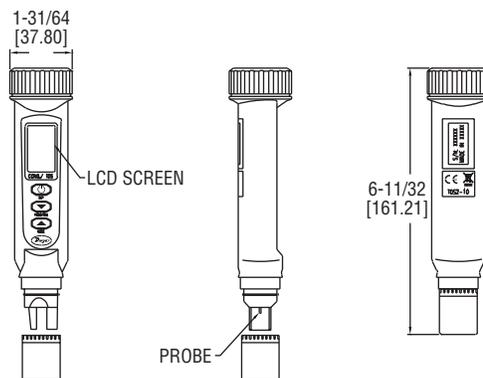




Waterproof Cond./TDS Testing Pen

Specifications - Installation and Operating Instructions



The Model TDS2-10 Cond./TDS Testing Pen monitors both conductivity and total dissolved solids in streams, rivers, or any other body of water. It picks up impurities and dissolved solids while checking the conductivity at the same time. This pocket sized tester is constructed of a durable ABS plastic waterproof housing and 316 SS electrodes to protect against corrosion. A large LCD display is easy to read and shows both the conductivity/total dissolved solids and temperature measurements simultaneously. Since change in temperature can affect accuracy, the TDS2-10 has automatic temperature compensation. Batteries (four LR44 alkaline) included in packaging.

OPERATING INSTRUCTIONS

Introduction

Please read the manual completely before using this meter. Filing and keeping the manual for future reference is recommended. It is also recommended to soak the electrode for at least 30 minutes before using the meter to clear anything affecting the probe.

Power Supply

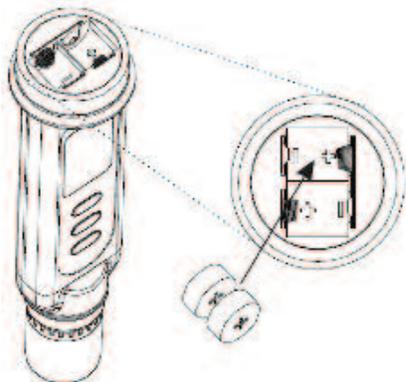
The meter is powered by 4 LR44 button cell batteries. Check the batteries if it is your first time use, if the battery symbol appears on the LCD, or if the meter cannot power on.

To install the batteries:

1. Turn off the meter.
2. Loosen the battery cover in the counterclockwise direction (DON'T discard the black washer!).
3. Replace the old batteries with four new button cell LR44 batteries.
4. Make sure the batteries are in place and the polarity is correct.
5. Put the battery cover back and turn it tightly in the clockwise direction.

NOTICE

Remove the batteries from instruments that you do not plan to use for a month or more. Do not leave batteries in the instrument.



SPECIFICATIONS

Wetted Materials: ABS plastic and 316 SS.

Range:

Conductivity: 0 to 1999 uS or 0 to 19.99 mS;
TDS: 0 to 1999 ppm or 0 to 19.99 ppt.

Accuracy: ±1% FS.

Display: 30 mm H x 18 mm W LCD dual display.

Resolution:

Conductivity: 1uS or .01 mS;
TDS: 1 ppm or .01 ppt.

Temperature Limits: 32 to 122°F (0 to 50°C).

Power Requirements: (4) 1.5 V LR44 alkaline batteries, installed functional, user replaceable.

Enclosure Material: ABS.

Enclosure Rating: IP65.

Weight: 4.3 oz (115 g).

Agency Approval: CE.



LCD Display

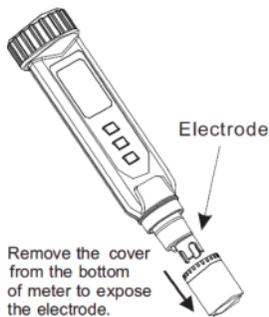
- The top shows the measured reading.
- The bottom shows the reading of the temperature.
- Cal = Calibration mode.
- Hold = Data hold.
- Microseconds (uS) or milliseconds (mS) is the unit of Conductivity.
- Parts per thousand (ppt) or parts per million (ppm) is the unit of TDS.
- C or F is the unit of the liquid temperature.
- is the battery low icon.

Keypad



Operation

1. Remove the probe cover from the meter to expose the electrode.
2. Press to power on the meter. The LCD will display parameters (ex: tnr, tCo, tds, rAn) in turns and then it will enter normal display.



3. The meter is default in auto-ranging status once powered on. Auto-ranging determines and selects a range which gives you the greatest resolution and accuracy. Alternatively, you can manually select the ranges. For example, if you prefer the meter to display a reading such as .50 mS instead of 500 uS, you press for more than 2 seconds.

- NOTICE** - Accuracy is a percent of the full-scale, so using your meter in the lowest range will result in the greatest accuracy.
- The LCD will display E02/E03 if the measured value is below or over the limit value, please re-select the range.

4. Set the temperature coefficient to the correct value. The meter is factory set to 2.1%/°C. This will normally provide good results. See the setup section to set the temperature coefficient if needed.
5. Select the normalization temperature. The meter is factory set to 77°F (25°C). If you need to normalize the meter to 68°F (20°C), see the set up section for details.
6. Rinse the probe with de-ionized or distilled water before use. This will remove any impurities adhering to the electrode. If the meter is not used for a long time, please soak the probe for more than 30 minutes to clear up the lazy effect of the probe.

7. Dip the probe into the sample. Make sure there are no air bubbles trapped in the slot of the probe. To remove air bubbles, give the probe a gentle stir. Make sure the electrode tip is submerged when you stir it.
8. Stir the probe gently in the sample to create a homogeneous sample. Allow a few seconds for it to reach temperature equilibrium (wait about 15 minutes to get a stable reading).
9. The unit of measurement will flash on the LCD to indicate that the meter is in measurement mode. When the reading is stable, the unit will stop flashing.



10. Press to freeze current readings. The text "Hold" will appear on the LCD. Press again to release.
11. Turn off the meter by pressing .
12. Make sure your electrode is clean and store it carefully. Before storage, rinse it carefully in de-ionized water and store dry with the cap. Remember the storage temperature limits. For more information, see the maintenance section.
13. Air bubbles can easily adhere around the gap between the electrode and the meter; this will affect the accuracy. See the troubleshooting section for more details on how to remove air bubbles.

Auto Power off (Sleep Function)

This meter will shut off automatically after 20 minutes of inactivity. For a longer operating time, you can disable sleep mode.

To disable the auto power off:

Before power on, press + simultaneously until an "n" appears on the screen. Then, release the keys to return to normal mode.



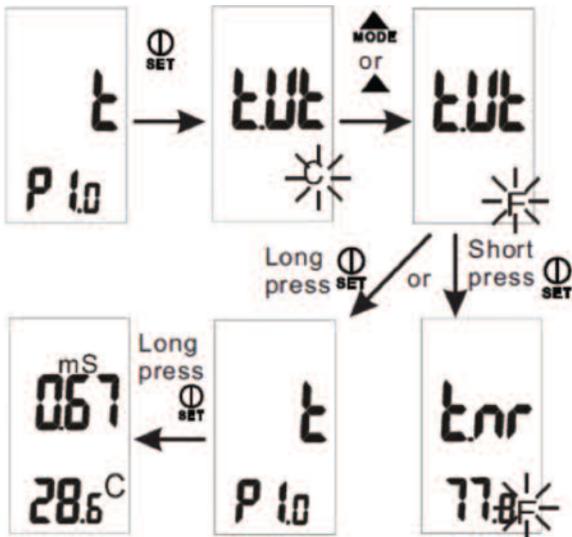
NOTICE The disable sleep mode will be invalid after every power off.

Setup

The advanced setup mode lets you customize your meter's preferences and defaults. To change the parameters, you can press for more than 2 seconds. You will enter setup mode when the meter is in measurement mode.

P1.0 Temperature Parameter Setting (t)

- When the meter is in measurement mode, press SET for more than 2 seconds to enter setup mode.
- Press MODE , ▲ , or ▼ to select P1.0.
- Press SET momentarily again to enter unit setting.
- Press ▲ or ▼ to select C or F.
- Press SET momentarily to confirm the unit, or press it for more than 2 seconds to return to P1.0 without saving.
- While in P1.0, press SET for more than 2 seconds to return to measurement mode.



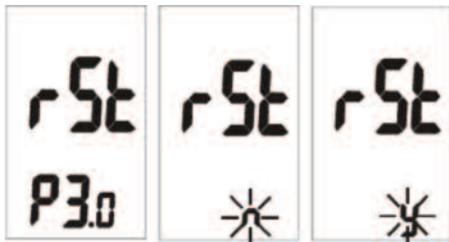
NOTICE The text P1.1, P1.2, P1.3, P2.1, P3.1 will not display on the LCD.

P3.0 Reset Meter (rSt)

When you decide to reset the meter, all parameters will be reset to factory default values, including the calibration information.

P3.1 Reset

- In P3.0, press SET momentarily to enter P3.1.
- Press ▲ or ▼ to select Y or N.
- Press SET momentarily to confirm the state and return to P3.0, or press it for more than 2 seconds to return to P3.0 without confirming the P3.1 value.



P4.0 Review Calibration Information (CAL)

In P3.0, press ▲ or ▼ to select P4.0.

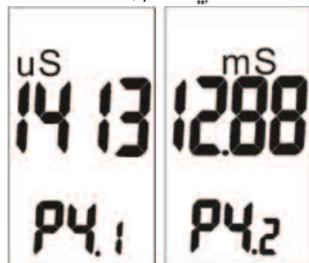
P4.1 Range 1 Calibration Information

In P4.0, press SET momentarily to enter P4.1 and you will see the last calibration concentration. If the meter is not yet calibrated, "----" will display on the LCD.

P4.2 Range 2 Calibration Information

In P4.1, press ▲ or ▼ to enter P4.2 and you will see the last calibration concentration. If range 2 is not yet calibrated, "----" will display on the LCD.

In P4.1 or P4.2, press SET momentarily to confirm the state and return to P4.0.



NOTICE

P4.1 & P4.2 are only for you to "review" the calibration information, not for calibration.

In P1.0, P2.0, P3.0, P4.0, you can press SET for more than 2 seconds to return to normal measurement mode.

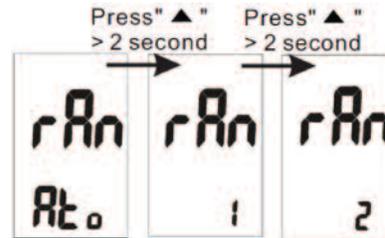
Select Measure Range (rAn)

Two measurement ranges are available for each parameter. For conductivity, users can select either 0 to 1999 μS or 0 to 19.99 mS. For TDS, users can select either 0 to 1999 ppm or 0 to 19.99 ppt.

ppt = parts per thousand

To manually select the measurement range:

- Turn off the meter and stay in normal measurement mode.
- Press ▲ or ▼ for more than 2 seconds to select the range.



(Default)

Calibration Mode (CAL)

Preparing for Calibration

Two issues need to be considered and prepared for before operation. **First, what is the right calibration standard? Second, when should you calibrate?**

What is the right calibration standard?

For best results, select a conductivity or TDS standard near the sample value that you are measuring. Alternatively, conductivity or TDS use a calibration solution value which is approximately 2/3 of the full-scale range you plan to use.

DO NOT reuse the calibration solution. Contaminants in the solution will affect the calibration and the accuracy. Be sure to use fresh solution each time.

When should you do a calibration?

Calibration is necessary and should be done regularly.

If you are measuring the mid-ranges, calibrate the meter at least once a month. Soak the probe for 15 minutes before calibration or measurement. This can saturate the probe surface and minimize drift. If measured at the extreme temperatures or in a concentration of conductivity 100 mS or TDS 2 mS or <100 ppm or >2 ppm. Calibrate the meter at least once a week to get specified accuracy.

Conductivity and TDS Calibration

Please follow the below steps for the conductivity or TDS meter calibration:

- Insert the probe into de-mineralized or distilled water for about 30 minutes to rinse the probe.
- Select the conductivity or TDS standard which is close to your measurement range. 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 convert the TDS factors to the correct value, please refer to the value provided by standard solution manufacturer.
- Pour 3 cm height of the standard into two separate and clean containers.
- Turn on the meter. Press the mode button to switch between TDS and conductivity.
- Rinse the probe in one of the containers. Gently stir the probe. Rinsing could remove contaminants that affect the calibration and could prevent error.
- Dip the rinsed probe into the other container. Tap the probe at the bottom of the container to remove air bubbles. Let the probe stabilize to the solution temperature.
- Press ▼ for more than 2 seconds to begin the calibration. The conductivity and TDS value will blink on the LCD.
- Press the ▲ or ▼ to adjust the value to match the value to the calibration standard. You can adjust the conductivity or TDS reading up to $\pm 30\%$ from the detected value. If the detected value and standard values differ by more than $\pm 30\%$, it means that the electrode needs to be cleaned. The meter is defaulted at 25°C.
- When the "CAL" stops blinking, you can press SET to confirm the value. The meter will switch back to conductivity and TDS measurement mode. If "CAL" always blinks, check the solution and make sure it is stable. Make the input in step 8 equal to the solution value.
- Repeat steps 1 through 9 for other ranges if needed.

Option 2: Using Conversion Factors

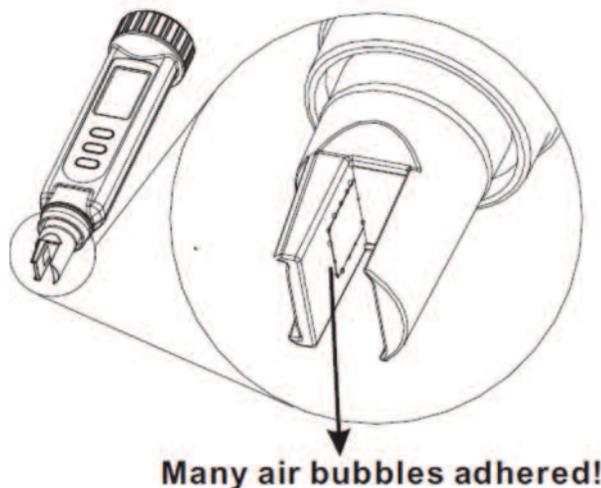
TDS values are related to conductivity. You can calibrate the meter by using conductivity standards as described above and then program the meter with a given conversion factor. Please refer to below steps.

1. Perform the conductivity calibration procedure.
2. Select the correct conductivity-to-TDS conversion factor for other solutions using the formula: $\text{Factor} = \text{Actual TDS} = \text{Actual Conductivity} @ 25^{\circ}\text{C}$.
3. When the meter is in measurement mode, press "set button" for more than 2 seconds. Press "up" to get to P2.0. In P2.0 press "set button picture" momentarily to enter P2.1. The factor will flash on the LCD. Press "up" or "down" to change factor from 0.40 to 1.00. Press "set button picture" momentarily to confirm the value and the meter will return to P2.0.

NOTICE If the standard buffer is over the measuring limit or less than 10% of the measuring limit, the displayed value will equal the range limit or 10% of the range limit.

When switching the meter from measurement to calibration mode, the meter will display the factory default value. If the meter was previously calibrated, the display may seem to jump to the factory default value when entering calibration.

Symptom	Action
Power on but no display	<ol style="list-style-type: none"> 1. Make sure the time of pressing the power key is more than .3 seconds. 2. Check that the batteries are in place and make good contact, minding polarities. 3. Replace new batteries. 4. Move the battery away for one minute and then put back in.
Display disappeared	Check whether the low battery icon was on before the display went off. If yes, replace with new batteries.
Air bubbles adhere on electrode	<ol style="list-style-type: none"> 1. Stir the electrode completely and dip it into the solution at an oblique angle. Dipping the electrode in vertically creates many air bubbles. 2. After soaking the electrode in solution for 15 to 30 minutes, inspect the electrode carefully to make sure no air bubbles adhere. If they still exist, tap the bottom of the container gently and stir the electrode to remove the air bubbles. 3. If the above method is not working, remove the electrode out of the solution and blow at the electrode to remove the air bubbles.



Error Code	Meaning	How to Handle?
Parameter: Conductivity		
---	Meter is in manual ranging 1; however, the conductivity measured value is higher than 1999uS.	Press "UP" key more than 2 seconds to change the mode to manual ranging 2 or auto ranging.
E03	Conductivity value is over the range limit (19.99mS) or meter is damaged.	Put the meter in standard buffer (the buffer concentration must be lower than range limit). If E03 still appears, send back for repair.
E04	The original temp. error results in this error.	Refer to below error code of temp. After solving the error of temp, E04 of conductivity will disappear.
Parameter: TDS		
---	Meter is in manual ranging 1; however, the TDS measured value is higher than 1999*TDS factor ppm.	Press "UP" key more than 2 seconds to change the mode to manual ranging 2 or auto ranging.
E04	The original temp. or conductivity error results in this error.	Refer to below error code of temp. & conductivity. After solving the error of temp, & conductivity, E04 of TDS will disappear.

Parameter: Temperature		
E01	Temperature circuit is damaged. Temperature value is lower than range limit (0°C) or temperature circuit is damaged.	Send back for repair. Put the meter in room temperature for 5 minutes to make the reading back to normal. If E02 still appears, send back for repair.
E02	Temperature value is higher than range limit (50°C) or temperature circuit is damaged.	Put the meter in room temperature for 5 minutes. If E02 still appears, send back for repair.
E03		

Appendix: Meter Factory Default Setting

Type	Parameters	Default	Remark
P1.1	Select °C/°F	°C	Temperature Unit
P1.2	Nor. Temp.	25°C	Selectable: 25 or 20°C
P1.3	Temp. Coefficient	2.1%/°C	Adjustable from 0.4 to 10%
P2.1	TDS Factor	0.50	Adjustable from 0.40 to 1.00 (only for 8361)
P3.1	Factory Default	NO	Retain Your Current Settings
P4.1	Viewing Previous	---	No Calibration Data for 1st
P4.2	Calibration Data	---	Range No Calibration Data for 2nd Range

MAINTENANCE/REPAIR

Upon final installation of the Series TDS2-10, no routine maintenance is required. The Series TDS2-10 is not field serviceable and should be returned if repair is needed. Field repair should not be attempted and may void warranty.

WARRANTY/RETURN

Refer to "Terms and Conditions of Sales" in our catalog and on our website. Contact customer service to receive a Return Goods Authorization number before shipping the product back for repair. Be sure to include a brief description of the problem plus any additional application notes.