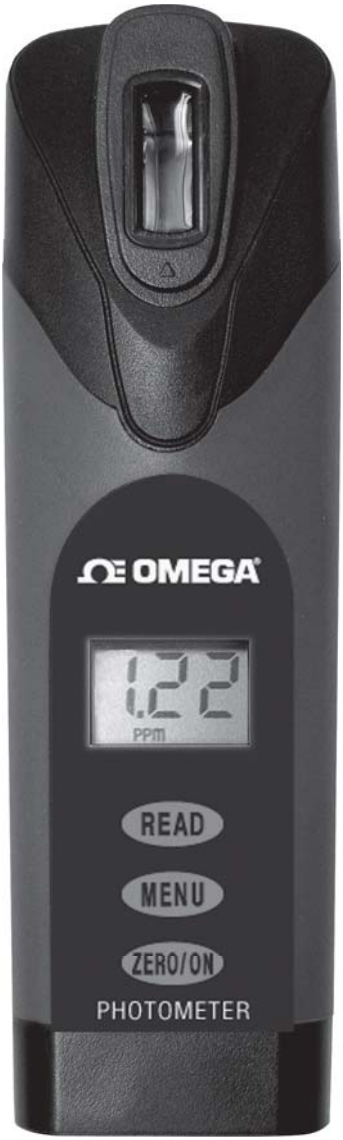
1 YEAR
WARRANTY

OMEGA®
User's Guide



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HHWT-11
Handheld Chlorine Photometer

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Engineering Service: 1-800-872-9436 (USA & Canada only)
Tel: (203) 359-1660 Fax: (203) 359-7700
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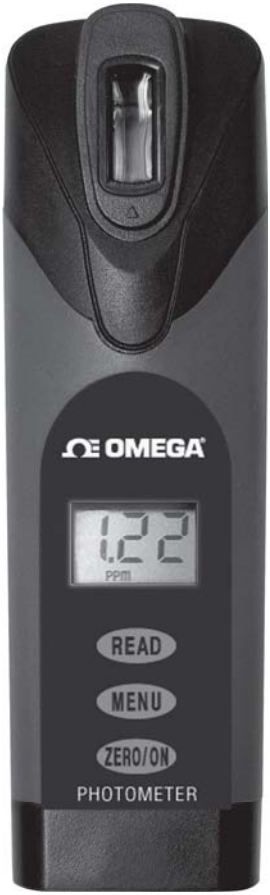
OMEGA® HHWT-11

Advanced Photometer System
Instruction Manual

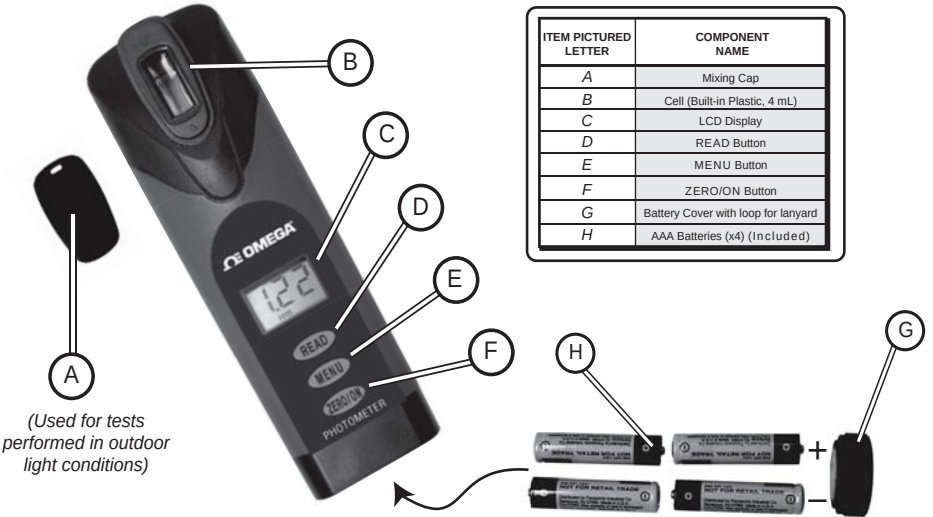
IDEAL FOR DRINKING WATER, POOL & SPA, ENVIRONMENTAL, FOOD & BEVERAGE TESTING

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



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

Index:



(Used for tests performed in outdoor light conditions)

ITEM PICTURED LETTER	COMPONENT NAME
A	Mixing Cap
B	Cell (Built-in Plastic, 4 mL)
C	LCD Display
D	READ Button
E	MENU Button
F	ZERO/ON Button
G	Battery Cover with loop for lanyard
H	AAA Batteries (x4) (Included)

HHWT-11 Meter Specifications

Measurement Method:	Photometric
Light Source:	Light Emitting Diode (LED)
Wavelength:	525 nm
Transmission Range:	100 - 0.00 %T
Photometric Precision:	+/- 0.1/0.01 %T
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:	4 mL (0.13 oz)
Operating Temperature Range:	0 - 50°C (32° - 122°F)
Power Supply:	(4) AAA alkaline batteries (Included)
Battery Life:	>2000 tests with alkaline batteries
Electromagnetic Compliance: (EMC)	Emitted Interference - EN 61326 Immunity to Interference - EN 61326
Waterproof Rating:	Exceeds IP67
Weight:	Instrument: 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

HHWT-11 has been designed to offer the user a more "Green" and cost-effective alternative to testing. Instead of using a 10mL water sample, *HHWT-11* 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.

HHWT-11 Specifications

Menu	Tests for*	Range	Resolution	Typical Accuracy
CL1	Free Chlorine (DPD-1) & Total Chlorine (DPD-3)	0.00-11.0 ppm	0.01 (0-5.99 ppm)	±3% (0-3.00 ppm) ±7% (3.01-5.99 ppm)
			0.1 (6-11 ppm)	±14% (6.0-11 ppm)
bR2	Bromine	0.0-14 ppm	0.01 (0-5.99 ppm)	±3% (0-2.50 ppm)
			0.1 (6-14 ppm)	±6% (2.51-14 ppm)
O3	Ozone	0.01-9 ppm	0.01 (0.01-5.99 ppm)	±8% (0.01-5.99 ppm)
			0.1 (6-9 ppm)	±16% (6.0-9 ppm)
Cd4	Chlorine Dioxide	0-12 ppm	0.01 (0-5 ppm) 0.1 (5.01-12 ppm)	±8%
PA5	Peracetic Acid	2-300 ppm	1	±5%
HP6	Hydrogen Peroxide	0-3 ppm	0.01 (0-1 ppm)	±10% (0-1.00 ppm)
			0.1 (1.1-3 ppm)	±13% (1.1-3 ppm)
PH7	pH	5.5-8.8 ppm	0.01	±0.4 pH
HR8	High Range Chlorine	0-300 ppm	1	±8%

* Performance verified with various water samples with optimal water temperatures at 10 – 40°C / 50 – 104°F.
Optimal water temperature for High Range Chlorine test is 0-40˚C / 32-104˚F.

R102016

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 HHWT-11 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, bR2, O3, Cd4, PA5, HP6, PH7, 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 Chlorine Plus System

All tests have been calibrated using certified reference standards and standard analytical spectrophotometric methods. The algorithm in the software of the HHWT-11 Systems mirrors the AWWA, US EPA , DIN, and ISO reference test methods for chlorine. Studies show that the HHWT-11 System, with the HHWT-486637 (DPD-1), repeatedly agrees with an EPA Compliant reference method greater than 99% (R2= 0.9989, 0 - 6.0 ppm - see page 14). The HHWT-11 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. For verification of photometer calibration, the 525nm 2.0 ppm Reference Standard (part #HHWT-486602) is available for purchase (see page 13).

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 Chlorine Plus meter uses a wavelength of 525nm; and the compliance requirement is that the colorimeter wavelength is between 490 and 530nm. The HHWT-486637 (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 Strip DPD delivery devices. The HHWT-486637 (DPD-1) for Free Chlorine, and the HHWT-486638 (DPD-3) or the HHWT-486670 (DPD-4) for Total Chlorine meet your reportable testing requirements because the HHWT Strips deliver 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	Strip DPD-1
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%

DPD-1 Free Chlorine Test Procedure

REMOVE STRIP

Remove one (1) **HHWT-486637** strip 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: CL1

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

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 **HHWT-486637** strip 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 (this result is automatically stored in CL1 Menu).

DO NOT discard the sample from the Free Chlorine test if you are planning to run HHWT-486638 (DPD-3) Total Chlorine Procedure. Move directly to steps 8-10 on page 7. Otherwise, rinse the cell immediately.

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

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

DPD-3 Total Chlorine Test Procedure

This procedure is only valid when run as a continuation of the Strip Micro CL (DPD-1) Test Procedure on page 6.

8 REMOVE STRIP

Remove one (1) ***HHWT-486638*** strip 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 ***HHWT-486638*** strip 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 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. After testing, rinse cell immediately and clean with brush. 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 then 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 also form the same color).

HHWT-486637 (DPD-1), HHWT-486638 (DPD-3), and HHWT-486670 (DPD-4) Interferences

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_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).

MENU DPD-4 (Total Chlorine) Test Procedure

CL1

1 REMOVE STRIP
Remove one (1) ***HHWT-486670*** strip 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 (4mL) with the water sample.

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

6 DIP STRIP AND PRESS "READ"
Dip the ***HHWT-486670*** strip 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 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, rinse cell immediately and clean with brush. Record the Total Chlorine as the highest value the meter displayed.

MENU Bromine DPD-1 Test Procedure

bR2

1 REMOVE STRIP
Remove one (1) ***HHWT-486636*** strip 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: bR2
Press and re-press the **MENU** button until the display shows the parameter **bR2**.

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

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

6 DIP STRIP AND PRESS "READ"
Dip the ***HHWT-486636*** strip 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 bR2 memory). After testing, rinse cell immediately and clean with brush. Press MENU to select next test.

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

MENU O3 — Ozone Test Procedure

1 REMOVE STRIP

Remove one (1) ***HHWT-486634*** strip 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: O3

Press and re-press the **MENU** button until the display shows the parameter **O3**.

4 FILL METER WITH SAMPLE

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

5 ZERO METER*

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

6 DIP STRIP AND PRESS "READ"

Dip the ***HHWT-486634*** strip 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 O3). After testing, rinse cell immediately and clean with brush.

MENU Cd4 — Chlorine Dioxide Test Procedure

1 REMOVE STRIPS

Remove one (1) ***HHWT-486633*** strip and one (1) ***HHWT-484014*** strip from their bottles before beginning the test. Set the strips in a dry, convenient place and recap the bottles 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: Cd4

Press and re-press the **MENU** button until the display shows the parameter **Cd4**.

4 FILL METER WITH SAMPLE

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

5 DIP STRIP AND PRESS "READ"

Dip the ***HHWT-484014*** Glycine strip 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 auto-zero. Get ready to dip ***HHWT-486633*** strip.

6 DIP STRIP AND PRESS "READ"

About 4 seconds after the meter auto-zeroes, "20" will appear on the display. Immediately dip the ***HHWT-486633*** strip into the **CELL**. During this 20 SECOND countdown timer, 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 begin counting up for 100 seconds, at the end of which the cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in Cd4). After testing, rinse cell immediately and clean with brush.

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

MENU PA5 Peracetic Acid Test Procedure

1 REMOVE STRIP
Remove one (1) ***HHWT-486675*** strip 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: PA5
Press and re-press the **MENU** button until the display shows the parameter **PA5**.

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

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

6 DIP STRIP AND PRESS "READ"
Dip the ***HHWT-486675*** strip 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 PA5). After testing, rinse cell immediately and clean with brush.

MENU HP6 Hydrogen Peroxide Test Procedure

1 REMOVE STRIP
Remove one (1) ***HHWT-486616*** strip 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: HP6
Press and re-press the **MENU** button until the display shows the parameter **HP6**.

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

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

6 DIP STRIP - (read carefully and follow procedure closely)
Dip the ***HHWT-486616*** strip 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 begin counting up for **120 seconds**, at the end of which, the cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in HP6). After testing, rinse cell immediately and clean with brush.

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

MENU PH7 — pH Test Procedure — PH

1 **REMOVE STRIP**
Remove one (1) ***HHWT-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: PH7**
Press and re-press the **MENU** button until the display shows the parameter **PH7**.

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

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

6 **DIP STRIP AND PRESS "READ"**
Dip the ***HHWT-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 PH7 Menu). After testing, rinse cell immediately.
NOTE: For best results, Total Alkalinity of the sample should be 40-140 ppm.
***NOTE: When testing outdoors (sunlight), for best accuracy, use the Mixing Cap/Cell Cover when Zeroing and Reading the sample.

MENU HR8 — High Range Chlorine Test Procedure — HR

1 **REMOVE STRIP**
Remove one (1) ***HHWT-486672*** strip 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 (4mL) with the water sample.

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

6 **DIP STRIP - (read carefully and follow procedure closely)**
Dip the ***HHWT-486672*** strip 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 begin counting up for **120 seconds**, at the end of which, 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, rinse cell immediately and clean with brush.
**NOTE: Use a 10 second dip time if water temperature is above 45˚C.*

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

HHWT-11 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.

5. Be sure the **CELL** is filled to capacity (4mL).

6. Rinse the **CELL** with clean water immediately after completing the test *(some indicators will stain the **CELL** wall if allowed to remain in 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 32°C (90°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 Free Chlorine test, rinsing is very important to remove residual KI, which may interfere.

12. Each strip 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 strips contains, at minimum, the quantity of strips notated on the bottle. Due to the strip slitting process, you may find one or two extra 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 incorrect results.

14. The HHWT-11 Photometer is not compatible for use with DPD-1, DPD-3, and DPD-4 powder pillows, tablets, or liquids available from other manufacturers. Accurate results can only be guaranteed by using genuine Micro strips or reagents (*reorder information below*).

15. Our lab testing with the HHWT-11 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.

16. Remove batteries when meter is not used for more than a month (Warranty Requirement).

17. CELL cleaning instructions: 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 (contact technical support for details).

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.

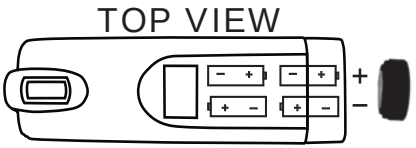
HHWT-11 Meter Messages

The following are some common messages that may be displayed, including error messages. If an error message other than those listed below is displayed, please contact Omega technical support in the USA at (800) 872-9436.

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

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 over tighten. 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.



HHWT-11 Reagent Reorder Information

(4mL) Reagent Specifications - For use with HHWT-11

No.	PARAMETER	PART NO.	# OF TESTS	DETECTION RANGE	CHEMISTRY
	Reference Standard	HHWT-486602	10	N/A	N/A
1	Bromine (DPD-1)	HHWT-486636	100	0 - 14 ppm	DPD
2	Chlorine Dioxide (DPD-1)	HHWT-486633	100	0 - 12 ppm	DPD
3	Free Chlorine (DPD-1)	HHWT-486637	100	0 - 11 ppm	DPD
4	Total Chlorine (DPD-3)	HHWT-486638	100	0 - 11 ppm	DPD
5	Total Chlorine (DPD-4)	HHWT-486670	100	0 - 11 ppm	DPD + KI
6	High Range Chlorine	HHWT-486672	50	0 - 300 ppm	KI + Buffer
7	Hydrogen Peroxide LR	HHWT-486616	50	0 - 3 ppm	DPD + PO_4 + MoO_4 + KI
8	Ozone (DPD-4)	HHWT-486634	100	0 - 9 ppm	DPD + KI
9	Peracetic Acid (PAA)	HHWT-486675	100	2 - 300 ppm	KI
10	pH	HHWT-486639	100	5.5 - 8.8 ppm	Phenol Red
11	Glycine (used for Chlorine Dioxide)	HHWT-484014	50	N/A	Glycine

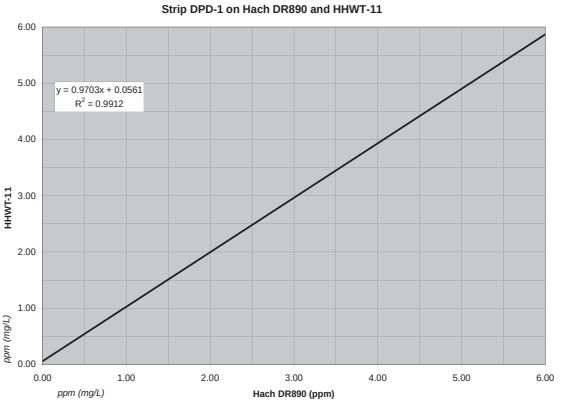
NOTE: Because most of our products are test strips or use reagents that have little or no hazard in the quantity sold, MSDS sheets are not supplied with the test kit.

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

Strip DPD-1 Accuracy

Free Chlorine results are compared using the ***HHWT-486637 (DPD-1)*** with the HHWT-11 Photometer in Menu CL1 and Hach® DR890 Colorimeter in Program 9 and Program 12 using Hach® powder pillows.

DR890	HHWT-11
0.00	0.00
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
HHWT-11	CL1	0.00 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

Reference Standard Ampoules

Assigned Value for HHWT-486602 **(lot 505)** Solution

Parameter	Desired Value (ppm)	Acceptable Value (ppm)
Free Chlorine	1.52	1.46 - 1.59

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

R020713

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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