User guide

Reference : PCC0003 & PCC0006

Rev : 1

Table of contents

I. General information

1) Utilization of this document

Read this user guide before any installation or manipulation of this unit to preserve swimmers, users or materials.

Information given in this document must be respected. The manufacturer will not be liable if instructions written in this document are not followed.

2) Liability

Manufacturer will not be liable of any loss of life, property, profits or other damages incurred through the use or misuse of his units.

3) Environment

Recyclable packaging of AQUA TESTER 3&6 units must be eliminated accordint to environment rules.

Packaging like papers, boxes, plastics or any recyclable part must be carried in an appropriate waste disposal facility.

According to european standard 2002/96/CE, this picture indicates that since the 12th of August 2005, electrics units can not be eliminated with industrial or domestic wastes. In accordance with the regulations, consumers in the EU are required after that date, to restore their old equipment to the manufacturer for safe disposal without charge.

According to european standard 2002/95/CE, this picture indicates that this unit has been designed in compliance with the restrictions on hazardous substances.

According to the low-voltage directive (2006/95/CE) and the electromagnetic compatibility directive (2004/108/CE), this symbol means that the device has been designed in compliance with the previously cited directives.

II. Composition of AQUA TESTER 3 & 6 cases

1) AQUA TESTER 3

- 1x Photometer AQUA TESTER 3
- 1x User guide AQUA TESTER 3 & 6
- 1x Test tube brush
- 4x Crushing rods
- 4x Tubes

- 1x Box of 100 reagents of DPD n°1
- 1x Box of 100 reagents of DPD n°3
- 1x Box of 100 reagents of Red Phenol
- 1x Box of 100 reagents of Cyanuric acid

2) AQUA TESTER 6

- 1x Photometer AQUA TESTER 6
- 1x User guide AQUA TESTER 3 & 6
- 1x Test tube brush
- 6x Crushing rods
- 6x Tubes

- 1x Box of 100 reagents of DPD n°1
- 1x Box of 100 reagents of DPD n°3
- 1x Box of 100 reagents of Red Phenol
- 1x Box of 100 reagents of Cyanuric acid
- 1x Box of 100 reagents of Alkalinity
- 1x Box of 100 reagents of Calcium Hardness

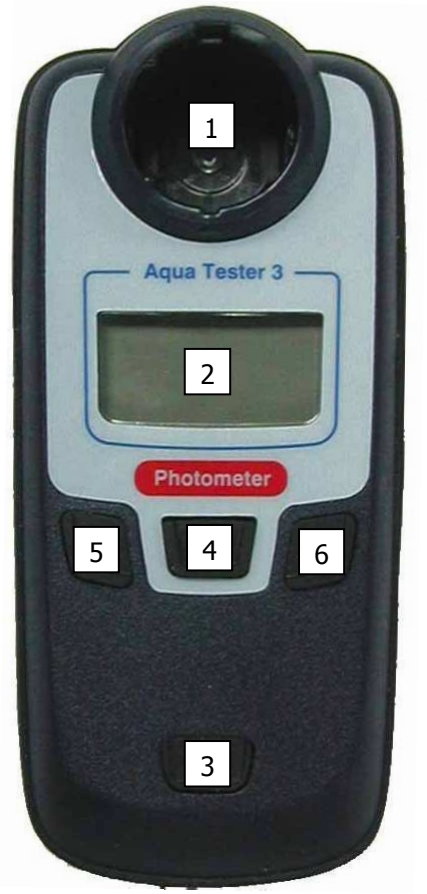
To consult products list, reagents and available accessories, please see section VIII

III. Technical information

1) Technical features

➢ Wavelength :	530 and 575 nm
➢ Tolerance :	± 2 nm
➢ Filter bandwidth :	10 nm
➢ Display :	LCD Display
➢ Definition :	128 x 64 Pixels
➢ Instrument operating temperature range :	0 à 50°C
➢ Waterproof rating :	IP 67
➢ Tube diameter :	25 mm
➢ Backup of zero :	Yes
➢ Supply :	2 batteries 1,5V Type 'AA'
➢ Size :	150x65x42 mm
➢ Weight :	200 g (Including batterries)

2) Photometer representation



1 : Test tube holder
2 : LCD Display
3 : Button "On/Off"
4 : Button "Menu"
5 : Button "Blank sample"
6 : Button "Read sample"

IV. Instructions

1) Analyzed parameters

Photometer	Parameter	Display Menu	Range
PCC0003	Free Chlorine	CL_2 5	0,01-5 (mg/L)
	Total Chlorine	CL_2 5	0,01-5 (mg/L)
	pH	pH	6,5 – 8,4
	Cyanuric Acide	CNA	2-200 (mg/L)
PCC0006	Free Chlorine	CL_2 5	0,01-5 (mg/L)
	Total Chlorine	CL_2 5	0,01-5 (mg/L)
	pH	pH	6,5 – 8,4
	Cyanuric Acid	CNA	2-200 (mg/L)
	Alkalinity	Alk T	10-500 (mg/L)
	Calcium Hardness	Calc	5-500 (mg/L)
	Calcium Hardness (Salt water only)	Calc NaCl	5-500 (mg/L)
	Bromine	Br	0,02-10 (mg/L)

2) General working

a) Blanks and Samples

Photometer of the AQUA TESTER 3&6 range use a BLANK tube to set the instrument to blank and a SAMPLE tube to take the reading.

The blank setting is held in memory. It is not necessary to reset the blank each time a reading is taken if the water samples to be tested are from the same body of water and if the conditions of use are the same. The blank setting can be confirmed if necessary by taking a test reading on the blank tube.

A SAMPLE tube is a test tube containing the sample to which reagents have been added in accordance with the test procedure described.

b) Taking a reading

- Press the "On/off" button to switch on the unit
- Press the "Menu" button to select the test to perform
- Insert your blank tube
- Press the "Blank Sample" button
- When 0.00 value is displayed, the unit is ready to take a reading
- Remove your blank tube and replace it with the sample tube
- Press the "Reading sample"
- The result will be displayed on screen

c) Viewing the instrument memory

AQUA TESTER 3&6 photometers save theirs 10 previous results in memory.

To view the previous results, hold during 3 secs the "Menu" button pressed while the reading value is displayed. The 10 previous results will appear at each time you press the "Menu" button.

V. Test procedures

1) Free Chlorine

Parameter : free chlorine
Symbol in the menu : CL_2 5
Range : 0.01 to 5.00 mg/L
Wavelength : 530 nm
Method : DPD
Reagent code : PCC1000

- Rinse test tube with sample leaving two or three drops in the tube
- Add one DPD n°1 tablet
- Crush the tablet with the crushing rod
- Fill the test tube with sample to the 10 mL mark
- Mix gently with the rod to dissolve the tablet ensuring any particles have settled
- Press the "Reading Sample" button to perform the reading
- The result is displayed
- Retain test solution if Total chlorine test is required

2) Total Chlorine

Parameter : total chlorine
Symbol in the menu : CL_2 5
Range : 0.01 to 5.00 mg/L
Wavelength : 530 nm
Method : DPD
Reagent code : PCC1001

- Carry out this test on the solution remaining from the Free chlorine test
- If any chlorine shock treatment chemicals have been added to the pool, see additional notes overleaf
- Add one DPD n°3 tablet
- Crush with the rod
- Mix to dissolve
- Stand for two minutes
- Press the "Reading Sample" button to perform the reading
- The result is displayed

To obtain the combined chlorine residual, subtract free chlorine result from total chlorine result.

Combined chlorine = Total chlorine – Free chlorine

Note :

- If any chlorine shock treatment chemicals have been added to the pool, add one DPD OxyStop tablet. Crush and mix to dissolve prior to adding the DPD n°3 tablet to the test solution. Stand for one minute before proceeding. This will prevent a response caused by the shock treatment chemicals.

3) pH

Parameter : pH
Symbol in the menu : pH
Range : 6.50 to 8.40
Wavelength : 575 nm
Method : Red Phenol
Reagent code : PCC1002

- Fill the test tube with sample to the 10 mL mark
- Add one Red Phenol tablet
- Crush the tablet with the rod
- Mix to dissolve
- Press the "Reading Sample" button to perform the reading
- The result is displayed

4) Cyanuric Acid

Parameter : Cyanuric Acid
Symbol in the menu : CNA
Range : 2.00 à 200 mg/L
Wavelength : 530 et 575 nm
Method : Turbidity
Reagent code : PCC1003

- Fill the test tube with sample to the 10 mL mark
- Add one tablet for Cyanuric acid test
- Let the tablet to dissolve for at least 2 minutes
- A cloudy solution indicates the presence of Cyanuric acid
- Crush any remaining undissolved tablet
- Mix to ensure uniformity
- Press the "Reading Sample" button to perform the reading
- The result is displayed

5) Alkalinity (Total)

Parameter : Alkalinity
Symbol in the menu : Alk T
Range : 10.0 à 500 mg/L
Wavelength : 575 nm
Method : Acid and indicator
Reagent code : PCC1005

- Fill the test tube with sample to the 10 mL mark
- Add one tablet for Alkalinity test
- Crush the tablet with the rod
- Mix until all the particles have dissolved
- Stand for 1 minute
- Press the "Reading Sample" button to perform the reading
- The result is displayed as mg/L of $CaCO_3$

Note :

- For accurate result, crush the tablet very thoroughly, stand for one minute and then, mix the solution. Look carefully at the bottom of the tube. If a thin yellow layer forms, mix the tube again. This ensures that reaction is complete. The result should not change on standing.

6) Calcium Hardness

Parameter : Calcium Hardness
Symbol in the menu : Calc
Range : 5.00 to 500 mg/L
Wavelength : 575 nm
Method : Indicator
Reagent code : PCC1004

- Fill the test tube with sample to the 10 mL mark
- Add one Calcicol n°1 tablet
- Crush the tablet with the rod
- Mix to dissolve
- Add one Calcicol n°2 tablet
- Crush the tablet with the rod
- Mix to dissolve
- Stand for 2 minutes
- Press the "Reading Sample" button to perform the reading
- The result is displayed

Note :

- The Calc NaCl setting is for salt pool only. This requires a different calibration but the method outlined for the standard Calcicol test is still valid
- Magnesium hardness up to 200 mg/L of $CaCO_3$ does not interfere with the test
- Iron at levels above 10 mg/L may cause low results
- Zinc above 5 mg/L may cause high results

7) Bromine

Parameter : Bromine
Symbol in the menu : Br
Range : 0.02 to 10.0 mg/L
Wavelength : 530 nm

Method : DPD
Reagent code : PCC1000

- Rinse test tube with sample leaving two or three drops in the tube
- Add one DPD n°1 tablet
- Crush the tablet with the crushing rod
- Fill the test tube with sample to the 10 mL mark
- Mix gently with the rod to dissolve the tablet ensuring any particles have settled
- Press the "Reading Sample" button to perform the reading
- The result is displayed

VI. Care and maintenance

1) General care

The handling of photometer tubes is important to ensure continuing accuracy. Scratches, finger-prints and water droplets on the tube or inside the light chamber can cause inaccurate results. Wipe test tubes on a clean tissue to remove drips or condensation before placing in the photometer.

It is imperative that the tubes and light chamber are clean and dry. The glassware must be clean and defect-free. Scratches and abrasions will permanently affect the accuracy of the readings.
Tubes can be acid washed periodically.

Keep the instrument in a clean and dry place when it is not in use.

2) Cleaning the optics

Any bluid-up of dirt or deposits may interrupt light transmission and affect readings.

To clean the optics, clean gently the internal surfaces of the optics with a soft, non-abrasive cloth. Do not use solvents. Deposits may be removed with a slightly dampened cotton bud.

The photometer is fitted with long-life light sources and contains no user-serviceable components. If the instrument requires servicing or repair, this can be arranged through your retailer.

3) Maintenance

a) Replacing the batteries 

Replace the batteries when the symbol remains on the display.
Use 2x1,5V Alkaline 'AA' batteries, MN 1500, LR6, E91, AM3 or equivalent.
Remove batteries from instrument if it is to be stored or left unused for a long period of time.

b) Error messages

The photometer will display an error message in the unlikely event of malfunction. These error messages are mainly designed to assist service staff to diagnose the instrument faults. In the event of an error message appearing on the photometer display, contact your retailer.

Error messages are coded 7,8 and 9 and all relate to blanking the instrument. In the first instance, the user should check the operating technique and sample clarity. If these are in order, then these errors indicate a fault in the optic system.

Error 7 : Indicates too much light
Solution : Remove the instrument from bright light

Error 8 : Indicates a fault with one of the optics components
Solution : Requires an assistance by the manufacturer

Error 9 : Indicates not enough light
Solution : Follow the "Clean the optics" routine

For any other problem, contact your retailer.

VII. Troubleshooting

1) Chemistry problems

It is very important to use any compatible reagent with the AQUA TESTER 3&6 range products. Using an alternative grade of tablet may lead to a turbid sample which in turn leads to inaccurate results.

a) Chlorine

Note that a too high chlorine level (> à 8 mg/L) can cause bleaching of the pink coloration formed in the DPD test and give a false negative or low results. If a colourless or weakly coloured test solution is obtained when the chlorine is known to be present, check for the possibility of bleaching by repeating the test on a sample diluted with chlorine-free water (See "Dilution" section).

Very high levels of calcium hardness (> à 1000 mg/L de $CaCO_3$) may lead to turbidity when performing the test. If this occurs, you need to add one EDTA tablet to your sample prior to adding your DPD tablet.

b) pH

Ionic strength, temperature and other water factors will have an effect on pH readings. This test has been calibrated for conditions most likely to be encountered in a typical swimming pool.

The colour range of the phenol red test is yellow, through orange, to red. The formation of an intense purple coloration shows that the indicator has been affected by high chlorine or bromine residuals. In such cases, the result should be disregarded.

c) Cyanuric Acid

The range of the Cyanuric acid test (CNA) is 2 to 200 mg/L. Higher levels can be tested by first diluting the sample with mains or deionised water and then applying the appropriate dilution factor according to the "Dilution" section.

d) Calcium hardness

The expression of hardness calcium results sometimes causes confusion. It is normal practice to express the results of hardness tests as mg/L of $CaCO_3$ (calcium carbonate). This is merely a convention to allow the comparison of different results and does not necessarily indicate that the hardness is present in the water in this form.
Results may also be expressed in literature as mg/L of Ca. The instrument will not do this calculation automatically. To convert mg/L of $CaCO_3$ to mg/L of Ca, multiply by 0,4.

e) Bromine

For most purposes, it is sufficient to simply measure the total bromine residual (Using DPD n°1 tablets) since both free and combined bromine ara active disinfectants.

Note that a too high chlorine level (> à 20 mg/L) can cause bleaching of the pink coloration formed in the DPD test and give a false negative or low results. If a colourless or weakly coloured test solution is obtained when the chlorine is known to be present, check for the possibility of bleaching by repeating the test on a sample diluted with chlorine-free water (See "Dilution" section).

f) Water balance

In swimming pools, the effects of the pH, hardness and alkalinity are all inter-related. The likely of corrosive or scale problems can be predicted using water balance calculation. The resulting value indicates to users the corrosion or scale forming tendency of the water. The following method is a simplified version of the Langelier Index and this can be calculated by subtracting 11,1.

<u>Method :</u>

- Take a sample of the water
- Measure the calcium hardness
- Using table 1, read off the factor which corresponds nearest to the calcium hardness value measured. Record this Calcium Hardness factor (Line 1)

- Take a sample of the water
- Measure the total alkalinity
- Using table 1, read off the factor which corresponds nearest to the total alkalinity value measured. Record this total alkalinity factor (Line 2)

- Take a sample of the water
- Measure the pH.
- Record the pH value (Line 3)

- Add together the values of lines 1,2 and 3. to find the Balanced Water Index of the water
- Compare the index obtained with the Water Balanced Condition in table 2. This table indicates whether the water is in balance and if not, the recommended action to be taken.

Table n°1	
Calcium Hardness / Alkalinity	Factor
20	0.90
60	1.4
100	1.6
140	1.75
180	1.85
200	1.95
260	2.05
300	2.10
340	2.15
380	2.20
460	2.30
580	2.40
780	2.50

Table n°2		
Index	Water Balanced Condition	Recommendation
< à 9,6	Highly corrosive	Recommendation 1
9,6 à 10,5	Corrosive	
10,6 à 10,9	Acceptable balance	Recommendation 2
11,0 à 11,2	Ideal balance	No action required
11,3 à 11,6	Acceptable balance	Recommendation 2
11,7 à 12,6	Scale forming	Recommendation 3
> à 12,6	Highly scale forming	

<u>Recommendation 1 :</u>

- Increase pH to 7,5 - 7,8
- Increase Calcium Hardness to at least 50 mg/L
- Increase Total Alkalinity to 100 mg/L or higher as necessary
- Retest Water Balance

Recommendation 2 :

- Retest water regularly

Recommendation 3 :

- Decrease pH to 7,2 - 7,5
- Decrease Total Alkalinity to 150 mg/L or lower as necessary
- Retest Water Balance

2) Sample dilution

When the test result is outside the concentration range of the test, the photometer will display the ">" symbol.
In such cases, it is necessary to dilute the pool water and repeat the test.

If the result is close to the top of the scale and a more accurate result is required, a dilution may be used to increase the sensitivity of the test.

For example, a dilution by 2 may be performed. Fill a half of the test tube with sample water (A half of 10 mL, so 5 mL) and the other half with tap water.
The obtained value must be multiplied by 2 to obtain the dilution result and so, the good value of your pool.

VIII. Order codes

Reference	Description
PCC0003	Photometer AQUA TESTER 3
PCC0006	Photometer AQUA TESTER 6
PCC1000	Reagent DPD1 for AQUA TESTER 3&6 (Box of 250)
PCC1001	Reagent DPD3 for AQUA TESTER 3&6 (Box of 250)
PCC1002	Reagent Red Phenol for AQUA TESTER 3&6 (Box of 250)
PCC1003	Reagent Cyanuric Acid for AQUA TESTER 3&6 (Box of 250)
PCC1004	Reagent Calcium Hardness for AQUA TESTER 3&6 (Box of 250)
PCC1005	Reagent Alkalinity for AQUA TESTER 3&6 (Box of 250)
PCC1009	Reagent EDTA for AQUA TESTER 3&6 (Box of 250)
PCC1019	Reagent OxyStop for AQUA TESTER 3&6 (Box of 250)
PCC1006	Test tube for AQUA TESTER 3&6
PCC1007	Crushing rod
PCC1008	Test tube brush