

MicroCAT C-T-(P)-ODO Recorder (Serial interface, Memory, integral Pump)

SBE 37-SMP-ODO



SUMMARY

- Moored Conductivity, Temperature, Pressure (optional), and Optical Dissolved Oxygen measurements, at user-programmable intervals (10 seconds to 6 hours).
- RS-232 serial interface (RS-485 or SDI-12 / RS-232 optional), internal memory, 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 350 meters (*ShallowCAT* plastic housing) or 7000 meters (titanium housing).
- Adds to field-proven MicroCAT family, with 10,000 instruments deployed since 1997.

DESCRIPTION

The SBE 37-SMP-ODO MicroCAT is a high-accuracy conductivity and temperature (pressure optional) recorder with **Serial interface**, internal batteries, **Memory**, integral **Pump**, and **Optical Dissolved Oxygen** 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, sound velocity, and specific conductivity can also be output.

SENSORS

Conductivity and Temperature 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 oxygen sensor is our field-proven SBE 63 Optical Dissolved Oxygen sensor.

The optional strain-gauge pressure sensor is available in eight ranges, from 0 - 20 meters to 0 - 7000 meters. 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 between samples, allowing the anti-foul concentration inside the system to maintain saturation.
- **Improved measurement correlation** – The individually calibrated SBE 63 Optical Dissolved Oxygen sensor is integrated within the CTD flow path, providing optimum correlation with CTD measurements.

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 400 meters at 2400 baud, simultaneous with recording. The user can upgrade firmware through the external connector, without opening the housing. There are two optional interfaces:

- **RS-485** interface allows multiple MicroCATs to share a common 2-wire cable, minimizing cable complexity for C-T chains.
- **RS-232 / SDI-12** dual interface allows for setup and data upload via RS-232 using the full set of commands, while a more limited set of commands can be sent via SDI-12 to make small setup changes in the field and to poll for data. User-selectable output variables for this interface, designed for coastal deployments, includes specific conductivity.

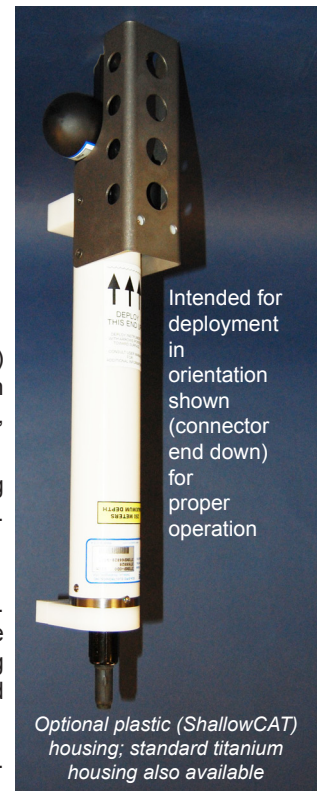
User-selectable operating modes include:

- **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.



Sea-Bird Electronics, Inc.

13431 NE 20th Street, Bellevue, Washington 98005 USA

Website: www.seabird.com

Email: seabird@seabird.com

Telephone: +1 425-643-9866

Fax: +1 425-643-9954

DATA STORAGE AND BATTERY ENDURANCE

Temperature and conductivity are stored 6 bytes/sample, time 4 bytes/sample, oxygen 6 bytes/sample, and optional pressure 5 bytes/sample; memory capacity exceeds 380,000 samples (with pressure). The MicroCAT is powered by a 7.8 Amp-hour (nominal) battery pack with 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 10 °C, the MicroCAT can be deployed for almost 6 months (24,000 samples); see the manuals for example calculations.

SPECIFICATIONS

Measurement Range

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

Initial Accuracy

- Conductivity:** ± 0.0003 S/m (0.003 mS/cm)
- Temperature:** ± 0.002 °C
- Optional Pressure:** ± 0.1% of full scale range
- Dissolved Oxygen:** larger of ± 3 µmol/kg (0.07 ml/L, 0.1 mg/L) or ± 2%

Typical Stability

- Conductivity:** 0.0003 S/m (0.003 mS/cm) per month
- Temperature:** 0.0002 °C per month
- Optional Pressure:** 0.05% of full scale range per year
- Dissolved Oxygen:** sample-based drift < 1 µmol/kg/100,000 samples (20 °C)

Resolution

- Conductivity:** 0.00001 S/m (0.0001 mS/cm)
- Temperature:** 0.0001 °C
- Optional Pressure:** 0.002% of full scale range
- Dissolved Oxygen:** 0.2 µmol/kg

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)

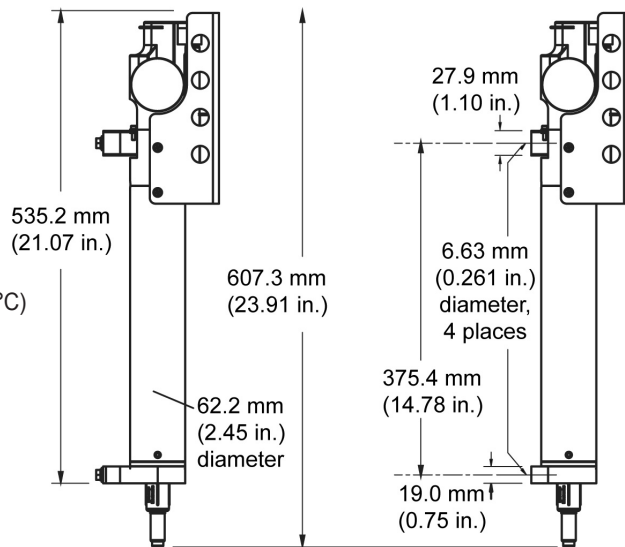
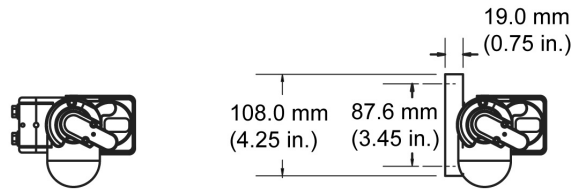
Optional External Power 0.25 Amps at 9-24 VDC

Power Consumption (all with pressure) **

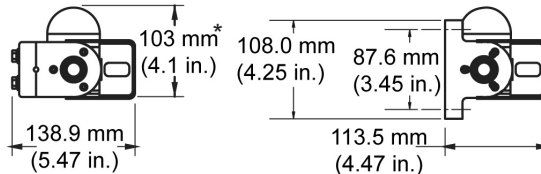
- Quiescent:** 0.0004 Watts
- CTD-DO Sample Acquisition (excluding pump):**
 - Real-time data enabled 0.17 Watts
 - No real-time data 0.155 Watts
- CTD-DO Sample Waiting (not sampling, pump running, excluding pump):**
 - Real-time data enabled 0.056 Watts if receive line valid, 0.016 Watts if receive 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), 4.2 kg (9.2 lbs) in air, 2.3 kg (5.0 lbs) in water
- Optional ShallowCAT:** Plastic housing, 350 m (1150 ft), 3.4 kg (7.5 lbs) in air, 1.5 kg (3.3 lbs) in water

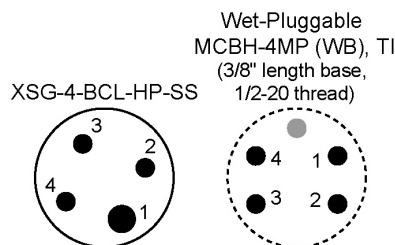


* 103 mm is for plastic housing; titanium housing dome is 9 mm smaller



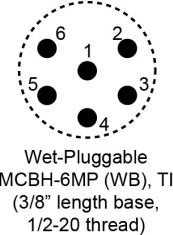
Standard Wire Mounting Clamp and Guide

Alternate Flat Surface Mounting Brackets



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

RS-232 or optional RS-485 Interface



Pin	Signal
1	Common
2	RS-232 data receive
3	RS-232 data transmit
4	SDI-12 data transmit
5	--
6	9-24 VDC external power

Optional SDI-12 / RS-232 Interface

** Power consumption values for standard RS-232 interface; for optional interfaces, see corresponding manual.

