PIRANI VACUUM LOGGER

Extreme Vacuum Monitoring

The Pirani Vacuum Logger pressure and temperature data logger is named after Marcello Stefano Pirani who, despite the Italian name, was a German scientist.

It is based on the principle of variation of thermal conductivity with varying pressure (in this case of vacuum).
The gas molecules, for example in the air, move and collide with an average speed depending on the temperature (indeed, this average speed is an index of the temperature). The impacts of the molecules on the walls of a container exert pressure and, if the number of molecules decreases, the number of impacts decreases and therefore the pressure exerted on the walls decreases.
In a solid body the higher the temperature the more the atoms of which it is composed vibrate and if it is heated compared to the environment, the gas molecules of the air that reach the surface of the solid are accelerated (increases the air temperature) at the expense of the amount of vibrations of the atoms of the solid (the solid cools). Consider an electric resistance stove: the temperature reached by the filament depends on the electrical energy consumed and reaches a balance when the air gas molecules have not taken away all the applied electrical energy. If I remove the molecules of the air gases (I make the vacuum) the energy drawn will decrease (the filament cools less) so the stove's filament will increase its temperature to reach another balance. A heated conductor wire varies its resistance in a (almost) linear way with the temperature; if I feed the wire with constant current I have, by **Ohm's law**:

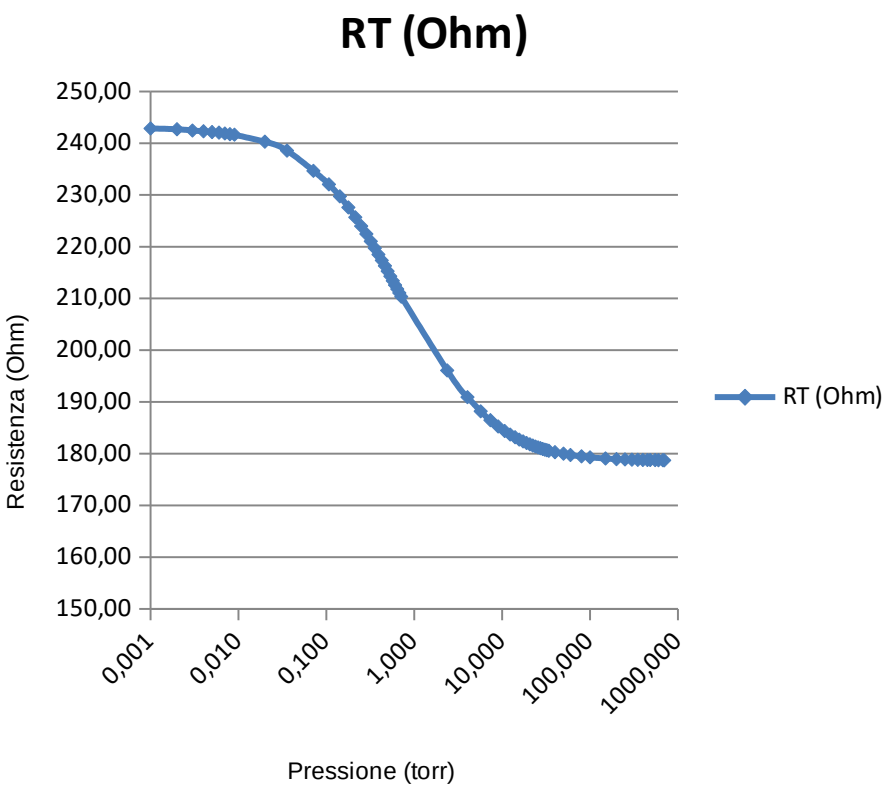
$$V = RI$$

where **I** is the current, **R** the resistance of the wire and **V** the voltage across the wire.

Ultimately, if a wire is heated with a constant current and the voltage across the wire is measured, this voltage will vary with the variation of the vacuum because the wire will heat up as gas molecules are subtracted, i.e. the vacuum will be made, and the **R** will increase according to the temperature.

Pirani used a platinum wire to make his vacuum meter. The vacuum is measured in Torr (from Torricelli) or mbar (1mbar = 0.75 torr); the atmospheric pressure is about 1000 mbar.

Typical vacuum curve measured with a Pirani sensor:



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WE DELIVER DATA

Tecnosoft s.r.l.
Via Galvani, 4, 20068 Peschiera Borromeo (MI) - ITALY
telephone +39 02 26922888 - fax +39 02 26922875 - tecnosoft@tecnosoft.eu - tecnosoft.eu