

# MicroCAT C-T Sensor (Serial Interface & integral Pump)

**SBE 37-SIP**  


## SUMMARY

- Conductivity, Temperature, and (optional) Pressure, continuously or at user-programmable intervals (6 seconds to 6 hours).
- RS-232 serial interface (RS-485 optional), internal memory, and external power.
- 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-SIP MicroCAT is a high-accuracy conductivity and temperature (pressure optional) sensor with Serial Interface and integral Pump, which includes a non-volatile memory. Externally powered, it is intended 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, providing data output in ASCII engineering units (decimal or XML); raw output is also available. The data always includes Conductivity, Temperature, and (optional) Pressure; users can choose to add time, sound velocity (Chen-Millero), salinity, depth, and/or density.

## SENSORS AND SENSOR 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. Its 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 typically 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 via standard RS-232 serial interface. Real-time data can be transmitted up to 1600 meters (5200 feet) at 600 baud (power considerations may limit distance), simultaneous with recording. Data can be uploaded at up to 115.2K baud. 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 4-wire cable (power, common, data +, data -), minimizing cable complexity for C-T chains.

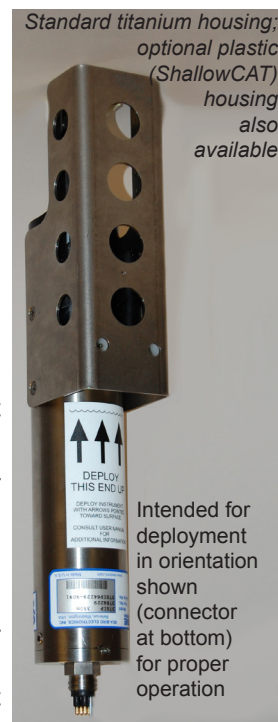
User-selectable operating modes include:

- **Autonomous Sampling** — The MicroCAT is pre-programmed to sample, store data in memory, and transmit data. There are two types of autonomous sampling:
  - *Continuous sampling* at the fastest rate possible (0.9 second minimum without pressure), with the pump running continuously.
  - *Interval sampling* at intervals of 6 seconds to 6 hours, with the pump running before each sample.
- **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, transmits data, 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.



## 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 Memory

5 seconds/month  
 8 Mbyte; capacity in excess  
 of 530,000 samples

### Input Power

0.25 Amps at 9 - 24 VDC

### Quiescent Current\*

30 microAmps

### Communication Current\*

4.3 milliAmps

### Acquisition Current\*

9.1 milliAmps (excluding pump)

### Acquisition Time

0.9 - 2.7 seconds/sample,  
 dependent on sampling mode  
 and inclusion of pressure sensor  
 25 milliAmps

### Pump Current

**Housing, Depth Rating, & Weight** (without pressure or clamps)  
 Standard Titanium, 7000 m (23,000 ft)  
 Weight in air: 3.0 kg (6.5 lbs)  
 Weight in water: 1.8 kg (4.0 lbs)

### Optional ShallowCAT

Plastic, 250 m (820 ft)

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

