment

$NO_2 \rightarrow NO$ gas converter (Type: ZDLO4)

- Target gas: Exhaust gas from general boilers, atmosphere
- Catalyst usage: 2 cm^3
- Catalyst replacement interval: Approximately 1 year
- Flow rate of the gas to be analyzed: 0.5 L/min or lower
- Conversion efficiency: 90% or higher (conforming to JIS)
- Temperature control: Built in
- Power supply voltage: 100 to 240 VAC, 50/60 Hz
- External dimensions: 212(H)x148(W)x130(D) mm

Zirconia oxygen sensor (Type: ZFK7)

- Measurement range: 0 to 25%
- Repeatability: Within ±0.5% of full scale
- Zero drift: Within ±1% of full scale/week
- Span drift: Within ±2% of full scale/week
- Response time: Approximately 20 sec (90% response)
- Temperature control: Built in
- Oxygen concentration display: Displayed on the gas analyzer connected
- Flow rate of the gas measured: 0.5±0.25 L/min
- Power supply voltage: 100 to 115 VAC, 50/60 Hz
- External dimensions: 140(H)x170(W)x190(D) mm

Gas extractor applicable up to 1300°C

(Type: ZBAK2)

- System: Electrical heating
- Maximum temperature of the gas used: 800°C or 1300°C
- Material of the gas-contacting area: SUS316, Viton
- Extractor material: SUS316 or SiC
- Mounting method: Flange
- Sample gas outlet: Rc1/2
- Filter: SUS316 wire mesh (40 µm)
- Power supply voltage: 100 VAC, 50/60 Hz, 100 VA

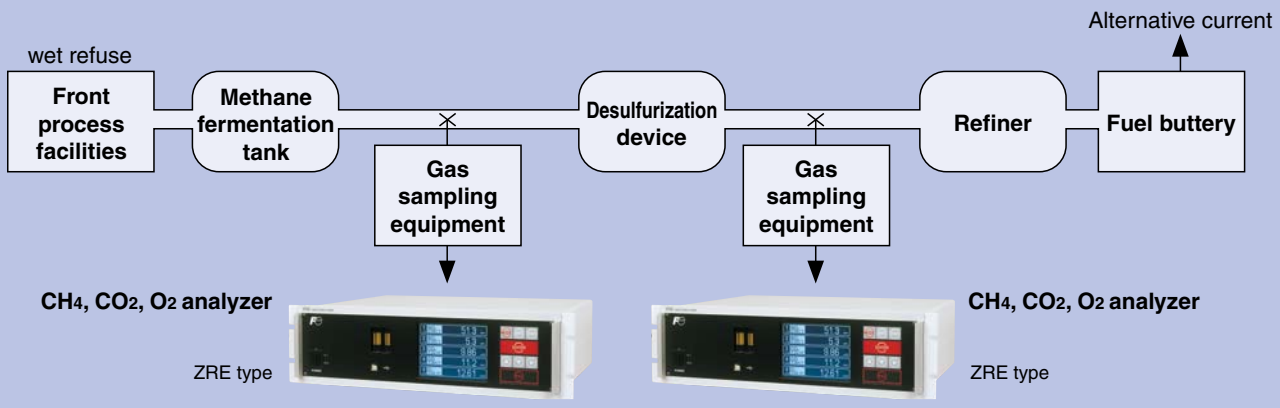
Electronic gas cooler

(Type: ZBC9)

- Fixed dehumidification flow rate (Max.): 1.5 L/min
- Inlet gas temperature: 40°C or lower
- Output gas dew point: 0.5°C to 3°C
- Pressure: 50 kPa (Max.)
- Power supply voltage: 100 VAC, 50/60 Hz
- Gas outlet/inlet: Rc1/4
- Dehumidification check function: With check terminal
- External dimensions: 250(H)x200(W)x167(D) mm

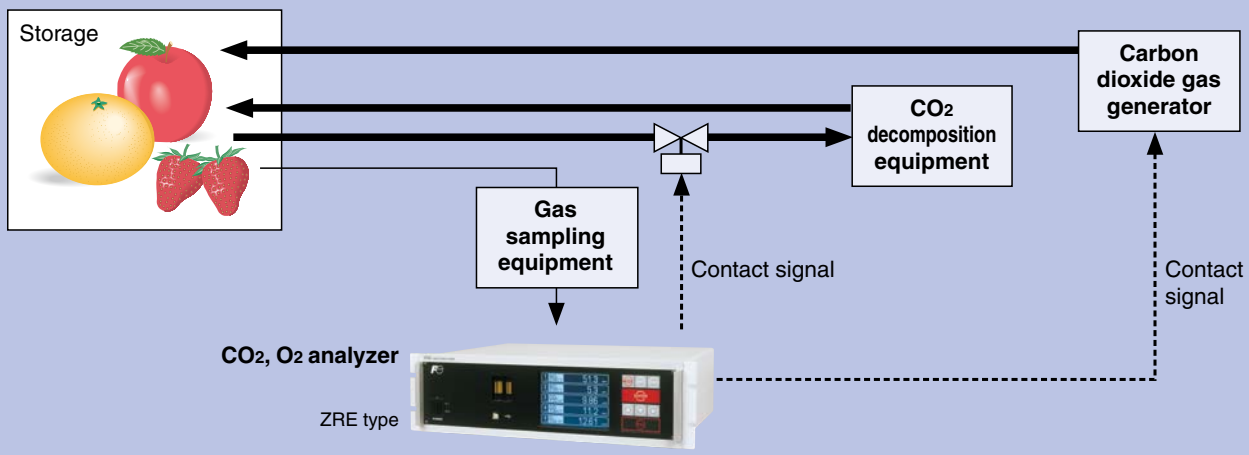
• Examples of Application

Infrared CH_4, CO_2 and O_2 gas analyzers optimum for bio-gas measurement.



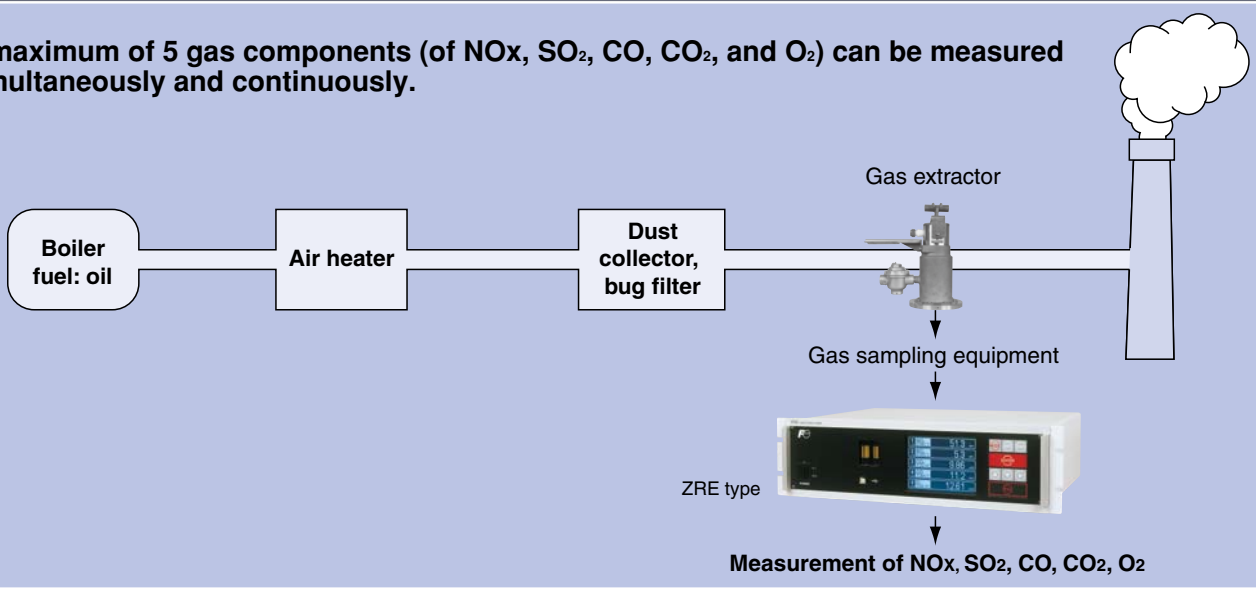
Infrared CO_2 and O_2 gas analyzer for storage of foodstuffs such as vegetable and fruit.

Foodstuffs can be kept fresh by controlling the CO_2 and O_2 concentrations properly in a storage house.



Example of measurement of exhaust gas from a boiler or refuse incinerator (NO, SO_2, CO, CO_2, and O_2 measurement)

A maximum of 5 gas components (of NOx, SO_2, CO, CO_2, and O_2) can be measured simultaneously and continuously.



• Code symbols

	4	5	6	7	8		9	10	11	12	13		14	15	16	17	18	19	20		21	22	23	24	25
ZRE	A				2	–						–								–			Y		

Digit	Description				Note	Code
4	Standard					A
5	<Installation structure>					
	19" rack mount type, Conforming to EIS					B
	19" rack mount type, Conforming to JIS					C
	Panel mount type					D
6	<Measurable components (NO, SO_2, CO, CH_4)>					
	1st	2nd	3rd	4th	Note 1	
	None					Y
	NO					P
	SO_2					A
	CO_2					D
	CO					B
	CH_4					E
	NO	SO_2				F
	NO	CO				G
	CO_2	CO				J
	CH_4	CO				K
	CO_2	CH4				L
	NO	SO_2	CO			N
	CO_2	CO	CH_4			T
	NO	SO_2	CO_2	CO		V
	Others					Z
7	<Measurable component (O_2)>					
	None					Y
	External O_2 sensor (0 to 1 VDC)				Note 2	1
	External zirconia O_2 sensor (Type ZFK7)					2
	Built-in fuel cell O_2 sensor					3
	Built-in paramagnetic O_2 sensor					4
9	<1st component, 1st measurement range>				Note 3	
	See Table 1.					□
10	<1st component, 2nd measurement range>				Note 3	
	See Table 1.					□
11	<2rd component, 1st measurement range>				Note 3	
	See Table 1.					□
12	<2rd component, 2nd measurement range>				Note 3	
	See Table 1.					□
13	<3rd component, 1st measurement range>				Note 3	
	See Table 1.					□
14	<3rd component, 2nd measurement range>				Note 3	
	See Table 1.					□
15	<4th component, 1st measurement range>				Note 3	
	See Table 1.					□
16	<4th component, 2nd measurement range>				Note 3	
	See Table 1.					□
17	<Measurable range (O_2 sensor)>					
	None					Y
	0 to 5/10%					A
	0 to 5/25%					B
	0 to 10/25%					C
	0 to 5%					L
	0 to 10%					M
	0 to 25%					V
	0 to 50%					P
	0 to 100%					R
	Others					Z
18	<Gas outlet/inlet connection>					
	Rc1/4					1
	NPT1/4					2
19	<Output signal>					
	0 to 1 VDC					A
	4 to 20 mA DC					B
	0 to 1 VDC + RS485 communication function					C
	4 to 20 mA DC + RS485 communication function					D

Digit	Description				Note	Code
20	<Display>					
	Japanese					J
	English					E
	Chinese					C
21	<O_2 collection and O_2 average value output>				Note 4	
	None					Y
	With O_2 correction output					A
	With O_2 correction output, O_2 correction and average output					C
22	<Optional function (DI, DO)>					
	FAULT	Auto calibration	Upper/lower limit alarm	Range identification/Remote		
	None					Y
	○					A
	○	○				B
	○		○			C
	○			○		D
	○	○	○			E
	○		○	○		F
	○	○		○		G
	○	○	○	○	Note 5	H
24	<Unit>					
	ppm, %					A
	mg/m^3, g/m^3				Note 6	B
25	<Adjustment>				Note 7	
	Standard					A
	For heat treatment furnace					C
	For converter					D
	Others					Z

Table 1.
<Measurement range code table>

Measurement range	Code
0 to 100ppm	B
0 to 200ppm	C
0 to 250ppm	D
0 to 300ppm	S
0 to 500ppm	E
0 to 1000ppm	F
0 to 2000ppm	G
0 to 2500ppm	U
0 to 3000ppm	T
0 to 5000ppm	H
0 to 1%	J
0 to 2%	K
0 to 3%	Q
0 to 5%	L
0 to 10%	M
0 to 20%	N
0 to 25%	V
0 to 40%	W
0 to 50%	P
0 to 70%	X
0 to 100%	R
Others	Z

Note 1: Specify code "Y" when the O_2 sensor only is required. When NO, SO_2 measurment is specified [Auto calibration] must be specified 22th digit.
Note 2: Feed input signals from the external O_2 sensor linearly within the range 0 to 1 VDC against the full scale. Our exclusive zirconia O_2 sensor (ZFK7) and external oxygen sensor are also optionally available.
Note 3: Select the measurable component and range from the table on pages 7. If code "Y" is selected for the 6th digit, specify "Y" for all of the digits from the 9th to 16th.
Note 4: O_2 correction output and O_2 correction average output are made for NO, SO_2, and CO only.
Note 5: Not applicable to the 5-component sensor. The number of output points for upper/lower limit alarms is 3 for the 4-component sensor.
Note 6: Even if code "B" is specified, select the measurement range in unit of ppm. A value converted into the mg/m^3 range will be delivered. Applicable only to NO, SO_2, and CO sensors. See the following table for correspondence between ppm and mg/m^3.
Note 7: Adjustment will be made using the following balance gas for all the codes from "A" to "D" before delivery. Specify "Z" if adjustment with other gases is desired. Standard "A": Balance gas N_2, "C" for heat treat furnace: Balance gas 30% H_2/70% N_2, "D" for converter: Balance gas CO, CO_2
Attach a table that lists the components contained in the gas to be measured if "Others" is specified.

If mg/m^3 is selected, specify the minimum to maximum range in ppm that corresponds to your desired range expressed in mg/m^3. Delivery will be made with adjustment made to satisfy the corresponding mg/m^3 range.
The conversion formula "ppm" unit into "mg/m^3" unit.
NO (mg/m^3) = 1.34 × NO (ppm)
SO_2 (mg/m^3) = 2.86 × SO_2 (ppm)
CO (mg/m^3) = 1.25 × CO (ppm)

		Corresponding range expressed in mg/m^3		
Range code	Unit: ppm	NO	SO_2	CO
C	0 to 200ppm	0 to 260mg/m^3	0 to 570mg/m^3	0 to 250mg/m^3
D	0 to 250ppm	0 to 325mg/m^3	0 to 700mg/m^3	0 to 300mg/m^3
S	0 to 300ppm	0 to 400mg/m^3	0 to 850mg/m^3	0 to 375mg/m^3
E	0 to 500ppm	0 to 650mg/m^3	0 to 1400mg/m^3	0 to 600mg/m^3
F	0 to 1000ppm	0 to 1300mg/m^3	0 to 2800mg/m^3	0 to 1250mg/m^3
G	0 to 2000ppm	0 to 2600mg/m^3	0 to 5600mg/m^3	0 to 2500mg/m^3
U	0 to 2500ppm	0 to 3300mg/m^3	0 to 7100mg/m^3	0 to 3000mg/m^3
T	0 to 3000ppm	0 to 4000mg/m^3	0 to 8500mg/m^3	0 to 3750mg/m^3
H	0 to 5000ppm	0 to 6600mg/m^3	0 to 14.00g/m^3	0 to 6250mg/m^3

• List of measurable components and ranges

Fabrication is possible under the condition that the range ratio of the first to the second is 1 to 10 or less.
For details of measuring range, refer to specifications (EDS3-133).

1-component analyzer

Measurable gas components	1st range		2nd range	
	Minimum range	Maximum range	Minimum range	Maximum range
NO	0 to 200ppm	0 to 5000ppm	0 to 250ppm	0 to 5000ppm
SO_2	0 to 200ppm	0 to 10%	0 to 250ppm	0 to 10%
CO	0 to 200ppm	0 to 100%	0 to 250ppm	0 to 100%
CO_2	0 to 100ppm	0 to 100%	0 to 200ppm	0 to 100%
CH_4	0 to 500ppm	0 to 100%	0 to 1000ppm	0 to 100%

2-component analyzer

$NO+SO_2$

Measurable gas components	1st range		2nd range	
	Minimum range	Maximum range	Minimum range	Maximum range
NO	0 to 200ppm	0 to 5000ppm	0 to 250ppm	0 to 5000ppm
SO_2	0 to 200ppm	0 to 5000ppm	0 to 250ppm	0 to 5000ppm

NO+CO

Measurable gas components	1st range		2nd range	
	Minimum range	Maximum range	Minimum range	Maximum range
NO	0 to 200ppm	0 to 5000ppm	0 to 250ppm	0 to 5000ppm
CO	0 to 200ppm	0 to 5000ppm	0 to 250ppm	0 to 5000ppm

CO_2+CO

Measurable gas components	1st range		2nd range	
	Minimum range	Maximum range	Minimum range	Maximum range
CO_2	0 to 100ppm	0 to 100%	0 to 200ppm	0 to 100%
CO	0 to 200ppm	0 to 100%	0 to 250ppm	0 to 100%

CH_4+CO

Measurable gas components	1st range		2nd range	
	Minimum range	Maximum range	Minimum range	Maximum range
CH_4	0 to 500ppm	0 to 100%	0 to 1000ppm	0 to 100%
CO	0 to 200ppm	0 to 100%	0 to 250ppm	0 to 100%

CO_2+CH_4

Measurable gas components	1st range		2nd range	
	Minimum range	Maximum range	Minimum range	Maximum range
CO_2	0 to 100ppm	0 to 100%	0 to 200ppm	0 to 100%
CH_4	0 to 500ppm	0 to 100%	0 to 1000ppm	0 to 100%

3-component analyzer

$NO+SO_2+CO$

Measurable gas components	1st range		2nd range	
	Minimum range	Maximum range	Minimum range	Maximum range
NO	0 to 200ppm	0 to 5000ppm	0 to 250ppm	0 to 5000ppm
SO_2	0 to 200ppm	0 to 5000ppm	0 to 250ppm	0 to 5000ppm
CO	0 to 200ppm	0 to 5000ppm	0 to 250ppm	0 to 5000ppm

$CO_2+CO+CH_4$

Measurable gas components	1st range		2nd range	
	Minimum range	Maximum range	Minimum range	Maximum range
CO_2	0 to 5000ppm	0 to 100%	0 to 1%	0 to 100%
CO	0 to 500ppm	0 to 100%	0 to 1000ppm	0 to 100%
CH_4	0 to 5000ppm	0 to 100%	0 to 1%	0 to 100%

4-component analyzer

$NO+SO_2+CO_2+CO$

Measurable gas components	1st range		2nd range	
	Minimum range	Maximum range	Minimum range	Maximum range
NO	0 to 200ppm	0 to 5000ppm	0 to 250ppm	0 to 5000ppm
SO_2	0 to 200ppm	0 to 5000ppm	0 to 250ppm	0 to 5000ppm
CO_2	0 to 1%	0 to 50%	0 to 2%	0 to 50%
CO	0 to 200ppm	0 to 2500ppm	0 to 250ppm	0 to 2500ppm

• Major specifications

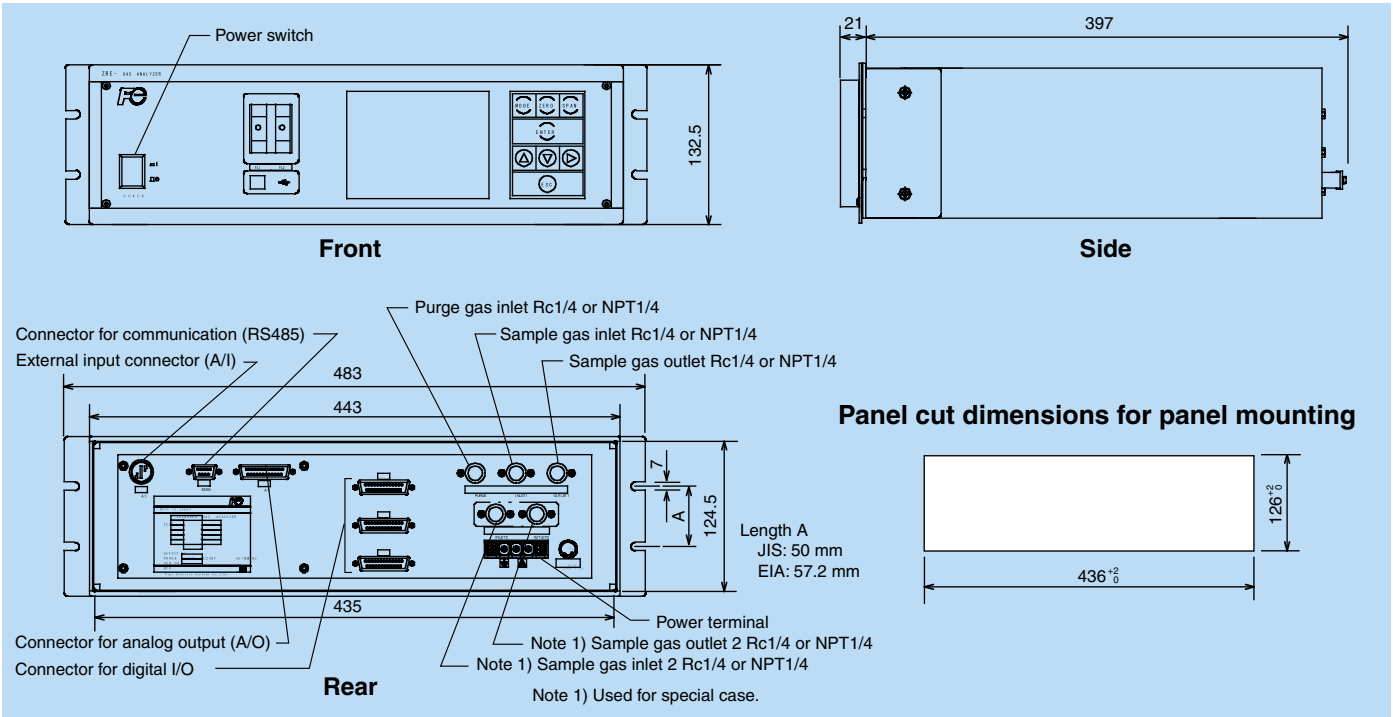
Measurement principle	NO, SO_2, CO, CO_2, CH_4: Non-dispersive infrared ray absorption (Single-beam system) O_2: Fuel cell (built in) or zirconia (externally installed ZFK7 by Fuji) or Paramagnetic (built in)		
Measurable component and range	Measured component	Minimum range	Maximum range
	NO	0-200ppm	0-5000ppm
	SO_2	0-200ppm	0-10 vol%
	CO_2	0-100ppm	0-100 vol%
	CO	0-200ppm	0-100 vol%
	CH_4	0-500ppm	0-100 vol%
	O_2 Fuel cell (built in)	0-10 vol%	0-25 vol%
	O_2 Zirconia Paramagnetic O_2 sensor	0-5 vol%	0-25 vol%
	Switching between 2 ranges allowed for each component. Maximum range ratio: 1:10 (excluding O_2)		
Repeatability	±0.5% FS		
Linearity	±1.0% FS		
Zero drift	Within ±2%FS/week		
Span drift	Within ±2%FS/week		
Response time	Within 60 sec (90% response from gas inlet) Varies depending on the components to be measured and the measurement range.		
Analog output signal	4 to 20 mA or 0 to 1 VDC (12 points at max.) Instantaneous value output (Concentration of each gas component measured) Option: O_2 correction instantaneous value output, O_2 correction average output, O_2 average output		
Display	LCD with backlight (Japanese, English or chinese by designation) Instantaneous value of each component, O_2 correction instantaneous value. O_2 correction average, O_2 average, parameter setting, with auto OFF function		
Range switching	Manual switching by key operation, auto switching, external contact input switching (option)		
External digital input (option)	Voltage contact (supply 12 to 24 VDC/15 mA max. at ON) 9 points at max. Range switching, auto calibration start, output signal hold, average value reset		

Contact output function (option)	1c relay contact (15 points at max.) Identification of each component range, instrument failure,calibration error, auto calibration in progress, upper/lower limit alarm for each component, solenoid valve drive for auto calibration
Communication function (option)	RS-485 (MODBUS protocol) Details of communication: Read/write of each setting, output of measured concentration and instrument status Type-B with USB connector (front face) and USB driver
Sample gas flowmeter	Built in
Gas outlet/inlet dimension	Rc1/4 or NPT1/4
Purge gas flow rate	1 L/min (Performed as required.)
Structure	Indoor type with steel case
Ambient temperature/ humidity	–5°C to 45°C, 90 RH or lower (No condensation allowed.)
Mounting method	19" rack mount, panel mount, desktop
Power supply voltage	100 to 240 VAC, 50/60 Hz, 100VA
Outside dimension	133×483×418 mm (19" rack mount) 133×440×418 mm (Panel mount)
Mass	Approximately 8 kg (5-component analyzer)
Applicable standard	CE mark

<Measured gas conditions>

Flow rate	0.5L/min±0.2L/min
Temperature	0°C to 50°C
Pressure	10 kPa or lower
Dust	100 µg/Nm3 or lower (Particle size: 0.3 µm or smaller)
Mist	Not allowed.
Moisture	Saturation at room temperature or lower (No condensation allowed.) Saturation at 2°C or lower (No condensation allowed.)
Corrosive component	HCl: 1 ppm or less

• Outline diagram (Unit: mm)



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