//control.Node Voltage Sensor

PS-3349

Introduction

The //control.Node Voltage Sensor is designed to be used with the PASCO //control.Node (PS-3232). The sensor connects to the sensor port on the //control.Node via an included 6-pin modular cable. The board can receive and measure both analog voltage measurements and digital signals, as well as on and off values from two built-in buttons. The Voltage Sensor can be used with a variety of other equipment for a diverse range of experiments.

Equipment

Included components:

- //control.Node Voltage Sensor
- 18 inch 6-pin male-to-male modular cable
- 20× six inch male-to-female jumper wires

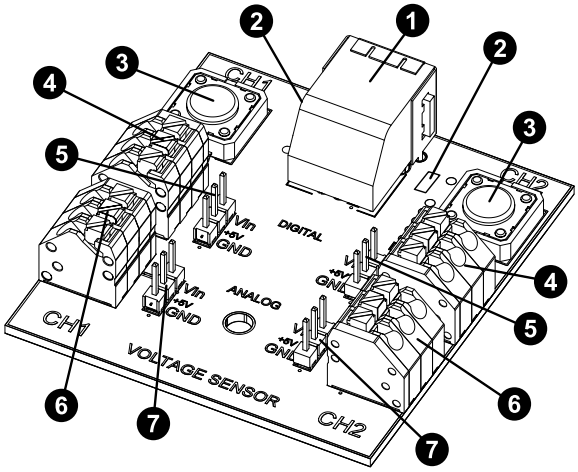
Required equipment:

- //control.Node (PS-3232)
- PASCO Capstone or SPARKvue data collection software

Recommended equipment:

- Photogate Head (ME-9498A)
- 1 W Solar Cell (SE-8847)
- Limit Switch (PS-3351)

Features



1 //control.Node connection port

Insert the 6-pin male-to-male modular cable here to connect the Voltage Sensor to a //control.Node sensor port.

2 Green LEDs

Can be programmed to light up via Blockly blocks.

3 Buttons

Use to send a signal to the program, reporting whether the button is pressed or not pressed.

4 Digital input terminal block

Use to secure wires from an external voltage source to the sensor, letting you measure a digital signal from the source.

5 Digital input pins

Two sets of three pins. **V_{in}** and **GND** are used to measure a digital signal from an external voltage source, and **+5V** supplies a fixed 5 V DC output.

6 Analog input terminal block

Use to secure wires from an external voltage source to the sensor, letting you measure the voltage of the source.

7 Analog inputs pins

Two sets of three pins. **V_{in}** and **GND** are used to measure the voltage of an external source, and **+5V** supplies a fixed 5 V DC output.

Get the software

You can use the sensor with SPARKvue or PASCO Capstone data collection software. If you're not sure which to use, visit pasco.com/products/guides/software-comparison. A browser-based version of SPARKvue is available for free on all platforms. We offer a free trial of SPARKvue and Capstone 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:

SPARKvue: Main Menu > Check for Updates

PASCO Capstone: Help > Check for Updates

Measurements

The //control.Node Voltage Sensor includes three types of measurement: button state, digital input, and analog voltage measurement. Two channels for each are provided, allowing a single Voltage Sensor to record two separate measurements of each type. The measurements from the channels on the left half of the Voltage Sensor board are labeled with a **1** in PASCO Capstone and SPARKvue, whereas the measurements from the channels on the right half of the board are labeled with a **2**. All of these measurements can also be used as inputs for the **value of** block under **Hardware** in Blockly.

The six inputs offered by the sensor are:

- **Button 1:** Reports "1" while the button on the left half of the board is held down and "0" when the button is not held down.
- **Button 2:** Reports "1" while the button on the right half of the board is held down and "0" when the button is not held down.
- **Digital Input 1:** Reports a "1" when the digital input on the left half of the board is receiving an electrical signal and a "0" when no signal is being received.
- **Digital Input 2:** Reports a "1" when the digital input on the right half of the board is receiving an electrical signal and a "0" when no signal is being received.

- **Voltage 1:** Reports the voltage measurement (±15 V) recorded by the analog input on the left half of the board.
- **Voltage 2:** Reports the voltage measurement (±15 V) recorded by the analog input on the right half of the board.

LEDs

In addition to the six measurements, the Voltage Sensor also features a pair of green LEDs, located between the //control.Node connection port and the buttons. These LEDs can be programmed to turn on using Blockly code in SPARKvue or PASCO Capstone. To do so, select the **Hardware** tab, create a **Turn Voltage Sensor LED for [//control.Node] channel [channel] on** block, select a //control.Node and channel, and set the variable value to **true**. Once data collection begins, the LED for the specified channel will turn on and remain lit until it is turned off by another block or the program ends.

Hardware setup

1. Plug one end of the 6-pin male-to-male modular cable to the connection port on the Voltage Sensor, then connect the other end to the sensor port on the //control.Node.
2. If you will be using the analog or digital inputs, connect the component you will be measuring to the appropriate channel on the Voltage Sensor using one of the following methods:
    - Connect the female end of two jumper wires to the $\mathbf{V_{in}}$ and **GND** pins for the channel of your choice. Touch the male end of the $\mathbf{V_{in}}$ jumper wire to the component's high potential side, touch the male end of the **GND** wire to the low potential side, and secure both male ends in place.
    - If the component already includes bare wires, connect these wires to your chosen channel. To do so, press and hold the button aligned with the relevant pin on the terminal block, insert the wire into the adjacent hole, and release the button. Make sure to insert the high potential wire into the $\mathbf{V_{in}}$ hole and the low potential wire into the **GND** hole.

> **NOTE:** If you are measuring voltage from an Arduino component that requires a power supply, use the "**+5V**" pin or terminal block hole to provide power to the component.

Software setup

SPARKvue

1. Start SPARKvue, then connect the //control.Node to the program. For more information on this procedure, see the //control.Node manual or the SPARKvue online help.

> **NOTE:** SPARKvue should automatically detect and recognize the Voltage Sensor. If it does not, make sure both the program and the //control.Node's firmware are updated to the latest version, then repeat Step 1.

2. Check the box for the measurement you want to observe in the **Select measurements for templates** column.
3. Select a template to open the Experiment Screen. The display will automatically be populated with your selected measurement.
4. When you are ready, select **Start** to begin recording data.

PASCO Capstone

1. Start Capstone, then connect the //control.Node to the program. For more information on this procedure, see the //control.Node manual or the Capstone online help.

> **NOTE:** Capstone should automatically detect and recognize the Voltage Sensor. If it does not, make sure both the program and the //control.Node's firmware are updated to the latest version, then repeat Step 1.

2. Create an appropriate display for your desired measurement. Where necessary, click **<Select Measurement>** and choose the desired measurement's name from the list.
3. When you are ready, select **Record** to begin recording data.

Applications

You may use the //control.Node Voltage Sensor for a variety of experiments, including:

- **Measure analog voltages.** Connect one of the analog inputs on the Voltage Sensor to a circuit element to measure the voltage across that element.
- **Power a photogate and detect when the beam is interrupted.** Connect a Photogate Head (ME-9498A) to one of the Voltage Sensor's digital inputs, using the **+5V** pin to power the photogate. Use Capstone or SPARKvue to observe when the digital signal changes from 0 to 1, indicating that the photogate's infrared beam is blocked.
- **Detect when a limit switch has been activated.** Connect the terminals of a limit switch, such as the PASCO Limit Switch (PS-3351), to the $\mathbf{V_{in}}$ and **GND** pins of one of the digital channels. When the switch is pressed down, the output received by the software will change from 0 to 1, allowing you to detect when a mechanical system reaches its limit.
- **Make your own analog sensor.** Power an external device, such as a potentiometer, using the **+5V** and **GND** pins of one of the analog channels. You can then make measurements of the voltage output from this component using the $\mathbf{V_{in}}$ pin of the same channel.
- **Detect when a button is pushed**. The "Button 1" and "Button 2" measurements in PASCO Capstone or SPARKvue output a value of 1 when the corresponding button is held down and 0 when it is not held down. Create a digits display in the program and begin recording data to monitor the state of the buttons in real time.
- **Measure voltage of a solar cell.** Connect the terminals of the 1 W Solar Cell (SE-8847) to one of the Voltage Sensor's analog inputs. Use Capstone or SPARKvue to monitor the voltage of the solar cell under a variety of lighting conditions.
- **Program in Blockly.** All of the Voltage Sensor's measurements are available to use in a Blockly program. The green LEDs can be activated in response to a voltage reading.

Software help

The SPARKvue, PASCO Capstone, and chemvue Help provide information on how to use this product with the software. You can access the help from within the software or online.

SPARKvue

Software: Main Menu > Help

Online: help.pasco.com/sparkvue

PASCO Capstone

Software: Help > PASCO Capstone Help

Online: help.pasco.com/capstone

Specifications and accessories

Visit the product page at pasco.com/product/PS-3349 to view the specifications and explore accessories. You can also download experiment files and support documents from the product page.

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

Limited warranty

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

Copyright

Trademarks

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.

CE statement

This device has been tested and found to comply with the essential requirements and other relevant provisions of the applicable EU Directives.

FCC statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.