SEA-BIRD SCIENTIFIC

User manual

SBE 63 Optical Dissolved Oxygen sensor

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seabird.com

Table of Contents

Section 1 Safety information

Please read this entire manual before this equipment is unpacked, set up, or operated. Pay attention to all danger, warning, and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

⚠DANGER

Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠WARNING

Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

⚠CAUTION

Indicates a potentially hazardous situation that may result in minor or moderate injury.

NOTICE

Indicates a situation which, if not avoided, may cause damage to equipment. Information that requires special emphasis.

1.1 Hazard information

⚠WARNING

This product can expose the user to chemicals with silica, crystalline (airborne particles of respirable size), which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

NOTICE

The manufacturer is not responsible for any damages due to misapplication of misuse of this product including, without limitation, direct, incidental and consequential damages, and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect process during a possible equipment malfunction.

1.2 Equipment labels

Read all labels and tags attached to the equipment. Personal injury or damage to the equipment could occur if not observed. A symbol on the equipment is referenced in the manual with a precautionary statement.

	Electrical equipment marked with this symbol may not be disposed of in European domestic or public disposal systems. Return old or end-of-life equipment to the manufacturer at no charge to the user.

	EFUP E: No hazardous material exists over the threshold of GB/T 26572-2011 standard, China's Requirements for Concentration Limits for Certain Hazardous Substances in Electrical and Electronic Products. This product should be recycled after its environmentally friendly use period.

Section 2 SBE 63 quick start guide

⚠WARNING

If the user thinks that a sensor has water in the pressure housing: Disconnect the sensor from any power supply. Put on safety glasses and make sure that the sensor is pointed away from the body and other people. In a well ventilated area, use the purge port (if the sensor is so equipped), or very SLOWLY loosen the bulkhead connector to let the pressure release.

⚠CAUTION

The pressure housing contains Electrostatic Discharge (ESD) sensitive parts and assemblies that are susceptible to damage from ESD. Follow ESD protocols:

- Put on protective eye wear before you open the pressure housing.
- Any electrostatic charge on the body of the human operator must be released before the pressure housing is opened: put a hand on a grounded surface, or better, wear a grounded antistatic wrist strap.
- At a minimum, wear short-sleeved antistatic clothing, such as cotton, or better, wear an antistatic smock for this service activity. *Do not wear a sweater, fleece or polyester-based clothing.*
- At a minimum, use a workstation with a wood or metal tabletop, or better, a tabletop that dissipates static. *Do not use a workstation with a synthetic or polymeric-based tabletop.*

This quick start guide gives the steps necessary to make sure that the SBE 63 Optical Dissolved Oxygen (ODO) sensor operates correctly and collects data before it is deployed.

What's in the box:

- SBE 63 ODO sensor
- CD or USB drive with software, calibration files, documentation
- Dummy plug and lock collar for the bulkhead connector
- Data I/O cable to connect the sensor to a PC.

1. Install the manufacturer-supplied software on a PC (refer to Install software and test sensor on page 9 for details.)
2. Connect the data I/O cable to the sensor and the PC and double-click on **SeasaveV2.exe** to start the software.
3. Make sure that all data stored in the sensor is transmitted to a PC.
4. Set the date and time and configure the data collection settings.
5. Send the GetSD and GetCC commands to verify status and calibration coefficients.
6. Install the I/O cable and attach the SBE 63 to the sensor with which it will be deployed (if not used as a stand-alone sensor).
7. Deploy the sensor.
8. Immediately after the sensor is recovered from a deployment:
   a. Flush the sensor with fresh water.
   b. Keep the SBE 63 out of direct sunlight between deployments.

Section 3 Specifications

3.1 Mechanical

Weight, 600 m, plastic, in air	0.245 kg
Weight, 7000 m, titanium, in air,	0.27 kg
Depth rating, plastic	600 m
Depth rating, titanium	7000 m
Optional hardware to use with SBE 16plus V2, 16plus-IM V2, 19plus V2, plastic, 5000 m	0.19 kg
Optional hardware to use with SBE 16plus V2, 16plus-IM V2, 19plus V2, titanium, 7000 m	0.545 kg

3.1.1 Connector

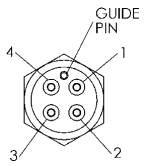
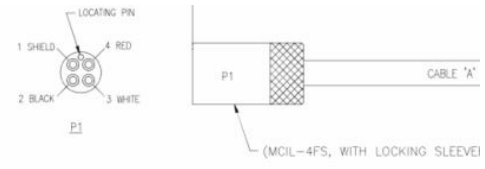
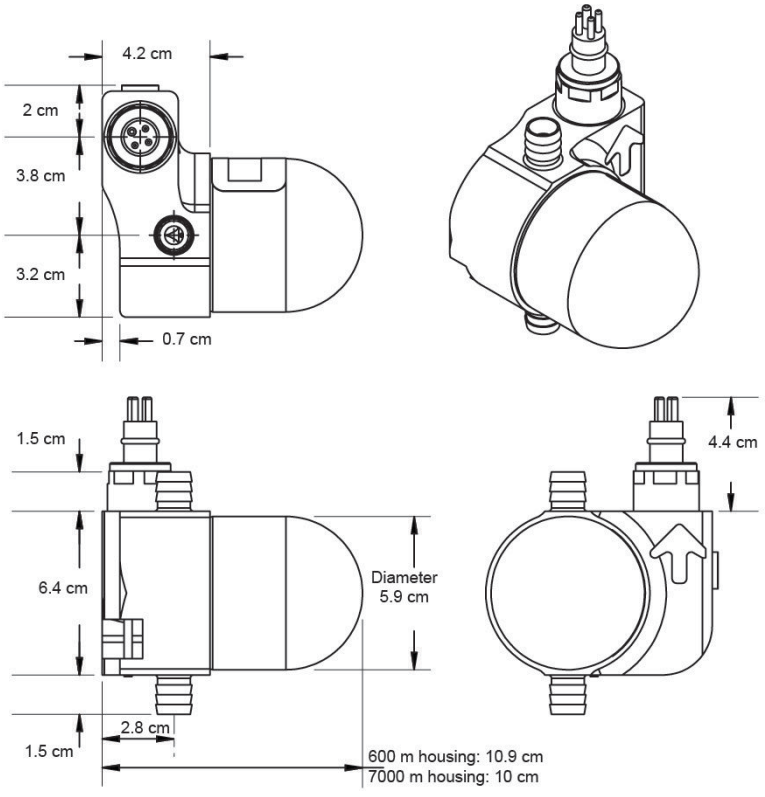
Contact	Function	MCBH4MP
1	Ground	
2	RS232 RX	
3	RS232 TX	
4	V in	

Figure 1 Data I/O cable



3.1.2 Dimensions



3.2 Electrical and communications

Input from external power supply	6-24 VDC
Communication interface	RS232
Data collection rate	1 Hz
Software	Seaterm V2, 2.6.2 and newer
Firmware	3.2.2 and newer

3.3 Analytical

Calibration range	0–450 µmol/kg
Measurement range	TBD but determined it would be in µmol/kg
Field accuracy	2% of full scale with specific language as after in-air cal on a float
Sample-based drift	< 1 µmol/kg per 100,000 samples at 20 °C
Response time, tau, 63% response	< 6 sec at 20 °C

Section 4 Set up sensor and verify operation

Install the software for the sensor and configure the hardware to make sure that the system functions correctly before deployment.

4.1 System description

The SBE 63 Optical Dissolved Oxygen (ODO) sensor is designed to be used in the pumped flow path of a CTD, but can also be used as a stand-alone sensor. When connected to a PC, the SBE 63 can show status, data collection setup, and diagnostic information.The SBE 63 operates in either an autonomous or polled mode:

- In autonomous mode, the SBE 63 takes samples at user-specified intervals 1–32767 seconds. It can be set to average up to 255 measurements per sample, then transmits that value.
- In polled mode, the SBE 63 takes one sample on command, and transmits the data.

Configuration options include—

- Use the optional sensor attachment hardware to attach the SBE 63 as an auxiliary RS232 sensor to the 16plus V2, the 16plus-IM V2, or the SBE 19plus V2.
- The SBE 63 can be installed on the SBE 37 SMP-ODO or the 37 IMP-ODO MicroCAT by the manufacturer.
- On a Navis float CTD or other Argo float CTD, the SBE 63 is installed with the CTD. The Navis float controller includes the RS232 interface that is required by the SBE 63.

4.2 Install software and test sensor

Make sure that the sensor is connected to a power supply and PC through the serial connector on the supplied cable. Most PCs no longer have serial ports, and a serial-to-USB adapter is necessary. Make sure that the USB driver software is installed on the PC so that there is communication between the sensor and the PC.

1. Install the Seasoft V2 software from the manufacturer-supplied CD or USB drive.
   - The software includes SeatermV2, a terminal program to communicate with and get data from the selected sensor.
   - SeasaveV7, to collect, convert, and show real-time or saved data.
   - SBE Data Processing, to calculate and make plots of conductivity, temperature, pressure, and other data, as well as derived data.
2. Remove the dummy plug from the sensor.
3. Connect the I/O cable to the sensor and to the PC and a power supply (6–24 VDC).
4. Supply power to the sensor.
5. Select **SeatermV2** to start the launcher.
6. At the **Instruments** menu item, select the sensor model.
   The main window opens. If this is the first time the software is opened, a Serial Port Configuration window opens. The software automatically connects at the default baud rate but will try others if necessary. The software automatically looks for the serial port number of the connected sensor.
   The area on the left shows available commands. The large area on the right shows commands and the responses from the sensor to those commands.
7. Push **OK** to close this window.
8. In the **Communications** menu, select *Connect*.
9. In the **File** menu, select *Load Command file* and select the connected sensor.
10. In the "Commands" area, select "Sampling," then "Take Sample" to make sure the sensor operates and collects data.

4.2.1 Software menu items

The menu items in Seasave are shown below.

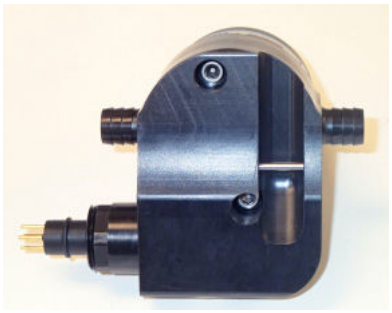
Menu item	Description
File	*Load command file* opens the selected .xml command file in the "Send Commands" area. *Unload command file* closes the file and removes the commands from the "Send Commands" area. *Exit* closes the program.
Communications	*Connect* connects to the COM port. *Disconnect* disconnects from the COM port. *Configure* establishes COM port and baud rates. *Disconnect and reconnect* turns communications off then on. Useful if a sensor is non-responsive.
Command	*Abort* stops the sensor. (The Esc key is equivalent.) *Send stop command* stops sensor operation.
Capture	*Capture* sensor responses to save real-time data or for diagnostics. Select *Capture* again to turn it off. Capture status shows in the "Status" bar.
Upload	Not applicable.
Tools	*Diagnostics log* saves diagnostic data. *Send script* sends the same setup information to a number of sensors.

Section 5 Deployment and recovery

5.1 Set up for deployment with SeaCAT or MicroCAT

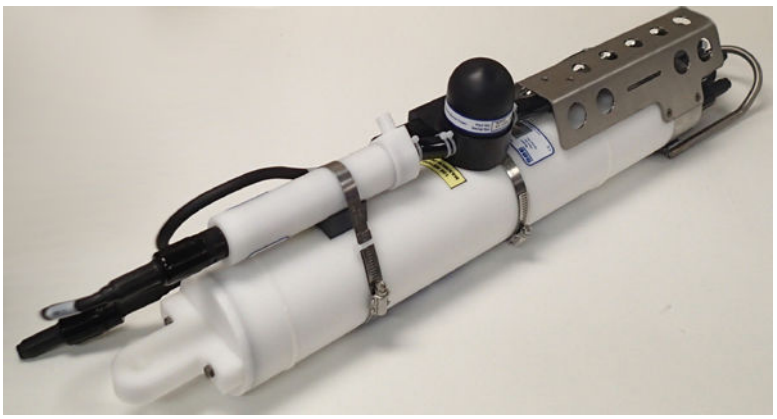
Install the SBE 63 on the SBE 16plus V2 or 19plus V2

front of sensor mount



back of sensor mount

1. Install the SBE 63 in the sensor mount:
   a. Put the two small O-rings on the sensor mount screw holes.
   b. Align the 4-contact connectors and push the SBE 63 onto the mount.
   c. Install the two 10-24 ½-inch titanium cap screws from the back of the sensor mount to attach the SBE 63 to the mount.
2. Attach the SBE 63 to the CTD:
   a. Install Tygon tubing to connect the SBE 63 inline between the CTD conductivity cell outlet and the pump inlet.
   b. Make sure that the large arrow on the sensor mount points in the direction of flow, which enters from the conductivity cell and exits to the pump.
3. Install the I/O cable on the SBE 63 sensor mount.



Use the SBE 63 on the SBE 16plus V2, the 16plus-IM V2 or the 19plus V2

- SetBaud= same as CTD, always 1200 for the 16plus-IM V2
- SetEcho=1
- SetAvg=2 (1 to 16 available)
- SetFormat=1
- SetAutoRun=0.

Make sure that <TxPwrSave> in the GetSD or GetHD response is 0 (set by the manufacturer).

If the SBE 63 will be deployed on a SBE 19plus V2 in Profiling mode, make sure that the <SerPause> in the GetSD or GetHD response is 1 (set by the manufacturer). For a SBE 19plus V2 or other SeaCATs in Moored mode, the <SerPause> can be 0 or 1.

Use the SBE 63 on the SBE 37-SMP-ODO or 37-IMP-ODO

The SBE 63 is installed on the MicroCAT by the manufacturer. Communication with the SBE 63 is through the MicroCAT. Send the Send63=GetSD command to verify that the SBE 63 is set up correctly.

- SetBaud= 2400 (set by the manufacturer; cannot be changed)
- SetEcho=1
- SetAvg=2 (1 to 16 available)
- SetFormat=1
- SetAutoRun=0.

Make sure that <TxPwrSave> in the GetSD or GetHD response is 0 (set by the manufacturer).

If the SBE 63 will be deployed on a RS485 or Inductive Modem MicroCAT, make sure that the <SerPause> in the GetSD or GetHD response is 1 (set by the manufacturer).

CTD settings

- PumpMode=2 for 16plus V2; MooredPumpMode=2 for 19plus V2
- DelayBeforeSampling=25 seconds at 15 °C, 40 seconds at 0 °C
- SampleInterval=, the interval between samples must be greater than or equal to the sum of the required sample time. Sample time is affected by—
  - The minimum time for the CTD to take a sample, 2.5 seconds
  - The time required to integrate the quartz pressure sensor, ParosIntegration
  - The time required for the CTD to collect and average NCycles=samples. Samples are 0.25 seconds apart
  - The delay after power is supplied to external sensors before data collection starts, DelayBeforeSampling=
  - The delay after data collection before power is removed from external sensors, DelayAfterSampling=.

5.2 Polled data collection

The manufacturer sets the SBE 63 to SetAutoRun=0 so that it does not automatically start to collect data when power is supplied. If SetAutoRun=1 is set, push **Esc** to stop the sensor. When the TS or TSR command is sent, the SBE 63 collects one sample and transmits the data.

Examples of polled data collection are shown below.

SBE 63 stand-alone operation

Supply power to the SBE 63. Select *Connect* in the **Communications** menu of the Seaterm232 software. Select the **Capture** menu to save data to a file.
Send SetAutoRun=0 to set up the sensor to wait for a command.

Send SetEcho=1 to see commands as they are entered.

Send SetFormat=0 to see converted oxygen and temperature data.

Send SetAvg=2 to see the average of two measurements for each sample.

Send GetHD to see the setup.

SBE 63 with a 16plus V2

All commands are preceded by #ii, where ii=ID.

Set the pump mode to PumpMode=2 for the 16plus V2.

Set the pump mode to MooredPumpMode=2 for the 19plus V2.

Set DelayBeforeSampling= to 25 seconds at 15 °C to 40 seconds at 0 °C to give the SBE 63 time to adjust after the pump starts but before the measurement is made.

Supply power to the SBE 63. Select *Connect* in the **Communications** menu of the Seaterm232 software.
Send SetAutoRun=0 to set up the sensor to wait for a command.

Send SetEcho=1 to see commands as they are entered.

Send SetAvg=2 to see the average of two measurements for each sample.

Send SetFormat=1 to transmit data in a format compatible with the 16plus V2.

Select *Configure* in the **Communications** menu of the Seaterm232 software. Change the baud rate to 9600 and push **OK**. In the **Communications** menu, select *Disconnect* then *Reconnect*.

Send GetHD to see the setup.

Turn off the power to the SBE 63.

To start data collection, connect the SBE 63 to the 16plus RS232 connector. Each time the SBE 16plus takes a measurement, it supplies power to the SBE 63 and sends a TS command.

For a moored CTD: SampleInterval=, the interval between samples must be greater than or equal to the sum of the required sample time. Sample time is affected by—

- The minimum time for the CTD to take a sample, 2.5 seconds
- The time required to integrate the quartz pressure sensor, ParosIntegration
- The time required for the CTD to collect and average NCycles=samples. Samples are 0.25 seconds apart
- The delay after power is supplied to external sensors befroe data collection starts, DelayBeforeSampling=
- The delay after data collection before power is removed from external sensors, DelayAfterSampling=.

SBE 63 with a SBE 41 (Argo float)

Supply power to the SBE 63. Select *Connect* in the **Communications** menu of the Seaterm232 software.
Send SetAutoRun=0 to set up the sensor to wait for a command.

Send SetEcho=1 to see commands as they are entered.

Send SetAvg=2 to see the average of two measurements for each sample.

Send SetFormat=1 to transmit data in a format compatible with the 16plus V2.

Send GetHD to see the setup.

Turn off the power to the SBE 63.

To start data collection, connect the SBE 63 to the SBE 41 connector. Each time the SBE 41 takes a measurement, it supplies power to the SBE 63 and sends a TS command.

5.3 Autonomous operation

The SBE 63 does not have and internal real-time clock, so when data collection starts, power to the SBE 63 must stay on during operation.

SetAutoRun=	0: send Start (default). 1: Turn on power, turn power off, then on or send Start to start operation.

To stop autonomous data collection:

- Turn off power, or
- Push **Esc** to stop and then send commands, or
- Send Stop to stop and then send commands.

Example: Autonomous setup for SetAutoRun=1 for use with a power supply and data controller	
`S>SetAutoRun=1`	Start data collection when power is supplied.
`S>SetEcho=1`	Show commands when they are entered.
`S>SetInterval=10`	Collect samples at 10-second intervals.

S>SetAvg=2	Average 2 measurements per output sample.
S>SetFormat=0	Get converted oxygen and temperature data.
S>SetBootDelay=1	Set the delay before operation to the minimum value.
S>SetGetHD=1	Verify setup.
	Remove power from the SBE 63.

To start data collection, connect the SBE 63 to a power supply and data controller (logger). To stop, remove power.

To operate the SBE without a data controller, supply power then push **Connect** in the *Communications* menu of the Seaterm232 software.

5.4 Default data format

SetFormat=1 is the default output format. It is required for use with—

- Argo CTD
- SeaCAT 16plus V2 and 16plus-IM V2
- SeaCAT 19plus V2
- MicroCAT 37 SMP-ODO and IMP-ODO

SeaCATs transmit the raw phase delay and the raw thermistor voltage. Use the Seasave or the SBE Data Processing software to convert these to units such as ml/L or mg/L.

MicroCATs use the raw phase delay and raw thermistor voltage along with pressure and salinity data from the CTD to calculate and transmit oxygen in ml/L or mg/L.

Data format:

aa.aaa, b.bbbbbb, o.oooo, tt.tttt

aa.aaaa	raw phase delay, µseconds
b.bbbb	raw thermistor voltage
o.ooo	dissolved oxygen in ml/L
tt.tttt	temperature, degrees C
Example, SetFormat=1 16.6423,0.641321,4.308,25.2553	

5.4.1 Data format: converted oxygen and temperature with units

SetFormat=0

Data format:

o.oooo, tt.tttt

o.oooo	converted oxygen, ml/L
tt.tttt	converted temperature, °C
Example, SetFormat=0 4.3019, 25.2556	

Converted oxygen value depends on the user-set values of SetRefSal= and SetRefP=.

5.4.2 Data format: raw and converted data

SetFormat=2

Data format:

01/01/11 00:00:00 660 aaaaa *695* bbbbb *570* oooo ttttt

Values in italics are constants and not used to calculate output. Values are tab-delimited.

aaaaa	raw phase delay x 1000
bbbbb	raw thermistor voltage x 65536 ÷ 3.30
oooo	dissolved oxygen in ml/L x 1000
tt.tttt	temperature, °C x 1000
Example, SetFormat=2 *01/01/11 00:00:00 66*016649 *695* 12736 *570* 4303 25255	

Converted oxygen value depends on the user-set values of SetRefSal= and SetRefP=.

5.4.3 Data format: sensor name, serial number, converted oxygen

SetFormat=3

Data format:

SBE63 ssss oo.ooo

ssss	SBE 63 serial number
oo.ooo	dissolved oxygen in ml/L
Example, SetFormat=3 SBE63 0013 04.304	

Sensor name and serial number are single-tab-delimited. Serial number and dissolved oxygen are double-tab delimited.

5.5 Recovery

⚠WARNING

If the user thinks that a sensor has water in the pressure housing: Disconnect the sensor from any power supply. Put on safety glasses and make sure that the sensor is pointed away from the body and other people. In a well ventilated area, use the purge port (if the sensor is so equipped), or very SLOWLY loosen the bulkhead connector to let the pressure release.

1. Flush the SBE 63 with fresh water.
2. Do not leave the SBE 63 in direct sunlight.

⚠WARNING

If the user thinks that a sensor has water in the pressure housing: Disconnect the sensor from any power supply. Put on safety glasses and make sure that the sensor is pointed away from the body and other people. In a well ventilated area, use the purge port (if the sensor is so equipped), or very SLOWLY loosen the bulkhead connector to let the pressure release.

6.1 Plastic sensor maintenance

Sensors with plastic or acetyl pressure housings are lighter and less expensive than the more durable titanium or aluminum housings, but require extra care.

- Plastic can become brittle in cold environments. It is possible for cracks to form around screw holes. Make sure that screws are tightened to 15 in-lbs., or finger-tight, then 45 degrees more.
- Plastic scratches easily. Do not use screwdrivers or metal tools to remove the end flange. Monitor the pressure housing for deep scratches that can become a point of weakness during deep deployments or very cold temperatures. Make sure that the O-ring surfaces are clean.

6.2 Examine O-rings

NOTICE

Do not use petroleum-based lubricants on O-rings. It will cause damage to the O-rings.
Damaged O-rings can cause the sensor to flood and make it unserviceable.

Examine the O-rings on the sensor every time they are exposed—on the connector end flange and other parts. O-rings must be pristine. If there is any question about whether an O-ring is clean and undamaged, replace it with a new one.

1. Dry the O-rings and O-ring grooves with a lint-free cloth or tissue.
2. Examine each O-ring to make sure there is no damage, dirt, lint or hair on it.
3. Replace an O-ring if necessary.
4. Apply a small quantity of silicone-based Parker Super O Lube® or Dow Corning® high vacuum grease to each O-ring.
    - The lubricant helps the O-ring move into its groove with no twist, which can compromise the seal.
    - Do NOT use petroleum-based lubricants on any O-ring.

6.3 Clean bulkhead connectors

NOTICE

Do not use WD-40® or petroleum-based lubricant 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.

Use silicone-based lubricants only.

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 failure of the bulkhead connector.

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:

Any corrosion.		
Cracks, scratches, or other damage on the rubber pins or in the sockets.		
Separation of the rubber from the pins.		
Swelled or bulging rubber pins.		

6. Use a silicone-based lubricant on each of the contacts of the bulkhead connector. The manufacturer recommends any of the products listed below.

   - 3M™ Spray Silicone Lubricant (3M ID# 62-4678-4930-3). Make sure to let it dry.
   - Dow Corning Molykote® III Compound (DC III)
   - Dow Corning High Vacuum Grease® (DC 976 V)
   - Dow Corning 4 Electrical Insulating Compound® (DC 4)
   - Dow Corning Molykote 44 High Temperature Grease® (DC 44)

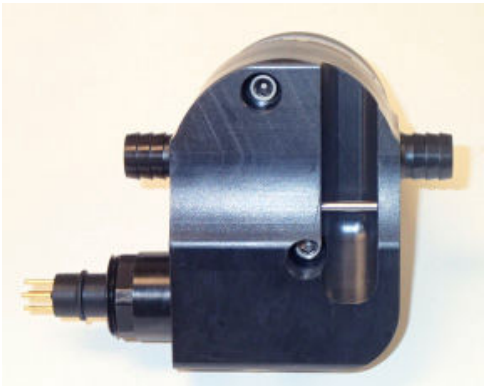
   Use a finger to put a small quantity (approximately 1 cm in diameter) of silicone grease on the socket end of the connector and push as much of the lubricant as possible into each socket. Do not use too much lubricant, as that will prevent a good seal.

7. Connect the connectors.
8. Use a lint-free wipe to clean any unwanted lubricant from the sides of the connectors.

6.4 Install or remove SBE 63 from sensor mount

Follow the steps below to remove or install the SBE 63 on the optional sensor mount.



Install SBE 63 on mount

1. Put the two O-rings on the sensor mount screw holes.
2. Align the connectors and push the SBE 63 onto the mount.
3. Install the two 10-24 x ½" titanium cap screws from the back of the sensor mount to attach the SBE 63 to the mount.

Remove SBE 63 from mount

1. Remove the two 10-24 x ½" titanium cap screws from the back of the sensor mount.
2. Pull the SBE 63 straight out of the sensor mount. Keep the O-rings if they are in good condition. It may be necessary to wear a rubber glove for a better grip, or to insert one of the cap screws into the sensor mount and turn once or twice to push the SBE 63 off of the mount.

6.5 Spare parts and accessories

Part number	Description	Qty
50511	Plastic sensor mount kit for depths to 5000 m	1
50585	Titanium sensor mount kit for depths to 7000 ,	1
311133	10-24 titanium cap screws, ½"	1
171792	Interface cable for 16plus V2, 16plus-IM V2, 19plus V2	1
31450	2 m Tygon tubing, black ½" ID, ¾" OD	1
90087	Universal plumbing kit with air release valve, Y-fitting, tubing	1

6.6 Sensor calibration

The manufacturer calibrates every sensor to known conditions and measures the response of the sensor. Calibration coefficients are calculated and are used to get engineering units.

Calibration coefficients are printed on the Calibration Certificate supplied with the sensor. They are also stored in the SBE 63, so the sensor can directly transmit dissolved oxygen in ml/L. When the SBE 63 is used with a Sea-Bird Scientific CTD, dissolved oxygen can be calculated in other units during post-processing.

The primary cause of calibration drift in optical oxygen sensors is fouling of the optical window by chemical or biological deposits. It is important to keep the window clean.

Another cause of calibration drift is photobleaching of the sensor film. It is important to keep the sensor film out of direct sunlight.

Recommended calibration intervals

Continuous long-term deployments show that the sensor can measure oxygen for more than a year and stay within 2% of the initial calibration. The manufacturer recommends calibration and service at the **shortest** of the intervals below for best operation and accuracy:

- Every 1 to 3 years
- Between extended deployments
- 300,000–500,000 samples

Section 7 Reference: command descriptions

This is a reference for advanced users. The values of these commands are stored in the sensor until the user changes them. Notes about terminal commands are listed below.

- Commands are not case-sensitive. Push **Enter** (oxD) to store a command.
- The argument Y and 1 are both "Yes" and N and 0 are both "No." For example, Volt0=y and Volt0=1 are equivalent.
- The sensor sends `Command failed: Unknown command` if a command is invalid.
- If the SBE 63 does not return an `S>` prompt after a command, push **Enter** or **Esc** to see the `S>` prompt.
- Remove power or push the **Esc** key or send **Stop** to stop the sensor as it transmits data.
- All commands that change the setup take effect immediately and are stored in the sensor.

7.1 Status

GetSD

Get and show status data, which includes all parameters used to set up the sensor.

GETSD

```
<StatusData DeviceType ='SBE063' SerialNumber='0013'>
<FirmwareVersion>3.2.2</FirmwareVersion>
<FirmwareDate>Mar 2 2015 15:03:49</FirmwareDate>
<CommandSetVersion>1.4</CommandSetVersion>
<LoaderVersion>SBE 63 FirmwareLoader V 1.0</LoaderVersion>
<CalibrationDate>05535</CalibrationDate>
<StatusConfig>
```

SetBaud= `<BaudRate>009600</BaudRate>`

`<BlueOnTime>0000000</BlueOnTime>`
Blue LED total on-time, seconds

SetAvg= `<SampleAvg>002</SampleAvg>`
Number of measurements to average per sample

SetInterval= `<SampleInterval>00004</SampleInterval>`
Interval between samples, autonomous mode

SetBootDelay= `<BootDelay>001</BootDelay>`
Delay before data collection starts, after power is supplied

SetFormat= `<OutFormat>01</OutFormat>`
Output format of data

`<AnalogGain>2</AnalogGain>`

`<AnalogOffset>00</AnalogOffset>`

SetAutoRun= `<AutoRun>0</AutoRun>`
Start data collection automatically when power is supplied

`<BlueTupdate>0</BlueTupdate>`
Update blue LED counter with every sample?

`<SerPause>1</SerPause>`
SBE 19plus V2 in profiling mode, 16plus-IM V2, 37-IMP-ODO: manufacturer-set to 1. Can be 0 or 1 for other applications

SetEcho=

<Echo>1/Echo>
Show characters entered

<TxPwrSave>0</TxPwrSave>
Set by manufacturer. Use 1 with CTD on Navis float. 0 for all other applications.

<Flags>0x0023</Flags>
(internally calculated from SetAutoRun= and manufacturer settings)

</StatusConfig>

</StatusData>

GetHD	Show hardware data
	Sensor model, S/N
	Manufacturer
	Firmware version
	Firmware date
	Command set version
	PCB S/N and assembly numbers
	Manufacture date, days since 1/1/2000
	PCB assemblies and S/Ns
	Optical film serial number
	Power supply voltage
	Software used to transmit firmware to SBE 63
	Calibration date, days since 1/1/2000
SetBaud=	Baud rate for communication
	Blue LED counter, total "on" time, seconds
SetAvg=	Number of measurements to average per sample
SetInterval=	Interval between samples, autonomous mode
SetBootDelay=	Delay before data collection starts, after power is supplied
SetFormat=	Output format of data
	Analog gain and offset
SetAutoRun=	Start data collection automatically when power is supplied
	Update blue LED counter with every sample?
	Serial pause—SBE 19plus V2 in profiling mode, 16plus-IM V2, 37-IMP-ODO: manufacturer-set to 1. Can be 0 or 1 for other applications
SetEcho=	Enable echo (show characters entered)
	Power save mode—set by manufacturer. Use 1 with CTD on Navis float. 0 for all other applications.

DS	Show status and setup parameters
	Sensor type
	Sensor serial number
	PCB assemblies and serial numbers
	Optical film serial number

	Firmware version and date
	Software used to transmit firmware to SBE 63
	Manufacture date, days since 1/1/2000
	Calibration date, days since 1/1/2000
	Power supply voltage
SetBaud=	Communication baud rate
	Analog gain
	Analog offset
	Blue LED counter, total "on" time, seconds
SetAvg=	Number of measurements to average per sample
SetInterval=	Interval between samples, autonomous mode
SetBootDelay=	Delay before data collection starts, after power is supplied
SetFormat=	Output format of data
SetAutoRun=	Start data collection automatically when power is supplied
	Update blue LED counter with every sample?
	Serial pause—SBE 19plus V2 in profiling mode, 16plus-IM V2, 37-IMP-ODO: manufacturer-set to 1. Can be 0 or 1 for other applications
SetEcho=	Enable echo (show characters entered)
	Power save mode—set by manufacturer. Use 1 with CTD on Navis float. 0 for all other applications.

GetCC	Show calibration coefficients. These should agree with the Calibration Certificates from the manufacturer.
	Calibration date, days since 1/1/2000
SetRefSal=	Reference salinity, 0–1000.0 psu. Use to calculate oxygen in converted units. Default = 0. Moored mode: enter approximate value for deployment. Profiling mode: 0. Correct oxygen for the effect of salinity during post-processing.
SetRefP=	Reference pressure, 0–10,000.0 dbar. Use to calculate oxygen in converted units. Default = 0. Moored mode: enter approximate value for deployment. Profiling mode: 0. Correct oxygen for the effect of salinity during post-processing.

DC	Show calibration coefficients in non-XML format. These should agree with the Calibration Certificates from the manufacturer.

Use the commands below to get and see the settings for a specific parameter.

Get with	Result	Set by
GetSN	serial number	manufacturer
GetModel	model	manufacturer
GetEcho	status of echo	SetEcho=
GetFormat	data output format	SetFormat=
GetBootDelay	delay before data collection after power is supplied	SetBootDelay
GetInterval	interval between samples, autonomous mode	SetInterval=
GetAvg	number of measurements to average per sample	SetAvg=

GetAutoRun	start data collection when power is supplied	SetAutoRun=
GetBlueTUp	blue LED counter total "on" time	manufacturer
GetCalDate	calibration date	SetCalDate=
GetA0	calibration coefficient	SetA0
GetA1	calibration coefficient	SetA1
GetA2	calibration coefficient	SetA2
GetB0	calibration coefficient	SetB0
GetB1	calibration coefficient	SetB1
GetC0	calibration coefficient	SetC0
GetC1	calibration coefficient	SetC1
GetC2	calibration coefficient	SetC2
GetE	calibration coefficient	SetE
GetTA0	calibration coefficient	SetTA0
GetTA1	calibration coefficient	SetTA1
GetTA2	calibration coefficient	SetTA2
GetTA3	calibration coefficient	SetTA3
GetSolB0	calibration coefficient	SetSolB0
GetSolB1	calibration coefficient	SetSolB1
GetSolB2	calibration coefficient	SetSolB2
GetSolB3	calibration coefficient	SetSolB3
GetSolC0	calibration coefficient	SetSolC0
GetRefSal	calibration coefficient	SetRefSal
GetRefP	calibration coefficient	SetRefP
GetTau20	calibration coefficient	SetTau20=

7.2 General setup

BaudRate=x	RS232 rates. 600, 1200, 2400, 4800, 9600, 19200, 33600, 38400, 57600, 115200. Default is 9600. Send two times to change the rate.
SetEcho=x	x=Y: show characters as they are entered (default) x=N: do not
SetFormat=	x=0: converted oxygen and temperature, with units. x=1: raw phase delay and thermistor voltage, converted oxygen and temperature, without units. Compatible with Argo CTD, SeaCATs, MicroCATs (default) x=2: raw and converted data x=3: sensor name, serial number, and converted oxygen
SetBootDelay=x	x= number of seconds after power is supplied before data collection starts, 0–255. Default = 1. Applies if AutoRun=1.
SetInterval=x*	x= interval between samples, 1–32767 seconds, for autonomous mode if power stays on and Start has been sent or AutoRun=1. Default = 4.
SetAvg=x	x= number of measurements to average per sample. Each additional measurement adds approximately 0.0167 seconds. A higher SetAvg value will decrease the film life of the sensor. Default = 2

SetAutoRun=x	x=0: wait for command when power is supplied. Default. Required for Argo CTD, SeaCATs, MicroCATs. x=1: start data collection when power is supplied. First sample taken after SetBootDelay=.
*Default	Set most setup parameters to the manufacturer defaults: SetEcho=1, SetFormat=1, SetBootDelay=1, SetInterval=4, SetAvg=2, SetAutoRun=0, SerPause=0, BlueTUpdate=0, TxPwrSave=0, Gain=2, Offset=0.

Notes:

- The baud rate of the sensor must be the same as the baud rate in the Seaterm232 software.
- Send baud rate command twice. The sensor changes to the new baud after the first entry, then waits for the command to be sent again. In Seaterm232, go to the **Communications** menu, then *Configure*. Select the new baud rate then push **OK**.
- In

Required setup when the SBE 63 is used with a 16plus V2, 16plus-IM, or 19plus V2:

- SetBaud=CTD baud rate (1200 for the 16plus-IM.)
- SetEcho=1
- SetFormat=1
- SetAvg=2 (range is 1–16)
- SetAutoRun=0
- CTD—PumpMode=2
- CTD—DelayBeforeSampling=25 seconds at 15 °C; 40 seconds at 0 °C so the SBE 63 can equilibrate after the pump starts and before a measurement.
- The SampleInterval= in the CTD must be more that the sum of the time required for a sample, a minimum of approximately 2.5 seconds. Total time changes with—
  - ParosIntegration= the integration of the optional quartz pressure
  - NCycles= the time required for the CTD to take and average samples taken at intervals of 0.25 seconds
  - DelayBeforeSampling= and DelayAfterSampling= delay before and after data collection before power is cycled.
  - Use ##ii in front of all commands for the 16plus-IM V2, where ii=ID.

7.3 Data collection

Start or Go	Stare autonomous data collection immediately at SetInterval= rate, and show data in SetFormat= . Applicable if SetAutoRun=0, or SetAutoRun=1 and pushed **Esc** to stop data collection.
Stop	Push **Esc**, send Stop command, or remove power. When data collection stops and the terminal program shows the `S>` prompt, commands can be sent. Note that the **Stop** command will not show in autonomous mode.
TS	Collect one sample and transmit data in format of SetFormat=.
TSR	Collect one sample and transmit in raw format (diagnostic for manufacturer)

7.4 Status

Use the commands below to get and see the settings for a specific parameter.

SetCalDate=	S=calibration date, days since 1/1/2000
SetTA0=F	F=TA0 coefficient
SetTA1=F	F=TA1 coefficient
SetTA2=F	F=TA2 coefficient
SetTA3=F	F=TA3 coefficient

SetA0=F	F=A0 coefficient
SetA1=F	F=A1 coefficient
SetA2=F	F=A2 coefficient
SetB0=F	F=B0 coefficient
SetB1=F	F=B1 coefficient
SetC0=F	F=C0 coefficient
SetC1=F	F=C1 coefficient
SetC2=F	F=C2 coefficient
SetE=F	F=E coefficient
SetSolB0=F	F=SolB0 coefficient
SetSolB1=F	F=SolB1 coefficient
SetSolB2=F	F=SolB2 coefficient
SetSolB3=F	F=SolB3 coefficient
SetSolC0=F	F=SolC0 coefficient
SetRefSal=F	F=Reference salinity, 0–1000.0 psu. Use to calculate oxygen in converted units. Default = 0. Moored mode: enter approximate value for deployment. Profiling mode: 0. Correct oxygen for the effect of salinity during post-processing.
SetRefP=F	F=Reference pressure, 0–10,000.0 dbar. Use to calculate oxygen in converted units. Default = 0. Moored mode: enter approximate value for deployment. Profiling mode: 0. Correct oxygen for the effect of salinity during post-processing.
SetTau20=F	F=sensor response time, 0–600 seconds. Default = 5. Used by Adaptive Pump Control in MicroCATs

Section 8 General information

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

8.1 Warranty

Refer to the manufacturer's website for warranty information (seabird.com/warranty).

8.2 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. 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-butyltin, 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.

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