

FLOWPACK FREQUENTLY ASKED QUESTIONS (FAQS)

SonTek/YSI is pleased to announce the release of FlowPack! This user-friendly software will easily generate Velocity-Index (VI) discharge ratings in a presentation quality format and simplify the storage of flow, velocity and stage measurements into a single program. Here are some of the key ways you will enjoy the most value out of FlowPack:

- FlowPack will *turn literally hours of work, into minutes.*
- Customers will no longer worry about *developing VI discharge ratings from scratch. (A BIG benefit!)*
- FlowPack is a simplified and robust solution for customers who have little or *no previous experience developing and analyzing complex VI discharge ratings.*
- Customers *are empowered to become VI pros* from the moment they use FlowPack.
- Comprehensive analysis reports and documentation help customers *make better, more informed decisions*, ultimately saving time and money.
- And finally, our customers can provide *better service to THEIR public and private customers* by giving them accurate discharge information faster, and in easy to read reports.

The best way to test out FlowPack's benefits first-hand is to download the 14-day free trial version available online. Most questions can be answered by exploring the FlowPack self-tutorial. However, here are some of the questions we think might help get customers started!



FlowPack was developed by SonTek in association with Prof. Art Schmidt, Ph. D., PE from the University of Illinois. The Velocity-Indexing equations are in accordance with present USGS/ISO standards.

What instruments can be used with FlowPack?

Data can be used from almost any type of velocity and stage sensor (or datalogger). FlowPack has a very flexible data import wizard giving you the ability to input ASCII data and identify both columns and units.

When I buy a copy of FlowPack what do I get?

You will receive one (1) licensed version of the most current FlowPack software. This will entitle you to support of the product and upgrades of this version. The license allows you to use FlowPack on a single PC. If you need to move the software to another PC you will need to contact SonTek directly to perform this action.

What data do I need to use FlowPack?

FlowPack calculates both the "stage-area" rating and the "mean-velocity" index rating. To do this the following data is required:

1. "Continuous" recording index-velocity and water-level data (time-series data). This data is typically measured using Argonaut SL/SW units.
2. "Calibration" discharge measurements. For example, data collected using the RiverSurveyor ADP, Flowtracker, an/or RiverSurveyor Stationary method.
3. Channel cross-section information in "one" of the following three forms:
 - Stage-area equation,
 - Assumed channel geometry (natural channel, trapezoid, circular, elliptical),
 - Surveyed data – depth vs. width (relative to the stage datum).

How do I get my data into FlowPack?

FlowPack is designed to be used with data from most continuous recording velocity and stage sensors (or dataloggers) and discharge measurement devices.

Two data formats can be used to input data into FlowPack:

- SonTek “FPX” format – Used with SonTek instruments (Argonaut SL/SW, Flowtracker ADV, River Surveyor moving and stationary methods). Data is first quality reviewed in the appropriate SonTek software and then exported in the “FPX” format. SonTek customers wanting to use the FPX format need to download the latest versions of the RiverSurveyor (moving and stationary), FlowTracker, and ViewArgonaut software from the SonTek website.
- ASCII-type data (*.txt, *.csv, “T”-files, etc..) – Used for a variety of sensors other than SonTek devices. FlowPack has a very flexible ASCII input wizard capable of identifying data variables by column and then saving a unique format “template” to simplify future data input.

How much data can be input into FlowPack?

Unlimited. FlowPack will automatically append new data that is brought into the program.

What results are provided when I use FlowPack?

FlowPack provides 3 reports with each rating equation analysis. Each report can be printed separately. The rating equations (area and “mean-velocity”) can be downloaded directly to the an Argonaut SL/SW.

1. Discharge Rating Report – Includes velocity and stage equations and charts, goodness-of-fit statistics, and calibration range, date and time.
2. Residual Plot Report – Includes three plots: Residuals vs. stage, residuals vs. measured velocity, and residuals vs. time.
3. Tabular Data report – includes all calibration data and residuals in tabular form.

Can the section geometry handle more than twenty data points?

Yes. The stage-area rating can be developed from ASCII-type data using an infinite number of data points. Upon completion of the analysis, a SonTek “GEO” file (for use with the Argonaut SL/SW) can be created from these data and downloaded to the Argonaut SL/SW. In this case, FlowPack will reduce the file down to 20 data points.

How does FlowPack work?

FlowPack first takes the input cross-section geometry and builds a relation between stage and area for the site. Using the “Stage-Area” data, for any given stage, the total flow area may now be determined. Next, the data from the velocity and stage sensor is loaded.

The next step is to load data from the discharge measurement device. FlowPack takes each of these measurements, and matching the times for the velocity and stage meter data and the discharge data, builds a table of discharge, velocity and stage data.

Using this table, FlowPack then performs an analysis of the data to find the “best-fit” for the relationship between the mean velocity (V_{mean}) and the velocity measured by the velocity and stage meter (V_{index}). This Velocity-Index equation can then be loaded into an Argonaut-SL or data logger installed at the site. This permits the output of

accurate flow data from the site in real-time.

Note: FlowPack automatically compares the range of the continuously measured time-series data to the range of calibration data used in the rating to ensure the calibration data covers the range of continuously measured conditions. It is important to calibrate over the entire range of continuously measured values to ensure the reliability and predictability of the rating equation.

What is the “Quality Score” provided in the “Discharge Rating Report”?

The Quality Score is a numeric value that ranges between 0 and 100 and provides a summary of several factors that might affect the rating analysis. A score near zero (0) indicates that analysis of the data used to develop the rating indicates significant potential problems and more analysis and possibly more measurements are needed to develop a satisfactory rating. A score near one hundred (100) indicates good results from all the factors considered and therefore the resulting rating can be used with confidence.

The quality score is not intended for comparison between sites. Also, for a given site, it is possible that a more complex rating will have a lower quality score (because of fewer degrees of freedom) than a simpler rating, and yet other tests automatically performed by FlowPack result in the complex rating being selected as the “Recommended Method”. This particular situation reflects that the number of observations is insufficient to make a clear distinction between the two rating formats and more data should be collected and used to result in a more robust rating.

What type of VI equations does FlowPack calculate?

Using regression analysis FlowPack calculates the two VI equation forms for each analysis:

$$V_{\text{mean}} = a + b \cdot V_{\text{Index}} \quad (\text{Equation 1})$$

$$V_{\text{mean}} = a + V_{\text{Index}}(b + c \cdot H) \quad (\text{Equation 2})$$

Where,

$$\begin{aligned} V_{\text{mean}} &= \text{Predicted “Mean-Velocity” (length/time),} \\ V_{\text{Index}} &= \text{Measured “Index-Velocity” (length/time),} \\ H &= \text{Stage (length)} \end{aligned}$$

$$a = \text{constant, } b = V_{\text{Index}} \text{ constant, } c = \text{stage constant}$$

Both of these equations are based on USGS/ISO standards and are compatible with flow calculation methods in the Argonaut SL/SW. The results of your complete analysis can be input into Argonaut SL/SW units.