



Instruction Manual

Portable EC Meter ; NeoMet Series ;
EC-40N (EC/TDS/Salinity/Temp)



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Water Analyzer - istek, Inc.

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Chapter I. Introduction

istek's advanced portable meters (EC-40N) is operated by Rechargeable Battery (AAA size x 6ea) and are controlled by Microprocessor for all measurement needs.

This EC-40N features a custom LCD that simultaneously displays various functions along with measurement results and capable of storing up to 100 points in memory at once for each item. And if setting up of data-log to be ON , it is available to receive data via RS232C interface cable at 1 sec. intervals. (Please refer to Chapter 6. Data-Log part)

EC-40N (Conductivity/TDS/Salinity/TEMP)

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(μS , mS), TDS(mg/L), Salinity(ppt) and ATC($^{\circ}\text{C}$). Conductivity indicates conductivity of solution. (unit $\mu\text{S/cm}$ and mS/cm)

TDS Indicates by converting the measured conductivity into concentration of the total dissolved solid present solution from. (unit $\mu\text{S/cm}$, mg/L)

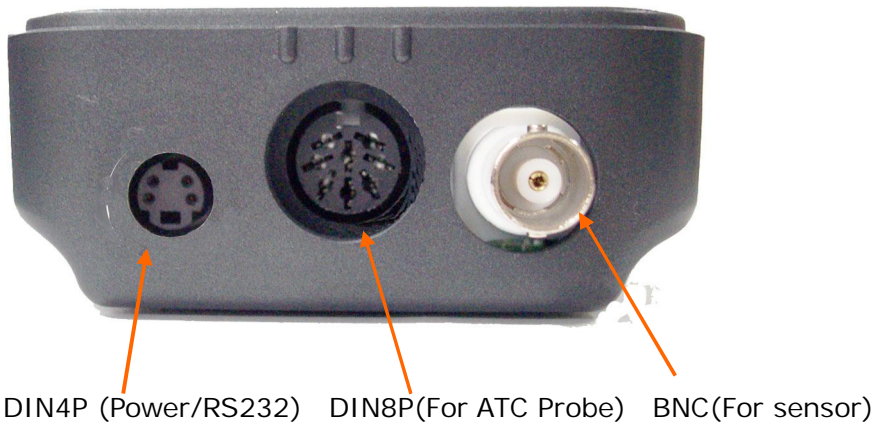
Salinity Indicates by converting the measured conductivity into salinity of solution. (unit ppt)

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

Chapter II. General Functions

1) Instrument Setup

Rear Panel



Power Source

Portable 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 it is appeared a message ;BAT; on LCD, user need to charge them with electricity using AC/DC Adaptor. It takes 6~8 hours for recharging fully. When the battery has exhausted in the suburb, user can replace with rechargeable battery to open the cover which is located a lower column of the meter's backside.

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.

Electrode and ATC probe connection

Attached Electrode by sliding the BNC connector onto the sensor input then push down and turn clockwise to lock into position. And also attached the ATC Probe to the ATC Jack by sliding the connector straight on until firmly in place.

RS232C Interface Cable and Printer Connection

Insert RS232C interface cable into the RS232C Jack(DIN4P Connector). This RS232 interface cable supplies by istek, inc. Please refer Chapter 6 and Chapter 7 for getting more information.

2) Key Function

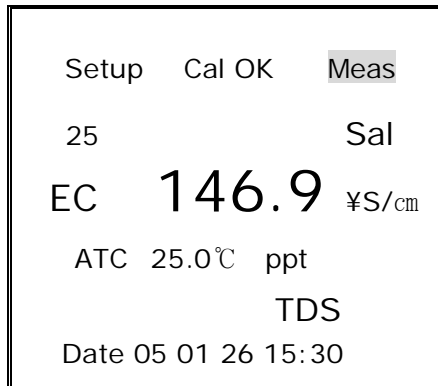
■ EC-40N (EC / TDS / SAL / Temp Meter)



Key	Description
On	Used to turn ON / OFF of Power
Mode	Used to select operating modes (Conductivity or Salinity)
Resolution	Indicate Data's resolution displayed(0.01/0.1)
Meas	Used to move from <Measure> to <Ready> or from <Ready> to <Measure>
Cal	Used this to start calibration or set a value of calibration. And, used to exit to initial display on the calibrating
Setup	Used this for Data-Log, Temp regulation and Current time setting for user
Select	Used to <Memory Clear>
Memory	1) Data saving in <Measure> Mode 2) Data saving in <Ready> Mode 3) Exit from <Memory> Mode 4) Used to save selected Calibration Buffer in <Setup> Mode in ISE
Out	Used to exit from <Setup> or Print the saved data
(^)	Uses for increasing data in Setup & Calibration mode.
(v)	Uses for decreasing data in Setup & Calibration mode

3) Display Description

■ EC-40N



Display	Function
COND	indicates conductivity with range of 0 ~199,999 µS/cm.
TDS	indicates the amount of TDS (Total dissolved solids) presents in solution (unit mg/L)
Salinity	indicates salinity presents in solution at current temp. (unit ppt)
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°C.
Meas	Indicates that meter is in <Measurement> Mode now.
Ready	Indicates that the meter is in <Ready> Mode now.
SETUP	Indicates that meter is in setup mode.
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.
Error	Displays when a serious problem has arisen on the meter, sensor or buffer and it is not available to measure or calibrate accurately.

4) Electrode Structure and 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.

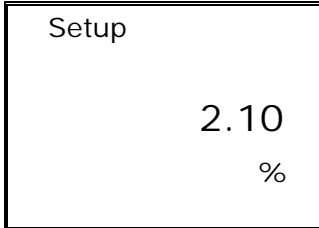
When a stronger cleaning solution is required, try concentrated hydrochloric acid mixed into 50% isopropanol.

Chapter III. Setup Functions

1. Setup in EC Mode

Temperature Coefficient Setup

In the EC initial display, press **Setup** key to enter Setup Mode 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. (Selecting display of Temperature coefficient; Available to set proper Temp Coefficient Unit is %/°C and it is settled 2.1 %/°C basically)

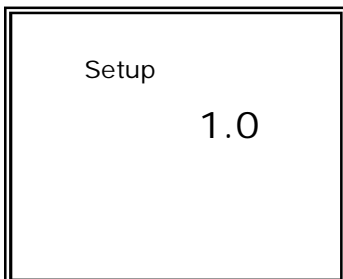
If exiting setup, press **Out** key to return a initial display. If pressing **Setup** key once more, the next setup screen is displayed.

The following table is a typical temperature coefficients. (Percentage of change of Conductivity per each solution)

Temp Coefficient (between 25 to 50°C) [Variation of ECis % /°C]	
Solutions	%/°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
Sugar Syrup	5.64

Cell Constant setup

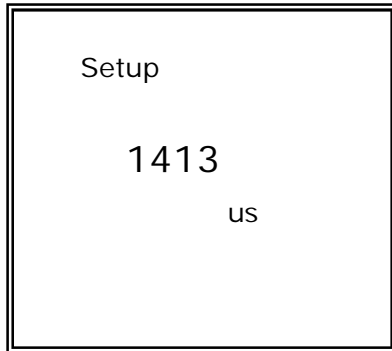
After setting up of Temperature Coefficient, press **Setup** key once more then below is displayed



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 setup

After setting cell constant, press **Setup** key, and then the display is shown as follows. If pressing **Select** key, conductivity of standard solution (146.9 μ S, 1413 μ S, 6.67mS, 12.9mS, and 111.9mS) is displayed in turn.



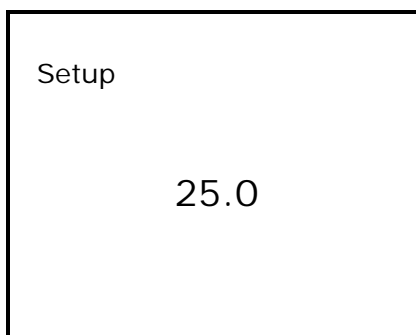
If using standard solution that not showing on screen, adjust conductivity by using **▲** or **▼** key.

The following table is shown correlation conductivity with concentration of KCL solution. Press **Out** Key to exit from this Setup mode.

Cell constant (K)	Buffer Solution
0.01	NO Calibrating
0.05	146.9 μ S/cm
0.1	146.9 μ S/cm
1.0	1413 μ S/cm
10	6.67mS/cm or 12.89mS/cm

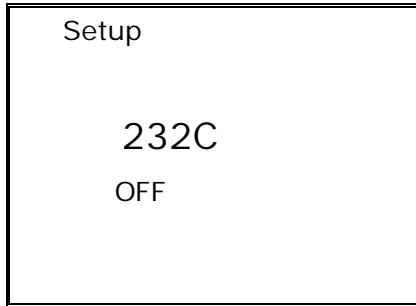
Compensation Temperature setup

After setting standard solution, press **Setup** Key. Press **▲** or **▼** key to change 20.0 to 25.0 $^{\circ}$ C.



The conductivity of a solution exhibits at 20.0 to 25.0 $^{\circ}$ C. And **Out** key to exit to EC initial display

Data Logging setup (via Hyper Terminal)



* When user want to receive a measured data in real-time, connect the meter with PC by RS232C Interface cable, then user can be transmitted the data at 1sec. intervals (minimum) via Hyper Terminal at real-time.

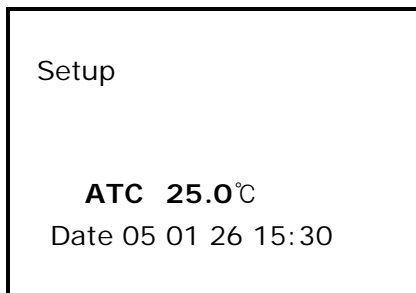
Press **Setup** key to enter left display.

Set ON/OFF of data transmission by using ▲ or ▼ key.

When this setup is set 'ON', meter transmits data with time interval of one second. This data can be received by PC via RS232C interface cable. Press **Out** Key to exit to initial display.

When Conductivity is 1410uS and temperature is 25.0°C, the following figure is an example to printer ; **COND 1413 uS 25.0** ;

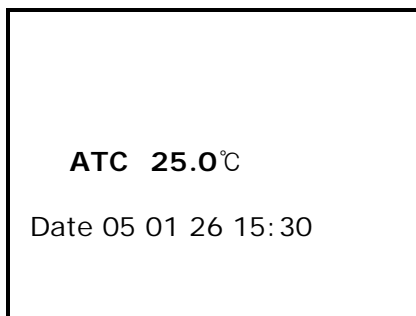
Temperature Setup



If temperature on display differs from a real temp, then set a real temperature. Set temperature by using ▲ or ▼ key.

If finishing setup, press **Setup** or **Out** key to exit to EC initial display.

Data and Time Setup



If Date and time on display differ from a real one, then set a real date and time.

From the initial display of EC, press **Setup** key 4 times to enter time in setup display as below.

Press **Select** Key and set correct date by using ▲ or ▼ key. After finishing setup, press **Memory** key to save it and return to EC initial display.

Memory Clear

When meter can not receive date from sensor, wrong time & date are settled, Data memory is wrong or want to be initialize the meter with an unknown cause, make Memory Clear as follows. 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.

When [Memory Clear] is finishing, it comes back to pH initial display automatically.

Chapter V. Calibration and Measurement

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

1. Calibration and measurement in EC Mode.

Preparation

Connect meter with cell and ATC jack.

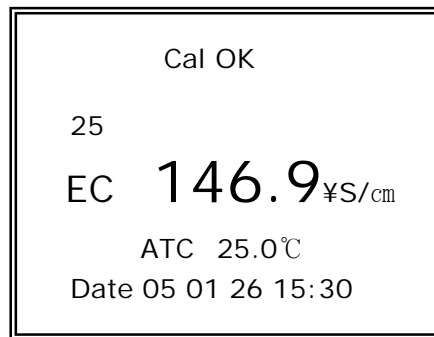
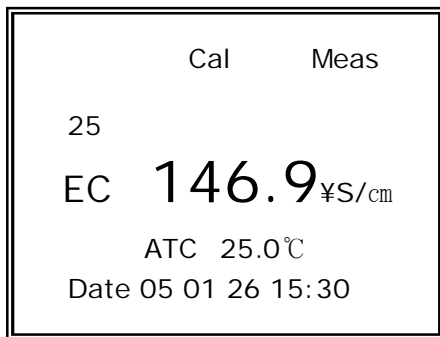
Prepare a required buffer for measurement and magnetic stirrer.

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 data stables, press **Cal** key.



Clearly rinse EC electrode and put into standard solution which is settled in Setup mode, 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

*If finishing calibration, it is changed automatically to EC initial display. Clear rinse the sensor and put into the sample and press Measure Key. If reading is stable, recode or store it by pressing **Memory** Key. (Refer to Data log)*

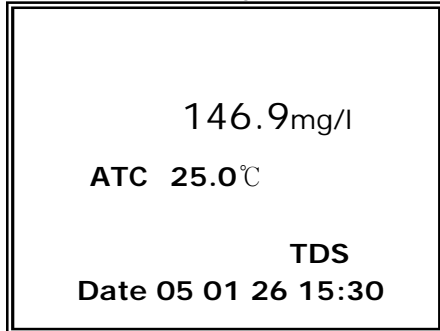
If measuring conductivity without compensation of temperature, press **Select** key to measure conductivity. While measuring, measure salinity and TDS by pressing **Mode** key.

In the calibration, TC (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.

2. Calibration and measurement in 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.

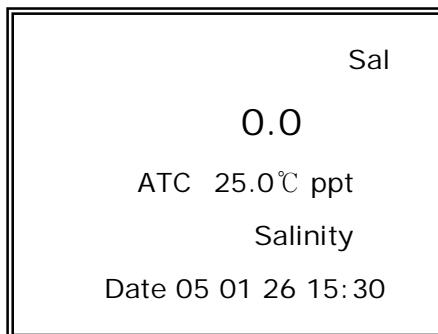


3. Calibration and measurement in Salinity Mode

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-Logging

In measuring condition, the measured data is stored by pressing **Memory** key manually. The measuring data is saving in regular sequence as a follow picture. Up to 100 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, Inc.*

Data 1 EC 146.9 $\mu\text{S}/\text{cm}$ ATC 25.0 $^{\circ}\text{C}$ Date 05 01 26 15:30

In order to print saved data, set the data **i ON i** condition by pressing **Setup** Key.

After that, 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 save the data. The data can be printed by pressing **Out** key.

It is also available to print by using built-in printer. Press **Printer** Key to print the data

The following figure is an example of printed paper

Data Memory {No. 1} Date 05 01 26 15 : 30 Conductivity : 1457.9 $\mu\text{S}/\text{cm}$ Temp : 25.0

Chapter VII. RS232C Remote Control

Data Logging (via Hyper Terminal)

When user want to receive a measured data in real-time, connect the meter with PC by **RS232C Interface cable**, then user can be transmitted the data at 1sec. intervals (minimum) via Hyper Terminal at real-time.

In ready condition, connect Meter with PC via RS232C Interface cable, and install communication program and press **Meas** Key for receiving the data.

The following messages are remote control commands for **Item /value/ temp /time**

```
EC 12.89 ms/cm 25.0 05/06/13 01:26  
EC 12.89 ms/cm 25.0 05/06/13 01:26  
EC 12.89 ms/cm 25.0 05/06/13 01:26  
EC 12.89 ms/cm 25.0 05/06/13 01:26  
EC 12.89 ms/cm 25.0 05/06/13 01:26
```

Chapter VIII Troubleshooting & Error Description

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
	Electrodes dirty	Clean with a detergent solution. Refer to 3. General Functions
	Temperature compensation incorrect	Check temperature.
	Cell constant incorrect	Replace cell

If problem still persists, please contact istek's Service Dept

- Please try to Memory Clear (Refer Setup Function Part for getting more 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. J W LEE)

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

Chapter IX Specifications

Model		EC-40N
Temperature	Range Resolution Relative Accuracy	-10 to 110°C 0.1°C ± 0.4°C
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 , DIN 8P(Temp) DIN 4P(RS232, AC/DC Adapter)
Output		DIN 4P(RS232C- Computer/Printer)
Power		Rechargeable Battery (AAA x 6ea)
Standard Accessories		Conductivity Cell (K=1.0)/ATC Probe Standard Solution(1413 µS/cm) AC/DC Power Adaptor Rechargeable Battery(AAA x 6ea)
Optional Accessories		Conductivity Cell (K=0.01, 0.1, 10), Luxury third arm stand Carrying case etc

Chapter X. 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, Manager in overseas sales department.*

A. Standard

- * Conductivity Cell (K=1.0) / ATC Probe
- * Conductivity Standard Solution (1413 μ S/cm) 125ml
- * AC/DC Power Adaptor
- * Rechargeable Battery (AAx6)
- * Instruction Manual

B. Option

- * Luxury Third-Arm Stand
- * Thermal Printer
- * Conductivity Standard Solution (1413 μ S/cm, 65.1 μ S/cm etc) 475ml
- * RS232C Interface Cable

- * Carrying Case

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