

Instruction Manual

CON 510

Bench Conductivity/TDS Meter



ENGLISH

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Oakton Instruments
P.O Box 5136,
Vernon Hills, IL 60061,
USA
Tel: (1) 888-462-5866
Fax: (1) 847-247-2984
info@4oakton.com
www.4oakton.com
www.oaktoninstruments.com

Eutech Instruments Pte Ltd.
Blk 55, Ayer Rajah Crescent,
#04-16/24 Singapore 139949
Singapore
Tel: (65) 6778 6876
Fax: (65) 6773 0836
marketing@eutechinst.com
www.eutechinst.com

Eutech Instruments Europe bv
Wallerstraat 125k
3862 CN Nijkerk
The Netherlands
Tel: (31) 33 2463887
Fax: (31) 33 2460832
info@eutech.nl
www.eutech.nl

1 INTRODUCTION

This manual contains the operating features of this meter. At some points this manual will refer to our website www.eutechinst.com, for further explanation and background information, it will be indicated with this symbol:



On this website you can also find additional information regarding applications, measuring theories and hints & tips. At the final page of this manual you can find information about the specifications of this meter, warranty issues and how to return your product to us.

2 DISPLAY AND KEYPAD FUNCTIONS

2.1 Display

The LCD has a primary and secondary display.

- The primary display shows the measured Conductivity/TDS values.
- The secondary display shows the measured temperature.

The display also shows error messages, keypad functions and program functions. It has the following indicators:

1. **SETUP** - Setup mode
2. **MEAS** - Measurement mode
3. **CAL** - Calibration mode
4. **MEM** - Memory recall mode
5. **ms** - Mill siemens
6. **μs** - Micro siemens
7. **ppt** - Parts per thousand
8. **ppm** - Parts per million
9. **ATC** - Automatic Temperature Compensation
10. **°C °F** - Temperature
11. **ERR** - Error
12. Electrode
13. Calibration solution
14. **K =** - Cell Constant.
15. **ON** - READY/Auto HOLD set up enable.
OFF - READY set up disable
16. **HOLD** - Hold
17. **READY** - Read

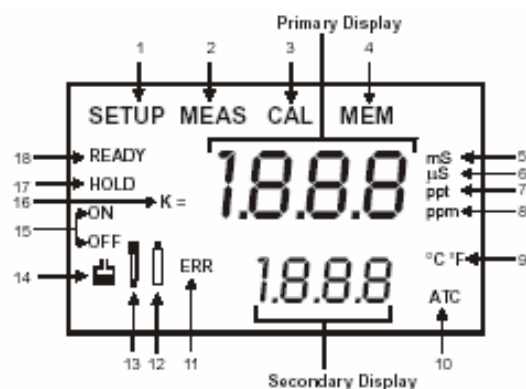


Figure 1: Active LCD display

2.2 Keypad

Some button has several functions depending on its mode of operation.

KEY	Function
ON / OFF	ON/OFF - Powers on and shuts off the meter. The meter will start in the measurement mode it was in when last switched off.
CAL / MEAS	Toggles between Calibration and Measurement mode. NOTE: Temperature calibration is available from conductivity/TDS calibration mode.
HOLD	HOLD - Activates/Deactivates freezing of the reading while in measurement mode.
MI/▲ MR/▼	In Measurement mode: Press MI/▲ to store values with its corresponding temperature values in the memory. Press MR/▼ to retrieve data from memory. In Calibration mode: Press to scroll calibration values. In SETUP mode: Press to scroll setup subgroup.
SETUP	SETUP- Activates the setting menu for customizing the meter
MODE	MODE Selects the measurement or calibration mode
ENTER / RANGE	ENTER: Press to confirm values in Calibration mode and selections in SETUP mode. RANGE: Press to enter manual ranging function.

3 PREPARATION

3.1 Conductivity Electrode Information

Your meter includes a conductivity electrode (Part No: ECCONSEN91W/ 35608-50) Ultem / Stainless Steel electrodes with an electrode constant of $K = 1.0$. This conductivity / TDS electrode features a built-in temperature sensor for Automatic Temperature Compensation (ATC). Wetted parts include:

- Polyetherimide PEI (Ultem®)
- Polybutylene Terephthalate PBT (Valox®)
- Stainless Steel (SS 304)

The removable protective plastic electrode guard is meant for simple periodic maintenance and it must be kept in tact during measurement and calibration. Always immerse the electrode beyond upper steel band.

Note: DO NOT remove the protective electrode guard during measurement and calibration as it may affect your readings.

Note: We recommend that you do not submerge the electrode above the protective yellow cap. You can submerge the cable for brief periods of time, not continuously.

Immerse
probe beyond
upper steel
band



3.2 Connecting the electrode to the meter

1. Insert the 6 pin female connector of the electrode to the 6 pins male connector on the meter.
Rotate the locking ring clockwise until it locks.
2. To remove the electrode, simply rotate the connector's locking ring counterclockwise and pull away gently for a complete removal.

CAUTION: Do not pull on the electrode cord to avoid internal wire breakages.

3.3 Connecting the AC/DC Adapter

The AC/DC adapter must be unplugged. Ensure that main voltage matches the adapter. Slide the AC/DC adapter jack into the socket marked DC of the meter. AC/DC adapter specifications: Input Voltage: 110 or 220 V • Output Voltage: 9 VDC • Current: 500 mA.

NOTE: Ensure the input voltage matches your adapter before connection.

3.4 Connecting the Electrode Holder

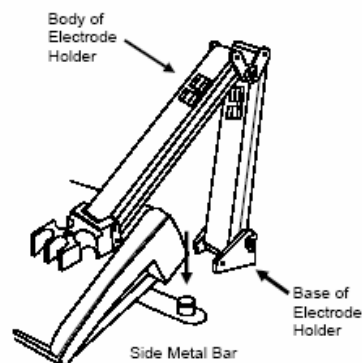
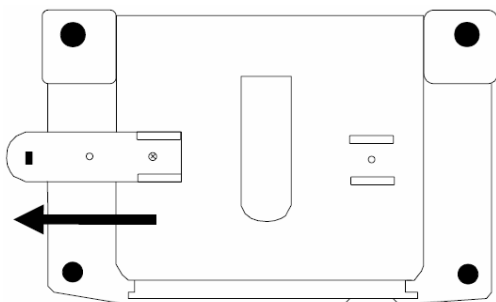
This meter's base plate has a side metal bar for a swivel electrode holder. The holder can be mounted on either right or left side of the meter.

To position the electrode arm:

Use a screwdriver to remove the screw holding the side bar. Line up the side bar with the second screw slot. Use the earlier removed screw to secure the side bar.

To install the electrode arm to the meter:

Align the slot of the arm with the metal rod at the metal side bar. Push it down until it fully sits into position.



4 CALIBRATION

4.1 Important Information on Meter Calibration

Your meter has five measuring ranges. You have an option of calibrating your meter in a single point calibration for all the five ranges or for better accuracy; you can calibrate one point in each of the measuring ranges (up to five points). When you perform a single point recalibration, the old calibration will be replaced by the new one even if the new calibration is done in a different range from the old calibration. For example, if you have previously calibrated at 1413 μS in 0 to 2000 μS range, and you recalibrate at 12.88 mS in 0 to 20.00 mS range, the new calibration will override the previous calibration in 0 to 2000 μS range.

In the case of multi point calibration, when you perform a multi point recalibration, old calibrations are replaced only on a range basis. For example, if you previously calibrated at 1413 μS in 0 to 2000 μS range and you recalibrate at 1500 μS (also in 0 to 2000 μS range), the meter will replace only the old calibration data (1413 μS) in that range. The meter will retain all calibration data in other ranges. To completely recalibrate your meter, or when you use a replacement electrode, it is best to clear all calibration data.

4.2 Preparing the Meter for Calibration

Before starting calibration, make sure you are in the correct measurement mode. For best results, select a standard value close to the sample value you are measuring.

4.3 Temperature Calibration

Your electrode features a built-in temperature sensor which is factory calibrated. Calibrate your sensor only if you suspect temperature errors may have occurred over a long period of time or if you have a replacement electrode.

1. Connect the electrode.
2. Switch the meter on. ATC will appear at the bottom right-hand corner of the LCD.
3. Press MODE to select conductivity or TDS mode.
4. Press CAL/MEAS. The CAL indicator appears.
5. Press MODE to enter temperature calibration mode.
6. Dip the electrode into a solution of known temperature (i.e. a temperature bath). Allow time for the built-in temperature sensor to stabilize.
7. Scroll with MI/ $\blacktriangle$ or MR/ $\blacktriangledown$ to set the correct temperature value (i.e. the temperature of the temperature bath). Maximum offset value is 5.0 $^{\circ}\text{C}$.
8. Press ENTER to confirm. The meter will be calibrated and return to measure mode.

Note: To exit without confirming the temperature calibration value, press CAL/MEAS.



Note: If the ATC does not light up, see SETUP menu Program P3.3 to switch it on.

Note: Since temperature affects the accuracy of conductivity / TDS, it is recommended to carry out a conductivity / TDS calibration after a temperature calibration is done.

4.4 Automatic or Manual, Single or Multi point Calibration (P5.0)

You can either choose automatic conductivity calibration or manual conductivity / TDS calibration. In the automatic calibration mode, the meter automatically detects and verifies the appropriate *known calibration standards solutions* before accepting these particular calibration standards as one of its calibration values in a specific measurement range.

The *known calibration standards* used for automatic calibration are:

At 25.0 $^{\circ}\text{C}$: 84 μS , 1413 μS , 12.88mS , 111.8mS

At 20.0 $^{\circ}\text{C}$: 76 μS , 1278 μS , 11.67mS , 102.1mS

In the manual calibration, non-standard calibration values can be used. You can manually input the appropriate values as your desired calibration standards in each specific range.

4.4.1 Selection of Automatic or Manual Calibration (P5.0)

Automatic calibration is applicable in conductivity measurement mode only, manual calibration is applicable in both conductivity and TDS mode. Only from the **conductivity** measurement mode;

1. Press SETUP.
2. Press MI/ $\blacktriangle$ or MR/ $\blacktriangledown$ until you view parameter P5.0 (ACAL).
3. Press ENTER
4. Press MI/ $\blacktriangle$ or MR/ $\blacktriangledown$ to select. "YES" activates automatic calibration, "NO" activates manual calibration.
5. Press ENTER to confirm.
6. Press CAL/MEAS key twice to return to measurement mode.

4.4.2 Selection of Single or Multi Point Calibration (P5.1)

Single point calibration lets you have a single calibration factor for all five ranges by calibrating one point in either one of the ranges, this factor is applied to all the five ranges.

Multi point calibration gives better calibration accuracy by letting you calibrate in each of the five ranges, this calibration factor would only be applicable in the particular range where the calibration is done.

1. Repeat steps 1 to 5 from P 4.4.1. (display shows SPC)
2. Press MI/▲ or MR/▼ to select. "YES" activates single point calibration, "NO" activates multi point calibration.
3. Press ENTER to confirm.
4. Press CAL/MEAS to return to measurement mode.
- 5.

4.5 Automatic Calibration (For Conductivity Calibration Only)

This procedure describes the method for calibration to a 1413 μ S calibration standard.

Note: select automatic or manual calibration as described in p 4.4.1

Note: select single -or multi point calibration as described in p 4.4.2

Note: To exit without confirmation, press CAL/MEAS to go back to measurement mode.

1. If necessary, the MODE to select conductivity mode.
2. Rinse the electrode with de-ionized water or a rinse solution, then rinse with a small amount of calibration standard.
3. Dip the electrode into the calibration standard. Immerse the electrode tip beyond the upper steel band. Stir the electrode gently to create a homogeneous sample. Allow time for the reading to stabilize.
4. Press CAL/MEAS to enter calibration mode. The CAL indicator will appear in the upper corner of the display. The primary display shows the current measured value, the secondary display shows the calibration standard value.
5. Wait for READY to appear
6. Press ENTER to confirm. The meter will now return to the measurement mode.

Multi point calibration: repeat step 1 to 6 for every calibration point in each measuring range using the known calibration solutions until all points have been calibrated.

4.6 Manual Calibration (For Conductivity & TDS Calibration)

This procedure describes calibration to a 12.00 mS calibration standard.

Note: select automatic or manual calibration as described in p 4.4.1

Note: select single -or multi point calibration as described in p 4.4.2

Note: To exit without confirmation, press CAL/MEAS to go back to measurement mode.

Note: Ensure you set the correct TDS factor before TDS calibration..

1. Repeat step 1 to 4 from p 4.5
2. Wait for the value to stabilize and press MI/▲ or MR/▼, adjust the value in the upper display to the calibration standard used.
3. Press ENTER to confirm and return to measurement mode.

Multi point calibration: repeat step 1 to 3 for every calibration point in each measuring range using the calibration solutions until all points have been calibrated.

4.7 TDS Calibration

4.7.1 Calibrating TDS with conductivity standards & adjusting TDS factor

Instead of calibrating for TDS directly using TDS calibration standard solutions, you can calibrate by using the conductivity calibration method and enter the appropriate TDS conversion factor into the meter. For more information regarding TDS Conversion Factor determination, please refer to our website: www.eutechinst.com

4.7.2 Setting the TDS Conversion Factor (P3.4)

The factory default setting for TDS conversion factor is 0.5. If your solution has a different TDS factor, you can improve accuracy by setting the TDS factor prior to calibration.

1. Press MODE to select TDS mode.
2. Press Setup.
3. Press MI/▲ or MR/▼ until you view P3.0 (COF)
4. Press ENTER repeatedly until you view P 3.4 (tdS).
5. Press MI/▲ or MR/▼ to select your calculated TDS conversion factor.
6. Press ENTER to confirm and return to measurement mode.
7. Press the CAL/MEAS key to return to measurement mode.

4.7.3 Calibrating for TDS using TDS standards

After setting the correct TDS Factor, you can calibrate in the TDS mode.

1. Press MODE to select the TDS mode.
 2. Follow the instructions in p 3.6 for the rest of the calibration process, this time using the TDS calibration standards.
- Note:** You can offset the TDS reading up to $\pm 40\%$ from the default setting. If your measured value differs by more than $\pm 40\%$, clean or replace electrode as needed.

5 MEASUREMENT

5.1 Temperature Compensation

This meter can take measurements with automatic (ATC) or manual (MTC) temperature compensation. Factory default is ATC on. For ATC, attach the conductivity/TDS electrode to the meter. The ATC indicator will light on the LCD.

If the conductivity/TDS electrode is not properly attached to the meter or it has been damaged, the ATC indicator will blink and the temperature display will show "Ur". If the ATC indicator does not light and the temperature display shows a reading, the meter might be in MTC mode.

5.1.1 Selecting Temperature Compensation mode (P3.3)

1. Press SETUP
2. Press MI/▲ or MR/▼ until you view P3.0 (COF)
3. Press ENTER repeatedly until you view P 3.3 (ATC).
4. Press ENTER. The upper display shows "ATC" and the lower shows "YES" or "NO".
5. Press MI/▲ or MR/▼ to select: "YES", ATC is on **or** "NO", ATC is off.
6. Press ENTER to confirm selection.
7. Press CAL/MEAS to return to measurement mode.
- 8.

5.1.2 Setting manual temperature compensation value

MTC enables you to enter the temperature value of your sample into the meter. Select any temperature between 0 and 100°C (32 to 212 °F). This is the value at which the readings will be temperature compensated. Default value is 25.0 °C.

1. Set temperature mode to MTC (p 4.1.1) and go through step 1 to 7.
2. Press CAL/MEAS. The CAL indicator will appear above the primary display.
3. Press MODE.
4. Press MI/▲ or MR/▼ to offset the temperature to your preferred settings.
5. Press ENTER to confirm

Note: To exit this program without confirming the MTC value, press CAL/MEAS.

5.2 Taking Measurements

1. Rinse the electrode with de-ionized or distilled water before use. Shake or air dry. To avoid contamination or dilution of your sample, rinse electrode with a small volume of your sample liquid.
2. Press ON to switch on meter.
3. Dip the electrode into the sample. When dipping the electrode into the sample, ensure that the liquid level is above its upper steel band. Stir the electrode gently in the sample to create a homogenous sample.
4. Allow time for the reading to stabilize.
5. Press MODE to toggle between conductivity and TDS readings (if necessary).

5.3 HOLD Function

Lets you freeze the display and hold the measured value.

1. Press HOLD/ENTER to hold a measurement. "HOLD" will appear on the display.
2. Press HOLD/ENTER again to release the held value.

Note: If the meter is shut off the HOLD value will be lost. For longer storage, use the memory functions.

5.4 Selection of READY and Auto HOLD function (P3.1)

The "READY" display indicates the measurement stability during a measuring process.

The Auto HOLD function lets the meter to "hold" your measurement when it is stable for more than 5 seconds. Press MI/▲ to store reading into the memory. Press the HOLD key to release the display and access other functions. From measurement mode:

1. Press SETUP.
2. Press MI/▲ or MR/▼ until you view P3.0 (COF)
3. Press ENTER to select P3.1, upper display shows "rdY".
4. Press MI/▲ or MR/▼ to select the configuration you require (left display).
 - a. "ON" activates the READY function.
 - b. "OFF" deactivates the READY function.
 - c. "ON" and "HOLD" activates the Auto HOLD function.
5. ENTER to confirm selection.
6. Press CAL/MEAS twice to return to measurement mode.

5.5 Ranging settings and options

Your meter automatically selects the range in which your readings appear. The manual ranging function lets you select the specific range you want to work in:

Meter range symbol	Conductivity range	TDS range
r1	0 – 20.00 µS/cm	0 – 10.00 ppm
R2	0 – 200.0 µS/cm	0 – 100.0 ppm
r3	0 – 2000 µS/cm	0 – 1000 ppm

r4	0 – 20.00 mS/cm	0 – 10.00 ppt
r5	0 – 200.0 mS/cm	0 – 100 ppt

5.5.1 Selecting manual or auto ranging

1. Press RANGE while in measurement mode. Display will show either “r1” to “r5”, indicating the range you are in. The range selected will appear and “MEAS” blinks.
2. Press RANGE, until desired range is selected.
3. To re-select the auto-ranging, repeatedly press RANGE until “MEAS” stops blinking.

Note: If the measured value is higher than the range selected, “Or” will appear. Press RANGE until the correct range is selected.

Note: The meter resets to the Auto-ranging once it is turned off. Manual ranging needs to be reset each time you turn the meter on.

6 MEMORY FUNCTION

The meter stores up to 50 sets of data. Sets include conductivity, TDS and temperature.

6.1 Memory Input

1. Press MI/▲ during measurement to input data into the memory. MEM, “StO” and memory number will appear for a moment.
2. If necessary, measure the next sample solution and press MI/▲ key to input the next data into the memory.

Note: If the memory is full the first value stored will be overwritten.

6.2 Memory Recall

1. Press MR/▼ once to retrieve the last reading stored.
2. Press ENTER to recall the reading
3. Press ENTER to return to the next memory location screen.
4. Press MI/▲ or MR/▼ to scroll to a specific memory location, press ENTER to select.
5. Press CAL/MEAS to exit Memory Recall.

Note: Readings stored in memory are retained even if the unit is turned off.

7 OTHER FUNCTIONS

7.1 Selection of °C or °F (P3.2)

1. Press SETUP.
2. Press MI/▲ or MR/▼ until you view P3.0 (COF)
3. Press ENTER until you view parameter P3.2 (C).
4. Press MI/▲ or MR/▼ to select between °C and °F.
5. Press ENTER to confirm selection.
6. Press CAL/MEAS to return.

7.2 Viewing calibration data (P1.0)

1. Press SETUP.
2. Press MI/▲ or MR/▼ until you view parameter P1.0 (CAL).
3. Press ENTER repeatedly to view the previous calibration data on each of the five measuring ranges.
4. When you have scrolled through all calibration data, you will automatically return to the subgroup menu.
5. Press CAL/MEAS key to return to the measurement mode.

Note: If there is no calibration data at a particular point, the primary display will show “----”.

7.3 Viewing Electrode Data (P2.0)

1. Press SETUP.
2. Press MI/▲ or MR/▼ until you view parameter P2.0 (ELE).
3. Press ENTER repeatedly to view the effective cell constant for each range.
4. When you have scrolled through all the electrode data, you will automatically return to the subgroup menu.
5. Press CAL/MEAS to return to measurement mode.

7.4 Reset to factory defaults (P7.0)

Resets all settings to the factory default.

1. Press SETUP.
2. Press MI/▲ or MR/▼ until you view parameter P7.0 (rSt).
3. Press ENTER.
4. Press MI/▲ or MR/▼ to select: NO retains current settings **or** YES clears all calibrations and its data.
5. Press ENTER to confirm and return to subgroup menu.
6. Press CAL/MEAS to return to measurement mode.

7.5 Setting the temperature coefficient (P4.1)

The temperature coefficient is the amount of change in conductivity per degree of temperature; it is expressed in percent per °C. Entering the exact temperature coefficient of your solution lets you accurately compensate temperature for almost any solution. You can adjust 0.0 to 10.0 % per °C. Meter default is 2.1% per °C. By setting the temperature coefficient to 0.0%, the meter will not apply any compensation but will display actual temperature.

1. Press SETUP
2. Press MI/▲ or MR/▼ until you view parameter P4.0 (tPr).
3. Press ENTER to select P4.1 (display shows "t.CO").
4. Press ENTER.
5. Press MI/▲ or MR/▼ to select the temperature coefficient of your solution.
6. Press ENTER to confirm and return to subgroup menu.
7. Press CAL/MEAS twice to return to the measurement mode.
- 8.

7.6 Setting the normalisation temperature (P4.2)

Your meter will normalize its conductivity measurements to a standard temperature that you can select. You can adjust the normalization temperature from 15°C to 30°C (59 to 86 °F). Meter default is 25.0°C (77 °F).

1. Press SETUP.
2. Press MI/▲ or MR/▼ until you view parameter P4.0.
3. Press ENTER three times to select P4.2 (display shows "t.nr").
4. Press ENTER.
5. Press MI/▲ or MR/▼ to set the normalization temperature.
6. Press ENTER to confirm and return to subgroup menu.
7. Press CAL/MEAS to return to measurement mode.
- 8.

7.7 Selection of cell constant (P6.0)

The meter lets you select a cell constant of K = 1.0, 10, or 0.1. The cell included with your meter has a cell constant of K=1.0.

1. Press SETUP.
2. Press MI/▲ or MR/▼ until you view parameter P6.0.
3. Press ENTER.
4. Press MI/▲ or MR/▼ to select the cell constant between K = 1.0, 0.1, or 10.
5. Press ENTER to confirm selection and return to the subgroup menu.
6. Press CAL/MEAS to return to measurement mode.

8 ERROR MESSAGES

Error message	Indicates	Possible cause	Corrective action
ERR.	Wrong keypad input	Wrong input in selected mode	Release key. Select valid operations depending on mode
CAL & Err annunciators on / Buffer and electrode indicators blink	Calibration error	Wrong value input at calibration. Dirty probe	Check your input value, clean probe. See Calibration sections

9 TROUBLESHOOTING

Problem	Possible cause	Solution
No display	a) AC outlet not switched on. b) AC adapter socket not inserted properly	a) Switch on power supply. b) Re-insert AC adapter socket.
Unstable readings	a) Air bubbles in electrode. b) Dirty electrode c) Electrode not deep enough in sample d) External noise pickup or induction caused by nearby electric motor e) Electrode guard not attached	a) Tap electrode to remove bubbles, move electrode away from bubbles present in sample b) Clean electrode, recalibrate c) Make sure sample entirely covers the electrode sensors d) Move or switch off interfering motor. e) Attach electrode guard
"Or" on upper display	a) Probe is shorted. b) Probe is in too-high solution for measurement range.	a) Test probe. b) Use different solution or select different range.
Not calibratable	a) Dirty/Oily probe b) Incorrect probe cell constant	A. Clean B. Replace and use correct probe.
Slow response	a) Dirty / Oily electrode	a) Clean electrode