



Instruction Manual

Laboratory EC Meter ; NeoMet Series ;
EC-400L (EC/TDS/ Salinity/Temp)



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Chapter I. Introduction

Advanced desktop Meter (Model EC-400L), the latest- model is operated by AC/DC adaptor (DC 12V), a high performance model controlled by **microprocessor** for all measurement needs.

EC-400L make a feature of a wide & clear backlit color LCD display, simultaneously display of various measured data; and a built-in printer can be installed as occasion demands and simplified user; instruction manual is stored in the meter for user; convenience.

EC-400L displays **Conductivity(μS , mS), Salinity(ppt), and Temp($^{\circ}\text{C}$)**.

The model *EC-400L* is capable of storing up-to 100 points in its memory box and storing by control of the time interval of data-log automatically. And also, by using RS232C cable, it can be remotely controlled and transmitted the measured information to the printer or computer by 1 second interval.

EC-400L (EC/Salinity/Temp Meter)

If a value is stable, a world ;Stable" is displaying on the screen, therefore a user can measure the sample more accurately. And it features Auto/Manual calibration (3 Points each) And displaying Conductivity(unit $\mu\text{S}/\text{cm}$ and mS/cm), Salinity(ppt) and temp($^{\circ}\text{C}$)

Conductivity indicates conductivity of solution. (unit $\mu\text{S}/\text{cm}$ and mS/cm)

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

Temperature Compensation(Temp)

For automatic temperaure compensation, a temperature probe supplied by *istek* must be used.

Temperature is automatically compensated on the base of Tref adjusted in Setup.

Tref can be set with 25.0 $^{\circ}\text{C}$ or 20.0 $^{\circ}\text{C}$ for a basis.

Chapter II. General Functions

1) Instrument Setup

Rear Panel of EC-400L



Power Source

Connect the supplied AC/DC adaptor to Power Jack of the meter.

istek supplies **AC/DC adaptor(DC 12V, 300mA) adjusting to 220V.**

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 Connection

We recommend to use electrodes which were provided by istek, Inc. for optimum working.

Put it into BNC Jack and turn it clockwise to lock into position. And Attached ATC probe to the ATC jack by sliding the connector straight on until firmly in place.

RS232C interface cable Connection

Using this RS232C Interface cable, it is available to connect the meter with Printer (Or Computer) and user can edit or print the data easily. For further information, please refer the Chapter 4 <Data ?Log> Part

2) Display Description

■ EC-400L



Display Function

Display	Function
COND	indicates conductivity with range of 0 ~199,999 $\mu\text{S}/\text{cm}$.
Salinity	indicates salinity presents in solution at current temp. (unit ppt)
$\mu\text{S}(\text{mS})$	indicates conductivity unit.
ATC	Indicates Automatic Temp Compensation, a temp probe supplied by istek, Inc. recommended to be used. Tempe Compensation is automatically Performing present temp and in case of it is unconnected with the meter, it displayed fixed temp as 25 $^{\circ}\text{C}$.
Meas	Indicates that meter is in <Measurement> Mode. If this is not shown, indicates ready condition.
Ready	Indicates that the meter is in <Ready> Mode now.
SETUP	Indicates that meter is in setup mode.
DATA1	Indicates number of data stored in meter.
Stable	Displays when the data is stable during it is measuring or calibrating
Cal	Indicates that meter is in calibration condition. used to calibration
Cal OK	Indicates the end of calibration corresponding to number.
2.10%/iC	Uses exists in Aquarius
Error	Displays when it is not available to correctly measure because Something happens wrong in the meter or buffers while calibrating or measuring.

3) Electrode Structure and Electrode Storage

* 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)

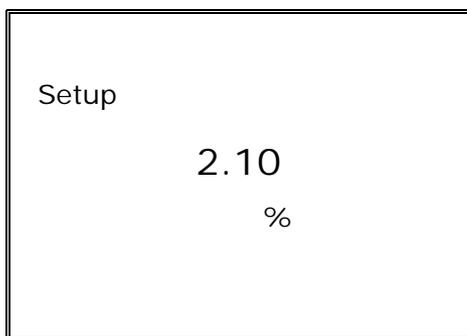
Grease, oil, fingerprints, and other contaminants on the sensing elements can cause erroneous measurements and sporadic responses. If it takes long time to response or a stable data isn't obtained, can be often restored to normal performance by using the following procedures; Clean cells with detergent 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 III. Setup Functions

1) Temperature Coefficient (Press Setup key 1 time)

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 value 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.



When pushing **▲** and **▼** key, it changes by 0.1 and sets a proper TC of Measuring solution. Selecting display of Temperature Coefficient: Available to set proper Temp Coefficient Unit is %/°C and it is settled 2.1 %/°C basically.

Temp Coefficient (Between 25 to 50°C) [Variation of EC;s % /°C]	
Solution	%/°C
Ultrapure 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
Sugar Syrup	5.64

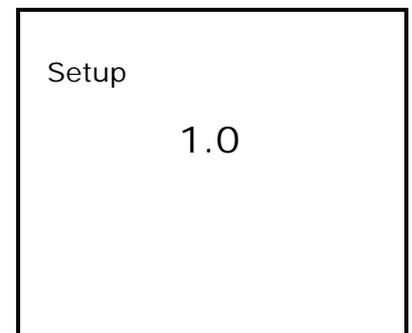
If not using next menu, pres **Out** key to go out to an initial display.

2) Setting Cell Constant

After setting TC, press **Setup** key and changes to a menu setting Cell Constant.

That means, press **Setup** key twice from an initial display.

< EC range per Cell Constant >	
Cell constant	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



Cell constant consists of 0.01, 0.1, 1.0, 10.0 and 100.0 and sets with pressing ▲ and ▼ key.

If going out without next Setup menu, press **Out** key to go to an initial display.

3) Setting Buffer Solution

After finishing cell constant, press **Setup** key once again to change to setting buffer solution.

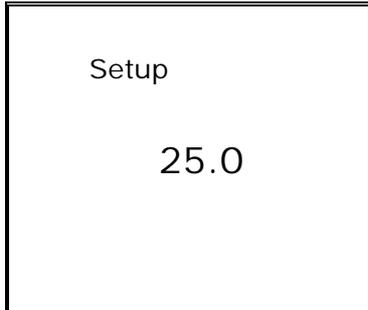


Selecting display of Cell Constant: It is available to select proper cell constant by the range

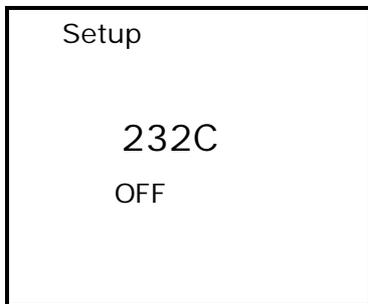
which you would like to measure.

If going out without next Setup menu, press **Out** key to go to an initial display.

4) Compensation Temperature

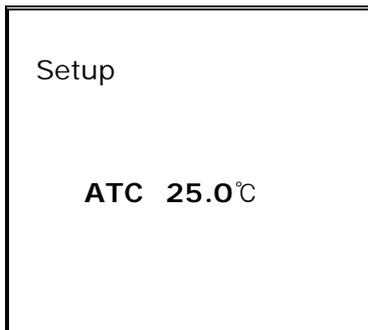


After setting standard solution, press **Setup** key.
Press ▲ or ▼ key to change 25.0 or 20.0.
The conductivity of a solution exhibits at 25.0°C or 20.0°C.



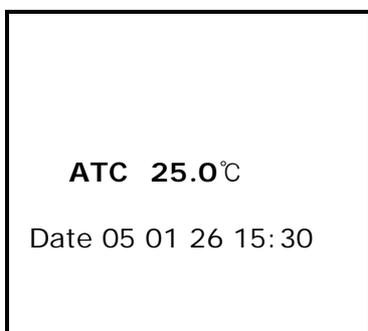
5) Data Logging (Hyper Terminal)

User can regulate in Setup mode by pressing setup Key 5times, And can set by using ▲ or ▼ key. When this setup is set iONi, meter transmits data with time interval of one second. This data can be taken by communication program or printer via RS232C interface cable. Press **Out** Key to exit to initial display



6) Temperature Setup

If temperature on display differs from a real temp, then set a real temperature. From the initial display of pH, press Setup key to enter Temp setup display. After that set real temp by using ▲ or ▼ key. After a setup temp, press **Out** key to exit to EC initial display.



7) Date and Time Setup

If Date and time on display differ from a real one, then user can set a real date and time manually. From the initial display of EC, press Setup key to enter time in setup display. Set real date and temp by using **Select** key and ▲ or ▼ key. After finishing setup, press **Out** key to return to EC initial display.

8) Memory Clear

If clearing all the stored data, settled press **Mode** key and press select key in Salinity Mode. When press **Select** key, whole former data saved is deleted completely. When **[Memory Clear]** is finished, it comes back to pH initial display automatically.

Chapter IV. Calibration and Measurement

The basic condition is as follows.

*i*Cell Constant (Cell): 1.0

*i*Compensation Temperature (Tref): 25.0

*i*Temperature Coefficient (TC): 2.10 %/°C

*i*Data-Log: memory

For calibrating of EC Sensor, It needs to select <Proper Probe> and <Standard Solution>

- (1) EC Meter
- (2) EC sensor / ATC Probe
- (3) Standard solution
- (4) Stirrer, Magnetic Bar, Distilled water for rinsing

Conductivity ?

Preparation

Connect meter with cell and ATC jack.

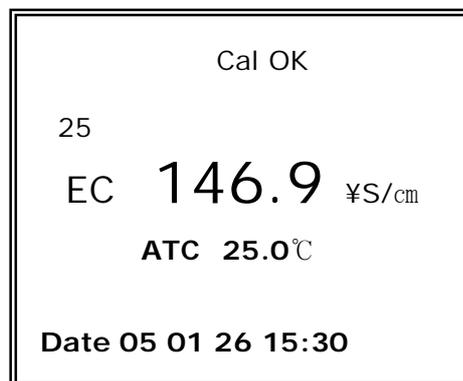
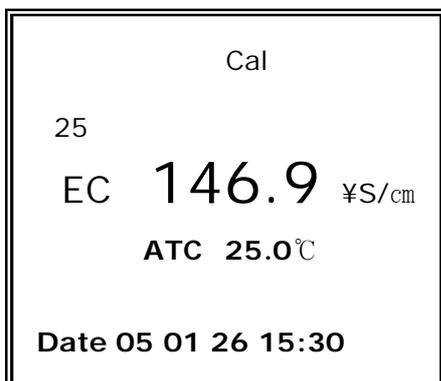
Prepare a required buffer for measurement and magnetic stirrer.

Clearly rinse cell with the distilled water and blot dry.

Put cell into standard solution and press **Cal** key.

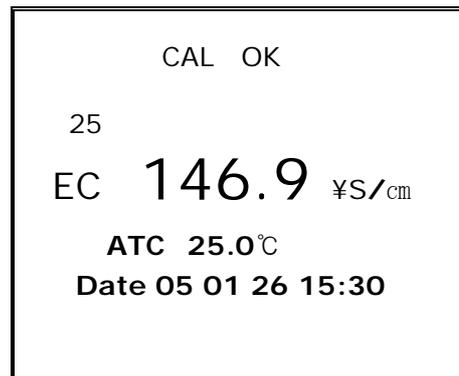
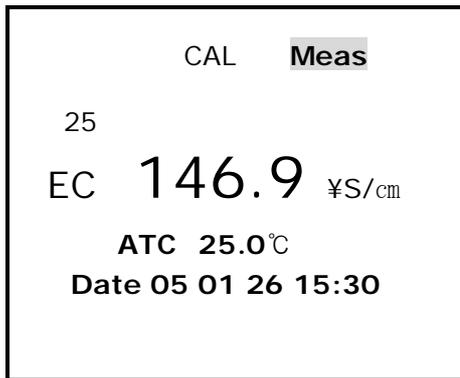
Press **Measure** key. After data stables, press **Cal** key.

1) Calibration and Measurement in Conductivity Mode



*** Calibration**

- (1) Put cell into distilled water for half an hour and dry it.
- (2) Stir buffer set in setup menu with stirrer and put cell into buffer.
- (3) In ready display, press **Cal** key and the following picture will be shown.
- (4) Press **Measure** key and measure the conductivity.
- (5) If the data stables, press **Cal** key. The following picture shows the buffer set in 146.9µS/cm.



- (6) After finishing calibration, the message ;CAL OK; shows upper side of the screen and it changes to an initial display.

*** Sample Measuring**

Clearly rinse cell with a distilled water and dry it. Put cell into a sample you are going to measure and press Measure key. If the data is stable, press Memory key to save data.

※ In calibration, TC automatically changes according to the temperature and selected buffer solution. Generally, in KCl solution, it takes 1.96 %/°C.

Because of that, set TC as 1.9 to 1.96 after calibrating.

** It is available of measuring without Temperature compensation. If needed, press Select key while measuring. Then ;25.0; in upper side of display disappears and the meter starts to read about conductivity data of present temperature.*

You can measure salinity while measuring conductivity.
In Measuring, press **Mode** key to change to salinity mode.

2) Measuring in Salinity Mode

Press Mode key to change to Salinity mode from Conductivity mode and press Measure key. A data display in screen is salinity data automatically compensated as 25.0°C.

Chapter V. Data-Logging

It is available to receive the measured data by using RS232C Communications equipment (Hyper Terminal) or PC.

In Ready Condition, connect the EC Meter to the computer with RS232C communication cable and install the communication Program in your PC.

After that, press **Meas** Key of the Meter and you can get the data from the Meter.

Min interval of this 1 sec. (Item, Data, Temp and Time)

DATA 1

EC **146.9** $\mu\text{s}/\text{cm}$

ATC 25.0 $^{\circ}\text{C}$

Date 05 01 26 15:30

* If trying to print out with a printer, it is able to print by using a printer served at istek, Inc. Stock data first and print the data.

- * First, let DATA as ;On; by using Setup key
Then press **Memory** key while measuring.
Press **Measure** Key again to go to the initial display.
Press **Measure** Key and search stocked data by ▲ or ▼ key.
Press **Out** key to print out the data.

[DATA MEMORY MODE]

Number : 4

Condcutivity = 185.3 $\mu\text{S}/\text{cm}$

TEMP = 25.0 $^{\circ}\text{C}$

Date 05 01 26 15:30

Chapter VI. RS232 Remote Control

The meter can be remotely controlled by PC.

After connecting your meter to PC ; **by RS232C Communication cable;** and performing communication program of computer, if pressing **[Meas]** key, it will be remotely controlled and key button of meter wouldn't work.

The following messages are the remote control commands(Item /value/ temp /time)

<i>50.0 uS/cm</i>	<i>25.0</i>

Chapter VII. Troubleshooting & Error Description

■ EC-400L (Conductivity/Salinity/TEMP Meter)

Symptom	Possible cause	Remedy
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 Cell broken.	Replace cell

If you failed to find the cause of error,

- Please do Memory Clear (Refer Setup Function Part for getting further information)
- The problem still persists, please contact istek, Inc Product Service Department.
(Tel : 82-2-2108-8400, E-mail : istek@istek.co.kr, Contact Person, Mr. S. H Park)

Chapter VIII. Specifications

Model		EC-400L
Temperature	Range Resolution Relative Accuracy	-10 to 110℃ 0.1℃ ± 0.4℃
Conductivity	Range Resolution Relative Accuracy	0 to 199,999µS/cm 0.01/0.1 ± 0.5%
Salinity	Range Resolution Relative Accuracy	0.0 to 70.0 ppt 0.1 ± 0.1
Data Logging		100 Points
Temperature Compensation		Auto
Calibration		Auto
Input		BNC, ATC , Power, RS232C
Output		RS232C (Computer/Printer)
Power		AC DC Power Adaptor
Standard Accessories		Conductivity Cell (K=1.0)/ATC Standard Solution(1413 µS/cm)
Optional Accessories		Conductivity Cell (K=0.01, 0.1, 10), Luxury Third Arm Stand Std Solutions

Chapter IX. Ordering Information

※ For getting further information, feel free to contact istek at any time.

Website : www.istek.co.kr

Email Address : istek@istek.co.kr

Contact Person : Dia Hur, Manage in sales dept.

A. Standard Accessories.

- * Conductivity Cell (K=1.0) / ATC Probe
- * Conductivity Standard Solution (1413 μ S/cm) 125ml
- * AC/DC Power Adaptor
- * Instruction Manual

B. Optional Accessories.

- * Conductivity cell.
- * Conductivity Standard Solution.
- * RS232C Interface Cable
- * Built ? in Printer
- * Third Arm Stand
- * Thermal Printer

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