

In-Situ

Zirconia Oxygen Analyzers

Detector: ZFK8, ZFKE Converter: ZKMA, ZKMB, ZKME

Ideal for Combustion Control

- ✓ User-replaceable zirconia element
- ✓ No gas sampling required
- ✓ Enhanced safety design
- ✓ Response speed from 4 to 7 seconds
- ✓ Dust- and water-proof, and/or flameproof enclosure
- ✓ Key operation available on front cover (ZKMA and ZKME)
- ✓ HART communication



ZKMA



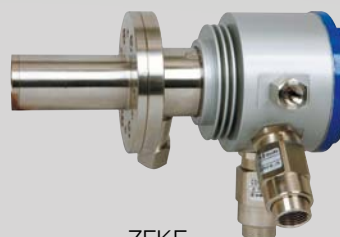
ZKMB



ZKME



ZFK8



ZFKE

Safety-Enhanced and Low-Maintenance Design



IP66 converter ZKMA



IP67 converter ZKMB

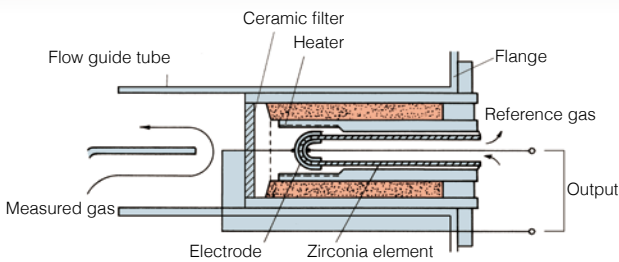


Detector ZFK8



Detector with flow guide tube

Operating Principle

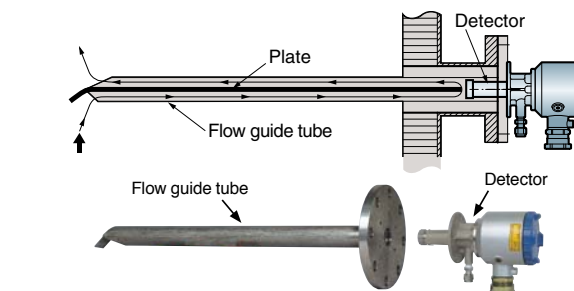


Keys on Front Cover (ZKMA and ZKME)



Allows operation without opening the cover.

Fast Sampling with No Gas Sampling Devices



Ejector for High-Temperature Gas



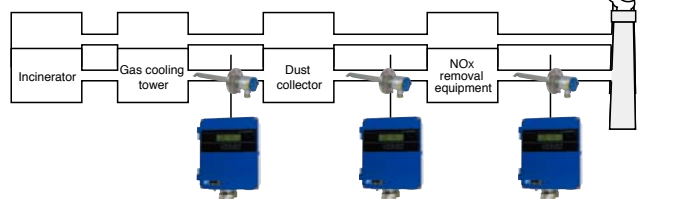
Ejector ZTA

High Safety Level

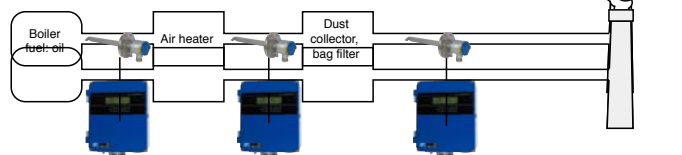
- Upon detecting a break of the thermocouple for heater control in the sensor unit, the analyzer stops the power supply to the detector.
- The power supply to the detector can also be stopped by contact input in an emergency.
- The key lock function prevents operational errors.

Applications

Waste incinerator



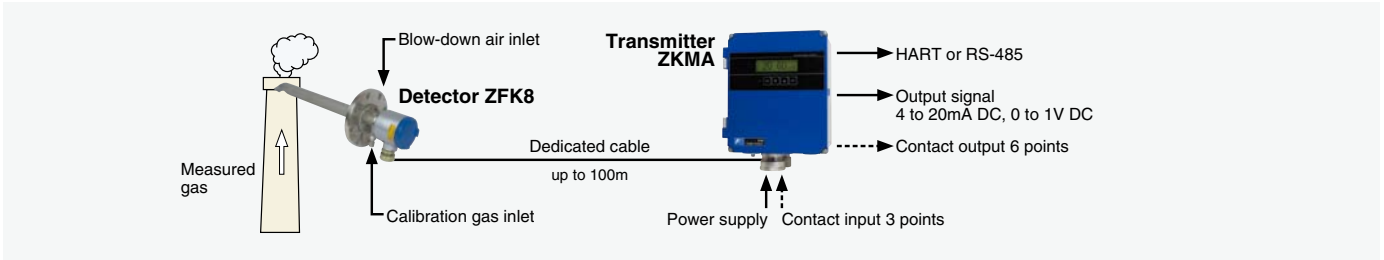
Boiler combustion control



Easily Replaceable Zirconia Element



System diagram



Ordering code

Detector

ZFK8

5	6	7	8
R		5	

 -

9	10	11	12	13

 -

14	15	16
	1	

Digit	Description	Note	Code
6	Pipe adapter for calibration gas inlet For ø 6mm tube (SS) For ø 1/4 inch tube (SS) With ball valve	1 2 3	
7	Power supply 100 to 120 V AC 50/60 Hz 200 to 240 V AC 50/60 Hz	1 3	
8	Revision No.	5	
9	Flow guide tube		
10	<Flange> <Application> <Length>		
11	No tube SS304 general use 300 mm SS304 general use 500 mm SS304 general use 750 mm SS304 general use 1000 mm SS316 for corrosive gas 300 mm SS316 for corrosive gas 500 mm SS316 for corrosive gas 750 mm SS316 for corrosive gas 1000 mm SS316 with blowdown nozzle 300 mm SS316 with blowdown nozzle 500 mm SS316 with blowdown nozzle 750 mm SS316 with blowdown nozzle 1000 mm SS316 for high particulate 300 mm SS316 for high particulate 500 mm SS316 for high particulate 750 mm SS316 for high particulate 1000 mm SS316 for high particulate with cover 300 mm SS316 for high particulate with cover 500 mm SS316 for high particulate with cover 750 mm SS316 for high particulate with cover 1000 mm Others	0Y0 5A3 5A5 5A7 5A1 5B3 5B5 5B7 5B1 5C3 5C5 5C7 5C1 6D3 6D5 6D7 6D1 6E3 6E5 6E7 6E1 ZZZ	
12	Heat-retaining cover Without With	Y A	
13	Pipe adapter for reference gas inlet None For ø 6 mm tube (SS) For ø 1/4 inch tube (SS)	Y A B	
14	Filter spec Standard	1	
15	Instruction manual Japanese English Chinese	J E C	
16	Specification nameplate 100 to 120 V AC 50/60 Hz 200 to 240 V AC 50/60 Hz	1 2	

Converter

ZKM

4	5	6	7	8
		2		

 -

9	10	11	12	13

 -

14	15	16
Y	R	

Digit	Description	Note	Code
4	Enclosure IP66 IP67		A B
5	Analog output signal 4 to 20 mA DC 0 to 1 V DC		B E
6	Communication None RS-485 HART		Y 2 3
7	Mounting bracket None Panel mounting Pipe mounting		Y 1 2
8	Revision No.		2
9	Optional functions None Combustion efficiency display Blowdown Auto calibration Combustion efficiency display + Blowdown Combustion efficiency display + Auto calibration Blowdown + Auto calibration Combustion efficiency display + Blowdown + Auto calibration	Note 1 Note 2 Note 2, 3 Note 1 Note 1, 3 Note 2, 3 Note 1	Y 1 2 3 4 5 6 7
10	Display language Japanese English Chinese		J E C
11	Selector valve/flowmeter None With valve (For ø6 mm tube) With valve + flowmeter (For ø6 mm tube) With valve (For ø1/4 inch tube) With valve + flowmeter (For ø1/4 inch tube)	Note 3	Y 1 2 3 4
12	—		1
13	Cable gland Without With		Y A
14	—		Y
15	—		R
16	Thermocouple for combustion efficiency display None Type R thermocouple Type K thermocouple	Note 4 Note 4	Y R K

Notes

- On the version with the combustion efficiency display, the rich mode indicator is available. If you order the version with combustion efficiency display (9th code 1, 4, 5, or 7), select "R" or "K" in the 16th digit.
- If you order the version without combustion efficiency display (9th code Y, 2, 3, or 6), select "Y" in the 16th digit.
- If you order the version with auto calibration (9th code 3, 5, 6, or 7), select "Y" in the 11th digit.
- A thermocouple is to be prepared by customer.

Ejector *Non-compliant with CE marking

ZTA

4	5	6	7	8
	1			1

Digit	Description	Note	Code
4	Measured gas temperature For high temperature (+1500°C max.) General use (+800°C max.)	1 2	
5	—	1	
6	Insertion length [mm] 500 750 1000 1500	B C D E	
7	Power supply voltage 100V/115 V AC 50/60Hz 200V/220 V AC 50/60Hz 230 V AC 50/60Hz	1 3 5	
8	Revision No.	1	



Replacement detector element

Power supply	Code symbols
AC100 to 120V	ZFK8YY15-0Y0YY-0YY
AC200 to 240V	ZFK8YY35-0Y0YY-0YY

Dedicated cable

ZRZ

4	5	6	7	8	9
K	R		1		

Digit	Description	Note	Code
4	Connectable device ZKM		K
5	Type R thermocouple		R
6	Length		
7	<Rainproof flexible conduit> <Cable>		
	None 6 m		YA
	None 10 m		YB
	None 15 m		YC
	None 20 m		YD
	None 30 m		YE
	None 40 m		YF
	None 50 m		YG
	None 60 m		YH
	None 70 m		YJ
	None 80 m		YK
	None 90 m		YL
	None 100 m		YM
	6 m	Note 5	AA
	10 m	Note 5	BB
	15 m	Note 5	CC
	20 m	Note 5	DD
8	Revision No.		1
9	Cable end treatment None One side (detector side) Both sides		0 1 2

Note 5) For connection between detector and converter, use a rainproof flexible conduit.

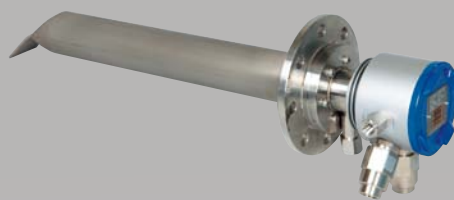
Flameproof version for Explosive Atmospheres



Converter ZKME



Detector ZFKE



Detector with flow guide tube

	TIIS	NEPSI
Converter ZKME	Ex d IIB T6	Ex d IIC T6 Gb
Detector ZFKE	Ex d IIB T4	Ex d IIC T4 Gb

Ordering code

Detector

ZFKE

5	6	7	8
R			

 -

9	10	11	12	13
		Y		

 -

14	15	16	17
			1

Digit	Description	Note	Code
6	Pipe adapter for calibration gas inlet None (G3/8 internal screw) For ø6mm tube For ø1/4 inch tube Ejector with pipe adapter for ø6mm tube Ejector with pipe adapter for ø1/4 inch tube		Y 1 2 A B
7	Power supply 100 to 120 V AC 50/60 Hz 200 to 240 V AC 50/60 Hz		1 3
8	Revision No.		5
9	Flow guide tube <Flange size> None JIS 5K 65A JIS 5K 80A JIS 5K100A JIS 10K 65A JIS 10K 80A JIS 10K 100A ANSI 150LB 2B ANSI 150LB 3B ANSI 150LB 4B DIN DN50 PN10 DIN DN80 PN10		0 7 8 9 A B C D E F G H
10	<Application / material> None For corrosive gas / SS316 With blow-down nozzle / SS316 For high particulate / SS316 For high particulate with cover / SS316 For high particulate / SS310S For high particulate with cover / SS310S For high particulate / titanium For high particulate with cover / titanium		Y F G H J K L M N
11	<Length> None 300mm 500 mm 750 mm 1000 mm		0 3 5 7 1
13	Pipe adapter for reference gas inlet None (G1/8 internal screw) For ø6mm tube (SS) For ø1/4 inch tube (SS)		Y A B
14	Filter Standard For high particulate		5 7
15	Instruction manual language Japanese English Chinese		J E C
16	Specification name plate Standard		1
17	Ex. standard NEPSI TIIS		N T

Converter

ZKME

5	6	7	8
		1	1

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9	10	11	12	13	14
			1		

Digit	Description	Note	Code
5	Output signal 4 to 20mA DC 0 to 1V DC		B E
6	Communication None RS-485		Y 2
9	Optional functions None Combustion efficiency display function Note1) Blowdown Auto calibration Combustion efficiency indication + Blowdown Combustion efficiency indication + Auto calibration Blowdown + Auto calibration Combustion efficiency indication + Blowdown + Auto calibration		Y 1 2 3 4 5 6 7
10	Instruction manual language Japanese English Chinese		J E C
11	Option None With valve With valve + flowmeter		Y 1 2
12	Specification name plate Standard		1
13	Number of cable glands 3 4 5 6 7		3 4 5 6 7
14	Ex standard NEPSI TIIS		N T

Note1) On the versions with combustion efficiency display, the rich mode indicator is available as well.

Dedicated cable

ZRZ

4	5	6	7	8	9
E	R			1	

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

Replacement detector element



Power supply	Code symbols
AC100 to 120V	ZFK8YY15-0Y0YY-0YY
AC200 to 240V	ZFK8YY35-0Y0YY-0YY

■ Specifications

General

Measuring object	Oxygen in non-combustible gas
Principle	Zirconia oxygen sensor
Range	0...2...50 vol% User-configurable two ranges
Repeatability	≤ ±0.5% FS
Linearity	≤ ±2% FS
Zero/span drift	≤ ±2% FS per month
Response time	4–7 seconds (from the calibration gas inlet)
Analog output	4–20 mA DC or 0–1 V DC, isolated
Power supply voltage	100–120 V AC or 200–240 V AC

Detector

	ZFK8	ZFKE
Gas temperature	With flow guide tube	-10...600°C
	With ejector	For general use
		For high temperature
Gas pressure	-3...3 kPa	-10...600°C
Filter material	Alumina, quartz paper	SS 316
Enclosure	IP66	IP66, flameproof
Weight (excl. flow guide tube)	1.6 kg	3 kg

Converter

Display	4-digit, with backlight
Contact output	6 relay contacts
Contact input	3 volt-free contacts
Communication	HART or RS-485 (Modbus)
Output hold	During calibration and during blowdown
Other functions	Thermocouple break detection, key lock, sensor diagnosis
Options	Combustion efficiency display, blowdown, auto calibration Flowmeter, selector valve
Enclosure	ZKMA: IP66 ZKMB: IP67 ZKME: IP65 and flameproof

Flow guide tube

	For ZFK8	For ZFKE
Types	Standard Corrosion resistant With blowdown nozzle Dust tolerant Dust tolerant and with cover	Corrosion resistant With blowdown nozzle Dust tolerant Dust tolerant and with cover
Length	300, 500, 700, or 1000 mm	
Flange size	JIS 5K 65A JIS 5K 80A (for dust tolerant version)	See the 9th to 11th digits of ordering codes

■ Detector Selection Guide

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

ZFK8

ZFK8R□□5-⁹■¹⁰■□□□-1□□^{←Digit}

Application	Gas conditions				Detector			Converter	Ejector	
	Temp.	Flow rate	Dust	Moisture	Flange material	Flow guide tube	9th–11th code			
Boilers	Gas, oil	≤ 600°C	5–20 m/s	< 0.2 g/Nm ³	Low	SS 304	Standard	5A □	ZKMA or ZKMB	-
	Coal			< 10 g/Nm ³	Low		With blowdown nozzle	5C □		
Refuse incinerators	≤ 600°C	5–20 m/s	< 1 g/Nm ³	Low	SS 316	For corrosive gas	5B □			
			< 10 g/Nm ³	Low		With blowdown nozzle	5C □			
			< 25 g/Nm ³	Low		For high particulate	6D □			
			< 25 g/Nm ³	High		For high particulate, with cover	6E □			
Heating furnaces	≤ 800°C	≤ 1 m/s	< 1 g/Nm ³	Low	-	No flow guide tube	0Y0	ZTA2		
	≤ 1500°C	≤ 1 m/s	< 1 g/Nm ³	Low	-	No flow guide tube	0Y0	ZTA1		

ZFKE

ZFKER□□5-□¹⁰■□Y□-□□1□^{←Digit}

Application	Gas conditions				Detector		Converter	
	Temp.	Flow rate	Dust	Moisture	Flow guide tube	10th code		
Boilers	Gas, oil	≤ 600°C	5–20 m/s	< 0.2 g/Nm ³	Low	For corrosive gas	F	ZKME
	Coal			< 10 g/Nm ³	Low	With blowdown nozzle	G	
Refuse incinerators	≤ 600°C	5–20 m/s	< 1 g/Nm ³	Low	For corrosive gas	F		
			< 10 g/Nm ³	Low	With blowdown nozzle	G		
			< 25 g/Nm ³	Low	For high particulate	H K M		
			< 25 g/Nm ³	High	For high particulate, with cover	J L N		

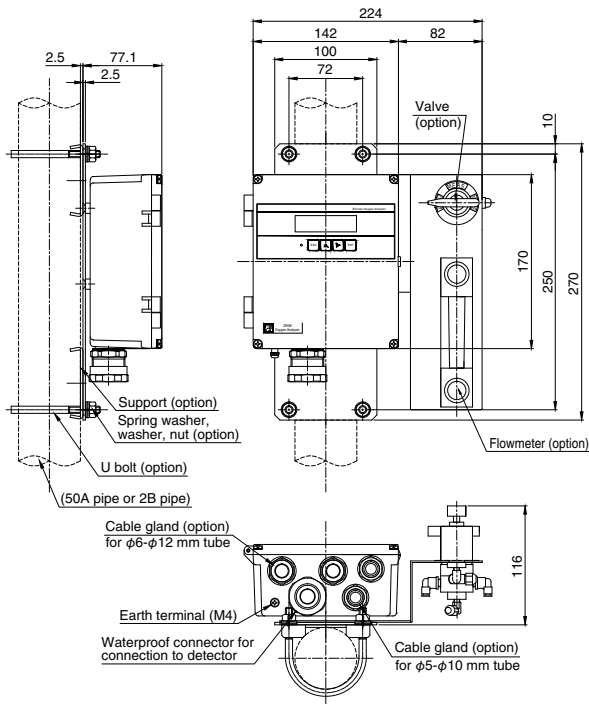
Notes: 1) Dust volumes listed above are approximate value.

2) If the oxygen concentration of ambient air fluctuates, select a detector with a pipe adapter for reference gas inlet (13th code A or B).

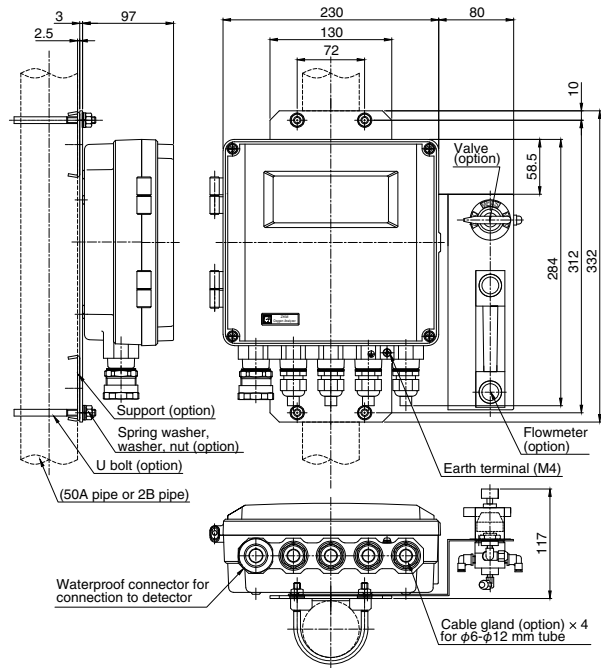
3) Consult us for specifications not listed above.

■ Dimensions (in mm)

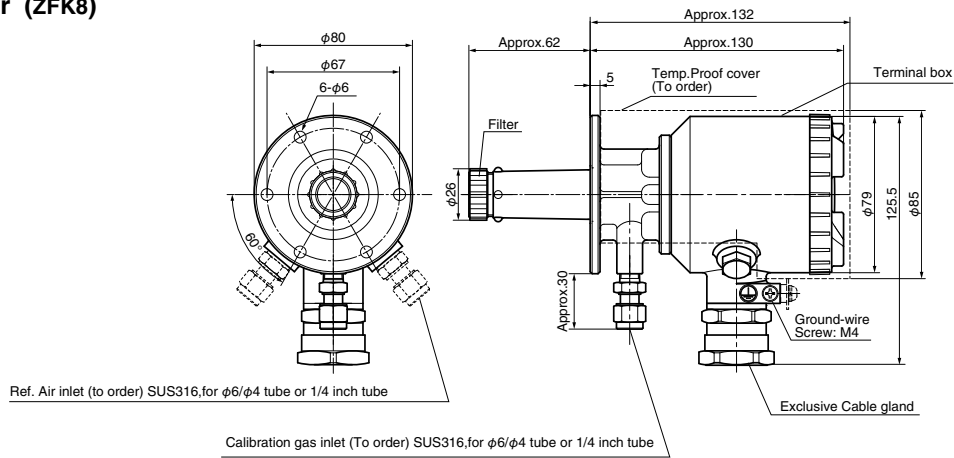
Converter (ZKMA) <IP66>



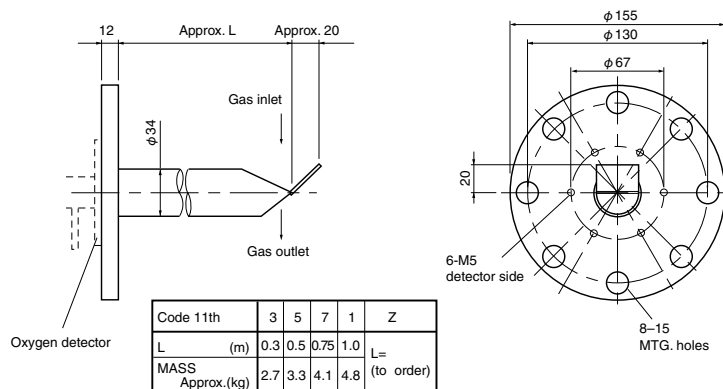
Converter (ZKMB) <IP67>



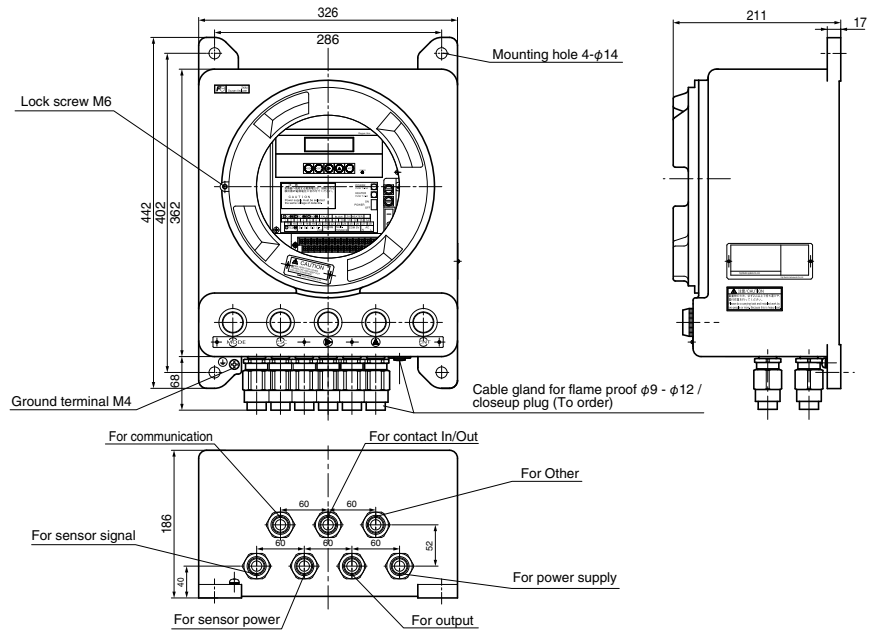
Detector (ZFK8)



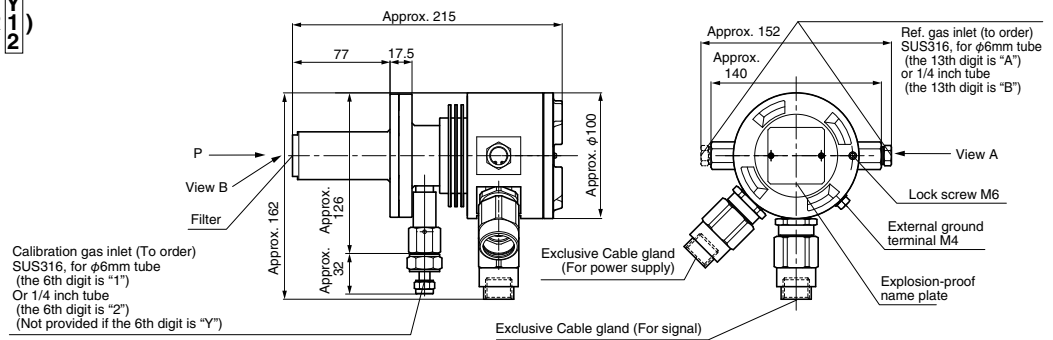
Flow guide tube for ZFK8 (Flange size JIS 5K 65A) 9th code:5, 10th code:A



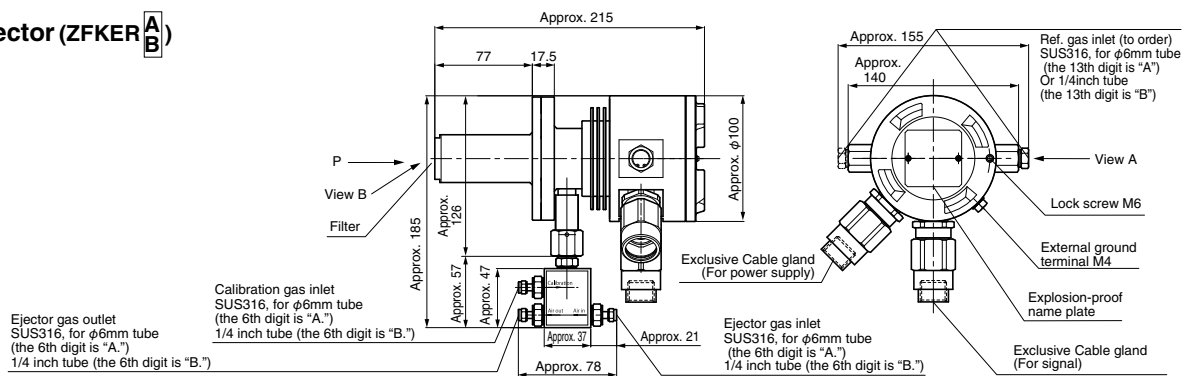
Converter (ZKME)



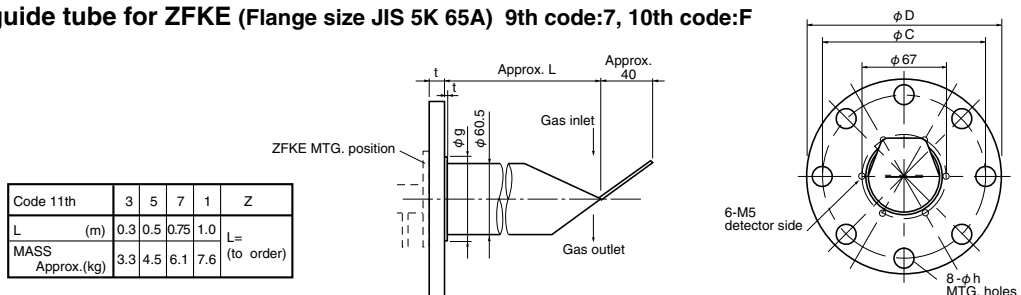
Detector (ZFKER ^Y1 ₂)



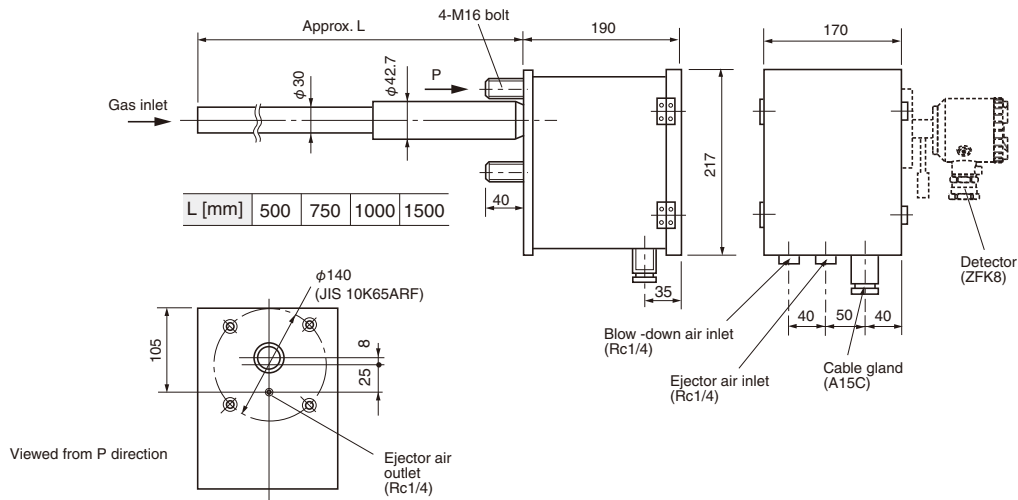
Detector (ZFKER ^AB)



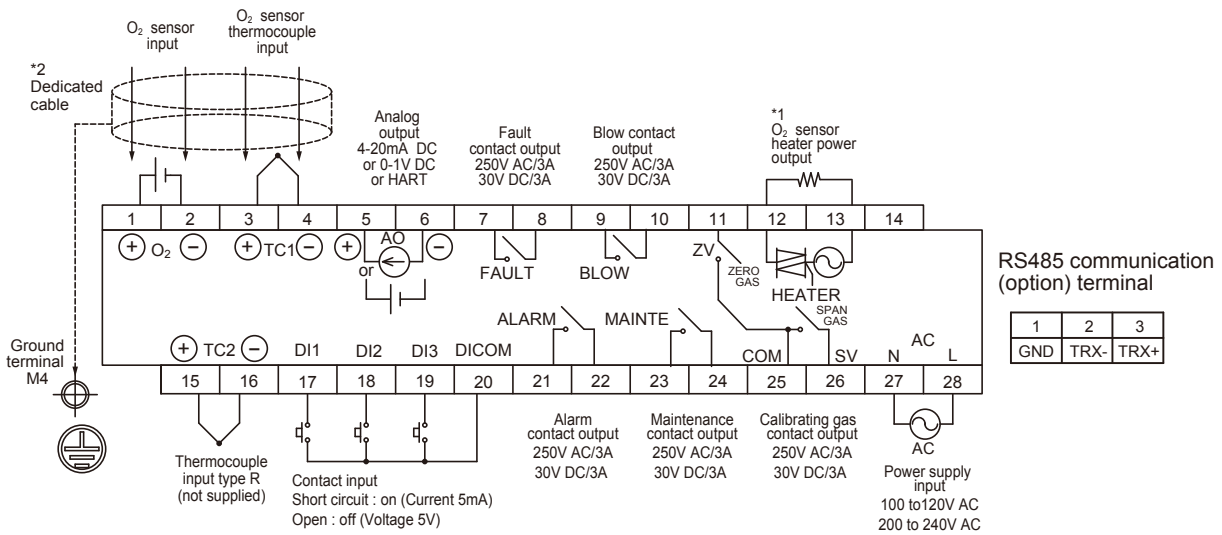
Flow guide tube for ZFKE (Flange size JIS 5K 65A) 9th code:7, 10th code:F



Ejector (ZTA) for ZFK8



■ Wiring diagram



- Note 1) The heater uses the same power source as the converter.
 Note 2) Connect the shield of the dedicated cable to the ground terminal inside the converter.
 Note 3) HART communication (option) uses the 4–20 mA analog output line.

Information in this catalog is subject to change without notice.
 Read the instruction manuals thoroughly before using the products.

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