

DIFFERENTIAL PRESSURE (FLOW) TRANSMITTER

DATA SHEET

FKC...5

The FCX-All differential pressure (flow) transmitter accurately measures differential pressure, liquid level, gauge pressure or flow rate and transmits a proportional 4 to 20 mA signal.

The transmitter utilizes a unique micro machined capacitance silicon sensor with state-of-the-art microprocessor technology to provide exceptional performance and functionality.

FEATURES

- High accuracy up to $\pm 0.04\%$**
0.065% accuracy as standard.
Fuji's micro-capacitance silicon sensor assures this accuracy for all elevated or suppressed calibration ranges without additional adjustment. 0.04% accuracy as option.
- Minimum inventory and design**
Electronics unit, local indicators and electronics housing are interchangeable among all FCX-All transmitters.
- Minimum environmental influence**
The "Advanced Floating Cell" design which protects the pressure sensor against changes in temperature, static pressure, and overpressure substantially reduces total measurement error in actual field applications.
- Fuji/HART® bilingual communications protocol**
FCX-All series transmitter offers bilingual communications to speak both Fuji proprietary protocol and HART®. Any HART® compatible devices can communicate with FCX-All
- Application flexibility**
Various options that render the FCX-All suitable for almost any process applications include.
 - Analog indicator at either the electronics side or terminal side
 - Full range of hazardous area approvals
 - Built-in RFI filter and lightning arrester
 - 5 digit LCD meter with engineering unit
 - Stainless steel electronics housing
 - Wide selection of materials
- Programmable output Linearization Function**
Output signal can be freely programmable.
(Up to 14 compensated points at approximation).
- Burnout current flexibility (Under Scale: 3.2 to 4.0 mA, Over Scale: 20.0 to 22.5 mA)**
Burnout signal level is adjustable using Model FXW or Hand Held Communicator (HHC) to comply with NAMUR NE43.
- Dry calibration without reference pressure**
Thanks to the best combination of unique construction of mechanical parts (Sensor unit) and high performance electronics circuit (Electronics unit), reliability of dry calibration without reference pressure is at equal level as wet calibration.



SPECIFICATIONS

Functional specifications

Type :

FKC : Smart, 4 to 20 mA DC + Fuji / Hart® digital signal

Service :

Liquid, gas, or vapour

Static pressure, span, and range limit :

Type	Static pressure MPa {bar}	Span limit kPa {m bar}		Range limit kPa {m bar}
		Min.	Max.	
FKC□11	-0.1 to +3.2 {-1 to +32}	0.1 {1}	1 {10}	±1 {±10}
FKC□22	-0.1 to +10 {-1 to +100}	0.1 {1}	6 {60}	±6 {±60}
FKC□33	-0.1 to +16 {-1 to +160}	0.32 {3.2}	32 {320}	±32 {±320}
FKC□35	-0.1 to +16 {-1 to +160}	1.3 {13}	130 {1300}	±130 {±1300}
FKC□36	-0.1 to + 16 {-1 to +160}	5 {50}	500 {5000}	±500 {±5000}
FKC□38	-0.1 to +16 {-1 to +160}	30 {300}	3000 {30000}	±3000 {±30000}
FKC□43	-0.1 to +42 {-1 to +420}	0.32 {3.2}	32 {320}	±32 {±320}
FKC□45	-0.1 to +42 {-1 to +420}	1.3 {13}	130 {1300}	±130 {±1300}
FKC□46	-0.1 to +42 {-1 to +420}	5 {50}	500 {5000}	±500 {±5000}
FKC□48	-0.1 to +30 {-1 to +300}	30 {300}	3000 {30000}	±3000 {±30000}
FKC□49*	-0.1 to +30 {-1 to +300}	500 {5000}	20000 {200000}	+20000,-10000 {+200000,-100000}

Remark : To minimize environmental influence, span should be greater than 1/40 of the max. span in most applications.

*Important : For FKC#49, max possible overload pressure on LP side must be ≤ 100 bar. The accuracy is not guaranteed when used at negative DP

Lower limit of static pressure (vacuum limit) ;

Silicone fill sensor: See Fig. 1

Fluorinated fill sensor:

66 kPa abs (500 mmHg abs) at temperature below 60°C

Over range limit :

To maximum static pressure limit

Output signal :

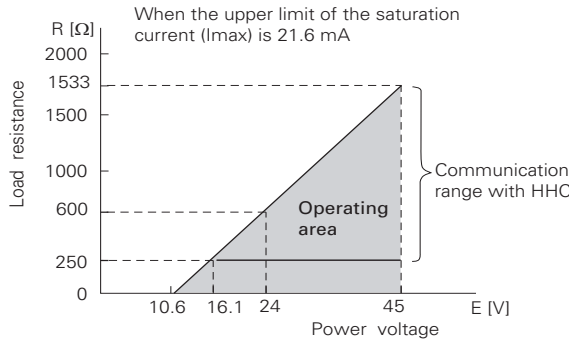
4 to 20 mA DC (linear or square root) with digital signal superimposed on the analog signal

Power supply :

Transmitter operates on 10.5 V to 45 V DC at transmitter terminals.

10.5 V to 32 V 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]

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

Note : For communication with HHC⁽¹⁾ (Model: FXW), min. of 250 Ω required.

Hazardous locations :

Authority (Digit 10 =)	Intrinsic safety																					
ATEX (K)	Ex II 1 G Ex ia IIC T5 (-40°C ≤ Ta ≤ +50 °C) Ex ia IIC T4 (-40°C ≤ Ta ≤ +70 °C) IP66/67 Entity Parameters: Ui ≤ 28 Vdc, Ii ≤ 94.3 mA, Pi ≤ 0.66 W Ci = 36 nF/26 nF for models with/without Arrester Li = 0.7 mH/0.6 mH for models with/without Analog Indicator																					
Factory Mutual (H)	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>Tamb</th> </tr> <tr> <th>9th digit</th> <th>13th digit</th> <th></th> </tr> </thead> <tbody> <tr> <td>A,B,C,D,J</td> <td>Y,G,N</td> <td>-40°C to +85°C</td> </tr> <tr> <td>L,P,M,1,2,3</td> <td>Y,G,N</td> <td>-20°C to +80°C</td> </tr> <tr> <td>Q,S,N,4,5,6</td> <td>Y,G,N</td> <td>-20°C to +60°C</td> </tr> <tr> <td>E,F,G,H,K</td> <td>Y,G,N</td> <td>-40°C to +60°C</td> </tr> <tr> <td>-</td> <td>W,A,D</td> <td>-10°C to +60°C</td> </tr> </tbody> </table> Entity Parameters: Vmax=42.4V, Imax=113mA, Pi=1W, Ci=35.98nF, Li=0.694mH	Model code		Tamb	9th digit	13th digit		A,B,C,D,J	Y,G,N	-40°C to +85°C	L,P,M,1,2,3	Y,G,N	-20°C to +80°C	Q,S,N,4,5,6	Y,G,N	-20°C to +60°C	E,F,G,H,K	Y,G,N	-40°C to +60°C	-	W,A,D	-10°C to +60°C
Model code		Tamb																				
9th digit	13th digit																					
A,B,C,D,J	Y,G,N	-40°C to +85°C																				
L,P,M,1,2,3	Y,G,N	-20°C to +80°C																				
Q,S,N,4,5,6	Y,G,N	-20°C to +60°C																				
E,F,G,H,K	Y,G,N	-40°C to +60°C																				
-	W,A,D	-10°C to +60°C																				
CSA (J)	Ex ia Class I, Groups A, B, C and D; Class II, Groups E,F and G; Class III Per drawing TC 522873 Temp. code T5 for Tamb max = +50°C Temp. code T4 for Tamb max = +70°C Entity Parameters: Vmax = 28 Vdc, Imax = 94.3 mA, Pmax = 0.66 W Ci = 36 nF/25 nF for models with/without Arrester Li = 0.7 mH/0.6 mH for models with/without Analog Indicator																					
IECEX (T)	Ex ia IIC T5 (-40°C ≤ Ta ≤ +50 °C) Ex ia IIC T4 (-40°C ≤ Ta ≤ +70 °C) IP66/67 Entity Parameters: Ui ≤ 28 Vdc, Ii ≤ 94.3 mA, Pi ≤ 0.66 W Ci = 36 nF/26 nF for models with/without Arrester Li = 0.7 mH/0.6 mH for models with/without Analog Indicator																					

Authority (Digit 10 =)	Type n Nonincendive																					
ATEX (P)	Ex II 3 G Ex nA II T5 (-40°C ≤ Ta ≤ +70 °C) IP66/67 Electrical ratings Model Without arrester: Ui ≤ 45 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W Model With arrester: Ui ≤ 32 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W Optional Analog indicator is not available for type "n"																					
Factory Mutual (H)	Class I II III Div.2 Groups A, B, C, D, F, G T4 Entity Type 4X <table border="1"> <thead> <tr> <th colspan="2">Model code</th> <th>Tamb</th> </tr> <tr> <th>9th digit</th> <th>13th digit</th> <th></th> </tr> </thead> <tbody> <tr> <td>A,B,C,D,J</td> <td>Y,G,N</td> <td>-40°C to +85°C</td> </tr> <tr> <td>L,P,M,1,2,3</td> <td>Y,G,N</td> <td>-20°C to +80°C</td> </tr> <tr> <td>Q,S,N,4,5,6</td> <td>Y,G,N</td> <td>-20°C to +60°C</td> </tr> <tr> <td>E,F,G,H,K</td> <td>Y,G,N</td> <td>-40°C to +60°C</td> </tr> <tr> <td>-</td> <td>W,A,D</td> <td>-10°C to +60°C</td> </tr> </tbody> </table>	Model code		Tamb	9th digit	13th digit		A,B,C,D,J	Y,G,N	-40°C to +85°C	L,P,M,1,2,3	Y,G,N	-20°C to +80°C	Q,S,N,4,5,6	Y,G,N	-20°C to +60°C	E,F,G,H,K	Y,G,N	-40°C to +60°C	-	W,A,D	-10°C to +60°C
Model code		Tamb																				
9th digit	13th digit																					
A,B,C,D,J	Y,G,N	-40°C to +85°C																				
L,P,M,1,2,3	Y,G,N	-20°C to +80°C																				
Q,S,N,4,5,6	Y,G,N	-20°C to +60°C																				
E,F,G,H,K	Y,G,N	-40°C to +60°C																				
-	W,A,D	-10°C to +60°C																				
CSA (J)	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 = 28 Vdc, Imax = 94.3 mA, Pmax = 0.66 W Ci = 36 nF/25 nF for models with/without Arrester Li = 0.7 mH/0.6 mH for models with/without Analog Indicator																					
IECEX (Q)	Ex nA II T5 (-40°C ≤ Ta ≤ +70 °C) IP66/67 Electrical ratings Model Without arrester: Ui ≤ 45 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W Model With arrester: Ui ≤ 32 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W Optional Analog indicator is not available for type "n"																					
Authority	Flameproof																					
ATEX (X)	Ex II 2 GD Ex d IIC T6 (-40°C ≤ Ta ≤ +65 °C) Ex d IIC T5 (-40°C ≤ Ta ≤ +85 °C) Ex tD A21 IP66/67 T 85°C Ex tD A21 IP66/67 T 100°C Electrical ratings Model Without arrester: Ui ≤ 45 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W Model With arrester: Ui ≤ 32 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W																					
Factory Mutual (D)	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 (E)	Class I, Groups C and D; Class II, Groups E,F and G ; Class III Maximum ambient temperature 85°C Maximum working pressure 50 Mpa Electrical ratings Model Without arrester: Ui ≤ 45 Vdc, 4-20 mA Model With arrester: Ui ≤ 32 Vdc, 4-20 mA Note: "Seal not required"																					
IECEX (R)	Ex d IIC T6 (-40°C ≤ Ta ≤ +65 °C) Ex d IIC T5 (-40°C ≤ Ta ≤ +85 °C) DIP A21 IP66/67 T 85°C DIP A21 IP66/67 T 100°C Electrical ratings Model Without arrester: Ui ≤ 45 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W Model With arrester: Ui ≤ 32 Vdc, 4-20 mA loop powered, Pi ≤ 1.0125 W																					

Zero/span adjustment :

Zero and span are adjustable from the HHC⁽¹⁾. Zero and span are also adjustable externally from the adjustable screw.

Damping :

Adjustable from HHC⁽¹⁾ or local adjustment unit with LCD display. The time constant is adjustable between 0.06 to 32 sec

Zero elevation / suppression :

-100% to +100% of URL

Normal / reverse action :

Selectable from HHC⁽¹⁾

Indication :

Analog indicator or 5 digit LCD meter, as specified. A plug-in analog indicator can be mounted on the electronics unit or the terminal block.

Burnout direction : Selectable from HHC⁽¹⁾

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

"Output Hold" :

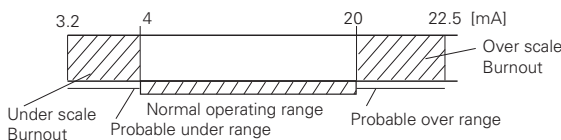
Output signal is hold as the value just before failure happens.

"Output Overscale" :

Adjustable within the range 20.0 mA to 22.5 mA from HHC⁽¹⁾

"Output Underscale" :

Adjustable within the range 3.2 mA to 4.0 mA from HHC⁽¹⁾



Output limits conforming to NAMUR NE43 by order.

Loop-check output :

Transmitter can be configured to provide constant signal 3.2 mA through 22.5 mA by HHC⁽¹⁾.

Temperature limit :

- Ambient : -40 to +85°C
- 20 to +80°C (for LCD indicator)
- 40 to +60°C (for arrester option)
- 10 to +60°C (for fluorinated oil filled transmitters)

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

- Process : -40 to +120°C for silicone fill sensor
- 20 to +80°C for fluorinated oil fill sensor

Storage : -40 to +90°C

Humidity limit :

0 to 100% RH (Relative Humidity)

Communication :

With HHC⁽¹⁾ (Model FXW, consult datasheet N° 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-AII. For supporting these items : "Saturate current", "Write protect", and "History".

Items	Fuji Protocol with FXW		Hart® Protocol		By local configurator (with 3 push button), (LCD indicator)	
	Display	Set	Display	Set	Display	Set
Tag No.	✓	✓	✓	✓	✓	✓
Model No.	✓	✓	✓	✓	✓	✓
Serial No. & Software Version	✓	—	✓	—	✓	—
Engineering unit	✓	✓	✓	✓	✓	✓
Range limit	✓	—	✓	—	✓	—
Measuring range	✓	✓	✓	✓	✓	✓
Damping	✓	✓	✓	✓	✓	✓
Output mode	Linear	✓	✓	✓	✓	✓
	Square root	✓	✓	✓	✓	✓
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	—	—	—	—	—	—
	✓	—	✓	—	✓	—

(Note) (1) HHC: Hand Held Communicator

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

Local configurator with 3 push button and LCD display can support all items including model No change (Fuji Protocol list) except "Linearize" function.

Programmable output linearization function :

Output signal can be characterized with "14 points linear approximation function" from HHC⁽¹⁾.

Performance specifications for linear output

Reference conditions, silicone oil fill, SS 316L isolating diaphragms, 4 to 20 mA analog output in linear mode.

Accuracy rating :

(including linearity, hysteresis, and repeatability)

Max span : 32 kPa to 3000 kPa model:

For spans greater than 1/10 of URL:
±0.065% of span or ±0.04% of span (optional)

For spans below 1/10 of URL:

$$\pm \left(0.015 + 0.05 \frac{0.1 \times \text{URL}}{\text{Span}} \right) \% \text{ of span}$$

Max span 20 MPa models :

For spans ≥ 5 MPa :
±0.1% of span

For spans < 5 MPa :

$$\pm \left(0.05 + 0.05 \frac{5\text{MPa}}{\text{Span}} \right) \% \text{ of span}$$

Max span 1 kPa, 6 kPa models :

For spans greater than 1/10 of URL:
±0.1% of span

For spans below 1/10 of URL :

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

Stability :

±0.1% of upper range limit (URL) for 10 years for 6th digit code 3, 5, 6, 8 and 9.

Temperature effect :

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

Range code (6th digit in code symbols)	Zero shift (% of span)	Total effect (% of span)
"1"/1 kPa {10 mbar} "2"/6 kPa {60 mbar}	$\pm \left(0.125 + 0.1 \frac{\text{URL}}{\text{Span}} \right) \%$	$\pm \left(0.15 + 0.1 \frac{\text{URL}}{\text{Span}} \right) \%$
"3"/32 kPa {320 mbar} "5"/130 kPa {1300 mbar} "6"/500 kPa {5000 mbar} "8"/3000 kPa {30000 mbar} "9"/20000 kPa {200000 mbar}	$\pm \left(0.075 + 0.0125 \frac{\text{URL}}{\text{Span}} \right) \%$	$\pm \left(0.095 + 0.0125 \frac{\text{URL}}{\text{Span}} \right) \%$

Double the effects for material code (7th digit in codes symbols) "H", "M", "T"

Static pressure effect :

Static pressure code (5th digit in Code symbols)	Zero shift (% of URL)
"1" / 1 kPa {10 mbar} sensor "2" / 6 kPa {60 mbar} sensor	±0.2% / 3.2 MPa {32 bar} ±0.2% / 10 MPa {100 bar}
"3" "4"	±0.035% / 6.9 MPa {69 bar} ±0.2% / 6.9 MPa {69 bar} FKCI49

Double the effects for material code (7th digit in codes symbols) "H", "M", "T"

Overrange effect :

Static pressure code (5th digit in Code symbols)	Zero shift (% of URL)
"1" / 1 kPa {10 mbar} sensor "2" / 6 kPa {60 mbar} sensor	±0.2% / 3.2 MPa {32 bar} ±0.2% / 10 MPa {100 bar}
"3" "3" "4" "4"	±0.1% / 16 MPa {160 bar} FKCI35,36,38 ±0.15% / 16 MPa {160 bar} FKCI33 ±0.25% / 42 MPa {420 bar} FKCI43,45,46,48 ±0.2% / 10 MPa {100 bar} FKCI49

Double the effects for material code (7th digit in codes symbols) "H", "M", "T"

Performance specifications for square root output**Accuracy rating:**

Output	Span	
	over 0.1 × URL	below 0.1 × URL
50 to 100%	±0.065 %	±(0.015+0.05 × 0.1 × URL/Span)%
20 to 50%	±0.163 %	±2.5 × (0.015+0.05 × 0.1 × URL/Span)%
10 to 20%	±0.325 %	±5 × (0.015+0.05 × 0.1 × URL/Span)%

Max span 1kPa, 6kPa model:

Output	Accuracy
50 to 100%	±0.1 %
20 to 50%	±0.25%
10 to 20%	±0.5 %

Temperature effect:

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

Range code	Shift at 20% output point
"1" and "2"	±(0.375+0.25 $\frac{URL}{Span}$)%/28°C
"3" through "9"	±(0.24+0.03125 $\frac{URL}{Span}$)%/28°C

Low flow cut-off:

The output signal is proportional to $\sqrt{\Delta P}$ differential pressure between low flow cut-off and the measuring range. Between zero and low flow cut-off, the output signal is programmable to zero or linear between 0 and 20% of the flow.

Performance specifications common for both output modes**Supply voltage effect :**

Less than 0.05% of calibrated span per 10 V

Update rate : 60 msec**RFI effect :**

< 0,2% of URL for the frequencies of 20 to 1000 MHz and field strength of 10 V/m when electronic housing covers are on (Classification : 2-abc : 0,2% of span according SAMA PMC 33.1).

Response time : (63,3% of output signal without damping)

Range code (6th digit in code symbols)	Time constant (at 23°C)	Dead time
"1"	0.33 sec.	0.12 sec.
"2"	0.3 sec.	
"3"	0.12 sec.	
"5" through "8"	0.08 sec.	

Response time = time constant + dead time

Mounting position effect :

Zero shift, less than 0.12 kPa {1.2 m bar} for a 10° tilt in any plane. This error can be corrected by adjusting Zero. (Double the effect for fluorinated fill sensor).

No effect on span.

Vibration effect :

< ±0,25% of span for spans greater than 1/10 of URL.

Frequency 10 to 150 Hz, acceleration 39,2 m/sec².

Material fatigue :

Please consult Fuji Electric.

Dielectric strength :

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

Insulation resistance : More than 100 MΩ at 500 V DC.

Internal resistance for external field indicator :

12 Ω max. (connected to test terminal CK+ and CK-)

Pressure equipment directive (PED) 97/23/EC

Digit 5 code 1, 2, 3, 8 and 9 according to Article 3.3

Digit 5 code 4 : Category III module H1

Physical specifications**Electrical connections :**

1/2"-14 NPT, Pg 13.5 or M 20 × 1.5

Process connections:

1/4"-18 NPT meets DIN 19213.

Option : 1/2"-14 NPT for oval flanges

Process-wetted parts material:

Material code (7th digit)	Process cover	Diaphragm	Wetted sensor body	Vent/drain
V	Ranges 1 & 2	SS 316L	SS 316L	SS 318LN
	Ranges 3 to 8	SS 316L	SS 316L	SS 316L
W	SS 316L	Hastelloy-C	SS 316L	SS 316L
H	SS 316L	Hastelloy-C	Hastelloy-C	SS 316L
J	SS 316L	SS 316L + Gold coating	SS 316L	SS 316L
M	SS 316L	Monel	Monel lining	SS 316L
T	SS 316L	Tantalum	Tantalum lining	SS 316L

Remark : Gasket : Viton o-ring or PTFE square section gasket. Availability of above material design depends on ranges and static pressure according material codes V, H, M and T. Refer to "Code symbols".

Non-wetted parts material :

Electronics housing :

Low copper die-cast aluminum alloy finished with polyester coating (standard), or SS 316 as specified.

Bolts and nuts:

- Cr-Mo alloy (standard).

Options :

- SS 316 (L) for static pressure if 160 bar max.
- SS 660 (M10) for static pressure < 160 bar.
- SS 660 (M12) for static pressure > 160 bar

Fill fluid :

Silicone oil (standard) or fluorinated oil (option)

Mounting bracket :

SS 304L or 316L (option)

Environmental protection:

IEC IP66/IP67 and NEMA 4X

Mounting:

Without mounting bracket : direct mounting on manifold (optional)

With optional mounting bracket : for 50 mm (2") pipe or direct wall mounting.

Mass {weight}:

Transmitter approximately 3.5 kg without options.

Add; 0,3 kg for indicator

0.5 kg for mounting bracket

2 kg for stainless steel housing (option)

Optional features

Indicator :

A plug-in analog indicator (2.5% accuracy) can be housed in the electronics compartment or in the terminal box of the housing.

An optional 5 digit LCD meter with engineering unit is also available.

Local configurator with LCD display :

An optional 5 digits LCD meter with 3 push buttons can support items without using communication with HHC⁽¹⁾.

Arrester :

A built-in arrester protects the electronics from lightning surges.

Lightning surge immunity: 4 kV (1.2 × 50 μs)

Oxygen service :

Special cleaning procedures are followed throughout the process to maintain all process wetted parts oil free.

The fill fluid is fluorinated oil.

Chlorine service :

The fill fluid is fluorinated oil. Same procedure and same fill fluid that above.

Degreasing :

Process-wetted parts are cleaned, but the fill fluid is standard silicone oil. Not for use on oxygen or chlorine measurement.

NACE specification :

Metallic materials for all pressure boundary parts comply with NACE MR 0175/ISO 15156.

SS 660 or SS 660/660 bolts and nuts comply with NACE MR 0175/ISO 15156.

Optional tag plate :

An extra stainless steel tag with customer tag data is wired to the transmitter.

ACCESSORIES

Oval flanges :

Converts process connection to 1/2"-14 NPT.

Manifolds :

Available in SS 316 and in pressure rating 16 MPa or 42 MPa.

Hand held communicator :

(FXW model, refer to datasheet N° EDS8-47)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	DESCRIPTION																																																																					
F	K	C					5																																																																														
																Indicator & Arrester																																																																					
																<table border="1"> <thead> <tr> <th>Indicator</th><th>Arrester</th><th>Initial setting</th></tr> </thead> <tbody> <tr><td>None</td><td>None</td><td></td></tr> <tr><td>Analog, 0-100% linear scale</td><td>None</td><td></td></tr> <tr><td>Analog, 0-100% $\sqrt{\text{scale}}$</td><td>None</td><td></td></tr> <tr><td>Analog, Custom scale</td><td>None</td><td>4-20 mA DC</td></tr> <tr><td>Analog, double scale</td><td>None</td><td></td></tr> <tr><td>None</td><td>Yes</td><td>+</td></tr> <tr><td>Analog, 0-100% linear scale</td><td>Yes</td><td></td></tr> <tr><td>Analog, 0-100% $\sqrt{\text{scale}}$</td><td>Yes</td><td>Hart® / Fuji</td></tr> <tr><td>Analog, Custom scale</td><td>Yes</td><td>digital signal</td></tr> <tr><td>Analog, double scale</td><td>Yes</td><td>"SMART"</td></tr> <tr><td>Digital, 0-100%</td><td>None</td><td></td></tr> <tr><td>Digital, Custom scale</td><td>None</td><td></td></tr> <tr><td>Digital, 0-100% $\sqrt{\text{scale}}$</td><td>None</td><td></td></tr> <tr><td>Digital, 0-100%</td><td>Yes</td><td></td></tr> <tr><td>Digital, Custom scale</td><td>Yes</td><td></td></tr> <tr><td>Digital, 0-100% $\sqrt{\text{scale}}$</td><td>Yes</td><td></td></tr> <tr><td>Digital, 0-100% with push button</td><td>None</td><td></td></tr> <tr><td>Digital, Custom scale with push button</td><td>None</td><td></td></tr> <tr><td>Digital, 0-100% $\sqrt{\text{scale}}$ with push button</td><td>None</td><td></td></tr> <tr><td>Digital, 0-100% with push button</td><td>Yes</td><td></td></tr> <tr><td>Digital, Custom scale with push button</td><td>Yes</td><td></td></tr> <tr><td>Digital, 0-100% $\sqrt{\text{scale}}$ with push button</td><td>Yes</td><td></td></tr> </tbody> </table>	Indicator	Arrester	Initial setting	None	None		Analog, 0-100% linear scale	None		Analog, 0-100% $\sqrt{\text{scale}}$	None		Analog, Custom scale	None	4-20 mA DC	Analog, double scale	None		None	Yes	+	Analog, 0-100% linear scale	Yes		Analog, 0-100% $\sqrt{\text{scale}}$	Yes	Hart® / Fuji	Analog, Custom scale	Yes	digital signal	Analog, double scale	Yes	"SMART"	Digital, 0-100%	None		Digital, Custom scale	None		Digital, 0-100% $\sqrt{\text{scale}}$	None		Digital, 0-100%	Yes		Digital, Custom scale	Yes		Digital, 0-100% $\sqrt{\text{scale}}$	Yes		Digital, 0-100% with push button	None		Digital, Custom scale with push button	None		Digital, 0-100% $\sqrt{\text{scale}}$ with push button	None		Digital, 0-100% with push button	Yes		Digital, Custom scale with push button	Yes		Digital, 0-100% $\sqrt{\text{scale}}$ with push button	Yes	
Indicator	Arrester	Initial setting																																																																																			
None	None																																																																																				
Analog, 0-100% linear scale	None																																																																																				
Analog, 0-100% $\sqrt{\text{scale}}$	None																																																																																				
Analog, Custom scale	None	4-20 mA DC																																																																																			
Analog, double scale	None																																																																																				
None	Yes	+																																																																																			
Analog, 0-100% linear scale	Yes																																																																																				
Analog, 0-100% $\sqrt{\text{scale}}$	Yes	Hart® / Fuji																																																																																			
Analog, Custom scale	Yes	digital signal																																																																																			
Analog, double scale	Yes	"SMART"																																																																																			
Digital, 0-100%	None																																																																																				
Digital, Custom scale	None																																																																																				
Digital, 0-100% $\sqrt{\text{scale}}$	None																																																																																				
Digital, 0-100%	Yes																																																																																				
Digital, Custom scale	Yes																																																																																				
Digital, 0-100% $\sqrt{\text{scale}}$	Yes																																																																																				
Digital, 0-100% with push button	None																																																																																				
Digital, Custom scale with push button	None																																																																																				
Digital, 0-100% $\sqrt{\text{scale}}$ with push button	None																																																																																				
Digital, 0-100% with push button	Yes																																																																																				
Digital, Custom scale with push button	Yes																																																																																				
Digital, 0-100% $\sqrt{\text{scale}}$ with push button	Yes																																																																																				
																Approvals for hazardous locations (consult FUJI for availability)																																																																					
																<table border="1"> <tbody> <tr><td>None (Standard)</td><td></td></tr> <tr><td>ATEX - Flameproof enclosures (digit 4 = "M, P, R, T" & "W" only)</td><td></td></tr> <tr><td>ATEX - Intrinsic Safety</td><td></td></tr> <tr><td>FM - Explosion-Proof (digit 4 = "P" & "T" only)</td><td>(*10)</td></tr> <tr><td>CSA - Explosion-Proof (digit 4 = "P" & "T" only)</td><td></td></tr> <tr><td>FM - Intrinsic Safety and Non Incendive</td><td></td></tr> <tr><td>CSA - Intrinsic Safety</td><td></td></tr> <tr><td>ATEX - Type "n" (digit 9 = A, E, 1, 2, 3, 4, 5 & 6 only)</td><td></td></tr> <tr><td>IECEx - Type "n" (digit 9 = A, E, 1, 2, 3, 4, 5 & 6 only)</td><td></td></tr> <tr><td>IECEx - Flameproof enclosures (digit 4 = "M, P, R, T" & "W" only)</td><td></td></tr> <tr><td>IECEx - Intrinsic Safety</td><td></td></tr> <tr><td>CSA - Explosion-Proof & Intrinsic Safety combined approval (digit 4 = "P" & "T" only)</td><td></td></tr> <tr><td>ATEX - Flameproof enclosures & Intrinsic Safety combined approval (digit 4 = "M, P, R, T" & "W" only)</td><td></td></tr> <tr><td>IECEx - Flameproof enclosures & Intrinsic Safety combined approval (digit 4 = "M, P, R, T" & "W" only)</td><td></td></tr> <tr><td>FM - Explosion-Proof & Intrinsic Safety combined approval (digit 4 = "P" & "T" only)</td><td></td></tr> </tbody> </table>	None (Standard)		ATEX - Flameproof enclosures (digit 4 = "M, P, R, T" & "W" only)		ATEX - Intrinsic Safety		FM - Explosion-Proof (digit 4 = "P" & "T" only)	(*10)	CSA - Explosion-Proof (digit 4 = "P" & "T" only)		FM - Intrinsic Safety and Non Incendive		CSA - Intrinsic Safety		ATEX - Type "n" (digit 9 = A, E, 1, 2, 3, 4, 5 & 6 only)		IECEx - Type "n" (digit 9 = A, E, 1, 2, 3, 4, 5 & 6 only)		IECEx - Flameproof enclosures (digit 4 = "M, P, R, T" & "W" only)		IECEx - Intrinsic Safety		CSA - Explosion-Proof & Intrinsic Safety combined approval (digit 4 = "P" & "T" only)		ATEX - Flameproof enclosures & Intrinsic Safety combined approval (digit 4 = "M, P, R, T" & "W" only)		IECEx - Flameproof enclosures & Intrinsic Safety combined approval (digit 4 = "M, P, R, T" & "W" only)		FM - Explosion-Proof & Intrinsic Safety combined approval (digit 4 = "P" & "T" only)																																								
None (Standard)																																																																																					
ATEX - Flameproof enclosures (digit 4 = "M, P, R, T" & "W" only)																																																																																					
ATEX - Intrinsic Safety																																																																																					
FM - Explosion-Proof (digit 4 = "P" & "T" only)	(*10)																																																																																				
CSA - Explosion-Proof (digit 4 = "P" & "T" only)																																																																																					
FM - Intrinsic Safety and Non Incendive																																																																																					
CSA - Intrinsic Safety																																																																																					
ATEX - Type "n" (digit 9 = A, E, 1, 2, 3, 4, 5 & 6 only)																																																																																					
IECEx - Type "n" (digit 9 = A, E, 1, 2, 3, 4, 5 & 6 only)																																																																																					
IECEx - Flameproof enclosures (digit 4 = "M, P, R, T" & "W" only)																																																																																					
IECEx - Intrinsic Safety																																																																																					
CSA - Explosion-Proof & Intrinsic Safety combined approval (digit 4 = "P" & "T" only)																																																																																					
ATEX - Flameproof enclosures & Intrinsic Safety combined approval (digit 4 = "M, P, R, T" & "W" only)																																																																																					
IECEx - Flameproof enclosures & Intrinsic Safety combined approval (digit 4 = "M, P, R, T" & "W" only)																																																																																					
FM - Explosion-Proof & Intrinsic Safety combined approval (digit 4 = "P" & "T" only)																																																																																					
																Side vent/drain & mounting bracket																																																																					
																<table border="1"> <thead> <tr> <th>Side Vent/drain</th><th>Mounting bracket</th></tr> </thead> <tbody> <tr><td>Standard</td><td>None</td></tr> <tr><td>Standard</td><td>Yes, SS 304L</td></tr> <tr><td>Standard</td><td>Yes, SS 316L</td></tr> <tr><td>Side</td><td>None</td></tr> <tr><td>Side</td><td>Yes, SS 304L</td></tr> <tr><td>Side</td><td>Yes, SS 316L</td></tr> </tbody> </table>	Side Vent/drain	Mounting bracket	Standard	None	Standard	Yes, SS 304L	Standard	Yes, SS 316L	Side	None	Side	Yes, SS 304L	Side	Yes, SS 316L																																																							
Side Vent/drain	Mounting bracket																																																																																				
Standard	None																																																																																				
Standard	Yes, SS 304L																																																																																				
Standard	Yes, SS 316L																																																																																				
Side	None																																																																																				
Side	Yes, SS 304L																																																																																				
Side	Yes, SS 316L																																																																																				
																SS parts																																																																					
																<table border="1"> <thead> <tr> <th>SS tag plate</th><th>SS housing</th></tr> </thead> <tbody> <tr><td>None</td><td>None</td></tr> <tr><td>Yes</td><td>None</td></tr> <tr><td>None</td><td>Yes</td></tr> <tr><td>Yes</td><td>Yes</td></tr> </tbody> </table>	SS tag plate	SS housing	None	None	Yes	None	None	Yes	Yes	Yes																																																											
SS tag plate	SS housing																																																																																				
None	None																																																																																				
Yes	None																																																																																				
None	Yes																																																																																				
Yes	Yes																																																																																				
																Special applications & fill fluid																																																																					
																<table border="1"> <thead> <tr> <th>Treatment</th><th>Fill fluid</th></tr> </thead> <tbody> <tr><td>None (std)</td><td>Silicone oil</td></tr> <tr><td>None (std)</td><td>Fluorinated oil</td></tr> <tr><td>Degreasing</td><td>Silicone oil</td></tr> <tr><td>Oxygen service</td><td>Fluorinated oil (digit 7 = J, V, W)</td></tr> <tr><td>Chlorine service</td><td>Fluorinated oil (digit 7=H,T)</td></tr> <tr><td>NACE</td><td>Silicone oil</td></tr> </tbody> </table>	Treatment	Fill fluid	None (std)	Silicone oil	None (std)	Fluorinated oil	Degreasing	Silicone oil	Oxygen service	Fluorinated oil (digit 7 = J, V, W)	Chlorine service	Fluorinated oil (digit 7=H,T)	NACE	Silicone oil																																																							
Treatment	Fill fluid																																																																																				
None (std)	Silicone oil																																																																																				
None (std)	Fluorinated oil																																																																																				
Degreasing	Silicone oil																																																																																				
Oxygen service	Fluorinated oil (digit 7 = J, V, W)																																																																																				
Chlorine service	Fluorinated oil (digit 7=H,T)																																																																																				
NACE	Silicone oil																																																																																				
																Process cover gasket																																																																					
																<table border="1"> <tbody> <tr><td>Viton</td><td></td></tr> <tr><td>PTFE square section gasket in SS flange (FEF design)</td><td></td></tr> <tr><td>PTFE square section gasket in PVDF insert</td><td>(*5)</td></tr> </tbody> </table>	Viton		PTFE square section gasket in SS flange (FEF design)		PTFE square section gasket in PVDF insert	(*5)																																																															
Viton																																																																																					
PTFE square section gasket in SS flange (FEF design)																																																																																					
PTFE square section gasket in PVDF insert	(*5)																																																																																				
																Bolts/screws material																																																																					
																<table border="1"> <tbody> <tr><td>Carbon steel Cr-Mo (standard) M10</td><td></td></tr> <tr><td>SS 316(L) / 316(L) (bolt/nuts) M10</td><td>(*3)</td></tr> <tr><td>Carbon steel Cr-Mo M12 (standard) for static pressure > 160 bar</td><td></td></tr> <tr><td>SS 660/660 (bolt/nuts) M10 for static pressure < 160 bar</td><td>(*11)</td></tr> <tr><td>SS 660/660 (bolt/nuts) M12 for static pressure > 160 bar</td><td>(*11)</td></tr> </tbody> </table>	Carbon steel Cr-Mo (standard) M10		SS 316(L) / 316(L) (bolt/nuts) M10	(*3)	Carbon steel Cr-Mo M12 (standard) for static pressure > 160 bar		SS 660/660 (bolt/nuts) M10 for static pressure < 160 bar	(*11)	SS 660/660 (bolt/nuts) M12 for static pressure > 160 bar	(*11)																																																											
Carbon steel Cr-Mo (standard) M10																																																																																					
SS 316(L) / 316(L) (bolt/nuts) M10	(*3)																																																																																				
Carbon steel Cr-Mo M12 (standard) for static pressure > 160 bar																																																																																					
SS 660/660 (bolt/nuts) M10 for static pressure < 160 bar	(*11)																																																																																				
SS 660/660 (bolt/nuts) M12 for static pressure > 160 bar	(*11)																																																																																				
																Special options or design																																																																					
																(*6) - * special, no code available																																																																					

Notes*:

- The thread is M12, if static pressure 300/420 bar
- Turn down of 100:1 is possible, but it should be used at a span greater than 1/40 of the maximum span for better performance.
- Max. static pressure 160 bar for SS 316(L) bolts/nuts; for static pressure > 160 bar, please specify SS 660 bolts.
- Gold coating on wetted measuring cell parts for Hydrogen service - Hydroseal version - gold/ceramic coating is available upon request.
- Process cover with PVDF insert with 1/2"-14 NPT side process connection/no vent drain, other upon request - square section PTFE gasket
- When no code can be found in the current code symbols, place (*) in concerned code digit(s) & add(*) in 16 th digit
- Our bolts/nuts in SS 660 are in conformity with the NACE MR 0175/ISO 15156 requirements and must be used for NACE MR 0175/ISO 15156 service.
- For the static pressure option 420 bar and process cover gasket PTFE please use only code "R", "T" or "X"
- Process connection on the bottom side.
- Code "D & V" FM approval only possible with electrical connection 1/2"-14 NPT.
- SS 660 bolts/nuts have to be used for oil & gas applications

OUTLINE DIAGRAM (unit: mm)

<7th digit code : V, H, M, T>

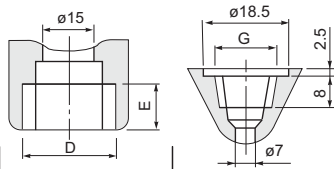
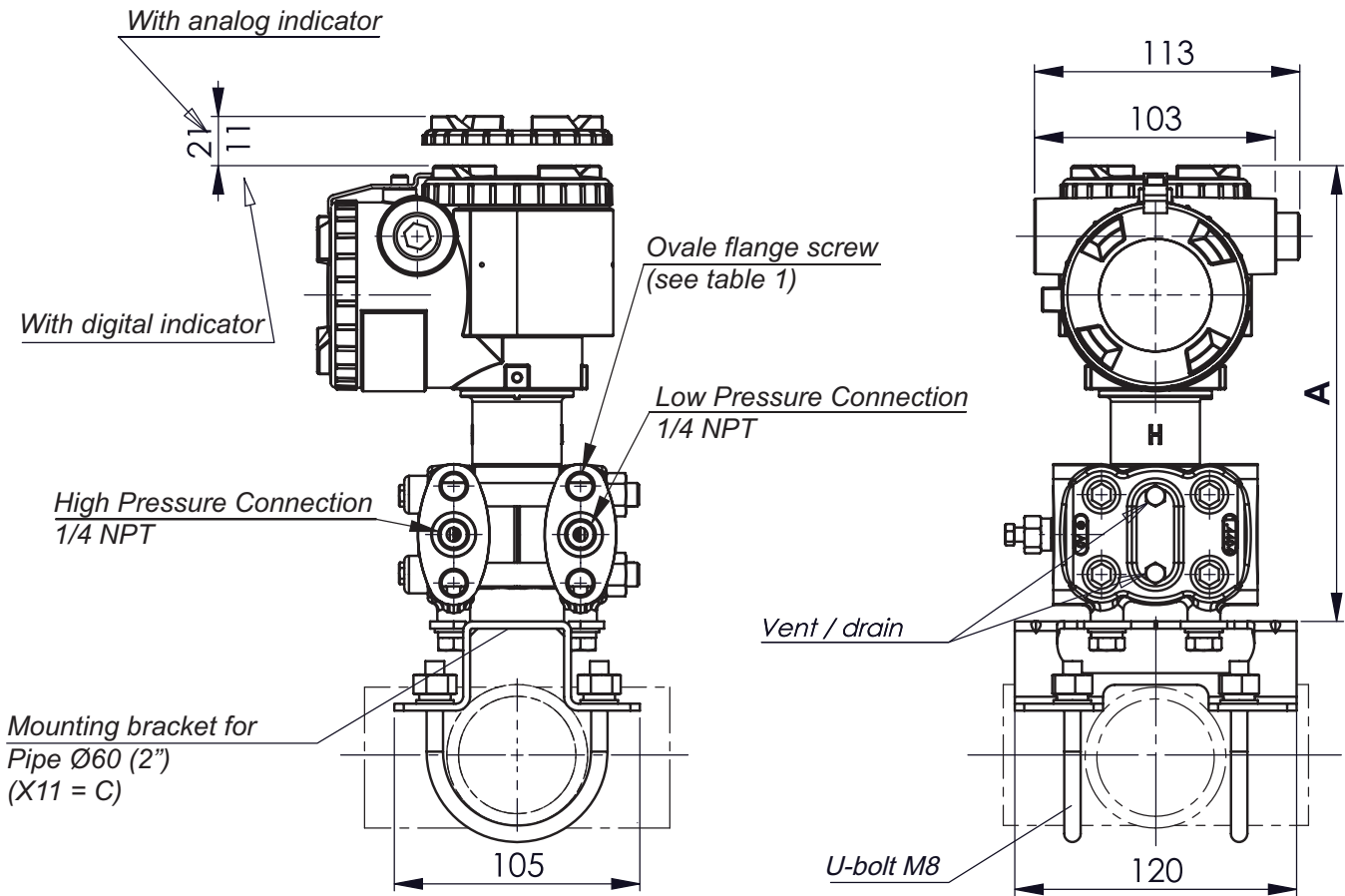


Table 1

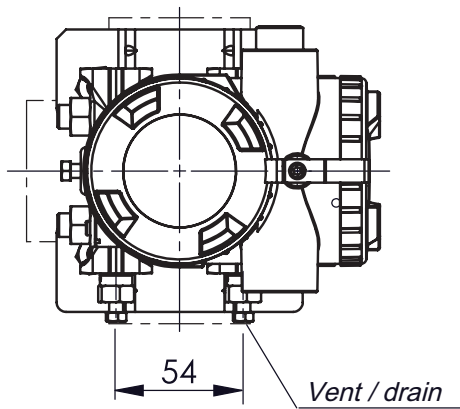
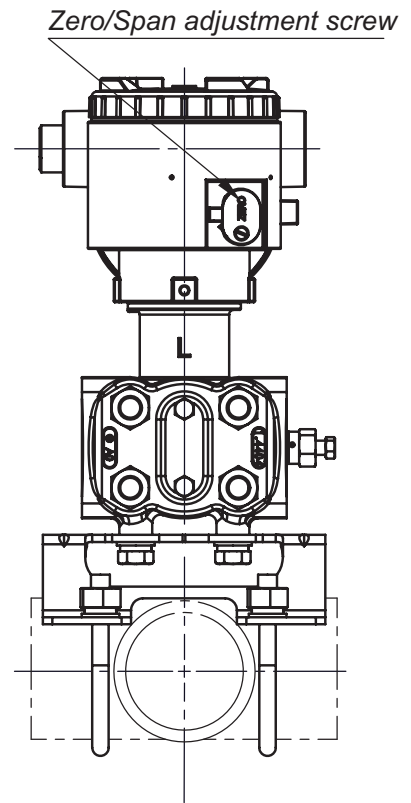
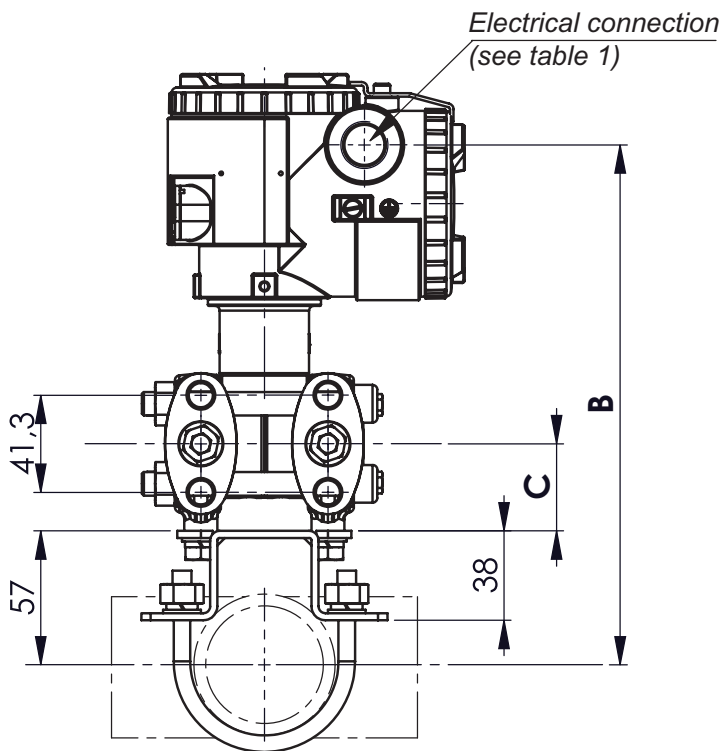
Code X=4	Electrical connection		Oval flange screw
	D	E	
R	M20x1.5	16	7/16-20 UNF
T	1/2-14NPT	16	7/16-20 UNF
V	Pg13.5	10,5	M10
W	M20x1.5	16	M10
X	Pg13.5	10,5	7/16-20 UNF

MODEL	DIMENSIONS		
	A	B	C
FKC□11 FKC□22	198,5	225,5	38,5
FKC□33 FKC□35 FKC□36	194	194	37
FKC□38 FKC□43 FKC□45 FKC□46 FKC□48	198,5	225,5	38,5

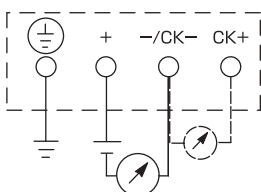
Weight :
3,5 kg (without option)

- Add : - 0,8 kg for indicator option
 - 2 kg for stainless steel housing option
 - 0,5 kg for mounting bracket

X ₁ X ₂ X ₃ X ₄ X ₅ X ₆ X ₇ X ₈ - X ₉ X ₁₀ X ₁₁ X ₁₂ X ₁₃ - X ₁₄ X ₁₅ - X ₁₆ F K C □ □ □ □ 5 - □ □ □ □ □ - □ □ - □	SPAN LIMIT	
	Min.	Max.
FKC □□1	0,1 kPa (1 mbar)	1kPa (10 mbar)
FKC □□2	0,1 kPa (1 mbar)	6kPa (60 mbar)
FKC □□3	0,32 kPa (3,2 mbar)	32 kPa (320 mbar)
FKC □□5	1,3 kPa (13 mbar)	130 kPa (1,3 bar)
FKC □□6	5 kPa (50 mbar)	500 kPa (5 bar)
FKC □□8	30 kPa (300 mbar)	3 MPa (30 bar)



CONNECTION DIAGRAM



EMC Directive (2004/108/EC)

All models of **FCX** series transmitters type **FCX-All** are in accordance with :

• the harmonized standards:

- EN 61326-1 : 2006 (Electrical equipment for measurement, control and laboratory use - EMC requirements).
- EN 61326-2-3 : 2006 (Part 2-3 : Particular requirements - Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning)

Emission limits : EN 61326-1 : 2006

Frequency range (MHz)	Limits	Basic standard
30 to 230	40 dB ($\mu\text{V/m}$) quasi peak, measured at 10m distance	EN 55011 / CISPR 11 Group 1 Class A
230 to 1000	47 dB ($\mu\text{V/m}$) quasi peak, measured at 10m distance	

Immunity requirements : EN 61326-1 : 2006 (Table 2)

Phenomenon	Test value	Basic standard	Performance criteria
Electrostatic discharge (EDS)	4 kV (Contact) 8 kV (Air)	EN 61000-4-2 IEC 61000-4-2	B
Electromagnetic field	10V/m (80 to 1000 MHz) 3 V/m (1.4 to 2.0 GHz) 1 V/m (2.0 to 2.7 GHz)	EN 61000-4-3 IEC 61000-4-3	A
Rated power frequency Magnetic field	30 A/m	EN 61000-4-8 IEC 61000-4-8	A
Burst	2 kV (5/50 NS, 5 kHz)	EN 61000-4-4 IEC 61000-4-4	B
Surge	1 kV Line to line 2 kV Line to line	EN 61000-4-5 IEC61000-4-5	B
Conducted RF	3 V (150 kHz to 80 MHz)	EN 61000-4-6 IEC61000-4-6	A

Performance criteria :

A : During testing, normal performance within the specification limits.

B : During testing, temporary degradation or loss of function or performance which is self-recovering.



Fuji Electric France S.A.S.

46 rue Georges Besse - ZI du brézet - 63039 Clermont ferrand

Tél : 04 73 98 26 98 - Fax : 04 73 98 26 99

Mail : sales.dpt@fujielectric.fr - web : www.fujielectric.fr