

NeoMet

*Portable pH/ISE/mV/ORP, DO/O₂/Air,
Conductivity/TDS/Salinity/Temp Meter*

*Model 79P
 29D
 47C
 415CP
 815PDC*

Instruction Manual

istek, Inc.



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Chapter I. Introduction

This meter is operated by battery(DC 9V) and is controlled by microprocessor for all measurement needs.

This meter features a custom LCD that simultaneously displays various functions along with measurement results. *istek's* instrument is high-performance for accurate measurement of wastewater and use at laboratory and its operation is simply designed in the position of user.

This model is capable of storing up to 50 points in memory at once for each items.

pH/ISE/mV/ORP/TEMP Meter

If pH reading is stable, \downarrow S(Stable) \downarrow is displayed in the left field, therefore measure accurately since user can easily know a stable value.

This model is a pH meter which features auto calibration and manual calibration simultaneously(3 points).

This model displays pH, ISE, mV, ORP(relative millivolt) and ATC(°C).

pH indicates power of hydrogen(H^+). (unit pH)

$$pH = -\log_{10}[H^+]$$

ISE indicates concentration of any given ion.(unit mg/L) To measure an ion must use electrodes which according to the type of ion, selectively response to only any given ion.

mV indicates electromotive force of each ion. (unit mV)

ORP indicates a relative potential. (unit mV)

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

DO/O₂/Air/TEMP Meter

This model features to obtain a reliable data since its program is treated by setting in detail about compensation factor(altitude and salinity) for an accurate measurement.

This model displays DO, O₂, air and ATC(°C).

DO indicates concentration of oxygen presents in the water. (unit mg/L)

- O₂ indicates percentage of oxygen as compared to the amount of oxygen presents in the air. (unit %)
- Air indicates percentage of DO or O₂ concentration. (unit %)
- ATC For automatic Temperature Compensation, a temperature probe supplied by *istek* must be used. Temperature Compensation is automatically performed while measuring.

Conductivity/TDS/Salinity/TEMP Meter

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

This model displays Conductivity(μ S, mS), TDS(mg/L), Salinity(ppt) and ATC($^{\circ}$ C).

Conductivity indicates conductivity of solution. (unit μ S/cm and mS/cm)

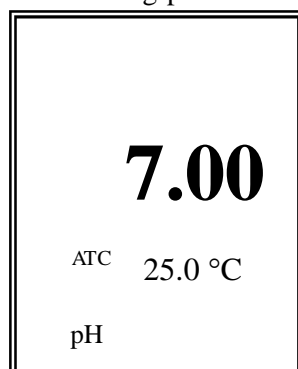
TDS indicates by converting the measured conductivity into concentration of the total dissolved solid present solution from. (unit mg/L)

Salinity indicates by converting the measured conductivity into salinity of solution. (unit ppt)

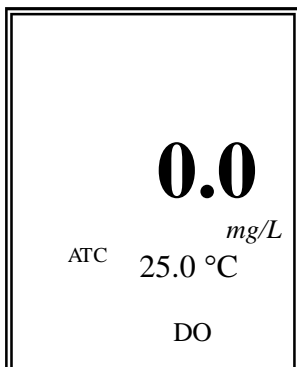
ATC For automatic temperature compensation, a temperature probe supplied by *istek* must be used.
Temperature is automatically compensated on the base of Tref adjusted in Setup. Tref indicates compensation temperature. Tref can be set with 25.0 $^{\circ}$ C or 20.0 $^{\circ}$ C for a basis.

815PDC

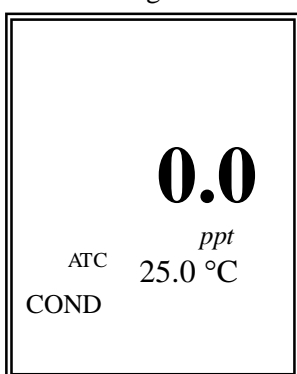
This meter features to measure pH, ISE, mV, ORP, DO, O₂, Air, Conductivity, TDS, Salinity and Temp, and automatically select a measuring mode by connection electrode. If connecting pH electrode, the displays is shown as follows.



If connecting DO probe, the displays is shown as follows

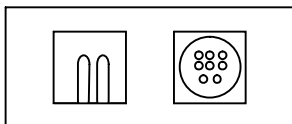


If Connecting Conductivity Cell, the displays is shown as follows



Chapter II. Instrument Setup

Top Panel



Electrode and ATC probe connection

Attach the electrode probe with ATC probe to the DIN jack by sliding the connector straight on until firmly in place.

RS232C Interface Cable Connection

Insert RS232C interface cable into the RS232C jack. Use interface cable supplied by *istek*.


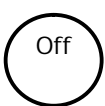
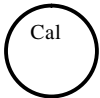

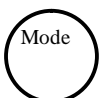



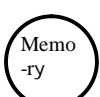

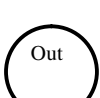

Power Source

Use 1.2V rechargeable battery / DC power adapter
If the message as ;BAT; is displayed, replace battery.

Chapter III. General Functions


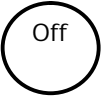
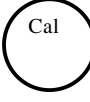

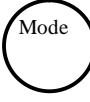


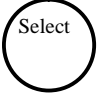
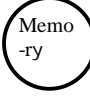
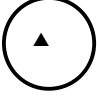
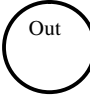

Keypad Functions

pH/ISE/mV/ORP

Key	Functions
 	Power used to turn ON/OFF.
 	Cal used to start and set calibration, In addition, exit in the middle of calibration.
 	Ready/measure used to change condition of meter i.e. measure or ready. This is used for changing from ready to measure condition or reversing.
 	Mode used to change operating modes, such as pH, mV or ISE.
 	Resolution used to change the resolution. For pH choose 0.1, 0.01 or 0.001.
 	Setup used to access the setup menu. This is used for setting instrument operating parameter for example, Temperature and Data logging in pH Setup, and Ion Buffer in ISE Setup.


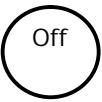










- Select used to select the standard solution in ISE setup.
 used to erase the memorized data.
- Memory used to store data in meter memory while measuring.
 In the ready condition, used to search to the memorized data.
- Slope indicates slope after pH or ISE calibration.
- Out used to exit in setup mode.
- up(▲) In setup, calibration and Data(Memory) mode, press to increase
 value.
- down(▼) In setup, calibration and Data(Memory) mode, press to decrease
 value.

DO/O₂/Air

Key	Functions		
		Power	used to turn ON/OFF.
		Cal	used to start and set calibration, In addition, exit in the middle of calibration.
		Ready/measure	used to change condition of meter i.e. measure or ready. This is used for changing from ready to measure condition or reversing.
		Mode	used to change operating modes, such as DO, O ₂ or Air.
		Resolution	used to change the resolution. For DO choose 0.1 or 0.01.
		Setup	used to access the setup menu. This is used for setting instrument operating parameter for example, altitude, salinity, temperature and Data logging in DO mode.

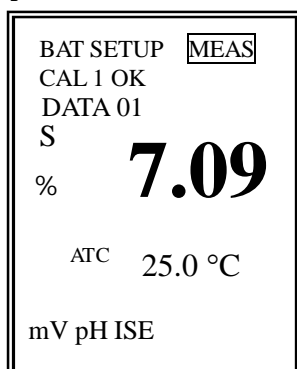
Select	used to erase the memorized data.
Memory	used to store data in meter memory while measuring. In the ready condition, used to search to the memorized data.
Out	used to exit in setup mode.
up(▲)	In setup, calibration and Data(Memory) mode, press to increase value.
down(▼)	In setup, calibration and Data(Memory) mode, press to decrease value.

Conductivity/TDS/Salinity

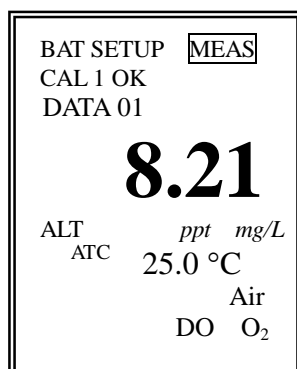
Key	Functions
 	<p>Power used to turn ON/OFF.</p>
 	<p>Cal used to start and set calibration, In addition, exit in the middle of calibration.</p>
 	<p>Ready/measure used to change condition of meter i.e. measure or ready. This is used for changing from ready to measure condition or reversing.</p>
 	<p>Mode used to change operating modes, such as Conductivity, TDS and Salinity.</p>
 	<p>Resolution used to change the resolution. For Conductivity choose 0.1 or 0.01(auto-range).</p>
 	<p>Setup used to access the setup menu. This is used for setting instrument operating parameter for example, temperature compensation coefficient, cell constant, compensation temperature, standard solution, temperature and Data logging in conductivity mode, and TDS factor in TDS mode.</p>
Select	<p>used to erase the memorized data. used to select the standard solution in Setup.</p>
Memory	<p>used to store data in meter memory while measuring. In the ready condition, it used to search to the memorized data.</p>
Out	<p>used to exit in setup mode.</p>
up(▲)	<p>In setup, calibration and Data(Memory) mode, press to increase value.</p>
down(▼)	<p>In setup, calibration and Data(Memory) mode, press to decrease value.</p>

Display Description

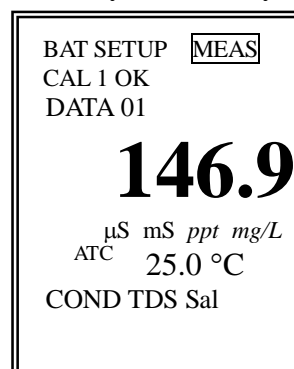
pH/ISE/mV/ORP/TEMP



DO/O₂/Air/TEMP



Conductivity/TDS/Salinity/TEMP



Common Display

Display	Function
ATC	displays when a temperature probe is attached, and indicates automatic temperature compensation.
MEAS	indicates that meter is in measurement mode. If this is not shown, indicates ready condition.
SETUP	indicates that meter is in setup mode.
CAL	indicates that meter is in calibration condition. used to calibration.
CAL 1 OK	indicates the end of calibration corresponding to number.
DATA 1	indicates number of data stored in meter.
Err(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.

pH/ISE/mV/ORP/TEMP Meter

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

Display	Function
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.
ISE	indicates ISE mode.
mV	indicates mV mode. displays electromotive force.

DO/O₂/Air/TEMP Meter

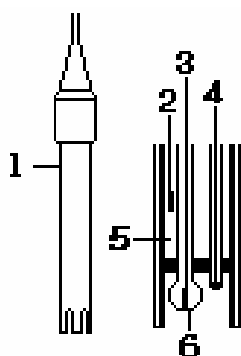
Display	Function
DO	When the DO mode is chosen, 'DO' is displayed below main field. displays concentration of dissolved oxygen with range of 0.00 to 19.99 mg/L.
O ₂	indicates O ₂ mode. indicates percentage of oxygen as compared to the amount of oxygen presents in the air.
AIR	INDICATES AIR MODE. indicates percentage of DO concentration.
ALT	displays in altitude setup.
ppt	displays in salinity setup.

Conductivity/TDS/Salinity Meter

Display	Function
COND	When the conductivity mode is chosen, 'COND' is displayed below main field. indicates conductivity with range of 0 ~199,999 µS/cm.
TDS	indicates TDS mode. indicates the amount of total dissolved solids presents in solution. (unit mg/L)
Salinity	indicates salinity mode indicates salinity presents in solution at a current temperature. (unit ppt)
µS(mS)	indicates conductivity unit.

Electrode Structure and Storage

General pH Combination Electrode



1. Reference Filling Hole ; hole filling electrode with the filling solution
2. Ag/AgCl or calomel electrode ; Reference Electrode
3. pH mono electrode ; indicator electrode
4. Temperature sensor
5. Reference Filling Solution ; Saturated KCl Solution
6. Glass Membrane ; membrane selectively responding hydrogen ion

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.

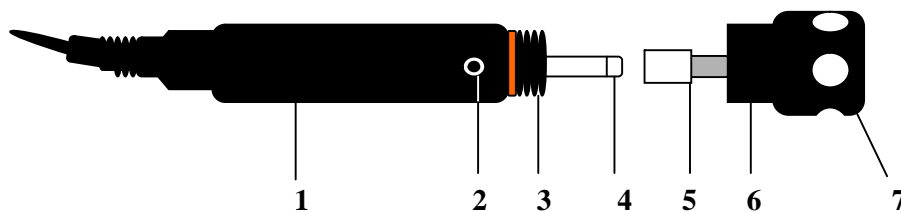
pH Electrode Maintenance (Electrode Cleaning)

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.

- 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.
- Oil/Grease films
Remove oil/Grease films with detergent, and then rinse electrode with distilled water.
- 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.
- Protein removal
Protein coatings can be removed by soaking glass electrodes in a 10% pepsin solution adjusted to pH 1 to 2.

DO Polarographic Probe Structure



1. Electrode Body
2. Temperature Sensor
3. Screw
4. Sensor; position of response to oxygen
5. Membrane
6. Membrane Cover ;
containing with the filling Solution
7. Membrane Protector

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.

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)

Gleaze, 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.

Chapter IV. Setup Functions

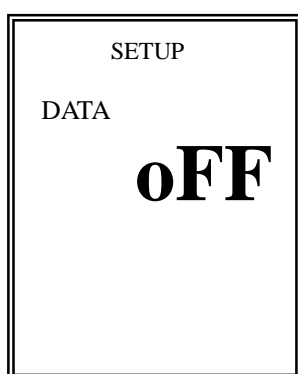
The setup menu is used to identify and change instrument parameters.

pH/ISE/mV/ORP/TEMP Meter

pH Mode

Data Log Setup

In pH ready condition if pressing **Setup** key to enter the setup, the display is shown as follows.



Set by using ▲ or ▼ key

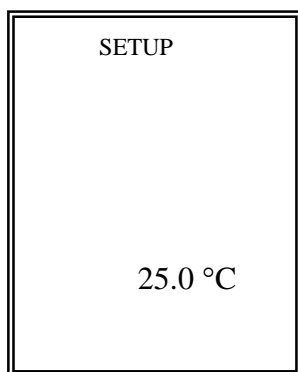
When this setup is set on, meter transmits data with time interval of one second.

This data can be taken by communication program or printer via RS232C interface cable.

When pH is 7.00 and temperature is 25.0°C, the following figure is an example to print.

pH 7.00 25.0

Temperature Setup



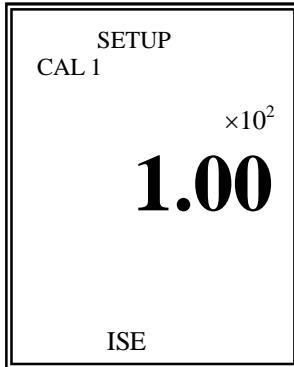
If temperature on display differs from a real temperature, set a real temperature.

Set temperature by using ▲ or ▼ key.

If finishing setup, press **Setup** or **Out** key to return to pH initial display.

ISE Mode Setup

Standard Solution Setup



In pH ready condition press Mode key to enter ISE mode. In ISE ready condition if pressing Setup key, the display is shown as follows.

If pressing **Select** key, concentration of buffer (1.00×10^{-2} , 1.00×10^0 , 1.00×10^1 , 1.00×10^2 , 1.00×10^3) is played in turn and then set buffer by using **Memory** key. It is available to set buffer up to 5 points. Please note that it is not available to set just only 1 point.

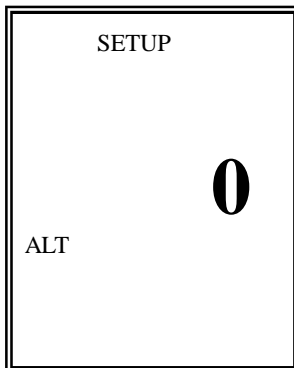
If finishing setup, press **Out** key exit setup mode.

DO/O₂/Air/TEMP Meter

DO Mode Setup

Altitude

In the initial display of DO, press **Setup** key to enter Setup and then the display is shown as follows.

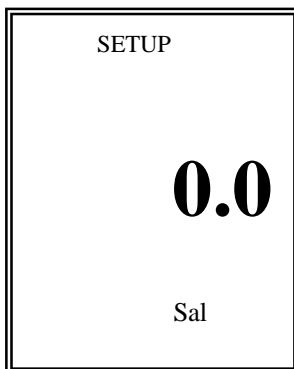


Adjust altitude with ▲ or ▼ key.

The set altitude is automatically compensated.

If finishing the setting of conditions, press **Out** key to exit or **Setup** key to enter the next setup.

Salinity

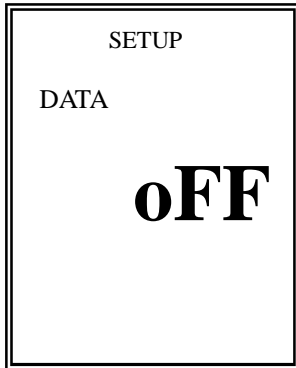


Adjust salinity with ▲ or ▼ key.

The set salinity is automatically compensated.

If finishing the setting of conditions, press **Out** key to exit or **Setup** key to enter the next setup.

Data Log Setup



Set by using ▲ or ▼ key

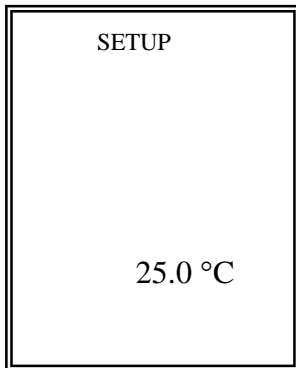
When this setup is set on, meter transmits data with time interval of one second.

This data can be taken by communication program or printer via RS232C interface cable.

When DO is 6.00 mg/L and temperature is 25.0°C, the following figure is an example to print.

DO 6.00 25.0

Temperature Setup



If temperature on display differs from a real temperature, set a real temperature.

Set temperature by using ▲ or ▼ key.

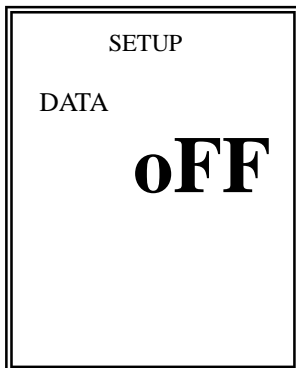
If finishing setup, press **Setup** or **Out** key to return to DO initial display.

Conductivity/TDS/Salinity/TEMP Meter

Conductivity Mode Setup

Temperature Coefficient

In the initial display of Conductivity, press **Setup** key to enter Setup and then the display is shown as follows.



The conductivity of solution with a specific electrolyte concentration will change in accordance with the change of temperature. Each conductive ion has a different temperature coefficient.

All *istek's* meters allow adjusting coefficient for the advanced performance.

Press ▲ or ▼ key until the desired value is displayed.

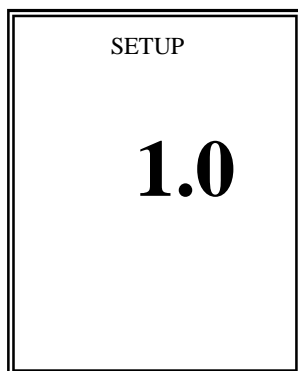
If exiting setup, press **Out** key to return a initial display. If pressing **Setup** key, the next setup screen is displayed.

The following table is a typical temperature coefficients (percentage of change of conductivity per).

Solution	%/°C
Ultra pure Water	4.55
Salt(NaCl)	2.12
5% NaOH	1.72
Dilute Ammonia	1.88
10% HCl	1.32
5% Sulfuric Acid	0.96
98% Sulfuric Acid	2.84

Cell Constant

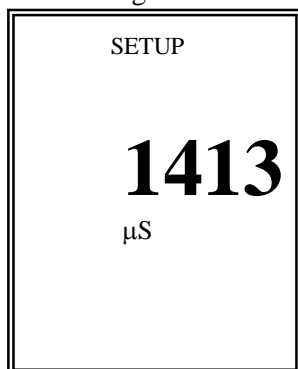
For conductivity measurement of a solution, can accurately measure by adjusting cell constant.



Cell constants consist of 0.01, 0.1, 1.0, 10 and 100, and set by using ▲ or ▼ key.

Standard Solution

After setting cell constant, press **Setup** key, and then the display is shown as follows.



If pressing **Se`lect** key, conductivity of standard solution (146.9μS, 1413μS, 6.67mS, 12.9mS, 111.9mS) is displayed in turn.

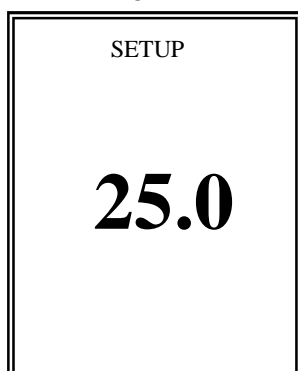
If using standard solution that not showing on screen, adjust conductivity by using ▲ or ▼ key.

The following table is shown correlation conductivity with concentration of KCl solution.

KCl solution(M)	Conductivity
0.001	146.9 μ S/cm
0.01	1413.0 μ S/cm
0.05	6.67 mS/cm
0.1	12.89 mS/cm
1	111.9 mS/cm

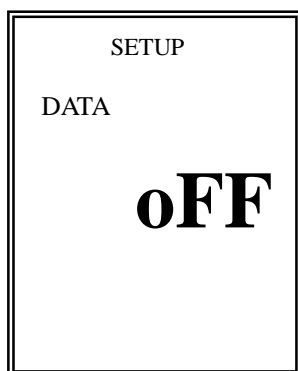
Compensation Temperature

After setting standard solution, press **Setup** key.



Press \blacktriangle or \blacktriangledown key to change 25.0 or 20.0.
The conductivity of a solution exhibits at 25.0°C or 20.0°C.

Data Log Setup

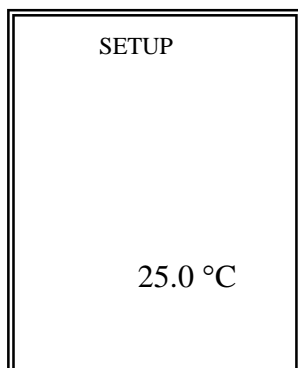


Set by using \blacktriangle or \blacktriangledown key
When this setup is set on, meter transmits data with time interval of one second.
This data can be taken by communication program or printer via RS232C interface cable.

When conductivity is 1410 μ S and temperature is 25.0 °C, the following figure is an example to print.

COND 1413uS 25.0

Temperature Setup



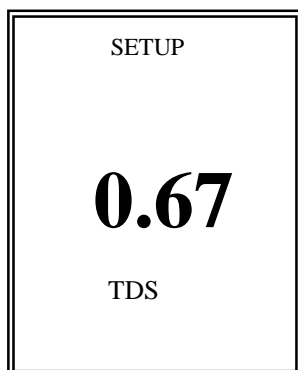
If temperature on display differs from a real temperature, set a real temperature.

Set temperature by using ▲ or ▼ key.

If finishing setup, press **Setup** or **Out** key to return to conductivity initial display.

TDS Mode Setup

In the TDS ready condition if pressing **Setup** key, the display is shown as follows.



TDS factor adjusts by using ▲ or ▼ key and is basically adjusted to 0.67.

If finishing setup, press **Setup** or **Out** key to return to TDS initial display.

Clear data(memory)

pH/ISE/mV/ORP/TEMP Meter

If clearing all the stored data, press **Mode** key to enter mV mode and then press **Select** key to clear. Therefore, all data which set at setup, is changed to a basic value.

DO/O₂/Air/TEMP Meter

If clearing all the stored data, press **Mode** key to enter O₂ mode and then press **Select** key to clear. Therefore, all data which set at setup, is changed to a basic value.

Conductivity/TDS/Salinity/TEMP Meter

If clearing all the stored data, press **Mode** key to enter Salinity mode and then press **Select** key to clear. Therefore, all data which set at setup, is changed to a basic value.

Chapter V. Calibration and Measurement

pH/ISE/mV/ORP/TEMP Meter

pH Calibration and Measurement

Perform calibration every two hours to compensation for electrode drift. There are two ways of calibrations; auto calibration or manual calibration.

Two or more than buffer calibration should be performed before pH is measured. Please note that it is not available to calibrate just only 1 point. If you try to exit after calibrating only 1 point, error message (i Erri) is displayed. In this case press **Power** key or continue calibration.

Preparation

Connect meter with electrode and ATC.

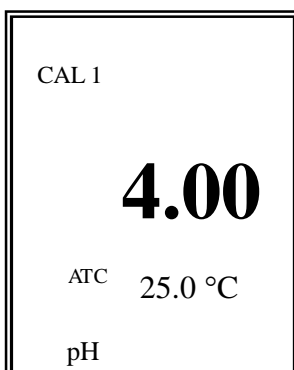
Prepare a calibration buffer and magnetic stirrer.

Calibration

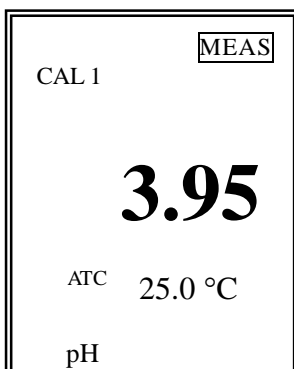
1) Calibration of CAL1(Buffer 1)

In the pH ready condition, press **Cal** key and then the display is shown as follows.

Put electrode into the first buffer.



With constant, but not violent, stirring for accurate measurement, press **Measure** key.

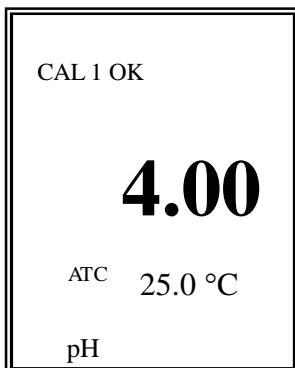


MEAS is displayed above the main field.

If pH reading is stable, i Si appears in the left field.

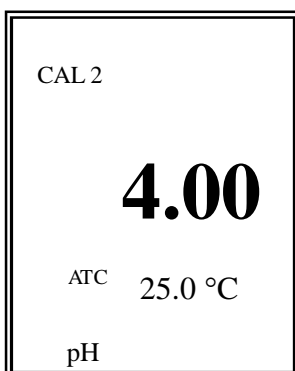
IF CALIBRATING WITH BUFFERS OTHER THAN 4.00, 7.00 OR 10.00, ADJUST VALUE TO THE MEASURING BUFFER BY PRESSING THE ▲ OR ▼ KEY.

Press **Cal** key therefore automatically set and then i CAL 1 OKi message is displayed in the upper field.

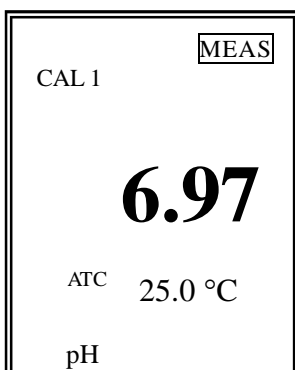


The left figure indicates the end of CAL1 calibration. And ;CAL 2; message is displayed in the upper field.

2) Calibration of CAL2 (Buffer2)



Clearly rinse electrode and put into the second buffer. With constant, but not violent, stirring for accurate measurement, press **Measure** key.

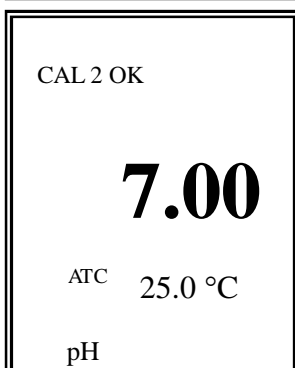


MEAS is displayed above the main field.

If pH reading is stable, ;S; appears in the left field.

IF CALIBRATING WITH BUFFERS OTHER THAN 4.00, 7.00 OR 10.00, ADJUST VALUE TO THE MEASURING BUFFER BY PRESSING THE ▲ OR ▼ KEY.

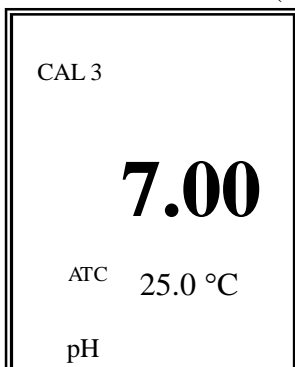
Press **Cal** key therefore automatically set and then ;CAL 2 OK; message is displayed in the upper field.



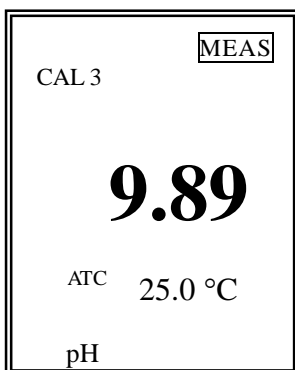
The left figure indicates the end of CAL1 calibration. And ;CAL 3; message is displayed in the upper field.

If pressing **Cal** key after calibrating 2 points, change to the initial display.

2) Calibration of CAL3 (Buffer3)



If you want to calibrate buffer up to 3 point, Clearly rinse electrode and put into the second buffer. With constant, but not violent, stirring for accurate measurement, press **Measure** key.

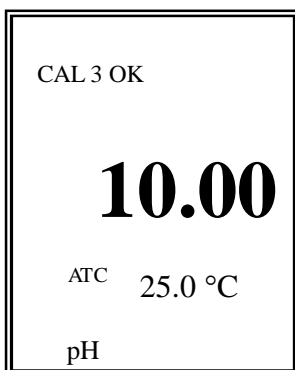


MEAS is displayed above the main field.

If pH reading is stable, \downarrow S \downarrow appears in the left field.

IF CALIBRATING WITH BUFFERS OTHER THAN 4.00, 7.00 OR 10.00, ADJUST VALUE TO THE MEASURING BUFFER BY PRESSING THE \blacktriangle OR \blacktriangledown KEY.

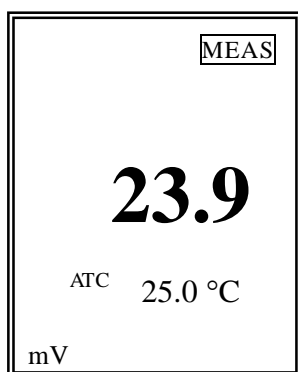
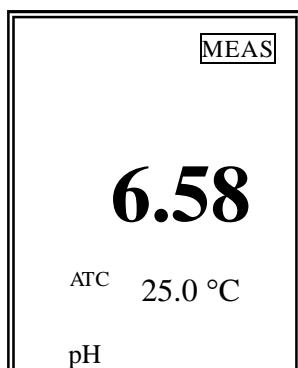
Press **Cal** key therefore automatically set and then \downarrow CAL 3 OK \downarrow message is displayed in the upper field.



The left figure indicates the end of CAL calibration.

It is available to calibrate buffer up to 3 points, if calibrating up to 3 points change into the initial display.

Put electrode into sample, and press **Measure** key.
If pH reading is stable, \bar{S} appears in the left field.



While measuring, you can also know millivolt by pressing **Mode** key.

The measured data is stored by pressing **Memory** key manually. Refer to Data-Log of Chapter VI.

ISE Calibration and Measurement

Please note that it is not available to calibrate just only 1 point. If try exit after calibrating only 1 point, error message (j Errj) is displayed. In this case press **Reset** key or continue calibration.

Preparation

Connect meter with electrode and ATC.

Prepare a required solution for measurement and magnetic stirrer.

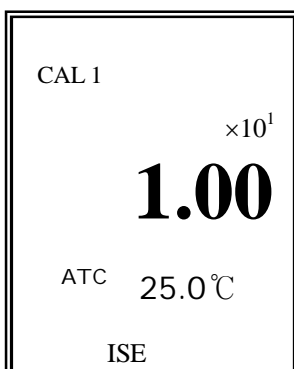
Set buffer(standard) solution in Setup. Refer to Setup.

Calibration should be done in order from the lower concentrated solution to the more concentrated solution.

Calibration and Measurement

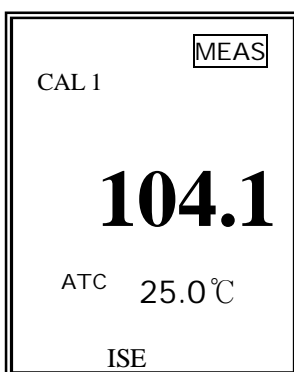
1) Calibration of CAL1 (Buffer 1)

In ISE ready condition, press **Cal** key and then the set buffer in Setup is shown as follows.



After rinsing electrode with distilled water and put electrode into the first buffer.

With constant, but not violent, stirring for accurate measurement, press **Measure** key.

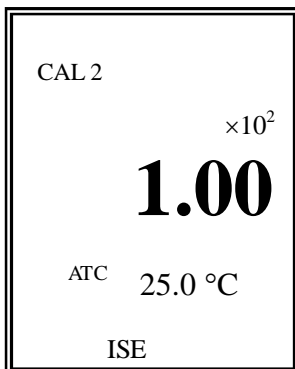


Millivolt corresponding to concentration of ion is displayed.

If mV reading is stable, press **Cal** key.

The left figure indicates the end of CAL1 calibration.

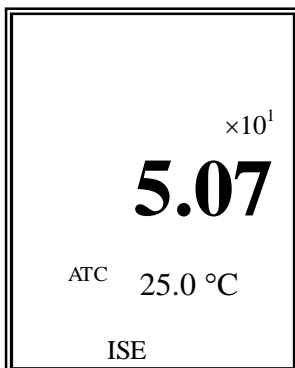
2) Calibration of CAL2 to CAL5 (Buffer 2 to Buffer 5)



Clearly rinse electrode and put into the second buffer. The calibration method of CAL2~CAL5 is the same as done in CAL1. If finishing calibration, is changed into the initial display automatically.

If pressing **Cal** key after calibrating 2 points, change to the initial display.

Put electrode into sample, and press **Measure** key.



The measured data is stored by pressing **Memory** key manually. Refer to Data-Log of Chapter VI.

Slope Feature & Functions

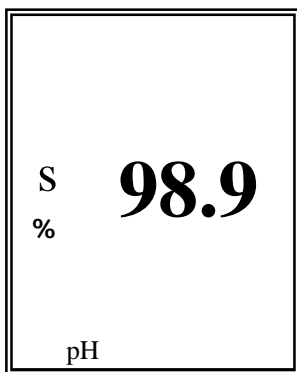
pH Slope

Press **Slope** key to confirm electrode slope after pH calibration.

The slope displays in the main field and then disappeared.

For the correct operation, the range of slope must be within 80 ~ 120%. If the slope is not within this range, prefer newly calibrating in order to prevent the higher error.

It also makes to estimate time of exchange of electrode since can know error through slope.

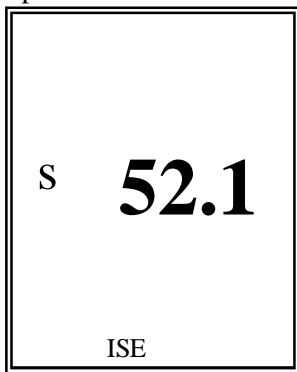


ISE Slope

Press **Slope** key to confirm electrode slope after ISE calibration.

The slope displays in the main field and then disappeared.

It also makes to estimate time of exchange of electrode since can know error through slope.

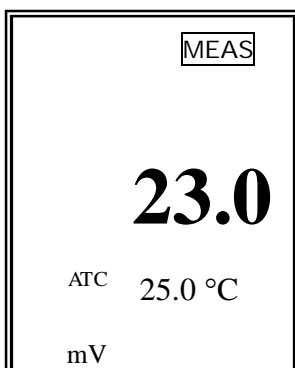


The slope is displayed with mV unit.

Millivolt / Relative Millivolt Measurement

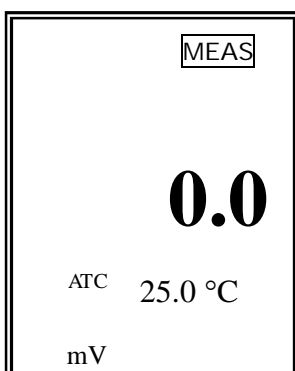
Meter can measure absolute or relative millivolt. The millivolt modes are useful when performing potentiometric titration or preparing calibration curves.

Millivolt



Millivolt is displayed to 0.1mV resolution in the range of ?1999.9 to +1999.9 mV. Access the millivolt mode by pressing **Mode** key and then **Measure** key. In addition, while measuring pH, you can also know millivolt by pressing **Mode** key.

Relative Millivolt



Relative millivolt is displayed to 0.1mV resolution in the range of ?1999.9 to +1999.9 mV. In the measuring condition of mV, changed from a currently displayed value to 0 values by pressing **Rel-mV** key and then measures relative millivolt.

DO/O₂/Air/TEMP Meter

The basic condition is as follows.

Salinity and Altitude = 0

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.

It takes 1~10 minutes to polarize probe because of using polarographic probe.

Calibration and Measurement

- DO Calibration and Measurement

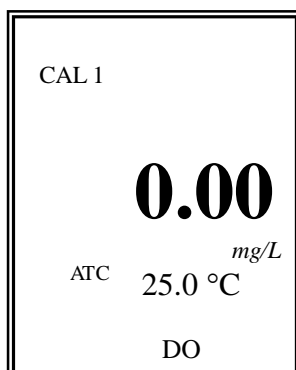
Constantly stir solution by using magnetic stirrer.

Saturate the solution with oxygen by the bubbling equipment at least 1~2 hours in advance before calibration.

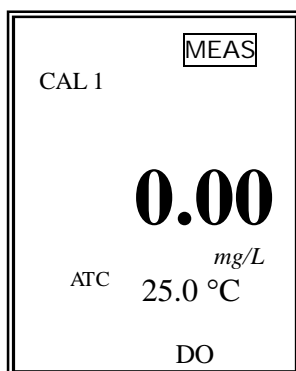
Put saturated solution into BOD bottle and cap to minimize the exposure in the air.

Zero Calibration

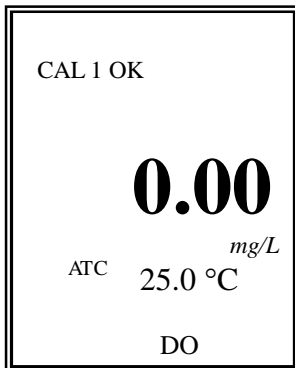
There are two ways of zero calibration. In ready condition, press **Cal** key to enter calibration mode. The display is shown as follows.



- 1) In case of calibration with solution not containing DO, add excess sodium sulfite, Na₂SO₃, and a trace of cobalt chloride, CoCl₂, to bring DO to zero. Put probe into this solution.
- 2) In case of calibration without solution, remove probe from Input and press **Measure** key.



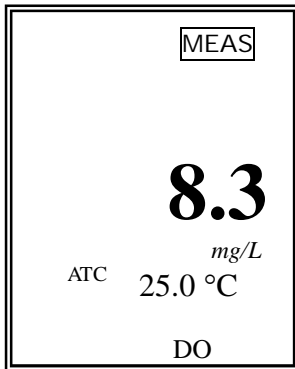
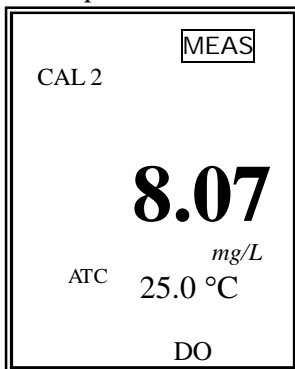
If the reading is stable, press **Cal** key, and then Cal 1 OK message is displayed in the upper field and set automatically.



The left figure indicates to finish Zero calibration.

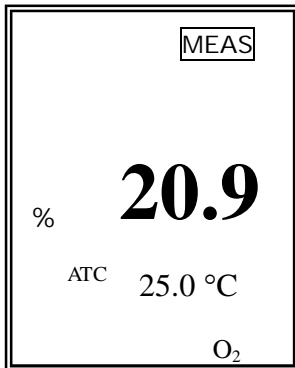
Saturated Calibration

Connect probe, rinse it and dry (blot dry with tissue). Rapidly put probe into the prepared BOD bottle containing water saturated with air to minimize the exposure in the air. Press **Measure** key. If the reading is stable, press **Cal** key. And then Cal 2 OK message is displayed in the upper field and set automatically.



After finishing calibration, change to the initial display automatically. Put probe into sample and press the **Measure** key. If pressing **Resolution** key, change resolution

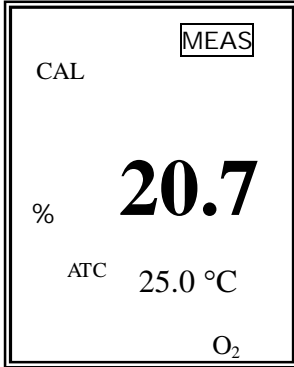
If the reading is stable, store or report it. While measuring DO, can also measure O₂ by pressing **Mode** key.



- O₂ Calibration and Measurement

In DO Mode, change to O₂ mode using **Mode** key

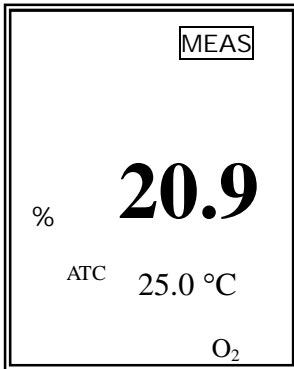
Clearly rinse probe with distilled water and dry (blot dry with tissue). Place probe in the air. Press **Cal** key.



Press **Measure** key.

If the reading is stable, press **Cal** key. And then Cal OK message is displayed in the upper field and set automatically.

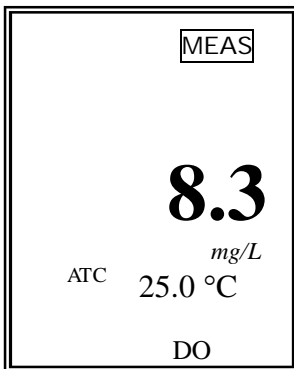
This value is automatically adjusted in accordance with the selected altitude.



If finishing calibration, automatically change to the initial display. Put probe into sample and press the **Measure** key.

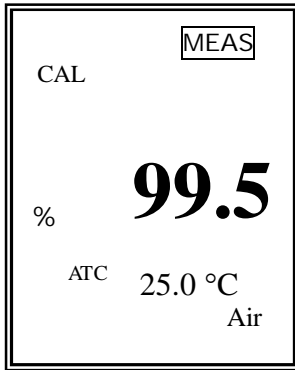
If the reading is stable, store or report it.

While measuring O₂, can also measure DO or air by pressing **Mode** key.



- Air Calibration and Measurement

In O₂ Mode, change to Air mode using **Mode** key



pressing **Mode** key.

Clearly rinse probe with distilled water and dry (blot dry with tissue). Place probe in the air. Press **Cal** key. Press **Measure** key.

If the reading is stable, press **Cal** key. And then Cal OK message is displayed in the upper field and set automatically.

This value is automatically adjusted in accordance with the selected altitude.

If finishing calibration, automatically change to the initial display. Put probe into sample and press **Measure** key to measure percentage of dissolved oxygen.

While measuring air, can also measure DO or O₂ by

Conductivity/TDS/Salinity/TEMP Meter

The basic condition is as follows.

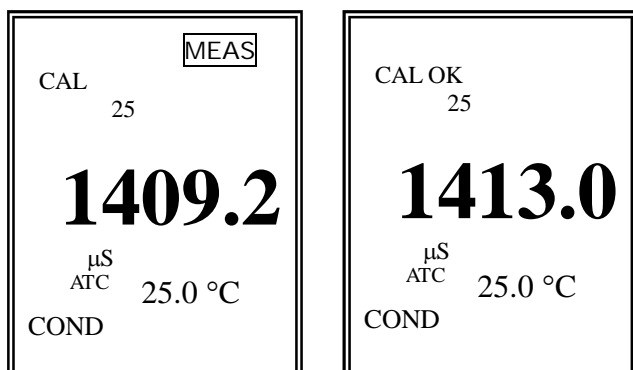
- ¡Cell Constant (Cell): 1.0
- ¡Compensation Temperature (Tref) : 25.0
- ¡Temperature Coefficient(TC): 2.10 %/°C
- ¡Data-Log: memory

Preparation

Connect meter with cell and ATC jack.
Prepare a required buffer for measurement and magnetic stirrer.
Clearly rinse cell with the distilled water and blot dry.

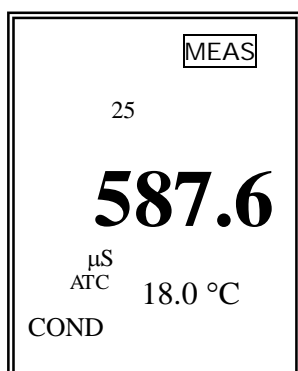
Calibration and Measurement

Put cell into standard solution and press **Cal** key.
Press **Measure** key. After the reading is stable, press **Cal** key.



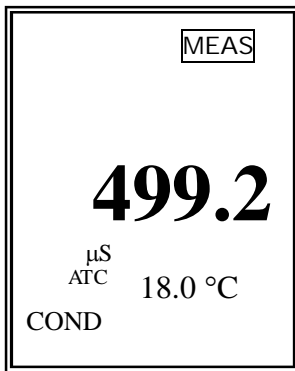
If finishing calibration, automatically change to the initial display.

Clearly rinse electrode and put into sample, and press **Measure** key.
If the reading is stable, record or store it. Refer to Data-Log.



In the calibration, TC(i.e. Temperature Compensation Coefficient) is automatically selected by standard solutions and measuring temperature. KCl solution have a lower temperature coefficient (app. 1.9%/°C) of conductivity than typical potable water. Sodium chloride(NaCl) has a temperature coefficient (2.12%/°C) that closely approximates that found in most waters from wells and surface sources.

If measuring conductivity without compensation of temperature, press **Select** key to measure conductivity at measuring temperature without compensation of temperature.



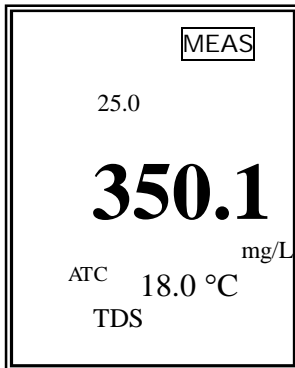
While measuring, measure salinity and TDS by pressing **Mode** key.

TDS Mode ?

The preparation for TDS is the same as for conductivity.

Press **Mode** key to enter TDS mode.

Press **Measure** key to measure TDS of solution.



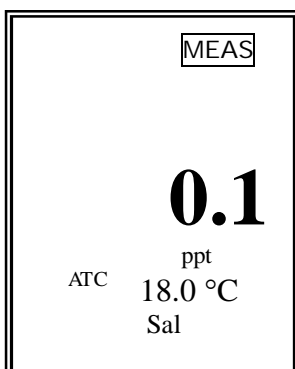
While measuring conductivity, measure TDS by pressing **Mode** key.

- Salinity Mode ?

Press **Mode** key to change salinity mode.

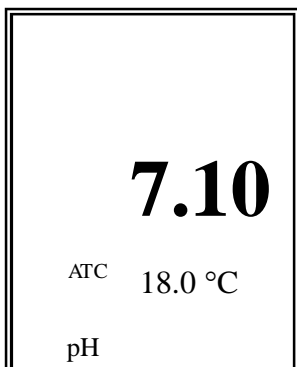
Press **Measure** key to measure salinity of solution.

While measuring conductivity, measure salinity by pressing **Mode** key



Chapter VI. Data-Log

Memory Data-Log



The measured data is stored by pressing **Memory** key manually.

Up to 50 points is stored in memory at once.

If the data stored in meter is required to print, it is available to output by using printer supplied by *istek*.

In ready or measure condition, enter Data(Memory) Mode by **Memory** key, search data stored in meter by using **▲** or **▼** key, and press **Memory** key to exit

Chapter VII. Troubleshooting & Error Description

pH/ISE/mV/ORP/TEMP Meter

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 When trying to exit after calibrating only 1 point, error message (Err) appears.	Check that meter is correctly connected with electrode and ATC probe. Buffer used may be out of specification. Repeat calibration using a fresh buffer. 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

*** When using Ion Selective Electrode, Refer to ISE manual**

DO/O₂/Air/TEMP Meter

MALFUNCTION	POSSIBLE CAUSE	REMEDY
	No power to meter	Press Power key. Check that battery is inserted correctly and polarity signs match.
Out of range reading or unstable reading	Probe failure	Clearly rinse electrode and blot dry. 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.

Conductivity/TDS/Salinity/TEMP Meter

MALFUNCTION	POSSIBLE CAUSE	REMEDY
No display	No power to meter	Press Power key. Check that battery is inserted correctly and polarity signs match.
Erratic reading	Faulty connection between meter and sensor	Tighten connection
	Broken cable	Replace cable
	Air trapped in conductivity Cell	Agitate cell up and down to expel trapped air
	Change of water temperature	Measure in situ
	Broken conductivity cell	Replace cell
When calibrating, for standard solution conductivity is very high or low.	Standards may be old or contaminated	Use fresh standards
	Electrodes dirty	Clean with a detergent solution. Refer to 3. General Functions
	Temperature compensation incorrect	Check temperature.
	Cell constant incorrect	Replace cell

If the cause can't know, Clear memory(data) to eliminate all data.
Refer to Clear Memory(data) of Setup Functions.

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

Chapter VIII. Specifications

Model		79P	29D	47C	415CP	815PDC
pH	Range Resolution Accuracy	-2.000 to 19.999 001/0.01/0.1 ±0.002	×	×	-2.000 to 19.999 001/0.01/0.1 ±0.002	-2.000 to 19.999 001/0.01/0.1 ±0.002
Millivolt (ORP)	Range Resolution Accuracy	±1999.9 mV 1mV ±0.1mV	×	×	±1999.9 mV 1mV ±0.1mV	±1999.9 mV 1mV ±0.1mV
Concentration (ISE)	Range Resolution Accuracy	0.00001 to 99999 ± 1 least significant ±0.25% of reading	×	×	0.00001 to 99999 ± 1 least significant ±0.25% of reading	0.00001 to 99999 ± 1 least significant ±0.25% of reading
Temperature	Range Resolution Accuracy	-10 to 110 °C 0.1 °C ±0.4°C	-10 to 60 °C 0.1 °C ±0.4°C	-10 to 110 °C 0.1 °C ±0.4°C	-10 to 110 °C 0.1 °C ±0.4°C	-10 to 110 °C 0.1 °C ±0.4°C
DO	Range Resolution Accuracy	×	0.0 to 19.99 mg/L 0.01/0.1 ±0.5%	×		1.0 to 19.99 mg/L 0.01/0.1 ±0.5%
O2	Range Resolution Accuracy	×	0.0 to 60.0 % 0.1 % ±1 digit	×		1.0 to 60.0 % 0.1 % ±1 digit
Air Saturation(%)	Range Resolution Accuracy	×	2.0 to 199.9 % 0.1 % ±1 digit	×		3.0 to 199.9 % 0.1 % ±1 digit
Conductivity	Range Resolution Accuracy	×	×	0 to 199,999 µS/cm 0.01/0.1/1.0 ±0.5%	0 to 199,999 µS/cm 0.01/0.1/1.0 ±0.5%	0 to 199,999 µS/cm 0.01/0.1/1.0 ±0.5%
TDS	Range Resolution Accuracy	×	×	0 to 1999 mg/L 1 mg/L ±0.2%	0 to 1999 mg/L 1 mg/L ±0.2%	0 to 1999 mg/L 1 mg/L ±0.2%
Salinity	Range Resolution Accuracy	×	×	0 to 80.0 ppt 0.1 ±0.1	0 to 80.0 ppt 0.1 ±0.1	0 to 80.0 ppt 0.1 ±0.1
Data Logging		50 Pints	50 Pints	50 Pints	100 Pints	150points
Temperature Compensation		Auto				
Calibration		Auto				
Input		8 pin Din, RS232C				
Output		RS232C(Computer/Printer)				
Power		1.2V rechargeable battery / DC power adapter				

ISE Specifications

ISE Specification is simply described.

The details refer to catalog or contact *istek*.

ISE	Sensing Type	Measurement Range		Slope	pH Range	Temp (°C) Range	Resp Time	Reference electrode & Filling Solution
		Molar(M)	ppm(mg/L)					
NH ₃	GS	1.0~5×10 ⁻⁷	17,000~0.01	56±3	above 11	0~50	20	N/A, NH ₄ Cl
NH ₄ ⁺	PM	1.0~5×10 ⁻⁶	18,000~0.1	56±3	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	Satjd~1×10 ⁻⁶	Satjd~0.02	57±2	5~8	0~80	20	Sgl, KCl
BF ₄ ⁻	PM	1.0~7×10 ⁻⁶	10,800~0.1(B)	56±2	2.5~11	0~50	30	Dbl,(NH ₄) ₂ SO 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) ₂ SO ₄
NO ₃ ⁻	PM	1.0~7×10 ⁻⁶	62,000~0.5	56±2	2.5~11	0~50	30	Dbl,(NH ₄) ₂ SO ₄
NO _x	GS	5.0×10 ⁻³ ~5×10 ⁻⁶	220~0.2	56±3	1.1~1.7	0~50	30	N/A, NaNO ₂
ClO ₄ ⁻	PM	1.0~7×10 ⁻⁶	98,000~0.7	56±2	2.5~11	0~50	30	Dbl,(NH ₄) ₂ SO 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	N/A, NH ₄ Cl
X ⁺ /X ⁻	SSM	5.0×10 ⁻² ~1×10 ⁻⁶	12,000~1.0	Titrat- ion	2~12	0~50	30	Sgl, KCl
Ca ⁺² /Mg ⁺²	PM	1.0~1×10 ⁻⁶	40,000~0.4(Ca)	26±3	5~10	0~50	30	Sgl, KCl

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

* Resp Time ; indicates response time.

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

Chapter IX. Ordering Information

※ Other items contact *istek*.

For further information on other accessories, please feel free to contact *istek* at any time.

A. Standard

- * Combination pH Electrode/ATC Probe
- * Rechargeable 1.2V battery (6pcs)
- * pH Buffer Solutions (pH4.00, 7.00, 10.00) 125ml
- * Instruction Manual

B. Option

- * pH, ORP, DO, ISE & Conductivity cell
- * Carrying Case
- * Extra pH Buffer Solutions (pH4.00, 7.00, 10.00) 475ml
- * pH Storage Solution 475ml
- * pH Filling Solution 125ml
- * RS232C Interface Cable
- * DO Membrane Kit
- * Luxury Third-Arm Stand
- * Conductivity Standard Solution 125ml
- * Printer