TECHNICAL GUIDANCE

High Accuracy and High Resolution, with 2-Wire 4–20 mA Output

FGY1000 Series Magnetostrictive Level Meter

OUTLINE

The **FGY1000** is a magnetostrictive level meter that pinpoints a float position using a magnetostrictive sensor, enabling high-accuracy, high-resolution level measurements.

The level of various liquids is output as a 2-wire, 4–20 mA DC signal, and a HART communication function comes as standard. The **FGY1000** can be used safely under harsh conditions such as corrosive liquids and pressurized or vacuum tanks, because the magnetostrictive sensor is completely insulated from the atmosphere in the tank by a rigid pipe or flexible tube.

STANDARD SPECIFICATIONS

Type of detection Measuring object	: Magnetostrictive : All types of liquids (viscosity: up to 600 m Pa · s, density: at least 0.8 g/cm ³ *) * Contact us if the density is less than 0.8 g/
Moasurement range	cm ³ .
ineasurement range	Max 4 000 mm with a rigid pipe
	Max. 7,000 mm with a flexible tube
Pressure class	. JIS5K to JIS20K ASME#150 to ASME#300
Liquid temperature	$= -40^{\circ}$ C to $+125^{\circ}$ C
	Depends on the material and temperature class.
	See Table 1 for details.
Process connection	: Tank top flange: 50A (2") or larger
	Outer chamber flange : 20A (3/4") or larger
	Inner chamber flange : 80A (3") or larger
	See Figures 3 and 4 for details.
	Ferrule: 2.5S to 6.5S
Two-liquid interface de	etection
	: Density difference must be at least 0.2 g/cm ³ .
Ambient temperature	: Operation: -40°C to +70°C
	Explosionproof: -40°C to +60°C
	Storage: -45°C to +80°C
	Depends on the temperature class.
	See Table 1 for details.
Ambient humidity	: Operation: 0 to 95% R.H.
	Storage: 0 to 85% R.H.
Materials	
Transmitter case:	ADC12
Flange: SUS304,	SUS316, SUS316L, NW0276, Titanium, PVC,
PFA (tubing)	
Guide pipe: SUS	304, SUS316, SUS316L, NW0276, Titanium,
PVC, PFA (tubing)	
Float: SUS316L, I	NW0276, Titanium, PVC, PFA (tubing)
Chamber: Carbor	n steel, SUS304, SUS316, SUS316L, NW0276
Display	: LCD
	1st line : Function
	2nd line : Data (4 digits)
	3rd line: Bar graph percentage



Output, power supply, and communication Current output: 4 to 20 mA DC (2-wire), HART (Rev.7, only for Ch1) Supply power voltage (UB): 12 to 40 V DC Allowable load resistance (Ra): Ra = ((UB) – 12)/0.02 (Ω) Max. 600 Ω for 24 V DC power supply voltage Signal range: 4–20 mA DC or 20–4 mA DC (depending on setting) Operation range: 3.8–20.5 mA DC Burnout: \leq 3.6 mA, \geq 21.0 mA (compliant with NAMUR NE43) (Burnout output hold function is available.)

Accuracy : $\pm 0.05\%$ F.S. or ± 1.0 mm, whichever is larger Degrees of protection : IEC60529 (JIS C 0920) IP66/67 Explosionproof :

	Explosionproof specifications	Certificate number
IECEx	Ex d h ia IIB T4T2 Ga/Gb	IECEx DEK 16.0041X
ATEX	 ⟨E⟩ II 1/2 G Ex d h ia IIB T4T2 Ga/Gb 	DEKRA 16ATEX0097X
Japan	Ex d ia IIB T4T2 Ga/Gb	CML 18JPN1235X

Explosionproof in Korea and China: In preparation Temperature class depends on process temperature.

TOKYO KEISO CO., LTD.

Table 1 Temperature class, process temperature, and ambient temperature

Stainless steel float + guide pipe

Temperature class	Process temperature	Ambient temperature
T4	–50°C to +103°C	-30°C to +60°C
T4	-40°C to +103°C	-40°C to +60°C
Т3	-50°C to +155°C *1	-30°C to +60°C
Т3	-40°C to +155°C *1	-40°C to +60°C

 $\ast 1:$ To satisfy the explosion proof certificate, the temperature range is limited to -40°C to +125°C.

Table 2 Temperature class, process temperature, and ambient temperature

PVC float + guide pipe

Table 3 Floats

Temperature class	Process temperature	Ambient temperature						
T4	-40°C to +60°C *2	-40°C to +60°C						
. O. To action the symplectic process of contificate, the terms are two reasons is limited to 000 to								

*2: To satisfy the explosionproof certificate, the temperature range is limit +60°C.

Cable entry	: M20 $ imes$ P1.5, M25 $ imes$ P1.5
	(NPT and G can be used with adapters.)
For flamepro	of models with cable glands, the outer diameter of
applicable ca	ables is as follows:

M20	Built-in gasket	: ø10.0 to 10.9
	Spare gasket	: ø9.0 to 9.9 and ø11.0 to 11.9
M25	Built-in gasket	: ø11.0 to 11.9
	Spare gasket	: ø10.0 to 10.9 and ø12.0 to 12.9

Painting :	40-µm polyurethane (standard)
	(20-µm ground coat and 20-µm finish coat)
	Transmitter body : Munsell N7.5
	Transmitter cover: Munsell 7.5BG4/1.5
	Chamber: Silver (SUS parts are unpainted.)
Conforming standards:	IECEx/ATEX, EMC (IEC61326), RoHS2
Weight :	2B class #150, Approx. 10 kg
Settings :	Remote setting using HART communication,
	or field setting using a magnet (no need to
	open the case cover)
	Setting items: zero adjustment, span, test

output, damping, burnout, etc.

No.	Float guide	Material	Outer diameter [mm]	Inner diameter [mm]	Min. required flange size	Min. density [g/cm ³]	Max. op. pressure [MPa]
1	Rigid pipe	SUS316L	max. ø47	ø15.4	50A (2")	0.8	2.0
4	Rigid pipe	NW0276	ø80	ø15.5	100A (4")	0.85	2.4
5	Rigid pipe	Titanium	ø60	ø15.3	65A (2-1/2 ")	0.9	0.3
6	Rigid pipe	PVC	ø48	ø20	50A (2")	0.85	0.13
7	Rigid pipe	PFA	ø68.2	ø19	80A (3")	0.9	0.2
8	Flexible tube	SUS316L	max. ø74	ø26	80A (3")	0.6	0.8

MODEL CODE

Basic code Process code 1											
FGY1 □ □ □ - □ □ -							-			-	Specifications
	1			-			-			-	Rigid pipe
Float guide 2				-			-			-	Flexible tube
	3			-			-			-	Sanitary (IDF)
		1		-			-			-	Liquid level measurement
Measurement		2		-			-			-	Liquid level + interface measurement (2 channel output). See Figure 2.
		3		-			-			-	Interface measurement
Othersteine			W	-			-			-	Dust-tight, water immersion-proof, non-ex
Structure			E	-			-			-	Explosionproof type (flameproof + intrinsically safe)
L: Guide pipe length (m Measuring length + at l mm required	ım) east	180)	-	Four digits		-			-	Set up with reference to Figure 1. Four digits Example: In the case of 980 mm, set [0980].
						EC	-			-	IECEx/ATEX
						JC	-			-	Japan
Explosionproof specific (flameproof + intrinsica	catio Ilv sa	ns afe)				KC	-			-	South Korea (KOSHA) [in preparation]
	,	,				CC	-			-	China (NEPSI) [in preparation]
						WW	-			-	Non-ex
- 24										-	Main body: SUS304, Float: SUS316L
							-	34		-	Main body: SUS316, Float: SUS316L
							-	- 44 - Main body, Float: SUS316L		Main body, Float: SUS316L	
							-	2T		-	Main body: SUS304, Float: Titanium
Sensor material							-	ЗT		-	Main body: SUS316, Float: Titanium
Main body material (fla	nge,	guio	de p	ipe,	flexible	tube)	-	4T		-	Main body: SUS316L, Float: Titanium
Float material							-	СТ		-	Main body: NW0276, Float: Titanium
(flexible tube: SUS304,	prot	tecti	ive b	lade	e: SUS3	316L)	-	TT		-	Main body, Float: Titanium
for explosionproof type	, 55 s.	, vv,	, anc	1 1	are ava	allable	-	СС		-	Main body, Float: NW0276
							-	55		-	Main body, Float: Polished SUS316L
							-	VV		-	Main body, Float: PVC
							-	FF		-	Main body, Float: PFA
							-	ZZ		-	Special (contact us)
									J1	-	JIS5k
									J2	-	JIS10k
									J4	-	JIS20k
									A2	-	ASME Class 150
									A5	-	ASME Class 300
Connection	n. th	ne m	neter	side	e serve	s as m	ale.		P2	-	JPI Class 150
	,			0.01		0 00 11			P5	-	JPI Class 300
									ID	-	ISO (IDF) ferrule (sanitary)
									RS	-	R screw
									GS	-	G screw
									ZZ	-	Special (contact us)

			-		-		-				-		-		-	Specifications	
	RF		-		-		-				-		-		-	RF flange	
Connection	FF		-		_		-				-		-		-	FF flange	
Connection	TD		-		_		-				-		-		-	Thread connection	
	ZZ		-		-		-				-		-		-	Special (contact us)	
		5	-		-		-				-		-		-	50A (2")	
		6	-		-		-				-		-		-	65A (2-½")	
		7	-		_		-				-		-		-	80A (3")	
Connection siz	е	8	-		_		-				-		-		-	100A (4")	
		9	-		-		-				-		-		-	125A (5")	
		Α	-		-		-				-		-		-	150A (6")	
		Ζ	-		_		-				-		-		-	Special (contact us)	
Liquid density (Density of upper liquid for interface measurement)											_		_	Four digits Unit: kg/m ³ Example: In the case of 0.997 g/ cm ³ , set [0997].			
Density of lowe measurement (0000 for liquid	er liquio level r	d for neas	inte sure	erface ment)	_	Four digits	_				_		_		_	Four digits Unit: kg/m ³ Example: In the case of 0.997 g/ cm ³ , set [0997].	
Float							-	*			-		-		-	* Select from Table 3 "Floats".	
									M02		-		-		-	M20 × P1.5 *3	
*3: Right of the	on glass	disp	olay						M30		-		-		-	M25 × P1.5 *4	
*4: Left of the g	glass d	lispla	ay						G02		-		-		-	G ¹ / ₂ *3, *5	
*5. USE all aua	pter.								ZZ		-		-		-	Special (contact us)	
Cable gland										Х	-		-		-	N/A	
Cable gland	Cable gland 1 -												-		-	Available	
h1: Position at which the liquid level output is 20 mA, 100% (mm) (Minimum distance from the level meter: 80 mm) - digit:											Four digits	-		_	Set with reference to Figure 1. Four digits Example: In the case of 120 mm, set [0120].		
h2: Position at (Distance from	h2: Position at which the liquid level output is 4 mA, 0% (mm) (Distance from the level meter)												-	Four digits	-	Set with reference to Figure 1. Four digits Example: In the case of 1850 mm, set [1850].	

Process code 2

Optional code

				-		-	\Box /	Specifications		
	Х			-		-		N/A		
Chamber	1			-		-		Outer chamber		
	2			-		-		Inner chamber		
		Х		-		-		N/A		
		1		-		-		V#7020		
		2		-		-		V#8591V-ZESZF (for stud bolts, choose from 3, 5, and 6)		
Gasket		3		-		-		V#8596V-EESZF (for stud bolts, choose from 3, 5, and 6)		
		4		-		-		V#6569V-EEEZZ (for stud bolts, choose from 3, 5, and 6)		
					-		V#7596V-EEEZZ (for stud bolts, choose from 3, 5, and 6)			
		9		-		-		Special (contact us)		
			Х	-		-		N/A		
			2	-		-		SUS304 (stainless steel)		
Other thank and			3	-		-		SNB7/S45C (A193-B7/A194-2H) (carbon steel)		
Stud bolt, nut			5	-		-		A193-B8CL2/A194-8 (stainless steel)		
			6	-		-		A320-B8CL2/A194-8 (stainless steel for low temperature)		
			9	-		-		Special (contact us)		
					XX/	-		N/A		
					OL/	-		Wetted parts: No oil treatment		
					WL/	-		Wetted parts: No water treatment		
					AP/	-		Wetted parts: Pickling treatment		
					PV/	-		Wetted parts: Passivation treatment		
Special processes.	spe	cial			BP/	-		Wetted parts: Buff polishing		
examinations and i	nspe	ectic	ons,		EP/	-		Wetted parts: Electrolytic polishing		
accessories, etc.					SP/	-		Special painting		
(Multiple selection	is po	ossik	ole.)		LT/	-		Leakage test		
					PT/	-		Penetrant test		
					RT/	-		Radiographic test		
					NC/	-		NACE test		
					PMI/	-		PMI test		
					AC/	-		Accessories		
						-	MS/	Wetted parts mill sheet		
						-	TR/	Test report		
						-	CC/	Calibration certificate of the measuring instruments used for inspections and tests		
						-	TS/	Traceability system		
						-	IP/	Inspection procedure		
						-	ITP/	INSPECTION and TEST PLAN		
						-	PS/	Product specification		
Document						-	SC/	Strength calculation		
(Multiple selection	is po	ossik	ole.)			-	PP/	Painting procedure		
					_	HPG/	(High pressure gas approved) Reports of results of tests conducted by qualified persons			
						_	WPS/	Welding procedure specification		
						_	PQR/	Procedure qualification record		
						-	CoC/	Explosionproof conformity certificate (Certificate of Conformity)		
						_	NA/	Non-applicability certificate		
							DoC/	EU declaration-of-conformity		
						-	ZZ/	Other documents		

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DRAWINGS AND DIMENSIONS

Figure 1 External dimensions (standard stainless steel wetted parts)



- (5) Stopper
- T : Flange thickness (depends on flange standards)
- L : Guide pipe length
- h1: Position at which 100% (20 mA) is output (min. 80 mm)

h2: Position at which 0% (4 mA) is output



(liquid level and interface measurements)

Figure 2 External dimensions

There are some restrictions on the measurement position for measuring the liquid level and interface. Contact us for details.

Figure 3 External dimensions (outer chamber)

Figure 4 External dimensions (inner chamber)





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WIRING



ORDERING FORM

Specify the following for orders or inquiries.								
1. Model code	Basic code FGY1	Process code 1	Process code 2	Optional code				
2. Liquid								
3. Liquid temperature4. Tank pressure								
5. Other requests								

* Specification is subject to change without notice.



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