Fuji Electric

Innovating Energy Technology

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

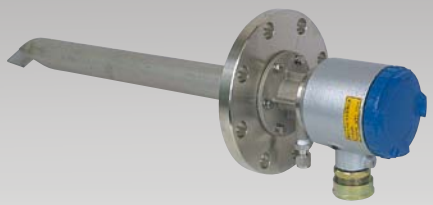
ZFKE

Safety-Enhanced and Low-Maintenance Design

IP66 converter ZKMA

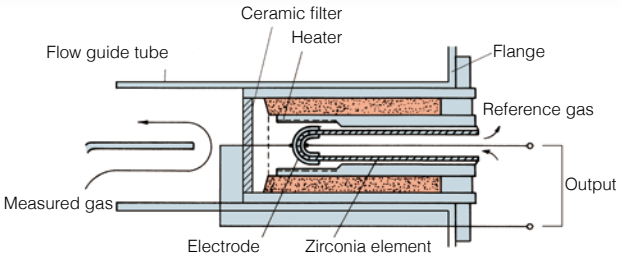
IP67 converter ZKMB

Detector ZFK8



Detector with flow guide tube

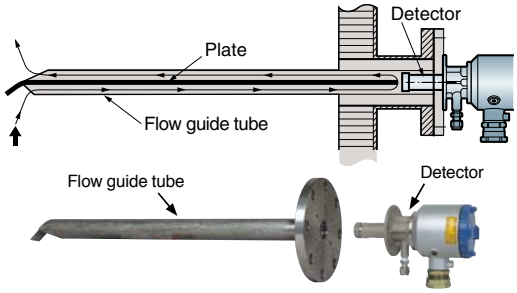
Operating Principle



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

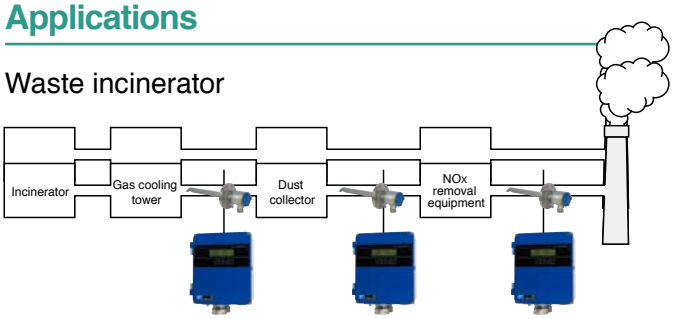
High Safety Level

- 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.

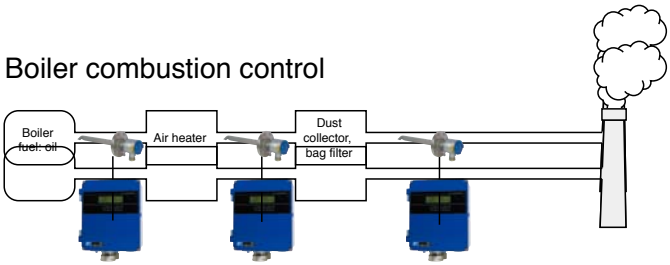
Easily Replaceable Zirconia Element

Applications

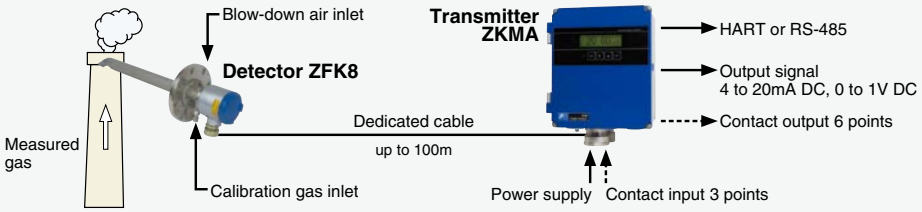
Waste incinerator



Boiler combustion control



■ System diagram



■ Ordering code

Detector

ZFK8 [R][ ][ ][5] - [ ][ ][ ][ ][ ] - [1][ ][ ]

(5 6 7 8 / 9 10 11 12 13 / 14 15 16)

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

Ejector *Non-compliant with CE marking

ZTA [ ][1][ ][ ][1]

(4 5 6 7 8)

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

Replacement detector element

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

Converter

ZKM [ ][ ][ ][ ][2] - [ ][ ][ ][1][ ] - [Y][R][ ]

(4 5 6 7 8 / 9 10 11 12 13 / 14 15 16)

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

Notes
1. 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.
2. If you order the version without combustion efficiency display (9th code Y, 2, 3, or 6), select “Y” in the 16th digit.
3. If you order the version with auto calibration (9th code 3, 5, 6, or 7), select "Y" in the 11th digit.
4. A thermocouple is to be prepared by customer.

Dedicated cable

ZRZ [K][R][ ][ ][1] - [ ]

(4 5 6 7 8 / 9)

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	6 m	Note 5	AA
	10 m	10 m	Note 5	BB
	15 m	15 m	Note 5	CC
	20 m	25 m	Note 5	DD
8	**Revision No.**			1
9	**Cable end treatment**			
	None			0
	One side (detector side)			1
	Both sides			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 [R][ ][ ][5] - [ ][ ][ ][Y][ ] - [ ][ ][1][ ]

(5 6 7 8 — 9 10 11 12 13 — 14 15 16 17)

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

Replacement detector element

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

Converter

ZKME [ ][ ][1][1] - [ ][ ][ ][1][ ] - [ ]

(5 6 7 8 — 9 10 11 12 13 — 14)

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

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

Dedicated cable

ZRZ [E][R][ ][ ][1] - [ ]

(4 5 6 7 8 — 9)

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

■ 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

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

Detector

	ZFK8			ZFKE
Gas temperature	With flow guide tube		-10…600°C	-10…600°C
	With ejector	For general use	-10…800°C	
		For high temperature	-10…1500°C	
Gas pressure	-3…3 kPa			
Filter material	Alumina, quartz paper			SS 316
Enclosure	IP66			IP66, flameproof
Weight (excl. flow guide tube)	1.6 kg			3 kg

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–■■□□□–1□□ ←Digit (9 10 11)

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/Nm³	Low	SS 304	Standard	5A □	ZKMA or ZKMB	–
	Coal			< 10 g/Nm³	Low	SS 316	With blowdown nozzle	5C □		
Refuse incinerators		≤ 600°C	5–20 m/s	< 1 g/Nm³	Low		For corrosive gas	5B □		
				< 10 g/Nm³	Low		With blowdown nozzle	5C □		
				< 25 g/Nm³	Low		For high particulate	6D □		
				< 25 g/Nm³	High		For high particulate, with cover	6E □		
Heating furnaces		≤ 800°C	≤ 1 m/s	< 1 g/Nm³	Low	–	No flow guide tube	0Y0		ZTA2
		≤ 1500°C	≤ 1 m/s	< 1 g/Nm³	Low	–	No flow guide tube	0Y0		ZTA1

ZFKE

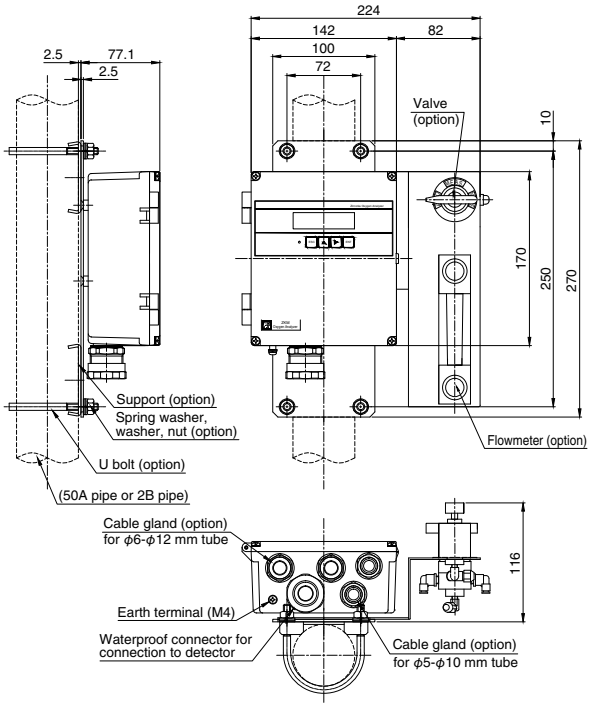
ZFKER□□5–□■□Y□–□□1□ ←Digit (10)

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/Nm³	Low	For corrosive gas	F	ZKME
	Coal			< 10 g/Nm³	Low	With blowdown nozzle	G	
Refuse incinerators		≤ 600°C	5–20 m/s	< 1 g/Nm³	Low	For corrosive gas	F	
				< 10 g/Nm³	Low	With blowdown nozzle	G	
				< 25 g/Nm³	Low	For high particulate	H K M	
				< 25 g/Nm³	High	For high particulate, with cover	J L N	

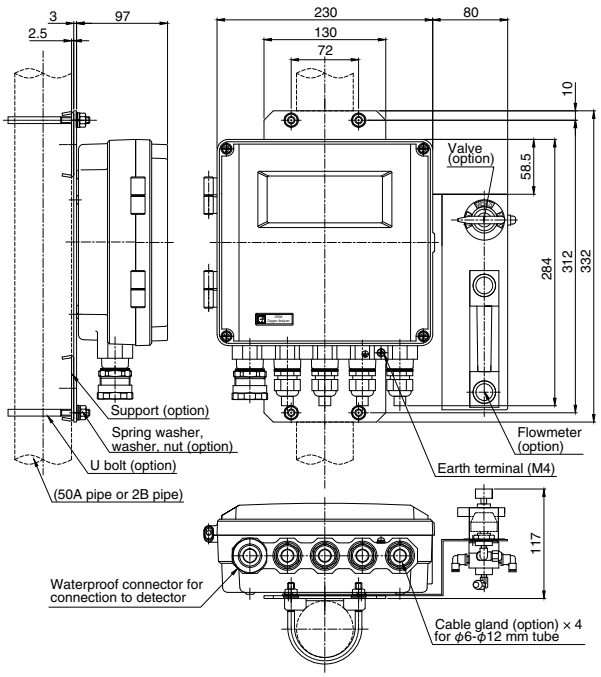
Notes: 1) Dust volumes listed above are approximate value.
2) If the oxygen concentration of ambient air fluctuates, select a detector with a pipe adapter for reference gas inlet (13th code A or B).
3) Consult us for specifications not listed above.

■ Dimensions (in mm)

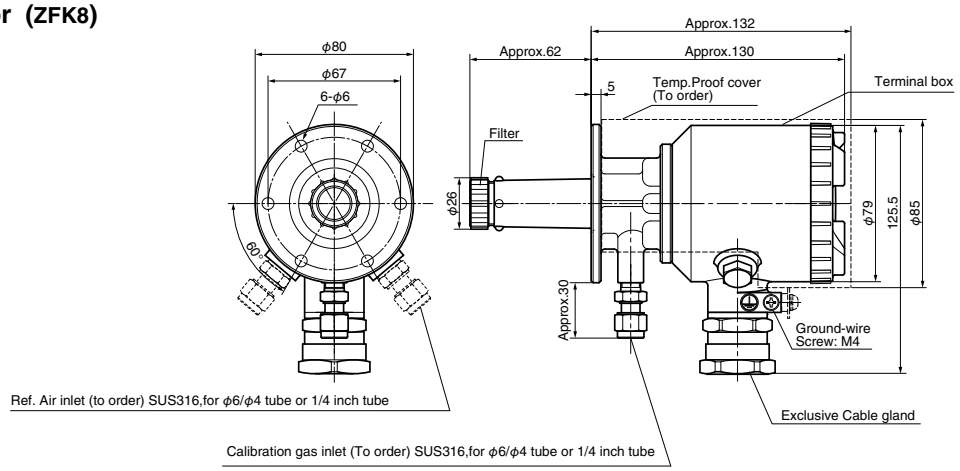
Converter (ZKMA) <IP66>



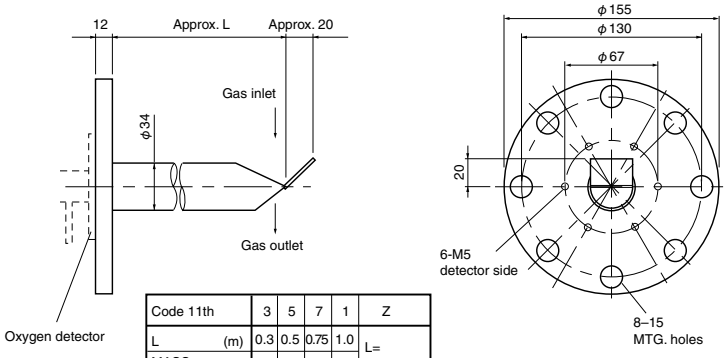
Converter (ZKMB) <IP67>



Detector (ZFK8)

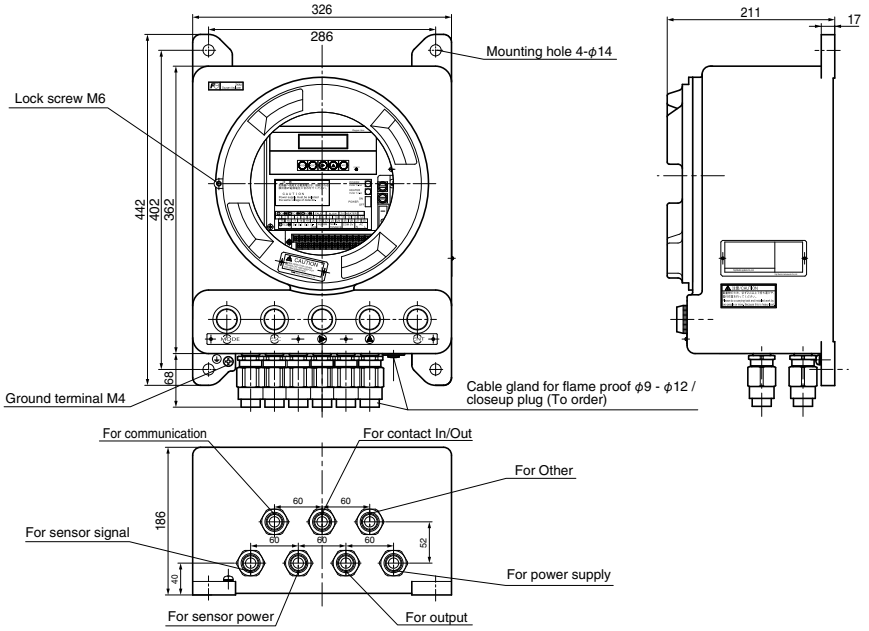


Flow guide tube for ZFK8 (Flange size JIS 5K 65A) 9th code:5, 10th code:A

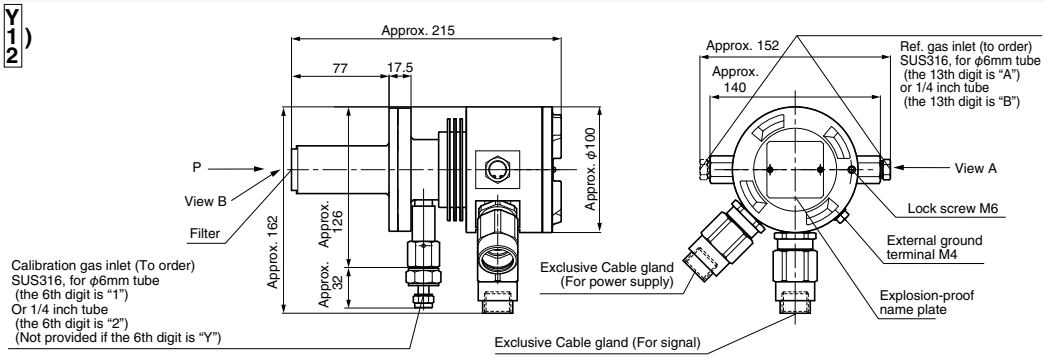


Code 11th	3	5	7	1	Z
L (m)	0.3	0.5	0.75	1.0	L= (to order)
MASS Approx.(kg)	2.7	3.3	4.1	4.8	

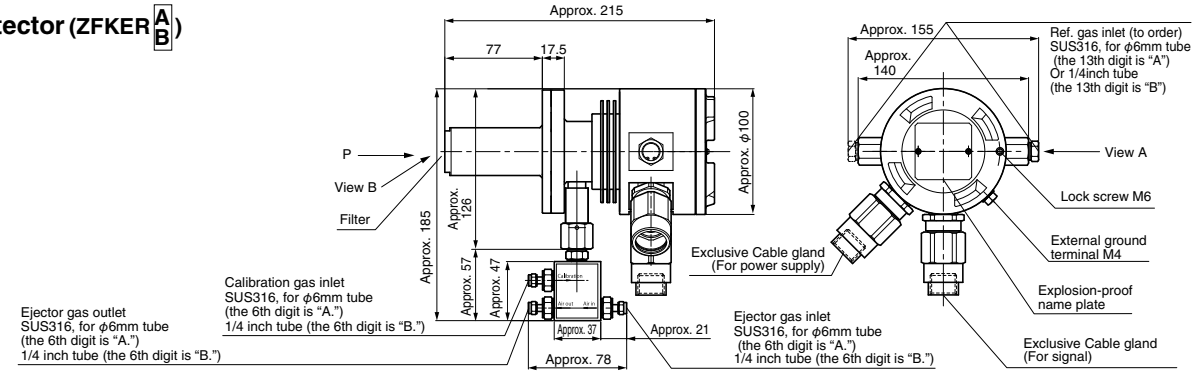
Converter (ZKME)



Detector (ZFKER Y / 1 / 2)

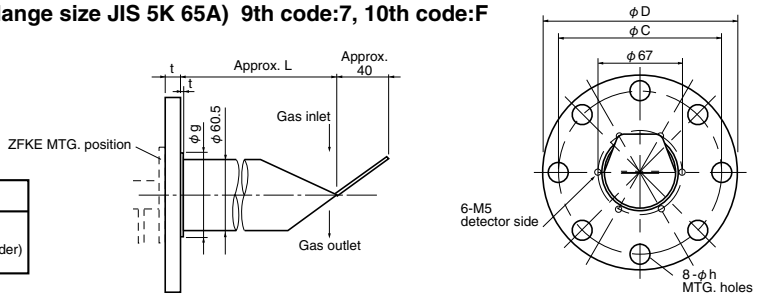


Detector (ZFKER A / B)

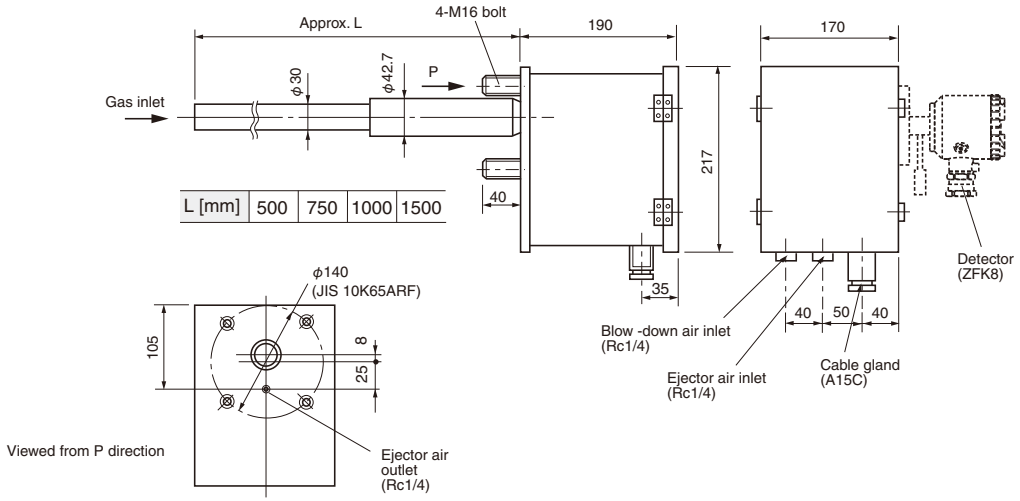


Flow guide tube for ZFKE (Flange size JIS 5K 65A) 9th code:7, 10th code:F

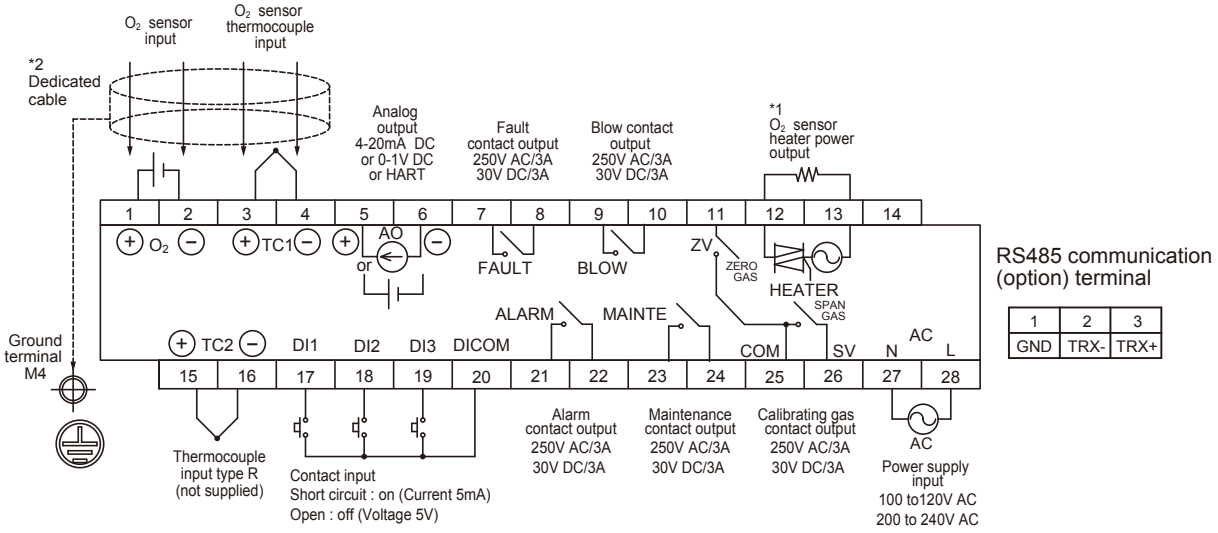
Code 11th	3	5	7	1	Z
L (m)	0.3	0.5	0.75	1.0	L= (to order)
MASS Approx.(kg)	3.3	4.5	6.1	7.6	



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.

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