

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



The SBE 37-SIP MicroCAT is a high-accuracy conductivity and temperature (pressure optional) sensor with **S**erial Interface and **I**ntegral **P**ump, which includes a non-volatile FLASH 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, 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, and Pressure (if optional pressure sensor installed); users can choose to add any combination of time, sound velocity (Chen-Millero), salinity, depth, and density.

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 Druck pressure sensor has a superior design that is entirely different from conventional 'silicon' types in which the deflection of a metallic diaphragm is detected by epoxy-bonded silicon strain gauges. The Druck sensor employs a micro-machined *silicon diaphragm* into which the strain elements are implanted using semiconductor fabrication techniques. Unlike metal diaphragms, silicon's crystal structure is perfectly elastic, so the sensor is essentially free of pressure hysteresis. Compensation of the temperature influence on pressure offset and scale is performed by the MicroCAT's CPU.

## SENSOR INTERFACE ELECTRONICS

Temperature is acquired by applying an AC excitation to a hermetically sealed VISHAY reference resistor and an ultra-stable aged thermistor (drift rate typically less than 0.002 °C per year). The ratio of thermistor resistance to reference resistance is determined by a 24-bit A/D converter; this A/D also processes the pressure sensor signal. Conductivity is acquired using 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 directly with a computer via a 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 by the user, 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 FLASH memory, and transmit data. There are two types of autonomous sampling:
  - *Continuous sampling* at the fastest rate possible (1.0 second minimum without pressure), with the pump running continuously
  - *Interval sampling* at intervals of 6 seconds to 4 hours, with the pump running before each sample.
- **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 FLASH 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.



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## 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

0.5 Amps at 8.5 - 24 VDC

### Quiescent Current\*

30 microAmps

### Communication Current\*

4.3 milliAmps

### Acquisition Current\*

15 milliAmps (excluding pump)

### Acquisition Time

1.0 - 2.6 seconds/sample,  
 dependent on sampling mode  
 and inclusion of pressure sensor  
 260 milliAmps

### Pump Current

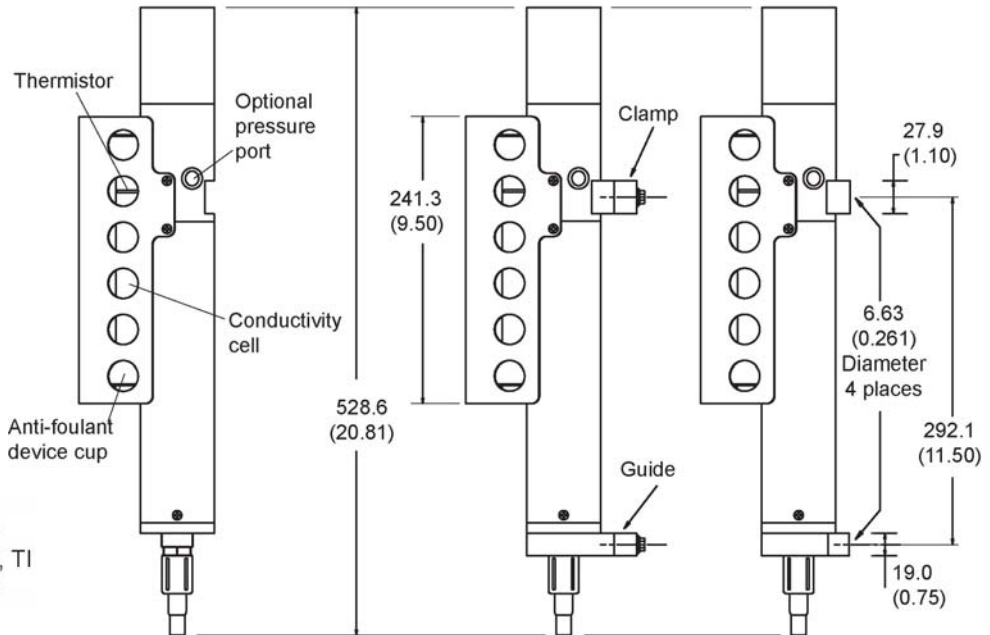
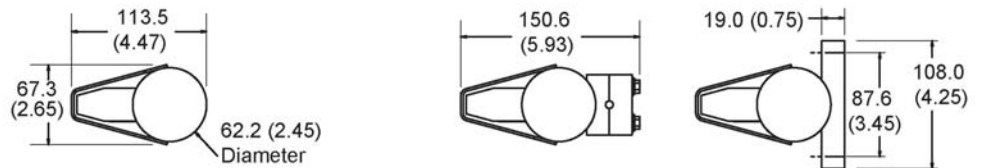
**Housing, Depth Rating, & Weight** (without pressure or clamps)  
 Standard Titanium, 7000 m (23,000 ft)  
 Weight in air: 4.2 kg (9.2 lbs)  
 Weight in water: 2.8 kg (6.2 lbs)

### Optional ShallowCAT

Plastic, 250 m (820 ft)  
 Weight in air: 3.1 kg (6.9 lbs)  
 Weight in water: 1.7 kg (3.8 lbs)

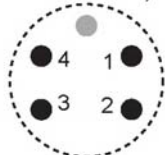
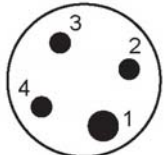
\* Power consumption values are for standard RS-232 interface; for optional RS-485 interface, see RS-485 manual.

Dimensions in  
 millimeters  
 (inches)

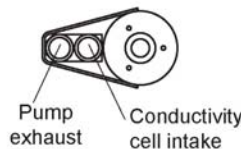


Standard  
 XSG-4-BCL-HP-SS

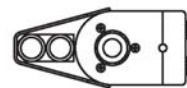
Optional  
 Wet-Pluggable  
 MCBH-4MP (WB), TI  
 (3/8" length base,  
 1/2-20 thread)



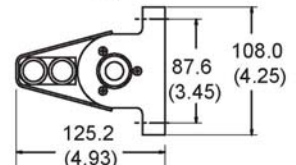
Pin	Signal
1	Common
2	RS-232 data receive
3	RS-232 data transmit
4	8.5 - 24 VDC external power



Standard Without  
 Mounting Hardware



Optional Wire Mounting  
 Clamp and Guide



Optional Flat Surface  
 Mounting Brackets