

SBE 911plus

CTD

Overview

The SBE 911plus CTD is the primary oceanographic research tool used by the world's leading institutions, providing 24 Hz sampling with an SBE 9plus CTD Unit and SBE 11plus V2 Deck Unit. The 911plus system provides real-time data collection over 10,000 meters of cable (single- or multi-conductor electro-mechanical sea cable, slipping equipped winch, and computer for data display and logging supplied by user). The 911plus is easily integrated with an SBE 32 Carousel Water Sampler for real-time or autonomous auto-fire operations.

The 911plus' pump-controlled, T-C ducted flow minimizes salinity spiking caused by ship heave and allows for slow descent rates without slowing sensor responses, improving dynamic accuracy and resolving small scale structure in the water column. One Conductivity and one Temperature sensor (fitted with TC Duct and constant-flow pump) are included. An optional second (redundant) pair of T and C sensors and pump can be easily installed. The 911plus supports numerous auxiliary sensors (dissolved oxygen, pH, turbidity, fluorescence, oil, PAR, nitrates, altimeter, etc.) with eight A/D channels.

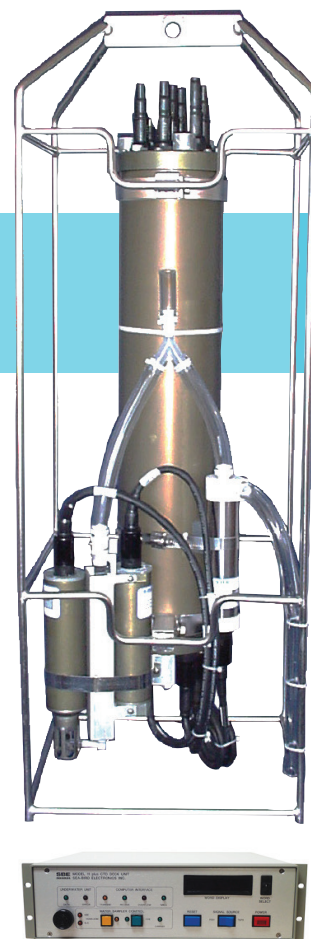
Features

SBE 9plus CTD Unit for depths to 0-10,500 m or 15,000 psi*, with:

- SBE 3plus premium Temperature sensor, SBE 4C Conductivity sensor, Digiquartz® Pressure sensor, SBE 5T pump.
- Communication and power support for up to eight auxiliary voltage sensors.
- Interface for dual C & T sensors (sensors optional).
- Modem channel for real-time SBE 32 Carousel Water Sampler control.
- Stainless steel protection cage.

SBE 11plus Deck Unit with NMEA 0183 interface for GPS data, 12-bit A/D channel for surface PAR sensor, 115/230 VAC operation, LED readout for raw data, audible bottom contact or altimeter alarm, remote pressure output (useful as input signal for towed vehicle control), programmable serial data output with up to seven variables in engineering units, free-standing cabinet, and kit for mounting in a standard 19-inch electronics rack.

- Seasoft® V2 Windows software package (setup, data upload, real-time data acquisition, and data processing).
- Five-year limited warranty.



Components

Unique internal-field conductivity cell permits use of T-C Duct, minimizing salinity spiking.

Aged and pressure-protected thermistor has a long history of exceptional accuracy and stability.

Digiquartz® pressure sensor with temperature compensation is available in five ranges (to 10,500 m).

Pump runs continuously, providing correlation of CTD and plumbed auxiliary sensor measurements.

*Lower pressure ranges are available. Accuracy of the pressure sensor is dependent on the sensor's range.

Options

- Aluminum (6800 m) or titanium (10,500 m) housing; XSG/AG or wet-pluggable MCBH connectors.
- Secondary temperature and conductivity sensors (and pump) for redundant T and C measurements.
- Sea-Bird Scientific auxiliary sensors — dissolved oxygen, pH, fluorescence, oil, radiance (PAR), light transmission, turbidity, nitrates, etc.
- Auxiliary sensors from other manufacturers — altimeter, etc.
- SBE 32 Carousel Water Sampler.
- SBE 17plus V2 Searam for in-situ power and recording, and programmable Carousel bottle firing (system referred to as 917plus).
- Serial Data Uplink for 9600 baud data pass-thru on shared CTD telemetry channel.
- RS-232 serial output for use with AUV/ROV logging CTD data.
- Bottom Contact switch.
- Manual pump control or water contact pump control (typically used for fresh water applications).
- Plastic shipping case.

Field Specifications

The specifications below represent the expected performance of the instrument when deployed in the field. Under controlled circumstances in a lab, we would expect the instrument to outperform these specifications.

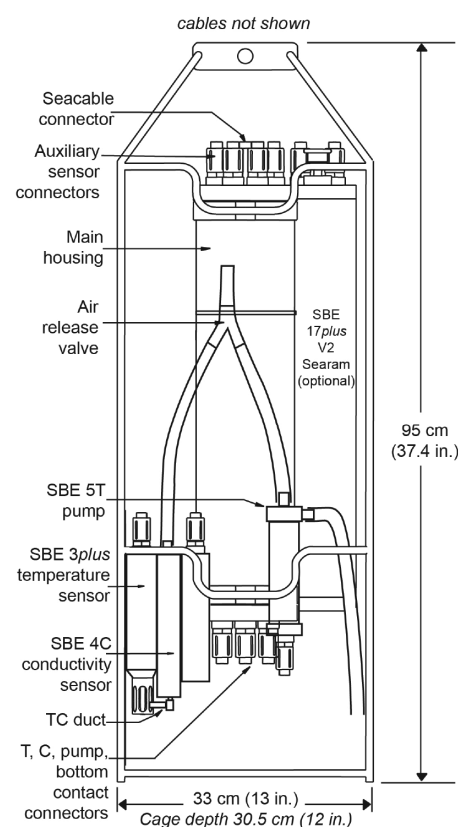
We have chosen to display field specifications to give our users a true measure of how Sea-Bird Scientific instruments perform in harsh environments and applications. It is critical to keep this in mind when comparing specifications with instruments from other manufacturers.

Measurement Range	
Conductivity	0 to 7 S/m
Temperature	-5 to 35 °C
Pressure	0 to 1400/2000/4200/6800/10,500 m (2000/3000/6000/10,000/15,000 psia)
Initial Accuracy	
Conductivity	± 0.0003 S/m
Temperature	± 0.001 °C
Pressure	± 0.015% of full scale range
Typical Stability	
Conductivity	0.0003 S/m per month
Temperature	0.0002 °C per month
Pressure	± 0.02% of full scale range per year
Resolution	
Conductivity	0.00004 S/m
Temperature	0.0002 °C
Pressure	0.001% of full scale range

Sampling Speed	24 Hz (24 samples/sec)
Time Response ¹	Conductivity & Temperature 0.065 sec; Pressure 0.015 sec
Master Clock Error Contribution ²	Conductivity 0.00005 S/m, Temperature 0.00016 °C, Pressure 0.3 dbar (for 6800 m [10,000 psia] sensor)
Auxiliary Sensors	Power out 1 A at +14.3 V; input range 0-5 VDC; initial accuracy ± 0.005 V; stability 0.001 volts/ month; resolution 12 bits; time response 5.5 Hz 2-pole Butterworth Low Pass Filter
Sea Cable	Inner conductor resistance 0 to 350 ohms
Modem Baud Rate	300 baud (30 characters/sec, full duplex)
9plus Housing, Depth Rating, Weight (with pump & cage)	Aluminum; 6800 m; in air 25 kg, in water 16 kg Titanium; 10,500 m; in air 29 kg, in water 20 kg 13.2 x 43.2 x 43.2 cm; 48.3 cm edge-to-edge for mounting brackets.
11plus Specifications	AC power input 130 Watts at 115 or 230 VAC 50-400 Hz.

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¹ Single-pole approximation including sensor and acquisition system contributions.

² Based on 5-year worst-case error budget including ambient temperature influence of 1 ppm total over -20 to +70 °C plus 1 ppm first year drift plus 4 additional years drift at 0.3 ppm/year.