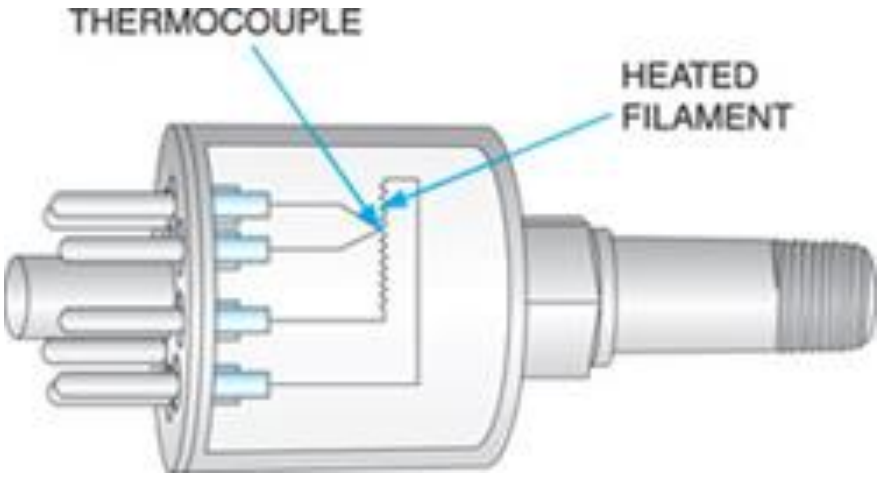
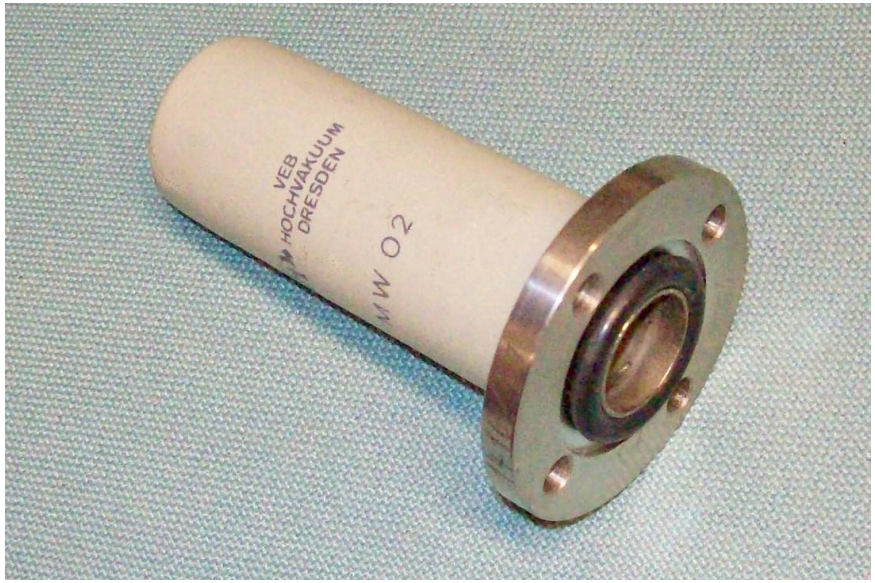
PRESSURE MEASURMENT DEVICES (GAUGE)





Biswajit
10.02.18

Thermocouple Gauge and Pirani Gauge

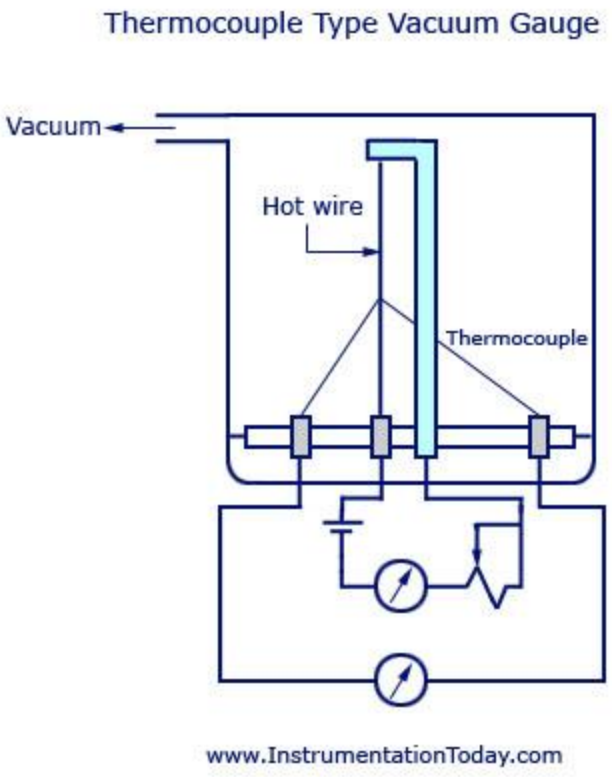
- Both work on the same principle of detecting thermal conductivity of the gas by a change in temperature.

- In the thermocouple gauge, temperature is sensed by thermocouple and in the pirani gauge by the change in resistance of the heated wire.

Thermocouple Gauge

WORKING

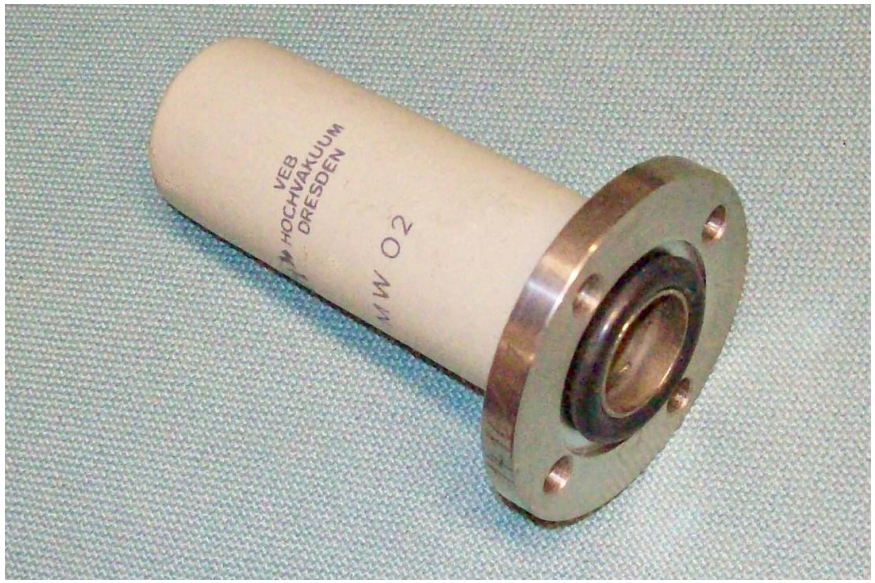
- Two sets of thermocouples are used to measure the temperatures of the heated wires in the two chambers and oppose each other.
- When there is a difference in pressure, there occurs an unbalance which is measured by a potentiometer circuit.
- Instead of single thermocouple per wire, a thermopile is often chosen to increase sensitivity.



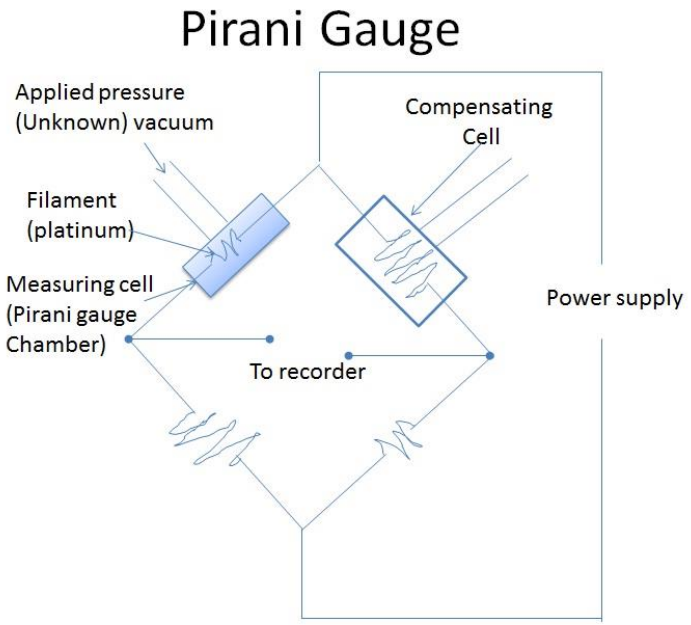
Pirani Gauge

STRUCTURE

- The Pirani gauge consists of a metal filament (usually platinum) suspended in a tube which is connected to the system whose vacuum is to be measured.
- Connection is usually made either by a ground glass joint or a flanged metal connector, sealed with an o-ring.
- The filament is connected to an electrical circuit from which, after calibration, a pressure reading may be taken.



PRINCIPLE



- A conducting wire gets heated when electric current flows through it.
- The rate at which heat is dissipated from this wire depends on the conductivity of the surrounding media.
- The conductivity of the surrounding media in turn depends on the density of the surrounding media (that is, lower pressure of the surrounding media, lower will be its density).
- If the density of the surrounding media is low, its conductivity also will be low causing the wire to become hotter for a given current flow, and vice versa.

Applications of Pirani gauge

- Used to measure low vacuum and ultra high vacuum pressures.

Advantages of Pirani gauge

- They are rugged and inexpensive.
- Give accurate results.
- Good response to pressure changes.
- Relation between pressure and resistance is linear for the range of use.
- Readings can be taken from a distance.

Limitations of Pirani gauge

- Pirani gauge must be checked frequently.
- Pirani gauge must be calibrated from different gases.
- Electric power is a must for its operation.

WHICH IS PREFFERED

PIRANI GAUGE

OR

THERMOCOUPLE GAUGE

ANSWER :

❖ PIRANI GAUGE IS PREFFERED OVER THERMOCOUPLE GAUGE BECAUSE:

- ITS TEN TIMES FASTER THAN THEROCOUPLE GAUGE .
- WIDER RANGE OF PRESSURES CAN BE MEASURED WITH A PIRANI GAUGE.

❑ Well designed Pirani gauges offer better accuracy and response time than do thermocouple gauges (often tens of milliseconds vs. several seconds).


Thank You!