ABSOLUTE PRESSURE TRANSMITTER

DATA SHEET FKA···5

The FCX-AIII absolute pressure transmitter accurately measures absolute pressure and transmits a proportional 4 to 20mA signal.
The transmitter utilizes a unique micromachined capacitance silicon sensor with state-of-the-art microprocessor technology to provide exceptional performance and functionality.

FEATURES

1. High accuracy
   0.2% accuracy for all calibrated spans is a standard feature for all AP models covering 1.6kPa {0.016bar} range to 3000kPa {30bar} high pressure range. 0.1% accuracy is available as option. Fuji's micro-capacitance silicon sensor assures this accuracy for all suppressed calibration ranges without additional adjustment.
2. Minimum environmental influence
   The "Advanced Floating Cell" design which protects the pressure sensor against changes in temperature, and overpressure substantially reduces total measurement error in actual field applications.
3. Fuji/HART® bilingual communications protocol and FOUNDATION™ fieldbus and Profibus™ compatibility
   FCX-AIII series transmitter offers bilingual communications to speak both Fuji proprietary protocol and HART®. Any HART® compatible devices can communicate with FCX-AIII. Further, by upgrading electronics FOUNDATION™ fieldbus and Profibus™ are also available.
4. Application flexibility
   Various options that render the FCX-AIII suitable for almost any process applications include:
   – Full range of hazardous area approvals
   – Built-in RFI filter and lightning arrester
   – 5-digit LCD meter with engineering unit
   – Stainless steel electronics housing
   – Wide selection of materials
5. Burnout current flexibility (Under Scale: 3.2 to 4.0mA, Over Scale: 20.0 to 21.6mA)
   Burnout signal level is adjustable using Model FXW Hand Held Communicator (HHC) to comply with NAMUR NE43.
6. Dry calibration without reference pressure
   Thanks to the best combination of unique construction of mechanical parts (Sensor unit) and high performance electronics circuit (Electronics unit), reliability of dry calibration without reference pressure is at equal level as wet calibration.

SPECIFICATIONS

Functional specifications

Service: Liquid, gas, or vapour

Span, range, and overrange limit:

Type	Span limit [kPa abs] {bar abs}		Range limit [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}

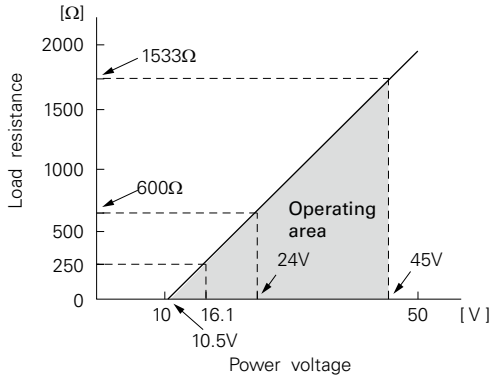
Remark: To minimize environmental influence, span should be greater than 1/40 of the max. span in most applications.

– The maximum span of each sensor can be converted to different units using factors as below.
  1MPa abs=10^3kPa abs=10bar abs=10.19716kgf/cm^2 abs =145.0377psi abs
  1kPa abs =10mbar abs=101.9716mmH_2O abs =4.01463inH_2O abs=7.50062mmHg abs

Output signal: 4 to 20mA DC with digital signal superimposed on the 4 to 20mA signal.

Power supply: Transmitter operates on 10.5V to 45V DC at transmitter terminals.
10.5V to 32V DC for the units with optional arrester.

Load limitations: see figure below



Note: For communication with HHC(1) (Model: FXW), min. of 250Ω is required.

Hazardous locations: SEE TABLE2

Zero/span adjustment:
Zero and span are adjustable from the HHC(1). Zero and span are also adjustable externally from the adjustment screw (span adjustment is not available with 9th digit code "L, P, Q, S").

Damping: Adjustable from HHC or local configurator unit with LCD display.
The time constant is adjustable between 0 to 32 seconds.

Zero elevation/suppression:
Zero can be elevated within the specified range limit of each sensor model.

Normal/reverse action:
Selectable from HHC(1).

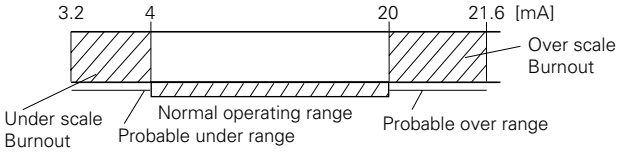
Indication: Analog indicator or 5-digit LCD meter, as specified.

Burnout direction: Selectable from HHC(1)
If self-diagnostic detect transmitter failure, the analog signal will be driven to either "Output Hold", "Output Overscale" or "Output Underscale" modes.

"Output Hold":
Output signal is hold as the value just before failure happens.

"Output Overscale":
Adjustable within the range 20.0mA to 21.6mA from HHC(1)

"Output Underscale":
Adjustable within the range 3.2mA to 4.0mA from HHC(1)



Output Limits comforming the NAMUR NE43 by order.

Loop-check output:
Transmitter can be configured to provide constant signal 3.2mA through 21.6mA by HHC(1).

Temperature limit:
Ambient: –40 to +85°C
(–20 to +80°C for LCD indicator)
(–40 to +60°C for arrester option)
For explosionproof units (flameproof or intrinsic safety), ambient temperature must be within the limits specified by each standard.
Process: –40 to +85°C for silicone fill sensor
Storage: –40 to +90°C

Humidity limit: 0 to 100% RH

Communication: With HHC(1) (Model FXW, consult Data Sheet No. EDS8-47), following items can be remotely displayed or configured.
Note: HHC's version must be higher than 7.0 (or FXW □□□□1–□4), for FCX-AⅢ.

Local configurator with LCD display (option):
Local configurator with 3 push button and LCD display can support following items.

Items	By communication with FXW		By local configurator (with 3 push button)	
	Display	Set	Display	Set
Tag No.	*v*	*v*	*v*	*v*
Model No.	*v*	*v*	*v*	*v*
Serial No. & Software Version	*v*	—	*v*	—
Engineering unit	*v*	*v*	*v*	*v*
Range limit	*v*	—	*v*	—
Measuring range	*v*	*v*	*v*	*v*
Damping	*v*	*v*	*v*	*v*
Output mode	*v*	—	*v*	—
Burnout direction	*v*	*v*	*v*	*v*
Calibration	*v*	*v*	*v*	*v*
Output adjust	—	*v*	—	*v*
Data	*v*	—	*v*	—
Self diagnoses	*v*	—	*v*	—
Printer (In case of FXW with printer option)	*v*	—	—	—
External switch lock	*v*	*v*	*v*	*v*
Transmitter display	*v*	*v*	*v*	*v*
Linearize	*v*	*v*	—	—
Rerange	*v*	*v*	*v*	*v*
Saturate current	*v*	*v*	*v*	*v*
Write protect	*v*	*v*	*v*	*v*
History – Calibration history – Ambient temperature history	 *v* *v*	 *v* —	 *v* *v*	 *v* —

EMC Conformity: EN61326 CE

(Note) (1) HHC: Hand Held Communicator

Performance specifications

Reference conditions, silicone oil fill, 316SS isolating diaphragms, 4 to 20mA analog output in linear mode.

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

(Standard)

For spans greater than 1/10 of URL: ±0.2% of span

For spans below 1/10 of URL:

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

(Option) (code: 21th digit H)

(Not available for Max span 16kPa abs, 130kPa abs)

For spans greater than 1/10 of URL: ±0.1% of span

For spans below 1/10 of URL:

$$\pm\left(0.05 + 0.05\,\frac{0.1 \times \text{URL}}{\text{Span}}\right)\% \text{ of span}$$

Stability: ±0.2% of upper range limit (URL) for 10 years.

Temperature effect:

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

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

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

Overrange effect: Zero shift; ±0.2% of URL for any overrange to maximum limit

Supply voltage effect:

Less than 0.005% of calibrated span per 1V

Update rate: 60 msec

Step response: Time constant: 0.08 s (at 23°C)
Dead time: 0.12 s
(without electrical damping)

Mounting position effect:

Zero shift, less than 0.1kPa{1mbar} for a 10° tilt in any plane.
No effect on span. This error can be corrected by adjusting zero.

Dielectric strength:

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

Insulation resistance:

More than 100MΩ at 500V DC.

Internal resistance for external field indicator:

12Ω or less

Physical specifications

Electrical connections:

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

Process connections:

1/4-18 NPT or Rc1/4 on 54mm centers, as specified.

Process-wetted parts material:

Material code (7th digit in "Code symbols")	Process cover	Diaphragm	Wetted sensor body	Vent/drain
V	316 stainless steel (*1)	316L stainless steel	316 stainless steel	316/316L stainless steel
H	316 stainless steel (*1)	Hastelloy-C	Hastelloy-C lining	316/316L stainless steel
M	316 stainless steel (*1)	Monel	Monel lining	316/316L stainless steel
T	316 stainless steel (*1)	Tantalum	Tantalum lining	316/316L stainless steel

Note: (*1) SCS14A per JIS G 5121 (equivalent CF8M per ASTM A351/A351M)

Remarks: Availability of above material design depends on ranges. Refer to "Code symbols".

Non-wetted parts material:

Electronics housing: Low copper die-cast aluminum alloy finished with polyester coating (standard), or 316 stainless steel (ASTM CF8M), as specified.
Bolts and nut: Cr-Mo alloy (standard), 304 or 316 stainless steel
Fill fluid: Silicone oil
Mounting bracket: 304 or 316 stainless steel.

Environmental protection:

IEC IP67 and NEMA 6/6P

Mounting: On 60.5mm (JIS 50A) pipe using mounting bracket, direct wall mounting, or direct process mounting.

Mass{weight}: Transmitter approximately 2.9 to 3.4kg without options.
Add; 0.5kg for mounting bracket
4.5kg for stainless steel housing option

Optional features

Indicator: A plug-in analog indicator (2.5% accuracy)
An optional 5-digit LCD meter with engineering unit is also available.

Local configurator with LCD display:

An optional 5 digits LCD meter with 3 push buttons can support items as using communication with FXW.

Arrester: A built-in arrester protects the electronics from lightning surges.
Lightning surge immunity:
4kV (1.2 × 50μs)

Degreasing: Process-wetted parts are cleaned, but the fill fluid is standard silicone oil. Not for use on oxygen or chlorine measurement.

NACE specification:

Metallic materials for all pressure boundary parts comply with NACE MR-01-75. 304 stainless steel bolts and nuts, ASTM B7M or L7M bolts and 2HM nuts (Class II) are available.

Optional tagplate:

An extra 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

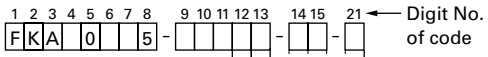
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	21
F	K	A		0			5	-					-		-

← Digit No. of code

Digit	Description	Note	Code
4	<Connections>		
	Process connection / Oval flange screw / Conduit connection / Case type		
	Rc1/4 / 7/16-20UNF / G1/2 / T type		5
	1/4-18NPT / 7/16-20UNF / 1/2-14NPT / T type		6
	1/4-18NPT / M10 / Pg13.5 / T type		7
	1/4-18NPT / M10 / M20×1.5 / T type		8
	1/4-18NPT / 7/16-20UNF / Pg13.5 / T type		9
	Rc1/4 / 7/16-20UNF / G1/2 / L type		S
	1/4-18NPT / 7/16-20UNF / 1/2-14NPT / L type		T
	1/4-18NPT / M10 / Pg13.5 / L type		V
	1/4-18NPT / M10 / M20×1.5 / L type		W
	1/4-18NPT / 7/16-20UNF / Pg13.5 / L type		X
6, 7	<Span limit>		
	Span limit [kPa abs]{bar abs}(*1) / Process cover / Diaphragm / Wetted cell body	Note1	
	1.6…16 {0.016…0.16} / 316 stainless steel / 316L stainless steel / 316 stainless steel		1V
			1H
			1M
	1.6…130 {0.016…1.3} / 316 stainless steel / 316L stainless steel / 316 stainless steel		2V
			2H
			2M
			2T
	5…500 {0.05…5} / 316 stainless steel / 316L stainless steel / 316 stainless steel		3V
			3H
			3M
			3T
	30…3000 {0.3…30} / 316 stainless steel / 316L stainless steel / 316 stainless steel		4V
			4H
			4M
			4T
9	<Indicator and arrester>		
	Indicator / Arrester		
	None / None		A
	Analog, 0 to 100% linear scale / None		B
	Analog, custom scale / None		D
	None / Yes		E
	Analog, 0 to 100% linear scale / Yes		F
	Analog, custom scale / Yes		H
	Digital, 0 to 100% / None		L
	Digital, custom scale / None		P
	Digital, 0 to 100% / Yes		Q
	Digital, custom scale / Yes		S
	Digital, 0 to 100% (Local configurator unit with LCD display) / None		1
	Digital, custom scale (Local configurator unit with LCD display) / None		2
	Digital, 0 to 100% (Local configurator unit with LCD display) / Yes		4
	Digital, custom scale (Local configurator unit with LCD display) / Yes		5
10	<Approvals for hazardous locations>		
	None (for ordinary locations)		A
	TIIS, Flameproof (Conduit seal) (*6)	Note6	B
	TIIS, Flameproof (Cable gland seal) (*6)	Note6	C
	TIIS, Intrinsic safety		G
	FM, Flameproof (or explosionproof) (*7)	Note7	D
	FM, Intrinsic safety and nonincentive		H
	FM Combined of flameproof and intrinsic safety (*7)	Note7	V
	ATEX Flameproof (*8)	Note8	X
	ATEX Intrinsic safety		K
	ATEX Type n		P
	ATEX Combined of flameproof and intrinsic safety (*8)	Note8	M
	IECEx Scheme, Flameproof (*8)	Note8	R
	IECEx Scheme, Intrinsic safety		T
	CSA, Flameproof (or explosionproof) (*9)	Note9	E
	CSA, Intrinsic safety and nonincentive		J
	NEPSI, Flameproof (or exprosionproof) (*7)	Note7	F
	NEPSI, Intrinsic safety (Entity)		S
	NEPSI, Combined of flameproof and intrinsic safety (*7)	Note7	U
11	<Vent/ drain and mounting bracket>		
	Vent/drain / Mounting bracket		
	Standard / None		A
	Standard / Yes, stainless steel (SUS304)		C
	Standard / Yes, stainless steel (SUS316)		K
	Side / None		D
	Side / Yes, stainless steel (SUS304)		F
	Side / Yes, stainless steel (SUS316)		L

Note1: (*1) 100: 1 turn down is possible, but should be used at a span greater than 1/40 of the maximum span for better performance.

Digit	Description			Note
12	<Options>			
	Extra SS tag plate	Stainless steel elec. housing	Coating of cell	
	None	None	None	Note2
	Yes	None	None	
	None (*2)	None	Yes	
	Yes	None	Yes	
	None	Yes (*5)	Yes	Note5
	Yes	Yes (*5)	Yes	Note5
13	<Special applications and fill fluid>			
	Treatment	Fill fluid		
	Standard	Silicone oil		
	Degreasing	Silicone oil		
	NACE specification	Silicone oil (7th digit code "T" and 15th digit code "A", "B" are not available)		
14	<O-ring/Gasket and Teflon membrance>			
	Teflon (gasket)			
15	<Bolt/nut> (*3)			Note 3
	Cr-Mo alloy hexagon socket head cap screw/carbon steel nut			
	Cr-Mo alloy hexagon bolt/nut			
	NACE bolt/nut (ASTM A193 B7M/A194 2HM)			
	NECE bolt/nut (ASTM A320 L7M/A194 2HM)			
	304 stainless steel bolt/304 stainless steel nut			
	316 stainless steel bolt/316 stainless steel nut			
21	<Other options> (*4)			Note 4
	High accuracy type	Instruction manual attached		
	Instruction manual unattached			
	High accuracy type	Instruction manual unattached		



Note2: (*2) Customer tag number can be engraved on standard stainless steel name plate. If extra tag plate is required, select "Yes".
Note3: (*3) In case of tropical use, select stainless bolts and nuts.
Note4: (*4) If other option is not necessary, 21st digit code is blank.
In case of 21st digit code is blank, instruction manual attached.
Note5: (*5) Available for 4th digit code "5" to "9".
Note6: (*6) Available for 4th digit code "5", "S".
Note7: (*7) Not available for 4th digit code "8", "W".
Note8: (*8) Available for 4th digit code "6", "8", "T", "W".
Note9: (*9) Available for 4th digit code "6", "T".

ACCESSORIES

Oval flanges: (Model FFP, refer to Data Sheet No. EDS6-10)
Converts process connection to 1/2-14 NPT or to Rc1/2; in carbon steel or in 316 stainless steel.

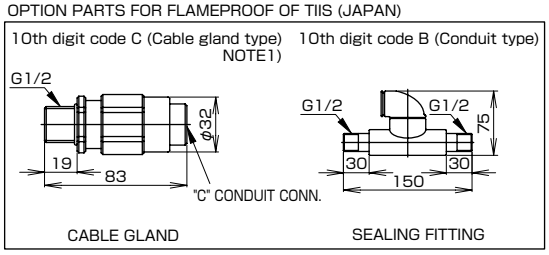
Hand held communicator:
(Model FXW, refer to Data Sheet No. EDS 8-47)

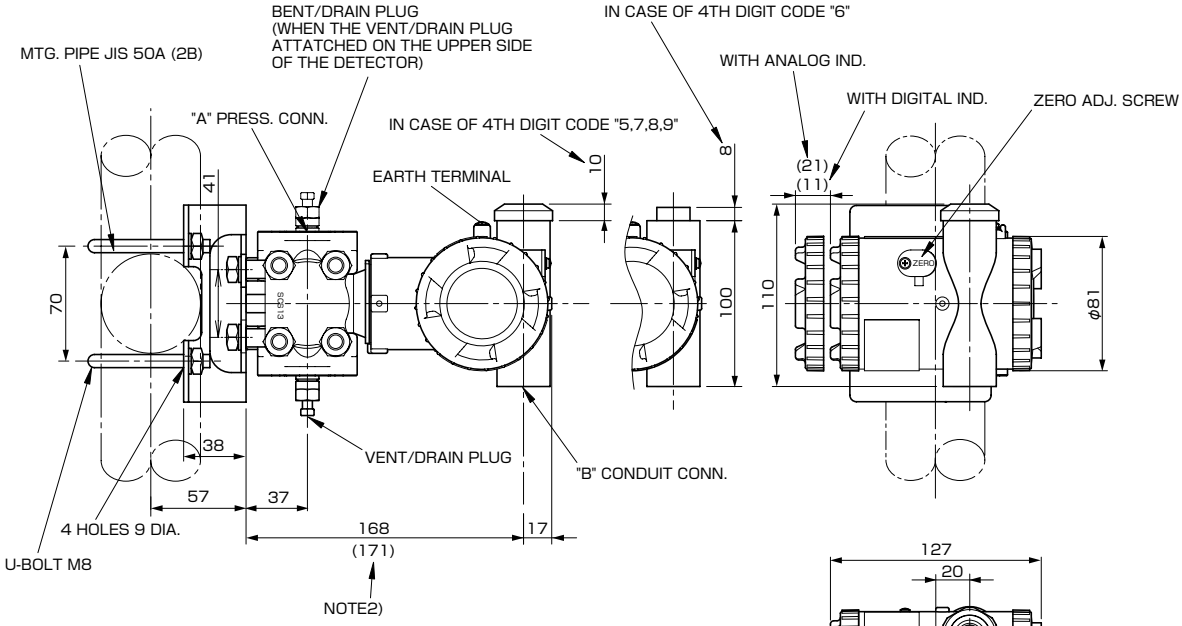
ORDERING INFOMATION

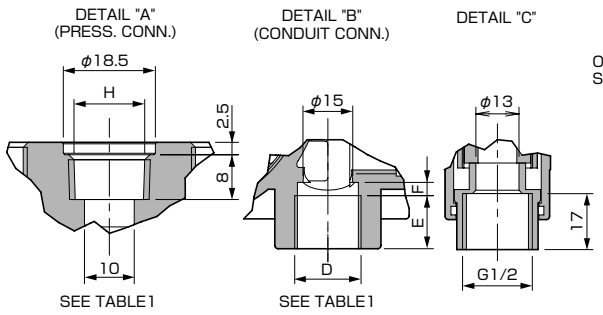
When ordering this instrument, specify.
1. CODE SYMBOLS
2. Measuring range.
3. Output orientation (burnout direction) when abnormality is occurred in the transmitter.
Hold / Overscale / Underscale
Unless otherwise specified, output hold function is supplied.
4. Indication method (indicated value and unit) in case of the actual scale (code D, H, P, S on 9th digit).
5. Tag No. (up to 14 alphanumerical characters), if required.

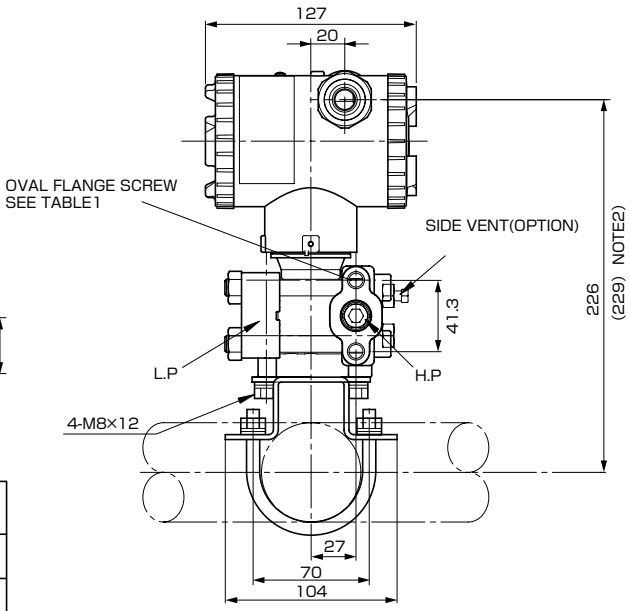
OUTLINE DIAGRAM (Unit:mm)

< CODE SYMBOLS : FKA [5 8 / 6 9 / 7] □□□5 >





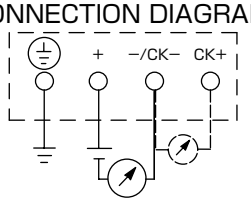




4th digit of the code symbols	Conduit conn.			Press. conn.	Oval frange screw
	D	E	F	H	
5	G 1/2	18	2	Rc1/4	7/16-20UNF SCREW DEPTH15
6	1/2-14NPT	16	4	1/4-18NPT	7/16-20UNF SCREW DEPTH15
7	Pg13.5	10.5	4.5	1/4-18NPT	M10 SCREW DEPTH15
8	M20×1.5	16	4	1/4-18NPT	M10 SCREW DEPTH15
9	Pg13.5	10.5	4.5	1/4-18NPT	7/16-20UNF SCREW DEPTH15

TABLE 1

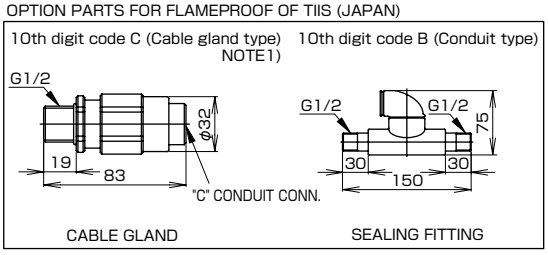
CONNECTION DIAGRAM

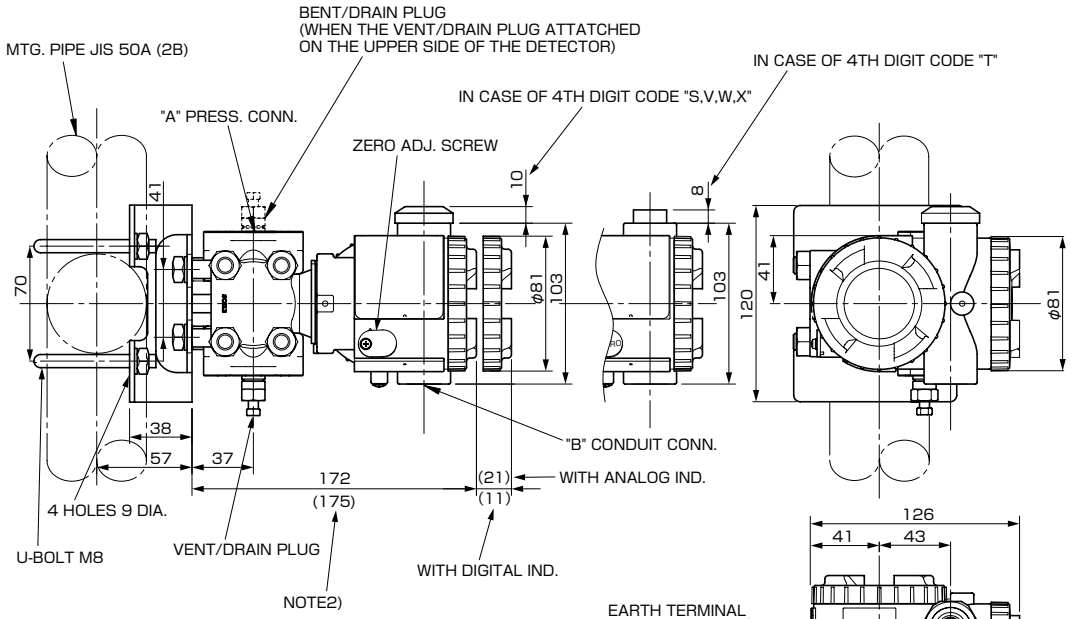


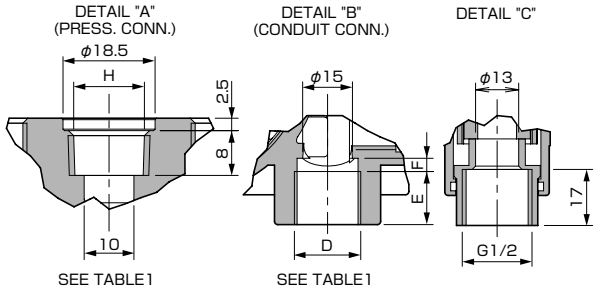
NOTE1) IN CASE OF 10TH CODE "C", φ11 CABLE IS SUITBLE.
NOTE2) WHEN THE 7TH DIGIT OF THE CODE SYMBOLS "H,M,T"

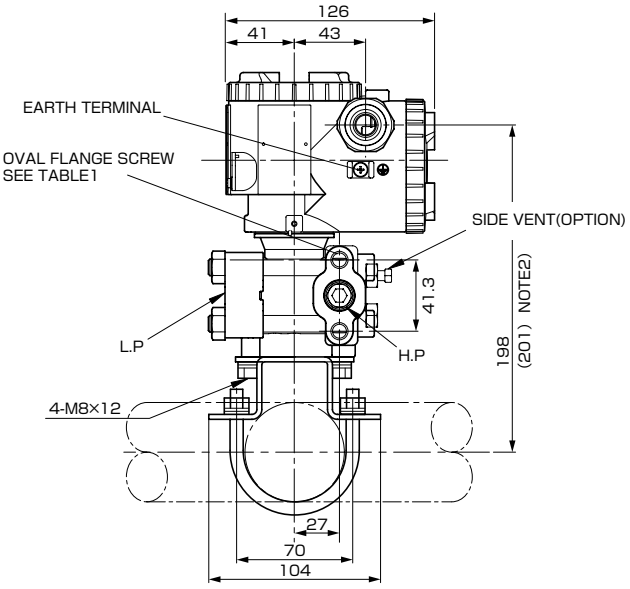
< CODE SYMBOLS : FKA [S W / T X / V] □□□5 >

OPTION PARTS FOR FLAMEPROOF OF TIIS (JAPAN)





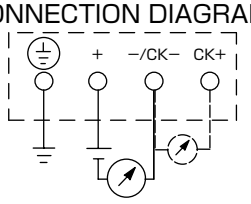




4th digit of the code symbols	Conduit conn.			Press. conn.	Oval frange screw
	D	E	F	H	
S	G 1/2	18	2	Rc1/4	7/16-20UNF SCREW DEPTH15
T	1/2-14NPT	16	4	1/4-18NPT	7/16-20UNF SCREW DEPTH15
V	Pg13.5	10.5	4.5	1/4-18NPT	M10 SCREW DEPTH15
W	M20×1.5	16	4	1/4-18NPT	M10 SCREW DEPTH15
X	Pg13.5	10.5	4.5	1/4-18NPT	7/16-20UNF SCREW DEPTH15

TABLE 1

CONNECTION DIAGRAM



NOTE1) IN CASE OF 10TH CODE "C", φ11 CABLE IS SUITBLE.
NOTE2) WHEN THE 7TH DIGIT OF THE CODE SYMBOLS "H,M,T"

TABLE 2

Authorities	Intrinsic safety
ATEX	Ex II 1 G Ex ia IIC T5 Tamb = –40°C to +50°C Ex ia IIC T4 Tamb = –40°C to +70°C Entity Parameters: Ui=28V, Ii=94.3mA, Pi=0.66W, Ci=26nF (Without Arrester), Li=0.6mH (Without analog indicator), Ci=36nF (With Arrester), Li=0.7mH (With analog indicator)
Factory Mutual (pending)	Class I II III Div.1 Groups A, B, C, D, E, F, G T4 Entity Type 4X Model code 9th digit / Tamb: A,B,D: –40°C to +85°C L,P,1,2: –20°C to +80°C Q,S,4,5: –20°C to +60°C E,F,H: –40°C to +60°C Entity Parameters: Vmax=42.4V, Imax=113mA, Pi=1W, Ci=35.98nF, Li=0.694mH
CSA	Class I Div.1 Groups A, B, C, D Class II Div.1 Groups E, F, G Class III Div.1 Temp Code T5 Tamb max = +50°C Temp Code T4 Tamb max = +70°C Entity Parameters: Vmax=28V, Imax=94.3mA, Ci=25nF (Without Arrester), Ci=36nF (With Arrester), Li=0.6mH (Without the analog meter), Li=0.7mH (With analog meter)
TIIS (pending)	Ex ia IIC T4 Tamb max = +60°C Entity Parameters: Ui=28V, Ii=94.3mA, Pi=0.66W, Ci=38.4nF, Li=0.694mH
IECEx Scheme	Ex ia IIC T4 Tamb = –40°C to +70°C Ex ia IIC T5 Tamb = –40°C to +50°C Entity Parameters: Ui=28V, Ii=94.3mA, Pi=0.66W, Ci=26nF (Without Arrester), Li=0.6mH (Without analog indicator), Ci=36nF (With Arrester), Li=0.7mH (With analog indicator)
NEPSI	Ex ia IIC T4 Ex d IIB+H_2 T6 / Ex ia IIC T4 Model code 9th digit / 13th digit / Tamb: A,B,D / Y,G,N: –40°C to +85°C L,P,1,2 / Y,G,N: –20°C to +80°C Q,S,4,5 / Y,G,N: –20°C to +60°C E,F,H / Y,G,N: –40°C to +60°C Entity Parameters: Ui=42.4V, Ii=113mA, Pi=1W, Ci=35.98nF, Li=0.694mH

Authorities	Flameproof
ATEX	Ex II 2 GD Ex d IIC T6 IP66/67 T85°C Tamb = –40°C to +65°C Ex d IIC T5 IP66/67 T100°C Tamb = –40°C to +85°C
Factory Mutual	Class I Div.1 Groups B, C, D T6 Type 4X Class II III Div.1 Groups E, F, G T6 Type 4X Tamb max = +60°C
CSA	Class I Div.1 Groups C, D Class II Div.1 Groups E, F, G Class III Div.1 Note) "Seal Not Required" enclosure is allowed.
TIIS	Ex do IIB+H_2 T4 Tamb max = +60°C Maximum process temp. = +120°C
IECEx Scheme	Ex d IIC T5 IP66/67 Tamb = –40°C to +85°C Ex d IIC T6 IP66/67 Tamb = –40°C to +65°C
NEPSI	Ex d IIB+H_2 T6 Tamb = –40°C to +60°C

Authorities	Type n Nonincendive
ATEX (pending)	Ex II 3 GD EEx nL IIC T5 Tamb = –40°C to +50°C EEx nL IIC T4 Tamb = –40°C to +70°C Specific Parameters: Model without arrester: Ui=42.4V, Ii=113mA, Pi=1W, Ci=25.18nF, Li=0.694mH Model with arrester: Ui=32V, Ii=113mA, Pi=1W, Ci=35.98nF, Li=0.694mH EEx nAL IIC T5 Tamb = –40°C to +50°C EEx nAL IIC T4 Tamb = –40°C to +70°C Specific Parameters: Model without arrester: Umax=42.4V, Imax=113mA, Pmax=1W Model with arrester: Umax=32V, Imax=113mA, Pmax=1W
Factory Mutual (pending)	Class I II III Div.2 Groups A, B, C, D, F, G T4 Entity Type 4X Model code 9th digit / Tamb: A,B,D: –40°C to +85°C L,P,1,2: –20°C to +80°C Q,S,4,5: –20°C to +60°C E,F,H: –40°C to +60°C
CSA (pending)	Class I Div.2 Groups A, B, C, D Class II Div.2 Groups E, F, G Class III Div.2 Temp Code T5 Tamb max = +50°C Temp Code T4 Tamb max = +70°C Entity Parameters: Vmax=28V, Ci=25.18nF (Without Arrester), Ci=35.98nF (With Arrester), Li=0.694mH

⚠ Caution on Safety

*Before using this product, be sure to read its instruction manual in advance.

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