Flow Rate/Temperature Sensor (PS-2130)
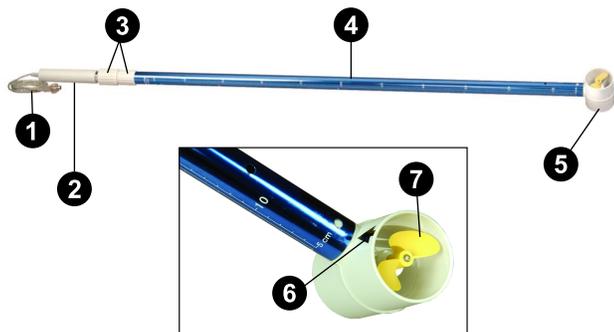
1. PASPORT Sensor Plug
2. Handle
3. Ribbed Sections
4. Depth Scales (cm and in)
5. Impeller Housing
6. Flow Direction Arrow
7. Propeller

Included Item

- Flow Rate/Temperature Sensor

Required Items

- PASCO Interface
- SPARKvue

Introduction

The PS-2130 Flow Rate/Temperature Sensor measures the flow rate and temperature of moving water. The impeller housing contains a propeller mounted on a low friction brass shaft. Magnets on the propeller revolve as the propeller turns, and the revolutions are recorded by a Hall effect sensing element. The Hall effect sensing element minimizes artifact pulses that sometimes occur with a magnetic reed switch. The propeller makes 4.31 revolutions for each linear foot of water that passes, so 8.62 pulses are produced for each linear foot of water passing through the housing.

The Flow Rate Sensor transforms the kinetic energy of moving water into electric pulses, which are in turn converted into velocity measurements and viewed in SPARKvue. The Flow Rate Sensor measures in feet per second (ft/s) or meters per second (m/s). The built-in temperature sensor measures temperature at the same point that the flow rate is measured.

The tube of the Flow Rate/Temperature Sensor can be extended to a total length of 7 feet (2.13 m). The outer part of the tube has depth markings in inches and centimeters. The impeller housing has an arrow to indicate the direction to hold the sensor so that the water flow can be measured.

The sensor is designed to work with a PASPORT-compatible interface and the SPARKvue data acquisition software.

Get the software

You can use the sensor with SPARKvue software.

SPARKvue is available as a free app for Chromebook, iOS, and Android devices. We offer a free trial of SPARKvue for Windows and Mac. To get the software, go to pasco.com/downloads or search for **SPARKvue** in your device's app store.

If you have installed the software previously, check that you have the latest update by going to **Main Menu** 🔲 and selecting **Check for Updates**

> **NOTE:** If you are in a controlled laboratory environment with access to Windows or Mac devices, you can use PASCO Capstone instead of SPARKvue.

Sensor Operation

Connect the sensor plug to one of the PASPORT input ports of a PASCO PASPORT-compatible interface, as shown below.
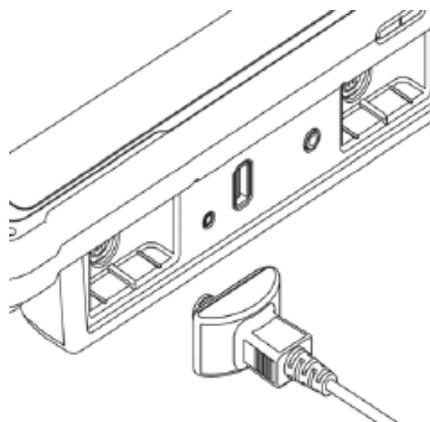
> **NOTE:** If more distance is needed between the sensor and the interface, plug the sensor into a Sensor Extension Cable (PS-2500) and then plug the cable into the interface.

Safety and Usage Advice

Safety Tips

- When using the Flow Rate Sensor outdoors, follow standard water and outdoor safety precautions.
- The Flow Rate Sensor is recommended for use in streams and lakes; avoid turbulent waters or rivers.
- Always be aware of potential hazardous conditions in the area. Do not use the sensor in high winds, adverse weather, avalanche conditions, near potential landslides or mudslides, or when standing on unstable ground. Survey the area before using the sensor.
- When inserting the Flow Rate Sensor into water, stand on stable ground or in shallow water.

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- Keep the Flow Rate Sensor away from water that has a lot of debris or potential obstacles.
- If the propeller or sensor becomes lodged in a high velocity current or near a drop-off, do not attempt to remove the sensor. In high risk situations, only allow a water patrol officer or public safety official to remove the sensor.

Usage Tips

- Always hold the pole vertically and keep the propeller in the direction of the current flow, facing upstream.
- When taking a reading, keep the handle steady.
- If the flow rate reading suddenly falls to zero mid-stream, check the propeller for debris. When sand or other particles become lodged in the propeller, the propeller stops turning and the reading drops to zero.
- Erratic readings may occur with turbulent water flow. If measuring flow from a stream or creek, keep the housing in a stable position, away from rocks and turbulence. If measuring in low depths, the housing can be set on the stream bed for a more stable reading.
- Do not connect the propeller housing to pipes or other tubing.
- If using the Flow Rate Sensor from a boat, tether the boat so the boat does not move during measurement, as boat movements may interfere with an accurate flow rate measurement.
- Calibration of the Flow Rate/Temperature Sensor is not required.

Using SPARKvue Software

- Connect the sensor plug to a PASPORT input port on a SPARKvue-compatible interface and start the software.
- Select **Sensor Data**. The sensor should automatically be displayed in the list of **Connected Devices**.
- From the "**Select Measurements for Templates**" section, select the quantity or quantities you will be recording.
- Select "Graph" from the **Templates** column at right to enter the Experiment Screen. The graph should automatically be set up with the desired quantity or quantities on the y-axis or axes and time on the x-axis; if not, switch to the appropriate quantities by clicking the label on each axis and selecting the desired quantity from the list.
- When you are ready, press **Start** 🟢 to begin collecting data. Once you are finished, press **Stop** 🟥 to end data recording.

Extending the Sensor Tube

Between the handle and the sensor tube are two ribbed sections. One of them is slightly longer and larger in diameter than the other. To extend the tube, hold the smaller ribbed section firmly with one hand, then turn the other ribbed section counterclockwise to loosen it. When the ribbed section is loose, pull the handle to extend the tube to the desired length. Turn the larger ribbed section clockise to tighten it and hold the tube in place.

Storage

When not using the Flow Rate Sensor, store the sensor in a dry environment to avoid corrosion. If necessary, periodically lubricate the propeller with silicone oil.

Suggested Activities

Activity 1: Mapping Stream Flow or Temperature Along a Stream

- Turn on your device's GPS and create a map display.
- Stop along stream to measure flow or temperature.

> **NOTE:** This activity requires all data to be in one run. If, during this process, your device disconnects or goes to sleep, export your data and combine the runs in a spreadsheet file.

- Once you are finished, save your data as a .txt file on your computer.
- In a web browser, navigate to www.arcgis.com and choose the "Map" tab at the top of the page.
- Drag your .txt file onto the map and choose the flow or temperature data to be displayed.

For help on this activity, go to pasco.com/resources/esri-and-gis.

Activity 2: Measuring the Flow Rate and Temperature Across a Stream

- Connect the sensor plug to the interface and turn on the interface.
- Hold the Flow Rate/Temperature Sensor impeller housing about two inches below the surface of a moving stream of water. Hold the sensor steady.
- Start recording data.
- On a piece of paper, draw a diagram of the stream and shoreline. On this diagram, mark the point where you took the measurement. Next to the point, record the flow rate and temperature readings.
- Repeat the data recording process at several depths and locations in the stream.
- Compare the flow rate and temperature at the different depths and locations.

Activity 3: Using the Flow Rate Sensor to Estimate Total Water Output

- With a measuring tape, measure the width of the stream of water (shore-to-shore) in meters; record this width.
- With the Flow Sensor's depth measurement scale, take depth measurements in meters at equally spaced intervals across the stream. For each measurement, submerge the impeller housing until it rests on the stream bed. Keep the sensor vertical. Record each depth.
- Connect the sensor plug to the interface and take a flow rate measurement in meters/second for each interval. Take a separate data run for each measurement.

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- Calculate the approximate cross-sectional area of the stream. Multiply each interval width by the corresponding depth to determine the area of each interval. Add the areas of all intervals together to obtain the approximate total cross-sectional area of the stream.

- Examine the data to find the average flow rate for each interface. Average these flow rates together to get the *overall* flow rate.

- Determine the **total water output** by multiplying the average flow rate by the total cross-sectional area of the stream.
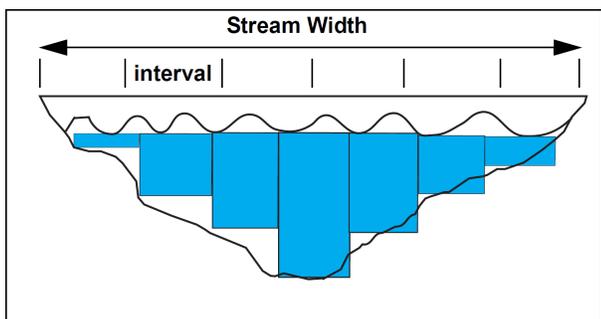
Specifications and accessories

Visit the product page at pasco.com/product/PS-2130 to view the specifications and explore accessories. You can also download support documents from the product page.

Software help

The SPARKvue Help provides additional information on how to use this product with the software. You can access the help within the software or online.

Software: Main Menu ▤ > Help

Online: help.pasco.com/sparkvue

Technical Support

Need more help? Our knowledgeable and friendly Technical Support staff is ready to answer your questions or walk you through any issues.

▢ Chat	pasco.com
📞 Phone	1-800-772-8700 x1004 (USA)
	+1 916 462 8384 (outside USA)
✉ Email	support@pasco.com

Regulatory Information

Limited Warranty
For a description of the product warranty, see the Warranty and Returns page at www.pasco.com/legal.

Product end-of-life disposal
This electronic product is subject to disposal and recycling regulations that vary by country and region.
It is your responsibility to recycle your electronic equipment per your local environmental laws and regulations to ensure that it will be recycled in a manner that protects human health and the environment.
To find out where you can drop off your waste equipment for recycling, please contact your local waste recycle or disposal service, or the place where you purchased the product.
The European Union WEEE (Waste Electronic and Electrical Equipment) symbol on the product or its packaging indicates that this product must not be disposed of in a standard waste container.