

Department of Electrical Engineering

Instrumentation Lab

EE-

Experiment No.-4: Instrumentation of load / force / pressure.

Objective: Study of Load cell as force/load transducer. Obtain the operational and calibration characteristics.

Equipment/Apparatus required: Load measurement tutor, weights of 500gm and 1kg, multi meter.

Theory:

Load cell consists of a rectangular load column, with strain gauges mounted on its sides as shown in figure 1. By applying load or place a weight on the column, the steel column deflects and bonded strain gauges are strained and their resistance changes. These resistance changes are detected in Wheat stone bridge circuit which is excited by constant DC voltage.

Initially when load is not applied the bridge is in balanced position and corresponding output voltage remains zero. By applying the load Wheat stone bridge gets disturbed and we get the corresponding voltage output-analog and digital. This output voltage is calibrated for the weights applied.

Specifications:

Range	: 5 kg
Resolution	: 0.01 kg
Excitation (built in)	: 5.0 V DC
Display	: 3 ½ digit
Adjustments	: Zero adjust, Span calibration
Analog output	: 2V, DC
Power source	: 230V, 50 Hz

Diagram:

Identify the various stages of functional block diagram (figure2) from input to output, from the panel diagram and circuit diagram attached (figure 3) and report

Procedure:

1. Connect Load cell (Force transducer) at the 9 pin connector.
2. Switch on the unit, check : red LED
3. Without any load applied, output (Load indicator) and voltage read zero, balance the load cell by the zero adjustment pot.
4. Set the span of Load cell by applying 5 kg load and adjust span control for full scale deflection as 5.0
5. Now take the reading of both analog and digital output for input loads varied from no load to full load (5kg) in steps of 500gm and record the outputs.

Observations:

S.No	Load applied (kg)	Test Signal(mV)	Analog o/p(V)	Display(kg)
1	No Load	0.0	0.0	0.0
2	0.5			
3	1.0			
4.	1.5			
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11	5.0			

Results:

Plot the graphs: Load v/s voltage output; Load v/s Display of load applied.

Precautions:

Do not apply the loads suddenly. It will damage.

Discussion:

1. Derive the expression for output voltage of wheat stone bridge if it is in full bridge model.
2. Report the operation of various stages of functional block diagram.
3. What could be two industrial applications? Explain.

References :

1. Principle of Industrial instrumentation- Patranabis,D.
2. Instrumentation-Devices & Systems- Rangan, Sarma, Mani

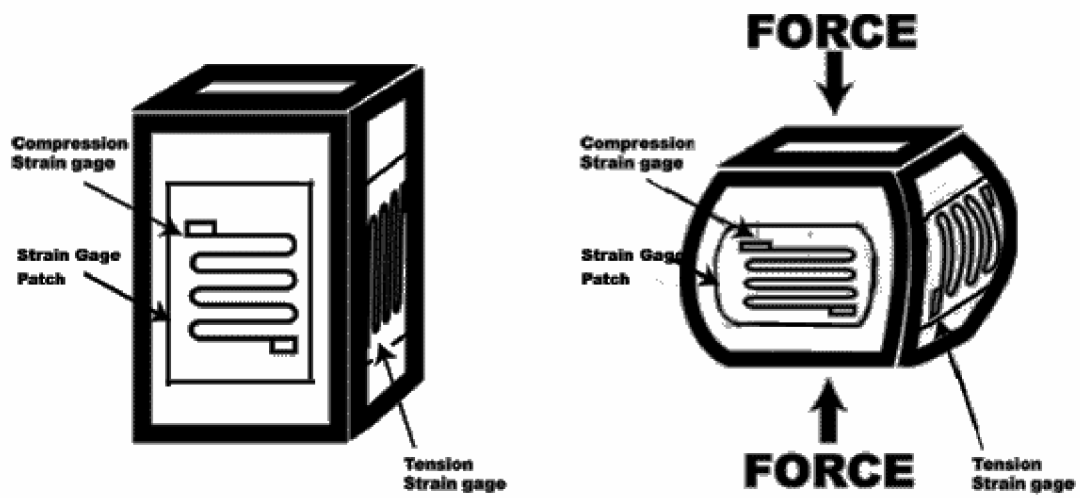


Figure: 1 configuration of Load cell

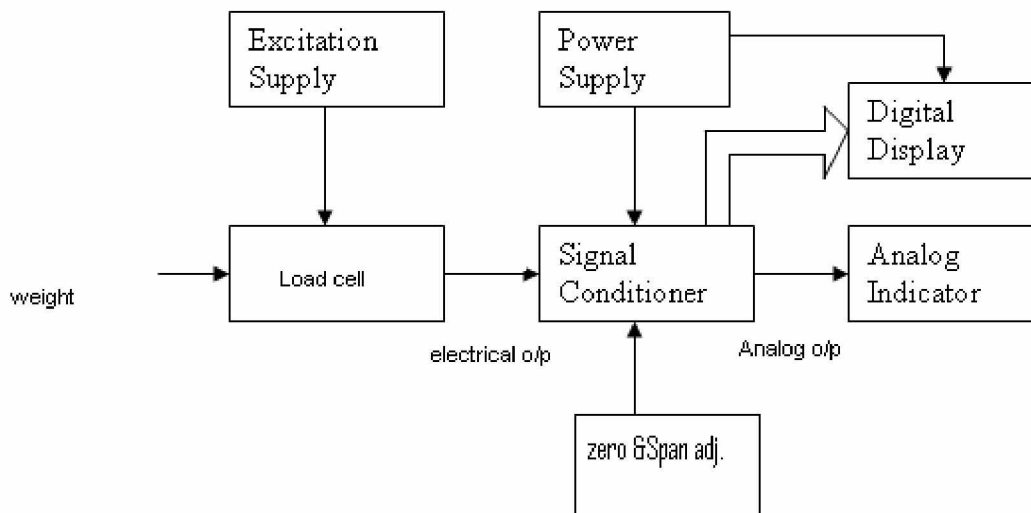


Figure: 2 Functional block diagram of Load cell tutor