

# DIAPHRAGM SEAL REFURBISHMENT / REPAIR SERVICE



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Collaborating with

**PCI**  
INSTRUMENTS

# Diaphragm Seals Refurbishment and Instrument Calibration

In collaboration with PCI Instruments, Shridhan Automation provides a comprehensive Repair and Calibration Service for Pressure Transmitters with Diaphragm Seals. A repair can be a quick and a cost-effective option. Most repairs can be completed and returned to the customer within 7 to 10 business days. This can save on the long delivery times and frustration associated with buying a new replacement.

## When to use Diaphragm Seals?

A diaphragm seal is a flexible membrane that seals and isolates an enclosure. The flexible nature of this seal allows pressure effects to cross the barrier but not the material being contained. Common uses for diaphragm seals are to protect pressure sensors from the process fluid whose pressure is being measured.

A diaphragm seal can be mounted to almost all pressure instruments. They are mostly used in combination with pressure (gauge or differential) transmitters, but also in combination with pressure gauges and pressure switches.

## Protect the Instrument and Process Medium



Corrosive



Extremely hot



Viscous or contains solid particles



Sterile (Important to eliminate formation of bacteria)

## Diaphragm Seal Advantages

- **Laser welded seals**
- **Low volume capacity** : Reduced fill fluid capacity prevents measurement errors caused by temperature, minimizes potential process contamination.
- **Backup diaphragm convolution** : Helps diaphragm maintain original form. Protects the diaphragm against rupture.
- **Recessed diaphragm** : Protects diaphragm from installation damage. Minimizes chances of gasket induced errors. We use a convoluted base on our seals which mirrors the diaphragm to add strength and reduce the risk of rupture should a serious pressure overload take place within the process system.

## Fill Fluids

Most liquids naturally contain microscopic amounts of dissolved gases. These gases expand or contract with ambient and process temperatures, which affects the fill fluids volume.

The fluctuation of the fill fluid volume inside a filled system can be detrimental to the accuracy of a pressure instrument. The instrument's sensing element misinterprets it as a pressure change. Resulting in measurement errors.



Fill Fluids

## Selection of Filling Fluid

The selection of the filling fluid is dependent on factors such as temperature, pressure, response time and process safety. Most used filling fluids are of silicone oil variants. Other special types can also be made available up to process temperatures of 400 °C.



Turbo Filling Station

## Usage of Capillary Lines

The diaphragm seals and the pressure instrument can be connected by means of a stainless-steel capillary with a flexible armor. The length of capillary should be carefully selected for best results and to ensure a balanced system.



DP Transmitters with Capillary and Remote Seals

## Various types of Diaphragm Seals

There are various types of Diaphragm Seals, such as threaded and flanged executions, with connections for hygienic requirements. Typically diaphragm seals are made of stainless-steel Construction; however, we also specialize in exotic metal diaphragm seals. These are required for aggressive applications within the Nuclear, Oil + Gas and Chemical Industries – and are the most common material that typically requires refurbishment.

## How does Refurbishment Process work?

When Shridhan receives the transmitter with diaphragm seal system, it is assessed, and the transmitter functionality is engineers by one of our engineers. A quotation for the repair of the **diaphragm seals portion ONLY** will be sent based on the engineers' report. On acceptance of the quote all reusable parts are cleaned while non-reusable parts are replaced from our large stock of components. We will machine new parts when required to save time and cost. Often, we will fit a completely new diaphragm seal assembly to the transmitter. When the repair is complete and has passed a calibration test, it is promptly returned with a new calibration certificate according to the end user's specifications.

**Differential / Gauge Pressure transmitters with remote diaphragm seal assemblies are some of the most common types of process instruments we refurbish.**

## Types of damages

### 1. Diaphragm is "bulged"

Diaphragm has bulge: A diaphragm that is bulging outwards can be a sign that the process medium temperatures are too high for the fill fluid behind the diaphragm. This has caused the fill fluid to cook and expand pushing the diaphragm out.



### 2. Diaphragm is "blown up"

Severely ruptured diaphragms can have this appearance. They can be a sign that the fill fluid has leaked and is on a vacuum. It may also be caused by a high-pressure water jet being directed at the diaphragm causing serious damage.



### 3. Diaphragm has "dents"

The thickness of most diaphragms is around 0.05mm or 0.075mm. This is necessary so they are sensitive enough to react under even small pressures. However, this makes them very vulnerable to damage if they are not handled with care. A dented diaphragm will no longer give an accurate reading.



## 4. Diaphragm is “ruptured”

When a diaphragm is ruptured its possible for the process medium to pass through the diaphragm membrane to the instrument’s measuring element. The process fluid is contaminated with the fill fluid and the instrument appears initially to operate as normal. In the meantime, the process could be corroding or damaging the inside of the instrument and diaphragm body.



## Advantages of Diaphragm Seal Refurbishment

- Most repairs can be completed and returned to the customer within 7 to 10 business days – ideal in case of urgent maintenance situations where new instruments have longer deliveries or additional premium costs
- All our diaphragm seals are helium leak tested
- Significantly economic than ordering a completely new instrument (transmitter + seal assembly)
- Universal diaphragm seal assembly for **any brand** of transmitter
- Warranty provided on the diaphragm seal system like a new product supply
- Supplied with standard calibration certificate and complete unit is certified for use at site



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