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INSTRUCTION MANUAL

MAGNETOSTRICTIVE TYPE LEVEL TRANSMITTER

HT-100M Series



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You should be well-informed of the contents where **WARNING** is marked before carrying out the work.



You should be careful where **CAUTION** is marked to carry out the work.

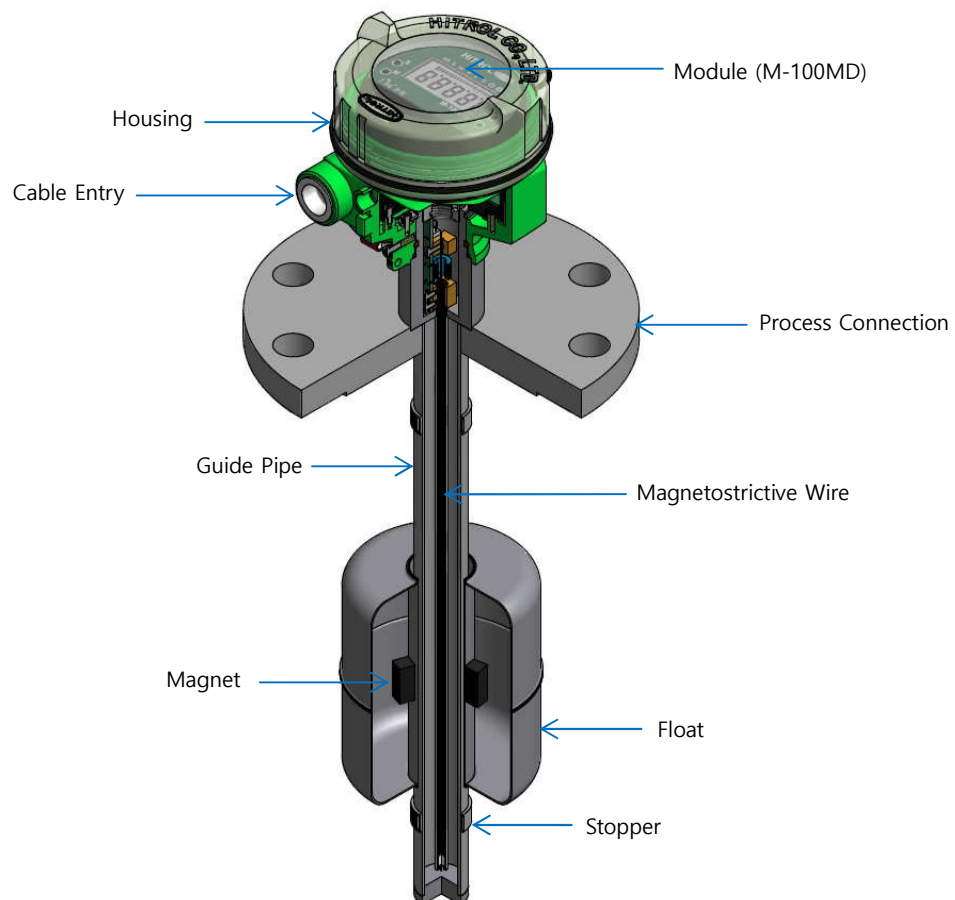


You should be aware of where **NOTICE** is marked to carry out the work.

Overview HT-100M Series are MAGNETOSTRICTIVE TYPE LEVEL TRANSMITTER that continuously measure water levels in containers using buoyancy. These transmitters can be easily installed and adjusted and can be used for chemicals because PVC and Teflon are used on their detecting elements. These transmitters are mainly used to measure clean water, industrial water, and liquids in LPG tanks and chemical tanks.

- Characteristics**
- Precise measurement (Resolution 1mm)
 - Widely used to measure various liquids (Resolution 1mm)
 - Applicable to corrosive and acidic liquids with anti-corrosive material for the sensor (PVC, Teflon)
 - Strong structure and high reliability
 - Local indication is available.

Operating Principles and Composition When a float manufactured to match the specific gravity of the measurement moves up and down to the level of the liquid due to buoyancy, the magnet embedded in the float causes distortion of the pulse moving along the magnetostrictive wire inside the guide pipe. The round trip time from the torsion point is detected by the module (M-100MD) inside the housing to continuously output the current value (DC 4-20 mA).



Product images are for reference only.

Specifications STAINLESS STEEL

Model	HT-100MS	
	Std.	Opt.
Mounting	Banding at HLG-100F	Flange
Process Temperature	Max. 90°C	
Process Pressure	None	Up to 20kg/cm ² (300#)
Power Source	DC +24V	
Output	DC 4~20mA(2-wire)	
Accuracy	±1mm or ±0.1% @ F.S whichever is greater	
Enclosure	Weather-Proof IP65 / IP66. (AL.)	
Wetted Part Material	SUS316L	
Process Connection	None	Min. 25A
Housing	PBT / AL. (Opt.)	
Cable Entry	PF 1/2"	
Resolution	1mm	

PVC

Model	HT-100MV	
Mounting	Flange	
Process Temperature	Max. 60°C	
Process Pressure	Up to 0.5kg/cm ²	
Power Source	DC +24V	
Output	DC 4~20mA(2-wire)	
Accuracy	±1mm or ±0.1% @ F.S whichever is greater	
Enclosure	Weather-Proof IP65 / IP66. (AL.)	
Wetted Part Material	PVC	
Process Connection	100A JIS 10K FF	
Housing	PBT / AL. (Opt.)	
Cable Entry	PF 1/2"	
Resolution	1mm	

TEFLON

Model	HT-100MT	
Mounting	Flange	
Process Temperature	Max. 90°C	
Process Pressure	Up to 0.5 or 3kg/cm ²	
Power Source	DC +24V	
Output	DC 4~20mA(2-wire)	
Accuracy	±1mm or ±0.1% @ F.S whichever is greater	
Enclosure	Weather-Proof IP65 / IP66. (AL.)	
Wetted Part Material	SUS316L+TEFLON	
Process Connection	100A JIS 10K FF	
Housing	PBT / AL. (Opt.)	
Cable Entry	PF 1/2"	
Resolution	1mm	

Float Application

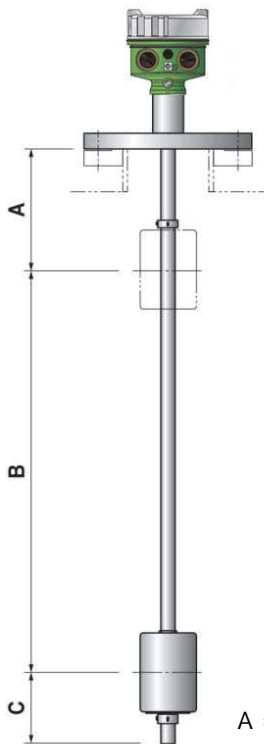
Float	Environment						
	Temp. (°C)	Press. (kg/cm ²)	Acid	Alkaline	Oil	Solvent	Liquid gas
SUS 316L	-40 ~ +150	Up to 20	△	○	○	◎	△
PVC	-10 ~ +60	0.5	○	○	X	△	X
TEFLON	-20 ~ +150	0.5~3	◎	◎	X	○	△
NBR	-40 ~ +60	Up to 20	X	△	◎	△	○
TITANIUM	-20 ~ +150	Up to 10	X	△	◎	○	○

Note: ◎ = Excellent ○ = Good △ = Acceptable X = Not good



Above application can be different according to the specific gravity and the specific medium

Section Distance



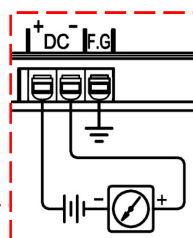
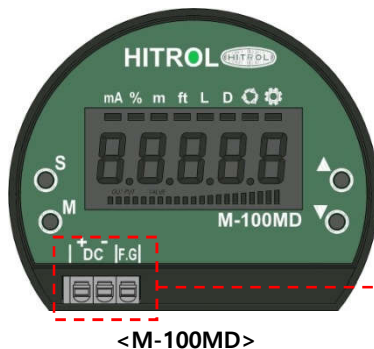
Section	HT-100MS (Unit : mm)			
	1"	2"	3"	4"
A	50	100	100	100
B	1400	3350	5300	5300
C	50	50	100	100

Section	HT-100MV (Unit : mm)		
	2"	3"	4"
A	100	100	100
B	3350	3800	3800
C	80	100	100

Section	HT-100MT (Unit : mm)			
	1"	2"	3"	4"
A	50	100	100	100
B	1380	2830	4300	4300
C	70	70	100	100

A = Upper Dead Band; Minimum length which cannot be measured from the bottom of flange
 B = Max. Measuring Range; It can be different according to the material.
 C = Lower Dead Band; Minimum length which cannot be measured from the end of guide pipe.

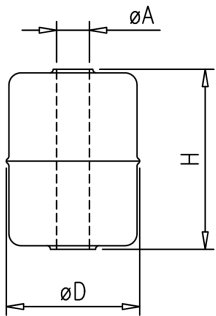
Wiring



- + -: DC 24V(DC 4~20mA Loop)
- FG: Field Ground
- Make sure to connect the power with correct polarity (+, -).
- The power supply must be between DC +17 and +40V.
- Do not connect the wire with the power connected.

Float Application

Table



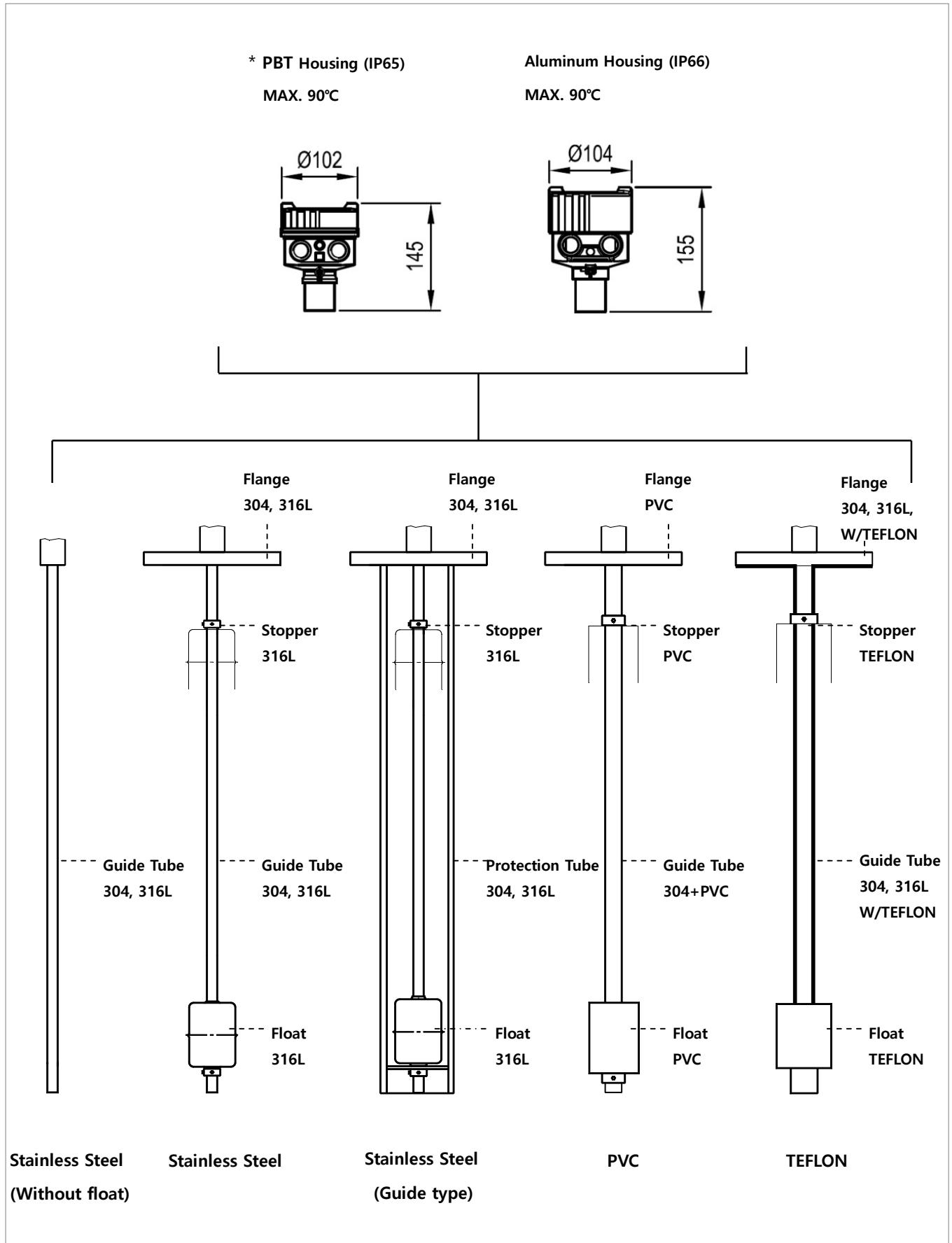
Product	Size	Dimensions (mm)			Guide Tube	Material	S.G Range
		D	H	A			
HT-100MS	1"	Ø28	28	Ø9.5	Ø8	316L	0.9~1.4
		Ø26	15	Ø9.5	Ø8	발포 NBR	0.8~1.3
	2"	Φ49	50	Φ15.5	Φ12.7	316L	0.7~1.0
		Φ50	45	Φ20	Φ15.8	NBR	0.6~0.9
		Φ42	50	Φ15	Φ12.7	316L	0.8~1.3
	3"	Φ73	105	Φ23.5	Φ21.7	316L	1.0~1.5
		Φ73	108	Φ23	Φ21.7	Titanium	0.6~0.9
		Φ65	90	Φ25	Φ21.7	316L	0.9~1.5
	4"	Φ95	119	Φ30	Φ25.4	316L	0.8~1.3
		Φ95	103	Φ23	Φ21.7	Titanium	0.6~0.8
		Φ95	118	Φ23	Φ21.7	Titanium	0.5~0.6
		Φ80	80	Φ28	Φ25.4	NBR	0.5~0.7

Product	Size	Dimensions (mm)			Guide Tube	Material	S.G Range
		D	H	A			
HT-100MV	2"	Φ49	60	Φ20	Φ18	PVC	1.0~1.6
	3"	Φ76	110	Φ31.5	Φ26		
	4"						

Product	Size	Dimensions (mm)			Guide Tube	Material	S.G Range
		D	H	A			
HT-100MT	1"	Ø26	30	Ø10.5	Ø10	TEFLON	1.1~1.7
		Ø28	35	Ø11	Ø10		1.1~1.7
		Ø28	30	Ø11	Ø10	PP	1.0~1.7
	2"	Φ45	50	Φ17	Φ15	TEFLON	0.9~1.6
							1.1~1.7
	3"&4"	Φ69	96	Φ23.5	Φ21		0.8~1.3
							0.9~1.5
	4"	Φ85	100	Φ33	Φ28		1.1~1.7

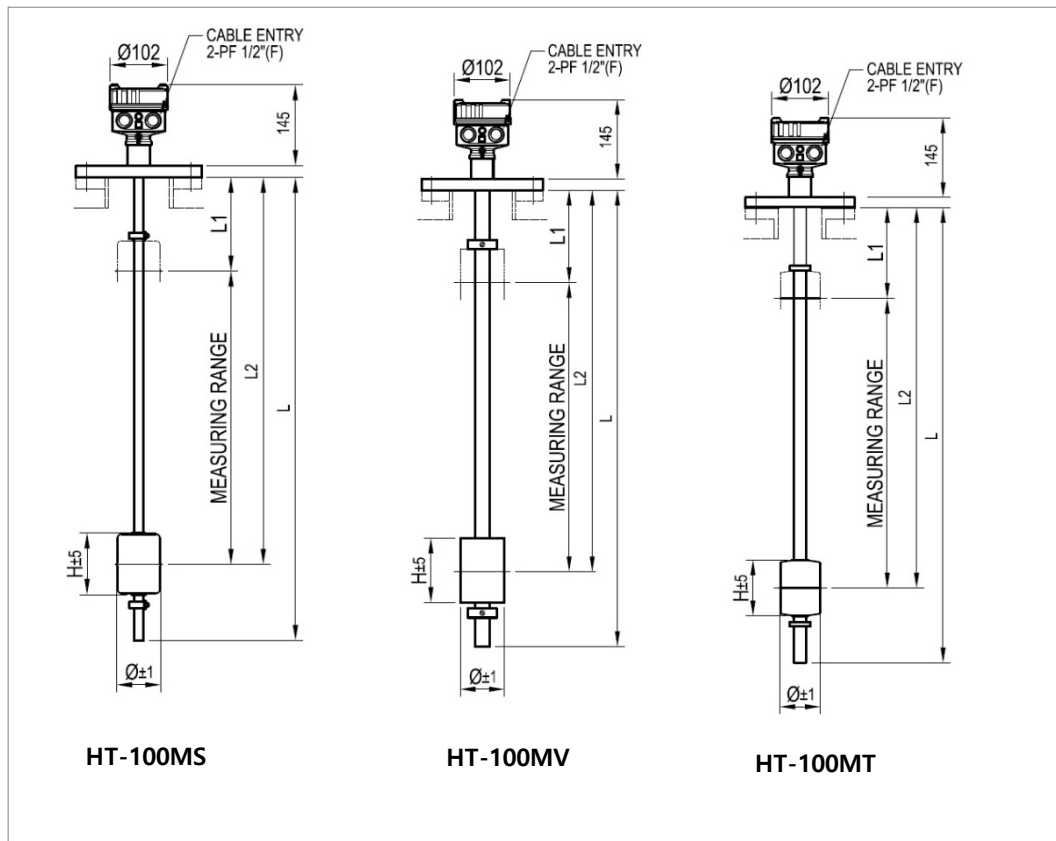
(*)S.G: Specific Gravity

Product Composition

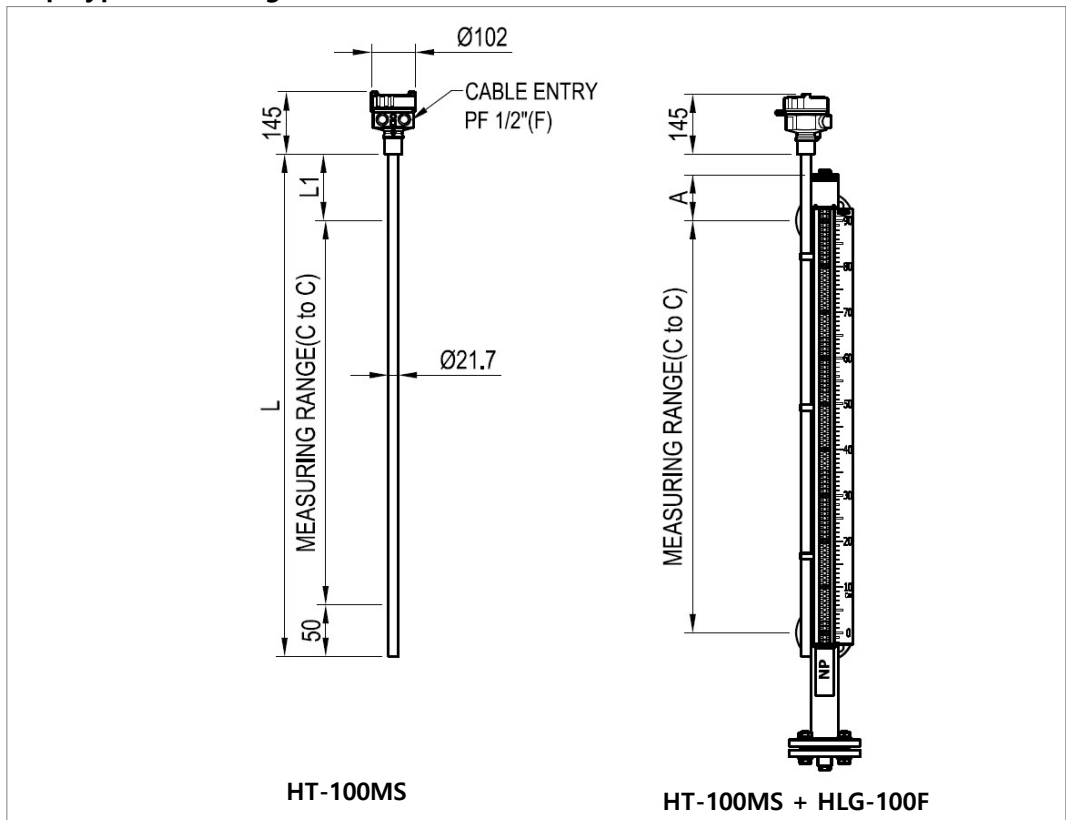


* PVC Type's workable temperature is Max 60°C

Dimensions



Flap Type Level Gauge with HT-100MS



	VENT PLUG	: $L1 = A + 30\text{mm}$
	VENT VALVE /w PLUG	: $L1 = A + 100\text{mm}$

Maintenance The main inspection part of the HT-100M Series level transmitter is divided into the sensor part and the transmission part. The sensor part consists of coil board, magnetostrictive wire, and float, and the transmission part has M-100MD. The life of the main part depends on the user's environment and can be used in optimal condition through periodic inspection. Therefore, the user should maintain it through inspection at least once a year. The product exterior inspection should be visually checked for damage, etc., and if there is a scale by the measured object, the float should be removed to facilitate operation.

Precautions for Removal

- Check the level and presence of measurements in the tank before removing it.
- Wear gloves when removing it, to prevent a burn.
- Disassemble work shall be done with the power off.
- If there is explosive gas atmosphere, do not open the cover.
- Make sure that any O-ring or gasket is not damaged while opening or closing the cover of product.

Precautions for Installation

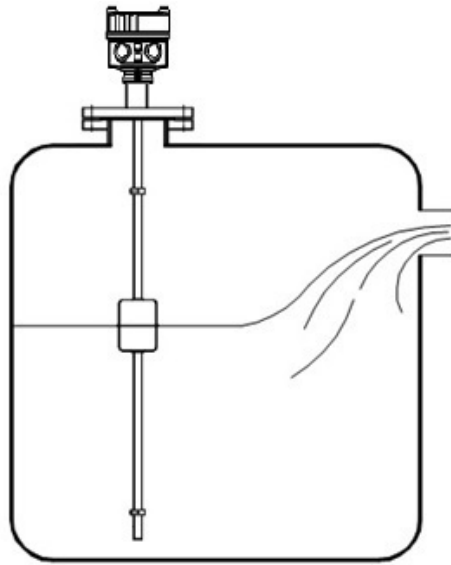
- Use the same standard flange or screw.
- Make sure to insert washers between bolts and nuts to prevent loosening.
- When you attach the product to a hopper, make sure that it is as bonded as possible by means of tools.
- Make sure to insert gaskets between flanges. (Select the gaskets in consideration of temperature of content and pressure of vessel.)
- After the installation is complete and the cover of the product is assembled, power it on.



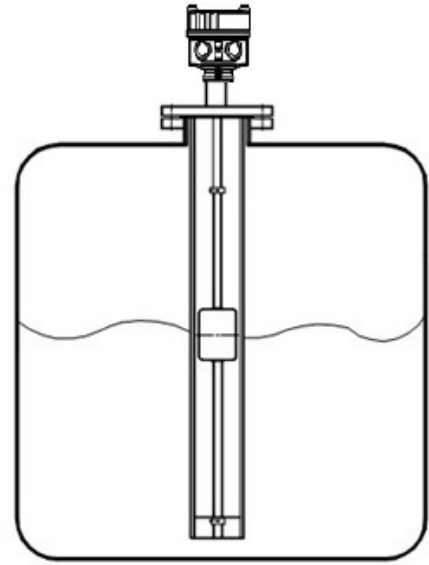
Please do not apply high impact to the product.

Installation

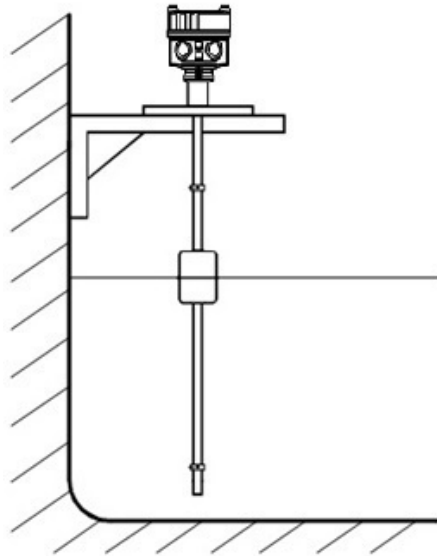
Below recommendation shall be considered when installation.



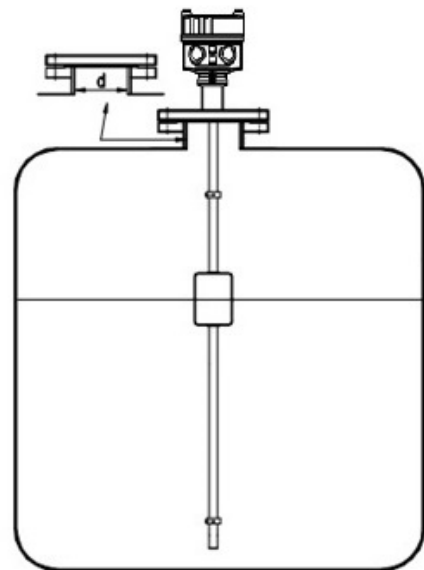
The product may malfunction if the product has been installed at the inlet through which the measure object flows in. Therefore, a guide should be installed in such case or the product should be installed at a position distant from the inlet for measure objects.



When there is flow or sloshing in the measured object or there is agitator around the sensor, the protective tube type must be used.



When installing the product on a concrete wall, you may want to install it as shown in the figure above.



Inner diameter "d" of tank nozzle shall be larger than the outer diameter of float as per above figure.

Safety and Environment

■ Precautions for Use

- Make sure to connect the product and vessel using required tools for sure.
- Keep the lock key safe and make sure that it is locked.
- Do not apply high impact to the product.

■ Precautions for Wiring

- The power voltage of the device must be connected after checking the specifications, checking, and then turning it on.
- Incorrect power voltage may cause damage or failure to the device.
- There is a risk of an electric shock, so you have to be careful about your safety.

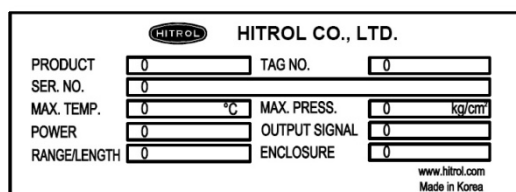
■ Disposal of Product

- Make sure to separate the amplifier and main unit from housing before disposing the products. Also, the amplifier shall be detached and discard the metal and non-metallic materials. No part (ex. Mercury switch) has influence on the environment, so no special attention is required.

Marking

■ Product Identification

The product identification mark is attached onto the housing and shows the model name, serial number, working temperature, working pressure, and matters regarding output. The serial number is a unique manufacturing number for the identification of products.



User Training

The above matters should be fully understood, and the temperature of fluids in the container where the product is used shall not exceed 90°C in the case of general types. In addition, make sure that the ambient temperature of housing is kept at -20°C ~ +60°C. (However, product with PVC sensor part, the fluid temperature of the container is limited to 60°C.)

Failure Mode & Actions

When the output current is below 4mA,

Cause	Checked
Calibration error	Recalibrate
The DC24V power supply line has not been connected.	Check the power supply line and reconnect
The FLOAT Stopper below the sensor has been loosened.	Reassemble or replace the Stopper
The sensor FLOAT lost buoyancy or has been damaged.	Replace FLOAT
The M-100R inter element has been damaged.	Replace the M-100MD

When the output current is above 20mA,

Cause	Checked
Calibration error	Recalibrate
The Float Stopper above the sensor has been loosened.	Reassemble or replace the Stopper
The M-100MD inter-element has been damaged.	Replace the M-100MD

Output current holding phenomenon

Cause	Checked
When the buoyancy has been lost because of impurities between the FLOAT of the sensor and the pipe	Clean the pipe and the FLOAT

Output hunting phenomenon

Cause	Checked
In the process for the inter-element (diode) of the M-100MD to be damaged, temporary over-measurement (approximately 10%) caused by over current and noise outputs are formed.	Replace the M-100MD

Warranty and Contact

■ Warranty and Service

This product is subject to the warranty for 2 years of shipment and unpaid service will be provided for any damage found under normal operating conditions. If it is not about the failure of product, the service charge will be payable.

You can request A/S at our website or by contacting our headquarters.



PTFE Float and Tube have a warranty period of one year after the product is shipped.

■ Headquarters . Factory . Laboratory Contact Number

ADDRESS: HITROL CO., LTD 141, Palhakgol-gil, Jori-eup, Paju-si, Gyeonggi-do, Korea

T E L : 031-950-9700 (Headquarters & A/S)

F A X : 031-943-5600 (Headquarters & A/S)

APPENDIX Z



M-100MD

User Manual

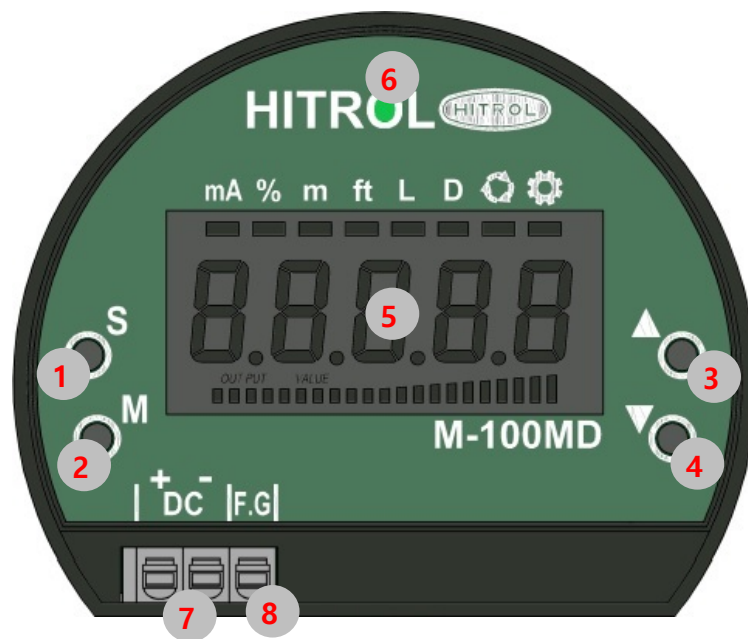
Magnetostirictive Type Level Transmitter



Doc. no.: Rev0.0

Issue date: 2024.10.08

1. M-100MD Module Configuration & Function



No.	Configuration	Function
1	S Key	<ul style="list-style-type: none"> ■ Function setting ■ Save the setting
2	M Key	<ul style="list-style-type: none"> ■ Mode change ■ Cancellation
3	▲ Key	<ul style="list-style-type: none"> ■ Span Set ■ Setting the value left & up
4	▼ Key	<ul style="list-style-type: none"> ■ Zero Set ■ Setting the value right & down
5	LCD	<ul style="list-style-type: none"> ■ Display of operating and setting status
6	LED	<ul style="list-style-type: none"> ■ Display of power and status
7	PWR	<ul style="list-style-type: none"> ■ For supply power and current output ■ Check for output current

2. Specifications

Items	Specifications	
Microprocessor	16Bit Microprocessor	
Current Loop Interface	2-Wire Loop Current	
Supply Voltage	DC+17V ~ +40V @ Typ.+24V	
Output Current Accuracy	4.0mA ~ 20.0mA @ ±0.1% F.S	
Output Current Range	■ 4.0mA ~ 20.0mA @ Alarm 3.8mA, 21mA [NAMUR NE43]	
Field Ground	F.G	
Damping Time	■ Default 0.5 sec	
	■ Range: 0 sec ~ 10 sec @ 0.5 sec Step ADJ.	
Self-Diagnosis	■ Missing the float from sensor	3.6mA current out
	■ Disconnected Sensor Cable	
	■ Lower than Zero Position	3.8mA current output [NAMUR NE43]
	■ Higher than Span Position	21mA current output [NAMUR NE43]
Simulation Current Out	■ 4mA @ 5 sec.	
	■ 12mA @ 5 sec.	
	■ 20mA @ 5 sec.	
Status Indicator	Tri-Color LED [Green / Red / Orange]	
Zero / Span Set	Quick Menu / Set Menu	
Wire Connection	One-Touch Connector (AWG 16~26)	
Display	mA, %, m, ft, Level, Distance	
Ambient Temperature	-20°C ~ +60°C	
Dimension	80mm x 65mm x 58mm	

3. Configuration of Setting Menu

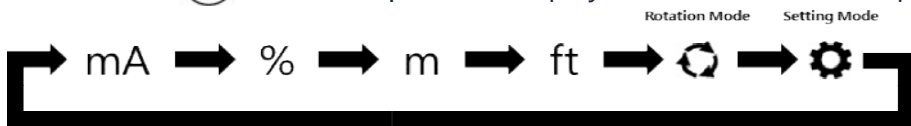
No.	Content	Description	Remarks
[00]	Select Unit : mA / %	▲ : mA ▼ : % (※ Unit Setting for [02], [03])	
[01]	Select Level / Distance	▲ : Level ▼ : Distance	Quick Menu
[02]	Zero Setting	Setting 0.0% ~ 95.0% or 4.000 mA ~ 19.200 mA (Float : Zero position)	Quick Menu
[03]	Span Setting	Setting Span 5.0% ~ 100.0% or 4.800 mA ~ 20.000 mA (Float : Span position)	Quick Menu
[04]	Zero Height Setting	Based on the setting of level ※ -9.999 ~ 99.999mm (User Setting)	
[05]	Span Height Setting		
[06]	Tank Height Setting		
[08]	NAMUR NE43 Set	NAMUR NE43 function setting and holding	
[10]	Damping Time Setting	0 ~ 10 sec. (Default 0.5 sec. @ 0.5 sec. Step ADJ.)	
[30]	Rotation Interval Setting	0.5 ~ 10 sec. (Default 1 sec @ 0.5 sec Step ADJ.)	
[31]	'mA' Display On/Off	Display 'mA' on/off at rotation mode	
[32]	'%' Display On/Off	Display '%' on/off at rotation mode	
[33]	'Meter' Display On/Off	Display 'M' on/off at rotation mode	
[34]	'Feet' Display On/Off	Display 'ft' on/off at rotation mode	
[40]	Output Current "4mA"	Output "4mA" current for 5 seconds	Quick Menu
	Output Current "12mA"	Output "12mA" current for 5 seconds	
	Output Current "20mA"	Output "20mA" current for 5 seconds	
[90]	Show Error Number	Display configuration number of error	
[91]	Show Detected Value	Display the zero, span, detected value of sensor	
[99]	Firm Ware Version	Display of firm Ware Version	
[100]	Factory Reset	Reset the setting value	

4. Setting and Operating



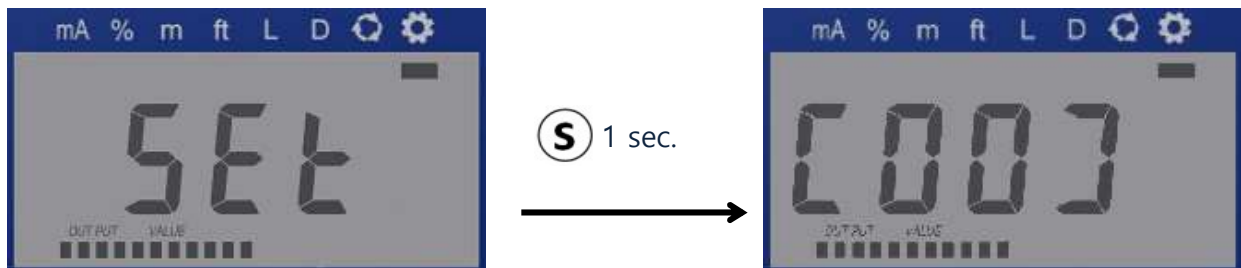
Display Mode	
mA	mA Mode
%	Percent Mode
m	Meter Mode
ft	Feet Mode
L	Level (User Setting)
D	Distance (User Setting)
⌚	Rotation Mode
⚙️	Setting Mode

Whenever (M) button is pressed, Display Mode is switched sequentially.



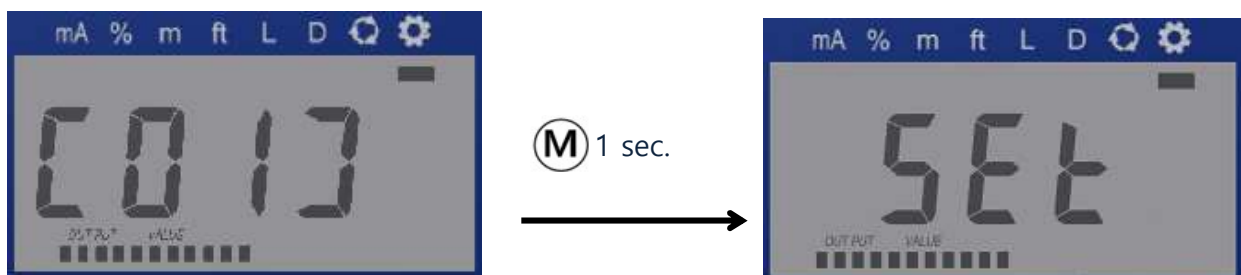
※ Rotation mode (⌚) show each display mode automatically at interval of 1 second by default. It can be set up to 10 second at intervals of 0.5 seconds.

□ How to enter to Setting Menu



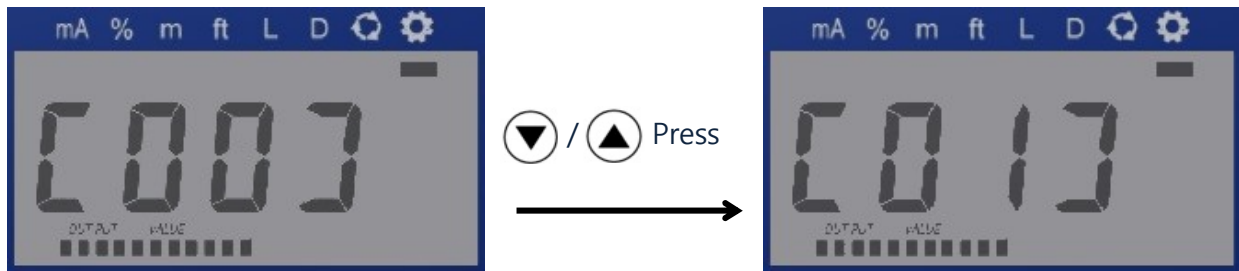
Press (M) button until the cursor is located to **Setting Mode** (⚙️) and Press (S) button for 1 second to enter **Setting Menu** (flickering: Green LED)

□ How to return to Setting Mode



Press (M) button for 1 second to exit to **Setting Mode** (⚙️). (flickering : Green LED)

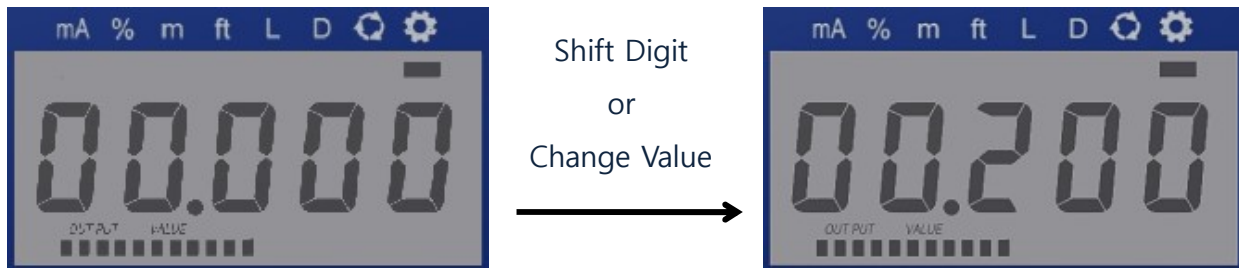
□ How to select the Setting Menu



Each **Setting Menu** can be switched by usage of arrow (▼/▲) buttons.

Press (S) button for 1 second to set of each function referring of below table.

□ How to change the setting value

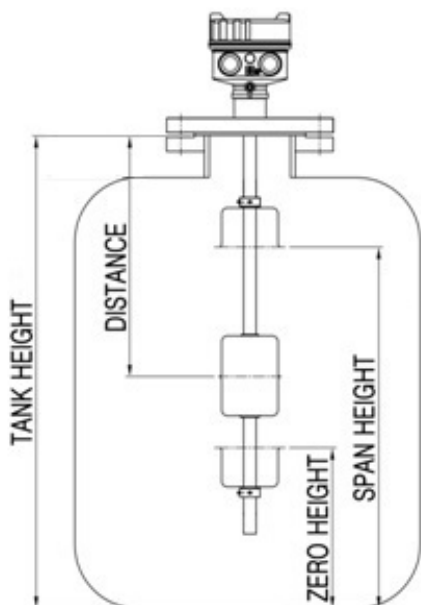


“Flickering only one Digit”: It is available to shift to the other digit.

“Flickering all of Digit”: It is available to change the setting value within flickering digit.

Key Button	Function
Press (▲) for more than 1 sec	Shift to the other digit
Press (▼) for more than 1 sec	Shift to the other digit
Press (▲) for less than 1 sec	Chang the value
Press (▼) for less than 1 sec	Chang the value
Press (M) for more than 1 sec	Exit without saving
Press (S) for more than 1 sec	Exit after saving

■ Definition of Height



- ▶ **Zero Height**
From bottom of tank to center of float at zero position
- ▶ **Span Height:**
From bottom of tank to center of float at span position.
- ▶ **Tank Height**
From bottom of tank to highest level of medium in the tank.
- ▶ **Distance**
From top of tank to center of float.

■ Zero, Span Quick Setting

Unit Setting Screen

※ Factory shipping is set as "[%] unit setting".



[mA] Unit Setting



[%] Unit Setting

Zero Setting

No.	Content	Quick Menu Setting
[02]	Zero Setting	▼ Press for 1 sec. → Input the value → S Press for 1 sec.

Span Setting

No.	Content	Quick Menu Setting
[03]	Span Setting	▲ Press for 1 sec. → Input the value → S Press for 1 sec.

Others

- ▷ Zero / Span can be set regardless of Display Mode status.
- ▷ It can set, save, or cancel the values. (Refer to *Table 3. Key Button Guidance*)
- ▷ The level of medium state shall be maintained when setting zero / span.