

# ABSOLUTE PRESSURE TRANSMITTER (DIRECT MOUNT TYPE)

DATA SHEET

FKH...5

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. Fuji's micro-capacitance silicon sensor assures this feature for all suppressed calibration ranges without additional adjustment.
2. **Minimum inventory**  
Electronics unit, communication module, local indicators and electronics housing are interchangeable among all FCX-AIII models.
3. **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-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 vapour

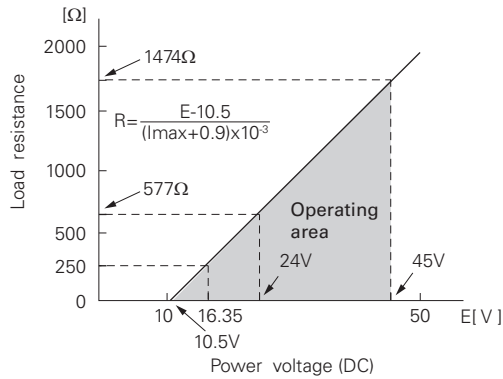
**Span, range, and overrange limit:**

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	187.5 {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: 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":

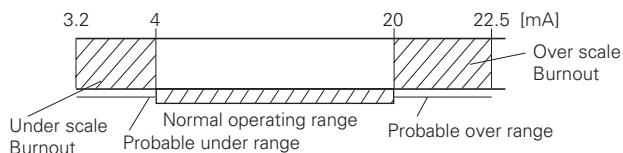
Output signal is hold as the value just before failure happens.

"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, consult Data Sheet No. EDS8-47), 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	✓	—	✓	—

EMC Conformity: EN61326-1: 2006 CE

(Note) (1) HHC: Hand Held Communicator

## Performance specifications

**Accuracy rating:** (including linearity, hysteresis, and repeatability).

For spans greater than 1/10 of URL:  $\pm 0.2\%$  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:**  $\pm 0.2\%$  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.
- NACE specification:**  
Metallic materials for all pressure boundary parts comply with NACE MR-01-75.
- Customer tag:** A stainless steel tag for customer tag data is wired to the transmitter.

**ACCESSORIES**

- Hand held communicator:**  
(Model FXW, refer to Data Sheet No.EDS 8-47)

# CODE SYMBOLS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	21	Description
F	K	H	0	5									0			
<b>Connections</b>																
		Conduit connection		Case type		Process connection										
5																
6																
7																
8																
<b>Span limit</b> [kPa abs] (bar abs)																
2																
3																
4																
<b>Material</b>																
		Process cover		Diaphragm		Wetted cell body										
V																
<b>Indicator and arrester</b>																
		Indicator		Arrester												
A																
B																
D																
E																
F																
H																
L																
P																
Q																
S																
1																
2																
4																
5																
<b>Approvals for hazardous locations</b>																
A																
B																
C																
G																
D																
H																
V																
X																
K																
P																
M																
R																
T																
E																
J																
F																
S																
U																
<b>Mounting bracket</b>																
A																
C																
<b>Optional specification</b>																
Stainless tag																
Y																
B																
<b>Special applications and fill fluid</b>																
		Treatment		Filled liquid												
Y																
G																
N																
<b>Process adaptor</b>																
Y																
A																
B																
C																
<b>&lt;Other options&gt; (*6)</b> (Note 6)																
L																

Note1: (\*1) Available for 4th digit code "5", "S".

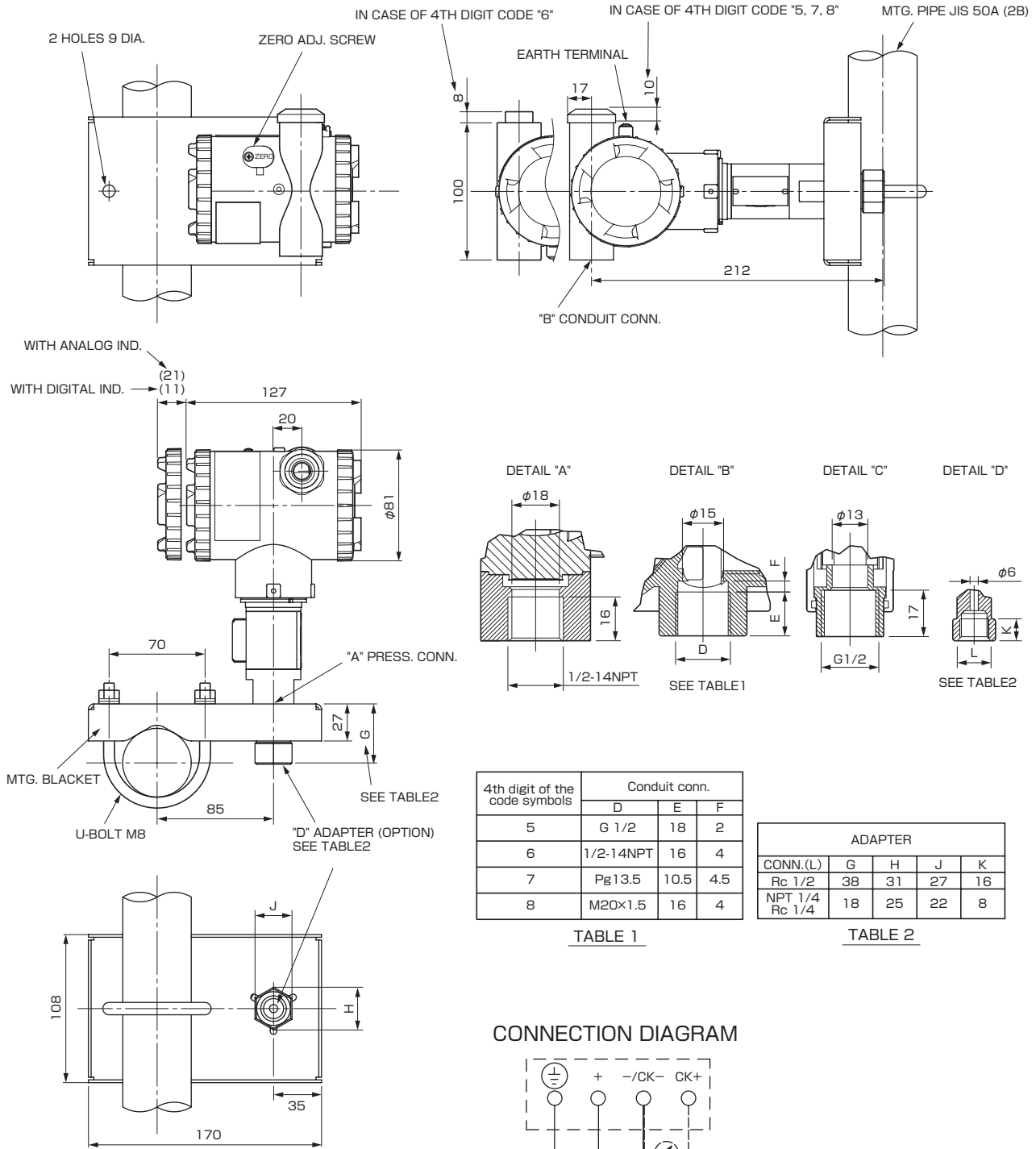
Note3: (\*3) Available for 4th digit code "6", "8", "T", "W".

Note4: (\*4) Available for 4th digit code "6", "T".

Note5: (\*5) Customer tag number can be engraved on standard stainless steel name plate. If extra tag plate is required select "Yes".

Note6: (\*6) If other option is not necessary, 21st digit code is blank. In case of 21st digit code is blank, instruction manual attached.

# OUTLINE DIAGRAM (Unit:mm)



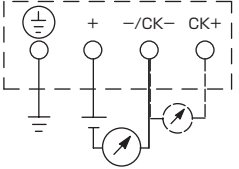
4th digit of the code symbols	Conduit conn.		
	D	E	F
5	G 1/2	18	2
6	1/2-14NPT	16	4
7	Pg13.5	10.5	4.5
8	M20x1.5	16	4

TABLE 1

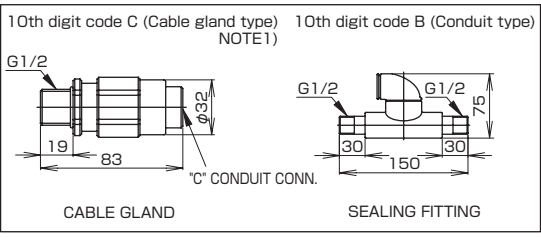
ADAPTER				
CONN.(L)	G	H	J	K
Rc 1/2	38	31	27	16
NPT 1/4 Rc 1/4	18	25	22	8

TABLE 2

## CONNECTION DIAGRAM



OPTION PARTS FOR FLAMEPROOF OF TIIS (JAPAN)



NOTE1) IN CASE OF 10TH CODE "C", φ11 CABLE IS SUITBLE.

TABLE 3

Authorities	Intrinsic safety																	
ATEX	<p>Ex II 1 G                      Ex ia IIC T5 Tamb = -40°C to +50°C                      Ex ia IIC T4 Tamb = -40°C to +70°C</p> <p>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)</p>																	
Factory Mutual	<p>Class I II III                      Div.1 Groups A, B, C, D, E, F, G                      T4 Entity Type 4X</p> <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,N</td> <td>-40°C to +85°C</td> </tr> <tr> <td>L,P,1,2</td> <td>Y,G,N</td> <td>-20°C to +80°C</td> </tr> <tr> <td>Q,S,4,5</td> <td>Y,G,N</td> <td>-20°C to +60°C</td> </tr> <tr> <td>E,F,H</td> <td>Y,G,N</td> <td>-40°C to +60°C</td> </tr> </tbody> </table> <p>Entity Parameters:                      Vmax=28V, Imax=94.3mA, Pi=0.66W,                      Ci=35.98nF, Li=0.694mH</p>	Model code		Tamb	9th digit	13th digit	A,B,D	Y,G,N	-40°C to +85°C	L,P,1,2	Y,G,N	-20°C to +80°C	Q,S,4,5	Y,G,N	-20°C to +60°C	E,F,H	Y,G,N	-40°C to +60°C
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E,F,H	Y,G,N	-40°C to +60°C																
CSA	<p>Class I                      Div.1 Groups A, B, C, D                      Class II                      Div.1 Groups E, F, G                      Class III                      Div.1</p> <p>Temp Code T5 Tamb max = +50°C                      Temp Code T4 Tamb max = +70°C</p> <p>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)</p>																	
TIIS	<p>Ex ia IIC T4                      Tamb max = +60°C</p> <p>Entity Parameters:                      Ui=28V, li=94.3mA, Pi=0.66W,                      Ci=38.4nF, Li=0.694mH</p>																	
IECEx Scheme	<p>Ex ia IIC T4                      Tamb = -40°C to +70°C                      Ex ia IIC T5                      Tamb = -40°C to +50°C</p> <p>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)</p>																	
NEPSI	<p>Ex ia IIC T4                      Ex d IIB+H<sub>2</sub> T6 / Ex ia IIC T4</p> <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,N</td> <td>-40°C to +85°C</td> </tr> <tr> <td>L,P,1,2</td> <td>Y,G,N</td> <td>-20°C to +80°C</td> </tr> <tr> <td>Q,S,4,5</td> <td>Y,G,N</td> <td>-20°C to +60°C</td> </tr> <tr> <td>E,F,H</td> <td>Y,G,N</td> <td>-40°C to +60°C</td> </tr> </tbody> </table> <p>Entity Parameters:                      Ui=42.4V, li=113mA, Pi=1W,                      Ci=35.98nF, Li=0.694mH</p>	Model code		Tamb	9th digit	13th digit	A,B,D	Y,G,N	-40°C to +85°C	L,P,1,2	Y,G,N	-20°C to +80°C	Q,S,4,5	Y,G,N	-20°C to +60°C	E,F,H	Y,G,N	-40°C to +60°C
Model code		Tamb																
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L,P,1,2	Y,G,N	-20°C to +80°C																
Q,S,4,5	Y,G,N	-20°C to +60°C																
E,F,H	Y,G,N	-40°C to +60°C																

Authorities	Flameproof																	
ATEX	<p>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</p>																	
Factory Mutual	<p>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</p>																	
CSA	<p>Class I                      Div.1 Groups C, D                      Class II                      Div.1 Groups E, F, G                      Class III                      Div.1</p> <p>Note) "Seal Not Required" enclosure is allowed.</p>																	
IECEx Scheme	<p>Ex d IIC T5 IP66/67                      Tamb = -40°C to +85°C                      Ex d IIC T6 IP66/67                      Tamb = -40°C to +65°C</p>																	
TIIS	<p>Ex do IIB+H<sub>2</sub> T4                      Tamb max = +60°C                      Maximum process temp. = +120°C</p>																	
NEPSI	<p>Ex d IIB+H<sub>2</sub> T6                      Tamb = -40°C to +60°C</p>																	
Authorities	Type n Nonincendive																	
ATEX	<p>Ex II 3 GD                      EEx nL IIC T5 Tamb = -40°C to +50°C                      EEx nL IIC T4 Tamb = -40°C to +70°C</p> <p>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</p> <p>EEx nAL IIC T5 Tamb = -40°C to +50°C                      EEx nAL IIC T4 Tamb = -40°C to +70°C</p> <p>Specific Parameters:                      Model without arrester:                      Umax=42.4V, Imax=113mA, Pmax=1W,                      Model with arrester:                      Umax=32V, Imax=113mA, Pmax=1W</p>																	
Factory Mutual (pending)	<p>Class I II III                      Div.2 Groups A, B, C, D, F, G                      T4 Entity Type 4X</p> <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,N</td> <td>-40°C to +85°C</td> </tr> <tr> <td>L,P,1,2</td> <td>Y,G,N</td> <td>-20°C to +80°C</td> </tr> <tr> <td>Q,S,4,5</td> <td>Y,G,N</td> <td>-20°C to +60°C</td> </tr> <tr> <td>E,F,H</td> <td>Y,G,N</td> <td>-40°C to +60°C</td> </tr> </tbody> </table>	Model code		Tamb	9th digit	13th digit	A,B,D	Y,G,N	-40°C to +85°C	L,P,1,2	Y,G,N	-20°C to +80°C	Q,S,4,5	Y,G,N	-20°C to +60°C	E,F,H	Y,G,N	-40°C to +60°C
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Q,S,4,5	Y,G,N	-20°C to +60°C																
E,F,H	Y,G,N	-40°C to +60°C																
CSA	<p>Class I                      Div.2 Groups A, B, C, D                      Class II                      Div.2 Groups E, F, G                      Class III                      Div.2</p> <p>Temp Code T5 Tamb max = +50°C                      Temp Code T4 Tamb max = +70°C</p> <p>Entity Parameters:                      Vmax=28V, Ci=25.18nF (Without Arrester),                      Ci=35.98nF (With Arrester), Li=0.694mH</p>																	

⚠ Caution on Safety

\*Before using this product, be sure to read its instruction manual in advance.

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## **Fuji Electric Systems Co., Ltd.**

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