

## Load cell and Load cell Types

There are two types of Load Cells, they are

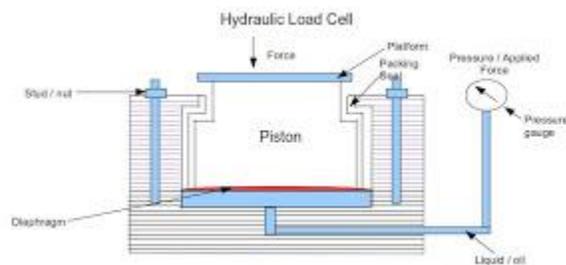
1. Hydraulic load cells
2. Pneumatic load cells

### Hydraulic Load Cell

Basic Principle of Hydraulic Load cell

When a force is applied on a liquid medium contained in a confined space, the pressure of the liquid increases. This increase in pressure of the liquid is proportional to the applied force. Hence a measure of the increase in pressure of the liquid becomes a measure of the applied force when calibrated.

## Description of Hydraulic Load Cell



The main parts of a hydraulic load cell are as follows

A diaphragm

A piston with a loading platform (as shown in figure) placed on top of the diaphragm.

A liquid medium which is under a pre-loaded pressure is on the other side of the diaphragm.

A pressure gauge (bourdon tube type) connected to the liquid medium.

## Operation of Hydraulic Load Cell

The force to be measured is applied to the piston.

The applied force moves the piston downwards and deflects the diaphragm and this deflection of the diaphragm increases the pressure in the liquid medium (oil).

This increase in pressure of the liquid medium is proportional to the applied force. The increase in pressure is measured by the pressure gauge which is connected to the liquid medium.

The pressure is calibrated in force units and hence the indication in the pressure gauge

becomes a measure of the force applied on the piston.

Note about Hydraulic Load cell:

As the hydraulic load cell is sensitive to pressure changes, the load cell should be adjusted to zero setting before using it to measure force.

This hydraulic load cell have an accuracy of the order of 0.1 percent of its scale and can measure loads upto upto  $2.5 \times 10^5$  Kgf

The resolution is about 0.02 percent.

## Pneumatic Load Cell

Basic Principle of Pneumatic Load Cell

If a force is applied to one side of a diaphragm and an air pressure is applied to the other side, some particular value of pressure will be necessary to exactly balance the force. This pressure is proportional to the applied force.

## Description of pneumatic Load cell

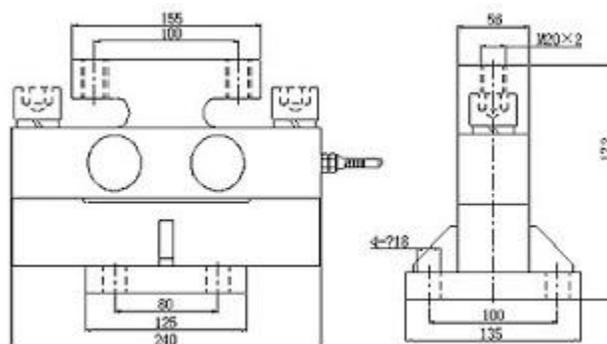
The main parts of a pneumatic load cell are as follows:

A corrugated diaphragm with its top surface attached with arrangements to apply force.

An air supply regulator, nozzle and a pressure gauge arranged as shown in figure.

A flapper arranged above the nozzle as shown in figure.

## Operation of Pneumatic Load cell



The force to be measured is applied to the top side of the diaphragm. Due to this force, the diaphragm deflects and causes the flapper to shut-off the nozzle opening. Now an air supply is provided at the bottom of the diaphragm. As the flapper closes the nozzle opening, a back pressure results underneath the diagram. This back pressure acts on the diaphragm

producing an upward force. Air pressure is regulated until the diaphragm returns to the pre-loaded position which is indicated by air which comes out of the nozzle. At this stage, the corresponding pressure indicated by the pressure gauge becomes a measure of the applied force when calibrated.

## **Note:**

The pneumatic load cell can measure loads upto  $2.5 \times 10^3$  Kgf.  
The accuracy of this system is 0.5 percent of the full scale.

Source:

<http://instrumentationandcontrollers.blogspot.in/2010/11/load-cell-and-load-cell-types.html>