

eXact[®] Micro 7+

Advanced Photometer System Instruction Manual

IDEAL FOR DRINKING WATER, POOLS AND SPAS,
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



Index:

Parameter	Page	MENU
Free Chlorine (DPD-1)	4	CL1
Combined/Total Chlorine (DPD-3)	5	CL1
Ozone (DPD-4)	6	CL1
Total Chlorine (DPD-4)	6	CL1
pH	6	PH2
Total Bromine (DPD-4)	7	bR3
Total Alkalinity (as CaCO ₃)	7	AL4
Total Hardness High (as CaCO ₃)	8	TH5
Copper (as Cu ⁺²)	8	CU6
Total Iron (as Fe)	9	FE7
High Range Chlorine	9	HR8
Specifications	2	
About Your Photometer	3	
Tips for Best Accuracy	10	
Battery Installation	11	
Warranty (2 year)	11	
Reorder Information	12	
USEPA Compliance	3, 12	
Kit Components	12	

Visit us online at sensafe.com/micro7+ for up-to-date product information and to register your warranty.

Manufactured By: Industrial Test Systems, Inc.
1875 Langston Street, Rock Hill, SC 29730 USA
Phone: 1-800-861-9712 - *INSIDE THE U.S.*
1-803-329-9712 - *OUTSIDE THE U.S.*

Fax: 1-803-329-9743

ITS@SENSAFE.COM

WWW.SENSAFE.COM

www.poolcheckonline.com



The eXact[®] Micro 7+ Advanced Photometer System is designed for use with the eXact[®] Strip Micro reagent delivery system.

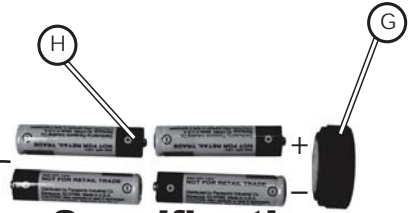
eXact[®] Micro 7+ is Manufactured and tested in an ISO 9001 Facility

eXact® Micro 7+ Photometer



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

(Used for testing outdoors)



eXact® Micro 7+ Meter Specifications

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

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:	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® Strip Micro 7+ has been designed to offer the user a more "Green" and cost-effective alternative to testing. Instead of using a 10mL water sample, eXact® Strip Micro 7+ 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® Micro 7+ Specifications

Menu	Tests for	Range	Resolution	BEST ACCURACY (%)
CL1	Free, Combined, and Total Chlorine	0.05 - 11 ppm	0.01 (0.05-5.99 ppm)	3
			0.1 (6.0-11 ppm)	
PH2	pH	6.4 - 8.4 pH	0.1	0.2 pH
bR3	Bromine, Total	0.02 - 10 ppm	0.01 (0-5.99 ppm)	6
			0.1 (6.0-13 ppm)	
AL4	Total Alkalinity (as CaCO ₃)	10 - 200 ppm	1	9
TH5	Total Hardness High (as CaCO ₃)	30 - 550 ppm	1	11
CU6	Copper (as Cu ⁺²)	0.05 - 10 ppm	0.01 (0.04-4.00 ppm)	6
			0.1 (4.1-10 ppm)	
FE7	Total Iron (as Fe)	0.02 - 4.5 ppm	0.01 (0.02-2.50 ppm)	10
			0.1 (2.6-4.5 ppm)	
HR8	Total Chlorine High	1.2 - 250 ppm	1	8

¹ 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. Optimal water temperature for High Range Chlorine test is 0-40°C / 32-113°F.

² Value provided represents best possible accuracy under laboratory conditions, but may vary throughout the detection range.

R042117

About Your eXact® Micro 7+ 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® Micro 7+ 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: CL1, PH2, BR3, AL4, TH5, CU6, FE7, HR8. 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 160 results in memory (20 in each menu).
3. **READ:** When pressed once, this button starts the timer for the parameter being tested. When pressed a second time the meter exits the timer and immediately prepares to colorimetrically measure the sample, 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.

About The Accuracy / Calibration Of The Micro 7+ 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® Micro 7+ Systems against the AWWA, US EPA, DIN, and ISO reference test methods for chlorine. Studies show that the eXact® Micro 7+ System repeatedly agrees with an EPA Compliant reference method greater than 99% ($R^2 = 0.9989$, 0 - 6.0 ppm - see page 12). The eXact® Micro 7+ 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. This is why the meter comes with a 2-Year Warranty. 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 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 Micro 7+ 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 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%

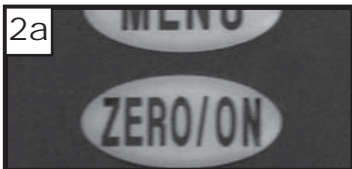
CL 1



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.

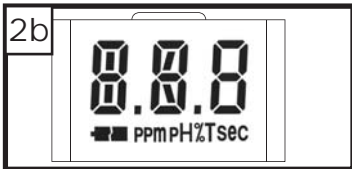


2a

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.



2b

3

SELECT TEST: CL1

Press and re-press the **MENU** button until the display shows the parameter **CL1**.

CL1 is also used for testing:

Total Chlorine (DPD-4), Ozone (DPD-4), Permanganate (DPD-1), and Total Chlorine (DPD-3). (Contact ITS for specs and details if you are planning on using **CL1** for Permanganate or Ozone measurements)



3

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.



4

6

DIP STRIP AND PRESS "READ"

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



5

7

RECORD RESULT DISPLAYED

The cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in CL1).



6

DO NOT discard the sample from the Free Chlorine test if you are planning to run eXact® Strip Micro DPD-3 (Combined Chlorine) Procedure. Move directly to steps 8-10 on page 5. 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.

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.

8

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.

9

DIP STRIP AND PRESS "READ"

Dip the **eXact® Strip Micro CL (DPD-3)** into the **CELL** and immediately press **READ**. This starts the 20 SECOND countdown timer. During this time move the strip in a gentle back and forth motion. **Remove and discard the strip 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 CL1 (NOTE: The Iodide added with DPD-3 will, in the presence of Combined Chlorine or Chloramines, convert into Iodine).

10

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 CL1. For Combined Chlorine value, subtract the Free Chlorine result, obtained in Step 7, from this Total Chlorine result. 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.

CL1: 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, and Chlorine Dioxide also form this 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 acidity above 150mg/L CaCO ₃ test may not develop full color. Neutralize to pH 6.0 to 7.0 with 0.5N Sodium hydroxide.
Alkalinity	If sample has alkalinity above 200mg/L CaCO ₃ test may not develop full color. Neutralize to pH 6.0 to 7.0 with 0.5N Sulfuric acid.
Bromine & Bromamines, Br ₂	Color similar to free chlorine reaction at all levels.
Chlorine Dioxide, ClO ₂	Color similar to free chlorine reaction at all levels.
Copper, Cu ⁺²	Color development is reduced above 10 ppm (mg/L).
Iodine, I ₂	Color similar to free chlorine reaction at all levels.
Manganese, oxidized (Mn ⁺⁴ , Mn ⁺⁷) or Chromium, oxidized (Cr ⁺⁶)	See AWWA procedure 4500-CL F, 1(d) for removal of interferences.
Monochloramines (NH ₂ Cl) (applies to DPD-1 only)	Monochloramine interferences are known to occur in free chlorine DPD methods. This interference is dependent on temperature and monochloramine concentration.
Ozone, O ₃	Color similar to free chlorine reaction at all levels.
Peroxides	Interference is possible.
pH	Typical pH samples of potable water with a pH of 6.0 to 9.0 are OK. If outside this range adjust to pH 6.0 to 7.0 using acid (0.5N Sulfuric acid) or base (0.5N Sodium hydroxide).

MENU DPD-4 (Total Chlorine or Ozone) Test Procedure

CL

CL1

1 REMOVE STRIP
Remove one (1) **eXact® Strip Micro CL (DPD-4 Total Chlorine), Part No. 486670** or **eXact Strip Micro O3 (DPD-4 Ozone), Part No. 486634** from the bottle before beginning the test. Set the strip in a dry, convenient place and recap the bottle immediately.

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

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

4 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 with the water sample.

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

6 DIP STRIP AND PRESS "READ"
Dip the **eXact® Strip Micro CL (DPD-4), Part No. 486670** into the **CELL** and immediately press **READ**. This starts the 20 SECOND countdown timer. During this time move the strip in a gentle back and forth motion. **Remove and discard the strip after "1" on the display disappears***. The cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in CL1).

7 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: Standard Method (4500-Cl G, procedure for total chlorine) requires the reading to be made after 2 minutes. 2 minute wait is not necessary for Ozone measurements.

MENU pH Test Procedure

PH

PH2

1 REMOVE STRIP
Remove one (1) **eXact® Strip Micro PH, Part No. 486639** 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: PH2
Press and re-press the **MENU** button until the display shows the parameter **PH2**.

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 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 PH, Part No. 486639** 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 PH2). 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 bR (DPD-4), Part No. 486644** 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: bR3

Press and re-press the **MENU** button until the display shows the parameter bR3.

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 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 bR, Part No. 486644** 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 stored in bR3 memory). After testing is completed, rinse cell immediately.

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 reading.

3

SELECT TEST: AL4

Press and re-press the **MENU** button until the display shows the parameter AL4.

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 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 (hot tubs), remove and discard the strip when the timer displays "10", countdown continues. For the hot water samples, a 10-second dip time is best. The cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in AL4). After testing is completed, rinse cell immediately.

NOTE: Total Alkalinity reacts with the Alizarin Red S and citric acid as it is released from the strip to form a red color, directly proportional to the alkalinity present in the sample.

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

MENU

Total Hardness High Test Procedure

THH**TH5**

*The pH of the sample should be between 6.9 and 7.2.
If the pH is not in this range, adjust the sample to pH 7 before doing the test.
Total Alkalinity must be in the range of 65-220 ppm (as CaCO₃)*

This test is good for drinking water, pool water, tap water and not good for samples made with DI or Distilled water.

- 1 **REMOVE STRIP**
Remove one (1) **eXact® Strip Micro THH, Part No. 486656** 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 **FILL METER WITH SAMPLE**
Rinse the **CELL** 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 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 THH, Part No. 486656** into the **CELL** and immediately press **READ**. This starts the 20 SECOND countdown timer. During this time move the strip in a gentle back and forth motion. **Remove and discard the strip after "1" on the display disappears**. The cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in TH5). After testing is completed, rinse cell immediately.

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

NOTE: The Calcium and Magnesium ions react with Phthalein purple to form a purple color depending on the concentration.

MENU

Copper Test Procedure

CU**CU6**

- 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: CU6**
Press and re-press the **MENU** button until the display shows the parameter **CU6**.
- 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 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 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. **Remove and discard the strip after "1" on the display disappears***. The display will immediately start counting up from **1 to 120** (this extra time allows more thorough color development). At 120 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 CU6). After testing is completed, rinse cell immediately.

NOTE: Copper reacts with Biquinoline or Bicinchoninic Acid as it is released from the strip to form a purple color, directly proportional to the copper concentration.

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



Total Iron, TPTZ (Fe⁺²/Fe⁺³) Test Procedure



(Total Iron Kit 486650 - Reducer and Strips)

- 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: FE7**
Press and re-press the **MENU** button until the display shows the parameter **FE7**.
- 3 **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. Fill cell to capacity with the water sample. NOTE: For accurate results (<0.3 ppm) it is recommended to rinse the CELL with diluted HCl (diluted Muriatic acid) or White Distilled Vinegar solution.
- 4 **ADD REAGENT, CAP, AND MIX**
Tilt meter to discard about 0.2 mL water in order to leave room for powder reagent. Add the contents of one **eXact® Reagent EZ Open REDUCER, Part No. 486601** to the **CELL** and cap meter cell with mixing cap. Press **READ** to start the **20 SECOND** countdown timer, place thumb over cap to keep cap securely in place, and mix the sample by turning the meter upside-down repetitively. **When time displays 1**, hold the meter upright and the cursor will flash and the meter will begin to count up to 40 seconds. After the 40 seconds, a result will be displayed (ignore this result).
- 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 FE (TPTZ), Part No. 486631** into the **CELL** and immediately press **READ**. This starts the 20 SECOND countdown timer. During this time, move the strip in a gentle back and forth motion. **Remove and discard the strip after "1" on the display disappears**. The meter will automatically count up for 40 seconds. The cursor will move across the display, informing you that it is about to measure the sample. Record result displayed (this result is automatically stored in FE7).

NOTE: Reducer will reduce Iron and the Iron will react with TPTZ to form a blue color.



High Range Chlorine Test Procedure



- 1 **REMOVE STRIP**
Remove one (1) **eXact® Strip Micro CLH, Part No. 486672** 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: HR8**
Press and re-press the **MENU** button until the display shows the parameter HR8.
- 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 with the water sample.
- 5 **ZERO METER***
Press the **ZERO/ON** button. The cursor will move across the display, followed by **0.0 PPM**. The sample is ready for testing.
- 6 **DIP STRIP - (read carefully and follow procedure closely)**
Dip the **eXact® Strip Micro CLH, Part No. 486672** into the **CELL** and immediately press **READ**. This starts the 20 SECOND countdown timer. During this time move the strip in a gentle back and forth motion. **Remove and discard the strip after "1" on the display disappears***. The display will immediately start counting up from **1 to 120** (this extra time allows more thorough color development). At 120 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 HR8). After testing is completed, rinse cell immediately with brush and water.

*Note: Use a 10 second dip time if water temperature is above 113°F / 40°C.

INTERFERENCES: Oxidizers such as Chloramine, Chlorine Dioxide, Bromine, Iodine, Ozone, Bromamines, and Permanganate will give false positive readings.

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

eXact® Micro 7+ Tips For Best Accuracy


1. Become familiar with the meter and the different tests by reading the instructions carefully.
2. The Free Chlorine, Combined Chlorine, and Total Chlorine reagents 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 when testing for oxidizers such as Chlorine and Bromine (Ozone can be measured in CL1 MENU).
5. Be sure the **CELL** is filled to capacity (4ml) unless mentioned in the procedure.
6. Rinse the **CELL** with clean water immediately after completing each test. Some reagents may stain the CELL if not rinsed shortly after use. It is recommended, after these tests, to use the Cell Cleaning Brush with water to clean the CELL.
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 amount of 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 38°C (100°F).
10. Dry the outside of the meter when testing is complete or before storage of the meter.
11. When running a DPD-1 Free Chlorine test **AFTER** a Total Chlorine DPD-3, a Total Chlorine DPD-4, or a HR Chlorine test, rinsing is very important to remove residual KI, which may interfere.
12. Each eXact® Strip Micro is valid for **ONLY** one test. Discard strip after single use in regular refuse that is inaccessible to children and pets.
13. Each bottle of eXact® Strip Micro contains the quantity of strips notated on the bottle. Due to the strip slitting process, 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.
14. Each table supplied has a unique revision number located in the bottom right corner of the table. It is recommended that you visit www.sensafe.com at least every 6 months to check for any updated revisions.
15. The eXact® Micro 7+ 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® Micro strips or reagents (*reorder information on page 19*).
16. Our lab testing with the Micro 7+ 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.
17. Remove batteries when meter is not used for more than a month (Warranty Requirement).
18. It is recommended that Pool and Spa samples for oxidizers (such as Chlorine) be taken 18 inches below the surface as follows: submerge meter with open cell facing down 18 inches, and then turn meter upright at that depth to fill the cell. Remove meter from water with the sample for testing.
19. When 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® Micro 7+ ASSIGNED VALUE FOR READY SNAP® 3		
READY SNAP® 3	FREE CHLORINE DESIRED VALUE	FREE CHLORINE ACCEPTABLE RANGE
Red dye # 505	1.52 ppm	1.46 – 1.59 ppm
Red dye # 22515	1.13 ppm	1.08 – 1.18 ppm

NOTE: Values reflect current concentrations as found at time of manufacture and may change with consecutive lots. R031517

eXact® Micro 7+ Meter Messages

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

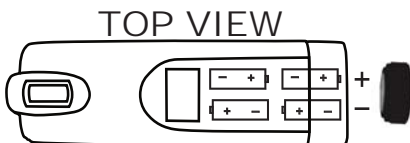
LCD Message	Description	Corrective Action
HI	In READ mode: test sample concentration is above the measurement range (test specific).	Dilute and retest.
LO	In READ mode: test sample concentration is below the measurement range (test specific).	Sample value is below measurement range.
LO	In ZERO mode: 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.
	Low battery indication.	Replace the batteries.
TR9	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 precipitation chemistry for analysis (Calcium Hardness and Cyanuric Acid).

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.



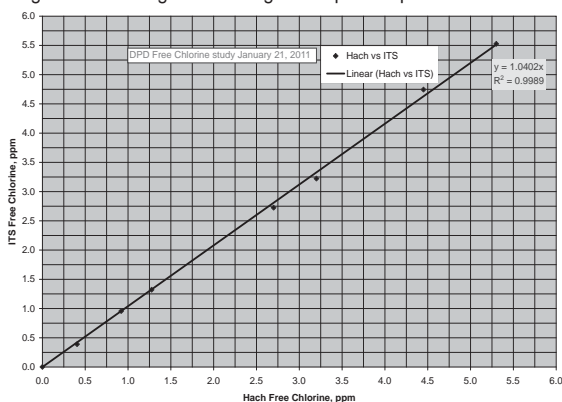
eXact® Photometer 2-Year Limited Warranty

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, however ITS pays return postage. A maximum processing fee of \$75 will be charged for repair or replacement of non-registered photometers and damages not covered by this warranty. Registration is available over the phone (+1-803-329-9712 Ext. 0) or online at <http://www.sensafe.com/product-registration-form/> (Personal data is kept confidential)

eXact® Strip Micro DPD-1 Accuracy

Free Chlorine results are compared using the **eXact® Strip Micro CL (DPD-1)** with the eXact® Micro 7+ Meter in Menu CL1 and Hach® DR890 Colorimeter in Program 9 and Program 12 using Hach® powder pillows.

DR890	Micro 7+
0.00	0
0.41	0.39
0.92	0.96
0.79	0.73
1.28	1.32
2.70	2.73
3.20	3.22
4.45	4.75
5.30	5.53



Meter	Menu	Range (PPM)	Resolution
Micro 7+	CL1	0 to 5.99	0.01
		6.0 to 11.0	0.1
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

eXact® Strip Micro 7+ Reagent Reorder Information

eXact® Strip Micro (4mL) Reagent Specifications - For use with eXact® Micro 7+, Part no. 486691

No.	PARAMETER	PART NO.	# OF TESTS	DETECTION RANGE	CHEMISTRY
	eXact® Micro Carrying Case w/ foam*	486001	N/A	N/A	N/A
	Dilution Kit	487200	N/A	N/A	N/A
	Reference Standard	486602	15	N/A	N/A
	Mini Dilution Kit II	487202	N/A	N/A	N/A
1	Alkalinity, Total (as CaCO ₃)*	486641	100	10 - 200 ppm	Alizarin Red S + Citrate
2	Bromine, Total*	486644	100	0.05 - 13 ppm	DPD
3	Hardness, Total High (as CaCO ₃)*	486656	50	30 - 550 ppm	Phthalein Purple
4	Chlorine, Free*	486637	100	0.05 - 11 ppm	DPD
	Chlorine, Free	484051	100 Foils	0.05 - 11 ppm	DPD
5	Chlorine, High Range*	486672	50	1.2 - 250 ppm	KI + Buffer
6	Chlorine, Combined* **	486638	100	0.05 - 11 ppm	KI
	Chlorine, Combined* **	484053	100 Foils	0.05 - 11 ppm	KI
7	Chlorine, Total*	486670	100	0.05 - 11 ppm	DPD + KI
	Chlorine, Total	484054	100 Foils	0.05 - 11 ppm	DPD + KI
8	Copper (as Cu ⁺²)*	486632	50	0.05 - 10 ppm	Biquinoline
9	Ozone	486634	100	0 - 11 ppm	DPD + KI
10	pH*	486639	100	6.4 - 8.4 pH	Phenol Red
11	Total Iron, TPTZ (as Fe ⁺² /Fe ⁺³)*	486650	50	0.02 - 4.5 ppm	TPTZ + PP

*Included in the Standard Kit (486691-K)

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

Contact Information

For US Inquiries and Re-Orders:

Industrial Test Systems, Inc.

1875 Langston Street,

Rock Hill, SC 29730 USA

Phone: 1-800-861-9712 - *INSIDE THE U.S.*

1-803-329-9712 - *OUTSIDE THE U.S.*

Fax: 1-803-329-9743

ITS@SENSAFE.COM

WWW.SENSAFE.COM

www.poolcheckonline.com



For European & Middle East Inquiries and Re-Orders:

ITS Europe, LTD

The UK Centre for Homeland Security

Building 7, Chilmark

Salisbury, Wiltshire SP3 5DU, United Kingdom

Tel: +44 (0)1722 717911 **Fax:** +44 (0) 1722 717941

SALES@SENSAFE.COM

WWW.ITSEUROPE.CO.UK

www.poolcheckonline.com