18ECO133T

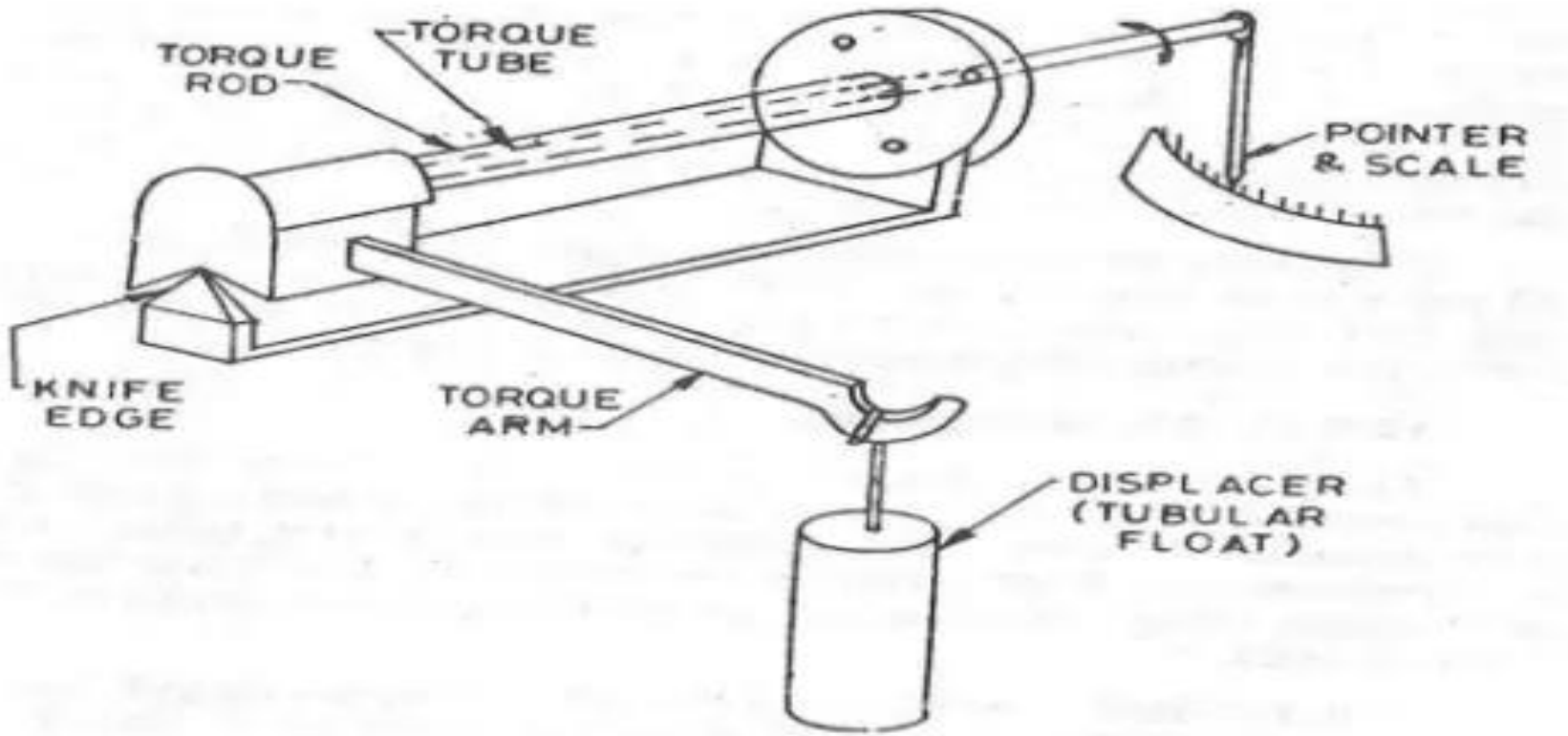
Sensors and Transducers

UNIT V

Session 6: SLO – 2

FLOAT DISPLACEMENT TYPE LEVEL MEASUREMENT

- These instruments work on the Archimedes principle according to which a body when placed in a liquid is buoyed up by a force equal to the weight of the displaced liquid, and the apparent change in weight of the body is directly proportional to the level of liquid in which it is placed.
- Torque tube is the most commonly used device for this purpose.
- The displacer is attached to a torque tube assembly whose rotary motion is used for read out/control.
- Otherwise, this instrument is rugged and simple in construction and reliable in operation. With selection of suitable material for float, float cage, and torque tube, it's possible to use this instrument over a wide range of pressure and for many liquids.



Float Displacement Type Level Measurement

Advantages

- High accuracy —
- Reliable in clean liquids
- Can be mounted internally or externally (external mounted unit can be disconnected for maintenance)
- Adaptable to liquid interface measurement

Disadvantages

- Limited range, devices exceeding 1.2m in length are bulky and difficult to balance
- Cost increases appreciably for externally mounted units as pressure ratings increase
- External units may require stilling chambers

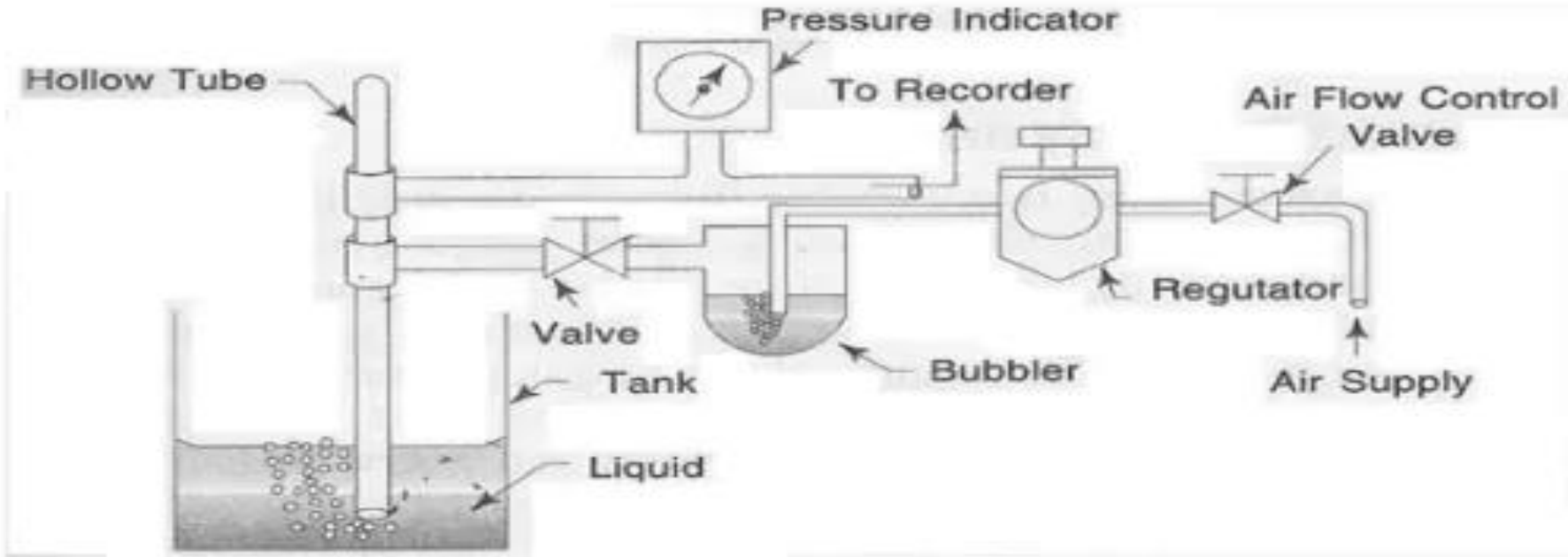
i. HYDROSTATIC PRESSURE TYPE

Hydrostatic pressure methods used for liquid level measurement are listed below.

a. Pressure gauge method
b. Air purge system
c. Diaphragm box type
d. Torque balance type

a. Air purge system

Air purge (bubbler tube) is one of the most popular hydrostatic pressure types of liquid measuring system which is suitable for any liquid as shown in fig.

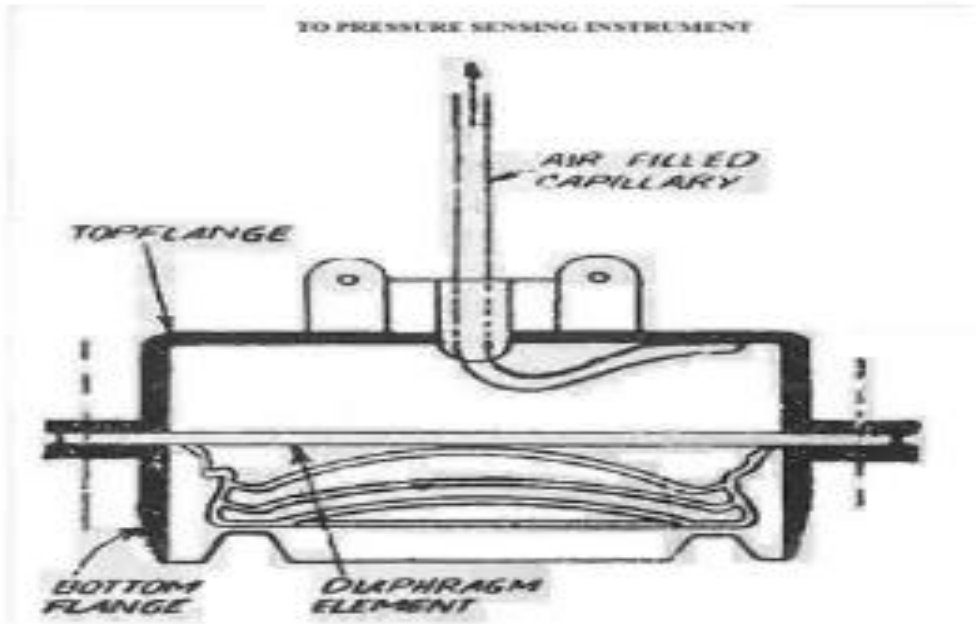


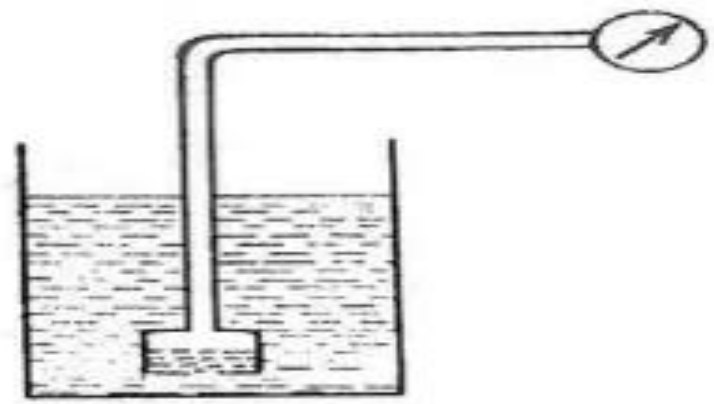
Advantages

- Pressure gauge can be placed above or below the tank level and can be kept as far away as 500 ft (12.7m) from the tank with the help of piping.
- Well - suited for measuring the corrosive/abrasive liquid.

b. DIAPHRAGM BOX METHOD

The diaphragm box liquid level meter is shown in fig. and consist of two flanges in between which is contained a diaphragm element made of rubber or oil resistant synthetic composition.





Advantage

•Where it is necessary to prevent contact b/w liquid and diaphragm, the box may be installed in a well outside the tank and the well is communicated to the tank with an impulse piping. The impulse piping and the well are filled with an inert liquid.

Disadvantage

•The main disadvantage is that the head developed is not sufficient to meet up the line losses as well as for a satisfactory indication. Hence ranges are quite limited.