

Marine Potable Water Test Kit

Instruction Manual



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Table of Contents	Page
Safety and Hygiene	3
Notes Page	5
Test Procedures.....	6
Chlorine (DPD), Free, Combined and Total Chlorine	6
pH using Phenol Red reagent.....	7
High Range Chlorine	8
Coliforms and E. Coli Bacteria (Presence/Absence)	9
Total Bacteria Count.....	11
Determination of Iron.....	13
Determination of Copper	14
Determination of Colour	15
Determination of Turbidity	15
Determination of Nitrate	16
Determination of Enterococci Bacteria	17
Portable Incubator User Instructions	18
Technical Data:	19
Switching On:	20
Setting Target Temperature	21
Setting Incubation Time	22
Starting the Heaters	22
Setting the Elapsed Time	23
Power Down	23
Error Warnings	23
Spares and Consumables	25

Safety and Hygiene

Workplace and Cleanliness

Simple to follow, step by step instructions are provided for the operation of all items and performance of all tests within this kit. It is however important to find a suitably clean and uncluttered area in which to organise and perform each test. Working in this environment will prevent mistakes and avoid contamination of the tests being performed. Ensure that all used items are suitably disinfected and disposed of correctly. Work surfaces should be cleaned with detergent and water before and after testing.

Personal Protective Equipment (PPE)

Due to the nature of the test chemicals contained within this test kit and the potential hazard to health of the samples being tested, it is important to wear gloves and safety glasses when carrying out all tests contained within the kit.

Operational hazards

Colitag sachets and Bacteria Plates (unused)

Unused Colitag (for the measurement of Coliforms/E.Coli) and Bacteria Plates present no hazard to health.

Colitag and Bacteria Plates (used)

Bags or plates containing used/incubated samples for the analysis of E.Coli/Coliforms (thermotolerant coliforms) or TVC bacteria should be treated as potentially hazardous to health until they have been suitably disinfected (Disinfection Procedure below) and washed/rinsed. These samples could contain cultured bacteria and care should be taken NOT to allow the contents to come into contact with skin or eyes. The health risk is primarily from the ingestion of bacteria after transfer to clothing or hands, not from actual skin contact. If contact is made, remove contaminated clothing and wash thoroughly with a strong detergent. Wash contaminated skin with soap and water.

Samples Being Tested

Again samples being tested could contain Coliform/E.Coli or TVC bacteria and, as such, present a similar risk to used Colitag or Bacteria Plate samples. As such, take the same precautions as detailed above.

Disinfection Procedure

It is necessary to disinfect spent containers used in the determination of E.Coli/Coliforms & TVC's prior to disposal. It is essential to wear appropriate protective equipment prior to performing the disinfection procedure. This includes gloves, safety glasses and appropriate overalls.

- 1) Fill a 5-litre bucket with at least 1 litre of strong bleach solution (5% activity).
- 2) Transfer all spent sampling bags, syringes and Bacteria Plates to the bucket.
- 3) Leave to sterilise for at least 2 hours. (Ensure that the bleach solution is in contact with all sides of the containers, inside and out, leaving no air pockets).
- 4) Pour the bleach solution to waste and dispose of the equipment as any normal waste.

Test Procedures

Chlorine (DPD), Free, Combined and Total Chlorine

CHECKIT® Disc	Measurement Range	Order Code
Chlorine	0 - 4.0 mg/l	778421
Accuracy: ± 5 % full scale		

Replacement Tablets	Order Code (pack of 250)
DPD No. 1 (R) - free chlorine	777934
DPD No. 3 (R) - combined and total chlorine	777935
Rapid dissolving DPD tablets (green printed foil = Type Rapid (R))	

Free chlorine (DPD No. 1 (R)-tablet)

- 1) Fill both cells to the 10 ml mark and
- 2) Place one cell in the left-hand compartment of the comparator as a blank.
- 3) Add one DPD No. 1 (R)-tablet in the other cell, close it with a lid and
- 4) Swirl it until the tablet has dissolved.
- 5) Place this second cell in the right-hand compartment of the comparator
- 6) Match the two colour fields against good light source and read off the result in mg/l free chlorine.

Total and combined chlorine (with the addition of DPD tablet No. 3 (R))

Having completed the test for free chlorine,

- 7) Take the cell from the right-hand compartment of the comparator, remove the lid and add one DPD No. 3 (R) - tablet.
- 8) Replace the lid and swirl the cell until the tablet is dissolved.
- 9) Place the cell in the right-hand compartment and
- 10) Allow for 2 minutes reaction time. Then compare the two colour fields against a good light source and read off the result as total chlorine in mg/l.

Combined chlorine

Deduct the reading for free chlorine from the figure obtained for total chlorine.
The difference represents the result for combined chlorine.

Example: Total chlorine = 1.20 mg/l
 Free chlorine = 0.42 mg/l
 Combined chlorine = 0.78 mg/l

Important: Place the cell with the mark (point) to the viewer in the compartment. It is essential to rinse the cells thoroughly after each test. To obtain maximum accuracy always view and match colour against a good light source.
Store CHECKIT® Disc in the dark.

pH using Phenol Red reagent

CHECKIT® Disc	Measurement Range	Order Code
pH	6.5 - 8.4 pH	778422
Accuracy: +/- 0.1 pH		

Tablets	Order Code
PHENOL RED (R) (pack of 250)	777936

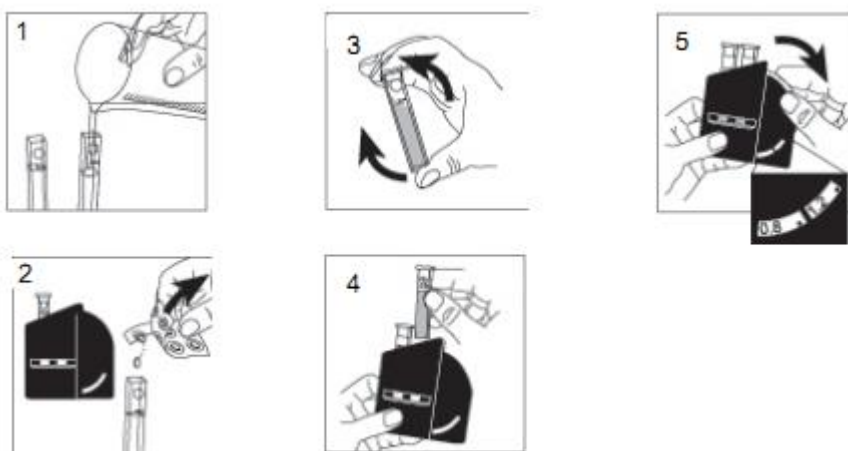
Rapid dissolving PHENOL RED tablets (green printed foil = Type Rapid (R))

pH (PHENOL RED (R)-tablet)

- 1) Fill both cells to the 10 ml mark.
- 2) Place one cell in the left-hand compartment of the comparator as a blank.
- 3) Add one pH (PHENOL RED (R))-tablet in the other cell, close it with a lid. Swirl it until the tablet has dissolved.
- 4) Place this second cell in the right-hand compartment of the comparator.
- 5) Match the two colour fields against good light source and read off the result as pH.

Note:

pH values below 6.5 always produce a yellow colouration. pH values above 8.4 always produce a red colouration. Water samples with low values of Total Alkalinity may give wrong pH readings.



Important: Place the cell with the mark (point) to the viewer in the compartment. It is essential to rinse the cells thoroughly after each test. To obtain maximum accuracy always view and match colour against a good light source.
Store CHECKIT® Disc in the dark.

High Range Chlorine

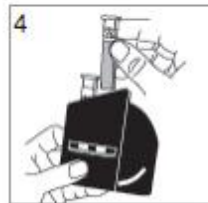
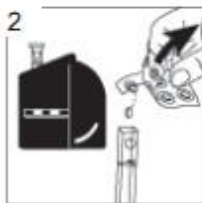
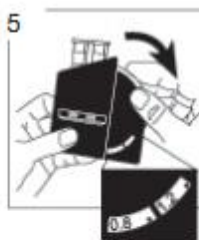
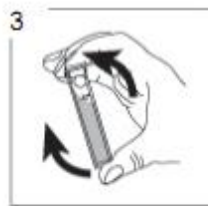
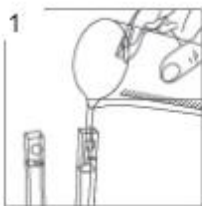
High Range

CHECKIT® Disc	Measurement Range	Order Code
Chlorine High Range	10 - 300 mg/l Cl ₂	778458
Accuracy: ± 5 % full scale		

Tablets	Order Code (pack of 250)
CHLORINE HR (KI)	777938
ACIDIFYING GP	777937

Chlorine High Range (CHLORINE HR / ACIDIFYING GP-tablet)

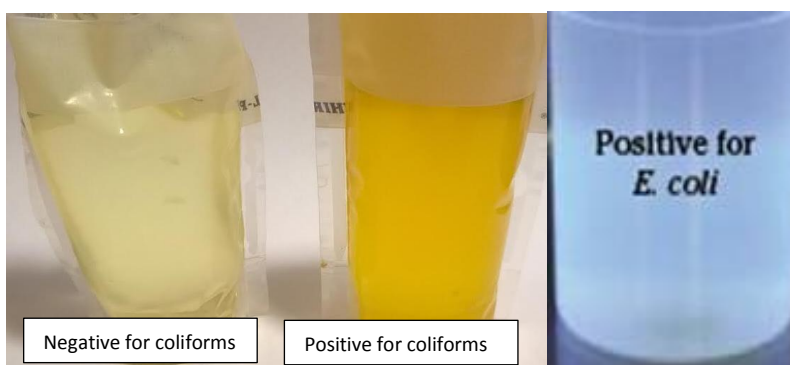
- 1) Fill both cells to the 10 ml mark.
 - 2) Place one cell in the left-hand compartment of the comparator as a blank.
 - 3) Add one CHLORINE HR-tablet to the other cell and crush to dissolve the tablet.
 - 4) Add one ACIDIFYING GP-tablet to the same cell and crush to dissolve the tablet.
- Close the cell with a lid. Swirl it until the tablet is dissolved.
- 5) Place this second cell in the right-hand compartment of the comparator.
 - 6) Match the colour fields against good light source and read off the result as mg/l chlorine.



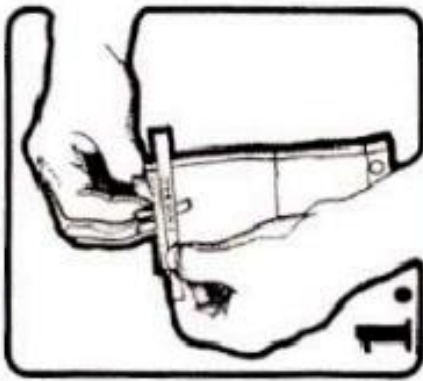
Coliforms and E. Coli Bacteria (Presence/Absence) - Order Code: 777932

This test procedure uses the Colilert sachets, 100ml sample bags and the handheld UV lamp. The test will take 24 hours to perform. It is important to store the samples at 35°C during this period. This test is very sensitive and, as such, it is important to prevent contamination. Ensure that the person performing the sampling and testing has washed hands thoroughly with soap and water. Do not allow the bag to remain open for any period of time, other than to take the sample and add the Colitag sachet. Do not let the sample point touch the bag.

- 1) Take one of the 100ml sample bags and collect 100ml of water to be tested. Use the pictorial guide for proper sampling procedure with the thio bags.
Note: It is important that the sample point is free from potential contamination. If necessary clean the sample point thoroughly prior to sampling. The sample bag contains a tablet to neutralise any chlorine that may be present in the sample. Allow this tablet to dissolve before continuing to step 2.
- 2) Carefully add the contents of one Colilert Sachet to the 100ml sample. Agitate gently to aid dissolution. A pale yellow colour may develop.
- 3) Place the sample inside one of the two plastic incubation pots provided and screw on the cap.
- 4) Incubate the sample at 35.0°C +/-0.5°C for 24 +/- 2 hours.
Note: Liquid samples MUST be incubated inside one of the incubation pots provided to prevent water entering the incubator should the liquid leak. Make sure the incubation pot is placed inside the incubator (with the lid off) during incubator warm-up period. Two samples can be placed inside one pot.
- 5) Sample interpretation
 - a. Visually check the sample for a deep yellow colour. If sample is deep yellow, then Coliform bacteria are present.
 - b. Place the sample in a dark area and expose to long wave UV light by shining the UV lamp supplied on the sample. If the sample fluoresces (glows a blue colour), E.Coli bacteria are present.
 - c. If no deep yellow colour is observed in the test sample after the 24 +/- 2 hour incubation period, the sample should be recorded as negative for Coliform bacteria and E.Coli, (Zero CFU/100ml)
 - d. Product Storage: Store at 4°C to 30°C, (preferably 4°C to 7°C) away from the light. Observe the expiry dates on the packaging.

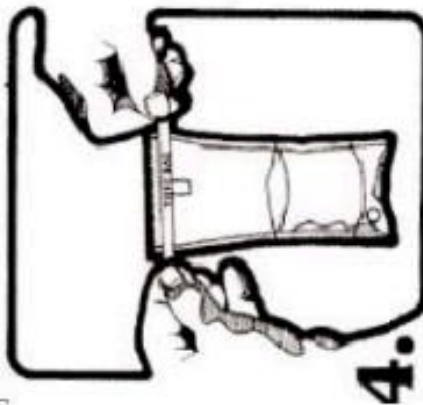


OPENING

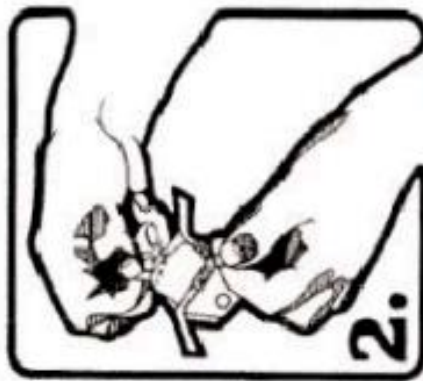


1. Tear off top at scored line.

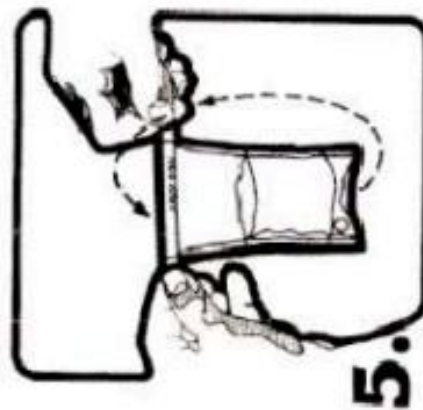
CLOSING



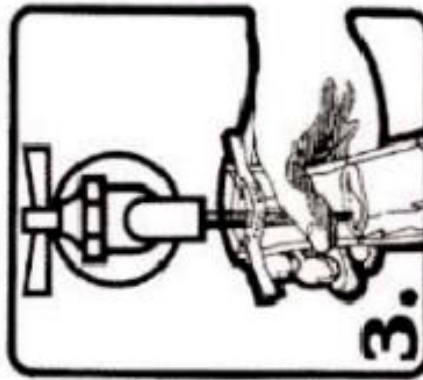
4. Pull wire ends to close bag.



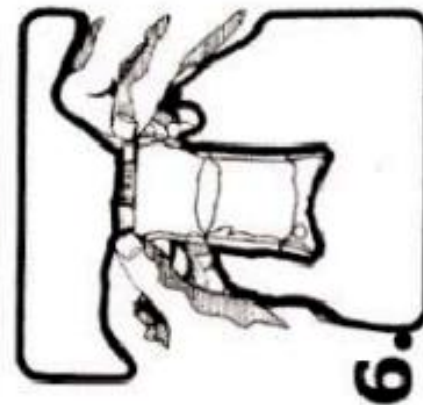
2. Pull tabs outward to open bag. Sometimes a pull on the bottom is also helpful.



5. Whirl bag three complete revolutions. (Do not roll tapes down.) Leave airspace for mixing in lab.



3. Fill bag to required fill line. The 4 oz. fill line will insure that 100 mls are collected.



6. Turn tape inward on opposite face of fold.

Total Bacteria Count

	Order Code
Bacteria Plates (40)	778413
Dilution Pots (40)	778414
1ml Sterile Syringes (30)	778483 (3 packs required)

This test is used for the quantification of total aerobic bacteria in water. The sample is added to dehydrated culture media and incubated for 48 hours at 35°C +/- 2°C (AOAC certified method). Aerobic bacteria show as red spots on the culture media and are counted to obtain the colony count as Colony Forming Units/ml (CFU/ml).

Storage

Store bacteria plates between 1°C and 30°C and observe the expiry dates on the packaging. Store dilution pots between 1°C and 30°C and observe the expiry dates on the packaging.

Sample Preparation

The collection bags supplied should be used to collect samples for total bacteria plate testing. The same sample can be used for this and the Coliform/E.Coli test. The sample bag contains a sodium thiosulphate tablet to remove any chlorine present in the sample. However, a clean sterile collection vessel of any type may be used as the total bacteria plate contains a chlorine neutralising agent.

Test Range: 0- 2000 CFU/ml

Procedure

1) Take one of the sterile, 100ml sample bags and collect 100ml of water to be tested. Use the pictorial guide for proper sampling procedure with the thio bags. The same sample can be used for the E. Coli/Coliform test.

Note: It is important that the sample point is free from potential contamination. If necessary, clean the sample point thoroughly prior to sampling. The sample bag contains a tablet to neutralise any chlorine that may be present in the sample. Allow this tablet to dissolve before continuing to step 2.

2) Have the following items ready for use:

- 1 x 100ml sample bag containing the sample to be tested
- 2 x new, sealed 1ml syringes
- 1 x sterile alcohol wipe
- 1 x 9ml dilution pot
- 1 x TVC bacteria plate

The incubator should be switched on and allowed to reach 35°C.

3) Wipe the foil surface of the dilution pot with the alcohol wipe and set the pot to one side (discard the wipe afterwards).

4) Using a new sterile 1ml syringe, draw up exactly 1ml of sample water from the sample bag.

Take care not to touch the inside of the bag and reseal immediately after sampling. The remaining sample can be used for the Coliform/E.Coli test.

5) Break the foil seal of the dilution pot with the base of the 1ml syringe and transfer the 1ml of sample into the pot. Remove the syringe and discard.

Swirl the pot gently to mix.

6) Take a new sterile 1ml syringe and fill with exactly 1ml of sample water from the dilution pot.

7) Open the lid of the TVC bacteria plate and slowly transfer the sample to the centre of the plate.

8) Cap the plate and transfer to the incubator.

9) Incubate at 35°C for 48 hours.

10) After 48 hours, place the plate on a white surface (or piece of paper) and count the number of red spot bacteria colonies on the surface of the plate.

11) The Colony Count (as CFU/ml) = Number of red spot colonies counted x10.
e.g. If 25 colonies are counted the final colony count for reporting purposes is 250 CFU/ml. Ideally, total bacteria levels in potable water should be less than 100 CFU/ml.

Guidance Notes for Plate Counting

If the water sample is highly contaminated (> 200 growing colonies) the plate will not be able to show single colonies. The amount of chromogenic substrate in the media is not enough to colour every colony. The plate will normally turn a complete pale pink colour, not showing any individual colonies. In this case, report the result as > 2000 CFU/ml.

Sometimes samples with a huge bacteria load, way in excess of 200 growing colonies will result in an even white covered plate. This plate looks empty however it is fully covered with bacteria. Study the plate carefully to check for complete coverage.

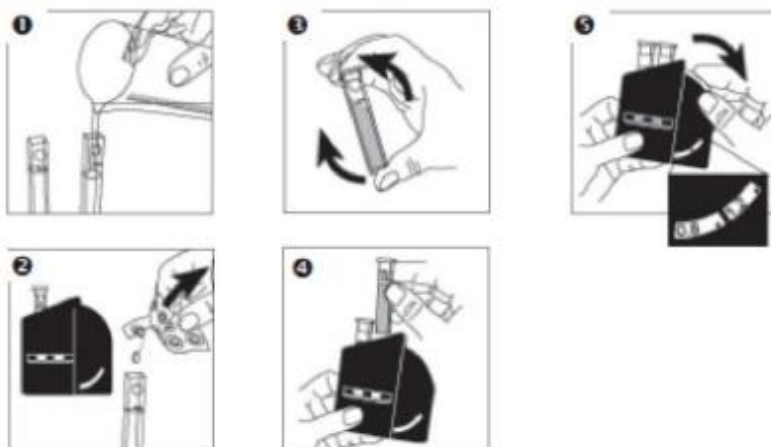
Some bacteria such as Staphylococcus will produce different coloured growth on the plate (not red). These should be included in the plate count.

Determination of Iron

CHECKIT® Disc	Measurement Range	Order Code
Iron Disc	0 to 1 mg/l	778644
CHECKIT® Comparator		778420
CHECKIT® Test Cells (2)		778457
Iron LR Tablets (pack of 100)		778645

- 1) Fill two cells to the 10ml mark with sample water and place one cell in the left compartment of the comparator as the blank.
- 2) To the second cell, add one Iron tablet and crush to dissolve.
- 3) Place the lid on the cell and swirl until sample is mixed (do not shake vigorously).
- 4) Place cell in right hand side of comparator and hold the comparator up to a good light source. Rotate the disc until the closest colour match is obtained. If necessary, estimate between the nearest values.
- 5) Read off the result in mg/l iron.

After testing, rinse and dry cells.



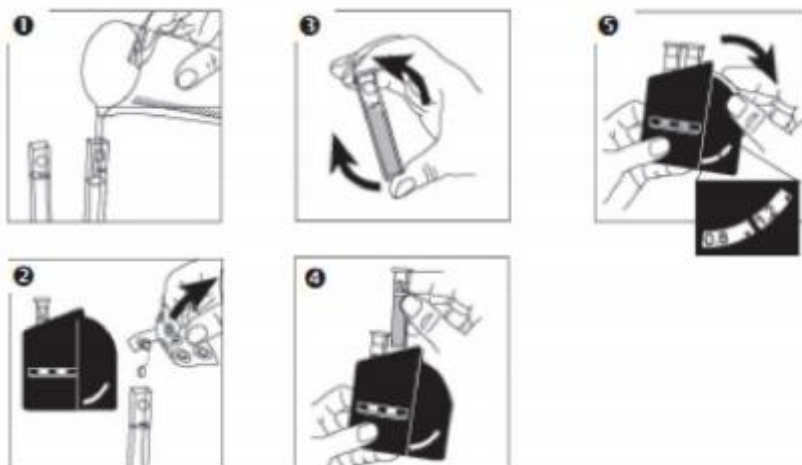
Determination of Copper

CHECKIT® Disc	Measurement Range	Order Code
Copper Disc	0 to 5 mg/l	778647
CHECKIT® Comparator		778420
CHECKIT® Test Cells (2)		778457
Copper No. 1 Tablets (pack of 100)		778646

Test Method

- 1) Fill two cells to the 10ml mark with sample water and place one cell in the left compartment of the comparator as the blank.
- 2) To the second cell, add one Copper No1 tablet and crush to dissolve.
- 3) Place the lid on the cell and swirl until sample is mixed (do not shake vigorously).
- 4) Place cell in right hand side of comparator and hold the comparator up to a good light source. Rotate the disc until the closest colour match is obtained. If necessary, estimate between the nearest values.
- 5) Read off the result in mg/l copper

After testing, rinse and dry cells.



Determination of Colour

Lovibond® Disc	Measurement Range	Order Code
Colour Disc	50 to 500 Hazen Units	778417
40mm Test Cell		778418
Lovibond® Comparator		555565

IMPORTANT – WHEN USING 40mm CELLS WITH THE LOVIBOND® 2000 COMPARATOR, THE CELL SPACER/LIGHT DIFFUSER MUST BE REMOVED AND REPLACED BY THE BLACK SPACER WITH THE TWO APERTURES.

Test Method

- 1) Fill a 40mm. cell to the 20ml line with sample and place in the right hand compartment of the Lovibond® 2000 comparator. Leave the left hand compartment empty.
- 2) Fit the disc into the Comparator and then place it in the Lovibond® 2000 comparator.
- 3) Hold the comparator up to a good light source and rotate the disc until the closest colour match is obtained. If necessary, estimate between the nearest values.
- 4) Record the value as Hazen units.

Determination of Turbidity

Turbidity Test Tube	Order Code
	778415

- 1) Put together the two pieces of the turbidity tube.
- 2) Fill the tube with sample water until the cross (x) at the bottom of the tube is not visible when looking down the length of the tube.
- 3) Check the level of the tube with graduations on the side and read off the result.
- 4) Record the result a turbidly in NTU.
- 5) Empty and rinse the tube.



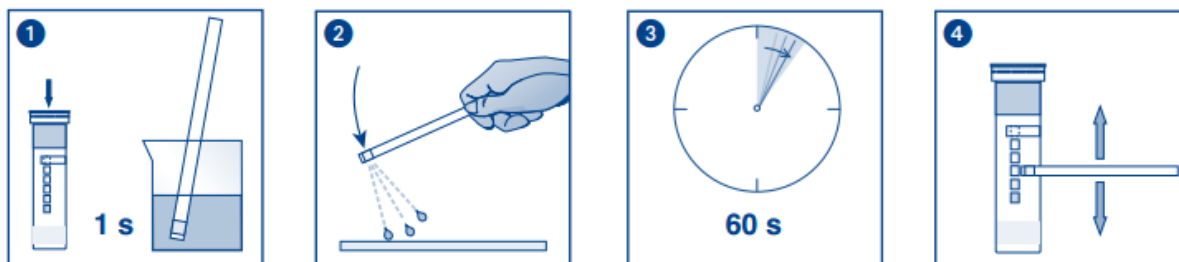
Determination of Nitrate

Nitrate Test Strips

Order Code
779958 Pack100 strips

QUANTOFIX Nitrate 100 are test strips for the semi-quantitative determination of nitrate ions (NO_3) in aqueous solutions or samples.

1. Insert the test strip with both fields into the test solution for 1 s.
2. Shake off excess liquid.
3. Wait 60 s.
4. Compare the test fields immediately to the colour scale. Read the values which match the colour of the test fields most closely (reading accuracy: $\pm \frac{1}{2}$ coloured field of the scale). If nitrate ions are present, the outer test field (at the end of the strip) will turn red-violet. The reaction colour of the test fields may change after the value has been taken. It is therefore crucial to evaluate the coloration within the prescribed time scale to achieve a correct result.



Determination of Enterococci Bacteria

Enterococci Test Set (20)

Order Code

778416

Sterile Colitag sample bags (25)

778163

Introduction

Enterolert* DW is designed to detect *Enterococcus* species in drinking water samples. Enterolert DW utilises Ortho-Nitrophenyl-B-D-glucoside as a nutrient indicator and incorporates a specifically designed blue background colour in the formulation. When the substrate is metabolised by enterococci the sample turns from blue to green to indicate a positive detection. Any change from the original colour to green is considered a positive result. No ultraviolet light source is required. Enterolert DW detects enterococci in drinking water sample in 24 hours.

Storage

Store at 2°C–25°C, away from direct light and humidity.

Presence/Absence (P/A) Procedure

- 1) Add contents of one sachet to a 100ml sample in a sterile, transparent, non- fluorescing vessel such as one of the Thio Bags used in the coliform test.
- 2) Seal the Thio Bag and shake until dissolved. A pale blue/turquoise colour will develop.
- 3) Incubate at 41°C +/- 0.5°C for 24 hours.
- 4) Note results according to interpretation below.

Blue/turquoise - Negative for Enterococci

Green – Positive for Enterococci



Portable Incubator User Instructions

Order Code 777930



Technical Data:

Voltage input: 12V DC, 2.5 Amps

Temperature Range: ambient +5°C to maximum 50°C

Contents:

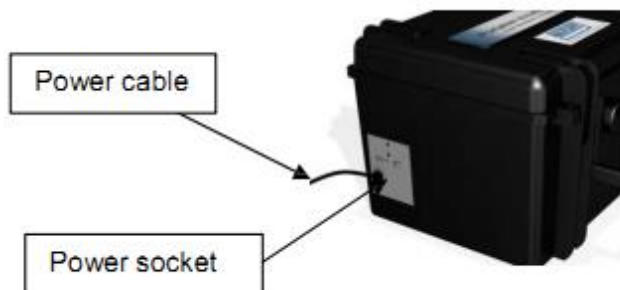
Portable Incubator (Order Code 777930)

External 12V Universal Adaptor

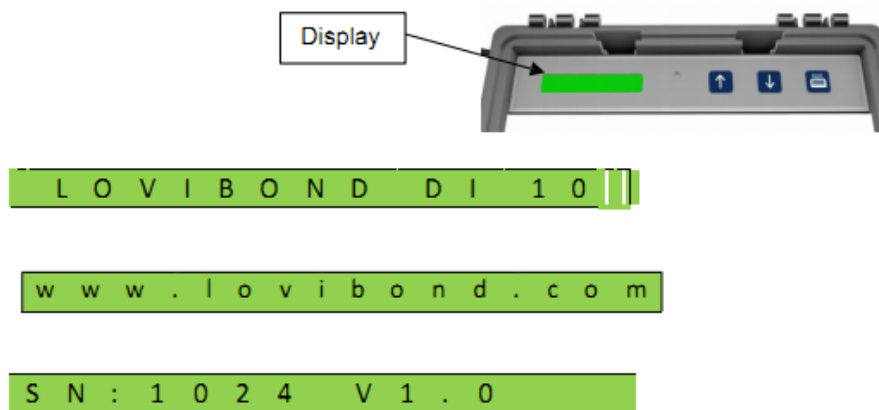
Set of Power Leads for Adaptor (UK, EURO and USA)

Switching On:

To turn the Incubator on, insert the regional power cable to the power socket on the side of the instrument.



When powering on the Incubator, the LCD display will show

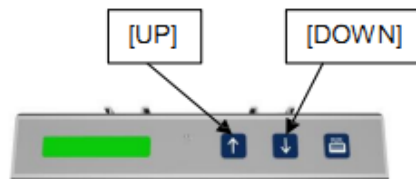


Then the screen will show the current temperature setting:

T e m p : 3 0 ° C

Move between screens by
[UP] and [DOWN] keys to show:

pressing



ELAPSED TIME:

E l a p s e d : 0 0 0 : 1 7

TARGET TEMPERATURE:

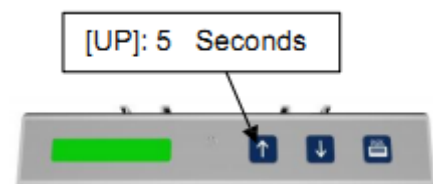
T a r g e t T e m p : 3 5

ALL INFO:

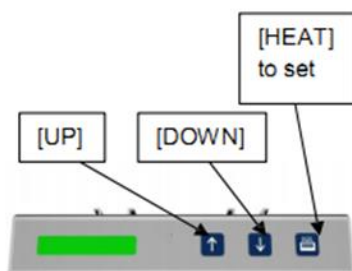
3 0 ° C 0 0 0 : 1 7 3 5 ° C

Setting Target Temperature

To change the Target Temperature,
press [UP] for 5 seconds then release the key, the screen
will change to:



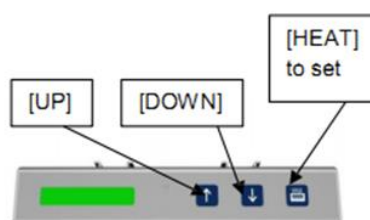
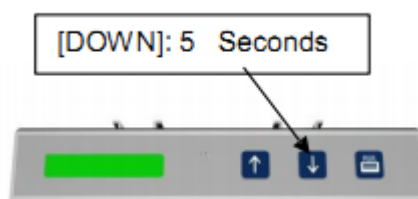
T a r g e t T e m p : 3 5



Press the [UP] and [DOWN] arrow keys
to change the value. The maximum value
is 40°C. Press the [HEAT] key to enter
the value. This value will be stored in the
flash memory and be the default value
when the instrument is switched on.

Setting Incubation Time

To set the Incubation Time, press [DOWN] for 5 seconds then release the key, the screen will change to:

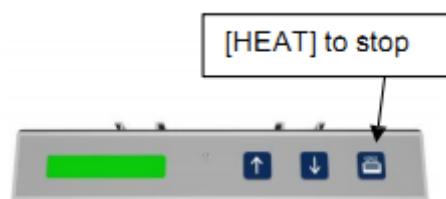


MINUTES : 3 5

Press the [UP] and [DOWN] arrow keys to change the value. Press the [HEAT] key to enter the value. The screen will then change to:

HOURS : 1 5

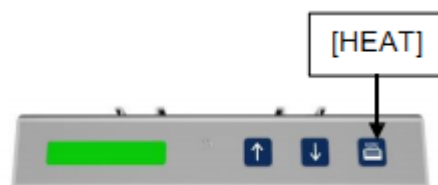
Press the [UP] and [DOWN] arrow keys to change the hours value. Press the [HEAT] key to enter the value



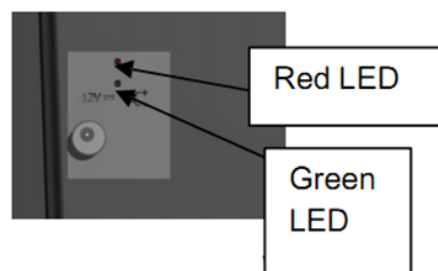
This value will be stored in the flash memory and be the default value when the instrument is switched on. (If this time is set to 0, then heating will continuous until the [HEAT] key is pressed again.)

Starting the Heaters

Press the [HEAT] key to switch on the heaters and circulating fans.

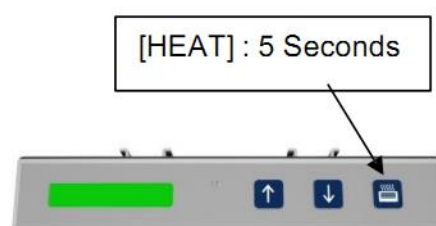


On the side of the instrument, the RED LED will show that the heaters are activated. When the target temperature has been reached, the GREEN LED will come on and the RED LED will switch off. These lights will come on and off to reflect the instrument's heating functions to keep the unit at the required temperature. If both lights stay on, this indicates an ERROR condition and a message will be shown on the display.



Setting the Elapsed Time

Once the unit has reached the required temperature, press the [HEAT] key for 5 seconds and release to view the elapsed time.



Power Down

If the incubation time has been set, then the instrument will power down automatically once this time has elapsed. The unit first switches off the heater and LED lights and after 4mins the fan stops and the unit shuts completely off.

Error Warnings

If there is a power failure while the unit is heating, then an error will be shown when the instrument reboots. Press any key to remove this message.

P O W E R F A I L U R E

If for any reason the instrument resets itself, all heating will be stopped and an error message will be shown for 3 seconds.

E R R O R R E S E T

[illegible]

Spares and Consumables

Description	Tests per kit or unit of supply	Part no.
Potable Water Test Kit (base kit)	25	778419
(Coliforms & EColi, Incubator, UV lamp, Instruction manual and video, safety gloves, safety glasses)		
Replacement Coliform/E.Coli Test Set	25	777932
Total Bacteria Count (order 778413, 778414 and 3 x 778483)		
Total bacteria test plates	40	778413
Dilution pots for HPC test	40	778414
1ml Sterile Syringes (30)	30	778483
Rapid Legionella bacteria test	5	777722
Free and Total Chlorine (individual items)		
Checkit comparator	1	778420
Checkit Test Cell (minimum 2 required)	1	778457
Checkit Free Chlorine Disc (0 to 4ppm)	1	778421
Chlorine DPD No.1 Tablets (Free)	250	777934
Chlorine DPD No.3 Tablets (Total)	250	777935
High Range Chlorine (requires Checkit comparator)		
Checkit High Range Chlorine Disc (10 to 300ppm)	1	778458
Chlorine High Range Tablets	250	777938
Acidifying GP Tablets (Chlorine)	250	777937
pH by comparator (requires checkit comparator)		
Checkit pH Disc (6.5 to 8.4)	1	778422
Phenol Red Tablets (pH)	250	777936
Intestinal Enterococci Kit	20	778416
Sterile Colitag sample bags	25	778163
Turbidity Test Tube	1	778415
Water Colour – 3 parts		
Lovibond 2000 Comparator	1	555565
Water Colour Test Disc	1	778417
40 mm Test Cells	1	778418
Iron and Copper Tests (requires Checkit comparator)		
Checkit Test Cell (minium 2 required)	1	778457
Iron Checkit Disc	1	778644
Iron LR Tablets	100	778645
Copper Checkit Disc	1	778647
Copper No,1 Tablets (100)	100	778646
Plastic stirring rods	10	778648
Portable Incubator	1	777930
UV lamp (for E.coli confirmation)	1	777931
Nitrate Test Strips	100	779058



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