

Zirconia Type Oxygen Analyzer
Ecoa Z TB Series Guidance



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INTRODUCTION

This book is made as a guidance of our main Oxygen analyzer TB series. TB series Oxygen sensors have very large application fields combined with suitable accessories.

This book is designed to select models and accessories to use TB series sensor properly.

WAY OF LOOKING

Please read 'GENERAL' first, to understand constitution of system, principle and outline of oxygen analysis

And then

1. Investigation of sensor models

Pick up the model for your purpose on 'MODELS FOR VARIOUS APPLICATIONS'. If you do not find proper application in the list, select it from nearly purpose.

2. Investigation of specification

Open the page of concerned model, then investigate accessories.

3. Investigation of control unit

Open the page of control unit, then select suitable model.

4. Specification for estimate

Check the INQUIRY CHART of the book end and send back to us by FAX.

We will estimate most proper system as soon as possible.

For special application which is not mentioned on this book, we may recommend suitable arrangement by our wide experiences.

Specifications of the products maybe changed for improvement without notice.

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I . TB SERIES MODELS FOR VARIOUS APPLICATIONS

Steel Industry	Powdered Coal Facility	TB- II E	%O ₂	
	Coke Oven	TB- II E	%O ₂	
	Sintering	TB- II E	%O ₂	
	Blast Furnace Stove	TB- II E	%O ₂	
	Continuous Casting	TB- II E	%O ₂	
	Heating Furnaces	TB- II E	%O ₂ , -%O ₂	
	CAL, CGL Radiant Tube	TB- II E	%O ₂	
	Alloying	TB- II E	%O ₂	
	Atmosphere	TB- II F	ppmO ₂ , atmO ₂	
Heat Treatment	Radiant Tube	TB- II E	%O ₂	
	Inert Gas	TB- II F	ppmO ₂ , atmO ₂	
	H ₂ +Inert Gas	TB- II F	ppmO ₂ , atmO ₂	
	Vacuum Furnace	TB- II V	ppmO ₂ , atmO ₂	
Non-ferrous Metal	Melting Furnace	TB- II E	%O ₂	
	Heating Furnace	TB- II E	%O ₂	
Ceramics	Glass Melting	TB- II E	%O ₂	
	Ceramic Kiln (Burned)	TB- II E	%O ₂ , -%O ₂	
	Ceramic Kiln (Electric)* *N ₂ , Ar, CO, CO ₂ , H ₂ , H ₂ O	TB- II F	ppmO ₂ , atmO ₂	
Environment	Dust Incinerator	TB- II E	%O ₂ , -%O ₂	
	Mad Incinerator	TB- II E	%O ₂ , -%O ₂	
Other Combustion Process	Boiler	TB- II E	%O ₂	
	Refineries	TB- II E	%O ₂	
	IGS, IGG	TB- II E	%O ₂	
Energy	Atomic Power	TB- II F, II V	ppmO ₂ , atmO ₂	
	Fuel Battery	TB- II F	ppmO ₂ , atmO ₂	
Electronics	Semi- Seal Gas	TB- II F	ppmO ₂ , atmO ₂	
	conductor Diffusion F' ce	TB- II F	ppmO ₂ , atmO ₂	
		CVD	TB- II F	ppmO ₂ , atmO ₂
	Board N ₂ Reflow	TB- II F	ppmO ₂	
	N ₂ Dip	TB- II F	ppmO ₂	
Clean Gas	Industrial Gas Plant	TB- II F, II P	%O ₂ , ppmO ₂	
	PSA	TB- II F, II P	%O ₂ , ppmO ₂	
	Piping, Purifier	TB- II F, II P	%O ₂ , ppmO ₂	
Other Analysts	Vacuum Equipment	TB- II V	ppmO ₂ , atmO ₂	
	Globe Box	TB- II V	%O ₂ , ppmO ₂	
	High Temp Humidity	TB- II H	%H ₂ O	
	Welding Shield	TB- II F, II P	%O ₂ , ppmO ₂	

©We also provide other models. Please contact us for the other purpose.

II . ABSTRACT

OUTLINE

This instrument is the oxygen analyzer of Zirconia electro-chemical method. It can indicate and output Oxygen analysis continuously.

Mainly it consists of following units.

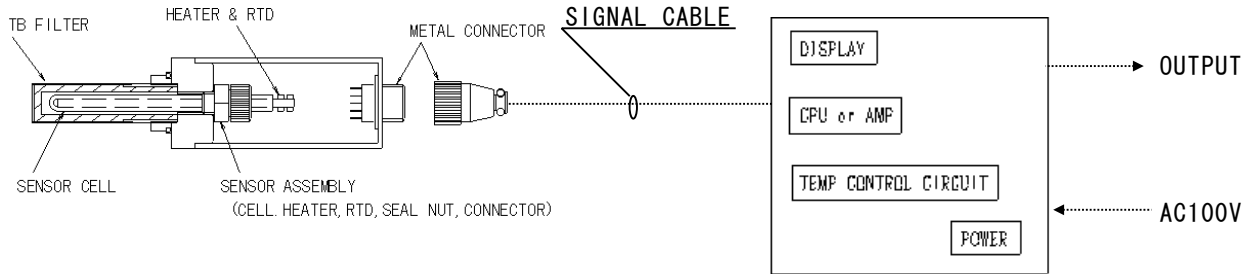
System schematic

O₂ Sensor

- Convert O₂ value to mV signal

Control Unit

- Cell temperature control
- Convert mV to display unit



FEATURES

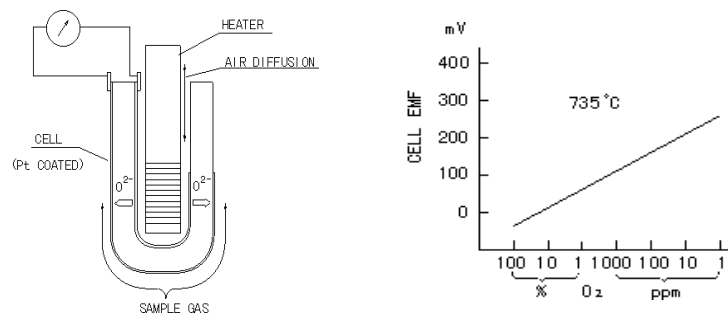
1. Wide application
2. Easy handling due to small size
3. Stable measurement for a long time
4. Easy maintenance because of simple structure
5. Saving power (about 10VA/unit)
6. Selectable any range by user

PRINCIPLE

Sensing cell is a closed end, 90mm length and 7mm diameter tube made of stabilized Zirconia. When it is red hot, it becomes a electrolyte because of movement of oxygen ions in its crystal structure. If there are two different gases on both side of the cell, a voltage is produced between both side. TB sensor cell inside contacts with air as reference and the outside contacts with sample, then it produces voltage correspond to oxygen value.

The cell voltage (cell EMF) is also related to cell temperature. Therefore the cell is controlled constant temperature using inserted heater and RTD.

Principle Diagram



For the oxygen in non-combustible gases, the oxygen value is calculated from following formula

$$E = 0.0496 \cdot T \cdot \log \frac{\text{Air (20.6\% = 206,000ppm = 0.206atm)}}{\text{Sample = } O_2\%, O_2\text{ppm, } O_2\text{atm}} + C$$

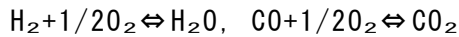
Where E is cell EMF, T is the absolute cell temperature, C is cell constant, $O_2\text{atm}$ is atomic pressure of the sample oxygen.

There for sensing cell produces no EMF when air is on both side, and the EMF increases as the sample composition becomes more different from air.

※ Analysis of Reducing Atmosphere (or excess fuel)

The reducing atmosphere is used for metal heat treatment and ceramic firing etc.

In the absence of molecular oxygen, the cell measures the tiny amount of oxygen produced by the dissociation of water and carbon dioxide at high operating temperature according to following equilibria.



The order of the PO_2 for these atmosphere should be

※ Analysis of Vacuum Atmosphere

This instrument measures oxygen partial pressure referred to atmospheric pressure. Therefore the same sample in different pressure are measured as different oxygen value.

For example, pressure reduced to 1 Torr, oxygen value of air (206,000ppm O_2) is to be shown as $206,000 \times 1/760 \approx 270\text{ppm}$

TB-II F can be used to 10^{-3}Torr , TB-II V can be used even 10^{-6}Torr .

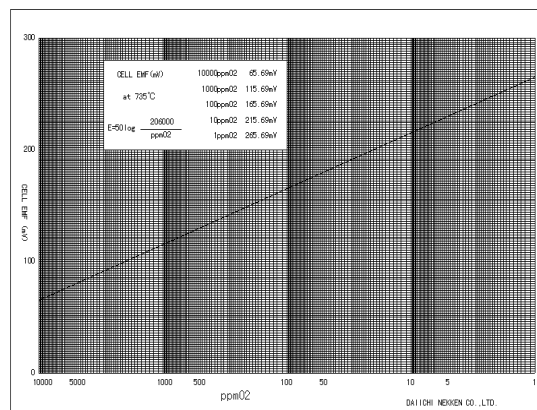
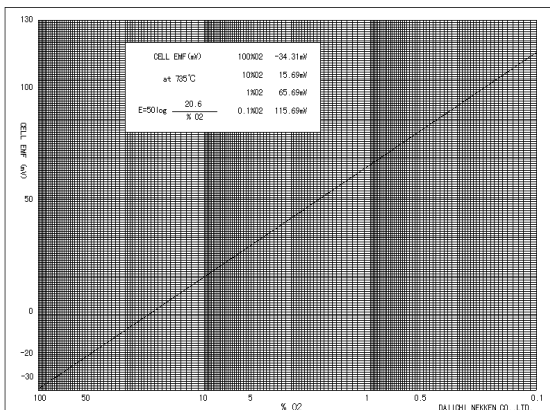
※ $CO+H_2$ Measurement in Excess Fuel Combustion

In direct firing atmospheric furnace, $CO+H_2\%$ can be measured by measuring dissociated PO_2 from $CO+H_2/CO_2+H_2O$ equilibrium condition.

$1\%(CO+H_2) + 0.5\%O_2 = 1\%(CO_2+H_2O)$, So $1\%(CO+H_2)$ corresponds to $-0.5\%O_2$

Special control units have $\%(CO+H_2)$ or $\pm\%O_2$ range.

EMF Curve



※ Sample Conditions

1. Sample Temperature

Normally, sample temperature at sensor inlet should be less than 300°C.

When sample temperature is higher than 300°C, The sensor should leave the wall of furnace for cooling sample. 1500°C sample needs 300mm space from the wall.

2. Sample Pressure

This instrument measures oxygen partial pressure referred to atmospheric pressure. Therefore the same sample in different pressure are measured as different oxygen value. (1% of measuring value for 100mmAq pressure difference)

For constant sample pressure there is no problem by field calibration. However, remarkable pressure disturbance needs pressure conversion.

3. Influence of Combustible Gases.

Combustible gases (CO, H₂, CmHn etc.) react with oxygen in the sample on heated cell surface. Therefore consumed oxygen becomes error.

However, in the absence of free oxygen such as reducing atmosphere, the instrument measures dissociated tiny oxygen and can control reducing/oxidizing potential.

4. Moisture in Sample

When water drops contact directly with heated ceramic cell, the cell should be broken by heat shock. It can be avoided by suitable sampling such as direct mounting on the furnace, sample line heating or drain separating etc.

5. Life Shortening Gases

Following gases in the sample shorten cell life.

SO ₂	2000ppm or more	NO _x	500ppm or more
HCL	1000ppm or more	H ₂ S	20ppm or more
NH ₃	50ppm or more		

Halogen gas (Cl₂, F etc.), Si vapor, metal vapors, Alkali vapor, Tar vapor produce troubles of measurement

III. O₂ SENSOR

III-1 TB - II E (Exhaust gas measurement)

1) Outline

TB-II E sensor is designed for combustion exhaust gas measurement
It is used with guide probe or aspirator block.

Structure

Cell holder, Sensor cap, Sensor assembly*, TB filter

*Sensor assembly includes Cell, Heater, RTD and Metal connector.

Specifications

Measuring range -5%O₂ ~ 25%O₂

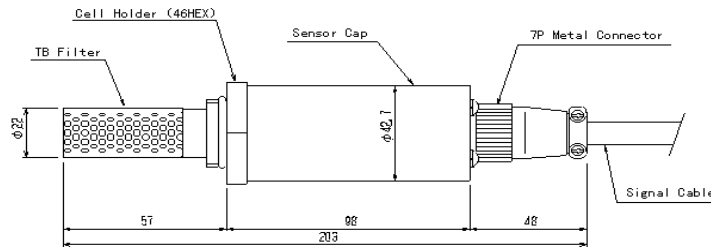
Drift less ±2%FS/month

Accuracy less ±2%FS

90% Response less 5sec

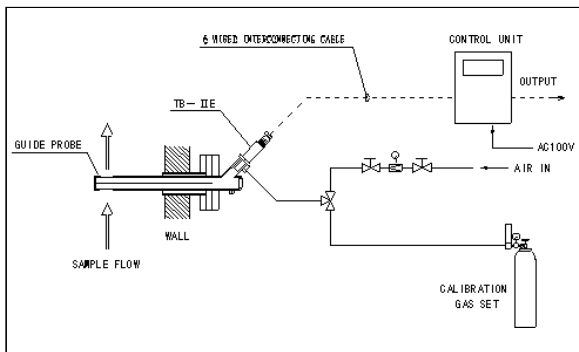
Repeatability less ±1%FS

Dimensions

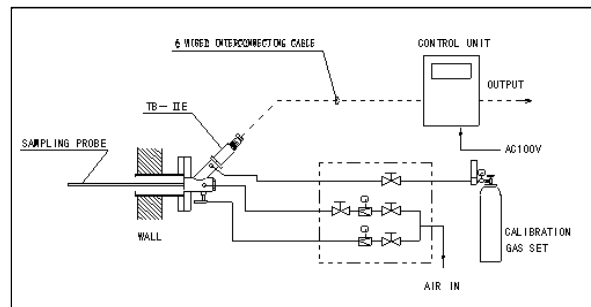


System Flow Sheet Examples

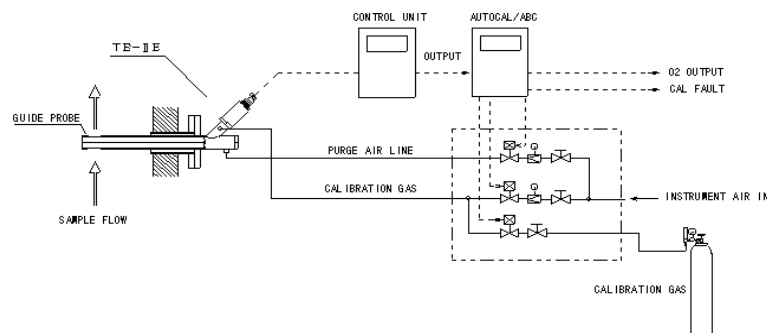
Guide Probe System



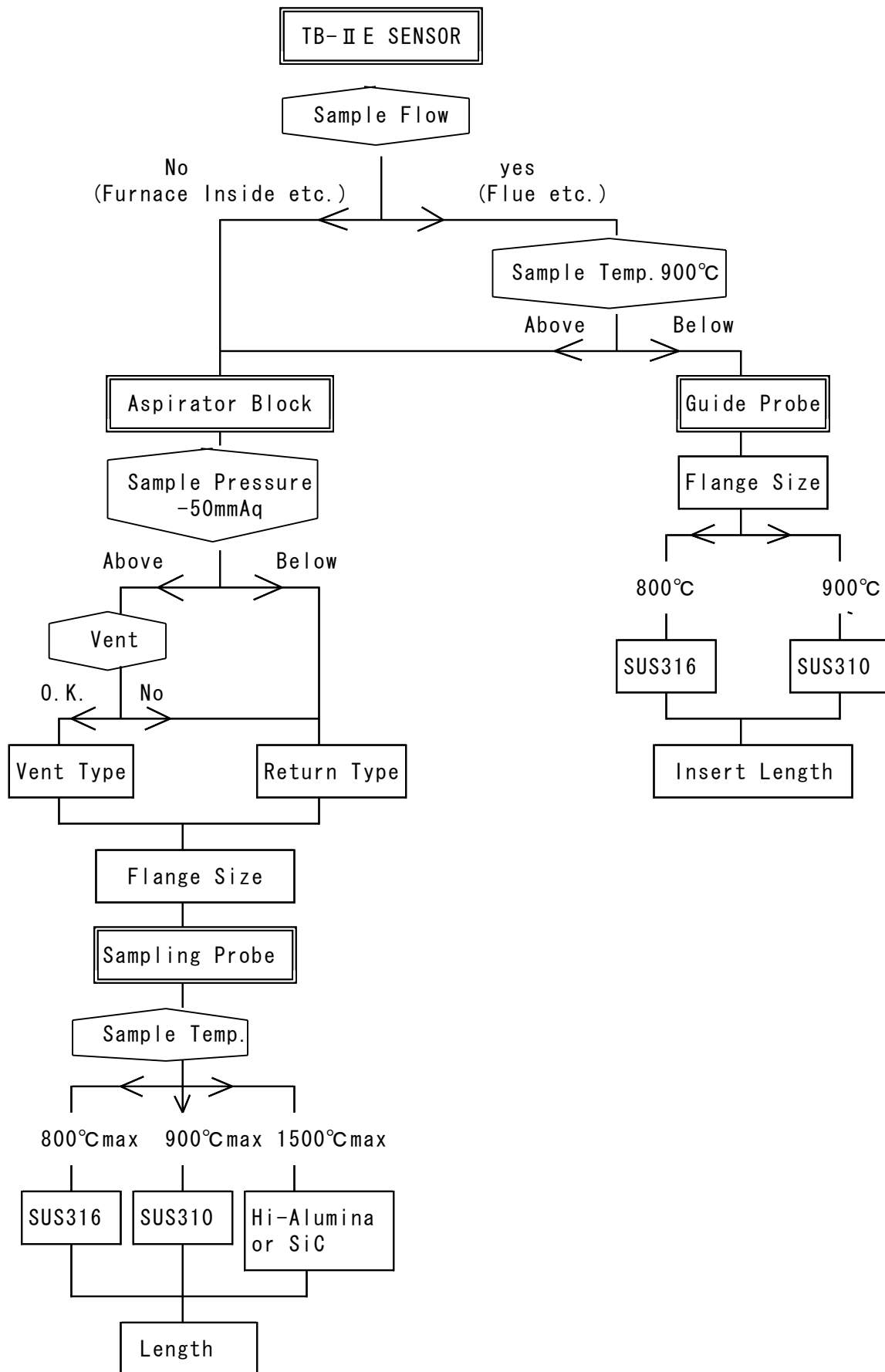
Aspirator Block System



Automatic Calibration & purge System



2) System Construction & Accessories Selection Chart



3) Guide Probe

Outline

This probe can be used only gas is flowing and can be mounted vertical or horizontal on the flue wall.

TB-II E sensor should be screwed into sensor port of the guide probe. Sample gas is induced from sample port of the top of the probe using flowing rate.

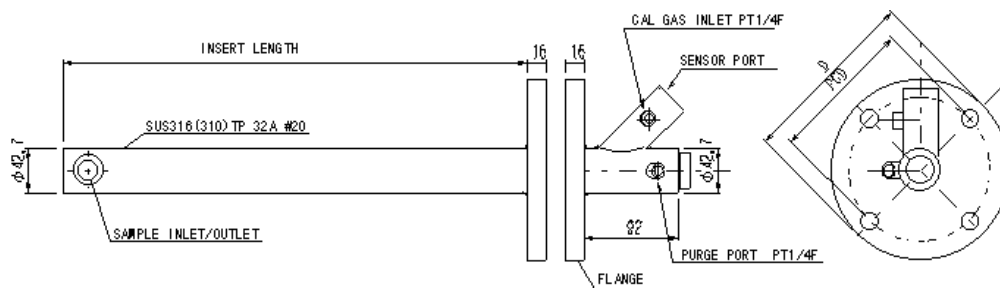
Specification

Sample Temp. 800°Cmax (SUS316), 900°Cmax (SUS310)

Sample Pressure -2000mmAq~1kg/cm²

*When the pressure over than ±200mmAq, or large fluctuation, please consult us in advance.

Dimensions



*Insert Length

We recommend that the top of probe is to be center of flue.

How to select

A B C D

GP-□□□-□□-□□-□□□□-□

A. Material

SUS316 (up to 800°C) , SUS310 (up to 900°C)

B. Mounting Flange

Pressure Rate: JIS2k, 5K, 10K

Size: 50A, 65A, 80A, 100A

C. Insert Length

300~1500mm

D. Rain Protector

0: No need

1: Cap Type for Splash

2: Box type for Rain

Writing Example

Material: SUS316, Flange: JIS5K/50A, Insert length: 500mm, No Rain

GP-316-05-50-0500-0

4) Aspirator Block

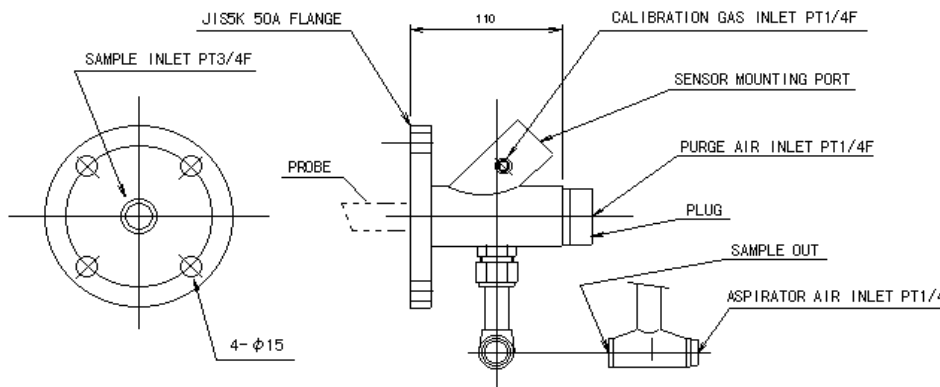
Outline

Aspirator block with probe can be used where even gas is not flowing and high temperature over than 900°C, mounted vertical or horizontal on the furnace wall. TB-II E sensor should be screwed into sensor port of the block. Sample gas is induced from the top of the probe using aspirator and exhausted to ambient (Vent Type) or furnace inside (Return Type).

Specification

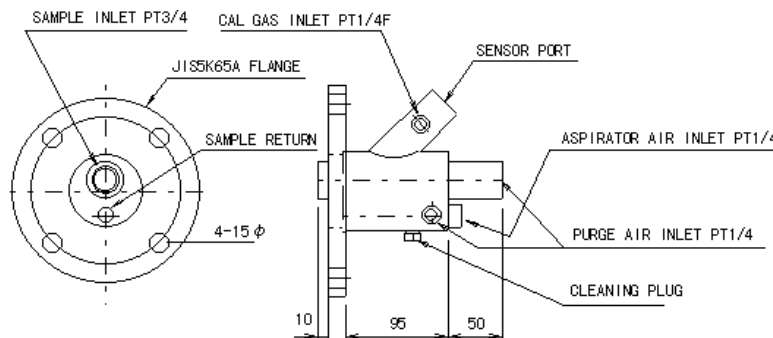
Sample Temp. Refer to 5) Sampling Probe
 Sample Pressure -50mmAq~100mmAq (Vent type)
 -2000mmAq~1kg/cm² (Return type)

Vent Type Appearance



Return Type Appearance

Minimum flange size is to be 65A.



How to order

A B C
 AP-□-□□-□□-□

A. Type

1:Vent, 2:Return

B. Mounting Flange

Pressure Rate: JIS2k, 5K, 10K

Size: 50A, 65A, 80A, 100A

C. Rain Protector

0:No need, 1:Cap Type, 2:Box type

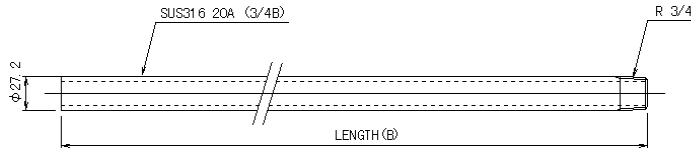
* For special specification, please consult us in advance.

5) Sampling Probe for TB-II E

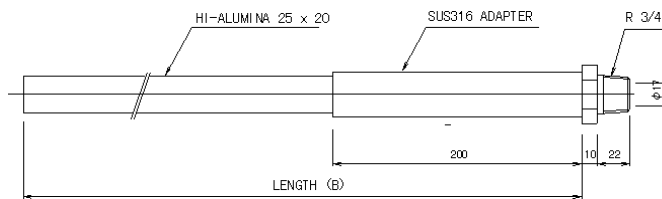
Outline

Sampling probe is fixed to aspirator block and inserted into furnace or flue to induce sample gas. The material should be selected for sample temperature. Non porous SiC is expensive but stronger than Hi-Alumina for vibration, wear and rapid temperature change at high temperature.

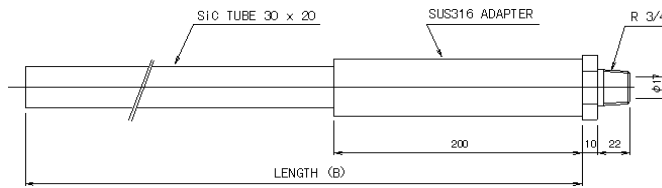
SUS Probe



Hi-Alumina Probe



SiC Probe



Insert Length Determination

For vent type aspirator, the top of the probe should project minimum 100mm from inner wall.

For return type, the projected length should be minimum 300mm.

*How to order

A B
ESP-□□□-□□□□

A. Material

B. Length mm

316: SUS316 (800°Cmax)

310: SUS310 (900°Cmax)

SSA: Hi-Alumina (1500°Cmax)

SiC: SiC (1500°Cmax)

Writing Example

Material: Hi-Alumina, Length: 700mm

ESP-SSA-0700

6) Air Supply Unit(ABC Unit)

Outline

This unit is the device for supplying Aspirator air, Purge(Blow back) air and Calibration gas to the sensor. Therefore another name is ABC Unit.

There are following types.

	Guide Probe Use(G)	Aspirator Block Use(A)
<p>Type1-G, A</p> <p>This type is automatic purge and calibration system by Autocal/ABC unit.</p>		
<p>Type2-G, A</p> <p>This type is automatic purge and manual calibration system.</p>		
<p>Type3-G, A</p> <p>This type is manual gas supply system.</p>		

*How to order

A B C D
 ABC-□-□-□-()

A. Type

- 1:Automatic Purge & Calibration
- 2:Automatic Purge & Manual calibration
- 3:Manual Purge & Calibration
- 5:Special spec.

B. Application G:Guide probe, A:Aspirator Block

C. Structure

- 1:Installed on the Plate
- 2:Installed in the exclusive box

D. Option

III-1 TB - II F/ II P (Trace oxygen measurement)

Outline

TB-II F/ II P sensors are designed for Trace oxygen measurement.

These sensors have high grade airtight seal and stainless steel housing.

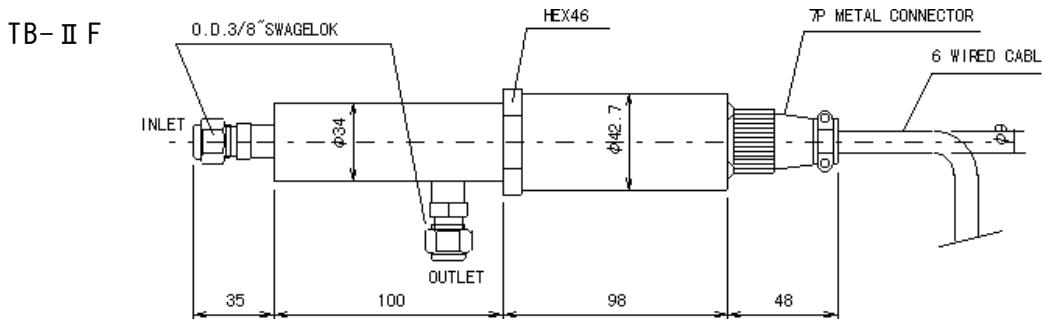
II F can measure from 100% to ppm level trace O₂ partial pressure and even 10⁻²⁰atmO₂ or less in the atmospheric furnaces. Also it can measure vacuum atmosphere down to 10⁻³Torr.

II P is used for low flow rate sample.

1) Specifications

	TB- II F	TB- II P
Measurement Range	1ppm~ 100%O ₂ /1~ 10 ⁻³⁰ atmO ₂	5ppm~ 100%O ₂
Tube Connection	O. D. 3/8" Swagelok, PT1/4F, 8VCR	PT1/8F
Sample Temp.	300°Cmax,	300°Cmax,
Sample Pressure	1x10 ⁻³ Torr~ 1kg/cm ²	10mmAq~ 1kg/cm ²
Flow Rate	0.5~5 l/min	0.2~2 l/min
Response	90% in 10sec or less	90% in 10sec or less
Repeatability	less than ±1% of FS	less than ±1% of FS

2) Dimensions



*How to select

TB- II F-□

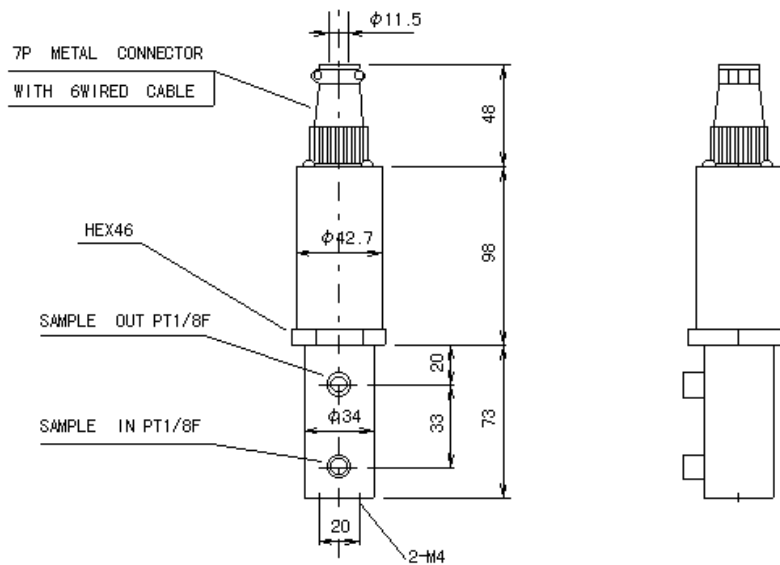
□. Connection

S: O. D. 3/8" Swagelok

R: PT1/4F

V: 8VCR

TB- II P

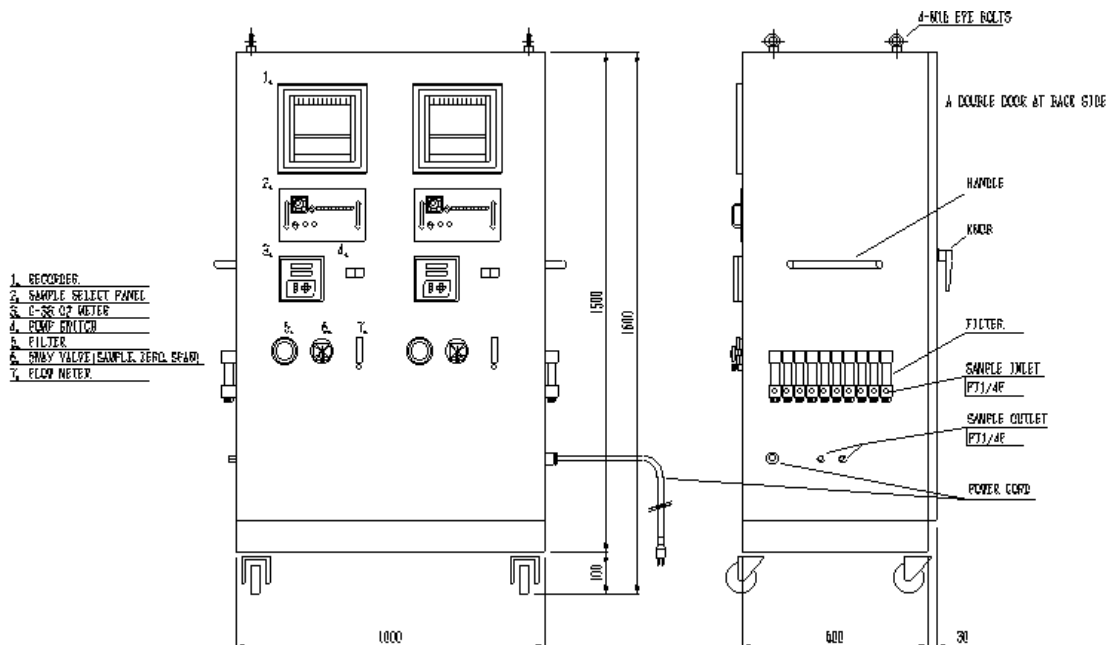


3) TB-II F/II P Accessories

These sensors are used with various accessories for sample conditions. Some examples are shown below.

- a. Sample withdraw from furnace.
 - Sampling probe, Port block
- b. High pressure sample
 - Pressure regulator, Needle valve
- c. Negative pressure
 - Air aspirator (untill -25mmAq) or • Sampling pump
- d. Flow control
 - Flowmeter+Needle valve or massflow controller
- e. Impure sample
 - Dust filter or • Charcoal filter (flamable impurities)
- f. Water vapor
 - Drain pot, • Electronic cooler or dryer
- g. Sample line heating (condensation prevention)
 - Pipe heater
- h. Malti point
 - Malti sampling unit
- i. Instalation
 - Plate or Box

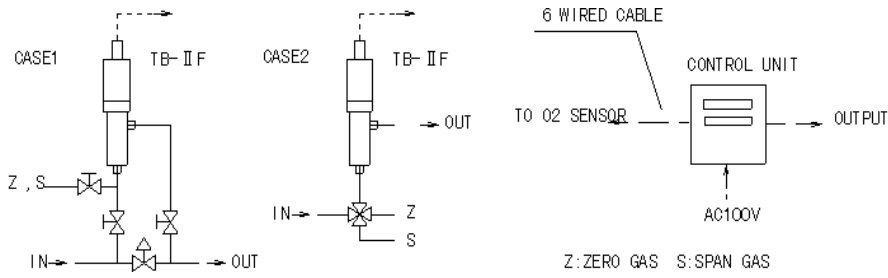
Box Instalation Example (Malti sampling)



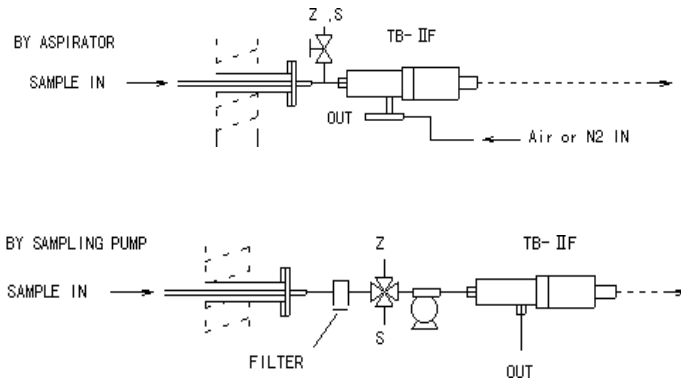
4) Flow Sheet Example

TB- II F

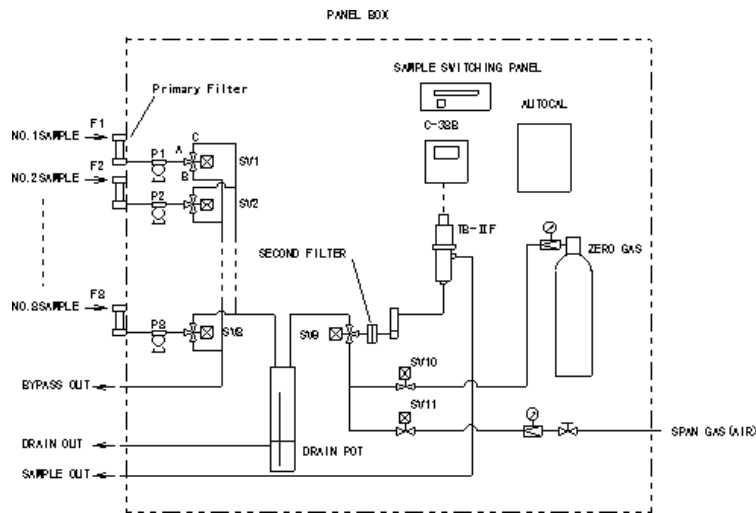
Positive Pressure Sample



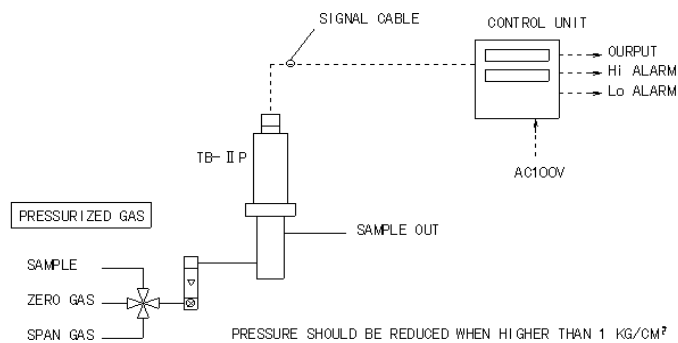
Negative Pressure Sample



Multi Sampling



TB- II P



III-3 TB - II V (Vacuum atmosphere measurement)

Outline

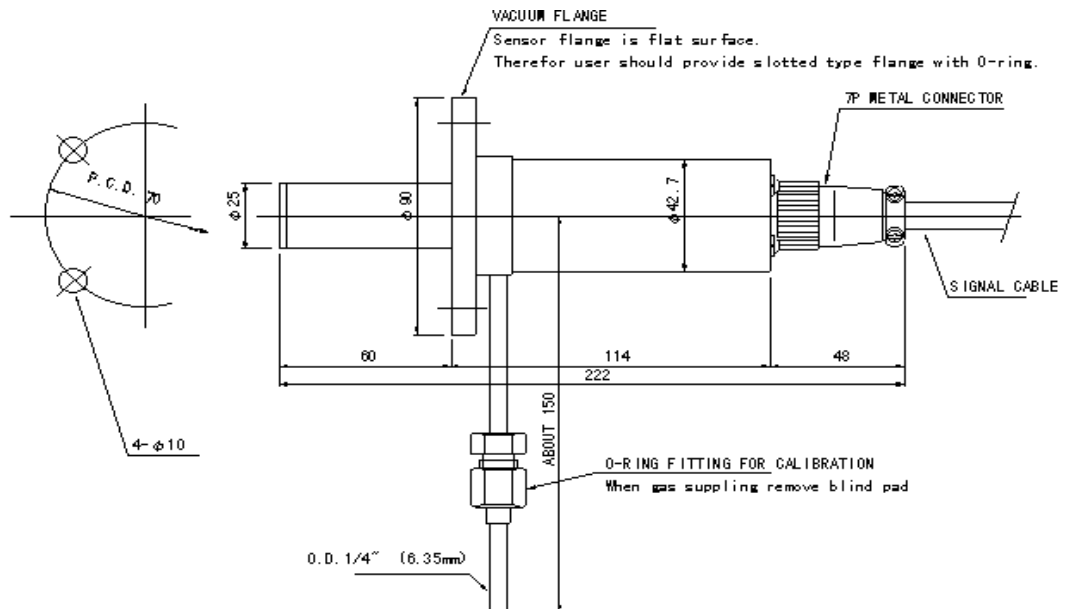
This sensor is used for vacuum furnaces or vessels which are difficult to withdraw sample.

It has been used in 1×10^{-6} Torr vacuum actual.

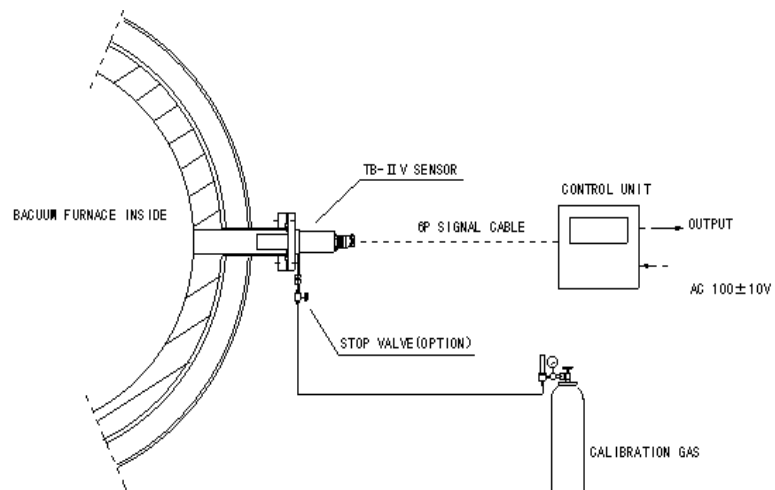
1) Specification

Measuring range	1ppm ~ 100%O ₂ /1 ~ 1×10^{-3} atmO ₂
Mounting	Horizontal ~ Vertical
Sampling	Diffusion
Calibration gas inlet	O. D. 1/4 Tube
Sample Temp.	300°Cmax.
Sample Pressure	2atm ~ 1×10^{-6} Torr
Option	Flange size, Cal' gas stop valve

Dimensions



2) Flow Sheet Example



III-3 TB - II H (Moisture in Hot Gases)

Outline

This instrument is used for moisture in high temperature gases. It can display %H₂O of hot gas comparing with oxygen percent of crude sample and dried sample.

1) Principle

a. Moisture in Hot Air

Oxygen percentage of wet air is diluted by moisture vapor. Using dry air as reference gas, cell EMF will be as follow.

$$E(mV) = 0.0496T * \log \frac{20.9(\text{dry air})}{\%O_2(\text{sample})} \text{----- (1)}$$

Relation of composition between moisture and oxygen is calculated as follows.

$$\frac{\%O_2 \text{ in Air}}{\%O_2 \text{ in Sample}} = \frac{O_2 \text{ dry}\%}{O_2 \text{ wet}\%} = \frac{100}{100 - H_2O\%}$$

Then formula(1) becomes

$$E(mV) = 0.0496T * \log \frac{100}{100 - H_2O} \text{----- (2)}$$

b. Moisture in Combustion Gas

When oxygen composition is different from air, dried sample is supplied as reference gas. If gas conditions is so wrong such as heavy oil combustion, we recommend two sensor system.

Calculation formulas are as follows

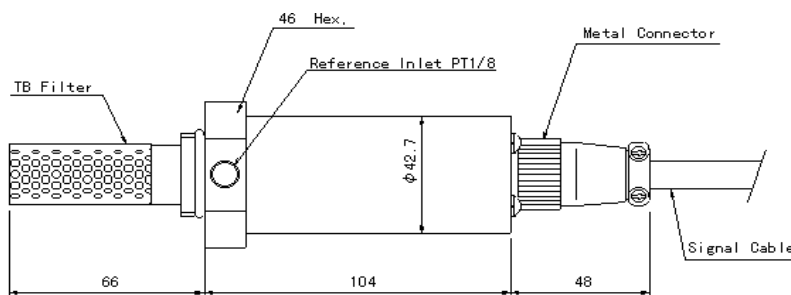
$$E(mV) = 0.0496T * \log \frac{100}{100 - H_2O} \text{--- (3) For 1 sensor system}$$

$$H_2O\% = 100 * \left(1 - \frac{O_2 \text{ wet}\%}{O_2 \text{ dry}\%} \right) \text{--- (4) For 2 sensor system}$$

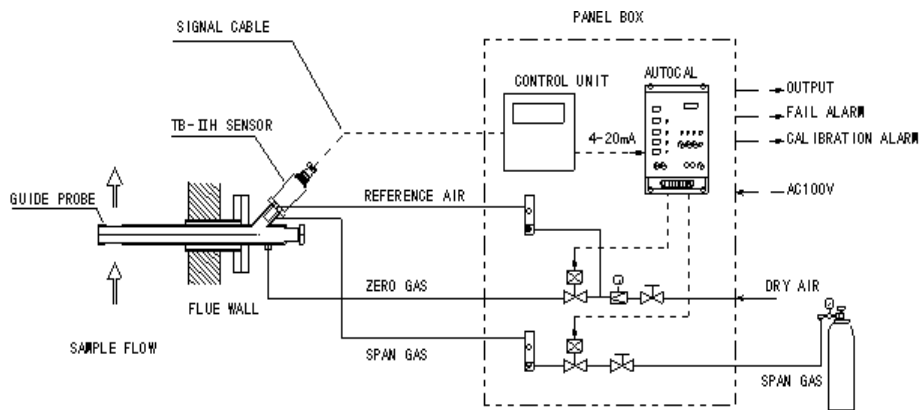
2) Specifications

Measurement Range	0 ~ 50% H ₂ O
Mounting	Horizontal ~ Vertical
Sampling	Guide probe/Aspirator/Pump
Sample Temp.	minimum 200°C
Sample Pressure	0 ± 200mmAq

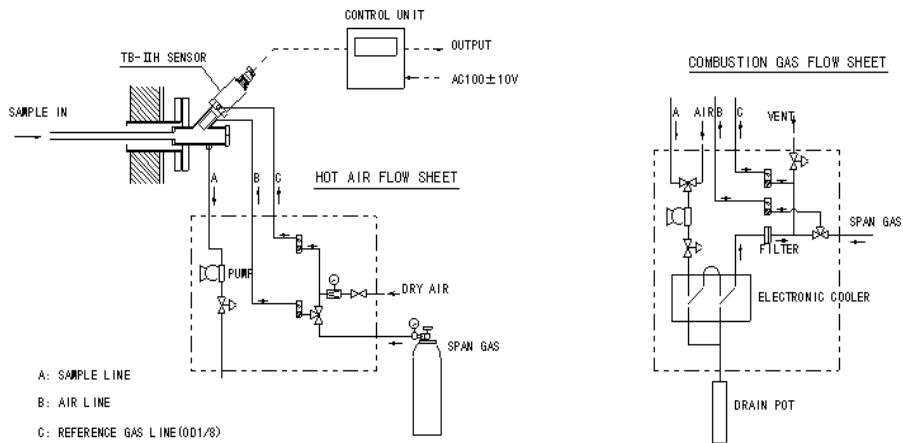
Dimensions



3) Flow Sheet Example Guide Probe Type

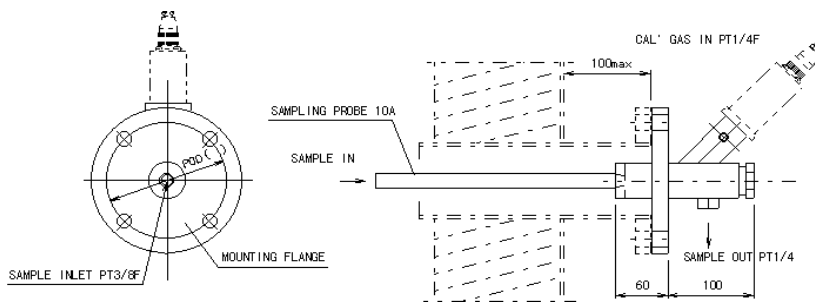


Sampling Probe Type



4) Accessories

Sampling Probe & Port Block



How to select

A B
HSP-□□-□□-□□□□

A. Flange

Pressure Rate: JIS5K, 10K Size: 40A, 50A, --

B. Probe Length mm

Writing example

HSP-05-50-0700 ---JIS5K flange, 700mm long probe

Guide Probe

See Section III-1

III-5 Sensor Accessories

1) Signal Cable

Outline

Sensor and control unit is connected with 6 wired signal cable. 3 meters of heat resistant signal cable is attached to sensor as standard accessory. If you need long wiring, extend it through intermediate terminal box.

We provide following special cable for extended wiring.

Kind of cable	Temp. max	Using condition
6 wired heat resist	120°C	under 50 meters, individual wiring
6 wired shield	80°C	over 50 meters or complex wiring

Wiring Capacity			
Distance	Cell EMF	Cell Heater	RTD
~ 50m	0.75mm ²	1.25mm ²	0.75mm ²

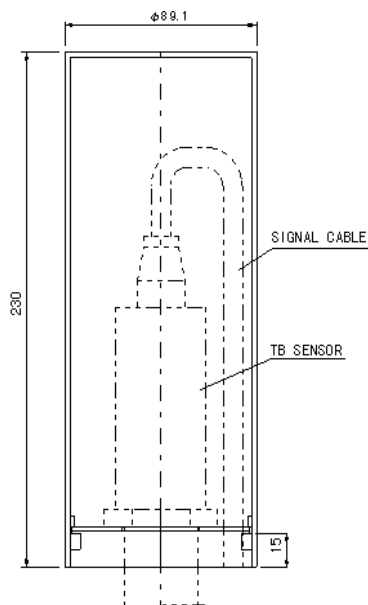
For longer than 50 meters wiring we recommend to use the capacity more than 2.0mm².

2) Rain Protector

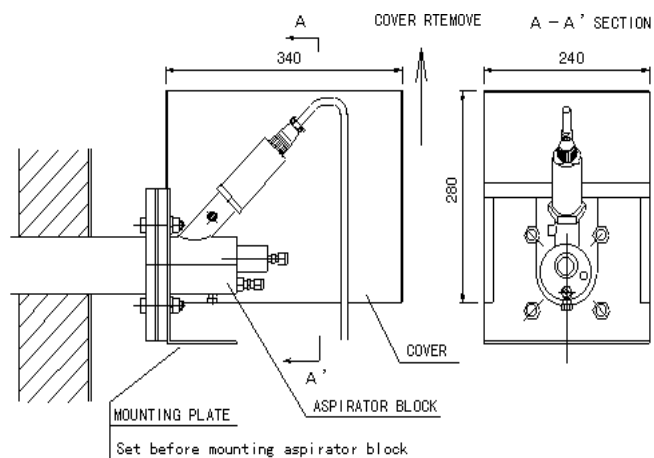
Outline

TB sensors are designed for indoor use. For outdoor the rain protector is needed.

1. Simple Type



2. Box Type



*Same box can be used for vertical mount.

IV. CONTROL UNIT

Outline

O₂ sensors are used combined with control unit.

As we mentioned in the principle EMF of Zirconia cell relates to O₂ partial pressure and cell temperature. TB sensors have a heater and a resistance temperature detector (RTD) inside of the cell. Control units control cell temperature by RTD resistance and convert cell EMF to Oxygen % etc.

We provide following four models for various application

Features

C-28B, C-28BR

These models are small size control unit with micro processor.

There are two types. C-28B is used for non-combustible gases and C-28BR is for excess fuel combustion gases.

Setting and changing operations can be easily done on the front panel key.

User can set the analog output for each ranges.

Single range but changeable optionally at site.

It has selectable 2 points of High-Low alarms.

C-38B, C-38R

These models are fully utilizes micro processor function.

There are two types. C-38B is used for non-combustible gases and C-38R is for excess fuel combustion gases

Any setting and changing operation can be easily done on the front panel by dialog method.

User can set optionally from 10⁻³atm to 100% of O₂ range.

It can preset 3 ~7 ranges.

C-14

These models are order made control unit which uses analog circuit.

Measuring range should be decided by user before manufacturing.

It can control 1 or 2 sensors and add optional functions.

C-5

These models are special made for multi sensors manufactured by user . options.

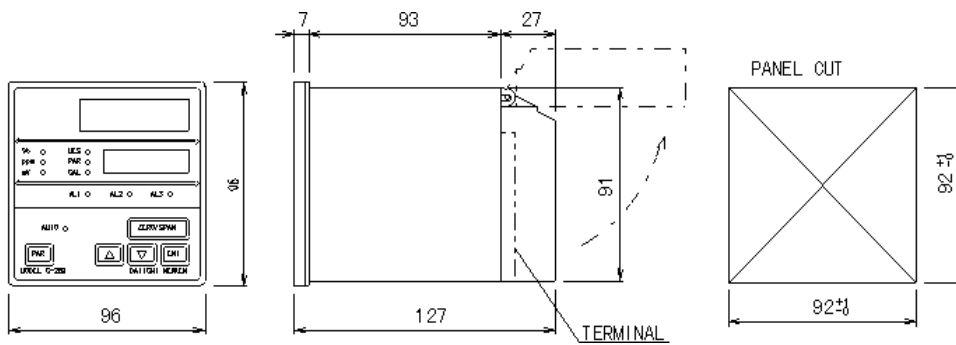
IV-1 C-28B, C-28BR

1) Specifications

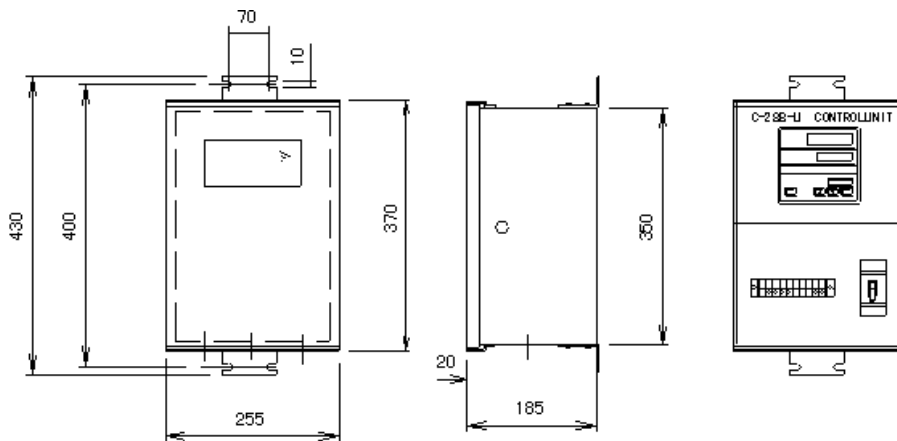
Type	C-28B		C-28BR
Size and Weight	96W x 96H x 127D about 600g		Same
Power Required	AC90V~130V 50/60Hz		Same
Display (2 Stage)	Upper	4-digit, 14.2mmH	Same
	Lower	4-digit, 10.2mmH	Same
Measurement Unit & Range	R1: %O ₂ 0~99.99% R2: ppmO ₂ 0~9999ppm R2: Cell EMF 0~1500mV		R1: %O ₂ -10~25.00% R2: Cell EMF 0~1500mV
Scaling	Variable in Each Range Ex. 0-10.00% for 4-20mA		Same
Unit Select	Manual Full Auto R1(%O ₂) ↔ R2(ppmO ₂)		Manual only
Output	Analog: DC4-20mA, 0-1V/0-10V (Isolated) Serial Communication: RS232C (Option)		
Alarm	AL1: High or Low acting AL2: High or Low acting AL3: Sensor Fault		
Other Functions	Cell EMF display Cell Temperature display Easy calibration by panel key Remote or Automatic Calibration Fail Alarm Measuring unit answer back Output hold		

2) C-28B, 28BR Dimensions

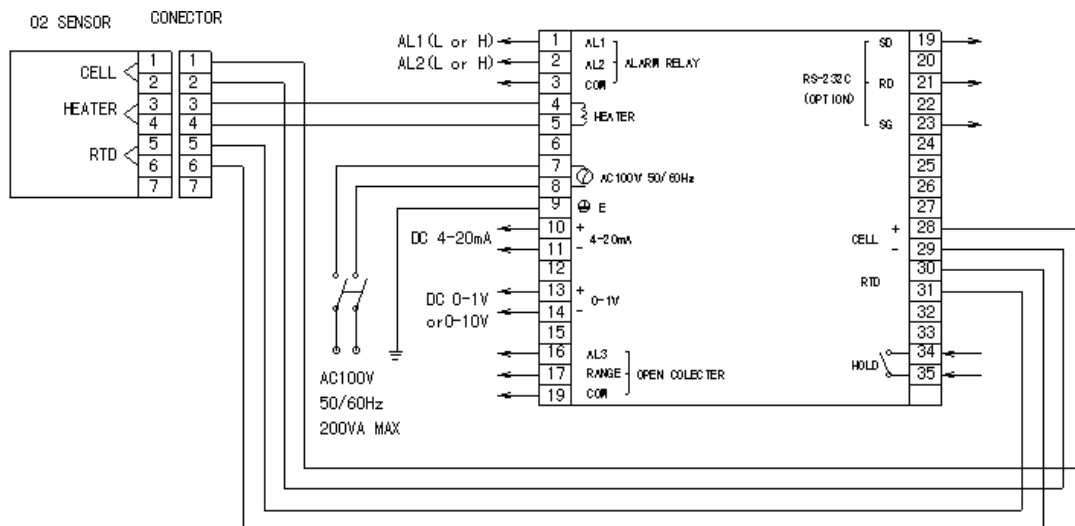
a. Panel Mount Type



b. Wall Mount Type (C-28B-U)



3) Standard Wiring Diagram

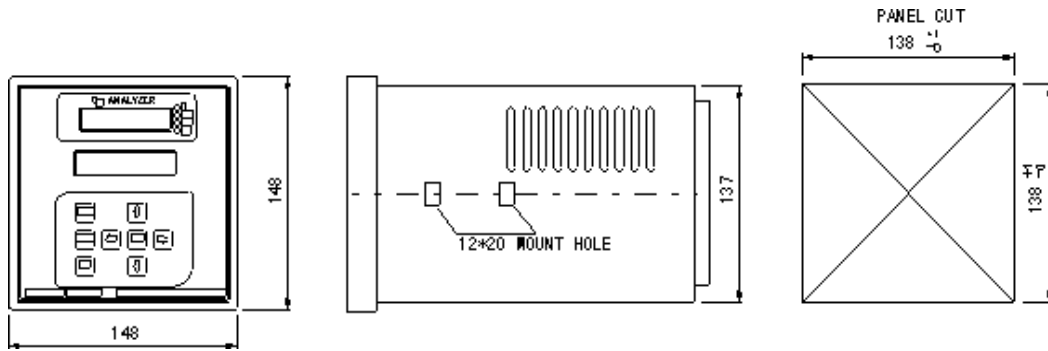


IV-2 C-38B, C-38R

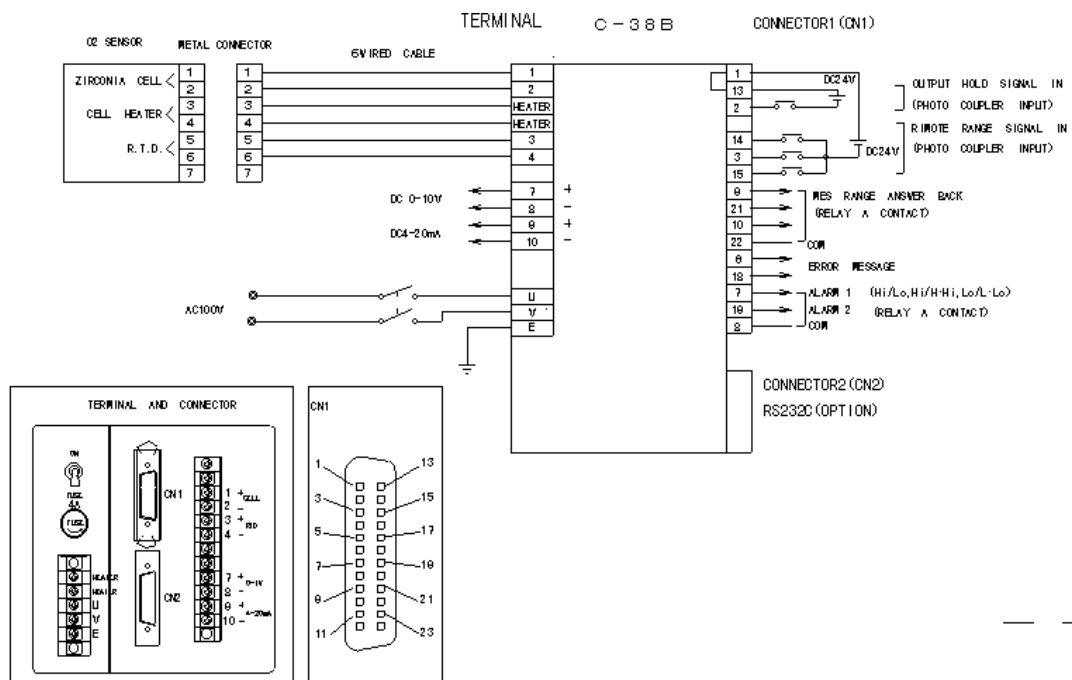
1) Specifications

Type	C-38B	C-38R
Size and Weight	144W x 144H x 240D about 3Kg	
Power Required	AC100V~115V 50/60Hz	
Display (2 Stage)	Upper	6-digit LED
	Lower	16-digit LCD
Range	Normal 3 Ranges, 4~7 ranges optional	
Measurement Unit	%O ₂ , ppmO ₂ , atmO ₂ , mV (Cell EMF)	%O ₂ , %F (CO+H ₂), A/F (AIR/Fuel) mV (Cell EMF)
Display Range	%O ₂ 0~100.00% ppmO ₂ 0~10000.0ppm atmO ₂ 1~10 ⁻³ atm mV 0~1500mV	%O ₂ -30~30.00 %F (CO+H ₂) 0~60.00 A/F 1.000~0.500 mV -35~1999
Unit Select	Manual/Remote	
Output	Analog: DC4~20mA, 0-1V/0-10V (Isolated) Serial Communication: RS232C (Option)	
Alarm	AL1: High or Low acting AL2: High or Low acting AL3: Sensor Fault	
Other Functions	Cell EMF display Cell Temperature display Temporally change of Unit One touch calibration Cell check Error message Measuring unit answer back Output hold	

2) C-38B Dimensions



3) C-38B Wiring Diagram

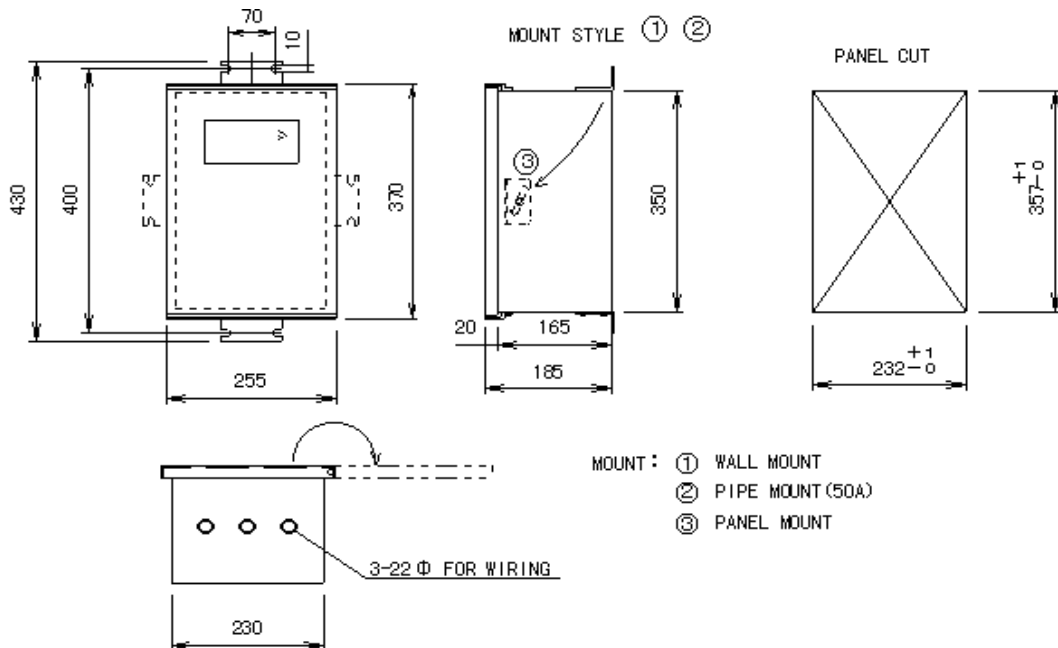


IV-3 C-14

1) Specifications

Size and Weight	255W x 370H x 155D about 5Kg
Mount	Wall/Panel/Pipe
Power Required	AC100V/115V 50/60Hz
Display	Digital or Analog meter
Range	Up to 3 Ranges, Linear or logarithmic
Measurement Unit	O ₂ Content: %O ₂ , ppmO ₂ O ₂ Partial Pressure: atmO ₂ , mV(Cell EMF) Excess Fuel Combustion: -%O ₂ , %CO+H ₂ Moisture: %H ₂ O, mmHg, Kg/Kg etc.
Range Select	Manual
Output	Analog: DC4-20mA, 0-1V (Non-isolated) Serial Communication: RS232C(Option)
Options	Output Isolator Auto/Remote range change Measuring unit answer back Output hold Alarms: Hi/Lo, H.hi/Hi, Lo/L.Lo : Sensor fault

2) C-14 Dimensions



V. AUTOCAL (Automatic Calibrator)

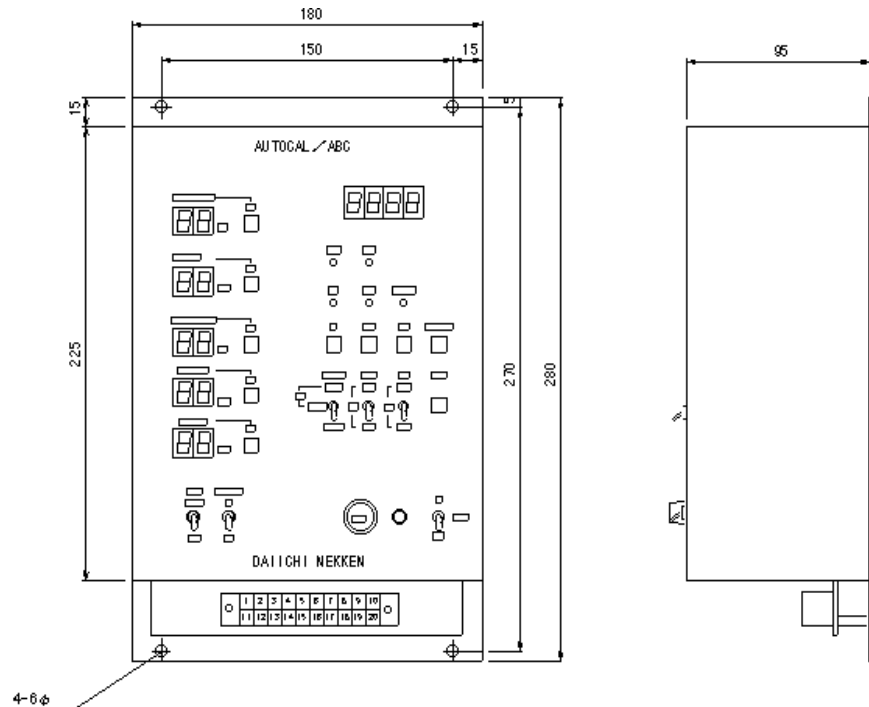
Outline

This instrument can calibrate analyzer output periodically using two calibration gases by inside timers and relays. It can be applied not only our analyzers but also various analyzers.

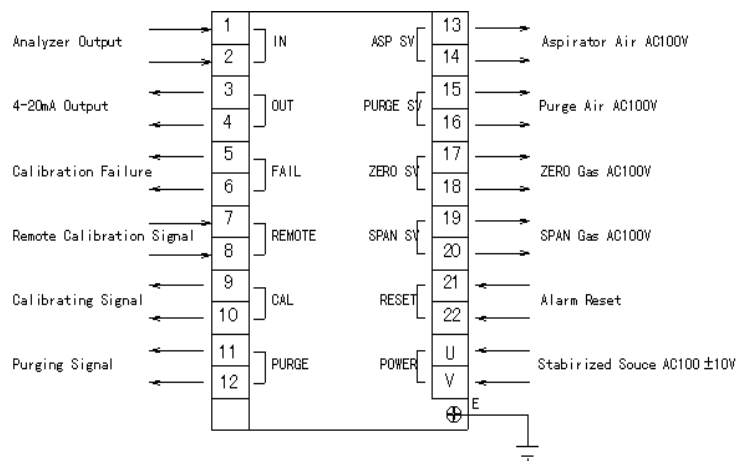
Specifications

Mount	Wall mount
Input	DC 4~20mA or 0~1V
Output	Same above
Adjustable Range	Zero: 4~8mA or 0~250mV Span: 14~20mA or 625~1000mV
Period	0~99days
Cal. Time	0~99min
Alarm	Fail calibration

Dimensions



Terminal Block



VI. OTHER PRODUCTS

We are manufacturing and selling following products besides TB series.

- a. Trace Oxygen Analyzer.
- b. Reducing Atmosphere Analyzer
- c. Premix Gas Analyzer
- d. O₂ in Steam Analyzer
- e. High Purity O₂
- f. Breath Oxygen Monitor
- g. Paramagnetic Oxygen Analyzer
- h. Infrared Analyzer
- i. Thermal Conductivity Gas Analyzer
- j. Combustibles Analyzer
- k. Gas Analysis and Control System

Please contact us for anything else by following communication.

DAIICHI NEKKEN CO.LTD.

TEL:81-797-31-2410 FAX:81-797-31-8951

E-Mail: info @ daiichinekken.co.jp

URL: <http://www.daiichinekken.co.jp>

INQUIRY CHART

To: Daiichi Nekken co. Ltd.
 Sales & Engineering Dep.
 Fax: 81-797-31-8951
 Tel: 81-797-31-2410

From: Name
 Firm
 Dep.
 Fax:
 Tel:

Please check figures by ○, and fill details in (___).

I. SENSOR

Applied Equipment (_____) Measuring Point (_____)

Install Place 1. Indoor 2. Outdoor

Purpose 1. Combustion Exhaust O₂ 2. Combustion Exhaust -O₂
 3. Trace Oxygen in Inert Gas 4. Oxygen in Mixture Gas
 5. Furnace Atmosphere
 6. Moisture of High Temperature Gases
 7. Others (_____)

Sample Condition Composition (_____)
 Temperature (_____)°C, Pressure (_____)
 Dust (_____)g/Nm³, Moisture (D.P. _____)°C,
 Estimate Value (_____) 1. %O₂, 2. ppmO₂, 3. atmO₂, 4. (_____)

Model of Sensor	1. TB-II E	2. II H	3. II F	4. II P	5. II V
Accessories	1. Guide Probe 2. Aspirator Block 3. Sampling Probe 4. Air Supply 5. Sampling Unit		1. Filter 2. Pump 3. Flow Meter		1. Stop Valve

II. CONTROL UNIT

Model: C-(_____)

When you hope to use C-14 or C-5 models please fill the follows

Type 1. 1 Sensor matching 2. (_____) Sensors matching

Meter 1. Analog 2. Digital

Range 1 Range (____ ~ ____) 1. %, 2. ppm, 3. atm 4. (____)
 2 Range (____ ~ ____) 1. %, 2. ppm, 3. atm 4. (____)
 3 Range (____ ~ ____) 1. %, 2. ppm, 3. atm 4. (____)

Option (_____
 (_____)

III. Additional Accessories & Instruments

(_____
 (_____)