

User manual thermal generator 4875.00

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Ae 4875.00

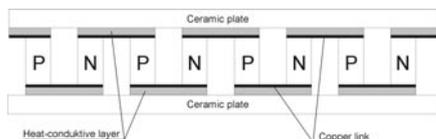


WARNING – HOT SURFACE:

When relative high power is applied, the surface of the Thermal Generator will reach temperatures above 60° C. The unit must then not be touched.

Description

The thermal generator is used to demonstrate energy conversion: either by generating electrical energy from thermal energy or vice versa. The thermal generator consists of a peltier element with a heat sink on one side, and it is supplied with safety jack connectors.



The peltier element is constructed from 72 semiconductor junctions connected in series mounted on a heat sink. If a temperature difference exists between the two sides of the element, a voltage is generated. On the other hand, if a voltage (max. 8 volts, 5 amperes) is applied to the peltier element, a temperature difference appears across the two sides of the element. The accessible side of the peltier element can readily be heated up or cooled off using a metal container with hot or cold water, causing an electric current to be generated.

The peltier element is mounted on a heat sink so that one side of the element can be maintained at a constant temperature (usually room temperature). If better thermal contact on the other side of the element is desired, heat conducting paste (part no. 6389.90) can be applied.

Operation and applications

The thermal generator can be used in two ways: as a heat generator or as a current generator.

Thermal generator

Connect the thermal generator to a dc power supply. Apply no more than maximum 8 volts, 5 amperes. Fill a metal container with a small quantity of water, and place it on the peltier element. When power is applied, the water will either be cooled or heated depending upon the polarity of the applied voltage. The experiment can be made more quantitative by measuring voltage, current and temperature difference.

Current generator

Connect a low torque motor with a propeller (part no. 5015.00) to the thermal generator and place a metal container on the element. Pour about a deciliter of cold water (or ice water) into the container. A temperature difference of 5-6 degrees between the water and ambient is adequate to provide sufficient electrical power to cause the propeller to turn. The same experiment can of course be performed with hot water.

A more advanced experiment can be performed by using a large container so that a heating coil can be used to heat up a quantity of water. Experiments can be performed to study the relationship of the rotation speed of the propeller versus the temperature of the container. The water temperature can also be compared with the electrical power supplied by the peltier element. If the heat sink is immersed in a hot water bath and dry ice is applied to the other side of the peltier element, sufficient electrical energy is produced so that a 1.5 volt 0.09 ampere lamp will light up.

Technical data

Current generator.

Temperature range -150 up to +110 degrees C.

Peltier effect.

Maximum current: 5 A.

Maximum voltage: 8 V.

Temperature difference: 67.5 degrees C.