

# PARAMAGNETIC OXYGEN ANALYZER

DATA SHEET

ZAG-2

The paramagnetic oxygen analyzer measures oxygen content in sample gas by utilizing the magnetic property of oxygen. Since the instrument is based on a principle of measurement unaffected by coexisting gas components, it is optimum for oxygen analyzers for combustion control, process control and measurement of environmental pollution, etc.

This instrument has passed a type approval test specified by the Japanese laws for measurement and weighing.

Certificate No.: SF812

## FEATURES

1. The instrument has high selectivity since it is based on a principle of measurement utilizing paramagnetism characteristic of O<sub>2</sub>, NO and NO<sub>2</sub> only.
2. The sensor is accommodated in a thermostatted chamber to assure excellent temperature characteristic.
3. A linearizer circuit (option) is built in the instrument.
4. Output signals are available in various types (4 to 20mA DC, 0 to 10mV DC and 0 to 1V DC).

## SPECIFICATIONS

**Measuring range:** 0 to 10/25% O<sub>2</sub> (2 ranges)  
0 to 25/50% O<sub>2</sub> (2 ranges)  
0 to 25/100% O<sub>2</sub> (2 ranges)  
Also single range is available.

**Measurable objects:**  
Oxygen in combustible waste gas or inactive gas

**Gas measurement condition (at inlet of oxygen meter):**

**Temperature:** - 5 to + 45°C

**Dew point:** Dehumidified by electronic cooler or gaseous phase dehumidifier, or equivalent dew point

**Dust:** Filter (0.3μm dia.) needs to be installed on the front stage  
(Recommended filter: Fuji membrane filter, ZBBM)

**Pressure:** 10kPa, max {0.1kgf/cm<sup>2</sup>} (outlet open)

**Corrosive gas:** SO<sub>2</sub>, 500ppm or less

**Output signal:**

- |   |                            |
|---|----------------------------|
| (1) 4 to 20mA DC<br>(load resistance less than 550Ω)<br>0 to 10mV DC<br>(output resistance 100Ω)<br>or<br>4 to 20mA DC<br>(load resistance less than 550Ω)<br>0 to 1 V DC<br>(output resistance approx. 200Ω) | } Simultaneously available |
|   | } Simultaneously available |



(2) Linearity  
(Linearizer can be added for single range only)

	Without linearizer	With linearizer
0 to 10% range	± 1% of FS (*) or less	—
0 to 25% range	± 3% of FS or less	± 1.2% of FS or less
0 to 50% range	± 5% of FS or less	± 1.5% of FS or less
0 to 100% range	± 10% of FS or less	± 2.0% of FS or less

**Repeatability:** ± 0.5% of full scale or less

**Response time:** 60 sec or less for 90% indication (flow rate, 1ℓ/min)

**Span drift:** ± 2% of full scale/week

**Zero drift:** ± 2% of full scale/week

**Sample gas flow rate:**  
1ℓ ± 0.3ℓ/min or 0.5ℓ ± 0.15ℓ/min

**Power supply:** 100V AC ± 10%, 50/60Hz or 110V AC ± 10%, 50/60Hz

**Power consumption:**  
Max. 60VA

**Ambient temperature:**  
- 5°C to + 45°C

**Ambient humidity:**  
Less than 90%RH

**Warmup time required:**  
5 hours or less

Note: \* FS: Full scale

**Materials of gas-contacting parts:**

Teflon, fluororubber, lead, glass, stainless steel 304, silver, epoxy resin, phenol resin

**External dimensions (H x W x D):**

240 x 197 x 353.2mm

**Mass (weight):** Approx. 12kg

**Finish color:** Munsell 7.5 BG 3.2/0.8

**Installation requirements:**

- The instrument should not be exposed to direct sunlight or radiation from body heated to high temperature.
- When the instrument is installed outdoors, it should be sheltered with a housing or cover to protect it from rain and wind.
- Atmosphere should be clean. It must not contain corrosive or combustible gas.
- The instrument should not be subjected to severe external vibration.

**Mounting:**

Vertical mounting on panel

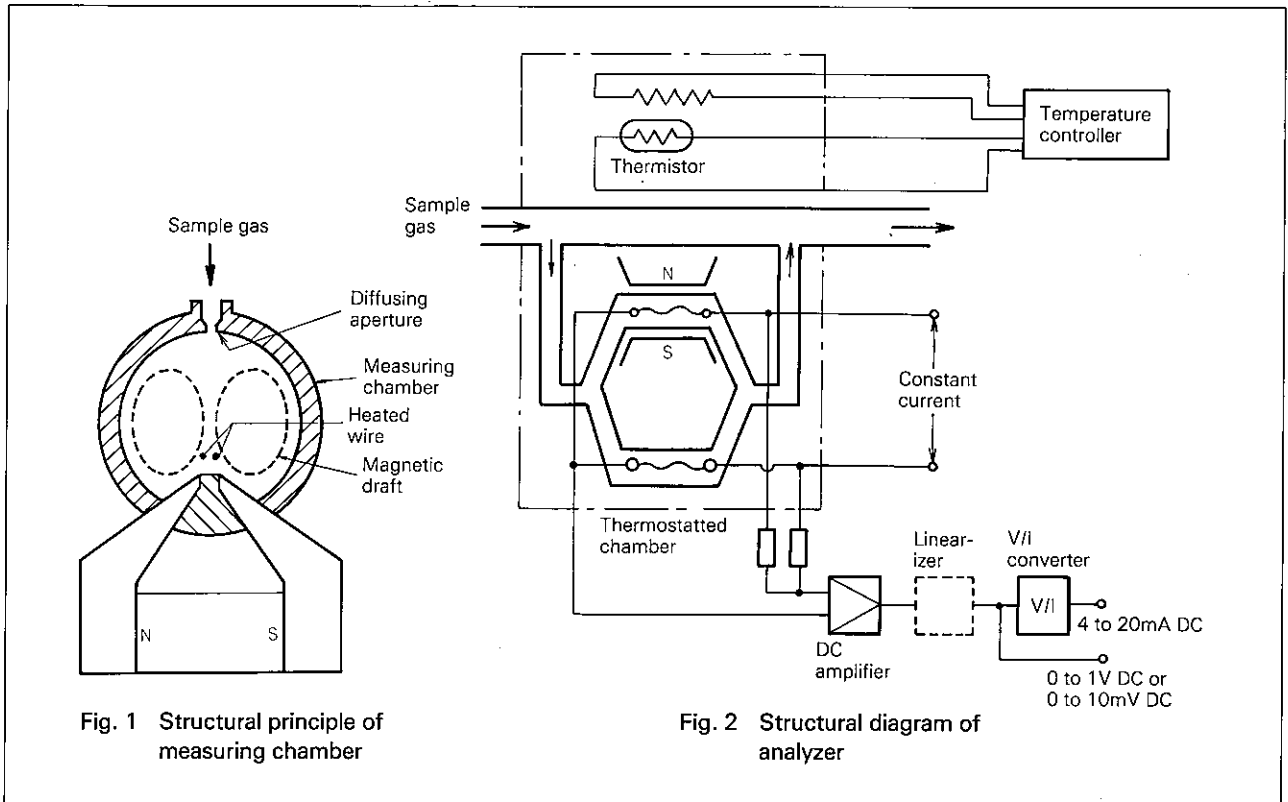
**CODE SYMBOLS**

1 2 3 4 5 6 7 8 9									Description			
ZAG									Measuring range			
									Measuring range		Scale	For approval test by Japanese standards
									1st range	2nd range		
2	C								0 to 10%	0 to 25%	50 uniform scale without unit	Not available
2	E								0 to 25%	0 to 50%		Not available
2	F								0 to 25%	0 to 100%		Not available
2	G								0 to 10%	0 to 25%	Double scale Actual scale	Available for 2 ranges
2	H								0 to 25%	0 to 50%		Available for 1 range only
2	J								0 to 25%	0 to 100%		Available for 1 range only
2	K								0 to 10%	—	Actual scale	Available
2	L								0 to 25%	—		Available
2	M								0 to 50%	—		Not available
2	N								0 to 100%	—		Not available
2	Z								Other range			
									Output signal			
1									4 to 20mA DC and 0 to 10mV DC (simultaneously available)			
2									4 to 20mA DC and 0 to 1V DC (simultaneously available)			
									Power source			
1									100V AC 50/60Hz			
2									110V AC 50/60Hz			
									Linearizer			
0									For general service		Without linearizer	
1											With linearizer for 2nd range	
2											With linearizer for 1st range	
3									For approval test by Japanese standards		Without linearizer	
4									(Measuring range 0 to 10%, 0 to 21%, 0 to 25% are available only)		With linearizer for 2nd range	
5											With linearizer for 1st range	

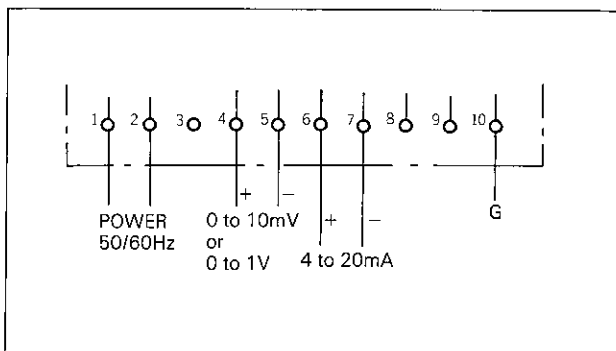
# PRINCIPLE OF MEASUREMENT

The measuring system forms an ununiform magnetic field in a measuring chamber made of a non-magnetic material with a strong permanent magnet as shown in Fig. 1. Stretched at the place where the magnetic field is the strongest is a wire (measuring element) heated with electric current. When oxygen exists in the measuring chamber, circulation of air (magnetic draft) proportional to oxygen content is produced due to magnetic property of oxygen. Since the heated wires are cooled by the circulation of air, the oxygen content is detectable as resistance change of the heated wires.

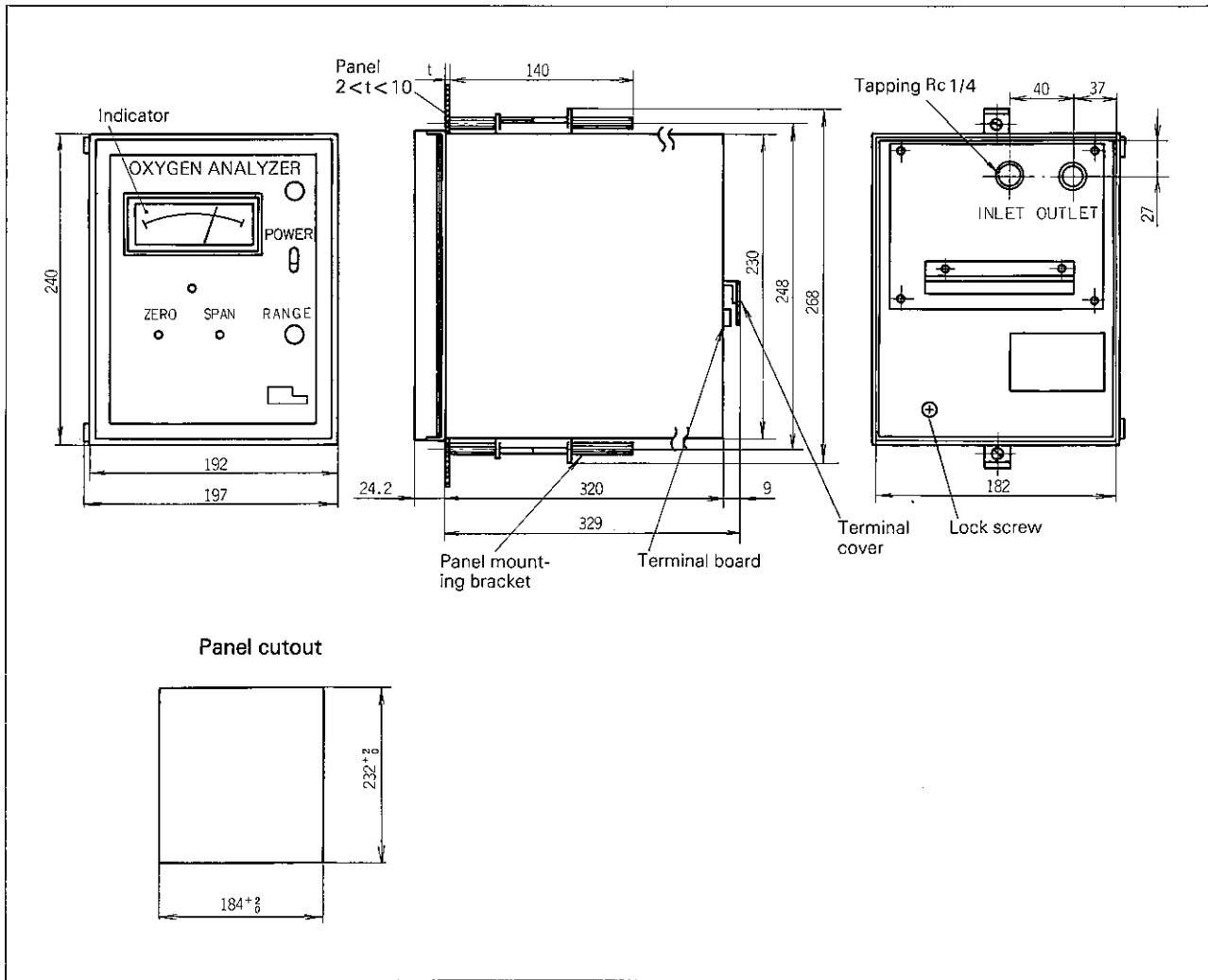
The analyzer consists of two heated wires and two fixed resistors which are connected to a Wheatstone bridge as illustrated in Fig. 2. One of the heated wires is located in the magnetic field. The bridge is kept in equilibrium while oxygen content remain zero, and generates unequilibrium voltage as oxygen content increases. Oxygen concentration can therefore be determined by measuring the voltage.



# CONNECTION DIAGRAM



**OUTLINE DIAGRAM (Unit:mm)**



**SCOPE OF DELIVERY**

- 1 x analyzer-transmitter main unit
- 2 x cartridge fuse (spare)
- 2 x panel mounting bracket

**Fuji Electric Co.,Ltd.**

**Head office**  
 12-1 Yurakucho 1-chome, Chiyoda-ku, Tokyo, 100 Japan  
 Phone: 81-3-3211-7111

**Fuji Electric Instruments Co.,Ltd.**

**Sales Div.**  
**International Sales Dept.**  
 No. 1, Fuji-machi, Hino-city, Tokyo, Japan  
 Phone: 81-425-85-6201, 6202  
 Fax: 81-425-85-6187, 6189