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**Instruction Manual**

# **GAS EXTRACTOR**

**TYPE: ZBAK2**

# PREFACE

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We are grateful for your purchase of Fuji Electric's Gas Extractor, TYPE:ZBAK2.

- First read this instruction manual carefully until an adequate understanding is acquired, and then proceed to installation, operation and maintenance of the gas extractor. Wrong handling may cause an accident or injury.
- The specifications of this extractor are subject to change without prior notice for further product improvement.
- Modification of this extractor is strictly prohibited unless a written approval is obtained from the manufacturer. Fuji Electric will not bear any responsibility for a trouble caused by such a modification.
- This instruction manual shall be stored by the person who actually uses the extractor.
- After reading the manual, be sure to store it at a place easier to access.
- This instruction manual should be delivered to the end user without fail.

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

## Request

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

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# CAUTION ON SAFETY

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First of all, read this “Caution on Safety” carefully, and then use the gas extractor 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”.

 <b>DANGER</b>	<p>Wrong handling may cause a dangerous situation, in which there is a risk of death or heavy injury.</p>
 <b>CAUTION</b>	<p>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.</p>
 <b>PROHIBITION</b>	<p>Items which must not be done are noted.</p>

<p style="text-align: center;"><b>Caution on installation and transport of gas extractor</b></p>	
 <b>DANGER</b>	<ul style="list-style-type: none"> <li>• This unit is not an explosion-proof type. Do not use it in a place with explosive gases to prevent explosion, fire or other serious accidents.</li> </ul>
 <b>CAUTION</b>	<ul style="list-style-type: none"> <li>• For installation, observe the rule on it given in the instruction manual and select a place where the weight of gas extractor can be endured. Installation at an unsuited place may cause turnover or fall and there is a risk of injury.</li> <li>• During installation work, care should be taken to keep the unit free from cable chips or other foreign objects. Otherwise, it may cause fire, trouble or malfunction of the unit.</li> <li>• For lifting the gas extractor, be sure to wear protective gloves. Bare hands may invite an injury.</li> <li>• The gas extractor is heavy (approx. 9kg). It should be transported carefully. Otherwise, body may be damaged or injured.</li> </ul>

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### Caution on piping



## CAUTION

- ⦿ In piping, the following precautions should be observed. Wrong piping may cause gas leakage.
- If the leaking gas contains a toxic component, there is a risk of serious accident being induced.
- Also, if combustible gas is contained, there is a danger of explosion, fire or the like occurring.
- Connect pipes correctly referring to the instruction manual.
  - For piping, use a pipe and a pressure reducing valve to which oil and grease are not adhering. If such a material is adhering, a fire or the like accident may be caused.

### Caution on wiring






## CAUTION


- Installation, wiring and piping work must be performed by specialists or your dealer. Incorrect installation may cause a fall device, electric shocks or injury.
- Before working, take off wrist watch and other metallic objects to prevent electric shocks.
- Wiring is allowed only when all power supplies are turned off. This is required for preventing electric shocks.
- Use power source that matches the rating of the unit. Use of power source out of rating may cause fire.
- Wires should be the proper one meeting the ratings of this instrument. If using a wire which cannot endure the ratings, a fire may occur.
- Be sure to fix the input cables to floors or walls. Careless wiring of cables may cause unexpected injury.
- When fixing input cables to floors, use protective materials on the cables. If not used, cables may be damaged which results in a risk of electric shocks.
- Be sure to connect cables using input terminals. Careless connection may cause a risk of electric shocks.
- Do not touch power terminals with metallic objects or fingers to prevent electric shocks or injury.



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**Caution on check and maintenance**

 <b>DANGER</b>	<ul style="list-style-type: none"><li>• Before starting work, be sure to put on heat-proof gloves. Work with bare hands or general-use gloves may cause a risk of burns.</li><li>• When the funnel is under positive pressure, be careful with the spout of funnel gas to prevent injury or burns.</li></ul>
 <b>CAUTION</b>	<ul style="list-style-type: none"><li>• Daily inspection is important to prevent burning or fire accident.</li><li>• When filter is installed in the funnel, the whole unit of the sampler needs to be removed from the funnel for inspection of the filter. Be sure to use a suitable foothold. Use of improper foothold may cause injury.</li><li>• Before working, take off a wrist watch, finger ring or the like metallic accessories. And never touch the instrument with a wet hand. Otherwise, you will have electric shocks.</li><li>• When the inside of chimney or funnel is positive pressure and the extractor needs to be removed, be careful with high temperature or hazardous gas as it blows out when it is removed. Do not get close the extractor to prevent burns or poisoning.</li><li>• The gas sampler case and filter are hot. When the filter and O-ring need to be replaced or inspected, turn OFF the power. Be sure to put on protective gloves to prevent burns or injury.</li><li>• Do not use a replacement part other than specified by the instrument maker. Otherwise, adequate performance will not be provided. Besides, an accident or fault may be caused.</li><li>• Replacement parts such as a maintenance part should be disposed of as incombustibles. For details, follow the local ordinance.</li></ul>
 <b>PROHIBITION</b>	<ul style="list-style-type: none"><li>• Maintenance and inspection must be made only by authorized engineers to prevent electric shocks or fire accidents.</li></ul>

<b>Caution to specialists</b>	
 <b>CAUTION</b>	<ul style="list-style-type: none"> <li>◎ Before starting maintenance, inspection or repair, be sure to read the instruction manual carefully.</li> </ul> <p>Improper work may cause a risk of electric shocks or fire accident.</p> <ul style="list-style-type: none"> <li>• Before starting work, take off wrist watch and other metallic objects to prevent electric shocks or burns.</li> <li>• During work, turn OFF (open) the breaker and the power. Even after power is OFF (open), some parts are still hot. Care should be taken to prevent burns.</li> <li>• Do not touch live parts with wet hands to prevent electric shocks.</li> <li>• The mass of the device is approx. 9kg. Careless transfer of the device may cause injury.</li> </ul>

<b>Others</b>	
 <b>DANGER</b>	<ul style="list-style-type: none"> <li>• When the gas sampler is installed on a high place or maintenance is required, use a suitable foothold for the sake of safety. Care should be taken to prevent unexpected accident such as a fall.</li> </ul>
 <b>CAUTION</b>	<ul style="list-style-type: none"> <li>• If the cause of any fault cannot be determined despite reference to the instruction manual, be sure to contact your dealer of Fuji Electric's technician in charge of adjustment. If the instrument is disassembled carelessly, you may have electric shocks or injury.</li> <li>• Do not work on rainy days to prevent a risk of electric shocks or a fall of device.</li> </ul>

# CONTENTS

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<b>PREFACE</b> .....	<b>i</b>
<b>CAUTION ON SAFETY</b> .....	<b>ii</b>
<b>1. OUTLINE</b> .....	<b>1</b>
<b>2. CONFIRMATION OF DELIVERED PRODUCTS</b> .....	<b>1</b>
<b>3. CONFIRMATION OF CODE SYMBOLS AND SPECIFICATIONS</b> .....	<b>2</b>
3.1 Code symbols .....	2
3.2 Specifications .....	3
<b>4. NAMES OF OPERATING PARTS</b> .....	<b>4</b>
<b>5. INSTALLATION</b> .....	<b>5</b>
5.1 Assembling the extractor.....	5
5.2 Selection of installation location .....	5
5.3 Mounting of extractor .....	6
5.4 Sampling piping .....	7
5.5 Wiring.....	8
<b>6. OPERATION</b> .....	<b>9</b>
<b>7. INSPECTION AND MAINTENANCE</b> .....	<b>10</b>
7.1 Daily inspection .....	10
7.2 Periodical inspection/maintenance (standard).....	10
7.3 Removal of wire gauze filter .....	10
7.4 Cleaning of wire gauze filter .....	11
<b>8. MAINTENANCE PARTS</b> .....	<b>12</b>
<b>9. OUTLINE DIAGRAM</b> .....	<b>13</b>
9.1 Gas extractor for general use.....	13
9.2 Gas extractor for high temperature .....	15
9.3 Gas outlet joint .....	17

# 1. OUTLINE

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The gas extractor is used to sample a gas from a funnel and send it to a gas analyzer. As it is used under very severe conditions, it must provide the following performance.

- Be usable at temperature of a sampling point.
- Have no property to cause reaction with a sample gas or act as a catalyst on it.
- Not be choked by dust, or easily replaceable or cleanable when choked.
- Cause no remarkable sampling delay.

Fuji Electric offers gas extractors meeting these requirements on the basis of long-accumulated experience.

# 2. CONFIRMATION OF DELIVERED PRODUCTS

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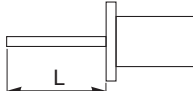
Delivered products list

Name of product		Quantity	Remark
Gas extractor main unit		1	
Sampling tube		1	As specified length
Packing (for flange)		1	
Bolt, nut, spring washer, plane washer (M12)		4 each	For flanges 5K65A, 5K80A, 10K65A
		8 each	For flanges 5K100A, 10K80A, 10K100A
O-ring (G50, G45)		1 each	For general use
		2 each	For high temperature
With heating pipe support	Terminal mounting plate	1	
	U-bolt (M6 nut)	2	For fixing the heating pipe
	Plane washer, spring washer, pan head screw (M6 × 12)	2 each	For fixing the terminal mounting plate



### 3. CONFIRMATION OF CODE SYMBOLS AND SPECIFICATIONS

#### 3.1 Code symbols

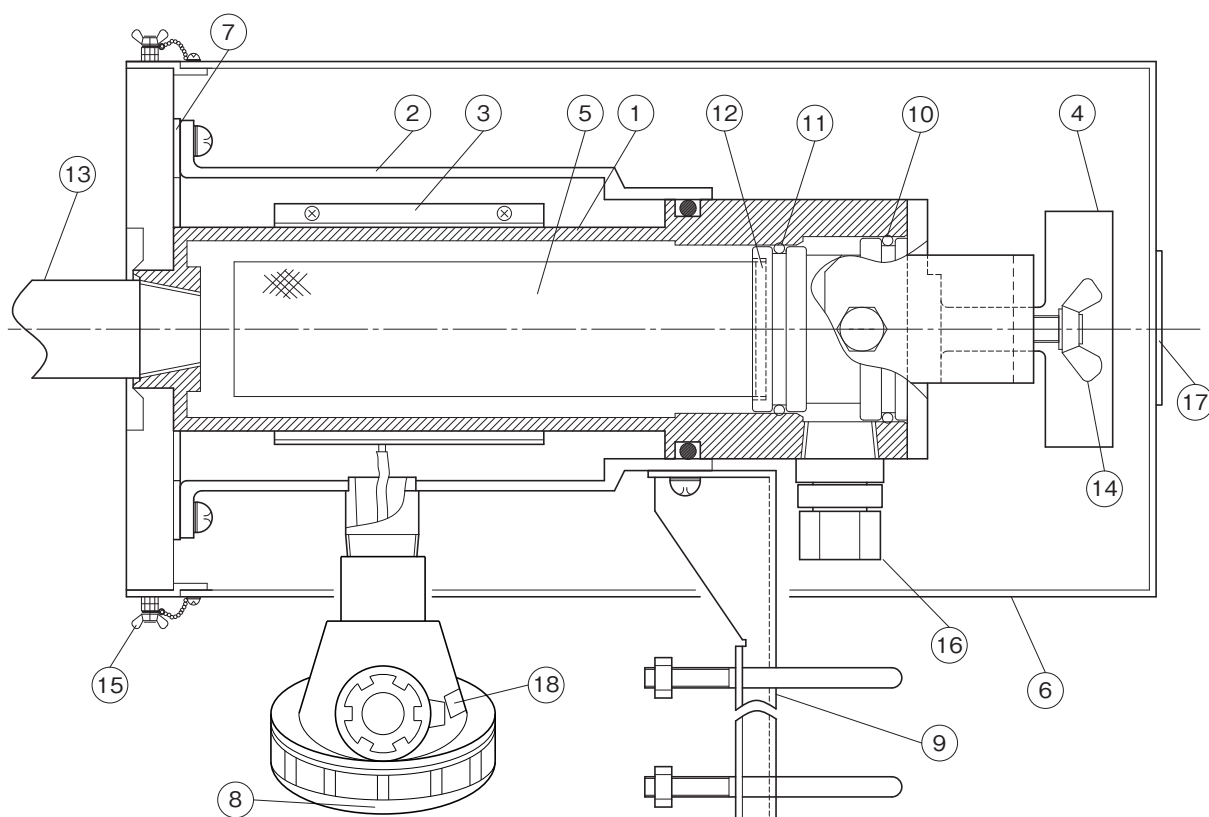
1 2 3 4 5 6 7 8 9 10 11 digits											Description													
Z	B	A					5				System Electric heating system													
				K							Structure Indoor/outdoor common													
					2						Material of gas handling parts SUS316, etc													
						W					Inserting length (L) 0mm 300mm 400mm 600mm 800mm 1000mm 1200mm 1500mm 2000mm 700mm 900mm As specified													
				Y							For general use, gas temperature max. 800°C SUS316  For high temperature, gas temperature max. 1400°C SiC													
				A																				
				B																				
				C																				
				E																				
				G																				
				H																				
				J																				
				K																				
				D																				
				F																				
				Z																				
												Gas outlet joint												
											<table border="1"> <thead> <tr> <th>Joint</th> <th>Branching socket</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>None</td> </tr> <tr> <td>2</td> <td>For Ø10/Ø8 Teflon tube</td> </tr> <tr> <td>5</td> <td>None</td> </tr> <tr> <td>7</td> <td>For Ø10/Ø8 Teflon tube</td> </tr> <tr> <td>A</td> <td>For Ø10/Ø8 Teflon tube</td> </tr> </tbody> </table>		Joint	Branching socket	0	None	2	For Ø10/Ø8 Teflon tube	5	None	7	For Ø10/Ø8 Teflon tube	A	For Ø10/Ø8 Teflon tube
Joint	Branching socket																							
0	None																							
2	For Ø10/Ø8 Teflon tube																							
5	None																							
7	For Ø10/Ø8 Teflon tube																							
A	For Ø10/Ø8 Teflon tube																							
											Flange													
				A							JIS 5K65AFF, t=14, 4holes													
				B							JIS 5K80AFF, t=14, 4holes													
				C							JIS 5K100AFF, t=16, 8holes													
				D							JIS 10K65AFF, t=18, 4holes													
				E							JIS 10K80AFF, t=18, 8holes													
				F							JIS 10K100AFF, t=18, 8holes													
				Z							As specified													
											Heating pipe support													
				Y							None													
				A							Provided (Except for "5" and "7" in the 9th digit)													

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## 3.2 Specifications

System	Electric heating system
Gas temperature	For general use : max. 800°C, for high temperature : max. 1400°C
Material of gas handling parts	SUS316, Byton
Sampling tube	For general use : SUS316, for high temperature : SiC
Mating flange	JIS 5K65AFF, JIS 5K80AFF, JIS 5K100AFF, JIS 10K65AFF, JIS 10K80AFF, JIS 10K100AFF
Filter	SUS316 wire gauze, filtering efficiency 40 μm (2 to 100 μm can be used)
Filtering area	About 180cm <sup>2</sup>
Response time	90% response, about 25sec at 3L/min
Mass	Approx. 9kg (without sampling tube)
Sample gas outlet	Rc <sup>1/2</sup>
Heater	100 V AC, 100 VA
Installation	Outdoor installation

## 4. NAMES OF OPERATING PARTS



No.	Name
①	Filter case
②	Drip-proof cover
③	Heater
④	Seal fixture
⑤	Wire gauze filter
⑥	Thermal insulation cover
⑦	Packing (for flange)
⑧	Terminal box
⑨	Heating pipe support (option)

No.	Name
⑩	O-ring (G50)
⑪	O-ring (G45)
⑫	Packing (for wire gauze filter)
⑬	Sampling tube
⑭	Thumb bolt (for tightening)
⑮	Thumb bolt (for fixing the thermal insulation cover)
⑯	Gas outlet joint $\phi 10 / \phi 8$
⑰	PL nameplate
⑱	Specification nameplate

## 5. INSTALLATION

### 5.1 Assembling the extractor

#### (1) Mounting of sampling tube

- ① Mount the supplied sampling tube on the extractor.  
Wind Teflon tape on the screw of the sampling tube and insert it into the flange of the main unit.
- ② Check if the slit of pressing fixture faces downward the gas outlet.

#### (2) Mounting of heating pipe (Code symbol: 11th digit "A").

Fasten the heating pipe on the supporting plate with the nut, using the supplied U-bolt.

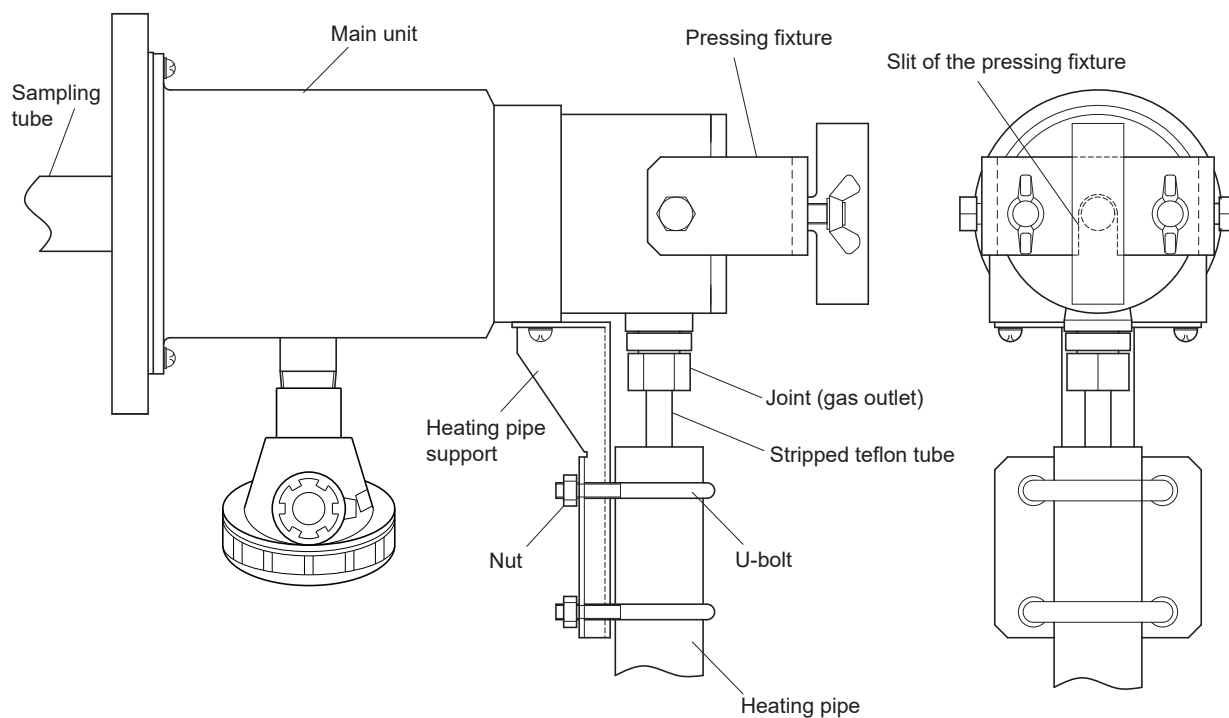


Fig. 5-1 Mounting of heating pipe

### 5.2 Selection of installation location

Location of sampling the gas for measurement (installation location of gas extractor) requires the following conditions (see JIS K0095, K0103, Z8808)

- ① Gas in funnel is flowing continuously.
- ② Maintenance and inspection can easily be performed.
- ③ Extractor can be installed near gas analyzer (length of gas pipe : less than 20m).
- ④ Extractor can be inserted vertically from the ceiling of funnel or through the side wall for installation.

### 5.3 Mounting of extractor

Mount the extractor observing the following points.

- (1) Sample gas temperature should be within the specified range (for general use : max. 800°C, for high temperature : max. 1400°C)
- (2) Mount in a place subject to little vibration (0.2 m/s<sup>2</sup> or less).  
If there is vibration or the sampling tube length exceeds 1500mm, prepare a support to prevent falling.
- (3) Mating flange that conforms to the limit of insertion angle of extractor should be prepared. Also, protective pipe and installation work should be completed.
  - Standard extractor flange (JIS 5K65AFF, JIS 5K80AFF, JIS 5K100AFF, JIS 10K65AFF, JIS 10K80AFF, JIS 10K100AFF)
  - Limit of insertion angle (Fig. 5-2)
    - ① For general use : 90 to 0° (Mount the gas outlet pipe facing downward.)
    - ② For high temperature : 90° straight down (prevention of damage to ceramic pipe)

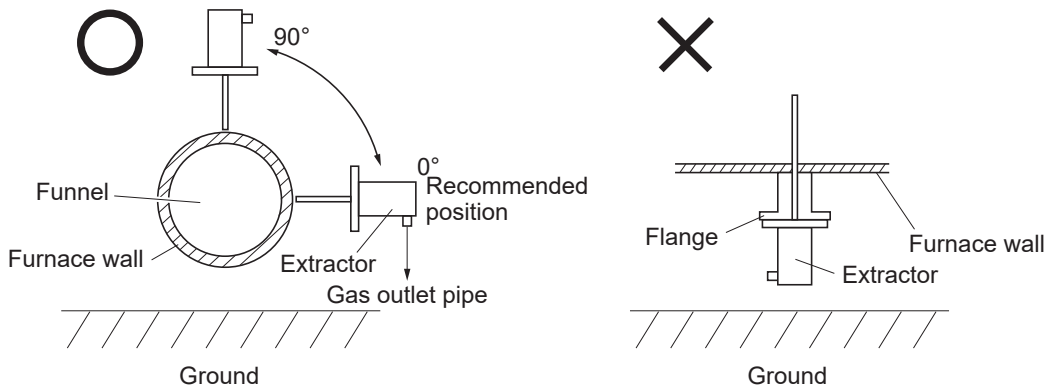


Fig. 5-2 Mounting angle

- (4) When mounting the extractor, the tip of it should be at the center of funnel (more than 300mm apart from furnace wall to prevent leak air from being sucked into the extractor) (Fig. 5-3).  
For use at high temperature, make sure that SUS tube can not get in high temperature furnace.
- (5) When mounting the extractor, put the attached packing between the extractor and the flange.

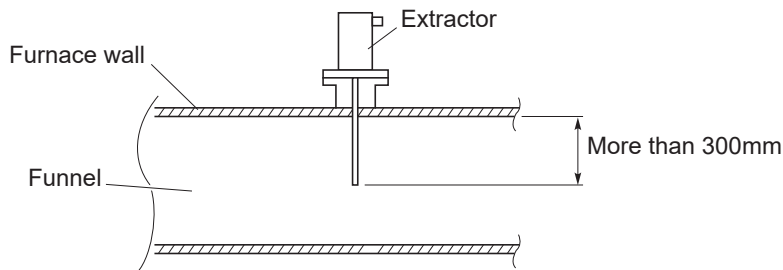


Fig. 5-3 Position of extractor

## 5.4 Sampling piping

- (1) Piping material must be anticorrosive and must not change the composition of sample gas.

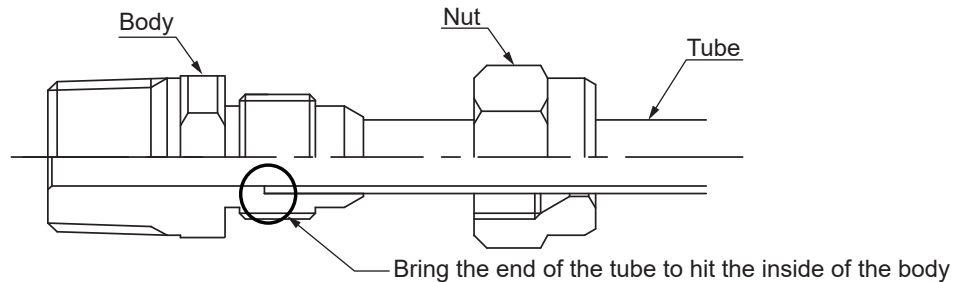
Recommended material : Teflon tube

(a) Tube insertion

Insert the tube into the body until the end of the tube hits the inside of the body.

(b) Initial tightening

Lightly tighten the nut with a hand, find where the movement suddenly becomes stiff and tighten another one and a half turns.



- (c) For additional tightening at the time of inspection or other occasion, ensure that the tightening torque does not exceed 1.5 times the torque shown below. Otherwise, the screw may be damaged.

- (2) For piping with SUS or SGP tube, piping joints ( $Rc^{1/2}$ ) should be used.

- (3) Tilt the piping from the extractor  $15^{\circ}C$  or more to allow condensed water to flow down. (Do not allow slack in the piping.)

Be careful with the inclination of the outlet of the extractor (Fig. 5-4).

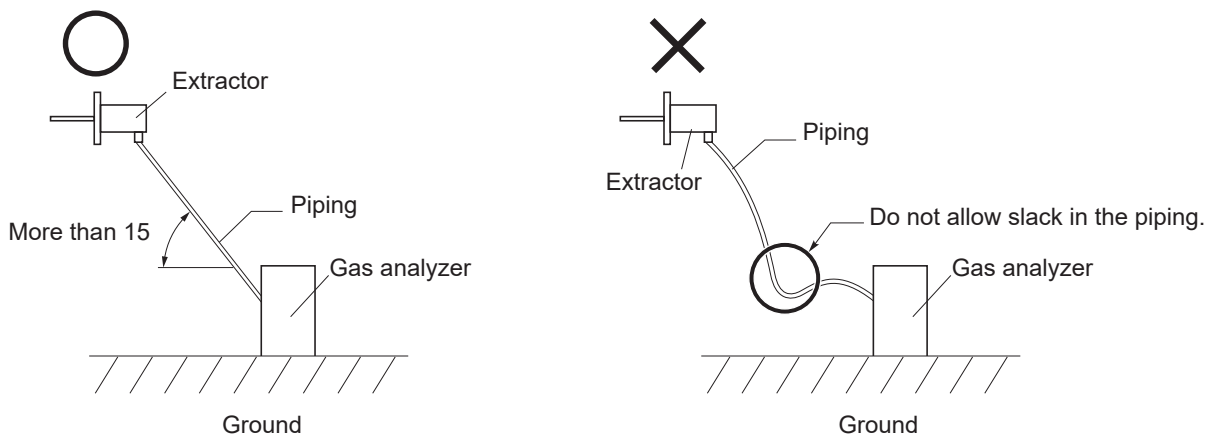


Fig. 5-4

- (4) When using the heating pipe, perform heating work or thermal insulation treatment as required (Fig.5-5). Otherwise, condensation may be caused at the outlet of the extractor.

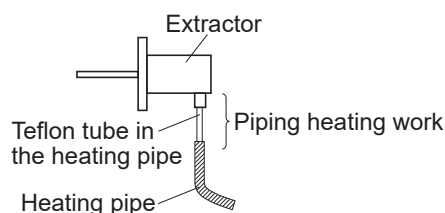


Fig. 5-5

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

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## 5.5 Wiring

Connect heater power (100V AC, 100VA) to the terminal in the terminal box. When the temperature of the installation location becomes high, heat-proof cables should be used for wiring.

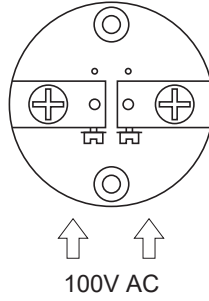


Fig. 5-6 Terminal box

## 6. OPERATION

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Before operating the extractor, be sure to observe the following points.

- Preparation for operation
  - ① Make sure that all the cables are connected correctly.
  - ② Turn ON the power.
  - ③ Suck in the sample gas after the extractor is warmed up for about 1 hour.
  - ④ While the furnace is being dried up, warm up the extractor but do not suck in the sample gas.



## 7. INSPECTION AND MAINTENANCE

### 7.1 Daily inspection

Check to make sure that extractor is properly warmed up.

### 7.2 Periodical inspection/maintenance (standard)

Item	Remark
Cleaning of wire gauze filter: Once/week to 3 months or when it becomes inoperative.	Clean or replace according to the amount of dust deposits in exhaust gas.
Replacement of O-ring or packing: (at inspection/replacement of wire gauze filter), Once/6 months for high temperature, once a year for general use	_____

### 7.3 Removal of wire gauze filter

- ① Turn OFF the power for the extractor.
- ② Turn OFF the pump of the gas analyzer.
- ③ Check that the extractor has been cooled down sufficiently, and then remove the thermal insulation cover (remove the thumb bolt for fixing the thermal insulation cover.)
- ④ Loosen the thumb bolt for fixing the pressing fixture and make 90° turns (use care of gas injection). Then hold the filter replacement handle and pull out the contents.
- ⑤ Remove the wire gauze filter fixing screw on the handle, and pull the wire gauze filter out of the seal fixture.
- ⑥ To mount the filter, coat the O-ring with silicon grease and reverse the above procedure.

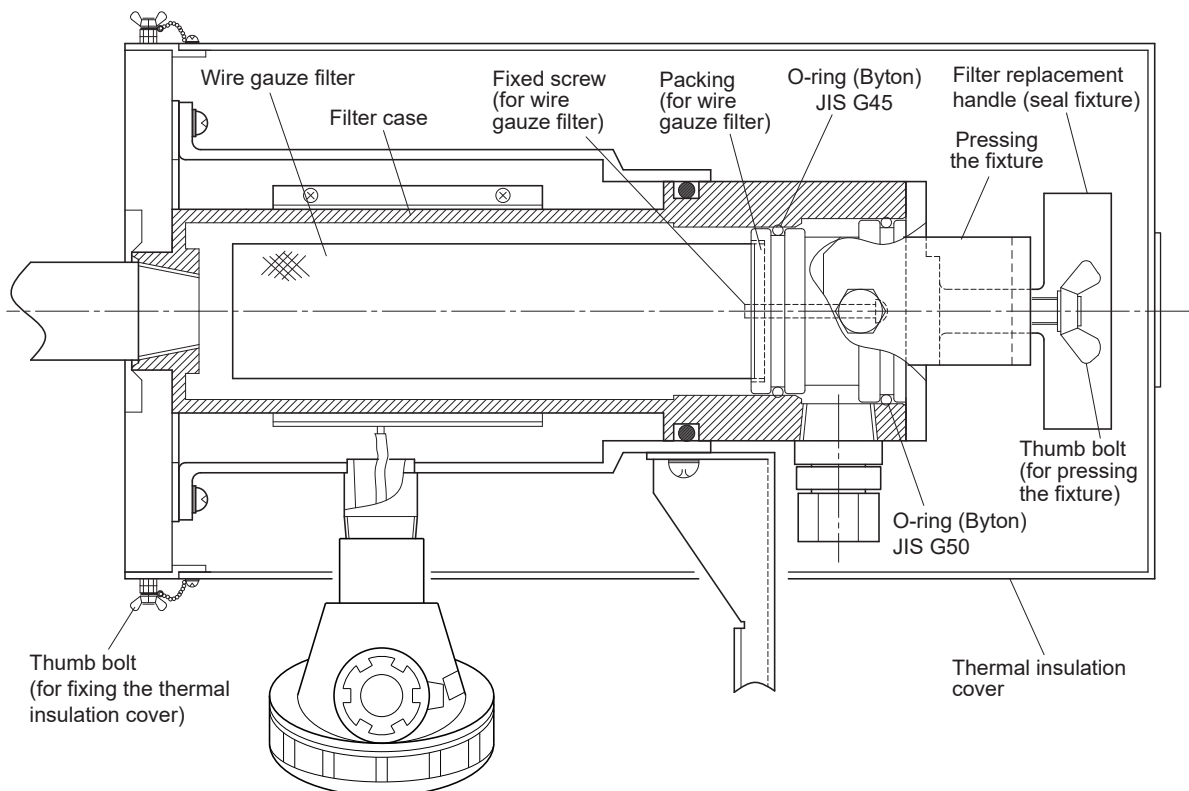


Fig. 7-1 Removal of wire gauze filter

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## 7.4 Cleaning of wire gauze filter

- ① Put the filter in water while it is still hot, and remove dust deposits.
- ② Wash the front and rear of the filter with compressed air and water pressure.
- ③ Dry the filter fully and then mount it back.

## 8. MAINTENANCE PARTS

When maintenance parts are required, inform us of their arrangement code or code No. shown in the following tables.

Table of spare parts for 1 year use

Name of parts	Quantity		Arrangement code
	General use	High temp.	
Wire gauze filter (40mm)	1	1	<ul style="list-style-type: none"> <li>• For general use : ZBN5BA3</li> <li>• For high temperature : ZBN5BA4</li> </ul>
O-ring (JIS G50)	1	2	
Packing (for wire gauze filter)	1	2	
O-ring (JIS G45)	1	2	

Table of maintenance parts

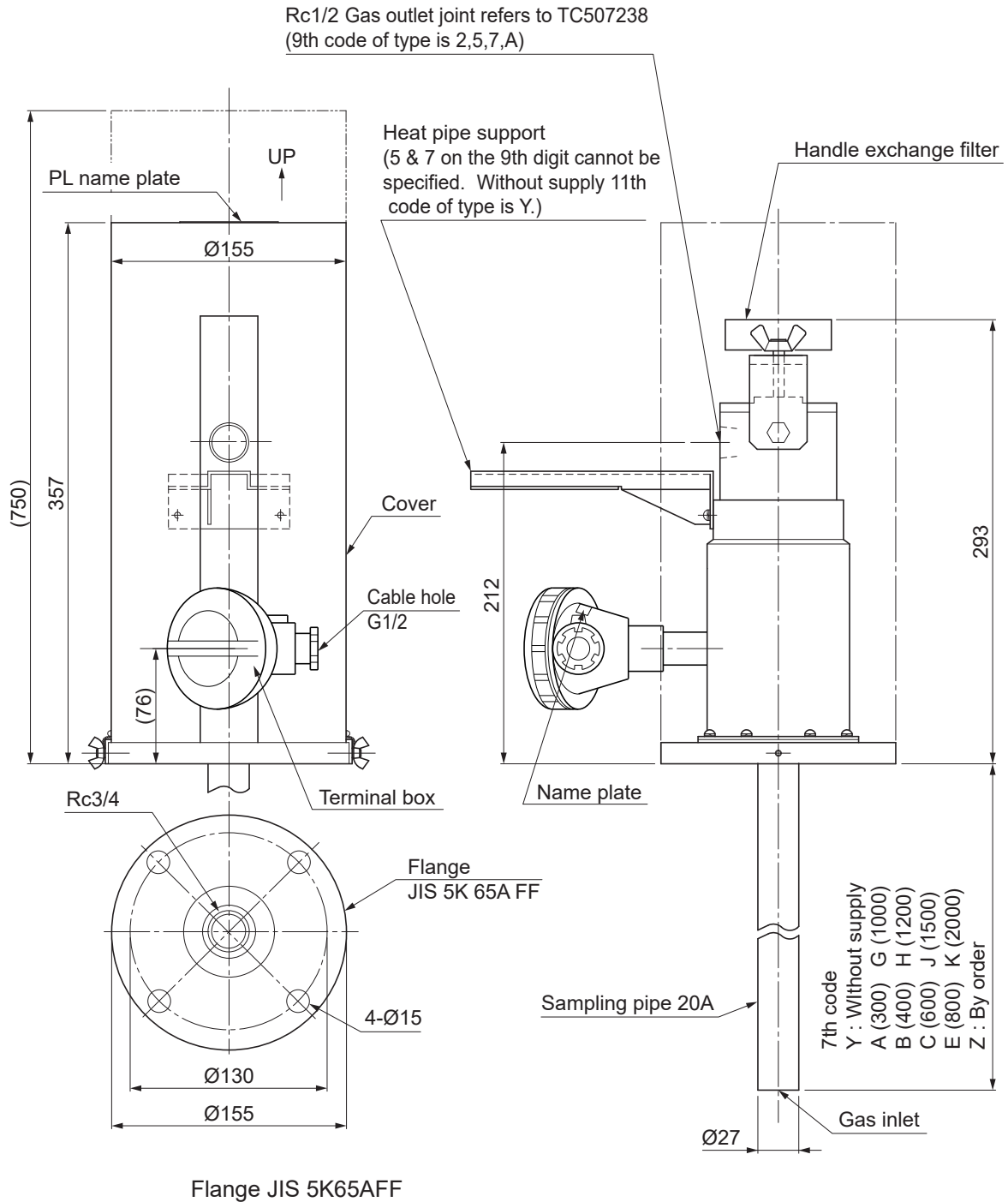
Name of parts			Code No.
Wire gauze filter (40μm)			ZBNL1012
Packing (for flange)	JIS 5K65AFF	Flange (for general use)	TK7H4238P1
		Flange (for high temperature)	TK7C8038P1
	JIS 5K80AFF	Flange (for general use)	TK7H4238P2
		Flange (for high temperature)	TK7C8038P2
	JIS 5K100AFF	Flange (for general use)	TK7H4239P1
		Flange (for high temperature)	TK7C8039P1
	JIS 10K65AFF	Flange (for general use)	TK7H4238P3
		Flange (for high temperature)	TK7C8038P3
	JIS 10K80AFF	Flange (for general use)	TK7H4239P2
		Flange (for high temperature)	TK7C8039P2
	JIS 10K100AFF	Flange (for general use)	TK7H4239P3
		Flange (for high temperature)	TK7C8039P3
	O-ring (G50)	10pcs. of 1 case	ZBNN1152
	Packing (for wire gauze filter)	10pcs. of 1 case	ZBNN1162
O-ring (G45)	10pcs. of 1 case	ZBNN1182	
Joint for Ø10/Ø8 Teflon tube (Refer to “9.3”.)			TK745559P2
Branching socket (Refer to “9.3”.)			TK750496C1

# 9. OUTLINE DIAGRAM

## 9.1 Gas extractor for general use

1) With flange JIS 5K65AFF

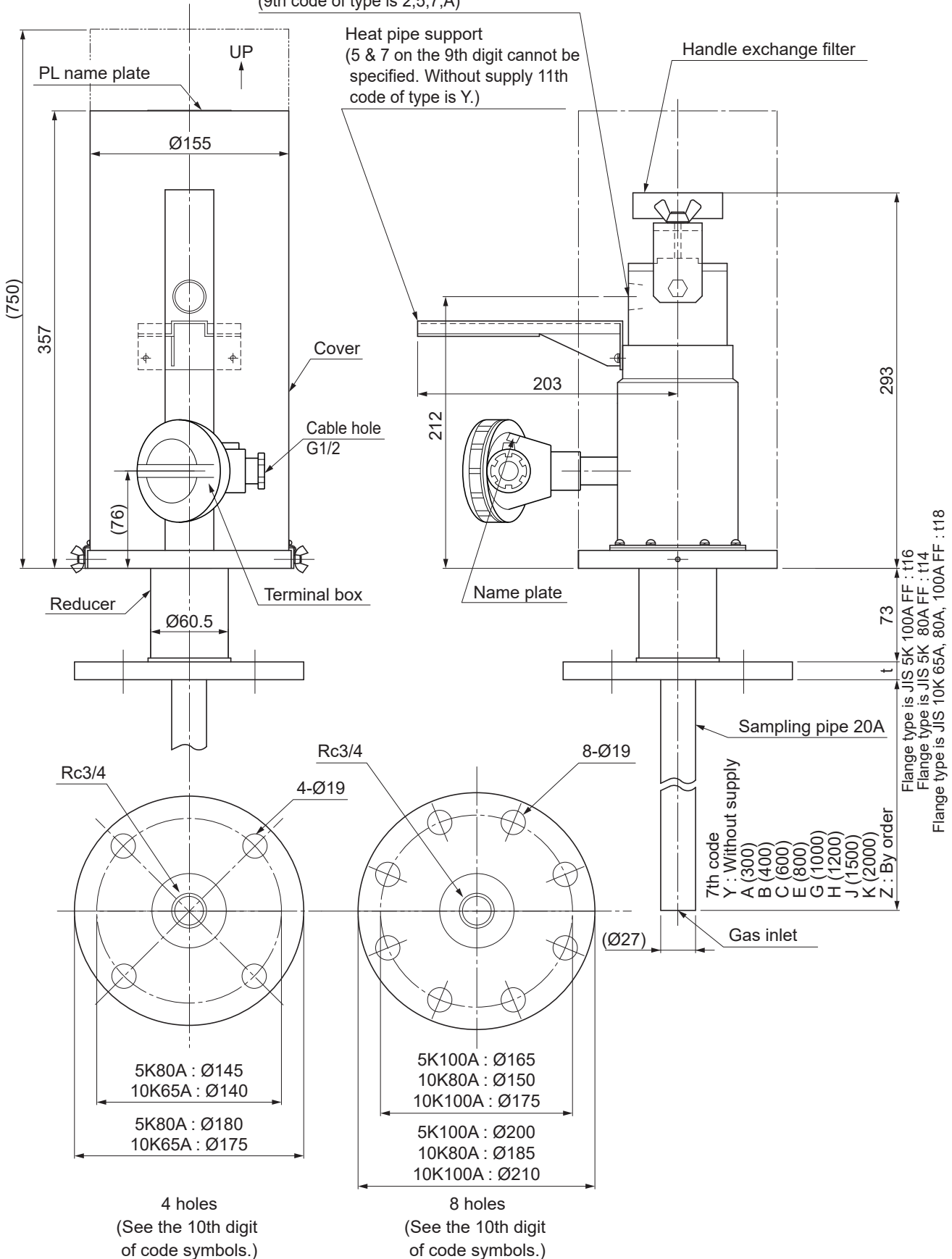
(Unit : mm)



2) With flange other than JIS 5K65AFF

Rc1/2 Gas outlet joint refers to TC507238  
(9th code of type is 2,5,7,A)

(Unit : mm)

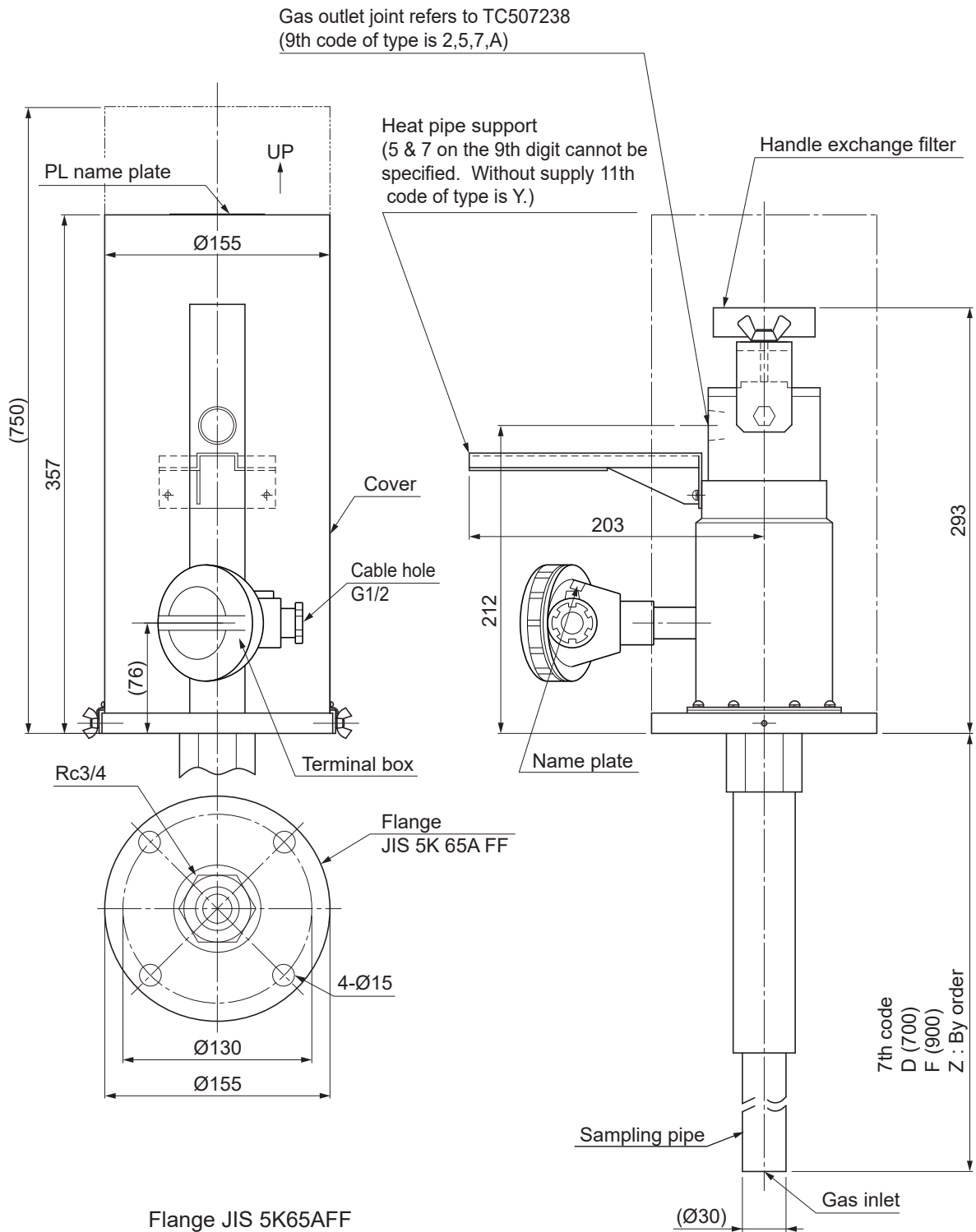


Flange other than JIS 5K65AFF

## 9.2 Gas extractor for high temperature

### 1) With flange JIS 5K65AFF

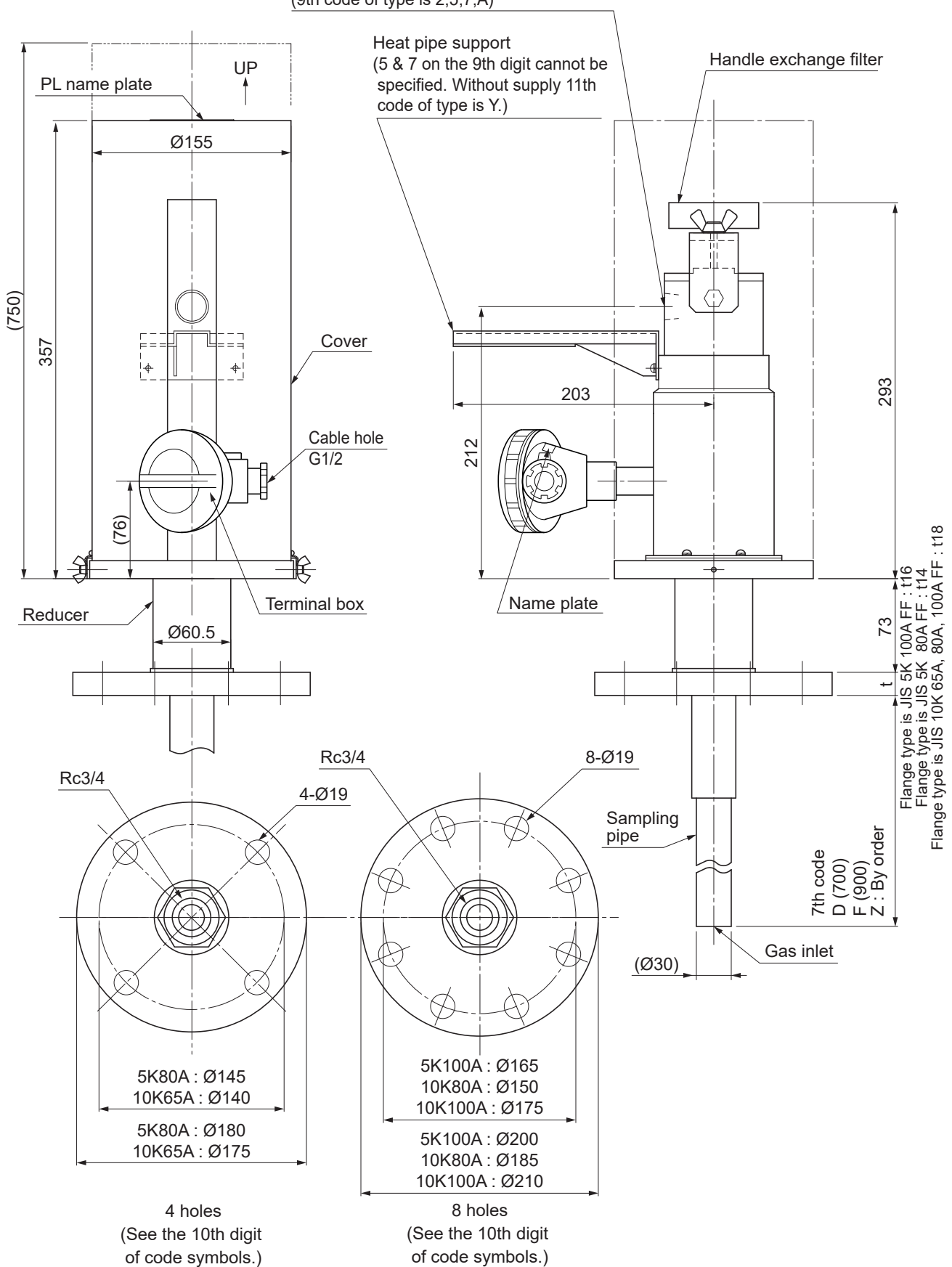
(Unit : mm)



2) With flange other than JIS 5K65AFF

Rc1/2 Gas outlet joint refers to TC507238  
(9th code of type is 2,5,7,A)

(Unit : mm)



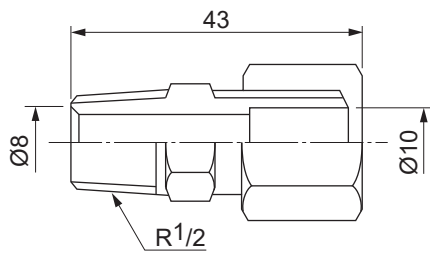
Flange other than JIS 5K65AFF

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### 9.3 Gas outlet joint

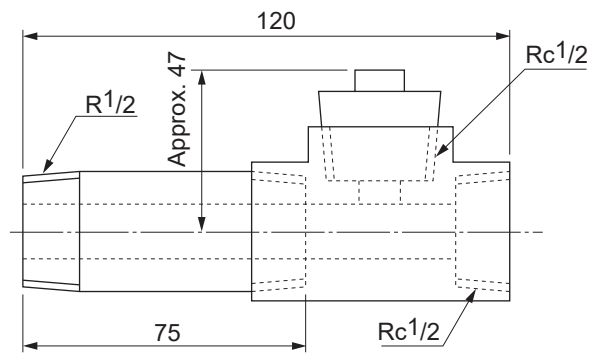
(1) Joint for  $\phi 10/\phi 8$  Teflon tube

(Unit : mm)



Material : Teflon (main unit)  
Nut (SUS)

(2) Branching socket



Material : SUS316



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