CURRENT & VOLTAGE SENSOR SET

Description D0384

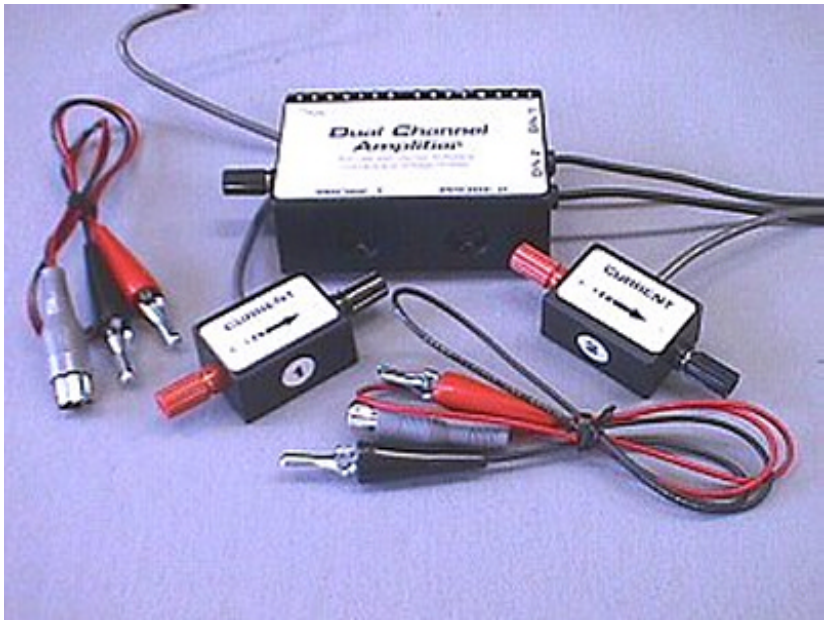


Figure 1. The Current and Voltage Sensor Set

Short description

The Current & Voltage Sensor Set is designed for exploring the basic principles of electricity. By using the sensor in simple circuits you can explore relationship between the current and the voltage - the Ohm's Law, series and parallel circuits, phase relationships in reactive components, and much more.
With a range of ± 6 V and ± 0.6 A, this set is ideal for use in most "battery and bulb" circuits. It also can be used with low-voltage AC circuit experiments.

The Current & Voltage Set consists of two-voltage probe, two current probes, and a dual-channel amplifier. The amplifier expands the data collection abilities of an interface by providing two differential inputs with selectable gain. Circuitry inside the amplifier automatically adjusts the gain of each channel as you switch from the voltage to current probes and vice versa. The two channels of the amplifier operate independently; any combination of current and voltage probes may be used.

The voltage probes are like voltmeter leads. They should be placed across a circuit element. They measure the potential difference between V_+-clip (red) and the V_-clip (black). The range is –6 volts to +6 volts and over-voltage protection is provided, so that slightly higher voltages will not damage anything. They never can be used for high voltages or 220 V.
The voltage probes have differential inputs, which means that measurements can be done directly across circuit elements without the constraints of common grounding. The voltage sensors can be used to measure negative potentials as well as positive potentials.

The current sensors contain 0.1Ω resistor (5 W). The sensors were designed to look like they should be wired in series with the circuit. Currents in either direction can be measured. The current will be indicated as positive if current flows in the direction of the arrow on the small box (from the red terminal to the black terminal. The range is ± 0.6 amps (± 600 mA). When a current sensor is connected to the amplifier, the gain of the amplifier is automatically increased. The final result is that an output voltage (between 0 – 5V) is produced from the amplifier. It varies in a linear way with the current through the current probe.

The Current & Voltage Sensor Set is delivered with a BT plug and can be connected to the following interfaces:

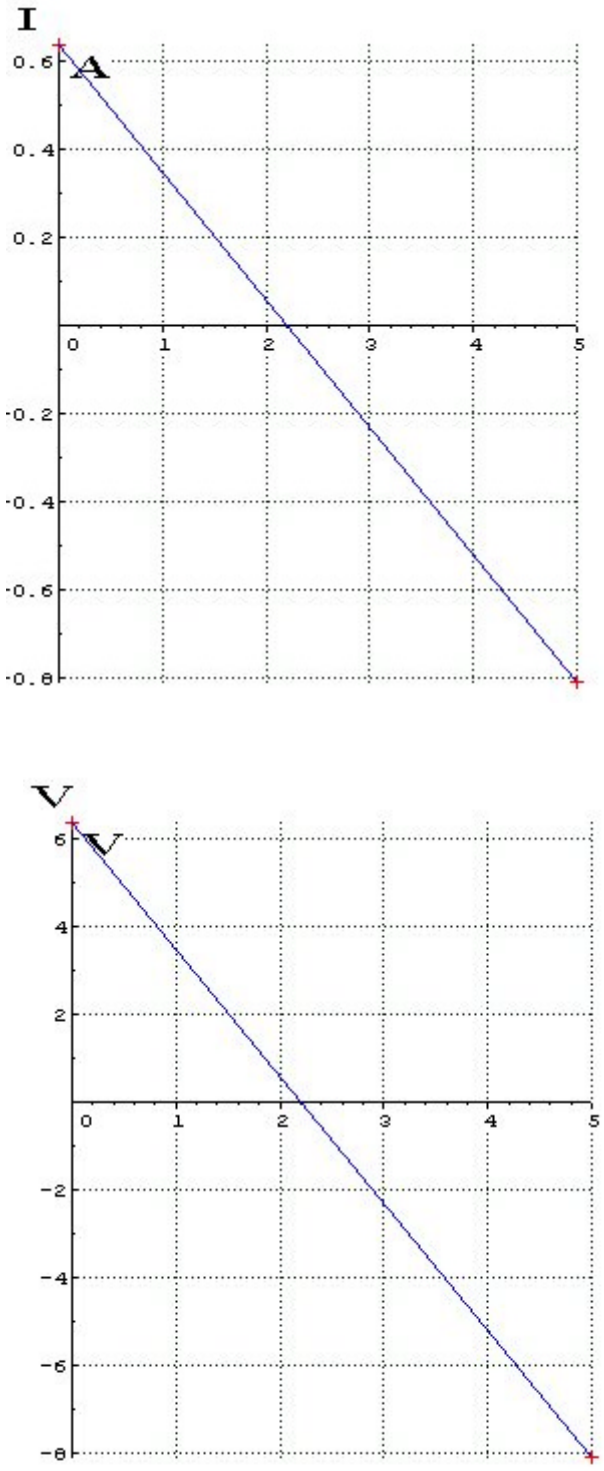
- UIA/UIB through Measuring Console (via 0520 adapter)
- CoachLab
- CoachLab II
- SMI (via 0520 adapter)

- Texas Instruments CBL™ data-logger.

There is an adapter (art. 0520) to connect sensors with BT-plugs to 4-mm inputs.

Calibration

When used with either voltage or current probes, the output of the system is linear with respect to the measurements it is making.
The amplifier allows measuring positive and negative values of voltage & current. Then the amplifier offsets and amplifies the incoming signal so that the output is always in the range of 0 to 5 V.
If and input is 0 V, for example, the amplifier will produce an output 2.5 V.
The output varies from this 2.5-volt level, depending on the input (see transfer functions).
It makes possible to measure negative voltage with the UIA card and the CoachLab I interface.
To collect data as voltage or current, use calibration supplied with the Coach 5 program or calibrate the unit using known voltages or currents (standard, simple 2-points calibration can be done).



The names of the current and voltage sensor in the sensor library of Coach 5 program are:

- **Current sensor (384&bt) (CMA)**
- **Voltage sensor (0384&bt) (CMA) - 8..6V.**

Figure 2. Calibrations graphs of current and voltage sensors - examples.

Technical data

Voltage range Current range	± 6.0 V ± 0.6 A
Linearity	0.01%
Resolution using 10 bits 5V A/D converter	 12.5 mV / 1.25 mA
Supply voltage Supply current (typical) Input impedance	5 V DC 9 mA 10 kΩ
Max. input voltage Output voltage range	±10 V 0 – 5 V
Transfer function (voltage) Transfer function (current)	$V_{Out} = -0.4 \times (V_+ - V_-) + 2.5$ $V_{Out} = -0.4 \times (I) + 2.5$
Connection	 BT (British Telecom) plug

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