

Teledyne RD Instruments

Pioneer

600 kHz / 300 kHz Phased Array DVLs

A New Era in Doppler Velocity Log (DVL) Technology



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 and offer expanded connectivity with external sensors, while minimizing overall power consumption.

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 users with **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.

PRODUCT FEATURES

- Bottom-tracking capability for deep water operations: 1000-4500 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
- Multiple communications channels, allowing for optimum connectivity with external sensors
- Upgradeable to include ADCP capability
- Real-time current profiling option provides additional critical data parameters from a single instrument
- Self-contained or remote-head options available
- 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
- 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

Pioneer Doppler Velocity Logs



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TECHNICAL SPECIFICATIONS

		600 kHz	300 kHz
Bottom Tracking	Maximum Altitude ^{1,2}	100 m	275 m
	Minimum Altitude	0.5 m (0.31 m optional)	0.6 m
	Velocity Range ³	±9 m/s or +16 m/s upon request	±9 m/s or +16 m/s upon request
	Long Term Accuracy ⁴	±0.3% ±0.2 cm/s	±0.4% ±0.2 cm/s
	Long Term Accuracy ⁵	±1.15% ±0.2 cm/s	±1.15% ±0.2 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 ⁶	12 Hz	7 Hz	
Water Profiling	Maximum Range ^{1,2}	60 m	150 m
	Minimum Range	1.9 m	4.5 m
	Velocity Range ³	±12 m/s	±17 m/s
	Long Term Accuracy	±0.3% ±0.2 cm/s	±0.6% ±0.2 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	
Acoustic	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.
Environmental	Maximum Operating Depth	1000-4500 m	1000-4500 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	6.3 kg	7.2 kg
	Weight in Water ⁷	2.2 kg	2.9 kg
Internal Sensors	Attitude AHRS ⁸	SBG Ellipse-A (200 deg/s)	SBG Ellipse-A (200 deg/s)
	Pressure Sensor	200, 500, 1000 m full-scale	200, 500, 1000 m full-scale
	Leak Detection	Dual up and down	Dual up and down
	Health Monitor	Transducer health, pressure cycles, maximum pressure, over pressure, operating time	
Sensor Interfaces	Magnetic compass • Pressure • Speed of sound • CTD • Echo sounder • GPS • Temperature • Heading, pitch, and roll from AHRS IMU		
Optional Sensors— Performance Parameters	Pressure Sensor: Resolution = 0.002% FS; Accuracy = ±0.1% FS TEB (total error band) over compensated temp. range of -10-80°C AHRS: Roll and pitch accuracy = ±0.1° over 360°; Heading accuracy = ±0.8° (internal magnetometers)		
Power	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 VDC	10.7-36 VDC & 24-48 VDC
	Surge Current	<6 A	<6 A
Communications	Number of Channels: 4; combination of RS232 and RS422		
Dimensions (cm)	24.5 x 16 ø		24.5 x 16 ø

1 @5°C and 35ppt, salinity, @ max V.
 2 Maximum range may be reduced due to flow noise.
 3 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.
 4 ECCN 6A001.
 5 ECCN 6A991.

6 @5% of maximum altitude.
 7 @1000 m; @4500 m consult factory.
 8 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.

Specifications subject to change without notice.
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