

18ECO133T

# Sensors and Transducers

UNIT V

Session 7: SLO – 1

# Method of Pressure Measurement

- Manometer method.
- Elastic pressure transducers.
- Pressure measurement by measuring vacuum.
- Pressure measurement by balancing the force produced on a known area by a measured force.
- Electrical pressure transducers.

## ➤ Monometers

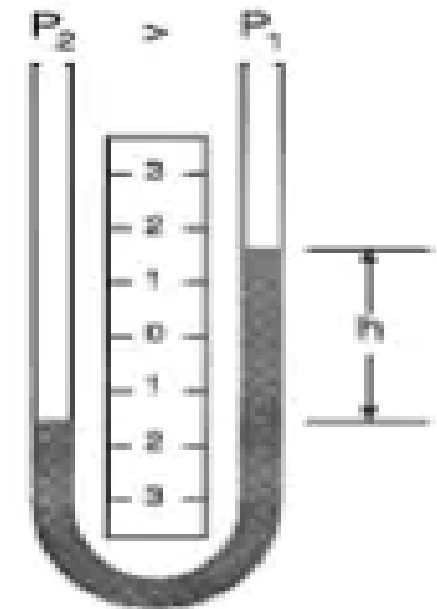
- A manometer is an instrument that uses a column of liquid to measure pressure.
- The manometer utilizes the hydrostatic (standing liquid) balance principle where in a pressure is measured by the height of the liquid it will support.
- Manometer depends on 3 factors;
  1. the Height of the column of the fluid [H]
  2. The density of the fluid [ $\rho$ ]
  3. The gravitational constant [g] which equal 9.81m/s<sup>2</sup>

So the pressure in manometer = **H x g**

- Manometers measure the unknown pressure by balancing against the gravitational force of liquid heads
- There are many types of manometers, some of which are as follows:
  - U tube manometer.
  - Well type manometer.
  - Barometer.
  - Inclined tube manometer.
  - Micromanometer.

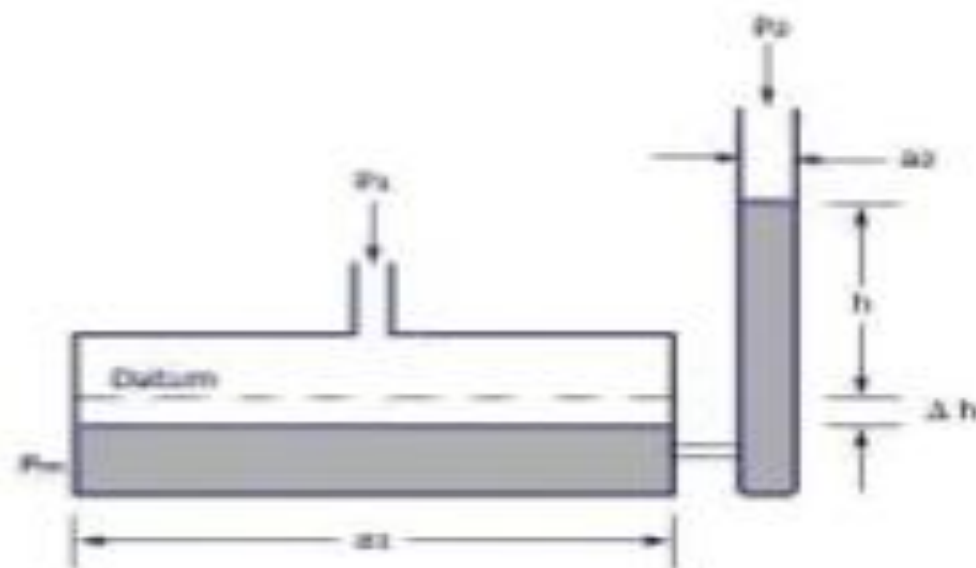
## ❖ U tube manometer.

- Simplest manometer.
- Used in the measurement of liquid or gas pressure.
- Both legs have same area.
- Manometric fluid of known specific gravity is used.
- Water and mercury are used as a manometric fluid.
- Advantage of using these fluid is that mass density of these fluid can be obtained easily and they do not stick to the tube.



## ❖ Well type manometer.

- One leg is a simple tube, other leg is a large well.
- For small displacement of liquid level in the well there will be a large change in the height of simple tube.
- The well type manometer is widely used because of inconvenience; the reading of only a single leg is required in it.

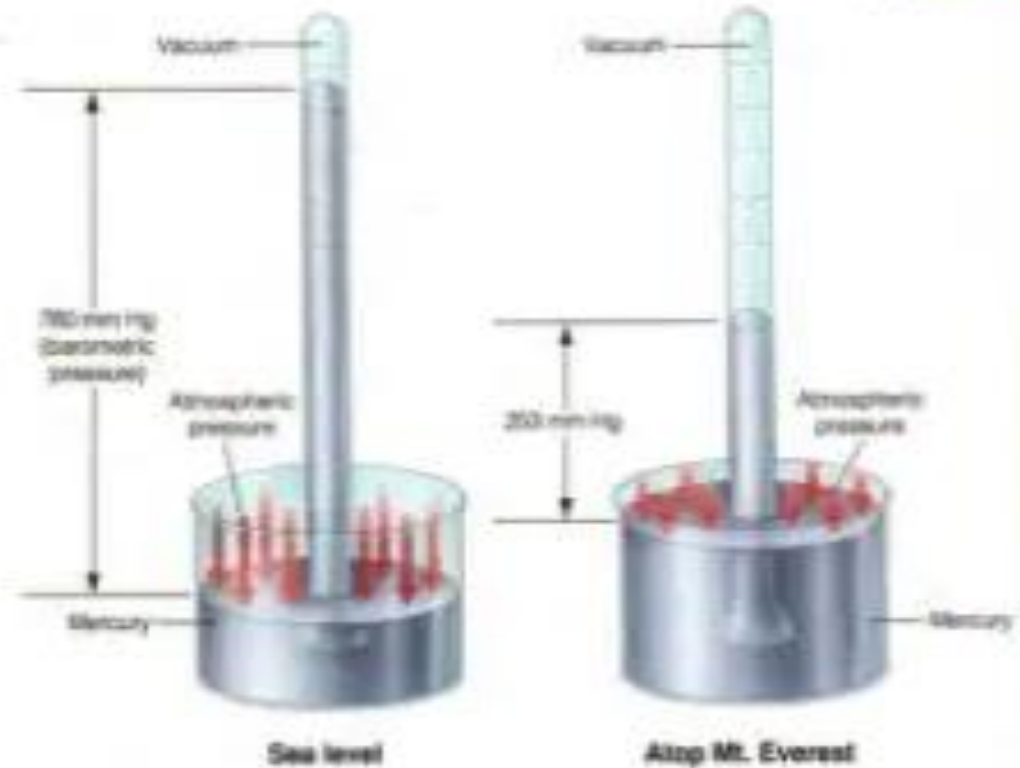


Well Type Manometer

- It consists of a very large-diameter vessel (well) connected on one side to a very small-sized tube. Thus the zero level moves very little when pressure is applied.

## ❖ Barometer.

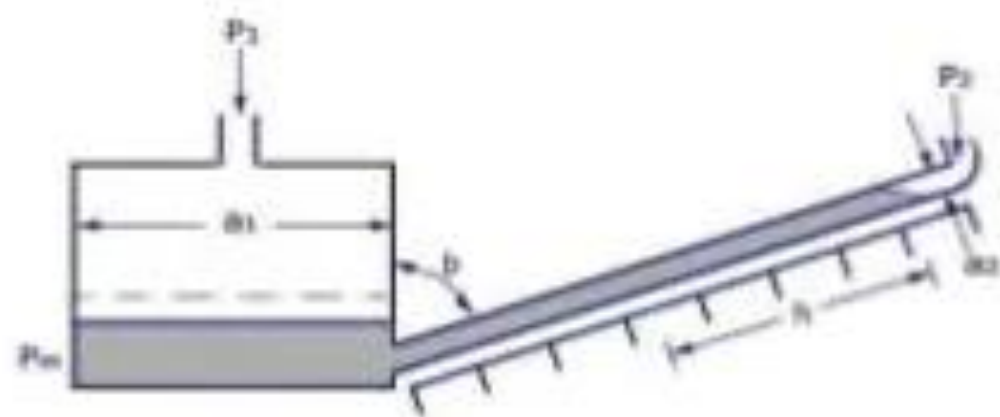
- Principle of working: If one end is at zero absolute pressure then “h” indicates the absolute pressure.
- Well type absolute pressure gauge.
- Its range is from zero absolute to atmospheric pressure.
- High vacuum are not measured.





## ❖ Inclined tube manometer.

- It is slant manometer.
- The angle of measuring leg is about  $10^\circ$ .
- Inclination is done to improve the sensitivity.
- This manometer is used to measure very small pressure difference



Inclined Tube manometer

## ❖ Micromanometer.

- One leg is well type and other leg is inclined tube.
- Inclined leg consist magnifier.
- Initially both well and inclined legs are at same pressure.
- Application of unknown pressure causes meniscus to move towards the reference point.
- The difference between initial & final reading gives change in height.

