FUJI ELECTRIC

FCX-C II

ABSOLUTE PRESSURE TRANSMITTER

DATA SHEET **FKH, FDH...4**

The FCX-CII 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 covering 81,25 mbarabs to 30 barabs. Fuji's micro-capacitance silicon sensor assures this feature for all elevated or suppressed calibration ranges without additional adjustment.

2- Minimum inventory
Electronics unit, local indicatiors and electronics housing are interchangeable among all FCX-CII models.

3- Fuji/HART® bilingual communications protocol and FOUNDATION™ Fieldbus and Profibus™ compatibility
FCX-CII series transmitter offers bilingual communication to speak both Fuji proprietary protocol and HART®.
Any HART® compatible devices can communicate with FCX-CII. Further, by upgrading electronics FOUNDATION™ Fieldbus and Profibus™ are also available.

4- Application flexibility
Example features that render the FCX-CII 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
- 5 digits LCD meter

5- Programmable output Linearisation Function
In addition to linear and square root, output signal can be freely programmable.

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), reliability of dry calibration without reference pressure is at equal level as wet calibration.

SPECIFICATIONS

Functional specifications

Type :
FKH : Smart, 4-20mA DC + Fuji/Hart® digital signal
FDH : FOUNDATION™ Fieldbus & Profibus™

Service :
Liquid, gas or vapour

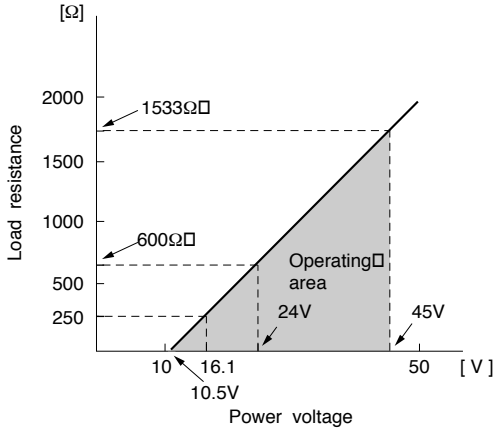
Span, range and overrange limit :

Type	Span limit (barabs)		Range limit (barabs)	Overrange limit (barabs)
	Min.	Max.		
F□H□02	0.08125	1.3	0 to +1.3	5
F□H□03	0.3125	5	0 to +5	15
F□H□04	1.875	30	0 to +30	90

Output signal :
4 to 20mA DC with digital signal superimposed on the 4 to 20mA signal.
Digital signal based on FOUNDATION™ Fieldbus or Profibus™

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 250Ω required.

Hazardous locations :
Designed to meet international intrinsic safety and flameproof (explosionproof) standards.
Please consult the code symbols some pages further on, to know the different types of approvals (digit 10).
Consult FUJI for status.

Zero/span adjustment :
Zero/span are adjustable from the communicator HHC. Zero/span are also adjustable externally from the adjustable screw.

Damping : adjustable from HHC.
The time constant is adjustable between 0 to 38.4 seconds with the communicator HHC.

Zero elevation/suppression :
Selectable with the communicator HHC

Normal/reverse action :
Selectable by moving a jumper pin located on the electronics unit.

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

Burnout direction: Selected from HHC
If self-diagnostic detect transmitter failure, the analog signal will be driven to eighter "Output Hold", "Output Overscale" or "Output Underscale" modes.
"Output Hold" :
Output signal is hold as the value just before failure happens.
"Output Overscale" : approx. 21,6 mA
Adjustable within the range 20,8 mA to 21,6 mA from the HHC
"Output Underscale" : approx. 3,8 mA
Adjustable within the range 3,2 mA to 3,8 mA from the communicator HHC.

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

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 (Model FXW, consult Data Sheet No. EDS8-47), following information can be remotely displayed or reconfigured.
Note : HHC's version must be higher than 6.0
(or FXW □□□□1-A3)

	HART® PROTOCOL		FUJI PROTOCOL	
Items	Display	Set	Display	Set
Tag n°	Yes	Yes	Yes	Yes
Model n°	–	–	Yes	Yes
Serial n°	Yes	–	Yes	–
Engeineering unit	Yes	Yes	Yes	Yes
Range limit	Yes	–	Yes	–
Measuring range	Yes	Yes	Yes	Yes
Damping	Yes	Yes	Yes	Yes
Output mode	Yes	–	Yes	–
Burnout direction	Yes	Yes	Yes	Yes
Adjustment	Yes	Yes	Yes	Yes
Output adjust	–	Yes	–	Yes
Data	Yes	–	Yes	–
Self diagnoses	Yes	–	Yes	–
Printer	–	–	–	–
External switch lock	Yes	Yes	Yes	Yes
Transmitter display	Yes	Yes	Yes	Yes
Linearise	–	–	Yes	Yes
Rerange	Yes	Yes	Yes	Yes

Programmable output linearization function :
Output signal can be characterized with "14 points linear approximation function" from HHC.

Field Bus units :
Digital signal
Transmission technique : according to IEC61158-2
Power supply : 9VDC...32VDC
Base current : 15 ±2mA
Transmission rate : 31,25kbits/s

Profibus-PA : version 3.0, DPVI version 2.0
Foundation Fielbus : FF-890/891

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 :

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

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 :

$$\pm (0.25 \frac{URL}{span}) \text{\%/28°C}$$

Total effect :

$$\pm (0.25 + 0.25 \frac{URL}{span}) \text{\%/28°C}$$

Overrange effect :

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

Supply voltage effect :

Less than 0.05% fo calibrated span per 10V

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 : (without electrical damping)

Time constant : 0.2s

Dead time : about 0.3s

Time constant (τ) = 63 % output signal

Response time = 5 x time constant + dead time

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.

(Double the effect for fluorinated fill sensors)

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 :

1/2"-14 NPTE, Pg13.5 or M20 x 1.5

Process connections :

1/2"-14NPTI, 1/2"-14NPTE, 1/4"-18NPTI, Rc 1/2", G1/2" A manometer fitting.

Process-wetted parts material :

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

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 6/6P

Mounting :

On 50mm (2") 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 located in the electronics compartment or in the terminal box of the housing.

An optional 5 digits LCD meter is also available.

Arrester :

A built-in arrester protects the electronics from lightning surges.

Lightning surge immunity : 4KV (1.2 x 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 with customer tag data is wired to the transmitter.

ACCESSORIES

Hand-held communicator :

Model FXW, refer to Data Sheet No. EDS8-47)

Two valve Manifold :

Available in 316 stainless steel and pressure rating 10MPa (100bar).

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 Electro-magnetic Radiation Disturbance	30-1000MHz	EN55011(1991) Class B

EMS (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/1kHz	ENV50140 (1993)	A
Radio-frequency Electromagnetic Field Pulse Modulated	900MHz 10V/m (unmodulated) 50% Duty 200 Hz (Rep. Freq.)	ENV50204 (IEC 1000-4-3, 1995)	A
Radio-frequency Common Mode Amplitude Modulated	150kHz-80MHz 10V/m(unmodulated) 80% AM/1kHz 150Ω	ENV50141 (IEC 1000-4-6, 1995)	A
Fast transients common mode	2kV, 5/50ns (Tr/Th) 5kHz (Rep. Freq.)	EN61000-4-4 (IEC 1000-4-4, 1995)	B

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

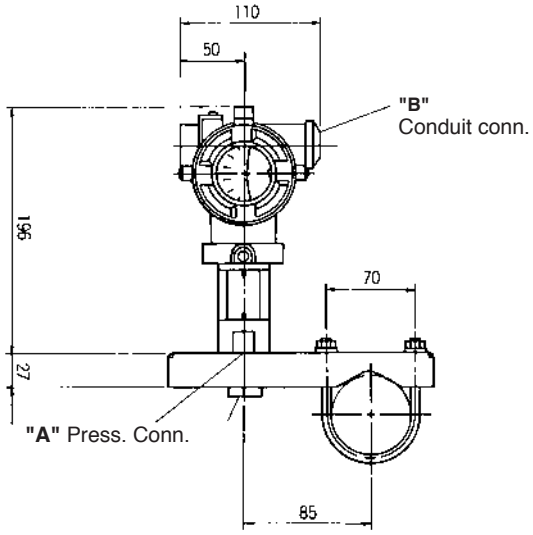
CODE SYMBOLS

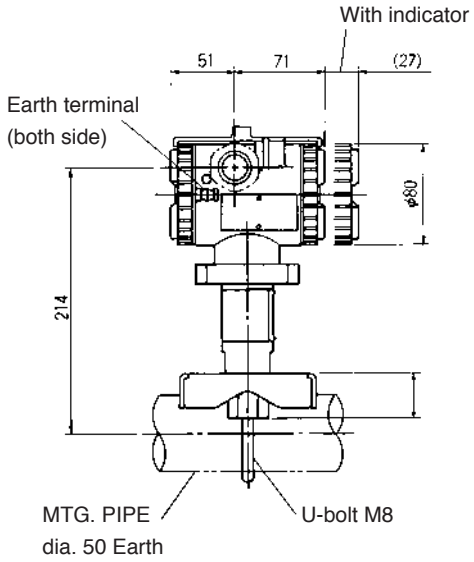
1	2	3	4	5	6	7	8		9	10	11	12	13		14	15	DESCRIPTION
F		P		0			4	-						-	0		
																	Type
F	K	H															Smart, 4-20 mAdc + Fuji/Hart® digital signal
F	D	H															FOUNDATION™ Fieldbus & Profibus™
																	Connections
			T														see digit 15 / 1/2"-14 NPT
			V														see digit 15 / Pg 13,5
			W														see digit 15 / M 20 x 1,5
																	Range & wetted parts material
				0	2	V											0,08125/1,3 bar / 316 L SS / 316 L SS
				0	3	V											0,3125/5 bar / 316 L SS / 316 L SS
				0	4	V											1,875/30 bar / 316 L SS / 316 L SS
																	Indicator & Arrester
							4	-	A								none / none
							4	-	B								Analog, 0-100% linear scale / none
							4	-	D								4-20mA DC / Analog, Custom scale / none
							4	-	J								Analog, double scale / none
							4	-	E								none / yes
							4	-	F								+ / Analog, 0-100% linear scale / yes
							4	-	H								Analog, Custom scale / yes
							4	-	K								Hart®/Fuji / Analog, double scale / yes
							4	-	L								digital signal / digital, 0-100% / none
							4	-	P								"SMART" / digital, Custom scale / none
							4	-	Q								digital, 0-100% / yes
							4	-	S								digital, Custom scale / yes
							4	-	R								FF / none / yes
							4	-	T								FF / digital / yes
							4	-	V								Profibus / none / yes
							4	-	W								Profibus / digital / yes
																	Approvals for hazardous locations (consult FUJI for availability)
										A							None (standard)
										X							Flameproof housing ATEX ⟨Ex⟩ II 2 GD - EEx d IIC T5/T6
										K							Intrinsic safety ATEX ⟨Ex⟩ II 1 GD - EEx ia IIC T4/T5
									*2	D							FM - Flameproof housing Class I, Division 1, Group B, C, D
																	Dust ingnitionproof Class II/III, Division 1, Group E, F, G - (elec. conn. code "T" only)
										H							FM - Intrinsic safety & Nonincendive Class I, II, III, Division 1, Group A, B, C, D, E, F, G
																	Nonincendive Class I, II, III, Division 2, Group A, B, C, D, F, G
										P							ATEX type "n" ⟨Ex⟩ II 3 GD - EEx nL IIC T4/T5
																	Mounting bracket
											A						None
											C						Yes (SS)
																	Stainless tag plate
												Y					None
												B					Yes
																	Special applications & fill fluid
													Y				None (std) / Silicone oil
													G				degreasing / Silicone oil
													N				NACE / Silicone oil
																	Process adaptor - all stainless steel parts
														-	0	Y	None - (1/2 - 14 NPTI connection)
														-	0	B	Rc 1/2" I
														-	0	C	1/4" - 18 NPTI
														*1 -	0	D	1/2" - 14 NPTE
														*1 -	0	E	G 1/2" A manometer fitting

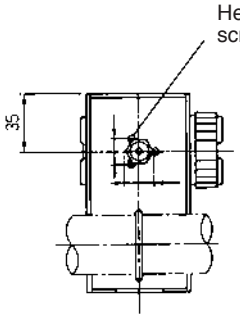
1- Digit 11, not possible - No mounting bracket for these transmitters.

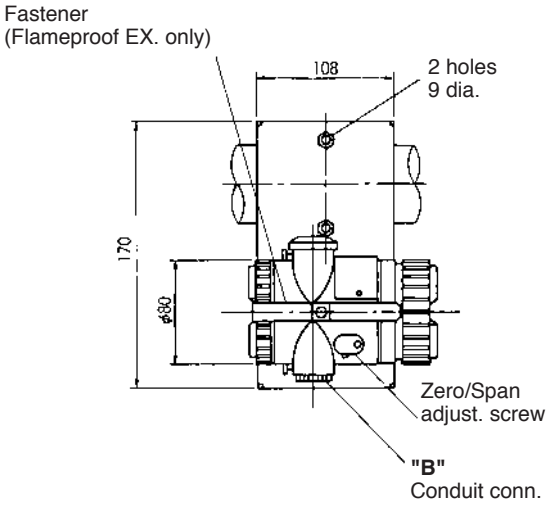
2- Only for elctrical connection code "T" : 1/2" -14 NPT

OUTLINE DIAGRAM (Unit : mm)

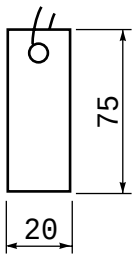




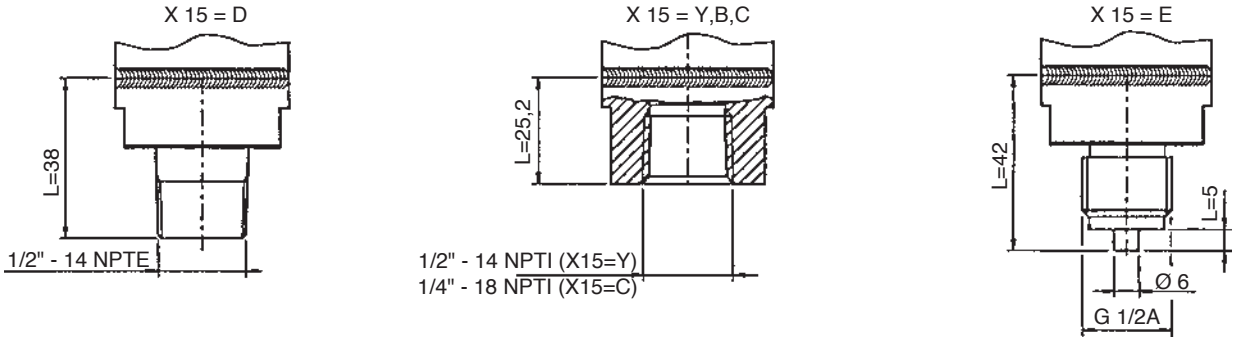




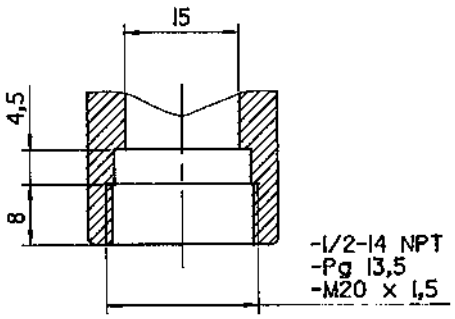
Optional stainless steel tag



Détail "A"- Process connection :

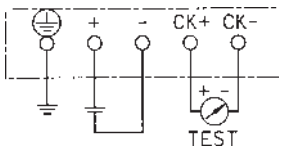


Détail "B" (conduit conn.)

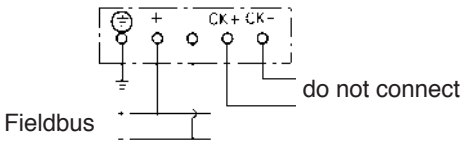


CONNECTION DIAGRAMS

FKH unit



FDH unit



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