Safety for Industrial Process

FKA...5 Absolute pressure transmitter

DATA SHEET

The ProcessX absolute pressure transmitter accurately measures absolute pressure and transmits proportional 4 to 20mA signal.

The transmitter utilizes the unique micromachined capacitive 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 the standard feature for all models covering 1.6kPa {0.016bar} range to 3000kPa {30bar} high pressure range. 0.1% accuracy is available as option. Georgin's micro-capacitance silicon sensor assures this feature for all suppressed calibration ranges without additional adjustment.

2. **Minimum inventory**

   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. **GEORGIN/HART™ bilingual communication module**

   The communication module is "bilingual" to speak both Georgin proprietary protocol and HART®. Any HART® compatible devices can communicate with ProcessX series transmitters.

4. **Application flexibility**

   Example features that render the ProcessX suitable for almost any process applications includes:

   - Full range of hazardous location approvals.
   - Built-in RFI filter and lightning arrester.
   - 5-digits 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 22.5mA)**

   Burnout signal level is adjustable using Model FXW or 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

Type:
FKA: Smart, 4 to 20mA DC + Georgin/Hart® digital signal

Service:
Liquid, gas or vapor

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□11	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}

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

FC-FKA-5-EN-25-10-2012
Subject to modifications due to technical advances

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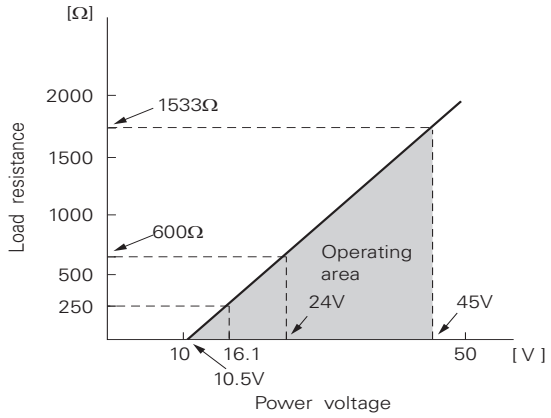
- **Output signal :**
  4 to 20mA DC with digital signal superimposed on the 4 to 20mA signal.
- **Power supply:**
  Transmitter operates on 10.5V to 45V DC at transmitter terminals
  10.5V to 32V DC for the units with optional arrester
- **Load limitations:** see figure below



Note: for communication with HHC (1) min. of 250Ω required.

- **Hazardous location:**

Authority (Digit 10 =)	Intrinsic safety
ATEX (K)	Ex II 1 G Ex ia IIC T5 (-40°C ≤ Ta ≤ +50 °C) Ex ia IIC T4 (-40°C ≤ Ta ≤ +70 °C) IP66/67 Entity Parameters: Ui ≤ 28 Vdc, Ii ≤ 94.3 mA, Pi ≤ 0.66 W Ci = 36 nF/26 nF for models with/without Arrester Li = 0.7 mH/0.6 mH for models with/without Analog Indicator
Factory Mutual (H)	Class I II III Div.1 Groups A, B, C, D, E, F, G T4 Entity Type 4X

Model code		Tamb
9th digit	13th digit	
A,B,C,D,J	Y,G,N	-40°C to +85°C
L,P,M,1,2,3	Y,G,N	-20°C to +80°C
Q,S,N,4,5,6	Y,G,N	-20°C to +60°C
E,F,G,H,K	Y,G,N	-40°C to +60°C
-	W,A,D	-10°C to +60°C

Entity Parameters:
Vmax=42.4V, Imax=113mA, Pi=1W,
Ci=35.98nF, Li=0.694mH

CSA (J)	Ex ia Class I, Groups A, B, C and D; Class II, Groups E,F and G; Class III Per drawing TC 522873 Temp. code T5 for Tamb max = +50°C Temp. code T4 for Tamb max = +70°C Entity Parameters: Vmax = 28 Vdc, Imax = 94.3 mA, Pmax = 0.66 W Ci = 36 nF/25 nF for models with/without Arrester Li = 0.7 mH/0.6 mH for models with/without Analog Indicator
IECEx (T)	Ex ia IIC T5 (-40°C ≤ Ta ≤+50 °C) Ex ia IIC T4 (-40°C ≤ Ta ≤+70 °C) IP66/67 Entity Parameters: Ui ≤ 28 Vdc, Ii ≤ 94.3 mA, Pi ≤ 0.66 W Ci = 36 nF/26 nF for models with/without Arrester Li = 0.7 mH/0.6 mH for models with/without Analog Indicator

Authority	Flameproof
ATEX (X)	Ex II 2 GD Ex d IIC T6 (-40°C ≤ Ta ≤ +65 °C) Ex d IIC T5 (-40°C ≤ Ta ≤ +85 °C) Ex tD A21 IP66/67 T 85°C Ex tD A21 IP66/67 T 100°C Electrical ratings Model Without arrester: Ui ≤ 45 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W Model With arrester: Ui ≤ 32 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W
Factory Mutual (D)	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 (E)	Class I, Groups C and D; Class II, Groups E,F and G ; Class III Maximum ambient temperature 85°C Maximum working pressure 50 Mpa Electrical ratings Model Without arrester: Ui ≤ 45 Vdc, 4-20 mA Model With arrester: Ui ≤ 32 Vdc, 4-20 mA Note: "Seal not required"
IECEx (R)	Ex d IIC T6 (-40°C ≤ Ta ≤ +65 °C) Ex d IIC T5 (-40°C ≤ Ta ≤ +85 °C) DIP A21 IP66/67 T 85°C DIP A21 IP66/67 T 100°C Electrical ratings Model Without arrester: Ui ≤ 45 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W Model With arrester: Ui ≤ 32 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W

Authority (Digit 10 =)	Type n Nonincendive
ATEX (P)	Ex II 3 G Ex nA II T5 (-40°C ≤ Ta ≤+70 °C) IP66/67 Electrical ratings Model Without arrester: Ui ≤ 45 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W Model With arrester: Ui ≤ 32 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W Optional Analog indicator is not available for type "n"
Factory Mutual (H)	Class I II III Div.2 Groups A, B, C, D, F, G T4 Entity Type 4X

Model code		Tamb
9th digit	13th digit	
A,B,C,D,J	Y,G,N	-40°C to +85°C
L,P,M,1,2,3	Y,G,N	-20°C to +80°C
Q,S,N,4,5,6	Y,G,N	-20°C to +60°C
E,F,G,H,K	Y,G,N	-40°C to +60°C
-	W,A,D	-10°C to +60°C

CSA (J)	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 = 28 Vdc, Imax = 94.3 mA, Pmax = 0.66 W Ci = 36 nF/25 nF for models with/without Arrester Li = 0.7 mH/0.6 mH for models with/without Analog Indicator
IECEx (Q)	Ex nA II T5 (-40°C ≤ Ta ≤+70 °C) IP66/67 Electrical ratings Model Without arrester: Ui ≤ 45 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W Model With arrester: Ui ≤ 32 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W Optional Analog indicator is not available for type "n"

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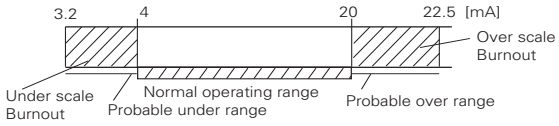
- **Zero/span adjustment:**
  Zero and span are adjustable either from the HHC(1) in Hart® or externally from the adjustment screw(span adjustment is not available with 9th digit code "L, P, Q, S").
- **Damping:** (Adjustable from the HHC(1))
  Adjustable from HHC or local adjustment unit with LCD display. The time constant is adjustable between 0 to 32 seconds.
- **Zero elevation/suppression:**
  Zero may be elevated within the specified range limit of each sensor model.
- **Normal/reverse action:**
  Configurable 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 22.5mA from HHC(1).

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



- **Loop-check output:**
  Transmitter can be configured to provide constant signal 3.2mA through 22.5mA 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), following items can be remotely displayed or configured

Note:
HHC's version must be higher than 7.0 for supporting these items: "Saturate current", "Write protect", and "History".

Items	Georgin protocol with HHC(1)		Hart Protocol	
	Display	Set	Display	Set
Tag No.	v	v	v	v
Model No.	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 (as 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 —

(Note) (1) HHC: Hand Held Communicator

- ***Local configurator with LCD display (option) :**
  Local configurator with 3 push button and LCD display can support all items (Georgin Protocol list) except "Linearize" function.
- **Programmable output linearization function:**
  Output signal can be characterized with "14 points linear approximation function" from HHC(1).

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Performance specifications

(Reference conditions, silicone oil fill, 316SS isolating diaphragms, 4 to 20mA analog output)

- **Accuracy rating:**
  (Including linearity, hysteresis, and repeatability)
  For span > than 1/10 of URL:
  ±0.2% of span
  For span < than 1/10 of URL:

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

  Option :
  (Not available for Max span 16kPa abs, 130kPa abs)
  For span > than 1/10 of URL:
  ±0.1% of span
  For span < than 1/10 of URL:

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

- **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:

$$\pm (0.125 + 0.1 \frac{URL}{span}) \%/28°C$$

  Total effect:

$$\pm (0.15 + 0.1 \frac{URL}{span}) \%/28°C$$

  Double the effects for material code "H" (7th digit in codes symbols)
- **Overrange effect:**
  Zero shift: ± 0.3% of URL for any overrange to maximum limit.
- **Supply voltage effect:**
  Less than 0.005% of calibrated span per 1V.
- **Update rate:**
  60 msec
- **Response time:** (without electrical damping)
  Time constant: 0.08 s (at 23°C)
  Dead time: about 0.12 s (without electrical damping)
  Response time = time constant + dead time
- **Mounting position effect:**
  Zero shift, less than 0.1kPa for a 10° tilt in any plane.
  No effect on span.
  This error can be corrected by adjusting zero.
- **Vibration effect:**
  < ±0.25% of span for spans greater than 1/10 of URL.
  Frequency 10 to 150Hz, acceleration 39.2m/sec^2
- **Material fatigue:**
  Consult Georgin.
- **Dielectric strength:**
  500 V AC 50/60Hz 1 min., between circuit and earth.
- **Insulation resistance:**
  > than 100 MΩ at 500 V DC.
- **Internal resistance for external field indicator:**
  12 Ω max. (connected to test terminal CK+ and CK-).

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Physical specifications

- **Electrical connections:**
  1/2 -14 NPT, Pg13.5 or M20 x 1.5
- **Process connections:**
  1/4-18NPT, as specified.
- **Process-wetted parts material:**

Code (7th digit)	Process cover	Diaphragm	Wetted sensor body	Vent/drain
V	316 SS	316L SS	316 SS	316 SS
H	316 SS or PVDF	Hastelloy-C	Hastelloy-C lining	316 SS
J	316 SS	Lining + gold coat	Tantalum Lining	316 SS

Remark:
Sensor gasket :Viton o-ring or PTFE square section gasket. Availability of above material design depends on ranges and static pressure.
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 as specified.
  Bolts and nut:
  Cr-Mo alloy (standard), or 316 stainless steel
  Fill fluid:
  Silicone oil
  Mounting bracket:
  304 stainless steel
- **Environmental protection:**
  IEC IP67 and NEMA 6/6P
- **Mounting:**
  Without mounting bracket:
  Direct mounting on manifold (optional)
  With optional mounting bracket :
  For 50mm (2") pipe or direct wall mounting.
- **Mass{weight}:**
  Transmitter:
  Approximately 2.9kg to 3.4kg without options.
  Add:
  0.5kg for mounting bracket
  4.5 kg for stainless steel housing (option)

Optional features

- **Indicator:**
  A plug-in analog indicator.
  An optional 5 digits 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 HHC.
- **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.
  660 stainless steel bolts and nuts comply with NACE
- **Customer tag:**
  A stainless steel tag for customer tag data is wired to the transmitter.

ACCESSORIES

- **Oval flanges:**
  Available in 316 stainless steel and pressure rating 10MPa (100bar).
- **Hand held communicator (HHC)**

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CODE SYMBOLS

1	2	3	4	5	6	7	8		9	10	11	12	13		14	15		16	DESCRIPTION
F	K	A					5	-						-			-		
																			Type
																			Smart 4-20 mAdc + Georgin/Hart digital® signal
																			Connections
			R																1/4-18 NPT / 7/16-20 UNF / M 20 x 1,5
			T																1/4-18 NPT / 7/16-20 UNF / 1/2-14 NPT
			V																1/4-18 NPT / M10 / Pg 13,5
			W																1/4-18 NPT / M10 / M 20 x 1,5
			X																1/4-18 NPT / 7/16-20 UNF / Pg 13,5
																		(*1)	**Range and materials** — Span(*1) / Process cover / Diaphragm / Wetted cell body
				0	1	V													0,016/0,16 bar abs / 316 SS / 316L SS / 316 SS
				0	1	H													0,016/0,16 bar abs / 316 SS / Hast.C / Hastelloy C lining
				0	1	J													0,016/0,16 bar abs / 316 SS / Gold coat / 316 SS
				9	1	H												(*3)	0,016/0,16 bar abs / PVDF insert / Hast. C / Hastelloy C lining
				0	2	V													0,016/1,3 bar abs / 316 SS / 316L SS / 316 SS
				0	2	H													0,016/1,3 bar abs / 316 SS / Hast.C / Hastelloy C lining
				0	2	J													0,016/1,3 bar abs / 316 SS / Gold coat / 316 SS
				9	2	H												(*3)	0,016/1,3 bar abs / PVDF insert / Hastelloy C / Hastelloy C lining
				0	3	V													0,05/5 bar abs / 316 SS / 316L SS / 316 SS
				0	3	H													0,05/5 bar abs / 316 SS / Hastelloy C / Hastelloy C lining
				0	3	J													0,05/5 bar abs / 316 SS / Gold coat / 316 SS
				9	3	H												(*3)	0,05/5 bar abs / PVDF insert / Hastelloy C / Hastelloy C lining
				0	4	V													0,3/30 bar abs / 316 SS / 316L SS / 316 SS
				0	4	H													0,3/30 bar abs / 316 SS / Hastelloy C / Hastelloy C lining
				0	4	J													0,3/30 bar abs / 316 SS / Gold coat / 316 SS
				9	4	H												(*3)	0,3/30 bar abs / PVDF insert / Hastelloy C / Hastelloy C lining
				0	5	V													1/100 bar abs / 316 SS / 316L SS / 316 SS
				0	5	J													1/100 bar abs / 316 SS / Gold coat / 316 SS
																			Indicator & Arrester — Indicator / Arrester / Initial setting
							5	- A											None / None
							5	- B											Analog, 0-100% linear scale / None
							5	- D											Analog, Custom scale / None
							5	- J											Analog, double scale / None / 4-20mA DC + Hart® / Georgin digital signal "SMART"
							5	- E											None / Yes
							5	- F											Analog, 0-100% linear scale / Yes
							5	- H											Analog, Custom scale / Yes
							5	- K											Analog, double scale / Yes
							5	- 1											Digital, 0-100% / None
							5	- 2											Digital, Custom scale / None
							5	- 4											Digital, 0-100% / Yes
							5	- 5											Digital, Custom scale / Yes
									A										**Approvals for hazardous locations (consult Georgin for availability)** — None (Standard)
									X										ATEX - Flameproof enclosures (digit 4 = "M, P, R, T" & "W" only)
									K										ATEX - Intrinsic Safety
									D									(*5)	FM - Explosion-Proof (digit 4 = "P" & "T" only)
									E										CSA - Explosion-Proof (digit 4 = "P" & "T" only)
									H										FM - Intrinsic Safety and Non Incendive
									J										CSA - Intrinsic Safety
									P										ATEX - Type "n" (digit 9 = A, E, 1, 2, 3, 4, 5 & 6 only)
									Q										IECEx - Type "n" (digit 9 = A, E, 1, 2, 3, 4, 5 & 6 only)
									R										IECEx - Flameproof enclosures (digit 4 = "M, P, R, T" & "W" only)
									T										IECEx - Intrinsic Safety
									L										CSA - Explosion-Proof & Intrinsic Safety combined approval (digit 4 = "P" & "T" only)
									M										ATEX - Flameproof enclosures & Intrinsic Safety combined approval (digit 4 = "M, P, R, T" & "W" only)
									N										IECEx - Flameproof enclosures & Intrinsic Safety combined approval (digit 4 = "M, P, R, T" & "W" only)
									V										FM - Explosion-Proof & Intrinsic Safety combined approval (digit 4 = "P" & "T" only)
										A									**Side vent/drain & mounting bracket** — Side vent/drain / Mounting bracket
										C									None / Yes, SS
										D									Yes / None
										F									Yes / Yes, SS
											Y								**SS parts** — SS tag plate / SS housing
											B								None / None
											C								Yes / None
											E								None / Yes
												Y							Yes / Yes
												G							**Special applications & fill fluid** — Treatment / Fill fluid
												N						(*4)	None (std) / Silicone oil
																			Degreasing / Silicone oil
																			NACE / Silicone oil
														- A					**Process cover gasket** — Viton
														- C					PTFE square section gasket in SS flange
														- D				(*3)	PTFE square section gasket in PVDF insert
																	A		**Bolts/screws material** — Carbon steel Cr-Mo (standard) M10
																	U		SS 316 / 316 (bolt/nuts) M10
																	W		SS 660 / 660 (bolt/nuts) M10
																			Special options or design
																		(*2)	- * Special, no code available

Note*:

1- Code "D" FM approval only possible with electrical connection 1/2" NPT.

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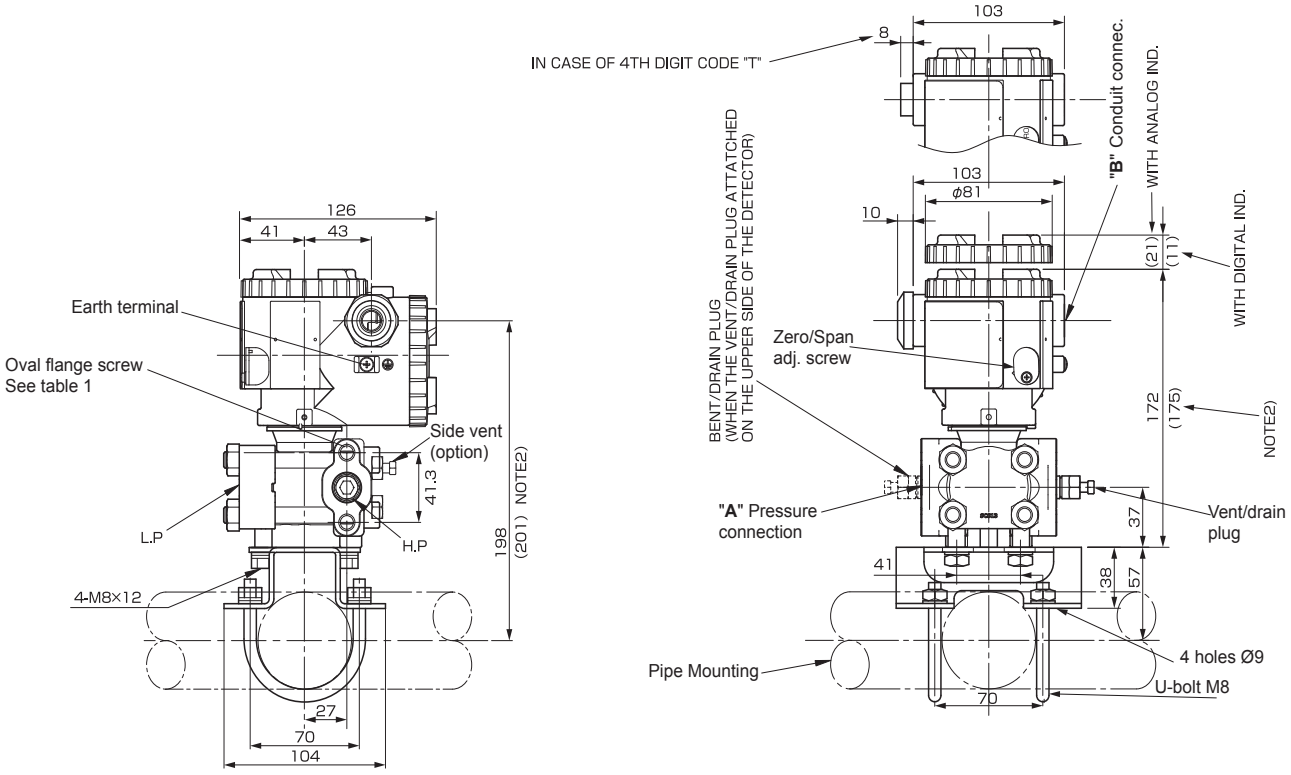
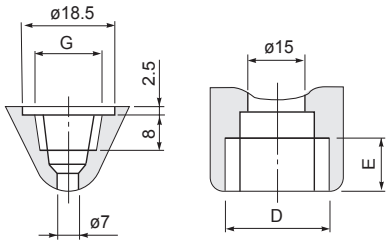
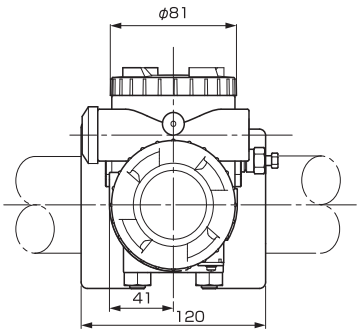
OUTLINE DIAGRAM (UNIT:MM)





Details of "**A**" Details of "**B**"



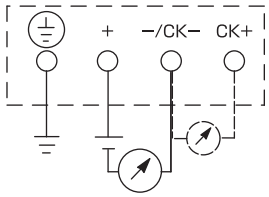
4th digit of the code symbols	Conduit conn.		Press. conn.	Oval frange screw
	D	E	G	
R	M20x1.5	16	1/4-18 NPT	7/16-20 UNF
T	1/2-14 NPT	16	1/4-18 NPT	7/16-20 UNF
V	Pg13.5	10,5	1/4-18 NPT	M10 or M12
W	M20x1.5	16	1/4-18 NPT	M10 or M12
X	Pg13.5	10,5	1/4-18 NPT	7/16-20 UNF

TABLE 1

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

Safety for Industrial Process

CONNECTION DIAGRAM



EMC Directive (2004/108/EC)

All models of ProcessX series transmitters are in accordance with the harmonized standards :

- EN 61326-1 : 2006 (Electrical equipment for measurement, control and laboratory use - EMC requirements).
- EN 61326-2-3 : 2006 (Part 2-3 : Particular requirements - Test configuration, operational conditions and performance criteria for tranducers with integrated or remote signal conditioning).

Emission limits : EN 61326-1 : 2006

Frequency range (MHz)	Limits	Basic standard
30 to 230	40dB (µV/m) quasi peak, measured at 10m distance	EN 55011 / CISPR 11 Group 1 Class A
230 to 1000	47dB (µV/m) quasi peak, measured at 10m distance	

Immunity requirements : EN 61326-1 : 2006 (Table 2)

Phenomenon	Test value	Basic standard	Performance criteria
Electrostatic discharge (EDS)	4 kV (Contact) 8 kV (Air)	EN 61000-4-2 IEC 61000-4-2	B
Electromagnetic field	10V/m (80-1000MHz) 3 V/m (1.4-2.0 GHz) 1V/m (2.0-2.7 GHz)	EN 61000-4-3 IEC 61000-4-3	A
Rated power frequency Magnetic field	30 A/m	EN 61000-4-8 IEC 61000-4-8	A
Burst	2kV (5/50 NS, 5 kHz)	EN 61000-4-4 IEC 61000-4-4	B
Surge	1 kV Line to line 2 kV Line to line	EN 61000-4-5 IEC 61000-4-5	B
Conducted RF	3 V (150 kHz to 80 MHz)	EN 61000-4-6 IEC 61000-4-6	A

Performance criteria:

A : During testing, normal performance within the specification limits.

B : During testing, temporary degradation or loss of function or performance which is self-recovering.

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