WET Labs

Water Quality Monitor

WQM

Host Software User's Guide

The user's guide is an evolving document. If you find sections that are unclear, or missing information, please let us know. Please check our website periodically for updates.

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WET Labs

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1. WQM Setup and Operation

The WQM is factory-configured to run out-of-the-box. This user's guide explains the Host program for the WQM. For hardware setup and operation, refer to the associated user's guide.

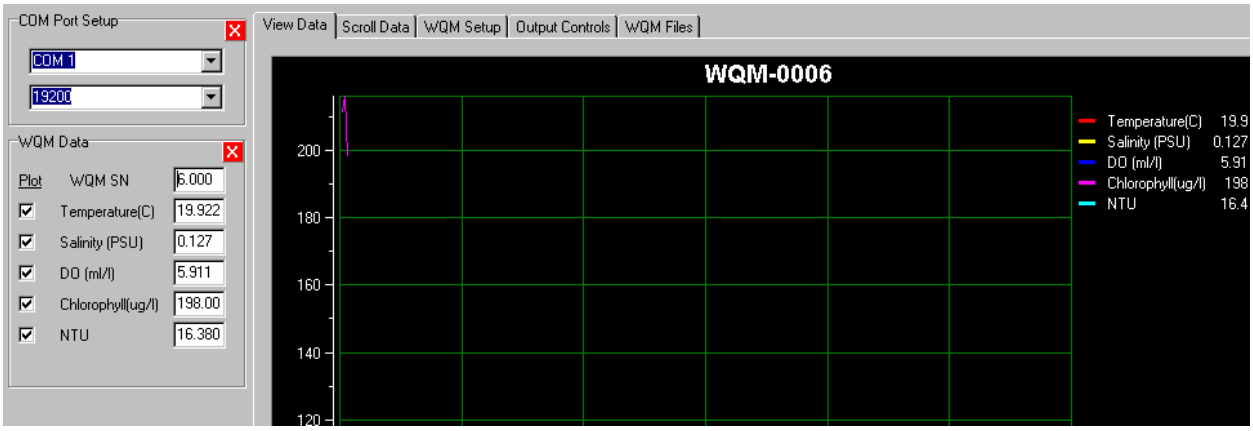
1. Install and start the WQM host software on host computer.

2. Connect the WQM to the host PC and a 12 V nominal power supply using the test cable. Turn the power supply on. Select the appropriate COM port and baud rate (19200).

3. The WQM will cycle through the DO Stabilization Mode, then move to Sample Mode. When sampling:
   - WQM output in air will be a line of data every 6–10 seconds.
   - WQM output in water will be a line of data every second.

4. Collect a few minutes of data:
   - *Optional*: Select Save WQM Output on PC to save raw data (*filename*.raw) to a file location of your choice.
   - Make sure the Internal Logging checkbox in the Setup tab is On.
   - Data will be saved as `.raw` files to both the PC and the WQM.

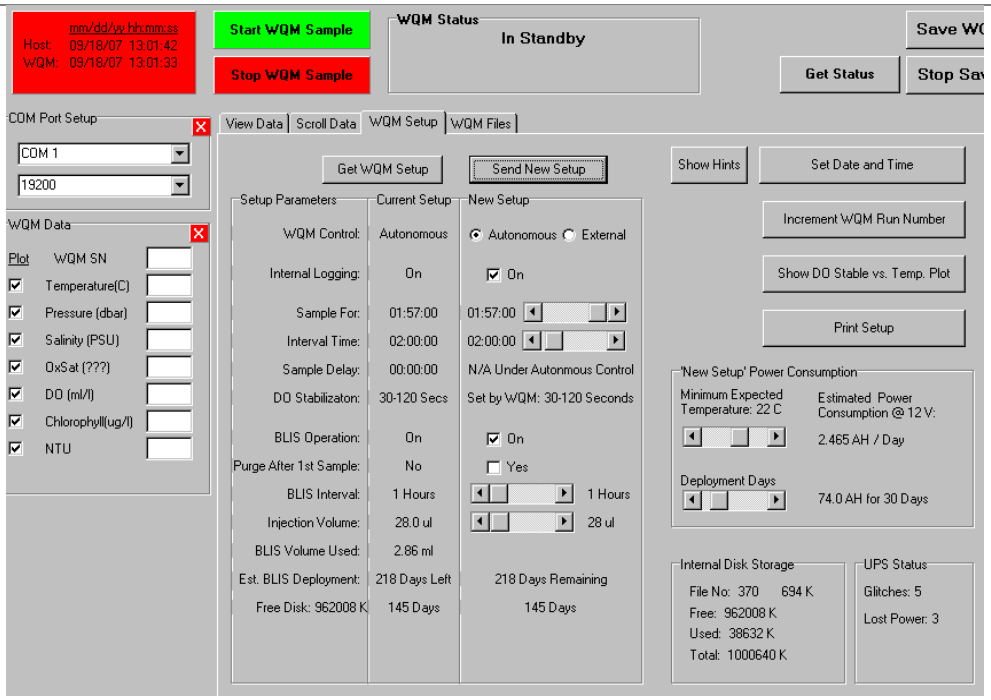
5. After approximately 30 seconds, the FLNTU Bio-wiper™ will open and the WQM will start transmitting data using the default output format. Data will plot in the View Data tab (below), or you can view raw data in the Scroll Data tab. Current values for each parameter will display to the right of the plot if the Show Plot Legend is checked, as well as to the left, in the WQM Data area. Either or both can be hidden or displayed.



6. Allow the meter to run for a few minutes, then Select Stop WQM Sample and Stop Saving Output Data. The Bio-wiper™ will close. Data will stop scrolling.

7. The WQM will enter Standby Mode, allowing you to communicate with the meter.

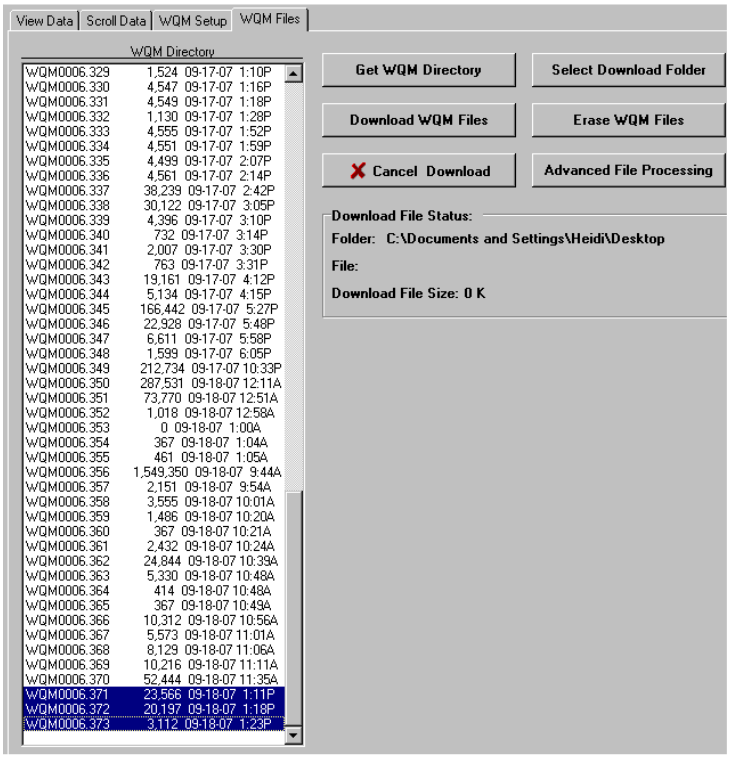
8. To view and change the WQM settings, select the WQM Setup tab, then Get WQM Setup. The WQM settings will appear in the Current Setup area.



9. Select Get Directory in the WQM Files tab. A list of .raw files stored on the WQM appears.

10. Select the Select Download Folder to set up a place on the host for the files.

11. Select Download WQM Files. They will save into the folder set up in the previous step.



Note that if you want to change the parameters the host will process, do so using the Advanced File Processing option. See Section 2.7 for details.

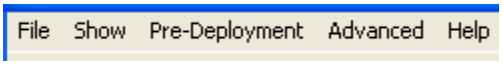
12. Turn off the power supply.

13. View the `.raw` files in MS Excel or a text editor.

2. Technical Reference

This section provides details on the controls and options available in the host software.

2.1 Menus

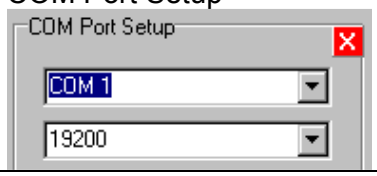


File

Exit: Exits the host program.

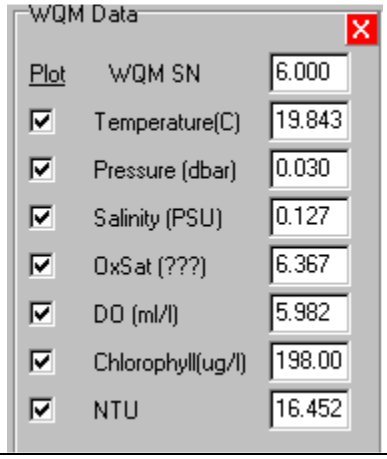
Show

COM Port Setup



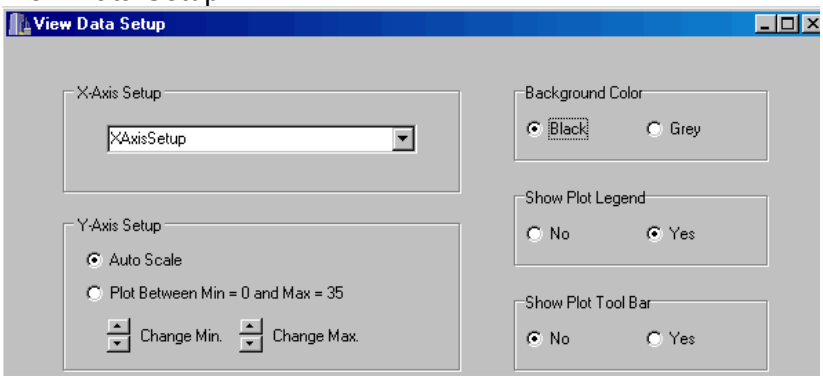
Selecting this will open the COM Port Setup box, which allows you to select the COM port and baud rate (19200) for Host PC–WQM communication. If the box is already open, this menu will be inactive.

Data Sidebar



Note that this display can be toggled using Advanced > Show WQM Data. These are the meter's default measurement settings. Checking the Plot box will cause each checked parameter to display in the View Data window. Values in the boxes to the right are the current values for each parameter, which is also displayed graphically in the View Data tab.

View Data Setup

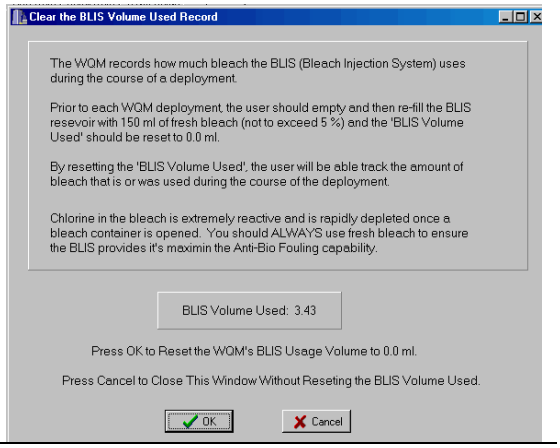


Displays or hides the legend and toolbar and changes background color on plot in the View Data tab.

Pre-Deployment

Clear BLIS Volume Used

Provides guidance on filling the BLIS reservoir (see Hardware User's Guide for details). The BLIS Volume Used is a running total of bleach used during a deployment. It should be reset prior to a new deployment.



Clear Power Failure Message

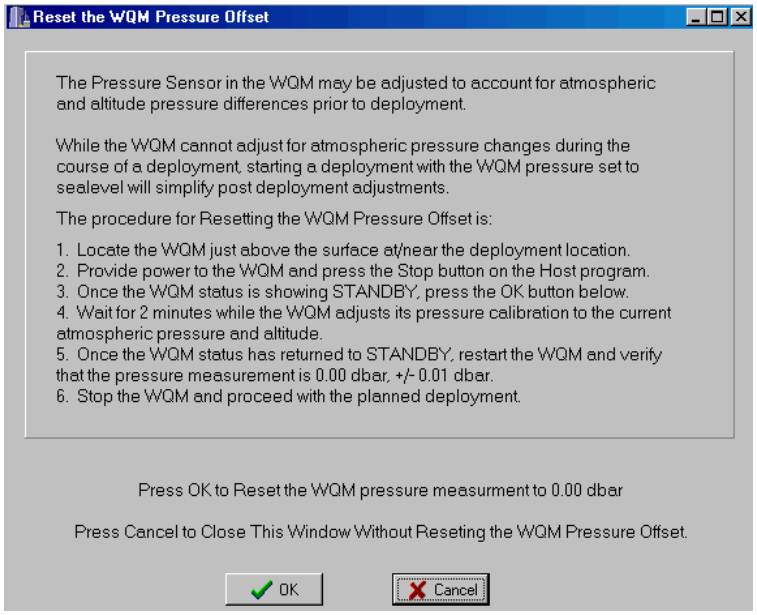
If power to the WQM is interrupted, a red warning box will appear, and the UPS Status box on the WQM Setup screen will be also go red. Select Clear Power Failure Message to clear the warning box and reset the red background on the UPS Status.

Increment File

Allows you to start another file run #. Used with External control.

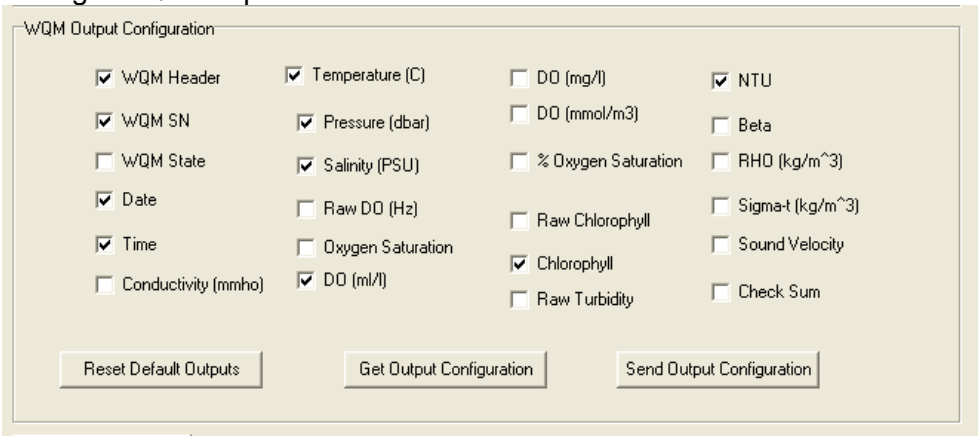
Reset Pressure Offset

Provides guidance on filling the resetting the pressure offset, and allows you to reset the volume used to 0.0 for a new deployment.



Advanced

Change WQM Output

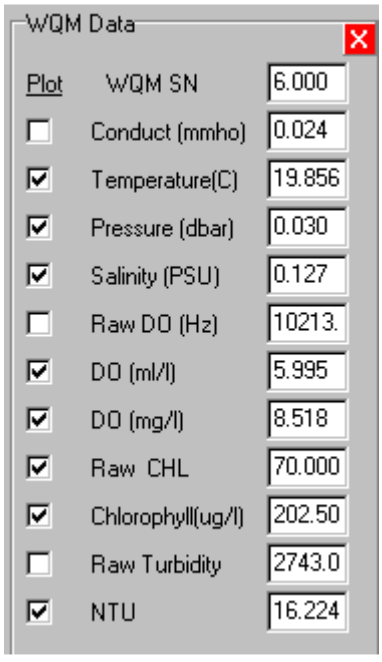


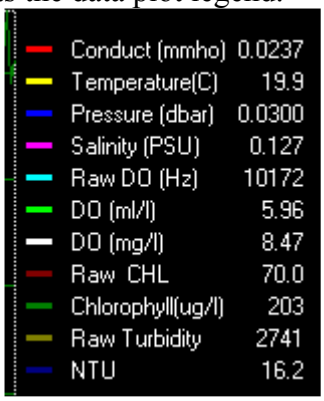
The parameters selected here are the default, or minimum output. Others can be selected and will appear above in the WQM Output Configuration area, in the Scroll Data tab, and in the View Data tab.

- Reset Default Outputs: Resets output to factory settings.
- Get Output Configuration: Retrieves the meter's output settings.
- Send Output Configuration: Sends any new selections to the WQM. The additionally selected parameters appear on the left in the WQM Data area and in the plot legend on the View Data tab.

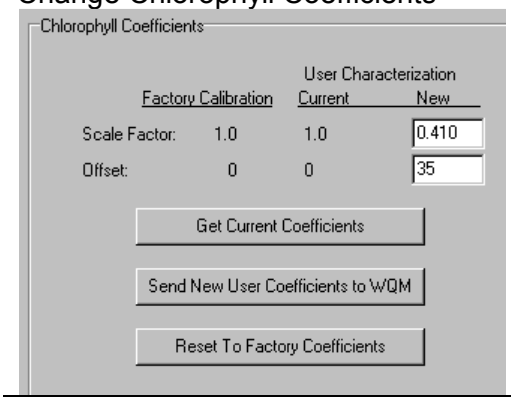
For example:
With the desired parameters selected, select Stop WQM Sample to put the WQM in standby mode.

Select Send Output Configuration. The WQM is updated and the changes are reflected in the WQM Data area, as well as the data plot legend.





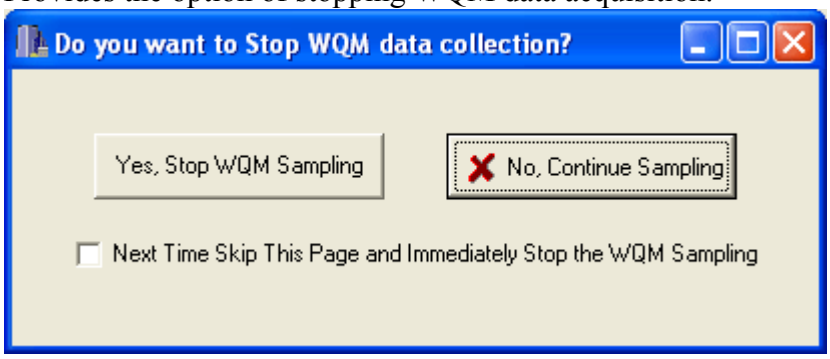
Change Chlorophyll Coefficients



Application-specific characterization coefficients can be input and loaded here. To retrieve the factory defaults, select Reset to Factory Coefficients.

Show Stop WQM Window

Provides the option of stopping WQM data acquisition.

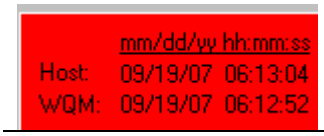


Help

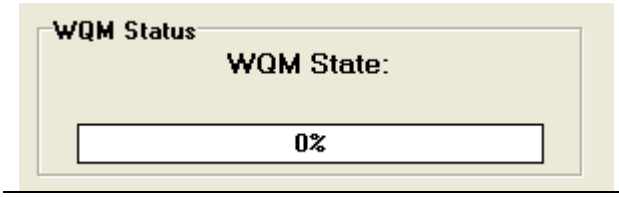
See Section 4 for troubleshooting using Help screen options and descriptions.

2.2 Status Indicators

Date and Time

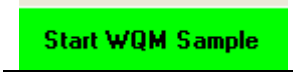


Displays the date and time of both the host PC and the WQM. This box will have a red background if the time difference between the WQM and the host PC.



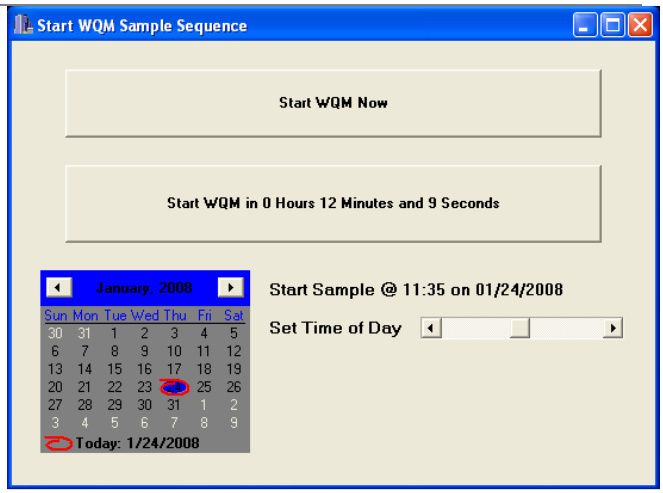
Displays DO Stabilization, Sample, and Standby operations.

WQM Data



The WQM will begin sampling.

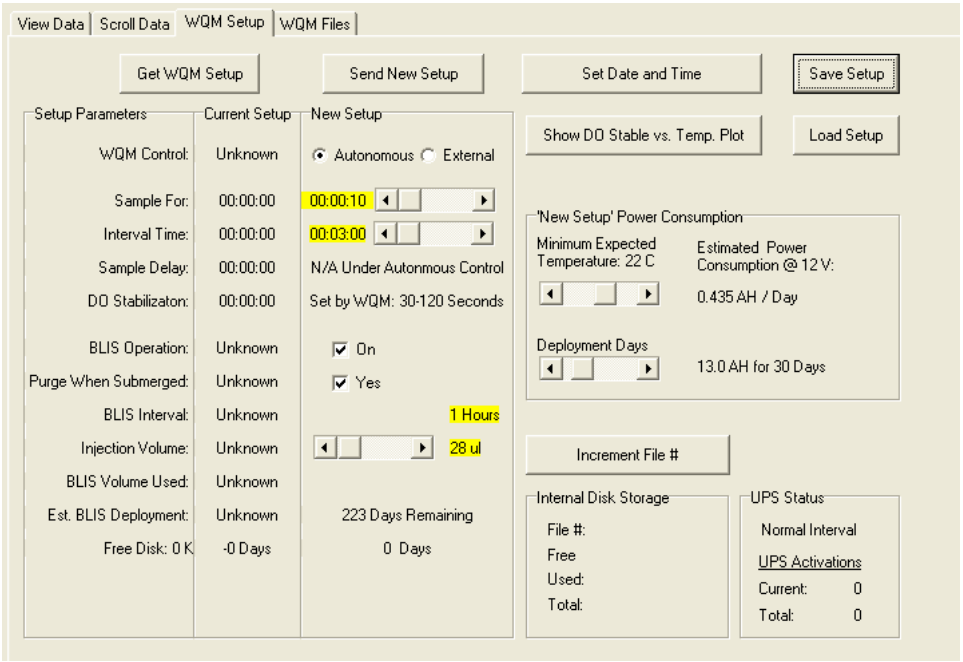
If the WQM is in a low power state when the green Start WQM Sample button is pressed, The window at the right will appear, providing the option of starting the WQM immediately, or at a date and time of your selection. The WQM Status will report and decrement the time the WQM will sit at low power before starting.



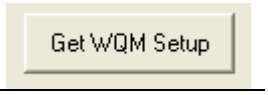
Get Status	Forces the WQM to update the data output display.
Save WQM Output on PC	Saves real-time data to the host PC.
Stop Saving Output Data	Stops saving data to PC.
Stop WQM Sample	Stops WQM and places it in Standby Mode.

2.3 WQM Setup

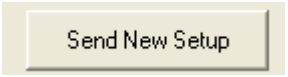
The default operating parameters of the WQM are factory-set, but can be changed:



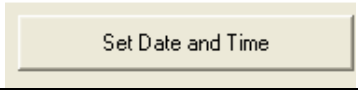
- To retrieve settings currently saved in the meter, select Get WQM Setup.



- To change settings currently saved the meter, make any desired changes in the New Setup area, then select Send New Setup. Note that the meter must be in Standby mode.



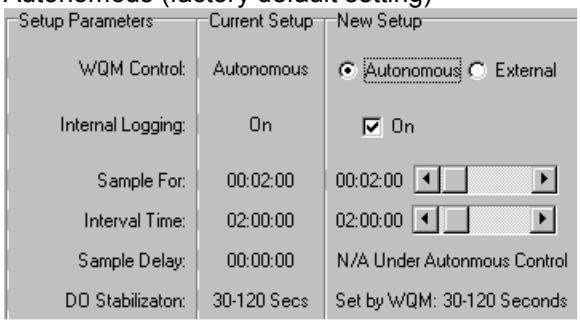
- To send the host PC time and date to the WQM, press Set Date and Time.



- To save WQM host settings, press Save Setup. A second window will appear in which to supply the filename and location on the PC.
- To load a saved setup, press Load Setup, then select the previously saved setup file. To send this to the WQM, press Send New Setup.

2.3.1 Setup Parameter: WQM Control

Autonomous (factory default setting)

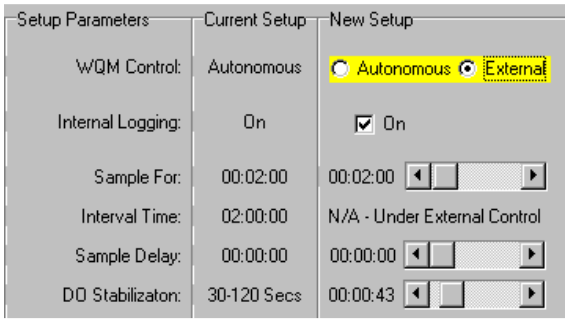


Setup Parameters	Current Setup	New Setup
WQM Control:	Autonomous	(•) Autonomous ( ) External
Internal Logging:	On	[✓] On
Sample For:	00:02:00	00:02:00
Interval Time:	02:00:00	02:00:00
Sample Delay:	00:00:00	N/A Under Autonmous Control
DO Stabilizaton:	30-120 Secs	Set by WQM: 30-120 Seconds

The WQM is connected to a constant power source and is self-directed. It uses an internally stored setup to determine when to sample, log, and sleep. Data filenames will increment upon power up and append when the meter is cycling between low power and sampling.

Note that when you change sampling parameters, the host software automatically re-calculates memory and power consumption.

External



Setup Parameters	Current Setup	New Setup
WQM Control:	Autonomous	( ) Autonomous (•) External
Internal Logging:	On	[✓] On
Sample For:	00:02:00	00:02:00
Interval Time:	02:00:00	N/A - Under External Control
Sample Delay:	00:00:00	00:00:00
DO Stabilizaton:	30-120 Secs	00:00:43

WQM data is synchronized with data from other instrumentation when using an external controller or logger. External power is switched on to the WQM at the start of the sample interval and a stop command is sent to the WQM at the end of the sample interval before external power is turned off.

Note that when you change sampling parameters, the host software automatically re-calculates memory and power consumption.

2.3.2 Internal Logging

Enables or disables data being saved internally to the WQM.

2.3.3 Sample For and Interval Time

When Autonomous is checked, the sample duration is selectable from 10 seconds to 2 hours. The Interval Time ranges from 3 minutes to 24 hours. The interval is inclusive: for example, setting the interval to 2 hours and the sample for time to 15 minutes, the WQM will sample once for 15 minutes every 2 hours.

Interval Time is not applicable when External is checked

2.3.4 Sample Delay

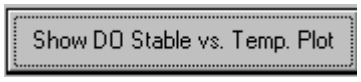
Sample Delay is not applicable when Autonomous is checked.
Under External control, sampling can be delayed for up to 1 hour once the WQM recovers power.

2.3.5 DO Stabilization

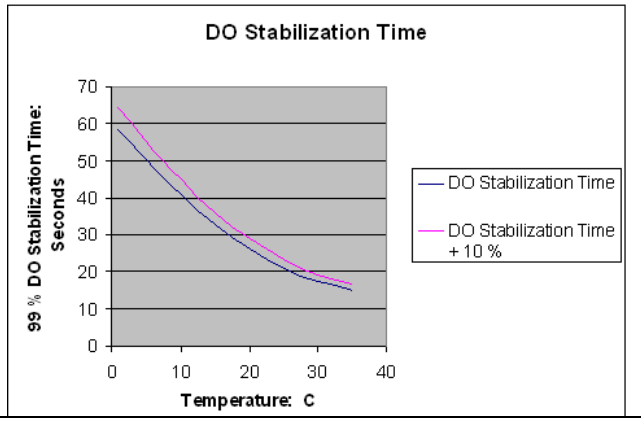
Autonomous Control: DO Stabilization is controlled by the WQM, depending on temperature. Stabilization takes less time in warm water (closer to 30 seconds) than in cold water (closer to 120 seconds).

External Control: DO stabilization time can be set from 30 seconds to 2 minutes. For external control, you must take into account the temperature of the water the WQM will be used in.

To calculate the time needed to stabilize the DO reading, select



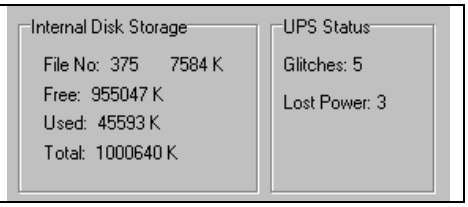
to display the plot at right.



2.3.6 BLIS Operation

The BLIS system can be set to inject from 7–700µl of bleach at 1 hour intervals, and to purge after taking the first sample. Note that the Est. BLIS Deployment time will automatically update in response to the volume and interval selections.

2.3.7 Free Disk

Provides an estimate of available memory. See Internal Disk Storage area to the right for details.	

3.8 Set Date and Time

Press to synchronize the WQM and the host computer's date and time. The WQM must be in Standby mode.

2.3.9 Increment WQM Run Number

Allows you to create a new file. This is used when the control is set to External to increment the run# between deployments.

2.3.10 DO Stable vs. Temp. Plot

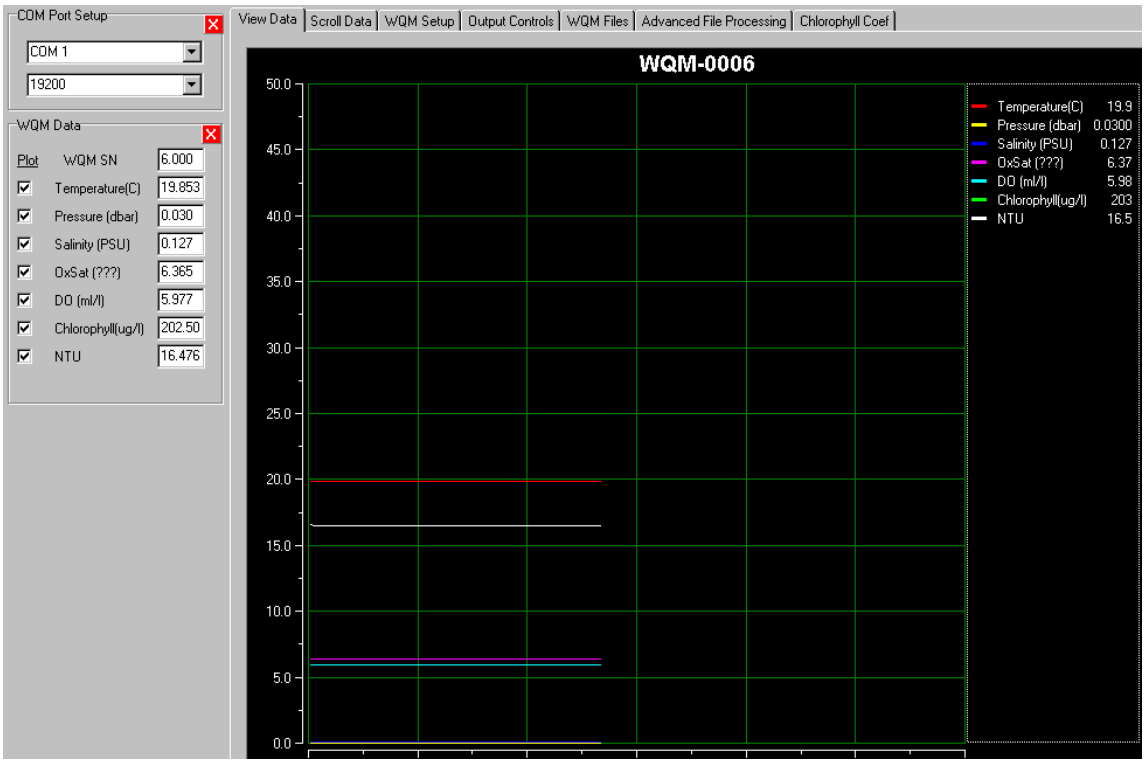
Allows you to estimate and set the time needed for DO sensor stabilization for a given water temperature. This option is available only in External (not Autonomous) mode.

2.3.11 Save Setup File

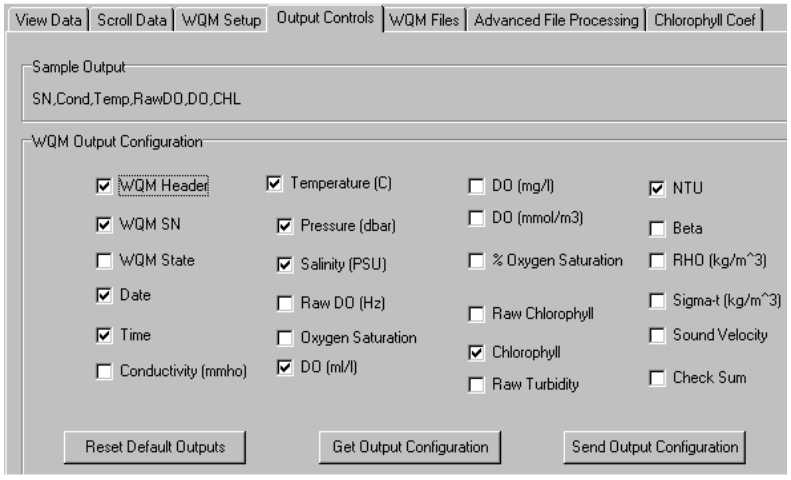
Opens a window so a text file of meter settings can be saved or printed.

2.4 View Data

Allows real-time viewing of selected parameters from the WQM Data area (left side of window) or the View Data Setup (see below). Plotted parameters can be changed on-the-fly.



Select Advanced menu, then Show Output Controls (right). With the meter in Standby, select or deselect parameters, then select Send Output Configuration to the WQM.



The new parameters will be displayed in the WQM Data area and the legend. Either or both can be hidden or displayed. Both show current output values for each parameter.

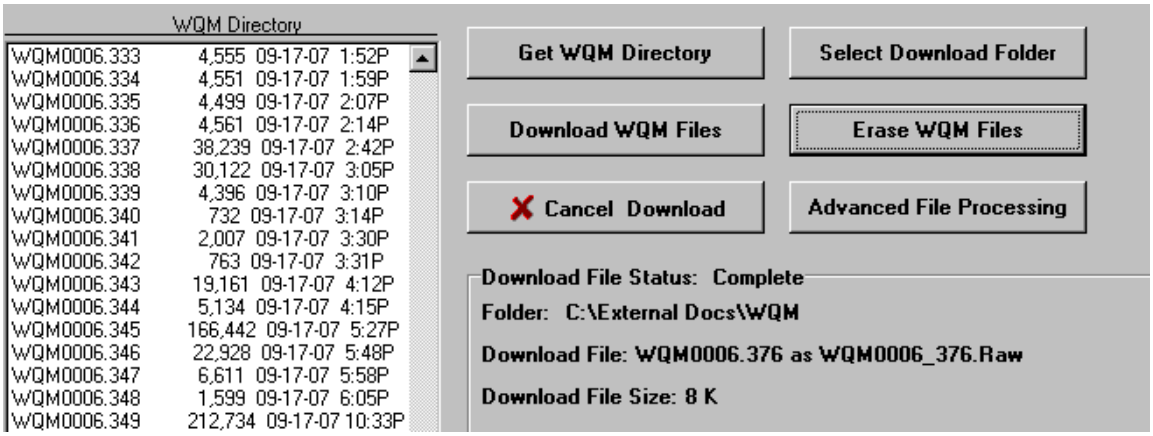
2.5 Scroll Data

Allows you to view real-time raw data according to the parameters selected in the Output Controls tab of the host program.

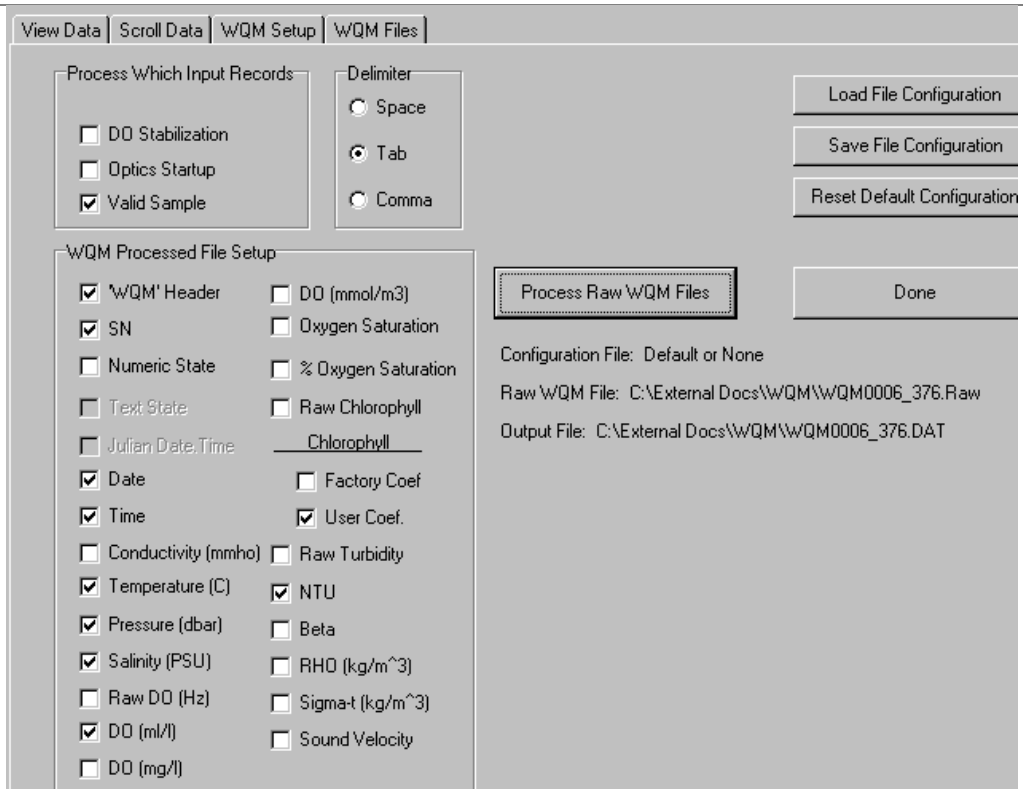
```
WQM,6,091907,084108,19.8197,0.03,0.127,6.370,6.001,202.500,16.254
WQM,6,091907,084109,19.8190,0.03,0.127,6.370,6.001,207.000,16.248
WQM,6,091907,084110,19.8185,0.03,0.127,6.370,6.000,198.000,16.248
WQM,6,091907,084111,19.8174,0.03,0.127,6.370,6.000,202.500,16.248
WQM,6,091907,084112,19.8155,0.03,0.127,6.370,6.001,198.000,16.248
WQM,6,091907,084113,19.8172,0.03,0.127,6.370,5.999,207.000,16.248
WQM,6,091907,084114,19.8158,0.03,0.127,6.370,6.000,207.000,16.260
WQM,6,091907,084115,19.8197,0.03,0.127,6.370,6.001,202.500,16.248
WQM,6,091907,084116,19.8217,0.03,0.127,6.369,6.000,193.500,16.248
WQM,6,091907,084117,19.8157,0.03,0.127,6.370,6.001,202.500,16.254
```

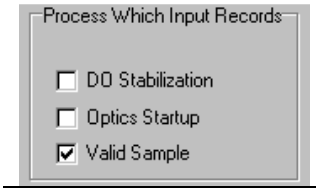
2.6 WQM Files

Options in this tab allow you to select the data files to be uploaded from the WQM to the host PC.



Get WQM Directory	Displays a list of files saved on the WQM. Select one or more and allows you to manage data files. Opens a window to allow you to select the location on the host PC to which the WQM's internal files will be saved. Cancels any download in progress.
Select Download Folder	Brings up a window for you to select or create a folder in which the .raw WQM files will be stored.
Download WQM Files	Saves the selected .raw files to the previously selected download folder.
Erase WQM Files	Selected files will be deleted from the WQM memory.
Cancel Download	Halts the process of saving .raw files. The host will save all of any file being saved when "cancel" is selected and any remaining, unsaved files will remain selected but will not be saved.
Advanced File Processing	After downloading (saving) files to the host PC in the WQM Files tab, you can select various derived parameters for the WQM Host program to calculate as part of the processed file.

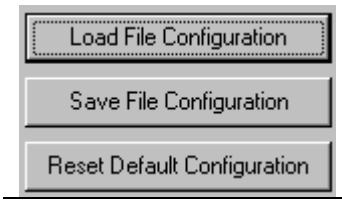




Any data generated during warmup is suspect. Normally only stable, valid samples are processed. DO Stabilization and Optics Startup allows you to process data with questionable DO measurements

Choose how the contents of the output file will be delimited.

Selecting this button results in a window that allows you to select the .raw file you'd like to process, and then saves the processed file (.dat) to the same folder.



Loads previously saved parameter configurations to be calculated by the host program.

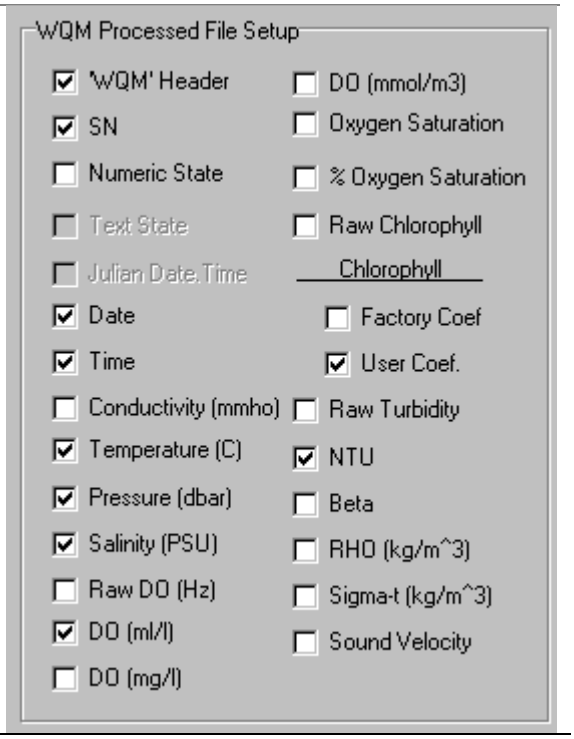
Saves configurations in the host program.

Returns the parameter configuration to the factory default settings (listed below).

Default data displayed:

- WQM Header
- WQM SN
- Date
- Time
- Temperature
- Pressure
- Salinity
- DO (mg/l)
- Chlorophyll (µg/l)
- NTU

Selections in this window do not change the data that's collected, merely the output: the host program calculates derived parameters from the raw data.



3. WQM Data and Status Record Formats

When actively sampling, the WQM will output a line of data every 6–10 seconds in air, and a line of data once per second in water.

The WQM Status record is used to update the WQM Host program during normal WQM operations. This record will be sent 1 per second while the WQM is in Standby (waiting for commands) or starting the CT-DO and optical sensors when the WQM is immersed in water. This record will be sent once every 10 seconds while the WQM is sampling in air. When the WQM is immersed and is sampling, the status record will be sent periodically, typically when the file size has incremented.

3.1 Data Format

The WQM outputs data as a tab-delimited, ASCII, <CR><LF> terminated record. A valid WQM record looks like this:

WQM,005,082412,064534,0.01032,17.3677,0.04,0.060,11817.7,9.520,8.878,92,0.529,1035,6.237

Where
WQM SN, date (format), time (format), conductivity (units), temperature (units), pressure (units), salinity (units), raw dissolved oxygen measurement, oxygen saturation, dissolved oxygen measurement, raw chlorophyll, chlorophyll, raw turbidity, and turbidity.

When the WQM is first started, you may see several records that lack either the CTD or ECO component of the WQM record, or may have neither CTD or ECO component of the record. These records are normal as the WQM warms up and starts obtaining data.

A record without either CTD or ECO data will look like:
WQM,005,082412,064435,,,,,,,,,,

A record with ECO data but missing the CTD component is:
WQM,005,082412,065146,,,,,,,,90,0.504,1016,6.117

A record with CTD data but without ECO data will be:
WQM,005,082412,065149,0.01032,17.4035,-0.04,0.060,10887.1,9.513,7.881,,,,

If partial records are being transmitted by the WQM after the initial startup, see the user's guide or contact WET Labs to diagnose the meter malfunction.

3.1.1 Valid Data Parameters

The first 3 columns after the Date and Time are Temperature (C), Pressure (dbar), and Salinity (PSU).

Temperature	Environment-dependent
Pressure	in air: 0.5 to -0.5 dbar in water: approximately equal to the depth in meters.
Salinity	Calculated and varies based on conductivity, temperature, and pressure.

The next column is dissolved oxygen.

Dissolved Oxygen	1–10 mg/l

The last two columns are the FLNTU measurements chlorophyll and turbidity.

Chlorophyll	0–50 µg/l
Turbidity	0–25 NTU

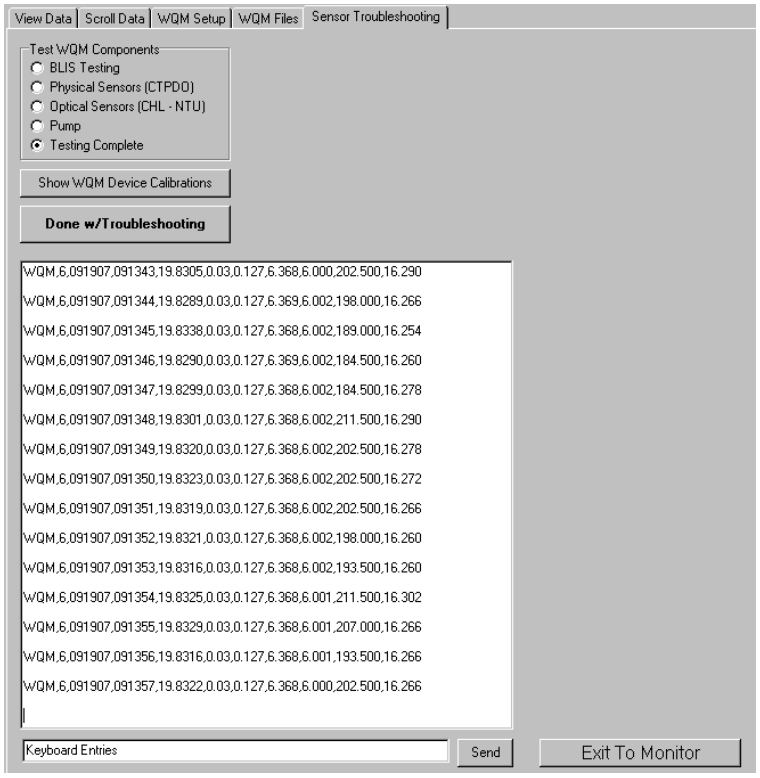
3.2 Status Record Format

The contents of the WQM status record Version 1 is:

Header:	WETS_WQM
WQM Serial Number	1-9999
Status Record Version	1
Month	1–12
Day	1–31
Year	07–99
Hour	0–23
Minute	0–59
Seconds	0–59
Control	0=Autonomous, 1=External
Mode	0=In air, 1=In-situ
Action	1–31: Defines action the WQM is working.
Countdown	1-second countdown for each action
Delay Time	Delay sample by X seconds while in External Mode
DO Stabilization Time	Time required to get a stable DO measurement
Sample Time	Sample for X seconds
Sample Interval	Interval between the start of consecutive samples.
Logging	Internally logging data: 0=No, 1=Yes
File Number	Data File Number
File Size	Size of current data file
Free Disk Space	KB of available WQM disk space
Total Disk Space	KB of total WQM disk space
Total BLIS Squirts	Number of times the BLIS pump has been cycled
BLIS Volume per Squirt	Volume in µl of one BLIS pump cycle
BLIS Hours	Number of hours between BLIS activations (always 1)
BLIS Squirts	Programmed number of squirts at each BLIS activation
BLIS Counter	Number of hours since the last BLIS activation
Purge	Number of BLIS squirts to purge the BLIS of air/water
Outbits	8 Hex ASCII bytes that define which data to output
Recent UPS	UPS was activated on last sample attempt
UPS Counter	Number of consecutive UPS activations
Total UPS Counter	Factory reset counter that totals all UPS activations
Power Status	1=Good Power, 0=Inadequate Power
Battery Voltage	0.0 indicates Not Available

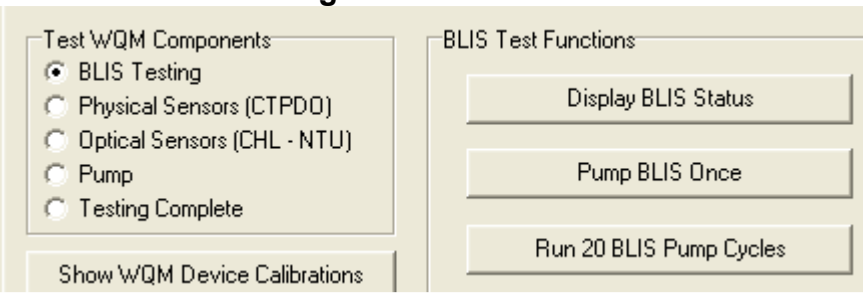
4. Troubleshooting

When you select Troubleshooting under the Help menu, the tab below appears. Note that the meter must be in Standby use troubleshooting.



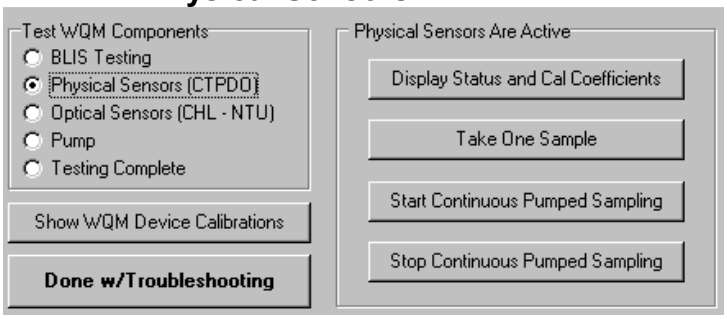
Selecting one of the buttons under Test WQM Components will activate additional options, described below.

4.1 BLIS Testing



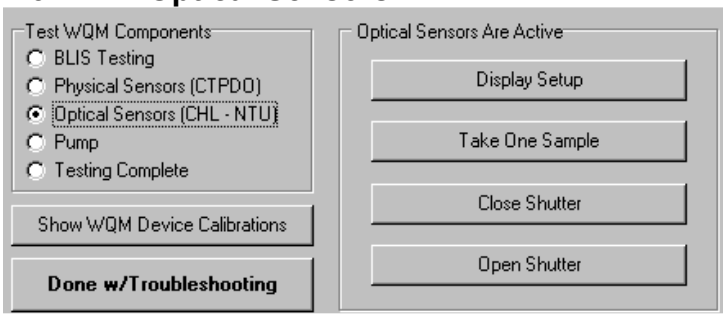
- Display BLIS Status: Displays the current configuration settings on the BLIS meter.
- Pump BLIS Once: Allows you to check the functionality of the pump.
- Run 20 BLIS Pump Cycles: Runs the BLIS pump 20 times.

4.2 Physical Sensors



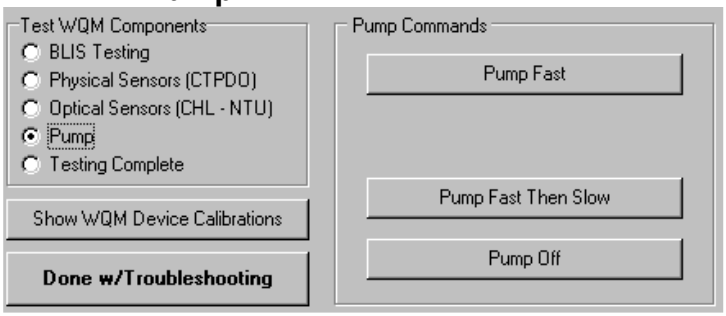
- Display Status and Cal Coefficients: Current calibration coefficients are displayed.
- Take One Sample: Allows you to check the output displayed.
- Start/Stop Continuous Pumped Sampling: Allows you to check the functionality of the pump while sampling.

4.3 Optical Sensors



- Display Setup: Displays the current configuration settings on the FLNTU meter.
- Take One Sample: Allows you to check the output displayed.
- Close/Open Shutter: Allows you to check the functionality of the *Bio-wiper*.

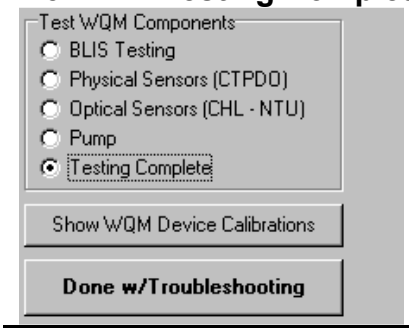
4.4 Pump



WARNING!
Make sure the WQM is in submerged before running the pump.

- Pump Fast/Pump Fast then Slow: Allows you to check the functionality of the pump.
- Pump Off: Turns the pump off.

4.5 Testing Complete



Returns the WQM to Standby mode.

4.6 Miscellaneous Commands

Checks for and reports the calibration values stored in the WQM.

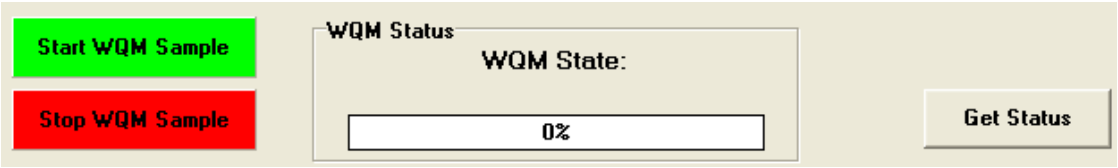
Closes the troubleshooting window.

Factory-assisted troubleshooting.

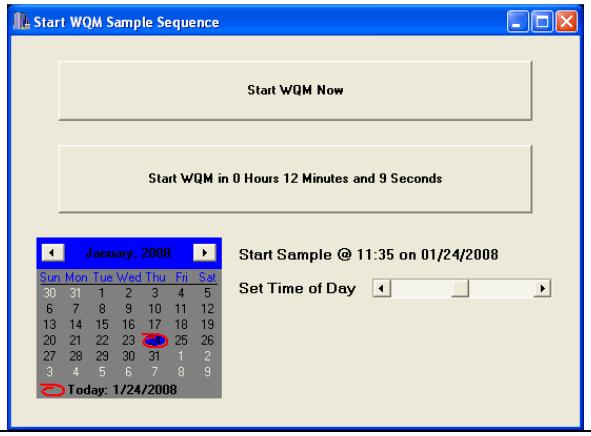
4.7 Interrupting Standby Mode

To "wake" the WQM from standby mode, thus enabling it to receive commands and begin acquiring data:

Press the Get Status button, and **within 4 seconds**, press the Start WQM Sample.



In the resulting window, determine whether you want to begin sampling immediately or at a later time and date.



Appendix A: Controlling the WQM with an External Logger

There are three methods of using the WQM with an external logger.

1. Leave the WQM constantly powered and let it run a pre-selected asynchronous sample/sleep sequence, transmitting data during the sample interval. The BLIS will run once per hour.

   Example: Set Sample For: to 60 and Interval Time: to 900. This will cause the WQM to sample for 60 seconds every 15 minutes.

2. Power the WQM when a sample is required and leave it powered until the entire sample sequence has completed and it has entered sleep. Using this method, the WQM will power up immediately as it receives power and will finish the sample with BLIS operation once per hour.

   Example: Set Sample For: to 60, turn the power on every 15 minutes and off every 5 minutes. This will allow the WQM to complete its sample sequence before power is removed and it will wake up immediately after receiving power at the start of the next interval.

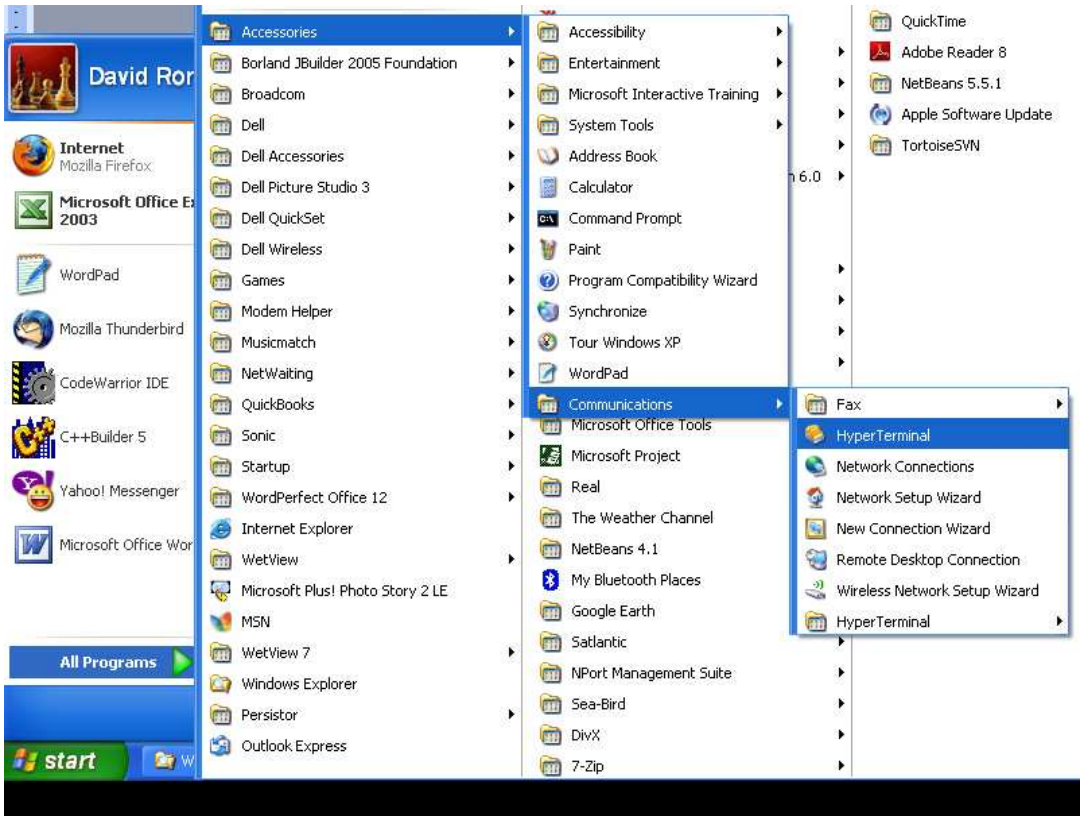
3. Power the WQM, collect data, and send the stop command when sampling is complete. This will cause the WQM to close FLNTU *Bio-wiper*.

   Example: Set Sample For: to 3400 and Interval Time: to 3600. Apply power when a sample is desired and then send stop command to 5 seconds prior to removing power.

Appendix B: Using HyperTerminal

To communicate with any WET Lab's serial data instruments, you may use the Windows-supplied terminal emulator program called Hyperterm or HyperTerminal.

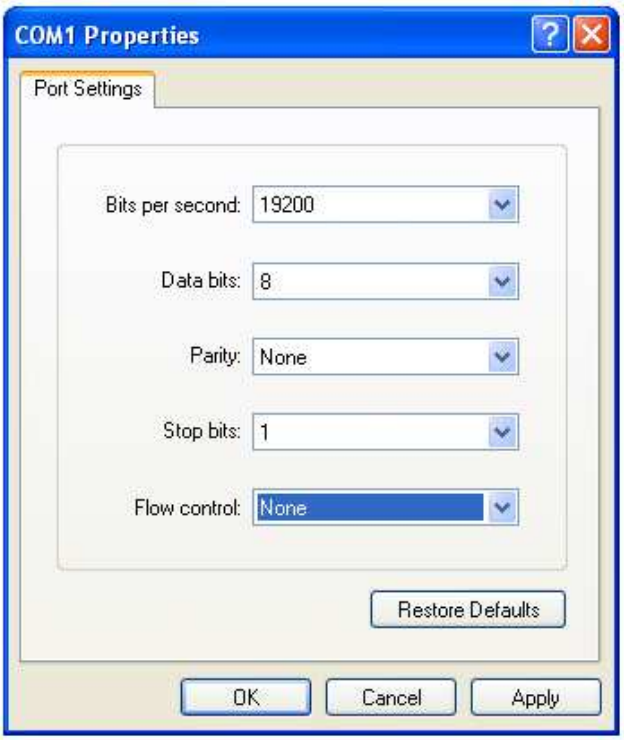
1. Find and start the program.



2. Select a Connection Name and press OK. In the example, the name will be ATest.

3. Select the COM port you want to communicate to the instrument with and then press OK. In this example, COM1 has been selected.

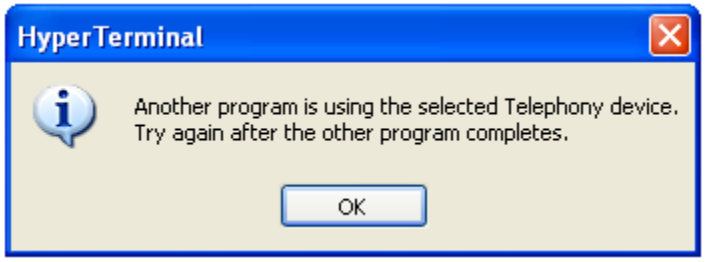
4. Select the desired Baud Rate (shown as Bits per second), turn off the Flow control by setting it to 'None', and press OK. In the example, the baud rate has been set to 19200.

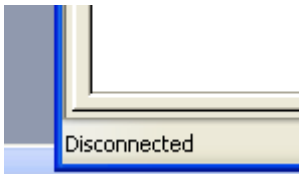


Typical baud rates for WET Labs' sensors:

ECO Gen 1 (DFL, FLS,VSF):	9600
ECO Gen 2 (everything else):	19200
*ac-9:	19200
*ac-s:	115200
WQM:	19200

After pressing OK, you will either get …

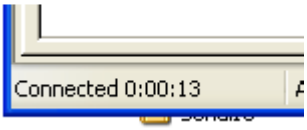




Disconnected showing in the lower left hand corner.

OR

Connected showing in the lower left hand corner. If you are connected you will start getting data as soon a test cable is connected to the computer and power is applied.



If you are Disconnected, make sure all other programs that might be using the COM port have been turned off, then cycle the two telephone icons on the tool bar:

This is the disconnect icon, used to turn off the PC COM port and to stop communication with the sensor.

This is the connect icon, used to turn on the PC COM port and to start communications with the sensor.

If you are connected and have data that looks like

```
WQM,500,012008,123313,16.2468,-0.20,0.008,6.658,0.300,4.917
WETS_WQM0500    1       012008  123314  0       0       6
        7020    7200    1       77      38      980471  1000640
        4       0       1       db90a000        1       0
.0
```

You are all set.

If you are connected and get binary data that looks like this …

```
▲ÿÇD≤'D≤S2à≤≤ä≤D≤_
```

You have selected the incorrect baud rate (unless you are looking for binary data such as for the ac-9 or ac-s). Change the baud rate (Step 5).

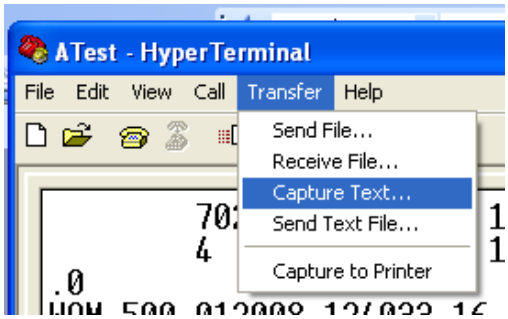
If your meter is connected to the PC, powered on, the correct COM port is selected and you get a blank terminal screen, you might be able to use these two icons to cycle the COM port off and on to get communications started.

If you have everything selected correctly (baud rate, COM port, power is on, cable hooked up) but are unable to see any data, you may have to shut down the computer to reset the Windows driver for the COM port.

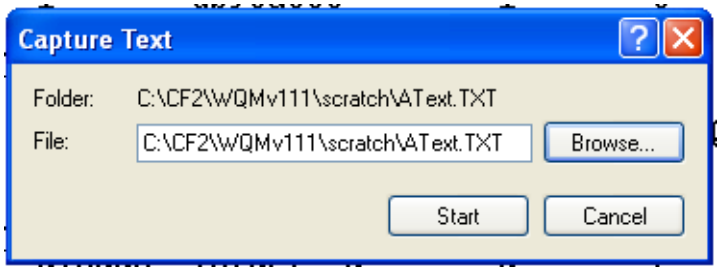
5. Disconnect the port using the Disconnect icon.

- Use the Properties icon ( ) to bring up the Properties window shown above in Step 4.
- Change the baud rate to the next choice and press OK.
- Use the Connect icon ( ) to reconnect to the instrument.

6. To log data, select Capture Text, then

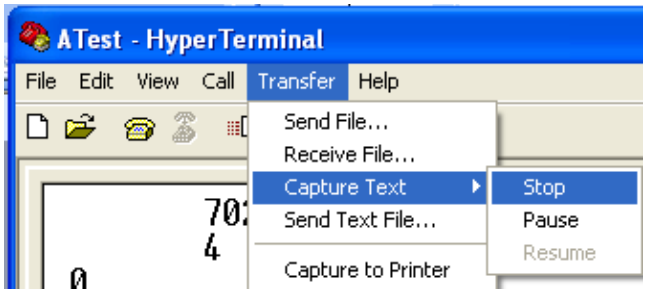


select a File (you may need to use the Browse button),



and press Start.

7. Once you have collected your data file, select Transfer > Capture Text > Stop or Pause to stop or pause data logging.



Revision History

Revision	Date	Revision Description	Originator
A	1/30/08	New document (DCR 561)	D. Romanko