



ANALOG GAUGE PRESSURE TRANSMITTER

DATA SHEET

FYG...K, L

The FYG pressure transmitter accurately measures gauge pressure and transmits a proportional 4 to 20mA signal.

The transmitter utilizes an unique micromachined capacitive silicon sensor to provide exceptional performance and functionality.

FYG series are specially designed for safety related applications encountered in nuclear power plants where high reliability and long lifetime undo mild to harsh environment is required (radiation with total integrated dose 50 kGray).



FEATURES

1. High accuracy

Fuji's micro-capacitance silicon sensor assures a high accuracy for all elevated or suppressed calibration ranges without additional adjustment.

2. 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.

3. Application flexibility

Various features that render the FCX-AII suitable for almost any process applications include.

- Hazardous area approvals
- Built-in RFI filter and lightning arrester
- Stainless steel electronics housing

4. Fully analog electronics

The design of the electronics without any SMART device embedded ensure the ability to address the highest safety levels in nuclear applications.

Functional specifications

Type:

FYG: Analog gauge pressure transmitter

Service:

Liquid, gas or vapour

Span, range and overrange limit:

Туре		n limit] {bar}		Ran [kPa	Overrange limit [MPa] {bar}			
	Min.	Max.	Lower limit		Upper limit		[IVIF a] {Dai}	
FYG□01	21,7	130	-100		130		1	
	{0,217}	{1,3}		{-1}		{1,3}		{10}
FYG□02	83	500	-100		500		1.5	
	{0.83}	{5}		{-1}		{5}		{15}
FYG□03	500	3000	-100		3000		9	
	{5}	{30}		{-1}		{30}		{90}
FYG□04	1700	10000	-100		10000		15	
	{17}	{100}		{-1}		{100}		{150}
FYG□05	10000	50000	-100		50000		75	
	{100}	{500}		{-1}		{500}		{750}

Lower range limit (vacuum limit) :

Silicon fill sensor : Fig.1 page 3

Output signal:

4 to 20 mA

Power supply:

Transmitter operates on 13 to 48V DC at transmitter terminals

Fuji Electric France S.A.S.—

	EDSF5-90b	
Date	October, 2020	

FYG...K, L

Load limitations:

Mini = 100Ω $Maxi = 600\Omega$

Hazardous locations:

Designed to meet international flameproof (explosionproof) standards.

Please consult the code symbols some pages further on, to know the different types of approvals (digit 10). Consult FUJI for status.

Zero/span adjustment:

Zero is adjustable from outside screw on the electronics housing and the span with the internal screw.

Possible damping: 0.1, 0.4, 1.2, 3.2 sec.

Zero elevation / suppression :

Adjustable with the external screw on the electronic housing between -90% to +84% of URL.

Temperature limit:

Ambient: 0 to 70°C Accident: Mini: -40°C

Maxi: 125°C during 65 hours

Process:

-40 to +120°C (silicone oil)

Storage: -40 to +90°C

Humidity limit:

0 to 100% RH (electronics housing closed and sealed)

Performance specifications

(reference conditions, silicone oil fill).

Accuracy ratings

(including linearity, hysteresis, and repeatability)

For all ranges (except FYG#05):

For spans greater than 1/6 of URL:

±0.25% of span

For spans below 1/6 of URL:

Fuji Electric doesn't guaranty the measurement accuracy.

For FYG#05:

For spans greater than 1/5 of URL:

±0.5% of span

For spans below 1/5 of URL:

Fuji Electric doesn't guaranty the measurement accuracy.

Stability:

± 0,2% of upper range limit (URL) for 30 days.

Temperature effect :

Effects per 55°C change

For all ranges (except FYG#05):

Zero shift: ±1% of URL Span shift:

±1% of URL

Total effect:

±2% of URL

For FYG#05: Zero shift:

±2% of URL Span shift:

±2% of URL

Total effect :

±4% of URL

Overrange effect:

Zero shift:

0.2% of URL for any overrange up to maximum limit

Supply voltage effect:

± 0,005%/V

RFI effect:

Less than 0,25% of URL for the frequencies of 80 to 2000 MHz and field strength 10V/m when electronics covers on.

Response time: (at 63,2% of the output signal)

200 msec.

Mounting position effect:

Zero shift:

Less than 0.1kPa {1mbar} for a 10° tilt in any plane.

No effect on span.

This error can be corrected by adjusting Zero.

Vibration effect:

< ±0,25% of span for spans greater than 1/10 of URL. Frequency 10 to 500Hz, acceleration 9,8m/sec²

Seismic resistance

Qualifaication to the "assembly" seismic spectrum x 1.5 according to RCC-E:

- Horizontal 7.5g ZPA

- Vertical 6g ZPA.

Integrity to the "components" seismic spectrum as

per RCC-E: 30 g ZPA

Dielectric strength:

500V AC, 50/60Hz during 1min. between terminals + & - on the one hand, and transmitter body on the other hand

Leak current less than 3 mA.

Insulation resistance:

More than $100M\Omega$ at 500V DC during 1min. between terminals + & - on the one hand, and transmitter body on the other hand.

Turn-on time:

4 seconds

Irradiation effect:

±2,5% of URL at Total Integrated Dose (50 kGy) Maximum Total Integrated Dose without permanent failure 65 kGy.

Presure equipment Directive (PED) 2014/68/UE

Digit 5 code 1, 2, 3 according to Article 4.3 Digit 5 code 4: Category III module H1

Physical specifications

Electrical connections:

M20 x 1,5 or

Souriau 8N35 socket, or Souriau 8N45S socket, or Souriau 8N45 socket, or

SAIB NU25 ref. 251-103-401 / M20 x 1,5 socket

(Compatible with 8N45 installed base)

Process connections:

Standard:

1/4 - 18 NPT

Option:

1/2 - 14 NPT with oval flange

Process-wetted parts material:

Material code	Process	Diaphragm	Wetted sensor	Vent/
(7th digit)	cover		body	Drain
V	SS 316	SS 316 L	SS 316L	SS 316
Α	Hast C276	Hast C276	Hast C276	Hast C276

Other material, upon request

Process gasket:

EPDM O-ring (mandatory when submitted to radiation with TTD > 50 Gy) or Viton O-ring

Non-wetted parts material:

Electronics housing:

SS 316

Bolts and nuts:

SS 316 for pressure ≤ 100 bar SS 660 for pressure > 100 bar

Fill fluid

Silicon oil

Mounting bracket:

SS 304.

Environmental protection:

IP66/IP67

Mounting:

Without mounting bracket:

Direct mounting on manifold With optional mounting bracket:

For 50mm (2") pipe or direct wall mounting.

Mass {weight}:

Transmitter only: 5,7 kg

Add:

Mounting bracket: 0,5 kg

Optional features

Degreasing:

Process wetted parts are cleaned, but the fill fluid is standard silicone oil.

Customer tag plate (70 x 20 mm):

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

Vacuum service:

Special silicone oil and filling procedure are applied.

See below figure.

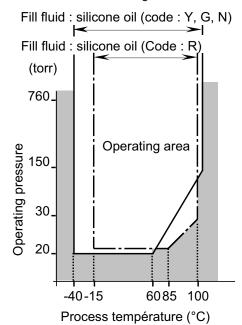


Fig.1 Relation between the temperature of process in contact with cell's diaphragms and operating pressure.

Optional accessories

Oval flanges:

Converts process connection to 1/2 - 14 NPT

Manifolds:

Refer to datasheet No. EDS6-F03

CODE SYMBOLS - FYG

1 2 3	4	5	6	7	8	,		10	11	12	13		14	15											
F Y G		0				-	Α	_	_	$oxed{oxed}$	\vdash	-			1				Description						
																	Analog gauge pres	ssure transmitter							
															_		Output 4-20 mA								
																	Connections	Oval flatte		Orași II					
																	Process	Oval flange		Conduit					
	W															(*1)		M10 or M12 (*1)		M20 x 1,5					
	3														-	(*1)		M10 or M12 (*1)		ouriau 8N45S socket					
	6															(*1)	1/4-18 NPT	M10 or M12 (*1)		socket (not for EPR I					
	7 8															(*1) (*1)	1/4-18 NPT 1/4-18 NPT	M10 or M12 (*1) M10 or M12 (*1)		5 socket (not for EPR i 251-103-401 / M20 x					
	0														(')			` ′		h 8N45 installed equip					
												(*8)	Ranges & materials		T =	T									
					<u> </u>												Measuring ranges	Process cover	Diaphragm	Welted cell body					
		0	1	V	_												217 to 1300 mbar	SS 316L	SS 316L	SS 316L					
		0	2	V													830 to 5000 mbar	SS 316L	SS 316L	SS 316L					
		0	3														5 to 30 bar	SS 316L	SS 316L	SS 316L					
		0	4	٧													17 to 100 bar	SS 316L	SS 316L	SS 316L					
		0	5	٧													100 to 500 bar	SS 316L	SS 316L	SS 316L					
		0	1	Α													217 to 1300 mbar	Hast C276	Hast C276	Hast C276					
		0	2	Α													830 to 5000 mbar	Hast C276	Hast C276	Hast C276					
		0	3	Α													5 to 30 bar	Hast C276	Hast C276	Hast C276					
		0	4	Α													17 to 100 bar	Hast C276	Hast C276	Hast C276					
			5														100 to 500 bar	Hast C276	Hast C276	Hast C276					
		U	-													(*5)	Transmitter		Indicator						
					К	_	Α									(0)	EDF "K3ad c			1					
					L	_	Α									(*4)	EDF "Not C		None						
					<u> </u>		- / (H								(-1)		ardous locations (ask I	L Euii)						
								Α									7 pprovato for flaze	None (standard)	uji)	1					
								X								(*3)	Flam	eproof housing ATEX		-					
								^								(0)	Vent /	, ,	Mounting b	racket (SS 304)					
									G									rect mounting	Vone						
									Н									rect mounting		ended for UTO stock					
										H	t						Customer tag	Electronics							
																	plate (option)	housing	1						
										C E	_						Without SS 316L	SS 316							
										드	\vdash	\vdash			\vdash		Treatment	Fill fluids							
											Y						None		1						
											G						Degreasing	Silicon oil							
											R						Vacuum service	55511 0.11							
											_						Process cover gas	sket	•						
												-	A E				Viton EPDM								
												<u> </u>	Е	\vdash	\vdash			torial							
														_	<u> </u>	(*0)	Bolts and nuts mat		I						
														E W			SS 316/316 (Bolts/r SS 660/660 (Bolts/r								
															\vdash	(2)	Accessories (option								
															1		ATEX - Flameproof								
															_	_		- 9							

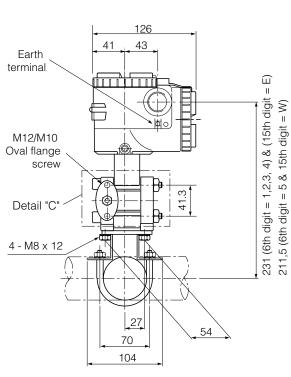
Notes*

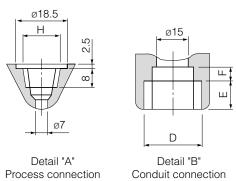
All models are equipped with specific surge arrester.

- 1- The thread of process cover is M12 if operating pressure > 100 bar (6th digit = 5)
- 2- SS316 M10 bolting (15th digit = E) is only for use with models whose maximum working pressure is up to 100 bar; For operation pressure >100 bar, please specify: SS 660 bolts in M12 (15th digit = W);
- 3- Not available for SAIB, Souriau 8N35/8N45/8N45S sockets.
 - To use with flameproof cable gland ATEX delivered by FUJI (option) or mounted by customer.
- 4- Transmitters' design is similar to K3A but on standard QA (ISO 9001).
- 5- For "K3A classification" transmitter, please contact Fuji Electric
- 6- FYG6 & FYG7 transmitters can only be used in existing power plants (not for EPR)
- 7- FYGW, FYG3 & FYG8 transmitters can be used in existing power plants and EPR. FYGW transmitters can be equipped with (optional) Flameproof cable gland. When mounted on the transmitter, additional 16th digit is set to 1.
- 8- For others materials, please contact Fuji Electric france

OUTLINE DIAGRAM (unit: mm)

Conduit connection M20 x 1,5 (4th digit = W)

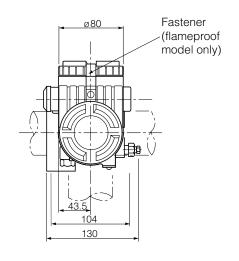




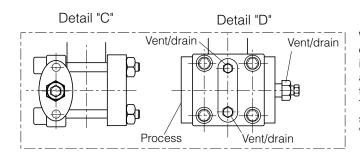
4th	Conduit con	nectio	Process connection	
digit	D	Е	F	G
W	M20 x 1,5	16	5	1/4"-18 NPT

(10)123 105 52.5 Detail "B" ø|80 Conduit Zero/Span connection adjustment screw Plug for code symbols "W, 6, 7" (4th digit) Vent/drain 37 (M10) 38,5 (M12) 210 or (*1) Detail "A" 190,5 (*2) Process connection Detail "D" 38 58 4 holes ø9 Mounting pipe ø50 (2") U bolt M8 41

Notes* (1*)	210 :	(6th digit = 1,2,3, 4) & (15th digit = E)
(2*)	190,5 :	(6th digit = 5) & (15th digit = W)



"Universal vent/drain, direct mounting" configuration (11th digit : G & H) (recommended for UTO stock)



With this configuration, vent/drain function on the external side of the process flanges is achieved by way of vent screws directly attached to the flange (sealing is of metal to metal type).

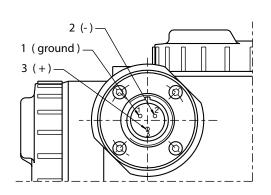
There is no more conventional screwed vent seat screwed in the flange and sealed with "PMUC Loctite" type compound.

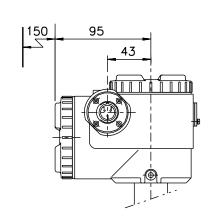
OUTLINE DIAGRAM (unit : mm)

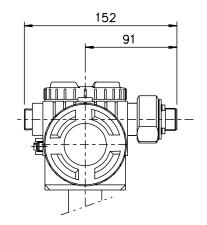
Conduit connection for SOURIAU sockets (4th digit = code 3, 6 or 7)

For Souriau 8N35 socket

CONDUIT CONNECTION - SOURIAU 8N35

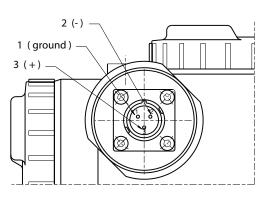


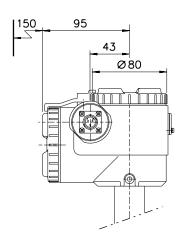


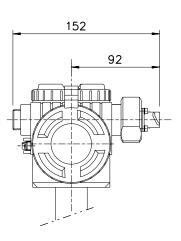


For Souriau 8N45 / 8N45S sockets

Conduit connection - SOURIAU 8N45 / 8N45S

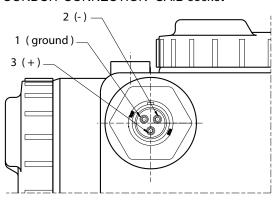


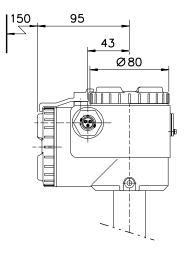


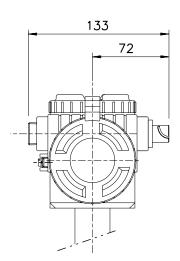


Conduit connection for SAIB socket (4th digit = code 8)

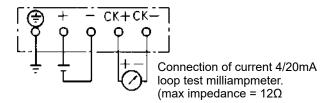
CONDUIT CONNECTION- SAIB socket





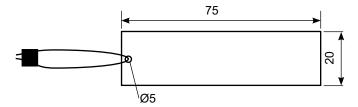


CONNECTION DIAGRAM



OPTIONAL CUSTOMER TAG PLATE

Attached to transmitter with SS 304 wire



ELECTROMAGNETIC COMPATIBILITY

All FCX-All series of pressure transmitters are in conformity with the provision of the EMC Directive 2014/30/EU on the harmonization of the laws of the Members States relating to electromagnetic compatibility.

All these models of pressure transmitters are in accordance with the following harmonized standards:

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

Emission limits (according to EN 55011 / CISPR 11, Group 1 Class A)

Frequency range (MHz)	Limits	Result
30 to 230	40 dB (μV/m) quasi peack, measured at 10 m distance	Passed
230 to 1000	47 dB (μV/m) quasi peack, measured at 10 m distance	

Immunity

Phenomenon	Test value	Standard	Required Performance criteria	Result of criteria
Electrostatic Discharge	±4 kV (Contact) ±8 kV (Air)	EN/IEC 61000-4-2	В	Α
Radiated, Electromagnetic Field	10 V/m (0.08 to 1.0 GHz) 3 V/m (1.4 to 2.0 GHz) 1 V/m (2.0 to 2.7 GHz)	EN/IEC 61000-4-3	A	Α
Fast transients (burst)	2 kV (5/50 ns, 5 kHz	EN/IEC 61000-4-4	В	Α
Surge Transients	1 kV Line to line 2 kV Line to ground	EN/IEC 61000-4-5	В	Α
Conducted RF Disturbances	3 Vrms (150 kHz to 80 MHz) 80% AM @ 1 kHz	EN/IEC 61000-4-6	A	Α
Power Frequency Magnetic Field	30 A/m (50 Hz, 60 Hz)	EN/IEC 61000-4-8	А	A

Performance criteria (A & B): according to IEC 61326



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