

# GAUGE AND ABSOLUTE PRESSURE TRANSMITTER WITH REMOTE SEAL

**DATA SHEET**
**FKP, FKH ...6**

The FKP and FKH models of FCX-AIV series of pressure transmitters accurately measure a gauge and absolute pressure and transmit a proportional 4-20 mA output signal.

The transmitter uses a unique micro-capacitive silicon sensor in combination with a state-of-the-art digital signal processing to provide exceptional performances in terms of accuracy and stability.

FCX-AIV series of pressure transmitters comply with Safety Integrity Level 2 or 3 according to IEC 61508 and IEC 61511 standards.

## FEATURES

### 1. High accuracy

The Fuji Electric's micro-capacitive sensor provides in standard  $\pm 0.1\%$  and  $\pm 0.2\%$  accuracies for gauge and absolute pressure respectively, for all elevated or suppressed calibration ranges without additional adjustments.

### 2. Minimum inventory and design

Electronic parts and transmitter housing are interchangeable among all FCX-AIV transmitters. Gauge and absolute pressure transmitters with remote seals are based on a full welded design with a reduced and optimized volume flange to guarantee a perfect vacuum tightness and high pressure services.

### 3. Minimum environmental influence

The Advanced Floating Cell technology provides a high immunity against temperature variations and overpressure commonly found in the process industry and substantially reduces the overall measurement error.

### 4. HART 7 communication protocol

FCX-AIV series of pressure transmitters can communicate using the universal HART communication protocol. By the use of the HART Device Description files, HART compatible devices can communicate with any FCX-AIV transmitter.

### 5. Application flexibility

Various options are available to address most of the process industry applications, including:

- Full range of hazardous area approvals
- Built-in RFI filter and lightning arrester
- 5 digits local display with engineering units
- Stainless steel electronics housing
- Wide selection of wetted part materials

### 6. Programmable output Linearization Function

The output signal can be linearized using up to 14 pair-points.

### 7. Burnout current flexibility

The burnout current value can be adjusted in the ranges of [3.4; 4.0] and [20.8 ; 22.5] mA and can be compliant with NAMUR NE43 recommendations.

### 8. Contactless local adjustment

An optional LCD unit with 3 push-buttons and magnetic switches allows to configure the transmitter without opening the indicator cover (flameproof approvals for hazardous locations). A magnetic pen is required to enable the 3 magnetic switches (please refer to the "Accessories" section).



## FUNCTIONAL SPECIFICATIONS

### Type:

FKP or FKH : Smart, 4-20 mA + HART communication protocol

### Service:

Liquid, gas, or vapour

### Span, range and overrange limit:

Model	Span limit kPa {bar}		Rangelimits (bar)	Overrange limit (bar)
	Min.	Max.		
	FKP			
FKP□01	0.08125	1.3	-1 to +1,3	10
FKP□02	0.3125	5	-1 to +5	15
FKP□03	1.875	30	-1 to +30	90
FKP□04	6.25	100	-1 to +100	150
	FKH		(bar abs)	(bar abs)
FKH□02	0.08125	1,3	0 to +1,3	5
FKH□03	0.3125	5	0 to +5	15
FKH□04	1.875	30	0 to +30	90

Note: Span higher than 1/10 of the URL is recommended for optimal accuracy.

### Output signal:

4-20 mA with HART communication protocol.

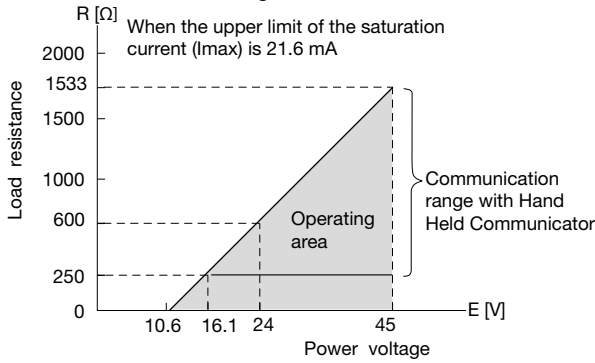
### Power supply :

10.5 to 45 V DC at transmitter terminals.

10.5 to 32 V DC with the optional arrester<sup>4</sup>

Refer to hazardous location table for specific limitations

**Load limitations :** see figure below



Note 1 : The load resistance varies with the upper limit of the saturation current [I max]

$$R [\Omega] = \frac{E [V] - 10.5}{(I_{max} [mA] + 0.9) \times 10^{-3}}$$

Note 2 : For communication with a HART device, a minimum load of 250 Ω is required.

**Hazardous locations:** (Approval pending)

Marking (Digit 10 =)	Protection type	
ATEX	Intrinsic Safety "i":	
	Ex II 1G/D	
	Ex ia IIC T4 Ga (-40°C ≤ Ta ≤ +60°C)	
	Ex ia IIC T5 Ga (-40°C ≤ Ta ≤ +50°C)	
	Ex ia IIIC T <sub>200</sub> 135°C Da (-40°C ≤ Ta ≤ +60°C)	
	Ex ia IIIC T <sub>200</sub> 100°C Da (-40°C ≤ Ta ≤ +50°C)	
	IP 66/67	
	Ui ≤ 28Vdc, Ii ≤ 110mA, Pi ≤ 0.77W	
	Ci = 14.9nF <sub>(1)</sub> /26.0nF <sub>(2)</sub> , Li = 0.18mH	
	(K)	Flameproof Enclosure "d":
		Ex II 2G/D
		Ex d IIC T5 Gb (-40°C ≤ Ta ≤ +85°C)
		Ex d IIC T6 Gb (-40°C ≤ Ta ≤ +65°C)
		Ex tb IIIC T <sub>200</sub> 100°C Db (-40°C ≤ Ta ≤ +85°C)
Ex tb IIIC T <sub>200</sub> 85°C Db (-40°C ≤ Ta ≤ +65°C)		
(X)	45 Vdc max	
	Combination (K) + (X)	
	IECEx	Intrinsic Safety "i":
		Ex ia IIC T4 Ga (-40°C ≤ Ta ≤ +60°C)
		Ex ia IIC T5 Ga (-40°C ≤ Ta ≤ +50°C)
		Ex ia IIIC T <sub>200</sub> 135°C Da (-40°C ≤ Ta ≤ +60°C)
Ex ia IIIC T <sub>200</sub> 100°C Da (-40°C ≤ Ta ≤ +50°C)		
IP 66/67		
Ui ≤ 28Vdc, Ii ≤ 110mA, Pi ≤ 0.77W		
Ci = 14.9nF <sub>(1)</sub> /26.0nF <sub>(2)</sub> , Li = 0.18mH		
(T)		Flameproof Enclosure "d":
		Ex d IIC T5 Gb (-40°C ≤ Ta ≤ +85°C)
		Ex d IIC T6 Gb (-40°C ≤ Ta ≤ +65°C)
		Ex tb IIIC T <sub>200</sub> 100°C Db (-40°C ≤ Ta ≤ +85°C)
		Ex tb IIIC T <sub>200</sub> 85°C Db (-40°C ≤ Ta ≤ +65°C)
		45 Vdc max
(R)	Combination (T) + (R)	
	cCSAus	Intrinsic Safety/Non Incendive/Class 1 Division 2:
		IS Class I Division 1, Groups ABCD Ex ia
		Class II Groups EFG: Class III
		NI Class I Division 2, Groups ABCD (Per control drawing)
		Class I Division 2, Groups ABCD
T4 (-40°C ≤ Ta ≤ +60°C)		
T5 (-40°C ≤ Ta ≤ +50°C)		
Ui ≤ 28Vdc, Ii ≤ 110mA, Pi ≤ 0.77W		
Ci = 14.9nF <sub>(1)</sub> /26.0 nF <sub>(2)</sub> , Li = 0.18mH		
(J)		Explosion proof
		XP Class I Division 1, Groups CD
		Class II Groups EFG: Class III
		T5 (-40°C ≤ Ta ≤ +85°C)
		T6 (-40°C ≤ Ta ≤ +65°C)
	Vmax = 42.4Vdc	
(E)	Combination (J) + (E)	
	ATEX IECEx cCSAus	Combination (K) + (X) + (T) + (R) + (J) + (E)

(1) Without optional arrester  
(2) With optional arrester

**Configuration:**

Configuration of the FCX-AIV series of pressure transmitters can be carried out by either using a HART device or the 3 push-buttons optional indicator.

A third party HART device can be used in combination with Fuji Electric FCX-AIV HART Device Description files. (<https://fieldcommgroup.org>).

Functions	HART Protocol		3 push buttons optional indicator	
	Display	Set	Display	Set
Tag Nb	✓	✓	✓	✓
Model Nb	✓	✓	✓	✓
Serial Nb & Software revision	✓	—	✓	—
Engineering units	✓	✓	✓	✓
Upper Range Value	✓	—	✓	—
Measuring Range	✓	✓	✓	✓
Damping	✓	✓	✓	✓
Output signal type	Linear	✓	✓	✓
	Square Root	✓	✓	✓
Burnout current	✓	✓	✓	✓
Calibration	✓	✓	✓	✓
Output Adjust	—	✓	—	✓
Measuring Value	✓	—	✓	—
Self Diagnosis	✓	—	✓	—
External Adj Screw Lock	✓	✓	✓	✓
Transmitter Display	✓	✓	✓	✓
Linearization	✓	✓	✓	✓
Rerange	✓	✓	✓	✓
Saturation Current	✓	✓	✓	✓
Write Protect	✓	✓	✓	✓
History				
- Calibration History	✓	✓	✓	✓
- Ambient T° History	✓	—	✓	—

**Zero and span adjustment:**

Zero and span are remotely adjustable by a HART device or locally by the three push-buttons LCD unit or the external adjustment screw.

**Damping:**

The damping time constant can be adjusted within the range of [0.04 to 32] seconds.

**Zero elevation/suppression:**

Zero can be adjusted within the range of -1 bar to 100% of the URL of the sensor.

**Normal/reverse action:**

Selectable by range setting

**Local indicator:**

Optional 5-digits LCD unit with 3 push-buttons and magnetic switches. A magnetic pen is required to enable this feature (please refer to the "Accessories" section).

**Saturation currents:**

Lower limit: 3.6 to 4.0mA, Default value: 3.8mA  
Upper limit: 20.0 to 21.6mA, Default value: 20.8mA

**Burnout direction and output current:**

In the self-diagnostic functions detect a transmitter failure, the burnout function will drive the output signal to either "Output Hold", "Output Overscale" or "Output Underscale" modes.

**When "Output Hold":**

The output signal is held as the latest value just before the failure happens.

**When "Output Overscale":**

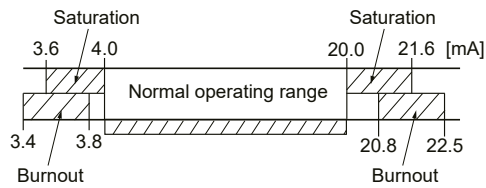
The output signal is set within the range of [20.8 to 22.5] mA, Default value: 21.6mA

**When "Output Underscale":**

The output signal is set within the range of [3.4 to 3.8] mA, Default value: 3.6mA

### IEC 61511 considerations:

For safety applications, the "Output Hold" MUST NOT be used. Only "Output Overscale" and "Output Underscale" must be used to clearly notify a "failure" state.



### Loop-check / fixed output current:

The transmitter can be configured to provide a constant output signal from 3.4 up to 22.5 mA.

### Temperature limit:

Ambient

-40 to +85°C

-20 to +80°C (with the optional LCD unit)

-40 to +60°C (with the optional arrester)

Please refer to the hazardous locations table for ambient temperature limitations according to the standard and type of protection.

Process: Please refer to the remote seal section and type of filling fluids.

Storage: -40 to +90°C

### Humidity limit:

0 to 100% RH (Relative Humidity)

## PERFORMANCE SPECIFICATIONS

Reference conditions, silicone oil filling, SS 316L isolating diaphragms, 4-20 mA analog output in linear mode

### Accuracy rating:

(including linearity, hysteresis, and repeatability)

For span > 1/10 of URL:

±0.1 % of calibrated span (FKP)

±0.2 % of calibrated span (FKH)

For span > 1/10 of URL:

$\pm \left( 0.05 + 0.005 \frac{\text{URL}}{\text{Span}} \right)$  % of span (FKP)

$\pm \left( 0.1 + 0.01 \frac{\text{URL}}{\text{Span}} \right)$  % of span (FKH)

### Stability:

±0.2% of URL for 10 years

### Temperature effect:

Effect per 28°C change between the limits of -40 and +85°C.

#### Model FKP:

Zero shift:  $\pm(0.4 + 0.1 \frac{\text{URL}}{\text{Span}})$  % / 28°C

Total effect:  $\pm(0.475 + 0.1 \frac{\text{URL}}{\text{Span}})$  % / 28°C

#### Model FKH:

Zero shift:  $\pm(0.4 + 0.2 \frac{\text{URL}}{\text{Span}})$  % / 28°C

Total effect:  $\pm(0.475 + 0.2 \frac{\text{URL}}{\text{Span}})$  % / 28°C

### Overrange effect:

Zero shift, 0.3% of URL

for any overrange to maximum limit

### Supply voltage effect:

< 0.005% of calibrated span per 1 V.

### Update rate: 40 msec

### Turn on time: 6 sec

### Response time:

(at 63.3% of output signal without electrical damping)

Time constant: 0.08 sec at 23°C

Dead time: about 0.06 sec

Response time = time constant + dead time

### Electromagnetic compatibility:

FCX-AIV transmitters are in accordance with the following harmonized standards:

EN 61326-1

EN 61326-2-3

EN 61326-3-1

### RFI effect:

< 0.2% of the URL for the frequencies from 20 up to 1000 MHz with an electrical field strength of 10 V/m and housing covers in place. (Classification : 2-abc : 0.2% of span according SAMA PMC 33.1).

### Mounting position effect:

Zero shift:

Less than 0.1kPa (1mbar) for a 10° tilt in any position.

This error can be corrected by adjusting zero. (Double the effect for fluorinated fill sensors.) No effect on span

### Vibration effect:

< ±0.25% of spans for spans greater than 1/10 of URL.

Frequency 10 to 150 Hz, acceleration 29.4 m/sec<sup>2</sup>

### Dielectric strength:

500 V AC, 50/60 Hz 1 min., between circuit and earth (except with the optional arrester)

### Insulation resistance:

More than 100 MΩ at 500 V DC.

### Internal resistance for external field indicator:

12Ω Max (connected to test terminal CK+ and CK-)

### Pressure equipment directive (PED) 2014/68/EU:

According to Article 4.3

## PHYSICAL SPECIFICATIONS

### Electrical conduit connection:

1/2-14 NPT, M20 × 1.5 or Pg13.5

### Non wetted parts material:

Electronic housing:

Low copper die-cast aluminum alloy with polyester coating (standard) or SS 316L (option)

Mounting bracket: SS 316L

### Environmental protection:

IP66, IP67 and Type 4X

### Mounting:

Direct mounting (rigid assembly)

With the optional mounting bracket for 50 mm (2") pipe

### Weight:

Refer to the page 9 and 10

### Diaphragm seal(s) :

Please refer to the remote seal section for detailed specifications.

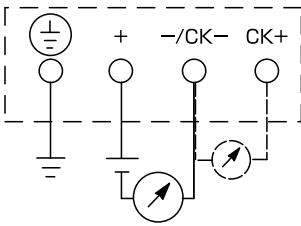
## ACCESSORIES

### Magnet pen:

To be used with the 3 push-buttons optional indicators.

Order number = ZZP\*TQ507742C1

## CONNECTION DIAGRAM



## OPTIONAL FEATURES

### Local indicator:

An optional 5 digit indicator with engineering units is available.

A local configuration can be carried out using the 3 push-buttons version with magnetic switches.

A separately ordered magnet pen is required for adjustment using the 3 magnetic switches (please refer to the "Accessories" section).

### Arrester:

A built-in arrester protects the electronics from lightning surges.

Lightning surge immunity:  $\pm 4$  kV ( $1.2 \times 50 \mu\text{s}$ )

### Optional tag plate:

An extra stainless steel tag plate with customer tag data is wired to the transmitter to the transmitter.

### Vacuum service:

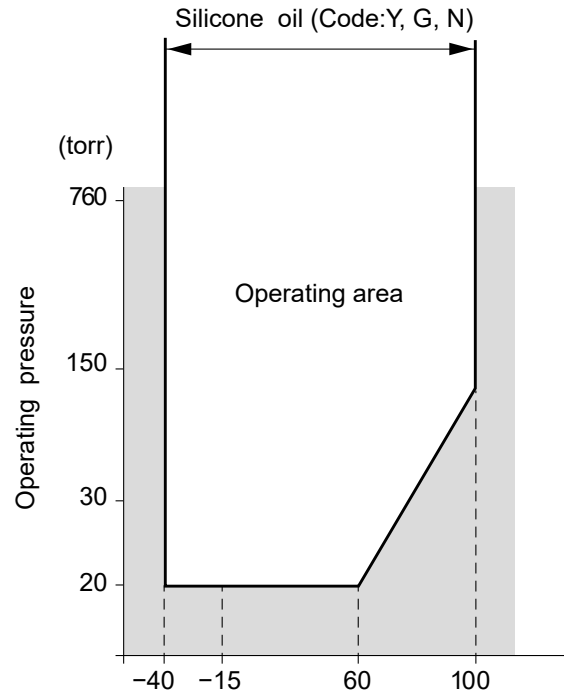


Fig. 1  
Relation between process temperature  
and operating pressure

# MODEL CODE SYMBOLS FKP...F

1	2	3	4	5	6	7	8	9	10	11	12	13	DESCRIPTION	
F	K	P					6				Y			
													<b>Type</b> Gauge pressure with remote seal - Smart, 4-20 mA+ HART communication protocol	
													<b>Conduit connection</b> 1/2 - 14 NPT	
													<b>Enclosure type</b> "L" shape	
													Pg 13,5	
													M20 x 1,5	
													1/2 -14 NPT	
													Pg13,5	
													M20 x 1,5	
													(1) <b>Diaphragm seal rating</b>	
													PN 25	
													PN 20 - 150 lbs	
													PN 50 - 300 lbs	
													PN 40	
													PN 16	
													PN 100 - 600 lbs	
													(2) <b>Measuring range 0...min to max</b>	
													(3) 0...81.25 to 1300 mbarg / 0...8.125 to 130 kPag / 0...1.18 to 18.86 psig	
													0...312.5 to 5000 mbarg / 0...31.25 to 500 kPag / 0...4.53 to 72.52 psig	
													0...1.875 to 30 barg / 0...187.5 to 3000 kPag / 0...27.20 to 435.11 psig	
													0...6.25 to 100 barg / 0...0.625 to 10 MPag / 0...90.65 to 1450.38 psig	
													V	
													6	
													<b>Design revision number</b>	
													<b>Indicator</b>	
													None	
													None	
													Digital, 0-100%	
													Digital, Custom scale	
													Digital, 0-100%	
													Digital, Custom scale	
													Digital, 0-100% with push button	
													Digital, Custom scale with push button	
													Digital, 0-100% with push button	
													Digital, Custom scale with push button	
													A	
													None	
													(4) ATEX - Flameproof	
													ATEX - Intrinsic Safety	
													(4) ATEX - Combination Flameproof and Intrinsic Safety	
													(4) cCSAus - Explosion proof	
													cCSAus - Intrinsic Safety and Non Incendive	
													(4) cCSAus -Combination Explosion proof, Intrinsic Safety and Non Incendive	
													(4) IECEx - Flameproof	
													IECEx - Intrinsic Safety	
													(4) IECEx - Combination Flameproof and Intrinsic Safety	
													(4) IECEx -ATEX - cCSAus - Explosion/flameproof, Intrinsic Safety and Non Incendive	
													<b>Assembling design</b>	
													<b>Ambiant temperature correction</b>	
													Capillary	
													Transmitter and diaphragm seal assembly	
													Transmitter	
													Rigid	
													Transmitter and diaphragm seal assembly	
													Transmitter	
													<b>Stainless steel parts</b>	
													<b>Tag plate</b>	
													<b>Housing</b>	
													None	
													Yes	
													None	
													Yes	
													None	
													Yes	

**Notes:**

- The flange rating is according to the Maximum Working Pressure
- A turn down ratio  $\leq 10$  is recommended for optimal performances
- For DN  $\leq 50$ , please consult Fuji Electric regarding process conditions
- Only with Digit 4 = "T", "W", "6", "8"

MODELS CODE SYMBOLS FKH...F

1	2	3	4	5	6	7	8	9	10	11	12	13	DESCRIPTION																							
F	K	H					6					Y																								
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(4) ATEX - Flameproof																																				
ATEX - Intrinsic Safety																																				
(4) ATEX - Combination Flameproof and Intrinsic Safety																																				
(4) cCSAus - Explosion proof																																				
cCSAus - Intrinsic Safety and Non Incendive																																				
(4) cCSAus -Combination Explosion proof, Intrinsic Safety and Non Incendive																																				
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Stainless steel parts																																				
Tag plate	Housing																																			
Y	Y	None	None																																	
B	Y	Yes	None																																	
C	Y	None	Yes																																	
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B																																				
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E																																				

Notes:

- 1- The flange rating is according to the Maximum Working Pressure
- 2- A turn down ratio ≤ 10is recommended for optimal performances
- 3- For DN ≤ 50, please consult Fuji Electric regarding process conditions
- 4- Only with Digit 4 = "T", "W", "6", "8"

# SEAL DIAPHRAGMS

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

FCX-AIV series of pressure transmitters can communicate using the universal HART communication protocol. By the use of the HART Device Description files, HART compatible devices can communicate with any FCX-AIV transmitter.

### 5. Application flexibility

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

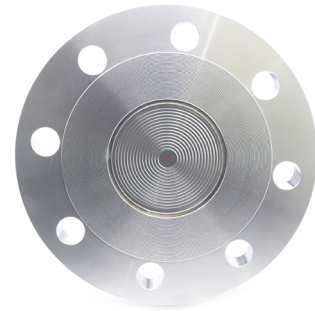
Flush mounting design from DN40 to DN100.

Diaphragm with extensions (50 to 200 mm).

Flanged or screwed adapters

Sanitary applications according to DIN or SMS standards.

For specific needs, please consult Fuji Electric.



## FUNCTIONAL SPECIFICATIONS

### Type:

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, high temperature process).

The rigid assembling can be either "long design" (in line) or "short design" (90°) as shown in the outline dimension drawings.

Type	Rigid mounting	Capillary mounting
FKB	Short or long design	HP side
FKD	Short design on HP side and capillary on LP side	HP and LP side HP side

### Capillary tube 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 tube sheilding possibilities:

Temperature limit:

PVC sleeve: -10 to 80°C  
Stainless steel sheald: -40 to 350°C

### Process connection possibilities:

- For flush mounting

- With extension

- With mounting adapters (flanged or screwed).

The mounting adapter is dedicated to either adapt the remote seal to a specific process connection or increase the sensibility of the measuring diaphragm.

### Temperature limits:

Ambiant temperature:

-40 to 85°C for transmitter

Process temperature:

-40 to 150°C for rigid mounting, 0 to 350°C for capillary design and high temperature filling fluid.

### 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 :

Depends on the limit of the measuring cell and the filling fluid of the remote seal. For the differential or gauge pressure transmitter with the silicone oil, the vacuum limit is 20 Torr or 27 mbar abs.

## 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, 4-20 mA output in linear mode.

### Accuracy:

Assembling 1 or 2 remote seal diaphragms on a transmitter increases the accuracy error at reference conditions by 0,1% of the span.

### Ambiant temperature effect:

Effect when only transmitter is corrected. (See 11th model code G, S, T of the FKB and code G, H of the FKD).

Seals	Transmitters	Effect (mbar/10°C)			
		FKB Gauge pressure	Capillary (/m)	FKD Differential pressure	Capillary (/m)
DN 50/2" - SS 316L diaphragm		2.03	1.5	0.48	0.32
DN 80/3" - SS 316L diaphragm		0.11	0.08	0.04	0.03
DN 80/3" - other diaphragm materials		0.22	0.2	0.05	0.07
DN 100/4" - SS 316L diaphragm		0.04	0.03	0.02	0.01
Adaptor - SS 316L diaphragm		0.11	0.08	0.04	0.03

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

Effect when both the transmitter and the seal assembly are corrected. (See 11th model B, L, M of the FKB and B, C, E of the FKD).

The correction of the zero drift can be done at factory level on the complete system (transmitter and remote seals) by an additional temperature correction operation.

A thermal isolation or a heating of the capillaries minimises the ambient temperature effect.

### Ambiant temperature effect:

Effect when only transmitter is corrected. (See 11th model code G, S, T of the FKB and code G, H of the FKD).

Seals	Transmitters	Effect (mbar/10°C)	
		FKB Gauge pressure	FKD Differential pressure
DN 50/2" - SS 316L diaphragm		1.24	0.5
DN 80/3" - SS 316L diaphragm		0.17	0.09
DN 80/3" - other diaphragm materials		0.73	0.22
DN 100/4" - SS 316L diaphragm		0.08	0.05
Adaptor - SS 316L diaphragm		0.17	0.09

### Static pressure effect for differential pressure transmitter with stainless steel diaphragms (FKD transmitter with DN80 and DN100 seals):

Zero shift:

$\pm 0.2\%$  of URL for flange rating, up to 40 bar or 300 lbs

### Response time: (mean values)

Filling fluid	7 <sup>th</sup> model code	Response time constant (sec)	
		0 to 320 mbar	0 to 1.3 bar
Std silicone oil	Y, G, N	0.15	0.037
Fluorinated oil	W, A, D	0.17	0.04
Oil for vacuum or high temperature	U, X	0.25	0.065

The indicated values are in seconds per meter of capillary length with internal tube 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 fluid of the diaphragm seals:

7 <sup>th</sup> 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 200	-20 to 120	1.84
F	Sanitary oil	-10 to 250	-10 to 120	0.94
V	Silicone oil		20 to 200	1.07
U	Silicone oil	0 to 300	20 to 200	1.07
X	Silicone oil	-10 to 350	20 to 200	1.09

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

Please consult Fuji Electric for special applications indicating your temperature, pressure and vacuum conditions (vacuum and temperature can occur together).

Other filling fluids can be used for your applications.



# MODELS CODE SYMBOLS FKH...F

1	2	3	4	5	6	7	8	DESCRIPTION
S								<b>Remote seal diaphragms</b>
A R W								<b>Flange / Capillary connection</b>
								Axial
								Radial - Not possible with rigid assembling design (digit 6 = "R")
								Wafer type - Not possible with rigid assembling design (digit 6 = "R")
							(1) <b>Flanges RF (flange size and rating)</b>	
4								ANSI-150 Lbs 3" / ISO PN20 DN80
5								ANSI-150 Lbs 4" / ISO PN20 DN100
6								ANSI-300 ILbs 3" / ISO PN50 DN80
7								ANSI-300 Lbs 4" / ISO PN50 DN100
8								DIN PN40 DN80
9								DIN PN16 DN100
H								(2) ANSI - 150 lbs 2" / ISO PN20 DN50
J								(2) ANSI - 300 lbs 2" / ISO PN50 DN50
G								(2) DIN PN40 DN50
K								(11) G 2" screwed seal
L								(11) G 1 1/2" screwed seal
U								PN25 DN50 - coupling nuts      DIN 11851      Digit 4 = "V" only
V								PN40 DN50 - coupling nuts      SMS      Digit 4 = "V" only
W								PN40 DN50 - seal only      Clamp      Digit 4 = "V" only
X								No dead volume      Sanitary      Digit 4 = "V" only
A								(3) Flange adapter PN40 DN25      Digit 4 = "V" only - others upon request
B								(3) Flange adapter ISO PN20 DN25 (1"-150 ANSI)      Digit 4 = "V" only - others upon request
C								(3) Flange adapter ISO PN50 DN25 (1"-300 ANSI)      Digit 4 = "V" only - others upon request
D								(3) Flange adapter PN40 DN40      Digit 4 = "V" only - others upon request
E								(3) Flange adapter ISO PN20 DN40 (1"1/2 - 150 ANSI)      Digit 4 = "V" only - others upon request
F								(3) Flange adapter ISO PN50 DN40 (1"1/2 - 300 ANSI)      Digit 4 = "V" only - others upon request
S								(3) Screwed 1/2 NPTE      Digit 4 = "V" only - others upon request
T								(3) To be welded (2"1/2 pipe)      Digit 4 = "V" only - others upon request
								<b>Seal diaphragm design</b>
								<b>Diaphragm</b> <b>Gasket surface</b> <b>Flange</b>
V								(4) SS 316L      SS 316L      rowspan="6">SS 316L
H								Hastelloy-C      Hastelloy-C
B								Monel      Monel
T								Tantalum      Tantalum
P								(9) Titanium      Titanium
R								(9) Zirconium      Zirconium
C								SS 316L + gold coating      SS 316L
F								(5) SS 316L + PFA lining      SS 316L + PFA lining

**Notes\* :**

- 1- Raising Face, gasket surface standard finishing: 'stock finish' (6.3 µm < Ra < 12.5 µm) Other flange face an finishing upon request
- 2- For DN ≤ 50, please consult Fuji Electric regarding process conditions
- 3- Only for axial seal diaphragm connection - No extension possible
- 4- SS 316L for DN50, DN80, DN100 and flange adapter
- 5- Not possible with digit 7 = "V", "U" and "X"
- 6- All wetted parts in the same material (diaphragm, extension and seal land surface). Available for Digit 3 = 4, 5, 6, 7, 8, 9, H, J, G. Other remote seal on demand
- 7- Vacuum service and high temperature > 120°C : internal capillary diameter = 2mm
- 8- Please consult Fuji Electric regarding the process conditions (minimum pressure, maximum temperature)
- 9- Maximum process temperature: 150°C
- 10- When no code can be found in the current model code, place "\*" in the cor-responding digit code as well as in the 16th digit.

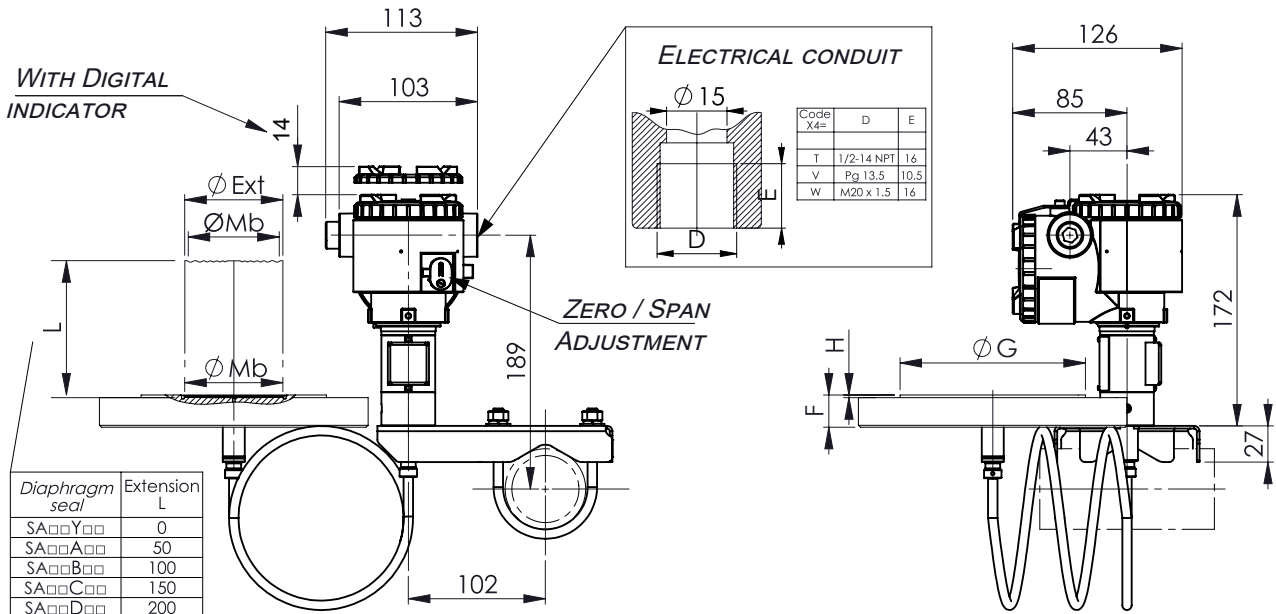
## MODELS CODE SYMBOLS FKH...F

1	2	3	4	5	6	7	8	DESCRIPTION
S								
Y								<b>Diaphragm extension</b> Flush mounting
A							(6)	Diaphragm extension 50 mm digit 4 = "V"
B							(6)	Diaphragm extension 100 mm digit 4 = "V"
C							(6)	Diaphragm extension 150 mm digit 4 = "V"
D							(6)	Diaphragm extension 200 mm digit 4 = "V"
E							(6)	Diaphragm extension 50 mm digit 4 = "H"
F							(6)	Diaphragm extension 100 mm digit 4 = "H"
G							(6)	Diaphragm extension 150 mm digit 4 = "H"
H							(6)	Diaphragm extension 200 mm digit 4 = "H"
J							(6)	Diaphragm extension 50 mm digit 4 = "B"
K							(6)	Diaphragm extension 100 mm digit 4 = "B"
L							(6)	Diaphragm extension 150 mm digit 4 = "B"
M							(6)	Diaphragm extension 200 mm digit 4 = "B"
P							(6)	Diaphragm extension 50 mm digit 4 = "T"
R							(6)	Diaphragm extension 100 mm digit 4 = "T"
S							(6)	Diaphragm extension 150 mm digit 4 = "T"
T							(6)	Diaphragm extension 200 mm digit 4 = "T"
								<b>Remote seal assembling characteristics</b>
								<b>Mounting assembly</b>
								<b>Length</b>
								<b>Protection</b>
A								PVC sheath
B							1,5 m	
C							3 m	
D							6 m	Stainless steel sheath
G						(7)	Upon request	
H						(7)	1,5 m	
K						(7)	3 m	
L						(7)	6 m	Sur demande
R							Sur demande	
								Rigid assembly - Not possible with digit 2 = "R", "W" - Maximum process temperature: 150 °C
								<b>Specific applications and filling fluids for the remote seal</b>
								<b>Treatment</b>
								<b>Filling fluids</b>
Y								None (standard)
W								Silicone oil
F								Fluorinated oil
D								Sanitary fill fluid
G								Chlorine service
A								Fluorinated oil
N								Degreasing
V								Silicone oil
U								Oxygen service
X								Fluorinated oil - Digit 4 = "V" only
								NACE MR 0175 / ISO 15156
							(8)	Vacuum service - maximum T° 200°C
							(8)	Very high temperature (0 to 300°C) - No vacuum
							(8)	Very high temperature (20 to 350°C) - No vacuum
								<b>Special options</b>
-	*						(10)	Special, no code available

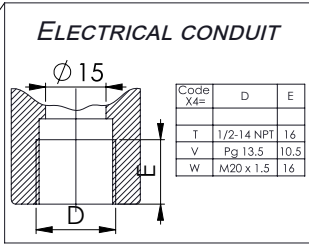
## Notes\* :

- Raising Face, gasket surface standard finishing: 'stock finish' ( $6.3 \mu\text{m} < \text{Ra} < 12.5 \mu\text{m}$ ) Other flange face an finishing upon request
- For  $\text{DN} \leq 50$ , please consult Fuji Electric regarding process conditions
- Only for axial seal diaphragm connection - No extension possible
- SS 316L for DN50, DN80, DN100 and flange adapter
- Not possible with digit 7 = "V", "U" and "X"
- All wetted parts in the same material (diaphragm, extension and seal land surface). Available for Digit 3 = 4, 5, 6, 7, 8, 9, H, J, G.  
Other remote seal on demand
- Vacuum service and high temperature  $> 120^\circ\text{C}$  : internal capillary diameter = 2mm
- Please consult Fuji Electric regarding the process conditions (minimum pressure, maximum temperature)
- Maximum process temperature:  $150^\circ\text{C}$
- When no code can be found in the current model code, place "\*" in the cor-responding digit code as well as in the 16th digit.

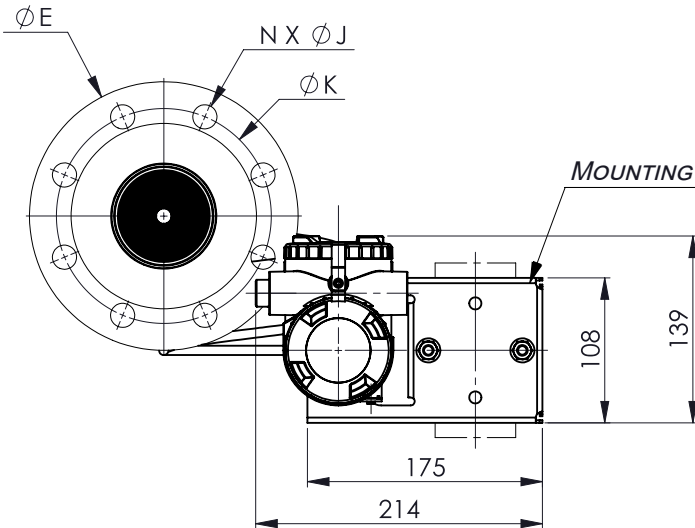
# OUTLINE DIMENSIONS FOR CAPILLARY ASSEMBLY (UNITS : MM)



Diaphragm seal	Extension L
SA□□Y□□	0
SA□□A□□	50
SA□□B□□	100
SA□□C□□	150
SA□□D□□	200



Code X4=	D	E
T	1/2-14 NPT	16
V	Pg.13.5	10,5
W	M20 x 1.5	14



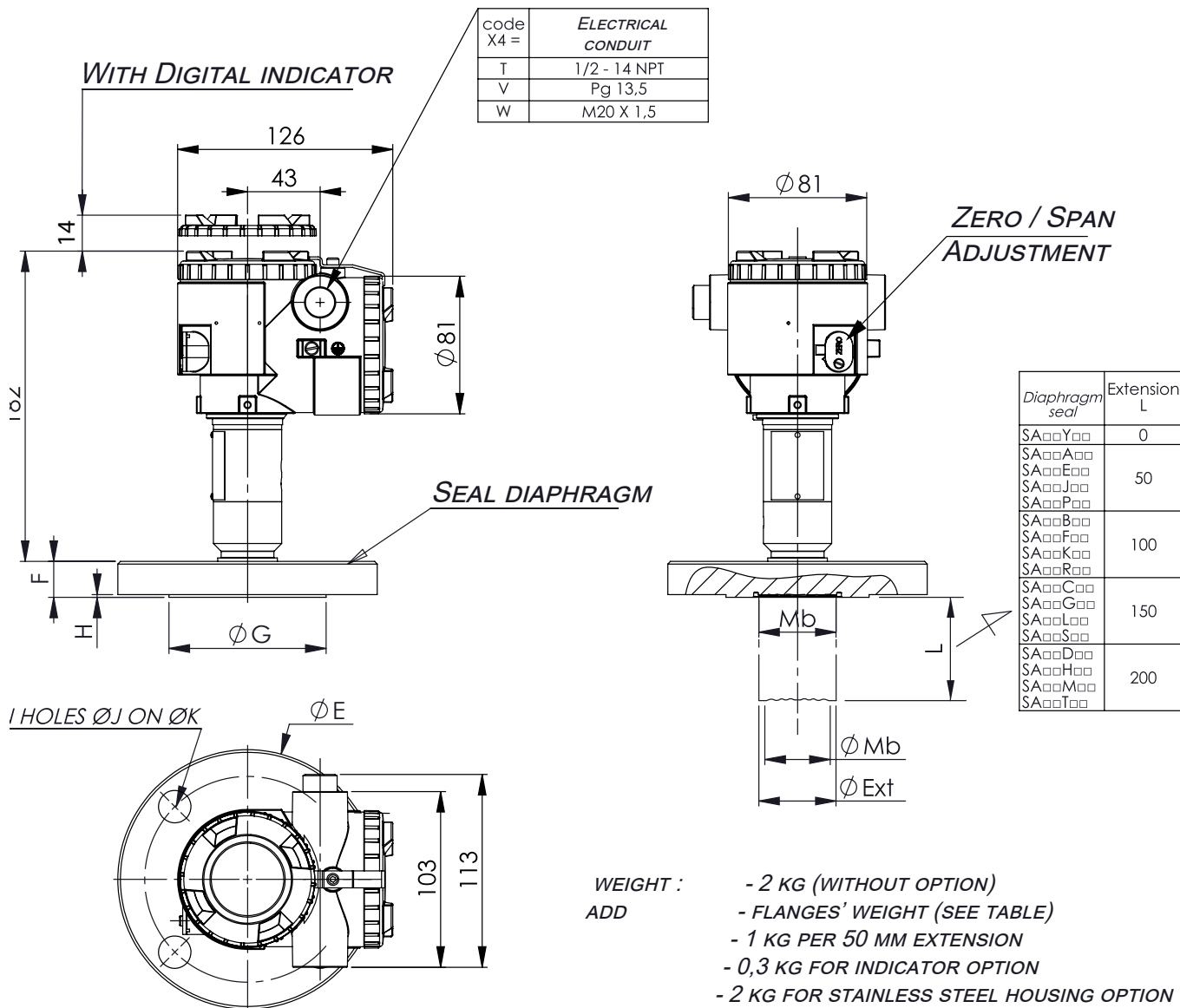
- weight :  
add
- 2 kg (without option)
  - flanges' weight (see table)
  - 1 kg per 50 mm extension
  - 0,3 kg for indicator option
  - 2 kg for stainless steel housing option

FLANGES DIMENSIONS ACCORDING TO EN 1092-1 & EN 1759-1										SS 316L		Exotic material	
diaphragm seal	EN 1092-1	EN 1759-1	ØE	F min	ØG	H	N x ØJ	ØK	Weight (kg)	L=0 ØMb	L≠0 ØExt=ØMb	L=0 ØMb	L≠0 ØExt(ØMb)
SA□□□□	DN50 PN40		165	20	102	2	4 x 18	125	3,3	59	48	59	48,3 (47)
SAH□□□		2" CLASS 150	152	21	92	1,6	4 x 19	120,6	2,7	59	48	59	48,3 (47)
SAJ□□□		2" CLASS 300	165	22,5	92	1,6	8 x 19	127	3,7	59	48	59	48,3 (47)
SA8□□□	DN80 PN40		200	24	138	2	8 x 18	160	5,8	73	73	89	76 (72)
SA4□□□		3" CLASS 150	190	24	127	1,6	4 x 19	152,4	5,3	73	73	89	76 (72)
SA6□□□		3" CLASS 300	210	28,5	127	1,6	8 x 22,2	168,3	7,8	73	73	89	76 (72)
SA9□□□	DN100 PN16		220	22	158	2	8 x 18	180	5,9	96	96	89	94 (89)
SA5□□□		4" CLASS 150	229	24	157	1,6	8 x 19	190,5	7,7	96	96	89	94 (89)
SA7□□□		4" CLASS 300	254	32	157	1,6	8 x 22,2	200	12,7	96	96	89	94 (89)

← ØMb = Ø diaphragm  
← ØExt = extension  
← Wetted parts material

FKP □□□ v6- □□□□ Y FKH □□□ v6- □□□□ Y X11 = B, G	Diaphragm seal : X1 X2 X3 X4 X5 X6 X7 S A □□□□□	SPAN LIMIT	
		Min.	Max.
FKP□□1		8.125 kpag (81.25 mbarg)	130 kpag (1300 mbarg)
FKP□□2		31.25 kpag (0.3125 barg)	500 kpag (5 barg)
FKP□□3		187.5 kpag (1.875 barg)	3000 kpag (30 barg)
FKP□□4		625 kpag (1.875 barg)	10000 kpag (100 barg)
FKH□□1		8.125 kpa abs (81.25 mbar abs)	130 kpa abs (1300 mbar abs)
FKH□□2		31.25 kpa abs (0.3125 bar abs)	500 kpa abs (5 bar abs)
FKH□□3		187.5 kpa abs (1.875 bar abs)	3000 kpa abs (30 bar abs)

# OUTLINE DIMENSIONS FOR RIGID ASSEMBLY (UNITS : MM)



FLANGES DIMENSIONS ACCORDING TO EN 1092-1 & EN 1759-1										SS 316L		Exotic material	
seal Diaphragm	EN 1092-1	EN 1759-1	ØE	F min	ØG	H	N x ØJ	ØK	Weight (kg)	L=0 ØMb	L≠0 ØExt=ØMb	L=0 ØMb	L≠0 ØExt(ØMb)
SAAG0000	DN50 PN40		165	20	102	2	4 x 18	125	3,3	59	48	59	48,3 (47)
SAH00000		2" CLASS 150	152	21	92	1,6	4 x 19	120,6	2,7	59	48	59	48,3 (47)
SAJ00000		2" CLASS 300	165	22,5	92	1,6	8 x 19	127	3,7	59	48	59	48,3 (47)
SA800000	DN80 PN40		200	24	138	2	8 x 18	160	5,8	73	73	89	76 (72)
SA400000		3" CLASS 150	190	24	127	1,6	4 x 19	152,4	5,3	73	73	89	76 (72)
SA600000		3" CLASS 300	210	28,5	127	1,6	8 x 22,2	168,3	7,8	73	73	89	76 (72)
SA900000	DN100 PN16		220	22	158	2	8 x 18	180	5,9	96	96	89	94 (89)
SA500000		4" CLASS 150	229	24	157	1,6	8 x 19	190,5	7,7	96	96	89	94 (89)
SA700000		4" CLASS 300	254	32	157	1,6	8 x 22,2	200	12,7	96	96	89	94 (89)

Wetted parts material

ØMb = Ø diaphragm  
ØExt = extension

X <sub>1</sub> X <sub>2</sub> X <sub>3</sub> X <sub>4</sub> X <sub>5</sub> X <sub>6</sub> X <sub>7</sub> X <sub>8</sub> - X <sub>9</sub> X <sub>10</sub> X <sub>11</sub> X <sub>12</sub> X <sub>13</sub>	Diaphragm seal :	SPAN LIMIT	
FKP □□□ V6- □□□□ Y	X <sub>1</sub> X <sub>2</sub> X <sub>3</sub> X <sub>4</sub> X <sub>5</sub> X <sub>6</sub> X <sub>7</sub>	Min.	Max.
FKH □□□ V6- □□□□ Y	S A □□□□□□		
X <sub>11</sub> = L, S			
		8.125 kpag (81.25 mbarg)	130 kpag (1300 mbarg)
		31.25 kpag (0.3125 barg)	500 kpag (5 barg)
		187.5 kpag (1.875 barg)	3000 kpag (30 barg)
		625 kpag (1.875 barg)	10000 kpag (100 barg)
		8.125 kpa abs (81.25 mbar abs)	130 kpa abs (1300 mbar abs)
		31.25 kpa abs (0.3125 bar abs)	500 kpa abs (5 bar abs)
		187.5 kpa abs (1.875 bar abs)	3000 kpa abs (30 bar abs)

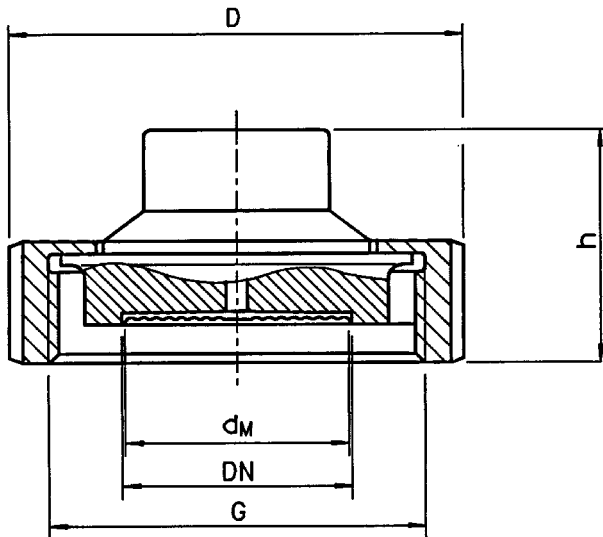
# OUTLINE DIMENSIONS OF SANITARY DIAPHRAGM SEALS (UNITS : MM)

The seals for the sanitary and pharmaceutical applications are available according DIN, SMS and Tri-Clamp standards

## Seals according DIN 11851 et SMS

2 differents design exist for DIN 11851 and SMS :

### Coupling nut design:

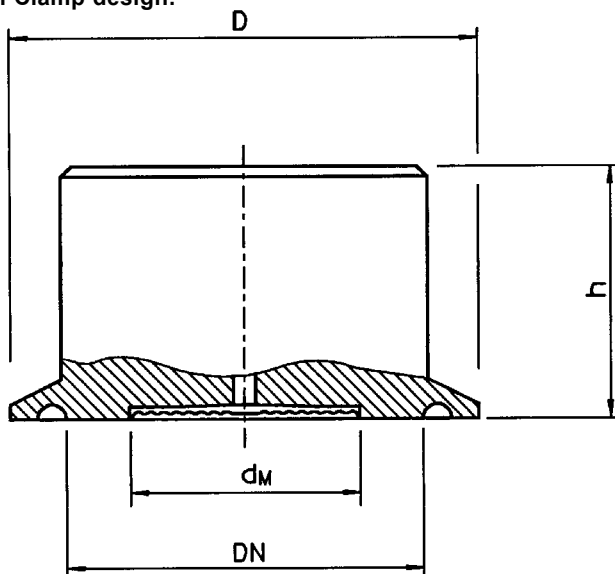


DIN 11851					
DN	PN (Max)	D	h	d <sub>M</sub>	G
25	40	63	36	25	Rd 52 x 1/6
32	40	70	36	32	Rd 58 x 1/6
40	40	78	36	40	Rd 65 x 1/6
50	40	112	36	52	Rd 78 x 1/6
65	40	112	36	65	Rd 95 x 1/6
80	40	127	36	76	Rd 110 x 1/4

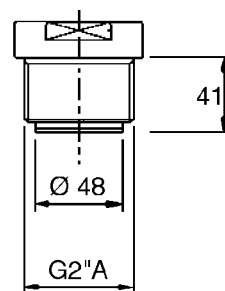
SMS					
DN	PN (Max)	D	h	d <sub>M</sub>	G
38	40	74	38	40	Rd 48 x 1/6
51	40	84	38	52	Rd 60 x 1/6
63.5	40	100	38	65	Rd 85 x 1/6
76	40	114	38	76	Rd 98 x 1/6

### Tri Clamp design:

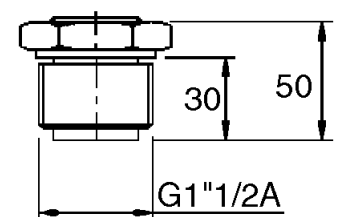


DN	PN (Max)	D	h	d <sub>M</sub>
1 1/2"	40	50	35	32
2"	40	64	35	40
2 1/2"	40	77.5	35	50
3"	40	91	35	65

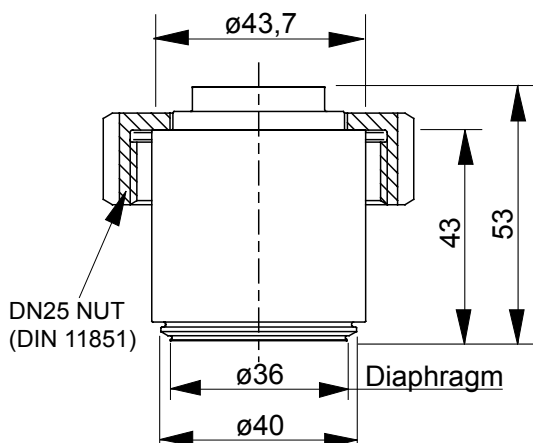
### Screwed G 2"A:



### Screwed G 1 1/2 A:



### No dead volume:





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**Fuji Electric France S.A.S.**

46 rue Georges Besse - ZI du brézet - 63039 Clermont ferrand

Tél : 04 73 98 26 98 - Fax : 04 73 98 26 99

Mail : [sales.dpt@fujielectric.fr](mailto:sales.dpt@fujielectric.fr) - web : [www.fujielectric.fr](http://www.fujielectric.fr)

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