



# TECHNICAL GUIDANCE

FCX-AIII Series

FKH...5

## ABSOLUTE PRESSURE TRANSMITTER (DIRECT MOUNT TYPE)

### OUTLINE

The FCX-AIII absolute pressure transmitter (Direct mount type) 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 8.125 to 3000kPa {0.13 to 30bar} high pressure range.

#### 2. Minimum inventory

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

#### 3. 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-AIII series transmitters.

#### 4. Application flexibility

Example features that render the FCX-AIII suitable for almost any process applications includes:

- Full range of hazardous location approvals
- Built-in RFI filter and lightning arrester
- 5-digits LCD meter
- The maximum span of each sensor can be converted to in different units using below factors.

#### 5. Burnout current flexibility (Under Scale: 3.2 to 4.0mA, Over Scale: 20.0 to 22.5mA)

Burnout signal level is adjustable using Model FXW Hand Held Communicator (HHC) to comply with NAMUR NE43.



### SPECIFICATIONS

#### Functional specifications

**Type:** 4 to 20mA with digital signal

**Service:** Liquid, gas, or vapor

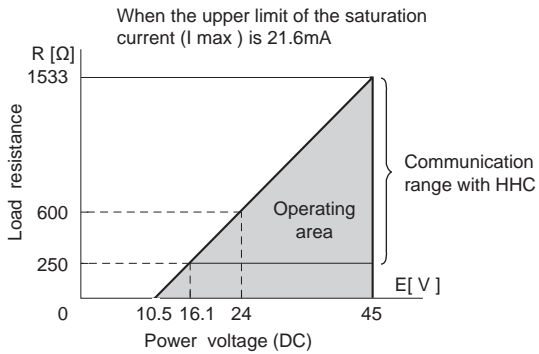
**Span, range, and overrange limit:**

Type	Span limit [kPa abs] {bar abs}		Range limit [kPa abs] {bar abs}	Overrange limit [MPa] {bar}
	Min.	Max.		
FKH□02	8.125 {0.08125}	130 {1.3}	0 to 130 {0 to 1.3}	0.5 {5}
FKH□03	31.25 {0.3125}	500 {5}	0 to 500 {0 to 5}	1.5 {15}
FKH□04	1875 {1.875}	3000 {30}	0 to 3000 {0 to 30}	9 {90}

**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) The load resistance varies with the upper limit of the saturation current [I max]

$$R [\Omega] = \frac{E [V]-10.5}{(I_{max} [mA]+0.9)\times 10^{-3}}$$

Note: For communication with FXW, min. of 250 Ω required.

**Hazardous locations:** SEE TABLE 3

**Zero/span adjustment:**

Zero and span are adjustable either from the HHC<sup>(1)</sup>. Zero is also adjustable externally from the adjustable screw.

**Damping:**

Adjustable electrical damping  
The time constant is adjustable between 0.06 to 32.0 seconds.

**Zero elevation/suppression:**

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

**Normal/reverse action:**

Configurable from HHC<sup>(1)</sup>.

**Indication:**

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

**Burnout direction:** Selectable from HHC<sup>(1)</sup>

If self-diagnostic detect transmitter failure, the analog signal will be driven to either "Output Hold", "Output Overscale" or "Output Underscale" modes.

"Output Hold":

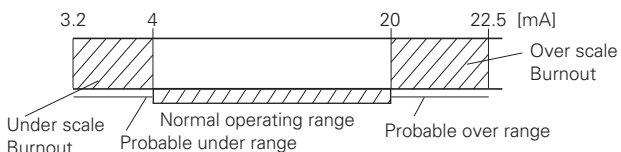
Output signal is hold as the value just before failure happens.

"Output Overscale":

Adjustable within the range 20.0mA to 22.5mA from HHC<sup>(1)</sup>

"Output Underscale":

Adjustable within the range 3.2mA to 4.0mA from HHC<sup>(1)</sup>



Output Limits conforming the NAMUR NE43 by order.

**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<sup>(1)</sup> (Model FXW), following items can be remotely displayed or configured.

Note: HHC's version must be higher than 7.0 (or FXW □□□□1-□4), for FCX-AIII.

**Local configurator with LCD display (option):**

Local configurator with 3 push button and LCD display can support following items.

Items	By communication with FXW		By local configurator (with 3 push button)	
	Display	Set	Display	Set
Tag No.	✓	✓	✓	✓
Model No.	✓	✓	✓	✓
Serial No. & Software Version	✓	—	✓	—
Engineering unit	✓	✓	✓	✓
Range limit	✓	—	✓	—
Measuring range	✓	✓	✓	✓
Damping	✓	✓	✓	✓
Output mode	✓	—	✓	—
Burnout direction	✓	✓	✓	✓
Calibration	✓	✓	✓	✓
Output adjust	—	✓	—	✓
Data	✓	—	✓	—
Self diagnoses	✓	—	✓	—
Printer (In case of FXW with printer option)	✓	—	—	—
External switch lock	✓	✓	✓	✓
Transmitter display	✓	✓	✓	✓
Linearize	✓	✓	—	—
Rerange	✓	✓	✓	✓
Saturate current	✓	✓	✓	✓
Write protect	✓	✓	✓	✓
History				
- Calibration history	✓	✓	✓	✓
- Ambient temperature history	✓	—	✓	—

(Note) (1) HHC: Hand Held Communicator

**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:

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

**Stability:** ±0.2% of upper range limit (URL) for 10 years

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

**Temperature effect:**

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

$$\text{Zero shift: } \pm (0.4 + 0.2 \frac{\text{URL}}{\text{span}}) \% / 28^\circ\text{C}$$

$$\text{Total effect: } \pm (0.475 + 0.2 \frac{\text{URL}}{\text{span}}) \% / 28^\circ\text{C}$$

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

**Update rate:** 60 msec

**Step response:** Time constant. 0.08 s (at 23°C)

Dead time: about 0.12 s

(without electrical damping)

**Mounting position effect:**

Zero shift, less than 0.1kPa 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.

**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.

**Process-wetted parts material:**

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

**Non-wetted parts material:**

Electronics housing: Low copper die-cast aluminum alloy (standard), finished with polyester 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 2.2kg without options.

Add; 0.5kg for mounting bracket

**Optional features**

**Indicator:** A plug-in turnable analog indicator (2.5% accuracy)  
An optional 5 digits LCD meter is also available.

**Local configurator with LCD display:**

An optional 5 digits LCD meter with 3 push buttons can support items as using communication with FXW.

**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.

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

**Hand held communicator:**

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

**ACCESSORIES**

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**Hand held communicator:** Model FXW

CODE SYMBOLS

Digit	Description	Note	Digit No. of code														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
4	<Connections>		F	K	H	0	5										
	Process connection	Conduit connection	Case type														
	1/2-14NPT	G1/2	T type														
	1/2-14NPT	1/2-14NPT	T type	5													
	1/2-14NPT	Pg13.5	T type	6													
6	<Span limit> [kPa abs] (bar abs)																
	8.125 ... 130 {0.08125 ... 1.3}																
	31.25 ... 500 {0.3125 ... 5}																
	187.5 ... 3000 {1.875 ... 30}																
7	<Material>																
	Process cover	Diaphragm	Wetted cell body														
	316 stainless steel	316L stainless steel	316 stainless steel														
9	<Indicator and arrester>																
	Indicator	Arrester															
	None	None															
	Analog, 0 to 100% linear scale	None															
	Analog, custom scale	None															
	None	Yes															
	Analog, 0 to 100% linear scale	Yes															
	Analog, custom scale	Yes															
	Digital, 0 to 100% linear scale	None															
	Digital, custom scale	None															
	Digital, 0 to 100% linear scale	Yes															
	Digital, custom scale	Yes															
	Digital, 0 to 100% linear scale (Local configurator unit with LCD display)	None															
	Digital, Custom scale (Local configurator unit with LCD display)	None															
	Digital, 0 to 100% linear scale (Local configurator unit with LCD display)	Yes															
Digital, Custom scale (Local configurator unit with LCD display)	Yes																
10	<Approvals for hazardous locations>																
	None (for ordinary locations)																
	TIIS, Flameproof (Cable gland seal) (*1)	Note 1															
	TIIS, Intrinsic safety																
	FM, Flameproof (or explosionproof) (*2)	Note 2															
	FM, Intrinsic safety and nonincensive	Note 2															
	FM Combined of flameproof and intrinsic safety (*2)	Note 2															
	ATEX Flameproof (*3)	Note 3															
	ATEX Intrinsic safety																
	ATEX Type n																
ATEX Combined of flameproof and intrinsic safety (*3)	Note 3																
IECEX Scheme, Flameproof (*3)	Note 3																
IECEX Scheme, Intrinsic safety																	
CSA, Flameproof (or explosionproof) (*2)	Note 2																
CSA, Intrinsic safety and nonincensive																	
11	<Mounting bracket>																
	None																
12	<Optional specification>																
	Stainless tag																
13	<Special application and fill fluid>																
	Treatment	Filled liquid															
	None (standard)	Silicon oil															
14	<Process connection>																
	1/2 -14NPT																
	Rc1/4																
	Rc1/2																
15	<Fixed code> (*5)	Note 5															

Note 1: (\*1) Available for 4th digit code "5".  
 Note 2: (\*2) Available for 4th digit code "6".  
 Note 3: (\*3) Available for 4th digit code "6", "8".  
 Note 4: (\*4) Customer tag number can be engraved on standard stainless steel name plate. If extra tag plate is required select "Yes".  
 Note 5: (\*5) In case of hazardous location type, tagplate is made by Fuji Electric Co., Ltd.



TABLE 3

Authorities	Intrinsic safety																	
ATEX	Ex II 1 G Ex ia IIC T5 Tamb = -40°C to +50°C Ex ia IIC T4 Tamb = -40°C to +70°C  Entity Parameters: Ui=28V, li=94.3mA, Pi=0.66W, Ci=26nF (Without Arrester), Li=0.6mH (Without analog indicator), Ci=36nF (With Arrester), Li=0.7mH (With analog indicator)																	
Factory Mutual	Class I II III Div.1 Groups A, B, C, D, E, F, G T4 Entity Type 4X  <table border="1"> <thead> <tr> <th colspan="2">Model code</th> <th rowspan="2">Tamb</th> </tr> <tr> <th>9th digit</th> <th>13th digit</th> </tr> </thead> <tbody> <tr> <td>A,B,D</td> <td>Y,G</td> <td>-40°C to +85°C</td> </tr> <tr> <td>L,P,1,2</td> <td>Y,G</td> <td>-20°C to +80°C</td> </tr> <tr> <td>Q,S,4,5</td> <td>Y,G</td> <td>-20°C to +60°C</td> </tr> <tr> <td>E,F,H</td> <td>Y,G</td> <td>-40°C to +60°C</td> </tr> </tbody> </table> Entity Parameters: Vmax=28V, Imax=94.3mA, Pi=0.66W, Ci=35.98nF, Li=0.694mH	Model code		Tamb	9th digit	13th digit	A,B,D	Y,G	-40°C to +85°C	L,P,1,2	Y,G	-20°C to +80°C	Q,S,4,5	Y,G	-20°C to +60°C	E,F,H	Y,G	-40°C to +60°C
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E,F,H	Y,G	-40°C to +60°C																
CSA	Class I Div.1 Groups A, B, C, D Class II Div.1 Groups E, F, G Class III Div.1 Temp Code T5 Tamb max = +50°C Temp Code T4 Tamb max = +70°C Entity Parameters: Vmax=28V, Imax=94.3mA, Ci=25nF (Without Arrester), Ci=36nF (With Arrester), Li=0.6mH (Without analog meter), Li=0.7mH (With analog meter)																	
TIIS	Ex ia IIC T4 Tamb max = +60°C Entity Parameters: Ui=28V, li=94.3mA, Pi=0.66W, Ci=40.92nF, Li=0.694mH																	
IECEX Scheme	Ex ia IIC T4 Tamb = -40°C to +70°C Ex ia IIC T5 Tamb = -40°C to +50°C Entity Parameters: Ui=28V, li=94.3mA, Pi=0.66W, Ci=26nF (Without Arrester), Li=0.6mH (Without analog indicator), Ci=36nF (With Arrester), Li=0.7mH (With analog indicator)																	

Authorities	Flameproof																	
ATEX	Ex II 2 GD Ex d IIC T6 IP66/67 T85°C Tamb = -40°C to +65°C Ex d IIC T5 IP66/67 T100°C Tamb = -40°C to +85°C																	
Factory Mutual	Class I Div.1 Groups B, C, D T6 Type 4X Class II III Div.1 Groups E, F, G T6 Type 4X Tamb max = +60°C																	
CSA	Class I Div.1 Groups C, D Class II Div.1 Groups E, F, G Class III Div.1  Note) "Seal Not Required" enclosure is allowed.																	
IECEX Scheme	Ex d IIC T5 IP66/67 Tamb = -40°C to +85°C Ex d IIC T6 IP66/67 Tamb = -40°C to +65°C																	
TIIS	Ex do IIB+H <sub>2</sub> T4 Tamb max = +60°C Maximum process temp. = +120°C																	
Authorities	Type n Nonincendive																	
ATEX	Ex II 3 GD EEx nL IIC T5 Tamb = -40°C to +50°C EEx nL IIC T4 Tamb = -40°C to +70°C Specific Parameters: Model without arrester: Ui=42.4V, li=113mA, Pi=1W, Ci=25.18nF, Li=0.694mH Model with arrester: Ui=32V, li=113mA, Pi=1W, Ci=35.98nF, Li=0.694mH  EEx nAL IIC T5 Tamb = -40°C to +50°C EEx nAL IIC T4 Tamb = -40°C to +70°C Specific Parameters: Model without arrester: Umax=42.4V, Imax=113mA, Pmax=1W, Model with arrester: Umax=32V, Imax=113mA, Pmax=1W																	
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\* Specification is subject to change without notice.

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