Palintest®
INSTRUMENTS

PHOTOMETER 7100

Your Palintest direct-reading photometer is designed to give long and trouble-free operation. To ensure you get the best out of this photometer, please read these instructions carefully and follow the procedures recommended.

The photometer is suitable for use in both the plant room and the laboratory, or for portable use at the waterside. It is sturdy and robust but should always be regarded as a scientific instrument. Treat it in the same way that you would a watch or a camera. It is designed to resist moisture and spills but careless use will almost certainly result in damage or reduce the life of the instrument.

Here are 10 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. Remember to cap the tube before reading in 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 away from all chemicals and cleaning materials. Do not place the instrument on top of chemical drums or barrels.
9. 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.
10. Keep the carrying case (where supplied) in a clean, dry condition. Make sure that any solutions which have spilled or drained into the carrying case are dried up before the case is closed up and the instrument is put away.

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OPERATING PRINCIPLE

The Palintest direct-reading photometer is an instrument for measuring colour intensity. Light is passed through a test tube containing the sample solution, and then through a coloured filter onto a photodetector. Filters have been chosen so that light of a specific wavelength is selected. When the solution is completely colourless, all of the light passes through the sample. With coloured samples, light is absorbed and that which passes through the sample is proportionately reduced.

In Palintest test procedures, the direct-reading photometer is used to measure the colour which is produced when chemical reagents are reacted with the water sample. In these tests, the colour intensity produced is proportional to the concentration of the parameter under test.

The photometer is pre-programmed with calibrations for each test parameter. Different test procedures are carried out at different wavelengths to optimize the sensitivity of each test. The required wavelength is selected automatically by the instrument.

The calibrations are accessed by entering a unique program number at the start of each test procedure. This enables the instrument to select the appropriate wavelength filter automatically and allows the photodiode response to be converted to a concentration reading. The instrument thus displays a direct-reading of the test result.

The photometer is ideally suited for general analytical applications. The instrument can be used as a laboratory or field photometer for standard analytical methods or for comparison of coloured solutions.

For general analytical applications, Transmittance (test program 0), or Absorbance (test program 1) can be chosen.

Power Supply

The photometer is designed to operate on alkaline batteries.

The photometer features a battery indicator – see 'System Mode' functions. A minimum voltage of 3.0V is needed to operate the photometer.

In addition to the above feature, a battery-warning message will appear automatically on the display when the battery voltage becomes low. The batteries should be replaced as soon as possible after the warning message appears.

Replacing the Batteries

The battery compartment in the base of the instrument is secured by four screws. To replace the batteries, remove the cover and install the batteries, observing the correct polarity as indicated. Use 3 x 1.5V 'AA' alkaline batteries or equivalent.

To avoid corrosion damage through leakage, remove batteries from the instrument if it is to be stored or left unused for a long period of time.

GENERAL PHOTOMETER OPERATION

The photometer is controlled by a simple intuitive menu system.

- The highlight indicates the active line or section of the screen.
- The ↑ and ↓ keys move the highlight through the menu choices.
- The ← and → keys allow selection of options.
- The flashing cursor in the 'options menu' at the bottom of the screen indicates the action which will occur if the [**OK**] button is pressed.

Operating Modes

The photometer has two distinct operating modes - the **PHOTOMETER** mode and the **SYSTEM** mode.

The **PHOTOMETER** mode is the normal operating mode for taking photometer readings. This mode is engaged automatically when the instrument is turned on by pressing the ⏻ key.

In order to conserve battery life the photometer will switch off automatically after use. The switch off period is five minutes.

The **SYSTEM** mode is used to set the system options. This mode is engaged when the photometer is turned on using the ⏻ key and then selecting 'System' using the ← and → keys and pressing [**OK**].

SYSTEM MODE

When the instrument is first used, the **SYSTEM** mode should be used to set the preferred operating options:

- Use the ↑ and ↓ keys to scroll through the features.
- Use the ← and → keys to select the options.
- Press [**OK**] to accept the selections and return to **PHOTOMETER** mode.

Back Light

The graphic display features a backlight to enhance the display contrast. This may be switched off to conserve battery power.

Language Options

The photometer can be operated in a number of different languages. When a particular language is selected, the test names and operating commands will appear in that language. Certain tests and unit options are provided in accordance with the conventions of particular countries and are only available when the photometer is switched to the language concerned. Select the language required from English, French, German, Spanish or Italian.

Units

The photometer offers the choice of result expressed in mg/l, ppm, mmol/l, µmol and g/l.

Battery Level

A battery level indicates the remaining battery life. At least 3.0V is required for successful operation of the instrument.

TAKING PHOTOMETER READINGS

The photometer is very simple to use. Screen prompts guide the user towards the test result. The following sections describe how to get the best out of the system.

Program Numbers and Test Instructions

Each test is identified by a separate program number or named key. Program numbers are shown in test instruction sheets supplied with the instrument or reagent systems. For some tests, a choice of different programs is offered in order to give the option of the result in different forms (eg for Nitrate - NO_3 or Nitrate Nitrogen - NO_3-N).

In certain methods, the test can be continued to a further stage - for example in the tests free chlorine and total chlorine. This is allowed for in the programming of the photometer. In these tests once the first stage result is obtained, the 'Follow-On' option may be selected to progress the test to the next program stage or stages and the result will be calculated automatically.

These continuation programs have their own program number for reference purposes although direct access to these programs may be restricted.

Blank and Sample Tubes

A BLANK TUBE is needed each time the photometer is used. This enables the instrument to be set automatically and compensates for any inherent colour in the test sample. It is important therefore to understand the meaning of the term 'BLANK TUBE'.

The BLANK TUBE is a test tube filled with the water being tested only. It is important to use the actual water to be tested to provide a true comparison for the test results.

The term 'SAMPLE TUBE' is used to describe the tube containing the water sample to which the reagents have been added in accordance with the appropriate test instructions. This tube is used to take the photometer reading.

Light Cap

A light cap is provided with the photometer. This cap fits over the test chamber and prevents stray light reaching the photodiode.

It is NOT necessary to use the light cap when using the photometer indoors or under shaded outdoor light. The light cap should however be used when working out of doors in strong sunlight. The light cap is also recommended when carrying out turbidity-based tests such as the cyanuric acid test, under bright or variable lighting conditions. Test instructions indicate when the light cap should be used.

Getting the Best Results

Success in obtaining accurate and consistent test results will depend on the care with which test procedures are carried out. Always follow the test instructions carefully and observe the stated standing periods and temperature conditions where applicable.

Wipe test tubes free from condensation before placing in the photometer. Test tubes should always be kept in a clean condition. Wash and dry carefully after use. Dirty tubes may be soaked in weak detergent solution if necessary. Tubes which become stained or scratched in use should be replaced.

Taking Test Readings

1 Press ⏻ key. The instrument displays the 'Choose a Test' menu box, with the last test program used highlighted as the active line.

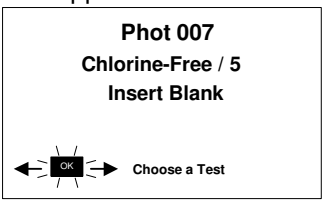
The cursor will flash on the [**OK**] symbol of the 'options menu' at the bottom of the screen.

Press [**OK**] to accept this program.

2 To choose a different test program, **either** use the ↑ and ↓ keys to scroll through the menu options, **or** use the numeric keys to enter the **Phot** number of the desired test.

Press [**OK**] to accept the selected program.

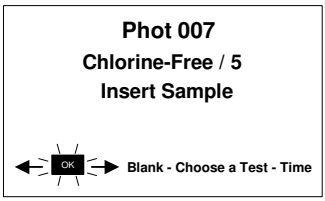
3 The following display will appear :-



Place a **BLANK TUBE** in the test chamber, then press [**OK**].

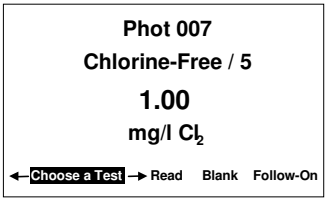
NOTE: The instrument is designed to hold the blank setting as long as the instrument is switched on. This stage will be omitted when further tests are being carried out. However, when changing to a test which requires a coloured or reagent blank, or uses a tube of a different diameter, the 'Insert Blank' prompt will be displayed.

4 The instrument will be set automatically, and after a few seconds the following display will appear :-



Place **SAMPLE TUBE** in the test chamber, then press [**OK**].

5 The instrument will take the reading and display the result as follows, for example :-



The following symbols indicate the result is out of test range :-

Result is higher than range **> >**

Result is lower than range **< <**

6 The 'Options' menu offers the choice to :-

'Choose a Test' - return to the menu of test programs and select another test

'Read' - read further sample tubes of the currently selected test

'Blank' - re-blank the instrument

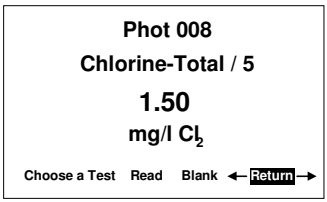
'Follow-On' - carry out a continuation test if available.

Continuation Tests (*Certain Tests Only*)

1 Select 'Follow-On' and press [**OK**] during the result display period of the foregoing test stage. The 'Insert Sample' screen will appear.

Place **SAMPLE TUBE** in the test chamber, then press [**OK**].

2 The instrument will take the reading and calculate the result from the combination of readings (where appropriate). The result will be displayed as follows, for example:



3 During the display period, the same options are available as at the end of a normal test program. Select 'Return' from the 'options menu' to take the program back to the start of the first stage of a multiple test procedure to enable further samples to be tested for the same parameters.

Note that some continuation test procedures involve a standing period. The photometer may switch off automatically during this time. To avoid the instrument switching off, use the timer function to time any standing period. The timer will over-ride the auto switch off function.

Favourite Tests List

The four most recently used tests are listed at the top of the 'Choose a Test' screen for convenience.

Expressing Different Chemical Forms

If the test result can be expressed in different chemical forms, the chemical symbol will have flashing ↑ and ↓ to indicate this. Use the the ↑ and ↓ keys to step through the options available.

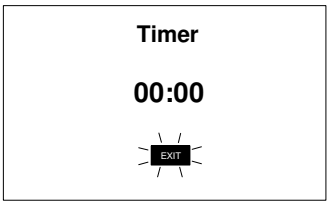
Reading in Transmittance and Absorbance

When taking readings in Transmittance or Absorbance mode, use the ↑ and ↓ keys to step through the wavelengths until the required wavelength is reached.

Timer

The photometer features a countdown timer with alarm as an aid to carrying out test procedures. The timer can be accessed at any time by selecting 'Timer' from the 'Options' menu.

The following display will appear :-



Key in the time required in minutes and seconds, maximum 29 minutes and 59 seconds, using the numerical keys, then press [**OK**] to start the timer. Use the ← and → keys to reposition the cursor and re-enter the time if it is keyed in incorrectly.

The timer will count down, giving an audible alarm at the end of the timed period. Press [**OK**] to stop the alarm.

During the timer countdown period, an 'Options' menu is available :-

Stop - to abort the timing operation, or stop the alarm at the end of the timed period

Exit - to return to the program screen to take readings. The timer will continue to run and give an audible alarm at the end of the period.

Exit and Read - to return to the program screen with the timer counting down on screen - the instrument will automatically take a reading at the end of the timed period - no alarm will sound.

CARE AND MAINTENANCE

The photometer is designed to give long and trouble-free operation. Care must be taken, however, to avoid test solutions being spilt over the instrument, and to prevent contamination of the instrument. Spillages or moisture should be wiped off immediately with a dry cloth. On no account should solvents or abrasive materials be used to clean the instrument. Care should be taken to keep the test chamber clean.

Cleaning the Optics

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

To clean the optics, undo the two screws to remove the optics base plate. Gently clean the internal surfaces of the optics with a soft, non-abrasive cloth. Deposits may be removed with a slightly dampened cotton bud. Replace the optics base plate and re-fasten the screws.

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.

SERVICE REQUIREMENT

The servicing of photometer instruments is essential to ensure optimum performance. To arrange a service of the instrument, contact Palintest Technical Services Department or the distributor who supplied the instrument. The Palintest standard photometer service includes cleaning of the optical assembly, replacement of any worn parts and checking/recalibration of the instrument.

ERROR MESSAGES

The photometer will display an error message in the unlikely even 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 Palintest Technical Services Department for advice.

Error messages are coded 7 and 9 and both 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 and use the light cap.

Error 9 indicates not enough light – follow 'Cleaning the Optics' routine.

GUARANTEE

Palintest 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. The guarantee specifically excludes damage caused by water or by ingress of chemical solutions. Should repair be necessary, contact our Technical Services Department quoting the serial number shown on the back of the instrument. This guarantee does not affect your statutory rights.

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