Fuji Electric

IN-SITU ZIRCONIA OXYGEN ANALYZER

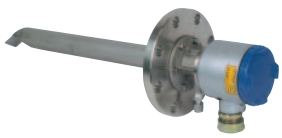
DATA SHEET

ZFK8, ZKM, ZTA

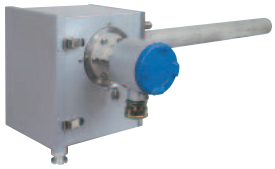
This oxygen analyzer is used to continuously measure oxygen concentration in combustion exhaust gas of industrial boilers or furnaces, and is ideally suited for combustion management and control.

The analyzer system is comprised of the detector and converter coupled together as a complete system. Detector setting configuration includes the detector flow guide tube and detector sensor. The flow guide tube is inserted directly into the gas and directs gas to the sensor for measurement. The converter (ZKM) is comprised of the signal processor, input/output and communications, display and system controls.

The converter is equipped with advanced functionality such as performing the sensor diagnostics and sensor recovery function, so the detector can be used within long term stability.



General-use detector (ZFK8)



High-temperature detector (ZTA)

<IP66> Converter (ZKM1)

<IP67> Converter (ZKM2)

FEATURES

1. Gas sampling device is unnecessary
   For quick response, insert the detector directly into the flue 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 is easy.
3. More reliable than sensor diagnosis, sensor recoverable function
   Depending on the concentration of the measurement gas, the power of the sensor might deteriorate. The equipment includes sensor recovery function electronically, checking the deterioration status of the sensor depletion.
   Therefore, it has high reliability and long-lasting stability.
4. Safe and secure
   System detects thermocouple break for heater control on the sensor side. Safety functions of isolating power supply to the detector or isolating power via external contact input are also.
5. Easy operation
   The operation and setting for the converter can be performed interactively, and available as English, Japanese or 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: Within 4 to 7 sec, for 90% (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: approx. 200VA, Converter: approx. 40VA)
Typical 70VA (Detector: approx. 50VA, Converter: approx. 20VA)

Detector Specifications (ZFK)

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

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:
–10 to +60ºC for Primary detecting element
–5 to +100ºC for ejector section
125ºC or less at detector flange surface with power applied

Storage temperature:
Sensing element: –20 to +70ºC
Ejector: –10 to +100ºC

Structure: Dust/rain-proof structure(IEC IP66 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, ϕ1/4-inch tube join, or ball valbe (as specified)

Reference air inlet (option):
ϕ6mm tube join or ϕ1/4-inch tube join (as specified)

Detector mounting:
Horizontal plane ±45º, 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:
Into furnace, returned to flue

Heater temperature drop alarm output (ejector):
Alarm output when below 100 ºC 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 calibration gas valve
- Zero calibration gas valve
- Instrument anomalies Note1)
- Alarm Note2)

Note1) The following Instrument errors (1) Thermocouples break (2) Sensor break (3) Temperature fault (4) Calibration fault (5) Zero/span adjustment fault (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:
- Available 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, processing diagnosis of sensor, warm-up, PID auto tuning, under set up maintenance mode "available" and blowdown. The hold function can also be released.

Valve and Flow meter (option):
Selects zero or span gas during manual zero or span calibration. Mounted on the side of the converter.

Communication function:
RS232C (MODBUS) standard specification
RS485 (MODBUS) (option)

Combustion efficiency display (option):
When you select this display, "rich mode display" will be simultaneously displayed. This function calculates and displays combustion efficiency from oxygen concentration and measured gas temperature.
Thermocouple (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: Aluminum case

Outer dimensions (H x W x D):
170 X 159 X 70mm (IP66, Bench type)
220 X 230 X 95mm (IP67)
182 X 163.5 X 70.6mm (Bench type)

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)

EC Directive Compliance

The product conforms to the requirements of the Low Volt-age Directive 2006/95/EC and EMC directive 89/336/EEC (as amended by Directive 92/31/EEC), both as amended by Direc-tive 93/68/EEC.
It conforms to following standards for product safety and electromagnetic compatibility:

EN61010-1 : 2010, EN62311: 2008
Safety requirements for electrical equipment for measurement, control and laboratory ese.
"Installation Category II"
"Pollution Degree 2"
"Altitude up to 2187 yard (2,000 m)"
EN61326-1 : 2006, EN61326-2-3: 2006
EN61000-3-2 : 2006, A1: 2009, A2: 2009
EN61000-3-3 : 2008
Electrical equipment for measurment, control and laboratory use. EMS requirements.

CE

ZFK, ZKM

CODE SYMBOLS

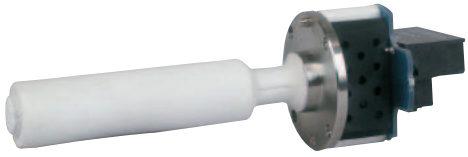
(Detector)

ZFK 8 R _ _ 5 - _ _ _ _ _ - 1 _ _

	Description		
	Cal. gas inlet		
1	For ϕ6mm tube (SUS)		
2	For ϕ1/4 inch tube (SUS)		
3	Ball valve		
	Power supply		
1	100 to 120VAC 50/60Hz		
3	200 to 240VAC 50/60Hz CE		
	Flow guide tube		
	flange	application	length
0 Y 0		None	
5 A 3	SUS304	general use	300mm
5 A 5	SUS304	general use	500mm
5 A 7	SUS304	general use	750mm
5 A 1	SUS304	general use	1000mm
5 B 3	SUS316	for corrosive gas	300mm
5 B 5	SUS316	for corrosive gas	500mm
5 B 7	SUS316	for corrosive gas	750mm
5 B 1	SUS316	for corrosive gas	1000mm
5 C 3	SUS316	with blow-down nozzle	300mm
5 C 5	SUS316	with blow-down nozzle	500mm
5 C 7	SUS316	with blow-down nozzle	750mm
5 C 1	SUS316	with blow-down nozzle	1000mm
6 D 3	SUS316	for high particulate	300mm
6 D 5	SUS316	for high particulate	500mm
6 D 7	SUS316	for high particulate	750mm
6 D 1	SUS316	for high particulate	1000mm
6 E 3	SUS316	for high particulate with cover	300mm
6 E 5	SUS316	for high particulate with cover	500mm
6 E 7	SUS316	for high particulate with cover	750mm
6 E 1	SUS316	for high particulate with cover	1000mm
Z Z Z		Others	
	Protection cover		
Y	Without		
A	With		
	Reference air inlet		
Y	Non		
A	For ϕ6mm tube (SUS)		
B	For ϕ1/4 inch tube (SUS)		
	Filter spec.		
1	Standard		
	Instruction manual language		
J	Japanese		
E	English		
C	Chinese		
	Specification name plate		
1	Standard (100 to 120V AC 50/60Hz)		
2	Standard (200 to 240V AC 50/60Hz)		

(Replacement Detector element)

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



(Converter)

Z K M _ _ _ 1 - _ _ _ 1

	Description
	Construction
1	IP66
2	IP67
3	Bench type
	Output signal
B	4 to 20mA DC
E	0 to 1V DC
Z	Other
	Communication function
1	RS-232C
2	RS-485
	Mounting bracket
Y	None (Specify "None" when the bench type is selected)
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 Note4)
5	Combustion efficiency indication + Auto calibration Note4)
6	Blowdown + Auto calibration
7	Combustion efficiency indication + Blowdown + Auto calibration Note4)
	Display language
J	Japanese
E	English
C	Chinese
	Option
Y	None (Specify "None" when the bench type or the auto calibration is selected)
1	With valve
2	With valve + flowmeter

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

(Exclusive-special cable)

Z R Z K R _ _ 1 - _ _

	Description	
	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 (Note5)	6m
BB	10m (Note5)	10m
CC	15m (Note5)	15m
DD	20m (Note5)	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	
			1					Measured gas temperature For high temperatures (+1500°C max.)
			2					General-use (+800°C max.)
					B			Insertion length [mm] 500
					C			750
					D			1000
					E			1500
							1	Power supply 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 × 1, 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 2.5A 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 tube 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.

DEVICE CONFIGURATION

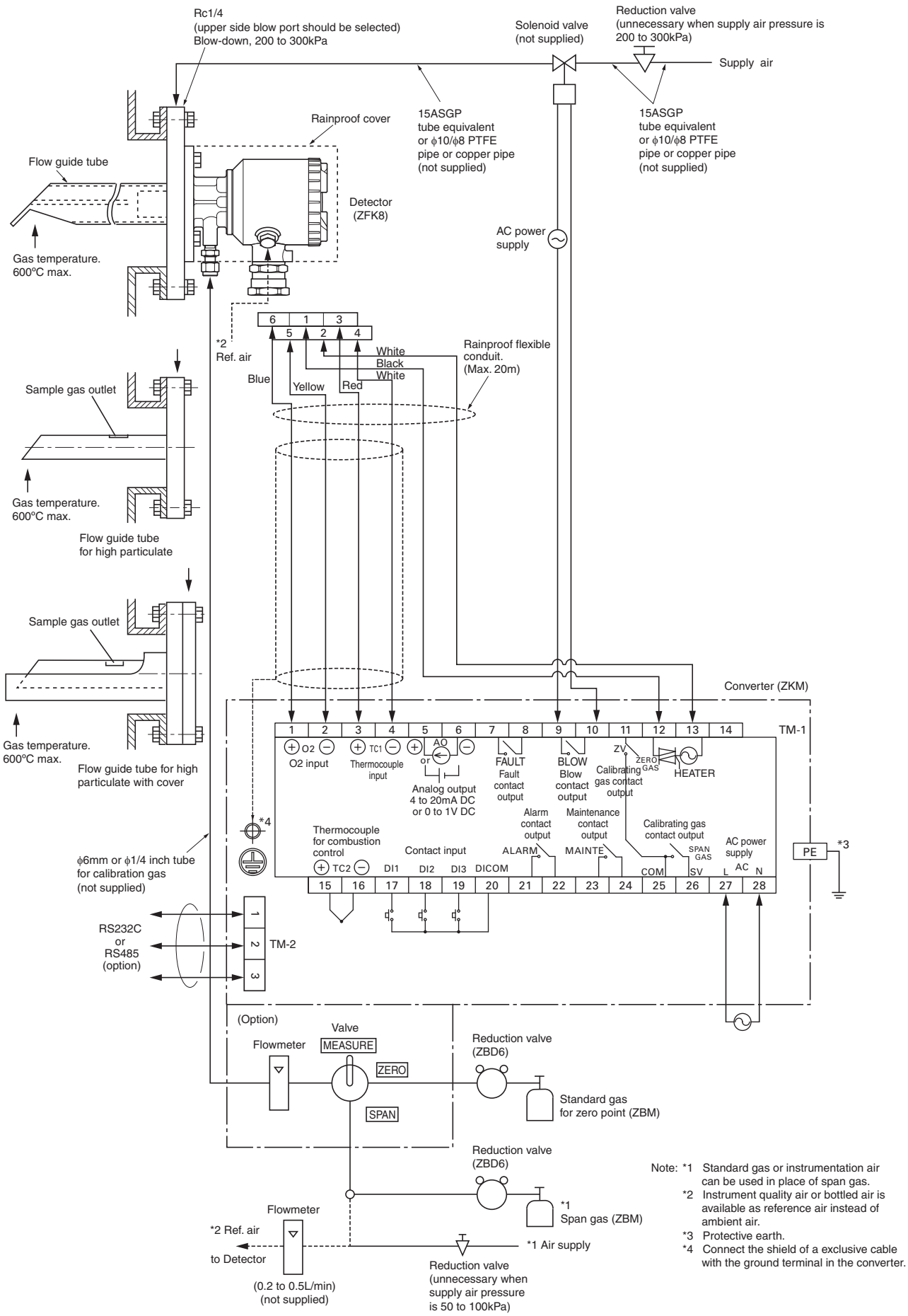
The device to be combined differ according to the conditions of the gas to be measured. Select the devices to be combined with reference to the following table.

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/Nm^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	ZTA2
	1500°C or less	Less than 1m/s	Less than 1g/Nm^3	—	SIC tube with blow down	ZFK8R□□5-0Y0□□-1□	ZKM	ZTA1

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.

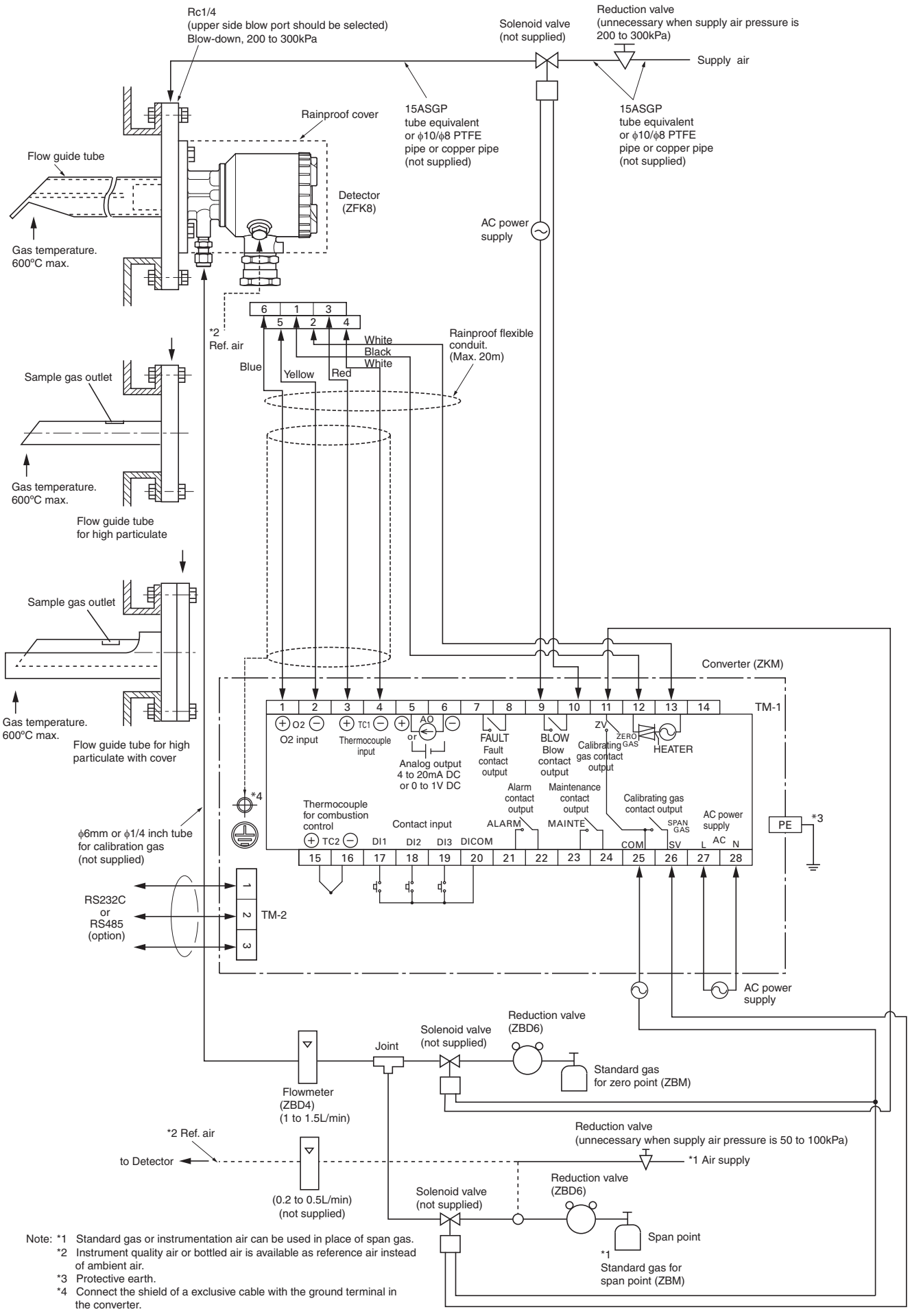
CONFIGURATION

Flow guide tube system (with valve)



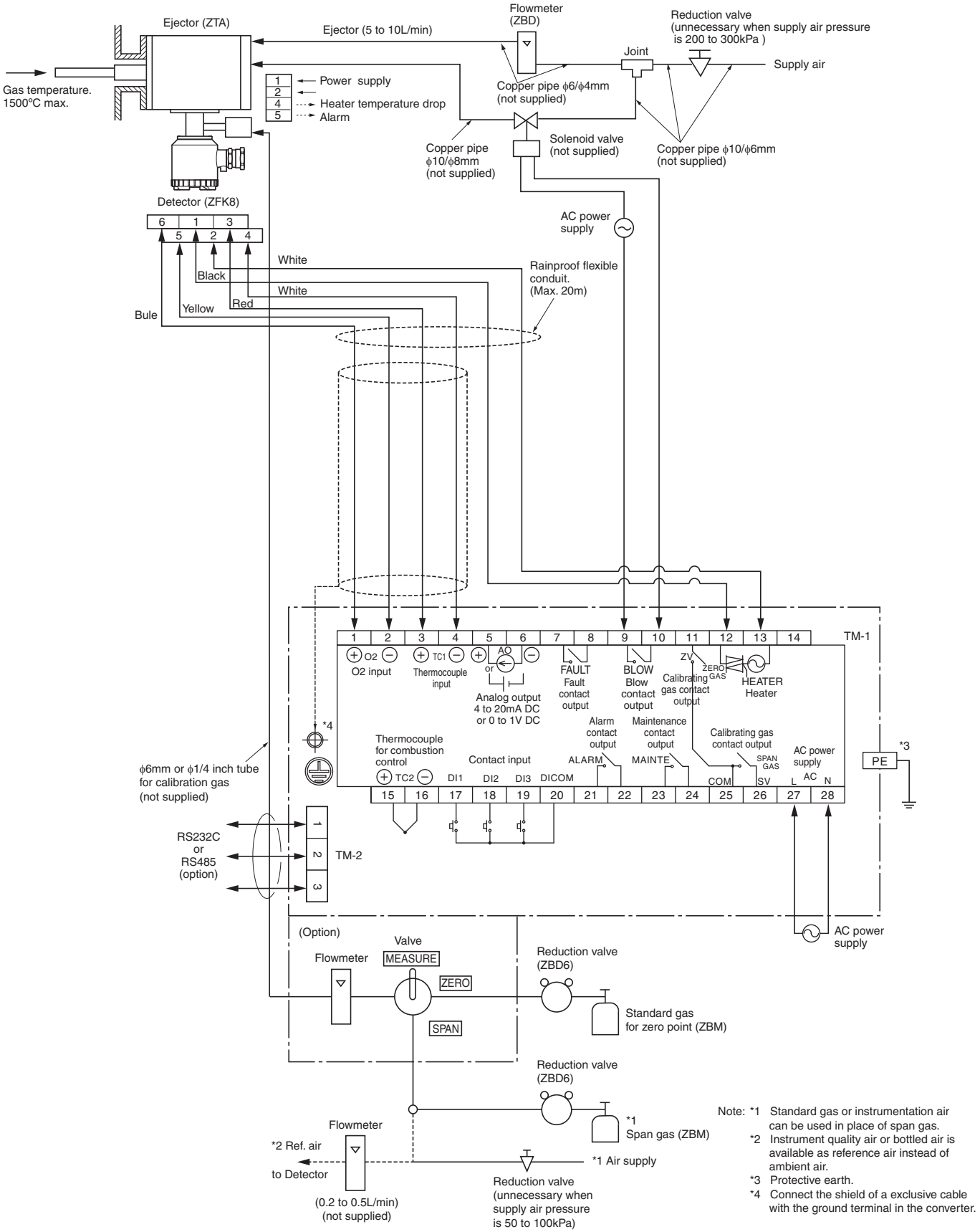
Note: *1 Standard gas or instrumentation air can be used in place of span gas.
*2 Instrument quality air or bottled air is available as reference air instead of ambient air.
*3 Protective earth.
*4 Connect the shield of a exclusive cable with the ground terminal in the converter.

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.
*4 Connect the shield of a exclusive cable with the ground terminal in the converter.

Ejector system (with valve)



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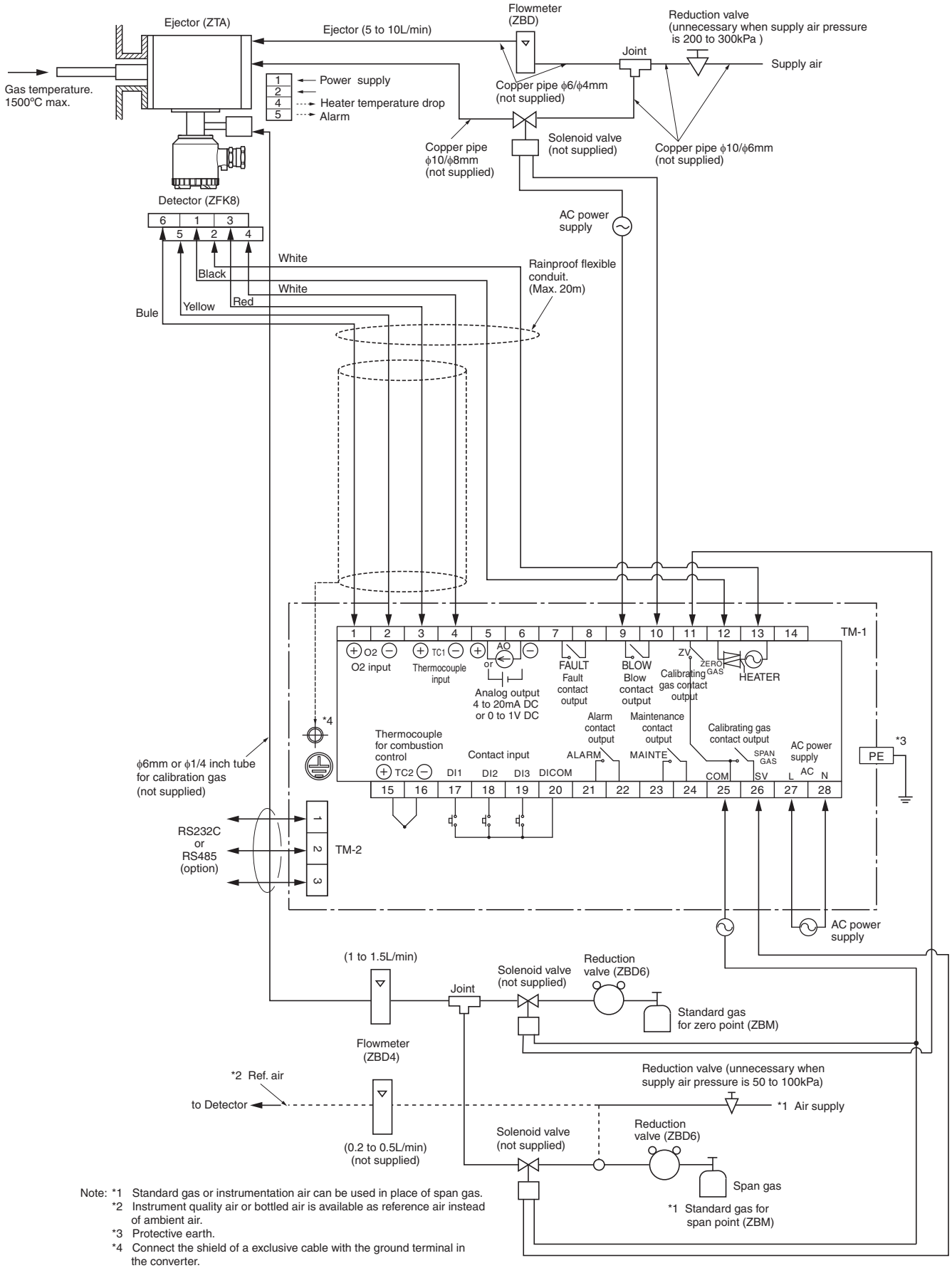
*3 Protective earth.
*4 Connect the shield of a exclusive cable with the ground terminal in the converter.

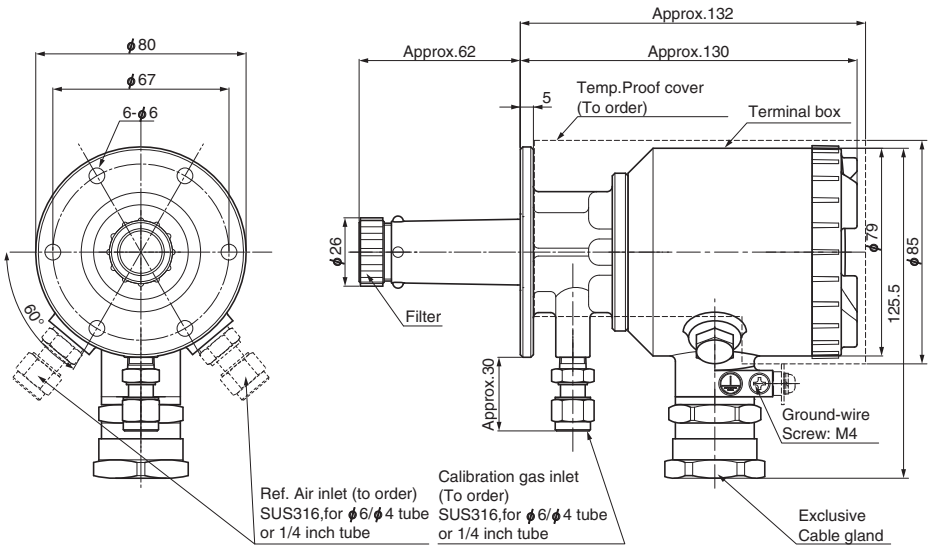
Ejector system



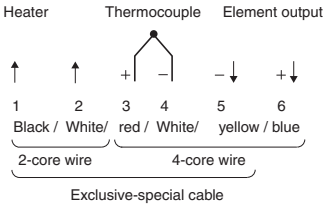
Note: *1 Standard gas or instrumentation air can be used in place of span gas.
*2 Instrument quality air or bottled air is available as reference air instead of ambient air.
*3 Protective earth.
*4 Connect the shield of a exclusive cable with the ground terminal in the converter.

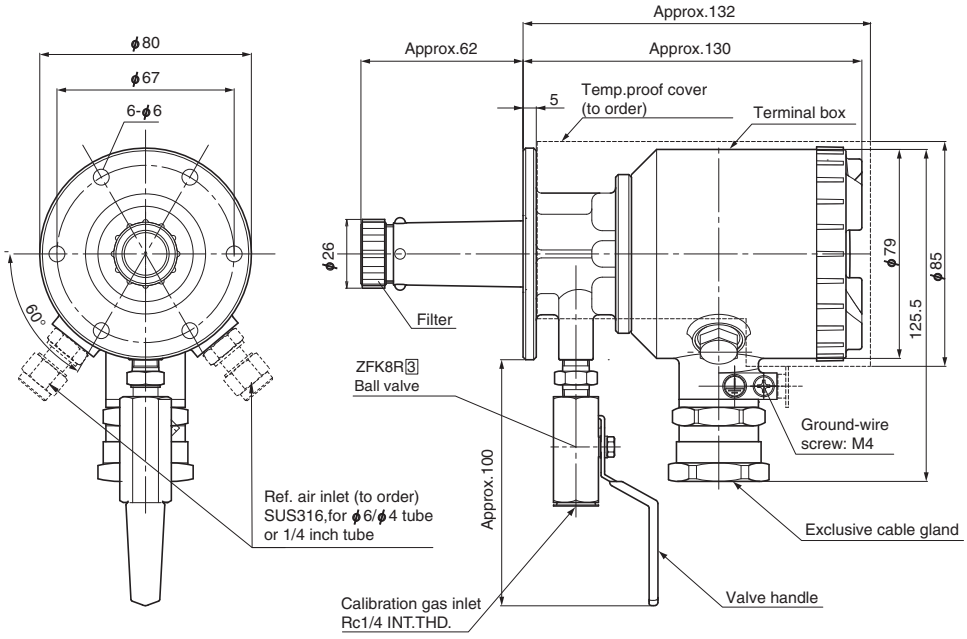
OUTLINE DIAGRAM (Unit:mm)

Detector (ZFK8)

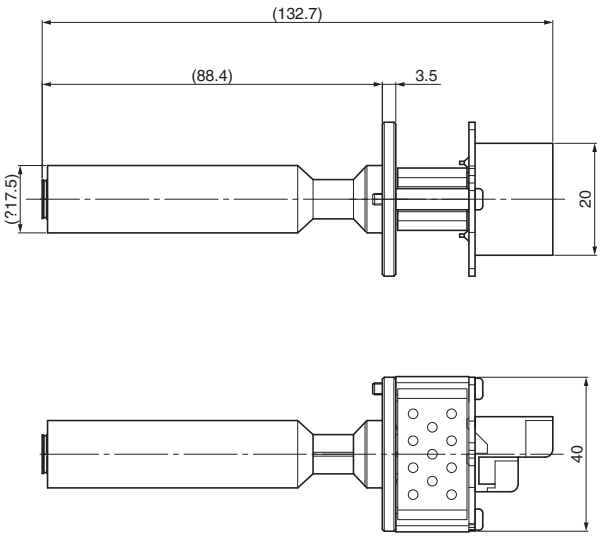


EXTERNAL CONNECTION DIAGRAM

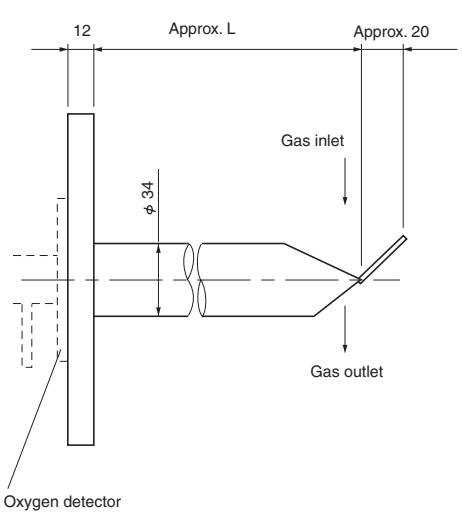


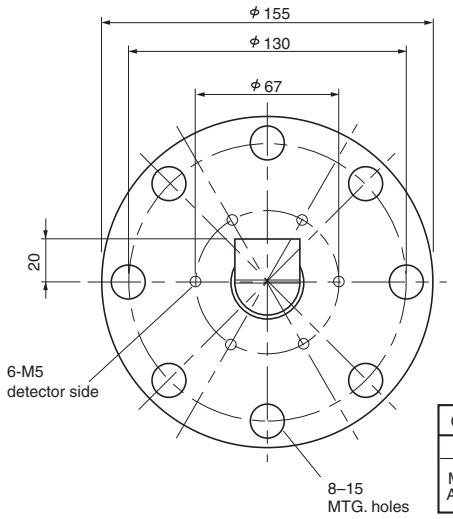


Sensor unit (ZFK8YY)



Flow guide tube

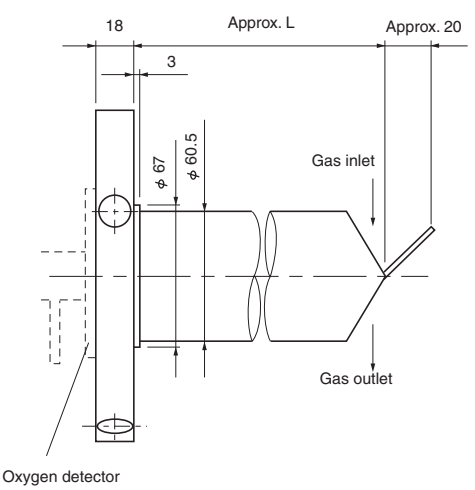


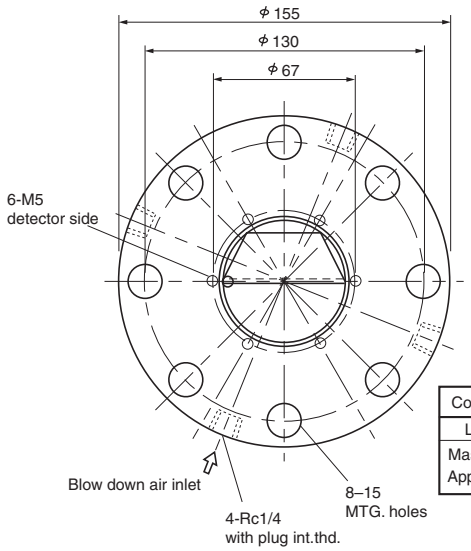


Z F K 8 R □ □ 5 - 5 A [3/5/7/1] □

Code 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)

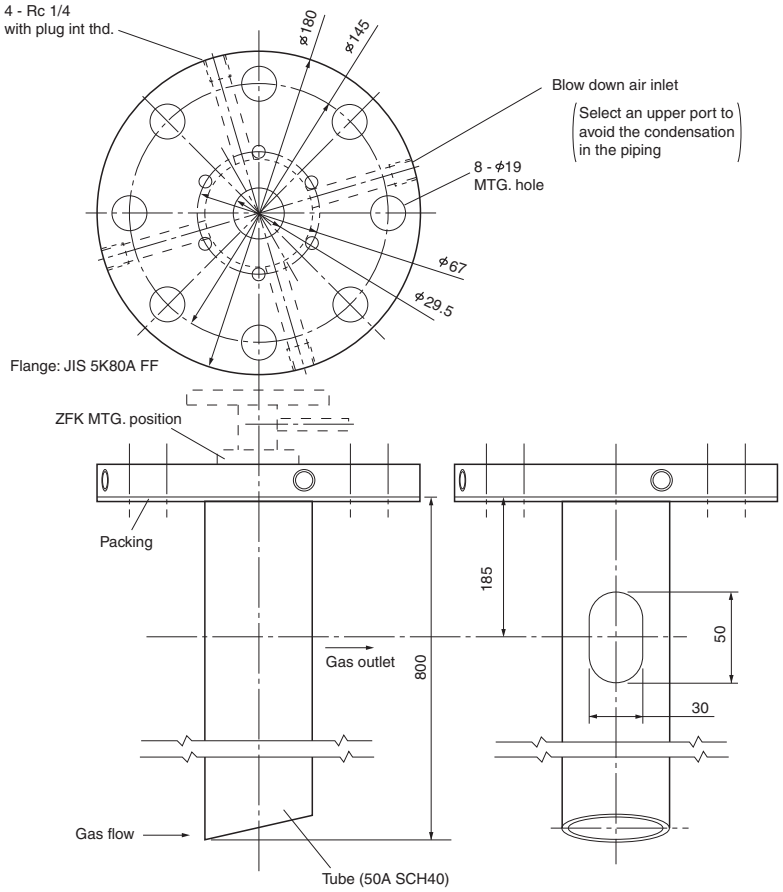




Z F K 8 R □ □ 5 - 5 C [3/5/7/1] □

Code 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	

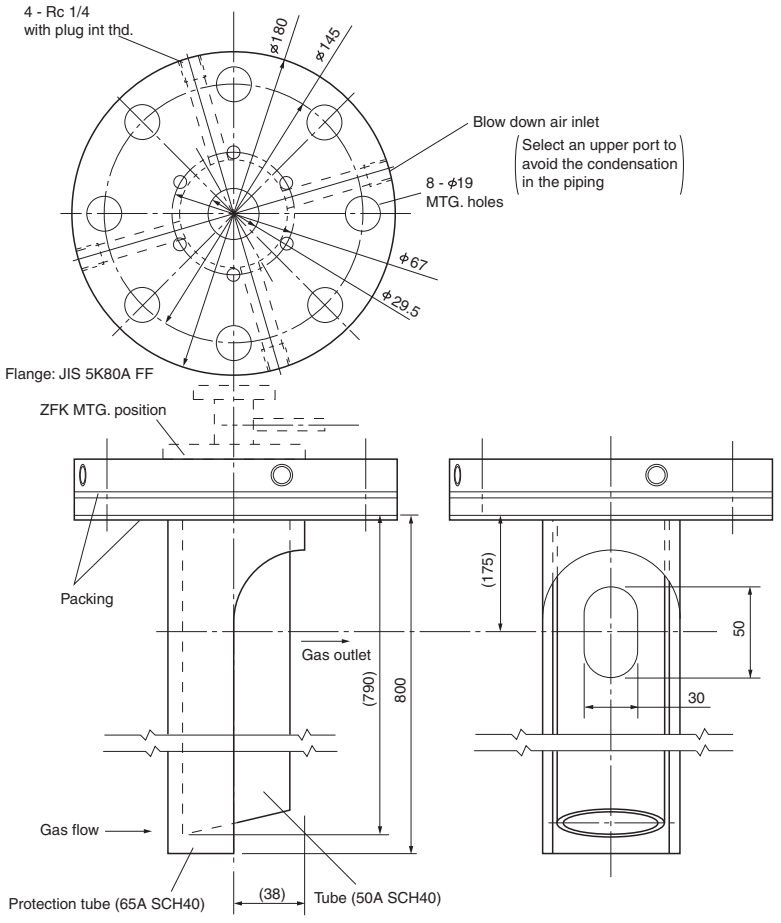
Flow guide tube (for high particulate)



Z F K 8 R□□5 - 6 D 3 5 7 1 □

Code 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	

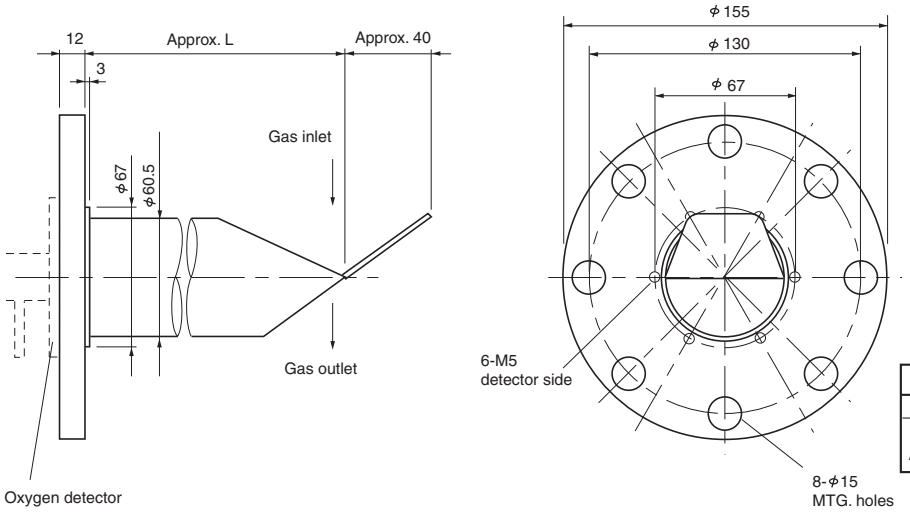
Flow guide tube (for high particulate with cover)



Z F K 8 R□□5 - 6 E 3 5 7 1 □

Code 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	

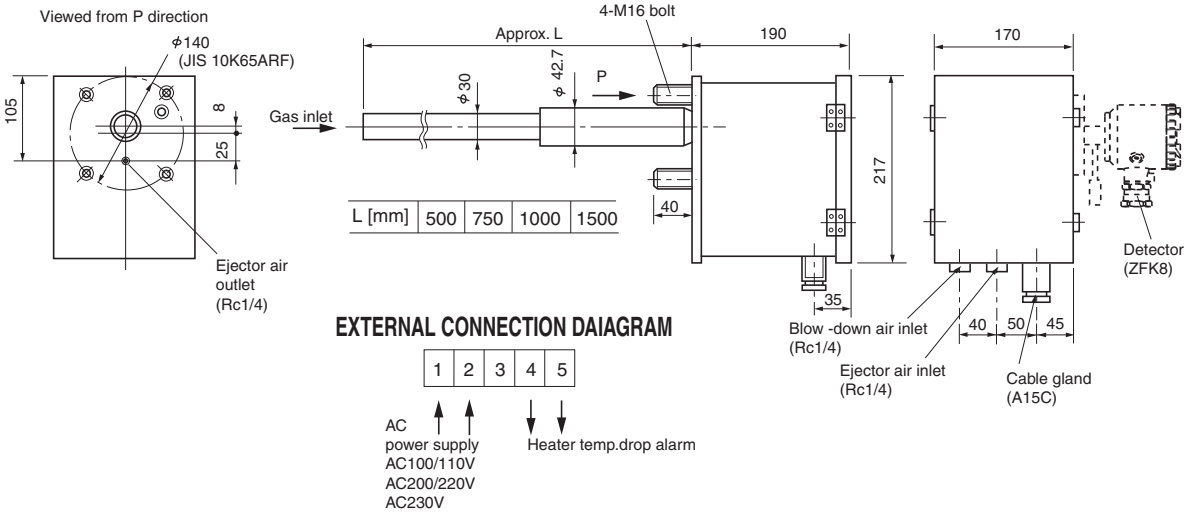
Flow guide tube (for corrosive gas)



Z F K 8 R□□5 - 5 B 3 □
5
7
1

Code 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)



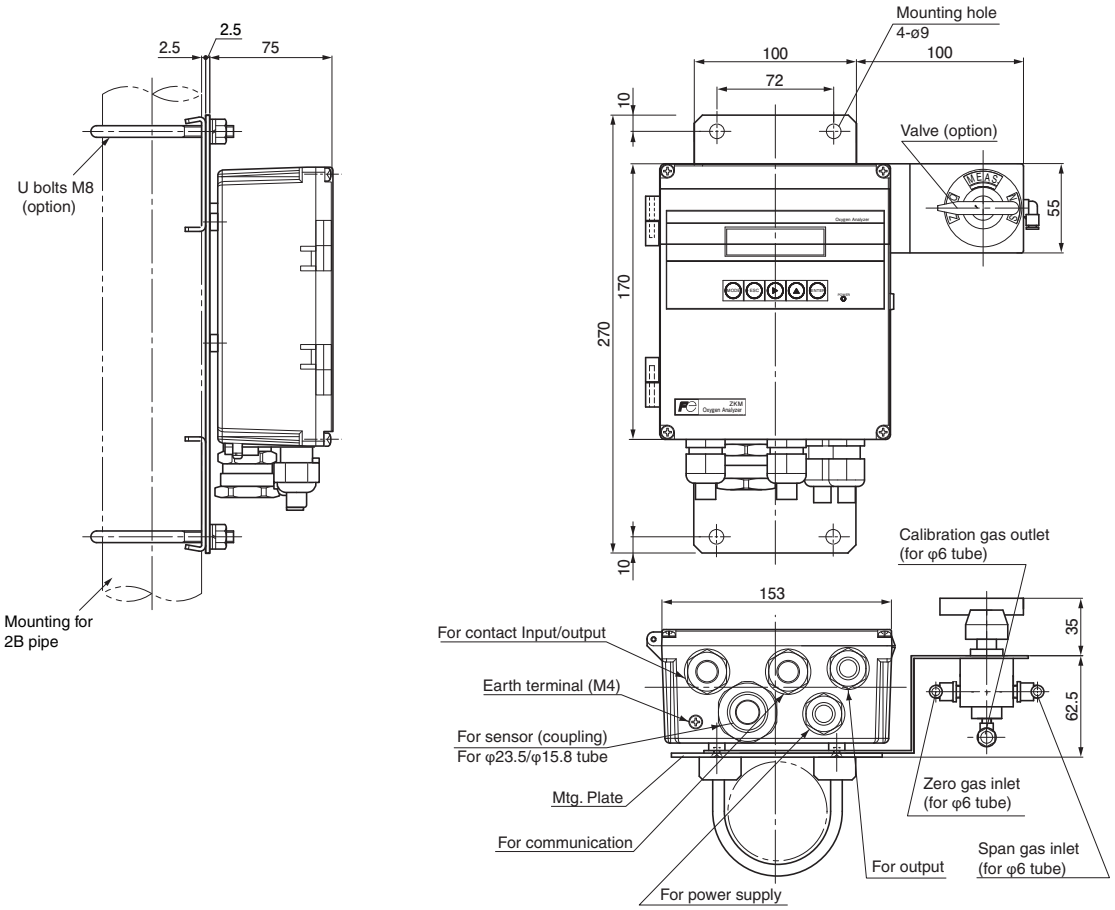
EXTERNAL CONNECTION DAIAGRAM

1	2	3	4	5

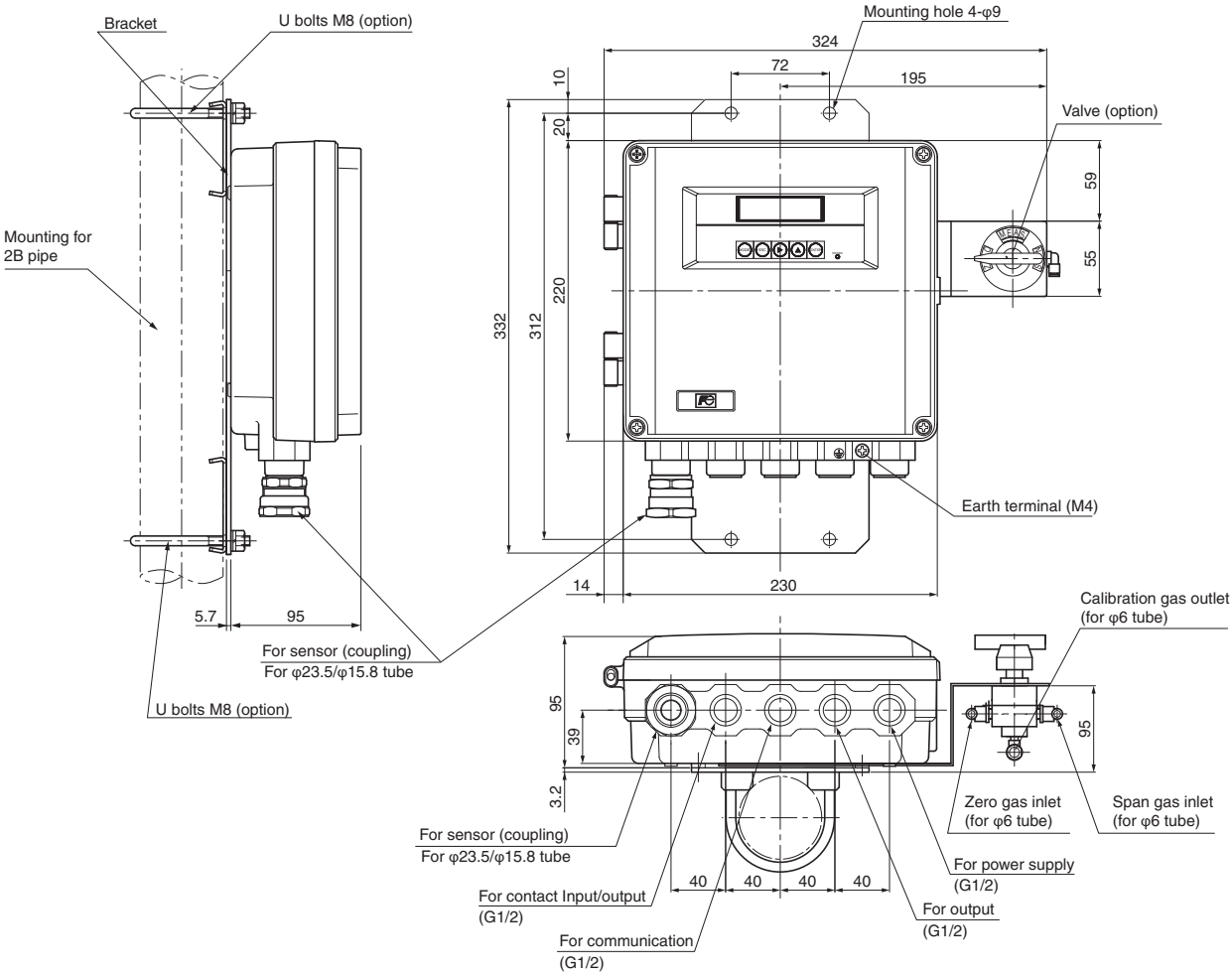
AC power supply
AC100/110V
AC200/220V
AC230V

Heater temp.drop alarm

Converter (ZKM1)
<IP66>



Converter (ZKM2)
<IP67>



Converter (ZKM1)
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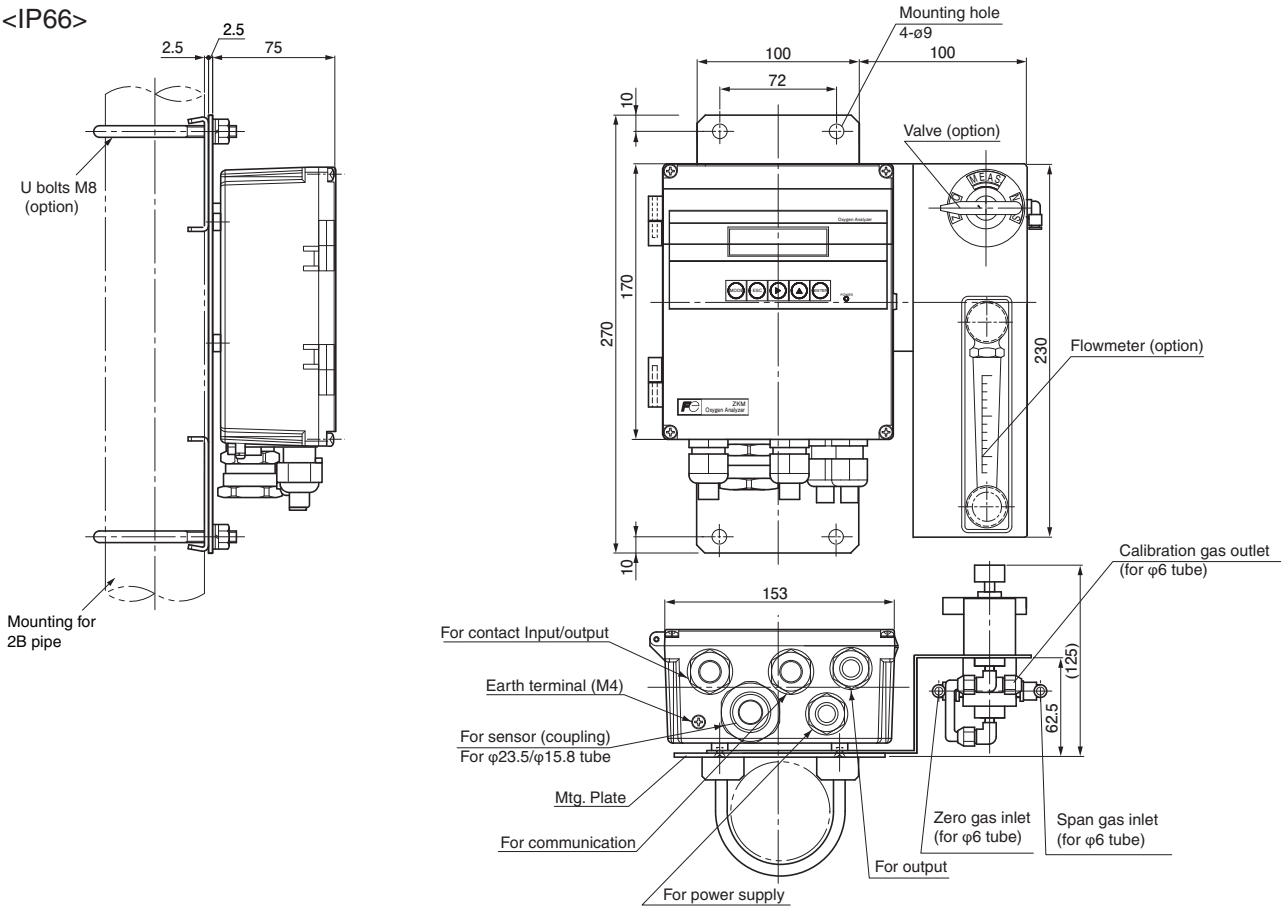

Converter (ZKM2)
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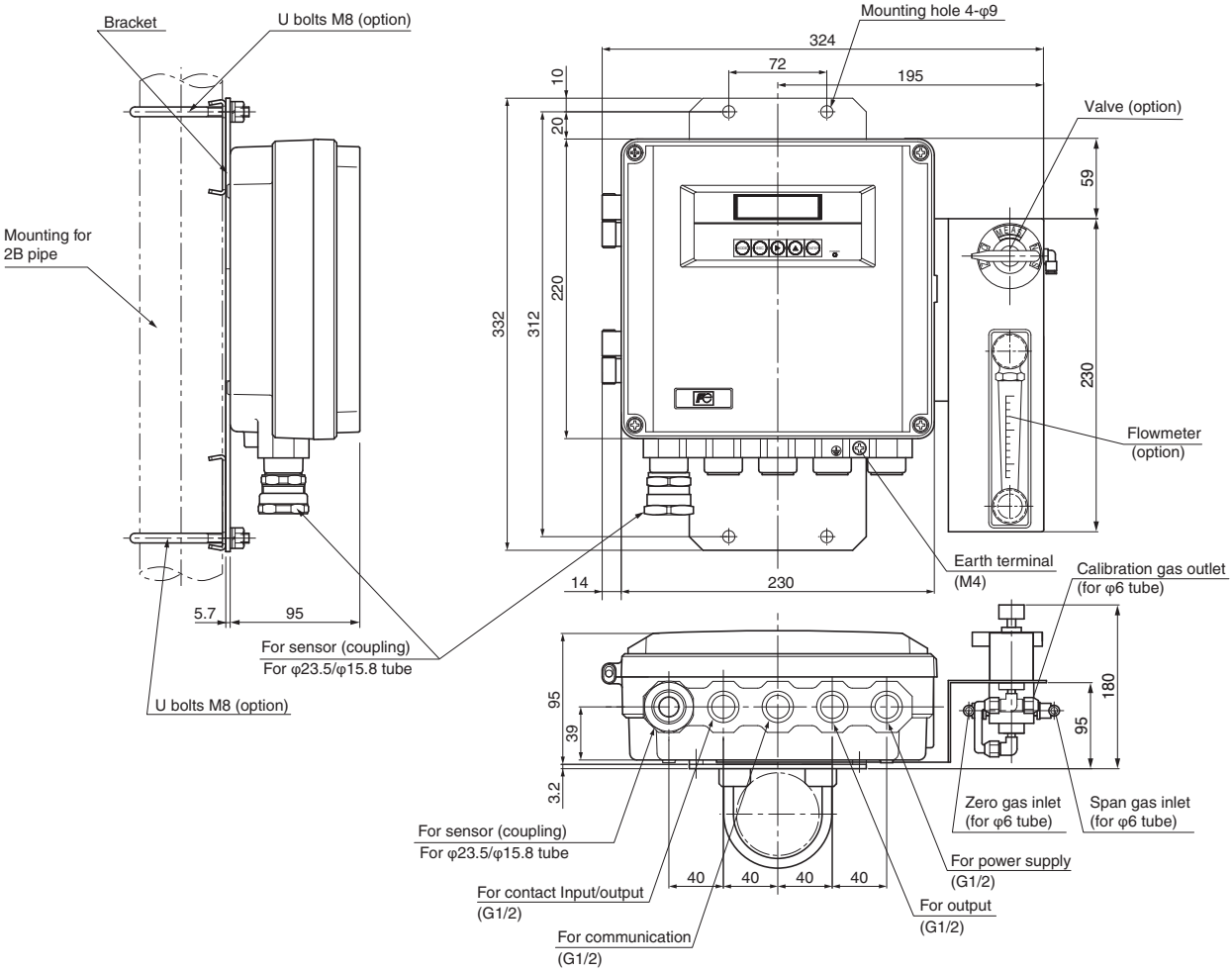
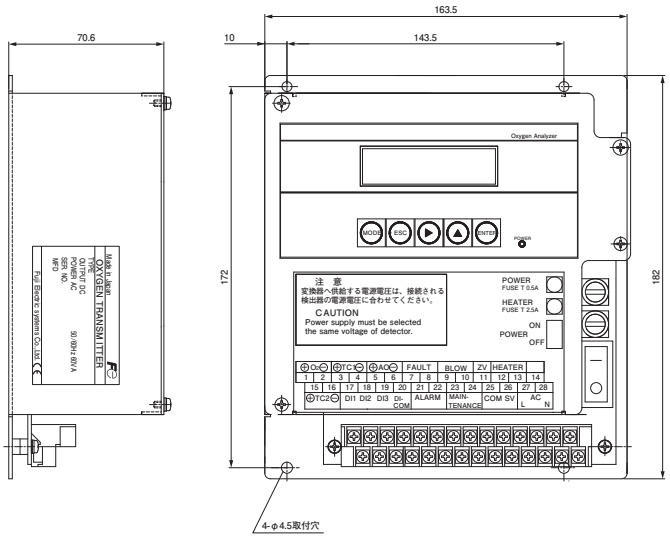
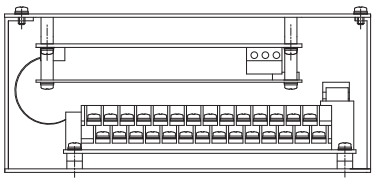
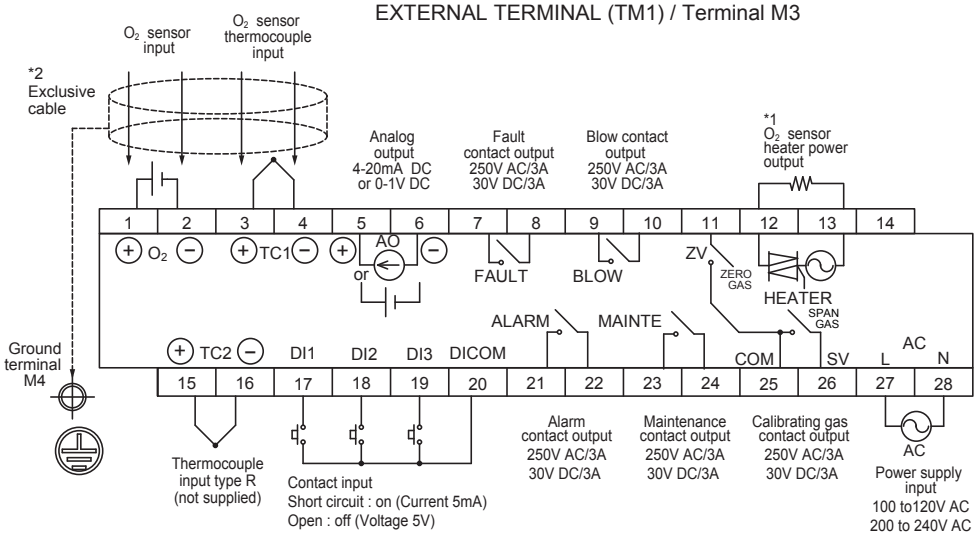


Converter (ZKM3)
<Bench type>





EXTERNAL TERMINAL (TM1) / Terminal M3



COMMUNICATION TERMINAL (TM2) /INSERTION TERMINAL

	Terminal number			Remarks
	1	2	3	
RS232C	TXD	RXD	GND	Standard
RS485	TRX+	TRX–	GND	Option

Note 1) The heater power supply is the same as the converter power supply.
Note 2) Be sure to connect the shield of the cable to the ground in the main body.

⚠ Caution on Safety

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

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Printed in Japan

Fuji Electric

IN-SITU ZIRCONIA OXYGEN ANALYZER FOR HAZARDOUS LOCATION

DATA SHEET

ZFKE, ZKME

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

The analyzer system is comprised of the detector and converter coupled together as a complete system. Detector setting configuration includes the flow guide tube and detector sensor. The flow guide tube is inserted directly into the gas and directs gas to the sensor for measurement. The converter (ZKME) is comprised of the signal processor, input/output and communications, display and system controls.

The converter is equipped with advanced functionality such as performing the sensor diagnostics and sensor recovery function, so the detector can be used within long term stability.

Detector (ZFKE)

Converter (ZKME)

FEATURES

1. Gas sampling device is unnecessary
   For quick response, insert the detector directly into the staek. 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 is easy.
3. More reliable than sensor diagnosis, sensor recoverable function
   Depending on the components in the measurement gas, the characteristics of the sensor might deteriorate. The equipment includes sensor recovery function electronically, checking the deterioration status of the sensor depletion.
   Therefore, it has high reliability and long-lasting stability.
4. Safe and secure
   System detects thermocouple break for heater control on the sensor side. Safety functions of isolating power supply to the detector or isoralting power via external contact input are also.
5. Easy operation
   The operation and setting for the converter can be performed interactively, and available as English, Japanese or 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 ··· 0 to 50 vol% O_2
2 ranges available in 1 vol% O_2 steps

Repeatability: Within ±0.5%FS

Linearity: Within ±2%FS

Response time: Within 4 to 7 sec, for 90% (from calibration gas inlet)

Warmup time: approx. 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: approx. 200VA, Converter: approx. 40VA)
Normal 70VA (Detector: approx. 50VA, Converter: approx. 20VA

Detector Specifications (ZFKE)

Measured gas temperature:
Flow guide tube system; −10 to +600°C (for general-use, corrosive gas)

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
Other: See. Code Symbols

Ejector (general-use):
Probe for vacumming up measured gas to detector (option)

Operating temperature:
−10 to +60°C for Primary detecting element
125°C or less at detector flange surface with power applied

Storage temperature:
Sensing element: −20 to +70°C

Structure: Dust/rain-proof structure(IEC IP66 equivalent)

Flame proof: See Table 1.

Filter: SUS316 (filtering accuracy 60μm)

Main materials of gas-contacting parts:
Detector; Zirconia, SUS316, platinum
Flow guide tube; SUS316

Calibration gas inlet:
ø6mm tube join or ø1/4-inch tube join (as specified)

Reference gas inlet (option):
ø6mm tube join or ø1/4-inch tube join (as specified)

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

Outer dimensions: (L × max. dia.) 215mm × 164mm (detector)

Mass (approx.) {weight}:
Detector; 3.0kg
Flow guide tube (for corrosive gas, 1m); 6kg

Finish color: Case: Silver and SUS metallic color
Cover: Blue

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}

Table 1

	Detector
TIIS	Exd IIB T4
NEPSI	EExd IIC T5 Ex II2G

Converter specification (ZKME)

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 fault (4) Calibration fault (5) Zero/span adjustment fault (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,processing diagnosis of sensor, warm-up, PID auto tuning, under set up maintenance mode " available" and blowdown. The hold function can also be released.

Valve and flow meter (option): Selects zero or span gas during manual zero or span calibration.

Communication function:
RS232C (MODBUS) standard specification
RS485 (MODBUS) (option)

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 temperature.
Thermocouple (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 IP65)

Explosion proof: See Table 2

Material: Aluminum case

Outer dimensions (H x W x D):
470 X 326 X 211mm (IP65)

Mass {weight}: IP65: Approx.22kg (excluding cable and detector)

Finish color: Case: Silver
Cover: blue

Mounting method: Mounted flush on panel

Table 2

	Converter
TIIS	Exd IIB T6
NEPSI	EExd IIC T6 Ex II2G

Electrical Safety:

CE

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

External overcurrent protective device
; 10A

Equipment interfaces are safety separated (SELV)

ZFKE, ZKME

CODE SYMBOLS

(Detector)

1	2	3	4	5	6	7	8		9	10	11	12	13		14	15	16	17	Description
Z	F	K	E	R			5	-				Y		-			1		
					Y														Cal. gas inlet Non (G3/8 female screw)
					1														For ϕ6mm tube
					2														For ϕ1/4 inch tube
					A														Ejector for ϕ6mm tube
					B														Ejector for ϕ1/4 inch tube
						1													Power supply 100 to 120VAC 50/60Hz
						3													200 to 240VAC 50/60Hz CE
							0	Y	0										Flow guide tube None
																			<Flange size>
							7												JIS 5K 65A
							8												JIS 5K 80A
							9												JIS 5K100A
							A												JIS 10K 65A
							B												JIS 10K 80A
							C												JIS 10K 100A
							D												ANSI 150LB 2B
							E												ANSI 150LB 3B
							F												ANSI 150LB 4B
							G												DIN DN50 PN10
							H												DIN DN80 PN10
								F											<Application / meterial>
								F											For corrosive gas / SUS316
								G											With blow-down nozzle / SUS316
								H											For high particular / SUS316
								J											For high particular with cover / SUS316
								K											For high particular / SUS310S
								L											For high particular with cover / SUS310S
								M											For high particular / titanium
								N											For high particular with cover / titanium
									3										<Length> 300mm
									5										500mm
									7										750mm
									1										1000mm
										Y									Reference gas inlet Non (G1/8 female screw)
										A									for ϕ6mm tube
										B									For ϕ1/4 inch tube
											5								Filter Standard
											7								For high particular
												J							Instruction manual language Japanese
												E							English
												C							Chinese
													1						Specification name plate Standard
															N				Ex. Standard NEPSI
															T				TIIS

(Converter)

1	2	3	4	5	6	7	8		9	10	11	12	13		14	Description
Z	K	M	E			1	1	-				1		-		
				B												Output signal 4 to 20mA DC
				E												0 to 1V DC
					1											Communication function RS-232C
					2											RS-485
									Y							Optional Functions None
									1							Combustion efficiency display function Note1)
									2							Blowdown
									3							Auto calibration
									4							Combustion efficiency indication + Blowdown Note1)
									5							Combustion efficiency indication + Auto calibration Note1)
									6							Blowdown + Auto calibration
									7							Combustion efficiency indication + Blowdown + Auto calibration Note1)
										J						Instruction manual language Japanese
										E						English
										C						Chinese
											Y					Mounting Option None (Mounting on panel surface)
											1					With valve
											2					With valve + flowmeter
												1				Specification name plate Standard
													3			Number of Cable Gland 3
													4			4
													5			5
													6			6
													7			7
															N	Ex Standard NEPSI
															T	TIIS

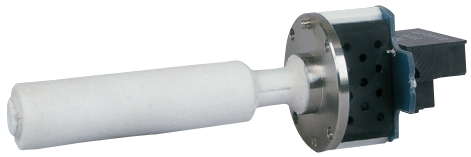
Note1) When you select this display, rich mode will be a simultaneous display.

(Exclusive-special cable)

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

(Replacement Detector element)

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



SCOPE OF DELIVERY

Detector: Detector main unit × 1, Viton Packing × 1, thermo seal × 1, mounting screw (M5mm × 25) × 6, flow guide tube (as specified) × 1, Wrench × 1, Instruction manual × 1

Converter: Converter main unit × 1, mounting screw (M12 × 50) × 4, Cock (option) × 1, flowmeter (option) × 1, Accessories (AC250V 500mA T fuse × 2, AC250V 2.5A T fuse × 2), Wrench × 1, Instruction manual × 1

Ejector: With detector main unit (option)

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)
  (unnecessary when the code 11th of ZKME is 2)
  Type; ZBD42403, 1 to 10L/min (for ejector)
(4) Opner
  Type; ZZP*TK7N9329P2 (for detector; ZFKE)
  Type; ZZP*TK7N9329P1 (for converter; ZKME)

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.

DEVICE CONFIGURATION

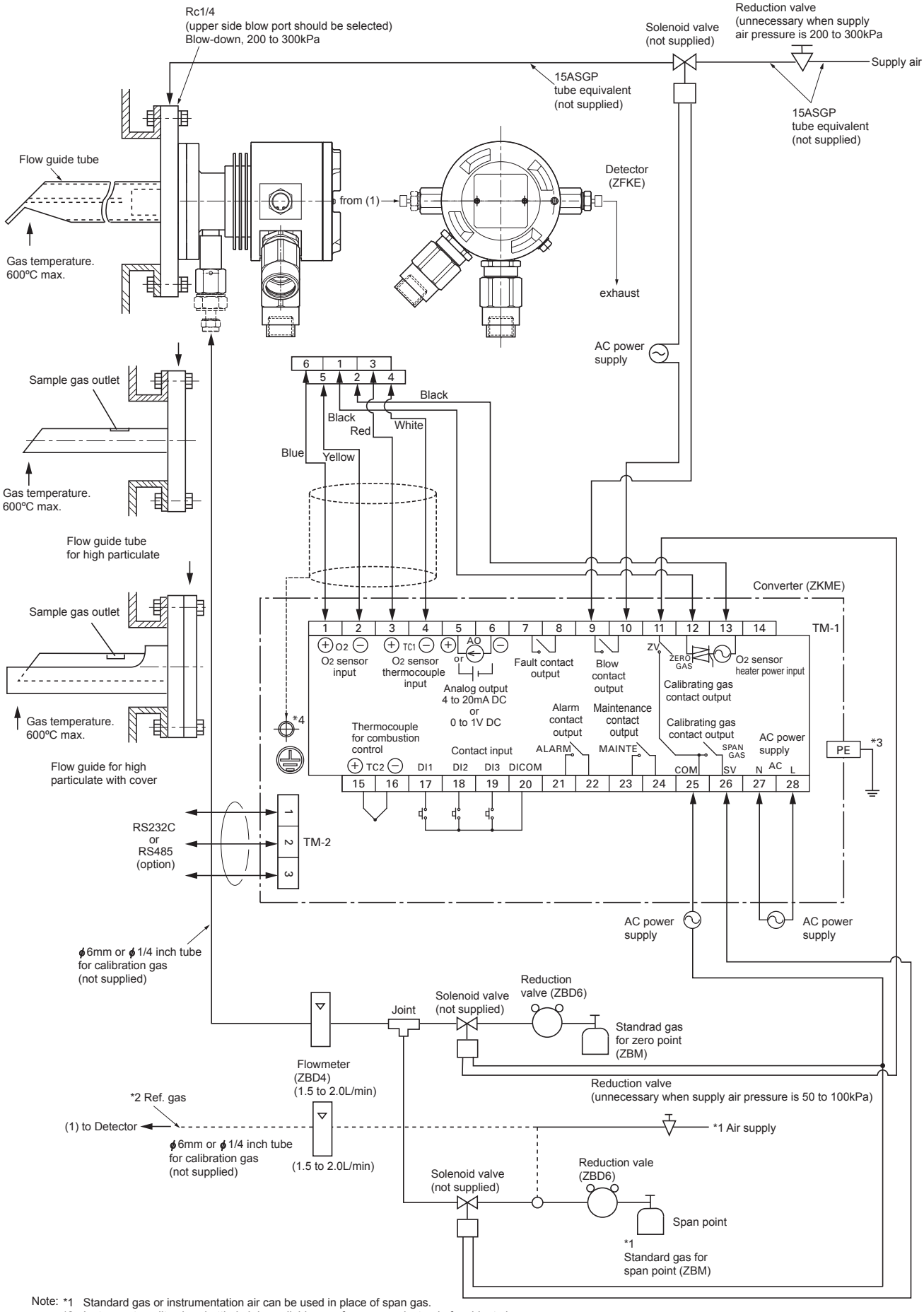
The device to be combined differ according to the conditions of the gas to be measured. Select the devices to be combined with reference to the following table.

Measured gas					Device configuration	
Application	Temperature	Gas Flow	DUST	Note	Detector type	Converter type
General-use (boiler)	600°C or less	5 to 20m/s	Less than 0.2g/Nm^3	Fuel; gas, oil	ZFKER□□5-□F□Y□-□□	ZKME
			Less than 10g/Nm^3	Fuel: coal with blow down	ZFKER□□5-□G□Y□-□□	ZKME
For corrosive gas (refuse incinerator)	600°C or less	5 to 20m/s	Less than 1g/Nm^3	Included low moisture	ZFKER□□5-□F□Y□-□□	ZKME
			Less than 10g/Nm^3	Included low moisture with blow down	ZFKER□□5-□G□Y□-□□	ZKME
			Less than 25g/Nm^3	Included low moisture with blow down	ZFKER□□5-□H/K/M□Y□-□□	ZKME
			Less than 25g/Nm^3	Included high moisture with blow down	ZFKER□□5-□J/L/N□Y□-□□	ZKME

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.

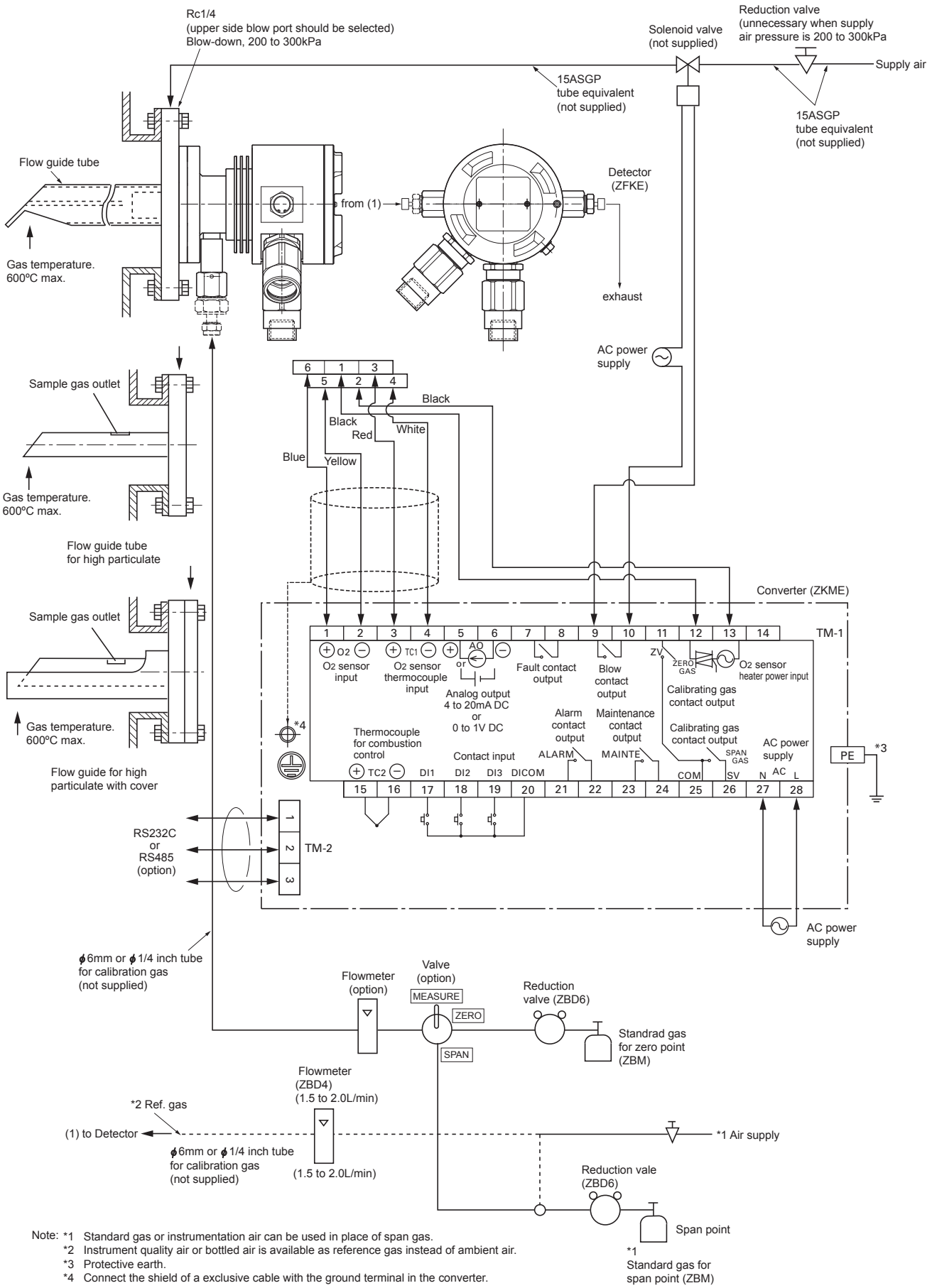
CONFIGURATION

Flow guide tube system



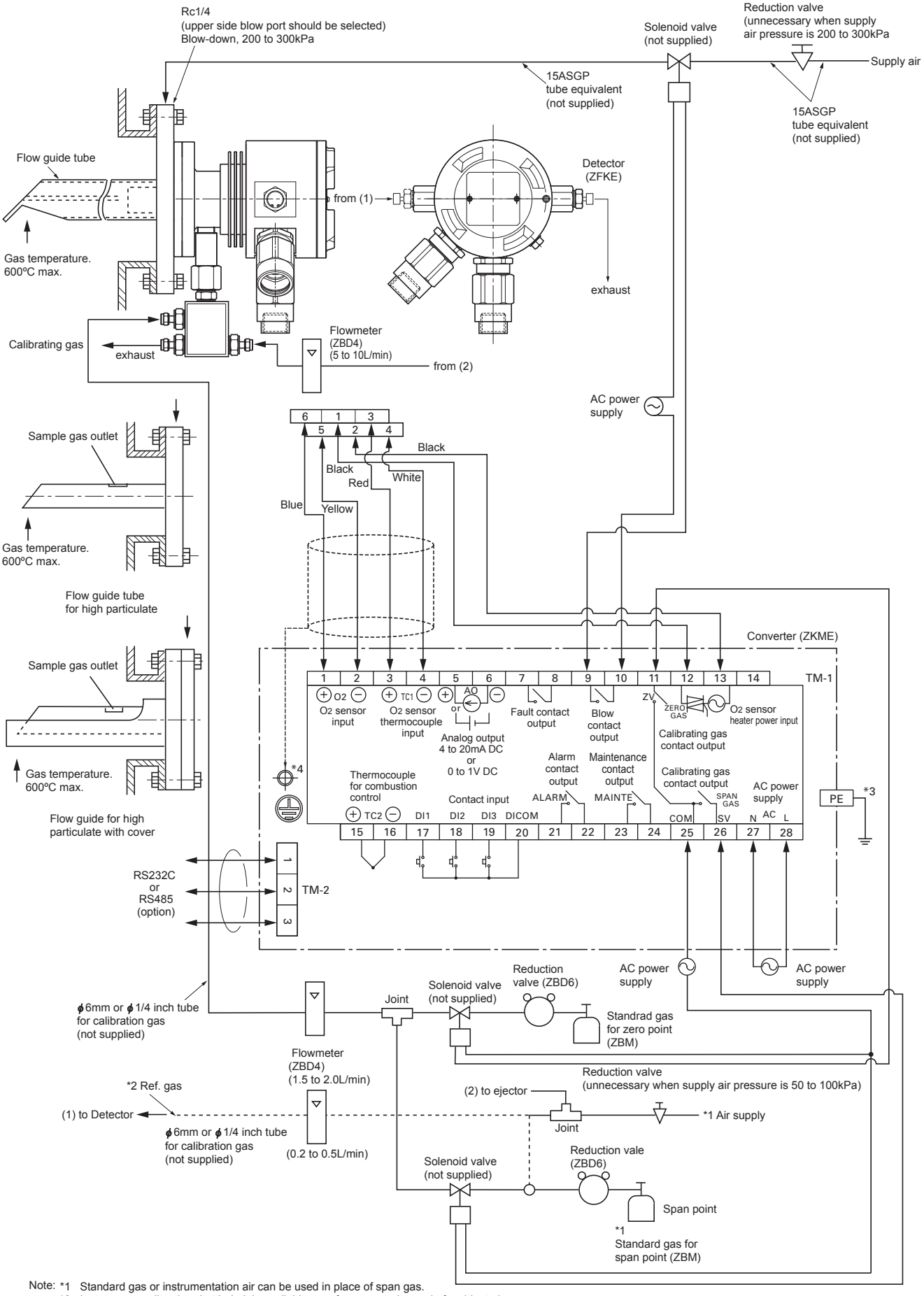
Note: *1 Standard gas or instrumentation air can be used in place of span gas.
*2 Instrument quality air or bottled air is available as reference gas instead of ambient air.
*3 Protective earth.
*4 Connect the shield of a exclusive cable with the ground terminal in the converter.

Flow guide tube system (with valve)



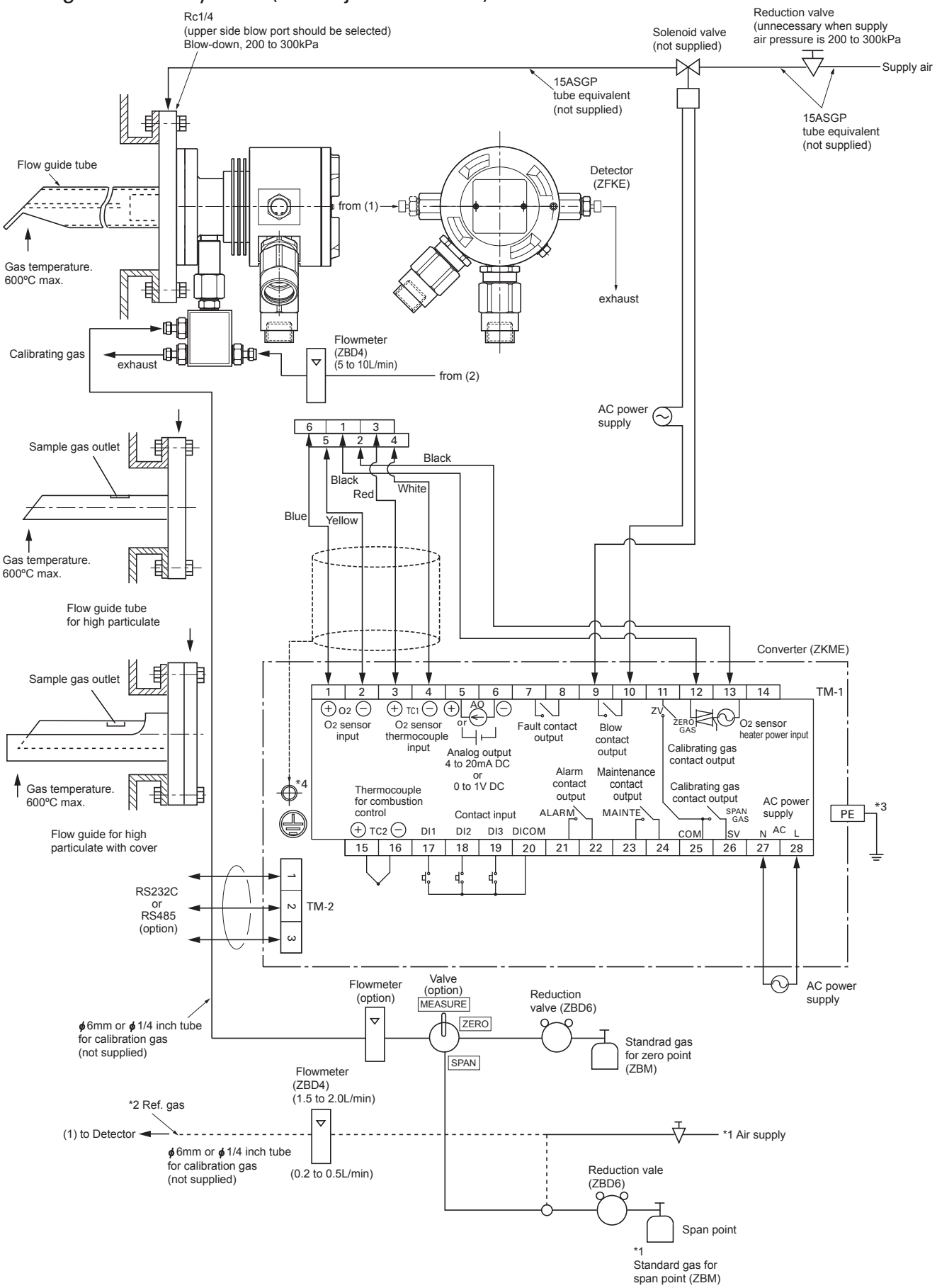
Note: *1 Standard gas or instrumentation air can be used in place of span gas.
*2 Instrument quality air or bottled air is available as reference gas instead of ambient air.
*3 Protective earth.
*4 Connect the shield of a exclusive cable with the ground terminal in the converter.

Flow guide tube system (with ejector)



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 gas instead of ambient air.
*3 Protective earth.
*4 Connect the shield of a exclusive cable with the ground terminal in the converter.

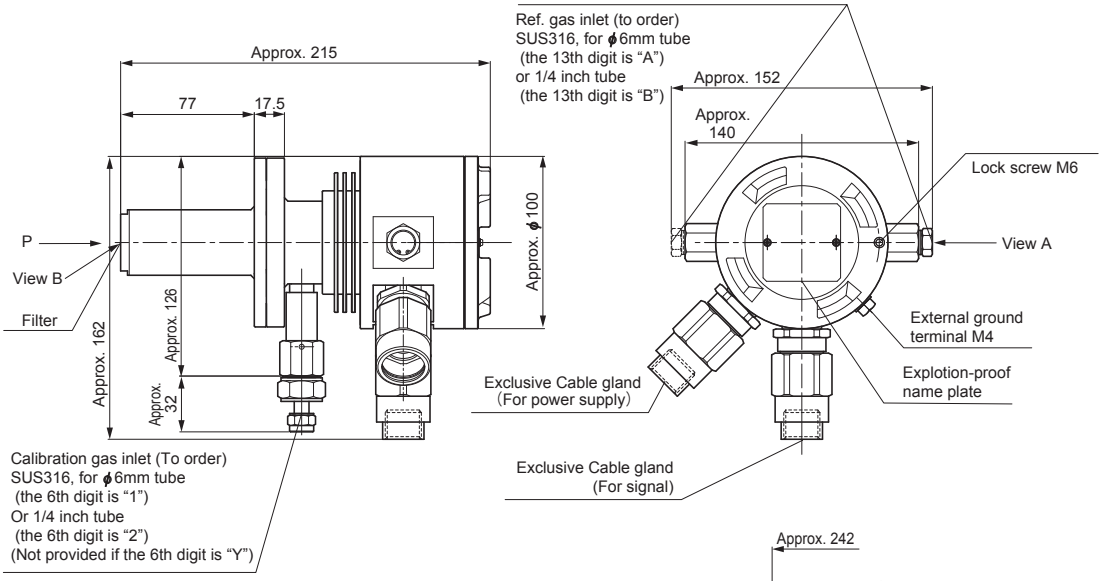
Flow guide tube system (with ejector+valve)

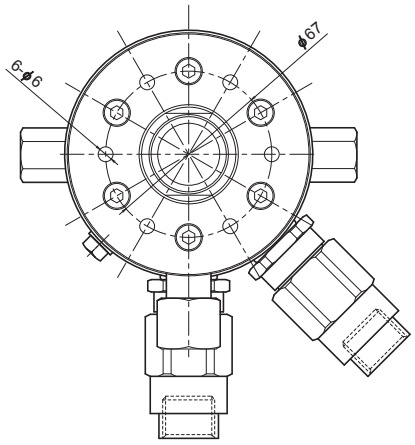


Note: *1 Standard gas or instrumentation air can be used in place of span gas.
*2 Instrument quality air or bottled air is available as reference gas instead of ambient air.
*3 Protective earth.
*4 Connect the shield of a exclusive cable with the ground terminal in the converter.

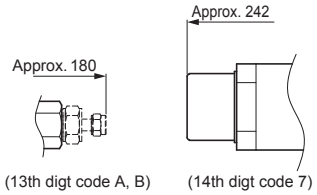
OUTLINE DIAGRAM (Unit:mm)

Detector (ZFKER [Y/1/2])



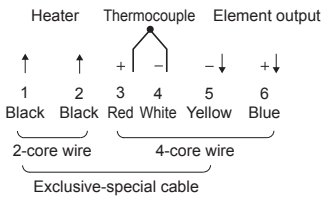


VIEW FROM P

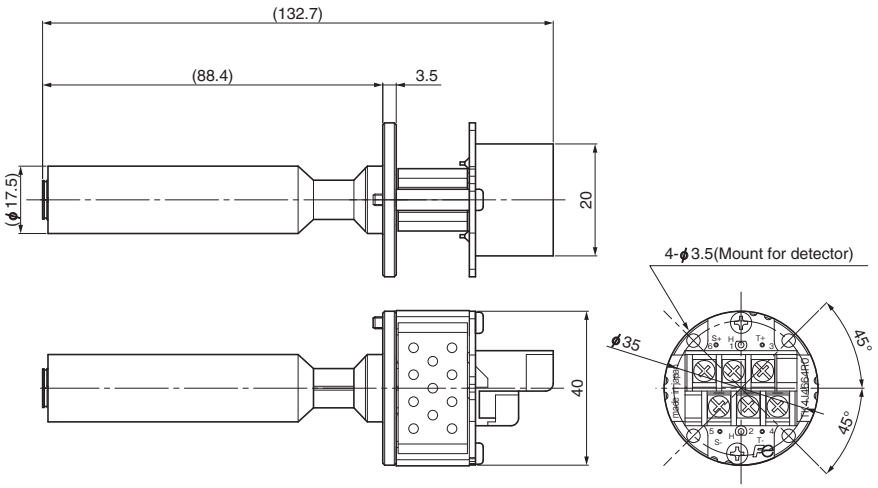


VIEW A VIEW B

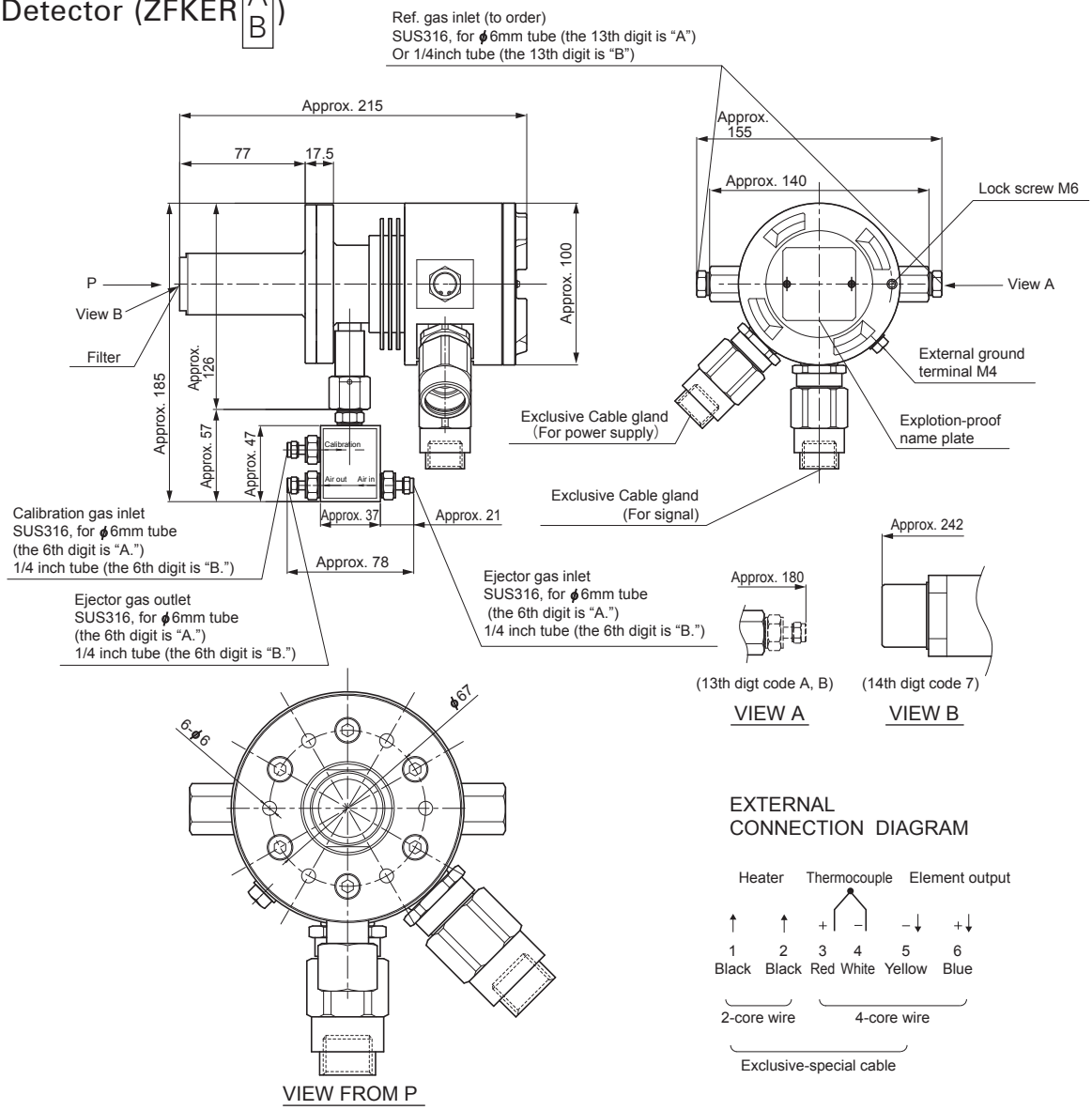
EXTERNAL CONNECTION DIAGRAM



Sensor unit (ZFK8YY)

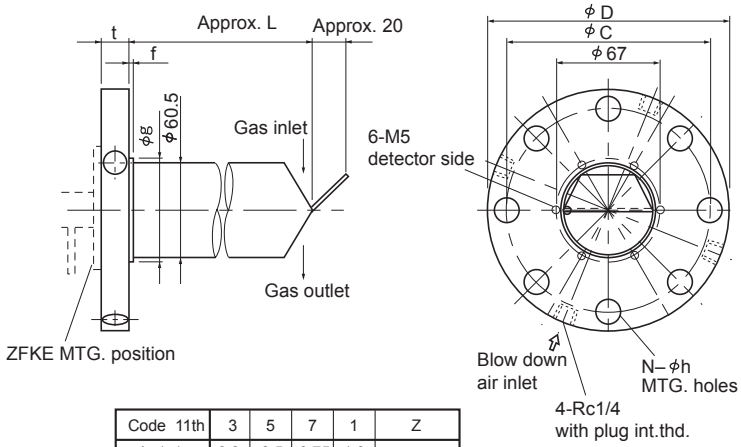


Detector (ZFKER A/B)



EXTERNAL CONNECTION DIAGRAM

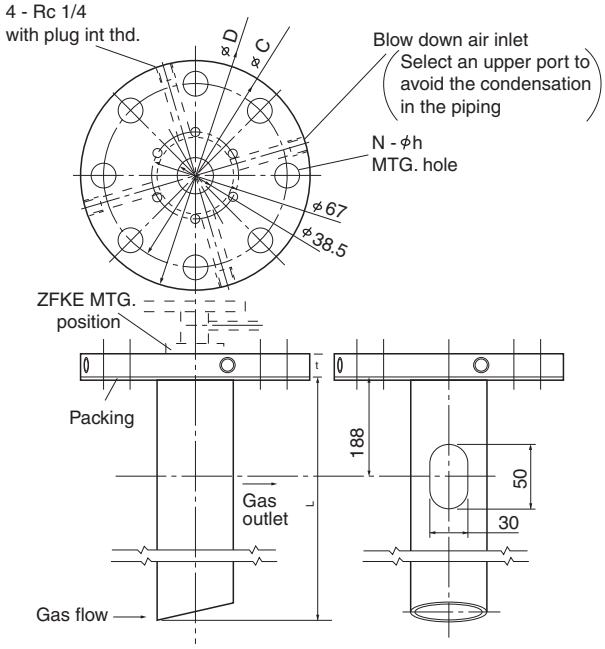
Flow guide tube (with blow-down nozzle) (ZFKE: 10th digit code. G)



Code 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	

Flange size	Code 9th	D	C	t	f	g	N	h
JIS 5K 65A	7	155	130	14	2	110	4	15
JIS 5K 80A	8	180	145	14	2	121	4	19
JIS 5K 100A	9	200	165	16	2	141	8	19
JIS 10K 65A	A	175	140	18	2	116	4	19
JIS 10K 80A	B	185	150	18	2	126	8	19
JIS 10K 100A	C	210	175	18	2	151	8	19
ANSI 150LB 2B	D	150	120.7	17.5	2	92.1	4	19.1
ANSI 150LB 3B	E	190	152.4	22.3	2	127	4	19.1
ANSI 150LB 4B	F	230	190.5	22.3	2	157.2	8	19.1
DIN DN50 PN10	G	165	125	18	0	0	4	18
DIN DN80 PN10	H	200	160	20	0	0	4	18

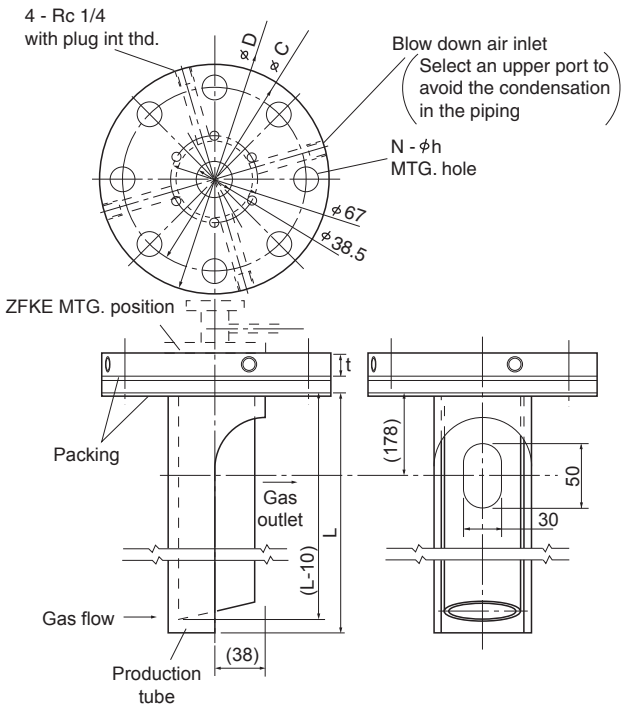
Flow guide tube (for high particulate) (ZFKE: 10th dight code. H, K, M)



Code 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	

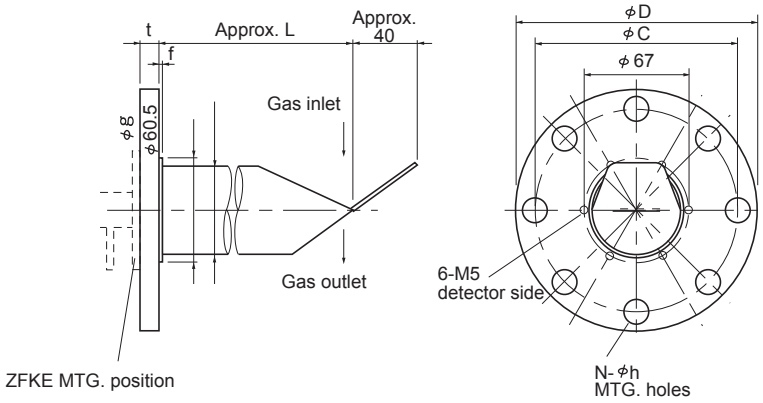
Flange size	Code 9th	D	C	t	f	g	N	h
JIS 5K 65A	7	155	130	14	2	110	4	15
JIS 5K 80A	8	180	145	14	2	121	4	19
JIS 5K 100A	9	200	165	16	2	141	8	19
JIS 10K 65A	A	175	140	18	2	116	4	19
JIS 10K 80A	B	185	150	18	2	126	8	19
JIS 10K 100A	C	210	175	18	2	151	8	19
ANSI 150LB 2B	D	150	120.7	17.5	2	92.1	4	19.1
ANSI 150LB 3B	E	190	152.4	22.3	2	127	4	19.1
ANSI 150LB 4B	F	230	190.5	22.3	2	157.2	8	19.1
DIN DN50 PN10	G	165	125	18	0	0	4	18
DIN DN80 PN10	H	200	160	20	0	0	4	18

Flow guide tube (for high particulate with cover) (ZFKE: 10th dight code. J, L, N)



Code 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	

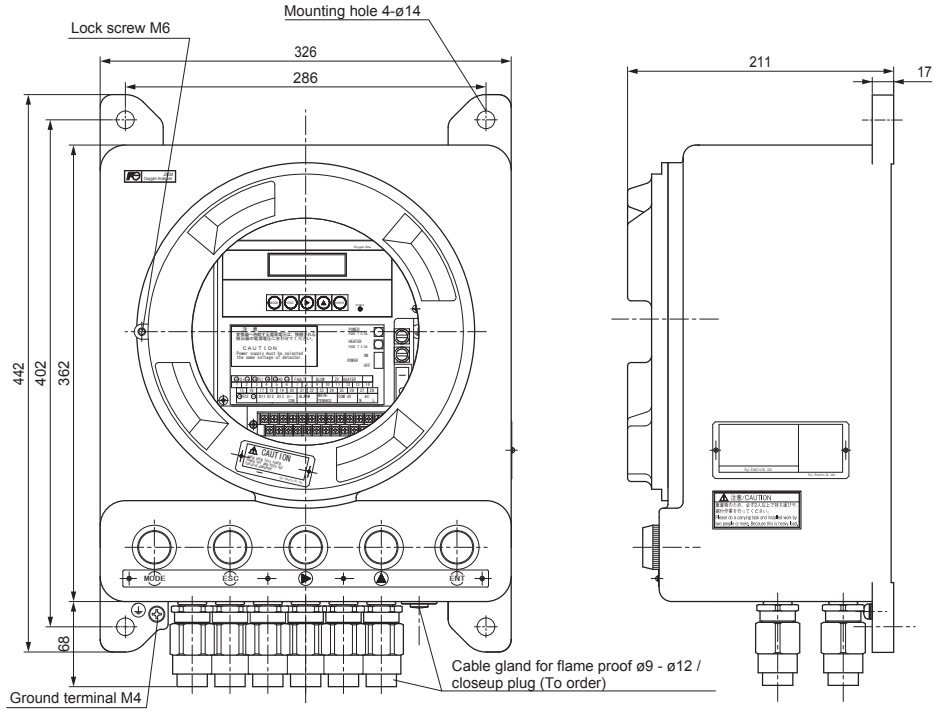
Flow guide tube (ZFKE: 10th dight code. F)

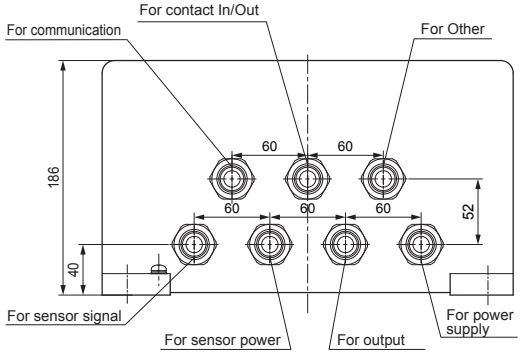


Code 11th	3	5	7	1	Z
L (m)	0.3	0.5	0.75	1.0	L= (to order)
MASS Approx.(kg)	3.3	4.5	6.1	7.6	

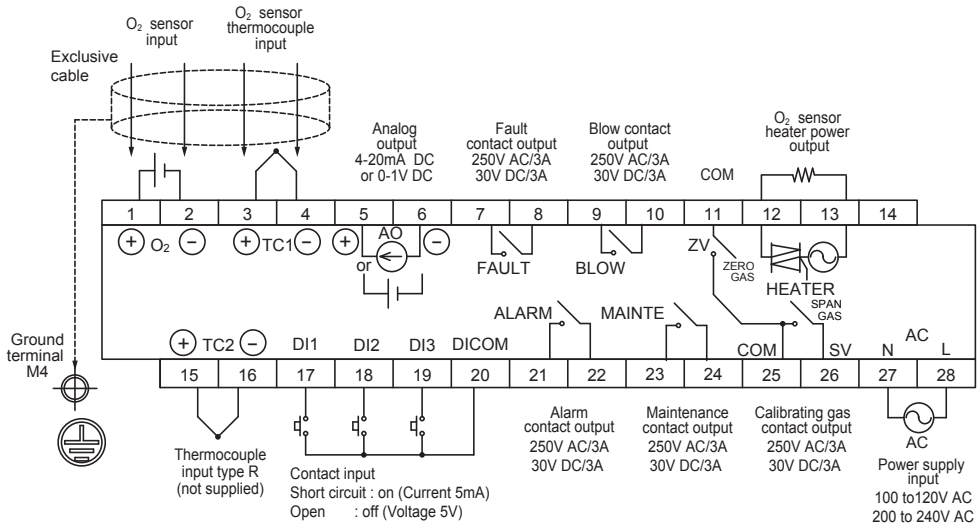
Flange size	Code 9th	D	C	t	f	g	N	h
JIS 5K 65A	7	155	130	14	2	110	4	15
JIS 5K 80A	8	180	145	14	2	121	4	19
JIS 5K 100A	9	200	165	16	2	141	8	19
JIS 10K 65A	A	175	140	18	2	116	4	19
JIS 10K 80A	B	185	150	18	2	126	8	19
JIS 10K 100A	C	210	175	18	2	151	8	19
ANSI 150LB 2B	D	150	120.7	17.5	2	92.1	4	19.1
ANSI 150LB 3B	E	190	152.4	22.3	2	127	4	19.1
ANSI 150LB 4B	F	230	190.5	22.3	2	157.2	8	19.1
DIN DN50 PN10	G	165	125	18	0	0	4	18
DIN DN80 PN10	H	200	160	20	0	0	4	18

Coverter (ZKME)





EXTERNAL TERMINAL (TM1) /M3



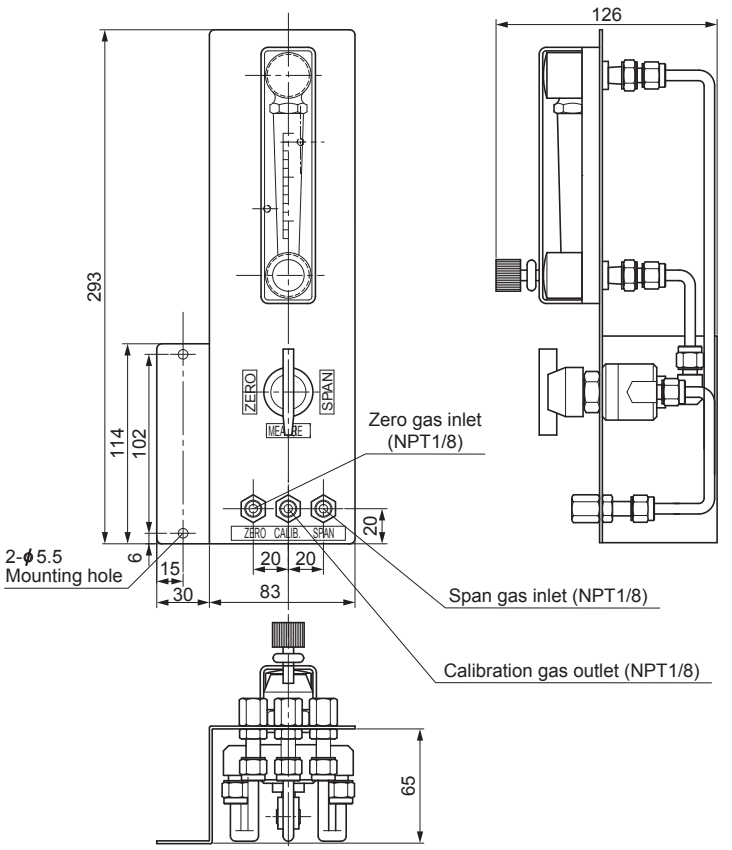
COMMUNICATION TERMINAL (TM2) /INSERTION TERMINAL

	Terminal number			Remarks
	1	2	3	
RS232C	TXD	RXD	GND	Standard
RS485	TRX+	TRX–	GND	Option

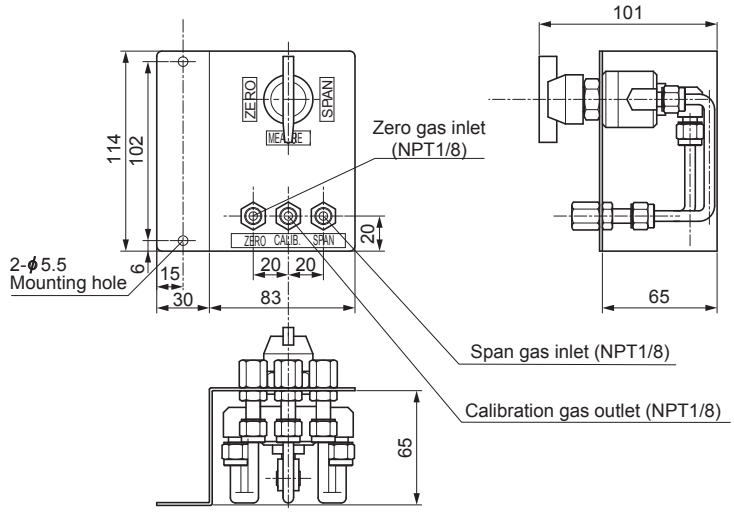
OUTLINE DIAGRAM (Unit:mm)

<Option>

SELECTOR VALVES + FLOWMETER (IN CASE OF 11TH DIGIT CODE “2”)



SELECTOR VALVES (IN CASE OF 11TH DIGIT CODE “1”)



⚠ Caution on Safety

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

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Printed in Japan