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Apr 2024

Flow Rate Sensor

Product Number: ENFLO-A254A

Overview

One of the highlights of any science class is the opportunity to get out of the classroom for field work. The Flow sensor gives students the opportunity to measure the velocity of water in a river, stream or canal and can be used to study the discharge, flow patterns and sediments of these bodies of water.

The Flow Rate sensor can be connected to all types of einstein™ data loggers. It is an ideal tool for experiments in Environmental Science.

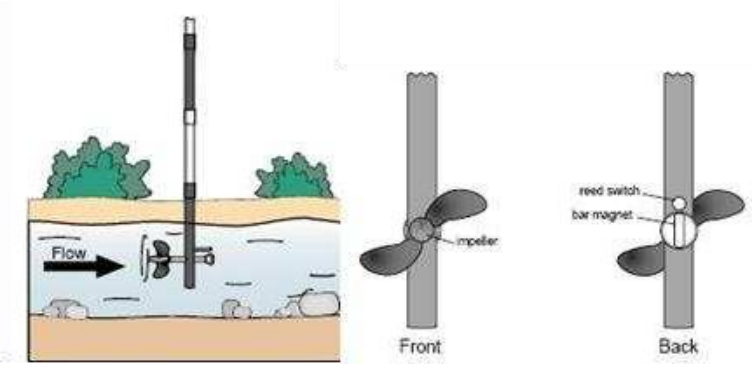
Typical experiments

Environmental Science

- **Measuring water velocity**
- **Calculating the stream flow**
- **Examining the relationship between particle size and stream flow**

How it works

The Flow Rate sensor measures the velocity of flowing water. When placed in running water, the water flows against the blades of the impeller, causing it to turn. The faster the water flows, the faster the impeller turns (see Figure 1). A bar magnet rotating with the impeller triggers a reed switch with each half rotation. The switch sends a pulse to the signal-conditioning box, where the pulses are converted into a voltage that is proportional to the flow rate (see Figure below). The flow rate is measured in m/s.

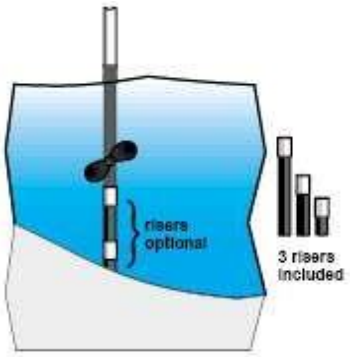


Sensor specification

Range:	0 – 4.0 m/s
Accuracy:	1% of full-scale reading
Resolution (12-bit):	0.0012 m/s
Response Time:	98% of full-scale reading in 5 seconds 100% of full-scale reading in 15 seconds
Operational Temperature Range:	0 to 70 °C

Technical Notes

- The plastic risers that come with the Flow Rate sensor can be very helpful in keeping the sensor rate at the same orientation while taking measurements (see Figure below). When using the risers, simply place the bottom of the sensor rod against the stream bottom. If you are unsure which riser to use, start with the medium riser first and gauge the depth from there.



- When students are selecting sites to take flow measurements, they should choose a site where the stream is not split by rocks, partially submerged obstructions, or sand bars.
- The impeller of the Flow Rate sensor should always be pointing into the flow when measurements are being made. Students need to stand on the shore when taking measurements close to the shore, or stand as far downstream as possible from the sensor when placing the sensor in deeper water.
- Because stream flow is easily affected by weather conditions, it is important that good notes concerning date, time, and weather be taken whenever flow measurements are made.

Safety Tips

- Follow safety guidelines when students are working in or near water. Avoid sites where the water is deep or swift. Water with a flow velocity of 0.5 m/s or greater is considered swift. Water with a depth greater than the top of your knee should be considered deep.
- Never work alone around a stream. Students should always work with others in groups of 2–3. Do not allow students to wander away from their group. It is important to know where student groups are at all times. Students should not change locations without notifying their instructor first.
- Before using a particular site, it is best to survey the area for unseen dangers, such as unstable banks, dangerous obstacles in the stream, or fallen trees. Avoid these possible dangers.
- Always be careful when crossing a stream. If it looks dangerous, select another spot in the stream to cross.
- Students should wear warm, waterproof clothes when working in a stream. If possible, they should bring spare clothes that can be worn after working in the water. Prolonged exposure to cold waters can result in hypothermia, which can be a life-threatening condition.

Calibration

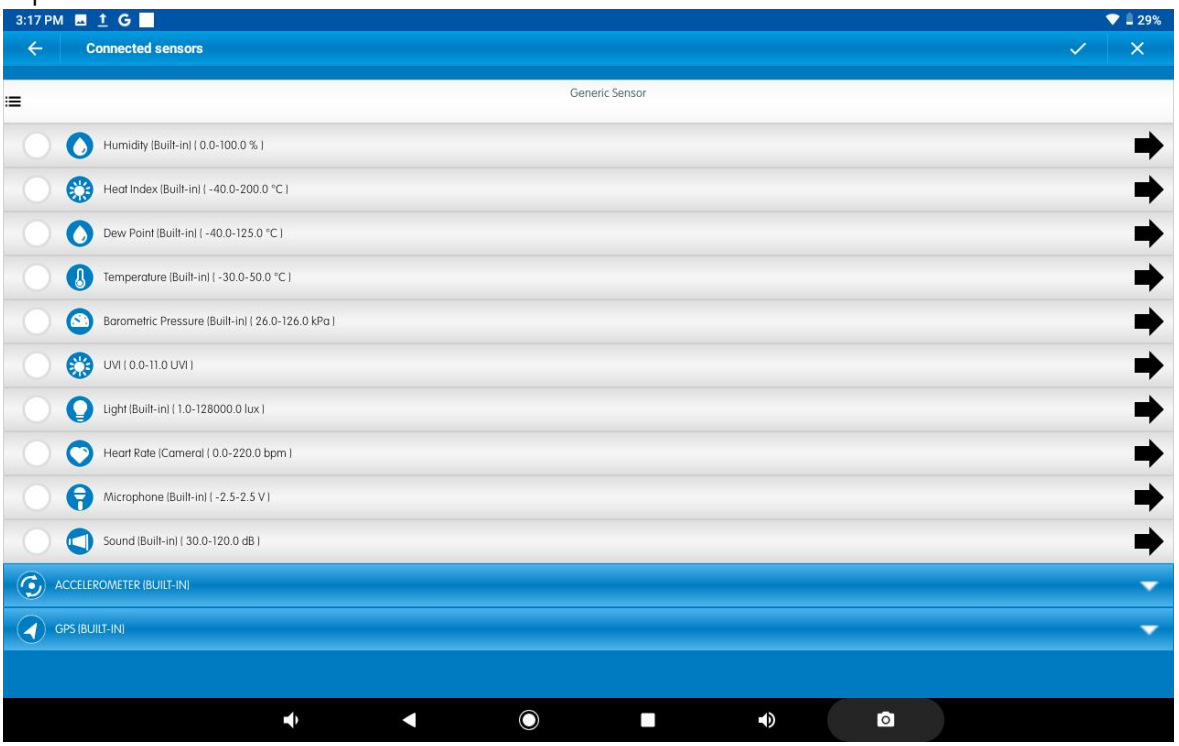
The Flow Rate sensor ships fully calibrated. No further calibration is needed.

Data logging and analysis

MiLAEBx™ Android

1. Take your einstein™ Tablet OR pair your einstein™LabMate with your Android or iOS tablet via Bluetooth
2. Insert the sensor cable into one of the sensor ports

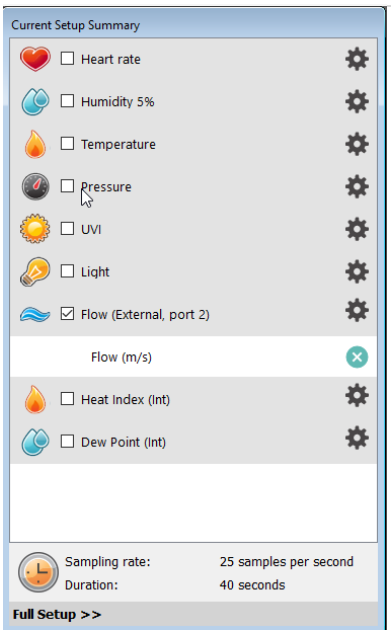
3. Launch MiLAEBx to Lab – Start an Experiment
4. Tap on sensors



5. Tap on Generic Sensor
6. Select Flow rate
7. Tap on V to confirm the selection
8. Set the sample rate and the duration
9. You are ready to start an Experiment

MiLAEBx™ Desktop

1. Pair your einstein™LabMate with your PC, MAC, or Linux machine via Bluetooth, or connect it via the USB cable (found in the einstein™LabMate™ box).
2. Insert the sensor cable into one of the sensor ports
3. Launch MiLAEBx™ and open Lab – Start an Experiment
4. Click on Full setup
5. Select Flow rate on the first column in the Empty text box



6. Click the Run button on the main toolbar to start logging

Troubleshooting

If the sensor isn't automatically recognized by MiLAEBx, please contact Fourier Education's technical support.

Technical support

For technical support, you can contact the Fourier Education's technical support team at: Web: www.einsteinworld.com/support
Email: support@fourieredu.com

Copyright and Warranty

All standard Fourier Systems sensors carry a one (1) year warranty, which states that for a period of twelve months after the date of delivery to you, it will be substantially free from significant defects in materials and workmanship.
This warranty does not cover breakage of the product caused by misuse or abuse.
This warranty does not cover Fourier Systems consumables such as electrodes, batteries, EKG stickers, cuvettes and storage solutions or buffers.