

# CROSS STACK LASER GAS ANALYZER

## DATA SHEET

ZSS

Cross stack laser gas analyzer (ZSS) provides continuous measurement of density of HCl contained in flue gas in an incineration system, NH<sub>3</sub> in denitration equipment, combustion gas, CO, CO<sub>2</sub> and O<sub>2</sub> with quick response speed. Due to in-situ method, Measured gas does not require the preparation by sampling system. This analyzer can be used under high dust conditions, so it is possible to install upstream of the bagfilter where gas sampling is normally difficult.

## FEATURES

1. Maintenance is minimized thanks to no need of gas sampling devices.
2. Running cost is negligible due to having few expendable parts.
3. Zero drift is within  $\pm 2.0\%$ FS, and an excellent stability is ensured for a long period of time.
4. Almost no interference by other gas component because an infrared semiconductor laser, which has exact absorption wavelength as the measured component, is used.
5. High speed response is available since the gas sampling device is unnecessary.
6. High vibration resistance because the optical adjustment mechanism is separated from the airtight compartment, and it is easy to make a fine adjustment and large adjustment angle.

## SPECIFICATIONS

### Measurement principle:

Non-dispersive infrared absorbance system (NDIR)

### Measuring method:

Cross-stack system (path system)

**Use application:** Incineration facilities, denitration equipment, etc.

**Light source:** Near-infrared laser

**Laser class:** Class 1 (excluding O<sub>2</sub> meter for use in high dust)

### Outline (D × W × H) mm:

Receiver unit (180 × 400 × 200 mm)  
 Transmitter unit (240 × 400 (432) × 200 mm)  
 Control unit (135 × 240 × 320 mm)

**Mass:** Receiver/Transmitter unit: Approx. 10kg  
 Control unit: Approx. 8kg

**Structure:** Outdoor use type, dustproofing/rainproofing structure (IP65)

**Box finish color:** Receiver/Transmitter box: gray  
 Control unit cover: blue  
 Control unit case: silver



### Measurable component and range:

Component	Min. measuring range	Max. measuring range
HCl	10 ppm	5000 ppm
HCl+H <sub>2</sub> O (*1)	50 ppm (HCl)	1000 ppm (HCl)
NH <sub>3</sub>	15 ppm	5000 ppm
NH <sub>3</sub> +H <sub>2</sub> O (*1)	50 ppm (NH <sub>3</sub> )	1000 ppm (NH <sub>3</sub> )
O <sub>2</sub> (Class 1 Laser)	4 vol%	100 vol%
O <sub>2</sub> (For use in high dust)	4 vol%	50 vol%
CO	2.0 vol%	50 vol%
CO (For use in high temperature)	10 vol%	50 vol%
CO <sub>2</sub>	2.0 vol%	50 vol%
CO <sub>2</sub> (For use in high temperature)	10 vol%	50 vol%
CO+CO <sub>2</sub>	2.5 vol%	50 vol%
CO+CO <sub>2</sub> (For use in high temperature)	10 vol%	50 vol%
CH <sub>4</sub>	100 ppm	50 vol%

(\*1) Range for H<sub>2</sub>O is fixed at 50vol%·m.  
 (Range in the case stack (optical path length) diameter is 1m)

Max. and min. ranges for each stack diameter

= (Max. and min. ranges when stack diameter is 1m)  
 ÷ Stack diameter

\* Stack diameter = Optical path length

(Example: In case stack diameter is 2m for HCl measurement, Max.range: 2500ppm and min. range: 5ppm).

**Material:** Receiver unit / Transmitter unit:  
 Aluminum, SUS316

Control unit: Aluminum

### Materials of gas-contacting parts:

SUS316, BK7, FKM, PTFE, glass-cloth, silicone

- Air purge connection diameter:**  
RC1/4 (tube  $\phi 8 \times 6$ )
- Power supply:** Rated voltage 100 to 240V AC  $\pm 10\%$   
Rated frequency 50/60 Hz
- Power consumption:**  
Max. rated power: Approx. 75VA or less
- Calibration interval:**  
Once every six months (Maintenance cycle may vary depending on the operating environment.)
- Indicator (control unit):** LCD with back light
- Communication functions:**  
USB (for loader), RS-485 (Modbus® protocol)
- Cable length:** Receiver unit to Transmitter unit:  
Standard 2m (Maximum 25m)  
Receiver unit to control unit:  
Standard 5m (Maximum 100m)
- Analog output:** 4 to 20mADC or 0 to 1VDC  $\times 2$  (4)  
Isolated output indicated in the parenthesis is optional.  
(1 to 5V DC, 0 to 5V or 0 to 10V is available.)  
Allowable load: 4 to 20mA DC 550 $\Omega$  or less, 0 to 1V DC 100k $\Omega$  or more  
(Output measurement value and O<sub>2</sub> corresponding value. Average value and instantaneous value are switchable by the settings.)
- Analog input:** 4 to 20mA DC  $\times 6$   
Measured gas pressure, measured gas temperature, measured gas velocity, O<sub>2</sub> gas concentration, water concentration, air purge pressure  
(Measurement concentration correction, O<sub>2</sub> correction or alarm output is performed according to the input signal.)
- Contact output:** Relay contact output (contact capacity 24V DC 1A 1a or 1b  $\times 5$  (Standard: 1a, 1b: for power supply off only)  
Low light transmission, outside the range of upper/lower limits, device failure, during hold/during calibration, power supply off.
- Contact input (option):**  
Photo coupler receiver contact input (operating voltage 12 to 24V DC / 5 to 20mA)  $\times 3$   
Average value reset signal, switching instantaneous value/moving average value and remote hold
- Alarm output (screen-displayed):**  
LD failure, LD temperature error, high gas temperature, air purge (low pressure), box temperature warning, low light transmission, PD over range, connection error, AI under, Range (H-Limit) or Range (L-Limit)
- Display contents:**  
Component, concentration (instantaneous value, average value O<sub>2</sub> correction instantaneous value and O<sub>2</sub> correction average value), alarm (fault status)

## CONTACT OUTPUT CONTENTS (1a CONTACT)

- Low light transmission:**  
Contact output is performed (close) when the amount of light transmission is insufficient.
- Outside the range of upper/lower limits:**  
According to the preset upper or lower limit alarm value, contact output is performed (close) when it becomes lower than alarm upper/lower limit.
- Device failure:** Contact output is performed (close) when laser failure, laser temperature control failure, exceeding the amount of light transmission or communication error are occurred.
- During hold/during calibration:**  
While AO output is held by the hold setting, the values, output (close) of which is held, is the ones just before the holding or arbitrary set values.  
Output (close) during calibration
- Power supply off:**  
Output (close) while power supply is off

## CONTACT INPUT CONTENTS (OPTION)

- Average value reset signal:**  
Output of converted average value is started from the initial state by applying rectangular-wave voltage (pulse width 2 sec or more) to the input terminal of average value resetting. Output is reset by inputting and restarted by opening.
- Switching instantaneous value/moving average value:**  
Switching to and from the instantaneous value and the average value of the analog output is performed by applying rectangular-wave voltage (pulse width 2 sec or more) to the input terminal for switching between the instantaneous value and the moving average values.
- Remote hold:** The analog output is held by applying rectangular-wave voltage (pulse width 2 sec or more) to the remote hold input terminal, and restarted by applying it again.

## FUNCTIONS

- O<sub>2</sub> correction:** Conversion of measured HCl gas concentrations into values at standard O<sub>2</sub> concentration
- Correction formula:
- $$C = \frac{21 - O_n}{21 - O_s} \times C_s$$
- C: Converted concentration  
C<sub>s</sub>: Measured concentration of sample gas  
O<sub>s</sub>: Measured O<sub>2</sub> concentration (Upper limit settable 1 to 20% O<sub>2</sub>)  
O<sub>n</sub>: Standard O<sub>2</sub> concentration (value changeable by setting; 0 to 19% O<sub>2</sub>)
- The result of calculation is indicated and output in an analog output signal.

## INSTALLATION ENVIRONMENT

### Ambient temperature:

-20 to 55°C (Receiver unit/Transmitter unit), -5 to 45°C (control unit)

### Ambient humidity: 90% R.H. or less

### Measurable optical path length (stack diameter):

0.5 to 10m

### Standard flange: JIS10K 50A flange (JIS B 2212)

**Air purge:** Instrument air (compressor must be installed when power supply cannot be provided.) N<sub>2</sub> for an O<sub>2</sub> meter less than 20 vol% Pressure 0.5 to 0.7MPa or more

### Air purge flow rate:

20L/min or more (depending on measured gas temperature, velocity, pressure, moisture and dust)

One-side air purge flow rate: (L/min) = Gas flow rate (m/s) × 10

### Measured gas condition:

Temperature: 1200°C or less (O<sub>2</sub>, CO, CO<sub>2</sub>, CO+CO<sub>2</sub>)(Note)  
130°C or more, and 450°C or less (NH<sub>3</sub>+H<sub>2</sub>O)  
130°C or more, and 450°C or less (HCl+H<sub>2</sub>O)  
300°C or more (CH<sub>4</sub>)

Pressure: ±10kPa

Moisture: 50vol% or less (Should not be saturated water vapor.)

Velocity: 25m/s or less (Consult us for use in high dust or moisture environment.)

Note) When measuring high-temperature gas at 500°C or higher, install a pressure sensor on the air-purge unit to monitor air purge. If measurement is taken while purge is not performed, the device may be damaged.

**Dust:** 5 to 30g/Nm<sup>3</sup> (depending on environmental conditions such as measuring component, equipment specification, light path length and particle diameter).  
If dust exceeds 30g/Nm<sup>3</sup>-m, consult with Fuji.

**Vibration:** 0.5G or less (0.2G or less when the frequency range is 20 to 40Hz) (when optical path length is 1m)

**Mounting angle:** Horizontally ±5 degrees or less (No dew condensation should accumulate on the window.)

## PERFORMANCE (EXCEPT FOR H<sub>2</sub>O)

**Repeatability:** ±1.0%FS (depending on measuring component and measuring range)

**Linearity:** ±1.0%FS (depending on measuring component and measuring range)

**Zero drift:** ±2.0% FS  
(NH<sub>3</sub> ±3.0%, FS when range is 20ppm or less)

**Interference from other gas components:** ±2.0%FS (The gasses which have no absorption within the wavelength range of measured gas (several tens pm) do not interfere in principle).

### Minimum detectable limit:

1% of minimum detectable limit

**Response time (90% FS response):** 1 to 5 seconds

**Warm up time:** 90 minutes or less

(\* Excluding influenced range with absorptive gases such as HCl and NH<sub>3</sub>)

## EC DIRECTIVE COMPLIANCE

Low voltage safety: EN61010-1(2001)

Electromagnetic: "Installation Category II"

compatibility EN61326-1(2006)

EN61326-2-3(2006)

EN61000-3-2(2006)

EN6100-3-3(1995), A1(2001), A2(2005)

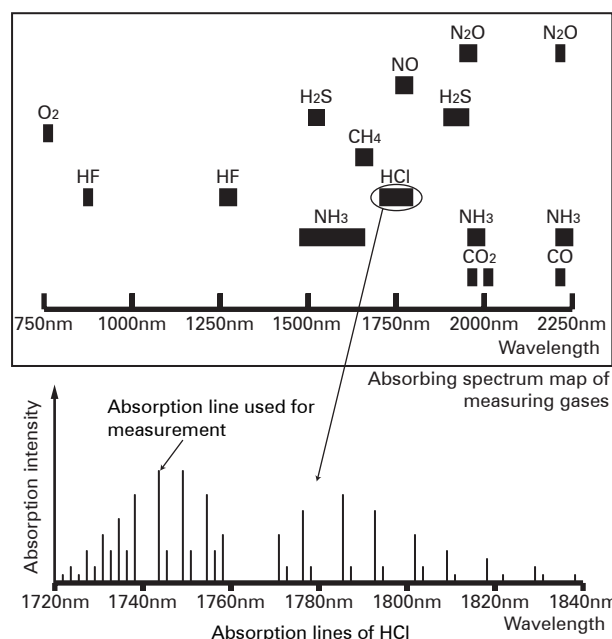
## BASIC PRINCIPLE

An infrared semiconductor laser is adopted for the light source and photo-diode for photo-detection. Each measured gas component has its own wavelength range where the gas absorbs the light (see the figure below).

The wavelength range consists of a set of many absorption lines, and one of these lines is used for measurement.

As measurement is performed in this very narrow wavelength range, no other gas does not have an interference in principle.

To detect the gas concentration, used is not a variation of light intensity, but intensity of modulated signal amplitude.



# CODE SYMBOLS

When ordering, be sure to submit the order sheet on the last page of this Data Sheet.

Digit	Specification	Note	ZSS	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
4	Measurable components	CO CO (For use in high temperature) HCl HCl+H <sub>2</sub> O CO <sub>2</sub> CO <sub>2</sub> (For use in high temperature) CO+CO <sub>2</sub> CO+CO <sub>2</sub> (For use in high temperature) O <sub>2</sub> (Class 1 Laser) O <sub>2</sub> (For use in high dust) CH <sub>4</sub> NH <sub>3</sub> NH <sub>3</sub> +H <sub>2</sub> O	Note 1 Note 1, 5 Note 1 Note 1, 9 Note 5 Note 5 Note 5	A B C F G H K L P Q R W X	Y	4																
5	Unit	ppm mg/m <sup>3</sup> vol%		1 3 5																		
6	Measuring range	0 to 2 0 to 2.5 0 to 4 0 to 5 0 to 10 0 to 15 0 to 20 0 to 25 0 to 50 0 to 100 0 to 200 0 to 250 0 to 400 0 to 500 0 to 1000 0 to 2000 0 to 5000 0 to 6000 Others	Note 2	K Q S L V O 1 T A B C D J E F G H M X																		
7								Y														
8	Modification No.							4														
9	Flange rating	10K 50A (JIS B 2212) 10K 100A DN50/PN10 ANSI #150 2B							A B C D													
10	Number of analog output points	2 points 4 points							0 1													
11	Number of analog input points	2 points 6 points							A B													
12	Analog output	4 to 20mA DC 0 to 20mA DC 0 to 1V DC 0 to 5V DC 1 to 5V DC							1 2 3 4 5													
13	Contact output/input	5 output points, No input 5 output points, 3 input points							0 1													
14	Cable length between receiver and control unit	5m 10m 20m 30m 40m 50m 80m 100m Others	Note 3 Note 6						A B C D E F G H X													
15	Cable length between receiver and transmitter	2m 5m 10m 15m 20m 25m Others	Note 4 Note 7						A B C D E F X													
16	Display and operation manual	Japanese English Chinese							J E C													
18	Measuring optical path length (unit: 1m)	0m 1m 2m 3m 4m 5m 6m 7m 8m 9m							0 1 2 3 4 5 6 7 8 9													
19	Measuring optical path length (unit: 0.1m)	0.0m 0.1m 0.2m 0.3m 0.4m 0.5m 0.6m 0.7m 0.8m 0.9m							0 1 2 3 4 5 6 7 8 9													
20	Measuring optical path length (unit: 0.01m)	0.00m 0.05m (Used only when 10m is specified)							0 5 9													
21	Dust proof specification	Standard Dust proof	Note 8																	N D		

Note 1) When O<sub>2</sub> conversion is required, specify the reference O<sub>2</sub> concentration (settable within 0 to 19vol%, O<sub>2</sub>: Integer). (HCl meter, NH<sub>3</sub> meter, CO meter)

Note 2) Specify the range within the max/min range calculated from path length. If the measuring range x stack length (optical path length) exceeds 1000ppm/m, consult Fuji.

Note 3) Cable length between receiver and control unit: Max. 100m

Note 4) Cable length between receiver and transmitter: Max. 25m

Note 5) Specified to use in high temperature gas: 500°C or more, and 1200°C or less

Note 6) Others (specified with X) are possible only for 10 m or more.

Note 7) Others (specified with X) are possible only for 5 m or more.

Note 8) Specify 'D' when dust exceeds 5g/Nm<sup>3</sup>-m.

Note 9) If H<sub>2</sub>O is contained in measured component, be sure to write the measured gas temperature into "Specification sheet" at the last page of this catalog, or contact directly to Fuji's service department.

How to specify measuring optical path length  
Example: 2.25m 2 for 18th digit, 2 for 19th digit and 5 for 20th digit  
10m 9 for 18th digit, 9 for 19th digit and 9 for 20th digit

## LIST FOR COMBINATIONS OF MEASURABLE COMPONENTS, UNITS AND MEASUREMENT RANGES

Measurable component	4th digit	Measurable range 6th digit (Unit: When 5th digit is 1 or 3)	Measurable range 6th digit (Unit: When 5th digit is 5)
CO	A	Not feasible	K, Q, S, L, V, 0, 1, T, A, X
CO (For use in high temperature)	B	Not feasible	V, 0, 1, T, A, X
HC	C	V, 0, 1, T, A, B, C, D, J, E, F, G, H, Z	Not feasible
HC+H <sub>2</sub> O	F	A, B, C, D, J, E, F	Not feasible
CO <sub>2</sub>	G	Not feasible	K, Q, S, L, V, 0, 1, T, A, X
CO <sub>2</sub> (For use in high temperature)	H	Not feasible	V, 0, 1, T, A, X
CO+CO <sub>2</sub>	K	Not feasible	Q, S, L, V, 0, 1, T, A, X (CO)
		Not feasible	Q, S, L, V, 0, 1, T, A, X (CO <sub>2</sub> )
CO+CO <sub>2</sub> (For use in high temperature)	L	Not feasible	V, 0, 1, T, A, X (CO)
		Not feasible	V, 0, 1, T, A, X (CO <sub>2</sub> )
O <sub>2</sub> (Class 1 Laser)	P	Not feasible	S, L, V, 0, 1, T, A, B, X
O <sub>2</sub> (For use in high dust)	Q	Not feasible	S, L, V, 0, 1, T, A, X
CH <sub>4</sub>	R	B, C, D, J, E, F, G, H, M, Z	K, Q, S, L, V, 0, 1, T, A, X
NH <sub>3</sub>	W	0, 1, T, A, B, C, D, J, E, F, G, H, Z	Not feasible
NH <sub>3</sub> +H <sub>2</sub> O	X	A, B, C, D, J, E, F	Not feasible

## SCOPE OF DELIVERY

- Receiver unit
- Transmitter unit
- Control unit
- Cable between receiver unit and transmitter unit (specified length)
- Cable between receiver unit and control unit (specified length)
- Standard accessory set, instruction manual

## OPTIONAL ITEMS

- Spare parts for one year (ZBN1SS12)
- Calibration gas cell (\*1) (\*2)
- Cable between receiver unit and transmitter unit (for calibration) (\*1)
- Cable between receiver unit and control unit (for calibration) (\*1)
- Standard gas (ZBM), pressure regulator (ZBD)
- Recorder (when necessary, Fuji's product type PHL/PHR, etc.)
- Others

\*1: One set of the cables and calibration gas cell are necessary for installation and annual maintenance.

\*2: Standard length 1m (200mm or 500mm when the measuring range is low concentration)

## STANDARD ACCESSORIES

Name	Quantity	Specification
Bolt	8 (16)	M16×55 (70) SUS (*)
Nut	8 (16)	M16 SUS (*)
Spring washer	8 (16)	M16 SUS (*)
Flat washer	8 (16)	M16 SUS (*)
Companion flange packing or flange packing specified for use in high temperature	2	According to flange specifications
Bolt for angle adjustment	6	Hex socket bolt M8 × 70
Power supply fuse	2	
Instruction manual	1	

(\*When "B" or "C" is specified in the 9th digit in a code symbol, quantity is 16 pieces. 8 pieces are attached in other cases.)

(\*When "B", "C" or "D" is specified in the 9th digit, Bolt length is 70mm. It is 55mm in other cases. Inch-sized bolts are not applicable.)

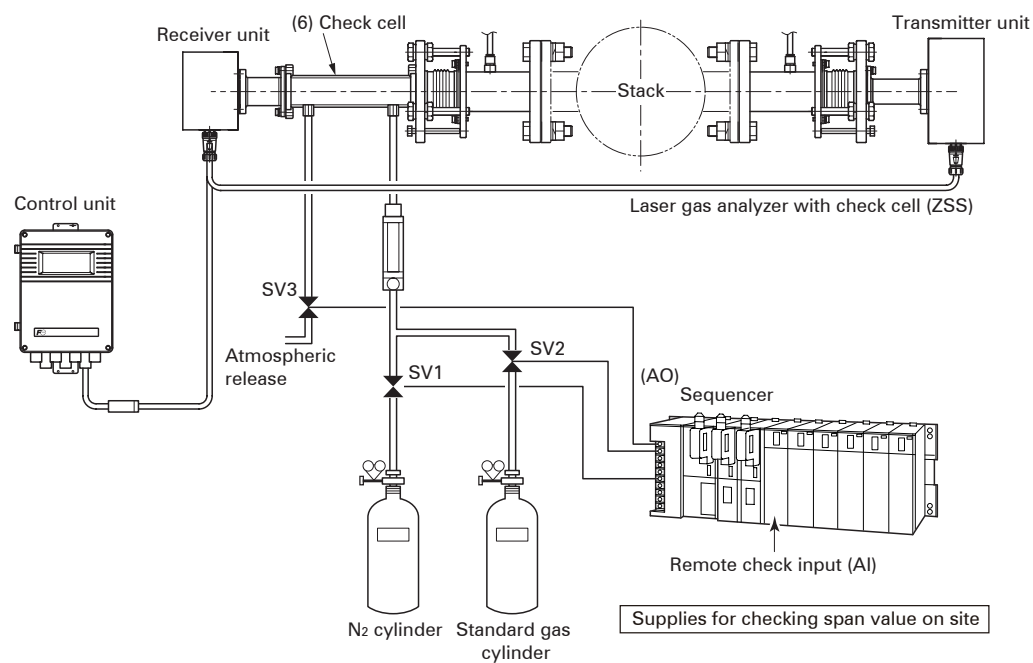
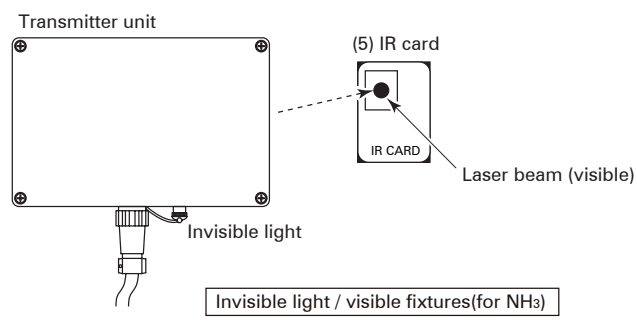
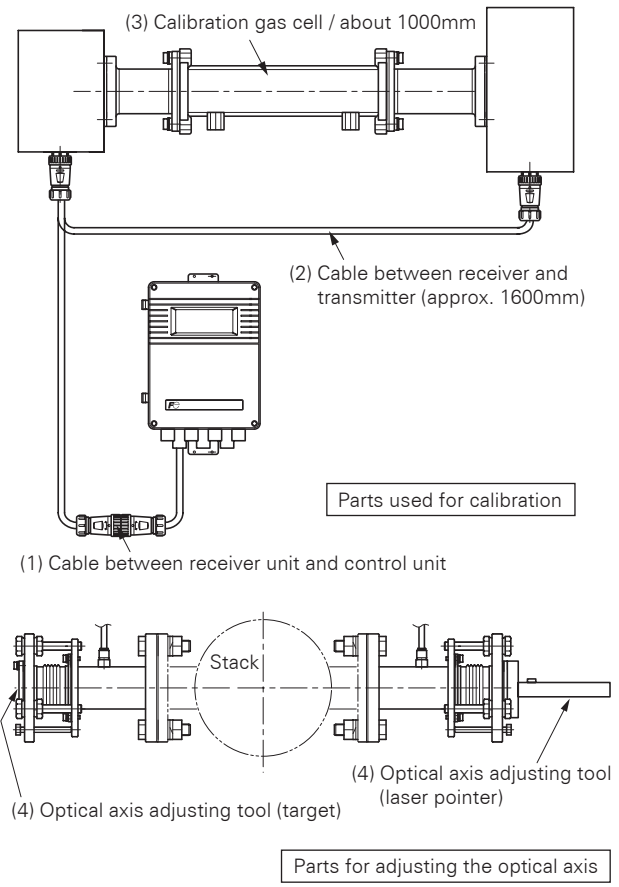
## SPARE PARTS FOR ONE YEAR (ZBN1SS12)

Name	Quantity	Remarks
Silicon packing A	2 pieces	For bellows (ZZP*ZSSTK7N3508P1)
O-ring	2 pieces	(ZZP*ZSSTK7P2530P3)

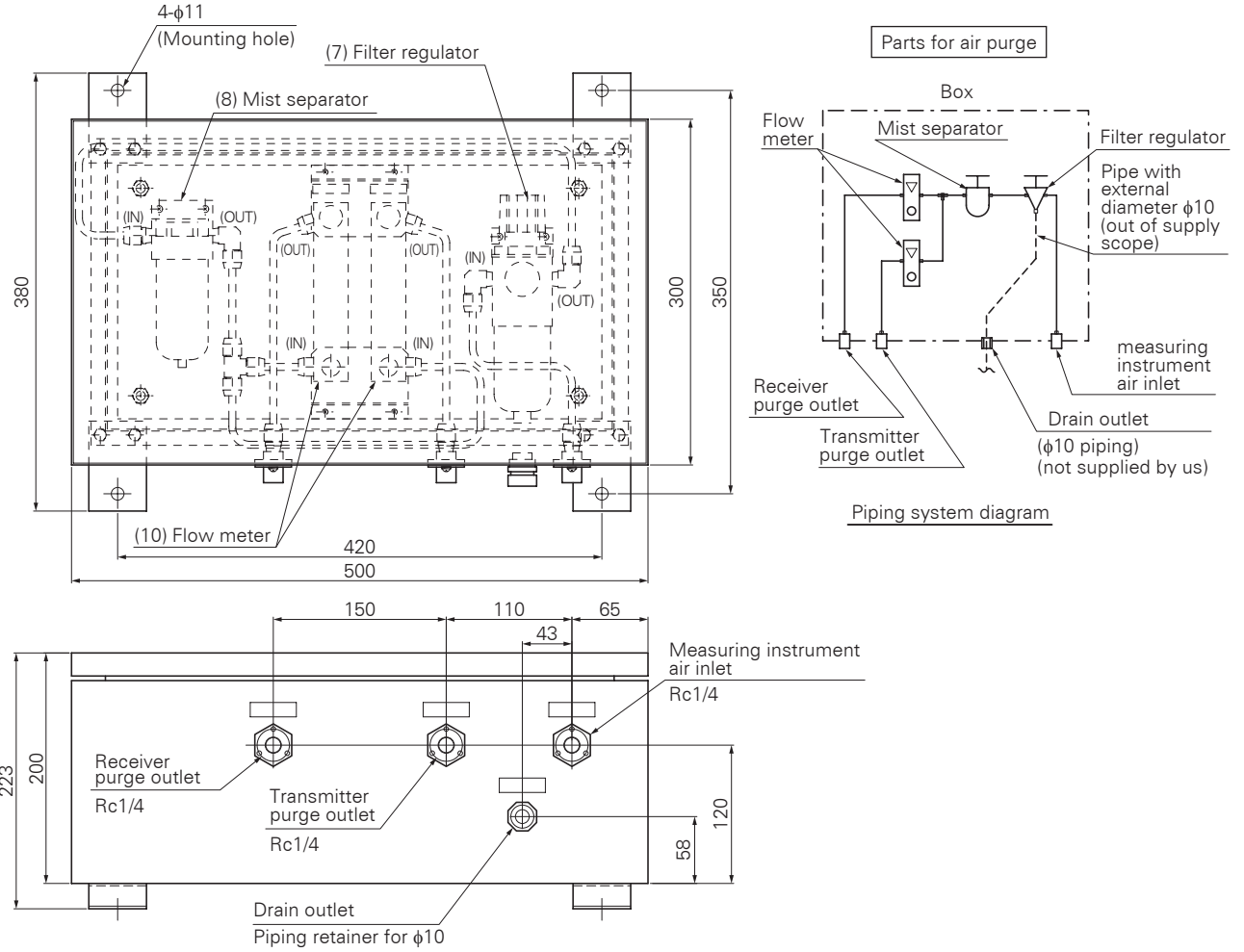
### CALIBRATION/INSTALLATION FIXTURES LIST (OPTION)

	Parts name	Quantity	Type
(1)	Cable between receiver unit and control unit (for calibration)	1	ZZP*ZSSTK4J1271C2
(2)	Cable between receiver unit and transmitter unit (for calibration)	1	ZZP*ZSSTK4J0641C3
(3)	Calibration gas cell (*3) (HCl, NH <sub>3</sub> , CO, CO <sub>2</sub> , CO+CO <sub>2</sub> , CH <sub>4</sub> )	1	ZZP*ZSSTK4J3676C1
	Calibration gas cell (*3) (HCl+H <sub>2</sub> O, NH <sub>3</sub> +H <sub>2</sub> O, O <sub>2</sub> )		ZZP*ZSSTK4J5026C1
(4)	Optical axis adjusting tool (laser pointer, target)	1	ZZP*ZSSTK4J1274C1
(5)	IR card (for NH <sub>3</sub> )	1	ZZP*ZSSTK7N4505P1
(6)	Check cell	1	ZZP*ZSSTK4J2605C1
(7)	Filter regulator	1	ZZP*ZSSTK7F9554P2
(8)	Mist separator	1	ZZP*ZSSTK7H8049P1
(9)	R1/4 stopper (plug) for mist separator	1	ZZP*ZSSTK738114P7
(10)	Flow meter (20 to 100L/min) (*4)	1	ZZP*ZSSTK7N4624P1
	Flow meter (4 to 50L/min) (*4)	1	ZZP*ZSSTK7N4624P2
	Flow meter (30 to 300L/min) (*4)	1	ZZP*ZSSTK7N8849P1
(11)	Air-set box (20 to 100L/min)	1	ZZP*ZSSTK7N6685C1
	Air-set box (4 to 50L/min)	1	ZZP*ZSSTK7N6685C2
	Air-set box (30 to 300L/min)	1	ZZP*ZSSTK7N6685C3
(12)	Air purge mechanism (20 to 100L/min)	1	ZZP*ZSSTK7P1433C1
	Air purge mechanism (4 to 50L/min)	1	ZZP*ZSSTK7P1433C2
	Air purge mechanism (30 to 300L/min)	1	ZZP*ZSSTK7P1433C3
(13)	BNC cable for optical axis adjustment	1	ZZP*ZSSTK7P2524C1

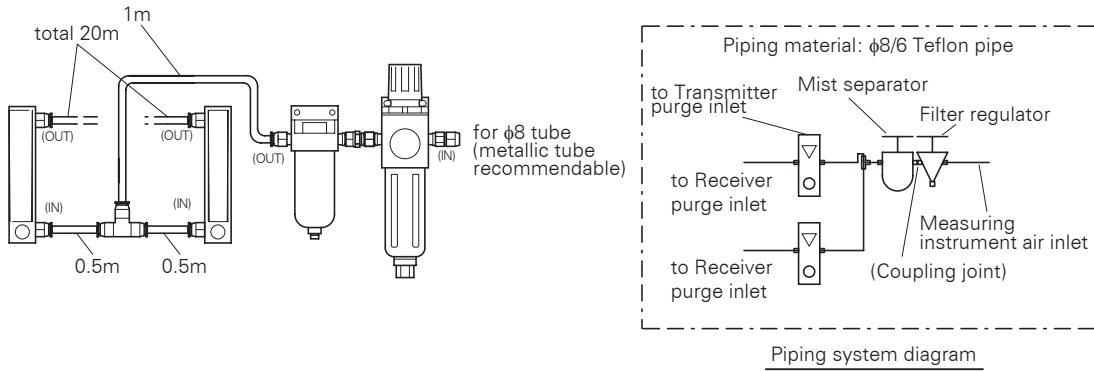
- \* 3: Standard length 1m (200mm or 500mm when the measuring range is low concentration)
- \* 4: Usually, 2 units are required to adjust each air purge for receiver unit and transmitter unit.



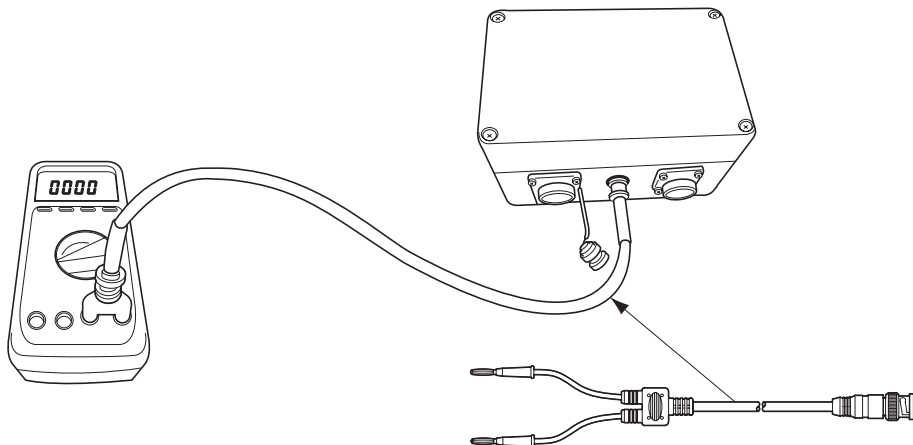
(11) Air set box



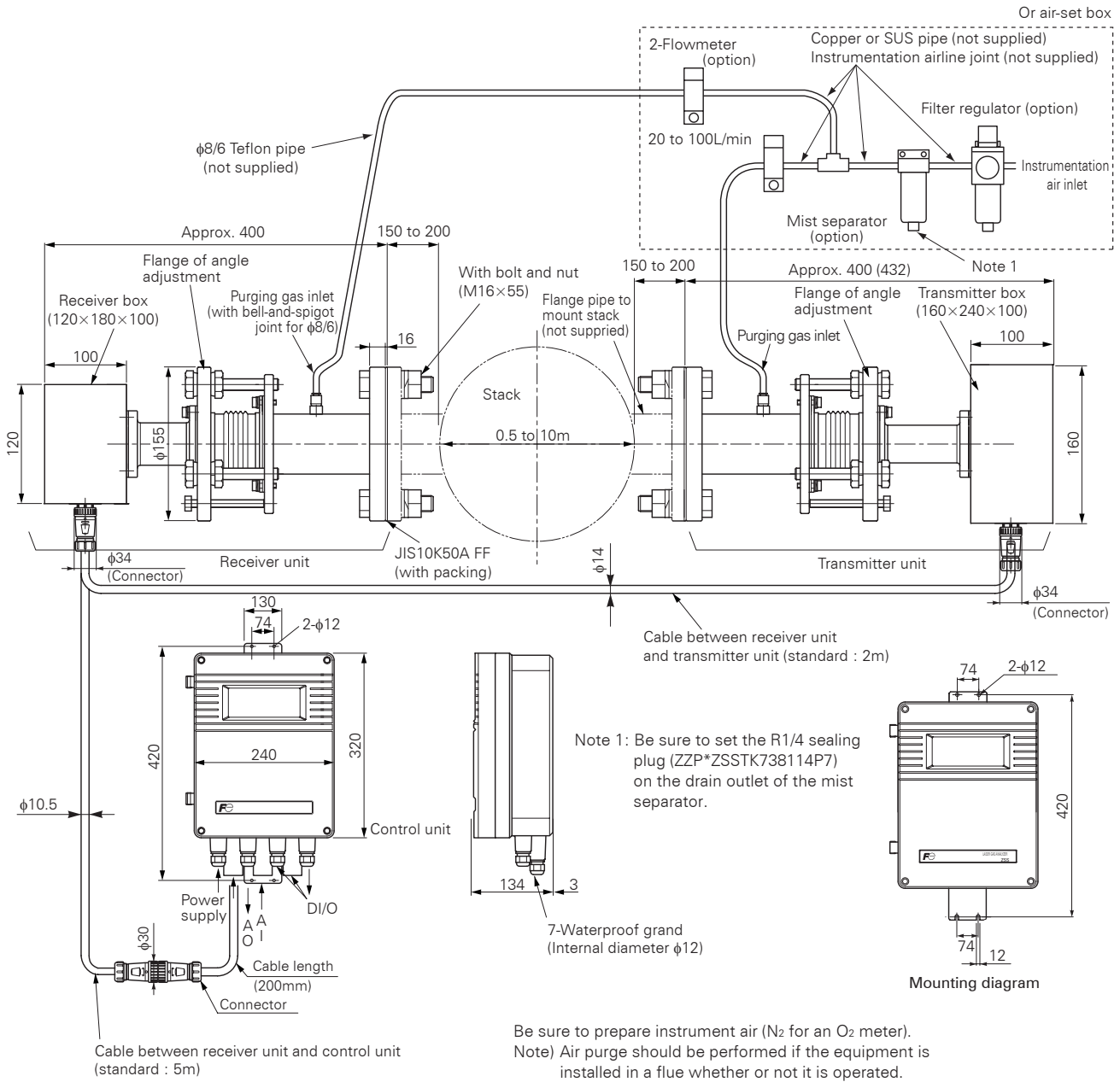
(12) Air purge mechanical part



(13) BNC cable for optical axis adjustment



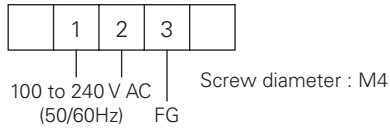
OUTLINE DIAGRAM (Unit : mm)



## EXTERNAL CONNECTION DIAGRAM (WHEN NUMBER OF ANALOG OUTPUT IS 2 POINTS)

There are two types of output/input terminal.

### Power supply terminal



### AO terminal

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Screw diameter : M2 or the equivalent

- |                                      |  |
|--------------------------------------|--|
| 1 AO1+ ] Analog output 1<br>2 AO1- ] | 21 AO2+ ] Analog output 2<br>22 AO2- ] |
|--------------------------------------|--|

### AI terminal

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Screw diameter : M2 or the equivalent

- |  |  |
|--|--|
| 3 AI1+ ] Analog input 1<br>4 AI1- ]<br>5 AI2+ ] Analog input 2<br>6 AI2- ]<br>7 AI3+ ] Analog input 3 (AI extension board is required)<br>8 AI3- ] | 23 AI4+ ] Analog input 4 (AI extension board is required)<br>24 AI4- ]<br>25 AI5+ ] Analog input 5 (AI extension board is required)<br>26 AI5- ]<br>27 AI6+ ] Analog input 6 (AI extension board is required)<br>28 AI6- ] |
|--|--|

### DI/DO terminal

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

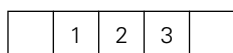
Screw diameter : M2 or the equivalent

- |   |  |
|---|--|
| 9 DO1 ] Low light transmission<br>10 DO1 ]<br>11 DO2 ] Device failure<br>12 DO2 ]<br>13 DO3 ] During hold / during calibration<br>14 DO3 ]<br>15 DO4 ] Outside the range of upper /<br>16 DO4 ] lower limits (component 1)<br>17 DO5 ] Range identification (component 1)<br>18 DO5 ]<br>19 DO6 ]<br>20 DO6 ] | 29 DO7 ]<br>30 DO7 ]<br>31 DO8 ] Power supply off<br>32 DO8 ]<br>33 DI1 ] Average value reset signal (option)<br>34 DI1 ]<br>35 DI2 ] Switching instantaneous value/moving average value (option)<br>36 DI2 ]<br>37 DI3 ] Remote hold (option)<br>38 DI3 ]<br>39 DI4 ]<br>40 DI4 ] |
|---|--|

Note) Unassigned terminal may be connected to internal circuit. So they should not be used as repeating terminals.

## EXTERNAL CONNECTION DIAGRAM (WHEN NUMBER OF ANALOG OUTPUT IS 4 POINTS)

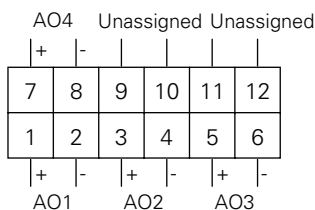
Power supply terminals



AC100 to 240V  
50/60Hz FG

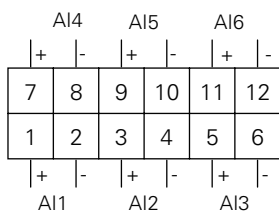
Screws diameter: M4

AO terminal



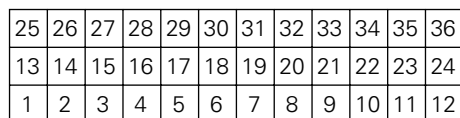
- |        |                   |        |                   |
|--------|-------------------|--------|-------------------|
| 1 AO1+ | ] Analog output 1 | 5 AO3+ | ] Analog output 3 |
| 2 AO1- |                   | 6 AO3- |                   |
| 3 AO2+ | ] Analog output 2 | 7 AO4+ | ] Analog output 4 |
| 4 AO2- |                   | 8 AO4- |                   |

AI terminal



- |        |                  |         |                  |
|--------|------------------|---------|------------------|
| 1 AI1+ | ] Analog input 1 | 7 AI4+  | ] Analog input 4 |
| 2 AI1- |                  | 8 AI4-  |                  |
| 3 AI2+ | ] Analog input 2 | 9 AI5+  | ] Analog input 5 |
| 4 AI2- |                  | 10 AI5- |                  |
| 5 AI3+ | ] Analog input 3 | 11 AI6+ | ] Analog input 6 |
| 6 AI3- |                  | 12 AI6- |                  |

DI/DO terminal

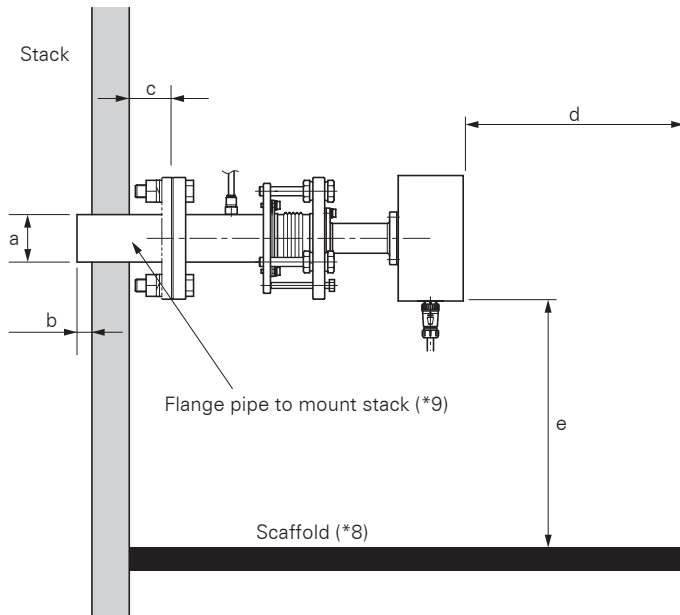


- |        |   |         |  |
|--------|---|---------|--|
| 1 DI1  | ] Average value reset signal (option)                         | 19 DO4  | ] Outside the range of upper/lowerlimits (component 1) |
| 2 DI1  |   | 20 DO4  |  |
| 3 DI2  | ] Switching instantaneous value/moving average value (option) | 21 DO5  | ] Range identification (component 1)                   |
| 4 DI2  |   | 22 DO5  |  |
| 5 DI3  | ] Remote hold (option)  | 23 DO6  | ]  |
| 6 DI3  |   | 24 DO6  |  |
| 7 DI4  | ]   | 25 DO7  | ]  |
| 8 DI4  |   | 26 DO7  |  |
| 9 DI5  | ]   | 27 DO8  | ] Power supply off                                     |
| 10 DI5 |   | 28 DO8  |  |
| 13 DO1 | ] Low light transmission                                      | 29 DO9  | ]  |
| 14 DO1 |   | 30 DO9  |  |
| 15 DO2 | ] Device failure  | 31 DO10 | ]  |
| 16 DO2 |   | 32 DO10 |  |
| 17 DO3 | ] During hold/during calibration                              | 33 DO11 | ]  |
| 18 DO3 |   | 34 DO11 |  |

Note) Unassigned terminals may be connected to internal circuit. So they should not be used as repeating terminals.

## MOUNTING DIMENSIONS (Unit: mm)

Do not install the device in a stack if air purge is not performed.  
It may become unusable because the window will get dirty.

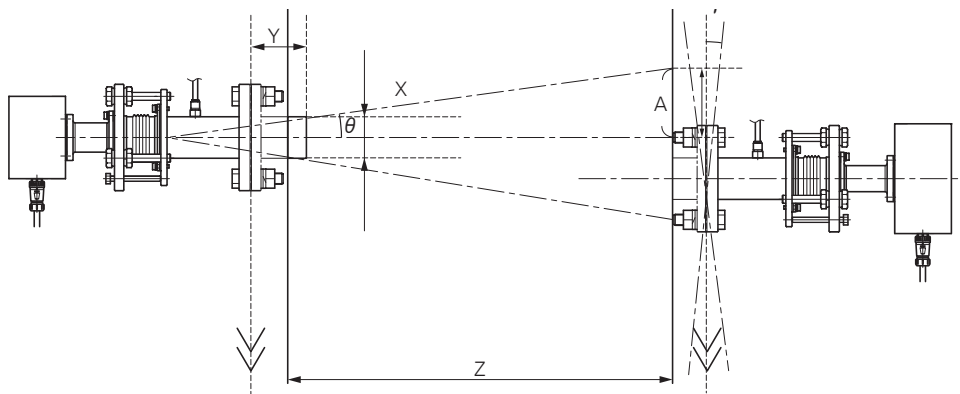


- a: Inner diameter of  $\phi 50\text{mm}$  or more
- b: 20 to 70mm (\*5)
- c: Approximately 200 to 250mm (\*6)
- d: 400mm or more (\*7)
- e: 500 to 1500mm (\*7)

- \*5: When used in an environment with high dust, reserve at least 50mm.
- \*6: When internal gas temperature is high, reserve the distance of 250mm or more. Note that, adjustable angle range narrows down, so mounting angle of flange pipe to mount stack should be adjusted accurately.
- \*7: Sufficiently secure a space for installation which permits easy operation.
- \*8: Scaffold is required for the both side of receiver unit and transmitter unit.
- \*9: Use a flange provided with a valve where there is a risk of gas injection or the operator may be exposed to dangerous situation.
- \*10: Tighten the flange with a torque of  $118 \pm 114\text{N}\cdot\text{m}$ . When tightening the flange, apply grease to the bolts (recommendable to use grease containing molybdenum).

## ROUGH GUIDE TO MOUNT THE COMPANION FLANGE

When  $\theta$  is larger than  $5^\circ$ , mount it within the  $\gamma$  angle ( $\approx 5^\circ$ ) inside the circle with the A radius.



- X: Inner diameter of flange of receiver unit and transmitter unit
- Y: Length of flange of receiver unit and transmitter unit
- Z: Length of stack

$$\gamma, \theta = \text{ATAN} \frac{X}{2(Y + 125)}$$

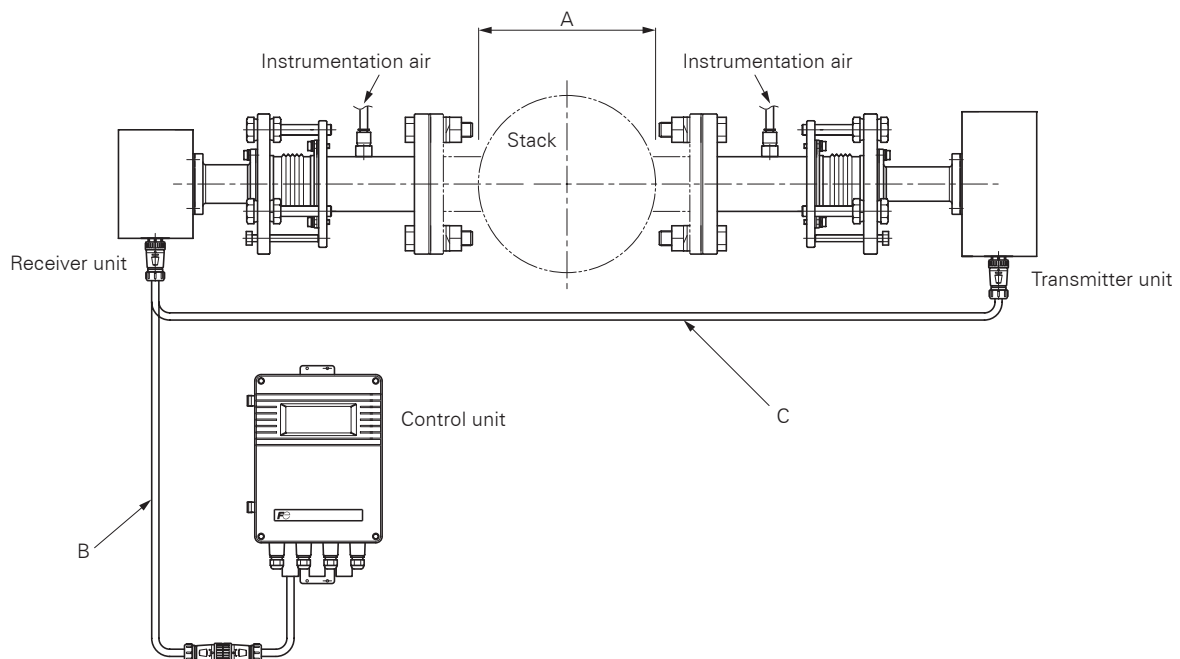
$$A \approx 0.087 \times (Z + Y + 125)$$

Please specify the following items when you contact us for inquiry.

- Code symbol ZSS
- Parameter of measured gas

Item	Min. value	Typical value	Max. value
Measured gas concentration			
Temperature (°C)			
Pressure (kPa)			
Flow (m/s)			
Moisture (vol%)			
Dust (mg/Nm <sup>3</sup> )			
Other gas component (vol%/ppm)			
Other gas component (vol%/ppm)			
Other gas component (vol%/ppm)			

- Stack diameter (Inner diameter) (measured optical path length) A  m
- Cable between receiver unit and control unit. B  m
- Cable between receiver unit and transmitter unit. C  m



- Spares for 1-year measurement      no need    necessary
- Optional items      no need    necessary
- Output of O<sub>2</sub> correction value (for only HCl and NH<sub>3</sub> meters)      no need    necessary
- Oxygen correction reference value (%) (When "necessary" is selected in 8)  %
- Vibration      no need    necessary (  G)

**⚠ Caution on Safety**

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

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