



Argonaut-SW Frequently Asked Questions

What does “SW” stand for?

“SW” is an acronym for “Shallow Water”. Although this is a relative term, in this case, we are referring to water from 0.5 to 16 ft (0.15 to 5m) deep.

I’m familiar with some of the other SonTek Argonaut products, what is different about the SW?

The electronics architecture of the Argonaut-SW is very similar to the other Argonaut products, and the data output follows the same format as the SL and XR. Thus many of the basic commands and settings are the same and the SW is fully supported by the *ViewArgonaut* software package. The product packaging is a bit different. Because the SW is intended for shallow water applications in channels, the physical design is low profile and the housing is a rugged black polycarbonate plastic. Another primary difference is that the SW uses a new and smaller wet-mateable 8-pin connector for real time output and power.

What is the intended application?

This instrument is intended to be bottom-mounted, looking up vertically through the water column for most applications. This could be in a canal, natural stream, culvert, or pipe. An important consideration in the design of the SW was that it would be a device capable of calculating and outputting “discharge” values (flow rates). That is, in addition to measuring water velocity and level, it could also calculate and report the channel flow. This can be accomplished in several ways, including inputting the cross sectional area into the SW, using theoretical equations for flow calculations, or inputting an empirically derived “index-velocity” relation.

What is the SW actually measuring?

The SW has three acoustic beams. When mounted properly on the bottom, one of these beams points straight up, and the other two point up/down stream at a 45-degree angle. The upward-looking beam measures the water level only, while the two 45 degree beams measure the water velocity via the Doppler method in 2D. This level and velocity information is then used to compute the flow, mean-velocity, and channel area.

Where in the channel is the SW measuring the water velocity?

When mounted properly along the axis of the channel with one beam pointed upstream and one downstream, the SW will measure the average velocity from an imaginary layer about 0.4 ft (0.12 m) above the transducer head, all the way to the surface. This ability to measure water velocity all the way to the water's surface is a key technical innovation of the SW. The system first uses the vertical beam to measure the distance to the water surface. The SW will then automatically compute the velocity cell end based on this measured distance. Thus, as the water level changes, the velocity measurement will automatically adjust to always measure to the surface no matter how frequently or rapidly it changes.

Can the Argonaut-SW profile the currents?

Yes. An optional feature will enable the SW to report up to five additional water velocity cells. The size and position of these cells are user-selectable. This is in addition to the single dynamic cell mentioned above.

What kind of pipes can the SW be used in?

The SW contains flow algorithms for circular or elliptical pipes of 1 ft (0.3 m) diameter and larger; however, for better results we recommend that it only be used in pipes of 18 inches (0.5 m) in diameter or larger. At present, the SW is not suitable for pressurized pipes.

What is the relationship between the clarity of the water and the Argonaut-SW's ability to measure water velocity?

Doppler sonar instruments such as the Argonaut-SW actually measure the movement of particles in the water, as opposed to measuring the water movement itself. This carries the assumption that the movement of the particles in the water is representative of the movement of the water itself. This actually turns out to be a very safe assumption that we have built our business on. So if you have a body of water where no particles are present, the physics is such that Doppler current meters will not work. Thankfully, most natural environments almost always have something suspended other than just water molecules (even if just tiny air bubbles).

What makes the SonTek Doppler system different from most other manufacturers who service the process control and irrigation customers is the sensitivity level. SonTek's technology is excellent at deciphering reflected acoustic energy from the background noise and that even a small amount of particles in the water is usually good enough for most measurements. Please keep in mind that SonTek instruments evolved from high-end laboratory and oceanographic instrumentation, so we are quite experienced in these environments.

Often times the reflective "scatterers" are either microscopic or even transparent organisms. Thus, the visual clarity (either observed or measured optically) of the water typically has no bearing on how well a Doppler will work. If you have any questions about whether or not the SW will work in your environment, please contact a SonTek representative.

Can I use the SW as a side-looking device?

This is possible, however, you are then limited to using it strictly as a velocity-indexing device. This is because in the present configuration, a side-mounted SW the otherwise vertical beam becomes useless for detecting the water level. You then must use an external stage device to get the level. For these applications, you might want to also consider an Argonaut-SL with a vertical beam.

Should I use an Argonaut-SL (Side-Looking) or an Argonaut-SW for my application?

The Argonaut-SL “Side-Looking” have become increasingly popular in recent years because they are so easy to install and maintain. Shorter cable runs, lower risk of loss/or burial, and lower installation costs are just some of the reasons SLs are preferred in many instances. Because they are fixed mounted on the side of a channel, generally, a side looking device should be installed such that its location is consistently at 30-70% of the maximum water level for optimal flow performance.

Here are some instances where an SW should be considered in place of an SL.

- *Large variations in water level:* If the water level falls near or below the level of at which the SL is installed, then the device cannot measure properly. Thus, while the SL can work fine in small channels even down to 1.5 ft (0.5 m) or so, it is better suited for sites that do not typically show large variations in water level.
- *Stratified Flow:* The SL measures in a sampling volume that spans through a horizontal layer. For calculating flow, it is assumed that the water velocity in this layer is representative of the channel velocity. This works exceptionally well for sites where an index-velocity will be performed and the SL can even detect reversing flow. However, since it measures in only one location along the vertical cross-section, theoretical flow calculations may not hold up if the flow is highly stratified.
- *Complex velocity profile:* In certain complex flow regimes the vertically integrated velocity measurement of the SW provides more information about the velocity distribution within the channel and can therefore produce a more robust theoretical flow estimate. The SW also works equally well at sites where an index-velocity calibration will be performed. The down side of bottom-mounting is that it can involve a more complex installation, longer cables, and the risk of the unit being covered by debris or buried by silt.

In many cases, both the SL and SW are perfectly viable solutions for the same measurement location. Your decision should then be based on the ease of installation, ongoing maintenance, how variable the water level is, and the flow stratification. If you have further questions about this, we recommend that you contact SonTek directly and we would be happy to help you.

How does the SW differ from the Argonaut-XR?

Basically the XR comes in a larger housing to accommodate a compass/tilt sensor, pressure sensor, and a third, orthogonal acoustic beam for velocity measurement. The XR does not have a vertical acoustic beam and instead uses a non-vented pressure sensor for water level, so its use as an accurate flow device is limited by its ability to accurately measure water level.

Because the XR measures 3D water velocity (the SW measure 2D), and it has a lower acoustic frequency, is usually preferred for deeper rivers where an existing level device is already installed, or when the application is more research-oriented and a study of the three-dimension fluid dynamics is of importance.

The XR also includes a compass tilt sensor and is typically installed in environments where either the exact system orientation cannot be controlled, and/or the exact direction of flow is not known or constant. By contrast, the SW is intended for channels where the user can set the system orientation and the exact flow direction is well defined.

Can the SW record data internally and is there an internal battery?

The SW has a 4 MB internal recorder; however, there is no internal battery power. 12-24v power must be supplied externally.

Can I run the SW off of a topside battery and solar panel?

Yes. The power consumption of the SW is a fraction of a watt and it can easily run off such a setup.

What are the output data formats?

The standard Argonaut-SW supports RS-232 or SDI-12 data output. For a complete description of the output parameters, please contact SonTek directly.

Can the SW measure reversing flow?

Yes. When mounted properly with one beam pointing upstream and the other beam pointed downstream, the SW will be able to detect when the flow changes directions. In addition, by enabling the multi-cell option, the user will also be able to collect incremental velocity data to show the location of the transition.

Can I output analog data such as a 4-20 mA current loop?

Yes. To do this you need to order a special output module from SonTek which enables the analog output. The limitation is that for every parameter you want to output, an additional module is required. Therefore, we highly recommend the use of either the RS232 or SDI-12 outputs if possible.

How long can the cable be?

The rule of thumb normally applied is up to 100 m (328 ft) for standard RS 232 or SDI-12.

In addition to water velocity, Level and Flow, what else can the SW measure?

A temperature sensor is also standard part of the package. At present, the SW is not offered with a pressure sensor option, or any external interface option.

How do I mount the SW?

The SW has two through holes on the housing, which can then be attached via machine screws (supplied) to a base mounting plate, which comes standard with the unit. The base mounting plate has four pre-drilled holes in the corners, or you can modify the plate yourself as need be.