FUJI ELECTRIC

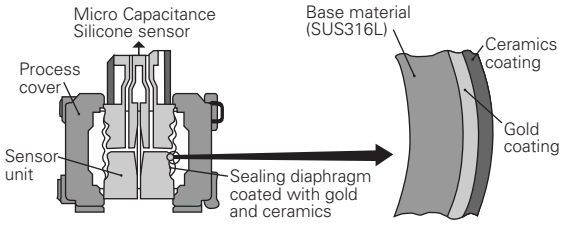
FCX-AII Series

PRESSURE TRANSMITTER
Hydroseal® Diaphragm Version

DATA SHEET FKG···4

FEATURES

1. Unique hydroseal diaphragm
   Permeation of hydrogen into the detecting unit through seal diaphragm can be suppressed thanks to the unique seal diaphragm (double coating) which employs coating of gold and ceramic.



2. High accuracy
   ±0.15% accuracy for all calibrated spans is the standard feature for pressure transmitter covering 50 to 10000kPa (or 0.5 to 100 kgf/cm²). Fuji's Micro-capacitance silicon sensor assures this feature.
3. Minimum environment influence
   Fuji's patented "Advanced Floating Cell" design which protects the pressure sensor against changes in temperature and overpressure substantially reduces total measurement error in actual field applications.
4. Fuji/HART® bilingual communications protocol and FOUNDATION™ fieldbus and Profibus™ compatibility
   FCX–AII series transmitter offers bilingual communications to speak both Fuji proprietary protocol and HART®. Any HART® compatible devices can communicate with FCX–AII. Further, by upgrading electronics FOUNDATION™ fieldbus and Profibus™ are also available.
5. Application flexibility
   Various options that render the FCX–A II series suitable for almost any process applications include.
   – Analog indicator at either the electronics side or terminal side
   – Full range of hazardous location approvals
   – 5-digit LCD meter with engineering unit
   – Stainless steel electronics housing
   – Built-in RFI filter and lightning arrester
6. Burnout current flexibility (Under Scale: 3.2 to 3.8mA, Over Scale: 20.8 to 21.6mA)
   Burnout signal level is adjustable using Model FXW hand Held Communicator (HHC) to comply with NAMUR NE43.
7. 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	Static pressure [MPa] (kgf/cm²)	Span limit [kPa] (bar)		Range limit [kPa] (bar)		Over range lemit [MPa] (bar)
		Min.	Max.	Lower limit	Upper limit	
FKG□07	–0.1 to 0.5 (–1 to 5)	50 (0.5)	500 (5)	–100 (–1)	500 (5)	1.5 (15)
FKG□08	–0.1 to 3 (–1 to 30)	300 (3)	3000 (30)	–100 (–1)	3000 (30)	9 (90)
FKG□09	–0.1 to 10 (–1 to 100)	1000 (10)	10000 (100)	–100 (–1)	10000 (100)	15 (150)

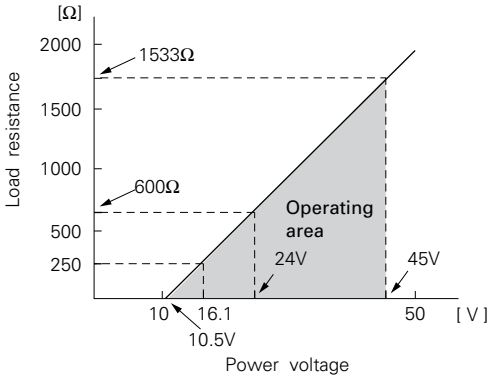
Remark: To minimize environmental influence, span should be greater than 1/40 of the max. span in most applications.

– Lower range limit (vacuum limit) ;
  Silicone fill sensor: See Fig. 1
  Fluorinated fill sensor: 66kPa abs (500mmHg abs) at below 60°C
– Conversion factors to different units;
  1 MPa=10^3 kPa=10bar=10.19716kgf/cm²= 145.0377psi
  1kPa=10mbar=101.9716mmH_2O =4.01463inH_2O

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 250 Ω required.

Hazardous locations:

Authorities	Flameproof	Intrinsic safety	Type n Nonincendive
ATEX	Ex II 2 GD - EExd IIC T5/T6	Ex II 1 GD - EExia IIC T4/T5	Ex II 3 GD - EExn IIC T4/T5
Factory Mutual	Class I II III Div. 1 Groups B thru. G	Class I II III Div. 1 Groups A thru. F	Class I II III Div. 2 Groups A thru. G
CSA	Class I II III Div. 1 Groups C thru. G	Class I II III Div. 1 Groups A thru. G	Class I II III Div. 2 Groups A thru. G
TIIS	Ex do IIB+H_2 T4	Ex ia II C T4 (*)	—

(*) Approval pending

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 adjustment unit with LCD display.
The time constant is adjustable between 0.12 to 32 seconds.

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

Normal/reverse action:
Selectable from HHC[1].

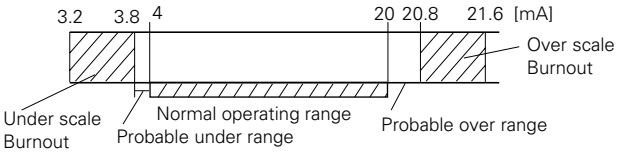
Indication: Analog indicator or 5-digit LCD meter, as specified.

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 20.8mA to 21.6mA from HHC[1]

"Output Underscale":
Adjustable within the range 3.2mA to 3.8mA from HHC[1]



Loop-check output:
Transmitter can be configured to provide constant signal 3.8mA through 21.6mA by HHC.

Temperature limit:
Ambient: –40 to +85°C
(–20 to +80°C for LCD indicator)
(–40 to +60°C for arrester option)
(–10 to +60°C for fluorinated oil fill transmitter)
For explosionproof units (flameproof or intrinsic safety), ambient temperature must be within the limits specified by each standard.
Process: –40 to +100°C for silicone fill sensor
–20 to +80°C for fluorinated oil 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 information can be remotely displayed or reconfigured.
Note: HHC's version must be more than 6.0 (or FXW□□□□1–□3), for FCX-A Ⅱ.

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*	—
Burnout direction	*v*	*v*
Calibration	*v*	*v*
Output adjust	—	*v*
Data	*v*	—
Self diagnoses	*v*	—
Printer	—	—
External switch lock	*v*	*v*
Transmitter display	*v*	*v*
Linearize	*v*	*v*
Rerange	*v*	*v*

(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)

For spans greater than 1/10 of URL: ±0.15% of span

For spans below 1/10 of URL:

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

Stability: ±0.15% of upper range limit (URL) for 6 month.

Temperature effect:

Effects per 28°C change between the limits of –40°C and +85°C

Zero shift: $\pm(0.125+0.075 \frac{\text{URL}}{\text{span}})\%$ /28°C

Total effect: $\pm(0.15+0.075 \frac{\text{URL}}{\text{span}})\%$/28°C

Overrange effect: Zero shift; 0.4% of URL for any overrange to maximum limit

Supply voltage effect:

Less than 0.005% of calibrated span per 1V

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. (Classification: 2-abc: 0.2% span per SAMA PMC 33.1)

Step response: Time constant: 0.2s *)

Dead time: 0.2s *)

(without electrical damping)

*) Faster response is available as option (maximum update rate: 25 times per second).

Mounting position effect:

Zero shift, less than 0.1kPa {1m bar} 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.

Turn-on time: 4 s

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.

1-port (standard) or 2-port with each conduit, as spcified.

Process connections:

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

Meet DIN 19213

Process-wetted parts material:

Material code	Process cover	Wetted sensor body	
		Diaphragm	Other wetted parts
C	316 stainless steel (*1)	316L stainless steel (*2)	316 stainless steel

Notes: *(1) SCS14 per JIS G 5121

*(2) The diaphragm face is coated with gold and ceramic.

Remark: Sensor O-rings : Viton O-ring and teflon gasket selectable

Non-wetted parts material:

Electronics housing: Low copper die-cast aluminum alloy finished with epoxy/polyurethane double coating (standard), or 316 stainless steel (SCS14 per JIS G5121), as specified.

Bolts and nuts: Cr-Mo alloy (standard), or 304 stainless steel.

Fill fluid: Silicone oil (standard) or fluorinated oil

Mounting bracket: 304 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 3.4kg without options.

Add; 0.5kg for mounting bracket

0.8kg for indicator option

4.5kg for stainless steel housing option

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 5-digit LCD meter with engineering is also available.

Local adjustment unit with LCD display:
An optional 5-digit LCD meter with Zero/Span adjustment function, loop-check function and damping adjustment function, is available.

Arrester: A built-in arrester protects the electronics from lightning surges.
Lightning surge immunity : 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: The fill fluid is fluorinated oil.

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. ASTM B7M or L7M bolts and 2HM nuts (Class II) are standard.

Vacuum service: Special silicone oil and filling procedure are applied.
See Fig.1.

Optional tag plate:
An extra stainless steel tag with 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 extermely corrosive.

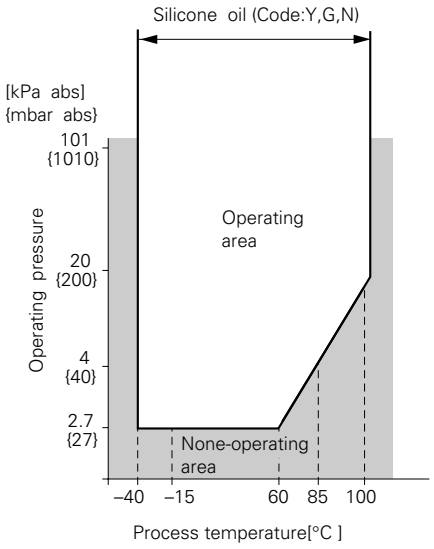


Fig. 1 Relation between process temperature and operating pressure

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. EDS8-47)

Z/S board: Parts No.=ZZPFCX4-A070
When Z/S board is mounted on the FCX–AII amplifier unit, external adjustment screw will be available for zero and span adjustment.

The product conforms to the requirements of the Electromagnetic compatibility Directive 94/9/EC as detailed within the technical construction file number TN513035. The applicable standards used to demonstrate compliance are :

EMI (Emission) EN61326 : 1997
Class A (standard for Industrial Location)

Frequency range MHz	Limits	Reference standard
30 to 230	40dB (μV/m) quasi peak, measured at 10m distance	CISPR16-1 and CISPR16-2
230 to 1000	47dB (μV/m) quasi peak, measured at 10m distance	

EMI (Immunity) EN61326: 1997
Annex A (standard for Industrial Location)

Phenomenon	Test value	Basic standard	Performance criteria
Electrostatic discharge	4kV (Contact) 8kV (Air)	IEC61000-4-2	B
Electromagnetic field	80 to 1000MHz 10V/m 80%AM (1kHz)	IEC61000-4-3	A
Rated power frequency magnetic field	30A/m 50Hz	IEC61000-4-8	A
Burst	2kV 5kHz	IEC61000-4-4	B
Surge	1.2μs/50μs 1kV (Line to line) 2kV (Line to ground)	IEC61000-4-5	B
Conducted RF	0.15 to 80MHz 3V 80%AM (1kHz)	IEC61000-4-6	A

Note) Definition of 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.

CODE SYMBOLS

Digit	Description	Note	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 ← Digit No. of code F K G 0 4 - -
4	<Connections> Process connection / Oval flange screw / Conduit connection Rc1/4 / 7/16-20UNF / G1/2 (×1) 1/4-18NPT / 7/16-20UNF / 1/2-14NPT (×1) 1/4-18NPT / M10 / Pg 13.5 (×1) 1/4-18NPT / M10 / M20×1.5 (×1) 1/4-18NPT / 7/16-20UNF / Pg 13.5 (×1) Combination with 12th digit code "C, E, P, Q" are not available. Rc1/4 / 7/16-20UNF / G1/2 (×2) 1/4-18NPT / 7/16-20UNF / 1/2-14NPT (×2) 1/4-18NPT / M10 / Pg 13.5 (×2) 1/4-18NPT / M10 / M20×1.5 (×2) 1/4-18NPT / 7/16-20UNF / Pg 13.5 (×2)		A B C D E S T V W X
6	<Span [KPa] (kgf/cm2)> 50..... 500 (or 0.5...5) 300..... 3000 (or 3...30) 1000..... 10000 (or 10...100)		7 8 9
7	<Material> Process cover / Wetted cell body: Diaphragm / Other wetted parts 316 Stainless Steel / 316 Stainless Steel (Note 1) / 316 Stainless Steel		C
9	<Indicator and arrester> Indicator / Arrester None / None Analog, 0 to 100% linear scale / None Analog, Custom scale / None None / Yes Analog, 0 to 100% linear scale / Yes Analog, Custom scale / Yes Z/S board attached. Approval pending for 10th digit code "G, H, J, K, P" Digital, 0 to 100% linear scale / None Digital, custom scale (Note 2) / None Digital, 0 to 100% linear scale / Yes Digital, custom scale (Note 2) / Yes Digital, 0 to 100% (Local adjustment unit with LCD display) / None Digital, custom scale (Local adjustment unit with LCD display) / None Digital, 0 to 100% (Local adjustment unit with LCD display) / Yes Digital, custom scale (Local adjustment unit with LCD display) / Yes Approval pending for 10th digit code "D, E, G, H, J, K, P"		A B D E F H L P Q S 1 2 4 5
10	<Approvals for hazardous locations> None (for ordinary locations) TIIS, Flameproof (Conduit seal) (Available for 4th digit code "A", "S") TIIS, Flameproof (Cable gland seal) (Available for 4th digit code "A", "S") FM, Flameproof (or explosionproof) (Available for 4th digit code "B", "T") CSA, Flameproof (or explosionproof) (Available for 4th digit code "B", "T") ATEX, Flameproof TIIS, Intrinsic safety (Approval pending) FM, Intrinsic safety and Nonincendive CSA, Intrinsic safety and Nonincendive ATEX, Intrinsic safety ATEX, Type n		A B C D E X G H J K P
11	<Vent/drain and mounting bracket> Vent/drain / Mounting bracket Standard / None Standard / Yes (stainless steel) Side / None Side / Yes (stainless steel)		A C D F

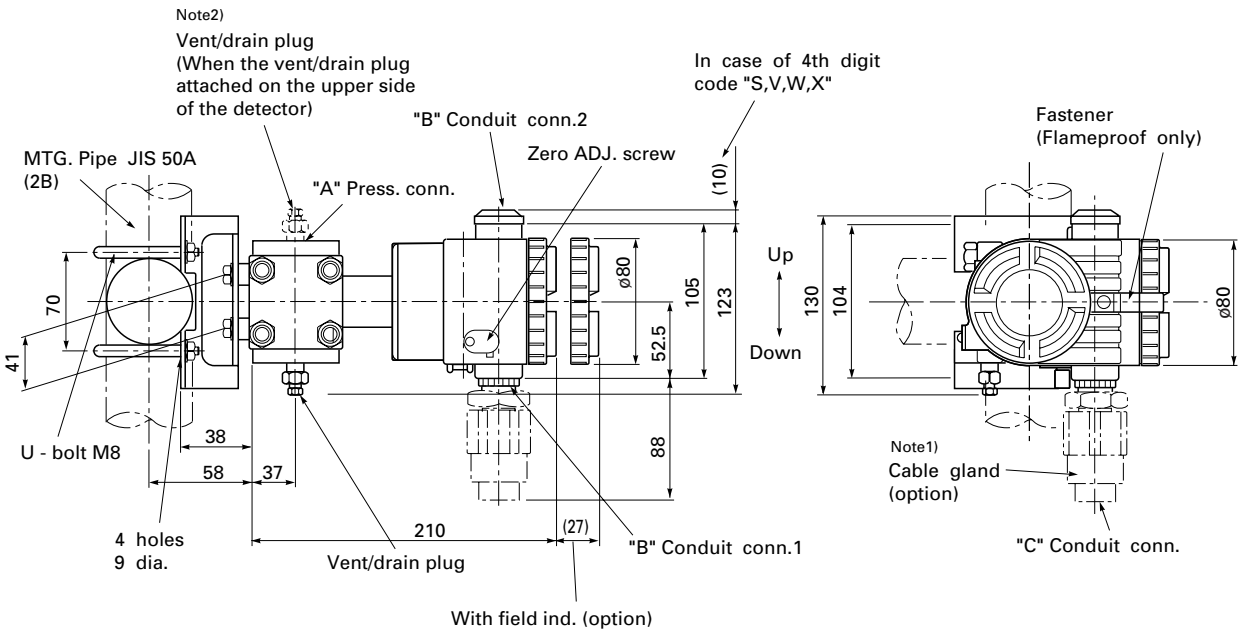
Digit	Description			Note	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 ← Digit No. of code
					F K G 0 4 - - -
12	<Options>				
	Extra SS tag	Stainless steel elec. housing	Corrosion-resistive coating of cell	Note1	
	None	Without	None		Y
	Yes	Without	None		G
	None	With	None		C
	Yes (*1)	With	None		E
	None	Without	Yes		M
	Yes	Without	Yes		N
	None	With	Yes		P
	Yes	With	Yes		Q
13	<Special applications and fill fluid>				
	Treatment	Fuill fluid			
	Standard	Silicon oil			Y
	Standard	Fluorinated oil			W
	Degreasing	Silicon oil			G
	Oxygen service	Fluorinated oil			A
	Nace specification	Silicon oil		Note2	N
14	<Sensor O-ring /Gasket>				
	Viton (O-ring)				A
	Teflon (gasket)				B
15	<Bolt/nut > (*2)			Note3	
	Standard (hexagonal socket head cap bolt)				A
	Cr-Mo hexagonal bolt/nut				B
	NACE bolt/nut (ASTM A193 B7M/A 194 2HM)				C
	NACE bolt/nut (ASTM A320 L7M/A194 2HM)				D
	304 stainless steel bolt/304 stainless steel nut				E

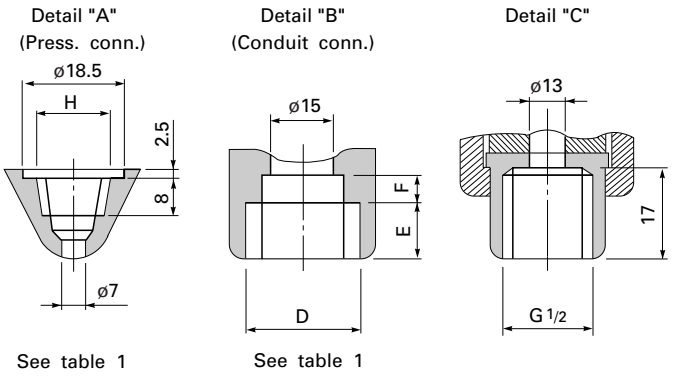
Note1: (*1) Customer tag number can be engraved on standard stainless steel name plate. If extra tag plate is required, select "Yes".
Note2: (*2) Not available for 15th digit code "A", "B".
Note3: (*3) In case of tropical use, select stainless bolts and nuts.

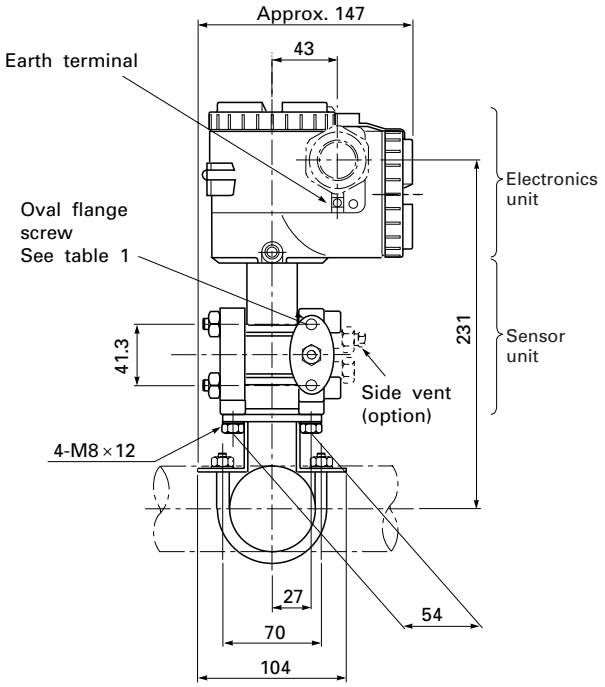
ORDERING INFORMATION

When ordering this instrument, specify.
1. CODE SYMBOLS
2. Measuring range
3. Output orientation (burnout direction) when abnormality is occured in the transmitter.
   Hold/Overscale (21.6mA)/Overscale (3.2mA)
   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 26 alphanumerical characters), if required.

OUTLINE DIAGRAM (Unit:mm)



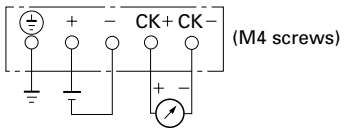




4th digit of the code symbols	Conduit conn.			Press.conn.	Oval flange screw
	D	E	F	H	
A, S	G1/2	17	8	Rc1/4	7/16-20UNF Screw depth15
B, T	1/2-14NPT	16	5	1/4-18NPT	7/16-20UNF Screw depth15
C, V	Pg13.5	8	4.5	1/4-18NPT	M10 Screw depth15
D, W	M20×1.5	16	5	1/4-18NPT	M10 Screw depth15
E, X	Pg13.5	8	4.5	1/4-18NPT	7/16-20UNF Screw depth15

Table 1

CONNECTION DIAGRAM



Note1) Cable gland is supplied in case of 10th digit code "C". ø11 cable is suitable.

Note2) The pressure connector is located on the down side surface of the detector, when the vent / drainplug is attatched on the upper side of the detector.

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