CHLORINE/CHLORINE DIOXIDE
BLUETOOTH

Code 3251

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Chlorine/Chlorine Dioxide Bluetooth Colorimeter Kit

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Chlorine/Chlorine Dioxide Colorimeter Kit

■ KIT CONTENTS

QUANTITY	CONTENTS	CODE
2 x 100	DPD #1 IG Tablets	6903A
100	DPD #3 IG Tablets	6197A
15 mL	Glycine Solution	6811-E
1	Colorimeter Tubes, w/caps, set of 6	0290-6
1	Water Sample Collecting Bottle	0688
1	Colorimeter for Chlorine/Chlorine Dioxide DPD	27926-BT-CLCD
1	USB Wall Adapter	1721
1	USB Cable	1720-01
1	Chlorine/Chlorine Dioxide Colorimeter Manual	3251-MN
1	Chlorine/Chlorine Dioxide Colorimeter Quick Start Guide	3251-QG

WARNING: Only use the USB cable (1720-01) that is supplied with the kit. Make no substitutions.

***WARNING:** Reagents marked with an * are considered to be potential health hazards. To view or print a Safety Data Sheet (SDS) for these reagents go to www.lamotte.com. Search the four digit reagent code number slisted on the reagent label, in the contents list or in the test procedures. Omit any letter that follows or precedes the four digit code number. For example if code is 4450WT-H, search 4450. To obtain a printed copy, contact LaMotte by e-mail, phone or fax.

Emergency information for all LaMotte reagents is available from Chem-Tel (US, 1-800-255-3924) (International, call collect, 813-248-0585).

To order individual reagents or test kit components, use the specified code number.

■ ACCESSORIES

DESCRIPTION	CODE
Test Tubes, with Caps	0290-6
Replacement Chamber	3-0038
USB Cable	1720-01
USB Wall Adapter	1721
Car Charger	5-0132

WARNING: Only use the USB Cable (1720-01) that is supplied with the kit. Make no substitutions.

TEST METHODS SPECIFICATIONS

■ APPLICATION

Drinking water supplies and distribution systems, swimming pool and spas, sewage, waste waters, process waters and sanitizing solutions.

■ RANGE

0.00 to 4.00 ppm Chlorine (may be extended by dilution)

0.00 to 8.00 ppm Chlorine Dioxide (may be extended by dilution)

■ METHOD

Chlorine

In the absence of Chlorine Dioxide, Free Available Chlorine reacts instantly with the buffered diethyl-p-phenylenediamine indicator (DPD) to produce a red color in proportion to the amount of chlorine present. Subsequent addition of potassium iodide produces a rapid color response from the combined forms of chlorine (chloramines).

Chlorine Dioxide

Chlorine Dioxide reacts with DPD to form a red color in proportion to the concentration. Glycine is added to prevent interference from chlorine.

■ HANDLING & PRESERVATION

Chlorine

Chlorine in aqueous solutions, particularly weak solutions, is not stable. Exposure to sunlight or agitation will accelerate the reduction of chlorine. Fill sample containers to the top and cap tightly. Analyze samples as soon as possible after collection. Samples to be analyzed for chlorine cannot be preserved or stored.

Chlorine Dioxide

Test as soon as possible to avoid loss of chlorine dioxide.

■ INTERFERENCES

Chlorine

The only interfering substance likely to be encountered is oxidized manganese. The extent of this interference can be determined by treating a sample with sodium arsenite to destroy the chlorine, so that the amount of interference can be estimated. Chlorine and chlorine dioxide will give a positive result and should be considered an interference unless the test is being performed specifically for that parameter.

Chlorine Dioxide

Chlorine interference can be removed with the use of glycine. Very high levels of chloramines may interfere if the test result is not read immediately. Oxidized manganese, bromine, iodine, and chromate interfere.

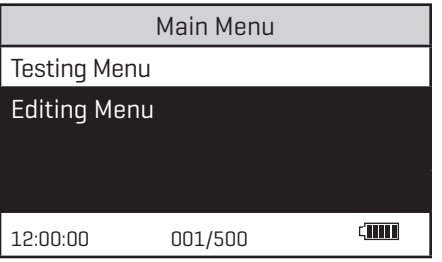
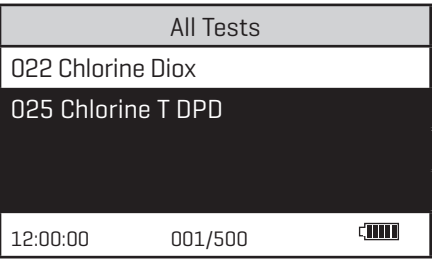
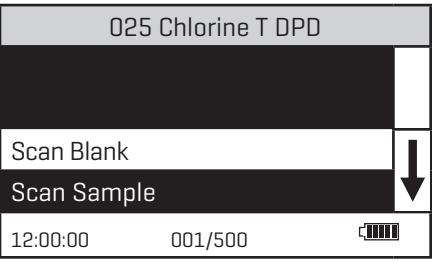
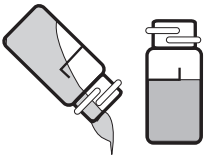
■ CALIBRATION

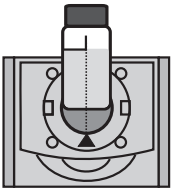
Chlorine

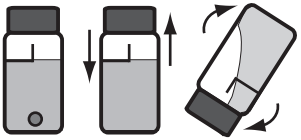
The colorimeter is precalibrated. In order to comply with NPDWR or NPDES reporting regulations, the calibration should be checked periodically by using a set of reference standards including a 0 mg/L blank and 0.3, 1.0, and 3.5 mg/L chlorine. To prepare these standards, a LaMotte 1000 mg/L standard chlorine equivalent solution (Code 3858) is available. Consult with your local regulatory agency to determine standardization frequency.

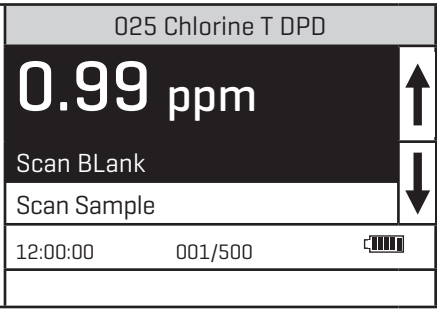
ANALYSIS:
CHLORINE IN THE ABSENCE OF CHLORINE DIOXIDE

PROCEDURE – FREE CHLORINE

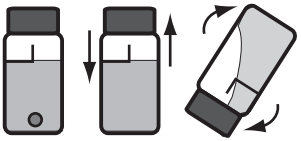
1. Fill the Water Sample Collecting Bottle (0688) with sample water.	
2. Press and hold ⏻ until colorimeter turns on.	
3. Press ENTER to select **Testing Menu**.	
4. Scroll to and select **025 Chlorine T DPD** from menu.	
5. Rinse a clean tube (0290) with sample water. Fill to the 10 mL line with sample. Cap and wipe dry.	

6. Insert tube into chamber, close lid and select **Scan Blank**.	

7. Remove tube from colorimeter. Add one DPD #1 IG Tablet (6903A). Cap tube and shake for 10 seconds. Invert slowly 5 times. Solution will turn pink if free chlorine is present.	

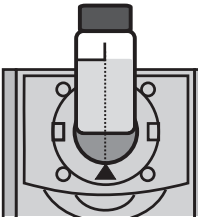
8. Immediately insert tube into chamber. Close lid. Select **Scan Sample**. Record result as Free Chlorine.	

PROCEDURE – COMBINED CHLORINE

9. Remove tube from colorimeter. Add one DPD #3 IG Tablet (6197A). Cap tube and shake for 10 seconds. Invert slowly 5 times. An increase in color represents combined chlorine.	

NOTE: For wastewater samples, ***Standard Methods for the Examination of Water and Wastewater*** recommends waiting 2 minutes for full color development when testing total.

10. Insert tube into chamber, close lid and select **Scan Sample**. Record result as Total Chlorine (Monochloramine, Dichloramine, and Nitrogen Trichloride) present in the water sample.



11. Subtract free chlorine reading from total chlorine reading to obtain concentration of combined chlorine.

12. Press ⏻ to turn off the colorimeter or press EXIT to exit to a previous menu or make another menu selection.

Levels of chlorine about 6 mg/L will cause a bleaching effect on the DPD indicator, and may give a false indication that no chlorine is present. If if is possible that the chlorine concentration is greater than 6 mg/L, perform test on a diluted sample and multiply the result by appropriate dilution factor.

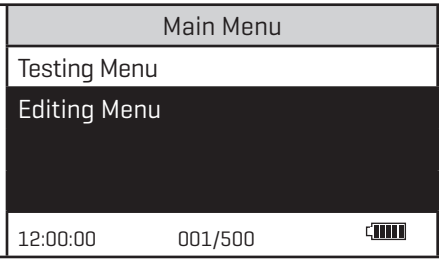
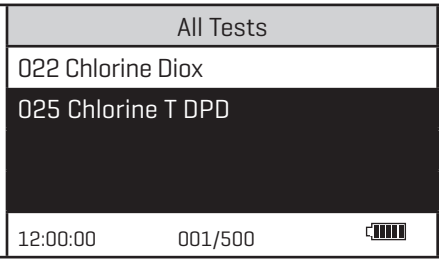
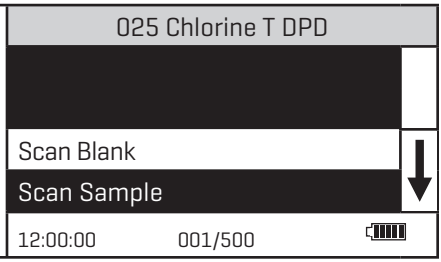
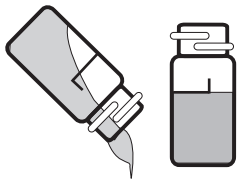
CAUTION: DO NOT leave reacted samples in test tubes. Discard sample and thoroughly rinse tubes. If allowed to remain, DPD wil stain tubes, signigicantly impairing the operation of the colorimeter. If necessary, acid wash, and vigorously clean glassware with test tube brush and detergent.

NOTE: For the most accurate results, samples over 6 ppm chlorine should be diluted with chlorine demand free water and re-tested.

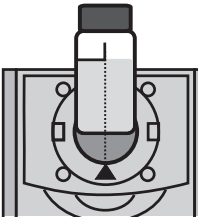
NOTE: The meter will remember the last scanned blank reading. It is not necessary to scan a blank each time the test is performed. To use the previous blank reading, instead of scanning a new one, scroll to Scan Sample and proceed. For the most accurate results, the meter should be blanked before each test and the same tube should be used for the blank and the reacted sample.

ANALYSIS:
CHLORINE IN THE PRESENCE OF CHLORINE DIOXIDE

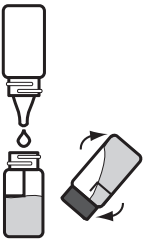
PROCEDURE

1. Fill the Water Sample Collecting Bottle (0688) with sample water.	
2. Press and hold ⏻ until colorimeter turns on.	
3. Press ENTER to select **Testing Menu**.	
4. Scroll to and select **025 Chlorine T DPD** from menu.	
5. Rinse a clean tube (0290) with sample water. Fill to the 10 mL line with sample. Cap and wipe dry.	

6. Insert tube into chamber, close lid and select **Scan Blank**.

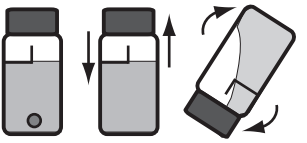


7. Remove tube from colorimeter. Add 5 drops Glycine (6811). Cap and mix.

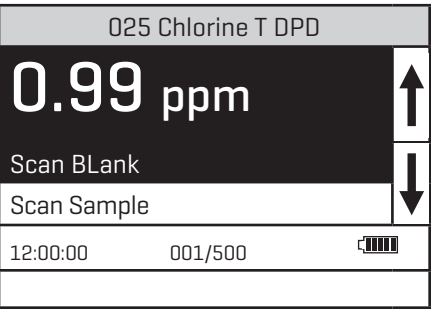


8. Add one DPD #1 IG Tablet (6903A).

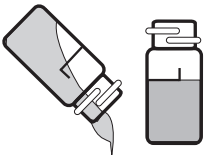
   Cap tube and shake for 10 seconds. Invert slowly 5 times.



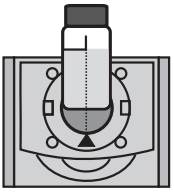
9. Immediately insert tube into chamber. Close lid. Select **Scan Sample**. Record result as **Reading A**.



10. Rinse a clean tube (0290) with sample water. Fill to the 10 mL line with sample. Cap and wipe dry.

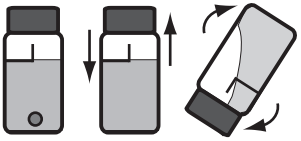


11. Insert tube into chamber, close lid and select **Scan Blank**.

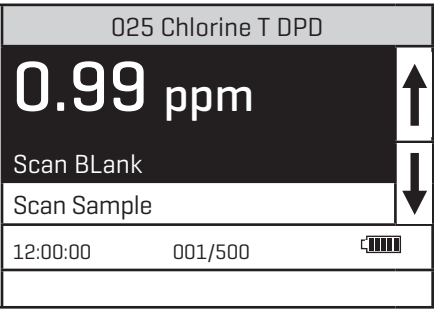


12. Remove tube from colorimeter. Add one DPD #1 IG Tablet (6903A).

    Cap tube and shake for 10 seconds. Invert slowly 5 times.

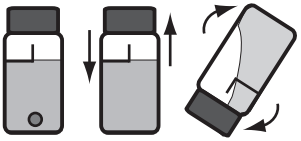


13. Immediately insert tube into chamber. Close lid. Select **Scan Sample**. Record result as **Reading B**.



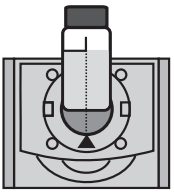
14. Remove tube from colorimeter. Add one DPD #3 IG Tablet (6197A).

    Cap tube and shake for 10 seconds. Invert slowly 5 times.



NOTE: For wastewater samples, ***Standard Methods for the Examination of Water and Wastewater*** recommends waiting 2 minutes for full color development when testing total chlorine.

15. Insert tube into chamber. Close lid. Select **Scan Sample**. Record result as **Reading C**.



16. Free Chlorine (ppm, chlorine) = Reading B - Reading A

    Combined Chlorine (ppm, chlorine) = Reading C - Reading B

17. Press ⏻ to turn off the colorimeter or press EXIT to exit to a previous menu or make another menu selection.

Levels of chlorine about 6 mg/L will cause a bleaching effect on the DPD indicator, and may give a false indication that no chlorine is present. If if is possible that the chlorine concentration is greater than 6 mg/L, perform test on a diluted sample and multiply the result by appropriate dilution factor.

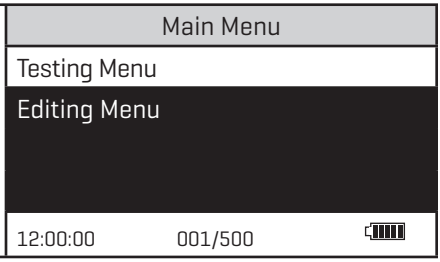
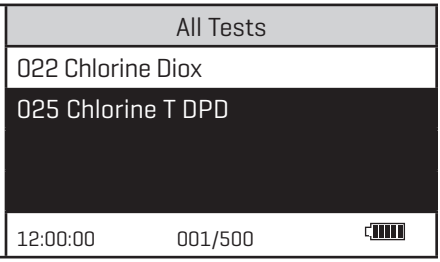
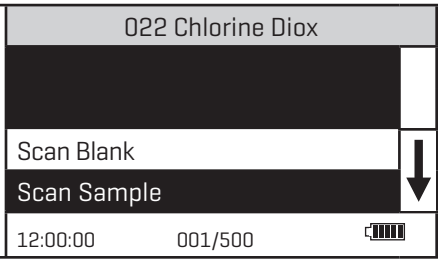
CAUTION: DO NOT leave reacted samples in test tubes. Discard sample and thoroughly rinse tubes. If allowed to remain, DPD wil stain tubes, signigicantly impairing the operation of the colorimeter. If necessary, acid wash, and vigorously clean glassware with test tube brush and detergent.

NOTE: For the most accurate results, samples over 6 ppm chlorine should be diluted with chlorine demand free water and re-tested.

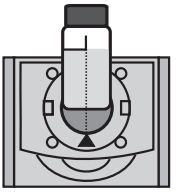
NOTE: The meter will remember the last scanned blank reading. It is not necessary to scan a blank each time the test is performed. To use the previous blank reading, instead of scanning a new one, scroll to Scan Sample and proceed. For the most accurate results, the meter should be blanked before each test and the same tube should be used for the blank and the reacted sample.

ANALYSIS:
CHLORINE DIOXIDE IN THE ABSENCE OF CHLORINE

PROCEDURE

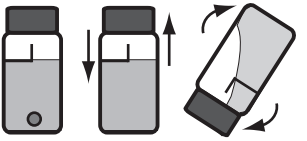
1. Fill the Water Sample Collecting Bottle (0688) with sample water.	
2. Press and hold ⏻ until colorimeter turns on.	
3. Press ENTER to select **Testing Menu**.	
4. Scroll to and select **022 Chlorine Diox** from menu.	
5. Rinse a clean tube (0290) with sample water. Fill to the 10 mL line with sample. Cap and wipe dry.	

6. Insert tube into chamber, close lid and select **Scan Blank**.



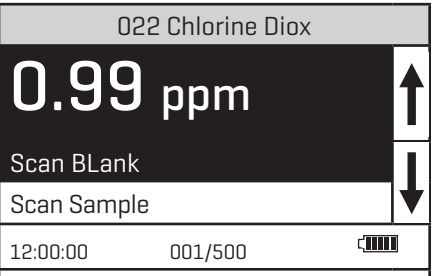
7. Add one DPD #1 IG Tablet (6903A).

   Cap tube and shake for 10 seconds. Invert slowly 5 times. Solution will turn pink if chlorine dioxide is present.



8. Immediately insert tube into chamber. Close lid. Select **Scan Sample**. Record result as Chlorine Dioxide.

   Note: To express the chlorine dioxide concentraion in units of chlorine equivilence (ppm, chlorine), select 021 Chlorine T DPD in Step 4.

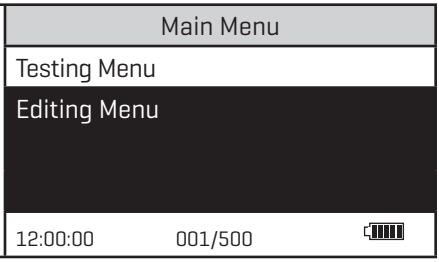
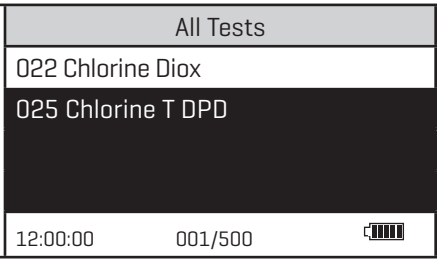
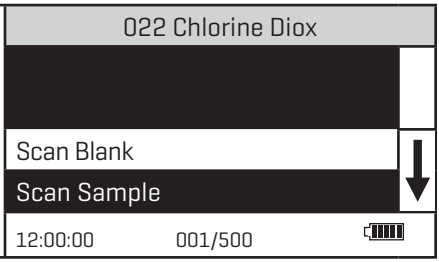
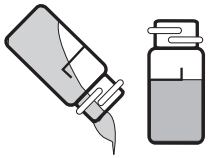


NOTE: For the most accurate results, samples over 12 ppm chloride dioxide should be diluted with chlorine demand free water and re-tested.

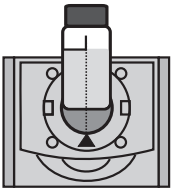
NOTE: The meter will remember the last scanned blank reading. It is not necessary to scan a blank each time the test is performed. To use the previous blank reading, instead of scanning a new one, scroll to Scan Sample and proceed. For the most accurate results, the meter should be blanked before each test and the same tube should be used for the blank and the reacted sample.

ANALYSIS:
CHLORINE DIOXIDE IN THE PRESENCE OF CHLORINE

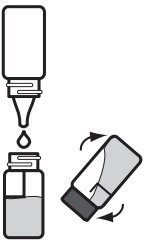
PROCEDURE

1. Fill the Water Sample Collecting Bottle (0688) with sample water.	
2. Press and hold ⏻ until colorimeter turns on.	
3. Press ENTER to select **Testing Menu**.	
4. Scroll to and select **022 Chlorine Diox** from menu.	
5. Rinse a clean tube (0290) with sample water. Fill to the 10 mL line with sample. Cap and wipe dry.	

6. Insert tube into chamber, close lid and select **Scan Blank**.

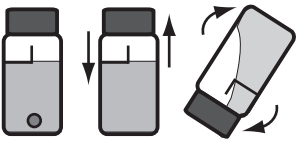


7. Remove tube from colorimeter. Add 5 drops Glycine (6811). Cap and mix.



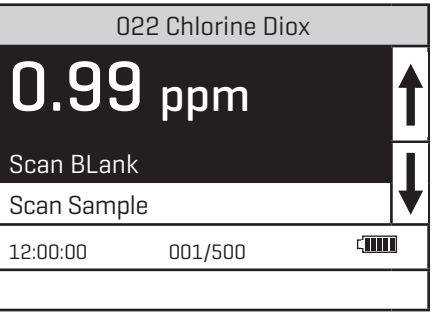
8. Add one DPD #1 IG Tablet (6903A).

   Cap tube and shake for 10 seconds. Invert slowly 5 times. Solution will turn pink if chlorine dioxide is present.



9. Immediately insert tube into chamber. Close lid. Select **Scan Sample**. Record result as Chlorine Dioxide.

   Note: To express the chlorine dioxide concentraion in units of chlorine equivilence (ppm, chlorine), select 025 Chlorine T DPD in Step 4.



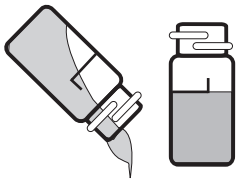
10. Press ⏻ to turn off the colorimeter or press EXIT to exit to a previous menu or make another menu selection.

NOTE: For the most accurate results, samples over 12 ppm chloride dioxide should be diluted with chlorine demand free water and re-tested.

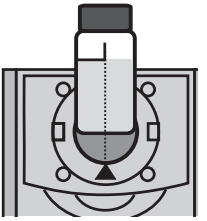
NOTE: The meter will remember the last scanned blank reading. It is not necessary to scan a blank each time the test is performed. To use the previous blank reading, instead of scanning a new one, scroll to Scan Sample and proceed. For the most accurate results, the meter should be blanked before each test and the same tube should be used for the blank and the reacted sample.

ANALYSIS:
CHLORINE AND CHLORINE DIOXIDE

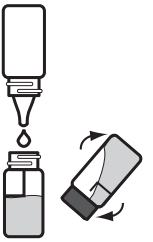
PROCEDURE

1. Fill the Water Sample Collecting Bottle (0688) with sample water.	
2. Press and hold ⏻ until colorimeter turns on.	Main Menu Testing Menu Editing Menu 12:00:00 001/500
3. Press ENTER to select **Testing Menu**.	All Tests 022 Chlorine Diox 025 Chlorine T DPD 12:00:00 001/500
4. Scroll to and select **025 Chlorine T DPD** from menu.	025 Chlorine T DPD Scan Blank Scan Sample 12:00:00 001/500
5. Rinse a clean tube (0290) with sample water. Fill to the 10 mL line with sample. Cap and wipe dry.	

6. Insert tube into chamber, close lid and select **Scan Blank**.

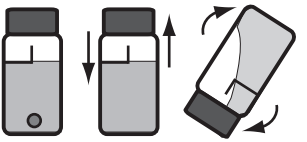


7. Remove tube from colorimeter. Add 5 drops Glycine (6811). Cap and mix.

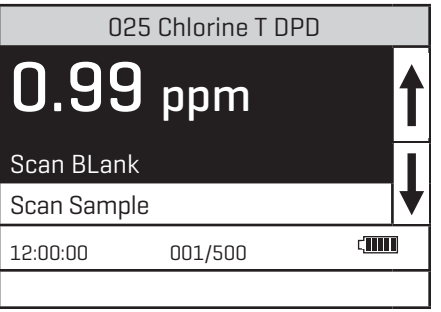


8. Add one DPD #1 IG Tablet (6903A).

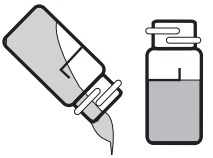
   Cap tube and shake for 10 seconds. Invert slowly 5 times.



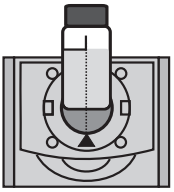
9. Immediately insert tube into chamber. Close lid. Select **Scan Sample**. Record result as **Reading A**.



10. Rinse a clean tube (0290) with sample water. Fill to the 10 mL line with sample. Cap and wipe dry.

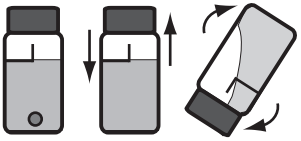


11. Insert tube into chamber, close lid and select **Scan Blank**.

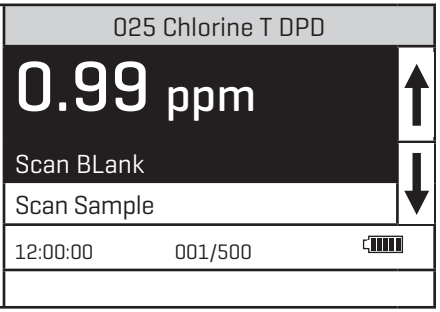


12. Remove tube from colorimeter. Add one DPD #1 IG Tablet (6903A).

    Cap tube and shake for 10 seconds. Invert slowly 5 times.

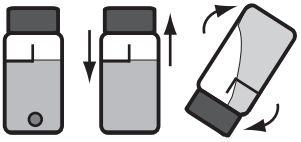


13. Immediately insert tube into chamber. Close lid. Select **Scan Sample**. Record result as **Reading B**.



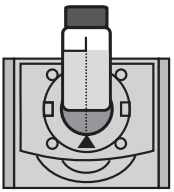
14. Remove tube from colorimeter. Add one DPD #3 IG Tablet (6197A).

    Cap tube and shake for 10 seconds. Invert slowly 5 times.



NOTE: For wastewater samples, ***Standard Methods for the Examination of Water and Wastewater*** recommends waiting 2 minutes for full color development when testing total chlorine.

15. Insert tube into chamber. Close lid. Select **Scan Sample**. Record result as **Reading C**.

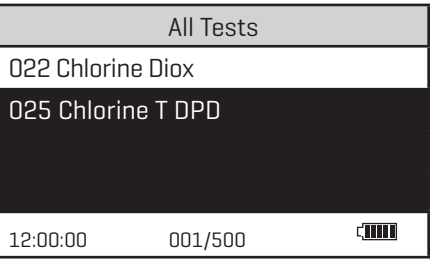


16. Free Chlorine (ppm, chlorine) = Reading B – Reading A

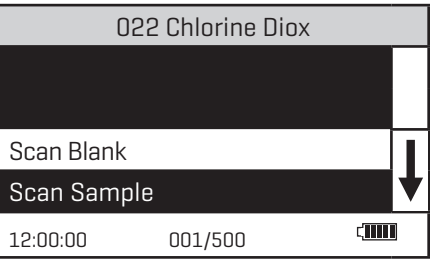
    Combined Chlorine (ppm, chlorine) = Reading C – Reading B

    Chlorine Dioxide (expressed as ppm chlorine) = A

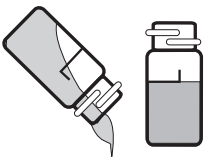
17. Press EXIT to return to **All Tests menu**.



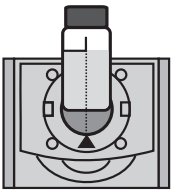
18. Scroll to and select **022 Chlorine Diox** from menu.



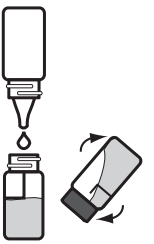
19. Rinse a clean tube (0290) with sample water. Fill to the 10 mL line with sample. Cap and wipe dry.



20. Insert tube into chamber, close lid and select **Scan Blank**.

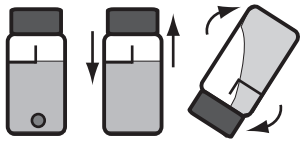


21. Remove tube from colorimeter. Add 5 drops Glycine (6811). Cap and mix.

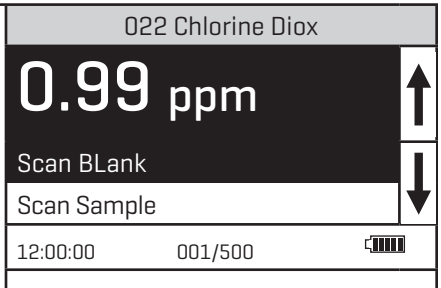


22. Add one DPD #1 IG Tablet (6903A).

    Cap tube and shake for 10 seconds. Invert slowly 5 times. Solution will turn pink if chlorine dioxide is present.



23. Immediately insert tube into chamber. Close lid. Select **Scan Sample**. Record result as Chlorine Dioxide.



24. Press ⏻ to turn off the colorimeter or press EXIT to exit to a previous menu or make another menu selection.

CALIBRATION

■ CHLORINE STANDARDS

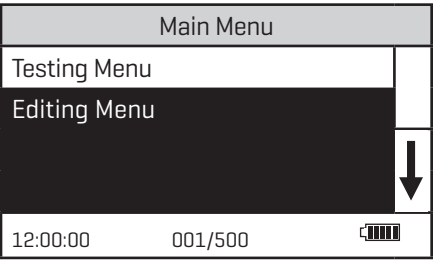
The meter should be calibrated with free chlorine standards. The calibration should be done with a distilled or deionized water blank and one chlorine standard of known concentration. The concentration of the calibration standard should be similar to the expected concentration of the sample that will be tested.

To perform a chlorine dioxide calibration, prepare a chlorine standard with a concentration that is equivenlent to a chlorine dioxide standard that is within the range of the chlorine dioxide test. (1 ppm chlorine = 1.9 ppm chlorine dioxide). Follow the procedure below but select the chlorine dioxide test.

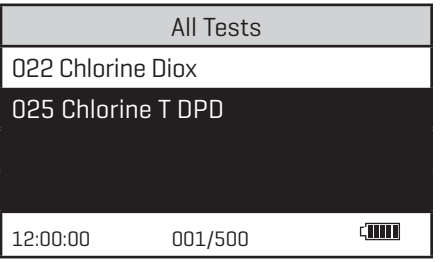
Chlorine Secondary Standards (Code 4140-03) are available to verify the performance of the meter.

CHLORINE CALIBRATION PROCEDURE

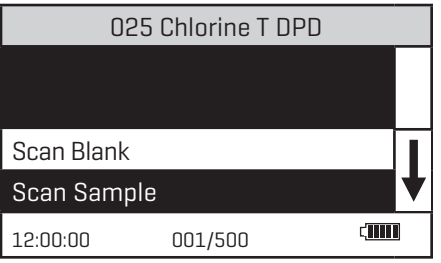
1. Press and briefly hold ⏻ to turn the meter on. The LaMotte logo screen will appear for about 3 seconds and the **Main Menu** will appear.



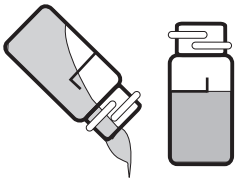
2. Press ENTER to select **Testing Menu**.



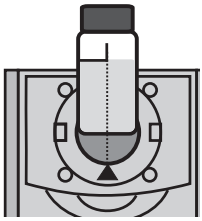
3. Scroll to and select **025 Chlorine T DPD** from menu.



4. Rinse a clean tube (0290) three times with the chlorine standard. Fill to the 10 mL line with the chlorine standard. Cap the tube. Dry hte tube with a lint-free cloth.

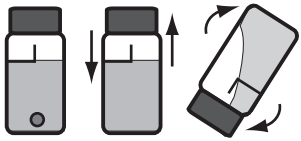


5. Insert tube into chamber, close lid and select **Scan Blank**.

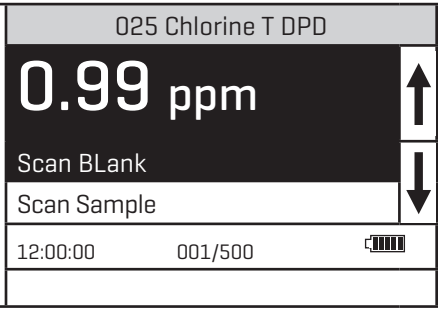


6. Remove tube from colorimeter. Add one DPD #1 IG Tablet (6903A).

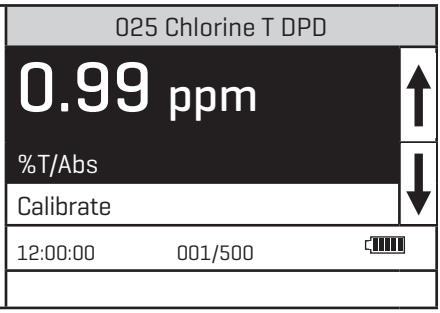
   Cap tube and shake for 10 seconds. Invert slowly 5 times. Solution will turn pink if free chlorine is present.



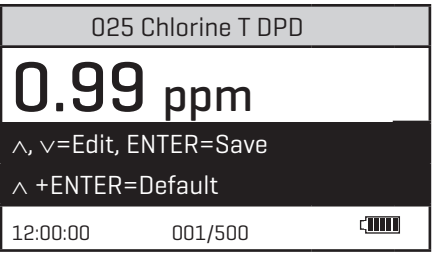
7. Immediately insert tube into chamber. Close lid. Select **Scan Sample**.



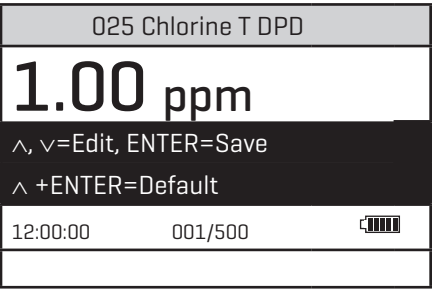
8. Press ▼ to scroll to **Calibrate**.



9. Press ENTER to select **Calibrate**. A reverse font (light background with dark characters) will appear to indicate that the reading can be adjusted.



10. Press ∧ or ∨ to adjust the value shown to the concentration of the prepared standard, 1.00 in this example. NOTE: A maximum adjustment of 25% is possible.

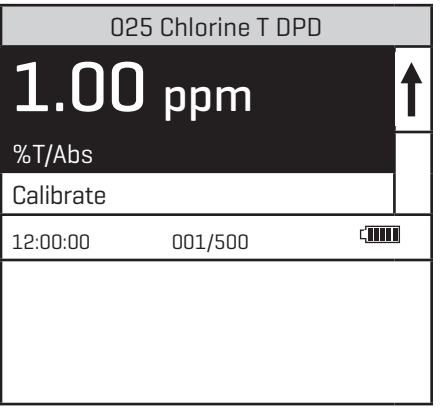


11. Press ENTER to save the value.

    To leave the Calibration procedure without saving the adjustment, press EXIT.

    Press ∧ and ENTER at any time to return to the default value.

    The calibration has now been standardized and can be used for testing. Scroll to **Scan Blank** and begin testing.

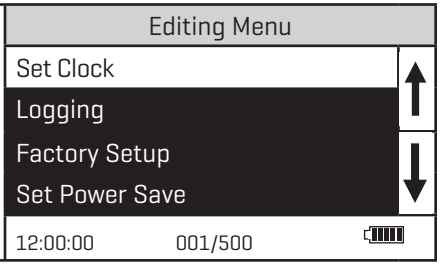


SET UP

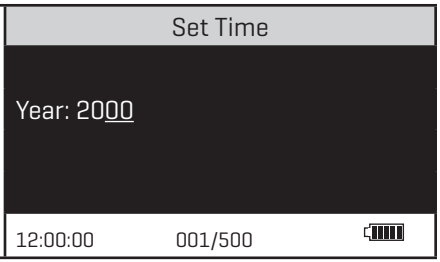
■ SETTING THE CLOCK

Setting the clock allows the correct time and date stamp to be stored with each reading in the data logger.

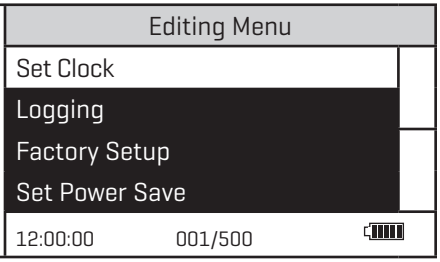
1. From the **Editing Menu**, press ^ or v to scroll to **Set Clock**.



2. Press ENTER to select **Set Clock**. The year is displayed. Press ^ or v to scroll to the appropriate character. Press ENTER to select the character. The month, day, hour, format hour, minute, second, AM/PM will be dislpayed. Repeat for each.



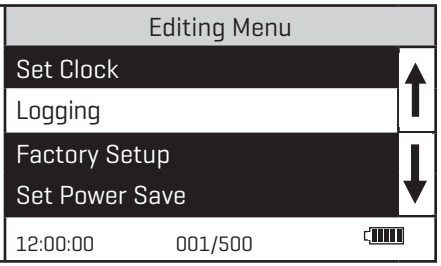
3. Press ENTER to select the final character. The time and date will be saved and the meter will return to the **Editing Menu**.



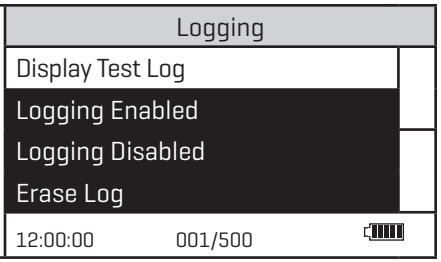
■ LOGGING DATA

The default setting for the data logger is enabled. The meter will log the last 500 data points. The counter in the center bottom of the display will show how many data points have been logged. The display will show 500+ when the data logger has exceeded 500 points and the data points are being overwritten.

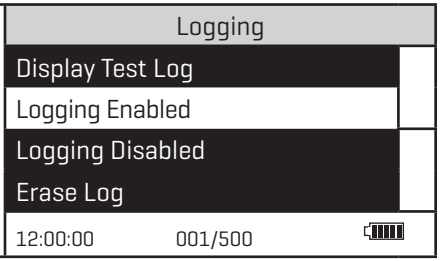
1. From the **Editing Menu**, press ▲ or ▼ to scroll to **Logging**.



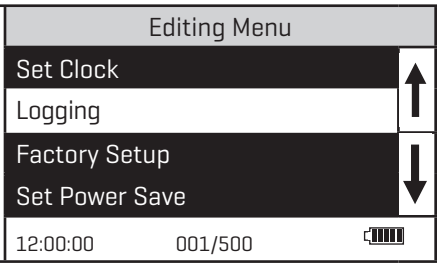
2. Press ENTER to select **Logging**.



3. Press ▲ or ▼ to scroll to desired function.



4. Press ENTER. The screen will display **Storing...** for about 1 second and return to the **Editing Menu**.

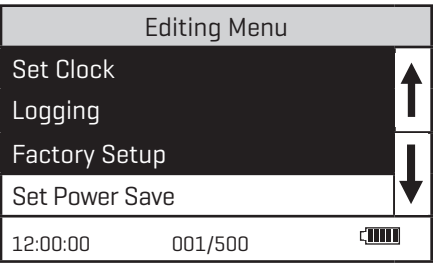
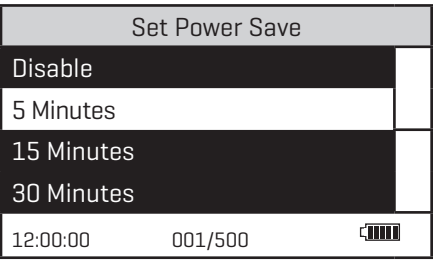
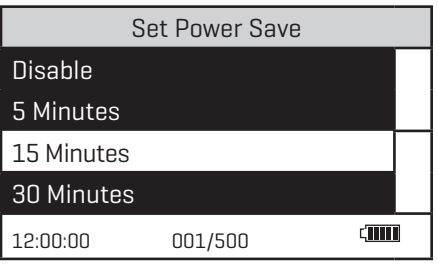
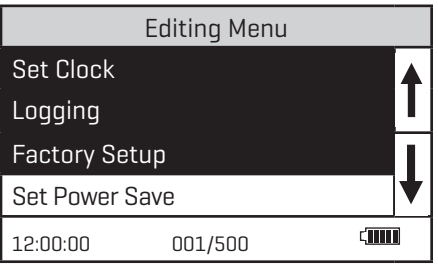


■ FACTORY SETUP

The Factory Setup menu is used in manufacturing of the colorimeter. This menu is not for use by the operator in the field.

■ SETTING POWER SAVE

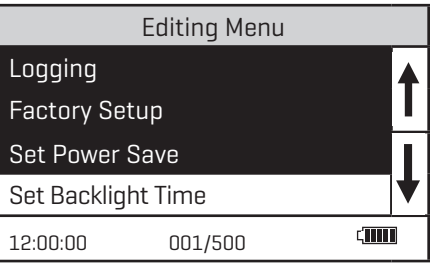
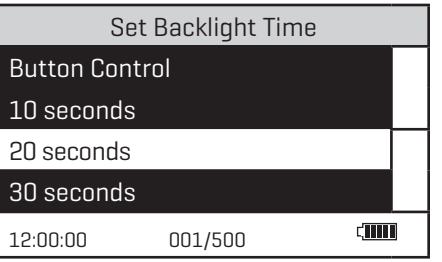
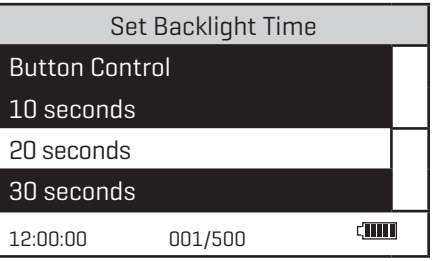
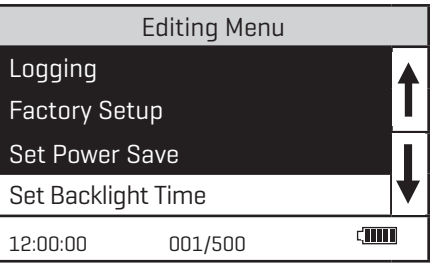
The power saving Auto Shutoff feature will turn the meter off when a button has not been pushed for a set amount of time. The default setting is disabled. To change the setting:

1. From the **Editing Menu**, press ▲ or ▼ to scroll to **Set Power Save**.	
2. Press ENTER to select **Set Power Save**.	
3. Press ▲ or ▼ to scroll to desired function.	
4. Press ENTER. The screen will display **Storing....** for about 1 second and the meter will retun to the **Editing Menu**.	

■ SETTING THE BACKLIGHT TIME

The backlight illuminates the display for enhanced viewing. The default setting is 10 seconds. If Button Control is chosen the backlight button on the key pad will act as an on/off switch and the backlight will remain on or off when the meter is being used. When one of the other settings – 10, 20 or 30 seconds – is chosen, the display will be illuminated for the specified amount of time after any button is pressed.

NOTE: The backlight feature uses a significant amount of power. The longer the backlight is on, the more frequently the battery will have to be charged if the USB/ Wall Adapter is not being used.

1. From the **Editing Menu**, press ▲ or ▼ to scroll to **Backlight Time**.	
2. Press ENTER to select **Set Backlight Time**.	
3. Press ▲ or ▼ to scroll to desired option.	
4. Press ENTER. The screen will display **Storing...** for about 1 second and the meter will return to the **Editing Menu**.	

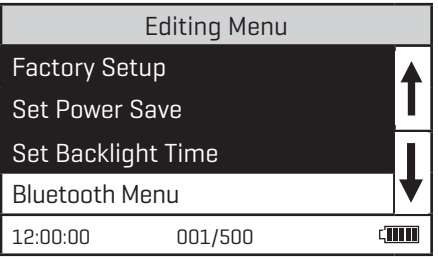
■ BLUETOOTH MENU

Enabling Bluetooth Power

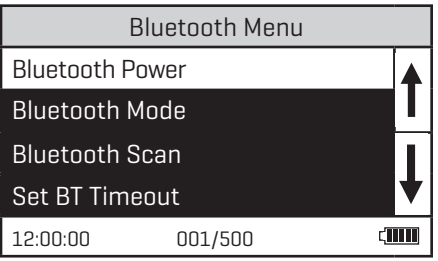
Bluetooth wireless technology allows communication between the colorimeter and a BLE Mobile Printer (Code 5-0067 only). Bluetooth Power must be enabled to use the BLE Mobile Printer (Code 5-0067). When Bluetooth Power is enabled, the Bluetooth icon will flash next to the battery icon on the bottom line of the display.

If the Bluetooth feature is not being used to connect to the printer, Bluetooth Power should be disabled to conserve the battery life. The default Bluetooth Power setting is disabled.

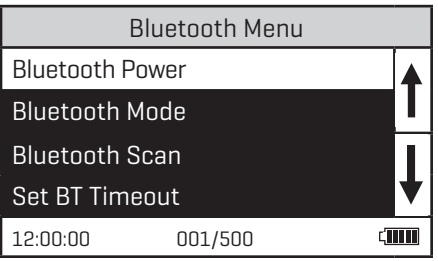
1. From the **Editing Menu**, press ▲ or ▼ to scroll to **Bluetooth Menu**.



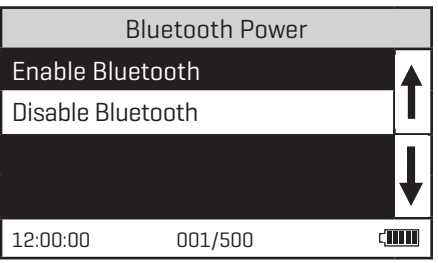
2. Press ENTER to select **Bluetooth Menu**.



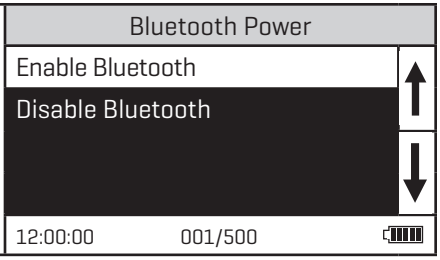
3. Press ▲ or ▼ to scroll to **Bluetooth Power**.



4. Press ENTER to select **Bluetooth Power**.



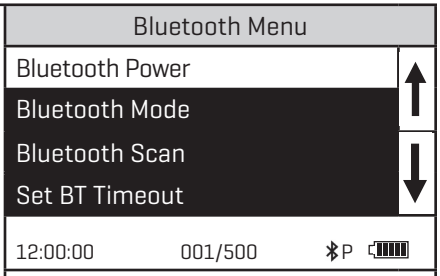
5. Press ^ or v to scroll to desired option.



6. Press ENTER to select the option. Bluetooth Power must be enabled to use the BLE Mobile Printer (Code 5-0067).

   The screen will display **Storing**... for about 1 second and the meter will return to the **Bluetooth Menu**.

   A flashing ᛒP symbol will indicate that Bluetooth is enabled.



■ Pairing

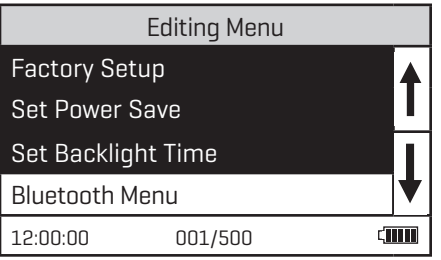
The Bluetooth Pairing option for the BT meter is Option 2. The default setting when the printer is received is Option 1 so the option selection must be changed to Option 2 when the printer is received.

1. Ensure the printer is OFF.
2. Press and hold the Mode button while powering the printer ON. After about five seconds, the Status light will flash five times to show that the printer is in configuration mode. Release the Mode button.
3. Press the Mode button four times to select Option 4.
4. After a short delay, the Status light will flash four times to indicate that Option 4 is selected. If you have made a mistake at this stage, simply wait. After a delay, the printer will power-on without changing any options.
5. To proceed with configuration, press the Mode button twice to select Option 2.
6. After a short delay, the Status light will flash twice to show that Option 2 has been selected.
7. After a further delay, the printer will power-on with the new setting.

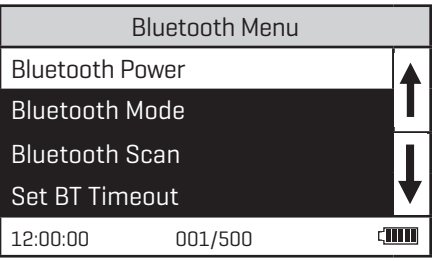
■ Printer Setup

A Bluetooth connection is available only for the BLE Mobile Printer (5-0067).

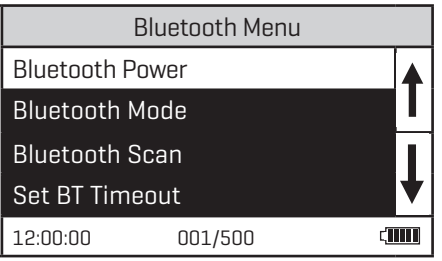
1. From the **Editing Menu**, press ▲ or ▼ to scroll to **Bluetooth Menu**.



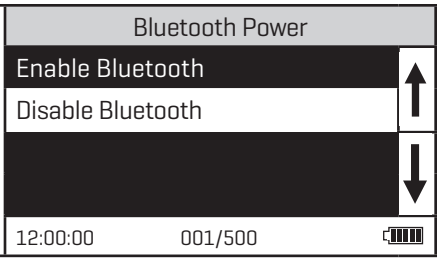
2. Press ENTER to select **Bluetooth Menu**.



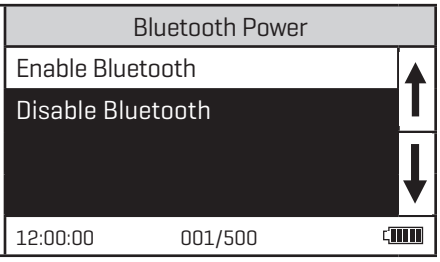
3. Press ▲ or ▼ to scroll to **Bluetooth Power**.



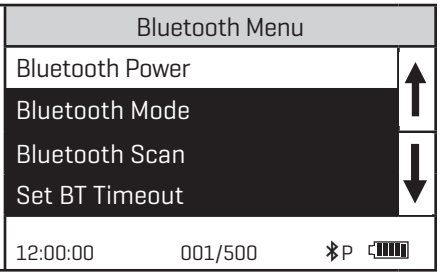
4. Press ENTER to select **Bluetooth Power**.



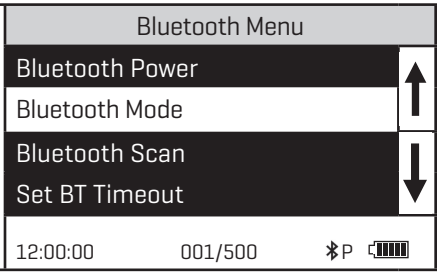
5. Press ▲ or ▼ to scroll to **Enable Bluetooth**.



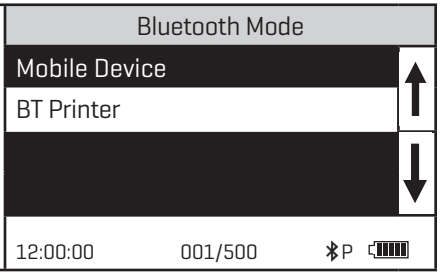
6. Press ENTER to select **Enable Bluetooth**.



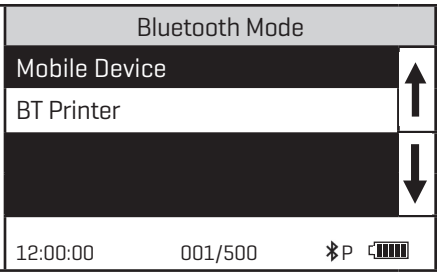
7. Press ▲ or ▼ to scroll to **Bluetooth Mode**.



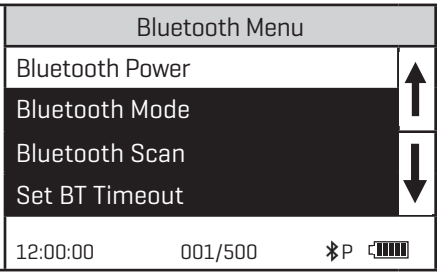
8. Press ENTER to select **Bluetooth Mode**.



9. Press ▲ or ▼ to scroll to **BT Printer**.

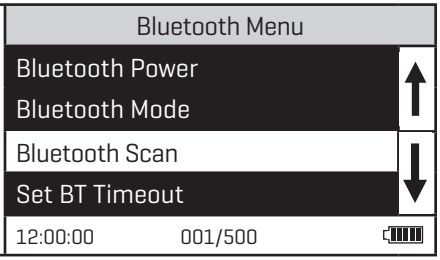


10. Press ENTER to select **BT Printer**. The meter is now ready to connect with a Bluetooth printer. When the meter is available for the Bluetooth connection the Bluetooth printer icon ᛒP next to the battery icon will flash.

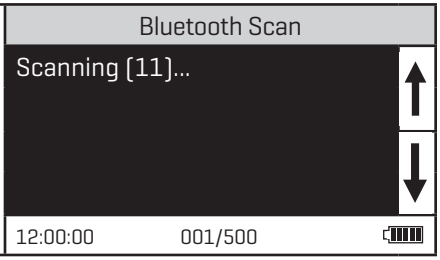


11. Turn on the BLE Mobile Printer (5-0067).

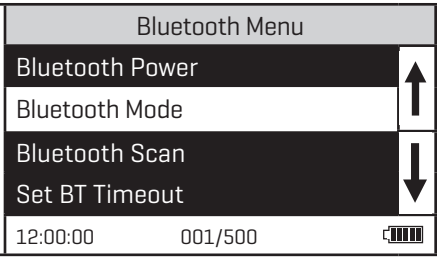
12. Press ▲ or ▼ to scroll to **Bluetooth Scan**.



13. Press ENTER to select **Bluetooth Scan**. The meter will begin scanning. A countdown timer will begin counting down from 11 seconds. The Bluetooth printer address will be displayed.



14. Press ENTER to select **Bluetooth Printer**.

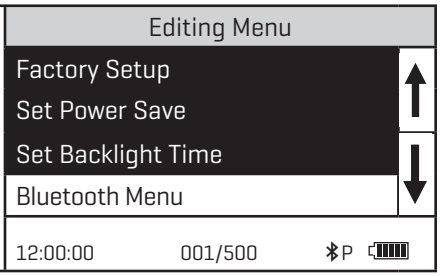


15. Within a few seconds the printer will connect to the meter and print a pairing confirmation message.

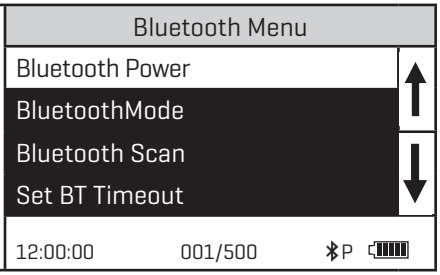
Set BT Timeout

The Bluetooth Timeout can be set to allow the Bluetooth feature to be on to allow data to be sent to the Bluetooth printer and then turn off after a specified amount of time.

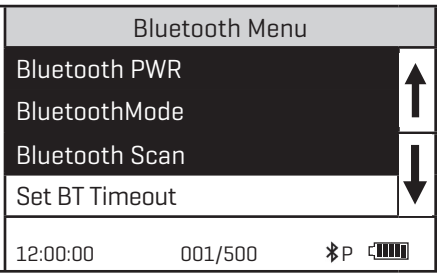
1. From the **Editing Menu**, press ▲ or ▼ to scroll to **Bluetooth Menu**.



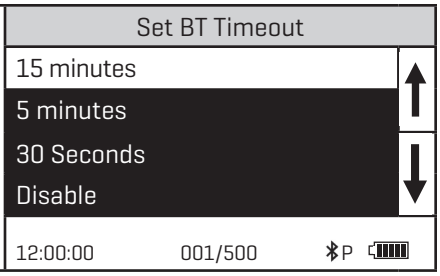
2. Press ENTER to select **Bluetooth Menu**.



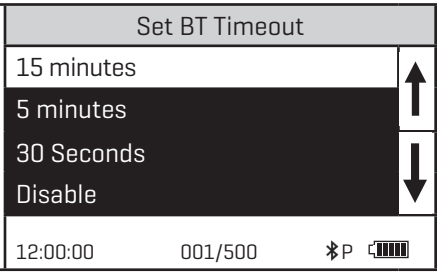
3. Press ▲ or ▼ to scroll to **Set BT Timeout**.



4. Press ENTER to select **Set BT Timeout**.



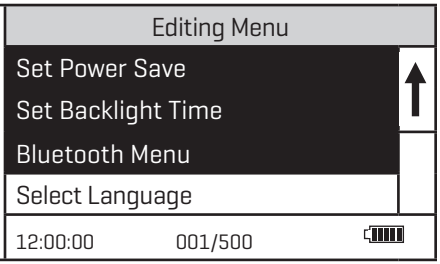
5. Press ^ or v to scroll to desired option.



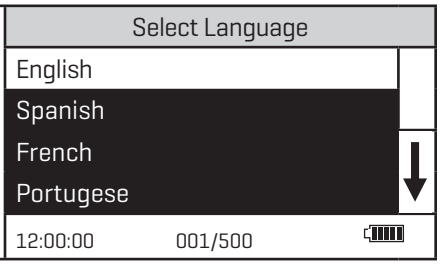
■ SELECTING A LANGUAGE

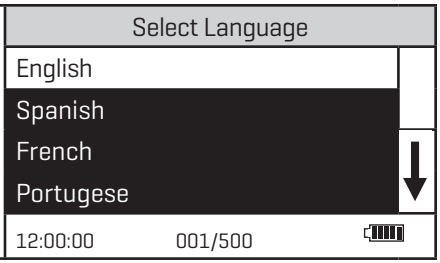
There are eight languages available: English, Spanish, French, Portuguese, Italian, Chinese, Japanese, and Turkish.

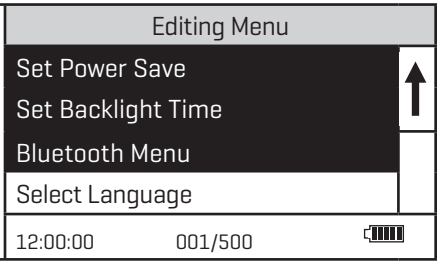
1. From the **Editing Menu**, press ^ or v to scroll to **Select Language**.



2. Press ENTER to select **Select Language**.



3. Press ^ or v to scroll to desired language.	

4. Press ENTER. The screen will display **Storing...** for about 1 second and the meter will return to the **Editing Menu**.	

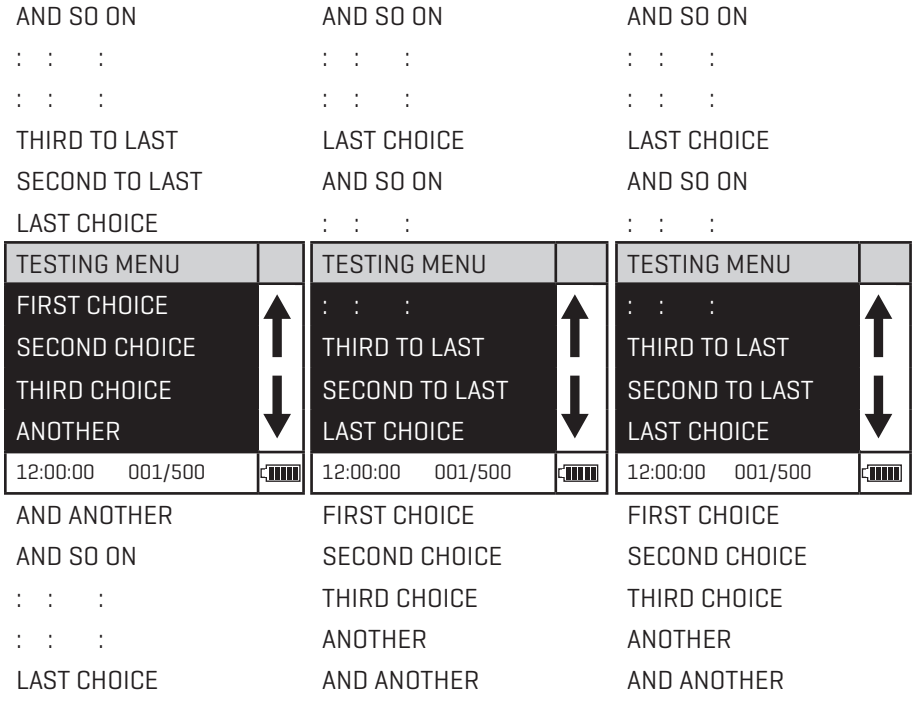
NOTE: If meter unintentionally switches to another language, use the procedure above to reset the meter to the desired language. For example, to reset the meter to English:

Turn meter on.

1. Press v one time. Press ENTER.
2. Press v six times. Press ENTER.
3. Press ENTER.

■ LOOPING MENUS

Long menus, such as All Tests, incorporate a looping feature which allows the user to quickly reach the last choice in the menu from the first choice. In a looping menu the last choices in the menu are above the first choice and scrolling upward moves through the menu in reverse order. Scrolling downward moves through the menu from first choice to last but the menu starts over following the last choice. So all menu choices can be reached by scrolling in either direction. The diagrams below demonstrate a looping menu.



The feature called **Looping Menu** can be turned on and off in the **Editing Menu**. The default setting is ON.

COMPUTER CONNECTION

■ OUTPUT

USB

■ COMPUTER CONNECTION

USB Type A, USB mini B, Order Cable Code 1720-01.

■ WATERLINK CONNECT 2

The meter may be interfaced with any Windows-based 64-bit computer by using the LaMotte WaterLink Connect 2 program and a USB cable. The program will store test information and results in a local database and allow for exporting this data to a comma separated value (CSV) file. The meter will send the following data: name of test, sample value, sample units, time/date stamp, and meter name. To download WaterLink Connect 2 go to http:// softwarecenter.lamotte.com/. Select "WaterLink Connect 2 FREE Download".

■ BLUETOOTH CONNECTION

The meter uses Bluetooth Low Energy technology to allow communication between the meter and the BLE Mobile Printer (Code 5-0067 only). The meter will automatically connect to the nearest Bluetooth enabled printer. Barriers to wireless signals can reduce the range of wireless devices. The meter will work best if there are no walls between it and the receiving device. Learn more about LaMotte software products at http://softwarecenter.lamotte.com.

BATTERY

■ BATTERY/AC OPERATION

The colorimeter may be operated on battery power using a USB wall adapter or USB computer connection. If using the meter as a bench top unit, use the wall adapter if possible to extend the battery life. The meter will remain on when the USB adapter is used.

To charge the lithium ion battery with the wall adapter, plug the smaller end of the USB cable (USB mini B connector) into the meter and the larger end of the USB cable (USB type A connector) into the wall adapter. Plug the wall adapter into an AC outlet. Reinsert the rubber USB port plug after charging. Failure to insert the USB port plug when the meter is not connected to a computer by USB or actively charging by USB could result in damage to internal components.

To charge the battery from a computer, plug the smaller end of the USB cable (USB mini B connector) into the meter and the larger end of the USB cable (USB Type A connector) into a USB port on a computer. Reinsert the USB port plug after charging. Failure to insert the USB port plug when the meter is not connected to a computer by USB or actively charging by USB could result in damage to internal components.

The battery icon will show no bars and flash when the unit first turns on. Then the indicator will indicate the battery status by showing 0, 1, 2, 3, or 4 bars. It will take

6 hours to fully charge a low battery. The battery icon will flash when the battery is charging. The battery icon will show four bars and stop flashing when it is fully charged. The charging circuit will automatically switch to a float charge when the battery is fully charged. The charger may remain connected. Some computers will NOT supply power to their USB ports during standby operation. The wall adapter will charge the unit continuously. Storing the meter above ambient room temperature will decrease the battery charge more quickly than storage at room temperature. If the meter does not turn on, it means that the battery is at a very low charge. Charging the battery with the wall adapter in this state may take up to 10 hours. At low temperatures, approaching 0 °C, the battery will charge more slowly. It will not charge at all below 0 °C.

The battery icon will show no bars and continuously flash if the battery is getting low but the unit will still operate normally. A "Low Battery" message on the status bar of the display will replace the time when the battery voltage is too low for proper operation and accuracy may be degraded. A "Shutdown Low Batt" message on the display will appear for a few seconds before the power is switched off when the battery is too low to operate the unit. When the battery icon simultaneously flashes bars 1 and 2 followed by bars 3 and 4, it is an indication that the battery is damaged and technical support should be contacted.

To extend the life of the battery:

- Shut down the unit with the power switch when not taking measurements or use the power save option to have the unit automatically turn off after 5 minutes.
- Store the unit at a moderate temperature.
- Fully charge the battery before storing the unit for extended periods of time.
- Fully charge the battery at least once per year. Failure to do so may result in a permanently drained battery.
- Limit backlight use. The unit consumes three times the normal power when the backlight is on. Set the backlight time option to 10 seconds or select "Button Control" and keep the backlight off.

BATTERY REPLACEMENT

The lithium ion battery used in this unit should last for many years with normal use. When it no longer powers the unit long enough to meet testing requirements it will need to be replaced. Lithium ion batteries that are properly charged and stored do not usually lose all capacity; they just have less capacity after hundreds of charge cycles. This unit uses a custom battery assembly that is only available from LaMotte Company. Battery replacement must be performed at a LaMotte authorized repair facility. The water resistant housing of this meter should not be opened by the user. Contact LaMotte Company by phone (1-800-344-3100) or email (tech@lamotte.com) for a return authorization number.

MAINTENANCE

■ CLEANING

Clean the exterior housing with a damp, lint-free cloth. Do not allow water to enter

the light chamber or any other parts of the meter. To clean the light chamber and optics area, point a can of compressed air into the light chamber and blow the pressurized air into the light chamber. Use a cotton swab dampened with Windex® window cleaner to gently swab the interior of the chamber. Do not use alcohol; it will leave a thin residue over the optics when dry.

■ RETURNS

Should it be necessary to return the meter, pack the meter carefully in a suitable container with adequate packing material. A return authorization number must be obtained from LaMotte Company by calling 800-344-3100 (US only) or 410-778-3100, faxing 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 and FAX numbers to the shipping carton. .

■ METER DISPOSAL

Waste Electrical and Electronic Equipment (WEEE)

Natural resources were used in the production of this equipment. This equipment may contain materials that are hazardous to health and the environment. To avoid harm to the environment and natural resources, the use of appropriate take-back systems is recommended. The crossed out wheeled bin symbol on the meter encourages the use of these systems when disposing of this equipment.

Take-back systems will allow the materials to be reused or recycled in a way that will not harm the environment. For more information on approved collection, reuse, and recycling systems contact local or regional waste administration or recycling services.

GENERAL OPERATING INFORMATION

■ OVERVIEW

The meter is a portable, microprocessor controlled, direct reading colorimeter. It has a graphical liquid crystal display and 6 button keypad. These allow the user to select options from the menu driven software, to directly read test results or to review stored results of previous tests in the data logger. The menus can be displayed in eight different languages.

The LaMotte tests are precalibrated for LaMotte reagent systems.The colorimeter displays the result of these tests directly in units of concentration.

The optics feature a colored LED. The LED has a corresponding silicon photoiode with an integrated interference filter. The interference filter selects a narrow band of light from the corresponding LED for the colorimetric measurements.

A USB wall adapter, USB computer connection or lithium battery powers the colorimeter.

Bluetooth wireless technology allows communication between the colorimeter and the Bluetooth Mobile Printer (Code 3-0066 only).

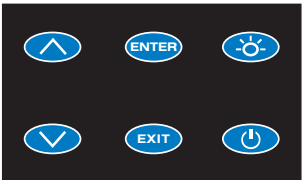
■ GENERAL OPERATING INFORMATION

The operation of the colorimeter is controlled by the menu driven software and user interface. A menu is a list of choices. This allows a selection of various tasks for the colorieter to perform, such as scan blank and scan sample. The keypad is used to make menu selections that are viewed on the display.

■ THE KEYPAD

The keypad has 6 buttons which are used to perform specific tasks.

	This button will scroll up through a list of menu selections.
	The button is used to select choices in a menu viewed on the display.
	This button controls the backlight on the display.
	This button will scroll down through a list of menu selections.
	This button exits to the previous menu.
	This button turns the meter on or off.

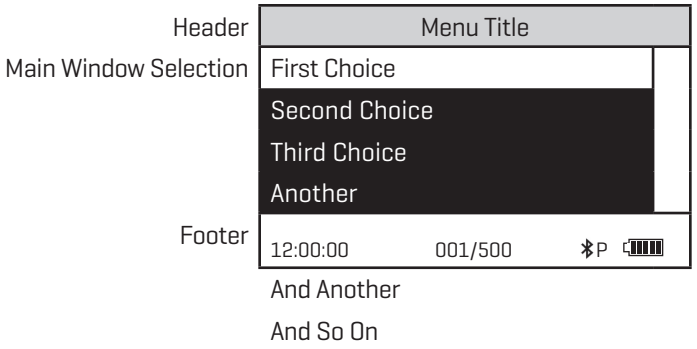


■ THE DISPLAY AND MENUS

The display allows menu selections to be viewed and selected. These selections instruct the colorimeter to perform specific tasks. The menus are viewed in the display using two general formats that are followed from one menu to the next. Each menu is a list of choices or selections.

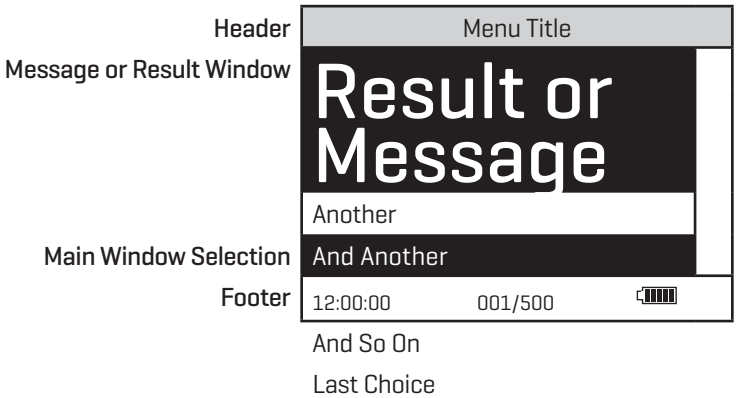
The display has a header line at the top and a footer line at the bottom. The header displays the title of the current menu. The footer line displays the time and the date, the data logger status, the bluetooth/printer status and the battery status. The menu selection window is in the middle of the display between the header and the footer.

The menu selection window displays information in two general formats. In the first format only menu selections are displayed. Up to 4 lines of menu selections may be displayed. If more selections are available they can be viewed by pressing the arrow buttons to scroll the other menu selections into the menu selection window. Think of the menu selections as a vertical list in the display that moves up or down each time an arrow button is pressed. Some menus in the colorimeter are looping menus. The top and bottom menu choices are connected in a loop. Scrolling down past the bottom of the menu will lead to the top of the menu. Scrolling up past the top of the menu will lead to the bottom of the menu.



A light bar will indicate the menu choice. As the menu is scrolled through, the light bar will highlight different menu choices. Pressing the ENTER button will select the menu choice that is indicated by the light bar.

In the second format the menu choice window takes advantage of the graphical capabilities of the display. Large format graphic information, such as test results or error messages or the LaMotte logo is displayed. The top two lines of the display are used to display information in a large, easy to read format. The menus work in the same way as previously described but two lines of the menu are visible at the bottom of the display.



As described previously, the EXIT button allows an exit or escape from the current menu and a return to the previous menu. This allows a rapid exit from an inner menu to the main menu by repeatedly pushing the EXIT button. Pushing ⏻ at any time will turn the colorimeter off.

The display may show the following messages:

	Battery Status
	More choices are available and can be viewed by scrolling up and/or down through the display.
Header	Identifies the current menu and information on units and reagent systems if applicable.
Footer	In the data logging mode the number of the data point is displayed and the total number of data points in the memory will be shown. The footer also shows current time and battery status

■ TUBES AND CHAMBERS

The colorimeter uses one type of tube (Code 0290) for all test factors.

The handling of the tubes is of utmost importance. Tubes must be clean and free from lint, fingerprints, dried spills and significant scratches, especially the central zone between the bottom and the sample line.

Scratches, fingerprints and water droplets on the tube can cause stray light interference leading to inaccurate results. Tubes that have been scratched in the light zone through excessive use should be discarded and replaced with new ones.

Tubes should always be washed on the inside and outside with mild detergent prior to use to remove dirt or fingerprints. The tubes should be allowed to air-dry in an inverted position to prevent dust from entering the tubes. Dry tubes should be stored with the caps on to prevent contamination.

After a tube has been filled and capped, it should be held by the cap and the outside surface should be wiped with a clean, lint-free absorbent cloth until it is dry and smudge-free. Handling the tube only by the cap will avoid problems from fingerprints. Always set the clean tube aside on a clean surface that will not contaminate the tube. It is imperative that the tubes and light chamber be clean and dry. The outside of the tubes should be dried with a clean, lint-free cloth or disposable wipe before they are placed in the meter chamber.

Tubes should be emptied and cleaned as soon as possible after reading a sample to prevent deposition of particulates on the inside of the tubes.

Variability in the geometry of the glassware and technique is the predominate cause of variability in results. Slight variations in wall thickness and the diameter of the tubes may lead to slight variations in the test results. To eliminate this error the tubes should be placed in the chamber with the same orientation each time.

Chambers which have been scratched through excessive use should be discarded and replaced with a new one.

■ SAMPLE DILUTION TECHNIQUES

If a test result is out of the range of the meter, it must be diluted. The test should then be repeated on the diluted sample. The following table gives quick reference guidelines for dilutions of various proportions.

Amount of Sample	Deionized Water to Bring Final Volume to 10 mL	Multiplication Factor
10 mL	0 mL	1
5 mL	5 mL	2
2.5 mL	7.5 mL	4
1 mL	9 mL	10
0.5 mL	9.5 mL	20

All dilutions are based on a final volume of 10 mL, so several dilutions will require small volumes of the water sample. Graduated pipets should be used for all dilutions. If volumetric glassware is not available, dilutions can be made with the colorimeter tube. Fill the tube to the 10 mL line with the sample and then transfer it to another container. Add 10 mL volumes of deionized water to the container and mix. Transfer 10 mL of the diluted sample to the colorimeter tube and follow the test procedure. Repeat the dilution and testing procedures until the result falls within the range of the calibration. Multiply the test result by the dilution factor. For example, if 10 mL of the sample water is diluted with three 10 mL volumes of deionized water, the dilution factor is four. The test result of the diluted sample should be multiplied by four.

GENERAL INFORMATION

■ PACKAGING AND DELIVERY

Experienced packaging personnel at LaMotte Company assure adequate protection against normal hazards encountered in transportation of shipments.

After the product leaves LaMotte Company, all responsibility for safe delivery is assured by the transportation company. Damage claims must be filed immediately with the transportation company to receive compensation for damaged goods.

■ GENERAL PRECAUTIONS

READ THE INSTRUCTION MANUAL BEFORE ATTEMPTING TO SET UP OR OPERATE THE METER. Failure to do so could result in personal injury or damage to the meter. The meter should not be used or stored in a wet or corrosive environment. Care should be taken to prevent water from wet tubes from entering the meter chamber.

NEVER PUT WET TUBES IN THE METER.

■ SAFETY PRECAUTIONS

Read the labels on all LaMotte reagent containers prior to use. Some containers include precautionary notices and first aid information. Certain reagents are considered hazardous substances and are designated with a * in the instruction manual. Safety Data Sheets (SDS) can be found at www.lamotte.com. Read the SDS before using these reagents. Additional emergency information for all LaMotte reagents is available 24 hours a day from the National Poison Control Center 1-800-222-1222 or by contacting the 24 hour emergency line for ChemTel 1-800-255-3924 (USA, Canada, Puerto Rico); locations outside the North American Continent 813-248-0585 (call collect). Be prepared to supply the name and four-digit LaMotte code number found on the container label or at the top of the SDS or in the contents list of the procedure. LaMotte reagents are registered with a computerized poison control information system available to all local poison control centers.

Keep equipment and reagent chemicals out of the reach of young children.

Ensure that the protection provided by this equipment is not impaired. Do not intall or use this equipment in a manner that is not indicated in this manual.

■ LIMITS OF LIABILITY

Under no circumstances shall LaMotte Company be liable for loss of life, property, profits, or other damages incurred through the use or misuse of its products.

■ SPECIFICATIONS & RANGES

INSTRUMENT TYPE: Colorimeter

Readout	160 x 100 backlit LCD, 20 x 6 line graphical display
Wavelengths	525 nm
Wavelength Accuracy	±2% FS
Readable Resolution	Determined by reagent system
Wavelength Bandwidth	10 nm typical
Photometric Range	–2 to +2 AU
Photometric Precision	± 0.001 AU at 1.0 AU
Photometric Accuracy	±0.005 AU at 1.0 AU
Sample Chamber	Accepts 25 mm diameter flat-bottomed test tubes
Light Sources	1 LEDs
Detectors	1 silicon photodiode
Modes	Pre-programmed tests, absorbance, %T
Pre-Programmed Tests	YES, with automatic wavelength selection
Languages	English, Spanish, French, Portuguese, Italian, Chinese, Japanese, Turkish
Temperature	Operation: 0-50 °C; Storage: -40-60 °C
Operation Humidity Range	0-90 % RH, non-condensing

USB Port	Mini B		
Power Requirements	USB wall adapter, USB computer connection or lithium ion rechargeable battery		
Battery	Charge Life: Approximately 380 tests with backlight on to 1000 tests with backlight off. Battery Life: Approximately 500 charges.		
Electrical Rating	Rated voltage (5V), Rated power of input current (1.0A) at mini-USB input port		
Data Logger	500 test results		
Waterproof	IP67 with USB port plug in place		
Certifications	BT Radio	FCC ID:	T9J-RN42
		Cert#	6514A-RN42
		BQB LISTED	B014867-SPP and DUN profiles
	CE Mark	Safety	EN61610-1:2010 +Corrigendum 1:2011
		EMC	EN 301 489-17 and EN 301 489
	US	EMC	FCC CFR 47, Part 15, subpart B
	Canada	EMC	ICES-3, (A)/NMB-3(A)
	AU/NZ	EMC	AS/NZS CISPR 22
Dimensions (LxWxH)	3.5 x 7.5 x 2.5 inches, 8.84 x 19.05 x 6.35 cm		
Weight	13 oz, 362 g (meter only)		

■ CE COMPLIANCE

The colorimeter has been independently tested and has earned the European CE Mark of compliance for electromagnetic compatibility and safety. To view certificates of compliance, go to the LaMotte website at www.lamotte.com.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interferences in which case the user will be required to correct the interference at his own expense.

■ IP67 Certification

The meets IP67 standards for protection against dust and immersion only when the USB port plug is in place. Documentation is available at www.lamotte.com.

■ WARRANTY

LaMotte Company warrants this instrument to be free of defects in parts and workmanship for 2 years from the date of shipment. Keep the proof of purchase for warranty verification. If it should become necessary to return the instrument during or the warranty period, contact our Technical Service Department at 1-800-344-3100 or 1-410-778-3100, ext. 3 or softwaresupport@lamotte.com for a return authorization number or visit www.lamotte.com for troubleshooting help. The sender is responsible for shipping charges, freight, insurance, and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. LaMotte Company specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental, or consequential damages. LaMotte Company's total liability is limited to repair or replacement of the product with a new or refurbished meter as determined by LaMotte Company. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

TROUBLESHOOTING

■ ERROR MESSAGES

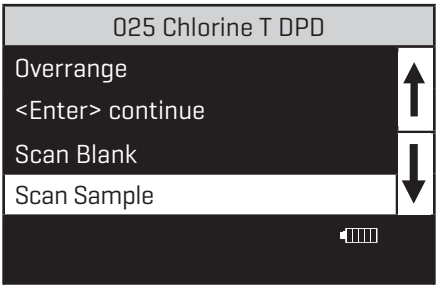
Over Range

f the message OVERRANGE is displayed when scanning a sample, the sample may be over range or under range. If the sample is over range, the sample should be diluted and tested again [see Sample Dilution Techniques and Volumetric Measurements, page 25].

If overrange is displayed, scroll to **Calibrate** and press ENTER to view the result. The concentration is only an **approximation**. Press EXIT and continue testing.

Note: If EXIT is not pressed the meter will calibrate on the over range result.

Note: Over range results will also be displayed in the test log.



■ CALIBRATION

As with all pre-calibrated meters, it is highly recommended, even if not required by regulations, that the user periodically verify the performance of the meter by running standards with a predetermined concentration. Results outside of

specification are an indication that the meter needs to be adjusted. This can be done following the user calibration described on page 24. If the user calibration fails to properly adjust the meter then the meter should be returned to LaMotte Company for recalibration. (See page 52).

■ STRAY LIGHT

The colorimeter should have no problems with stray light. Make sure that the sample compartment lid is always fully closed.

■ TROUBLESHOOTING GUIDE

PROBLEM	*REASON*	*SOLUTION*
Flashing	Low battery. Readings are reliable.	Charge battery or use USB wall/computer adapter.
"Low Battery"	Battery voltage is very low. Readings are not reliable.	Charge battery or use USB wall/computer adapter.
"Shut Down Low Batt" Shut Down	Battery is too low to operate the unit.	Charge battery or use USB wall/computer adapter.
"Overrange"	Sample is outside of acceptable range.	Dilute sample and test again.
Unusually large negative or positive readings when performing calibration	Incorrect standards used to calibrate meter.	Use fresh 0.0 standard in clean tube. Reset meter to factory default settings. Recalibrate meter.

■ SOFTWARE TROUBLESHOOTING

PROBLEM	*REASON*	*SOLUTION*
No printer connected	Colorimeter has not been paired via Bluetooth, or pairing was lost by leaving Bluetooth range.	Re-Pair the colorimeter to the printer.
Printer does not appear in the list of Bluetooth devices	Printer in not powered on.	Power on the printer
Connection lost	Bluetooth pairing with the printer was lost.	Re-Pair the Printer to the colorimeter

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