

ABSOLUTE PRESSURE TRANSMITTER (DIRECT MOUNT TYPE)

DATA SHEET

FKH...5/FDH...5

The FCX -AIII absolute pressure transmitter (direct mount type) accurately measures absolute pressure 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. It's small volume, light weight, good environment adaptability, and applicable to all fields. If using the hand held communicator (sold separately), it can be set and display via remote operation, without affecting the DC 4~20mA output signal of transmitter. FCX-AIII series transmitters with safety function have obtained the certificate of SIL certification by TÜV.



FKH

Features

- High accuracy**
Absolute pressure transmitter can be carried out with high accuracy measurement in the range of 13 ~ 50000kPa abs.
Standard accuracy: $\pm 0.2\%$ Accuracy(50MPa): $\pm 0.2\%$
High accuracy(optional): $\pm 0.1\%$
- 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 indicator
 - Stainless steel AMP case
 - Built-in RFI filter and lightning arrester
 - Built-in local configurator with 3 push buttons
- 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

- Measured fluid: Liquid, gas, or vapor
- Range, operating pressure, and overrange limit:

Type	Operating pressure [kPa abs]	Span limit [kPa abs]		Range limit [kPa abs]		Overrange limit [MPa]
		Min.	Max.	Lower	Upper	
FKH□02 FDH□02	0 ~ 130	8.125	130	0	130	0.5
FKH□03 FDH□03	0 ~ 500	31.25	500	0	500	1.5
FKH□04 FDH□04	0 ~ 3000	187.5	3000	0	3000	9
FKH□05 FDH□05	0 ~ 10000	625	10000	0	10000	15
FKH□06 FDH□06	0 ~ 50000	3125	50000	0	50000	75

- Process temperature: $-40 \sim +120^{\circ}\text{C}$
- Remote function: Refer to table 1
- Output signal: (1)FKA: DC4~20mA+HART protocol
(2)FDA: FOUNDATION Fieldbus protocol or PROFIBUS-PA
- Allowable load resistance: 0 ~ 600Ω (at DC 24V)
(Refer to figure 1) For communication with HHC, min. of 250Ω resistor is required.

- Power supply:**

General	DC10.5 ~ 45V
Intrinsic safety	DC10.5 ~ 26V
With arrester	DC10.5 ~ 32V
- Damping:** The time constant is adjustable from 0.06 to 32 seconds.
- Condition of communication line:** Length: up to 2km
(0.75 ~ 1.25mm² Using twisted pair cable when instrument control cable is more than 1km.)
Load resistance: 250 ~ 600Ω
(DC24V, including resistance of cable)
Load capacitance: 0.22μF or less
Load inductance: 3.3mH or less
Spacing with power line: 15cm or more
(Please avoid parallel wiring.)
Note: Line condition of intrinsic safety and explosion-proof is different, please refer to the instruction manual.
- Saturation current:** Upper limit 20.0 ~ 22.5mA(variable)
Lower limit 3.2 ~ 4.0mA(variable)
- Adjustment function:** Zero and span are adjustable by the external adjustment screw, or by local configurator with 3 push buttons, or by HHC.
- Zero elevation/suppression:** Zero can be elevated or suppressed within the range of 0 kPa abs to upper range limit.
- Normal/reverse action:** Selectable from HHC or LCD unit with local adjustment function.
- Burnout direction:** Output hold
Output 20.0 ~ 22.5mA (variable)
Output 3.2 ~ 4.0mA (variable)
(Settable in increments of 0.1mA with HHC or local configurator unit with LCD display.)
- Explosion proof:** Refer to table 4
- Ambient temperature:** $-40 \sim +85^{\circ}\text{C}$
(With arrester: $-40 \sim +60^{\circ}\text{C}$)
Note: The optimum operating temperature of digital indicator is $-30 \sim +80^{\circ}\text{C}$, response is slow below -30°C .
- Storage temperature:** $-40 \sim +90^{\circ}\text{C}$
- Weather resistance:** DIN 40040 GPC
- EMC applicable standard:** EN61326-1: 2006 CE

Performance specifications

- Accuracy rating: (including linearity, hysteresis, repeatability)
 For spans greater than 1/10 of URL: :
 ± 0.065% or
 ± 0.04%(21th code: H)
 For spans below 1/10 of URL:
 ± $(0.1 + 0.1 \frac{0.1 \times \text{URL}}{x})\%$
- Ambient temperature effect: Changed per 28°C in the range of -40°C ~ +85°C.
 Zero shift: ± $(0.4 + 0.2 \frac{\text{URL}}{x})\%/28^\circ\text{C}$
 Total shift: ± $(0.475 + 0.2 \frac{\text{URL}}{x})\%/28^\circ\text{C}$
 In the formal, x: SPAN
 URL: Upper range limit
- Overrange effect: Zero shift ±0.3% of URL for any overrange to maximum limit .
- Mounting position effect: 0.1kPa/10°
- Supply voltage effect: ± 0.005% /1V(DC 16.1 ~ 45V)
- Insulation strength: 500VAC, 50/60Hz, 1 min, between circuit and earth.
- Insulation resistance: More than 100MΩ at 500V DC, between circuit and earth.
- Update rate: 60ms
- Response time: Time constant: 0.08s (at 23°C)
 Dead time: approx. 0.12s
- Stability: Zero shift ±0.2% of upper range limit (URL) for 10 years. In case of 6th digit code "3","4"

Structure and material

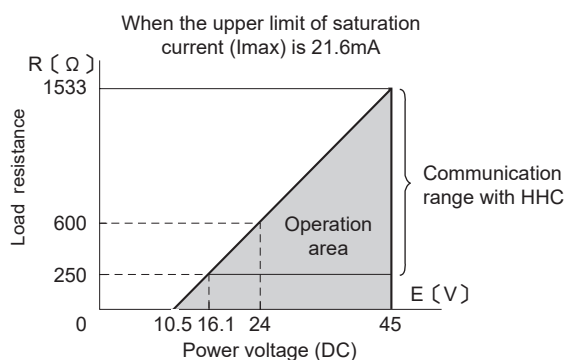
- Materials:

Material code	Detecting unit body	
	Seal diaphragm	Other wetted parts
V	SUS316L	SUS316
H	Hastelloy-C	SUS316
- Amp case material: Aluminium alloy
- Amp case coating: Polyester coating silvery
 (Amp case cover.....blue)
- Structure of case: Immersion protected type JIS C 0920
 (Equivalent to IEC IP67, NEMA 6/6P)
- Outline dimension: According to the outline drawing.
- Weight: approx. 2.2kg
- Conduit connection: G¹/₂, 1/2-14NPT, M20× 1.5, Pg13.5
 (Refer to the model code table for details.)
- External terminal: M3.5 Screw
- Preocess connection: 1/2-14NPT (Refer to the model code table for details.)
 (But it can be converted to Rc¹/₄, Rc¹/₂, 1/4-18NPT, M20×1.5 by process adpater.)
- Mounting method: Dierctly mounting on the process pipe, or mounting on 50A(2B) pipe with U-bolt (according to model and specification).

Optional specifications

- Analog indicator: Built in amplifier unit
 Class 2.5, moving-coil, movement 90°,
 0 ~ 100% evenly divided scale or actual scale
- Digital indicator: Built in amplifier unit, 5 digit LCD and unit dispaly, 0 ~ 100% scale display or actual scale display. Optimum operating temperature range: -30 ~ +80°C,
- Digital indicator: Displaying or setting the items of table 1 (with 3 push buttons) via 3 push buttons of digital indicator.
- Arrester: Built in amplifier unit
 Lightning performance: 4kV(1.2× 50μs)
- NACE specifications: H₂S treatment countermeasure based on NACE specification.
 (Provide the manufacturer's product record management number and attach NACE specification sign)

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(Note) The load resistance varies according to the upper limit of saturation current.

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

Figure 1 Operation area of power voltage and load resistance

The product conforms to the requirements of European EMC directive "Electromagnetic Compatibility Directive 2004/108/EC". The detail content is recorded in the technical construction file number TN5A0704. The applicable standards are as follows:

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.

Table1 Adjustment function

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

Note1) 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 details.

Scope of delivery

Instrument body, pipe mounting bracket (according to type selection)

Related products

- Hand held communicator (Model: FXW):
Hand held, built-in battery, setting, display
For the details, please refer to data sheet (CSDS8-47).

Ordering information

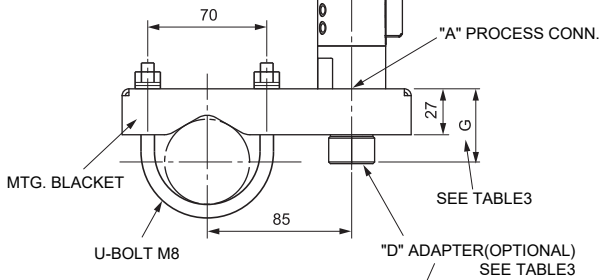
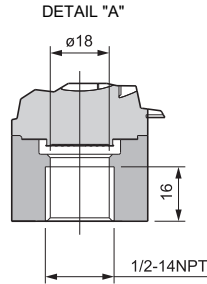
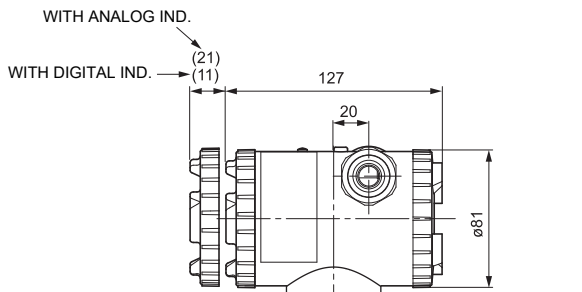
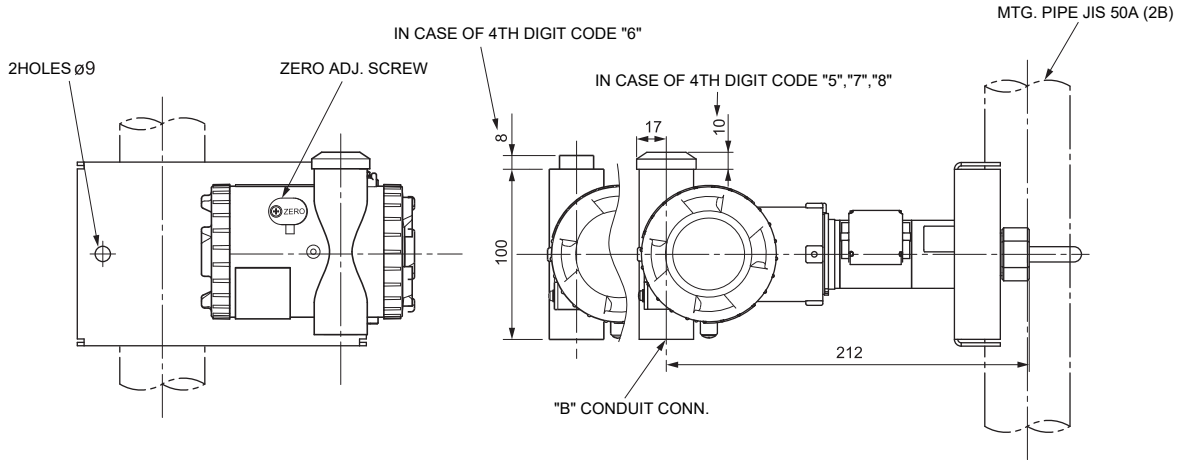
- Model code
- Span
- Please select the direction of output (Notuse/OVER/UNDER) when the transmitter is fault (Burnout). If unspecified, it is Notuse.
- If the scale of indicator is selected to actual scale (9th code: D、H、P、S), please select the items of display (digit, scale, unit, etc).
- Please select the tag plate according to need.(up to 14 digit, consist of letters and numbers).

Digit	Discription	Note	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	21	← Digit No.
	Absolute pressure transmitter (direct mount type) DC4~20mA+HART FOUNDATION Fieldbus and PROFIBUS		F	H																
			F	K	H	0		5									0			
			F	D	H	0		5									0			
15	<Process adapter> None (1/2-14NPT Internal thread) With Rc1/4 (Internal thread) With Rc1/2 (Internal thread) With 1/4-18NPT (Internal thread) With 1/2-14NPT (External thread) With M20× 1.5 (External thread)																	Y A B C D Z		
16	<Options> None Two valves manifold Two valves manifold	<Material> None SUS304 SUS316																Y A B		
21	<Other> High accuracy type Inspection report	Note2																		H F

- Note1) Please note when select Fieldbus or Profibus transmitter.
- Note2) The digit is blank when not needed.
- Note3) Available only for 4th digit code "5".
- Note4) Available only for 4th digit code "6", "8".
- Note5) Available only for 4th digit code "6".
- Note6) The 8th digit code can be selected as "S", this means that it's the transmitter with safety function. SIL2 capability for single transmitter use, SIL3 capability for dual transmitter use.

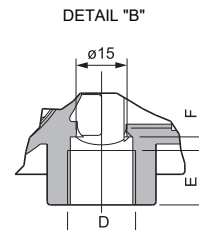


OUTLINE DIAGRAM (Unit: mm)

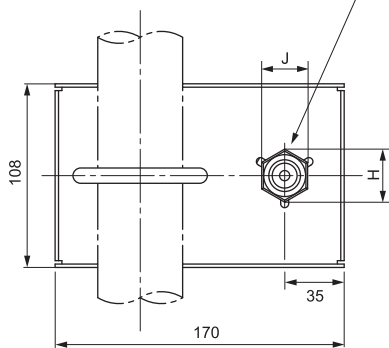


4th digit code	Conduit conn.		
	D	E	F
5	G 1/2	18	2
6	1/2-14NPT	16	4
7	Pg13.5	10.5	4.5
8	M20×1.5	16	4

Table 2



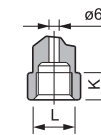
SEE TABLE2



Adapter					
L	G	H	J	K	
Rc 1/2	38	31	27	16	
NPT 1/4 Rc 1/4	18	25	22	8	

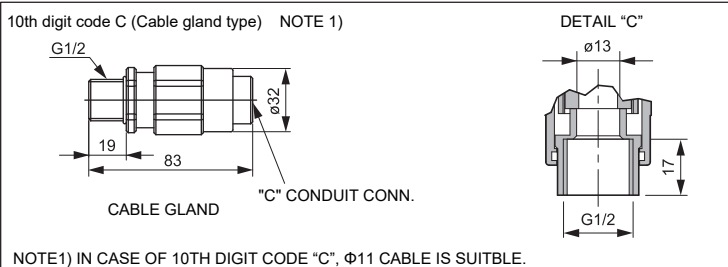
Table 3

DETAIL "D"



SEE TABLE3

<OPTIONAL PARTS FOR FLAMEPROOF OF THIS>



NOTE1) IN CASE OF 10TH DIGIT CODE "C", ø11 CABLE IS SUITBLE.

<SS TAG PLATE(OPTIONAL)> <CONNECTION DIAGRAM>

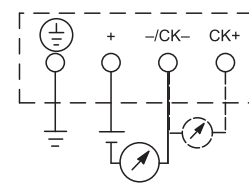
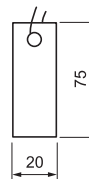


Table 4 Explosion proof

Authorities	Intrinsic safety	Authorities	Flameproof																					
ATEX	Ex II 1 G Ex ia II C T5 Tamb = -40°C ~ +50°C Ex ia II C T4 Tamb = -40°C ~ +70°C	ATEX	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																					
	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)		FM	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																				
FM	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</th> <th>Tamb</th> </tr> <tr> <th>9th digit</th> <th>13th digit</th> <th></th> </tr> </thead> <tbody> <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> </tbody> </table> Entity Parameters: Vmax = 28V, Imax = 94.3mA, Pi = 0.66W, Ci = 35.98nF, Li = 0.694mH	Model		Tamb	9th digit	13th digit		A, B, D	Y, G, N	-40°C ~ +85°C	L, P, 1, 2	Y, G, N	-20°C ~ +80°C	Q, S, 4, 5	Y, G, N	-20°C ~ +60°C	E, F, H	Y, G, N	-40°C ~ +60°C	-	W, A, D	-10°C ~ +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.
Model		Tamb																						
9th digit	13th digit																							
A, B, D	Y, G, N	-40°C ~ +85°C																						
L, P, 1, 2	Y, G, N	-20°C ~ +80°C																						
Q, S, 4, 5	Y, G, N	-20°C ~ +60°C																						
E, F, H	Y, G, N	-40°C ~ +60°C																						
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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), Li = 0.6mH(without analog indicator) Ci = 36nF(with arrester), Li = 0.7mH(with abalig indicator)	TIIS	Ex do IIB+H2 T4 Tamb max = +60°C Maximum process temp. = +120°C																					
TIIS	Ex ia IIC T4 Tamb max = +60°C Entity Parameters: Ui = 28V, li = 94.3mA, Pi = 0.66W, Ci = 38.4nF, Li = 0.694mH	IECEX Scheme	Ex d II C T5 IP66/67 Tamb = -40°C ~ +85°C Ex d II C T6 IP66/67 Tamb = -40°C ~ +65°C																					
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NEPSI	Ex ia IIC T4 Ex d IIB+H2T6/Ex ia IIC T4 <table border="1"> <thead> <tr> <th colspan="2">Model</th> <th>Tamb</th> </tr> <tr> <th>9th digit</th> <th>13th digit</th> <th></th> </tr> </thead> <tbody> <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> </tbody> </table> Entity Parameters: Ui = 42.4V, li = 113mA, Pi = 1W, Ci = 35.98nF, Li = 0.694mH	Model		Tamb	9th digit	13th digit		A, B, D	Y, G, N	-40°C ~ +85°C	L, P, 1, 2	Y, G, N	-20°C ~ +80°C	Q, S, 4, 5	Y, G, N	-20°C ~ +60°C	E F H	Y, G, N	-40°C ~ +60°C	-	W, A, D	-10°C ~ +60°C	Authorities	Type n Nonincendive
Model		Tamb																						
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E F H	Y, G, N	-40°C ~ +60°C																						
-	W, A, D	-10°C ~ +60°C																						
		ATEX	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, 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 ~ +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																					
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