

eXact® Eco-Check

Dual Wavelength Advanced Photometer System

Instruction Manual

**IDEAL FOR AQUACULTURE, AQUARIUMS, LAKES,
ENVIRONMENTAL, & EDUCATIONAL TESTING**

**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,
EU Patent #1,725,864, and International Patent Appl. No. PCT/US2005/033985

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



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Visit us online at sensafe.com/eco-check for up-to-date product information and to register your warranty.

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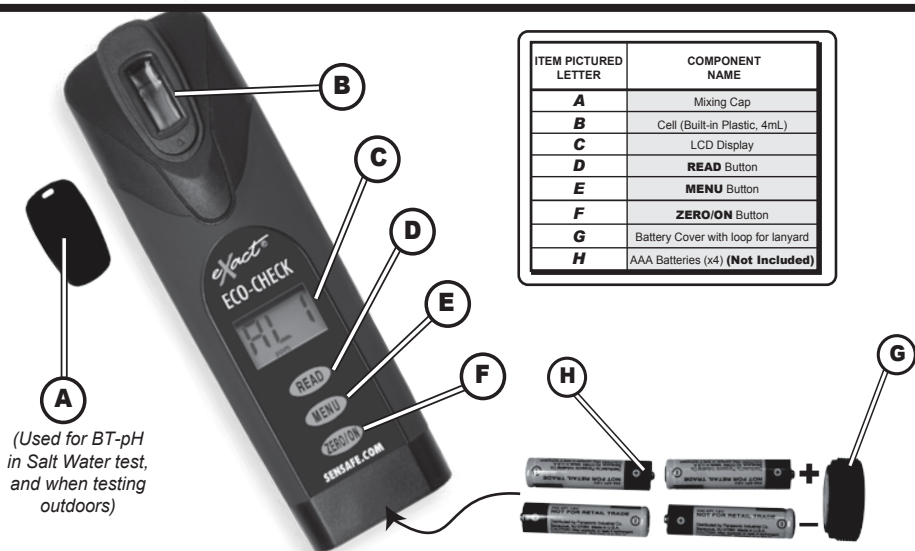
www.poolcheckonline.com



**The eXact® Eco-Check
Dual-Wavelength Photometer System
is designed for use with the eXact®
Strip Micro reagent delivery system.**

**eXact® Eco-Check is Manufactured
and tested in an ISO 9001 Facility.**

eXact® Eco-Check Photometer



ITEM PICTURED LETTER	COMPONENT NAME
A	Mixing Cap
B	Cell (Built-in Plastic, 4mL)
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)

(Used for BT-pH in Salt Water test, and when testing outdoors)

eXact® Eco-Check Photometer Specifications

Measurement Method:	Photometric
Light Source:	Light Emitting Diode (LED) with precision filter
Wavelength:	Dual – 525 nm & 638 nm
Automatic Range Selection:	See Specifications below
Display:	3-digit customized liquid crystal display with annunciators
CELL Pathlength:	20mm
Filter:	525nm

Cell Chamber:	Custom-molded, proprietary, PET plastic fused into chamber, non-removable
Sample Required:	4mL (0.13 oz)
Operating Temperature Range:	0 - 50°C (32° - 122°F)
Power Supply:	(4) AAA alkaline batteries (Not Included)
Battery Life:	>2000 tests with alkaline batteries
Electromagnetic Compliance: (EMC)	Emitted Interference - EN 61326 Immunity to Interference - EN 61326
Waterproof Rating:	Exceeds IP67
Weight:	Instrument: 181 g (6.4 oz)
Dimensions:	Instrument: 5 (W) x 3.5 (D) x 16.5 (H) cm; (2 x 1.4 x 6.5 in)

We offer a “Green” Alternative

eXact® Eco-Check Photometer has been designed to offer the user a more “Green” and cost-effective alternative to testing. Instead of using a 10mL water sample, the eXact® Eco-Check Photometer uses a 4mL water sample, which uses up to 60% less chemical per test. The accuracy of the meter is maintained by designing the photo cell with a 20mm pathlength.

eXact® Eco-Check Specifications

Menu	Tests for	Range	Resolution	Expected Meter Accuracy (±%)
AL1	Total Alkalinity (as CaCO ₃) ¹	1 - 320 ppm	0.1 (0-50.0 ppm) 1 (51-320 ppm)	10 (1-100 ppm) 7.5 (101-200 ppm) 11 (201-320 ppm)
NO2	Nitrite (as NO ₂) ²	0.01 - 1.8 ppm	0.01	5
NO3	Nitrate (as NO ₃)	0.12 - 30 ppm	0.01 (0-5.00 ppm) 0.1 (5.1-30 ppm)	20
NH4	Ammonia (as NH ₃) ³	0.01 - 2.4 ppm	0.01	5
TH5	Total Hardness (as CaCO ₃) ²	5 - 300 ppm	1	19 (5-80 ppm) 17 (81-180 ppm) 16 (181-300 ppm)
CL6	Free and Total Chlorine ²	0.01 - 5 ppm	0.01	3 (0.01-1.50 ppm) 6 (1.51-5 ppm)
bt7	pH, BT (fresh water)	4.5 - 9.2 pH	0.01	0.2 pH (4.5-7.50) 0.5 pH (7.51-9.2)
PO8	Phosphate (as PO ₄) ⁴	0.01 - 4 ppm	0.01 (0-2.50 ppm) 0.1 (2.6-4 ppm)	4 (0.01-2 ppm) 7.5 (2.01-4 ppm)
CU9	Copper (as Cu ²⁺) ²	0.01 - 11 ppm	0.01 (0-4.00 ppm) 0.1 (4.1-11 ppm)	2
CH0	Salt (as NaCl) ²	1 - 430 ppm	1	20 (1-100 ppm) 24 (101-250 ppm) 21 (251-430 ppm)
P11	pH, BT (salt water)	4.5 - 9.0 pH	0.01	0.2 pH (4.5-7.5) 0.6 pH (7.6-9)

¹ Optimal water temperature is 15-40°C / 59-104°F.

² Performance verified with various salt systems and water samples with optimal water temperature at 10-40°C / 50-104°F.

³ The calibration of the meter is based on a water temperature between 57°F (14°C) and 82°F (28°C). If temperature is below 57°F (14°C), your final Ammonia value may read low.

⁴ The calibration of the meter is based on a water temperature between 59°F (15°C) and 88°F (31°C). If temperature is below 59°F (15°C), your final Phosphate value may read low. This test can also be used for salt water testing.

About Your eXact® Eco-Check Instrument

In order 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. Also, the test result is stored in memory for easy retrieval.

The eXact® Eco-Check meter is controlled by three buttons:

- 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 parameters and is stored and retained even when meter turns off. However, it is recommended that each new water sample analyzed is zeroed before testing, to maximize sensitivity and accuracy.
- MENU:** With each press, the MENU button advances through the tests in the following sequence: AL1, NO2, NO3, NH4, TH5, CL6, bt7, PO8, CU9, CH0, P11. 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, **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 display, from memory, the last 20 readings in sequence beginning with -20, which is the latest result, followed by -19, which is the 2nd latest result, etc; and finally -01, which is the oldest result retained. Only the last 20 readings are stored in each menu. This meter is able to store 220 results in memory (20 in each menu).
- READ:** When pressed once, this button starts the timer for the parameter being tested and proceeds for each test procedure. When pressed a second time the meter exits the timer and immediately prepares to colorimetrically measure the sample (not accurate, for accurate results you need to wait the entire reaction time) and simultaneously stores 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 and does not apply to all parameters.

Assigned Value for READY SNAP™ Solution

Ready Snap Lot #	Parameter	Desired Value	Acceptable Value
Red Dye #505	Free Chlorine	1.72 ppm	1.70 - 1.74 ppm
Blue Dye #506	BT-pH	6.85 pH	6.80 - 6.98 pH

NOTE: Values reflect current concentrations as found at time of manufacture and may change with consecutive lots.

R061913



1

REMOVE STRIP

Remove one (1) *eXact® Strip Micro AL, Part No. 486641* 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 stored reading in memory.



3

SELECT TEST: AL1

Press and re-press the **MENU** button until the display shows the parameter AL1.



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**. The sample is ready for testing.



6

DIP STRIP AND PRESS "READ"

Dip the *eXact® Strip Micro AL, Part No. 486641* 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 (approx. 2 strokes/sec). **Remove and discard the strip after "1" on the display disappears***. NOTE: For water temperatures above 95°F/35°C, remove and discard the strip when the timer displays "10", allow countdown to continue.



7

RECORD RESULT DISPLAYED

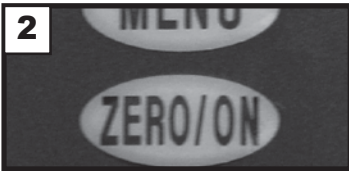
The cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in AL1 Menu). After testing is completed, rinse cell immediately.

NOTE: Alizarin Red S and citric acid react with the Total Alkalinity in the sample to form a red color directly proportional to the alkalinity in the sample.

*NOTE: When testing outdoors (sunlight), for best accuracy, use the Mixing Cap/Cell Cover when Zeroing and Reading the sample.



1 REMOVE STRIP
Remove one (1) **eXact® Strip Micro NO₂, Part No. 486623** 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: NO2
Press and re-press the **MENU** button until the display shows the parameter **NO2**.



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 NO₂, Part No. 486623** 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 (approx. 2 strokes/sec). **Remove and discard the strip after "1" on the display disappears***. The meter will automatically start to count up for 360 seconds (6 minutes).



7 RECORD RESULT DISPLAYED
After the 360 seconds, the cursor will automatically move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in NO2 Menu).

To determine Nitrite value as Nitrogen (NO₂ as N) as used by USEPA, divide displayed result by 3.3.

NOTE: Nitrite reacts with chromotropic acid and sulfanilamide in acid media and forms a pink color, directly proportional to Nitrite concentration.

*NOTE: When testing outdoors (sunlight), for best accuracy, use the Mixing Cap/Cell Cover when Zeroing and Reading the sample.

MENU

Nitrate (as NO₃) Test Procedure

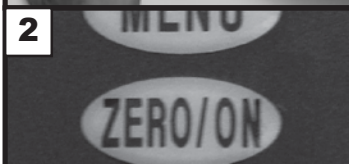
NO₃**NO₃**

FRESH WATER ONLY (Salt level must be less than 400ppm)

For Salt Water: Follow the procedure and multiply the displayed result by 4.5.

**1****REMOVE STRIP**

Remove one (1) **eXact® Strip Micro NO₃, Part No. 486655** 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: NO₃**

Press and re-press the **MENU** button until the display shows the parameter **NO₃**.

**4****RINSE AND FILL CELL WITH SAMPLE**

Add sample water to the **CELL** and use brush to remove any zinc from previous tests. 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 NO₃, Part No. 486655** 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 (approx. 2 strokes/sec). **Remove and discard the strip after "1" on the display disappears***. The meter will automatically start to count up for 600 seconds (10 minutes).

**7****RECORD RESULT DISPLAYED**

After the 600 seconds, the cursor will automatically move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in NO₃ Menu). After testing, rinse cell and clean with brush.

IMPORTANT NOTE: Need to clean the cell after each experiment with brush and distilled water. This is very IMPORTANT. If any zinc dust is adhering to the cell wall, it will affect the results. Finally, wash the sample three to four times before the measurement starts.

To determine Nitrate value as Nitrogen (NO₃ as N) as used by USEPA, divide displayed result by 4.4.

NOTE: The Zinc metal reduces Nitrate to Nitrite and Nitrite reacts with chromotropic acid and sulfanilamide in acid media and forms a pink color, directly proportional to Nitrite concentration.

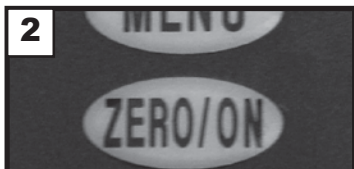
*NOTE: When testing outdoors (sunlight), for best accuracy, use the Mixing Cap/Cell Cover when Zeroing and Reading the sample.



1

REMOVE STRIP

Remove one (1) *eXact® Strip Micro NH₃, Part No. 486654-A* 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: NH₄

Press and re-press the **MENU** button until the display shows the parameter **NH₄**.



4

RINSE/FILL CELL & ADD REAGENT

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. Add 3 drops of *eXact® Reagent NH₃, Part No. 486654-B* to the **CELL**. For Salt Water Analysis, add 10 drops.



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 NH₃, Part No. 486654-A* 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 (approx. 2 strokes/sec). **Remove and discard the strip after "1" on the display disappears***. The meter will automatically start to count up for 500 seconds.



7

RECORD RESULT DISPLAYED

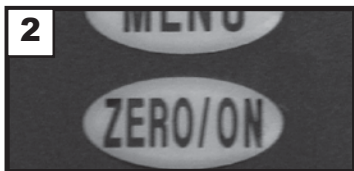
After the 500 seconds, the cursor will move across the display while the meter prepares to measure the sample. Record result displayed as **NH₃ concentration** (this result is automatically stored in **NH₄ Menu**). After testing, rinse cell and clean with brush.

NOTE: Ammonia compounds react with Chlorine to form monochloramine. This reacts with salicylate to form 5-amino salicylate. This will oxidize in the presence of sodium nitroprusside to form a green color, directly proportional to Ammonia concentration.

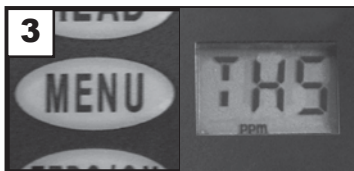
*NOTE: When testing outdoors (sunlight), for best accuracy, use the Mixing Cap/Cell Cover when Zeroing and Reading the sample.



- 1** **REMOVE STRIP**
Remove one (1) *eXact® Strip Micro TH, Part No. 486673* 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: TH5**
Press and re-press the **MENU** button until the display shows the parameter **TH5**.



- 4** **RINSE AND FILL CELL WITH SAMPLE**
Rinse the **CELL** 2 or 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**. The sample is ready for testing.



- 6** **DIP STRIP AND PRESS "READ"**
Dip the *eXact® Strip Micro TH, Part No. 486673* 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 (approx. 2 strokes/sec). **Remove and discard the strip when "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 TH5 Menu). After testing is completed, rinse cell immediately and use brush to remove any residual from previous test.

INTERFERENCES: Positive interference are observed if the test sample contains Barium. Interferences also observed if the test sample contains Copper, Lead, Cobalt or Nickel.

NOTE: Test samples higher than 300 ppm of Total Hardness requires dilution (see page 15).

NOTE: The Calcium and Magnesium ions react with Phthalein purple to form a purple color, directly proportional to Calcium and Magnesium concentration.

*NOTE: When testing outdoors (sunlight), for best accuracy, use the Mixing Cap/Cell Cover when Zeroing and Reading the sample.

1

**REMOVE STRIP**

Remove one (1) *eXact® Strip Micro CL (DPD-4), 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: CL6**

Press and re-press the **MENU** button until the display shows the parameter **CL6**.

CL6 is also used for testing:

Free Chlorine (DPD-1), Ozone (DPD-4), Permanganate (DPD-1), and Total Chlorine (DPD-3). Contact ITS for specs and details if you are planning on using **CL6** for Permanganate or Ozone measurements.

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-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 (approx. 2 strokes/sec). **Remove and discard the strip after "1" on the display disappears*.**

RECORD RESULT DISPLAYED

The cursor will move across the display while the meter prepares to measure the sample. Record result displayed as Free Chlorine (this result is automatically stored in CL6 Menu).

7



8

PRESS READ AGAIN

Press **READ** again and the meter will count down and display the next Total Chlorine result. If this reading matches the previous result, then record this as Total Chlorine value (this result is stored in CL1). After testing is completed, rinse cell immediately. Record the Total Chlorine as the highest value the meter displayed.

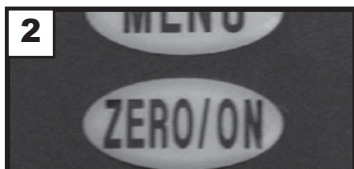
*NOTE: When testing outdoors (sunlight), for best accuracy, use the Mixing Cap/Cell Cover when Zeroing and Reading the sample.

bt7

NOTE: If NaCl value is less than 4,000 ppm, then use this procedure.
If NaCl value is greater than 4,000 ppm, then use Procedure on page 14.



- 1 REMOVE STRIP**
Remove one (1) *eXact® Strip Micro bt, Part No. 486652* 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: bt7**
Press and re-press the **MENU** button until the display shows the parameter **bt7**.



- 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. When the display shows **0.0 PH**, the sample is ready for testing.



- 6 DIP STRIP AND PRESS "READ"**
Dip the *eXact® Strip Micro bt, Part No. 486652* 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 (approx. 2 strokes/sec). **Remove and discard the strip after "1" on the display disappears***.



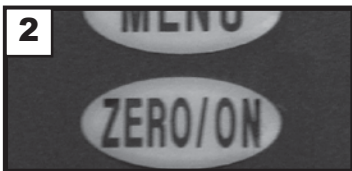
- 7 READ RESULT DISPLAYED**
The cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in bt7 Menu). After testing, rinse cell immediately.

NOTE: For best results, Total Alkalinity of the sample should be 40-140 ppm.

*NOTE: When testing outdoors (sunlight), for best accuracy, use the Mixing Cap/Cell Cover when Zeroing and Reading the sample.



- 1** **REMOVE STRIP**
Remove one (1) *eXact® Strip Micro PO₄, Part No. 486814* 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: PO8**
Press and re-press the **MENU** button until the display shows the parameter **PO8**.



RINSE AND FILL CELL WITH SAMPLE

Note: Clean the CELL with Distilled Vinegar (5%), 0.1 N HCl or Muriatic Acid. 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. When the display shows **0.00 PPM**, the sample is ready for testing.



DIP STRIP AND PRESS "READ"

Dip the *eXact® Strip Micro PO₄, Part No. 486814* 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 (approx. 2 strokes/sec). **Remove and discard the strip after "1" on the display disappears***. The meter will automatically start to count up for 120 seconds.



- 7** **READ RESULT DISPLAYED**
After the 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 PO8 Menu). After testing, rinse cell immediately.

NOTE: Reactive Phosphate reacts with Molybdenum in acid media to form a phosphomolybdate complex. This complex will reduce in the presence of ascorbic acid to form an intense blue color.

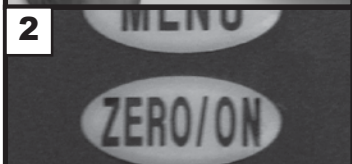
*NOTE: When testing outdoors (sunlight), for best accuracy, use the Mixing Cap/Cell Cover when Zeroing and Reading the sample.

1

**REMOVE STRIP**

Remove one (1) *eXact® Strip Micro CU, Part No. 486632* 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: CU9**

Press and re-press the **MENU** button until the display shows the parameter **CU9**.

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. When the display shows **0.00 PPM**, the sample is ready for testing.

6

**DIP STRIP AND PRESS "READ"**

Dip the *eXact® Strip Micro CU, Part No. 486632* 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 (approx. 2 strokes/sec). **Remove and discard the strip after "1" on the display disappears***. The display will immediately start counting up from 1 to 20 (this extra time allows more thorough color development).

7

**READ RESULT DISPLAYED**

At 20 sec, the cursor will move across the display while the meter prepares to measure the sample. Press **READ** again. If this reading matches the previous result, then record this as the Copper value.

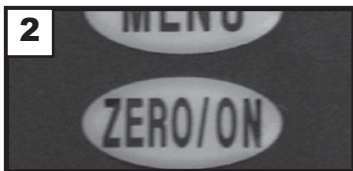
If not matching, some water samples may require a 2 minute wait time to complete the reaction. For reporting, you must time the two minutes and then press **READ** to get your final result. Record result displayed (this result is automatically stored in CU9 Menu). After testing is complete, rinse cell immediately.

NOTE: Copper reacts with biquinoline to form a purple-colored complex according to the concentration of Copper.

*NOTE: When testing outdoors (sunlight), for best accuracy, use the Mixing Cap/Cell Cover when Zeroing and Reading the sample.



- 1 REMOVE STRIP**
Remove one (1) **eXact® Strip Micro CH, Part No. 486757** 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: CHO**
Press and re-press the **MENU** button until the display shows the parameter **CHO**.



- 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. When the display shows **0 PPM**, the sample is ready for testing.



- 6 DIP STRIP AND PRESS "READ"**
Dip the **eXact® Strip Micro CH, Part No. 486757** 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 (approx. 2 strokes/sec). **Remove and discard the strip after "1" on the display disappears***.



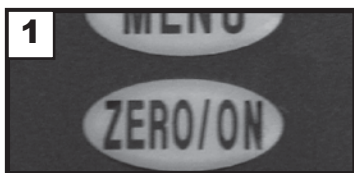
- 7 READ RESULT DISPLAYED**
The cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in **CHO** Menu). After testing, rinse cell immediately and clean with brush.

¹ Test samples higher than 430 ppm of Chloride requires dilution (see page 15).

NOTE: Chloride ions react with silver to form a white precipitate.

*NOTE: When testing outdoors (sunlight), for best accuracy, use the Mixing Cap/Cell Cover when Zeroing and Reading the sample.

NOTE: If NaCl value is greater than 4,000 ppm, then use this procedure.
If NaCl value is less than 4,000 ppm, then use Procedure on page 10.



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: P11

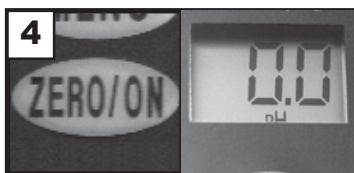
Press and re-press the **MENU** button until the display shows the parameter **P11**.



3

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.



4

ZERO METER

Press the **ZERO/ON** button. When the display shows **0.0 pH**, the sample is ready for testing.



5

ADD REAGENT AND CAP

Shake the bottle of **eXact® Reagent P-pH, Part No. 486657** to mix the chemical in the bottle. Then, add three (3) drops of eXact® Reagent P-pH to the cell and cap meter cell with mixing cap.



6

PRESS "READ" AND MIX

Press **READ** to start timer, place thumb or finger over cap, and mix the sample by turning the meter upside-down repetitively during the **20 SECOND** countdown. **NOTE:** Cover the cap completely and hold firmly.



6

READ RESULT DISPLAYED

When timer displays 1, place meter on flat surface. The cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in P11 Menu). After testing is completed, rinse cell immediately.

*NOTE: When testing outdoors (sunlight), for best accuracy, use the Mixing Cap/Cell Cover when Zeroing and Reading the sample.

Mini Dilution Kit II (487202) Instructions

Kit includes: Graduated Cylinder (50mL) with cap; Graduated 3mL Syringe (labeled at 0.1mL increments).

How to do 1 to 20 dilution using the 3mL syringe (dilution factor of 20)

Rinse the 3mL syringe three times with water sample that you are about to test.

1. Rinse the 50mL graduated cylinder three times with distilled or deionized (salt free) water.
2. Fill the 3mL syringe to the 2mL line by pulling up water sample to be tested with upward motion of plunger to the 2mL line. Note that the plunger ring should line up at the 2mL line.
3. Hold the filled syringe over a clean 50mL cylinder. Push the plunger all the way down to add the sample to the cylinder.
4. After adding sample to the cylinder, fill the graduated cylinder to the 40mL line with distilled or deionized (salt free) water. Securely put the cap on the cylinder.
5. Mix the contents of the graduated cylinder by turning the cylinder up side down at least three times. The sample is ready to add to the meter for testing.

Other dilutions possible with the 3mL syringe are as follows:

Volume in syringe	Volume filled in Cylinder	Dilution Factor
1.0mL	40mL	40
1.0mL	30mL	30
1.0mL	20mL	20
0.5mL	50mL	100
0.5mL	25mL	50
0.2mL	50mL	250

CALCULATION:
Test Result x Dilution Factor =
Actual Result

Free Chlorine (DPD-1) Test Procedure

DPD-1 and DPD-3 are not included in the Standard Eco-Check Kit.

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: CL6

Press and re-press the **MENU** button until the display shows the parameter **CL6**.

4 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-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 (approx. 2 strokes/sec). **Remove and discard the strip after "1" on the display disappears***. The cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in CL6 Menu).

DO NOT discard the sample from the Free Chlorine test if you are planning to run eXact® Strip Micro DPD-3 (Total Chlorine) Procedure. Move directly to steps 7-9 on page 16. Otherwise, rinse the cell immediately.

NOTE: Chlorine reacts with N,N-diethyl-p-phenylenediamine as it is released from the strip to form a magenta color, directly proportional to the Chlorine concentration.

*NOTE: When testing outdoors (sunlight), for best accuracy, use the Mixing Cap/Cell Cover when Zeroing and Reading the sample.

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

7 REMOVE STRIP

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

8 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 (approx. 2 strokes/sec). **Remove and discard the strip when “1” on the display disappears.** The cursor will move across the display while the meter prepares to measure the sample. This result is automatically stored in CL6 Menu (NOTE: The Iodide added with DPD-3 will, in the presence of Combined Chlorine or Chloramines, convert into Iodine).

9 PRESS READ AGAIN

Press READ again and the meter will count down and display the next reading. If this reading matches the previous result, then record this as the Total Chlorine result. This value is automatically stored in CL6 Menu. After testing is completed, rinse cell immediately. Record the Total Chlorine as the highest value the meter displayed.

***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 time the two minutes and then make your measurement. NOTE: From testing in our lab, water samples above 70°F (20°C), generally, reach a stabilized reading quicker than 2 minutes.

CL6: Chlorine and Iodine react with N,N-diethyl-p-phenylenediamine as it is released from the strip to form a magenta color, directly proportional to the Chlorine concentration. (Ozone, Bromine, and Permanganate also form the color)

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 strong acidity, test may not develop full color. Neutralize to pH 6.0 to 7.0 with 0.5 N 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 0.5 N 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 (0.5 N Sulfuric acid) or base (0.5N Sodium hydroxide).

eXact® Eco-Check Tips For Best Accuracy


1. Become familiar with the meter and the different tests by reading the instructions carefully.
2. The Free Chlorine and Total Chlorine results are compliant for meeting USEPA (4500-Cl G); ISO 7393/2; and German DIN 38408 G4-2 requirements.
3. Observe the dip time (*as required for the test*) for accurate results.
4. Test immediately after filling the **CELL** with water sample.
5. Be sure the **CELL** is filled to capacity (4mL).
6. Rinse the **CELL** with clean water immediately after completing the test. (*Some test reagents will stain or coat the **CELL** wall if allowed to remain*).
7. 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 sample*).
8. Store the meter and all test materials out of direct sunlight and away from chemical storage areas.
9. Minimize exposure of meter and test reagents to heat above 90°F (32°C).
10. Dry the outside of the meter when testing is complete or before storage of the meter.
11. Each eXact® Strip Micro test strip is valid for **ONLY** one test. Discard strip after single use in regular trash that is inaccessible to children and pets.
12. Each bottle of eXact® Strip Micro contains the quantity of strips notated on the bottle. You may find one or two strips that are noticeably smaller or larger in width than the normal strips in the bottle. These should be discarded. Using these strips may give unreliable results.
13. The eXact® Eco-Check meter is not compatible for use with DPD-1, DPD-3, and DPD-4 powder pillows, tablets, and liquids available from other manufacturers. Accurate results can only be guaranteed by using genuine eXact® Strip Micro strips or reagents (reorder information on page 19).
14. Our lab testing with the Micro 20 meter has shown that zeroing and measuring of the sample normally does not require any cell cover for accurate results, except in sunlight. To obtain optimal accuracy when testing with the meter outdoors (sunlight), use the Mixing Cap/Cell Cover when zeroing and reading the sample.
15. Remove batteries when meter is not used for more than a month (Warranty Requirement).

If there is a question about the quality of a ReagentStrip™, your test method, or the photometer you are using, then it is recommended to test the SYSTEM (reagent, you, and photometer) by using the appropriate READY SNAP™ solution.

Follow the procedure for the test you are running. If you get the acceptable result using the READY SNAP™ solution, then you can be confident that the reagent, you, and the photometer are working as a SYSTEM correctly.

eXact® Eco-Check Meter Messages

The following are some common messages that may be displayed, including error messages.

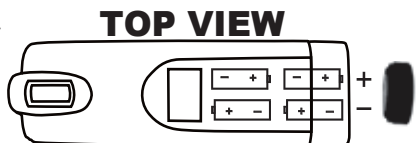
LCD Message	Description	Corrective Action
HI	In READ mode: test sample concentration is above the measurement range (test specific).	Dilute and retest.
LO	In READ mode: test sample concentration is below the measurement range (test specific).	Sample value is below measurement range.
LO	In ZERO mode: 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.
ER	Excessive stray light detected. Normally this does not occur, even when testing in sunlight.	Place the LIGHT BLOCKING CAP over the CELL for zeroing and for reading result. Moving to a shaded area can also fix this problem.
 in lower left	Low battery indication during testing (meter may not zero).	Replace the batteries.
TRA/TRb	Quality control of meter used by ITS.	Unscrew and rescrew battery cover to reset.
CL5	Clear memory. Contact ITS for more info.	Unscrew and rescrew battery cover to reset.

About The Built-In 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. When the **CELL** becomes stained or cloudy from repeated testing, or when the meter does not blank when you press the **ZERO/ON** button, the cell needs to 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. Cleaning the cell regularly is especially recommended after you run a test that is using turbidity or Zinc dust chemistry for analysis (Chloride and Nitrate).

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. Batteries are not included.
2. Remove the used batteries and install 4 new AAA batteries following the diagram for correct polarity (see diagram). We recommend high quality AAA alkaline batteries be used.
4. Replace the battery cover. Be sure to tighten the cover securely (do not overtighten). 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 \$100 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® Eco-Check Reagent Reorder Information

eXact® Strip Micro (4mL) Reagent Specifications - For use with eXact® Eco-Check

No.	PARAMETER	AES Item #	# OF TESTS	DETECTION RANGE	CHEMISTRY
	Dilution Kit	487200	N/A	N/A	N/A
1	Alkalinity, Total (as CaCO ₃)	486641	100	1 - 320 ppm	Alizarin Red S + Citrate
2	Ammonia (as NH ₃)	486654-A	25	0.01 - 2.4 ppm	Salicylate Method
	Ammonia Reagent	486654-B	25		
3	Total Hardness (as CaCO ₃)	486673	50	5 - 300 ppm	Phtalein Purple
4	Chloride III (as NaCl)	486757	25	1 - 430 ppm	Silver
5	Chlorine, Free	486637	100	0.01 - 5 ppm	DPD
6	Chlorine, Total*	486638	100	0.01 - 5 ppm	KI
7	Copper (as Cu ⁺²)	486632	50	0.01 - 11 ppm	Biquinoline
8	Nitrate (as NO ₃)	486655	50	0.12 - 30 ppm	Zinc + Chromotropic Acid + SA
9	Nitrite (as NO ₂)	486623	50	0.01 - 1.8 ppm	Chromotropic Acid + SA
10	BT-pH (fresh water)	486652	100	4.5 - 9.2 pH	Bromothymol Blue
11	BT-pH (salt water)	486657	50	4.5 - 9 pH	Bromothymol Blue
12	Phosphate (as PO ₄)	486814	50	0.01 - 4 ppm	Molybdate Antimony

* Total Chlorine Test requires Free Chlorine (486637) to be run first.

About The Accuracy / Calibration Of The eXact® Eco-Check System

All tests have been calibrated using certified reference standards and standard analytical spectrophotometric methods. The algorithms in the software reflect the best correlation of the eXact® Eco-Check Systems against the AWWA, US EPA, DIN, and ISO reference test methods for chlorine. Studies show that the eXact® Eco-Check System repeatedly agrees with an EPA Compliant reference method greater than 99% (R²= 0.99948, 0 - 5 ppm - see page 20). The eXact® Eco-Check Advanced Photometric System has been factory calibrated for your convenience. You can expect the fixed calibrations in the meter to be valid for the life of the meter because of the quality, Long-Life LED, the photo cell, and the software as written into the meter. NOTE: Test algorithms in this meter give accurate results in fresh and salt water (except Nitrate)

Compliance Verification for Free and Total Chlorine Testing

This DPD test system is accepted by most state health departments because this test is USEPA (DIN Standard 38 408 G4, ISO 7393/2) accepted for testing requirements for Free and Total Chlorine. The eXact® Eco-Check meter uses a wavelength of 525nm; and the compliance requirement is that the colorimeter wavelength is between 490 and 530nm. The eXact® Strip Micro CL (DPD-1) uses the same reagents and proportions, and the resulting solution pH is maintained between 6.2 and 6.5 as specified by AWWA (American Water Works Association) method 4500-Cl G. It should be understood that the USEPA does not "approve" commercial DPD delivery systems such as reagent powder pillows, tablets, dispensers, or eXact® Strip Micro DPD delivery devices. The eXact® Strip Micro CL (DPD-1) for Free Chlorine, and the eXact® Strip Micro CL (DPD-3) or the eXact® Strip Micro CL (DPD-4) for Total Chlorine meet your reportable testing requirements because the eXact® Strip Micro CL delivers the same chemicals in identical proportions (see table below); therefore, the system is compliant. Likewise, AWWA proportions are followed as required for Total Chlorine measurements using Potassium Iodide.

Component (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%

NOTE: Because most of our products are test strips or use reagents that have little or no hazard in the quantity sold, MSDS sheets are not supplied with the test.

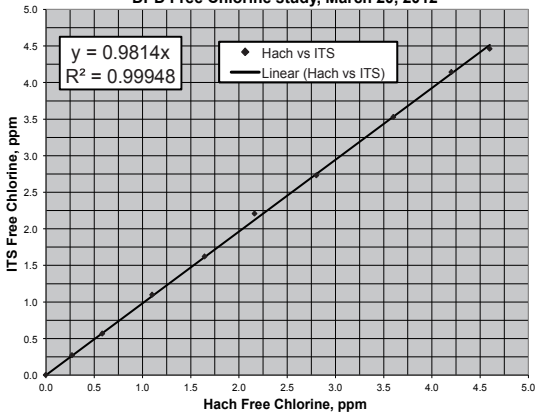
To ensure optimal performance, store your eXact® kit in a cool, dry place away from excess heat (below 90°F / 32°C), moisture, and oxidizers such as Chlorine and Bromine.

eXact® Strip Micro DPD-1 Accuracy

Free Chlorine results are compared using the eXact® Strip Micro CL (DPD-1) with the eXact® Eco-Check Meter in Menu CL6 and Hach® DR890 Colorimeter in Program 9 and Program 12 using Hach® powder pillows.

DR890	Eco-Check
0.00	0
0.27	0.27
0.58	0.57
1.10	1.10
1.64	1.62
2.16	2.21
2.8	2.73
3.6	3.53
4.2	4.14
4.6	4.46

DPD Free Chlorine study, March 20, 2012



Meter	Menu	Range (PPM)	Resolution
Eco-Check	CL6	0 to 5.00	0.01
DR890	Program 9	0.00 to 2.20	0.01
	Program 12	0.0 to 11.0	0.1

Hach® is a registered trademark of Danaher Corporation

The eXact® Eco-Check Kit

(486798-K) Standard Kit Includes:

- 1 eXact® Eco-Check Meter 486798
- eXact® Strip Micro DPD-4 486670-25
- eXact® Strip Micro BT-pH 486652-25
- eXact® Reagent BT-pH 486657-25
- eXact® Strip Micro Copper 486632-25
- eXact® Strip Micro Total Alkalinity 486641-25
- eXact® Strip Micro Total Hardness 486673-25
- eXact® Strip Micro Ammonia 486654-A-25
- eXact® Reagent Ammonia 486654-B-25
- eXact® Strip Micro Nitrate 486655-25
- eXact® Strip Micro Nitrite 486623-25
- eXact® Strip Micro Phosphate 486614-25
- eXact® Strip Micro Chloride 486757
- Mini Dilution Kit II 487202
- 1 Mixing Cap
- 1 Cell Cleaning Brush
- Instruction Booklet
- Plastic Carrying Case



Contact Information

For US Inquiries and Re-Orders: Industrial Test Systems, Inc.

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Rock Hill, SC 29730 USA
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1-803-329-9712 - *OUTSIDE THE U.S.*

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