IN-SITU ZIRCONIA OXYGEN ANALYZER

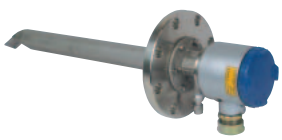
DATA SHEET ZFK8, ZKM, ZTA

This oxygen analyzer is used to continuously measure oxygen concentration in combustible exhaust gas of industrial boilers or furnaces, and is ideally suited for combustion management and control.

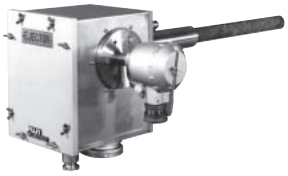
Setting configurations are flow guide tubes which conduct measured gas to the detector inserted directly, detectors which are fitted with flow guide tubes (ZFK8), control detectors, signal processing, displays, external input/output and communication converters (ZKM), detectors and converters are coupled together.

The Detector is composed of unit sensor, easy to maintenance on spot.

The converter is equipped with non-conventional function such as performing the sensor diagnostics and sensor recoverable function, so the detector can be used within long term stability.



General-use detector (ZFK8)



High-temperature detector (ZTA)

<IP66>

<IP67>

Converter (ZKM)

FEATURES

1. Gas sampling device is unnecessary
   For quick response, insert the detector to a flue directly. Gas sampling functions such as a gas aspirator and a dehumidifier are not required.
2. Easy maintenance
   The sensor equipped with the detector, has unit construction, it is easy to replace.
   By separating the detector and the flow guide tube, filter replacement can be easy, and possible to maintain them individually.
3. More reliable than sensor diagnosis, sensor recoverable function
   Depending on the component of the measurement gas, the power of the sensor might be deteriorated. The equipment includes sensor recoverable function by electronic, checking the deterioration of the converter as standard equipment. Because of that, it has high reliability and you can measure within long-lasting stability.
4. Safe and secure
   The equipment detects the break of thermocouples for heater control which equipped on sensor side, also includes the function which stops a power supply to the detector, or also stops a power supply by external contact input to the detector in an emergency and key lock functions as standard equipment. So you can use it at ease.
5. Easy operation
   The operation and setting for the converter can be performed interactively, and are available to select from English, Japanese and Chinese for language display.

SPECIFICATIONS

General Specifications

Measuring object: Oxygen in noncombustible gas

Measuring method:
Directly insert type zirconia system

Measuring range: 0 to 2 ··· setting range at option 2 in 50 vol% O_2
(in 1 vol% O_2 steps)

Repeatability: Within ±0.5%FS

Linearity: Within ±2%FS

Response time: Reply 90% less than 6 sec. (from calibration gas inlet)

Warmup time: More than 10 min

Analog output: 4 to 20mA DC (allowable load resistance less than 500Ω) or 0 to 1V DC (output resistance more than 100Ω)

Power supply: Rated voltage;
100 to 120V AC (operating voltage 90 to 132V AC)
200 to 240V AC (operating voltage 190 to 264V AC)
Rated frequency; 50/60Hz

Power consumption:
Maximum 240VA (Detector: about 200VA, Converter: about 40VA)
Normal 70VA (Detector: about 50VA, Converter: about 20VA)

Detector Specifications (ZFK)

Measured gas temperature:
Flow guide tube system; −20 to +600°C (for general-use, corrosive gas)
Ejector system; −20 to +1500°C (for high-temperature gas)
−20 to +800°C (for general-use)

Measured gas pressure:
−3 to +3kPa (−306 to +306mmH_2O)

Flow guide tube: With or without blow-down nozzle
Flange; JIS5K 65A FF
(JIS5K-80AFF for high particulate gas)
Insertion length; 0.3, 0.5, 0.75, 1m
(0.8m for high particulate gas)

Ejector (general-use):
Probe for guiding measured gas to detector
Flange; JIS10K 65A RF
Insertion length; 0.5, 0.75, 1, 1.5m (according to customer's specification)

Operating temperature:
−20 to +60°C for Primary detecting element
−5 to +100°C for ejector section
125°C or less at detector flange surface with power applied

Storage temperature:
Sensing element: −30 to +70°C
Ejector: −10 to +100°C

Structure: Dust/rain-proof structure(IEC IP55 equivalent)

Filter: Alumina(filtering accuracy 50μm) and quartz paper

Main materials of gas-contacting parts:
Detector; Zirconia, SUS316, platinum
Flow guide tube; SUS304 or SUS316
Ejector (general use); SUS316, SUS304
Ejector; (for high temperature) SiC, SUS316, SUS304

Calibration gas inlet:
ϕ6mm tube join or ϕ1/4-inch tube join (as specified)

Reference air inlet (option):
Rc1/8 or NPT1/8

Detector mounting:
Horizontal plane ±45°, ambient surrounding air should be clean.

Outer dimensions: (L × max. dia.) 210mm × 100mm (detector)

Mass (approx.) {weight}:
Detector; 1.6kg
Ejector; 15kg (insertion length 1m)
Flow guide tube (general-use, 1m); 5kg

Finish color: Silver and SUS metallic color

Ejector air inlet flow rate:
5 to 10 L/min

Calibration gas flow:
1.5 to 2 L/min

Blowdown air inlet pressure:
200 to 300kPa {2 to 3 kgf/cm^2}

Ejector exhaust gas processing:
Within furnace, returned to flue

Heater temperature drop alarm output (ejector):
Alarm output when below 100°C Mechanical thermostat
N.O. (1a) contact, 200V AC, 2A

Converter specification (ZKM)

Concentration value indication:
Digital indication in 4 digits

Contact output signal:
(1) Contact specification; 6 points, 1a 250V AC/3A or 30V DC/3A
(2) Contact function;
- Under maintenance
- Under blowdown Note3)
- Span calibrating gas
- Zero calibration gas
- Instrument anomalies Note1)
- Alarm Note2)

Note1) The following Instrument errors 1) Thermocouples break 2) Sensor break 3) Temperature anomaly 4) Calibration error 5) Zero/span adjustment abnormal 6) Output error turn the contact-ON

Note2) Alarm selects just one as mentioned below 1) High 2) Low 3) Upper and Lower 4) High-high 5) Low-low, it turns ON while operating.

Note3) Under blow down is available in case of option, and it turns on while operating.

Contact input signal:
(1) Contact specification; 3points (the following option)
ON; 0V (10mA or less), OFF; 5V
(2) Contact function;
- External hold
- Calculation reset
- Heater OFF
- Blow down (option)
- Inhibition of calibration
- Calibration start
- Range change

Calibration method:
(a) Manual calibration with key operation
(b) Auto. calibration (option)
Calibration cycle; 00 day 00 hour to 99 days 23 hours
(c) All calibration

Calibration gas:
- Range settings
Zero gas; 0.010 to 25.00% O_2
Span gas: 0.010 to 50.00% O_2
- Recommended calibration gas concentration
Zero gas; 0.25 to 2.0% O_2
Span gas; 20.6 to 21.0% O_2
(oxygen concentration in the air)

Blowdown: (option) A function for blowing out with compressed air dust that has deposited in the flow guide tube. Blowdown can be performed for a predetermined time and at predetermined intervals.
Blowdown cycle; 00 hour 00 minute to 99 hours 59 minutes
Blowdown time; 0 minute 00 second to 0 minutes 999 seconds

Output signal hold:
Output signal is held during calibration, processing recoverable sensor, warm-up, and blowdown. The hold function can also be released.

Transmission function:
RS232C (MODBUS) standard specification
RS485 (MODBUS)

Combustion efficiency display (option):
When you select this display, "rich mode display" will be an simultaneous display. This function calculates and displays combustion efficiency from oxygen concentration and measured gas temper-ature.
Thermocouple (K or R) is required for temperature measurement.

Operating temperature:
–20 to +55°C

Operating humidity:
95% RH or less, non condensing

Storage temperature:
–30 to +70°C

Storage humidity: 95% RH or less, non condensing

Construction: Dust-proof, rainproof construction (corresponding to IP66 or IP67 of IEC)

Material: Aluminume case

Outer dimensions (H x W x D):
170 X 159 X 70mm (IP66)
220 X 230 X 95mm (IP67)

Mass {weight}: IP66: Approx. 2kg (excluding cable and detector)
IP67: Approx. 4.5kg (excluding cable and detector)

Finish color: IP66: Case: Silver
Cover: Pantone Cool Gray 1C-F
IP67: Munsell 6PB 3.5/10.5 (blue)
Cover: Silver (case)

Mounting method: Mounted flush on panel or on pipe

Electrical Safety:

Overvoltage category ; II power supply input ; I relay interfaces (IEC1010-1)

External overcurrent protective device ; 10A

Equipment interfaces are safety separated (SELV)

The product conforms to the requirements of the Electromagnetic compatibility Directive 89/336/EEC as detailed within the technical construction file number TZ734575. The applicable standards used to demonstrate compliance are :

EN 55011 : 1992 CLASSA Conducted and Radiated emissions

EN 50082-1 : 1992 Radiated immunity, ESD and FBT

CODE SYMBOLS

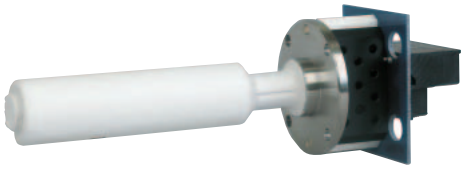
(Detector)

ZFK 8 R [ ] 5 - [ ][ ][ ][ ][ ] - [ ][ ]

Position	Code	Description
6	1	Cal. gas inlet: For ϕ6mm tube (SUS)
	2	Cal. gas inlet: For ϕ1/4 inch tube (SUS)
7	1	Power supply: 100 to 120VAC 50/60Hz
	3	Power supply: 200 to 240VAC 50/60Hz
9 10	0Y0	Flow guide tube: None
	5A3	SUS304, general use, 300mm
	5A5	SUS304, general use, 500mm
	5A7	SUS304, general use, 750mm
	5A1	SUS304, general use, 1000mm
	5B3	SUS316, for corrosive gas, 300mm
	5B5	SUS316, for corrosive gas, 500mm
	5B7	SUS316, for corrosive gas, 750mm
	5B1	SUS316, for corrosive gas, 1000mm
	5C3	SUS316, with blow-down nozzle, 300mm
	5C5	SUS316, with blow-down nozzle, 500mm
	5C7	SUS316, with blow-down nozzle, 750mm
	5C1	SUS316, with blow-down nozzle, 1000mm
	6D3	SUS316, for high particulate, 300mm
	6D5	SUS316, for high particulate, 500mm
	6D7	SUS316, for high particulate, 750mm
	6D1	SUS316, for high particulate, 1000mm
	6E3	SUS316, for high particulate with cover, 300mm
	6E5	SUS316, for high particulate with cover, 500mm
	6E7	SUS316, for high particulate with cover, 750mm
	6E1	SUS316, for high particulate with cover, 1000mm
	ZZZ	Others
11	Y	Protection cover: Without
	A	With
12	Y	Reference air inlet: Non
	A	Rc1/8
	B	NPT1/8
13	1	Filter spec.: Standard
	2	For high particulate
	3	Standard (integral type)
14 15	J	Instruction manual language: Japanese
	E	English
	C	Chinese

(Replacement Detector element)

Power supply	Code symbols
100 to 120V AC	ZFK8YY15-0Y0YY-0Y
200 to 240V AC	ZFK8YY35-0Y0YY-0Y



(Converter)

1 2 3 4 5 6 7 8	9 10	Description
Z K M		
		Construction
1		IP66
2		IP67
		Output signal
B		4 to 20mA DC
E		0 to 1V DC
Z		Other
		Transmission output function
1		RS-232C
2		RS-485
		Mounting bracket
Y		None
1		Mounting on panel surface
2		Pipe mounting
		Optional Functions
	Y	None
	1	Combustion efficiency display function Note4)
	2	Blowdown
	3	Auto calibration
	4	Combustion efficiency indication + Blowdown
	5	Combustion efficiency indication + Auto calibration
	6	Blowdown + Auto calibration
	7	Combustion efficiency indication + Blowdown + Auto calibration
		Display language
	J	Japanese
	E	English
	C	Chinese

Note4) When you select this display, rich mode will be a simultaneous display.

(Exclusive-special cable)

1 2 3 4 5 6 7 8	9	Description	
Z R Z K R			
		Connectable devices	
K		For ZKM	
		Types	
R		For R thermocouple	
		Conduit length	**Cable length**
YA		None	6m
YB		None	10m
YC		None	15m
YD		None	20m
YE		None	30m
YF		None	40m
YG		None	50m
YH		None	60m
YJ		None	70m
YK		None	80m
YL		None	90m
YM		None	100m
AA		6m	6m
BB		10m	10m
CC		15m Note5	15m
DD		20m	20m
		Cable end treatment	
	0	None	
	1	One side (detector side)	
	2	Both sides	

Note5) For connection between detector and converter, the conduit to be used should be rainproof flexible type.

(Ejector)

1 2 3 4 5 6 7 8	Description
Z T A 1 1	
	Measured gas temperature
1	For high temperatures (+1500°C max.)
2	General-use (+800°C max.)
	Insertion length [mm]
B	500
C	750
D	1000
E	1500
	Power supply
1	100V/115V AC 50/60Hz
3	200V/220V AC 50/60Hz
5	230VAC 50/60Hz

SCOPE OF DELIVERY

Detector: Detector main unit × 1, Viton O ring × 2, mounting screw (M5mm × 16) × 6, thermal sticker × 1, flow guide tube (as specified) × 1, ceramic filter × 1, rain-proof cover (as specified) × 1, Instruction manual × 1

Converter: Converter main unit × 1, mounting bracket set, (as specified) × 1
Accessories (AC250V 500mA T fuse × 2, AC250V 3.15A T fuse × 2),
Instruction manual × 1

Ejector: Ejector main unit × 1, insertion tube × 1, M16mm nut, and washer × 4, packing × 1

Items to be prepared separately:

(1) Standard gas for calibration
Type ZBM□NSH4-01 (up to 5% O_2 range)
Type ZBM□NSJ4-01 (over 5% O_2 range)

(2) Reduction valve for standard gas (type ZBD61003)

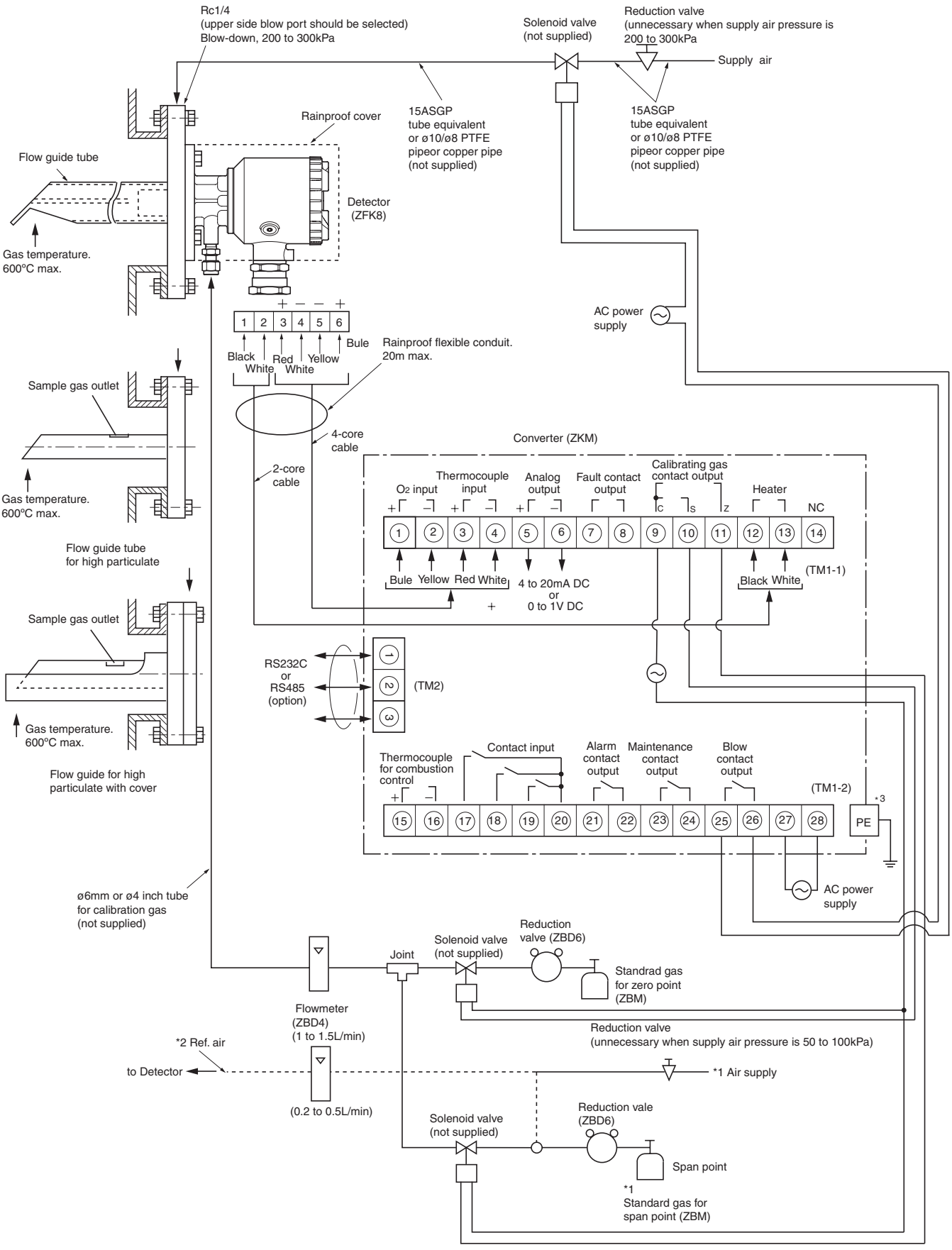
(3) Flowmeter
Type; ZBD42203, 0.2 to 2L/min (for calibrating gas)
Type; ZBD42403, 1 to 10L/min (for ejector)

CAUTIONS

- If combustible gas (CO, H_2 etc.) exists in the measured gas, error will occur due to burning at the sensor section. The inclusion of corrosive gas (Si vapor, alkaline metal, P, Pb etc.) will shorten the life of the sensor.
- When the measured gas temperature is high (+300°C or higher), the flange should be separated from the furnace wall in order to bring the detector flange surface temperature below the specified value +125°C). The flow guide should be attached in the direction in which the gas flow to the detector decreases.
- When much dust is included in the gas, the flow guide tube should be attached at an inclination so that the flow goes from below to above. And the flow guide should be attached in the direction in which the gas flow to the detector decreases.
- In the case of a refuse incinerator, automatic blow down of the flow guide should not be performed (to prevent corrosion of the flow guide tube due to drainage). Blow-down should be performed manually when change in the indication has become very little with the furnace stopped.

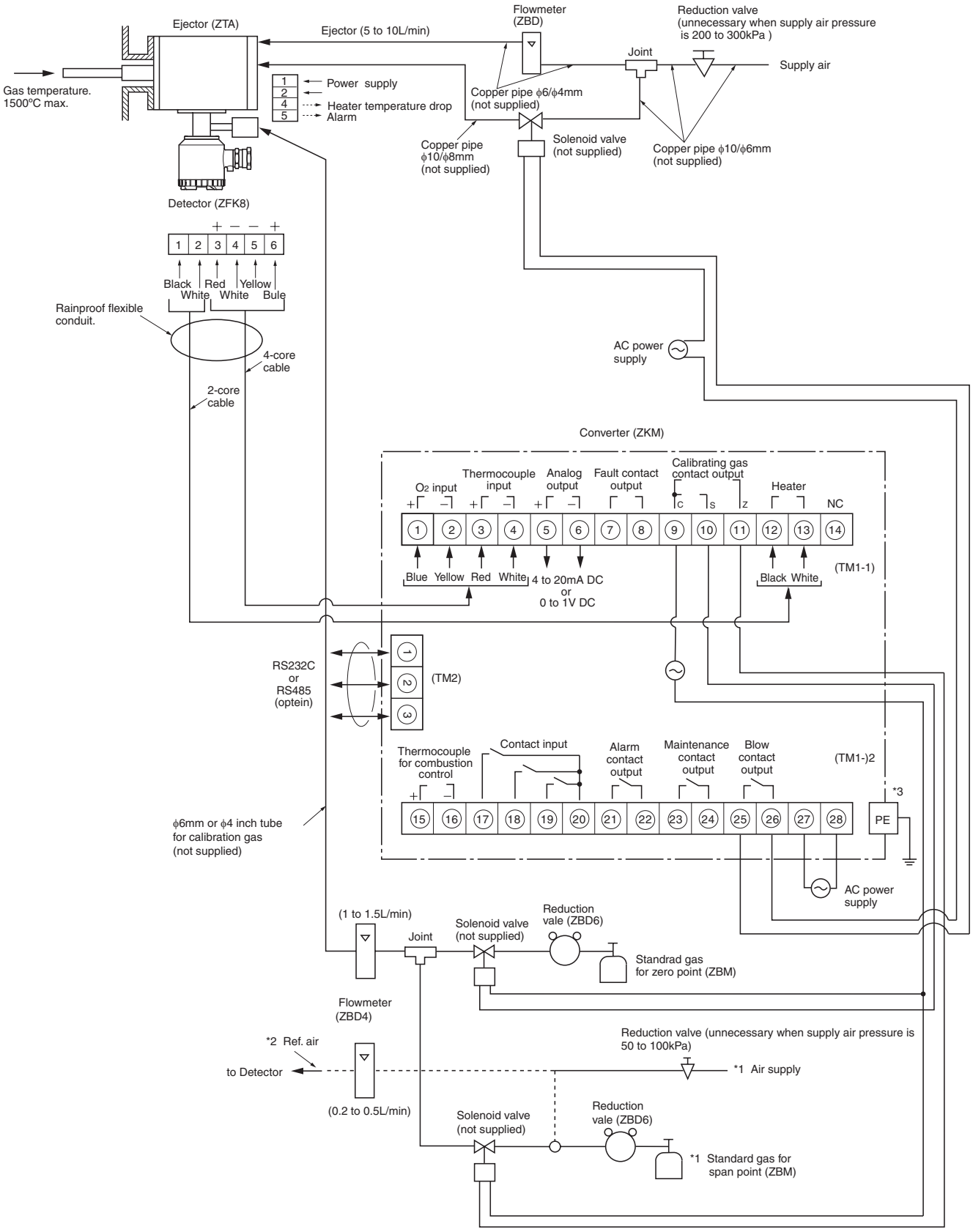
CONFIGURATION

Flow guide tube system



Note: *1 Standard gas or instrumentation air can be used in place of span gas.
*2 Instrument quality air or bottled air is available as reference air instead of ambient air.
*3 Protective earth.

Ejector system



Note: *1 Standard gas or instrumentation air can be used in place of span gas.
*2 Instrument quality air or bottled air is available as reference air instead of ambient air.
*3 Protective earth.

DEVICE CONFIGURATION

The device to be combined differ according to the conditions of the gas to be measured. Select the devices to be combined with reference to the following table.

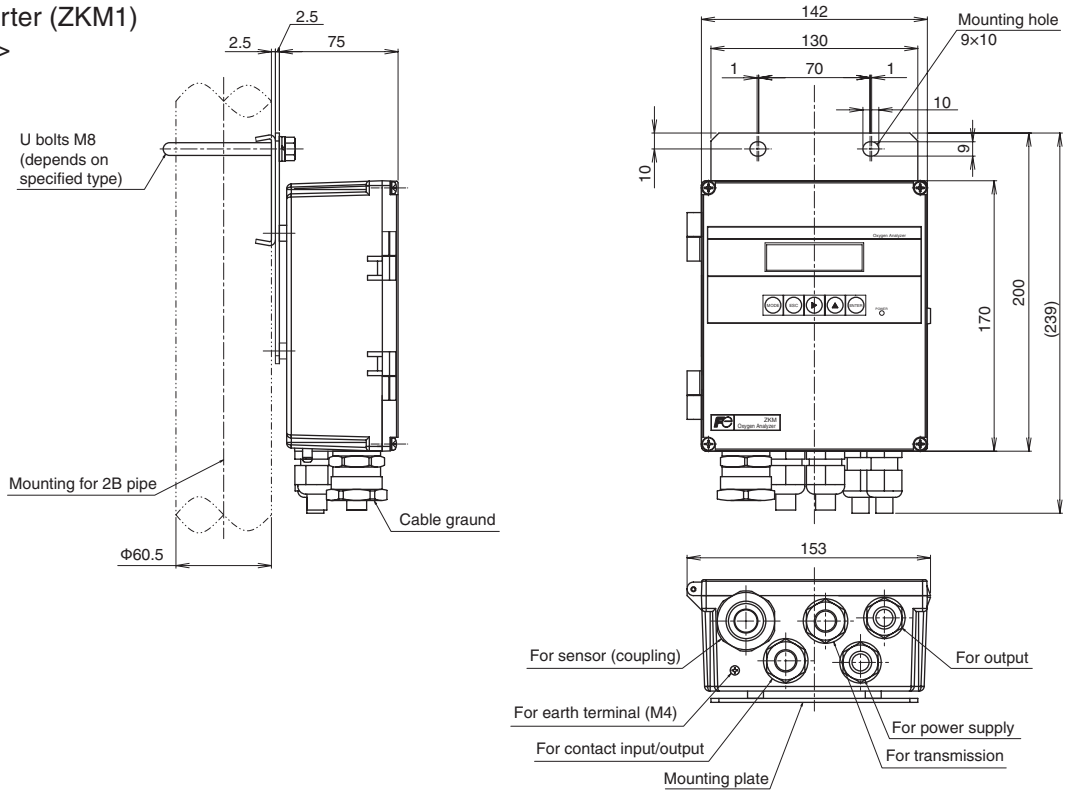
Measured gas						Device configuration		
Application	Temperature	Gas Flow	DUST	Protection cover	Note	Detector type	Converter type	Ejector type
General-use (boiler)	600°C or less	5 to 20m/s	Less than 0.2g/mm^3	—	Fuel; gas, oil	ZFK8R□□5-□A5□□-1□	ZKM	—
			Less than 10g/Nm^3	—	Fuel: coal with blow down	ZFK8R□□5-□C5□□-1□	ZKM	—
For corrosive gas (refuse incinerator)	600°C or less	5 to 20m/s	Less than 1g/Nm^3	—	Included low moisture	ZFK8R□□5-□B5□□-2□	ZKM	—
			Less than 10g/Nm^3	—	Included low moisture with blow down	ZFK8R□□5-□C5□□-2□	ZKM	—
			Less than 25g/Nm^3	no	Included low moisture with blow down	ZFK8R□□5-□D6□□-2□	ZKM	—
			Less than 25g/Nm^3	yes	Included high moisture with blow down	ZFK8R□□5-□E6□□-2□	ZKM	—
General-use (boiler)	800°C or less	Less than 1m/s	Less than 1g/Nm^3	—	SUS316 tube with blow down	ZFK8R□□5-0Y0□□-1□	ZKM	ZTA1
	1590°C or less	Less than 1m/s	Less than 1g/Nm^3	—	SIC tube with blow down	ZFK8R□□5-0Y0□□-1□	ZKM	ZTA2

Note (1) Dust volume is approximate value.

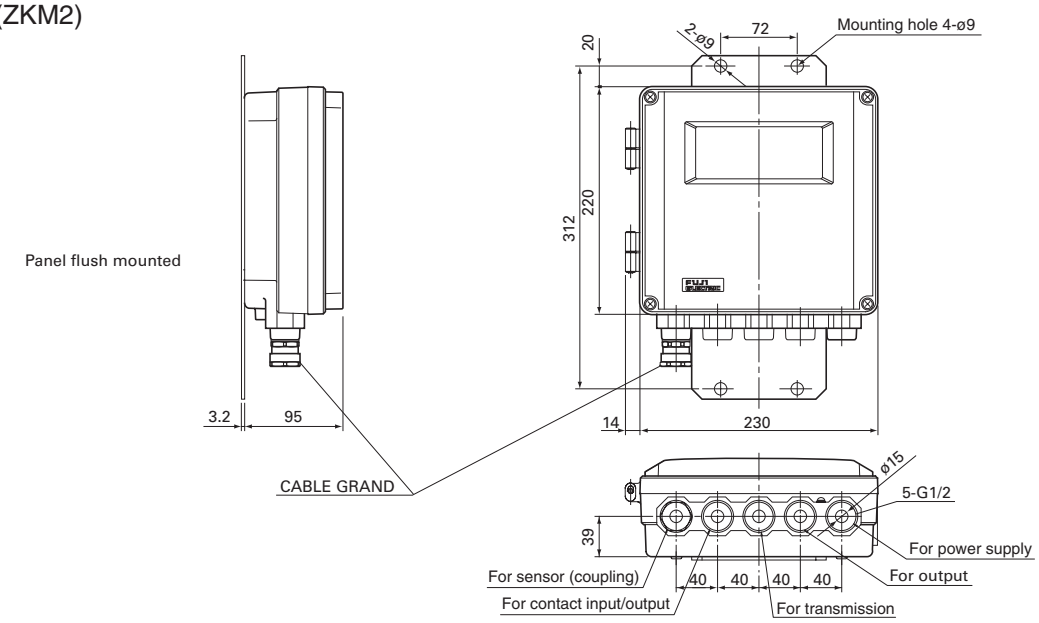
(2) Instrument quality air or bottled air is available as reference air by selecting detector with reference air inlet.

OUTLINE DIAGRAM (Unit:mm)

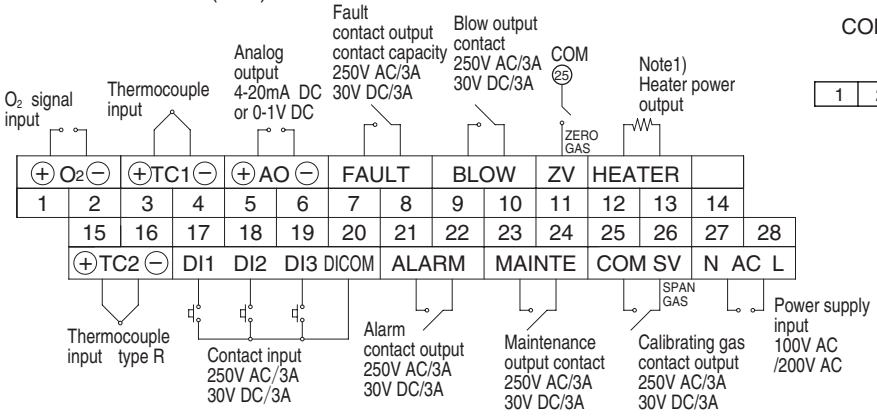
Converter (ZKM1)
<IP66>



Converter (ZKM2)
<IP67>



EXTERNAL TERMINAL (TM1)



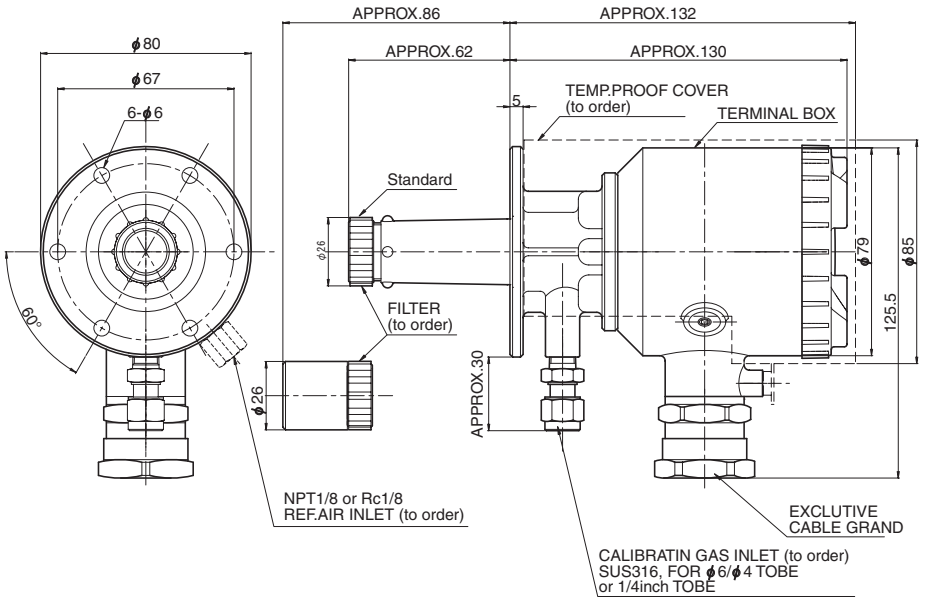
COMMUNICATION TERMINAL (TM2)

1	2	3

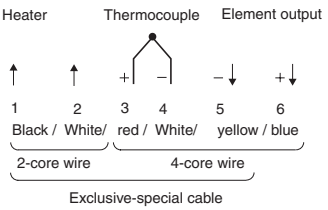
	Terminal number			Remarks
	1	2	3	
RS232C	TXD	RXD	GND	standard
RS485	TRX+	TRX−	GND	option

Note1) Heater power may depend on ZFK power supply.

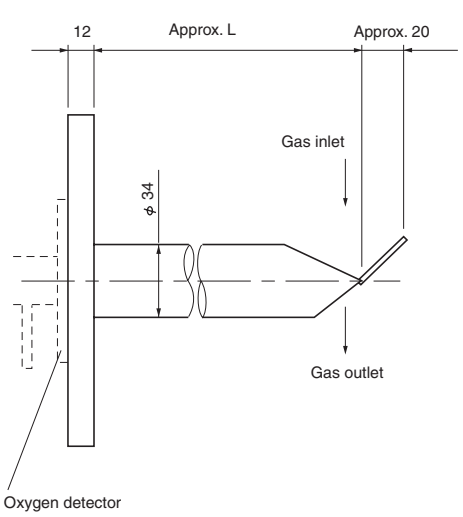
Detector (ZFK8)

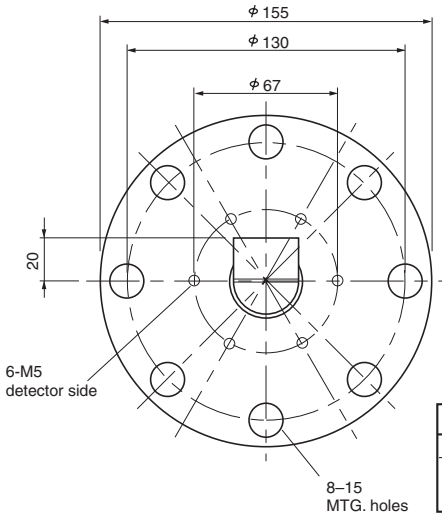


EXTERNAL CONNECTION DIAGRAM



Flow guide tube

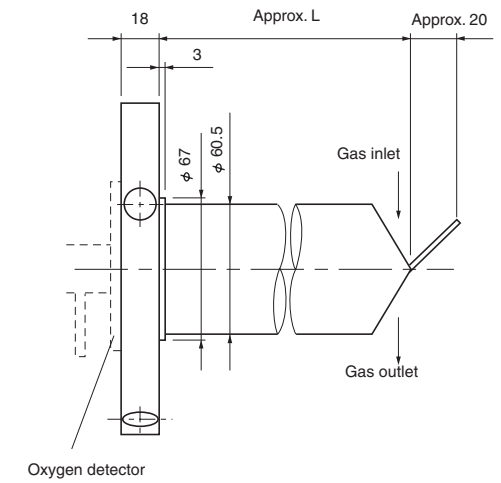


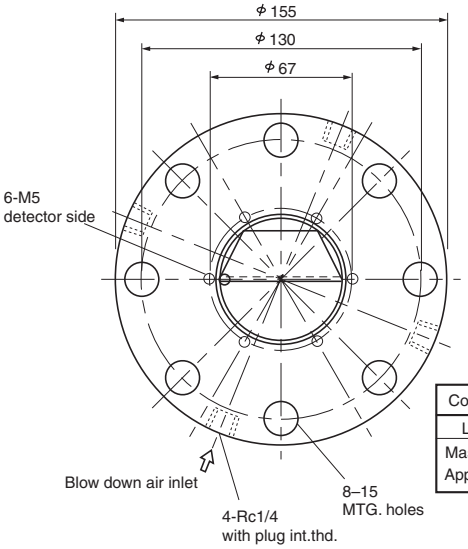


Z F K 8 R□□5 - 5 A [3/5/7/1] □

Cord 11th	3	5	7	1	Z
L (m)	0.3	0.5	0.75	1.0	L= (to order)
MASS Approx.(kg)	2.7	3.3	4.1	4.8	

Flow guide tube (with blow-down nozzle)

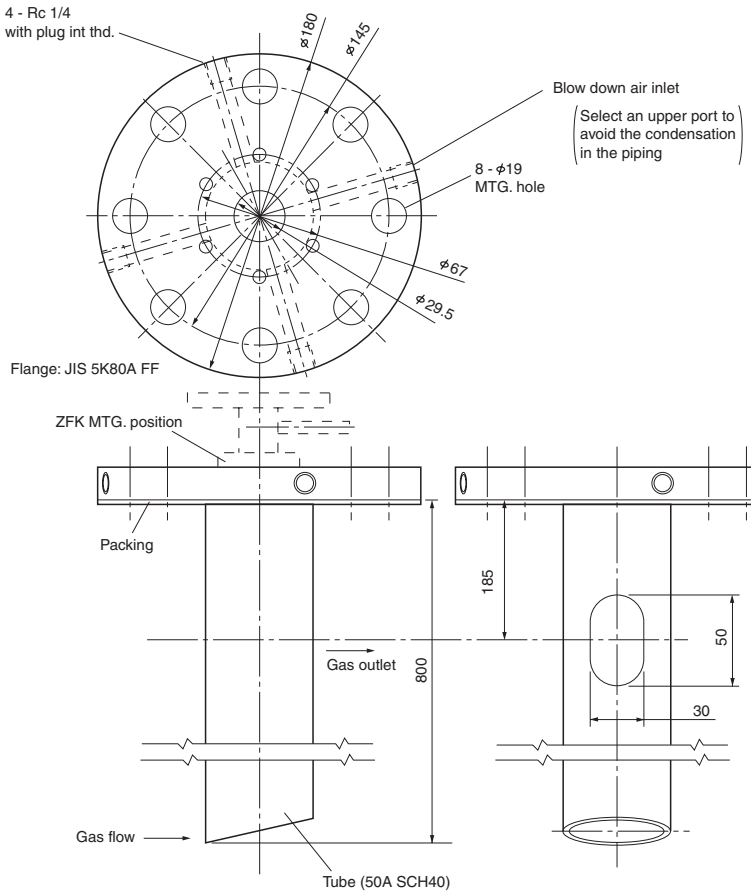




Z F K 8 R□□5 - 5 C [3/5/7/1] □

Cord 11th	3	5	7	1	Z
L (m)	0.3	0.5	0.75	1.0	L= (to order)
Mass Approx.(kg)	3.0	3.8	4.8	5.7	

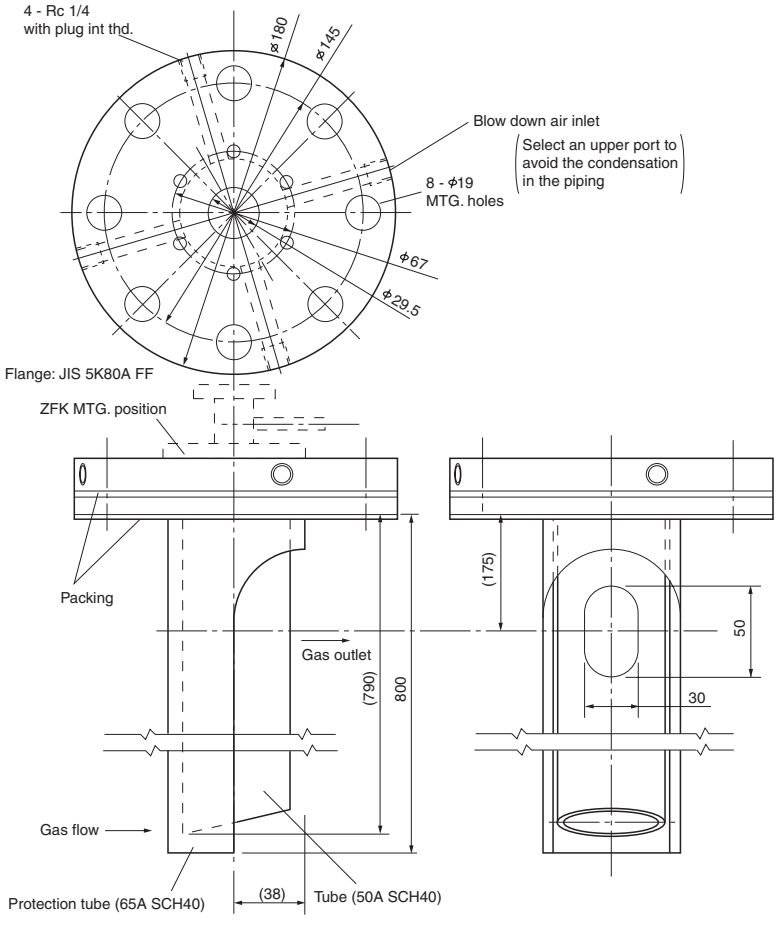
Flow guide tube (for high particulate)



Z F K 8 R□□5 - 6 D 3 □
5
7
1

Cord 11th	3	5	7	1	Z
L (m)	0.3	0.5	0.75	1.0	L= (to order)
Mass Approx.(kg)	4.5	5.6	7.0	8.3	

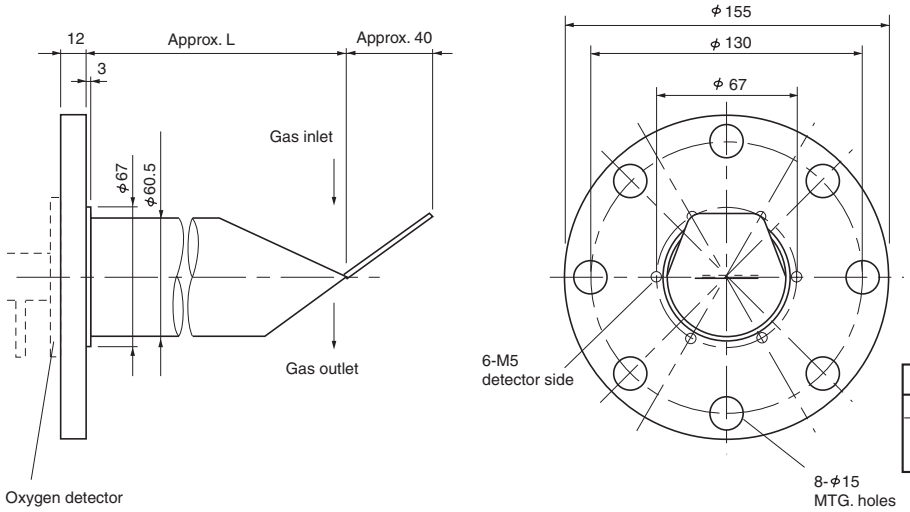
Flow guide tube (for high particulate with cover)



Z F K 8 R□□5 - 6 E 3 □
5
7
1

Cord 11th	3	5	7	1	Z
L (m)	0.3	0.5	0.75	1.0	L= (to order)
Mass Approx.(kg)	7.1	9.0	11.4	13.6	

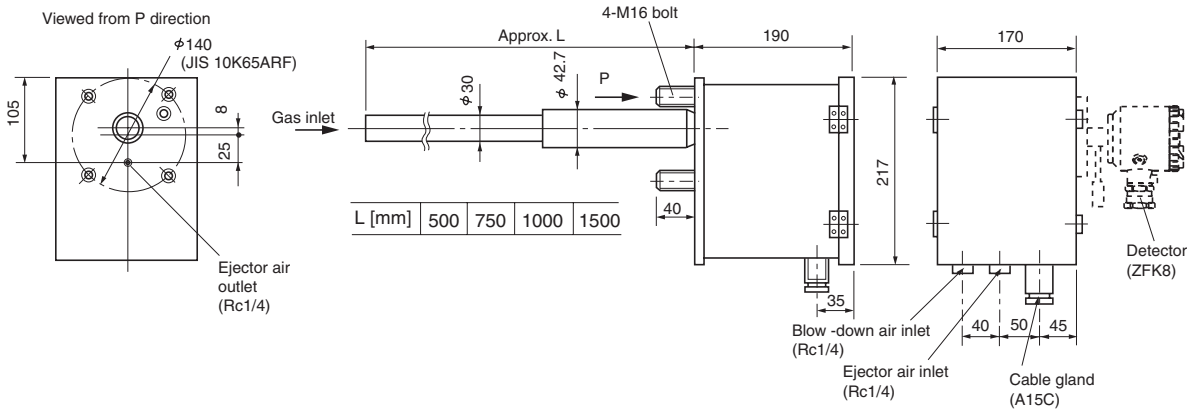
Flow guide tube



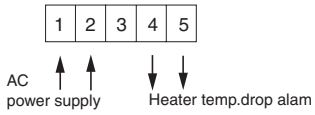
Z F K 8 R□□5 - 5 B 3 □
5
7
1

Cord 11th	3	5	7	1	Z
L (m)	0.3	0.5	0.75	1.0	L= (to order)
MASS Approx.(kg)	3.3	4.5	6.1	7.6	

Ejector (ZTA)



EXTERNAL CONNECTION DAIAGRAM



⚠ Caution on Safety

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

Fuji Electric Systems Co., Ltd.

Sales Div. III, International Sales Group
Global Business Group

Gate City Ohsaki, East Tower, 11-2, Osaki 1-chome,
Shinagawa-ku, Tokyo 141-0032, Japan
http://www.fesys.co.jp/eng

Phone: 81-3-5435-7280, 7281 Fax: 81-3-5435-7425
http://www.fic-net.jp/eng

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