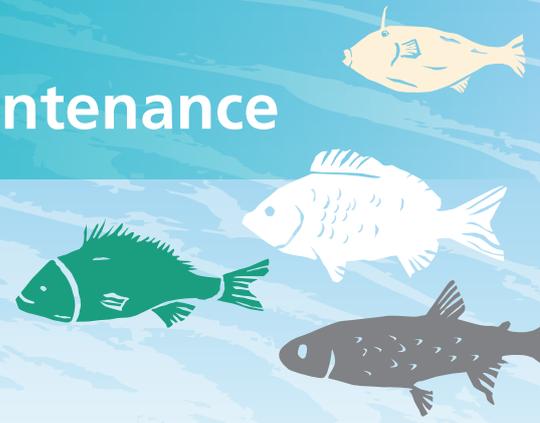


Equipment Inventory and Maintenance



1. Inventory of EstuaryWatch monitoring equipment

To undertake EstuaryWatch monitoring a variety of equipment is needed. Each EstuaryWatch group receives an EstuaryWatch monitoring kit. This kit is stored in two separate boxes at a designated location convenient to the estuary of study. The 'Calibration and Spares' box contains all items necessary for calibration of the electronic meters and any spare equipment you might require. The other 'EstuaryWatch Field Monitoring Kit' box contains everything you will need to take to your EstuaryWatch monitoring sites.

If you are only undertaking mouth condition monitoring this will reduce the amount of equipment required. Items marked with an asterix (*) are required for mouth condition monitoring.

Calibration and Spares Box

- this manual
- mouth condition *, physico-chemical monitoring data sheets
- calibration record sheet
- distilled water container (500ml or 20L for remote groups)
- 0.1M KCL solution container (500ml or 20L for remote groups)
- multi-parameter meter manual
- towel for drying equipment and box
- accident/incident report forms.

EstuaryWatch Field Monitoring Kit

- clipboard for data sheets with laminated photopoint monitoring guide *
- photopoint instruction sheet*
- compass, string and clip attachments *

- berm measurement pole (only required for intermittently open estuaries) *
- grey lead pencil with eraser*
- distilled water bottle
- pH4 and pH7 buffers (100ml containers)
- calibration containers
- spare membranes for YSI probe
- sponge circles for pH meter lid
- remote sampler bottle and pole (nb. too large to fit in box)
- Van Dorn water sampler (nb. too large to fit in box)
- turbidity tube
- bubble wrap for turbidity tube storage
- spare AA or C batteries
- multi-parameter water quality meter (see Meter Set-Up and Calibration section for further information)
- PCS Testr35 pH Meter
- monitoring 'Cheat Sheets' (see Appendix D)
- tape measure
- nylon rope with dive weight attached
- 1L plastic jug
- tide chart
- screwdriver
- emergency phone numbers.
- tissues

To be supplied by individual EstuaryWatch volunteers

- Digital camera *

2. Maintenance

There are two great reasons to ensure that your EstuaryWatch monitoring equipment is maintained and kept in good condition:

1. the equipment is expensive to replace; and
2. careful maintenance and storage of the equipment ensures it operates correctly.

When undertaking EstuaryWatch monitoring equipment can get wet, salty and muddy. However, not surprisingly, electronic monitoring equipment does not cope well if water, salt and mud is not removed before storage. If you follow the maintenance tips outlined below, your kit will last much longer and work more accurately.

Maintenance requirements

Maintaining the EstuaryWatch monitoring equipment is easy. It requires you to be aware of the correct way to store each item and to take an extra five minutes at the end of each monitoring session to check each item and maintain it appropriately.

General

- all equipment should be stored out of sunlight in a dry area
- extremes of temperature should be avoided to maintain calibration solutions integrity
- all equipment and storage boxes should be cleaned and dried inside and out after each monitoring session
- any excess water or mud can be rinsed off with tap water and then dried with a clean, dry towel that is supplied with the kit
- the boxes should be stored with lids off so excess water can escape via evaporation
- make sure that the equipment will not pose a trip hazard to other users of the area when stored.



Figure 1. YSI Model 85 Meter storage method in EstuaryWatch Field Monitoring Kit



Items with specific maintenance requirements

The components of the *Calibration and Spares Box* and *EstuaryWatch Field Monitoring Kit* that require specialised maintenance actions are listed below:

Distilled water bottles, 0.1M KCL solution bottles and pH4 and pH7 buffers.	These should all be stored upright to prevent leaks.
Van Dorn sampler	Dry off any excess water and try to store with the 'ends' not plugged in to the main tube to allow air ventilation.
Turbidity tube	Store outside the field kit box to allow for air drying. Remember to place it back in the box and take it with you next time you monitor.
Weighted rope for depth measurement	Do not store tied up tightly. After use, store outside of the <i>EstuaryWatch Field Monitoring Kit</i> to allow for air drying. Important to remember to place back in and take it with you next time you monitor
pH Meter	<ul style="list-style-type: none"> air bubbles can move into the glass bulb at the probe end of the meter. To remove air bubbles, shake down the electrode in the same manner as a clinical thermometer until the glass bulb is filled with solution store the meter capped the meter is to be stored with a moist sponge in the cap. The sponge should be moist, not dripping. Remoisten it with buffer solution pH 7.00. Never use distilled water on the sponge
Multi-parameter Meter	<ul style="list-style-type: none"> wipe clean with tissues and use a small amount of tap water if necessary (use distilled water for the probes) and dry with a clean, dry towel ensure the cable is cleaned and dried also do not wrap the cable up tightly, rather, gently place un-wound into the box to discourage kinking. if there are any signs of moisture behind the display screen of the meter contact your EstuaryWatch Coordinator promptly Store the YSI Model 85 Meter probe in the hole in the side of the meter (see Figure 1) Store the YSI Model 2030 Meter probe in the storage sleeve (see Figure 2 overleaf) If the YSI Model Pro2030 is to be stored for greater than a month without use, please contact your EstuaryWatch Coordinator as special storage requirements are needed.

Equipment Inventory and Maintenance



Figure 2. YSI Model Pro2030 meter storage method in EstuaryWatch Field Monitoring Kit



Figure 3. Hach HQ40d meter storage method in EstuaryWatch Field Monitoring Kit

Equipment Inventory and Maintenance

Multi-parameter meter set-up and calibration



To undertake EstuaryWatch depth profiling and top/bottom sampling you will need to use electronic water quality meters. There are three different types of multi-parameter water quality meters currently used in the EstuaryWatch program – a YSI Model 85, YSI 2030 and a Hach HQ40d meter. The pH meter used is the PCS Testr35 pH Meter. This section outlines the functionality and calibration techniques for each of these meters.

1. Meter Set-up

YSI Model 85 meter

The YSI Model 85 meter consists of a handheld meter and the oxygen, conductivity, salinity and temperature sensors on a probe that is attached to the meter via cable. Figure 2 below outlines the display functions for this meter.



Figure 1. YSI Model 85 meter

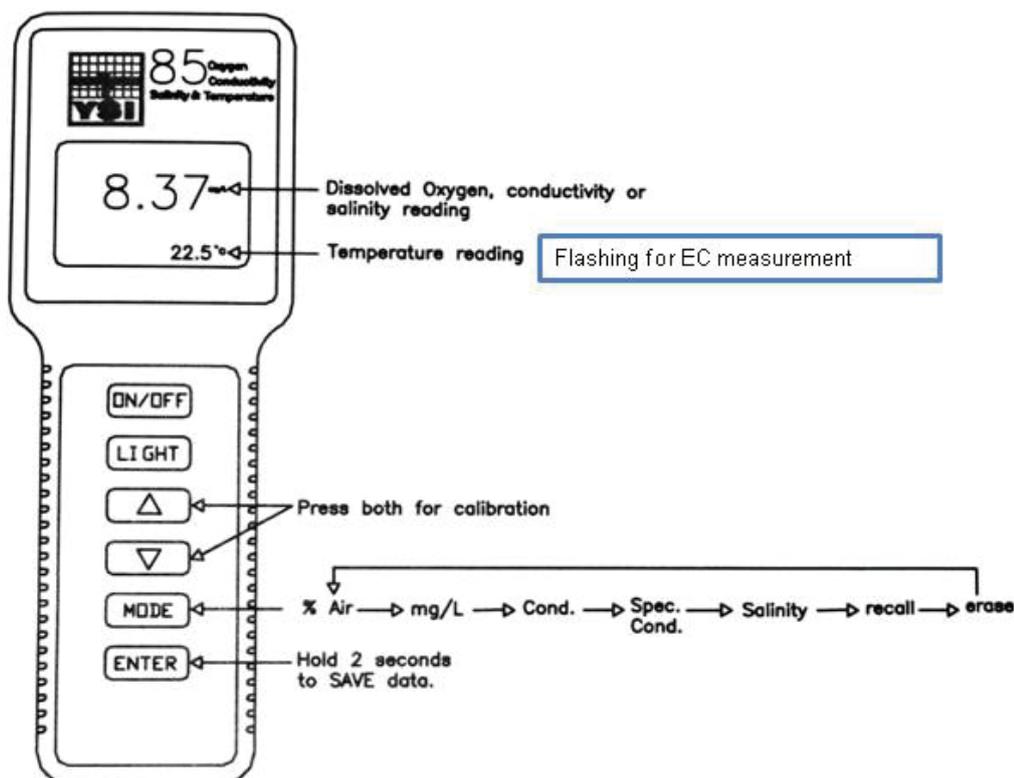


Figure 2. Display functions of YSI Model 85 Meter. Source: YSI Model 85 Manual, 1998 (amended)

Equipment Inventory and Maintenance

Multi-parameter meter set-up and calibration

YSI Pro2030

The YSI Pro2030 meter consists of a handheld meter and a probe with oxygen, conductivity and temperature sensors connected to the meter via cable. Figure 4 below outlines the button functions for this meter.

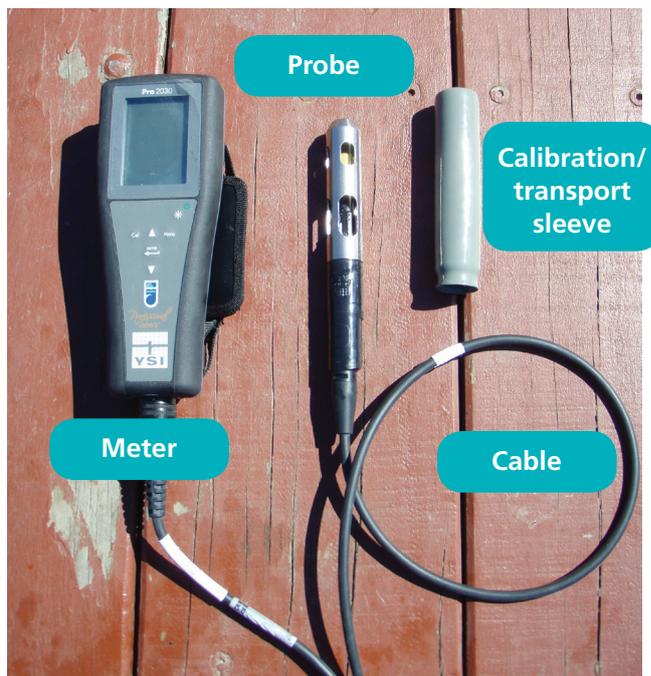


Figure 3. YSI Pro2030 Meter

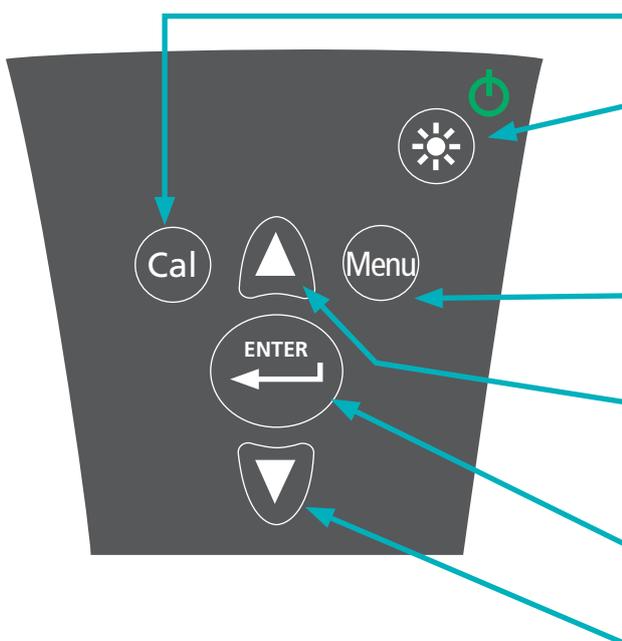


Figure 4. Key functions of the YSI Pro2030 Meter.
Source: YSI Pro2030 Manual, 2010 (amended)

Calibrate

Press and hold for 3 seconds to access the Calibration Screen.

Power and Backlight

Press once to turn meter on. Press a second time to turn the backlight on. Press a third time to turn the backlight off. Press and hold for 3 seconds to turn meter off.

Menu

Use to enter the menu from the monitoring screen.

Up Arrow

Use to navigate through menus, options along the bottom of the monitoring screen and to increase numbers.

Enter

Press to confirm entries and selections.

Down Arrow

Use to navigate through menus, options along the bottom of the monitoring screen and to decrease numbers.



Hach HQ40d meter

The Hach HQ40d meter consists of the HQ40d handheld meter, a conductivity probe, LDO (luminescent dissolved oxygen) probe and their associated leads.

The Hach HQ40d meter incorporates data logging procedures. It is recommended not to use this application of the meter, instead all data should be written on the data sheets provided. Figure 6 below outlines the button functions for this meter.

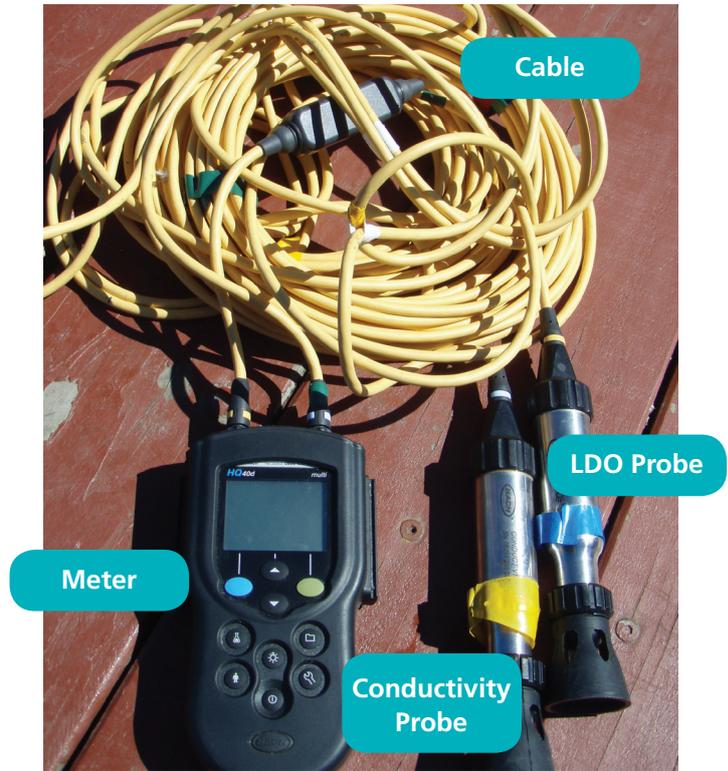


Figure 5. Hach HQ40d Meter

Blue/left Key – allows you to choose from menu functions listed on the display screen above

Sample ID – not used for EstuaryWatch

Backlight

Operator ID – not used for EstuaryWatch

On/Off Key



Green/Right Key – allows you to choose from menu functions listed on the display screen above

Up and Down Keys – allows you to scroll through menu options listed on the display screen above

Data Log – not used for EstuaryWatch

Meter Options and Parameter Methods Key – not used by EstuaryWatch monitors

Figure 6. Button functions of the Hach HQ40d Meter.

Equipment Inventory and Maintenance

Multi-parameter meter set-up and calibration

PCS Testr35 pH meter

The PCS Testr35 pH meter has a sensor capable of measuring pH, temperature and electrical conductivity.

A cap with a sponge insert protects the sensor.

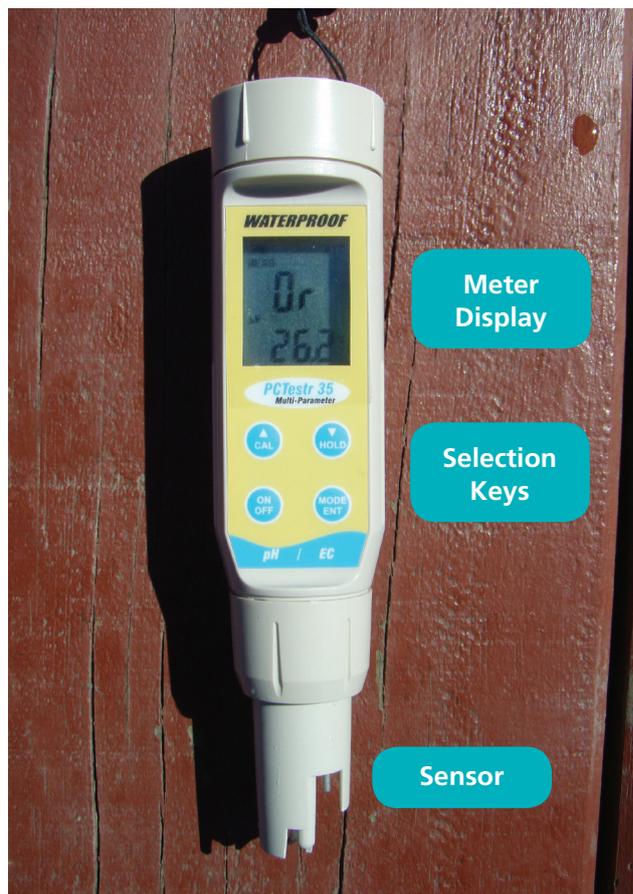


Figure 7. PCS Testr35 pH Meter



2. Calibration

To ensure that data collected as part of EstuaryWatch are credible it is essential that equipment is calibrated accurately. Calibration is a comparison between measurements – one of known magnitude or correctness made or set with one device and another measurement made in as similar a way as possible with a second device. In the case of EstuaryWatch calibration, the device with the known or assigned correctness is called the standard. The second device is the multi-parameter meter or pH meter.

Methods

Location and timing

- Calibration should be undertaken before each monitoring session. Depending on the type of meter you have, you will need to calibrate for electro-conductivity and/or dissolved oxygen and pH.
- Calibration must be undertaken prior to monitoring.
It is best to undertake calibration in a quiet location where you can concentrate and where the temperature is as close to 25°C as possible. This will minimise any temperature compensation error of the meter. Inside at home before you set out for monitoring is ideal.
- Record calibration on the EstuaryWatch calibration record sheet and on your first physico-chemical data sheet and any data sheet after that where calibrations were conducted.

Calibration Solution

The standard solution used for electrical conductivity checks and calibration for EstuaryWatch monitoring is 0.1M KCl (potassium chloride with a conductivity of 12.88mS/cm at 25°C). This standard is harmless and has a salinity consistent with mid-range brackish waters. Should the majority of your estuary samples record consistently higher readings for salinity it may be more appropriate to use a 0.4M KCl (potassium chloride with a conductivity of 47.20mS/cm at 25°C) standard solution (your EstuaryWatch Coordinator will supply you with this if necessary). The following table gives you an understanding of the standard solutions we use for calibration.

Table 1. Electrical conductivity of different water types	
Water type	Expected electrical conductivity readings
Fresh water	0 – 1.9 mS/cm
Brackish	0 – 19.90 mS/cm
Sea water	~ 50 mS/cm

Please refer to the instructions referring to the meter you will be using to understand the calibration process for that meter.

YSI Model 85 meter – page 6

YSI Pro2030 meter – page 10

HQ40d meter – page 14

PCS Testr35 pH meter – page 16

3. YSI Model 85 meter calibration

Equipment

All equipment required for calibration (other than the meter itself) are listed below and can be found in the Calibration and Spares Box for your EstuaryWatch group:

- YSI Model 85 meter and probe (stored in the EstuaryWatch Field Monitoring Kit)
- 0.1M KCL solution
- Distilled water
- Calibration container
- Calibration cheat sheets
- YSI Model 85 Manual (if further information is required).

Procedure

- Before calibrating it is important to check the membrane cap to assess its condition.
- You will first undertake a calibration check of dissolved oxygen and conductivity. This will tell you if the meter is reading correctly (i.e. calibrated) and therefore if you need to do a calibration.
- The electrical conductivity check and calibration (if required) must be done before monitoring. It will not need to be done again for 12 hours, no matter how often the meter is turned on and off.
- Dissolved oxygen should be checked and calibrated if needed at the first site and every time the meter is turned off.
- Once the check and calibration is completed, it must be logged on the calibration sheet which can be found in the Calibration and Spares box. This information should also be entered onto the green physico-chemical data sheet.

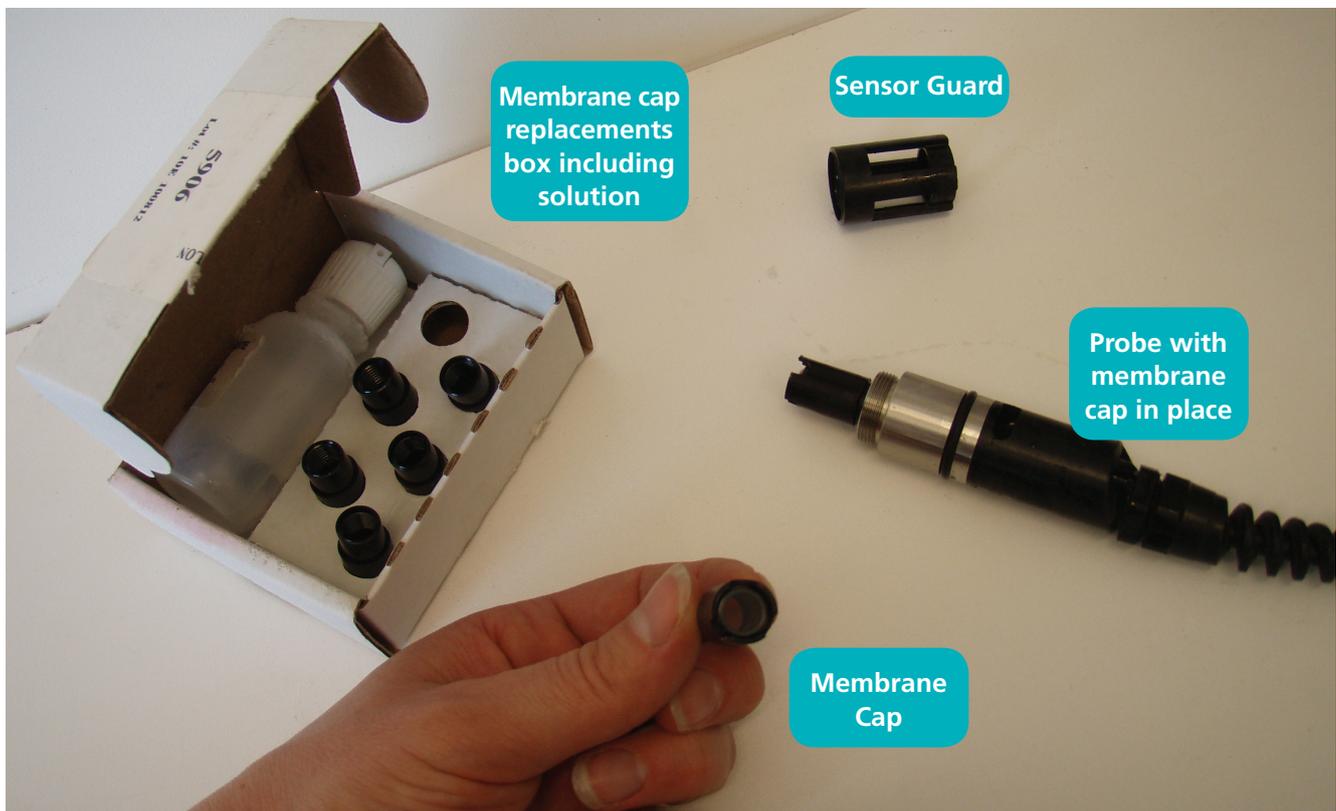


Figure 8. YSI Model 85 Membrane Cap Set-Up

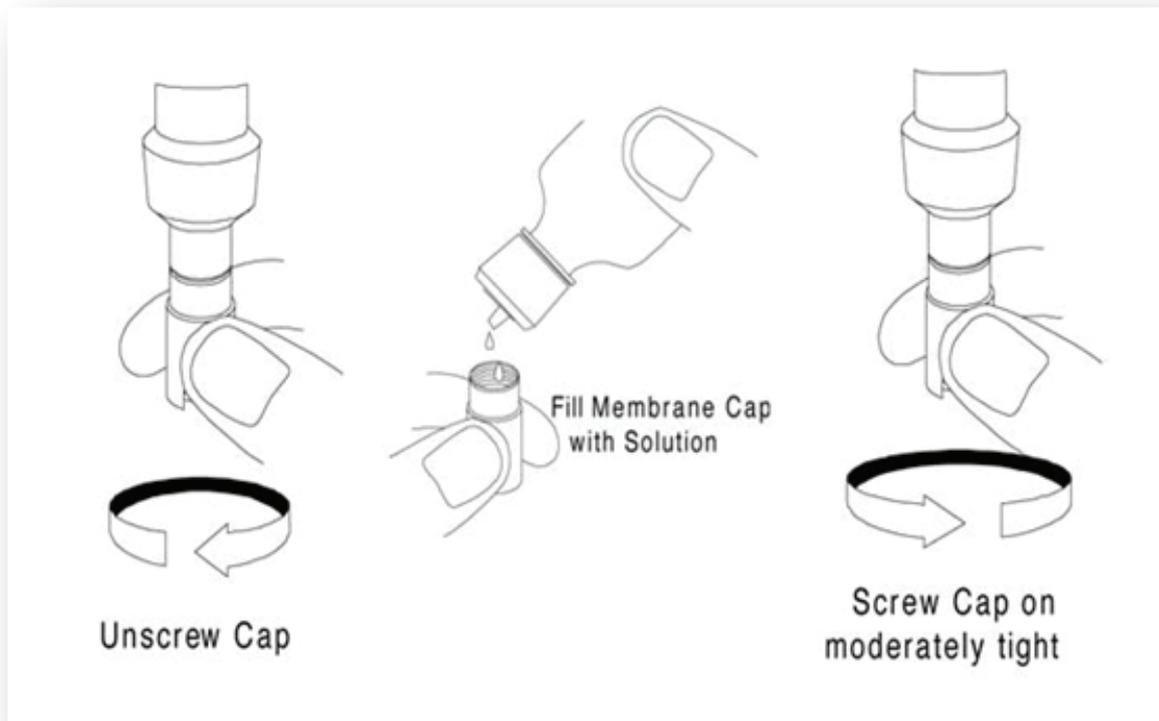


Figure 9. Changing the Membrane Cap in YSI Model 85. Source: YSI Pro2030 Manual, 2010

Membrane Cap Check

Ensure the DO sensor at the end of the probe has a good membrane with electrolyte installed. A good membrane is free of wrinkles, tears, fouling and air bubbles. The sensor guard should always be used over the probe.

The YSI dissolved oxygen probe has a sensor tip that sits in a special oxygen probe solution held in a cap membrane.

If the membrane is cared for carefully, not immersed in bottom sediments and looks clear and tight to the naked eye, the solution and membrane will only need to be replaced approximately every six months. This will be scheduled to occur at the bi-annual QA/QC sessions held for your monitoring group. If the membrane is damaged (e.g. is accidentally immersed in bottom sediments) and needs replacing, follow the instructions below.

Instructions for membrane cap replacement

1. Remove sensor guard to access probe tip.
2. Unscrew and remove old membrane.
3. Thoroughly rinse the sensor tip with distilled water.
4. Fill a new cap membrane with O₂ probe solution (prepare as per instructions on bottle). Be careful not to touch the membrane surface.
5. Lightly tap on the side of the cap membrane to release bubbles that may be trapped.
6. Thread the cap membrane onto the probe. It is normal for a small amount of electrolyte to overflow.
7. Inspect the membrane to make sure there are no bubbles trapped inside. If there is you will need to return to step 4 using the same cap membrane.
8. Replace sensor guard.
9. Rinse and store with a damp sponge in the purpose-built holder.

Equipment Inventory and Maintenance

Multi-parameter meter set-up and calibration

YSI Model 85 meter. Techniques used for electrical conductivity

Electrical Conductivity Calibration Check

1. Rinse the meter probe well with distilled water and shake gently to dry
2. Rinse the calibration container well with distilled water twice
3. Rinse the container three times with a small amount of 0.1M KCl standard solution
4. Fill the container to the neck of the bottle with 0.1MKCl solution
5. Turn the meter on by pressing the ON/OFF button. Press the MODE button on the meter until the conductivity units' mS or μ S show on the right-hand side of the display
6. The electrical conductivity (EC) measurement we need to take is "Specific Conductance". This measurement is temperature compensated and so the °C symbol on the display will be flashing. (An easy way to remember this is if the °C is NOT flashing then it's NOT the setting to use)
7. Insert the probe into the container deep enough that the two holes at the top of the probe (see Figure 10) are completely covered. Do not rest the probe on the bottom of the container – suspend it above the bottom
8. Move the probe vigorously side to side to dislodge any air bubbles from the probe electrode
9. Wait approximately one minute for the reading to stabilise
10. Check the conductivity reading on the probe. The temperature-corrected conductivity of the standard should read **between 12.494 and 13.266 mS/cm** (standard is 12.880mS/cm +/-3%)
11. If the reading is outside this range, the meter will need to be calibrated (keep the probe in the standard solution in the jar for calibration). Details for this are given below and on page 12 of the YSI manual.

Electrical Conductivity Calibration

1. Undertake a conductivity check (directions listed above). If the conductivity reading is outside the set range proceed with salinity/ conductivity calibration;



Figure 10. YSI Model 85 Meter probe inserted correctly into calibration container

2. The meter probe should be in the container filled with 0.1M KCl standard solution and the MODE reading of the meter should be showing mS as the units measured on the right-hand-side of the display;
3. Ensure that the °C units are flashing next to the temperature reading. This indicates that the meter is in specific conductance mode;
4. Use two fingers to press and release both the UP ARROW and DOWN ARROW buttons on the meter at the same time. A black box with CAL in it will appear on the bottom left-hand corner of the meter display to indicate the meter is now in calibration mode;
5. Use the UP ARROW and DOWN ARROW to adjust the reading on the display to read **12.88mS** – then press ENTER;
6. SAVE will flash onto the screen and the meter will return to normal reading mode. The reading should now read 12.88 mS – the calibration is now complete;
7. If the calibration does not work, repeat steps 3 to 6;
8. Rinse the probe in distilled water prior to placing back in the hole on the side of the meter.



YSI Model 85 meter. Techniques used for dissolved oxygen

Dissolved Oxygen Calibration Check

1. Make sure the meter is in the shade. This is important as you are trying to calibrate at a temperature as close as possible to the estuary water temperature you are about to sample.
2. Ensure that the sponge in the probe-holder is damp, but not dripping. To remoisten the sponge, squirt distilled water into the probe-holder cavity and let any excess water drip out.
3. The probe end should be placed into the holder far enough for a good seal around the edge of the probe (see Figure 11).
4. Turn the meter on by pressing the ON/OFF button. Press the MODE button on the meter until it displays dissolved oxygen in %.
5. Wait for the temperature and dissolved oxygen readings to stabilise (usually 5 to 15 minutes is required).
6. The dissolved oxygen should read between **98.5-101.5%** saturation. If the reading is not accurate, the sensor should be calibrated.



Figure 11. YSI Model 85 Meter probe inserted into hole in side of meter for dissolved oxygen check and calibration.

Dissolved Oxygen Calibration

Detailed instructions for this procedure are on page 11 of the YSI Model 85 manual.

1. Undertake a dissolved oxygen check (directions listed above). If the dissolved oxygen reading is outside the set range proceed with the dissolved oxygen calibration.
2. Use two fingers to press and release both the UP ARROW and DOWN ARROW on the meter at the same time.
3. An altitude setting ALT will appear on the meter display – make sure this is set to '0' and press ENTER.
4. A black box with CAL written in it will show on the bottom left-hand side of the meter display. The calibration value of 100% will be displayed in the lower right of the display and the current % reading (before calibration) will be shown on the main display.
5. Wait until the % oxygen reading (large display) is stable (this may take about 5 minutes) and press ENTER.
6. 'SAVE' will appear briefly on the screen before a dissolved oxygen (DO) reading of 100.0%.
7. The calibration is now complete and the meter will return to normal operation mode.

4. YSI Pro2030 meter calibration

Equipment

All equipment required for calibration (other than the meter itself) are listed below and can be found in the Calibration and Spares Box for your EstuaryWatch group:

- YSI Model 2030 meter and probe (stored in the EstuaryWatch Field Monitoring Kit)
- calibration/transport sleeve and its associated sponge
- 0.1M KCL solution
- distilled water
- calibration container
- YSI Pro2030 manual (if further information is required).

Procedure

- Before calibrating it is important to check the membrane cap to assess its condition.
- You will first undertake a calibration check of dissolved oxygen and conductivity. This will tell you if the meter is reading correctly (i.e. calibrated) and therefore if you need to do a calibration;
- The electrical conductivity check and calibration (if required) must be done before monitoring. It will not need to be done again for the next 12 hours, no matter how often the meter is turned on and off;
- Dissolved oxygen should be checked and calibrated (if needed) at the first site and after every time the meter is turned off;
- Once the check and calibration is completed, it must be logged on the Calibration Sheet which can be found in the Calibration and Spares box. This information is also to be entered onto the green physico-chemical data sheet.

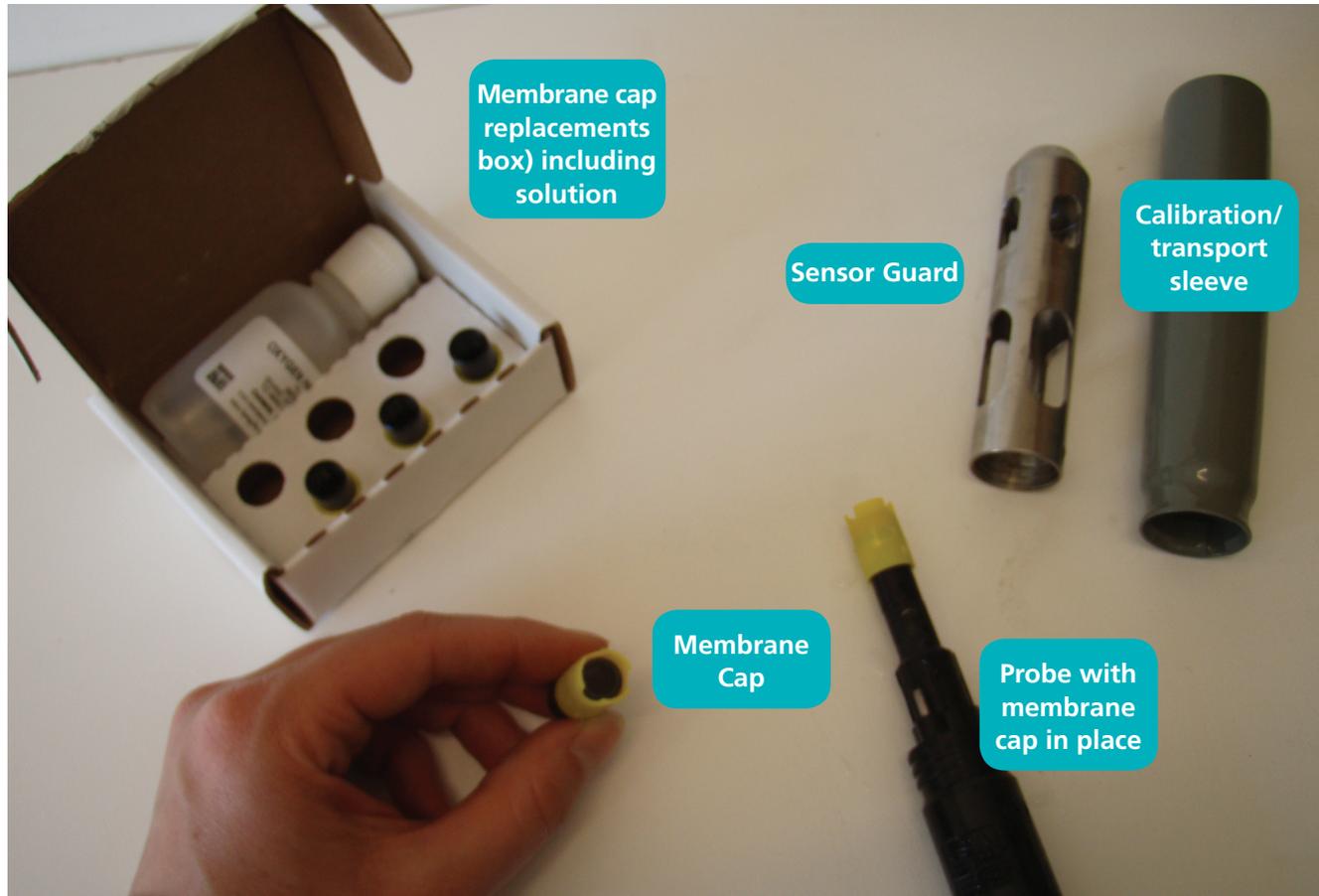


Figure 12. YSI Pro2030 Membrane Cap Set-Up

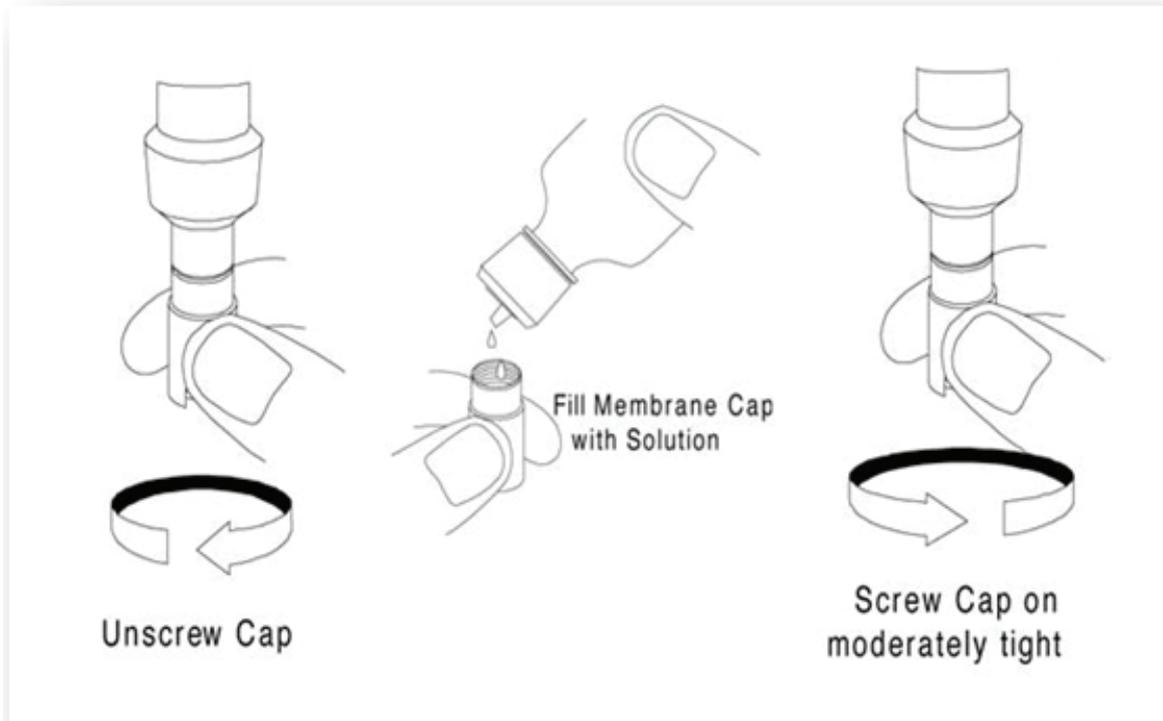


Figure 13. Changing the Membrane Cap on YSI Pro2030. Source: YSI Pro2030 Manual, 2010

Membrane Cap Replacement

Ensure the DO sensor at the end of the probe has a good membrane with electrolyte installed. A good membrane is free of wrinkles, tears, fouling and air bubbles. The sensor guard should always be used over the probe.

The YSI dissolved oxygen probe has a sensor tip that sits in a special oxygen probe solution held in a cap membrane.

If the membrane is cared for carefully, not immersed in bottom sediments and looks clear and tight to the naked eye, the solution and membrane will only need to be replaced approximately every 6 months. This will be scheduled to occur at the bi-annual QA/QC sessions held for your monitoring group. If, the membrane is damaged (eg. is accidentally immersed in bottom sediments) and needs replacing, follow the below instructions.

Instructions for membrane cap replacement

1. Remove sensor guard to access probe tip.
2. Unscrew and remove old membrane and discard.
3. Thoroughly rinse the sensor tip with distilled water.
4. Fill a new membrane cap with the O₂ probe solution (prepare as per instructions on bottle). Be very careful not to touch the membrane surface.
5. Lightly tap on the side of the membrane cap to release bubbles that may be trapped.
6. Thread the membrane cap onto the sensor. It is normal for a small amount of electrolyte to overflow.
7. Inspect the membrane to make sure there are no bubbles trapped inside. If there is you will need to return to step 4 using the same membrane cap.
8. Replace sensor guard.
9. Rinse and store with a damp sponge in the calibration/transport sleeve.

Equipment Inventory and Maintenance

Multi-parameter meter set-up and calibration

YSI Pro 2030. Techniques used for electrical conductivity

Electrical Conductivity Calibration Check

1. Rinse the meter probe well with distilled water. Shake gently to dry.
2. Rinse the calibration container well with distilled water twice.
3. Rinse the container three times with a small amount of 0.1M KCl standard solution (see Figure 14).



Figure 14. Calibration container for the YSI Pro2030

4. Fill the container with 0.1MKCl solution the top line marked on the calibration container.
5. Turn the meter on by pressing the power button if not already on.
6. Take the probe out of its protective sleeve and place the sleeve somewhere clean whilst not in use.
7. Immerse the probe into the KCl solution. The solution must cover the two holes in the conductivity sensor on the probe which are closest to the cable (see Figure 15).
8. Allow the conductivity and temperature readings to stabilise (approximately 10seconds).
9. Check the EC reading on the display. It is denoted as 'spc' next to the mS/cm which refers to specific conductance (conductivity temperature corrected to 25°C). The EC reading should be between **12.494 and 13.266 mS/cm** (standard is 12.880 mS/cm +/- 3%).
10. If the reading is outside this range, the meter will need to be calibrated (keep probe in the standard solution in the calibration container). Details for this are given below.

Electrical Conductivity Calibration

1. Undertake a conductivity check (directions listed above). If the conductivity reading is outside the set range proceed with electrical conductivity calibration.
2. Press the Cal key for three seconds to enter the calibration mode.
3. A screen will display with 2 options, use the arrows to select the 'Conductivity' option (a cross will display in the box beside it). Press Enter.
4. Another screen will display, use the arrows to select the 'Sp. Conductance' option. Press Enter. The electrical conductivity measurement that we need to take is specific conductance.
5. Another screen will display with options for units to measure in. Use the arrows to select 'mS'. Press Enter.
6. **12.880 sp mS/cm** will display on the screen (along with the current temperature). This is the value of the conductivity solution we are calibrating to. Press enter to complete the calibration.



7. 'Cal Successful' will display for a few seconds and then it will return to the monitoring screen.
8. If the calibration is unsuccessful an error message will display on the screen. Repeat the above steps carefully to achieve a successful calibration.
9. Rinse the probe in distilled water prior to placing back in the calibration/transport sleeve.

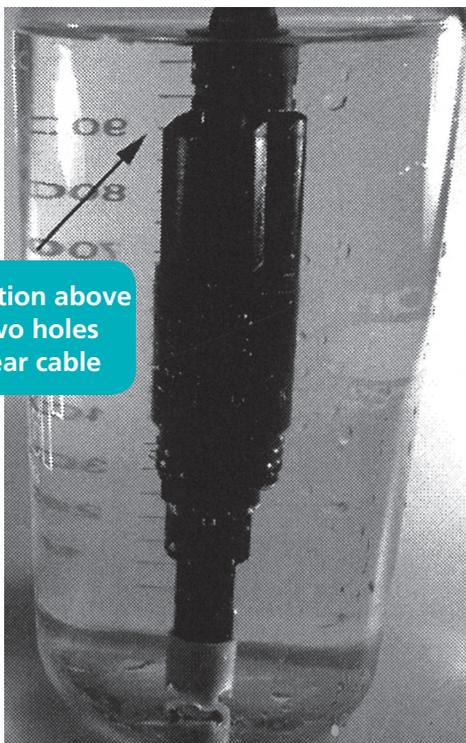


Figure 15. The YSI Pro2030 in a calibration container (without sensor guard) showing the two holes which need to be submerged for conductivity calibration. Source: YSI Pro2030 Manual, 2010

YSI Pro 2030. Techniques used for dissolved oxygen

Dissolved Oxygen Calibration Check

The YSI 2030 calibrates for oxygen using % saturation measurements. When placed inside the Calibration/Transport sleeve a 100% saturated dissolved oxygen environment is created. Follow the steps below to do a calibration check for dissolved oxygen.

1. Ensure the sponge within the calibration/transport sleeve is moist. Ensure the probe is installed snugly in the sleeve.
2. Turn the meter on using the Power button. The monitoring display will automatically come up on the screen. Wait 10 minutes for the dissolved oxygen sensor to stabilise.
3. The dissolved oxygen should read between **98.5-101.5%** saturation. If the reading is outside this range the meter will need to be calibrated as outlined below.

Dissolved Oxygen Calibration

1. Undertake a dissolved oxygen calibration check as outlined above.
2. Press and hold the Cal button for 3 seconds.
3. A screen will display with 2 options, use the arrows to select the 'DO calibration' option (a cross will display in the box beside it). Press Enter.
4. The words 'Calibration Successful' will display on the screen for a few seconds to indicate a successful calibration.
5. The calibration is now complete and the screen will then automatically return to the normal monitoring screen.
6. If the calibration is unsuccessful an error message will display on the screen. Repeat the above steps carefully to achieve a successful calibration.

5. Hach HQ40d meter calibration

Equipment

All equipment required for calibration (other than the meter itself) can be found in the Calibration and Spares Box for your EstuaryWatch group:

- HQ40d meter (stored in the EstuaryWatch Field Monitoring Kit).
- conductivity probe.
- LDO (luminescent dissolved oxygen) probe.
- 0.1M KCl calibration solution.
- calibration container.
- distilled water.
- Hach manual (if extra information required).

Procedure

- Attach probes to meter and screw in clockwise. The meter display should be set to single screen mode using the arrow keys before calibration begins.
- An electrical conductivity check and calibration (if necessary) must be done prior to monitoring.
- As outlined below, the Hach meter does not need to be checked or calibrated for dissolved oxygen readings, unless irregular readings are recorded during a monitoring session. Discuss what an irregular reading might be with your EstuaryWatch Coordinator.
- Once the electrical conductivity check and calibration is completed, information about this must be entered into the calibration sheet which can be found in the Calibration and Spares box and also entered onto the blue physico-chemical data sheet.
- Prior to calibration of electrical conductivity you will undertake a calibration check. This will tell you if the meter is reading correctly (i.e. calibrated) and therefore if you need to do a calibration.

Hach HQ40d. Techniques used electrical conductivity

Electrical Conductivity Calibration Check

1. Rinse a clean container well with distilled water twice.
2. Rinse the container three times with a small amount of 0.1MKCl standard solution.
3. Fill the container enough to cover the sensor on the bottom of the probe.
4. Remove the guard from the conductivity probe by unscrewing the knurled ring and insert the probe into the standard solution.
5. Press the spanner button on the bottom right of the meter.
6. Use the up and down arrows to highlight 'Run Check Standard'. Then press the green button under Select.
7. Use the up and down arrows to highlight 'CDC401 Check Standard' (this selects the conductivity probe). Then press the green button under Select.
8. Press the Green/Right button under Read. This will check the conductivity reading on the probe. The meter is set up to check for a standard of 0.1M KCl and should read **12.880mS/cm +/-3%**.
9. The display will show the value of the check standard and either "Check Standard Passed" or "Check Standard Failed". If it failed the meter will need to be calibrated.
10. Press Green/Right key under Done.
11. If the meter needs to be calibrated, keep the probe in the standard solution in the container. If the check standard passed, replace the guard, ensuring that it is clipped into the notches on the probe and move on to monitoring.



Electrical Conductivity Calibration

1. Ensure the meter is in Single Read mode by pressing the down arrow. CDC401 will be displayed at the top of the screen and $\mu\text{S}/\text{cm}$ or mS/cm will display as units of measure in the middle of the screen (see Figure 16).

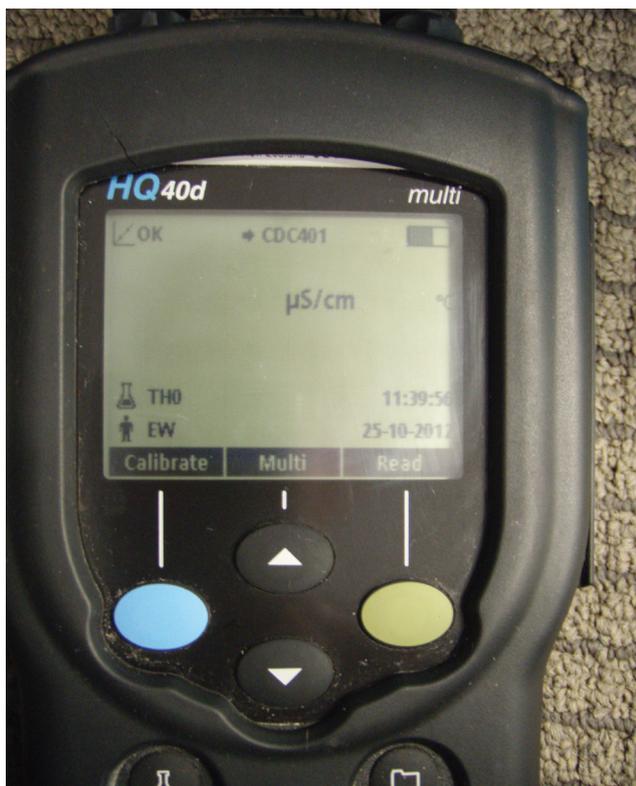


Figure 16. Hach HQ40d Meter in single screen mode for electrical conductivity calibration.

2. Press the Blue/Left key under Calibrate.
3. The display will show the required conductivity standard solution. Rinse the probe and place it in the solution.
4. Press the Green/Right key under Read. The meter will measure the standard and when stable, the display will show the temperature corrected value of the conductivity reading of the standard solution (standard is $12.880\text{mS}/\text{cm} \pm 3\%$).
5. Press the Up key under Done.
6. The Calibration Summary will appear. Press the Green/Right key under Store to accept the calibration and the meter will automatically return to the measurement mode. When the calibration is successful the display will show OK in the upper left corner. A question mark will be displayed if a calibration has expired or a calibration check has failed or is due.
7. Rinse the probe and replace the guard, ensuring that it is clipped into the notches on the probe and move on to monitoring."

Hach HQ40d. Techniques used for Dissolved Oxygen

Dissolved Oxygen Check

The Hach dissolved oxygen probe has a replaceable sensor that uses a luminescent method. Once installed, these sensors require little ongoing maintenance or calibration. The sensors have a limited lifespan and must be replaced once a year. A countdown to replacement will be shown on the meter when there are 30 days or less until the replacement date. Your EstuaryWatch Coordinator will organise for the annual service and maintenance requirements.

6. PCS Testr35 pH meter calibration

Equipment

- PCS Testr35 pH meter
- "USA" 4.01 (pink) calibration buffer solution
- "USA" 7.00 (yellow) calibration buffer solution
- distilled water bottle for rinsing probe
- calibration record sheet
- tissues.

Note: The pH buffers are not harmful, but they have a limited shelf life. The expiry date is on the label (eg. Shelf life 2/2014). Your EstuaryWatch Coordinator will change the pH calibration solutions in your kit approximately every 6 months. It is important to ensure that they are not contaminated through rinsing and drying the probe thoroughly in between using the buffers for calibration. If at any point you are concerned that they have been contaminated contact your EstuaryWatch Coordinator.

Procedure

Calibration for the pH meter is to be undertaken prior to every monitoring trip. It can be carried out at home before the monitoring session. If the meter turns off in between calibration and monitoring, this is not a problem.

Techniques Used

1. Press "ON/OFF" to turn meter on, select pH using the "MODE/ENT" button.
2. Press the "CAL" button to enter calibration mode.
3. Rinse the sensor with distilled water and shake to remove excess water. Pat dry the outside of the meter using the tissues provided making sure not to touch the glass bulb at the tip.

4. Place the sensor into the buffer solution. You MUST calibrate at pH 7 first before proceeding to calibrate at pH 4. The primary display will show the un-calibrated pH value, while the secondary display should search for and lock on the closest automatic calibration value "7.00" or "4.01".
5. Allow the primary display to stabilize, then press "MODE/ENT" to confirm the calibration value. The primary value will blink briefly before the secondary value automatically scrolls thru the remaining pH buffers available for calibration.
6. Repeat steps 3 to 6 with the ph 4 buffer solution.
7. Rinse the probe thoroughly with distilled water, shake well and pat dry with tissue.
8. Press "CAL" to return to measurement mode.

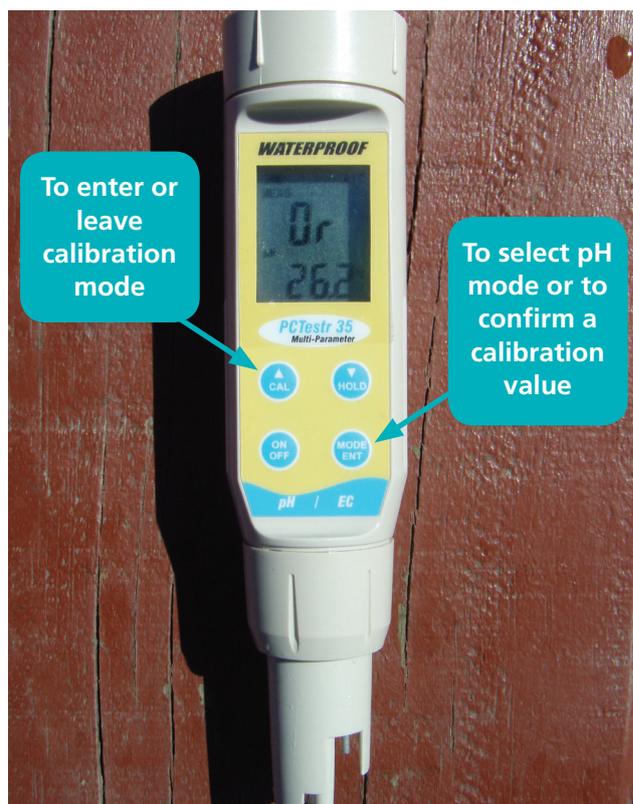


Figure 17. The buttons required for calibration of the PCS Testr35 pH meter. Source: <http://www.4oakton.com> (modified)