RiverSurveyor®

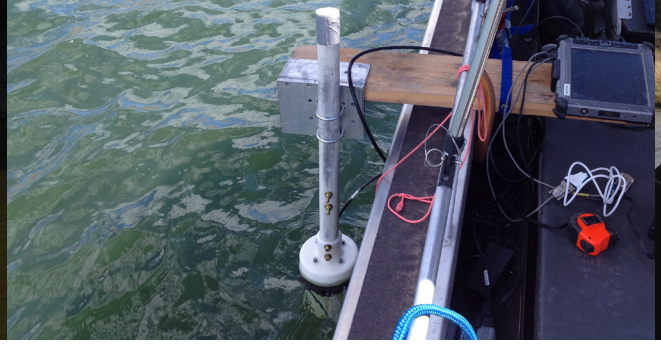
S5

M9

DISCHARGE, BATHYMETRY AND CURRENT PROFILING

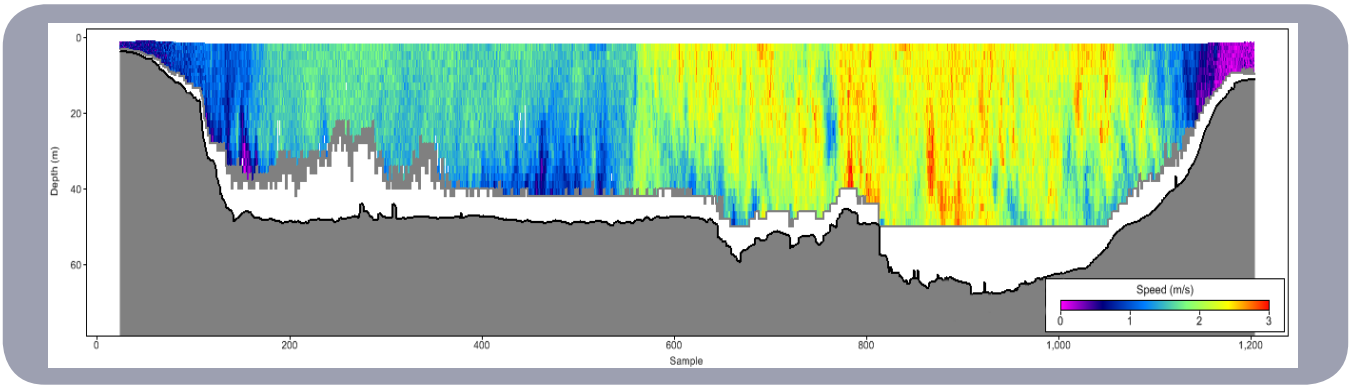
SonTek

a xylem brand


Taken to Incredible Extremes.

The RiverSurveyor S5/M9 is a river discharge measurement system without the traditional limitations. Small, portable and easy to use, the patented and award-winning RiverSurveyor measures in extreme flood or drought situations within a single instrument, and without changing user settings. The results speak for themselves - the RiverSurveyor S5/M9 has revolutionized the way discharge is measured in rivers and canals.



"Meeting of the Waters" Amazon River near Manaus, Brazil

It's a SonTek exclusive - multiple acoustic frequencies with SmartPulseHD® make for the most robust and continuous shallow-to-deep measurements ever. An array of four deterministic microcontrollers expertly apportion the proper acoustics, pulse scheme, and cell size so you can focus on the measurement - not the instrument setup. The system even has a vertical beam for accurate channel definition and it's all designed to work intuitively. Slow to fast, shallow to deep, the RiverSurveyor S5/M9 handles it all on the fly.

Features	Benefits
Multi-band (Multiple acoustic frequencies)[1,2]	Balances the highest resolution with the greatest range of depths.
Vertical acoustic beam[1]	Superior channel definition for both bathymetric and discharge applications. Extends maximum discharge depth when bottom-tracking is out of range.
SmartPulseHD®[3]	An intelligent algorithm that looks at water depth, velocity and turbulence, and then acoustically adapts to those conditions using pulse-coherent, broadband, and incoherent techniques. High-def cell sizes down to 2 cm.
Microprocessor computed discharge and secure data[1]	All discharge computations are simultaneously done both within the S5 or M9, and on the host computer. No lost data if communications drop out.
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.
Bottom-tracking	Acoustically track vessel speed over ground independent of DGPS. Also supplies redundant depth measurement.
RTK GPS (optional)	Ultra precise positioning as an alternative to bottom tracking in moving bed or other difficult situations.

[1]RiverSurveyor technology patent number 8,125,849
[2]RiverSurveyor technology patent number 8,411,530
[3]Patent Pending

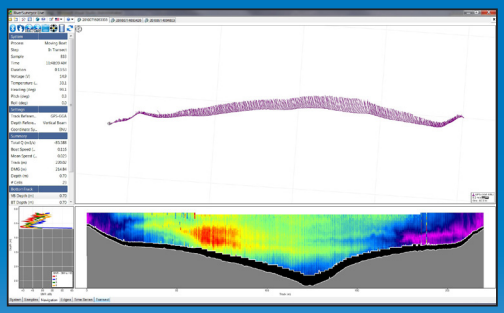
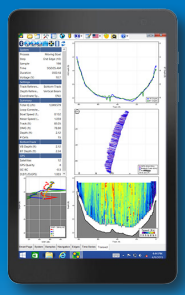


Display. Process. Analyze.

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.

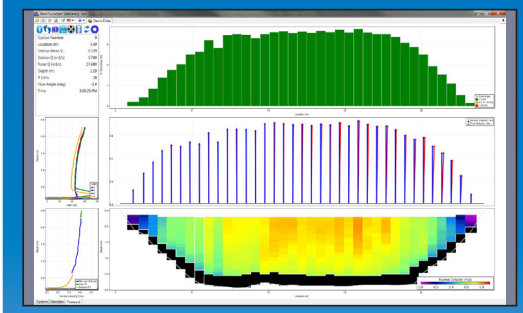
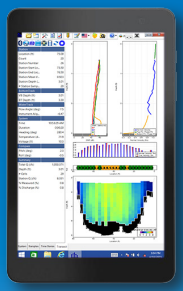



RiverSurveyor Live
Mobile Multi-language Display

- 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 and Stationary Moving Bed Analysis for moving bed conditions.

Stationary (Section-by-Section)

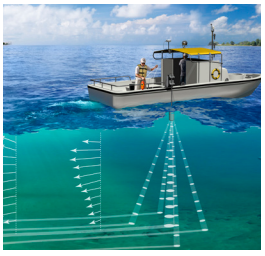
Optional add-on program that uses traditional USGS/ISO mid section or mean section methods.

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.

Get More Value.



The SonTek HydroSurveyor

Own a RiverSurveyor system, but need survey data as well? Upgrade your current M9 system and collect bathymetric, water column velocity profile, and acoustic bottom tracking data. The upgrade includes:

- 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®)

The SonTek HydroBoard II.

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

A dive-resistant, flexible body design allows the HydroBoard II to be used anywhere from low velocity irrigation canals to high-velocity mountain streams. Every HydroBoard comes equipped with reinforced mounting hardware, perfect for securing your instrument during unpredictable conditions.

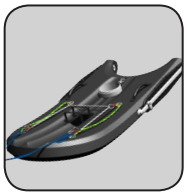
RiverSurveyor ACCESSORIES AND SPECIFICATIONS

Handheld Tablet :
Running on a tablet available from SonTek, RiverSurveyor Live software makes one-man system operation simple.

(Model subject to change.)

Power/Communications:
The Power/Communications Module (PCM) for the S5/M9 operates on standard AA batteries[5]. It can be factory-configured with 2.4 GHz telemetry, SBAS-GPS, or RTK GPS.

RTK GPS:
The optional SonTek RTK GPS[3] solution is easy to use and offers an incredibly precise, fully integrated boat speed solution to augment, or be an alternative to, bottom tracking.

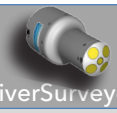
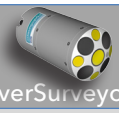


SonTek HydroBoard II:
All-in-one, rugged and easy to transport, this dive-resistant design allows the RiverSurveyor to be used in challenging flow conditions.

HydroBoard II Bags:
Ready to go where you are, these rugged bags are outfitted with shoulder straps and offer the perfect storage protection for the HydroBoard II.

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 to128	Up to128
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

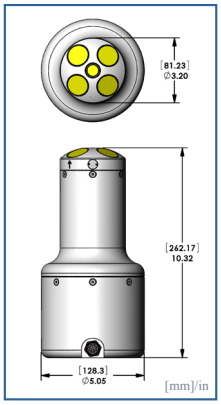
S5/M9 Additional Specifications

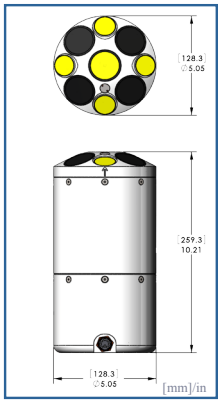
- Temperature Sensor
  - Resolution: ± 0.01° C
  - Accuracy: ± 0.1° C
- Compass/Tilt (Solid State Type)
  - Range: 360°
  - Heading Accuracy: ± 2°
  - Pitch/Roll: ± 1°
- Internal Recorder Size: 16GB
- Power/Communications
  - 12 - 18v DC
  - RS232 Communications
  - RS232 Serial GPS Input
  - Max Data Output Rate: 2 Hz
  - Internal Sampling Rate: Up to 70 Hz
- Physical/Environmental
  - Depth Rating: 50m
  - Operating Temperature: -5° to 45° C
  - Storage Temperature: -20° to 70° C

Power Communications Module

- Batteries
  - Type: Standard AA batteries[5]
  - Average duration: 8 hours of continuous operation (6 hours with RTK GPS enabled)
- GPS Options
  - SBAS GPS Horizontal Accuracy[2]: <1.0m
  - RTK GPS Horizontal Accuracy[2]: <0.02m ; Vertical Accuracy <0.04m[2,3]

	Range (Std.; 10 dBm)[4]	Range (High; 22dBm)[4]
• Base to Rover	**1000 m**	**3000 m**
• **PC to Rover**	450 m	1500 m
• **Bridge 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)

[1]Please contact SonTek for accuracies better than 1%, or velocities >10 m/s.
[2]Depends on multipath environment, antenna selection, number of satellites in view, satellite geometry, and ionospheric activity.
[3]Requires absolute RTK solution. Only available with HydroSurveyor.
[4]High power may not be available in all countries; all ranges with default 2 dBi antenna and line-of-sight.
[5]Standard AA batteries are defined as alkaline or NiMH rechargeables, with a diameter up to 14.5mm.

xylem
Let's Solve Water

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.

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