

CYANIDE ION MONITORS

Models: CNBM-100A (Panel Mounting)  
CNBM-160 (Field Mounting)

This cyanide ion monitor measures the concentration of cyanide ions in water promptly and continuously. The monitor is designed to enable its membrane type ion electrode to detect hydrogen cyanide in the gas state by using an air pump to aerate and vaporize hydrogen cyanide in water, and therefore it is possible to carry out the measurement steadily even in contaminated water for an extended period of time. However, it does not detect cyanogen in the ionic state or such cyanide that cannot be vaporized by aeration. Performance of the ion electrode may be affected by those ions that are vaporized along with cyanogen. As to whether this monitor suits purposes and conditions of your measurement, please refer to "Sample Conditions" on the next page.

There are two types of configuration, panel mounting and field installation, available to be used with the immersion type detector, CNCG-76.



CNBM-100A

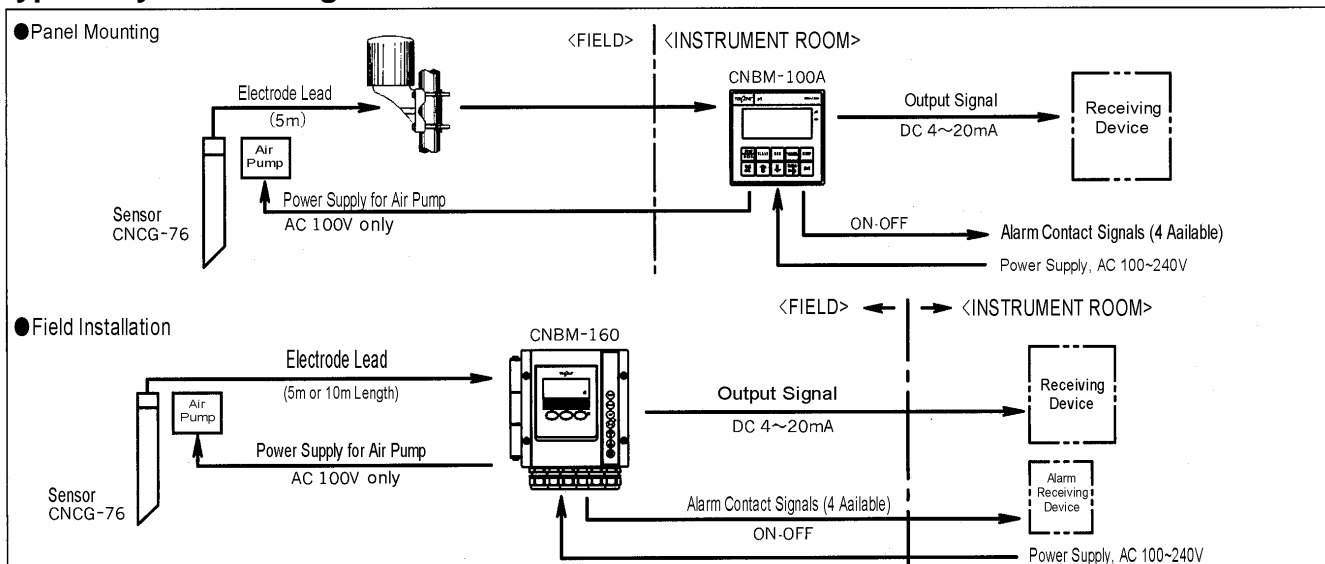


CNBM-160

Features

- No sampling or pre-treatment required. The sensor can be directly immersed in water without addition of alkaline reagent. pH value of water to be tested should be between 4 and 8.5.
- Standard measurement range is set to either 0~2mg/L or 0~5mg/L at the factory, in accordance with your request.
- 4 alarm outputs are available. These can be configured such as upper limit alarms, instrument error, power-off, and under cleaning. Concentration alarms are adjustable for delay time and band width.
- Output for sample temperature measurement is available (CNBM-160).
- RS-232C: Output signal for measured concentration, sample temperature, and upper limit alarms is available (optional).

Typical System Configuration



## Common Specifications

Model Codes	: CNBM-100A (panel mounting) CNBM-160 (outdoor, field mounting)	Contact Switching Outputs	: CNBM-100A: 4 outputs available (4 normally open contacts) CNBM-160: 4 outputs available (3 normally open contacts and 1 transfer contact)
Measurement Method	: Membrane electrode method		
Display:	Digital, LCD type		Select from high limit, low limit, under maintenance, meter error. Power off can be selected by CNBM-160 (Factory setting is OFF). Delay times and bandwidth are adjustable for the high and low limit alarms. Contact rating: 250 VAC, 3A or 30VDC, 3A
Display Ranges	: 0.00~9.99mg/L for ion conc. 0.0~50.0°C for temperature		
Measurement Ranges (Output Ranges)	: 0.00~2.00mg/L or 0.00~5.00mg/L for cyanide ion conc. 0.0~50.0°C for temperature (only CNBM-160)	Performance	: <b>Linearity:</b> within +/-8% FS (excluding sensor) within +/-30% FS (with sensor) <b>Repeatability:</b> within +/-5% FS (excluding sensor) within +/-30% FS (with sensor) <b>Response time:</b> (90%): within 15 seconds (excluding sensor) within 180 seconds (with sensor, at 20°C)
Output Signal	: 4~20mA DC, isolated CNBM-100A: 1 output for ion conc. CNBM-160: 2 outputs for ion conc. and temperature		
Digital Output Signal (Option)	: RS-232C, Asynchronous, half duplex, 9600 Baud. Data transmitted includes ion concentration, electrode potential, sample temperature, concentration alarms, under maintenance, meter error	Self Diagnostics	: <b>Calibration Error:</b> Displays E-0,4,5 <b>Temp. Sensor Error:</b> displays E-12 Burn out or error signal is output
Temperature Compensation	: Electrode potential and gas concentration are compensated within 0~40°C of sample temperature.	Operation Power	: 100~240 VAC, 50/60Hz
		Power Consumption	: Approx. 10VA (CNBM-100A) Approx. 11VA (CNBM-160)

## Individual Specifications

	CNBM-100A	CNBM-160
Installation	Panel mounting (panel cut-out: 92 x 92mm)	Outdoor, field installation (50A pipe, wall or rack mounting)
External dimensions	96(w) x 96(w) x 90(d) mm	181(w) x 180(w) x 95(d) mm
Enclosure Rating	Indoor installation type (IP-30)	Outdoor installation type, dust and splash proof (IP-65)
Materials of construction	Main body: Aluminum Display: Polyester	Main body: Aluminum die cast Display: Polyester
Surface finish	Display: Pale Yellow	Main body: Metallic silver
Cable entry	Not applicable	G1/2 x 6 (with 6~12mm diameter cable gland)
Ambient Temp and humidity	-10~50°C 90% RH or less (no condensation)	-20~55°C 95% RH or less (no condensation)
Weight	Approx. 0.5kg	Approx. 2kg
Temp output signal	Not applicable	Adjustable in 10°C widths with 1°C units. Factory setting 0.0~50.0°C

## Sample Conditions

pH : To be stable within pH4~8.5  
In order for hydrogen cyanide (HCN) to be detected by the sensor, HCN must exist as molecules, not as ions, so that it can be vaporized by aeration. Under the sample condition of pH8.6, about 84% of HCN exists as molecules while the rest consists of H<sup>+</sup> and CH<sup>-</sup> ions. HCN molecules compose 87% of HCN in sample water with a pH8.5, 95% of that with a pH8.0, and almost 100% of that with a pH7.5 or less. Therefore, variations in pH could change components of the sample and, as a result, affect measured values.

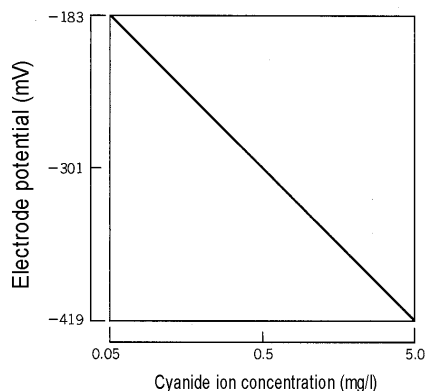
Temperature : To be stable within 0~40 °C  
 Measured values are affected by temperature changes because the amount of HCN vaporized by aeration varies depending on the sample temperature.

Coexisting Components : There should be no such components as sulfide, iodide, free chlorine, and metals including iron, copper and nickel.  
 Vaporized sulfide, iodide or free chlorine could deteriorate the ion electrode.  
 Metals can combine with cyanogen to form compounds that cannot be vaporized. Although, according to the total cyanide measurement method as specified in JIS K 0102, such compounds are decomposed in order to measure cyanogen, this monitor is not designed to do so.

## Principle of Operation

The hydrogen cyanide (HCN) electrode generates an electromotive force between the sensing electrode and the reference electrode, which corresponds to the concentration of HCN gas emitted from the sample water. There is an equilibrium relation between the concentration of HCN gas emitted from the sample and that of HCN ions in the sample as shown in the diagram on the right.

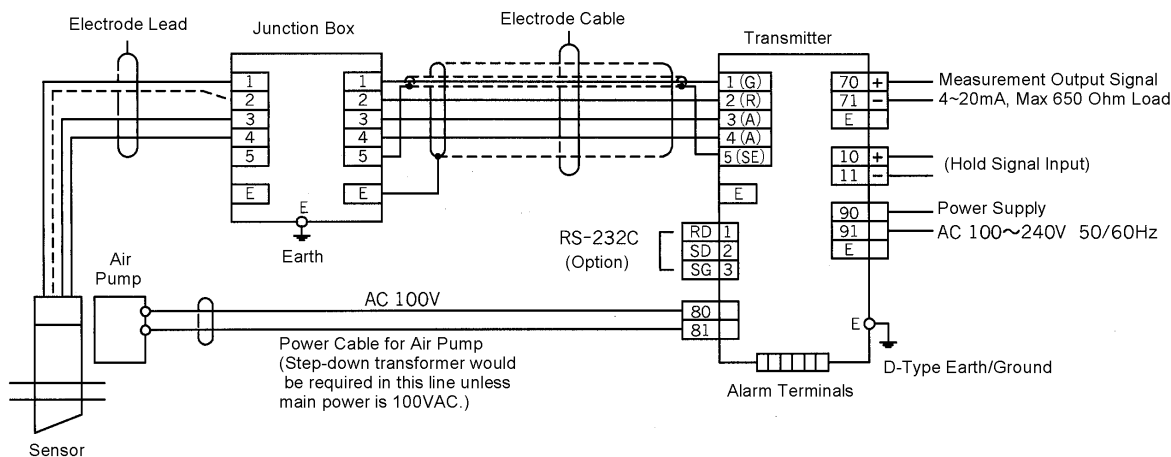
In order to measure the concentration of cyanide ions, simply expose the electrode to hydrogen cyanide gas after calibration with standard solution.



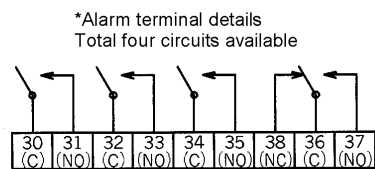
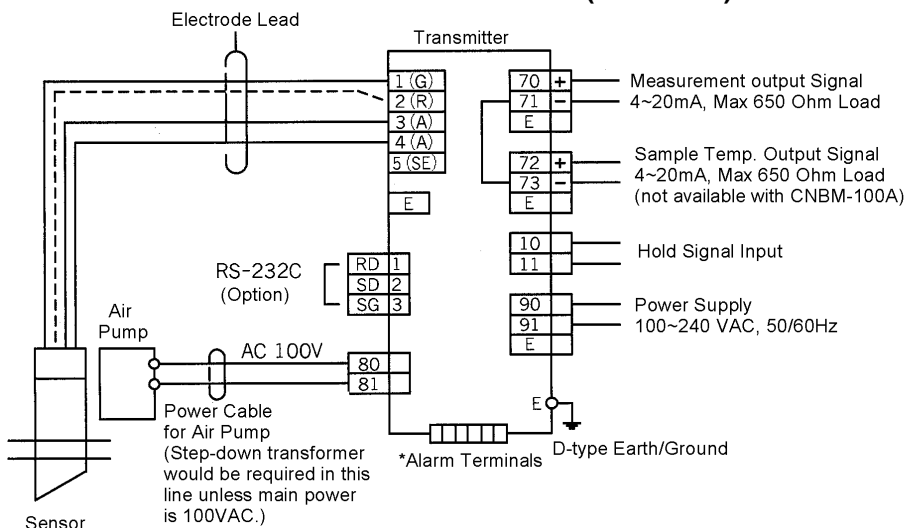
Electrode potential vs Cyanide Ion Concentration

## Terminal Connections

### • Electrode Connection via Junction Box (CNBN-100A)



### • Direct Electrode Connection to Transmitter (CNBN-160)



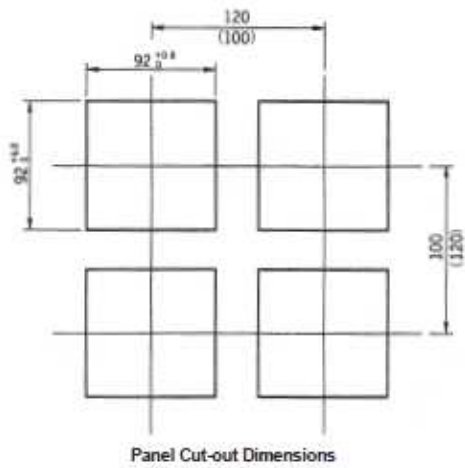
Contact rating: 250 VAC, 3A, or 30 VDC, 3A  
 Available Functions: high limit, low limit, under cleaning, under maintenance, meter error

NOTE: Terminal 38(NC)※ is Only available with CNCB-160 transmitter.

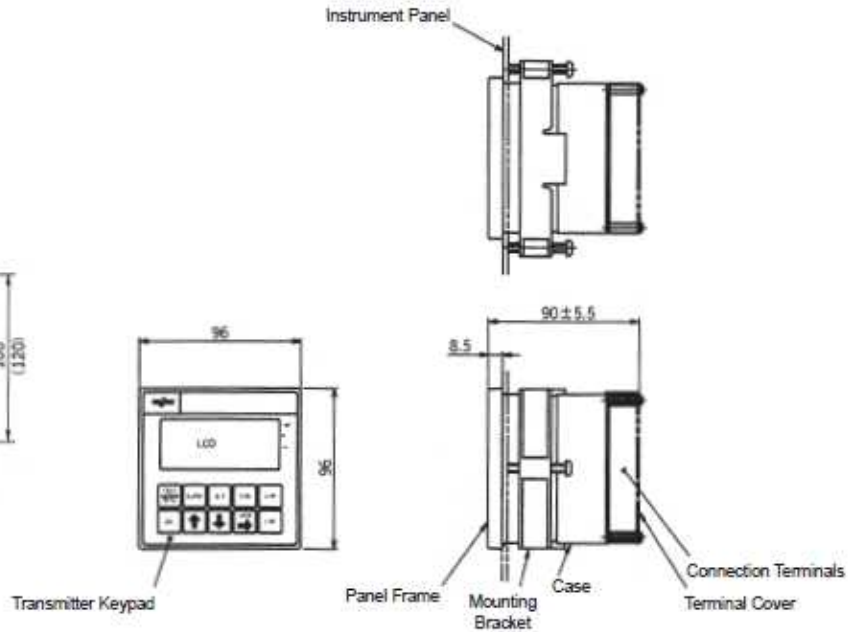
# Dimensions

(Units: mm)

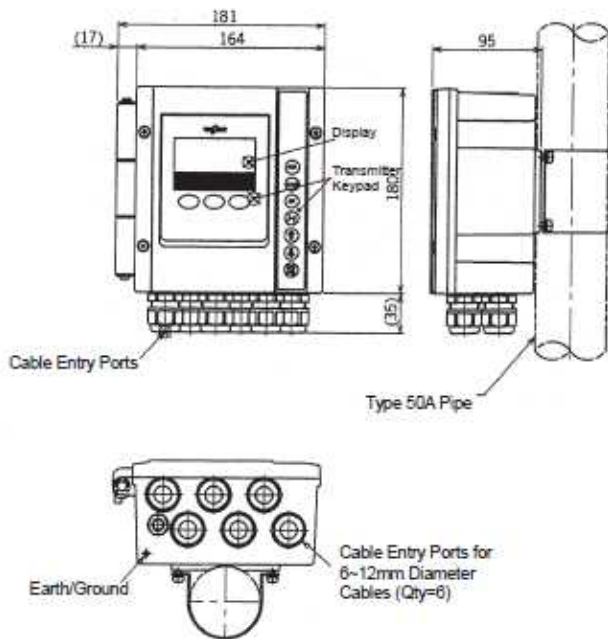
## ● CNBM-100A Panel Mounting



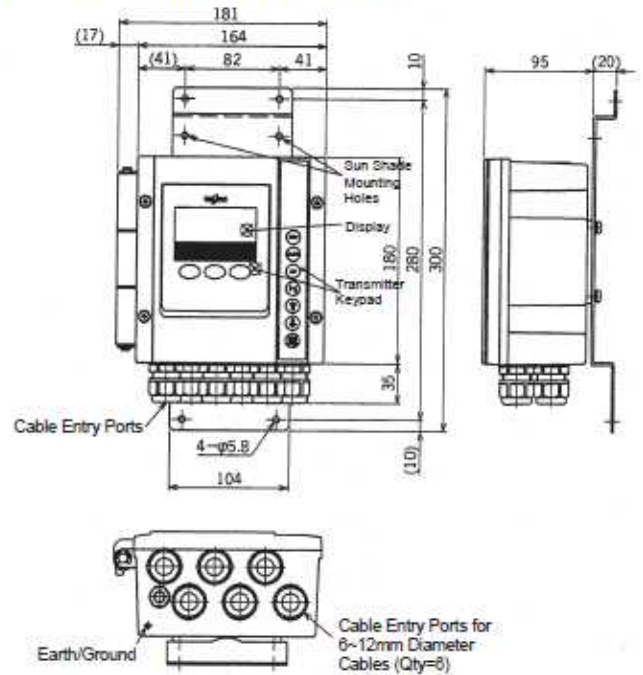
Panel Cut-out Dimensions



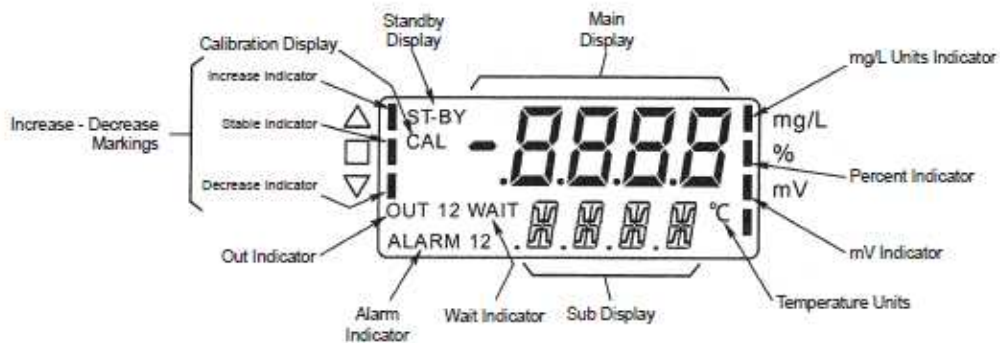
## ● CNBM-160 Pole Mounting



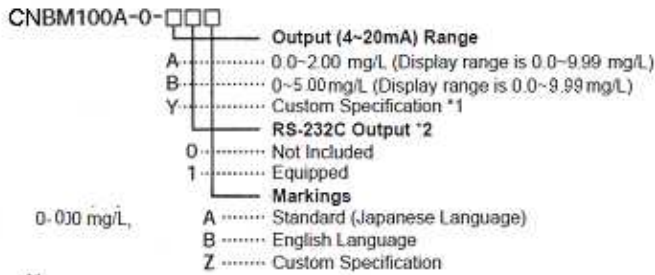
## ● CNBM-160 Wall or Rack Mounting



# Display Configuration

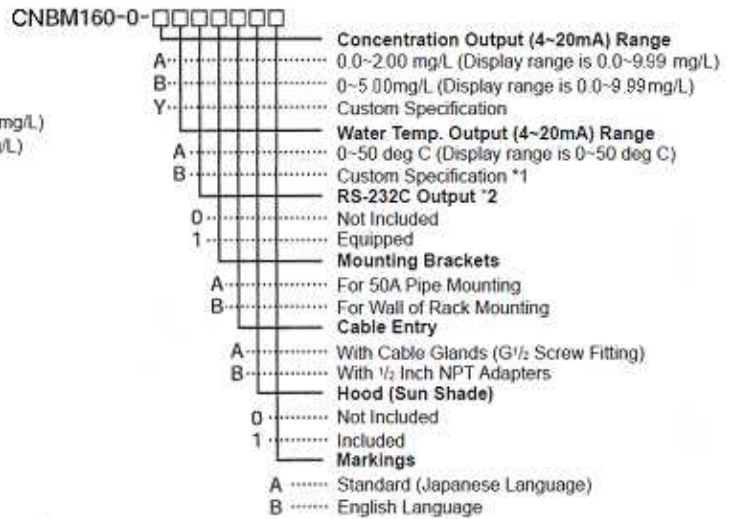


# Product Codes



\*1  
For "Custom Spec", please specify 1/10 of Full Scale or greater for measurement display range for each range (examples 0-1mg/L, 0-8 mg/L).

\*2  
The RS232C output includes the following as well as ion concentration and water temperature: high limit alarm, high-high limit alarm, under maintenance, under cleaning, instrument malfunction etc..



\*1  
For "Custom Spec", please specify 1/10 of Full Scale or greater for measurement display range for each range (examples 0-1mg/L, 0-8mg/L, 0-30 degC).

\*2  
The RS232C output includes the following as well as ion concentration and water temperature: high limit alarm, high-high limit alarm, under maintenance, under cleaning, instrument malfunction etc..

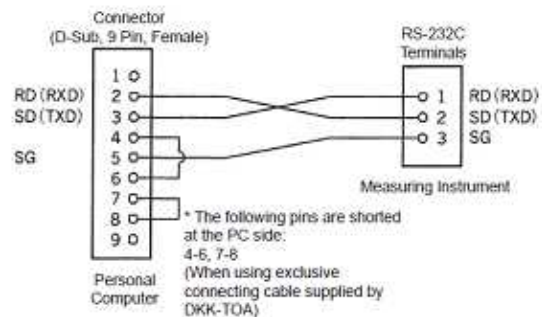
## Options

### ● RS-232C Output

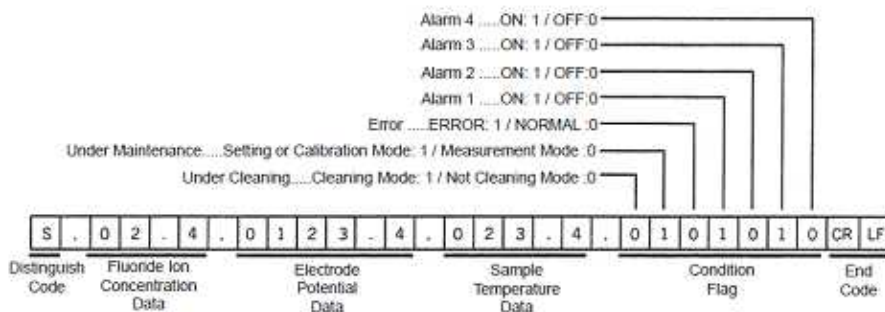
If RS-232C is selected as "Equipped" then digital data including status alarms etc. is available for download to PC or other RS232C peripheral device.

RS-232C Terminal Connections

Terminal No	Signal Symbol	Description	Direction
1	RD (RXD)	Receive	Input
2	SD (SXD)	Transmit	Output
3	SG	Ground	



RS-232C Cable Pin Assignment

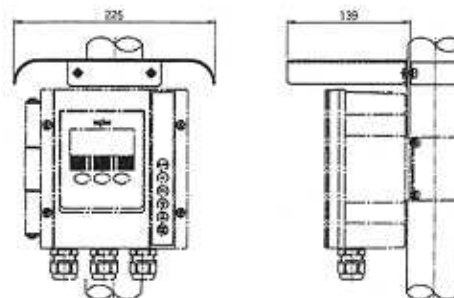


RS-232C Data Protocol

### ● CNBM-160 Hood (Sun Shade)

Recommended if CNBM-160 is installed outdoors in direct sunlight.

Material: 304 Series Stainless Steel  
Installation: 50A Pipe Mounting  
Code No.: 7049930K



## Sensor

Model	: CNCG-76
Construction	: Consisting of a holder for gaseous phase hydrogen cyanide electrode and an air pump for purging hydrogen cyanide gas out of the sample.
Material	: PP
Holder Length	: 0.5, 1.0, 1.5m
Temperature	: -5~40°C
Sample Temp.	: 0~40°C (no freezing)
Applicable Electrode	: 7234-5F (lead length 5m)

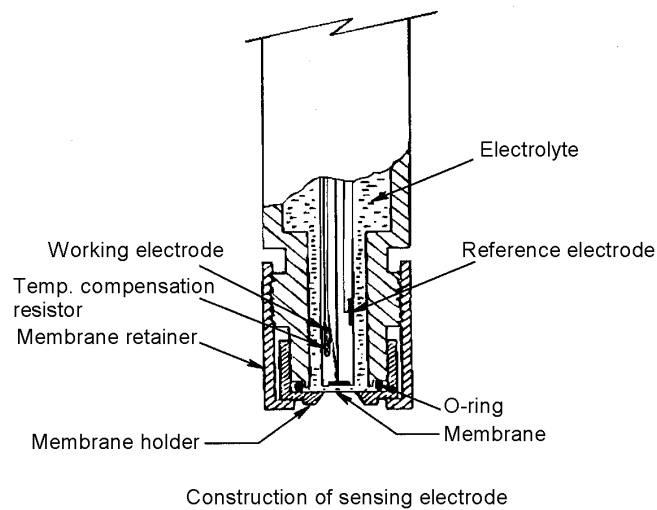
### •Air Pump

Model	: CNP-51
Power Requirements	: 100V AC±10% 50/60Hz
Power Consumption	: 2.5VA (50Hz) or 2VA (60Hz)
Air Flow Rate	: 1.7L/min (50Hz) or 2L/min(60Hz)

Site Requirement : Avoid locations where there is acid gas like HCl, SO<sub>2</sub> and NO<sub>x</sub>.

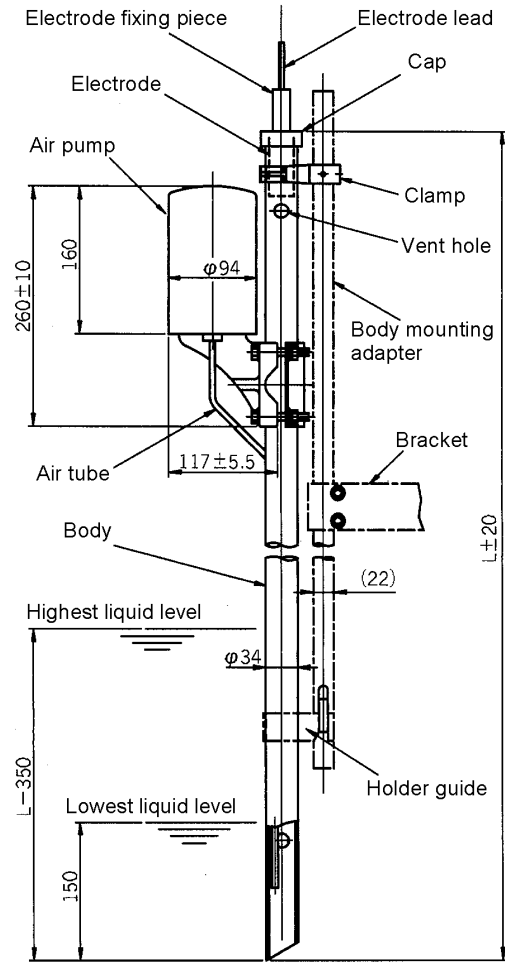
## Structure of the Electrode

The electrode is composed of a sensing electrode and a counter electrode in electrolyte solution, covered with a membrane that allows hydrogen cyanide gas to permeate into the electrode. When a sample containing hydrogen cyanide is aerated while the sensor tip is immersed in it, hydrogen cyanide gas in the sample is pushed out by the air toward the sensing electrode and permeates the membrane to react with the electrolyte, producing a potential change in the sensing electrode. This ion monitor, by detecting changes in potential, measures cyanide ion concentration and activates the alarm system.

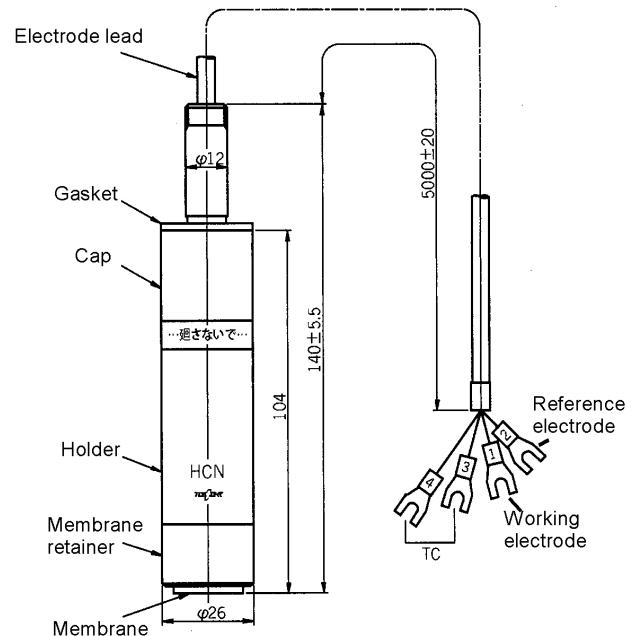


## DIMENSIONS Sensor CNCG-76

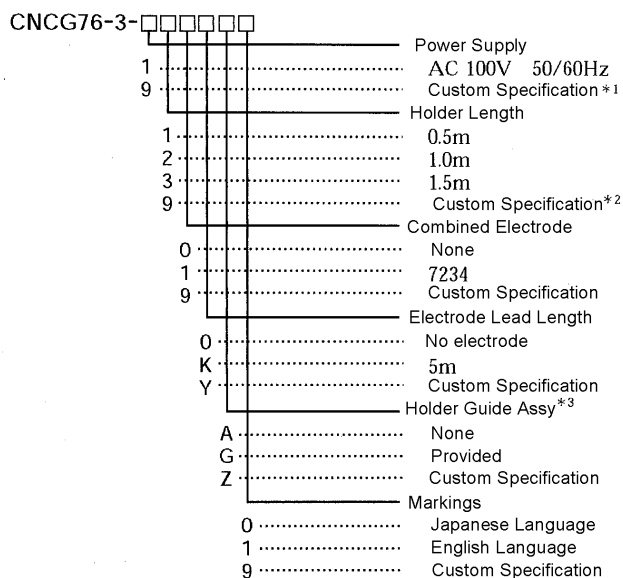
Units: mm



## Electrode 7234-5F





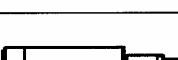





# Sensor Product Code



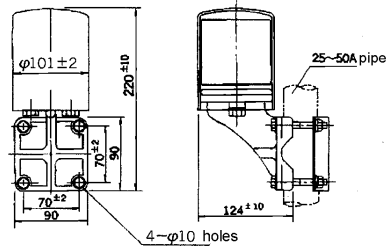
- \*1. For supply voltages other than 100 V, use the step-down transformer (ZP-30 for 35 VA to be ordered separately).
- \*2. For a holder longer than 1.5 m or in case of a heavily contaminated sample, the special specification holder equipped with a high-power pump is required.
- \*3. This part is required when using the detector with the ZN-7 mounting bracket.

## Annual Spare Parts List

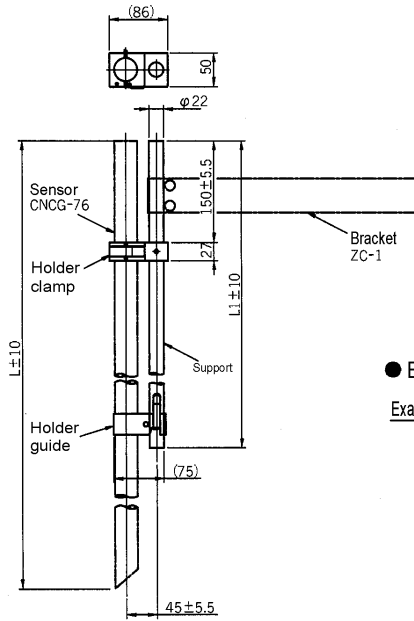
No.	Part Code	Description	Appearance	qty.		Note
				Consumable	Spare	
1	143A018	Inner solution 100mL for hydrogen cyanide electrode		1		
2	143F092	Ion strength adjuster pH7-AB 100mL		1		
3	524381S	Electrode diaphragm 5 pieces		1		
4	115A532	Silicone O-ring P14		1		For electrode diaphragm
5	EL7234	Hydrogen cyanide electrode 7234-5F			1	
6	125B071	Air pump NS-SUN			1	For purge
7	116D010	Teflon tube 3X4 white	 (Same length as holder)		1	For purge
8	36498800	Electrode holder body for 0.5 m length			1	Choose one of three bodies.
	35869000	Electrode holder body for 1.0 m length				
	35869100	Electrode holder body for 1.5 m length				

# Additional Equipment

- Junction Box
  - Model : FC-4
  - Ambient Temp.: -5~40°C
  - Material : ABS resin
  - Finish : Chromium plating, pearskin finish
  - Weight : Approx. 0.9kg



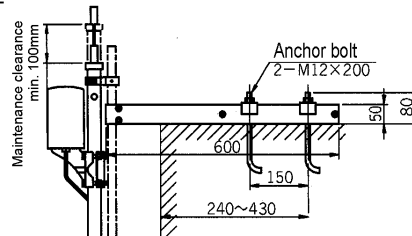
- Holder Bracket ZN-7



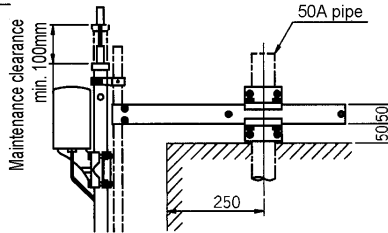
Bracket length(L1)	
500 (L : 1000)	
1000 (L : 1500, 2000)	
1500 (L : 2000, 2500)	

- Bracket ZC-1

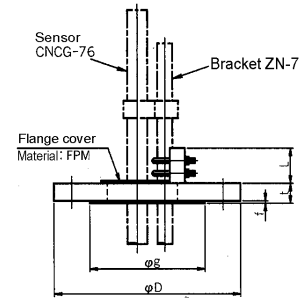
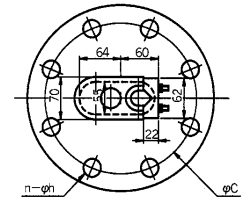
Example A



Example B



- Open Flange ZFK-1 (PVC)  
ZFK-2 (stainless steel)



Nominal pressure 10K										
Nominal diameter	D	t	Metal	Nonmetal	f	g	C	n	h	L
100	210	18	24	2	151	175	8	19	100	
150	280	22	26	2	212	240	8	23	50	
200	330	22	26	2	262	290	12	23	50	

## DKK-TOA CORPORATION



## CAUTION

Do not operate products before consulting instruction manual.

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<http://www.toadkk.co.jp>

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