

# MicroCAT C-T Recorder (Serial interface, Memory, & integral Pump) **SBE 37-SMP**



## SUMMARY

- Conductivity, Temperature, and (optional) Pressure, at user-programmable intervals (6 seconds to 6 hours).
- RS-232 serial interface (RS-485 optional), internal memory, and internal batteries.
- Expendable anti-foulant devices, unique flow path, and pumping regimen for maximum bio-fouling protection.
- New, high-efficiency pump for longer deployments or shorter sampling intervals
- Depths to 250 meters (*ShallowCAT* plastic housing) or 7000 meters (titanium housing).
- Sea-Bird's field-proven MicroCAT family, with more than 8000 instruments deployed since 1997.

## DESCRIPTION

The SBE 37-SMP MicroCAT is a high-accuracy conductivity and temperature (pressure optional) recorder with **S**erial interface, internal battery, non-volatile **M**emory, and integral **P**ump. The MicroCAT is designed for moorings or other long duration, fixed-site deployments. Constructed of titanium and other non-corroding materials to ensure long life with minimum maintenance, the MicroCAT's depth capability is 7000 meters; it is also available with an optional 250-meter plastic *ShallowCAT* housing.

Calibration coefficients are stored in EEPROM, allowing the MicroCAT to output data in ASCII engineering units (decimal or XML format); raw output is also available. The data always includes Conductivity, Temperature, Pressure (if optional pressure sensor is installed), and time. If desired, the MicroCAT can calculate and output salinity and sound velocity (Chen-Millero).

## SENSORS AND INTERFACE ELECTRONICS

The MicroCAT retains the temperature and conductivity sensors used in our time-proven SEACAT and SEACAT *plus* products. Electrical isolation of the conductivity electronics eliminates any possibility of ground-loop noise. The MicroCAT's unique internal-field conductivity cell permits the use of expendable anti-foulant devices. The aged and pressure-protected thermistor has a long history of exceptional accuracy and stability.

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 offset and scale is performed by the MicroCAT's CPU.

Temperature is acquired by applying an AC excitation to a hermetically sealed VISHAY reference resistor and an ultra-stable aged thermistor (drift rate typically < 0.002 °C per year). The thermistor resistance to reference resistance ratio is determined by a 24-bit A/D converter, which also processes the pressure sensor signal. Conductivity is acquired with an ultra-precision Wien-Bridge oscillator.

## PUMP

The integral pump runs for 1.0 second each time the MicroCAT samples, providing the following advantages:

- **Improved conductivity response** – The pump flushes the previously sampled water from the conductivity cell and brings a new water sample quickly into the cell.
- **Improved anti-foul protection** – Water does not freely flow through the conductivity cell between samples, allowing the anti-foul concentration inside the cell to build up.

## COMMUNICATIONS AND INTERFACING

The MicroCAT communicates directly with a computer 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 (5200 feet) at 600 baud, simultaneous with recording. Firmware upgrades can be downloaded through the communications port, without opening the instrument. 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 6 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 wakes up, runs the pump, samples, 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), and derived variables such as salinity and sound velocity.

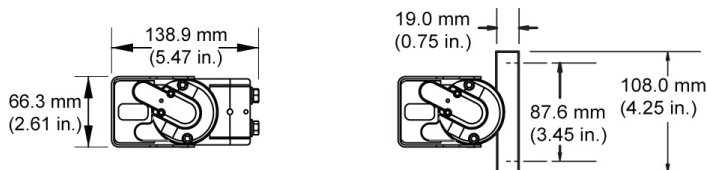


Intended for deployment in orientation shown (connector at bottom) for proper operation

Optional plastic (*ShallowCAT*) housing shown; standard Titanium housing available

## DATA STORAGE AND BATTERY ENDURANCE

Temperature and conductivity are stored 6 bytes/sample, time 4 bytes/sample, and optional pressure 5 bytes/sample; memory capacity is in excess of 530,000 samples. 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. The pack provides sufficient internal battery capacity for more than 380,000 samples for a typical sampling scheme. \*



## 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)

### Initial Accuracy

Conductivity: 0.0003 S/m (0.003 mS/cm)  
 Temperature: 0.002 °C  
 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  
 Optional Pressure: 0.05% of full scale range per year

### Resolution

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

**Clock Stability** 5 seconds/month

**Quiescent Current \*** 30 microAmps

### Sampling and Communication Current \*

Communication 4.3 milliAmps  
 Sampling (excluding pump) 9.1 milliAmps if transmitting real-time;  
 7.9 milliAmps if not transmitting

**Pump Current** 0.025 Amp-seconds/sample

**Acquisition Time** 1.9 - 2.9 seconds/sample,  
 dependent on sampling mode and  
 inclusion of pressure sensor

**Power Supply** 7.8 Amp-hour (nominal) battery pack

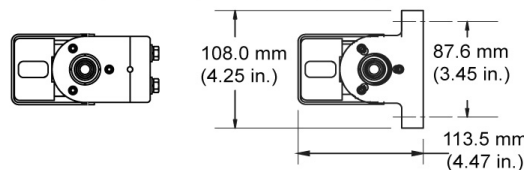
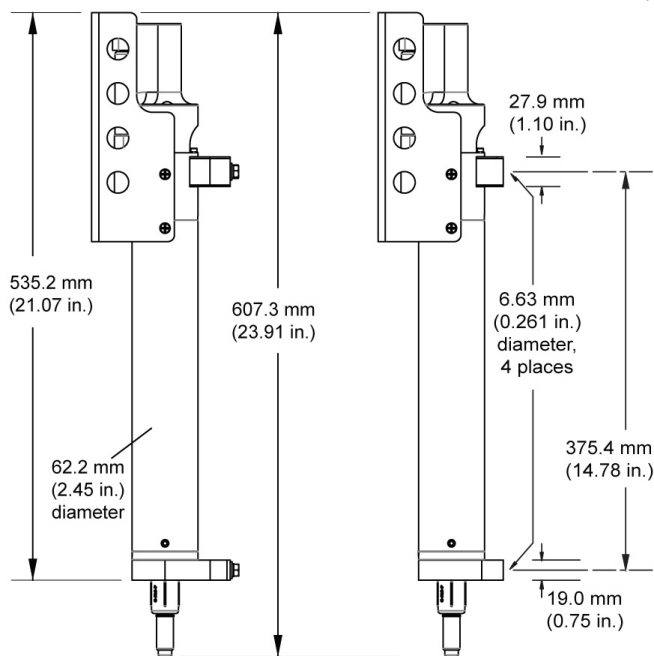
**Optional External Power** 0.25 Amps at 9-24 VDC

### Housing and Depth Rating

Standard Titanium, 7000 m (23,000 ft)  
 Optional ShallowCAT Plastic, 250 m (820 ft)

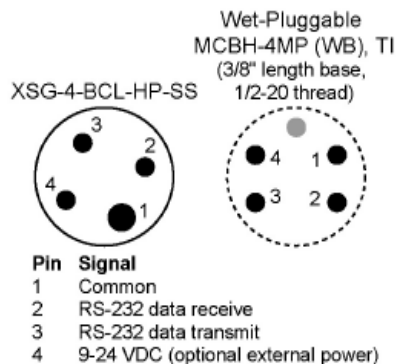
**Weight** (with standard mounting clamp and guide)

Optional ShallowCAT In air: 3.4 kg (7.5 lbs)  
 In water: 1.6 kg (3.5 lbs)



Standard Wire Mounting  
Clamp and Guide

Alternate Flat Surface  
Mounting Brackets



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