138 Bresle Salt Kit

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User Guide

Elcometer 138

Bresle Kit & Patches

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For the avoidance of doubt, please refer to the original English language version.
Kit Dimensions: 346 x 292 x 84mm (13.6 x 11.5 x 3.3")
Kit Weight: 1.1kg (2lb 7oz)
Material Safety Data Sheets for the Elcometer 138 Standard Calibration Solutions are available to download via our website:
http://www.elcometer.com/images/stories/MSDS/elcometer_138_b771_calibration_solution.pdf
http://www.elcometer.com/images/stories/MSDS/Calibration_Solution_T13827352-1_to_T13827352-3_EU.pdf
http://www.elcometer.com/images/stories/MSDS/Calibration_Solution_T13827352-1_to_T13827352-3_Americas.pdf

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1 OVERVIEW

The Elcometer 138 Bresle Kit and Patches provides all the materials and equipment required to determine the surface chloride contamination level.

Chloride salts are extracted from the surface using the Bresle Patch method and the chloride content of the test solution is measured using a conductivity meter.

These instructions incorporate two test methods:

- ISO 8502-6 / ISO8502-9
- US NAVY PPI 63101-000 (Rev 27)

The Elcometer 138 Bresle Kit and Patches can also be used in accordance with ISO 8502-11; AS 3894.6-A and SSPC Guide 15.

For IMO PSPC[a], the surface salts should be measured and recorded. The Elcometer 138 Bresle Kit and Patches can be used for this.

2 BOX CONTENTS

- Elcometer 135B Bresle Patch, Pack of 25 or;
  Elcometer 135C Bresle Test Patch, Pack of 25
  (depending on kit ordered)
- Elcometer 138 Conductivity Meter & Sensor
- Standard Calibration Solution 1.41 mS/cm; 14ml (0.47 fl oz)
- Moistening Solution; 14ml (0.47 fl oz)
- Bottle of Pure Water; 250ml (8.5 fl oz)
- Syringes, 5ml (0.17 fl oz); x3
- Needles (Blunt); x3
- Plastic Beaker; 30ml (1 fl oz)
- CR2032 Lithium Batteries; x2
- Transit Case
- User Guide

Note: The Elcometer 138 Conductivity Meter included in the test kit measures the conductivity of aqueous solutions. The meter is NOT designed to measure solids, organic solvents, surfactant, oil, adhesive, alcohol, strong acids (pH: 0 to 2) or strong alkalis (pH: 12 to 14). The life of the sensor will be extremely short if these substances are measured.

[a] International Maritime Organisation, Performance Standard for Protective Coatings.

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3 TEST PROCEDURE: ISO 8502-6 / ISO 8502-9

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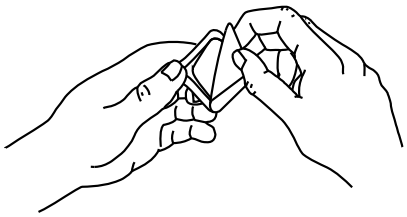
3.1 BEFORE YOU START

1 Calibrate the conductivity meter, see Section 5.5 on page 10.

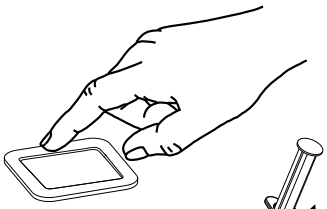
2 As the test is extremely sensitive, clean latex or nitrile gloves should be worn during the extraction of soluble salts to prevent contamination of the surface.

3.2 TEST PROCEDURE

1 Remove the printed protective backing and foam centre from the Bresle patch.



2 Apply the patch to the surface pressing firmly around the perimeter of the patch to ensure a complete seal. If using the Elcometer 135C Bresle Test Patch, remove the protective paper cover.

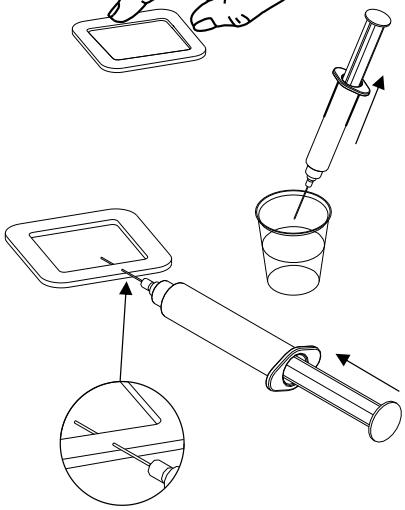


3 Fill a syringe with 3ml of pure water.

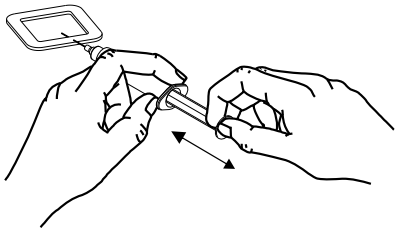
4 Insert the syringe into the patch through the spongy foam perimeter at an angle of approximately 30° to the test surface so that it passes through the foam into the compartment formed by the elastomer film and the test surface. If the patch is positioned in a difficult position bend the needle as required.

5 Inject the pure water into the patch. Do not remove the needle.

- If necessary, any air can be evacuated into the syringe and allowed to stay above the water in the syringe. Take care not to re-insert the air during steps 6 and 7.



6 During a suitable period of time[b], without removing the needle, suck and re-inject the solution at least four times[c].



[b] On un-pitted blast-cleaned areas, a period of 10 minutes has been found to be satisfactory, though this time should be agreed by the interested parties.

[c] During steps 6 and 7, it is essential that no solution is lost. If any solution is lost, the test shall be rejected.

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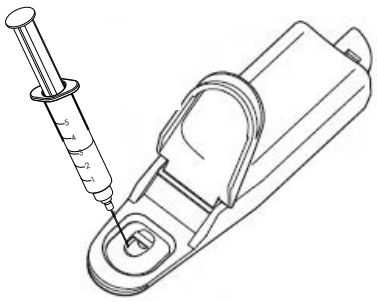
3 TEST PROCEDURE: ISO 8502-6 / ISO 8502-9 (continued)

7 At the end of the period, extract as much solution as possible and remove the syringe from the patch[c].

8 Measure the conductivity of the solution using the Elcometer 138 Conductivity Meter, see Section 5.6 on page 11. Inject the sample directly into the sensor cell. Rinse the sensor cell several times with the solution to be measured before taking the reading.



3.3 AFTER TEST

1 Record the temperature of the solution.

2 Remove the patch from the surface and clean the surface. If required, any adhesive residue from the patch left on the test surface can be removed by wiping with a cloth moistened with a suitable solvent. Ensure that the solvent will not damage the surface before use.

3 Rinse all components of the test kit, other than the patch, in fresh, pure water. The components can then be used again.

3.4 TO CALCULATE THE SURFACE DENSITY OF SALTS

Multiply the reading by one of the following factors:

	Surface Density of Salts: Factors[d]			
	ISO Salt Mix		**IMO PSPC equivalent NaCl**	
Reading	mg/m^2	$\mu g/cm^2$	mg/m^2	$\mu g/cm^2$
µS/cm	x1.2	x0.12	x1.1	x0.11

Note: ISO 8502-9 allows for the measurement of the pure water before testing and then the subtraction of that value from that obtained in section 3.2 step 8 above.

[c] During steps 6 and 7, it is essential that no solution is lost. If any solution is lost, the test shall be rejected.
[d] Based on an area of 12.5cm^2 and a volume of 3ml.

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4 TEST PROCEDURE: US NAVY PPI 63101-000

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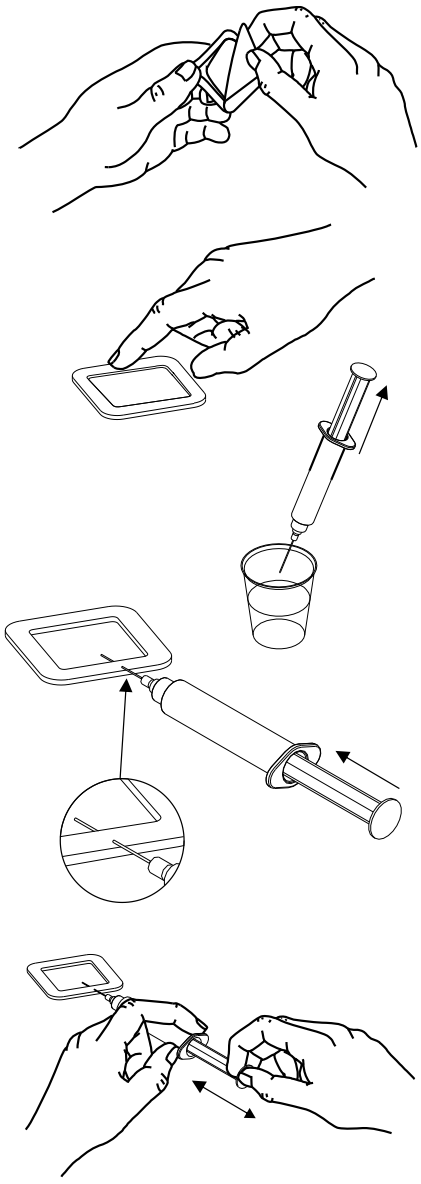
4.1 BEFORE YOU START

1 Calibrate the conductivity meter, see Section 5.5 on page 10.
2 As the test is extremely sensitive, clean latex or nitrile gloves should be worn during the extraction of soluble salts to prevent contamination of the surface.

4.2 TEST PROCEDURE

Measurements are to be made randomly over the prepared surface. Five measurements should be taken every 90m^2 (1000ft^2). Five measurements should be taken for areas less than 90m^2 (1000ft^2).

1 Remove the printed protective backing and foam centre from the Bresle patch.
2 Apply the patch to the surface pressing firmly around the perimeter of the patch to ensure a complete seal. If using the Elcometer 135C Bresle Test Patch, remove the protective paper cover.
3 Fill a syringe with 3ml of pure water.
4 Insert the syringe into the patch through the spongy foam perimeter and inject 1.5ml of pure water into the patch. Do not remove the syringe.
5 With the syringe still in the patch, reposition the needle and evacuate any air in the patch.
6 Once the air has been removed, inject the remaining 1.5ml of pure water.
7 Remove the syringe from the patch.



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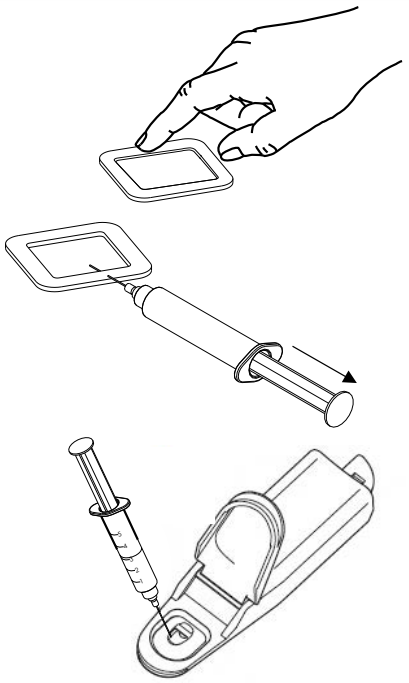
4 TEST PROCEDURE: US NAVY PPI 63101-000 (continued)



8 Rub the surface of the patch gently for 10 to 15 seconds to allow the water to dissolve surface contaminants.

9 Insert the syringe into the patch through the spongy foam perimeter and extract the solution from the patch.

10 Measure the conductivity of the solution using the Elcometer 138 Conductivity Meter, see Section 5.6 on page 11. Inject the sample directly into the sensor cell. Rinse the sensor cell several times with the solution to be measured before taking the reading.

4.3 AFTER TEST

1 Record the temperature of the solution.

2 Remove the patch from the surface and clean the surface. If required, any adhesive residue from the patch left on the test surface can be removed by wiping with a cloth moistened with a suitable solvent. Ensure that the solvent will not damage the surface before use.

3 Rinse all components of the test kit, other than the patch, in fresh, pure water. The components can then be used again.

4.4 PASS / FAIL CRITERIA

For immersed applications, conductivity due to soluble salts (total ionic) shall not exceed 30µS/cm.

For non-immersed applications, conductivity due to soluble salts shall not exceed 70µS/cm.

Note: The charts produced by the US Navy for the calculation of chloride levels are not required for this test method. Please contact Elcometer or your local Elcometer supplier if you require a copy of these charts.

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5 USING THE CONDUCTIVITY METER

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5.1 CAUTION

- Do not drop the conductivity meter.
- Never apply undue force when opening the meter (to change the batteries or sensor).
- Do not exert undue force on the sensor.
- Do not allow utensils (tweezers, pipette, etc) to touch sensor cell.
- Do not measure samples hotter than 40°C (105°F)
- Do not allow contact with solvents.
- Do not subject the conductivity meter to high temperature or humidity.
- Although the product is waterproof, avoid immersing it completely. If the meter is accidentally dropped in water, take it out and remove the moisture.

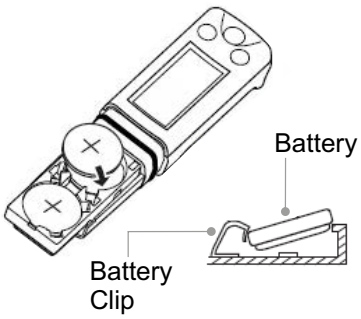
5.2 FITTING THE BATTERIES

The Elcometer 138 Conductivity Meter uses dry cell batteries only. Two CR2032 lithium batteries are supplied in the kit.

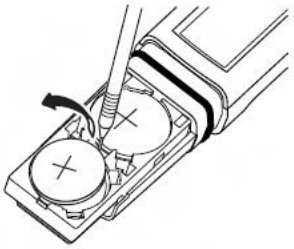
To fit or replace the batteries:

1 Place batteries in battery clips ensuring correct polarity.

2 To reassemble the meter, slide the sensor onto the body of the meter and push the body and sensor together gently until sensor retaining clip engages.



When the battery voltage becomes low, the low battery warning indicator will flash. Replace both batteries immediately.



Note: Lithium batteries must be disposed of carefully to avoid environmental contamination. Please consult your local Environmental Authority for information on disposal in your region. ***Do not dispose of any batteries in fire.***

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5 USING THE CONDUCTIVITY METER (continued)

5.3 CONTROLS AND DISPLAY

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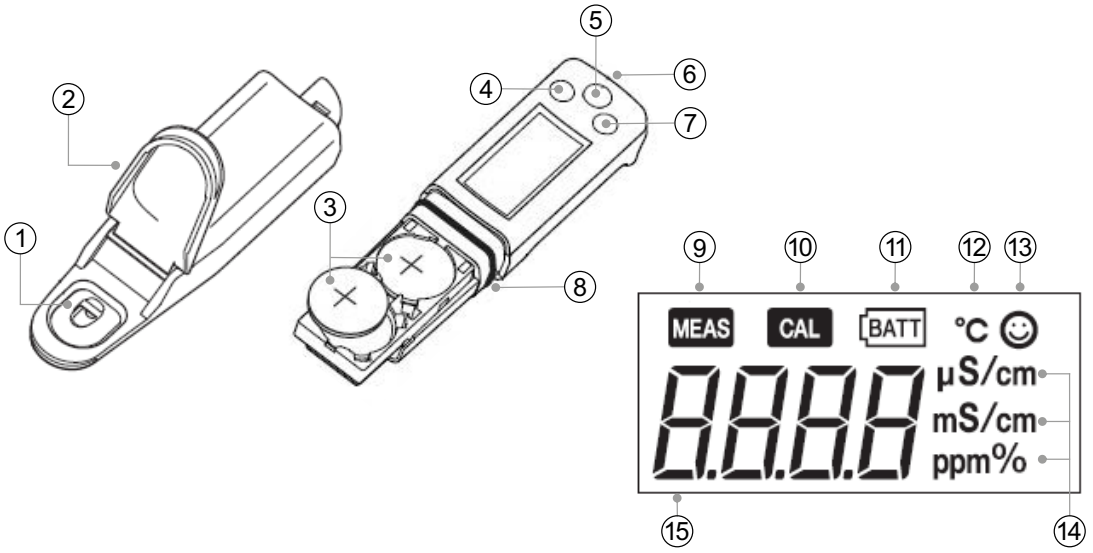
The Elcometer 138 Conductivity Meter is operated using 3 buttons and displays readings and other information on the LCD screen.



GUIDE TO CONDUCTIVITY METER & DISPLAY INDICATORS		
1	Measurement Cell	Place a liquid sample in this cell to measure it with the electrode located on the bottom of the cell.
2	Protection Cover	Protects the measurement cell and flat sensor in storage.
3	Lithium Batteries	CR2032 x 2
4	MEAS Button	Switches the calibration mode to the measurement mode, activates / deactivates the reading locking function in the measurement mode and starts / applies settings in the special setting mode.
5	ON/OFF Button	Turns the meter On / Off.
6	Strap Eyelet	A strap can be attached here.
7	CAL Button	Starts calibration and switches items / settings in the special setting mode.
8	Waterproof Gasket	Makes the meter waterproof.

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5 USING THE CONDUCTIVITY METER (continued)

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GUIDE TO CONDUCTIVITY METER & DISPLAY INDICATORS		
9	MEAS Icon	Flashes until the measured value is stabilised and illuminates steadily when the measured value is settled, while the reading locking function is active.
10	CAL Icon	Flashes during calibration and illuminates steadily when calibration is finished.
11	Battery Alarm Icon	Illuminates when the batteries are low and need to be replaced.
12	Temperature Alarm Icon	Flashes when the measuring environment temperature does not meet the specified operating temperature of 5°C to 40°C (41°F to 105°F).
13	Stability Icon	Illuminates when measured value is stabilised.
14	Measurement Unit Display	A unit symbol illuminates corresponding to the value displayed on the measured value display (15). The default setting is 'S/cm'.
15	Measured Value Display	Displays a measured, set and status value.

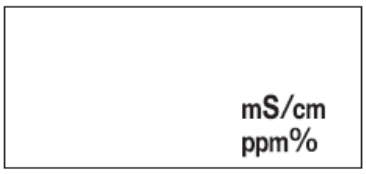
5.4 SETTING THE MEASUREMENT UNITS

1 Press and hold the **MEAS** button for over 3 seconds in the measurement mode to enter the special setting mode. All items appear on the LCD then the display changes as shown.

2 Press the **MEAS** button for 0.5 seconds. The current setting is displayed.

3 Press the **CAL** button for 0.5 seconds to change the setting. Pressing the **CAL** button continuously changes the settings sequentially (see diagram on page 10).

4 Press the **MEAS** button to apply the setting. The instrument returns to measurement mode.



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5 USING THE CONDUCTIVITY METER (continued)

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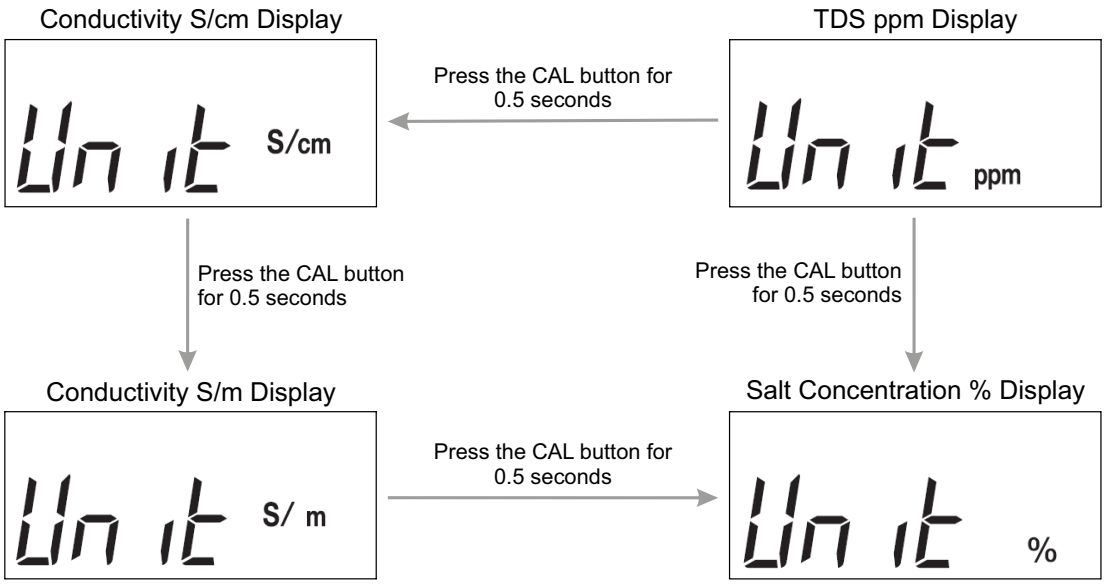
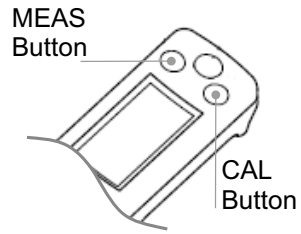


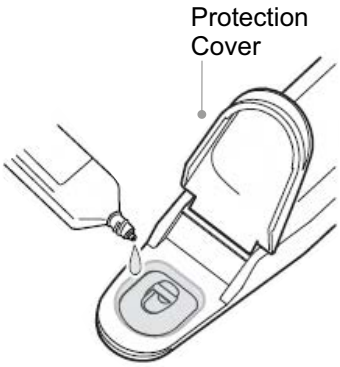
5.5 ONE-POINT CALIBRATION

1 To set 'One-point calibration', switch the meter on, press and hold the **MEAS** button for 3 seconds. Press the **CAL** button until CAL appears.

2 Press the **MEAS** button again for 0.5 seconds and the calibration type will be displayed (1 or 2). Press the **CAL** button to change the setting to 1 as required and press **MEAS** again to apply the setting.

3 Open the protection cover and place some drops of the 1.41mS/cm standard solution into the measurement cell. Washing the sensor with standard solution beforehand may provide more accurate calibration.





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5 USING THE CONDUCTIVITY METER (continued)

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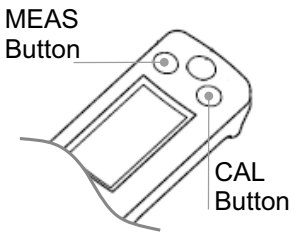
4 Close the protection cover and press the **CAL** button for over 2 seconds. CAL and ☺ flash and the calibration value is displayed. After the calibration is completed, CAL and ☺ stop flashing and illuminate steadily.



5 Clean the sensor with tap water and remove moisture.

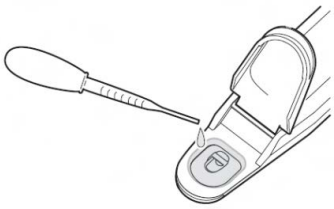
6 Press the **MEAS** button for 0.5 seconds to enter the measurement mode and prepare for measurement.

Note: The Elcometer 138 Conductivity Meter has a two-point calibration mode. For details, see the full Elcometer 138 operating instructions which is available to download via our website. The two-point calibration mode requires two standard solutions.

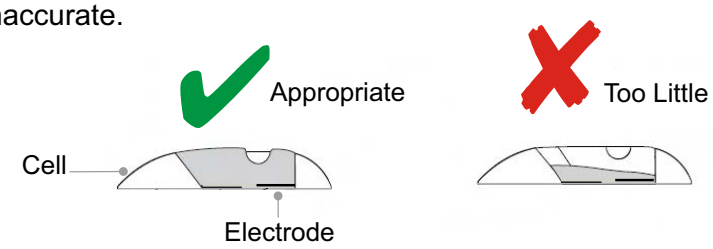
5.6 TAKING A READING

1 Press the ON/OFF button to switch the meter on.

2 Open the protection cover and place drops of the sample on to the sensor.



- Put an appropriate amount of the test sample into the measurement cell avoiding the inclusion of bubbles. Bubbles in the solution may cause the conductivity measurement to be inaccurate.



3 Close the protection cover.

- Ambient air may cause the measurement values to fluctuate. To reduce environmental interference, close the protection cover.

Without using the reading locking function:

4 Read the value displayed when ☺ appears.

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5 USING THE CONDUCTIVITY METER (continued)

When using the reading locking function[e]:

4 After ☺ appears, press the **MEAS** button for 0.5 seconds. The reading locking function is activated. MEAS flashes until the measured value is stabilised. When the measured value is stable, MEAS stops flashing and the displayed value is locked with MEAS and ☺ illuminated steadily.

5 Read the displayed value.

6 Press the **MEAS** button for 0.5 seconds. The reading locking function is deactivated and MEAS disappears.

Note: If a measurement result is out of the specified measurement range, the displayed measured value flashes.

5.7 AFTER MEASUREMENT

1 Press the ON/OFF button to switch the meter off.
2 Wash the sensor with tap water and wipe away any residual water using a clean tissue.
3 Replace the sensor protection cap.

Note: If the meter is to remain unused for a long period of time, use pure water instead of tap water to wash the sensor.

6 CARE & MAINTENANCE

The Elcometer 138 Conductivity Meter is designed to give many years reliable service under normal operating conditions.

- Prolonged periods of non-use may cause the sensor to dry out. This can result in malfunction or unstable readings. Pour moistening solution into the sensor cell and leave for a few minutes to allow the sensor to become saturated. Wash the sensor with water prior to use.
- If the measuring surface of the sensor is contaminated or if air bubbles are regularly present in the sample, clean the sensor using a diluted neutral detergent (diluted 100 times).

[e] When using the reading locking function, deactivate the function before starting every measurement.

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6 CARE & MAINTENANCE (continued)

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- The Elcometer 138 Conductivity Meter incorporates a Liquid Crystal Display. If the display is heated above 50°C (120°F) it may be damaged. This can happen if the conductivity meter is left in a car parked in strong sunlight.
- Always store the components of the Elcometer 138 Bresle Kit and Patches in the carrying case when the kit is not being used.

The Elcometer 138 Conductivity Meter does not contain any user-serviceable components. In the unlikely event of a fault, the meter should be returned to your local Elcometer supplier or directly to Elcometer Limited - contact details can be found on our website, www.elcometer.com. The warranty will be invalidated if the instrument has been opened.

7 TECHNICAL SPECIFICATION

7.1 BRESLE PATCH	
Patch Size	5cm x 5cm
Test Area	12.5cm^2
Sample Volume	3ml

7.2 CONDUCTIVITY METER		
Measurement Principle	2 AC Bipolar Method	
Measurement Mode	Conductivity	
Conductivity Range & Repeatability	0 - 199µS/cm	±5µS/cm
	0.2 - 1.99mS/cm	±0.05mS/cm
	2 - 19.9mS/cm	±0.5mS/cm
Display	Liquid Crystal Display (LCD); 2½ digits	
Measurement Temperature	5°C to 40°C (41°F to 105°F)	
Dimensions	164 x 29 x 20mm (6.5 x 1.1 x 0.79")	
Weight	47g (1.7 oz) - including batteries	
Battery Type	2 x CR2032 lithium	

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8 SPARES & ACCESSORIES

The Elcometer 138 Bresle Kit is complete with all the items required to get started and take measurements however, over the life of the kit, replacements may be required. The following items are available from Elcometer or your local Elcometer supplier.

8.1 ELCOMETER 138 CALIBRATION SOLUTIONS

Description	Part Number
Standard 1.41 mS/cm (1410 µS/cm) Calibration Solution; 6 x 14ml (0.47fl oz) Bottles	T13823926
Standard 12.9 mS/cm (12900 µS/cm) Calibration Solution; 6 x 14ml (0.47fl oz) Bottles	T13824404
Standard 447 µS/cm (0.447 mS/cm) Calibration Solution; 4 x 20ml (0.74fl oz) Single Use Pouches	T13827352-1
Standard 1413 µS/cm (1.413 mS/cm) Calibration Solution; 4 x 20ml (0.74fl oz) Single Use Pouches	T13827352-2
Standard 15000 µS/cm (15 mS/cm) Calibration Solution; 4 x 20ml (0.74fl oz) Single Use Pouches	T13827352-3

8.2 BRESLE PATCHES

Description	Part Number
Elcometer 135B Bresle Patch, Pack of 25	E135----B
Elcometer 135C Bresle Test Patch, Pack of 25	E135----C25
Elcometer 135C Bresle Test Patch, Pack of 100	E135----C100

8.3 MISCELLANEOUS ACCESSORIES

Description	Part Number
Elcometer 138 Conductivity Meter	T13823925
Replacement Sensor for Conductivity Meter	T13823928
Bottle of Pure Water; 250ml (8.5 fl oz)	T13827259
Syringes, 5ml (0.17 fl oz); x3	T13818517
Needles (Blunt); x3	T13818518
Plastic Beaker; 30ml (1 fl oz)	T13818519

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9 LEGAL NOTICES & REGULATORY INFORMATION

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This product meets the Electromagnetic Compatibility Directive.

This product is Class B, Group 1 ISM equipment according to CISPR 11.

Group 1 ISM product: A product in which there are intentionally generated and/or used conductively coupled radio-frequency energy which is necessary for the internal functioning of the equipment itself.

Class B product are suitable for use in domestic establishments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

The Elcometer 138 Bresle Kit and Patches is packed in a cardboard package. Please ensure that this packaging is disposed of in an environmentally sensitive manner. Consult your local Environmental Authority for further guidance.

CAUTION

The needles supplied for use with this kit are blunt, but care must be exercised when using and disposing of these needles to prevent accidental needle stick injuries. It is recommended that used needles be disposed of as special waste, and not in landfill.

If the standard solution used for calibration of the meter comes into contact with the skin, wash the skin with fresh water. If the standard solution comes into contact with eyes, immediately flush the eye with large amounts of fresh water and seek medical advice.