MicroCAT C-T-(P)-DO Sensor (Serial Interface & integral Pump)   SBE 37-SIP-IDO

Titanium housing with optional clamps; plastic housing also available

SUMMARY

- Conductivity, Temperature, Pressure (optional), and Dissolved Oxygen measurements, at user-programmable 1-sec to 6-hour intervals.
- RS-232 or RS-485 serial interface, 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 350 meters (*ShallowCAT* plastic housing) or 7000 meters (titanium housing).
- Sea-Bird's field-proven MicroCAT family, with more than 10,000 instruments deployed since 1997.
- Five-year limited warranty.

DESCRIPTION

The SBE 37-SIP-IDO MicroCAT is a high-accuracy conductivity and temperature (pressure optional) sensor with **S**erial **I**nterface, integral **P**ump, and **I**ntegrated **D**issolved **O**xygen sensor. It includes an internal memory, but is externally powered. Constructed of 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.

Deploy in orientation shown (connector at bottom) for proper operation

SENSORS

Temperature and Conductivity sensors are based on our field-proven SeaCAT and SeaCAT*plus*. 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, to a maximum depth of 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 between samples, allowing the anti-foul concentration inside the system to maintain saturation.
- **Improved measurement correlation** – The individually calibrated SBE 43 Dissolved Oxygen sensor is integrated within the CTD flow path, providing optimum correlation with CTD measurements.

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 RS-232 or RS-485 serial interface:
- **RS-232** — 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.
- **RS-485** — Multiple MicroCATs can share a common 4-wire cable (power, common, data +, data -), minimizing cable complexity for C-T chains.

User-selectable operating modes include:
- **Autonomous** — The MicroCAT is pre-programmed to sample, store data in memory, and transmit data. There are 3 types of autonomous sampling: *Continuous* (pump continuously; sample continuously at 1 sample/sec); *Fast Interval* (pump continuously; sample at 5-sec to 179-sec intervals); *Slow Interval* (pump before each sample; sample at 3-minute to 6-hour intervals).
- **Polled** — On command from a computer or satellite, radio, or wire telemetry equipment, the MicroCAT 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, takes 1 sample, stores data in memory, transmits data, and goes to sleep.

SOFTWARE

The MicroCAT is supplied with a powerful Windows 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.
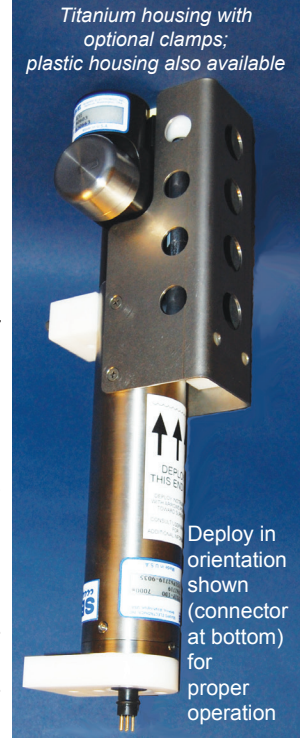
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SPECIFICATIONS

Measurement Range

Conductivity:	0 - 7 S/m (0 - 70 mS/cm)
Temperature:	-5 to 45 °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 (-5 to to 35 °C);
	± 0.01 (35 °C to 45 °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 sec/month
Memory	8 Mbyte; > 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, Weight

Plastic:	350 m (1150 ft)
Titanium:	7000 m (23,000 ft),
	3.6 kg in air, 2.3 kg in water

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

XSG-4-BCL-HP-SS

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	9-24 VDC external power

RS-232 Interface
(for RS-485: pin 2 is RS-485 A,
pin 3 is RS-485 B)

108.0 mm (4.25 in.)
87.6 mm (3.45 in.)
138.8 mm (5.46 in.)
19.0 mm (0.75 in.)

27.9 mm (1.10 in.)

383.7 mm (15.10 in.)

62.2 mm (2.45 in.) diameter

6.63 mm (0.261 in.) diameter, 4 places

243.6 mm (9.59 in.)

91.4 mm (3.60 in.)

19.0 mm (0.75 in.)

66.3 mm (2.61 in.)

114.0 mm (4.49 in.)

87.6 mm (3.45 in.)
108.0 mm (4.25 in.)

113.5 mm (4.47 in.)

Standard Without Mounting Hardware

Optional Wire Mounting Clamp and Guide

Optional Flat Surface Mounting Brackets

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