

Innovating Energy Technology

# **THERMAL CONDUCTIVITY GAS ANALYZER** (Type: ZAF-4)

# Optimum for concentration measurement for H<sub>2</sub>, Ar and He.



- Operation facilitated with easy-to-read, large LCD panel.
- Free voltage on 100 to 240 V AC,50/60 Hz.
- **CRS232C (MODBUS) communication.** (option)
- Automatically calibrates zero/span. (option)
- Computes and corrects influence by other gases. (option)
- Gas concentration alarm output. (option)
- Two measuring range. (option)





Mountable in same panel cutout as

heretofore.

#### Easy-to-read, large LCD.



#### Operation is facilitated with the aid of guidance in English.



240

H<sub>2</sub> measurement

CO2 measurement

Two range. (option)

command.

Range ratio

Compact size mountable on panel.

Computes and corrects influence by other gases. (option)

192

A range selected by key on front panel or by external contact closure

Up to 1:10 for H<sub>2</sub> or He measurement,

Linear measurement output signal.

Up to 1:5 for Ar, CH<sub>4</sub> or CO<sub>2</sub> measurement.

/169







# High-high limit Low-low limit

# Main applications

- H<sub>2</sub> concentration measurement for semiconductor equipment.
- H<sub>2</sub> concentration measurement for hydrogen generator.
- H<sub>2</sub> concentration measurement for kiln.
- Ar, He or CH<sub>4</sub> concentration measurement for gas generation plant.
- He concentration measurement for super-conducting equipment.
- Ar concentration measurement for air separation plant.

# Thermal Conductivity Ratio of Gases

	-						
Gases	Comparative thermal conductivity (0°C when replacing thermal conductivity of (2.41 x 10-2 w/(m.k) with 1						
Sulfur dioxide gas Carbon dioxide gas Argon Carbon monoxide Steam (100°C) Air Nitrogen Oxygen Methane	SO2 CO2 Ar CO H2O N2 O2 CH4						
Hydrogen	H <sub>2</sub>						

# es OMeasuring Principle

Dispenses with external linearizer.

This thermal conductivity gas analyzer measures gas concentration by utilizing the different thermal conductivities of 2 gas components. In the detector, there are reference and measuring chambers in each of which a thin platinum wire is stretched. The reference chamber is filled with reference gas and through the measuring chamber, sample gas is flowed. Each platinum wire composes a bridge circuit in combination with an external fixed resistor, and it is heated by flowing a constant current. When there is a change in the concentration of the component under measurement, the thermal conductivity of sample gas will change to affect the temperature of the platinum wire in the measuring chamber. The resulting thermal change is taken out as a change in electric resistance, according to which the concentration of measured gas is calculated.



(Unit mm)

Mass 5kg

Corrected output signal

CO<sub>2</sub> measurement signal

4 to 20mA DC, etc.

(1 to 5V DC)

## • Specifications (Standard type)

#### **Standard Specifications**

Measuring principle	Measurement of thermal conductivity						
Measurable component	He,Ar,H <sub>2</sub> ,CH <sub>4</sub> ,CO <sub>2</sub>						
Measurable range	As specified for particular type.						
Output signal	4 to 20mA DC, 0 to 1V DC, 0 to 10mV DC Non-isolated output(Any one-output signal specifiable in CODE SYMBOLS)						
Allowable load resistance	550Ωmax. (in 4 to 20mA DC output)						
Output resistance	100kΩ(in 0 to 1V DC or 0 to 10mV DC output)						
Display unit	LCD with backlight						
Display of measured value	Max. 4 digits						
Display language	English						
Output signal holding	In both manual and automatic calibrations, output value just before calibration can be held.						
Power supply	100 to 240V AC, 50/60Hz, Approx. 50VA						
Warm-up time	At least 30min						
Ambient temperature	-5 to 45°C						
Ambient humidity	Less than 90% RH (condensation unallowable)						
Storage conditions	$-20{\sim}60^\circ$ C, less than 95% RH (condensation unallowable)						
Mounting	Flush mounting on panel						
External dimensions(H×W×D)	240×192×213mm						
Mass	Approx. 5kg						
Finish color	Off-white (equivalent to 10Y7.5/0.5)						
Housing	Steel-plate case, indoor type						
Material of gas- contacting parts	JIS SUS304, platinum, platinum iridium, silver,fluororubber, epoxy resin, nickel, tin						
Gas inlet/outlet, purge port	Rc1/4 or NPT1/4 (whichever specified)						
Purge gas flow rate	Approx. 1L/min (as required)						
Applied standard	CE mark (Option)						

#### Performance

Repeatability	±1% of F.S.
Drift	Zero point : Within $\pm 2\%$ of full scale/week (H <sub>2</sub> meter, reference gas N <sub>2</sub> ) Span : Within $\pm 2\%$ of full scale/week (H <sub>2</sub> meter, reference gas N <sub>2</sub> )
Response speed (90% response)	Standard within 60sec (at flow rate 0.4L/min) High speed within 10sec (at flow rate 1L/min), allowed only for Hz meter (reference gas $N_2$ )

#### **Standard Gas Measurement Conditions**

Temperature	0 to 50°C
Gas flow rate	Constant at 0.4±0.05 L/min
Dust	Less than $100\mu$ g/Nm <sup>3</sup> with a particle size of $0.3\mu$ m max.
Pressure	10kPa max.
Mist,Corrosive gas	Unallowable
Moisture	Below saturation at 2°C
Standard gases for calibration	Zero gas: same as reference gas Span gas: Concentration within 90 to 100% of measuring range Concentration beyond 100% is inapplicable.

#### Outline Diagram (Standard type) (Unit: mm)

#### **Optional Specifications**

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slay contact output	<ul> <li>5 SPST relay contact outputs</li> <li>Relay contact capacity; 220V AC/2A (resistive load)</li> <li>Isolated with relay between contacts, and between contacts and internal circuit.</li> <li>Max. 5 functions are selectable among those listed below.</li> <li>①Zero-side solenoid valve drive output for automatic calibration</li> <li>②Suction pump OFF output in automatic calibration</li> <li>④Upper limit (1point) concentration alarm output</li> <li>⑥Upper/lower limit (1point) concentration alarm output</li> <li>⑦Upper limit (1point) and lower limit (1point) concentration alarm output</li> <li>⑦Upper limit (1point) and lower limit (1point) concentration alarm output</li> <li>⑦Upper limit (1point) at each step) concentration alarm output</li> <li>(Total 2 points)</li> <li>⑨2-step lower limit (1point at each step) concentration alarm output</li> <li>(Total 2 points)</li> <li>⑩Analyzer error or automatic calibration error alarm output</li> <li>①Calibrating status output</li> <li>(@Range identification output (for 2 range type only)</li> </ul>
intact input	3 non-voltage contact inputs ON; 0 V, OFF; 5V DC, current at ON; 5mA Isolated with photo coupler between inputs and internal circuit. Not isolated between contact inputs. The following actions can be input. ①Remote holding of measured value output ②Remote range changeover (only with 2-range meter) ③Remote start of automatic calibration
terference gas easured value input	Analog input for H <sub>2</sub> meter interference correction (1 to 5V DC) Either CO <sub>2</sub> or CH <sub>4</sub> component of an external gas analyzer is to be input. Adjustment is required at Fuji Electric's factory. Details of measurement gas will be checked when receiving an order.
tomatic calibration nction	Zero and span calibrations are automatically carried out at the predetermined intervals. Calibration gases are flowed sequentially by driving the externally installed solenoid valves.
mmunicating function	RS-232C (9-pin D-sub output) Half duplex, asynchronous MODBUS™ protocol, communication speed 9600 bps Contents of communication: Reading/writing of measured concentration values and various set values, and output of device status

#### **Installation Conditions**

- The analyzer should not be exposed to direct sunlight or radiation from a hot object.
  A place subjected to heavy vibrations should be avoided. A location with clean atmosphere should be selected.
- Before measuring combustible gases, the existing gases should be purged from the analyzer using air or  $N_{\rm 2}.$
- When the analyzer is installed outdoors, it should be sheltered with a housing or cover to protect it from rain and wind.



### Code Symbols (Standard type)

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	Concentration alarm See table below.												C				
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16	<response speed=""></response>												_	-			F
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	High-speed response (Note 5)													6	3		L
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Note 1 Reference gas refers to gas other than the component to be ("Z" must be specified when interference gas is to be contained.)

Note 2) The ratio of maximum range to the first range is as given below. For CO₂, Ar or CH₄ measurement : 1st range x 5 (times) For He or H₂ measurement : 1st range x 10 (times) A range from 0 to ...% cannot be combined with that from 100 to ...%. 1st range < 2nd range

Note 3 Specify Y if linearization in the 12th digit is not reguired.

Note 4 A CO₂ or CH₄ meter needs to be prepared separately. A reverse range such as 100 to 0% cannot be specified. Input signal is 1 to 5 V DC. Adjustment is required at Fuji Electric's factory. Details of measurement gas will be checked when receiving an order. Reverse range such as 100% to 0% cannot be specified. Cannot be specified if high-speed response is selected.

Note 5 High-speed response is for H2 meter used for reference gas N2 only.



### EC Directive Compliance

The product conforms to the requirements of the Low Voltage Directive 2006/95/EC and EMC directive 89/336/EEC (as amended by Directive 92/31/EEC), both as amended by Directive 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 use.

"Installation Category II"

"Pollution Degree 2" "Altitude up to 2187 yard [2,000m]"

EN61326-1:2006, EN61326-2-3:2006,

EN61000-3-2:2006, A1:2009, A2:2009

EN61000-3-3:2008

Electrical equipment for measurement, control and laboratory use - EMC requirements.

Input	/output	contact specifications	14th digit:A	14th digit:C	14th digit:E		
			Automatic calibration related	Concentration alarm related	Contact output selection (Note 7)		
Contact output	Automatic calibration related	Zero gas valve drive Span gas valve drive Suction pump OFF in automatic calibration	○(D01) ○(D02) ●(D03)		○ ○ ●		
	Concen- tration larm related Upper limit (1 point) concentration alarm Upper/lower limit (1 point) concentration alarm Upper limit (1 point) and lower limit (1 point) concentration alarm 2-step upper limit (1 point each) concentration alarm			Any one alarm settable on screen (D01, 2) 2 Point (NO) contact	Any one alarm settable on screen 2 Point (NO) contact		
	Other	Calibration status Range information (2-range meter)(Note3) Analyzer error or automatic calibration error	○(D04) - ○(D05)	○(D04) ○(D03) ○(D05)	000		
Contact input	Remote automatic calibration start (Note4) Remote range changeover (2-range meter)(Note5) Remote measured value output holding (Note6)		○(DI3) ○(DI2) ○(DI1)	○(DI3) ○(DI2) ○(DI1)	○(DI3) ○(DI2) ○(DI1)		

- (Note 1) Mark⊖: Normally Open (NO) contact (Note 2) Mark●: Normally Closed (NC) contact, after turning on power supply (Note 3) Low range: Contacts close, High range: Contacts open (Note 4) When contacts open 1.5 sec after their closure, automatic calibration starts.
- (Note 5) Contacts closed: Low range, Contacts open: High range
- (Note 6) Contacts closed: Holding, Contacts open: Holding canceled

(Note 7) Up to 5 contact outputs can be set.

#### SCOPE OF DELIVERY

Analyzer main unit Panel mounting brackets (1 set) 2 power fuses (250 V AC, 1 A) Instruction Manual

#### **ITEMS TO BE PREPARED SEPARATELY**

Gas sampling equipment, standard gas, receiving instrument, etc. With interference corrective calculation: CO or CO2 gas analyzer

#### ORDERING INFORMATION

- 1. Analyzer type
- 2. Gas component to be measured
- 3. Measuring range
- 4. Gas component other than measured