SeaCAT C-T Recorder (Inductive Modem)

SBE 16*plus*-IM V2

SUMMARY

- Conductivity, Temperature, Pressure (optional), and up to seven auxiliary sensors, at user-programmable intervals (10 seconds to 4 hours)
- Inductive Modem (IM) interface, internal memory, and internal batteries
- Expendable anti-foulant devices and optional pump for maximum bio-fouling protection
- Depths to 600 or 7000 meters
- Adds to Sea-Bird's SeaCAT family, field-proven since 1987
- Five-year limited warranty

DESCRIPTION

The SBE 16*plus*-IM **V2** (Version 2) SeaCAT is a high-accuracy conductivity and temperature recorder (pressure is optional) with built-in **I**nductive **M**odem. Compared to the previous 16*plus*-IM, the V2 incorporates an electronics upgrade and additional features, with six differentially amplified A/D input channels, one RS-232 data input channel, and 64 MB FLASH memory. Data can be output in XML as well as ASCII and HEX formats.

The Inductive Modem (IM) system provides reliable, low-cost, real-time data transmission for up to 100 IM-enabled instruments using plastic-coated wire rope (typically 3 x 19 galvanized steel) as both the transmission line and mooring tension member. IM instruments clamp anywhere along the rugged mooring wire. Expensive and potentially unreliable multi-conductor electrical cables with fixed-position underwater connectors are not required. IM moorings are easily reconfigured for changing deployments (positions changed or instruments added or removed), by sliding and re-clamping instruments on the cable. IM systems are much less expensive and more power-efficient than acoustic modems, and offer reliable communication over greater distances.

In a typical mooring, an **I**nductive **M**odem **M**odule (IMM) or **S**urface **I**nductive **M**odem (SIM) housed in the buoy communicates with underwater IM instruments and is interfaced to a computer or data logger via an RS-232 serial port. The computer or data logger (not supplied by Sea-Bird) is programmed to poll each IM instrument on the mooring for its data, and send the files to a telemetry transmitter (satellite link, cell phone, RF modem, etc.). The 16*plus*-IM V2 saves data in memory for upload after recovery, providing a data backup if real-time telemetry is interrupted.

The SBE 16*plus*-IM V2 uses the same temperature and conductivity sensors (and optional strain gauge or Digiquartz® pressure sensor) proven in 10,000 SeaCATs and MicroCATs. Sea-Bird's unique internal-field conductivity cell permits the use of expendable anti-foulant devices, for long-term bio-fouling protection.

Calibration coefficients are stored in memory, permitting data output in ASCII engineering units (°C, S/m, decibars, salinity [PSU], sound velocity [m/sec], etc.). The sample interval, ranging from 10 to 14,400 seconds, is user-programmable in 1-second increments. Between samples, the 16*plus*-IM V2 powers down, drawing only 140 microAmps. Alkaline D-cells provide power for approximately 290,000 samples of C and T, depending on the sampling and telemetry schedule. Six differentially amplified A/D input channels and one RS-232 channel provide conditioned power (500 mA) for, and obtain data from, optional auxiliary sensors (oxygen, turbidity, fluorescence, etc.).

CONFIGURATION, OPTIONS, AND ACCESSORIES

A standard SBE 16*plus*-IM V2 is supplied with plastic housing for depths to 600 meters, 64 Mbyte FLASH memory, alkaline batteries, glass-reinforced epoxy bulkhead connectors, and expendable anti-foulant devices.

Options and accessories include:

- Titanium housing for depths to 7000 or 10,500 meters (data transmission rated to 8000 meters)
- Strain-gauge or Digiquartz® pressure sensor
- Wet-pluggable MCBH series connectors
- Auxiliary sensors for dissolved oxygen, fluorescence, radiance (PAR), light transmission, and optical backscatter (turbidity)
- SBE 5M miniature pump for pumped conductivity; SBE 5P or 5T pump for pumped conductivity and pumped auxiliary sensor(s)
- Battery pack kit for lithium batteries (lithium batteries **not** supplied by Sea-Bird)

SOFTWARE

The SBE 16*plus*-IM V2 is supplied with a powerful Windows software package, Seasoft© V2, which includes programs for communication and data retrieval, and data processing (filtering, aligning, averaging) and plotting of CTD and auxiliary sensor data and derived variables.

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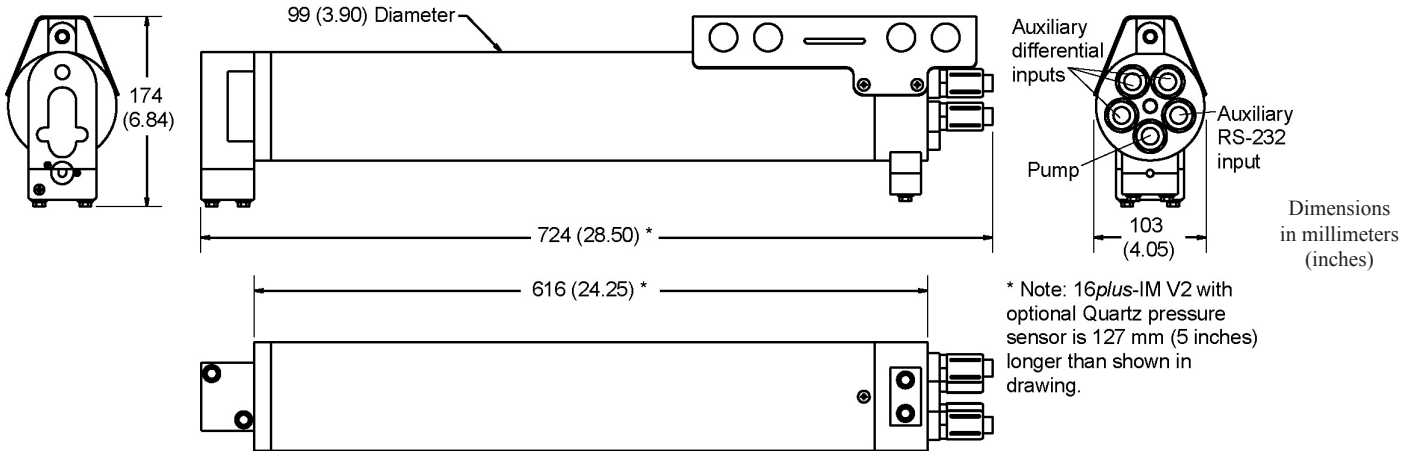


SPECIFICATIONS

Measurement Range

Temperature	-5 to +35 °C
Conductivity	0 to 9 S/m
Pressure (optional)	Strain-gauge — 0 to 20/100/350/600/1000/2000/3500/7000 m Quartz — 0 to 20/60/130/200/270/680/1400/2000/4200/7000 m

Initial Accuracy

Temperature	± 0.005 °C
Conductivity	± 0.0005 S/m
Pressure (optional)	Strain-gauge — ± 0.1% of full scale range Quartz — ± 0.02% of full scale range

Typical Stability

Temperature	0.0002 °C/month
Conductivity	0.0003 S/m/month
Pressure (optional)	Strain-gauge — 0.1% of full scale range/year Quartz — 0.02% of full scale range/year

Resolution

Temperature	0.0001 °C
Conductivity	0.00005 S/m typical
Pressure (optional)	Strain-gauge — 0.002% of full scale range Quartz — depends on sample integration time; consult factory

Memory 64 Mbyte non-volatile FLASH memory

Data Storage

Recorded Parameter	Bytes/Sample
T + C	6 (3 each)
Pressure - *strain gauge* or *Quartz*	5
each external voltage	2
auxiliary RS-232 sensor	sensor dependent
date and time	4

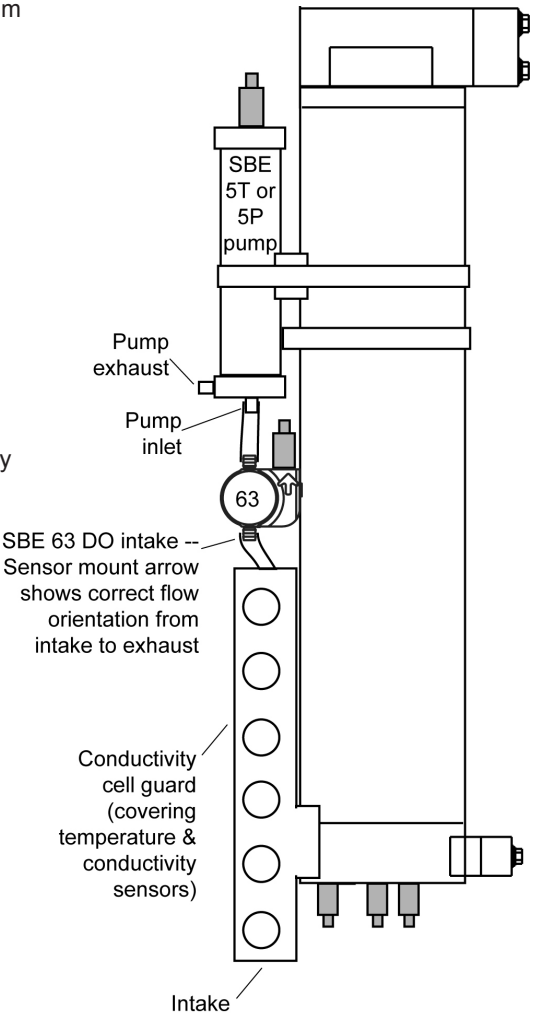
Real-Time Clock 32,768 Hz TCXO accurate to ±1 minute/year

Internal Batteries 9 alkaline D-cells

Battery Endurance [1]
CT only — 290,000 samples
CTD only — 200,000 samples
CTD & 5M pump — 110,000 samples

[1] With Duracell MN1300 cells. Dependent on sampling scheme.

Shown with optional pump and dissolved oxygen sensor



Auxiliary Voltage Sensors

Auxiliary power out	up to 500 mA at 10.5 - 11 VDC
A/D resolution	14 bits
Input range	0 - 5 VDC

Housing Materials — Depth Rating — Weight

Acetal Copolymer *Plastic* housing — 600 m (1950 ft) — *in air* 9 kg (20 lbs), *in water* 4 kg (9 lbs)
3AL-2.5V *Titanium* housing — 7000 m (22,900 ft) — *in air* 17 kg (38 lbs), *in water* 12 kg (27 lbs)
6AL-4V *Titanium* housing — 10,500 m (34,400 ft)

12/13

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