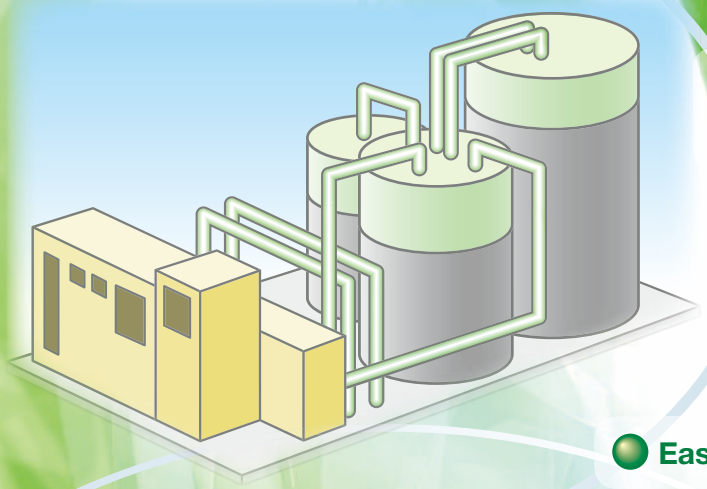
Fuji Electric

Innovating Energy Technology

Simultaneously and continuously monitors H_2S, CH_4, CO_2, and O_2

Biomass gas analyzer <ZPAF>

Perfect system for your application

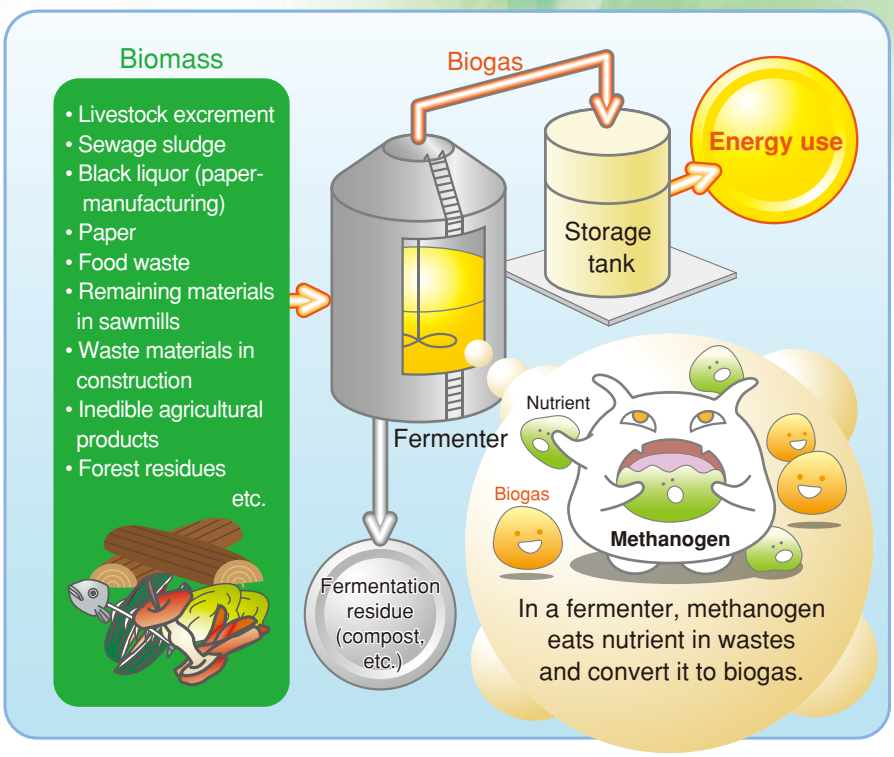


- **Simultaneous and continuous measurement of 4 components: H_2S, CH_4, CO_2, O_2**
- **Compact and lightweight 133 × 483 × 382 mm (H×W×D), approx. 9 kg**
- **Easy-to-see LCD**
- **A wide variety of optional functions**
  Automatic calibration, concentration alarm for upper and lower limit, remote input for switching range, range identification signal output, etc.

21C1-E-0082a

Biomass gasification process

Biogas generated through fermentation of biomass can be used as a fuel for boilers, gas engines, and other applications.



● Biogas composition

CH_4	50 to 75 vol%
CO_2	25 to 50 vol%
N_2	0 to 10 vol%
H_2	0 to 1 vol%
H_2S	0 to 3 vol%
O_2	0 to 2 vol%

● Biomass resources

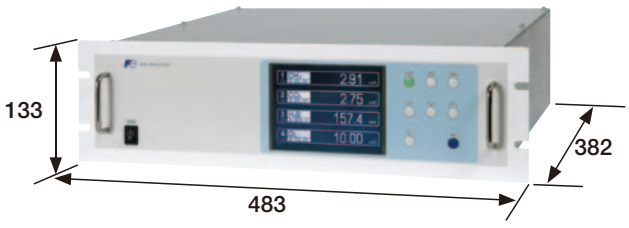
- Livestock excrement
- Sewage sludge
- Black liquor (paper - manufacturing)
- Paper
- Food waste
- Remaining materials in sawmills, etc.
- Waste materials in construction
- Inedible agricultural products
- Forest residues

Features

Contains 3 sensors necessary for monitoring 4 components

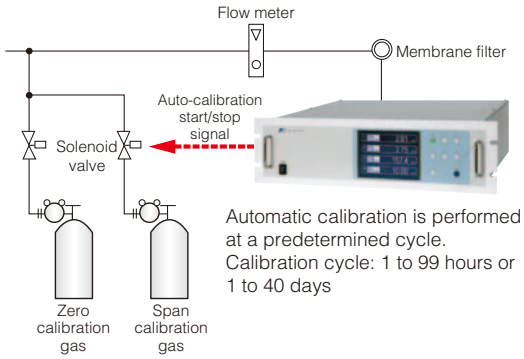
Target gas	Measurement range		Sensor
	1st range	2nd range	
CH_4	0 to 20 vol%	0 to 100 vol%	Single-beam infrared sensor
CO_2	0 to 20 vol%	0 to 100 vol%	
H_2S	0 to 500 ppm	0 to 2000/5000 ppm	Constant-potential electrolytic sensor
O_2	0 to 10 vol%	0 to 25 vol%	Galvanic cell sensor

Compact and lightweight



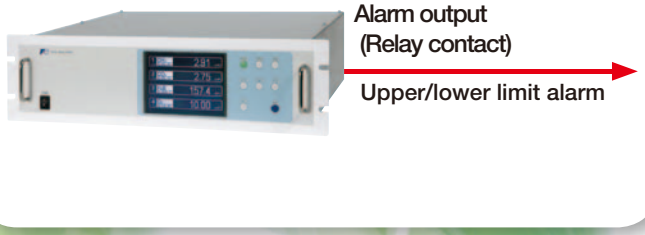
H133 x W483 x D382 mm, approx. 9 kg

Automatic calibration (optional) eliminates the need for troublesome calibration work

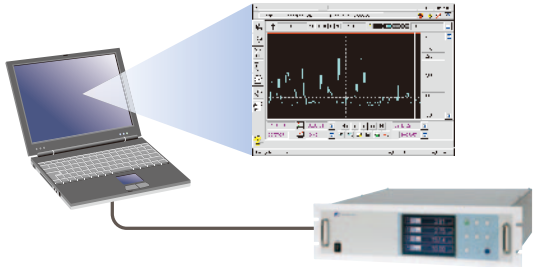


Automatic calibration is performed at a predetermined cycle.
Calibration cycle: 1 to 99 hours or 1 to 40 days

Gas concentration alarm output (optional)



RS485 (MODBUS) communication with PC (optional)



Specifications

■ Main specifications

Principle	CH_4, CO_2 (Single beam NDIR sensor) O_2 (Galvanic cell sensor) H_2S (constant-potential electrolytic sensor)		
Display	4-digit backlit LCD		
Components/ range	Component	1st range	2nd range
	CH_4	0 to 20 vol%	0 to 100 vol%
	CO_2	0 to 20 vol%	0 to 100 vol%
	H_2S	0 to 500 ppm	0 to 2000/5000 ppm
	O_2	0 to 10 vol%	0 to 25 vol%
Number of measurable components	Max. 4 (simultaneous and continuous measurement)		
Analog output	4 to 20 mA DC or 0 to 1 V DC (up to 12 points)		
Contact output (optional)	1c contact (max. 15 points) Device error, calibration error, range identification, auto-calibration status, solenoid valve drive for auto-calibration, limit alarm		
Contact input (optional)	Voltage input (12 to 24 V DC) up to 9 points Remote switchover of ranges, auto-calibration remote start, remote hold		
Output hold	During calibration, output signal can be hold at the value before calibration.		
Range switchover	manual or automatic		
Power supply voltage	100 to 240 V AC, 50/60 Hz		
Power consumption	Approx. 100 VA		
Dimensions	Refer to outline drawing		
Ambient temperature	5°C to 40°C (H_2S and O_2 sensors: 15°C to 40°C)		
Weight	Approx. 9kg		
Gas inlet/outlet	Rc 1/4 or NPT 1/4 internal thread		
Sensor life expectancy	O_2 sensor: approx. 2 years H_2S sensor: approx. 1 year		
Certification	CE Marking		

■ Performance

Repeatability	±0.5 %FS (H_2S: ±2.0 %FS)
Linearity	±1 %FS (H_2S: ±2.0 %FS)
Zero drift	±2 %FS/week
Span drift	±2 %FS/week H_2S (0 to 2000 ppm) : ±2.5 %FS/week H_2S (0 to 5000 ppm) : ±5 %FS/day
Response (90 %FS)	10 to 30 sec. H_2S (0 to 2000 ppm) : 180 sec. H_2S (0 to 5000 ppm) : 300 sec.
Remote output hold	by external contact input

■ Functions

Range identification output	Measurement range can be identified.
Automatic zero/span calibration	can be performed at a predetermined cycle.
Auto-calibration remote start	by external digital input
Simple zero calibration	can be performed at a predetermined cycle.
Upper/lower limit alarm	output when the gas concentration reaches the preset value.
Contact output	· at device error · at calibration error · during auto calibration
Communication	RS485 communication (MODBUS)

■ Gas conditions

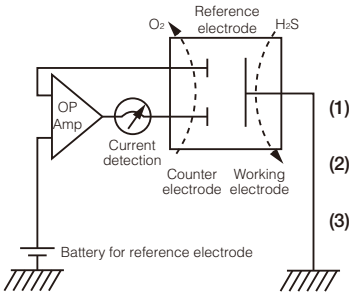
Flow rate	0.5 ±0.2 L/min
Temperature	10 to 50°C
Pressure	10 kPa or less
Dust	100 μg/Nm^3 or less in particle size of 0.3 μm or smaller

■ Replacement sensor

H_2S sensor	Model: ZZP＊TQ503691C1 (0 to 2000 ppm) Model: ZZP＊TQ503691C3 (0 to 5000 ppm)
O_2 sensor	Model: ZZP＊TQ503691C2

Principle

● Constant-potential electrolytic sensor (for H_2S)

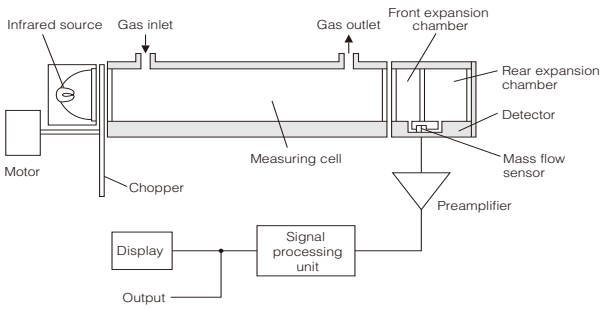


(1) Reaction at the working electrode
$H_2S + 4H_2O \rightarrow H_2SO_4 + 8H^+ + 8e^-$

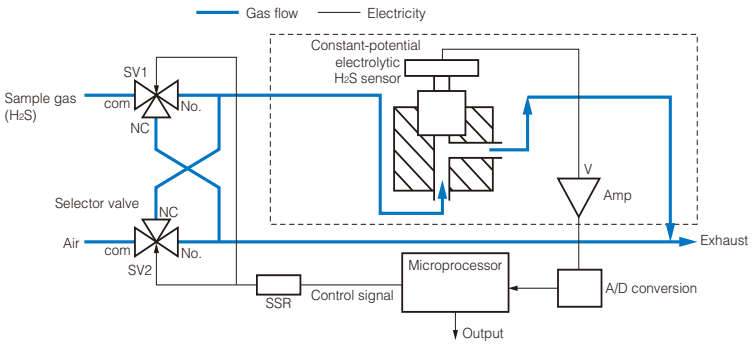
(2) Reaction at the counter electrode
$O_2 + 4H^+ + 4e^- \rightarrow 2H_2O$

(3) Total reaction
$H_2S + 2O_2 \rightarrow H_2SO_4$

● Infrared sensor (for CO_2 and CH_4)

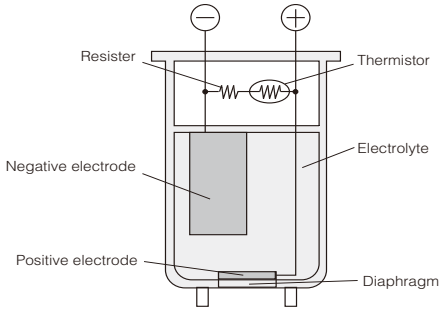


● H_2S measurement



As the H_2S sensor uses constant-potential electrolytic method, there must be oxygen included in the sample gas.
Therefore, air is supplied to the sensor at regular intervals to enable gas analysis in biogas plants where oxygen is absent, and thus stable readings are provided.

● Galvanic fuel cell sensor (for O_2)



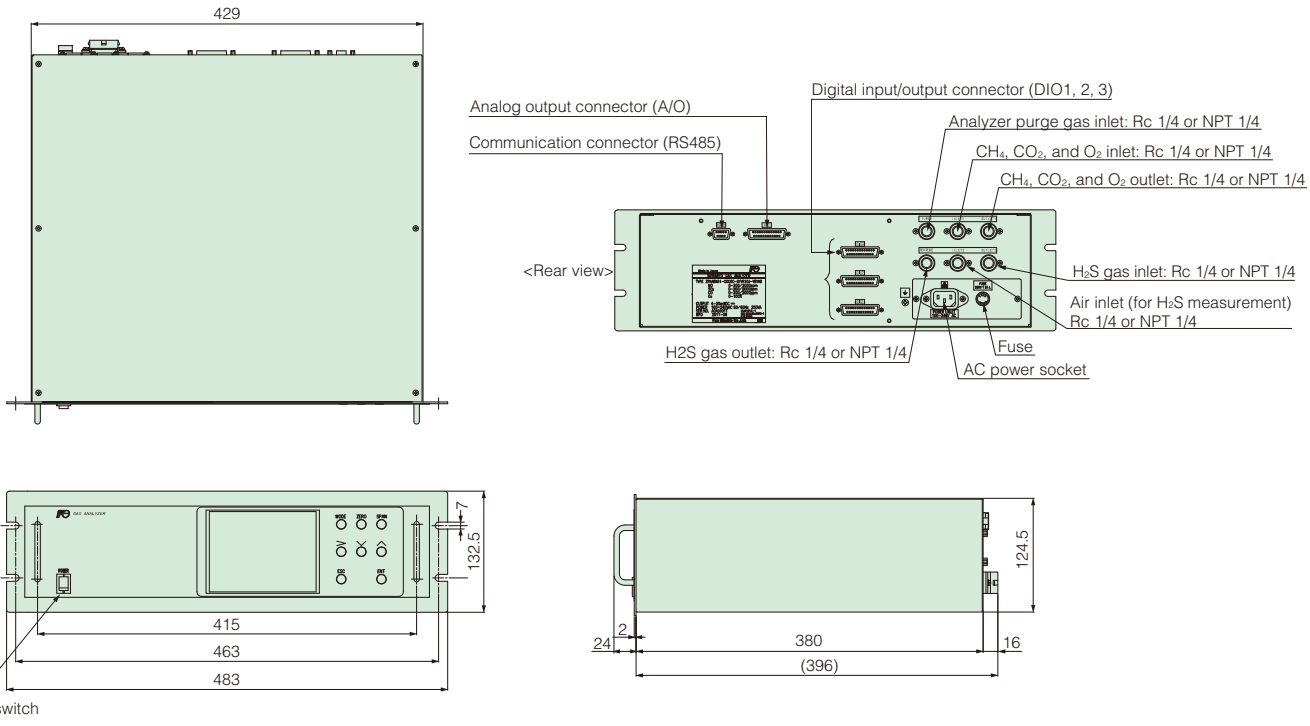
Model Specifications

	4	5	6	7	8		9	10	11	12	13		14	15	16	17	18	19	20		21	22	23	24	25	← Digit
ZPA	F	B			1	-					Y	-	Y	Y	Y					-	Y		Y	A	G	

Digit	Specifications		Code
4	Specification	Biomass gas	F
5	Installation	19-inch rack mount	B
6	Measured components (CH_4, CO_2)	none	Y
		CO_2 (1st component)	D
		CH_4 (1st component)	E
		CO_2 (1st component)+CH_4 (2nd component)	L
7	Measured components (O_2, H_2S)	H_2S	6
		O_2 + H_2S	7
8	Revision code		1
9	Measurement range (1st component 1st range)	none	Y
		0 to 20 vol%	N
10	Measurement range (1st component 2nd range)	none	Y
		0 to 100 vol%	R
11	Measurement range (2nd component 1st range)	none	Y
		0 to 20 vol%	N
12	Measurement range (2nd component 2nd range)	none	Y
		0 to 100 vol%	R
17	Measurement range (O_2, H_2S)	0 to 10/25 vol% O_2	C
		0 to 500 ppm/2000 ppm H_2S	T
		0 to 500 ppm/5000 ppm H_2S	V
		C + T	U
		C + V	W
18	Gas inlet/outlet size	Rc 1/4	1
		NPT 1/4	2

Digit	Specifications					Code
19	Output signal	0 to 1 V DC				A
		4 to 20 mA DC				B
		0 to 1 V DC + RS485 communication				C
		4 to 20mA DC + RS485 communication				D
20	Language/Power cable	Japanese/Power cable rated 125 V (PSE)				J
		English/Power cable rated 125 V (UL)				E
		English/Power cable rated 250V (CEE)				U
		Chinese/Power cable rated 250V (CCC)				C
21	-					Y
22	Optional functions (DIO)	FAULT	Auto calibration	Upper/lower limit alarm	Range identification	
		-	-	-	-	Y
		○	-	-	-	A
		○	○	-	-	B
		○	-	○	-	C
		○	-	-	○	D
		○	○	○	-	E
		○	-	○	○	F
		○	○	-	○	G
		○	○	○	○	H
23	-					Y
24	Unit	ppm, vol%				A
25	Adjustment	Biogas				G

Dimensions (unit: mm)



Fuji Electric Co., Ltd.

Grobal Sales Section
Instrumentation & Sensors Planning Dept.
1, Fuji-machi, Hino-city, Tokyo 191-8502, Japan
http://www.fujielectric.com
Phone: +81-42-514-8930 Fax: +81-42-583-8275
http://www.fujielectric.com/products/instruments/

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