PRESSURE TRANSMITTER

DATA SHEET FHG···4

The FCX – AIIe pressure transmitter accurately measures gauge 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 ±0.1%
   0.1% accuracy is a standard feature. Fuji's micro-capacitance silicon sensor assures this accuracy for all elevated or suppressed calibration ranges without additional adjustment.
2. Minimum environmental influence
   The "Advance 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
   FCX–AIIe series transmitter offers bilingual communications to speak both Fuji proprietary protocol and HART®. Any HART® compatible devices can communicate with FCX–AIIe.
4. Application flexibility
   Various options that render the FCX – AIIe suitable for almost any process applications include:
   – Analog indicator at either the electronics side or terminal side
   – Full range of hazardous area approvals
   – Built-in RFI filter and lightning arrester
   – 5-digit LCD meter with engineering unit
5. 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.
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

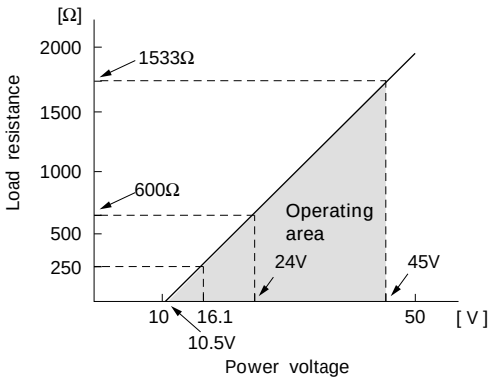
Service: Liquid, gas, or vapour
Span, range and overrange limit:

Type	Span limit [kPa] {bar}		Range limit [kPa] {bar}		Overrange limit [MPa] {bar}
	Min.	Max.	Lower limit	Upper limit	
FHG□02	16.66 {0.16}	500 {5}	–100 {–1}	500 {5}	1.5 {15}
FHG□03	100 {1}	3000 {30}	–100 {–1}	3000 {30}	9 {90}
FHG□04	333.3 {3.33}	10000 {100}	–100 {–1}	10000 {100}	15 {150}

– 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/cm^2= 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: (Approval pending)

Authorities	Flameproof	Intrinsic safety	Type n Nonincendive
ATEX	Ex II 2 G and D - EExd IIC T5/T6	Ex II 1 G and D - EExia IIC T4/T5	Ex II 3 G and D - 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
RIIS	Ex do IIB+H_2 T4	—	—

Zero/span adjustment:
Zero and span are adjustable from the HHC(1). Zero is also adjustable externally from the adjustment screw.

Damping: Adjustable from HHC.
The time constant is adjustable between 0 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).

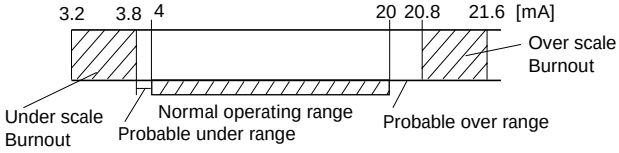
Indication: Analog indicator or 5-digit LCD meter, as specified.

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



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-AⅡ.

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: ±0.1% of span

For spans below 1/10 of URL:

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

Stability: ±0.2% of upper range limit (URL) for 3 years

Temperature effect:

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

Zero shift: $\pm(0.1+0.025\ \frac{\mathrm{URL}}{\mathrm{span}})\%$

Total effect: $\pm(0.125+0.025\ \frac{\mathrm{URL}}{\mathrm{span}})\%$

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

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: approximately 0.2s
(without electrical damping)

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 sec.

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), 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 (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 stainless steel

Note: *(1) SCS14 per JIS G 5121
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.
Bolts and nuts: Cr-Mo alloy (standard), or 304 stainless steel (630 stainless steel for 50MPa unit).
Fill fluid: Silicone oil (standard) or fluorinated oil
Mounting bracket: 304 stainless steel

Environmental protection:

IEC IP67

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

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 unit is also available.

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

Optional tag plate:
An extra stainless steel tag with customer tag data is wired to the transmitter.

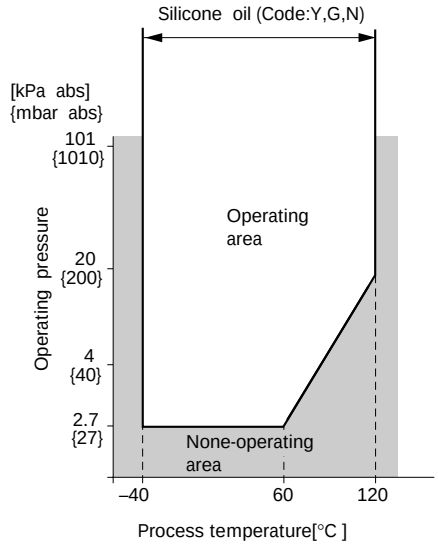


Fig. 1 Relation between process temperature and operating pressure

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)

The product conforms to the requirements of the Electromagnetic compatibility Directive 89/336/EEC as detailed within the technical construction file number TN513035. The applicable standards used to demonstrate compliance are :

EMI (Emission) EN50081-2 : 1993

Test item	Frequency range	Basic standard
Applicable Electromagnetic Radiation Disturbance	30-1000MHz	EN55011 (1991) Class B

EMI (Immunity) EN50082-2 : 1995

Test item	Test specification	Basic standard	Performance criteria
Electrostatic discharge	8kV (Air)	EN61000-4-2 (1995)	B
Radio-frequency Electromagnetic Field Amplitude Modulated	80-1000MHz 10V/m (unmodulated) 80%AM	ENV50140 (1993)	A
Radio-frequency Electromagnetic Field Pulse Modulated	900MHz 10V/m (unmodulated) 50% Duty 200Hz (Rep. Freq.)	ENV50204 (IEC1000-4-3, 1995)	A
Radio-frequency Common Mode Amplitude Modulated	0.15-80MHz 10V/m (unmodulated) 80%AM 150Ω	ENV50141 (IEC1000-4-6, 1995)	A
Fast Transients Common mode	2kV 5ns/50ns (Tr/Th) 5kHz (Rep. Freq.)	EN61000-4-4 (IEC1000-4-4, 1995)	B

"LVD - The transmitter is not covered by the requirements of the LVD standard."

ORDERING INFORMATION

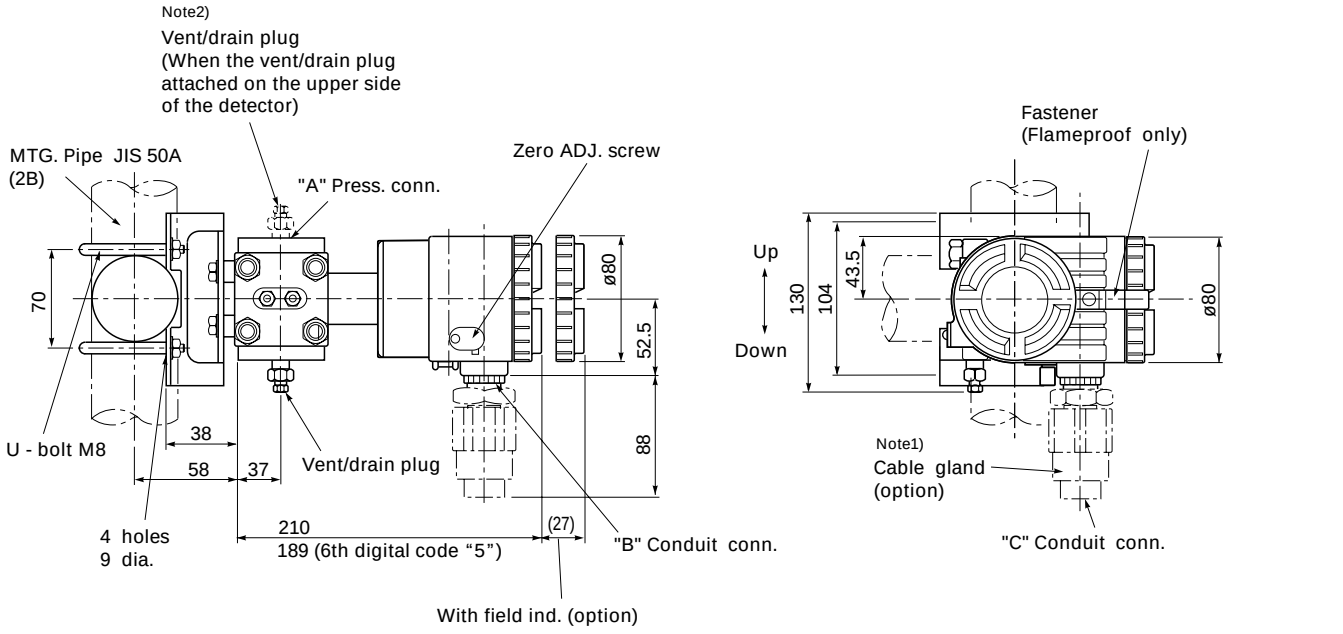
When ordering this instrument, specify.
1. CODE SYMBOLS
2. Measuring range
3. Output orientation (burnout direction) when abnormality is occured in the transmitter.
   Hold/Overscale (21.6mA)/Overscale (3.2mA)
   Unless otherwise specified, output hold function is supplied.
4. Indication method (indicated 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.

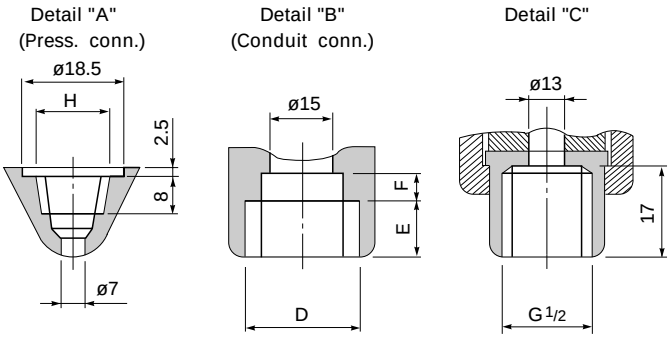
CODE SYMBOLS

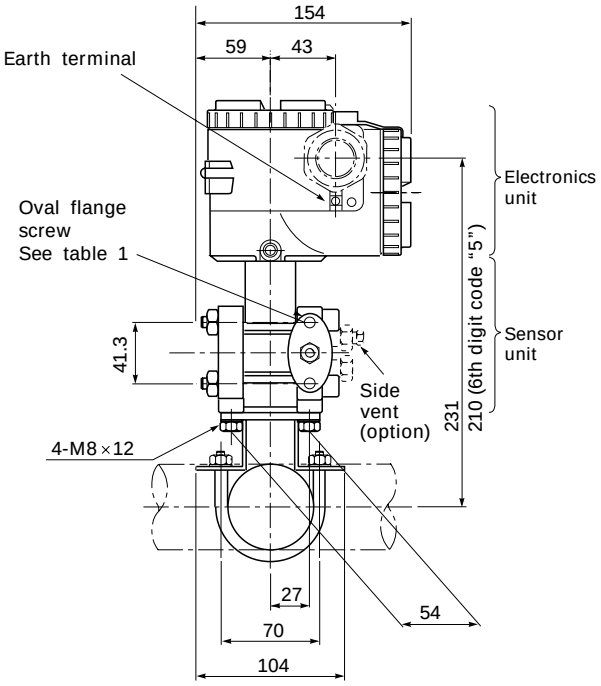
Digit	Description	Note	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 ← Digit No. of code F H G			0			4	–					–		
4	<Connections>																
	Process connection / Oval flange screw / Conduit connection																
	Rc1/4 / 7/16-20UNF / G1/2 (×1)				A												
	1/4-18NPT / 7/16-20UNF / 1/2-14NPT (×1)				B												
	1/4-18NPT / M10 (or M12)(*1) / Pg13.5 (×1)				C												
	1/4-18NPT / M10 (or M12)(*1) / M20×1.5 (×1)				D												
	1/4-18NPT / 7/16-20UNF / Pg13.5 (×1)				E												
6, 7	<Span and materials>																
	Span limit [kPa]{bar} / Process cover / Diaphragm / Wetted cell body						2V										
	16.66…500 {0.16…5} / 316 stainless steel / 316L stainless steel / 316 stainless steel						3V										
	100…3000 {1…30} / 316 stainless steel / 316L stainless steel / 316 stainless steel						4V										
	333.3…10000 {3.33…100} / 316 stainless steel / 316L stainless steel / 316 stainless steel																
9	<Indicator and arrester>																
	Indicator / Arrester									A							
	None / None									B							
	Analog, 0 to 100% linear scale / None									D							
	Analog, custom scale / None									E							
	None / Yes									F							
	Analog, 0 to 100% linear scale / Yes									H							
	Analog, custom scale / Yes									L							
	Digital, 0 to 100% / None									P							
	Digital, custom scale / None									Q							
	Digital, 0 to 100% / Yes									S							
	Digital, custom scale / Yes																
10	<Approvals for hazardous locations (Approval pending)>										A						
	None (for ordinary locations)										B						
	RIIS, Flameproof (Conduit seal) (Available for 4th digit code “A“)										C						
	RIIS, Flameproof (Cable gland seal) (Available for 4th digit code “A“)										D						
	FM, Flameproof (or explosionproof) (Available for 4th digit code “B“)										E						
	CSA, Flameproof (or explosionproof) (Available for 4th digit code “B“)										X						
	ATEX, Flameproof										H						
	FM, Intrinsic safety and Nonincendive										J						
	CSA, Intrinsic safety and Nonincendive										K						
	ATEX, Intrinsic safety										P						
	ATEX, Type n																
11	<Vent/ drain and mounting bracket>											A					
	Vent/drain / Mounting bracket											C					
	Standard / None											D					
	Standard / Yes, stainless steel											F					
	Side / None																
	Side / Yes, stainless steel																
12	<Options>												Y				
	Extra SS tag plate / Stainless steel elec. housing / Coating of cell												B				
	None / None / None												C				
	Yes / None / None												E				
	None / Yes / None	Note 1											M				
	Yes (*1) / Yes / None												N				
	None / None / Yes												P				
	Yes / None / Yes												Q				
	None / Yes / Yes																
	Yes / Yes / Yes																
13	<Special applications and fill fluid>													Y			
	Treatment / Fill fluid													G			
	Standard / Silicone oil													A			
	Degreasing / Silicone oil													N			
	Oxygen service / Fluorinated oil (7th digit code “V“ only)																
	NACE specification / Silicone oil (Not available for 15th digit code “A“, “B“)																
14	<Sensor O-ring / Gasket>														A		
	Viton (O-ring)														B		
	Teflon (gasket)																
15	<Bolt/nut>															A	
	Cr-Mo alloy hexagon socket head cap screw/carbon steel nut															B	
	Cr-Mo alloy hexagon bolt/nut															C	
	NACE bolt/nut (ASTM A193 B7M/A194 2HM)															D	
	NACE bolt/nut (ASTM A320 L7M/A194 2HM)															E	
	304 stainless steel bolt/304 stainless steel nut															F	
	630 stainless steel bolt/304 stainless steel nut																

Note 1 : (*1) Costomer tag number can be engraved on standartd stainless steel name plate. If extra tag plate is required, select “Yes“.

OUTLINE DIAGRAM (Unit:mm)



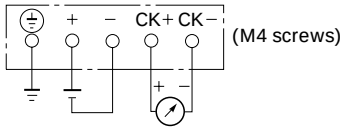




4th digit of the code symbols	Conduit conn.			Press.conn.	Oval flange screw
	D	E	F	H	
A	G1/2	17	8	Rc1/4	7/16-20UNF Screw depth15
B	1/2-14NPT	16	5	1/4-18NPT	7/16-20UNF Screw depth15
C	Pg13.5	8	4.5	1/4-18NPT	M10 Screw depth15
D	M20×1.5	16	5	1/4-18NPT	M10 Screw depth15
E	Pg13.5	8	4.5	1/4-18NPT	7/16-20UNF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