FUJI ELECTRIC

FCX

FCX – C SERIES PRESSURE TRANSMITTER

DATA SHEET

FHP, FKP

The FCX –C pressure transmitter accurately measures gauge 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
   0.1% accuracy for all calibrated spans is the standard feature covering 13 to 10000kPa {0.13 to 100bar}.
   Fuji's micro-capacitance silicon sensor assures this feature for all elevated or suppressed calibration ranges without additional adjustment.
2. Minimum inventory
   Electronics unit, communication module, local indicatiors 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-A/C 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

SPECIFICATIONS

Functional specifications

Type:
Model FHP: 4 to 20mA
Model FKP: 4 to 20mA with digital signal

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.		
	FHP	FKP	FHP/FKP		
F□P□01	13 {0.13}	8.125 {0.08125}	130 {1.3}	–100 to +130 {–1 to +1.3}	1 {10}
F□P□02	50 {0.5}	31.25 {0.3125}	500 {5}	–100 to +500 {–1 to +5}	1.5 {15}
F□P□03	300 {3}	187.5 {1.875}	3000 {30}	–100 to +3000 {–1 to +30}	9 {90}
F□P□04	1000 {10}	625 {6.25}	10000 {100}	–100 to +10000 {–1 to + 100}	15 {150}

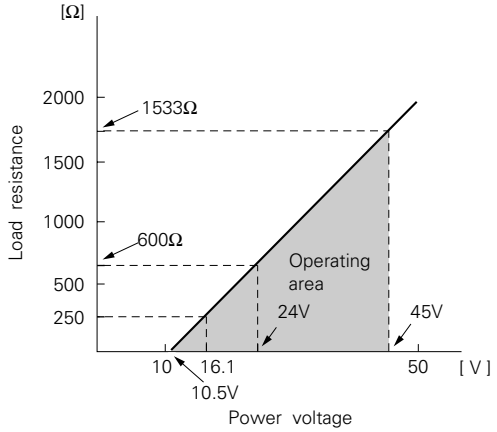
— Lower range limit (vacuum limit) is;
Silicone fill sensor: See Fig. 1
Fluorinated fill sensor: 66kPa abs (500mmHg abs) at below 80°C

— 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:
Model FHP: 4 to 20mA DC 2-wire
Model FKP: 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	Ex ds IIC T5, T6	EEx ia IIC T4, T5	Ex N II 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
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 FHP: 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 FKP: Zero and span are adjustable either from the HHC. Zero is also adjustable externally from the adjustable screw.

Damping: Adjustable electrical damping.

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

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

Zero elevation/suppression:

Model FHP: Zero may be elevated or suppressed within the specified range limit of each sensor model.

Model FKP: Selectable from HHC

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

Indication: Analog indicator or $4\frac{1}{2}$-digit LCD meter, as specified.

Burnout direction: Output hold
Output 21.6mA } selectable
Output 3.8mA }

Model FHP: Unless otherwise specified, the burnout is in hold position.

Model FKP: Selectable from HHC

Loop-check output:

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

Model FKP: 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: (Model FKP only)
With HHC (Model FXW, consult Data Sheet No. EDS8-47), following information can be remotely displayed or reconfigured.
HHC's version must be higher than 5.0, to communicate with the type "F□P□01."

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	v
Burnout direction	v	v
Adjustment	v	v
Output adjust	—	v
Data	v	—
Self diagnoses	v	—
Printer	—	—
External switch lock	v	v
Transmitter display(*)	v	v

Note: (*) HHC's version must be higher 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:
± 0.1% of span
For spans below 1/10 of URL (Model FKP only):

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

Stability: ±0.2% of upper range limit (URL) for 24 months
(In case of 6th digit code "2", "3", "4")

Temperature effect:
Effects per 28°C change between the limits of – 40°C and +85°C at (1 to 1/2.5) x URL
Zero shift : ±0.25%/28°C at (1 to 1/2.5) x URL

$$\pm (0.25 \frac{0.4 \times URL}{span}) \%/28°C$$

For spans below 1/2.5 of URL
Total effect: ±0.5%/28°C at (1 to 1/2.5) x URL

$$\pm (0.25+0.25\frac{0.4 \times URL}{span}) \%/28°C$$

For spans below 1/2.5 of URL

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: Time constant: 0.2s
Dead time: about 0.3s
(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.
(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:
G1/2, 1/2-14 NPT, Pg13.5, or M20 x 1.5 conduit, as specified.

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

Process-wetted parts material:

Material code (7th digit in Code symbols)	Process cover	Diaphragm	Wetted sensor body
V	316 stainless steel	316L stainless steel	316 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 (standard) or fluorinated oil (Daifloil)
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 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.

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.

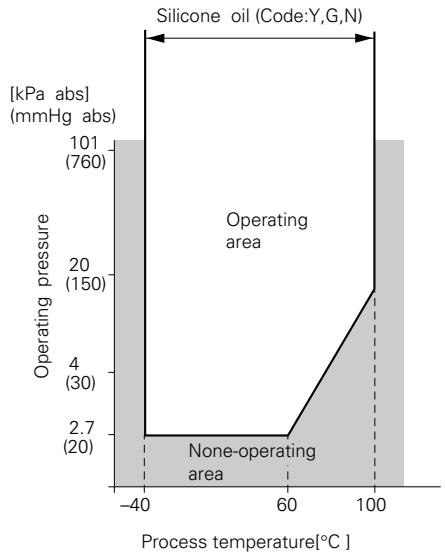


Fig. 1 Relation between process temperature and operating pressure

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)

Communication module: (Standard for model FKP)
When using this module for model FHP, 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.

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

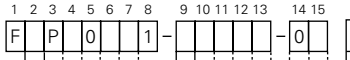
Test item	Frequency range	Basic standard
Applicable Electro-magnetic Radiation Disturbance	30-1000MHz	EN55022 Class B

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

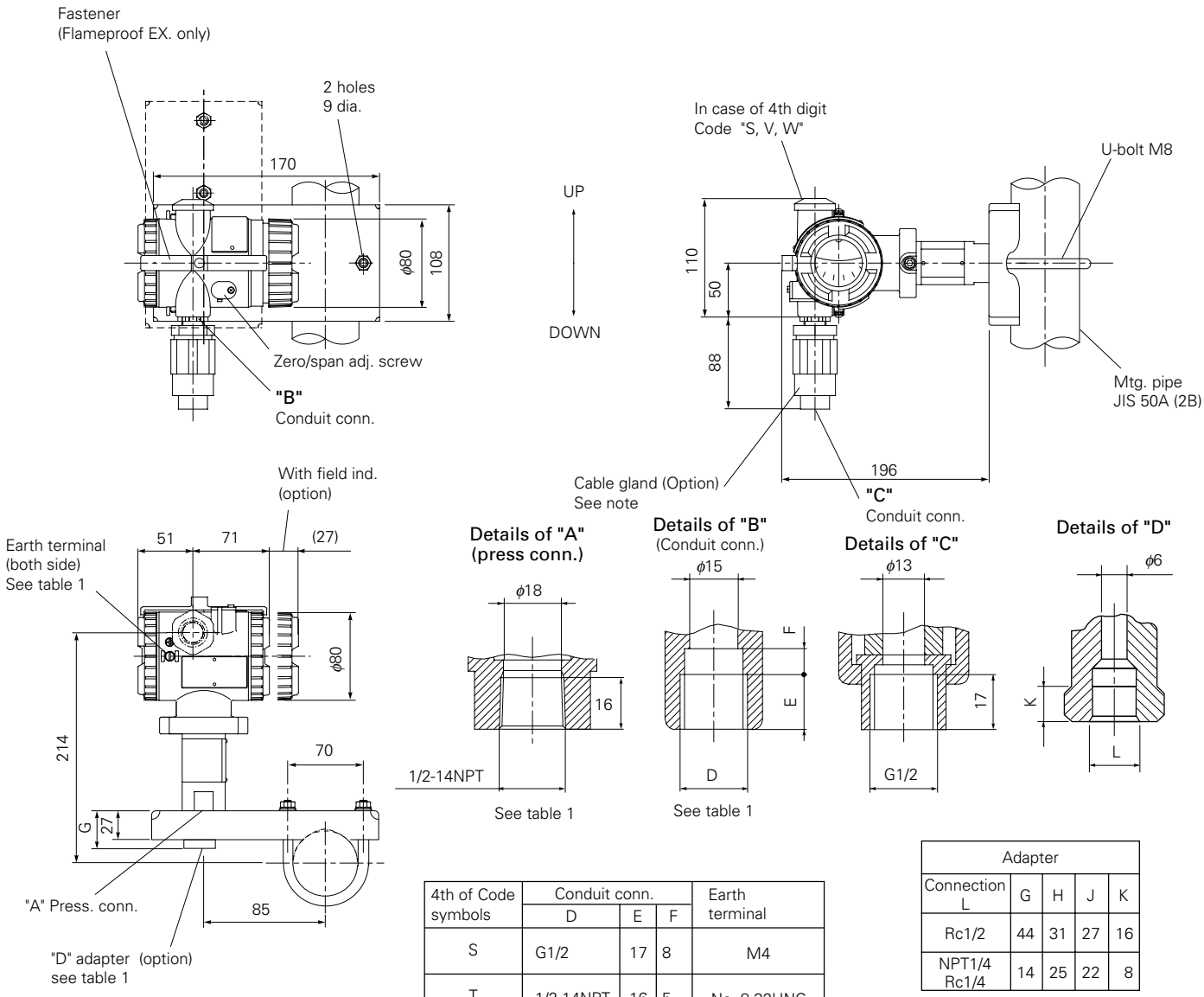
"LVD - The transmitter is not covered by the requirements of the LVD standard."

CODE SYMBOLS



Description		
Type		
H	4 to 20 mA, Output type.	
K	4 to 20 mA with digital signal, Output type.	
Connections		
Process conn.	Conduit conn.	
S	G1/2	
T	1/2-14NPT	
V	1/2-14NPT	Pg 13.5
W		M20 x 1.5
Span limit FHP/FKP kPa {bar}		
1	13/8.125… 130 {0.13/0.08125… 1.3}	
2	50/31.25… 500 {0.5/0.3125 … 5}	
3	300/187.5… 3000 {3/1.875 … 30}	
4	1000/625 …10000 {10/6.25 …100}	
Material		
Process cover	Diaphragm	Wetted cell body
V	316 stainless steel	316L stainless steel	316 stainless steel
Indicator and arrester		
Indicator		Arrester
A	None	None
B	Analog, 0 to 100% linear scale	None
D	Analog, custom scale	None
J	Analog, double scale	None
E	None	Yes
F	Analog, 0 to 100% linear scale	Yes
H	Analog, custom scale	Yes
K	Analog, double scale	Yes
L	Digital, 0 to 100%	None
P	Digital, custom scale	None (Model FKP only)
Q	Digital, 0 to 100%	Yes
S	Digital, custom scale	Yes (Model FKP only)
Approvals for hazardous locations		
A	None (for ordinary locations)	
D	FM, Flameproof (or explosionproof) (Available for 4th digit code" T")	
E	CSA, Flameproof (or explosionproof) (Available for 4th digit code "T")	
M	BASEEFA, Flameproof (Conduit seal)	
N	BASEEFA, Flameproof (Cable gland seal) (Conduit connection G 1/2 only)	
H	FM, Intrinsic safety and Nonincendive	
J	CSA, Intrinsic safety and Nonincendive	
K	CENELEC, Intrinsic safety	
P	CENELEC, Intrinsic safety and BASEEFA, Type N	
R	SAA Flameproof (Conduit seal) (Available for 4th digit code "S, T, W")	
T	SAA Intrinsic safety (Available for 4th digit code "S, T, W")	
Q	SAA Type – N (non-speaking) (Available for 4th digit code "S, T, W")	
Mounting bracket		
A	None	
C	Yes (stainless steel)	
Optional specification		
Stainless tag		
Y	None	
B	Yes	
Special application and fill fluid		
Treatment		Filled liquid
Y	None (standard)	Silicon oil
G	Degreasing	Silicon oil
A	Oxygen service	Fluorinated oil
N	NACE specification	Silicon oil
Process adaptor		
Y	None (1/2 -14NPT)	
A	Rc1/4	
B	Rc1/2	
C	1/4-18NPT	

OUTLINE DIAGRAM (Unit:mm)

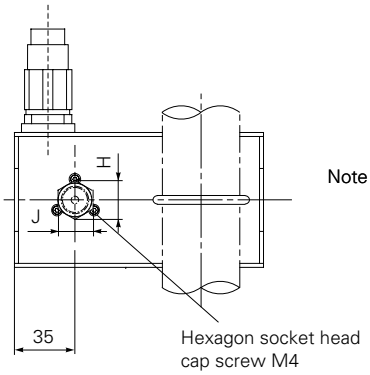


4th of Code symbols	Conduit conn.			Earth terminal
	D	E	F	
S	G1/2	17	8	M4
T	1/2-14NPT	16	5	No. 8-32UNC
V	Pg13.5	8	4.5	M4
W	M20 × 1.5	16	5	M4

Table 1

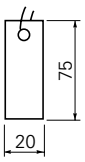
Adapter				
Connection L	G	H	J	K
Rc1/2	44	31	27	16
NPT1/4 Rc1/4	14	25	22	8

Table 2

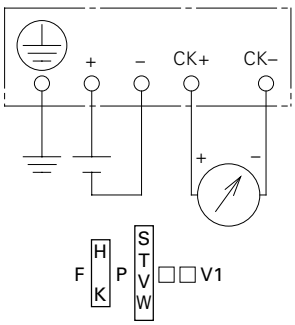


Note *: Cable gland is supplied in case of flameproof packing type.

<Optional stainless steel tag>



CONNECTION DIAGRAMS



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