

# Pioneer

## 600 kHz / 300 kHz Phased-Array DVLs

After integrating into hundreds of vehicles and navigating hundreds of thousands of miles, Teledyne RDI taps into its vast experience to launch the newest DVL technology in the market.

Designed with unmanned and remotely operated vehicles in mind, the 600 kHz and 300 kHz compact DVLs can be packaged into small, portable, underwater vehicles. Additionally, these powerful DVLs can be leveraged for surface and subsurface manned and unmanned vessels.

Utilizing **state-of-the-art electronics**, Pioneer DVLs provide an array of advanced internal sensors, while minimizing overall power consumption.



### PRODUCT FEATURES

- Bottom-tracking capability for deep water operations: 1000-6000 m depth rating for tracking ranges 100-275 m
- Compact DVLs that can be packaged into small portable UUVs of 7.5 inches (<19 cm) in diameter
- Flexible triggering with both trigger in and trigger out
- Upgradeable to include ADCP capability
- Real-time current profiling option provides additional critical data parameters from a single instrument
- Advanced AHRS IMU for accurate vehicle attitude correction in static and dynamic environments
- Leak detection and monitoring for peace of mind in the most critically demanding deep missions
- Self-contained or OEM options available
- Transducer and system health monitoring for real-time health monitoring of your critical navigation asset
- Time of validity output for highly accurate coupling with an Inertial Navigation System (INS), further improving the resulting DVL-aided-INS position accuracy
- **New optional XRT** (Extended Range Tracking) delivers 50% increase in bottom tracking range

The 600 kHz and 300 kHz DVLs combine Teledyne RDI's **proven bottom detection** algorithms and single-ping bottom location accuracy with its broadband velocity processing technology, providing **highly reliable** precision velocity data for navigation and position processing, even over indeterminate terrain.

Pioneer DVLs are available in self-contained and remote head configurations.

#### The 600 kHz and 300 kHz DVLs include a new suite of cutting-edge internal sensors

**Attitude and Heading Reference System (AHRS):** The AHRS MEMS-based inertial measurement unit (IMU) integrates three gyroscopes, three magnetometers, and three accelerometers running an extended Kalman filter (EKF), which means your heading sensor is **semi-resistant to magnetic transients** during the mission—providing you with accurate orientation data in both static and dynamic conditions.

**Dual Leak Sensor:** These instruments include leak detection sensors: one mounted near the connector end and one mounted at the transducer end of the DVL. This feature provides the user with **real-time leak detection monitoring**, allowing for peace of mind and strategic decision making during critical, high-pressure missions.

**Transducer Health Monitor:** The innovative transducer health monitor provides insight, in near **real-time**, about the status of the transducer, and **alerts** the user of potential problems. The health monitor sensor also tracks pressure cycles, maximum pressure, and operating time for quality tracking purposes



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# Pioneer 600 kHz / 300 kHz Phased-Array DVLs

## TECHNICAL SPECIFICATIONS

|   |  | 600 kHz   | 300 kHz  |
|---|--|---|--|
| <b>Bottom Tracking</b>                              | Maximum Altitude <sup>1,2</sup>  | 100 m (150 m optional)  | 275 m (400 m optional)                             |
|   | Minimum Altitude   | 0.2 m (<20 cm altitude mode available)  | 0.6 m  |
|   | Velocity Range <sup>3</sup>  | ±9 m/s or +16 m/s upon request  | ±9 m/s or +16 m/s upon request                     |
|   | Long Term Accuracy <sup>4</sup>  | ±0.2% ±0.1 cm/s   | ±0.3% ±0.1 cm/s                                    |
|   | Long Term Accuracy <sup>5</sup>  | ±1.15% ±0.1 cm/s  | ±1.15% ±0.1 cm/s                                   |
|   | Precision @ 1 m/s  | ±0.5 cm/s @ ½ alt.  | ±0.6 cm/s @ ½ alt.                                 |
|   | Precision @ 3 m/s  | ±1.5 cm/s @ ½ alt.  | ±1.7 cm/s @ ½ alt.                                 |
|   | Precision @ 5 m/s  | ±2.3 cm/s @ ½ alt.  | ±2.6 cm/s @ ½ alt.                                 |
|   | Resolution   | 0.1 cm/s (default)  | 0.1 cm/s (default)                                 |
|   | Maximum Ping Rate <sup>6</sup>   | 12 Hz   | 7 Hz   |
| <b>Water Profiling</b>                              | Maximum Range <sup>1,2</sup>   | 60 m  | 150 m  |
|   | Minimum Range  | 1.9 m   | 4.5 m  |
|   | Velocity Range <sup>3</sup>  | ±12 m/s   | ±17 m/s  |
|   | Long Term Accuracy   | ±0.3% ±0.1 cm/s   | ±0.6% ±0.1 cm/s                                    |
|   | Precision @ 1 m/s  | ±7.5 cm/s@2 m bin   | ±7.5 cm/s@4 m bin                                  |
|   | Precision @ 3 m/s  | ±7.5 cm/s@2 m bin   | ±7.6 cm/s@4 m bin                                  |
|   | Precision @ 5 m/s  | ±7.7 cm/s@2m bin  | ±7.8 cm/s@4 m bin                                  |
|   | Resolution   | 1 mm/s  | 1 mm/s   |
| Cell Sizes  | 0.1 m–4 m  | 0.5 m–8 m   |  |
| <b>Acoustic</b>                                     | Center Frequency   | 614.4 kHz   | 307.2 kHz  |
|   | Source Level (re 1 µPa)  | 217 dB@1 m  | 220 dB@1 m   |
|   | 1-Way Beam Width   | 2.2°  | 2.7°   |
|   | Number of Beams  | 4-phased array  | 4-phased array                                     |
|   | Beam Angle (nominal)   | 30°   | 30°  |
|   | Bandwidth (nominal)  | 6.25% of center freq.   | 6.25% of center freq.                              |
| <b>Environmental</b>                                | Maximum Operating Depth  | 1000-6000 m   | 1000-6000 m  |
|   | Operating Temperature  | -5°C to 45°C  | -5°C to 45°C                                       |
|   | Storage Temperature  | -30°C to 60°C   | -30°C to 60°C                                      |
|   | Weight in Air  | 7.3 kg - 1000 m; 9.9 kg - 4500 m; 15.4 kg - 6000 m                                  | 7.2 kg - 1000 m; 9.9 kg - 4500 m; 15.4 kg - 6000 m |
|   | Weight in Water  | 2.9 kg - 1000 m; 5.5 kg - 4500 m; 10.0 kg - 6000 m                                  | 2.9 kg - 1000 m; 5.5 kg - 4500 m; 10.0 kg - 6000 m |
| <b>Internal Sensors</b>                             | Leak Detection   | Dual up and down  | Dual up and down                                   |
|   | Health Monitor   | Transducer health, pressure cycles, maximum pressure, over pressure, operating time |  |
| <b>Optional Sensors—<br/>Performance Parameters</b> | Pressure Sensor: Resolution = 0.002% FS; Accuracy = ±0.1% FS TEB (total error band) over compensated temp. range of -10-80°C<br>AHRS: Roll and pitch accuracy = ±0.1° over 360°; Heading accuracy = ±0.8° (internal magnetometers) |   |  |
|   | Attitude AHRS <sup>7</sup>   | SBG Ellipse2-A (200 deg/s)  | SBG Ellipse2-A (200 deg/s)                         |
|   | Pressure Sensor  | 1000 m, 6000 m  | 1000 m, 6000 m                                     |
| <b>Power</b>  | Average Power  | 6 W   | 15 W   |
|   | Quiescent Power  | <1.5 W (1.8 W with AHRS)  | <1.5 W (1.8 W with AHRS)                           |
|   | Input Voltage (VDC)  | 10.7-36   | 10.7-36  |
|   | Surge Current  | <6 A  | <6 A   |
| <b>Communications</b>                               | Communications: RS232 (or RS422 install at factory)  |   |  |
| <b>Dimensions</b>                                   | Height x Ø (cm)  | 24.5 x 16   | 24.5 x 16  |

<sup>1</sup> @5°C and 35ppt, salinity, @ max V.

<sup>2</sup> Maximum range may be reduced due to flow noise.

<sup>3</sup> When mounted with beam @45°. Also, for platforms with forward velocity higher than reverse (or vice versa), the maximum velocity can be increased to [-2 m/s -> +16 m/s] for bottom track via firmware modification.

<sup>4</sup> ECCN 6A001.

<sup>5</sup> ECCN 6A991.

<sup>6</sup> @5% of maximum altitude.

<sup>7</sup> MEMS-based Inertial Measurement Unit (IMU) integrating three gyroscopes, three magnetometers, and three accelerometers. Running an extended Kalman filter (EKF), the Ellipse-A provides accurate orientation data in both static and dynamic conditions and some immunity to magnetic transients.



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