

FCX – C SERIES ABSOLUTE PRESSURE TRANSMITTER

DATA SHEET

FHH, FKH

The FCX –C 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 AP models covering 13 to 3000kPa{0.13 to 30bar} high pressure range. Fuji's micro-capacitance silicon sensor assures this feature for all suppressed calibration ranges without additional adjustment.

2. Minimum inventory

Electronics unit, communication module, local indicators and electronics housing are interchangeable among all FCX –C models.

3. Replaceable Communication Module

Fuji micro-electronics manufacturing technology offers replaceable communication module that makes FCX-AC transmitter very unique design. In case of change in communication protocol all that needs to be done is just replace the module and the transmitter gets upgraded to the new version.

4. Fuji/HART bilingual communication module

The communication module is "bilingual" to speak both Fuji proprietary protocol and HART. Any HART compatible devices can communicate with FCX-A/C series transmitters.

5. Application flexibility

Example features that render the FCX –C suitable for almost any process applications includes:

- Analog indicator at either the electronics side or terminal side
- Full range of hazardous location approvals
- Built-in RFI filter and lightning arrester
- 4 $\frac{1}{2}$ -digits LCD meter
- The maximum span of each sensor can be converted to in different units using below factors.



SPECIFICATIONS

Functional specifications

Type:

Model FHH: 4 to 20mA

Model FKH: 4 to 20mA with digital signal

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.			
	FHH	FKH	FHH/FKH		
F□H□02	13 {0.13}	8.125 {0.08125}	130 {1.3}	0 to 130 {0 to 1.3}	0.5 {5}
F□H□03	50 {0.5}	31.25 {0.3125}	500 {5}	0 to 500 {0 to 5}	1.5 {15}
F□H□04	300 {3}	187.5 {1.875}	3000 {30}	0 to 3000 {0 to 30}	9 {90}

1 MPa=10³KPa=10bar=10.19716kgf/cm²=145.0377psi

1 KPa=10mbar=101.9716mmH₂O=4.01463inH₂O

Output signal:

Model FHH: 4 to 20mA DC 2-wire

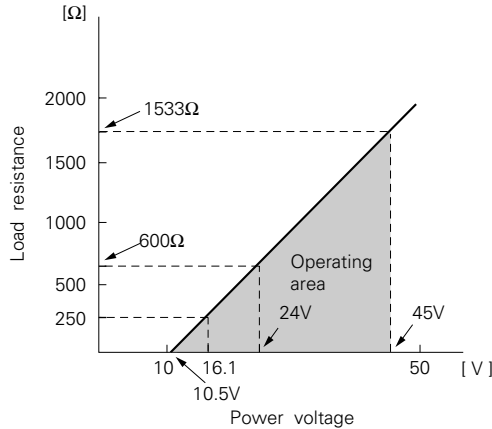
Model FKH: 4 to 20mA DC with digital signal superimposed on the 4 to 20mA signal.

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 FXW, min. of 250 Ω required.

Hazardous locations:

Authorities	Flameproof	Intrinsic safety	Type N Nonincendive
BASEEFA Factory Mutual	Ex ds IIC T5, T6 Class I II III Div. 1 Groups B thru. G	EEx ia IIC T4, T5 Class I II III Div. 1 Groups A thru. F	Ex N II T5 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
SAA	Ex d II C T5, T6 IP 66/67	Ex ia II C T5, T6 IP 66/67	Ex n II C T5, T6 IP 66/67

Zero/span adjustment:

Model FHH: Zero is adjustable from an external adjustable screw. The adjustable screw can also function to adjust span when MODE SWITCH (located on the electronics unit) is in the span mode. INHIBIT mode to disable the adjustable screw is also available.

Model FKH: Zero and span are adjustable either from the HHC. Zero is also adjustable externally from the adjustable screw.

Damping: Adjustable electrical damping

Model FHH: The time constant is adjustable to 0, 0.3, 1.2, 4.8, or 19.2 seconds.

Model FKH: The time constant is adjustable between 0 to 38.4 seconds. (9 steps)

Zero elevation/suppression:

Zero may be elevated within the specified range limit of each sensor model.

Normal/reverse action:

Model FHH: Selectable by moving a jumper pin located on the electronics unit.

Model FKH: Configurable from HHC.

Indication: Analog indicator or 4 1/2-digit LCD meter, as specified.

Burnout direction:

Output hold
Output 21.6mA } selectable
Output 3.8mA

Model FHH: Unless otherwise specified, the output is in hold position.

Model FKH: Selectable from HHC.

Loop-check output:

Model FHH: Transmitter can output constant signal of 4mA, 12mA, or 20mA if MODE SWITCH is set to the loop check mode.

Model FKH: 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)

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: (Model FKH only)

With HHC (Model FXW, consult Data Sheet No. EDS8-47), following information can be remotely displayed or reconfigured.

Items	Display	Set
Tag No.	✓	✓
Model No.	✓	✓
Serial No.	✓	—
Engineering unit	✓	✓
Range limit	✓	—
Measuring range	✓	✓
Damping	✓	✓
Output mode	✓	✓
Burnout direction	✓	✓
Adjustment	✓	✓
Output adjust	—	✓
Data	✓	—
Self diagnoses	✓	—
Printer	—	—
External switch lock	✓	✓
Transmitter display(*)	✓	✓

Note: (*) HHC's version must be more than 5.0 (or FXW□□□□1-□2), to use this function.

Performance specifications

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

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

For spans below 1/10 of URL (Model FKH only):

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

Stability: ±0.2% of upper range limit (URL) for 24 months

(In case of 6th digit code "3", "4")

Temperature effect:

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

$$\text{Zero shift: } \pm (0.25 \frac{\text{URL}}{\text{span}}) \% / 28^\circ\text{C}$$

$$\text{Total effect: } \pm (0.25 + 0.25 \frac{\text{URL}}{\text{span}}) \% / 28^\circ\text{C}$$

Overrange effect: Zero shift, 0.3% of URL for any overrange to maximum limit

Supply voltage effect:

Less than 0.05% of calibrated span per 10V

RFI effect:

Less than 0.2% of URL for the frequencies of 20 to 1000MHz and field strength 30V/m when electronics covers on.

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

Step response: Time constant. 0.2 s
 Dead time: about 0.3 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.

Turn-on time: 4 sec

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.

Process connections:
 1/2-14 NPT, 1/4-18NPT, Rc1/2 or Rc1/4 as specified.

Material code (7th digit in "Code symbols")	Process cover	Diaphragm	Wetted sensor body	Vent/drain
V	316 stainless steel	316L stainless steel	316 stainless steel	316 stainless steel

Process-wetted parts material:

Non-wetted parts material:

Electronics housing: Low copper die-cast aluminum alloy (standard), finished with epoxy/polyurethane double coating, as specified.

Fill fluid: Silicone oil

Mounting bracket: 304 stainless steel

Environmental protection:

IEC IP67 and NEMA 4X

Mounting: On 60.5mm (JIS 50A or 2B) pipe using mounting bracket, direct wall mounting, or direct process mounting.

Mass{weight}: Transmitter approximately 1.9kg without options.

Add; 0.5kg for mounting bracket
 0.8kg for indicator option

Optional features

Indicator: A plug-in turnable analog indicator (1.5% accuracy) can be housed in the electronics compartment or in the terminal box of the housing.
 An optional 4 $\frac{1}{2}$ digits LCD meter is also available.

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 for oxygen or chlorine measurement.

NACE specification:
 Metallic materials for all pressure boundary parts comply with NACE MR-01-75.

Customer tag: A stainless steel tag for customer tag data is wired to the transmitter.

ACCESSORIES

Hand held communicator:

(Model FXW, refer to Data Sheet No.EDS 8-47)

Communication module: (Standard for model FKH)

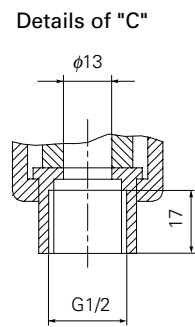
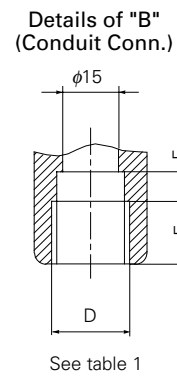
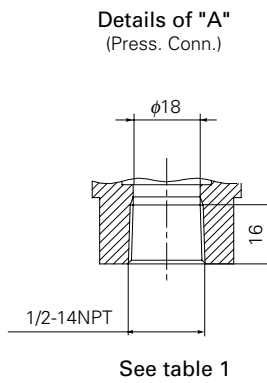
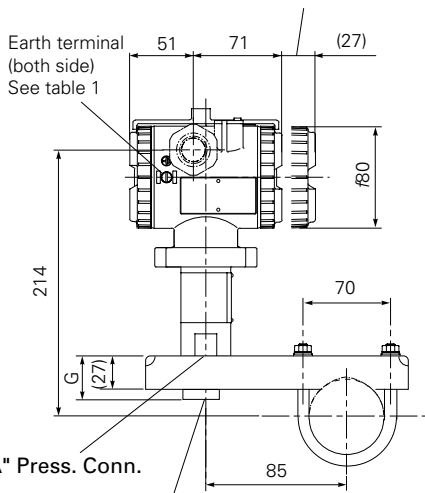
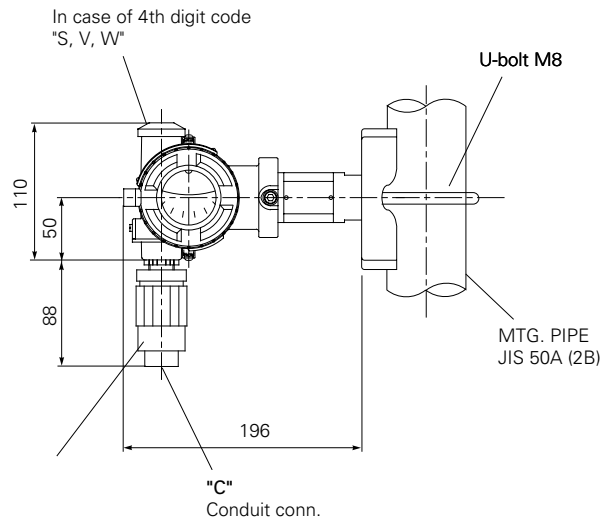
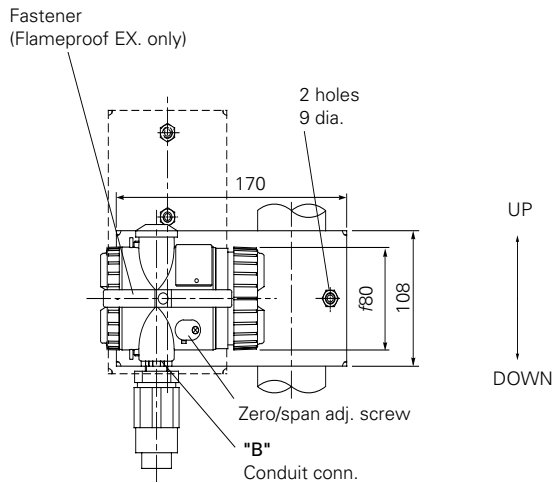
When using this module for model FHH, remote setting function becomes available

Remark: When the communication module is connected, the operation mode of external zero/span adjustable screw is changed to zero adjustment only.

CODE SYMBOLS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15														
F	H	0	1											0
Description														
Type														
4 to 20 mA, Output type														
4 to 20 mA with digital signal, Output type														
Connections														
Process conn.														
Conduit conn.														
1/2-14NPT														
G1/2														
1/2-14NPT														
Pg 13.5														
M20 x 1.5														
Span limit [kPa abs] (bar abs)														
13/8.125...130 (0.13/0.08125...1.3)														
50/31.25...500 (0.5/0.3125...5)														
300/187.5...3000 (3/1.875...30)														
Material														
Process cover Diaphragm Wetted cell body														
316 stainless steel 316L stainless steel 316 stainless steel														
Indicator and arrester														
Indicator Arrester														
None None														
Analog, 0 to 100% linear scale None														
Analog, custom scale None														
Analog, double scale None														
None Yes														
Analog, 0 to 100% linear scale Yes														
Analog, custom scale Yes														
Analog, double scale Yes														
Digital, 0 to 100% None														
Digital, custom scale None (Model FKH only)														
Digital, 0 to 100% Yes														
Digital, custom scale Yes (Model FKH only)														
Approvals for hazardous locations														
None (for ordinary locations)														
FM, Flameproof (or explosionproof) (Available for 4th digit code "T")														
CSA, Flameproof (or explosionproof) (Available for 4th digit code "T")														
BASEEFA, Flameproof (Conduit seal)														
BASEEFA, Flameproof (Cable gland seal) (Conduit connection G 1/2 only)														
FM, Intrinsic safety and Nonincendive														
CSA, Intrinsic safety and Nonincendive														
CENELEC, Intrinsic safety														
CENELEC, Intrinsic safety and BASEEFA, Type N														
SAA Flameproof (Conduit seal) (Available for 4th digit code "S, T, W")														
SAA Intrinsic safety (Available for 4th digit code "S, T, W")														
SAA Type – N (non-speaking) (Available for 4th digit code "S, T, W")														
Mounting bracket														
None														
Yes (stainless steel)														
Optional specification														
Stainless tag														
None														
Yes														
Special applications and fill fluid														
Treatment Filled liquid														
None (standard) Silicon oil														
Degreasing Silicon oil														
NACE specification Silicon oil														
Process adaptor														
None (1/2 -14NPT)														
Rc1/4														
Rc1/2														
1/4-18NPT														

OUTLINE DIAGRAM (Unit:mm)

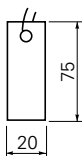


"D" Adapter (option)
See table 1

4th of Code symbols	Conduit conn.			Earth terminal
	D	E	F	
S	G1/2	17	8	M4
T	1/2-14NPT	16	5	No. 8-32UNC
V	Pg13.5	8	4.5	M4
W	M20x1.5	16	5	M4

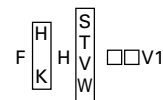
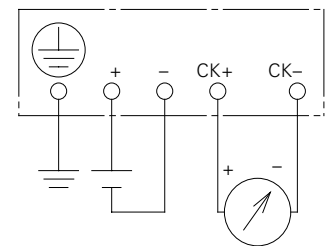
Table

<Optional stainless steel tag>



Note *: Cable gland is supplied in case of flameproof packing type.
φ11 cable is suitable.

CONNECTION DIAGRAMS



The product conforms to the requirements of the Electromagnetic compatibility Directive 89/336/EEC as detailed within the technical construction file number TN510412. The applicable standards used to demonstrate compliance are :-

EMI (Emission) EN50081-1 : 1992

Test item	Frequency range	Basic standard
Applicable Electromagnetic Radiation Disturbance	30-1000MHz	EN55022 Class B

EMS (Immunity) EN50082-1 : 1992

No.	Test item	Test specification	Basic standard	Performance criteria
1	Electrostatic discharge	8kV (Air)	IEC 801-2:1984	B
2	Radio-frequency electromagnetic field.	27-500MHz 3V/m (Unmodulated)	IEC 801-3:1984	A
3	Fast transients common mode	0.5kV, 5/50 (Tr/Th) ns 5kHz Rep.	IEC 801-4:1988	B

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

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