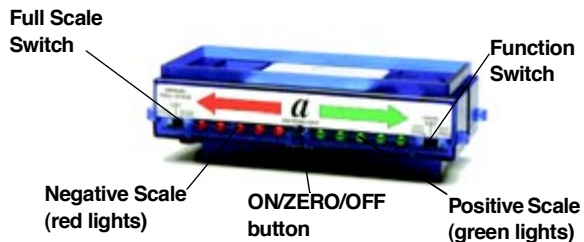


PASport

PS-2128

## Visual Accelerometer



## Accelerometer Quick Start

The PS-2128 Visual Accelerometer provides a real-time, visual display of acceleration ( $\text{m/s}^2$  or  $\text{g}$ ) along a single axis. When connected to a computer with DataStudio software, the Visual Accelerometer can be also used to record and graph acceleration changes.

### Additional Equipment Needed

- PASPORT™ interface [USB Link (PS-2100) with USB-compatible computer or Xplorer (PS-2000)]
- EZscreen or DataStudio® software (version 1.7.2 or later)

### Equipment Setup

1. Connect the USB Link to a USB port on your computer or to a USB hub.
2. Connect the PASPORT cable to the Visual Accelerometer and to the USB Link (or Xplorer).
3. The software launches when it detects a PASPORT sensor. Select a choice from the PASPORTAL window.
4. Move the Accelerometer slide switches to select a scale type and/or range.
5. To turn on the Accelerometer, momentarily push in and release the black button.

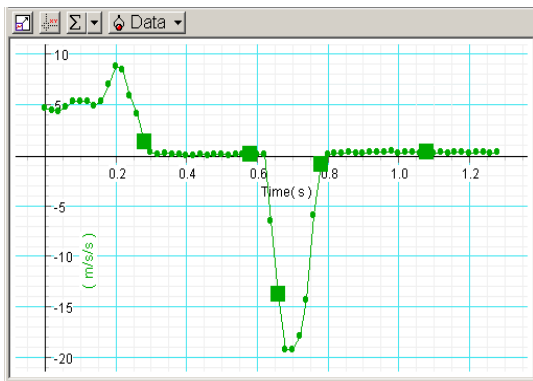


### Specifications:

<b>Sensor range:</b>	Auto-scale: $\pm 0.02 \text{ g}$ to $\pm 2 \text{ g}$ $(\pm 0.2 \text{ m/s}^2 \text{ to } \pm 20 \text{ m/s}^2)$ Manual scale: $\pm 0.1 \text{ g}$ , $\pm 0.5 \text{ g}$ , $\pm 2 \text{ g}$ $(\pm 1, \pm 5, \pm 20 \text{ m/s}^2)$
<b>Resolution:</b>	LEDs: 20% of full scale range; DataStudio: $0.001 \text{ g}$ ( $0.01 \text{ m/s}^2$ )
<b>Accuracy:</b>	$\pm 0.02 \text{ g}$ ( $0.2 \text{ m/s}^2$ )
<b>Maximum sample rate:</b>	100 samples/sec
<b>Frequency response:</b>	0 to 10 Hz
<b>Maximum acceleration:*</b>	$\pm 2 \text{ g}$ ( $20 \text{ m/s}^2$ ), single axis

\*Note: The maximum acceleration *measurement* is  $\pm 2 \text{ g}$  ( $20 \text{ m/s}^2$ ). However, the maximum acceleration without damage to the sensing element is  $1000 \text{ g}$ .

## Acceleration of a Cart Up and Down an Incline



### DataStudio/DS Lite Tasks:

<b>Record the acceleration:</b>	On the main toolbar, click the <b>Start</b> (▶ Start) button.
<b>Open the Experiment Setup window:</b>	On the main toolbar, click the <b>Setup</b> (≡ Setup) button.
<b>Change acceleration units:</b>	In the Experiment Setup window, click the Maximize button and scroll to the Visual Accelerometer options. Click the down arrow next to the Acceleration box, and select the desired units.
<b>Scale to fit the data:</b>	Click on the <b>Scale-to-Fit</b> (⌘) button.
<b>View data statistics:</b>	In the Graph display, click on the <b>Statistics</b> (Σ) button.

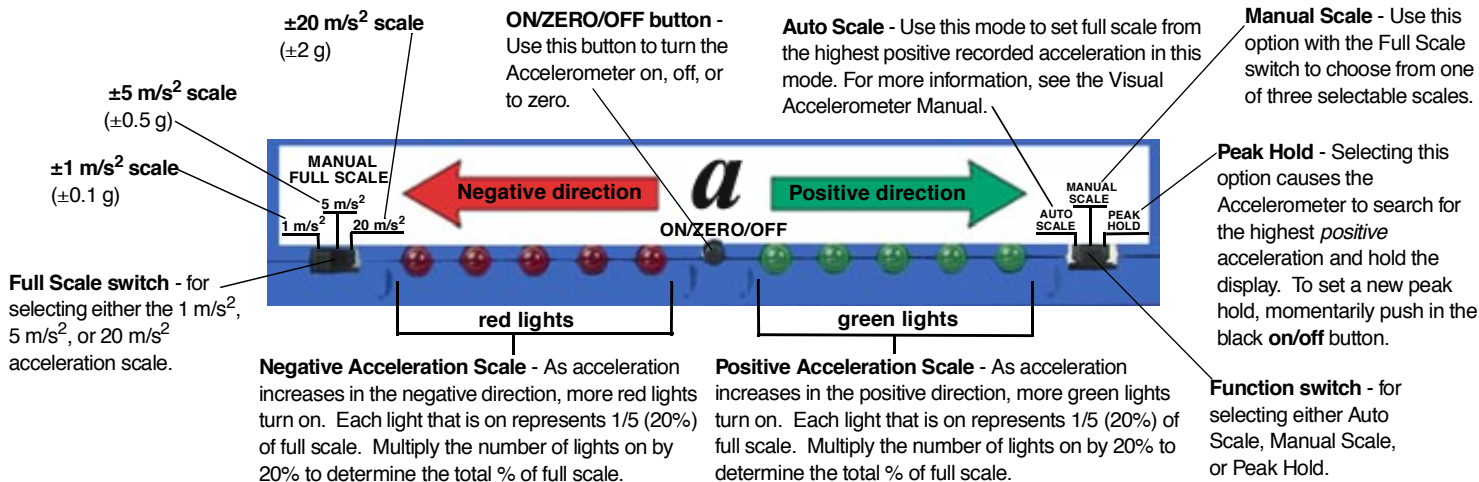
## Zeroing the Visual Accelerometer

1. Place the Accelerometer in a resting position (in the same orientation that you plan to use during the experiment).
2. Press and release the black button on the side of the sensor. The sensor will take about 1 second to zero. *Do not move or jar the sensor during the zeroing process.*
3. To verify the zero, connect the Visual Accelerometer to a USB link, open DataStudio, and click the **Start** (▶ Start) button. Your reading should be zero.

## Activity: Acceleration on an Incline

1. Using the PASPORT extension cable, plug the Visual Accelerometer into a USB Link or **Xplorer**.
2. Using the thumbscrews, mount the Accelerometer to a PAScar (ME-6950), GOcar (ME-6951), or a Dynamics Cart (ME-9430).
3. Move the function switch to Manual Scale. Move the scale switch to  $20\text{m/s}^2$ .
4. Push in and release the black button to turn on the Visual Accelerometer.
5. Place the car on a Dynamics Track (ME-9435A or ME-9458) that has been inclined at some angle. Zero the Accelerometer.
6. Have a lab partner at the end of the track ready to push the car up the track. (Note: Have the lab partner hold (but not pull) the PASPORT extension cable so that it doesn't interfere with the car.)
7. In DataStudio or **Xplorer**, click the **Start** (▶ Start) button and push the car up the track. On the visual scale, observe and record the number and color of lights lit as the car moves up and down the track.
8. When the car reaches the end of the track, click the **Stop** (◻ Stop) button. Describe the acceleration (+) or (-) of the car as it is a) pushed up the track and b) rolls down the track.

## The Visual Acceleration Scale



## Reading the Visual Acceleration Scale

No. of Lights On	Percent of Full Scale	Value (1 m/s <sup>2</sup> scale)	Value (5 m/s <sup>2</sup> scale)	Value (20 m/s <sup>2</sup> scale)
None	0 to <10%	0	0	0
1	10 to 30%	green: 0.2 or red: -0.2	green: 1.0 or red: -1.0	green: 4.0 or red: -4.0
2	30 to 50%	green: 0.4 or red: -0.4	green: 2.0 or red: -2.0	green: 8.0 or red: -8.0
3	50 to 70%	green: 0.6 or red: -0.6	green: 3.0 or red: -3.0	green: 12.0 or red: -12.0
4	70 to 90%	green: 0.8 or red: -0.8	green: 4.0 or red: -4.0	green: 16.0 or red: -16.0
5	>90%	green: 1.0 or red: -1.0	green: 5.0 or red: -5.0	green: 20.0 or red: -20.0

## Turn On/Off the Accelerometer

The Accelerometer requires 3 “AA” alkaline cells and/or USB power. USB operation requires a PASPORT USB link or PASPORT **Xplorer** and DataStudio software.

**Turn on the Accelerometer:** Press in and release the black button. When you release the button, five green and five red lights alternately illuminate and turn off.

**Note:** At turn on, the alternating of five flashing red and green lights is the battery test and only occurs with battery-powered operation. If the Accelerometer is plugged into a USB Link or Xplorer, the battery test does not take place and five red and green lights do not illuminate.

**Turn off the Accelerometer:** Press and hold the black button until two red and two green lights turn on. When you release the button, the sensor turns off.

## Battery Life and Operation

When batteries are in the unit, and the unit is powered from a USB port or hub, the unit cannot be turned off and the 3-hour automatic-off feature stops functioning. When you disconnect the unit from USB power, the push button on-off and auto-off timer functions operate normally.

If the batteries are low, two inside red lights and two inside green lights on the scale will flash. Under intermittent operating conditions, battery life is 6-9 months. When the Accelerometer is turned off, only a fraction of a milliamp is drawn from the batteries. If you do not expect to use the unit for several weeks, always remove the batteries; this can increase the battery life to years and reduce the risk of leaky batteries damaging the unit.

## Using the PS-2128 Accelerometer

1. **For standalone use:** Remove the casing and install the batteries.  
Or

**For use with DataStudio or an Xplorer:** Connect the receptacle end of the PASPORT extension cable into the pin connector on top of the Accelerometer. Connect the PASPORT extension cable to either the USB Link or **Xplorer**.

2. Press in the black button to turn on the Visual Accelerometer.
3. Move the Function switch to either Manual or Auto scale. (If using Manual scale, use the Full Scale switch to select a full scale value (1, 5, or 20 m/s<sup>2</sup>).
4. (Optional): Use the provided thumbscrews to fasten the Accelerometer to the top of a PAScar, Dynamics Cart, or GOcar.
5. Place the Visual Accelerometer in the desired orientation for your experiment and momentarily push in the black button to zero the Accelerometer.
6. Move the Accelerometer or car and watch the display lights illuminate as you accelerate in either direction.

**Note:** The unit has a fixed internal timer that will automatically turn power off after three hours, even if the unit is being used at the time. To resume operation, just press the black push button. The Accelerometer will save the auto-scale setting if that function was in use and the switch was not moved off auto-scale. If the unit fails to turn on or off using the push-button switch, open the case and remove any battery for a few seconds, then reinstall. The unit should operate normally.