



SEA-BIRD  
SCIENTIFIC

# User manual

## WQM Water Quality Monitor

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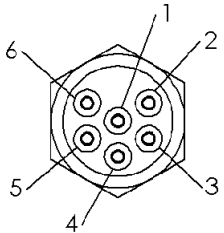
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# Section 1 Specifications

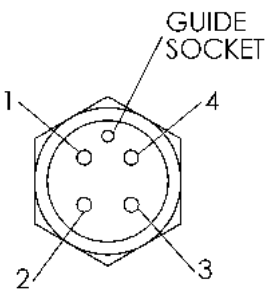
## 1.1 Mechanical

Diameter	18.5 cm
WQM length	65.4 cm
WQMx length	69.0 cm
Depth rating	200 m
Temperature range	-5–35 °C
Pressure housing	Acetal coploymer, ABS, PVC, titanium, copper
WQM weight in air, water	5.4 kg, 1.8 kg
WQMx weight in air, water	6.25 kg, 1.7 kg

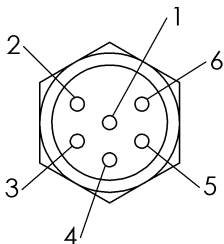
### 1.1.1 Standard bulkhead connector

Contact	Function	MCBH-6-MP connector
1	Ground	
2	RS232 RX	
3	Reserved	
4	Voltage in	
5	RS232 TX	
6	Reserved	

#### 1.1.1.1 Serial connector

Contact	Function	MCBH-4-FS connector
1	Ground	
2	Voltage in	
3	RS232 RX	
4	RS232 TX	

#### 1.1.1.2 Analog external data port connector

Contact	Function		MCBH-6-FS connector
	1 analog	2 analog	
1	Ground		
2	Analog 1		
3	Analog 1 ground		
4	Voltage in		
5	No connect	Analog 2	
6	No connect	Analog 2	

## Specifications

### 1.2 Electrical

Input voltage	9–16 VDC
Current draw, data collection	< 100 mA
Current draw, peak data collection	180 mA
Current draw, BLIS operation	350 mA
Current draw, low power	< 50 $\mu$ A

### 1.3 Communications

Transfer standard	RS232
Sample rate	1 Hz

### 1.4 Optical

Sensor	Parameter	Wavelength	Range, Sensitivity
WQM, WQMx	Chlorophyll	470/695 nm	0–30, 0.015 $\mu$ g/L
WQM	Turbidity	700 nm	0–25, 0.013 NTU
WQMx	CDOM	370/460 nm	0–375, 0.18 ppb
WQMx	Scattering	700 nm	0–3, 0.002 $\text{m}^{-1}$

### 1.5 Conductivity, Temperature, Depth, Dissolved Oxygen

Parameter	Range	Accuracy	Resolution
Conductivity	0–9 S/m	0.0003 S/m	0.0005 S/m
Temperature	–5–35 °C	0.002 °C	0.001 °C
Depth (Pressure)	1–100 or –200 m	0.1% full scale	0.002% full scale
Dissolved Oxygen	120% of saturation (150% on request)	2% of saturation	0.035% of saturation 0.003 ml/L at 0 °C, 35 PSU

## Section 2 Functional check

### ⚠ WARNING

FDOM sensors use an ultraviolet LED light source. Do not look directly at a UV LED when it is on. It can damage the eyes. Keep products that have UV LEDs away from children, pets, and other living organisms. Wear polycarbonate UV-resistant safety glasses to protect the eyes when a UV LED is on.

The WQM has configurations of sensors that use the abbreviations listed below.

- WQM—Water Quality Monitor
- BLIS—BLEach Injection System
- CTD—Conductivity, Temperature, Depth
- DO—Dissolved Oxygen
- FDOM—Fluorescent Dissolved Organic Matter

Model	Description
WQM-a	Available analog output. BLIS anti-fouling. Chlorophyll fluorometer and turbidity sensor. CTD and DO sensors.
WQM-d	Digital output. BLIS anti-fouling. Chlorophyll fluorometer and turbidity sensor. CTD and DO sensors.
WQMx-a	Available analog output. BLIS anti-fouling. Chlorophyll fluorometer, turbidity, and CDOM sensors. CTD and DO sensors.
WQMx-d	Digital output. BLIS anti-fouling. Chlorophyll fluorometer, turbidity, and CDOM sensors. CTD and DO sensors.

### 2.1 Pre-deployment check

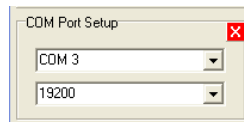
The user needs the items listed below to make sure that the sensor operates correctly before deployment.

- a clean work bench
- a PC
- a regulated power supply

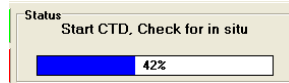
*Manufacturer-supplied:*

- test cable
- sensor
- CD with software
- 5/32" hex key
- orange fluorescent stick
- blue fluorescent stick

1. Lubricate each of the connectors with pure silicone spray. Let the spray dry. Refer to the section on "[bulkhead connector maintenance](#)" for details about how to care for bulkhead connectors.
2. Select the software, the file on the CD that ends with ".exe" and move it to the desktop of the PC.  
The software is now available on the PC.
3. Connect the test cable to the PC, the sensor, and the power supply.
4. Start the software on the PC.
5. Supply power to the sensor.  
The software tries to identify the COM port and the baud rate.
6. If necessary, select the COM port and the baud rate (19200) from the drop-down menu in the COM Port Setup area of the software.



7. Push **Start Sample**, then push **Start WQM Now**.  
The sensor does a warm-up for the CTD, DO, and the optics before it starts the **Sample** mode. This sequence takes approximately 35 seconds.



8. Push **Stop WQM Sample**, then push **Yes, Stop WQM Sampling**.  
The sensor goes into **In Standby** mode. The user can now make changes to the sensor setup.
9. Go to the *WQM Setup* tab.
10. Push **Set Date and Time** to make sure the PC and the sensor show the same date and time.
11. Go to The *WQM Output* tab.
12. Make sure to select the boxes listed below:
  - a. Conductivity
  - b. Temperature
  - c. Pressure
  - d. Raw dissolved oxygen
  - e. Processed dissolved oxygen
  - f. Chlorophyll
  - g. NTU
  - h. FDOM (WQMx only)

Only those values with selected boxes are stored by the sensor as data. A data value with a box that is not selected is not available in the [Data Sidebar](#) area or the *View Data* tab.
13. Push **Send Output Configuration**.  
The selected parameters are stored in the sensor.
14. Push **Start WQM Sample**.  
The sensor starts its warm-up cycle.

## 2.2 Monitor data

There are three places in the software to monitor the data collected by the sensor.

- The *Scroll Data* tab.
  - The *View Data* tab.
  - The [Data Sidebar](#) area.
1. Look at the data in the [Data Sidebar](#) area.
  2. Change the values of the collected data:
    - For chlorophyll: Put an orange fluorescent stick in front of the chlorophyll (blue) light to change the value of the data from the chlorophyll sensor. The value increases toward the maximum output value listed on the sensor's characterization page.
    - For NTU: Put a solid object such as a finger in front of the turbidity (red) light to change the value of the data from the turbidity sensor. The value increases toward the maximum output value listed on the sensor's characterization page.



- For FDOM: Put a blue fluorescent stick in front of the FDOM (purple) light to change the value of the data from the FDOM sensor. The value increases toward the maximum output value listed on the sensor's characterization page.
- Make sure that the CTD and DO sensor have the output values as listed below.
    - Conductivity: 0.000 (+0.0005, -0.0001)
    - Temperature: current room temperature
    - Pressure: 0.00 ( $\pm 0.5$ )
    - Raw Dissolved Oxygen: 3000–15000 Hz
    - Processed Dissolved Oxygen: 3–6.5 ml/L

## 2.2.1 Scroll data tab

The *Scroll Data* tab shows the data collection, the sensor's status records, and other miscellaneous messages. Sensors that use version 1.5 or newer show data collection at 1 Hz. Older versions show the data collected once every 10 seconds when the sensor is in air, and at 1 Hz when it is in water.

- Go to the *Scroll Data* tab.
- Monitor the collected data.

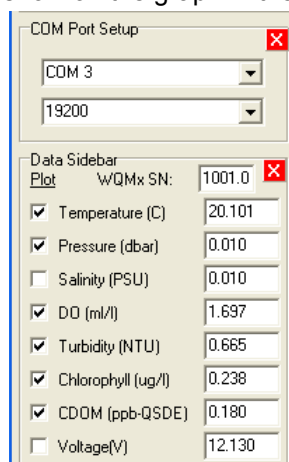
```
WETS_WQMx1001 11 020713 080400 0 1 0 5 4 12.12
WETS_WQMx1001 11 020713 080401 0 1 0 5 3 12.13
WETS_WQMx1001 11 020713 080402 0 1 0 5 2 12.13
WETS_WQMx1001 11 020713 080403 0 1 0 5 1 12.13
WQMx,SN,Date(mmddyy),Time(hhmmss),Temp(C),Pres(dbar),Sal(PSU),DO(ml/l),TURBIDITY(NTU),CHLA(UG/L),CDOM(PPB-QSDE),Volts
WETS_WQMx1001 11 020713 080404 0 1 0 6 129 12.13
WQMx,1001,020713,080404,20.1800,0.01,0.010,1.646,0.665,0.214,-0.270,12.13
WQMx,1001,020713,080405,20.1790,0.01,0.010,1.644,0.671,0.226,-0.090,12.18
WQMx,1001,020713,080406,20.1804,0.01,0.010,1.642,0.659,0.214,0.270,12.17
```

- WETS\_ ...:** These lines show the sensor's serial number and the conditions that are used by the sensor in the setup and view controls.
- WQM,SN,Date(mmddyy),...:** These lines show the column headings for the collected data.
- WQM,1001,0207013,...:** These lines show data records. These records are transmitted at 1 Hz when the sensor collects data.

## 2.2.2 Data sidebar area

The *Data Sidebar* area shows the data and lets the user select the parameters that show in the graph area of the *View Data* tab.

- Look at the *Data Sidebar* area on the left side of the software window to see which parameters will show on the graph in the *View Data* tab.



## Functional check

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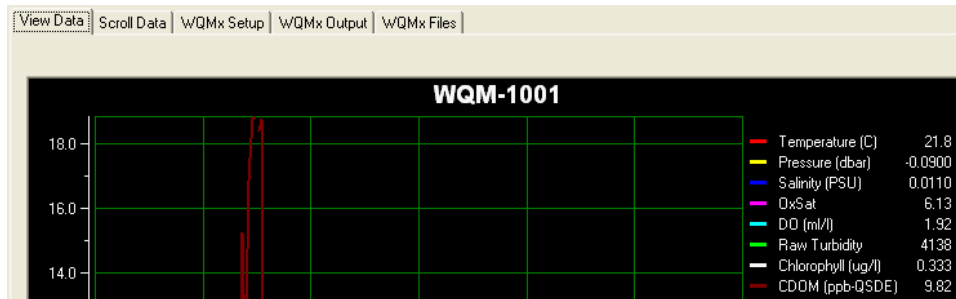
Temperature, Pressure, DO, Turbidity, Chlorophyll and CDOM show in the *View Data* tab.

2. Select different checkboxes under the Plot heading to see different parameters in the *View Data* tab.
3. Start the sensor.
4. Monitor the data in the *View Data* tab and in the Data Sidebar area.

### 2.2.3 View data tab

Monitor the collected data in real-time.

1. Go to the *View Data* tab.



2. The user can change the parameters that show in the plot area of *View Data* tab.
  - a. Put the sensor in **In Standby**.
  - b. Go to the *WQMx Output* tab.
  - c. Select the check boxes for the parameters to be stored in the sensor.
  - d. Push **Send Output Configuration**.
  - e. Go to the Data Sidebar area and select the parameters to show in the *View Data* graph area.

## 2.3 Stop sensor

Stop the sensor to finish the functional check.

1. Push **Stop WQM Sample**.
  - a. No more data is collected on the *View Data* and *Scroll Data* tabs, or the Data Sidebar area.
  - b. The Bio-wiper closes on the WQM. The wiper does not move on the WQMx.
  - c. The *Scroll Data* tab shows "status records" that start with "WETS" at 1 Hz.
  - d. The sensor is in **In Standby**.
2. Turn off the power supply.
3. Disconnect the sensor from the power supply and the PC.

## Section 3 Sensor set up and operation

### ⚠ WARNING

Bleach is caustic. Wear nitrile gloves and safety glasses and work in a well ventilated area to use bleach.

### ⚠ CAUTION

Do not supply more than 16 VDC to the sensor. More than 16 VDC will cause damage.

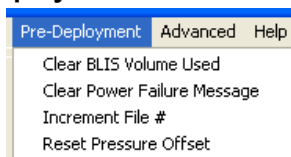
### NOTICE

Make sure that the BLIS system has fresh bleach, and that the software is set up for the environment in which the sensor will be deployed.

## 3.1 Pre-deployment tasks

Make sure that the values for the BLIS, the sensor power, the data files and the pressure sensor are set up correctly before each deployment.

1. Start the software if necessary.
2. Make sure the sensor has power supplied and is in **In Standby**.  
Refer to [Pre-deployment check](#) on page 5 for details.
3. If necessary, clear the red background in the clock area. Go to the *WQM Output* tab and push **Set Date and Time**.  
The time shown on the sensor's clock and on the PC clock are the same.
4. Go to the **Pre-deployment** menu at the top of the software window.



### 3.1.1 Adjust BLIS calculator

The software counts the number and the volume of bleach squirts and calculates the quantity of the bleach used during a deployment. Make sure that the bleach reservoir is emptied and then filled with 150 mL of 5% fresh bleach before every deployment.

1. Go to the **Pre-Deployment** menu, then select *Clear BLIS Volume Used*.
2. In the window that opens, push **OK** to set the volume of bleach that has been used to 0.00 mL.
3. Go to the *WQM Setup* tab and push **Send New Setup**.  
The "BLIS Volume Used" shows 0.00.

### 3.1.2 Adjust power failure message

If the supplied voltage falls too low or power is lost, the Uninterruptible Power Supply (UPS) comes on. The software shows the condition in red.

Select the "Clear Power Failure Message" to adjust this in the software.

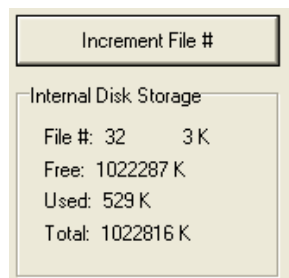
- The UPS message goes out of view.

### 3.1.3 Adjust data file number

**Note:** This is used in **External Control** mode only.

In **External Control** mode, the file numbers do not change. This is so that all of the data in a deployment is collected in the same file.

1. View the "File #."

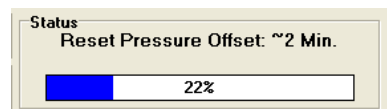


2. Push **Increment File #** to make the file number increase.
3. Push **Get Status**.  
The file number increases by one.

### 3.1.4 Adjust pressure offset

The sensor uses pressure measurements to calculate the depth of the water. As the atmospheric pressure changes, the sensor calculates an offset for the pressure measurement. Set the pressure measurement to 0.00 dbar before a deployment.

1. Select the **Pre-Deployment** menu.
2. Select the *Reset Pressure Offset* menu item.
3. Do the steps in the new window.
  - a. Put the sensor just above the surface of the water near the location of the planned deployment.
  - b. Supply power to the sensor.
  - c. Put the sensor in **In Standby**.
  - d. Push **OK** in the **Reset the WQM Pressure Offset** window.
4. Wait for approximately 2 minutes for the sensor to adjust to the atmospheric pressure and altitude.



5. The message "Pressure Reset Completed" shows in the *Scroll Data* tab.  
The sensor goes into **In Standby**.
6. Remove the power to the sensor.
7. Start the sensor again to make sure that the pressure measurement is  $0.00 \pm 0.01$  dbar.
8. Stop the sensor.
9. Remove the power to the sensor.

## 3.2 Set up sensor for deployment

Use the *WQMx Setup* tab to look at or adjust the parameters that the sensor uses to operate. These include:

- the current time
  - the data collected
  - the condition of the BLIS
  - the condition of the data files
  - the condition of the power supply.
1. If necessary, start the software.
  2. If necessary, supply power to the sensor.
  3. Put the sensor in **In Standby**.

Refer to the section on [Pre-deployment check](#) on page 5 for details.

4. Push **Get Current Setup**.

Look at the values stored in the sensor. They show in the Current Setup area.

View Data | Scroll Data | WQMx Setup | WQMx Output | WQMx Files | Sensor Troubleshooting

Get Current Setup | Send New Setup | Set Date and Time | Save Setup

Setup Parameters | Current Setup | New Setup

Sample Control: Autonomous  
Sample For: 00:55:00  
Interval Time: 01:00:00  
DO Stabilization: 15-120 Secs  
BLIS Operation: On  
Purge When Insitu: Yes  
BLIS Interval: 1 Hour  
Injection Volume: 27.0 ul  
BLIS Volume Used: 0.00 ml  
Est. BLIS Remaining: 231 Days  
Free Disk: 1022607 K

Autonomous  
00:55:00  
01:00:00  
Set by WQM: 15-65 Seconds  
On  
Yes  
1 Hours  
27 ul  
231 Days  
162 Days

Autonomous  
00:55:00  
01:00:00  
Set by WQM: 15-65 Seconds  
On  
Yes  
1 Hours  
27 ul  
231 Days  
162 Days

Show DO Stable vs. Temp. Plot  
Load Setup  
New Setup Power Consumption  
Minimum Expected Temperature: 22 C  
Max Seconds: 26  
Estimated Power Consumption @ 12 V:  
2.326 AH / Day  
Deployment Days  
69.8 AH for 30 Days  
Increment File #  
Internal Disk Storage  
File #: 24 0 K  
Free: 1022607 K  
Used: 209 K  
Total: 1022816 K  
UPS Status  
Normal Interval  
UPS Activations  
Current: 0  
Total: 0

3.2.1 Adjust operation setup

The examples in this section refer to a sensor that is set up for "Autonomous" operation. Refer to the section on [External sample control](#) on page 37 for instructions on how to set up the sensor for External Sample Control.

1. View the values in the 'New Setup' Power Consumption area of the software.

1 Sample For: 00:05:00  
2 Interval Time: 01:00:00  
DO Stabilization: 15-120 Secs  
BLIS Operation: On  
Purge When Insitu: Yes  
BLIS Interval: 1 Hour  
Injection Volume: 27.0 ul  
BLIS Volume Used: 0.00 ml  
Est. BLIS Remaining: 231 Days  
Free Disk: 1022511 K

00:05:00  
01:00:00  
Set by WQM: 15-65 Seconds  
On  
Yes  
1 Hours  
27 ul  
231 Days  
1474 Days

00:05:00  
01:00:00  
Set by WQM: 15-65 Seconds  
On  
Yes  
1 Hours  
27 ul  
231 Days  
1474 Days

'New Setup' Power Consumption  
Minimum Expected Temperature: 20 C  
Max Seconds: 28  
Estimated Power Consumption @ 12 V:  
0.227 AH / Day  
Deployment Days  
3.2 AH for 14 Days  
Increment File #  
Internal Disk Storage  
File #: 29 51 K  
Free: 1022511 K  
UPS Status  
Normal Interval  
UPS Activations  
Current: 0  
Total: 0

1 The number of hours, minutes or seconds that the sensor actively collects data.	4 The number of days that the sensor will be deployed.
2 The time each "Sample For" in #1 is set to, plus the time in low-power and warm-up.	5 The volume of the bleach solution that is used for each injection.
3 The minimum expected temperature in the water where the sensor is to be deployed.	

2. Adjust the values to see how the Estimated Power Consumption @ 12 V and the Est. BLIS Remaining are affected.

3. Adjust these values for the next deployment.

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## Sensor set up and operation

4. Push **Send New Setup** to store the values in the sensor.
5. Push **Get Current Setup** to make sure that the correct values show.

### 3.3 Set up data output

1. Make sure that power is supplied to the sensor and it is in **In Standby** mode.
2. Go to the *WQM Output* tab.
3. Push **Get Output Configuration**.  
Look at the parameters stored in the sensor.
4. Look at the parameters that have checkmarks in the boxes next to them.

Header / Misc	CTD-DO	CTD Derived	Triplet-w
<input checked="" type="checkbox"/> WQMx Header	<input type="checkbox"/> Pump Status	<input type="checkbox"/> RHO (kg/m <sup>3</sup> )	<input type="checkbox"/> Raw ECO 1
<input checked="" type="checkbox"/> SN	<input type="checkbox"/> Conductivity (S/m)	<input type="checkbox"/> Sigma-t (kg/m <sup>3</sup> )	<input checked="" type="checkbox"/> ECO 1
<input checked="" type="checkbox"/> Date	<input checked="" type="checkbox"/> Salinity (PSU)	<input type="checkbox"/> Sound Velocity (m/s)	<input type="checkbox"/> Raw ECO 2
<input checked="" type="checkbox"/> Time	<input checked="" type="checkbox"/> Temperature (C)		<input checked="" type="checkbox"/> ECO 2
<input checked="" type="checkbox"/> Voltage	<input checked="" type="checkbox"/> Pressure (dbar)		<input type="checkbox"/> Raw ECO 3
<input type="checkbox"/> Check Sum	<input type="checkbox"/> Raw DO (Hz)		<input checked="" type="checkbox"/> ECO 3
	<input type="checkbox"/> Oxygen Saturation		
	<input checked="" type="checkbox"/> DO (ml/l)		
	<input type="checkbox"/> DO (mg/l)		
	<input type="checkbox"/> DO (mmol/m <sup>3</sup> )		
	<input type="checkbox"/> % O <sub>2</sub> Sat		

5. Make the selections for the next deployment.  
These parameters will show in the *Scroll Data* tab.  
**Note:** Either the Raw ECO or the ECO always has a checkmark.
6. Push **Send Output Configuration** to store the selections in the sensor.  
These parameters will show in the *Scroll Data* tab when the data is being collected.  
**Note:** Either the Raw ECO or the ECO always has a checkmark.

### 3.4 External data port (EDP)

All WQM sensors have two bulkhead connectors so that the user can connect an external sensor to the WQM. Either a digital (4-socket) or an analog (6-socket) connection is available.

Digital connections:

- CDOM
- PAR
- SBE18S pH
- Custom Setup

Analog connections:

- Analog 1
- Analog 1 + 2
- SBE18 pH
- SBE27 pH and redox

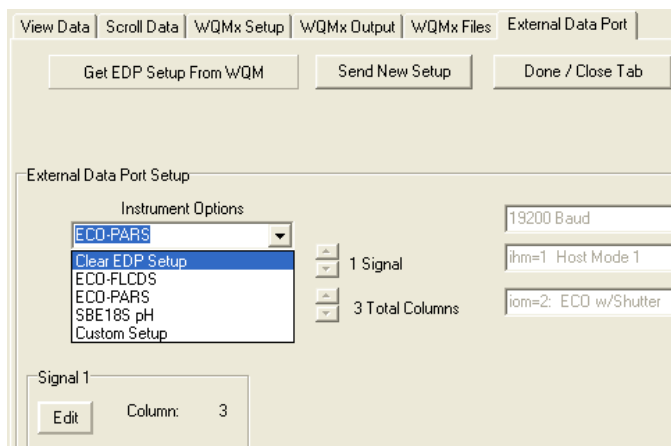
1. Go to the **Advanced** menu at the top of the software screen and select *Setup External Data Port*.

A new tab, *External Data Port*, shows in the software.

2. Push **Get EDP Setup from WQM**.  
Look at the setup values stored in the sensor.

### 3.4.1 Digital EDP setup

The user can adjust the "Signal" values in this tab so that the latest characterization values from a connected sensor are stored in the WQM. Refer to the [Custom EDP set up](#) on page 14 to connect a digital sensor that is not listed in the drop-down menu.



1. Make sure that the external digital sensor is connected to the WQM sensor.
2. Make sure that the sensor is in **In Standby**.
3. Push **Get EDP Setup from WQM**.  
The manufacturer sets up the calibration or characterization values that are specific to an external sensor and these will show in the *External Data Port Setup* tab.
4. If no sensor has been set up, go to the Instrument Options drop-down menu and select the sensor that is connected to the WQM.
5. Make sure that the values on the sensor-specific calibration page for the sensor agree with the information in the Signal 1 area.
6. To change the calibration or characterization values, push **Edit** in the Signal 1 area. The values are the same as the calibration or characterization page, or the most recent application-specific characterization that the user did.
7. Push **Done** in the Signal 1 area.
8. Push **Send New Setup**.  
The calibration or characterization values for the external sensor are stored in the WQM.

### 3.4.2 Analog EDP setup

1. Make sure that the external analog sensor is connected to the WQM sensor.
2. Make sure that the sensor is in **In Standby**.
3. Select the **Advanced** menu, then *Setup Analog*.
4. If no sensor is selected, select the analog sensor that is connected to the WQM from the Instrument Options drop-down menu.  
An example setup for an SBE27 is shown below.

View Data | Scroll Data | WQMx Setup | WQMx Output | WQMx Files | Analog Data Port

Get Analog DP Setup From WQM | Send New Setup | Done / Close Tab

Setup is NOT Current

Analog Data Port Setup

Instrument Options

SBE27 (pH + ORP) SN: SBE27-xxxx

Analog Signal 1		Analog Signal 2	
Math:	SBE-pH	Math:	SBE-ORP
Header:	pH	Header:	ORP
Raw Units:	Volts	Raw Units:	Volts
Units:	pH	Units:	milli-Volts
pH Slope	1.0	ORP M	1.0
pH Offset	0	ORP B	0

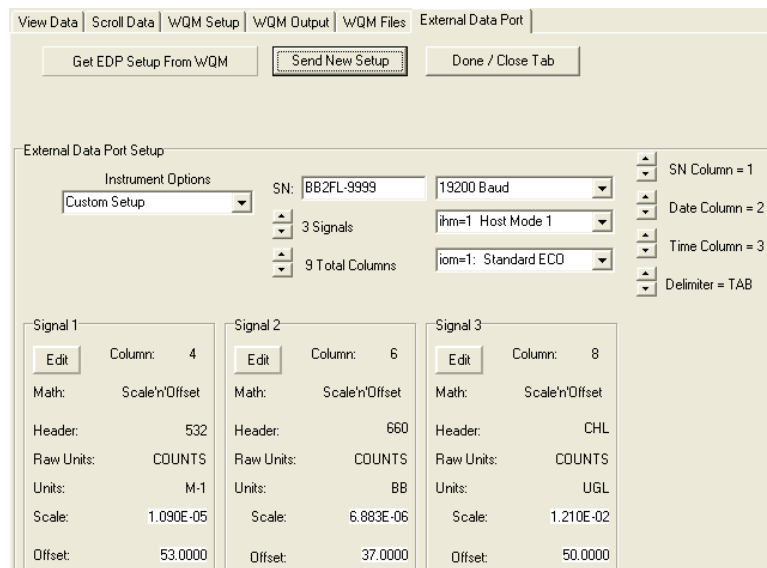
5. Enter the serial number of the analog sensor in the SN: text box.
6. Push **Edit** to change the pH Slope or pH Offset in the Analog Signal 1 area.
7. Push **Done**.
8. Push **Edit** to change the ORP M or ORP B in the Analog Signal 2 area.
9. Push **Done**.
10. Push **Send New Setup**.  
The Status area will show "Loading..." until the new setup is stored in the sensor.
11. Push **Done/Close Tab**.
12. Push **Stop WQM Sample**, then **Yes, Stop WQM Sampling**.
13. Remove power to the WQM.  
The sensor is ready to be deployed.

### 3.4.3 Custom EDP set up

Use the "Custom Setup" function to set up sensors that can collect more than a single "Signal" or parameter of data.

1. Make sure that the external sensor is connected to the WQM.
2. Make sure that the WQM sensor is in **In Standby**.
3. Go to the *External Data Port* tab.
4. Push **Get EDP Setup from WQM**.  
The stored setup values will show in the window. If custom setup values do not show, the user needs to enter them.
5. Select "Custom Setup" in the Instrument Options drop-down menu.
6. Do the procedures below to set up a three-parameter *ECO* sensor as in the example.  
The user needs the sensor's device file to complete the setup.

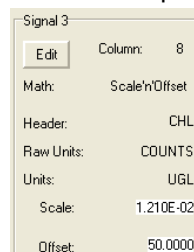




- Select the serial number ("SN") of the sensor connected to the WQM.
- Select the number of sampling parameters ("Signals") the sensor has.
- Select the "Total Columns" of output.  
The software counts the S/N, Date, Time as columns 1–3. The data format of the external sensor is N/U, Data, N/U, Data, N/U, Data, N/U where N/U is "not used" and the data ("Signal") as the WQM host calculates it is in columns 4, 6, and 8.

07/24/13	13:19:03	532	4122	660	4122	695	1627	532
07/24/13	13:19:04	532	4122	660	4122	695	1428	532
07/24/13	13:19:05	532	180	660	524	695	74	532
07/24/13	13:19:06	532	401	660	831	695	94	532
<b>Date</b>	<b>Time</b>	<b>N/U</b>	<b>Data</b>	<b>N/U</b>	<b>Data</b>	<b>N/U</b>	<b>Data</b>	<b>N/U</b>

- Select "19200" for the baud rate of the sensor.
  - Select "ihm=1" for a standard *ECO* sensor. Or select "ihm=2" for a Triplet-w.
  - Select "iom=1" for a standard *ECO* sensor. Or, select "iom=2" for an *ECO* sensor with a Bio-wiper. Or, select "iom=3" for a Triplet-w.
  - Select "1" for the SN Column.
  - Select "2" for the Date Column.
  - Select "3" for the Time Column.
  - Select either Comma, or Tab, or Space to separate the columns of the collected data.
7. Do the procedures below to set up each of the three signals as in the example.



- Push **Edit** in the Signal 3 area.
  - Select "8" for the Column.
  - Select "Scale'n'Offset:" for the Math.  
The Header value is fills in automatically.
  - Enter "Counts" for the Raw Units.  
("DKFOL" means "don't know find out later")
  - Enter "µg/L," or "scattering" or other appropriate label value for the Units.

- e. Enter the Scale, the scale factor of the sensor from the sensor-specific calibration or characterization page.
- f. Enter the Offset, the offset (dark counts) value from the sensor-specific calibration or characterization page.
9. Push **Done**.
10. Do the step above for Signal 1 and Signal 2.
11. Push **Send New Setup**.  
Make sure that the *Status* area at the top of the window shows "Storing EDP Setup" while the setup values are saved to the WQM.
12. Go to the *Sample Output* tab.
13. Select either or both Raw EDP 1 and EDP 1.  
"Raw" is output in counts. EDP is processed output such as µg/L, NTU, scattering, etc.
14. Press **Send Output Configuration**.  
The *Status* area shows "Loading Output."

### 3.4.4 Erase EDP setup

Do these steps to erase the setup that is stored in the WQM sensor.

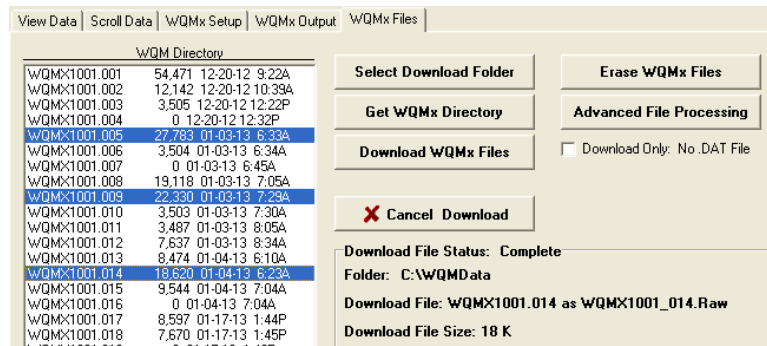
1. Make sure that the status of the WQM is **In Standby**.
2. Go to the **Advanced** menu at the top of the software window.
3. Select *Setup External Data Port*.  
The *External Data Port* tab opens.
4. Under the Instrument Options drop-down menu, select "Clear EDP Setup."
5. Push **Send New Setup**.  
The status of the WQM shows **Erasing EDP Setup**.
6. Turn off the power supply and disconnect the sensor that is connected to the external data port.
7. Connect a different sensor.
8. Turn the power supply on.  
The WQM does its warm-up cycle and starts to collect data.
9. Push **Stop WQM Sample**.  
The sensor is in **In Standby**.
10. Go to the **Advanced** menu at the top of the software window.
11. Select **Setup External Data Port**.
12. Under the Instrument Options drop-down menu, select the sensor that is connected to the WQM external data port.
13. Refer to the [Digital EDP setup](#) on page 13 section or the [Custom EDP set up](#) on page 14 section to complete the set up of the sensor that is connected to the WQM.

## 3.5 Monitor data collection

Monitor the data that is collected in the *Scroll Data* tab or the *View Data* tab. Use the selections in the Data Sidebar area to monitor the data in the graph area of the *View Data* tab. Refer to the section [Monitor data](#) on page 6 for details.

## 3.6 Save data

Go to the *WQMx Files* tab to save and erase data from the sensor.



1. Push **Select Download Folder** to select a location on the PC to save the downloaded data.
2. Push **Get WQMx Directory**.  
A list of the files stored in the sensor shows in the WQM Directory area.
3. Select the file or files to download to the PC. In the example above, files 005, 009 and 014 from WQMx 1001 are selected.  
The user can adjust the baud rate to 115200 to increase the download speed.
4. Push **Download WQMx Files**.  
The Download File Status shows "Complete" when the last selected file is downloaded.
5. To stop a file or files from being downloaded, push **Cancel Download**.
  - Software version 1.5 and newer: the file transfer will stop immediately.
  - Software version 1.26 and older: the file transfer will complete for the current file, and then stop.

## 3.6.1 File types

The software saves both **.raw** and **.dat** files to the PC.

- The **.raw** file is the data that is stored in the sensor.
- The **.dat** file has processed data with both raw (counts) and derived values.

To view collected data in counts only, select the box at "Download Only: No .DAT" in the WQM Files tab.

To view the data collected in counts and as processed data, ignore the checkbox or select **Advanced File Processing**. Refer to the section on [Advanced file processing](#) on page 41 for details. Processed data is saved to the PC.

## 3.7 Erase data

The user can erase selected files from the sensor or format the sensor memory card.

1. Go to the WQMx Files tab.
2. Push **Get WQMx Directory**.
3. Select the files to erase from the directory.
4. Push **Erase WQM Files**.
  - To erase the selected files, select **Delete the Selected Files**.
  - To erase all of the files on the flash memory card, select **Flash Format the Flash Memory Card**.
5. Push **Erase**.  
The Status area at the top of the window shows the percentage of the selected files that have been erased.
6. Push **Done** to go to the WQMx Files tab again.

### 3.8 Set up BLIS for deployment

#### DANGER

Bleach is corrosive and harmful to almost every part of the sensor. Make sure that bleach does not get into the sensor.

The BLEach Injection System (BLIS) must be filled with bleach and its pump must be primed before deployment. Only put bleach into a BLIS that will be deployed. If the sensor will be put in storage, make sure there is NO bleach in the system.

#### Supplies:

User-supplied	Manufacturer-supplied
Clean water	5/32" hex key
Container for up to 150 ml of bleach	Plastic-tipped syringe (10 ml)
Household bleach	Syringe with quick-disconnect attachment (3 ml)

1. Insert the long end of the 5/32" hex key straight through the hole in the copper BLIS guard.

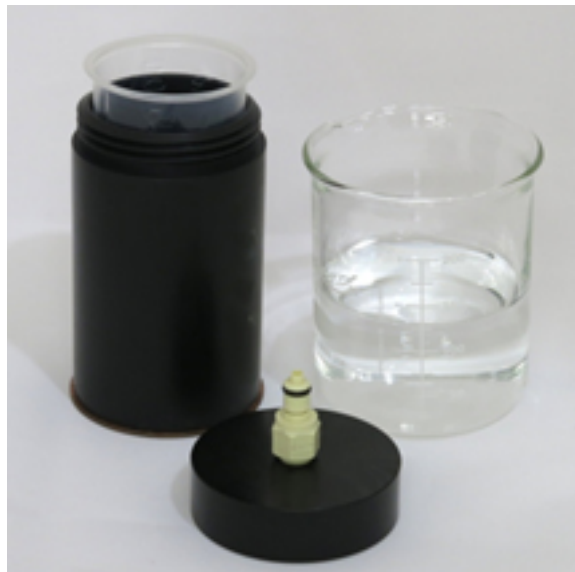


The key touches the reservoir release button.

2. Push firmly on the key to release the reservoir.
3. Insert the short end of the 5/32" hex key into one of the holes at the top of the reservoir and lift the reservoir straight up and out.



4. Turn the top of the reservoir counterclockwise to remove.
5. Make sure there is a Playtex™ Drop-Ins® liner inside the reservoir.
6. Pour 125–150 ml of bleach into the liner inside the reservoir.



The appropriate quantity of bleach will vary with the deployment environment. The maximum capacity of the reservoir is 150 ml.

7. Attach the top to the reservoir again.
8. Insert the reservoir into the copper sleeve and push firmly until the reservoir "clicks" into place.



9. Make sure the reservoir is secure: insert the short end of the 5/32" hex key into one of the holes on the top and pull up. The reservoir does not release.

**Installation tip:** If the reservoir does not "click" into place, make sure that the pin on the receiving connector is in the unlocked position.



Unlocked



Locked

## Section 4 Sensor maintenance

### ⚠ CAUTION

Do not use acetone or other solvents to clean any part of the sensor.

1. After each cast or exposure to natural water, flush the sensor with clean fresh water.
2. Use soapy water to clean any grease or oil on the optical face of the sensor. It is made of ABS plastic and optical epoxy and can be damaged if an abrasive cleaner is used.
3. Dry the sensor with a clean soft cloth.

### 4.1 CT-DO maintenance

### ⚠ CAUTION

Do not use Triton® X-100 for long wash periods. Long exposure to Triton® X-100 damages the DO sensor membrane and changes the calibration of the sensor.

### ⚠ CAUTION

Never put undiluted Triton® X-100 or bleach into the sensor.

**Note:** A stronger solution does not clean better. Do not use stronger solutions or longer wash times than those recommended by the manufacturer.

Clean the conductivity cell and the dissolved oxygen sensor, which are in the CT-DO flow path. Sensors that have marine growth that can be seen are dirty. The user may need to do the steps below up to five times.

**Supplies:**

- De-ionized or distilled water. If unavailable, use fresh tap water, used with Triton® X-100 or bleach. Do not use shipboard fresh water because it can have traces of oil in it.
  - Triton® X-100 mixed 1000:1—The manufacturer supplies Triton® X-100 with each sensor. Triton® X-100 is octyl phenol ethoxylate, a mild, non-ionic detergent. Make sure that any alternative detergent that is used is scientific grade, with no colors, perfumes, glycerins, lotions, etc.
  - Bleach mixed 50:1—Household bleach is usually 4–7% (40,000–70,000 ppm) sodium hypochlorite with stabilizers.
  - Manufacturer-supplied CT-DO cleaning device.
  - 19 liter (5 gal.) container to put water and the sensor in.
1. Bend the exhaust tube assembly to remove the exhaust tube from the lower elbow fitting.

**Figure 1 Exhaust tube removed from elbow fitting**



Do not remove the screws that attach the elbow fittings to the sensor.

2. Soak the sensor upside down (optics end up) in a container of water at approximately 20 °C for a minimum of 30 minutes.
3. Put the 3/8" ID tubing of the CT-DO cleaning device on the exhaust elbow fitting.
4. Remove the plunger from the syringe.
5. Fill the syringe and the attached hose with DI water.
6. Put approximately 1 liter of DI water into the syringe and tubing. This flushes the inside of the sensor.
7. Put the mixed Triton® X-100 solution into the syringe.

**Figure 2 Triton® X-100 solution into the CT-DO**



8. Put the plunger in the syringe and push the solution into the CT-DO chamber.
9. Push and pull on the plunger quickly to mix the solution. Bubbles eject from the intake port.
10. Do steps 6–8 two to three more times.
11. Remove the syringe plunger.
12. Hold the syringe up and fill it with the diluted bleach solution.
13. Put the plunger in the syringe and push the solution into the CT-DO chamber.
14. Push and pull on the plunger quickly to mix the solution.
15. Do steps 10–13 two to three more times.
16. Flush with DI water (refer to step 6) to clean the sensor of bleach and detergent.

## 4.2 Replace CT-DO anti-fouling devices

### **⚠ DANGER**

AF24173 Anti-foulant devices contain (bis)tributyltin oxide. Handle the devices only with rubber or latex gloves. Wear eye protection. Wash hands with soap and water when the replacement is complete. Read the precautionary information on the product label first. Refer to the section on the [AF24173 anti-fouling device](#) on page 48 for details. It is a violation of US Federal Law to use this product in manner that is inconsistent with its labeling.

There are two anti-fouling devices in the CT-Do flow path. One is in the intake and the other is in the exhaust. They are good for approximately one year. The manufacturer replaces these when the user returns the sensor for annual maintenance. The user can get replacement devices from Sea-Bird Electronics company (P/N AF24173).



### 4.2.1 Replace CT-DO intake anti-fouling cartridge

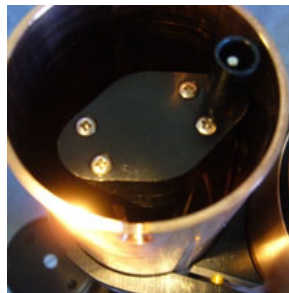
1. Use a #2 Phillips screwdriver to remove the two screws on opposite sides of the copper sleeve. Do not remove the three screws on the top.

Figure 3 CT-DO end cap removal



2. Pull the end cap up and off. **Do not twist.**
3. Use a #0 Phillips screwdriver to loosen the four screws that attach the duct top to the base.

Figure 4 Anti-fouling duct screws



Note that the screws have size 003 O-rings under their heads.

4. Lift the duct top straight up and off.
5. View the anti-fouling cartridge in the duct base.

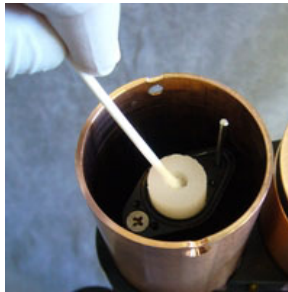
Figure 5 Anti-fouling cartridge



If necessary, push the size 021 O-ring back in its groove.

6. Use a cotton swab to remove the anti-fouling cartridge from the duct base. To prevent damage to the duct base, do not push the swab all the way through the cartridge.

Figure 6 Removal of anti-fouling cartridge



If the cartridge is difficult to remove, use needle-nose pliers to break up the anti-fouling cartridge.

7. Clean the inside of the duct base.
8. Put the used anti-fouling cartridge and the swab into a plastic bag for disposal.
9. Put a new anti-fouling cartridge on a cotton swab and put it in the duct base.
10. Use the end of the swab to make sure the anti-fouling cartridge is in the duct base correctly.
11. Make sure that the O-ring is clean and has no contamination from the swab.
12. Replace the duct top.  
Make the four screws snug, not tight. There is no gap between the duct top and the duct base.
13. Put the end cap on the protective sleeve.  
The user can view the temperature probe in one of the holes.
14. Install the Phillips screws to attach the end cap to the sleeve.

### 4.2.2 Replace CT-DO exhaust anti-fouling cartridge

The second anti-fouling cartridge is in a canister in the exhaust tubing.

1. Turn the right-angle hose barbs as necessary to disconnect the tubing and the canister from the hose barbs. It may be necessary to loosen the screws that hold the hose barbs so that they can be turned. **Do not loosen the screws more than 1/4-turn.**

Figure 7 Tube disconnected from bottom elbow



Note that one end of the canister has wrench flats.

2. Use a wrench to unscrew the end of the canister.

Figure 8 Canister end cap removal



3. Use a cotton swab to remove the anti-fouling cartridge.
4. Clean the canister with a lint-free tissue or canned air.
5. Put the new anti-fouling cartridge in the canister.
6. Replace the end cap of the canister.
7. Attach the tubing to the canister.
8. Attach the tubing to the right-angle hose barbs.

### 4.3 Clean ECO sensors

The procedures to clean or replace the anti-fouling wipers on the *ECO* sensors in the WQM and the WQMx are similar.

- The WQM has an integrated *ECO* two-parameter sensor with a solid Bio-wiper that covers the optics of the sensor. The wiper can be cleaned or replaced. Refer to the section on [Clean Bio-wiper and faceplate](#) on page 25 for details.
- The WQMx has an integrated *ECO* three-parameter sensor with a three-legged wiper. Both the wiper and the wiper motor can be replaced. Refer to the section on [Wiper replacement](#) on page 27 for details.

#### 4.3.1 Clean Bio-wiper and faceplate

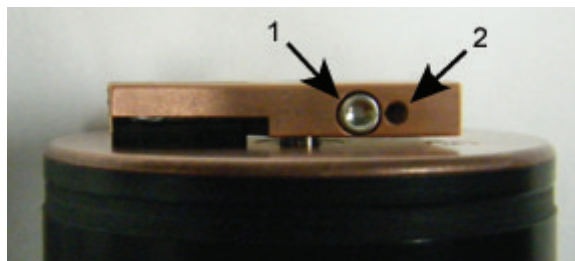
Sensors that have copper faceplates and copper Bio-wipers need to be cleaned at regular intervals to keep the copper effective as an anti-fouling aid. Remove the Bio-wiper and faceplate from the sensor to clean them.

#### NOTICE

Do not twist the Bio-wiper or the Bio-wiper shaft by hand. Push **Open Shutter** and **Close Shutter** in the software to turn the Bio-wiper. Turning by hand will damage the Bio-wiper motor.

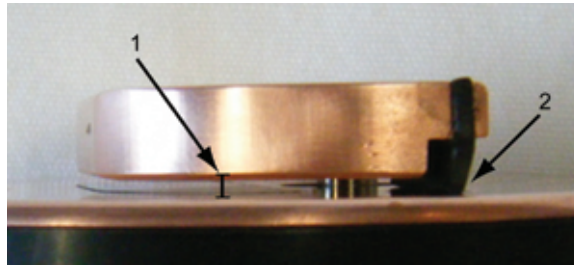
1. Disconnect the sensor from any power source.
2. Use the manufacturer-supplied 3/32" hex key to loosen the screw that holds the Bio-wiper to the sensor.  
If necessary, insert the manufacturer-supplied jacking screw into the expander hole to loosen the Bio-wiper. *PAR sensors do not have an expander hole and do not ship with jacking screws.*

Figure 9 Bio-wiper screw holes



1 the screw in the clamping hole	2 the expander hole
----------------------------------	---------------------

3. Lift the Bio-wiper off of the faceplate.
4. If used, remove the jacking screw.
5. Use a small Phillips screwdriver to remove the screws that attach the faceplate to the optics face.
6. Keep the screws.
7. Clean the Bio-wiper and faceplate with soapy water.
8. Rinse and dry thoroughly.
9. Use a Scotch-Brite® or similar pad to buff the Bio-wiper and faceplate until they are shiny.
10. Use an isopropyl alcohol-saturated cotton swab to clean the Bio-wiper shaft and the shaft hole.
11. Make sure the Bio-wiper and faceplate dry completely.
12. Attach the faceplate again.
13. Make sure the screw used to attach the Bio-wiper is in good condition.  
The 3/32" hex key must fit into the screw's socket.
14. If the screw is damaged, use a new screw from the spare parts kit that the manufacturer supplies with the sensor.  
These screws are 4-40 x 3/8" 316 stainless steel and are treated with anti-seize.
15. Insert a jacking screw into the expander hole of the Bio-wiper. Turn it slowly until the Bio-wiper goes onto the shaft easily.
16. Put the clean Bio-wiper over the shaft but do not twist the Bio-wiper.
17. Make sure to remove the jacking screw before tightening the 3/32-inch clamping screw.
18. Use the commands in the software to put the Bio-wiper into the closed position.  
The Bio-wiper covers the optics.
19. Set the clearance between the Bio-wiper and the faceplate to approximately 0.6 mm.  
**Note:** If the Bio-wiper is has too much bend because it is too close to the faceplate, the motor will use too much current. If it is not close enough to the faceplate, the Bio-wiper will not keep the optics clean.

**Figure 10 Bio-wiper clearance****1** Bio-wiper clearance from faceplate**2** Bio-wiper flex

- 20.** Use the 3/32" hex key to tighten the screw. Do not over-tighten the screw.
- 21.** Turn on the sensor to make sure that the Bio-wiper rotates correctly.  
The Bio-wiper must rotate 180 degrees and uncover the optics before they come on.  
The Bio-wiper will then rotate 180 degrees to cover the optics after they come on.

### 4.3.2 Wiper replacement

Replace the sensor's wiper with a new one from the wiper replacement kit (sold separately).

- 1.** Use a 1/16" hex wrench to loosen the wiper's set screw.

**Figure 11 Wiper set screw loosened**

- 2.** Lift the wiper off of the wiper motor shaft.
- 3.** Put the new wiper on the motor shaft.
- 4.** Put the wiper height gauge on the faceplate under the wiper and around the motor shaft.

**Figure 12 Wiper height gauge inserted**

- 5.** Turn the wiper so that the set screw faces the flat on the motor shaft.
- 6.** Push down on the wiper to pinch the wiper height gauge between the wiper and the faceplate and tighten the wiper set screw.

Figure 13 Wiper attached with set screw



7. Remove the wiper height gauge.

### 4.4 Examine pressure sensor

#### ⚠ CAUTION

Do not use a brush or any object in the pressure sensor. It is easy to break.

Examine the pressure sensor at regular intervals and remove any particles or debris.

Figure 14 Pressure sensor



### 4.5 Examine and maintain BLIS

#### ⚠ CAUTION

Sediment and other solids will cause the BLIS intake area to become clogged and it will not function correctly.

#### ⚠ CAUTION

Do not use any abrasive the inside of the BLIS intake. Scratches on this surface will prevent the nipple of the bleach reservoir from a proper seal.

The Bleach Injection System (BLIS) uses a Playtex Drop-Ins® liner as a bleach reservoir. This product is made of a recyclable (check local with the local waste carrier) HDPE plastic that can withstand long-term exposure to bleach. DO NOT substitute with another liner.

Make sure that the BLIS operates correctly. Operate the system with water as a operational check. Only fill the reservoir with bleach immediately before deployment.

1. Follow the steps in [Set up BLIS for deployment](#) on page 18 to remove the bleach reservoir.
2. Use a 5/32" hex key to loosen the clamp that holds the CT sensors and BLIS.



3. Lift the clamp up and off the CT and BLIS protective copper sleeves.
4. Use a 5/32" hex key to remove the two 10-24 x 1/2" screws at the base of the BLIS sleeve.



5. Lift the copper BLIS sleeve up and off. Do not twist any more than necessary.
6. If necessary, use a Scotch-Brite™ scrub pad to remove any corrosion that "flakes" off.
7. Flush the copper sleeve with clean water.
8. Clean the intake area:
  - a. Use a lint-free towel or tissue to clean the area.
  - b. Do not scrape the inside the intake. Scratches may prevent the bleach reservoir from a correct seal.
  - c. Use the plastic-tipped syringe to flush the intake area with clean water.



#### 4.5.1 Verify flow volume of BLIS

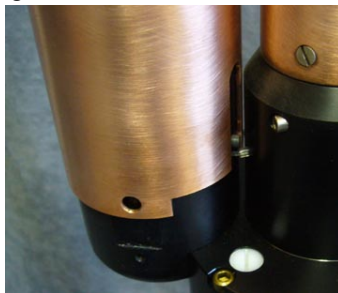
While the copper sleeve is still off of the intake area of the BLIS, use the 3 mL syringe with the quick disconnect fitting to verify that the flow volume of the BLIS is correct.

1. Connect the sensor to the PC and power supply.
2. Start the software.

3. Supply power to the sensor.
4. Push **Stop WQM Sample**, then **Yes**, then **Stop WQM Sampling**.  
The sensor is in Standby mode.
5. Go to the **Help** menu and select *Troubleshooting*.
6. Connect the 3 ml syringe to the intake and fill with clean water.



7. Under "Select Test Mode" select "Test BLIS."  
The sensor status is "Test BLIS Pump."
8. Push **Run 100 BLIS Cycles**.  
The pump makes a "click" sound each time it operates. The user can see the water level fall in the syringe. The water will fall approximately 1–1.5 ml per 100 cycles. The software shows each pump cycle. Refer to the Troubleshooting section for details about what to do if the water level does not fall.
9. Fill the syringe again and run 100 BLIS cycles again.
10. Turn off power to the sensor and disconnect it from the PC and power supply.
11. Press the metal tab to release, and remove the syringe assembly from the intake.
12. Assemble the BLIS:
  - a. Slide the copper sleeve onto the sensor, and make sure that the slot in the copper guard aligns correctly with the yellow fitting on the side. Slide the copper guard straight down. Do not twist.



- b. Install the two 10-24 x 1/2" screws at the bottom of the sleeve. Install finger-tight only.
13. Install the bleach reservoir:
  - For deployment, add up to 150 ml of bleach.
  - For storage, make sure the liner is clean and empty.
14. Slide the clamp over the BLIS and CT sleeves approximately 8 cm from the top of the BLIS sleeve.



15. Use a 5/32" hex key to install the screw in the clamp. Do not overtighten.
16. Hold the clamp only to lift the sensor.  
If the clamp does not slip, it is tight enough.

#### 4.5.2 Troubleshoot BLIS

If the water level in the intake area does not fall while the BLIS is in operation, do the steps below.

1. Make sure that the sensor has power supplied and is in communication with the software.
2. Make sure the pump has time to operate. The flow rate is approximately 1–1.5 ml per 100 pump cycles (1 ml/min).
3. Check again for blockage at the intake.
4. Flush the intake with clean water.
5. Listen for the pump to click.
  - a. If it clicks but water does not flow, contact the manufacturer to send the sensor for service.
  - b. If it does not click, but communicates, contact the manufacturer to send the sensor for service.

#### 4.6 Maintain bulkhead connector

### ⚠ CAUTION



Do not use WD-40® or petroleum-based lubricants on bulkhead connectors. It will cause damage to the rubber.  
Damaged connectors can cause a loss of data and additional costs for service.  
Damaged connectors can cause damage to the sensor and make it unserviceable.

Examine, clean, and lubricate bulkhead connectors at regular intervals. Connectors that are not lubricated increase the damage to the rubber that seals the connector contacts. The incorrect lubricant will cause the bulkhead connector to fail.

1. Apply isopropyl alcohol (IPA) as a spray or with a nylon brush or lint-free swab or wipes to clean the contacts.
2. Flush with additional IPA.
3. Shake the socket ends and wipe the pins of the connectors to remove the IPA.
4. Blow air into the sockets and on the pins to make sure they are dry.
5. Use a flashlight and a magnifying glass to look for:

Cracks, scratches, or other damage on the rubber pins or in the sockets.		
Any corrosion.		

## Sensor maintenance

Separation of the rubber from the pins.	
Swelled or bulging rubber pins.	

6. Apply a small quantity of 3M™ Spray Silicone Lubricant (3M ID# 62-4678-4930-3) to the pin end of the connector. Make sure to let it dry.
7. Connect the connectors.
8. Use a lint-free wipe to clean any unwanted lubricant from the sides of the connectors.

### 4.7 Long term storage

The user needs to do several steps to store the sensor for several weeks to several months.

**Note:** Keep the sensor at or below 25 °C when possible. Temperatures above 40 °C cause an increase in the sensitivity of the sensor. It takes several days for the sensor to return to normal operation.

#### ⚠ CAUTION

Bleach and Triton® X-100 are corrosive. Do not store the sensor with either solution still in the sensor.

1. Clean the sensor in fresh water. Refer to [CT-DO maintenance](#) on page 21 for details.
2. Clean the BLIS and make sure there is no bleach in the sensor. Refer to [Examine and maintain BLIS](#) on page 28 for details.
3. Shake any excess water out of the sensor. If there is a possibility that the sensor could freeze, store it where temperatures are above freezing and keep the sensor warm before deployment.
4. Cover the intake and the exhaust ports on the CT-DO guard with tape. The calibration drift is reduced if air does not enter the sensor.

### 5.1 Setup selections

The user can view or adjust the sensor configurations below in the *Setup* tab.

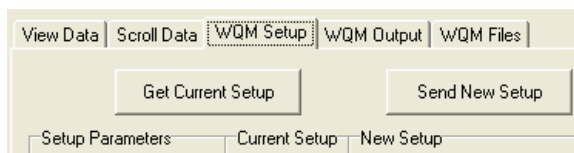
- the internal clock
- the sample parameters
- the BLIS parameters
- the condition of the BLIS
- the quantity of data storage used
- the condition of the Uninterruptible Power Supply (UPS)

#### 5.1.1 Date and time

The software shows the date and the time for both the WQM and the PC. This information has a red background if the clocks are different by more than 5 seconds.

Push **Set Date and Time** to update the date and time in the sensor to the PC.

#### 5.1.2 Get and send setup information



The values that the user can change are listed under the Setup Parameters heading.

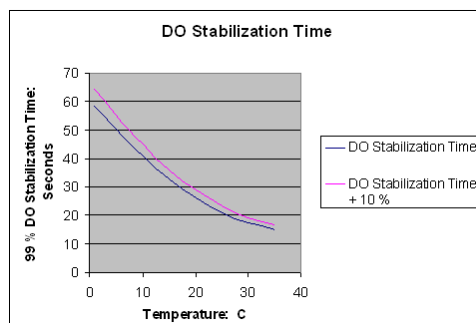
Push **Get Current Setup** to get the setup information that is stored in the sensor. This information will show under the Current Setup heading.

Any setup values that the user changes will show under the New Setup heading and have a yellow background. Push **Send Current Setup** to save new values to the sensor. The yellow background goes out of view.

**Note:** Push **Get Current Setup** to make sure that the values are stored in the sensor.

#### 5.1.3 Dissolved Oxygen (DO) stabilization time

Push **Show DO Stable vs. Temp. Plot** to see a graph of the relationship between the temperature of the water and the time required to get a stable DO value.



#### 5.1.4 Bleach Injection System (BLIS) operation

The BLIS sends bleach into the pump manifold just below the DO sensor. The bleach prevents biological fouling on the DO sensor membrane.

BLIS Operation:	On	<input checked="" type="checkbox"/> On
Purge When Insitu:	Yes	<input checked="" type="checkbox"/> Yes
BLIS Interval:	1 Hour	1 Hours
Injection Volume:	36.0 ul	36 ul <input type="text"/>
BLIS Volume Used:	0.00 ml	
Est. BLIS Remaining:	173 Days	173 Days
Free Disk: 1022383 K	496 Days	496 Days

Adjust the BLIS for the type of environment it will be deployed in.

- **BLIS Operation**—Set to "On." When the conductivity value shows that the sensor is in water, the BLIS sends bleach to the pump manifold after the first sample of every hour.
- **Purge when in situ**—Set to "Yes." When the sensor is in situ, the BLIS pump operates 20 times to remove air or water from the BLIS tubing. This makes sure a sufficient quantity of bleach is available to protect the DO sensor.
- **BLIS Interval**—The BLIS sends the selected quantity of bleach after the first sample of every hour.
- **BLIS Injection Volume**—Select the quantity of bleach to be used in 9  $\mu\text{L}$  increments. The manufacturer recommends a minimum of 36  $\mu\text{L}$ .
- **BLIS Volume Used**—The host software makes a continuous estimate of the quantity of bleach used in relation to the quantity selected by the user.
- **Estimated BLIS Remaining**—The host software makes a continuous estimate of the quantity of bleach in the reservoir. The estimate is in relation to the **Sample Interval**, the **Injection Volume**, and the **BLIS Volume Used**.

### 5.1.5 Power use estimates

The software calculates the power required by the sensor to complete a deployment in the 'New Setup' [Power Consumption](#) area.

**Note:** The user should add 10–25 % to the estimates of the software for factors such as battery chemistry self-discharge.

'New Setup' Power Consumption	
Minimum Expected Temperature: 15 C	Estimated Power Consumption @ 12 V:
Max Seconds: 35	
<input type="text" value="0.711"/>	0.711 AH / Day
Deployment Days: <input type="text" value="28"/>	19.9 AH for 28 Days

The "Estimated Power Consumption @ 12 V" uses the values from the "Sample For:," the "Interval Time:," and the "DO Stabilization:" time in relation to the user-selected expected water temperature to estimate how much power the sensor will use during 24 hours of data collection.

The total power use for a deployment is the daily power use multiplied by the number of days the user selects in the "Deployment Days" slider.

### 5.1.6 Sensor internal disk storage

The [Internal Disk Storage](#) shows the condition of the memory in the sensor.

Increment File #	
Internal Disk Storage	
File #: 32	3 K
Free: 1022287 K	
Used: 529 K	
Total: 1022816 K	

- **File #**—Shows the current file number and the size of the file.
- **Free**—Shows the available memory in the sensor.
- **Used**—Shows the total size of all of the files stored in the sensor.
- **Total**—Shows the total memory of the sensor.

The [Free Disk](#) at the bottom of the [Setup Parameters](#) column shows an estimate of the number of days the sensor can store data before the memory is full.

### 5.1.7 User-specific internal sensor characterization

#### ⚠ WARNING

FDOM sensors use an ultraviolet LED light source. Do not look directly at a UV LED when it is on. It can damage the eyes. Keep products that have UV LEDs away from children, pets, and other living organisms. Wear polycarbonate UV-resistant safety glasses to protect the eyes when a UV LED is on.

The manufacturer characterizes the internal *ECO* sensor but the user can replace these values with application-specific values.

1. Make sure that the WQM is in **In Standby**.
2. Go to the **Help** menu and select *Enable Internal ECO Setup*.
3. Go to the **Advanced** menu and select *Setup Internal ECO*.
4. Push **Get Internal ECO Setup from WQM**.  
The characterization values stored in the sensor can be viewed in the ECO Signal 1, ECO Signal 2, and ECO Signal 3 areas of the tab.  
*Note: Not all sensor models have three signals.*
5. Push **Edit** in the ECO Signal area.  
**Edit** changes to **Done**.
6. Change the "Scale" and "Offset" values.

The screenshot shows the 'Internal ECO Setup' window with the following details:

- Instrument Options:** BBFL2W - NTU, CHLa, CDOM
- SN:** BBFL2W-0345
- Baud Rate:** 19200 Baud
- Signals:** 3 Signals
- Total Columns:** 9 Total Columns
- Host Mode:** ihm=1 Host Mode
- Wiper Mode:** iom=3: ECO w/wiper
- SN Column:** 0
- Date Column:** 1
- Time Column:** 2
- Delimiter:** TAB

ECO Signal 1		ECO Signal 2		ECO Signal 3	
Math:	Column:	Math:	Column:	Math:	Column:
None	4	None	6	None	8
Header:	Turbidity	Header:	CHLa	Header:	CDOM
Raw Units:	Counts	Raw Units:	Counts	Raw Units:	Counts
Units:	NTU	Units:	ug/l	Units:	ppb-QSDE
Scale:	6.000E-03	Scale:	1.200E-03	Scale:	4.500E-03
Offset:	45.0000	Offset:	45.0000	Offset:	46.0000

7. Push **Done**.
8. Push **Send New ECO Calibration**.  
The sensor Status area shows **Loading ECO Calibration**.
9. Push **Done/Close Tab** to hide the *Internal ECO* tab.

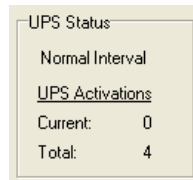
### 5.1.8 Uninterruptible Power Supply (UPS)

The WQM has a UPS that comes on if the sensor loses power while data is being collected. The UPS will supply power to the sensor long enough to save recently collected data, close any files that are open, and store the required operation values. The UPS does not supply power to the internal ECO sensor: the wiper on an FLNTU will stay in an open position and bio-fouling can occur.

If power is supplied to the sensor within 1 second of removal, the sensor will start data collection again.

The UPS has a 9-volt lithium battery. The battery can supply power for thousands of shutdown cycles but it does have a limited time of operation. The manufacturer recommends that the user return the sensor for battery replacement every 3 years. Note

that the manufacturer replaces the battery every time the sensor is returned to be calibrated or serviced.



The UPS in the sensor comes on when the voltage falls below 8 V while the sensor collects data.

- **Autonomous Control:** The sensor closes its data files, goes into a low power state, and comes on again for the next scheduled data collection.
- **External Control:** The sensor goes to **In Standby**.

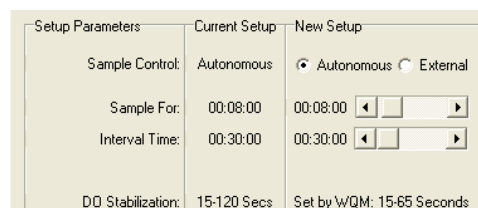
### UPS conditions

- Normal—The normal condition of the UPS is shown above. The sensor is operating at the normal, user-selected, data collection schedule.
- Red box, "Power Failure Detected" "Normal Interval"—one or two consecutive data collection sequences have been interrupted by a power loss or low voltage. The sensor will try to collect data on its normal schedule.
- Red box, "Power Failure Detected" "1 Hour Interval"—three to five consecutive data collection sequences have been interrupted by a power loss or low voltage. The sensor will try to collect data after a one-hour delay.
- Red box, "Power Failure Detected" "24 Hour Interval"—six or more consecutive data collection sequences have been interrupted by a power loss or low voltage. The sensor will try to collect data after a 24-hour delay.
- Yellow box, "Power Failure Detected" "Normal Interval"—The UPS has come on but the sensor completed the last data collection try.

### Clear power failure message

- Go to the *Pre-Deployment* menu at the top of the software window. Select "Clear Power Failure Message."

## 5.1.9 Autonomous sample control



Use the Autonomous Sample Control value when the sensor is connected to a constant power source. The sensor uses the internally stored setup to collect and save data, and to go into a low power state. The file names of the saved data increment each time the sensor is turned on. The file names append when the sensor has power and is collecting data or in a low power state.

In the example above, the sensor is set up to collect data for 8 minutes every 30 minutes.

### 5.1.10 External sample control

Setup Parameters	Current Setup	New Setup
Sample Control:	External	<input type="radio"/> Autonomous <input checked="" type="radio"/> External
Sample For:	00:08:00	00:08:00 <input type="text"/>
Sample Delay:	00:04:45	00:04:45 <input type="text"/>
DO Stabilization:	00:00:15	00:00:15 <input type="text"/>

Use the External Sample Control to align the data that is collected by the WQM sensor with the data that is collected from other sensors when they are all connected to an external logger or controller. The WQM is turned on by the external logger at the start of the sample interval. The logger sends a "stop" command to the WQM sensor at the end of the data collection (sample) interval. The external logger turns the power off.

The user can adjust the data collection time, the delay time, and the length of time the sensor will wait for the dissolved oxygen value to become stable.

- Sample For: The maximum length of time the sensor collects data before it stops and goes into a low power state.
- Sample Delay: The user can adjust the length of time the sensor waits to collect data. This helps the user align the start of data collection with sensors that have a longer warm-up time, and decreases the sensor's power consumption.
- DO Stabilization: The user sets the length of time the sensor will wait for a stable DO value.

## 5.2 Data collection

The sensor can be set up to start data collection at a user-specified time and date.

1. Make sure the sensor is in **In Standby**.
2. Push **Start WQM Sample**.
3. Use the calendar and the slider menu to set a date and time for the sensor to start data collection.

Start WQM Sample Sequence

Start WQM Now

Start WQM in 3 Hours 12 Minutes and 22 Seconds

February, 2013

Start Sample @ 09:58 on 02/07/2013

Set Time of Day

Today: 2/7/2013

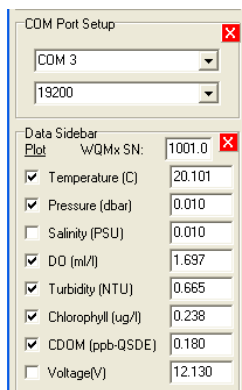
In the example above, the sensor is set up at 6:46 am to start data collection in 3 hours, 12 minutes, and 22 seconds, at 9:58 am.

4. Push **Start WQM in ...** to set a specific start time.

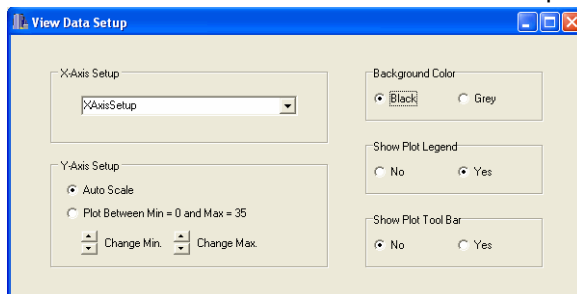
## 5.3 Data display

The user can increase the size of the display in the *View Data* tab so that it is easier to see.

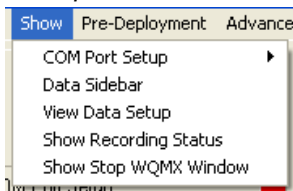
1. Go to the area to the Data Sidebar area and select the parameters to monitor in the *View Data* tab.



2. Push the red X to close the Data Sidebar.
3. Push the red X to close the COM Port Setup.  
The *View Data* tab expands.
4. Go to the *Show* menu and select "View Data Setup."



5. If necessary, adjust the X-Axis Setup time frame. This variable assumes data is collected at 1 Hz.
6. If necessary, adjust the Y-Axis Setup scale.
7. If necessary, adjust the Background Color, the Plot Legend, or the Plot Tool Bar.
8. To open the Data Sidebar or the COM Port Setup again, go to the **Show** menu.
9. Select *COM Port Setup*, then "Show COM Port Setup."



The COM Port Setup area shows on the left side of the window.

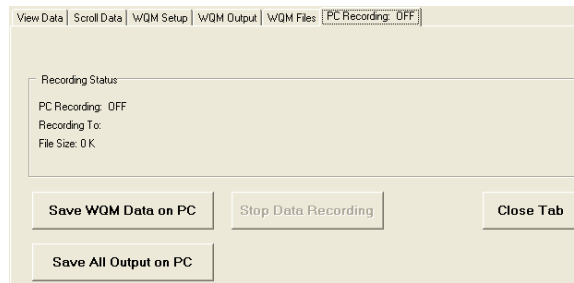
10. Select *View Data Sidebar*.  
The Data Sidebar area shows on the left side of the window below the COM Port Setup area.

## 5.4 Data storage

Data collected by the sensor can be saved to the PC if they are connected.

1. Go to the **Show** menu and select *Show Recording Status*.





2. To save only collected data, push **Save WQM Data on PC**.  
A new window shows.
3. Make a name and location for the file in which to save the collected data.
4. Push **Save**.
5. To save all collected data and debug messages, push **Save All Output on PC**.  
A new window shows.
6. Make a name for the file to save the collected data and other messages to.
7. Push **Save**.
8. The file size will increase as the sensor collects data.
9. Push **Stop Data Recording** when data collection is done.

## 5.5 Power modes

The sensor enters a low-power mode to increase the life of the battery power that the sensor uses. It is slow to respond to commands when it is in this mode. There are two ways to change the low-power mode to standby mode.

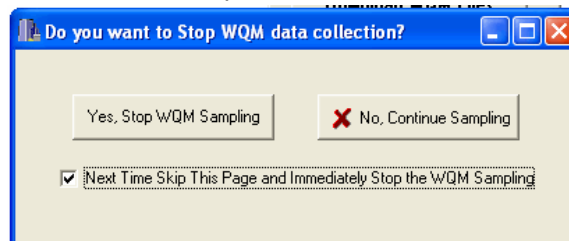
1. Get the current mode of operation and make sure the sensor is still doing data collection.
  - Push **Get Status**. Wait for 2 seconds.
  - Push **Get Status** again.

The first push changes the mode of the sensor from low power. The second push gets information on the operation condition of the sensor. Note that the second push must happen within 4 seconds of the first push, or the sensor will ignore the second push.

2. Change the mode of operation and stop data collection.
  - Push **Get Status**.
  - Within 4 seconds push **Stop WQM Sample**. The sensor is in **In Standby**.

Or—

- A window shows. Select the checkbox and push **Yes, Stop WQM Sampling**.  
Data collection stops.



## 5.6 Missing data

The normal data that is collected by the sensor starts with a row of header information and then data records. Each data record is made of a data field separated by a comma. If a sensor is configured incorrectly, there may be gaps in the data, which show as commas. Missing data shows as a series of commas.

```
SN,State,Date,Time,Cond(S/m),Temp(C),Pres(dbar),RawDO(Hz),Pumped,TURBIDITY(COUNTS),CHLA(COUNTS),CDOM(COUNTS),Volts,PH(VOLTS)
```

Complete record

```
1001,4,031213,065547,0.00002,20.3644,0.07,5669.7,0,0,0,0,12.38,0
```

Missing CDOM record

```
1001,4,031213,065548,0.00002,20.3639,0.07,5667.7,0,0,0,,,,,12.38,0
```

## 5.7 Digital pH sensor (SBE-18S) setup

If necessary, the user sets up external pH sensors to operate with the WQM sensor and makes sure that the data that is collected by the pH sensor can be viewed in the software.

### 5.7.1 Connect a pH sensor

1. If necessary, connect the WQM sensor to the PC and regulated power supply.
2. Connect the pH sensor to the WQM sensor.
3. Supply power to the WQM.
4. Stop the data collection and put the WQM in **In Standby**.
5. Select the **Advanced** menu and then select *Setup External Data Port*. The *External Data Port* tab shows.
6. Select "SBE 18S pH" in the *Instrument Options* drop-down menu.
7. Enter the serial number of the pH sensor in SN: area.
8. Push **Edit** in the *Signal 1* area.
9. If necessary, enter the pH Slope and pH Offset values from manufacturer-supplied calibration page.

10. Push **Done** in the *Signal 1* area.
11. Push **Send New Setup**.  
The *Status* area shows **Storing EDP Setup** as the change is saved in the WQM.
12. Go to the **Help** menu and select *Sensor Troubleshooting*.
13. Select "Test External Data Port" from the *Select Test Mode* drop-down menu.  
The pH sensor starts. Note that it may be necessary to push **Enter** to get the pH sensor to start.
  - If the data is not readable, as in the example below, push **Test is Complete**.



8. Push **Load File Header**.  
The software has the correct output values based on the content of the .raw file.
9. Make sure that the correct file shows in the Raw File: area at the top of the window, and the status message reads **File Header Load Complete**.
10. Select the values for the software to process from the check boxes in the Select Output File Parameters for WQM-xxx area.
11. Select the file delimiter to use.
12. Select the date and time format to use.
13. Select whether and how the data output file is split.
14. Select the data averaging to use.
  - a. "None"—The default.
  - b. "Average Last 10 Seconds"—The user selects a period of time at the end of a data file.
  - c. "Average Each Sample"—Every data sample collected is averaged.
  - d. "Calculate Hourly Sample"—The data from each hour the sensor collected data is averaged.
  - e. "Calculate Daily Average"—The data from a 24-hour period from 12:00:01 to 12:00:00 is averaged.
  - f. "User Selected Averaging Count"—The user selects up to 60 seconds of a data file to average.
15. Push **Process WQM File**.  
A new window shows.
16. Select the **.Raw** file.  
The file-type changes to **.DAT**.
17. Push **Save**.  
The new file is stored on the PC in the same folder as the **.Raw** file.

## 5.9 Functional tests

### ⚠ CAUTION

Do not operate the pump of a CTD without water. It will cause damage to the pump.

The user can do tests on the sensors that make up the WQM to make sure that they operate correctly.

1. Make sure that the sensor is in **In Standby**.
2. Go to the **Help** menu, then select *Troubleshooting*.
3. Select a sensor to test from the Select Test Mode drop-down menu.
  - Test CTD-DO sensors
    - **Display CTD Cal Coefficients**—shows the calibration information that is stored in the sensor.
    - **Take One Sample**—The sensor operates to collect one measurement.
    - **CTD Sampling: "StartNow/Stop"**—The sensor operates to collect data until the user pushes **Stop**.
    - **Display CTD Status**—Shows the operation settings that are stored in the sensor.
    - **Set Output Rate**—Select the slider in the area below to set the number of measurements. **Important:** the calibration for the ODO sensor is accurate for approximately 200,000 samples, and then the precision of the collected data decreases.
  - Test internal optical sensors
    - **Display Setup**—Shows the operation settings that are stored in the sensor.
    - **Take One Sample**—The sensor operates to collect one measurement.
    - **Close Bio-wiper**—The Bio-wiper moves to a closed position.
    - **Open Bio-wiper**—The Bio-wiper moves to an open position.
  - Test CTD pump
    - **Turn pump On/ Turn pump off**—Turn the pump on or off.
  - Test external data port—
    - **Display Setup**—Shows the operation settings that are stored in the sensor.
    - **Take One Sample**—The sensor operates to collect one measurement.
  - Test analog inputs—not currently available
  - Setup/test SBE18S
    - **Display Status**—Shows the operation settings that are stored in the sensor.
    - **Take One Sample**—The sensor operates to collect one measurement.
    - **Start Continuous Sampling/Stop Sampling**—The sensor operates to collect data until the user pushes **Stop**.
    - **Configure SBE18**—Shows the operation settings that are stored in the sensor.
    - Set SBE18 baud rate—The default is 9600. The user can select a faster rate to move collected data from the sensor
4. Select a test to do from the test area that shows to the right of the sensor drop-down menu.
5. Push **Test is Complete** to go back to the drop-down menu and select a different sensor to test.
6. Push **Close Tab** when tests are done.

## 5.10 Horizontal deployment

The sensor can be deployed in a horizontal position if necessary. The sensor cannot easily remove air bubbles from the plumbing in this position. Make sure that the intake duct is higher than the exhaust duct. This will aid the pump to fill with water and operate

correctly. It may take two or three data collection cycles to remove air bubbles from the sensor's plumbing.

If necessary, a plumbing fitting is available from the manufacturer that will aid in the removal of air bubbles.

### 5.11 Bio-fouling prevention

Electrical tape, copper foil tape, and anti-fouling paint will decrease the rate of bio-fouling on the plastic parts of sensors. The manufacturer supplies an anti-fouling paint kit with WQM sensors. Instructions for use are detailed below.

#### Electrical tape

The manufacturer recommends electrical tape such as Scotch® Super 33+ or Super 88. This tape can be used in seawater and can be removed without leaving adhesive residue. Softer bio-foulants will peel off with the tape. The tape can be put on irregular surfaces.

#### Adhesive-backed copper foil tape

The manufacturer recommends putting a layer of electrical tape under the copper foil tape because the adhesive on the copper foil tape is tacky and difficult to remove from the surfaces of the sensor. One layer of copper foil tape will give good protection for approximately 6 weeks.

#### Anti-fouling paint kit

The manufacturer supplies an anti-fouling paint kit with each sensor that has ECOMINDER® paint, tape, a brush, and detailed instructions for application. ECOMINDER® is an alternative to copper-based anti-fouling paint.

### 5.12 Spare parts

The manufacturer supplies the spare parts listed below so that the user can clean and maintain the sensor.

Qty	Item	P/N
1	Playtex® Premium Nurser Drop-ins® liners	GXA-ZX0202
1	Test cable	EXA-210409
1	3/32" hex key for Bio-wiper	GXA-SX0050
1	5/32" hex key for BLIS	GXA-SX0109
4	4-40 x 1/4" pan head acetal screws for ECO copper guard ring	GXA-SX0146
3	4-40 x 1/4" flat head Phillips screws for copper faceplate	GXA-SX0155
1	3 ml Luer slip syringe to verify pump flow of BLIS	GXA-ZX0002
1	Modified valved coupling insert, 1/8 NPT, to attach to 3 ml syringe	MAA-911281
1	10 ml taper-tip syringe to clean BLIS pump	GXA-ZX0051
4	10-24 x 1/2" 316 stainless steel socket-head cap screws for BLIS copper guard	GXA-SX0179
3	4-40 x 3/8" 316 stainless steel socket-head cap screws for Bio-wiper	GXA-SX0099
3	8-32 x 1/2" flat head acetal screws for ECO brass base ring	EXA-SX0147

Qty	Item	P/N
1	Orange fluorescent stick to test chlorophyll output	MAA-520001
1	Scotch-Brite™ scrub pad to clean copper	GXA-ZX0203
1	Ecominder® anti-fouling paint kit	BAA-003000
1	3/8" right-angle hose barb	RXA-031630
1	50 ml plastic bottle of Triton®X-100	50091
1	CT-DO cleaning device	50431
1	6-32 x 1/8" 316 stainless steel set screw for Wiper (WQMx)	GXA-SX0074
3	8-32 x 5/16" flat head Phillips screws for copper guard ring (WQMx)	GXA-SX0374
1	1/16" hex key for Wiper (WQMx)	GXA-SX0059
1	Wiper height gauge (WQMx)	MAA-230630
1	Blue fluorescent stick to test FDOM output (WQMx)	MAA-520003
<b>Installed parts</b>		
1	6-contact dummy connector	EXA-KX0038
1	4-contact dummy connector (digital external data port)	EXA-KX0004
1	6-contact dummy connector (analog external data port)	EXA-KX0183
2	Lock collars	EXA-KX0070

### 5.13 Bleach Injection System (BLIS) operation

The BLIS sends bleach into the pump manifold just below the DO sensor. The bleach prevents biological fouling on the DO sensor membrane.

BLIS Operation:	On	<input checked="" type="checkbox"/> On
Purge When Insitu:	Yes	<input checked="" type="checkbox"/> Yes
BLIS Interval:	1 Hour	1 Hours
Injection Volume:	36.0 ul	36 ul <input type="text"/>
BLIS Volume Used:	0.00 ml	
Est. BLIS Remaining:	173 Days	173 Days
Free Disk: 1022383 K	496 Days	496 Days

Adjust the BLIS for the type of environment it will be deployed in.

- **BLIS Operation**—Set to "On." When the conductivity value shows that the sensor is in water, the BLIS sends bleach to the pump manifold after the first sample of every hour.
- **Purge when in situ**—Set to "Yes." When the sensor is in situ, the BLIS pump operates 20 times to remove air or water from the BLIS tubing. This makes sure a sufficient quantity of bleach is available to protect the DO sensor.
- **BLIS Interval**—The BLIS sends the selected quantity of bleach after the first sample of every hour.
- **BLIS Injection Volume**—Select the quantity of bleach to be used in 9 µL increments. The manufacturer recommends a minimum of 36 µL.
- **BLIS Volume Used**—The host software makes a continuous estimate of the quantity of bleach used in relation to the quantity selected by the user.

- **Estimated BLIS Remaining**—The host software makes a continuous estimate of the quantity of bleach in the reservoir. The estimate is in relation to the **Sample Interval**, the **Injection Volume**, and the **BLIS Volume Used**.



## **Section 6      General information**

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Revised editions of this user manual are on the manufacturer's website.

## 6.1 AF24173 anti-fouling device

### **DANGER**

Refer to the Precautionary Statements for additional information.

**For use only in Sea-Bird Electronics' conductivity sensors to control the growth of aquatic organisms within electronic conductivity sensors.**

Replacement AF24173 Anti-fouling devices are supplied in polyethylene bags that have the label shown below.

AF24173 ANTI-FOULANT DEVICE	
FOR USE ONLY IN SEA-BIRD ELECTRONICS' CONDUCTIVITY SENSORS TO CONTROL THE GROWTH OF AQUATIC ORGANISMS WITHIN ELECTRONIC CONDUCTIVITY SENSORS.	
ACTIVE INGREDIENT: Bis(tributyltin) oxide	53.0%
OTHER INGREDIENTS	47.0%
Total	100.0%
<b>DANGER</b>	
Refer to conductivity sensor manual for the complete label and additional precautionary statements and information on the handling, storage, and disposal of these devices.	
Net contents: Two anti-foulant devices	EPA Registration No. 74489-1
Sea-Bird Electronics, Inc.	EPA Establishment No. 74489-WA-1
13431 NE 20 <sup>th</sup> St.	
Bellevue, WA 98005	

### First Aid

If on skin or clothes:	Remove contaminated clothes.
	Rinse skin immediately with plenty of water for 15–20 min.
	Call a poison control center or a doctor for treatment advice.
If swallowed:	Call a poison control center or a doctor immediately for treatment advice.
	Have person drink several glasses of water.
	Do not induce vomiting.
	Do not give anything by mouth to an unconscious person.
If in eyes:	Hold the eye open and rinse slowly and gently with water for 15–20 min.
	Remove contact lenses, if present, after the first 5 minutes, then continue to rinse eye.
	Call a poison control center or a doctor for treatment advice.

Note to physician: Probable mucosal damage may contraindicate the use of gastric lavage.

Refer to the product container or label when a poison control center or physician is called, or going for treatment. For more information, call the National Pesticide Telecommunications Network at (NPTN) at 1-800-858-7378.

Net contents: Two anti-foulant devices

Sea-Bird Electronics, Inc.

13431 NE 20<sup>th</sup> St.

Bellevue, WA 98005

EPA Registration No. 74489-1

EPA Establishment No. 74489-WA-1

**PRECAUTIONARY STATEMENTS  
HAZARD TO HUMANS AND DOMESTIC ANIMALS****⚠ DANGER**

**Corrosive**—Causes irreversible eye damage and skin burns. Harmful if swallowed. Harmful if absorbed through the skin or inhaled. Prolonged or frequently repeated contact may cause allergic reactions in some individuals. Wash thoroughly with soap and water after handling.

**USER SAFETY RECOMMENDATIONS FOR PERSONAL PROTECTIVE EQUIPMENT (PPE)**

Users should:

- Remove clothes immediately if pesticide gets inside. Then wash thoroughly and put on clean clothes.
- Wear protective gloves (rubber or latex), goggles or other eye protection, and clothes to minimize contact.
- Follow the manufacturer's instructions to clean and maintain PPE. If there are no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.
- Wash hands with soap and water before eating, drinking, chewing gum, using tobacco or using the toilet.

**ENVIRONMENTAL HAZARDS**

Do not discharge effluent that contains this product into lakes, streams, ponds, estuaries, oceans, or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent that contains this product to sewer systems without previously notifying the local sewage treatment plant authority. Contact the local State Water Board or Regional Office of the EPA for guidance. This material is toxic to fish. Do not contaminate water to clean equipment or dispose of equipment washwater.

**PHYSICAL OR CHEMICAL HAZARDS**

Do not use or store near heat or open flame. Avoid contact with acids and oxidizers.

**DIRECTIONS FOR USE**

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. For use only in Sea-Bird Electronics' conductivity sensors. Read installation instructions in [Replace anti-fouling devices](#).

**STORAGE AND DISPOSAL**

**PESTICIDE STORAGE:** Store in original container in a cool, dry place. Prevent exposure to heat or flame. Do not store near acids or oxidizers. Keep container tightly closed.

**PESTICIDE SPILL PROCEDURE:** In case of a spill, absorb spills with absorbent material. Put saturated absorbent material into a labeled container for treatment or disposal.

**PESTICIDE DISPOSAL:** Pesticide that cannot be used according to label instructions must be disposed of according to Federal or approved State procedures under Subtitle C of the Resource Conservation and Recovery Act (RCRA).

**CONTAINER HANDLING:** The container may not be used again. Do not reuse this container for any other purpose. Offer to recycle if available.

## 6.2 Warranty

This sensor is warranted against defects in materials and workmanship for one year from the date of purchase. The warranty is void if the manufacturer finds the sensor was abused or neglected beyond the normal wear and tear of deployment. The manufacturer

will replace or repair, as deemed necessary, any defective components. This warranty does not include shipping charges to and from the manufacturer's facility.

### 6.3 Service and support

The manufacturer recommends that sensors be sent back to the manufacturer annually to be cleaned, calibrated, and for standard maintenance.

Refer to the website for FAQs and technical notes, or contact the manufacturer for support at [support@seabird.com](mailto:support@seabird.com).

Do the steps below to send a sensor back to the manufacturer.

1. Complete the online Return Merchandise Authorization (RMA) form or contact the manufacturer.  
**Note:** *The manufacturer is not responsible for damage to the sensor during return shipment.*
2. Remove all batteries from the sensor, if so equipped.
3. Remove all anti-fouling treatments and devices.  
**Note:** *The manufacturer will not accept sensors that have been treated with anti-fouling compounds for service or repair. This includes AF 24173 devices, tri-butyl tin, marine anti-fouling paint, ablative coatings, etc.*
4. Use the sensor's original ruggedized shipping case to send the sensor back to the manufacturer.
5. Write the RMA number on the outside of the shipping case and on the packing list.
6. Use 3rd-day air to ship the sensor back to the manufacturer. Do not use ground shipping.
7. The manufacturer will supply all replacement parts and labor and pay to send the sensor back to the user via 3rd-day air shipping.

### 6.4 Waste electrical and electronic equipment



Electrical equipment that is marked with this symbol may not be disposed of in European public disposal systems. In conformity with EU Directive 2002/96/EC, European electrical equipment users must return old or end-of-life equipment to the manufacturer for disposal at no charge to the user. To recycle, please contact the manufacturer for instructions on how to return end-of-life equipment, manufacturer-supplied electrical accessories, and auxiliary items for proper disposal.



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