

GENERAL

FM Mag Gauge is a float type metal tube level gauge. Liquid level is indicated by clear and visible color flappers. This eliminates problems likely in indication by existing glass gauges.

In addition, special material of PVC, Fluoroplastics, Glass lining etc. are ready to cover very corrosive liquid level measurement.

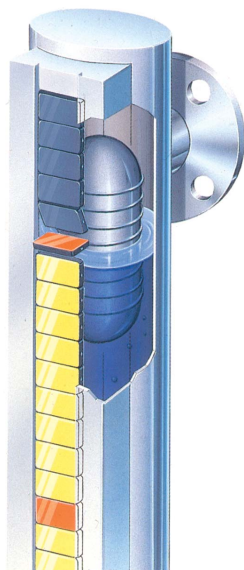
Alarm contacts and / or analog output unit can be additionally provided for remote monitoring and control purpose.

Japanese HPGCL certified manufacturing process guarantees high quality and reliability of FM Mag Gauge.

OPERATION PRINCIPLE

A float, in which a rounded shape magnet is integrated, is located in a non-magnetic tube (called Chamber). This float moves up and down depending on the liquid level in chamber with specified draft line. Outside of the chamber, an indicator unit is installed, in which plastic magnet rotating flappers are provided. The front surfaces of such flappers are black and the other sides of flappers are coloured in yellow for every 10mm and red for every 100mm. Then these flappers are rotated by movement of float to indicate liquid level in colour flappers.

FM Mag Gauge can be provided with alarm contacts and/or analog output (DC4~20mA) unit additionally onto this level indicator.



FM-3100
Compact type

FEATURES

- Metal tube
Free from breakage and leakage.
- Clear and visible indication
By colour flappers, Liquid level in tanks is easily observed even from a distance. Free from blurs and smudges which are common for Glass Gauges.
- Covering high pressure and temperature
HPGCL approved version is also available.
- Wide selection of material
Standard stainless steel, PVC, Fluoroplastics, Glass lining
Wide selection range is ready to meet corrosive liquid level measurement.
Special material of Hastelloy and Titanium are also available.
- Full function
Indication, alarm contacts as well as analog output.
One unit of FM Mag Gauge covers all necessary functions of level monitoring and control.

STANDARD SPECIFICATION

- Measuring object : Max. viscosity 600mPa·s and without sticking and crystallization.
- Available range : Refer to pages of subject models.
- Maximum OP. Press. : Refer to pages of subject models.
- Temp. range : Refer to pages of subject models.
- Level indication : By colour flappers
- Interval of flappers : Standard version FM 10mm
Fine version FMS* 5mm
- Indication accuracy : Standard version FM ±15mm
Fine version FMS* ±10mm
- Process connection. : Standard; Tank side through 1"(25mm) flanges
Details are to be referred to pages of subject models.
- Material : To be referred to pages of subject models.
- *: FM-1200 (Stainless) is only available for FMS type.
- ※: Change velocity of liquid possible to follow: 2cm/sec.

Consult factory for jacket type.

DESCRIPTION OF MODEL CODE

Model code of FM Mag Gauge is described as follows;

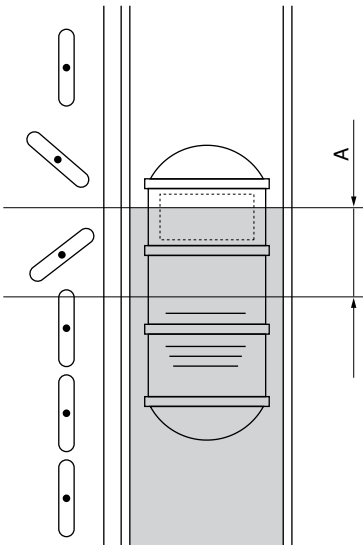
- 1) Only for local indicator
FM-123- 4
- 2) Local indicator+Alarm contacts
FM-123- 4567
- 3) Local indicator+Analog output
FM-123- 4 / 8910
- 4) Local indicator+Alarm contacts+Analog output
FM-123- 4567 / 8910
/ 8910 to be added to the end of code indication 2)

1	Indicator	Press., Temp. class (2 digit)
2		Chamber, Nozzle material
3		Float material and density range
4		Conn. flange rating
5	Alarm	Enclosure of alarm (W, IS, EP)
6		No. of contact
7		No. of terminal box
8	Analog output	Enclosure of analog unit (W, IS, EP)
9		Direction of sensor
10		Direction of convertor

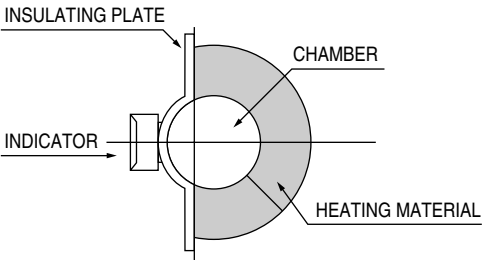
Refer to pages of subject models for details of model code.

SUGGESTIONS

- On liquid level indication
The indicator flappers are actuated by magnet in float. There are different types of float for models, but the position of magnet and actual liquid level (Draft line to float) are different depending on the liquid density. Thus, the position where specific indicator flapper rotates and the position of actual liquid level are different slightly. This gap is fixed and shifted upward in fixed value. This gap (A) is indicated in Approval drawing. The zero line of indicator is to be located above actual liquid zero point by distance of A. Refer to instruction manual for details.
Also, be careful for minimum density for the float. Operation problem may occur in case of lower density than designed density. Interface measurement and / or extreme low and high density liquid measurement are available on request. Consult factory for details.



- Heating and heat insulation
In case of necessity of heating and / heat insulation for sticky liquids etc., heating material is to be provided only for chamber portion as shown below. Do not cover indicator, alarm and analog unit by heating material.



MODEL SELECTION GUIDANCE

Different types and materials are available for FM Mag Gauge. Refer to the following table for selection.

• FOR STANDARD TEMPERATURE

(Upto 120°C with limitation for PVC and glass lined material)

MODEL	CHAMBER MATERIAL	FLOAT MATERIAL	TEMP. RANGE	MAX. OP. PRESS.*1	AVAILABLE RANGE (mm)	
				MPa	Min.	Max.
FM-121□	SUS304	SUS316,SUS316L or Titanium (TP340)	*2 -10~120°C	*6 3	0~250	0~4380
2□	SUS316					
3□	SUS316L					
Z□	Special metallic material	To be consulted				
FM-124□	PVC(HPVC)	PVC(HPVC)	0~60°C(80)	0.2	0~250	0~2000
5□	Stn. Stl.+PVC lining					0~4000
FM-126□	Stn. Stl.+ETFE lining	NBR balloon + PFA lining	0~100°C	*3 0.2	0~250	*4 0~3500
7□	Stn. Stl.+PFA lining					
FM-128□	Stn. Stl.+PTFE lining					
FM-129□	Stn. Stl.+Glass lining	Glass	0~60°C	0.2	0~250	0~3000
FM-131□	SUS304	Titanium (TP340) or Titanium alloy	*2 -10~120°C	5	0~250	0~4380
2□	SUS316					
3□	SUS316L					
Z□	Special metallic material					
FM-141□	SUS304	Glass epoxy balloon or Titanium alloy	*8 0~120°C	7.3	0~250	0~4380
2□	SUS316					
3□	SUS316L					
Z□	Special metallic material					
FM-311□	SUS304	SUS316	-10~120°C	1	0~250	0~2000
2□	SUS316					
3□	SUS316L					

• FOR HIGH TEMPERATURE

(121~300°C. Use STANDARD TEMPERATURE version for upto 120°C.)

MODEL	CHAMBER MATERIAL	FLOAT MATERIAL	TEMP. RANGE	MAX. OP. PRESS.*1	AVAILABLE RANGE (mm)	
				MPa	Min.	Max.
FM-161□	SUS304	SUS316,SUS316L *5 Or Titanium (TP340)	*7 121~300°C	2	0~250	0~4380
2□	SUS316					
3□	SUS316L					
Z□	Special metallic material	To be consulted				
FM-171□	SUS304	Titanium (TP340) or Titanium alloy	121~285°C	*9 3.9	0~250	0~4380
2□	SUS316					
3□	SUS316L					
Z□	Special metallic material					
FM-181□	SUS304	Titanium alloy	121~285°C	7	0~250	0~4380
2□	SUS316					
3□	SUS316L					
9□	Special metallic material					

*1 : Subject to flange connection rating

*2 : Lower than -10°C on request. Special non-frozen indicator will be provided. Consult factory for details.

*3 : Upto 0.75MPa on request as option.

*4 : Max. 2400mm for ETFE, and Max. 2500mm for PTFE vacuum applications.

*5 : TP340, Titanium alloy, and Glass epoxy balloon may cause hydrogen embrittlement.

*6 : Maximum 2.5MPa available for titanium float.

*7 : Maximum 250°C available for titanium.

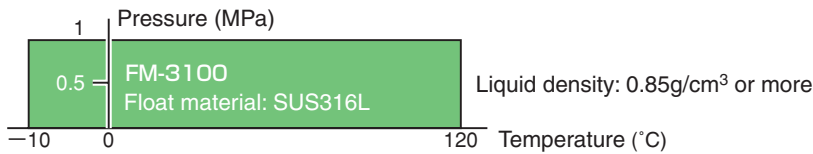
*8 : Maximum 100°C available for glass epoxy balloon.

*9 : Maximum 4.4MPa available for titanium float.

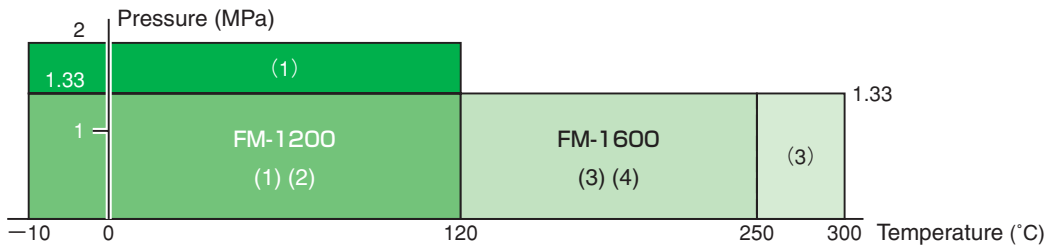
STANDARD PRESSURE AND TEMPERATURE RANGE

● FM-3100 (SUS, Chamber size: 1 inch)

* Subject to flange connection rating

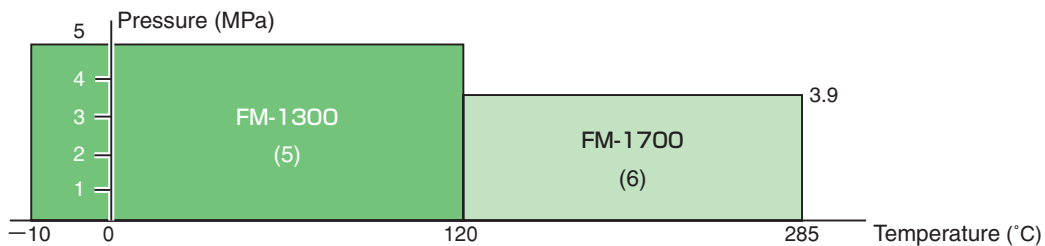


● FM-1200, FM-1600 (SUS, Chamber size 2 inches)



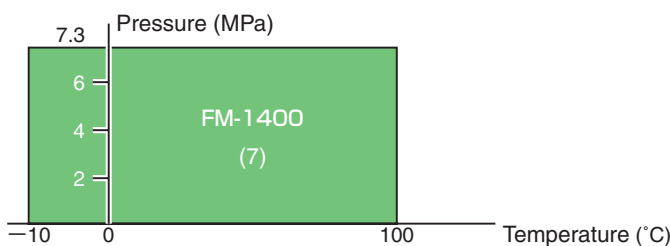
(1) FM-1200	Float material	SUS316	Liquid density 0.6g/cm ³ or more
(2) FM-1200	Float material	Titanium (TP340)	Liquid density 0.39g/cm ³ or more
(3) FM-1600	Float material	SUS316	Liquid density 0.65g/cm ³ or more
(4) FM-1600	Float material	Titanium (TP340)	Liquid density 0.39g/cm ³ or more

● FM-1300, FM-1700 (SUS, Chamber size 2 inches)



(5) FM-1300	Float material	Titanium (TP340)	Liquid density 0.6g/cm ³ or more
(6) FM-1700	Float material	Titanium (TP340)	Liquid density 0.68g/cm ³ or more

● FM-1400 (SUS, Chamber size 2 inches)



(7) FM-1400	Float material	Glass epoxy	Liquid density 0.8g/cm ³ or more
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FM-1210,1220,1230,12Z0

STANDARD TYPE, STANDARD PRESS., STANDARD TEMP., AND METALLIC MATERIAL

FM-12¹/₃0 series are standard type Mag gauge with SUS304, SUS316, or SUS316L material. (Titanium float is used for some ranges.)

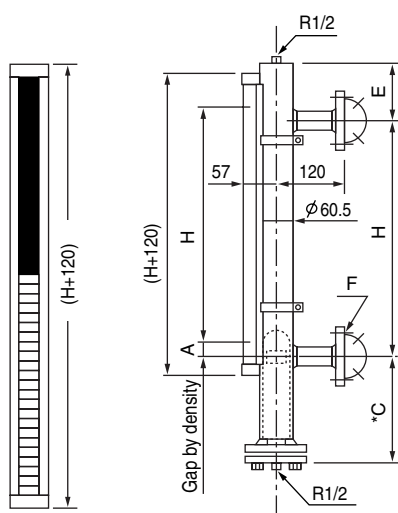
AVAILABLE RANGES OF PRODUCTS

Range : Min. 0~250mm
Max. 0~4380mm (3420mm for FMS)

Max. Op. Press.: 3MPa
(Max. 2.5MPa for titanium float)
(Subject to connection flange rating)

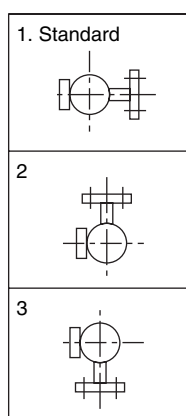
Temp. range : · FM-1200
-10~120°C
(Down to -60°C available on request with special acryl non-frozen Indicator)
· FMS-1200
-10~80°C

DIMENSIONS



* C length will be changed. Consult factory for details.

INDICATOR INSTALLATION ANGLE



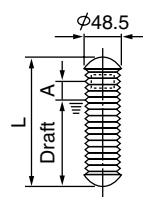
MODEL CODE

		—	12		—		Description
Flapper pitch	FM						10mm(Accuracy ±15mm)
	FMS						5mm (Accuracy ±10mm)
Chamber material			1				SUS304
			2				SUS316
			3				SUS316L
			Z				Other special metallic material*1
Density range (g/cm ³) Float material		A					0.39~0.45
		0					0.44~0.52
		1					0.5~0.6
		2					0.55~0.7
		3					0.62~0.8
		N					0.6~0.7
		P					0.65~0.8
		5					0.7~0.9
		6					0.8~1.0
		7					0.9~1.4
		8					1.0~1.5
		9					1.25~2.0
Connection flange rating		0					25A JIS 10KFF
		1					25A JIS 10KRF
		2					1" JPI 150#RF
		3					1" ANSI 150#RF
		4					25A JIS 20KRF
		5					1" JPI 300#RF
		6					1" ANSI 300#RF
		7					25A JIS 5KFF
		8					Other 1" (25A) flanges
		9					Special

*1: SUS304L, MA276, Titanium etc. available. Consult factory for details of density range etc.

FLOAT AVAILABILITY AND SIZES

No.	Density (g/cm ³)	Design		Float	
		C	E	Material	L
A	0.39~0.45	450	200	TP340 Titanium	470
0	0.44~0.52	350	200		380
1	0.5~0.6	280	200		300
2	0.55~0.7	250	200		270
3	0.62~0.8	210	200		220
N	0.6~0.7	485	160	SUS316 or SUS316L	520
P	0.65~0.8	385	150		410
5	0.7~0.9	305	130		320
6	0.8~1.0	235	110		250
7	0.9~1.4	195	110		200
8	1.0~1.5	165	100		170
9	1.25~2.0	165	100		170



Max. operating press. is 1.33MPa for float No. A to 3.

Max. operating press. is 2.0MPa for float No. N to 9.

Consult factory for details when max. press. exceeds these values.

FM-121Z0,122Z0,123Z0,12ZZ0

DUPLEX-TUBE TYPE FOR LIQUEFIED GAS

FM-12^{1Z}_{2Z}0 are metal tube level gauge for liquefied gas with SUS304, SUS316, or SUS316L material.

A duplex-tube type has the effectiveness that inhibits the sudden rise and dive of a float by boiling and bumping of liquefied gas.

And use an orifice plate in flange connection part (upper) according to operational situation.

AVAILABLE RANGES OF PRODUCTS

Range : Min. 0~250mm

Max. 0~4380mm

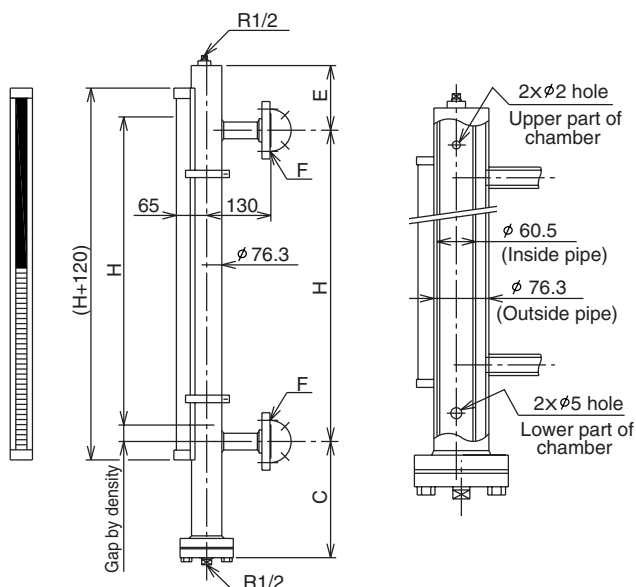
Max. Op. Press. : 2.5MPa

(Subject to connection flange rating)

Temp. range : -10~120°C

(Down to -60°C available on request with special acryl non-frozen Indicator)

DIMENSIONS

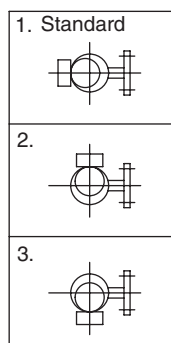


MODEL CODE

FM-12		—	Description
Chamber material	1Z		SUS304
	2Z		SUS316
	3Z		SUS316L
	4Z		Other special metallic material *1
Density range (g/cm ³) Float material	A		0.39~0.45
	0		0.44~0.52
	1		0.5~0.6
	2		0.55~0.7
	3		0.62~0.8
	Z		Special
Connection flange rating	0		25A JIS 10KFF
	1		25A JIS 10KRF
	2		1 ^B JPI 150#RF
	3		1" ANSI 150#RF
	4		25A JIS 20KRF
	5		1 ^B JPI 300#RF
	6		1" ANSI 300#RF
	7		25A JIS 5KFF
	8		Other 1" (25A) flanges
	9		Special

*1: SUS304L, MA276, Titanium etc. available. Consult factory for details of density range etc.

INDICATOR INSTALLATION ANGLE



The direction to install indicator can not be changed at site.

FLOAT AVAILABILITY AND SIZES

No.	Density (g/cm ³)	Design		Material	L	Float
		C	E			
A	0.39 ~ 0.45	780	200	TP340 Titanium	790	Ar Gas Sealed 0.91(MPa) φ48.5 Draft L
0	0.44 ~ 0.52	580	200		610	
1	0.5 ~ 0.6	450	200		470	
2	0.55 ~ 0.7	380	200		400	
3	0.62 ~ 0.8	320	200		330	

Max. operating press. is 1.96MPa.

Consult factory for details when max. press. exceeds these values.

FM-1240,1250

PVC MATERIAL, STANDARD TEMP., STANDARD PRESS.

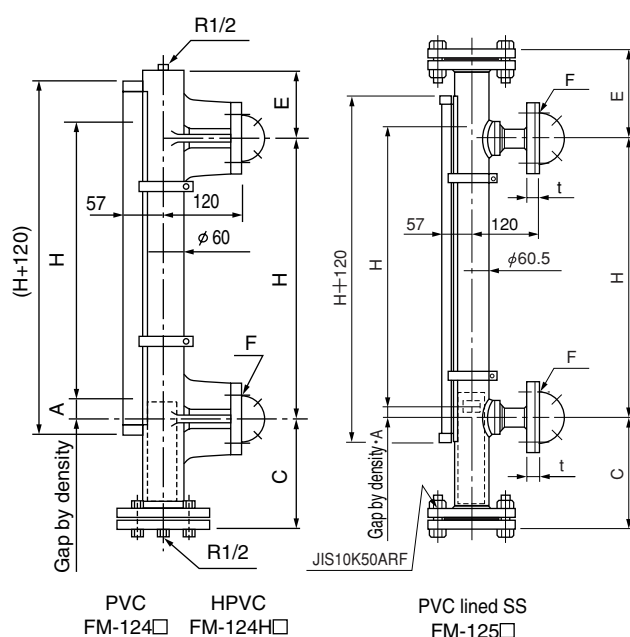
FM-1240 series are level gauge with PVC material for both chamber and float to cover corrosive liquids.

FM-1250 has a PVC lined stainless steel chamber which offers better mechanical durability than pure PVC chambers.

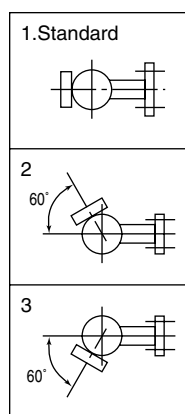
AVAILABLE RANGES OF PRODUCTS

Range : Min. 0~250mm
 Max. 0~2000mm *2
 Max. Op. Press. : 0.2MPa
 Temp. range : 0~60°C (HPVC : 80°C)

DIMENSIONS



INDICATOR INSTALLATION ANGLE



MODEL CODE

		—	12		—	Description
Flapper pitch	FM					10mm (Accuracy ±15mm)
Chamber material		4				PVC
		4H				HPVC
		5				St. Stl.+PVC lining
Density range (g/cm³) Float material *1		5				0.75~0.9 (0.7~0.8)
		6				0.8~1.0 (0.75~0.9)
		7				0.9~1.3 (0.85~1.2)
		8				1.05~1.7 (1.0~1.5)
		9				1.35~2.0 (1.35~2.0)
Connection flange rating *3		0				25A JIS 10KFF (t=21)
		2				1" JPI 150#RF (t=19.7)
		3				1" ANSI 150#RF (t=19.7)
		7				25A JIS 5KFF (t=17)
		8				Other 1" (25A) flanges
		9				Special

*1: Float material is PVC or HPVC. () indicates applicable density range for FM-125 □ type (Stainless steel + PVC lining).

*2: In case of material code 5, max.4000mm is available.

*3: Connection flange of lined version is Flat Face (20A or more).
 The inside of parenthesis shows the thickness of flange.

FLOAT AVAILABILITY AND SIZES

For PVC version FM-124 □ and HPVC version FM-124H □

No.	Density (g/cm³)	Design			Float
		C	E	L	
5	0.75~0.9	290	120	300	PVC, HPVC
6	0.8~1.0	250	120	250	
7	0.9~1.3	200	120	200	
8	1.05~1.7	150	120	150	
9	1.35~2.0	140	120	150	

For Stainless steel+PVC lining version FM-125 □

No.	Density (g/cm³)	Design			Float
		C	E	L	
5	0.7~0.8	290	150	300	PVC
6	0.75~0.9	250	150	250	
7	0.85~1.2	200	160	200	
8	1.0~1.5	150	170	150	
9	1.35~2.0	140	180	150	

FM-1260, 1270

FLUORORESIN MATERIAL, STANDARD TEMP. , STANDARD PRESS.

This is a series of Fluororesin and other high anti-corrosive material.

AVAILABLE RANGES OF PRODUCTS

Range : Min. 0~250mm
Max. 0~3500mm *1

Max. Op. Press. : 0.2MPa

Temp. range : 0~100°C

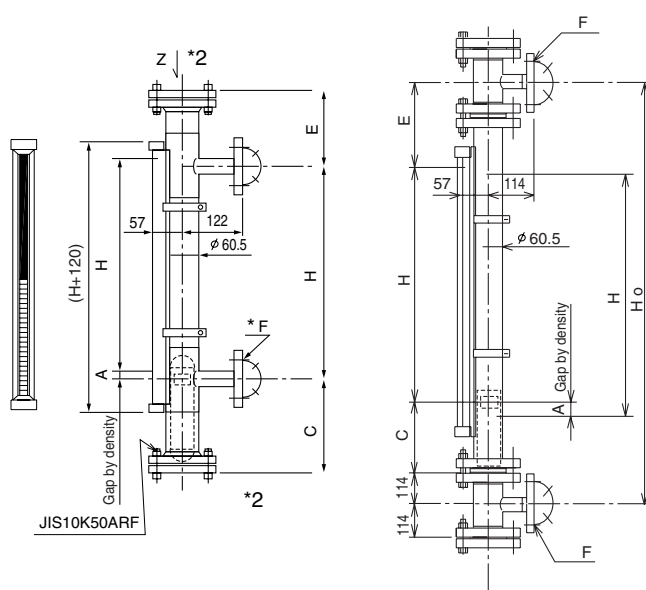
Details of lining

ETFE lining : FM-126 □ Lining thickness 1.6 mm

PFA lining : FM-127 □ Lining thickness 1.75 mm

*1: ETFE application is max. 2400mm.

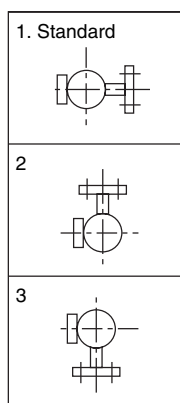
DIMENSIONS



ETFE lining
FM-126 □

PFA lining
FM-127 □

INDICATOR INSTALLATION ANGLE



MODEL CODE

		— 12				Description
Flapper pitch	FM					10mm(Accuracy ±15mm)
Chamber material		6				ETFE lining
		7				PFA lining
Density range (g/cm³) Float material	A					0.72~0.75
	B					0.75~0.8
	C					0.8~0.9
	E					0.9~1.0
	F					1.0~1.3
	G					1.3~1.5
	H					1.5~2.0
Connection flange rating *1						Special *
	1					25A JIS 10K
	2					1" ANSI(JPI)#150
	9					Special

* Gasket of lined version is equivalent to Raised Face.

FLOAT AVAILABILITY AND SIZES

For ETFE lining version FM-126 □

No.	Density (g/cm³)	Design			Float
		C	E	L	
A	0.72~0.75	400	190	400	
B	0.75~0.8	370	190	345	
C	0.8~0.9	310	190	280	
E	0.9~1.0	240	190	210	
F	1.0~1.3	200	190	170	
G	1.3~1.5	190	190	190	
H	1.5~2.0	190	190	190	

Titanium+PFA lining available on request

(Dimension will be changed. Consult factory for details.)

*1 Float material will be Titanium + ETFE lining for vacuum application.

*2 Flange material is carbon steel + PTFE.

*3 Vacuum application of float, dimension will be changed.

For PFA lining version FM-127 □

No.	Density (g/cm³)	Design			Float
		C	E	L	
A	0.72~0.75	400	250	400	
B	0.75~0.8	370	250	345	
C	0.8~0.9	310	250	280	
E	0.9~1.0	240	250	210	
F	1.0~1.3	200	250	170	
G	1.3~1.5	190	260	190	
H	1.5~2.0	170	270	190	

Titanium+PFA lining available on request

(Dimension will be changed. Consult factory for details.)

FM-1280

FLUORORESIN MATERIAL, STANDARD TEMP. , STANDARD PRESS.

This is a series of Fluororesin and other high anti-corrosive material.

AVAILABLE RANGES OF PRODUCTS

Range :Min. 0~250mm
Max. 0~3500mm *1

Max. Op. Press. :0.2MPa

Temp. range : 0~100°C

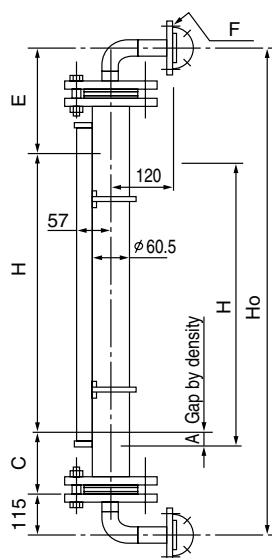
Details of lining

PTFE lining : FM-128 □ Lining thickness 2 mm

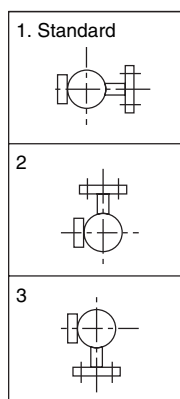
: 3mm for vacuum application

*1: Max. 2500mm for vacuum application

DIMENSIONS



INDICATOR INSTALLATION ANGLE

**MODEL CODE**

		—	12		—	Description	
Flapper pitch	FM					10mm(Accuracy ± 15mm)	
Chamber material			8		PTFE lining		
Density range (g/cm³) Float material				A		0.72~0.75	NBR+ *3 PFA lining(1.5t)
				B		0.75~0.8	
				C		0.8~0.9	
				E		0.9~1.0	
				F		1.0~1.3	
				G		1.3~1.5	
				H		1.5~2.0	
				9		—	Special
Connection flange rating *2					1	25A JIS 10K	
					2	1" ANSI(JPI)#150	
					9	Special	

*2 Gasket of lined version is equivalent to Raised Face.

*3 Float material will be Titanium + ETFE lining for vacuum application.

FLOAT AVAILABILITY AND SIZES

No.	Density (g/cm ³)	Design		L	Float
		C	E		
A	0.72~0.75	400	240	400	
B	0.75~0.8	370	240	345	
C	0.8~0.9	310	240	280	
E	0.9~1.0	240	240	210	
F	1.0~1.3	200	240	170	
G	1.3~1.5	190	260	190	
H	1.5~2.0	190	270	190	

* Titanium+PFA lining available on request

(Dimension will be changed. Consult factory for details.)

* Vacuum application of PTFE, dimension will be changed.

FM-1290

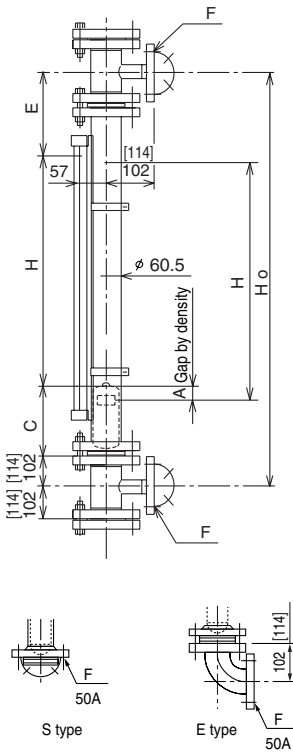
GLASS LINING, STANDARD PRESS., STANDARD TEMP.

FM-1290 is a series of glass lined material for very corrosive liquid applications.

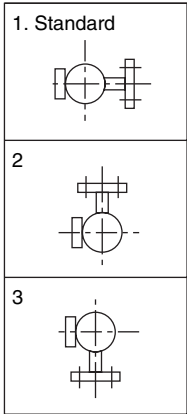
AVAILABLE RANGES OF PRODUCTS

Range :Min. 0~250mm
Max. 0~3000mm
Max. Op. Press. :0.2MPa
Temp. range :0~60°C

DIMENSIONS



INDICATOR INSTALLATION ANGLE



MODEL CODE

FM-129		—	Description
Chamber material			Stn. Stl.+Glass lining *3
Density range (g/cm ³) (Float material : Glass)	1		0.8~0.85
	2		0.85~0.92
	3		0.9~1.0
	5		1.0~1.1
	6		1.1~1.25
	7		1.2~1.4
	8		1.3~1.6
	9		1.5~1.9
Connection flange (1,2,3,4 and 9 are T or Reducing T.)	1		25A JIS 10KRF
	2		1 ^B JPI(ANSI)150#RF
	3		50A JIS 10KRF
	4		2 ^B JPI(ANSI)150#RF
	5	S	50A JIS 10KRF
	6	E	50A JIS 10KRF
	7	S	2 ^B JPI(ANSI)150#RF
	8	E	2 ^B JPI(ANSI)150#RF
	9		Special

- * 1 H length may be changed according to customer's specification.
- * 2 Gasket of lined version is equivalent to Raised Face
- * 3 Flange material is carbon steel + glass lining.

FLOAT AVAILABILITY AND SIZES

No.	Density (g/cm ³)	Design		Float	
		C	E	L	
1	0.8~0.85	480	260	364	
2	0.85~0.92	430	260	312	
3	0.9~1.0	390	260	273	
5	1.0~1.1	340	260	220	
6	1.1~1.25	310	260	186	
7	1.2~1.4	290	260	160	
8	1.3~1.6	260	260	144	
9	1.5~1.9	240	260	120	

FM-1310, 1320, 1330, 13Z0

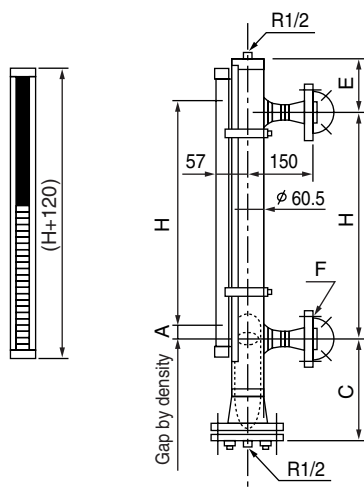
MEDIUM PRESS. (5MPa), STANDARD TEMP., METALLIC MATERIAL

FM-1300 is a series of medium pressure metal tube level gauge with stainless steel chamber and Titanium float.

AVAILABLE RANGES OF PRODUCTS

Range : Min. 0~250mm
 Max. 0~4380mm
 Max. Op. Press. : 5MPa (Max.4.5MPa for titanium alloy float)
 (Subject to connection flange rating)
 Temp. range : -10~120°C

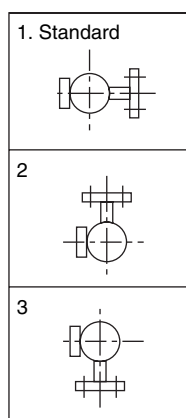
DIMENSIONS



MODEL CODE

FM-13			Description
Chamber material	1		SUS304
	2		SUS316
	3		SUS316L
	Z		Special
Density range (g/cm³) Float materia	E	0.55~0.62	Titanium alloy (Max. 4.5MPa)
	—	—	
	1	0.6~0.64	TP340 Titanium
	2	0.64~0.7	
	3	0.7~0.81	
	5	0.74~0.86	
	6	0.8~1.02	
	7	0.96~1.3	
	9	Special material other than above	
Connection flange rating	1	25A JIS 20KRF	
	2	1" JPI 300#RF	
	3	1" ANSI 300#RF	
	4	25A JIS 30KRF	
	5	25A JIS 40KRF	
	6	1" JPI 600#RF	
	7	1" ANSI 600#RF	
	9	Special	

INDICATOR INSTALLATION ANGLE



FLOAT AVAILABILITY AND SIZES

No.	Density (g/cm³)	Design		Float	
		C	E	L	
E	0.55 ~ 0.62	*	200	*	
—	—	—	—	—	
—	—	—	—	—	
—	—	—	—	—	
—	—	—	—	—	
1	0.6 ~ 0.64	810	160	820	
2	0.64 ~ 0.7	620	160	630	
3	0.7 ~ 0.81	470	160	485	
5	0.74 ~ 0.86	400	160	405	
6	0.8 ~ 1.02	320	160	325	
7	0.96 ~ 1.3	250	160	260	
9	Special	—	—	—	

* Consult factory for details.

FM-1410, 1420, 1430, 14Z0

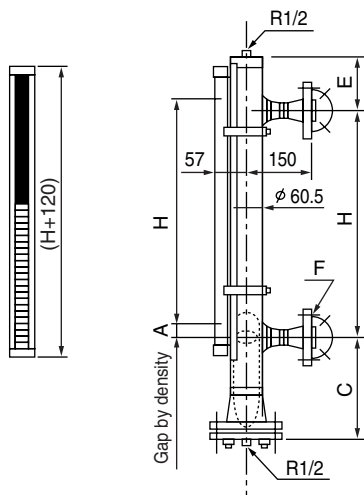
HIGH PRESS. (7.3MPa), STANDARD TEMP., METALLIC MATERIAL

FM-1400 is a series of high pressure metal tube level gauge with stainless steel chamber and Titanium or Glass Epoxy float.

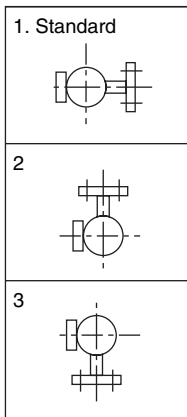
AVAILABLE RANGES OF PRODUCTS

Range :Min. 0~250mm
Max. 0~4380mm
Max. Op. Press. :7.3MPa
(Subject to connection flange rating)
Temp. range :0~120°C (Glass epoxy : 0~100°C)

DIMENSIONS



INDICATOR INSTALLATION ANGLE

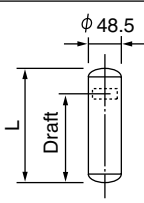


MODEL CODE

FM-14	-				Description
Chamber material	1				SUS304
	2				SUS316
	3				SUS316L
	Z				Special
Density range (g/cm ³) Float materia	E			0.7 ~ 0.74	Titanium alloy
	F			0.73 ~ 0.83	
	G			0.8 ~ 0.96	
	H			0.9 ~ 1.2	
	6			0.8 ~ 1.0	Glass Epoxy
	7			0.9 ~ 1.2	
	8			1.0 ~ 1.4	
	9			Special	
Connection flange rating	1				25A JIS 40KRF
	2				1" JPI 600#RF
	3				1" ANSI 600#RF
	4				25A JIS 63KRF
	5				1" JPI 900#RF
	6				1" ANSI 900#RF
	9				Special

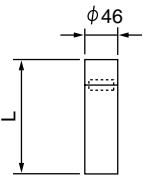
FLOAT AVAILABILITY AND SIZES

Titanium Alloy floats

No.	Density (g/cm ³)	Design		Float	
		C	E	L	Spec.
E	0.7~0.74	*	200	*	7.3 MPa 
F	0.73~0.83	*	200	*	
G	0.8~0.96	*	200	*	
H	0.9~1.2	*	200	*	
9		—	—	—	

*Consult factory for details.

Glass Epoxy floats

No.	Density (g/cm ³)	Design		Float	
		C	E	L	Spec.
6	0.8~1.0	290	120	280	
7	0.9~1.2	210	110	200	
8	1.0~1.4	170	100	155	

FM-3110, 3120, 3130

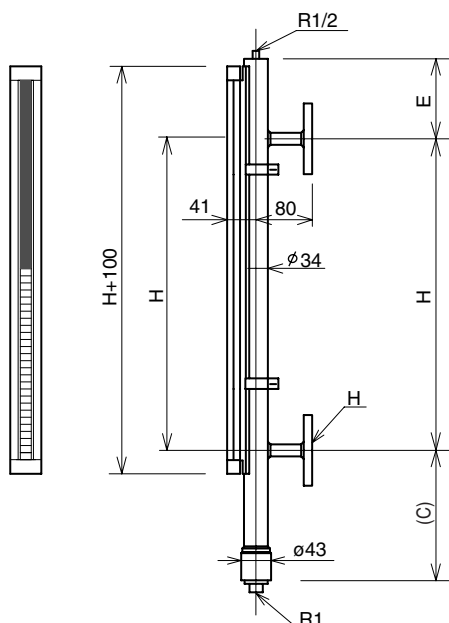
COMPACT TYPE, LOW PRESS, STANDARD TEMP., METALLIC MATERIAL

FM-3100 series is a small and lightweight Mag gauge with a chamber (ø34) of made of SUS304, SUS316 or SUS316L stainless steel and SUS316L float.

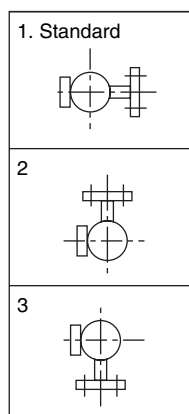
AVAILABLE RANGES OF PRODUCTS

Range : Min. 0~250mm
 : Max. 0~2000mm
 Max. Op. Press.: 1MPa
 (Subject to connection flange rating)
 Temp. range : -10~120°C
 : Alarm contact transmitter (W,E or S)* is available.

DIMENSIONS



INDICATOR INSTALLATION ANGLE



MODEL CODE

		—	31		—	Description
Flapper pitch	FM					10mm (Accuracy-15mm)
Chamber material *2			1			SUS304
			2			SUS316
			3			SUS316L
Density range (g/cm³) *3 Float material *4			1			0.85~0.97
			2			0.95~1.12
			3			1.10~1.42
			4			1.40~2.0
Connection flange rating			0			10A JIS 10KFF
			1			10A JIS 10KRF
			2			10A JIS 5KFF
			3			10A JIS 5KRF
			4			15A (1/2") flanges *5
			5			20A (3/4") flanges *5
			6			25A (1") flanges *5
			9			Special *6

*1 : Analog level transmitter is not applicable. FM-1000 series is recommended.

*2,*4: FM-1000 series is recommended if special materials are required.

*3 : FM-1000 series is recommended if special range of density is required.

*5 : JIS10KFF, JIS10KRF, JPI #150 and ANSI #150 are available.

*6 : Consult factory for details.

FLOAT AVAILABILITY AND SIZES

No.	Density (g/cm³)	Design		Material	Float	
		C	E		L	
1	0.85~0.97	320	100	SUS316L	320	
2	0.95~1.12	230			229	
3	1.10~1.42	180			177	
4	1.40~2.00	180			177	

FM-1610, 1620, 1630, 16Z0

HIGH TEMP., STANDARD PRESS., METALLIC MATERIAL

FM-1600 is a series of metal tube level gauge for high temperature with stainless steel chamber and float (Titanium float for low density applications). A heat insulation is provided between indicator and chamber to cover high temperature.

AVAILABLE RANGES OF PRODUCTS

Range : Min. 0~250mm

Max. 0~4380mm *

Max. Op. Press.: 2MPa (Titanium float : 1.6MPa)

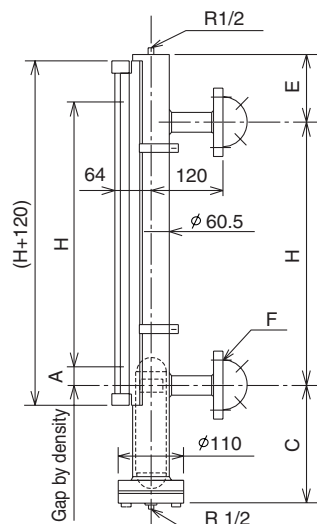
(Subject to connection flange rating)

Temp. range : 121~300°C (Titanium float : 0~250°C)

(Select standard types of FM-12¹/₃ 0 series for the temperature range of 0~120°C.)

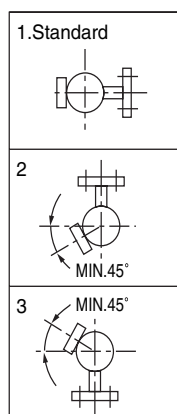
* Observe heat expansion factor of stainless steel chamber and vessel material to finalize measuring range.

DIMENSIONS

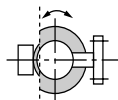


* Dimension will be changed.
Consult factory for details.

INDICATOR INSTALLATION ANGLE



Heating / heat insulation are to be conducted onto chamber portion only.



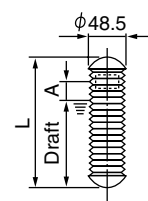
MODEL CODE

FM-16				Description
Chamber material	1			SUS304
	2			SUS316
	3			SUS316L
	Z			Other special metallic material *1
Density range (g/cm ³) Float material	A		0.39~0.45	TP340 Titanium
	0		0.44~0.52	
	1		0.5~0.6	
	2		0.55~0.7	
	3		0.62~0.8	
	P		0.65~0.8	SUS316
	5		0.7~0.9	
	6		0.8~1.0	
	7		0.9~1.4	
	8		1.0~1.5	
Connection flange rating	— 0		25A JIS 10KFF	
	— 1		25A JIS 10KRF	
	— 2		1" JPI 150# RF	
	— 3		1" ANSI 150# RF	
	— 4		25A JIS 20KRF	
	— 5		1" JPI 300# RF	
	— 6		1" ANSI 300# RF	
	— 7		25A JIS 5KFF	
	— 8		Other 1"(25mm) flanges	
	— 9		Special	

*1: SUS304L, MA276, Titanium etc. available. Consult factory for details of density range etc.

FLOAT AVAILABILITY AND SIZES

No.	Density (g/cm ³)	Design		Float	
		C	E	Material	L
A	0.39~0.45	620	200	TP340 Titanium *(0.68MPa)	650
0	0.44~0.52	490	200		520
1	0.5~0.6	390	200		410
2	0.55~0.7	340	200		360
3	0.62~0.8	290	200		300
P	0.65~0.8	460	170	SUS316 or SUS316L *(1.35MPa)	460
5	0.7~0.9	400	170		400
6	0.8~1.0	300	150		300
7	0.9~1.4	260	150		260
8	1.0~1.5	230	130		230



* Consult factory for details when max. press. exceeds these value.

FM-1710, 1720, 1730, 17Z0

HIGH TEMP., MEDIUM PRESS.(3.9MPa), METALLIC MATERIAL

FM-1700 is a series of metal tube level gauge for high temperature with stainless steel chamber and Titanium float for high temperature and medium pressure.

AVAILABLE RANGES OF PRODUCTS

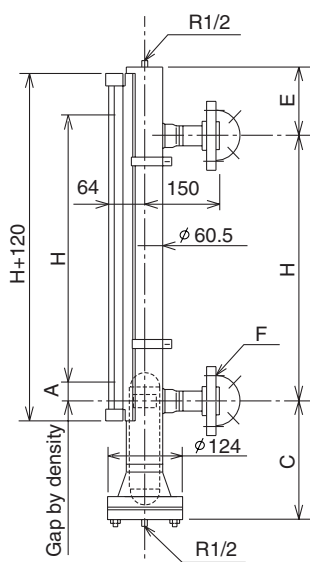
Range : Min. 0~250mm
Max. 0~4380mm *

Max. Op. Press.: 3.9MPa
(Max. 4.4MPa for TP340 float)
(Subject to connection flange rating)

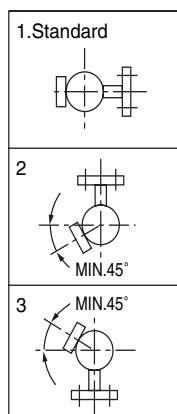
Temp. range : 121~285°C
(Select standard types of FM-1300 series for the temperature range of 0~120°C.)

* Observe heat expansion factor of stainless steel chamber and vessel material to finalize measuring range.

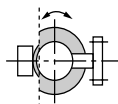
DIMENSIONS



INDICATOR INSTALLATION ANGLE



Heating / heat insulation are to be conducted onto chamber portion only.



MODEL CODE

FM-17		—	Description
Chamber material	1		SUS304
	2		SUS316
	3		SUS316L
	Z		Special
Density range (g/cm ³) Float material	F		0.66~0.68
	—		—
	—		—
	—		—
	1		0.64~0.69
	2		0.69~0.77
	3		0.77~0.88
	5		0.82~0.96
	6		0.95~1.2
	7		1.1~1.5
	9		Special
Connection flange rating	1		1 ^B JPI 300# RF
	2		1" ANSI 300# RF
	3		1 ^B JPI 600# RF
	4		1" ANSI 600# RF
	5		1 ^B JPI 600# RTJ
	6		1" ANSI 600# RTJ
	9		Special

FLOAT AVAILABILITY AND SIZES

No.	Density (g/cm ³)	Design		Float	
		C	E	L	
F	0.66~0.68	*	200	*	
—	—	—	—	—	
—	—	—	—	—	
—	—	—	—	—	
—	—	—	—	—	
—	—	—	—	—	
1	0.64~0.69	820	200	820	
2	0.69~0.77	630	200	630	
3	0.77~0.88	480	200	485	
5	0.82~0.96	390	200	405	
6	0.95~1.2	320	200	325	
7	1.1~1.5	250	200	260	
9	Special	—	—	—	

*Consult factory for details.

FM-1810, 1820, 1830, 18Z0

HIGH TEMP., HIGH PRESS.(7MPa), METALLIC MATERIAL

FM-1800 is a series of metal tube level gauge for high temperature with stainless steel chamber and Titanium float for high temperature and high pressure.

AVAILABLE RANGES OF PRODUCTS

Range : Min. 0~250mm

Max. 0~4380mm *

Max. Op. Press. : 7MPa

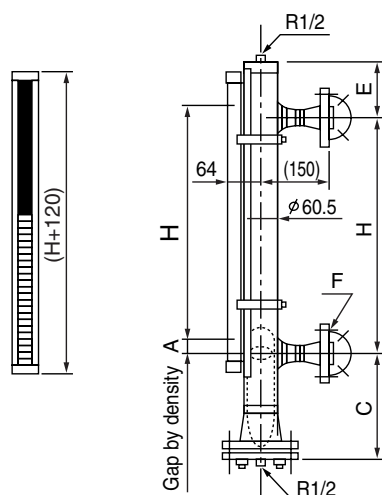
(Subject to connection flange rating)

Temp. range : 121~285°C

(Select standard types of FM-1400 series for the temperature range of 0~120°C.)

* Observe heat expansion factor of stainless steel chamber and vessel material to finalize measuring range.

DIMENSIONS



MODEL CODE

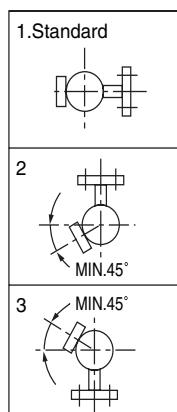
FM-18			Description
Chamber material	1		SUS304
	2		SUS316
	3		SUS316L
	Z		Special
Density range (g/cm ³) Float material	F	0.76~0.77	Titanium alloy (Gas inerted)
	G	0.79~0.89	
	H	0.86~0.98	
	I	0.95~1.2	
	J	1.08~1.3	
	9	Special	
Connection flange rating	1	1 ^B JPI 900#RF	
	2	1" ANSI 900#RF	
	3	1 ^B JPI 900#RTJ	
	4	1" ANSI 900#RTJ	
	5	1 ^B JPI 1500#RF	
	6	1" ANSI 1500#RF	
	7	1 ^B JPI 1500#RTJ	
	8	1" ANSI 1500#RTJ	
	9	Special	

FLOAT AVAILABILITY AND SIZES

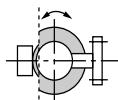
No.	Density (g/cm ³)	Design			Float ø48.5
		C	E	L	
F	0.76~0.77	*	200	*	
G	0.79~0.89	*	200	*	
H	0.86~0.98	*	200	*	
I	0.95~1.2	*	200	*	
J	1.08~1.3	*	200	*	
—	—	—	—	—	
—	—	—	—	—	
9	Special				

*Consult factory for details.

INDICATOR INSTALLATION ANGLE



Heating / heat insulation are to be conducted onto chamber portion only.



ALARM CONTACTS TRANSMITTER

● Intrinsically safe version (FM - □ □ □ □ S □ □)

A safety relay is inserted into the contact loop of watertight version to achieve Intrinsically safe loop.

Alarm contact (s) can be provided to all FM Mag Gauges.

A reed switch is located at side portion of chamber which is actuated by the magnet in float. Watertight, Intrinsically safe as well as pressure tight explosionproof versions are available.

IS classification : Ex ia IIC T6

(Subject to using of specified safety relay)

Dimension of Safety Relay EB3C-R01A (1 point use)

MODEL CODE OF ALARM CONTACTS

FM-□□□-□5□6□7/□□□□

FM-1	5	6	7	
Enclosure	W			Watertight (Non-Ex)
	E			EX-d, Flameproof
	S			EX-i, Flameproof
Contact				No. of contact
Terminal box				No. of terminal box

SPECIFICATION

● Watertight version (FM-□□□□-□W□□)

Type of contact : 1 X SPST (Self-holding contact)

Contact capacity : 10W, AC/DC

Max. voltage ; AC, DC 100V

Fluid temp. : -10~200°C

Ambient temp. : -10~60°C

Enclosure : Watertight

No. of contact : Depending on the length of chamber
(No limitation)

Repeatability : ±15mm
(Equivalent to indicator accuracy)

Reset span : Max. 30mm (Fixed)

Alarm action : High or Low
(To be specified. Also at field adjustable)

Setting range : Between 50mm above lower and 50mm below upper end.

Min. gap between points :

50mm

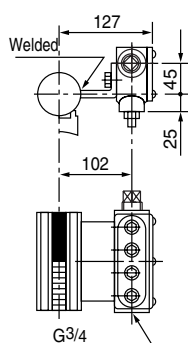
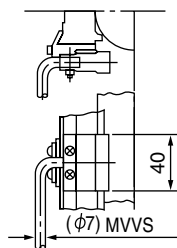
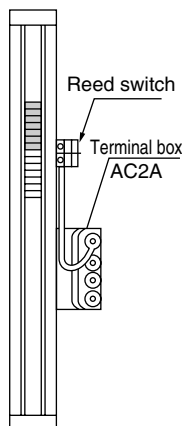
(Shorter gap on request)

Accessory : Surge suppressor intergrated
(It is not attached to IS version)

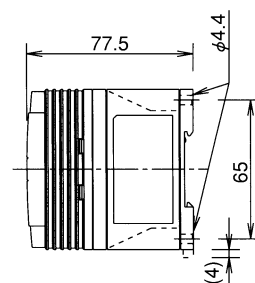
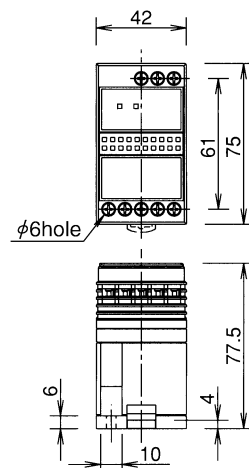
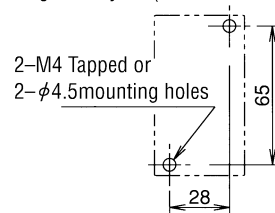
Terminal box : The cable from a reed switch is drawn and it is used for terminal connection.

Installed terminal : 8P, M3.5 screws

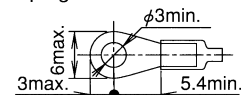
Cable entries : For alarm switches
4 entries with gland gasket,
Max. cable dia. 7 mm
For alarm outlet
1 X G3/4 (Female)



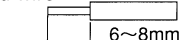
Mounting hole layout (Screw mounting)



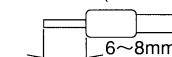
Applicable crimping terminal



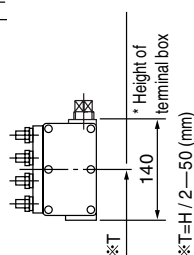
Stripping the wire end
Solid wire



Stranded wire (Ferrule)



Case : AC2A
Cover : SPCC
Fitting : SUS



● Pressure tight flameproof version (FM-1□ □ □- □ E □ □)

Individual reed switch and terminals are capcellated in one pressure tight housing for each alarm contact.

Construction : Pressure tight flameproof (d2G5) (No. T49972)

Type of contact : SPST (Self-holding contact)

Contact capacity : 10W, AC/DC

Max. voltage ; AC,DC 100V

No. of contact : Depending on the length of chamber
(No limitation)

Repeatability : $\pm 15\text{mm}$
(Equivalent to indicator accuracy)

Reset span : Max. 30mm (Fixed)

Alarm action : High or Low (To be specified.)

Setting range : From 100 mm above lower end to 100 mm
below upper end

Min. gap between points :
200mm (Shorter gap on request)

Fluid temp. : $-10\sim 200^{\circ}\text{C}$

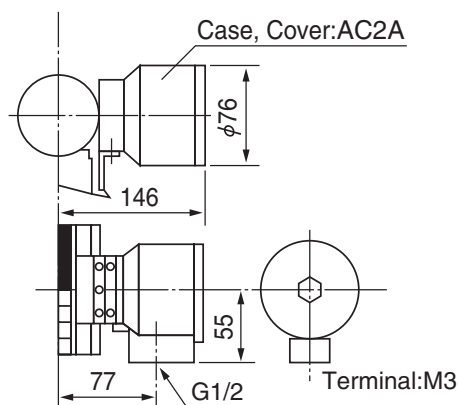
Amb. temp. : $-10\sim 60^{\circ}\text{C}$

Accessory : Surge suppressor integrated

Built-in terminal : 2P (M3)

Installation : Clamping onto chamber

Cable entry : 1XG1/2 (Female)



ANALOG LEVEL TRANSMITTER

Analog level transmitter can be additionally provided for all types of FM Mag Gauge even together with alarm contact (s).

Watertight, IS and Pressure tight flameproof versions are available to meet area classification.

MODEL CODE OF ANALOG TRANSMITTER

FM-1	8	9	10
Enclosure	W		Watertight
	E		Flameproof
	S		Intrinsically safe
Direction of sensor	R		Right hand side
	L		Left hand side
Direction of Converter	R		Right hand side
	L		Left hand side

SPECIFICATION

Output span : Min. 0~250mm
Max. 0~4380mm
(Shorter output span than measuring range on request)

Enclosure : 1) Watertight
FM-1□□□-□□□□/□W□□
2) Flameproof
FM-1□□□-□□□□/□E□□
Ex d IIB T6, RIIS certification No. TC14720
3) Intrinsically safe
FM-1□□□-□□□□/□S□□
Ex ia IIC T4, RIIS certification No. C16354

Fluid temp. : -10~200°C

Amb. temp. : -10~55°C

Power supply: Nominal DC24V

Max. load resistance

Watertight (W) 600Ω

Flameproof (E) 600Ω

Intrinsically safe construction (600 – Resistance inside barrier) Ω

When using MTL728+, 600 – 340 = 260Ω

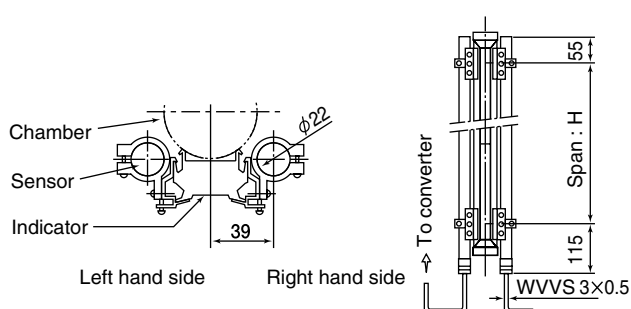
Output accuracy : $\pm(0.2 + \frac{10}{H} \times 100)\%$ F.S.

H : Measuring range(mm)

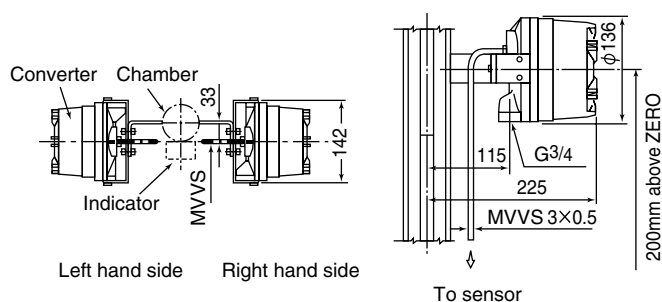
DIMENSION

Watertight (W) and Intrinsically safe (S)

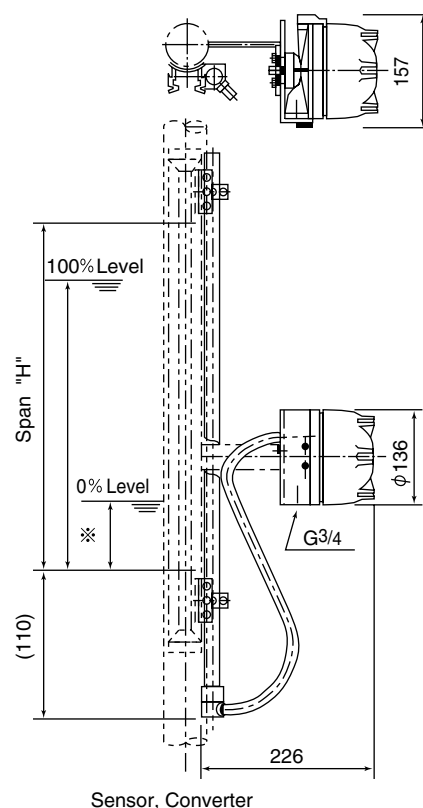
a. Sensor (Installed onto indicator housing)



b. Converter (Installed onto chamber)



Pressure tight flameproof version (E)



* Specification is subject to change without notice.

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