

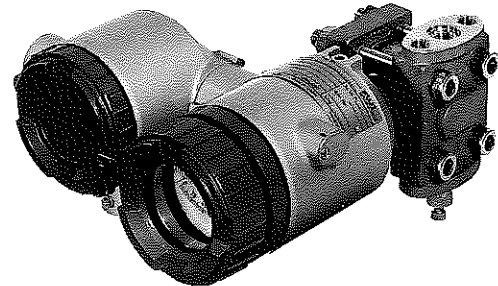
# FCX -A SERIES PRESSURE TRANSMITTER HYDROGEN-PROOF TYPE

DATA SHEET

FHG,FKG...2

The FCX series flow transmitter accurately measures differential pressure transmits 4 to 20mA output signal by extraction of square root. The transmitter utilizes the unique micromachined capacitive silicon sensor with state-of-the-art microprocessor technology to provide exceptional performance and functionality.

It is small, lightweight and least affected by environment, so applicable in any field. The transmitter comes in two types; high-accuracy traditional type FHG and highly-functional smart type FKG allowing remote maintenance. The traditional type can be upgraded to the smart type easily at the field even after installation.



## FEATURES

- World's first double coating structure**  
Permeation of hydrogen into the filled fluid can be suppressed due to the structure which employs coating of gold and ceramic (double coating) onto the seal diaphragm face for the first time in the world.
- 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/cm<sup>2</sup>). Fuji's Micro-capacitance silicon sensor assures this feature.
- 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.
- Upgradable electronics**  
A small plug-in communication module (to be ordered separately) can upgrade your traditional type FHG transmitter to smart type FKG which has remote communication functions. A Hand held communicator (Model FXW to be ordered separately, consult Data sheet No. EDS 8-47) can remotely display or reconfigure all transmitter parameters at any point on the loop without affecting 4 to 20mA DC output signal of the transmitter.
- Application flexibility**  
Example features that render the FCX series suitable for almost any process applications includes.
  - Analog indicator at either the electronics side or terminal side
  - Full range of hazardous location approvals
  - 5-digit LCD meter
  - Stainless steel electronics housing
  - Built-in RFI filter and lightning arrester

## SPECIFICATIONS

### Functional specifications

Type:

Model FHG: 4 to 20mA, Traditional type

Model FKG: 4 to 20mA with digital signal, Smart type

Service: Liquid, gas, or vapour

Span, range and overrange limit:

Type	Static pressure [MPa] (kgf/cm <sup>2</sup> )	Span limit [kPa] (kgf/cm <sup>2</sup> )		Range limit [kPa] (kgf/cm <sup>2</sup> )		Over range limit [MPa] (kgf/cm <sup>2</sup> )
		Min.	Max.	Lower limit	Upper limit	
F□G□02	-0.1 to 0.5 (-1 to 5)	50 (0.5)	500 (5)	Permissible negative pressure limit	500 (5)	1.5 (15)
F□G□03	-0.1 to 3 (-1 to 30)	300 (3)	3000 (30)		3000 (30)	9 (90)
F□G□04	-0.1 to 10 (-1 to 100)	1000 (10)	10000 (100)		10000 (100)	15 (150)

Remark: For smart type (FKG), recommended measurement span is up to 1/40 of the maximum span.

Process temperature and permissible negative pressure limit: For details, see Fig. 1.

Filled fluid	13th code	Process temperature *1 [°C]	Permissible negative pressure limit
Silicone oil	Y, G, N	-20 to +100	2.7kPa abs (20 mmHg abs)
Fluorinated oil	W, A	-20 to +80	Atmospheric pressure

Note: \*1 Process temperature  
For explosionproof type: -20 to +100°C  
For intrinsically safe type: -10 to +80°C

**Remote operation function:**

See Table 1.

**Output signal:** 4 to 20mA DC, 2-wire

**Load limitations:** 0 to 600Ω at 24V DC

(see Fig. 2) Note: For communication with FXW, min. 250Ω of load resistance is required.

**Power supply:**

(see Fig. 2)

For general use	10.5 to 45V DC
For intrinsically safe	10.5 to 26V DC
With arrester	10.5 to 32V DC

**Damping:**

Adjustable electrical damping.

Model FHG: The time constant is adjustable to 0, 0.3, 1.2, 4.8 or 19.2 seconds, in 5 steps.

Model FKG: The time constant is adjustable to 0, 0.3, 0.6, 1.2, 2.4, 4.8, 9.6, 19.2 or 38.4 seconds, in 9 steps.

**Zero/span adjustment:**

Model FHG: Zero is adjustable from the external adjustment screw.

The adjustment 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 adjustment screw is also available.

Model FKG: Zero and span are adjustable from the HHC. Zero is also adjustable externally from the adjustment screw.

**Zero point shift:** May be shifted within the range from -0.1 MPa (-1kgf/cm<sup>2</sup>) to +100% of maximum span.

**Normal/reverse action:**

Selectable between both directions.

FHG: by selection plug inside of the electronics housing.

FKG: by remote setting from the HHC (model FXW)

**Burnout direction:** Output hold

Output 21.6mA } selectable.  
Output 3.8mA }

**Hazardous locations:**

Intrinsic safety: JIS i3aG4

Explosionproof: JIS Exds II B +H<sub>2</sub>T4 these approval pending.

**Ambient temperature :** -20 to 85°C

(-10 to +60°C for intrinsic safety)

(-20 to +60°C for flameproof)

(-20 to +80°C for LCD indicator)

(-20 to +60°C for arrester option)

(-10 to +60°C for fluorinated oil fill transmitters)

For explosionproof units (flameproof or intrinsic safety), ambient temperature must be within the limits specified in each standard.

**Storage temperature:**

-40 to +90°C

**Weather resistance:**

DIN 40040 GPC

**Performance specifications**

**Accuracy rating:** ±0.15% of measuring span at reference condition

(Including linearity, hysteresis, and repeatability)

**Temperature effect:**

$$\pm (0.2+0.15 \frac{URL}{x}) \% / 55^{\circ}C$$

$$\text{Total shift : } \pm (0.25+0.15 \frac{URL}{x}) \% / 55^{\circ}C$$

where x: Set span

URL: Maximum span

(at -20 to +85°C)

**Overrange effect:** Zero shift at maximum span is ±0.4/-0.1 MPa (-1kgf/cm<sup>2</sup>) to over range limit

**Inclination effect:** 0.1kPa (10mmH<sub>2</sub>O)/10°

Double the effect for material code (13th digit in code symbols) "W" and "A".

**Dielectric strength:**

500V AC, 50/60Hz 1 min., between circuit and earth.

**Insulation resistance:**

More than 100MΩ at 500V DC, between circuit and earth.

**Response time:** Time constant; 0.2s

Dead time; approx. 0.3s

**Structure and material**

**Material:**

Material code	Process cover	Wetted sensor body	
		Diaphragm	Other wetted parts
C	SCS14	SUS316L (*1)	SUS316

Note: Asterisk (\*1) indicates that the fluid contacting face is coated with gold and ceramic.

**Coating:** Double coating with epoxy and polyurethane in silver (amplifier case cover...blue)

**Housing structure:**

JIS C 0920 immersion-proof (IEC IP67, NEMA4X equivalent)

**Outline dimension:**

See outline diagram.

**Mass:**

Approx. 3.6 kg

**Conduit connection:**

G1/2 (1 or 2 locations)

**External terminal:** M4 screw

2 output signal terminals and 2 external indicator terminals (Note, however, that the external indicator terminals should be used when mounting the optional analog indicator in the terminal box.)

**Process connection:**

Rc1/4, thread for oval flange 7/16-20UNF

**Mounting:**

On a 50A (2B) pipe with U-bolt or wall mounting (as specified for each type)

**Optional features**

**Analog indicator:** Built in electronics compartment (can also be built in terminal box).

Class 1.5, movable coil type, mountable at a rotational angle 90°

0 to 100% linear scale or actual scale (Actual scale of even 30, 35, 40, 50 divisions or 0 to 100% linear scale with reading factor is selectable.)

**Digital indicator:** Built in electronics compartment, 5-digit LCD indication

0 to 100% proportional indication, actual scale indication (FKG alone)

Operating temperature range; -20 to +80°C

**Arrester:**

Built in electronics compartment

**Oil-free treatment for oxygen:**

Fluorinated oil filled in, cleaning of wetted parts by degreasing

**NACE specification:**

H<sub>2</sub>S countermeasure in compliance with NACE specification

**Corrosion-resistive coating of sensor:**

Double coating with epoxy and polyurethane

**Vent/drain:**

Standard type, A type, long A type  
For details, see "Outline diagram".

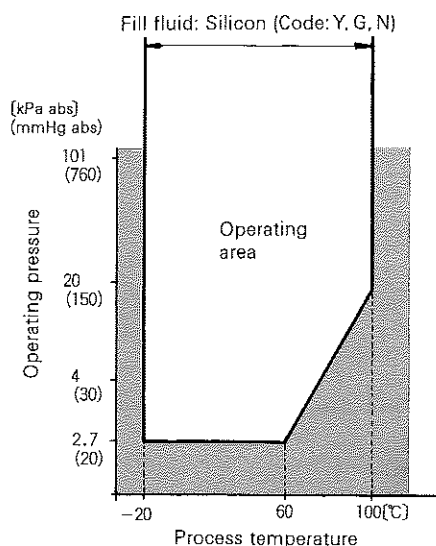


Fig. 1 Relation between process temperature and

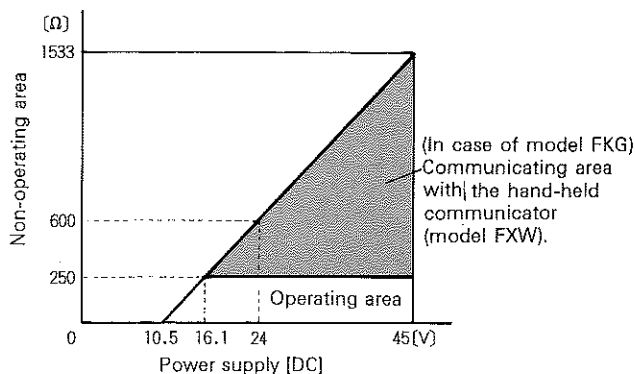


Fig. 2 Operating area between power supply and load resistance

Table 1. Remote function (from HHC)

No.	Items	Display	Set	Description
1	Tag No.	✓	✓	26-digit alphanumerics
2	Model No.	✓	✓	Model of instrument
3	Serial No.	✓	—	Manufacturing serial No. of instrument
4	Engineering unit	✓	✓	Setting of engineering unit
5	Range limit	✓	—	Display max. valve within range
6	Measuring range	✓	✓	Setting or change of measuring range
7	Damping	✓	✓	Settable within 0 to 38.4 sec.
8	Output mode	✓	—	Indication of output signal and linear output mode of built in digital indicator
9	Burnout direction	✓	✓	Output direction at error (21.6mA, hold or 3.8mA)
A	Input adjustment	✓	✓	Adjustment of input value
B	Output adjustment	—	✓	Adjustment of output 4mA/20mA, and setting of constant current output
C	Data measurement	✓	—	Data indication
D	Self diagnosis	✓	—	Indication of instrument error, amplifier error and temperature
E	Printer	—	—	Printout
F	External switch lock	✓	✓	Locking of external zero adjustment screw
G*	Scale range setting built-in digital indicator	✓	✓	Setting of indication value corresponding to output 4mA and 20mA

Note: \* Operation is allowed only when HHC version is 5.0 (corresponding to FXW□□□□1-□2) or higher.

**SCOPE OF DELIVERY**

Transmitter, and pipe fixture (depending on specification)

**DEVICES TO BE PREPARED SEPARATELY**

**Oval flange:** Used as the flange of pressure connection.

For details, refer to the data sheet of the oval flange (EDS 6-10).

**Hand-held communicator (model FXW):**

Refer to the data sheet No. EDS 8-47.

**Communication module:**

In case of model FHG, remote setting and adjustment can be performed with the hand-held communicator (type FXW) just by plugging the separately available communication module (type ZZPFCX2-A170) into the electronics unit.

Remarks: When the communication module is plugged in, the screw for external zero/span adjustment is usable solely for zero adjustment.

CODE SYMBOLS

1 2 3 4 5 6 7 8		9 10 11 12 13		14 15		Description		
FHG	0	2				<b>Type</b> 4 to 20mA, Traditional type 4 to 20mA with digital signal, Smart type		
FKG						<b>Connection</b>		
						Process connection	Oval flange screw	Conduit connection
1						Rc1/4	7/16-20UNF	G 1/2 (1 location)
2						Rc1/4	7/16-20UNF	G 1/2 (2 locations)
						<b>Span [kPa] (kgf/cm<sup>2</sup>)</b>		
2						50..... 500 (or 0.5...5)	} FHG	
3						300..... 3000 (or 3...30)		
4						1000... 10000 (or 10...100)		
7						50..... 500 (or 0.5...5)	} FKG	
8						300..... 3000 (or 3...30)		
9						1000... 10000 (or 10...100)		
						<b>Material</b>		
						Process cover	Wetted cell body	
							Diaphragm	Other wetted parts
C						SCS14	SUS316L(Note 1)	SUS316
						<b>Indicator and arrester</b>		
						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% linear scale	None	
P						Digital, Custom scale (Note 2)	None	
Q						Digital, 0 to 100% linear scale	Yes	
S						Digital, Custom scale (Note 2)	Yes	
						<b>Approvals for hazardous locations (Approvals pending)</b>		
A						None (for ordinary locations)		
B						JIS, Flameproof (Flameproof threaded-joint metal conduit type)		
C						JIS, Flameproof (Flameproof packing type)		
G						JIS, Intrinsic safety (Safty barrier need be prepared separately. See Note 3)		
						<b>Process connection</b>		
						Side vent/drain	Mounting bracket	Process connection method
A						None	None	} Standard
B						None	Yes (carbon steel)	
C						None	Yes (stainless steel)	
D						Yes	None	
E						Yes	Yes (carbon steel)	
F						Yes	Yes (stainless steel)	
G						Yes	None	} Rear connection
H						Yes	Yes (carbon steel)	
J						Yes	Yes (stainless steel)	
						<b>Special specifications</b>		
						Stainless steel tag	Stainless steel elec. housing	Corrosion-resistive coating of cell
Y						None	Without	None
B						Yes	Without	None
C						None	With	None
E						Yes	With	None
M						None	Without	Yes
N						Yes	Without	Yes
P						None	With	Yes
O						Yes	With	Yes
						<b>Treatment</b>		
						Treatment	Fill fluid	
Y						None	Silicon oil	
W						None	Fluorinated oil	
G						Degreasing	Silicon oil	
A						Oxygen service	Fluorinated oil	
N						NACE specification	Silicon oil	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
F	H	G					2							
F	K	G					2							

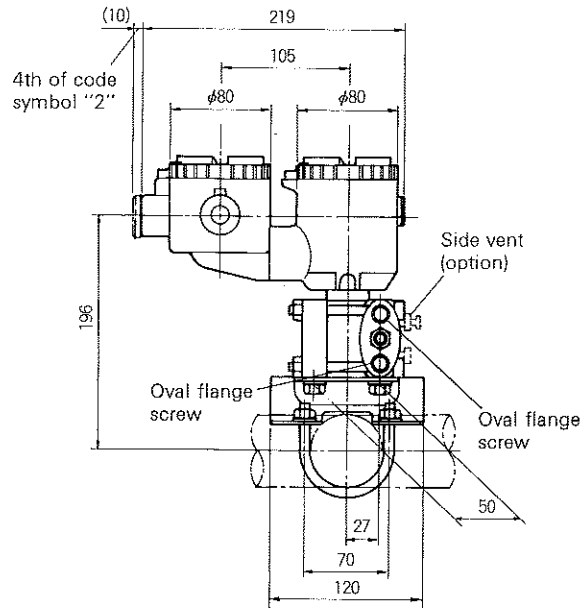
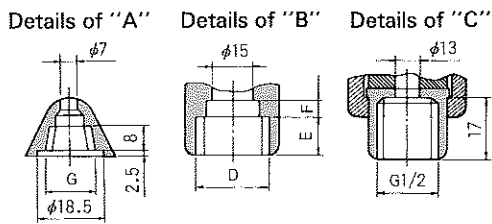
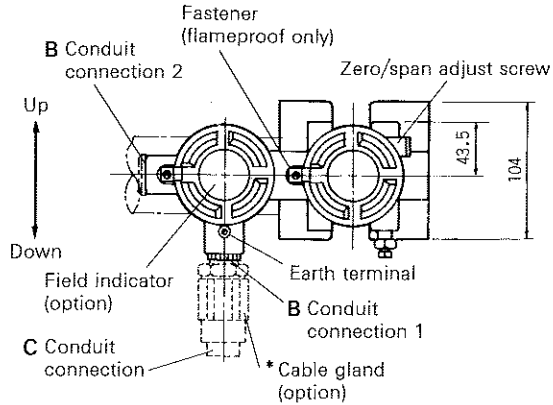
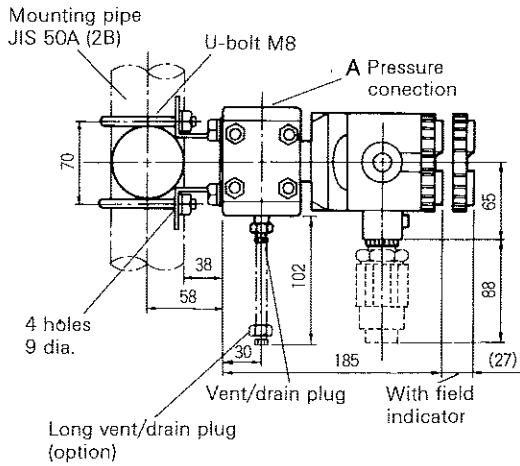
		Description	
		<b>O-ring</b>	
A		Viton	
B		Teflon	
		<b>Vent/drain type</b>	<b>Casing bolt/nut material</b>
A	Standard (Outlet vertical to axial direction)		Standard (hexagonal socket head cap bolt)
B			Cr-Mo hexagonal bolt/nut
C			NACE bolt/nut (ASTM A193 B7M/A194 2HM)
D			NACE bolt/nut (ASTM A320 L7M/A194 2HM)
E			Stainless steel SUS304/SUS304
G	A type (Outlet aligned in axial direction)		Standard (hexagonal socket head cap bolt)
H			Cr-Mo hexagonal bolt/nut
J			NACE bolt/nut (ASTM A193 B7M/A194 2HM)
K			NACE bolt/nut (ASTM A320 L7M/A194 2HM)
L			Stainless steel SUS304/SUS304
N	Long-A type (Outlet aligned in axial direction)		Standard (hexagonal socket head cap bolt)
P			Cr-Mo hexagonal bolt/nut
Q			NACE bolt/nut (ASTM A193 B7M/A194 2HM)
R			NACE bolt/nut (ASTM A320 L7M/A194 2HM)
S			Stainless steel SUS304/SUS304
		<b>Remarks</b>	

- Notes: 1. Liquid contacting face is coated with gold and ceramic.  
 2. Digital indicator / custom scale indication can be selected only for model FKG.  
 3. The safety barrier can be ordered in PWXA  1.

## ORDERING INFORMATION

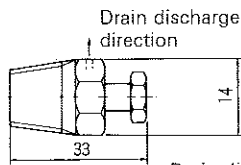
When ordering, specify the output direction (burnout direction) selected with an error has occurred on the transmitter. Unless otherwise specified, the output direction will be held.

# OUTLINE DIAGRAM (Unit:mm)

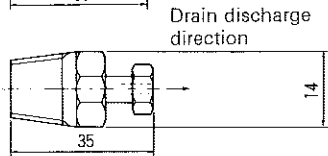


## VENT/DRAIN OUTLINE DIAGRAM

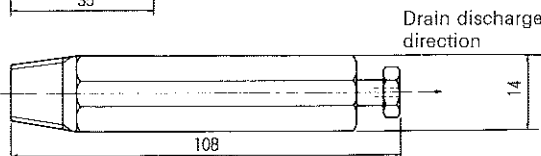
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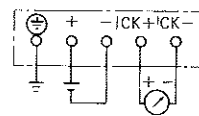
<A Type>



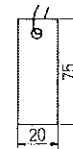
<Long A type>



External connection



<Stainless steel tag plate (option)>



4th of the code symbol	Conduit connection 1			Conduit connection 2			Pressure connection	Oval flange screw	Earth terminal
	D	E	F	D	E	F			
1	G1/2	17	8	None			Rc 1/4	7/16-UNF screw depth 13	M4
2	G1/2	17	8	G1/2	17	8	Rc 1/4	7/16-UNF screw depth 13	M4

\*Note: Cable gland is provided only for the flameproof type (flameproof packing type) and 11 mm diameter cable should be used.

FHG 1 2 0□C2

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