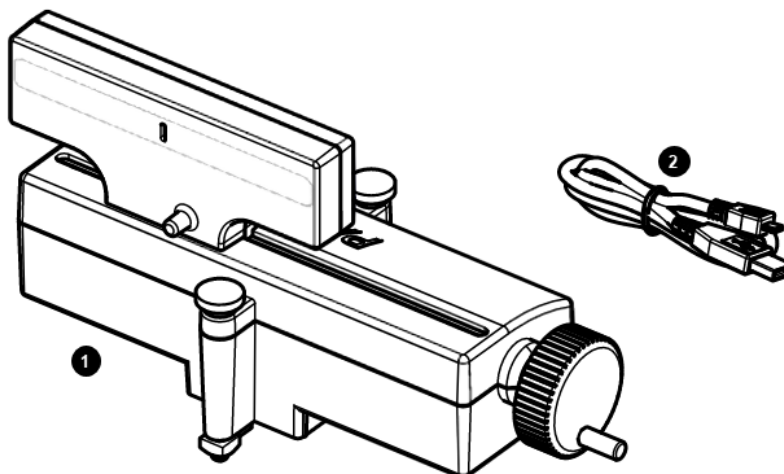


## Wireless Diffraction Scanner

OS-8441



### Included Equipment

1 Wireless Diffraction Scanner

2 Micro USB cable

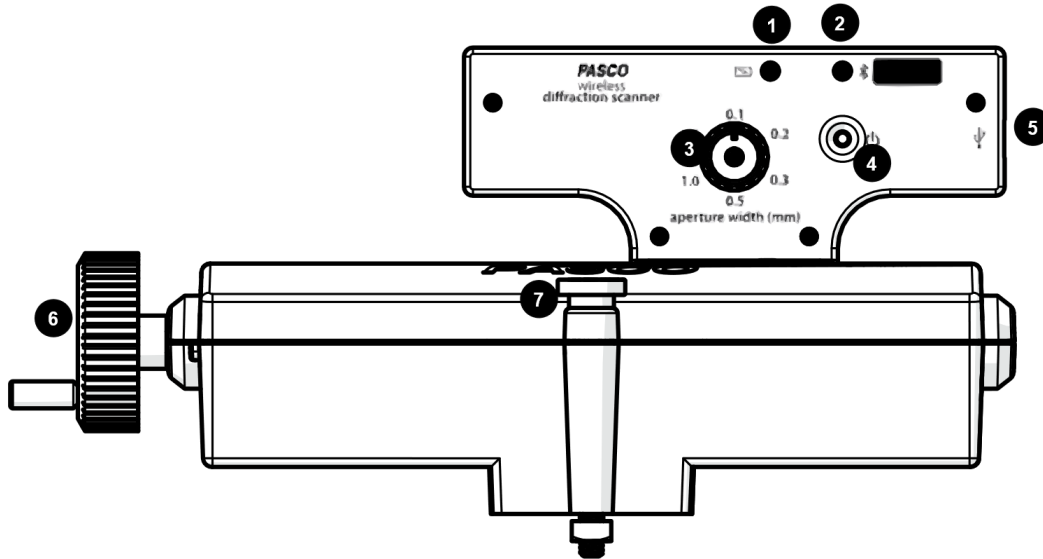
For connecting the accessory to a USB charger or a USB port of a computer.

### Required Equipment

The following table lists the equipment required to perform experiments with the Wireless Diffraction Scanner. Only one of the options provided for each item is required.

Item	Options	Item	Options
Track	OS-8508 1.2 m Optics Track	Laser	OS-8525 Red Diode Laser
	ME-9493 1.2 m Aluminum Dynamics Track <sup>1</sup>		OS-8458 Green Diode Laser
	ME-9779 2.2 m Aluminum Dynamics Track <sup>1</sup>	Diffraction Slits	OS-8442 Diffraction Slits
	ME-6960 PASTrack <sup>1</sup>		OS-8453 Precision Diffraction Slits
		Software	PASCO Capstone SPARKvue

<sup>1</sup> Requires the OS-8472A Dynamics Track Optics Carriages.



## Components

- |  |  |
|--|--|
| <p><b>1 Battery status LED</b><br/>           Red blink Battery needs to be recharged soon.<br/>           Green solid Battery is fully charged.<br/>           Yellow solid Battery is charging.</p> <p><b>2 Bluetooth status LED</b><br/>           Red blink Ready to be paired with software.<br/>           Green blink Paired with software.<br/>           Yellow blink Remotely logging data.</p> <p><b>3 Aperture selection knob</b><br/>           Turn the knob to adjust the aperture width.</p> <p><b>4 Power button</b><br/>           Press and hold to turn the power on or off.</p> | <p><b>5 Micro USB port</b><br/>           For connecting the included USB cable to a charger or USB port of a computer.</p> <p><b>6 Crank</b><br/>           Turn to change the position of the diffraction scanner head.</p> <p><b>7 Thumbscrew</b><br/>           For mounting the Diffraction Scanner to an optics track or an optics carriage.</p> <p><b>8 Micro USB port</b><br/>           For connecting the included USB cable to a charger to charge the battery.</p> |
|--|--|

## Getting Started

Before using the device with students for the first time, perform the following tasks:

1. Charge the battery.
2. Update your PASCO data collection software.
3. Update the firmware.

### To charge the battery

1. Connect the micro USB cable to the micro USB port on the Diffraction Scanner. Connect the other end of the cable to a USB charger or port.

2. Allow the battery to charge for at least three hours. The battery status LED will turn green when fully charged.

Charging automatically stops when the battery is fully charged. The device can remain connected to a power source when fully charged without damaging the battery.

### To update PASCO data collection software


1. Open the PASCO data collection software.
2. The software will display a message if an update is available. Follow the instructions on the screen. If you do not receive a message, the software is up to date.

You can also check for an update by doing the following:



Go to the **Help** menu then click **Check for Updates**.



Select the menu icon  and select **Check for Updates**.

## To update the firmware

The device contains firmware that controls how it functions. It is important to make sure that your device has the latest version of the firmware installed.

1. Connect the device to your software. It is recommended to use a USB connection since this will result in a faster update.
2. The software will prompt you if a firmware update is available. Follow the instructions on the screen if prompted. If you do not receive a prompt, the firmware is up to date.

## Connecting to Software

The device can be connected to software using USB or Bluetooth.

### To connect using USB

1. Connect the device to a computer using the USB cable.
2. Open your PASCO software. The device automatically connects with the software.

### To connect using Bluetooth



1. Press and hold the power button until the battery status LED turns on.
2. Open Capstone and click Hardware Setup.
3. Select the wireless device that matches your device ID.



1. Press and hold the power button until the battery status LED turns on.
2. Open SPARKvue and select Sensor Data.

3. Under Connected Devices, select the wireless device that matches your device ID.

## Experimental Setup

The Diffraction Scanner is designed to be used with a PASCO laser, diffraction slits, and track (see Required Equipment). The Diffraction Scanner can be mounted to an optics track or a dynamics track using the included Dynamics Track Optics Carriages. The setup works best when the Diffraction Scanner is mounted at least 1 meter from the diffraction slits (Figure 1).

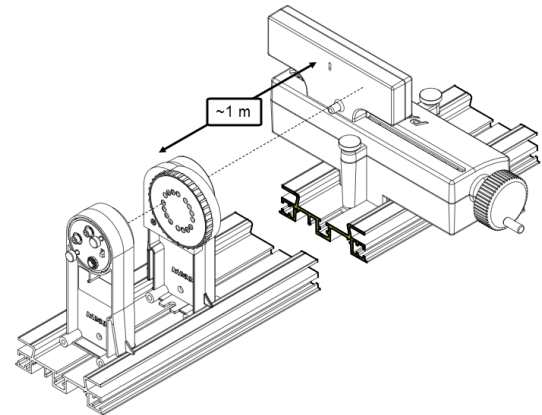


Figure 1. Setup with laser and diffraction slits.

### To mount to an optics track

1. Loosen the mounting screws without removing the nut or the screw from the apparatus.
2. Insert the square nuts into the center slot of the optics track with the aperture facing the track (Figure 2).
3. Slide the Diffraction Scanner to the desired position on the track then tighten the front and rear mounting screws.

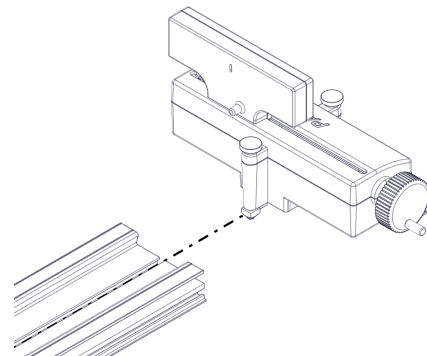


Figure 2. Inserting the Diffraction Scanner into an optics track.

## To mount to a dynamics track

1. Loosen the mounting screws without removing the nut or the screw from the apparatus.
2. Insert the front square nut into the center slot of a Dynamics Track Carriage then tighten the front mounting screw (Figure 3).
3. Insert the rear square nut into the center slot of another Dynamics Track Carriage then tighten the rear mounting screw.
4. Snap the Dynamics Track Carriages on the desired position on the track with the aperture facing the opposite end of the track.

Use the two remaining Dynamics Track Carriages to mount the laser and diffraction slits to the dynamics track.

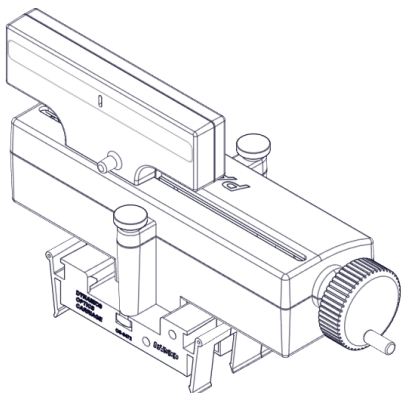


Figure 3. Diffraction Scanner mounted to two Dynamics Optics Carriages.

## Taking Measurements

The Wireless Diffraction Scanner combines a position sensor with a light sensor for scanning diffraction patterns. PASCO Capstone or SPARKvue are used to plot light intensity versus position of the diffraction pattern.

### Light Intensity

The Diffraction Scanner contains a slit aperture centered on a white screen. The width of the aperture can be changed to control the spatial resolution and amount of light entering the light intensity sensor. Six apertures of different widths are installed on a wheel inside of the Diffraction Scanner casing (Figure 4). The approximate widths of the apertures are 0.1 mm, 0.2 mm, 0.3 mm, 0.5 mm, 1.0 mm, and 1.5 mm.

Change the aperture width by turning the aperture knob. Select a wider slit to allow more light into the sensor or a narrower slit to improve the spatial resolution.

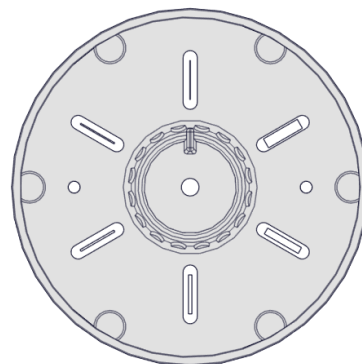


Figure 4. Aperture wheel inside the Diffraction Scanner casing.

### Position

The light sensor is mounted on a track that can move laterally by turning the crank on the side of the Diffraction Scanner. The position is measured by a rotary encoder attached to the crank. To obtain the best data, turn the crank at a slow rate.

## Experiments

Copy-ready experiment worksheets for classroom use are available on the PASCO website. Download the experiments for free at:

[www.pasco.com/resources/lab-experiments](http://www.pasco.com/resources/lab-experiments)

## Replacement Parts

Replacement parts can be purchased from the PASCO website. Contact Technical Support if the part you need is not listed below.

- PS-3584 Micro USB Cable

## Specifications

Property	Value
Position Range	155 mm
Position Resolution	0.01 mm
Slit Aperture Width	0.1, 0.2, 0.3, 0.5, 1.0, 1.5 mm

## Technical Support

For assistance with PASCO products, contact PASCO Technical Support at:

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

Phone: 916-462-8384

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

Email: [support@pasco.com](mailto:support@pasco.com)

## FCC Statement

This digital 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.

## 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.



## Warranty, Copyright, and Trademarks

**Limited Warranty** For a description of the product warranty, see the PASCO catalog.

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