NECMET

Instruction Manual

Model PDC-70N (*Portable Multi Meter*)

pH/ISE/ORP/DO/O2/Air/Conductivity/TDS/Salinity/TEMP Meter

istek, Inc.

ISO Certified 9001

Website : www.istek.co.kr

E-mail : istek@istek.co.kr

Chapter I. Introduction

istek¡s **Portable Multi *pH(ORP/mV)/DO(Air/O2)/Conductivity(TDS/Salinity)/Temp Meter (Model PDC-70N)*** is operated by Rechargeable Battery and is controlled by Microprocessor for all measurement needs.

istek¡s multi meter PDC-70N is high-Performance for accurate measurement at laboratory, river, sea, water supply system, swage system and factory. This Meters features a graphic LCD that simultaneously displays various functions along with measurement results.

pH Mode

pH Indicates Power of hydrogen(H^+). (Unit is pH) pH = $-\log_{10}[H^+]$

ISE Indicates Concentration of ION. (Unit is mg/L) To measure an ION, must be used proper electrode which selected for the purpose.

mV Indicates Electromotive Force of each ION. (Unit is ¡mV¡)

ORP Indicates Strength of Relative Potential. (Unit is ¡mV¡)

ATC For automatic temperature compensation, a temperature probe supplied by *istek* must be used. Temperature Compensation is automatically performed while measuring.

DO Mode

DO Indicates Concentration of Oxygen presents in the water.
(Range 0.00~19.99mg/ℓ, Unit is mg/ℓ)

O_2 Indicates Percentage of Oxygen which is based Amount of oxygen presents in the air. (Unit is %)

Air Indicates Percentage of Dissorlved Oxygen or O_2 Concentration. (Unit is %)

EC Mode

This model features to obtain a reliable data since its program is treated by setting in detail of compensation factor (Temperature Compensation Coefficient, Cell Constant, etc) for an accurate measurement.

Conductivity Indicates Conductivity of Solution. (Unit is μS/cm, mS/cm)

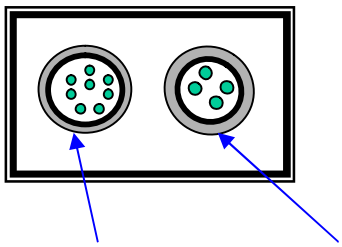
TDS Indicates by converting the measured conductivity into concentration of the total dissolved solid present solution from. (Unit is mg/L)

Salinity Indicates by converting the measured conductivity into salinity of solution. (Unit is ppt)

Chapter II. General Functions

2.1 Instrument Setup

Rear Panel



DIN8PIN (For Sensor) DIN4PIN (For Power/RS232)

Power Source

This meter is operated by Rechargeable Battery (AAA size Battery (1.2V 900mA) x 6ea & AC/DC Adaptor (AC 220V 60Hz / DC 7.5V 300mA)).
When message ¡BAT¡ is appeared on LDC, user charged them with electricity using AC/DC Adaptor and It takes 6~8 hours for recharging fully. When the battery has exhausted in the suburb or field, you can replace with rechargeable battery to open the cover which is located a lower column of the meter¡s backside. (When battery is charging, meter should be power off)

This meter can be used in free voltages and if you would like to use this to 110V, just use a proper connector for inserting a users plug.

Sensors and ATC probe Connecting

We recommend to using an electrode provided together with the Meter for optimum working. Put it into BNC Jack and turn it clockwise to lock into position. And Attached ATC probe to the ATC jack (8PinDin) by sliding the connector straight on until firmly in place.

RS232C interface cable Connecting

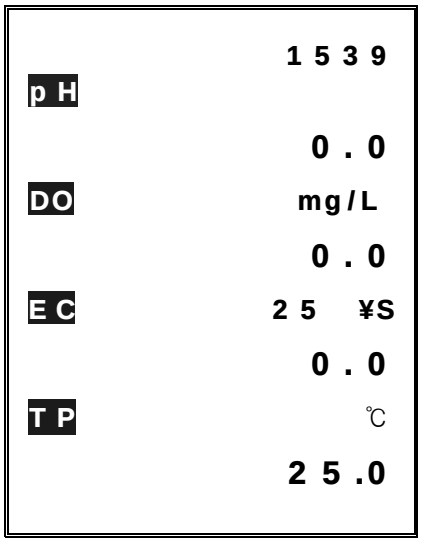
Using this RS232C Interface cable provided by istek, inc, user can connect it with Printer (or computer) for receiving data in real-time and edit/print them easily. For further information, please refer the Chapter 4 <Data ?Logging> Part

2.2 Key Function

Key	Description
ON/OFF	Used to turn ON/OFF.
Ready/Measure	Used to move ¡Measure¡ to ¡Ready¡ or ¡Ready¡ to ¡Measure¡
Setup	Used to access the Setup Menu. This is used for setting and changing of contents of instrument operating parameter
Select	Used to changing operating Modes. Such as pH=>DO=>EC=>Temp.
Memory/Out	Used to store data in meter memory while It is measuring. In the ready condition, be used to search a memorized data.
Down(⩛)	Used to change the item in Measuring Mode pH Mode ; pH=>Ready=>ION=>ORP=>pH DO mode ; DO => Ready=> Air => O_2 => DO EC mode ; EC => Ready => SAL =>TDS => EC Setup Mode ; Used to decrease the DATA Memory : Used to decrease the No. of data
Up(⩓)	Used to change the item in Measuring Mode pH Mode ; pH => ORP => ION =>Ready => pH DO mode ; DO => O_2 => Air => Ready => DO EC mode 에서는 EC => TDS => SAL =>Ready => EC Setup Mode ; Used to increase the DATA Memory : Used to increase the No. of data

2.3 Display Description

<Display>



M or R	Indicates that meter is in measurement mode. If this is disappear indicates READY condition
CAL	Indicates that meter is in calibration condition.
CAL OK	Indicates the end of calibration corresponding to number
Data-Bank	Indicates number of data stored in meter..
Error	Displays when it is not available to correctly measure because something is wrong in the meter or buffer while calibrating or measuring.
Bat	Displays when the battery is low and needs to be replaced.
Measure or Ready	Measure: condition of measuring Ready: Condition of waiting
CAL OK	Indicate the calibration is finished
Memory	Saves measuring data when measuring. When ready, you can see memorized data. When measuring triple item simultaneously, it can be stocked 170 data.
Error	displays when it is not available to correctly measure because something is wrong in the meter or buffer while calibrating or measuring.

■ pH Mode (*pH/mV/ORP*)

S indicates slope value.
If pH reading is stable, displays in the left field.

pH When the pH mode is chosen, ¡pH¡ is displayed below main field.
Displays power of hydrogen with range of ?2.000 to 19.999 pH.

ION indicates ION mode.

mV indicates mV mode. Displays electromotive force of each ION

■ DO Mode (*DO/O_2/Air*)

DO displays concentration of dissolved oxygen with range of 0.00 to 19.99 mg/L.

O_2 indicates percentage of oxygen as compared to the amount of oxygen presents in the air.

Air indicates percentage of DO concentration.

Alt indicates Altitude by meter. It is shown in Setup mode.

Sal indicates Salinity by PPT. It is shown in Setup mode.

■ Conductivity Mode (*Conductivity/TDS/Salinity*)

Conductivity Indicates conductivity of solution. (unit μS/cm and mS/cm)

TDS Indicates by converting the measured conductivity into concentration of the total dissolved solid present solution from. (unit mg/L)

Sal Indicates by converting the measured conductivity into salinity of solution. (unit ppt)

Cell Indicates the cell constants of the electrode.

Tref indicates temperature compensation.
It usually can be compensated by 25℃ or 20 ℃

TC indicates Temperature Factor. Generally can be used 2.01℃/% but it has different factors according to each electrolytic solvent.
So you should choice proper TC which is harmonized with sample.

Electrode Structure and Storage

pH electrode

pH Electrode Storage

Electrodes are stored in the cap storage solution supplied by istek.
Membrane must be kept wet. If there is no storage solution, pH 4 buffer is best for the single glass electrode and saturated KCl is preferred for a calomel and Ag/AgCl reference electrode. Saturated KCl is the preferred solution for a combination electrode. Electrodes are sometimes stored in distilled water, but this method causes electrode life to decrease.

pH Electrode Maintenance (Electrode Cleaning)

If it takes long time to response or a stable data isn¡t obtained, can often be restored to normal performance by one of the following procedures;
Glass electrodes fail because of scratches, deterioration or accumulation of debris on the glass surface.

1) Salt deposits
Recover electrode by alternately immersing it three times each in 0.1N HCl and 0.1N NaOH for approx. five minutes. If this fails, immerse tip in KCl solution for 30s. After recovery, soak in pH 7.00 buffer overnight. Rinse and soak in pH 7.00 buffer. Rinse again with distilled water before use.

2) Oil/Grease films
Remove oil/Grease films with detergent, and then rinse electrode with distilled water.

3) Clogged Reference Junction
Heat diluted KCl solution to about 60 ~ 80 °C. The electrode must be stored in this solution for approx. ten minutes, then cool electrode in not heated KCl solution.
4) Protein removal
Protein coatings can be removed by soaking glass electrodes in a 10% pepsin solution adjusted to pH 1 to 2.

DO electrode

DO Probe Storage

For longer storage, cover the membrane tip with a cap originally supplied by *istek*.

DO Probe Maintenance (Probe Cleaning)

If it takes long time to response or a stable data isn't obtained, check membrane.
If air bubble is occurred on membrane, remove air bubble. Check membrane for damage (i.e. holes and leak, etc.). If membrane gets damage, replace membrane.

EC electrode

Conductivity Cell Storage

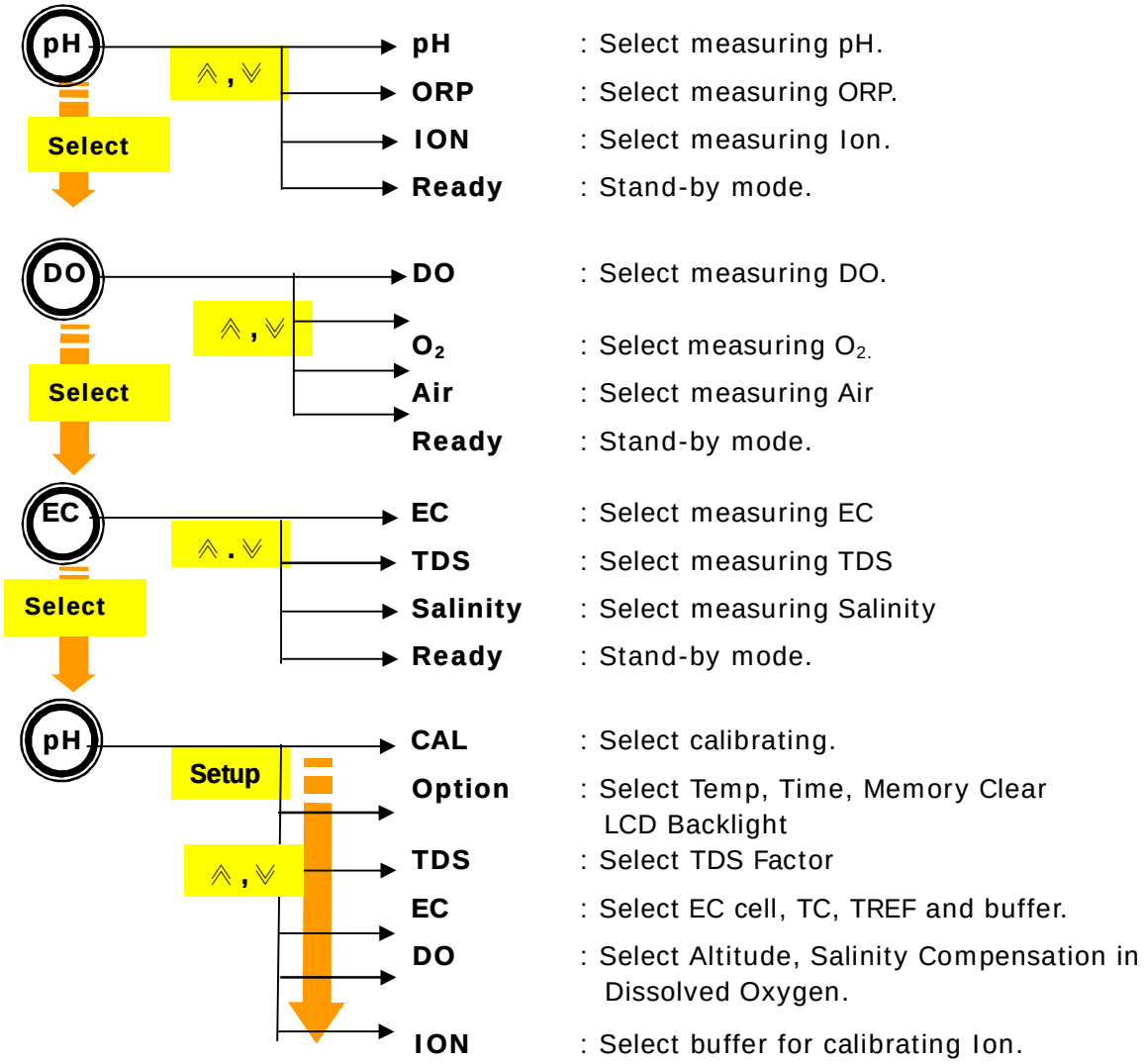
A dirty cell will contaminate the solution and cause conductivity to change. It is best to store cells that are immersed in deionized water. Provided the cell has been stored in condition of drying, should be soaked in distilled water for five to ten minutes before using to keep electrode wet.

Conductivity Cell Maintenance (Cell Cleaning)

Glease, oil, fingerprints, and other contaminants on the sensing elements can cause erroneous measurements and sporadic responses.
If it takes long time to response or a stable data isn't obtained, can be often restored to normal performance by using the following procedures;
Clean cells with detergent and/or dilute nitric acid(1%) by dipping or filling the cell with cleaning solution and agitating for two or three minutes. Other diluted acids(e.g. sulfuric, hydrochloric, chromic) may be used for cleaning except for aqua regia. When a stronger cleaning solution is required, try concentrated hydrochloric acid mixed into 50% isopropanol

Cell Constant	Measuring Range
0.01	**0.055 - 20 ¥S/cm**
0.1	**0.5 - 200¥S/cm**
1.0	**0.01 - 2 mS/cm**
10.0	**1 - 200 mS/cm**

Chapter III. Setup Functions



By pressing **Select key**, user can move **pH=> DO=> EC=> pH=>¡**
Form initial display, press **Setup Key** to enter ***calibration mode***, and user can move cursors by using ⩓**,** ⩔ key.

Chapter IV. Calibration and Measurement

■ *pH (pH/ORP/ION) Calibration & Measurement*

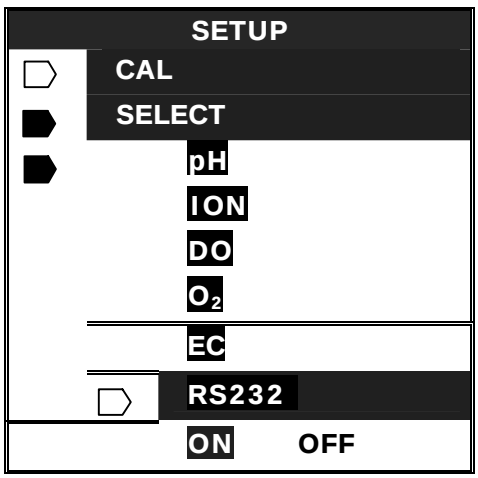
Perform calibration every two hours to compensate for electrode drift.
There are two ways of calibrations ; a) Auto Calibration b) Manual Calibration.
Minimum two point calibration should be performed for accurate measurement of pH.
(1 point calibration is not allowed.)

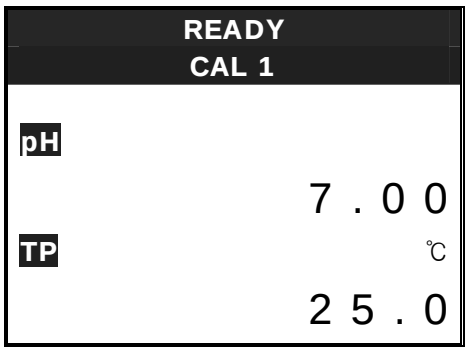
Preparation

1) pH Meter / pH Electrode / ATC Probe.
2) pH Calibration Buffer Solutions(commonly pH 4.00, pH 7.00, pH 10.00)
3) Stirrer, Magnetic Bar, Distilled water for rinse and 100ml Beaker etc.

pH Calibration

Setup-> Setup-> Setup (CAL 1) -> Ready/Measure (Put in a pH sensor Buffer 4.00 and stir it regularly. Press [Measure] Key and the data is stable, Press [Memory Out] Key to save this first calibrate date.) ***-> Memory/out (CAL 1 OK) -> Ready/Measure-> Memory/out (CAL 2 OK) -> Ready/Measure-> Memory/out (CAL 3 OK)***

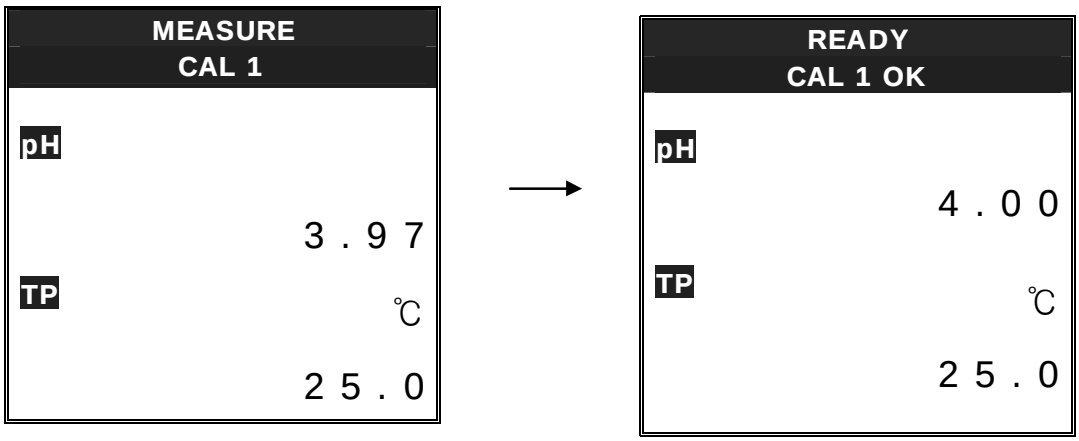




To move to pH mode from CAL screen in SETUP, press **Setup Key twice** and to looks like above <picture 2>. Press **Measure Key** then Screen will be shown as follow.

Calibration of CAL 1

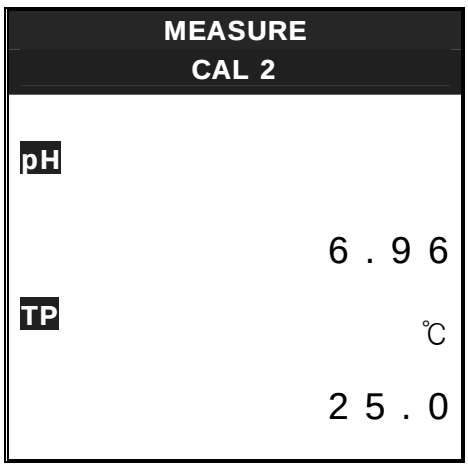
Rinse pH sensor with distilled water and dry it.
And put the sensor into Buffer1 (usually pH 4) Stir it carefully (User can use magnetic stirrer) and press Ready/ Measure Key.



Like a left picture, it presents MEASURE on upper position of the screen which means it is measuring now and it shows pH of buffer solution and present temperature on the screen.
If data is stable, press **Memory/Out Key** to finish Cal 1.
A ¡CAL1¡ is finished. The screen disappears soon and next screen (CAL 2) shows.

Calibration of CAL2

Clean the sensor with distilled water and put it into Buffer 2(usually pH7) Stir it carefully with magnetic stirrer and press Ready/ Measure Key .

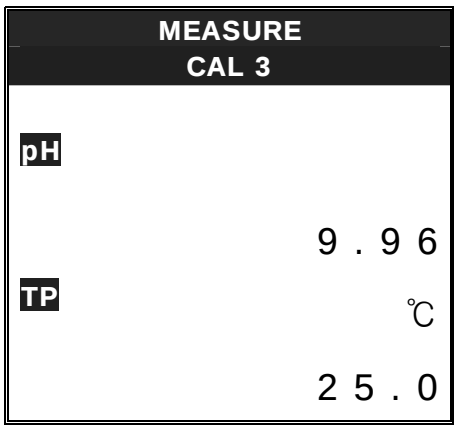


Like a left picture, it comes to MEASURE on upper position of the screen which means it is measuring now and it shows pH of buffer solution and present temperature on the screen. If the data is stable, press **Memory/ Out** key to finish Cal 2.

A ¡CAL 2¡ is finished.
The screen disappears soon and next screen shows. If you want to quit before CAL 3, press **Memory/ Out** key to finish calibrating.

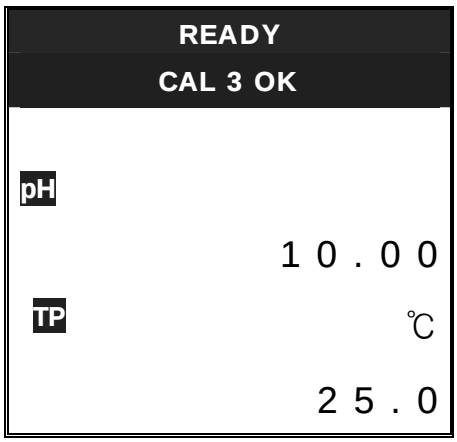
Calibration of CAL 3

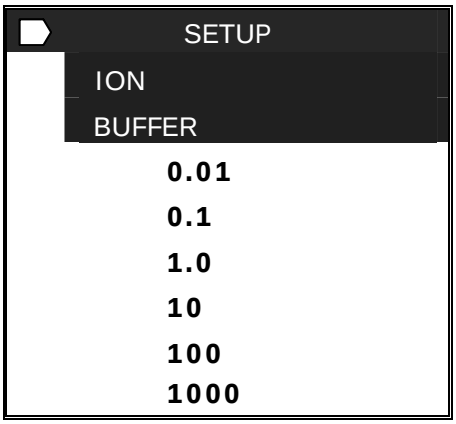
Clean the electrode with distilled water and put it into Buffer (usually pH10) Stir the solution (ex, using magnetic stirrer) press Ready/ Measure.



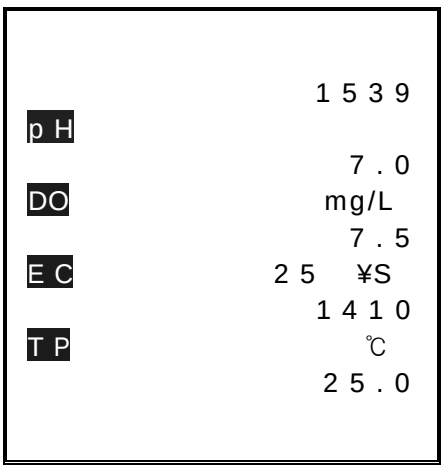
Like an this feature, it comes to MEASURE on upper position of the screen which means it is measuring now and it shows pH of buffer solution and present temperature on the screen. If data is stable, press **Memory/ Out** key to finish Cal 3.

A ¡CAL3¡ was finished and the screen disappears soon and next screen shows.





Sample Measuring



If user finished above 3point calibration, press **Memory/ Out** to escape from Setup mode.
And put the sensor in real sample and stir pressing **Measure** key to measure

■ *DO (DO/O_2/Air) calibration & Measurement*

Preparation

1) Connect probe and temperature sensor to Input and ATC jack respectively.
2) Clearly rinse probe with distilled water and blot dry with tissue.
3) Prepare solution for measurement and magnetic stirrer.

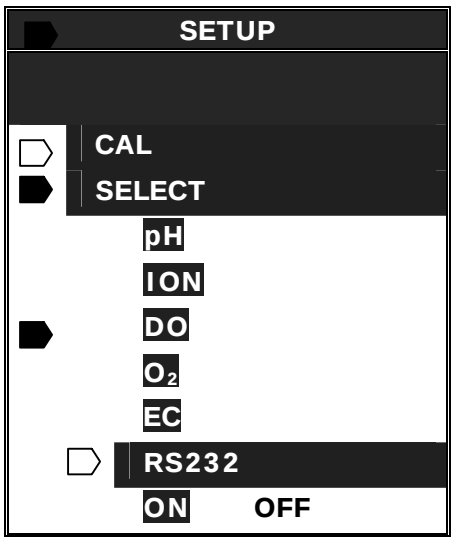
Constantly stir solution by using magnetic stirrer.
Saturate solution with oxygen by the bubbling equipment at least 1~2 hours in advance before calibrating. Put saturated solution into BOD bottle and cap to minimize the exposure in the air.

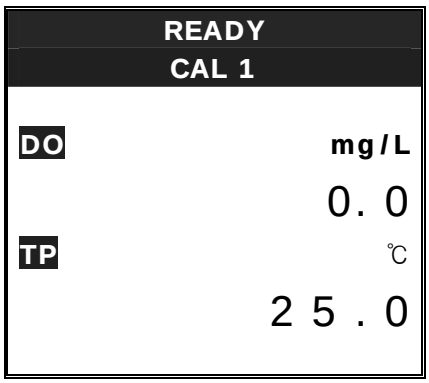
Solution which has not included DO completely
Put a $CoCl_2$ (0.5g) and Na_2SO_3 (5g) in to same BOD bottle, and fill out distilled water there. Then put a cork and mix the solution well. This solution should be prepared just before measuring.

Solution which has saturated DO
Put air lift pump in BOD bottle or other beaker and let it be to saturate enough. After that keep the solution in BOD bottle to prevent tough with outside air

DO Calibration.

In DO setup mode, select ALT and SAL and input calibration data by using ⩓, ⩔ key.
Move to CAL display in SETUP to calibrate DO.



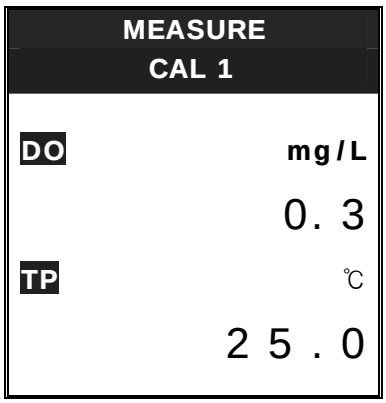


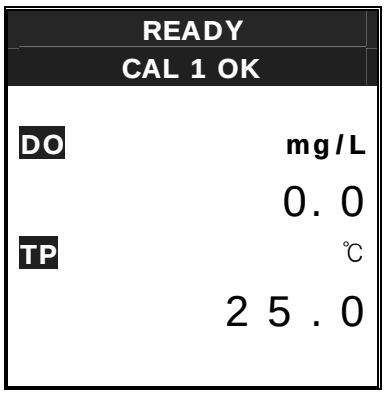
Move to DO mode from CAL display by using Setup key & ⩓, ⩔ key

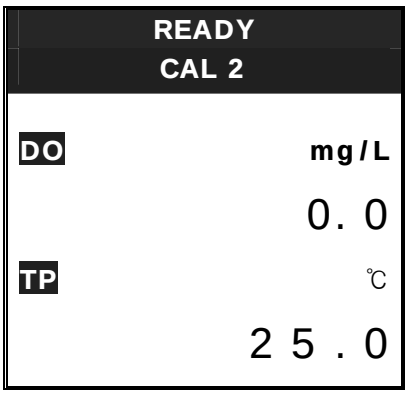
Zero Calibration (CAL 1)

Rinse DO sensor and dry (blot dry with tissue) and put it in prepared first Zero Solution CAL1) and press Ready/Measure Key.

****Notice**: Rapidly put probe into the prepared BOD bottle containing water never contains oxygen. Do not let the bottle contact with air.





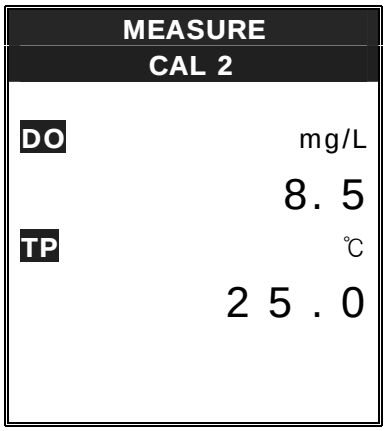


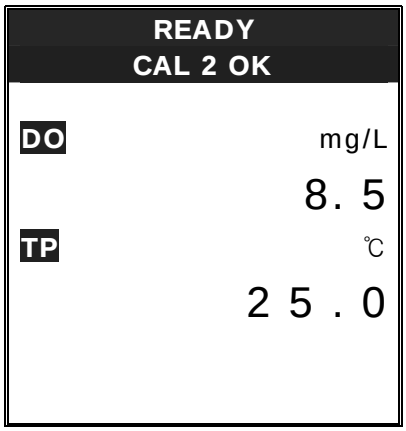
MEASURE will be appeared on the upper position of the screen like a feature above, DO and temperature data will be in the screen. When the data is stable, press **Memory/Out key** to finish Zero calibration.

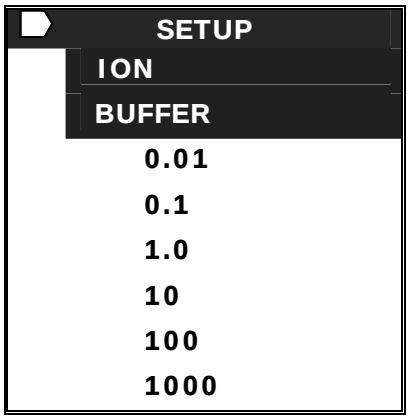
Above screen means ¡CAL1¡ has been finished.
The screen disappears soon and next screen shows like above third picture.

Saturate Calibration (CAL 2)

After finishing zero calibration, put the probe into prepared saturated solution quickly to avoid contacting with air. Then press **Ready/ Measure.**
After DO data is stable, DO data displays compensating salinity and altitude set in SETUP by pressing **Memory/ Out key.** The screen shows a completion of saturate calibration. The screen disappears soon and next screen shows

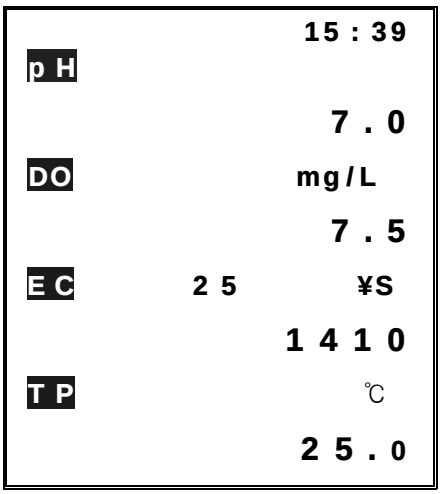






Sample measuring

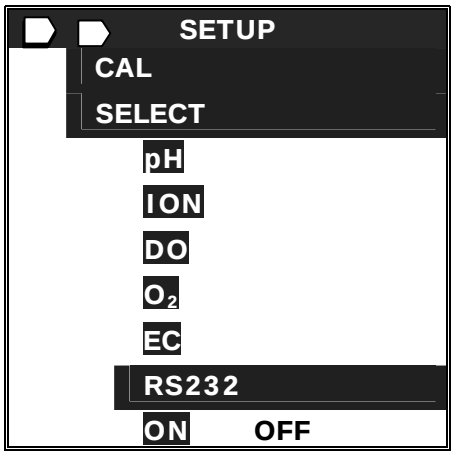
If the calibration is finished, press **Memory/ Out** to quit from Setup mode.
Press **Measure** key to measure.

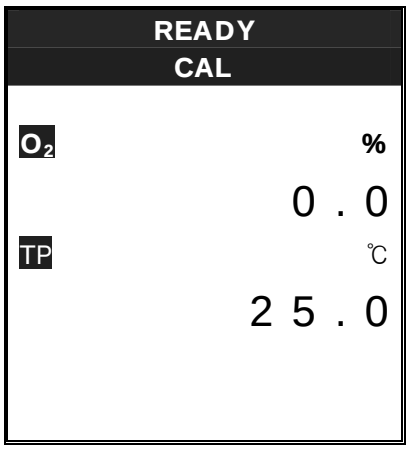


■ Calibration in O_2 Mode

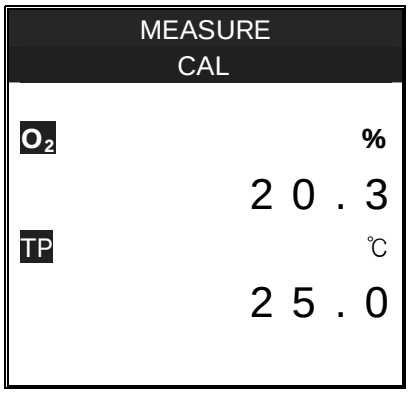
Preparation for O_2 Calibration.

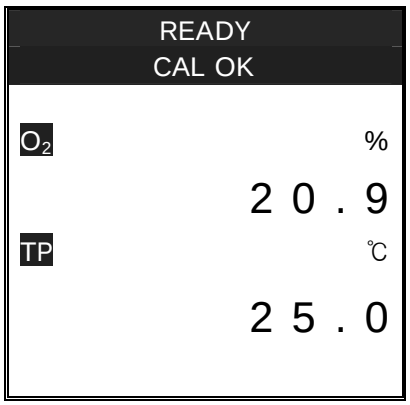
In DO select mode, press **Setup** key to select ALT (altitude) and SAL (salinity) by using ⩓, ⩔ key. Move to CAL in SETUP mode by calibrating O_2.





In CAL in SETUP mode, move to O_2 and press **Setup Key**. Following feature will be shown up. To calibrate using O_2 in the air, Clean electrode with distilled water and dry it. Put it in the air and press **Ready/ Measure key.**

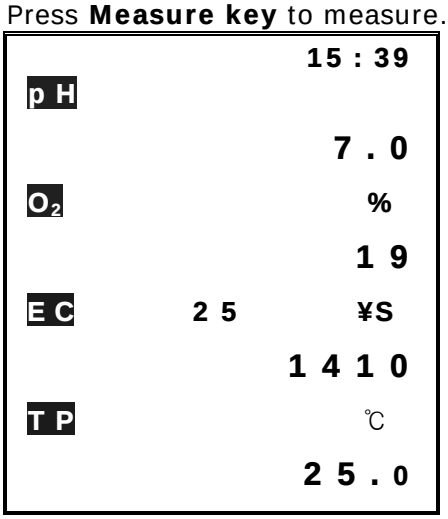




Like an above feature, **MEASURE** mark is displaying with O_2 and temp data.
If the data is stable, press **Memory/ Out key** to calibrate O_2 automatically by compensating altitude automatically.

Sample measuring

If the calibration is finished, press **Memory/ Out Key** to quit from Setlup mode.
Press **Measure key** to measure.

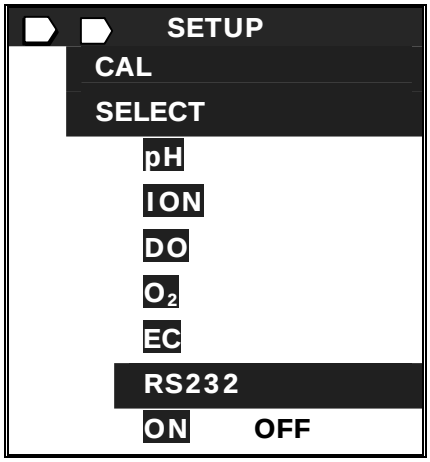


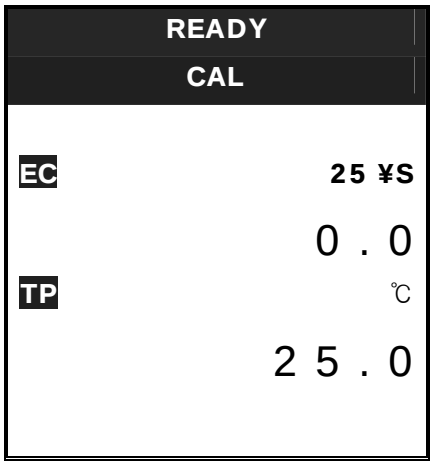
■ Conductivity (Conductivity/TDS/Salinity)

Preparing conductivity calibration.

It is available to change Cell constant, TC, Tref and buffer solution fits for your circumstances.
It is the basic setting if SETUP is not changed.
- Cell Constant: 1.0
- Temperature Reference (Tref): 25.0℃
- Temperature Compensation (TC): 2.10%/℃

Change to CAL in SETUP menu to calibrate conductivity.

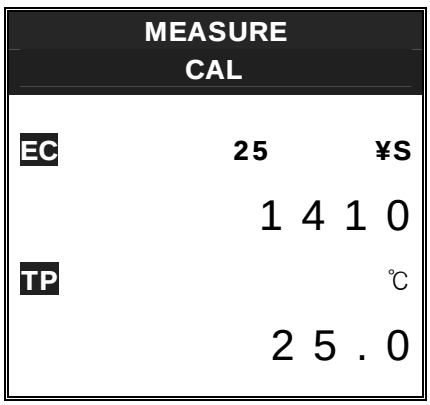


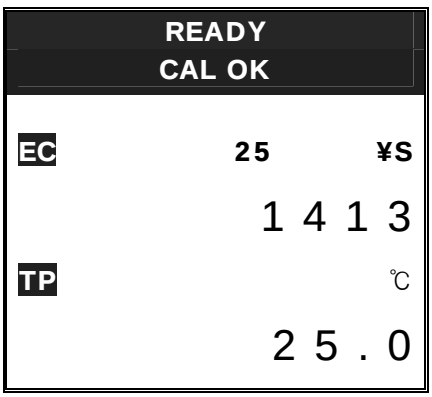


Move to EC in Cal in SETUP menu and press **Setup key** to following feature.

Calibration in EC

Stir prepared buffer and put a probe into the buffer. Press **Ready/ Measure key.**

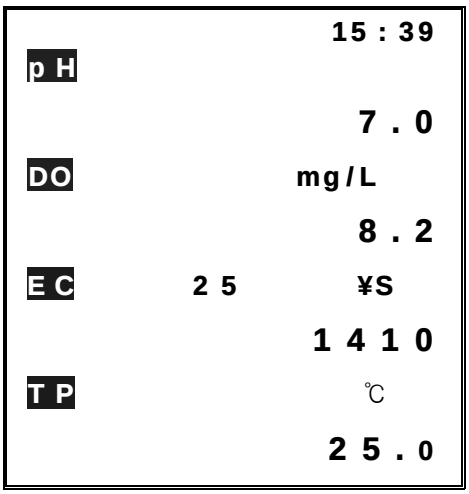




Like an above feature, **MEASURE** mark is displaying with EC and temp data.
If the data is stable, press **Memory/ Out key** to complete calibration.
The following feature will be shown after finishing calibration.

Sample measuring

If the calibration is finished, press **Memory/ Out** to quit from Setup mode.
Press **Measure** key to measure.



※ In calibration, it automatically changes by present temperature and standard solution.
So after finishing calibration, it is available to change TC by 1.9 to 1.96

■ ION

ION Calibration and Measurement

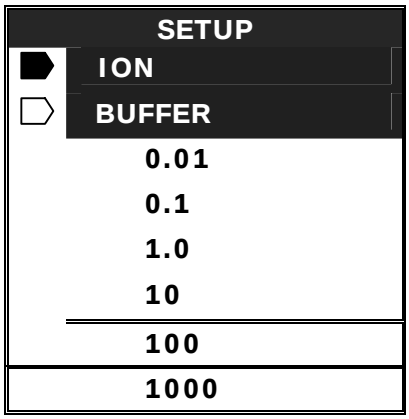
Ion Calibration can use 0.01, 0.1, 1.0, 10, 100 and 1000ppm buffer of two. Ion Calibration cannot calibrate 1 point calibration but 2 point calibration.

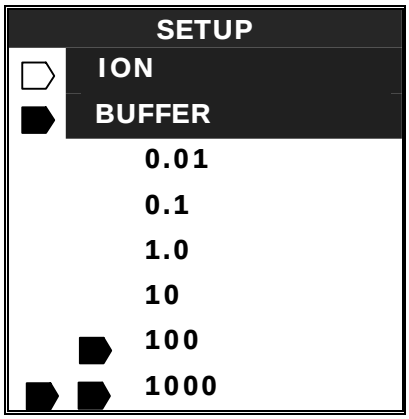
Preparation.

- Connect probe and temperature sensor to Input and ATC jack respectively.
- Clearly rinse probe with distilled water and blot dry with tissue.
- Prepare solution for measurement and magnetic stirrer.

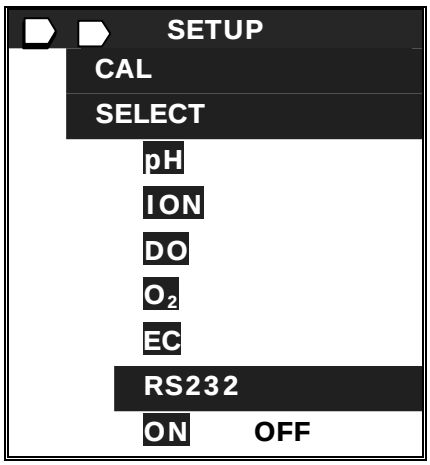
Calibration in ION Mode

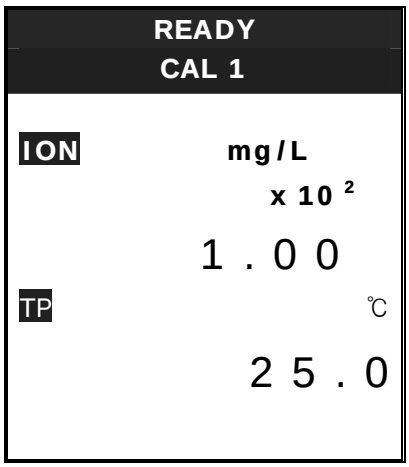
Press **Setup** key to change Ion buffer selecting menu from main menu.





In ion selecting menu, press **Setup key** and choose buffer. Choose buffer what you want to and press **Setup Key.** Choose another buffer as shown. Generally, istek Inc. offers you 100 and 1000ppm buffer solution. Following feature shows how to calibrate by using two buffers; 100 and 1000ppm.

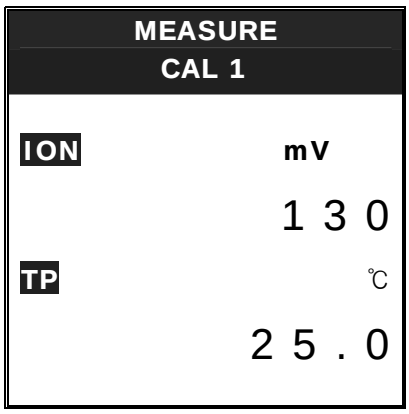


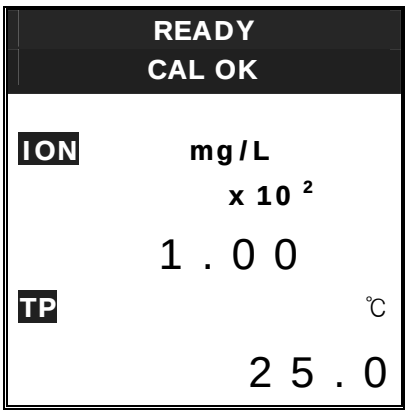


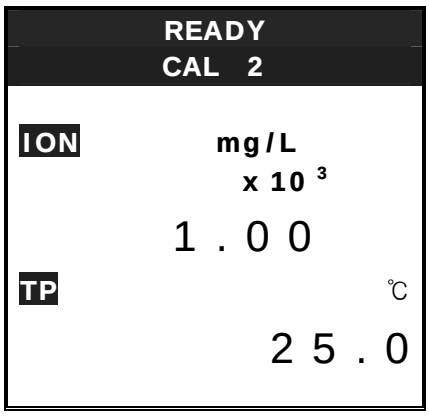
In CAL in SETUP mode, press **Setup Key** to change CAL in SETUP mode.

Calibration of CAL 1

Clearly rinse probe with distilled water and put it in buffer solution 1. Stir the solution by using magnetic stirrer and press **Ready/ Measure key.**
When calibrating ion, measured data is shown as mV like a following feature.
If the data is stable, press **Memory/out key** to finish CAL1.



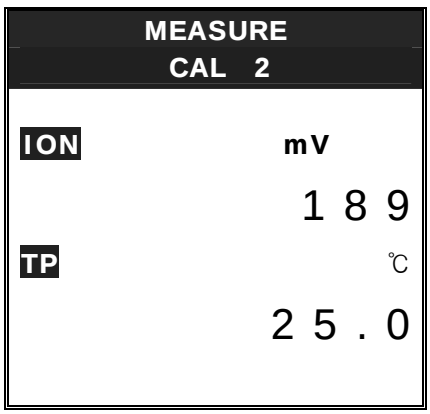


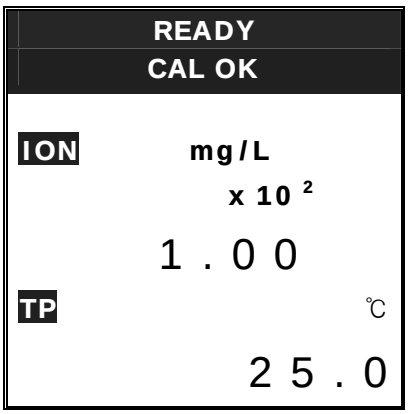


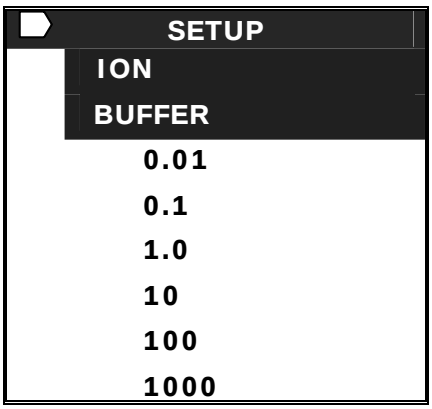
The following feature will be shown after finishing CAL1. The screen disappears soon and next screen shows.

Calibration of CAL 2

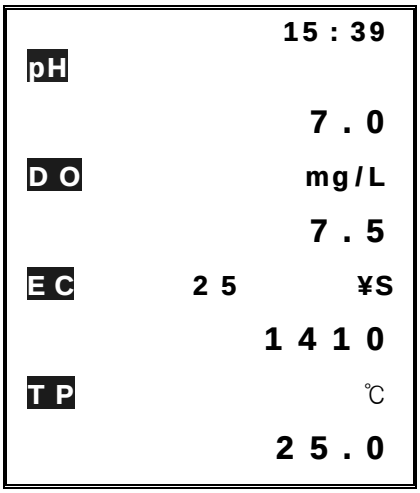
Clearly rinse probe with distilled water and put it in buffer solution 2 Stir the solution by using magnetic stirrer and press **Ready/ Measure key.**







The following feature will be shown after finishing CAL2.
The screen disappears soon and next screen shows.

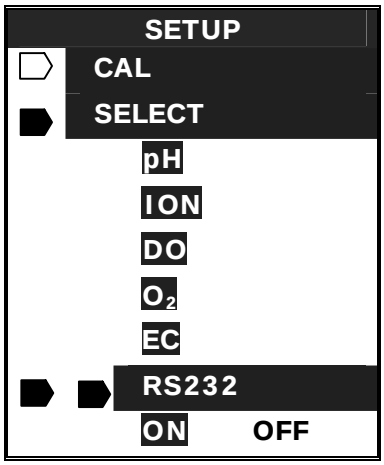


Sample measuring

In If the calibration is finished, press **Memory/ Out** to quit from Setup mode.
Press **Measure** key to measure pH measuring, press ⩓, ⩔ key to change Ion mode and press **Measure key**.

Chapter V. Data Logging.

Move to SELECT form CAL in SETUP by pressing **Setup Key**, and move to RS232 by pressing ⩓,⩔ **key**. Select ON/OFF by using ⩓,⩔ **key.**



* It is available to print data connecting with a printer by setting RS232 as on.
* If RS232 is set on, data will be printed on printer or HyperTerminal simultaneously.
* If printing stocked data, press **Memory key** and choose data to print and press **Setup Key**.

Memory Clearing

1. Clearing stocked memory without calibrated data
   -> Press **Memory Key** => Press **Measure Key** three times continually => stocked data clears with ¡Beep¡ sound

2. Clearing calibrated data without stocked memory.
   -> Mentioned at Chapter III; Setup Functions.

Chapter VI. Troubleshooting & Error Description.

The PDC-70N is waterproof portable meter, so you should tight up a screw when you change an Electrode or Battery
We do not be responsible for an error what is occurred by user¡s mistake.

If the cause is uncertain or confused, clear memories (data) eliminating all data. Refer to Clear Memory(data) of Setup Functions.

If the problem persists, please contact *istek* **Product Service Department**.

MALFUNCTION	POSSIBLE CAUSE	REMEDY
No display	No power to meter	Press Power key. Check that battery is inserted correctly and polarity signs match.
Error occurred in Cal mode ? Reading Out of Range	Electrode failure Out of Range for Buffer	Check that meter is correctly connected with electrode and ATC probe. Buffer used may be out of specification. Repeat calibration using a fresh buffer.
	When trying to exit after calibrating only 1 point, error message (Err) appears.	Press Power key or continue calibration.
Error occurred in measure mode	Out of measuring Range of pH	Check that meter is correctly connected with electrode and ATC probe. Check Calibration Slope

Chapter VII. Specifications.

Moldel		PDC-70N
pH	Range Resolution Relative Accuracy	-2.000 to 19.999 0.001/0.01/0.1 ¡ 0.002
Millivolt (ORP)	Range Resolution Relative Accuracy	¡ 1999.9mV 0.1mV ¡ 0.1mV
Concentration (ISE)	Range Resolution Relative Accuracy	0.0001 to 19999 ㎎/ℓ ¡ 1 least significant ¡ 0.25% of reading
DO	Range Resolution Relative Accuracy	0.00 to 19.99 ㎎/ℓ 0.01/0.1 ¡ 0.5%
O_2	Range Resolution Relative Accuracy	0.0 to 60.0% 0.1% ¡ 1 digit
Air Saturation (%)	Range Resolution Relative Accuracy	0.0 to 199.9% 0.1% ¡ 1 digit
Conductivity	Range Resolution Relative Accuracy	0 to 199,999 ¥S/cm 0.01/0.1 ¡ 0.5%
TDS	Range Resolution Relative Accuracy	0 to 1999 ㎎/ℓ 1 ㎎/ℓ ¡ 0.2 %
Salinity	Range Resolution Relative Accuracy	0.0 to 80.0 ppt 0.1 ¡ 0.1
Temperature	Range Resolution Relative Accuracy	-10 to 110℃ 0.1℃ ¡ 0.4℃
Data Logging		210 Point
Temperature Compensation		Auto
Waterproof		IP66(Waterproof-able)
Input		8 Pin Din,
Output		Power or RS232C(Computer/Printer)
Power		Rechargeable Battery, Battery
Dimensions		120¡ 220¡ 62mm, 9Kgs for 1full set

ISE Specifications

ISE	Sensing Type	Measurement Range		Slope	pH Range	Temp(℃) Range	Response Time	Reference Electrode & Filling solution
		Molar(M)	mg/L(ppm)					
NH_3	GS	1.0~5¡ 10^{-7}	17,000~0.01	56¡ 3	above11	0~50	20	N/A,NH_4Cl
NH_4^+	PM	1.0~5¡ 10^{-6}	18,000~0.1	56¡ 2	4~10	0~50	30	Dbl,NaCl
Br^-	SSM	1.0~5¡ 10^{-6}	79,900~0.4	57¡ 2	0~14	0~80	20	Dbl,KNO_3
Cd^{+2}	SSM	0.1~1¡ 10^{-7}	11,200~0.01	27¡ 2	2~12	0~80	20	Dbl,KNO_3
Ca^{+2}	PM	1.0~5¡ 10^{-6}	40,000~0.2	27¡ 2	3~10	0~50	30	Sgl,KCl
CO_2	GS	0.01~1¡ 10^{-4}	440~4.4	56¡ 3	4.8~5.2	0~50	20	N/A,$NaHCO_3$
Cl^-	SSM	1.0~5¡ 10^{-5}	35,500~1.8	56¡ 2	2~12	0~80	20	Dbl,KNO_3
Cu^{+2}	SSM	0.1~1¡ 10^{-8}	6,350~0.0006	27¡ 2	2~12	0~80	20	Dbl,KNO_3
CN^-	SSM	0.01~5¡ 10^{-6}	260~0.1	57¡ 2	11~13	0~80	20	Dbl,KNO_3
F^-	SSM	Sat'd~1¡ 10^{-6}	Sat'd~0.02	57¡ 2	5~8	0~80	20	Sgl,KCl
BF_4^-	PM	1.0~7¡ 10^{-6}	10,8,00~0.1(B)	56¡ 2	2.5~11	0~50	30	Dbl,$(NH_4)_2SO_4$
I^-	SSM	1.0~5¡ 10^{-8}	127,000~0.006	57¡ 2	0~14	0~80	20	Dbl,KNO_3
Pb^{+2}	SSM	0.1~1¡ 10^{-6}	20,700~0.2	25¡ 2	3~8	0~80	20	Dbl,KNO_3
Li^+	PM	1.0~1¡ 10^{-5}	6,900~0.7	56¡ 2	5~10	0~50	30	Dbl,$(NH_4)_2SO_4$
NO_3^-	PM	1.0~7¡ 10^{-6}	62,000~0.5	56¡ 2	2.5~11	0~50	30	Dbl,$(NH_4)_2SO_4$
NO_X	GS	5¡ 10^{-3}~5¡ 10^{-6}	220~0.2	56¡ 3	1.1~1.7	0~50	30	N/A,$NaNO_3$
ClO_4^-	PM	1.0~7¡ 10^{-6}	98,000~0.7	56¡ 2	2.5~11	0~50	30	Dbl,$(NH_4)_2SO_4$
K^+	PM	1.0~1¡ 10^{-6}	39,000~0.04	56¡ 2	2~12	0~50	30	Dbl,NaCl
Ag^+/ S^{-2}	SSM	1.0~1¡ 10^{-7} 1.0~1¡ 10^{-7}	107,900~0.01 32,100~0.003	57¡ 2 27¡ 2	2~12 2~12	0~80 0~80	20 20	Dbl,KNO_3 Dbl,KNO_3
Na^+	PM	1.0~1¡ 10^{-5}	23,000~0.2	55¡ 2	5~10	0~50	30	Dbl,NH_4Cl
X^+/X^-	SSM	5¡ 10^{-2}~1¡ 10^{-6}	12,000~1.0	Titration	2~12	0~50	30	Sgl,KCL
Ca^{+2}/ Mg^{+2}	PM	1.0~1¡ 10^{-5}	40,000~0.4(Ca)	26¡ 3	5~10	0~50	30	Sgl,KCl

* Sensing Type ; GS(Gas Sensing Membrane), PM(Polymer Membrane), SSM(Solid State Membrane)

* Reference electrode N/A(No Reference electrode), Dbl(Double Junction Reference electrode), Sgl(Single Junction Reference electrode)

Chapter VIII. Ordering Information.

A. Standard (FULL SET)

* Combination pH Electrode / ATC Probe
* pH Buffer Solutions (pH 4.00, pH 7.00, pH 10.00 125ml)
* Do Polarographic Electrode
* Conductivity Cell (K=1.0) / ATC Probe
* Conductivity Standard Solution (1413 ¥S/cm) 125ml
* Electrode Housing (Stainless steel)
* Thermal Printer
* Carrying Case (Aluminum)
* Rechargeable Battery, DC Power Adaptor
* Instruction Manual
* RS232C Interface Cable

B. Option

* pH, ORP, Ion electrode
* Electrode Storage Solution 475ml
* Electrode Filling Solution 125ml
* pH Buffer Solutions (pH 4.00, 7.00, 10,00) 475ml
* DO Membrane Kit

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istek, Inc.

Room 1011 Hanshin IT-Tower, #235 Kuro-Dong, Kuro-Ku, Seoul, Korea
Tel : +82-2-2108-8400
Fax : +82-2-2108-8430
Homepage : http://www.istek.co.kr
E-mail : istek@istek.co.kr