LaMotte

CON 6/TDS 6 Meter Manual

The LaMotte 6 Series

CE

WARNING! This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision

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INTRODUCTION

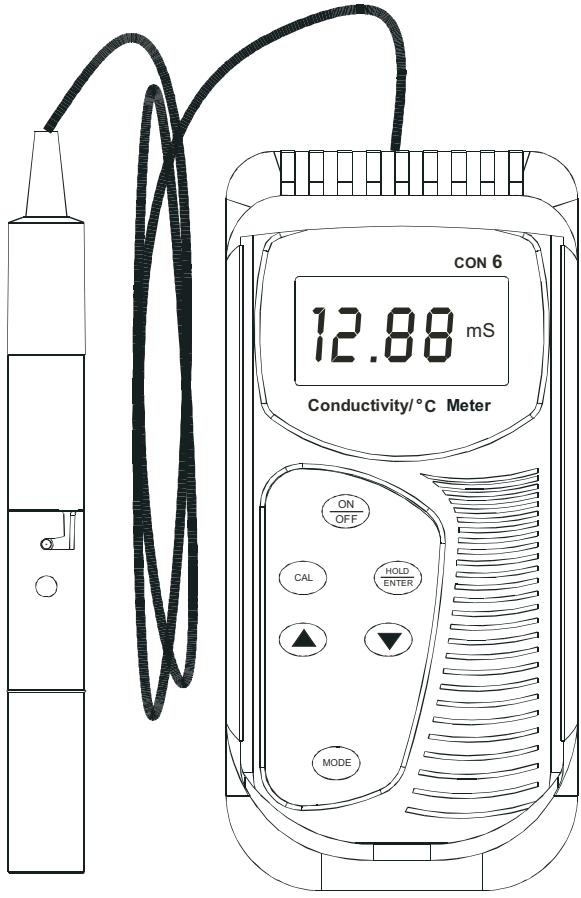
Thank you for purchasing the CON 6 Conductivity Meter or TDS 6 Total Dissolved Solids Meter. These economy microprocessor-based handheld meters deliver up to ±0.5% full-scale accuracy. It has a large custom LCD (Liquid Crystal Display) for clear and easy reading.

The CON 6 measures Conductivity (µS/mS) and Temperature (°C) while the TDS 6 measures Total Dissolved Solids (TDS) and Temperature (°C). These sturdy meters measure up to 5 different ranges with auto-ranging capabilities that that will switch automatically to the appropriate measuring range.

The meters include a conductivity electrode (cell constant K = 1.0) with built-in temperature sensor, a rubber boot, 4 alkaline "AAA" batteries, and an instruction manual.

Read the manual thoroughly before operating the meter.

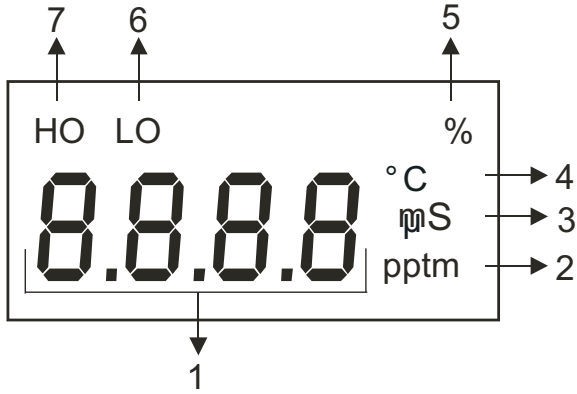
To order other accessories and buffer standard solutions, refer to the Accessories Section for more information.


CON 6
12.88
mS
Conductivity/°C Meter
ON
OFF
CAL
HOLD
ENTER
MODE

DISPLAY & KEYPAD FUNCTIONS

Display

The meter has a large custom LCD that consists of 4-digit segments and operation annunciators for uS/mS for the CON 6 meter, or ppm/ppt for the TDS 6 meter, and °C (Temperature). Other annunciators include "HO" (when the HOLD function is activated) and "LO" (low battery condition). See Figure below.



LCD and Customized Annunciators for CON 6/TDS 6 meters

1. Primary display
2. Parts Per Million (ppm) or Parts Per Thousand (ppt) indicator - TDS 6 meter only.
3. milli-Siemens/cm (mS) or micro-Siemens/cm (µS) indicator - CON 6 meter only.
4. Temperature indicator
5. Percentage indicator for Temperature Coefficient.
6. Low battery indicator.
7. Hold (freezed) reading indicator.

Keypad

The CON 6 /TDS 6 meter has 6 buttons on the splash-proof keypad; ON/OFF, HOLD/ENTER, CAL, MODE, s and t question buttons. Some buttons have several functions depending on the mode of operation.

	Powers on and shuts off the meter. Goes directly into the measurement mode when the meter is turned on.
	Enters into the calibration mode for Conductivity/TDS and Temperature. To abort calibration or set-up mode without confirming any set value.
	HOLD: Freezes the measured reading. To activate, press HOLD button while in measurement mode. To release, press HOLD button again. ENTER: Press to confirm values in the calibration mode, and to confirm selections in the SET-UP mode.
	In Calibration Mode: Press to scroll through calibration values. In Set-up Mode: Press to scroll through the set-up sub-group programs. Press s button during conductivity measurement mode to activate manual ranging function. Each button press will move to a higher conductivity range.
	Selects measurement mode for Conductivity/TDS and Temperature. Pressed together with ON/OFF button to go to the SET-UP mode. This allows customization of meter preferences such as selecting the electrode cell constant, normalization temperature, temperature coefficient factor, TDS factor (for TDS 6), automatic calibration (CON 6 only) or manual calibration, single-point or multi-point calibrations, and to reset meter to factory default.

PREPARATION

Inserting & Removing Rubber Boot

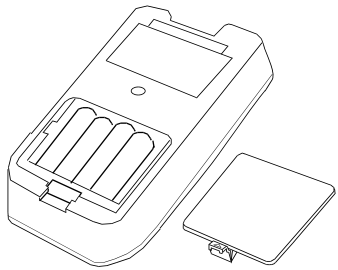
To insert the meter into the rubber boot, slide the top of the meter into the rubber boot before pushing the bottom edges of meter down to set it into position. Lift up the stand at the back of meter for bench top applications if necessary.

To remove the meter from the rubber boot, first push the bottom edge of the meter out of the boot. Ensure that the electrode or temperature probe cables are not connected.

Inserting the Batteries

The battery compartment is found at the back of instrument as shown. To open the battery compartment:

1. Remove the rubber boot. Open the battery compartment. Push in the direction of arrow and lift up the cover.
2. Insert four AAA batteries. Note the polarity of battery before inserting into position.
3. Replace the cover. Press down until it clicks. Replace the rubber boot.



Battery Replacement

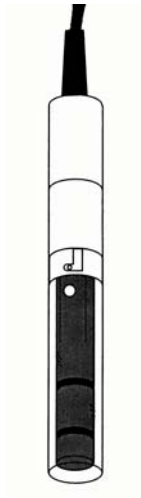
A "LO" annunciator in the LCD will indicate when the battery power is running low. See Figure below. Replace the batteries with the same type as recommended by the manufacturer as soon as possible.

"LO" Battery Condition

Caution: Turn the meter off meter when changing the batteries.

Conductivity Electrode Information

The CON 6/TDS 6 hand-held meter is supplied with a conductivity/TDS electrode with a BNC connector. This conductivity/TDS electrode comes with Stainless Steel rings, a cell constant of K = 1.0, and a built-in temperature sensor for Automatic Temperature Compensation (ATC).
The specially designed Ultem-body housing has chemically resistant properties. It provides fast temperature response and reduces air entrapment, which makes it easy to obtain accurate, stable readings.



The durable probe materials include:

1. Polyetherimide (Ultem) – protective probe guard
2. Polybutylterphalate (Valox) – sensor housing
3. Stainless Steel (SS 304) – 2 steel bands

Proper use of the probe is essential to ensure that the optimum measurement is taken in the shortest amount of time.

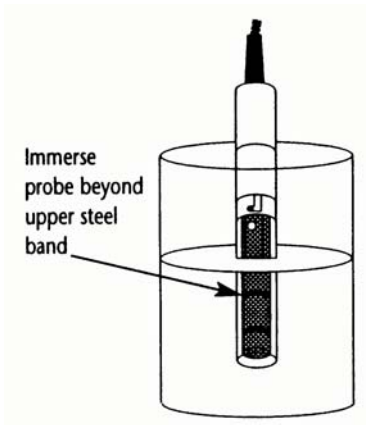
The protective plastic probe guard is removable for simple periodic maintenance but it must be kept intact during measurement and calibration.

Always immerse the probe beyond upper steel band.

NOTE:

1. DO NOT remove the protective probe guard during measurement and calibration. It will affect the results.
2. DO NOT submerge the probe above the protective guard. The cable can be submerged for brief periods of time, but not continuously.

See – "Probe Care and Maintenance" for more information.

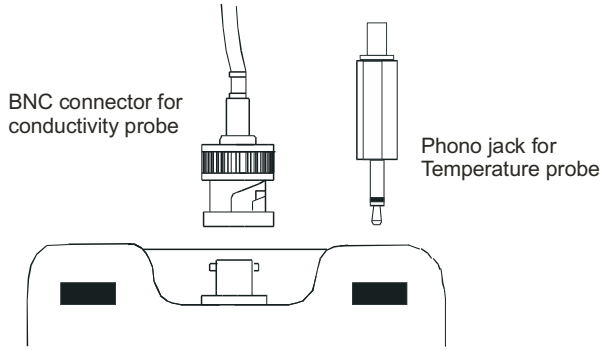


Connecting the Probe to the Meter

1. To connect the electrode to the meter, align the connector slots with the posts of the meter socket and rotate the connector clockwise until it locks.
2. To remove, rotate the connector in a counter-clockwise direction until it unlocks, and slide the connector off the socket.
3. Insert the mini phono jack on the temperature sensor into the socket on the meter as shown below.
4. Unplug the phono jack when not in use or when measuring Conductivity or TDS without any temperature compensation (see Manual Temperature Compensation).

CAUTION: Do not pull on or force the probe cord or the probe wires might disconnect.

NOTE: Keep connectors clean. Do not touch connectors with soiled hands.

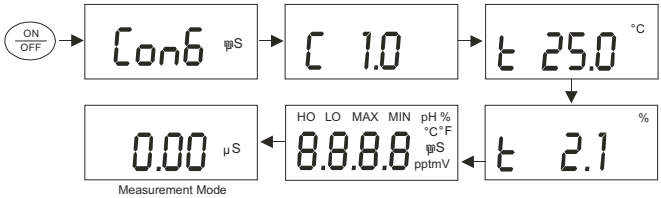


Connection for Conductivity & Temperature Probes

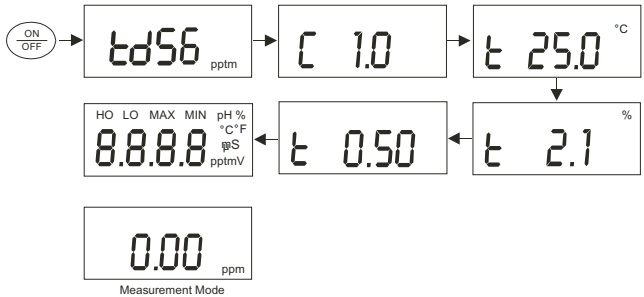
Turning the Meter On

When the meter is turned on, it will go through a series of displays that show the set-up parameters.

For CON 6



For TDS 6



Press **ON/OFF** button to turn on the meter.

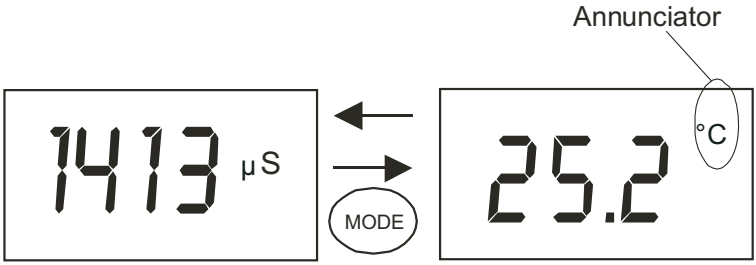
1. First screen shows **[Con 6]** (or **[tdS 6]**) to identify the meter.
2. Second screen shows **[C 1.0]** which is the conductivity cell constant, k. Cell constants of 0.1, 1.0 or 10.0 can be selected. Refer to Section on Advance Set-up. Default value is k=1.0.
3. Third screen shows **[t 25.0 °C]** which is the Normalization Temperature. Normalization Temperatures of 25 °C or 20 °C may be selected. Refer to Section on Advance Set-up. Default value is 25 °C.

4. Fourth screen shows **[t 2.1%]** which is the Temperature Coefficient. The meter can be customized with different Temperature Coefficient values from 0.0 to 3.0 %/°C in the Advance Set-up mode. Default value is 2.1 %/°C.
5. All LCD segments will light up for 2 seconds, and then advance into the measurement mode.
6. The meter is ready to measure conductivity or TDS.

Change Conductivity/ TDS ⇔Temperature Measurement Mode

To switch between the Conductivity/TDS measurement mode and Temperature measurement mode, press the **MODE** button.

The customized annunciator will indicate the measurement parameter.



CALIBRATION

Important Information on Meter Calibration

The meter has five measuring ranges. The meter can be calibrated at one po

int in each of the five measuring ranges. If measurements are being taken in more than one range, each of the ranges were measurements are being made must be calibrated.

The following table lists the corresponding conductivity and TDS ranges. Each range should be calibrated with a solution that falls between the values in the "recommended calibration solution range" column.

Conductivity Range	Recommended Calibration Solution Range	TDS Range	Recommended Calibration Solution Range
0.00 to 20.00 µS	6.00 to 17.00 µS	0.00 to 10.00 ppm	3.00 to 8.50 ppm
0.0 to 200.0 µS	60.0 to 170.0 µS	10.0 to 100.0 ppm	30.0 to 85.0 ppm
0 to 2000 µS	600 to 1700 µS	100 to 1000 ppm	300 to 850 ppm
0.00 to 20.00 mS	6.00 to 17.00 mS	1.00 to 10.00 ppt	3.00 to 8.50 ppt
0.0 to 200.0 mS	60.0 to 170.0 mS	10.0 to 200 ppt	30.0 to 170 ppt

When the meter is recalibrated, the old calibrations are replaced on a range by range basis. For example, if the conductivity meter was previously calibrated at 1413 µS in the 0 to 2000 µS range and it is recalibrated at 1500 µS (also in the 0 to 2000 µS range), the meter will replace the old calibration data (1413 µS) with the new calibration data (1500 µS) for that range. The meter will retain all calibration data in the other ranges.

To completely recalibrate the meter, or when a probe is replaced, it is best to clear all calibration data. To erase all the old conductivity or TDS calibration data completely, see – Restore Factory Default Values.

Preparing the Meter for Calibration

Before starting calibration, be sure the meter is in the correct measurement mode.

For best results, select a standard value close to the value of the sample that is being measured. Alternatively use a calibration solution value that is approximately 2/3 the full-scale value of the measurement range that is being used. For example, in the 0 to 2000 µS conductivity range, use a 1413 µS solution for calibration.

Calibrate all measurement ranges to ensure the highest accuracy throughout the entire measurement range. Note that the CON 6/TDS 6 meter will not accept calibration values less than 40 µS/cm (20 ppm). All new calibration values will automatically override existing data.

If solutions with Conductivity lower than 100 µS/cm, or TDS lower than 50 ppm, are being measured the meter should be calibrated at least once a week for optimum accuracy. If measurements are in the mid-ranges, and the probe is washed with deionized water and stored dry, the meter can be calibrated once a month. If measurements are taken at extreme temperatures, the meter should be calibrated at least once a week.

Fresh conductivity standard solutions should be used during calibration. Do not reuse standard solutions. They could be contaminated and affect the calibration and accuracy of the measurements. Store solutions in a dry and cool environment if possible.

Always rinse the probe with either deionized water or rinse solution before and after each calibration/sample measurement to avoid cross-contamination. For details refer to *Probe Care and Maintenance*.

NOTE: These meters are factory set to a temperature coefficient of 2.1% per °C. For most applications this will provide good results.
To set the temperature coefficient to different value, see Temperature Coefficient.
Also, see Appendix 3 - Calculating the Temperature Coefficient to determine the appropriate temperature coefficient for any solution.

NOTE: The factory default value for normalization temperature is 25 °C. If a value other than 25 °C is needed, see Normalization Temperature.

Selection of Automatic or Manual Calibration

This meter is capable of performing either automatic (CON 6 only) or manual calibration.

In the automatic calibration mode, the meter (CON 6 only) automatically detects and verifies the appropriate known calibration standards solutions being calibrated before accepting these particular calibration standards as one of the calibration values in a specific measurement range. This automatic calibration mode makes the manual calibration procedure unnecessary.

The calibration standards used for automatic calibration are:

Meter	Normalization Temperature	Calibration Standards (Range)
CON 6	25 °C	1. 84 µS (for 0 – 200 µS/cm) 2. 1413 µS (for 0 – 2000 µS/cm) 3. 12.88 mS (for 0.00 – 20.00 mS/cm) 4. 111.8 mS (for 0.0 – 200.0 mS/cm)
	20 °C	1. 76 µS (for 0 – 200 µS/cm) 2. 1278 µS (for 0 – 2000 µS/cm) 3. 11.67 mS (for 0.00 – 20.00 mS/cm) 4. 102.1 mS (for 0.0 – 200.0 mS/cm)

Table 1: Conductivity Calibration Standards for Automatic calibration.

In the manual calibration, non-standard calibration values can be used for calibration. The appropriate values can be manually input as the desired calibration standards in each specific range. This is useful in situations with customized calibration standards that are unique to an application.

To select Automatic or Manual Calibration settings, refer to Automatic Calibration for more information.

Automatic Calibration (Conductivity)

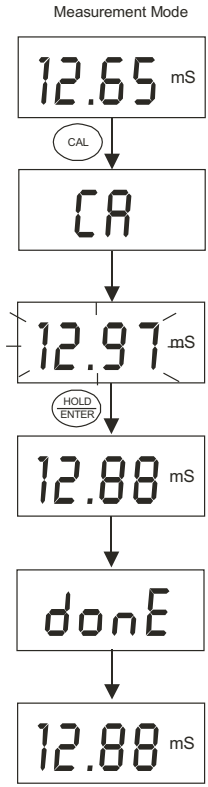
In the Automatic Calibration mode, the meter is capable of accepting a single-point calibration or up to 4 points for multi-point calibration with the maximum of 1 point per specific measurement range. For the automatic calibration standard values refer to *Table 1*.

1. If necessary, press **MODE** button to select the conductivity mode.
2. Rinse the probe thoroughly with deionized water or a rinse solution, then rinse with a small amount of calibration standard.

NOTE: For Automatic Calibration one of the calibration standards listed in Table 1 must be used.

3. Dip the probe into the calibration standard. Immerse the probe tip beyond the upper steel band . Gently stir the sample with the probe to create a homogeneous sample. Allow time for the reading to stabilize.
4. Press **CAL** button to enter the conductivity calibration mode. The **[CA]** indicator will appear for 1.5 seconds, and a value will appear flashing.

   NOTE: To exit calibration without confirmation, press CAL button again to go back to measurement mode.
5. Wait for the value to stabilize and press **ENTER** button. The calibration standard value will appear for 3 seconds. If the calibration has been successfully performed, **[donE]** will be displayed for about 3 seconds, and the meter will return to the measurement mode.
6. To perform the next point calibration in the multi-point calibration, repeat steps 1-5 until all points have been calibrated.



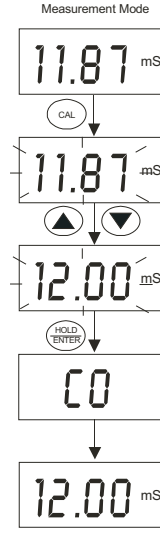
IMPORTANT NOTES:

1. The meter allows a tolerance range of ±40% of the calibration standard. An error message "**Err 1**" will be displayed for 3 seconds if an attempt is made to calibrate with a solution with a value outside of the tolerance range.
   For instance: For 1413 µS conductivity calibration standard, 40% tolerance is from 848 µS to 1978 µS.

2. If the temperature (t °C) of the conductivity calibration solution is below 0 °C or above 50 °C (0°C < t °C > 50 °C), an error message "**Err 2**" will be displayed when performing the auto calibration, and meter will return to measurement mode.
3. All new calibration data will over-ride existing stored calibration data for each measuring range calibrated.
4. It is important to use fresh conductivity calibration standards.
5. Low conductivity standard solutions (less than 20 µS /cm) can become contaminated as soon as they are exposed to the air. Exercise caution during calibration in the first measurement range (0.00 to 20.0 µS /cm).

Manual Calibration (Conductivity or TDS)

In Manual Calibration mode (see page 23) the meter can be calibrated with customized conductivity calibration standards that are specific to a particular application. The following example shows the calibration sequence of a 12.00 mS conductivity calibration standard.



This procedure is for the CON 6 and TDS 6 meters.

1. If necessary, press the **MODE** button to select the conductivity mode.
2. Rinse the probe thoroughly with deionized water or a rinse solution, then rinse with a small amount of calibration standard.
3. Dip the probe into the calibration standard. Immerse the probe tip beyond the upper steel band. Gently stir the sample with the probe to create a homogeneous sample. Allow time for the reading to stabilize.
4. Press **CAL** button to enter conductivity calibration mode. The **[CA]** indicator will appear for 1.5 seconds, and a value will appear flashing.

NOTE: To exit calibration without confirmation, press CAL button again to go back to measurement mode.

5. Wait for the value to stabilize. Press **s** or **t** button and adjust the value to the calibration standard used.
6. Press the **ENTER** button. The **[CO]** indicator will appear for 1.5 seconds, and the calibration has been successfully performed. The meter will return to the measurement mode.
7. To perform the next point calibration in the multi-point calibration for the next range, repeat steps 1-6 until all points have been calibrated.

Temperature Calibration

The conductivity electrode has a built-in temperature sensor for ATC. The temperature sensor is factory calibrated to the meter. Calibrate the sensor only if it is suspected that temperature errors that may have occurred over a long period of time or if the probe is a replacement probe.

1. Make sure that the phono jack (for temperature measurement) is properly connected to the meter.
2. Turn on the meter and if necessary, press the **MODE** button to select the temperature measurement mode.
3. Press **CAL** button to start temperature calibration process.
4. Dip the probe into a solution with known temperature (for example, a temperature bath). Allow time for the temperature to stabilize.
5. After the value has stabilized, press question **s** or **t** button and adjust the value to the solution temperature.
6. Press the **ENTER** button. The **[CO]** indicator will appear for 1.5 seconds, and the reading will stop flashing. The temperature calibration has been successfully performed. The meter will return to the measurement mode.

NOTE: To exit calibration without confirmation, press CAL button again to go back to measurement mode.

NOTE: The temperature reading can be offset up to ±5 °C from the original (default) reading.

MEASUREMENT

The CON 6/TDS 6 meter is capable of taking measurements with automatic temperature compensation or manual temperature compensation.

With Automatic Temperature Compensation (ATC)

For ATC, make sure the phono jack of the probe is securely connected to the meter.

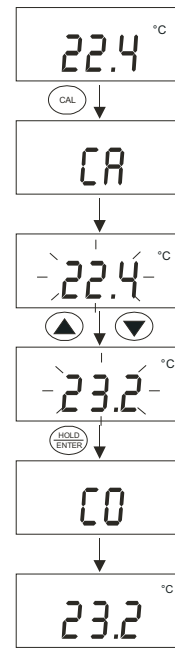
The conductivity/TDS reading displayed will be compensated for according to the normalization temperature (20 °C or 25 °C) selected. *See Normalization Temperature*.

Without ATC (Manual Temperature Compensation)

For manual temperature compensation, unplug the probe phono jack (not BNC) from the meter.

To use manual temperature compensation, enter the temperature value of the process into the meter. The meter will compensate the result to this temperature. Any temperature between 0 and 50 °C (32 to 122 °F) can be selected. The default value is 25 °C.

1. Make sure that the phono jack (for temperature measurement) is disconnected from the meter.
2. Turn on the meter and if necessary, press the **MODE** button to select the temperature measurement mode.
3. Press **CAL** button to start the temperature calibration process.
4. "**CA**" will appear momentarily and the temperature value will start flashing.
5. Check the temperature of the sample using an accurate thermometer. Wait for the value to stabilize. Press **s** or **t** button and adjust the value on the display to match the value on the reference thermometer.
6. Press the **ENTER** button. The **[CO]** indicator will appear for 1.5 seconds, and the reading will stop flashing. The temperature calibration has been successfully performed. The meter will return to the measurement mode.



Taking Measurements

1. Rinse the probe with deionized or distilled water before use to remove any impurities adhering to the probe body. Shake or air dry. To avoid contamination or dilution of the sample, rinse the probe with a small volume of the sample liquid.
2. Press **ON** to turn the meter on.
3. Dip the probe into the sample.
4. Allow time for the reading to stabilize. Note the reading on the display.

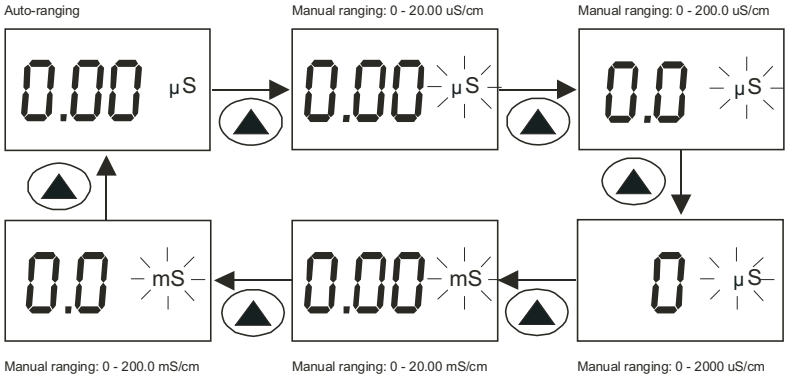
NOTE: When dipping the probe into the sample, take care to ensure that the liquid level is above the upper steel band. Gently stir the sample with the probe to create a homogenous sample.

Using Manual Ranging Function

By default the meter has auto-ranging ability and will automatically select the range in which the readings appear.

However, a specific range may be selected. This is achieved by pressing **s** button successively for each measurement range. The five ranges are:

Conductivity Range (CON 6)	TDS Range (TDS 6) (if TDS factor is 0.5)
0 – 20.00 µS/cm	0 – 10.00 ppm
0 – 200.0 µS/cm	0 – 100.0 ppm
0 – 2000 µS/cm	0 – 1000 ppm
0 – 20.00 mS/cm	0 – 10.00 ppt
0 – 200.0 mS/cm	0 – 100 ppt



NOTE:

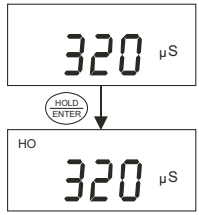
If the value of the solution being measured is higher than the range selected **[Or]** will appear on the primary display. Press RANGE until the correct range is selected.

The meter resets to the Auto-ranging function once it is turned off. The manual ranging function must be reset each time the meter is turned on.

HOLD Function

The hold feature will freeze the display for a delayed observation. **HOLD** can be used any time in measurement mode.

1. To hold a measurement, press the **HOLD** button while in measurement mode. **[HO]** will appear on the display.
2. To release the held value, press the **HOLD** button again. Continue to take measurements.



NOTE:

The meter will shut off automatically after 20 minutes of nonuse.

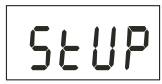
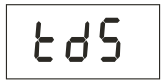
If the meter is shut off either automatically or manually, the HOLD value will be lost.

ADVANCED SET-UP FUNCTIONS

Advanced Set-up Overview

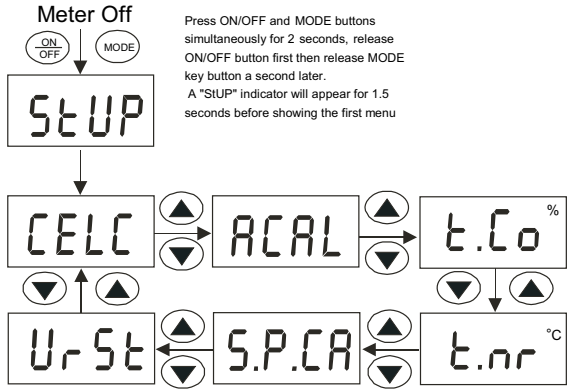
The advanced set-up mode customizes the meter preferences and defaults. To enter the advanced set-up mode:

1. Make sure that the meter is turned off.
2. Press **ON** and **MODE** buttons simultaneously, holding both buttons for 2 seconds. First release **ON** button first before releasing the **MODE** button.
3. **[StUP]** indicator will appear momentarily and **[CELC]** will appear next.
4. Overviews of the CON 6 and TDS 6 Set-up Menu are as follows.

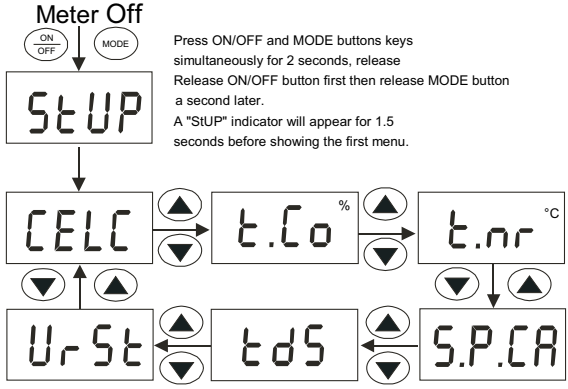
	Enter Set-Up Page.
	Select Cell Constant. Choice of k = 0.1, 1.0, and 10.0. Default value is 1.0.
	Select Automatic Calibration. “Yes” for auto calibration and “no” for manual calibration. Default value is “Yes”. ***(Available in CON 6 meter only)***
	Adjust Temperature Coefficient value from 0.0 to 3.0 %/°C. Default value is 2.1 %/°C.
	Select Normalization Temperature. Choice of either 20 °C or 25 °C. Default value is 25 °C.
	Adjust TDS factor from 0.4 to 1.0. Default value is 0.5. ***(Available in TDS 6 meter only)***

S.P.CA	Select Single Point Calibration. Choice of “Yes” or “No”. Default value is “Yes”.
UrSt	User reset to factory defaults. Choice of “Yes” or “No”. Default value is “no”.

Overview of Advanced Set-Up



Overview of CON 6 Set-Up Menu



Overview of TDS 6 Set-Up Menu

Select Cell Constant

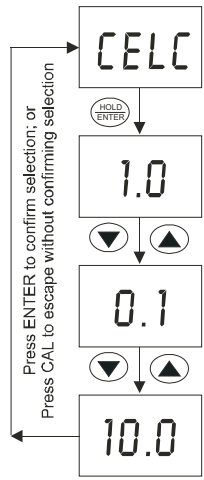
It is possible to select a cell constant of K = 1.0, 10, or 0.1.

Use a cell of K = 1.0 for midrange measurements

Use a cell of K = 10 for high range measurements (above 20 mS or 10 ppt).

Use a cell of K = 0.1 for low range measurements (below 20 µS or 10 ppm).

The cell included with the meter has a cell constant of K = 1.0.

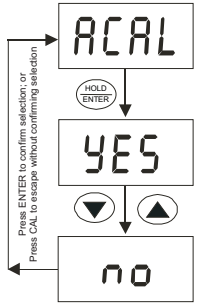


1. Enter Advanced Set up.
2. Press s or t button until [**CELC**] appears on the LCD. Press **ENTER** button.
3. Press s or t button to select either "1.0", "0.1" or "10.0". Ensure the cell constant selected correspond with the conductivity electrode that is being used with the meter.
4. Press **ENTER** button to select. The meter will return to the menu, [**CELC**].
5. Press s or t button to move to the next menu or press **CAL** to exit to measurement mode.

Automatic Calibration (for CON 6)

The automatic calibration allows the meter to be quickly calibrated to any of the four widely used conductivity calibration standards. For a list of calibration standards refer to *Table 1*.

In the manual calibration mode, customized conductivity calibration standard can be used to calibrate this meter.



1. Enter Advanced Set-up.
2. Press **s** or **t** button until **[ACAL]** appears on the LCD. Press **ENTER** button.
3. Press **s** or **t** button to select either **[Yes]** or **[no]**.
4. Press [ENTER] button to select. The meter will return to the menu, **[ACAL]**.
5. Press **s** or **t** button to move to the next menu or press **CAL** to exit to measurement mode.

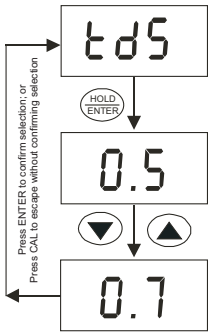
Setting the TDS Factor (for TDS 6)

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

To calculate the TDS conversion factor refers to *Appendix 2 – Calculating TDS Conversion Factor*.

TDS conversion factors for various types of salts can also be found in chemical reference books.

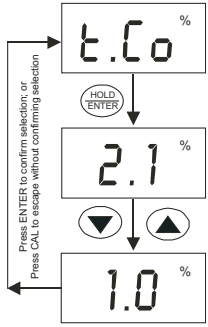
The TDS conversion factor can be set between 0.4 and 1.0. The meter default is 0.5.



1. Enter Advanced Set-up.
2. Press **s** or **t** button until **[tdS]** appears on the LCD. Press **ENTER** button.
3. Press **s** or **t** button to select a value between 0.4 to 1.0.
4. Press **ENTER** button to select. The meter will take return to the menu, **[tdS]**.
5. .Press **s** or **t** button to move to the next menu or press **CAL** to exit to the measurement mode.

Temperature Coefficient

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 the solution being measured will accurately compensate the temperature for almost any solution. The temperature coefficient can be set between 0.0 and 3.0 % per °C. The meter default is 2.1% per °C.



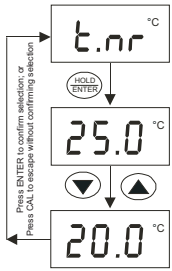
6. Enter Advanced Set-up.
7. Press **s** or **t** button until [**t.Co %**] appears on the LCD. Press **ENTER** button.
8. Press **s** or **t** button to select a value between 0.0 and 3.0.
9. Press **ENTER** button to select. The meter will return to the menu, [**t.Co %**].

Press **s** or **t** button to move to the next menu or press **CAL** to exit to the measurement mode.

Normalization Temperature

The meter can be set to normalize the conductivity measurements to a standard temperature of either 25 °C or 20 °C.

The default value is 25 °C.



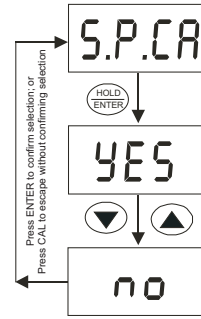
1. Enter Advanced Set-up.
2. Press **s** or **t** button until [**t.nr °C**] appears on the LCD. Press **ENTER** button.
3. Press **s** or **t** button to select either [**25.0 °C**] or [**20.0 °C**].
4. Press **ENTER** button to select. The meter will return to the menu, [**t.nr °C**].
5. Press **s** or **t** button to move to the next menu or press **CAL** to exit to the measurement mode.

Single-Point Calibration

A single-point calibration refers to calibrating at one conductivity value that will be used for all 5 conductivity ranges.

By selecting [no] to single-point calibration, a calibration for each conductivity range can be performed.

1. Enter Advanced Set-up.
2. Press **s** or **t** button until [S.P.CA] appears on the LCD. Press **ENTER** button.
3. Press **s** or **t** button to select either [**Yes**] or **no**].
4. Press **ENTER** button to select. The meter will return to the menu, [**S.P.CA**].
5. Press **s** or **t** button to move to the next menu or press **CAL** to exit to the measurement mode.

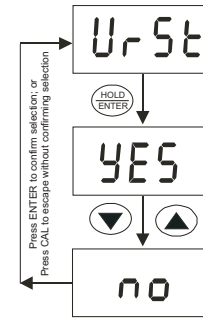


Restore Factory Default Values

This function allows all parameters to be reset to the factory default settings. This clears all calibration data and any other set-up functions that may have been changed.

IMPORTANT: Once activated the meter settings and calibration data will be erased. Always exercise caution. Meter reset is not reversible.

1. Enter Advanced Set-up.
2. Press **s** or **t** button until [UrSt] appears on the LCD. Press **ENTER** button.
3. Press **s** or **t** button to select either [**Yes**] or [**no**].
4. Press **ENTER** button to select.
5. The meter will return to the measurement mode after the turn-on initialization.



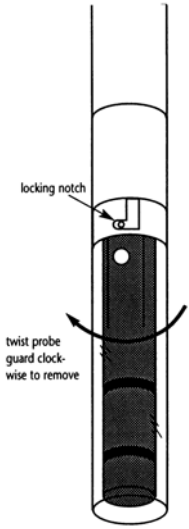
PROBE CARE AND MAINTENANCE

Keep the conductivity probe clean. Rinse the probe twice before using. Gently swirl the probe in the solution while taking readings. Do not immerse the probe in oily solutions.
For best accuracy, soak a dry probe for at least 5 to 10 minutes or longer before calibration.
The conductivity probe included with the meter features a removable probe guard to make cleaning easy.

To remove probe guard:

1. Grip the yellow probe guard and twist clockwise. The locking notch will release.
2. Slide the probe guard off the end of the probe.

Clean the electrode thoroughly by stirring it in a mild detergent bath or isopropyl alcohol. Wipe the probe with a soft tissue paper. Rinse thoroughly in tap water and then in deionized water. Recalibrate the meter after cleaning the probe.
NOTE: Remember to re-attach the probe guard prior to taking readings. Failure to do so could result in erroneous readings.
Rinse the probe with deionized or tap water before storing. Never scratch the bands with a hard substance. Do not strike the probe against any hard surface.



TROUBLESHOOTING GUIDE

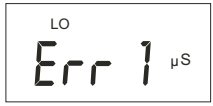
Problem	Cause	Solution
Power on but no display	a) Batteries not in place b) Batteries not in correct polarity (+ and – position) c) Weak batteries	a) Check that batteries are in place and making good contact. b) Reinsert batteries with correct polarity. c) Replace batteries.
Unstable readings	a) Air bubbles in probe b) Dirty probe c) Probe not deep enough in sample d) External noise pickup or induction caused by nearby electric motor e) Broken probe	a) Tap probe to remove bubbles. b) Clean the probe and recalibrate. c) Make sure sample entirely covers the probe sensors. d) Move or turn off interfering motor. e) Replace probe.
Slow response	a) Dirty / Oily probe	a) Clean probe. See “Probe Care & Maintenance”.

ERROR MESSAGES

LCD Display	Indicates	Cause	Solution
"LO" indicator appears.	Low battery level	Need new batteries or battery connection is bad.	Clean battery contacts. Replace batteries with fresh ones, noting polarity.
Err 1	Conductivity calibration error	Calibration point is outside the ±40% window in the auto-calibration.	Check the value of the conductivity calibration solution. Turn to manual calibration mode and calibrate again. If message persists, return unit*.
Err 2	Temperature calibration error	Auto calibration is performed outside the temperature range (0 – 50 °C).	Check the temperature and make sure that it is within the acceptable range. If message persists, return unit*.
Err 3	Conductivity calibration error	Calibration point is within 10% of the measurement range in the manual calibration mode.	Check the value of the conductivity calibration solution. If message persists, return unit*.

* See *Sections on "Warranty" and "Return of Items"*.

If an error message appears, turning off the meter and turning it on again may eliminate the error message. Refer to diagram on right.



If error persists, or the meter shows incorrect values, return the meter.

For a complete diagram of the display see page 3.

SPECIFICATIONS	DESCRIPTIONS	CON 6	TDS 6
Conductivity Range	0 to 20.00, 200.0, 2000 µS/cm; 0 to 20.00, 200.0 mS/cm	X	
Resolution	0.01, 0.1, 1 µS/cm: 0.01, 0.1 ,S/cm		X
Accuracy	±1% F.S.		X
TDS Range	0 to 10.00, 10.0 to 100.0, 100 to 1000 ppm; 1.00 to 10.00, 10.00 to 100.0, Up to 200 ppt depending on the TDS factor setting.		X
Resolution	0.01, 0.1, 1 ppm; 0.01, 0.1 ppt	X	X
Accuracy	±1% F.S.	X	X
Temperature Range	-10.0 to 110.0 °C	X	X
Resolution/Accuracy	0.1 °C / ± 0.5 for °C	X	X
Cell Constant	0.1, 1.0, 10.0 (selectable)	X	X
Temperature Compensation	Automatic / Manual (from 0 to 50 °C)	X	X

SPECIFICATIONS	DESCRIPTIONS	CON 6	TDS 6
Temperature Coefficient	0.0 to 3.0% / °C	X	
Normalization Temperature	20.0 °C and 25.0 °C (selectable)	X	X
Conductivity to TDS Conversion factor	0.4 to 1.0		X
Number of calibration points	5: Maximum 1 per range	X	X
Auto- & Manual-ranging		X	X
HOLD Function		X	X
Auto Power Off	20 minutes after last button operation	X	X
Inputs	BNC for conductivity and phono jack for temperature	X	X
Display	Single Custom LCD	X	X
Power Requirements	4 'AAA' Batteries	X	X
Battery Life	> 100 hours	X	X
Dimension / Weight	Meter: 14 x 7 x 3.5 cm; 200 g	X	X

ACCESSORIES

Replacement Meter and Meter accessories

Item	Code
CON 6, portable conductivity meter complete with conductivity probe of k=1.0 and case	5-0039-01
TDS 6, portable TDS meter complete with conductivity probe of k=1.0 and case	5-0037-01
Electrode, stainless steel 3 ring, Ultem body with ATC, BNC plug (for CON 6), cell constant = 1.0, x110 mm, 1m cable length	5-0106
Protective Rubber Boot	5-0040

Calibration Solutions

84µS, 25 mL	6312-G
1413µS, 100 mL	6354-J
12.88 mS, 25 mL	6317-G

CONDUCTIVITY THEORY

Conductivity is defined as the ability of a solution to conduct an electrical current, or the reciprocal of the solution's ability to resist the current. The current is conducted by electrically charged particles called ions, which are present in almost all solutions. Different solutions have different kinds and amounts of ions. Distilled water has very few ions, and therefore a low conductivity, while seawater has a large number of ions, and a high conductivity.

Although a conductivity reading provides an overall measurement of the ionic strength of a solution, it is not possible to distinguish the specific amounts of individual ions. For this reason, conductivity is often used to measure the total dissolved solids (TDS) of a solution. TDS is defined as the amount of solids that will pass through a 45 micron filter. Rather than filtering a solution, the TDS can be estimated by multiplying the conductivity measurement by a predetermined factor. This factor, which is determined gravimetrically, will fall between 0.55 and 0.9. A commonly used factor is 0.7.

Conductivity is measured using a probe which has two parallel plates separated by a fixed distance. When a voltage from the meter is applied across the electrodes, the ions in the solution conduct a current that flows between the two electrodes. The greater the concentration of ions in the solution, the larger the current generated and the higher the conductivity. Likewise, the smaller the concentration of ions, the lower the conductivity. The meter converts the current measured to a conductivity reading. Conductivity values are related to the conductance of a solution by the physical dimensions - area and length — or the cell constant of the measuring electrode. The physical distance between the plates is also critical, as it effects the strength of the electric field between the plates. By using cells with defined plate areas and separation distances, it is possible to standardize conductance measurements.

The relationship between conductance and specific conductivity is:

Specific Conductivity S.C. = (Conductance) (cell constant, k)
= siemens x cm/cm^2
= siemens/cm

where C is the conductance (siemens)
k is the cell constant, length/area or cm/cm^2

Conductivity is measured in microsiemens per centimeter (µS/cm). In waters of higher conductivity, µS/cm may be multiplied by 1000, giving results as millisiemens per centimeter (mS/cm). Total dissolved solids are measured in parts per million (ppm). Therefore:

µS/cm X 0.7 = ppm TDS

Conductivity measurements are very dependent on temperature. The ability of the ions to move through the solution, and conduct the current, is related to the temperature of the solution. As the temperature of the solution rises, the ions move more quickly through the solution, increasing the conductivity. As the temperature decreases the ions move more slowly and the conductivity decreases. Since the conductivity of the same solution can change by as much as 2 percent per °C, accurate temperature measurements must be made simultaneously to with the conductivity reading. The CON 6/TDS 6 has a temperature sensor within the probe that will measure the temperature of the solution.

To make conductivity readings taken at different times and places comparable, measurements are often converted to what the conductivity of the solution would be at 20°C or 25°C. The CON 6/TDS 6 automatically applies this conversion before displaying a reading.

Because it is a quick, reliable, and inexpensive way of monitoring the ionic content of a solution, conductivity measurements are widely used in many areas of water testing from environmental monitoring to municipal water supplies to many industrial applications.

APPENDIX 1: CALIBRATION TIPS

Only one calibration point is needed to measure solutions throughout the entire range of the meter. If a range was not calibrated, the meter will automatically detect the closest range calibrated and use that calibration information. However, only the ranges that were calibrated will have maximum accuracy.

If the solutions being measured are near to or greater than 20 mS (10 ppt), or near to or lower than 100 µS (50 ppm), the meter should be calibrated at least once a week to get the specified ±1% F.S. accuracy.

If the solutions being measured are in the mid-ranges and the probe was washed in deionized water and stored dry, the meter should be calibrated at least once a month.

Wet the probe for 10 minutes before calibrating or taking readings to saturate the probe surface and minimize drift. If measurements are made at extreme temperatures, the meter should be calibrated at least once a week.

Use only the conductivity/TDS probe specified for the CON 6/TDS 6 meters. This probe has a built-in temperature sensor. If a probe without a temperature sensor is used, the temperature of the solutions must be measured and manually entered into the meter. (see Manual Temperature Compensation section 5.2)

APPENDIX 2: CALCULATING The TDS CONVERSION FACTOR

The meter can be calibrated using TDS calibration standard solutions. The TDS value of the solution at a standard temperature, such as 25 °C, is required. To determine the conductivity-to-TDS conversion factor use the following formula:

Factor = Actual TDS ÷ Actual Conductivity @ 25 °C

Definitions:

- Actual TDS: Value from the solution bottle label or as calculated when prepared with high purity water and precisely weighed salts.
- Actual Conductivity: Value measured using a properly calibrated Conductivity/Temperature meter.

Both the Actual TDS value and the Actual Conductivity values must be in the same magnitude of units. For example, if the TDS value is in ppm the conductivity value must be in µS; if the TDS value is in ppt the conductivity value must be in mS.

The calculated factor can be checked by multiplying the conductivity reading by the factor. The result should be the TDS value.

APPENDIX 3: CALCULATING TEMPERATURE COEFFICIENTS

To determine the temperature coefficient of the sample solution:

$$tc = 100 \times \frac{C_{T2} - C_{T1}}{C_{T1}(T_2 - 25) - C_{T2}(T_1 - 25)}$$

Where:

tc = Temperature coefficient	25 = 25 °C
C_{T1} = Conductivity at Temp 1	C_{T2} = Conductivity at Temp 2
T_1 = Temp 1	T_2 = Temp 2

NOTE: A controlled temperature water bath is ideal for this procedure.

1. Immerse the probe in the solution and adjust the temperature coefficient to 0% (that is, no compensation) by following instructions as described in *Temperature* Coefficient.

2. Wait for 5 minutes. Note T_1 and C_{T1} (conductivity at T_1).
3. Condition the sample solution and probe to a temperature (T_2) that is about 5 °C to 10 °C different from T_1, and note the conductivity reading C_{T2}.
   NOTE: Record the results for future reference. Ideally T_1 and T_2 should bracket the measurement temperature, and should not differ by more than 5 °C.
4. Calculate the temperature coefficient of the solution according to the formula shown above.
5. Enter the calculated temperature coefficient into the meter. *Refer to Temperature Coefficient.*

The calculated temperature coefficient will not be applied to all the meter readings.

WARRANTY

This Instrument is guaranteed to be free from defects in material and workmanship for a period of three (3) years from the original purchase date. The probe is guaranteed to be free from defects in material and workmanship for a period of six (6) months from the original purchase date. In the event that a defect is found during the warranty time frame, LaMotte Company agrees that it will be repaired or replaced without charge except for the transportation costs. This guarantee does not cover batteries.

This product can not be returned without a return authorization number from LaMotte Company. For warranty support or a Return Authorization Number, contact LaMotte Company at 1-800-344-3100 or tech@lamotte.com.

Limitations

This guarantee is void under the following circumstances:

- Damage due to operator negligence, misuse, accident or improper application.
- Damage or alterations from attempted repairs by an unauthorized (non-LaMotte) service.
- Damage due to improper power source, AC adapter or battery.
- Damage caused by acts of God or natural disaster.
- Damage occurred while in transit with a shipping carrier.

LaMotte Company will service and repair out-of-warranty products at a nominal charge..

Packaging and Delivery

Experienced personnel at LaMotte Company assure adequate protection against normal hazards encountered during shipping. After the product leaves the manufacturer, the transporter assures all responsibility for its safe delivery. Damage claims must be filed immediately with the transporter to receive compensation for damaged good

RETURN OF ITEMS

Should it be necessary to return the meter for repair or servicing, pack the meter carefully in a suitable container with adequate packing material. A return authorization number must be obtained from LaMotte Company by calling 1-800-344-3100, faxing 1-410-778-6394, or emailing tech@lamotte.com. Often a problem can be resolved over the phone or by email. If a return of the meter is necessary, attach a letter with the return authorization number, meter serial number, a brief description of problem and contact information including phone & FAX numbers to the shipping carton. This information will enable the service department to make the required repairs more efficiently.

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