Fuji Electric

Innovating Energy Technology

IN SITU

Laser Gas Analyzer ZSS

In-Situ Measurement: High Speed and Stability for Optimizing Your Process

- ☑ Low Power-Consumption
- ☑ Low Running Cost for Maintenance
- ☑ NH_3 and CO_2 Analyzer Available



Measurable components

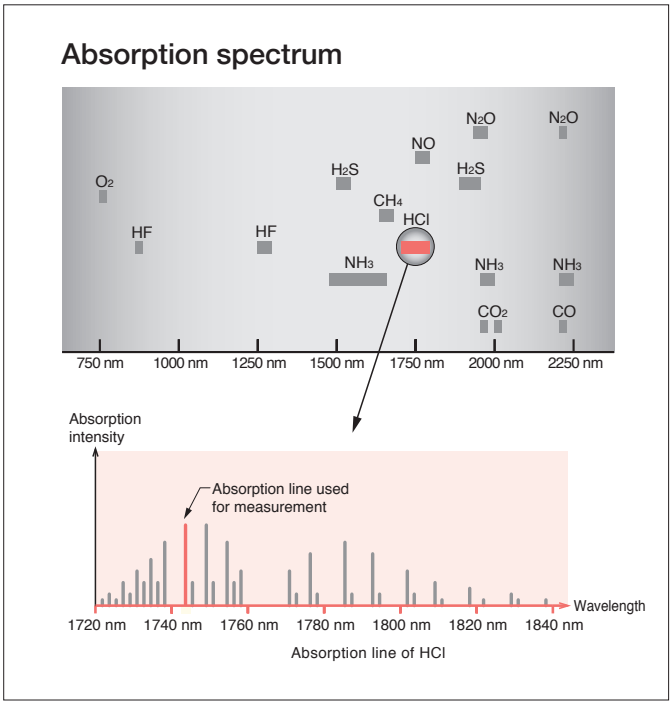
NH_3	HCl	O_2	CO	CO_2
Ammonia	Hydrogen chloride	Oxygen	Carbon monoxide	Carbon dioxide

21C1-E-0001d

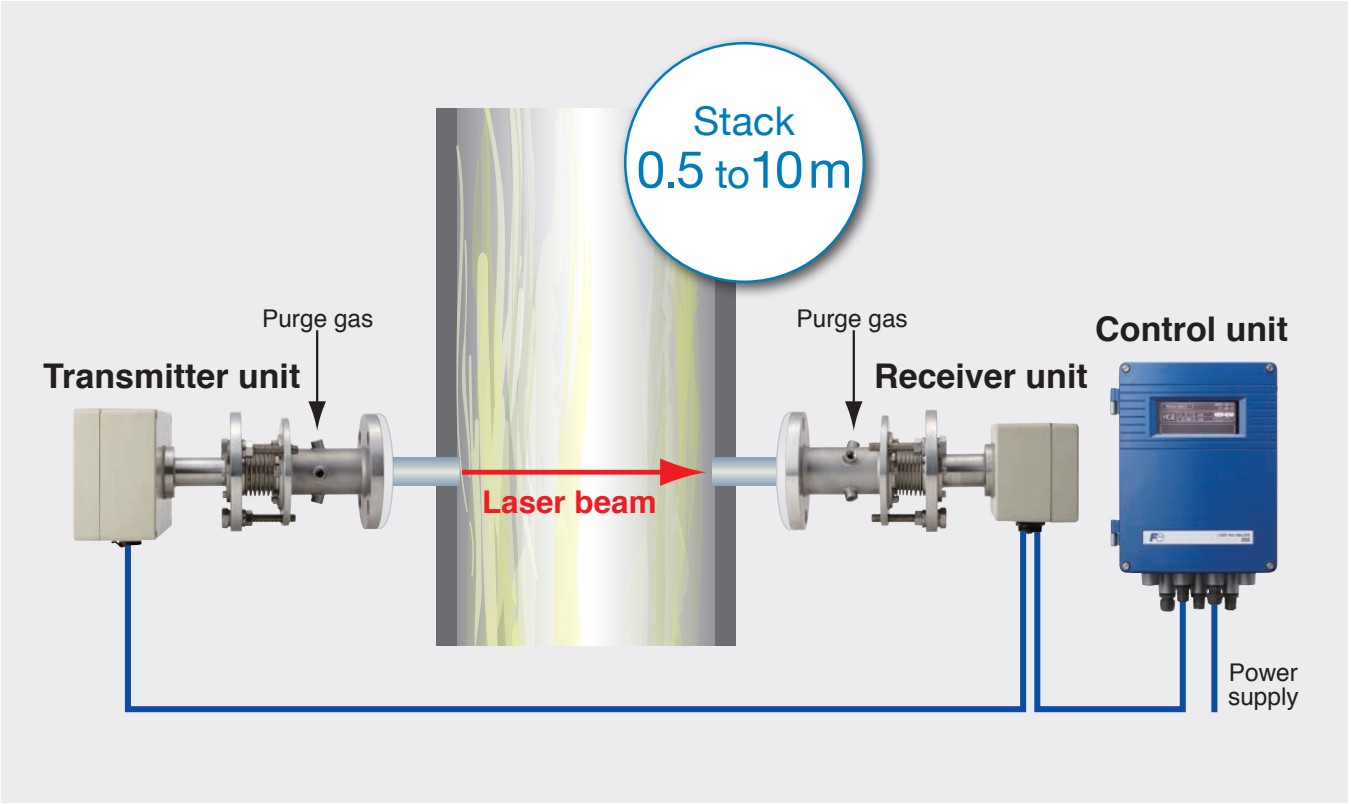
Improve the efficiency of your plant

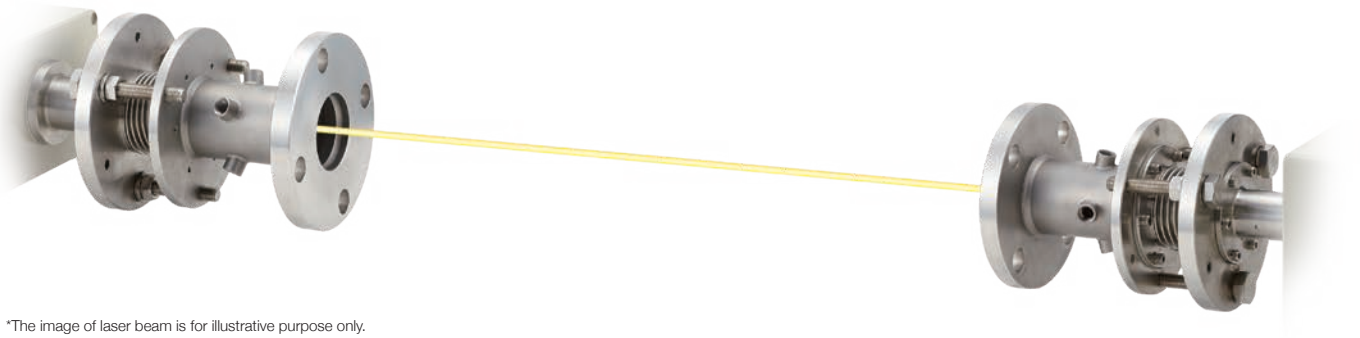
Fast Response Within 2 Seconds and High Accuracy

The analyzer can respond quickly because it requires no gas sampling through long tube. By the use of a narrowed waveband to detect the target component, the analyzer offers highly precise measurement.



NH_3	HCl	O_2	CO	CO_2
Ammonia	Hydrogen chloride	Oxygen	Carbon monoxide	Carbon dioxide



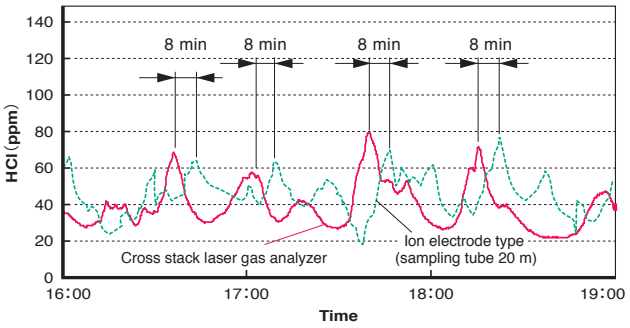


*The image of laser beam is for illustrative purpose only.

Fast Response Within 2 Seconds

Compared to the gas sampling type (ion electrode method), the direct measurement provides remarkably faster response.

Comparison with sampling system



CO and O_2 Analyzer for Combustion Control

Simultaneous measurement of CO and O_2 enables precise control of air-fuel ratio while reducing the cost of installation and maintenance.

- ppm CO + O_2 (high-temperature)
- vol% CO + O_2
- ppm CO + O_2 (instrument air purge)
- CO + CO_2

Zero Point Stability: ±2.0% FS per 6 Months

Purge system reduces the risk of zero drift due to contamination

R&D applications aimed at replacing fossil fuels

The fast response measurement of CO_2 and NH_3 makes ZSS suits for R&D applications.

Energy Efficient and Low Maintenance

The analyzer consumes only 80 VA at maximum, and yearly or half-yearly maintenance work is enough.

No gas sampling **No preconditioning**
No filter **No catalyst**

Tolerant to Temperature and Dust

ZSS can measure high temperature gas up to 1200°C, and at the upstream of a bug filter where the gas sampling is usually difficult.

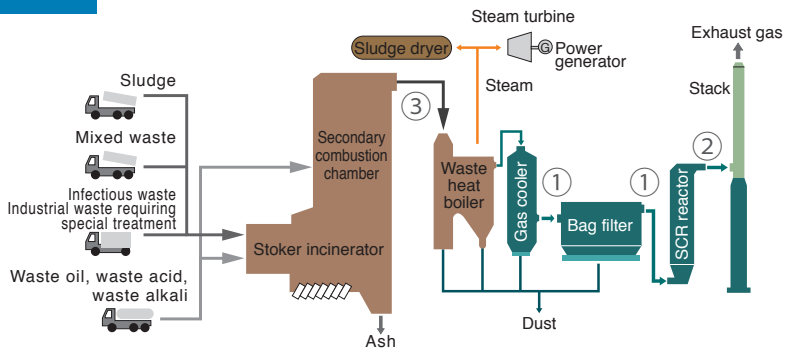
Applications

Waste Incineration Plants

① Measurement of HCl in stack and before bag filter—Optimal control of injection amount of slaked lime

② Continuous monitoring of HCl and O_2 in flue gas

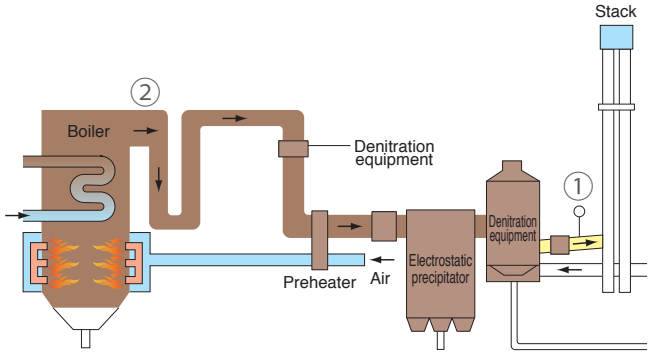
③ CO and O_2 measurement for combustion control



Large-Scale Boilers

① Control of ammonia injection amount for NOx reduction

② CO and O_2 measurement for combustion control



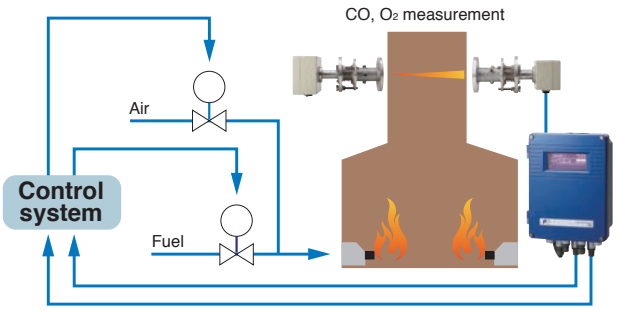
Boiler Combustion Efficiency Monitoring

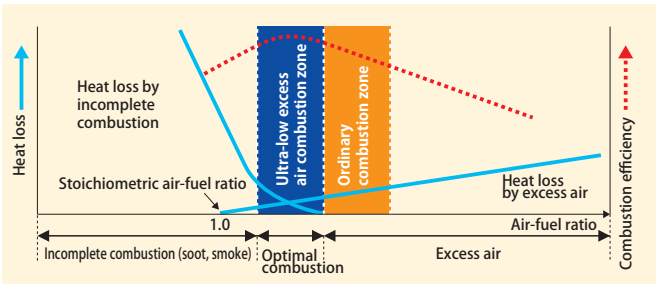
Ultra-low excess air combustion

Most of the combustion control systems for boilers control the air-fuel ratio by measuring O_2 only (zone ■ in the graph). But these systems cannot eliminate the possibility of heat loss due to incomplete combustion.

The most efficient combustion can be achieved by lowering the air-fuel ratio to the point just before incomplete combustion occurs, which we call the ultra-low excess air combustion (zone ■ in the graph). The laser gas analyzer ZSS enables the ultra-low excess air combustion by detecting CO and O_2 simultaneously.

CO and O_2 based combustion control system





Other applications

Direct measurement of process gas HCl, NH_3, CO, CO_2	**Plant safety monitoring** O_2 in combustible gas	**Combustion process control** O_2 and CO in furnace
Denitrification equipment NH_3 leak detection	**Converter gas recovery efficiency** O_2 and CO high-speed analysis	**R&D applications** CO_2 and NH_3 measurement

Table 1 Measurable components and ranges

	Measurable components		Min. range*	Max. range*	Gas temperature	Purge gas	4th code
Single beam 1 component analyzer	HCl		10 ppm	5000 ppm	≤ 400°C	Instrument air	C
	NH_3		15 ppm	5000 ppm	≤ 450°C		W
	CO (high range)		2.0 vol%	100 vol%	≤ 300°C		A
	CO (low range)		200 ppm	1 vol%	≤ 400°C		M
	CO_2		2.0 vol%	100 vol%	≤ 300°C		G
	O_2		10 vol%	100 vol%	≤ 300°C	N_2	P
	O_2 (high temperature)		4 vol%	100 vol%	≤ 1200°C		Q
	O_2 (instrument air purge)		25 vol%	100 vol%	400°C … 1200°C	Instrument air	T
Single beam 2 component analyzer	CO + CO_2		2.5 vol%	100 vol%	≤ 300°C	Instrument air	K
Dual beam 2 component analyzer	ppm CO + O_2 (instrument air purge)	CO	200 ppm	2 vol%	400°C … 1200°C	Instrument air	V
		O_2	25 vol%	100 vol%			
	ppm CO + O_2 (high temperature)	CO	200 ppm	2 vol%	≤ 1200°C	N_2	U
		O_2	5 vol%	50 vol%			
	vol% CO + O_2	CO	2 vol%	50 vol%	≤ 300°C		S
		O_2	10 vol%	100 vol%			

*: Min. and Max. measuring range in the above table are for measuring path length (stack diameter) of 1m. See below on the ranges for other path lengths.

Calculation method of measuring range for optical path lengths other than 1 m

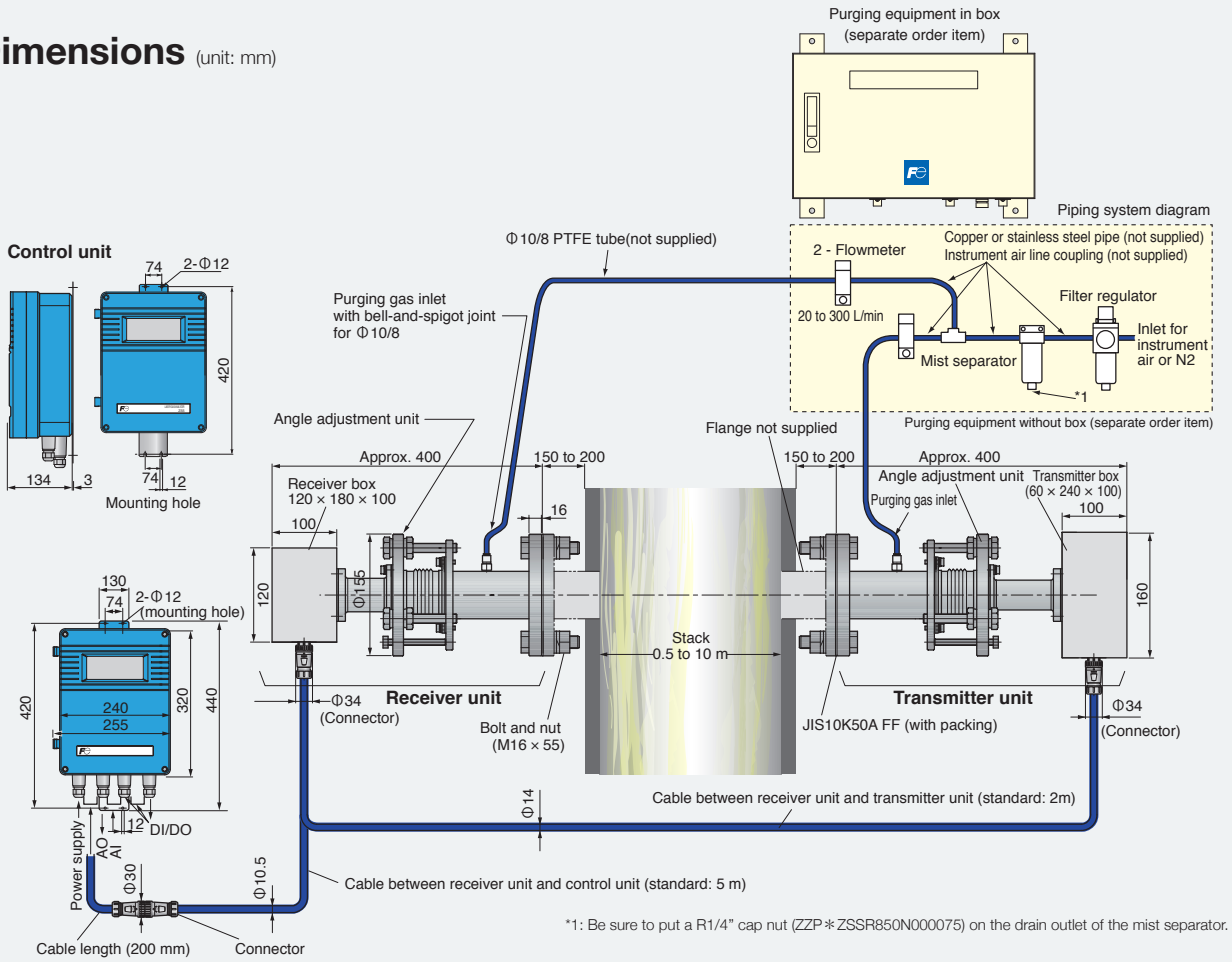
Example 1) HCl analyzer, path length 5 m

Upper limit: 5000 ppm ÷ 5 m = 1000 ppm
Lower limit: 10 ppm ÷ 5 m = 2 ppm
Therefore, measuring range is between 0 to 2…1000 ppm.

Example 2) HCl analyzer, path length 0.5 m

Upper limit: 5000 ppm ÷ 0.5 m = 10000 ppm
Lower limit: 10 ppm ÷ 0.5 m = 20 ppm
Therefore, measuring range is between 0 to 20…10000 ppm.

Dimensions (unit: mm)



*1: Be sure to put a R1/4" cap nut (ZZP＊ZSSR850N000075) on the drain outlet of the mist separator.

SPECIFICATIONS

General

Principle	Non-dispersive infrared (NDIR)
Principle	Cross-stack
Measurable components and ranges	See Table 1 on Page 5
Light source	Near-infrared semiconductor laser
Laser class	CLASS 1 (O_2 analyzers of high-temperature version and instrument air purge version fall under CLASS 3B)
Power supply voltage	100–240 V AC, 50/60 Hz
Power consumption	80 VA
Calibration interval	every 6 months (depending on the operating environment)
Display	Backlit LCD
Display contents	Component, concentration (instantaneous value, average, O_2 corrected instantaneous value, O_2 corrected average value), alarm
Weight	Receiver unit and transmitter unit: approx. 10 kg each, control unit: approx. 8 kg
Dimensions (D × W × H)	Receiver unit (400 × 180 × 155 mm)
	Receiver unit (400 × 240 × 160 mm)
	Control unit (137 × 255 × 440 mm)
IP rating	IP65

Performance

Response	≤ 4 s (≤ 2 s in high-speed version)
Repeatability	±1.0% FS (depending on components and ranges) CO + O_2 measurement: ±2% FS
Linearity	±1.0% FS (depending on components and ranges) CO + O_2 measurement: ±3% FS
Zero drift	±2.0% FS per 6 months (depending on component and range) CO + O_2 measurement: ±4% FS per 6 months
Interference effect	±2.0% FS
Detection limit	1% of the minimum range

Scope of delivery

- Control unit
- Receiver box
- Transmitter box
- Angle adjustment units
  (two units, one for transmitter unit and the other for receiver unit)
- Cable between the receiver unit and the control unit (specified length)
- Cable between the receiver unit and the transmitter unit
  (specified length)
- Standard accessories
- Instruction manual

Separate order Items

- Purging equipment (essential)
- Zero/span calibration equipment (essential)*
- Optical axis adjustment tool (essential)*
- Spare parts for one year (ZBN1SS12)
- Standard gas (ZBM)
- Recorder (as needed)

* The calibration equipment and the optical axis adjustment tool are not required for every gas analyzer, but required at least one set for one site.

Input/output signal

Analog output	4–20 mA DC or 1–5 V DC, 2 or 4 points Measured value and O_2 corrected value. Switchable between instantaneous value and average value
Analog input	4–20 mA DC, 2 points Sample gas pressure, temperature, velocity, O_2 concentration, water concentration, air purge pressure *Inputs are used for compensating concentration, O_2 correction, and alarm output.
Digital output	Relay contact output, 6 points Low light transmission, H/L limit alarm, analyzer error, during calibration / during hold, power interruption, environmental error
Digital input (option)	Voltage input received by photocoupler, 3 points Average value reset, switchover between instantaneous value and moving average value, remote hold

Installation environment

Ambient temperature	–20 to +55°C (Receiver unit, transmitter unit) –5 to +45°C (Control unit)
Ambient humidity	≤ 90% RH
Optical path length	0.5 to 10 m (0.5 to 5 m in CO + O_2 measurement)
Flange rating	DN50/PN10, ANSI 150 2B, JIS10K 50A, JIS10K 100A
Purge gas	See Table 1 on Page 5. Purge gas pressure: ≥ 0.3 MPa
Purge gas flow rate	≥ 20 L/min
Gas conditions	Temperature: See Table 1 on Page 5. Moisture: ≤ 50 vol% (no condensation) Pressure: ±10 kPa (Consult us for pressures above the limit.) Dust: Standard version: ≤ 10 g/m³ (N) Dust resistant version: ≤ 15 g/m³ (N)

Conforms to JIS B 7993: Automated measuring systems for flue gas using non-extractive methods.

Standard accessories

Item	Q'ty	Specification
Bolt	8 or 16*1	M16 × 55 (70)*2, stainless steel
Nut	8 or 16*1	M16, stainless steel
Spring washer	8 or 16*1	M16, stainless steel
Flat washer	8 or 16*1	M16, stainless steel
Companion flange packing or flange packing specified for use in high temperature	2	According to flange specification
Bolt for angle fine adjustment	6	Hex socket bolt, M8 × 70
Power supply fuse	2	
Bolt for connecting the receiving unit and the transmitter unit	12	Hex socket bolt, M5 × 12

*1: When the 9th code is "B", 16 pieces are provided. For other cases, 8 pieces are provided.
*2: When the 9th code is "B", "C", or "D", the length of the bolt is 70 mm. When the 9th code is "A", the length is 55 mm. Inch-sized bolts are not supplied.

Spare parts for one year (ZBN1SS12)

Name	Q'ty	Specification
Silicone packing A	2	For bellows (ZZP＊ZSSTQ505205P1)
O-ring	2	(ZZP＊ZSSR8552850)

Ordering Code

ZSS 4 5 6 7 8 - 9 10 11 12 13 - 14 15 16 17 18 19 20 - 21 22

ZSS [ ][ ][ ][ ][8] - [ ][ ][A][ ][ ] - [ ][ ][ ][0][ ][ ][ ] - [N][ ]

Single beam (1 or 2 component analyzer)

Digit	Specification		Note	Code
4	Components	CO		A
		CO (low-range)		M
		HCl		C
		HCl + H_2O (50 vol%)	Note 1	F
		CO_2		G
		CO + CO_2		K
		O_2		P
		O_2 (high temperature)		Q
		O_2 (instrument air purge)		T
		NH_3		W
		NH_3 + H_2O (50 vol%)	Note 1	X
5	Unit	ppm		1
		mg/m^3		3
		vol%		5
		ppm (1st comp), vol% (2nd comp)		7
		vol% (1st comp), vol% (2nd comp)		9
6	Measurement range (1st component)	0 to 2	Note2, 3	K
		0 to 2.5		Q
		0 to 4		S
		0 to 5		L
		0 to 10		V
		0 to 15		0
		0 to 20		1
		0 to 25		T
		0 to 50		A
		0 to 100		B
		0 to 200		C
		0 to 250		D
		0 to 400		J
		0 to 500		E
		0 to 1000		F
		0 to 2000		G
		0 to 5000		H
		0 to 6000		M
		Others		X
7	Measurement range (2nd component)	-	Note 4	Y
		0 to 2		K
		0 to 2.5		Q
		0 to 4		S
		0 to 5		L
		0 to 10		V
		range		0
		(2st component)		1
				T
				A
				B
				C
				D
				J
				E
				F
				G
				H
				M
		Others		X
9	Flange rating	10K 50A (JIS B 2212)		A
		10K 100A		B
		DN50 / PN10		C
		ANSI #150 2B		D
10	Number of analog outputs	2		0
		4		1
11	Number of analog inputs	2		A
12	Analog output signal	4–20 mA DC		1
		1–5 V DC		5
13	Digital input/ output	6 outputs, no input		0
		6 outputs, 3 inputs		1
14	Cable between receiver unit and control unit	5 m	Note 5	A
		10 m		B
		20 m		C
		30 m		D
		40 m		E
		50 m		F
		80 m		G
		100 m		H
		Others		X
15	Cable between receiver unit and transmitter unit	2 m	Note 6	A
		5 m		B
		10 m		C
		15 m		D
		20 m		E
		25 m		F
		Others		X
16	Language	Japanese		J
		English		E
		Chinese		C
17	-	-		0
18	Optical path length (ones place)	0 m	Note 7	0
		1 m		1
		2 m		2
		3 m		3
		4 m		4
		5 m		5
		6 m		6
		7 m		7
		8 m		8
		9 m		9
19	Optical path length (tenth place)	0.0 m	Note 7	0
		0.1 m		1
		0.2 m		2
		0.3 m		3
		0.4 m		4
		0.5 m		5
		0.6 m		6
		0.7 m		7
		0.8 m		8
		0.9 m		9
20	Optical path length (hundredths place)	0.00 m	Note 7	0
		0.05 m		5
		(Used only when 10 m is specified)		9
21	-	-		N
22	High-dust (high-speed AGC) version	No		N
		Yes		H

Note 1) Contact us when selecting H_2O measurement.
Note 2) Specify the same range for CO and CO_2.
Note 3) Specify the measuring range within the limit calculated based on the optical path length (See Page 1).
Note 4) For single component analyzer, select "Y". For two-component analyzer, select a range for the second component.
Note 5) Cable length between the receiver unit and the control unit: when you select the code "X", available length is 10 m or longer.
Note 6) Cable length between the receiver unit and the transmitter unit: when you select the code "X", available length is 5 m or longer.
Note 7) When the optical path length is 10 m, select "9" in 18th, 19th, and 20th codes.

ZSS 4 5 6 7 8 - 9 10 11 12 13 - 14 15 16 17 18 19 20 - 21 22

ZSS [ ][ ][ ][ ][8] - [ ][ ][A][ ][ ] - [ ][ ][ ][0][ ][ ][ ] - [N][ ]

Dual beam (2 component analyzer)

Digit	Specification		Note	Code
4	Components	ppm CO + O_2 (instrument air purge)		V
		ppm CO + O_2 (high temperature)		U
		vol% CO + O_2		S
5	Unit	ppm (1st comp), vol% (2nd comp)		7
		vol% (1st comp), vol% (2nd comp)		9
6	Measurement range (CO)	0 to 2	Note 1	K
		0 to 2.5		Q
		0 to 4		S
		0 to 5		L
		0 to 10		V
		0 to 15		0
		0 to 20		1
		0 to 25		T
		0 to 50		A
		0 to 100		B
		0 to 200		C
		0 to 250		D
		0 to 400		J
		0 to 500		E
		0 to 1000		F
		0 to 2000		G
		0 to 5000		H
		0 to 6000		M
		Others		X
7	Measurement range (O_2)	0 to 5	Note 1	L
		0 to 10		V
		0 to 15		0
		0 to 20		1
		0 to 25		T
		0 to 50		A
		0 to 100		B
		Others		X
9	Flange rating	10K 50A (JIS B 2212)		A
		10K 100A		B
		DN50 / PN10		C
		ANSI #150 2B		D
10	Number of analog outputs	2		0
		4		1
11	Number of analog inputs	2		A
12	Analog output signal	4–20mA DC		1
		1–5 V DC		5
13	Digital input/ output	6 outputs, no input		0
		6 outputs, 3 inputs		1
14	Cable between receiver unit and control unit	5 m	Note 2	A
		10 m		B
		20 m		C
		30 m		D
		40 m		E
		50 m		F
		80 m		G
		100 m		H
		Others		X
15	Cable between receiver unit and transmitter unit	2 m	Note 3	A
		5 m		B
		10 m		C
		15 m		D
		20 m		E
		25 m		F
		Others		X
16	Language	Japanese		J
		English		E
		Chinese		C
17	-	-		0
18	Optical path length (ones place)	0 m	Note 4	0
		1 m		1
		2 m		2
		3 m		3
		4 m		4
		5 m		5
19	Optical path length (tenth place)	0.0 m	Note 4	0
		0.1 m		1
		0.2 m		2
		0.3 m		3
		0.4 m		4
		0.5 m		5
		0.6 m		6
		0.7 m		7
		0.8 m		8
		0.9 m		9
20	Optical path length (hundredths place)	0.00 m	Note 4	0
		0.05 m		5
		(Used only when 10 m is specified)		9
21	-	-		N
22	High-dust (high-speed AGC) version	No		N
		Yes		H

Note 1) Specify the measuring range within the limit calculated based on the optical path length.
Note 2) Cable length between the receiver unit and the control unit: when you select the code "X", available length is 10 m or longer.
Note 3) Cable length between the receiver unit and the transmitter unit: when you select the code "X", available length is 5 m or longer.
Note 4) When the optical path length is 5 m, select "5" in the 18th code, and "0" in the 19th and 20th codes.
Note 5) Specify the code "H" for dust tolerant version, fast response version, and/or O_2 analyzer for combustion control.

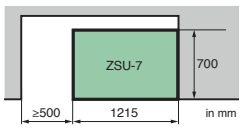
NDIR Gas Analyzer System ZSU-7
Simultaneous Measurement of 7 Components in Flue Gas

Space-saving design

Contains everything you need for measurement up to 7 components: NOx, SO_2, CO, CO_2, O_2, HCl, and dust

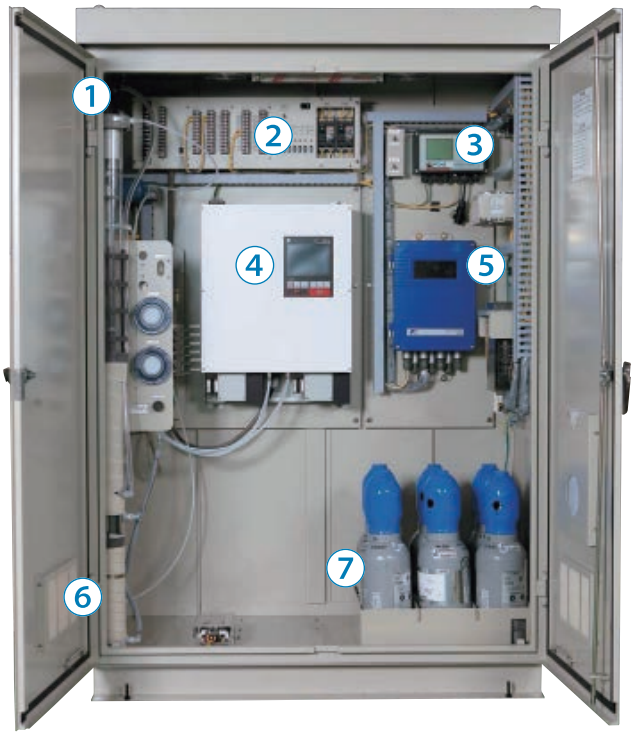
Designed for ease of maintenance

Allows maintenance from front side



Designed for ease of maintenance

Signal and power terminals are in one place





Dimensions in mm

① Gas inlet

for NOx, SO_2, CO, CO_2, O_2

② External wiring terminals

for gas concentration output signals or power supply

③ Dust analyzer

No sampling involved



④ NDIR gas analyzer (ZKJ)

Real-time monitoring of 5 components: NOx, SO_2, CO, CO_2, (O_2)





⑤ HCl analyzer

No sampling involved You can install the HCl analyzer later on.



⑥ Gas conditioner

removes dust and water from flue gas.

⑦ Six 3.4 L standard gas cylinders

for zero and span calibration can be stored.

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

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