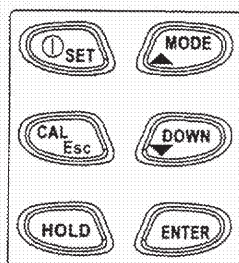


DISPLAY

The meter will display all LCD segments when it is first turned on for approx. 3sec.

- The primary display shows the measured conductivity value (CON) in uS or mS per cm
- The secondary display below the primary display shows the temperature of the reading for all models.
- HLD(Hold)/Ready/ATC are at the left side of the screen

KEY PAD OPERATION

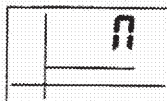
- 1. (POWER)SET key:**
Short press to turn on the meter when the meter is off. When the meter is on, press this key more than 2 seconds to enter setting (SET) mode. Press this key less than one second to turn off.
- 2. MODE key:**
In normal mode, press this key to switch Cond. & TDS

In setting & recall mode, press this key to switch to different content.
- 3. CAL/Esc key:**
In normal mode, press this key > 2 seconds to enter calibration mode. While the meter is in calibration, setting or recall mode, press this key (Esc) to return to previous mode.
- 4. DOWN key**
Press this key to change the setting content in setting mode.
- 5. HOLD key**
In normal mode, press the key < 1 sec. to hold the current reading, then short press this key again to unlock it.
- 6. ENTER key**
To confirm the setting, calibration and so on by pressing this key.
- 7. SET + MODE :**
When the meter is off, pressing these two keys simultaneously for more than one second to disable auto-sleep mode.

AUTO POWER OFF

The meter will be auto powered off in 20 minutes after last key operation. This sleep function is for battery power saving.

To disable this function, press **POWER** and **UP** keys at the same time until "n" display on LCD. Releasing the keys and meter will then enter normal mode with "non-sleep".



The previous calibration data will be replaced after re-calibrating again. For example, if you previously calibrated conductivity meter at 1413 uS in the 0 to 1999 uS range, when you re-calibrate it at 1500 uS again (also in the 0 to 1999 uS range), the previous 1413 uS will be replaced in this range (0-1999 uS). However, the meter will retain the calibration data for other ranges which are not yet re-calibrated.

If you use solution to calibrate one range and then manually input the cell constant again cell constant of range 1 to 5 will be all changed simultaneously.

NOTE:

The temperature coefficient of the meter is defaulted at 2.1% per °C (Fig. E) and provides good results for most applications.

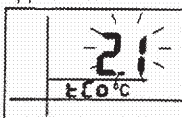


Fig. E

NOTE:

The default value of normalization temperature is 25 °C. If you need to normalize to another value, please see Program P4.2 on page 28 (Fig. F). Before resetting this value, the calibration standard value of that normalized temp. must be known. (you could refer to the datasheet enclosed with your solution)

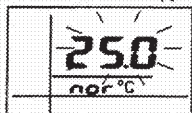
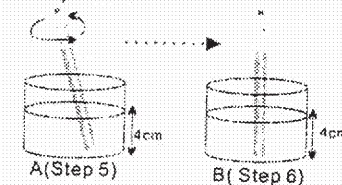


Fig. F

CONDUCTIVITY CALIBRATION

Please follow up below steps to proceed the conductivity calibration:

1. Insert the probe into demineralized water or distilled water for about 30 minutes to rinse the probe.
2. Select the conductivity standard for calibration.
3. Pour 4 cm height of the solution into two separate clean containers (A&B).
4. Power on the meter. Full LCD will display for a three times and then get into the normal measurement mode.
5. Rinse the probe into one of above containers. Gently stir the probe.
6. Dip the rinsed probe into the other container. Tap probe on the bottom of container to remove air bubbles. Let the probe stabilize to the solution temperature.



7. Press CAL key more than 2 seconds to enter calibration. The probe will automatically detect the conductivity value of solution and blinks the value on the LCD (Fig. H)

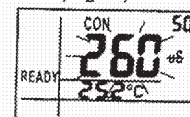


Fig. H

8. Press the UP/DOWN keys to change the value on the primary display to match the value to the standard which is referred to normalization temp. 25°C. You can adjust the conductivity reading up to ±20% from the detected value. However, if your detected value and standard value differs by more than ±20%, it means cleaning or replacing probe is needed.
For example:
Standard: 10uS; Detected value: 19uS
Adjustable range: ±3.8us (19*20%)
However, under above situation, the values already differed over 20%.

NOTE:

When the calibration is stable, the "Ready" will display on the LCD. If you don't find "Ready" display, please check the calibration solutions and make sure: is the solution stable? is the input value in step 8 correct.

NOTE:

The meter will automatically detect the solution. If the standard value is over the measuring limit or less than 10% of measuring limit, the displayed value will equal to the range limit or 10% of range limit. Under this situation, user should go to parameter setting first to manually select a suitable range.

For example 1:

Standard: 22uS; Detected value: 19uS
Adjustable range: ±3.8us (19*20%)
Although the values differ less than

20% but the 22uS is already over range limit so the maximum value could be input is 19.99uS only. To exactly adjust the value to 22uS, please manual select the range as 0-199.9

For example 2:

Standard: 1.6uS; Detected value: 2.1uS
Adjustable range: $\pm 0.42\text{uS}$ ($2.1 \times 20\%$)
Although the values differ less than 20% but the 1.6uS is already less than 10% range limit (1.99) so the max. value could be input is 1.99uS.

9. After "Ready" is displayed, press "ENTER" to confirm the calibration. The LCD will stop flashing and the meter will switch back to normal measurement mode.

10. Repeat 1-9 for other ranges if needed.

NOTE:

When switch the meter from measurement to calibration mode, due to the meter will auto detect the solution value based on the previously selected cell constant (0.1, 1.0 or 10), so, sometimes the display in primary display may seem to jump to the auto detected value after entering calibration. This means that even in the same solution, if the displayed values in measurement and calibration mode are different, this is not abnormal.

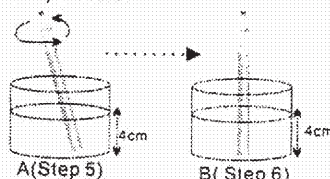
NOTE:

To exit conductivity calibration mode without confirming calibration, **DO NOT** press the ENTER key in step 9. Press **Esc** instead and this will make you retain the meter's previous calibration data for the current range which you proceed.

TDS CALIBRATION

Please follow up below steps to proceed the calibration:

1. To insert the probe into demineralized or distilled water for about 30 minutes in order to rinse the probe.
2. Select the TDS standard for calibration. The factory default setting of the TDS conversion factor is 0.50. If your solution has a different TDS factor, you can improve the calibration accuracy by setting the TDS factor before starting the calibration. To converse the TDS factors to the correct value, please see Appendix B or refer to the value provided by standard solution manufacturer.
3. Pour 4 cm height of the solution into two separate & clean containers. (A&B)
4. Turn on the meter. The full LCD will display for three times. Press the **MODE** key to select TDS mode.
5. Rinse the probe into one of the containers. Gently stir the probe.
6. Dip the rinsed probe into the other container. Tap the probe on the bottom of container to remove air bubbles. Let the probe stabilize to the solution temperature.



7. Press **CAL** key for more than 2 sec. To begin the calibration. The TDS value will blink on the LCD. (Fig. 1)
8. Press the **UP/DOWN** keys to change the value on the primary display to match the value to the standard solution. You could refer to your solution normalization temperature. The meter is defaulted at 25°C

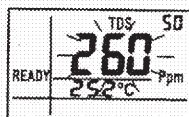


Fig. 1

9. After "Ready" display, pressing "ENTER" to confirm the calibration. The LCD will stop flashing and the meter will switch back to TDS measurement mode.
10. Repeat 1-9 for other ranges if needed

CONDUCTIVITY MEASUREMENT

Range Selection (For COND. & TDS)

The meter is default at "auto-ranging" mode. Auto-ranging mode will determine and select the range which gives you the greatest resolution and accuracy. Alternatively, you can manually select one of the five ranges in setup mode

Example: if you prefer the meter to display a reading as 0.50 mS rather than 500 uS, you could select the "0 to 19.99 mS" range by the manual ranging function

The meter will be reset to auto-ranging mode once it is powered off.

NOTE:

Accuracy is a percent of full-scale, so using your meter in the lowest range could bring your measurement the greatest accuracy.

Automatic Temperature Compensation (For COND. & TDS)

To measure with automatic temperature compensation, please follow up below steps:

1. Turn on the meter. The text "ATC" should be displayed on the left-bottom corner of the LCD. If the ATC indicator doesn't appear, it means the manual temperature compensation may be selected already in setting mode.
2. Set the temperature coefficient to the right value.

All meters are factory default to 2.1% per °C (temperature coefficient) and this will provide good results for most applications.

3. Select the normalization temperature. All meters are factory defaulted to 25°C (normalization temp.).

4. Press **Esc** to switch back to normal mode. Rinse the probe with deionized or distilled water before using to remove any impurities adhering to the electrode body. If the electrode isn't used for a long time, please soak probe for more than 30 mins.

5. Dip the probe into the sample. Make sure there are no air bubbles trapped on the slot of the probe. To remove air bubbles, stir the probe mildly and make sure the electrode tip is submerged.

6. Stir the probe gently in the sample to create a homogenous sample. Allow a few seconds for the temperature reading to approach the solution temperature.

7. Take readings. When the reading is stable, "READY" will be displayed on the left-middle LCD.

TDS MEASUREMENT

Please follow up below steps to proceed the TDS measurement.

1. Power on the meter.
2. Set the TDS conversion factor to a correct value. The factory default value of the TDS conversion factor is 0.50.
3. Select Range, automatic temperature compensation or manual temperature compensation per your application
4. Start to take readings. Press "MODE" to switch the meter to TDS mode and then get the reading from LCD. (Fig. L)

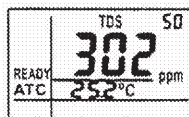


Fig. L

PARAMETER SETTING

1. When the meter is in the normal mode, press **SET** key more than two seconds to enter to setup mode.
2. Press **▲** or **▼** to switch the setting parameter one by one.
3. Press **ESC** key to return to previous status.
4. Press **ENTER** to enter each parameter setting as following:

P1.0: manual range setting (rAn)

Normally, the meter will automatically select a range when readings appear. The purpose of having manual ranging function is for you to select the specific range (and corresponding resolution) that you want to work in. This function is for COND. & TDS measurement.

There are 5 ranges for you to select. Pressing **UP** or **DOWN** keys to select the ranging function, rAn. (Fig. P). When you see P1.0, press **ENTER** to enter setting. The text of the central LCD will flash.

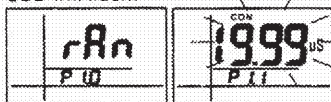


Fig. P

Pressing **UP** or **DOWN** key to select from P1.1 to P1.5 and then press **ENTER** to save.

NOTE: When press **ENTER** to select P1.1 for other ranges, LCD will flash the limit value (Fig. P). Press **ENTER** key to confirm and the meter will return to normal measure mode.

The LCD will display E03 if the measured conductivity/TDS values are beyond the limit value. You need to select the measure range again when it is over the range.

The meter will be reset to the Auto-ranging function once it is turned off. So, user need to set the manual ranging function each time when the meter is powered on again.

Type		Range		
		Cell Constant = 0.1	Cell Constant = 1.0	Cell Constant = 10
P1.1	1st Range	0~1.99 uS/cm	0~19.99 uS/cm	0~199.99 uS/cm
P1.2	2nd Range	0~19.99 uS/cm	0~199.99 uS/cm	0~1999.99 uS/cm
P1.3	3rd Range	0~199.99 uS/cm	0~1999.99 uS/cm	0~19999.99 uS/cm
P1.4	4th Range	0~1999.99 uS/cm	0~19999.99 uS/cm	0~199999.99 uS/cm
P1.5	5th Range	0~19999.99 uS/cm	0~199999.99 uS/cm	0~1999999.99 uS/cm

c) P2.0: Meter configuration: (CoF)**P2.1: TDS factor:**

The concentration of dissolved salts in solution increases the conductivity. This effect varies from salt to salt and is roughly linear in a given range for a given salt. The TDS conversion factor is a value used by the meter to convert from conductivity to TDS.

After selecting P2.0, press **ENTER** to select P2.1. Press again to enter P2.1. TDS factor flashes on the LCD (Fig. Q). You can press **UP/DOWN** to change the value from 0.40 to 1.00. The default value is 0.50. Press **ENTER** to confirm the TDS factor and select P2.2 automatically.



Fig. Q

P2.2: READY indicator: (rdy)

P2.2 lets you select **READY** indicator "on" to remind you the measurement is stable. You might also select **READY** indicator "off" for faster response. Press **UP/DOWN** to switch ready function to "on" or "off". (Fig. R). Press **ENTER** to confirm the last state and select P2.3 automatically.



Fig. R

P2.3: Auto endpoint function: (AEP)

P2.3 lets you switch on or off the "Auto endpoint function". Select auto endpoint to "on" could **HOLD** your measurement when it is stable for more than 5 seconds. The display value will freeze and **HLD** indicator will appear on the LCD. Press the **HLD** key again to release the display.

Select the auto endpoint to "off" could deactivate this feature. Press **UP/DOWN** to switch auto endpoint function on or off (Fig. S). Press **ENTER** to confirm the last state and select P2.4 automatically.

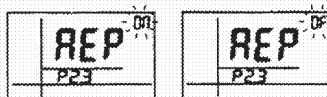


Fig. S

P2.4: ATC or non-ATC: (Atc)

P2.4 allows you to select Automatic or Manual Temperature Compensation. The default is ATC.

Press **UP/DOWN** to switch automatic temperature compensation on or off (Fig. T). Press **ENTER** to confirm the last state and return to P2.0.

NOTE: To be summarized, the meter default is "Ready Indicator on", "auto endpoint function off" & "ATC on"

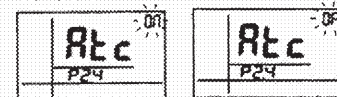


Fig. T

d) P3.0: Unit: (Unt)**P3.1 selecting °C or °F: (t)**

Select P3.0 and press **ENTER** to enter P3.1.

Press **UP** or **DOWN** key to switch °C or °F. Press **ENTER** again to confirm the last unit and then enter P3.2 automatically. (Fig. U)



Fig. U

P3.2 selecting ppm or mg/L: (tdS)

After entering P3.2 from P3.1, the TDS unit (mg/l or ppm) will flash on the LCD. The default unit is ppm.

Press **UP** or **DOWN** key to switch ppm or mg/l. Press **ENTER** again to confirm the last unit and return to P3.0. (Fig. V)

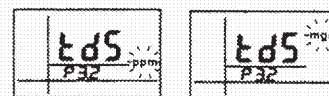


Fig. V

e) P4.0: temperature parameters: (t)**P4.1: Temperature coefficient: (tCo)**

The temp. coefficient (expressed as percent per °C) is the changed ratio of conductivity per degree of temp.. By using a suitable temp. coefficient for solution could let you accurately compensate temp. for most solution. The adjustable range is 0.0 per °C to 10.0 % per °C. The default is 2.1 % per °C. 0.0% has no effect on temperature so the displayed value is the same as actual temperature.

Select P4.0 and press **ENTER** to select P4.1. Press **ENTER** again and Temperature Coefficient will flash on the LCD. Press **UP/DOWN** to change the value from 0.0 to 10.0, the unit is %/°C (Fig. W). Press **ENTER** to confirm the last value and select P4.2 automatically.



Fig. W

P4.2: Normalization temperature:(nor)

The meter will normalize its cond. measurement to a standard temp. which you preset.

User can adjust the normalization temp. from 15 to 30 °C (59 to 86 °F). Meter is defaulted at 25 °C (77 °F). After pressing **ENTER**, the normalization temperature will flash on the LCD. Press **UP/DOWN** to change the value from 15.0 to 30.0 °C (59.0~86.0 °F). (Fig. X)

Press **ENTER** to confirm the last value and select P4.3 automatically.

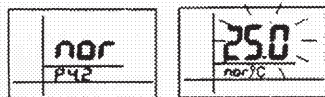


Fig X

P4.3: Manual temp. Compensation:(Int)

When you disable the ATC and select manual temperature compensation, you need to manually enter the temp. value of solution into the meter. You can select any temperature between 0 and 50 °C (32 to 122 °F). The default is 25 °C (77 °F).

Press **ENTER** to enter P4.3 from P4.2, the default manual input temperature will flash on the LCD.

Press **UP** to select the flashing value from 0~9. (Fig. Y)

Press **DOWN** to select the edit digit. Adjustable range is from 0.0~50.0 °C (32.0~122.0 °F). The default is 25.0 °C (77.0 °F).

Press **ENTER** to confirm the last input and return to P4.0.

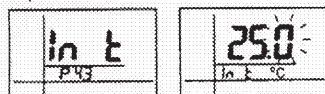


Fig Y

f) P5.0: CELL setting: (CEL)**P5.1: Cell Constant:(SEL)**

The cell constant, K, could be 1.0, 10, or 0.1.

To use Cell Constant = 1.0 for midrange measurements.

To use Cell Constant = 10 for high range measurements (above 20 mS or 10 ppt)

To use Cell Constant = 0.1 for low range measurements (below 20 μS or 10 ppm)

Using correct cell constant is important to obtain the optimal reading in various ranges of measurement. Refer to below table for suggested K values.

Measurement	K=0.1	K=1.0	K=10
0.00~19.99 μS/0~9.99 ppm	*	*	
0.0~199.9 μS/0~99.9 ppm		*	
0~1999 μS/0~999 ppm		*	*
0.00~19.99 mS/0~9.99 ppt		*	*
0.0~199.9 mS/0.0~99.9 ppt		*	*

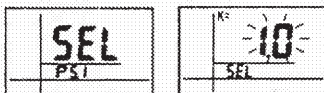


Fig Z

Select P5.0 and press **ENTER** to enter P5.1. Press **ENTER** again and cell constant value will flash on the LCD. Press **UP/DOWN** to switch the value from 0.1, 1.0, 10.0 one by one. The default value is 1.0. (Fig. Z) Press **ENTER** to confirm the last input and select P5.2 automatically.

NOTE:

When using a cell constant K = 0.1, the measured range will be only 1/10 of the range which measured by K=1. So, the lowest range will be 0~1.99 μS (0~0.99 ppm). Due to only 5 ranges are available, the highest range will only be 0~19.99 mS (0~9.99 ppt)

When using a cell constant K = 10, the measured range will be 10 times of the range which measured by K=1. So, the highest range will be: 0 to 1999 mS (0.0 to 999 ppt). Due to only 5 ranges are available, the lowest range will be 0 to 199.9 μS (10.0 to 99.9 ppm)

P5.2: Input the cell constant:(InPt)

If constant K=0.1/1/10 could not completely meet your need, you can input the cell constant after selecting the K=0.1, 1 or 10.

For example: if K=0.992

After saving P5.1, the P5.2 will be selected. Press **ENTER** again to enter P5.2. The cell constant (0.1 or 1 or 10) will flash on the LCD.

Press **UP** to select the flashing value from 0~9. (Fig. AA)

Press **DOWN** to change the flashing digit.

The selectable range is ±20% of cell constant which is selected in P5.1.

Press **ENTER** to confirm the last value and return to P5.0.

NOTE: After inputting cell constant, all calibration information in P8.0 will be clear. Manual input Cell Constant will change all the constant in range 1~5 at the same time.

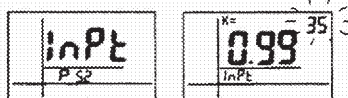


Fig. AA

h) P7.0: Reset to factory default setting(rSt)**P7.1: Meter reset (rSt)**

P7.1 lets you reset all parameters to factory default settings. This function will clear all calibration data and any other setup functions which you have done. However, it will not clear clock settings & memory.

In P7.0, press **ENTER** to enter P7.1. Press **UP/DOWN** to select "n"-NO or "y"-YES. (Fig. AC)

Press **ENTER** to confirm and then return to P7.0.

NOTE: Refer to Appendix A to review the default parameter of meter. To completely recalibrate a meter or using a replacement probe, it is best to clear all calibration data in memory.



Fig. AC

i) P8.0: View calibration data (CAL)

This function lets you recall previous calibration data and could help you know when is needed to re-calibrate the meter. This function is made for "Review" purpose only.

In P8.0, press **ENTER** to enter P8.1. User can press **UP/DOWN** key to change to P8.X. Ex: **UP** key to enter P8.2 or **DOWN** key to return P8.0. P8.1 is calibration data for range 1. P8.2 is for range 2, P8.5 is for range 5. (Fig. AD)

If there is no previous calibration data at a particular range, the primary display will show "..."

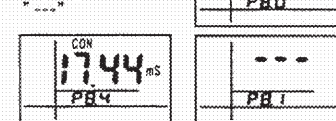


Fig. AD

J) P9.0: Electrode data:(ELE)

This mode has five options for you to check the probe cell constant value for diagnostic purposes.

If no solution calibration proceed, the cell constant value will be equal to the value in P5.2 for 5 ranges. If solution calibration is proceeded in specific range after P5.2 setting, the cell constant in specific range is adjusted according to your calibration.

In P9.0, press **ENTER** to enter P9.1. Press **UP/DOWN** key to change to P9.X (P9.1~P9.5). Ex: **UP** key to enter P9.2 or **DOWN** key to enter P9.0 (Fig. AE). P9.1 is the cell constant value for range 1. P9.2 is for range 2, P9.5 is for range 5

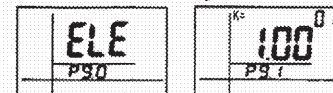


Fig. AE

RS232 OUTPUT: (9600 bps)

The meter can link with personal computer to capture on-line data, display COND./TDS readings with real-time output, you can retrieve file, save the data for operating data analysis, record statistics, versatile functions for your choice.

Connection procedures:

1. Plug the optional accessory RS232 cable onto the RS232 jack port (at the right side of the meter)
2. Insert the D-sub 9P type connector onto computer's Com.1 or 2 port or....
3. Start to set up RS232 software by inserting the CD-ROM.
4. When installing the RS232 software, please follow the procedure on operation manual which is enclosed in the software package.
5. RS232 Protocol: 9600 bps, 8 data bits, no parity.
6. Data Format:

Tx: ASCII code sent by each second while meter is on:

C: " " μS(mS); " " °C(F); 0: " " ppm(ppb) LRCRLF

The error message format is: ExxNull
xx: stands for error code.