ECO puck user manual

User manual

03/2013, Edition 1

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Section 1 Specifications

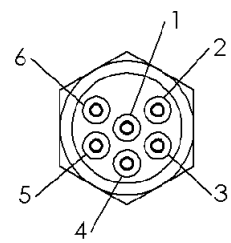
1.1 Mechanical

There are many different sizes of *ECO* pucks. The most common are specified below.

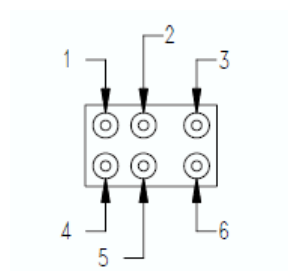
Diameter	Length	Depth rating	Temperature range	Weight in air, water
6.30 cm	5.683 cm	600 m	0–30 °C	0.235 kg, 0.235 kg
6.937 cm	5.147 cm			0.261 kg, 0.261 kg
7.62 cm	5.72 cm	600 m 1000 m		0.282 kg, 0.282 kg

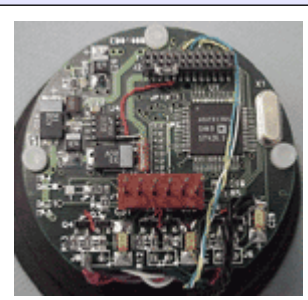
1.1.1 Puck bulkhead connectors

ECO pucks use different bulkhead connectors. The most common are shown below.

Pin	Function	MCBH-6-MP connector
1	Ground	
2	RX	
3	Reserved	
4	Voltage in	
5	TX	
6	Analog out	

Note: *Three-parameter sensors do not have analog output from pin 6.*

Pin	Function	LPMBH-6-MP
1	Ground	
2	RX	
3	Reserved	
4	Voltage in	
5	TX	
6	Analog out	

Pin	Function	Internal Molex connector
1	Reserved	
2	Voltage in	
3	TX	
4	RX	
5	Reserved	
6	Ground	

1.2 Electrical

Input	Current draw	Linearity
7–15 VDC	60 mA	99%

1.3 Communication

Sample rate	Output rate	Output maximum	Output resolution
to 4 Hz	19200 baud	4130 ±30 counts	12 bit

1.4 Optical

1.4.1 Single-parameter fluorometer

Parameter	Wavelength EX/EM	Range, Sensitivity
Chlorophyll (Chl)	470/695 nm	0–125, 0.016 µg/L
Colored Dissolved Organic Matter (CDOM)	370/460 nm	0–500, 0.093 ppb
Uranine (UR)	470/530 nm	0–400, 0.05 ppb
Phycocyanin (PC)	630/680 nm	0–230, 0.029 ppb
Phycoerythrin (PE)	540/570 nm	0–230, 0.029 ppb

1.4.2 Single-parameter scattering

Parameter	Wavelength	Range, Sensitivity
Scattering	470 nm, 532 nm, 650 nm	0–5, 0.003 m^{-1}
	700 nm	0–3, 0.002 m^{-1}
		0–5, 0.003 m^{-1}

1.4.3 Two-parameter fluorometer-turbidity

Parameter	Wavelength EX/EM	Range, Sensitivity (chl)	Parameter	Wavelength	Range, Sensitivity (NTU)
Chlorophyll	470/695 nm	0–30, 0.015 µg/L 0–50, 0.025 µg/L 0–75, 0.037 µg/L 0–125, 0.062 µg/L 0–250, 0.123 µg/L	NTU	700 nm	0–10, 0.005 NTU 0–25, 0.013 NTU 0–200, 0.098 NTU 0–350, 0.172 NTU 0–1000, 0.123 NTU

1.4.4 Three-parameter fluorometer/scattering

Parameter	Wavelength EX/EM	Range, Sensitivity
Chlorophyll (Chl)	470/695 nm	0–30, 0.015 µg/L
		0–50, 0.025 µg/L
Colored Dissolved Organic Matter (CDOM)	370/460 nm	0–375, 0.184 ppb
Uranine (UR)	470/530 nm	0–300, 0.073 ppb
Phycocyanin (PC)	630/680 nm	0–175, 0.086 ppb
Phycoerythrin (PE)	540/570 nm	0–175, 0.086 ppb

Parameter	Wavelength	Range, Sensitivity
Scattering	412 nm, 470 nm, 532 nm, 650 nm, 880 nm	0–5, 0.003 m^{-1}
	700 nm	0–3, 0.002 m^{-1}
		0–5, 0.003 m^{-1}

Section 2 Operation

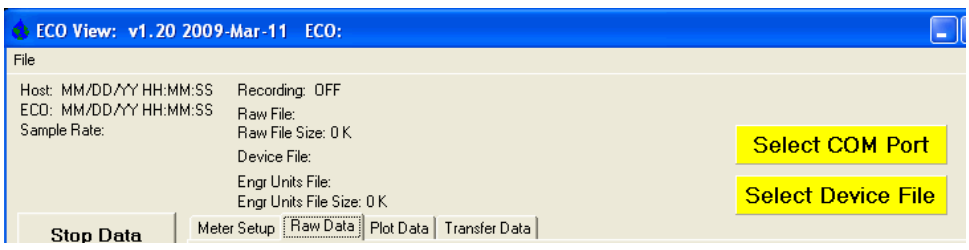
2.1 Functional check

⚠ CAUTION

CDOM sensors use UV LED light. 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.

Make sure that the sensor operates before further setup and deployment.

1. Connect the 6-socket connector on the optional test cable (refer to the section on the Test cable on page 9 for details) to the sensor.
2. Remove the cap that protects the sensor's optical face.
3. Connect the battery connectors on the test cable to a regulated power supply set at 12 VDC or a 9 V battery.
   Note: *For UV LEDs, put the blue fluorescent stick in front of the optical face to check the light. It is violet.*
4. Turn on the power supply.
5. The sensor comes on.
6. Put the CD that ships with the sensor into the host PC.
7. Select the file that ends in ".exe" to start the ECOView host software from the CD.



Note that only the top part of the host software window is shown above.

8. Push **Select COM Port**.
9. Select the COM port.
   - The COM port can also be selected from the drop-down menu at the lower left corner of the ECOView window.
10. Push **OK**.
11. Push **Select Device File**.
12. Select the device file from the CD. Its file extension is **.dev**.
13. Push **Open**.
    - The device file can also be selected from the **File** menu at the top of the host software screen.
14. Turn on the regulated power supply (or connect the 9V battery) if necessary.
15. Push **Start Data**.
16. Data will show in the *Raw Data* tab.

2.2 Pre-deployment check

1. Make sure that the host software is open and that the baud rate and device file are selected.
2. Make sure that the sensor is connected to a power source (or 9V battery) and that the power source is on.
3. Remove the protective cap from the sensor if necessary.

4. Hold a finger, the protective cap, or fluorescent stick if the sensor is a fluorometer, 1–4 cm away from the sensor's optics face.
   The value of the incoming data will increase toward the saturation value specified for the sensor.
   - Use a blue fluorescent stick to saturate the CDOM parameter.
   - Use an orange fluorescent stick to saturate the chlorophyll or phycoerythrin parameters.
   - Use a yellow fluorescent stick to saturate the uranine or phycocyanin parameters.
5. Push **Stop Data**.
   If the sensor has a Bio-wiper, the wiper closes. Note that if the power is turned off in mid-cycle, the Bio-wiper starts at the beginning of the cycle when power is supplied again.

2.2.1 Monitor data

Monitor the data from the sensor in counts. The number of "Signal" columns will vary depending on whether the user has a one-, two-, or three-parameter sensor.

1. Make sure the sensor has power supplied and is turned on.
2. Push **Start Data**.
3. Go to the *Raw Data* tab.

Meter Setup | Raw Data | Plot Data | Transfer Data

Date	Time	Wave-length	Signal	Wave-length	Signal	Wave-length	Signal	Thermistor
06/14/12	06:06:05	532	267	660	3070	695	78	535
06/14/12	06:06:06	532	315	660	3406	695	89	535
06/14/12	06:06:07	532	437	660	3861	695	127	535
06/14/12	06:06:08	532	509	660	4122	695	175	535
06/14/12	06:06:09	532	2577	660	4122	695	629	535
06/14/12	06:06:10	532	4122	660	4122	695	957	535
06/14/12	06:06:11	532	4122	660	4122	695	970	535
06/14/12	06:06:12	532	4122	660	4122	695	868	535
06/14/12	06:06:14	532	4122	660	4122	695	946	535

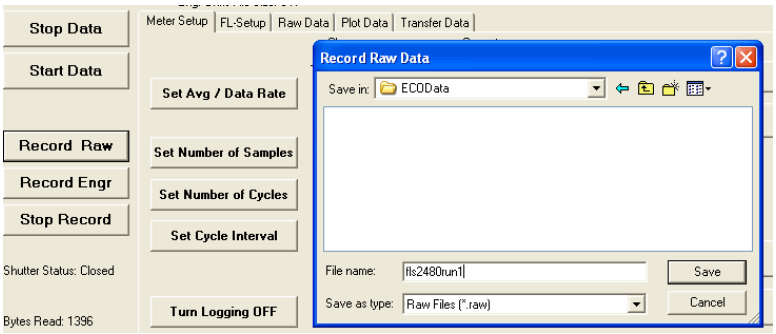
Note: *RT and puck sensors usually show 9's as placeholders in the date and time columns.*

2.2.2 Save data

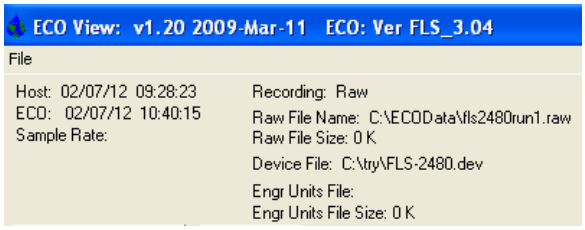
Save the data collected by the sensor in the sensor's memory (if so equipped), on the host PC, or both.
Note: *RT and puck sensors do not store data. Save the data from these sensors in real-time to the host PC or to a data logger.*

2.2.2.1 Save data to host PC

To save data to the host PC in counts, push **Record Raw**. To save data in engineering units, push **Record Engr**. Data collected by the sensor is saved in real-time to the host PC.



1. Push **Record Raw**.
   The *Record Raw Data* window shows in the host software.
2. Select a location on the host PC to store the data.
3. Type a file name.
4. Push **Save**.
5. Push **Record Engr**.
   The *Record Engineering Data* window shows in the host software.
6. Select a location on the host PC to store the data.
7. Type a file name.
8. Push **Save**.
9. Make sure the PC is configured to save data.
   - The file names from step 3 and step 7 will show in the host software.



10. Push **Start Data**.
    The host software will show the host PC file sizes.

2.2.3 Sensor maintenance

NOTICE

Do not use acetone or other solvents to clean the sensor or the sensor's optical face.

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 sensor's optical face. 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.

2.2.3.1 Bulkhead connector maintenance

Lubricate the mating surfaces of bulkhead connectors at regular intervals with pure silicone spray only. Allow the contacts to dry before they are connected.

Make sure that the pins have no corrosion, which looks green and dull. Make sure that the rubber seals on the pins are not delaminated. Connectors should mate smoothly and not feel "gritty" or too resistant.

The manufacturer recommends 3M™ Silicone Lubricant spray (UPC 021200-85822). Other silicone sprays may contain hydrocarbon solvents that damage rubber.

DO NOT use silicone grease. **DO NOT** use WD-40®. The wrong lubricant will cause the bulkhead connector to fail prematurely and the sensor will flood.

2.3 Additional operations

Note: *Real-time (RT and RTD) sensors do not store data. The setup selections in this section do not apply to these sensor models.*

2.3.1 Terminal program communication commands

Use Windows HyperTerminal® or other terminal program to communicate with *ECO* sensors as an alternative to the host software.

Interface settings				
baud rate: 19200	stop bits: 1	data bits: 8	flow control: none	parity: none

Command	Parameters	Description
!!!!!	none	Stops data output. Allows the user to input setup parameters. (If the sensor is in a low-power state, turn the power supply off for one minute, then turn the power on and keep the "!" key pressed at the same time.)
$ave	1–255	The number of measurements that make up each row of output.
$clk	24-hour time	Sets the time in the internal memory in the format hhmmss.
$date	date	Sets the date in the internal memory in the format mmddyy.
$emc	—	Clears the internal memory.
$get	—	Reads data from the internal memory. Prints **etx** when it is complete.
$int	24-hour time	Sets the time interval between sets of measurements the format hhmmss.
$mnu	—	Prints the menu of available settings to the host PC screen.
$mvs	1 = ON; 0 = OFF	1 = the Bio-wiper is open. 0 = the Bio-wiper is closed.
$pkt	0–65535	Sets the number of rows of data that are output between the selected time intervals.
$rec	1 = ON 0 = OFF	1 = Turns on the sensor's internal memory. 0 = Turns off the sensor's internal memory.
$rls	—	Loads the settings from the flash memory.
$run	—	Uses the current settings to operate.
$set	0–65535	Sets the number of rows of data that are output between low-power states.
$sto	—	Stores the desired settings to the sensor's flash memory.

Single-parameter sensors—Fluorometer and NTU only		
$asv	1 2 4	Sets the sensor's analog scaling value. 1 = the analog output covers the bottom quarter of the output range. 2 = the analog output covers half of the sensor's output range. 4 = the analog output covers the sensor's entire output range.

Fluorometer-only commands		
$cal	1 = ON 0 = OFF	Turns on the column with engineering units that are output in µg/L. Turns off the column with engineering units output in µg/L.
$ugl	0–255	Sets the scale factor for output in µg/L.
$off	0–255	Sets the offset for output in µg/L.

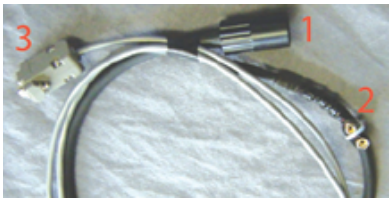
Section 3 Reference topics

3.1 Delivered items

- the *ECO* sensor
- a dummy plug with a lock collar
- a plastic protective cover for the optics face
- a model-specific spare parts kit
- **On the CD:**
- this user manual
- the ECOView host software
- the sensor's device file or files
- the sensor's characterization or calibration page

3.1.1 Test cable

Use a test cable to set up and test the sensor before deployment.



1 six-contact connector	**3** db-9 serial port connector
2 9-volt battery connector	

1. Connect the six-contact connector into the sensor.
2. Connect the 9-volt connector to a 9-volt battery. As an alternative, it can be connected to a regulated power supply.
3. Connect the db-9 connector to the host PC. Use a USB-to-RS232 adapter cable if necessary.

3.2 Calibration

The manufacturer calibrates all scattering sensors to make sure that the data that is collected meets the sensor's specifications. This information is on the sensor-specific calibration page that comes with the sensor.

3.3 Characterization

The manufacturer characterizes all fluorescence sensors using a fluorescing material to make sure that the data that is collected meets the sensor's specifications. This information is on the sensor-specific characterization page that ships with the sensor.

Section 4 General information

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

4.1 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.

4.2 Service and repair

The manufacturer recommends that sensors be sent back to the factory annually to be cleaned, calibrated, and for standard maintenance. Do the steps below to send a sensor back to the manufacturer.

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

4.3 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.

WET Labs, Inc.
P.O. Box 518
Philomath, OR 97370 U.S.A.
Tel. (541) 929-5650
Fax (541) 929-5277
www.wetlabs.com

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