

eXact[®] CHLORINE

Advanced Photometer System Instruction Manual

**IDEAL FOR TESTING DRINKING WATER,
ENVIRONMENTAL, & POOLS AND SPAS**

**USEPA, DIN, & ISO Compliant for Free & Total Chlorine Testing
(4500-CL G, DIN Standard 38 408 G4, ISO 7393/2)**

U.S. Patent No. 7,333,194, U.S. Patent No. 7,491,546, South African Patent No. 2007/0628 and International patent applications including International Patent Appln. No. PCT/US2005/033985; and Eur. Pat. App. 1,725,864

**USEPA
DIN, ISO
COMPLIANT
FREE AND TOTAL
CHLORINE**
(4500-CL G, DIN STANDARD
38 408 G4, ISO 7393/2)



**eXact[®] Chlorine
is Manufactured
and tested in an
ISO 9001 Facility**

**This Chlorine Advanced Photometer
System has been designed for easy use
with the eXact[®] Strip Micro DPD-1, DPD-3,
and DPD-4 reagent delivery system.**

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**NOTE: No water chlorine treatment
recommendations are included in
this manual. Follow guidelines
supplied by manufacturer or
government regulation.**

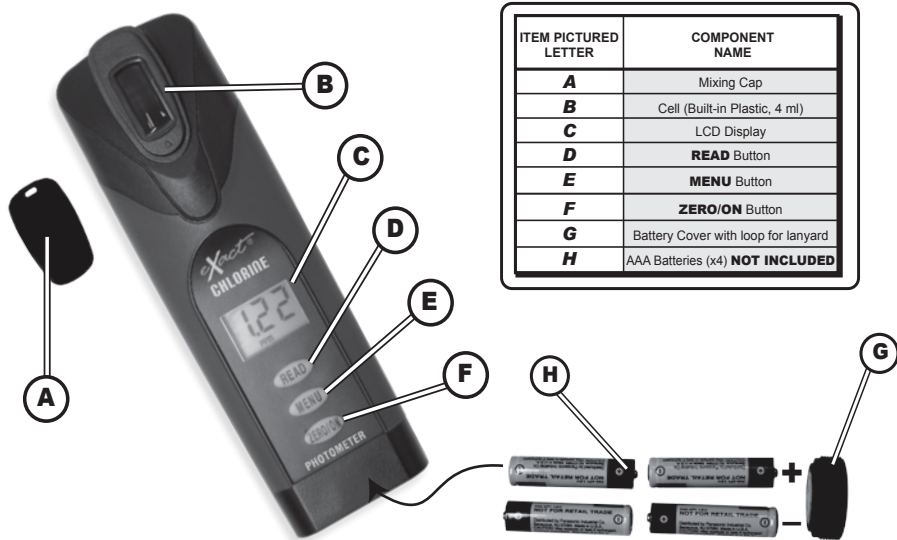
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Visit us online at [sensafe.com/micro](http://www.sensafe.com/micro) for up-to-date product information & NEW tests available.

Activate your Warranty - go to our website or telephone us (<http://www.sensafe.com/micro>) within 30 days of purchase to register ownership of your photometer. Include the serial number found on the bottom of the photometer. Registering allows you to stay connected with eXact[®] Chlorine Photometer updates.

eXact® Chlorine Photometer



ITEM PICTURED LETTER	COMPONENT NAME
A	Mixing Cap
B	Cell (Built-in Plastic, 4 ml)
C	LCD Display
D	READ Button
E	MENU Button
F	ZERO/ON Button
G	Battery Cover with loop for lanyard
H	AAA Batteries (x4) NOT INCLUDED

eXact® Chlorine Photometer Specifications

Measurement Method:	Photometric	Sample Cell:	PET plastic fused into chamber, non-removable
Light Source:	Light Emitting Diode (LED)	Sample Required:	4 ml (0.13 oz)
Wavelength:	525 nm	Operating Temperature Range:	0 - 50°C (32° - 122°F)
Transmission Equivalent:	100 - 0.00 %T	Power Supply:	(4) AAA alkaline batteries Not Included
Photometric Precision:	+/- 0.1/0.01 %T (transmission)	Battery Life:	>2000 tests with alkaline batteries
Automatic Range:	Available for Chlorine	Electromagnetic Compliance: (EMC)	Emitted Interference - EN 61326 Immunity to Interference - EN 61326
Display:	3-digit liquid crystal display with annunciators	Waterproof Rating:	Exceeds IP67
CELL Pathlength:	20mm	Instrument Weight:	140 g (5 oz)
Detection Range:	0.01 - 2.20 ppm	Instrument Dimensions:	5 (W) x 3.5 (D) x 16.5 (H) cm; (2 x 1.4 x 6.375 inches)
Typical Accuracy:	0.01 - 2.20 ppm (0.02 or 2%) above 2.20 ppm (above 15%)		
Resolution:	0.00 - 5.99 ppm (0.01) 6.0 - 11.0 ppm (0.1)		

Custom Conversion Charts using the Percent Transmission (TR3) Menu

Transmission measurements (TR3) expand the flexibility of this meter for use with DPD tablets or powders. Chlorine reacts with the DPD indicator to form a red color that proportionally indicates the concentration present by the transmission value (%T) found. The higher the chlorine level, the lower the transmission result. Before you can use the meter with tablets or powders you must first prepare a conversion chart for each brand of tablet or powder you plan to use with this meter. In the CL1 and TC2 menus the conversion charts are already entered as algorithms that deliver accurate results for Free and Total Chlorine using the eXact® Strip Micro DPD Reagent Delivery Method. Use the TR3 MENU to develop your own custom conversion chart by following the general tablet and powder methods suggested on page 6 & 7. Use Chlorine or Permanganate Standards to collect 5-10 transmission values at different chlorine concentrations (%T values are given as 3 digits, 99.2 or 7.32, for example). Graph the %T values as in the example on page 12 (Comparison of Hach Powder Dispenser vs. eXact Chlorine Micro Strip). Using the graph, determine the %T values that correspond to the desired range of chlorine values and develop a chlorine vs. %T conversion chart similar to the pH vs. %T conversion chart on page 8 of this manual. Conversion charts and specific information about Free and Total Chlorine tests using different venter powder pillows, dispensers, or tablets are not given in this booklet.

About Your eXact® Chlorine Photometer

To save power, the meter is designed to turn off after 3 minutes (timed from the last button pressed). Should the meter turn off in the middle of a test, the last stored zero in the meter will remain valid when the meter is turned on again. The eXact® Chlorine Photometer is controlled by three buttons:

1. **ZERO/ON:** When first pressed, this button turns the meter on. When the meter is on and this button is pressed, it zeroes the sample in the cell. Once the meter is zeroed, this zero value applies to all 3 menu parameters and is stored and retained even when meter turns off. It is recommended that each new water sample analyzed is zeroed before testing, to maximize sensitivity and accuracy.
2. **MENU:** With each press, when the meter is on, the MENU button advances through the tests in the following sequence: CL1, TC2, and TR3. Each test menu can store up to 20 results. To **retrieve the stored results**, go to the desired test using the MENU key. When the desired test is displayed, release button and allow meter to display the last test result in that MENU. Then, **press and hold down the MENU key**. Continue holding down the MENU key to scroll the stored results for that test, starting with the most recent result. The meter will retrieve from stored memory and display the last 20 readings in sequence beginning with -20, which is the latest result, followed by -19, which is the 2nd latest result ... finally -01, which is the oldest result retained. Only the last 20 readings are stored in each menu. This meter is able to store 60 results in memory (20 in each menu).
3. **READ:** When pressed once, this button starts a **20 SECOND** countdown timer for the parameter being tested. If READ is pressed a second time during the countdown, the meter exits the current timing and performs the next function. For CL1 and TR3 this would be the colorimetric measure of the sample, followed by storage of the measurement in memory.

If the parameter being measured is below or above the detection range, the display will show “**LO**” (Under Range) or “**HI**” (Over Range), respectively. This feature is menu specific.

About the Accuracy/Calibration of the Chlorine Photometer System

The algorithms in the software reflect the best correlation of the eXact® Chlorine Photometer System against the AWWA, US EPA, DIN, and ISO reference test methods for chlorine. Studies show that the eXact® Chlorine Photometer System agrees with other US EPA Compliant reference methods ($R^2=0.9975$, 0 - 2.20 ppm - see page 12). The eXact® Chlorine Photometer System has been factory calibrated for your convenience. The calibration is valid for the life of the meter. A 2.0 ppm Reference Standard Solution, Part No. 486602 is used to verify meter performance. This meter comes with a 2-year Warranty because of the quality of materials and workmanship in the long-life LED, the photo cell and the operating software.

Compliance Verification of eXact® Chlorine Photometer and eXact® Chlorine Strip

This DPD test system is US EPA accepted for testing Free and Total Chlorine. The eXact® Chlorine Photometer wavelength (525nm) complies with the required photometer wavelength range of 490 to 530nm. The eXact® Strip Micro CL (DPD-1 for Free Chlorine, DPD-3 and DPD-4 for Total Chlorine) meets your reportable testing requirements because it delivers the approved chemicals for Free Chlorine testing in identical proportions as required by the American Water Works Association (AWWA) reference method 4500 Cl-G (see table below). The same is true for Potassium Iodide (KI) delivered for Total Chlorine testing.

Components For Free Chlorine	AWWA 4500-Cl G	eXact® DPD-1
Anhydrous DPD sulfate	1.5%	1.5%
Anhydrous Na ₂ HPO ₄	33.4%	33.4%
Anhydrous KH ₂ PO ₄ Na ₂	64.0%	64.0%
EDTA	1.1%	1.1%

MENU DPD-1 Free Chlorine Test Procedure

CL1



- 1 REMOVE STRIP**
Remove one (1) *eXact® Strip Micro CL (DPD-1), Part No. 486637* from the bottle before beginning the test. Set the strip in a dry, convenient place and recap the bottle immediately.



- 2 TURN METER ON**
Press the **ZERO/ON** button to power the meter on; the display will show all annunciators, then the current MENU selection, followed by the last reading.



- 3 SELECT TEST: CL1**
Press and re-press the **MENU** button until the display shows the parameter **CL1**.



- 4 RINSE AND FILL CELL WITH SAMPLE**
Rinse the **CELL** at least 3 times with the water sample you will be testing - rinsing minimizes the potential for cross-contamination from a previous test. Finally, fill cell to capacity (4ml) with the water sample.



- 5 ZERO METER**
Press the **ZERO/ON** button. The cursor will move across the display followed by **0.00 PPM**. Sample is ready for testing.



- 6 DIP STRIP AND PRESS "READ"**
Dip the *eXact® Strip Micro CL (DPD-1), Part No. 486637* into the **CELL** and immediately press **READ**. This starts the **20 SECOND** countdown timer. During this time move the strip in a gentle back and forth motion. **Remove and discard the strip after "1" on the display disappears.**



- 7 RECORD RESULT DISPLAYED**
The cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in CL1).
NOTE: If your result is 2.20 ppm or greater, go to page 8 and follow Chlorine Levels above 2.20 ppm Procedure.

DO NOT discard the sample from the Free Chlorine test, if your levels are below 2.20ppm and you are planning to run *eXact® Strip Micro DPD-3 (Total Chlorine) Procedure*, move directly to steps 8-10 on page 5. Otherwise, rinse the cell immediately.

NOTE: N,N-diethyl-p-phenylenediamine also reacts to form a magenta color with Ozone, Total Chlorine, Permanganate, Iodine, and other oxidizers.

MENU DPD-3 Total Chlorine Test Procedure

TC2

This procedure is only valid when run as a continuation of the eXact® Strip Micro CL (DPD-1) Test Procedure on page 4.

8

REMOVE STRIP

Remove one (1) eXact® Strip Micro CL (DPD-3), Part No. 486638 from the bottle before continuing the test. Set the strip in a dry, convenient place and recap the bottle immediately.

9

SELECT TEST: TC2

Press and re-press the **MENU** button until the display shows the parameter **TC2**.

10

DIP STRIP AND PRESS “READ”

Dip the eXact® Strip Micro CL (DPD-3) into the **CELL** and immediately press **READ**. This starts the **20 SECOND** countdown timer. During this time move the strip in a gentle back and forth motion. **Remove and discard the strip after “1” on the display disappears.** The display will flash and begin immediately counting up from **1 to 120** (this extra time allows complete color development). At 120 seconds, the cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in TC2). **NOTE: If your result is 2.20 ppm or greater, go to page 8 and follow Chlorine Levels above 2.20 ppm Procedure.** After testing is completed, rinse cell immediately.

NOTE: Standard Method (4500-Cl G, procedure for total chlorine) requires the reading to be made after 2 minutes from the time the KI is added. For compliance testing, you must allow the meter to count up for 120 seconds. The one strip of DPD-3 adds sufficient KI for Total Chlorine testing up to 11 ppm.

MENU DPD-4 (Total Chlorine) Test Procedure

TC2

1

REMOVE STRIP

Remove one (1) eXact® Strip Micro CL (DPD-4 for Total Chlorine), Part No. 486670 from the bottle before beginning the test. Set the strip in a dry, convenient place and recap the bottle immediately.

2

TURN METER ON

Press the **ZERO/ON** button to power the meter on; the display will show all annunciators, then the current **MENU** selection, followed by the last reading.

3

SELECT TEST: TC2

Press and re-press the **MENU** button until the display shows the parameter **TC2**.

4

RINSE AND FILL METER WITH SAMPLE

Rinse the **CELL** at least 3 times with the water sample you will be testing - rinsing minimizes the potential for cross-contamination from a previous test. Finally, fill cell to capacity (4ml) with the water sample.

5

ZERO METER

Press the **ZERO/ON** button. The cursor will move across the display, followed by **0.00 PPM**. Sample is ready for testing.

6

DIP STRIP AND PRESS “READ”

Dip the eXact® Strip Micro CL (DPD-4), Part No. 486670 into the **CELL** and immediately press **READ**. This starts the **20 SECOND** countdown timer. During this time move the strip in a gentle back and forth motion. **Remove and discard the strip after “1” on the display disappears.** The display will flash and begin immediately counting up from **1 to 120** (this extra time allows complete color development). At 120 seconds, the cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in TC2). **NOTE: If your result is 2.20 ppm or greater, go to page 8 and follow Chlorine Levels above 2.20 ppm Procedure.** After testing is completed, rinse cell immediately.

NOTE: Standard Method (4500-Cl G, procedure for total chlorine) requires the reading to be made after 2 minutes. For compliance testing, you must allow the meter to count up for 120 seconds.

eXact® Strip Micro CL (DPD-1/DPD-3/DPD-4) Interferences (part nos. 486637/486638/486670)

Interfering Substance	Interfering Levels & Treatments
Acidity	If sample has acidity above 150mg/L CaCO ₃ test may not develop full color. Neutralize to pH 6.0 to 7.0 with 0.5N Sodium hydroxide.
Alkalinity	If sample has alkalinity above 200mg/L CaCO ₃ test may not develop full color. Neutralize to pH 6.0 to 7.0 with 0.5N Sulfuric acid.
Bromine & Bromamines, Br ₂	Color similar to free chlorine reaction at all levels.
Chlorine Dioxide, ClO ₂	Color similar to free chlorine reaction at all levels.
Copper, Cu ⁺²	Color development is reduced above 10 ppm (mg/L).
Iodine, I ₂	Color similar to free chlorine reaction at all levels.
Manganese, oxidized (Mn ⁺⁴ , Mn ⁺⁷) or Chromium, oxidized (Cr ⁺⁶)	See AWWA procedure 4500-CL F, 1(d) for removal of interferences.
Monochloramines (NH ₂ Cl) (applies to DPD-1 only)	Monochloramine interferences are known to occur in free chlorine DPD methods. This interference is dependent on temperature and monochloramine concentration.
Ozone, O ₃	Color similar to free chlorine reaction at all levels.
Peroxides	Interference is possible.
pH	Typical pH samples of potable water with a pH of 6.0 to 9.0 are OK. If outside this range adjust to pH 6.0 to 7.0 using acid (0.5N Sulfuric acid) or base (0.5N Sodium hydroxide).

MENU Free & Total Chlorine Test Procedure using Tablets

TR3 Tablets may also be run in CL1 and TC2 MENU for a direct read result. However, lower accuracy can be expected with tablets in these menus. For best results, a % Transmission vs. Chlorine Conversion Chart should be prepared for each brand of tablet. To run in TR3 MENU, use with an appropriate procedure such as outlined below.

1 **TURN METER ON**
Press the **ZERO/ON** button to power the meter on; the display will show all annunciators, then the current MENU selection, followed by the last reading.

2 **SELECT TEST: TR3**
Press and re-press the **MENU** button until the display shows the parameter **TR3**.

3 **RINSE AND FILL METER WITH SAMPLE**
Rinse the **CELL** at least 3 times with the water sample you will be testing - rinsing minimizes the potential for cross- contamination from a previous test. Finally, fill cell to capacity (4ml) with the water sample.

4 **ZERO METER**
Press the **ZERO/ON** button. The cursor will move across the display, followed by **100 %T**.

5 **PREPARE AND ADD TABLET — PRESS “READ”**
Dispense the **DPD-1 Tablet** into a separate, clean and dry, glass vial (**not supplied**), crush tablet, and dispense the crushed tablet into the water in the meter **CELL**. Cap cell with the mixing cap and press **READ**. This starts the **20 SECOND** countdown timer. During this time mix sample by pressing one finger over the cap to keep it in place and rotating meter upside-down repeatedly during the 20 seconds. After the 20 seconds, be sure meter is upright. The cursor will move across the display, while the meter prepares to measure the sample (ignore this result). Press **READ** again and use the displayed value after the 20 seconds for your chlorine level. Record result displayed (this result is automatically stored in TR3) and select chlorine value from the Chlorine Conversion Chart. If your tablet is for 10mL sample size, this should be adequate reagent for full range of chlorine detection (0.0 – 11.0 ppm). After testing is complete, rinse cell immediately. For Total Chlorine test, use procedure as above; but read value only after 120 second color development time.

WARNING: Do not crush tablet in **CELL**. Meter warranty is voided if **CELL** breakage occurs while attempting to crush a tablet directly in meter **CELL**.

MENU Free Chlorine Test Procedure using Powder Reagent

TR3 Powder Reagent may be run in CL1 MENU for a direct read result. However, lower accuracy can be expected when powder pillows are used in CL1 MENU. For best results, a %Transmission vs. Chlorine Conversion Chart should be prepared for each brand of powder pillow. To run in TR3 MENU, use with an appropriate procedure such as outlined below.

1 **TURN METER ON**
Press the **ZERO/ON** button to power the meter on; the display will show all annunciators, then the current MENU selection, followed by the last reading.

2 **SELECT TEST: TR3**
Press and re-press the **MENU** button until the display shows the parameter **TR3**.

3 **RINSE AND FILL METER WITH SAMPLE**
Rinse the **CELL** at least 3 times with the water sample you will be testing - rinsing minimizes the potential for cross- contamination from a previous test. Finally, fill cell to capacity (4ml) with the water sample.

4 **ZERO METER**
Press the **ZERO/ON** button. The cursor will move across the display, followed by **100 %T**. Sample is ready for testing.

5 **ADD POWDER REAGENT AND PRESS "READ"**
Dispense the *DPD-1 Powder (10ml Powder Pillow or 10ml DPD Dispenser)* into the liquid in the **CELL** and cap cell. Press **READ** to start the **20 SECOND** countdown timer. During this time mix sample by pressing one finger over the cap to keep it in place and rotating meter upside-down repeatedly during the 20 seconds. After the 20 seconds, be sure meter is upright. The cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in TR3). Use this as your Free Chlorine level. After testing is complete, rinse cell immediately.

MENU Total Chlorine Test Procedure using Powder Reagent

TR3 Powder Reagent may be run in TC2 MENU for a direct read result. However, lower accuracy can be expected when powder pillows are used in TC2 MENU. If direct read TC2 MENU is used, press read after capping cell and mix during countdown. The 120 second countup will immediately follow on display. For best results, a %Transmission vs. Chlorine Conversion Chart should be prepared for each brand of powder pillow. To run in TR3 MENU, use with an appropriate procedure such as outlined below.

1 **TURN METER ON**
Press the **ZERO/ON** button to power the meter on; the display will show all annunciators, then the current MENU selection, followed by the last reading.

2 **SELECT TEST: TR3**
Press and re-press the **MENU** button until the display shows the parameter **TR3**.

3 **RINSE AND FILL METER WITH SAMPLE**
Rinse the **CELL** at least 3 times with the water sample you will be testing - rinsing minimizes the potential for cross- contamination from a previous test. Finally, fill cell to capacity (4ml) with the water sample.

4 **ZERO METER**
Press the **ZERO/ON** button. The cursor will move across the display, followed by **100 %T**. Sample is ready for testing.

5 **ADD POWDER REAGENT AND PRESS "READ"**
Dispense the *DPD-4 Powder (10ml Powder Pillow or 10ml DPD Dispenser)* into the liquid in the **CELL** and cap cell. Mix for 20 seconds by pressing one finger over the cap to keep it in place and rotating meter upside-down repeatedly. Now, wait 100 seconds and Press **READ** to start the **20 SECOND** countdown timer (this extra time meets required time for color development). After the 20 seconds, be sure meter is upright. The cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in TR3). Use this as your Total Chlorine level. After testing is complete, rinse cell immediately.

MENU**Chlorine Levels above 2.20 Procedure****CL****TR3**

This method and conversion chart are valid for the Free Chlorine (DPD-1) and Total Chlorine (DPD-1 + DPD-3 or DPD-4) tests above 2.20ppm for better accuracy.

- 1** If your reading in FC1 or TC2 is above 2.20ppm, immediately switch to TR3 MENU and Press READ twice to display the Transmission value (use this value for the chart below).
- 2** Find the "TR" result in the table below to determine the Free Chlorine concentration in parts per million. (Example: a "TR" result of 7.53 (use only the 7.5 for the chart) equals a Free Chlorine value of 3.34 ppm). Record result. After testing is completed, rinse cell immediately.

Chlorine Conversion Chart

tr	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1	0
13	2.1	2.12	2.14	2.16	2.18	2.18	2.2	2.22	2.24	2.26
12	2.26	2.28	2.28	2.3	2.32	2.32	2.34	2.36	2.38	2.4
11	2.40	2.42	2.44	2.46	2.48	2.50	2.50	2.52	2.54	2.56
10	2.58	2.60	2.62	2.64	2.66	2.68	2.70	2.70	2.72	2.74
9	2.76	2.78	2.80	2.82	2.84	2.86	2.88	2.90	2.92	2.94
8	2.96	3.00	3.02	3.04	3.06	3.08	3.10	3.14	3.18	3.20
7	3.22	3.24	3.26	3.30	3.34	3.38	3.40	3.42	3.46	3.50
6	3.52	3.56	3.60	3.60	3.64	3.70	3.72	3.76	3.80	3.85
5	3.90	3.95	4.00	4.05	4.10	4.15	4.20	4.25	4.30	4.35
4	4.40	4.50	4.60	4.70	4.80	4.80	4.90	5.00	5.15	5.30
3	5.40	5.60	5.80	6.00	6.20	6.50	6.80	7.20	7.60	8.00
2	8.40	8.80	9.10	9.50	9.80	10.10	10.40	10.70	11.00	>11
1	>11	>11	>11	>11	>11	>11	>11	>11	>11	>11

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Other Test Kits Now Available:**eXact® Chlorine Plus Kit (48696-PlusK) Tests:**

Chlorine Dioxide	0-12 ppm
Free Chlorine	0-11 ppm
High Free Chlorine	0-300 ppm
Bromine	0-14 ppm
Peracetic Acid	0-3 ppm
Hydrogen Peroxide	0-3 ppm
Ozone	0-9 ppm

eXact® Micro 7+ Kit (48691-K) Tests:

Total Alkalinity	12-180 ppm
Bromine	0-14 ppm
Calcium Hardness	10-500 ppm
Free Chlorine	0-11 ppm
Total Chlorine	0-11 ppm
High Free Chlorine	0-300 ppm
Copper	0-8 ppm
Ozone	0-11 ppm
Permanganate	0-4.5 ppm
pH	6.2-8.4 pH

MENU How to use Reference Standard Solution

CL1
TC2
TR3

NOTE: The 2.0 ppm Reference Standard Solution, *Part No. 486602*, is only valid for verifying the performance of the eXact® Chlorine Photometer, *Part No. 486696*.

- 1 TURN METER ON**
Press the **ZERO/ON** button to power the meter on; the display will show all annunciators, then the current MENU selection, followed by the last reading.
- 2 SELECT TEST: TR3**
Press and re-press the **MENU** button until the display shows the parameter **TR3**.
- 3 RINSE AND FILL CELL WITH DISTILLED OR DEIONIZED WATER**
Rinse the **CELL** at least 3 times with distilled or deionized water - rinsing minimizes the potential for cross-contamination from a previous test. Finally, fill cell to capacity (4ml) with the distilled or deionized water.
- 4 ZERO METER**
Press the **ZERO/ON** button. The cursor will move across the display followed by **100 %T**. Press the **READ** button. After 20 second countdown, the cursor will move across the display followed by **100 %T**. If result is not **100 %T**, repeat Step 4 by pressing the **ZERO/ON** button again. Press **READ**. If result is **100 %T**, meter is ready for standard testing. Discard water from cell. Gently shake the meter to remove any excess water. **NOTE:** This step is very important for accurate verification of photometer performance.
- 5 FILL CELL WITH 2.0 PPM REFERENCE STANDARD SOLUTION**
Fill cell to capacity (4ml) with the **2.0 ppm Reference Standard Solution, Part No. 486602**. Discard this sample and refill the **CELL** with fresh 2.0 ppm Reference Standard Solution.
- 6 PRESS "READ"**
Press **READ**, to start the **20 SECOND** countdown timer. After 20 seconds, the cursor will move across the display while the meter prepares to measure the sample. Record the displayed result below (this result is automatically stored in TR3). Do not discard solution. Continue with Step 7.
- 7 REPEAT STEP 6 ABOVE FOR CL1 AND TC2 MENU**
Press and re-press **MENU** button until **CL1** appears on the display. Press **READ** and, after 20 seconds, record result displayed below. Similarly repeat for **TC2 MENU**. The result should fall within the range supplied with the 2.0 Reference Standard. After meter performance verification is complete, immediately empty the cell and rinse it with clean water.

Serial Number of Meter for Data below _____ (see back of meter)

Date of meter purchase _____ (warranty valid for 2 years)

DATE	TR3	CL1	TC2	DATE	TR3	CL1	TC2

eXact® Chlorine Tips For Best Accuracy

1. Become familiar with the meter by reading the instructions carefully.
2. This meter was calibrated with samples at a temperature of 22°C ± 2°C (72°F ± 4°F). Expect best accuracy with samples in the temperature range 18°C to 30°C.
3. The Free Chlorine and Total Chlorine eXact® Strip Micro use approved analytical reagents as specified in USEPA (4500-Cl G); ISO 7393/2; and German DIN 38408 G4-2 requirements.
4. Observe the dip time (*as required for the test*) for accurate results.
5. Test immediately after filling the **CELL** with water sample.
6. Be sure the **CELL** is filled to capacity (4ml).
7. Rinse the **CELL** with clean water immediately after completing every test (*DPD reagents will stain the CELL if allowed to sit for longer than 5 minutes*). *A stained cell will need to be cleaned according to procedure as described in About the Built-In Cell/Cleaning Cell (page 11).*
8. Just before testing, rinse the sample **CELL** with the sample water several times to get a representative sample. (*Use deionized or distilled water for rinsing if you have a limited amount of sample*).
9. Store the meter and all test materials out of direct sunlight and away from chemical storage areas.
10. Minimize exposure of meter and test reagents to heat above 100°F (38°C).
11. Dry the outside of the meter when testing is complete or before storage of the meter.
12. When running a DPD-1 Free Chlorine test **AFTER** a Total Chlorine DPD-3 or DPD-4 test, rinsing is very important to remove residual KI, which may interfere.
13. Each eXact® Strip Micro is valid for **ONLY** one test. Discard strip after single use in regular trash that is inaccessible to children and pets.
14. Each bottle of eXact® Strip Micro contains the quantity of strips notated on the bottle. Due the manufacturing process, you may find one or two strips that are noticeably smaller or larger in width than the normal 4mm strips in the bottle. These abnormally sized strips should be discarded. Using these strips may give unreliable results.
15. The eXact® Chlorine photometer is not recommended for, but can be used with, DPD-1, DPD-3, and DPD-4 powder pillows, tablets, and liquids available from other manufacturers. Accurate results are guaranteed by using genuine eXact® Micro strips or reagents. Powder pillows and tablets may be used to test Chlorine in the CL1 and TC2 menus for a direct read result, but with lower accuracy. It is recommended to use the TR3 menu and prepare a %Transmission vs. Chlorine Conversion chart in the eXact® Chlorine Photometer. See representative procedure for using these alternative chemistries on pages 6 & 7.
16. Our lab testing with the eXact® Chlorine Photometer has shown that zeroing and measuring of the sample does not require cell cover for accurate results, even in full sunlight.
17. Remove batteries when meter is not used for more than a month (Warranty Requirement).
18. Do not drop meter. This may cause meter to stop functioning or result in broken CELL or display. These kinds of meter failures are not covered by the warranty.

We offer a “Green” Alternative

The eXact® Chlorine Photometer has been designed to offer the user a more “Green” and cost-effective alternative to testing. Instead of using a 10ml water sample, eXact® Chlorine uses a 4ml water sample, which uses less chemical per test. The accuracy of the meter is maintained by designing the photo cell with 20mm pathlength. This smaller volume still meets all regulatory agency requirements for compliance testing.

eXact® Chlorine Photometer Messages

The following are some common messages that may be displayed, including error messages. If an error message other than those listed below is displayed, please contact technical support in the USA at (803) 329-0162 (ext. 0).

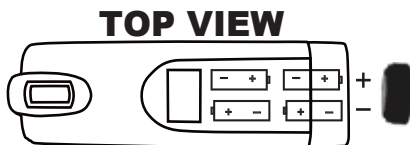
LCD Message	Description	Corrective Action
HI	In READ mode: test sample concentration is above the measurement range (test specific).	Dilute and retest. Dilution Kit available (Part Number 487200).
LO	In READ mode: test sample concentration is below the measurement range (test specific).	Sample value is below measurement range.
LO	In ZERO mode: sample absorbance (due to a cloudy or colored sample or a dirty cell) is too high to zero, the meter will read "LO".	Dilute sample, filter sample, or clean cell. One of these options should remedy the problem.
+ -	Low battery indication.	Replace the batteries.

About The Built-In Cell/Cleaning Cell

The built-in **CELL** is transparent plastic and, when filled to the top, contains 4ml. The sturdy **CELL** design will last for over 20,000 readings. Scratches on the **CELL** will not interfere or compromise the accuracy of the readings because of its fixed position. For best accuracy, rinse cell with clean water immediately after a test is completed. Do not use solvents, such as acetone, to clean the cell. After each 100 tests, it is recommended that the cell be cleaned. **Clean as follows:** Fill cell with clean water and move the **Cell cleaning brush** up-and-down and back-and-forth along the walls of the cell. Afterwards, rinse the cell and the meter is ready for use again. If staining has occurred from DPD, fill cell with a 5% chlorine solution. After 20 seconds, discard solution and rinse cell several times with clean water. Meter is ready for testing.

To Install/Replace "AAA" Batteries:

1. Unscrew the O-ring sealed battery cover counter-clockwise. Use proper sized pliers if necessary. Do not disturb the sealing O-ring.
2. Remove the used batteries.
3. Install 4 new AAA batteries following the diagram for correct polarity (see below).
4. Replace the battery cover. Be sure to tighten the cover securely. This is necessary for meter to be waterproof.
5. Dispose of the used batteries in accordance with your local regulations.
6. Press ZERO/ON button to confirm the meter turns on. The meter is now ready for operation.
7. Meter will not work if battery orientation is incorrect.



eXact® Photometer 2-Year Limited Warranty

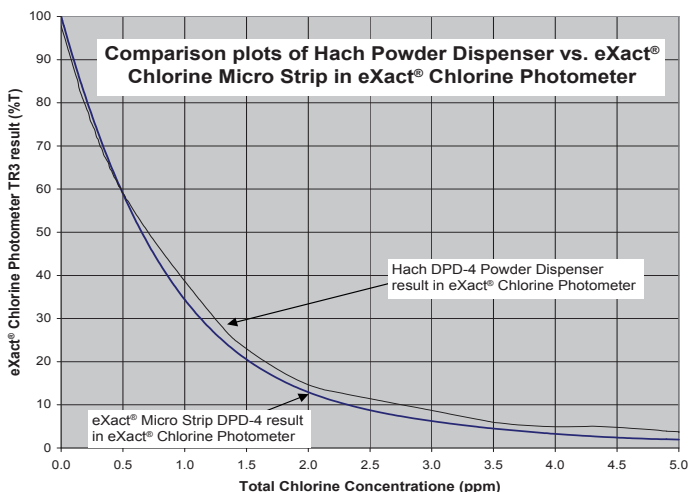
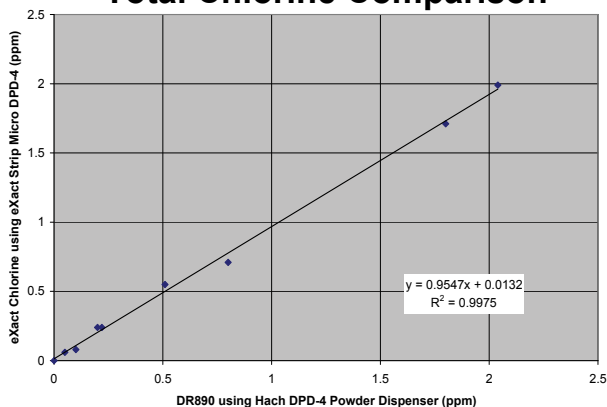
Registration of your eXact® photometer must be received within 30 days from date of purchase to activate the warranty. The eXact® photometer is warranted to be free from defects in materials and workmanship for a period of two (2) years from the date of purchase by the customer. ITS will repair or replace any part of the product which is deemed to be faulty or otherwise defective. The non-transferable warranty does not cover product damage caused by abuse (such as crushing a tablet in the cell) or improper use. If the meter is faulty or otherwise defective contact ITS by phone (+1-803-329-9712 Ext. 0) or email (its@sensafe.com) to describe the problem and obtain a return authorization form before returning the photometer to ITS. Damage caused by improper packing of the photometer for return shipment to ITS will not be covered by the warranty. Customer is responsible for shipping charges to ITS. ITS pays postage when photometer is returned to customer. A maximum processing fee of \$75 will be charged for repair or replacement of non-registered photometers and damages not covered by this warranty. Registration is available over the phone (+1-803-329-9712 Ext. 0) or online at <http://www.sensafe.com/micro/warranty/> (Personal data is kept confidential)

eXact® Strip Micro Accuracy

Chlorine results are compared using the eXact® Strip Micro CL (DPD-4) with the eXact® Chlorine Photometer in Menu TC2 and Hach® DR890 Colorimeter in Program 9 using Hach® DPD-4 powder dispenser. Each data point is the mean of two results.

Hach® DR890	eXact® Chlorine
0	0
0.05	0.06
0.10	0.08
0.20	0.24
0.22	0.24
0.51	0.55
0.80	0.71
1.80	1.71
2.04	1.99

Total Chlorine Comparison



Contact Information

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