YSI Professional Series Water Quality Meter

Instruction Manual

Version 1

Contents

Please see the video associated with this manual for visual demonstrations of the procedures presented in this manual. The video times associated with the different manual sections are as follows:

Introduction

This YSI hand held meter is a piece of monitoring equipment that measures water quality parameters.

What are Parameters?
Parameters are a measurable factor. The sensors are used to collect information about these different parameters. This instrument measures 5 different water quality parameters:

1. Temperature
2. Conductivity
3. pH
4. Oxidation/Reduction Potential (ORP)
5. Dissolved Oxygen (DO)

Properly calibrated sensors that measure different water quality parameters are attached to one end of the meter. The meter is used by submerging its sensors into a lake or river and it collects data from the water. The data are then downloaded to a computer. The meter should be calibrated before each use.

There are some advantages to using a meter over traditional water quality sampling methods like manually collecting samples and sending them to a lab. For example, the meter can collect a lot of data, more frequently, with less effort and at a lower cost than traditional sampling. Of course, there are disadvantages to using a meter as well. The meter can only measure a few key parameters, whereas a water sample that is collected and sent to a lab can be analyzed for a much broader suite of nutrients and contaminants.

Manufacturer name and model number of this meter: YSI Pro Plus

Initial Setup

Battery Installation

- Unscrew the four screws on the back of the YSI instrument
- Remove plastic backing
- Install 2 C size batteries
- Replace plastic backing and screws. Be careful not to overtighten the screws. Overtightening could crack the battery cover and require a new one to be purchased.

*****Note: changing the battery will re-set the date/time. The instrument will maintain date/time for 2 minutes when batteries are out. This is important if you intend to log data.

Basic Functions

- System button will take you to the screen with all of the instruments basic settings
- Use “Esc” whenever you would like to exit the current screen and return to the main screen. Using the left arrow key will take you back to the previous screen instead of to the main screen.
- “Probe” button (also referred to as sensor button) will take you to the sensor menu. Use this button to enable sensors and display units.
- “Cal” or calibration button opens the calibrate menu. Use to calibrate all parameters except temperature.
- File button is used to view data and good laboratory practice (.glp) files, set up site and folder lists, and delete data.

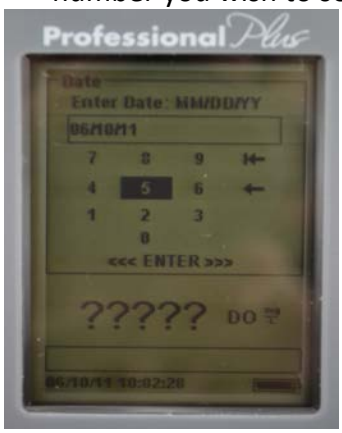
*Note: At any time the “?” button can be pressed to receive tips during operation

Setting the date

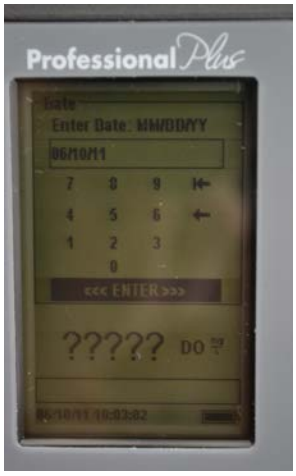
- Press system key
- Use arrow keys to scroll down and Highlight Date/time press “Enter”

- Scroll down to “Date” press “Enter”

- Use arrow keys to press on the numbers for the current day, pressing “Enter” on each number you wish to select



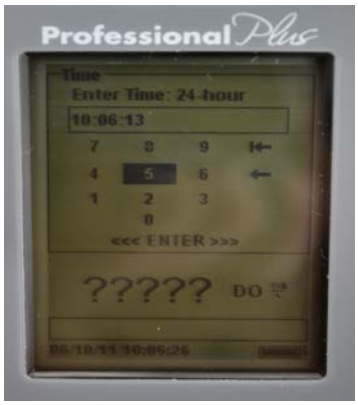
- When finished scroll down with arrow keys until “Enter” is highlighted press “Enter”



Setting the Time

- Use arrow keys to scroll down and highlight “Time” press “Enter”

- Use arrow keys to select numbers for the current time, pressing “Enter” after each number. *Note: Instrument should always be set to Mountain Standard Time.



- When finished scroll down with arrow keys until “ENTER” is highlighted press “Enter”

Setting up (Enabling) Sensors

The four sensors (Conductivity/Temperature, Dissolved Oxygen, pH and Oxidation Reduction Potential or ORP) must be enabled one at a time as follows:

To enable Conductivity/Temperature and Dissolved Oxygen sensors:

- Press the “Probe” key
- Highlight “Set up” with arrow keys and press “Enter”

- Using the arrow keys, highlight “Conductivity” and press “Enter”
- “Enabled” will be highlighted press “Enter” to enable it. There will be a checkmark in the box to show the parameter is enabled.

- Press left arrow key to return to previous screen or “Esc” to the main screen
- Enable the Dissolved Oxygen sensor by repeating the steps above.

The pH sensor will be installed in port ISE1 and the ORP sensor will be installed in port ISE2.

To enable the pH sensor:

- Press the “Probe” key
- Highlight “Set up” with arrow keys and press “Enter”
- Scroll down using the arrow keys to “ISE1” and press “Enter”
- Highlight “pH” and press “Enter”
- Scroll down to “USA” and press “Enter”
- You will now be back to the setup menu and “enabled” will be checked
- Press “Escape” to return to the system menu. The pH sensor is now enabled.

To enable the ORP sensor:

- Press the “Probe” key
- Highlight “Set up” with arrow keys and press “Enter”
- Scroll down using the arrow keys to “ISE2” and press “Enter”
- Use the arrow keys to highlight “ORP” and press “Enter”
- The ORP sensor is now enabled and there should be a checkmark next to ORP

All sensors should now be enabled.
*Note: If a sensor is enabled but isn’t connected to the instrument, the display will show a ??????, or ----- before the units.

<u>Selecting Different Units</u>
You can select which units the different parameters will be reported in (e.g. %, mg/L). You should not need to do this often because we will be using the default units programmed into the meter when you receive it.

- Press the “Probe” button

- Scroll down with arrow keys until “Display” is highlighted, press “Enter”

- Scroll down until the parameter you wish to access is highlighted, press “Enter”

- Another menu will appear, use the arrow keys to select which unit you wish to use. There will be a check mark in the box of any units you have selected to use

*Note: Some parameters can be reported in multiple units (e.g., DO) others (e.g., temperature) cannot.

Installing Sensors

When connecting the sensors to the instrument there are three things to remember.

1. Ensure sensor and sensor port are clean and dry

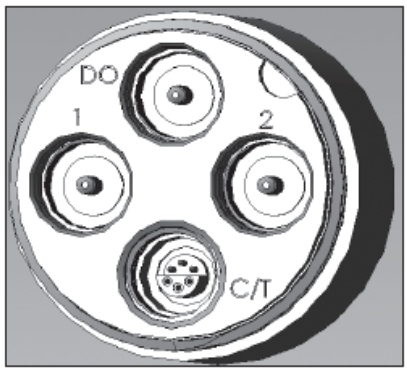
2. Ensure the sensor is properly aligned with the bulk head
3. Ensure to tighten sensors in place enough so that water doesn't get in, but not to over tighten

The Bulkhead

The long cable with the black tube at the end (i.e.,the bulkhead) is where the sensors plug in to.

To install the sensors you will need to unscrew the probe guard to reveal the bulkhead.

There are four ports on the bulkhead with red protectors that will hold four different sensors. They are labelled DO (Dissolved Oxygen), CT (Conductivity/Temperature), 1 and 2.



Below is a table outlining which sensors go into which ports:

Port 1	**Port 2**	**DO**	**CT**
pH	Oxidation Reduction Potential (ORP)	Galvanic Dissolved Oxyen sensor (DO)	Conductivity/ Temperature sensor (CT)

*Note: A sensor must be installed in port 1 for proper operation of port 2.

Connecting Sensors

First, remove the four red protective plugs from the sensor bulkhead. Note: The red protective plugs are for shipping only and cannot be used to protect the port when taking field measurements. These plugs do not provide a water proof seal.

When installing sensors it is best to proceed in the following order: port 1, DO, port 2, CT.

Installing the pH sensor:

- Put on a pair of protective gloves.
- Take the pH sensor out of its box and remove it from the small bottle of electrode storage solution. Use the second white cap (without the hole) to close the bottle of solution.
- Lubricate the sensor O-ring with a small dab of Krytox from the small white tube, just to the point that it is shiny. Do not over-lubricate. If you apply too much o-ring lubricant, use a lens cleaning tissue to remove excess Krytox.

- Push the pH sensor into port 1 on the bulkhead until only one o-ring is visible.
- Twist grey portion of the sensor clockwise to screw in the sensor.
- Finger tighten.

Installing the Dissolved Oxygen Sensor:

*Note: Enable the DO sensor in the instrument program before physically installing the DO sensor into the bulkhead.

- Take the Dissolved Oxygen sensor out of its box.
- Install a cap membrane onto dissolved oxygen sensor as follows:
    1. If this is the first time the sensor is being set up, remove the red cap from the tip of the dissolved oxygen sensor.
    2. Thoroughly rinse the probe tip with distilled or de-ionized water.
    3. Find the membrane kit (YSI 5913). If the galvanic oxygen sensor electrolyte bottle contains powder, fill to neck with distilled water.
    4. Select a new cap membrane from the box and fill it with electrolyte solution from the small bottle. Do not touch the membrane surface!
    5. Gently tap the side of the cap membrane to remove any air bubbles.

6. Screw the cap membrane onto the sensor. It is normal for a small amount of electrolyte solution to overflow during this step.

- Lubricate the sensor O-ring with a small dab of Krytox from the small white tube, just to the point that it is shiny. Do not over-lubricate. If you apply too much o-ring lubricant, use a lens cleaning tissue to remove excess Krytox.
- Install the probe into port 1 of the bulkhead by pushing the sensor into the port until only one O-ring remains visible.
- Twist the grey portion of the sensor clockwise to screw the sensor into place and finger tighten.

Installing the Oxidation Reduction Potential (ORP) sensor:

- Put on a pair of protective gloves.
- Take the ORP sensor out of its box and remove it from the small bottle of electrode storage solution. Use the second white cap (without the hole) to close the bottle of solution.
- Lubricate the sensor O-ring with a small dab of Krytox from the small white tube, just to the point that it is shiny. Do not over-lubricate. If you apply too much o-ring lubricant, use a lens cleaning tissue to remove excess Krytox.
- Push the ORP sensor into port 2 on the bulkhead until only one o-ring is visible.
- Twist grey portion of the sensor clockwise to screw in the sensor.
- Finger tighten.

Installing the Conductivity/Temperature Sensor:

- Take the Conductivity/Temperature Sensor out of its box.
- Lubricate the sensor O-rings with a small dab of Krytox from the small white tube, just to the point that it is shiny. Do not over-lubricate. If you apply too much o-ring lubricant, use a lens cleaning tissue to remove excess Krytox.

- Line up the sensor connector with the connector inside the port. You might have to turn the sensor slightly inside the port to get the alignment correct.
- Once the connectors have met, push the sensor in until you feel it all the way in. It is normal to feel some slight resistance.
- Screw the nut at the base of the sensor clockwise with your fingers. *If the nut is difficult to turn STOP as this could mean its not threading properly. If this happens, unscrew and start again.
- Once the nut is finger tight, use the silver tool to tighten it another ¼ to ½ a turn. *Do not over tighten the nut.

Installing Port Plugs

For any ports that do not have sensors installed, install a port plug. Port Plugs are black plastic screws with two white o-rings. Port plugs protect the electronics inside unused ports from water damage. When connecting port plugs put a thin layer of O-ring lubricant (Krytox) on the o-rings before screwing them in. Finger tighten so that water cannot enter the bulkhead.

Using the Probe Guard

Screw probe guard (black tube with holes) in to protect sensors while sampling

Connecting the Cable to the Instrument

- Line up the slots with the bumps on the end of the cable
- Push together firmly
- Screw the outer metal ring until it is locked into place

Calibration

Calibration is an important process that helps the user ensure that the meter sensors are measuring properly and generating accurate water quality data. We basically have to train the sensors so that they 'know' how to measure the parameters we are interested in. Calibration requires solutions (called standards) with known levels of the chemical parameters we will be measuring. We calibrate one sensor at a time. The meter sensors are immersed in the standards (one standard at a time), and the verified concentration of the chemical that is present is input into the instrument. This way, the instrument can link the signal it is measuring to the proper, known concentration. Then, when the instrument measures an unknown level of the same parameter in the lake or river being studied, it uses the calibration information to calculate the concentration of the chemical in the water. It is very important that the meter be calibrated before each use.

Calibrations of the different parameters measured by this meter can involve using one single standard (a one point calibration) or 2 standards (a 2-point calibration).

Supplies required for calibration

-Calibration cup
-Standard (approximate volume required)
    De-ionized (DI) water
    Conductivity standard (1413 µS/cm =1.413 mS/cm at 25 °C)
    pH 7 standard

pH 10 standard
Zobell's solution
-Thermometer
-Calibration worksheet (located at the end of this section)

Conductivity and Temperature

You will need de-ionized (DI) water and the conductivity standard (1413 µS/cm =1.413 mS/cm at 25 °C)

Step 1) Rinse the sensors and calibration cup once with de-ionized water.

Step 2) Rinse the sensors and calibration cup 3 times with conductivity solution (1413 µS/cm =1.413 mS/cm at 25 °C).

Step 3) Place the sensor into conductivity standard (1413 µS/cm =1.413 mS/cm at 25 °C) in the calibration cup and screw the cup closed. The standard must cover all the holes in the conductivity sensor. Ensure that the entire sensor is submerged and that there are no air bubbles in any of the holes by rotating the sensor gently. The temperature sensor must also be completely submerged in solution.

Step 4) From the main screen, **record the Before Calibration Conductivity Reading** in µS/cm on the calibration worksheet.

Step 5) From the **Calibrate menu** highlight **Conductivity** and press enter.

Step 6) Select **Sp. Conductance** (specific conductance) and press enter.

Step 7) Choose the units **SPC-µS/cm** and press enter

Step 8) Scroll up to highlight **Calibration value** and press enter to **input the value of the conductivity standard at 25 °C in µS/cm (i.e., 1413)**. Use the arrow key until enter is highlighted and press enter. The values of all the sensors will appear on the screen and will change as the readings stabilize.

Step 9) Once the temperature and conductivity readings have stabilized highlight **Accept Calibration** and press enter.

Step 10) You will now be at the main screen. **Record the After Calibration Conductivity Reading** in the after calibration column of the worksheet. Because of temperature effects on conductivity, the post-calibration reading will be different than the input standard value at 25°C (i.e., 1413 µS/cm) if you are calibrating at a different temperature than 25 °C. This is normal.

Step 11) **Record the conductivity cal cell constant** on the calibration worksheet. You can find the conductivity cal cell constant by pushing the **File** button, highlighting **View GLP** and pressing enter. You will see a screen called Calibrate: conductivity or Calibrate: (some other parameter). Press the down arrow until you reach Calibrate: conductivity. Press the down arrow until you can see the **Cal Cell Constant**. **Record this Cal Cell Constant on the calibration sheet**. It should fall between 4.55 - 5.45 and not vary from the historical value more than 0.1 (look back at previous calibration sheets to determine the historical value). If it doesn't meet these criteria, the calibration standard may be off!! Try another bottle of calibration standard. A dirty conductivity sensor can also lead to bad calibrations. Use soapy water along with the conductivity brush to properly clean the sensor .If the cell constant is still off, the sensor might need to be replaced.

Step 12) **Record the temperature value in °C** from the meter on the calibration worksheet.

Step 13) Remove the calibration cup cap and add a thermometer to the solution and allow the reading to stabilize. **Record the value from the thermometer in °C** on the calibration worksheet. The instrument and thermometer readings should be less than 2°C apart.

Step 14) Rinse all the sensors and cup thoroughly with DI water before calibrating the next parameter.

Dissolved Oxygen

You will need de-ionized (DI) water

Step 1) Add a few mL of de-ionized water and the sponge to the clean calibration cup.

Step 2) Make sure there are no water droplets on the dissolved oxygen sensor membrane or on the temperature sensor. Do not touch the dissolved oxygen sensor membrane.

Step 3) Screw the calibration cup onto the bulkhead, engaging a few threads so air can diffuse into calibration cup. Do not tighten the cup completely onto the bulkhead. **Be sure the dissolved oxygen and temperature sensors are not submerged in water.**

Step 4) Wait 5 to 15 minutes until the air in the storage container has completely saturated with water. When the reading is stable, **record the Before Calibration Dissolved Oxygen Reading in mg/L and in %** on the calibration worksheet.

Step 5) Press the **Cal** button

Step 6) Use the arrow keys to highlight **DO**, press enter

Step 7) Highlight **DO%L** (L stands for Local), press enter

Step 8) When the reading is stable, highlight **Accept Calibration** and press enter. The reading should now be very close to 100%.

Step 9) You should now be back at the main screen. **Record the After Calibration Dissolved Oxygen Reading in mg/L and %** on the calibration worksheet.

Step 10) **Record the barometric pressure (in mmHg)** on the calibration worksheet.

Step 11) Empty the calibration cup and rinse with DI water.

pH

You will need de-ionized (DI) water, pH 7 standard, and pH 10 standard

*Note: pH requires a 2-point calibration

Step 1) Rinse the sensors and calibration cup once with de-ionized water and 3 times with pH 7 standard.

Step 2) Pour enough pH 7 standard into the calibration cup to immerse the pH bulb and the temperature sensor.

Step 3) Press the **Cal** button

Step 4) Highlight **ISE1 pH**, press enter.

Step 5) The message line at the bottom of the screen will show the instrument is **ready for point 1**.

Step 6) The instrument will automatically recognize the standard value and will display it at the top of the screen.

Step 7) Once the pH and temperature readings stabilize, **record the Before Calibration pH Reading in pH units** on the calibration worksheet. This value will display under **actual readings**.

Step 8) Highlight **Accept Calibration** and press enter to accept the first calibration point.

Step 9) **Record the After Calibration pH Reading in pH units** and the **After Calibration pH millivolts** on the calibration sheet. The pH millivolts value should be between -50 mV and +50 mV.

Step 10) Remove the calibration cup from the bulkhead and dispose of the pH 7 standard. Rinse the sensors and calibration cup 1 time with water and 3 times with pH 10 standard.

Step 11) Pour enough pH 10 standard into the calibration cup to immerse the pH bulb and the temperature sensor.

Step 12) Once the pH and temperature readings stabilize, **record the Before Calibration pH Reading in pH units** on the calibration worksheet. This value will display under **actual readings**.

Step 13) The instrument will automatically recognize the standard value and will display it at the top of the screen.

Step 14) Highlight **Accept Calibration** and press enter to accept the second calibration point.

Step 15) **Record After Calibration pH Reading in pH units** and the **post-calibration pH millivolts** on the calibration sheet. This pH millivolt value should be should be between 165 mV and 180 mV *below the pH 7 mV reading*. If this is not the case, this could mean the probe needs to be cleaned. Clean the probe according to the manufacturer's recommendations (see section on page 25 of this manual on sensor maintenance and cleaning) and then recalibrate. If the pH millivolt reading is still not within the range specified above, the reference solution inside the probe might be too old. The sensor may need further maintenance or to be replaced. The lifespan of reference solution inside pH sensors is only 1.5-2 years.

Step 16) Remove the calibration cup from the bulkhead and dispose of the pH 10 standard. Rinse the sensors and calibration cup 3 times with de-ionized water.

Step 17) If you have a third pH standard (i.e., pH 4), follow the directions above to accept a third calibration point. Otherwise, press the Cal button to finish the pH calibration.

Oxidation Reduction Potential (ORP)

You will need de-ionized (DI) water and Zobell's solution

*Note: Calibrate ORP *after* successfully calibrating pH

Step 1) Prepare the Zobell calibration solution according to the instructions on the bottle: Open the bottle and add 125 mL of de-ionized water to the dry powder. The solution has a shelf life of 6 months once mixed.

Step 2) Rinse the sensors with a small amount of the Zobell solution.

Step 3) Pour the Zobell solution into the calibration cup and immerse the pH, ORP and temperature probes in the solution.

Step 4) Once the ORP reading stabilizes, **record the Before Calibration ORP Reading in millivolts** on the calibration worksheet.

Step 5) Press the **Cal** button

Step 6) Select **ISE2 ORP**, press enter.

Step 7) The instrument will automatically recognize the standard and will display the value (in millivolts) at the top of the screen. Check the recognized value against the following table to ensure that it makes sense:

TEMPERATURE, CELSIUS	ZOBELL SOLUTION VALUE, MV
-5	270.0
0	263.5
5	257.0
10	250.5
15	244.0
20	237.5
25	231.0
30	224.5
35	218.0
40	211.5
45	205.0
50	198.5

Step 8) Highlight **Accept Calibration** and press enter.

Step 9) **Record the After Calibration ORP Reading in millivolts** on the calibration sheet.

Calibration Sheet

Date/Time	
Checked by	
Time since last calibration	
Meter ID	
Location	

Parameter	Standard Used	Before Calibration Reading		After Calibration Reading
Temperature (ºC) (meter)	meter		Calibrate	
Temperature (ºC) (thermometer reading)	thermometer			
Barometric Pressure (mmHg)	from meter			
Specific Conductance (µS/cm)	0			
	1413			
Dissolved Oxygen	%			
	mg/L			
pH	4			
	7			
	10			
Oxidation Reduction Potential (ORP)	Zobells			

Comments

YSI DETAILS **VERY IMPORTANT TO FILL THIS CHART IN!!**

parameter	value	acceptable range
Conductivity Cal Cell Constant		5.0 ± 0.45 & not more than ±0.1 from historical value
pH mV buffer 7		0 MV ±50
pH mV buffer 10		-177 from pH 7 mV
span b/w pH4-7 mV		165 to 180 mV
span b/w pH7-10 mV		-165 to -180 mV

Maintenance Record

Sensor	Completed (Y, N, N/A)	Task
Batteries changed		If not, battery voltage: _____

Storing Data

We will be storing data in site. Use the name of the area you are sampling data from to “name” your site.

To set up the instrument to store data:

- Turn on instrument so that it is on the main screen
- Place probe into sample
- Move the probe around in the water until the readings stabilize and to release any air bubbles
- “Log One Sample” will be highlighted on your instrument, press “Enter”

- Use arrow key to scroll down until “Site” is highlighted, press “Enter” on whichever place you wish to store your data
- Use arrow keys to scroll down to “Add New”, press “Enter”

- Use arrow keys to spell out the name of your site, press “Enter” after each letter is selected

- When finished use arrow keys to scroll down to “ENTER”, press “Enter”

*Note: Use the keypad to make a new site name, this option will not come up if Site list is disabled in the System menu

- Use arrow keys to select name of site you wish to log data in, press “Enter”

- Use the arrow keys to scroll down until “Log Now” is highlighted, press “Enter”

- The instrument will confirm the data is being logged

Logging data at specific intervals

- Press the “System” button
- Use the arrow keys to scroll down until “Logging” is highlighted, press “Enter”

- Highlight “Continuous Mode” to enable it, press “Enter” There will be a checkmark in the box to show continuous mode enabled

- Use arrow keys to scroll down to “Interval” is highlighted, press “Enter”

- Use the arrow keys to select the timings, pressing “Enter” after each number is selected

- Use the arrow keys to scroll down until “ENTER” is highlighted, press “Enter”

- Press the “Esc” button to take you back to the main screen
- When your back on the main screen “Log One Sample” will be changed to “Start Logging” according to the time interval you have selected, press “Enter” to begin logging data

- Once on a continuous log the box will change to “Stop Logging”
- When finished press “Enter” to stop the instrument from collecting data

The Autostable Function

This meter has a function called autostable that will alert you when a parameter’s reading is stable and ready to measure. You will want autostable to be “on” for each parameter that you are measuring. For example, to turn on the autostable function on for pH:

- Press the probe button
- Scroll down to Autostable and press enter
- Scroll down to ISE1pH and press enter
- You will now be at a screen where “enable” will either be checked or not checked. If it is not checked, press enter to check the box and turn on the autostable function for pH.
- Press escape
- Repeat this procedure for the DO, ORP and Conductivity/Temperature sensors.
- The DO and Conductivity/Temperature sensors will keep the autostable function setting once enabled. However, the pH and ORP sensors must be enabled each time the instrument is turned off and back on.

Taking Measurements

Before taking measurements ensure all of ports have a calibrated sensor or a sensor plug installed, as without these, the connections are not waterproof
Ensure that the probe guard is installed when taking measurements

To collect the most accurate readings each sensor has a few different things to do while taking measurements.

Dissolved Oxygen

- Place probe into the sample, give a shake to release any air bubbles
- Allow temperature readings to stabilize
- Stir the probe in a 6 inch circle per a second
- Once values plateau and stabilize, record this measurement
- The DO reading will drop over time if stirring is ceased

When taking a DO sample in fast flowing water, place the probe with the flow of water.

If taking a DO sample in an aeration tank/basin, point probe upwards so it's facing the sky. This is so air bubbles don't burst directly on the sensor, causing a flaw in the measurement.

Conductivity/Temperature

Place probe into the sample, give a shake to release any air bubbles

pH/ORP

These readings should happen quickly, if it starts taking too long the sensor will most likely need cleaning.

Maintenance and Storage

It is important to maintain the O-rings so that water does not leak into the sensor ports or battery compartment. Inspect the O-rings every time you use the meter for dirt, damage, or if they are missing. If the O-rings are okay they should always be lightly greased.

Replacing O-rings

- Use tweezers or a similar tool to remove the O-ring from its groove. Be careful if using objects like screwdrivers when removing the o-ring. Damage to the plastic channel where the o-ring seats will cause a leak path.
- Clean the O-ring groove for any excess dirt or lubricant, if dirty clean with a lens cleaning tissue
- Inspect the new O-ring for any cracks, nicks or imperfections
- When installing new O-rings ensure that your hands and work area is clean. This is so no damage or dirt can affect the O-ring while installing. Any amount of dirt can cause a leak.
- Apply a very small amount of O-ring lubricant to your thumb and index finger
- Use this grease to lightly cover the O-ring
- Place the O-ring into its grove making sure that it does not roll or twist
- Use the leftover grease on your fingers to go over the outside of the O-ring surface

Note: It is very important that no moisture, grease, or foreign material are allowed to contaminate the electrical connection of the probe during maintenance, calibration, and cleaning.

Cleaning Sensor Ports

Always make sure the ports are clean and dry. If there is dirt in them use compressed air to clean them.

Cleaning Sensors

Over time the **conductivity/temperature** sensor will need to be cleaned. Use the conductivity cleaning brush and a mild detergent to maintain accuracy of the readings.

Conductivity Cleaning Brush

The **dissolved oxygen** membrane cap will need to be re-placed over time. The membrane should be changed if a). Bubbles are visible under the membrane b). Significant deposits of dried electrolyte are visible on the membrane c). If the sensor readings don't stabilize

While replacing the membrane, examine the silver tip and shaft of the sensor to see if they are dull in colour. If they are, they will need to be sanded down with the circle sanding disc that was included with the membrane kit. Only sand if it really needs it, you may not need to every time you change the membrane.

Remember to keep the sensor port clean and dry!!

When sanding the silver tip follow these few simple steps:

- Dry the sensor tip completely with a lens cleaning tissue
- Wet the sanding disk with a small amount of water and place it in the palm of your hand
- Place the sensor tip directly on the sanding disk on the palm of your hand
- Twist it in a circular motion three or four times to sand, the gold should have a matte finish

*The goal is to sand off any build-up and to lightly scratch the surface

- Rinse thoroughly and wipe with a wet paper towel before putting on a new membrane

When sanding the shaft follow these few simple steps:

- Wet sanding disc with a small amount of clean water
- Gently wrap it around the sensor shaft
- Twist it a few times to lightly sand

*The goal is to simply sand off any build-up without scratching or removing layers of the sensor itself

- Rinse the sensor shaft with clean water and wipe with a lens cleaning tissue to remove any dirt that has been left behind.
- Finish off with rinsing the sensor tip with de-ionized water

The **pH/ORP** sensor has glass bulbs that are very thin and are easily broken if any pressure is exterted on them. The best way to clean them is by soaking them in a 1:1 bleach/water solution for 10 - 20 minutes and then rinsing thoroughly in tap water if necessary. If the pH/ORP response must be restored refer to the YSI Professional Plus user manual for more detailed information.

*Note: Refer to Page 58-68 in the YSI Professional Plus User Manual for more detailed Care, Maintenance and Storage instructions

Sensor Storage

Short Term Storage

When not in use, the cable comes with a grey rubber sleeve that goes over the probe guard. Put the sponge and a cap full of water into it to maintain a moist air environment. This is for short term storage (less than a month).

Long Term Storage

It is important when storing any of the sensors that they do not freeze while in storage. This will damage them.

Conductivity/Temperature

No special storage required, can be stored dry or wet. Just make sure the sensor is cleaned with the provided brush before and after storing for a long period of time.

Dissolved Oxygen

This sensor should be stored in a dry state for long term storage. 1). remove the membrane cap and thoroughly rinse with clean water. 2). Blow it dry with compressed air or allow to air dry completely. 3). Install a new membrane cap (without electrolyte) over the sensor to keep it dry and to protect the electrodes.

After storing the sensor for a long time it is important to "condition" the sensor by putting a new membrane with electrolyte solution on the sensor and then turning the meter on to allow the sensor time to stabilize.

pH

It's always important to make sure this sensor does not dry out for both short term and long term storage. Remove the sensor from the bulk head and seal the vacant sensor port. Fill the original shipping bottle with buffer 4 solution and then submerge the sensor into the solution. The sensor will remain in this solution during storage so it is important to ensure it is sealed on properly so the solution doesn't evaporate or leak. The pH sensor is only good for 1.5-2 years with proper storage.

ORP

Remove the sensor from the bulkhead and seal off the sensor port. Fill the original shipping bottle with buffer 4 solution and submerge the sensor into this solution. The sensor will remain in this solution during storage so it is important to ensure it is sealed on properly so the solution doesn't evaporate or leak.

*Note: Refer to Page 58-68 in the YSI Professional Plus User Manual for more detailed Care, Maintenance and Storage instructions

Viewing Saved Data

- Press the "File" button
- Scroll down with arrow keys until "View Data" is highlighted, press "Enter"
- Scroll down with arrow keys until you reach your site that will be highlighted, press "Enter"

To Save in Site:

- Scroll down with arrow keys until "Site" is highlighted, press "Enter"

- Select the site you wish to view data from or select “All Sites” using the arrow keys
- Scroll up to show data is highlighted, press enter
- Use left and right arrow keys to view data from different sensors
- Record all of the data in your field book
- Press the “Esc” button to return to the main screen

Downloading Data from the YSI pro plus to a computer

Installing Data Manager program and USB drivers to a Computer

Data Manager needs to be installed on the computer before you try to connect the instrument to your computer. First install Data Manger, then connect the communications saddle to the computer and, lastly, connect the saddle to your Pro Plus. Refer to the Data Manager Readme file on the CD for detailed installation instructions.

- The instrument comes with a CD, put it in your computer. (the software can also be downloaded from YSI's website at ysi.com/software).
- Open “My Computer”
- Double click on the YSI CD picture
- Another screen will open up showing all of the files on the CD
- Double click on “YSI Data Manager” to begin installing Data Manager
- A box will open beginning installation, follow the prompts it goes through

*Note: It is important to install Data Manager on your computer before connecting the YSI meter to your computer. These instructions may vary depending on what version of Windows you have on your PC. Refer to the ReadMe file on the CD by double clicking the icon for more details.

Connecting the YSI pro plus to the computer

A black plastic saddle and a USB cable are included with your instrument.

- Insert the small end of the USB cable into the top of the saddle
- Insert the bigger end of the USB cable into your USB port on your computer
- If connecting for the first time, Windows will likely prompt you to go through two “Found Hardware Wizards” in order to complete the installation. Go through both these wizards when prompted. **The drivers must be installed before attaching the instrument to the saddle. Otherwise, DataManager will not recognize the instrument has been attached.**
- Attach the black plastic saddle to the instrument by first clicking in the top of the saddle to the back of your instrument (oval shaped groove)
- Align the grooves on the top and middle of the saddle

- Once aligned push down on the saddle and it should snap into place.
- Data Manager may open on its own. If not, open data manager. Data manager will recognize the instrument is connected.
- The "Home" screen will appear where you can select various functions such as: Retrieve Instrument Data, Real Time Instrument Data, Instrument Configuration, or View Saved File/Data

Downloading water quality data to the computer

- Click on your hand-held instrument's serial number under the select **Instrument heading.**
- Under the **Retrieve Instrument Data** tab, click **Data files**.
- The **Retrieve Data** page will open.
- Under **Select Data**, check **select all**
- Click **Start**
- Click OK when data retrieval is complete.
- Click **View Saved File/Data** tab
- Click **Data**
- Under **Setup**, select your site from the drop down menu
- Under **Select Parameters (max 6)**, click:
  Barometer
  Specific Conductance
  Dissolved Oxygen
  ORP_1
  pH_1
  Temperature
- Click **View Data**
- Click **Export**
- Click **Browse** and select where to save the data spreadsheet (Excel file)
- Under **Save as**, name your file
- Click **Export**
- Your data file will be in the location you specified.

For more detailed user information refer to the YSI Professional Plus User Manual or the ReadMe file on the CD Rom provided. You can also visit www.ysi.com for more information on their products.

GLP (Good Laboratory Practice)

The .glp file has detailed information about calibrations and diagnostic information about the sensors, such as: date/time stamp, calibration method, and sensor information. See the YSI manual for a more complete description about the information contained in the .glp file.

References

These instructions have been assembled and reproduced (with modifications) from:

YSI incorporated Professional Plus Quick Start Guide – Revision B. 2009. 2 pages.

YSI incorporated Professional Plus Quick User Manual – Revision D. 2009. 88 pages.

Please see the video associated with this manual for visual demonstrations of the procedures presented in this manual. The video times associated with the different manual sections are as follows:

0:05 Introduction (pg.4)
4:17 Installing Batteries (pg.4)
5:26 Basic Functions (pg.5)
7:26 Setting up (Enabling) Sensors (pg.7)
12:01 Installing Sensors (pg. 9)
- 12:33 Bulkhead (pg. 10)
- 13:43 Installing the pH sensor (pg. 11)
- 16:32 Installing the Dissolved Oxygen Sensor (pg. 11)
- 20:49 Installing the Oxidation Reduction Potential (ORP) sensor (pg. 12)
- 22:24 Installing the conductivity/temperature sensor (pg. 12)

24:29 Connecting the cable to the instrument (pg. 14)
24:54 Short Term Storage (pg. 27)
26:10 The Autostable Function (pg. 24)
28:23 Calibration (pg. 14)
- 28:28 Conductivity/Temperature (pg. 15)
- 38:14 Dissolved Oxygen (pg. 16)
- 42:48 pH (pg. 17)
- 52:08 ORP (pg. 18)

56:31 Taking Measurements (pg.25) and Storing Data (pg. 21)
59:26 Maintenance (pg. 25)
59:45 Storing data (pg. 21)