Product Data Sheet
00813-0100-4016, Rev GA
Catalog 2006 - 2007

Rosemount 1199 Diaphragm Seal Systems

(Global Offering)

FOR ROSEMOUNT 3051, 1151, AND 2088 TRANSMITTERS

EXPANDED TRANSMITTER USE

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

APPLICATIONS

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

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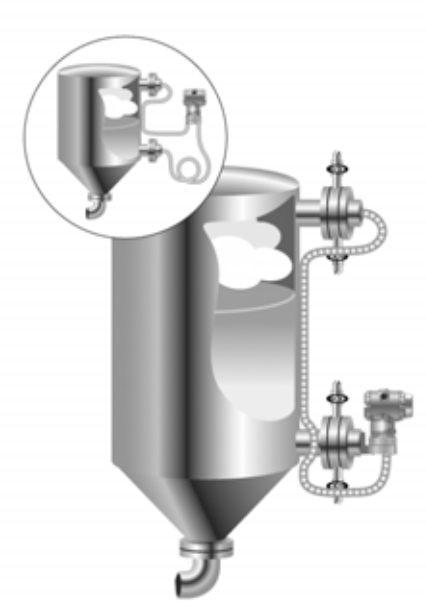
The Most Complete Offering

The Rosemount 1199 Diaphragm Seal Systems provide the World's largest product offering to meet the measurement and application requirements. This product data sheet highlights the wide variety of process connection designs, direct mount or capillary systems, and materials of construction available.



Proven *Tuned-Systems*™ Deliver Best Practices for DP-Level Installations

Rosemount Inc. offers the only *Tuned-Systems* on the market. Direct mounting the transmitter with a Tuned-System results in:

- Transmitter installed cost reduced by 20%
- Total system performance improved by 10%
- Time response improved by over 80%.

Instrument Toolkit software:

- calculates seal system temperature performance and response time
- specifies the right seal system the first time, every time

To learn more about Instrument Toolkit® Software, see “Instrument Toolkit® Software” on page 87. To learn more about *Tuned-Systems*, see “Tuned-Systems versus Balanced System” on page 79.

Rosemount 1199 diaphragm seals transmitter offering

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

Rosemount 3051S Series of Instrumentation

Scalable pressure, flow and level measurement solutions improve installation and maintenance practices.

Rosemount 3051 Pressure Transmitter

Provides industry leading performance, flexible *Coplanar*™ platform and guaranteed five year stability.

Rosemount 3095MV Mass Flow Transmitter

Accurately measures differential pressure, static pressure and process temperature to dynamically calculate fully compensated mass flow.

Rosemount 1151 Pressure Transmitter

Provides reliable measure of differential, gage, and absolute pressure or liquid level. Ranges from 0.5 inH20 to 0-6000 psig.

Rosemount 2088 Pressure Transmitter

Economical, compact, and rugged transmitter, ideal for gage and absolute pressure ranges from 1 to 4000 psi.

Specifications

SEAL SPECIFICATIONS

Functional Specifications

Sanitary Seal Approvals

Rosemount sanitary seals: *Tri-clamp*® in-line, tank spud, thin wall spud, *Tri-clamp*, APC style aseptic, and *Cherry Burrell*™ "I" line, conform to 3-A Sanitary Standards for Sensor and Sensor Fittings and Connections used on Milk and Milk Product Equipment, Number 74-074-03.

The sanitary fill fluid glycerin (FDA - 21CFR182.1320) and water is Generally Recognized as Safe (GRAS) in accordance with the FDA Code of Federal Regulations Title 21.

The sanitary fill fluid *Neobee M-20*® (FDA - 21CFR172.856) and propylene glycol (FDA - 21CFR184.1666) and water are approved as indirect food additives in accordance with the FDA Code of Federal Regulations Title 21.

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 an Emerson Process Management representative to aid in selecting the proper materials to meet the NACE standard.

Material Traceability

Material traceability is provided for the diaphragm seal, upper housing, and if applicable, lower housing/flushing connection or diaphragm extension, upon selecting the Transmitter Ordering Option Code Q8.

Material traceability for the transmitter/seal system is provided per the DIN EN 10204 3.1.B standard, and is only available for General Assembly Seals.

Performance Specifications

Instrument Toolkit calculates remote seal system performance and validates model number configuration.

Physical Specifications

Material of Construction

Remote seal materials (diaphragms, upper housing, flange, lower housing, bolts, and gaskets / o-rings) are listed for each remote seal type.

Fill fluids are specified in Table 1.

Mounting flanges are specified in Table 2 and 3.

TABLE 1. Fill Fluid Specifications

Fill Fluid	Temperature Limits(1)		Specific Gravity	Coeff. of Therm. Exp. (cc/cc/°C)	Viscosity at 25 °C centistokes
	Pabs < 1 bara	Pabs > 1 bara			
D.C.® 200 Silicone	–45 to 100 °C (–49 to 212 °F)	–45 to 205 °C (–49 to 401 °F)	0.93	0.00108	9.5
D.C. 704 Silicone(2)	0 to 200 °C (32 to 392 °F)	0 to 315 °C (32 to 599 °F)	1.07	0.00095	44
Inert (Halocarbon)	–45 to 80 °C (–49 to 176 °F)	–45 to 160 °C (–49 to 320 °F)	1.85	0.000864	6.5
Syltherm® XLT Silicone	NA	–75 to 150 °C (5 to 302 °F)	0.85	0.001199	1.6
Glycerin and Water(3)	NA	–15 to 95 °C (5 to 203 °F)	1.13	0.00034	12.5
Propylene Glycol and Water (3)	NA	–15 to 95°C (5 to 203 °F)	1.02	0.00034	2.8
Neobee M–20(4)	–15 to 120 °C (5 to 248 °F)	–15 to 225 °C (5 to 437 °F)	0.92	0.001008	9.8

(1) Temperature limits are reduced in vacuum service and may be limited by seal selection. Contact an Emerson Process Management representative for assistance.

(2) Upper temperature limit is for capillary seal systems mounted away from the transmitter. Contact an Emerson Process Management representative for temperature limits above 315 °C.

(3) Glycerin and Water and Propylene Glycol are not suitable for vacuum service.

(4) Not compatible with Buna-N or Ethylene-Propylene O-ring material.

MOUNTING FLANGE

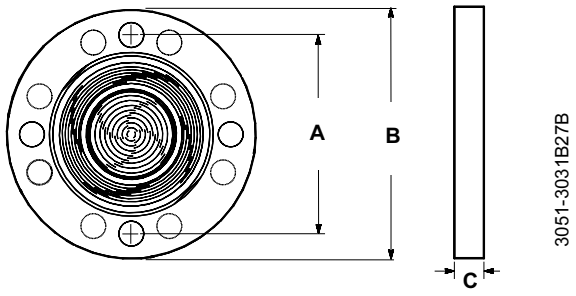


TABLE 2. Maximum Flange Pressure Rating

Standard	Class/ Rating	Carbon Steel	Stainless Steel
ANSI	150	285 psig(1)	275 psig(1)
ANSI	300	740 psig(1)	720 psig(1)
ANSI	600	1,480 psig(1)	1,440 psig(1)
ANSI	900	2200 psig(1)	2120 psig(1)
ANSI	1500	3705 psig(1)	3600 psig(1)
ANSI	2500	6170 psig(1)	6000 psig(1)
DIN	PN 40	40 bar(2)	40 bar(2)
DIN	PN 10/16	16 bar(2)	16 bar(2)
DIN	PN 25/40	40 bar(2)	40 bar(2)
DIN	PN 64	64 bar(2)	64 bar(2)
DIN	PN 100	100 bar(2)	100 bar(2)
JIS	10 k	200 psig(2)	200 psig(2)
JIS	20 k	480 psig (2)	480 psig(2)
JIS	40 k	960 psig (2)	960 psig(2)

(1) At 100 °F (38 °C), the rating decreases with increasing temp.

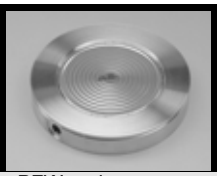
(2) At 248 °F (120 °C), the rating decreases with increasing temp.

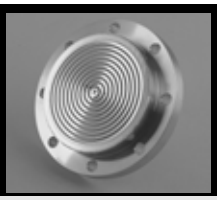
TABLE 3. Mounting Flange Dimensions

Class	Pipe Size	"A" Bolt Circle Diameter	"B" Outside Diameter	"C" Flange Thickness(1)	Number of Bolts	Bolt Hole Diameter
ANSI 150	1 in.	3.12 in.	4.25 in.	0.50 in.	4	0.62 in.
	1.5 in.	3.88 in.	5 in.	0.62 in.	4	0.62 in.
	2 in.	4.75 in.	6 in.	0.69 in	4	0.75 in.
	3 in.	6 in.	7.5 in.	0.87 in.	4	0.75 in.
	4 in.	7.5 in.	9 in.	0.87 in.	8	0.75 in.
ANSI 300	1 in.	3.5 in.	4.88 in.	0.62 in.	4	0.75 in.
	1.5 in.	4.5 in.	6.12 in.	0.75 in.	4	0.88 in.
	2 in.	5 in.	6.5 in.	0.81 in.	8	0.75 in.
	3 in.	6.62 in.	8.25 in.	1.06 in.	8	0.88 in.
	4 in.	7.88 in.	10 in.	1.19 in.	8	0.88 in.
ANSI 600	1 in.	3.5 in.	4.88 in.	0.68 in.	4	0.75 in.
	1.5 in.	4.5 in.	6.12 in.	0.87 in.	4	0.88 in.
	2 in.	5 in.	6.5 in.	1.00 in.	8	0.75 in.
	3 in.	6.62 in.	8.25 in.	1.25 in.	8	0.88 in.
	4 in.	8.5 in.	10.75 in.	1.50 in.	8	1.00 in.
DIN PN 10/40	DN 25	85 mm	115 mm	18 mm	4	14 mm
	DN 40	110 mm	150 mm	18 mm	4	18 mm
	DN 50	125 mm	165 mm	20 mm	4	18 mm
	DN 80	160 mm	200 mm	24 mm	8	18 mm
DIN PN 10/16	DN 100	180 mm	220 mm	20 mm	8	18 mm
DIN PN 25/40	DN 100	190 mm	235 mm	24 mm	8	22 mm

(1) Tolerance for flange thickness is +0.125 in.

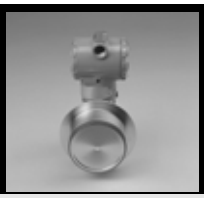
Guide to the Selection of Diaphragm Seals

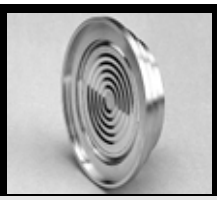
Diaphragm Seal Selection Guide				
Seal Type	PFW and PCW (RTJ connection) Pancake (See page 16)	FFW, FCW (RTJ connection), and FUW/FVW Flanged Flush Surface (See page 22)	RFW and RCW (RTJ connection) Flanged Remote Seal (See pages 38)	EFW Extended Flanged Seal (See page 45)
Usual Application and Type of Service	General Applications	General Applications Larger Process Connections	General Applications Smaller Process Connections	Insulated Processes
Process Connection Size	1 1/2 in. DN 40 40A 2 in. DN 50 50A 3 in. DN 80 80A	1 in. DN 25 1 1/2in. DN 40 50A 2 in. DN 50 80A 3 in. DN 80 00A 4 in. DN 100	1/2 in. DN 10 40A 3/4 in. DN 25 50A 1 in. DN 40 80A 1 1/2 in. DN 50 2 in. DN 80 3 in.	1 1/2 in. DN 50 2 in. DN 80 3 in. DN 100 3 in. Headbox 3 in. Schedule 40 4 in. Schedule 80 4 in. Schedule 40 4 in. Headbox
Flange Pressure Rating or Maximum Working Pressure	Class 150 10K Class 300 20K Class 600 40K Class 900 Class 1500 Class 2500 PN 40 PN 64 (63) PN 100 No flange (2000 psi MWP)	Class 150 10K Class 300 20K Class 600 40K Class 900 Class 1500 Class 2500 PN 10/16 PN 40 PN 64 PN 100 PN 160	Class 150 10K Class 300 20K Class 600 40K Class 900 Class 1500 Class 2500 PN 16 PN 40 PN 64 PN 100	Class 150 Class 300 Class 600 Class 900 Class 1500 Class 2500 PN 10/16 PN 40 PN 64 PN 100
Diaphragm and Wetted Parts Material	316L SST *Hastelloy*® C-276 *Hastelloy* B Tantalum 304 SST *Monel*® 400 Nickel 201 Titanium Gr. 4	316L SST 316 Ti SST *Hastelloy* C-276 *Hastelloy* B *Hastelloy* C-22 Tantalum Nickel 201 Titanium Gr. 4 / Gr. 2 304L SST *Monel* 400 Inconnel 600 Zirconium	316L SST *Hastelloy* C-276 *Hastelloy* B Tantalum *Inconel* 600 304L SST Alloy 20 *Monel* 400 Nickel 201 Titanium Gr. 4	316L SST *Hastelloy* C-276 *Hastelloy* B Tantalum Titanium Gr. 4
Lower Housing Material	316 SST *Hastelloy* C-276 Carbon Steel 304L SST Titanium Gr. 4 *Hastelloy* B *Monel* 400 Nickel 201	316 SST 316Ti SST *Hastelloy* C-276 *Hastelloy* B Carbon Steel Nickel 201 Titanium Gr. 4 *Monel* 400	316 SST *Hastelloy* C-276 *Hastelloy* B Carbon Steel 304L SST *Monel* 400 Nickel 201 Titanium Gr. 4 *Inconel* 600 *Inconel* 625 Alloy 20	NA
Options	Direct Mount Connection Gold Plated Diaphragm Cold-Temperature Fill 0.006 Diaphragm Thickness	Direct Mount Connection Gold Plated Diaphragm Cold-Temperature Fill 0.006 Diaphragm Thickness	Direct Mount Connection Gold Plated Diaphragm Cold-Temperature Fill 0.006 Diaphragm Thickness	Direct Mount Connection Gold Plated Diaphragm Cold-Temperature Fill 0.006 Diaphragm Thickness Custom Extension Lengths

Diaphragm Seal Selection Guide				
Seal Type	RTW Threaded Remote Seal (See page 48)	CTW Chemical Tee Seal (See page 53)	UCW Union Connection Seal (See page 54)	UCP Threaded Pipe Mount Seal (see page 55)
Usual Application and Type of Service	High Temperature Applications Threaded Connection	Flow Applications Retro-fit Design	Threaded Retro-fit Design	Pulp and Paper Applications
Process Connection Size	1/4–18 NPT 3/8–18 NPT 1/2–14 NPT 3/4–18 NPT 1–14 NPT 1 1/2–11.5 NPT	Retro-fit	2 1/8–16N2 × 25/64 Male Thread	1 1/2 in. with Threaded Knurled Nut 1 1/2 in. with Threaded Hex Nut
Flange Pressure Rating or Maximum Working Pressure	1,500 psi 2,500 psi 5,000 psi 10,000 psi	500 psig	2,000 psig	300 psi at 100 °F
Diaphragm and Wetted Parts Material and Upper Housing Material	316L SST *Hastelloy* C-276 *Hastelloy* B Tantalum 304L SST *Monel* 400 Nickel 201 Titanium Gr. 4	316L SST *Hastelloy C*-276	316L SST *Hastelloy C-276*	316L SST *Hastelloy C-276*
Lower Housing Material	316L SST *Hastelloy* C-276 *Hastelloy* B Carbon Steel 304L SST *Monel* 400 Nickel 201 Titanium Gr. 4 PVC	NA	NA	316 SST Weld Spud *Hastelloy C-276* Weld Spud
Options	Gold Plated Diaphragm Cold-Temperature Fill 0.006 Diaphragm Thickness	Cold-Temperature Fill 0.006 Diaphragm Thickness	Weld Nugget for Capillary Support Tube Cold-Temperature Fill	*Teflon*® Coated Diaphragm

Diaphragm Seal Selection Guide				
Seal Type	PMW Paper Mill Sleeve Seal (see page 55)	WSP Flow-Thru Saddle Seal (see page 57)	TFS Wafer Style In-Line Seal (see page 58)	WFW Flow-Thru Flanged Seal (see page 59)
Usual Application and Type of Service	Pulp and Paper Applications	Flow Applications	Eliminate Process Dead Ends High Viscosity Process Fluid	Flow Applications
Process Connection Size	1 in. with Cap Screw Retainer	3 in. Pipe 4 in. and Larger Pipe	1 in. DN 25 1 1/2 in. DN 40 2 in. DN 50 3 in. DN 80 4 in. DN 100	1 in. 2 in. 3 in.
Maximum Working Pressure	300 psi at 100 °F	1,250 psig at 100 °F, 6-bolt 1,500 psig at 100 °F, 8-bolt	Flange not supplied. Seal rated to Class 2500/PN 16-400 or flange rating.	Class 150
Diaphragm and Wetted Parts Material and Upper Housing Material	316L SST *Hastelloy C-276*	316L SST *Hastelloy C-276* Tantalum	316L SST *Hastelloy C-276* 316Ti SST (WNr 1.4571)	316L SST
Lower Housing Material	316 SST Weld Spud *Hastelloy C-276* Weld Spud	*Hastelloy* C-276 Carbon Steel 316L SST	NA	316L SST
Options	*Teflon* Coated Diaphragm	*Teflon* Gasket *Grafoil*™ Gasket *Teflon* Coated Diaphragm		*Teflon* Gasket *Grafoil* Gasket *Gylon* Gasket

Diaphragm Seal Selection Guide		**Photo Pending**
Seal Type	WWW and WBW Flow-Thru Socket Weld and Flow-Thru Butt Weld Seals (see page 61)	WTW In Line Flow-Thru Threaded Seals (see page 63)
Usual Application and Type of Service	Flow Applications	Flow Applications
Process Connection Size	¾ in. 1 in. 1 ½ in. 2 in.	¼ in. NPT ½ in. NPT ¾ in. NPT 1 in. NPT
Maximum Working Pressure	1,500 psi	1,500 psi
Diaphragm and Wetted Parts Material and Upper Housing Material	316L SST	316L SST
Lower Housing Material	316L SST	316L SST
Options	*Teflon* Gasket *Grafoil* Gasket *Gylon* Gasket	*Teflon* Gasket *Grafoil* Gasket *Gylon* Gasket

Sanitary Seal Selection Guide				
Seal Type	VCS Sanitary In-Line *Tri-Clamp* Connection (see page 65)	SCW Sanitary *Tri-Clamp* Seal (see page 66)	SSW Sanitary Tank Spud Seal (see page 68)	STW Sanitary Thin Wall Tank Spud Seal (see page 70)
Usual Application and Type of Service	Sanitary Flow	Sanitary	Sanitary	Sanitary
Process Connection Size	1 in. 1 1/2 in. 2 in. 3 in. 4 in.	1 1/2 in. 2 in. 2 1/2 in. 3 in. 4 in.	(see page 44)	(see page 46)
Maximum Working Pressure	580 psi	see Table 36 on page 67	600 psig	600 psig
Diaphragm and Wetted Parts Material and Upper Housing Material	316L SST 316Ti SST (WNr 1.4571)	316L SST *Hastelloy C-276*	316L SST *Hastelloy* C-276	316L SST *Hastelloy* C-276
Options	Cold-Temperature Fill 20 µin. (0.5 µm) R_a finish 15 µin. (0.375 µm) R_a finish Electropolishing	Cold-Temperature Fill High Pressure Clamp 20 µin. (0.5 µm) R_a finish 15 µin. (0.375 µm) R_a finish 10 µin. (0.25 µm) R_a finish Electropolishing	Cold-Temperature Fill 2 in. Extension 6 in. Extension Tank Spud and Plug 20 µin. (0.5 µm) R_a finish 15 µin. (0.375 µm) R_a finish Electropolishing	Tank Spud 20 µin. (0.5 µm) R_a finish 15 µin. (0.375 µm) R_a finish Electropolishing

Sanitary Seal Selection Guide				
Seal Type	SHP *Cherry-Burrell* Seal (see page 71)	SAP Aseptic (APC) Style Seal (see page 72)	SLS, SMS, SFS, and SRS Sanitary Seals (see page 73)	MLS, MMS, MFS, and MRS Sanitary Seals (see page 75)
Usual Application and Type of Service	Sanitary	Sanitary	Sanitary	Sanitary
Process Connection Size	2 in. 3 in.	2 in. 3 in.	1 in. DN 25 1 1/2 in. DN 32 2 in. DN 38 2 1/2 in. DN 40 3 in. DN 50 DN 51 DN 63.5 DN 65 DN 76 DN 80	1 in. DN 25 1 1/2 in. DN 32 2 in. DN 38 2 1/2 in. DN 40 3 in. DN 50 DN 51 DN 63.5 DN 65 DN 76 DN 80
Maximum Working Pressure	500 psig	500 psig	580 psig	580 psig
Diaphragm and Wetted Parts Material and Upper Housing Material	316L SST *Hastelloy* C-276	316L SST	316L SST 316Ti SST (WNr 1.4571)	316L SST *Hastelloy* C-276 316Ti SST (WNr 1.4571)

Ordering Information

Please review this entire procedure before specifying a transmitter/seal system model number.

Step 1. Specify a Pressure Transmitter Model Number

For additional transmitter information, refer to the following product data sheets:

- Rosemount 3051S Series (document number 00813-0100-4801)
- Rosemount 3051C, 3051L, 3051T document number (00813-0100-4001)
- Rosemount 2088 – (document number 00813-0100-4690)
- Rosemount 1151 – (document number 00813-0100-4360)

Step 2. Specify a Seal Assembly Model Number.

General-purpose seal assembly located on page 16.

Use a capillary/fill fluid table **and** a seal table to specify a valid seal assembly model number.

1. Use Table 4 or 5 to select a valid code (nine characters) to specify the location of the seal(s) on the transmitter, the fill fluid, and the capillary/direct mount information. For example, using Table 4 on page 10: “1199WDB10...” is typical of the first half of a seal assembly model number.
2. Using the seal tables starting on page 16, complete the model number. For example, using Table 4 on page 10: “...APFW70LA00” is typical of the second half of a seal assembly model number with a pancake seal.
3. Combine the two sets of model numbers to create one model number string, such as 1199WDB10APFW70LA00 This completes a valid seal assembly model number.

Step 3. Order a Transmitter/Seal System.

1. Combine the two sets of model numbers from Step 1 and 2, and specify a quantity.
   For example:
   Quantity Model Number
   3051CD2A22A1AS1 (From Step 1)
   1199WDB10APFW70LA00 (From Step 2)
2. This completes the required model number to order a valid transmitter/seal system

NOTES FOR SPECIAL CONFIGURATIONS
It is possible to specify the location of the seal assembly on the transmitter in respect to the high or low pressure side. It is also possible to order two different seal assemblies for one transmitter. In this case, specify (via the location character) to which side each seal assembly needs to be attached. For example, suppose a direct mount seal is required on the high pressure side of the Rosemount 3051 All Welded system and a seal with a 15-ft (4.5 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	1199WCA96AFFW72DAA1 (From Step 2)
1	1199MCC15AFFW72DAA1 (From Step 2)

CAUTION
While it is possible to combine different types of seals, fill fluids, and capillary lengths, be aware that performance may be more affected by some combinations than others. Use Instrument Toolkit to help select the best performing seal system or consult Rosemount Customer Central to assist in seal selection.

Diaphragm Seal Connections

Capillary/Fill Fluid

NOTE:
Use Table 4 for Capillary Type Connections. Use Table 5 for Direct Mount Type Connections.

TABLE 4. Capillary/Fill Fluid Ordering Information

Model	Type			
1199	Diaphragm Seals			
Code	**Seal Location**		**Connection Type**	**Transmitter Type**
P[1][2]	Seal on High Pressure Side of Transmitter		All Welded Vacuum	3051T, 2088, and 3051S_T
R[1][2]	Seal on High Pressure Side of Transmitter		All Welded Vacuum	3051S_C (option code B11)
S[1][2]	Seal on Low Pressure Side of Transmitter (use with 1199T)		All Welded Vacuum	3051S_C (option code B12)
T[1][2]	Seal on High Pressure Side of Transmitter (requires 1199S on low side)		All Welded Vacuum	3051S_C (option code B12)
D[1]	Same Seal on Both High and Low Pressure Sides of Transmitter		Repairable-Welded	Differential Transmitters
W[1]	Seal on High Pressure Side of Transmitter		Repairable-Welded	All Transmitters
M[1]	Seal on Low Pressure Side of Transmitter		Repairable-Welded	Differential Transmitters
Code	**Fill Fluid**	**Temperature Limits**	**Specific Gravity**	
	General Purpose Fill Fluids			
A	*Syltherm* XLT	–75 to 150 °C (–102 to 302 °F)	0.85	
C[3]	*D.C.* 704 (not available with 0.03 in. ID capillary)	0 to 315 °C (32 to 599 °F)	1.07	
D	*D.C.* 200	–45 to 205 °C (–49 to 401 °F)	0.93	
H	Inert (Halocarbon)	–45 to 160 °C (–49 to 320 °F)	1.85	
	Sanitary Fill Fluids			
G[4]	Glycerin and Water	–15 to 95 °C (5 to 203 °F)	1.13	
N[4]	*Neobee M-20*	–15 to 225 °C (5 to 437 °F)	0.92	
P[4]	Propylene Glycol and Water	–15 to 95 °C (5 to 203 °F)	1.02	
Code	**Capillary Seal Connection Inside Diameter inches (mm)**	**Material**		
B	0.03 (0.7)	316 SST Armored Sleeving		
C	0.04 (1.1)	316 SST Armored Sleeving		
D	0.075 (1.91)	316 SST Armored Sleeving		
E	0.03 (0.7)	PVC Coating on 316 SST Armored Sleeving		
F	0.04 (1.1)	PVC Coating on 316 SST Armored Sleeving		
G	0.075 (1.91)	PVC Coating on 316 SST Armored Sleeving		
H	0.03 (0.7)	316 Armored Sleeving, Support Tube without Compression Fitting		
J	0.04 (1.1)	316 Armored Sleeving, Support Tube without Compression Fitting		
K	0.075 (1.91)	316 Armored Sleeving, Support Tube without Compression Fitting		
M[5]	0.03 (0.7)	PVC Coated 316 Armored Sleeving, Support Tube with Compression Fitting		
N[5]	0.04 (1.1)	PVC Coated 316 Armored Sleeving, Support Tube with Compression Fitting		
P[5]	0.075 (1.91)	PVC Coated 316 Armored Sleeving, Support Tube with Compression Fitting		

TABLE 4. Capillary/Fill Fluid Ordering Information

Code	Capillary Connection Length
01	1 ft (0.3 m)
05	5 ft (1.5 m)
10	10 ft (3.0 m)
15	15 ft (4.5 m)
20	20 ft (6.1 m)
25	25 ft (7.6 m)
30	30 ft (9.1 m)
35	35 ft (10.7 m)
40	40 ft (12.2 m)
45	45 ft (13.7 m)
50	50 ft (15.2 m)
51	0.5 m (1.6 ft)
52	1.0 m (3.3 ft)
53	1.5 m (4.9 ft)
54	2.0 m (6.6 ft)
55	2.5 m (8.2 ft)
56	3.0 m (9.8 ft)
57	3.5 m (11.5 ft)
58	4.0 m (13.1 ft)
59	5.0 m (16.4 ft)
60	6.0 m (19.7 ft)
61	7.0 m (23 ft)
62	8.0 m (26.2 ft)
63	9.0 m (29.5 ft)
64	10.0 m (32.8 ft)
65	11.0 m (36.1 ft)
66	12.0 m (39.4 ft)
67	13.0 m (42.6 ft)
68	14.0 m (45.9 ft)
69	15.0 m (49.2 ft)

(1) See page 85 for more information on all welded vacuum and repairable-welded connection types. The difference between the all welded vacuum and repairable-welded is that all the connection points in the all welded vacuum system are welded, including welding a disk over the sensor module isolators.In the repairable-welded type, there is a gasket between the sensor module and transmitter flange. This allows the transmitter to be re-used in the event the Remote Seal System needs to be repaired.

(2) All welded system connection types require either a 316L SST or Hastelloy C-276 isolating diaphragm in the pressure transmitter model codes.

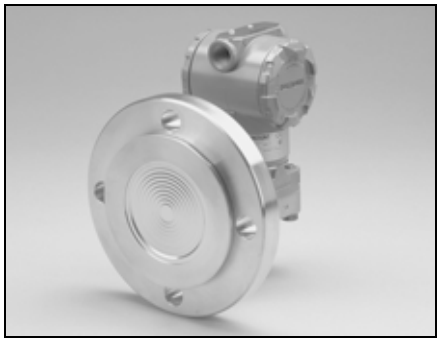
(3) Not available with Capillary Seal connection codes B, E, H, or M.

(4) This is a food grade fill fluid.

(5) Compression fitting does not provide a hermetic seal.

Direct Mount/Fill Fluid

Rosemount 3051 Flush Flanged Seal with Direct Mount Connection



1199-039AB

NOTE: Use Table Table 5 for Direct Mount Type Connections. Use Table 4 for Capillary Type Connections.

TABLE 5. Direct Mount/Fill Fluid Ordering Information

Model	**Type**		
1199	Diaphragm Seals		
Code	**Seal Location**	**Connection Type**	**Transmitter Type**
W(1)	Seal on High Pressure Side of Transmitter	Repairable-Welded	All Transmitters
P(1)(2)	Seal on High Pressure Side of Transmitter	All Welded Vacuum	3051T, 2088, and 3051S2T
R(1)(2)	Seal on High Pressure Side of Transmitter	All Welded Vacuum	3051S2C (option code B11)
T(2)	Seal on High Pressure Side of Transmitter	All Welded Vacuum	3051S2C (option code B12)
Code	**Fill Fluid**	**Temperature Limits**	**Specific Gravity**
	General Purpose Fill Fluids		
A	*Syltherm* XLT	–75 to 150 °C (–102 to 302 °F)	0.85
C(3)	D. C. Silicone 704	0 to 260 °C (32 to 500 °F)	1.07
D	D. C. Silicone 200	–45 to 205 °C (–49 to 401 °F)	0.93
H	Inert (Halocarbon)	–45 to 160 °C (–49 to 320 °F)	1.85
	Sanitary Fill Fluids		
G(4)	Glycerin and Water	–15 to 95 °C (5 to 203 °F)	1.13
N(4)	*Neobee M-20*	–15 to 225 °C (5 to 437 °F)	0.92
P(4)	Propylene Glycol and Water	–15 to 95 °C (5 to 203 °F)	1.02
Code	**Seal Connection Type**		
A	Direct Mount 0.04 in. (1.1 mm)		

TABLE 5. Direct Mount/Fill Fluid Ordering Information

Code	Direct Mount Connection Type (see page 12 for direct mount seal availability information)
REPAIRABLE-WELDED CONNECTION TYPE	
	Rosemount 3051S_C with B11 Process Connection code or 3051C Transmitter code S1 (use with Seal Location code W) .
93	One-Seal System
B3	One-Seal System, 2-in. (50 mm) connection extension
D3	One-Seal System, 4-in. (100 mm) connection extension
	Rosemount 3051S_C with B12 Process Connection code or 3051C Transmitter code S2 (use with Seal Location code W)
94	Two-Seal System
B4	Two-Seal System, 2-in. (50 mm) connection extension
D4	Two-Seal System, 4-in. (100 mm) connection extension
	Rosemount 3051S_T, 3051T, or 2088 In-Line Transmitter (use with Seal Location code W)
95	One-Seal System
	Rosemount 1151 Transmitter (use with Seal Location code W)
92	One- or Two-Seal System
ALL WELDED VACUUM SYSTEM TYPE	
	Rosemount 3051C 3051S_C with B11 process connection code (use with Seal Location code R) or 3051C Transmitter option code S0 (use with Seal Location code W)
97	One-Seal System
B7	One-Seal System, 2-in. (50 mm) connection extension
D7	One-Seal System, 4-in. (100 mm) connection extension
	Rosemount 3051S_C with B12 Process Connection code (use with Seal Location code T) or 3051C Transmitter code S9 (use with Seal Location code W)
96	Two-Seal System
B6	Two-Seal System, 2-in. (50 mm) connection extension
D6	Two-Seal System, 4-in. (100 mm) connection extension
	Rosemount 3051S_T, 3051T, or 2088 In-Line Transmitter (use with Seal Location code P)
95	One-Seal System

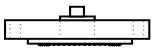
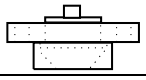
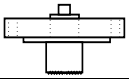
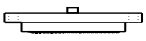
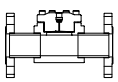
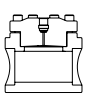
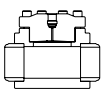
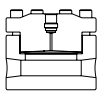
(1) See page 85 for more information on all welded vacuum and repairable-welded connection types.

(2) All welded system connection types require either a 316L SST or Hastelloy C-276 isolating diaphragm in the pressure transmitter model codes.

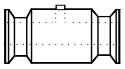
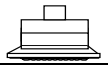
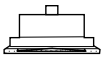
(3) Fill fluid maximum operating temperature is limited by heat transfer to the transmitter electronics. Temperature limit for 3051C 4-in. Extended Direct Mount System is 260 °C (500 °F), 3051C 2-in. Extended Direct Mount System is 240 °C (464 °F), and 205 °C (401 °F) for all other Direct Mount Connection Types at 21 °C (70 °F) ambient temperature.

(4) This is a food grade fill fluid.

AVAILABILITY OF DIRECT MOUNT DIAPHRAGM SEALS

Seal Description	Model Code	1151	2088/ 3051T	3051 One Seal Code 3051–S1 93	B3	D3
				Two Seal Code 3051–S2 94	B4	D4
		One or Two Seal Code	One Seal Code	All Welded System One Seal Code 3051–S0 97	B7	D7
		92	95	All Welded System Two Seal Code 3051–S9 96	B6	D6
				Additional Direct Mount Connection Length 0 in.	2 in.	4 in.
Pancake 	PFW/PCW (page 16)	—	—	—	—	—
Flush Flanged 	FFW/FCW (page 22)	•	•	Class 150 ANSI Two Piece Design only	•	•
Flanged Remote 	RFW/RCW (page 38)	•	•	—	•	•
Extended Flanged 	EFW (page 45)	•	•	DIN and Class 150 ANSI Flanges Only	•	•
Threaded Remote 	RTW (page 48)	•	•	—	•	•
Chemical Tee 	CTW (page 53)	•	•	—	•	•
Union Connection 	UCW (page 54)	—	–	—	—	—
Threaded Pipe Mount & Paper Mill Sleeve 	UCP PMW (page 55)	—	•	•	—	—
Saddle 	WSP (page 57)	•	•	—	•	•
Wafer Style In-Line 	TFS (page 58)	—	•	—	—	—
Flow-Thru Flanged 	WFW (page 59)	•	•	—	•	•
Flow-Thru Socket Weld 	WWW (page 61)	•	•	—	•	•
Flow-Thru Butt Weld 	WBW (page 61)	•	•	—	•	•
In Line Flow-Thru Threaded 	WTW (page 63)	•	•	—	•	•

AVAILABILITY OF DIRECT MOUNT DIAPHRAGM SEALS

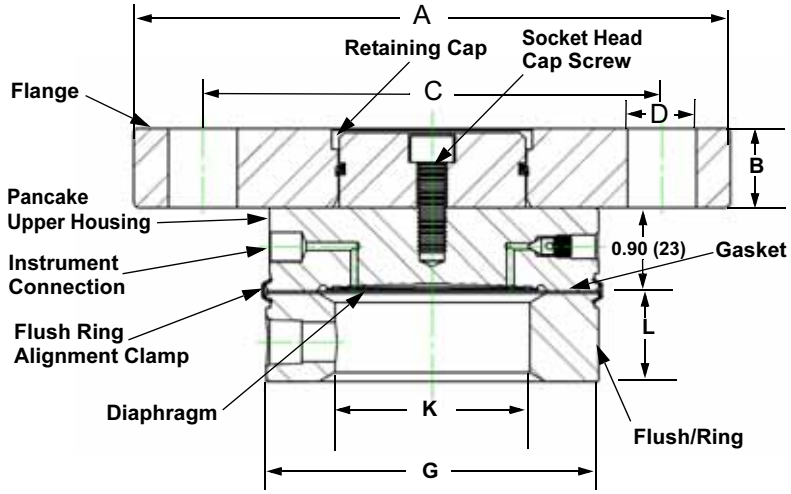
Seal Description	Model Code	1151	2088/ 3051T	3051 One Seal Code 3051–S1		
				93	B3	D3
				Two Seal Code 3051–S2		
				94	B4	D4
		One or Two Seal Code	One Seal Code	All Welded System One Seal Code 3051–S0		
				97	B7	D7
		92	95	All Welded System Two Seal Code 3051–S9		
				96	B6	D6
				Additional Direct Mount Connection Length		
				0 in.	2 in.	4 in.
Tri-Clamp In-Line 	VCS (page 65)	—	•	—	—	—
Tri-Clamp 	SCW (page 66)	•	•	•	•	•
Tank Spud 	SSW (page 68)	•	•	•	•	•
Thin-Wall Tank Spud 	STW (page 70)	•	•	—	•	•
Cherry-Burrell 	SHP (page 71)	—	•	—	—	—
Aseptic (APC) Style 	SAP (page 72)	—	•	—	•	•
SLS, SMS,SFS, and SRS Dairy 	SLS, SMS,SFS, SRS (page 73)	—	•	—	—	—
MLS, MMS,MFS, and MRS Dairy 	MLS, MMS,MFS, MRS (page 75)	—	•	—	—	—

General Purpose Seal Assemblies

PANCAKE SEAL

NOTE
Drawings represent the standard offering. Dimensional drawings may vary when ordering special shaded options. Contact an Emerson Process Management representative if dimensional drawings are required for special order configuration.

3-in. Pancake Seal with Optional Flushing Connection



Measurement in inches (millimeters)

NOMINAL PIPE SIZE	CLASS	"G" +0.015[0.38] -0.010[0.26]	Diaphragm "F"	FLG. OD "A" ±0.06[1.5]	FLG Thickness "B" +0.12[3.0] +0.00[0.0]	QTY. OF BOLT	BOLT HOLE SIZE "D" ±0.02[0.5]	BOLT CIRCLE "C" ±0.06[1.5]
ANSI 2"	150#	3.62[91.9]	2.30[58.4]	6.00[152.4]	0.75[19.1]	4	0.750[19.05]	4.75[120.7]
	300#	3.62[91.9]	2.30[58.4]	6.50[165.1]	0.87[22.1]	8	0.750[19.05]	5.00[127.0]
	600#	3.62[91.9]	2.30[58.4]	6.50[165.1]	1.25[31.8]	8	0.750[19.05]	5.00[127.0]
ANSI 3"	150#	5.00[127.0]	3.50[88.9]	7.50[190.5]	0.96[24.4]	4	0.750[19.05]	6.00[152.4]
	300#	5.00[127.0]	3.50[88.9]	8.25[209.6]	1.12[28.4]	8	0.875[22.23]	6.62[168.1]
	600#	5.00[127.0]	3.50[88.9]	8.25[209.6]	1.50[38.1]	8	0.875[22.23]	6.62[168.1]
DN 50	PN40	4.00[102]	2.30[57]	6.50[165]	0.67[17]	4	0.71[18]]	4.92[125]
	PN64	4.00[102]	2.30[57]	7.09[180]	0.91[23]	4	0.87[22]	5.31[135]
DN 80	PN40	5.43[138]	3.50[89]	7.87[200]	0.83[21]	8	0.71[18]	6.30[160]
	PN64	5.43[138]	3.50[89]	8.46[215]	0.98[25]	8	0.87[22]	6.69[170]

	Pipe Size	Outer Diameter "G"	Inner Diameter "K"	Thickness with 1/4–NPT F.C. "L"	Thickness with 1/2–NPT F.C. "L"
ANSI / ASME / JIS / DIN	2-in.	3.62 (92)	2.12 (54)	0.97 (25)	1.31 (33)
	3-in.	5.00 (127)	3.60 (91)	0.97 (25)	1.31 (33)
	DN 50	4.00 (102)	2.40 (61)	0.97 (25)	1.31 (33)
	DN 80	5.43 (138)	3.60 (91)	0.97 (25)	1.31 (33)

TABLE 6. Pancake Seal Ordering Information

• = Available
— = Unavailable

Code	Industry Standard
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)
D	DIN (Deutsches Institut für Normung)
J	JIS (Japanese Industrial Standards)

Code	Process Connection Style
PFW[1]	Pancake

Code	Process Connection Size		
	ANSI	DIN	JIS
G	2 in.	DN 50	50A
7	3 in.	—	80A
J	—	DN 80	—

Code	Maximum Working Pressure (Flange Rating)
0	No Flange Supplied, Seal Rated to 6,250 psi
1	Class 150 (ANSI), 10K (JIS), Flange and Retaining Cap
2	Class 300 (ANSI), 20K (JIS), Flange and Retaining Cap
4	Class 600 (ANSI), 40K (JIS), Flange and Retaining Cap
G	PN 40 (DIN) Flange and Retaining Cap
5	Class 900 (ANSI), Flange and Retaining Cap
6	Class 1,500 (ANSI), Flange and Retaining Cap
7	Class 2,500 (ANSI), Flange and Retaining Cap
H	PN 64(63) (DIN), Flange and Retaining Cap
J	PN 100 (DIN), Flange and Retaining Cap

Code	Diaphragm and Wetted Material[2]	Upper Housing[2]	Mounting Flange	Available with Process Connection Code		
				G	7	J
LA[3]	316L SST	316L SST	No Flange	•	•	•
CA[3]	316L SST	316L SST	Carbon Steel	•	•	•
DA[3]	316L SST	316L SST	316 SST	•	•	•
LB	*Hastelloy* C-276	316L SST	No Flange	•	•	•
CB	*Hastelloy* C-276	316L SST	Carbon Steel	•	•	•
DB	*Hastelloy* C-276	316L SST	316 SST	•	•	•
BB[3]	*Hastelloy* C-276	*Hastelloy* C-276	No Flange	•	•	•
MB[3]	*Hastelloy* C-276	*Hastelloy* C-276	Carbon Steel	•	•	•
KB[3]	*Hastelloy* C-276	*Hastelloy* C-276	316 SST	•	•	•
LC	Tantalum-Seam Welded	316L SST	No Flange	•	•	•
CC	Tantalum-Seam Welded	316L SST	Carbon Steel	•	•	•
DC	Tantalum-Seam Welded	316L SST	316 SST	•	•	•
L3[3]	Tantalum-Brazed	316L SST	No Flange	•	•	•
C3[3]	Tantalum-Brazed	316L SST	Carbon Steel	•	•	•
D3[3]	Tantalum-Brazed	316L SST	316 SST	•	•	•
LF	304L SST	316L SST	No Flange	•	•	•
BF[3]	304L SST	304 SST	No Flange	•	•	•
LV	*Monel* 400	316L SST	No Flange	•	•	•
BV[3]	*Monel* 400	*Monel* 400	No Flange	•	•	•
KV[3]	*Monel* 400	*Monel* 400	316 SST	•	•	•
MV[3]	*Monel* 400	*Monel* 400	Carbon Steel	•	•	•
LJ	*Hastelloy* B	316L SST	No Flange	•	•	•
BJ[3]	*Hastelloy* B	*Hastelloy* B	No Flange	•	•	•
KJ[3]	*Hastelloy* B	*Hastelloy* B	316 SST	•	•	•
LP	Nickel 201	316L SST	No Flange	•	•	•
BP[3]	Nickel 201	Nickel 201	No Flange	•	•	•
KP[3]	Nickel 201	Nickel 201	316 SST	•	•	•
TH[3]	Titanium Gr. 4	Titanium Gr. 4	No Flange	•	•	•
RH[3]	Titanium Gr. 4	Titanium Gr. 4	316 SST	•	•	•
LH[4]	Titanium Gr. 4	316L SST	No Flange	•	•	•
DH[4]	Titanium Gr. 4	316L SST	316 SST	•	•	•
CH[4]	Titanium Gr. 4	316L SST	Carbon Steel	•	•	•
WW	316Ti	316Ti	No Flange	•	•	•

TABLE 6. Pancake Seal Ordering Information

LE	Inconel 600	316L SST	No Flange	•	•	•
LM	Titanium Gr. 4	316L SST	No Flange	•	•	•
L4	Hastelloy C-22	316L SST	No Flange	•	•	•

Code	Flushing Connection Ring Material (Lower Housing)(5)
0	No Flushing Connection Ring
A	316 SST
B	*Hastelloy* C-276
D	Carbon Steel
F	304 L SST
H	Titanium Gr. 4
J	*Hastelloy* B
6	Nickel 201
V	*Monel* 400

Code	Flushing Option
0	No Flushing Connection Ring
1	One 1/4-in. Flushing Connection
3	Two 1/4-in. Flushing Connections
7	One 1/2-in. Flushing Connection
9	Two 1/2-in. Flushing Connections

Code	Options
B	Extra Fill for Cold Temperature Applications
C	150 μm (0.006-in.) Diaphragm Thickness (316L SST and *Hastelloy C-276* diaphragms only, for abrasive applications)
D	*Hastelloy* Plug in Flushing Connection
G	SST Plug in Flushing Connection
H	SST Drain/Vent in Flushing Connection (Not NACE MR01-75 compliant)
J	*Teflon* Gasket (for use with flushing connection ring)
K	Barium Sulfate-Filled *Teflon* Gasket (for use with flushing connection ring)
V	*Teflon* Coated Diaphragm for nonstick purposes (316L SST and *Hastelloy C-276* diaphragms only)
T	NACE MR-01-75
N	*Grafoil*™ Gasket (for use with flushing connection ring)
U	25 μm (0.001 in) Gold Plated Diaphragm

(1) Shaded areas indicate special orders. Consult an Emerson Process Management representative for configuration availability, performance effects, and lead time.

(2) When ordering special diaphragm materials, the upper housing is 316LSST unless otherwise noted.

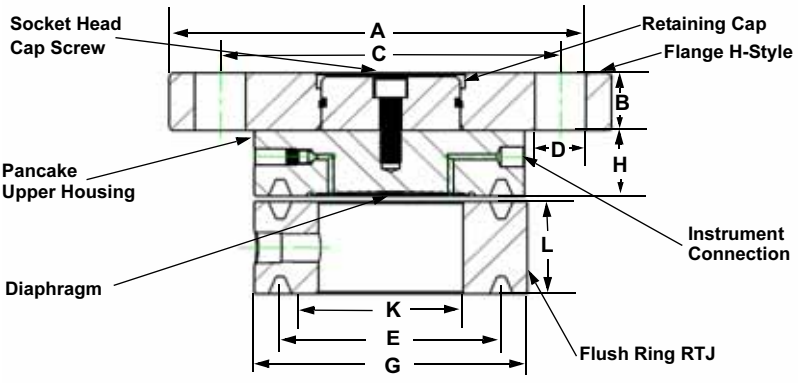
(3) For use with customer supplied spiral wound metallic gaskets.

(4) Operating temperature limited to 150° C (302° F).

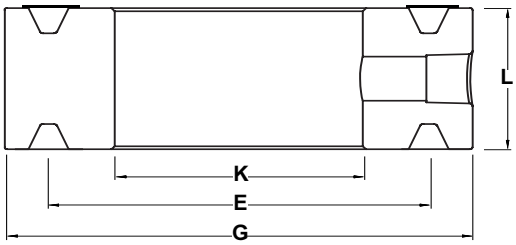
(5) Supplied standard with Thermo-Tork® 9000 gasket.

(6) Not available with transmitter option code Q8, for Material Traceability per DIN EN10204 3.1.B of the transmitter/diaphragm seal assembly.

PCW: Pancake Seal - Ring Type Joint (RTJ) Gasket Surface



Flushing Connection Ring (Lower Housing)



Measurement in inches (millimeters)

NOMINAL PIPE SIZE	CLASS	"G" +0.020[0.51] -0.000[0.00]	"E" ±0.005[0.13]	FLG.OD "A" ±0.06[1.5]	FLG THICKNESS "B" +0.12[3.0] +0.00[0.0]	QTY. OF BOLT	BOLT HOLE SIZE "D" ±0.02[0.5]	BOLT CIRCLE "C" ±0.06[1.5]
ANSI 2"	150#	4.00[101.6]	3.250[82.55]	6.00[152.4]	0.75[19.1]	4	0.750[19.05]	4.75[120.7]
	300#	4.25[108.0]	3.250[82.55]	6.50[165.1]	0.87[22.1]	8	0.750[19.05]	5.00[127.0]
	600#	4.25[108.0]	3.250[82.55]	6.50[165.1]	1.25[31.8]	8	0.750[19.05]	5.00[127.0]
	900/1500#	4.88[124.0]	3.750[95.25]	8.50[215.9]	1.50[38.1]	8	1.000[25.40]	6.50[165.1]
	2500#	5.25[133.4]	4.000[101.60]	9.25[235.0]	2.00[50.8]	8	1.125[28.58]	6.75[171.5]
ANSI 3"	150#	5.25[133.4]	4.500[114.30]	7.50[190.5]	0.96[24.4]	4	0.750[19.05]	6.00[152.4]
	300#	5.75[146.1]	4.875[123.83]	8.25[209.6]	1.12[28.4]	8	0.875[22.23]	6.62[168.1]
	600#	5.75[146.1]	4.875[123.83]	8.25[209.6]	1.50[38.1]	8	0.875[22.23]	6.62[168.1]
	900#	6.12[155.4]	4.875[123.83]	10.50[266.7]	1.88[47.8]	8	1.250[31.75]	8.00[203.2]
	1500#	6.62[168.1]	5.375[136.53]	10.50[266.7]	1.88[47.8]	8	1.250[31.75]	8.00[203.2]
	2500#	6.62[168.1]	5.000[127.00]	12.00[304.8]	2.62[66.5]	8	1.375[34.93]	9.00[228.6]

NOMINAL PIPE SIZE F/RTJ SIZE	DIAPHRAGM DIAMETER	PANCAKE THICKNESS "H" F/8MM WELD
2"	2.3[58.4]	1.00[25.4]
3"	3.5[88.9]	1.08[27.4]

Dimensional Table for Flushing Connection Ring (Lower Housing)

	PIPE SIZE	CLASS	"E"	"G"	"K"	Thickness with 1/4–NPT F.C. "L"	Thickness with 1/2–NPT F.C. "L"
ANSI/ ASME /JIS	2-in.	150 lb.	3.250(83)	4.00(102)	2.12(54)	1.4(36)	1.7(43)
		300 lb.	3.250(83)	4.25(108)	2.12(54)	1.4(36)	1.7(43)
		600 lb.	3.250(83)	4.25(108)	2.12(54)	1.4(36)	1.7(43)
		1500 lb.	3.750(95)	4.88(124)	2.12(54)	1.4(36)	1.7(43)
		2500 lb.	4.000(102)	5.25(133)	2.12(54)	1.4(36)	1.7(43)
	3-in.	150 lb.	4.500 (114)	5.25 (133)	3.60 (91)	1.5 (38)	1.8 (46)
		300 lb.	4.875 (124)	5.75 (146)	3.60 (91)	1.5 (38)	1.8 (46)
		600 lb.	4.875 (124)	5.75 (146)	3.60 (91)	1.5 (38)	1.8 (46)
		900 lb.	4.875 (124)	6.12 (155)	3.60 (91)	1.5 (38)	1.8 (46)
		1500 lb.	5.375 (137)	6.62 (168)	3.60 (91)	1.5 (38)	1.8 (46)
		2500 lb.	5.000 (127)	6.62 (168)	3.60 (91)	1.5 (38)	1.8 (46)

TABLE 7. Ring Type Joint Pancake Seal Ordering Information

Code	Industry Standard		
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)		
Code	**Process Connection Style**		
PCW[1]	Ring Joint Type Pancake		
Code	**Process Connection Size**		
4	1 1/2 in.		
G	2 in.		
7	3 in.		
Code	**Maximum Working Pressure (Flange Rating)**		
1	Class 150		
2	Class 300		
4	Class 600		
5	Class 900		
6	Class 1500		
7	Class 2500		
Code	**Diaphragm Material[2]**	**Upper Housing[2]**	**Mounting Flange**
LA	316 SST	316 SST	No Flange
CA	316 SST	316 SST	Carbon Steel
DA	316 SST	316 SST	316 SST
BB	*Hastelloy* C-276	*Hastelloy* C-276	No Flange
MB	*Hastelloy* C-276	*Hastelloy* C-276	Carbon Steel
KB	*Hastelloy* C-276	*Hastelloy* C-276	316 SST
BF	304 SST	304 SST	No Flange
BV	*Monel* 400	*Monel* 400	No Flange
KV	*Monel* 400	*Monel* 400	316 SST
BJ	*Hastelloy* B	*Hastelloy* B	No Flange
KJ	*Hastelloy* B	*Hastelloy* B	316 SST
BP	Nickel 201	Nickel 201	No Flange
KP	Nickel 201	Nickel 201	316 SST
TH	Titanium Gr. 4	Titanium Gr. 4	No Flange
RH	Titanium Gr. 4	Titanium Gr. 4	316 SST
Code	**Flushing Connection Ring Material (Lower Housing)**		
0	No Flushing Connection Ring		
A	316 SST		
B	*Hastelloy* C-276		
D	Carbon Steel		
F	304 SST		
H	Titanium Gr. 4		
J	*Hastelloy* B		
6	Nickel 201		
V	*Monel* 400		

Code	Flushing Option
0	No Flushing Connection Ring
1	One 1/4-in. Flushing Connection
3	Two 1/4-in. Flushing Connections
7	One 1/2-in. Flushing Connection
9	Two 1/2-in. Flushing Connections
Code	**Options (select up to 3)**
0	None
B	Extra Fill for Cold Temperature Applications
C	150 μm (0.006-in.). Diaphragm Thickness (316L SST and *Hastelloy C-276* diaphragms only, for abrasive applications)
D	*Hastelloy* Plug in Flushing Connection
G	SST Plug in Flushing Connection
V(3)	*Teflon* Coated Diaphragm for nonstick purposes (316L SST and *Hastelloy C-276* diaphragms only)
T	NACE MR-01-75
U	Gold Plated Diaphragm
H	SST Drain/Vent in Flushing Connection (Not NACE MR01-75 compliant)

(1) Shaded areas indicate special orders. Consult an Emerson Process Management representative for configuration availability, performance effects, and lead time.

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

(3) Not available with transmitter option code Q8, for Material Traceability per DIN EN10204 3.1.B of the transmitter/diaphragm seal assembly.

FFW FLUSH FLANGED REMOTE SEAL

Two-Piece Design (shown with flushing ring)

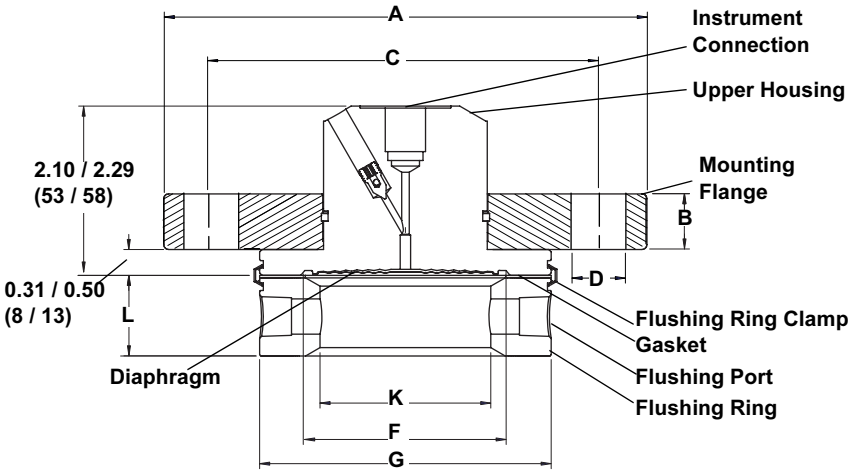


TABLE 8. Dimensional Table for Flush Flanged Raised Face Diaphragm Seals Two Piece (Upper Housing and Flange) Design

Measurement in inches (millimeters)

	Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	Bolt Circle "C"	Bolts	Bolt Hole Diameter "D"	Standard Diaphragm Diameter "F"	Raised Face Diameter "G"
AnSI/ ASME/ JIS	2-in.	150 lb.	6.00 (152)	0.69 (18)	4.75 (121)	4	0.75 (19)	2.30 (58)	3.62 (92)
		300 lb.	6.50 (165)	0.82 (21)	5.00 (127)	8	0.75 (19)	2.30 (58)	3.62 (92)
		600 lb.	6.50 (165)	1.00 (25)	5.00 (127)	8	0.75 (19)	2.30 (58)	3.62 (92)
	3-in.	150 lb.	7.50 (191)	0.88 (22)	6.00 (152)	4	0.75 (19)	3.50 (89)	5.00 (127)
		300 lb.	8.25 (210)	1.07 (27)	6.62 (168)	8	0.88 (22)	3.50 (89)	5.00 (127)
		600 lb.	8.25 (210)	1.25 (32)	6.62 (168)	8	0.88 (22)	3.50 (89)	5.00 (127)
	4-in.	150 lb.	9.00 (229)	0.88 (22)	7.50 (191)	8	0.75 (19)	3.50 (89)	6.20 (157)
		300 lb.	10.0 (254)	1.19 (30)	7.88 (200)	8	0.88 (22)	3.50 (89)	6.20 (157)
		600 lb.	10.75 (273)	1.50 (38)	8.50 (216)	8	1.00 (25)	3.50 (89)	6.20 (157)
DIN	DN 50	PN 40	6.50 (165)	0.79 (20)	4.92 (125)	4	0.71 (18)	2.30 (58)	4.00 (102)
		PN 64	7.08 (180)	1.02 (26)	5.31 (135)	4	0.87 (22)	2.30 (58)	4.00 (102)
		PN 100	7.68 (195)	1.10 (28)	5.71 (145)	4	1.02 (26)	2.30 (58)	4.00 (102)
	DN 80	PN 40	7.87 (200)	0.94 (24)	6.30 (160)	8	0.71 (18)	3.50 (89)	5.43 (138)
		PN 64	8.46 (215)	1.10 (28)	6.69 (170)	8	0.88 (22)	3.50 (89)	5.43 (138)
		PN 100	9.06 (230)	1.26 (32)	7.09 (180)	8	1.02 (26)	3.50 (89)	5.43 (138)
	DN 100	PN 16	8.66 (220)	0.79 (20)	7.09 (180)	8	0.71 (18)	3.50 (89)	6.20 (157)
		PN 40	9.25 (235)	0.94 (24)	7.48 (190)	8	0.87 (22)	3.50 (89)	6.20 (157)
		PN 64	9.84 (250)	1.18 (30)	7.87 (200)	8	1.02 (26)	3.50 (89)	6.20 (157)

FFW FLANGED TYPE: FLUSH DIAPHRAGM SEALS

One-Piece Design (shown with flushing ring)

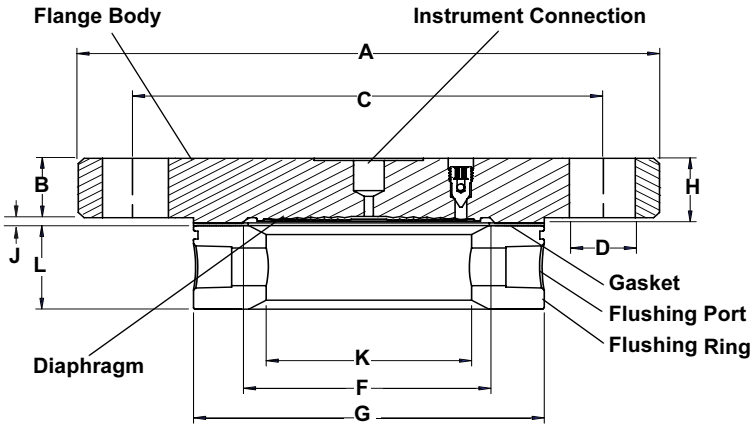


TABLE 9. Dimensional Table for Flush Flanged Diaphragm Seals One Piece (Upper Housing and Flange) Design (Option code E)

Measurement in inches (millimeters)

	Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	Bolt Circle "C"	Bolts	Bolt Hole Diameter "D"	Standard Diaphragm Diameter "F"	Raised Face Diameter "G"	Overall Height "H"	Raised Face Height "J"
ANSI / ASME / JIS	2-in.	150 lb.	6.00 (152)	0.69 (18)	4.75 (121)	4	0.75 (19)	2.30 (58)	3.62 (92)	0.75 (19)	0.06 (1.5)
		300 lb.	6.50 (165)	0.82 (21)	5.00 (127)	8	0.75 (19)	2.30 (58)	3.62 (92)	0.88 (22)	0.06 (1.5)
		600 lb.	6.50 (165)	1.00 (25)	5.00 (127)	8	0.75 (19)	2.30 (58)	3.62 (92)	1.25 (32)	0.25 (6.3)
	3-in.	150 lb.	7.50 (191)	0.88 (22)	6.00 (125)	4	0.75 (19)	3.50 (89)	5.00 (127)	0.94 (24)	0.06 (1.5)
		300 lb.	8.25 (210)	1.06 (27)	6.62 (168)	8	0.88 (22)	3.50 (89)	5.00 (127)	1.12 (28)	0.06 (1.5)
		600 lb.	8.25 (210)	1.25 (32)	6.62 (168)	8	0.88 (22)	3.50 (89)	5.00 (127)	1.50 (38)	0.25 (6.3)
	4-in.	150 lb.	9.00 (229)	0.88 (22)	7.50 (191)	8	0.75 (19)	3.50 (89)	6.20 (157)	0.94 (24)	0.06 (1.5)
		300 lb.	10.00 (254)	1.19 (30)	7.88 (200)	8	0.88 (22)	3.50 (89)	6.20 (157)	1.25 (32)	0.06 (1.5)
		600 lb.	10.75 (273)	1.50 (38)	8.50 (216)	8	1.00 (25)	3.50 (89)	6.20 (157)	1.75 (44)	0.25 (6.3)
DIN	DN 25[(1)]	PN 40	4.53 (115)	0.71 (18)	3.35 (85)	4	055 (14)	1.30 (33)	2.67 (68)	1.00 (25)	0.07 (1.8)
		PN 100	5.51 (140)	0.94 (24)	3.94 (100)	4	0.71 (18)	1.30 (33)	2.67 (68)	1.22 (31)	0.07 (1.8)
	DN 40[(1)]	PN 40	5.91 (150)	0.71 (18)	4.33 (110)	4	0.71 (18)	1.90 (48)	3.46 (88)	1.00 (25)	0.12 (3)
		PN 100	6.69 (170)	1.02 (26)	4.92 (125)	4	0.71 (18)	1.90 (48)	3.46 (88)	1.30 (33)	0.12 (3)
	DN 50	PN 40	6.50 (165)	0.79 (20)	4.92 (125)	4	0.71 (18)	2.30 (58)	4.00 (102)	0.91 (23)	0.12 (3)
		PN 64	7.08 (180)	1.02 (26)	5.31 (135)	4	0.87 (22)	2.30 (58)	4.00 (102)	1.14 (29)	0.12 (3)
		PN 100	7.68 (195)	1.10 (28)	5.71 (145)	4	1.02 (26)	2.30 (58)	4.00 (102)	1.22 (31)	0.12 (3)
	DN 80	PN 40	7.87 (200)	0.94 (24)	6.30 (160)	8	0.71 (18)	3.50 (89)	5.43 (138)	1.06 (27)	0.12 (3)
		PN 64	8.46 (215)	1.10 (28)	6.69 (170)	8	0.88 (22)	3.50 (89)	5.43 (138)	1.22 (31)	0.12 (3)
		PN 100	9.06 (230)	1.26 (32)	7.09 (180)	8	1.02 (26)	3.50 (89)	5.43 (138)	1.38 (35)	0.12 (3)
	DN 100	PN 16	8.66 (220)	0.79 (20)	7.09 (180)	8	0.71 (18)	3.50 (89)	6.20 (157)	0.91 (23)	0.12 (3)
		PN 40	9.25 (235)	0.94 (24)	7.48 (190)	8	0.87 (22)	3.50 (89)	6.20 (157)	1.06 (27)	0.12 (3)
		PN 64	9.84 (250)	1.18 (30)	7.87 (200)	8	1.02 (26)	3.50 (89)	6.20 (157)	1.30 (33)	0.12 (3)

(1) For 1-in. 1 1/2-in., DN 25, and DN 40 line sizes, overall height "H" dimensions includes an additional 0.28-in. (7.1 mm) raised instrument connection hub.

FLUSHING CONNECTION RING (LOWER HOUSING)

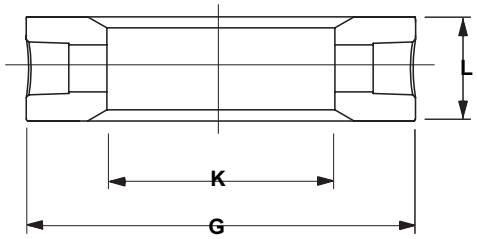


TABLE 10. Dimensional Table for Flushing Connection Ring (Lower Housing)

Measurement in inches (millimeters)

	Pipe Size	Outer Diameter "G"	Inner Diameter "K"	Thickness with 1/4–NPT F.C. "L"	Thickness with 1/2–NPT F.C. "L"
ANSI/ ASME/ JIS	2-in.	3.62 (92)	2.12 (54)	0.97 (25)	1.31 (33)
	3-in.	5.00 (127)	3.60 (91)	0.97 (25)	1.31 (33)
	4-in.	6.20 (158)	3.60 (91)	0.97 (25)	1.31 (33)
DIN	DN 25	2.68 (68)	1.56 (40)	0.97 (25)	1.19 (30)
	DN 40	3.46 (88)	2.12 (54)	0.97 (25)	1.19 (30)
	DN 50	4.00 (102)	2.40 (61)	0.97 (25)	1.31 (33)
	DN 80	5.43 (138)	3.60 (91)	0.97 (25)	1.31 (33)

TABLE 11. FFW Diaphragm Seal – ANSI / ASME and JIS Ordering Information[1]

Code	Industry Standards		
A	ANSI / ASME B16.5 (American Standards Institute / American Society of Mechanical Engineering)		
J	JIS B2238 (Japanese Industrial Standards)		
Code	**Process Connection Style**		
FFW	Flanged, flush surface		
Code	**Process Connection Size**		
	ANSI	*JIS*	
G	2-in.	50 A	
7	3-in.	80 A	
9	4-in.	100 A	
Code	**Maximum Working Pressure (Flange Rating)**		
1	Class 150 (ANSI / ASME), 10K (JIS)		
2	Class 300 (ANSI / ASME), 20K (JIS)		
4	Class 600 (ANSI / ASME), 40K (JIS)		
5	Class 900 (ANSI / ASME)		
6	Class 1500 (ANSI / ASME)		
7	Class 2500 (ANSI / ASME)		
Code	**Diaphragm and Wetted Parts Material[2]**	**Upper Housing Material[2]**	**Mounting Flange[3]**
CA[4][5]	316L SST	316L SST	Carbon Steel
DA[5]	316L SST	316L SST	316 SST
CB[4][6]	*Hastelloy* C-276, seam welded	316L SST	Carbon Steel
DB[6]	*Hastelloy* C-276, seam welded	316L SST	316 SST
MB[4][5]	*Hastelloy* C-276, solid faceplate	*Hastelloy* C-276 / 316L SST	Carbon Steel
KB[4][5]	*Hastelloy* C-276, solid faceplate	*Hastelloy* C-276 / 316L SST	316 SST
CC[4]	Tantalum, seam welded	316L SST	Carbon Steel
DC	Tantalum, seam welded	316L SST	316 SST
C3[4][5][6][7]	Tantalum, brazed	316L SST	Carbon Steel
D3[4][5][6][7]	Tantalum, brazed	316L SST	316 SST
DJ	*Hastelloy* B	316L SST	316 SST
CJ[4]	*Hastelloy* B	316L SST	Carbon Steel
DF	304L SST	316L SST	316 SST
CF[4]	304L SST	316L SST	Carbon Steel
DP	Nickel 201	316L SST	316 SST
CP[4]	Nickel 201	316L SST	Carbon Steel
DV	*Monel* 400	316L SST	316 SST
CV[4]	*Monel* 400	316L SST	Carbon Steel
RH[5]	Titanium GR-4	Titanium GR.4	316 SST
DH[8]	Titanium GR.4	316L SST	316 SST
CH[8]	Titanium GR.4	316L SST	Carbon Steel
DM[8]	Titanium GR.2	316L SST	316 SST
WW[5][9]	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)
WB[9]	*Hastelloy* C-276	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)
D4	*Hastelloy* C-22	316L SST	316 SST
C5[4]	Duplex 2507 SST	316L SST	Carbon Steel
D5	Duplex 2507 SST	316L SST	316 SST
DE	*Inconel* 600	316L SST	316 SST
DZ[8]	Zirconium	316L SST	316 SST

TABLE 11. FFW Diaphragm Seal – ANSI / ASME and JIS Ordering Information(1)

Code	Flushing Connection Ring Material (Lower Housing)
0	No flushing ring required
A	316L SST
B	*Hastelloy* C-276
D	Plated Carbon Steel
2	Duplex 2205 SST
E	*Inconel* 600
H	Titanium Gr. 4
J	*Hastelloy* B
6	Nickel 201
V	*Monel* 400
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
E	One piece design
B	Extra fill for cold temperature applications
C	150 μm (0.006-in.) diaphragm thickness (available with 316L SST, *Hastelloy* C-276, Nickel 201, and 2507 Duplex SST diaphragms only, abrasive applications)
D	*Hastelloy* plug(s) for flushing connection(s)
G	SST plug(s) for flushing connection(s)
H	SST vent/drain for flushing connections
J	*Teflon* gasket (for use with flushing connection ring)
7(10)	50 μm (0.002-in.) diaphragm thickness
V(10)	*Teflon* coated diaphragm for nonstick purposes only
N	Grafoil gasket (for use with flushing connection ring)
K	Barium sulfate-filled *Teflon* gasket in lower housing
U	25 μm (0.001 in) Gold plated diaphragm
T	NACE MR0175
2(9)	Radial Capillary Connection
4(9)	Flat Face, Flush Flange

(1) Shaded areas indicate special orders. Consult a local Emerson Process Management, Rosemount division sales representative for availability, performances effects, and lead time.

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

(3) The mounting flange and upper housing are a single item for the one-piece design, option code E.

(4) Only available with two piece design.

(5) For use with spiral wound metallic gaskets.

(6) Not available with option code C.

(7) Only available in Process Connection Size code G and 7.

(8) Operating temperature limited to 150 °C (302 °F).

(9) Only available with one-piece design, option code E.

(10) Available with 316L SST and Hastelloy C-276 diaphragms only.

TABLE 12. FFW Diaphragm Seal – DIN Ordering Information[1]

Code	Industry Standards		
D	DIN 2401 and 2501 (Deutsches Institut fur Normung)		
Code	**Process Connection Style**		
FFW	Flanged, flush surface, DIN 2526 form D		
Code	**Process Connection Size**		
G	DN 50		
J	DN 80		
D[2]	DN 25		
F	DN 40		
9	DN 100		
Code	**Maximum Working Pressure (Flange Rating)**		
G	PN 40		
E	PN 10/16 (DN 100 only)		
H	PN 64		
J	PN 100		
Code	**Diaphragm and Wetted Parts Material[3]**	**Upper Housing Material[3]**	**Mounting Flange[4]**
CA[5][6]	316L SST	316L SST	Carbon Steel
DA[6]	316L SST	316L SST	316 SST
CB[5][7]	*Hastelloy* C-276, seam welded	316L SST	Carbon Steel
DB[7]	*Hastelloy* C-276, seam welded	316L SST	316 SST
MB[5][6]	*Hastelloy* C-276, solid faceplate	*Hastelloy* C-276 / 316L SST	Carbon Steel
KB[5][6]	*Hastelloy* C-276, solid faceplate	*Hastelloy* C-276 / 316L SST	316 SST
CC[5]	Tantalum, seam welded	316L SST	Carbon Steel
DC	Tantalum, seam welded	316L SST	316 SST
C3[5][6][7][8]	Tantalum, brazed	316L SST	Carbon Steel
D3[5][6][7][8]	Tantalum, brazed	316L SST	316 SST
DJ	*Hastelloy* B	316L SST	316 SST
CJ[5]	*Hastelloy* B	316L SST	Carbon Steel
DF	304L SST	316L SST	316 SST
CF[5]	304L SST	316L SST	Carbon Steel
DP	Nickel 201	316L SST	316 SST
CP[5]	Nickel 201	316L SST	Carbon Steel
DV	*Monel* 400	316L SST	316 SST
CV[5]	*Monel* 400	316L SST	Carbon Steel
RH[5][6]	Titanium GR.4	Titanium GR.4	316 SST
DH[9]	Titanium GR.4	316L SST	316 SST
CH[5][9]	Titanium GR.4	316L SST	Carbon Steel
DM[9]	Titanium GR.2	316L SST	316 SST
WW[2][6]	316Ti SST (WNr 1.4571)	316 Ti SST (WNr 1.4571)	316 Ti SST (WNr 1.4571)
WB[2]	*Hastelloy* C-276	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)
D4	*Hastelloy* C-22	316L SST	316 SST
C5	Duplex 2507 SST	316L SST	Carbon Steel
D5	Duplex 2507 SST	316L SST	316 SST
DE	*Inconel* 600	316L SST	316 SST
DZ[9]	Zirconium	316L SST	316 SST

TABLE 12. FFW Diaphragm Seal – DIN Ordering Information(1)

Code	Flushing Connection Ring Material (Lower Housing)
0	No flushing ring required
A	316L SST
B	*Hastelloy* C-276
D	Plated Carbon Steel
2	Duplex 2205 SST
H	Titanium Gr. 4
J	*Hastelloy* B
6	Nickel 201
V	*Monel* 400
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
E	One piece design
B	Extra fill for cold temperature applications
C(10)	150 μm (0.006-in.) diaphragm thickness
D	*Hastelloy* plug(s) for flushing connection(s)
G	SST plug(s) for flushing connection(s)
H	SST vent/drain for flushing connections
J	*Teflon* gasket (for use with flushing connection ring)
7(10)	50 μm (0.002-in.) diaphragm thickness
V(10)	*Teflon* coated diaphragm for nonstick purposes only
N	Grafoil gasket (for use with flushing connection ring)
K	Barium sulfate-filled *Teflon* gasket in lower housing
U	25 μm (0.001 in) Gold plated diaphragm
T	NACE MR0175
2(2)	Radial Capillary Connection

(1) Shaded areas indicate special orders. Consult a local Emerson Process Management, Rosemount division sales representative for availability, performance, and lead time

(2) Only available with one piece design, option code E

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

(4) The mounting flange and upper housing are a single item for the one-piece design, option code E.

(5) Only available with two piece design.

(6) For use with spiral wound metallic gaskets.

(7) Not available with option code C.

(8) Only available in Process Connection Size code G and J.

(9) Operating temperature limited to 150° C (302° F).

(10) Available with 316L SST and Hastelloy C-276 diaphragms only.

FCW: FLUSH FLANGED DIAPHRAGM SEALS – RING TYPE JOINT (RTJ) GASKET SURFACE

Two-Piece Design (shown with flushing ring)

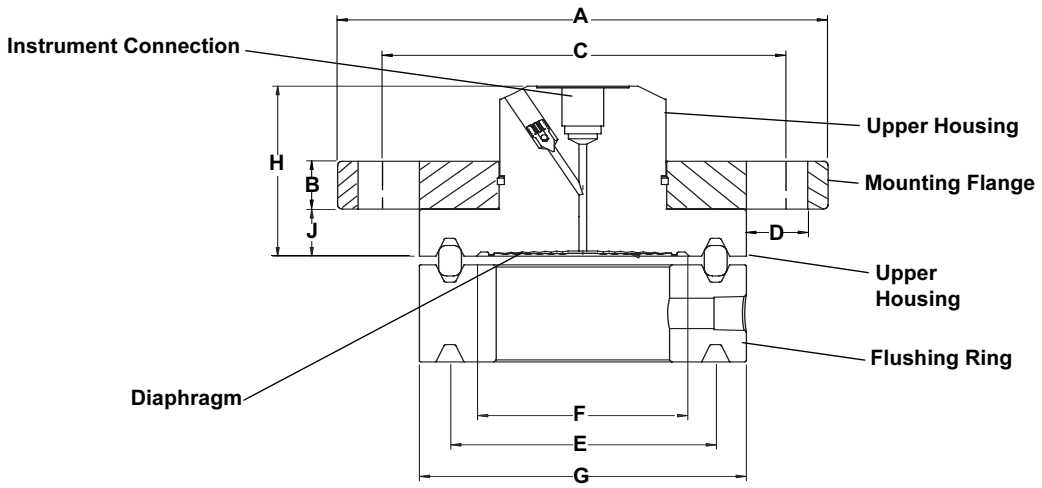


TABLE 13. Dimensional Table for FCW 2-Piece Flange Type Flush Diaphragm Seal

Measurement in inches (millimeters)

Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	Bolt Circle Diameter "C"	Bolt Hole Diameter "D"	RTJ Diameter "E"	Standard Diaphragm Diameter "F"	Raised Face Diameter "G"	Overall Height "H"	Raised Face Height "J"
1 1/2-in.	150 lb.	5.00 (127)	0.63 (16)	3.88 (99)	0.62 (16)	2.562 (65)	1.90 (48.3)	3.25 (83)	2.47 (62.7)	0.68 (17.3)
	300 lb.	6.12 (156)	0.75 (19)	4.50 (114)	0.88 (22)	2.688 (68)	2.30 (58.4)	3.56 (90)	2.47 (62.7)	0.68 (17.3)
	600 lb.	6.12 (156)	0.88 (22)	4.50 (114)	0.88 (22)	2.688 (68)	2.30 (58.4)	3.56 (90)	2.47 (62.7)	0.68 (17.3)
	1500 lb	7.00 (178)	1.25 (32)	4.88 (124)	1.12 (28)	2.688 (68)	2.30 (58.4)	3.62 (92)	2.61 (66.3)	0.82 (20.8)
	2500 lb	8.00 (203)	1.75 (44)	5.75 (146)	1.25 (32)	3.250 (83)	2.30 (58.4)	4.50 (114)	3.14 (79.8)	0.82 (20.8)
2-in.	150 lb.	6.00 (152)	0.69 (18)	4.75 (121)	0.75 (19)	3.250 (83)	2.30 (58.4)	4.00 (102)	2.47 (62.7)	0.68 (17.3)
	300 lb.	6.50 (165)	0.82 (21)	5.00 (127)	0.75 (19)	3.250 (83)	2.30 (58.4)	4.25 (108)	2.47 (62.7)	0.68 (17.3)
	600 lb.	6.50 (165)	1.00 (25)	5.00 (127)	0.75 (19)	3.250 (83)	2.30 (58.4)	4.25 (108)	2.47 (62.7)	0.68 (17.3)
	1500 lb	8.50 (216)	1.50 (38)	6.50 (165)	1.00 (25)	3.750 (95)	2.30 (58.4)	4.88 (124)	2.61 (66.3)	0.82 (20.8)
	2500 lb	9.25 (235)	2.00 (51)	6.75 (171)	1.12 (28)	4.000 (102)	3.50 (88.9)	5.25 (133)	3.94 (100.1)	0.82 (20.8)
3-in.	150 lb.	7.50 (191)	0.88 (22)	6.00 (168)	0.75 (19)	4.500 (114)	3.50 (88.9)	5.25 (133)	2.47 (62.7)	0.68 (17.3)
	300 lb.	8.25 (210)	1.07 (27)	6.62 (168)	0.88 (22)	4.875 (124)	3.50 (88.9)	5.75 (146)	2.47 (62.7)	0.68 (17.3)
	600 lb.	8.25 (210)	1.25 (32)	6.62 (168)	0.88 (22)	4.875 (124)	3.50 (88.9)	5.75 (146)	2.47 (62.7)	0.68 (17.3)
	900 lb	9.50 (241)	1.50 (38)	7.50 (191)	1.00 (25)	4.875 (124)	3.50 (88.9)	6.12 (155)	2.61 (66.3)	0.82 (20.8)
	1500 lb	10.50 (267)	1.88 (48)	8.00 (203)	1.25 (32)	5.375 (137)	3.50 (88.9)	6.62 (168)	3.81 (96.8)	0.82 (20.8)
	2500 lb	12.00 (305)	2.62 (67)	9.00 (229)	1.38 (35)	5.000 (127)	3.50 (88.9)	6.62 (168)	3.94 (100.1)	0.82 (20.8)
4-in.	150 lb.	9.00 (229)	0.88 (22)	7.50 (191)	0.75 (19)	5.875 (149)	3.50 (88.9)	6.75 (171)	2.47 (62.7)	0.68 (17.3)
	300 lb.	10.00 (254)	1.19 (30)	7.88 (200)	0.88 (22)	5.875 (149)	3.50 (88.9)	6.88 (175)	2.47 (62.7)	0.68 (17.3)
	600 lb.	10.75 (273)	1.50 (38)	8.50 (216)	1.00 (25)	5.875 (149)	3.50 (88.9)	6.88 (175)	2.47 (62.7)	0.68 (17.3)

One-Piece Design

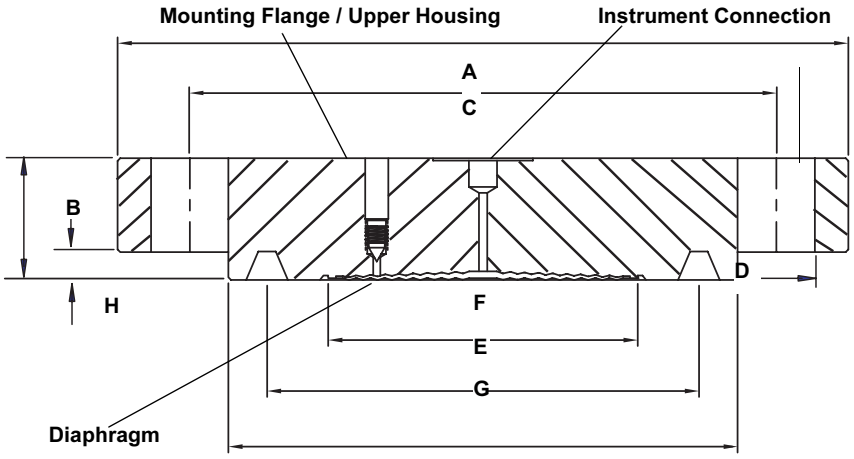


TABLE 14. Dimensional Table for FCW 1-Piece Flange Type Flush Diaphragm Seal

Measurement in inches (millimeters)

Pipe Size	Class	Flange Diameter "A"	Overall Height "B"	Bolt Circle Diameter "C"	Bolt Hole Diameter "D"	RTJ Diameter "E"	Standard Diaphragm Diameter "F"	Raised Face Diameter "G"	Raised Face Height "H"
1 1/2-in.	300 lb.	6.12 (156)	0.88 (22.4)	4.50 (114)	0.88 (22)	2.688 (68)	2.30 (58.4)	3.56 (90)	0.25 (6.4)
	600 lb.	6.12 (156)	0.88 (22.4)	4.50 (114)	0.88 (22)	2.688 (68)	2.30 (58.4)	3.56 (90)	0.25 (6.4)
	1500 lb	7.00 (178)	1.25 (31.8)	4.88 (124)	1.12 (28)	2.688 (68)	2.30 (58.4)	3.62 (92)	0.25 (6.4)
	2500 lb	8.00 (203)	1.75 (44.5)	5.75 (146)	1.25 (32)	3.250 (83)	2.30 (58.4)	4.50 (114)	0.312 (7.92)
2-in.	150 lb.	6.00 (152)	0.94 (23.9)	4.75 (121)	0.75 (19)	3.250 (83)	2.30 (58.4)	4.00 (102)	0.25 (6.4)
	300 lb.	6.50 (165)	1.13 (28.7)	5.00 (127)	0.75 (19)	3.250 (83)	2.30 (58.4)	4.25 (108)	0.312 (7.92)
	600 lb.	6.50 (165)	1.31 (33.3)	5.00 (127)	0.75 (19)	3.250 (83)	2.30 (58.4)	4.25 (108)	0.312 (7.92)
	1500 lb	8.50 (216)	1.81 (46.0)	6.50 (165)	1.00 (25)	3.750 (95)	2.30 (58.4)	4.88 (124)	0.312 (7.92)
	2500 lb	9.25 (235)	2.31 (58.7)	6.75 (171)	1.12 (28)	4.000 (102)	3.50 (88.9)	5.25 (133)	0.312 (7.92)
3-in.	150 lb.	7.50 (191)	1.13 (28.7)	6.00 (168)	0.75 (19)	4.500 (114)	3.50 (88.9)	5.25 (133)	0.25 (6.4)
	300 lb.	8.25 (210)	1.37 (34.8)	6.62 (168)	0.88 (22)	4.875 (124)	3.50 (88.9)	5.75 (146)	0.312 (7.92)
	600 lb.	8.25 (210)	1.56 (39.6)	6.62 (138)	0.88 (22)	4.875 (124)	3.50 (88.9)	5.75 (146)	0.312 (7.92)
	900 lb	9.50 (241)	1.81 (46.0)	7.50 (191)	1.00 (25)	4.875 (124)	3.50 (88.9)	6.12 (155)	0.312 (7.92)
	1500 lb	10.50 (267)	2.19 (55.6)	8.00 (203)	1.25 (32)	5.375 (137)	3.50 (88.9)	6.62 (168)	0.312 (7.92)
	2500 lb	12.00 (305)	3.00 (76.2)	9.00 (229)	1.38 (35)	5.000 (127)	3.50 (88.9)	6.62 (168)	0.375 (9.52)
4-in.	150 lb.	9.00 (229)	1.13 (28.7)	7.50 (191)	0.75 (19)	5.875 (149)	3.50 (88.9)	6.75 (171)	0.25 (6.4)
	300 lb.	10.00 (254)	1.50 (38.1)	7.88 (200)	0.88 (22)	5.875 (149)	3.50 (88.9)	6.88 (175)	0.312 (7.92)
	600 lb.	10.75 (273)	1.81 (46.0)	8.50 (216)	1.00 (25)	5.875 (149)	3.50 (88.9)	6.88 (175)	0.312 (7.92)

RTJ FLUSHING CONNECTION RING (LOWER HOUSING)

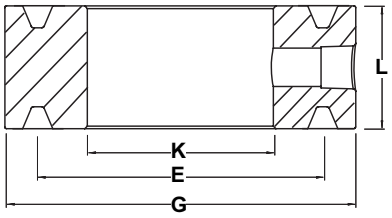


TABLE 15. Dimensional Table for Flushing Connection Ring (Lower Housing)

Measurement in inches (millimeters)

	Pipe Size	Class	"E"	Outer Diameter "G"	Inner Diameter "K"	Thickness with 1/4–NPT F.C. "L"	Thickness with 1/2–NPT F.C. "L"
ANSI / ASME / JIS	1 1/2-in.	150 lb.	2.562 (65)	3.25 (83)	1.80 (46)	1.2 (30)	1.5 (38)
		300 lb.	2.688 (68)	3.56 (90)	1.80 (46)	1.2 (30)	1.5 (38)
		600 lb.	2.688 (68)	3.56 (90)	1.80 (46)	1.2 (30)	1.5 (38)
		1500 lb.	2.688 (68)	3.62 (92)	1.80 (46)	1.2 (30)	1.5 (38)
		2500 lb.	3.250 (83)	4.50 (114)	1.80 (46)	1.2 (30)	1.5 (38)
	2-in.	150 lb.	3.250 (83)	4.00 (102)	2.12 (54)	1.4 (36)	1.7 (43)
		300 lb.	3.250 (83)	4.25 (108)	2.12 (54)	1.4 (36)	1.7 (43)
		600 lb.	3.250 (83)	4.25 (108)	2.12 (54)	1.4 (36)	1.7 (43)
		1500 lb.	3.750 (95)	4.88 (124)	2.12 (54)	1.4 (36)	1.7 (43)
		2500 lb.	4.000 (102)	5.25 (133)	2.12 (54)	1.4 (36)	1.7 (43)
	3-in.	150 lb.	4.500 (114)	5.25 (133)	3.60 (91)	1.5 (38)	1.8 (46)
		300 lb.	4.875 (124)	5.75 (146)	3.60 (91)	1.5 (38)	1.8 (46)
		600 lb.	4.875 (124)	5.75 (146)	3.60 (91)	1.5 (38)	1.8 (46)
		900 lb.	4.875 (124)	6.12 (155)	3.60 (91)	1.5 (38)	1.8 (46)
		1500 lb.	5.375 (137)	6.62 (168)	3.60 (91)	1.5 (38)	1.8 (46)
		2500 lb.	5.000 (127)	6.62 (168)	3.60 (91)	1.5 (38)	1.8 (46)

TABLE 16. FCW Diaphragm Seal – ANSI / ASME Ordering Information [1]

● Available
— Not available

Code	Industry Standards				
A	ANSI / ASME B16.5 (American National Standards Institute / American Society of Mechanical Engineers)				
Code	**Process Connection Style**				
FCW	Ring Type Joint Flanged, Flush Surface				
Code	**Process Connection Size**				
4	1 1/2-in.				
G	2-in.				
7	3-in.				
9	4-in.				
Code	**Maximum Working Pressure (Flange Rating)**	**1 1/2-in.**	**2-in.**	**3-in.**	**4-in.**
1	Class 150	●	●	●	●
2	Class 300	●	●	●	●
4	Class 600	●	●	●	●
5	Class 900	●	●	●	—
6	Class 1500	●	●	●	—
7	Class 2500	●	●	●	—
Code	**Diaphragm and Wetted Parts Material[3]**	**Upper Housing Materials[3]**			**Mounting Flange[2]**
CA[5]	316L SST	316L SST			Carbon Steel
DA	316L SST	316 SST			316 SST
MB[5]	*Hastelloy* C-276	*Hastelloy* C-276 / 316L SST			Carbon Steel
KB[5]	*Hastelloy* C-276	*Hastelloy* C-276 / 316L SST			316 SST
KJ[5]	*Hastelloy* B	*Hastelloy* B / 316L SST			316 SST
MJ[5]	*Hastelloy* B	*Hastelloy* B / 316L SST			Carbon Steel
KF[5]	304L SST	304L SST / 316L SST			316 SST
MF[5]	304L SST	304L SST / 316L SST			Carbon Steel
KP[5]	Nickel 201	Nickel 201 / 316L SST			316 SST
MP[5]	Nickel 201	Nickel 201 / 316L SST			Carbon Steel
KV[5]	*Monel* 400	*Monel* 400 / 316L SST			316 SST
MV[5]	*Monel* 400	*Monel* 400 / 316L SST			Carbon Steel
RH[5]	Titanium GR-4	Titanium GR.4			316 SST
WW[2]	316Ti SST (WNr 1.4571)	316 Ti SST (WNr 1.4571)			316 Ti SST (WNr 1.4571)
V1[2]	*Hastelloy* C-276 / Duplex 2205 SST	Duplex 2205 SST			Duplex 2205 SST
VB[5]	*Hastelloy* C-276	*Hastelloy* C-276 / Duplex 2205 SST			Duplex 2205 SST
Code	**Flushing Connection Ring Material (Lower Housing)**				
0	No flushing ring required				
A	316L SST				
B	*Hastelloy* C-276				
D[5]	Carbon Steel				
H	Titanium Gr. 4				
J	*Hastelloy* B				
6	Nickel 201				
V	*Monel* 400				
W[2]	316Ti SST (WNr 1.4571)				
2	Duplex 2205 SST				

TABLE 16. FCW Diaphragm Seal – ANSI / ASME Ordering Information [1]

● Available
— Not available

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
E[4]	One piece design
B	Extra fill for cold temperature applications
C	150 μm (0.006-in.) diaphragm thickness (available with 316L SST and *Hastelloy* C-276 diaphragms only, abrasive applications)
D	*Hastelloy* plug(s) for flushing connection(s)
G	SST plug(s) for flushing connection(s)
H	SST vent/drain for flushing connections
V[6]	*Teflon* coated diaphragm for nonstick purposes only
7[6]	50 μm (0.002-in.) diaphragm thickness
U	25 μm (0.001 in) Gold plated diaphragm
T	NACE MR0175
2[2]	Radial Capillary Connection

(1) Shaded areas indicate special orders. Consult a local Emerson Process Management, Rosemount division sales representative for availability, performance, and lead time.

(2) Only available with one-piece design, option code E.

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

(4) The mounting flange and upper housing are a single item for the one-piece design, option code E.

(5) Only available with two-piece design.

(6) Available with 316L SST and *Hastelloy* C-276 diaphragms only

FUW AND FVW FLANGED TYPE: FLUSH DIAPHRAGM SEALS

FUW DIN 2512 Form N

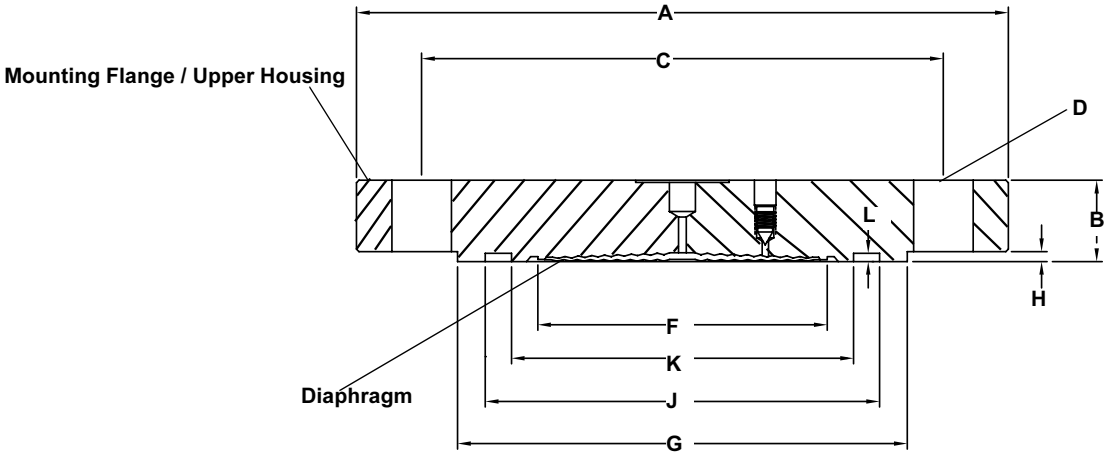


TABLE 17. FUW Flange Type Dimensions(1)

Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	Bolt Circle "C"	Bolt Diameter "D"	Bolts	Standard Diaphragm "F"	Raised Face Diameter "G"	Raised Face Height "H"	Groove O.D. "J"	Groove I.D. "K"	Groove Depth "L"
DN 50	PN 40	6.50 (165)	0.79 (20)	4.92 (125)	0.71 (18)	4	2.30 (58)	4.00 (102)	0.12 (3.0)	3.46 (88)	2.83 (72)	0.10 (2.5)
	PN 64	7.09 (180)	1.02 (26)	5.31 (135)	0.87 (22)	4	2.30 (58)	4.00 (102)	0.12 (3.0)	3.46 (88)	2.83 (72)	0.10 (2.5)
	PN 100	7.68 (195)	1.10 (28)	5.71 (145)	1.02 (26)	4	2.30 (58)	4.00 (102)	0.12 (3.0)	3.46 (88)	2.83 (72)	0.10 (2.5)
	PN 160	7.68 (195)	1.18 (30)	5.71 (145)	1.02 (26)	4	2.30 (58)	4.00 (102)	0.12 (3.0)	3.46 (88)	2.83 (72)	0.10 (2.5)
DN 80	PN 40	7.87 (200)	0.94 (24)	6.30 (160)	0.71 (18)	8	3.50 (89)	5.43 (138)	0.12 (3.0)	4.76 (121)	4.13 (105)	0.10 (2.5)
	PN 64	8.46 (215)	1.10 (28)	6.69 (170)	0.87 (22)	8	3.50 (89)	5.43 (138)	0.12 (3.0)	4.76 (121)	4.13 (105)	0.10 (2.5)
	PN 100	9.06 (230)	1.26 (32)	7.09 (180)	1.02 (26)	8	3.50 (89)	5.43 (138)	0.12 (3.0)	4.76 (121)	4.13 (105)	0.10 (2.5)
	PN 160	9.06 (230)	1.42 (36)	7.09 (180)	1.02 (26)	8	3.50 (89)	5.43 (138)	0.25 (6.4)	4.76 (121)	4.13 (105)	0.10 (2.5)
DN 100	PN 16	8.66 (220)	0.79 (20)	7.08 (180)	0.71 (18)	8	3.50 (89)	6.22 (158)	0.12 (3.0)	5.91 (150)	5.04 (128)	0.12 (3.0)
	PN 40	9.25 (235)	0.94 (24)	7.48 (190)	0.87 (22)	8	3.50 (89)	6.37 (162)	0.12 (3.0)	5.91 (150)	5.04 (128)	0.12 (3.0)
	PN 64	9.84 (250)	1.18 (30)	7.87 (200)	1.02 (26)	8	3.50 (89)	6.37 (162)	0.12 (3.0)	5.91 (150)	5.04 (128)	0.12 (3.0)
	PN 100	10.43 (265)	1.42 (36)	8.27 (210)	1.18 (30)	8	3.50 (89)	6.37 (162)	0.25 (6.4)	5.91 (150)	5.04 (128)	0.12 (3.0)

(1) Measurement in inches (millimeters).

FVW DIN 2512 Form F

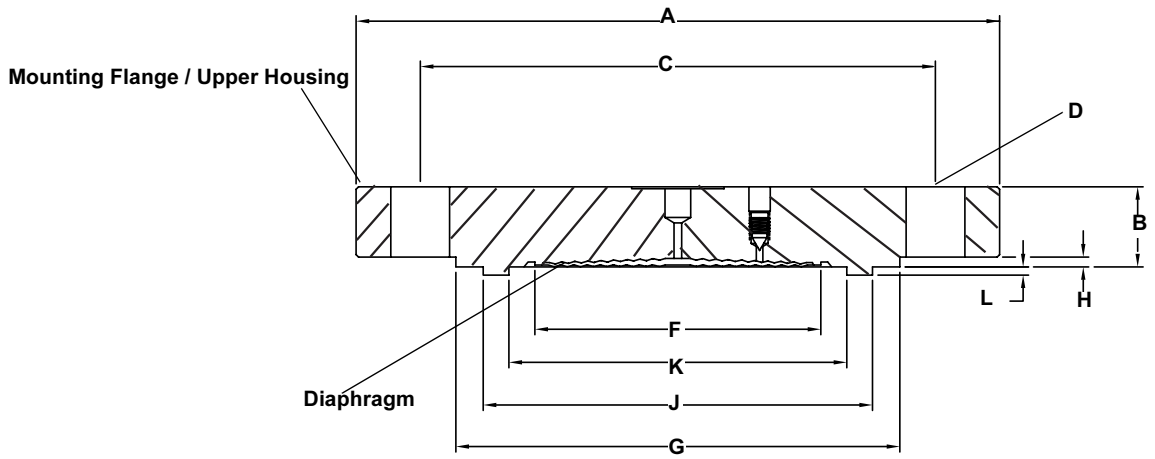


TABLE 18. FVW Flange Type Dimensions(1)

Pipe Size	Class	Flange Diameter "A"	Flange Thickness "B"	Bolt Circle "C"	Bolt Diameter "D"	Bolts	Standard Diaphragm "F"	Raised Face Diameter "G"	Raised Face Height "H"	Groove O.D. "J"	Groove I.D. "K"	Groove Depth "L"
DN 50	PN 40	6.50 (165)	0.79 (20)	4.92 (125)	0.71 (18)	4	2.30 (58)	4.00 (102)	0.12 (3.0)	3.43 (87)	2.87 (73)	0.16 (4.0)
	PN 64	7.08 (180)	1.02 (26)	5.31 (135)	0.87 (22)	4	2.30 (58)	4.00 (102)	0.12 (3.0)	3.43 (87)	2.87 (73)	0.16 (4.0)
	PN 100	7.68 (195)	1.10 (28)	5.71 (145)	1.02 (26)	4	2.30 (58)	4.00 (102)	0.12 (3.0)	3.43 (87)	2.87 (73)	0.16 (4.0)
	PN 160	7.68 (195)	1.18 (30)	5.71 (145)	1.02 (26)	4	2.30 (58)	4.00 (102)	0.12 (3.0)	3.43 (87)	2.87 (73)	0.16 (4.0)
DN 80	PN 40	7.87 (200)	0.94 (24)	6.30 (160)	0.71 (18)	8	3.50 (89)	5.43 (138)	0.12 (3.0)	4.72 (120)	4.17 (106)	0.16 (4.0)
	PN 64	8.46 (215)	1.10 (28)	6.69 (170)	0.87 (22)	8	3.50 (89)	5.43 (138)	0.12 (3.0)	4.72 (120)	4.17 (106)	0.16 (4.0)
	PN 100	9.06 (230)	1.26 (32)	7.09 (180)	1.02 (26)	8	3.50 (89)	5.43 (138)	0.12 (3.0)	4.72 (120)	4.17 (106)	0.16 (4.0)
	PN 160	9.06 (230)	1.42 (36)	7.09 (180)	1.02 (26)	8	3.50 (89)	5.43 (138)	0.12 (3.0)	4.72 (120)	4.17 (106)	0.16 (4.0)
DN 100	PN 16	8.66 (220)	0.79 (20)	7.08 (180)	0.71 (18)	8	3.50 (89)	6.22 (158)	0.12 (3.0)	5.87 (149)	5.08 (129)	0.18 (4.5)
	PN 40	9.25 (235)	0.94 (24)	7.48 (190)	0.87 (22)	8	3.50 (89)	6.37 (162)	0.12 (3.0)	5.87 (149)	5.08 (129)	0.18 (4.5)
	PN 64	9.84 (250)	1.18 (30)	7.87 (200)	1.02 (26)	8	3.50 (89)	6.37 (162)	0.12 (3.0)	5.87 (149)	5.08 (129)	0.18 (4.5)
	PN 100	10.43 (265)	1.42 (36)	8.27 (210)	1.02 (26)	8	3.50 (89)	6.37 (162)	0.12 (3.0)	5.87 (149)	5.08 (129)	0.18 (4.5)

(1) Measurement in inches (millimeters).

FUW CONNECTION RING

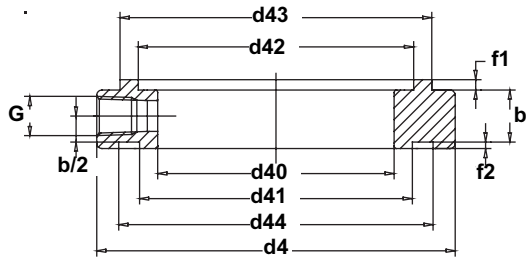


TABLE 19. Dimensional Table for FUW Connection Ring

Measurement in inches (millimeters)

DN	PN	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
100	10 - 100	91	162	129	149	4.5	128	150	3.0	2.4	1/4–18 NPT

TABLE 20. FUW and FVW Diaphragm Seal – DIN Ordering Information [1]

Code	Industry Standards	
D	DIN 2401 and 2501 (Deutsches Institut fur Normung)	
Code	**Process Connection Style**	
FUW	Flange Type: Flush Diaphragm Seal, DIN 2512 Form N Contact Surface – up to PN 160	
FVW	Flange Type: Flush Diaphragm Seal, DIN 2512 Form F Contact Surface – up to PN 160	
Code	**Process Connection Size**	**Diaphragm Diameter**
G	DN50	2.3-in. (57 mm)
J	DN 80	3.5-in. (89 mm)
D	DN 25	1.4-in. (35 mm)
F	DN 40	1.9-in. (48 mm)
9	DN 100	3.5-in. (89 mm)
Code	**Flange Pressure Rating**	
G	PN 40	
E	PN 16 (DN 100 only)	
H	PN 64 (not available for DN 25 and DN 40)	
J	PN 100	
Code	**Diaphragm and Wetted Parts Material[2]**	**Upper Housing Materials (includes flange)**
DA[3]	316L SST	316 SST
WW[3]	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)
KB[4]	*Hastelloy* C-276	316 SST
DC[3]	Tantalum	316 SST
KV[4]	*Monel* 400	316 SST
Code	**Flushing Connection Ring Material (Lower Housing)**	
0	No flushing ring required	
A	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	
E	One piece design	
B	Extra fill for cold temperature applications	
C	150 μm (0.006-in.) diaphragm thickness (available with 316L SST and *Hastelloy* C-276 diaphragms only, abrasive applications)	
D	*Hastelloy* plug(s) for flushing connection(s)	
G	SST plug(s) for flushing connection(s)	
H	SST vent/drain for flushing connections	
V[5]	*Teflon* coated diaphragm for nonstick purposes only	
7[5]	50 μm (0.002-in.) diaphragm thickness	
U	25 μm (0.001 in) Gold plated diaphragm	
T	NACE MR0175	
2[3]	Radial Capillary Connection	

(1) Shaded areas indicate special orders. Consult a local Emerson Process Management, Rosemount division sales representative for availability, performance, and lead time.

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

(3) Only available with one piece design, option code E.

(4) Only available with two-piece design.

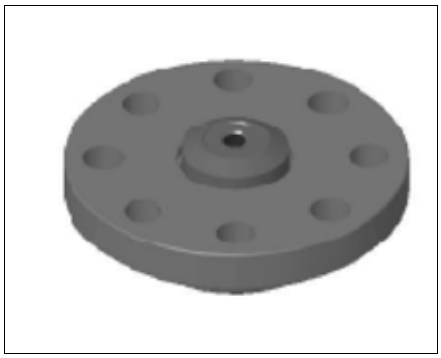
(5) Available with 316L SST and *Hastelloy* C-276 diaphragms only.

RFW Flanged Remote Seal

(For smaller process connection)

NOTES
Drawings represent the standard offering. Dimensional drawings may vary when ordering special shaded options. Contact an Emerson Process Management representative if dimensional drawings are required for special order configuration.

1-in. Flanged Remote Seal and Flushing Connection Ring (Lower Housing)



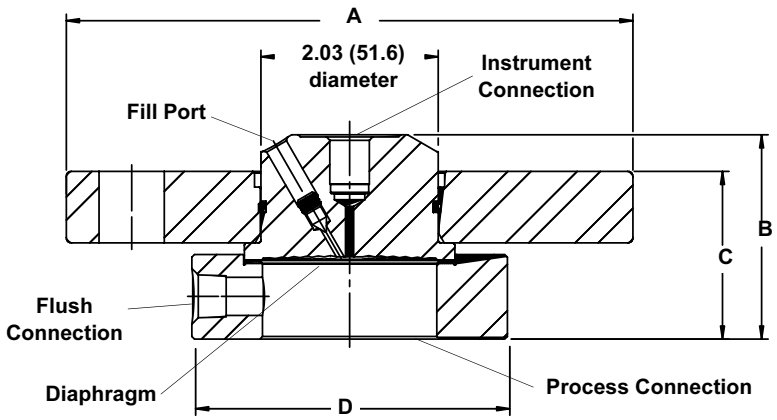


TABLE 21. RFW Dimensions(1)

Pipe Size Class	Flange Diameter (A)	Overall Height (B)		Flange to Lower Housing (C)		Lower Housing Diameter (D)
		No or 1/4-in. NPT flush connection	1/2-in. NPT flush connection	No or 1/4-in. NPT flush connection	1/2-in. NPT flush connection	
ANSI						
1-in. (150#)	4.25 (107.9)	2.41 (61.2)	2.75 (69.9)	1.73 (43.9)	2.07 (52.6)	2.62 (66.5)
1-in. (300/600#)	4.88 (124.0)	2.41 (61.2)	2.75 (69.9)	1.86 (74.2)	2.20 (55.9)	2.62 (66.5)
1 1/2-in. (150#)	5.00 (127.0)	2.41 (61.2)	2.75 (69.9)	1.80 (45.7)	2.14 (54.4)	2.88 (73.2)
1 1/2-in. (300#)	6.12 (155.4)	2.41 (61.2)	2.75 (69.9)	1.92 (48.8)	2.26 (57.4)	2.88 (73.2)
1 1/2-in. (600#)	6.12 (155.4)	2.41 (61.2)	2.75 (69.9)	2.05 (52.1)	2.39 (60.7)	2.88 (73.2)
DIN						
DN25 (40)	4.53 (115.1)	2.41 (61.2)	2.75 (69.9)	1.74 (44.2)	2.08 (52.8)	2.68 (68.1)
DN40 (40)	5.91 (150.1)	2.41 (61.2)	2.75 (69.9)	1.70 (73.2)	2.04 (51.8)	3.47 (88.1)

(1) Dimensions are in inches (millimeters)

ARFW Flanged Remote Seal (for smaller process connections)[1]

Code	Industry Standard		
A	ANSI / ASME B16.5 (American National Standards Institute / American Society of Mechanical Engineers)		
J	JIS (Japanese industrial Standards)		
Code	**Process Connection Style**		
RFW	Flanged		
Code	**Process Connection Size**		
	ANSI		**JIS**
2	1-in.		NA
4	1 1/2-in.		40A
1	1/2-in. (bolts and studs included for 150# to 1500# Class)		NA
A	3/4-in. (bolts and studs included for 150# Class)		NA
Code	**Flange Pressure Rating**		
1	Class 150 (ANSI)		
2	Class 300 (ANSI)		
4	Class 600 (ANSI)		
5	Class 900 (ANSI)		
6	Class 1500 (ANSI)		
7	Class 2500 (ANSI)		
Code	**Diaphragm Material**	**Upper Housing Material[2]**	**Mounting Flange Material**
CA	316L SST	316 SST	Carbon Steel
DA	316L SST	316 SST	316 SST
CB	*Hastelloy*® C-276	316 SST	Carbon Steel
DB	*Hastelloy*® C-276	316 SST	316 SST
CC	Tantalum	316 SST	Carbon Steel
DC	Tantalum	316 SST	316 SST
CF	304L SST	316 SST	Carbon Steel
DF	304L SST	316 SST	316 SST
CJ	*Hastelloy* B	316 SST	Carbon Steel
DJ	*Hastelloy* B	316 SST	316 SST
CE	*Inconel*® 600	316 SST	Carbon Steel
DE	*Inconel*® 600	316 SST	316 SST
CV	*Monel*® 400	316 SST	Carbon Steel
DV	*Monel*® 400	316 SST	316 SST
CP	Nickel	316 SST	Carbon Steel
DP	Nickel	316 SST	316 SST
CK	Alloy 20	316 SST	Carbon Steel
DK	Alloy 20	316 SST	316 SST
RH	Titanium Gr 4	Titanium Gr 4	316 SST
CH[3]	Titanium Gr 4	316 SST	Carbon Steel
DH[3]	Titanium Gr 4	316 SST	316 SST
YM	Titanium Gr 2	Titanium Gr 2	316 SST
CM[3]	Titanium Gr 2	316 SST	Carbon Steel
DM[3]	Titanium Gr 2	316 SST	316 SST
C4	*Hastelloy* C-22	316 SST	Carbon Steel
D4	*Hastelloy* C-22	316 SST	316 SST
C5	Duplex 2507 SST	316 SST	Carbon Steel
D5	Duplex 2507 SST	316 SST	316 SST
WW	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)	316 SST
WC	Tantalum	316Ti SST (WNr 1.4571)	316 SST
WB	*Hastelloy* C-276	316Ti SST (WNr 1.4571)	316 SST
RZ	Zirconium 702	Zirconium 702	316 SST
CZ[3]	Zirconium 702	316 SST	Carbon Steel

ARFW Flanged Remote Seal (for smaller process connections)[1]

DZ[3]	Zirconium 702	316 SST	316 SST
Code	**Flushing Connection Ring Material (Lower Housing)[4]**		
A	316 SST		
B	*Hastelloy* C-276		
D	Carbon Steel		
C[5]	Tantalum-lining 316 SST (no flushing connection allowed)		
2	Duplex 2205 SST		
F	304L SST		
H	Titanium Gr 4		
J	*Hastelloy* B		
6	Nickel 201		
V	*Monel* 400		
E	*Inconel* 600		
1	*Inconel* 625		
K	Alloy 20		
W	316Ti SST (WNr 1.4571)		
Code	**Flushing Options**		
1	One 1/4-in. Flushing Connection		
3	Two 1/4-in. Flushing Connection		
5	No Flushing Connection		
7	One 1/2-in. Flushing Connection		
9	Two 1/2-in. Flushing Connection		
Code	**Options (select up to 3)**		
0	None		
B	Extra Fill for Cold Temperature Applications		
C	150 µm (0.006-in.) Diaphragm Thickness (316L SST and *Hastelloy* C-276 diaphragms only, for abrasive applications)		
D	*Hastelloy* Plug In. Flushing Connection		
G	SST Plug In Flushing Connection		
H	SST Drain / Vent in Flushing Connection		
J	*Teflon* Gasket (for use with flushing connection ring)		
K	Barium Sulfate-filled *Teflon* Gasket (for use with flushing connection ring)		
N	*Grafoil* Gasket (for use with flushing connection ring)		
R	Ethylene Propylene Gasket for lower housing		
V[6]	*Teflon* Coated Diaphragm for nonstick purposes (316L SST and *Hastelloy* C-276 diaphragms only)		
3	300 Series SST Bolts		
9	104 mm (4.1-in.) Diaphragm		
U	25 µm (0.001 in) Gold Plated Diaphragm		
T	NACE MR 01-75 Certification		

(1) Shaded areas indicate special orders. Consult an Emerson Process Management, Rosemount division, representative for availability, performance effects, and lead time.

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

(3) Operating temperature is limited to 150 °C (302 °F).

(4) Supplied with C4401 gasket.

(5) Not applicable for Process Connection codes 1 and A with 150# Class.

(6) Not available with transmitter option code Q8, for Material Traceability per DIN EN 10204 3.1B of the transmitter / diaphragm seal assembly.

DRFW Flanged Remote Seal (for smaller process connections)[1]

Code	Industry Standard
D	DIN (Deutsches Institut fur Normung)

Code	Process Connection Style
RFW	Flanged

Code	Process Connection Size
D	DN 25
F	DN 40
B	DN 15 (bolts and studs included)

Code	Flange Pressure Rating
G	PN 40
H	PN 64
J	PN 100
K	PN 160

Code	Diaphragm Material	Upper Housing Material[2]	Mounting Flange Material
CA	316L SST	316 SST	Carbon Steel
DA	316L SST	316 SST	316 SST
CB	*Hastelloy*® C-276	316 SST	Carbon Steel
DB	*Hastelloy*® C-276	316 SST	316 SST
CC	Tantalum	316 SST	Carbon Steel
DC	Tantalum	316 SST	316 SST
CF	304L SST	316 SST	Carbon Steel
DF	304L SST	316 SST	316 SST
CJ	*Hastelloy* B	316 SST	Carbon Steel
DJ	*Hastelloy* B	316 SST	316 SST
CE	*Inconel*® 600	316 SST	Carbon Steel
DE	*Inconel*® 600	316 SST	316 SST
CV	*Monel*® 400	316 SST	Carbon Steel
DV	*Monel*® 400	316 SST	316 SST
CP	Nickel	316 SST	Carbon Steel
DP	Nickel	316 SST	316 SST
CK	Alloy 20	316 SST	Carbon Steel
DK	Alloy 20	316 SST	316 SST
RH	Titanium Gr 4	Titanium Gr 4	316 SST
CH[3]	Titanium Gr 4	316 SST	Carbon Steel
DH[3]	Titanium Gr 4	316 SST	316 SST
YM	Titanium Gr 2	Titanium Gr 2	316 SST
CM[3]	Titanium Gr 2	316 SST	Carbon Steel
DM[3]	Titanium Gr 2	316 SST	316 SST
C4	*Hastelloy* C-22	316 SST	Carbon Steel
D4	*Hastelloy* C-22	316 SST	316 SST
C5	Duplex 2507 SST	316 SST	Carbon Steel
D5	Duplex 2507 SST	316 SST	316 SST
WW	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)	316 SST
WC	Tantalum	316Ti SST (WNr 1.4571)	316 SST
WB	*Hastelloy* C-276	316Ti SST (WNr 1.4571)	316 SST
RZ	Zirconium 702	Zirconium 702	316 SST
CZ[3]	Zirconium 702	316 SST	Carbon Steel
DZ[3]	Zirconium 702	316 SST	316 SST

DRFW Flanged Remote Seal (for smaller process connections)[1]

Code	Flushing Connection Ring Material (Lower Housing)[4]
A	316 SST
B	*Hastelloy* C-276
D	Carbon Steel
C	Tantalum-lined 316 SST (no flushing connection allowed)
2	Duplex 2205 SST
F	304L SST
W	316Ti SST (WNr 1.4571)
H	Titanium Gr 4
J	*Hastelloy* B
6	Nickel 201
V	*Monel* 400
E	*Inconel* 600
1	*Inconel* 625
K	Alloy 20
Code	**Flushing Options**
1	One 1/4-in. Flushing Connection
3	Two 1/4-in. Flushing Connection
5	No Flushing Connection
7	One 1/2-in. Flushing Connection
9	Two 1/2-in. Flushing Connection
Code	**Options (select up to 3)**
0	None
B	Extra Fill for Cold Temperature Applications
C	150 μm (0.006-in.) Diaphragm Thickness (316L SST and *Hastelloy* C-276 diaphragms only, for abrasive applications)
D	*Hastelloy* Plug In. Flushing Connection
G	SST Plug In Flushing Connection
H	SST Drain / Vent in Flushing Connection
J	*Teflon* Gasket (for use with flushing connection ring)
K	Barium Sulfate-filled *Teflon* Gasket (for use with flushing connection ring)
N	*Grafoil* Gasket (for use with flushing connection ring)
R	Ethylene Propylene Gasket for lower housing
V[5]	*Teflon* Coated Diaphragm for nonstick purposes (316L SST and *Hastelloy* C-276 diaphragms only)
3	300 Series SST Bolts
9	104 mm (4.1-in.) Diaphragm
U	25 μm (0.001 in) Gold Plated Diaphragm
T	NACE MR 01-75 Certification

(1) Shaded areas indicate special orders. Consult an Emerson Process Management, Rosemount division, representative for availability, performance effects, and lead time.

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

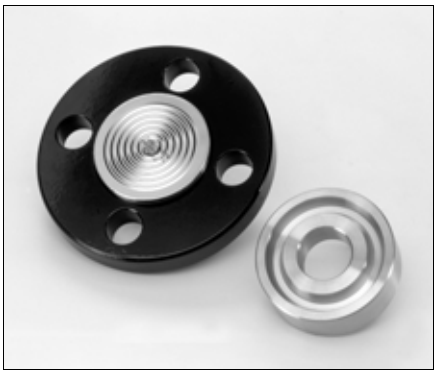
(3) Operating temperature is limited to 150 °C (302 °F).

(4) Supplied with C4401 gasket.

(5) Not available with transmitter option code Q8, for Material Traceability per DIN EN 10204 3.1B of the transmitter / diaphragm seal assembly.

RING TYPE JOINT (RTJ) FLANGED REMOTE SEAL

1 in. RTJ Flanged Remote Seal and Flushing Connection Ring



ARCW Ring Type Joint Flanged Remote Seal (for smaller process connections)(1)

Code	Industry Standard		
A	ANSI / ASME B16.5 (American National Standards Institute / American Society of Mechanical Engineers)		
Code	**Process Connection Style**		
RCW	Ring Type Joint Flanged		
Code	**Process Connection Size**		
1	1/2-in. (bolts and studs included for 300# to 1500# Class) (Not available for 150# Class)		
A	3/4-in. (Not available for 150# Class)		
2	1-in.		
4	1 1/2-in.		
Code	**Flange Pressure Rating**		
1	Class 150 (ANSI)		
2	Class 300 (ANSI)		
4	Class 600 (ANSI)		
5	Class 900 (ANSI)		
6	Class 1500 (ANSI)		
7	Class 2500 (ANSI)		
Code	**Diaphragm Material**	**Upper Housing Material(2)**	**Mounting Flange Material**
CA	316L SST	316 SST	Carbon Steel
DA	316L SST	316 SST	316 SST
CB	*Hastelloy*® C-276	316 SST	Carbon Steel
DB	*Hastelloy*® C-276	316 SST	316 SST
CC	Tantalum	316 SST	Carbon Steel
DC	Tantalum	316 SST	316 SST
CF	304L SST	316 SST	Carbon Steel
DF	304L SST	316 SST	316 SST
CJ	*Hastelloy* B	316 SST	Carbon Steel
DJ	*Hastelloy* B	316 SST	316 SST
CE	*Inconel*® 600	316 SST	Carbon Steel
DE	*Inconel*® 600	316 SST	316 SST
CV	*Monel*® 400	316 SST	Carbon Steel
DV	*Monel*® 400	316 SST	316 SST
CP	Nickel	316 SST	Carbon Steel
DP	Nickel	316 SST	316 SST
CK	Alloy 20	316 SST	Carbon Steel

ARCW Ring Type Joint Flanged Remote Seal (for smaller process connections)[1]

DK	Alloy 20	316 SST	316 SST
RH	Titanium Gr 4	Titanium Gr 4	316 SST
CH[3]	Titanium Gr 4	316 SST	Carbon Steel
DH[3]	Titanium Gr 4	316 SST	316 SST
YM	Titanium Gr 2	Titanium Gr 2	316 SST
CM[3]	Titanium Gr 2	316 SST	Carbon Steel
DM[3]	Titanium Gr 2	316 SST	316 SST
C4	*Hastelloy* C-22	316 SST	Carbon Steel
D4	*Hastelloy* C-22	316 SST	316 SST
C5	Duplex 2507 SST	316 SST	Carbon Steel
D5	Duplex 2507 SST	316 SST	316 SST
RZ	Zirconium 702	Zirconium 702	316 SST
CZ[3]	Zirconium 702	316 SST	Carbon Steel
DZ[3]	Zirconium 702	316 SST	316 SST

Code	Flushing Connection Ring Material (Lower Housing)[4]
A	316 SST
B	*Hastelloy* C-276
D	Carbon Steel
F	304L SST
H	Titanium Gr 4
J	*Hastelloy* B
6	Nickel 201
V	*Monel* 400
E	*Inconel* 600
1	*Inconel* 625
K	Alloy 20

Code	Flushing Options
1	One 1/4-in. Flushing Connection
3	Two 1/4-in. Flushing Connection
5	No Flushing Connection
7	One 1/2-in. Flushing Connection
9	Two 1/2-in. Flushing Connection

Code	Options (select up to 3)
0	None
B	Extra Fill for Cold Temperature Applications
C	150 μm (0.006-in.) Diaphragm Thickness (316L SST and *Hastelloy* C-276 diaphragms only, for abrasive applications)
D	*Hastelloy* Plug In. Flushing Connection
G	SST Plug In Flushing Connection
H	SST Drain / Vent in Flushing Connection
V[5]	*Teflon* Coated Diaphragm for nonstick purposes (316L SST and *Hastelloy* C-276 diaphragms only)
3	300 Series SST Bolts
U	25 μm (0.001 in) Gold Plated Diaphragm
T	NACE MR 01-75 Certification

(1) Shaded areas indicate special orders. Consult an Emerson Process Management, Rosemount division, representative for availability, performance effects, and lead time.

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

(3) Operating temperature is limited to 150 °C (302 °F).

(4) Supplied with C4401 gasket.

(5) Not available with transmitter option code Q8, for Material Traceability per DIN EN 10204 3.1B of the transmitter / diaphragm seal assembly.

Extended Flanged Seal

NOTES
Drawings represent the standard offering. Dimensional drawings may vary when ordering special shaded options. Contact an Emerson Process Management representative if dimensional drawings are required for special order configuration.

Extended Flanged Assembly Dimensional Drawing

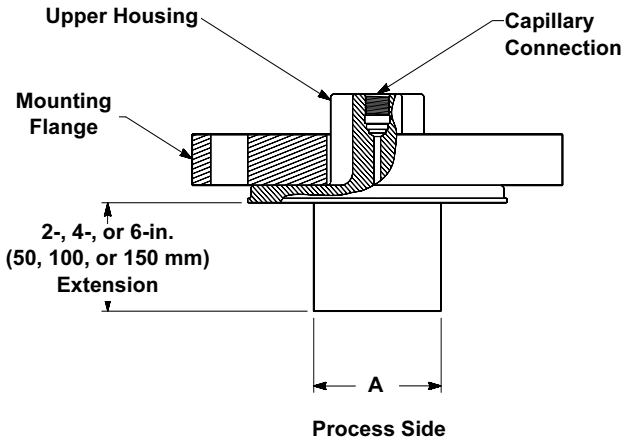


TABLE 22. Dimensions (1)

Process Connection Size	Flange Rating	Diameter (A)
3 in. Sch. 80	All	2.580 (66)
4 in./DN 100 Sch. 80	All	3.500 (89)
DN 80	All	2.990 (76)
3 in. Headbox (Code H)	All	2.875 (74)
4 in. Headbox (Code K)	All	3.780 (97)
3 in. Sch. 40	All	2.850 (73)
4 in. Sch. 40	All	3.700 (94)
2 in.	All	1.900 (49)
1 ½ in.	All	1.450 (37)

(1) Dimensions are in inches (millimeters)

TABLE 23. Extended Flanged Seal Ordering Information

• = Available
— = Unavailable

Code	Industry Standard
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)
D	DIN (Deutsches Institut fur Normung)
J	JIS (Japanese Industrial Standards)

Code	Process Connection Style
EFW[1]	Extended Flanged Seal

Code	Process Connection Size			
	ANSI/ASME	**DIN**	**JIS**	**Extension Diameters**
7	3 in. (Schedule 80)	DN 80	80 A	2.580 (66)
9	4 in. (Schedule 80)	DN 100	100 A	3.500 (89)
J	3 in.	DN 80	80 A	2.990 (76)
4	11/2 in	DN 40	40 A	1.450 (37)
G	2 in.	DN 50	50 A	1.900 (49)
R	3 in. (Schedule 40)	DN 80	80 A	2.850 (73)
H	3 in. (Headbox)	DN 80	80 A	2.875 (74)
T	4 in. (Schedule 40)	DN 100	100 A	3.700 (94)
K	4 in. (Headbox)	DN 100 Headbox	100 A	3.780 (97)

Code	Maximum Working Pressure (Flange Rating)
1	Class 150 (ANSI/ASME)
2	Class 300 (ANSI/ASME)
4	Class 600 (ANSI/ASME)
G	PN 40 (DIN)
E	PN 10/16 (DN 100 only)
5	Class 900 (ANSI)
6	Class 1500 (ANSI)
7	Class 2500 (ANSI) (Not available with 4-in. Process Connection)
H	PN 64 (DIN)
J	PN 100 (DIN)

					Available with Process Connection Code							
Code	**Diaphragm Material**	**Extension**	**Upper Housing**	**Mounting Flange**	**7**	**9**	**J**	**4**	**G**	**H**	**T**	**K**
DA	316L SST	316L SST	316L SST	316L SST	•	•	•	•	•	•	•	•
CA	316L SST	316L SST	316L SST	Carbon Steel	•	•	•	•	•	•	•	•
DB	*Hastelloy* C-276	*Hastelloy* C-276	316L SST	316L SST	•	•	•	•	•	•	•	•
CB	*Hastelloy* C-276	*Hastelloy* C-276	316L SST	Carbon Steel	•	•	•	•	•	•	•	•
CD[2]	Tantalum	316L SST	316L SST	Carbon Steel	•	•	•	—	—	—	—	—
DD[2]	Tantalum	316L SST	316L SST	316L SST	•	•	•	—	—	—	—	—
RH[3]	Titanium Gr. 4	Titanium Gr. 4	Titanium Gr. 4	316L SST	•	•	•	•	•	•	•	•
YR[3]	Titanium Gr. 2	Titanium Gr. 2	Titanium Gr. 2	316L SST	•	•	•	•	•	•	•	•
CM	*Hastelloy* C-276	316L SST	316L SST	Carbon Steel	•	•	•	•	•	•	•	•
DM	*Hastelloy* C-276	316L SST	316L SST	316L SST	•	•	•	•	•	•	•	•
DJ	*Hastelloy* B	*Hastelloy* B	316L SST	316L SST	•	•	•	•	•	•	•	•
CJ	*Hastelloy* B	*Hastelloy* B	316L SST	Carbon Steel	•	•	•	•	•	•	•	•

TABLE 23. Extended Flanged Seal Ordering Information

• = Available
— = Unavailable

Code	Extension Length	
	ANSI/ASME	**DIN**
2	2 in.	(50 mm)
4	4 in.	(100 mm)
6	6 in.	(150 mm)
0	0 in.	(0 mm)
1	1 in.	(25 mm)
3	3 in.	(75 mm)
5	5 in.	(125 mm)
7	7 in.	(175 mm)
8	8 in.	(200 mm)
9	9 in.	(225 mm)
Code	**Additional Fractional Extension Length**	
	ANSI/ASME	**DIN**
0	0 in.	(0 mm)
1	1/8 in.	(2.5 mm)
2	1/4 in.	(5 mm)
3	3/8 in.	(7.5 mm)
4	1/2 in.	(10 mm)
5	5/8 in.	(12.5 mm)
6	3/4 in.	(15 mm)
7	7/8 in.	(17.5 mm)
8	—	(20 mm)
9	—	(22.5 mm)
Code	**Options**	
3	4-in. Flange for 3-in. Diaphragm	
B(4)	Extra Fill for Cold Temperature Applications	
C(5)	150 μm (0.006-in.) Diaphragm Thickness (316L SST and *Hastelloy C-276* diaphragms only, for abrasive applications)	
V(6)	*Teflon* Coated Diaphragm for nonstick purposes (316L SST and *Hastelloy C-276* diaphragms only)	
6	Add 10 in. (250 mm)	
7	Add 20 in. (500 mm)	
5	0.002-in. Diaphragm Thickness (316L SST and *Hastelloy C-276*)	
T	NACE MR-01-75	
U	25 μm (0.001 in) Gold Plated Diaphragm	

(1) Shaded areas indicate special orders. Consult an Emerson Process Management representative for configuration availability, performance effects, and lead time.

(2) Available with Extension Length options 2, 4, or 6. Consult an Emerson Process Management representative for other extension lengths.

(3) Not available with welded capillary or direct mount connections.

(4) For seal assemblies that will be used in cold ambient temperature applications, contact an Emerson Process Management representative or reference Instrument Toolkit for assistance.

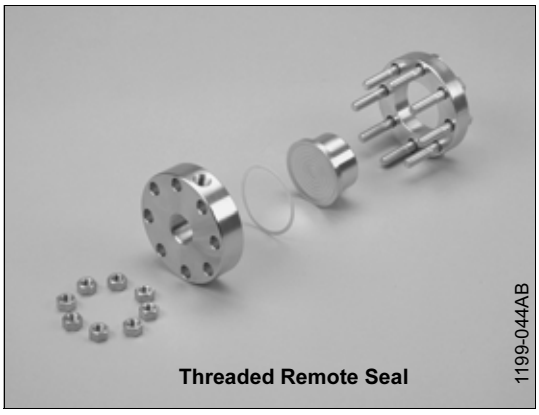
(5) May cause adverse seal temperature effects. Consult an Emerson Process Management representative for assistance.

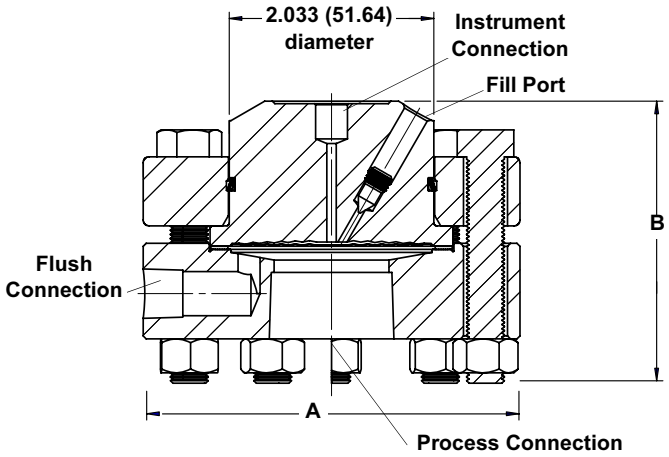
(6) Not available with transmitter option code Q8, for Material Traceability per DIN EN10204 3.1.B of the transmitter/diaphragm seal assembly.

RTW Threaded Remote Seal

NOTES
Drawings represent the standard offering. Dimensional drawings may vary when ordering special shaded options. Contact an Emerson Process Management representative if dimensional drawings are required for special order configuration.

Threaded Remote Seal Assembly Dimensional Drawing





Dimensions are in inches (millimeters)

TABLE 24. RTW Dimensions(1)

Rating	Overall Diameter (A)	Overall Height (B)
2500 psi (172 bar)	3.75 (95.3)	2.80 (71.1)
5000 psi (345 bar)	3.75 (95.3)	2.80 (71.1)
10000 psi (690 bar)	4.00 (101.6)	2.80 (71.1)

(1) Dimensions are in inches (millimeters)

ARTW Threaded Remote Seal (for smaller process connections)[1]

Code	Industry Standard
A	ANSI / ASME B16.5 (American National Standards Institute / American Society of Mechanical Engineers)
Code	**Process Connection Style**
RTW	Threaded (standard thread is female, for male select Option code 9)
Code	**Process Connection Size**
1	1/4-18 NPT
2	3/8-18 NPT
3	1/2-14 NPT
4	3/4-14 NPT
5	1-11.5 NPT
6	1 1/4-11.5 NPT (flushing connection not available)
7	1 1/2-11.5 NPT (flushing connection not available)
Code	**Pressure Rating**
0	2500 psi Maximum Working Pressure
2[2]	5000 psi Maximum Working Pressure
3[2]	10000 psi Maximum Working Pressure
8	1500 psi Maximum Working Pressure (104 mm (4.1-in.) diaphragm)

Code	Diaphragm Material	Upper Housing Material[3]	Mounting Ring Material
CA	316L SST	316 SST	Carbon Steel
DA	316L SST	316 SST	316 SST
CB	*Hastelloy*® C-276	316 SST	Carbon Steel
DB	*Hastelloy*® C-276	316 SST	316 SST
CC	Tantalum	316 SST	Carbon Steel
DC	Tantalum	316 SST	316 SST
CF	304L SST	316 SST	Carbon Steel
DF	304L SST	316 SST	316 SST
CJ	*Hastelloy* B	316 SST	Carbon Steel
DJ	*Hastelloy* B	316 SST	316 SST
CE	*Inconel*® 600	316 SST	Carbon Steel
DE	*Inconel*® 600	316 SST	316 SST
CV	*Monel*® 400	316 SST	Carbon Steel
DV	*Monel*® 400	316 SST	316 SST
CP	Nickel	316 SST	Carbon Steel
DP	Nickel	316 SST	316 SST
CK	Alloy 20	316 SST	Carbon Steel
DK	Alloy 20	316 SST	316 SST
RH[4]	Titanium Gr 4	Titanium Gr 4	316 SST
CH[5]	Titanium Gr 4	316 SST	Carbon Steel
DH[4]	Titanium Gr 4	316 SST	316 SST
YM[3]	Titanium Gr 2	Titanium Gr 2	316 SST
CM[4]	Titanium Gr 2	316 SST	Carbon Steel
DM[4]	Titanium Gr 2	316 SST	316 SST
C4	*Hastelloy* C-22	316 SST	Carbon Steel
D4	*Hastelloy* C-22	316 SST	316 SST
C5	Duplex 2507 SST	316 SST	Carbon Steel
D5	Duplex 2507 SST	316 SST	316 SST
WW	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)	316 SST
WC	Tantalum	316Ti SST (WNr 1.4571)	316 SST
WB	*Hastelloy* C-276	316Ti SST (WNr 1.4571)	316 SST
RZ[3]	Zirconium 702	Zirconium 702	316 SST
CZ[4]	Zirconium 702	316 SST	Carbon Steel
DZ[4]	Zirconium 702	316 SST	316 SST

ARTW Threaded Remote Seal (for smaller process connections)(1)

Code	Flushing Connection Ring Material (Lower Housing)(6)
A	316 SST
B	*Hastelloy* C-276
D	Carbon Steel
F	304L SST
H	Titanium Gr 4
V	*Monel* 400
J	*Hastelloy* B
W	316Ti SST (1.4571 SST)
P(7)	PVC (no flushing connections allowed)
Code	**Flushing Options**
1	One 1/4-in. Flushing Connection
3	Two 1/4-in. Flushing Connection
5	No Flushing Connection
Code	**Options (select up to 3)**
0	None
3(2)	300 Series SST Bolts
B	Extra Fill for Cold Temperature Applications
C	150 μm (0.006-in.) Diaphragm Thickness (316L SST and *Hastelloy* C-276 diaphragms only, for abrasive applications)
D	*Hastelloy* Plug In. Flushing Connection
G	SST Plug In Flushing Connection
H	SST Drain / Vent in Flushing Connection
J(2)(8)	*Teflon* Gasket (for use with flushing connection ring)
K(2)(8)	Barium Sulfate-filled *Teflon* Gasket (for use with flushing connection ring)
N(8)	*Grafoil* Gasket (for use with flushing connection ring)
R(2)(8)	Ethylene Propylene Gasket for lower housing
V(8)(9)	*Teflon* Coated Diaphragm for nonstick purposes (316L SST and *Hastelloy* C-276 diaphragms only)
U	25 μm (0.001 in) Gold Plated Diaphragm
T	NACE MR 01-75 Certification
9(10)	Male NPT Process Connection Threads
5	*Monel* metal gasket (Pressure Rating code 3 only)

(1) Shaded areas indicate special orders. Consult an Emerson Process Management, Rosemount division, representative for availability, performance effects, and lead time.

(2) Consult an Emerson Process Management, Rosemount division, representative for pricing and availability on Pressure Rating codes 2 or 3.

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

(4) Not available with welded capillary connections.

(5) Operating temperature is limited to 150 °C (302 °F).

(6) Supplied with C4401 aramid fiber gasket.

(7) Maximum working pressure of 200 psi.

(8) Not available with Pressure Rating code 3.

(9) Not available with transmitter option code Q8, for Material Traceability per DIN EN 10204 3.1B of the transmitter / diaphragm seal assembly.

(10) Only available with Process Connection codes 3 and 5.

DRTW Threaded Remote Seal (for smaller process connections)[1]

Code	Industry Standard		
D	DIN (Deutsches Institut fur Normung)		
Code	**Process Connection Style**		
RTW	Threaded (standard thread is female, for male select Option code 9)		
Code	**Process Connection Size**		
C	Parallel thread: G 1/2A DIN 16288		
N	Tapered thread: R 1/2 per ISO 7/1		
Code	**Pressure Rating**		
0	172 bar		
2	344 bar		
8	103 bar (104 mm (4.1-in.) diaphragm)		
Code	**Diaphragm Material**	**Upper Housing Material[2]**	**Mounting Ring Material**
CA	316L SST	316 SST	Carbon Steel
DA	316L SST	316 SST	316 SST
CB	*Hastelloy*® C-276	316 SST	Carbon Steel
DB	*Hastelloy*® C-276	316 SST	316 SST
CC	Tantalum	316 SST	Carbon Steel
DC	Tantalum	316 SST	316 SST
CF	304L SST	316 SST	Carbon Steel
DF	304L SST	316 SST	316 SST
CJ	*Hastelloy* B	316 SST	Carbon Steel
DJ	*Hastelloy* B	316 SST	316 SST
CE	*Inconel*® 600	316 SST	Carbon Steel
DE	*Inconel*® 600	316 SST	316 SST
CV	*Monel*® 400	316 SST	Carbon Steel
DV	*Monel*® 400	316 SST	316 SST
CP	Nickel	316 SST	Carbon Steel
DP	Nickel	316 SST	316 SST
CK	Alloy 20	316 SST	Carbon Steel
DK	Alloy 20	316 SST	316 SST
RH[3]	Titanium Gr 4	Titanium Gr 4	316 SST
CH[4]	Titanium Gr 4	316 SST	Carbon Steel
DH[3]	Titanium Gr 4	316 SST	316 SST
YM[3]	Titanium Gr 2	Titanium Gr 2	316 SST
CM[3]	Titanium Gr 2	316 SST	Carbon Steel
DM[3]	Titanium Gr 2	316 SST	316 SST
C4	*Hastelloy* C-22	316 SST	Carbon Steel
D4	*Hastelloy* C-22	316 SST	316 SST
C5	Duplex 2507 SST	316 SST	Carbon Steel
D5	Duplex 2507 SST	316 SST	316 SST
WW	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)	316 SST
WC	Tantalum	316Ti SST (WNr 1.4571)	316 SST
WB	*Hastelloy* C-276	316Ti SST (WNr 1.4571)	316 SST
RZ[3]	Zirconium 702	Zirconium 702	316 SST
CZ[3]	Zirconium 702	316 SST	Carbon Steel
DZ[3]	Zirconium 702	316 SST	316 SST

DRTW Threaded Remote Seal (for smaller process connections)(1)

Code	Flushing Connection Ring Material (Lower Housing)(5)
A	316 SST
W	316Ti SST (1.4571 SST)
B	*Hastelloy* C-276
Code	**Flushing Options**
1	One 1/4-in. Flushing Connection
3	Two 1/4-in. Flushing Connection
5	No Flushing Connection
Code	**Options (select up to 3)**
0	None
3(2)	304 SST Bolts
B	Extra Fill for Cold Temperature Applications
C	150 μm (0.006-in.) Diaphragm Thickness (316L SST and *Hastelloy* C-276 diaphragms only, for abrasive applications)
D	*Hastelloy* Plug In. Flushing Connection
G	SST Plug In Flushing Connection
H	SST Drain / Vent in Flushing Connection
J(2)	*Teflon* Gasket (for use with flushing connection ring)
N	*Grafoil* Gasket (for use with flushing connection ring)
V(6)	*Teflon* Coated Diaphragm for nonstick purposes (316L SST and *Hastelloy* C-276 diaphragms only)
U	25 μm (0.001 in) Gold Plated Diaphragm
T	NACE MR 01-75 Certification
9	Male Process Connection Threads

(1) Shaded areas indicate special orders. Consult an Emerson Process Management, Rosemount division, representative for availability, performance effects, and lead time.

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

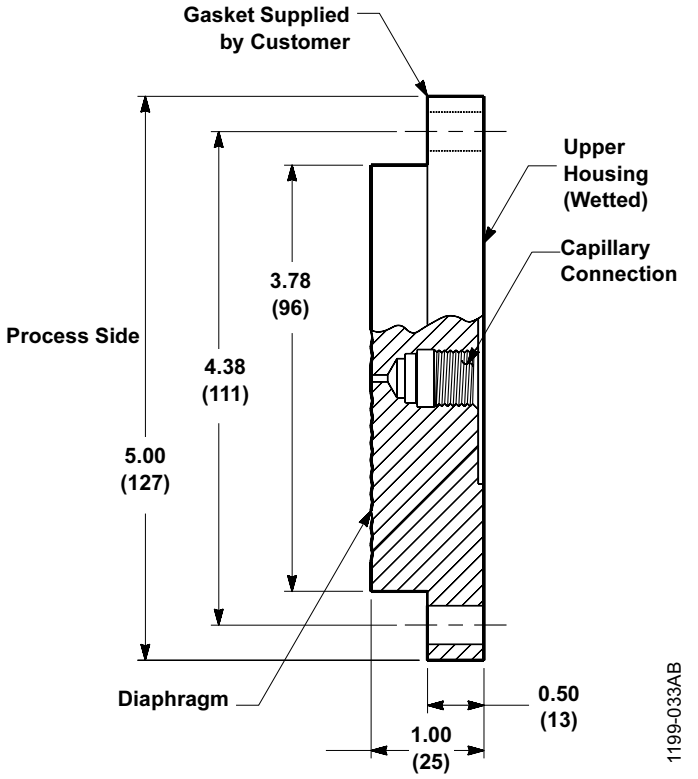
(3) Not available with welded capillary connections.

(4) Operating temperature is limited to 150 °C (302 °F).

(5) Supplied with C4401 gasket.

(6) Not available with transmitter option code Q8, for Material Traceability per DIN EN 10204 3.1B of the transmitter / diaphragm seal assembly.

CHEMICAL TEE SEAL



Dimensions are in inches (millimeters)

TABLE 25. Chemical Tee Seal Ordering Information

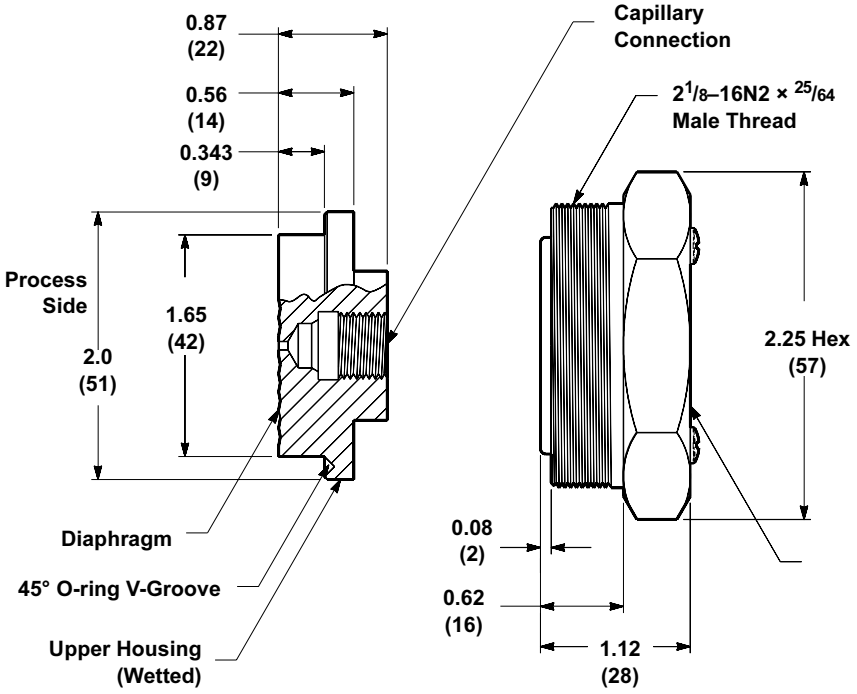
Code	Industry Standard	
N	Industry Specific	
Code	**Process Connection Style**	
CTW	Chemical Tee Seal (Wedge flow style seal)55	
Code	**Maximum Working Pressure (Flange Rating)**	
20	300 psig	
Code	**Diaphragm Material**	**Upper Housing Material (Wetted)**
AA	316L SST	316L SST
BB	*Hastelloy* C-276	*Hastelloy* C-276
Code	**Lower Housing/Flushing Option**	
00	Not Applicable	
Code	**Options**	
B(1)	Extra Fill for Cold Temperature Applications	
C(2)	150 μm (0.006-in.) Diaphragm thickness (316L SST and *Hastelloy C-276* diaphragms only)	
T	NACE MR-01-75	
V(3)	*Teflon* Coated Diaphragm for nonstick purposes (316L SST and *Hastelloy C-276* diaphragms only)	

(1) For seal assemblies that will be used in cold ambient temperature applications, contact an Emerson Process Management representative or reference Instrument Toolkit *for assistance.*

(2) May cause adverse seal temperature effects. Contact an Emerson Process Management representative for assistance.

(3) Not available with transmitter option code Q8, for Material Traceability per DIN EN10204 3.1.B of the transmitter/diaphragm seal assembly.

UNION CONNECTION SEAL



Dimensions are n inches (millimeters)

TABLE 26. Union Connection Seal Ordering Information

Code	Industry Standard
N	Non-Industry Standard
Code	**Process Connection Style**
UCW(1)	Union Connection Seal
Code	**Maximum Working Pressure (Flange Rating)**
10(2)	2,000 psig
Code	**Upper Housing (Wetted) / Diaphragm Material**
AA	316L SST/316L SST
BB	*Hastelloy* C-276 / *Hastelloy* C- 276
Code	**Lower Housing/Flushing Option**
00	Not Applicable
Code	**Options**
1	Weld Nugget for Capillary Support Tube
B(3)	Extra Fill for Cold Temperature Applications
V(4)	*Teflon* Coated Diaphragm for nonstick purposes (316L SST and *Hastelloy C-276* diaphragms only)

(1) Consult an Emerson Process Management representative for use with low calibrated spans.

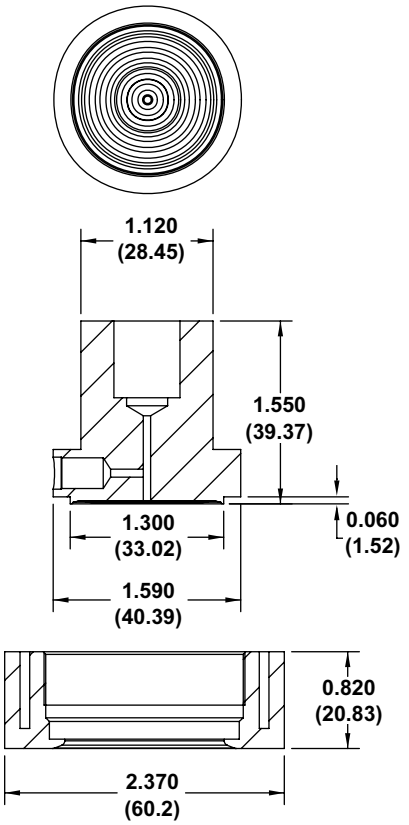
(2) Standard O-ring is Teflon material.

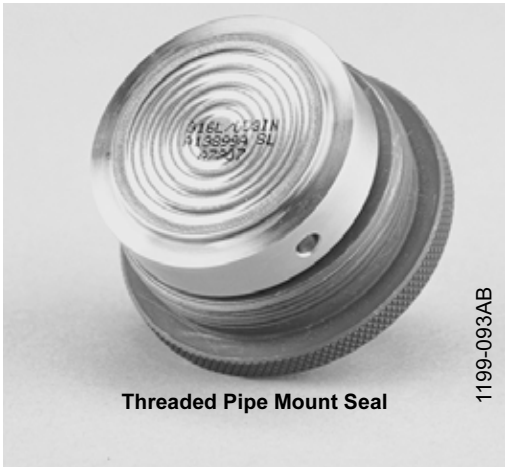
(3) For seal assemblies that will be used in cold ambient temperature applications, contact an Emerson Process Management representative or reference Instrument Toolkit *for assistance.*

(4) Not available with transmitter option code Q8, for Material Traceability per DIN EN10204 3.1.B of the transmitter/diaphragm seal assembly.

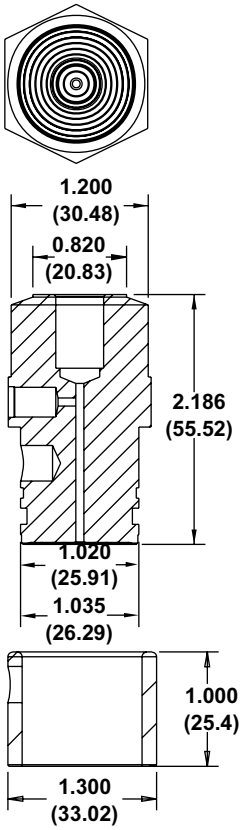
THREADED PIPE MOUNT SEAL

(UCP)	Paper Mill Sleeve Seal (PMW)





Threaded Pipe Mount Seal



Paper Mill Sleeve Seal

Dimensions are in inches (millimeters)

TABLE 27. Threaded Pipe Mount Seal Ordering Information

Code	Industry Standard	
N	Non-Industry Standard	
Code	**Process Connection Style**	**Maximum Working Pressure (Flange Rating)**
UCP	Male Threaded (only available with process connection code 30 or 40)(1)	600 psig at 100 °F (2 070 kPa at 38 °C)
PMW	Paper Mill Sleeve (only available with process connection code 50)(1)	300 psig at 100 °F (2 070 kPa at 38 °C)
Code	**Process Connection Size**	
30	1 1/2 in. with Threaded Knurled Nut (UCP only)	
40	1 1/2 in. with Threaded Hex Nut (UCP only)	
50	1 in. with Cap Screw Retainer (PMW only)	
Code	**Upper Housing / Diaphragm Material(2)**	
AA	316L SST/ 316L SST	
BB	*Hastelloy C-276* / *Hastelloy C-276*	
Code	**Lower Housing Material**	
00	No Weld Spud	
A0	316 SST Weld Spud	
B0	*Hastelloy C-276* Weld Spud	
Code	**Options**	
V(3)	*Teflon* Coated Diaphragm for nonstick purposes (316L SST and *Hastelloy C-276* diaphragms only)	

(1) Consult factory for low-calibrated spans.

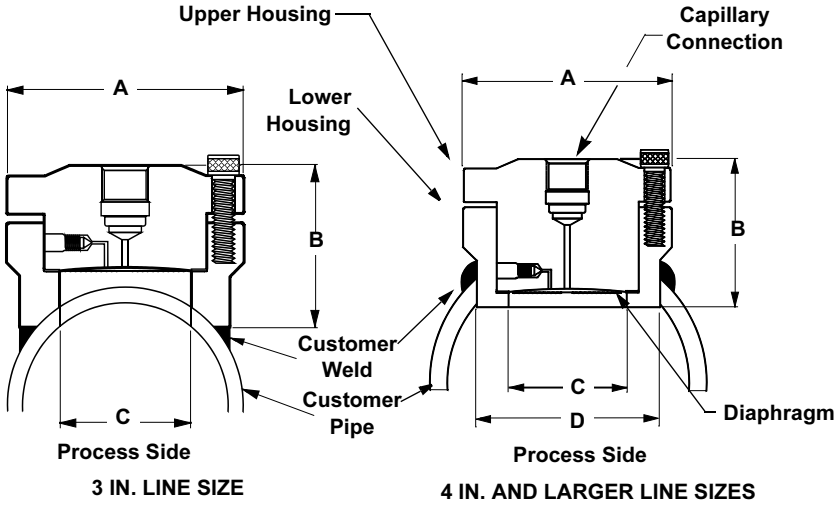
(2) UCP seal supplied standard with barium sulfate filled Teflon gasket. PMW seal supplied standard with Viton® O-ring.

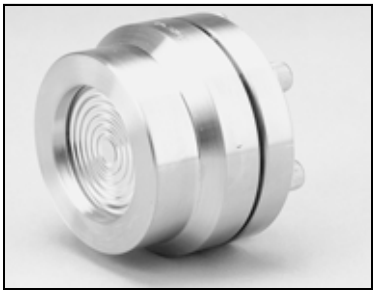
(3) Not available with transmitter option code Q8, for Material Traceability per DIN EN10204 3.1.B of the transmitter/diaphragm seal assembly.

TABLE 28. Parts List

Part Description	Part Number
Teflon Gasket (package of 12 – for Process Connection Style code UCP)	02088-0078-0001
316 SST Weld Spud (for Process Connection Style code UCP)	02088-0295-0003
316 SST Plug/Heat Sink	02088-0196-0001
316 SST Weld Spud (for Process Connection Style code PMW)	02088-0285-0001
O-Ring (package of 12 – for Process Connection Style code PMW)	01199-2012-0001
Minimum Span (Consult factory for low-calibrated spans.)	
1.5” NUCP = 300 in. H2O	
1.0” NPMW = 1050 in. H2O	

SADDLE SEAL





Size	Dimension A	B	C	D
2-in.	3.50 (89)	2.6 (66)	1.5 (38)	—
3-in.	3.50 (89)	2.27 (58)	2.01 (51)	—
4-in. and larger	3.50 (89)	2.38 (60)	2.01 (51)	2.99 (76)

Dimensions are in inches (millimeters)

TABLE 29. Saddle Seal Ordering Information

Code	Industry Standard	
N	Non-Industry Standard	
	Process Connection Style	
WSP	Flow-Thru Saddle Seal[1]	
	Process Connection Size	
G	2 in. Pipe	
7	3 in. Pipe	
9	4 in. and Larger Pipe	
	Maximum Working Pressure (Flange Rating)	
0	1,250 psig at 100 °F (8 618 kPa at 38 °C)—Six bolt holes	
1	1,500 psig at 100 °F (10 340kPa at 38 °C)—Eight bolt holes (standard design)	
	Upper Housing Material	**Diaphragm Material**
LA	316L SST (304 SST Bolts)	316L SST
LB	316L SST (304 SST Bolts)	*Hastelloy* C-276
LC	316L SST (304 SST Bolts)	Tantalum
	Lower Housing Material[2]	
00	No Lower Housing	
B5	*Hastelloy* C-276	
D5	Carbon Steel	
L5	316L SST	
V5	*Monel*	
	Options	
J	*Teflon* Gasket (for Lower Housing)	
N	*Grafoil* Gasket (for Lower Housing)	
V[3]	*Teflon* Coated Diaphragm for nonstick purposes (316L SST and *Hastelloy* C-276 diaphragms only)	
B	Extra fill for cold temperature applications	

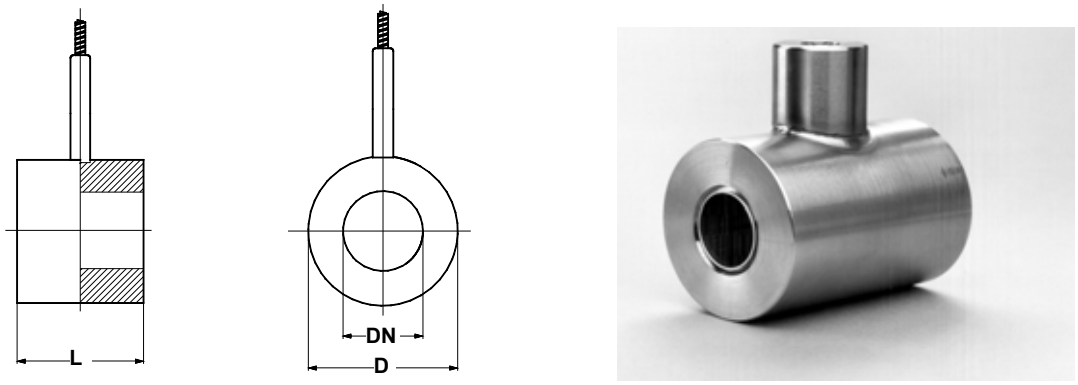
(1) Standard gasket material is Klinger Compound No. C4401.

(2) Standard pipe schedule 40/405S, for other pipe schedules consult the factory.

(3) Not available with transmitter option code Q8, for Material Traceability per EN10204 3.1.B of the transmitter/diaphragm seal assembly.

WAFER STYLE IN-LINE SEAL

TFS Cell Type: In-Line Diaphragm Seal Dimensional Drawings



ANSI/ASME B16.5 - 1996		Dimensions (mm)	
DN	CL	D	L
1 in.	150-2500	51	90
1½ in.	150-2500	73	90
2 in.	150-2500	92	90
3 in.	150-2500	127	90
4 in.	150-2500	157	90

DIN 2501		Dimensions (mm)	
DN	PN	D	L
25	16-400	68	90
40	16-400	88	90
50	16-400	102	90
80	16-400	138	90
100	16-400	162	90

TABLE 30. Wafer Style In-Line Seal

Code	Industry Standard	
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)	
D	DIN 2501 (Deutsches Institut für Normung)	
Code	**Process Connection Style**	
TFS(1)	Wafer Style: In-Line Diaphragm Seal	
Code	**Process Connection Size**	
	ANSI/ASME	DIN
2(2)	1 in.	—
4(2)	1½ in.	—
G	2 in.	DN 50
7	3 in.	—
9	4 in.	—
D	—	DN 25
F	—	DN 40
J	—	DN 80
K	—	DN 100
Code	**Maximum Working Pressure (Flange Rating)**	
0	Flange not supplied. Seal rated to carbon steel Class 2500 or flange rating	
Code	**Diaphragm and Wetted Parts Material(3)**	**Housing Material**
LA	316L SST	316L SST
LB	*Hastelloy* C-276	316L SST
WW(4)	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)
Code	**Housing Body Length**	
00	90 mm (standard configuration)	

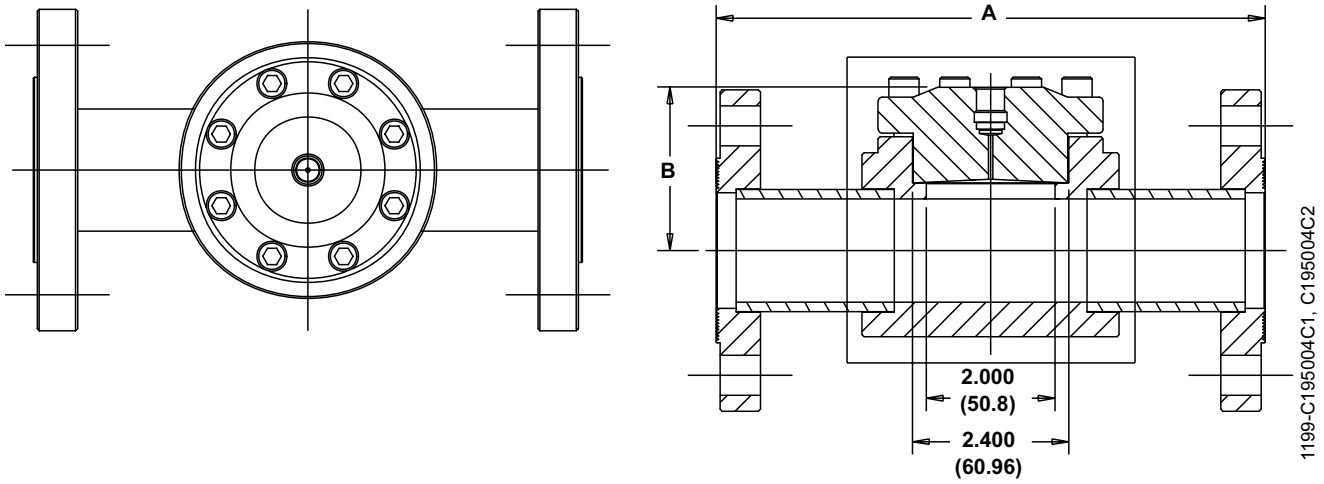
(1) Available with welded capillary connection only.

(2) Consult factory for low calibrated spans.

(3) When ordering special diaphragm materials, the standard housing material is 316L SST, unless noted otherwise. Optional housing, diaphragm, and wetted parts materials are available upon request. Contact an emerson Process Management representative for additional information.

(4) Shaded areas indicated special orders. Consult an Emerson Process Management representative for configuration availability, performance effects, and lead time.

FLOW-THRU FLANGED



Dimensions are in inches (millimeters)

Class (lb.)	Nominal Pipe Size (in.)	Overall Length ± 0.05 "A"	Upper to Centerline Height "B"
150	1	7.00 (177.8)	2.28 (57.91)
	2	9.00 (228.6)	2.80 (71.12)
	3	11.00 (279.4)	3.50 (88.9)

TABLE 31. Flow-Thru Flanged Seal Ordering Information

Code	Industry Standard
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)
Code	**Process Connection Style**
WFW	Flow-Thru Flanged
Code	**Process Connection Size(1)**
1	1/2 in.
A	3/4 in.
2	1 in.
4	1 1/2 in.
G	2 in.
7	3 in.
9	4 in.
C	6 in.
Code	**Maximum Working Pressure (Flange Rating) (1)**
1	Class 150 psi
2	Class 300 psi
4	Class 600 psi
5	Class 900 psi
6	Class 1500 psi

TABLE 31. Flow-Thru Flanged Seal Ordering Information

Code	Upper Housing	Diaphragm Material[1]
LA	316L SST	316L SST
LB	316L SST	*Hastelloy* C276
LC	316L SST	Tantalum
LJ	316L SST	*Hastelloy* B
LV	316L SST	*Monel* 400
FF	304L	304L
LH[2]	316L SST	Titanium Gr. 4

Code	Lower Housing[1]
0	No lower housing
L	316L SST
B	*Hastelloy* C-276
D	Plated Carbon Steel
V	*Monel* 400
F	304L
J	*Hastelloy* B
H	Titanium Gr. 4[3]

		Maximum Working Pressure of Pipe (in psig)							
Code	Pipe Schedule[1]	1/2 in.	3/4 in.	1 in.	1 1/2 in.	2 in.	3 in.	4 in.	6 in.
K	5	1500	1500	1340	920	730	630	490	430
M	10/10s	1500	1500	1500	1500	1250	920	710	530
N	40/40s	1500	1500	1500	1500	1500	1500	1500	1120
P	80	3000	3000	3000	3000	3000	3000	2000	1720
T	160	4000	4000	4000	4000	4000	4000	3300	2860

Code	Options
3	304 SST Bolts
U	25 μm (0.001 in) Gold Plated Diaphragm
J	*Teflon* O-ring (between Upper and Lower Housing)
N	Grafoil Gasket (between Upper and Lower Housing)
K	Gylon Gasket (between Upper and Lower Housing)
V	*Teflon* coated diaphragm for nonstick purposes (available with 316L SST and *Hastelloy* C-276 diaphragm materials only)
1	PIC or ITT 6 bold style bolting pattern
9	.002 in. diaphragm thickness (316 sst and *Hastelloy* diaphragm material only
C	.006 in. diaphragm thickness (316 sst and *Hastelloy* diaphragm material only
B	Extra fill for cold temperature applications
T	Nace MR-01-75

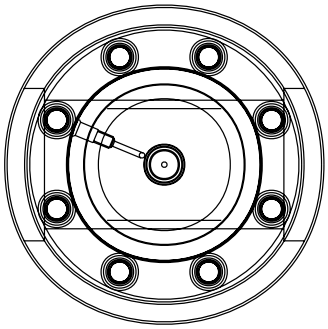
(1) Consult factory for special process connection sizes, flange pressure ratings, diaphragm/lower housing materials, and pipe schedules.

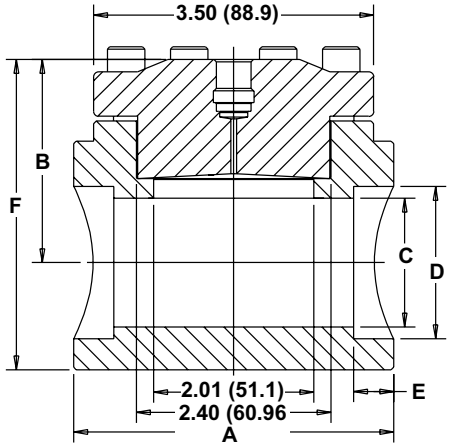
(2) Operating temperature limited to 150 °C (302 °F).

(3) Requires applications review prior to ordering.

FLOW-THRU SOCKET AND BUTT WELD SEALS

Flow–Thru Socket Weld Dimensional Drawing



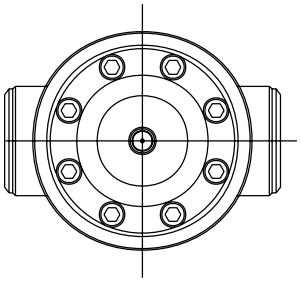


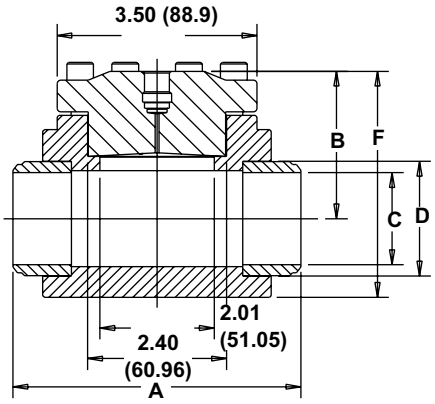
Dimensions are in inches (millimeters)

Code	Overall Length "A"	Upper to Centerline Height "B"	Bore Diameter "C"	Counter Bore Diameter "D"	Counter Bore Depth "E"	Overall Height "F"
A	3.50 (88.9)	2.18 (55.37)	0.82 (20.83)	1.06 (26.92)	0.40 (10.16)	3.09 (78.49)
2	3.50 (88.9)	2.28 (57.91)	1.05 (26.67)	1.32 (33.53)	0.40 (10.16)	3.33 (84.58)
4	4.00 (101.6)	2.56 (65.02)	1.61 (40.89)	1.91 (48.51)	0.50 (12.7)	3.90 (99.06)
G	4.00 (101.6)	2.80 (71.12)	2.07 (52.58)	2.38 (60.45)	0.50 (12.7)	4.37 (111.0)

Flow–Thru Butt Weld Dimensional Drawing

1 in. Flow–Thru Butt Weld Seal





Dimensions are in inches (millimeters)

Code	Overall Length "A"	Upper to Centerline Height "B"	Bore Diameter "C"	Counter Bore Diameter "D"	Overall Height "F"
A	4.25 (107.95)	2.17 (55.12)	0.82 (20.83)	1.05 (26.67)	3.13 (79.5)
2	4.25 (107.95)	2.29 (58.17)	1.05 (26.67)	1.32 (33.53)	3.39 (86.11)
4	5.00 (127.0)	2.57 (65.28)	1.61 (40.89)	1.90 (48.26)	3.95 (100.33)
G	5.00 (127.0)	2.77 (70.36)	2.07 (52.58)	2.38 (60.45)	4.38 (111.25)

TABLE 32. Flow-Thru Socket and Butt Weld Seals Ordering Information

Code	Industry Standard
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)

Code	Process Connection Style
WWW	Flow-Thru Socket Weld
WBW	Flow-Thru Butt Weld

Code	Process Connection Size[1]
1	1/2 in.
A	¾ in.
2	1 in.
4	1 ½ in.
G	2 in.
7	3 in. (not available for Socket Weld)
9	4 in. (not available for Socket Weld)

Code	Maximum Working Pressure (Flange Rating)
0	1250 psi (6 bolt pattern) (not available for pipe schedule codes P & T)
1	Not Applicable (See Pipe Schedule)

Code	Upper Housing	Diaphragm Material[1]
LA	316L SST	316L SST
LB	316L SST	*Hastelloy* C-276
LC	316L SST	Tantalum
LV	316L SST	*Monel* 400
LJ	316L SST	*Hastelloy* B
LH[2]	316L SST	Titanium Gr. 4
FF	304L	304L

Code	Lower Housing[1]
0	No lower housing
L	316L SST
B	*Hastelloy* C-276
D	Plated carbon steel (Zinc)
V	*Monel* 400
J	*Hastelloy* B
H[3]	Titanium Gr. 4
F	304L

		Working Pressure of Pipe (in psig)						
Code	Pipe Schedule[1] Maximum	1/2 in.	¾ in.	1 in.	1 ½ in.	2 in.	3 in.	4 in.
K	5	1500	1500	1340	920	730	630	490
M	10/10	1500	1500	1500	1500	1250	920	710
N	40/40s	1500	1500	1500	1500	1500	1500	1500
P	80	3000	3000	3000	3000	3000	3000	2000
T	160	4000	4000	4000	4000	4000	4000	3300

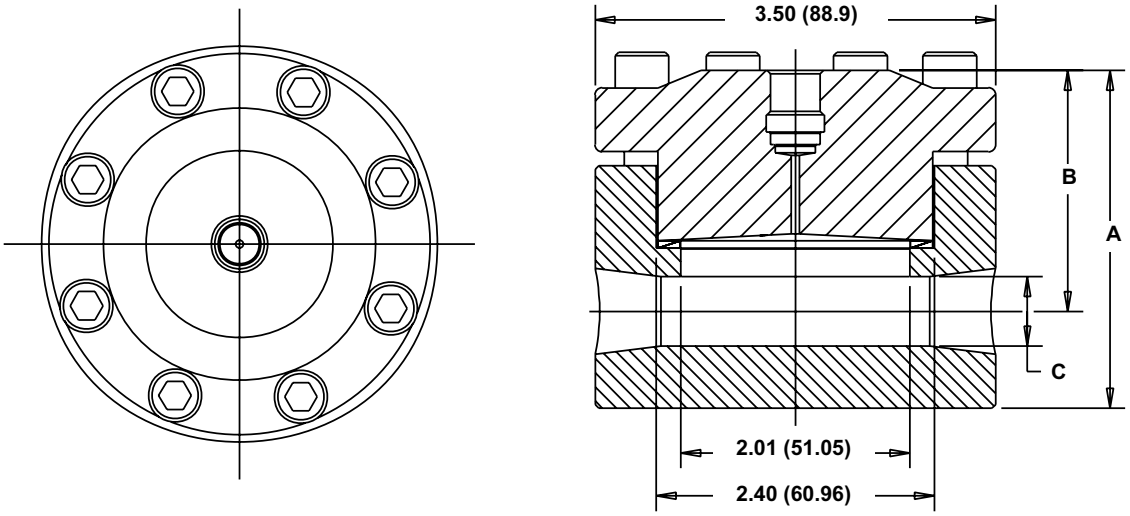
Code	Options
3	304 SST Bolts
U	25 μm (0.001 in) Gold plated diaphragm
J	*Teflon* O-ring (between Upper and Lower Housing)
N	Grafoil Gasket (between Upper and Lower Housing)
K	Gylon Gasket (between Upper and Lower Housing)
V	*Teflon* coated diaphragm for nonstick purposes (Available with 316L SST and *Hastelloy* C- 276 diaphragm materials only.)
9	.002 in. diaphragm thickness (Available with 316L SST and *Hastelloy* C- 276 diaphragm materials only.)
C	.006 in. diaphragm thickness (Available with 316L SST and *Hastelloy* C- 276 diaphragm materials only.)
B	Extra fill for cold temperature applications
T	Nace MR-01-75

(1) Consult factory for special process connection sizes, diaphragm/lower housing materials, and pipe schedules.

(2) Operating temperature limited to 150 °C (302 °F).

(3) Requires applications review prior to ordering.

IN-LINE FLOW-THRU THREADED SEAL



Dimensions are in inches (millimeters)

Code	Overall Length "A"	Upper to Centerline Height "B"	Bore Diameter "C"
1	2.62 (66.55)	1.97 (50.04)	0.44 (11.18)
3	2.91 (73.91)	2.12 (53.85)	0.72 (18.29)
4	3.13 (79.5)	2.22 (56.39)	0.92 (23.37)
5	3.38 (85.85)	2.34 (59.44)	1.15 (29.21)

TABLE 33. In-Line Flow-Thru Threaded Seal Ordering Information

Code	Industry Standard	
A	ANSI/ASME B16.5 (American National Standards Institute/American Society of Mechanical Engineers)	
Code	**Process Connection Style**	
WTW	In Line Flow-Thru Threaded	
Code	**Process Connection Size**	
1	¼ in. NPT	
3	½ in. NPT	
4	¾ in. NPT	
5	1 in. NPT	
Code	**Maximum Working Pressure (Flange Rating)**	
0	1250 psi (6 bolt pattern) (Not available for pipe schedule code P)	
1	Not Applicable (See Pipe Schedule)	
Code	**Upper Housing**	**Diaphragm Material(1)**
LA	316L SST	316L SST
LB	316L SST	*Hastelloy* C-276
LC	316L SST	Tantalum
LV	316L SST	*Monel* 400
LJ	316L SST	*Hastelloy* B
LH(2)	316L SST	Titanium Gr. 4
FF	304L	304L

TABLE 33. In-Line Flow-Thru Threaded Seal Ordering Information

Code	Lower Housing[1]	
0	No lower housing	
L	316L SST	
B	*Hastelloy* C-276	
D	Plated carbon steel (Zinc)	
V	*Monel* 400	
J	*Hastelloy* B	
H[3]	Titanium Gr. 4	
F	304L	
Code	**Pipe Schedule[1]**	**Maximum Working of Pressure Pipe**
P	80	3000 psi
N	40/40s	1,500 psi
Code	**Options**	
3	304 SST Bolts	
U	25 μm (0.001 in) Gold plated diaphragm	
J	*Teflon* O-ring (between Upper and Lower Housing)	
N	Grafoil Gasket (between Upper and Lower Housing)	
K	Gylon Gasket (between Upper and Lower Housing)	
V	*Teflon* coated diaphragm for nonstick purposes (Available with 316L SST and *Hastelloy* C- 276 diaphragm materials only.)	
9	.002 in. diaphragm thickness (Available with 316L SST and *Hastelloy* C- 276 diaphragm materials only.)	
C	.006 in. diaphragm thickness (Available with 316L SST and *Hastelloy* C- 276 diaphragm materials only.)	
B	Extra fill for cold temperature applications	
T	Nace MR-01-75	

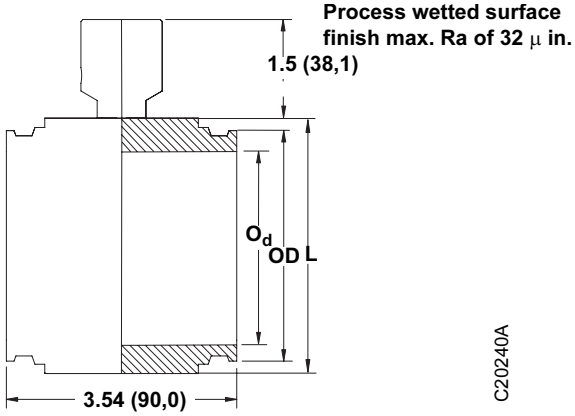
(1) Consult factory for special diaphragm materials, lower housing materials, and pipe schedules.

(2) Operating temperature limited to 150 °C (302 °F).

(3) Requires applications review prior to ordering.

Tri-clamp® IN-LINE SEAL

Dimensional Drawing for VCS Sanitary In-Line Diaphragm Seal



Dimensions are in inches (millimeters)

DN	Max. Working Pressure	Dimensions (inches) 0d	0D	L
1 in.	600 psi	0.87	1.99	3.54
1½ in.	600 psi	1.37	1.99	3.54
2 in.	600 psi	1.87	2.52	3.54
3 in.	600 psi	2.87	3.58	3.54
4 in.	600 psi	3.83	4.69	3.54

TABLE 34. Tri-Clamp In-Line Seal Ordering Information

Code	Industry Standard	
S	Sanitary (Conforms to 3-A Standard 74-02)	
Code	**Process Connection Style**	
VCS(1)(2)	*Tri-Clamp* In-Line Seal Maximum Working Pressure: 600 psi (4140 kPa)	
Code	**Process Connection Size**	
20(3)	1 in.	
30(3)	1½ in.	
50	2 in.	
70	3 in.	
90	4 in.	
Code	**Diaphragm Material(4)**	**Housing Material**
LA00	316L SST	316L SST
WW(1)	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)
Code	**Options**	
P	Non-Sanitary Fill Fluid (Does not conform to 3-A standard 7)	
H	20 μin. (0.5 μm) Ra diaphragm surface finish	
G(5)	15 μin. (0.375 μm) Ra diaphragm surface finish	
6	Electropolishing	

(1) Shaded areas indicate special orders. Consult an Emerson Process Management representative for configuration availability, performance effects, and lead time.

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

(3) Consult factory for low calibrated spans.

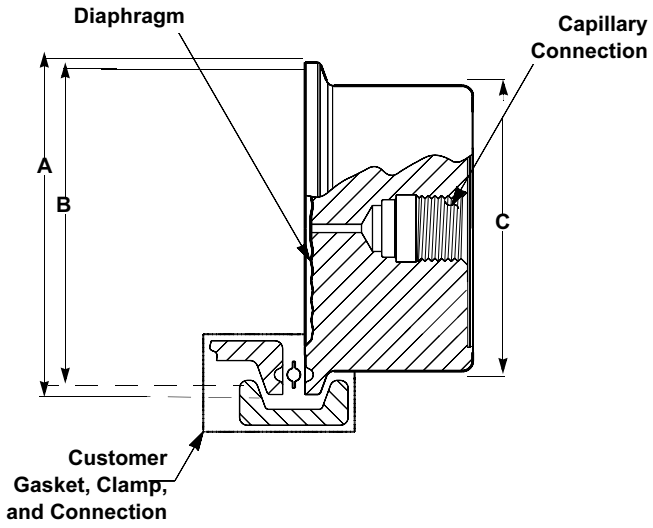
(4) When ordering optional diaphragm materials, the standard housing material is 316L SST. Optional housing, diaphragm and wetted parts materials are available upon request. Contact an emerson Process Management representative for additional information.

(5) Requires Option code 6, electropolishing.

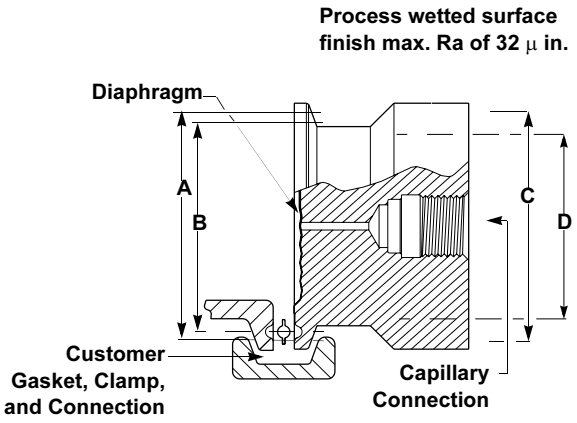
Tri-Clamp SEAL

Sanitary *Tri-Clamp* Diaphragm Seal Dimensional Drawing

***Tri-Clamp* Seal Configuration (2, 2 1/2, 3, and 4-in. Size)**

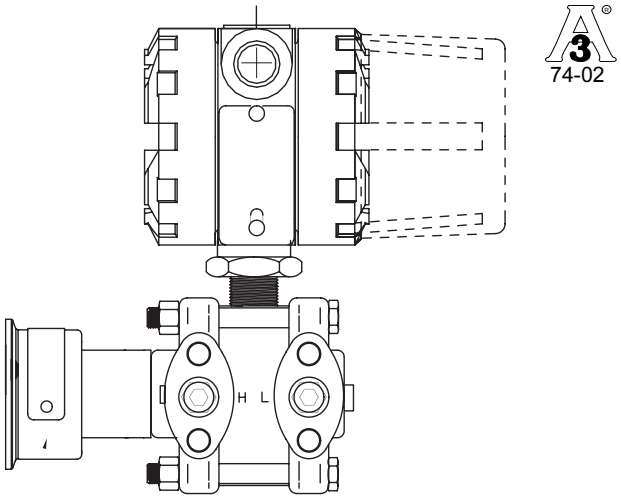


***Tri-Clamp* Seal Configuration (1 1/2-in. Size)**



Order Code	Seal Diameter	"A"	"B"	"C"	"D"
30	1.5-in. (38 mm)	2.00-in. (51 mm)	1.72-in. (44 mm)	2.04-in. (52) mm	1.62-in. (41 mm)
50	2.0-in. (51 mm)	2.50-in. (64 mm)	2.22-in. (56 mm)	2.04-in. (52) mm	—
60	2.5-in. (64 mm)	3.05-in. (76 mm)	2.78-in. (71 mm)	2.04-in. (52 mm)	—
70	3.0-in. (76 mm)	3.58-in. (91 mm)	3.28-in. (93 mm)	2.04-in. (52 mm)	—
90	4.0-in. (102	4.68-in. (119 mm)	4.35-in. (111 mm)	2.04-in. (52) mm	—

Rosemount 1151 with Direct Mount Seal (Connection Code 99)



Rosemount 3051C with Direct Mount Seal (Connection Codes 93 and 94)

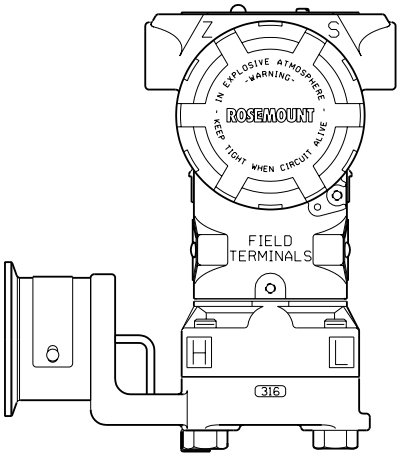


TABLE 35. Sanitary *Tri-Clamp* Seal Ordering Information

Code	Industry Standard	
S	Sanitary (Conforms to 3-A Standard 74-02)	
Code	**Process Connection Style**	
SCW	Sanitary *Tri-Clover* Style *Tri-Clamp* (1)	
Code	**Process Connection Size**	
30(2)	1½ in.	
50(2)	2 in.	
60	2½ in.	
70	3 in.	
90	4 in.	
Code	**Diaphragm Material**	**Upper Housing Material**
LA	316L SST (WNr 1.4435)	316L SST
LB	*Hastelloy* C-276	316L SST
BB(3)	*Hastelloy* C-276	*Hastelloy* C-276
Code	**Lower Housing Flushing or Extension Option**	
00	Not Applicable	
Code	**Options**	
H	20 μin. (0.5 μm) R_a diaphragm surface finish	
G	15 μin. (0.375 μm) R_a diaphragm surface finish	
D	10 μin. (0.25 μm) R_a diaphragm surface finish	
2	High Pressure Ladish Clamp and Buna N Gasket–see table below for clamp pressure rating (Conforms to 3-A Standard 74-02)	
3	Buna-N Gasket (Conforms to 3-A Standard 74-02)	
6	Electropolishing	
P	Non-Sanitary Fill Fluid (Does not conform to 3-A Standard 74-02)	

(1) Clamp and gasket furnished by user. The maximum working pressure is dependent upon the clamp pressure rating.

(2) Consult an Emerson Process Management representative for use with low calibrated spans.

(3) Not available with option codes H, G, D, or 6.

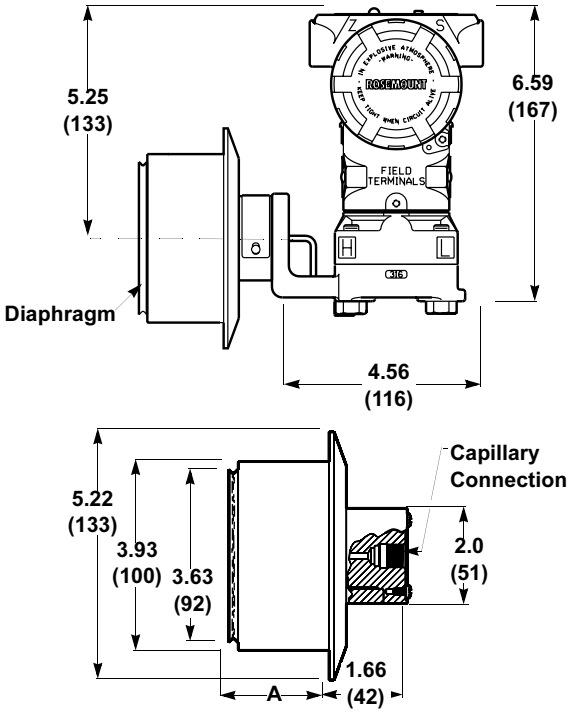
TABLE 36. High Pressure Ladish Clamp Maximum Working Pressure

Process Connection Size	psi at 70 °F	psi at 250 °F
1 1/2 in.	1,500	1,200
2 in.	1,000	800
2 1/2 in.	1,000	800
3 in.	1,000	800
4 in.	1,000	800

TANK SPUD SEAL

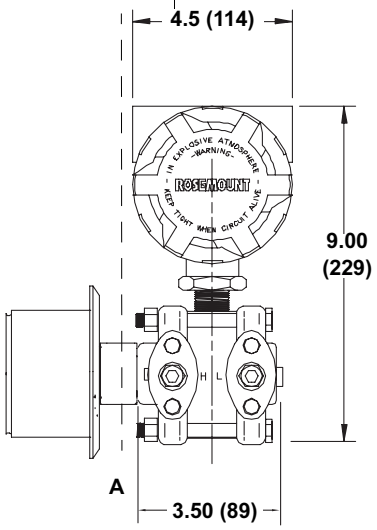
Sanitary Tank Spud Seal Dimensional Drawing

Direct Mount (Rosemount 3051C) (Connection Code 93 and 94)



Direct Mount (Rosemount 1151) (Connection Code 99)

Process wetted surface finish max. Ra of 32 μ in.



3
74-02

Extension Length	A
2 in. (51 mm)	2.11 in. (54 mm)
6 in. (152 mm)	6.11 in. (155 mm)

TABLE 37. Sanitary Tank Spud Seal Ordering Information

Code	Industry Standard	
S	Sanitary (Conforms to 3-A Standard 74-02)	
Code	**Process Connection Style**	
SSW(1)	Sanitary Tank Spud Style	
Code	**Maximum Working Pressure (Clamp Rating)**	
A0	600 psig (4 136 kPa)	
Code	**Upper Housing Material**	
A	316 SST	
Code	**Wetted Parts Material – Diaphragm**	**Extension**
AL	316L SST (WNr 1.4435)(2)	316L SST(2)
BB	*Hastelloy* C-276	*Hastelloy* C-276
Code	**Extension Length**	
2	2 in. Extension	
6	6 in. Extension	
Code	**Options**	
1	Tank Spud Included with Seal Shipment	
4	*Viton*® O-ring, instead of Standard Ethylene Propylene O-ring (Conforms to 3-A Standard 74-02)	
3	Buna N O-ring, instead of Standard Ethylene Propylene O-ring (Conforms to 3-A Standard 74-02)	
P	Non-Sanitary Fill Fluid (Does not conform to 3-A Standard 74-02)	
C	150 μm (0.006-in.) Diaphragm Thickness	
H	20 μin.(0.5 μm) diaphragm surface finish	
G(3)	15 μin. (0.375 μm) diaphragm surface finish	
6	Electropolishing	

(1) Clamp and Ethylene Propylene o-ring supplied.

(2) Diaphragm brazed and Tig-welded to extension.

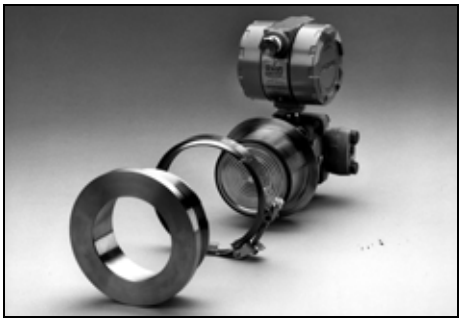
(3) Requires Option code 6, electropolishing.

SANITARY TANK SPUD ACCESSORIES

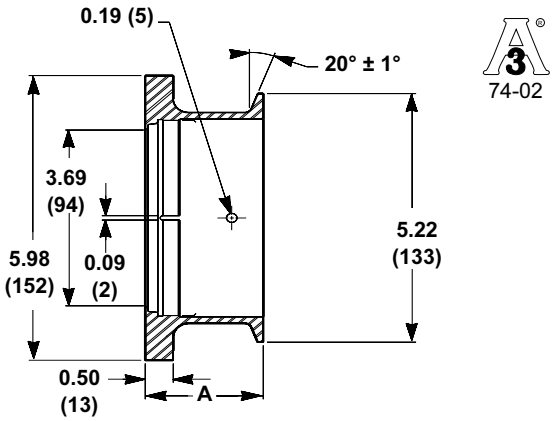
Tank Spud and Clamp

Rosemount 3051 with Direct Mount Sanitary Tank Spud Seal

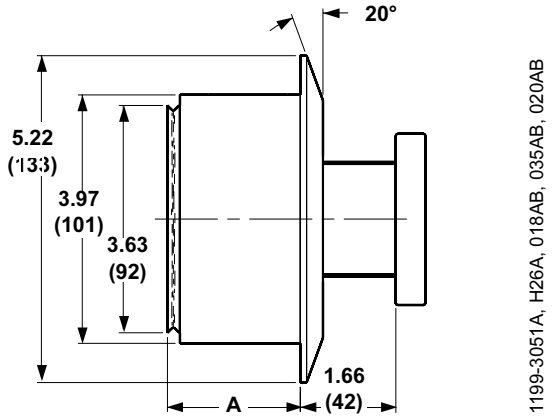
Rosemount 1151 with 1151 Direct Mount Sanitary Tank Spud with Tank Spud and Clamp



Tank Spud



Tank Spud Plug



Dimensions are in inches (millimeters)

TABLE 38. Sanitary Tank Spud Optional Accessories

Model	Description
1199-0061-	Sanitary Tank Spud (1)
Code	**Size**
0001	2 in.
0002	6 in.

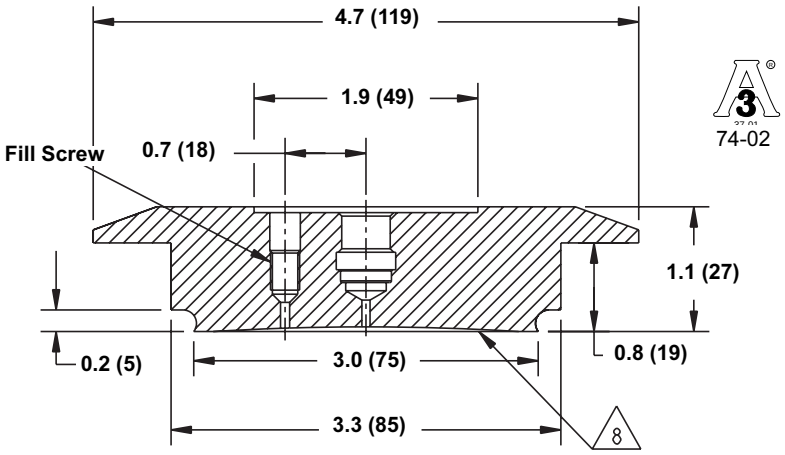
Model	Description
1199-0552-	Sanitary Tank Spud Plug
Code	**Size**
0001	2 in.
0002	6 in.

(1) Welding procedures and material certifications are shipped with the tank spud. Standard material is cast equivalent of 316L SST per ASTM- A351 grade CF3M.

TABLE 39. Sanitary Tank Spud Spare Parts

Part Number	Description
01199-0526-0002	Clamp
C531850070-0341	Ethylene Propylene O-ring

SANITARY THIN-WALL TANK SPUD SEAL



Process wetted surface finish max. Ra of 32 μ in.

1199-016AB

Dimensions are in inches (millimeters)

TABLE 40. Thin-Wall Tank Spud Seal Ordering Information

Code	Industry Standard
S	Sanitary (Conforms to 3-A Standard 74-02)
Code	**Process Connection Style**
STW(1)	Sanitary Thin Wall Tank Spud
Code	**Maximum Working Pressure (Flange Rating)**
B0	600 psig Maximum Working Pressure (41 bar) with supplied clamp and ethylene propylene O-ring
Code	**Upper Housing/Diaphragm Material**
LA	316 SST/316L SST
BB	*Hastelloy* C-276/*Hastelloy* C-276
Code	**Other Wetted Material/Extensions**
00	Not Applicable
Code	**Options**
P	Non-Sanitary Fill Fluid (Does not conform to 3-A Standard 74-02)
1	Tank Spud Included With Shipment
H	20 μin. (0.5 μm) R_a diaphragm surface finish
G(2)	15 μin. (0.375 μm) R_a diaphragm surface finish
6	Electropolishing

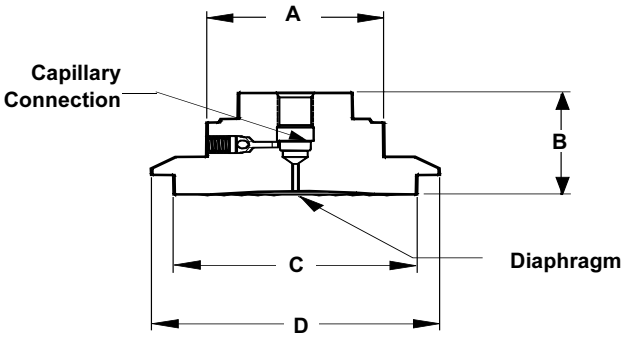
(1) For tank walls up to 3/16-in. thick. Clamp and Ethylene Propylene o-ring supplied.

(2) Requires option code 6, electropolishing.

TABLE 41. Optional Accessories

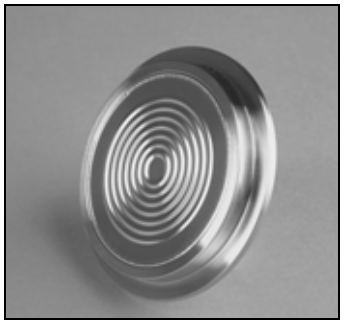
Description	Part Number
Sanitary Thin-Wall Tank Spud	01199-0073-0001
Tri-Clamp	01199-0526-0004
Ethylene Propylene O-ring	53185-0070-0336

Cherry-Burrell "I" LINE SEAL



3
74-02

Process wetted surface finish max. Ra of 32 μ in



1199-9050A3A
1199-102AB

Diameter (Nominal)	Dimensions "A"	"B"	"C"	"D"
2 in.	1.62-in. (41 mm)	1.59-in. (40 mm)	2.24-in. (57 mm)	2.64-in. (67 mm)
3 in.	Consult Factory	1.24-in. (31 mm)	3.30-in. (84 mm)	3.87-in. (98 mm)

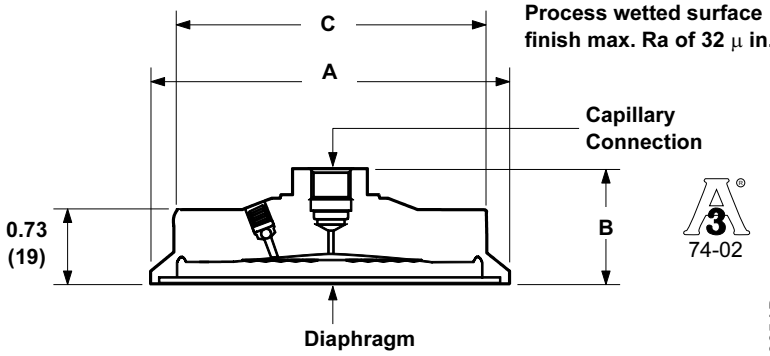
TABLE 42. *Cherry-Burrell* "I" Line Seals Ordering Information

Code	Industry Standard
S	Sanitary (Conforms to 3-A Standard 74-02)
Code	**Process Connection Style**
SHP(1)	Sanitary *Cherry-Burrell* "I" Line Style (Maximum Working Pressure 500 psig)
Code	**Process Connection Size**
50(2)	2 in.
70	3 in.
Code	**Upper Housing/Diaphragm Material**
AA	316 SST/316L SST
BB	*Hastelloy C-276*/*Hastelloy C-276*
Code	**Lower Housing/Flushing Option**
00	Not Applicable
Code	**Options**
P	Non-Sanitary Fill Fluid (Does not conform to 3-A Standard 74-02)

(1) Clamp and gasket furnished by user. Maximum working pressure is the lesser of either clamp pressure rating or 500 psi.

(2) Contact an Emerson Process Management representative for use with low calibrated spans.

ASEPTIC (APC) STYLE SEAL



Diameter (Nominal)	"A"	"B"	"C"
2 in.	3.05-in. (77 mm)	1.2-in. (30 mm)	2.69-in. (68 mm)
3 in.	4.23-in. (107 mm)	1.28-in. (33 mm)	3.81-in. (97 mm)

1199-1180B04A, 1199-095AB

Dimensions are in inches (millimeters)

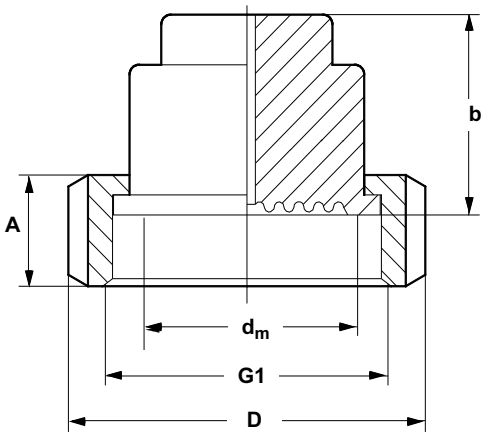
TABLE 43. APC Style Seal Ordering Information

Code	Industry Standard
S	Sanitary (Conforms to 3-A Standard 74-02)
Code	**Process Connection Style**
SAP	APC Style Seal(1)
Code	**Process Connection Size**
50(2)	2 in.
70	3 in.
Code	**Upper Housing/Diaphragm Material**
LA	316L SST / 316L SST
Code	**Lower Housing/Flushing Option**
00	Not Applicable
Code	**Seal Options**
P	Non-Sanitary Fill Fluid (Does not conform to 3-A Standard 74-02)

(1) Clamp and gasket furnished by user.

(2) Consult an Emerson Process Management representative for use with low calibrated spans.

SLS, SMS, SFS, AND SRS SANITARY SEALS: DAIRY PROCESS CONNECTIONS— *FEMALE THREAD*



Standard	DN	PN	DIMENSIONS (mm)				
			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	59	Rd95×1/6	112
	80	40	29	47	76	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	50	Rd70×1/6	84
	63.5	40	30	40	50	Rd85×1/6	100
	76	40	32	40	76	Rd98×1/6	114
IDF(1)							
RTJ(1)							

(1) Contact factory for dimensions.

TABLE 44. SLS Sanitary Seals: Dairy Process Connection - **Female Thread** Ordering Information

Code	Industry Standard	
S	Sanitary	
Code	**Process Connection Style**	
SLS(1)(2)	Female Thread per DIN 11851	
Code	**Process Connection Size**	**Maximum Working Pressure (Flange Rating)**
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**	**Upper Housing Material**
LA00	316L SST	316L SST (coupling nut same material)
WW00(1)	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)
Code	**Options (Multiple Selections)**	
6	Electrolytical polishing of diaphragm material	
2	Counterpiece (tank/pipe spud) and Gasket	

(1) Shaded areas indicate special orders. Consult an Emerson Process Management representative for configuration availability, performance effects, and lead time.

(2) Available with welded capillary or direct mount connections only.

TABLE 45. SMS, SFS, and SRS Sanitary Seals: Dairy Process Connection - **Female Thread** Ordering Information

Code	Industry Standard	
S	Sanitary	
Code	**Process Connection Style**	
SMS(1)(2)	Female Thread per SMS Standard	
SFS(2)	Female Thread per IDF Standard	
SRS(2)	Female Thread per RTJ Standard	
Code	**Process Connection Size**	**Maximum Working Pressure (Flange Rating)**
30	DN 38 ($1^1/_2$ in.)	40 bar
50	DN 51 (2 in.)	40 bar
20	DN 25	40 bar
60(3)	DN 63.5	40 bar
70	DN 76	40 bar
Code	**Diaphragm Material**	**Housing Material**
LA00	316L SST	316L SST (coupling nut same material)
LB00(4)	*Hastelloy* C-276	316L SST
WW00(1)	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)
Code	**Options (Multiple Selections)**	
6	Electrolytical polishing of diaphragm material	
2	Counterpiece (tank/pipe spud) and Gasket	

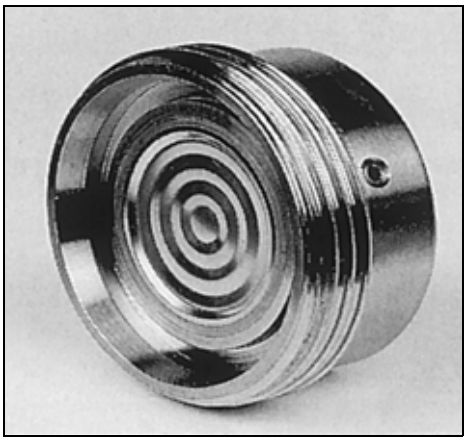
(1) Shaded areas indicate special orders. Consult an Emerson Process Management representative for configuration availability, performance effects, and lead time.

(2) Available with welded capillary or direct mount connections only.

(3) Process Connection Size Code 6 is not available with the SMS seal.

(4) Diaphragm/Housing Material code LB00 is available only with the SRS Seal.

MLS, MMS, MFS, AND MRS SANITARY SEALS: DAIRY PROCESS CONNECTIONS—*MALE THREAD*



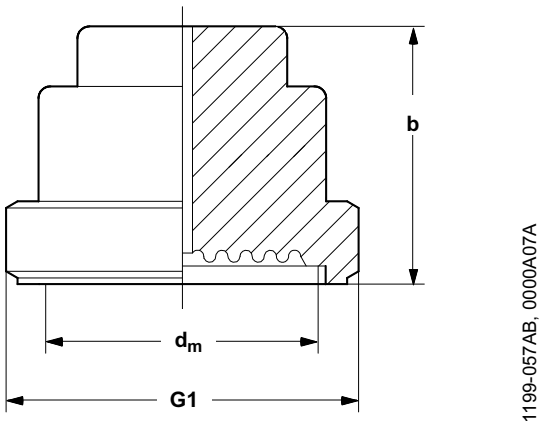


TABLE 46. MSL, MMS, MFS, and MRS Process Connection Dimensions

			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	40	Rd65×1/6
	50	40	46	50	Rd78×1/6
	65	40	46	57	Rd95×1/6
	80	40	47	76	Rd110×1/4
SMS	25	40	47	25	Rd40×1/6
	32	40	47	32	Rd48×1/6
	38	40	47	40	Rd60×1/6
	51	40	47	50	Rd70×1/6
	63.5	40	47	57	Rd85×1/6
	76	40	47	76	Rd98×1/6
IDF(1)					
RTJ(1)					

(1) Consult the factory for dimensions.

TABLE 47. MLS Sanitary Seal: Dairy Process Connections - Male Thread Ordering Information

Code	Industry Standard	
S	Sanitary	
Code	**Process Connection Style**	
MLS(1)(2)	Male Thread per DIN 11851	
Code	**Process Connection Size**	**Maximum Working Pressure (Flange Rating)**
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**	**Upper Housing**
LA00	316L SST	316L SST (coupling nut same material)
WW00(1)	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)
Code	**Options (Multiple Selections)**	
6	Electrolytical polishing of diaphragm material	
2	Counterpiece (tank/pipe spud) and gasket	

(1) Shaded areas indicate special orders. Consult an Emerson Process Management representative for configuration availability, performance effects, and lead time.

(2) Available with welded capillary or direct connections only.

TABLE 48. MMS, MFS, and MRS Sanitary Seals: Dairy Process Connections - Male Thread Ordering Information

Code	Industry Standard	
S	Sanitary	
Code	**Process Connection Style**	
MMS(1)(2)	Male Thread per SMS Standard	
MFS(2)	Male Thread per IDF Standard	
MRS(2)	Male Thread per RTJ Standard	
Code	**Process Connection Size**	**Maximum Working Pressure (Flange Rating)**
30	DN 38 ($1^1/_2$ in.)	40 bar
50	DN 51 (2 in.)	40 bar
20	DN 25	40 bar
60	DN 63	40 bar
70	DN 76	40 bar
Code	**Diaphragm Material and Wetted Parts**	**Upper Housing**
LA00	316L SST	316L SST (coupling nut same material)
LB00(3)	*Hastelloy* C-276	316L SST
WW00(1)	316Ti SST (WNr 1.4571)	316Ti SST (WNr 1.4571)
Code	**Options (Multiple Selection)**	
6	Electrolytical polishing of diaphragm material	
2	Counterpiece (tank/pipe spud) and gasket	

(1) Shaded areas indicate special orders. Consult an Emerson Process Management representative for configuration availability, performance effects, and lead time.

(2) Available with welded capillary or direct mount connections only.

(3) Diaphragm/Housing Material code LB00 is available with the MRS seal only.

General Information

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

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

- Rosemount 3051S Series (document number 00813-0100-4801)
- Rosemount 3051 Pressure Transmitter (document number 00813-0100-4001)
- Rosemount 1151 Analog Pressure Transmitters (document number 00813-0100-4360)
- Rosemount 2088 Gage and Absolute Pressure Transmitter (document number 00813-0100-4690)
- Rosemount 1199 Instrument Toolkit Software (document number 00813-0100-4017)

NOTE
Many other special-order transmitter/diaphragm seal materials, configurations, and fill fluids are available that are not covered in this document. Contact an Emerson Process Management representative or consult the factory for additional 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 thin, 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 is displaced, transferring the measured pressure through the filled system, through the capillary tubing, to the transmitter element. This transferred pressure displaces the sensing diaphragm in the pressure-sensitive element of the transmitter. This displacement is proportional to the process pressure and is converted electronically to an appropriate current, voltage, or digital HART (Highway Addressable Remote 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.

PERFORMANCE CONSIDERATIONS

Temperature Effects

Temperature effects occur when the fill fluid expands or contracts with fluctuations in the process or ambient temperature. This change in fill volume drives 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 stiffer 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 on page 79 shows that large-diameter diaphragms, which are less stiff, have smaller errors caused by changes in the fill fluid volume. This is the 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 Fahrenheit (cc/cc/F). The amount of expansion varies between fill fluids, as shown in Figure 1, graph 2. Selecting a fill fluid with a smaller coefficient of thermal expansion will help minimize temperature error. Table 1, “Fill Fluid Specifications” on page 3, 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 effects.

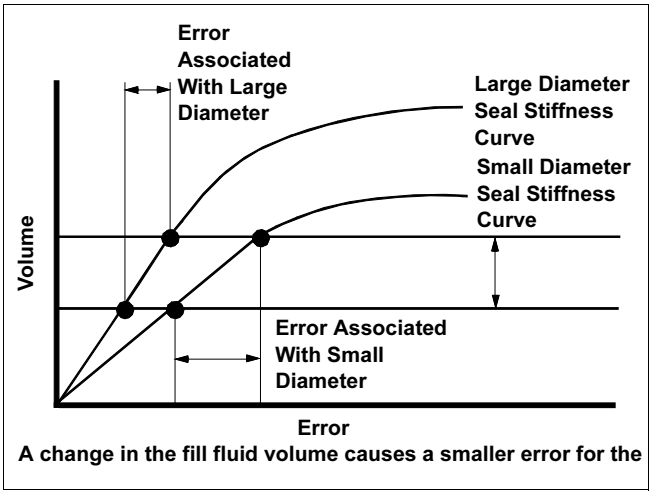
Head Effects

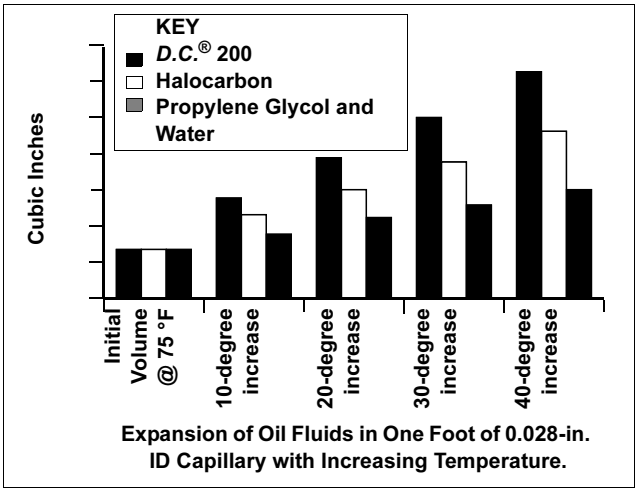
Head effect is a result of a change in the density of the fill fluid in the capillaries. This effect is caused by fluctuations in the process or ambient temperature, and can be additive to temperature effect errors.

Head effects are dependent on the change in ambient temperature, capillary inside diameter and fill fluid, and the distance between process connection taps (not the capillary length).

Consult the Instrument Toolkit program or an Emerson Process Management, Rosemount division representative for more information on temperature or head effects.

FIGURE 1. Diaphragm Stiffness Curves and Effect of Fill Fluid Expansion on Fill Volume





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.

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.

Tuned-Systems versus Balanced System

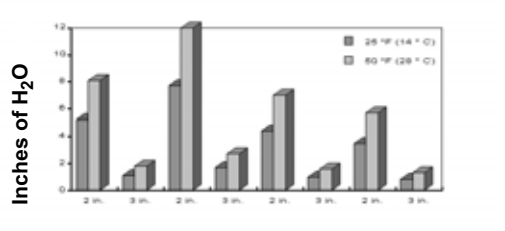
While a balanced system (identical seals/capillary lengths on both sides) only addresses temperature effect, a Tuned-System addresses both head and temperature effect. The Tuned-System yields a reduction in total system error and improves response time. Use Instrument Toolkit software or consult an Emerson Process Management representative to show you how a Tuned-System will improve performance for the application.

Summary

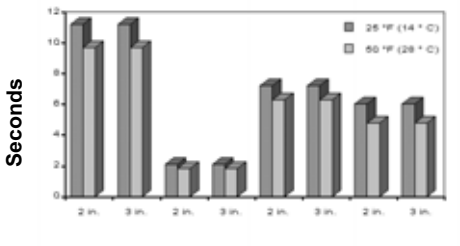
Adding diaphragm seals to a transmitter can affect the overall system performance. Selecting the most appropriate diaphragm seals, capillaries, and fill fluid can minimize these effects, maximize the assembly performance, and still meet or exceed the process demands. Rosemount provides a software program called Instrument Toolkit that considers all of these variables and makes selecting the best performing transmitter/seal system easy. (See “Instrument Toolkit® Software”on page 87 for more information.)

Summary of Temperature Effect and Time Response with Various Seal, Capillary, and Fill Fluid Combinations. (Numbers shown were calculated using Instrument Toolkit software.)

Temperature Effect



Time Response



1199-0138,0139

Seal Diameter	2-in.	3-in	2-in	3-in	2-in	3-in	2-in	3-in
Fill Fluid	*D.C.* 200	*D.C.* 200	*D.C.* 200	*D.C.* 200	*D.C.* 200	*D.C.* 200	Inert	Inert
Capillary Length	15 ft	15 ft	15 ft	15 ft	10 ft	10 ft	10 ft	10 ft
Inside Diameter	0.03 -in.	0.03 -in.	0.07 -in.	0.07 -in.	0.03 -in	0.03 -in	0.03 -in	0.03 -in

Seal Diameter	2-in	3-in	2-in	3-in	2-in	3-in	2-in	3-in
Fill Fluid	*D.C.* 200	*D.C.* 200	*D.C.* 200	*D.C.* 200	*D.C.* 200	*D.C.* 200	Inert	Inert
Capillary Length	15 ft	15 ft	15 ft	15 ft	10 ft	10 ft	10 ft	10 ft
Inside Diameter	0.03 -in.	0.03 -in.	0.07 -in.	0.07 -in.	0.03 -in.	0.03 -in.	0.03 -in.	0.03 -in.

Consider the following when selecting a diaphragm seal system:

- Use larger diameter diaphragms to minimize the temperature effects.
- Keep the 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 the fill fluid that is the least viscous and has the smallest coefficient of thermal expansion while satisfying the most extreme process conditions.

SEAL CONNECTION TYPES

Capillary Style

Capillary style seal connections are available in three ID sizes:

- 0.03–inches (0.7 mm)
- 0.04–inches (1.1 mm)
- 0.07–inches (1.75 mm)

and are available in standard lengths up to 50 ft (15 m), larger capillaries are available upon customer request. Select the ID size and length that is appropriate for the process demands and maximizes system performance.

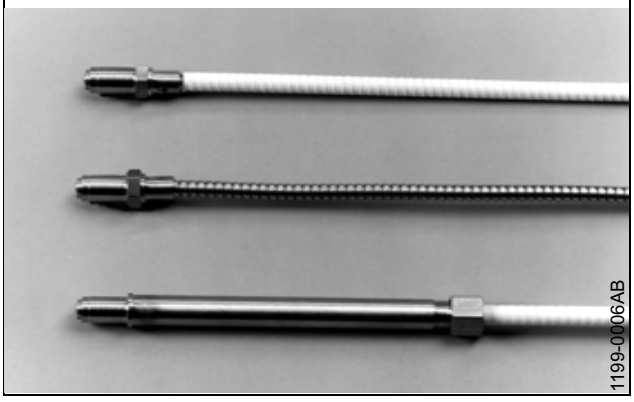
Capillary style seal connections are available in four choices:

- 316 SST armored sleeving
- PVC coating on 316 SST armored sleeving
- 316 armored sleeving, support tube without compression fitting
- PVC coating on 316 armored sleeving, support tube with compression fitting

316 SST armored sleeving is the standard material choice. The optional PVC coating is useful for shielding the armored sleeving from exposure to the sun and for providing a protective coating in sanitary applications.

The support tube provides extra protection for the capillary-to-seal connection. This is a useful option, especially for the Pancake type seal because the capillary connection is located on the side of the seal.

Armored sleeving, PVC Coated Armored Sleeving, and Support Tube Capillaries.



Direct Mount Style

The Rosemount 3051, 1151, and 2088 transmitters with the Rosemount 1199 direct mount style seals are flange mounted directly to the vessel. They provide precise level and specific gravity measurements for a wide variety of tank configurations. The direct mount style connection is available with both General Assembly Seals or Sanitary Seal Assemblies.

The direct mount connection is welded at the seal and the “L” bracket on Rosemount 3051C transmitters, and at the seal and the transmitter flange for the Rosemount 1151 and 2088 transmitters. Table 49: “Typical Transmitter/ Diaphragm Seal Assembly Configurations” on page 84 illustrates the various direct mount seal assembly configurations and weld locations.

Direct Mount Option Code Index

General Assembly Seal Systems

Rosemount 3051

Direct Mount Connection
One Seal Connection = Option Code 93
Two Seal Connection = Option Code 94

2-inch (50 mm) Direct Mount Connection
One Seal Connection = Option Code B3
Two Seal Connection = Option Code B4

4-inch (100 mm) Direct Mount Connection
One Seal Connection = Option Code D3
Two Seal Connection = Option Code D4

Rosemount 3051 (All Welded System)

Direct Mount Connection
One Seal Connection = Option Code 97
Two Seal Connection = Option Code 96

2-inch (50 mm) Direct Mount Connection
One Seal Connection = Option Code B7
Two Seal Connection = Option Code B6

4-inch (100 mm) Direct Mount Connection
One Seal Connection = Option Code D7
Two Seal Connection = Option Code D6

Rosemount 1151

Direct Mount Connection
One or Two Seal Connection = Option Code 92

Sanitary Direct Mount Connection

One or Two Seal Connection = Option Code 99

Rosemount 3051S_T, 3051T and 2088

Direct Mount Connection
One Seal Connection = Option Code 95

DIAPHRAGM SEAL SELECTION

Once performance needs, process conditions, and installation requirements are known, the individual seal components may be selected.

Rosemount Inc. offers a complete variety of seals to meet many application needs. Seal categories include general application and sanitary diaphragm seals. Key features of each of the seal types follow.

General Application Seals

Flanged seals include the flanged diaphragm and flush flanged, which have mounting flanges that assist when aligning the diaphragm with the process connection. The 2-in./DN 50, 3-in./DN 80, and 4-in./DN100 versions of this seal may be used with the diaphragm surface flush with the process or with a flushing connection ring. The smaller sizes (1 in./DN25 and 1½ in./DN40) also include lower housings that enable a larger diaphragm diameter to be used with the smaller connections.

Extended flanged seals provide a choice of extension lengths that mount on a pipe flange and extend in toward the tank wall. It is available in 3-in./DN 80, and 4-in./DN100 process connection sizes with 2-, 4-, 6-in., or custom extension lengths. The diameter of the 3-in./DN80 and the 4-in./DN100 process connection sizes can be sized especially for schedule 40 pipe in headbox applications. See Table 10 on page 25 for ordering and dimensional information.

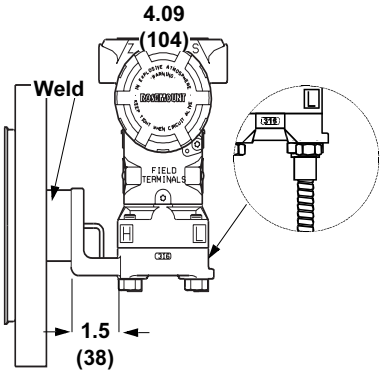
Pancake seals are available in several process connection sizes, with or without a flushing connection ring. The capillary connection is on the side of the seal, enabling use in areas where space is limited or restricted on the outside of the vessel. Because a flange is not a permanent part of this seal, it provides more flexibility in plants where flanges with different pressure ratings are often needed.

Threaded seals provide a variety of process connection thread sizes. With threaded seals, the flushing connection ring screws onto a pipe, and a mounting ring bolted to the flushing connection ring holds the diaphragm in place. Threaded seals are available with or without flushing connections.

Union connection seals were designed as retrofit seals for applications where a specially sized bushing already exists. The supplied union nut threads into this bushing and the seal is flush with the surface.

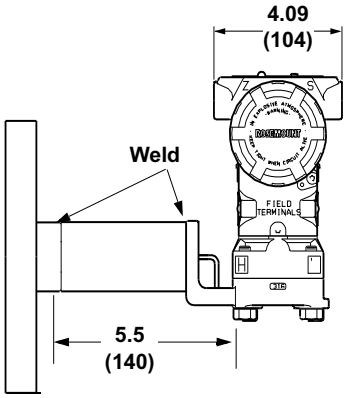
Chemical Tee seals attach to a wedge flow element device (or a Chemical Tee) that requires the eight-bolt connection pattern. This one-size seal fits into any of these flow elements regardless of their size.

Rosemount 1199 Direct Mount Connection Types for General Purpose Seal Systems



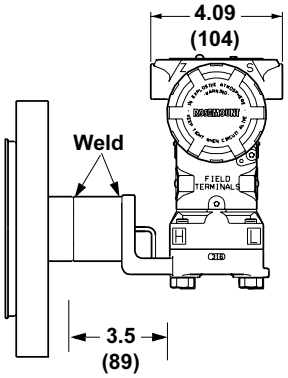
Rosemount 3051
One-Seal System
1199 _ _ _ 93
1199 _ _ _ 97

Rosemount 3051
Two-Seal System
1199 _ _ _ 94
1199 _ _ _ 96
(Add Low Side Capillary)



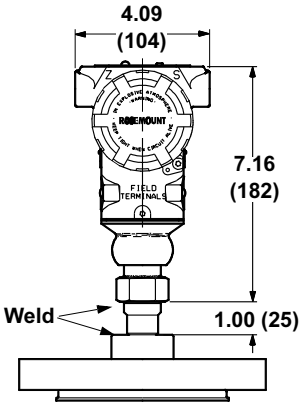
Rosemount 3051
One-Seal System
1199 _ _ _ D3 (4-in. Connection)
1199 _ _ _ D7 (4-in. Connection)

Rosemount 3051
Two-Seal System
1199 _ _ _ D4 (4-in. Conn.)
1199 _ _ _ D6 (4-in. Conn.)
(Add Low Side Capillary)

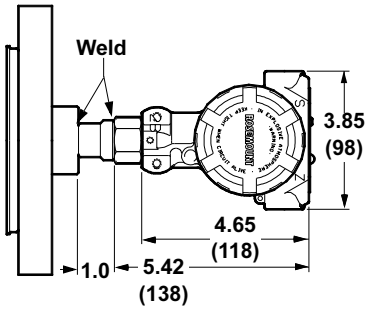


Rosemount 3051
One-Seal System
1199 _ _ _ B3 (2-in. Connection)
1199 _ _ _ B7 (2-in. Connection)

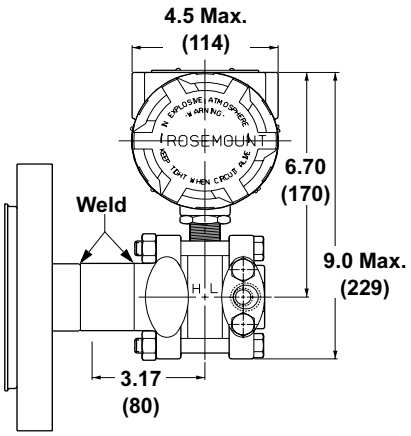
Rosemount 3051
Two-Seal System
1199 _ _ _ B4 (2-in. Conn.)
1199 _ _ _ B6 (2-in. Conn.)
(Add Low Side Capillary)



Rosemount
3051T



Rosemount
2088



Rosemount
1151

NOTES
Dimensions are in inches (millimeters).
Transmitters are shown with Flush Flanged (FFW) Seals.

1191-3031E27A, E27B, E27C, 1199-3051C06A, 1199-2088C07B, 1199-1151C25A

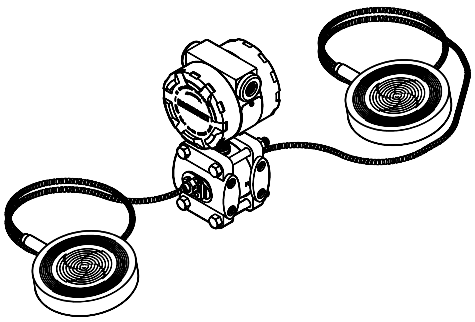
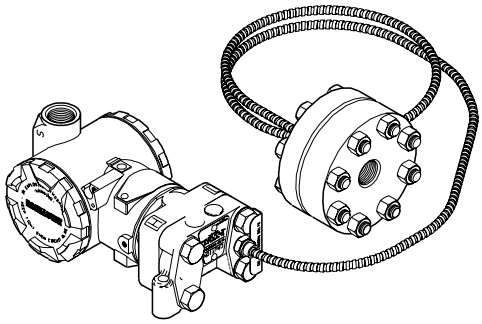
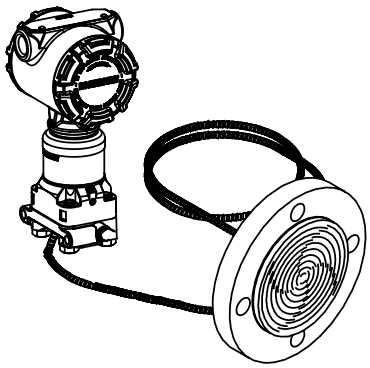
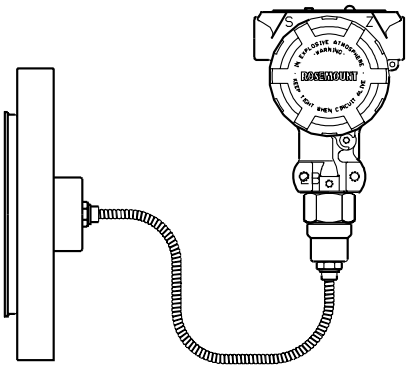
The nature of the application may narrow the selection of a seal from one of these categories. However, if performance is a critical issue, then remember that the primary variable to consider is diaphragm size. In other cases, the need to have a flushing ring, a recessed diaphragm, or a flushed or extended diaphragm should lead you to the best decision.

Extended Flanged, Flush Flanged, and Pancake Seals

3-A Sanitary Seals

S*anitary seals* are designed in accordance with 3-A Sanitary Standard for sensor and sensor fittings and connections used on milk and milk product equipment, number 74-02. This standard requires the product contact surface be free of crevices where bacteria or food may collect, have smooth surfaces, and be easy to remove. Sanitary seals are appropriate for clean-in-place applications. In addition, these seals attach to the process using clamps instead of bolts. The three types of sanitary seals include *Tri-Clamp*® and two types of tank spud seals. *Tri-Clamp seals* fit into *Tri-Clamp* ferrules that are common in sanitary applications. With this seal, the seal surface is recessed from the wall of the pipe or tank. Two types of *tank spud seals* include the sanitary tank spud and thin-wall tank spud seal. The sanitary tank spud seal is available in 2- and 6-in. extensions. The thin-wall tank spud seal features a more compact design, allowing it to fit into a special tank spud for thin wall tanks (this seal is available in only one size).

TABLE 49. Typical Transmitter/ Diaphragm Seal Assembly Configurations

Rosemount 1151 Differential with Rosemount 1199 Pancake Diaphragm Seal Two Seal System	**Rosemount 3051C Differential with Rosemount 1199 Threaded Remote Seal One-Seal System**
	
Rosemount 3051S Gage with Rosemount 1199 Flush Flanged Diaphragm Seal One-Seal System	**Rosemount 2088 with Rosemount 1199 Flanged Diaphragm Seal One-Seal System**
	

High Temperature and Vacuum Applications

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

Fill Fluid Selection

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 in order to remain in the liquid phase at all times. (Be sure to consider temperature and pressure conditions during start-up and system cleaning operations.)

Temperature limits of fill fluids, as shown in Table 1, See “Fill Fluid Specifications” on page 3 are stated for atmospheric pressure conditions; these limits are reduced under vacuum conditions. “Fill Fluid Vapor Pressure Curves” on Page 86 provides the vapor pressure curves for *D.C.* 200, *D.C.* 704, and *Neobee M-20* fill fluids.

Note that the Instrument Toolkit software program makes checking fill fluid compatibility simple and easy by automatically verifying the pressure curve against the process conditions.

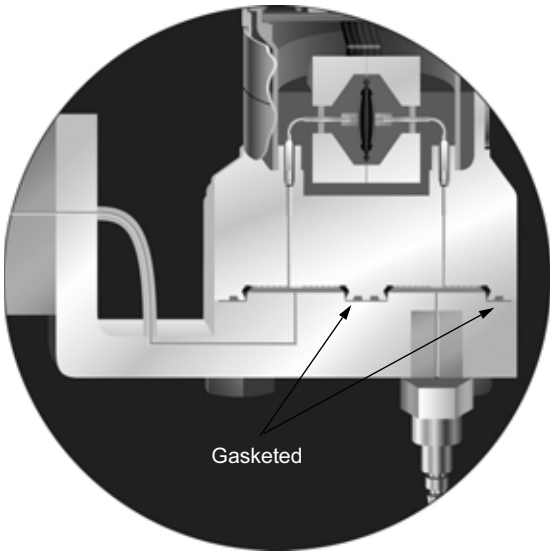
Remote Seal System Construction

1199 remote seal systems are offered in two construction types: *repairable-welded* and *all welded (vacuum)*. The most commonly used construction is the repairable-welded. In this design all of the connection points are welded except the sensor module to transmitter flange, which allows for the repair of the seal system. In this case, the transmitter can be re-used with replacement remote seals attached.

The all welded vacuum construction was designed specifically for high temperature and vacuum applications. In this construction, the sensor module gaskets are removed and a disk is welded over the sensor isolators. This eliminates the possibility of air being drawn into the seal system in deep vacuum conditions. This premium design is strongly suggested for vacuum pressures below 6 psia (310 mmHga).

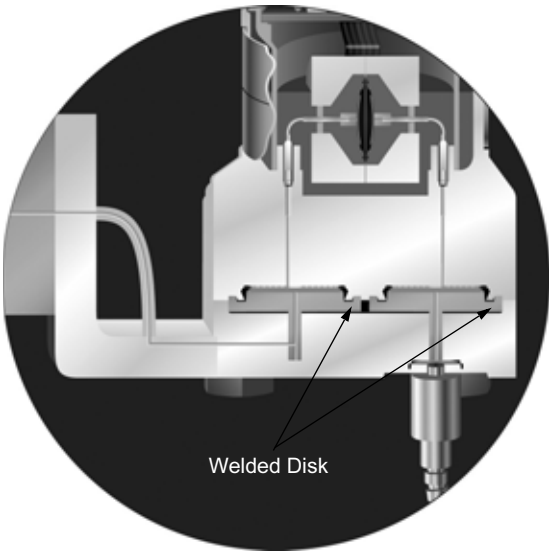
Rosemount 3051 All Welded System

Repairable-Welded Construction



All connection points welded except gasket between sensor module and transmitter flange

All Welded (Vacuum) Construction



All connection points welded including welded disk over sensor module isolators

3051-WeldRepairable-AllWelded

To order the All-Vacuum construction on the Rosemount 3051C, specify S7, S8, S9, or S0 in the 3051Cmodel number and the W seal location in the 1199 model number. To order the All Welded Vacuum system on the Rosemount 3051T, specify S1 in the 3051T model number and the P seal location code in the 1199 model number.

To order an All Welded Vacuum system on the Rosemount 3051S, specific B11 or B12 in the 3051S model number and the P, R, S, or T seal location code in the 1199 model number.

See Table 50 to confirm how the transmitter assemble to code and 1199 seal location codes combine to get Repairable-Welded or All Welded Vacuum construction.

TABLE 50. Remote Seal System Construction Model Codes

Transmitter Type	Transmitter Assemble To Code	1199 Seal Location Code	Repairable -Welded	All Welded Vacuum
3051S_C	B11	R	—	•
3051S_CD	B12	S or T	—	•
3051S_T	B11 or B12	P	—	•
3051S	B12	D	•	—
	B11 or B12	W or M	•	—
3051CD	S1 or S2	W, M, or D	•	—
	S7, S8, S9, or S0	W, M, or D	—	•
3051CG / CA	S1	W	•	—
	S7 or S0	W	—	•
3051T	S1	W or P	—	•
1151	S1 or S2	W, M, or D	•	—
2088	S1	W or P	•	—

Installation

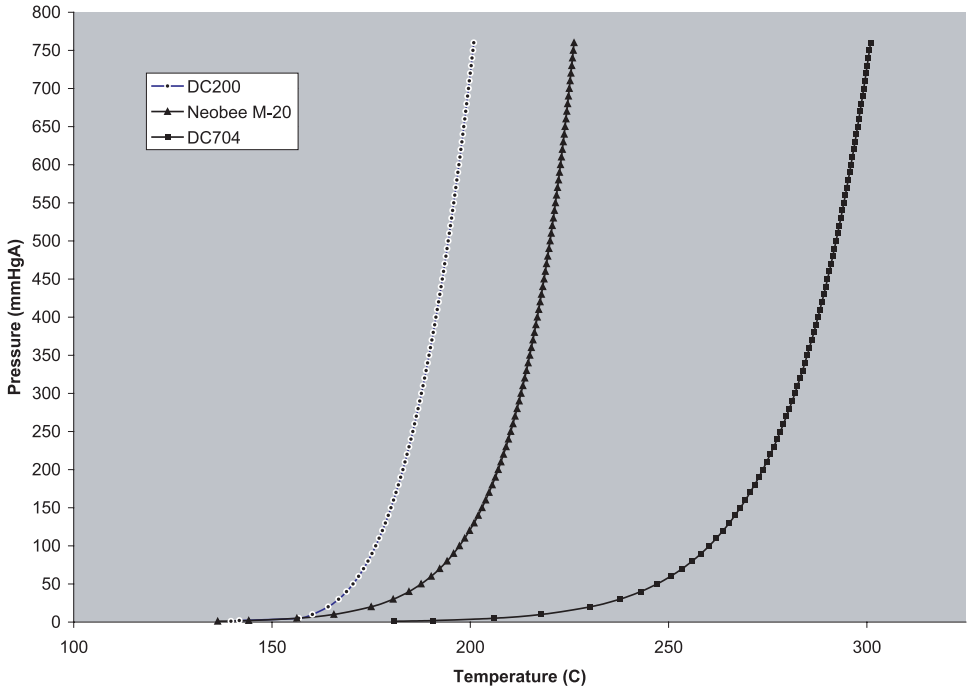
For vacuum applications, to ensure positive pressure at the transmitter, mount the transmitter so that it is level with, or below the lowest tap.

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 in the capillary.

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.

Fill Fluid Vapor Pressure Curves



FILL_VP_CURVE_AA04A

Instrument Toolkit® Software

Rosemount Inc. offers the best tool available for understanding transmitter /seal system assemblies and for making seal selection easy.

The *Instrument Toolkit*® is a *Windows*®-based software package. Whether the application is level, flow, pressure, density, or interface, Instrument Toolkit will assist in selecting the best transmitter-diaphragm seal system for the application. The program will request the application parameters and will then calculate the correct calibration range (See Figure 2). Next, the program will go through transmitter and remote seal model number selection (See Figure 3). Based on the models selected and the application data, Instrument Toolkit will calculate the seal and transmitter/seal system performance (See Figure 4).

Instrument Toolkit uses exclusionary logic to limit the selection of transmitter and seal models which meet the application requirements. The program will not permit the selection of transmitter ranges which do not meet the application span; diaphragm seal models which do not meet the maximum working pressure; or seal fill fluids which do not meet the temperature and vapor pressure limitations.

The Instrument Toolkit Help section includes other tools to assist in Diaphragm Seal selection. seal dimensional drawings, product data, selection fundamentals, technical information, and ordering instructions are included in this section.

Instrument Toolkit also allows the user to generate, view, and print performance and application reports including installation drawings and specification sheets.

Instrument Toolkit considers the following variables to match the best seal system to the application:

- Seal diaphragm thickness, diameter, material, and rigidity
- Fill fluid volume, quality, thermal expansion and vapor pressure characteristics
- Capillary length and inside diameter
- Ambient and process temperatures
- Working and static pressures
- Vacuum applications
- Transmitter location and performance

FIGURE 2. Seal System Calibration Screen

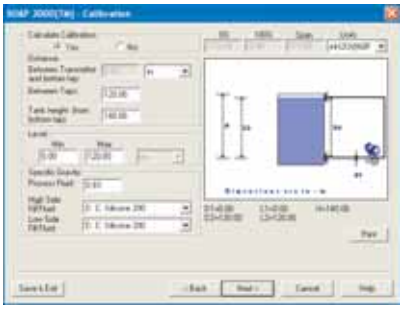


FIGURE 3. Model Number Selection Screen

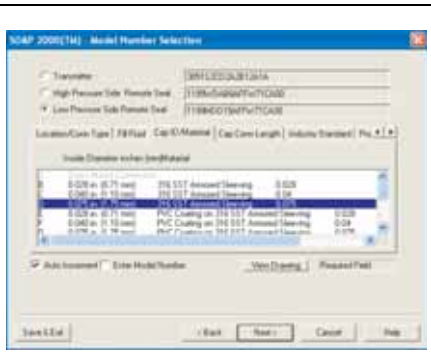
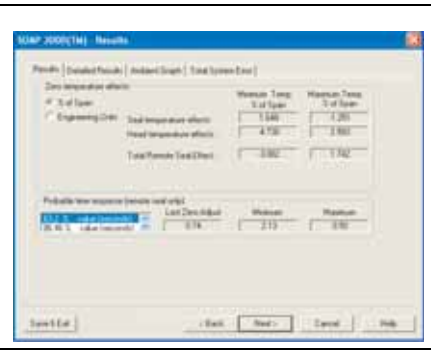


FIGURE 4. Results Screen



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 0.020 in. (0.051 cm) thick with 0.125 in. (0.318 cm) high letters. A permanently attached tag is available upon request. The remote seal model number is identified on the transmitter nameplate.

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.

Custom Configurations

Rosemount 3051 (Option Code C1)
If code C1 is ordered, the customer may specify the following data in addition to the standard configuration parameters. Refer to the respective configuration data sheet within the device PDS.

Descriptor: 16 alphanumeric characters.

Message: 32 alphanumeric characters.

Date: Day, month, year.

Damping: Sec.

Rosemount 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 the respective configuration data sheet within the device PDS.

4 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

Configuration Data Sheet

Date:_____ Service:_____

Customer:_____ Tag:_____

Address:

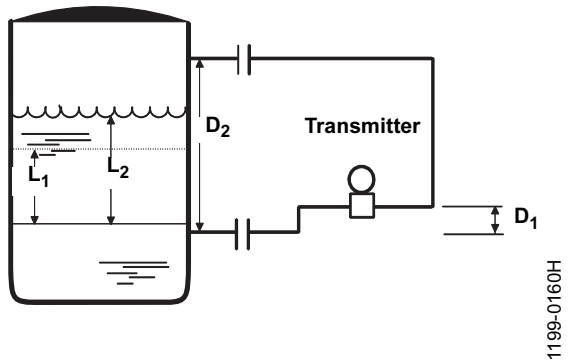
Attention:_____ Department:_____

Telephone:_____ Fax:_____

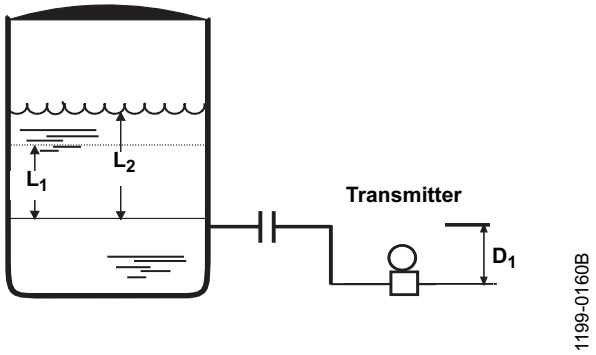
Order Number:_____ Project:_____

Quantity:_____ Delivery Date:_____

Closed Tank



Open Tank



NOTE
Transmitter mounting below high pressure tap recommended for vacuum applications: minimum D_1 value one meter.

D_1= _____ D_2 =_____

L_2 = _____ L_1 =_____

Key

L_2 = Maximum level

L_1= Minimum level

D_2 = Distance between taps

D_1 = Distance between transmitter and high pressure tap.

PROCESS DATA

Working Pressure: Max._____ Min. _____

Minimum (Vacuum) Pressure: _____

Process Temperature (High Side):Max._____ Min. _____

Process Temperature (Low Side):Max._____ Min. _____

Ambient Temperature (High Side):Max._____ Min. _____

Ambient Temperature (Low Side):Max._____ Min. _____

Describe Vessel Cleaning Process: _____

Process Fluid:Specific Gravity: _____

Name of Application: _____

Required Response Time: _____

Required percent of Span Accuracy: _____

Other:

Notes:

HIGH PRESSURE SIDE

Industry Standard:_____ (ANSI, DIN, JIS)

Seal Type: _____ Process Connection Type:_____

Process Connection Size:_____ Gasket Surface Type:_____

Materials Type:_____

Other:

LOW PRESSURE SIDE

Industry Standard: _____ (ANSI, DIN, JIS)

Seal Type: _____ Process Connection Type:_____

Process Connection Size:_____ Gasket Surface Type:_____

Materials Type:_____

Other:

Rosemount 1199

Product Data Sheet
00813-0100-4016, Rev GA
Catalog 2006 - 2007

Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Pressure – Level or Interface Measurement

Emerson has a complete line of Rosemount pressure transmitters and remote seals for measuring level or interfaces in liquid applications. Optimize performance with direct mount, Tuned Seal systems:

- Rosemount 3051S_L, 3051L, and 1151LT Liquid Level Transmitters
- Rosemount 1199 Remote Diaphragm Seals with direct mount or capillary connections

Guided Wave Radar – Level and Interface Measurement

The reliable Rosemount 3300 Series consists of:

- Rosemount 3301 for level measurements of liquids and solids
- Rosemount 3302 for level and interface measurement of liquids

Both can be equipped with a wide range of probes for different applications.

Non-contacting Radar – Level Measurement

The Rosemount non-contacting radar family consists of:

- Rosemount 5400 Series Transmitter. The two loop-powered models utilize different transmitter frequencies, and both can be equipped with a wide range of antennas for liquid level measurement in most applications and process conditions.
- Rosemount 5600 Series Transmitter. These radar level transmitters have ultra-high sensitivity and are the perfect choice for measuring level of liquids and solids, even for the most challenging applications.

Vibrating Fork Switches – Point Level Detection

The Rosemount 2100 Series is developed for reliable point level measurement of liquids and consists of:

- Rosemount 2110 Compact Vibrating Fork Liquid Level Switch
- Rosemount 2120 Universal Vibrating Fork Liquid Level Switch

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

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