Chemical / Diaphragm Seal Unit

MODEL : CSU

Features

What is a Diaphragm Seal?

A diaphragm seal is a device in which a flexible membrane (diaphragm) seals and isolates the measuring instrument from the process medium. The instrument side of the diaphragm is filled with appropriate fluid. The pressure exerted by the process fluid on the Diaphragm is hydraulically transmitted through the seal fluid to the pressure sensing element. Diaphragm seal protects the pressure sensor from the harmful and hazardous effect the process fluid.

Where Diaphragm Seal is essential?

- Corrosive process fluid
- Highly viscous process fluid
- Process fluid having sediments or solid particles
- Process fluid having tendency to solidify, freeze or crystallize at lower temperatures which may block the sensing element.
- Hazardous process fluid

Specifications

The generally offered MOC is as follows :

Non wetted parts: CS, SS304, SS316
Diaphragm : SS316, SS316L, PTFE, SS PTFE coated, Titanium, Hastelloy B, Hastelloy C, Nickel, Monel, Tantalum
Wetted Parts : SS316, SS304L, SS316L, SS PTFE coated / lined/ block, Hastelloy B, C.
Filling Fluids :
Silicone Oil, DC-200 (-45°C to 205°C)
DC-704 (0 to 315°C)
DC-705 (20 to 350°C, Short term exposure up to 400°C)
DC-710 (5 to 345°C)
Fluorolube Oil (-40°C to 150°C)
Glycerine (5 to 80°C)
Halocarbon Oil (-40°C to 235°C)
Food Grade Vegetable Oil (5 to 182°C)

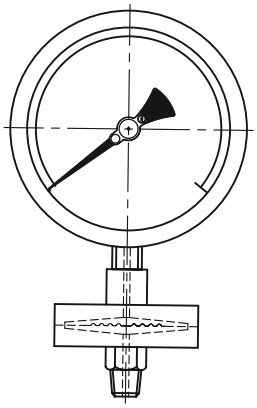
Optional Feature:
- Capillary for Remote mounting of the Pressure Instrument
- Flushing Ring (Spacer Ring) for purging / cleaning the area below the diaphragm without removing the Seal from the process line.
- Stud / Nut & Gasket, for assembling the Diaphragm Seal with Process Flange.

Different types of Diaphragm Seal offered:

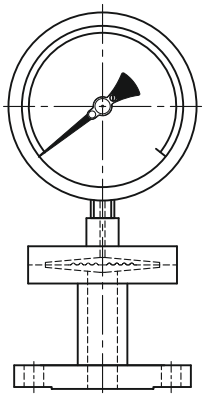
1) Sandwich Type (Threaded or Flanged Connection)
2) Flush Diaphragm Seal (Flanged Connection only)
3) Pan Cake type Diaphragm Seal (Flanged Connection only)
4) Extended diaphragm seal (Flanged Connection only)
5) In line flow through type (Flanged or Weld in connection)
6) In line flow through Jacketed type (Flanged or Weld in connection)

Note :
Proper selection of diaphragm seal (Type & Material) is important after reviewing the application. Purchaser must confirm the suitability of the MOC suggested.

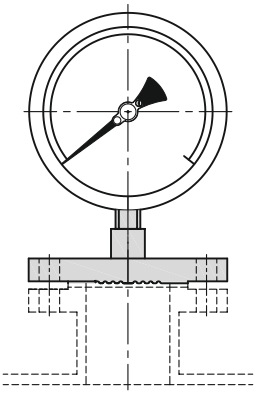
Sketches of Different types of Diaphragm Seals



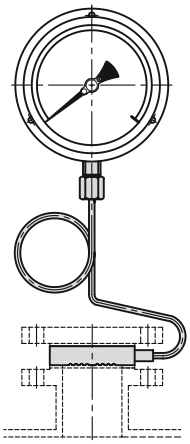
1) Sandwich type, Threaded Conn.



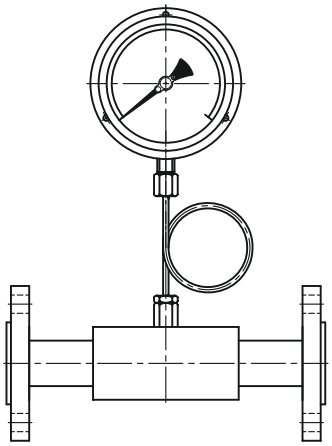
2) Sandwich type, Flange Conn.
(with " I " Section)



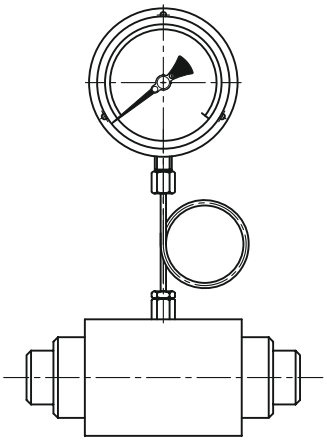
3) Flush Diaphragm Seal
(Flange Conn. only)



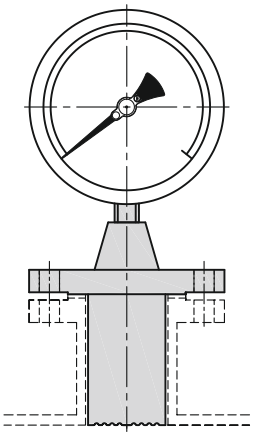
4) Pan Cake type Diaphragm Seal
(Flange Conn. only)



5) In-Line Diaphragm Seal
(Flanged Conn. shown, Weld in conn. also available)



6) Jacketed In-Line Diaphragm Seal
(Weld in Conn. shown, Flange conn. also available)



7) Extended type diaphragm seal
(Flange Conn. only)

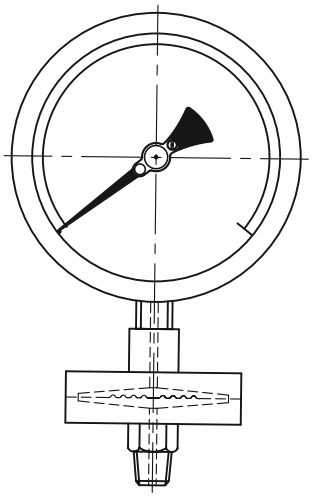
Sandwich type Diaphragm Seal

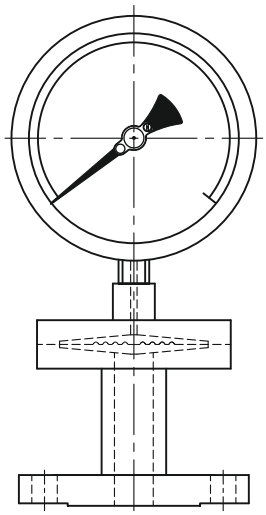
MODEL : CSU

Features

Sandwich type diaphragm seals are the most commonly used diaphragm seals. The diaphragm is sandwiched between top chamber and bottom chamber/flange. These are available threaded as well as flanged process connection. For low pressure range and smaller flange sizes, 'I' section type diaphragm seals are used.

Optionally, flushing connection of 1⁄4" NPT(F) or 1⁄2" NPT(F) can be provided which enables the user to flush out/clean the area below the diaphragm without removing the seal from the process line. For threaded process connection and flange connection with 'I' section, flushing connection shall be directly provided on the bottom chamber. For bigger flange sizes, separate flushing rings (spacer rings) are usually provided.





Optional Feature

- **Cooling tower**
- **Capillary** for remote mounting of the pressure instrument
- **Integral flushing connection or flushing ring (spacer ring)** for purging/cleaning the area below the diaphragm without removing the seal from the process line.
- **Stud/Nut and Gasket** (for flanged connection only), for assembling the diaphragm seal with process flange.

Ordering Information

SANDWICH DIAPHRAGM SEAL (Threaded or Flange)

MODEL: CSU- [ ] [ ] [ ] [ ] [ ] [ ] [ ]

CONNECTION TYPE

SDT	Sandwich type, Threaded Conn.
SDF	Sandwich type, Flanged Conn.

TOP CHAMBER

C	CS
S4	SS304
S6	SS316
XX	Other (Please Specify)

DIAPHRAGM

S6	SS316	M4	Monel 400
SL	SS316L	TI	Titanium
ST	SS316Ti	NI	Nickel
SP	SS316+PTFE	TA	Tantalum
S1	SS321	SI	Silver
HB	Hastelloy B	GP	Gold Plated
HC	Hastelloy C	GL	Gold
PT	PTFE		
XX	Others (Please Specify)		

BOTTOM CHAMBER / FLANGE

S6	SS316	I8	Incoloy 800
SL	SS316L	HB	Hastelloy B
ST	SS316Ti	HC	Hastelloy C
SP	SS316+PTFE	TI	Titanium
S1	SS321	NI	Nickel
M4	Monel 400	TA	Tantalum
XX	Others (Please Specify)		

PROCESS CONNECTION

THREADED

CODE	SIZE	TYPE		MALE / FEMALE		METRIC THREADS	
6	1/4"	NT	NPT	M	Male	18 M	M 18 x 1.5
10	3/8"	BP	BSP	F	Female	20 M	M 20 x 1.5
15	1/2"	BT	BSPT			24 M	M 24 x 1.5
20	3/4"	PF	PF			27 M	M 27 x 2
25	1"	GS	Gas			33 M	M 33 x 2
32	1.1/4"	NS	NPS			XX	Any other
40	1.1/2"						

FLANGED

CODE	SIZE	CODE	RATING	CODE	FACING
15	½"	A	150#	RF	RF
20	¾"	B	300#	FF	FF
25	1"	C	600#	RTJ	RTJ
40	1½"	D	900#	LT	LT
50	2"	E	1500#	LG	LG
80	3"	F	2500#		

OPTION

CT	Cooling Tower
AR(*)	Capillary : SS+SS armoured
PV(*)	Capillary : SS+SS armoured + PVC covered
FC06	Integral Flushing Connection, 1/4" NPT(F)
FC15	Integral Flushing Connection, 1/2" NPT(F)
FR06(**)	Flushing Ring, 1/4" NPT(F)
FR15(**)	Flushing Ring, 1/2" NPT(F)
ST	Stud & Nuts
GK	Gasket
L	Nil

FILLING FLUID

F	Fluorolube
G	Glycerine
H	Halocarbon
S	Silicone Oil DC-200
V	Food grade oil
D1	DC-710
D4	DC-704
D5	DC-705

* Specify the length of Capillary in Meters.
** Specify Ring material (Refer Bottom Chamber / Flange table)

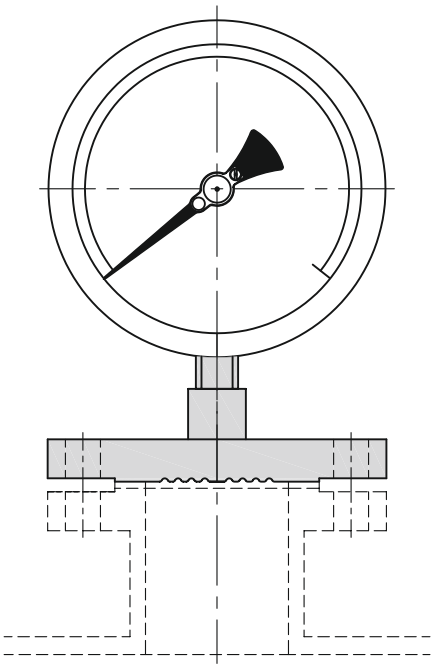
Flush Diaphragm Seal

MODEL : CSU

Features

Process fluids which are highly viscous or containing solid particles could plug or clog the diaphragm seal cavity on the process side of the diaphragm. In order to overcome this difficulty, a flush diaphragm seal is used. In this design, since the diaphragm is directly welded on the flange face, there are no cavities or hidden ports where the process fluid can enter and clog the system.

Optionally, flushing ring (spacer ring) with 1/4" NPT(F) or 1/2" NPT(F) connection can be provided as per the requirement. Flushing connection enables the user to purge/flush out/clean the area below the diaphragm without removing the seal from the process line.



Optional Feature

- **Cooling Tower**
- **Capillary** for remote mounting of the pressure instrument
- **Flushing Ring (Spacer Ring)** for purging/cleaning the area below the diaphragm without removing the seal from the process line.
- **Stud/Nut & Gasket** (for flanged connection only), for assembling the diaphragm seal with process flange.

Ordering Information

FLUSH DIAPHRAGM SEAL (Flange)

MODEL: CSU- [ ] [ ] [ ] [ ] [ ] [ ]

TYPE

FD	Flush Diaphragm Seal

FLANGE (Non-wetted part)

C	CS
S4	SS304
S6	SS316
SL	SS316L
XX	Other (Please Specify)

DIAPHRAGM (wetted part)

S6	SS316	TI	Titanium
SL	SS316L	NI	Nickel
ST	SS316Ti	TA	Tantalum
S1	SS321	SI	Silver
HB	Hastelloy B	GP	Gold Plated
HC	Hastelloy C	GL	Gold
M4	Monel 400		
XX	Others (Please Specify)		

PROCESS CONNECTION

FLANGED

CODE	SIZE	CODE	RATING	CODE	FACING
25	1”	A	150#	RF	RF
40	1½”	B	300#	FF	FF
50	2”	C	600#	RTJ	RTJ
80	3”	D	900#	LT	LT
		E	1500#	LG	LG
		F	2500#		

OPTION

CT	Cooling Tower
AR(*)	Capillary : SS+SS armoured
PV(*)	Capillary : SS+SS armoured + PVC covered
FR06(**)	Flushing Ring, 1/4" NPT(F)
FR15(**)	Flushing Ring, 1/2" NPT(F)
ST	Stud & Nuts
GK	Gasket
L	Nil

FILLING FLUID

F	Fluorolube
G	Glycerine
H	Halocarbon
S	Silicone Oil DC-200
V	Food grade oil
D1	DC-710
D4	DC-704
D5	DC-705

* Specify the length of Capillary in Meters.
** Specify Ring material (Refer Bottom Chamber / Flange table)

Pan Cake type Diaphragm Seal

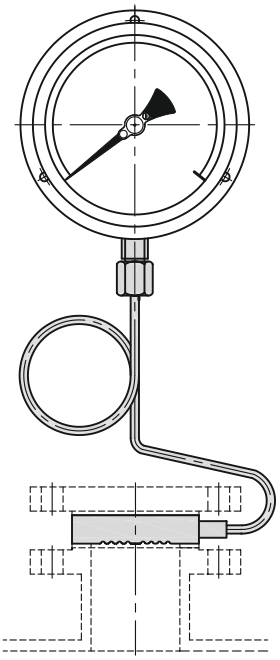
MODEL : CSU

Features

Pan cake type diaphragm seal is sandwiched between the instrument flange (loose back-up flange) and process (nozzle) flange. It is always provided with capillary for the remote mounting of the pressure instrument.

Pan cake type diaphragm seals are ideal for fluids which are viscous or containing solid particles. The diaphragm is directly welded to the pan cake unit and there are no cavities or hidden ports where the process fluid can enter and clog the system.

Optionally, flushing ring (spacer ring) with 1⁄4" NPT(F) or 1⁄2" NPT(F) connection can be provided as per the requirement. Flushing connection enables the user to purge/flush out/clean the area below the diaphragm without removing the seal from the process line.



Optional Feature

- **Flushing Ring (Spacer Ring)** for purging/cleaning the area below the diaphragm without removing the seal from the process line.
- **Stud/Nut & Gasket** for assembling the diaphragm seal with process flange.

Ordering Information

PAN CAKE DIAPHRAGM SEAL (Flange)

MODEL: CSU- [ ] [ ] [ ] [ ] [ ] [ ] [ ]

TYPE
PC Pan Cake Diaphragm Seal

MOUNTING FLANGE (Non-wetted part)
C CS
S4 SS304
S6 SS316
SL SS316L
XX Other (Please Specify)

PAN CAKE UNIT (wetted part)
S6 SS316
SL SS316L
ST SS316Ti
S1 SS321
HB Hastelloy B
M4 Monel 400
TI Titanium
NI Nickel
HC Hastelloy C
XX Others (Please Specify)

DIAPHRAGM (wetted part)
S6 SS316
SL SS316L
ST SS316Ti
S1 SS321
HB Hastelloy B
HC Hastelloy C
M4 Monel 400
TI Titanium
NI Nickel
TA Tantalum
SI Silver
GP Gold Plated
GL Gold
XX Others (Please Specify)

PROCESS CONNECTION

FLANGED

CODE	SIZE	CODE	RATING	CODE	FACING
40	1½"	A	150#	RF	RF
50	2"	B	300#	FF	FF
80	3"	C	600#	RTJ	RTJ
		D	900#	LT	LT
		E	1500#	LG	LG
		F	2500#		

OPTION
AR(*) Capillary : SS+SS armoured
PV(*) Capillary : SS+SS armoured + PVC covered
FR06(**) Flushing Ring, 1/4" NPT(F)
FR15(**) Flushing Ring, 1/2" NPT(F)
ST Stud & Nuts
GK Gasket
L Nil

FILLING FLUID
F Fluorolube
G Glycerine
H Halocarbon
S Silicone Oil DC-200
V Food grade oil
D1 DC-710
D4 DC-704
D5 DC-705

* Specify the length of Capillary in Meters.
** Specify Ring material (Refer Bottom Chamber / Flange table)

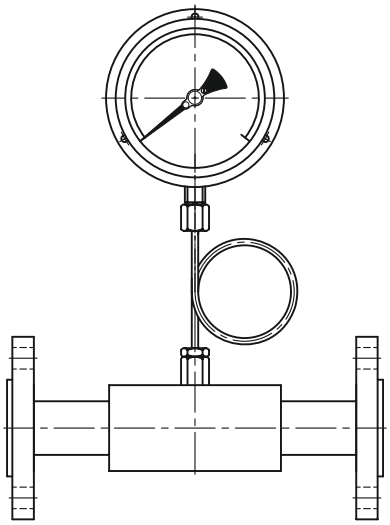
In-Line Flow through type Diaph. Seal

MODEL : CSU

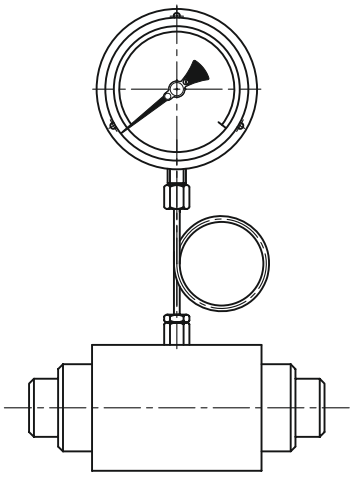
Features

In-Line Diaphragm Seal:
In line diaphragm seals are installed directly in the process flow line. These are referred to as 'In-line' or 'Flow-through' types. This diaphragm seal is so designed that the diaphragm is essentially flush with the flow stream and thus continually washed by the process media. Inline diaphragm seals are recommended when the process media is slurry or a liquid that contains a solid component or viscous.

Jacketed In-Line Diaphragm Seal:
Jacketed In line Diaphragm Seals are used when the process fluid has a freezing point at normal ambient temperatures. Jacket helps the diaphragm seal to externally heat the process fluid by means of steam or thermic fluid. Thus it prevents the process fluid from solidifying and keeps the same at elevated temperature as per the requirement.



In-Line Diaphragm Seal (Flanged)



Jacketed In-Line Diaphragm Seal (Weld in)

Optional Feature

- **Capillary** for remote mounting of the pressure instrument
- **Stud / Nut & Gasket** for assembling the diaphragm seal with process flange.

Ordering Information

IN LINE DIAPHRAGM SEAL (Flange)

MODEL: CSU- [ ] [ ] [ ] [ ] [ ] [ ] [ ]

TYPE

IFW	In line flow through type, Weld in connection
IFF	In line flow through type, Flanged connection
IJW	In line flow through type, Jacketed, Weld in connection
IJF	In line flow through type, Jacketed Flanged connection

NON-WETTED PART

C	CS
S4	SS304
S6	SS316
SL	SS316L
XX	Other (Please Specify)

DIAPHRAGM (wetted part)

S6	SS316
SL	SS316L
XX	Others (Please Specify)

FLANGE & WETTED PARTS

S6	SS316
SL	SS316L
XX	Others (Please Specify)

PROCESS CONNECTION

WELD IN PIPE SIZE

CODE	SIZE	PIPE SCHEDULE	CODE
15	1/2”	40	A
20	3/4”	80	B
25	1”	160	C
32	1-1/4”	XXS	D
40	1-1/2”	Any Other	Z
50	2”		

FLANGED

CODE	SIZE	CODE	RATING	CODE	FACING
15	½”	A	150#	RF	RF
20	¾”	B	300#	FF	FF
25	1”	C	600#	RTJ	RTJ
40	1½”	D	900#	LT	LT
50	2”	E	1500#	LG	LG
80	3”	F	2500#		

OPTION

CT	Cooling Tower
AR(*)	Capillary : SS+SS armoured
PV(*)	Capillary : SS+SS armoured + PVC covered
ST	Stud & Nuts
GK	Gasket
L	Nil

FILLING FLUID

F	Fluorolube
G	Glycerine
H	Halocarbon
S	Silicone Oil DC-200
V	Food grade oil
D1	DC-710
D4	DC-704
D5	DC-705

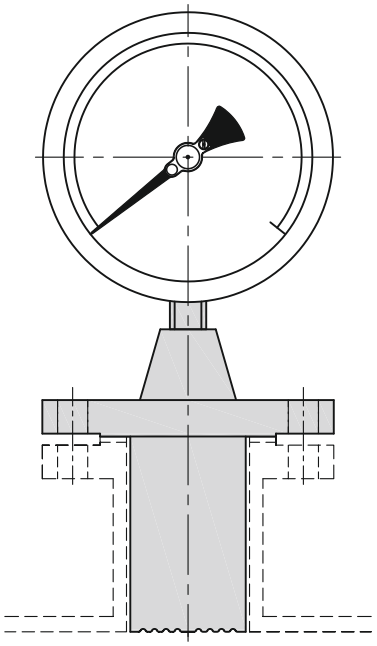
* Specify the length of Capillary in Meters.

Extended Diaphragm Seal

MODEL : CSU

Features

Extended diaphragm seal is mounted on the nozzle flange of the process pipe line. The diaphragm is extended to the process media though the nozzle. The length and diameter of the extension is decided as per the process requirement and nozzle diameter. The diaphragm is directly extended through the nozzle and preventing clogging or other obstructions in the connection nozzle. Extended diaphragm seals are suitable for corrosive, highly viscous, crystallizing or hot pressure media.



Optional Feature

- **Cooling Tower**
- **Capillary** for Remote mounting of the pressure instrument
- **Stud/Nut & Gasket** for assembling the diaphragm seal with process flange.

Ordering Information

EXTENDED DIAPHRAGM SEAL (Flange)

MODEL: CSU- [ ] [ ] [ ] [ ] [ ] [ ] [ ]

TYPE

ED	Extended Diaphragm Seal

FLANGE

S6	SS316	M4	Monel 400
SL	SS316L	TI	Titanium
ST	SS316Ti	NI	Nickel
S1	SS321	HC	Hastelloy C
HB	Hastelloy B	I8	Incoloy 800
XX	Others (Please Specify)		

DIAPHRAGM (wetted part)

S6	SS316	M4	Monel 400
SL	SS316L	TI	Titanium
ST	SS316Ti	NI	Nickel
S1	SS321	TA	Tantalum
HB	Hastelloy B	SI	Silver
HC	Hastelloy C	GP	Gold Plated
XX	Others (Please Specify)	GL	Gold

EXTENSION UNIT

S6	SS316	M4	Monel 400
SL	SS316L	TI	Titanium
ST	SS316Ti	NI	Nickel
S1	SS321	HC	Hastelloy C
HB	Hastelloy B	I8	Incoloy 800
XX	Others (Please Specify)		

PROCESS CONNECTION

FLANGED

CODE	SIZE	CODE	RATING	CODE	FACING
40	1½"	A	150#	RF	RF
50	2"	B	300#	FF	FF
80	3"	C	600#	RTJ	RTJ
100	4"	D	900#	LT	LT
		E	1500#	LG	LG
		F	2500#		

OPTION

CT	Cooling Tower
AR(*)	Capillary : SS+SS armoured
PV(*)	Capillary : SS+SS armoured + PVC covered
ST	Stud & Nuts
GK	Gasket
L	Nil

FILLING FLUID

F	Fluorolube
G	Glycerine
H	Halocarbon
S	Silicone Oil DC-200
V	Food grade oil
D1	DC-710
D4	DC-704
D5	DC-705

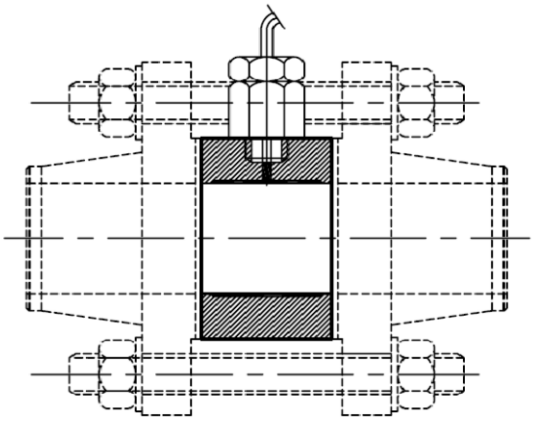
* Specify the length of Capillary in Meters.

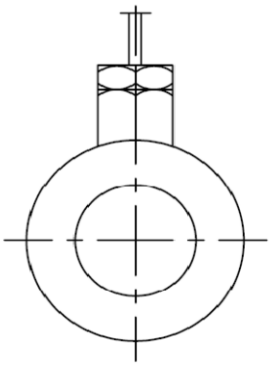
In-line Flow through type Diaphragm seal

Cylindrical Diaphragm seal to be mounted between 2 Flanges

Features

Cylindrical type In-Line Diaphragm Seals are installed directly in the process flow line between two flanges. These are also called as cell type diaphragm seal. Cylindrical type in-line diaphragm seal is recommended when the process media is slurry or a liquid that contains a solid component or viscous.The area behind the diaphragm is sealed with suitable filling fluid. As the process fluid flows though the pipe, it exerts pressure on the cylindrical diaphragm, which is transmitted to the pressure instrument through the filling fluid. The inner diameter of the seal unit is same as that of the process pipe. Thus it is continuously washed/cleaned by the flowing process media, thereby avoiding any clogging, which results in accurate reading of the pressure instrument.





Optional Features

- Capillary tubing for remote mounting of the pressure instrument
- Cooling tower

Ordering Information

In-Line Diaphragm Seal (Cylindrical Diaphragm) to be mounted between 2 Flanges

MODEL: CSU- [ ] [ ] [ ] [ ] [ ] [ ] [ ]

TYPE

IFC	In line flow through type with Cylindrical Diaphragm

SIZE

025	1"	080	3"
040	1.5"	100	4"
050	2"	125	5"
065	2.5"	150	6"

BODY MATERIAL

S6	SS316
SL	SS316L
HC	Hastelloy-C
M	Monel
X	Any other (Please Specify)

CYLINDRICAL DIAPHRAGM

S6	SS316
SL	SS316L
HC	Hastelloy-C
M	Monel
X	Any other (Please Specify)

OPTION

CT	Cooling Tower
AR(*)	Capillary : SS+SS armoured
PV(*)	Capillary : SS+SS armoured +PVC covered

Specify the capillary length in Meters.

FILLING FLUID

F	Fluorolube
G	Glycerine
H	Halocarbon
S	Silicone Oil DC-200
V	Food Grade Oil
D1	Silicone Oil DC-710
D4	Silicone Oil DC-704
D5	Silicone Oil DC-705

MOUNTING FLANGE DETAILS (Not part of the Diaphragm Seal**)

CODE	SIZE	CODE	RATING	CODE	FACING
25	1"	A	150#	RF	RF
40	1-1/2"	B	300#	FF	FF
50	2"	C	600#	X	Other (Specify)
65	2-1/2"	D	900#		
80	3"	E	1500#		
100	4"	F	2500#		
120	5"				
150	6"				

** Flanges are not part of the Diaphragm Seal. Sealing Face of the Diaphragm Seal shall be suitable for the Flange facing.

Ring Type In-Line Diaphragm Seal

MODEL : CSU

Features

Ring type In-Line Diaphragm Seals are installed directly in the process flow line. These are also referred to as isolating rings. Isolating rings are recommended when the process media is slurry or a liquid that contains a solid component or viscous.

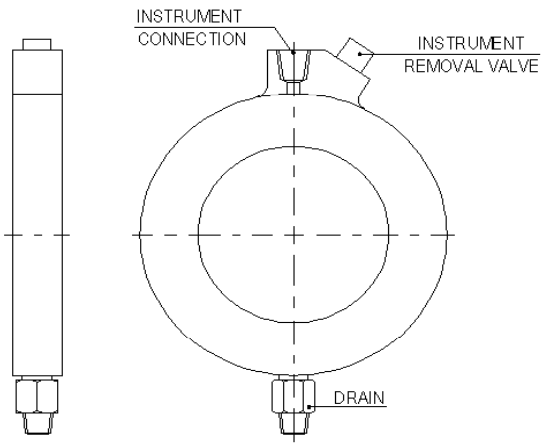
The area behind the flexible cylinder is sealed with suitable filling fluid. As the process fluid flows though the pipe, it exerts pressure on the flexible cylinder (Cylindrical Diaphragm), which is transmitted to the pressure instrument through the filling fluid. The diameter of the inner flexible cylinder is same as the inner diameter of the process pipe. Thus it is continuously washed / cleaned by the flowing process media, thereby avoiding any clogging, which results in accurate reading of the pressure instrument.

Instrument Removal Valve:

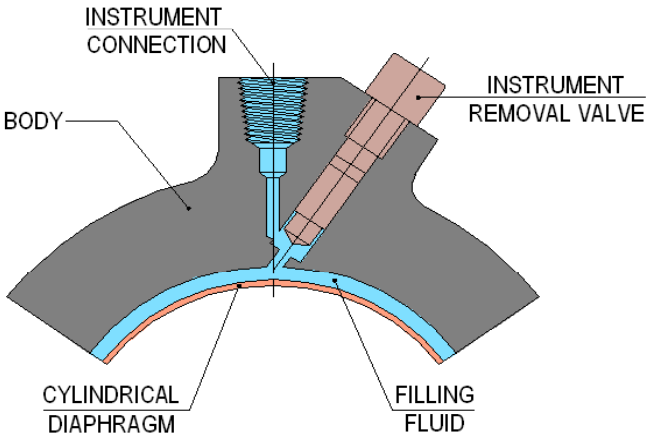
One additional feature offered by us is the instrument removal valve, which facilitates the removal of the pressure instrument for calibration or repair without interrupting the flow in processes line.

Optional Feature:

Capillary tubing for remote mounting of the pressure instrument.



ISOLATING RING (WAFER TYPE)



Ordering Information

Ring type In-Line Diaphragm Seal (Isolating Ring - Wafer type)

MODEL: CSU- ☐☐☐☐☐☐☐

TYPE

IRW	Isolating Ring, Wafer type

SIZE

025	1"	150	6"
040	1.5"	200	8"
050	2"	250	10"
065	2.5"	300	12"
080	3"	350	14"
100	4"	400	16"
125	5"	500	20"

BODY MATERIAL

CS	Carbon Steel
S4	SS304
S6	SS316
SL	SS316L
X	Any other (Please Specify)

CYLINDRICAL DIAPHRAGM

BN	Buna-N
EP	EPDM
FL	Fluorocarbon
NR	Natural Rubber
PT	PTFE
WN	White Neoprene
X	Any other (Please Specify)

INSTRUMENT RANGE

Please Specify
(Max 40 bar, higher on request)

FILLING FLUID

F	Fluorolube
G	Glycerine
H	Halocarbon
S	Silicone Oil DC-200
V	Food Grade Oil
D1	Silicone Oil DC-710
D4	Silicone Oil DC-704
D5	Silicone Oil DC-705

SEALING FLANGES

CS	Carbon Steel
S4	SS304
S6	SS316
SL	SS316L
X	Any other (Please Specify)