MicroCAT C-T-DO Recorder (Serial interface, Memory, integral Pump) SBE 37-SMP-IDO

SUMMARY

- Conductivity, Temperature, Pressure (optional), and Dissolved Oxygen measurements, at user-programmable intervals (10 seconds to 6 hours).
- RS-232 serial interface (RS-485 optional), internal memory, and internal batteries (can be powered externally).
- *Adaptive Pump Control* for high-accuracy oxygen data.
- Expendable anti-foulant devices, unique flow path, and pumping regimen for maximum bio-fouling protection.
- Depths to 250 meters (*ShallowCAT* plastic housing) or 7000 meters (titanium housing).
- Adds to Sea-Bird's field-proven MicroCAT family, with more than 8000 instruments deployed since 1997.

Optional plastic (ShallowCAT) housing; standard titanium housing also available

Intended for deployment in orientation shown (connector end down) for proper operation

DESCRIPTION

The SBE 37-SMP-IDO MicroCAT is a high-accuracy conductivity and temperature (pressure optional) recorder with **S**erial interface, internal batteries, **M**emory, integral **P**ump, and **I**ntegrated **D**issolved **O**xygen sensor. Constructed of titanium and other non-corroding materials for long life with minimal maintenance, the MicroCAT is designed for moorings or other long duration, fixed-site deployments.

Calibration coefficients are stored in EEPROM, allowing output of C, T, P, DO, and time in ASCII engineering units (decimal or XML; raw output available); salinity can also be output.

SENSORS

Temperature and Conductivity sensors are based on our field-proven SEACAT and SEACAT*plus* products. Electrical isolation of conductivity electronics eliminates any possibility of ground-loop noise. Our unique internal-field conductivity cell permits the use of expendable anti-foulant devices, for long-term bio-fouling protection. The aged and pressure-protected thermistor has a long history of exceptional accuracy and stability.

The IDO is a frequency-output version of our field-proven SBE 43 Dissolved Oxygen sensor, with the same performance specifications.

The optional Druck pressure sensor has a micro-machined silicon diaphragm, and is essentially free of pressure hysteresis. Compensation of the temperature influence on pressure is performed by the MicroCAT's CPU.

PUMP

The integral pump runs each time the MicroCAT samples, providing the following advantages:
- **Improved conductivity and oxygen response** – The pump flushes the previously sampled water from the conductivity cell and oxygen sensor plenum, and brings a new water sample quickly into the system.
- **Improved anti-foul protection** – Water does not freely flow through the conductivity cell and oxygen sensor plenum between samples, allowing the anti-foul concentration inside the system to maintain saturation.

With *Adaptive Pump Control*, the MicroCAT calculates the pumping time for best oxygen accuracy, as a function of the previous sample's temperature and pressure (maximizing data quality while minimizing power consumption).

COMMUNICATIONS AND INTERFACE

The MicroCAT communicates via standard RS-232 interface. Data can be uploaded at up to 115.2K baud; real-time data can be transmitted up to 1600 meters at 600 baud, simultaneous with recording. The user can upgrade firmware through the external connector, without opening the housing. An optional RS-485 interface allows multiple MicroCATs to share a common 2-wire cable, minimizing cable complexity for C-T chains.

User-selectable operating modes include:
- **Autonomous Sampling** – At pre-programmed intervals of 10 seconds to 6 hours, the MicroCAT wakes up, runs the pump, samples, stores data in memory, and goes to sleep.
- **Polled Sampling** – On command from a computer or satellite, radio, or wire telemetry equipment, the MicroCAT runs the pump, takes a sample, and transmits data.
- **Serial Line Sync** – In response to a pulse on the serial line, the MicroCAT wakes up, runs the pump, samples, stores data in memory, and goes to sleep.

SOFTWARE

The MicroCAT is supplied with a powerful Windows 2000/XP software package, SEASOFT© V2, which includes:
- SeatermV2© – terminal program for easy communication and data retrieval.
- SBE Data Processing© – programs for calculation, display, and plotting of conductivity, temperature, pressure (optional), dissolved oxygen, and derived variables such as salinity, sound velocity, and density.

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DATA STORAGE AND BATTERY ENDURANCE

Temperature and conductivity are stored 6 bytes/sample, time 4 bytes/sample, oxygen 3 bytes/sample, and optional pressure 5 bytes/sample; memory capacity is in excess of 444,000 samples (with pressure). The MicroCAT is powered by a 7.8 Amp-hour (nominal) battery pack consisting of twelve AA lithium batteries (Saft LS14500) which, when removed from the MicroCAT, can be shipped via commercial aircraft. Battery endurance varies widely, depending on the sampling scheme and deployment pressure and temperature. Sampling every 10 minutes in water temperatures of approximately 10 °C, the MicroCAT can be deployed for almost 6 months (24,000 samples); see the manual for example calculations.

SPECIFICATIONS

Measurement Range

Conductivity:	0 - 7 S/m (0 - 70 mS/cm)
Temperature:	-5 to 35 °C
Oxygen:	120% of surface saturation
	(all natural waters, fresh and salt)
Optional Pressure:	20/100/350/600/1000/2000/3500/7000
	(meters of deployment depth capability)

Initial Accuracy

Conductivity:	0.0003 S/m (0.003 mS/cm)
Temperature:	0.002 °C
Oxygen:	2% of saturation
Optional Pressure:	0.1% of full scale range

Typical Stability

Conductivity:	0.0003 S/m (0.003 mS/cm) per month
Temperature:	0.0002 °C per month
Oxygen:	0.5% per 1000 hours
Optional Pressure:	0.05% of full scale range per year

Resolution

Conductivity:	0.00001 S/m (0.0001 mS/cm)
Temperature:	0.0001 °C
Oxygen:	0.035% of saturation
Optional Pressure:	0.002% of full scale range

Clock Stability   5 seconds/month

Acquisition Time   2.4 - 3.2 sec/sample (see manual)

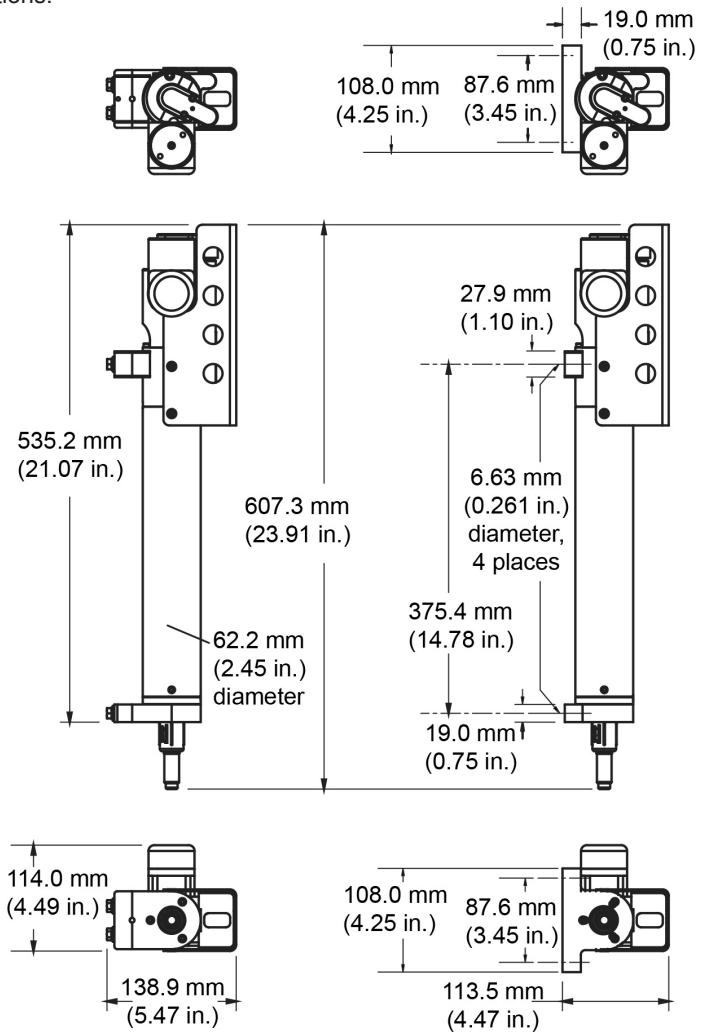**Power Supply**   7.8 Amp-hour (nominal) battery pack, 257 KJoules (derated for calculations)

Optional External Power   0.25 Amps at 9-24 VDC

Power Consumption (all with pressure) *

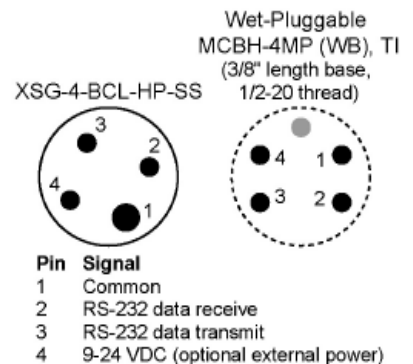|	
Quiescent:	0.0004 Watts
CTD-DO Sample Acquisition (excluding pump):	
Real-time data enabled	0.17 Watts
No real-time data	0.155 Watts
CTD-DO Sample Waiting (not sampling, pump running, excluding pump):	
Real-time data enabled	0.056 Watts if receive line valid,
	0.016 Watts if receive line not valid
No real-time data	0.016 Watts
CTD-DO Between Samples:	
Real-time data enabled	0.056 Watts if receive line valid,
	0.0004 Watts if receive line not valid
No real-time data	0.0004 Watts
Pump:	0.12 Watts
Communications:	0.065 Watts

Housing, Depth Rating, & Weight

Standard:	Titanium housing, 7000 m (23,000 ft),
Optional ShallowCAT:	Plastic housing, 250 m (820 ft),
	3.6 kg (8 lbs) in air, 1.6 kg (3.5 lbs) in water

19.0 mm (0.75 in.)

108.0 mm (4.25 in.)   87.6 mm (3.45 in.)

535.2 mm (21.07 in.)

607.3 mm (23.91 in.)

27.9 mm (1.10 in.)

6.63 mm (0.261 in.) diameter, 4 places

375.4 mm (14.78 in.)

62.2 mm (2.45 in.) diameter

19.0 mm (0.75 in.)

114.0 mm (4.49 in.)

138.9 mm (5.47 in.)

108.0 mm (4.25 in.)   87.6 mm (3.45 in.)

113.5 mm (4.47 in.)

Standard Wire Mounting Clamp and Guide

Alternate Flat Surface Mounting Brackets

Wet-Pluggable MCBH-4MP (WB), TI (3/8" length base, 1/2-20 thread)

XSG-4-BCL-HP-SS

Pin	Signal
1	Common
2	RS-232 data receive
3	RS-232 data transmit
4	9-24 VDC (optional external power)

* Power consumption values are for standard RS-232 interface; for optional RS-485 interface, see RS-485 manual.   10/10