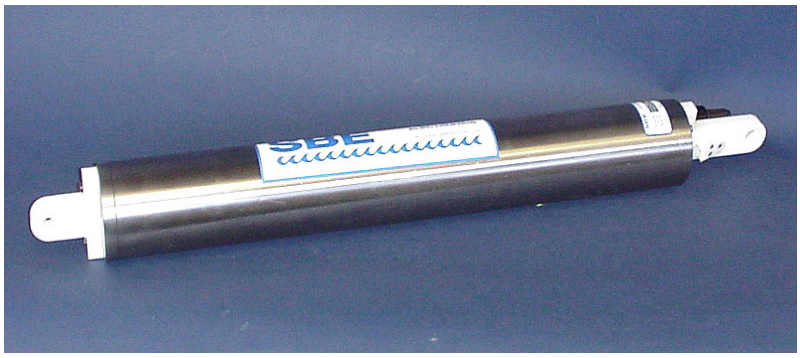
BPR Bottom Pressure Recorder SBE 53



The SBE 53 BPR measures full ocean depth water level with extremely high resolution, accuracy, and stability. The BPR combines a uniquely precise and stable time base with low power frequency acquisition circuitry, Paroscientific Digiquartz® pressure transducer, non-volatile 32 MB FLASH memory, and a precision thermometer, to provide unprecedented bottom pressure recording capability. An optional conductivity sensor (SBE 4M) can be added to provide salinity data as well.

The BPR integrates pressure measurements to obtain water levels (tides) unaffected by wave action. The interval between each water level measurement and the duration of the integration period are user-programmable. The interval is programmable over a range of 1 minute to 1 hour. The integration duration is programmable from 1 minute to the entire tide interval. The BPR can continuously power the pressure transducer and reference frequency oscillator, eliminating turn-on transients and providing the highest quality data. Alternatively, the BPR can be programmed to enter a power-down state between measurements to conserve battery power for very long deployments, with a user-specified *warm-up* period before each pressure measurement. Temperature data is recorded with each pressure integration. Logging (recording) can be programmed to start and stop at specified times after the instrument is deployed.

The pressure signal and internal temperature compensation (pressure temperature) signal (frequencies) from the transducer are integrated in parallel for the tide integration duration. The measurement times are set by a continuously powered, real-time clock with an accuracy of ± 5 seconds/month. Long-term drift of the counter's reference frequency is on the order of 1 ppm per year. To allow for correction of drift, an ovenized crystal oscillator is programmed to periodically make a reference frequency measurement.

Large memory and low power requirements permit frequent water level recording. For example, with standard alkaline batteries, a 420-day deployment could include water level measurements every 30 minutes (integrating pressure for the entire 30 minutes); a 2-year deployment could be achieved if pressure integration is limited to 4 minutes for each water level measurement, with a 15-minute warm-up of the pressure sensor and reference frequency oscillator before each measurement. Alternatively, deployments approximately 3 times longer are possible with Electrochem DD lithium batteries. Binary upload of data in memory can be accomplished at up to 115,200 baud.

Firmware upgrades can be downloaded via the serial interface without opening the electronics compartment.

STANDARD CONFIGURATION

- Titanium housing for depths to 7000 meters (22,900 ft)
- 1300, 2000, 4000, or 6800 meter (2000, 3000, 6000, or 10000 psia) Paroscientific Digiquartz temperature-compensated pressure sensor
- Accurate temperature sensor – aged thermistor embedded in BPR end cap
- Frequency input channel and bulkhead connector for optional SBE 4M conductivity sensor
- 32 MB FLASH memory
- 12 alkaline D-cell batteries (Duracell MN1300, LR20); battery compartment is separated from electronics by a moisture-proof seal.
- Impulse glass-reinforced epoxy bulkhead connectors

OPTIONS

- SBE 4M Conductivity sensor, interfaced via bulkhead connector and clamped to BPR housing
- High accuracy external temperature sensor
- Wet-pluggable (MCBH) connectors in place of standard connectors

SOFTWARE

The BPR includes a comprehensive package of Windows programs for instrument setup and data retrieval, data conversion, and plotting.

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BPR Bottom Pressure Recorder SBE 53

SPECIFICATIONS

Pressure
Range: 0 to 1300, 2000, 4000, or 6800 m (2000, 3000, 6000, or 10000 psia)
Accuracy *: 0.01% of full scale
Repeatability: 0.005% of full scale
Hysteresis: 0.005% of full scale
Calibration: 0 psia to full scale pressure
Resolution: 0.045 ppm (0.3 mm for 10,000 psia range, 1-minute integration, continuously powered)
* Digiquartz residual temperature sensitivity is measured at Sea-Bird, and Digiquartz calibration coefficients are adjusted so that residual temperature sensitivity is less than 1 ppm over 0 – 20 °C (0.05 ppm/°C; 0.0005 psia for a 10,000 psia range sensor).

Standard Temperature [°C]
Range: -5 to +35 Accuracy: 0.01
Resolution: 0.001 Calibration: +1 to +32 [1]

High Accuracy Temperature [°C] (optional)
Range: -5 to +35 Accuracy: 0.002
Resolution: 0.0001 Calibration: +1 to +32 [1]

Conductivity [S/m] (optional)
Range: 0 to 7 Accuracy: 0.001
Resolution: 0.00002
Calibration: 2.6 – 6 plus zero conductivity (air) [1]

[1]Measurements outside specified calibration ranges will be at slightly reduced accuracy due to extrapolation errors.

Clocks
Counter Time Base (for Digiquartz pressure & pressure temperature):
Quartz TCXO ± 3 ppm per year aging
(± 1 ppm/year typical), ± 0.1 ppm (0 - 20 °C)
Ovenized Crystal Oscillator (for reference frequency drift correction):
Warm-up re-stabilization: less than ± 1 x 10^{-7}
Stability vs. temperature: ± 0.1 ppm (-20 °C to +70 °C)
Aging: < 1 x 10^{-7} per year, less than 1 x 10^{-6} /10 years
Real-Time Clock (for time stamp and sample timing):
Quartz TCXO watch-crystal type 32,768 Hz;
accuracy ± 2 ppm (5 seconds/month).
Battery-backed for minimum 2-year operation, without main batteries installed.
Conductivity Time Base:
Quartz TCXO ± 1 ppm per year aging;
± 15 ppm (-20 to +70 °C).

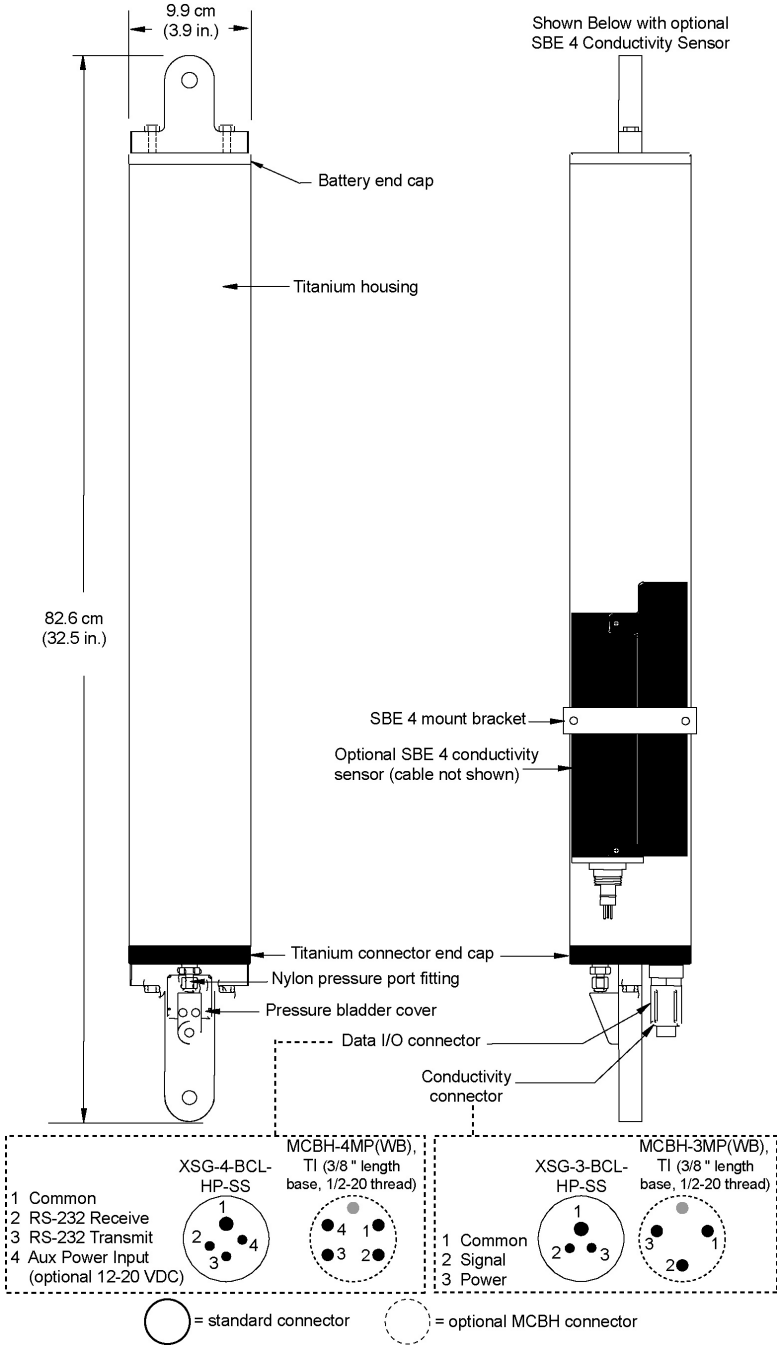
Memory: 32 MB Flash RAM.

Data Storage: 17 bytes/sample (no conductivity)
20 bytes/sample (with conductivity)

Power Supply: Internal: 12 alkaline D cells, Duracell MN 1300, LR20 (standard) **or**
6 lithium DD cells (Electrochem BCX85-3B76-TC)
External: 12 – 24 VDC nominal.

Housing: Titanium to 7000 m

Weight (with alkaline batteries):
14.5 kg (32 lbs) in air, 8.6 kg (19 lbs) in water



08/09

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