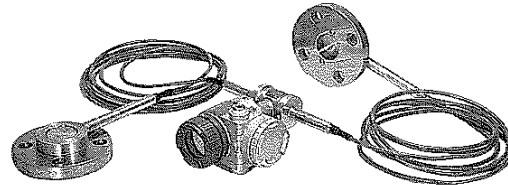


# FCX - A SERIES SMALL FLANGE REMOTE SEAL TYPE DIFFERENTIAL PRESSURE TRANSMITTER

DATA SHEET

FHX, FKX...2

The FCX -A Series small flange remote seal type differential pressure transmitter accurately measures differential pressure, liquid level or gauge pressure and transmits a proportional 4 to 20mA signal. The transmitter utilizes a unique micromachined capacitive silicon sensor with state-of-the-art microprocessor technology to provide exceptional performance and functionality. Totally welded construction of the seals assures excellent reliability in high temperature and highly corrosive process conditions.



## FEATURES

- 1. Directly connectable to 1-1/2in and 2in flanges**  
The transmitter is connectable to 1-1/2in and 2in pipes without a reducer.
- 2. Flow measurement without impulse piping**  
1/2in and 3/4in flange size is also available. This differential pressure transmitter allows connection to 1/2in and 3/4in flanges of a general size for the orifice tap, which eliminates the need of using a impulse piping. Problems with the impulse piping, such as clogging, leaks or corrosion can be solved. In addition, the following process connection is also available.  
Screw connection 1/2-14NPT, 3/4-14NPT, Rc1/2, Rc3/4
- 3. Minimum environmental influence**  
The "Advanced Floating Cell" design which protects the pressure sensor against changes in temperature, static pressure, and overpressure substantially reduces total measurement error in actual field applications.
- 4. Smart / Traditional convertible**  
Fuji micro-electronics manufacturing technology offers free selection of Smart / Traditional transmitters. A small plug-in communication module upgrades your model FHX to smart type model FKX, which has full remote communication capabilities. A Hand Held Communicator (HHC), model FXW can remotely display or reconfigure all transmitter parameters at any point on the loop without affecting the transmitter signal.
- 5. Fuji/HART bilingual communication module**  
The communication module is "bilingual" to speak both Fuji proprietary protocol and HART. Any HART compatible devices can communicate with FCX-A/C series transmitters.
- 6. Application flexibility**  
Example options that render the FCX -A suitable for almost any process applications includes:
  - Analog indicator at either the electronics side or terminal side
  - Full range of hazardous area approvals
  - Built-in RFI filter and lightning arrestor
  - 4 1/2 -digits LCD meter
  - Stainless steel electronics housing
  - Wide selection of materials
  - High temperature, high vacuum seals

## SPECIFICATIONS

### Functional specifications

Type:

Model FHX: 4 to 20mA, Traditional type

Model FKX: 4 to 20mA with digital signal, Smart type

Service: Liquid, gas, or vapour

Static pressure, span, and range limit:

Type	Static pressure	Span limit [kPa] (m bar)			Range limit [kPa] (m bar)
		Min.		Max.	
		FHX	FKX	FHX/FKX	
F0X□□5	Up tp flange rating	13	3	130	+/- 130
F0X□□6		{ 130 }	{ 30 }	{ 1300 }	{ +/- 1300 }
		50	12.5	500	+/- 500
		{ 500 }	{ 125 }	{ 5000 }	{ +/- 5000 }

- Maximum static pressure limit for screw connection type: 4.2MPa
- Lower limit of static pressure (vacuum limit),  
Silicone fill sensor: See Fig. 1  
Fluorinated fill sensor: Atmospheric pressure
- The maximum span of each sensor can be converted to different units using factors as below.  
1MPa=10<sup>3</sup>kPa=10bar=10.19716kgf/cm<sup>2</sup>=  
145.0377psi  
1kPa=10mbar=101.976mmH<sub>2</sub>O=4.01463H<sub>2</sub>O

Overrange limit: To maximum static pressure limit

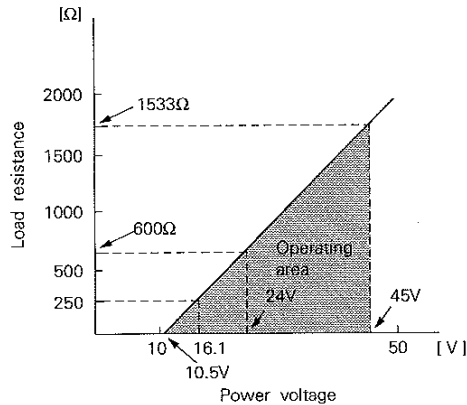
Output signal:

Model FHX: 4 to 20mA DC 2-wire, linear signal

Model FKX: 4 to 20mA DC (linear or square root) with digital signal superimposed on the 4 to 20mA signal

**Power supply:** Transmitter operates on 11V to 45V DC at transmitter terminals.  
11V to 32V DC for the units with optional arrester.

**Load limitations:** see figure below



Note: For communication with FXW, min. of 250 Ω required.

**Hazardous locations:**

Authorities	Flameproof	Intrinsic safety	Type N Nonincendive
BASEEFA	Ex ds IIC T5, T6	EEx ia IIC T4, T5	Ex N II T5
Factory	Class I II III	Class I II III	Class I II III
Mutual	Div. 1	Div. 1	Div. 2
RIIS	Groups B thru. G	Groups A thru. F	Groups A thru. G
	Exds IIB + H <sub>2</sub> T4	i2G4	—

**Zero/span adjustment:**

**Model FHX:** Zero is adjustable from the external adjustment screw.  
The adjustment screw can also function to adjust span when MODE SWITCH (located on the electronics unit) is in the span mode. INHIBIT mode to disable the adjustment screw is also available.

**Model FKX:** Zero and span are adjustable from the HHC. Zero is also adjustable externally from the adjustment screw.

**Damping:** Adjustable electrical damping.

**Model FHX:** The time constant is adjustable to 0, 0.3, 1.2, 4.8, or 19.2 seconds.

**Model FKX:** The time constant is adjustable between 0 to 38.4 seconds.

**Zero elevation/suppression:**

-100% to +100% of URL

**Normal/reverse action:**

**Model FHX:** Selectable by moving a jumper pin located on the electronics unit.

**Model FKX:** Selectable from HHC

**Indication:** Analog indicator or 4 1/2 digit LCD meter, as specified.

**Burnout direction:** Output hold  
Output 21.6mA } selectable.  
Output 3.8mA }

**Model FHX:** Unless otherwise specified, the output is in hold position.

**Model FKX:** Selectable from HHC.

**Loop-check output:**

**Model FHX:** Transmitter can output constant signal of 4mA, 12mA, or 20mA if MODE SWITCH is set to the loop check mode.

**Model FKX:** Transmitter can be configured to provide constant signal 3.8mA through 21.6mA by HHC.

**Temperature limit:**

Ambient: - 15 to + 65°C

(- 15 to + 60°C for arrester option)

(- 10 to + 60°C for fluorinated oil fill transmitter)

(- 10 to + 60°C for silicone oil "H", "S")

For explosionproof units (flameproof or intrinsic safety), ambient temperature must be within the limits specified in each standard.

**Process:**

Fill fluid	13th digit of "Code symbols"	Process temperature	Lower limit of static press.
Fluorinated oil	W, A and D	- 20 to 120°C	Atmospheric pressure
Silicone oil	H	0 to 250°C	2.7kPa abs (20mmHg abs)
	Y and G	- 40 to 120°C	
	S	0 to 250°C	

Storage: - 40 to +70°C

**Humidity limit:** 0 to 100% RH

**Communication:** (Model FKX only)

With HHC (Model FXW, consult Data Sheet No. EDS8-47), following information can be remotely displayed or reconfigured.

Items	Display	Set
Tag No.	v	v
Model No.	v	v
Serial No.	v	—
Engineering unit	v	v
Range limit	v	—
Measuring range	v	v
Damping	v	v
Output mode	v	v
Burnout direction	v	v
Adjustment	v	v
Output adjust	—	v
Data	v	—
Self diagnoses	v	—
Printer	—	—
External switch lock	v	v
Transmitter display(*)	v	v

Note: (\*) HHC's version must be more than 5.0 (or FXW □□□□1-□2), to use this function.

## Performance specifications

**Accuracy rating:** (including linearity, hysteresis, and repeatability)

For spans greater than 1/10 of URL: 0.25% of span  
For spans below 1/10 of URL (Model FKX only):

$$\pm \left( 0.17 + 0.08 \frac{0.1 \times \text{URL}}{\text{Span}} \right) \% \text{ of span}$$

**Linearity:** 0.1% of calibrated span

**Stability:**  $\pm 0.2\%$  of upper range limit (URL) for 6 months

**Temperature effect:**

Effects per 55°C change between the limits of -15°C and +65°C

Zero shift:  $\pm 1\%/55^\circ\text{C}$   
(x equal to 1/2 URL or more)

Zero shift;  $\pm \left( \frac{\text{URL}}{2 \times x} \right) \% / 55^\circ\text{C}$   
(x less than 1/2 URL)

Total shift;  $\pm 1.5\%/55^\circ\text{C}$   
(x less than 1/2 URL or more)

Total shift;  $\pm \left( 0.5 + \frac{\text{URL}}{2 \times x} \right) \% / 55^\circ\text{C}$   
(x less than 1/2 URL)

High performance type (option)  
Zero shift:  $\pm 1\%/55^\circ\text{C}$   
(x equal to 1/6.5 URL or more)

Zero shift;  $\pm \left( \frac{\text{URL}}{6.5 \times x} \right) \% / 55^\circ\text{C}$   
(x less than 1/6.5 URL)

Total shift;  $\pm 1.5\%/55^\circ\text{C}$   
(x equal to 1/6.5 URL or more)

Total shift;  $\pm \left( 0.5 + \frac{\text{URL}}{6.5 \times x} \right) \% / 55^\circ\text{C}$   
(x less than 1/6.5 URL)

Where, x: Calibrated span  
URL: Maximum span (Upper Range Limit)

Note 1: Condition: Capillary length: 3m max.  
In case the capillary length is 5m, the performance becomes 1.5 times worse than above.

Note 2: In case the 7th code (material code) is other than W, A, B, C or D, the performance becomes 2.5 times worse than above.

Note 3: Above specifications are based on the conditions that flanges and sensor unit are at the same temperature and in the same level. If temperature is different at flanges, capillary or sensor unit, output variation may increase.

**Static pressure effect:**

Zero shift; 0.2% of URL/1MPa (10 bar)  
2.5 times the zero shift for material code, "H", "M" and "T"

Span shift:  $-0.2 \pm 0.1$  % of calibrated span for flange nominal pressure

**Overrange effect:** Zero shift; 0.3% of URL for flange nominal pressure

2.5 times the effects for material code, "H", "M" and "T"

**Supply voltage effect:**

Less than 0.05% of calibrated span per 10V

**RFI effect:** Less than 0.2% of URL for the frequencies of 20 to 1000MHz and field strength 30 V/m when electronics covers on.

**Step response:** (without electrical damping)

Time constant (*)	Dead time
1.7 s	Approx. 0.3 s

Note: \* Capillary length: 1.5m, Ambient temperature: 23°C

**Dielectric strength:**

500V AC, 50/60Hz 1 min., between circuit and earth.

**Insulation resistance:**

More than 100MΩ/500V DC.

**Turn-on time:** 4 sec.

**Internal resistance for external field indicator:**

12Ω or less

## Physical specifications

**Electrical connections:**

G1/2, 1/2-14 NPT, Pg13.5, or M20×1.5 conduit, as specified.

**Process connections:**

JIS  
10K, 20K, 30K - 40, 50A  
10K, 20K, 30K - 15, 20A (with Adapter)  
ANSI/JPI  
150LB, 300LB - 1½B, 2B  
150LB, 300LB - 1/2B, 3/4B (with Adapter)  
Screw connection (with Adapter):  
Rc1/2, Rc3/4, 1/2 - 14NPT, 3/4 - 14NPT

**Diaphragm extension:**

0, 50, 100, 150, or 200mm as specified.  
(See model code. Extended diaphragm is available only with 316L stainless steel diaphragm)

**Process-wetted parts material:**

Diaphragm: 316L stainless steel, Hastelloy-C, Monel or Tantalum  
Flange face: 316 stainless steel, Hastelloy-C lining, Monel lining, or Tantalum lining  
Extension: 316 stainless steel

**Non-wetted parts material:**

Electronics housing: Low copper die-cast aluminum alloy (standard), finished with epoxy/polyurethane double coating, or 316 stainless steel, as specified.  
Capillary: PVC armored stainless steel  
Mounting flange: (option) 304 stainless steel or carbon steel  
Fill fluid: Silicone oil (standard) or fluorinated oil (Daifloil)  
Mounting bracket: Carbon steel with epoxy coating or 304 stainless steel, as specified

**Environmental protection:**

IEC IP67 and NEMA 4X

**Mounting:**

On 60.5mm (JIS 50A) pipe using mounting bracket, direct wall mounting

**Mass (weight):**

Transmitter approximately 15kg without options.  
Add; 0.5kg for mounting bracket  
0.8kg for indicator option  
4.5kg for stainless steel housing option  
1.5kg per 50mm extension of diaphragm

**Optional features**

- Indicator:** A plug-in analog indicator (1.5% accuracy) can be housed in the electronics compartment or in the terminal box of the housing. An optional 4 1/2 digits LCD meter is also available.
- Arrester:** A built-in arrester protects the electronics from lightning surges. Lighting surge immunity is 4kV (1.2 x 50µs).
- Oxygen service:** Special cleaning procedures are followed throughout the process to maintain all process wetted parts oil-free. The fill fluid is fluorinated oil.
- Chlorine service:** Oil-free procedures as above. Includes fluorinated oil for fill.
- Degreasing:** Process-wetted parts are cleaned, but the fill fluid is standard silicone oil. Not for use on oxygen or chlorine measurement.
- Vacuum service:** Special silicone oil and filling procedure are applied. See below figure.

**ACCESSORIES**

- Hand-held communicator:**  
(Model FXW, refer to Data Sheet No. EDS 8-47)
- Communication module:** (standard for model FKX)  
When using this module for model FHX, remote setting function becomes available.  
Remark: When the communication module is connected, the operation mode of external zero/span adjustment screw is changed to zero adjustment.

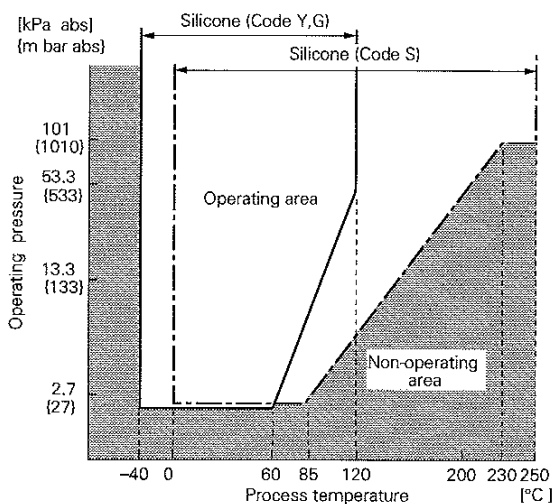


Fig. 1 Relation between process temperature and operating pressure

- Customer tag:** A stainless steel tag for customer tag data is wired to the transmitter.
- Coating of cell:** Cell's surface is finished with epoxy/polyurethane double coating. Specify if environment is extremely corrosive.

# CODE SYMBOLS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21		Description		
F	X	Type 4 to 20mA, Traditional type 4 to 20mA with digital signal, Smart type		
FHX	FKX			
S		Conduit connection <4th digit> G 1/2 1/2 - 14NPT Pg 13.5 M20 X 1.5		
T				
V				
W				
		Flange <5th digit>		
		Material	Size and rating	
0		304 stainless steel	JIS 10K 40A	
1			JIS 10K 50A	
2			JIS 20K 40A	
3			JIS 20K 50A	
4			JIS 30K 40A	
5			JIS 30K 50A	
A			ANSI/JPI 150LB 1 1/2B	
B			ANSI/JPI 150LB 2B	
C			ANSI/JPI 300LB 1 1/2B	
D			ANSI/JPI 300LB 2B	
G		Carbon steel	JIS 10K 40A	
H			JIS 10K 50A	
J			JIS 20K 40A	
K			JIS 20K 50A	
L			JIS 30K 40A	
M			JIS 30K 50A	
O			ANSI/JPI 150LB 1 1/2B	
R			ANSI/JPI 150LB 2B	
S			ANSI/JPI 300LB 1 1/2B	
T			ANSI/JPI 300LB 2B	
W		None (Wafer type)	40A, 1 1/2B	
X			50A, 2B	
Y		—	Direct mounting adapter connection (* 1)	
		Span limit [kPa] (m bar) <6th digit>		
		FHX	FKX	
5		13...130 (130...1300)	3...130 ( 30...1300)	
6		50...500 (500...5000)	12.5...500 (125...5000)	
		Material/diaphragm extension <7th digit>		
		Diaphragm	Flange face	Diaphragm extension (mm)
W		316L stainless steel	316L stainless steel	0
A				50
B				100
C				150
D				200
H		Hastelloy-C	Hastelloy-C	0
M		Monel	Monel	0
T		Tantalum	Tantalum	0

Note 1: Direct mounting adapter type is specified at 16th to 20th digit.  
 Direct mounting adapter is available only for 7th digit code "W".  
 2: Diaphragm extension is available only for 2B (50A) flanges.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
F	X						2						0							

		Description	
		<b>Indicator and arrester &lt;9th digit&gt;</b>	
A	Indicator	Arrester	
B	None	None	
C	Analog, 0 to 100% linear scale	None	
D	Analog, 0 to 100% sq. root scale	None	
J	Analog, custom scale	None	
E	Analog, double scale	None	
F	None	Yes	
G	Analog, 0 to 100% linear scale	Yes	
H	Analog, 0 to 100% sq. root scale	Yes	
K	Analog, custom scale	Yes	
L	Analog, double scale	Yes	
P	Digital, 0 to 100%	None	
M	Digital, custom scale	None (Model FKX only)	
O	Digital, 0 to 100% square root	None	
S	Digital, 0 to 100%	Yes	
N	Digital, custom scale	Yes (Model FKX only)	
N	Digital, 0 to 100% square root	Yes	
		<b>Approvals for hazardous locations &lt;10th digit&gt;</b>	
A	None (for ordinary locations)		
B	JIS, Flameproof (Conduit seal)		
C	JIS, Flameproof (Cable gland seal)		
D	FM, Flameproof (or explosionproof)		
M	BASEEFA, Flameproof (Conduit seal)		
N	BASEEFA, Flameproof (Cable gland seal) (Conduit connection G 1/2 only)		
G	JIS, Intrinsic safety		
H	FM, Intrinsic safety and Nonincendive		
K	CENELEC, Intrinsic safety		
P	CENELEC, Intrinsic safety and BASEEFA, Type N		
		<b>Capillary and mounting bracket &lt;11th digit&gt;</b>	
		mounting bracket	Capillary
A	Carbon steel		1.5m
B			3m
G			5m
D	Stainless steel		1.5m
E			3m
L			5m
		<b>Stainless steel parts &lt;12th digit&gt;</b>	
	Stainless steel tag plate	Stainless steel elec. housing	Coating of cell
Y	None	None	None
B	Yes	None	None
C	None	Yes	None
E	Yes	Yes	None
M	None	None	Yes
N	Yes	None	Yes
P	None	Yes	Yes
O	Yes	Yes	Yes
		<b>Treatment/Fill fluid &lt;13th digit&gt;</b>	
		Treatment	Fill fluid
Y	None		Silicone oil (for general use)
W	None		Fluorinated oil
G	Degreasing		Silicone oil
A	Oxygen service		Fluorinated oil (7th digit code "W", "A", "B", "C" and "D")
D	Chlorine service		Fluorinated oil (7th digit code "H" and "T")
H	High temp. 250°C		Silicone oil
S	High temp and vacuum (250°C)		Silicone oil } (7th digit code "W", "A", "B", "C" and "D")
		<b>Teflon membrane &lt;14th digit&gt;</b>	
Y	None		
C	Yes (7th digit code "W", "H", "M", and "T")		

**Ordering information**

- When ordering this instrument, specify the output orientation (burnout direction) in case of abnormality in the transmitter. Unless otherwise specified, the output hold function is supplied.
- When ordering FKX, specify the output mode (linear or square root output). Unless otherwise specified, linear output is supplied.
- When specifying the digital indicator/actual scale (codes P and S on 9th digit), specify the method indication (indicated value and unit).

## Specifications of Direct Mounting Adapter {for 15, 20A (1/2, 3/4B) connection} and others

Note 1. When ordering the instrument with direct mounting adapter, specify "Y" in the 5th digit of Code Symbol, and specify 16th digit to 20th digits.

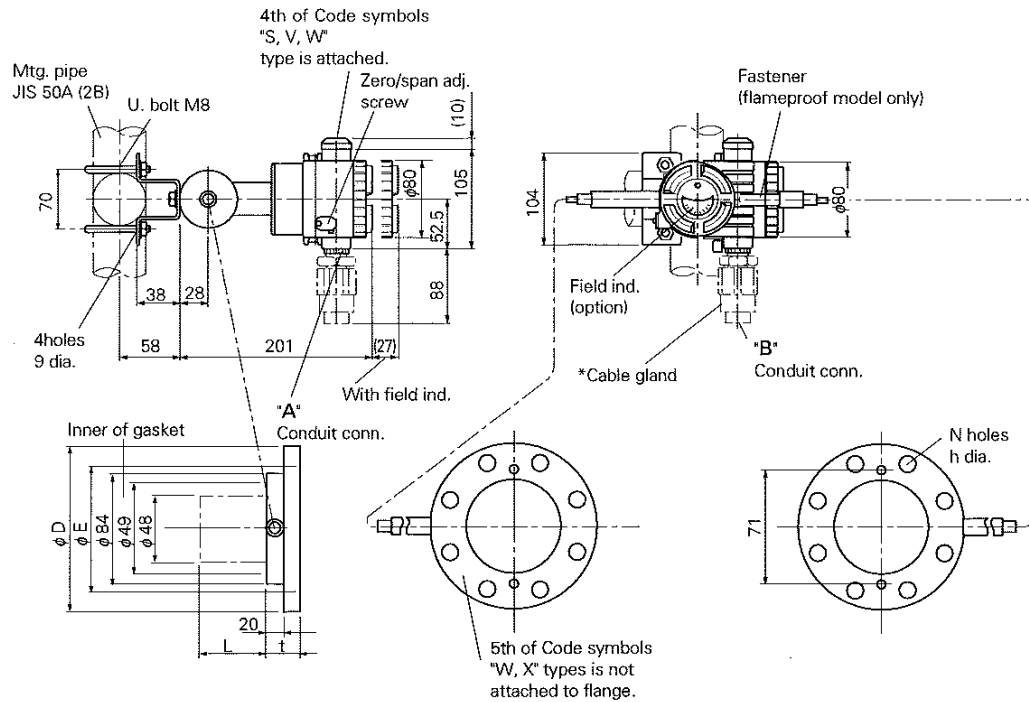
When ordering the instrument without direct mounting adapter, nothing should be filled in the 16th to 20th digits.

2. Unless otherwise described in the specifications, leave the 21st digit blank.

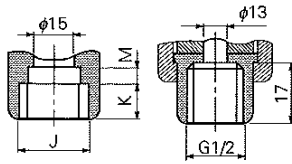
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Description					
F	X						2							0									Process connection (direct mounting adapter) <16th to 17 digit>			
																							1	1	JIS 10K 15A	
																							1	2	JIS 10K 20A	
																							2	1	JIS 20K 15A	
																							2	2	JIS 20K 20A	
																							3	1	JIS 30K 15A	
																							3	2	JIS 30K 20A	
																							1	H	ANSI/JPI 150LB 1/2B	
																							1	T	ANSI/JPI 150LB 3/4B	
																							2	H	ANSI/JPI 300LB 1/2B	
																							2	T	ANSI/JPI 300LB 3/4B	
																							S	R	Screw connection Rc1/2	
																							S	2	Screw connection Rc3/4	
																							S	N	Screw connection Rc1/2 - 14NPT	
																							S	T	Screw connection Rc3/4 - 14NPT	
																									Material (direct mounting adapter) <18th digit>	
																									Adapter	Bolts/nuts (* 1)
																							W		316 Stainless Steel	Cr-Mo steel/carbon steel
																									Vent/drain (for direct mounting adapter) <19 th digit>	
																							G		Standard	
																							N		Long type	
																									Gasket (for direct mounting adapter) <20th digit>	
																							1		Standard (Teflon) (Only Y, W, G, A and D can be specified on 13th digit).	
																							2		For high temperature (spiral gasket) (Only H and S can be specified on 13th digit).	
																									Other specifications <21st digit>	
																							A		With Material certificate	

Note 1 For connection of transmitter receiving pressure unit and direct mounting adapter

# OUTLINE DIAGRAM (Unit:mm)

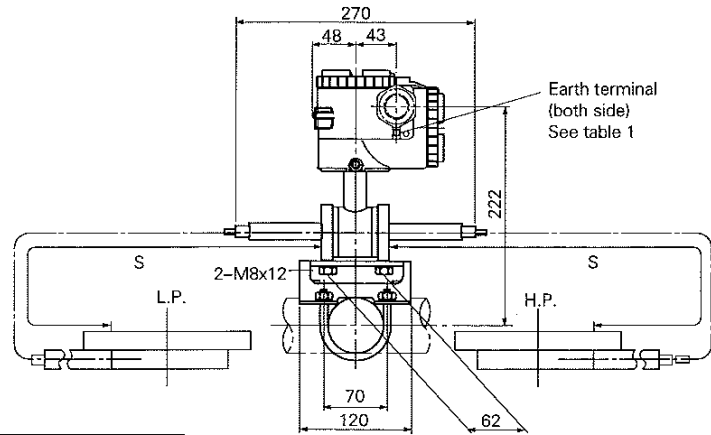


Details of "A"      Details of "B"



See table 1

<Optional stainless steel tag>



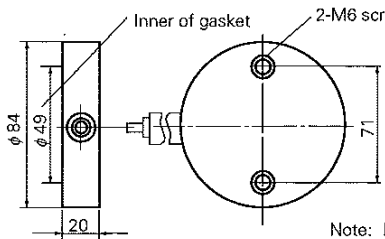
5th digit of code symbols	φ D	φ E	t	N-φ h	Flange
0, G	140	105	36	4-19	JIS-10K-40A
1, H	155	120	36	4-19	JIS-10K-50A
2, J	140	105	38	4-19	JIS-20K-40A
3, K	155	120	38	8-19	JIS-20K-50A
4, L	160	120	42	4-23	JIS-30K-40A
5, M	165	130	42	8-19	JIS-30K-50A
A, Q	127	98.4	37.5	4-16	ANSI/JPI-150LB-1 1/2B
B, R	152	120.6	39.5	4-20	ANSI/JPI-150LB-2B
C, S	156	114.3	41	4-23	ANSI/JPI-300LB-1 1/2B
D, T	165	127	42.5	8-20	ANSI/JPI-300LB-2B

4th digit of Code symbols	Conduit conn.			Earth terminal
	J	K	M	
S	G1/2	17	8	No. 8-32UNC
T	1/2-14NPT	16	5	M4
V	Pg13.5	8	4.5	M4
W	M20x1.5	16	5	M4

Table 1

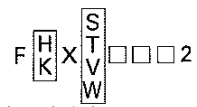
7th digit of Code symbols	L	Mass approx. [kg]	11th digit of code symbols	Capillary length S [mm]
W, H, M, T	0	14 to 19.5	A, D	1500
A	50	15 to 30.5	B, E	3000
B	100	15.5 to 31	G, L	5000
C	150	18 to 31.5		
D	200	16.5 to 32		

Note \*: Cable gland is supplied in case of flameproof packing type. φ11 cable is suitable.



<Wafer type>

Note: In case of water type, flange is excluded from the scope of supply. Mount flange, referring to the view.



CONNECTION DIAGRAM

