

MicroCAT C-T Recorder (Serial Interface & Memory)



The SBE 37-SM MicroCAT is a high-accuracy conductivity and temperature (pressure optional) recorder with internal battery and memory. Designed for moorings or other long duration, fixed-site deployments, the MicroCAT includes a standard serial interface and non-volatile FLASH memory. Construction is of titanium and other non-corroding materials to ensure long life with minimum maintenance, and depth capability is 7000 meters (23,000 feet).

Calibration coefficients are stored in EEPROM, and uploaded data is presented in ASCII engineering units. The data always includes Conductivity, Temperature, and Pressure (if optional pressure sensor is installed); time can be added to each scan if desired. The MicroCAT retains the temperature and conductivity sensors used in our time-proven SEACAT products; however, new acquisition techniques provide increased accuracy and resolution while reducing power consumption. Electrical isolation of the conductivity electronics eliminates any possibility of ground-loop noise.

The MicroCAT's unique internal-field conductivity cell is completely unaffected by external fouling, permitting the use of expendable anti-fouling devices to inhibit internal fouling and ensure stability. The aged and pressure-protected thermistor has a long history of exceptional accuracy and stability.

The MicroCAT's optional pressure sensor, developed by Druck, Inc., has a superior new 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. A high-stability reference crystal with a drift rate of less than 2 ppm/year is used to count the frequency from the oscillator.

COMMUNICATIONS AND INTERFACING

The MicroCAT communicates directly with a computer via standard RS-232 interface. Data can be uploaded at up to 38.4K baud. Real-time data can be transmitted at distances of up to 1000 meters (3300 feet) at 600 baud, simultaneously with recording. An optional RS-485 interface allows multiple MicroCATs to share a common 2-wire cable, minimizing cable complexity for C-T chains.

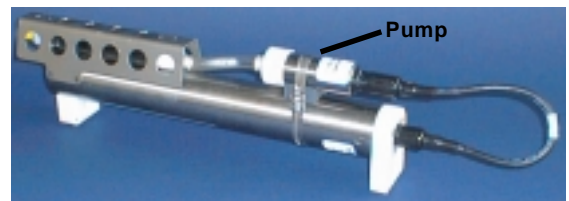
User-selectable operating modes include:

- **Autonomous Sampling** – allows sampling at pre-programmed intervals of 5 seconds to 9.1 hours, with the MicroCAT going to sleep between samples.
- **Polled Sampling** – allows sampling and data transmission to be triggered by a command from a computer or satellite, radio, or wire telemetry equipment.
- **Serial Line Sync** – allows sampling and data transmission to be triggered by a pulse on the serial line, which causes a sleeping MicroCAT to wake up, sample, record, and power off automatically.

OPTIONAL PUMP

The submersible pump comes on for 1/2 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.



SOFTWARE

The MicroCAT is supplied with a powerful software package that includes:

- SEATERM® – Win 95/98/NT terminal program for easy communication and data retrieval.
- SEASOFT® – programs for calculation, display, and plotting of conductivity, temperature, pressure (optional), and derived variables such as salinity and sound velocity.



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DATA STORAGE AND BATTERY ENDURANCE

Converted temperature and conductivity are stored 5 bytes per sample, time 4 bytes per sample, and optional pressure 2 bytes per sample; memory capacity is in excess of 185,000 samples. The MicroCAT is powered by a 7.2 Ampere-Hour (nominal) battery pack consisting of six 9-volt lithium batteries which, when removed from the MicroCAT, can be shipped without hazardous material restrictions. The pack provides sufficient internal battery capacity for more than 175,000 samples (80,000 with optional pump).

SPECIFICATIONS

Measurement Range

Conductivity: 0 - 7 S/m (0 - 70 mS/cm)
 Temperature: -5 to 35 °C
 Optional Pressure*: 20/100/350/1000/2000/3500/7000 m
 *Expressed in 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 (per month)

Conductivity: 0.0003 S/m (0.003 mS/cm)
 Temperature: 0.0002 °C
 Optional Pressure: 0.004% of full scale range

Resolution

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

Time Resolution

1 second

Clock Accuracy

13 seconds/month

Quiescent Current

10 microamps

Current consumption per sample

0.1 amp-second

Acquisition Time

3 seconds per sample

Optional External Input Power

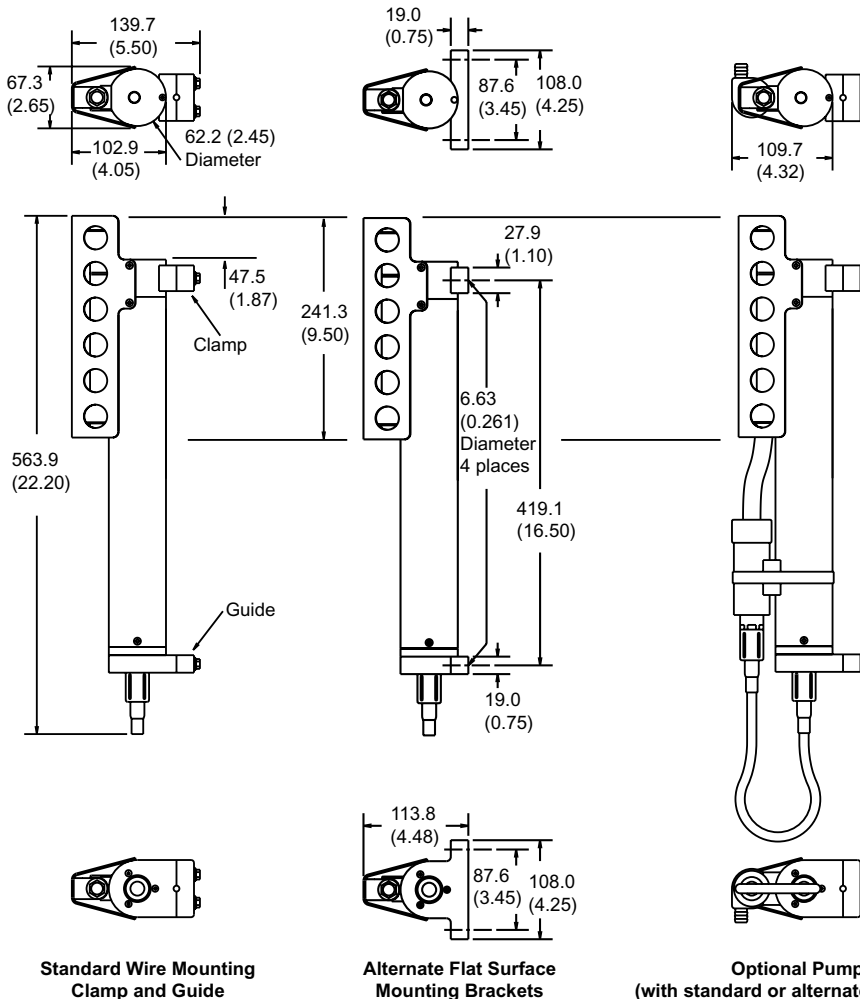
40 ma @ 9-24 VDC

Housing

Titanium

Depth Capability

7000 m (23,000 feet)



Dimensions in millimeters (inches)

Weight (without pump)
 in air: 3.8 kg (8.3 lbs)
 in water: 2.3 kg (5.1 lbs)