

**USIBWC Clean Rivers Program Standard Operating Procedure
Calibration, Maintenance, and Troubleshooting of the YSI 556
April 2011**

INTRODUCTION

This Standard Operating Procedure (SOP) is intended for all USIBWC Clean Rivers Partners who use the YSI 556 for their water sampling. Following is a step-by-step guide on calibration, maintenance of the probes, and troubleshooting for the instrument. This guide is a combination of the YSI 556 Operation Manual, the YSI Model 556 Quick-Start Guide, the YSI 5909 Cap Membrane Instruction Sheet, the TCEQ Surface Water Quality Monitoring Procedures, Volume 1, and other resources. All diagrams are taken from the YSI 556 Operation Manual and the YSI 5909 Cap Membrane Instruction Sheet. The basic components of the YSI 556 needed for sampling are shown in Figure 1.

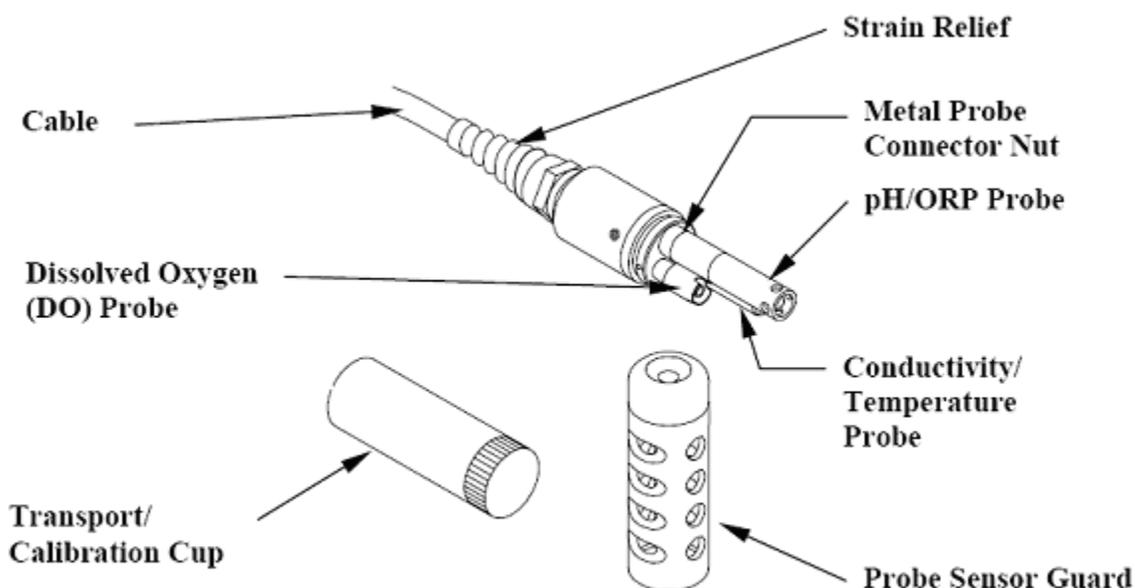


Figure 1. Features of the YSI 556 Probe

The YSI 556 uses three different probes: a combined temperature/conductivity probe, a pH probe, and a dissolved oxygen (DO) probe. Each probe has its own connecting port, making it difficult to insert them incorrectly. An up-close look at the probe ports is provided in Figure 2.

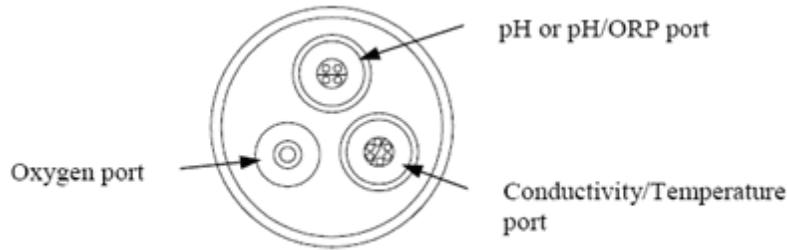


Figure 2. YSI 556 Probe Ports

Initial Instrument Setup

USIBWC CRP personnel will perform the initial setup and calibration of the instrument prior to shipping it out to any partner. This is to ensure that all the necessary parts were received in good working condition and were not damaged during shipping. This also ensures that the instrument is working properly before we send it to a partner so that if a problem is seen, it can be immediately dealt with.

All USIBWC CRP partners will receive their YSI 556 fully set up, functioning properly, and ready for sampling. In addition, the partner will receive all equipment necessary for the proper maintenance of their instrument, which includes the maintenance kit that is provided with the instrument, the DO replacement kit, standards for pH and conductivity calibration, and a stand. Other materials and supplies will be provided by the USIBWC CRP to the partners as needed.

CALIBRATION

Specific Conductance

1. Rinse the probes twice with distilled water.
2. Rinse the probes twice with conductivity standard solution.
3. Fill the transport/calibration cup with enough conductivity standard to cover the probe (usually above the top of the label on the cup).
4. Allow the probes to sit in the standard until the temperature stabilizes. Once they have not changed for 30 seconds, enter the temperature that the YSI is reading in the *Temperature of Standard* box in the calibration logbook. See Figure 3.
5. Press the “Esc” button, which will take you to the main menu. Select “Calibrate” in the main menu, and hit the “Enter” button (the arrow button).
6. Select “conductivity” as the sensor to be calibrated. Hit the “Enter” button. A second menu will pop up.
7. In the second menu, select “Specific Conductance.” Hit the “Enter” button.
8. Enter the value for the conductivity standard used. **For all USIBWC partners, the standard should always be entered as 1.413. Make sure that the decimal is in the correct place. The**

YSI 556 is equipped to auto- correct the conductivity value to room temperature, so you do not have to use the temperature table on the standard bottle. Hit “Enter.” This should take you back to the reporting menu. Enter 1.413 as the *Value of Standard* in the calibration logbook.

9. Allow the readings to stabilize. Once they have not changed for 30 seconds, enter the value for specific conductance that the YSI is reading **at that time** in the *Initial Reading* box in the logbook. See Figure 3.
10. Hit “Enter” when it asks if you want to calibrate. The screen will tell you whether or not the calibration has been accepted (it should be the same value as that of the standard). Write down the value in the *Calibrated To* box in the logbook.
11. Press “Esc” to return to the calibration screen/menu.

pH (Standards 7 and 10)

1. Rinse the probes twice with distilled water.
2. Rinse the probes twice with pH Standard Solution 7.00.
3. Fill the transport/calibration cup with enough pH 7.00 Standard to cover the probe (usually above the top of the label on the cup).
4. Allow the probes to sit in the standard until the temperature stabilizes. Write down the temperature in the calibration logbook.
5. Using the temperature value in the YSI reporting menu (round to the nearest whole number), look up the value of the standard at that temperature in Table 1 and write that in the *Value of Standard* box in the calibration logbook. **The YSI 556 does not auto-correct pH for temperature, which is why you must do this step for pH but not for conductivity.**
6. Press the “Esc” button, which will take you to the main menu. Select “Calibrate” in the main menu, and hit the “Enter” button (the arrow button).
7. Select “pH” as the sensor to be calibrated. Hit the “Enter” button. A second menu will pop up.
8. In the second menu, select “2- point” calibration. Hit “Enter” button.
9. Enter the value for the pH standard. **For pH calibration, always calibrate with the 7.00 standard first.** Enter the value for the standard (from the table). Hit “Enter.” This should take you back to the reporting menu.
10. Record the initial reading in the calibration logbook. Hit the “Enter” button (to confirm that you want to calibrate). The screen will tell you whether or not the calibration has been accepted (should be the same value as that of your standard). Record the value in the *Calibrated To* box in the logbook.
11. If calibration was accepted, leave the probe screen alone while you rinse the probe. **Do not press “continue” (the enter button) yet.** Follow the previous rinsing instructions, but this time using the **pH 10.00 standard.**
12. Fill the transport/calibration cup with enough pH 10.00 Standard to cover the probe (usually above the top of the label on the cup).

13. Allow the readings to stabilize. Once they have been stable for 30 seconds, record the temperature of the standard, the value of the standard at that temperature (according to Table 1), and the initial reading in their corresponding boxes on the YSI calibration logbook.
14. Now hit the “Enter” button again. This will take you back to the screen that allows you to put in the second pH value.
15. Enter the 2nd pH standard value on the input screen. Input the value of the 2nd pH standard for that temperature that was in Table 1. Record this value under *Value of Standard* for pH 10 in the calibration logbook as well. **Make sure that you enter the value correctly and the decimal is in the correct place. If a mistake is made at the time you are entering anything for the 2nd pH standard, you will have to redo the pH calibration from the beginning.** Hit the “Enter” button. This will take you back to the reporting screen.
16. Hit the “Enter” button. The screen will tell you whether or not the calibration has been accepted (should be the same value as that of your standard). Record the calibrated to value in the logbook.
17. Press “Enter” button again to return to the calibration screen/menu.

DO (% Saturation)

1. Rinse the probes and the transport/calibration cup twice with tap water. From the previous calibration of pH, the screen should be back on the calibration menu. Scroll down and choose “DO 2 mil PE (Blue).” Hit the “Enter” button.
2. At the second menu, choose “DO %.” Hit the “Enter” button. This will take you to the screen that prompts you to input the barometric pressure. **The YSI 556 has a built- in internal barometer. It should automatically input the barometric pressure for you.**
3. Look at the barometric pressure that the YSI is reporting at the bottom of the right- hand corner on the YSI screen. Record this value in the YSI calibration logbook under “Barometric pressure.” Make sure that it matches what the instrument put into the input screen. Hit the “Enter” button. This will take you to the reporting screen.
4. Using a Kim Wipe, remove any moisture (water droplets) from the probes, focusing specifically on the DO membrane. Gently tap the DO membrane with the Kim Wipe to remove any moisture that may be on the membrane.
5. Fill the calibration cup with about 1/8 of an inch of tap water.
6. Screw the calibration cup only about 1 ½- 2 threads (just enough so that the calibration cup does not fall off the probe when you let it go), and allow to stabilize for 10-15 minutes. **You must allow the probe to remain undisturbed for at least 10 minutes to ensure that the air inside the calibration cup is saturated and the DO reading is correct.**
7. While waiting, you can calculate what the DO % saturation should be. It will follow this formula: $\text{Barometric Pressure}/760 = \underline{\hspace{2cm}} * 100$. Round to the nearest tenth and write this value in the “Value of standard” section in the YSI logbook. This is what the DO should correct to when you calibrate the instrument.
8. After allowing 10 minutes of stabilization, record the temperature and the initial reading in the YSI logbook. Hit the “Enter” button.

9. The DO should calibrate to the value given by the formula. Hit the “Esc” button three times to go back to the reporting screen.

“Out of Range” Error Message for pH

After each calibration, if no error message pops up and you are allowed to move onto the next calibration, then the calibration was performed properly and was accepted. However, there may be times during the calibrations (most commonly with the pH calibration) that you receive a message stating: “Out of range: Accept Yes or No.” **Do not accept the readings if this message pops up.** Simply hit no, and this will return you to the calibration menu.

You can try the following procedure to see if the pH sensor was simply not reading properly before trying other maintenance procedures. For the purpose of explanation, the pH probe will be used as the example.

1. On the calibration menu, select “pH,” then select “2-point” on the second menu.
2. The input screen should come up. Do not enter a value. Instead, **press and hold the “Esc” key and the “Enter” key at the same time.**
3. A screen should come up that says “Uncal? Yes or No.” Select yes.
4. Follow the same procedure for the second pH value.
5. You have now uncalibrated the probe for pH. Re-do the calibration for pH from the beginning.
6. If the same error message is received again at the end of this calibration procedure, then proceed to the maintenance part of this guide for additional help.

Troubleshooting for Conductivity/Temperature and DO probes

DO readings are affected by temperature, so if the DO readings on the YSI instrument are not in their normal range, the conductivity and temperature probe may be off. For the YSI 556, the conductivity sensor must be enabled and functioning correctly to obtain accurate DO readings. There are many things that can affect the DO readings; before trying any maintenance procedures, please perform the following procedure:

1. From the “Report” screen, hit the “Esc” button. This will take you to the Main Menu.
2. Scroll down to “File” and hit the “Enter” key (the arrow).
3. Hit “Enter” on the “Directory” selection.
4. Scroll to the file that has a .glp at the end of the filename. Hit the “Enter” button.
5. Select the “View file” option. This will take you to a screen with numerous times and dates.
6. Scroll all the way to the bottom of the screen by holding down the “down” arrow. The YSI will make a small “beep” noise notifying you that you are at the end of the data.
7. Scroll to the right using the arrow buttons in the middle of the display case. This will take you to a smaller screen that indicates “Type” and “Value” in two columns.

8. There is a row under the “Type” column that says “Conductivity gain.” **The value for this should be as close to 1.0 as possible.** If it is not (for example, the conductivity gain value is 128.5533), then perform the uncalibration procedure referenced in the previous section, but on the conductivity calibration screen:
 - a. On the calibration menu, select “Conductivity,” then select “specific conductance” on the second menu.
 - b. The input screen should come up. Do not enter a value. Instead, **press and hold the “Esc” key and the “Enter” key at the same time.**
 - c. A screen should come up that says “Uncal? Yes or No.” Select yes.
 - d. Once “yes” is selected, check the conductivity gain value again. It should read 1.0 or a value very close to that. If it does, repeat the calibration procedure, and it should calibrate fine.
 - e. If this does not fix the issue and the values are still off, perform the recommended maintenance procedures in the “Probe Maintenance” section of this document.

TCEQ Surface Water Quality Monitoring YSI Multiprobe Calibration and Maintenance Log					
Date: 4/10/2011		Time: 08:30		Employee name: J. Smith	
Battery Voltage: Half full			Sonde Type and Serial No.		
Calibration					
Function	Temp. of Standard	Value of Standard	Initial Reading	Calibrated to	Comments
Specific conductance (high) $\geq 1,000$ $\mu\text{S}/\text{cm}$	23.4	1.413	1.490	1.413	
Conductivity cell constant					Range 5.0 \pm 0.5
pH calibrated (~7)	23.5	7.00	6.95	7.00	
pH mv for pH 7 solution					Range 0 \pm 50 mv
pH slope (~ 4/10)	23.1	10.03	9.99	10.03	
pH mv for pH 10 pH mv for pH 4					Range: -130 to -230 mv Range: 130 to 230 mv
Dissolved oxygen (%sat) *	22.9	85.8	81.2	85.8	
Dissolved oxygen charge					Range 25 to 75
Dissolved oxygen gain					Range 0.7 to 1.4
Optional Sensors (include parameter: turbidity, etc.)					
DATA NEEDED FOR DISSOLVED OXYGEN CALIBRATION					
Altitude (A) = _____ feet above msl		Barometric pressure _____ inches _____ mm			
Barometric Pressure (BP) Options			Barometric Pressure Formulas		
Barometer 652.3		Barometric pressure (inches) _____ x 25.4 = BP _____ mm			
From local source after correction (CBP)		BP _____ mm = CBP _____ mm - 2.5 (altitude _____ /100)			
Estimated from altitude only		BP _____ mm = 760 mm - 2.5 (altitude _____ /100)			
DO % saturation standard calculation *		DO% sat Standard = Absolute BP mmHg/760 x 100 85.8 mm/Hg			
Deployment Checklist (required for data logging only)					
Logging interval:	SDI-12 Autosleep enabled:	RS 232 autosleep enabled:	DO warm-up time:	Battery volts in Sonde (days):	Available memory in Sonde (days):
Yes No	Yes No	Yes No			
Post-Calibration Check					
Date: 4/10/2011		Time: 3:30		Employee Name: J. Smith	
Battery Voltage: Half full			Sonde Type and Serial No.		
Function	Temp. of Standard	Value of Standard	Initial Reading	Pass Post-Cal?	Comments
Specific conductance	23.1	1.413	1.420	<input type="checkbox"/> Yes <input type="checkbox"/> No	Passed- Check Yes.
pH calibrated (~7)	23.2	7.00	6.99	<input type="checkbox"/> Yes <input type="checkbox"/> No	Passed- Check Yes.
pH slope (~ 4/10)	23.4	10.03	10.00	<input type="checkbox"/> Yes <input type="checkbox"/> No	Passed- Check Yes.
Dissolved oxygen (%sat) *	23.0	86.7	85.9	<input type="checkbox"/> Yes <input type="checkbox"/> No	Barometer 658.6. Value of standard is 86.7. Passed- Check Yes.
Optional Sensors (include parameter: turbidity, etc.)				<input type="checkbox"/> Yes <input type="checkbox"/> No	
Location of Deployment, Routine Run, or Special Study:				Date/Time Deployed:	Date/Time Retrieved:
Use(circle one): 24-hour Continuous Grab Referee					
MAINTENANCE (Refer to Chapter 8 for maintenance requirements)					
Sensor	Date	Initials	Maintenance Completed		
pH	4/8/11	JS	Cleaned pH probe with soap and water.		
DO	4/8/11	JS	Changed DO membrane and cleaned probe.		
Specific Conductance	4/8/11	JS	Cleaned conductivity probe with brush.		
Perform temperature check along with regular maintenance. The laboratory thermometer must be checked against NIST traceable thermometer annually.					
Annual NIST traceable check	Date:	NIST Temp:		Lab Thermometer Temp:	Correction Factor:
Maintenance temperature check	Date:	Sonde Temp:		Lab Thermometer Temp:	
Factory maintenance/repair notes:					

TCEQ-20118 (rev. 11/07/08)

Figure 3. Example Calibration Log

Table 1. pH-Calibration Standards

Temperature (EC)	pH 4 Standard	pH 7 Standard	pH 9 Standard	pH 10 Standard
10	4.00	7.06	9.33	10.15
11	4.00	7.06	9.32	10.14
12	4.00	7.05	9.31	10.13
13	4.00	7.05	9.30	10.12
14	4.00	7.04	9.29	10.11
15	4.00	7.04	9.28	10.10
16	4.00	7.04	9.27	10.09
17	4.00	7.03	9.26	10.08
18	4.00	7.03	9.25	10.07
19	4.00	7.02	9.24	10.06
20	4.00	7.02	9.23	10.05
21	4.00	7.01	9.22	10.05
22	4.00	7.01	9.21	10.04
23	4.00	7.00	9.20	10.03
24	4.00	7.00	9.19	10.01
25	4.00	7.00	9.18	10.00
26	4.00	7.00	9.17	9.99
27	4.00	7.00	9.16	9.98
28	4.01	6.99	9.16	9.98
29	4.01	6.99	9.15	9.97
30	4.01	6.99	9.14	9.96
31	4.01	6.99	9.13	9.95
32	4.01	6.99	9.13	9.94
33	4.02	6.98	9.12	9.93
34	4.02	6.98	9.12	9.92
35	4.02	6.98	9.11	9.91
36	4.02	6.98	9.10	9.90
37	4.02	6.98	9.09	9.89
38	4.02	6.98	9.08	9.88

POST-CALIBRATION CHECKS

Post- calibration is a way to verify the measurement accuracy of the instrument. A post- calibration check should be performed after every sampling event where the instrument is used and before any maintenance is performed. Since USIBWC CRP partners perform routine sampling, calibration and post- calibration should be no more than 24 hours apart. The sooner the procedure is done, the more representative the results are of how the instrument performed during the sampling event that was just completed. After completing the routine sampling at the last station, fill the calibration cup with a small amount of water and:

1. When back in the lab or place where calibration is performed, rinse the probes thoroughly with DI water. Once thoroughly rinsed with DI water, rinse with the appropriate calibration standard.
2. Fill the calibration cup with the standard and allow the instrument to stabilize.
3. Record the temperature and the value of the standard in the *Post Calibration Check* section of the calibration logbook (See Figure 3). Read the initial value directly off of the display unit (the value that the reporting screen is giving. For example, if you are checking conductivity, you will report the reading for conductivity as is on the reporting screen).
4. You get the value of standard the same way you did in the Calibration. (Conductivity = 1413, pH depends on temp, and DO depends on barometric pressure). Make sure to write the new barometric pressure down in the calibration logbook (you can write this in the “Comments” section).
5. Record the initial reading and the value of standard on the *Post- Calibration Check* section on the calibration logbook.

Do not use the calibration menu at all for the post- calibration check. No adjustments are necessary; you are just taking the readings for each standard directly from the reporting screen.

The purpose of post- calibration is to ensure that the instrument has held calibration during the day of sampling. You must compare the post- calibration values to the expected value for each standard. If the post- calibration values fall outside the error limits for specific conductance, pH, and DO, then the data does not pass QA and cannot be reported. See Table 2 for the error limits.

Table 2 Post- Calibration Check Error Limits

Parameter	Value
Dissolved oxygen	± 0.5 mg/L, ± 6 % saturation
pH	± 0.5 standard units
Specific conductance	± 5 %
Temperature	± 0.2 ° C

- Values above apply when using the YSI probe.

PROBE MAINTENANCE

Due to the fact that the partners will receive their respective YSI instrument already assembled, the discussion here will be directed at how to install a new conductivity, pH, and DO probe. Any instrument maintenance should be done at least 24 hours in advance of the sampling event.

Installation of pH and Temperature/Conductivity Probe

The YSI 5511 maintenance kit comes supplied with an installation tool (it looks like a small steel bar).

1. Insert the installation tool into the probe that you wish to replace, unscrewing the probe in a counter clockwise motion. See Figure 4.

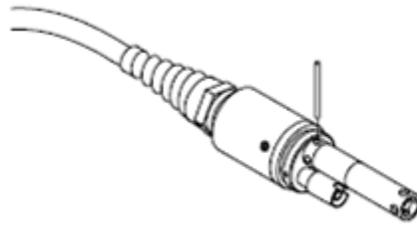


Figure 4. Sensor Installation

2. Pull the old probe out. You may discard this probe.
3. Apply a thin coat of lubricant (which is also provided in the maintenance kit) to the O-rings on the connecting part of the new probe. This makes it easier to slide the probe into its port without causing any damage.
4. Make sure there is no moisture inside the probe port **before** you install the new probe. If there is, dry it thoroughly before installation. Installing while moisture is in the port can cause permanent damage to the probe and the YSI instrument as a whole.
5. Insert the probe into the correct port (remember that each probe and corresponding port have their own pattern, so you cannot install it incorrectly). Once the connector and probe align, push it gently in.
6. Once you aligned the connectors and push the probe in, screw down the probe nut using the installation tool. **Make sure you do not cross-thread the O-ring.** If the O-ring cross-threads, simply unscrew and try to screw the probe in correctly again.
7. Screw down until the probe nut is seating on the face of the bulkhead. **Do not over tighten.** See Figure 5.

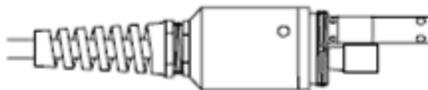


Figure 5. Bulkhead Seating

Cleaning of Temperature/Conductivity Probe

The temperature/conductivity probe must be cleaned regularly so that any deposits formed on the electrode can be removed. The cleaning procedure for this probe is relatively simple.

1. Your YSI probe should have come with a small maintenance kit (YSI 5511 maintenance kit) and other accessories. Included in these accessories is a small scrubbing brush. Pull the probe out of its port for cleaning. Make sure no water gets inside the port.
2. Dip the brush into water and insert into each hole in the probe. Do this about 15-20 times.
3. Rinse the probe well with deionized water.

If deposits have formed on the electrodes, or there is other noticeable but hard-to-remove contamination, the following may also be done:

1. Add a few drops of mild detergent to the water and scrub with the brush as previously directed.
2. Rinse the probe with deionized or tap water.
3. Dry the port on the YSI and the probe connector as well (the part of the probe that gets inserted into the YSI port body).
4. Apply a thin coat of lubricant and re-install.
5. Check the probe by calibrating with fresh conductivity standard.

If the accuracy of the conductivity readings is still not correct, then the probe is mostly likely in need of further maintenance or needs to be replaced. Please contact USIBWC CRP staff. The portion of the probe that measures temperature does not need any maintenance.

Cleaning the pH Probe

Cleaning of the pH probe is required whenever it appears that there may be contaminants on the glass bulb, or when the probe response is slower than usual. A common problem that has been noticed is what looks like a filmy substance on the glass bulb.

1. Remove the probe from its port in the YSI.
2. Use clean water and a cotton swab or Kim Wipe to remove any foreign material from the glass bulb and the electrode junction.

If the pH readings are still not correct, the following procedure may be followed:

1. Soak the probe for 10-15 minutes in a solution of clean water with a few drops of dishwashing liquid (mild).
2. Clean the bulb gently with a cotton swab or wipe that has been soaked in the soapy solution.
3. Rinse the probe with clean water. Wipe the bulb gently with a cotton swab or wipe soaked in clean water, and re-rinse with clean water.

If after this procedure, the pH response is still not restored, then the probe is probably defective and needs to be replaced. Contact USIBWC CRP staff for a new probe. The pH probes may need to be replaced as often as every year.

Cleaning of DO Probe

Since the DO probe is a bit more complex than the other probes, a general explanation will be presented here on how to remove an old membrane and install a new one. The other probes require simple maintenance once they have been installed or replacement if they are no longer working properly. However, the DO membrane requires regularly scheduled cleaning and maintenance. A diagram of the DO replacement procedure is shown below.

Most manuals recommend that the KCL solution and membrane be changed every 30 days. However, the life of the membrane depends on usage. The partners that sample more frequently (i.e., monthly) will need to change the DO membrane more often than the partners who sample quarterly. When replacing a membrane, please make sure that you do so at least 24 hours in advance of the sampling event and that the membrane is allowed to sit for at least 24 hours before use.

The KCL solution and the membrane should also be replaced if there are any visible air bubbles under the membrane, deposits of KCL are seen on the membrane or the O-ring, the DO readings become unstable, or if there is evidence of damage to the membrane. Since the partner will receive the YSI with the DO membrane already installed, use the following procedure to replace the DO membrane.

Replacing the DO membrane

1. Dry the YSI probes very well with a paper towel or Kim Wipes to make sure that no water enters the probe port when you remove the DO probe.
2. Insert the long end of the hex key wrench (should be in the supplies received with the YSI. See Figure 6) into the small hole in the side of the cable assembly, near the DO port. Turn the small wrench counter clockwise to remove the hex screw. You do not have to remove the screw completely to pull out the DO probe.
3. Pull the old DO probe module straight out of the probe port. **It does not twist-- simply pull straight up.**

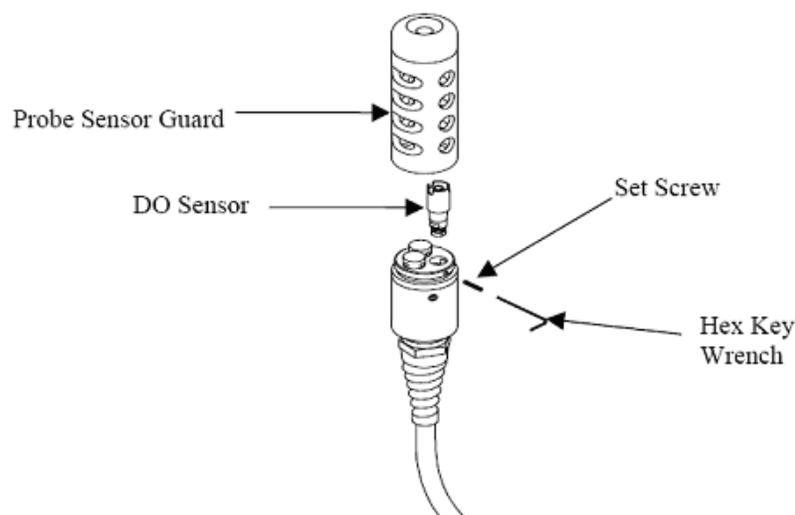


Figure 6. DO Sensor Replacement

4. With the DO probe facing down, very carefully unscrew the DO membrane cap (the blue cap). You may discard this cap. **Make sure that you do not touch the probe itself.**
5. Hold the probe in a vertical position. Using a clean or new pink pencil eraser, gently rub the top of the probe face in and back and forth motion. Continue until the top of the probe face is a nice shiny gold color. Be careful not to touch any part of the DO probe itself.
 - a. If you do not have a pink pencil eraser handy, you can use the sanding disc provided with the DO kit. Take the small sanding disc provided in the DO membrane replacement kit, hold it parallel to the probe, and stroke the probe face (the small flat gold side at the top of the probe that goes up against the blue membrane cap) **gently** about 10 times in a back and forth motion. Sand as gently as possible, since rough treatment can harm the probe.
6. After cleaning/sanding the surface of the probe, rinse the probe thoroughly with water. Make sure you rinse the probe face thoroughly several times. Rinse thoroughly and enough times to make sure you remove any grit left on the probe from the cleaning/sanding procedure.
7. Look at the gasket at the base of the probe and inspect it for any tears or signs of damage or wear. Also take notice if the gasket is loose. If any of these are present, remove the gasket and install a new one provided in the DO membrane replacement kit.
8. Sit the new gasket all the way down against the probe body. This step may require the use of a small pair of tweezers. See Figure 7 below.

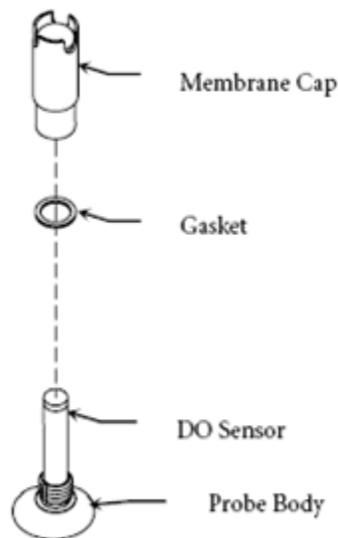


Figure 7. Gasket Installation

9. Fill a new cap membrane to the top with the KCl solution provided in the DO membrane replacement kit. Be very careful and avoid touching the membrane surface. Lightly tap the side of the cap membrane to release any air bubbles that may have formed inside the cap.
10. Insert the probe into the membrane cap (hold the cap upside down to hold the electrolyte solution. The probe, when being inserted into the cap, should then face down).
11. Lightly tap the membrane cap again, in case inserting the probe caused any air bubbles to form.

12. Thread the cap membrane onto the probe. This will cause some of the electrolyte solution to overflow, which is normal.
13. Partially unscrew the cap membrane and then retighten. This prevents a bulge from forming in the membrane.
14. Re-install the DO probe into its port in the YSI. Make sure to push the probe completely in **and be careful not to touch the membrane**. If the probe is not pushed in fully, water may get into the port, causing damage to the instrument.
15. After the new DO membrane is installed, make sure to let it sit for at least 24 hours before using the instrument. Calibration procedures may then be initiated to ensure that the probe is functioning correctly.

Additional Information

Calibration

Additional information on calibration procedures may be found in Chapter 8 of the Surface Water Quality Monitoring Procedures, Volume 1, the YSI Environmental Model 556 Quick-Start Guide, and Chapter 6 of the YSI 556 MPS Operations Manual.

Maintenance

Additional information on calibration procedures may be found in Chapter 8 of the Surface Water Quality Monitoring Procedures, Volume 1, the YSI 5562 Sensor Installation Instruction sheet, the YSI 559 Replaceable DO Module Kit instruction sheet, the YSI 5909 Cap Membrane instruction sheet, and Chapter 11 of the YSI 556 MPS Operations Manual.

Any additional information on the YSI 556 instrument can be found in the YSI 556 MPS Operations Manual. Information on sampling procedures and other CRP- related material may be found in the Surface Water Quality Monitoring Procedures, Volume 1, or by contacting USIBWC CRP staff.