

# SBE 911plus CTD

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, slip-ring 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 with eight A/D channels.



## Features

- **SBE 9plus CTD Unit** for depths to 6800 or 10,500 m, 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.

## 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.
- Auxiliary sensors — dissolved oxygen, pH, fluorescence, radiance (PAR), light transmission, turbidity, 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.

## 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 (at 24 Hz)

Conductivity	0.00004 S/m
Temperature	0.0002 °C
Pressure	0.001% of full scale range

**Time Response**<sup>1</sup> Conductivity & Temperature 0.065 sec; Pressure 0.015 sec

**Master Clock Error Contribution**<sup>2</sup> Conductivity 0.00005 S/m, Temperature 0.00016 °C, Pressure 0.3 dbar (for 6800 m [10,000 psia] sensor)

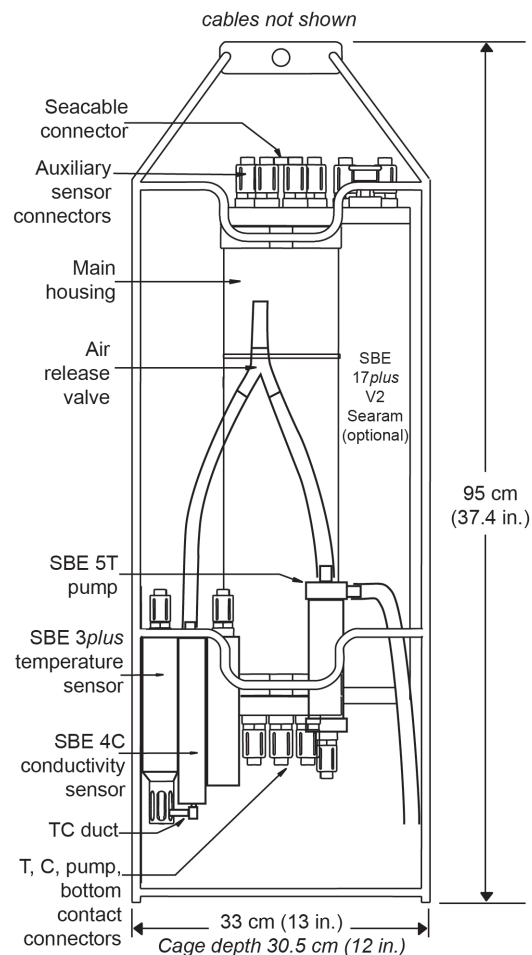
**Auxiliary Sensors** Power out 1 A at +14.3 V; input range 0-5 VDC; initial accuracy ± 0.005 V; stability 0.001 volts/month; resolution 12 bits; time response 5.5 Hz 2-pole Butterworth Low Pass Filter

**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

**11plus** Dimensions 13.2 x 43.2 x 43.2 cm;  
48.3 cm edge-to-edge for mounting brackets.  
AC power input 130 Watts at 115 or 230 VAC 50-400 Hz.



<sup>1</sup> Single-pole approximation including sensor and acquisition system contributions.

<sup>2</sup> 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.