

SEAL DIAPHRAGMS

DATA SHEET

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Fuji Electric remote seal diaphragms are dedicated to accurately measure level, density, flow and line pressure in heavy process conditions.

The use of remote seal diaphragms avoids the measuring cell of the transmitter to be directly in contact with the process conditions

The various architectures and the full welded construction provide to the Fuji Electric remote seal diaphragm product offer an excellent reliability in harsh processing conditions such as high static pressure, temperature and corrosiveness as well as viscous, clogging or abrasive processes..

FEATURES

1. Construction

Connection of the remote seal to the measuring cell diaphragms can be done either by a rigid (direct) or capillary architectures. The full welded Fuji Electric design allows a free of gasket path between the remote seal and the differential or gauge measuring cell of the FCX-A IV pressure transmitters.

Depending the nature of the process, specific filling fluids are available to ensure the optimal transmission of the process pressure to the measuring cell.

2. Operating principle

The pressure is applied on the remote seal and transferred by the filling fluid through the capillary path to the measuring cell of the pressure transmitter.

3. Wide variety of materials selection

Depending the process conditions, wetted or non-wetted parts and filling fluids can be selected thanks to the model code definition.

Wetted parts:

SS 316L, Tantalum, Hastelloy, Monel, Titanium, Zirconium, SS 316L with Gold or PFA coating.

Non wetted parts:

SS 316L

Filling fluids:

Standard silicone, fluorinated, sanitary, high temperature and vacuum specific oils. For specific process conditions, please consult Fuji Electric.

4. Diaphragm seal types

According to the connection type and operating conditions different seal types can be defined:

- Flush mounting design from DN40 to DN100.
- Seals with extensions (50 to 200 mm).
- Flanged, screwed or welded neck adapters
- Seals for sanitary applications according DIN, SMS or Tri-Clamp standards.
- For specific needs, please consult Fuji Electric.



FUNCTIONAL SPECIFICATIONS

Remote seal diaphragm assembly:

The remote seal can be assembled on the transmitter either by a direct (rigid) connection (as for level measurement at the bottom of a tank) or by capillary (distant measuring point with high temperature process).

Capillary specifications:

Standard capillary lengths:

1.5 / 3 / 6 m (other upon request)

Inside diameter:

1 mm standard

2 mm for vacuum service, high process temperature applications, short response time requirements

Smallest bending radius of the capillary: 100 mm

Capillary protection sheath:

PVC (-10 °C to +80 °C)

Stainless steel sheath (-40 °C to +350 °C)

Type of process connections:

- Flush mounting
- With diaphragm extension
- With adapter (flanged, screwed or welded).

The adapter is dedicated either to adapt the process connection or to increase the diameter of the membrane and the sensitivity of the measurement

Temperature limits:

Ambiant temperature:

- 40 to 85 °C for transmitters without fluorinated oil
- 10 to +60 °C for transmitters with fluorinated oil

Process temperature:

Rigid assembly: -40 to 150°C (P ≥ 1 atm)

Capillary assembly: Refer to the "Filling fluids and temperatures" section

Pressure limits:

Working pressure:

Limited by the smallest value between the nominal flange rating of the seal diaphragm and the maximum working pressure of the transmitter.

Vacuum limit :

To evaluate the global performances, both the transmitter and the remote seal diaphragm performances must be considered under the reference conditions : standard silicone oil filling, SS 316L seal diaphragm.

PERFORMANCE SPECIFICATIONS

To evaluate the global performances, both the transmitter and the remote seal diaphragm performances must be considered under the reference conditions : standard silicone oil filling, SS 316L seal diaphragm.

Accuracy:

Assembling 1 remote seal diaphragm on a transmitter increases the accuracy error at reference conditions by 0,1% of the span.

Ambiant temperature effect:

Diaphragm seal \ Transmitters	Effect (mbar/10°C)	
	Gauge / Absolute pressure	Capillary (/m)
DN 50/2" - SS 316L	2.03	1.5
DN 80/3" - SS 316L	0.11	0.08
DN80/3" Other diaphragm materials	0.22	0.2
DN100/4" - SS 316L	0.04	0.03
Adaptor - SS 316L	0.11	0.08

Note: The indicated values are in mbar/10°C for capillary length of 1m and internal capillary tube \varnothing of 1 mm

The correction of the zero drift is done at factory level on the complete system (transmitter and remote seals) by an additional temperature correction operation. A thermal insulation or the heating of the capillaries may be necessary to minimize the ambient temperature effect.

Process temperature effect:

Diaphragm seal \ Transmitters	Effect (mbar/10°C)
	Gauge and absolute pressure
DN 50/2" - SS 316L	1.24
DN 80/3" - SS 316L	0.17
DN80/3" Other diaphragm materials	0.73
DN100/4" - SS 316L	0.08
Adaptor - SS 316L	0.17

Response time: (mean values)

Filling fluid	7 th model code	Response time constant (sec)
		0 to 1.3 bar
Std silicone oil	Y, G, N	0.037
Fluorinated oil	W, A, D	0.04
Vacuum or high temperature	V, U, X	0.065

The indicated values are in seconds per meter of capillary length with internal diameter \varnothing 1 mm.

The indicated response time is based on a pressure change of 0 to 100% of the calibrated span at reference temperature of 20°C.

The indicated values do not include the response time of the transmitter.

Filling fluids and temperatures:

7 th model code	Designation	Temperature resistance (°C)		Density (25°)
		P abs \geq 1 bar	P abs < 1 bar	
Y, G, N	Silicone oil	-40 to 180	-40 to 120	0.95
W, D, A	Fluorinated oil	-20 to 250	-20 to 120	1.84
F	Sanitary oil	-10 to 250	-10 to 120	0.94
V	Silicone oil	NA	0 to 200	1.07
U	Silicone oil	0 to 300	NA	1.07
X	Silicone oil	20 to 350	NA	1.09

The indicated values and limits are for the most common applications (standard filling fluids).

Please consult Fuji Electric for special applications regarding the process conditions (temperature, pressure and vacuum conditions).

MODELS CODE SYMBOLS FKH...F

1	2	3	4	5	6	7	8	Notes	DESCRIPTION
S								(6)	Diaphragm extension
Y									Extension length (mm)
A									4 th digit material
B									Code "V"
C									
D									
E									
F									Code "H"
G									
H									
J									
K									Code "B"
L									
M									
P									
R									Code "T"
S									
T									
									Remote seal assembling characteristics
									Mounting assembly
A									Length
B									Protection
C									
D									
G									
H									
K									
L									
S									
									Capillary
									1,5 m
									3 m
									6 m
									Upon request
									Stainless steel sheath
									1,5 m
									3 m
									6 m
									Upon request
									Rigid assembly - Not possible with digit 2 = "R", "W" - Maximum process temperature: 150 °C
									Specific applications and filling fluids for the remote seal
									Treatment
									Filling fluids
Y									None (standard)
W									Silicone oil
F									Fluorinated oil
D									Sanitary fill fluid
G									Fluorinated oil
A									Silicone oil
N									Fluorinated oil - Digit 4 = "V" only
V									Silicone oil
U									
X									
									Very high temperature (0 to 300°C) - No vacuum
									Very high temperature (20 to 350°C) - No vacuum
									Special options
								(7)	Special, no code available

Notes:

- Standard : Raising Face, stock finish ($6.3 \mu\text{m} < \text{Ra} < 12.5 \mu\text{m}$). Other types of flange and surface finish upon request.
 - For $\text{DN} \leq 50$, please consult Fuji Electric regarding process conditions
 - Only for axial diaphragm seal (2nd digit = "A") - No extension possible
 - Maximum process temperature = 150 °C
 - Maximum process temperature = 250 °C
 - Extension available for Digit 3 = 4, 5, 6, 7, 8, 9, H, J, G
- All wetted parts in the same material (diaphragm, extension and gasket surface) for Digit 4 = V, H, B, T
- 7- When no code can be found in the current definition, place a "*" in the corresponding digit code as well as in the 16th digit.



support.help@bennypass.com

www.bennypass.com