



RiverSurveyor[®]

DISCHARGE, BATHYMETRY AND CURRENT PROFILING

S5

M9



a xylem brand



Taken to Extremes.

It's a SonTek exclusive - multiple acoustic frequencies fused with precise bandwidth control make for the most robust and continuous shallow-to-deep measurements ever. A deterministic microcontroller expertly apportions the proper acoustics, pulse scheme, and cell size so you can focus on the measurement - not the instrument setup. The system even has an embedded echosounder (vertical beam) for precise channel definition - and it's all designed to work intuitively.

Leading edge technologies such as 2.4 GHz telemetry, mobile phones, and RTK (Real-Time Kinematic) GPS are all incorporated to elevate performance and expand utility.



Upgrade and Save. Good news for RiverSurveyor M9 users who also require bathymetric data. Now you can upgrade your RiverSurveyor M9 to include the bathymetry power of the **HydroSurveyor** - a system designed to collect bathymetric, water column velocity profile, and acoustic bottom tracking data as part of a hydrographic survey.

The HydroSurveyor upgrade is all inclusive:

- Full water column velocity mapping,
- Exclusive 5-beam depth sounding
- Acoustic bottom tracking (for speed over ground when GPS is lost)
- Sound speed integration and interpolation (when using with the CastAway-CTD)

Features	Benefits
Multiple acoustic frequencies*	Combines the highest resolution with the greatest range of depths.
Vertical acoustic beam (echosounder)*	Superior channel definition, extends the maximum measurable discharge depth.
Automated cell size*	Always uses the optimal resolution for channel depth - no user input required.
Automated pulse scheme and frequency hopping*	Automatically adjusts the acoustic Doppler sampling (ping) scheme for channel conditions. User does not need to pre-program unit.
Microprocessor computed discharge and secure data*	All discharge computations are done within the S5 or M9 unit internally (in addition to the computer). No lost data from communications drop outs.
Standard 360° compass and two-axis tilt sensor	Compensates for vessel motion due to surface conditions.
Reverberation control with ping rates to 70Hz	High ping rates ensure extremely robust data collection.
Pulse-coherent processing	Maximizes high resolution performance in shallow water.
Bottom-tracking	High precision vessel tracking and depth measurement without GPS requirement.
RTK GPS (optional)	Ultra precise earth-referenced positioning as an alternative to bottom tracking in moving bed or other difficult situations.

*RiverSurveyor technology patent number 8,125,849

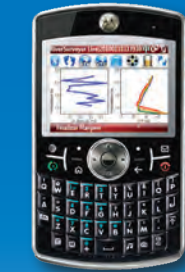
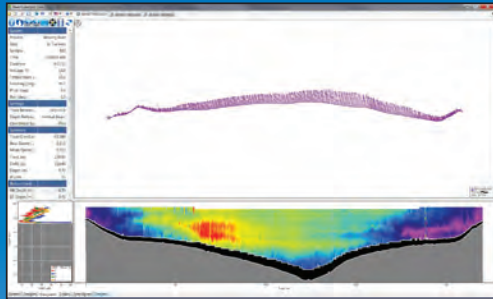


Display. Process. Analyze.

Exceed your expectations both during and after the measurement with the RiverSurveyor Live! software suite for both PC and mobile platforms. All programs take full advantage of SmartPulseHD™ and the intelligent software ensures no loss of data during telemetry dropouts. Easily switch between computer or mobile devices during mid-measurement. Several quality indicators and statistics with selectable graphics provide instant feedback on data collection. Multi-language support includes Afrikaans, Catalan, Chinese, English (UK & US), French, German, Hungarian, Italian, Japanese, Korean, Polish, Portuguese, Spanish and Turkish. Need your language? Let us know at inquiry@sontek.com.

Moving Boat

Standard with every system and used for underway measurements that calculate discharge from a moving vessel.

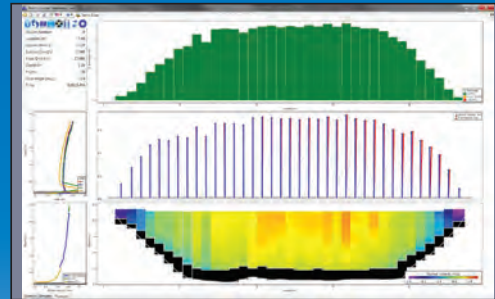


RiverSurveyor Live
Mobile Multi-language Display

- Enables you to efficiently transect from one bank to the other with a full contour plot of the water velocity profile and bottom bathymetry.
- View multiple data results (bottom-track, vertical beam, GPS-GGA, and GPS-VTG) simultaneously.
- Supports USGS Loop Correction Method for moving bed conditions.

Stationary (Section-by-Section)

Optional add-on program that uses traditional USGS/ISO mid section or mean section methods.



RiverSurveyor Stationary Live
Mobile Display

- An alternative to moving boat method for highly turbulent areas or moving bed environments where GPS is unavailable.
- Supports discharge measurements through ice holes.
- Supports sections that are braided or have islands.

HydroBoard II: Moving Boat Solution for SonTek ADP®'s

Face challenging white water conditions and extreme weather events head-on with the new SonTek HydroBoard II.

Innovative. Face the challenge of high velocity discharge measurements with the confidence gained from the use of the new SonTek HydroBoard II. The new dive-resistant, flexible body design allows the HydroBoard II to be used anywhere from low velocity irrigation canals to high-velocity mountain streams.

Rugged. Specifically designed with the full forces of nature in mind, the HydroBoard II uses a highly buoyant material, secure mounting hardware for the RiverSurveyor and HydroSurveyor ADP systems.

Stable. One of the great sources of error in an ADP discharge measurement is excessive and irregular speed. This sleek and sturdy design provides the user with the platform to achieve the controlled speed and tracking conducive to quality ADP discharge measurements.



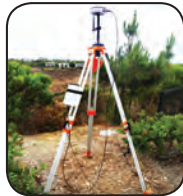
RiverSurveyor ACCESSORIES AND SPECIFICATIONS



Mobile Handheld:
RiverSurveyor Live Mobile running on a SonTek-provided handheld and SonTek Bridge makes one-man system operation simple. (Model subject to change.)



Power/Communications:
The Power/Communications Module (PCM) for the S5 and the M9 features optional rechargeable battery packs. It can be factory-configured with 2.4 GHz telemetry, SBAS-GPS, or RTK GPS.



RTK GPS:
The optional SonTek RTK GPS³ solution is easy to use and offers an incredibly precise, fully integrated boat speed solution to augment, or be an alternative to, bottom tracking.



SonTek HydroBoard II:
All-in-one, rugged and easy to transport, this dive-resistant design allows the RiverSurveyor to be used in challenging flow conditions.



HydroBoard II Bags:
Outfitted with back pack and shoulder straps, these bags offer the perfect transportation option for both all SonTek HydroBoards.



Boat Mount:
Delrin/aluminum fixture that is custom designed for the M9 or S5 to facilitate mounting over the side of a boat. (Attachment to boat not included.)



Trimaran:
Contact SonTek for trimaran solutions to fit special applications.

	RiverSurveyor S5	RiverSurveyor M9
Velocity Measurement		
Profiling Range (Distance)	0.06m to 5m	0.06m to 40m
Profiling Range ¹ (Velocity)	+/- 20 m/s	+/- 20 m/s
Accuracy ¹	Up to +/- 0.25% of measured velocity; +/- 0.2cm/s	Up to +/- 0.25% of measured velocity; +/- 0.2cm/s
Resolution	0.001 m/s	0.001 m/s
Number of Cells	Up to 128	Up to 128
Cell Size	0.02m to 0.5m	0.02m to 4m
Transducer Configuration		
	Five (5) Transducers;	Nine (9) Transducers;
	4-beam 3.0 MHz Janus at 25° Slant Angle;	Dual 4-Beam 3.0 MHz/1.0 MHz Janus at 25° Slant Angle;
	1.0 MHz Vertical Beam Echosounder	0.5 MHz Vertical Beam Echosounder
Depth Measurement		
Range	0.20m to 15m	0.20m to 80m
Accuracy	1%	1%
Resolution	0.001m	0.001m
Discharge Measurement		
Range with Bottom-Track	0.3m to 5m	0.3m to 40m
Range with RTK GPS or DGPS	0.3m to 15m	0.3m to 80m
Computations	Internal	Internal

S5/M9 Additional Specifications

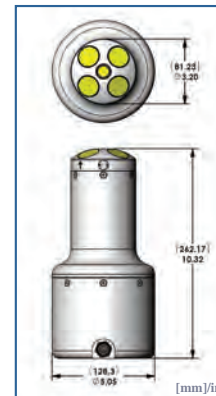
- Temperature Sensor
 - Resolution: ± 0.01° C
 - Accuracy: ± 0.1° C
- Compass/Tilt (Solid State Type)
 - Range: 360°
 - Heading Accuracy: ± 2°
 - Pitch/Roll: ± 1°
- Internal Recorder Size: 8GB
- Power/Communications
 - 12 - 18v DC
 - RS232 Communications
 - RS232 Serial GPS Input
 - Max Data Output Rate: 2 Hz
 - Internal Sampling Rate: Up to 70 Hz
- Physical/Environmental
 - Depth Rating: 50m
 - Operating Temperature: -5° to 45° C
 - Storage Temperature: -10° to 70° C

Power Communications Module

- Batteries
 - Type: Any AA-sized batteries
 - Capacity/duration: 8 hours of continuous operation (6 hours with RTK GPS enabled)
- GPS Options
 - SBAS GPS Horizontal Accuracy²: <1.0m
 - RTK GPS Horizontal Precision (repeatability)²⁻³: <0.03m

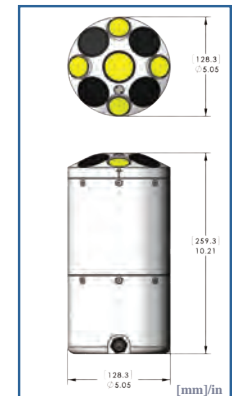
Range (Std.; 10 dBm)⁴ Range (High; 22dBm)⁴

- Base to Rover 1000 m 3000 m
- PC to Rover 450 m 1500 m
- Mobile to Rover 200 m 400 m



RiverSurveyor-S5

- Weight in Air: 1.1 kg (2.5 lb)
- Weight in Water: -0.3 kg (-0.7 lb)



RiverSurveyor-M9

- Weight in Air: 2.3 kg (5.0 lb)
- Weight in Water: -0.6 kg (-1.3 lb)

¹Please contact SonTek for accuracies better than 1%, or velocities >10 m/s.

²Depends on multipath environment, antenna selection, number of satellites in view, satellite geometry, and ionospheric activity.

³Contact SonTek for details about RTK GPS performance and specifications.

⁴High power may not be available in all countries; all ranges with default 2 dBi antenna and line-of-sight.



Founded in 1992 and advancing environmental science globally, SonTek manufactures acoustic Doppler instrumentation for water velocity measurement in oceans, rivers, lakes, harbors, canals, estuaries, industrial pipes and laboratories. SonTek's sophisticated and proprietary technology serves as the foundation for some of the industry's most trusted flow data collection systems. SonTek is headquartered in San Diego, California, and is a division of Xylem Inc.

SonTek
9940 Summers Ridge Road
San Diego CA 92121
Tel +1.858.546.8327
Fax +1.858.546.8150
www.sontek.com

YSI, Inc.
1700/1725 Brannum Lane
Yellow Springs, Ohio 45387
Tel +1.937.767.7241
Fax +1.937.767.9353
www.ysi.com

Xylem, Inc.
1133 Westchester Avenue
White Plains, NY 10604
Tel +1.914.323.5700
Fax +1.914.323.5800
www.xylem.com

www.sontek.com

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