

## ABSOLUTE PRESSURE TRANSMITTER

DATA SHEET

FKA...6

The FKA model of FCX-A IV series of pressure transmitters accurately measures an absolute pressure and transmits a proportional 4-20 mA output signal.

The transmitter uses an 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-A IV series of pressure transmitters comply with Safety Integrity Level 2 or 3 according to IEC 61508 and IEC 61511 standards.



### FEATURES

**1. High accuracy**

- ±0.2% accuracy for all calibrated spans is standard.
- ±0.1% accuracy is available in option.

**2. Minimum inventory and design**

Electronics parts, local indicators and electronics housing are interchangeable among all FCX-A IV transmitters.

**3. Minimum environmental influence**

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

**4. HART 7 communication protocols**

FCX-A IV 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-A IV 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 pointpairs.

**7. Burnout current flexibility**

The burnout current value can be adjusted in the ranges of [3.4 ; 3.8] and [20.8 ; 22.5] mA and can be compliant with NAMUR NE43 recommendations.

**8. Contactless local adjustment**

An optional local configurator with 3 magnetic switches allows to configure the transmitter without opening the indicator cover (flameproof approvals for hazardous locations). The Magnetic pen is required to enable the 3 magnetic switches (Please refer to ACCESSORIES).

### FUNCTIONAL SPECIFICATIONS

**Type:**

FKA: Smart, 4-20mA with Hart communication protocol

**Service:**

Liquid, gas, or vapour

**Span, range, and overrange limit:**

Model	Span limits kPa abs {bar abs}		Range limits kPa abs {bar abs}	Overrange limit MPa {bar}
	Min.	Max.		
FKA□01	1.6 {0.016}	16 {0.16}	0 to +16 {0 to +0.16}	0.5 {5}
FKA□02	1.6 {0.016}	130 {1.3}	0 to +130 {0 to +1.3}	0.5 {5}
FKA□03	5 {0.05}	500 {5}	0 to +500 {0 to +5}	1.5 {15}
FKA□04	30 {0.3}	3000 {30}	0 to +3000 {0 to +30}	9 {90}
FKA□05	100 {1}	10000 {100}	0 to +10000 {0 to +100}	15 {150}

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

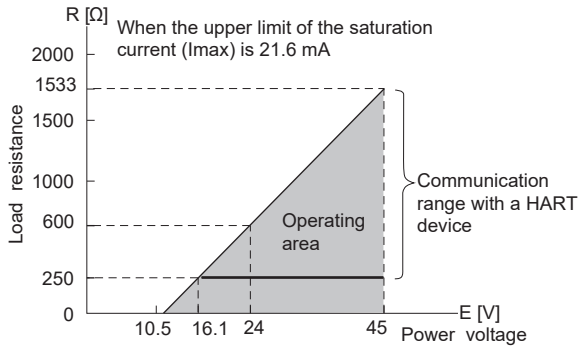
**Output signal:**

4-20 mA with HART communication protocols.

**Power supply:**

- 10.5 to 45 V DC at transmitter terminals.
  - 10.5 to 32 V DC with the optional arrester.
- 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:**

Marking (Digit 10 <sup>th</sup> )	Protection type			
<b>ATEX</b>	K	Intrinsic Safety "i"		
		Ex II1 G/D		
		Ex ia IIC T4 Ga (Ta: -40°C to +60°C)		
		Ex ia IIC T5 Ga (Ta: -40°C to +50°C)		
		Ex ia IIIC T <sub>200</sub> 135°C Da (Ta: -40°C to +60°C)		
		Ex ia IIIC T <sub>200</sub> 100°C Da (Ta: -40°C to +50°C)		
		Ui = 28Vdc, li = 110mA, Pi = 0.77W		
		Ci = 14.9nF (without optional Arrester)		
		Ci = 26.0nF (with optional Arrester)		
		Li = 0.181mH		
	IP66/67			
	X	Flameproof Enclosure "d"		
		Ex II2 G		
		Ex db IIC T6...T4 Gb		
		Temperature class	Ambient temperature	Process temperature
		T6	-40°C to +65°C	-40°C to +85°C
		T5	-40°C to +85°C	-40°C to +100°C
		T4	-40°C to +60°C	-40°C to +120°C
IP66/67				
M	Combination (K) + (X) pending			
<b>IECEX</b>	T	Intrinsic Safety "i"		
		Ex ia IIC T4 Ga (Ta: -40°C to +60°C)		
		Ex ia IIC T5 Ga (Ta: -40°C to +50°C)		
		Ex ia IIIC T <sub>200</sub> 135°C Da (Ta: -40°C to +60°C)		
		Ex ia IIIC T <sub>200</sub> 100°C Da (Ta: -40°C to +50°C)		
		Ui = 28Vdc, li = 110mA, Pi = 0.77W		
		Ci = 14.9nF (without optional Arrester)		
		Ci = 26.0nF (with optional Arrester)		
		Li = 0.181mH		
		IP66/67		
	R	Flameproof Enclosure "d"		
		Ex db IIC T6...T4 Gb		
		Temperature class	Ambient temperature	Process temperature
		T6	-40°C to +65°C	-40°C to +85°C
		T5	-40°C to +85°C	-40°C to +100°C
		T4	-40°C to +60°C	-40°C to +120°C
		IP66/67		
	N	Combination (T) + (R) pending		

cCSAus pending		Intrinsic Safety/Non-Incendive
		J
	E	Flameproof Enclosure XP Class I Division 1 Groups CD Class II Groups EFG, Class III T6 (-40°C ≤ Ta ≤ +65°C) T5 (-40°C ≤ Ta ≤ +85°C) T4 (-40°C ≤ Ta ≤ +60°C) Vmax = 45Vdc
	L	Combination (J) + (E)

**Configuration:**

Configuration of the FCX-A IV series of pressure transmitters can be carried out by either using a HART device or the optional local configurator.

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

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

**Zero and span adjustment:**

Zero and span are remotely adjustable by a HART device or locally by the local configurator or the external adjustment screw.

**Damping:**

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

**Normal/reverse action:**

Selectable by range setting

**Local indicator:**

Optional 5-digits LCD unit or local configurator with 3 magnetic switches and push-buttons.

A magnetic pen is required to enable this local configurator function.

(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":

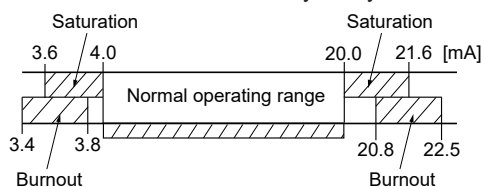
The output signal is set within the range of [20.8 to 22.5] mA, Default value: 21.6mA

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 currents:

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 optional LCD unit)

-40 to +60°C (with optional arrester)

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

Process: -40 to +85°C for silicone oil filling

Storage: -40 to +90°C

### Humidity limit:

0 to 100% RH (Relative Humidity)

## PERFORMANCE SPECIFICATIONS

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

### Accuracy rating:

(including linearity, hysteresis, and repeatability).

#### Standard:

For spans > 1/10 of URL:  $\pm 0.2\%$  of span

For spans < 1/10 of URL:

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

**Optional:** not available for 16 kPa abs and 130 kPa abs models

For spans > 1/10 of URL:  $\pm 0.1\%$  of span

For spans < 1/10 of URL:

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

### Stability:

$\pm 0.2\%$  of upper range limit (URL) for 10 years.

### Temperature effect:

Effect per 28°C change within the range of -40°C and +85°C

Zero shift:  $\pm \left( 0.125 + 0.1 \frac{\text{URL}}{\text{Span}} \right) \% \text{ of span}$

Total effect:  $\pm \left( 0.15 + 0.1 \frac{\text{URL}}{\text{Span}} \right) \% \text{ of span}$

Double the effects for material code "H" (7th digit in the model code)

### Overrange effect:

Zero shift:

$\pm 0.2\%$  of URL for any overrange to maximum limit

### Supply voltage effect:

Less than 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 damping)

Time constant: 0.08 sec (at 23°C)

Dead time: about 0.06 sec

Response time = time constant + dead time

### Electromagnetic compatibility:

FCX-A IV 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.

No effect on span.

### Vibration effect:

<  $\pm 0.25\%$  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:

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

### Pressure Equipment Directive (PED) 2014/68/EU:

According to article 4.3

## PHYSICAL SPECIFICATIONS

### Electrical conduit connections:

1/2-14 NPT, Pg13.5 or M20 × 1.5

### Process connections:

Standard: 1/4-18 NPT

Option: 1/2-14 NPT with oval flanges.

Remark: the codification does not include the oval flange accessories.

### Process-wetted parts material:

Material code (7th digit in the model code)	Process cover	Diaphragm	Wetted sensor body	Vent / drain
V	SS 316L	SS 316L	SS 316L	SS 316L
H	PVDF or SS 316L	Hastelloy C	Hastelloy C	SS 316L
J	SS 316L	SS 316L + gold coating	SS 316L	SS 316L

Remark: Sensor gasket : Viton o-ring or PTFE square section gasket. Availability of above material design depends on ranges and static pressure. Refer to the "Model code symbols".

### Non-wetted parts material:

Electronics housing:

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

Bolts and nuts:

Carbon steel, SS 316L or SS 660

Filling fluid: Silicone oil

Mounting bracket: SS 316L

### Environmental protection:

IEC IP66 & IP67 and Type 4X

### Mounting:

DN50(2") pipe or wall mounting using the mounting bracket.

Direct to process cover connections without the mounting bracket.

### Mass {weight}:

Transmitter: 3.0 kg without options.

Add: +0.2 kg for indicator

+0.5 kg for mounting bracket

+2.0 kg for stainless steel housing (option)

## ACCESSORIES

### Oval flange:

Converts process connection to 1/2-14 NPT.

### Magnet pen:

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

Order number = ZZP\*TQ507742C1

## OPTIONAL FEATURES

### Local indicator:

An optional 5 digit indicator with engineering units is available.

A local configurator can be carried using the 3 magnetic switches and push-buttons.

A separately ordered magnet pen is required for adjustment using the magnetic 3-push buttons.

See the accessories section.

### Arrester:

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

Lightning surge immunity: ±4 kV (1.2 × 50 μs)

### Degreasing:

Process-wetted parts are cleaned and the filling fluid is the standard silicone oil. Not for use with oxygen or chlorine based process.

### NACE specification:

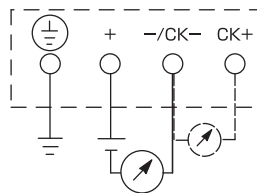
Metallic materials for all pressure boundary parts comply with NACE MR 0175/ISO 15156.

SS 660 bolts and nuts comply with NACE MR 0175/ISO 15156.

### Optional tag plate:

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

## CONNECTION DIAGRAM



# MODEL CODE SYMBOLS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	DESCRIPTION
F	K	A			6											Type
																Absolute pressure transmitter- Smart, 4-20 mA with HART communication protocol
																Connections
																Process Connection
																Oval flange threading
																Conduit connection
																Enclosure type
R																1/4-18 NPT
T																7/16-20 UNF
X																M20×1.5
3																1/2-14 NPT
6																Pg13.5
9																M20×1.5
																1/2-14 NPT
																Pg13.5
																Range and materials
																(*1) Measuring ranges
																Process cover
																Diaphragm
																Wetted cell body
0	1	V														SS 316L
0	1	H														Hastelloy C
0	1	J														Gold coating
9	1	H														SS 316L
																PVDF insert
																Hastelloy C
0	2	V														SS 316L
0	2	H														Hastelloy C
0	2	J														Gold coating
9	2	H														SS 316L
																PVDF insert
																Hastelloy C
0	3	V														SS 316L
0	3	H														Hastelloy C
0	3	J														Gold coating
9	3	H														SS 316L
																PVDF insert
																Hastelloy C
0	4	V														SS 316L
0	4	H														Hastelloy C
0	4	J														Gold coating
9	4	H														SS 316L
																PVDF insert
																Hastelloy C
0	5	V														SS 316L
0	5	J														Gold coating
																SS 316L
																Gold coating
																Improvement Symbol
																Indicator
																Arrester
A																None
E																None
L																Yes
P																Digital, 0-100% linear scale
Q																Digital, custom scale
S																None
1																Digital, 0-100% linear scale
2																Digital, custom scale
4																Digital, 0-100% linear scale (Local configurator)
5																Digital, custom scale (Local configurator)
																None
A																None
X																(*3) ATEX - Flameproof
K																ATEX - Intrinsic Safety
M																(*3) ATEX - Combination Flameproof and Intrinsic Safety
E																pending
J																(*3) cCSAus - Explosion proof
L																pending
R																cCSAus - Intrinsic Safety and Non Incendive
T																pending
N																(*3) cCSAus - Combination Explosion proof, Intrinsic Safety and Non Incendive
W																pending
																(*3) IECEx - Flameproof
																IECEX - Intrinsic Safety
																IECEX - Combination Flameproof and Intrinsic Safety
																pending
																(*3) IECEx - ATEX - cCSAus - Explosion/Flameproof, Intrinsic Safety and Non Incendive
																pending
																(*2) Side vent/drain
																Mounting bracket
A																None (standard)
K																None
D																SS 316L
L																None
																Yes
																SS 316L
																Stainless steel parts
																TAG plate
																Housing
																Paint of detecting unit
Y																None
B																None
C																Yes
E																Yes
																Special applications & Filling fluids
																Treatment
																Filling fluid
Y																None
G																Degreasing
N																NACE
																Silicone oil

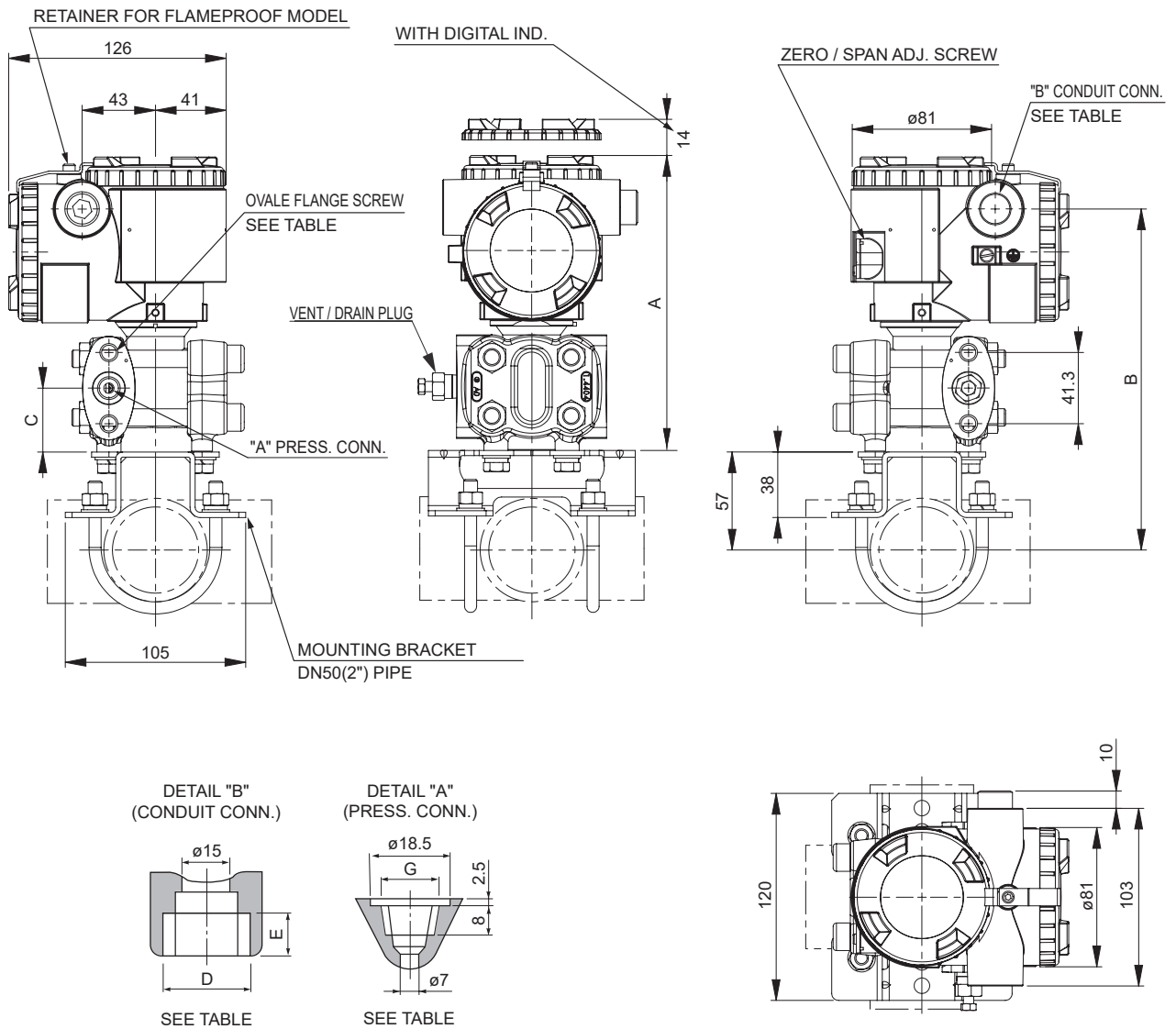
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	DESCRIPTION		
F	K	A					6									<b>Process cover gasket</b>	<b>Vent Drain plug</b>	<b>Bolt/Nut</b>
C																PTFE square section gasket	Standard type	Carbon steel - M10 for static pressure < 160 bar (16MPa)
G																PTFE square section gasket	Standard type	SS 316L / 316L - M10 for static pressure < 160 bar (16MPa)
J							(*4)									PTFE square section gasket	Standard type	SS 660 / 660 - M10 for static pressure < 160 bar (16MPa)
D																PTFE square section gasket in PVDF insert	Standard type	Carbon steel - M10 for static pressure < 160 bar (16MPa)
E																PTFE square section gasket in PVDF insert	Standard type	SS 316L / 316L - M10 for static pressure < 160 bar (16MPa)
F							(*4)									PTFE square section gasket in PVDF insert	Standard type	SS 660 / 660 - M10 for static pressure < 160 bar (16MPa)
4																Viton	Standard type	Carbon steel - M10 for static pressure < 160 bar (16MPa)
5																Viton	Standard type	SS 316L / 316L - M10 for static pressure < 160 bar (16MPa)
6							(*4)									Viton	Standard type	SS 660 / 660 - M10 for static pressure < 160 bar (16MPa)
																<b>Special options</b>		
L																		Instruction manual unattached
T																		
							(*5)	*								special, no code available		

Notes\* :

- 1- Turn Down Ratio < 10 is recommended for optimal performances.
- 2- Process cover with PVDF insert: 1/2-14 NPT side process connection only, square section PTFE gasket, no vent/drain.
- 3- Only with M20 x 1.5 or 1/2-14 NPT electrical conduit.
- 4- SS 660 bolts/nuts are in conformity with NACE MR0175/ISO 15156 and must be used for NACE service.
- 5- When no code can be found in the current model code, place "\*" in the corresponding digit code as well as in the 16th digit.

# OUTLINE DIAGRAM (Unit : mm)

<L SHAPE> <4TH DIGIT CODE: R, T, X AND 7TH DIGIT CODE V, H, J>



4TH MODEL CODE	CONDUIT CONNECTION		PRESS. CONN.	OVAL FLANGE SCREW
	D	E	G	
R	M20×1.5	16	1/4-18NPT	7/16-20UNF
T	1/2-14NPT	16	1/4-18NPT	7/16-20UNF
X	Pg13.5	10.5	1/4-18NPT	7/16-20 UNF

TABLE

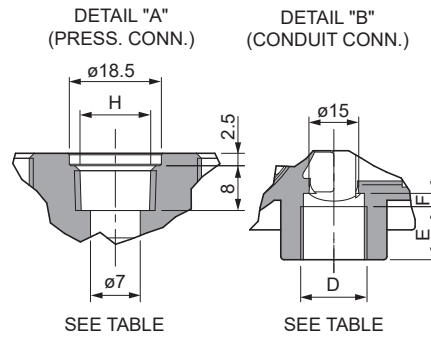
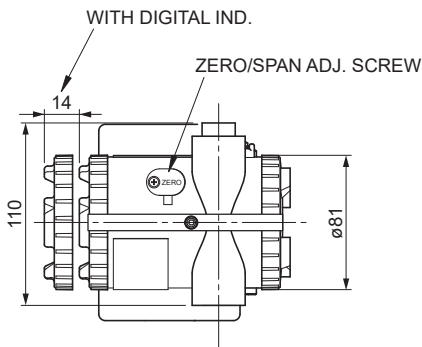
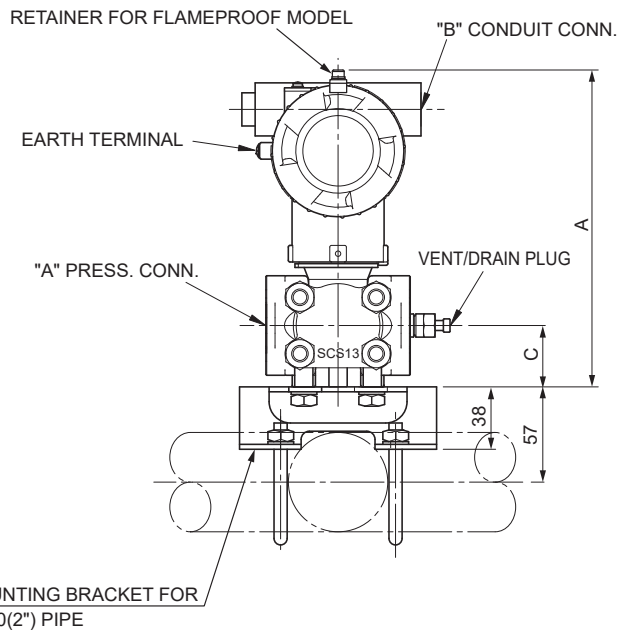
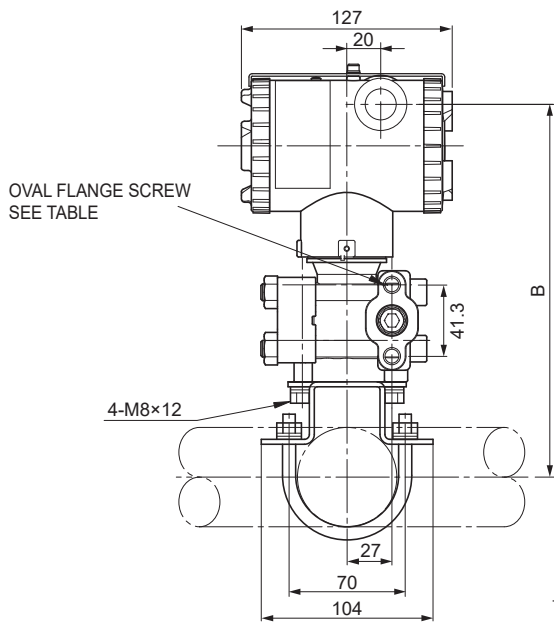
MODEL	DIMENSIONS		
	A	B	C
FKA□01	171 (175.5)	198 (202.5)	37 (38.5)
FKA□02			
FKA□03			
FKA□04			
FKA□05			

NOTE: 7TH MODEL CODE "H"

- WEIGHT : - 3.0 kg (WITHOUT OPTION)  
 ADD : - 0.2 kg FOR INDICATOR  
 - 0.5 kg FOR MOUNTING BRACKET  
 - 2.0 kg FOR STAINLESS STEEL HOUSING OPTION

# OUTLINE DIAGRAM (Unit : mm)

<T SHAPE> <4TH DIGIT CODE: 3, 6, 9 AND 7TH DIGIT CODE V, H, J>



4TH MODEL CODE	CONDUIT CONNECTION			PRESS. CONN.	OVAL FLANGE SCREW
	D	E	F	H	
3	M20x1.5	16	4	1/4-18NPT	7/16-20UNF
6	1/2-14NPT	16	4	1/4-18NPT	7/16-20UNF
9	Pg13.5	10.5	4.5	1/4-18NPT	7/16-20UNF

TABLE

MODEL	DIMENSIONS		
	A	B	C
FKA□01	192 (196.5)	225 (229.5)	37 (38.5)
FKA□02			
FKA□03	NOTE	NOTE	NOTE
FKA□04	NOTE	NOTE	NOTE
FKA□05	NOTE	NOTE	NOTE

NOTE: 7TH MODEL CODE "H"

- WEIGHT : - 3.0 kg (WITHOUT OPTION)
- ADD : - 0.2 kg FOR INDICATOR
- 0.5 kg FOR MOUNTING BRACKET
- 2.0 kg FOR STAINLESS STEEL HOUSING OPTION





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## **Fuji Electric India Private Limited**

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