



Tech Note

GSR-200 Galvanic Skin Response Adapter

Overview

As a person's psychological state changes and events in his or her environment occur, the electrical properties of the person's skin change. These electrodermal responses can be detected using devices like the GSR-200. Since human skin is a good conductor of electricity, a weak electrical current applied to the skin can determine the resistance of the skin, or its reciprocal which is conductance.

The GSR-200 applies a constant, imperceptible voltage between two electrodes attached to the skin. Since the voltage is constant, the current flowing between the electrodes is proportional to the skin conductance, or inversely proportional to the skin resistance. The GSR-200 is able to detect the current flowing between the electrodes and convert it to a voltage that can be recorded. Using the conversion factor of the GSR-200, the recorded voltage is easily converted into units known as microSiemens (μS).



Conductance and Output

The purpose of the GSR is to provide a measure of skin conductance to record. Conductance (G), as expressed in units known as Siemens, is the inverse of Resistance (R):

$$G = \frac{1}{R}$$

The GSR-200 presents a voltage of 200mV across the resistance being measured, so that the Current (I) flowing across the skin from one electrode to the other is equal to applied voltage divided by the resistance:

$$I = \frac{200\text{mV}}{R} = 200\text{mV} \cdot G$$

In the GSR adapter, the Current (I) flows through a 1megOhm feedback resistor to produce the Output Voltage (V_{out}), so that:

$$V_{\text{out}} = \frac{1}{R_{\text{feedback}}} = I \cdot 1 \text{ megOhm} = 200\text{mV} \cdot G \cdot 1\text{megOhm}$$

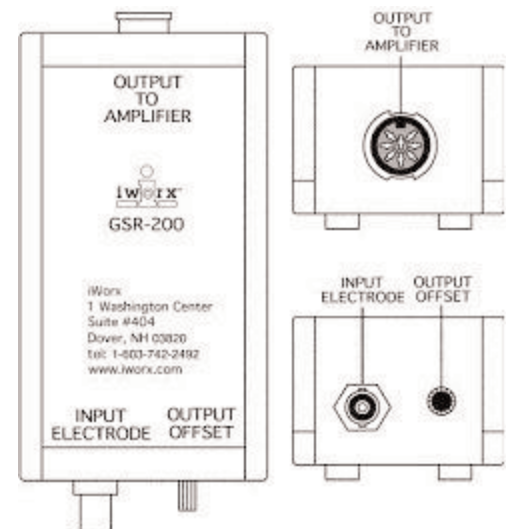


Figure 1: The connectors and control of the GSR-200.

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Solving for Conductance (G):

$$G = \frac{V_{\text{out}}}{0.200V \cdot 1\text{megOhm}}$$

Since 1 megOhm is the reciprocal of 1 μ Siemens, the Conductance (G), in μ Siemens, is equal to 5 times the Output Voltage:

$$G (\mu\text{Siemens}) = 5 \cdot V_{\text{out}}$$

Therefore, for the GSR-200, 1 Volt of output equals 5 μ Siemens. This relationship along with the calibration function of the recording device can be used to convert the voltages recorded from the subject to μ Siemens of conductance.

Equipment Setup

Plug one end of a male-male DIN cable into the GSR amplifier. Connect the other end of the same cable to DIN input of an iWorx data acquisition unit or amplifier.

Calibration of GSR Adapter

The GSR-200 adapter is factory calibrated so that an output of 1 Volt is equal to 5 microSiemens (μ S). Use this conversion factor to convert the recorded voltage into the μ Siemens (μ S), the units used in expressing skin conductance levels.

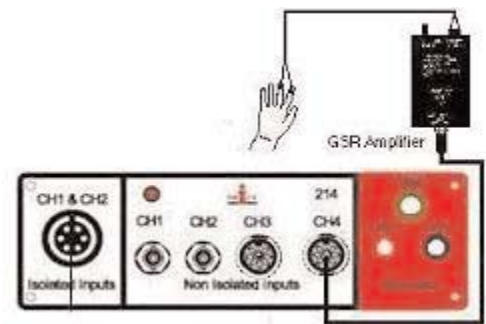


Figure 2: The GSR-200 adapter connected to an iWorx 214.

Operating the GSR-200 Adapter

Before connecting the conductivity electrodes to the BNC input connector on the GSR-200 adapter, turn the offset knob on the GSR adapter to position the baseline where desired. Once the baseline is set, attach the conductivity electrodes to the subject, and the other end of the electrode cable to the BNC input of the GSR-200 adapter. Begin recording.

Experiments

Experiments using the GSR-200 Adapter and Electrodes can be downloaded by clicking on the following links:

[Print-disabled Interference of Stimuli on Associative Tasks -The Stroop Effect experiment \(PDF file\).](#)

User Area (password protected)

[High resolution press optimized or low resolution screen optimized Interference of Stimuli on Associative Tasks -The Stroop Effect](#)

Specifications

Input impedance:	10 GOhm
Input connector:	BNC
Working voltage:	-200 mV
Output connector:	DIN8
Output voltage swing:	+ 4.0 Volts
Bandwidth:	DC to 3Hz
Power:	From DIN8 input of iWorx amplifier or A/D
Noise:	1.0mV p-p

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