

ABB MEASUREMENT & ANALYTICS | DATA SHEET

S261

Remote seals with capillary tube



Measurement made easy

Engineered solutions for all applications

Wide range of remote seal types

- Allows optimum design for each application without compromising performance

Large selection of options, materials and fill fluids

- Meets nearly all process requirements

Designed for use with the 2600T pressure transmitter

- Combines an economically feasible and technically sound solution that ensures total reliability from line pressure to full vacuum

Special designed remote seals for individual process solutions

- Local configuration via operating buttons on LCD indicator

Remote Seals Overview

The S261 seals are used in combination with 261 transmitters for gauge or absolute pressure measurements.

The seal is connected to the relevant transmitter via a capillary system that links the transmitter sensor to a "remote" seal of any type.

The S26 Series Seal System is a protective device used to isolate 2600T series transmitters from the process fluid. The seal system provides a flexible diaphragm between the process fluid and a liquid filled capillary tube connected to the body of the transmitter. The diaphragm isolates the process fluid while the filled capillary tube hydraulically transmits the process pressure to the transmitter sensor. The remote seal capillary is corrosion-resistant with robust construction in stainless steel with spiral armor protection, and an optional PVC jacket.

For certain applications, it is necessary to use a remote seal in order to suit specific process conditions, e.g.:

- The process fluid has solids in suspension or is highly viscous and can foul impulse lines.
- The process fluid can solidify in impulse lines or the transmitter.
- The transmitter must be located in a separate area from a hazardous process fluid.
- The process temperature exceeds the recommended limits for the transmitter.
- The transmitter must be located in a separate area from the process for easier maintenance.

The S26 series is available with process connections for ASME or DIN pipe flanges. Extended diaphragm remote seals, suitable for connection to 2-, 3- or 4-inch resp. DN 50, DN 80 or DN 100 flanged tank nozzles or flanged tees, permit the seal diaphragm to be located flush with the inside of a tank or pipe. FDA approved fillings and compliance with 3-A Sanitary Standards are also available.

Fill fluids with FDA approval are defined as food fills and are Generally Recognized As Safe (GRAS) by the US Food and Drug Administration (FDA).

Seal system selection criteria

The application of an S26 system in direct mount or remote seal configuration to 2600T transmitters affects performance of the original device.

These effects are shown in:

- Accuracy
- Temperature effect
- Dynamic response

Accuracy

Accuracy is only marginally affected when seal diaphragm stiffness is relevant low compared with sensor stiffness. High stiffness of diaphragm associated with low URL might produce increased errors of linearity, hysteresis and long-term stability and has effect to the behavior of changing process- and environment conditions.

Temperature effect

The S26 system has an effect on temperature performance of the complete transmitter. Errors primarily affect the zero position of units. They are caused by a temperature-dependent change in volume of the fill fluids in the seal system. The change in volume must be absorbed by the seal diaphragm. Depending on the stiffness of the diaphragm, additional pressure may form in the fill fluid, resulting in a zero error.

The level of error depends on the stiffness of the seal diaphragm and the thermal expansion coefficient of the fill fluid.

Dynamic response

Application of S26 seal to transmitters increases the original time response. The amount of the increase depends on the number of elements and condition of the instrument as follows:

- transmitter sensor range
- fill fluid viscosity of the S26 system applied
- ambient and process temperature
- capillary length

The delay introduced by the seal may be added to the time constant of the associated transmitter.

To obtain the best application solution:

- choose the sensor code with URL closest to the application SPAN.
- select largest diameter diaphragm seal related to URL.
- keep the capillary length as short as possible
- Use fluids with as low as possible viscosity and minimal thermal expansion
- In vacuum applications, mount the transmitter primary 30 cm / 12 inches or more below the lower seal connection.

Ordering code

The transmitter and each seal system are each identified by a product code number. The code numbers are listed on the type plate of the transmitter, and each character stands for a special product feature. Refer to ordering information for a detailed explanation of the product code numbers.

A typical example of the product code is as follows:

Transmitter product code: 261GRR21_L1 B2

Seal System Product Code: S261FHBEFSACS

If remote seal applications not described in this data sheet are required, custom applications are available. Please allow ABB to check the existing options in this case by providing the application as well as process and ambient temperature. The following table shows the types of standard seals described in this data sheet.

ABB can also work with you to develop a special remote seal for applications requiring individual solutions.

Please contact your local ABB office or representative for additional information.

Filling fluids (applications)	ID	Density at 20 °C in kg/m ³	Thermal expansion (x10 ⁻⁴ /K)	Process temperature	Pressure in kPa abs.					
					20 °C (68 °F)	100 °C (212 °F)	150 °C (302 °F)	200 °C (392 °F)	250 °C (482 °F)	375 °C (707 °F)
Silicone oil	IL	935	10,8	-30 to 250 °C (-22 to 482 °F)	>0,5	>0,5	>1,5	>11	>100	>
Fluorocarbon	G5	1830	10,9	-30 to 150 °C (-22 to 302 °F)	>0,3	>3,5	>32,5	>	>	>
High temperature oil	SH	1070	7,7	-10 to 375 °C (14 to 707 °F)	>0,07	>0,07	>0,07	>0,07	>1,6	>100
White oil (FDA)	WB	849	7,9	-6 to 200 °C (21 to 392 °F)	>50	>100	>100	>100	>100	>
Silicone oil for vacuum-tight design	IL-V	935	10,8	-30 to 250 °C (-22 to 482 °F)	>0,07	>0,07	>0,5	>4,5	>38,5	>
White oil (FDA) for vacuum-proof design	WB-V	849	7,9	-6 to 200 °C (21 to 392 °F)	>0,5	>2,5	>5	>100	>	>

Important

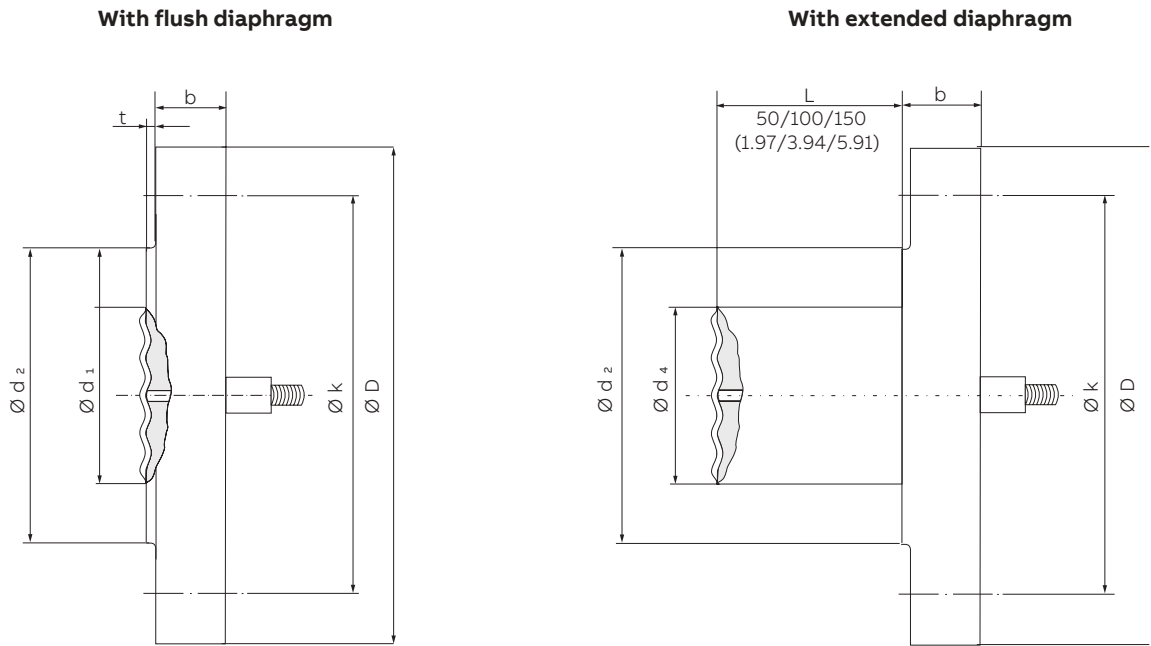
Seals with diaphragm made of Tantalum should not be used with temperatures more than 220°C.
Seals dimensions on the following pages are in mm (inch).

S261F Model Flanged Flush and Extended Diaphragm Remote Seal

The flush and extended diaphragm remote seal is designed to connect to ASME or DIN flanged pipe fitting.

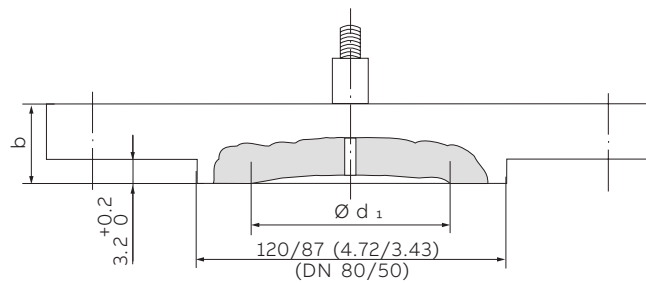
Seal dimensions

Flush diaphragm remote seals



M00197

Form V13 sealing surface



M00199

...S261F Model Flanged Flush and Extended Diaphragm Remote Seal

Sealing surface

Form RF (ASME B 16.5), EN 1092-B2 (DIN 2526-E), EN 1092-D (DIN 2512-N)

Measurements in mm/inches

Size	Pressure rating	Ø D	Ø k	Extension Ø d ₄	Ø d ₁	Ø d ₂
DN 50	PN 16 / 40	165 (6.50)	125 (4.92)	48,3 (1.9)	57 (2.24)	102 (4.02)
DN 50	PN 63	180 (7.09)	135 (5.31)	48,3 (1.9)	57 (2.24)	102 (4.02)
DN 50	PN 100	195 (7.68)	145(5.71)	48,3 (1.9)	57 (2.24)	102 (4.02)
DN 80	PN 16 / 40	200 (7.87)	160 (6.30)	73 (2.87)	75 (2.95)	138 (5.43)
DN 80	PN 63	215 (8.46)	170 (6.69)	73 (2.87)	75 (2.95)	138 (5.43)
DN 80	PN 100	230 (9.06)	180 (7.09)	73 (2.87)	75 (2.95)	138 (5.43)
DN 100	PN 16	220 (8.66)	210 (8.27)	94 (3.70)	89 (3.50) ¹⁾	188 (7.40)
2 in	Class 150	152.4 (6.00)	120.6 (4.75)	48,3 (1.9)	57 (2.24)	92.1 (3.63)
2 in	Class 300	165.1 (6.50)	127 (5.00)	48,3 (1.9)	57 (2.24)	92.1 (3.63)
2 in	Class 600	165.1 (6.50)	127 (5.00)	48,3 (1.9)	57 (2.24)	92.1 (3.63)
3 in	Class 150	190.5 (7.50)	152.4 (6.00)	73 (2.87)	75 (2.95)	127 (5.00)
3 in	Class 300	209.5 (8.25)	168.3 (6.63)	73 (2.87)	75 (2.95)	127 (5.00)
3 in	Class 600	209.5 (8.25)	168.3 (6.63)	73 (2.87)	75 (2.95)	127 (5.00)
4 in	Class 150	230 (9.06)	190.5 (7.50)	94 (3.70)	89 (3.50)	158 (6.22)

Size	Pressure rating	t	b	Screws required		Weight in kg	
				Number	Ø bore hole	Flush diaphragm	With extended diaphragm
DN 50	PN 16 / 40	2 (0.08)	20 (0.79)	4	18 (0.71)	3,3	4
DN 50	PN 63	2 (0.08)	26 (1.02)	4	22 (0.87)	4,5	5,2
DN 50	PN 100	2 (0.08)	28 (1.10)	4	26 (1.02)	5,8	6,5
DN 80	PN 16 / 40	2 (0.08)	24 (0.94)	8	18 (0.71)	5,8	7,5
DN 80	PN 63	2 (0.08)	28 (1.10)	8	22 (0.87)	6,9	8,6
DN 80	PN 100	2 (0.08)	32 (1.26)	8	26 (1.02)	9,4	11,1
DN 100	PN 16	2 (0.08)	22 (0.87)	8	18 (0.71)	5,9	6,8
2 in	Class 150	1.6 (0.06)	19,1 (0.75)	4	19.1 (0.75)	2,3	4
2 in	Class 300	1.6 (0.06)	22,4 (0.88)	8	19.1 (0.75)	3,7	5,4
2 in	Class 600	6.35 (0.25)	25,4 (1.0)	8	19.1 (0.75)	4,5	6,2
3 in	Class 150	1.6 (0.06)	22,2 (0.87)	4	19.1 (0.75)	5,3	7
3 in	Class 300	1.6 (0.06)	28,4 (1.12)	8	22.4 (0.88)	7,3	9
3 in	Class 600	6.35 (0.25)	31,8 (1.25)	8	22.4 (0.88)	9,1	10,8
4 in	Class 150	1.6 (0.06)	24 (0.94)	8	19.1 (0.75)	7,7	8,6

¹⁾ not available for form V13 sealing surface

Specifications

Maximum Working Pressure

DIN PN 16/PN 40: 4 MPa, 40 bar, 580 psi
 DIN PN 63: 6,3 MPa, 63 bar, 913 psi
 DIN PN 100: 10 MPa, 100 bar, 1450 psi
 Standard temperature 50° C (122 °F); as temperature increases the permissible pressure load capacity decreases acc. to EN 1092-1
 ASME CL 150: 1,59 MPa, 15,9 bar, 230 psi
 ASME CL 300: 4,14 MPa, 41,4 bar, 600 psi
 ASME CL 600: 8,27 MPa, 82,7 bar, 1200 psi
 Standard temperature 38 °C (100 °F); as temperature increases the permissible pressure load capacity decreases acc. to ASME B16.5

Vacuum Service

Same as fill fluid limits. Refer to table A.

Process Temperature Limits

Same as fill fluid limits. Refer to table A.

- 220 °C (428 °F) for tantalum diaphragm.
- 150 °C (302 °F) for use with FEP anti-stick coating.

Temperature effect

The following table shows the temperature effect for a 20 K (36 °F) change, detailed separately for:

- the remote seal
- the capillary tube per meter
- the transmitter (in addition to the transmitter data sheet) when filling IC silicone oil and stainless steel diaphragm materials.

When using a different filling than silicone oil, the errors can be multiplied by the quotient of thermal expansion coefficient of actual filling divided by the thermal expansion coefficient of silicone oil (filling X / silicone oil). (See table "Fill fluid properties".)

S261F flanged remote seal, connected to 261GR

Additional effect for each 20 K (36 °F) temperature change

	Size	System (sensor) error			Capillary error per meter			Seal error		
		kPa	mbar	in H ₂ O	kPa	mbar	in H ₂ O	kPa	mbar	in H ₂ O
Flush diaphragm	2 in / DN 50	0.02	0.2	0.08	0.015	0.15	0.06	0.06	0.6	0.24
Flush diaphragm	3 in / DN 80	0.01	0.1	0.04	0.008	0.08	0.032	0.02	0.2	0.08
Flush diaphragm	4 in / DN 100	0.01	0.1	0.04	0.008	0.08	0.032	0.03	0.3	0.12
Extended diaphragm	2 in / DN 50	0,04	0.4	0.16	0.035	0.35	0.14	0.16	1.6	0.64
Extended diaphragm	3 in / DN 80	0.01	0.1	0.04	0.008	0.8	0.02	0.16	0.2	0.08
Extended diaphragm	4 in / DN 100	0.01	0.1	0.04	0.008	0.8	0.03	0.02	0.3	0.12

...S261F Model Flanged Flush and Extended

Ordering information

S261F Flanged Remote Seal, DN 50 / DN 80 / DN 100 / 2 in. / 3 in. / 4 in.	S261F	X	X	X	X	X	X	X	X
Transmitter Side of Connection									
High side		H							
Size / Pressure Rating									
2 in. / ASME CL 150			A						
2 in. / ASME CL 300			D						
2 in. / ASME CL 600			G						
3 in. / ASME CL 150			B						
3 in. / ASME CL 300			E						
3 in. / ASME CL 600			H						
4 in. / ASME CL 150			C						
DN 50 // DIN PN 16 / PN 40			M						
DN 50 / DIN PN 63			P						
DN 50 / DIN PN 100			R						
DN 80 // DIN PN 16 / PN 40			L						
DN 80 / DIN PN 63			Q						
DN 80 / DIN PN 100			S						
Mounting Flange Material / Seat Finish									
AISI 316L SST (1.4404) / Form RF (ASME B 16.5)		(1)	E						
AISI 316L SST (1.4404) / EN 1092 - B2 (DIN 2526 - Form E)		(2)	S						
AISI 316L SST (1.4404) / EN 1092 - B1 (DIN 2526 - Form D)		(3)	4						
AISI 316L SST (1.4404) / EN 1092 - E (DIN 2513 - V13)		(2)	M						
AISI 316L SST (1.4404) / EN 1092 - D (DIN 2512 - N)		(2)	N						
Extension Length / Material									
Flush			F						
50 mm (2 in.) / AISI 316L SST (1.4404)			1						
50 mm (2 in.) / Hastelloy C-276			2						
100 mm (4 in.) / AISI 316L SST (1.4404)			3						
100 mm (4 in.) / Hastelloy C-276			4						
150 mm (6 in.) / AISI 316L SST (1.4404)			5						
150 mm (6 in.) / Hastelloy C-276			6						
Diaphragm Material									
AISI 316L SST (1.4435), NACE		(4)	S						
Hastelloy C-276, NACE		(5)	H						
Tantal, NACE		(6)	T						
AISI 316L SST (1.4435) with FEP anti-stick coating, NACE		(6)	1						
Hastelloy C-276 with FEP anti-stick coating, NACE		(6)	2						
Capillary Protection									
AISI 304 SST (1.4301) armour							A		
AISI 304 SST (1.4301) armour with PVC protective cover		(7)	B						
Capillary Length									
1 m (3 ft)								A	
2 m (7 ft)								C	
4 m (13 ft)								G	
6 m (20 ft)								L	
8 m (27 ft)								Q	
11 m (37 ft)								W	
16 m (53 ft)								V	
Special Length between 1 m and 16 m (Additional cost: 21.80 Euro per m)								Z	
Fill Fluid									
Silicone oil									S
Silicone oil for high temperatures, max. 375 °C									H
White oil (FDA approved)								(8)	W
Inert fluid								(9)	N
Silicone oil for vacuum applications									L
White oil (FDA approved), for vacuum applications								(8)	Y

(1) Not available with Size / Pressure Rating code L, M, P, Q, R, S, T

(2) Not available with Size / Pressure Rating code A, B, C, D, E, G, H, T

(3) Only available with Size / Pressure Rating code T

(4) Not available with Extension Length / Material code 2, 4, 6

(5) Not available with Extension Length / Material code 1, 3, 5. Not available with Mounting Flange Material / Seat Finish code N

(6) Not available with Extension Length / Material code 1, 2, 3, 4, 5, 6. Not available with Mounting Flange Material / Seat Finish code N

(7) Price per meter

(8) Suitable for food applications

(9) Suitable for oxygen applications

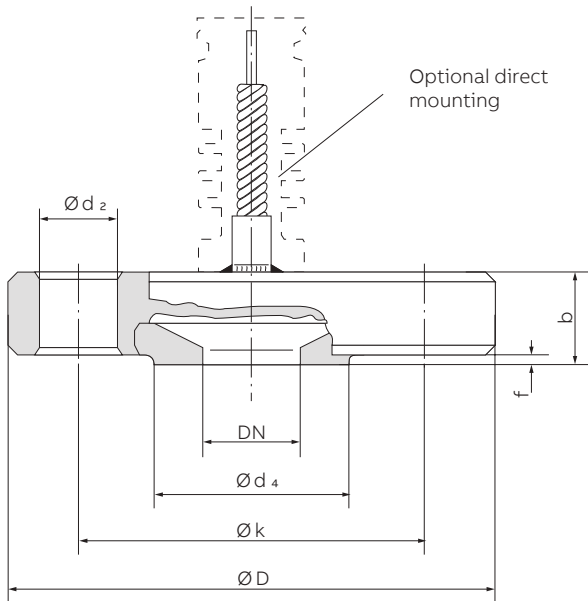
S261M Model off-line flanged connection remote seal

The off-line flanged connection remote seals are designed to connect directly to ASME or DIN flanged tank nozzle.

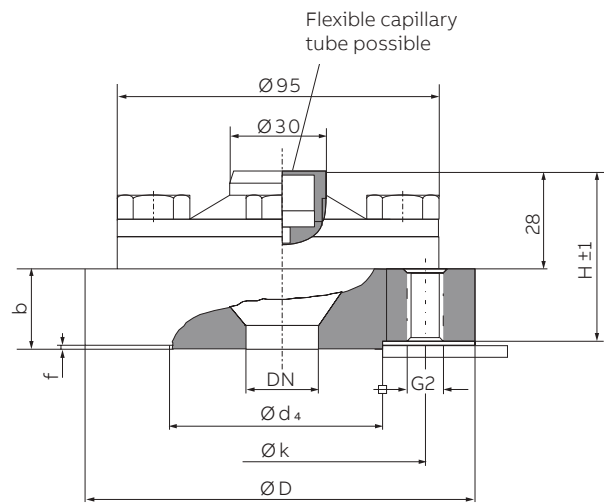
Seal dimensions

Remote seal with flush diaphragm DN 25/ DN 1 in

With internal diaphragm
PN 10 / 40 or class 150 / 300



With internal diaphragm
PN 63 to 250 or class 600 / 1500



M00200

Process connection acc. to EN 1092-1 Form B1 / DIN 2501 Form D

Measurements in mm/inches

Size	Pressure	D	K	d_4	d_2	b	f	H	G2	Weight in kg
DN 25	PN 10/40	115 (4.53)	85 (3.35)	68 (2.68)	14 (0.55)	22 (0.87)	2 (0.08)	-	-	1,5
DN 25	PN 63/100	140 (5.51)	100 (3.94)	68 (2.68)	-	24 (0.94)	2 (0.08)	52 (2.05)	4 x M16	3,2
	PN 160	140 (5.51)	100 (3.94)	68 (2.68)	-	28 (1.10)	2 (0.08)	52 (2.05)	4 x M16	3,6
	PN 250	150 (5.91)	105 (4.13)	68 (2.68)	-	28 (1.10)	2 (0.08)	56 (2.20)	4 x M20	4,0

Process connection acc. to ASME B 16.5, RF

Measurements in mm/inches

Size	Pressure	D	K	d_4	d_2	b	f	H	G2 UNC	Weight in kg
1 in	Class 150	110 (4.33)	79,5 (3.13)	51 (2.00)	16 (0.63)	22 (0.87)	2 (0.08)	-	-	1,4
	Class 300	125 (4.92)	89 (3.50)	51 (2.00)	20 (0.79)	22 (0.87)	2 (0.08)	-	-	1,7
1 in	Class 600	125 (4.92)	89 (3.50)	51 (2.00)	-	25 (0.98)	7 (0.28)	53 (2.09)	4 x 5/8 in	2,3
	Class 1500	150 (5.91)	101,5 (4.00)	51 (2.00)	-	36 (1.42)	7 (0.28)	64 (2.52)	4 x 7/8 in	4,8

...S261M Model off-line flanged connection remote seal

Specifications

Maximum Working Pressure

DIN PN 10/PN 40: 4 MPa, 40 bar, 580 psi
 DIN PN 63/PN 100: 10 MPa, 100 bar, 1450 psi
 DIN PN 160: 16 MPa, 160 bar, 2320 psi
 DIN PN 250: 25 MPa, 250 bar, 3625 psi
 Standard temperature 50 °C (122 °F); as temperature increases the permissible pressure load capacity decreases acc. to EN 1092-1
 ASME CL 150: 1,59 MPa, 15,9 bar, 230 psi
 ASME CL 300: 4,14 MPa, 41,4 bar, 600 psi
 ASME CL 600: 8,27 MPa, 82,7 bar, 1200 psi
 ASME CL 1500: 20.68 MPa, 206.8 bar, 3000 psi
 Standard temperature 38 °C (100 °F); as temperature increases the permissible pressure load capacity decreases acc. to ASME B16.5

Vacuum Service

Same as fill fluid limits. Refer to table A.

Process Temperature Limits

Same as fill fluid limits. Refer to table A.
 Same as fill fluid limits but not greater than 250° C (482 °F)

Temperature effect

The following table shows the temperature effect for a 20 K (36 °F) change, detailed separately for:

- the remote seal
- the capillary tube per meter
- the transmitter (in addition to the transmitter data sheet) when filling IC silicone oil and stainless steel diaphragm materials.

S261M off-line remote seal, connected to 261GR

Additional effect for each 20 K (36 °F) temperature change

Size	System (sensor) error			Capillary error per meter			Seal error		
	kPa	mbar	in H ₂ O	kPa	mbar	in H ₂ O	kPa	mbar	in H ₂ O
1 in / DN 25	0.025	0.25	0.1	0.025	0.25	0.1	0.06	0.6	0.24

Ordering information

S261M Off-Line Mini-flanged Remote Seal, DN 25 / 1 in.	S261M	X	X	X	X	X	X	X
Transmitter Side of Connection High side	H							
Size / Mounting Flange Rating 1 in. / ASME CL 150 1 in. / ASME CL 300 1 in. / ASME CL 600 1 in. / ASME CL 1500 DN 25 // DIN PN 10 / PN 40 DN 25 // DIN PN 63 / PN 100 DN 25 / DIN PN 160 DN 25 / DIN PN 250			A C E K H L T V					
Mounting Flange Material / Seat Finish AISI 316 SST (1.4401) / Form RF (ASME B 16.5) (NACE) AISI 316 SST (1.4401) / EN 1092 - D (DIN 2512 - N) (NACE) AISI 316 SST (1.4401) / EN 1092 - B1 (DIN 2526 - Form D) (NACE)		(1) (2) (2)	E N 4					
Diaphragm Material AISI 316L SST (1.4435), NACE						S		
Capillary Protection AISI 304 SST (1.4301) armour AISI 304 SST (1.4301) armour with PVC protective cover							A B	
Capillary Length 1 m (3 ft) 2 m (7 ft) 4 m (13 ft) 6 m (20 ft) Special Length between 1 m and 16 m (Max. 6 m for S261M. Additional cost: 21.80 Euro per m)								A C G L Z
Fill Fluid Silicone oil Silicone oil for vacuum applications								S L

(1) Not available with Size / Mounting Flange Rating code H, L, T, V

(2) Not available with Size / Mounting Flange Rating code A, C, E, K

(3) Price per meter

(4) Max. 6 m for S261M

Notes

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Notes

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