TECHNICAL GUIDANCE

MAG GAUGE
FM4000
METAL TUBE LEVEL GAUGE

GENERAL

The **FM4000** series metal tube level gauges are improved versions of the FM-1000 series level gauges that Tokyo Keiso has been manufacturing for many years.
Liquid level is indicated by rotating flappers in an indicator by the action of a magnet integrated in a float.
Alarm switches and/or analog output (4 to 20 mA DC) transmitters can be additionally provided for on-site checking and remote monitoring and control purposes.
Specifications for the high pressure gas certified product, PVC, or fluorocarbon resin linings are the same as those for the FM-1000 series.

FEATURES

❏ Metal tube (FM4100 to FM4800)
All pressure-resistant parts and wetted parts are made of metal and hence free from breakage or liquid leakage.

❏ Clear level indication
Fluorescent color flappers enable easy observation of liquid levels even from a distance. Indicators are free from blurs and smudges that are common with glass gauges.

❏ Three functions by a single gauge (on-site indication, alarm, and level transmission)
In addition to on-site indication, an alarm switch and an analog output (4 to 20 mA DC) transmitter can be additionally provided for minimizing the total cost of level control.

❏ Operable under harsh conditions
Pressure: Max. 40 MPa
Liquid temperature: –196 to +400°C
Measurable liquid density: Min. 0.39g/cm^3
Interface measurement: Density difference 0.2g/cm^3 and density sum 1.2g/cm^3 or higher
(These gauges cannot withstand the combination of maximum values.)

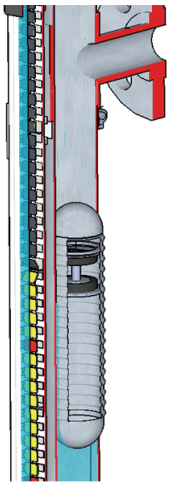
❏ Manufactured to meet customers' specifications
Gauges can be manufactured to meet customers' specifications such as connection size, measurement range, density, and vent and drain designs.
Contact us for details.

❏ High-performance analog output (4 to 20 mA DC) transmitter using magnetostrictive effect
High-precision analog output (4 to 20 mA DC) transmitter using the magnetostrictive effect can be additionally provided.
Conforms to Japanese, IECEx, ATEX, and Chinese explosion-proof standards.

❏ Explosion-proof alarm switch
Conforms to Japanese, IECEx, ATEX, and Chinese explosion-proof standards.

OPERATION PRINCIPLE

A float with an integrated magnet is located in a metal tube (chamber). This float moves up and down depending on the liquid level in the chamber with a specified draft line. In an indicator unit, rotating flappers made of plastic magnets are arranged at every 10 mm. The front surfaces of the flappers are black and the other surfaces are colored in yellow at every 10 mm and red at every 100 mm from a reference position. These flappers rotate and their colors change due to the movement of the float, thus indicating the liquid level. Alarm switches and/or an analog output (4 to 20 mA DC) transmitter with a magnetostrictive sensor can be provided additionally onto this level indicator.



TOKYO KEISO CO., LTD.

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7th edition May 2025 K
1st edition Nov 2021 K

STANDARD SPECIFICATIONS

Process specifications

Model	FM4100	FM4200	FM4300	FM4400	FM4500	FM4600	FM4700	FM4800
Main tube size	40A	50A	50A	50A	50A	50A	50A	65A
Maximum pressure	2 MPa	2 MPa	3 MPa	13 MPa	2 MPa	3 MPa	13 MPa	40 MPa
Liquid viscosity and liquid conditions	Liquids without sticking or freezing at 25 mPa·s or below	Liquids without sticking or freezing at 600 mPa·s or below						
Minimum density	More than 0.41g/cm^3	More than 0.39g/cm^3	More than 0.39g/cm^3	More than 0.52g/cm^3	More than 0.39g/cm^3	More than 0.39g/cm^3	More than 0.57g/cm^3	More than 0.84g/cm^3
Operable temperature range (without freezing)	–196 to +400°C	–10 to +120°C	–10 to +120°C	–10 to +120°C	–196 to +400°C	–196 to +225°C	–196 to +400°C	–10 to +120°C

Each condition indicates individual values. For details, see the Model Code page.

<Selection table for process temperature and pressure ranges>

Temperature/pressure	To 2 MPa	To 3 MPa	To 13 MPa	To 40 MPa
To 120°C	FM4100 (40A) FM4200 (50A)	FM4300 (50A)	FM4400 (50A)	FM4800 (65A)
To 225°C	FM4100 (40A) FM4500 (50A)	FM4600 (50A)	FM4700 (50A)	–
To 400°C	FM4100 (40A) FM4500 (50A)	FM4700 (50A)	FM4700 (50A)	–

See the code table for each model (after page 10) for the availability.

Main body specifications

Measurement range : Minimum measurement length 250 mm
Maximum measurement length 4,800 mm

Level indicator : Indication method : Color flapper method
Flapper pitch : 10 mm
Indication accuracy : ±15 mm
Flapper indication color : Without scale plate : Yellow/every 10 mm, red/every 100 mm, black/no liquid
With scale plate : Yellow/every 10 mm, black/no liquid

Chamber (metal tube) size
: 40A welded tube
50A welded tube
50A seamless tube
65A seamless tube

Process connection : Flange standard : JIS 10K, JIS 20K, ASME class 150, ASME class 300, JPI class 150, JPI class 300, and others
Flange size : 25A (1") [Standard], 15A (1/2"), 20A (3/4"), 40A (1-1/2"), 50A (2")

Chamber bottom flange (drain part)
: 1-1/2" JPI, 2" JPI, or 2-1/2"" JPI

Vent design : R1/2 vent plug [Standard], NPT1/2 vent plug, and others

Drain design : R1/2 vent plug [Standard], NPT1/2 vent plug, Rc1/2 ball valve, and others

MATERIAL

	Parts	Material		Remarks
Wetted and gas contact parts	Chamber (Metal tube)	40A	SUS304	T tube: SCS16
			SUS316	T tube: SCS16
			SUS316L	
			Other special materials	
		50A 65A	SUS304	
			SUS316	
			SUS316L	
			Other special materials	
	Float	SUS316L [Standard] Pure titanium JIS type 2 Titanium alloy (Ti-6Al-4V)		
	Process connection flange	SUS304 SUS316 SUS316L Other special materials		
	Chamber bottom flange	SUS304 SUS316 SUS316L Other special materials		
	Vent plug	SUS304 SUS316 SUS316L Other special materials		
	Drain plug	SUS304 SUS316 SUS316L Other special materials		
	Gasket for chamber bottom flange	Valqua 7020 (sheet gasket)		−50 ≤ Process temperature ≤ +150°C
		Valqua 7026 (sheet gasket)		−50 ≤ Process temperature ≤ +150°C
		Valqua 8591V (spiral wound gasket)		−196°C ≤ Process temperature < +300°C
		Valqua 8596V (spiral wound gasket)		−196°C ≤ Process temperature < +300°C
		Valqua 6596V (graphite spiral wound gasket)		−196°C ≤ Process temperature ≤ +400°C
		Valqua 7596V (PTFE spiral wound gasket)		−196°C ≤ Process temperature ≤ +300°C
		Octagonal ring joint gasket SUS316L		
		Others		

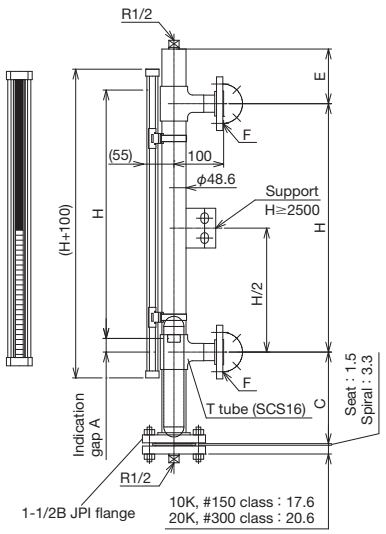
	Parts	Material	Remarks
Non-wetted and gas contact parts	Indicator housing	Aluminum alloy	External surface: Silver/black paint
	Indicator window	Acrylic resin [Standard]	−10 ≤ Process temperature ≤ +350°C
		Glass	+350 < Process temperature ≤ +400°C
		Acrylic resin	−196 < Process temperature ≤ +150°C
	Indicator mounting bracket	Stainless steel	
	Bolts and nuts for chamber bottom flange	Carbon steel A193-B7/A194-2H [Standard]	Process temperature ≥ 0°C
		SUS304	Only for the case of sheet gaskets
		Stainless steel A193-B8CL2/A194-8 (Equivalent to 304SS)	Process temperature ≥ 0°C
		Stainless steel A320-B8CL2/A194-8 (Equivalent to 304SS)	Process temperature < 0°C

✻ See the model code for the applicable range and combination of materials.

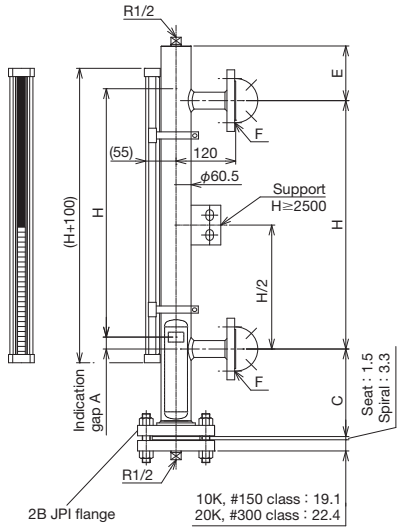
EXTERNAL DIMENSIONS

Main body

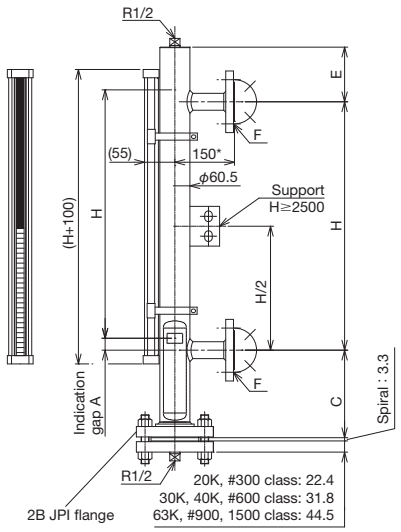
FM4100【Metal tube 40A slim type】



FM4200,4300【Metal tube 50A】

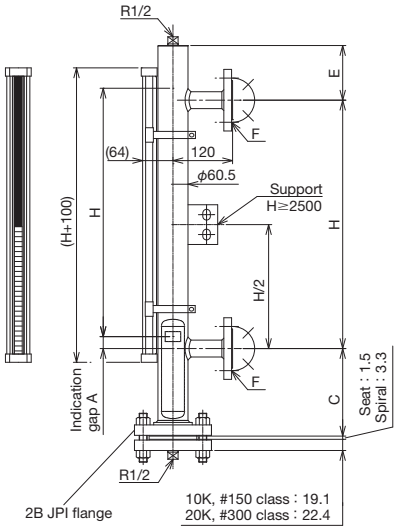


FM4400【Metal tube 50A】

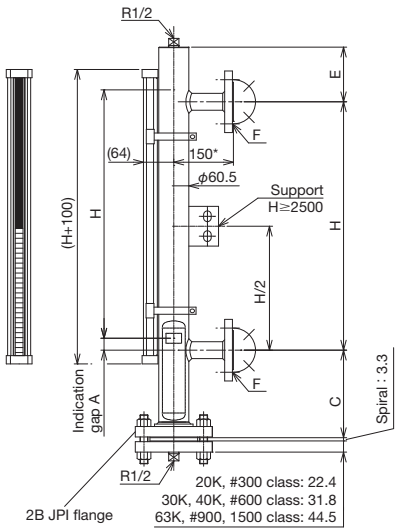


*180 for 2B#900,1500.

FM4500,4600【Metal tube 50A】

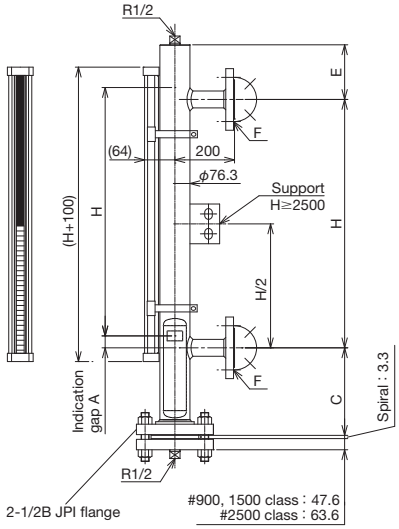


FM4700【Metal tube 50A】



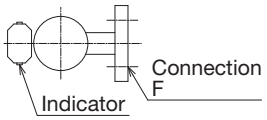
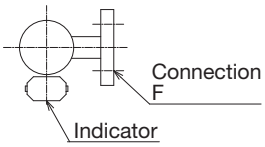
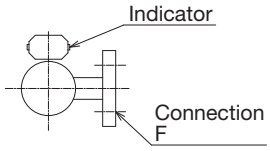
*180 for 2B#900,1500.

FM4800【Metal tube 65A】



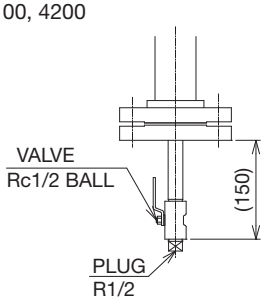
• Refer to the detailed diagram of the support on page 6 for the dimensions of the support.

Indicator mounting direction

No.F【Standard】	No.R	No.L
		

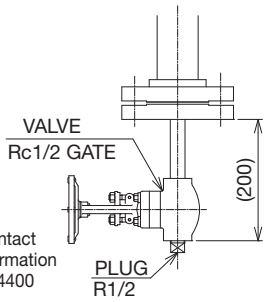
Drain

No.B
FM4100, 4200



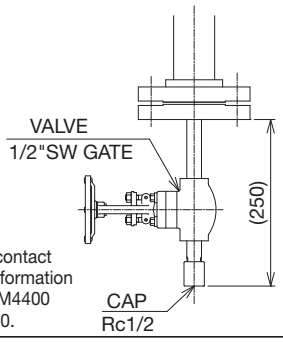
Negative pressure or alkaline liquid not allowed,
T ≤ +130ºC

No.G
FM4100 to 4700



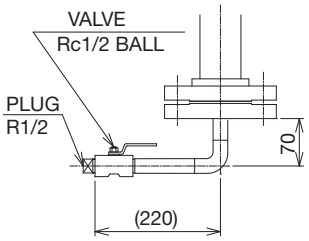
Please contact us for information about FM4400 and 4700.

No.W
FM4100 to 4700



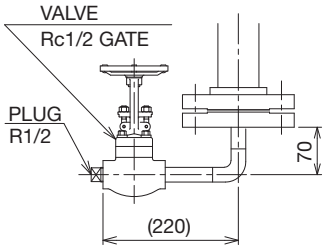
Please contact us for information about FM4400 and 4700.

No.L
FM4100, 4200



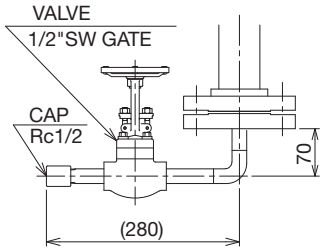
Negative pressure or alkaline liquid not allowed,
T ≤ +130ºC

No.C
FM4100 to 4700



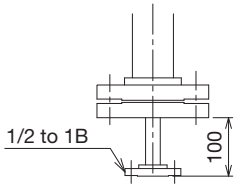
Please contact us for information about FM4400 and 4700.

No.Q
FM4100 to 4700



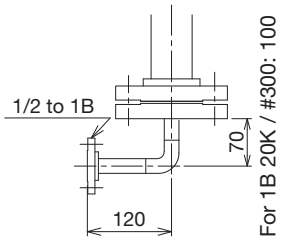
Please contact us for information about FM4400 and 4700.

No.H
FM4100 to 4700



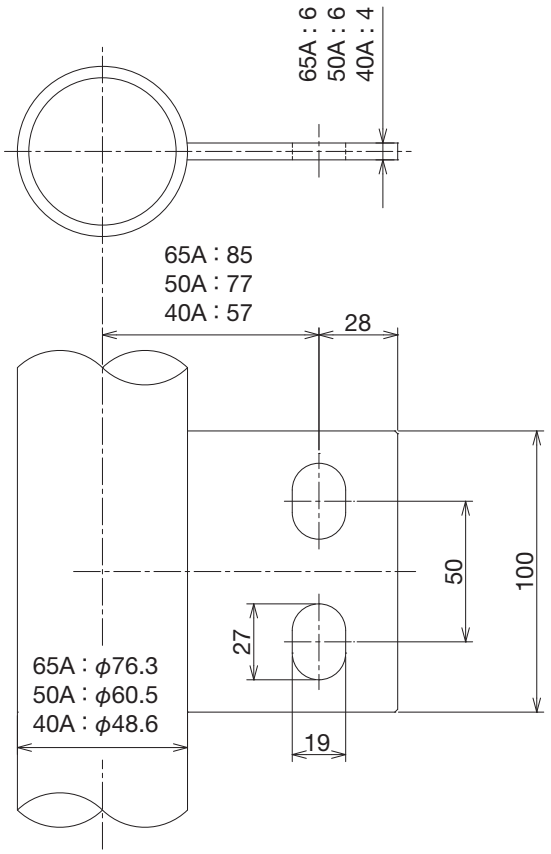
Please contact us for information about FM4400 and 4700.

No.K
FM4100 to 4700



Please contact us for information about FM4400 and 4700.

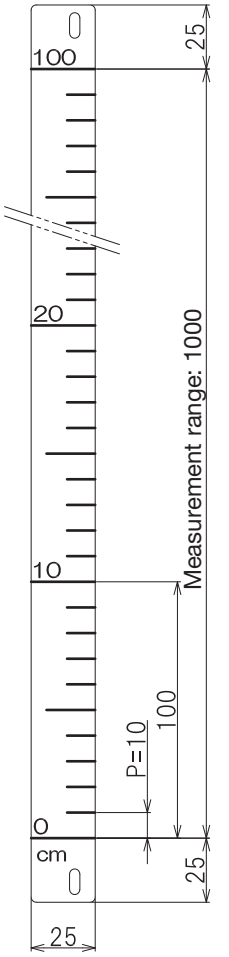
Support



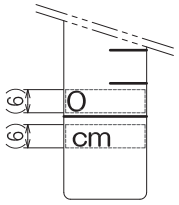
- A support is provided when the face-to-face dimension is 2,500 mm or longer.
- The support material is 304SS.
- Mounting holes on a support are designed for M16 bolts. When M16 bolts are not applicable, M12 bolts can be used instead with plain washers of 12 nominal diameter.

Level scale plate

Example: 1,000 mm measurement range (left-side mounting)



Material : SUS304
Plate thickness : t1.5
Background color : White
Font color : Black
Character size : 6
Graduation : Black

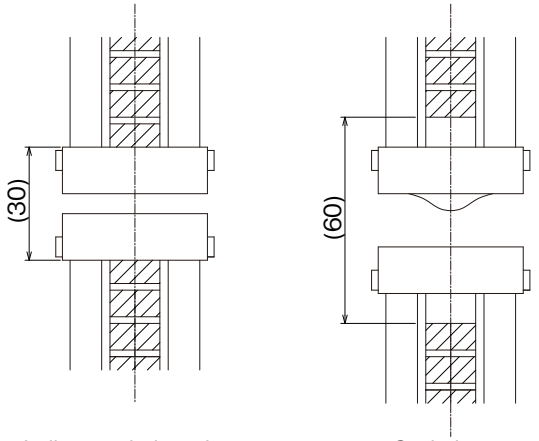


Example of character size

- Standard: Left-side mounting
- When the gauge comes with a scale plate, the flapper indication color is yellow only at every 10 mm.
- For using a capacity scale plate, a tank table is required to see both capacity and liquid level.

Indicator

Indicator window acrylic : A single indicator can cover the measurement range of up to 4,800 mm.
Indicator window glass : A single indicator can cover the measurement range of up to 800 mm.
When a wider measurement range is required, an indicator is separated into two parts resulting in a no indication zone of about 30 mm width, as illustrated below.
Sealed type : A single indicator can cover the measurement range of up to 2,900 mm.
When a wider measurement range is required, an indicator is separated into two parts resulting in a no indication zone of about 60 mm width, as illustrated below.



Indicator window glass　　Sealed type

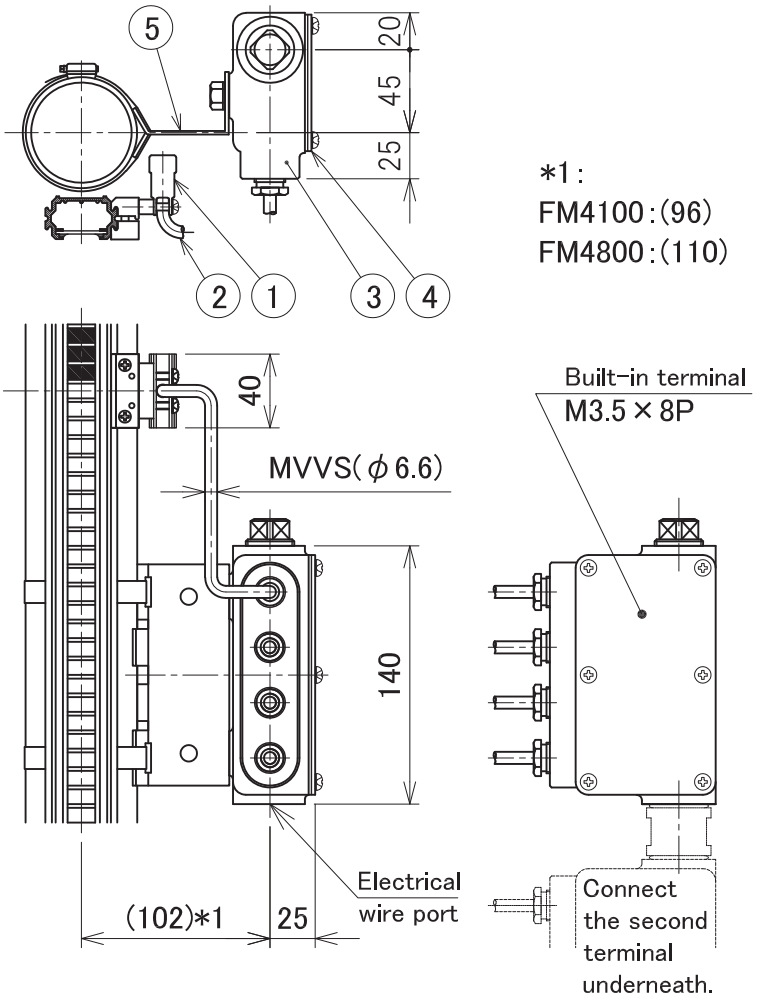
WATERPROOF (NON-EXPLOSION-PROOF) ALARM SWITCH SPECIFICATIONS

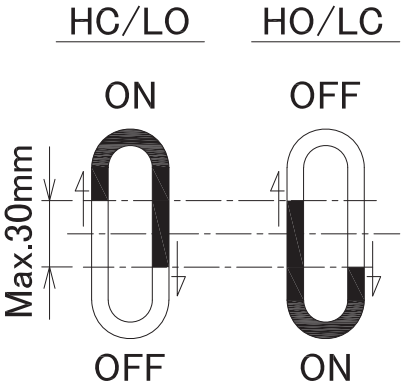
Separate Terminal Box Type Model

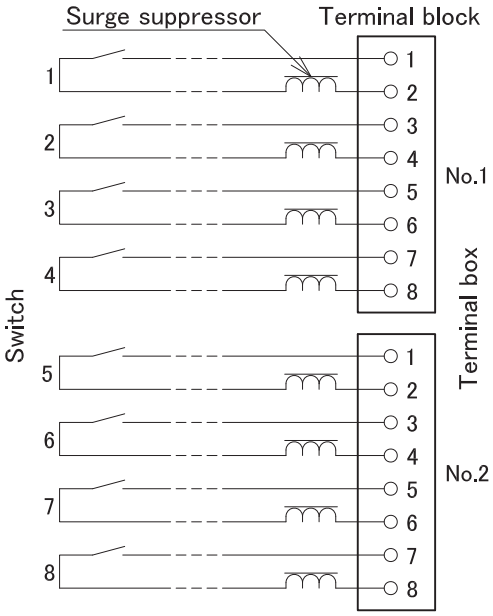
Detection method : Reed switch SPST (self-holding contact)
Liquid temperature : -10 to +200°C
Ambient temperature : -10 to +60°C
Contact capacity : 10VA AC, 10W DC
(Maximum applied voltage AC/DC 100V)
Reproducibility : ±15 mm
Differential gap : Within 30 mm
Contact operation : Upper limit (HC, HO), Lower limit (LC, LO)
Minimum alarm interval : 50 mm (HC-LC: 70 mm)
Can be set below this if the installation direction is divided into left and right.
Maximum number of alarm points: Number of points where switches can be installed
Allowable range : Cannot be set 50 mm above or below the measurement range.
Protection class : Equivalent to IP54
Wiring connection : 1 x G3/4
Terminal box : Used to pull in cables from each reed switch and connect terminals.
Terminal block : 8P (M3.5)
Inlet from switch with one terminal box: Maximum four points (For five or more points, connect a second terminal box under this one.)

Separate terminal box type model (equivalent to the conventional FM-1000 model)

Separate terminal box type model that is the same as the conventional FM-1000 model.
Select this if you want to update using the existing wiring from the FM-1000 model.
(Please contact us if you want to update the safe alarm from the FM-1000 model.)







[Materials and exterior]

No	Part	Material	Exterior
①	Switch body	A6063P	Anodized aluminum
②	Cable	PVC	---
③	Terminal box (case)	AC2A	Painted silver (polyurethane resin)
④	Terminal box (cover)	SUS304	Unpainted
⑤	Bracket	SUS304	Unpainted

ALARM SWITCH SPECIFICATIONS (OPTIONAL)

Standard (non-explosion-proof), intrinsically safe, and explosion-proof types are available.

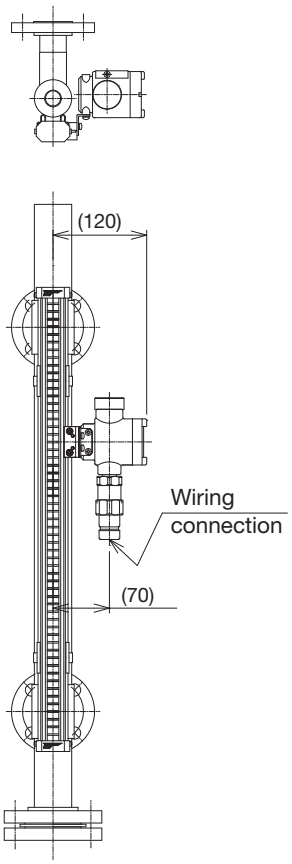
Detection method : Reed switch SPST
(mechanical self-holding contacts)
Ambient temperature : –40 to +60°C (Explosion-proof type depends on temperature class)
Ambient humidity : During operation: 0 to 95% R.H.
During storage : 0 to 85% R.H.
Material : Housing : ADC12 aluminum alloy
Cover : ADC12 aluminum alloy
Paint : Polyurethane resin
Color Housing : Light gray
Cover : Jade green
Contact capacity : 10 VA/W, 200 V DC 0.5 A, 140 V AC 0.35 A
Repeatability : ±15 mm
Reset span : Max. 30 mm
Contact operation : Upper limit, lower limit
Minimum alarm interval : 250 mm (the same direction)
For an alarm switch with an adapter and a cable ground: 300 mm
Setting range : From 50 mm above lower end to 50 mm below upper end.
Protection class : Equivalent to IP65
Explosion-proof design :

	Explosion-proof standard	Certificate number
IECEx (Intrinsically safe)	Ex ia IIC T6...T3 Ga	IECEx CML19.0067X
IECEx (Flameproof)	Ex db IIC T6...T3 Gb	
ATEX (Intrinsically safe)	Ⓔx II 1 G Ex ia IIC T6...T3 Ga	CML 19ATEX1241X
ATEX (Flameproof)	Ⓔx II 2 G Ex db IIC T6...T3 Gb	
JAPAN (Intrinsically safe)	Ex ia IIC T6...T3 Ga	CML 19JPN2512X
JAPAN (Flameproof)	Ex db IIC T6...T3 Gb	CML 19JPN1465X
CHINA (Intrinsically safe)	Ex ia IIC T3...T6 Ga	GYJ21. 3402X
CHINA (Flameproof)	Ex d IIC T3...T6 Gb	

Wiring connection : M20 × P1.5 female screw
Explosion-proof type, applicable cable diameter of attached glands
Built-in packings: ø10.0 to 10.9
Spare packings : ø9.0 to 9.9, ø11.0 to 11.9
Compatible standards : IECEx/ATEX, RoHS2 directive

Integrated terminal box model

This model does not have a terminal box to bundle the wiring unlike the conventional FM-1000 model.
If you update from the FM-1000 model, you cannot use the existing wiring as it is.
If you want to use the existing wiring, select a separate terminal box type model.
(Please contact us if you want to update the safe alarm from the FM-1000 model.)



Relation between process temperature and ambient temperature

[°C]

Ambient temperature		+60	+50	+40	+30	+20	+10	0	–10	–20	–30	–40
Process temperature (for each class)	T6	–196 to +125	–196 to +190	–196 to +255	–196 to +320	–196 to +385	–196 to +400	–196 to +400	–190 to +400	–125 to +400	–60 to +400	0 to +400
	T5	–196 to +225	–196 to +290	–196 to +355	–196 to +400	–196 to +400						
	T4	–196 to +290	–196 to +350	–196 to +400								
	T3											

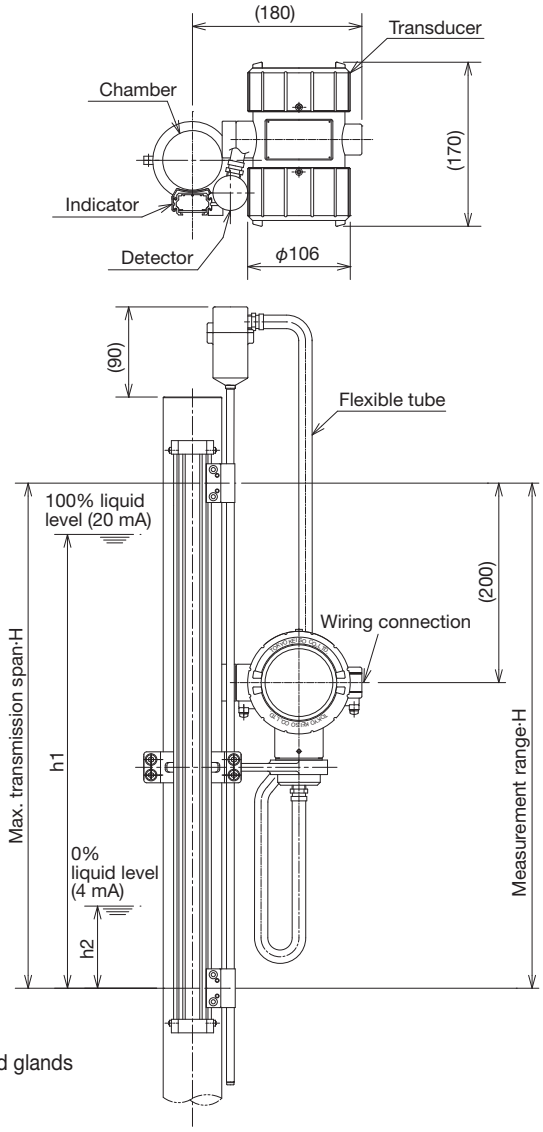
TRANSMITTER (4 to 20 mA DC) SPECIFICATIONS (MAGNETOSTRICTIVE SENSOR TYPE: OPTIONAL)

This unit detects liquid level by a magnetostrictive sensor and the magnet position in a float, and outputs a 4 to 20 mA DC signal. General (non-explosion-proof) and explosion-proof types are available.

Measurement method : Magnetostrictive
Measurement range : Min. 250 mm
Ambient temperature : –40 to +60°C
(Explosion-proof type depends on temperature class)
Ambient humidity : During operation : 0 to 95% R.H.
During storage : 0 to 85% R.H.
Material : Housing : ADC12 aluminum alloy
Cover : ADC12 aluminum alloy
Magnetostrictive sensor pipe : SUS304
Paint : Polyurethane resin
Paint color Housing : Light gray
Cover : Jade green
Display : LCD
Top line Function display
Middle line Data display (4 digits)
Bottom line Percent display by a bar graph
Power supply (UB) : 12 to 40 V DC
Output current : 4 to 20 mA DC (two-wire), HART (In preparation)
Allowable load resistance (Ra)
: Ra = [(UB) – 12]/0.02 (Ω)
600Ω or below when power supply voltage is 24 V DC
Signal range : 4 to 20 mA DC/20 to 4 mA DC (depending on the setting)
Operating range : 3.8 to 20.5 mA DC
Burnout function : ≤3.6 mA, ≥21.0 mA (conforms to NAMUR NE43)
Indication and output accuracy
: ±((0.1% F.S. or 2 mm, whichever is larger) + 3 mm)
Protection class : Equivalent to IP65
Explosion-proof design :

	Explosion-proof standard	Certificate number
IECEx	Ex db ia IIB T4 Gb	IECEx CML 20.0172X
ATEX	Ⓔx II 2 G Ex db ia IIB T4 Gb	CML 20ATEX1315X
JAPAN	Ex db ia IIB T4 Gb	CML 19JPN1392X
CHINA	Ex db ia IIB T4 Gb	GYJ24.1111X

Wiring connection : M20 × P1.5 female screw
Explosion-proof type, applicable cable diameter of attached glands
Built-in packings : ø10.0 to 10.9
Spare packings : ø9.0 to 9.9, ø11.0 to 11.9
Compatible standards : IECEx/ATEX, RoHS2 directive



Relation between process temperature and ambient temperature

Model FM4100 [°C]

Ambient temperature	+60	+50	+40	+30	+20	+10	0	–10	–20	–30	–40
Process temperature	–196 to +130	–196 to +165	–196 to +200	–196 to +235	–196 to +270	–196 to +305	–196 to +340	–196 to +375	–196～+400	–196～+400	–196 to +400

Model FM4200, 4300, 4400 [°C]

Ambient temperature	+60	+50	+40	+30	+20	+10	0	–10	–20	–30	–40
Process temperature	–196 to +120	–196 to +120	–196 to +120	–196 to +120	–196 to +120	–196 to +120	–196 to +120	–196 to +120	–196 to +120	–196 to +120	–196 to +120

Model FM4500, 4700 [°C]

Ambient temperature	+60	+50	+40	+30	+20	+10	0	–10	–20	–30	–40
Process temperature	–196 to +325	–196 to +400	–196 to +400	–196 to +400	–196 to +400	–196 to +400	–196 to +400	–196 to +400	–196 to +400	–196 to +400	–196 to +400

Model FM4600 [°C]

Ambient temperature	+60	+50	+40	+30	+20	+10	0	–10	–20	–30	–40
Process temperature	–196 to +225	–196 to +225	–196 to +225	–196 to +225	–196 to +225	–196 to +225	–196 to +225	–196 to +225	–196 to +225	–196 to +225	–196 to +225

MODEL CODE

FM4	(1) to (11)	(12) to (18)	(19) to (25)	/□□/□□/·····
	Main body specification code	Detail code	Alarm switch and magnetostrictive sensor code	Option code

The main body specification code and detail code are selected from the model code tables for FM4100 to FM4800.
(19) to (25) are additional codes for adding alarm switches and magnetostrictive sensors.
Option codes are added when non-standard inspection, paint, or treatment is required.
Fill in a specification confirmation sheet when a special specification (Z), alarm switch, or magnetostrictive sensor is added that is not included in each code table.

CONTENTS

FM4100 [Metal tube 40A Slim type] [2MPa] [–196°C ≤ T ≤ +150°C] [–10°C ≤ T ≤ +400°C]

FM4	(1)	(2)	(3)	–	(4)	(5)	(6)	(7)	–	(8)	(9)	(10)	(11)	–	(12)	(13)	(14)	–	(15)	(16)	(17)	(18)	Specification P: Design pressure (MPa), T: Design temperature (°C)
Main body specifications (mandatory)	Fixed code	1																					Metal tube 40A t2.0 welded tube Meter flange: JPI
	Chamber material		1																				304SS (T tube is available only in SCS16, which is equivalent to 316LSS.)
			2																				316SS (T tube is available only in SCS16, which is equivalent to 316LSS.)
			3																				316L SS
			Z																				Special (special material or seamless tube)
	Float	Float classification																					Density ρ (g/cm³)					Material	C	E	L
			A	–					–					–				–					0.41	≤	ρ	<	0.45	Titanium type 2	410	250	496
			B	–					–					–				–					0.45	≤	ρ	<	0.51		350	250	429
			C	–					–					–				–					0.51	≤	ρ	<	0.60		285	250	346
			D	–					–					–				–					0.60	≤	ρ	<	0.73		225	250	279
			E	–					–					–				–					0.73	≤	ρ	<	1.00		170	250	211
			1	–					–					–				–					0.56	≤	ρ	<	0.62	316L SS [Standard]	435	250	496
			2	–					–					–				–					0.62	≤	ρ	<	0.69		350	250	406
			3	–					–					–				–					0.69	≤	ρ	<	0.80		285	250	331
			4	–					–					–				–					0.80	≤	ρ	<	0.98		215	250	256
			5	–					–					–				–					0.98	≤	ρ	<	1.35		165	250	196
			Z	–					–					–				–					Special								
	Connection flange standard			–	J	1			–					–				–					JIS10K								
				–	J	4			–					–				–					JIS20K								
				–	A	2			–					–				–					ASME#150								
				–	A	5			–					–				–					ASME#300								
				–	P	2			–					–				–					JPI#150								
				–	P	5			–					–				–					JPI#300								
				–	Z	Z			–					–				–					Special								
	Connection flange design						R		–					–				–					RF								
							F		–					–				–					FF								
							Z		–					–				–					Special								
	Connection flange size							1	–					–				–					15A(1/2B)								
								2	–					–				–					20A(3/4B)								
								3	–					–				–					25A(1B) [Standard]								
								4	–					–				–					40A(1-1/2B)								
								5	–					–				–					50A(2B)								
								Z	–					–				–					Special								
	Connection nozzle face-to-face dimension (measurement range: H)								–					–				–					Face-to-face dimension (mm) Max. 4000 mm Example: 0900 for 900 mm *1								
									–	Z	Z	Z	Z	–				–					Special (when face-to-face dimension is different from measurement range)								
Detail code	Indicator (Indication color: yellow/every 10 mm, red/every 100 mm, and black/no liquid)													–	A			–					–10 ≤ T ≤ +350°C (Acrylic indication window) [Standard]								
														–	G			–					+350 < T ≤ +400°C (Glass indication window) *2								
														–	S			–					–196 ≤ T ≤ +150°C (Sealed type) *3								
														–	Z			–					Special (Special indication color) Example: white/no liquid, red/with liquid								
	Indicator mounting direction															F		–					Front [Standard]								
																L		–					Left side								
																R		–					Right side								
																Z		–					Special (45° and others)								
	Indicator scale plate (when a scale plate is attached, the indication color is yellow only at every 10 mm)																N	–					No [Standard]								
																	H	–					Level scale (standard when a scale plate is attached) (standard: left-side mounting)								
																	Z	–					Special (capacity scale and others)								
	Vent design																	–	V				R1/2 vent plug [Standard]								
																		–	N				NPT1/2 vent plug								
																		–	Z				Special (other valves or additional flanges)								
	Drain design (the valve handle faces in the same direction as the indicator)																			R			R1/2 drain plug [Standard]								
																				N			NPT1/2 drain plug								
																				B			With a valve (Rc1/2 ball valve) (negative pressure or alkaline liquid not allowed, T ≤ +130°C) (stop plug)*4								
																				G			With a valve (Rc1/2 gate valve) (stop plug)								
																				W			With a valve (SW1/2 gate valve) (stop cap)								
																				L			With a valve (Rc1/2 ball valve) (negative pressure or alkaline liquid not allowed, T ≤ +130°C) (stop plug) (elbow) *4								
																				C			With a valve (Rc1/2 gate valve) (plug lock type) (elbow)								
																				Q			With a valve (SW1/2 gate valve) (cap lock type) (elbow)								
																				H			With a flange (1/2 to 1B) *9								
																				K			With a flange (1/2 to 1B) (elbow) *9								
																				Z			Special								
	Gasket (gaskets for process connection should be supplied by the customer)																				1		V#7020 (sheet gasket) –50 ≤ T ≤ +150°C *5								
																					2		V#7026 (sheet gasket) –50 ≤ T ≤ +150°C *6								
																					8		V#8591V (spiral wound gasket) [Standard] –196°C ≤ T < +300°C *7								
																					9		V#8596V (spiral wound gasket) [Standard for negative pressure] –196°C ≤ T < +300°C *8								
																					6		V#6596V (graphite spiral wound gasket) –196°C ≤ T ≤ +400°C *8								
																					7		V#7596V (PTFE spiral wound gasket) –196°C ≤ T ≤ +300°C *8								
																					Z		Special								
	Bolt/Nut (bolts and nuts for process connection should be supplied by the customer)																					A	304SS (only sheet gasket is available)								
																						H	A193-B7/A194-2H (carbon steel) [Standard] T ≥ 0°C								
																						B	A193-B8CL2/A194-8 (equivalent to 304SS) T ≥ 0°C								
																						L	A320-B8CL2/A194-8 (equivalent to 304SS) T < 0°C								
																						Z	Special								

- See the supplementary code table on another page for dimensions C and E and the indicator mounting direction.
- Manufacturable face-to-face dimension: Max. 4,000 mm
- Accepts negative pressure (F. V.).
- Viscosity up to 25mPa·s (Not applicable to high-viscosity fluids such as oil)
- Electropolishing, acid cleaning, and buffing are not applicable.
- Not applicable to interface measurements.

*1 When the face-to-face dimension is longer than 2,500 mm, a support is attached at the middle of the face-to-face dimension. See the supplementary code table.
*2 A single indicator can cover the measurement range of up to 800 mm. When a wider measurement range is required, an indicator is separated into two parts resulting in a no indication zone of about 30 mm width. See the supplementary code table.
*3 A single indicator can cover the measurement range of up to 2,900 mm. When a wider measurement range is required, an indicator is separated into two parts resulting in a no indication zone of about 60 mm width. See the supplementary code table.
*4 Select a gate valve when the chamber material is 316LSS. (There is no other material equivalent to 316LSS.)
*5 High-concentration alkaline liquids or polymerizable monomers are not allowed.
*6 High-concentration acidic liquids or polymerizable monomers are not allowed.
*7 Hoop: The same material as the chamber. Outer ring: Carbon steel (304SS for T < 0°C)
*8 Inner ring and hoop: The same material as the chamber. Outer ring: Carbon steel (304SS for T < 0°C)
*9 Specify the specifications and sizes of flanges.

Allowable measurement temperature and pressure
Float No. A to E (titanium type 2)

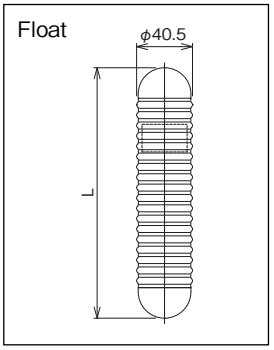
T(°C)	–196	–175	–150	–125	–100	–75	–50	–25	0	25	50	75
P(MPa)	1	1	1	1	1	1	1	1	1	1	1	1

T(°C)	100	125	150	175	200	225	250	275	300	325	350
P(MPa)	1	1	0.9	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.5

Float No. 1 to 5 (316L SS)

T(°C)	–196	–175	–150	–125	–100	–75	–50	–25	0	25	50	75
P(MPa)	2	2	2	2	2	2	2	2	2	2	2	2

T(°C)	100	125	150	175	200	225	250	275	300	325	350	375	400
P(MPa)	2	2	1.9	1.7	1.6	1.5	1.5	1.4	1.4	1.3	1.3	1.2	1.2



FM4200 [Metal tube 50A] [2MPa] [–10°C ≤ T ≤ +120°C]

FM4	(1)	(2)	(3)	–	(4)	(5)	(6)	(7)	–	(8)	(9)	(10)	(11)	–	(12)	(13)	(14)	–	(15)	(16)	(17)	(18)	Specification P: Design pressure (MPa), T: Design temperature (°C)
Main body specifications (mandatory)	Fixed code	2			–				–					–				–					Metal tube 50A t3.0 welded tube Meter flange: JPI
	Chamber material		1		–				–					–				–					304 SS
			2		–				–					–				–					316 SS
			3		–				–					–				–					316L SS
			Z		–				–					–				–					Special (special material or seamless tube)

Float classification	Density ρ (g/cm³)					Material	C	E	L
A	0.39	≤	ρ	≤	0.45	Titanium type 2	420	250	471
0	0.44	≤	ρ	≤	0.52		335	250	381
1	0.50	≤	ρ	≤	0.60		260	250	301
2	0.55	≤	ρ	≤	0.70		230	250	271
3	0.62	≤	ρ	≤	0.80		190	250	221
N	0.60	≤	ρ	≤	0.70	316L SS [Standard]	410	250	441
P	0.65	≤	ρ	≤	0.80		330	250	361
5	0.70	≤	ρ	≤	0.90		280	250	311
6	0.80	≤	ρ	≤	1.00		215	250	241
7	0.90	≤	ρ	≤	1.40		175	250	201
8	1.00	≤	ρ	≤	1.50		155	250	181
9	1.25	≤	ρ	≤	2.00		150	250	171
Z	Special								

Main body specifications (mandatory)	Connection flange standard			–	J	1			–					–				–					JIS10K
				–	J	4			–					–				–					JIS20K
				–	A	2			–					–				–					ASME#150
				–	A	5			–					–				–					ASME#300
				–	P	2			–					–				–					JPI#150
				–	P	5			–					–				–					JPI#300
				–	Z	Z			–					–				–					Special
	Connection flange design						R		–					–				–					RF
							F		–					–				–					FF
							Z		–					–				–					Special
	Connection flange size							1	–					–				–					15A (1/2B)
								2	–					–				–					20A (3/4B)
								3	–					–				–					25A (1B) [Standard]
								4	–					–				–					40A (1-1/2B)
								5	–					–				–					50A (2B)
								Z	–					–				–					Special
	Connection nozzle face-to-face dimension (measurement range: H)								–					–				–					Face-to-face dimension (mm) Max. 4800 mm Example: 0900 for 900 mm *1
									–	Z	Z	Z	Z	–				–					Special (when face-to-face dimension is different from measurement range)
	Indicator (Indication color: yellow/every 10 mm, red/every 100 mm, and black/no liquid)													–	A			–					–10 ≤ T ≤ +120°C (Acrylic indication window) [Standard]
														–	S			–					–10 ≤ T ≤ +100°C (Sealed type) *2
														–	Z			–					Special (Special indication color) Example: white/no liquid, red/with liquid
	Indicator mounting direction															F		–					Front [Standard]
																L		–					Left side
																R		–					Right side
																Z		–					Special (45° and others)
	Indicator scale plate (when a scale plate is attached, the indication color is yellow only at every 10 mm)																N	–					No [Standard]
																	H	–					Level scale (standard when a scale plate is attached) (standard: left-side mounting)
																	Z	–					Special (capacity scale and others)
	Vent design																	–	V				R1/2 vent plug [Standard]
																		–	N				NPT1/2 vent plug
																		–	Z				Special (other valves or additional flanges)
	Drain design (the valve handle faces in the same direction as the indicator)																			R			R1/2 drain plug [Standard]
																				N			NPT1/2 drain plug
																				B			With a valve (Rc1/2 ball valve) (negative pressure or alkaline liquid not allowed, T ≤ +130°C) *3
																				G			With a valve (Rc1/2 gate valve) (stop plug)
																				W			With a valve (SW1/2 gate valve) (stop cap)
																				L			With a valve (Rc1/2 ball valve) (negative pressure or alkaline liquid not allowed, T ≤ +130°C) *3
																				C			With a valve (Rc1/2 gate valve) (plug lock type) (elbow)
																				Q			With a valve (SW1/2 gate valve) (cap lock type) (elbow)
																				H			With a flange (1/2 to 1B) *8
																				K			With a flange (1/2 to 1B) (elbow) *8
																				Z			Special
	Gasket (gaskets for process connection should be supplied by the customer)																				1		V#7020 (sheet gasket) *4
																					2		V#7026 (sheet gasket) *5
																					8		V#8591V (spiral wound gasket) [Standard] *6
																					9		V#8596V (spiral wound gasket) [Standard for negative pressure] *7
																					6		V#6596V (graphite spiral wound gasket) *7
																					7		V#7596V (PTFE spiral wound gasket) *7
																					Z		Special
	Bolt/Nut (bolts and nuts for process connection should be supplied by the customer)																					A	304SS (only sheet gasket is available)
																						H	A193-B7/A194-2H (carbon steel) [Standard] T≥0°C
																						B	A193-B8CL2/A194-8 (equivalent to 304SS) T≥0°C
																						L	A320-B8CL2/A194-8 (equivalent to 304SS) T<0°C
																						Z	Special

- See the supplementary code table on another page for dimensions C and E and the indicator mounting direction.
- Manufacturable face-to-face dimension: Max. 4,800 mm
- Accepts negative pressure (F. V.).
- Applicable to interface measurements. (Minimum density difference 0.2g/cm³ and minimum density sum 1.2g/cm³.) There will be a dead zone at the top of the measurement range. Contact us for details.

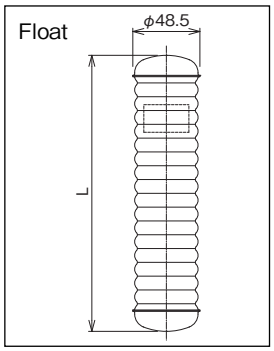
*1 When the face-to-face dimension is longer than 2,500 mm, a support is attached at the middle of the face-to-face dimension. See the supplementary code table.
*2 A single indicator can cover the measurement range of up to 2,900 mm. When a wider measurement range is required, an indicator is separated into two parts resulting in a no indication zone of about 60 mm width. See the supplementary code table.
*3 Select a gate valve when the chamber material is 316LSS. (There is no other material equivalent to 316LSS.)
*4 High-concentration alkaline liquids or polymerizable monomers are not allowed.
*5 High-concentration acidic liquids or polymerizable monomers are not allowed.
*6 Hoop: The same material as the chamber. Outer ring: Carbon steel (304SS for T < 0°C)
*7 Inner ring and hoop: The same material as the chamber. Outer ring: Carbon steel (304SS for T < 0°C)
*8 Specify the specifications and sizes of flanges.

Allowable measurement temperature and pressure
Float No. A to 3 (titanium type 2)

T(°C)	–10	0	25	50	75	100	120
P(MPa)	1	1	1	1	1	1	0.9

Float No. N to 9 (316L SS)

T(°C)	–10	0	25	50	75	100	120
P(MPa)	2	2	2	2	2	2	2



FM4300 [Metal tube 50A] [3MPa] [–10°C ≤ T ≤ +120°C]

	FM4	(1)	(2)	(3)	–	(4)	(5)	(6)	(7)	–	(8)	(9)	(10)	(11)	–	(12)	(13)	(14)	–	(15)	(16)	(17)	(18)	Specification P: Design pressure (MPa), T: Design temperature (°C)
Main body specifications (mandatory)	Fixed code	3			–					–					–				–					Metal tube 50A t3.0 welded tube Meter flange: JPI
	Chamber material		1		–					–					–				–					304 SS
			2		–					–					–				–					316 SS
			3		–					–					–				–					316L SS
			Z		–					–					–				–					Special (special material or seamless tube)
	Float		Float classification																					Density ρ (g/cm³)
			A		–					–					–				–					0.39 ≤ ρ ≤ 0.45
			0		–					–					–				–					0.44 ≤ ρ ≤ 0.52
			1		–					–					–				–					0.50 ≤ ρ ≤ 0.60
			2		–					–					–				–					0.55 ≤ ρ ≤ 0.70
			3		–					–					–				–					0.62 ≤ ρ ≤ 0.80
			N		–					–					–				–					0.60 ≤ ρ ≤ 0.70
			P		–					–					–				–					0.65 ≤ ρ ≤ 0.80
			5		–					–					–				–					0.70 ≤ ρ ≤ 0.90
			6		–					–					–				–					0.80 ≤ ρ ≤ 1.00
			7		–					–					–				–					0.90 ≤ ρ ≤ 1.40
			8		–					–					–				–					1.00 ≤ ρ ≤ 1.50
			9		–					–					–				–					1.25 ≤ ρ ≤ 2.00
			Z		–					–					–				–					Special
	Connection flange standard			–	J	1			–					–				–					JIS10K
				–	J	4			–					–				–					JIS20K
				–	A	2			–					–				–					ASME#150
				–	A	5			–					–				–					ASME#300
				–	P	2			–					–				–					JPI#150
				–	P	5			–					–				–					JPI#300
				–	Z	Z			–					–				–					Special
	Connection flange design						R		–					–				–					RF
							F		–					–				–					FF
							Z		–					–				–					Special
	Connection flange size							1	–					–				–					15A(1/2B)
								2	–					–				–					20A(3/4B)
								3	–					–				–					25A(1B) [Standard]
								4	–					–				–					40A(1-1/2B)
								5	–					–				–					50A(2B)
								Z	–					–				–					Special
	Connection nozzle face-to-face dimension (measurement range: H)								–					–				–					Face-to-face dimension (mm) Max. 4700 mm Example: 0900 for 900 mm *1
									–	Z	Z	Z	Z	–				–					Special (when face-to-face dimension is different from measurement range)
Detail code	Indicator (Indication color: yellow/every 10 mm, red/every 100 mm, and black/no liquid)														–	A			–					–10 ≤ T ≤ +120°C (Acrylic indication window) [Standard]
															–	S			–					–10 ≤ T ≤ +100°C (Sealed type) *2
															–	Z			–					Special (Special indication color) Example: white/no liquid, red/with liquid
	Indicator mounting direction																F		–					Front [Standard]
																	L		–					Left side
																	R		–					Right side
																	Z		–					Special (45° and others)
	Indicator scale plate (when a scale plate is attached, the indication color is yellow only at every 10 mm)																	N	–					No [Standard]
																		H	–					Level scale (standard when a scale plate is attached) (standard: left-side mounting)
																		Z	–					Special (capacity scale and others)
	Vent design																		–	V				R1/2 vent plug [Standard]
																			–	N				NPT1/2 vent plug
																			–	Z				Special (other valves or additional flanges)
	Drain design (the valve handle faces in the same direction as the indicator)																				R			R1/2 drain plug [Standard]
																					N			NPT1/2 drain plug
																					G			With a valve (Rc1/2 gate valve) (stop plug)
																					W			With a valve (SW1/2 gate valve) (stop cap)
																					C			With a valve (Rc1/2 gate valve) (plug lock type) (elbow)
																					Q			With a valve (SW1/2 gate valve) (cap lock type) (elbow)
																					H			With a flange (1/2 to 1B) *5
																					K			With a flange (1/2 to 1B) (elbow) *5
																					Z			Special
	Gasket (gaskets for process connection should be supplied by the customer)																					8		V#8591V (spiral wound gasket) [Standard] *3
																						9		V#8596V (spiral wound gasket) [Standard for negative pressure] *4
																						6		V#6596V (graphite spiral wound gasket) *4
																						7		V#7596V (PTFE spiral wound gasket) *4
																						Z		Special
	Bolt/Nut (bolts and nuts for process connection should be supplied by the customer)																						H	A193-B7/A194-2H (carbon steel) [Standard] T≥0°C
																							B	A193-B8CL2/A194-8 (equivalent to 304SS) T≥0°C
																							L	A320-B8CL2/A194-8 (equivalent to 304SS) T<0°C
																							Z	Special

- See the supplementary code table on another page for dimensions C and E and the indicator mounting direction.
- Manufacturable face-to-face dimension: Max. 4,700 mm
- Accepts negative pressure (F. V.).
- Applicable to interface measurements. (Minimum density difference 0.2g/cm³ and minimum density sum 1.2g/cm³.) There will be a dead zone at the top of the measurement range. Contact us for details.

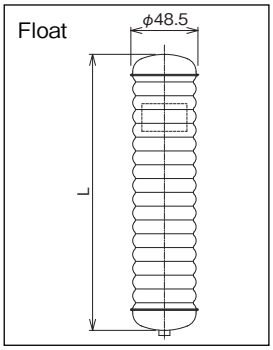
*1 When the face-to-face dimension is longer than 2,500 mm, a support is attached at the middle of the face-to-face dimension. See the supplementary code table.
*2 A single indicator can cover the measurement range of up to 2,900 mm. When a wider measurement range is required, an indicator is separated into two parts resulting in a no indication zone of about 60 mm width. See the supplementary code table.
*3 Hoop: The same material as the chamber. Outer ring: Carbon steel (304SS for T < 0°C)
*4 Inner ring and hoop: The same material as the chamber. Outer ring: Carbon steel (304SS for T < 0°C)
*5 Specify the specifications and sizes of flanges.

Allowable measurement temperature and pressure
Float No. A to 3 (titanium type 2)

T(°C)	–10	0	25	50	75	100	120
P(MPa)	2	2	2	2	2	2	1.9

Float No. N to 9 (316L SS)

T(°C)	–10	0	25	50	75	100	120
P(MPa)	3	3	3	3	3	3	3



FM4400 [Metal tube 50A] [13MPa] [–10°C ≤ T ≤ +120°C]

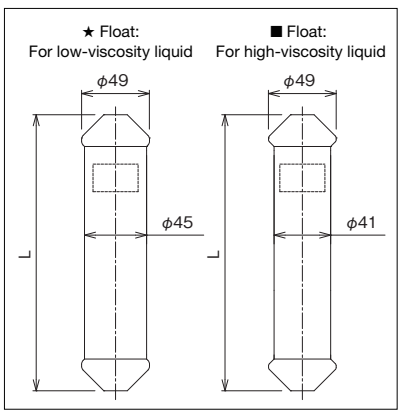
FM4	(1)	(2)	(3)	–	(4)	(5)	(6)	(7)	–	(8)	(9)	(10)	(11)	–	(12)	(13)	(14)	–	(15)	(16)	(17)	(18)	Specification P: Design pressure (MPa), T: Design temperature (°C)								
Main body specifications (mandatory)	Fixed code	4			–					–					–				–					Metal tube 50A Sch40 (t3.9) seamless tube Meter flange: JPI								
	Chamber material		1		–					–					–				–					304 SS								
			2		–					–					–				–					316 SS								
			3		–					–					–				–					316L SS								
			Z		–					–					–				–					Special								
	Float	Float classification																					Density ρ (g/cm³)					Material/Use	C	E	L
			A	–					–					–				–					0.52	≤	ρ	<	0.54	Ti-6Al-4V (Titanium alloy) ★ For low-viscosity liquid (such as water)	715	250	756
			B	–					–					–				–					0.54	≤	ρ	<	0.57		615	250	655
			C	–					–					–				–					0.57	≤	ρ	<	0.61		515	250	554
			D	–					–					–				–					0.61	≤	ρ	<	0.69		420	250	453
			E	–					–					–				–					0.69	≤	ρ	<	0.85		315	250	352
			F	–					–					–				–					0.85	≤	ρ	<	1.20		215	250	250
			1	–					–					–				–					0.59	≤	ρ	<	0.61	Ti-6Al-4V (Titanium alloy) ■ For high-viscosity liquid (such as oil)	710	250	760
			2	–					–					–				–					0.61	≤	ρ	<	0.65		615	250	659
			3	–					–					–				–					0.65	≤	ρ	<	0.70		515	250	558
			4	–					–					–				–					0.70	≤	ρ	<	0.80		420	250	457
			5	–					–					–				–					0.80	≤	ρ	<	1.00		320	250	356
			6	–					–					–				–					1.00	≤	ρ	<	1.40		215	250	254
			Z	–					–					–				–					Special								
	Connection flange standard			–	J	4			–					–				–					JIS20K								
				–	J	5			–					–				–					JIS30K								
				–	J	6			–					–				–					JIS40K								
				–	J	7			–					–				–					JIS63K								
				–	A	5			–					–				–					ASME#300								
				–	A	7			–					–				–					ASME#600								
				–	A	8			–					–				–					ASME#900								
				–	A	9			–					–				–					ASME#1500								
				–	P	5			–					–				–					JPI#300								
				–	P	7			–					–				–					JPI#600								
				–	P	8			–					–				–					JPI#900								
				–	P	9			–					–				–					JPI#1500								
				–	Z	Z			–					–				–					Special								
	Connection flange design						R		–					–				–					RF								
							J		–					–				–					Ring joint (Meter flange equipped with a standard RF)								
							Z		–					–				–					Special								
	Connection flange size							1	–					–				–					15A(1/2B)								
								2	–					–				–					20A(3/4B)								
								3	–					–				–					25A(1B) [Standard]								
								4	–					–				–					40A(1-1/2B)								
								5	–					–				–					50A(2B)								
								Z	–					–				–					Special								
	Connection nozzle face-to-face dimension (measurement range: H)								–					–				–					Face-to-face dimension (mm) Max. 4500 mm Example: 0900 for 900 mm *1								
									–	Z	Z	Z	Z	–				–					Special (when face-to-face dimension is different from measurement range)								
Detail code	Indicator (Indication color: yellow/every 10 mm, red/every 100 mm, and black/no liquid)								–					–	A			–					–10 ≤ T ≤ +120°C (Acrylic indication window) [Standard]								
									–					–	S			–					–10 ≤ T ≤ +100°C (Sealed type) *2								
									–					–	Z			–					Special (Special indication color) Example: white/no liquid, red/with liquid								
	Indicator mounting direction															F		–					Front [Standard]								
																L		–					Left side								
																R		–					Right side								
																Z		–					Special (45° and others)								
	Indicator scale plate (when a scale plate is attached, the indication color is yellow only at every 10 mm)																N	–					No [Standard]								
																	H	–					Level scale (standard when a scale plate is attached) (standard: left-side mounting)								
																	Z	–					Special (capacity scale and others)								
	Vent design																	–	V				R1/2 vent plug [Standard]								
																		–	N				NPT1/2 vent plug								
																		–	Z				Special (other valves or additional flanges)								
	Drain design (the valve handle faces in the same direction as the indicator)																			R			R1/2 drain plug [Standard]								
																				N			NPT1/2 drain plug								
																				G			With a valve (Rc1/2 gate valve) (plug lock type)								
																				W			With a valve (SW1/2 gate valve) (cap lock type)								
																				C			With a valve (Rc1/2 gate valve) (plug lock type) (elbow)								
																				Q			With a valve (SW1/2 gate valve) (cap lock type) (elbow)								
																				H			With a flange (1/2 to 1B) *4								
																				K			With a flange (1/2 to 1B) (elbow) *4								
																				Z			Special								
	Gasket (gaskets for process connection should be supplied by the customer)																				6		V#6596V (graphite spiral wound gasket) [Standard] *3								
																					7		V#7596V (PTFE spiral wound gasket) *3								
																					Z		Special								
	Bolt/Nut (bolts and nuts for process connection should be supplied by the customer)																					H	A193-B7/A194-2H (carbon steel) [Standard] T≥0°C								
																						B	A193-B8CL2/A194-8 (equivalent to 304SS) T≥0°C								
																						L	A320-B8CL2/A194-8 (equivalent to 304SS) T<0°C								
																						Z	Special								

- See the supplementary code table on another page for dimensions C and E and the indicator mounting direction.
- Manufacturable face-to-face dimension: Max. 4,500 mm
- Accepts negative pressure (F. V.).
- Please contact us for interface level measurement.
- ★ Float: For low-viscosity liquid (such as water) (up to 25mPa·s)
- ■ Float: For high-viscosity liquid (such as oil)

*1 When the face-to-face dimension is longer than 2,500 mm, a support is attached at the middle of the face-to-face dimension. See the supplementary code table.
*2 A single indicator can cover the measurement range of up to 2,900 mm. When a wider measurement range is required, an indicator is separated into two parts resulting in a no indication zone of about 60 mm width. See the supplementary code table.
*3 Inner ring and hoop: The same material as the chamber. Outer ring: Carbon steel (304SS for T < 0°C)
*4 Specify the specifications and sizes of flanges.

Allowable measurement temperature and pressure
Float No. A to F, 1 to 6

T(°C)	–10	0	25	50	75	100	120
P(MPa)	13.2	13.2	13.2	12.8	11.9	11.1	10.7



FM4500 [Metal tube 50A] [2MPa] [–196°C ≤ T ≤ +150°C] [–10°C ≤ T ≤ +400°C]

	FM4	(1)	(2)	(3)	–	(4)	(5)	(6)	(7)	–	(8)	(9)	(10)	(11)	–	(12)	(13)	(14)	–	(15)	(16)	(17)	(18)	Specification P: Design pressure (MPa), T: Design temperature (°C)
Main body specifications (mandatory)	Fixed code	5			–					–					–				–					Metal tube 50A t3.0 welded tube Meter flange: JPI
	Chamber material		1		–					–					–				–					304 SS
			2		–					–					–				–					316 SS
			3		–					–					–				–					316L SS
			Z		–					–					–				–					Special (special material or seamless tube)
	Float			Float classification																				Density ρ (g/cm³) 0.39 ≤ ρ ≤ 0.45 — Material: Titanium type 2 — C 605 E 250 L 651
				A	–					–					–				–					Density ρ (g/cm³) 0.39 ≤ ρ ≤ 0.45 — Material: Titanium type 2 — C 605 E 250 L 651
				0	–					–					–				–					Density ρ (g/cm³) 0.44 ≤ ρ ≤ 0.52 — Material: Titanium type 2 — C 475 E 250 L 521
				1	–					–					–				–					Density ρ (g/cm³) 0.50 ≤ ρ ≤ 0.60 — Material: Titanium type 2 — C 375 E 250 L 411
				2	–					–					–				–					Density ρ (g/cm³) 0.55 ≤ ρ ≤ 0.70 — Material: Titanium type 2 — C 320 E 250 L 361
				3	–					–					–				–					Density ρ (g/cm³) 0.62 ≤ ρ ≤ 0.80 — Material: Titanium type 2 — C 270 E 250 L 301
				P	–					–					–				–					Density ρ (g/cm³) 0.65 ≤ ρ ≤ 0.80 — Material: 316L SS [Standard] — C 450 E 250 L 481
				5	–					–					–				–					Density ρ (g/cm³) 0.70 ≤ ρ ≤ 0.90 — Material: 316L SS [Standard] — C 380 E 250 L 411
				6	–					–					–				–					Density ρ (g/cm³) 0.80 ≤ ρ ≤ 1.00 — Material: 316L SS [Standard] — C 295 E 250 L 331
				7	–					–					–				–					Density ρ (g/cm³) 0.90 ≤ ρ ≤ 1.40 — Material: 316L SS [Standard] — C 240 E 250 L 271
				8	–					–					–				–					Density ρ (g/cm³) 1.00 ≤ ρ ≤ 1.50 — Material: 316L SS [Standard] — C 210 E 250 L 241
				Z	–					–					–				–					Special
	Connection flange standard				–	J	1			–					–				–					JIS10K
					–	J	4			–					–				–					JIS20K
					–	A	2			–					–				–					ASME#150
					–	A	5			–					–				–					ASME#300
					–	P	2			–					–				–					JPI#150
					–	P	5			–					–				–					JPI#300
					–	Z	Z			–					–				–					Special
	Connection flange design							R		–					–				–					RF
								F		–					–				–					FF
								Z		–					–				–					Special
	Connection flange size								1	–					–				–					15A (1/2B)
									2	–					–				–					20A (3/4B)
									3	–					–				–					25A (1B) [Standard]
									4	–					–				–					40A (1-1/2B)
									5	–					–				–					50A (2B)
									Z	–					–				–					Special
	Connection nozzle face-to-face dimension (measurement range: H)									–					–				–					Face-to-face dimension (mm) Max. 4600 mm Example: 0900 for 900 mm *1
										–	Z	Z	Z	Z	–				–					Special (when face-to-face dimension is different from measurement range)
Detail code	Indicator (Indication color: yellow/every 10 mm, red/every 100 mm, and black/no liquid)														–	A			–					–10 ≤ T ≤ +350°C (Acrylic indication window) [Standard]
															–	G			–					+350°C < T ≤ +400°C (Glass indication window) *2
															–	S			–					–196 ≤ T ≤ +150°C (Sealed type) *3
															–	Z			–					Special (Special indication color) Example: white/no liquid, red/with liquid
	Indicator mounting direction																F		–					Front [Standard]
																	L		–					Left side
																	R		–					Right side
																	Z		–					Special (45° and others)
	Indicator scale plate (when a scale plate is attached, the indication color is yellow only at every 10 mm)																	N	–					No [Standard]
																		H	–					Level scale (standard when a scale plate is attached) (standard: left-side mounting)
																		Z	–					Special (capacity scale and others)
	Vent design																		–	V				R1/2 vent plug [Standard]
																			–	N				NPT1/2 vent plug
																			–	Z				Special (other valves or additional flanges)
	Drain design (the valve handle faces in the same direction as the indicator)																				R			R1/2 drain plug [Standard]
																					N			NPT1/2 drain plug
																					G			With a valve (Rc1/2 gate valve) (stop plug)
																					W			With a valve (SW1/2 gate valve) (stop cap)
																					C			With a valve (Rc1/2 gate valve) (plug lock type) (elbow)
																					Q			With a valve (SW1/2 gate valve) (cap lock type) (elbow)
																					H			With a flange (1/2 to 1B) *8
																					K			With a flange (1/2 to 1B) (elbow) *8
																					Z			Special
	Gasket (gaskets for process connection should be supplied by the customer)																					1		V#7020 (sheet gasket) –50 ≤ T ≤ +150°C *4
																						2		V#7026 (sheet gasket) –50 ≤ T ≤ +150°C *5
																						8		V#8591V (spiral wound gasket) [Standard] –196°C ≤ T < +300°C *6
																						9		V#8596V (spiral wound gasket) [Standard for negative pressure] –196°C ≤ T < +300°C *7
																						6		V#6596V (graphite spiral wound gasket) –196°C ≤ T ≤ +400°C *7
																						7		V#7596V (PTFE spiral wound gasket) –196°C ≤ T ≤ +300°C *7
																						Z		Special
	Bolt/Nut (bolts and nuts for process connection should be supplied by the customer)																						A	304SS (only sheet gasket is available)
																							H	A193-B7/A194-2H (carbon steel) [Standard] T ≥ 0°C
																							B	A193-B8CL2/A194-8 (equivalent to 304SS) T ≥ 0°C
																							L	A320-B8CL2/A194-8 (equivalent to 304SS) T < 0°C
																							Z	Special

- See the supplementary code table on another page for dimensions C and E and the indicator mounting direction.
- Manufacturable face-to-face dimension: Max. 4,600 mm
- Accepts negative pressure (F. V.).
- Applicable to interface measurements. (Minimum density difference 0.2g/cm³ and minimum density sum 1.2g/cm³.) There will be a dead zone at the top of the measurement range. Contact us for details.

*1 When the face-to-face dimension is longer than 2,500 mm, a support is attached at the middle of the face-to-face dimension. See the supplementary code table.
*2 A single indicator can cover the measurement range of up to 800 mm. When a wider measurement range is required, an indicator is separated into two parts resulting in a no indication zone of about 30 mm width. See the supplementary code table.
*3 A single indicator can cover the measurement range of up to 2,900 mm. When a wider measurement range is required, an indicator is separated into two parts resulting in a no indication zone of about 60 mm width. See the supplementary code table.
*4 High-concentration alkaline liquids or polymerizable monomers are not allowed.
*5 High-concentration acidic liquids or polymerizable monomers are not allowed.
*6 Hoop: The same material as the chamber. Outer ring: Carbon steel (304SS for T < 0°C)
*7 Inner ring and hoop: The same material as the chamber. Outer ring: Carbon steel (304SS for T < 0°C)
*8 Specify the specifications and sizes of flanges.

Allowable measurement temperature and pressure
Float No. A to 3 (titanium type 2)

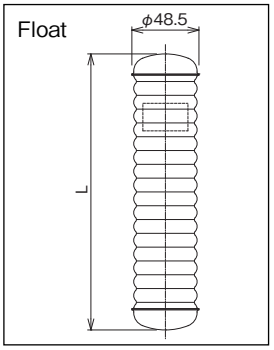
T (°C)	–196	–175	–150	–125	–100	–75	–50	–25	0	25	50	75
P (MPa)	1	1	1	1	1	1	1	1	1	1	1	1

T (°C)	100	125	150	175	200	225	250	275	300	325	350
P (MPa)	1	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.5

Float No. P to 8 (316L SS)

T (°C)	–196	–175	–150	–125	–100	–75	–50	–25	0	25	50	75
P (MPa)	2	2	2	2	2	2	2	2	2	2	2	2

T (°C)	100	125	150	175	200	225	250	275	300	325	350	375	400
P (MPa)	2	2	2	1.9	1.8	1.7	1.6	1.6	1.5	1.5	1.4	1.3	1.3



FM4600 [Metal tube 50A] [3MPa] [–196°C ≤ T ≤ +150°C] [–10°C ≤ T ≤ +225°C]

	FM4	(1)	(2)	(3)	–	(4)	(5)	(6)	(7)	–	(8)	(9)	(10)	(11)	–	(12)	(13)	(14)	–	(15)	(16)	(17)	(18)	Specification P: Design pressure (MPa), T: Design temperature (°C)
Main body specifications (mandatory)	Fixed code	6			–					–					–				–					Metal tube 50A t3.0 welded tube Meter flange: JPI
	Chamber material		1		–					–					–				–					304 SS
			2		–					–					–				–					316 SS
			3		–					–					–				–					316L SS
			Z		–					–					–				–					Special (special material or seamless tube)
	Float			Float classification	–					–					–				–					Density ρ (g/cm³) 0.39 ≤ ρ ≤ 0.45 — Material: Titanium type 2 Gas-filled type — C 745 E 250 L 791
				A	–					–					–				–					Density ρ (g/cm³) 0.39 ≤ ρ ≤ 0.45 — Material: Titanium type 2 Gas-filled type — C 745 E 250 L 791
				0	–					–					–				–					Density ρ (g/cm³) 0.44 ≤ ρ ≤ 0.52 — Material: Titanium type 2 Gas-filled type — C 565 E 250 L 611
				1	–					–					–				–					Density ρ (g/cm³) 0.50 ≤ ρ ≤ 0.60 — Material: Titanium type 2 Gas-filled type — C 435 E 250 L 471
				2	–					–					–				–					Density ρ (g/cm³) 0.55 ≤ ρ ≤ 0.70 — Material: Titanium type 2 Gas-filled type — C 365 E 250 L 401
				3	–					–					–				–					Density ρ (g/cm³) 0.62 ≤ ρ ≤ 0.80 — Material: Titanium type 2 Gas-filled type — C 300 E 250 L 331
				P	–					–					–				–					Density ρ (g/cm³) 0.65 ≤ ρ ≤ 0.80 — Material: 316L SS Gas-filled type [Standard] — C 535 E 250 L 561
				5	–					–					–				–					Density ρ (g/cm³) 0.70 ≤ ρ ≤ 0.90 — Material: 316L SS Gas-filled type [Standard] — C 445 E 250 L 471
				6	–					–					–				–					Density ρ (g/cm³) 0.80 ≤ ρ ≤ 1.00 — Material: 316L SS Gas-filled type [Standard] — C 345 E 250 L 371
				7	–					–					–				–					Density ρ (g/cm³) 0.90 ≤ ρ ≤ 1.40 — Material: 316L SS Gas-filled type [Standard] — C 275 E 250 L 301
				8	–					–					–				–					Density ρ (g/cm³) 1.00 ≤ ρ ≤ 1.50 — Material: 316L SS Gas-filled type [Standard] — C 235 E 250 L 261
				Z	–					–					–				–					Special
	Connection flange standard				–	J	1			–					–				–					JIS10K
					–	J	4			–					–				–					JIS20K
					–	A	2			–					–				–					ASME#150
					–	A	5			–					–				–					ASME#300
					–	P	2			–					–				–					JPI#150
					–	P	5			–					–				–					JPI#300
					–	Z	Z			–					–				–					Special
	Connection flange design							R		–					–				–					RF
								F		–					–				–					FF
								Z		–					–				–					Special
	Connection flange size								1	–					–				–					15A(1/2B)
									2	–					–				–					20A(3/4B)
									3	–					–				–					25A(1B) [Standard]
									4	–					–				–					40A(1-1/2B)
									5	–					–				–					50A(2B)
									Z	–					–				–					Special
	Connection nozzle face-to-face dimension (measurement range: H)									–					–				–					Face-to-face dimension (mm) Max. 4500 mm Example: 0900 for 900 mm *1
										–	Z	Z	Z	Z	–				–					Special (when face-to-face dimension is different from measurement range)
Detail code	Indicator (Indication color: yellow/every 10 mm, red/every 100 mm, and black/no liquid)									–					–	A			–					–10 ≤ T ≤ +225°C (Acrylic indication window) [Standard]
										–					–	S			–					–196 ≤ T ≤ +150°C (Sealed type) *2
										–					–	Z			–					Special (Special indication color) Example: white/no liquid, red/with liquid
	Indicator mounting direction																F		–					Front [Standard]
																	L		–					Left side
																	R		–					Right side
																	Z		–					Special (45° and others)
	Indicator scale plate (when a scale plate is attached, the indication color is yellow only at every 10 mm)																	N	–					No [Standard]
																		H	–					Level scale (standard when a scale plate is attached) (standard: left-side mounting)
																		Z	–					Special (capacity scale and others)
	Vent design																		–	V				R1/2 vent plug [Standard]
																			–	N				NPT1/2 vent plug
																			–	Z				Special (other valves or additional flanges)
	Drain design (the valve handle faces in the same direction as the indicator)																				R			R1/2 drain plug [Standard]
																					N			NPT1/2 drain plug
																					G			With a valve (Rc1/2 gate valve) (stop plug)
																					W			With a valve (SW1/2 gate valve) (stop cap)
																					C			With a valve (Rc1/2 gate valve) (plug lock type) (elbow)
																					Q			With a valve (SW1/2 gate valve) (cap lock type) (elbow)
																					H			With a flange (1/2 to 1B) *5
																					K			With a flange (1/2 to 1B) (elbow) *5
																					Z			Special
	Gasket (gaskets for process connection should be supplied by the customer)																					8		V#8591V (spiral wound gasket) [Standard] –196°C ≤ T < +300°C *3
																						9		V#8596V (spiral wound gasket) [Standard for negative pressure] –196°C ≤ T < +300°C *4
																						6		V#6596V (graphite spiral wound gasket) –196°C ≤ T ≤ +400°C *4
																						7		V#7596V (PTFE spiral wound gasket) –196°C ≤ T ≤ +300°C *4
																						Z		Special
	Bolt/Nut (bolts and nuts for process connection should be supplied by the customer)																						H	A193-B7/A194-2H (carbon steel) [Standard] T ≥ 0°C
																							B	A193-B8CL2/A194-8 (equivalent to 304SS) T ≥ 0°C
																							L	A320-B8CL2/A194-8 (equivalent to 304SS) T < 0°C
																							Z	Special

- See the supplementary code table on another page for dimensions C and E and the indicator mounting direction.
- Manufacturable face-to-face dimension: Max. 4,500 mm
- Accepts negative pressure (F. V.).
- Applicable to interface measurements. (Minimum density difference 0.2g/cm³ and minimum density sum 1.2g/cm³.) There will be a dead zone at the top of the measurement range. Contact us for details.

*1 When the face-to-face dimension is longer than 2,500 mm, a support is attached at the middle of the face-to-face dimension. See the supplementary code table.
*2 A single indicator can cover the measurement range of up to 2,900 mm. When a wider measurement range is required, an indicator is separated into two parts resulting in a no indication zone of about 60 mm width. See the supplementary code table.
*3 Hoop: The same material as the chamber. Outer ring: Carbon steel (304SS for T < 0°C)
*4 Inner ring and hoop: The same material as the chamber. Outer ring: Carbon steel (304SS for T < 0°C)
*5 Specify the specifications and sizes of flanges.

Allowable measurement temperature and pressure
Float No. A to 3 (titanium type 2)

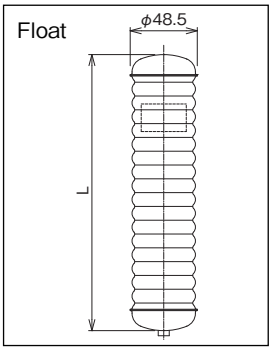
T(°C)	–196	–175	–150	–125	–100	–75	–50	–25	0	25	50	75
P(MPa)	1.5	1.6	1.7	1.8	1.9	1.9	2	2	2	2	2	2

T(°C)	100	125	150	175
P(MPa)	2	1.9	1.8	1.8

Float No. P to 8 (316L SS)

T(°C)	–196	–175	–150	–125	–100	–75	–50	–25	0	25	50	75
P(MPa)	2.9	2.9	3	3	3	3	3	3	3	3	3	3

T(°C)	100	125	150	175	200	225
P(MPa)	3	3	3	2.9	2.8	2.7



FM4700 [Metal tube 50A] [13MPa] [–196°C ≤ T ≤ +150°C] [–10°C ≤ T ≤ +400°C]

	FM4	(1)	(2)	(3)	–	(4)	(5)	(6)	(7)	–	(8)	(9)	(10)	(11)	–	(12)	(13)	(14)	–	(15)	(16)	(17)	(18)	Specification P: Design pressure (MPa), T: Design temperature (°C)
Main body specifications (mandatory)	Fixed code	7			–					–					–				–					Metal tube 50A Sch40 (t3.9) seamless tube Meter flange: JPI
	Chamber material		1		–					–					–				–					304 SS
			2		–					–					–				–					316 SS
			3		–					–					–				–					316L SS
			Z		–					–					–				–					Special
	Float			Float classification																				Density ρ (g/cm³) / Material/Use / C / E / L
				A	–					–					–				–					0.57 ≤ ρ < 0.60 / Ti-6Al-4V (Titanium alloy) ★ For low-viscosity liquid (such as water) / 705 / 250 / 756
				B	–					–					–				–					0.60 ≤ ρ < 0.64 / 〃 / 605 / 250 / 655
				C	–					–					–				–					0.64 ≤ ρ < 0.70 / 〃 / 510 / 250 / 554
				D	–					–					–				–					0.70 ≤ ρ < 0.81 / 〃 / 410 / 250 / 453
				E	–					–					–				–					0.81 ≤ ρ < 1.04 / 〃 / 310 / 250 / 352
				F	–					–					–				–					1.04 ≤ ρ < 1.50 / 〃 / 210 / 250 / 250
				1	–					–					–				–					0.64 ≤ ρ < 0.68 / Ti-6Al-4V (Titanium alloy) ■ For high-viscosity liquid (such as oil) / 710 / 250 / 760
				2	–					–					–				–					0.68 ≤ ρ < 0.73 / 〃 / 610 / 250 / 659
				3	–					–					–				–					0.73 ≤ ρ < 0.81 / 〃 / 510 / 250 / 558
				4	–					–					–				–					0.81 ≤ ρ < 0.94 / 〃 / 410 / 250 / 457
				5	–					–					–				–					0.94 ≤ ρ < 1.22 / 〃 / 310 / 250 / 356
				6	–					–					–				–					1.22 ≤ ρ < 1.60 / 〃 / 210 / 250 / 254
				Z	–					–					–				–					Special
	Connection flange standard				–	J	4			–					–				–					JIS20K
					–	J	5			–					–				–					JIS30K
					–	J	6			–					–				–					JIS40K
					–	J	7			–					–				–					JIS63K
					–	A	5			–					–				–					ASME#300
					–	A	7			–					–				–					ASME#600
					–	A	8			–					–				–					ASME#900
					–	A	9			–					–				–					ASME#1500
					–	P	5			–					–				–					JPI#300
					–	P	7			–					–				–					JPI#600
					–	P	8			–					–				–					JPI#900
					–	P	9			–					–				–					JPI#1500
					–	Z	Z			–					–				–					Special
	Connection flange design							R		–					–				–					RF
								J		–					–				–					Ring joint (Meter flange equipped with a standard RF)
								Z		–					–				–					Special
	Connection flange size								1	–					–				–					15A (1/2B)
									2	–					–				–					20A (3/4B)
									3	–					–				–					25A (1B) [Standard]
									4	–					–				–					40A (1-1/2B)
									5	–					–				–					50A (2B)
									Z	–					–				–					Special
	Connection nozzle face-to-face dimension (measurement range: H)									–					–				–					Face-to-face dimension (mm) Max. 4500 mm Example: 0900 for 900 mm *1
										–	Z	Z	Z	Z	–				–					Special (when face-to-face dimension is different from measurement range)
Detail code	Indicator (Indication color: yellow/every 10 mm, red/every 100 mm, and black/no liquid)														–	A			–					–10 ≤ T ≤ +350°C (Acrylic indication window) [Standard]
															–	G			–					+350 < T ≤ +400°C (Glass indication window) *2
															–	S			–					–196 ≤ T ≤ +150°C (Sealed type) *3
															–	Z			–					Special (Special indication color) Example: white/no liquid, red/with liquid
	Indicator mounting direction																F		–					Front [Standard]
																	L		–					Left side
																	R		–					Right side
																	Z		–					Special (45° and others)
	Indicator scale plate (when a scale plate is attached, the indication color is yellow only at every 10 mm)																	N	–					No [Standard]
																		H	–					Level scale (standard when a scale plate is attached) (standard: left-side mounting)
																		Z	–					Special (capacity scale and others)
	Vent design																		–	V				R1/2 vent plug [Standard]
																			–	N				NPT1/2 vent plug
																			–	Z				Special (other valves or additional flanges)
	Drain design (the valve handle faces in the same direction as the indicator)																				R			R1/2 drain plug [Standard]
																					N			NPT1/2 drain plug
																					G			With a valve (Rc1/2 gate valve) (plug lock type)
																					W			With a valve (SW1/2 gate valve) (cap lock type)
																					C			With a valve (Rc1/2 gate valve) (plug lock type) (elbow)
																					Q			With a valve (SW1/2 gate valve) (cap lock type) (elbow)
																					H			With a flange (1/2 to 1B) *5
																					K			With a flange (1/2 to 1B) (elbow) *5
																					Z			Special
	Gasket (gaskets for process connection should be supplied by the customer)																					6		V#6596V (graphite spiral wound gasket) [Standard] *4
																						7		V#7596V (PTFE spiral wound gasket) T ≤ 300°C *4
																						Z		Special
	Bolt/Nut (bolts and nuts for process connection should be supplied by the customer)																						H	A193-B7/A194-2H (carbon steel) [Standard] T ≥ 0°C
																							B	A193-B8CL2/A194-8 (equivalent to 304SS) T ≥ 0°C
																							L	A320-B8CL2/A194-8 (equivalent to 304SS) T < 0°C
																							Z	Special

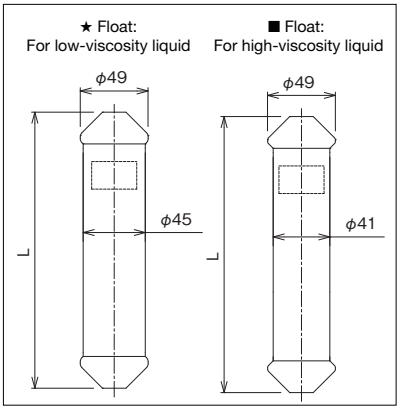
- See the supplementary code table on another page for dimensions C and E and the indicator mounting direction.
- Manufacturable face-to-face dimension: Max. 4,500 mm
- Accepts negative pressure (F. V.).
- Please contact us for interface level measurement.
- ★ Float: For low-viscosity liquid (such as water) (about 25mPa·s or higher)
- ■ Float: For high-viscosity liquid (such as oil)

*1 When the face-to-face dimension is longer than 2,500 mm, a support is attached at the middle of the face-to-face dimension. See the supplementary code table.
*2 A single indicator can cover the measurement range of up to 800 mm. When a wider measurement range is required, an indicator is separated into two parts resulting in a no indication zone of about 30 mm width. See the supplementary code table.
*3 A single indicator can cover the measurement range of up to 2,900 mm. When a wider measurement range is required, an indicator is separated into two parts resulting in a no indication zone of about 60 mm width. See the supplementary code table.
*4 Inner ring and hoop: The same material as the chamber.
Outer ring: Carbon steel (304SS for T < 0°C)
*5 Specify the specifications and sizes of flanges.

Allowable measurement temperature and pressure
Float No. A to F, 1 to 6

T (°C)	–196	–175	–150	–125	–100	–75	–50	–25	0	25	50	75
P (MPa)	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	12.8	11.9

T (°C)	100	125	150	175	200	225	250	275	300	325	350	375	400
P (MPa)	11.1	10.7	10.1	9.7	9.4	9.1	8.8	8.6	8.4	8.2	8.1	8.0	7.9



FM4800 [Metal tube 65A] [40MPa] [–10°C ≤ T ≤ +120°C]

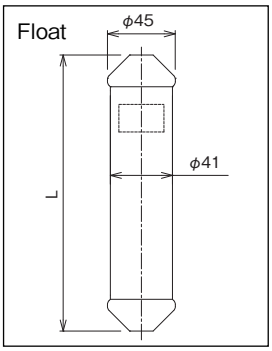
FM4	(1)	(2)	(3)	–	(4)	(5)	(6)	(7)	–	(8)	(9)	(10)	(11)	–	(12)	(13)	(14)	–	(15)	(16)	(17)	(18)	Specification P: Design pressure (MPa), T: Design temperature (°C)
Main body specifications (mandatory)	Fixed code	8			–				–					–				–					Metal tube 65A SchXXS (t14) seamless tube Meter flange: JPI
	Chamber material		1		–				–					–				–					304 SS
			2		–				–					–				–					316 SS
			3		–				–					–				–					316L SS
			Z		–				–					–				–					Special
	Float	Float classification																					Density ρ (g/cm³) / Material / C / E / L
			A	–					–					–				–					0.84 ≤ ρ < 0.88 / Ti-6Al-4V (Titanium alloy) *1 / 705 / 250 / 745
			B	–					–					–				–					0.88 ≤ ρ < 0.93 / Ti-6Al-4V (Titanium alloy) *1 / 605 / 250 / 645
			C	–					–					–				–					0.93 ≤ ρ < 1.06 / Ti-6Al-4V (Titanium alloy) *1 / 505 / 250 / 545
			D	–					–					–				–					1.06 ≤ ρ < 1.25 / Ti-6Al-4V (Titanium alloy) *1 / 405 / 250 / 445
			Z	–					–					–				–					Special
				–	A	9			–					–				–					ASME#1500
				–	A	T			–					–				–					ASME#2500
				–	P	9			–					–				–					JPI#1500
				–	P	T			–					–				–					JPI#2500
				–	Z	Z			–					–				–					Special
	Connection flange design						R		–					–				–					RF
							J		–					–				–					Ring joint (Meter flange equipped with a standard RF)
							Z		–					–				–					Special
	Connection flange size							1	–					–				–					15A (1/2B)
								2	–					–				–					20A (3/4B)
								3	–					–				–					25A (1B)
								4	–					–				–					40A (1-1/2B) [Standard]
								5	–					–				–					50A (2B)
								Z	–					–				–					Special
	Connection nozzle face-to-face dimension (measurement range: H)								–					–				–					Face-to-face dimension (mm) Max. 4500 mm (3000 for SUS316) Example: 0900 for 900 mm *2
									–	Z	Z	Z	Z	–				–					Special (when face-to-face dimension is different from measurement range)
Detail code	Indicator (Indication color: yellow/every 10 mm, red/every 100 mm, and black/no liquid)													–	A			–					–10 ≤ T ≤ +120°C (Acrylic indication window) [Standard]
														–	S			–					–10 ≤ T ≤ +100°C (Sealed type) *3
														–	Z			–					Special (Special indication color) Example: white/no liquid, red/with liquid
	Indicator mounting direction															F		–					Front [Standard]
																L		–					Left side
																R		–					Right side
																Z		–					Special (45° and others)
	Indicator scale plate (when a scale plate is attached, the indication color is yellow only at every 10 mm)																N	–					No [Standard]
																	H	–					Level scale (standard when a scale plate is attached) (standard: left-side mounting)
																	Z	–					Special (capacity scale and others)
	Vent design																	–	V				R1/2 vent plug [Standard]
																		–	N				NPT1/2 vent plug
																		–	Z				Special (other valves or additional flanges)
	Drain design (the valve handle faces in the same direction as the indicator)																			R			R1/2 drain plug [Standard]
																				N			NPT1/2 drain plug
																				Z			Special
	Gasket (gaskets for process connection should be supplied by the customer)																				6		V#6596V (graphite spiral wound gasket) P ≤ 24MPa [Standard] *4
																					R		Ring joint (316LSS) (octagonal) *5
																					Z		Special
	Bolt/Nut (bolts and nuts for process connection should be supplied by the customer)																					H	A193-B7/A194-2H (carbon steel) [Standard] T≥0°C
																						B	A193-B8CL2/A194-8 (equivalent to 304SS) T≥0°C
																						L	A320-B8CL2/A194-8 (equivalent to 304SS) T<0°C
																						Z	Special

- See the supplementary code table on another page for dimensions C and E and the indicator mounting direction.
- Manufacturable face-to-face dimension: Max. 4,500 mm (3000 for SUS316)
- Accepts negative pressure (F. V.).
- Not applicable to interface measurements.

*1 Maximum pressure for the float pressure test is 44MPa.
*2 When the face-to-face dimension is longer than 2,500 mm, a support is attached at the middle of the face-to-face dimension. See the supplementary code table.
*3 A single indicator can cover the measurement range of up to 2,900 mm. When a wider measurement range is required, an indicator is separated into two parts resulting in a no indication zone of about 60 mm width. See the supplementary code table.
*4 Inner ring and hoop: The same material as the chamber. Outer ring: Carbon steel (304SS for T < 0°C)
*5 The material is 316LSS regardless of the chamber material (304SS, 316SS, or 316LSS).

Allowable measurement temperature and pressure

T (°C)	–10	0	25	50	75	100	120
P (MPa)	40	40	40	36.1	32.5	30.3	28.2



FM4000 ALARM SWITCH AND MAGNETOSTRICTIVE SENSOR CODE

FM4 (1) to (18)	–	(19)	(20)	(21)	(22)	–	(23)	(24)	(25)	Specifications	Remarks
Alarm switch	Design	0				–				No alarm switch	
		B				–				Waterproof structure (equivalent to IP54)	Separate terminal box type model (equivalent to the conventional FM-1000 model)
		W				–				Waterproof structure (equivalent to IP65) (*1)	Integrated terminal box model
		E				–				Explosion-proof design	
		S				–				Intrinsically safe design (*1)	
	Number of alarm points		0			–				Number of alarm points: 0 (no alarm switch)	When alarm switches are attached, specify their positions in the specification confirmation sheet.
			1			–				Number of alarm points: 1	
			2			–				Number of alarm points: 2	
			3			–				Number of alarm points: 3	
			4			–				Number of alarm points: 4	
			5			–				Number of alarm points: 5	
			6			–				Number of alarm points: 6	
			7			–				Number of alarm points: 7	
			8			–				Number of alarm points: 8	
	Type of explosion-proof certification			0		–				No alarm switch and waterproof design	
				1		–				E: IEC-compliant JPN explosion-proof (cable gland attached)	The cases of E (explosion-proof)
				2		–				E: IECEx	
				3		–				E: ATEX	
				4		–				–	
				5		–				E: NEPSI CHIN Explosion-proof (*2)	
				A		–				S: IEC-compliant JPN Intrinsically safe explosion-proof	The cases of S (intrinsically safe explosion-proof)
				B		–				S: IECEx	
				C		–				S: ATEX	
				D		–				–	
				E		–				S: NEPSI CHIN Explosion-proof	
	Wiring connection (Cable gland not attached as standard for overseas explosion-proof) (*3)				0	–				No alarm switch	
					A	–				G3/4 [Standard for separate terminal box type model]	The integrated terminal box model cannot be selected.
					1	–				M20×P1.5 [Standard for integrated terminal box model]	
					2	–				G1/2	
					3	–				M20×P1.5 Cable gland attached (explosion-proof)	
					4	–				G1/2 Cable gland attached (explosion-proof)	Standard for JPN explosion-proof
					5	–				Other	Specify the requests.
Magnetostrictive sensor	Design					–	0			No magnetostrictive sensor	"0" for (22) to (24) when no alarm switch is required
						–	W			Waterproof design	
						–	E			Explosion-proof design	
	Type of explosion-proof certification							0		No magnetostrictive sensor and explosion-proof design	
								1		E: IEC-compliant JPN explosion-proof (cable gland attached)	The cases of E (explosion-proof)
								2		E: IECEx	
								3		E: ATEX	
								4		–	
								5		E: NEPSI CHIN Explosion-proof (*2)	
	Wiring connection (Cable gland not attached as standard for overseas explosion-proof)								0	No magnetostrictive sensor	
									1	M20×P1.5 [Standard]	
									2	G1/2	
									3	M20×P1.5 Cable gland attached (explosion-proof)	
									4	G1/2 Cable gland attached (explosion-proof)	Standard for JPN explosion-proof
									5	Other	Specify the requests.

*1 This model does not have a terminal box to bundle the wiring unlike the conventional FM-1000 model.
If you update from the FM-1000 model, you cannot use the existing wiring as it is.
If you want to use the existing wiring, select a separate terminal box type model.
(Please contact us if you want to update the safe alarm from the FM-1000 model.)
*2 A cable gland is not attached to NEPSI-certified products. (Certified cable glands are not available to us.)
*3 Only M20 × 1.5 is available for alarm switches of overseas explosion-proof type without cable glands.
Other choices are available with cable glands and adapters for IECEx/ATEX-certified alarm switches.

FM4000 OPTION CODE

FM4 (1) to (25)	/	□	□	Specifications	Parts	Remarks
Option	/	M	S	Mill sheet	Pressure-resistant parts (except float)	
	/	I	P	Inspection procedure		
	/	P	T	Penetrant test (PT)	Pressure-resistant welded parts (except float)	
	/	L	T	Airtightness test		
	/	P	S	Special paint	Alarm switch terminal box 4 to 20 mA transmitter terminal box	
	/	O	L	Oil-free treatment	Wetted parts, gas contact parts	
	/	W	L	Water-free treatment	Wetted parts, gas contact parts	
	/	A	P	Acid pickling treatment	Wetted parts, gas contact parts	The upper chamber is a flange type. Please contact us for the maximum chamber length.
	/	E	P	Electropolishing	Wetted parts, gas contact parts	The upper chamber is a flange type. Please contact us for the maximum chamber length.
	/	B	P	Buffing	Chamber inner surface, float outer surface	Standard is #400.Chamber top must be in the flange design.

FM4000 SPECIFICATION CONFIRMATION SHEET

Fill in this sheet when “Z” (special specifications) is checked in the main body code, or an alarm switch or 4 to 20 mA magnetostrictive sensor is attached.

Code	Parts	Specifications	
(2)	Chamber material		
(3)	Float material and density		
(4 to 7)	Connection flange standard, design, and size		
(8 to 11)	Face-to-face dimension and measurement range	Face-to-face dimension:	Measurement range:
(12)	Indicator type and indication color	Indicator type *1:	Indication color:
(13)	Indicator mounting direction		
(14)	Indicator scale plate		
(15)	Vent design		
(16)	Drain design		
(17)	Gasket		
(18)	Bolt/Nut		

Alarm switch

Number of alarm points	Alarm position (mm) From the center of the lower nozzle	Alarm action HC or LC *2	Mounting direction Right or left *3, *4 [Standard: Right]
1			
2			
3			
4			
5			
6			
7			
8			

∗1 Select the indicator type among A, G, and S in the code table.

∗2 HC : Go up and ON
HO : Go up and OFF
LC : Go down and ON
LO : Go down and OFF

∗3 There are limitations on the configurable alarm intervals.
See the ALARM SWITCH SPECIFICATIONS page.

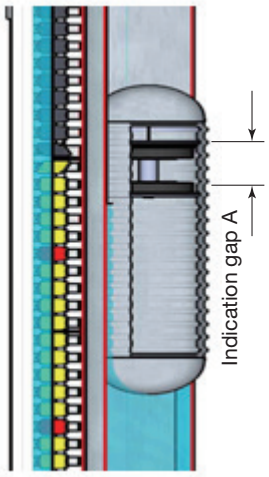
∗4 An alarm switch and a 4 to 20 mA magnetostrictive switch cannot be mounted in the same direction.

4 to 20 mA magnetostrictive sensor

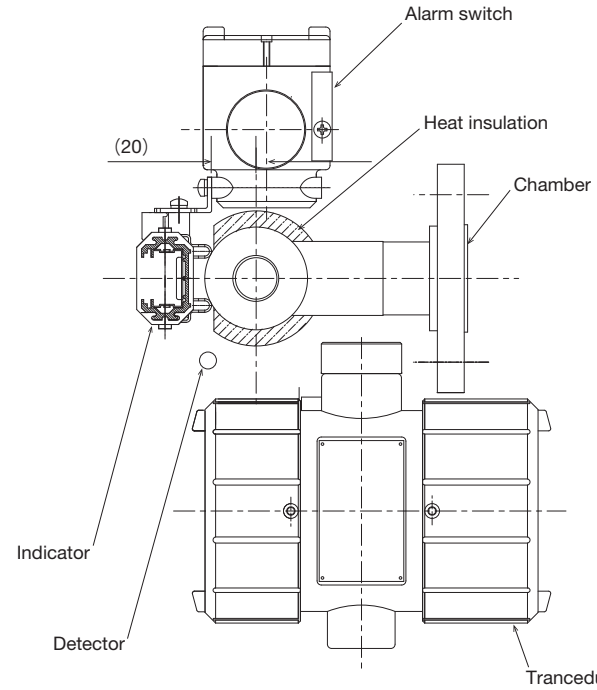
Mounting direction (right or left) [Standard: Right] *4	
Output	Output position (mm) from the center of the lower nozzle
0% (4 mA)	
100% (20 mA)	

PRECAUTIONS ON USING THE LEVEL GAUGE

- The FM Mag Gauge indicates liquid level by flappers that are rotated by the action of a magnet integrated in a float.
  Several types of floats are available according to the density of the liquid to be measured. However, as the liquid density increases from the design lower limit, a gap occurs between the actual liquid level (float draft line) and the position of the built-in magnet.
  This gap does not change even if the liquid level changes.
  Therefore, in practice, the indicator is displaced upward to compensate the gap (indication gap A).
  The red flapper at the indicator bottom is aligned to the actual zero position of the liquid level.
  Refer to the gap value (indication gap A) described in the delivery specification.



- When the liquid level goes up or down faster than 2 cm/s, flappers may fail to follow the movement of a float and fail to rotate.
  In such a case, use the attached magnet to restore the correct indication.
  When the tank pressure or temperature fluctuates rapidly, bumping (abrupt generation of gas in liquid) may occur, causing an abrupt rise of the float and a jump in the indication.
  A double tube may help prevent this phenomenon.
  Contact us for details.
- To use this gauge in vacuum, be careful about abrupt pressure changes in the tank or level gauge. The float may jump up to the end and cause damage.
- Select the float so that the density of the liquid to be measured does not fall below the design minimum density of the float.
  Density changes may have to be taken into account if the temperature changes significantly.
  Contact us for the cases of values not described in the code table or interface measurements.
- The compatibility between the liquid to be measured and the gauge materials should be checked by the customer.
- The liquid to be measured must be free from sticking or freezing.
- A magnet is integrated in a float.
  In an iron-rich (or rusty) environment, ferric substances may adhere to the magnet, causing malfunction.
  Periodic inspection and cleaning are recommended.
- When a chamber needs heat insulation, for measuring sticking liquids for example, make sure that the heat insulation does not enshroud the indicator, as shown in the Figure. Likewise, alarm switches and magnetostrictive sensors should not be covered by heat insulation.
  If the indicator and sensors are covered by heat insulation, the gauge may become hot and may fail.
  Use non-magnetic materials (that do not react to a magnet) for heat insulation, protection, and fixing hardware.
- When implementing wiring to alarm switches and magnetostrictive sensors, seal the wire outlets so that water or moisture does not penetrate into the devices.
- Indicators, alarm switches, and magnetostrictive sensors of Mag Gauges work by the action of magnets integrated in floats. When installing a Mag Gauge, make sure that no magnetic substances or substances made of iron that reacts to the magnet in the float are near a level gauge.
  The presence of such substances may cause malfunction.
- Use of a gauge under an environment subject to harsh impact or vibration may cause malfunction or failure.



Do not cover around indicators, alarm switches, transducers, or detectors with heat insulation.

* Specification is subject to change without notice.

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