

Strain Gauge Characteristics

Aim:- To understand the monitoring working principle of strain gauge

Objectives:- 1. Plot the characteristics of strain gauge
2. Understand the effect of various parameters on the strain gauge.

Theory :-

Introduction to strain gauge :-

Strain gauge transducer transforms mechanical elongation and compression into measurable value.

Types of Strain Gauges based on principle of working :-

i) Mechanical :- Used to determine the strain in concrete specimens and structures, rock strata, different part of a structure, in remote areas and under adverse conditions, using a single instrument.

ii) Electrical :- An electrical strain gauge is most commonly used strain gauge. The resistance of strain gauge changes when force is applied and this change will give a different electrical output.

iii) Piezoelectric :-

Piezoelectric sensors comprise two crystal disks with an electrode coil mounted in between. When applying force this results in an electrical charge that can be measured.

Aim :- To study different parts and different types of valves.

Theory :-

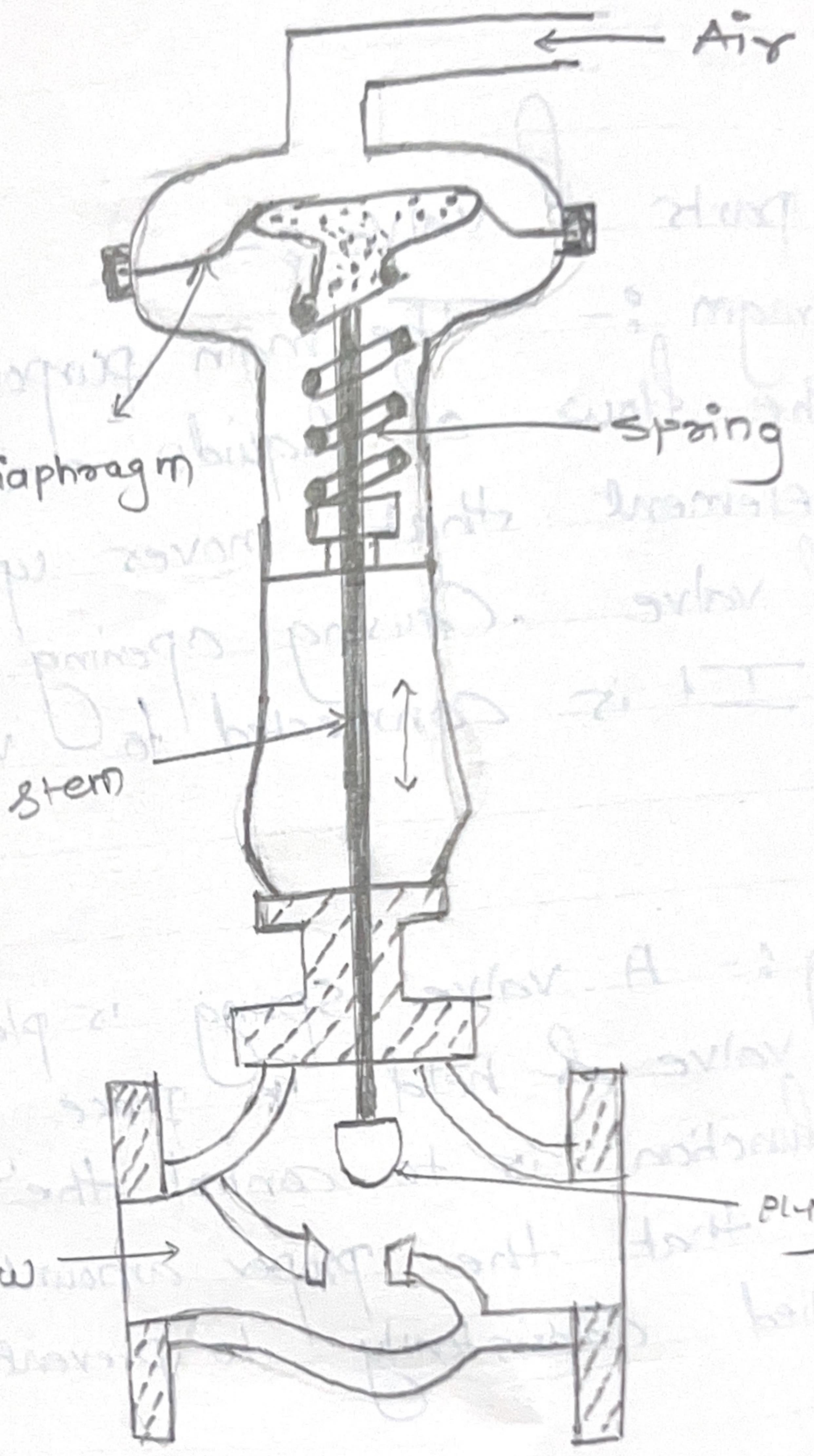
To Study cut section of valve & explain their main parts.

* Main parts of valve :-

1] Diaphragm :- The main purpose of diaphragm is to control the flow of liquids and gases. It is an elastic element that moves up and down within the body of valve, causing opening and closing against a seat. It is connected to valve stem along with spring.

2] Spring :- A valve spring is placed around the stem of a valve & held in place by a retainer. Its main function is to control the entire valve train, ensuring that the proper amount of spring pressure is applied consistently to prevent valve bounce.

3] Valve stem :- Valve stem connects valve plug to the actuator. It is responsible for positioning the valve plug. Valve stem ends upto valve plug for valve designs, valve stem prevents leakage, fine surface finish of the stem in the area of the seat is necessary.



4] Valve Plug :- Valve plug are a type of flow control valve that allows the user to increase or decrease flow by rotating the handle or other similar operation. The user may have to adjust the valve plug to desired flow rate as needed for system to work, with the valve plug it would be able to hold the flow rate consistently and reliably.

5] Seat ring :- The seat ring are also called as seat ring. The seat rings provide the seating surface for the valve plug or disk. In some designs, the body is machined to serve as the seating surface and seal rings are not used.

6] Actuator Stem :- It is interconnected with actuator valve stem.

7] Valve Body :- A major component of the valve and get direct contact with the fluid. The connection to the pipeline : The valve body structure is a frequently encountered.

- (1) Single ported
 - (2) Double ported
 - (3) Two-way valve
 - (4) Three way valve
- The valve body contains valve plug, seat ring, flanges. Therefore, the size and material must be chosen accordingly.

8] Actuator :- Actuator is the next logical area of interest. The operation of a control valve involves positioning its movable part relative to the valve. actuator is to accurately locate the valve plug in a position dictated by the control signal. Actuator is one who actuates some kind of action. In Control Valve the action is displacement. Actuator needs to move valve plug.

Describe and explain the cut section of valve / control valve.

- ① Control valve is used for regulation of fluids, gases etc. It is a pneumatically activated valve.
- ② Seat ring is always fit into the body.
- ③ When valve plug will fit in the seat ring the flow of water will stop, that means no flow of water takes place.
- ④ Valve plug is sealing the seat ring, then no flow of water takes place.
- ⑤ If sealing is not proper then there will be leakage.
- ⑥ The valve plug has to be placed in the seat ring. Valve plug has to be moved in seat ring.
- ⑦ It contains the different main parts of control valve :-
 - i) Valve actuator
 - ii) Valve positioner
 - iii) Valve body.

- i) Valve actuator :- It is used to move valve modulating elements like butterfly or ball.
- ii) Valve positioner :- It is used to check that desired degree of opening is reached or not which overcomes the issues of wear & friction.
- iii) Valve body :- It contains modulating element, globe, plug, butterfly or ball.

Two control actions are possible :-

- i) Air to current to close : Increment of flow restriction as the control signal valve increases.
- ii) Air to current to open : Decrement of flow restriction as the control signal valve increases.

Advantages of control valve :-

- i) It provides control over flow rate
- ii) Effect we & rapid functioning
- iii) durable service life
- iv) can handle corrosive fluids.

Materials used to move control valve :-

- i) Stainless steel - for acids, etc.
- ii) Cast iron, Carbon Steel for normal liquids.

Conclusion :-

Hence we studied and observed about the main parts of valve.

~~26/4/22 (R)~~