

SEACAT Profiler

SBE 19plus



The SBE 19plus is the next generation *Personal CTD*, bringing numerous improvements in accuracy, resolution (in fresh as well as salt water), reliability, and ease-of-use to the wide range of research, monitoring, and engineering applications pioneered by its legendary SEACAT predecessor. The 19plus samples faster (4 Hz vs 2), is more accurate (0.005 vs 0.01 in T, 0.0005 vs 0.001 in C, and 0.1% vs 0.25% — with *seven times the resolution* — in D), and has more memory (8 Mbyte vs 1). There is more power for auxiliary sensors (500 ma vs 50), and they are acquired at higher resolution (14 bit vs 12). Cabling is simpler and more reliable because there are four differential auxiliary inputs on two separate connectors, and a dedicated connector for the pump. All exposed metal parts are titanium, instead of aluminum, for long life and minimum maintenance.

The 19plus can be operated without a computer from even the smallest boat, with data recorded in non-volatile FLASH memory and processed later on your PC. Simultaneous with recording, real-time data can be transmitted over single-core, armored cable directly to your PC's serial port (maximum transmission distance dependent on number of auxiliary sensors, baud rate, and cable properties). The 19plus' faster sampling and pump-controlled TC-ducted flow configuration significantly reduces salinity spiking caused by ship heave, and allows slower descent rates for improved resolution of water column features. Auxiliary sensors for dissolved oxygen, pH, turbidity, fluorescence, and PAR can be added. For moored deployments, the 19plus can be set to *time-series* mode using software commands. External power and two-way real-time communication over 10,000 meters of cable can be provided with the SBE 36 CTD Deck Unit and Power and Data Interface Module (PDIM).

The 19plus uses the same temperature and conductivity sensors proven in 5000 SEACAT and MicroCAT instruments, and a superior new micro-machined silicon strain gauge pressure sensor developed by Druck, Inc. Improvements in design, materials, and signal acquisition techniques yield a low-cost instrument with superior performance that is also easy to use. Calibration coefficients, obtained in our computer-controlled high-accuracy calibration baths, are stored in EEPROM memory. They permit data output in ASCII engineering units (degrees C, Siemens/m, decibars, Salinity [PSU], sound velocity [m/sec], etc.).

Accuracy, convenience, portability, software, and support: compelling reasons why the 19plus is today's best low-cost CTD.

CONFIGURATION AND OPTIONS

A standard SBE 19plus is supplied with:

- Plastic housing for depths to 600 meters
- Strain-gauge pressure sensor
- 8 Mbyte FLASH RAM memory
- 9 D-size alkaline batteries
- Impulse glass-reinforced epoxy bulkhead connectors: 4-pin I/O, 2-pin pump, and two 6-pin (two differential auxiliary A/D inputs each)
- SBE 5M miniature pump and T-C Duct

Options include:

- Titanium housing for depths to 7000 meters
- SBE 5T pump in place of SBE 5M for use with dissolved oxygen and/or other pumped sensors
- Bulkhead connector for use with PAR sensor
- Sensors for oxygen, pH (for integration in Profiling mode only), fluorescence, light (PAR), light transmission, and turbidity
- Stainless steel cage
- MCBH *Micro* connectors in place of glass-reinforced epoxy connectors
- Nickel Metal Hydride (NiMH) batteries and charger
- Nickel-Cadmium (Ni-Cad) batteries and charger
- Moored mode conversion kit with anti-foulant device fittings

SOFTWARE

The SBE 19plus is supplied with a powerful Windows 95/98/NT/2000/XP software package, SEASOFT®-Win32, which includes:

- SEATERM® — communication and data retrieval
- SEASAVE® — real-time data acquisition and display
- SBE Data Processing® — filtering, aligning, averaging, and plotting of CTD and auxiliary sensor data and derived variables



Shown with optional cage, SBE 5T pump, & SBE 43 DO sensor



Sea-Bird Electronics, Inc.

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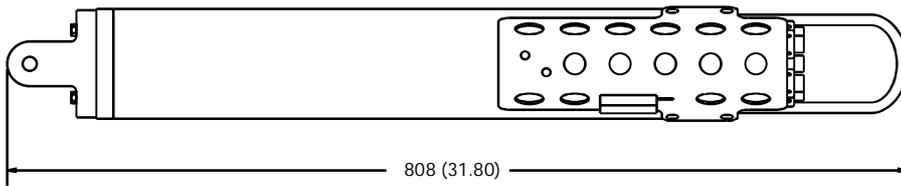
Website: <http://www.seabird.com>

E-mail: seabird@seabird.com

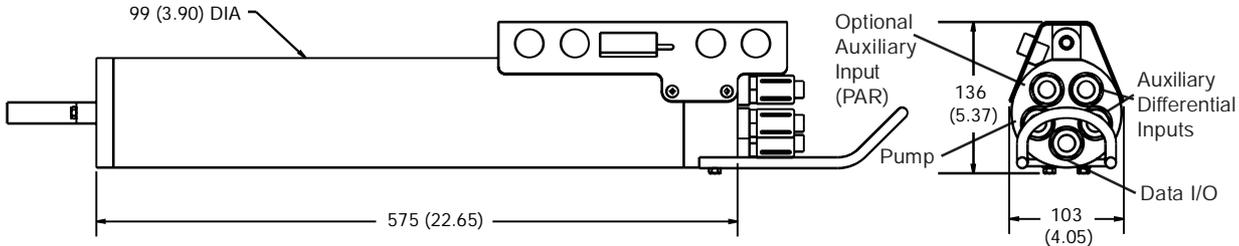
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SEACAT Profiler



Dimensions
in millimeters
(inches)



SPECIFICATIONS

| | Measurement Range | Initial Accuracy | Typical Stability (per month) | Resolution |
|--------------------|--|--------------------------|-------------------------------|---|
| Conductivity (S/m) | 0 to 9 | 0.0005 | 0.0003 | 0.00005 (most oceanic waters; resolves 0.4 ppm in salinity) 0.00007 S/m (high salinity waters; resolves 0.4 ppm in salinity) 0.00001 S/m (fresh waters; resolves 0.1 ppm in salinity) |
| Temperature (°C) | -5 to +35 | 0.005 | 0.0002 | 0.0001 |
| Pressure | 0 to 20/100/350/600/ 1000/2000/3500/ 7000 meters | 0.1% of full scale range | 0.004% of full scale range | 0.002% of full scale range |

- Memory 8 Mbyte non-volatile FLASH memory
- Data Storage

| | |
|-----------------------|--------------|
| Recorded Parameter | Bytes/Sample |
| T + C | 6 |
| pressure | 5 |
| each external voltage | 2 |
- Real-Time Clock 32,768 Hz TCXO accurate to ±1 minute/year
- Internal Batteries 9 alkaline D-cells (Duracell MN1300, LR20) provide 60 hours profiling; optional 9-cell NiMH battery pack provides 40 hours profiling per charge; optional 9-cell Ni-Cad battery pack provides 24 hours profiling per charge
- External Power Supply 9 - 28 VDC; consult factory for required current
- Power Requirements

| | |
|----------------------|--------|
| Sampling | 65 mA |
| SBE 5M pump | 100 mA |
| Optional SBE 5T pump | 150 mA |
| Communications | 60 mA |
| Quiescent | 30 µA |

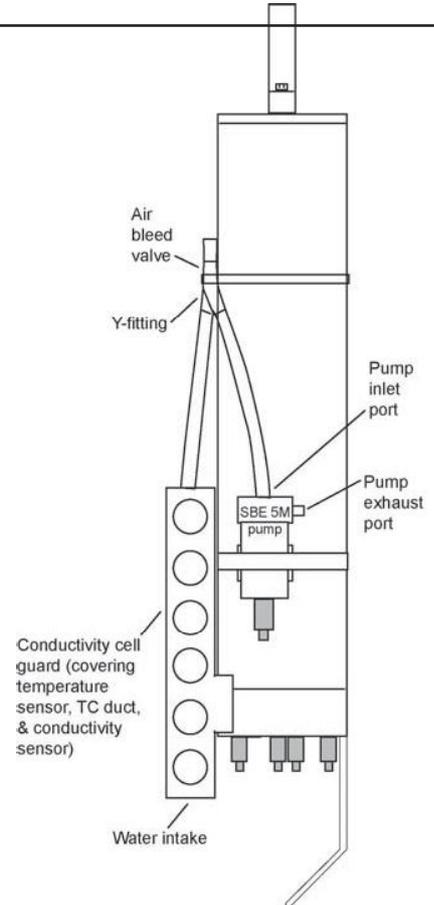
- Auxiliary Voltage Sensors

| | |
|---------------------|-------------------------------|
| 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 in air*, Weight in water*
 Acetal Copolymer Plastic housing, 600 meter (1950 feet), 7.3 kg (16 lbs), 2.3 kg (5 lbs)
 3AL-2.5V Titanium housing, 7000 meter (22,900 feet), 13.7 kg (30 lbs), 8.6 kg (19 lbs)

*Weights listed above are without pump; add:
 SBE 5M pump (standard) 0.4 kg (0.9 lbs) in air, 0.3 kg (0.6 lbs) in water
 SBE 5T pump (optional) 0.7kg (1.5 lbs) in air, 0.3 kg (0.6 lbs) in water

Optional Cage
 1016 mm x 241 mm x 279 mm (40 in. x 9.5 in. x 11 in.), 6.3 kg (14 lbs)



03/05



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Submersible Pump

SBE 5T

The SBE 5T pump module is a compact unit consisting of a centrifugal pump head and a long-life, brushless, DC, ball-bearing motor contained in a titanium pressure housing useable to 10,500 meters. The pump impeller and electric drive motor are coupled magnetically through the housing, providing high reliability by eliminating moving seals.



APPLICATIONS

The SBE 5T is a primary component in the SBE *9plus* CTD Underwater Unit and SBE 25 SEALOGGER CTD. It is also used as optional equipment on SBE *16plus*, *16plus-IM*, and *19plus* SEACAT CTDs. The pump flushes water through the conductivity cell at a constant rate, independent of the CTD's motion, improving dynamic performance. The pump may also be suitable for custom applications, where pressure heads are less than 300 cm of water and flow rates are less than 100 ml/sec.

CONFIGURATION

The SBE 5T is configured for various applications by selecting standard or low voltage options, and one of several motor speed options. Speed options of 1300, 2000, 3000 or 4500 rpm have been established to meet various flow rate requirements. Other speeds can be set by adjusting a potentiometer.

- #3 winding, low voltage, 2000 rpm – typical for SBE 25
- #3 winding, standard voltage, 2000 rpm – typical for SBE *16plus*, *16plus-IM*, or *19plus* with pumped auxiliary sensor(s)
- #3 winding, standard voltage, 3000 rpm – typical for SBE *9plus*

OPERATION

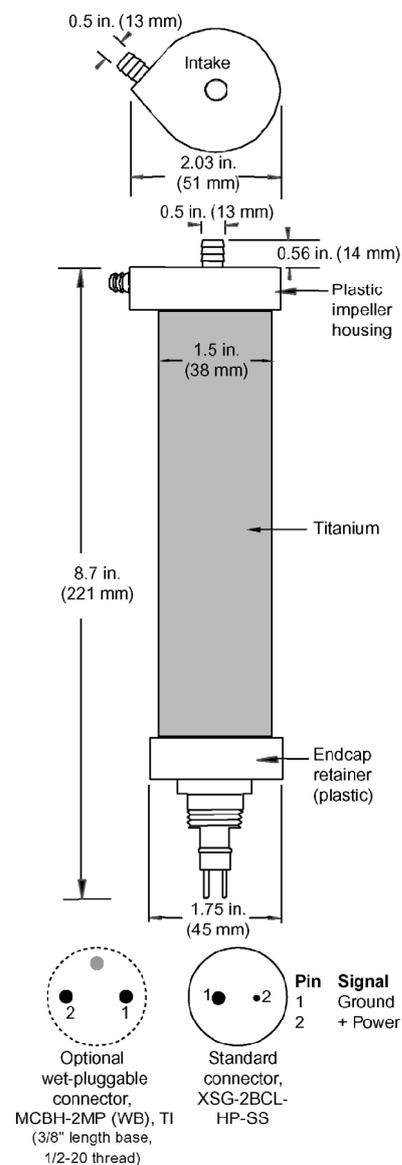
Motor speed and pumping rate remain nearly constant over the entire input voltage range (less than 1% change in speed for a 1 volt change in supply voltage). The unrestricted flow rate with no head is approximately 100 ml/second at 2000 rpm. Flow changes are nearly linear with changes in speed. With unlimited power supply current, turn-on surge is approximately 1.8 amperes (maximum), which drops to steady state in approximately 0.25 seconds. If power supply current is limited to approximately 200 milliamps, the motor comes up to speed in approximately 0.30 seconds. A series diode is installed in the input power line to prevent damage if the wires are accidentally reversed. Pumping rates and motor current for various applications are shown on the next page.

SPECIFICATIONS

Input Voltage:

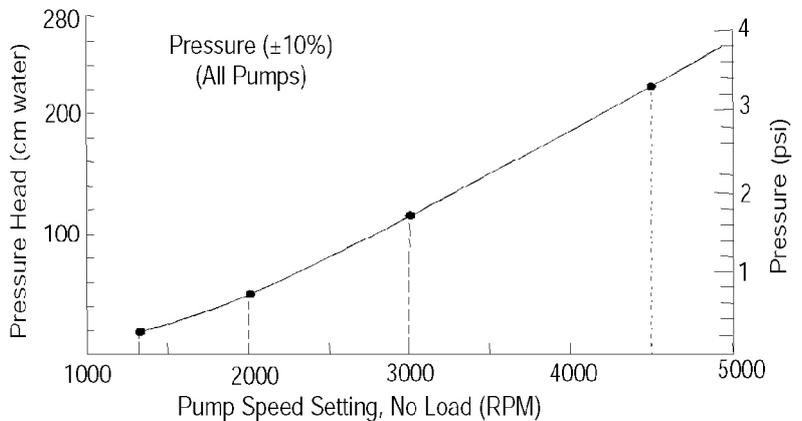
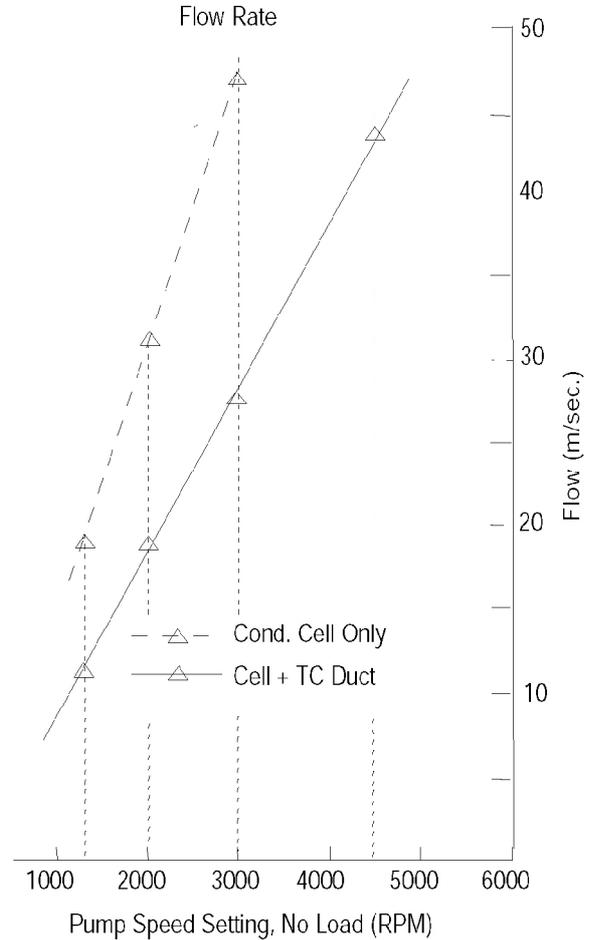
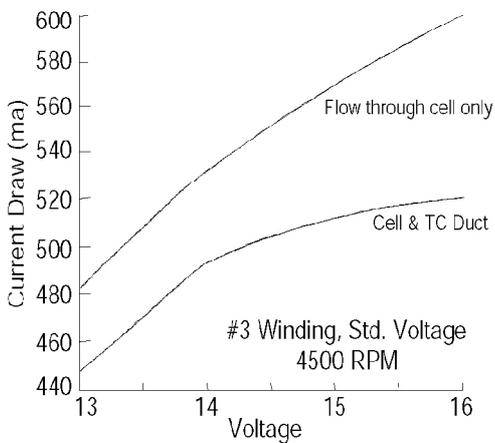
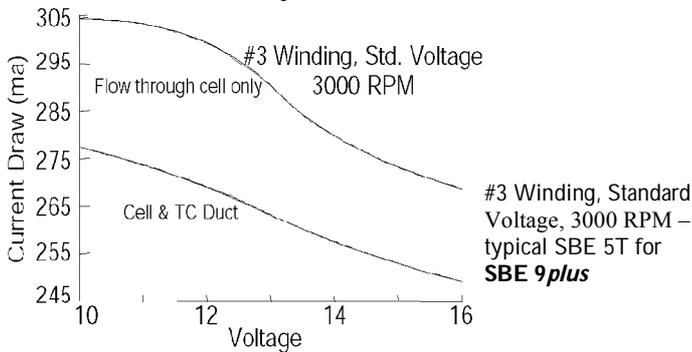
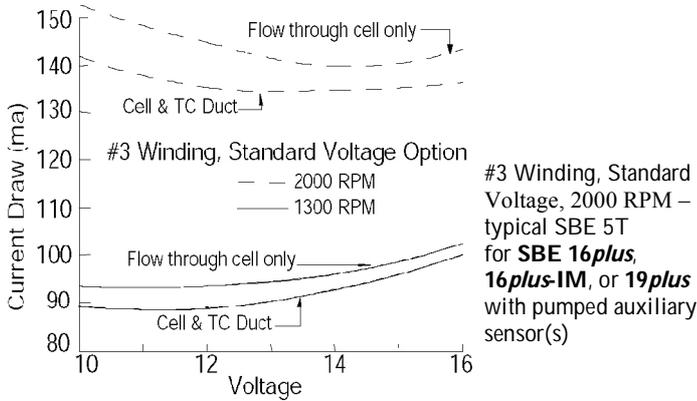
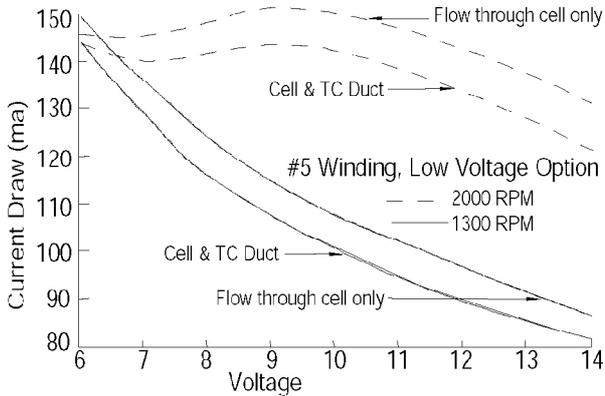
| | |
|---|-------------|
| Standard input range (#3 winding, 1300 - 3000 RPM): | 10 - 18 VDC |
| Standard input range (#3 winding, 4500 RPM): | 13 - 18 VDC |
| Low input range (#3 or #5 winding - 1300, 2000 RPM only): | 6 - 16 VDC |

Weight: 0.7 kg (1.5 lbs) in air, 0.3 kg (0.65 lbs) in water



Submersible Pump

SBE 5T



01/07