

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

SBE 37-SIP-IDO

SUMMARY

- Conductivity, Temperature, Pressure (optional), and Dissolved Oxygen measurements, at user-programmable Intervals (1 second to 6 hours).
- RS-232 serial interface (RS-485 optional), internal memory, and external power.
- *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 250 meters (*ShallowCAT* plastic housing) or 7000 meters (titanium housing).
- Adds to Sea-Bird's field-proven MicroCAT family, with more than 8000 instruments deployed since 1997.

DESCRIPTION

The SBE 37-SIP-IDO MicroCAT is a high-accuracy conductivity and temperature (pressure optional) sensor with **Serial Interface**, **integral Pump**, and **Integrated Dissolved Oxygen** sensor. It includes an internal memory, but is externally powered. Constructed of titanium and other non-corroding materials for long life with minimum maintenance, the MicroCAT is useful as a stand-alone monitoring device, and is easily integrated with current meters, ROVs, AUVs, towed sonars, and other instrumentation platforms.

Calibration coefficients are stored in EEPROM, allowing output of C, T, P, and DO, in ASCII engineering units (decimal or XML; raw output available); time, salinity, sound velocity (Chen-Millero), and depth can also be output.

SENSORS

Temperature and Conductivity 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 IDO is a frequency-output version of our field-proven SBE 43 Dissolved Oxygen sensor, with the same performance specifications.

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 and oxygen sensor plenum between samples, allowing the anti-foul concentration inside the system to maintain saturation.

With *Adaptive Pump Control*, the MicroCAT calculates the pump 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 INTERFACING

The MicroCAT communicates via standard RS-232 interface. Real-time data can be transmitted up to 1600 meters at 600 baud (power considerations may limit distance), simultaneous with recording; data can be uploaded at up to 115.2K baud. The user can upgrade firmware through the external connector, without opening the housing. 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 three types of autonomous sampling:
 - *Continuous sampling* — The pump runs continuously, and the MicroCAT samples continuously at 1 Hz (1 sample/second).
 - *Fast Interval sampling* — The pump runs continuously, and the MicroCAT samples at intervals of 5 seconds to 179 seconds.
 - *Slow Interval sampling* — The pump runs before each sample, and the MicroCAT samples at intervals of 3 minutes to 6 hours.
- **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, 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), dissolved oxygen, and derived variables such as salinity, sound velocity, and density.



Optional plastic (*ShallowCAT*) housing; standard titanium housing also available



Intended for deployment in orientation shown (connector end down) for proper operation

SBE 37-SMP-IDO shown; 37-SIP-IDO similar but shorter



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SPECIFICATIONS

Measurement Range

Conductivity: 0 - 7 S/m (0 - 70 mS/cm)
 Temperature: -5 to 35 °C
 Oxygen: 120% of surface saturation
 (all natural waters, fresh and salt)
 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
 Oxygen: 2% of saturation
 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
 Oxygen: 0.5% per 1000 hours
 Optional Pressure: 0.05% of full scale range per year

Resolution

Conductivity: 0.00001 S/m (0.0001 mS/cm)
 Temperature: 0.0001 °C
 Oxygen: 0.035% of saturation
 Optional Pressure: 0.002% of full scale range

Clock Stability 5 seconds/month
Memory 8 Mbyte; capacity in excess
 of 444,000 samples (with pressure)
Acquisition Time 2.2 - 5.0 sec/sample (see manual)
Input Power 0.25 Amps at 9 - 24 VDC
Power Consumption (all with pressure)*
Quiescent: 0.0004 Watts
CTD-DO Sample Acquisition (excluding pump):
 0.17 Watts
CTD-DO Sample Waiting (not sampling, pump running, excluding pump):
Receive line valid 0.056 Watts
Receive line not valid 0.016 Watts
CTD-DO Between Samples:
Receive line valid 0.056 Watts
Receive line not valid 0.0004 Watts
Pump: 0.12 Watts
Communications: 0.065 Watts

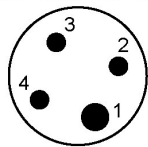
Housing, Depth Rating

Standard Titanium, 7000 m (23,000 ft)
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.

**Dimensions are
 for 37-SMP-IDO;
 37-SIP-IDO similar
 but shorter**

Standard
 XSG-4-BCL-HP-SS



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

Optional
 Wet-Pluggable
 MCBH-4MTI

