Fuji Electric

Instruction Manual

INFRARED GAS ANALYZER (INSTALLATION MANUAL)

TYPE: ZSJ

INZ-TN5A1588a-E Fuji Electric Co., Ltd.

PREFACE

We are grateful for your purchase of Fuji Infrared Gas Analyzer, TYPE: ZSJ.

- Read this installation manual carefully to understand the installation procedure fully prior to commencing the work. Improper installation may result in an accident or injury.
- The specifications of this analyzer are subject to change without prior notice for further product improvement.
- Modification of this analyzer is strictly prohibited unless a written approval is obtained from the manufacturer. Fuji will not bear any responsibility for an accident caused by such a modification.
- Those who actually install the gas analyzer should read and keep this installation manual near at hand.
- After reading the manual, be sure to store it at a place at a place easy to access.
- Make sure that this installation manual is handed over to the installation service that actually performs the work.
- Refer to the manufacturing specifications submitted separately.

Manufacturer:	Fuji Electric Co., Ltd.
Type:	Described in nameplate on main frame
Date of manufacture:	Described in nameplate on main frame
Product nationality:	Japan

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Request

- It is prohibited to transfer part or all of this manual without Fuji's permission in written format.
- Description in this manual is subject to change without prior notice for further improvement.

CAUTION ON SAFETY

First of all, read this "Caution on safety" carefully, and then install the analyzer in the correct way.

- The cautionary descriptions listed here contain important information about safety, so they should always be observed. Those safety precautions are ranked in 3 levels, "DANGER", "CAUTION" and "PROHIBITION".

⚠ **DANGER**	Wrong handling may cause a dangerous situation, in which there is a risk of death or heavy injury.
⚠ **CAUTION**	Wrong handling may invite a dangerous situation, in which there is a possibility of medium-level trouble or slight injury or only physical damage is predictable.
⊘ **PROHIBITION**	Items which must not be done are noted.

Caution on installation, re-installation and storage of gas analyzer	
⚠ **DANGER**	• This unit is not explosion-proof type. Do not use it in a place with explosive gases to prevent explosion, fire or other serious accidents.
⚠ **CAUTION**	• Entrust the installation, movement or re-installation to a specialist or the supplier. A poor installation may cause accidental tipover, electric shock, fire, injury, etc. • The infrared gas analyzer is heavy. It should be installed with utmost care. Otherwise, it may tip over or drop, for example, causing accident or injury. • For lifting the infrared gas analyzer, be sure to wear protective gloves. Bare hands may invite an injury. • This unit should be installed in a place which conforms to the conditions noted in the instruction manual. Otherwise, it may cause electric shocks, fire or malfunction of the unit. • During installation work, care should be taken to keep the unit free from entry of cable chips or other foreign objects. Otherwise, it may cause fire, failure or malfunction of the unit. • For discharging the exhaust gas, carry out piping up to a position which is not easily accessible by persons so as not to adversely affect the human body.

Caution on wiring	
⚠ CAUTION	• Entrust the wiring to a specialist or the supplier. Poor wiring may cause electric shock or injury. • Enforce construction of class-D grounding wire by all means. If the specified grounding construction is neglected, an electric shock or malfunction may be caused. **Caution to wiring electrician** **For avoiding electric shock, fire and injury, be sure to observe the following.** • Before wiring, be sure to turn off the main power supplies. This is required for preventing an electric shock. • As a grounding wire, use 600V-IV wire of 2 mm^2 or thicker having a sufficient dielectric strength. Use of a wrong ground wire may cause electric shock or malfunction. • Input/output wires should have proper diameters meeting the rated current of the infrared gas analyzer. If a wire which cannot endure the rating is used, a fire may occur. • For connection to input and output terminal blocks, be sure to use solderless terminals. • For branching the output wires, use a terminal block. • Be sure to fasten the input/output wires on the floor, wall, etc. and put guards on the wires. • Do not install the instrument near high frequency heating furnace, electric welding machine or others which considerably disturb the power waveforms. Do not share their power supplies either.

Others	
⚠ CAUTION	• If the cause of any fault cannot be determined despite reference to the instruction manual, be sure to contact your dealer or Fuji' s technician in charge of adjustment. If the instrument is disassembled carelessly, damage, electric shock or injury may result.

CONTENTS

1. INSTALLATION

⚠ DANGER

- This unit is not explosion-proof type. Do not use it in a place with explosive gases to prevent explosion, fire or other serious accidents.

⚠ CAUTION

- Entrust the installation, movement or re-installation to a specialist or the supplier. A poor installation may cause accidental tipover, electric shock, fire, injury, etc.
- The infrared gas analyzer is heavy. It should be installed with utmost care. Otherwise, it may tip over or drop, for example, causing accident or injury.
- For lifting the infrared gas analyzer, be sure to wear protective gloves. Bare hands may invite an injury.
- This unit should be installed in a place which conforms to the conditions noted in the instruction manual. Otherwise, it may cause electric shocks, fire or malfunction of the unit.
- During installation work, care should be taken to keep the unit free from entry of cable chips or other foreign objects. Otherwise, it may cause fire, failure or malfunction of the unit.

1.1 Selecting location of analyzer

To install the analyzer for optimum performance, select a location that meets the following conditions;

(1) A place close to a gas sampling point (30 meter, max).

(2) A place which is not exposed to direct sunlight or radiation heat from high temperature object.

A place free from rain or water drops for indoor use.

(3) A place which is free from dust or corrosive gas.

(4) A vibration-free place. ($0.2m/s^2$ or less)

(5) A place where change in ambient temperature is minimum.

(6) A place where a sufficient maintenance space can be secured (see "1.3.3 Maintenance space").

1.2 Selecting location of gas extractor

For sampling measuring gases (for installing the gas extractor), select a location that meets the following conditions (see JIS K0095, K0103, Z8808).

(1) Standard measuring gas conditions

Temperature : 60 to 800°C

Dust : 100mg/*N*m^3 or less

Pressure : −5 to +5kPa (The gas analyzer is selected from among three sample gas pressure ranges of −5 to +1kPa, −3 to +3kPa, and −1 to +5kPa.)

Components : SO_2: 500 ppm or less, NOx: 1000 ppm or less, CO_2: 15% or less, CO: 2000 ppm or less, O_2: 21% or less, HCl: 100ppm or less, the residual components: N_2, H_2O

(2) A place where gas is ceaselessly supplied, and having a stack that is always filled with gases.

(3) A place accessible for maintenance and check.

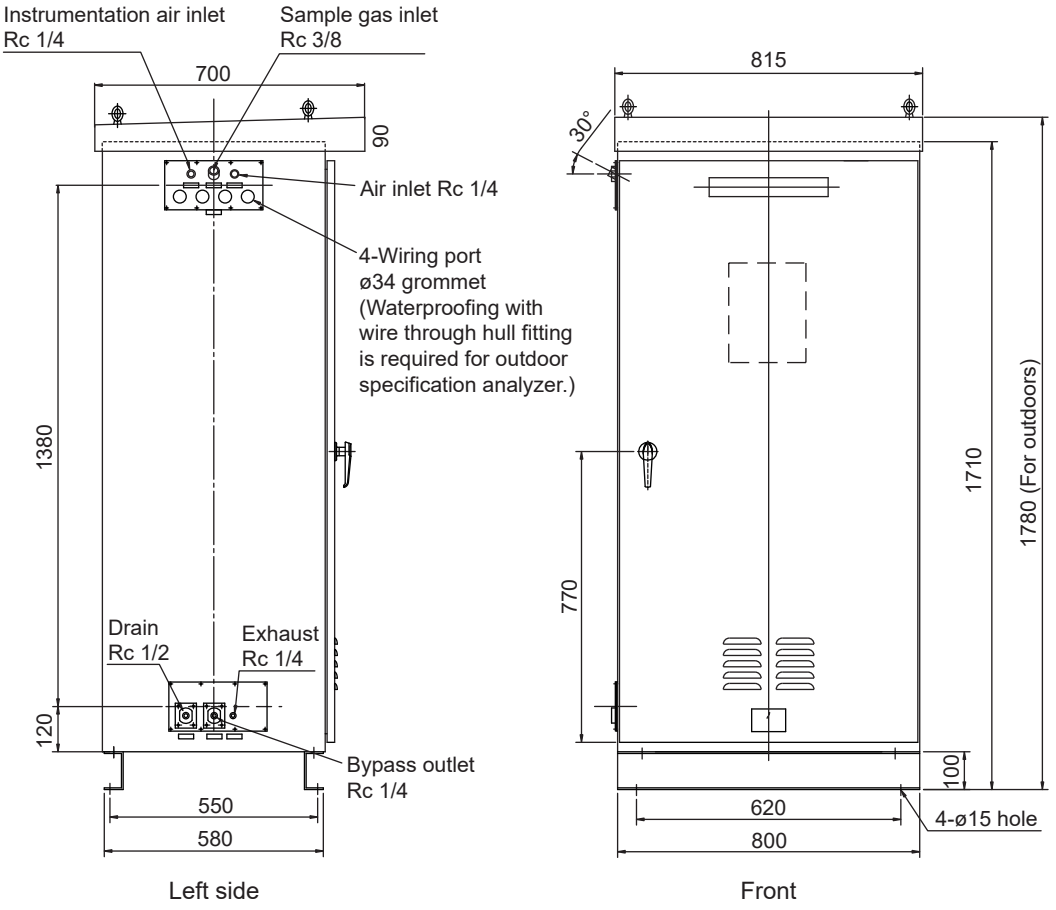
(4) A place where pressure or temperature fluctuation is minimum.

(5) A place where the analyzer can be mounted upon inserting it sidewise from the side wall of the stack or vertically from the ceiling.

1.3 Installation of analyzer

1.3.1 External dimensions

The external dimensions of analyzer cubicle (standard type) are as follows:

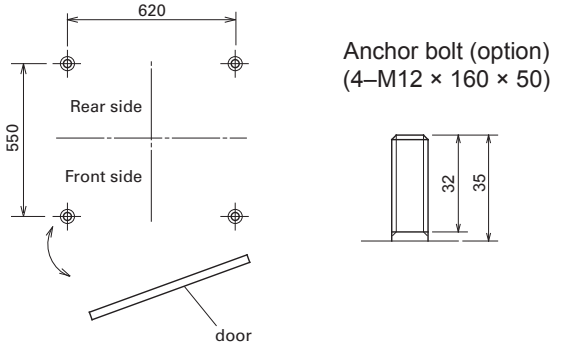


Unit: mm

Fig. 1-1

1.3.2 Anchor bolt mounting dimensions

The mounting dimensions of anchor bolts that fix the analyzer cubicle are as follows:

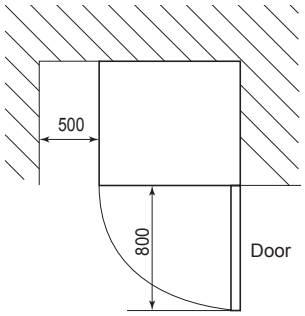


Unit: mm

Fig. 1-2

1.3.3 Maintenance space

Secure a space with the following dimensions for a maintenance area of the analyzer cubicle.



Unit: mm

Fig. 1-3

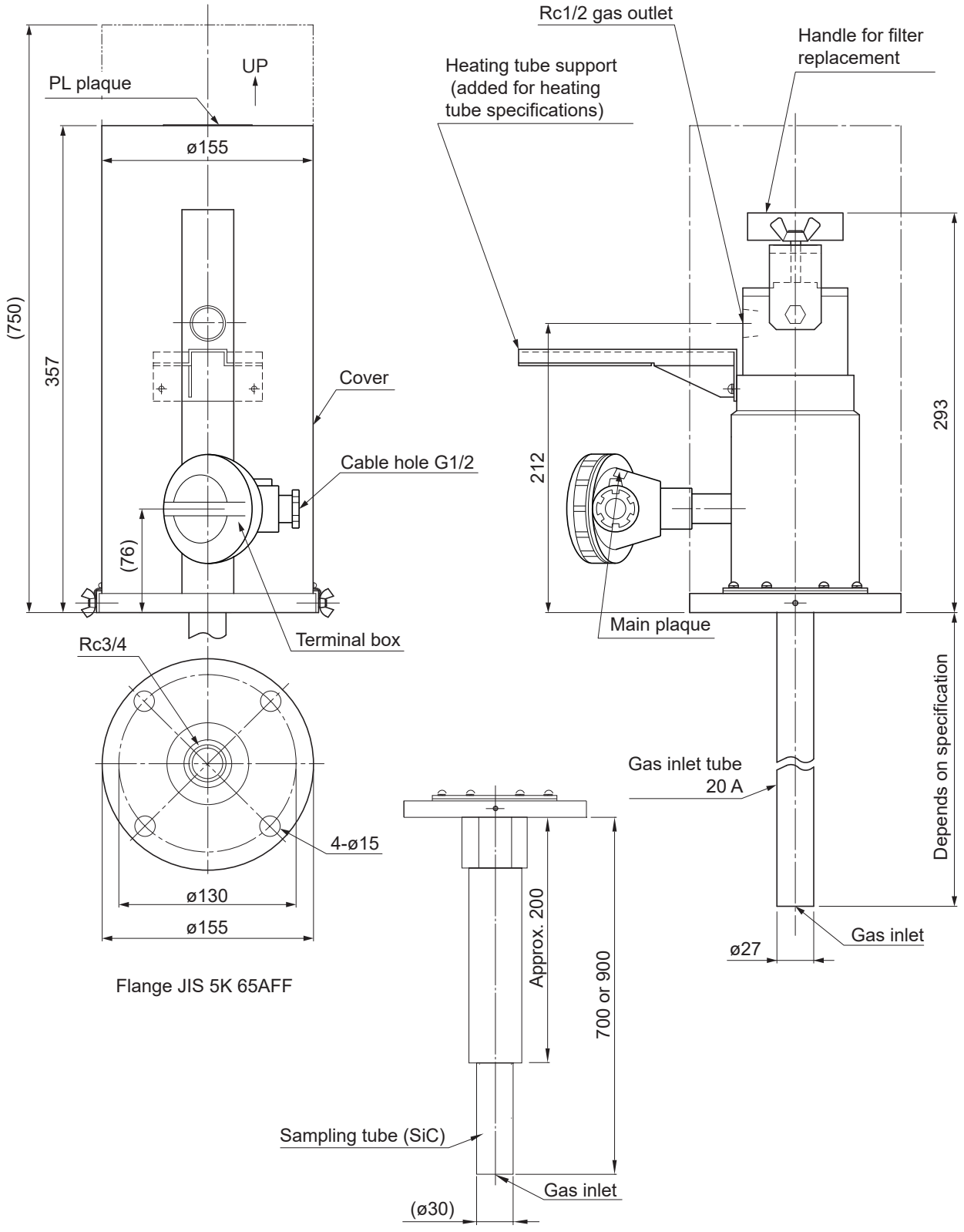
1.3.4 Vibration proof measures

To install it at a location which is subject to frequent vibration, place vibration proof rubber below the cubicle.

Tolerable vibration: 0.2 m/s^2 or less

1.4 Installation of gas extractor

1.4.1 Dimensions of gas extractor



Unit: mm

Fig. 1-4

1.4.2 Mounting conditions for gas extractor

To install the extractor, observe the following conditions:

(1) Sampling gas temperature is within the specified range (general use: 800°C in max, high temperature: 1300°C in max.).

(2) Perform processing or installation of mating flanges or protective tubes in advance to conform with the insertion angle limitations of each extractor.

- Standard gas extractor flange: JIS 5K65AFF
- Power requirements: 100 V AC, 50/60 Hz (100VA)
- Limits of insertion angle (See Fig. 1-5)
- General use: 90° to 0°
- High temperature: 90° straight downward (to prevent damage to SiC tube)

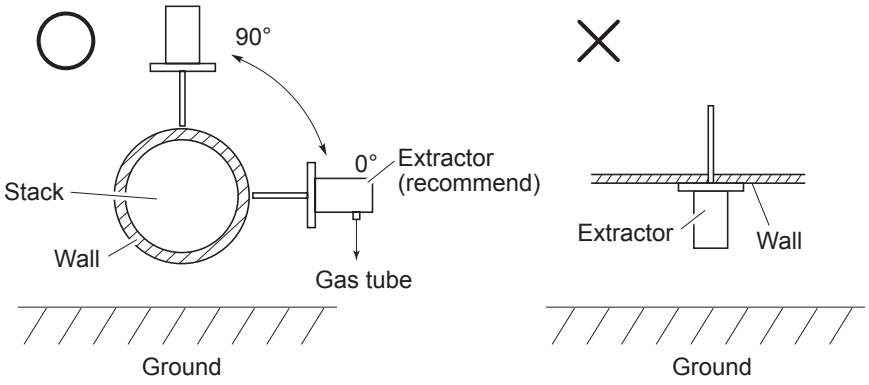


Fig. 1-5

Note) Be sure to mount the gas extractor so that its outlet faces downward to prevent the drain in sample gas from residing.

(3) Install the extractor so that the tip of sampling tube is located at the center of stack (separated 300 mm or more from the wall). A provision should be made to prevent aspiration of leak air as shown in Fig. 1-6. For high temperature device, install so that SUS protective tubes are not placed in the high temperature furnace. (see Fig. 1-4.)

(4) Position the supplied packing under the flange beforehand.

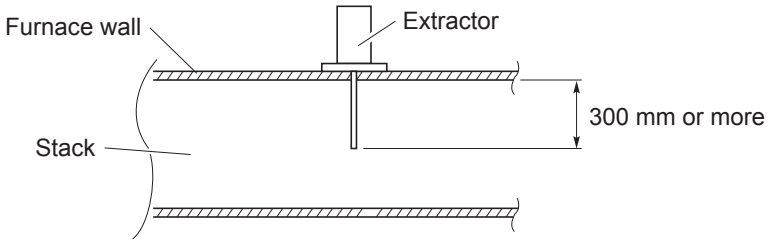


Fig. 1-6 Position of sampling tube

1.4.3 Assembly of gas extractor

(1) Mounting of gas sampling tube

Mount the supplied gas sampling tube on the gas extractor. (For dimensions, see "1.4.1 Dimensions of gas extractor". For others, see separately submitted "Manufacturing specifications".)

Wind Teflon seal tape on threads of the gas sampling tube, and screw it in the extractor flange.

(2) Mounting of heating tube support

The heating tube can be mounted on the support plate.

1) How to mount the heating tube support

   Hold the extractor by supplied U bolt and reinforced plate, and mount it with plain washers, spring washers and nuts.

2) How to mount the heating tube

   Position the heating tube, and fasten it by supplied U bolts.

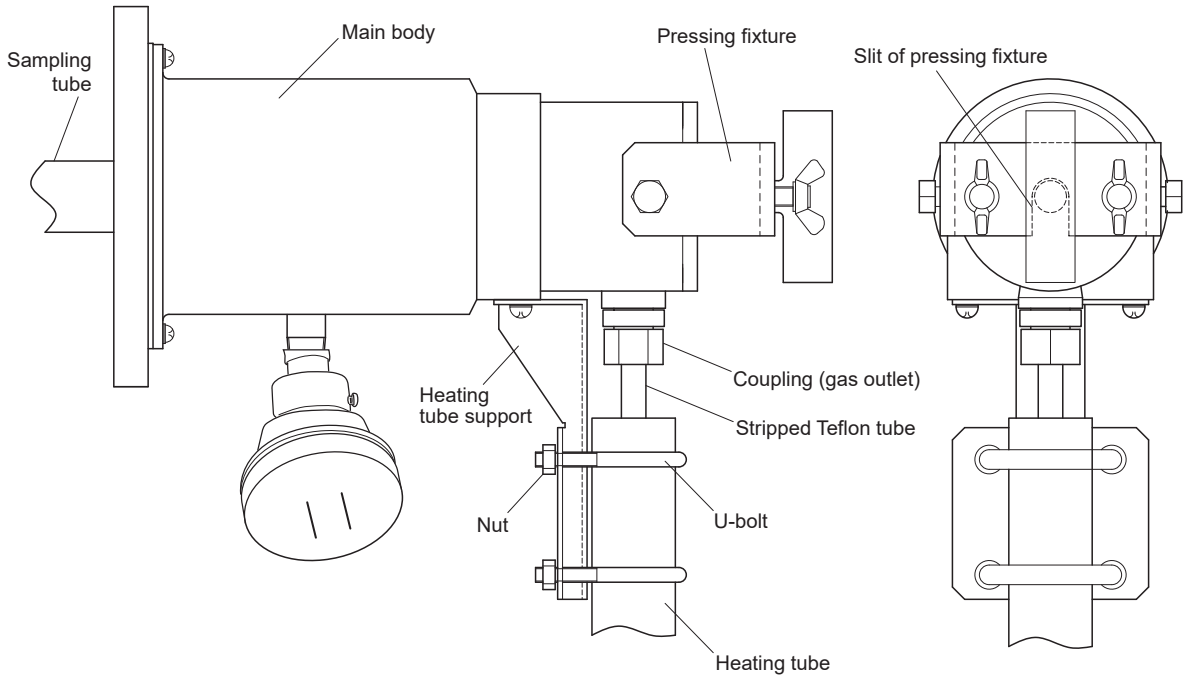


Fig. 1-7 Mounting of heating tube support

Note) Be sure to mount the gas extractor so that its outlet faces downward to prevent the drain in sample gas from residing.

2. PIPING

⚠ CAUTION

- For discharging the exhaust gas, carry out piping up to a position which is not easily accessible by persons so as not to adversely affect the human body.

2.1 Piping diagram

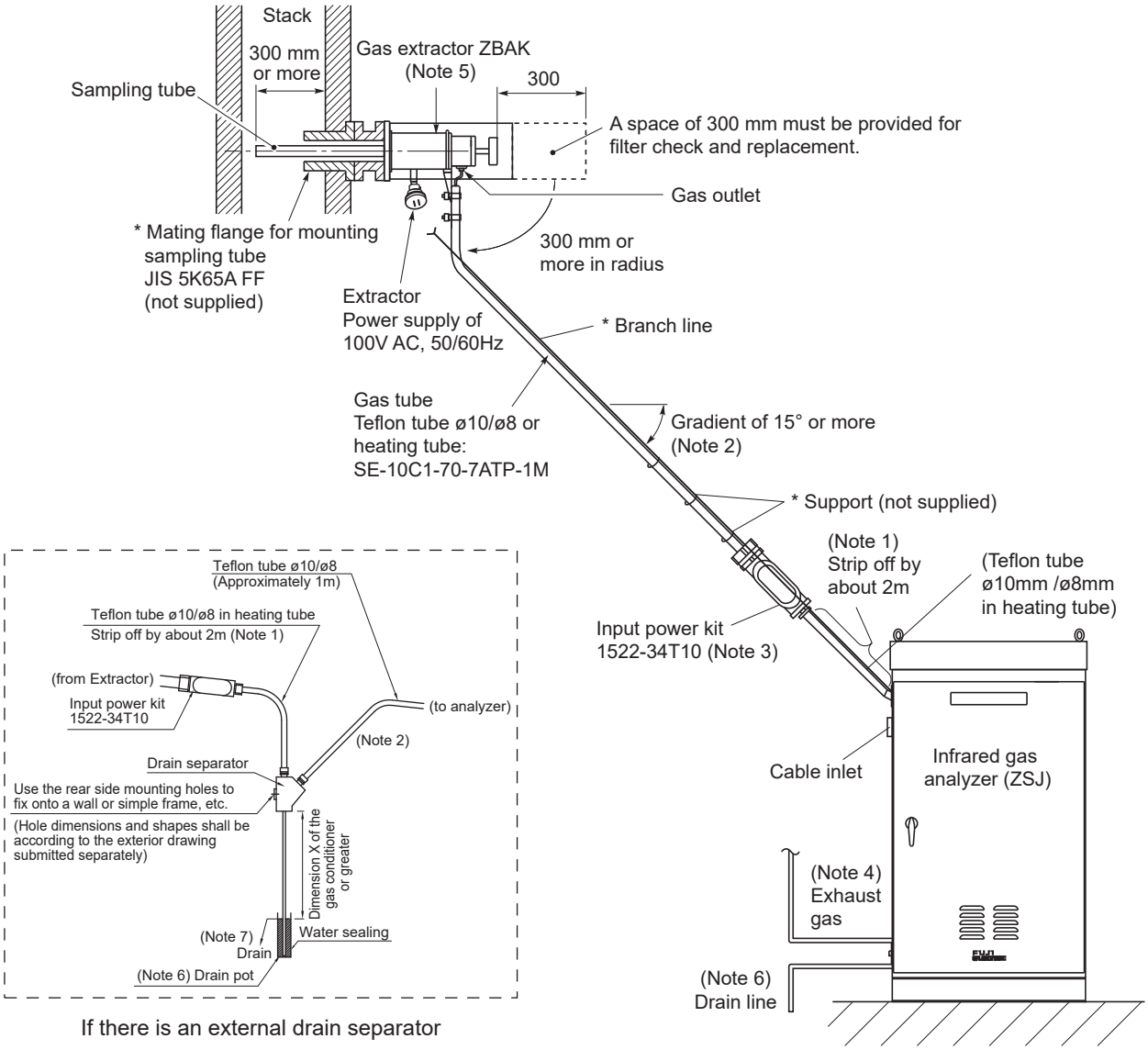


Fig. 2-1

Note 1) Strip the heat tube by about 2 meters to air-cool measuring gas.

Note 2) Tilt the gas tube at an angle of 15° or more so that drain won't remain at the time of power interruption.

Note 3) Input power kit is used together with the heat tube.

Note 4) Install the piping outlet at a suitable place for exhausted gas not to affect the human body.Locate the outlet pipe away from the rain or dust.

Note 5) Keep the insertion angle within the limit (90° to 0° for the general use, and 90° downward for high temperature).

Note 6) If there is a fear of freezing in winter, provide a heat insulation means on the drain line from the equipment.

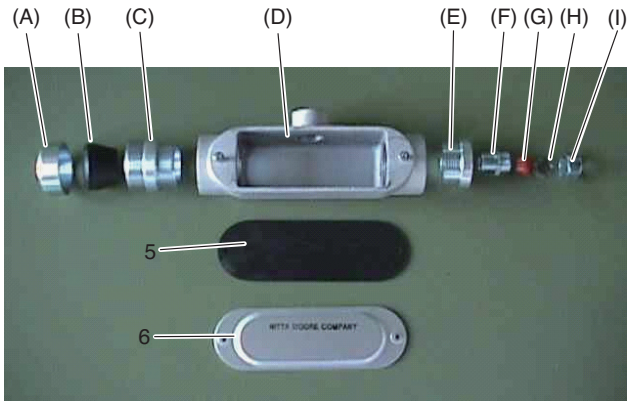
Note 7) Handle the drain with care, as it can sometimes contain CO gas.

2.2 Installation of heating tube

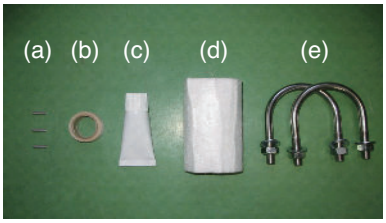
1. Power source side

(1) Packing contents

Input power kit



Attachment



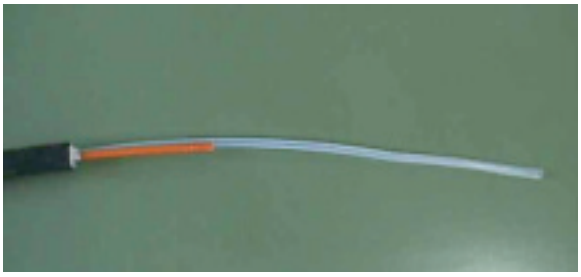
(a) Crimp sleeve (1 spare included)
(b) Heat resistance tape
(c) End sealant (NET 15g)
(d) Fiberglass tape
(e) U bolts (2pcs)
with nuts and washers (4 pcs for each)

(2) How to treat the end

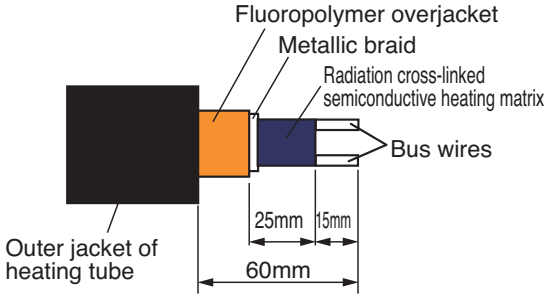
1) Remove outer jacket from heating tube so that teflon tube and heating cable covered with flouropolymer overjacket are stripped.

Removed length: (200 + L) mm

L = distance from input power kit to process tube connecting section



2) Cut the cable approx. 60mm from the end of outer jacket and treat the end as shown below.



Bus wires can be easily pulled out from heating matrix by skiving outside edge of heating matrix.

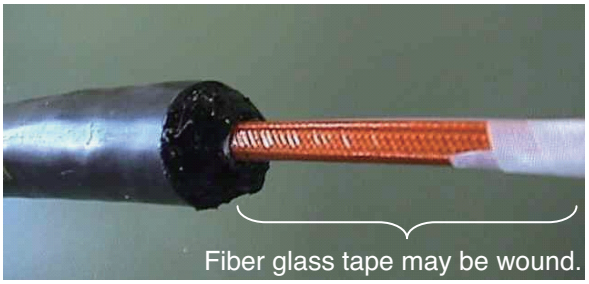
3) Connect bus wires with heat resisting wires or other power supply wires using the crimp sleeve (attachment (a)). Insulate the crimp sleeve areas and heater nichrome wire ends with heat resisting tape (attachment (b)).

4) Put gland nut(A) and sealing bushing (B) through into the bundle.

5) Apply end sealant (attachment (c)) for preventing moisture, corrosive gasses, etc. from coming in through the bundle end.

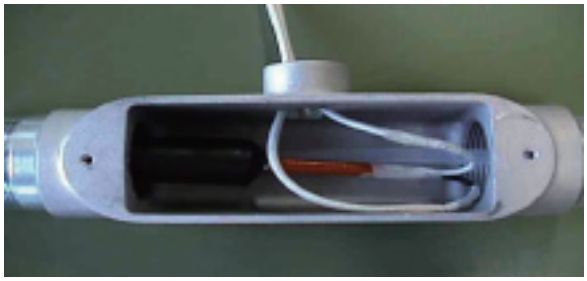
It takes 24 hours for the end sealant to completely set. After coating, do not move the part excessively.

* Winding the exposed heater section by the fiberglass tape (attachment (d)) improves the thermal insulation there.



6) Wind seal tape on connector body (C) and reducer (E), and screw them into connection box (D).

7) Insert the process tube and power supply wires first, and then insert the bundle into the connection box.
Fold back the power supply wires in the box. Take care not to bend the connection section with the heater conductors.



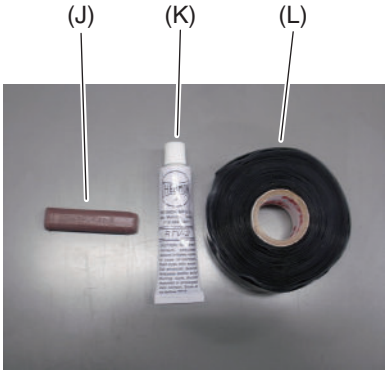
8) Insert the connector body (F), sealing bushing (G), washer(H) and nut (I) for the process tube protected by sealing tape, and securely tighten the bundle side gland nut.

9) Install gasket (J) and cover (K).

10) Finally, fasten the cover with screws securely.
Mount the heating tube to the main unit with U bolt (attachment (e)). Refer to Fig. 2-1.)

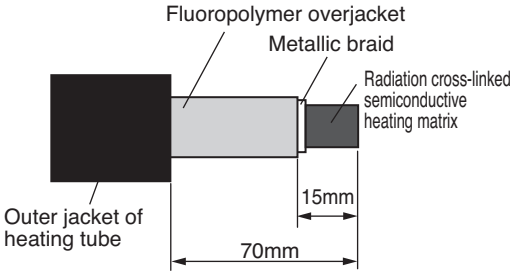
2. Gas extractor side

(1) Packing contents

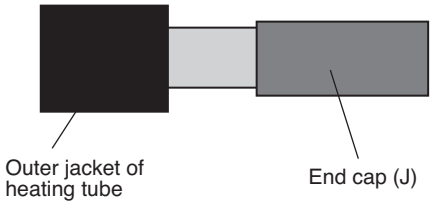


(2) How to treat the end

1) Remove outer jacket from heating tube so that teflon tube and heating cable covered with flouropolymer overjacket are stripped.
Removed length: (70 + L) mm
2) Cut the cable approx. 70mm from the end of outer jacket and treat the end as shown below.

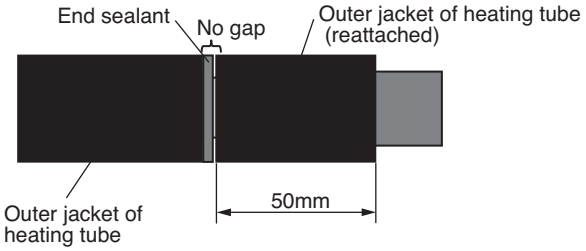


3) Apply a liberal amount of the end sealant (K) to the tube and put the end cap (J) onto the end of the tube.

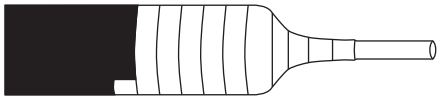


4) Apply end sealant (K) for preventing moisture, corrosive gasses, etc. from coming in through the bundle end.
It takes 4 hours for the end sealant to completely set. After coating, do not move the part excessively.

5) Cover the end of the tube approx. 50mm with the outer jacket removed in step 1 and fiberglass tape.
(This is a step of width adjustment necessary for installation to the support of gas extractor.)

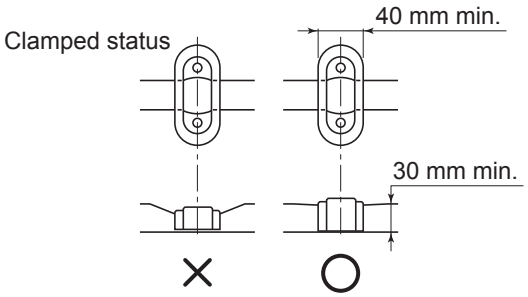


6) Wrap self-welding tape (L) around heating tube without gaps.

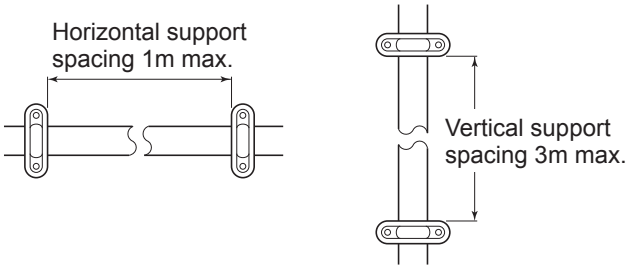


(3) Precaution for piping

1) Do not give excessive stresses (over 100 kPa) to a section between supports nor junctions.

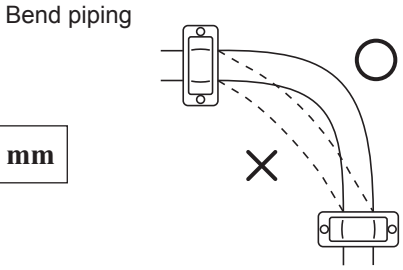


2) For supporting the tube, use commercially available electrical conduit clamps that match the bundle outer diameter, paying attention to their spacing so that the excessive stresses will not be applied to the bundle.

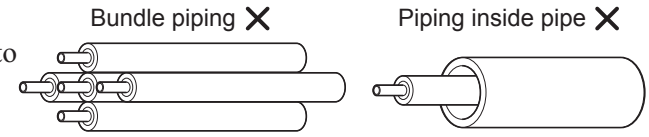


3) Do not bend the piping below the minimum allowable curvature radius. Do not clamp the piping on any curvature.

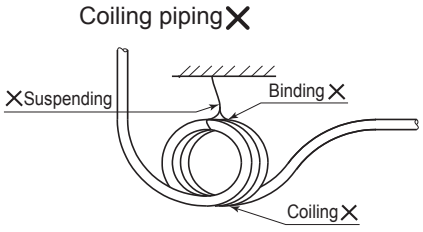
Minimum allowable curvature radius : 300 mm



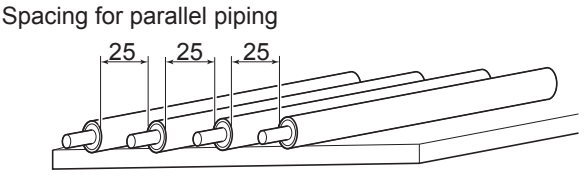
4) Never collect bundles together, nor coil them together, nor put a bundle in a pipe to avoid heat generation or other troubles.



5) If bundles are placed on ground, never step on nor give stresses to them.



6) Place 2 or more bundles in parallel at least 25 mm away from each other.



7) Refrain from piping where the temperature exceeds 40°C (boiler, heat exchanger, reaction tower or the like).

8) Avoid piping at −10°C or lower. Otherwise, clamping or bending may give stresses to bundles, thereby damaging them.

9) Limit the difference in atmospheric temperature to below 40°C so as not to adversely affect the internal temperature.

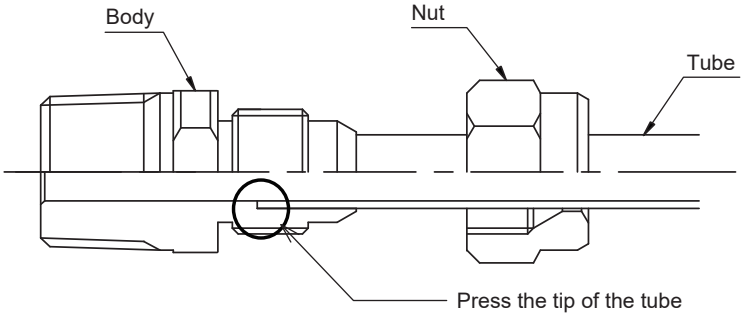
2.3 Piping of gas extractor

(1) Sampling tube

1) The tube material must be corrosion resistant and one that won't affect the composition of sampling gases. Teflon tube is recommended.

   (a) Inserting a tube

   Insert the tube into the body and press the tip of the tube against the body interior.



   (b) Initial tightening

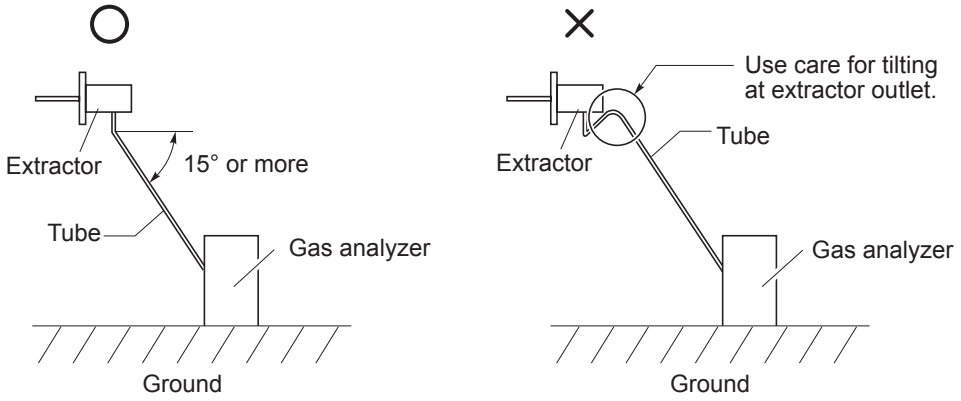
   Use your hand to lightly tighten the nut, and tighten another 1.5 turns after it suddenly becomes stiff.

   (c) If tightening further in inspections, etc., do not use 1.5 times or greater torque than the below tightening torque. The screw may break.

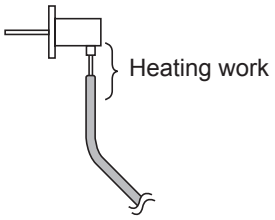
   Tightening torque: 80 N•cm (8 kgf•cm)

2) Prepare tube couplings (Rc1/2) separately for SUS tube or SGP tube.

3) The pipe from the extractor should be tilted to an angle of 15° or more to allow condensed water to flow. Especially care should be paid to tilt at the outlet of extractor.



4) So as not to cause a condensation at the outlet of the gas extractor, provide heating works or thermal insulation according to particular installation conditions and location.

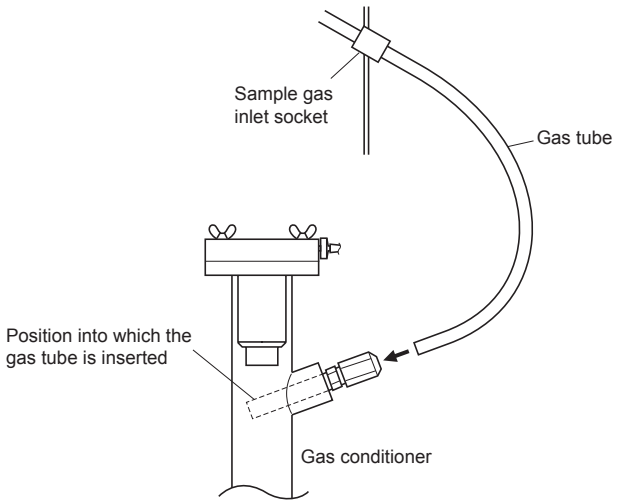


Note) Use the heating tube in cold climate or if SO_2 analyzer is included.

2.4 Piping of analyzer interior

(1) Piping for a sample gas

Pull the gas tube directly from the “Sample gas inlet” at the upper part of the side of the cubicle, without cutting of the gas tube. Connect the tube to the gas conditioner at the left side inside the cubicle. (Insert the gas tube into near the center of the gas conditioner main body)



(2) Piping of exhaust and drain

1) Exhaust
   Discharge the gas through “Exhaust” on the lower side of the cubicle to an appropriate place outdoors.
2) Drain
   Discharge the drain through “Drain” and “Bypuss outlet” located on the lower side of the cubicle.
   Install the drain line from the cubicle so that the drain will not stay.
   Provide a heat insulation means if there is a fear of freezing in winter.
3) Use tubes made of Teflon or other non-corrosive materials.

3. WIRING

3.1 Wiring procedure

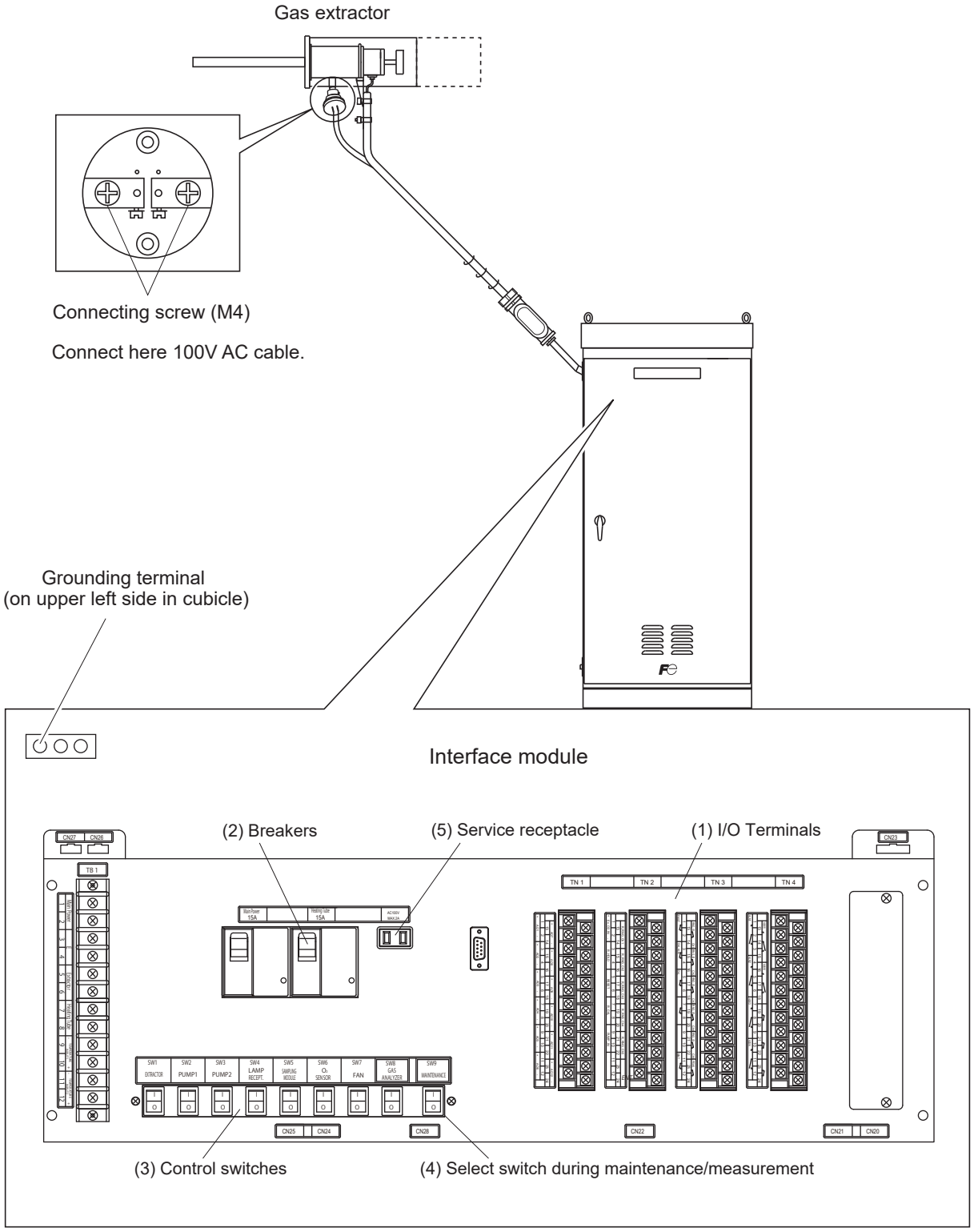


Fig. 3-1 Wiring procedure

* For details of these terminal blocks, see Item 3.2.1.

3.2 Wiring

⚠ CAUTION

- Entrust the wiring to a specialist or the supplier. Poor wiring may cause electric shock or injury.
- Enforce construction of class-D grounding wire by all means. If the specified grounding construction is neglected, an electric shock or malfunction may be caused.

Caution to wiring electrician

For avoiding electric shock, fire and injury, be sure to observe the following.

- Before wiring, be sure to turn off the main power supplies. Otherwise, an electric shock may occur.
- As a ground wire, use 600V-IV wire of 2 mm^2 or thicker having a sufficient dielectric strength. Use of a wrong ground wire may cause electric shock or malfunction.
- Input/output wires should have proper diameters meeting the rated current of the gas analyzer. If a wire which cannot endure the rating is used, a fire may occur.
- For connection to input and output terminal blocks, be sure to use solderness terminals.
- For branching the output wires, use a terminal block.
- Be sure to fasten the input/output wires on the floor, wall, etc. and put guards on the wires.
- Do not install the instrument near high frequency heating furnace, electric welding machine or others which considerably disturb the power waveforms. Do not share their power supplies either.

(1) Material of cable

Power cable	CV cable, cable dia. 2 mm^2 to 5.5mm^2
Signal cable	CVV cable or SVV-S cable, dia. 1.25 mm^2 or more
Groundling cable	600-IV cable, cable dia. 2 mm^2 to 5.5mm^2

(2) Wiring at outdoor installation

When the analyzer is installed outdoors, water-proof cable glands (A25a) (different arrangement) can be mounted at the cable lead-in port of the analyzer to prevent entry of water. As shown below, insert the cable into the water-proof cable glands and tighten them. If conduits are used for wiring, employ fixtures matching them.

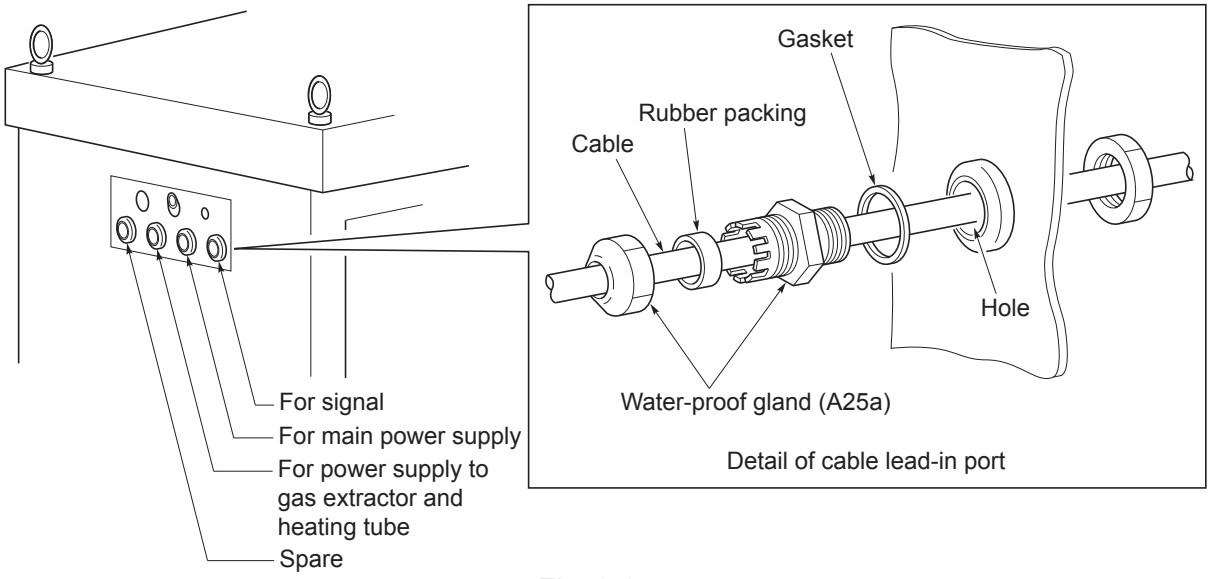
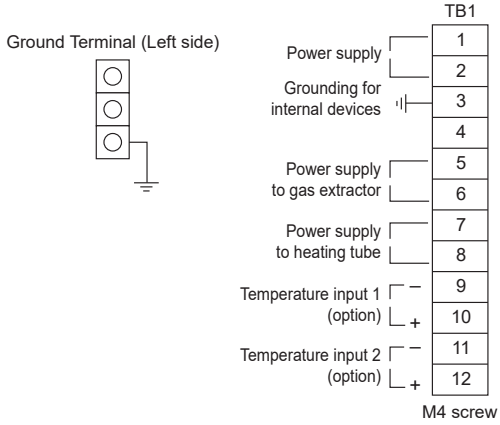


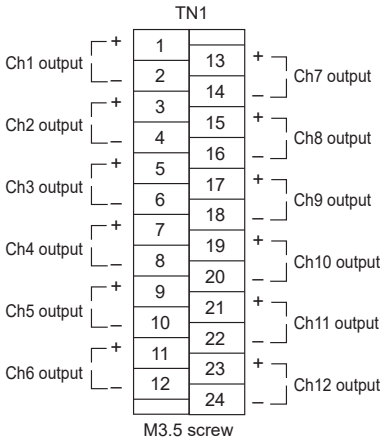
Fig. 3-2

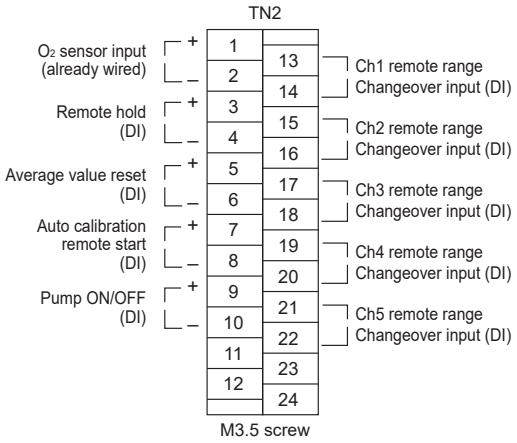
3.2.1 Terminal blocks

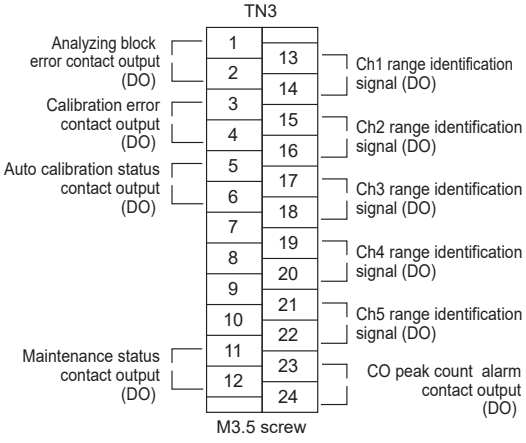
If manufacturing specifications are provided separately, please refer them.

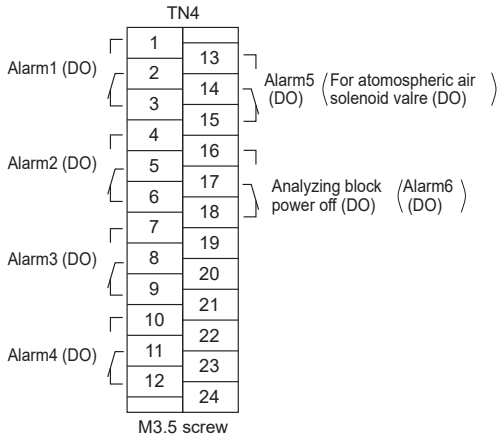
(1) List of terminal blocks



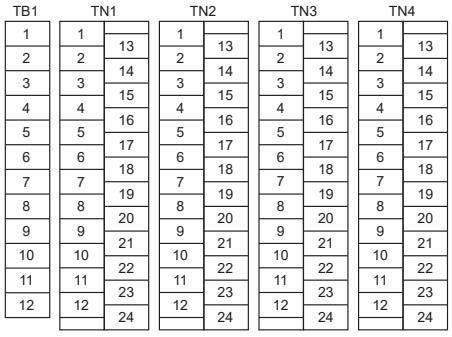






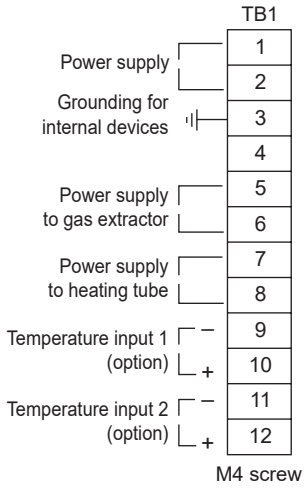


External terminal block diagram (Upper side of main unit)



- For correspondence between channel No. and output item, refer to "Table 3-1 Correspondence betwenn measurement channel and measured value" in Section 3.2.1 (3) ".

(2) Description on terminal block



Terminal block <TB1>

Between 1 – 2 : Terminal block for main power supply input

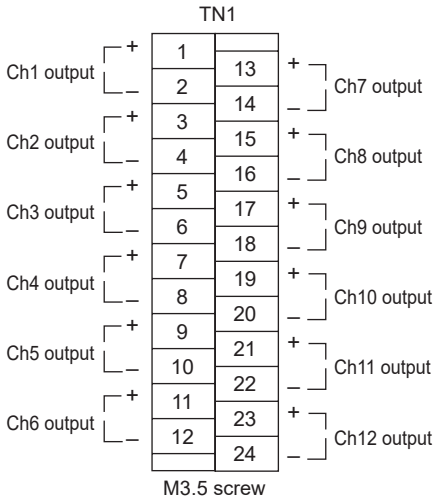
3 : **Ground for internal device. Connect nothing others. Connect the ground for power supply to ground terminal located on upper left side in locker.**

Between 5 – 6 : Terminal block for extractor power supply

Between 7 – 8 : Terminal block for heating pipe power supply

Between 9 – 10 : Temperature input 1

Between 11–12 : Temperature input 2

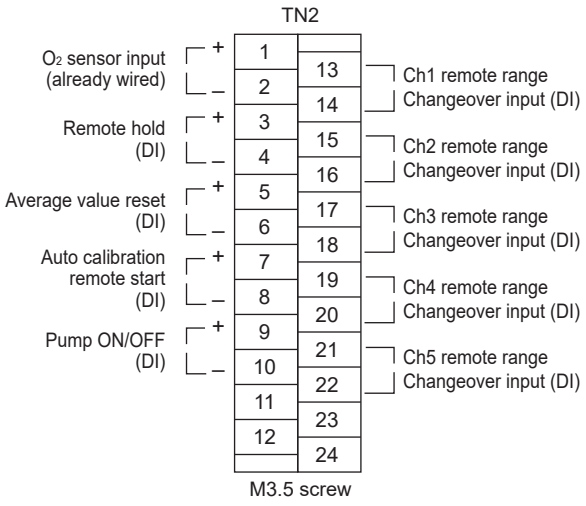


Terminal block 1 <TN1>

Terminal block for analog output

Between 1 – 2 : Ch1 output
Between 3 – 4 : Ch2 output
Between 5 – 6 : Ch3 output
Between 7 – 8 : Ch4 output
Between 9 – 10 : Ch5 output
Between 11 – 12 : Ch6 output
Between 13 – 14 : Ch7 output
Between 15 – 16 : Ch8 output
Between 17– 18 : Ch9 output
Between 19– 20 : Ch10 output
Between 21– 22 : Ch11 output
Between 23– 24 : Ch12 output

- For correspondence between channel No. and output item, refer to "Table 1-1 Correspondence between measurement channel and measured value" (Section 1.5.3).



- For remote range changeover input, “open” selects the high range, and “short” selects the low range. Refer to “Remote range action” under “3.6 Parameter setting” of the instruction manual for detailed operations.
- For correspondence between channel numbers and output items, refer to “Table 1-1 Correspondence between measurement channel and measured value.”
- The channel number in a remote range input is effective only when it corresponds to an instantaneous value. The range of converted values is linked with that of instantaneous values.

Terminal block 2 <TN2>

Between 1– 2 : For O_2 sensor input. (Input for our Zirconia oxygen sensor. Must not be used unless O_2 sensor is added.)

Between 3– 4 : Remote hold input. No hold when open. Output hold when short.

Between 5– 6 : Average value reset input. Shorting the contact input (for 1.5 sec or more.) resets O_2 average and converted average simultaneously. Opening it restarts the average value.

Between 7– 8 : Automatic calibration remote start input. Open input after shorting for at least 1.5 seconds starts the automatic calibration whether automatic calibration setting is ON or OFF.

Between 9– 10 : Pump ON/OFF contact input. Pump ON when open. Pump OFF when short.

Note: If an NOx meter and a CO meter are used in mixture, there is a possibility where the reading of the CO meter rises when the pump stops running, because minor CO is generated due to chemical changes in the NO_2/NO converter and this CO accumulates. If this phenomenon becomes a problem, hold the output before pump stop.

Between 11 – 12 : For internal connection. Must not be wired. (Must not be used as junction terminal.)

Between 13 – 14 : Ch1 remote range changeover input

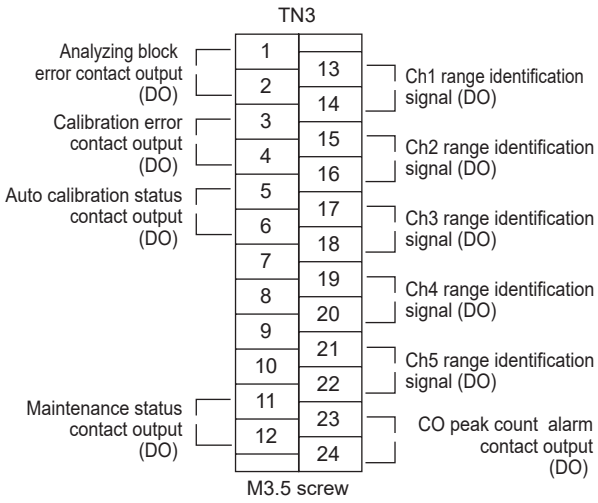
Between 15 – 16 : Ch2 remote range changeover input

Between 17– 18 : Ch3 remote range changeover input

Between 19– 20 : Ch4 remote range changeover input

Between 21– 22 : Ch5 remote range changeover input

Between 23– 24 : For internal connection. Must not be wired. (Must not be used as junction terminal.)



Terminal block 3 <TN3>

Between 1 – 2 : Conductive when analyzer unit error is produced. Normally open.

Between 3 – 4 : Calibration error contact output. Conductive when error is produced at zero or span calibration. Normally open.

Between 5 – 6 : Automatic calibration status contact output. Conductive during automatic calibration. Open otherwise.

Between 7 – 10 : For internal connection. Must not be wired. (Must not be used as junction terminal.)

Between 11 – 12 : Conductive when maintenance status switch is ON.

Between 13 – 14 : Ch1 range identification signal output

Between 15 – 16 : Ch2 range identification signal output

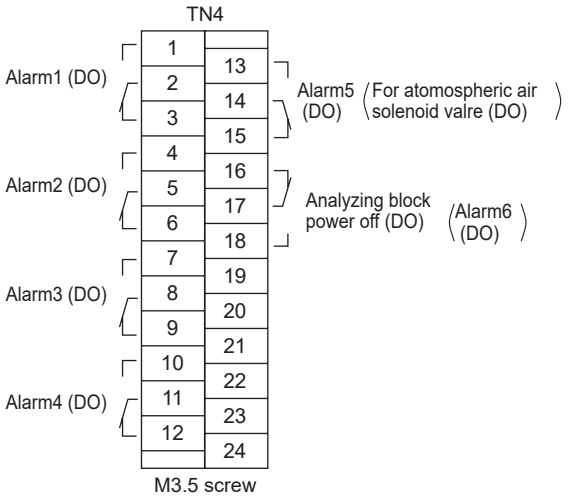
Between 17– 18 : Ch3 range identification signal output

Between 19– 20 : Ch4 range identification signal output

Between 21– 22 : Ch5 range identification signal output

Between 23– 24 : Peak count alarm contact output. Conductive at preset peak count or more. Open otherwise. For setting and action, refer to instruction manual “3.6 Peak Alarm Setting.”

- Range identification signal is short at Low range or open at High range.
- The channel No. in a range identification signal is effective only when it corresponds to an instantaneous value. The range of converted value is linked with that of instantaneous value.



Terminal block 4 <TN4>

Between 1 – 3 : Alarm 1 (initial state)
Conductive at 1-2 and open at 2-3 when a measured value exceeds the limit value. Open at 1-2 and conductive at 2-3 otherwise.

Between 4 – 6 : Alarm 2 (initial state)
Conductive at 4-5 and open at 5-6 when a measured value exceeds the limit value. Open at 4-5 and conductive at 5-6 otherwise.

Between 7 – 9 : Alarm 3 (initial state)
Conductive at 7-8 and open at 8-9 when a measured value exceeds the limit value. Open at 7-8 and conductive at 8-9 otherwise.

Between 10 – 12 :Alarm 4 (initial state)
Conductive at 10-11 and open at 11-12 when a measured value exceeds the limit value. Open at 10-11 and conductive at 11-12 otherwise.

Between 13 – 15 : Alarm 5 (initial state)
Conductive at 13-14 and open at 14-15 when a measured value exceeds the limit value. Open at 13-14 and conductive at 14-15 otherwise.
※ For specification zero gas atmospheric air
Contact output for atmospheric air solenoid valve connection. (Already wired if atmospheric air is used as zero gas. Must not be wired otherwise.)

Between 16– 18 : Analyzing block power off output. (initial state)
Conductive at 16-17 and open at 17-18 when analyzer unit is energized. Open at 16-17 and conductive at 17-18 when analyzer unit is de-energized.
※ Usable as a normal alarm by setting change.
For specification Alarm 6
Conductive at 16-17 and open at 17-18 when a measured valve exceeds the limit valve. Open at 16-17 and conductive at 17-18 otherwise.

- Alarm responds only to an instantaneous value.

(3) Contents of measured channel (Ch)

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

Table 3-1 Correspondence between measurement channel and measured value

Code symbol		Contents
4th digit	5th digit	
P	0	Ch1: NO_X
A	0	Ch1: SO_2
B	0	Ch1: CO
F	0	Ch1: NO_X, Ch2: SO_2
H	0	Ch1: NO_X, Ch2: CO
L	0	Ch1: NO_X, Ch2: SO_2, Ch3: CO
M	0	Ch1: NO_X, Ch2: SO_2, Ch3: CO_2, Ch4: CO
P	4 to G	Ch1: NO_X, Ch2: O_2, Ch3: Converted NO_X, Ch4: Converted NO_X average
A	4 to G	Ch1: SO_2, Ch2: O_2, Ch3: Converted SO_2, Ch4: Converted SO_2 average
B	4 to G	Ch1: CO, Ch2: O_2, Ch3: Converted CO, Ch4: Converted CO average
F	4 to G	Ch1: NO_X, Ch2: SO_2, Ch3: O_2, Ch4: Converted NO_X, Ch5: Converted SO_2, Ch6: Converted NO_X average, Ch7: Converted SO_2 average
H	4 to G	Ch1: NO_X, Ch2: CO, Ch3: O_2, Ch4: Converted NO_X, Ch5: Converted CO, Ch6: Converted NO_X average, Ch7: Converted CO average
L	4 to G	Ch1: NO_X, Ch2: SO_2, Ch3: CO, Ch4: O_2, Ch5: Converted NO_X, Ch6: Converted SO_2, Ch7: Converted CO, Ch8: Converted NO_X average, Ch9: Converted SO_2 average, Ch10: Converted CO average
M	4 to G	Ch1: NO_X, Ch2: SO_2, Ch3: CO_2, Ch4: CO, Ch5: O_2, Ch6: Converted NO_X, Ch7: Converted SO_2, Ch8: Converted CO, Ch9: Converted NO_X average, Ch10: Converted SO_2 average, Ch11: Converted CO average

Fuji Electric Co., Ltd.

Gate City Ohsaki, East Tower, 11-2, Osaki 1-chome, Shinagawa-ku, Tokyo 141-0032, Japan
Phone: +81-3-5435-7111
www.fujielectric.com
www.fujielectric.com/products/instruments/