HCA2 Photometric Test Kit Manual

Advanced Photometric System

Measures:

Free Chlorine, Total Chlorine,

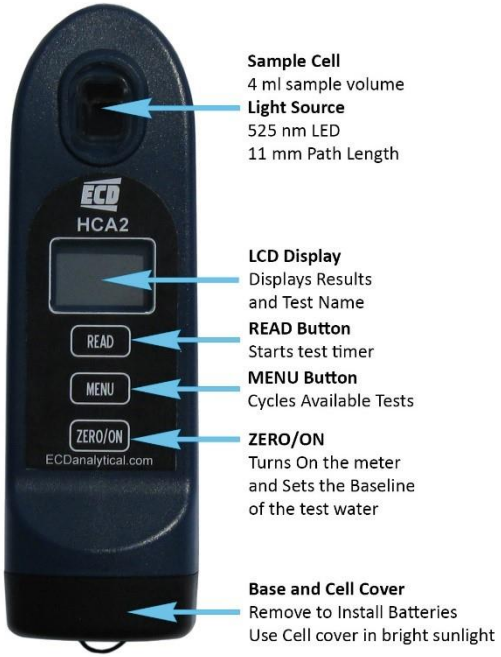
High level Total Chlorine, Chlorine Dioxide,

Hydrogen Peroxide, Ozone, or Peracetic Acid

(Dependent on the Reagent Test Strip used)

Contents

OVERVIEW



WELCOME TO YOUR NEW HCA2 PHOTOMETER

Thank you for your HCA2 Test Kit purchase! This guide will quickly walk you through the technical details of your new photometer. After initial set-up, test procedures, and tips, you will be on your way to digital water testing! Each test will require the use of one or more of the testing methods outlined in this manual.

YOUR HCA2 PHOTOMETER COMES WITH:

- Cleaning Brush
- Quick Start Guide (this booklet)
- Bottle(s) of the specified test strips at order (see description above): Free Chlorine (DPD-1), Total Chlorine (DPD-4), Total Chlorine High Range, Chlorine Dioxide (DPD-1), Hydrogen Peroxide, Ozone (DPD-4), or Peracetic Acid (PAA)
- Four (4) AAA batteries
- Acrylic Calibration Key

PART #S AND DESCRIPTIONS

PARAMETER/TEST	PART #	RANGE ppm	% BEST ACCURACY	NUMBER OF TESTS
Chlorine, Free & Total*	1000040-1	0.00 – 12.0	5	100 ea.
Chlorine, Free (DPD–1)*	1000040-2	0.00 – 12.0	5	100
Chlorine, Total (DPD–4)*	1000040-3	0.00 – 12.0	5	100
Chlorine, Total High	1000040-5	1.00 – 200	5	50
Chlorine Dioxide (DPD-1)/Glycine	1000040-4	0.00 – 6.0	5	100 ea.
Hydrogen Peroxide	1000040-8	0.50 – 130	5	50
Ozone (DPD-4)	1000040-6	0.01 – 2.00	10	100
Peracetic Acid (PAA)	1000040-7	2.00 – 590	5	100
HCA2 Meter Only	1000575	Meter Only		
Test Strips	**PART #**	**Number of TESTS**		
Chlorine, Free (DPD–1)	9260100	100 per Bottle		
Chlorine, Total (DPD–4)	9260101	100 per Bottle		
Chlorine, Total High	9260103	50 per Bottle		
Chlorine Dioxide (DPD-1)/Glycine	9260102	100 per Bottle ea.		
Hydrogen Peroxide	9260106	50 per Bottle		
Ozone (DPD-4)	9260104	100 per Bottle		
Peracetic Acid (PAA)	9260105	100 per Bottle		
Calibration Verification	9260107	10 Ampules		
**Concentrations above 6 ppm require (2) test strips*				

WHAT YOU WILL NEED TO GET STARTED:

- Four (4) AAA batteries
- #4 Phillips head screwdriver

INSTALL "AAA" BATTERIES

1. Use a #4 Phillips head screwdriver to remove the screw from the base of your HCA2 Photometer.
2. Remove the base.
3. Install Four (4) new AAA batteries as illustrated inside your photometer's battery compartment.
4. Replace the base firmly with pressure while tightening the screw with #4 Phillips head screwdriver. Be sure not to over tighten.

5. The meter will turn on automatically.

BUILT IN SAMPLE CELL

The built-in sample cell is made of transparent plastic; the sturdy cell design will last for over 20,000 readings. Our studies have shown that scratches on the cell will not compromise the accuracy of your results because of the cell's fixed position.

COMPLIANCE TESTING

This DPD test system for Chlorine and Chlorine Dioxide are accepted for reporting by most health departments because the tests are USEPA (DIN Standard 38 408 G4/G5, ISO 7393/2) accepted for testing requirements for Free Chlorine, Total Chlorine, and Chlorine Dioxide.

The compliance requirement is a photometer wavelength to measure between 490 and 530nm. The HCA2 photometer uses a 525nm wavelength and 11 mm path-length. The HCA2 Test Strips CL/ClO2 (DPD-1) use the same reagents and proportions, and the resulting solution pH is maintained between 6.2 and 6.5 as specified by AWWA method 4500-Cl G/ClO2-D. The USEPA does not "approve" commercial DPD delivery systems.

The HCA2 Test Strip CL (DPD-1) for Free Chlorine, and the HCA2 Test Strip (DPD-4) for Total Chlorine and the HCA2 Test Strip ClO2 (DPD-1) for Chlorine Dioxide meet your reportable testing requirements because the HCA2 Micro Strips deliver the same chemicals in identical proportions as the approved method.

Consult with your local health department for official regulations.

COMPONENT (FREE CHLORINE)	AWWA 4500-CL G	HCA2
Anhydrous DPD sulfate	1.5%	1.5%
Anhydrous Na_2HPO_4	33.4%	33.4%
Anhydrous $KH_2PO_4Na_2$	64.0%	64.0%
EDTA	1.1%	1.1%

HCA2 PHOTOMETER ACCURACY

All tests have been calibrated using certified reference standards and analytical spectrophotometric methods. The HCA2 Photometer has been factory calibrated and will stay valid because of its exceptional quality. We are so confident in the HCA2 meter, we offer an industry leading 2-year warranty.

We built the HCA2 Photometer to be easy, accurate and environmentally friendly. We have achieved this by utilizing our Test Strip Technology, which uses 60% less water and chemistry than alternative methods. Instead of using a 10mL water sample, HCA2 Test Strip uses a 4mL water sample. The accuracy of the meter is maintained by designing the sample cell with an 11mm path-length.

FOR BEST ACCURACY

- The HCA2 photometer has a 5 minute auto-shutoff timer.
- Each test menu can store 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 HCA2 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 100 results in memory (20 in each menu).
- Before testing, rinse the meter sample cell with the sample water 3 times.
- Always fill the cell to capacity (4mL); be careful not to splash liquid over the side.
- Test immediately after filling the cell with the water sample.
- To obtain optimal accuracy when testing outdoors (sunlight), use the cell cover when zeroing and reading the sample.
- Due to the strip slitting process, you may find one or two strips that are noticeably smaller or larger in width than the normal

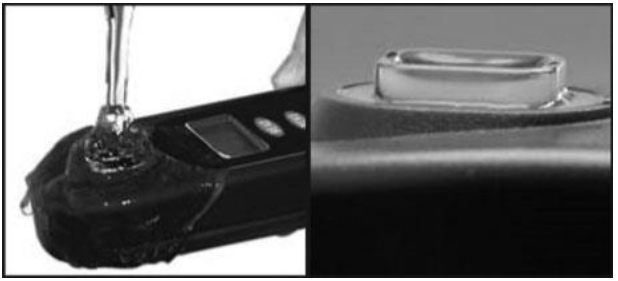
strips in the bottle. These should be discarded. Using these strips may give unreliable results.

- HCA2 Meter is not compatible for use with powder pillows, tablets, or liquids from other manufacturers.
- Dip test strip for entire countdown.
- Each HCA2 Test Strip is valid for ONLY one test. Discard strip after use.
- Dry the outside of the meter before storage.
- Remove batteries before storing for prolonged periods.
- Store the HCA2 meter and test strips out of direct sunlight and away from chemical storage areas.
- Minimize exposure of HCA2 meter and test strips to heat above 90°F (32°C).
- When installing batteries, verify the O-ring is still attached to the screw before tightening.
- Cleaning the cell with water and brush after each test is recommended for best accuracy and prior to storage of unit

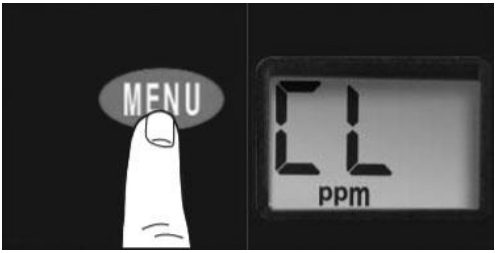
FILL, DIP, READ

FREE CHLORINE

1. Turn the POWER ON. Press the ZERO/ON button to power the HCA2 meter
2. FILL the Cell. Rinse the cell 3 times with the water sample and fill to the TOP to begin testing.



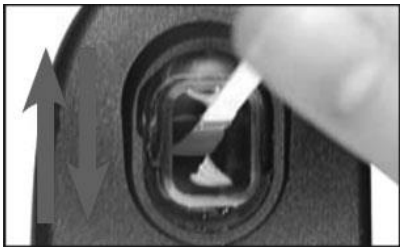
3. SELECT the test. Press the MENU button until the display shows CL. (Chlorine Free)



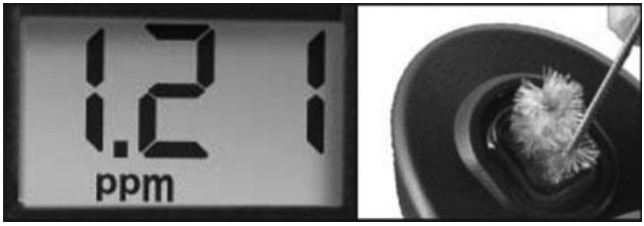
4. ZERO the Meter. Press the ZERO/ON button and the display will read 0.00 ppm, the meter is ready for testing.

5. Remove one Free Chlorine Test Strip (DPD-1) and set in a dry, convenient place. Replace cap on bottle.
6. Press the READ button to initiate a 20 second countdown and simultaneously DIP the Test Strip by submerging all pads in the sample then use a gentle, constant, back and forth motion

(2 strokes per second) until the timer displays ‘1’. Remove and discard the strip.



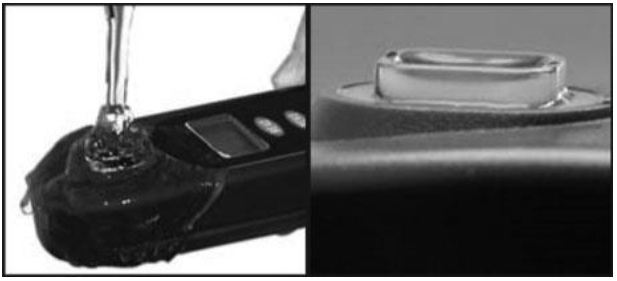
7. READ the Results. The HCA2 will display the Free Chlorine ppm and store it in the CLF memory.



   a. If the result is greater than 6 ppm repeat steps 5-7 with a new strip and the same sample.
   b. Always rinse the sample cell immediately after the test is complete.

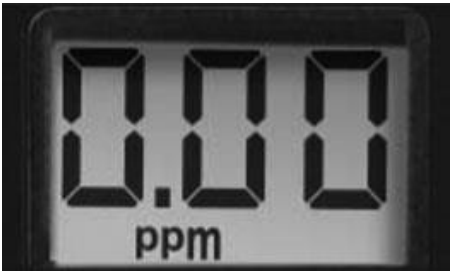
TOTAL CHLORINE

1. Turn the POWER ON. Press the ZERO/ON button to power the HCA2 meter
2. FILL the Cell. Rinse the cell 3 times with the water sample and fill to the TOP to begin testing.



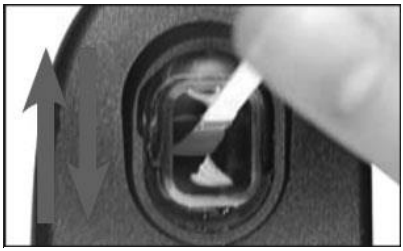
3. SELECT the test. Press the MENU button until the display shows TC. (Total Chlorine)

4. ZERO the Meter. Press the ZERO/ON button and the display will read 0.00 ppm, the meter is ready for testing.

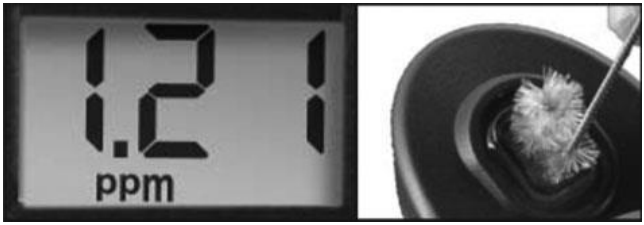


5. Remove one Total Chlorine Test Strip (DPD-4) and set in a dry, convenient place. Replace cap on bottle.

6. Press the READ button to initiate a 20 second countdown and simultaneously DIP the Test Strip by submerging all pads in the sample then use a gentle, constant, back and forth motion (2 strokes per second) until the timer displays “1”. Remove and discard the strip.



7. The display will automatically start to count up for 120 seconds.

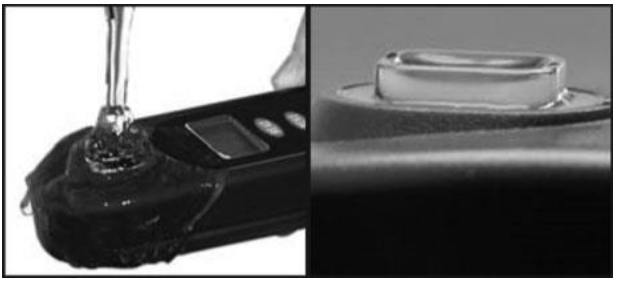


   a. Standard Method (4500-Cl G, procedure for total chlorine) requires the reading to be made after 2 minutes from the time the KI is added. For compliance testing, you must time the two minutes and then make your measurement. NOTE: From testing in our lab, water samples above 70°F (20°C), generally, reach a stabilized reading quicker than 2 minutes.

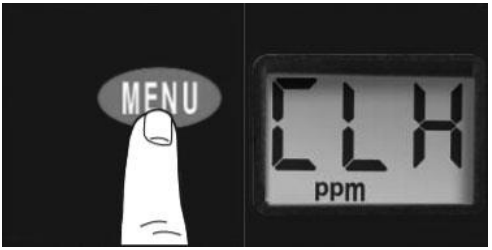
8. READ the Results. The HCA2 will display the Total Chlorine ppm and store it in the TC memory.
   a. If the result is greater than 6 ppm repeat steps 5-7 with a new strip and the same sample.
   b. Always rinse the sample cell immediately after the test is complete.

TOTAL CHLORINE HIGH LEVEL

1. Turn the POWER ON. Press the ZERO/ON button to power the HCA2 meter
2. FILL the Cell. Rinse the cell 3 times with the water sample and fill to the TOP to begin testing.



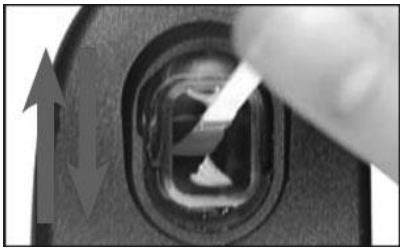
3. SELECT the test. Press the MENU button until the display shows CLH. (Chlorine Total, High)



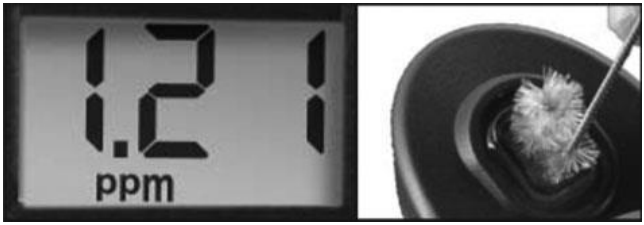
4. ZERO the HCA2 Meter. Press the ZERO/ON button and the display will read 0.00 ppm, the meter is ready for testing.

5. Remove one Total Chlorine Test Strip CLH and set in a dry, convenient place. Replace cap on bottle.

6. Press the READ button to initiate a 20 second countdown and simultaneously DIP the Test Strip by submerging all pads in the sample then use a gentle, constant, back and forth motion (2 strokes per second) until the timer displays ‘1’. Remove and discard the strip.



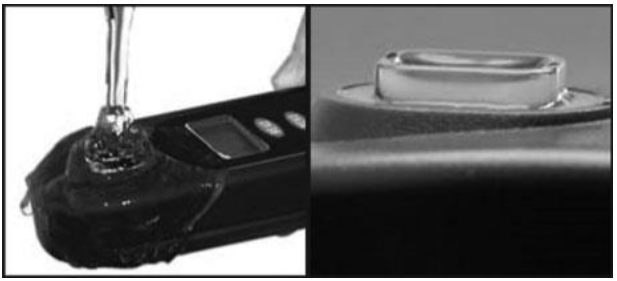
7. The display will automatically start to count up for 120 seconds.



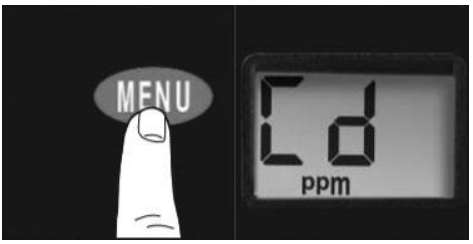
8. READ the Results. The HCA2 will display the Total Chlorine High ppm and store it in the CLH memory.
    a. Always rinse the sample cell immediately after the test is complete.

CHLORINE DIOXIDE

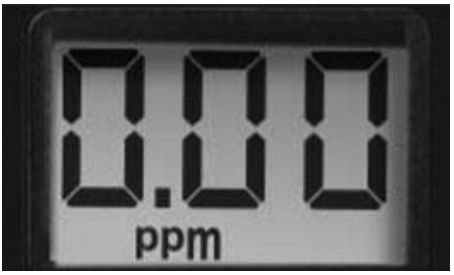
1. Turn the POWER ON. Press the ZERO/ON button to power the HCA2 meter
2. FILL the Cell. Rinse the cell 3 times with the water sample and fill to the TOP to begin testing.



3. SELECT the test. Press the MENU button until the display shows Cd. (Chlorine Dioxide)



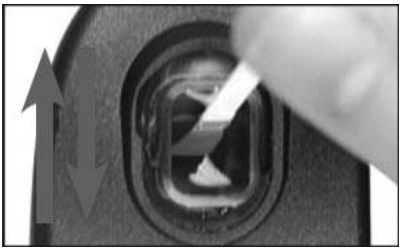
4. Remove one Glycine Test Strip and set in a dry, convenient place. Replace cap on bottle.



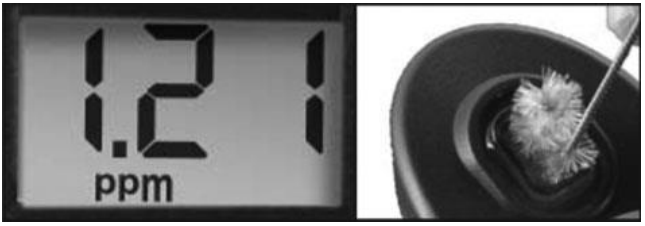
    a. The addition of Glycine is required even if no Chlorine is present.

5. Press the READ button to initiate a 20 second countdown and simultaneously DIP the Test Strip by submerging all pads in the sample then use a gentle, constant, back and forth motion (2 strokes per second) until the timer displays ‘1’. Remove and discard the strip.

6. ZERO the HCA2 Meter. Press the ZERO/ON button and the display will read 0.00 ppm, the meter is ready for testing.



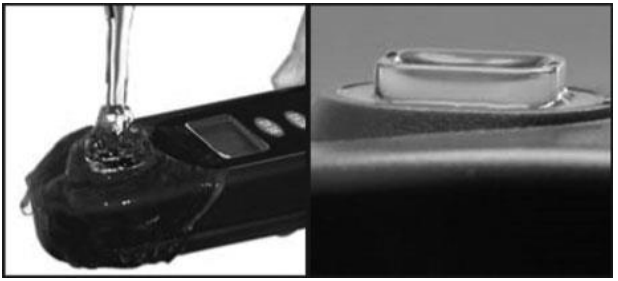
7. Remove one Chlorine Dioxide Test Strip and set in a dry, convenient place. Replace cap on bottle.



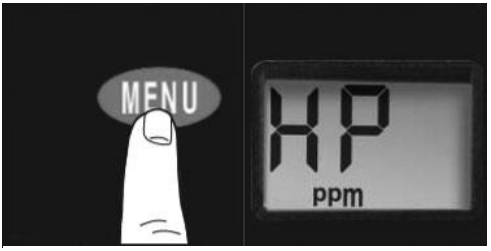
8. Press the READ button to initiate a 20 second countdown and simultaneously DIP the Test Strip by submerging all pads in the sample then use a gentle, constant, back and forth motion (2 strokes per second) until the timer displays '1'. Remove and discard the strip.
9. READ the Results. The HCA2 will display the Chlorine Dioxide ppm and store it in the Cd memory.
    a. Always rinse the sample cell immediately after the test is complete.

HYDROGEN PEROXIDE

1. Power on Photometer. Press the ZERO/ON button to power on the HCA2 Meter.
2. Fill Cell. Before testing, rinse CELL and clean with brush thoroughly. Finally, rinse the cell 3 times with the water sample to be tested, then FILL cell to capacity to begin test.



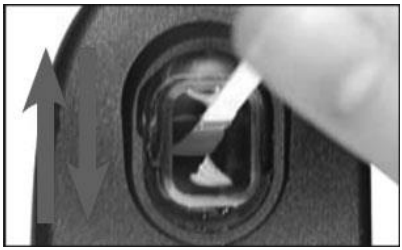
3. Select Test. Press and re-press the MENU button until the display shows HP.



4. Cap Cell and Zero Meter. Place the Cell Cover onto the CELL and press ZERO/ON and the photometer display reads 0.0 ppm, indicating the meter is ready for testing.

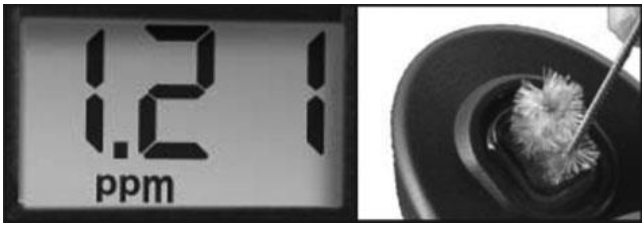
5. Remove Strip. Remove one HP Test Strip and set in a dry, convenient place. Replace cap on bottle.

6. Dip Strip. Press READ to initiate a 20 second countdown and simultaneously DIP the test strip in the sample. Gently touching the bottom of the cell. Use a gentle constant back and forth motion (2 strokes per second) until the timer displays “1”. Remove and discard the strip. The display will automatically start to count up for 100 seconds.



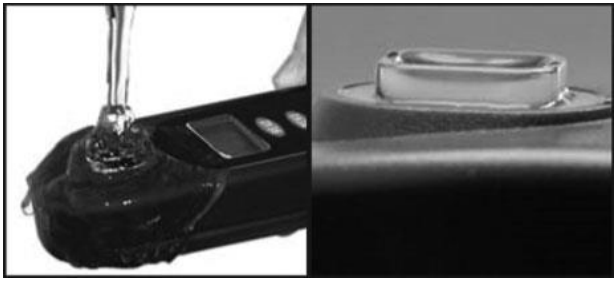
   a. If sample temperature is less than 42°F, allow sample to reach room temperature before testing. Another option is to ignore the result on the display and press READ again to start another 20 second countdown/100 second count-up. The extra reaction time is needed on cold samples.

7. Cap Cell And Read Results. Place the Cell Cover onto the CELL and READ result displayed as Hydrogen Peroxide. This result is automatically stored in the HP menu. After testing is complete, rinse the sample cell immediately and clean with a brush to remove reagents which coat the CELL wall.

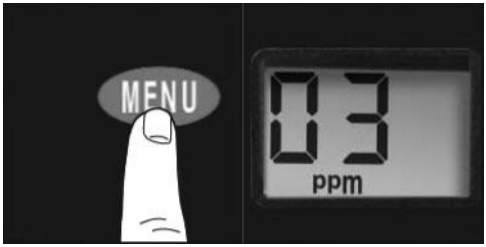


OZONE

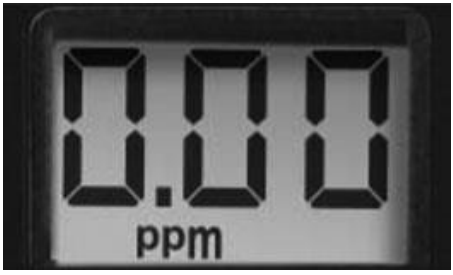
1. Power on Photometer. Press the ZERO/ON button to power on the HCA2 meter.
2. Fill Cell. Before testing, rinse CELL and clean with brush thoroughly. Finally, rinse the cell 3 time with the water sample to be tested, then FILL cell to capacity to begin test.



3. Select Test. Press and re-press the MENU button until the display shows O3.

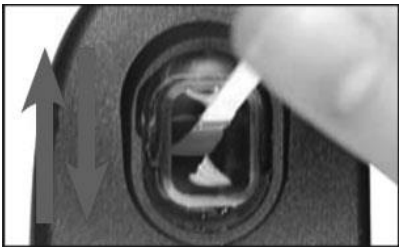


4. Cap Cell and Zero Meter. Place the Cell Cover onto the CELL and press ZERO/ON and the photometer display reads 0.00 ppm, indicating the meter is ready for testing.



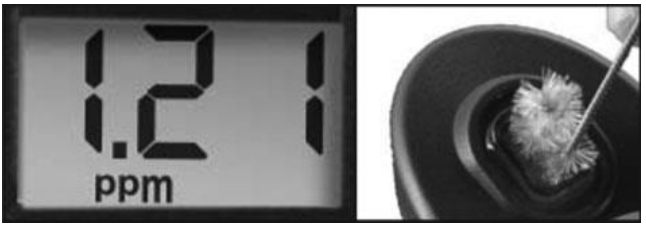
5. Remove Strip. Remove on O3 Test Strip and set in a dry, convenient place. Replace cap on bottle.

6. Dip Strip. Press READ to initiate a 20 second countdown and simultaneously DIP the Test Strip in the sample, gently touching the bottom of the cell. Use a gentle constant back and forth motion (2 strokes per second) until the timer displays “1”. Be careful to not spill the sample from the CELL. Remove and discard the strip. See page 6 for important tips.



   a. DPD will stain the CELL wall if allowed to remain in the cell. To remove staining, rinse cell thoroughly and fill with water then add two (2) drops of bleach (5-8%) and clean with brush until stain is removed. Caution: Avoid contact of bleach with eyes and clothing.

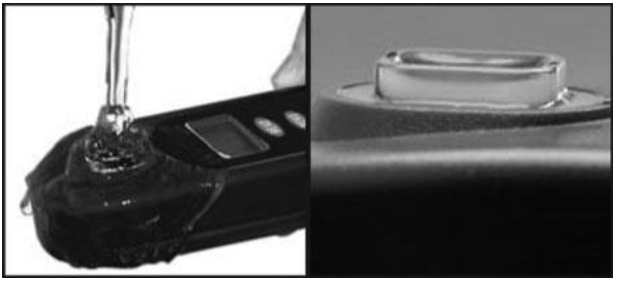
7. Cap Cell and Read Results. Place the Cell Cover onto the CELL and READ result displayed as Ozone. This result is automatically stored in the O3 menu. After testing is complete, rinse the sample cell immediately and clean with brush to remove reagents which coat the CELL wall.



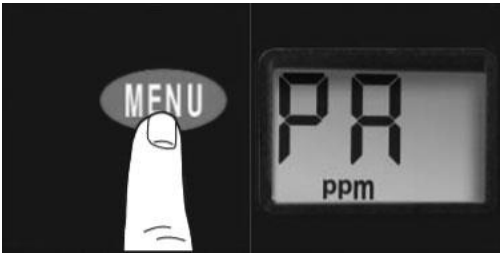
   a. Do not empty cell if Chlorine or Bromine may be present in the sample. Instead, press READ again and simultaneously DIP a Glycine strip into the reacted sample from step 7. Take this second result and subtract it from the first result (obtained from step 7 above). This new value is your Ozone result.

PERACETIC ACID

1. Power on Photometer. Press the ZERO/ON button to power on the HCA2 meter.
2. Fill Cell. Before testing, rinse CELL and clean with brush thoroughly. Finally, rinse the cell 3 time with the water sample to be tested, then FILL cell to capacity to begin test.



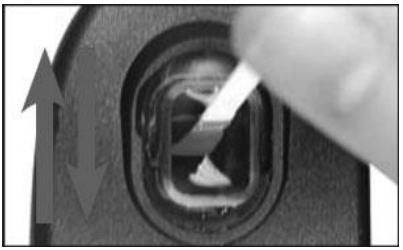
3. Press and re-press the MENU button until the display shows PA.



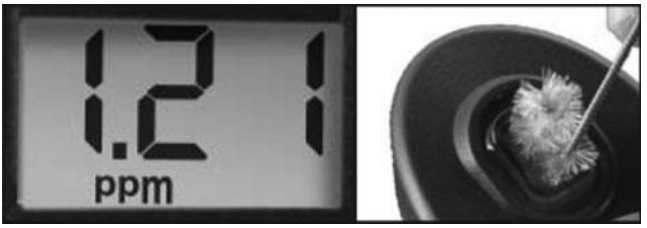
4. Cap Cell and Zero Meter. Place the Cell Cover onto the CELL and press ZERO/ON and the photometer display reads 0.00 ppm, indicating the meter is ready for testing.

5. Remove Strip. Remove one PA Test Strip and set in a dry, convenient place. Replace cap on bottle.

6. Dip Strip. Press READ to initiate a 20 second countdown and simultaneously DIP the Test Strip in the sample, gently touching the bottom of the cell. Use a gentle constant back and forth motion (2 strokes per second) until the timer displays “1”. Remove and discard the strip. The display will automatically start to count up for 120 seconds. See page 6 for important tips.



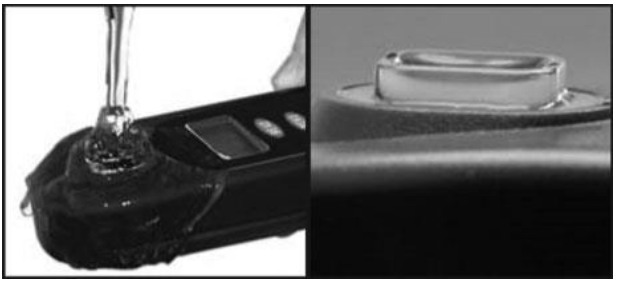
7. Cap Cell and Read Results. Place the Cell Cover onto the CELL and READ result displayed as Peracetic Acid. This result is automatically stored in the PA menu. After testing is complete, rinse the sample cell immediately and clean with brush to remove reagents which coat the CELL wall.



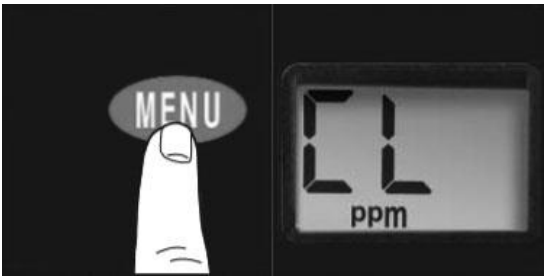
ACRYLIC CALIBRATION KEY

The Acrylic Calibration Key (translucent purple part) is a tool for verifying the calibration of your HCA2 photometer compared to its original factory settings. Run this test immediately upon receipt and record value for future reference. To get started refer to page 7 in this manual and follow steps 1-4. Then follow the remaining steps below.

5. FILL the cell. Rinse the cell 3 times with clean water sample and FILL to the top to begin testing.

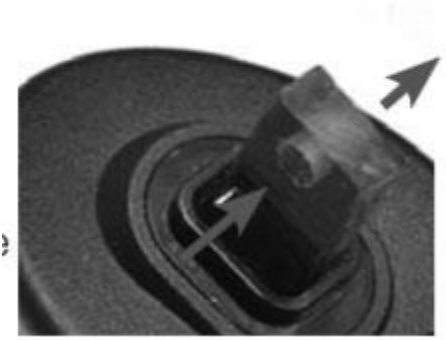


6. Tap SELECT TEST at the top and select the Chlorine, Free menu.



7. Press ZERO/ON and the hand held will display reads 0.00 ppm indicating the meter is ready for testing.

8. Place the Calibration Verification Key into the water sample in the center of the CELL. Be sure the key is positioned upright (vertical) and to the bottom of the CELL.



9. Result is displayed on the handle held and in the app. Record value on provided chart located in the back of this manual. To run additional tests, repeat steps 5-9.

Expect the result to be within 0.15 units from previous calibration. If variation is greater, please re-check your ZERO procedure (steps 5-7) and be sure to use clean water (deionized or distilled is necessary).

TROUBLESHOOTING

Subject	Cause	Solution
Dim screen or no response from meter	Low battery	Replace batteries
“LO” on LCD while zeroing	Low battery	Replace batteries
	Dirty cell	Clean cell
	Cloudy sample	Dilute sample or use filter
	Bad LED	Contact ECD
“HI” on LCD while reading	Result above detection level	Re-run test to verify result
“LO” on LCD while reading	Result below detection level	Re-run test to verify result
“LO” flashes on LCD, then "Err"	Improper test procedure for Combined Chlorine	Re-read test procedure and follow directions carefully
"HI" flashes on LCD, then "Err"	Combined Chlorine result above detection limit	Re-run test to verify result
		Dilute and re-run test

INTERFERENCES

Test Strip (DPD-1, DPD-4) Interferences

Interfering Substance	**Interfering Levels & Treatments**
Acidity	If the 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^{+6}) or Chromium (Cr^{+6})	See AWWA procedure 4500-CL F, 1(d) for removal of interferences.
Monochloramine (NH_2Cl) (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)

Date Tested	Recorded Value	Comments

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