

INFRARED GAS ANALYZER FOR STACK GAS

DATA SHEET

ZSP

This instrument consists of an (or two) infrared gas analyzer(s), a zirconia O₂ sensor and a sampling device. It is used for measuring the NO_x, SO₂, CO and O₂ components in the flue gas of various boilers, garbage incinerators, furnaces, etc. through a selective combination of the components. The instrument has passed a type approval test in compliance with regulations on measurement and weighing (specified in Japan) of each component. It is extensively applicable as a gas analyzer for environmental pollution control and combustion control.

FEATURES

1. Simultaneous measurement of five components

A combination of two infrared gas analyzers plus a zirconia O₂ sensor allows simultaneous measurement of four components, NO_x, SO₂, CO, CO₂ and O₂.

2. Easy operation with multiple functions

This analyzer can be equipped with a number of functions such as auto calibration, O₂ correction and self-diagnosis. It is easier to operate and maintain than a separate type calculator system.

3. Little interference from other gases

Measuring error due to interfering gases contained in sample is nearly zeroed by the Permapure dryer and interference compensating detector adopted in the analyzer section respectively.

4. Excellent measuring accuracy and stability

The optical system is so constructed as to be free from external stress by using a single light source and double beam paths, and therefore assures improved measuring accuracy plus excellent stability.

5. High sensitivity and wide dynamic range

The infrared gas analyzer, which mounts a mass flow sensor, has a high sensitivity and a broad dynamic range, and is capable of switching the measuring range to obtain 1:20 at maximum.

6. Reliable sampling system

Simple but reliable sampling system based on Fuji's rich experience in the field enables easy maintenance and reduces frequency of maintenance.

SPECIFICATIONS

Type of cubicle: Indoor type or outdoor installation type
Measuring system:

Non-dispersion infrared absorption (NDIR) method for NO_x, SO₂ and CO;
zirconia method for O₂

Sampling system: Dry sampling at approx. -15°C (dew point) (Permapure dryer adopted)



Measuring range: NO_x: 0 to 100...2000ppm
SO₂: 0 to 100...1000ppm
CO: 0 to 200...2000ppm
CO₂: 0 to 5...50%
O₂: 0 to 10/25%
Dual range (except for O₂), max. range ratio 1:20

Note: A type test-satisfied instrument having a measuring range of 50 to 2000ppm is available for each of NO_x, SO₂ and CO.

Repeatability: ±0.5% of full scale
Drift: Zero; ±2% of full scale/week for NO_x, SO₂ and CO
±2% of full scale/month for O₂
Span; ±2% of full scale/week

Linearity: ±2% of full scale

Response time: Within 3 minutes for 90% indication (after extracting sample gas through the inlet)
Within 4 minutes for SO₂

Output: 4 to 20mA DC (allowable load resistance 550Ω), non-isolated
For the number of output points, see Table 1.

Contact output: Each NO (1a) contact (100V AC, 1 A) for error (analyzer error, calibration error) and auto calibration status

Indication: Digital indication (on analyzer front panel)

Sample gas extracting rate:

Approx. 2L/min

Gas extractor: Electrical heating type (filter built in)
Filter mesh; 40μm mesh of 316 stainless steel

Probe; 316 stainless steel, length 600, 800 or 1000mm

Flange; JIS 5K65A FF

Sample inlet tube:

φ10/φ 8mm Teflon tube for CO and O₂ meter and NO_x and O₂ meter
Heating tube (φ10/φ 8mm teflon tube) for NO_x, SO₂ and O₂ meter and NO_x, SO₂, CO and O₂ meter

Standard gas (3.4L):

Standard air gas for zero calibration and O₂ span calibration
Standard analyte/remaining N₂ gas for low range span calibration and O₂ zero calibration

Ambient temperature:

-5 to +40°C

Power supply: 100 ±10V AC, 50 or 60Hz

Power consumption:

Approx. 1.1kVA (excluding heating tube)

Mass {weight}: Approx. 300kg

Finish color: Munsell 5Y 7/1

Standard requirements for sample gas:

Temperature; 60 to 800°C

Dust, 100 mg/Nm³ or less

Pressure; -2.94 to +2.94kPa

Components;

SO₂ 0 to 1000ppm

NO_x 0 to 2000ppm

CO₂ several % to over 10%

CO 0 to 2000ppm

O₂ 0.5 to 21%

H₂O } remaining percent
N₂ }

When other component is contained in sample gas, consult with Fuji.

Installation requirements:

Select a location free from direct sunlight and severe vibration.

Table 1 Number of output points and kinds of outputs

Type	ZSP1L	ZSP1F	ZSP1P	ZSP1B	ZSP1A	ZSP1H	ZSP1M
Analyte	NO _x , SO ₂ , CO, (O ₂)	NO _x , SO ₂ , (O ₂)	NO _x , (O ₂)	CO, (O ₂)	SO ₂ , (O ₂)	NO _x , CO, (O ₂)	NO _x , SO ₂ , CO, CO ₂ , (O ₂)
No. of output points	11	7	3	3	3	5	12
Kind of output	A, B, C, (D (2points), E, F, G, H, J, K)	A, B, (D, E, F, H, J)	A, (D, E)	C, (D, K)	B, (D)	A, C, (D, E, K)	A, B, C, L (D (2points), E, F, G, H, J, K)

A: NO_x instantaneous value

B: SO₂ instantaneous value

C: CO instantaneous value

D: O₂ instantaneous value

E: NO_x instantaneous value after O₂ correction

F: SO₂ instantaneous value after O₂ correction

G: CO instantaneous value after O₂ correction

H: 1hr. moving average NO_x value after O₂ correction

J: 1hr. moving average SO₂ value after O₂ correction

K: 4hr. moving average CO value after O₂ correction

L: CO₂ instantaneous value

(1) O₂ correction

(a) Calculating equation

$$C = \frac{21 - O_n}{21 - O_s} \cdot C_s$$

C : Concentration after O₂ correction

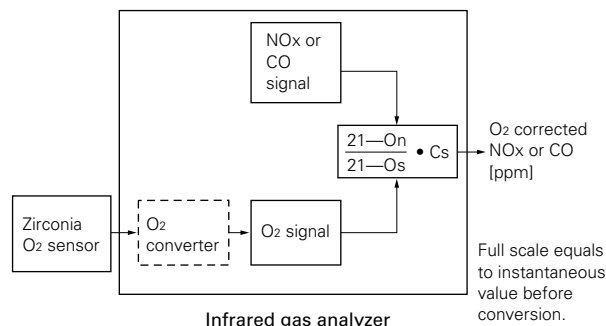
C_s : NO_x or CO concentration measured

O_s : O₂ concentration measured

O_n : O₂ concentration as conversion basic:
4% Oil combustion boiler

- 5% Gas combustion boiler
- 6% Solid object combustion boiler, petroleum heating furnace
- 12% Garbage incinerator

(b) Block diagram



(2) Moving average output

1 hr. moving average output (for NO_x, SO₂)

4 hr. moving average output (for CO)

Auto calibration

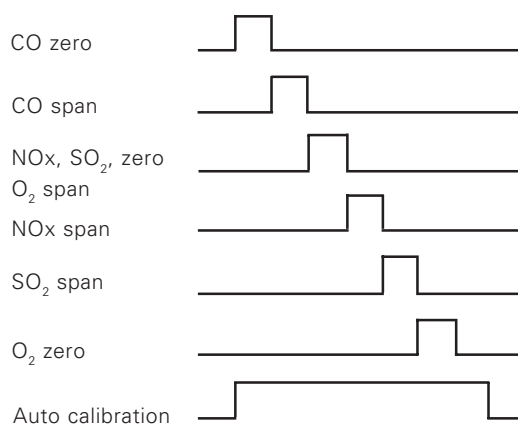
Calibration accuracy:

±0.2% of full scale

Output hold during calibration:

Possible

Calibration gas flow mode (Example of four components):



Calibration cycle: Once daily (variable up to 7 days)

Calibration gas flow time:

Variable from 2 to 10min on each gas

Indication:

Calibration abnormality;

Error code E — □ indicated when zero or span exceeds ±20% of full scale.

Under calibration;

[CAL] lamp lights up

Auto calibration contact output:

NO (1a) contact, 250V AC, 1A (resistive load)

CODE SYMBOLS

1	2	3	4	5	6	7	8	9	10	11	12	13	Description
Z	S	P					4	-					
													Application
													1 Combustion exhaust gas
													2 Others
													Component
													P NOx + (O ₂)
													A SO ₂ + (O ₂)
													B CO + (O ₂)
													F NOx + SO ₂ + (O ₂)
													H NOx +CO+ (O ₂)
													L NOx + SO ₂ +CO + (O ₂)
													M NOx + SO ₂ +CO + CO ₂ + (O ₂)
													Z Others
													O₂ meter
													0 Without
													1 With zirconia type (Standard)
													2 With paramagnetic type (option)
													Auto calibration
													1 With
													Type of cubicle
													1 Indoor installation type
													2 Outdoor installation type

ORDERING INFORMATION

1. Measuring range of analyzer
2. Length of sample inlet tube
3. Insertion length of gas extracting tube
4. Power supply voltage and frequency
5. Omission of calibration standard gases if desired
6. Omission of type test for each component by Japan quality assurance organization if desired
7. Necessity of spares for 1-year measurement
8. Contents of other function if necessary

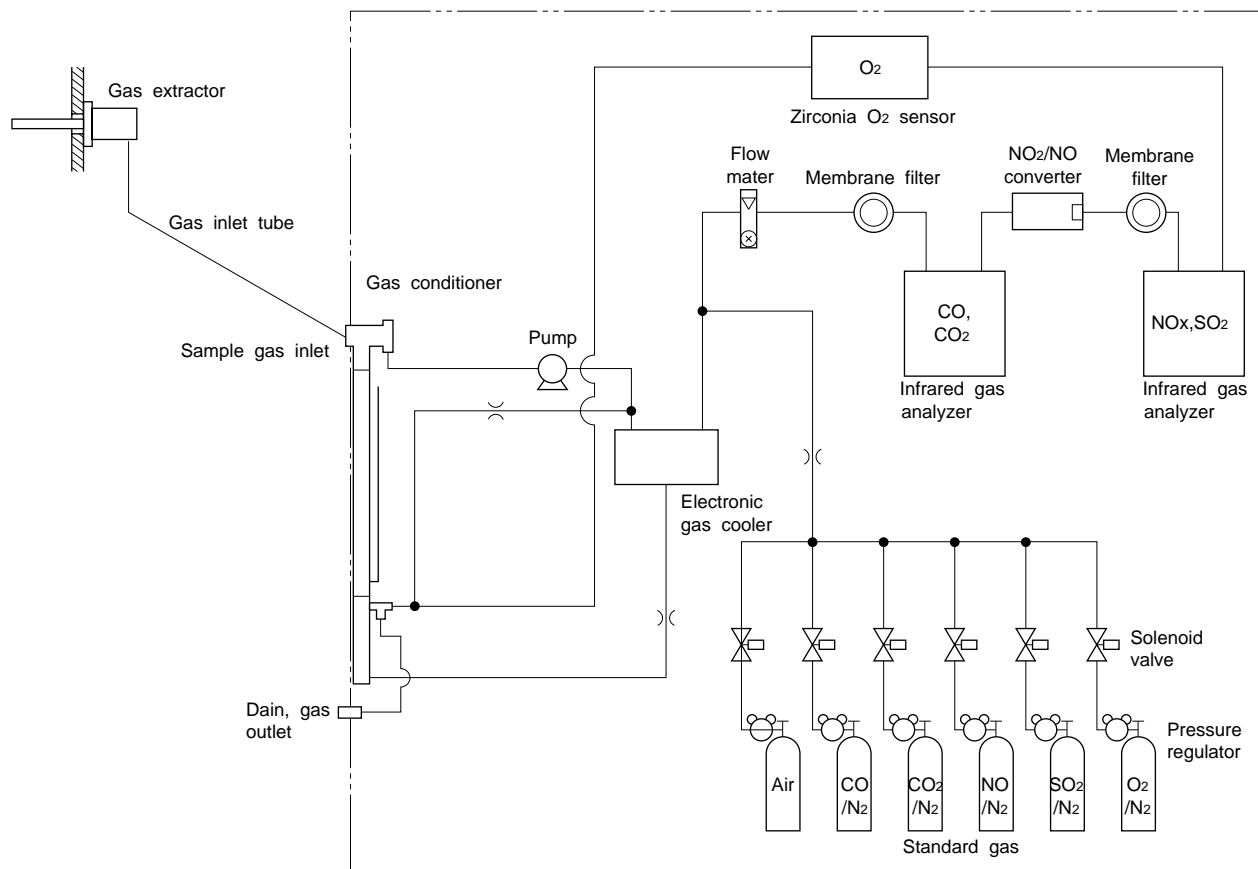
Remarks: Separate specification is required for functions such as remote range selection, output holding via external contact, auto calibration start via external contact, isolated output and measured concentration alarm.

Functions of individual components

- **Gas extractor (type ZBA):**
With heating type stainless steel filter; standard diameter 40μm for filter.
- **Gas conditioner (type ZBH9):**
For separating drain and removing sulfuric acid mist and oil mist or fine dust particles. Automatically extractor air to prevent drain from being sucked when internal pressure reaches -6.78kPa {-690mmH₂O}.
- **Pump(typeZBG8):**
A diaphragm type suction pump to extractor sample gas (sample gas flow rate approx. 2L/min).
- **Electronic gas cooler (type ZBCA):**
An electronic dehumidifier which dries the moisture in sample gas to a dew point of approximately 2°C.
A valve for adjusting sample gas flow rate and to be operated while monitoring the flowrator on the front panel.
- **Converter (type ZDL):**
Added to the NOx analyzer. A converter using a special catalyst which converts NO₂ gas into NO. The catalyst must be renewed once every year.
Temperature controller is equipped in the unit.
- **Solenoid valve (type; AB21):**
Used for introducing calibration gas when auto calibration function is provided.

- **Membrane filter (type ZBBM):**
Eliminates fine dust particles with a paper filter made of glasswool or Teflon, and permits monitoring dust adhering condition on the front panel of the gas analyzer.
- **Flow rotor:** Monitors standard flow rate of sample gas.
- **Standard gas (type ZBM):**
Reference gas used for calibrating zero and span of the analyzer. When using a zirconia oxygen meter, this is used together with air for calibrating zero for NO, SO₂, and CO and for calibrating span for O₂.
- **Zirconia O₂ sensor (type; ZFK4)**
Used in combination with the infrared analyzer. Outputs about 0V at measurement of the air, and an inverse logarithm of about 1V at measurement of 0.05% O₂.

Sampling system block diagram



Standard accessories

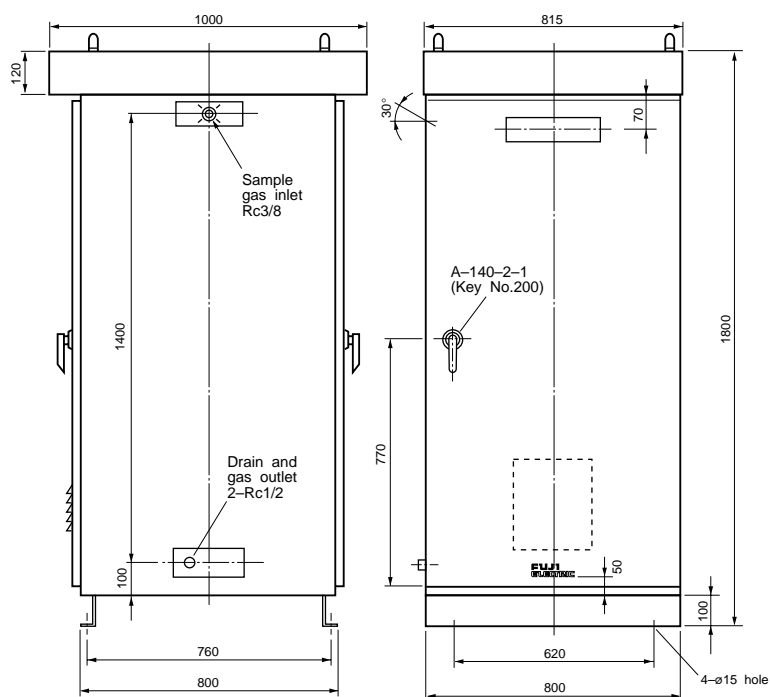
No.	Name	Type/part No.	Quantity				Remarks
			NOx, SO ₂	NOx	SO ₂	Others	
1	Filter paper for membrane filter	TK701837C6	—	1 pack	—	1 pack	1 pack contains 25 sheets. Except for SO ₂ meter
2	Fluoropore filter for membrane filter	TK741833P3	2	—	2	—	For meter including SO ₂
3	Fuse (for instrument SW)	Various types	2	2	2	2	
4	Tool for electric cooler	TK725417P7	1	1	1	1	
5	Joint	TK7F7627P1	1 set	1 set	1 set	1 set	PT1/4 ø6mm, for pressure regulator
6	Hose band	TK539474C410	1 set	1 set	1 set	1 set	For ø6mm tube and manual calibration pipe
7	Toaron tube 0.3m	TK727528P1	1	1	1	1	
8	Polyethylene tube 5m	415966P4	1	1	1	1	
9	Anchor bolt	M12 x 160 x 50	4	4	4	4	Option
10	Instruction manual	INZ-TN4ZSP INZ-TN2ZRG	1 set	1 set	1 set	1 set	1 copy each
11	Analyzer accessory	3 x fuse 2A	1 set	1 set	1 set	1 set	
12	Water bottle	TK7H3493P1	1	1	1	1	

Spare parts for 1-year measurement (option)

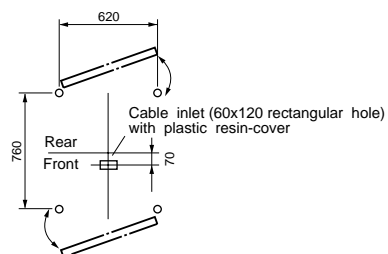
No.	Name	Quantity				Remarks
		NOx, SO ₂	NOx	SO ₂	Other	
1	Spare parts for converter	1	1	—	—	ZBNK0001
2	Filter element for gas conditioner	2	2	2	2	TK7H8043P1
3	O-ring for gas conditioner	2	2	2	2	G65 chloroprene
4	Filter paper for membrane filter	—	1 pack	—	1 pack	25 sheet pack, ZBNC60 Except for SO ₂ meter
5	Fluoropore filter for membrane filter	6	—	6	—	TK741833P3, for meters including SO ₂
6	O-ring for membrane filter	1	1	1	1	P49 chloroprene
7	O-ring for membrane filter	1	1	1	1	G65 chloroprene
8	Fuse	6	6	6	6	2A x 4, 3.2A x 2
9	Fixed restrictor	1	1	1	1	TK729264C6 (ø1 mm)
10	Fixed restrictor	1	1	1	1	TK729264C7 (ø1.4 mm)
11	Diaphragm membrane for pump	1	1	1	1	TK725417P5
12	Diaphragm valve for pump	1	1	1	1	TK725417P6
13	Spare parts for gas extractor	1	1	1	1	TK7J6183C1 For instrument equipped with gas extractor

OUTLINE DIAGRAM (Unit:mm)

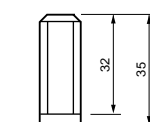
For outdoor installation type



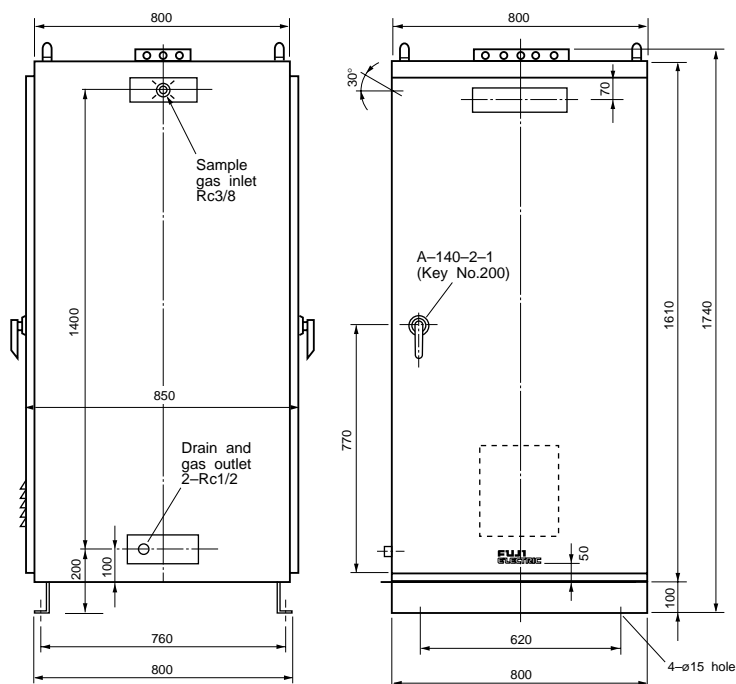
Anchor plan and door opening diagram



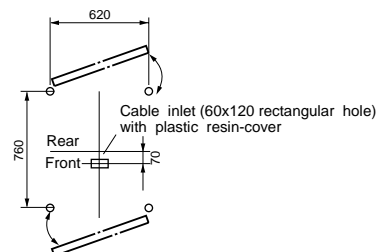
Anchor bolt
(4-M12x160x50)



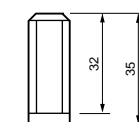
For indoor installation type



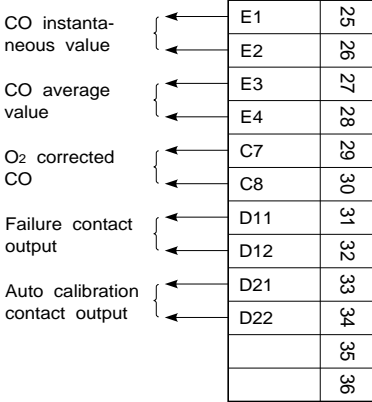
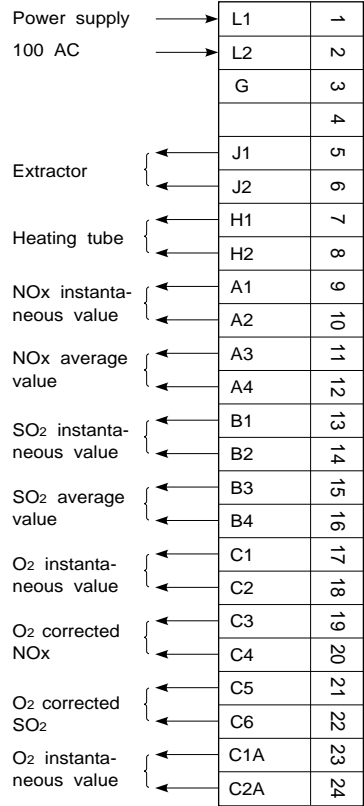
Anchor plan and door opening diagram



Anchor bolt
(4-M12x160x50)



CONNECTION DIAGRAM



⚠ Caution on Safety

*Before using this product, be sure to read its instruction manual in advance.

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