

INTRODUCTION

The EXAOXY Series ZA8 In-Situ Type Zirconia Oxygen Analyzer Averaging Converter System performs multipoint oxygen concentration measurement in large-scale boiler and industrial furnace flues for combustion control optimization.

In this system, up to four or eight detectors are connected to a single AV8C averaging converter. Various other accessories may also be employed in order to obtain optimal measurements.

When the various devices that comprise this system are delivered to you, be sure to exercise care in their use to avoid impairing performance.

1. Cautions

This section describes general cautions that you should observe concerning the use of the averaging converter and detectors.

Notes and cautions relating specifically to installation, wiring and piping, operation and maintenance are described in the relevant sections of this manual.

[Averaging Converter]

- **Never touch the converter when carrying a static electrical charge.**

When humidity is low, your body can be carrying an especially large static charge. Before touching any of the converter's electronic circuits, always touch a grounded metal object first to discharge static electricity.

- **Never use an organic solvent to remove dirt.**

Organic solvents can discolor or cause deterioration of the materials. Use a neutral detergent or anhydrous alcohol to clean hard-to-remove dirt.

- **Never store in locations at high temperature or humidity.**

The converter should be used indoors at an ambient temperature of -5 to 50°C and humidity of 10% to 90% RH. Also avoid storing it in locations at high temperatures or high humidity.

The permissible storage temperature range is -20 to 75°C .

[Detectors]

- **Avoid subjecting the detector to mechanical shock.**

The zirconia used in the detectors is a kind of ceramic, and is fragile. Never subject the detectors to mechanical shock. Take extreme care when unpacking and transporting the detectors.

2. Contents of This Manual

The EXAOXY Series ZA8 In-Situ Type Zirconia Oxygen Analyzer Averaging Converter System has been developed for combustion control. This analyzer basically consists of a detector and a converter. The detector comes in one of four styles which can be selected based upon your application.

Optional accessories are also available to improve measurements and automate calibration. An optimal control system can be realized if the proper types of equipment are selected.

This instruction manual refers to almost all of the equipment related to the ZA8. You may skip the sections on the equipment which is not included in your system.

Product Line Included in This Manual and Described Content for Each

Model	Name	Description in the Manual				
		Specifi- cations	Install- ation	Opera- tion	Mainte- nance	CMPL
AV8C	Averaging Converter	○	○	○	○	○
—	Case for Outdoor Installation	○	○			
ZO21D-L	General Purpose Detector (Standard type)	○	○	○	○	○
ZO21DW-L	General Purpose Detector (Pressure balance type)	○	○	○	○	○
ZO21D-H	High-temperature Detector	○	○	○	○	○
ZO21V	Probe Supporter	○	○			
ZO21R-L	Probe Protector	○	○			
ZO21P-H	High-temperature Pprobe Adapter	○	○			○
—	High-temperature Auxiliary Ejector (Part No.: E7046EC, E7046EN-A0)	○	○			○
—	Dust Elimination Filter (Part No.: E7042UQ)	○	○		○	
AV8E	Manual Calibration Flow Setting Unit	○	○	○		
AV8F	Automatic Calibration Flow Setting Unit	○	○	○		
AV8H	Reference Gas Flow Setting Unit	○	○	○		
—	Calibration Gas Unit Case (Part No.: E7044KF)	○	○			

This manual is divided into twelve chapters as follows :

Chapter	Contents	Work Item		
		Installation	Operation	Maintenance
1. General	Gives examples of system configuration.	○	△	○
2. Specifications	Shows external views of equipment together with standard specifications and model codes or part numbers.	◎	○	○
3. Installation	Illustrates installation procedure for each type of equipment.	◎		△
4. Piping	Provides piping diagrams for four standard system configurations.	◎		△
5. Wiring	Wiring principles are explained according to the application.	◎		△
6. Names and Functions of Components	Describes the main components of the system.	△	○	○
7. Operation	Describes the operating procedure.		◎	△
8. Converter Key Operation	Details the converter key operation.		○	△
9. Calibration	Describes the calibration procedure required in the course of operation.		○	△
10. Check and Maintenance	Items to be checked are listed along with a description of the replacement procedure for damaged parts.		○	◎
11. Troubleshooting	This chapter describes measures to be taken when an abnormal condition occurs.		△	◎
CMPL (Parts List)	A list of replacement parts is given for each type of equipment.		△	○

◎ : Items which should be read through before starting operation.

○ : Items which should be read before operation and during operation as required.

△ : Items to be read as required.

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1. OVERVIEW

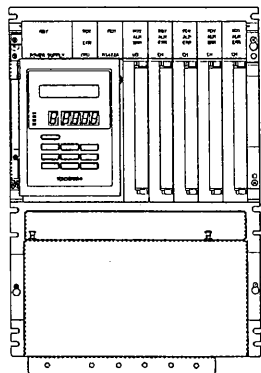
To improve combustion efficiency in large-scale electric power boilers and industrial boilers and furnaces (black liquor recovery boilers, petroleum refinery and iron and steel plant fired heaters, lime kilns, etc.) requires accurate and effective measurement of oxygen concentration in the flue gas. Since the oxygen concentration in a large boiler or industrial furnace flue may differ across the gas flow cross-section, measurements must be made at multiple points.

The best instrument in these applications is the EXAOXY Series ZA8 In-Situ Type Zirconia Oxygen Analyzer Averaging Converter System.

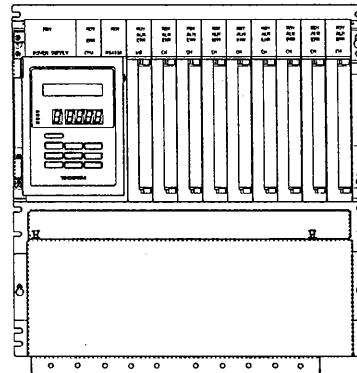
In a ZA8 In-Situ Type Zirconia Oxygen Analyzer Averaging Converter System, up to four or eight detectors can be connected to a single converter, enabling oxygen concentration to be obtained at multiple measurement points and averaged across those points.

This enables highly reliable low-O₂ combustion control with a minimum of equipment.

This section gives an overview of the system configuration, and discusses the specifications of various component devices.



AV8C-A, AV8C-C (4 channels)



AV8C-B, AV8C-D (8 channels)

Figure 1.1 Averaging Converter External Views

1.1 System Configuration Examples

To configure a ZA8 In-Situ Type Zirconia Oxygen Analyzer Averaging Converter System requires selection not only of the detectors and averaging converter most appropriate to the application, but also of the devices (such as flow setting units) to be used for measurement system calibration.

Flow setting units are available for both manual and automatic calibration, and there are some differences in operating and maintenance procedures depending on which type is selected.

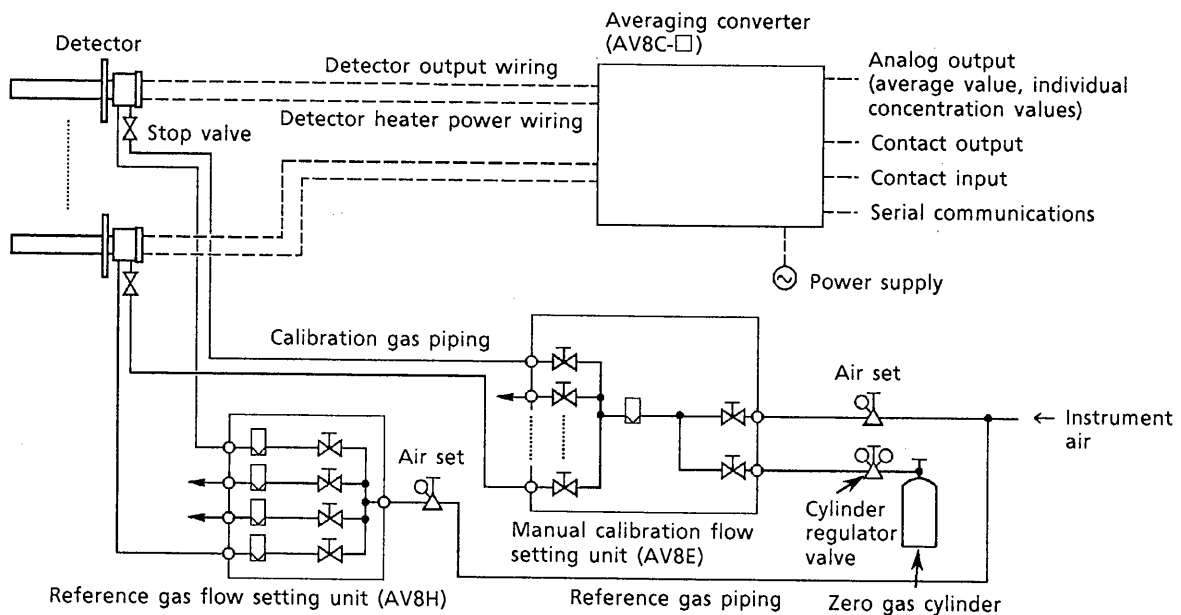
Section 1.1.1 shows a system configuration example using flow setting units intended for manual calibration, while Section 1.1.2 shows a system configuration example using flow setting units intended for automatic calibration.

1.1.1 System Configuration Example Using Flow Setting Units for Manual Calibration

As shown in Figure 1.2, this system consists of the detectors, averaging converter, manual calibration flow setting units (AV8E-□), and reference gas flow setting unit. Note that if more than four detectors are used, two reference gas flow setting units are used.

The reference gas flow setting unit is used to adjust the reference gas to a fixed flow to the detectors. This reference gas must be pure dry air with an oxygen concentration of 20.9%. Normally, instrument air serves as the source for this air. This air is supplied to the detectors as the span gas when calibration is performed.

The zero gas required during calibration is supplied to the detectors from a cylinder.



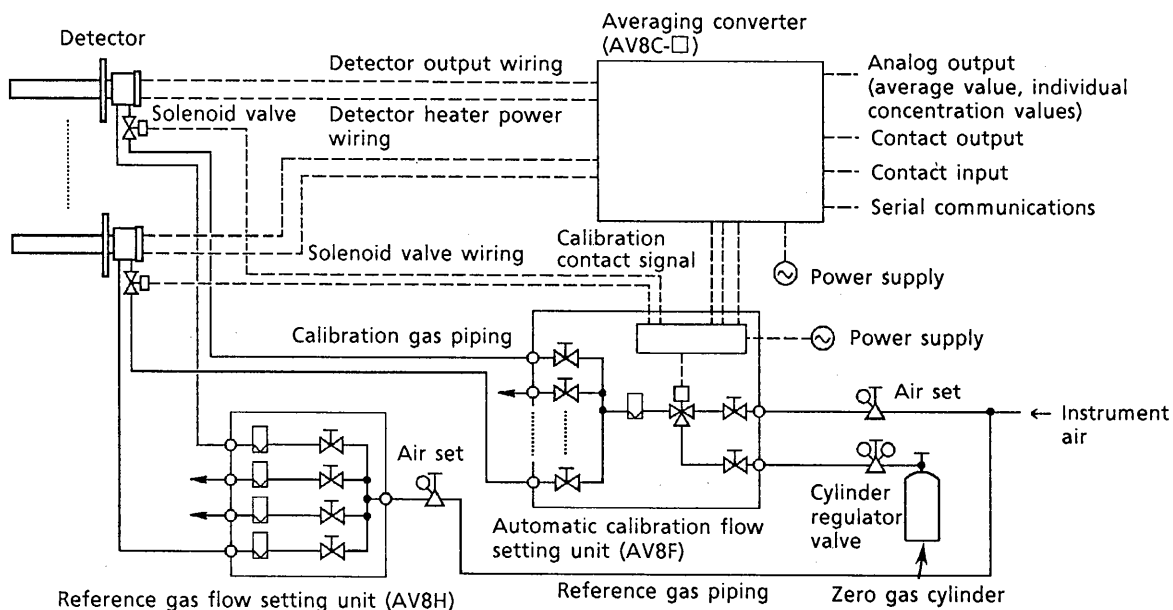
Note: The reference gas flow setting unit can supply reference gas for up to four units.
If more than four detectors are used, two reference gas flow setting units are used.

Figure 1.2 System Configuration Example Using Flow Setting Units for Manual Calibration

1.1.2 System Configuration Example Using Flow Setting Units for Automatic Calibration

Figure 1.3 shows a system in which calibration is performed automatically.

The devices used in this system are the same as those described in Section 1.1.1 for use in a manual calibration system, except that the automatic calibration flow setting unit (AV8F) is used instead of the manual calibration flow setting unit. Also, the valves that supply calibration gas to the detectors are automatic valves (solenoid valves).



Note: The reference gas flow setting unit can supply reference gas for up to four units.
If more than four detectors are used, two reference gas flow setting units must be used.

Figure 1.3 System Configuration Example Using Flow Setting Units for Automatic Calibration

1.2 System Components

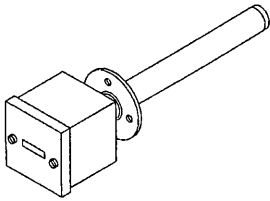
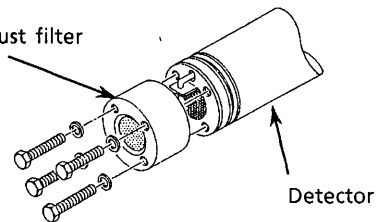
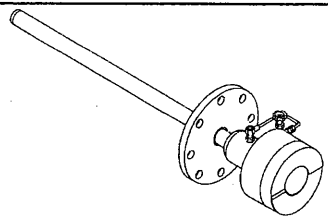
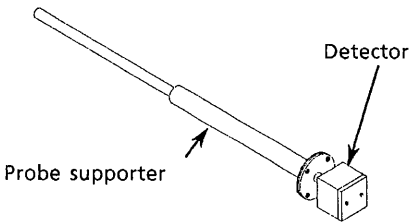
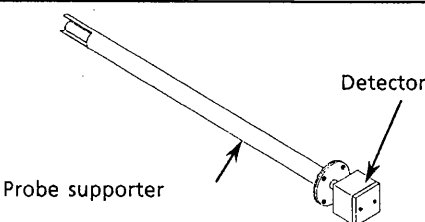
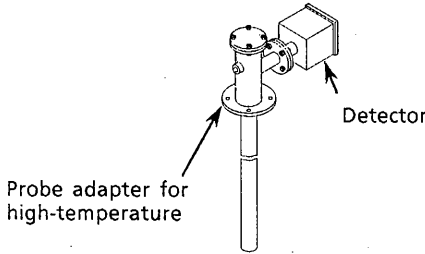
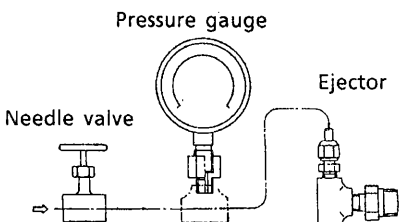
1.2.1 Device Types and Systems in Which Applicable

Model or Part No.	Name	System 1 Manual calibration- gas feed	System 2 Manual calibration- gas feed
AV8C-□ (□ : A, B, C, D)	Averaging Converter	○	○
(AV8C-□) / C (Note 1)	Case for Outdoor Installation	(○)	(○)
(See Section 1.2.2)	Detector	○	○
AV8E - 4, AV8E - 8	Manual Calibration Flow Setting Unit	○	
AV8F - 4, AV8F - 8	Automatic Calibration Flow Setting		○
AV8H	Reference Gas Flow Setting Unit	○	○
G7011XH, G7013XH	Needle (Stop) Valve	○	
G700□XP, E7057G□	Solenoid Valve		○
G7011XF, E7040EL	Air set	○	○
(E7044KF) (Note 2)	(Calibration Gas Unit Case)	(○)	(○)
G7001ZC	Zero Gas Cylinder	○	○
G7013XF, G7014XF	Zero Gas Cylinder Regulator Valve	○	○

Note 1: The averaging converter must be housed in this case in outdoor installations.
To order, specify in the averaging converter model code.

Note 2: A calibration gas unit case should be used only when specifically required.

1.2.2 Detectors and Accessories

● General Purpose Detector (temperature : 0 to 600°C)		Accessories (if required)
<p>Standard Type Detector</p> 	<p>Model</p> <p>ZO21D - L</p>	<p>Dust elimination filter for the detector Part No. : E7042UQ</p> 
	<p>Mounting</p> <p>Vertical or horizontal when inserted 0.4 to 2m. Vertical when inserted 3m.</p>	
<p>Applications : Boilers, Heating furnaces</p>		
<p>Pressure Balance Type Detector</p> 	<p>Model</p> <p>ZO21DW - L</p>	
	<p>Mounting</p> <p>Vertical or horizontal when inserted 0.4 to 2m. Vertical when inserted 3m.</p>	
<p>Applications : Boilers</p>		
<p>Detector with a Probe Supporter</p> 	<p>Model</p> <p>ZO21D - L and ZO21V</p>	
	<p>Mounting</p> <p>Vertical or horizontal (when inserted 3m)</p>	
<p>Application : Boilers, Heating furnaces</p>		
<p>Detector with a Probe Protector</p> 	<p>Model</p> <p>ZO21D - L and ZO21R - L</p>	
	<p>Mounting</p> <p>Vertical or horizontal (when inserted 1m to 2m)</p>	
<p>Application : Cement kiln Powdered coal boiler with gas flow over 10 m/s</p>		
● High-temperature Detector (temperature : 0 to 1400°C)		Accessories (if required)
<p>Probe adapter for high-temperature</p> 	<p>Model</p> <p>ZO21D - H and ZO21P - H</p>	<p>Auxiliary ejector Part No. : E7046EC or E7046EN-A0</p> 
	<p>Mounting</p> <p>(Probe adapter should be attached) vertical A SUS probe can also be attached horizontally.</p>	
<p>Application : Heating furnaces</p>		

2. SPECIFICATIONS

This chapter describes the specifications for the following:

ZO21D - L	General purpose detector (Standard type)	(See Section 2.2.1)
ZO21DW - L	General purpose detector (Pressure balance type)	(See Section 2.2.2)
ZO21V	Probe supporter	(See Section 2.2.3)
ZO21R - L	Probe protector	(See Section 2.2.4)
ZO21D - H	High-temperature detector	(See Section 2.3.1)
ZO21P - H	High-temperature probe adapter	(See Section 2.3.2)
AV8C	Averaging converter	(See Section 2.4)
AV8E	Manual calibration flow setting unit	(See Section 2.5.1)
AV8F	Automatic calibration flow setting unit	(See Section 2.5.2)
AV8H	Reference gas flow setting unit	(See Section 2.5.3)

2.1 General Specifications

2.1.1 Standard Specifications

Measurement Object	:	Oxygen concentration in combustion exhaust gases and in mixed gases (except combustible gases)
Measurement Method	:	Zirconia method
Measurement Range	:	Display: 0.0 to 100 vol% O ₂ (3-digit display) Output: 0 to 5 through 0 to 100 vol% O ₂ (can be set in increments of 1 vol% O ₂)
Data sampling Rate	:	0.2 sec
Warmup Time	:	Approx. 10 minutes
Wiring (for sensor output)	between Detector and Averaging Converter:	Total conductor resistance around circuit, 10Ω max. (300 m max. for 1.25 mm ² conductors, 400 m max for 2.5 mm ² conductors)
No. of Detectors per Averaging Converter:		AV8C-A, C : 2 to 4 detectors AV8C-B, D : 2 to 8 detectors
Power Supply	:	100V range commercial power (100, 110, or 115 V AC), 50/60Hz
Power Consumption	:	Normal : 50 VA + (90 VA × number of detectors) At power-on : 50 VA + (max. 200 VA × number of detectors)

2.1.2 Features

Repeatability	:	±0.5% full scale
Linearity	:	±1% full scale (for a maximum range of 0 to 25 vol% O ₂)
Drift	:	±2% Full scale/month for the zero point and span
Response	:	90% response within five seconds (measured from the time gas is switched on at the detector calibration gas inlet until the analog output signal starts to vary)

2.2 General Detector and Related Equipment

General detector ZO21D-L can be used by itself or in combination with probe supporter ZO21V (see Section 2.2.2) or in combination with probe protector ZO21R-L (see Section 2.2.3).

2.2.1 ZO21D-L General Detector (Standard type)

- **Standard Specifications**

Construction : Water-resistant, non-explosionproof, direct insertion

Insertion length: 0.4, 1.0, 1.5, 2.0 or 3.0 m

Material : Terminal box : SUS304

Probe portion : SUS316 (Probe)
SUS304 (Flange)
Zirconia (Sensor)

Weight :

Flange of Standard	Insertion Length				
	0.4 m	1.0 m	1.5 m	2.0 m	3.0 m
JIS 5 K - 65 - FF equivalent	Approx. 4 kg	Approx. 6 kg	Approx. 7 kg	Approx. 8.5 kg	Approx. 10.5 kg
ANSI CLASS 150 - 4 - FF equivalent	Approx. 8 kg	Approx. 9 kg	Approx. 10 kg	Approx. 11.5 kg	Approx. 13.5 kg
DIN PN 10 - DN 50 - A equivalent	Approx. 6.5 kg	Approx. 7.5 kg	Approx. 8.5 kg	Approx. 9.5 kg	Approx. 12 kg

Installation : Flange mounting

Flange specifications: JIS 5K - 65 - FF equivalent (thickness varies)

ANSI CLASS 150 - 4 - FF equivalent (thickness varies)

DIN PN 10 - DN 50 - A equivalent (thickness varies)

Mounting angle : The probe may be placed vertically with its tip downward or horizontally or at any angle in between. A probe supporter is required for a 3-meter insertion detector unless it is mounted vertically.

Reference Gas and Calibration Gas Piping Outlet:

Uses Rc 1/8 or 1/8 NPT female screw.

Cable inlet : Ø27 mm (two locations)

Ambient Temperature : -10 to 80°C

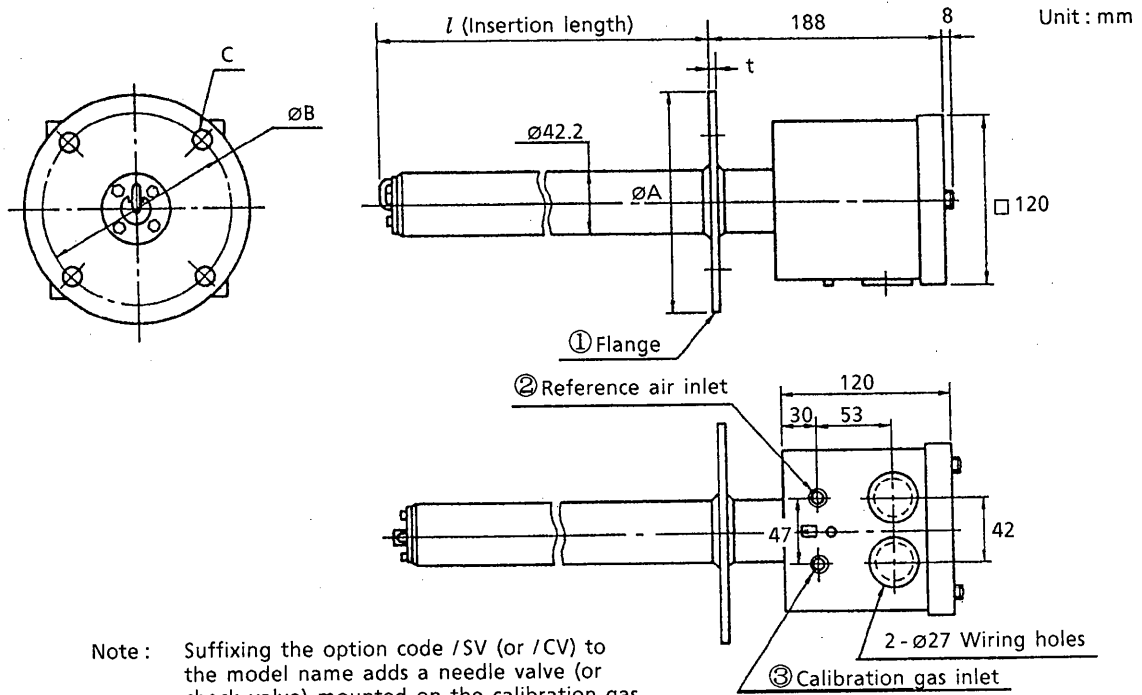
Temperature of Measured Gas: 0 to 600°C

Pressure of Measured Gas : -500 to 500 mm H₂O

- Model and Code

Model	Basic Specification Code	Option Code	Specifications
ZO21D	-L .....	.....	General purpose detector (Standard type)
Insertion length	-040 .....	.....	0.4 m
	-100 .....	.....	1.0 m
	-150 .....	.....	1.5 m
	-200 .....	.....	2.0 m
	-300 .....	.....	3.0 m
Flange connection	-J .....	.....	JIS 5 K - 65 FF Equivalent, Rc 1/8 (PT 1/8 Female screw)
	-A .....	.....	ANSI CLASS 150 - 4 - FF Equivalent, 1/8 NPT Female screw
	-E .....	.....	DIN PN10 - DN50 - A , Rc 1/8 (PT 1/8 Female screw)
Style code	* B .....	.....	Style B
Check valve		/CV	Equipped with a check valve
Needle valve		/SV	Equipped with a needle (stop) valve .

● External Dimensions



Note: Suffixing the option code /SV (or /CV) to the model name adds a needle valve (or check valve) mounted on the calibration gas input via a nipple. See Section 2.6.3 for the needle valve dimensions. Note detectors with check valves are, as a rule, not used in averaging converter systems.

Model	l	②, ③ Inlet	① Flange				
			Standard	A	B	C	t
ZO21D-L-040-J*B	400	Rc 1/8	JIS 5 K- 65 - FF (Equivalent)	155	130	4- $\varnothing 15$	5
ZO21D-L-100-J*B	1000						
ZO21D-L-150-J*B	1500						
ZO21D-L-200-J*B	2000						
ZO21D-L-300-J*B	3000						
ZO21D-L-040-A*B	400	1/8 NPT Femel screw	ANSI CLASS 150 - 4 - FF (Equivalent)	228.2	190.5	8- $\varnothing 19$	12
ZO21D-L-100-A*B	1000						
ZO21D-L-150-A*B	1500						
ZO21D-L-200-A*B	2000						
ZO21D-L-300-A*B	3000						
ZO21D-L-040-E*B	400	Rc 1/8	DIN PN10 - DN50 - A (Equivalent)	165	125	4- $\varnothing 18$	12
ZO21D-L-100-E*B	1000						
ZO21D-L-150-E*B	1500						
ZO21D-L-200-E*B	2000						
ZO21D-L-300-E*B	3000						

2.2.2 ZO21DW-L General Detector (Pressure Balance Type)

To obtain accurate measurements using a zirconia oxygen concentration detector, it is desirable that there be no difference in pressure between the measured gas in contact with the sensor anode and the reference gas supplied to the cathode.

The ZO21DW detector is constructed such that the reference gas outlet can be opened to the furnace. The measured gas and reference gas can therefore be maintained at nearly the same level, enabling very precise measurement.

• Standard Specifications

Construction : Rainproof, direct insertion
Insertion Length: 0.4, 1.0, 1.5, 2.0, or 3.0 m
Material : Terminal box : Cast aluminum alloy
 Contact gas probe section: SUS316 (probe)
 SUS304 (flange)
 Zirconia (sensor)

Weight (approx.) :

Flange Standard	Insertion Length				
	0.4m	1.0m	1.5m	2.0m	3.0m
JIS 10 K - 100 - FF	Approx. 6.5 kg	Approx. 10 kg	Approx. 13 kg	Approx. 17 kg	Approx. 20 kg
ANSI CLASS 150 - 4 - RF	Approx. 7 kg	Approx. 10.5 kg	Approx. 13.5 kg	Approx. 17.5 kg	Approx. 20.5 kg
DIN PN 10 - DN 100 - A	Approx. 6.6 kg	Approx. 10.1 kg	Approx. 13.1 kg	Approx. 17.1 kg	Approx. 20.1 kg

Mounting : Flange mounting
 Flange standards: JIS 10 K - 100 - FF
 ANSI CLASS 150 - 4 - RF
 DIN PN 10 - DN 100 - A
 Mounting angle : The probe may be placed vertically with its tip downward, horizontal, or at any angle in between.
 The 3-meter insertion length detector is restricted to vertical mounting.

Reference Gas and Calibration Gas Piping Connection:

Rc 1/8 (PT 1/8 female)

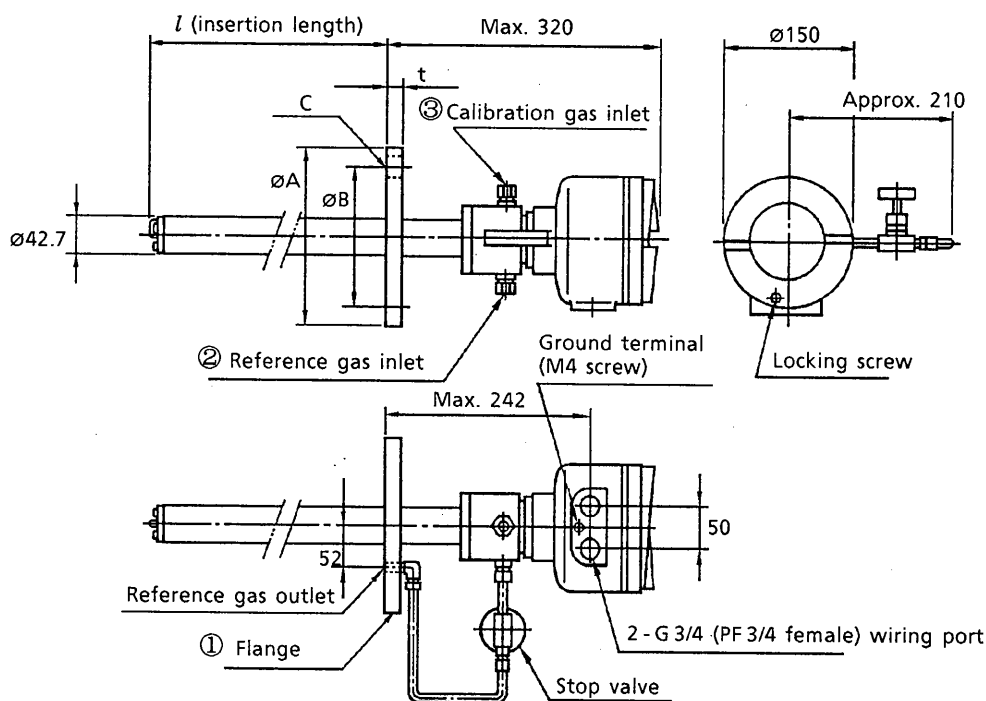
Cable Inlet : Two G 3/4 (PF 3/4 female)
Ambient Temperature : -10 to 80°C
Measured Gas Temperature : 0 to 600°C
Measured Gas Pressure : -500 to 500 mm H₂O
Reference Gas Flow Rate : 800 ml/mim (using instrument air)

- Model and Code

Model	Basic Specification Code	Option Code	Specifications
Z021DW	- L .....	.....	General purpose detector (Pressure balance type)
Insertion length	- 040 .....	.....	0.4 m
	- 100 .....	.....	1.0 m
	- 150 .....	.....	1.5 m
	- 200 .....	.....	2.0 m
	- 300 .....	.....	3.0 m
Flange connection	- J .....	.....	JIS 5 K - 65 - FF Equivalent, Rc 1/8 (PT 1/8 Female screw)
	- A .....	.....	ANSI CLASS 150 - 4 - FF Equivalent, 1/8 NPT Female screw
	- E .....	.....	DIN PN10 - DN 50 - A , Rc 1/8 (PT 1/8 Female screw)
Style code	* A .....	.....	Style A
Check valve		/CV	Equipped with a check valve
Needle valve		/SV	Equipped with a needle (stop) valve

• ZO21DW-L Dimension Drawings

Unit : mm

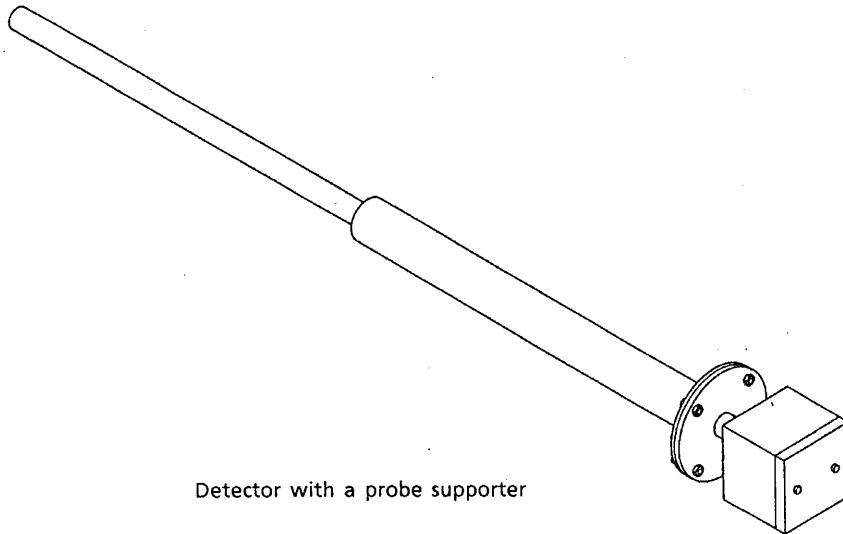


Note : Sufficing the option code /SV (or /CV) to the model name adds a needle valve (or check valve) mounted on the calibration gas input via a nipple. See Section 2.6.3 for the needle valve dimensions. Note detectors with check valves are, as a rule, not used in averaging converter systems.

Model	l	②, ③ Inlet	① Flange				
			Standard	A	B	C	t
ZO21DW-L-040-J*B	400	Rc 1/8 Femel	JIS 10 K - 100 - FF equivalent	210	175	8- $\phi 19$	18
ZO21DW-L-100-J*B	1000						
ZO21DW-L-150-J*B	1500						
ZO21DW-L-200-J*B	2000						
ZO21DW-L-300-J*B	3000						
ZO21DW-L-040-A*A	400	1/8 NPT Femel	ANSI CLASS 150 - 4 - RF	228.2	190.5	8- $\phi 19$	23.8
ZO21DW-L-100-A*A	1000						
ZO21DW-L-150-A*A	1500						
ZO21DW-L-200-A*A	2000						
ZO21DW-L-300-A*A	3000						
ZO21DW-L-040-E*A	400	Rc 1/8 Femel	DIN PN10 - DN100 - A	220	180	8- $\phi 18$	20
ZO21DW-L-100-E*A	1000						
ZO21DW-L-150-E*A	1500						
ZO21DW-L-200-E*A	2000						
ZO21DW-L-300-E*A	3000						

2.2.3 ZO21V Probe Supporter

A probe supporter is required when a standard detector with a 3-meter insertion length is used at an inclination other than vertical.



Detector with a probe supporter

- **Standard Specifications**

Material : SUS316 (Supporter)
 SUS304 (Flange)

Supporter Length : 1.5 m

Weight : Approx. 16 kg when JIS flange is used.
 Approx. 19 kg when ANSI flange is used.
 Approx. 17.5 kg when DIN flange is used.

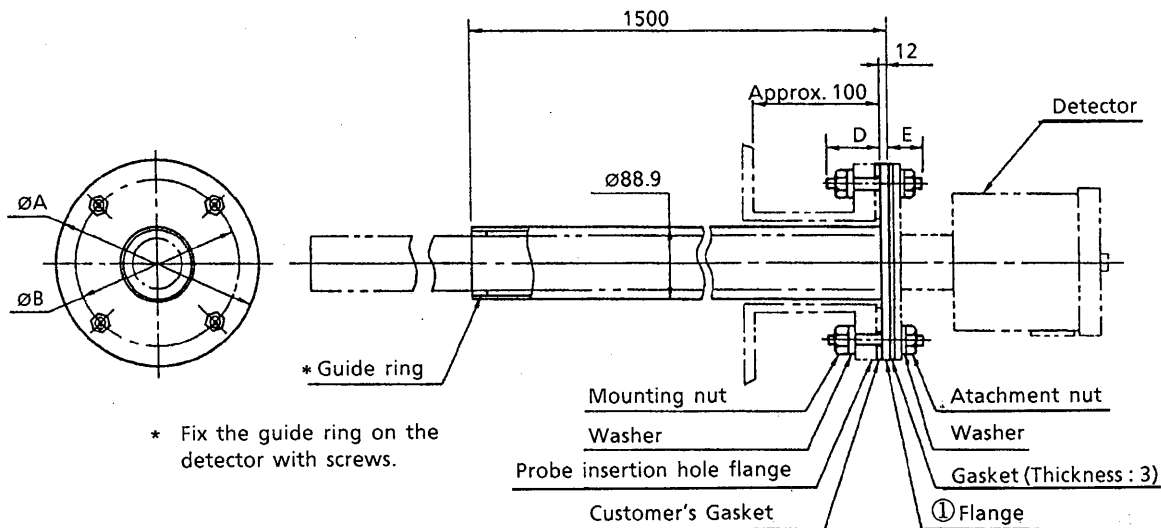
Installation : Flange mounting
 JIS 5K - 65 - FF equivalent (thickness varies)
 ANSI CLASS 150 - 4 - FF equivalent (thickness varies)
 DIN PN 10 - DN 50 - A equivalent (thickness varies)

- **Model and Code**

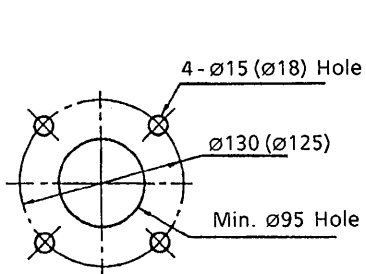
Model	Basic Specification Code	Option Code	Specifications
ZO21V	.....	.....	Probe supporter
Insertion length	- 150 .....	.....	1.5 m (Supporter length) for detector with 3-meter insertion length
Flange	- J .....	.....	JIS 5 K - 65 - FF equivalent
	- A .....	.....	ANSI CLASS 150 - 4 - FF equivalent
	- E .....	.....	DIN PN 10 - DN 50 - A equivalent
Style	* B .....	.....	Style B

● External Dimensions

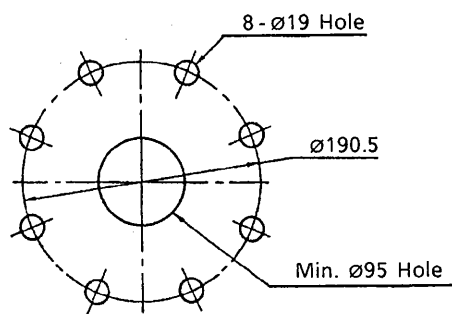
Unit: mm



* Fix the guide ring on the detector with screws.



When JIS(DIN) flange



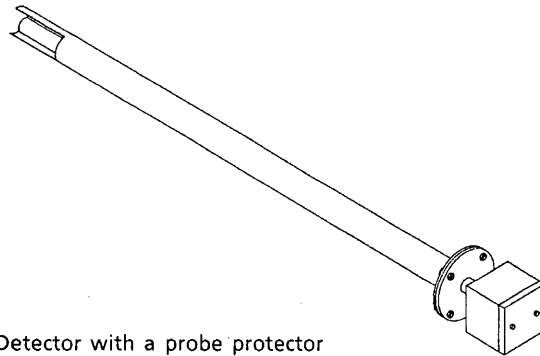
When ANSI flange

Boring and Drilling Dimensions for Probe Insertion Hole Flange

Model	① Flange					Weight
	Standard	A	B	D	E	
ZO21V-150-J*B	JIS 5K - 65 - FF equivalent	155	130	40	40	Approx. 16 kg
ZO21V-150-A*B	ANSI CLASS150 - 4 - FF equivalent	228.6	190.5	50	50	Approx. 19 kg
ZO21V-150-E*B	DIN PN10 - DN50 - A equivalent	165	125	50	50	Approx. 17.5 kg

2.2.4 ZO21R-L Probe Protector

This probe protector is required for the standard detector when it is used for oxygen concentration measurements in powdered coal boilers or in fluidized furnaces to prevent abrasion due to dust particles when gas flow exceeds 10 m/s.



Detector with a probe protector

• Standard Specifications

Material : SUS316 (Protector)
SUS304 (Flange)

Protector Length : 1.05, 1.55 or 2.05 m

Weight :

Standard of Flange	Protector Length		
	1.05 m	1.55 m	2.05 m
JIS 5K - 65 - FF equivalent	Approx. 10 kg	Approx. 15 kg	Approx. 20 kg
ANSI CLASS 150 - 4 - FF equivalent	Approx. 14 kg	Approx. 19 kg	Approx. 24 kg
DIN PN 10 - DN 50 - A equivalent	Approx. 12.5 kg	Approx. 17.5 kg	Approx. 22 kg

Installation : Flange mounting

Flange specification : JIS 5 K - 65 - FF equivalent (Thickness of the flange varies.)

ANSI CLASS 150 - 4 - FF equivalent (Thickness of the flange varies.)

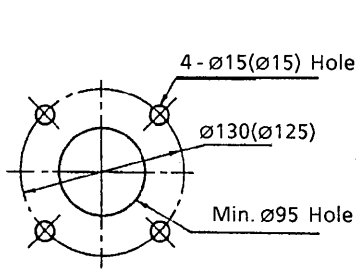
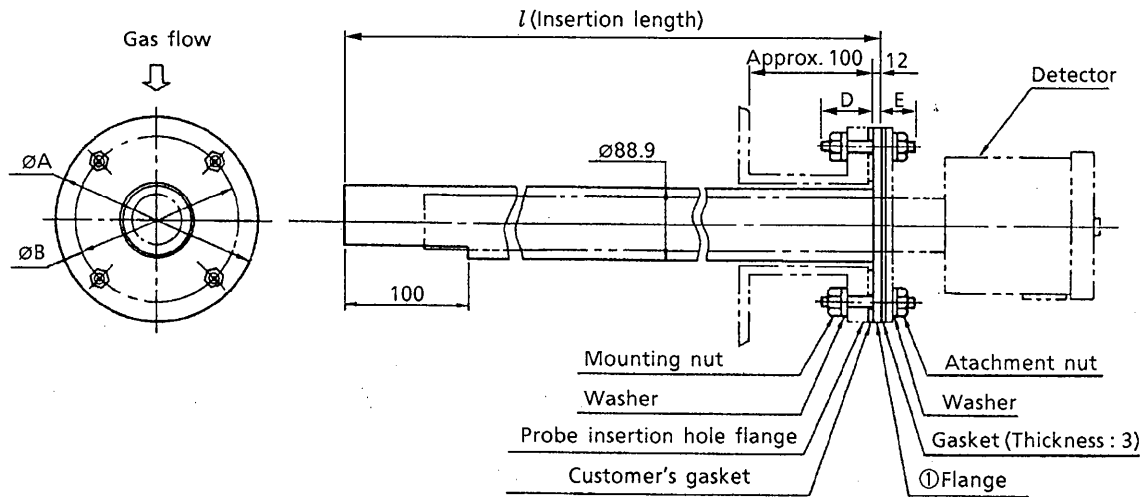
DIN PN 10 - DN 50 - A equivalent (Thickness of the flange varies.)

• Model and Code

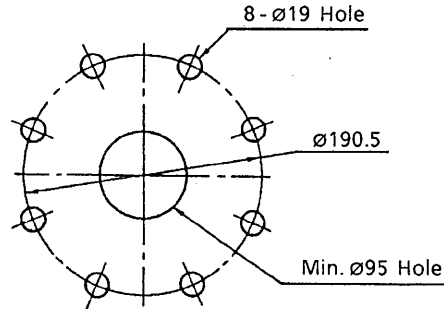
Model	Basic Specification Code	Options Code	Specifications
ZO21R	- L .....	.....	Probe protector
Insertion length	- 100 .....	.....	1.05 m for a detector of 1.0 m insertion length
	- 150 .....	.....	1.55 m for a detector of 1.5 m insertion length
	- 200 .....	.....	2.05 m for a detector of 2.0 m insertion length
Flange	- J .....	.....	JIS 5 K - 65 - FF equivalent
	- A .....	.....	ANSI CLASS 150 - 4 - FF equivalent
	- E .....	.....	DIN PN 10 - DN 50 - A equivalent
Style code	* B .....	.....	Style B

• External Dimensions

Unit: mm



When JIS(DIN) flange



When ANSI flange

Boring and Drilling Dimensions for Probe Insertion Hole Flange

Model	l	① Flange					
		Standard	A	B	t	D	E
ZO21R-L-100-J*B	1050	JIS 5 K- 65 - FF equivalent	155	130	5	40	40
ZO21R-L-150-J*B	1550						
ZO21R-L-200-J*B	2050						
ZO21R-L-100-A*B	1050	ANSI CLASS 150 - 4 - FF equivalent	228.6	190.5	12	50	50
ZO21R-L-150-A*B	1550						
ZO21R-L-200-A*B	2050						
ZO21R-L-100-E*B	1050	DIN PN 10 - DN 50 - A equivalent	165	125	12	50	50
ZO21R-L-150-E*B	1550						
ZO21R-L-200-E*B	2050						

2.3 High-Temperature Detector and Related Equipment

2.3.1 ZO21D-H High-Temperature Detector

- Standard Specifications

Construction : Water-resistant, non-explosionproof

Probe Length : 0.15 m

Terminal Box : SUS304

Probe Material : SUS316 (Probe), SUS304 (Flange), Zirconia (Sensor)

Weight : Approx. 3 kg

Installation : Flange mounting (The use of high-temperature detector probe adapter ZO21P-H is recommended.)

Flange standard : JIS 5 K - 32 - FF equivalent (thickness varies)

Mounting angle : Any angle between horizontal and vertical (high-temperature probe is fitted with an adapter)

Reference Gas and Calibration Gas Piping Connection :

Rc 1/8 (PT 1/8) or 1/8 NPT female screw

Cable Inlet : Ø27 mm (two holes)

Ambient Temperature : -10 to 150°C

Sample Gas Temperature : 0 to 600°C when no adapter is used. 0 to 750°C or 0 to 1400°C when the probe adapter for high temperature is used.

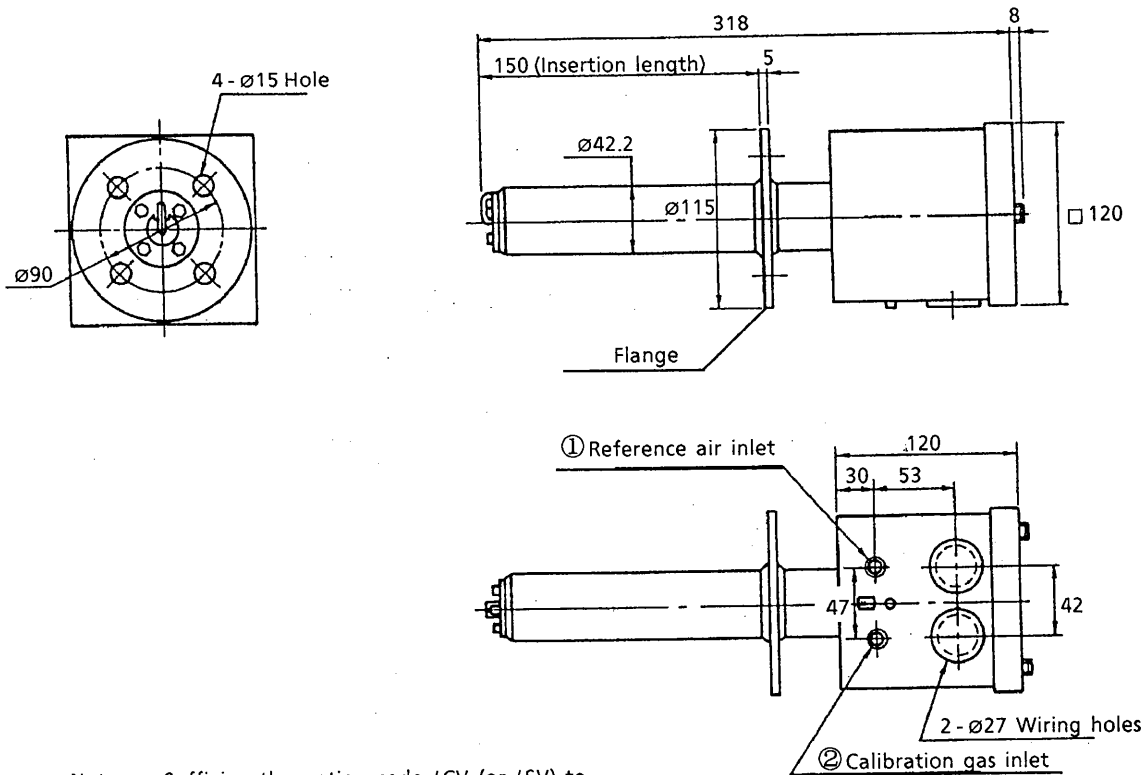
Sample Gas Pressure : -50 to 500 mm H₂O

- Model and Code

Model	Basic Specification Code	Option Code	Specifications
ZO21D	-H		High-temperature detector
Insertion length	-015		0.15 m
Flange, piping	-J		JIS 5 K - 32 - FF equivalent, Rc 1/8 female screw
	-K		JIS 5 K - 32 - FF equivalent, 1/8 NPT female screw
Style code	*A		Style A
Check valve		/CV	Equipped with a check valve
Needle valve		/SV	Equipped with a needle (stop) valve

● External Dimensions

Unit : mm



Note : Suffixing the option code /CV (or /SV) to the model name adds a needle valve (or check valve) mounted on the calibration gas input via a nipple. See Section 2.6.3 for the needle valve dimensions. Note detectors with check valves are, as a rule, not used in averaging converter systems.

Model	①, ② Inlet
ZO21D-H-015-J*A	PT 1/8 (F)
ZO21D-H-015-K*A	1/8 NPT (F)

2.3.2 ZO21P-H Adapter for the High-Temperature Probe

The probe adapter is used to lower the sample gas temperature below 600°C before it is fed to the detector.

- **Standard Specifications**

Insertion Length: 1 m, 1.5 m

Material in Contact with the Gas:

SUS310S or Silicon carbide (probe)

SUS304 (flange)

SUS316 (Adapter body)

Weight :

Standard of Flange	Insertion Length	
	1 m	1.5 m
JIS 5K-50-FF equivalent	Approx. 4 kg	Approx. 5 kg
ANSI CLASS 150-4-RF equivalent	Approx. 6 kg	Approx. 7 kg
DIN PN 10-DN 50-A equivalent	Approx. 7 kg	Approx. 8 kg

Installation

: Flange mounting

Flange specifications : JIS 5 K - 50 - FF equivalent (thickness varies)
ANSI CLASS 150 - 4 - RF equivalent (thickness varies)
DIN PN 10 - DN 50 - A equivalent (thickness varies)

Mounting angle : Vertical (can also be attached horizontally if the probe material is SUS310S.)

Sample Gas Exhaust : Rc 1/2 (PT 1/2) female screw

Operation Temperature : 0 to 750°C (SUS310S probe)
0 to 1400°C (SiC probe)

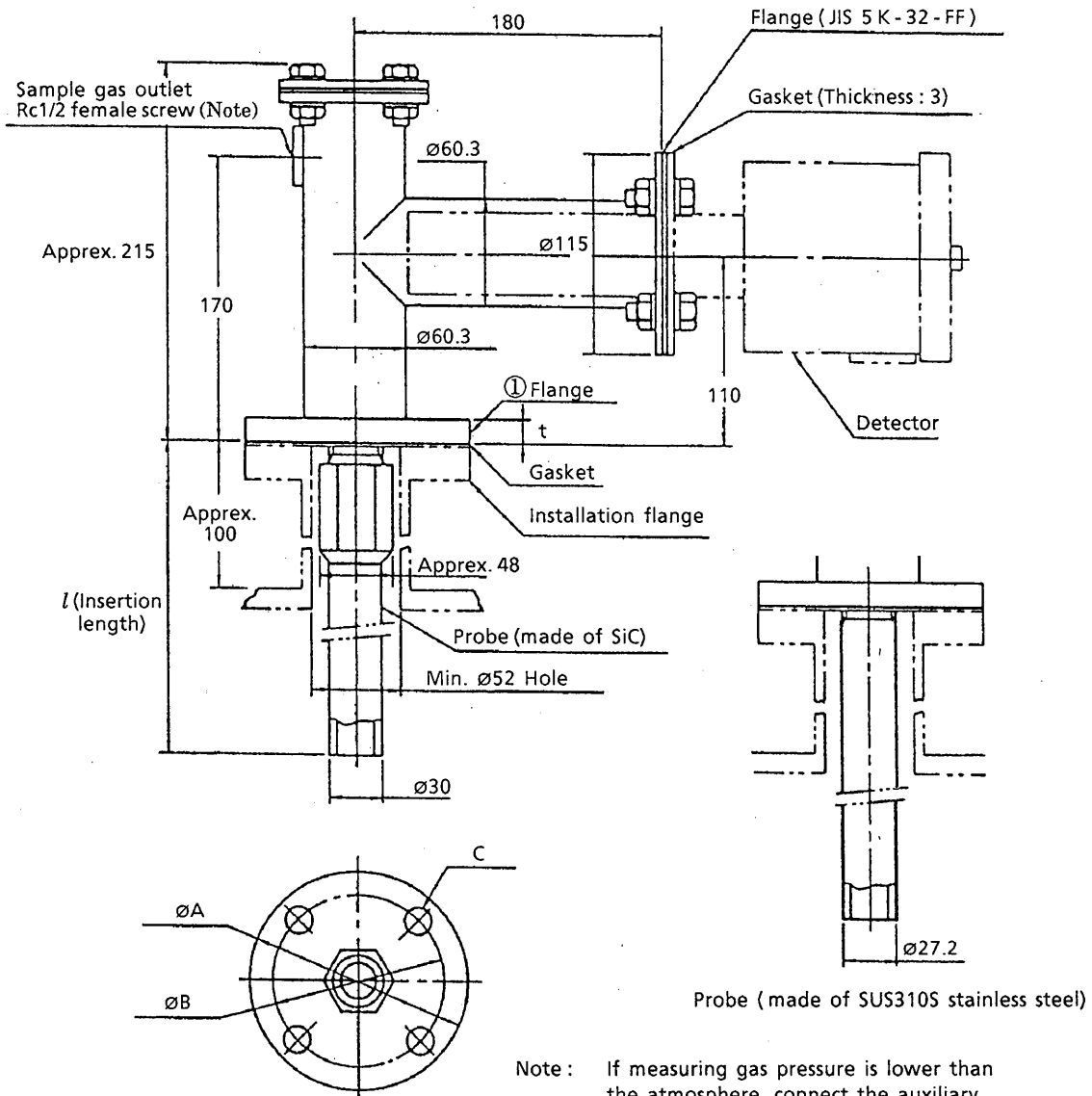
Operation Pressure : -50 to 500 mm H₂O (An auxiliary ejector is required for negative pressure.)

- **Model and Code**

Model	Basic Specification Code	Option Code	Specifications
ZO21P	-H .....	.....	High-temperature probe adapter
Probe material	-A .....	.....	Silicon carbide (SiC)
	-B .....	.....	SUS310S
Insertion length	-100 .....	.....	1.0 m
	-150 .....	.....	1.5 m
Flange	-J .....	.....	JIS 5 K - 50 - FF equivalent
	-A .....	.....	ANSI CLASS 150 - 4 - RF equivalent
	-E .....	.....	DIN PN 10 - DN 50 - A equivalent
Style code	*U .....	.....	Style U

● External Dimensions

Unit : mm



Model	l	① Flange				
		Standard	A	B	C	t
ZO21P-H-□-100-J*A	1000	JIS 5 K - 50 - FF equivalent	130	105	4- $\phi 15$	14
ZO21P-H-□-150-J*A	1500					
ZO21P-H-□-100-A*A	1000	ANSI CLASS 150 - 4 - RF equivalent	228.6	190.5	8- $\phi 19$	23.8
ZO21P-H-□-150-A*A	1500					
ZO21P-H-□-100-E*A	1000	DIN PN10 - DN50 - A equivalent	165	125	4- $\phi 18$	18
ZO21P-H-□-150-E*A	1500					

2.4 AV8C-□ Averaging Converter

• Standard Specifications

Construction : Rack construction for indoor installation

Note: Can be housed in an enclosing case for outdoor installation. To have the converter delivered mounted in this case, specify the option code (/C). See the dimension drawings in this section for specifications of the case.

Material : SPCC

Paint : Baked epoxy resin paint

Color : Pale gray (Munsell 1.1Y6.2/0.9 equivalent)

Mounting : Wall mounting

Weight : AV8C-A, C : Max. 18 kg
AV8C-B, D : Max. 20 kg

Ambient Temperature : -5 to 50°C

Ambient Humidity : 10% to 90% RH (noncondensing)

Ambient Atmosphere : No corrosive gases

Power Supply : 100 V range commercial power (100, 100, or 115 V AC),
50/60 Hz

Allowable Power Supply Voltage Range : 85 to 127 V AC, 50/60 Hz

Allowable Transient Power Failure Time : Operation continues up to 20 ms

Ground : JIS Class 3 ground (ground resistance, max. 100Ω)

Number of Detectors that can be Connected:

AV8C-A, C : Up to 4 detectors

AV8C-B, D : Up to 8 detectors

Display

Data Display : 4-digit large-format LED

Oxygen concentration : 0.0 to 100.0 vol% O₂

Error codes :

- E--1 Sensor (cell) failure
- E--2 Sensor (cell) temperature too low
- E--3 Sensor (cell) temperature too high
- E--4 A/D failure
- E--5 Calibration failure: Zero point
- E--6 Calibration failure: Span
- E--7 Stabilization time exceeds maximum
- E--8 ROM, RAM failure

□□□□ (No display) Digital circuit failure, or power failure

Status Indicators : Current status is shown by the indicator lamps lit.

Operating mode :

- Green indicator lamps
- MEAS (measurement mode)
- MAINT (maintenance/data setting mode)

Error indicators :

- Red indicator lamps
- ALM (during high/low limit alarm or other alarm generating contact signal output)
- FAIL (error detected by self-diagnostics)

Message Display : 40-character dot matrix LCD**Measurement group A (1st level):**

- A-0 (analog bar graph, output range, alarm output setting)
- A-1 (maximum and minimum O₂ concentrations within a user-set time interval)
- A-2 (average O₂ concentration within a user-set time interval)
- A-3 (cell electromotive force in mV)
- A-4 (cell temperature in °C / thermocouple electromotive force in mV)
- A-5 (output current in mA / output range in vol% O₂)
- A-6 (current date & time : year, month, day / hour, minute)

Measurement group B (2nd level):

- B-0 (span correction factor history)
- B-1 (zero point correction factor history)
- B-2 (90% response time, in seconds)
- B-3 (cell internal resistance, in Ω)
- B-4 (cell robustness index)
- B-5 (thermocouple cold junction temperature, in °C)
- B-6 (cell heater duty factor (percent ON time))
- B-7 (dry O₂ concentration / moisture concentration)

Setup group C (calibration functions):

- C-0 (span gas concentration, in vol% O₂)
- C-1 (zero gas concentration, in vol% O₂)
- C-2 (calibration mode)
- C-3 (stabilizing time, in minutes)
- C-4 (calibration interval, in minutes)
- C-5 (calibration interval, in days / hours)
- C-6 (calibration start date & time, month / day, hour / second)
- C-7 (zero point / span calibration skip yes / no setting check)

Setup group D (output signal functions):

- D-0 (analog output range 1, in vol% O₂)
- D-1 (analog output range 2, in vol% O₂)
- D-2 (output signal hold selection)
- D-3 (analog output signal selection: 4 to 20 mA or 0 to 20 mA)
- D-4 (output characteristic selection: linear or log)
- D-5 (output smoothing constant in sec.)
- D-6 (wet / dry O₂ concentration selection)
- D-7 (averaging Group "a" definition)
- D-8 (averaging Group "b" definition)

Setup group E (alarm functions):

- E-0 (high-high and high limit alarm value settings)
- E-1 (low-low and low limit alarm value settings)
- E-2 (exclude data exceeding alarm setting from average value computation)
- E-3 (contact operating delay in seconds, and hysteresis in vol% O₂)

Setup group F (other):

- F-0 (O₂ concentration averaging interval, in hours)
- F-1 (maximum/minimum O₂ concentration monitoring interval, in hours)
- F-2 (temperature unit selection, °C or °F)
- F-3 (Time Day/ Hour, Minute)

Setup group G (contact outputs, contact inputs):

- G-0 (contact output 1)
- G-1 (contact output 2)
- G-2 (contact output 3)
- G-3 (contact output 4)
- G-4 (contact output 5)
- G-5 (contact input 1)
- G-6 (contact input 2)

Setup group H (communications):

- H-0 (communication parity: none, odd, even)
- H-1 (baud rate)
- H-2 (unit number setting)

Setup group J (exhaust gas data):

- J-0 (amount of moisture in exhaust gas)

Status message group, dialogue message group, supplementary message group

Analog Output:

- Output Data** : Average oxygen concentrations (Group A, Group B, and C :
 $C = (A + B) \times 1/2$)
 Individual oxygen concentrations
 Note: Abnormal values and channels in calibration are automatically excluded from the average oxygen concentration computation. The capability is also provided to exclude channels exceeding the high or low limit alarm settings from this computation.
- Range** : 2 ranges, each settable to any span from 0 to 5vol% O₂ up to 0 to 100 vol% O₂ (Range selection is controlled by contact input)
- Output Signal** : 4 to 20 mA DC, or 0 to 20 mA DC
 Maximum load resistance, 550Ω, with input/output isolation
- Output Characteristic** : Linear or log (log output selectable from among 0.1 to 5, 0.1 to 10, 0.1 to 25, or 0.1 to 100 vol% O₂ ranges)

- Contact Outputs** : 5 output points
- Contact Capacity** : 30 V DC 2 A, 250 V AC 2 A, resistive load
- Contact Type** : Terminal connections enable selection of either NO or NC contacts
- Relay Actions** : Can be set up for normally energized or normally de-energized operation
- Functions** : The function or functions to be assigned to individual contact outputs can be selected as required from among those listed below.
- Error (FAIL)
 - Entry in progress, range selection command answer back, warmup in progress, calibration in progress, solenoid valve unit drive, blowback, calibration gas pressure drop (re-output of contact input)
 - Low-low limit alarm, low limit alarm, high limit alarm, high-high limit alarm

Relay Actions and Applications Selected when Shipped :

- Contact output #1 → Normally energized, "error"
- Contact output #2 → Normally de-energized, "entry in progress, warmup in progress"
- Contact output #3 → Normally de-energized, "low limit alarm, high limit alarm"
- Contact output #4 → Normally de-energized, "range selection command answer back"
- Contact output #5 → Normally de-energized, "calibration in progress"

Note: A contact signal assigned for more than one function is output if any of the functions applies.

If the relay is set up for "normally energized" action, a contact closure is generated between the NC terminal and the common terminal (C) when the relevant state is established; conversely, a contact closure is generated between the NO terminal and the common terminal at all other times. If the relay is set up for "normally de-energized" action, circumstances under which the contact closures are output are reversed.

- "Error (self-diagnostic)" Contact Outputs** : 1 point per channel
- Contact capacity** : 30 V DC 2 A, 250 V AC 2 A, resistive load
- Contact types** : Terminal connections enable selection of either NO or NC contacts
- Automatic Calibration Contact Output** : SSR (TRIAC) output
- Contact Capacity** : 250 V AC 1 A
- OFF-state Leakage Current** : Max. 3 mA

Digital Communications : Serial communications using RS-422-A or RS-485

Communication Specifications : (for details, see Section 5.9)

Receive data : Zero point, span calibration request / calibration end request, analog output range selection signal, calibration gas pressure drop alarm, process gas error alarm, blowback start / stop, data transmission request

Transmit data : Transmits data in 6 data groups, A through F, on request (see Section 5.9.5 for transmitted data)

System : Start-stop synchronization, half-duplex

Communication rate : Can be selected from among 9600, 4800, 2400 bit/second

Protocol : Procedureless

Data length : 8 bits

Parity : None, odd, even (selectable)

Start bits : 1

Stop bits : 1

Communication code set : ASCII code set

Contact Inputs : 2 points, isolated

Input : Contact (resistance), or voltage input

(1) Contact (resistance) input

ON : 200 Ω max.

OFF : 100 k Ω min.

(2) Voltage input

ON : -1 to 1 V DC

OFF : 4.5 to 25 V DC

Functions : (Can be selected from the following and assigned as desired)

Calibration gas pressure drop alarm

Range selection

Calibration start command

Process gas abnormality alarm

Note: Selecting this function will cause the heater power supply to all sensors to turn off whenever an ON signal is input to the averaging converter

Blowback start command

Self-diagnostics : Sensor (cell) failure

Sensor (cell) temperature too low

Sensor (cell) temperature too high

A/D (analog) circuit failure

Calibration failure

ROM, RAM failure

Digital circuit failure

Power failure

Calibration :**Calibration Execution Methods :**

Automatic, semi-automatic, one-touch

(1) Automatic :

Calibration for all channels executed periodically on schedule according to a specified sequence.

(2) Semi-automatic (calibration for single channel executed by single start command) :

When a start command is executed by a key operation, etc., calibration is executed according to a specified sequence.

(3) One-touch calibration (calibration for single channel executed by single start command) :

After the start command is executed, calibration gas flow and key operations are executed according to the messages that are displayed.

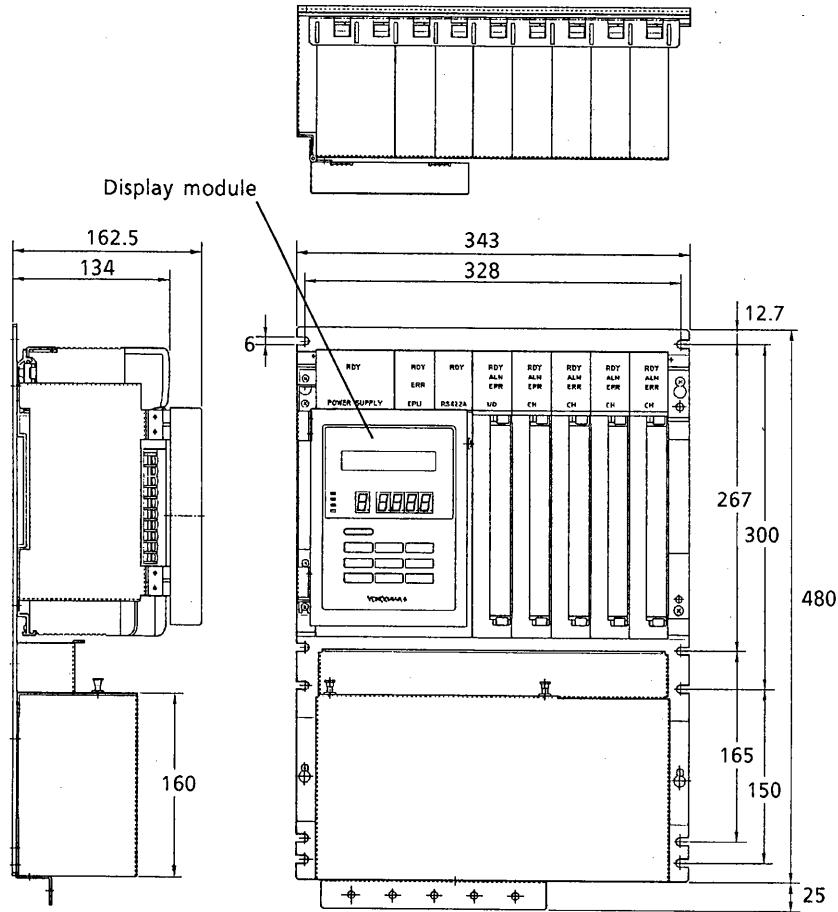
Calibration Gas O₂ Concentration :0.3 to 100 vol% O₂● **Model and Suffix Codes**

Model	Suffix Code	Option Code	Specifications
AV8C	.....	.....	Averaging converter
Rack type	- A .....	.....	4-channel rack
	- B .....	.....	8-channel rack
	- C .....	.....	4-channel rack (Panel mounting type display module)
	- D .....	.....	8-channel rack (Panel mounting type display module)
No. of channels installed	- 2 .....	.....	2 channels (2 detectors connected)
	- 3 .....	.....	3 channels (3 detectors connected)
	- 4 .....	.....	4 channels (4 detectors connected)
	- 5 .....	.....	5 channels (5 detectors connected)
	- 6 .....	.....	6 channels (6 detectors connected)
	- 7 .....	.....	7 channels (7 detectors connected)
Display panel labeling	- J .....	.....	Japanese
	- E .....	.....	English
Style code	* A .....	.....	Style A
Case for outdoor installation		/C	With case

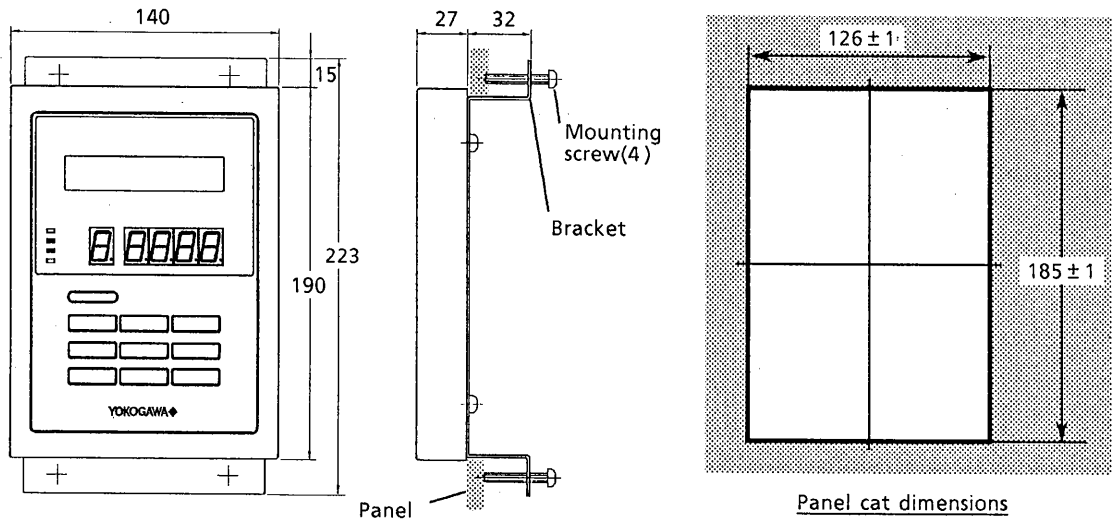
• Dimension Drawings

AV8C-A, AV8C-C 4-channel Averaging Converter

Unit : mm

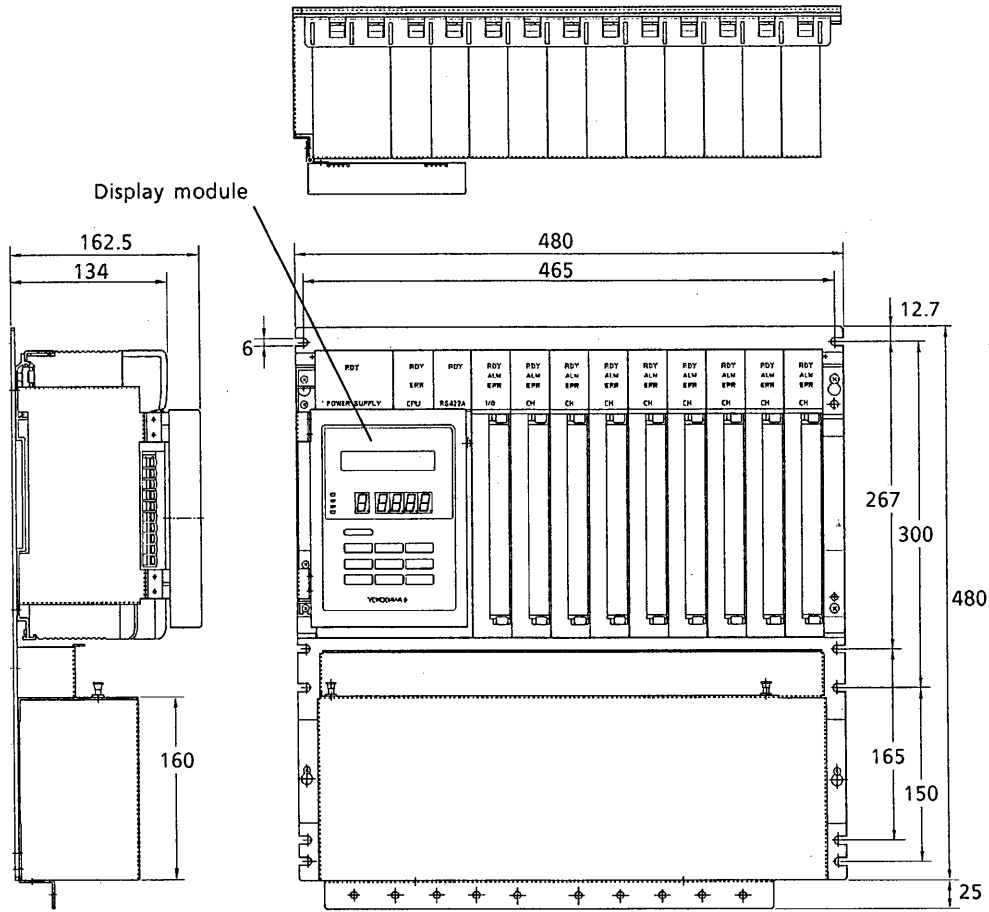


• Display module of AV8C-C

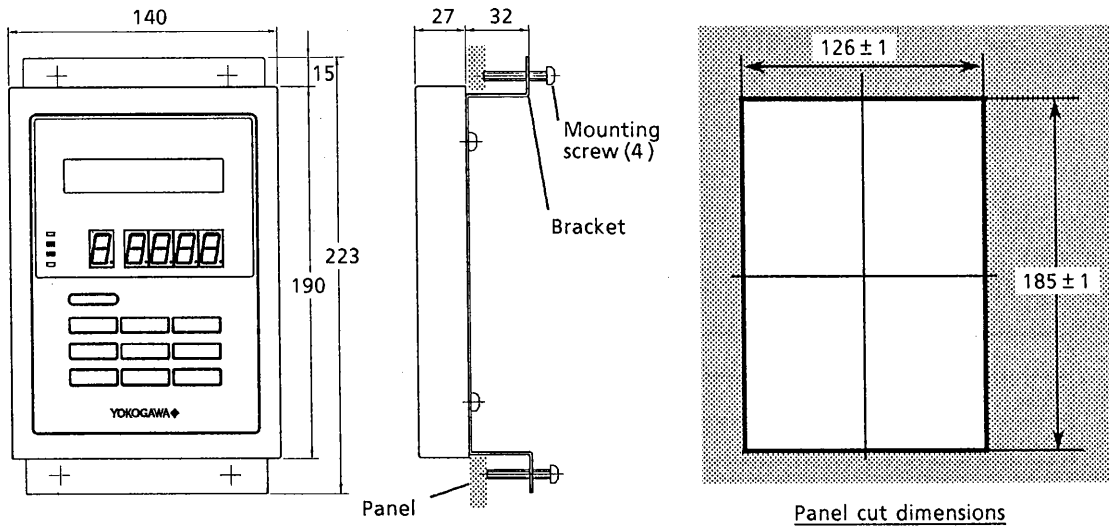


● AV8C-B, AV8G - D 8-channel Averaging Converter

Unit : mm

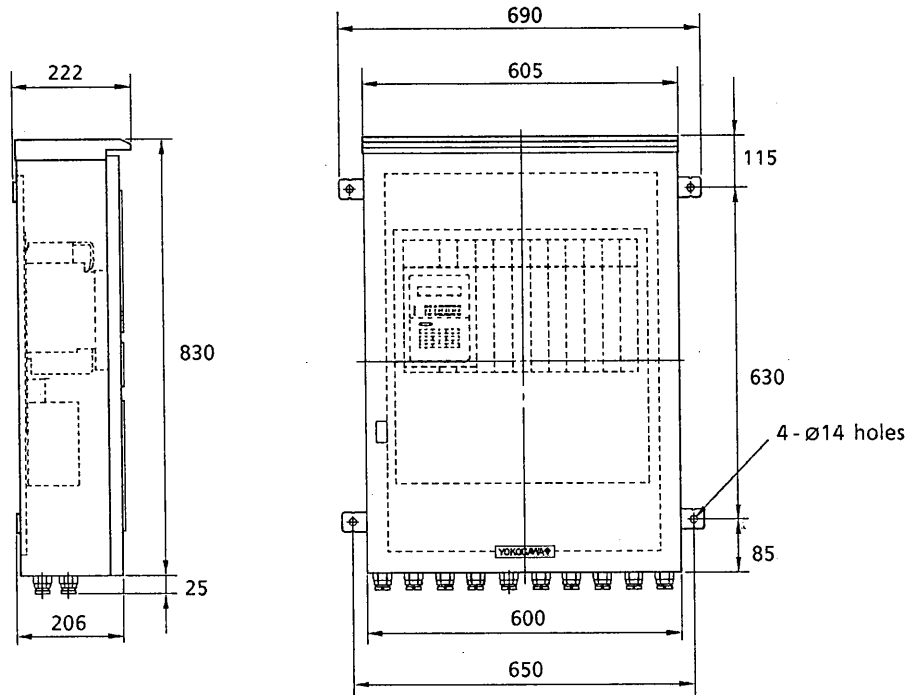


● Display module of AV8C-D

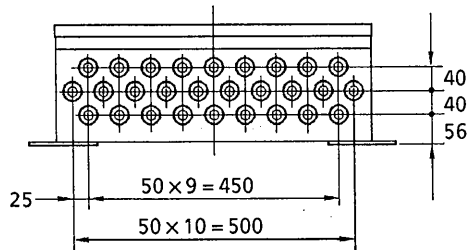


● Case for Outdoor Installation

Unit : mm



- Construction : Rainproof construction
- Mounting : Wall mounting
- Material : Zn-plating Steel
- Paint : Baked melamine resin paint
- Color : Munsell 5Y7 / 1 equivalent
- Front door : One-way (Right)



Weight : Approx. 32 kg

● AV8C Accessories

Part Name	Quantity	Remarks
Fuse	2	Rating : 3.15 A
Wiring harness band	15	

2.5 Flow Setting Units

2.5.1 AV8E Manual Calibration Flow Setting Unit

This device supplies calibration gas to the detectors at a fixed flow rate, and is used in a system in which calibration is performed manually.

- **Standard Specifications**

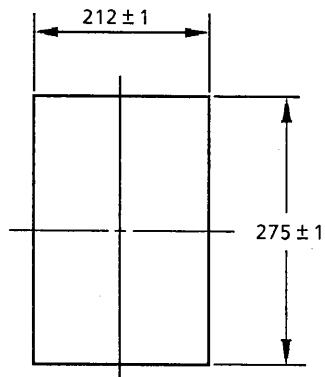
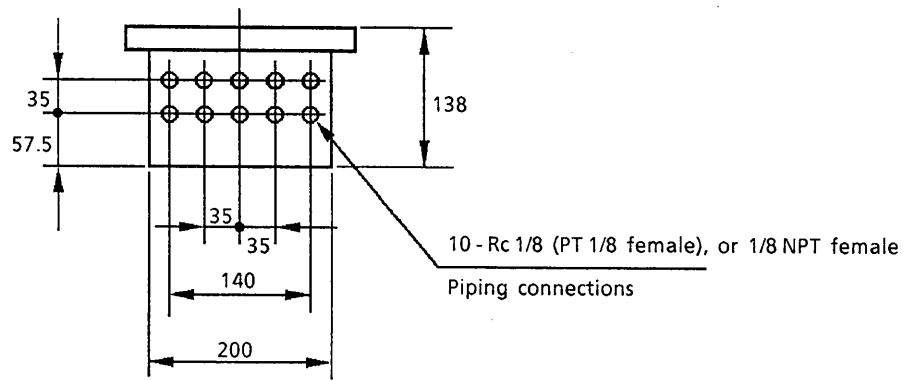
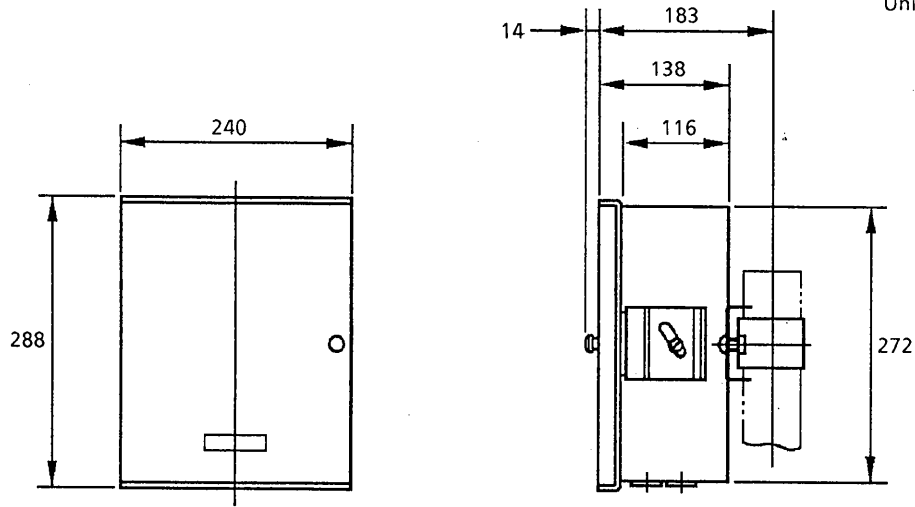
Construction	: Constructed for outdoor installation
Case Material	: SPCC
Paint	: Baked epoxy resin paint
Color	: Door : Munsell 2.8GY6.4/0.9 equivalent Case : Munsell 2.0GY3.1/0.5 equivalent
Mounting	: Pipe mounting, wall mounting, panel mounting
Mounting Angle	: Vertical
No. of Flow Paths	: AV8E-4 : 4 flow paths AV8E-8 : 8 flow paths
Piping Connections	: Rc 1/8 (PT 1/8 female), or 1/8 NPT female (with adapter)
Weight	: Max. 7 kg
Span Gas Air Source	: Pure air at a pressure of 0.5 to 7 kgf/cm ²
Calibration Gas (zero gas, span gas) Consumption:	Approx. 0.7 N l/min per sensor (during calibration only)

- **Model and Suffix Codes**

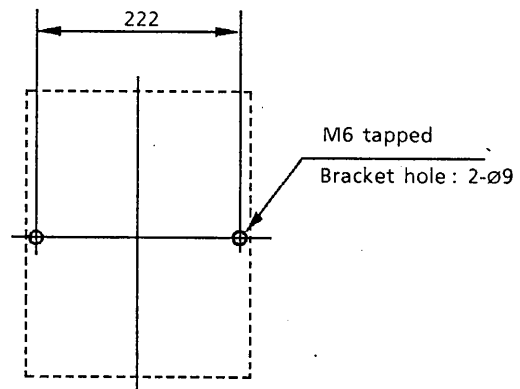
Model	Suffix Code	Option Code	Specifications
AV8E	.....	.....	Manual calibration flow setting unit
No. of flow paths	-4 .....	.....	4 flow paths
	-8 .....	.....	8 flow paths
Piping connections	-J .....	.....	Rc 1/8 (PT 1/8 female)
	-A .....	.....	1/8 NPT female, with adapter
Labeling	-J .....	.....	Japanese
	-E .....	.....	English
Style code	*A .....	.....	Style A

• Dimension Drawings (AV8E Manual Calibration Flow Setting Unit)

Units: mm



Panel Cutout



Wall Mounting Hole

2.5.2 AV8F Automatic Calibration Flow Setting Unit

This device supplies zero gas and span gas to the detectors during calibration at a fixed flow rate, and is used in a system in which calibration is performed automatically.

This device receives contact signals (to open the calibration gas solenoid valve for each detector, and to open the zero gas/span gas switching solenoid valve) from the averaging converter according to the calibration sequence, and operates the appropriate solenoid valves.

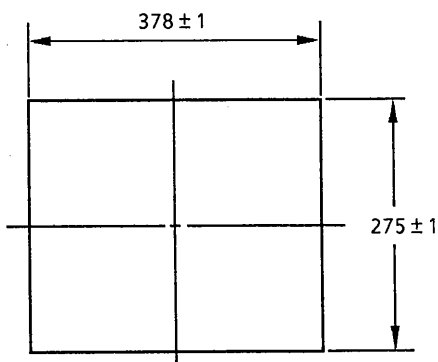
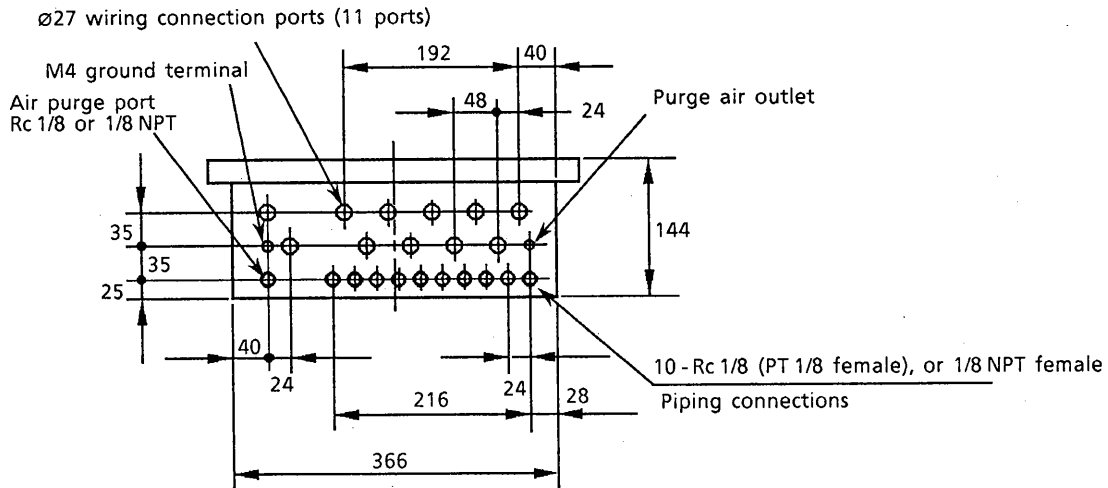
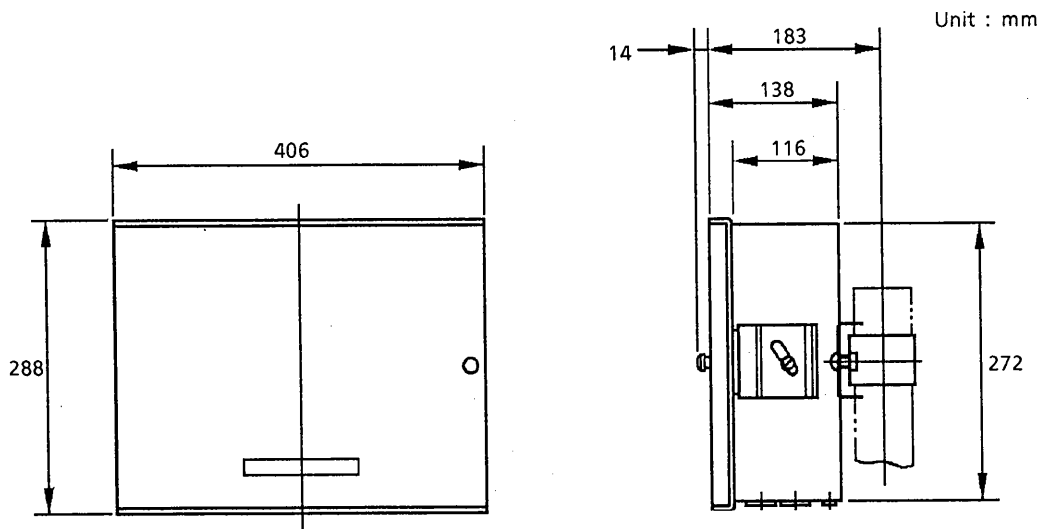
• Standard Specifications

Construction	: Constructed for outdoor installation
Case Material	: SPCC
Paint	: Baked epoxy resin paint
Color	: Door ; Munsell 2.8GY6.4/0.9 equivalent Case ; Munsell 2.0GY3.1/0.5 equivalent
Mounting	: Pipe mounting, wall mounting, panel mounting
Mounting Angle	: Vertical
No. of Flow Paths	: AV8F-4 : 4 flow paths AV8F-8 : 8 flow paths
Piping Connections	: Rc 1/8 (PT 1/8 female), or 1/8 NPT female (with adapter)
Solenoid Valve Power Supply	: 100, 110, or 115 V AC, 50/60Hz
Wiring Ports	: Ø27 (11 ports)
Weight	: Approx. 9.5 kg
Span Gas Air Source	: Pure air at a pressure of 0.5 to 7 kgf/cm ²
Calibration Gas (zero gas, span gas) Consumption :	Approx. 0.7 N l/min per sensor (during calibration only)

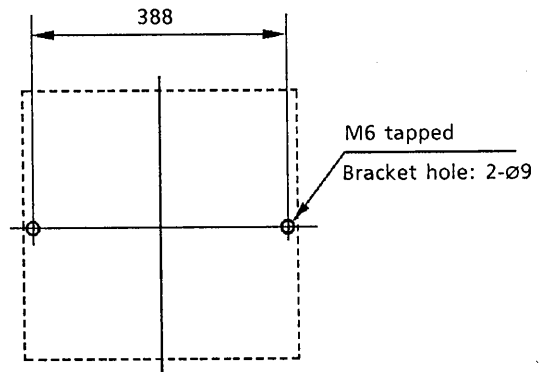
• Model and Suffix Codes

Model	Suffix Code	Option Code	Specifications
AV8F	.....	.....	Automatic calibration flow setting unit
No. of flow paths	-4 .....	.....	Rc 1/4 (PT 1/4 female)
	-8 .....	.....	1/4 NPT female (with adapter)
Power supply	-5 .....	.....	100 V AC, 50/60 Hz
	-7 .....	.....	110 V AC, 50/60 Hz
	-8 .....	.....	115 V AC, 50/60 Hz
Piping connections	-J .....	.....	Rc 1/8 (PT 1/8 female)
	-A .....	.....	1/8 NPT female, with adapter
Labeling	-J .....	.....	Japanese
	-A .....	.....	English
Style code	*B .....	.....	Style B

• Dimension Drawings (AV8F Automatic Calibration Flow Setting Unit)



Panel Cutout



Wall Mounting Holes

2.5.3 AV8H Reference Gas Flow Setting Unit

This device supplies reference gas at a fixed flow rate.

Up to four detectors can be connected to one of these units. If more than four detectors are used, two of these units must be installed.

• Standard Specifications

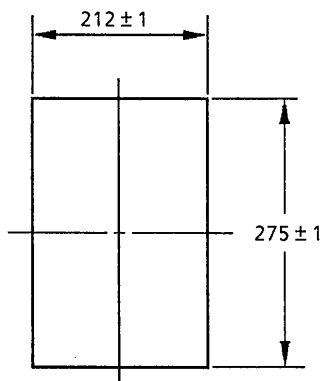
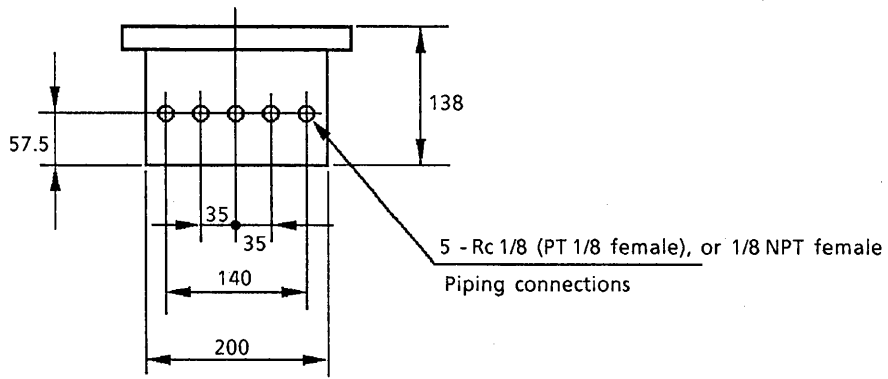
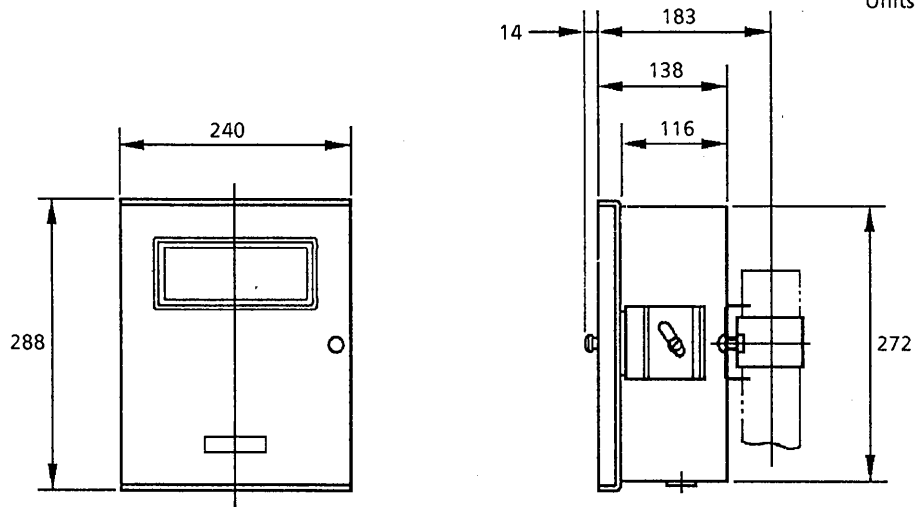
Construction	: Constructed for outdoor installation
Case Material	: SPCC
Paint	: Baked epoxy resin paint
Color	: Door : Munsell 2.8GY6.4/0.9 equivalent Case : Munsell 2.0GY3.1/0.5 equivalent
Mounting	: Pipe mounting, wall mounting, panel mounting
Mounting Angle	: Vertical
No. of Flow Paths	: 4 flow paths (four detectors can be connected)
Piping Connections	: Rc 1/8 (PT 1/8 female), or 1/8 NPT female (with adapter)
Weight	: Approx. 7 kg
Reference Gas Air Source	: Pure air at a pressure of 0.5 to 7 kgf/cm ² (20.9 vol% O ₂)
Flow Setting Unit Inlet Pressure:	0.2 to 0.6 kgf/cm ²
Reference Gas Flow Rate	: Approx. 0.6 N l/min (per detector)

• Model and Suffix Codes

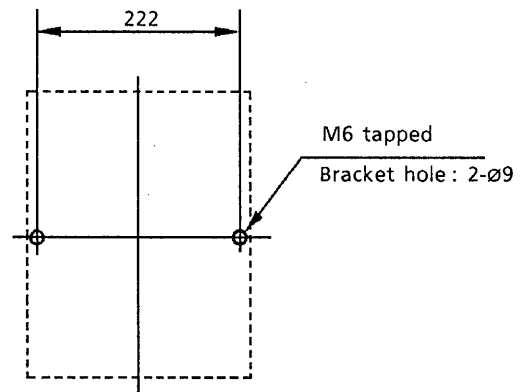
Model	Suffix Code	Option Code	Specifications
AV8H	.....	.....	Reference gas flow setting unit
Piping connections	-J .....	.....	Rc 1/8 (PT 1/8 female)
	-A .....	.....	1/8 NPT female (with adapter)
Labeling	-J .....	.....	Japanese
	-E .....	.....	English
Style code	*A .....	.....	Style A

• Dimension Drawings (AV8H Reference Gas Flow Setting Unit)

Units : mm



Panel Cutout



Wall Mounting Holes

2.6 Other Equipment

2.6.1 Dust Filter for the Detector (Part No.: E7042UQ)

This filter is used to protect the detector sensor from a corrosive dust component or from a high concentration of dust when the oxygen concentration in utility boilers or cement kilns are to be measured.

- **Standard Specifications**

Application : Standard detector
(The gas flow should almost be at a right angle to the probe axis direction.)

Filter Type : Carborundum (SiC), 70 mesh

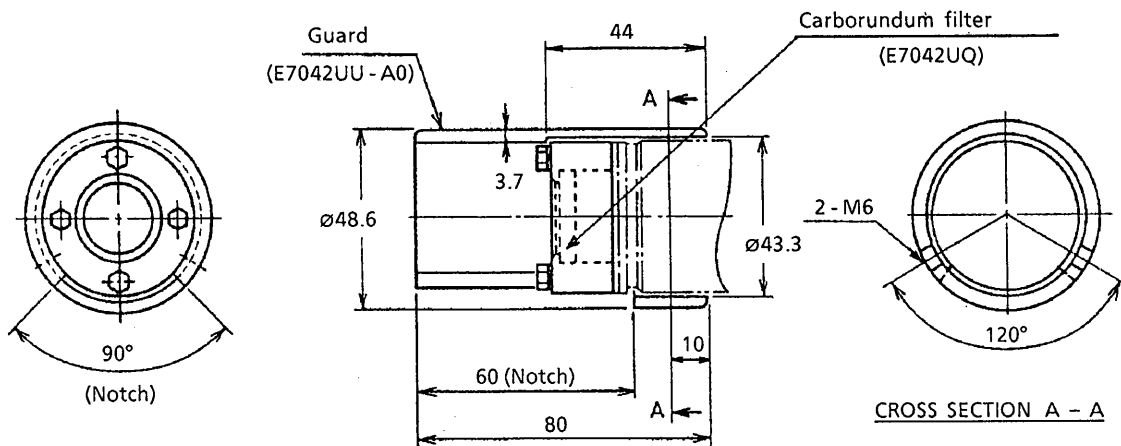
Weight : Approx. 300 g (About 650 g for a model with a guard)

- **Part No.**

Part Name	Part No.	Description
Filter	E7042UQ	The E7042UU-A0 guard should be ordered separately.

- **External Dimensions**

Unit : mm



Note: E7042UU guard should be used only when necessary (see Section 3.1.4).

2.6.2 Auxiliary Ejector for High-Temperature Use (Part No. : E7046EC or E7046EN-A0)

This is used with a high-temperature detector when the gas to be analyzed is under negative pressure. The unit consists of an ejector assembly, pressure gauge and needle valve.

• Standard Specifications

Ejector Assembly	:
Material	: SUS304 (JIS)
Air Supply	: 0.3 to 0.7 kgf/cm ² (at the inlet)
Air Consumption	: 30 to 40 l/min
Suction Gas Flow	: 3 to 7 l/min
Connection to the High-temperature Probe Adapter	: Rc 1/2 (PT 1/2 male screw)
Piping Connection	: Rc 1/4 (PT 1/4) or 1/4 NPT female screw
Connection Tube	: Ø6×Ø4 mm or 1/4 - inch copper or stainless pipe
Pressure Gauge	:
Type	: A1.5 U3/8 × 75 (JIS B7505)
Material in Contact with Gas	: SUS316 (JIS)
Case Material	: Aluminum alloy (Black coat)
Piping Connection	: Rc 1/4 (PT 1/4 male screw) or 1/4 NPT male screw
Scaling	: 0 to 1 kgf/cm ² G
Ambient Temperature	: 40°C at maximum
Needle Valve:	
Piping Connection	: Rc 1/4 (PT 1/4) or 1/4 NPT female screw
Material	: SUS316

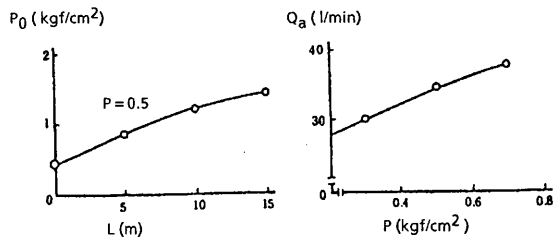
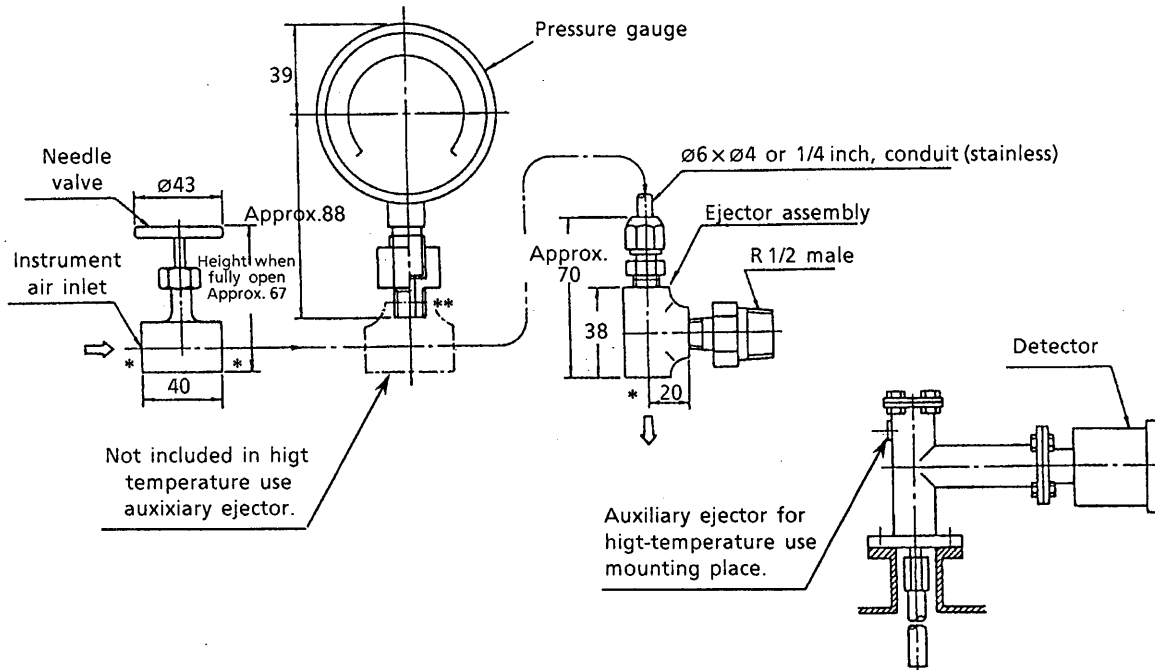
• Part Number

Part No.	Specifications	Construction
E7046EC	Piping connection : Rc 1/4 (PT 1/4 female screw)	Ejector, pressure gauge, and needle valve
E7046EN-A0	Piping connection : 1/4 NPT female screw	

● External Dimensions

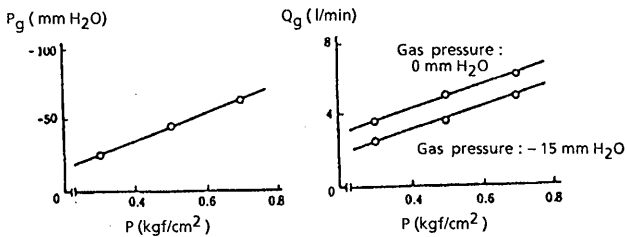
E7046EC : Piping connections, Rc 1/4 female (* part) or R 1/4 male (** part)
 E7046EN - A0 : Piping connections, 1/4 NPT female (* part) or 1/4 NPT male (** part)

Unit : mm



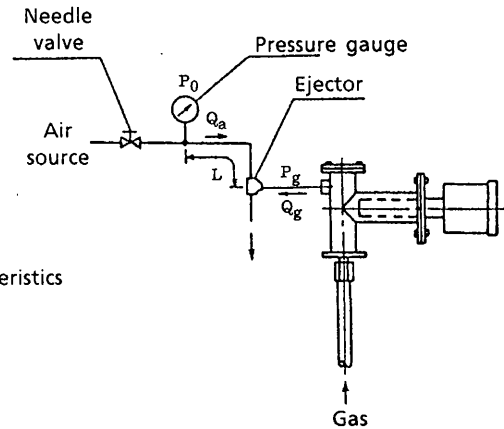
Pressure setting characteristics

Air consumption characteristics



Suction pressure characteristics

Suction flow characteristics



- P₀ (kgf/cm²) : Pressure setting
- P (kgf/cm²) : Drive pressure (at the ejector entrance)
- P_g (mmH₂O) : Suction pressure
- Q_a (l/min) : Air consumption
- Q_g (l/min) : Suction flow
- L (m) : Distance between the ejector and the pressure gauge

2.6.3 Needle (Stop) Valve (Part No. : G7011XH or G7013XH)

This valve is mounted on the calibration gas line in the system to allow for one-touch calibration. This is applied to the system corresponding to "System 1".

- **Standard Specifications**

Material : Brass
 Piping Connection : Rc 1/8 (PT 1/8) or 1/8 NPT female screw
 Weight : Approx. 80 g

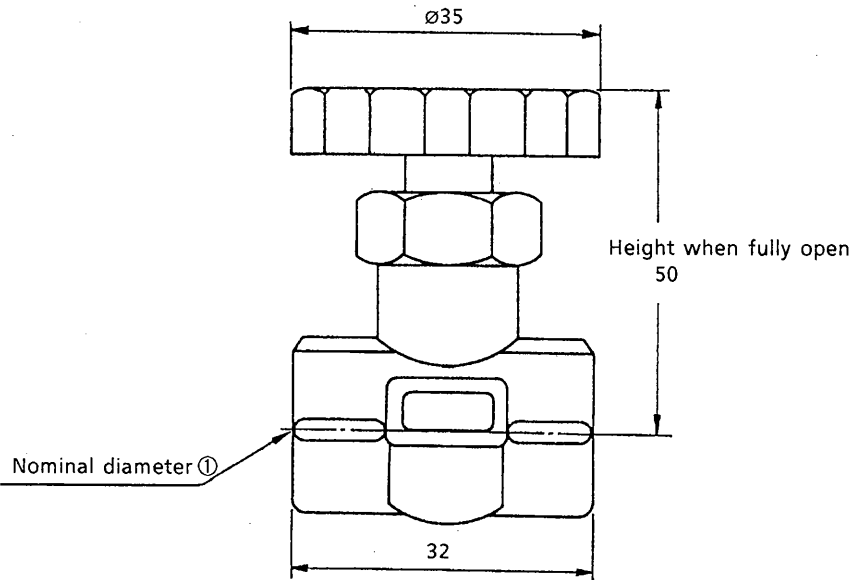
- **Part Number**

Part Name	Part No.	Description
Needle valve	G7011XH	Piping connection : Rc 1/8 (PT 1/8 female screw)
	G7013XH	Piping connection : 1/8 NPT female screw

- **External Dimensions**

G7011XH : Nominal dia. ①, Rc 1/8 (PT 1/8 female screw)
 G7013XH : Nominal dia. ①, 1/8 NPT female screw

Unit : mm



2.6.4 Solenoid Valve (Part No.: E7057G□ or G700□ XP)

This valve is mounted on the calibration gas line in system which use automatic calibration or semi-automatic calibration. Place it adjacent to the detector connector.

• Standard Specifications

Type	: 2-port, normally closed solenoid valve
Compatible Fluids	: Gas (excluding corrosive or flammable gases)
Fluid Temperature	: 5 to 60°C
Rated Power	: Max. 17 VA (when activated)
Weight	: Approx. 400 g

• Part Numbers

Part Name	Part Number	Specifications
Solenoid valve	G7001XP	Power supply: 100 V AC, 50/60Hz, Piping connections: Rc 1/8 (PT 1/8 female)
	G7002XP	Power supply: 110 V AC, 50/60Hz, Piping connections: Rc 1/8 (PT 1/8 female)
	G7003XP	Power supply: 115 V AC, 50/60H, Piping connections: Rc 1/8 (PT 1/8 female)
	E7057GR	Power supply: 100 V AC, 50/60H, Piping connections: 1/8 NPT female (adapter)
	E7057GS	Power supply: 110 V AC, 50/60H, Piping connections: 1/8 NPT female (adapter)
	E7057GT	Power supply: 115 V AC, 50/60H, Piping connections: 1/8 NPT female (adapter)

• External Dimensions

