

# Dual-Wavelength Photometer System **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 and International patent applications including International Patent Appln. No. PCT/US2005/033985; and EU Patent #1,725,864

COMPLIANT FOR FREE AND TOTAL CHLORINE (4800-CI DIN STANDARD 38 408 64, 190 7363/2)	
	Stacks ECO-CHECK
SENSAFE.CO.	

Index: <u>Parameter</u> Total Alkalinity (as CaCO <sub>3</sub> ) Nitrite (as NO <sub>2</sub> ) Nitrate (as NO <sub>3</sub> ) Ammonia (as NH <sub>3</sub> ) Total Hardness (as CaCO <sub>3</sub> ) Total Chlorine pH in Fresh Water Phosphate (as PO <sub>4</sub> ) Copper (as Cu <sup>+2</sup> ) Chloride (as NaCl) pH in Salt Water Free Chlorine Total Chlorine	Page 4 5 6 7 8 9 10 11 12 13 14 15 16	MENU AL1 NO2 NO3 NH4 TH5 CL6 bt7 PO8 CU9 CH0 P11 CL6 CL6
Specifications About Your Photometer Mini Dilution Kit II Instructions Tips for Best Accuracy Battery Installation <b>Warranty (2 year)</b> Reorder Information USEPA Compliance Kit Components	2 3 15 17 18 <b>18</b> 19 19 20	run-to-date
product information and to register your warranty.		

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

eXact<sup>®</sup> Eco-Check is Manufactured and tested in an ISO 9001 Facility.

# eXact<sup>®</sup> Eco-Check Photometer



# eXact<sup>®</sup> Eco-Check Photometer Specifications

tal display

Cell Chamber:	Custom-molded, proprietary, PET plastic fused into chamber, non-removable
Sample Required:	4 ml (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:	Emitted Interference - EN 61326
(EMC)	Immunity to Interference - EN 61326
Waterproof Rating:	Exceeds IP67
Weight:	Instrument: 140 g (5 oz)
Dimensions:	Instrument: 5 (W) x 3.5 (D) x 16.5 (H) cm;
	(2 x 1.4 x 6.375 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<sup>®</sup> Eco-Check Specifications

Menu	Tests for	Range	Resolution	Typical (±%) Accuracy
AL1	Total Alkalinity (as CaCO <sub>3</sub> ) <sup>1</sup>	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 <sub>2</sub> ) <sup>1</sup>	0.01 - 1.8 ppm	0.01	5
NO3	Nitrate (as NO <sub>3</sub> )	0.12 - 30 ppm	0.01 (0-5.00 ppm) 0.1 (5.1-30 ppm)	20
NH4	Ammonia (as NH <sub>3</sub> ) <sup>1</sup>	0.01 - 2.4 ppm	0.01	5
TH5	Total Hardness (as CaCO <sub>3</sub> ) <sup>1</sup>	5 - 300 ppm	1	19 (5-80 ppm) 17 (81-180 ppm) 16 (181-300 ppm)
CL6	Free and Total Chlorine <sup>1</sup>	0.01 - 5 ppm	0.01	3 (0.01-1.50 ppm) 6 (1.51-5 ppm)
bt7	рН, ВТ	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 <sub>4</sub> ) <sup>1</sup>	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) 1	0.01 - 11 ppm	0.01 (0-4.00 ppm) 0.1 (4.1-11 ppm)	2
СН0	Salt (as NaCl) 1	1 - 430 ppm	1	20 (1-100 ppm) 24 (101-250 ppm) 21 (251-430 ppm)
P11	pH, BT	4.5 - 9 pH	0.01	0.2 pH (4.5-7.5) 0.6 pH (7.6-9)

<sup>1</sup> Performance verified with various salt systems and water samples with optimal water temperature at 10-40°C / 50-104°F.

Optimal water temperature for Total Alkalinity test is 15-40°C / 59-104°F.

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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<sup>®</sup> Eco-Check meter 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 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.

2. **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 2<sup>nd</sup> 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).

3. **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<sup>™</sup> 3 (lot 505) Solution

Parameter	Desired Value (ppm)	Acceptable Value (ppm)
Free Chlorine	1.72	1.70 - 1.74

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











#### **REMOVE STRIP**

Remove one (1) **eXact**<sup>®</sup> **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.

#### 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.

#### SELECT TEST: AL1

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

#### 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.



#### 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.



#### DIP STRIP AND PRESS "READ"

Dip the eXact<sup>®</sup> 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.



#### **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.







MENU

**NO2** 



#### **REMOVE STRIP**

Remove one (1) **eXact<sup>®</sup> Strip Micro NO<sub>2</sub>, Part No. 486623** from the bottle before beginning the test. Set the strip in a dry, convenient place and recap the bottle immediately.

#### 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.

#### SELECT TEST: NO2

Press and re-press the **MENU** button until the display shows the parameter **NO2**.

#### **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.



#### ZERO METER\*

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

#### **DIP STRIP AND PRESS "READ"**

Dip the eXact<sup>®</sup> Strip Micro NO<sub>2</sub>, 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). **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 (NO<sub>2</sub><sup>-</sup> 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.



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# Nitrate (as NO<sub>3</sub>) Test Procedure







**REMOVE STRIP** 

Remove one (1) eXact<sup>®</sup> Strip Micro NO<sub>3</sub>, Part No. 486655 from the bottle before beginning the test. Set the strip in a dry, convenient place and recap the bottle immediately.

#### 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.

#### **SELECT TEST: NO3**

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

#### **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.

#### **ZERO METER\***

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



#### **DIP STRIP AND PRESS "READ"**

Dip the eXact<sup>®</sup> Strip Micro NO, 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).



#### 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).

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 (NO<sub>3</sub> 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.

#### MENU NH4

# Ammonia (NH<sub>3</sub>/NH<sub>4</sub><sup>+</sup>) Test Procedure







#### (Ammonia Kit 486654 - Reagent and Strips)

#### **REMOVE STRIP**

Remove one (1) **eXact**<sup>®</sup> **Strip Micro NH**<sub>3</sub>, **Part No. 486654-A** from the bottle before beginning the test. Set the strip in a dry, convenient place and recap the bottle immediately.

#### 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.

#### SELECT TEST: NH4

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

#### 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 NH<sub>3</sub>**, **Part No. 486654-B** to the **CELL**. For Salt Water Analysis, add 10 drops.



#### ZERO METER\*

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

#### **DIP STRIP AND PRESS "READ"**

Dip the eXact<sup>®</sup> Strip Micro NH<sub>3</sub>, 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.



#### 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  $NH_3$  concentration (this result is automatically stored in NH4 Menu).

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. 2





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#### **REMOVE STRIP**

Remove one (1) **eXact**<sup>®</sup> **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.

#### 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.

# MENU HRE di

#### SELECT TEST: TH5

Press and re-press the **MENU** button until the display shows the parameter **TH5**.



#### **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.



#### 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.



#### DIP STRIP AND PRESS "READ"

Dip the eXact<sup>®</sup> 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\*.



#### **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.



# **DPD-4 Total Chlorine Procedure**



MENU

CL6













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#### REMOVE STRIP

Remove one (1) eXact<sup>®</sup> 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.

#### **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.

#### **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.

#### 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.

#### **ZERO METER\***

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

#### **DIP STRIP AND PRESS "READ"**

Dip the eXact<sup>®</sup> 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).

#### 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.



# pH (Fresh Water) Test Procedure

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.



#### **REMOVE STRIP**

Remove one (1) **eXact**<sup>®</sup> 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.



#### 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.



#### SELECT TEST: bt7

Press and re-press the **MENU** button until the display shows the parameter **bt7**.



# ZERO/ON

#### 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.

#### ZERO METER\*

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



#### **DIP STRIP AND PRESS "READ"**

Dip the eXact<sup>®</sup> 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\*.



#### 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.







# REMOVE STRIP

Remove one (1) eXact<sup>®</sup> Strip Micro PO<sub>4</sub>, Part No. 486814 from the bottle before beginning the test. Set the strip in a dry, convenient place and recap the bottle immediately.

#### 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.

#### **SELECT TEST: PO8**

Press and re-press the MENU button until the display shows the parameter PO8.



#### **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. NOTE: For accurate results (<0.3 ppm) it is recommended to rinse the CELL with diluted HCI (diluted Muriatic acid) or 5% vinegar solution.



# FΔ



# **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.

**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.





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#### **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.

#### 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.

#### SELECT TEST: CU9

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

#### 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.



#### 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<sup>®</sup> 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).



#### READ RESULT DISPLAYED

At 20 sec, the cursor will move across the display while the meter prepares to measure the sample. 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.





#### **REMOVE STRIP**

Remove one (1) **eXact**<sup>®</sup> **Strip Micro CH, Part No. 481657-II** from the bottle before beginning the test. Set the strip in a dry, convenient place and recap the bottle immediately.



#### 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.



#### SELECT TEST: CH0

Press and re-press the **MENU** button until the display shows the parameter **CH0**.



#### **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.



#### ZERO METER\*

Press the **ZERO**/**ON** button. When the display shows **0 PPM**, the sample is ready for testing.





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\*.



#### **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 CH0 Menu). After testing, rinse cell immediately and clean with brush.

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

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

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

MENU P11

# pH (Salt Water) Test Procedure

P

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.



#### **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.



#### SELECT TEST: P11

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



#### 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.



#### ZERO METER

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



#### ADD REAGENT AND CAP

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



#### PRESS "READ" AND MIX

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



#### **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.

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

#### How to do 1 to 20 dilution using the 3 ml 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 3 ml syringe to the 2 ml line by pulling up water sample to be tested with upward motion of plunger to the 2 ml line. Note that the plunger ring should line up at the 2 ml line.
- 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: <u>Volume in syringe</u> Volume filled in Cylinder Dilution Factor

1.0 ml	40 ml	40	
1.0 ml	30 ml	30	
1.0 ml	20 ml	20	Test Result x Dilution Factor =
0.5 ml	50 ml	100	Actual Result
0.5ml	25 ml	50	
0.2 ml	50 ml	250	

# Free Chlorine (DPD-1) Test Procedure



#### **REMOVE STRIP**

Remove one (1) eXact<sup>®</sup> 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.



3

4

#### 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.

#### **SELECT TEST: CL6**

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

#### 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.

#### ZERO METER\*

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



5

#### DIP STRIP AND PRESS "READ"

Dip the eXact<sup>®</sup> 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<sup>®</sup> 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.

8

9



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

#### **REMOVE STRIP**

Remove one (1) eXact<sup>®</sup> 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.

#### **DIP STRIP AND PRESS "READ"**

Dip the *eXact*<sup>®</sup> *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 lodide added with DPD-3 will, in the presence of Combined Chlorine or Chloramines, convert into lodine).

#### 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-CI 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 then 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)

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 CaCO3 test may not develop		
	full color. Neutralize to pH 6.0 to 7.0 with 0.5 N Sulfuric acid.		
Bromine & Bromamines, Br <sub>2</sub>	Color similar to free chlorine reaction at all levels.		
Chlorine Dioxide, ClO <sub>2</sub>	Color similar to free chlorine reaction at all levels.		
Copper, Cu <sup>+2</sup>	Color development is reduced above 10 ppm (mg/L).		
lodine, l <sub>2</sub>	Color similar to free chlorine reaction at all levels.		
Manganese, oxidized (Mn <sup>+4</sup> , Mn <sup>+7</sup> )	See AWWA procedure 4500-CL F, 1(d) for removal of interferences.		
or Chromium, oxidized (Cr <sup>+6</sup> )			
Monochloramines (NH <sub>2</sub> Cl)	Monochloramine interferences are known to occur in free chlorine		
(applies to DPD-1 only)	DPD methods. This interference is dependent on temperature and		
	monochloramine concentration.		
Ozone, O <sub>3</sub>	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® Strip Micro CL (DPD-1/DPD-3/DPD-4) Interferences (Part Nos 486637/486638/486670)

### eXact<sup>®</sup> Eco-Check Tips For Best Accuracy

- 1. Become familiar with the meter and the different tests by reading the instructions carefully.
- The Free Chlorine and Total Chlorine results are compliant for meeting USEPA (4500-CI 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<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> Strip Micro strips or reagents (reorder information on page 19).
- **14.** For accurate results in full sunlight, use the cell cover when zeroing the meter and measuring the sample.
- **15.** Remove batteries when meter is not used for more than a month (Warranty Requirement).

When there is a question about the quality of a ReagentStrip<sup>™</sup>, 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<sup>™</sup> solution.

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

### eXact<sup>®</sup> Eco-Check Meter Messages

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

LCD Message	Description	Corrective Action
Н	In READ mode: test sample concentration is above	Dilute and retest.
	the measurement range (test specific).	
LO	In READ mode: test sample concentration is below	Sample value is below measurement
	the measurement range (test specific).	range.
LO	In ZERO mode: sample absorbance (due to a	Dilute sample, filter sample, or clean cell. One of
	cloudy or colored sample or a dirty cell) is too high	these options should remedy the problem.
	to zero, the meter will read "LO".	
ER	Excessive stray light detected. Normally this	Place the LIGHT BLOCKING CAP over the CELL
	does not occur, even when testing in sunlight.	for zeroing and for reading result. Moving
		to a shaded area can also fix this problem.
l + -	Low battery indication.	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 Duild	

#### **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. <u>Clean as follows</u>: 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.
- 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.
- 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<sup>®</sup> Photometer 2-Year Limited Warranty

Registration of your eXact<sup>®</sup> photometer must be received within 30 days from date of purchase to activate the warranty. The eXact<sup>®</sup> 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 <sub>3</sub> )	486641	100	1 - 320 ppm	Alizarin Red S + Citrate	
2	Ammonia (as NH <sub>3</sub> )	486654-A	25	0 - 2.4 ppm	Salicylate Method	
	Ammonia Reagent	486654-B	25			
3	Total Hardness (as CaCO <sub>3</sub> )	486673	50	5 - 300 ppm	Phtalein Purple	
4	Chloride (as NaCl)	481657-II	25	1 - 430 ppm	Silver	
5	Chlorine, Free	486637	100	0 - 5 ppm	DPD	
6	Chlorine, Total*	486638	100	0 - 5 ppm	KI	
7	Copper (as Cu <sup>+2</sup> )	486632	50	0 - 11 ppm	Biquinoline	
8	Nitrate (as NO <sub>3</sub> )	486655	50	0.12 - 30 ppm	Zinc + Chromotropic Acid + SA	
9	Nitrite (as NO <sub>2</sub> )	486623	50	0 - 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 <sub>4</sub> )	486814	50	0 - 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<sup>®</sup> Eco-Check Systems against the AWWA, US EPA, DIN, and ISO reference test methods for chlorine. Studies show that the eXact<sup>®</sup> Eco-Check System repeatedly agrees with an EPA Compliant reference method greater than 99% (R<sup>2</sup>= 0.99948, 0 - 5 ppm - see page 20). The eXact<sup>®</sup> 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-CI 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 CL (DPD-3) or 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-CI G	eXact® DPD-1
Anhydrous DPD sulfate	1.5%	1.5%
Anhydrous Na <sub>2</sub> HPO <sub>4</sub>	33.4%	33.4%
Anhydrous KH <sub>2</sub> PO <sub>4</sub> Na <sub>2</sub>	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<sup>®</sup> kit in a cool, dry place away from excess heat (below 90°F / 32°C), moisture, and oxidizers such as Chlorine and Bromine. **19**  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

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<sup>®</sup> Eco-Check Kit

#### (486798-K) Standard Kit Includes:

1 eXact<sup>®</sup> Eco-Check Meter <sup>486798</sup> 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 486814-25 eXact® Strip Micro Chloride 481657-II 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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