

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.

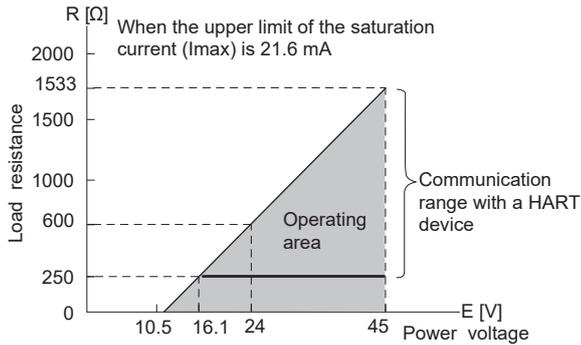
Power supply:

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 th)	Protection type			
ATEX	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 ₂₀₀ 135°C Da (Ta: -40°C to +60°C)		
		Ex ia IIIC T ₂₀₀ 100°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 +85°C	
IP66/67				
M	Combination (K) + (X) pending			
IECEx	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 ₂₀₀ 135°C Da (Ta: -40°C to +60°C)		
		Ex ia IIIC T ₂₀₀ 100°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 +85°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	✓	✓	✓	✓
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 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":

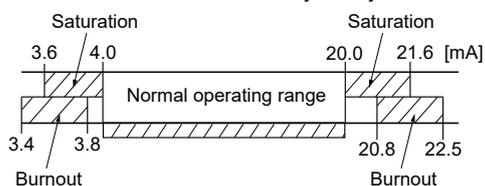
The output signal is set within the range of [20.8 to 22.5] mA, Default value: 21.6mA

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

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

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/sec².

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:

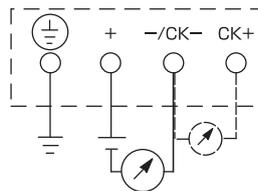
Metallic materials for all pressure boundary parts comply with NACE MR 0175/ISO 15156.

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
																M20×1.5
																1/2-14 NPT
																Pg13.5
																M20×1.5
																1/2-14 NPT
																Pg13.5
																Range and materials
																(*1) Measuring ranges
																Process cover
																Diaphragm
																Wetted cell body
																SS 316L
																Hastelloy C
																Hastelloy C
																Gold coating
																SS 316L
																PVDF insert
																Hastelloy C
																Hastelloy C
																SS 316L
																Hastelloy C
																Hastelloy C
																Gold coating
																SS 316L
																PVDF insert
																Hastelloy C
																Hastelloy C
																SS 316L
																Hastelloy C
																Hastelloy C
																Gold coating
																SS 316L
																PVDF insert
																Hastelloy C
																Hastelloy C
																SS 316L
																Gold coating
																SS 316L
																Gold coating
																SS 316L
																Improvement Symbol
																Indicator
																Arrester
																None
																None
																Yes
																None
																None
																Yes
																None
																Yes
																None
																Yes
																Hazardous location approvals
																None
																(*3) ATEX - Flameproof
																ATEX - Intrinsic Safety
																(*3) ATEX - Combination Flameproof and Intrinsic Safety
																pending
																(*3) cCSAus - Explosion proof
																pending
																cCSAus - Intrinsic Safety and Non Incendive
																pending
																(*3) cCSAus - Combination Explosion proof, Intrinsic Safety and Non Incendive
																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
																None (standard)
																SS 316L
																None
																Yes
																SS 316L
																Stainless steel parts
																TAG plate
																Housing
																Paint of detecting unit
																None
																None
																Yes
																Yes
																Special applications & Filling fluids
																Treatment
																Filling fluid
																None
																Degreasing
																Silicone oil
																NACE

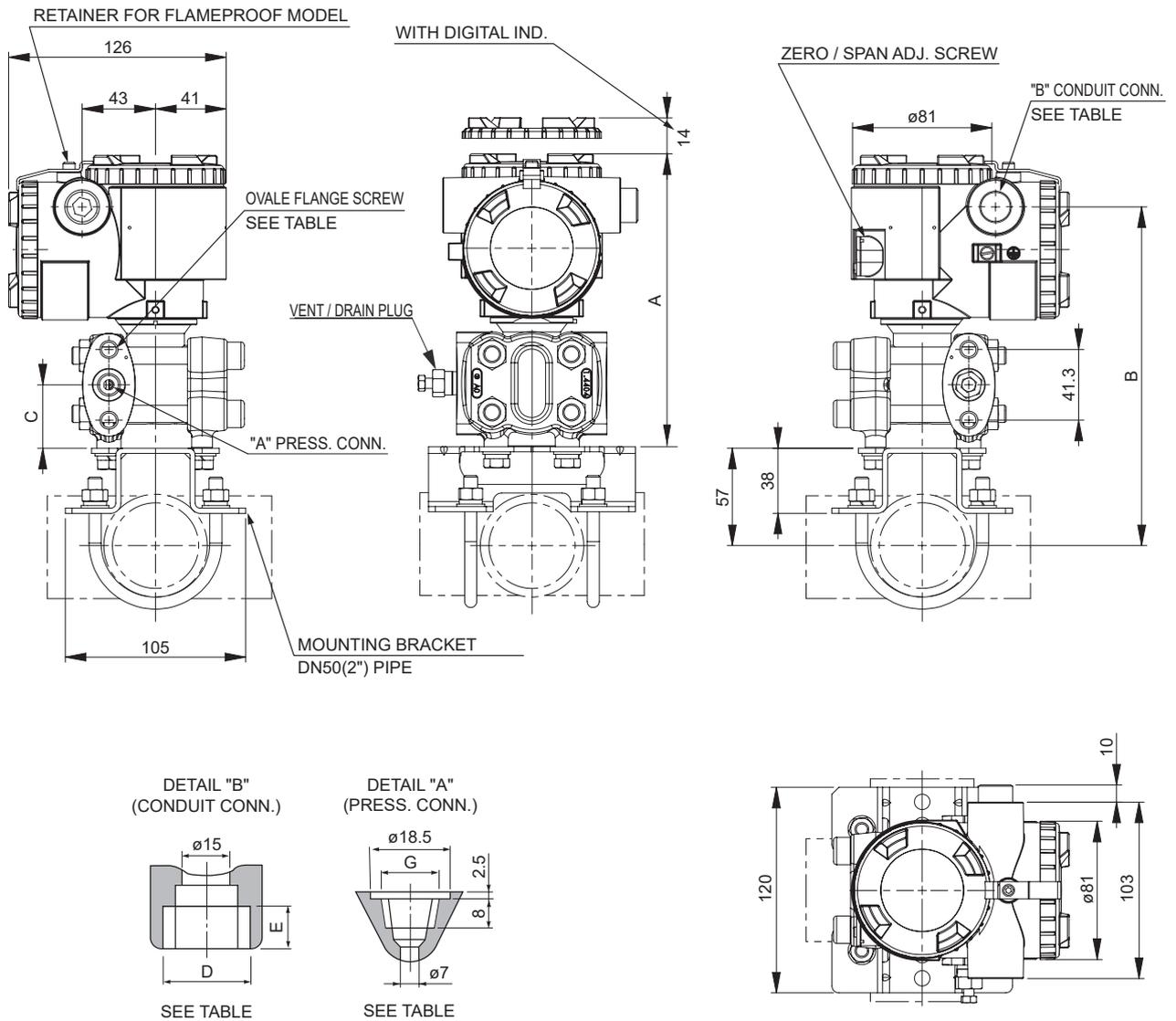
1 2 3 4 5 6 7 8								9 10 11 12 13					14	15	16	DESCRIPTION						
F	K	A					6											Process cover gasket	Vent Drain plug	Bolt/Nut		
C																		PTFE square section gasket	Standard type	Carbon steel - M10		
G																		PTFE square section gasket	Standard type	SS 316L - M10		
J																		(*4) PTFE square section gasket	Standard type	SS 660 - M10		
D																		PTFE square section gasket in PVDF insert	Standard type	Carbon steel - M10		
E																		PTFE square section gasket in PVDF insert	Standard type	SS 316L - M10		
F																		(*4) PTFE square section gasket in PVDF insert	Standard type	SS 660 - M10		
4																		Viton	Standard type	Carbon steel - M10		
5																		Viton	Standard type	SS 316L - M10		
6																		(*4) Viton	Standard type	SS 660 - M10		
																		Special options				
L																			None		Instruction manual unattached	
T																		High accuracy type				
																		(*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

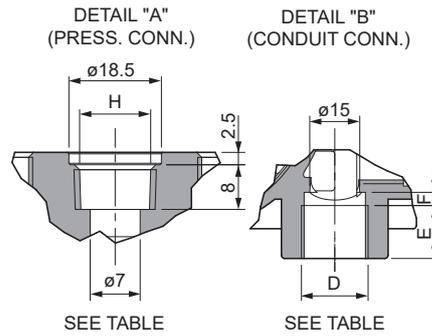
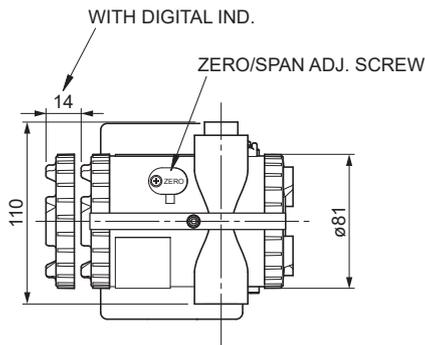
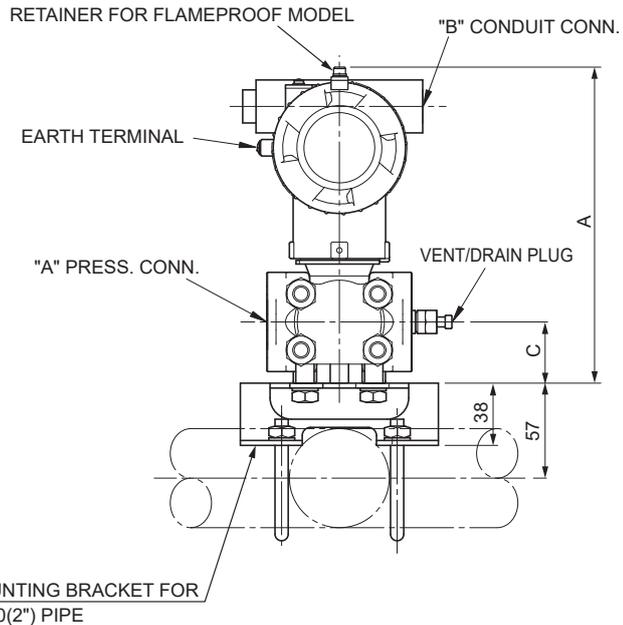
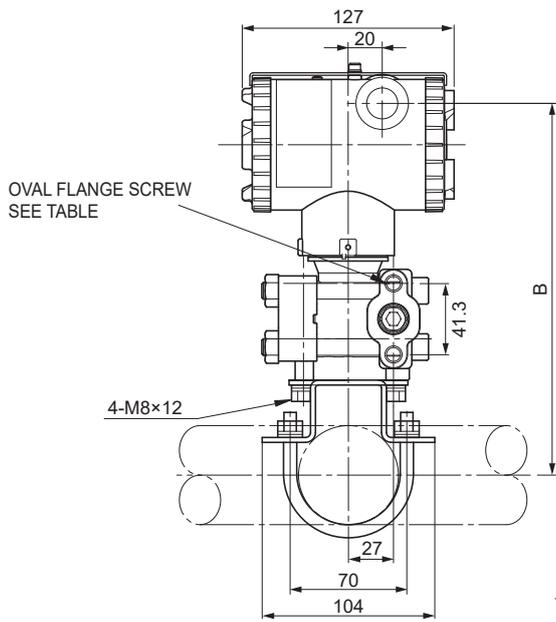
MODEL	DIMENSIONS		
	A	B	C
FKA□01	171 (175.5)	198 (202.5)	37 (38.5)
FKA□02			
FKA□03			
FKA□04			
FKA□05			

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	M20×1.5	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			
FKA□02	192	225	37
FKA□03	(196.5)	(229.5)	(38.5)
FKA□04	NOTE	NOTE	NOTE
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



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