Product Data Sheet
00813-0201-4016, Rev EA
Catalog 2002 – 2003

Model 1199 Diaphragm Seal Systems
(European Offering)

FOR MODELS 3051C, 3051T, 1151, AND 2088 TRANSMITTERS

EXPANDED TRANSMITTER USE

- *Extreme hot and cold temperatures*
- *Corrosive applications*
- *Clogging*
- *Sanitary requirements*

APPLICATIONS

- *Level, Flow, Pressure, Interface, Density*

Contents

Specifications

FILL FLUID SPECIFICATIONS

TABLE 1. Fill Fluid Specifications

Fill Fluid	Temperature Limits(1)		Specific Gravity	Coeff. of Therm. Exp. (cc/cc/°C)	Viscosity at 25 °C centistokes	Recommended Capillary I. D.
	Pabs < 1 bara	Pabs > 1 bara				
General Purpose Silicone Oil	–45 to 100 °C	–45 to 205 °C	0,93	0,00108	9,5	All
Inert	–45 to 80 °C	–45 to 175 °C	1,85	0,000864	6,5	All
Low Temperature Silicone Oil	NA	–75 to 150 °C	0,85	0,001199	1,6	All
Sanitary Oil(2)	–15 to 120 °C	–15 to 205 °C	0,90	0,001008	9,8	All
High Temperature Silicone Oil(3)	0 to 200 °C	0 to 315 °C	1,07	0,00095	44,0	2 mm
Vegetable, Sanitary Oil	–10 to 120 °C	–10 to 250 °C	0,91	0,0008	63,0	2 mm

(1) Temperature unit of system based on lowest temperature option.

(2) Select sanitary fill fluid for sanitary applications requiring faster response times.

(3) Upper temperature limit is for capillary seal systems mounted away from the transmitter. Contact your Rosemount® representative for temperature limits above 315 °C.

MINIMUM SPAN RECOMMENDATIONS

Table 2 lists minimum span recommendations in mbar for Rosemount pressure transmitters as a function of the diameter of the diaphragm seal. Contact your Rosemount representative for minimum calibrated span recommendation for all in-line seal designs or seals with diameter less than 25mm.

These recommendations are based on the following:

- Stainless steel diaphragm; standard thickness.
- Single-sided capillary length up to 5 m.
- The diameter of the pressure sensor smaller than the diameter of the diaphragm seal.
- Differential pressure systems are balanced.

Consult Instrument ToolKit™ software or contact your Rosemount representative for a more detailed performance evaluation of diaphragm seal systems.

TABLE 2. Minimum Span Recommendations (mbar) F.A. = Factory Approval required

Differential Pressure			Gauge Pressure		Absolute Pressure	
dm (mm)	2 mm Cap ID	1 mm Cap ID	2 mm Cap ID	1 mm Cap ID	2 mm Cap ID	1 mm Cap ID
25	F.A.	F.A.	10000	10000	F.A.	F.A.
32	F.A.	F.A.	2500	2000	F.A.	F.A.
40	750	500	1500	1000	F.A.	F.A.
57	100	75	500	300	1000	750
76	25	20	150	100	500	350
89	4	3	20	20	20	20

INDUSTRY STANDARDS

Tables 3 and 4 list industry standards and their descriptions for General Purpose and Sanitary Seals.

TABLE 3. Available Industry Standards for General Purpose Diaphragm Seals

Standard	Description
DIN 2512 Form F	Tongue
DIN 2512 Form N	Groove
DIN 2513 Form R-13	Large female face
DIN 2513 Form V-13	Large male face
DIN 2514 Form V-14	Male face
DIN 2514 Form R-14	Female face
DIN 2526 Form C, D or E	Raised face
DIN 2696 Form L	'Linsen" gasket face
ANSI /ASME B16.5	Raised face
ANSI /ASME B16.5	Ring type joint
ANSI /ASME B16.5	Large male tongue
ANSI /ASME B16.5	Large female groove
ANSI /ASME B16.5	Large or small tongue face
ANSI /ASME B16.5	Large or small groove face
ANSI /ASME B16.5	Large or small male face
ANSI /ASME B16.5	Large or small female face

TABLE 4. Available for Sanitary Diaphragm Seals Industry Standards(1)

Standard	Description
SMS: Swedish Milk Standard	Female or male thread
IDF: International Dairy Federation	Female or male thread
RJT: Ring Joint Type	Female or male thread
DIN 11851	Female or male thread
Tri-Clamp®	Sanitary
Tuchenhagen *Varivent*®	Sanitary
Homogenizer Clamping Flange	Sanitary

(1) Other standards are available upon request.

GASKET SPECIFICATIONS

Table 5 refers to the gaskets supplied with the diaphragm seal.

TABLE 5. Gasket Specifications

Gasket	Temperature Limit (°C)
PTFE(1)	–160 to 230 °C
98% Graphite(1)	–200 to 500 °C
Viton®(2)	–20 to 200 °C
Ethylene Propylene	–55 to 150 °C

(1) Temperature limits are in standard circumstances.

(2) Temperature limit in oxidizing atmosphere.

TRANSMITTER SPECIFICATIONS

Functional Specifications

For complete functional, performance, and physical specifications for the Model 3051C, Model 3051T, Model 1151, and Model 2088 transmitters, refer to the respective product data sheets listed in this section.

The transmitter pressure ranges and ordering codes for use with diaphragm seals are located in Section 4 of this document.

TABLE 6. Transmitter Temperature Limits Summary.

	Models 3051C, 3051T	Model 1151	Model 2088
Ambient	–40 to 85 °C	**S Electronics** –40 to 85 °C **E,G Electronics** –30 to 95 °C	–40 to 85 °C
Storage	–45 to 110 °C	**S Electronics** –50 to 85 °C **E,G Electronics** –50 to 120 °C	–45 to 85 °C
Process Silicone Sensor	–40 to 120 °C	–40 to 105 °C	–40 to 120 °C

Hazardous Locations Certifications

Adding seals to the transmitter does not change the approval ratings of the individual transmitters. For complete approval listings, see the respective product data sheet for the pressure transmitter.

Maximum Working Pressure of Transmitter–Seal System

The maximum working pressure (MWP) of the transmitter–seal system is a function of the MWP of the transmitter and the remote seal. To determine the MWP of the transmitter–seal system, simply select the lesser value of the two. For safe operation, the MWP of the transmitter–seal system must not be exceeded.

NACE Standard

NACE (National Association of Corrosion Engineers) standard MR–01–75 defines metallic material requirements for resistance to sulfide stress cracking when exposed to sour environments. Contact your Rosemount representative to aid in selecting the proper materials in order for Rosemount diaphragm seals to meet the NACE standard.

Zero Elevation and Suppression

Output Codes S, E, and G

Zero elevation and suppression must be such that the lower range value is greater than or equal to the (–URL) and the upper range value is less than or equal to the (+URL). The calibrated span must be greater than or equal to the minimum span.

PHYSICAL SPECIFICATIONS

Materials of Construction

Transmitters

Isolating Diaphragm
Model 3051C: 316L SST
Model 3051T: 316L SST
Model 1151: 316L SST
Model 2088: 316L SST

Process Flange or Connector
Model 3051C: 316 SST
Model 3051T: 316L SST
Model 1151: CF-8M
(Cast Version of 316 SST, material per ASTM-A743)
Model 2088: 316L SST

O-ring
Model 3051C: Glass-filled TFE
Model 3051T: None
Model 1151: Viton or Buna N
Model 2088: None

Sensor Module Fill Fluid

Silicone Oil

Bolts (Models 3051C and 1151 only)

Plated Carbon Steel or 316 SST

Electronics Housing

Low-copper aluminum or CF-8M (cast version of 316 SST, material per ASTM-A743), NEMA 4X, IP66

Paint

Polyurethane

Cover O-rings

Buna-N

Electrical Connection

Model 3051C, 3051T, and Model 2088

1/2–14 NPT, PG 13.5, G1/2 Female
(PF1/2 Female, or M20 × 1.5 Female (CM20) conduit entry)

Model 1151

1/2–14 NPT conduit with screw terminals and integral test jacks compatible with miniature banana plugs (Pomona 2944, 3690, or equivalent)

Model 3051C, 3051T, and Model 1151 Smart

The HART®-based communicator connections are fixed to the terminal block.

Transmitter Weight

The transmitter/seal system weight depends on the type of capillary and seal:

Model 3051C

2,5 kg without options

Model 3051T

1,4 kg without options

Model 1151

5,5 kg without options

Model 2088

1,0 kg without options

Standard Accessories

All models are shipped with flange adapters, drain/vent valves, and one instruction manual per shipment.

Tagging

The pressure transmitter will be tagged, at no charge, in accordance with customer requirements. All tags are stainless steel. The standard tag is wired to the transmitter. Tag is 0,051 cm thick with 0,318 cm high letters. A permanently attached tag is available upon request.

Calibration

Transmitters are factory calibrated to customer's specified range. If calibration is not specified, then the transmitters are calibrated at maximum range. Calibration is performed at ambient temperature and pressure. Four and 20 mA points must be the same unit of measure. Available units of measure:

inH_2O	mmH_2O	bar	kg/cm^2	torr
inHg	mmHg	mbar	Pa	atm
ftH_2O	psi	g/cm^2	kPa	

Custom Configurations

Model 3051C (Option Code C1)

If code C1 is ordered, the customer may specify the following data in addition to the standard configuration parameters. Refer to Configuration Data Sheet 00806-0100-4001.

Model 1151 (Option Code C9)

If Options Code C9 is ordered, the customer may specify the following data in addition to the standard configuration parameters. Refer to Configuration Data Sheet 00806-0100-4593.

Descriptor: 16 alphanumeric characters
Message: 32 alphanumeric characters
Date: Day, month, year
Damping: Sec.

General Purpose Seals Selection Overview

Diaphragm Seal Selection Guides

Diaphragm Seal Selection Guide				
Seal Type	Flush Flanged Type (FFS, FUS) (see page Pressure-294)	RTJ Flush Flanged Type (FCS) (see page Pressure-301)	Extended Flanged Type (EES, EFS) (see page Pressure-303)	Flush Pancake (Cell) Type (PFS) (see page Pressure-308)
Usual Application and Type of Service	General Applications	High Pressure Applications	Insulated Processes	General Applications
Gasket Surface Type	DIN 2526 Form D DIN 2526 Form E ANSI/ASME B16.5 Serrated Finish ANSI/ASME B16.5 Smooth Finish DIN 2512 Form F DIN 2512 Form N DIN 2513 Form V-13 DIN 2513 Form R-13 DIN 2514 Form V-14 DIN 2514 Form R-14	RTJ	DIN 2526 Form D DIN 2526 Form E ANSI/ASME B16.5 Serrated Finish ANSI/ASME B16.5 Smooth Finish	DIN 2526 Form D DIN 2526 Form E ANSI/ASME B16.5 Serrated Finish ANSI/ASME B16.5 Smooth Finish
Process Connection Size	DN 25 1 in. DN 40 $1^1/_2$ in. DN 50 2 in. DN 80 3 in. DN 100 4 in. DN 125 5 in.	1in. $1^1/_2$ in. 2 in. 3 in. 4 in. 5 in.	DN 50 2 in. DN 80 3 in DN 100 4 in. DN 125 5 in.	DN 25 1 in. DN 40 $1^1/_2$ in. DN 50 2 in. DN 80 3 in. DN 100 4 in. DN 125 5 in.
Flange Pressure Rating	PN 16 Class 150 PN 40 Class 300 PN 64 Class 400 PN 100 Class 600 PN 160 Class 900 PN 250 Class 1500 PN 400 Class 2500	Class 150 Class 300 Class 400 Class 600 Class 900 Class 1500 Class 2500	PN 16 Class 150 PN 40 Class 300 PN 64 Class 400 PN 100 Class 600 PN 160 Class 900 PN 250 Class 1500 PN 400 Class 2500	PN 16-400 Class 150–2500
Diaphragm and Wetted Parts Material/ Upper Housing Material	316LSST Monel® 400® 316Ti SST (WNr 1.4571) Titanium Gr2 *Hastelloy*® C-276®,B-2®,C-22 Zirconium Inconel 600® Tantalum Nickel 201	316LSST 316Ti SST (WNr 1.4571) *Hastelloy* C-276 Duplex 1.4462	316LSST Nickel 201 316Ti SST (WNr 1.4571) Monel 400 Hastelloy C-22, C-276, B-2 Inconel 600 Tantalum Titanium Gr2	316LSST Nickel 201 316Ti SST (WNr 1.4571) Titanium Gr2 *Hastelloy* C-276, B-2, C-22 Monel 400 Zirconium Tantalum Inconel 600
Flushing Ring Material	316L SST 316Ti SST (WNr 1.4571) *Hastelloy* C-276 Duplex 1.4462	316L SST 316Ti SST (WNr 1.4571) Hastelloy C-276 Duplex 1.4462	Not Applicable	316L SST 316Ti SST (WNr 1.4571) Hastelloy C-276 Duplex 1.4462
Options	Direct Mount Connection Material Traceability Gold-coated 5 μm *Teflon*®-coated Diaphragm Cold Temperature Fill 50 μm Diaphragm Thickness 150 μm Diaphragm Thickness	Direct Mount Connection Material Traceability *Teflon*-coated Diaphragm Cold Temperature Fill 50 μm Diaphragm Thickness 150 μm Diaphragm Thickness	Direct Mount Connection Material Traceability Custom Extension Lengths Cold Temperature Fill 50 μm Diaphragm Thickness 150μm Diaphragm Thickness	Material Traceability Cold Temperature Fill Gold-coated 5 μm *Teflon*-coated Diaphragm 50 μm Diaphragm Thickness 150μm Diaphragm Thickness

Diaphragm Seal Selection Guide

	Extended Pancake (Cell) Type (DES, DFS) (see page Pressure-311)	Internal Flanged Type (RFS) (see page Pressure-316)	Internal Threaded Type (RTS) (see page Pressure-319)
Seal Type			
Usual Application and Type of Service	Insulated Processes	Small Process Connections	Small Process Connections High Pressures
Gasket Surface Type	DIN 2526 Form D DIN 2526 Form E ANSI/ASME B16.5 Serrated Finish ANSI/ASME B16.5 Smooth Finish DIN 2512 Form N DIN 2512 Form F DIN 2513 Form V-13 DI 2513 Form R-13 DIN 2514 Form V-14 DIN 2514 Form R-14	DIN 2526 Form D DIN 2526 Form E ANSI/ASME B16.5 Serrated Finish ANSI/ASME B16.5 Smooth Finish	Not Applicable
Process Connection Size	DN 50 2 in. DN 80 3 in. DN 100 4 in. DN 125 5 in.	DN 15 1 in. DN 20 1/2 in. DN 25 3/4 in. DN 32 1 1/4 in. DN 40 1 1/2 in.	Parallel Thread: G 1/2A DIN 16288 Tapered Thread: R 1/2A per ISO 7/1 1/2–14 NPT 1–11.5 NPT
Flange Pressure Rating	PN 16–400 Class 150–2000	PN 40 Class 150 PN 64 Class 300 PN 100 Class 600 PN 160	PN 40 PN 100 PN 250
Diaphragm and Wetted Parts Material	316LSST Nickel 201 316Ti SST (WNr 1.4571) Monel 400 Inconel 600 Tantalum Titanium Gr2 Hastelloy C-276, C-22, B-2	316LSST Nickel 201 316Ti SST (WNr 1.4571) Monel 400 Inconel 600 Tantalum Hastelloy C-276, C-22, B-2 Titanium Gr 2	316LSST Monel 400 316Ti SST (WNr 1.4571) Tantalum Inconel 600 Nickel 201 Hastelloy C-276, C-22, B-2 Titanium Gr 2
Lower Housing (Flushing) Material	Not Applicable	Hastelloy C-276 316L SST 316Ti SST (WNr 1.4571)	Hastelloy C-276 316L SST 316Ti SST (WNr 1.4571)
Options	Material Traceability *Teflon*-coated Diaphragm Cold Temperature Fill 50 μm Diaphragm Thickness 150 μm Diaphragm Thickness Custom Extension Lengths	Direct Mount Connection Material Traceability Gold-coated 5 μm *Teflon*-coated Diaphragm Cold Temperature Fill 50 μm Diaphragm Thickness 150 μm Diaphragm Thickness *Teflon*-lined Lower Housing	Direct Mount Connection Material Traceability *Teflon*-coated Diaphragm Cold Temperature Fill 50 μm Diaphragm Thickness 150 μm Diaphragm Thickness

Diaphragm Seal Selection Guide

	Threaded Flush Type (HTS) (see page Pressure-322)	In-Line Cell Type (TFS) (see page Pressure-324)	Extruder Flanged Type (JES) (see page Pressure-326)
Seal Type			
Usual Application and Type of Service	High Process Pressures Chemical, Food, Paint, Pulp and Paper Industries	Eliminate Process Dead Ends High Viscosity Fluids	Plastic Extrusion High Temperature
Gasket Surface Type	Dependent on Thread Type	DIN 2526 Form D DIN 2526 Form E ANSI/ASME B16.5 Smooth Finish	Extrusion Clamping Flange
Process Connection Size	G1 1-11.5 NPT G1 1/2 1 1/2-11.5 NPT G2 2-11.5 NPT	DN 25 1 in. DN 40 1 1/2 in. DN 50 2 in. DN 80 3 in. DN 100 4 in.	Special for Extruders
Pressure Rating	600 Bar	PN 16-400 Class 150-2500	400 bar
Diaphragm and Wetted Parts Material/ Upper Housing Material	316L SST 316Ti SST (WNr 1.4571)	316L SST 316Ti SST (WNr 1.4571)	316L SST 316Ti SST (WNr 1.4571)
Options	Material Traceability Cold Temperature Fill 50 µm Diaphragm Thickness 150 µm Diaphragm Thickness Direct Mount	Material Traceability Integral Flange Construction Direct Mount to Model 3051T or Model 2088	Material Traceability 150 µm Diaphragm Thickness Custom Extension Lengths Jock Screws Direct Mount

Sanitary Seal Selection Overview

Sanitary Seal Selection Guide				
Seal Type	In-Line Sanitary Type (VLS, VMS) (see page Pressure-328)	Dairy Type (SLS, SMS, SFS, SRS) (see page Pressure-330)	Dairy Type (MLS,MMS, MFS, MRS) (see page Pressure-332)	In-Line Sanitary Tri-Clamp (VCS) (see page Pressure-334)
Usual Application and Type of Service	Food and Pharmaceutical Industries High Viscosity Fluids Eliminate Process Dead Ends	Sanitary and Food Industry	Sanitary and Food Industry	Food and Pharmaceutical Industries High Viscosity Fluids Eliminate Process Dead Ends
Connection Type	DIN 11851 Male SMS Male	DIN 11851 Female SMS Female IDF Female RJT Female	DIN 11851 Male SMS Male IDF Male RJT Male	Tri-Clamp
Process Connection Size	DN 25 1 in. DN 40 1 1/2 in. DN 50 2 in. DN 80 3 in. DN 100 4 in.	DN 25 DN 65 DN 32 DN 80 DN 40 DN 100 DN 50	DN 25 DN 65 DN 32 DN 80 DN 40 DN 100 DN 50	DN 25 1 in. DN 40 1 1/2 in. DN 50 2 in. DN 80 3 in. DN 100 4 in.
Pressure Rating	40 bar	40 Bar	40 Bar	40 Bar
Diaphragm Material	316L SST 316Ti SST (WNr 1.4571)	316L SST 316Ti SST (WNr 1.4571)	316L SST 316Ti SST (WNr 1.4571)	316L SST 316Ti SST (WNr 1.4571)
Options	Electro-polished Diaphragm Material Traceability	Electro-polished Diaphragm Material Traceability	Electro-polished Diaphragm Material Traceability	Material Traceability Electro-polished Diaphragm

Sanitary Seal Selection Guide				
Seal Type	Sanitary *Tri-Clamp* Type (SCS) (see page Pressure-335)	Sanitary Tank Spud Type (EES) (see page Pressure-336)	Tuchenhagen *Varivent* Compatible Connection (see page Pressure-337)	Homogenizer Clamping Flange (CHS) (see page Pressure-338)
Usual Application and Type of Service	Sanitary and Food Industry	Sanitary and Food Industry	Sanitary and Food Industry	Homogenizers
Process Connection Size	Tri-Clamp	Spud-Ring with Ethylene-Propylene O-ring Standard	Tuchenhagen *Varivent*	Special for Homogenizers
Pressure Rating	40 bar	40 bar	40 bar	600 bar
Diaphragm Material	316L SST 316Ti SST (WNr 1.4571)	316L SST 316Ti SST (WNr 1.4571) *Hastelloy* C-276	316L SST 316Ti SST (WNr 1.4571)	316L SST
Options	Electro-polished Diaphragm Material Traceability Counterpiece, Gasket and Clamp	Electro-polished Diaphragm Material Traceability Counterpiece and Gasket	Electro-polished Diaphragm Material Traceability Counterpiece and Gasket	Material Traceability 150 μm Diaphragm Thickness

Ordering Information

HOW TO ORDER A ROSEMOUNT SEAL/TRANSMITTER SYSTEM

The following steps outline the transmitter/seal system ordering process. Please review the entire procedure before specifying a transmitter/seal system model number.

Step 1. Select a Pressure Transmitter Model Number

Refer to the Pressure Transmitters product data sheets below to select a transmitter model number.

For additional transmitter information, see the following product data sheets:

Model 3051S Series: PDS 00813-0100-4801

Model 3051C and 3051T: PDS 00813-0100-4001

Model 2088: PDS 00813-0100-4690

Model 1151: PDS 00813-0100-4360

Step 2. Select a Seal Assembly Model Number

1. Use Table 1 on page 282 or Table 8 on page 293 to specify a Capillary or Direct Mount Fill Fluid code (nine characters).
   Example: Using: “1199MD256...” is typical of the first half of a seal assembly model number.
   - Include a code from each section of the table.
2. Use the Seal tables beginning on page Pressure-291 to specify the Diaphragm Seal Configuration.
   Example: Using Table 9 on page 295(FFS Flanged Type Seals): “...DFFSJGLA00” is typical of the second half of a seal assembly model number.
   - Include a code from each section of the table.
   - Include as many options as desired from the Options (Multiple Selections) section.
   Example: The customer wants to add a vacuum resistant gasket and material traceability per DIN EN10204 3.1.B to his order. The model string becomes DFFSJGLA00 AZ.
3. Combine the two sets of model numbers to create one model number string. This completes a valid seal assembly model number.
   Example: Combine the model strings in steps A and B above for a complete seal assembly model number string: “1199MD256 DFFSJGLA00 AZ.”

NOTE FOR SPECIAL CONFIGURATIONS
It is possible to order two different seal assemblies for one transmitter. Use the seal location code to specify the attachment location for both the high and low side seals.
For example, suppose a direct mount seal is required on the high pressure side of the Model 3051 All-Welded System and a seal with a 3 m capillary is required for the low pressure side. In this example, the order may look like the following:

Quantity	Model Number
1	3051CD4A22A1AS9 (From Step 1)
1	1199WDAD6 DFFSJGLA00 (From Step 2)
1	1199MD356 DFFSJGLA00 (From Step 2)

CAUTION
While it is possible to combine different types of seals, fill fluid and capillary lengths, be aware that performance may be more affected by some combinations than others. Consult with your local Rosemount representative for assistance in seal selection.

Diaphragm Seal Connections

(NOTE: Use Table 7 to order Capillary type connections. Use Table 8 to order Direct Mount type connections.)

Capillary/Fill Fluid

TABLE 7. Capillary/Fill Fluid Ordering Information[1]

Model	Type
1199	Diaphragm Seal

Code	Seal Location	Capillary Connections	Transmitter Type
P	Seal on High Pressure Side of Transmitter	All welded system	Models 3051S2T, 3051T, 2088
R	Seal on High Pressure Side of Transmitter	All welded system	Model 3051S2C (option code B11)
S	Seal on Low Pressure Side of Transmitter (use with Model 1199T)	All welded system	Model 3051S2C (option code B12)
T	Seal on High Pressure Side of Transmitter (requires Model 1199S on low side)	All welded system	Model 3051S2C (option code B12)
D	Same Seal on Both High and Low Pressure Sides of Transmitter	Welded	Differential Transmitters
W	Seal on High Pressure Side of Transmitter	Welded	All Transmitters
M	Seal on Low Pressure Side of Transmitter	Welded	Differential Transmitters

		Temperature Limits		
Code	Fill Fluid	Pabs < 1 bara	Pabs > 1 bara	Specific Gravity
D	General Purpose Silicone Oil	–45 to 100 °C	–45 to 205 °C	0,93
C[2]	*D.C.* 704	0 to 200 °C	0 to 315 °C	1,07
A	Low Temperature Silicone Oil	N/A	–75 to 150 °C	0,85
H	Inert	–45 to 80 °C	–45 to 175 °C	1,85
N	Sanitary Oil	–15 to 120 °C	–15 to 205 °C	0,90
4	Vegetable, Sanitary Oil	–10 to 120 °C	–10 to 250 °C	0,91

Code	Capillary Inside Diameter (mm)	Material
2	1 mm	SST Armored Sleeving and Support Tubes
3	2 mm	SST Armored Sleeving and Support Tubes
5	1 mm	SST Armored Polyethylene Sleeving and Support Tubes
6	2 mm	SST Armored Polyethylene Sleeving and Support Tubes

Code	Capillary Connection Length
51	0,5 m
52	1,0 m
53	1,5 m
54	2,0 m
55	2,5 m
56	3,0 m
57	3,5 m
58	4,0 m
59	5,0 m
60	6,0 m
61	7,0 m
62	8,0 m
63	9,0 m
64	10,0 m
65	11,0 m
66	12,0 m
67	13,0 m
68	14,0 m
69	15,0 m

Table continued on next page

TABLE 7. Capillary/Fill Fluid Ordering Information[1]

Code	Capillary Connection Length
70[3]	16 m
71[3]	17 m
72[3]	18 m
73[3]	19 m
74[3]	20 m
75[3]	21 m
76[3]	22 m
77[3]	23 m
78[3]	24 m
79[3]	25 m
80[3]	26 m
81[3]	27 m
82[3]	28 m
83[3]	29 m
84[3]	30 m

(1) Shaded Areas indicate special orders. Consult your Rosemount representative for configuration availability, performance effect, and lead time.

(2) Not available with seal connection code M.

(3) Consult your Rosemount representative to perform performance effect calculation.

Direct Mount Connection Type/Fill Fluid

TABLE 8. Direct Mount/Fill Fluid Ordering Information[1]

Model	Type			
1199	Diaphragm Seal			
Code	**Seal Location**		**Connection Type**	**Transmitter Type**
W	Seal on High Pressure Side of Transmitter		Welded	All Transmitters
P	Seal on High Pressure Side of Transmitter		All welded system	Models 3051T, 2088, and 3051S2T
R	Seal on High Pressure Side of Transmitter		All welded system	Model 3051S2C (option code B11)
T	Seal on High Pressure Side of Transmitter		All welded system	Model 3051S2C (option code B12)
		Temperature Limits[2]		
Code	**Fill Fluid**	**Pabs < 1 bara**	**Pabs > 1 bara**	**Specific Gravity**
D	General Purpose Silicone Oil	–45 to 100 °C	–45 to 205 °C	0,93
C	High Temperature Silicone Oil	0 to 200 °C	0 to 260 °C	1,07
A	Low Temperature Silicone Oil	N/A	–75 to 150 °C	0,85
H	Inert	–45 to 80 °C	–45 to 175 °C	1,85
N	Sanitary Oil	–15 to 120 °C	–15 to 205 °C	0,90
4	Vegetable, Sanitary Oil	–10 to 120 °C	–10 to 250 °C	0,91
Code	**Connection Type**			
A	Direct Mount Connection			
Code	**Direct Mount Connection Type**			
WELDED CONNECTION TYPE: Models 3051C and 3051S Transmitters (use with seal code W)				
Attachment of One Diaphragm Seal, Model 3051C Transmitter Option Code S1 or Model 3051S2C with B11 process connection code.				
B3	One Diaphragm Seal System, 50 mm Connection			
D3	One Diaphragm Seal System, 100 mm Connection			
ALL WELDED CONNECTION TYPE: Models 3051C and 3051S all welded system (use with seal codes R or T)				
Attachment of One Diaphragm Seal, Model 3051C Transmitter Option Code S0 or Model 3051S2C with B11 process connection code				
B7	One Diaphragm Seal System, 50 mm Connection			
D7	One Diaphragm Seal System, 100 mm Connection			
Attachment of Two Diaphragm Seals, Model 3051C (use with seal code W) **Transmitter Option Code S2 or Model 3051S2C with B12 process connection code**				
B4	Two Diaphragm Seal System, 50 mm Direct Mount Connection and Capillary Connection			
D4	Two Diaphragm Seal System, 100 mm Direct Mount Connection and Capillary Connection			
Attachment of Two Diaphragm Seals, Model 3051C Transmitter Option Code S9 or Model 3051S2C with B12 process connection code				
B6	Two Diaphragm Seal System, 50 mm Direct Mount Connection and Capillary Connection			
D6	Two Diaphragm Seal System, 100 mm Direct Mount Connection and Capillary Connection			
WELDED OR ALL WELDED CONNECTION TYPE: Model 3051T Transmitter				
95	One Diaphragm Seal System, 25 mm Connection, all welded (use with code P) or welded (use with code W)			
A5	One Diaphragm Seal System, 50 mm Connection			
WELDED CONNECTION TYPE: Model 1151 Transmitter (use with seal code W)				
92	One or Two Diaphragm Seal System. One Direct Mount, One Direct Mount and One Capillary Mount, or Two Capillary Mount Configuration Available			
WELDED OR ALL WELDED CONNECTION TYPE: Model 2088 Transmitter				
95	One Diaphragm Seal System, 25 mm Connection, all welded (use with code P) or welded (use with code W)			
A5	One Diaphragm Seal System, 50 mm Connection			

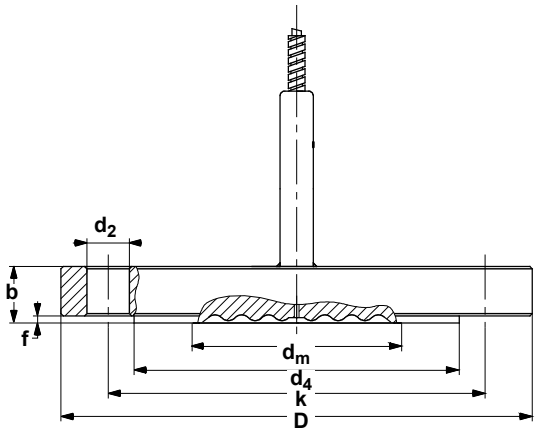
(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.

(2) Fill fluid maximum operating temperature is limited by heat transfer to transmitter electronics. Teckperature limit for Model 3051C 100 mm Direct Mount system is 260 °C and 205 °C for all other direct mount connection types at 21 °C ambient temperature. The temperature limit for the Model 1151 and 2088 Direct Mount systems is 205 °C.

General Purpose Seal Assemblies

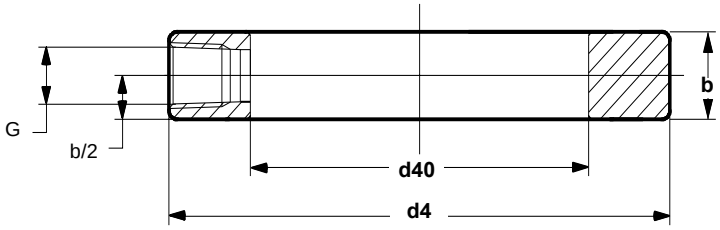
FFS Flanged Type: Flush Diaphragm Seals

Dimensional Drawing for FFS Flanged Type: Flush Diaphragm Seals



1199-HSAB01A 1199-0FDFA01A 1199-067AB

Dimensional Drawing for FFS Flushing Connection Ring



Flushing Ring Dimensions (mm)

DN	d40	d4	b	G
50	59	102	20	¼-18 NPT
80	91	138	20	¼-18 NPT
2 in.	59	92	20	¼-18 NPT
3 in.	91	127	20	¼-18 NPT

FFS Process Connection Dimensions

DIN 2501

DN	PN(1)	Dimensions (mm) dm	D	b	d2	k	f	d4
25	40	25	115	18	4x14	85	2	68
	100	25	140	24	4x18	100	2	68
	160	25	140	24	4x18	100	2	68
40	40	40	150	18	4x18	110	2	88
	100	40	170	28	4x22	125	3	88
	160	40	170	28	4x22	125	3	88
50	40	57	165	20	4x18	125	3	102
	64	57	180	26	4x22	135	3	102
	100	57	195	28	4x26	145	3	102
80	40	89	200	24	8x18	160	3	138
	64	89	215	28	8x22	170	3	138
	100	89	230	32	8x26	180	3	138
100	16	89	220	20	8x18	180	3	158
	40	89	235	24	8x22	190	3	162
	64	89	250	30	8x26	200	3	162
125	16	124	250	22	8x18	210	3	188
	40	124	270	26	8x26	220	3	188
	64	124	295	34	8x30	240	3	188

ANSI/ASME B16.5 RF

DN	CL(1)	Dimensions (mm) dm	D	b	d2	k	f	d4 (2)
1 in.	150	25	108	14	4x16	79	1,5	51
	300	25	124	18	4x19	89	1,5	51
	600(3)	25	124	18	4x19	89	6,3	51
1.5 in.	150	40	127	17	4x16	98	1,5	73
	300	40	155	21	4x22	114	1,5	73
	600(3)	40	155	22	4x22	114	6,3	73
2 in.	150	57	152	19	4x19	121	1,5	92
	300	57	165	22	8x19	127	1,5	92
	600(3)	57	165	25	8x19	127	6,3	92
3 in.	150	89	190	24	4x19	152	1,5	127
	300	89	210	28	8x22	168	1,5	127
	600(3)	89	210	32	8x22	168	6,3	127
4 in.	150	89	229	24	8x19	190	1,5	157
	300	89	254	32	8x22	200	1,5	157
	400	89	254	35	8x25	200	6,3	157
5 in.	150	124	254	24	8x22	216	1,5	186
	300	124	279	35	8x22	235	1,5	186
	400	124	279	38	8x25	235	6,3	186

(1) Dimensions for other flange ratings are available upon request.

(2) d4 dimensions only valid for full 316 SST execution.

(3) Class 600 flanges add 0.63 mm to flange thickness dimension for raised face.

TABLE 9. FFS Flanged Type: Flush Diaphragm Seal – DIN Ordering Information[1]

Code	Industry Standard	
D	DIN 2501 (Deutsches Institut für Normung)	
Code	**Process Connection Style**	
F	Flanged Type: Flush Diaphragm Seal	
Code	**Gasket Surface Type[2]**	
FS	DIN 2526 Form D	
Code	**Process Connection Size**	
G	DN 50	
J	DN 80	
D	DN 25	
F	DN 40	
K	DN 100	
M	DN 125	
Code	**Flange Pressure Rating**	
G	PN 40	
E	PN 16	
H	PN 64	
J	PN 100	
K	PN 160	
Code	**Diaphragm and Wetted Parts Material[3]**	**Upper Housing Material (includes flange)**
LA	316L SST	316 SST
LB	*Hastelloy* C-276	316 SST
LC	Tantalum	316 SST
WW	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)
WB	*Hastelloy* C-276	316 SST (WNr 1.4571)
LM	Titanium GR.2	316 SST (Only available with a smooth gasket surface)
LJ	*Hastelloy* B-2	316 SST
LP	Nickel 201	316 SST
L4	*Hastelloy* C-22	316 SST
LV	*Monel* 400	316 SST
LZ	Zirconium	316 SST
LE	*Inconel* 600	316 SST

Table continued on next page

TABLE 9. FFS Flanged Type: Flush Diaphragm Seal – DIN Ordering Information(1)

Code	Flushing Ring Material
0	No Flushing Ring required
L	316L SST
W	316Ti SST (WNr 1.4571)
B	*Hastelloy* C-276
Code	**Flushing Options**
0	No Flushing Ring required
1	One 1/4–18 NPT Flushing Connection
3	Two 1/4–18 NPT Flushing Connection
7	One 1/2—14 NPT Flushing Connection
9	Two 1/2–14 NPT Flushing Connection
Code	**Options (Multiple Selections)**
0	None
V	*Teflon* Coated Diaphragm for nonstick purposes only (available with 316L SST and *Hastelloy* C–276 diaphragm only)
G	SST Plug(s) for Flushing Connections(s)
H	SST Vent/Drain for Flushing Connection(s)
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter Code Q8)
2	Radial Capillary Connection
5	50 μm Diaphragm Thickness (available in 316L SST or *Hastelloy*)
8	150 μm Diaphragm Thickness - 316L SST or *Hastelloy* C-276 Materials (*Hastelloy* C-276 is only available with a smooth gasket surface)
U	Gold Coated 5 micron
B	Extra Fill for Cold Temperature Applications
D	*Hastelloy* Plug(s) for Flushing Connection(s)
1	Zone 0 Execution PTB Nr. III B/S 2415
T	NACE MR–01–75

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.
(2) Other gasket surfaces are possible; consult factory for coding and availability.
(3) When ordering special diaphragm materials, the standard housing material is 316L SST unless otherwise noted. Consult your Rosemount representative for use with spiral wound gaskets.

TABLE 10. FFS Flanged Type: Diaphragm Seal — ANSI/ASME Ordering Information[1]

Code	Industry Standard	
A	ANSI/ASME B 16.5 (American Standards Institute/American Society of Mechanical Engineers)	
Code	**Process Connection Style**	
F	Flanged Type: Flush Diaphragm Seal	
Code	**Gasket Surface Type [2]**	
FS	Serrated Finish	
Code	**Process Connection Size**	
G	2 in.	
7	3 in.	
2	1 in.	
4	$1^1/_2$ in.	
9	4 in.	
B	5 in.	
Code	**Flange Pressure Rating**	
1	Class 150	
2	Class 300	
3	Class 400	
4	Class 600	
5	Class 900	
6	Class 1500	
7	Class 2500	
Code	**Diaphragm and Wetted Parts Material [3]**	**Upper Housing Material (include flange)**
LA	316L SST	316 SST
LB	*Hastelloy* C-276	316 SST
LC	Tantalum	316 SST
WB	*Hastelloy* C-276	316 SST (WNr 1.4571)
LM	Titanium GR.2	316 SST (Only available with a smooth gasket surface)
LJ	*Hastelloy* B-2	316 SST
LP	Nickel 201	316 SST
L4	*Hastelloy* C-22	316 SST
LV	*Monel* 400	316 SST
LZ	Zirconium	316 SST
LE	*Inconel* 600	316 SST

Table continued on next page

TABLE 10. FFS Flanged Type: Diaphragm Seal — ANSI/ASME Ordering Information[1]

Code	Flushing Ring Material
0	No Flushing Ring required
L	316L SST
W	316Ti SST (WNr 1.4571)
B	*Hastelloy* C-276
Code	**Flushing Options**
0	No Flushing Ring required
1	One 1/4–18 NPT Flushing Connection
3	Two 1/4–18 NPT Flushing Connection
7	One 1/2-–14 NPT Flushing Connection
9	Two 1/2–14 NPT Flushing Connection
Code	**Options (Multiple Selections)**
0	None
V	*Teflon* Coated Diaphragm for non-stick purposes only (available with 316L SST and *Hastelloy* C–276 diaphragm only)
G	SST Plug(s) for Flushing Connections(s)
H	SST Vent/Drain for Flushing Connection(s)
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter Code Q8)
2	Radial Capillary Connection
5	50 μm Diaphragm Thickness (available in 316L SST or *Hastelloy*)
8	150 μm Diaphragm Thickness - 316L SST or *Hastelloy* C-276 Diaphragm Material (*Hastelloy* C-276 is only available with a smooth gasket surface)
U	Gold Coated 5 micron
B	Extra Fill for Cold Temperature Applications
D	*Hastelloy* Plug(s) for Flushing Connection(s)
1	Zone 0 Execution PTB Nr. III B/S 2415
T	NACE MR–01–75

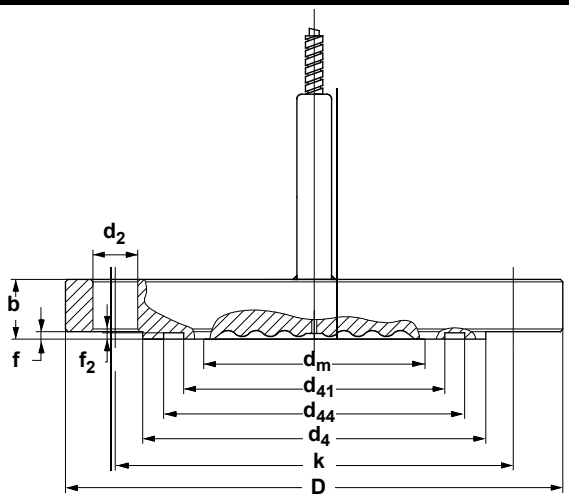
(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.

(2) Other gasket surfaces are possible; consult factory for coding and availability.

(3) When ordering special diaphragm materials, the standard housing material is 316L SST unless otherwise noted. Consult your Rosemount representative for use with spiral wound gaskets.

FUS Flanged Type: Flush Diaphragm Seal—DIN 2512 Form N Gasket Surface

Dimensional Drawing for FUS Flanged Type: Flush Diaphragm Seals— DIN 2512 Form N Gasket Surface



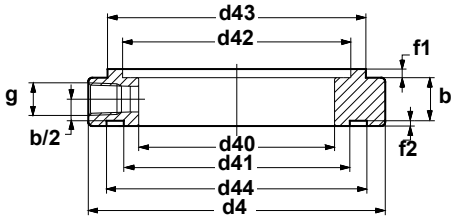
FUS Process Connection Dimensions
DIN 2512 Form N(1)

DN	PN	Dimensions (mm)									
		dm	D	b	d2	k	f	f2	d4(2)	d41	d44
25	40	25	115	18	4x14	85	2	3, 0	68	42	58
	100	25	140	24	4x14	100	2	3, 0	68	42	58
	160	25	140	24	4x14	100	2	3, 0	68	42	58
40	40	40	150	18	4x18	110	2	3, 0	88	60	76
	100	40	170	26	4x22	125	3	3, 0	88	60	76
	160	40	170	28	4x26	125	3	3, 0	88	60	76
50	40	57	165	20	4x18	125	3	3, 0	102	72	88
	64	57	180	26	4x22	135	3	3, 0	102	72	88
	160	57	195	28	4x26	145	3	3, 0	102	72	88
80	40	89	200	24	4x18	160	3	3, 0	138	105	121
	64	89	215	28	4x22	170	3	3, 0	138	105	121
	100	89	230	32	4x26	180	3	3, 0	138	105	121
100	16	89	220	20	4x18	180	3	3, 5	158	128	150
	40	89	235	24	4x22	190	3	3, 5	162	128	150
	64	89	250	30	4x26	200	3	3, 5	162	128	150
125	16	124	250	22	8x18	210	3	3, 5	188	154	176
	40	124	270	26	8x26	220	3	3, 5	188	154	176
	64	124	295	34	8x30	240	3	3, 5	188	154	176

(1) Dimensions for other flange ratings are available upon request.

(2) d4 dimensions only valid for full stainless steel 316 execution.

Dimensional Drawing for FUS Flushing Connection Ring



DN	PN	Flushing Ring Dimensions (mm)										
		d40	d4	d42	d43	f1	d41	d44	f2	b	g
50	10-100	59	102	73	87	4	72	88	2.5	20	1/4-18 NPT
80	10-100	91	138	106	120	4	105	121	2.5	20	1/4-18 NPT

TABLE 11. FUS Flanged Type: Flush Diaphragm Seal – DIN Ordering Information[1]

Code	Industry Standard	
D	DIN 2501 (Deutsches Institut für Normung)	
Code	**Process Connection Style**	
F	Flanged Type: Flush Diaphragm Seal	
Code	**Gasket Surface Type**	
US	DIN 2512 Form N Contact Surface–up to PN 160	
VS	DIN 2512 Form F Contact Surface–up to PN 160	
GS	DIN 2513 Form V-13 Contact Surface–up to PN 100	
HS	DIN 2513 Form R-13 Contact Surface–up to PN 100	
JS	DIN 2514 Form V-14 Contact Surface–up to PN 40	
KS	DIN 2514 Form R-14 Contact Surface–up to PN 40	
Code	**Process Connection Size**	**Diaphragm Diameter**
G	DN 50	57 mm
J	DN 80	89 mm
D	DN 25	32 mm
F	DN 40	40 mm
K	DN 100	89 mm
M	DN 125	124 mm
Code	**Flange Pressure Rating**	
G	PN 40	
E	PN 16	
H	PN 64	
J	PN 100	
K	PN 160	
Code	**Diaphragm and Wetted Parts Material[2]**	**Upper Housing Material (includes flange)**
LA	316L SST	316 SST
LB[3]	*Hastelloy*-C 276	316 SST
LC[3]	Tantalum	316 SST
LV[3]	*Monel* 400	316 SST
Code	**Flushing Ring Material**	
0	No Flushing Ring required	
L	316L SST	
W	316Ti SST (WNr 1.4571)	
Code	**Flushing Options**	
0	No Flushing Ring required	
1	One 1/4–18 NPT Flushing Connection	
3	Two 1/4–18 NPT Flushing Connection	
7	One 1/2–14 NPT Flushing Connection	
9	Two 1/2–14 NPT Flushing Connection	
Code	**Options (Multiple Selections)**	
0	None	
V	*Teflon* Coated Diaphragm for non-stick purposes only (available with 316L SST and *Hastelloy* C–276 diaphragm only)	
G	SST Plug(s) in Flushing Connection(s)	
H	SST Vent/Drain in Flushing Connection(s)	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter Code Q8)	
2	Radial Capillary Connection	
5	50 μm Diaphragm Thickness (available in 316L SST or *Hastelloy*)	
8	150 μm Diaphragm Thickness - 316L SST or *Hastelloy* C-276 Diaphragm Material only	
U	Gold Coated 5 Micron	
B	Extra Fill for Cold Temperature Applications	
D	*Hastelloy* Plug(s) for Flushing Connection(s)	
1[4]	Zone 0 Execution PTB Nr. III B/S 2415	
T	NACE MR–01–75	

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.

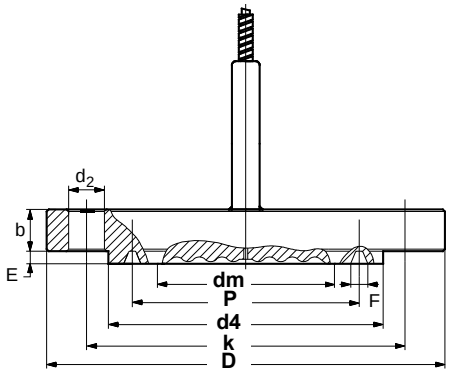
(2) When ordering special diaphragm materials, the standard housing material is 316L SST unless noted otherwise.

(3) Requires selecting DIN 2512 Form N contact surface type (Option Code US).

(4) Only available for DFUS.

FCS Flanged Type: Flush Diaphragm Seal—RTJ Gasket Surface

Dimensional Drawing for FCS Flanged Type: Flush Diaphragm Seal—RTJ Gasket Surface



1199-0000C04A

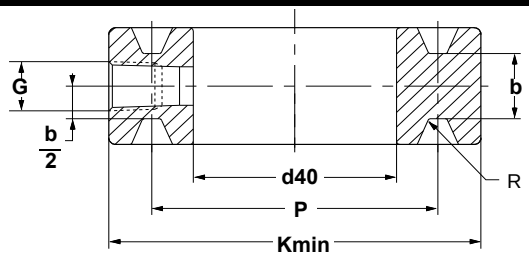
1199–069AB

FCS Process Connection Dimensions

		ASME B16.5 RTJ(1)								
		Dimensions (mm)								
DN	CL	dM	D	b	d2	k	d4	E	F	P
1-in.	600	32	124	18	4x19	89	70	6,3	8,7	51
	1500	32	149	28	4x25	102	70	6,3	8,7	51
	2500	32	159	35	4x25	108	83	6,3	8,7	60
1½-in.	600	40	155	22	4x22	114	90	6,3	8,7	68
	1500	40	178	32	4x28	124	92	6,3	8,7	68
	2500	40	205	44	4x32	146	114	6,3	12	83
2-in.	600	57	165	25	8x19	127	108	7,9	12	83
	1500	57	216	38	8x25	165	124	7,9	12	95
	2500	57	235	51	8x28	171	133	7,9	12	102
3-in.	600	89	210	32	8x22	168	146	7,9	12	124
	900	89	241	38	8x25	190	155	7,9	12	124
	1500	89	267	48	8x32	203	168	7,9	12	136
	2500	89	305	67	8x35	229	168	9,5	13,5	127

(1) Dimensions for other flange ratings are available upon request

Dimensional Drawing for FCS Flushing Connection Ring



1199-0000A09A

1) Dimensions will be provided upon request.

TABLE 12. FCS Flanged Type: Flush Diaphragm Seal - ANSI/ASME Ordering Information[1] • = *Available* - = *Not Available*

Code	Industry Standard
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)
Code	**Process Connection Style**
F	Flanged Type: Flush Diaphragm Seal
Code	**Gasket Surface Type**
CS	ASME B16.5 RTJ: Ring Type Joint Facing
Code	**Process Connection Size**
G	2 in.
7	3 in.
2	1 in.
4	11/2 in.
9	4 in.
B	5 in.

Code	Flange Pressure Rating	1 in.	11/2 in.	2 in.	3 in.	4 in.	5 in.
4	Class 600	•	•	•	•	-	-
5	Class 900	-	-	-	•	-	-
6	Class 1500	•	•	•	•	-	-
7	Class 2500	•	•	•	•	-	-
1	Class 150	•	•	•	•	•	•
2	Class 300	•	•	•	•	•	•
3	Class 400	-	-	-	-	•	•

Code[2]	Diaphragm	Wetted Parts Material	Upper Housing Material
LA	316L SST	316L SST	316 SST
LB	Hastelloy C-276	316L SST	316 SST
BB	Hastelloy C-276	Hastelloy C-276	316 SST
VI	Hastelloy C-276	Duplex 1.4462	Duplex 1.4462
VB	Hastelloy C-276	Hastelloy C-276	Duplex 1.

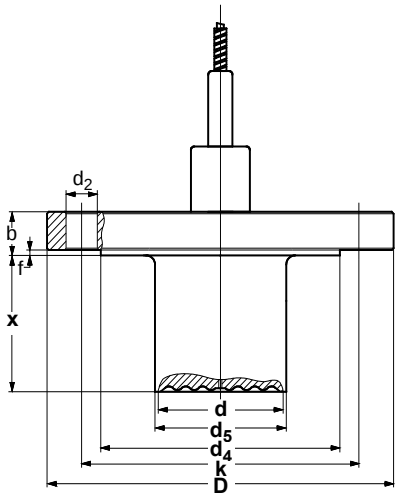
Code	Flushing Ring Material
0	No Flushing Ring required
L	316L SST
W	316Ti SST (WNr 1.4571)
B	Hastelloy C-276
2	Duplex 1.4462
Code	**Flushing Options**
0	No Flushing Ring required
1	One 1/4-18 NPT Flushing Connection
3	Two 1/4-18 NPT Flushing Connection
7	One 1/2--4 NPT Flushing Connection
9	Two 1/2--4 NPT Flushing Connection
Code	**Options (Multiple Selections)**
0	None
2	Radial Capillary Connection - Available with 316L SST or 316Ti SST (WNr 1.4571) diaphragms only
V	Teflon Coated Diaphragm for non-stick purposes only (available with 316L SST and Hastelloy C-276 diaphragm only)
G	SST Plug(s) in Flushing Connection(s)
H	SST Vent/Drain in Flushing Connection(s)
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter Code Q8)
5	50 mm Diaphragm Thickness (available in 316L SST or Hastelloy)
8	150 mm Diaphragm Thickness - 316L SST or Hastelloy C-276 Diaphragm Material only
B	Extra Fill for Cold Temperature Applications
D	Hastelloy Plug(s) for Flushing Connection(s)
T	NACE MR-01-75

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.

(2) When ordering special diaphragm materials, the standard housing material is 316L SST unless noted otherwise.

EFS Flanged type: Extended Diaphragm Seals

Dimensional Drawing for EFS Flanged Type: Extended Diaphragm Seal



EFS Process Connection Dimensions

DIN 2501										ANSI/ASME B16.5									
		Dimensions (mm)										Dimensions (mm)							
DN	PN[1]	dm	D	b	d2	k	f	d4	d5	DN	CL[2]	dm	D	b	d2	k	f	d4	d5
50	40	40	165	20	4x18	125	3	102	48	2 in.	150	40	152	19	4x19	121	1,5	92	48
	64	40	180	26	4x22	135	3	102	48		300	40	165	22	8x19	127	1,5	92	48
	100	40	195	28	4x26	145	3	102	48		600[3]	40	165	25	8x19	127	6,3	92	48
80	40	72	200	24	8x18	160	3	138	76	3 in.	150	72	190	24	4x19	152	1,5	127	76
	64	72	215	28	8x22	170	3	138	76		300	72	210	28	8x22	168	1,5	127	76
	100	72	230	32	8x26	180	3	138	76		600[3]	72	210	32	8x22	168	6,3	127	76
100	16	89	220	20	8x18	180	3	158	94	4 in.	150	89	229	24	8x19	190	1,5	157	94
	40	89	235	24	8x22	190	3	162	94		300	89	254	32	8x22	200	1,5	157	94
	64	89	250	30	8x26	200	3	162	94		400	89	254	35	8x25	200	6,3	157	94
125	16	124	250	22	8x18	210	3	188	125	5 in.	150	124	254	24	8x22	216	1,5	186	125
	40	124	270	26	8x26	220	3	188	125		300	124	279	35	8x22	235	1,5	186	125
	64	124	295	34	8x30 2	240	3	188	125		400	124	279	38	8x25	235	6,3	186	125

Standard Extension Lengths x [2]	DIN Standard Extension Lengths x[1]	ANSI/ASME Standard Extension Lengths x [1]
50 mm	50 mm	2 in
100 mm	100 mm	4 in.
150 mm	150 mm	6 in.
200 mm	200 mm	8 in.

(1) Other extension lengths are available upon request.

(1) Dimensions for other flange ratings are available upon request.

(2) Other extension lengths and diameter are available upon request.

(3) Class 600 flanges add 0.63 mm to flange thickness dimension for raised face.

TABLE 13. EES and EFS Flanged Type: Extended Diaphragm Seal – DIN Ordering Information[1]

Code	Industry Standard		
D	DIN 2501 (Deutsches Institut für Normung)		
Code	**Process Connection Style**		
E	Flanged Type: Extended Diaphragm Seal		
Code	**Gasket Surface Type**		
FS	DIN 2526 Form D		
Code	**Process Connection Size**		
G	DN 50		
J	DN 80		
K	DN 100		
M	DN 125		
Code	**Flange Pressure Rating**		
E	PN 16		
G	PN 40		
H	PN 64		
J	PN 100		
K	PN 160		
Code	**Diaphragm Material[2]**	**Extension/Gasket Surface Material**	**Flange/ Upper Housing Material**
LA	316L SST	316L SST	316 SST
LB	Hastelloy C-276	Hastelloy C-276	316 SST
LM	Hastelloy C-276	316L SST	316 SST
LC	Tantalum (Only available with smooth gasket surface)	Tantalum	316 SST
LD	Tantalum	316L SST	316 SST
LR	Titanium GR.2 (Only available with smooth gasket surface)	Titanium GR.2	316 SST
LJ	Hastelloy B-2	Hastelloy B-2	316 SST
LP	Nickel 201	Nickel 201	316 SST
L4	Hastelloy C-22	Hastelloy C-22	316 SST
LV	Monel 400	Monel 400	316 SST
LE	Inconel 600	Inconel 600	316 SST
Code	**Extension Length [3]**		
2	50 mm		
4	100 mm		
6	150 mm		
8	200 mm		
0	0 mm		
1	25 mm		
3	75 mm		
5	125 mm		
7	175 mm		
9	225 mm		
Code	**Extension Length (Amount to Add) [3]**		
0	Add 0 mm		
8	Add 20 mm		
1	Add 2,5 mm		
2	Add 5 mm		
3	Add 7,5 mm		
4	Add 10 mm		
5	Add 12,5 mm		
6	Add 15 mm		
7	Add 17,5 mm		
9	Add 22,5 mm		

Continued on next page

TABLE 13. EES and EFS Flanged Type: Extended Diaphragm Seal – DIN Ordering Information(1)

Code	Options (Multiple Selections)
0	None
6	Add 250 mm Extension Length
7	Add 500 mm Extension Length
V	*Teflon* Coated Diaphragm for non-stick purposes only (available with 316L SST and *Hastelloy* C–276 diaphragm only)
Z	Material Traceability per EN10204 DIN 3.1.B (Requires Selection of Transmitter Code Q8)
2	Radial Capillary Connection - Available with 316L SST or 316Ti SST (WNr 1.4571) Diaphragm Material only
5	50 μm Diaphragm Thickness (available in 316L SST or *Hastelloy*)
8	150 μm Diaphragm Thickness - 316L SST or *Hastelloy* C-276 Diaphragm Material only
B	Extra Fill for Cold Temperature Applications
1(4)	Zone 0 Execution PTB Nr. III B/S 2415
T	NACE MR–01–75

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time

(2) When ordering special diaphragm materials, the standard housing material is 316L SST unless noted otherwise. Consult your Rosemount representative for use with spiral wound gaskets.

(3) DIN extension lengths are specified in millimeters as offered. Additional lengths are available as special orders. Consult factory.

(4) Only available for DEFS

TABLE 14. EES and EFS Flanged Type: Extended Diaphragm Seal –ANSI Ordering Information[1]

Code	Industry Standard		
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)		
Code	**Process Connection Style**		
E	Flanged Type: Extended Diaphragm Seal		
Code	**Gasket Surface Type**		
FS	Serrated Finish		
ES	Smooth Finish [2]		
Code	**Process Connection Size**		
G	2 in.		
7	3 in.		
9	4 in.		
B	5 in.		
Code	**Flange Pressure Rating**		
1	Class 150		
2	Class 300		
3	Class 400		
4	Class 600		
5	Class 900		
6	Class 1500		
7	Class 2500		
Code	**Diaphragm Material[3]**	**Extension/Gasket Surface Material**	**Flange/Upper Housing Material**
LA	316L SST	316L SST	316 SST
LB	Hastelloy C-276	Hastelloy C-276	316 SST
LM	Hastelloy C-276	316L SST	316 SST
LC	Tantalum (Only available with smooth gasket surface)	Tantalum	316 SST
LD	Tantalum	316L SST	316 SST
LR	Titanium GR.2 (Only available with smooth gasket surface)	Titanium GR.2	316 SST
LJ	Hastelloy B-2	Hastelloy B-2	316 SST
LP	Nickel 201	Nickel 201	316 SST
L4	Hastelloy C-22	Hastelloy C-22	316 SST
LV	Monel 400	Monel 400	316 SST
LE	Inconel 600	Inconel 600	316 SST
Code	**Extension Length[4]**		
2	2 in.		
4	4 in.		
6	6 in.		
8	8 in.		
0	0 in.		
1	1 in.		
3	3 in.		
5	5 in.		
7	7 in.		
9	9 in.		
Code	**Extension Length (Amount to Add)**		
0	Add 0 in.		
1	Add 1/8 in.		
2	Add 1/4 in.		
3	Add 3/8 in.		
4	Add 1/2 in.		
5	Add 5/8 in.		
6	Add 3/4 in.		
7	Add 7/8 in.		

Continued on next page

TABLE 14. EES and EFS Flanged Type: Extended Diaphragm Seal –ANSI Ordering Information(1)

Code	Options (Multiple Selections)
0	None
V	*Teflon* Coated Diaphragm for non-stick purposes only (available with 316L SST and *Hastelloy* C–276 diaphragm only)
Z	Material Traceability per EN10204 DIN 3.1.B (Requires Selection of Transmitter Code Q8)
2	Radial Capillary Connection - Available with 316L SST or 316Ti SST (WNr 1.4571) Diaphragms only
5	50 µm Diaphragm Thickness (available in 316L SST or *Hastelloy*)
6	Add 10-in. Extension Length
7	Add 20-in. Extension Length
8	150 µm Diaphragm Thickness - 316L or *Hastelloy* C-276 Diaphragm Material only
B	Extra Fill for Cold Temperature Applications
1(5)	Zone 0 Execution PTB Nr. III B/S 2415
T	NACE MR–01–75

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.

(2) Select for Tantalum wetted parts only.

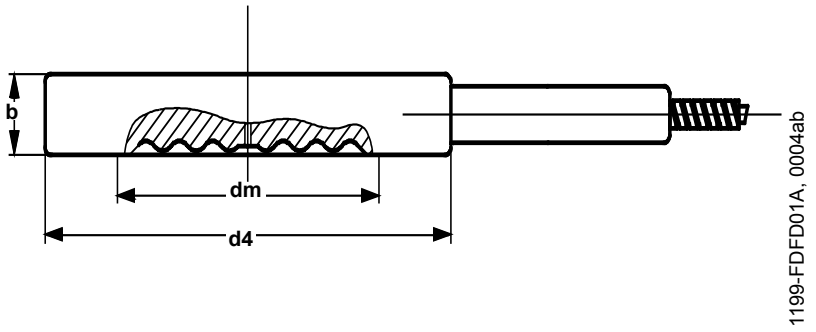
(3) When ordering special diaphragm materials, the standard housing material is 316L SST unless noted otherwise. Consult your Rosemount representative for use with spiral wound gaskets.

(4) ANSI extension lengths are in inches as offered. Additional lengths are available as special orders. Consult factory.

(5) Only available for AEFS.

PFS Pancake (Cell) Type: Flush Diaphragm Seals

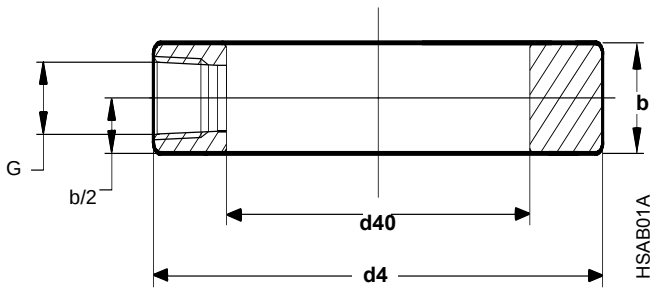
Dimensional Drawing for PFS Pancake (Cell) Type: Flush Diaphragm Seal



PFS Process Connection Dimensions

DIN 2501					ANSI/ASME B16.5				
		Dimensions (mm)					Dimensions (mm)		
DN	PN	dm	b	d4	DN	PN	dm	b	d4
25	16–400	25	20	68	1 in.	150-2500	25	20	51
50	16-400	57	20	102	1 1/2 in.	150-2500	40	20	73
80	16-400	89	20	138	2 in.	150-2500	57	20	92
100	16-400	89	20	158	3 in.	150-2500	89	20	127
125	16-400	124	20	188	4 in.	150-2500	89	20	157
					5 in.	150-2500	124	20	186

Dimensional Drawing for PFS Flushing Connection Ring



Flushing Ring Dimensions (mm)				
DN	d40	d4	b	G
50	59	102	20	¼–18 NPT
80	91	138	20	¼–18 NPT
2 in.	59	92	20	¼–18 NPT
3 in.	91	127	20	¼–18 NPT

TABLE 15. PFS Pancake (Cell) Type: Flush Diaphragm Seal – DIN Ordering Information[1]

Code	Industry Standard	
D	DIN 2501 (Deutsches Institut für Normung)	
Code	**Process Connection Style**	
P	Pancake (Cell) Type: Flush Diaphragm Seal	
Code	**Gasket Surface Type[2]**	
FS	DIN 2526 Form D	
Code	**Process Connection Size**	**Diaphragm Diameter**
G	DN 50	57 mm
J	DN 80	89 mm
D	DN 25	25 mm
F	DN 40	40 mm
K	DN 100	89 mm
M	DN 125	124 mm
Code	**Pressure Rating**	
0	Flanged not supplied. Seal rated to PN 16-400 or flange ratings or as indicated	
Code	**Diaphragm and Wetted Parts Material[3]**	**Upper Housing Material**
LA	316L SST	316 SST
LB	*Hastelloy* C-276	316 SST
LC	Tantalum	316 SST
LE	*Inconel* 600	316 SST
LM	Titanium GR.2	316 SST (Only available with a smooth gasket surface)
LJ	*Hastelloy* B-2	316 SST
LP	Nickel 201	316 SST
L4	*Hastelloy* C-22	316 SST
LV	*Monel* 400	316 SST
LZ	Zirconium	316 SST
Code	**Flushing Ring Material**	
0	No Flushing Ring	
L	316L SST	
W	316Ti SST (WNr 1.4571)	
B	*Hastelloy* C-276	
Code	**Flushing Options**	
0	No Flushing Ring	
1	One 1/4–18 NPT Flushing Connection	
3	Two 1/4–18 NPT Flushing Connection	
7	One 1/2–14 NPT Flushing Connection	
9	Two 1/2–14 NPT Flushing Connection	
Code	**Options (Multiple Selections)**	
0	None	
V	*Teflon* Coated Diaphragm for non-stick purposes only (available with 316L SST and *Hastelloy* C–276 diaphragm only)	
G	SST Plug(s) in Flushing Connection(s)	
H	SST Vent/Drain in Flushing Connection(s)	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter code Q8)	
5	50 µm Diaphragm Thickness (available in 316L SST or *Hastelloy*)	
8	150 µm Diaphragm Thickness - 316L or *Hastelloy* C-276 Diaphragm Material only (*Hastelloy* C-276 is only available with a smooth gasket surface)	
B	Extra Fill for Cold Temperature Applications	
D	*Hastelloy* Plug(s) for Flushing Connection(s)	
1	Zone 0 Execution PTB Nr. III B/S 2415	
T	NACE MR–01–75	

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.

(2) Other gasket surfaces are possible; consult factory for coding and availability.

(3) When ordering special diaphragm materials, the standard housing material is 316L SST unless noted otherwise. Consult your Rosemount representative for use with spiral wound gaskets.

TABLE 16. PFS Pancake (Cell) Type: Flush Diaphragm Seal – ANSI/ASME Ordering Information[1]

Code	Industry Standard	
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)	
Code	**Process Connection Style**	
P	Pancake (Cell) Type: Flush Diaphragm Seal	
Code	**Gasket Surface Type[2]**	
FS	Serrated Finish	
Code	**Process Connection Size**	**Diaphragm Diameter**
G	2 in.	57 mm
7	3 in.	89 mm
9	4 in.	89 mm
B	5 in.	124 mm
2	1 in.	25 mm
4	1 1/2 in.	40 mm
Code	**Flange Pressure Rating**	
0	Flange not supplied; seal rated to Class 150–2500 or flange rating	
Code	**Diaphragm and Wetted Parts Material[3]**	**Upper Housing Material**
LA	316L SST	316 SST
LB	*Hastelloy* C-276	316 SST
LC	Tantalum	316 SST
LE	*Inconel* 600	316 SST
LM	Titanium GR.2	316 SST (Only available with a smooth gasket surface)
LJ	*Hastelloy* B-2	316 SST
LP	Nickel 201	316 SST
L4	*Hastelloy* C-22	316 SST
LV	*Monel* 400	316 SST
LZ	Zirconium	316 SST
Code	**Flushing Ring Material**	
0	No Flushing Ring	
L	316L SST	
W	316Ti SST (WNr 1.4571)	
B	*Hastelloy* C-276	
Code	**Flushing Options**	
0	No Flushing Ring	
1	One 1/4-18 NPT Flushing Connection	
3	Two 1/4-18 NPT Flushing Connection	
7	One 1/2-14 NPT Flushing Connection	
9	Two 1/2-14 NPT Flushing Connection	
Code	**Options (Multiple Selections)**	
0	None	
V	*Teflon* Coated Diaphragm for non-stick purposes only (available with 316L SST and *Hastelloy* C–276 diaphragm only)	
G	SST Plug(s) in Flushing Connection(s)	
H	SST Vent/Drain in Flushing Connection(s)	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter Code Q8)	
5	50 µm Diaphragm Thickness (available in 316L SST or *Hastelloy)*	
8	150 µm Diaphragm Thickness - 316L SST or *Hastelloy* C-276 Diaphragm Material only (*Hastelloy* C-276 is only available with a smooth gasket surface)	
B	Extra Fill for Cold Temperature Applications	
D	*Hastelloy* Plug(s) for Flushing Connection(s)	
1	Zone 0 Execution PTB Nr. III B/S 2415	
T	NACE MR–01–75	

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.

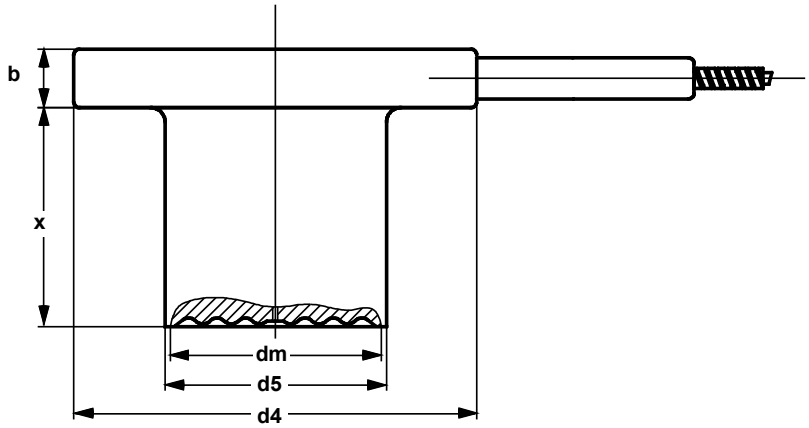
(2) Other gasket surfaces are possible; consult factory for coding and availability.

(3) When ordering special diaphragm materials, the standard housing material is 316L SST unless otherwise noted. Consult your Rosemount representative for use with spiral wound gaskets.

DES and DFS Pancake (Cell) Type: Extended Diaphragm Seals

Dimensional Drawing for DES and DFS Pancake Type: Extended Diaphragm Seals

1199-0006AB



DIN Standard Extension Lengths x(1)	ANSI/ASME Standard Extension Lengths x (1)
50 mm	2 in
100 mm	4 in.
150 mm	6 in.
200 mm	8 in.

(1) Other extension lengths are available upon request.

1199-EDB01A

DES and DFS Pancake (Cell) Process Connection Dimensions

DIN 2501						ANSI/ASME B16.5					
		Dimensions (mm)						Dimensions (mm)			
DN	PN	dm	b	d4	d5	DN	CL	dm	b	d4	d5
50	16-400	40	20	102	48	2 in.	150-2500	40	20	92	48
80	16-400	72	20	138	76	3 in.	150-2500	72	20	127	76
100	16-400	89	20	162	94	4 in.	150-2500	89	20	157	94
125	16-400	124	20	188	125	5 in.	150-2500	124	20	186	125

TABLE 17. DES and DFS Pancake (Cell) Type: Extended Diaphragm Seal – DIN Ordering Information[1]

Code	Industry Standard		
D	DIN 2501 (Deutsches Institut für Normung)		
Code	**Process Connection Style**		
D	Pancake (Cell) Type: Extended Diaphragm Seal		
Code	**Gasket Surface Type**		
FS	DIN 2526 Form D		
ES	DIN 2526 Form E [2]		
Code	**Process Connection Size**		
G	DN 50		
J	DN 80		
K	DN 100		
M	DN 125		
Code	**Pressure Rating**		
0	Flange not supplied; seal rated to PN 16-400 or flange rating		
Code	**Diaphragm Material[3]**	**Extension/Gasket Surface Material**	**Upper Housing Material**
LA	316L SST	316L SST	316 SST
LB	*Hastelloy* C-276	*Hastelloy* C-276	316 SST
LC	Tantalum (Only available with smooth gasket surface)	Tantalum	316 SST
LE	*Inconel* 600	*Inconel* 600	316 SST
LR	Titanium GR.2 (Only available with smooth gasket surface)	Titanium GR.2	316 SST
LJ	*Hastelloy* B-2	*Hastelloy* B-2	316 SST
LP	Nickel 201	Nickel 201	316 SST
L4	*Hastelloy* C-22	*Hastelloy* C-22	316 SST
LV	*Monel* 400	*Monel* 400	316 SST
LD	Tantalum	316L SST	316 SST
LM	*Hastelloy* C-276	316L SST	316 SST
Code	**Extension Length[4]**		
2	50 mm		
4	100 mm		
6	150 mm		
8	200 mm		
0	0 mm		
1	25 mm		
3	75 mm		
5	125 mm		
7	175 mm		
9	225 mm		
Code	**Extension Length (Amount to Add)[3]**		
0	Add 0 mm		
1	Add 2,5 mm		
2	Add 5 mm		
3	Add 7,5 mm		
4	Add 10 mm		
5	Add 12,5 mm		
6	Add 15 mm		
7	Add 17,5 mm		
8	Add 20 mm		
9	Add 22,5 mm		

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TABLE 17. DES and DFS Pancake (Cell) Type: Extended Diaphragm Seal – DIN Ordering Information(1)

Code	Options (Multiple Selections)
0	None
V	*Teflon* Coated Diaphragm for non-stick purposes only (available with 316L SST and *Hastelloy* C–276 diaphragm only)
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter Code Q8)
5	50 μm Diaphragm Thickness (available in 316L SST or *Hastelloy*)
8	150 μm Diaphragm Thickness - 316L SST or *Hastelloy* C-276 Diaphragm Material only
6	Add 250 mm Extension Length
7	Add 500 mm Extension Length
B	Extra Fill for Cold Temperature Applications
T	NACE MR–01–75

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.

(2) Select for Tantalum wetted parts only.

(3) When ordering special diaphragm materials, the standard housing material is 316L SST unless noted otherwise. Consult your Rosemount representative for use with spiral wound gaskets.

(4) DIN extension lengths are specified in millimeters, as offered. Other extension lengths are available as special offers on request.

TABLE 18. DES and DFS Pancake (Cell) Type: Extended Diaphragm Seal – ANSI/ASME Ordering Information[1]

Code	Industry Standard		
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)		
Code	**Process Connection Style**		
D	Pancake (Cell) Type: Extended Diaphragm Seal		
Code	**Gasket Surface Type**		
FS	Serrated Finish		
ES	Smooth Finish [2]		
Code	**Process Connection Size**		
G	2 in.		
7	3 in.		
9	4 in.		
B	5 in.		
Code	**Pressure Rating**		
0	Flange not supplied; seal rated to Class 150–2500 or flange rating		
Code	**Diaphragm Material [3]**	**Extension/Gasket Surface Material**	**Upper Housing Material**
LA	316L SST	316L SST	316 SST
LB	*Hastelloy* C-276	*Hastelloy* C-276	316 SST
LC	Tantalum (Only available with smooth gasket surface)	Tantalum	316 SST
LE	*Inconel* 600	*Inconel* 600	316 SST
LR	Titanium GR.2 (Only available with smooth gasket surface)	Titanium GR.2	316 SST
LJ	*Hastelloy* B-2	*Hastelloy* B-2	316 SST
LP	Nickel 201	Nickel 201	316 SST
L4	*Hastelloy* C-22	*Hastelloy* C-22	316 SST
LV	*Monel* 400	*Monel* 400	316 SST
LD	Tantalum	316L SST	316 SST
LM	*Hastelloy* C-276	316L SST	316 SST
Code	**Extension Length[4]**		
2	2 in.		
4	4 in.		
6	6 in.		
8	8 in.		
0	0 in.		
1	1 in.		
3	3 in.		
5	5 in.		
7	7 in.		
9	9 in.		
Code	**Extension Length (Amount to Add)**		
0	Add 0 in		
1	Add 1/8 in		
2	Add 1/4 in.		
3	Add 3/8 in.		
4	Add 1/2 in.		
5	Add 5/8 in.		
6	Add 3/4 in.		
7	Add 7/8 in.		

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TABLE 18. DES and DFS Pancake (Cell) Type: Extended Diaphragm Seal – ANSI/ASME Ordering Information(1)

Code	Options (Multiple Selections)
0	None
V	*Teflon* Coated Diaphragm for non-stick purposes only (available with 316L SST and *Hastelloy* C–276 diaphragm only)
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter code Q8)
5	50 μm Diaphragm Thickness (available in 316L SST or *Hastelloy*)
8	150 μm Diaphragm Thickness - 316L or *Hastelloy* C-276 Diaphragm Material Only
6	Add 10-in. Extension Length
7	Add 20-in. Extension Length
B	Extra Fill for Cold Temperature Applications
T	NACE MR–01–75

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.

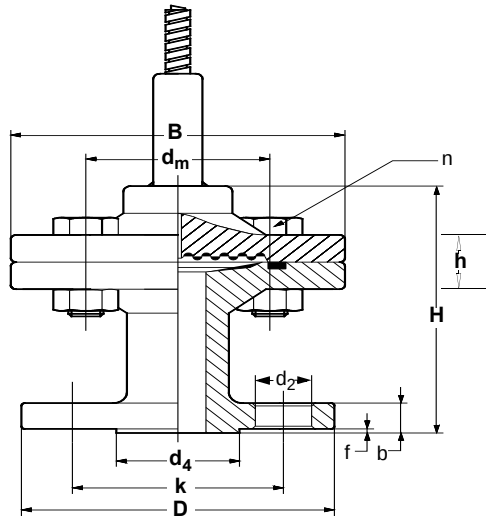
(2) Select for Tantalum wetted parts only.

(3) When ordering special diaphragm materials, the standard housing material is 316L SST unless noted otherwise. Consult your Rosemount representative for use with spiral wound gaskets.

(4) ANSI extension lengths are specified in inches as offered. Other extension lengths are available as special offers on request.

RFS Flanged Type: Internal Diaphragm Seals

Dimensional Drawing for RFS Flanged Type: Internal Diaphragm Seal



RFS Dimensions for Process Flange to Lower Housing Connection

DIN 2501

DN	PN(1)	Dimensions (mm) D	b	f	d2	k	d_4	H ca.
15	40	95	16	2	4x14	65	45	94
	100	105	20	2	4x14	75	45	101
	160	105	20	2	4x14	75	45	101
20								
	40	105	18	2	4x14	75	58	96
25	40	115	18	2	4x14	85	68	96
	100	140	24	2	4x18	100	68	114
	160	140	24	2	4x18	100	68	114
32								
	40	140	18	2	4x18	100	78	98
40	40	150	18	3	4x18	110	88	101
	100	170	26	3	4x22	125	88	118
	160	170	28	3	4x22	125	88	120

ANSI/ASME B16.5

DN	CL(1)	Dimensions (mm) D	b	f	d2	k	d4	H ca.
1/2-in.	150	89	11	1,5	4x16	60	35	104
	300	95	14	1,5	4x16	66	35	108
	600	95	14	6,3	4x16	66	35	108
3/4-in.	150	98	13	1,5	4x16	70	43	108
	300	117	16	1,5	4x19	83	43	113
	600	117	16	6,3	4x19	83	43	113
1-in.	150	108	14	1,5	4x16	79	51	112
	300	124	18	1,5	4x19	89	51	118
	600	124	18	6,3	4x19	89	51	118
1 1/4-in	150	117	16	1,5	4x16	89	64	113
.	300	133	19	1,5	4x19	99	64	121
	600	133	21	6,3	4x19	99	64	123
1 1/2-in	150	127	18	1,5	4x16	99	73	118
.	300	155	21	1,5	4x22	114	73	124
	600	155	22	6,3	4x22	114	73	126

(1) Dimensions for other flange ratings are available upon request.

RFS Dimensions for Upper Housing to Lower Housing Connection

PN	B	dm	n	h
40	138	89	8xM10	42
100(1)	95	57	4xM10	42
100	124	72	8xM10	42
160	95	57	8xM10	42

(1) Factory standard upper housing dimensions. Other upper housing dimensions optional. Contact your local Rosemount representative for additional information.

TABLE 19. RFS Flanged Type: Internal Diaphragm Seal — DIN Ordering Information[1]

Code	Industry Standard	
D	DIN 2501 (Deutsches Institut für Normung)	
Code	**Process Connection Type**	
R	Flanged Type: Internal Diaphragm Seal	
Code	**Gasket Surface Type[2]**	
FS	DIN 2526 Form D	
Code	**Process Connection Size**	**Diaphragm Size**
B	DN 15	57 mm
C	DN 20	57 mm
D	DN 25	57 mm
E	DN 32	57 mm
F	DN 40	57 mm
Code	**Flange Pressure Rating**	
G	PN 40	
J	PN 100 (n/a with DN 20 or DN 32)	
K	PN 160	
Code[3]	**Diaphragm Material**	**Upper and Lower Housing Material**
LA	316L SST	316 SST
LB	*Hastelloy* C-276	316 SST
LC	Tantalum	316 SST
LE	*Inconel* 600	316 SST
LJ	*Hastelloy* B-2	316 SST
LP	Nickel 201	316 SST
L4	*Hastelloy* C-22	316 SST
LV	*Monel* 400	316 SST
LZ	Zirconium	316 SST
WC	Tantalum	316 SST (WNr 1.4571)
WB	*Hastelloy* C-276	316 SST (WNr 1.4571)
Code[4]	**Lower Housing Material (Supplied with Viton Gasket)[5]**	
L	316L SST	
W	316Ti SST (WNr 1.4571)	
B	*Hastelloy* C-276	
Code	**Flushing Options**	
1	One 1/4-18 NPT Flushing Connection	
3	Two 1/4-18 NPT Flushing Connection	
5	No Flushing Connection	
Code	**Options (Multiple Selections)**	
0	None	
2	98% Graphite Gasket	
V	*Teflon* Coated Diaphragm for non-stick purposes only (available with 316L SST and *Hastelloy* C–276 diaphragm only)	
D	*Hastelloy* Plug(s) for flushing connection(s)	
G	SST Plug(s) for flushing connection(s)	
H	SST Vent/Drain for flushing connection(s)	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter Code Q8)	
J	*Teflon* Gasket	
5	50 µm Diaphragm Thickness (available in 316L SST or *Hastelloy*)	
8	150 µm Diaphragm Thickness - 316L or *Hastelloy* C-276 Diaphragm Material only	
U	Gold Coated Diaphragm (5 microns)	
B	Extra Fill for Cold Temperature Applications	
6	72 mm Diaphragm Diameter (up to PN 100)	
7	89 mm Diaphragm Diameter (PN 40 only)	
T	NACE MR–01–75	

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.

(2) Other gasket surfaces are possible; consult factory for coding and availability.

(3) When ordering special diaphragm materials, the standard housing material is 316L SST unless noted otherwise.

(4) Other gasket materials are available upon request.

(5) Limited to a process temperature of 200 °C.

TABLE 20. RFS Internal Flanged Diaphragm Seal — ANSI/ASME Ordering Information[1]

Code	Industry Standard	
A	ANSI /ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)	
Code	**Process Connection Type**	
R	Flanged Type: Internal Diaphragm Seal	
Code	**Gasket Surface Type[2]**	
FS	Serrated Finish	
Code	**Process Connection Size**	**Diaphragm Size**
1	1/2 in.	52 mm
A	3/4 in.	52 mm
2	1 in.	52 mm
3	1 ¼in.	52 mm
4	1 ½ in.	52 mm
Code	**Flange Pressure Rating**	
1	Class 150	
2	Class 300	
3	Class 600	
Code[3]	**Diaphragm Material**	**Upper and Lower Housing Material**
LA	316L SST	316 SST
LB	*Hastelloy* C-276	316 SST
LC	Tantalum	316 SST
LE	*Inconel* 600	316 SST
LJ	*Hastelloy* B-2	316 SST
LP	Nickel 201	316 SST
L4	*Hastelloy* C-22	316 SST
LV	*Monel* 400	316 SST
WC	Tantalum	316 SST (WNr 1.4571)
WB	*Hastelloy* C-276	316 SST (WNr 1.4571)
Code[4]	**Lower Housing Material (Supplied with Viton Gasket)[5]**	
L	316L SST	
W	316Ti SST (WNr 1.4571)	
B	*Hastelloy* C-276	
Code	**Flushing Options**	
1	One 1/4-18 NPT Flushing Connection	
3	Two 1/4-18 NPT Flushing Connection	
5	No Flushing Connection	
Code	**Options (Multiple Selections)**	
0	None	
2	98% Graphite Gasket for chloride applications	
V	*Teflon* Coated Diaphragm for non-stick purposes only (available with 316L SST and *Hastelloy* C–276 diaphragm only)	
D	*Hastelloy* Plug(s) for flushing connection(s)	
G	SST Plug(s) for flushing connection(s)	
H	SST Vent/Drain for flushing connection(s)	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter Code Q8)	
5	50 µm Diaphragm Thickness (available in 316L SST or *Hastelloy*)	
8	150 µm Diaphragm Thickness - 316L or *Hastelloy* C-276 Diaphragm Material only	
U	Gold Coated Diaphragm (5 microns)	
B	Extra Fill for Cold Temperature Applications	
6	72 mm Diaphragm Diameter (up to Class 600)	
7	89 mm Diaphragm Diameter (up to Class 300)	
T	NACE MR–01–75	

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.

(2) Other gasket surfaces are possible; consult factory for coding and availability.

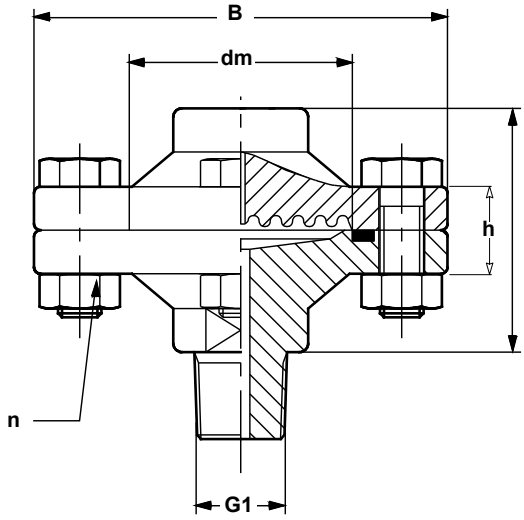
(3) When ordering special diaphragm materials, the standard housing material is 316L SST unless noted otherwise.

(4) Other gasket materials are available upon request.

(5) Limited to a process temperature of 200 °C.

RTS Threaded Type: Internal Diaphragm Seal

Dimensional Drawing for RTS Threaded Type: Internal Diaphragm Seal



RTS Threaded Process Connection Dimensions

Parallel Thread						Tapered Thread					
		Dimensions (mm)						Dimensions (mm)			
PN	G1[(1)]	dm	B	n	h	PN	G1[(1)]	dm	B	n	h
100	1/2 in.	57	95	4xM10	42	100	1/2 in.	57	95	4xM10	42
250	1/2 in.	57	95	8xM10	42	250	1/2 in.	57	95	8xM10	42
100	1/2 in.	72	124	8xM10	42	100	1/2 in.	72	124	8xM10	42
40	1/2 in.	89	138	8xM10	42	40	1/2 in.	89	138	8xM10	42

(1) Others available upon request (1/2-14NPT male shown).

TABLE 21. RTS Threaded Type: Internal Diaphragm Seal — Ordering Information[1]

Code	Process Connection Style	
DRTS	Threaded (Standard thread is male; for female, see options below)	
Code[2]	**Process Connection Size**	
C	Parallel thread: G 1/2A DIN 16288	
N	Tapered thread: R 1/2 per ISO 7/1	
Code	**Pressure Rating**	**Diaphragm Size**
1	PN 100	57 mm
2	PN 250	57 mm
4	PN 40	89 mm
Code[3]	**Diaphragm Material**	**Upper Housing Material**
LA	316L SST	316 SST
LB	*Hastelloy* C-276	316 SST
LC	Tantalum	316 SST
LE	*Inconel* 60	316 SST
LJ	*Hastelloy* B-2	316 SST
LP	Nickel 201	316 SST
L4	*Hastelloy* C-22	316 SST
LV	*Monel* 400	316 SST
WC	Tantalum	316 SST (WNr 1.4571)
WB	*Hastelloy* C-276	316 SST (WNr 1.4571)
EM	Titanium Gr.2	Titanium Gr.2
Code	**Lower Housing Material (Supplied with Viton Gasket)[4]**	
L	316L SST	
W	316Ti SST (WNr 1.4571)	
B	*Hastelloy* C-276	
Code	**Flushing Options**	
1	One ¼–18NPT Flushing Connection	
3	Two ¼–18 NPT Flushing Connection	
5	No Flushing Connection	
Code	**Options (Multiple Selections)**	
0	None	
V	*Teflon* Coated Diaphragm for non-stick purposes only (available with 316L SST and *Hastelloy* C–276 diaphragm only)	
J	*Teflon* Gasket	
2	98% Graphite Gasket for chloride applications	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter Code Q8)	
5	50 μm Diaphragm Thickness (available in 316L SST or *Hastelloy*)	
8	150 μm Diaphragm Thickness - 316L SST or *Hastelloy* C-276 Diaphragm Material only	
9	Female Threads (Internal parallel thread G 1/2A–DIN 16288, internal tapered thread R 1/2–ISO 7/1)	
H	SST Drain/Vent for flushing connection(s)	
G	SST Plug(s) for flushing connection(s)	
B	Extra Fill for Cold Temperature Applications	
D	*Hastelloy* Plugs for Flushing Connections	
6	72 mm Diaphragm Diameter	
T	NACE MR–01–75	

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.

(2) For special process connection sizes, contact your Rosemount representative.

(3) When ordering special diaphragm materials, the standard housing material is 316L SST unless noted otherwise.

(4) Limited to a process temperature of 200 °C.

TABLE 22. RTS Threaded Type: Internal Diaphragm Seal — Ordering Information[1]

Code	Process Connection Style	
ARTS	Tapered Threaded (Standard thread is female, for male, see options below)	
Code[2]	**Process Connection Size**	
3	1/2–14 NPT	
5	1–14 NPT	
Code	**Pressure Rating**	**Diaphragm Size**
1	PN 100	57 mm
2	PN 250	57 mm
4	PN 40	89 mm
Code[3]	**Diaphragm Material**	**Upper Housing Material**
LA	316L SST	316 SST
LB	*Hastelloy* C-276	316 SST
LC	Tantalum	316 SST
LE	*Inconel* 60	316 SST
LJ	*Hastelloy* B-2	316 SST
LP	Nickel 201	316 SST
L4	*Hastelloy* C-22	316 SST
LV	*Monel* 400	316 SST
WC	Tantalum	316 SST (WNr 1.4571)
WB	*Hastelloy* C-276	316 SST (WNr 1.4571)
EM	Titanium Gr.2	Titanium Gr.2
Code	**Lower Housing Material (Supplied with Viton Gasket)[4]**	
L	316L SST	
W	316Ti SST (WNr 1.4571)	
B	*Hastelloy* C-276	
P[5]	PVDF	
Code	**Flushing Options**	
1	One ¼–18NPT Flushing Connection	
3	Two ¼–18 NPT Flushing Connection	
5	No Flushing Connection	
Code	**Options (Multiple Selections)**	
0	None	
V	*Teflon* Coated Diaphragm for non-stick purposes only (available with 316L SST and *Hastelloy* C–276 diaphragm only)	
J	*Teflon* Gasket	
2	98% Graphite Gasket for chloride applications	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter Code Q8)	
5	50 µm Diaphragm Thickness (available in 316L SST or *Hastelloy*)	
8	150 µm Diaphragm Thickness - 316L SST or *Hastelloy* C-276 Diaphragm Material only	
1	NPT Male Threads	
H	SST Drain/Vent for flushing connection(s)	
G	SST Plug(s) for flushing connection(s)	
B	Extra Fill for Cold Temperature Applications	
D	*Hastelloy* Plugs for Flushing Connections	
6	72 mm Diaphragm Diameter	
T	NACE MR–01–75	

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.

(2) For special process connection sizes, contact your local Rosemount representative.

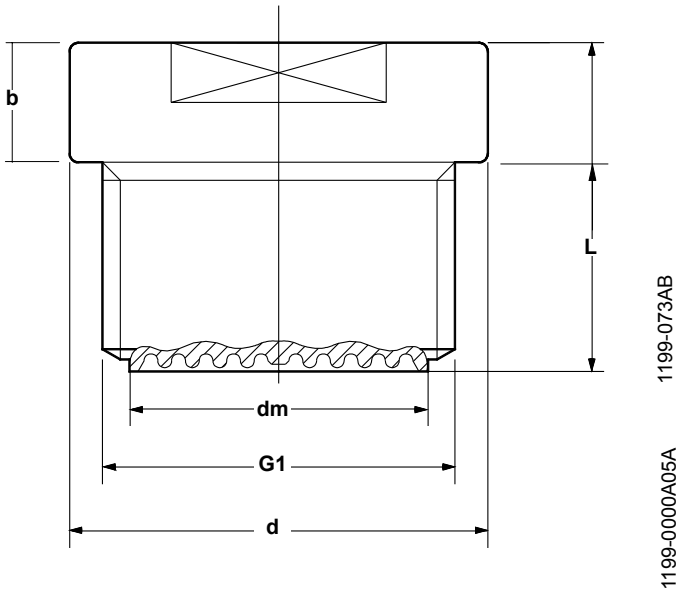
(3) When ordering special diaphragm materials, the standard housing material is 316L SST unless noted otherwise.

(4) Limited to a process temperature of 200 °C.

(5) Pressure rating reduced. Contact your Rosemount representative for details.

HTS Threaded Type: Flush Diaphragm Seal

Dimensional Drawing for HTS Threaded Type: Flush Diaphragm Seal



HTS Process Connection Dimensions

ISO 228/1 Parallel Thread						NPT: Tapered Thread					
		Dimensions (mm)						Dimensions (mm)			
G1	PN	dm	L	b	d	G1	PN	dm	L	b	d
1 in.	600	25	21	30	47	1 in.	600	25	23	30	47
1½ in.	600	32	30	30	60	1½ in.	600	32	32	30	60
2 in.	600	40	35	30	70	2 in.	600	40	37	30	70

TABLE 23. HTS Threaded Type: Flush Diaphragm Seal — DIN Ordering Information(1)

Code	Process Connection Style	
DHTS(2)	Parallel Thread	
Code	**Process Connection Size**	**Diaphragm Diameter**
E	G1	25 mm
G	G1 1/2	32 mm
J	G2	40 mm
Code	**Pressure Rating**	
6	600 bar	
Code	**Diaphragm and Wetted Parts Material**	**Housing Material**
LA00	316L SST	316 SST
Code	**Options (Multiple Selections)**	
0	None	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter Code Q8)	
5	50 μm Diaphragm Thickness (available in 316L SST or *Hastelloy* C-276)	
8	150 μm Diaphragm Thickness - 316L SST or *Hastelloy* C-276 Diaphragm Material only	
B	Extra Fill for Cold Temperature Applications	
T	NACE MR–01–75	

(1) Consult your Rosemount representative for use with low calibrated spans. Shaded areas indicate special orders, consult your Rosemount representative for availability, performance effects, and lead time.

(2) Gasket available upon request; contact your Rosemount representative.

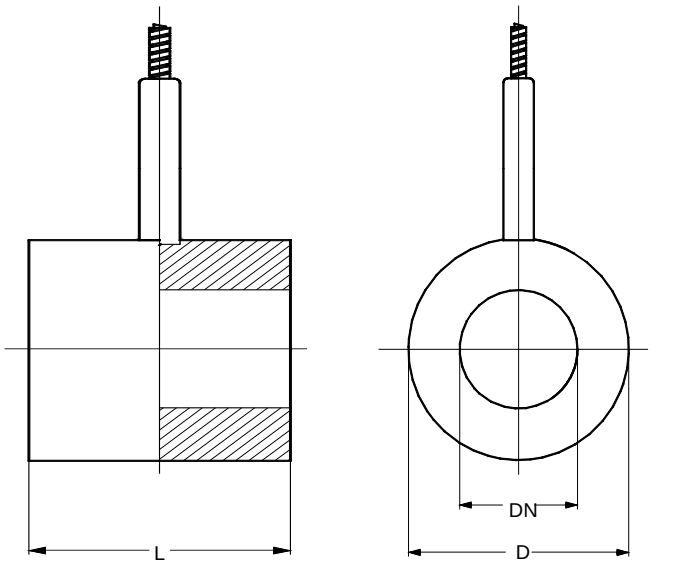
TABLE 24. HTS Threaded Type: Flush Diaphragm Seal —NPT Ordering Information (1)

Code	Process Connection Style	
AHTS	Tapered Thread	
Code	**Process Connection Size**	**Diaphragm Diameter**
5	1-11,5 NPT	25 mm
7	1½-11,5 NPT	32 mm
9	2-11,5 NPT	40 mm
Code	**Pressure Rating**	
6	600 bar	
Code	**Diaphragm and Wetted Parts Material**	**Housing Material**
LA00	316L SST	316L SST
Code	**Options (Multiple Selections)**	
0	None	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter Code Q8)	
5	50 μm Diaphragm Thickness (available in 316L SST or *Hastelloy* C-276)	
8	150 μm Diaphragm Thickness - 316L SST or *Hastelloy* C-276 Diaphragm Material only	
B	Extra Fill for Cold Temperature Applications	
T	NACE MR–01–75	

(1) Consult your Rosemount representative for use with low calibrated spans. Shaded areas indicate special orders, consult your Rosemount representative for availability, performance effects, and lead time.

TFS Cell Type: In-Line Diaphragm Seal

Dimensional Drawings for TFS Cell Type: In-Line Diaphragm Seal



TFS Process Connection Dimensions

DIN 2501					ANSI/ASME B16.5				
Process Connection Size	PN	Dimensions (mm) DN	D	L	Process Connection Size	CL	Dimensions (mm) DN	D	L
25	16-400	27	68	90	1 in.	150-2500	27	51	90
40	16-400	41,0	88	90	1½ in.	150-2500	41,0	73	90
50	16-400	50	102	90	2 in.	150-2500	50	92	90
80	16-400	78,0	138	90	3 in.	150-2500	78,0	127	90
100	16-400	107	162	90	4 in.	150-2500	101	157	90

TABLE 25. TFS Cell Type: In-Line Diaphragm Seal —DIN Ordering Information[1]

Code	Industry Standard	
D	DIN 2501 (Deutsches Institut für Normung)	
Code	**Process Connection Style**	
T	Flanged Type: In-Line Diaphragm Seal	
Code	**Gasket Surface**	
FS	DIN 2526 Form D	
Code	**Process Connection Size**	
D	DN 25	
F	DN 40	
G	DN 50	
J	DN 80	
K	DN 100	
Code	**Pressure Rating**	
0	Flange not supplied; seal rated to PN 16-400 or flange rating	
Code	**Diaphragm and Wetted Parts Material[2]**	**Housing Material**
LA00	316L SST	316 SST
LB00	*Hastelloy* C-276	316 SST
Code[3]	**Options (Multiple Selections)**	
0	None	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter Code Q8)	
T	NACE MR–01–75	

(1) Consult your Rosemount representative for use with low calibrated spans. Shaded areas indicate special orders, consult your Rosemount representative for availability, performance effects, and lead time.

(2) When ordering special diaphragm materials, the standard housing material is 316L SST unless noted otherwise.

(3) Other lengths and integral flange construction available. Consult the factory.

TABLE 26. TFS Cell Type: In-Line Diaphragm Seal —ANSI/ASME Ordering Information[1]

Code	Industry Standard	
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)	
Code	**Process Connection Style**	
T	Flanged Type: In-Line Diaphragm Seal	
Code	**Gasket Surface**	
FS	Serrated Finish	
Code	**Process Connection Size**	
2	1 in.	
4	1½ in.	
G	2 in.	
7	3 in.	
9	4 in.	
Code	**Pressure Rating**	
0	Flange not supplied; seal rated to Class 2500 or flange rating	
Code	**Diaphragm and Wetted Parts Material[2]**	**Housing Material**
LA00	316L SST	316L SST
LB00	*Hastelloy* C-276	316L SST
Code[3]	**Options (Multiple Selections)**	
0	None	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter Code Q8)	
T	NACE MR–01–75	

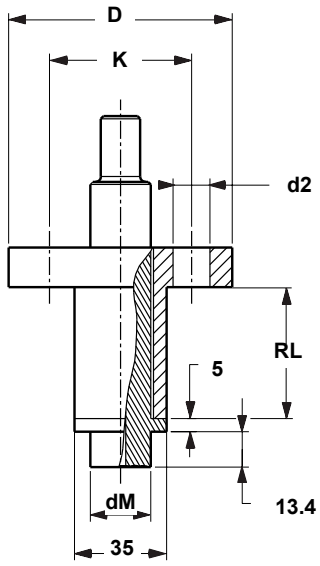
(1) Consult your Rosemount representative for use with low calibrated spans. Shaded areas indicate special orders, consult your Rosemount representative for availability, performance effects, and lead time.

(2) When ordering special diaphragm materials, the standard housing material is 316L SST unless noted otherwise.

(3) Other lengths and integral flange construction available. Consult factory.

JES Extruder Flanged Type

Dimensional Drawings for JES Extruder Flanged Type



1199-1199004B, 1199-NCESA01C

JES Process Connection Dimensions (mm)						
PN	dM	D	K	d2	RL	Flange Thickness
400 bar	23	85	54	4x14	See Table 27	25 mm

TABLE 27. JES Extruder Flanged Type — Ordering Information[1]

Code	Process Connection Style	
NJES	Plastics Extrusion Clamping Flange	
Code	**Process Connection Size**	
B	23 mm (minimum span 60 bar)	
Code	**Pressure Rating**	
P[2]	400 bar	
Code	**Diaphragm and Wetted Parts Material**	**Upper Housing Material**
LA	316L SST	316 SST
Code	**Extension Length**	
0	Add 0 mm	
1	Add 10 mm	
2	Add 20 mm	
3	Add 30 mm	
4	Add 40 mm	
5	Add 50 mm	
6	Add 60 mm	
7	Add 70 mm	
8	Add 80 mm	
9	Add 90 mm	
Code	**Extension Length (Amount to Add)**	
0	Add 0 mm	
1	Add 1 mm	
2	Add 2 mm	
3	Add 3 mm	
4	Add 4 mm	
5	Add 5 mm	
6	Add 6 mm	
7	Add 7 mm	
8	Add 8 mm	
9	Add 9 mm	
Code	**Options (Multiple Selections)**	
0	None	
5	50 mm Diaphragm Thickness (available in 316L SST or Hastelloy)	
8	150 mm Diaphragm Thickness (316L SST or Hastelloy C-276 Diaphragm Material Only)	
6	Add 100 mm extension length	
7	Add 200 mm extension length	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter Code Q8)	
T	NACE MR–01–75	

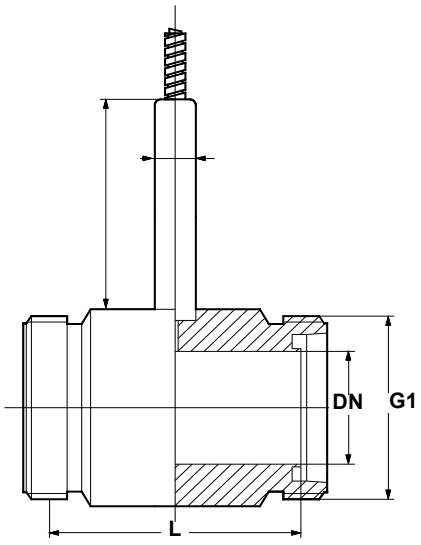
(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.

(2) Minimum range is 100 bar.

Sanitary Diaphragm Seal Systems

VLS and VMS Sanitary In-Line Diaphragm Seals— DIN 11851 or SMS Process Connections

Dimensional Drawing for VLS and VMS Sanitary In-Line Diaphragm Seals



1199-RWIC01A, 1199-075AB

VLS and VMS Process Connection Dimensions[(1)]

DIN 11851[(1)]					SMS				
Process Connection Size	PN	Dimensions (mm) DN	G1	L	Process Connection Size	PN	Dimensions (mm) DN	G1	L
25	40	25,0	Rd52x1/6	90	25	40	25,0	Rd40x1/6	90
40	40	38,1	Rd65x1/6	90	38	40	38,1	Rd60x1/6	90
50	40	50	Rd78x1/6	90	51	40	50	Rd70x1/6	90
80	40	81,0	Rd110x1/4	90	76	40	76,0	Rd98x1/6	90
100	40	100,0	Rd130x1/4	90					

(1) RJT and IDF dimensions available upon request.

TABLE 28. VLS Sanitary In-Line Diaphragm Seal—DIN Ordering Information[1]

Code	Industry Standard
S	Sanitary
Code	**Process Connection Style[2]**
VLS	Sanitary In Line Seal per DIN 11851 (maximum working pressure: 40 bar)
Code	**Process Connection Size**
D0	DN 25
F0	DN 40
G0	DN 50
J0	DN 80
K0	DN 100
Code	**Diaphragm Material[3]**
LA00	316L SST
Code	**Options (Multiple Selections)**
0	None
6	Electrolytical polishing of diaphragm material
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter code Q8)

(1) Consult your Rosemount representative for use with low calibrated spans. Shaded areas indicate special orders, consult your Rosemount representative for availability, performance effects, and lead time.

(2) Other industry standards such as IDF and RJT available upon request.

(3) When ordering optional diaphragm materials, the standard housing material is 316L SST, unless noted otherwise.

TABLE 29. VMS Sanitary In-Line Diaphragm Seal—SMS Ordering Information[1]

Code	Industry Standard
S	Sanitary
Code	**Process Connection Style[2]**
VMS	Sanitary In Line Seal per SMS (maximum working pressure: 40 bar)
Code	**Process Connection Size**
20	DN 25
30	DN 38
50	DN 51
70	DN 76
Code	**Diaphragm Material[3]**
LA00	316L SST
Code	**Options (Multiple Selections)**
0	None
6	Electrolytical polishing of diaphragm material
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter code Q8)

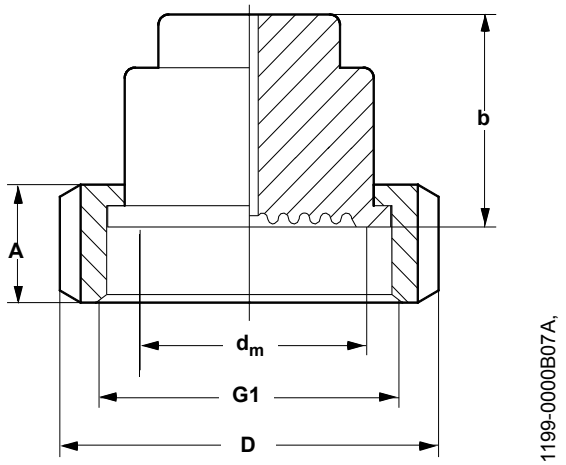
(1) Consult your Rosemount representative for use with low calibrated spans. Shaded areas indicate special orders, consult your Rosemount representative for availability, performance effects, and lead time.

(2) Other industry standards such as IDF and RJT available upon request.

(3) When ordering optional diaphragm materials, the standard housing material is 316L SST, unless noted otherwise.

SLS, SMS, SFS and SRS Sanitary Seals: Dairy Process Connections—Female Thread

Dimension Drawing for SLS, SMS, SFS and SRS: Dairy Process Connections—Female Thread



SLS, SMS, SFS and SRS Process Connection Dimensions

	Female Thread						
	DIMENSIONS (mm)						
STANDARD	DN	PN	A	b	d_m	G1	D
DIN 11851	25	40	21	45	25	Rd52×1/6	63
	32	40	21	40	32	Rd58×1/6	70
	40	40	21	45	40	Rd65×1/6	78
	50	40	22	46	57	Rd78×1/6	92
	65	40	25	47	57	Rd95×1/6	112
	80	40	30	47	72	Rd110×1/4	127
SMS	25	40	20	38	25	Rd40×1/6	51
	32	40	22	40	32	Rd48×1/6	60
	38	40	25	40	32	Rd60×1/6	74
	51	40	26	40	57	Rd70×1/6	84
	63,5	40	30	40	57	Rd85×1/6	100
	76	40	32	40	72	Rd98×1/6	114
IDF(1)							
RJT(1)							

(1) Contact factory for dimensions.

TABLE 30. SLS Sanitary Seals: Dairy Process Connection—**Female Thread** Ordering Information[1]

Code	Industry Standard	
S	Sanitary	
Code	**Process Connection Style**	
SLS	Female Thread per DIN 11851	
Code	**Process Connection Size**	**Pressure Rating[2]**
D0	DN 25	40 bar
F0	DN 40	40 bar
G0	DN 50	40 bar
J0	DN 80	40 bar
E0	DN 32	40 bar
H0	DN 65	40 bar
Code	**Diaphragm Material**	
LA00	316L SST	
Code	**Options (Multiple Selections)**	
0	None	
6	Electrolytical polishing of diaphragm material	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter code Q8)	
2	Counterpiece (tank/pipe spud) and Gasket (ethylene propylene standard gasket material)	

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lea d time.

(2) Maximum working pressure is dependent on the pressure rating of the connection.

TABLE 31. SMS, SFS and SRS Sanitary Seals: Dairy Process Connection—**Female Thread** Ordering Information[1]

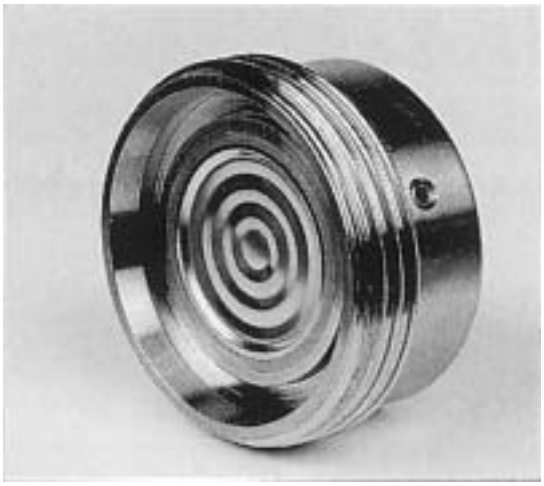
Code	Industry Standard	
S	Sanitary	
Code	**Process Connection Style**	
SMS	Female Thread per SMS Standard	
SFS	Female Thread per IDF Standard	
SRS	Female Thread per RJT Standard	
Code	**Process Connection Size**	**Pressure Rating[2]**
30	DN 38 ($1\frac{1}{2}$ in.)	40 bar
50	DN 51 (2 in.)	40 bar
20	DN 25	40 bar
60	DN 63.5	40 bar
70	DN 76	40 bar
Code	**Diaphragm Material**	
LA00	316L SST	
Code	**Options (Multiple Selections)**	
0	None	
6	Electrolytical polishing of diaphragm material	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter code Q8)	
2	Counterpiece (tank/pipe spud) and Gasket (ethylene propylene standard gasket material)	

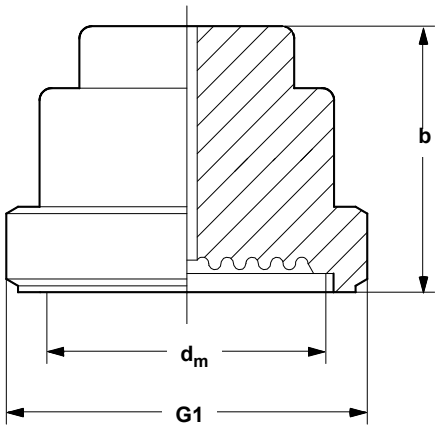
(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lea d time.

(2) Maximum working pressure is dependent on the pressure rating of the connection.

MLS, MMS, MFS and MRS Sanitary Seal: Dairy Process Connections—Male Thread

Dimensional Drawing for MLS, MMS, MFS and MRS: Dairy Process Connections—Male Thread





1199-0000A07A 1199-057AB

MLS, MMS, MFS and MRS Process Connection Dimensions

			Male Thread		
			DIMENSIONS (mm)		
STANDARD	DN	PN	b	d_m	G1
DIN 11851	25	40	46	25	Rd52×1/6
	32	40	47	32	Rd58×1/6
	40	40	46	32	Rd65×1/6
	50	40	46	40	Rd78×1/6
	65	40	46	57	Rd95×1/6
	80	40	47	72	Rd110×1/4
SMS	25	40	47	25	Rd40×1/6
	32	40	47	32	Rd48×1/6
	38	40	47	32	Rd60×1/6
	51	40	47	40	Rd70×1/6
	63,5	40	47	57	Rd85×1/6
	76	40	47	72	Rd98×1/6
IDF(1)					
RJT(1)					

(1) Consult the factory for dimensions.

TABLE 32. MLS Sanitary Seal: Dairy Process Connections—**Male Thread** Ordering Information[1]

Code	Industry Standard	
S	Sanitary	
Code	**Process Connection Style**	
MLS	Male Thread per DIN 11851	
Code	**Process Connection Size**	**Pressure Rating[2]**
F0	DN 40	40 bar
G0	DN 50	40 bar
J0	DN 80	40 bar
D0	DN 25	40 bar
E0	DN 32	40 bar
H0	DN 65	40 bar
Code	**Diaphragm Material**	
LA00	316L SST	
Code	**Options (Multiple Selections)**	
0	None	
6	Electrolytical polishing of diaphragm material	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter code Q8)	
2	Counterpiece (tank/pipe spud) and gasket (standard gasket material ethylene propylene)	

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lea d time.

(2) Maximum working pressure is dependent on the pressure rating of the connection.

TABLE 33. MMS, MFS, and MRS Sanitary Seals: Dairy Process Connections—**Male Thread** Ordering Information[1]

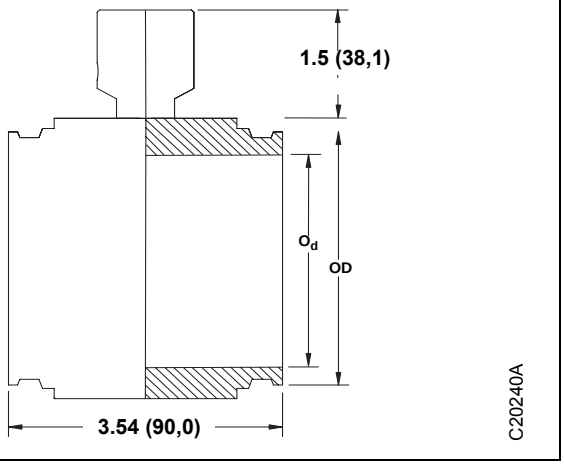
Code	Industry Standard	
S	Sanitary	
Code	**Process Connection Style**	
MMS	Male Thread per SMS Standard	
MFS	Male Thread per IDF Standard	
MRS	Male Thread per RJT Standard	
Code	**Process Connection Size**	**Pressure Rating[2]**
30	DN 38 ($1\frac{1}{2}$ in.)	40 bar
50	DN 51 (2 in.)	40 bar
20	DN 25	40 bar
60	DN 63.5	40 bar
70	DN 76	40 bar
Code	**Diaphragm Material and Wetted Parts**	
LA00	316L SST	
Code	**Options (Multiple Selections)**	
0	None	
6	Electrolytical polishing of diaphragm material	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter code Q8)	
2	Counterpiece (tank/pipe spud) and gasket (standard gasket material ethylene propylene)	

(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lea d time.

(2) Maximum working pressure is dependent upon the pressure rating of the connection.

VCS Sanitary In-Line Diaphragm Seal—
Tri-Clamp Process Connection

Dimensional Drawing for VCS Sanitary In-Line Diaphragm Seal



VCS Process Connection Dimensions

Max. Working Pressure	DN	Dimensions (mm)		
		O_d	OD	A
40 bar	1 in.	22,1	50,5	60,5
40 bar	1 1/2 in.	34,8	50,5	60,5
40 bar	2 in.	47,5	64,0	73,2
40 bar	2 1/2 in.	60,20	77,4	85,9
40 bar	3 in.	72,9	90,9	98,6
40 bar	4 in.	97,4	119,1	126,5

TABLE 34. VCS Sanitary In-Line Diaphragm Seal Ordering Information(1)

Code	Industry Standard
S	Sanitary
Code	**Process Connection Style**
VCS(2)	In Line Tri-Clamp Seal (Maximum Working Pressure: 40 bar)
Code(3)	**Process Connection Size**
20	1 in.
30	1½ in.
50	2 in.
70	3 in.
90	4 in.
Code	**Diaphragm Material(4)**
LA00	316L SST
	Options (Multiple Selections)
0	None
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter code Q8)

(1) Consult a Rosemount representative for minimum calibrated spans. Shaded areas indicate special orders, consult your Rosemount representative for availability, performance effects, and lead time.

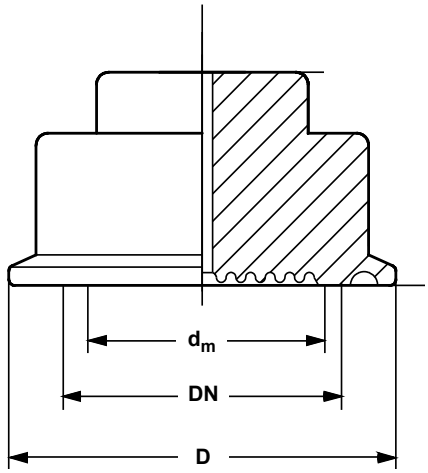
(2) Gasket and clamp are furnished by the user. The maximum working pressure is dependent upon the pressure rating of the connection.

(3) DIN Tri-Clamp dimensions available on request.

(4) When ordering optional diaphragm materials, the standard housing material is 316L SST, unless otherwise noted.

SCS Sanitary Tri-Clamp® Diaphragm Seal

Dimensional Drawing for SCS Sanitary Tri-Clamp Diaphragm Seal



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SCS Process Connection Dimensions

		Dimensions (mm)	
DN	PN	d_M	D
1½ in.	40	32	50,5
2 in.	40	40	64
2½ in.	40	57	77,5
3 in.	40	72	91

TABLE 35. SCS Sanitary Tri-Clamp Diaphragm Seal Ordering Information(1)

Code	Industry Standard
S	Sanitary
Code	**Process Connection Style**
SCS(2)	Tri-Clamp Seal (maximum working pressure: 40 bar)
Code(3)	**Process Connection Size**
30	1½ in.
50	2 in.
60	2½ in.
70	3 in.
Code	**Diaphragm Material(4)**
LA00	316L SST
Code	**Options (Multiple Selections)**
0	None
6	Electrolytical polishing of diaphragm material
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter code Q8)
B	Extra Fill for Cold Temperature Applications
2	Counterpiece (tank/pipe spud) and gasket (standard gasket material ethylene propylene)

(1) Consult a Rosemount representative for minimum calibrated spans. Shaded areas indicate special orders, consult your Rosemount representative for availability, performance effects, and lead time.

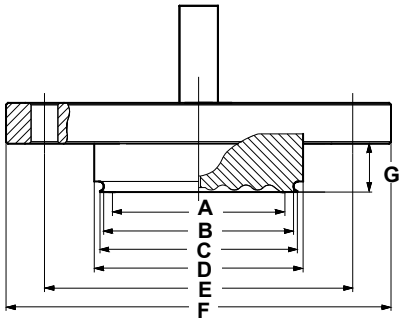
(2) Gasket and clamp furnished by user. The maximum working pressure is dependent upon the pressure rating of the connection.

(3) DIN Tri-Clamp sizes available on request.

(4) When ordering optional diaphragm materials, the standard housing material is 316L SST unless noted otherwise.

EES Sanitary Tank Spud: Extended Diaphragm Seal

Dimensional Drawing for EES Sanitary Tank Spud Type: Extended Diaphragm Seal



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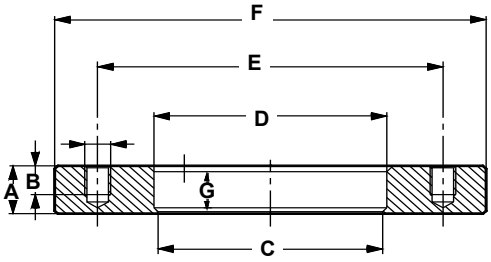
		Dimensions (mm)						
DN	PN	A	B	C	D	E	F	G
50	40	72	73	76	82.3	125	165	25
80	40	89	98	102	107.2	160	200	25

Flanged Type Tank Spud



Flanged Type Tank Spud Dimensions

	Dimensions (mm)						
DN	A	B	C	D	E	F	G
50	25	15	76	82.5	125	165	22
80	25	15	103	108	160	200	22

1199-0000B14B

TABLE 36. EES Sanitary Tank Spud Type: Extended Diaphragm Seal Ordering Information[1]

Code	Industry Standard	
S	Sanitary	
Code	**Process Connection Style**	
EES	Flanged Tank Spud Seal Type: Extended Diaphragm Seal (Supplied with ethylene propylene gasket)	
Code	**Process Connection SizeFlange Pressure Rating**	
JG	DN 80	40 bar
GG	DN 50	40 bar
Code	**Diaphragm and Wetted Parts Material[2]**	
LA	316L SST	
LB	*Hastelloy* C-276	
Code	**Extension Length[3]**	
10	25 mm	
Code	**Options (Multiple Selections)**	
0	None	
1	*Viton* O-ring	
2	Tank spud counterpiece to be welded on tank: includes Ethylene-Propylene O-ring, stainless steel bolts, and washers	
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter code Q8)	
5	50 μm Diaphragm Thickness (available in 316L SST or *Hastelloy*)	
8	150 μm Diaphragm Thickness (316L SST or *Hastelloy* C-276 Diaphragm Material Only)	
B	Extra Fill for Cold Temperature Applications	
6	Electrolytical Polishing of Diaphragm Material	
7	Blind Plug for Tank Spud Counterpiece	

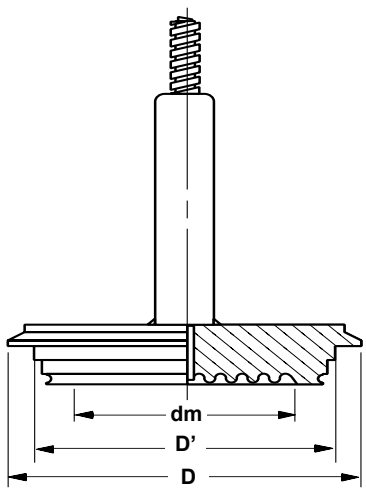
(1) Shaded areas indicate special orders. Consult your Rosemount representative for availability, performance effects, and lead time.

(2) When ordering optional diaphragm materials, the standard housing material is 316L SST unless noted otherwise.

(3) Other extension lengths are available upon request.

Varivent® Compatible Connection

Dimensional Drawing for *Varivent* Compatible Connection



Varivent Compatible Process Connection Dimensions			
dm	PN	Dimensions (mm)	
		D	D'
52 mm	40	84	68

TABLE 37. *Varivent* Compatible Sanitary Seal Ordering Information(1)

Code	Industry Standard
S	Sanitary
Code	**Process Connection Style**
SVS	Off-line *Varivent* compatible (maximum working pressure: 40 bar)
Code	**Process Connection Size**
V0	*Varivent* compatible standard connection only
Code	**Diaphragm Material**
LA00	316L SST
Code	**Options (Multiple Selections)**
0	None
6	Electrolytical polishing of diaphragm material
B	Extra Fill for Cold Temperature Applications
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter code Q8)
2	Counterpiece and (Varivent Type U) Gasket (standard gasket material ethylene propylene)

(1) ***Varivent*** *is a registered trademark of Tuchenhagen Nederland B.V.*

CHS Homogenizer Clamping Flange Type

Dimensional Drawings for CHS Homogenizer Clamping Flange Type

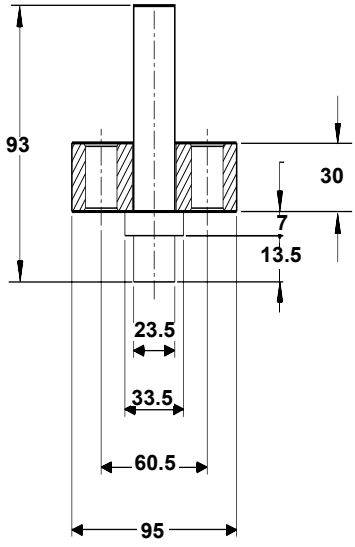


TABLE 38. CHS Homogenizer Clamping Flange Type–Ordering Information(1)

Code	Process Connection Style
NCHS	Homogenizer Clamping Flange
Code	**Process Connection Size**
C	23,5 mm
Code(2)	**Pressure Rating**
R	600 bar
Code	**Diaphragm and Wetted Parts Material(3)**
LA00	316L SST
Code	**Options (Multiple Selections)**
0	None
5	50 μm Diaphragm Thickness (available in 316L SST or *Hastelloy*)
V	*Teflon* Coated Diaphragm for nonstick purposes only (available with 316L SST and *Hastelloy* C–276 diaphragm only)
B	Extra Fill for Cold Temperature Applications
Z	Material Traceability per EN10204 DIN 3.1.B (Requires selection of transmitter code Q8)

(1) Shaded areas indicate special orders. Please consult your Rosemount representative for availability, performance effects, and lead time.

(2) Minimum range is 100 bar.

(3) When ordering special diaphragm materials, the standard housing material is 316L SST, unless noted otherwise.

General Information

WHAT IS A DIAPHRAGM SEAL SYSTEM?

A diaphragm seal system consists of a pressure transmitter, a diaphragm seal, a fill fluid, and either a direct-mount or capillary-style connection.

During operation, the flexible diaphragm and fill fluid separate the pressure sensitive element of the transmitter from the process medium. The capillary tubing or direct mount flange connects the diaphragm to the transmitter.

When process pressure is applied, the diaphragm transfers the measured pressure through the filled system and capillary tubing to the transmitter element. This transferred pressure displaces the sensing diaphragm in the pressure-sensitive element of the transmitter. The displacement is proportional to the process pressure and is electronically converted to an appropriate current, voltage, or digital HART® (Highway Addressable Diaphragm Transducer) output signal.

WHY USE DIAPHRAGM SEALS?

Seal systems provide a reliable process pressure measurement and prevent the process medium from contacting the transmitter diaphragm.

Transmitter/diaphragm seal systems should be considered when:

- The process **temperature** is outside of the normal operating ranges of the transmitter and cannot be brought into those limits with impulse piping.
- The process is **corrosive** and would require frequent transmitter replacement or unusual materials of construction.
- The process contains suspended **solids** or is **viscous** and may plug the impulse piping.
- The application requires the use of **sanitary connections**.
- There is a need for easier cleaning of the process from the connections to **avoid contamination** between batches.
- There is a need to **replace wet legs** to reduce maintenance on applications where the wet leg is not stable or often needs to be refilled.
- There is a need to make **density** or **interface measurements**.
- The process medium may **freeze** or **solidify** in the transmitter or impulse piping.

SPECIAL ORDERS

Many other special-order transmitter/diaphragm seal materials, configurations, and fill fluids are available that are not covered in this document. Contact your Rosemount representative or consult the factory for special order information.

ADDITIONAL INFORMATION

This product data sheet provides information on Rosemount transmitter/diaphragm seal systems.

Model 1199 diaphragm seals can be assembled to Model 3051, 1151, and 2088 differential, gage, and absolute pressure transmitters, and liquid level transmitters. For additional information, refer to the following product data sheets:

Model 3051S Series of Instrumentation
PDS 00813-0100-4801

Model 3051 Smart Pressure Transmitter Family
PDS 00813-0100-4001

Model 1151 Pressure Transmitters
PDS 00813-0100-4360

Model 2088 Gage and Absolute Pressure Transmitter
PDS 00813-0100-4690

PERFORMANCE CONSIDERATIONS

Temperature Effects

Temperature effect errors occur when the fill fluid expands or contracts with fluctuations in the process or ambient temperature, thus causing a change in the internal pressure of the transmitter/seal system.

Two primary factors affect the temperature performance of a diaphragm seal system: the diaphragm stiffness and the characteristics of the fill fluid.

Diaphragm Stiffness

Diaphragm stiffness is a critical parameter affecting temperature performance. As the fill fluid expands and contracts, due to temperature changes, a flexible diaphragm will exert less back pressure than a stiff diaphragm (for equal changes in fill volume). Back pressure causes a measurement error as it acts upon the sensing diaphragm of the transmitter. Therefore, the more flexible diaphragm seal can accommodate changes in fill volume and minimize errors resulting from temperature changes.

Diaphragm stiffness is affected by the diaphragm surface diameter, material of construction, thickness, and convolution pattern. Of these factors, the most significant is the diaphragm seal diameter. Each diaphragm has its own characteristic stiffness curve. Generally, smaller diameter diaphragms are more stiff than larger diameter diaphragms, and thus have stiffness curves that are less vertical. A more vertical stiffness curve helps to minimize the amount of pressure error that can occur when the fill fluid expands or contracts with temperature changes.

Figure 1 shows that large-diameter diaphragms, which are less stiff, have smaller errors caused by changes in the fill fluid volume. This is a result of a more vertical stiffness curve. The small-diameter diaphragms have a less vertical stiffness curve, resulting in larger errors with changes in temperature.

Fill Fluid

The expansion characteristics and the volume of the fill fluid affect seal performance.

All fill fluids expand and contract with changes in temperature. The coefficient of thermal expansion defines the amount of change and is represented in cubic centimeters of expansion per cubic centimeter of fluid per degree Celsius (cc/cc/°C). The amount of expansion varies between fill fluids, as shown in Figure 2. Selecting a fill fluid with a smaller coefficient of thermal expansion will help minimize temperature error. Table 1 on page 282 provides the coefficients of thermal expansion for all available fill fluids.

A larger volume of fill fluid increases the potential for volume expansion. By minimizing the capillary length and inside diameter, fill volumes can be kept as low as possible to reduce temperature error.

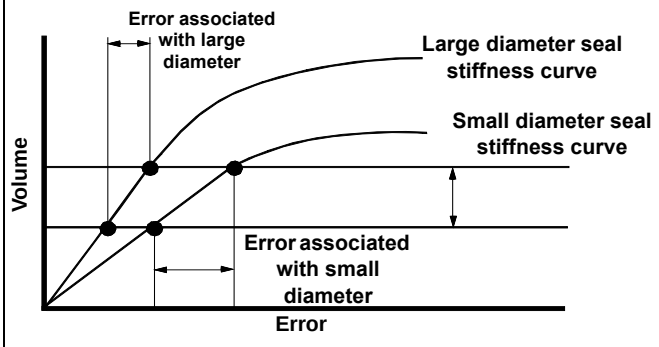
Time Response

Use of diaphragm seals increases the overall response time of transmitter/diaphragm seal systems. Time response varies with temperature, pressure, capillary length, inside diameter (ID), fill fluid, viscosity, and transmitter type.

Capillary ID: A smaller capillary inside diameter (ID) creates more restrictions and slows down the pressure transport. The larger capillary ID provides a faster response time.

Fill Fluid Viscosity: Viscosity of the fill fluid is a measure of its fluidity and is temperature dependent. Choosing a less viscous fill fluid enhances time response, especially when using longer capillaries in colder conditions.

FIGURE 1. Diaphragm Stiffness Curves



A change in the fill fluid volume causes a smaller error for the larger diameter diaphragm than for the smaller diameter diaphragm.

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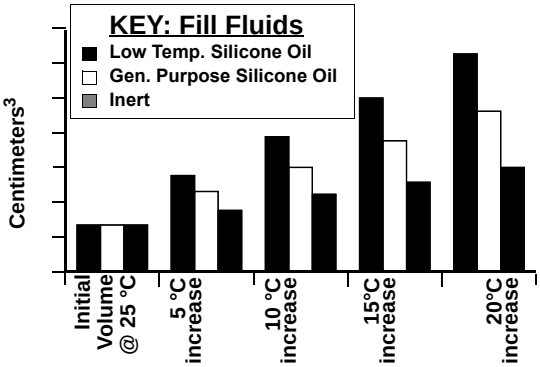
FIGURE 2. Effect of Fill Fluid Expansion on Fill Volume



Expansion of Oil Fluids in 1.0 Meters of 1 mm ID Capillary with Increasing Temperature

1199-0051A

Capillary Length: A longer capillary provides a greater distance for the pressure signal to travel, thus increasing the response time.

Applications with large tanks and slow changes in level, may not be hindered by a longer response time. Yet, a small, narrow tank may be subject to measurement difficulties if the response time is too slow. Applications that change rather quickly, such as flow, also require faster response times.

Summary

Adding seals to a transmitter can affect overall system performance. Selecting the most appropriate diaphragm seals, capillaries, and fill fluid can minimize these effects, maximize assembly performance, and still meet or exceed process demands.

Consider the following when selecting a diaphragm seal system:

- Use larger diameter diaphragms to minimize temperature effects.
- Keep capillary length as short as possible to reduce temperature effects and response time.
- Select larger ID capillaries to improve time response or select smaller ID capillaries to improve temperature performance.
- Select fill fluid that is the least viscous and has the smallest coefficient of thermal expansion while satisfying the most extreme process conditions.

Refer to Figure 3 for a summary of temperature effect and time response properties of various seal systems. In-line seal designs, diaphragm seal designs with diameters less than 50 mm and various other design configurations can result in significant temperature effect errors. Consult Instrument ToolKit or contact a Rosemount representative for a detailed performance evaluation of a specific diaphragm seal system configuration.

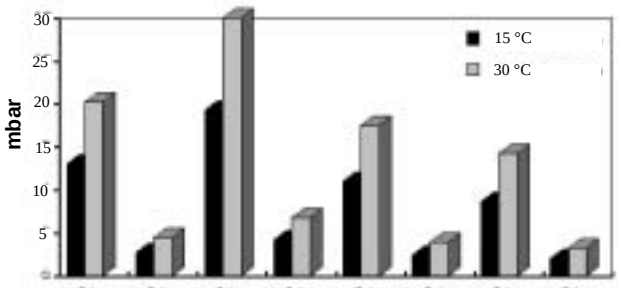
DIRECT MOUNT SEAL CONNECTION TYPES

Model 3051, 1151, and 2088 transmitters with the Model 1199 direct mount style seals are flange mounted directly to the vessel. They provide precise level and specific gravity measurements and are available in a wide variety of configurations.

The direct-mount connection is welded at the seal and the “L” bracket on Model 3051C transmitters and at the seal and the transmitter flange for Model 1151 and 2088 transmitters. Figure 4, 5, and 6 illustrate the various direct mount seal assembly configurations and weld locations.

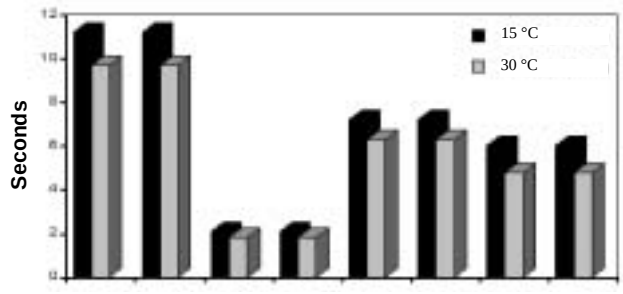
FIGURE 3. Summary of Temperature Effect and Time Response with Various Seal, Capillary, and Fill Fluid Combinations

Temperature Effect



Diaphragm Diameter	50 mm	80 mm	50 mm	60 mm	50 mm	80 mm	50 mm	80 mm
Fill Fluid	General Purpose	General Purpose	General Purpose	General Purpose	General Purpose	General Purpose	Inert	Inert
Capillary Length	5 m	5 m	5 m	5 m	3 m	3 m	3 m	3 m
Inside Diameter	1 mm	1 mm	2 mm	2 mm	1 mm	1 mm	1 mm	1 mm

Time Response

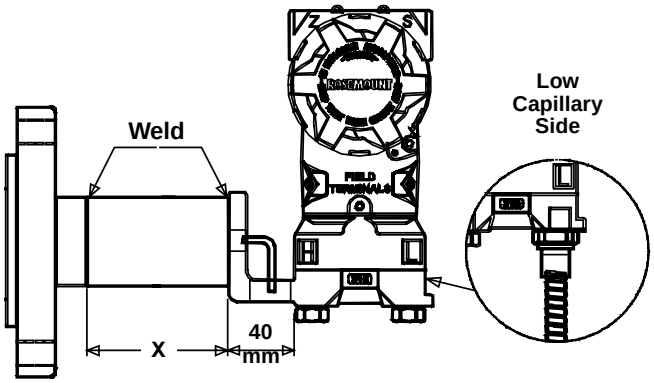


Diaphragm Diameter	50 mm	80 mm	50 mm	80 mm	50 mm	80 mm	50 mm	80 mm
Fill Fluid	General Purpose	General Purpose	General Purpose	General Purpose	General Purpose	General Purpose	Inert	Inert
Capillary Length	5 m	5 m	5 m	5 m	3 m	3 m	3 m	3 m
Inside Diameter	1 mm	1 mm	2 mm	2 mm	1 mm	1 mm	1 mm	1 mm

1199-0138 1199-0139

Direct Mount Option Code Index

FIGURE 4. Model 3051 Direct Mount Connection Type



Model 3051C
Direct-Mount Connections
Standard (Option Code S1 or S2)

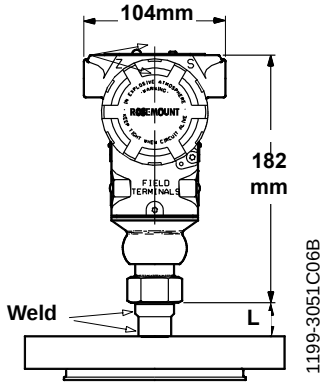
All-Welded System
(Option Code S0 or S9)

Connection	X = 50 mm	X = 100 mm
One Seal (S1)	B3	D3
Two Seals (S2)	B4	D4
One Seal All-Welded (S0)	B7	D7

1199-0517A

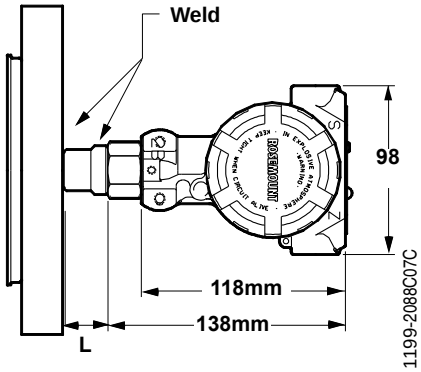
Model 3051T (Option Code S1)
Direct Mount Connection
One Seal Connection =
Option Code 95 (L = 25 mm)
One Seal Connection =
Option Code A5 (L = 50 mm)

FIGURE 5. Model 3051T Direct Mount Connection Type



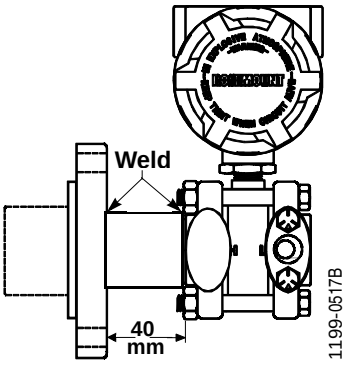
Model 2088 (Option Code S1)
Direct Mount Connection
One Seal Connection =
Option Code 95 (L = 25 mm)
One Seal Connection =
Option Code A5 (L = 50 mm)

FIGURE 7. Model 2088 Direct Mount Connection Type



Model 1151 (Option Code S1 or S2)
Direct Mount Connection
One or Two Seal Connection = Option Code 92

FIGURE 6. Model 1151 Direct Mount Connection Type



VACUUM APPLICATIONS

There are three parameters to consider when selecting a transmitter/seal system for vacuum applications: fill fluid compatibility, configuration, and installation.

Fill Fluid Compatibility

The fill fluid must be able to withstand the highest temperature and lowest process pressure conditions under which the transmitter will be operating. Therefore, the fill fluid must have a vapor pressure that is compatible with the most extreme process conditions. (Be sure to consider temperature and pressure conditions during start-up and system cleaning operations).

Temperature limits of fill fluids, as shown in Table 6 on page 284, are stated for positive and vacuum pressure conditions. Figure 8 provides the vapor pressure curves for general purpose, high temperature, and sanitary fill fluids.

Configuration

Transmitter Connections

For moderate to high vacuum applications, the Model 1151 transmitter is available with a vacuum resistant gasket, to ensure extra reliability.

For full vacuum applications, the Model 3051C All Welded System is available. This transmitter/seal system welds the following four connection points, as shown in Figure 8:

4. Capillary-to-transmitter flange connection
5. Module-to-capillary connection
6. Transmitter fill screw
7. 316 SST bolts on the module-to-flange connection

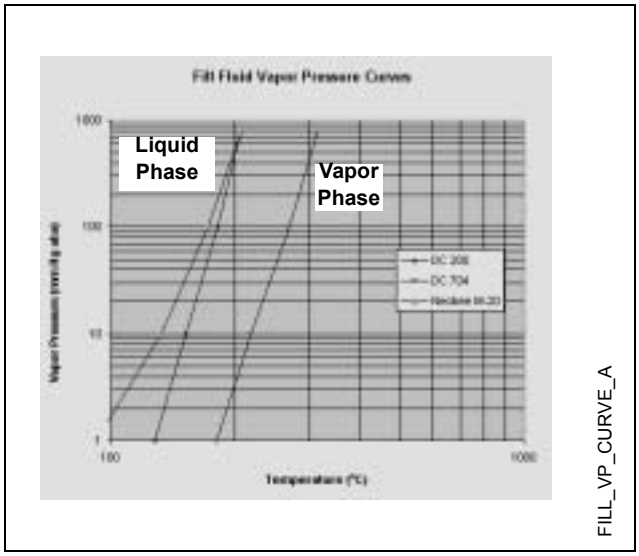
Installation

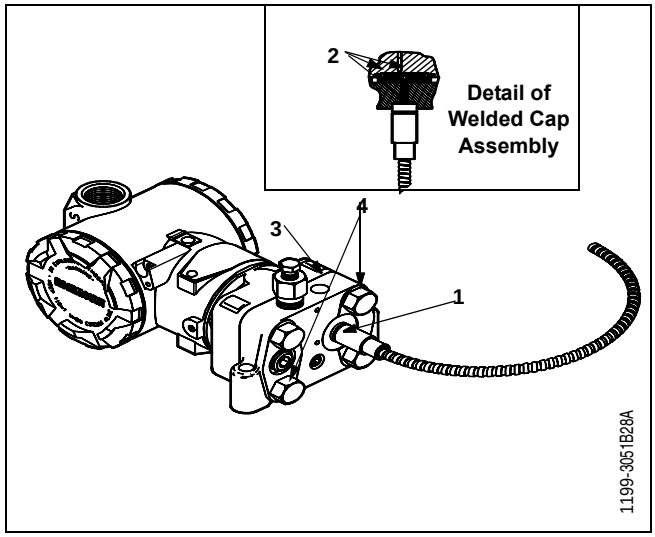
For vacuum applications, to ensure positive pressure at the transmitter, mount the transmitter so that it is level with, or below the lowest tap.
Under the following conditions, the transmitter fill fluid may start to vaporize, at which point, the transmitter will cease to make appropriate readings:

- The transmitter is mounted above the lower tap (causing a negative head effect)
- The process pressure is less than the head pressure exerted by the fill fluid.
- This puts the transmitter fill fluid under a vacuum, thereby degrading the maximum operating temperature

If the operating temperature and vacuum pressure exceed the vapor pressure point of the transmitter fill fluid, the fill fluid is likely to vaporize.

FIGURE 8. Fill Fluid Vapor Pressure Curves and Model 3051C All-Welded System





Product Data Sheet
00813-0201-4016, Rev EA
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Model 1199

The Model 3051C Pressure Transmitter may be protected by one or more of the following U.S. Pat. No.: 4,370,890: 4,612,812; 4,791,352; 4,798,089; 4,818,994; 4,833,922; 4,866,435; 4,926,340; 4,988,990; 5,028,746. MEXICO PATENTADO NO. 154,961. May Depend on Model. Other U.S. and Foreign Patents Issued and Pending.
The Model 1151 Pressure Transmitter may be protected by one or more of the following U.S. Pat. Nos.: 3,854,039; 3,975,719; 4,339,750; and Re. 30.603. May Depend on Model. Other U.S. and Foreign Patents Issued and Pending,

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