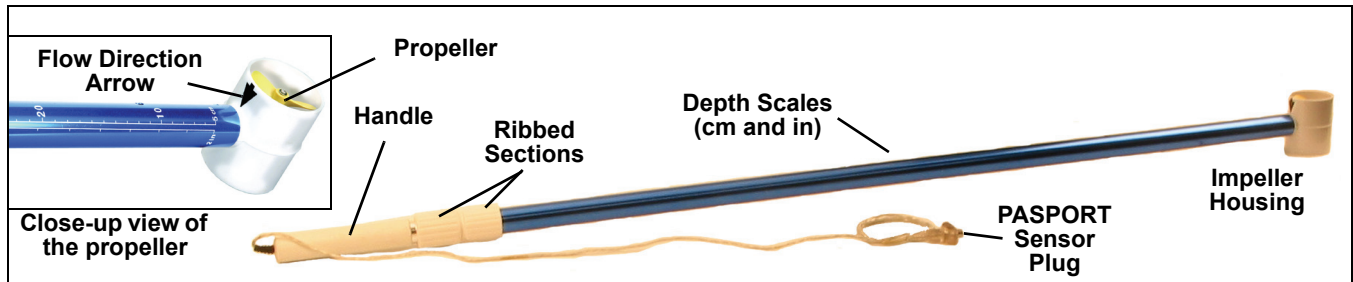


# Flow Rate/Temperature Sensor

PS-2130



<b>Included Item</b>
Flow Rate/Temperature Sensor

<b>Required Items*</b>
PASCO Interface
PASCO Data Acquisition Software

\*See the PASCO catalog or the PASCO web site at [www.pasco.com](http://www.pasco.com) for more information.

## 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 that are converted into velocity measurements and viewed in the data acquisition software. 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 as the flow rate is measured.

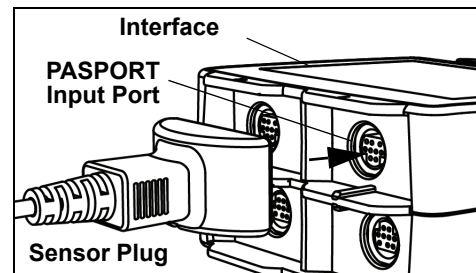
The tube of the Flow Rate/Temperature Sensor can be extended to a total length of 7 feet (2.13 m). The outer part of the tube has depth markings in inches and centimeters. The

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 (such as the PS-2002 Xplorer GLX hand-held data-logger) and PASCO data acquisition software.

## Sensor Operation

- Connect the sensor plug to one of the PASPORT input ports of a PASCO PASPORT-compatible interface.



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 CAUTION!


**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 or avalanche conditions, near potential land or mudslides, or when standing on unstable ground. Before using the sensor, survey the area. When inserting the Flow Rate Sensor into water, stand on stable ground or in shallow water. Keep the Flow Rate Sensor away from water that has lots 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.


- 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 such that the boat does not move during measurements. Boat movement may interfere with an accurate flow rate measurement.

## Making Measurements

### Using SPARKvue Software

- Connect the sensor plug to a PASPORT input port on a SPARKvue-compatible interface and start the software. The sensor parameter screen opens and shows the list of measurements for the sensor.
- In the sensor parameter screen, touch a measurement, and then touch ‘Show’ to open a graph display of the measurement.
- Touch “Start”(  ) to begin recording data.

### Using the Xplorer GLX

- Turn on the Xplorer GLX and connect the sensor plug to a port on the top. A Graph display of Flow Rate versus Time opens automatically.
- Press the **Start/Stop** key (  ) to begin recording data. Press the same key again to stop recording.

### Calibration Information

Calibration of the Flow Rate/Temperature Sensor is not needed.

### More Information

For more information about collecting, recording, displaying and analyzing data, refer to the User’s Guide or Online Help System for the data acquisition software.

## Specifications

Item	Value
<b>Ranges:</b>	<b>Flow Rate: 0.3 to 13 ft/s</b> <b>Temperature: -3° to 42°C</b>
<b>Accuracy:</b>	<b>0.1 ft/s</b>
<b>Pulse Frequency:</b>	<b>8.62 per linear foot</b>
<b>Unit Options:</b>	<b>feet/second, meters/second, total pulses</b>
<b>Probe Length:</b>	<b>1 meter to 2.13 m</b>
<b>Minimum Depth:</b>	<b>1.5 in (3.8 cm)</b>

## 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. To extend the tube, hold the smaller ribbed section firmly with one hand, and turn the other ribbed section counter-clockwise (left-to-right) 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 clockwise (right-to-left) to tighten it and hold the tube in place.

## Maintenance

### 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 Activity: Measuring the Flow Rate and Temperature in a Stream

- Connect the sensor plug to the interface and turn on the interface.
- Place 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 the stream 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 as several depths and locations in the stream of water.
- Compare the flow rate and temperature at the different depths and locations.

## Using the Flow Rate Sensor to Estimate Total Water Output

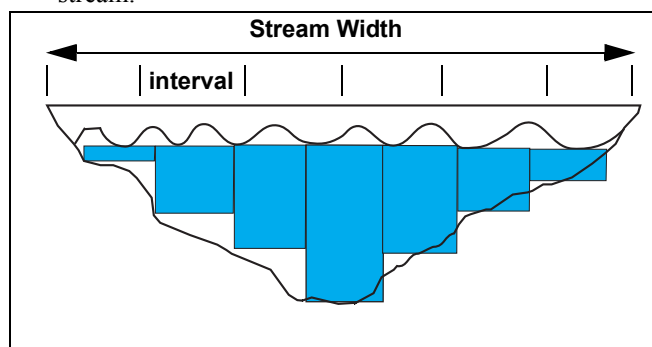
- With a measuring tape, measure the width of the stream of water (shore-to-shore) and record the width in meters.
- With the Flow Sensor’s depth measurement scale, take depth measurements in meters at equally spaced inter-

vals 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.

### Estimating Total Water Output

- Calculate the approximate cross-sectional area of the stream. Multiply each interval width by each depth you measured to determine the area for each interval. Add the areas for each interface together to object the approximate total cross-sectional area of the stream.
- Examine the data to find the average flow rate for each interface. Average the flow rates recorded for each of the intervals to get an overall flow rate.
- Determine the total water output by multiplying the *average flow rate* by the *total cross-sectional area* of the stream.



### More Information

For the latest information about the Flow Rate/Temperature Sensor, visit [www.pasco.com](http://www.pasco.com) and enter “PS-2130” in the Search window.

## Technical Support

For assistance with any PASCO product, contact PASCO at:

Address: PASCO scientific  
10101 Foothills Blvd.  
Roseville, CA 95747-7100

Phone: +1 916-462-8384 (worldwide)  
877-373-0300 (U.S.)

E-mail: [support@pasco.com](mailto:support@pasco.com)

Web [www.pasco.com](http://www.pasco.com)

**Limited Warranty** For a description of the product warranty, see the PASCO catalog. **Copyright** The PASCO scientific *Instruction Sheet* is copyrighted with all rights reserved. Permission is granted to non-profit educational institutions for reproduction of any part of this manual, providing the reproductions are used only in their laboratories and classrooms, and are not sold for profit. Reproduction under any other circumstances, without the written consent of PASCO scientific, is prohibited. **Trademarks** PASCO, PASCO Capstone, PASPORT, SPARK Science Learning System, SPARK SLS, and SPARKvue are trademarks or registered trademarks of PASCO scientific, in the United States and/or in other countries. For more information visit [www.pasco.com/legal](http://www.pasco.com/legal).

### Product End of Life Disposal Instructions:

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/disposal service, or the place where you purchased the product.

The European Union WEEE (Waste Electronic and Electrical Equipment) symbol (to the right) and on the product or its packaging indicates that this product must not be disposed of in a standard waste container.

