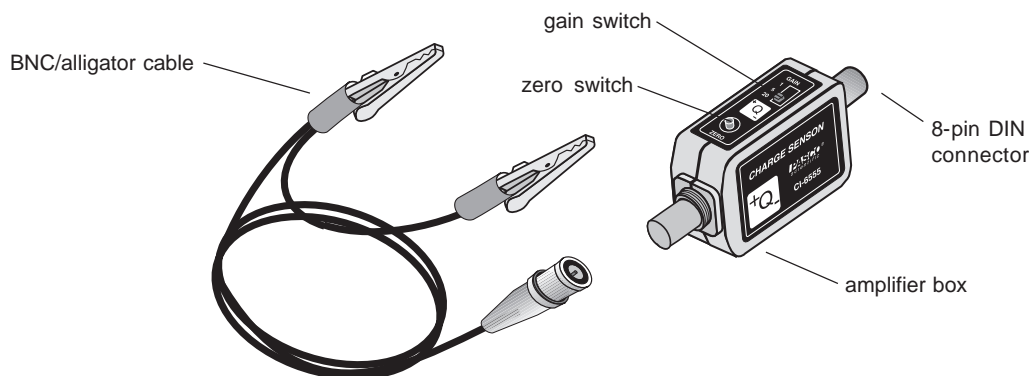


**Instruction Sheet
for the PASCO
Model CI-6555**

CHARGE SENSOR



Introduction

The CI-6555 Charge Sensor measures voltages from sources where the total amount of available charge is very small, for example, many electrostatics experiments. It is essentially a voltage amplifier with extremely high input resistance. Whereas a typical digital multimeter has an input resistance of 10 megaohms (10^7 ohms), the Charge Sensor has an input resistance of at least 10^{12} ohms.

Coupled with a *ScienceWorkshop*[®] Computer Interface, the Charge Sensor can be used as an electronic version of the familiar laboratory electroscopes. Unlike the traditional electroscopes however, the Charge Sensor can make quantitative measurements as well as indicate charge polarity.

Equipment

INCLUDED

- Charge Sensor (CI-6555)

SUGGESTED ACCESSORIES:

- Faraday Ice Pail (ES-9042A)
- Charge Producers and Proof Plane (ES-9057A)
- Conductive Spheres (ES-9059B)
- Power Supply (ES-9077)

ADDITIONAL REQUIRED

- PASCO *ScienceWorkshop* Computer Interface (300, 500, 700, or 750)

© 1999 PASCO scientific

Setup Procedure

1. Insert the 8-pin DIN plug into analog input A, B, or C of the *ScienceWorkshop* Interface box. Note that the Charge Sensor will plug directly into the interface box (Figure 1a), or an extension cable (CI-6516, available separately) may be used (Figure 1b).

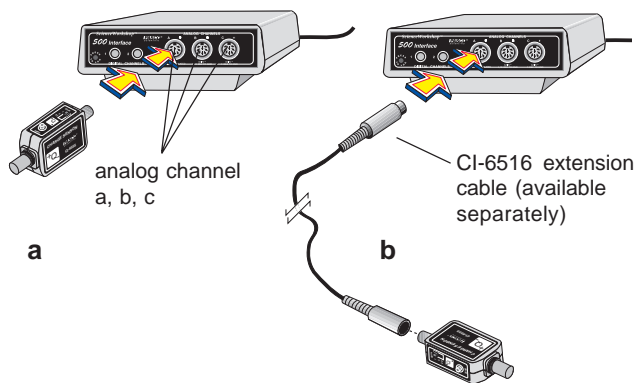


Figure 1
Two ways to connect the Charge Sensor to the *ScienceWorkshop* Interface box.

2. Attach the BNC/alligator clip probe to the BNC connector on the amplifier box by lining up the alignment pins. Push the BNC connector in slightly and turn clockwise one-quarter turn to lock.
3. Discharge the input capacitor by pressing the ZERO switch. Set the sensitivity of the sensor by changing the position of the GAIN switch.

The table below shows the relationship between the position of the GAIN switch and the measurable full-scale input voltage:

Gain Switch Position	Full-Scale Input (\pm volts)
1	10.0
5	2.0
20	0.5

4. Set up the Charge Sensor in your data acquisition software, and open a Meter display.

Tips On Use of the Charge Sensor

1. When used on the most sensitive range (X20), the Charge Sensor may display a small offset voltage. That is, pressing the ZERO switch may not cause the voltage to go exactly to zero. Although this residual voltage is typically quite small (less than 0.1 volts), it will be constant for any particular GAIN setting and can be subtracted from the final measurement to give a more accurate reading.
2. The extremely high input resistance of the sensor also makes it sensitive to stray electrostatic fields in the immediate vicinity of the case. To minimize the influence of static fields and for the greatest accuracy, follow these guidelines:
 - Plug the Charge Sensor directly into an interface (avoid using the extension cable, if possible).
 - Stabilize the sensor by mounting it on a rod stand using the mounting nut on the sensor case.
 - Position the sensor and interface box as far away from the experiment as possible.
 - Wrap the sensor case in aluminum foil. (Wrapping the sensor in aluminum foil will not only stabilize the readings but will demonstrate Gauss’s theorem in showing that there can be no net field within a hollow conductor.)

Note: Higher frequency fluctuating fields (such as 50 or 60 Hz) will usually not be detectable unless you are viewing the output of the sensor on an oscilloscope.

Note: This instruction sheet was written assuming that the user is familiar with *ScienceWorkshop* or DataStudio™. Users can gain familiarity by working through the tutorials provided with *ScienceWorkshop* or from DataStudio’s online help.

Suggested Activity

Use the Charge Sensor to demonstrate the magnitude of charge build-up induced on PASCO Charge Producers (ES-9057A).

In this demonstration, you connect the Charge Sensor to a Faraday Ice Pail (ES-9042A) as shown in Figure 2.

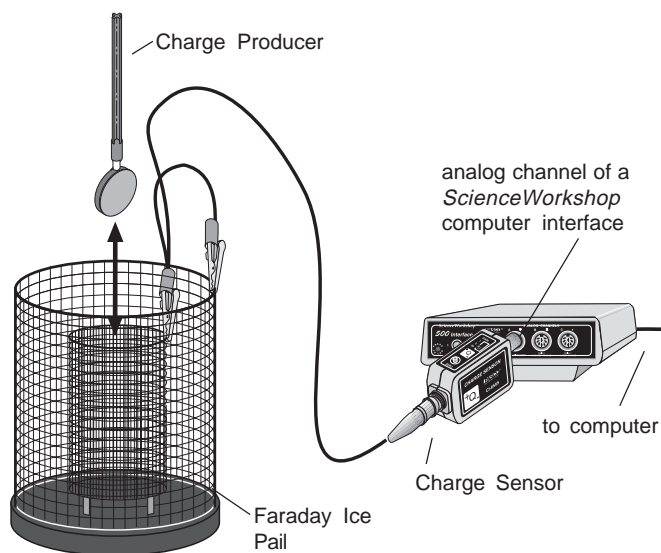


Figure 2

Setup for demonstrating the magnitude of charge on the Charge Producers.

After setting the sensor up in your data acquisition program and opening a Meter display, briskly rub the Charge Producers together. Next, lower one of the Charge Producers into the inner basket of the Faraday Ice Pail.

Result: The magnitude of the charge that was provided when the Charge Producers were rubbed together will be displayed on the Meter display. The Charge Producer with the blue surface will acquire a negative charge, and the one with the white surface will have a positive charge. The magnitude of the positive and negative charges will be equivalent.

Specifications

- Input Resistance: 10^{12} ohms, minimum
- Input Capacitance: $0.01 \mu\text{F} \pm 5\%$
- Input Voltage Range: ± 10 volts
- Maximum Input Voltage: ± 150 volts dc, continuous

Limited Warranty

PASCO scientific warrants the product to be free from defects in materials and workmanship for a period of one year from the date of shipment to the customer. PASCO will repair or replace, at its option, any part of the product which is deemed to be defective in material or workmanship. The warranty does not cover damage to the product caused by abuse or improper use. Determination of whether a product failure is the result of a manufacturing defect or improper use by the customer shall be made solely by PASCO scientific. Responsibility for the return of equipment for warranty repair belongs to the customer. Equipment must be properly packed to prevent damage and shipped postage or freight prepaid. (Damage caused by improper packing of the equipment for return shipment will not be covered by the warranty.) Shipping costs for returning the equipment after repair will be paid by PASCO scientific.

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

Phone: (916) 786-3800
FAX: (916) 786-8905
email: techsupp@pasco.com
web: www.pasco.com

