



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	: Magnetostrictive
Measuring object	: All types of liquids (viscosity: up to 600 mPa · s, density: at least 0.8 g/cm ³ *) * Contact us if the density is less than 0.8 g/cm ³ .
Measurement range	: 250 to 7,500 mm Max. 4,000 mm with a rigid pipe Max. 7,500 mm with a flexible tube
Pressure class	: JIS5K to JIS20K, ASME#150 to ASME#300
Liquid temperature	: –40°C to +125°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 detection	: 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: SUS304, SUS316, SUS316L, NW0276, Titanium, PVC, PFA (tubing) Float: SUS316L, NW0276, Titanium, PVC, PFA (tubing) Chamber: Carbon 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 (depending on load resistance)

Allowable load resistance (Ra): $R_a = ((UB) - 12) / 0.02$ (Ω)
Max. 600Ω 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: ≤ 3.6 mA, ≥ 21.0 mA (compliant with NAMUR NE43)
(Burnout output hold function is available.)

Accuracy : ±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 db h ia IIB T4...T2 Ga/Gb	CML 20ATEX1315X
ATEX	⊕ II 1/2 G Ex db h ia IIB T4...T2 Ga/Gb	IECEx CML 20.0172X
Japan	Ex db ia IIB T4...T2 Ga/Gb	CML 18JPN1235X
China	Ex db ia IIB T2...T4 Ga/Gb Ex h IIB T2...T4 Ga	GYJ24.1111X

Explosionproof in Korea: In preparation

Temperature class depends on process temperature.

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
T3	-50°C to +155°C *1	-30°C to +60°C
T3	-40°C to +155°C *1	-40°C to +60°C

*1: To satisfy the explosionproof 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

Temperature class	Process temperature	Ambient temperature
T4	-40°C to +60°C *2	-40°C to +60°C

*2: To satisfy the explosionproof certificate, the temperature range is limited to 0°C to +60°C.

Cable entry : M20 × P1.5, M25 × P1.5

(NPT and G can be used with adapters.)

For flameproof models with cable glands, the outer diameter of applicable cables is as follows:

- M20 Built-in gasket : ϕ 10.0 to 10.9
- Spare gasket : ϕ 9.0 to 9.9 and ϕ 11.0 to 11.9
- M25 Built-in gasket : ϕ 11.0 to 11.9
- Spare gasket : ϕ 10.0 to 10.9 and ϕ 12.0 to 12.9

- Painting : 40- μ m polyurethane (standard)
(20- μ m ground coat and 20- μ m 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.

Table 3 Floats

No.	Guide pipe type	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. ϕ 47	ϕ 15.4	50A (2")	0.8	2.0
2	Rigid pipe	SUS316L	max. ϕ 74	ϕ 15.4	80A (3")	0.54	0.2
3	Rigid pipe	SUS316L	ϕ 80	ϕ 15.4	100A (4")	0.65	1.33
4	Rigid pipe	NW0276	ϕ 80	ϕ 15.5	100A (4")	0.85	2.4
5	Rigid pipe	Titanium	ϕ 60	ϕ 15.3	65A (2-1/2")	0.9	0.3
6	Rigid pipe	PVC	ϕ 48	ϕ 20	50A (2")	0.85	0.13
7	Rigid pipe	PFA	ϕ 68.2	ϕ 19	80A (3")	0.9	0.2
8	Flexible tube	SUS316L	max. ϕ 74	ϕ 26	80A (3")	0.6	0.8
A	Rigid pipe	NW0276	max. ϕ 74	ϕ 15.4	80A (3")	1.0	1.2
B	Rigid pipe	NW0276	max. ϕ 92	ϕ 15.4	100A (4")	0.69	1.2

MODEL CODE

Basic code		Process code 1									Specifications	
FGY1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	<input type="checkbox"/>	<input type="checkbox"/>	-	<input type="checkbox"/>	<input type="checkbox"/>	-		
Float guide type	1			-			-			-	Rigid pipe	
	2			-			-			-	Flexible tube	
	3			-			-			-	Sanitary (IDF)	
Measurement	1			-			-			-	Liquid level measurement	
	2			-			-			-	Liquid level + interface measurement (2 channel output). See Figure 2.	
	3			-			-			-	Interface measurement	
Structure	W			-			-			-	Dust-tight, water immersion-proof, non-ex	
	E			-			-			-	Explosionproof type (flameproof + intrinsically safe)	
L: Guide pipe length (mm) Measuring length + at least 180 mm required				-	Four digits		-			-	Set up with reference to Figure 1. Four digits Example: In the case of 980 mm, set [0980].	
Explosionproof specifications (flameproof + intrinsically safe)		EC					-			-	IECEX/ATEX	
		JC					-			-	Japan	
		KC						-			-	South Korea (KOSHA) [in preparation]
		CC						-			-	China (NEPSI)
		WW						-			-	Non-ex
Sensor material Main body material (flange, guide pipe, flexible tube) Float material (flexible tube: SUS304, protective blade: SUS316L) Only 24, 34, 44, TT, CC, 55, VV, and FF are available for explosionproof types.				-		24				-	Main body: SUS304, Float: SUS316L	
				-		34				-	Main body: SUS316, Float: SUS316L	
				-		44				-	Main body, Float: SUS316L	
				-		2T				-	Main body: SUS304, Float: Titanium	
				-		3T				-	Main body: SUS316, Float: Titanium	
				-		4T				-	Main body: SUS316L, Float: Titanium	
				-		CT				-	Main body: NW0276, Float: Titanium	
				-		TT				-	Main body, Float: Titanium	
				-		CC				-	Main body, Float: NW0276	
				-		55				-	Main body, Float: Polished SUS316L	
				-		VV				-	Main body, Float: PVC	
				-		FF				-	Main body, Float: PFA	
			-		ZZ				-	Special (contact us)		
Connection In the thread connection, the meter side serves as male.		J1								-	JIS5k	
		J2								-	JIS10k	
		J4									-	JIS20k
		A2									-	ASME Class 150
		A5									-	ASME Class 300
		P2									-	JPI Class 150
		P5									-	JPI Class 300
		ID									-	ISO (IDF) ferrule (sanitary)
		RS									-	R screw
		GS									-	G screw
		ZZ									-	Special (contact us)

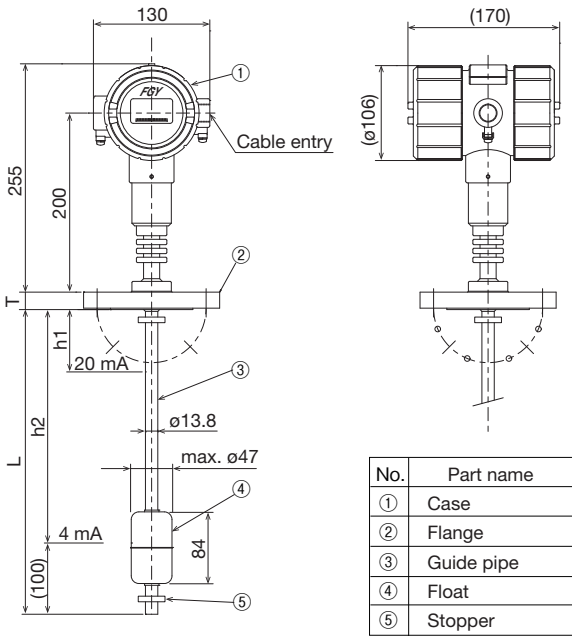
Process code 2

	<input type="checkbox"/>	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>	-	Specifications
Connection	RF		-		-		-			-		-			RF flange
	FF		-		-		-			-		-			FF flange
	TD		-		-		-			-		-			Thread connection
	ZZ		-		-		-			-		-			Special (contact us)
Connection size	5		-		-		-			-		-			50A (2")
	6		-		-		-			-		-			65A (2-1/2")
	7		-		-		-			-		-			80A (3")
	8		-		-		-			-		-			100A (4")
	9		-		-		-			-		-			125A (5")
	A		-		-		-			-		-			150A (6")
	Z		-		-		-			-		-			Special (contact us)
Liquid density (Density of upper liquid for interface measurement)				Four digits	-		-			-		-			Four digits Unit: kg/m ³ Example: In the case of 0.997 g/ cm ³ , set [0997].
Density of lower liquid for interface measurement (0000 for liquid level measurement)					-	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".
Cable connection *3: Right of the glass display *4: Left of the glass display *5: Use an adapter.									M02		-				M20 × P1.5 *3
									M30		-				M25 × P1.5 *4
									G02		-				G 1/2 *3, *5
									ZZZ		-				Special (contact us)
Cable gland									X		-				N/A
									1		-				Available
h1: Position at which the liquid level output is 20 mA, 100% (mm) (Minimum distance from the level meter: 80 mm)										-	Four digits				Set with reference to Figure 1. Four digits Example: In the case of 120 mm, set [0120].
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].

Optional code								Specifications
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	<input type="checkbox"/>	-	<input type="checkbox"/>	
Chamber	X			-		-		N/A
	1			-		-		Outer chamber
	2			-		-		Inner chamber
Gasket	X			-		-		N/A
	1			-		-		V#7020
	2			-		-		V#8591V-ZESZF (for stud bolts, choose from 3, 5, and 6)
	3			-		-		V#8596V-EESZF (for stud bolts, choose from 3, 5, and 6)
	4			-		-		V#6596V-EEZZ (for stud bolts, choose from 3, 5, and 6)
	5			-		-		V#7596V-EEZZ (for stud bolts, choose from 3, 5, and 6)
	9			-		-		Special (contact us)
Stud bolt, nut	X			-		-		N/A
	2			-		-		SUS304 (stainless steel)
	3			-		-		SNB7/S45C (A193-B7/A194-2H) (carbon steel)
	5			-		-		A193-B8CL2/A194-8 (stainless steel)
	6			-		-		A320-B8CL2/A194-8 (stainless steel for low temperature)
	9			-		-		Special (contact us)
Special processes, special examinations and inspections, accessories, etc. (Multiple selection is possible.)	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
	BP/			-		-		Wetted parts: Buff polishing
	EP/			-		-		Wetted parts: Electrolytic polishing
	SP/			-		-		Special painting
	LT/			-		-		Leakage test
	PT/			-		-		Penetrant test
	RT/			-		-		Radiographic test
	NC/			-		-		NACE test
	PMI/			-		-		PMI test
AC/			-		-		Accessories	
Document (Multiple selection is possible.)	-	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
	-	SC/						Strength calculation
	-	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	

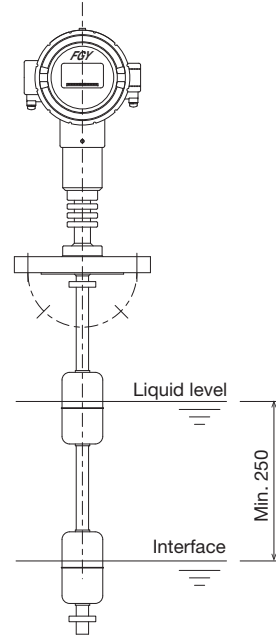
DRAWINGS AND DIMENSIONS

Figure 1 External dimensions (standard stainless steel wetted parts)



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

Figure 2 External dimensions (liquid level and interface measurements)



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)

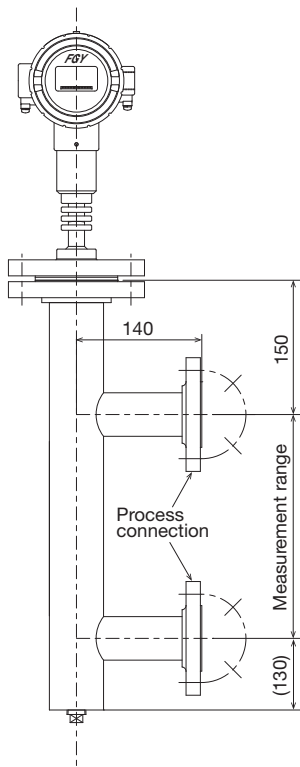
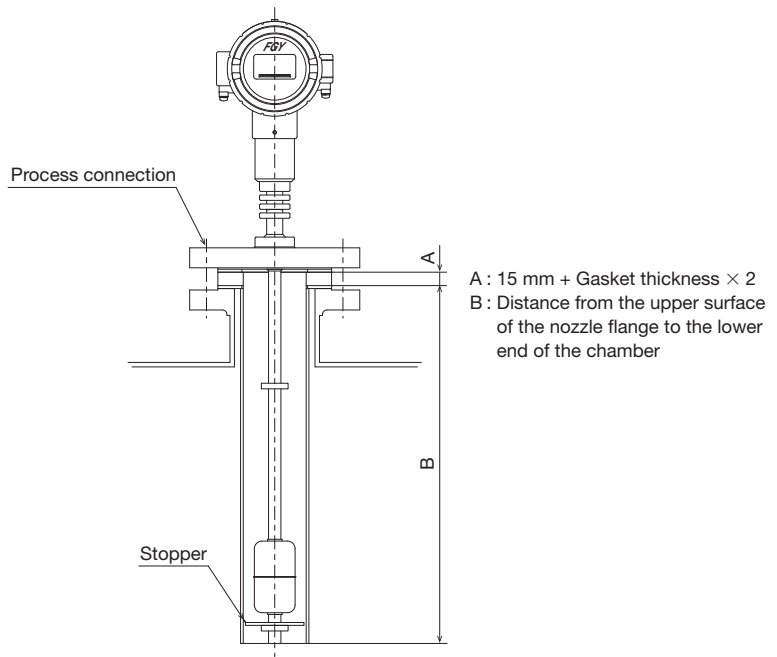
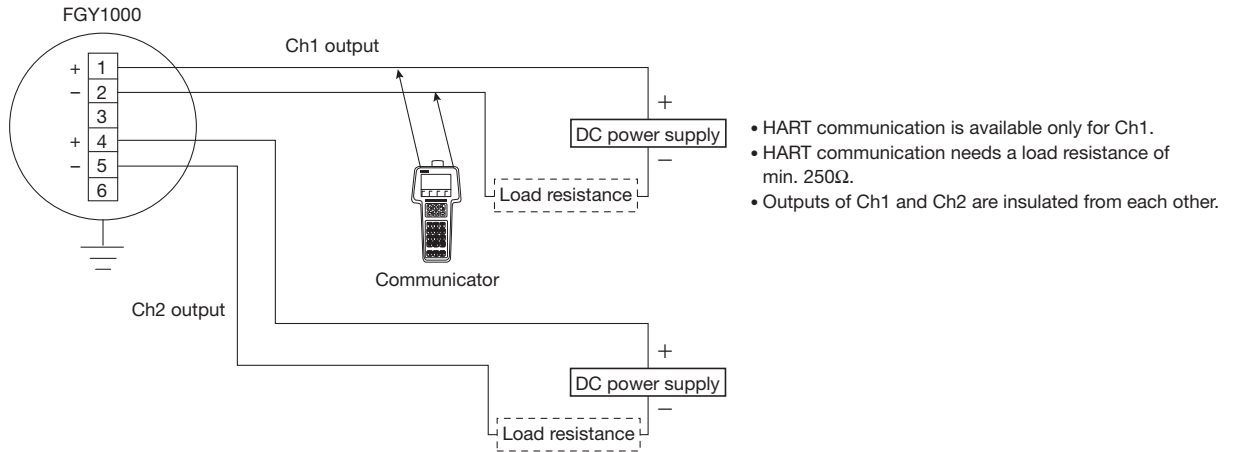


Figure 4 External dimensions (inner chamber)



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	FGY1			
3. Liquid temperature				
4. Tank pressure				
5. Other requests				

* Specification is subject to change without notice.

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