

# Pooltest 3

## Handheld colorimeter For chlorine and isocyanuric acid tests



## INSTRUCTIONS MANUAL

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HANDHELD COLORIMETER

**Palintest Pooltest 3**

ACprov1011

**MSA**

**190-10**

## 1 GENERAL INFORMATION

Palintest instruments and reagents are renowned as being simple to use, whilst providing rapid and reliable results for the testing of water. Our instruments are of the highest quality and fully waterproof. Palintest's experience, built-up over the last 50 years, is the reason why our instruments and reagents are used in laboratories, treatment plants, leisure facilities and industrial premises throughout the world.

Our products are packaged carefully and the product should reach you in the state it left our factory; if this product has reached you in a state that is less than satisfactory, please contact BAMO Mesures SAS.

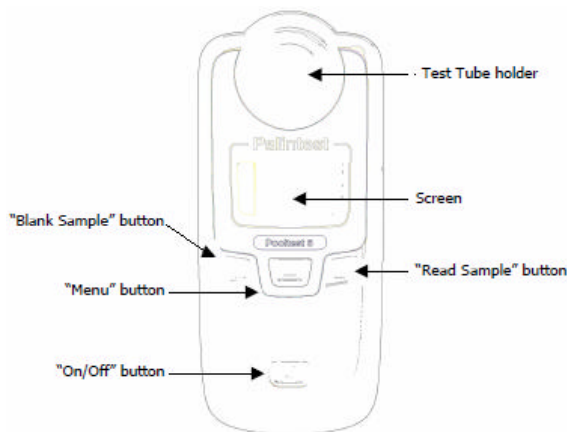
This booklet describes the best way to use Palintest products, and provides instructions for the range of water tests that can be performed using this instrument.

Palintest instruments are calibrated for Palintest reagents. To guarantee the high accuracy and performance that our instruments give, you must ensure that only Palintest reagents are used with Palintest instruments. Failure to do so can lead to erroneous results.

### Kit Pooltest 3 content

- Pooltest 3 instrument
- Instructions manual
- Crushing Rods
- Cleaning brush
- Test cells
- Reagents:
  - Chlorine (Free and Total)
  - pH (Phenol Red)
  - Cyanuric Acid

### Instrument layout



## 2 BACKGROUND INFORMATION

Introduction to Colorimetric Measurement.

Palintest tests are based on measuring the intensity of colours produced by Palintest reagents and using Palintest photometers to measure that intensity of colour. This is colorimetry and can be defined as any technique used to evaluate an unknown colour in reference to known colours.

To avoid subjective measurement between test samples and colour standards, a colorimeter can be used for quantitative measurement of the amount of coloured light absorbed by a sample (with reagents added) in reference to a untreated sample (blank).

White light is made up of many different wavelengths of light.

A colorimeter passes a white light beam through an optical filter which transmits only one particular band of wavelength of light to the photodetector where it is measured.

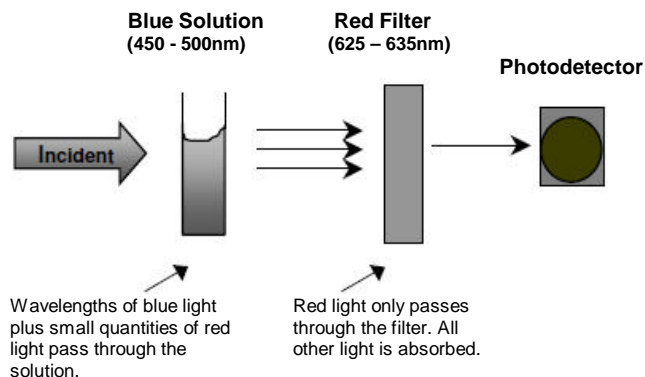
The difference in the amount of coloured light transmitted by a colourless sample (blank) and the amount of coloured light transmitted by a coloured sample is a measurement of the amount of coloured light absorbed by the sample.

The use of filters improves the sensitivity of this process and choice of the correct optical filter (and, therefore, the correct wavelength) of light is important.

It is interesting to note that the filter that gives the most sensitive calibration for a test factor is the complementary colour of the test sample.

For example, the chlorine test produces a pink colour proportional to the chlorine concentration in the sample (the greater the chlorine concentration, the darker the pink colour). In this case, a green filter gives the greatest sensitivity as a pinkish-red solution absorbs mostly green light.

Palintest photometers calculate and then display the test results directly in milligrams per litre (mg/L) of the test factor, by comparing the amount of absorbed light to the calibration data programmed into the instrument.



## Blanks and Samples

Palintest photometers use a BLANK tube to set the instrument to blank and a SAMPLE tube to take the reading.

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

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 the conditions of use are the same. The blank setting can be confirmed if necessary by taking a test reading on the blank tube.

## Taking a Reading

- 1 Press the 'on/off' button to start the unit.
- 2 Press the 'menu' button until the test you wish to perform is indicated on the screen.
- 3 Insert your blank tube and press the 'blank sample' button.
- 4 An image displaying a blank tube will be displayed on screen.  
When this is replaced by 0.00 the instrument is finished blanking and ready to take a reading.
- 5 Remove your blank tube and replace it with the sample tube.  
Press the 'Read Sample' button to take a reading.
- 6 The result will be displayed on screen in mg/L.

## Care and Maintenance

**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. 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.**

**Here are some hints on keeping the photometer clean, free from contamination and in good working order:**

- 1 Prepare your workplace before use.  
Make sure that you have enough space to work with the photometer and with the reagent systems.
- 2 Do not pour out samples or prepare the tests directly over the instrument.
- 3 Always cap the test tubes after preparing the blank and test sample.
- 4 Wipe test tubes on a clean tissue to remove drips or condensation before placing in the photometer.
- 5 Do not leave tubes standing in the photometer test chamber.  
Remove the tubes immediately after each test.
- 6 Immediately wipe up any drips or spillages onto the instrument or into the test chamber with a clean tissue.
- 7 Keep the instrument clean.  
Clean the test chamber regularly using a moistened tissue or cotton bud.
- 8 Keep the instrument in a clean, dry place when it is not in use.  
Keep it on a clean, dry bench away from chemicals, place it in a storage cupboard or keep it in a carrying case.

## Viewing the Instrument Memory

To view the previous results (10 results are stored within the instrument memory); hold the 'menu' button whilst the display showing the selected test or result is on the screen.

## Backlight Operation

The backlight can be turned on and off by holding the 'On/Off' button for a two second period during power on.

### 3 TEST PROCEDURES

The methodologies listed here are for use with the Pooltest 3 and Pooltest 6 instruments.  
Before attempting to do any tests, ensure you read 'Blanks and Samples' and the 'Care and Maintenance' sections in Section 2.

#### To Select the Test

Press the MENU key.  
The currently selected test will appear on the display:

- Cl<sub>2</sub> 5 Chlorine [Free and Total] (0.01 – 5 mg/L range)
- pH pH (pH Units)
- CNA Cyanuric Acid

To change the test selected, press the MENU key repeatedly until the required test appears on the display.  
The ranges in each test refer to the lower limit of detection to the highest value the unit can guarantee confidence up to.

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**Chlorine**  
**Range**  
**Cl<sub>2</sub> 5: 0.01 to 5 mg/L**  
**Wavelength – 530 nm**

#### Method – DPD

##### Free Chlorine

- 1 Rinse test tube with sample leaving two or three drops in the tube.
- 2 Add one DPD No 1 tablet (or DPD-XF for high range instruments), crush the tablet with the crushing rod and then fill the test tube with sample to the 10 ml mark.  
Mix gently with the rod to dissolve the tablet and ensure any remaining particles have settled.
- 3 Take photometer reading immediately as the result may drift on standing. Ensure the display shows the test range that you desire.
- 4 Retain test solution if Total Chlorine test required (see further on for more instructions).

##### Total Chlorine

- 1 Carry out this test on the solution remaining from the Free Chlorine test.
- 2 If any non chlorine shock treatment chemicals have been added to the pool, see additional notes further on
- 3 Add one DPD No 3 tablet (or DPD-XT for high range instruments), crush and mix to dissolve.
- 4 Stand for two minutes.
- 5 Take photometer reading.  
Ensure the display shows the test range that you desire.  
To obtain COMBINED CHLORINE residual, subtract Free Chlorine result from Total Chlorine result:  
i.e. Combined Chlorine = Total Chlorine - Free Chlorine  
For notes on chlorine testing, see further on.

#### Notes

- If any non chlorine shock treatment chemicals have been added to the pool, add one DPD Oxystop (AP 017) tablet, crush and mix to dissolve prior to adding the DPD No 3 tablet to the test solution.  
Stand for one minute before proceeding.  
This will prevent a response caused by the shock treatment chemicals.

- DPD reacts with both chlorine and bromine. However, it is possible to determine bromine in the presence of chlorine, and to separate between bromine and chlorine residuals using a DPD methodology. For instructions on how to do this, please contact BAMO Mesures SAS.

## Reagents

AP 011 - DPD No 1 Tablets

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**pH**  
**Range: 6.5 to 8.4**  
**Wavelength: 575 nm**

## Method – Phenol Red

- 1 Fill test tube with sample to the 10 mL mark.
- 2 Add one PHENOL RED tablet, crush and mix to dissolve.
- 3 Take the photometer reading.

**Reagents:** AP 130 - Phenol Red Tablets

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**Cyanuric Acid**  
**Range: 2 to 200 mg/L**  
**Wavelength 530 and 575 nm**

## Method – Turbidity

- 1 Fill test tube with sample to the 10 mL mark.
- 2 Add one Cyanuric Acid tablet and allow to disintegrate for at least two minutes.
- 3 A cloudy solution indicates the presence of cyanuric acid.
- 4 Crush any remaining undissolved tablet and mix to ensure uniformity.
- 5 Take the photometer reading.


**Reagents:** AP 087 – Cyanuric Acid Tablets

## 4 INSTRUMENT

For an illustration on the instrument layout, see Section 1.

For information on performing a test, see Section 2.

### Replacing the Batteries

Replace the battery when the symbol  remains on the display.

Use 2 x 1.5 V 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.

### Liability

Under no circumstances shall Palintest Ltd be liable for loss of life, property, profits or other damages incurred through the use or misuse of their products.

### Disposal

Waste Electrical and Electronic Equipment (WEEE).

Natural resources were used in the production of this equipment.

This equipment may contain materials that are hazardous to health and the environment.

To avoid harm to the environment and natural resources, the use of appropriate recycling systems is recommended.

The crossed out wheeled bin symbol on the meter encourages you to use these systems when disposing of this equipment.

### 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 in diagnosing instrument faults. In the event of an error message appearing on the photometer display, contact BAMO Mesures SAS.

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 optics:

**Error 7** indicates too much light – remove the instrument from bright light.

**Error 8** indicates a fault with one of the optics components, and requires service assistance.

**Error 9** indicates not enough light – follow 'Cleaning the Optics' routine.  
If the problem persists, contact BAMO Mesures SAS

### Technical features

Colorimeter:	Direct reading, handheld instrument
Principle:	Double wavelength (530 & 575 nm $\pm$ 2 nm), LED light source Automatic configuration through the menu  Filter Bandwidth 10nm  LCD Display 128 x 64 pixel screen
Memory:	Built-in memory to store the last 10 measurements
Test cells:	Diam. 25 mm
Temperature:	Operating from 1 to 50°C
Protection:	IP67
Blank/Zero setting	Held in memory or reset for each reading
Power:	2 batteries AA, 1.5 V, auto switch-off setting
Dimensions:	150 x 65 x 42 mm
Mass:	200 g (including batteries)

## Cleaning the Optics

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

To clean the optics gently clean 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 our Technical Services Department.

## Servicing and Warranty

Palintest Pooltest Photometers are guaranteed for a period of two years from the date of purchase, excluding accidental damage or damage caused by unauthorised repair or misuse. Should repair be necessary, contact our Technical Services Department quoting the serial number. This guarantee does not affect your statutory rights.

An instrument failure due to test cell contamination is not covered by the Palintest instrument warranty.

## 5 TROUBLESHOOTING

### Chemistry Troubleshooting

**It is very important to specify Palintest Photometer Grade tablets when ordering replacement reagents for this instrument. Using an alternative grade of tablet may lead to a turbid sample which in turn leads to inaccurate results.**

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#### Chlorine:

Note that a too high chlorine level (>8 mg/L) can cause bleaching of the pink coloration formed in the DPD test and give a false negative or low result (this doesn't occur with DPD XF and XT reagents). If a colourless or weakly coloured test solution is obtained when chlorine is known to be present, check for the possibility of bleaching by repeating the test on a sample diluted with chlorine-free water.

Very high levels of calcium hardness (>1000 mg/L as CaCO<sub>3</sub>) may lead to turbidity when performing the test. If this occurs, you need to add one EDTA (AT 090) tablet to your sample prior to adding your DPD tablet.

Non-chlorine shock dosing treatments for swimming pools are widely used to support chlorine treated pools. Chemicals containing monopotassium persulphate (MPS) are used to oxidise organic contaminants in the water and regenerate free chlorine from chloramines.

Typical products are Oxybrite, Oxysure and Purolyte Plus.

Excess MPS reacts in the DPD test. It does not affect the free chlorine result with DPD No 1, but raises the DPD No 3 reading, thus yielding a false high result for combined chlorine. Unwary pool operators may add further shock dose at this point, and this further raises the false total chlorine result. Palintest's DPD Oxystop has been developed to prevent this problem.

The DPD Oxystop tablet should be added after the DPD No 1 Free Chlorine test result has been read and before the DPD No 3 tablet is added. The tablet must be thoroughly crushed and mixed well into the solution, and allowed a one-minute stand before proceeding with the DPD No 3 tablet.

Thus, Oxystop suppresses the response from MPS and allow accurate measurements of free and total chlorine on non chlorine shock dosed pool waters.

The DPD Oxystop tablet may also be used in exactly the same way with the DPD-XF and DPD-XT tablets.

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#### 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.

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#### Cyanuric Acid:

The range of the cyanuric acid (CNA) test is 2 – 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. Palintest's Dilution Tube (PT 512), which is available as an optional extra, should be used for the dilution.

## Compliance

The DPD method is a published standard method in the UK, the European Community, USA, Australia and in many other countries. The Palintest DPD free and total chlorine tests are approved by the USEPA as accepted versions of the Standard Method 4500-C1-G (0 – 5 mg/L).

The Palintest photometer series has been independently tested and has earned the European CE Mark of Compliance for electro-magnetic compatibility (EMC).

## Sample Dilution and Collection

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. A Palintest dilution tube (PT 512) is available to dilute samples accurately.

If the result is close to the top of the scale (e.g. chlorine above 4 mg/L on the Chlorine-Free/5 or Chlorine-Total/5 range, calcium hardness above 300 mg/L and cyanuric acid above 150 mg/L) and a more accurate result is required, a dilution may be used to increase the sensitivity of the test.

The following points should be observed when taking water samples from the pool. Take pool water samples from below the water surface. Collect in a clean plastic bottle and fill to the neck so as to avoid unnecessary airspace.

The free chlorine or bromine may drop during sample storage. Other parameters such as pH and alkalinity can also change. Samples should therefore be tested as soon as possible after sample collection.

## 6 REORDER CODES and ACCESSORIES

Code	Reference	Designation
190 821	DPD1 x250	Pack of 250 tablets for testing acc. To DPD1
190 823	DPD3 x250	Pack of 250 tablets for testing acc. To DPD3
190 824	isocyanuric x250	Pack of 250 tablets for testing isocyanuric acid