eXact® Micro 20

Revision 02/25/14
486700-K **Standard Kit**
486700-WD **Well Driller Kit**
486700-KP **Pool Kit**

Dual Wavelength Advanced Photometer System

Instruction Manual

IDEAL FOR DRINKING WATER, POOLS & SPAS, ENVIRONMENTAL, AND EDUCATIONAL TESTING

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 Appln. No. PCT/US2005/033985

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

CE

EZ-3™ Method
FAST, ACCURATE RESULTS IN
3 SIMPLE STEPS

The eXact® Micro 20 Dual Wavelength Advanced Photometer System is designed for use with the eXact® Strip Micro reagent delivery system. The eXact® Micro 20 Dual Wavelength Photometer is manufactured and tested in an ISO 9001 Facility.

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Visit us online at sensafe.com/micro20 for up-to-date product information and NEW tests available.

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eXact® Micro 20 Meter Specifications

Measurement Method:	Photometric
Light Source:	Light Emitting Diode (LED) with precision filter
Wavelength:	Dual – 525 nm & 638 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
Reagent System:	Utilizes patented eXact® Strip Micro reagent delivery system with our EZ-3™ Method

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

About Your eXact® Micro 20 Photometer

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 20 meter is controlled by four buttons:

When first pressed, the **ZERO/ON** button powers the meter. When the meter is on and this button is pressed, it zeroes the sample in the cell. It is recommended that each new water sample analyzed is zeroed before testing, to maximize sensitivity and accuracy.

With each press, the **SELECT** button advances through the Select Group 1 through 7. The current Select Group will appear as a small digit to the right of the selected MENU (example: CL 1).

With each press, the **MENU** button advances through the tests available in the current Select Group. 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.

When **READ** is 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.

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 20 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_2HPO_4	33.4%	33.4%
Anhydrous $KH_2PO_4Na_2$	64.0%	64.0%
EDTA	1.1%	1.1%

We offer a "Green" Alternative

eXact® Strip Micro 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* 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 20

	PARAMETER / TEST	PART #	PAGE #	MENU & SELECT GROUP 1	2	3	4	5	6	7	COUNT-UP TIME (sec)
1	Alkalinity, Total	486641	10	$AL4_1$		$AL1_3$	$AL1_4$				Immediate
2	Aluminum (as Al^{3+}) [1]	486821	12						$Al3_6$		80
3	Ammonia (as NH_3)	486654	12		$NH3_2$		$NH4_4$				500
4	Biguanide [1]	486810	10			$bG8_3$					Immediate
5	Bromine [1]	486637	10			$bR9_3$		$bR2_5$			Immediate
6	Calcium (as $CaCO_3$) [1]	486629	10			$CA5_3$					Immediate
7	Chloride (as NaCl) III [1]	486757	10			$CH6_3$	$CH0_4$				Immediate
8	Chloride High Range (as NaCl) III [1]	486757	16			$CH6_3$	$CH0_4$				Immediate
9	Chlorine Dioxide [1]	486637 & 484014	17					$Cd4_5$			Immediate
10	Chlorine, Combined [1]	486637 & 486638	8			$CL3_3$					Immediate
11	Chlorine, Free [1]	486637	6	$CL1_1$			$CL6_4$	$CL1_5$			Immediate
12	Chlorine, High Range	486672	10					$HR8_5$			120
13	Chlorine, Total [1]	486637 & 486638	6&7	$CL1_1$			$CL6_4$	$CL1_5$			Immediate
14	Chlorine, Total [1]	486670	6	$CL1_1$			$CL6_4$	$CL1_5$			Immediate
15	Chromium (VI) [1]	486614	10						$Cr6_6$		240
16	Copper (as Cu^{2+}) [1]	486632	10	$CU6_1$			$CU9_4$				20
17	Cyanide	486812	13		$CN1_2$						600
18	Cyanuric Acid II [1]	481652-II	9			$CY7_3$					60
19	Fluoride [1]	486643	9	$F8_1$					$F1_6$		Immediate
20	Hardness, Total (as $CaCO_3$) [1]	486673	10	$TH5_1$			$TH5_4$				Immediate
21	Hardness, Total HR (as $CaCO_3$) [1]	486656	18							$TR1_7$	Immediate
22	Hydrogen Peroxide LR [1]	486616	10					$HP6_5$			120
23	Iron (II) [1]	486631	14	$FE3_1$	$FE2_2$						40
24	Iron, Total [1]	486650	14	$FE3_1$	$FE2_2$						40
25	Manganese (as Mn^{2+}) [1]	486606	15	$MN7_1$					$MN2_6$		120
26	Nitrate (as NO_3) [1]	486655	10				$NO3_4$				600
27	Nitrate (salt water >400ppm) [1]	486655	19							$TR1_7$	580
28	Nitrite (as NO_2) [1]	486623	10				$NO2_4$				360
29	Ozone [1]	486670	10					$O3_5$			Immediate
30	Peracetic Acid [1]	486670	10					$PA5_5$			Immediate
31	Permanganate [1]	486637	10					$PM7_5$			Immediate
32	pH [1]	486639	10	$PH2_1$		$PH2_3$					Immediate
33	pH, BT Fresh Water [1]	486652	10		$bt5_2$		$bt7_4$				Immediate
34	pH, BT Salt Water [1]	486657	9				$P11_4$				Immediate
35	Phosphate (as PO_4)	486814	10		$PO4_2$	$PO4_3$	$PO8_4$				120
36	Quaternary Ammonia [1]	486823	10					$QA9_5$	$QA5_6$		Immediate
37	Sulfate (as SO_4) [1]	486608	10						$SO4_6$		Immediate
38	Sulfide (as S^{2-})	486818	12		$S6_2$						180

[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.

[2] For example: If the sample has 1 ppm of Free Chlorine, the meter may read 0.97 ppm or 1.03 ppm. Contact sales department for detailed meter accuracy values.

SELECT GROUP OVERVIEW

1 Water Quality
CL1–Free & Total Chlorine
PH2–pH
FE3–Iron (II) & Total Iron
AL4–Total Alkalinity
TH5–Total Hardness
CU6–Copper
MN7–Manganese
F8–Fluoride

2 Miscellaneous
CN1–Cyanide
FE2–Iron (II) & Total Iron
NH3–Ammonia
PO4–Phosphate
bt5–BT-pH
S6–Sulfide

3 Pool & Spa
AL1–Total Alkalinity
PH2–pH
CL3–Free & Total Chlorine
PO4–Phosphate
CA5–Calcium Hardness
CH6–Chloride
CY7–Cyanuric Acid
bG8–Biguanide
bR9–Bromine

Test Specifications

	REAGENTS USED	RANGE ppm	RESOLUTION	EXPECTED METER ACCURACY (±%) [2]
1	AL Strip	1 - 200	0.1 (1-50), 1 (51-320)	12
2	5 Drops Al Buffer & Al Strip	0.02 - 1.5	0.01	13
3	3 Drops NH (reg. water) or 10 Drops NH (salt water), & NH Strip	0.01 - 2.4	0.01	5
4	BG Strip	2 - 200	0.1 (2-20), 1 (21-200)	7.5
5	CL (DPD-1) Strip	0.1 - 12	0.01 (0.1-2), 0.1 (2.1-12)	10
6	CA Strip	18 - 420	1	12
7	CH Strip	1 - 430	1	20
8	1:20 Dilution of sample & CH Strip	20 - 8600	20	20
9	Glycine Strip & CL (DPD-1) Strip	0.01 - 10	0.01	5
10	CL (DPD-1) Strip & CL (DPD-3) Strip	0.01 - 5	0.01	3
11	CL (DPD-1) Strip	0.01 - 5	0.01	3
12	HR Strip	0.3 - 300	0.1 (0.3-20), 1 (21-300)	9
13	CL (DPD-1) Strip & CL (DPD-3) Strip	0.01 - 5	0.01	3
14	CL (DPD-4) Strip	0.01 - 5	0.01	3
15	Cr Strip	0.01 - 1.8	0.01	5
16	CU Strip	0.01 - 11	0.01 (0-4), 0.1 (4.1-11)	2
17	CN-1 Strip & CN-2 Strip	0.01 - 1.9	0.01	13
18	5 Drops CY	3 - 120	1	8
19	10 Drops F	0.03 - 1.45	0.01	15
20	TH Strip	5 - 200	1	16
21	HRTH Strip	20 - 1250		
22	HP Strip	0.01 - 2	0.01	8
23	FE Strip	0.04 - 8	0.01 (0.04-2.5), 0.1 (2.51-8)	3
24	EZ Open Reducer (Powder) & FE Strip	0.04 - 8	0.01 (0.04-2.5), 0.1 (2.51-8)	3
25	MN#1 Strip, MN#2 Strip, & 3 Drops MN	0.02 - 1.5	0.01	6
26	NO3 Strip	0.12 - 30	0.01 (0.12-5), 0.1 (2.6-4)	20
27	NO3 Strip	0 - 90		
28	NO2 Strip	0.01 - 1.8	0.01	5
29	CL (DPD-4) Strip	0.01 - 5	0.01	3
30	CL (DPD-4) Strip	0.01 - 6	0.01	3
31	CL (DPD-1) Strip	0.01 - 5	0.01	2
32	PH Strip	5.5 - 8.8 pH	0.01	0.4 pH
33	bt Strip	4.5 - 9.2 pH	0.01	0.2 pH
34	3 Drops P-pH	4.5 - 9.0 pH	0.01	0.2 pH
35	PO4 Strip	0.01 - 4	0.01 (0-2.5), 0.1 (2.6-4)	4
36	QA Strip	4 - 110	1	8
37	SO4 Strip	1 - 250	1	5
38	4 Drops S & S2- Strip	0.01 - 1.7	0.01	6

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SELECT GROUP OVERVIEW

4 Environmental	5 Oxidizers	6 Specialty	7 Transmission
AL1–Total Alkalinity	**CL1–Free & Total Chlorine**	**F1–Fluoride**	**TR1 Transmission** (525nm)
NO2–Nitrite	**bR2–Bromine**	**MN2–Manganese**	**TR2 Transmission** (638nm)
NO3-Nitrate	**O3–Ozone**	**Al3–Aluminum**	
NH4–Ammonia	**Cd4–Chlorine Dioxide**	**SO4–Sulfate**	
TH5–Total Hardness	**PA5–Peracetic Acid**	**QA5–Quaternary Ammonia**	
CL6–Free & Total Chlorine	**HP6–Hydrogen Peroxide**	**Cr6–Chromium**	
bt7–BT-pH Fresh Water	**PM7–Permanganate**		
PO8–Phosphate	**HR8–High Range Chlorine**		
CU9–Copper	**QA9–Quaternary Ammonia**		
CH0–Chloride			
P11–BT-pH Salt Water			

FREE OR TOTAL CHLORINE PROCEDURE

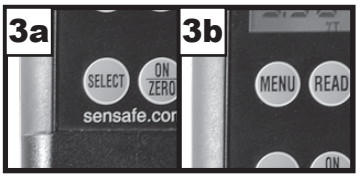
DPD-1 strip used for Free Chlorine detection, DPD-4 strip used for Total Chlorine detection

1 REMOVE STRIP

Remove one (1) **eXact® Strip Micro CL (DPD-1), Part No. 486637** or **eXact® Strip Micro CL (DPD-4), Part No. 486670** from the bottle before beginning the test. Set the strip in a dry, convenient place and recap the bottle immediately.

2 TURN METER ON

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

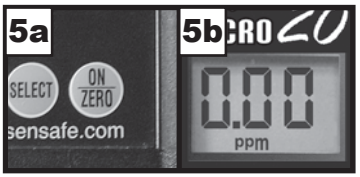


3 SELECT GROUP & MENU

Press and re-press the **SELECT** button to **Select Group 1, 4, or 5** (see figure 3a). Press and re-press the **MENU** button to select the test parameter **CL1 or CL6** (see figure 3b).

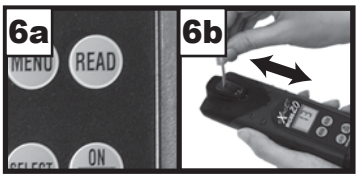
4 RINSE AND FILL CELL WITH SAMPLE

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



5 ZERO METER*

Press the **ON/ZERO** 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 required 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**.*

7 RECORD RESULT

The cursor will move across the display while the meter prepares to measure the sample. Record the value displayed for the respective parameter and this value is automatically stored in the CL MENU.

DO NOT discard the sample from the Free Chlorine (DPD-1) test if you are planning to run eXact® Strip Micro DPD-3 (Total Chlorine) Procedure. Move directly to steps 8-10 on the next page. Otherwise, rinse CELL immediately.

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

DPD-3 COMBINED CHLORINE PROCEDURE

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 (approx. two 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. Record the value displayed and this value is automatically stored in the CL MENU. (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 the CL MENU. After testing is completed, rinse CELL immediately. Record the highest value the meter displayed as your Total Chlorine result.

***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.*

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

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

eXact® Strip Micro CL (DPD-1/DPD-3/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).

FREE CHLORINE & COMBINED CHLORINE PROCEDURE

(Direct read Combined Chlorine Procedure)

1 **REMOVE STRIP**

Remove one (1) ***eXact® Strip Micro CL (DPD-1), Part No. 486637*** from the bottle before beginning the test. Set the strip in a dry, convenient place and recap the bottle immediately.

2 **TURN METER ON**

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

3 **SELECT GROUP & MENU**

Press and re-press the **SELECT** button to **Select Group 3**. Press and re-press the **MENU** button to select the test parameter **CL3**.

4 **RINSE AND FILL CELL WITH SAMPLE**

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

5 **ZERO METER***

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

6 **DIP STRIP AND PRESS "READ"**

Dip the ***eXact® Strip Micro CL (DPD-1)*** into the **CELL** and immediately press **READ**. This starts the **20 SECOND** countdown timer. During this time, move the strip in a gentle back and forth motion (approx. 2 strokes/Sec). **Remove and discard the strip after "1" on the display disappears**.*

7 **RECORD RESULT**

The cursor will move across the display while the meter prepares to measure the sample. Record the result displayed as Free Chlorine.

Note: **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 the next steps 8-11. Otherwise, rinse the cell immediately.

8 **RE-ZERO METER***

Press the **ON/ZERO** button, the display will immediately read **0.00 PPM**

9 **REMOVE STRIP**

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

10 **DIP STRIP AND PRESS "READ"**

Dip the ***eXact® Strip Micro CL (DPD-3)*** into the **CELL** and immediately press **READ**. This starts the **20 SECOND** countdown timer. During this time move the strip in a gentle back and forth motion (approx. 2 strokes/Sec). **Remove and discard the strip after "1" on the display disappears.***

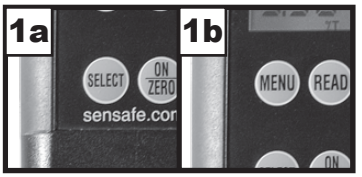
11 **RECORD RESULT**

The cursor will move across the display while the meter prepares to measure the sample. Record the result displayed as Combined Chlorine (this result and the free chlorine result are automatically stored in CL MENU). The sum of the free and combined chlorine will equal Total Chlorine. ***Note:*** If you press **READ** again, the meter will do 20-second countdown and will display the Total Chlorine result. After testing is completed, rinse CELL immediately.

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

STANDARD DROP PROCEDURE

(BT-pH in Salt Water[1], Cyanuric Acid[2], and Fluoride[3])

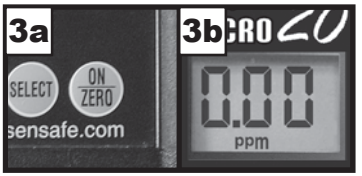


TURN METER ON and CHOOSE SELECT GROUP & MENU

Press the **ON/ZERO** button and press the **SELECT** button to the correct **Select Group** from pages 4-5. Press the **MENU** button to select the test parameter from pages 4-5.

RINSE and FILL CELL 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. Fill cell to capacity (4mL) with the sample. Tilt the meter to discard about 0.2 mL sample in order to leave room for liquid reagent.

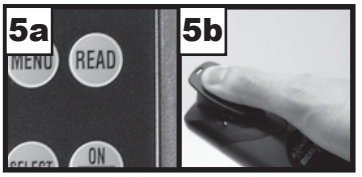


ZERO METER*

Press the **ON/ZERO** button. The cursor will move across the display followed by **0.00 pH** (for bt-pH) **or 0.00 ppm** (for Cyanuric Acid and Fluoride). Sample is ready for testing.

ADD DROPS

Take the required bottle of reagent and add the required drops *(see pages 4-5)* ***(Precaution: make sure that the bottle is straight)*** and cover the meter cell with the mixing cap.



PRESS "READ"

Press **READ** to start timer, place thumb, or finger over the cap and mix the sample by turning the meter upside-down repetitively during the **20 SECOND** countdown. *Precaution: Cover the cap firmly.* For Cyanuric Acid measurement, the meter begins a 60-second count up timing.

RECORD RESULT

The cursor will move across the display while the meter prepares to measure the sample. Record the value displayed for the respective parameter and this value is automatically stored in its MENU. *After testing, rinse CELL immediately and clean with brush.*

[1] Use this procedure if NaCl is greater than 4,000 ppm. Otherwise, use Standard Strip Procedure on page 10.

[2] Shake the bottle vigorously, to mix the suspension in the bottle, before adding the drops to the meter.

[3] The reagent contains acid and, if necessary, a stir bar may be used to mix the reagent.

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

STANDARD STRIP PROCEDURE

(Used for Biguanide, Bromine, BT-pH in Fresh Water[1], Calcium Hardness[2], Chloride[3], Chromium[4], Copper[5], High Range Chlorine[6], Hydrogen Peroxide, Nitrate[7], Nitrite, Ozone, Peracetic Acid, Permanganate, pH, Phosphate[8], Quaternary Ammonia, Sulfate, Total Alkalinity[9], and Total Hardness[10])

SEE NEXT PAGE FOR SPECIAL NOTES

REMOVE STRIP

Remove the appropriate strip from the bottle before beginning the test (see pages 4-5). Set the strip in a dry, convenient place and recap the bottle immediately.

TURN METER ON and CHOOSE SELECT GROUP & MENU

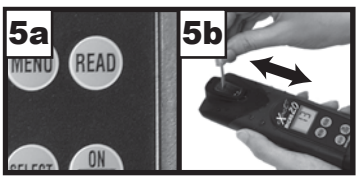
Press the **ON/ZERO** button and press the **SELECT** button to the correct **Select Group** from pages 4-5. Press the **MENU** button to select the test parameter from pages 4-5.

RINSE and FILL CELL 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. Fill cell to capacity (4mL) with the sample.

ZERO METER*

Press the **ON/ZERO** button. The cursor will move across the display followed by **0.00 pH** (for BT-pH and pH) or **0.00 PPM** (for all other parameters). Sample is ready for testing.



DIP STRIP and PRESS "READ"

Dip the appropriate strip into the **CELL** (see pages 4-5), 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**.* If the parameter being tested requires a count-up time, the meter will automatically start to count up (see pages 4-5).

RECORD RESULT

The cursor will move across the display while the meter prepares to measure the sample. Record the value displayed for the respective parameter and this value is automatically stored in its MENU. *After testing rinse the 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.

STANDARD STRIP PROCEDURE (SPECIAL NOTES)

[1] **BT-pH** – Use this procedure if NaCl is less than 4,000 ppm. Otherwise, use Standard Drop Procedure on page 9.

[2] **Calcium Hardness** – The Calcium test uses the Oxalic acid precipitation method. This test is most accurate when the pool or spa water sample is within APSP recommended ranges for pH (7.2-7.8) and alkalinity (80-130ppm). For best results, confirm that the pH and total alkalinity are in these ranges before running this test.

[3] **Chloride** – If sample pH is high (>9), adjust pH to 5-6 using Vinegar.

[4] **Chromium** – The strip needs to be angled in order to fit in the CELL because it is too wide.

[5] **Copper** – After value is displayed, 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 Copper value. If not matching, some water samples may require a 2 minute wait time to complete the reaction. For reporting, you must time the two minutes and then press READ to get your final result.

[6] **High Range Chlorine** – Use a 10 second dip time if water temperature is above 40°C/113°F. INTERFERENCES: Oxidizers such as Chloramine, Chlorine Dioxide, Bromine, Iodine, Ozone, Bromamines, and Permanganate will give false positive readings.

[7] **Nitrate** –

- **A.** Use this procedure if NaCl is less than 400 ppm. Otherwise, use Nitrate (Salt Water) Procedure on page 19.
- **B.** The CELL needs to be cleaned with brush and distilled water after each test. If any zinc dust is adhering to the CELL wall, it will affect results.

[8] **Phosphate** –

- **A.** Clean CELL with 0.1N HCl, Distilled Vinegar (5%), or Muriatic Acid before filling the meter with the sample to be tested.
- **B.** If running multiple tests in a row, using the same water sample, the CELL does not have to be rinsed or cleaned with acid between each test. It is recommended that the CELL be rinsed three times with the sample water.
- **C.** The calibration of the meter is based on a water temperature between 15°C (59°F) and 31°C (88°F). If temperature is below 15°C (59°F), your final Phosphate value may read low. This test can also be used for salt water testing.

[9] **Total Alkalinity** – For water temperatures above 95°F/35°C (hot tubs), remove and discard the strip when the timer displays “10”, countdown continues.

[10] **Total Hardness** –

- **A.** Positive interferences are observed if the test sample contains Barium. Interferences also observed if the test sample contains Copper, Lead, Cobalt, or Nickel.
- **B.** For test samples higher than 300ppm of Total Hardness, use High Range Total Hardness Procedure on page 18.

ALUMINUM[1], AMMONIA[2], & SULFIDE[3] PROCEDURE

1 **TURN METER ON and SELECT GROUP & MENU**

Press the **ON/ZERO** button and press the **SELECT** button to the correct **Select Group**. Press the **MENU** button to select the test parameter from pages 4-5.

2 **RINSE and FILL CELL 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. Fill cell to capacity (4mL) with the sample. Tilt the meter to discard about 0.2 mL sample in order to leave room for liquid reagent.

3 **ADD DROPS**

Take the required bottle of reagent and add the required drops *(see pages 4-5)*.

4 **ZERO METER***

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

5 **DIP STRIP AND PRESS "READ"**

Take the required strip as mentioned on pages 4-5, dip into the CELL, and immediately press **READ**. This starts the **20 SECOND** countdown timer. During this time, move the strip in a gentle back and forth motion (approx. 2 strokes/Sec). **Remove and discard the strip after "1" on the display disappears**.* The meter will automatically start to count up. The count up time varies for each parameter, as given on pages 4-5. At the end, the cursor will move across the display while the meter prepares to measure the sample. Record the value displayed for the respective parameter and this value is automatically stored in its MENU. After testing, rinse CELL immediately *and clean with the brush.* ***After Sulfide testing: rinse CELL with Distilled White Vinegar, 0.1N HCl, or Muriatic Acid and clean with brush.***

[1] **Aluminum** –

- **A.** First, clean the CELL with 0.1N HCl, Distilled Vinegar (5%), or Muriatic Acid before filling the meter with the sample to be tested.
- **B.** If running multiple tests in a row, using the same water sample, the CELL does not have to be rinsed or cleaned with acid between each test. It is recommended that the CELL be rinsed three times with the sample water.

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

[3] **Sulfide** –

- **A.** For results as Hydrogen Sulfide (H_2S), multiply the resulting value by 1.06.
- **B.** The calibration of the meter is based on the water sample temperature above 20°C. If the water sample is below 20°C, the strip has to dip in the sample for an additional 10 seconds.

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

CYANIDE PROCEDURE

1 REMOVE STRIPS

Remove the ***eXact® Strip Micro CN-1, Part No. 486812-A*** and ***eXact® Strip Micro CN-2, Part No. 486812-B*** from the bottle before beginning the test. Set the strips in a dry, convenient place and recap the bottles immediately.

2 TURN METER ON and SELECT GROUP & MENU

Press the **ON/ZERO** button and press the **SELECT** button to **Select Group 2**. Press the **MENU** button to select the test parameter **CN1**.

3 RINSE AND FILL CELL 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. Fill cell to capacity (4mL) with the sample.

4 ZERO METER*

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

5 DIP STRIP AND PRESS "READ"

Dip the **CN-1** strip into the CELL, and immediately press READ. This starts the **30 Second** countdown timer. Because the strip is 8mm wide, the strip will need to be angled to fit in the cell. Be sure that the test pad is fully submerged. 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, informing you to get ready with the **CN-2** strip. When the **30 Second** countdown starts, dip immediately the **CN-2** strip into the CELL. During this time, with the strip angled slightly, move the strip in a gentle back and forth motion (approx. 2 strokes/Sec). **Remove and discard the strip after "1" on the display disappears**.

The meter will automatically start to count up to 600 seconds. At 600 seconds, the cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in CN MENU). *After testing*, *rinse CELL immediately and clean with the brush.*

NOTE: The calibration of the meter is based on a water temperature between 20°C (68°F) and 25°C (77°F). If temperature is below 20°C (68°F), your final Cyanide value may read low.

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

IRON (II) & TOTAL IRON PROCEDURE

Do not run this test immediately after sulfide test.

1 TURN METER ON and SELECT GROUP & MENU

Press the **ON/ZERO** button and press the **SELECT** button to **Select Group 1 or 2**. Press the **MENU** button to select the test parameter **FE** from pages 4-5.

2 RINSE and FILL CELL 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. Fill cell to capacity (4mL) with the sample.

3 ADD REDUCER - Skip this step if testing only Iron (II)

Tilt the meter to discard about 0.2 mL sample in order to leave room for reagent. Add the contents of one ***eXact® Reagent EZ Open REDUCER, Part No. 486601*** to the CELL and cover the CELL with the mixing cap. Press READ to start the **20 SECOND** countdown timer, place thumb over cap to keep it securely in place, and mix the sample by turning the meter upside-down repetitively. When countdown displays 1, hold the meter upright and the cursor will flash and the meter will begin a 40 second count up. After the count up, a result will be displayed (ignore this result).

4 ZERO METER*

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

5 DIP STRIP and PRESS "READ"

Dip the **eXact® 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 (approx. 2 strokes/Sec). **Remove and discard the strip after "1" on the display disappears**.* The meter will automatically start to count up for 40 seconds. At the end, the cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this value is automatically stored in the FE MENU). *After testing is completed, rinse CELL immediately and clean with brush.*

Special Notes:

A. First, clean the CELL with 0.1N HCl, Distilled Vinegar (5%), or Muriatic Acid before filling the meter with the sample to be tested.

B. If running multiple tests in a row, using the same water sample, the CELL does not have to be rinsed or cleaned with acid between each test. It is recommended that the CELL be rinsed three times with the sample water.

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

MANGANESE PROCEDURE

1 REMOVE STRIPS

Remove the **eXact® Strip Micro Mn#1, Part No. 481020-1** and **eXact® Strip Micro Mn#2, Part No. 481020-2** strips from their foil packets before beginning the test. Also, shake the bottle of eXact® Reagent MN and remove the cap. Set the strips in a dry, convenient place.

2 TURN METER ON and SELECT GROUP & MENU

Press the **ON/ZERO** button and press the **SELECT** button to **Select Group 1 or 6**. Press the **MENU** button to select the test parameter **MN** from pages 4-5.

3 RINSE and FILL CELL 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. Fill cell to capacity (4mL) with the sample.

4 DIP STRIP and PRESS "READ"

Dip the **Mn#1** 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, informing you to get ready with the **Mn#2** strip. When the next **20 SECOND** countdown starts, dip immediately the **Mn#2** strip into the **CELL**. During this time, move the strip in a gentle back and forth motion (approx. 2 strokes/Sec). **Remove and discard the strip after "1" on the display disappears**.* The meter will automatically start to count up to 20 seconds. After 20 seconds, the cursor will move across the display and the display will **AUTO ZERO**.

5 ADD DROPS

Add three (3) drops of eXact® Reagent MN to the CELL ***(Precaution: make sure that the bottle is straight)*** and cover the meter CELL with the mixing cap. When the **20 SECOND** countdown starts, place thumb over the cap, and mix the sample by turning the meter upside-down repetitively during the countdown. When timer displays 1, hold the meter upright and the cursor will flash. The meter will begin a 120 second count up. After **120 seconds**, the cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in MN MENU). *After testing is completed, rinse CELL immediately and clean with the brush.*

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

HIGH RANGE CHLORIDE PROCEDURE

This test requires a 1:20 (1 to 20) dilution of the salt system sample.

PREPARE SAMPLE FOR TESTING (using Mini Dilution Kit II #487202)

Kit includes: Graduated Conical Tube (50mL) with cap; Graduated 3.0mL Syringe (increments of 0.1mL). **Distilled or Deionized (salt-free) water (not supplied) is required** to complete this test.

How to do 1:20 dilution using Mini Dilution Kit II for Micro 20 (MENU CH0$_4$)

Rinse syringe three times with salt system sample that you are about to test by moving plunger up and down.

1. Rinse 50mL graduated conical tube with distilled or deionized (salt-free) water.
2. Rinse the 3.0mL syringe with water sample to be tested. Finally, fill the 3.0mL syringe to the 2.0mL line very precisely (plunger ring should line up at the 2.0mL line and little or no air bubble should be present).
3. Add the syringe content (2.0mL salt system sample) to clean 50mL graduated conical tube by pushing plunger all the way down to expel sample.
4. Now, fill the graduated conical tube to the 40mL line with distilled or deionized (salt-free) water. Cap graduated conical tube.
5. Mix content of graduated conical tube by turning up side down at least three times. 1:20 Dilution Sample is ready for testing.

REMOVE STRIP

Remove one (1) ***eXact® Strip Micro Chloride III, Part No. 486757*** 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 **ON/ZERO** button to power the meter on; the display will show all annunciators, then the current MENU selection, followed by the last reading.

SELECT GROUP & MENU

Press the **SELECT** button to **Select Group 3 or 4**. Press the **MENU** button to select the test parameter **CH** from pages 4-5.

RINSE AND FILL CELL WITH SAMPLE

Using the 1:20 Dilution Sample prepared above, **rinse the CELL 3 times**. Then, fill the **CELL** to capacity (4mL) with the 1:20 Dilution Sample.

ZERO METER*

Press the **ON/ZERO** button. The cursor will move across the display, followed by **0 PPM**. Meter is ready for testing.

DIP STRIP AND PRESS "READ"

Dip the ***eXact® Strip Micro Chloride III, Part No. 486757*** into the **CELL** and immediately press **READ**. This starts the **20 SECOND** countdown timer. During this time move the strip in a gentle back and forth motion (approx. 2 strokes/sec). **Remove and discard the strip when "1" on the display disappears***.

RECORD RESULT DISPLAYED

The cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in CH MENU). After testing is completed, rinse CELL immediately and clean with the brush.

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

The display only gives you three digits. You should multiply the result by 20. As an example "213" equals 4,260 ppm as Sodium Chloride (NaCl).

CHLORINE DIOXIDE PROCEDURE

1 **REMOVE STRIPS**

Remove the ***eXact® Strip Micro Glycine, Part No. 484014*** and ***eXact® Strip Micro CL (DPD-1), Part No. 486637*** from the bottle before beginning the test. Set the strips in a dry, convenient place and recap the bottles immediately.

2 **TURN METER ON and SELECT GROUP & MENU**

Press the **ON/ZERO** button and press the **SELECT** button to **Select Group 5**. Press the **MENU** button to select the test parameter **Cd4**.

3 **RINSE AND FILL CELL 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. Fill cell to capacity (4mL) with the sample.

4 **DIP STRIP AND PRESS "READ"**

Dip the ***eXact Strip Micro Glycine, Part No. 484014*** 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 (ignore this result).

5 **ZERO METER***

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

6 **DIP STRIP AND PRESS "READ"**

Dip the ***eXact Strip Micro CL (DPD-1), Part No. 486637*** into the CELL, and immediately press **READ**. This starts the **20 Second** countdown timer. During this time, move the strip in a gentle back and forth motion (approx. 2 strokes/Sec). **Remove and discard the strip after "1" on the display disappears**.* The cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this result is automatically stored in Cd MENU). After testing is completed, rinse CELL immediately.

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

About The Accuracy / Calibration Of The Micro 20 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 20 Systems against the AWWA, US EPA , DIN, and ISO reference test methods for chlorine. Studies show that the eXact® Micro 20 System repeatedly agrees with an EPA Compliant reference method greater than 99% (R2= 0.99948, 0 - 5.00 ppm - see back cover). The eXact® Micro 20 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.

Assigned Value for READY SNAP™ Solution

Ready Snap™ Lot	Desired Value (%T)	Acceptable Value (%T)
Red Dye #505	17.1	16.5 - 17.5
Blue Dye #506	30.1	28.0 - 32.8

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

R061913

HIGH RANGE TOTAL HARDNESS PROCEDURE

1 REMOVE STRIP

Remove one (1) ***eXact® Strip Micro HRTH, 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 and CHOOSE SELECT GROUP & MENU

Press the **ON/ZERO** button and press the **SELECT** button to **Select Group 7**. Press the **MENU** button to select the test parameter **TR1**.

3 RINSE and FILL CELL 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. Fill cell to capacity (4mL) with the sample.

4 ZERO METER*

Press the **ON/ZERO** button. The cursor will move across the display followed by **100 %T**. Sample is ready for testing.

5 DIP STRIP and PRESS "READ"

Dip the eXact Strip Micro HRTH, 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 (approx. 2 strokes/Sec). **Remove and discard the strip after "1" on the display disappears**.* NOTE: If sample temperature is 40°F–52°F (4°C–11°C), press **READ** to start another 20 SECOND countdown timer and dip the same strip until the meter displays "10".

6 RECORD RESULT

The cursor will move across the display while the meter prepares to measure the sample. Record the value displayed (this value is automatically stored in TR1). After testing is completed, rinse CELL immediately and clean with brush.

7 USE TABLE

Find the "TR1" result in the table below to determine the Total Hardness concentration in ppm (parts per million). (Example: a "TR1" result of 65.3 (use only the 65 for the chart) equals a Total Hardness value of 159 ppm). Record result. After testing is completed, rinse cell immediately.

High Range Total Hardness (as $CaCO_3$) Table

High Range Total Hardness results require the table below. Follow **eXact® Micro 20 High Range Total Hardness (as $CaCO_3$) Test Procedure** (above) using *eXact® Strip Micro HRTH, Part No. 486656.*

eXact® Strip Micro HRTH, Part No. 486656 - for 4mL Samples										
%T	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
90	0	0	0	0	0	0	0	0	0	0
80	0	20	28	36	44	52	62	70	77	82
70	88	92	97	105	110	115	120	125	130	134
60	139	144	149	154	159	163	173	178	183	187
50	192	197	207	211	216	221	228	235	240	245
40	255	260	269	276	283	291	298	308	315	322
30	332	341	351	360	370	380	389	399	408	418
20	428	437	452	466	480	491	504	519	533	553
10	567	586	605	629	649	668	697	721	745	783
0	827	855	898	951	1004	1080	1170	1250	>1250	>1250
										Rev. 030613-BT

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

NITRATE (SALT WATER >400PPM) PROCEDURE

1 **REMOVE STRIP**

Remove one (1) ***eXact® Strip Micro NO_3, Part No. 486655*** from the bottle before beginning the test. Set the strip in a dry, convenient place and recap the bottle immediately.

2 **TURN METER ON and CHOOSE SELECT GROUP & MENU**

Press the **ON/ZERO** button and press the **SELECT** button to **Select Group 7**. Press the **MENU** button to select the test parameter **TR1**.

3 **RINSE and FILL CELL WITH SAMPLE**

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

4 **ZERO METER***

Press the **ON/ZERO** button. The cursor will move across the display followed by **100 %T**. Sample is ready for testing.

5 **DIP STRIP and PRESS "READ"**

Dip the ***eXact® Strip Micro NO_3, Part No. 486655*** into the **CELL** and immediately press **READ**. This starts the **20 SECOND** countdown timer. During this time move the strip in a gentle back and forth motion (approx. 2 strokes/sec). **Remove and discard the strip after "1" on the display disappears***. Time the reaction in the CELL for 580 seconds (no timer provided). During this time, the meter will shut off. When 580 seconds have elapsed, turn meter on and wait for the display to show last reading. Then, press READ, which will start a final 20 SECOND countdown.

6 **RECORD RESULT**

The cursor will move across the display while the meter prepares to measure the sample. Record result displayed (this value is automatically stored in TR1).

7 **USE TABLE**

Find the "TR1" result in the table below to determine the Nitrate concentration in ppm (parts per million). (Example: a "TR1" result of 65.3 (use only the 65 for the chart) equals a Nitrate value of 23 ppm). Record result. After testing is completed, rinse cell immediately and clean brush and distilled water. This is very IMPORTANT. If any zinc dust is adhering to the cell wall, it will affect the results.

Nitrate (as NO_3^-) Table

Nitrate results require the table below. Follow **eXact® Micro 20 Nitrate (as NO_3^-) Test Procedure** (above) using *eXact® Strip Micro NO3, Part No. 486655*

eXact® Strip Micro NO3, Part No. 486655 - for 4mL Samples										
%T	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
90	0	0	0	0	0	0	0	2	3	4
80	5	5	6	7	7	8	9	10	11	12
70	12	13	14	14	15	16	17	17	18	19
60	20	20	21	22	23	24	25	26	27	27
50	28	29	30	31	32	33	33	34	35	36
40	37	38	39	40	41	42	43	44	45	46
30	47	48	49	50	51	52	53	54	55	56
20	57	59	60	61	62	64	65	66	67	68
10	70	71	72	74	75	76	78	79	80	82
0	83	85	86	87	89	90	>90	>90	>90	>90
										Rev. 041613-BT

To determine Nitrate value as Nitrogen (NO_3 as N) as used by USEPA, divide displayed result by 4.4.

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

Mini Dilution Kit II (487202) Instructions

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

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

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

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

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

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

CALCULATION:
Test Result x Dilution Factor = Actual Result

NOTES

eXact® Micro 20 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 technical support in the USA at (803) 329-0162 (ext. 0).

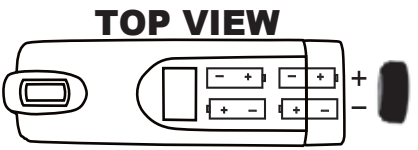
LCD Message	Description	Corrective Action
HI	In READ mode: test sample concentration is above the measurement range (test specific).	Dilute and retest. Dilution Kit available (Part Number 487200).
LO	In READ mode: test sample concentration is below the measurement range (test specific).	Sample value 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” or low battery.	Dilute sample, filter sample, or clean cell. One of these options should remedy the problem. May need to replace batteries if low battery indication.
ER	Excessive stray light detected. Normally this does not occur, even when testing in sunlight.	Place the LIGHT BLOCKING CAP over the CELL for zeroing and for reading result. Moving to a shaded area can also fix this problem.
in lower left	Low battery indication during testing (meter may not zero).	Replace the batteries.

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. This is necessary for meter to be waterproof.
5. Dispose of the used batteries in accordance with your local regulations.
6. Press ZERO/ON button to confirm the meter turns on. The meter is now ready for operation.
7. Meter will not work if battery orientation is incorrect.



eXact® Photometer 2-Year Limited Warranty

Registration of your eXact® photometer must be received within 30 days from date of purchase to activate the warranty. The eXact® photometer is warranted to be free from defects in materials and workmanship for a period of two (2) years from the date of purchase by the customer. ITS will repair or replace any part of the product which is deemed to be faulty or otherwise defective. The non-transferable warranty does not cover product damage caused by abuse (such as crushing a tablet in the cell) or improper use. If the meter is faulty or otherwise defective contact ITS by phone (+1-803-329-9712 Ext. 0) or email (its@sensafe.com) to describe the problem and obtain a return authorization form before returning the photometer to ITS. Damage caused by improper packing of the photometer for return shipment to ITS will not be covered by the warranty. Customer is responsible for shipping charges to ITS. ITS pays postage when photometer is returned to customer. A maximum processing fee of $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/micro/warranty/ (Personal data is kept confidential)

eXact® Micro 20 Tips For Best Accuracy

1. Our lab testing with the Micro 20 meter has shown that zeroing and measuring of the sample normally does not require any cell cover for accurate results, except in sunlight. To obtain optimal accuracy when testing with the meter outdoors (sunlight), use the Mixing Cap/Cell Cover when zeroing and reading the sample.
2. Become familiar with the meter and the different tests by reading the instructions carefully.
3. 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.
4. Observe the dip time (as required for the test) for accurate results.
5. Test immediately after filling the CELL with water sample when testing for oxidizers such as Chlorine and Bromine (Ozone can be measured in CL3 MENU).
6. Be sure the CELL is filled to capacity (4mL), especially for pH and Total Alkalinity.
7. Rinse the CELL with clean water immediately after completing each test. Some reagents may stain the CELL if not rinsed shortly after use. Other reagents including Cyanuric Acid, Chloride, and Calcium Hardness may coat the CELL wall. It is recommended, after these tests, to use the Cell Cleaning Brush with water to clean the CELL.
8. 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).
9. Store the meter and all test materials out of direct sunlight and away from chemical storage areas.
10. Minimize exposure of meter and test reagents to heat above 100°F (38°C).
11. Dry the outside of the meter when testing is complete or before storage of the meter.
12. 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.
13. 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.
14. 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.
15. Each table supplied has a unique revision number located in the bottom right corner of the table. We recommended that you visit www.sensafe.com regularly for any updated revisions.
16. The eXact® Micro 20 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).
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.

eXact® Strip Micro 20 Reagent Reorder Information

eXact® Strip Micro (4mL) Reagent Specifications - For use with eXact® Micro 20, Part no. 486700

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
	Ready Snap™ 3	486903	10	N/A	N/A
1	Alkalinity, Total	486641	100	1 - 200 ppm	Alizarin Red S + Citrate
2	Aluminum (as Al^{3+})	486821	50	0.02 - 1.5 ppm	PV
3	Ammonia (as NH_3)	486654	25	0.01 - 2.4 ppm	Salicylate Method
4	Biguanide	486810	50	2 - 200 ppm	Bromophenol Blue
5	Bromine	486637	100	0.1 - 12 ppm	DPD
6	Calcium (as $CaCO_3$)	486629	50	18 - 420 ppm	Ozalic Acid
7	Chloride (as NaCl) III	486757	25	1 - 430 ppm	Silver (ppt)
	High Range 1:20 Dilution	486757	25	20 - 8600 ppm	Silver (ppt)
8	Chlorine Dioxide	486637	100	0.01 - 10 ppm	DPD
9	Chlorine, Free	486637	100	0.01 - 5 ppm	DPD
	Chlorine, Free	484051	100 Foils	0.01 - 5 ppm	DPD
10	Chlorine, High Range	486672	50	0.3 - 300 ppm	KI + Buffer
11	Chlorine, Combined*	486638	100	0.01 - 5 ppm	KI
	Chlorine, Combined*	484053	100 Foils	0.01 - 5 ppm	KI
12	Chlorine, Total	486670	100	0.01 - 5 ppm	DPD + KI
	Chlorine, Total	484054	100 Foils	0.01 - 5 ppm	DPD + KI
13	Chromium (VI)	486614	50	0.01 - 1.8 ppm	Diphenylcarbazide
14	Copper (as Cu^{2+})	486632	50	0.01 - 11 ppm	Biquinoline
15	Cyanide	486812	50	0.01 - 1.9 ppm	Isonicotinic/Barbituric Acid
16	Cyanuric Acid II	481652-II	60	3 - 120 ppm	Melamine (ppt)
17	Fluoride	486643	25	0.03 - 1.45 ppm	SPADNS
18	Glycine (used for Chlorine Dioxide)	484014	50	N/A	Glycine
19	Hardness, Total (as $CaCO_3$)	486673	50	5 - 200 ppm	Phthalein Purple
20	Hardness, Total HR (as $CaCO_3$)	486656	50	20 - 1250 ppm	Phthalein Purple
21	Hydrogen Peroxide LR	486616	50	0 - 2 ppm	DPD + PO_4 + MoO_4 + KI
22	Iron (II)	486631	50	0.04 - 8 ppm	TPTZ
23	Iron, Total	486650	50	0.04 - 8 ppm	TPTZ + PP
24	Manganese (as Mn^{2+})	486606	24	0.02 - 1.5 ppm	PAN + Cyanide
25	Nitrate (as NO_3)	486655	50	0.12 - 30 ppm	Zinc Reduction
26	Nitrite (as NO_2)	486623	50	0.01 - 1.8 ppm	Chromotropic Acid
27	Ozone	486670	100	0.01 - 5 ppm	DPD + KI
28	Peracetic Acid	486670	100	0.01 - 6 ppm	DPD + KI
29	Permanganate	486637	100	0.01 - 5 ppm	DPD
30	pH	486639	100	5.5 - 8.8	Phenol Red
31	pH, BT Fresh Water	486652	50	4.5 - 9.2	Bromothymol Blue and Thymol Blue
32	pH, BT Salt Water	486657	50	4.5 - 9	Bromothymol Blue and Thymol Blue
33	Phosphate (as PO_4)	486814	50	0.01 - 4 ppm	Molybdate Method
34	Quaternary Ammonia	486823	50	4 - 130 ppm	Bromophenol Blue + Buffer
35	Sulfate (as SO_4)	486608	50	1 - 250 ppm	Barium (ppt)
36	Sulfide (as S^{2-})	486818	50	0.01 - 1.7 ppm	DPD Reagent + $FeCl_3$

*Combined Chlorine DPD-3 Test requires Free Chlorine DPD-1 (486637) to be run first.

If there is a question about the quality of a test strip, 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.

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. The exceptions are the Manganese (486606) test, which comes with 2 strips and one liquid reagent (PAN); Fluoride (486643) test, which is a liquid reagent (SPADNS); and Iron (486650) test, which is a powder reagent.

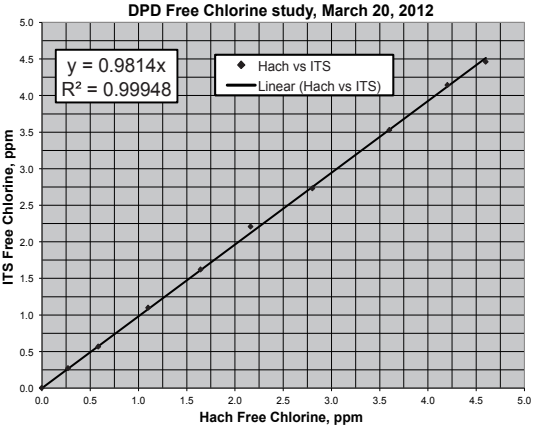
If your required procedure is not listed in this manual, please see the back page for our contact information.

To ensure optimal performance, store your eXact® kit in a cool, dry place away from excess heat (below 100°F / 38°C), moisture, and oxidizers such as Chlorine and Bromine.

eXact® Strip Micro DPD-1 Accuracy

Free Chlorine results are compared using the ***eXact® Strip Micro CL (DPD-1)*** with the eXact® Micro 20 Meter in Menu CL and Hach® DR890 Colorimeter in Program 9 and Program 12 using Hach® powder pillows.

DR890	Micro 20
0.00	0
0.27	0.27
0.58	0.57
1.10	1.10
1.64	1.62
2.16	2.21
2.8	2.73
3.6	3.53
4.2	4.14
4.6	4.46



Meter	Menu	Range (PPM)	Resolution
Micro 20	CL	0 to 5.00	0.01
DR890	Program 9	0.00 to 2.20	0.01
	Program 12	0.0 to 11.0	0.1

The eXact® Micro 20 Line of Kits

Standard Kit

(486700-K) Includes:

1 eXact® Micro 20 Meter *(486700)*
eXact® Strip Micro DPD-1 *(486637-25)*
eXact® Strip Micro DPD-3 *(486638-25)*
Mini Dilution Kit II *(487202)*
1 Mixing Cap
1 Cell Cleaning Brush
Instruction Booklet
Plastic Carrying Case
Plastic Stirrer

Part No. 486700-KP

Well Driller Kit

(486700-WD) Includes:

1 eXact® Micro 20 Meter *(486700)*
eXact® Strip Micro DPD-1 *(486637-25)*
eXact® Strip Micro DPD-3 *(486638-25)*
eXact® Strip Micro pH *(486639-25)*
eXact® Strip Micro Total Alkalinity *(486641-25)*
eXact® Strip Micro Copper *(486632-25)*
eXact® Strip Micro Nitrate *(486655-25)*
eXact® Strip Micro Manganese *(486606)*
eXact® Strip Micro Total Hardness *(486673-25)*
eXact® Strip Micro High Range Chlorine *(486672-25)*
eXact® Strip Micro Total Iron, TPTZ *(486650-25)*
Mini Dilution Kit II *(487202)*
1 Mixing Cap
1 Cell Cleaning Brush
Instruction Booklet
Plastic Carrying Case
Plastic Stirrer

Pool Kit

(486700-KP) Includes:

1 eXact® Micro 20 Meter *(486700)*
eXact® Strip Micro DPD-1 *(486637-25)*
eXact® Strip Micro DPD-3 *(486638-25)*
eXact® Strip Micro pH *(486639-25)*
eXact® Strip Micro Total Alkalinity *(486641-25)*
eXact® Strip Micro Copper *(486632-25)*
eXact® Strip Micro Nitrate *(486655-25)*
eXact® Strip Micro Total Iron, TPTZ *(486650-25)*
eXact® Strip Micro Calcium Hardness *(486629-25)*
eXact® Strip Micro Phosphate *(486814-25)*
eXact® Strip Micro Chloride *(481657-II)*
eXact® Reagent Cyanuric Acid *(481652-II)*
eXact® Strip Micro Biguanide *(486810-25)*
Mini Dilution Kit II *(487202)*
1 Mixing Cap
1 Cell Cleaning Brush
Instruction Booklet
Plastic Carrying Case
Plastic Stirrer

Contact Information

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