



# MODEL DC1100

## Instruction Manual



### **LaMOTTE COMPANY**

Helping People Solve Analytical Challenges®

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## AN INTRODUCTION TO COLORIMETRIC ANALYSIS

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Most test substances in water are colorless and undetectable to the human eye. In order to test for their presence, we must find a way to “see” them. The LaMotte colorimeter can be used to measure any test substance that is itself colored or can be reacted to produce a color. In fact, a simple definition of colorimetry is “the measurement of color” and a colorimetric method is “any technique used to evaluate an unknown color in reference to known colors.” In a colorimetric chemical test, the intensity of the color from the reaction must be proportional to the concentration of the substance being tested.

A colorimeter can be used to photoelectrically measure the amount of colored light absorbed by a colored sample in reference to a colorless sample (blank).

White light is made up of many different colors or wavelengths of light. A colored sample typically absorbs only one color or one band of wavelengths from the white light. Little difference could be measured between white light before it passes through a colored sample versus after it passes through. The reason for this is that the one color absorbed by the sample is only a small portion of the total amount of light passing through the sample. However, if we could select only that one color or band of wavelengths of light to which the test sample is most sensitive, we would see a large difference between the light before it passes through the sample and after it passes through. A colorimeter passes a white light beam through an optical filter which transmits only one particular color or band of wavelengths of light to the photodetector where it is measured. The difference in the amount of colored light transmitted by a colorless sample (blank) and the amount of colored light transmitted by a colored sample is a measurement of the amount of colored light absorbed by the sample. In most colorimetric tests the amount of colored light absorbed is directly proportional to the concentration of the test factor producing the color and the path length through the sample. However, for some tests the amount of colored light absorbed is inversely proportional to the concentration.

The choice of the correct optical filter and therefore the correct color or wavelength of light is important. It is interesting to note that the filter that gives the most sensitive calibration for your test factor is the complementary color of the test sample. For example, the Nitrate-Nitrogen test produces a pink color proportional to the nitrate concentration in the sample (the greater the nitrate concentration, the darker the pink color). A green filter is used since a pinkish-red solution absorbs mostly green light.

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## THE MODEL DC1100 COLORIMETER

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The DC1100 colorimeter has been specially calibrated to read the test result directly in parts per million (ppm) of a desired substance (i.e. ppm chlorine, ppm phosphate). The sensitivity of the DC1100's response has been maximized by selecting a specific, complimentary light source for each test. The light chosen is absorbed by the color of the test solution. For example, a green light is used for reactions that will produce a red sample. Since green light is absorbed in a red solution, the detector can respond to minute variations in the intensity of the transmitted light.

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## MODEL DC1100 SINGLE-PARAMETER TEST KITS

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The DC1100 can be supplied with reagents for a variety of tests, including wastewater monitoring, industrial process control, boiler and cooling water testing, pool and spa water testing, public health inspection, environmental studies, aquaculture, hydroponics, and other general water analysis applications. The meter, reagents, glassware and accessories are packaged in foam in a compact carrying case for easy transportation and field use.

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## SPECIFICATIONS

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**MODEL:** DC1100

**INSTRUMENT TYPE:** Single wavelength, direct reading colorimeter

*Readout:* 3½ digit LCD

*Reading Stability:* Within 1% of final value within 5 seconds

**PHOTOMETRIC DATA:** *Source:* Light emitting diode

*Detector:* Filtered photo-diode

*Configuration:* Round 21 mm diameter sample tubes (flat bottom) indexed in chamber

**CONTROLS:** ON/OFF

SET BLANK

**POWER REQUIREMENTS:** *Battery Operated:* Field replaceable NEDA #1604A, 9 volt

*Line Operation:* 120/220V, 50/60Hz, 2VA with optional adapter

**METER HOUSING:** *Dimensions:* (H x W x D), 150 mm x 80 mm x 45 mm, 6" x ¾" x 1¾"

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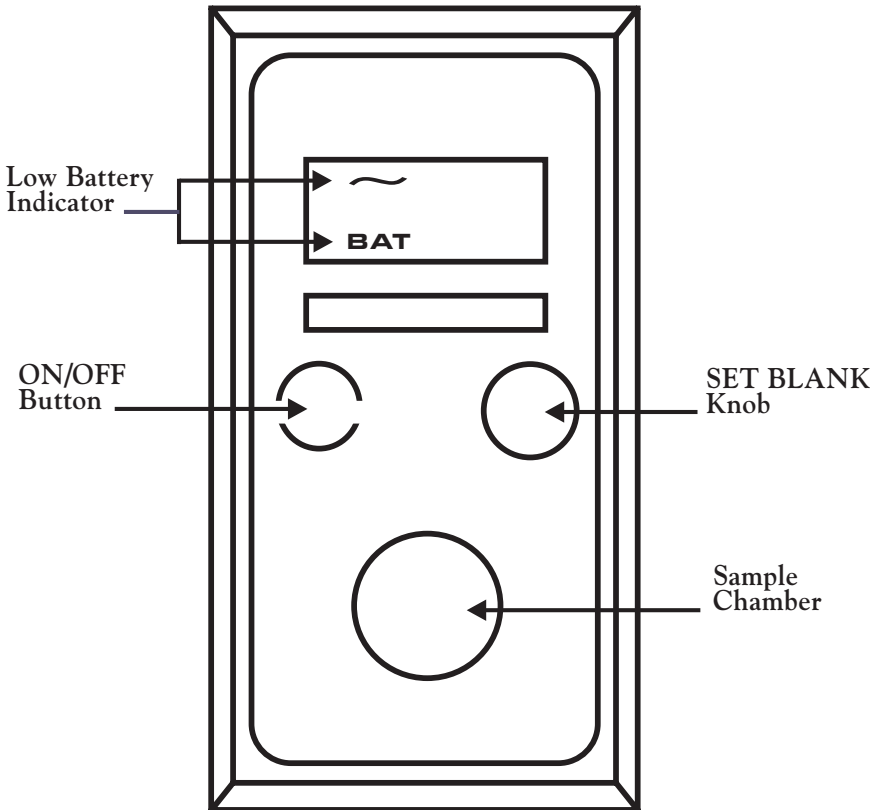
## GENERAL OPERATING INSTRUCTIONS

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1. Fill the water sample bottle (0688) with the sample water.
2. Fill colorimeter tube (0967) to 10 mL line with water from sample bottle. The bottom of the curved surface, the meniscus, should rest on the top of the line.
3. Cap the colorimeter tube and insert into the DC1100 colorimeter chamber.

**NOTE:** Dry all colorimeter tubes with a tissue before inserting into the chamber. Also be sure that there are no scratches on the tubes. **Keep the chamber clean and dry at all times.**

4. Press the “ON/OFF” button and adjust the SET BLANK knob until the display reads 0. Once this adjustment has been made, do not move the SET BLANK knob for the remainder off the test.



**NOTE:** The location of the decimal point may vary for different meters.

5. For best results, use the same tube that was used to adjust the blank for all measurements. If the test you are performing requires a wait of more than thirty seconds, turning the meter off will extend battery life.
6. Follow individual test instructions to add reagents to the tube.
7. Cap the treated sample tube, making sure the tube is clean and dry, then insert the tube into the chamber.
8. Press the “ON/OFF” button if the meter has been turned off. Record reading directly from the display.

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## TEST SAMPLE DILUTIONS AND VOLUMETRIC MEASUREMENTS

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If the indicated reading is higher than the maximum concentration specified on the reagent specifications, a dilution should be done to ensure accuracy. In rare cases of extremely high concentrations, the display may indicate an over-range condition: the left digit will be a “1,” the other digits will remain blank. The sample must then be diluted with demineralized water and the test repeated to bring the concentration within a range that can be accurately measured by the meter. The reading is then multiplied by the appropriate dilution factor to obtain the test result.

### EXAMPLE:

Measure 5 mL of the original sample into a graduated cylinder. Dilute to 10 mL with distilled or demineralized water. The sample has now been diluted by half, and the test results are multiplied by 2.

The following dilution table shows the amount of original sample to be diluted, the amount of distilled or demineralized water required, and the dilution factor. Since the tests are based on a 10 mL sample, the dilutions must be measured accurately to assure reliable results.

Size of Sample	Distilled Water to Bring 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

**NOTE:** When measuring small sample sizes, use graduated cylinders or pipets, and measure the final dilution in a graduated cylinder. Pipet the sample water into the graduated cylinder, then fill the cylinder to the 10 mL line with distilled or demineralized water.

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## REAGENT BLANK

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For greater accuracy, the test procedure should be run on a 10 mL sample of deionized water, known as the reagent blank. This procedure will compensate for color or turbidity that the reagents may produce. Subtract this result from the test result to receive final reading.

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## REPLACING THE BATTERY

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When the battery indicator appears on the display, the battery should be replaced.

1. Turn meter over and remove four screws from the meter base.
2. Remove old battery and insert new battery. The DC1100 uses a Type 1604A 9 volt Alkaline battery.

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## CONNECTING THE AC ADAPTER

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To connect meter to a power source, plug the connector of the AC adapter into the small hole at the back of the meter. Plug large end into an electrical outlet (120V, 60Hz).

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## WARRANTY INFORMATION

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### REPAIRS

If it is necessary to return the instrument for repair, contact LaMotte Company at 1-800-344-3100 for a return authorization number.

### INSTRUMENT GUARANTEE

This instrument is guaranteed to be free of defects in material and workmanship for one year from date of original purchase. If, in that time, it is found to be defective, it will be repaired without charge, except for transportation expenses. This guarantee does not cover the batteries.

This guarantee is void under the following circumstances:

- operator's negligence
- improper application
- unauthorized servicing

### LIMITS OF LIABILITY

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

### PACKAGING AND DELIVERY

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

## TROUBLE SHOOTING GUIDE

PROBLEM	CHECK	ACTION
<b>Meter won't come on</b>	Battery?	Replace, see pg. 6 of manual.
^	AC Adapter?	See pg. 6 of manual.
^	AC Wall Outlet?	Verify power source.
^	Contact LaMotte for return authorization.	Return to LaMotte for repair.
^		
<b>Comes on, but readings drift</b>	Are instrument grade reagents being used?	Obtain instrument grade reagents.
^	Are there suspended solids in sample?	Filter both blank and sample (after reaction). <b>NOTE:</b> Do not use filtered blank for sample reaction.
^	Do reading drift up scale?	Bring samples to room temperature.
^	Readings drift down scale with cold sample?	Check for sample tube fogging, let sample equilibrate to room temperature.
<b>Suspect Calibration</b>	Will meter blank? (zero)	If no, see next page.
^	Are instrument grade reagents being used?	Obtain instrument grade reagents.
^	How old are the reagents?	Contact LaMotte to verify age.
^	Check calibration with standards?	How old is the standard?
^	Is class "A" volumetric glassware being used to make up the standards?	If not, obtain and see Standard Methods.

## TROUBLE SHOOTING GUIDE (continued)

PROBLEM	CHECK	ACTION
<b>Suspect Calibration</b>	Verify standard with alternate test method?	Run alternate test on standard.
^	Verify with another meter?	Check other meter calibrations.
^	Contact LaMotte for return authorization.	Return for Calibration check.
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<b>Meter won't zero</b>	Sample tubes free of dirt & scratches?	Check & replace if necessary.
^	Sample tubes clean?	Clean tubes often with soap and a test tube brush. Do not leave reacted samples in tubes, staining may occur.
^	Possible internal meter components subjected to moisture?	Always dry tubes before inserting. Examine tube chamber for visible moisture or chemical stains. If yes, remove 4 screws from back, split case & dry with hair dryer under low heat (10 - 15 min).
^	LED contaminated with dirt and deposits?	Clean square LED and Photodetector w/cotton swab & small amount of alcohol.
^	High suspended solids in sample blank?	Filter with coffee filter, or similar, to remove most solids. (Be sure to filter reacted samples as well) <b>NOTE:</b> Do not use filtered blank for sample reaction.
<b>Meter read 1 - w/o samples in chamber</b>	Meter over range?	Contact LaMotte for return authorization & return.
<b>Meter read 1 - only when samples in chamber</b>	Meter over range?	Extremely high concentration, dilute sample to see if 1 - condition returns to normal condition.