

SeaGuardII DCP

600kHz Doppler Current Profiler

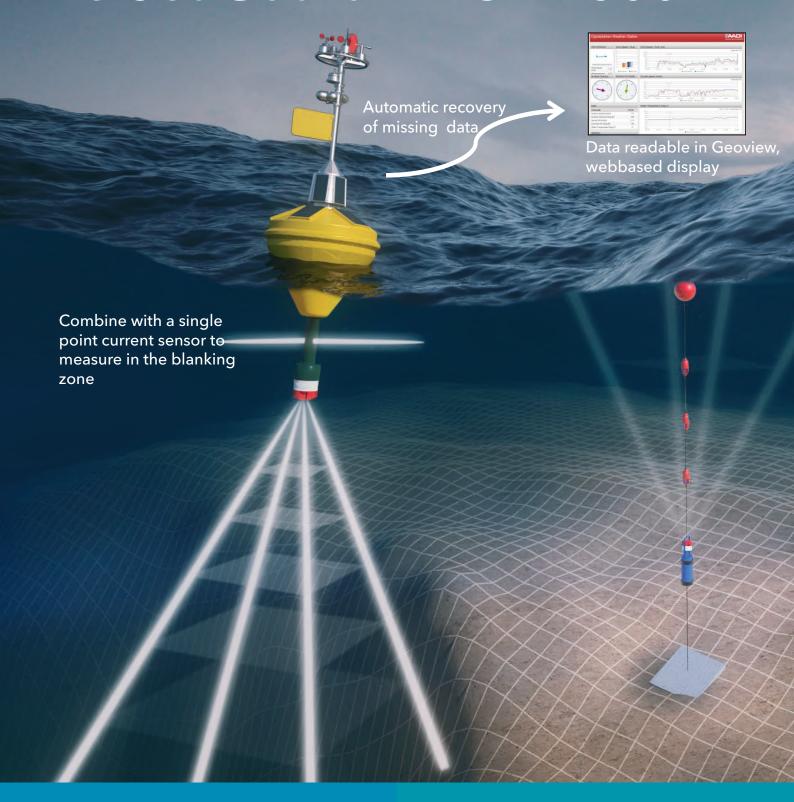
Introducing SeaGuardII DCP:

- Multiparameter Doppler Current Profiler
- Scalable platform from stand-alone to observatory hub
- Optimal flexibility in programming of data collection
- Intelligent compensation for non-ideal environments
- Increased deployment time up to 2 years with 30 min. interval
- Smart data quality control
- Secure data from site to the office
- Modem support





The SeaGuardII DCP - 600 kHz



BUOY

- Lower cost by removing the need for additional logger; SeaGuardII is the system data hub
- Lower transmission cost by intelligent transmission interval settings
- Store full datasets and transmit reduced amount of data
- Direct connection and control of modems; radio, GSM, GPRS, Iridium, AIS, GOES

MOORING LINE

- Upside down mounting
- Full flexibility of additional parameters on top end plate or distributed in the water column using AiCaP CANbus
- 2 serial inputs with power control
- 4 analog inputs
- Plug and play wave, tide, oxygen, conductivity, temperature and turbidity sensors

Doppler Current Profiler Surface referred cells Surface current measurement in top cms layer Multiple profiles simultaneously Automatic removal of erroneous beam disturbances

BOTTOM MOUNTED

- Measure closer to the bottom by combining with Aanderaa's single point current sensor
- Refer current cells to the surface to follow water level changes
- Multi column capabilities
- Surface current in top cms layer
- Additional battery capability

SEAGUARDII DCP

- User selectable broadband or narrowband modes
- Automatic flagging of bad data
- Multi sensors groups with individual recording interval
- Same power consumption in burst and spread mode
- Advanced tilt compensation for each ping to achieve true current measurements

SEAGUARDII DCP - DOPPLER CURRENT PROFILER

For almost 50 years and more than 20 000 instruments used worlwide, Aanderaa Data Instruments is synonymous with quality, electronically and mechanically robust and reliable in all ocean environments.

SeaGuardII DCP is a scalable, easy to use current profiler. Its flexibility makes it the perfect instrument to address all scenarios of ocean observations and monitoring.

SeaGuardII is a smart data hub that combines the SeaGuard electronics with the advanced management firmware of Aanderaa SmartGuard data hub offering impressive capabilities. Combined with the newly developed Doppler Current Sensor, DCPS600, it forms the SeaGuardII DCP

Unique extendable features

- Unique sensor network features
- Easy connection of AiCAP sensors
- Integration of 3rd party analog sensors
- RS232/RS422 inputs with power control

Profile flexibility

- User selectable broadband and narrowband modes
- Several profiles simultaneously
- Surface referred columns
- Surface current in top cm layer

Perfect instrument for buoy and system applications

- Unique motion compensation algorithms
- Modem support for direct connection to radio, GPRS, GOES, GSM or Iridium
- Weather station (through serial connection)
- Reduced transmission cost
- Store full datasets and transmit selected datasets
- Recording and transmission interval may be scheduled independently
- Automatic retransmission of missing datasets

Longer deployment time

- 24 months autonomous deployment with 30 minutes sampling
- Reduced power consumption (broadband technology)
- Increased battery capacity; up to 70Ah internal
- Optional user assembled battery

Additional features

- Double the measuring range with a single instrument; connect two plug and play DCP sensors
- Measure in the blanking zone combined with a single point current sensor

LED indicator

Visual confirmation of the instrument status

User friendly set up and data analysis

Predeployment configuration software:

- Real Time Collector
- USB, RS232 / RS422 connection
- Device layout
- Control recording
- Status monitoring

Post processing software: Data Studio

 Less then one minute from full data overview with table overview, 2D and 3D graphs, export function

Real time web based display - GeoView:

- Both real time and historical data in graphs
- Data storage and retrieval from included database
- Several stations simultaneously

AANDERAA DATA INSTRUMENTS AS

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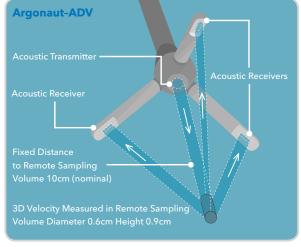


Robust and Always Reliable

The Argonaut-ADV takes SonTek's renowned ADV technology and makes it practical and affordable for deployments in lakes, streams or along the coast. Also, its low velocity/shallow water capability make it the ultimate solution for marsh and wetland studies.

The unique Auto-velocity range scaling feature eliminates the need to pre-set the velocity range - it's all done automatically by the instrument. A built-in recorder, SDI-12 interface, and battery enable you to either deploy the Argonaut-ADV for autonomous operation, or connect it to a data logger for real-time data reporting.





- O Low velocity with resolution of 0.0001 m/s
- Shallow water (down to 2-3 cm with 2-D probe option)
- RS-232 and SDI-12 output standard
- Auto-velocity range capability
- Objective in the property of the property o
- High battery capacity for long deployments



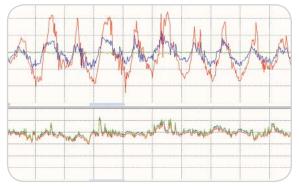
a xylem brand

Standard Features

- SonTek Auto-velocity range capability
- 3-D down looking probe
- Remote sampling volume of 0.25 cc located 10 cm from center transducer
- Temperature sensor
- Distance to boundary (acoustic altimetry)
- Internal 4 MB recorder
- Internal battery pack
- ViewArgonaut Windows software for data analysis, processing and exporting
- Solid state compass/tilt sensor
- RS-232/SDI-12 output

Optional Features

- 2-D side-looking ADV probe for shallow water (as little as 2-3 cm) deployments
- RS-422 output
- Pressure sensor

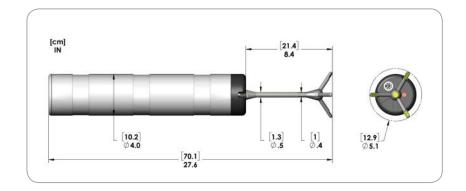


Example of Argonaut-ADV software

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2-D side-looking version deployed for marsh study in Louisiana.

Specifications	
Maximum sample rate	1 Hz
Sample volume distance	10cm
Sample volume size	0.25cc
Maximum velocity	4.5 m/s
Acoustic altimetry limit	30cm
Auto-velocity range	Yes
Maximum depth	60m
Available sensor geometries	3D down, 2D side
Stem configuration	15 cm stem
Recorder Size	4MB
Pressure Sensor	Piezoresistive strain gauge (0.1% accuracy)
Operating Temperature Storage Temperature	-5 to 40 °C -10 to 50 °C
Temperature Accuracy Resolution	+/- 0.1 °C 0.01 °C
Velocity Accuracy Resolution	+/- 1% of measured velocity, +/- 0.25cm/s 0.01 cm/s
Compass/Tilt Heading Accuracy Heading Resolution Tilt Accuracy Tilt Resolution	+/- 2° 0.1° +/- 1° 0.1°
Power Input Voltage Power Consumption Battery Pack Capacity	7-15 VDC 0.2-0.5W 200 WH (internal)





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500 WH (external)



A Practical Solution to Current and Wave Measurement

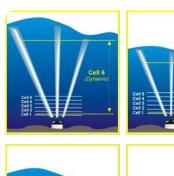
The Argonaut-XR offers exceptional value for current profiling applications. Its small size, rugged build quality, and flexible programming options make the Argonaut-XR very attractive for both real-time operation as well as autonomous deployments.

With a main measurement cell that is independent of the velocity profile, an Argonaut-XR can be a single-cell current meter, profiler, or both. For example, the system can be programed for a velocity profile in addition to a dynamic measurement cell which can be fixed in size and location anywhere in the water column, or configured to change its size or location as the water level changes (the Auto-Tide feature).

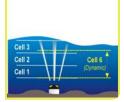
The basic autonomous configuration includes an external battery, internal recorder, compass/tilt sensor, pressure and temperature sensors.

Adding options such as the SonWave package, or a CT/TS sensor, make the Argonaut-XR the centerpiece of a complete oceanographic system.









The additional dynamic cell adjusts with changing water level.

Argonaut-XR accessories and specifications



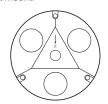
Pyramidal housing protects the Argonaut-XR from damage in busy ports, as shown here in Brazil.*

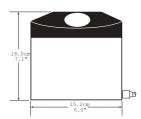


The Argonaut-XR on mounting plate with optional battery pack.



An XR and battery pack installed in an optional trawl-resistant mount.





Argonaut-XR Characteristics									
	Profiling Feature			Main Measurement Cell					
Frequency	Max Profiling Range	Min Cell Size	Min Blanking Distance	Cell Begin (CB)		Cell End (CE)		Min CE-CB	
Kunge	Distance	Min	Max	Min	Max				
1.5MHz	20.0m (66.0ft)	0.40m (1.2ft)	0.50m (1.6ft)	0.50m (1.6ft)	19.5m (63.4ft)	1.50m (4.9ft)	20m (66.0ft)	1.00m (3.28ft)	
750 kHz	40.0m (131.0ft)	0.80m (2.5ft)	0.80m (2.5ftft)	0.80m (2.5ft)	46.5m (152.6ft)	4.30m (14.1ft)	50m (164.0ft)	3.50m (11.5ft)	

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Velocity	Main mea	Main measurement cell plus up to 10 cells in profiling feature								
- Range				±6 m/s						
- Resolution	- Resolution			0.1 cm/s						
- Accuracy				±1% of	measured v	velocty, ±0.	.5 cm/s			
Compass/Tilt Se	ensor									
- Calibration Pr	rocedure		Buil	Built-in, compensate for ambient magnetic fields						
- Resolution					0.1	l°				
- Heading Acci	uracy				±2)°				
- Pitch, Roll Aco	curacy				±1	0				
Temperature										
- Resolution					0.01	°C				
- Accuracy	- Accuracy				±0.1	I°C				
Pressure			I	Piezoresist	ive strain g	auge, 0.1%	accuracy			
Recorder Size	Recorder Size				4N	1B				
Environmental										
- Pressure Ratir	ng			200m (pressure sensor dependent)						
- Operating Te	mperature			-5° to 40°C						
- Storage Temp	- Storage Temperature			-10° to 50°C						
Physical										
- Housing			_	Delrin plastic						
- Weight in Air	- Weight in Air			2.5 kg 5.5 lb						
- Weight in Wa	ter		_	-0.3 kg -0.7 lb						
- Dimensions				15.2cm x 18.0cm 6.0 in x 7.1 in						
Power	Power									
- Input Power	- Input Power			7-15 V DC						
- Typical Power			(0.2 to 0.5 W Continuous; 0.01 W Stand-by						
	Communications			RS232, SDI-12						
Additional Features			_							
- External Batte	ery Housing (5	00 WH)		Optional						
- Real Time Wa	ives (Height, P	eriod, Spectra)		Optional						
- RS422 Outpu	it			Optional						
- Integrated C		Optional								



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SonTek HydroSurveyor[™] Software and Hydrographic Surveying ADCP

THE PRACTICAL SOLUTION TO VELOCITY, POSITION, AND DEPTH MEASUREMENT

Skip the complicated set-up, expensive equipment and complex software packages. With the new HydroSurveyor, enjoy access to today's most sophisticated bathymetric technology in a single package, and at a fraction of the cost.

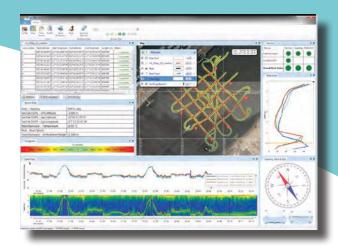
Flexible and Fast. Water sound speed corrections are interpolated in both space and time with the fully integrated CastAway[™]_CTD, delivering agility and accuracy to your surveys.

All Inclusive. Full water column velocity mapping, exclusive 5-beam depth sounding and acoustic bottom tracking (for speed over ground when GPS is lost) provide comprehensive data for a complete solution within a single package.

Software Centric. With built-in automatic data gridding and interpolation, even intricate surveys won't require specialized complex software, saving you time and money.

Additional Features Include:

- Sound speed integration and interpolation (with CastAway-CTD)
- Speed over ground (Acoustic Bottom Tracking)
- 5-beam depth soundings (50° swath)
- Water column velocity mapping
- Automatic data gridding and interpolation
- 360° compass and two-axis tilt sensor
- Interface for customer-supplied GPS and/or heading sensor





Additional options:

- CastAway-CTD
- Upgrade for existing RiverSurveyor M9 systems
- SonTek RTK GPS or DGPS
- Delrin/aluminum boat mount
- Bluetooth/spread spectrum telemetry



HydroSurveyor hydrographic surveying software and adop



The addition of the SonTek RTK-GPS or DGPS makes the HydroSurveyor a complete package.



Seamless integration with the CastAway-CTD, allows sound speed corrections to be done right in the field.



Custom designed Delrin/aluminum fixture to facilitate mounting the HydroSurveyor over the side of a boat.

¹Depends on multipath environment, antenna selection, number of satellites in view, satellite geometry, and ionospheric activity.

**Contact Son'E for details about RTK GPS performance and specifications.

Depth Measurement

Range (Vertical Beam): 0.2m to 80m Range (Slanted Beams): 0.2m to 40m

Accuracy: 0.02m (sound speed corrected)

Resolution: 0.001m Vertical Beam Angle: 8° Velocity Beam Angle: 3°

Swath Width: 50°

Velocity Measurement

Profiling Range (Distance): 0.06m to 40m

Profiling Range (Velocity): \pm 10 m/s Accuracy: Up to \pm 1.0%, \pm 0.2 cm/s

Resolution: 0.001 m/s

Number of Cells: Up to 128

Cell Size: 0.02m to 4m

Acoustic Bottom Tracking

Range: ± 10 m/s Altitude: 0.2 - 40m

GPS Options

SonTek RTK GPS: (Base-Rover Distance 2km)

Horizontal Precision^{1,2} (Repeatability): <0.03m

SonTek DGPS:

SBAS GPS Horizontal Accuracy¹: <1.0m

Other

Transducer Configuration:

8-beam Janus (4 x 1MHz; 4 x 3MHz) and 1 Vertical Beam (0.5 MHz)

Temperature Sensor Resolution: ± 0.01°C

Temperature Sensor Accuracy: ± 0.1°C

Compass Type: Solid State type, with Built-in Inclinometer

Compass Range: Full 360°

Compass Heading Accuracy: ± 2°

Compass Tilt Accuracy: ± 1°

Power: 12-18 vdc

Operating Temperature: -5 $^{\circ}$ C to 45 $^{\circ}$ C

Storage Temperature: -10 °C to 70 °C



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.

www.sontek.com

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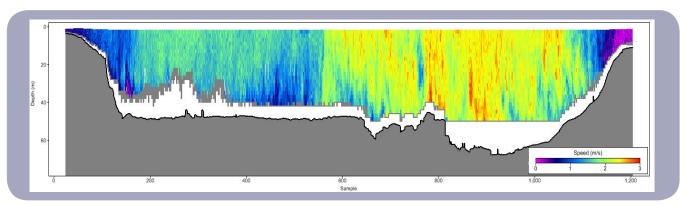


M9



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.

¹RiverSurveyor technology patent number 8,125,849

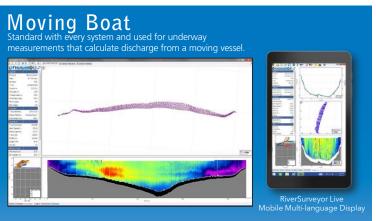
²RiverSurveyor technology patent number 8,411,530

³Patent 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.



- 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. **The control of the control o

- 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.

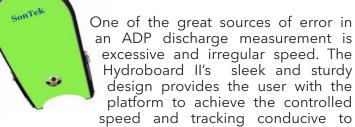


The SonTek HydroSurveyor

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.



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



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

(Model subject to change.)



The Power/Communications Module (PCM) for the S5/ M9 operates on standard AA batteries⁵. It can be factory-configured with 2.4 GHz telemetry, SBAS-GPS, or 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.



onTek HydroBoard II:

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



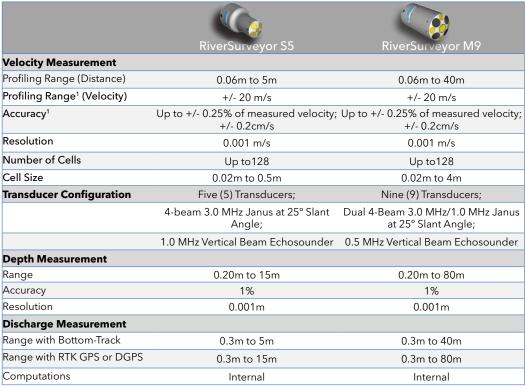
Ready to go where you are, these rugged bags are outfitted with shoulder straps and offer the perfect storage protection for the HydroBoard II.



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.)



Contact SonTek for trimaran solutions to fit special applications.



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: -20° to 70° C

Power Communications Module

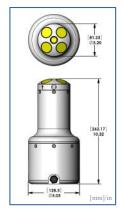
- Batteries
 - Type: Standard AA batteries⁵
 - Average duration: 8 hours of continuous operation (6 hours with RTK GPS enabled)
- GPS Options
 - SBAS GPS Horizontal Accuracy²: <1.0m
 - RTK GPS Horizontal Accuracy²: <0.02m; Vertical Accuracy < 0.04m^{2,3}

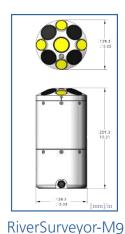
Range (Std.; 10 dBm)⁴ Range (High; 22dBm)⁴

400 m

• Base to Rover 1000 m 3000 m · PC to Rover 450 m 1500 m • Bridge to Rover

200 m





RiverSurveyor-S5

- Weight in Air: 1.1 kg (2.5 lb)
- Weight in Water: -0.3 kg (-0.7 lb)
- Weight in Air: 2.3 kg (5.0 lb) Weight in Water: -0.6 kg (-1.3 lb)
- Please contact SonTek for accuracies better than 1%, or velocities > 10 m/s.

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

 *Requires absolute RTK solution. Only available with HydroSurveyor.

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

 *Standard AA batteries are defined as alkaline or NiMH rechargeables, with a diameter up to 14 Servers.
- up to 14.5mm.



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