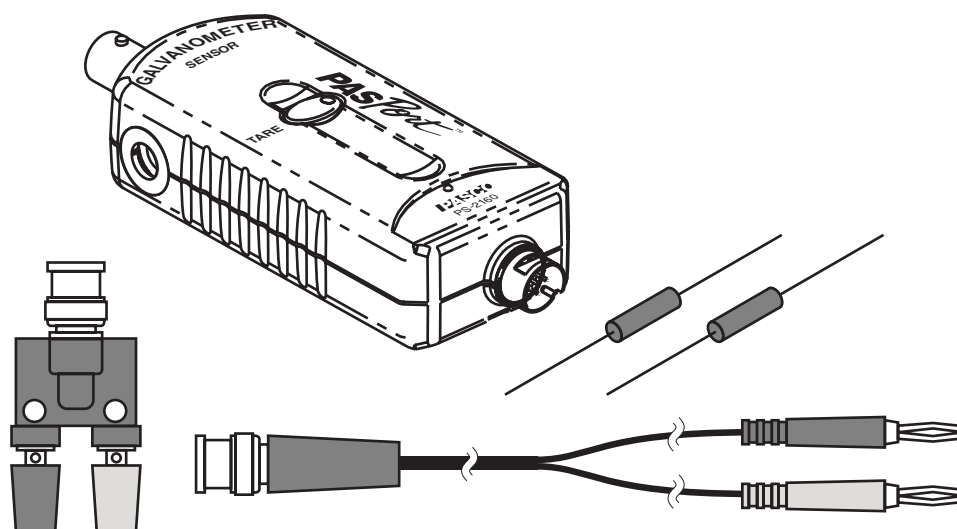


Galvanometer

PS-2160



Included Equipment

Included Equipment	Part Number
Galvanometer	PS-2160
BNC-to-banana plug cable	514-015
BNC-to-binding post adapter	515-012
Resistor, 10 Ω , 5 W, 5%	111-100
Resistor, 0.1 Ω , 3 W, 1%	130-019

Required Equipment

PASPORT Interface ¹	See PASCO catalog or www.pasco.com
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¹PASPORT interfaces include the AirLink (PS-2005), Xplorer GLX (PS-2002), Xplorer (PS-2000), PowerLink (PS-2001), and USB Link (PS-2100)

+2 V. It can also be used in combination with a resistor as a current sensor.

Sensor Set-up

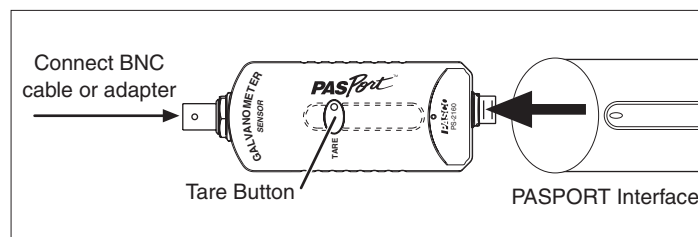
Connect the Galvanometer Sensor to a PASPORT interface. If you are using a computer, start DataStudio.

For measuring voltage, connect the included cable or binding post adapter to the sensor's BNC connector, or connect a device to the Galvanometer with a BNC cable.

Before making a measurement, short the + and – inputs together and press the Tare button on the sensor. This adjusts the sensor's measurement to 0 V.

Introduction

The PASPORT Galvanometer is a high-resolution, high-impedance voltage sensor for use with PASPORT interfaces. It measures differential voltage in the range of –2 V to



To start data collection, click the **Start** button in DataStudio or press  on the Xplorer GLX.

By default, the sensor collects data at 10 Hz and displays it in units of volts. In DataStudio, click the **Setup** button to open the **Experiment Setup** window, where you can change the sample rate and units. On the Xplorer GLX, press ,  to open the Sensors screen, where you can change the sample rate and units.

Note: For complete instructions on collecting and displaying data, press F1 for DataStudio's on-line help, or refer to the Xplorer GLX Users' Guide.

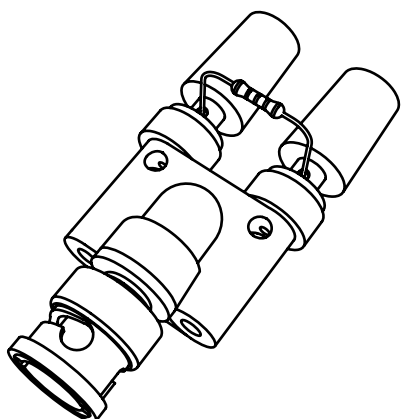
Over-sampling

The Galvanometer uses dynamic variable over-sampling to reduce noise, produce smoother data, and improve measurement resolution. This effect is especially noticeable when very small voltage changes are measured. The degree of dynamic variable over-sampling that take place within the Galvanometer depends on the sample rate. To maximize the over-sampling, set the sample rate as low as possible for a given application. Maximum over-sampling occurs at sampling rates of 1 Hz or slower.

Measuring Current

Current Measurement Set-up

To measure current, connect the included binding post adapter to the sensor's BNC connector. Loosen the binding post screws and connect one of the included resistors (or another resistor) as pictured.



In this configuration, the sensor will measure the voltage drop across the resistor as current flows through it. Connect a circuit or device so that positive current will flow through the resistor from the red post to the black post.

Before making a measurement, ensure that no current is flowing through the resistor and press the Tare button.

Current Calculation

To calculate the current (I) from the measured voltage (V), use Ohm's Law:

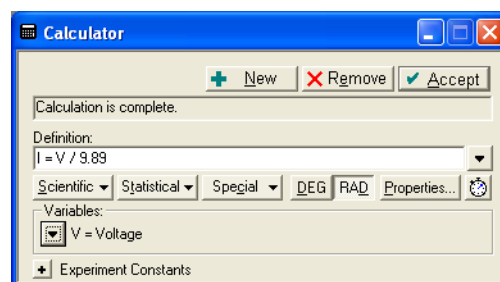
$$I = \frac{V}{R}$$

where R is the combined resistance of the resistor and the leads connecting it to the binding posts.

A reliable way to measure R is to apply an accurately known current (I') and note the measure voltage (V'). The resistance is

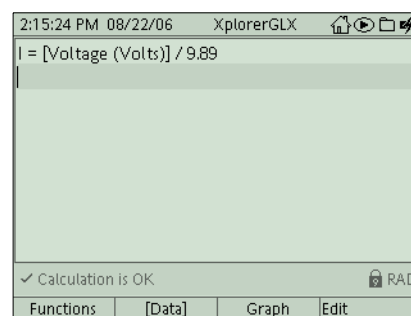
$$R = \frac{V'}{I'}$$

Once you have determined R , you can configure DataStudio or the Xplorer GLX to automatically calculate the current. In DataStudio, click the **Calculate** button and define a calculation such as



where, in this example, “9.89” is the value of R in Ω .

On the GLX (in standalone mode), press ,  to open the Calculator screen and define a calculation such as



Note: For complete instructions on defining calculations, press F1 for DataStudio's on-line help, or refer to the Xplorer GLX Users' Guide.

Resistor Selection for Current Measurement

By selecting different resistors, you can measure very large current with low impedance or measure smaller current very precisely. The table summarizes the approximate range, and resolution (without over-sampling) for current measurements using the included resistors.

Resistance	Range	Resolution
0.1 Ω	± 5.5 A	1 mA
10 Ω	± 0.2 A	0.01 mA

Note that the range for the 0.1 Ω resistor is limited by the power rating.

In addition to the included resistors, you can use any resistor (rated for the maximum current and power you intend to apply). In general, select a lower resistance for measuring higher current or a higher resistance for lower current. For very low resistance, a simple piece of wire will suffice.

Specifications

Measurement Range	± 2000 mV differential
Resolution	0.1 mV
Maximum Sample Rate	5000 Hz with Xplorer GLX 1000 Hz with other interfaces
Input Impedance	1 M Ω
Absolute Maximum Input	50 V

Technical Support

For assistance with any PASCO product, contact PASCO at:

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

Phone: 916-786-3800 (worldwide)
800-772-8700 (U.S.)

Fax: (916) 786-7565

Web: www.pasco.com

Email: support@pasco.com

Limited Warranty

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

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