

SVDL Version 1.5

The Stress Engineering Services subsea vibration data logger (SVDL) was developed to service the emerging need to collect high-quality vibration data for extended periods in subsea environments. An upgraded version of the SVDL, v1.5, is now available offering redundant six degree-of-freedom measurements and greatly extended battery life.

Housed inside the unit are two inertial measurement units (IMUs) measuring three orthogonal axes of acceleration and three angular rates. The IMUs are constructed using state-of-the-art MEMS processes to achieve unprecedented sensitivity and resolution. The IMUs feature onboard digital filtering and oversampling capabilities to maintain the highest digitized signal quality. The long battery life, low power consumption, and large memory storage are well-matched to maximize the deployed logging duration.

The data logger and clamping devices feature a low mass and high mechanical impedance structure. This ensures that the vibration signals collected by the logger are not distorted by the mechanical characteristics of the logger system itself, even at high measurement frequencies of 50 Hz or greater.

Mechanical - Aluminum (Al) or Stainless Steel (SS)

- Fully enclosed in a one-atmosphere aluminum subsea housing with redundant O-ring seals at each closure
- Depth rating: 10,000 feet sea water (Al); 13,000 feet sea water (SS)
- Exterior dimensions: 3.1" diameter x 18.25" long (24" long including ROV handle)
- Mass: Less than 10 lbm (Al); Less than 20 lbm (SS)
- Weight in seawater: Less than 6 lbf (Al); Less than 15 lbf (SS)
- All exposed aluminum surfaces hard-anodized
- Sensor is hard-mounted to housing end cap to maximize coupling stiffness to measured structure
- Ported for nitrogen back-fill; includes pressure relief valve

Fully tested under subsea conditions including simultaneous temperature, pressure at full ocean depth, and vibration environments.

Sensor

- Six degree of freedom redundant IMUs
- Accelerometer Range: $\pm 2/\pm 4/\pm 8/\pm 16$ g full scale, each axis
- Angular Rate Sensor (Gyroscope) Range: $\pm 125/\pm 250/\pm 500/\pm 1000/\pm 2000$ °/sec full scale, each axis
- Acceleration Sensitivity (at ± 2 g range): 0.061 mg/LSB
- Angular Rate Sensitivity (at ± 125 °/sec range): 4.38×10^{-3} °/sec/LSB
- Acceleration RMS Noise (at ± 2 g range): 1.8 mg
- Angular RMS Noise (at ± 125 °/sec range): 7.5×10^{-2} °/sec
- Bandwidth: Variable based on configuration
- Amplitude non-linearity: $\pm 1.0\%$ Fso
- On-board 16-bit analog-to-digital converter (ADC) with programmable sampling rate
- On-board programmable digital filtering



Suitable for measurements of any underwater structure including risers, jumpers, flowlines, and manifolds.

Digital Data Acquisition and Storage

- Data storage: Data stored in raw format on a 32 GB MicroSDHC card

Host Interface

- Primary USB 2.0 interface to host PC
- Memory card may be removed from the logger and downloaded directly to the host PC via a card reader and translator software

Software Interface

- Custom LabVIEW interface for logger configuration and data export / visualization

Software Operating Modes

- Parameter Setup:
 - Clock Set
 - Delay Start Set
 - Set Sampling Rate
 - Set Digital Filter Cutoff Frequency
 - Memory Card Setup
 - Intermittent Setup (define duty cycle)
- Signal Calibration
- Data Logging Mode:
 - Continuous / Intermittent
 - Data Transfer

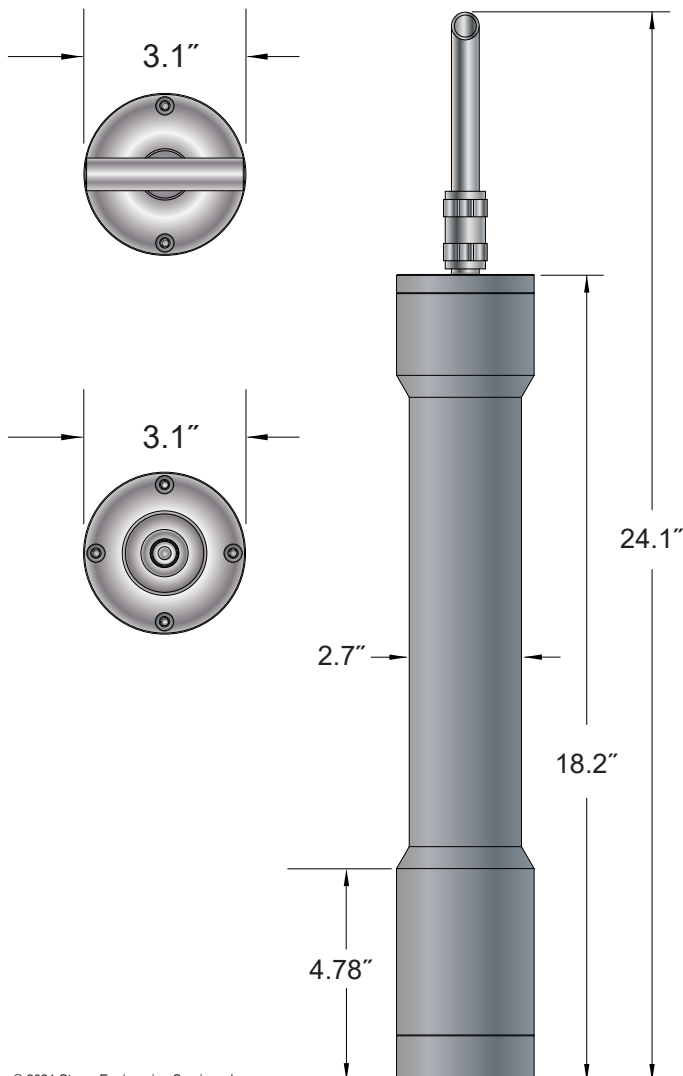
Microcontroller

- ARM® 32-bit Cortex®-M7 microcontroller with variable clock frequency
- 1 MB Flash memory
- Low-power 32 kHz real-time precision clock with external 25 MHz precision oscillator reference
- Dynamic Memory Allocation controller
- Internal watchdog timers
- Sleep, Stop and Standby low power modes

Power and Life

- Batteries: High-performance primary lithium battery pack @ 18 VDC; 15,000 mAh capacity
- Logger life depends on sampling rate and duty cycle (see table below)
- In most circumstances, memory card capacity will exceed battery life

Sampling Rate (Hz)	Life (days)	Life (months)
100	80	2.7
50	120	4
10	180	6



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