

INFRARED GAS ANALYZER

DATA SHEET

ZRC

This infrared gas analyzer measures the concentration of gas by utilizing the nature of gas (foreign atom molecules) to absorb infrared rays of a specific wavelength.

A number of advanced techniques such as a high sensitivity mass-flow sensor, a single point chopper of excellent S/N ratio, and a detector which effectively compensates for interference, have been concentrated in this analyzer to provide outstanding stability and precise measurement.

This non-dispersive type infrared gas analyzer is optimum for use not only as a CO meter for the environment (measuring method type approved product), but for applied research in various research facilities and for measuring the concentration of various gases.



FEATURES

1. A wide range of applications

In addition to the standard measurement method, this instrument can perform 2-mode measurement of absolute concentration and concentration difference via a differential measuring system, plus precise measurement of low concentrations with a built-in sample switching system, which allows a broad range of applications.

2. Compact and easy to maintain

Options such as pump, filter, flowmeter, indicator and so on can be all built in a compact case. And the instrument comes in three types; a 19-inch rack mounting type, a panel mounting type and a desk-top type.

3. High accuracy and stability

A single-light-source double-beam system, a high sensitivity mass-flow sensor, a single point chopper with excellent S/N ratio assures precise and stable measurements.

4. Minimum interference

An interference compensating detector minimizes the influence of other gases coexisting in the sample gas.

5. A wide dynamic range

The standard type analyzer has a rangeability of 1:20 maximum while the differential and sample switching type analyzers have 1:10 maximum.

SPECIFICATIONS

General items

Range selection: Performed by a switch on the front panel.
Power supply: 110V, 115V or 220V $\pm 10\%$ AC, 50/60Hz as specified

Note: Refer to "Code symbols".

Power consumption:

110VA max. (200VA max. when CO/CO₂ converter equipped)

Ambient temperature:

-5 to +45°C

Ambient humidity:

90% RH or less

Enclosure: Steel plate casing

External dimensions (H x W x D):

Rack mounting type; 220 x 483 x 350mm

Panel mounting type; 220 x 443 x 350mm

Desk-top type; 250 x 443 x 350mm

Weight:

Approx. 17kg (approx. 21kg when converter, pump and flowmeter equipped)

Finish color:

Casing; Munsell 5 Y 8/1, semi-gloss
Base section; Munsell N1.5, semi-gloss

Sample gas temperature:

0 to 50°C

Warmup time: About 4 hours or more (after turning on power)

Material of gas contacting parts:

Sample cell; SUS304, neoprene rubber
IR transmitting window;

CaF₂ or sapphire

Internal piping;

Teflon, silicone or toaron tube

Size of gas inlet/outlet, purge gas inlet:

PT1/4 internal thread

Purge gas flow rate:

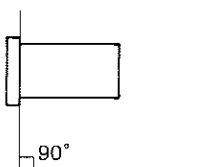
1 ± 0.5ℓ/min (purging provided when necessary)

Scope of delivery:

Analyzer, mounting brackets, test results (including calibration curve), power fuse, cleaning cloth for IR transmitting window

Mounting method:

Mounted on a 19-inch rack, on a panel, or on a desk



Installation conditions:

Select a place that is not exposed to direct sunlight or heat from a high temperature object, where there is minimum vibration, and which is clean. Also avoid a place where there is corrosive or combustible gas. For outdoor installation, use an appropriate case and cover to protect from wind and precipitation.

Standard type; ZRC1

Single-component analyzer for continuously measuring CO/CO₂ concentration etc.

Measuring method:

Non-dispersion infrared absorption method, deviation method, single-light-source double-beam system

Detectable components and scale:

Component		Minimum scale range	Standard scale
CO	Carbon monoxide	0 to 100ppm	Refer to "Code symbols"
CO ₂	Carbon dioxide	0 to 50ppm	
NO	Nitric monoxide	0 to 100ppm	
SO ₂	Sulfur dioxide	0 to 200ppm	
CH ₄	Methane	0 to 500ppm	
CCl ₄	Carbon tetrachloride	0 to 200ppm	
N ₂ O	Nitrous oxide	0 to 200ppm	
CF ₃ CHBrCl	Halothane	0 to 50ppm	
C ₂ HF ₃ Cl -OCHF ₂	Ethrane	0 to 50ppm	
C ₂ H ₅ OH	Ethyl alcohol	0 to 250ppm	

Note: This method is also available to detect other components. Consult us when to specify other components.

Measuring range:

See "Standard type measuring range"

Output signal:

0 to 1V / 4 to 20mA DC simultaneous output
Linearity ± 2% of full scale (one linearizer circuit built in)
0 to 1V DC/0.1Ω or less; allowable load current 2mA or less
4 to 20mA DC; allowable load resistance 550Ω or less

Repeatability: Within ± 0.5% of full scale
Zero drift: Within ± 2% of full scale per week
Span drift: Within ± 2% of full scale per week

Response time: Within 20 sec including gas substitution time (for 90% response); differs with the length of sample cell

Sample gas flow rate:
0.5 ± 0.25ℓ/min standard

Sample switching type; ZRC3

Sample switching type gas analyzer optimum for low concentration measurements or for excluding influence of interfering components

Measuring method:

Non-dispersion infrared absorption method, deviation method, single-light-source double-beam, sample switching system

Detectable component:

CO (carbon monoxide)

Measuring range:

1st range	2nd range
0 to 10ppm	none, 0 to 20, 25, 50, 100ppm
0 to 25ppm	none, 0 to 50, 100ppm
0 to 50ppm	none, 0 to 100ppm
0 to 100ppm	none

Output signal: 0 to 1V DC linear (output resistance 300Ω or less); step-like output which changes every 50 sec

Repeatability: Within ± 1% of full scale
Zero drift: Within ± 0.5% of full scale per week
Span drift: Within ± 1.5% of full scale per week
Response time: Within 120 sec (for 90% response)

Sample gas flow rate:
2.0 ± 0.2ℓ/min (reference gas + sample gas)

Sample switching type; type approved by measurement and weighing laws

Application: Measurement of CO in environment

Measuring method type approved product:
Type; ZRC
Approval No.; SA 792-1

Other specifications are the same as for sample switching type, ZRC3.

Differential flow type; ZRC4

A gas analyzer optimum for measurement in two modes, absolute concentration and difference concentration between sample and reference.

Measuring method:

Non-dispersion differential infrared absorption method with flowing reference cell, deviation method, single light source double beam system

Detectable components and measuring range:

Detectable component		1st range	2nd range
CO ₂	Carbon dioxide	-50 to +50ppm	0 to 500ppm
		-100 to -100ppm	0 to 1000ppm
CO	Carbon monoxide	0 to 100ppm	none, 0 to 200, 250, 500ppm
		0 to 200ppm	none, 0 to 500ppm
		0 to 250ppm	none, 0 to 500ppm

Output signal:	1st range	2nd range	
	CO ₂	DC -1V to +1V	DC 0 to 1V
	CO	DC 0 to 1V	DC 0 to 1V

Linear output; linearity $\pm 2\%$ of full scale, allowable load current 2mA or less

Repeatability: Within $\pm 0.5\%$ of full scale

Zero drift: Within $\pm 2\%$ of full scale per week

Span drift: Within $\pm 2\%$ of full scale per week

Response time: Within 25 sec. including gas substitution time (for 90% response)

Sample gas flow rate:

1 \pm 0.5l/min (reference gas + sample gas)

Optional devices

(provided when specified; see "Code symbols".)

Indicator: Moving coil type, JIS 1.5 class, scale length 80mm, uniform scale (0 to 1) without unit

Filter, flowmeter: Membrane filter and flowmeter are built in.

Notes (1) The built-in membrane filter is a monitoring filter consisting of 3 sheets of glass fiber. A pre-filter must be separately prepared.

(2) These components can be seen by detaching the front cover.

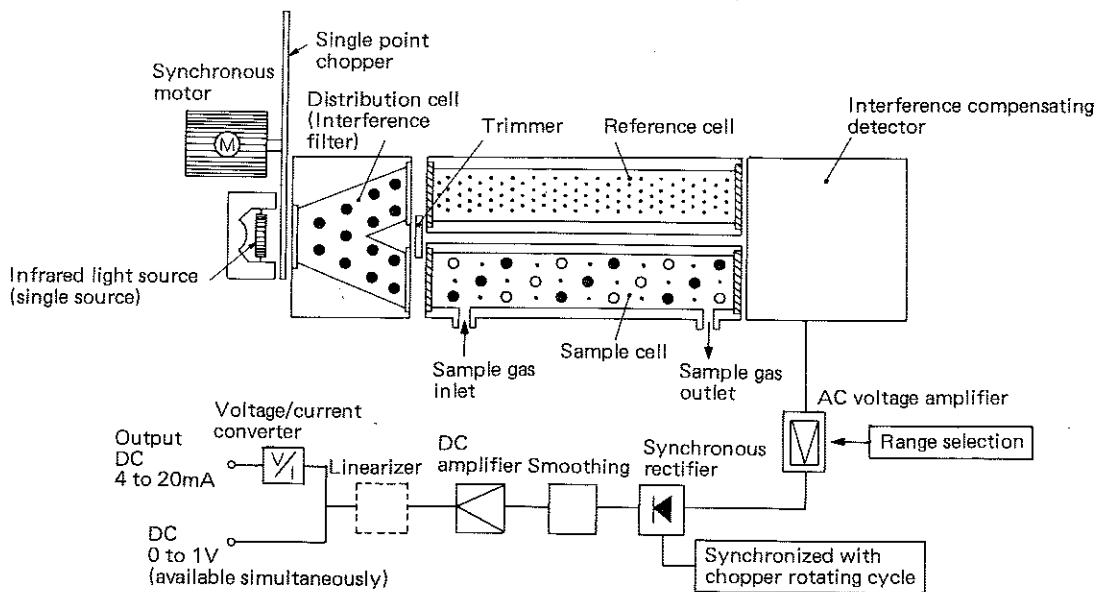
Pump:

A small dual electromagnetic pump is built in, so sample gas and reference gas can be separately sampled at the same time.

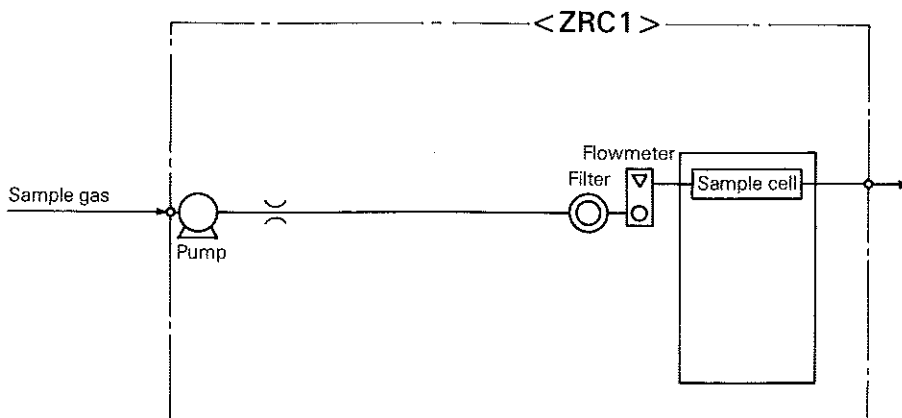
CO/CO₂ converter:

Used with the sample switching type analyzer or the like, and has a special catalyst which efficiently converts CO in sample gas into CO₂; converter is built in the analyzer.

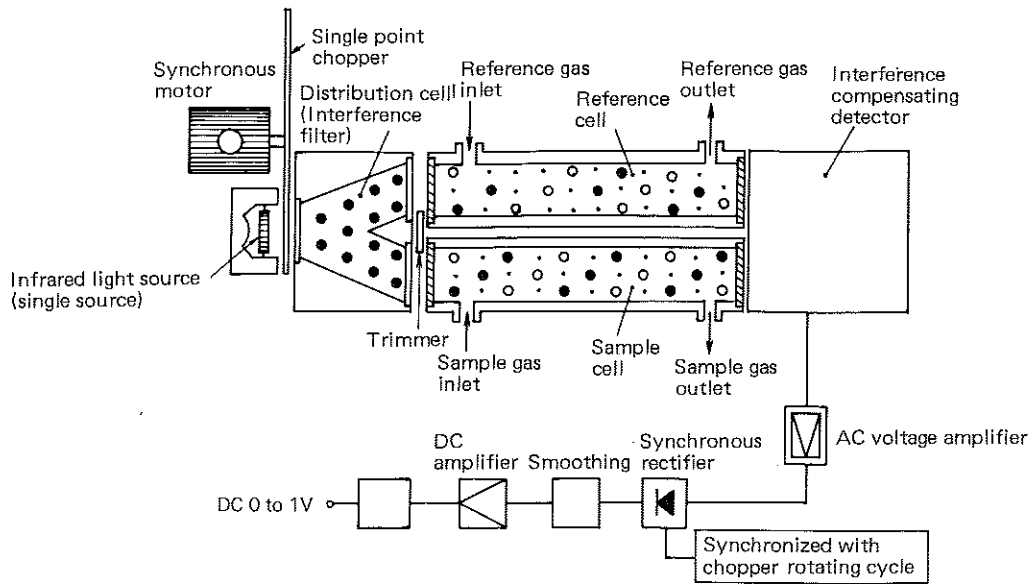
FUNDAMENTAL PRINCIPLE DIAGRAM (Standard type)



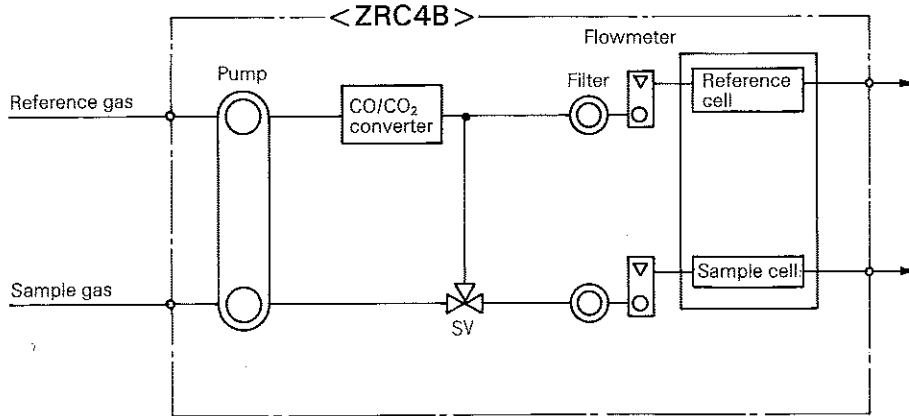
BLOCK DIAGRAM WITH OPTIONAL SAMPLING DEVICES



FUNDAMENTAL PRINCIPLE DIAGRAM (Differential flow type)

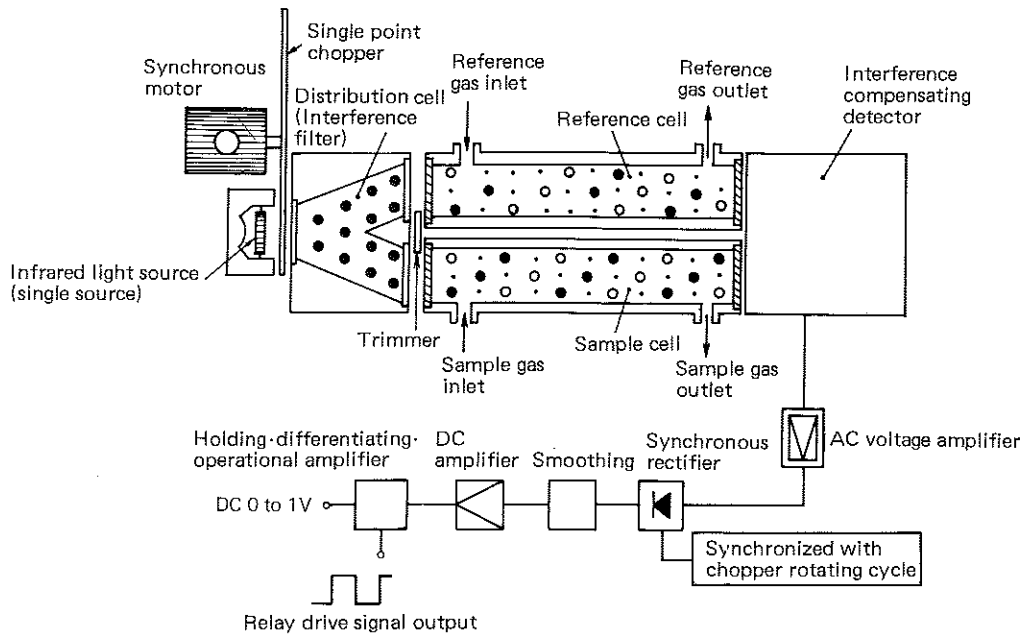


BLOCK DIAGRAM WITH OPTIONAL SAMPLING DEVICES



Note) The sampling device for CO₂ analyzer ZRC4D should be separately prepared and installed outside this instrument.

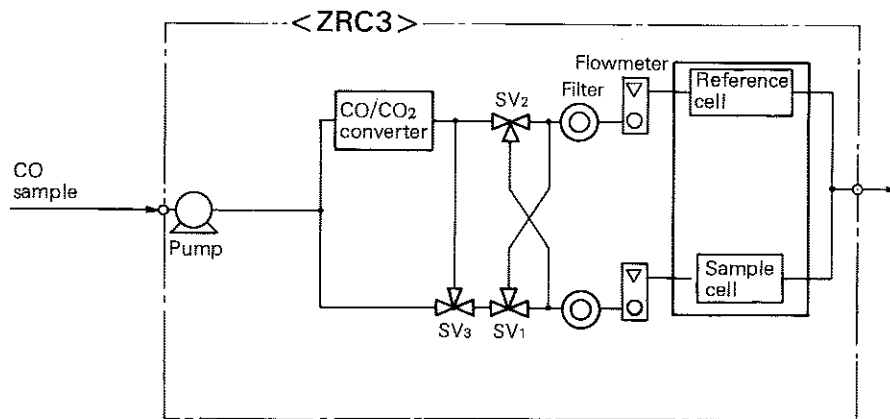
FUNDAMENTAL PRINCIPLE DIAGRAM (Sample switching type)



Operation of sample switching system

The sample gas is divided into two, and one of the flow paths contains a high performance converter which converts carbon monoxide into carbon dioxide to obtain zero (reference) gas and led into one cell of the high sensitivity infrared analyzer, while the other gas is led directly into the other cell. According to the changeover valve drive signal transmit-

ted from the analyzer, the flow paths are switched via changeover valves SV₁ and SV₂ every 50 seconds. And by performing this switching cyclically, the output of the analyzer changes according to the concentration of carbon monoxide in the measured gas. The amount of change is taken as a measured value to improve the S/N ratio, whereby the interference of components and zero drift are eliminated.



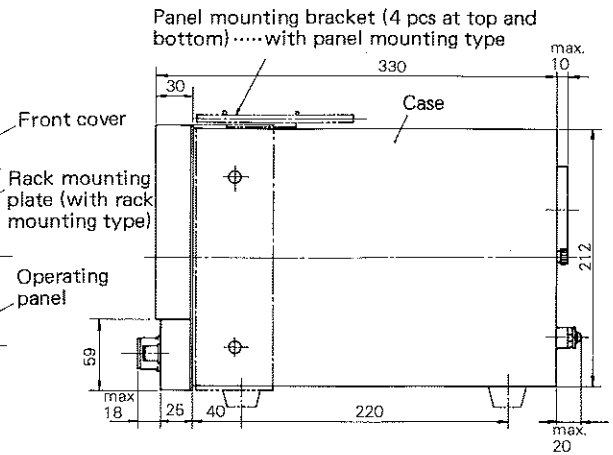
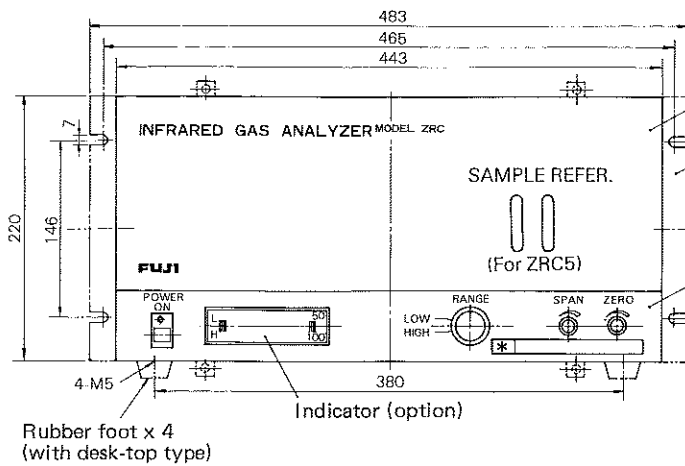
< Differential flow type >

1 2 3 4 5 6 7 8 9 10 11 12 13 14

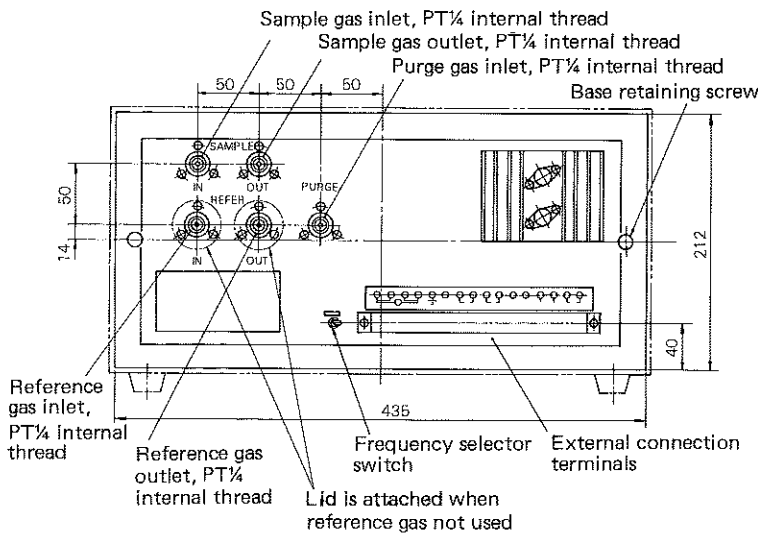
Z	R	C	4									Y	0		
4															
DQ6															
DR7															
BB0															
BB2															
BB3															
BB5															
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Description				
Fundamental configuration				
Differential flow type				
Detectable component	1st measuring range	2nd measuring range		
CO ₂ (Carbon dioxide)	350 ± 50ppm 350 ± 100ppm	0 to 500ppm 0 to 1000ppm		
CO (Carbon monoxide)	0 to 100ppm	1st range × 0 × 2 × 2.5 × 5		
	0 to 200ppm	1st range × 0 × 2 × 2.5		
	0 to 250ppm	1st range × 0 × 2		
Structure				
1 Desk-top type				
2 19-inch rack mounting type				
3 Panel mounting type				
Power supply				
A 110V AC 50Hz				
B 110V AC 60Hz				
C 115V AC 60Hz				
D 220V AC 50Hz				
Optional devices				
Applied measured gas	Indicator	Filter, flow-meter	Pump	CO/CO ₂ converter
CO ₂	— ○	— —	— —	— —
CO	— ○ ○ ○	— ○ ○ ○	— ○ ○ —	— ○ ○ ○
Non-standard specification				
Z Other non-standards				

OUTLINE DIAGRAMS (Unit: mm)

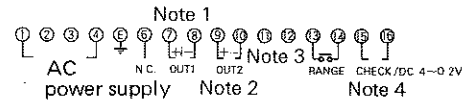


CASE REAR DIAGRAM



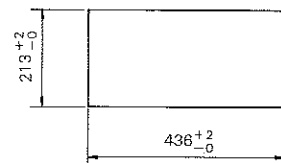
Notes: *1 Type approval auxiliary nameplate (For ZRC5)
 *2 Type approval nameplate

EXTERNAL CONNECTION DIAGRAM



Notes: (1) DC 0 to 1V. DC 0 to 1V and DC ±1V with ZRC4D.
 (2) DC 4 to 20mA. None with ZRC3, 4D, 5.
 (3) None. For zero calibration with ZRC3, 4B, 5.
 (4) None with ZRC4D, ±1V with ZRC3, 5.

PANEL CUTOUT DIMENSIONS (With panel mounting type)



CAUTIONS ON INSTALLATION

1. Wiring and piping inside the analyzer should be flexible with a length margin of at least 300mm so that the base can be pulled out for maintenance.
2. At least 70% of the instrument weight should be supported by the case bottom.