



**APPLICATION NOTE NO. 72**

**Revised May 2013**

**Setting Up WET Labs ECO Sensor with Bio-Wiper™ for integration with SeaCATplus CTDs (SBE 16plus, 16plus-IM, 19plus)**

*Note: see Application Note 72-V2 for integration with SeaCATplus V2 (16plus V2, 19plus V2).*

This application note applies to the following models of the WET Labs ECO sensor with Bio-Wiper:

- **ECO-FLNTUS** chlorophyll and turbidity sensor
- **ECO-FLS** chlorophyll sensor
- **ECO-FLCDS** CDOM sensor

These sensors can be configured to operate in Profiling or Moored mode:

- **Profiling mode** – The ECO opens the Bio-Wiper when power is applied and keeps it open continuously, even when power is removed. The ECO samples continuously when powered, and outputs a voltage that changes as the data changes.
- **Moored mode** – The ECO opens the Bio-Wiper when power is applied, takes a sample, outputs a voltage, closes the Bio-Wiper, and holds the voltage until power is removed.

When Sea-Bird integrates the ECO with one of our CTDs, we set up the ECO to operate in the mode appropriate for the CTD. However, you may want to change the mode in the future, if:

- You purchased the ECO for use with an SBE 19plus, which can be field configured to operate in either profiling or moored mode.
- You want to use the ECO in the future with another CTD; for example, you purchased the ECO for use with an SBE 25 profiling CTD and now want to use it with an SBE 16plus moored CTD.

**Changing ECO Setup (see [www.wetlabs.com](http://www.wetlabs.com) for details)**

To change the ECO configuration, connect the ECO **directly** to the computer and a 12 V power source, using the cable supplied by WET Labs. Configure the ECO using a terminal program or WET Labs' ECOView program.

The required comm port settings are: 19200 baud, 8 data bits, no parity.

<i>Configure ECO for Profiling Mode</i>	<i>Configure ECO for Moored Mode</i>
Send the following commands: !!!! \$pkt 0 \$set 0 \$sto	Send the following commands: !!!! \$pkt 1 \$set 1 \$sto

*Notes:*

1. Five exclamation points (!!!!) accesses the ECO command set.
2. For commands that set a value for a parameter, the space between the command and the number is important. For example, make sure that there is a space between \$set and 0 or 1 (\$set 0 is correct; \$set0 is incorrect).
3. The \$sto command stores the settings in memory. If you omit this command, the ECO defaults to its last stored settings.

After you have configured the ECO for your CTD, reconnect the ECO to the CTD.

## Setting Up / Using CTD in Moored Mode

### General

Delay before sampling sets the amount of time to wait after switching on external voltages before sampling. The ECO requires approximately 4 seconds to provide time for the sensor to open the Bio-Wiper before sampling (sensor dependent; see WET Labs documentation). Therefore, set:

- **DelayBeforeSampling=4** (16*plus* RS-232, and 19*plus* in moored mode), or
- **#iiDelayBeforeSampling=4** (16*plus* RS-485, and 16*plus*-IM)

### Newer SeaCAT*plus* firmware

- SBE 16*plus* (RS-232) firmware  $\geq$  1.6d (October 2004 and later)
- SBE 16*plus* (RS-485) Digital firmware  $\geq$  1.0c (May 2005 and later)
- SBE 16*plus*-IM Digital firmware  $\geq$  1.1b (May 2005 and later)
- SBE 19*plus* firmware  $\geq$  1.4f (May 2005 and later)

Sea-Bird added a Bio-Wiper command to the command set, to ensure that the Bio-Wiper automatically closes after sending the status command:

Command	Description
<b>BioWiper=x</b> (16 <i>plus</i> RS-232, and 19 <i>plus</i> )  or  <b>#iiBioWiper=x</b> (16 <i>plus</i> RS-485, and 16 <i>plus</i> -IM)	<b>x=Y:</b> Configuration includes WET Labs sensor with Bio-Wiper. CTD is powered longer (total of 8 sec) for status command ( <b>DS</b> or <b>#iiDS</b> ), providing 4 sec for Bio-Wiper to open and then shut again if in Moored mode. <b>Note:</b> 4 sec for the Bio-Wiper to open and shut is sufficient for the typical application, with the ECO set up to take a single measurement for each sample. However, the ECO can be user-programmed to take and average a number of measurements for each sample; <b>if averaging multiple measurements, 4 sec may not provide sufficient time for the Bio-Wiper to close.</b> Use the <b>TV</b> , <b>TVR</b> , or <b>TS</b> command ( <b>#iiTV</b> , <b>#iiTVR</b> , or <b>#iiTS</b> for RS-485 or IM) after the status command, as described below for older CTD firmware, to ensure the Bio-Wiper closes for these applications.  <b>x=N</b> (default): Configuration does not include WET Labs sensor with Bio-Wiper.

### Older SeaCAT*plus* firmware

- SBE 16*plus* (RS-232) firmware  $\leq$  1.6c
- SBE 16*plus* (RS-485) Digital firmware  $\leq$  1.0a
- SBE 16*plus*-IM Digital firmware  $\leq$  1.1
- SBE 19*plus* firmware  $\leq$  1.4d

In older SeaCAT*plus* firmware, power was not provided for enough time for the Bio-Wiper to close after the status command (**DS** for 16*plus* RS-232 and 19*plus*; **#iiDS** for 16*plus* RS-485 and 16*plus*-IM) was sent if the Bio-Wiper was in Moored mode. If the user did not notice that the Bio-Wiper was still open, and then deployed the CTD on a mooring with a delayed start time, the WET Labs sensor could become fouled, because the Bio-Wiper would not close until after the first sample was taken.

#### After sending the status command to these older firmware versions:

Send the **TV**, **TVR**, or **TS** command (**#iiTV**, **#iiTVR**, or **#iiTS** for RS-485 or IM) and then wait at least 10 sec to cycle the Bio-Wiper open/closed. Verify that the Bio-Wiper has closed before deploying.

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## Application Note Revision History

Date	Description
February 2004	Initial release.
December 2004	Add description of how to handle ECO when integrated with a moored instrument ( <i>16plus</i> RS-232, <i>16plus</i> RS-485, <i>16plus</i> -IM, <i>19plus</i> in moored mode).
May 2005	Add BioWiper= command for updated firmware for <i>16plus</i> RS-485, <i>16plus</i> -IM, and <i>19plus</i> .
March 2008	<ul style="list-style-type: none"><li>• Add applicability to V2 SeaCAT<i>plus</i> (<i>16plus</i> V2, <i>16plus</i>-IM V2, <i>19plus</i> V2).</li><li>• Add ECO-FLCDS (CDOM fluorometer) with Bio-Wiper.</li></ul>
May 2013	<ul style="list-style-type: none"><li>• Remove V2 SeaCAT<i>plus</i> (<i>16plus</i> V2, <i>16plus</i>-IM V2, <i>19plus</i> V2) from application note; information on those instruments is in separate application note (AN 72-V2)</li></ul>