DC1500-CL

Chlorine Colorimeter Kit · DPD Tablet

Code 3240

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General Information

Trouble Shooting Guide

DC1500 Chlorine & Bromine DPD Tablet Kit

■ Kit Contents

QUANTITY	CONTENTS	CODE
100	*Chlorine DPD #1 Instrument Grade Tablets	*6903A-J
100	*Chlorine DPD #3 Instrument Grade Tablets	*6197A-J
1	Colorimeter Tubes, w/caps,set of 6	0290-6
1	Water Sample Collecting Bottle	0688
1	1500 Colorimeter for Chlorine DPD	26650
1	USB Wall Adapter	1721
1	USB Cable	1720
1	DC1500-CL Chlorine Colorimeter, DPD Tablet Manual	3240-MN
1	DC1500-CL Chlorine Colorimeter, DPD Tablet Quick Start Guide	3240-QG

***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

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.

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
USB Wall Adapter	1721
Car Charger	5-0132
SMARTLink3 Program (CD)	1901-CD

TEST METHODS SPECIFICATIONS

■ APPLICATION

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

■ RANGE

0 to 4.0 ppm Chlorine (may be extended by dilution)

0 to 7.0 ppm Bromine (may be extended by dilution)

■ METHOD

In the absence of Iodide, 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). In buffered samples, bromine reacts with disthyl-p-phenylene diamine (DPD) to produce a pink-red color in proportion to the concentration of bromine present.

■ HANDLING & PRESERVATION

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

■ INTERFERENCES

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 or bromine present, so that the amount of interference can be estimated. Iodine, bromine and chlorine can also interfere, but these are not normally present unless they have been added as additional sanitizers.

■ CALIBRATION

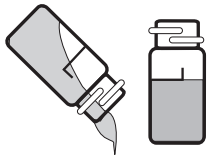
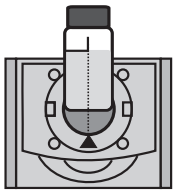
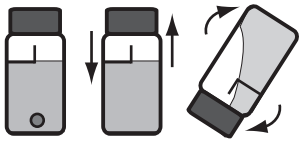
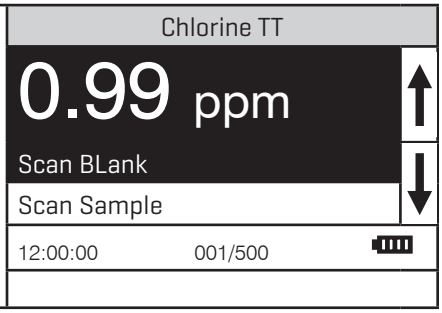
The single test colorimeter is precalibrated. In order to comply with NPDWR or NPDES reporting regulations, the calibration should be checked periodically by using a set of reference standards including a 0 mg/L blank and 0.3, 1.0, and 3.5 mg/L chlorine. To prepare these standards, a LaMotte 1000 mg/L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

ANALYSIS - CHLORINE

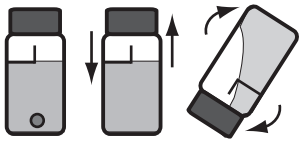
PROCEDURE – FREE CHLORINE

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 Run PC Link 12:00:00 001/500
3. Press ENTER to select **Testing Menu**.	Testing Menu All Tests Menu Absorbance 12:00:00 001/500
4. Press ENTER to select **All Tests Menu**.	All Tests Chlorine TT Chlorine Liq DPD Bromine TT Bromine Liq DPD 12:00:00 001/500
5. Scroll to and select **Chlorine TT** from menu.	Chlorine TT Scan Blank Scan Sample 12:00:00 001/500

Chlorine

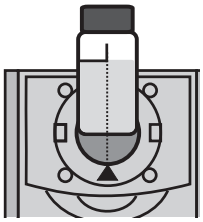
6. Rinse a clean tube (0290) with sample water. Fill to the 10 mL line with sample. Cap and wipe dry.	
7. Insert tube into chamber, close lid and select **Scan Blank**.	
8. Remove tube from colorimeter. Add one *Chlorine DPD #1 Instrument Grade Tablet (6903A). Cap tube and shake for 10 seconds. Invert slowly 5 times. Solution will turn pink if free chlorine is present.	
9. Immediately insert tube into chamber. Close lid. Select **Scan Sample**. Record result as Free Chlorine.	

PROCEDURE – COMBINED CHLORINE

10. Remove tube from colorimeter. Add one *Chlorine DPD #3 Instrument Grade Tablet (6197A) to sample from Step 8. 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 chlorine.

11. 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.



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

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

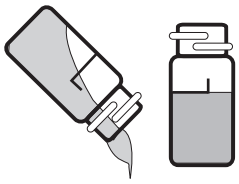
ANALYSIS - BROMINE

PROCEDURE

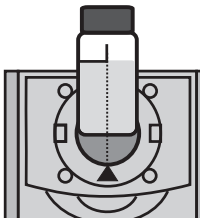
1. Fill the Water Sample Collecting Bottle (0688) with sample water.	

2. Press and hold ⏻ until colorimeter turns on.	Main Menu Testing Menu Editing Menu Run PC Link 12:00:00 001/500
3. Press ENTER to select **Testing Menu**.	Testing Menu All Tests Menu Absorbance 12:00:00 001/500
4. Press ENTER to select **All Tests Menu**.	All Tests Chlorine TT Chlorine Liq DPD Bromine TT Bromine Liq DPD 12:00:00 001/500
5. Scroll to and select **Bromine TT** from menu.	Bromine TT Scan Blank Scan Sample 12:00:00 001/500

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

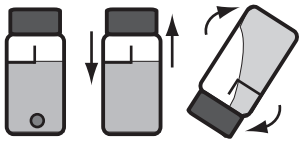


7. Insert tube into chamber, close lid and select **Scan Blank**.

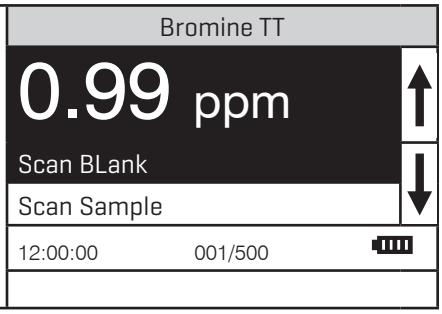


8. Remove tube from colorimeter. Add one *Chlorine DPD #1 Instrument Grade Tablet (6903A).

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



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



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

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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 the code is 4450WT-H, search 4450. To obtain a printed copy, contact LaMotte by email, 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).

NOTE: For the most accurate results, samples over 7 ppm bromine 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.

CALIBRATION

Chlorine Standards

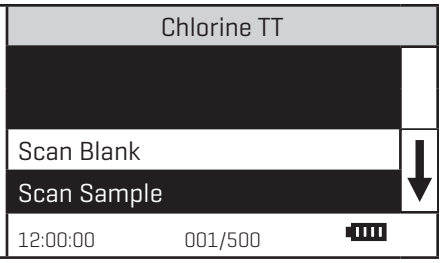
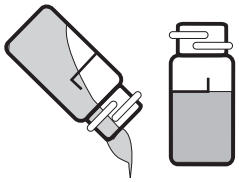
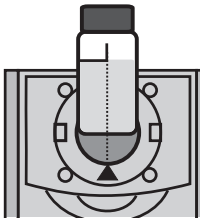
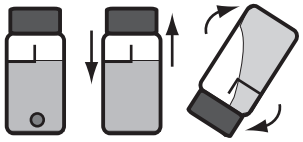
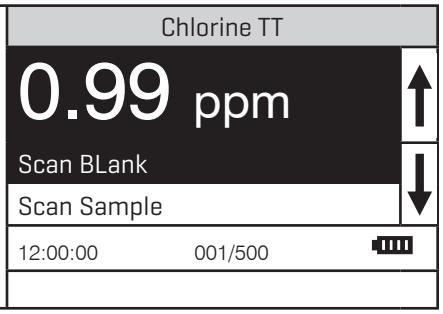
The meter should be calibrated with free chlorine standards. The calibration should be done with a distilled or deionized water blank and one chlorine standard of known concentration. The concentration of the calibration standard should be similar to the expected concentration of the sample that will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

To perform a bromine calibration, prepare a chlorine standard with a concentration that is equivenlent to a bromine standard that is within the range of the bromine test. (1 ppm chlorine = 2.25 ppm bromine). Follow the procedure below but select the bromine test.

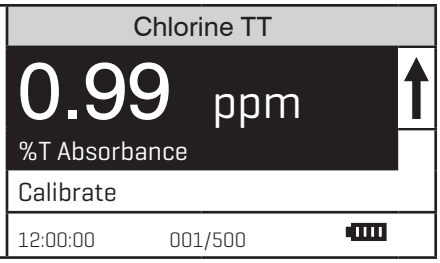
Chlorine Secondary Standards (Code 4140-03) are available to verify the performance of the meter.

CHLORINE CALIBRATION PROCEDURE

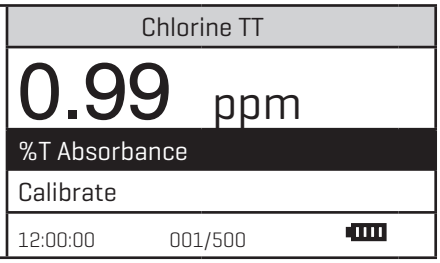
1. Press and hold ⏻ until colorimeter turns on.	Main Menu Testing Menu Editing Menu Run PC Link 12:00:00 001/500
2. Press ENTER to select **Testing Menu**.	Testing Menu All Tests Menu Absorbance 12:00:00 001/500
3. Press ENTER to select **All Tests Menu**.	All Tests Chlorine TT Chlorine Liq DPD Bromine TT Bromine Liq DPD 12:00:00 001/500

4. Scroll to and select **Chlorine TT** from menu.	
5. Rinse a clean tube (0290) three times with the chlorine standard. Fill the tube to the 10 mL line with the chlorine standard. Cap the tube. Dry the tube with a lint-free cloth.	
6. Insert tube into chamber, close lid and select **Scan Blank**.	
7. Remove tube from colorimeter. Add one *Chlorine DPD #1 Instrument Grade 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**.	

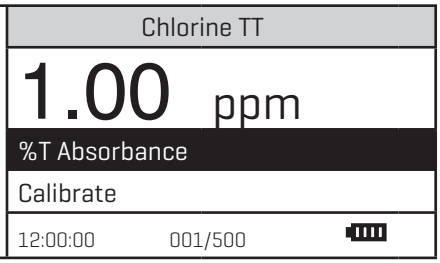
9. Press ▼ to scroll to **Calibrate**.



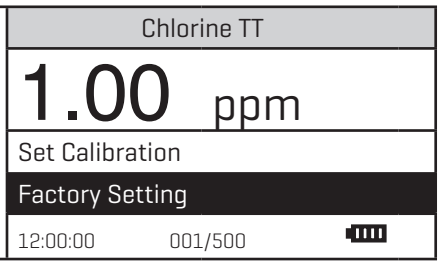
10. Press ENTER to select **Calibrate**. A reverse font (light background with dark characters) will appear to indicate that the reading can be adjusted.



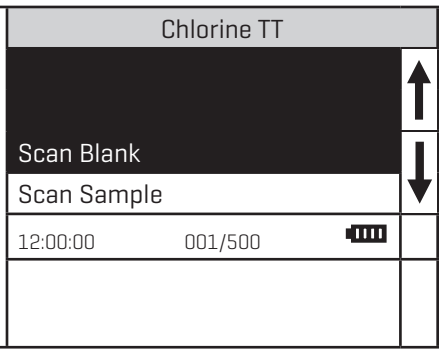
11. Press ▲ or ▼ to scroll to the concentration of the standard, 1.00 in this example. Note: The allowable adjustment is ±25%.



12. Press ENTER to select **Calibrate**. Two menu choices will be offered, **Set Calibration** and **Factory Setting**.



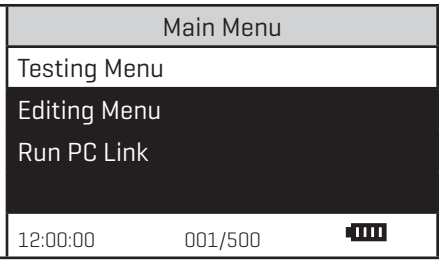
13. Press ENTER to select **Set Calibration** and save the calibration. Press ▲ or ▼ to scroll to and select **Factory Setting** to revert to the factory calibration. The meter will momentarily display **Storing...** and return to the **Chlorine TT** Menu. The calibration has now been saved and the meter can be used for testing.



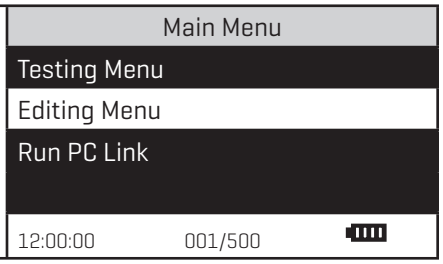
SET UP

■ SETTING THE CLOCK

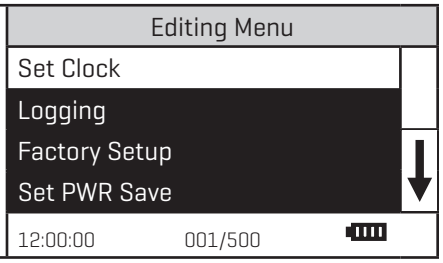
1. Press and briefly hold ⏻ to turn the meter on. The LaMotte logo screen will appear for about 3 seconds and the **Main Menu** will appear.



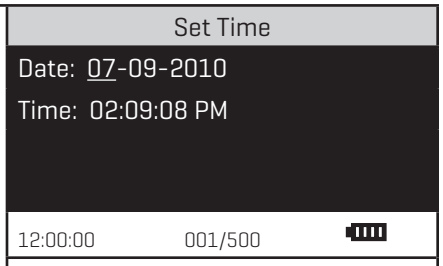
2. Press ▼ to scroll to **Editing Menu**.

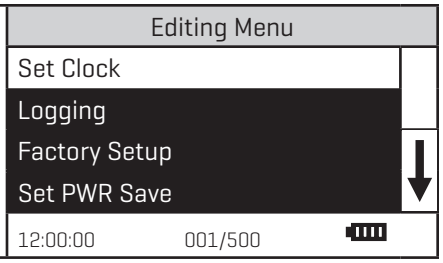


3. Press ENTER to select **Editing Menu**.



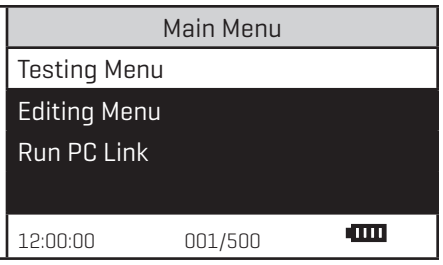
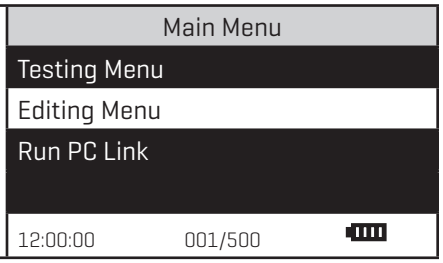
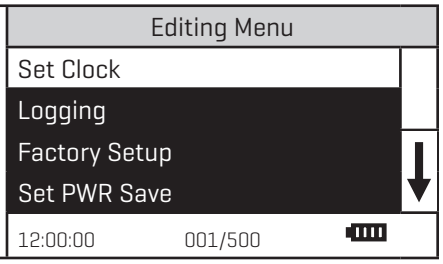
4. Press ENTER to select **Set Clock**. The date is displayed as month-day-year. The time is displayed as hours:minutes:seconds AM/PM. Press ▲ or ▼ to the appropriate character and press ENTER to select. The cursor will move to the next character. Set all characters in the same manner. This is a scrolling menu.

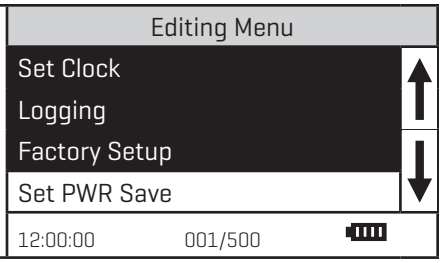
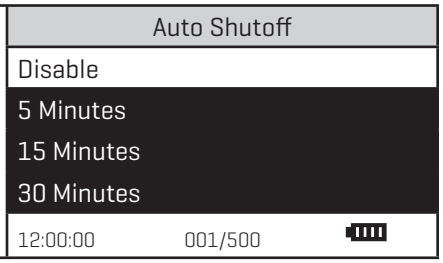
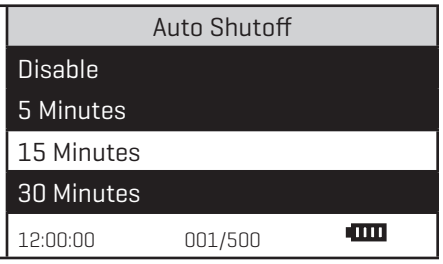
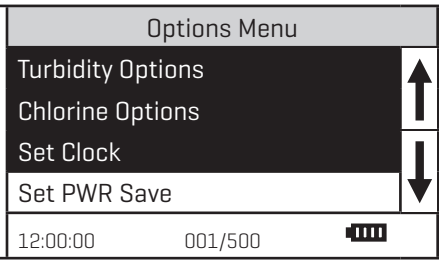


5. Press ENTER to select the final character. The time and date will be saved and the screen will return to the **Editing Menu**.	

■ 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 5 minutes. To change the setting:

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 ▼ to scroll to **Editing Menu**.	
3. Press ENTER to select **Editing Menu**.	

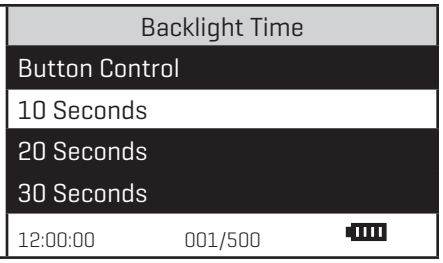
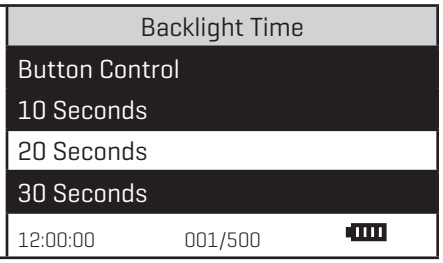
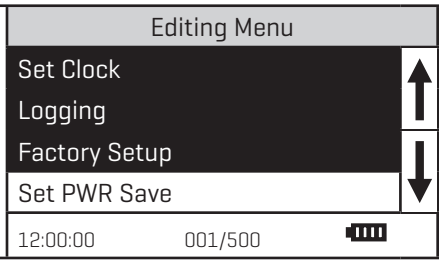
4. Press ▼ to scroll to **Set PWR Save**.	
5. Press ENTER to select **PWR Save**.	
6. Press ▲ or ▼ to scroll to desired setting.	
7. Press ENTER to save the selection. The screen will display **Storing...** for about 1 second and return to the **Editing Menu**.	

■ SETTING THE BACKLIGHT TIME

The backlight illuminates the display for enhanced viewing. 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. As a precaution, the backlight will not illuminate during turbidity measurements to avoid interference from stray light.

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 Charger is not being used.

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.	Main Menu Testing Menu Editing Menu Run PC Link 12:00:00 001/500
2. Press ▼ to scroll to **Editing Menu**.	Main Menu Testing Menu Editing Menu Run PC Link 12:00:00 001/500
3. Press ENTER to select **Editing menu**.	Editing Menu Set Clock Logging Factory Setup Set PWR Save 12:00:00 001/500
4. Press ▼ to scroll to **Set Backlight Time**.	Editing Menu Logging Factory Setup Set PWR Save Set Backlight Time 12:00:00 001/500

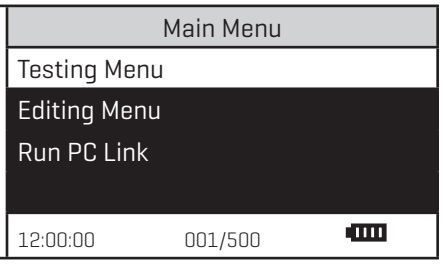
5. Press ENTER to select **Set Backlight Time**.	
6. Press ^ or v to scroll to desired setting.	
7. Press ENTER to save the selection. The screen will display **Storing...** for about 1 second and return to the **Editing Menu**.	

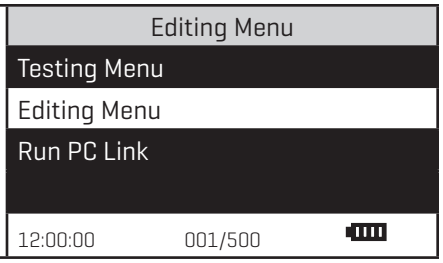
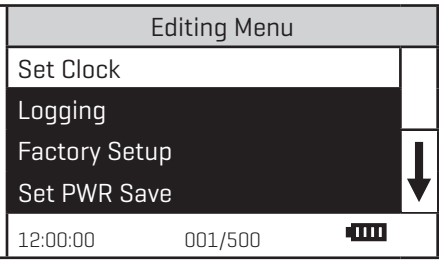
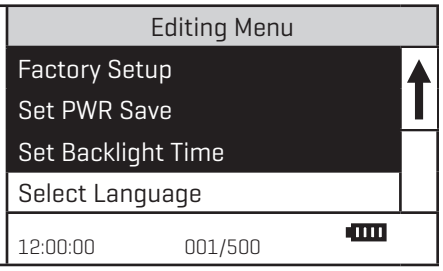
■ FACTORY SETUP

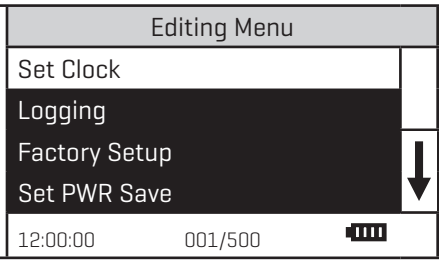
The Factory Setup menu is used in the manufacturing of the DC1500 Colorimeter. This menu is not for use by the operator in the field.

■ SELECTING A LANGUAGE

There are two languages available in the DC1500 colorimeter: English, Spanish, French, Portuguese, Italinan, Chinese, and Japanese (Kana).

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 ▼ to scroll to **Editing Menu**.	
3. Press ENTER to select **Editing Menu**.	
4. Press ▼ to scroll to **Select Language**.	
5. Press ▼ to scroll to **Select Language**.	
6. Press ▲ or ▼ to scroll to desired language.	

7. Press ENTER to select desired language. The screen will momentarily display, **Storing...** for about 1 second and return tot the **Editing Menu**.	

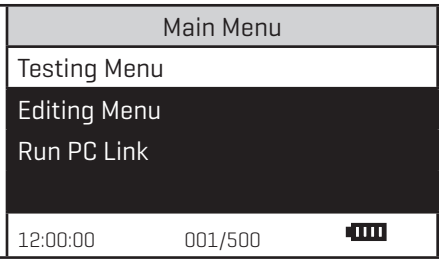
NOTE: If the meter unintentionally switches to another language, use the procedure above to reset the meter to the desired language. For example, to reset the meter to English:

1. Turn the meter on.
2. Press ▼ once. Press ENTER .
3. Press ▼ five times. Press ENTER .
4. Press ENTER .

DATA LOGGING

NOTE: Data from the data logger must be retrieved in the same language in which it was collected.

The meter will log the last 500 data points. The counter in the center bottom of the display will show how many tests have been logged. The display will show 500+ when the data logger has exceeded 500 points and the data points are being overwritten. The meter will log the following data: test name, test result, time of test and date of test. The data logger is password protected and can only be accessed by authorized users.

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 ▼ to scroll to **Editing Menu**.	Editing Menu Testing Menu Editing Menu Run PC Link 12:00:00 001/500
3. Press ENTER to select **Editing Menu**.	Editing Menu Set Clock Logging Factory Setup Set PWR Save 12:00:00 001/500
4. Press ▼ to scroll to **Logging**.	Editing Menu Set Clock Logging Factory Setup Set PWR Save 12:00:00 001/500
5. Press ENTER to select **Logging**.	Logging Display Test Log Enable Logging Disable Logging Erase Log 12:00:00 001/500
6. Press ▲ or ▼ to scroll through the data points in the log.	Record Numbr 4 Chlorine TT 525nm=0.001ppm Abs=0.000 %T=99.9 01:13:41AM 02-07-2015 12:00:00 004/500

7. Press ENTER to display the last data point and the time it was logged.	Record Number 3 Chlorine TT 525nm=0.000ppm Abs=0.000 %T=100.0 01:04:13AM 02-07-2015 12:00:00 003/500
8. Press EXIT to return to the **Logging** menu. Press ▲ or ▼ to scroll to disable the logging options or erase the log. Press ENTER to select the option. The screen will display **Storing...** for about 1 second and return to the **Logging Menu**.	Logging Display Test Log Enable Logging Disable Logging Erase Log 12:00:00 001/500

COMPUTER CONNECTION

■ PC LINK

The DC1500 may be interfaced with any Windows-based computer by using the LaMotte SMARTLink 3 Program and USB Cable. The program will store test information and results in a database.

To transfer data from the meter to 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. The DC1500 will send the following data: test name, wavelength, concentration, transmittance, absorbance, sample, blank, time of test, and date of test.

■ OUTPUT

USB

■ COMPUTER CONNECTION

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

BATTERY/AC OPERATION

The DC1500 may be operated on battery power or using a USB wall adapter or USB computer connection. If using the meter as a bench top unit, use the AC wall adapter if possible to extend the battery life.

To charge the 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 USB port plug after charging.

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 the computer. Reinsert the USB port plug after charging.

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 5 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 charger will charge the unit continuously.

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.

To extend the battery life:

- 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 in a cool dry place.
- Fully charge the battery before storing the unit for extended periods of time.
- Limit backlight use. The unit consumes 3X normal power with the backlight 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.

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.

■ REPAIRS

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

the return authorization number, meter serial number, a brief description of problem and contact information including phone and FAX numbers to the shipping carton. This information will enable the service department to make the required repairs more efficiently.

■ 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 DC1500 is a portable, microprocessor controlled, direct reading colorimeter. It has a graphical liquid crystal display and six 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 seven different languages.

The DC1500 uses a state of the art, multi-detector optical configuration that assures long term stability of calibrations, high precision and accuracy and low detection limits. All readings are determined by sophisticated digital signal processing algorithms, minimizing fluctuations in readings and enabling rapid, repeatable measurements.

A USB wall adapter, USB computer connection or lithium battery powers the DC1500.

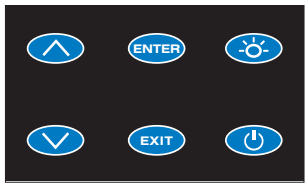
A USB port on the back of the meter allows an interface of the meter with a Windows-based computer for real-time data acquisition and data storage using a PC. The DC1500 may be interfaced with any Windows®-based computer by using the LaMotte SMARTLink 3 Program.

■ GENERAL OPERATING INFORMATION

The operation of the DC1500 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 DC1500 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

	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.

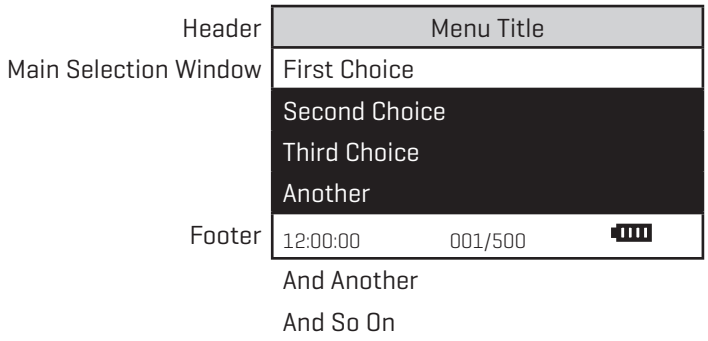


■ THE DISPLAY & MENUS

The display allows menu selections to be viewed and selected. These selections instruct the DC1500 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.

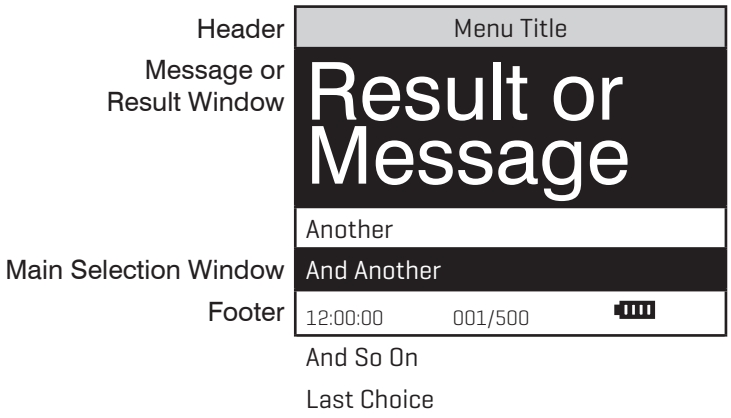
The display has a header line at the top and a footer line at the bottom. The header displays the title of the current menu. The footer line displays the time and the date, the data logger status and the battery status. The menu selection window is in the middle of the display between the header and 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 ^ v 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 ^ v is pressed. Some menus in the DC1500 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 DC1500 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 DC1500 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

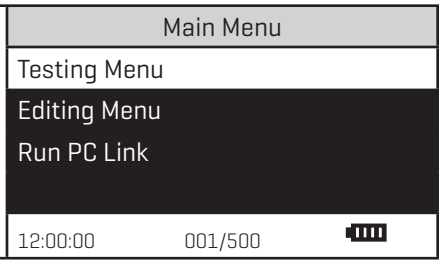
If a test result is out of the range of the meter, it must be diluted. The test should then be repeated on the diluted sample. The following table gives quick reference guidelines for dilutions of various proportions.

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

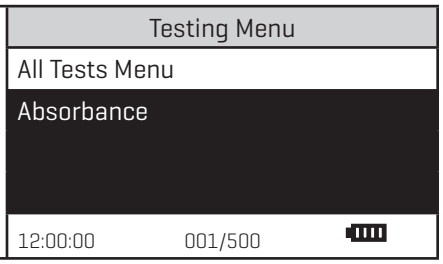
All dilutions are based on a final volume of 10 mL, so several dilutions will require small volumes of the water sample. Graduated pipets should be used for all dilutions. If volumetric glassware is not available, dilutions can be made with the colorimeter tube. Fill the tube to the 10 mL line with the 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.

■ MEASURING IN THE ABSORBANCE MODE

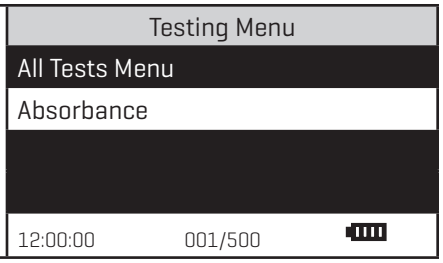
1. Press and briefly hold ⏻ to turn the meter on. The LaMotte logo screen will appear for about 3 seconds and the **Main Menu** will appear.



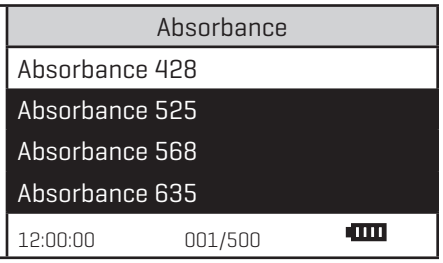
2. Press ENTER to select **Testing Menu**.



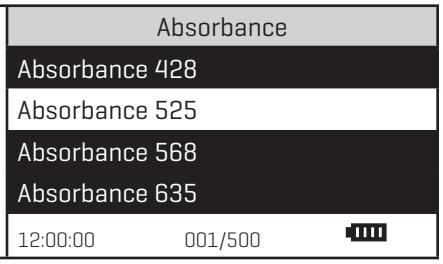
3. Press ^ or v to scroll to **Absorbance**.



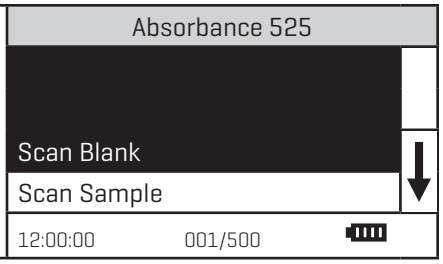
4. Press ENTER to select **Absorbance**.



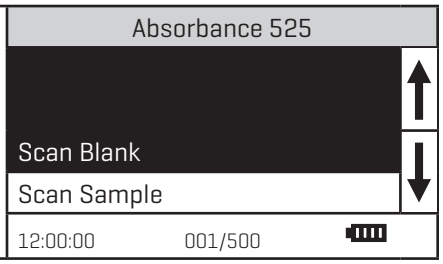
5. Press ^ or v to scroll to desired wavelength.



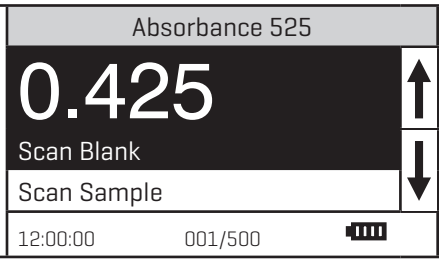
6. Press ENTER to select the wavelength.



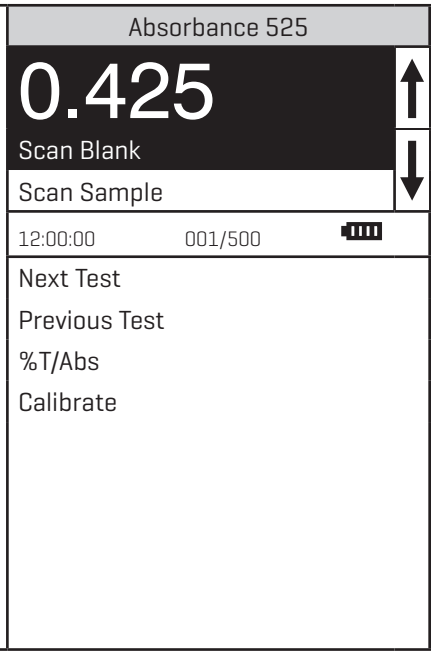
7. Insert the blank. Close the lid. Press ENTER to scan the blank. The screen wil display **Blank Done** for about 1 second and return to the Absorbance menu.



8. Insert the reacted sample. Press ENTER to scan the sample. The screen will display **Reading** for about 1 second. The result will appear on the screen.



9. To repeat the test, press ENTER to scan the sample again. The last blank scanned is used by the colorimeter for repeated scans. A different blank can be used by pressing ^ or v to scroll to **Scan Blank** and then scanning another blank. Scroll with ^ or v and make another selection with ENTER .The %T or Absorbance of the last test can be viewed by choosing %T/Abs. Press EXIT to escape to previous menus.
NOTE: The menus loop in this screen so either ^ or v will lead to the menu selection needed.
NOTE: The calibrate function does not work in the Absorbance mode.



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 label on all reagent containers. Some labels include precautionary notices and first aid information. Certain reagents are considered potential health hazards and are designated with a * in the instruction manual. To view

information for all LaMotte reagents is available in the United States, Canada,

International access number. Each reagent can be identified by the four-digit number listed on the upper left corner of the reagent label, in the contents list and in the test procedures.

■ 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 (Abs 428nm, 525nm, 568nm, 635nm)
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	4 LEDs
Detectors	4 silicon photodiodes
Pre-Programmed Tests	YES, with automatic wavelength selection
Languages	English, Spanish, French, Portuguese, Italian, Chinese, Japanese
USB Port	Mini B
Power Requirements	USB wall adapter or USB computer connection or lithium ion rechargeable battery
Battery	Charge Life: Approximately 380 tests with backlight on to 1000 tests with backlight off.
Electrical Ratings	Provided on nameplate label
Waterproof	IP67 with USB port plug in place
Dimensions (LxWxH)	8.84 x 19.05 x 6.35 cm, 3.5 x 7.5 x 2.5 inches
Weight	362 g, 13 oz (meter only)
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 DC1500 meter has been independently tested and has earned the European CE Mark of compliance for electromagnetic compatibility and safety.

NOTE: The device complies to the product specifications for the Low Voltage Directive.

TROUBLESHOOTING GUIDE

TROUBLESHOOTING

PROBLEM	*REASON*	*SOLUTION*
"Blank?"	Sample is reading lower than the blank.	With samples of very low concentration reblank or record as zero. On samples of higher concentration reblank and read again.
Flashing	Low battery. Readings are reliable.	Charge battery or use USB wall/computer charger.
"Low Battery"	Battery voltage is very low. Readings are not reliable.	Charge battery or use USB wall/computer charger.
"Shut Down Low Batt" Shut Down	Battery is too low to operate the unit.	Charge battery or use USB wall/computer charger.
"Overrange"	Sample is outside of acceptable range.	Dilute sample and test again.
"Error1"	High readings	Dilute sample by at least 50% and retest.

■ STRAY LIGHT

The accuracy of readings on the DC1500 should not be affected by stray light. Make sure that the sample compartment lid is always fully closed when taking readings.