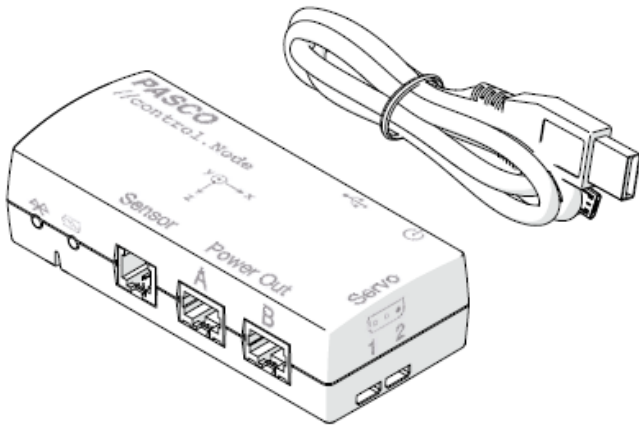# //control.Node (PS-3232)

What's Included

- //control.Node
- USB cable

Accessories

The following accessories are designed for use with the //control.Node:

- High Speed Stepper Motor (PS-2976)
- Low Speed Stepper Motor (PS-2978)
- Power Output Module (PS-3324)
- Greenhouse Sensor (PS-3322)
- PASCObot Body (PS-3318)
- PASCObot Range Finder (PS-3321)
- PASCObot Line Follower (PS-3320)
- Servo Motor (SE-2975)
- Continuous Rotation Servo Motor (SE-2977)

Device Features
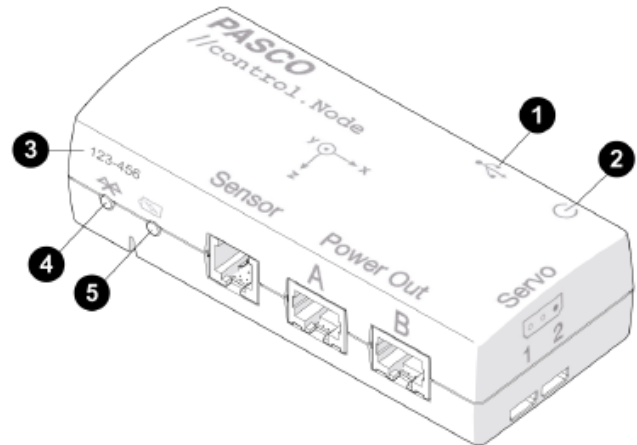
❶ USB Port ⚡
Use this port to charge the battery by connecting to a USB charger, using the included USB cable. You can also use this port to make a wired connection to a computer or Chromebook.

❷ Power Button ⏻
Press and hold for one second to turn the sensor on or off. This button is also used to start execution of uploaded code.

❸ Device ID
Use to identify the sensor when connecting using Bluetooth.

❹ Bluetooth Status Light ❋
Indicates the status of the Bluetooth connection and whether uploaded code is running.

Light	Status
Red, blink	Ready to pair
Green, blink	Paired
Blue, blink	Running uploaded code

❺ Battery Status Light 🔋
Indicates the battery level and charging status.

Light	Status
Red, blink	Low battery level
Green, solid	Fully charged
Yellow, solid	Charging

❻ Mounting holes (on bottom)
Use for mounting the //control.Node to various objects. Accepts #6-32 screws.

Sense and Control Features

The //control.Node outputs are controlled with blocks provided in the Code tool in SPARKvue or PASCO Capstone. Sensors can be used to control devices connected to the outputs using the **value of** block in the Code tool. After opening the Code tool ![icon], select the **Hardware** category to access the blocks.
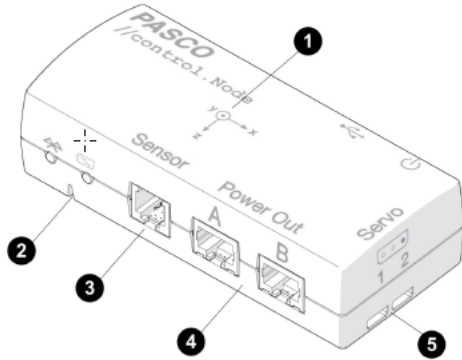

❶ **Accelerometer** ![icon]
Use the accelerometer to measure acceleration along three axes. The label indicates the location of the accelerometer on the //control.Node and the positive direction of each axis.
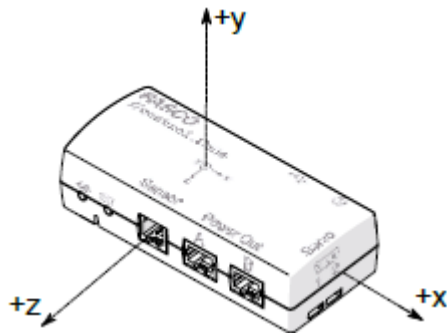
When motionless, the accelerometer measures +9.8 m/s² when pointing *away* from the ground and -9.8 m/s² when pointing *towards* the ground. This is useful for determining the //control.Node's orientation. For example, if the y-axis is pointing away from the ground, the **Acceleration - y** measurement reads 9.8 m/s² and the other axes measure 0.
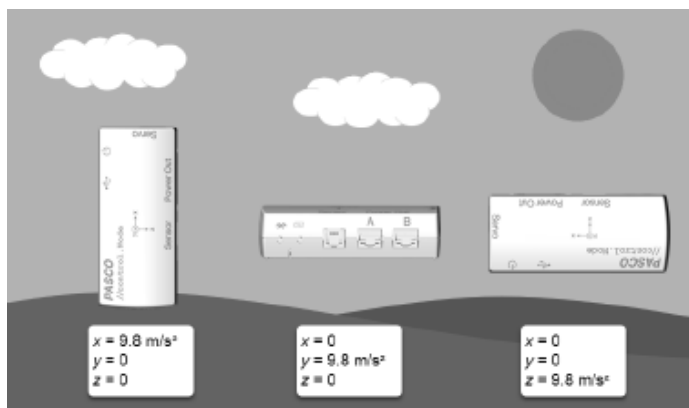
❷ **Speaker**
Use the speaker to output a sound at a specified frequency. Control the speaker frequency using the **set frequency** block.

❸ **Sensor port**
Use this port to connect sensors, including the Greenhouse Sensor (PS-3322), Line Follower (PS-3320), or Range Finder (PS-3321).

> **Note:** It is not possible to set different sample rates for multiple connected sensors. All connected sensors will take data measurements at the same interval.

❹ **Power Out ports**
Use these ports to connect a High Speed Stepper Motor (PS-2976), Low Speed Stepper Motor (PS-2978), Power Output Board (PS-3324), or Grow Light (PS-3347). Control each accessory with a block designed specifically for the accessory.

❺ **Servo ports**
Use these ports to connect a Servo Motor (SE-2975), Continuous Rotation Servo (SE-2977), or other third-party servos. Control servos with the **set servo** block.

> **Important:** The servos must connect with the black wire on the *right* side, as indicated by the dark dot on the label.
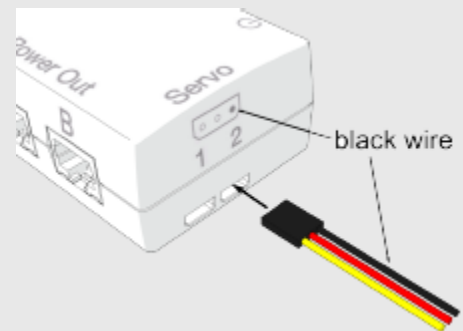
The //control.Node On-board Sensor can measure the servo current. You can use this measurement to detect a resisting force when the servo is trying to maintain a specified position. The **Servo Current** increases in response to resisting the force.

PASCO

Getting Started

Perform the tasks in this section before using this device in the classroom.

Step 1: Charge the battery

Connect the //control.Node USB port ⏚ to a USB charger using the included USB cable. The battery light 🔋 displays yellow while charging and changes to green when fully charged.

Step 2: Get the software

You can use the //control.Node with SPARKvue or PASCO Capstone software. If you're not sure which app to use, visit **pasco.com/products/guides/software-comparison** for help. SPARKvue is available as a free app for Chromebook, iOS, and Android devices. We offer a free trial of SPARKvue and Capstone for Windows and Mac.

Windows and Mac	Chromebook, iOS, and Android
Go to **pasco.com/downloads**.	Search for **SPARKvue** in your device's app store.

If you already have the software, check that you have the latest update installed:

🔲 SPARKvue

Go to the **Main Menu** ☰ then select **Check for Updates**.

☁ PASCO Capstone

In the menu bar, click **Help** then select **Check for updates**.

Step 3: Connect to the software

🔲 SPARKvue

1. Press and hold the power button ⏻ until the lights turn on.
2. Open SPARKvue.
3. Select **Sensor Data** on the Welcome Screen.

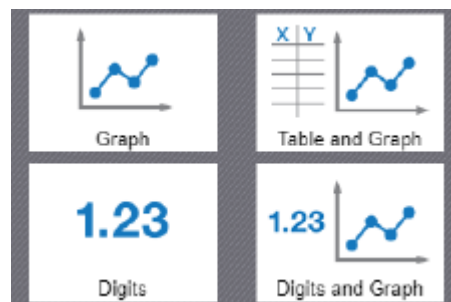4. Select the //control.Node that matches your device's ID.

> ⚠ **Important:** You may be prompted to update the firmware if a new version is available. If so, click **Yes** to update the firmware.

5. Select a template. If you're not sure which to choose, select **Graph**.

☁ PASCO Capstone

1. Press and hold the power button ⏻ until the lights turn on.
2. Open PASCO Capstone.
3. Click **Hardware Setup**.

4. Select the //control.Node that matches your device's ID.

> ⚠ **Important:** You may be prompted to update the firmware if a new version is available. If so, click **Yes** to update the firmware.

5. Click **Hardware Setup** again to close the panel.

Step 4: Create a program

Create a program using Blockly by opening the Code tool 🐱 in the software. You can either build a program from scratch or import a program from the PASCO Code Library available in the code workspace.

To build a new program, select a category in the Blockly toolbox and drag blocks to the workspace. The **Hardware** category contains the sense and control blocks for the //control.Node.

To import a program from the PASCO Code Library:

1. At the top right corner of the Code tool, click the PASCO Code Library icon.
2. Select a category from the list.
3. Select a program to import, then click **OK**.

To run the program, click **Start** 🟢 in SPARKvue or **Record** 🔴 in Capstone.

> ✎ **NOTE:** It is also possible to upload code to the //control.Node, allowing the code to be run without the device being connected by Bluetooth. For information on uploading code to the //control.Node, see the PASCO Capstone and SPARKvue online help.

Additional information on how to use the Code tool and Blockly can be found in the SPARKvue and PASCO Capstone help.

▦ SPARKvue

Software: Go to the **Main Menu** ▤, then select **Help**.

Online: **pasco.com/help/sparkvue**

☁ PASCO Capstone

Software: In the menu bar, click **Help**, then select **PASCO Capstone Help**.

Online: **pasco.com/help/capstone**

Step 5: Download an experiment

Download one of several student-ready activities from the PASCO Experiment library. Experiments include editable student handouts and teacher notes. Go to **pasco.com/freelabs/ps-3232**.

Specifications and Accessories

Visit the product page at **pasco.com/product/PS-3232** to view the specifications and explore accessories. You can also find experiment files and support documents on 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

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.

Battery disposal

Batteries contain chemicals that, if released, may affect the environment and human health.
Batteries should be collected separately for recycling and recycled at a local hazardous material disposal location adhering to your country and local government regulations.
To find out where you can drop off your waste battery for recycling, please contact your local waste disposal service, or the product representative.
The battery used in this product is marked with the European Union symbol for waste batteries to indicate the need for the separate collection and recycling of batteries.

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.

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

PASCO