

About the "O" Ring Influence

Referring to the drawing below which displays an encapsulated sensor, when the Pressure is applied, it is clear that the bending of the membrane is limited by its Effective Diameter D_m (as the red sealing area between the membrane and the Base Plate is not moving). Consequently, the sensitivity of the sensor is determined by the effective diameter and the thickness of the membrane (all other physical parameters are supposed to be known).

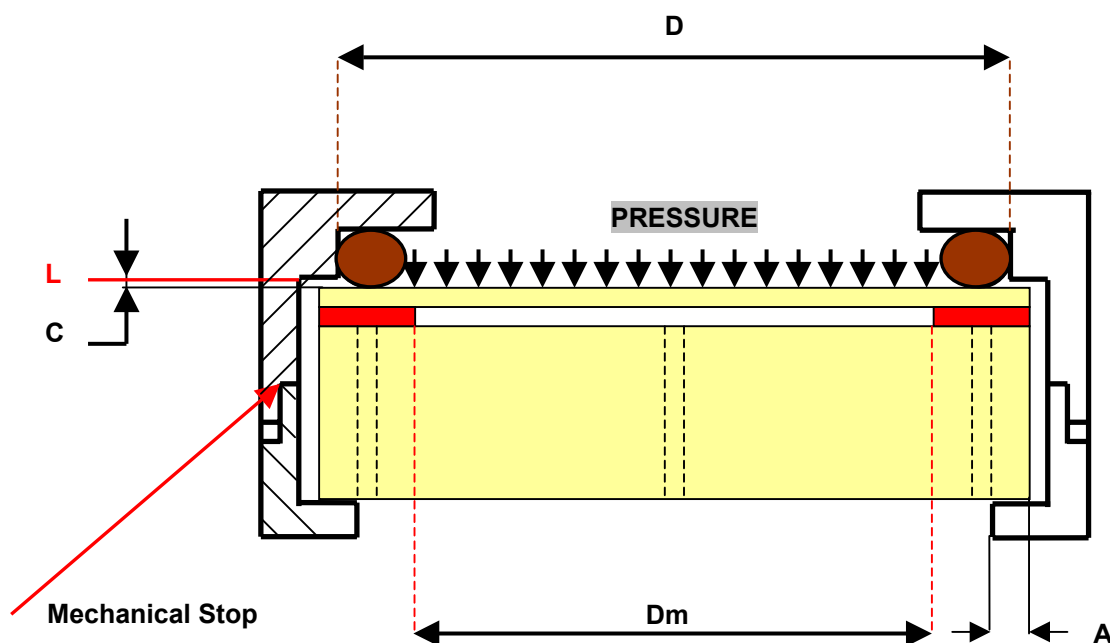
One could think that the force generated on the sensor by the application of the Pressure is $F = P \times S = P \times \pi \times D_m^2 / 4$.

In practice, this is not true because the "O" Ring composed of a smooth material behaves as if it were a part of the Fluid.

Then, it is justified to consider that the Force generated is proportional to D^2 instead of D_m^2 .

Thus, it comes : $F = P \times \pi \times D^2 / 4$

That force lays on the "A" circular area of the metal housing.



In order to avoid an excessive force applied on the small A circular area, it is then necessary to keep the external diameter of the "O" Ring as low as possible. Otherwise, if the pressure resulting from the F force applied on the area A ($P = F / A$) is too high, this generates a high internal stress inside the Base Plate of the sensor which reacts on the membrane and then modifies its normal behavior.



Technical Note # TN03 (continued)

This is why it is strongly recommended to follow our Instructions for use giving the appropriate size of the "O" Ring for each pressure range (for a given Model).

It is also important to respect the Shore A Hardness recommended in our instructions, for each range.

Usually the "O" Ring should be tightened in such a way that its diameter decreases by about 20 to 25 % when it is pressed by the assembly of mechanical parts.

Another very important matter is to design the housing so that when the "O" Ring is pressed, it always remains a C clearance as shown on the drawing, to make sure that the membrane never comes in touch with the L line. In that case, the sensor remains "floating" inside the housing and gives the right performance.

The best solution for this purpose is to design the assembly of mechanical parts, so that there is somewhere a "mechanical stop" which limits the compression of the "O" Ring, instead of trying to specify a maximum torque to apply.

Following those basic rules will allow to take advantage of the full performance of the sensor.

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