REMOTE SEAL TYPE ABSOLUTE PRESSURE TRANSMITTER

DATA SHEET **FKM···5/FDM···5**

The FCX -AIII remote seal type absolute pressure transmitter accurately measures various parameters in the production process and converts it into an output signal of 4~20mA DC. The transmitter utilizes a unique micromachined capacitance silicon sensor with state-of-the-art microprocessor technology to provide exceptional performance and functionality.FCX-AIII series transmitters with safety funtion have obtained the certificate of SIL certification by TÜV.

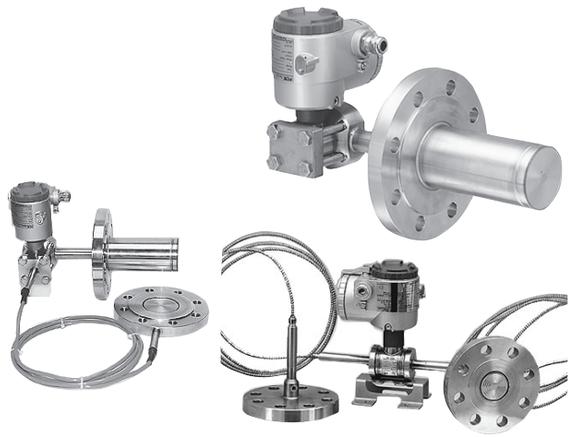
Features

1. High accuracy
   Remote seal type absolute pressure transmitter can be carried out with high accuracy measurement in the range of 1.6 ~ 10000kPa. Standard accuracy: ± 0.2%, High accuracy(optional)：± 0.1%
   There's no need to linear calibration when carrying out zero elevation or suppression.
2. Excellent environmental adaptaboility
   The advanced floating cell protects sensor from temperature and overpressure effect, and controls the total measurement error of the filed to the minimun.
3. Excellent operability and easy to use
   It has an excellent operability and easy to use in any application.
   - All range meet the requirements of explosion-proof.
   - 5-digit digital indiactor
   - Stainless steel AMP case
   - Built-in RFI filter and lightning arrester
   - Various anti-corrosive materials
   - Products used for high temperature and high vacuum
   - Built-in local configurator with 3 push buttons
4. The transmitter can communicate using FUJI, HART, communication protocol, and also can use FOUNDATION FIELDBUS or PROFIBUS protocol after changing the electronic circuit.

Specifications

Functional specifications

Model:
— FKM: Remote seal type absolute pressure transmitter
— FDM: Fieldbus type
Measured medium: Liquid, gas, or bapor

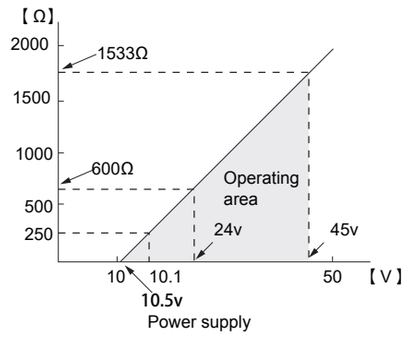


Span and measuring range:

Model	Span（kPa abs）		Range limit
	Min.	Max.	（kPa abs）
FKM □□ 1	1.6	16	0~+16
FDM □□ 1			
FKM □□ 2	1.6	130	0~+130
FDM □□ 2			
FKM □□ 3	5	500	0~+500
FDM □□ 3			
FKM □□ 4	30	3000	0~+3000
FDM □□ 4			
FKM □□ 5	100	10000	0~+10000
FDM □□ 5			

Note: To reduce the effect of operating conditions, the span of transmitter should be greater than 1/40 of max.span.

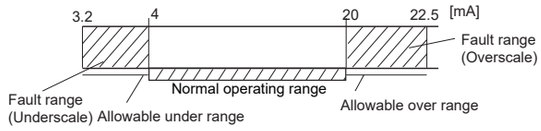
Overrange limit: maximum static pressure
Output signal: 4~20mA DC superposed digital signal
Digital signal based on F.F and Profibus™
Power supply:10.5V~45V DC(terminal)
Load characteristics: see the figure below



Note: When communicating with FXW, an at least 250Ω resistor should be connected into the circuit.

FKM

- Explosion proof: Refer to table 6
- Zero/Span adjustment: zero/span of instrument can be adjusted by HHC, also can use the external adjustment screw of AMP case to carry out zero adjustment.
- Damping adjustment: The damping of output signal can be adjusted by HHC, time constant is between 0.06s to 32s. it also can be local adjusted by LCD digital display unit.(refer to the option of field indicator.)
- Zero elevation/suppression: Zero can be elevated or suppressed within the range of 0 kPa abs to upper range limit.
- Normal/reverse action: selectable by HHC
- Field indicator: Plug-in analog indicator can be mounted on the electronic part side, also can be mounted on the terminal side.The 5 digit local LCD display unit is mounted on the electronic part side.
- Brunout direction: if the fault of instrument is detected when self-diagnosis, the analog output can be set by HHC in advance, any one of the following is selectabel: (1) Hold, (2) Overscale, (3)Underscale.
  - "Output hold"
    Output value is hold just before fault happens.
  - "Otuput overscale"
    Adjustable between 20.0mA to 22.5mA with HHC.
  - "Otuput underscale"
    Adjustable between 3.2mA to 4.0mA with HHC.



- Loop check output: When the transmitter is calibration, the standard output signal of the instrument can be set by HHC.
  The setting value is between 3.2mA to 22 .5mA.
- Temperature range: ambient temperature: -40°C ~ +85°C
  -30°C ~ +80°C(for LCD digit display unit)
  -40°C ~ +60°C(for built-in arrester)
  -20°C ~ +80°C(for transmitter filled with fluorinated oil)
  For the explosion-proof instrument (flameproof orIntrinsic safety type), ambient temperature must be within the scope of the explosion proof standard.
- Storage temperature: -40°C ~ +90°C
- Relative humidity: 0 ~ 100%RH
- Communication function: Using HHC (model FXW, refer to data sheet), it can remote set, change or display the following data.

  Note: The version of HHC must be higher than 7.0 (or FXW□□□□1-□4)

Table1 Adjustment function

No.	Items	HHC (Model:FXW)Note1)		Local configurator (With 3 push buttons)	
		Display	Set	Dispaly	Set
1	Tag No.	○	○	○	○
2	Type	○	○	○	○
3	Serial No. & Software Version	○	—	○	—
4	Engineering unit	○	○	○	○
5	Range Limit	○	—	○	—
6	Measuring range	○	○	○	○
7	Damping	○	○	○	○
8	Output mode	○	—	○	—
9	Burnout direction	○	○	○	○
A	Zero/span calibration	○	○	○	○
B	Calibration of output circuit	—	○	—	○
C	Measured data	○	—	○	—
D	Self-diagnosis	○	—	○	—
E	Printer function	○	—	—	—
F	Lock of adj. function	○	○	○	○
G	Indication of digital indicator	○	○	○	○
H	Linzearize	○	○	—	—
I	Rerange	○	○	○	○
J	Saturation current Write	○	○	○	○
K	protect	○	○	○	○
L	History -Calibration history -Temperature history	 ○ ○	 ○ —	 ○ ○	 ○ —

Nore1) The version of HHC must be higher than 7.0 when it supports FCX-AIII series transmitter(or FXW□□□□1–□4).
It can upgrade the version by changing ROM, please consult our company's windows or agency shop nearby for deatils.

Programmable output linearization function:
The output signal can be programmed with hand held communicator, and at most 14 compensation points according to the line approximation method.

Performance specifications

Silicone oil, diaphragm material is SUS316

Accuracy: (including linearity, hysteresis, and repeatability)
Accuracy is ± 0.2% of span. When span is less than 1/10 of URL, accuracy is

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

Linear:
± 0.1% of span

Stability:
changed ± 0.2% of URL for 10 years

Temperature effect: (Only transmitter)
the effect of changing per 28°C in the range of -40°C ~ +80°C.
Zero shift: ±（0.125+0.1×URL/span）%
Total shift: ±（0.125+0.1×URL/span）%

Overrange effect:
When the overrange pressure is not exceeded the range limit, zero shift is ± 0.2%/URL.

Power voltage effect:
per changed 10V, less than 0.05% of the calibration range.

Radio frequency interference (RFI) effect:
frequency 20~1000MHz, electric field intensity 10V/m, the case is screwed on, less than 0.2% of URL (class: 2-abc: according to SAMA PMC 33.1 it's 0.2% of span.)

Step effect: (no circuit damping)
Time constant: 0.2s
Dead time: about 0.3s
Respone time=5×time constant +Dead time Time constant (t)=63% of output signal

Effect of mounting location:

When tilting 10° in any direction, zero shift is less than 12mmH2O, this error can be eliminated by zero adjustment, it's no effect to span.

Insulation strength:

500VAC50/60Hz, between circuit and earth, 1 min

Insulation resistance: more than 100MΩ（500V DC）

Start-up time: 4s

Internal resistance of field indicator:≤12Ω

Physical characteristics

Conduit connection:

1/2-14NPT，Pg13.5 or M20× 1.5

Materials of non-wetted part

Electronic part case:

Low Cu-Al alloy (standard), coating two layers of expoy polyurethane paint on the surface, 316 stainless steel is optional.

Bolt and nut:

Standard: Cr-Mo alloy

Optional: SUS316 (perating pressure≤ 10MPa) or SUS630 (operating pressure > 10MPa)

Fill fluid:

Standard: silicone oil

Optional: fluorinated oil

Mounting bracket:

Standard: Carbon steel, epoxy coating

Optional:304 stainless steel

Case structure:

IEC IP67 and NEMA6/6P

Mounting:

mounted on the steel pipe of the diameter 60.5mm (JIS50A), and can also be mounted on the plate.

Weight：

Transmitter body：about 5kg

Options: mounting bracket 0.5kg, field indicator 0.8kg, stainless seel electronic part case 4.5kg(optional)

Seal diaphragm assembly (S2):

selecting the complete model according to the specification of seal diaphragm assembly (S2)

Optional specifications

Field indicator:

Plug-in analog indicator (accuracy 1.5%) can be mounted on the electronic part side, also can be mounted on the terminal side.The 5 digit LCD display unit mounted on the electronic part side can also be selected.

Arrester:

The arrseter can prevent the instrument damaged from lightning, it's mounted in the instument. The lightning reansient voltage is 4KV（1.2× 50μ s）

NACE specification:

All the metal materials of under pressure parts comply with NACE specification, also meet the ASTM or L7M screw and 2HM nut(II class) specification.At this moment, the maximum operating pressure is 10MPa.

User tag plate：

Stainless steel tag plate is used to print the tag number of instrument, it's tied to the transmitter.

Options

HHC model: FXW

The product conforms to the requoirments of European EMC directive "Electromagnetic Compatibility Directive2004/108/EC". The detail content is recorded in the techiacal construction file nmber TN5A0704. The applicable standards are as follows:

CE

Emission list:
EN 61326-1 : 2006 Class A (Industrial location)

Frequency range	Limits	Reference standard
30 ~ 230MHz	40dB(μV/m) quasi peak, measured at 10m distance	EN55011:1998 +A1:1999 +A2:2002 (Group1 Class A)
230 ~ 1000MHz	47dB(μV/m) quasi peak, measured at 10m distance	

Immunity requirements:
EN 61326-1 : 2006 Table2 (Industrial location)

Phenomenon	Test value	Basic standard	P.C.
Electrostatic discharge	2/4kV (Contact) 2/4/8kV (Air)	IEC 61000-4-2:1995 +A1:1998+A2:2001	B
Electromagnetic field	10V/m(80 ~ 1000MHz) 3V/m(1.4 ~ 2.0GHz) 1V/m(2.0 ~ 2.7GHz) 80%AM(1kHz)	IEC 61000-4-3:2002 +A1:2002	A
Rated power frequency magnetic field	30 A/m 50/60 Hz	IEC 61000-4-8:1993 +A1:2001	A
Burst	2kV	IEC 61000-4-4:2004	B
Surge	1.2/50μs(Voltage) 8.0/20μs(Current) 0.5/1kV line to line 0.5/1/2kV line to ground	IEC 61000-4-5:1995 +A1:2001	B
Conducted RF	0.15 ~ 80MHz 3V 80%AM(1kHz)	IEC 61000-4-6:1996 +A1:2001	A

Definition of performance criteria:
A: During testing, normal performance within the specification limits.
B: During testing, temporary degradation, or less of function or performance which is self-recovering.

Model code

1	2	3	4	5	6	7	8	9	10	11	12	13	Discription
						V	5	-				Y	
												(*6)	Type
F	K	M											Smart absolute pressure transmitter, 4-20mA DC+Fuji/Hart digital signal
F	D	M											Foundation Fieldbus and Profibus
													Conduit connection
			T										1/2" —14NPT
			V										Pg13.5
			W										M20×1.5
													Pressure rating of seal diaphragm assembly (MPa)
				2									PN2.5
				4									PN2.0-150LB
				6									PN5.0-300LB
				8									PN4.0
				9									PN1.6
												(*1)	Span (kPa abs)
					1							(*2)	1.6…16
					2							(*3)	1.6…130
					3								5…500
					4								30…3000
													Field indicator and arrester

Initial setting	Field indicator	Arrester
Smart 4~20mA DC +Fuji/Hart digital signal	None	None
	Analog, 0-100% linear scale	None
	None	Yes
	Analog, 0-100% linear scale	Yes
	Digital, 0-100%	None
	Digital, customer scale	None
	Digital, 0-100%	Yes
	Digital, customer scale	Yes
Foundation Fieldbus	None	Yes
Foundation Fieldbus	Digital, customer scale	Yes
Profibus	None	Yes
Profibus	Digital, customer scale	Yes

													Explosion-proof certification
													None (standard)
													NEPSI Flameproof
													NEPSI Intrinsic safety
													Mounting type (*4)
													Capillary remote flange mounting
													Fixed flange mounting (straight)
													Fixed flange mounting (L)

Stainless steel parts

		Screw/Nut	Stainless steel tag plate	Stainless steel case and cover
(*5)	1	None (Capillary flange mounting)	None	None
(*5)	2	None (Capillary flange mounting)	Yes	None
(*5)	3	None (Capillary flange mounting)	None	Yes
(*5)	4	None (Capillary flange mounting)	Yes	Yes
	Y	Carbon steel	None	None
	B	Carbon steel	Yes	None
	C	Carbon steel	None	Yes
	E	Carbon steel	Yes	Yes
	A	SUS316/SUS316	None	None
	D	SUS316/SUS316	Yes	None
	F	SUS316/SUS316	None	Yes
	G	SUS316/SUS316	Yes	Yes

Note1) Range ratio can reach 100:1, but in order to ensure its excellent performance, the actual use range should greater than 1/10 of URL.
Note2) Please contact Wuxi Kunlun Fuji Instruments Co., Ltd. for whether special production can be carried out.
Note3) When DN＜50, Please contact Wuxi Kunlun Fuji Instruments Co., Ltd. for whether special production can be carried out.
Note4) The transmitter with remote capillary is equipped with mounting bracket, fixed flange mounting type is not equipped with mounting bracket.
Note5) Not available for 12th digit code "1,2,3,4", when using fixed flange mounting.
Note6) The standard fill fluid is silicone oil, please contact Wuxi Kunlun Fuji Instruments Co., Ltd. when need other fill fluid.

Table 6 Explosion proof

<table>
<tr><th>Authorities</th><th>Intrinsic safety</th></tr>
<tr><td>ATEX</td><td>Ex II 1 G
Ex ia II C T5 Tamb = -40°C ~ +50°C
Ex ia II C T4 Tamb = -40°C ~ +70°C

Entity Parameters:
Ui = 28V, Ii = 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)</td></tr>
<tr><td>FM</td><td>Class I II III
DIV.1 Groups A, B, C, D, E, F, G
T4 Entity Type 4X
<table>
<tr><th colspan="2">Model</th><th rowspan="2">Tamb</th></tr>
<tr><th>9th digit</th><th>13th digit</th></tr>
<tr><td>A,B,D</td><td>Y,G,N</td><td>-40°C ~ +85°C</td></tr>
<tr><td>L,P,1,2</td><td>Y,G,N</td><td>-20°C ~ +80°C</td></tr>
<tr><td>Q,S,4,5</td><td>Y,G,N</td><td>-20°C ~ +60°C</td></tr>
<tr><td>E,F,H</td><td>Y,G,N</td><td>-40°C ~ +60°C</td></tr>
<tr><td>－</td><td>W,A,D</td><td>-10°C ~ +60°C</td></tr>
</table>
Entity Parameters:
Vmax = 28V, Imax = 94.3mA, Pi = 0.66W,
Ci = 35.98nF, Li = 0.694mH</td></tr>
<tr><td>CSA</td><td>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), Li = 0.6mH(without analog indicator)
Ci = 36nF(with arrester), Li = 0.7mH(with abalig indicator)</td></tr>
<tr><td>TIIS</td><td>Ex ia IIC T4
Tamb max = +60°C
Entity Parameters:
Ui = 28V, Ⅰi = 94.3mA, Pi = 0.66W,
Ci = 38.4nF, Li = 0.694mH</td></tr>
<tr><td>IECEx Scheme</td><td>Ex ia II C T4
Tamb = -40°C ~ +70°C
Ex ia II C T5
Tamb = -40°C ~ +50°C
Entity Parameters:
Ui = 28V Ii = 94.3mA Pi = 0.66W
Ci = 26nF(without arrester), Li = 0.6mH(without analog indicator)
Ci = 36nF(with arrester), Li = 0.7mH(with abalig indicator)</td></tr>
<tr><td>NEPSI</td><td>Ex ia IIC T4
Ex d IIB+H₂T6/Ex ia IIC T4
<table>
<tr><th colspan="2">Model</th><th rowspan="2">Tamb</th></tr>
<tr><th>9th digit</th><th>13th digit</th></tr>
<tr><td>A,B,D</td><td>Y,G,N</td><td>-40°C ~ +85°C</td></tr>
<tr><td>L,P,1,2</td><td>Y,G,N</td><td>-20°C ~ +80°C</td></tr>
<tr><td>Q,S,4,5</td><td>Y,G,N</td><td>-20°C ~ +60°C</td></tr>
<tr><td>E F H</td><td>Y,G,N</td><td>-40°C ~ +60°C</td></tr>
<tr><td>－</td><td>W,A,D</td><td>-10°C ~ +60°C</td></tr>
</table>
Entity Parameters:
Ui = 42.4V, Ii = 113mA, Pi = 1W,
Ci = 35.98nF, Li = 0.694mH</td></tr>
</table>

<table>
<tr><th>Authorities</th><th>Flameproof</th></tr>
<tr><td>ATEX</td><td>Ex II 2 GD
EEx d II C T6 IP66/67 T85°C
Tamb = -40°C ~ +65°C
EEx d II C T5 IP66/67 T100°C
Tamb = -40°C ~ +85°C</td></tr>
<tr><td>FM</td><td>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</td></tr>
<tr><td>CSA</td><td>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.</td></tr>
<tr><td>TIIS</td><td>Ex do IIB+H₂ T4
Tamb max = +60°C
Maximum process temp. = +120°C</td></tr>
<tr><td>IECEx Scheme</td><td>Ex d II C T5 IP66/67
Tamb = -40°C ~ +85°C
Ex d II C T6 IP66/67
Tamb = -40°C ~ +65°C</td></tr>
<tr><td>NEPSI</td><td>Ex d II B+H₂ T6
Tamb = -40°C ~ +60°C</td></tr>
</table>

<table>
<tr><th>Authorities</th><th>Type n Nonincendive</th></tr>
<tr><td>ATEX</td><td>Ex II3 GD
EEx nL IIC T5 Tamb = -40°C ~ +50°C
EEx nL IIC T4 Tamb = -40°C ~ +70°C
Specific Parameters:
Model without arrester:
Ui=42.4V, Ii=113mA, Pi=1W,
Ci=25.18nF, Li=0.694mH
Model with arrester:
Ui=32V, Ii=113mA, Pi=1W,
Ci=35.98nF, Li=0.694mH

EEx nAL IIC T5 Tamb = -40°C ~ +50°C
EEx nAL IIC T4 Tamb = -40°C ~ +70°C
Specific Parameters:
Model without arrester:
Umax=42.4V, Imax=113mA, Pmax=1W
Model with arrester:
Umax=32V, Imax=113mA, Pmax=1W</td></tr>
<tr><td>FM</td><td>Class I II III
Div.2 Groups A、B、C、D、F、G
T4 Entity Type 4X
<table>
<tr><th colspan="2">Model</th><th rowspan="2">Tamb</th></tr>
<tr><th>9th digit</th><th>13th digit</th></tr>
<tr><td>A,B,D</td><td>Y,G,N</td><td>-40°C ~ +85°C</td></tr>
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<tr><td>－</td><td>W,A,D</td><td>-10°C ~ +60°C</td></tr>
</table></td></tr>
<tr><td>CSA</td><td>Class I
Div.2 Groups A, B, C, D
Class II
Div.2 Groups E, F, G
Class III
Div.2
Temp code T5 Tamb max = +50°C
Temp code T4 Tamb max = +70°C
Entity Parameters:
Vmax=28V,Ci=25.18nF (without arrester),
Ci=35.98nF (with arrester), Li=0.694mH</td></tr>
</table>

FKM