HITROL CO., LTD.

HEAD OFFICE.FACTORY.R&D INSTITUDE
HITROL CO.,LTD. 141, Palhakgol-gil, Jori-eup
Paju-si, Gyeonggi-do, Korea
TEL. : (00)-82-31-950-9700
FAX. : (00)-82-31-943-5600
www.hitrol.com

INSTRUCTION MANUAL

MAGNETOSTRICTIVE TYPE LEVEL TRANSMITTER

HT-100M Series

Doc. no.: HT100M_IM_Eng_Rev.0.2

Issue date: 2024. 11

Table of Contents

Overview · 3

Characteristics· 3

Operating Principles and Composition · · · · · · · · 3

Specifications · 4

Float Application · 5

Section Distance · 5

Wiring · 5

Float Specifications · · · · · · · · · · · · · 6

Product Composition · · · · · · · · · · · · · 7

Dimensions · · · · · · · · · · · · · · · · · · · 8

Maintenance · 9

Precautions for Removal · · · · · · · · · · · · · · · · · · 9

Precautions for Installation · · · · · · · · · · · · · · · · 9

Installation · 10

Safety and Environment · 11

Marking · 11

User Training · 11

Failure Modes and Actions ·· · · · · · · · · · · · · · · · · ·12

When the output current is below 4 mA · · · · · · · · · 12

When the output current is above 20 mA ·· · · · · · · ·12

Output current holding phenomenon· · · · · · · · · · · · 12

Output hunting phenomenon· · · · · · · · · · · · · · · · · · 12

Warranty and Contact · 12

APPENDIX

APPENDIX Z · · · · · · · · · · M-100MD User Manual

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

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

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

Overview

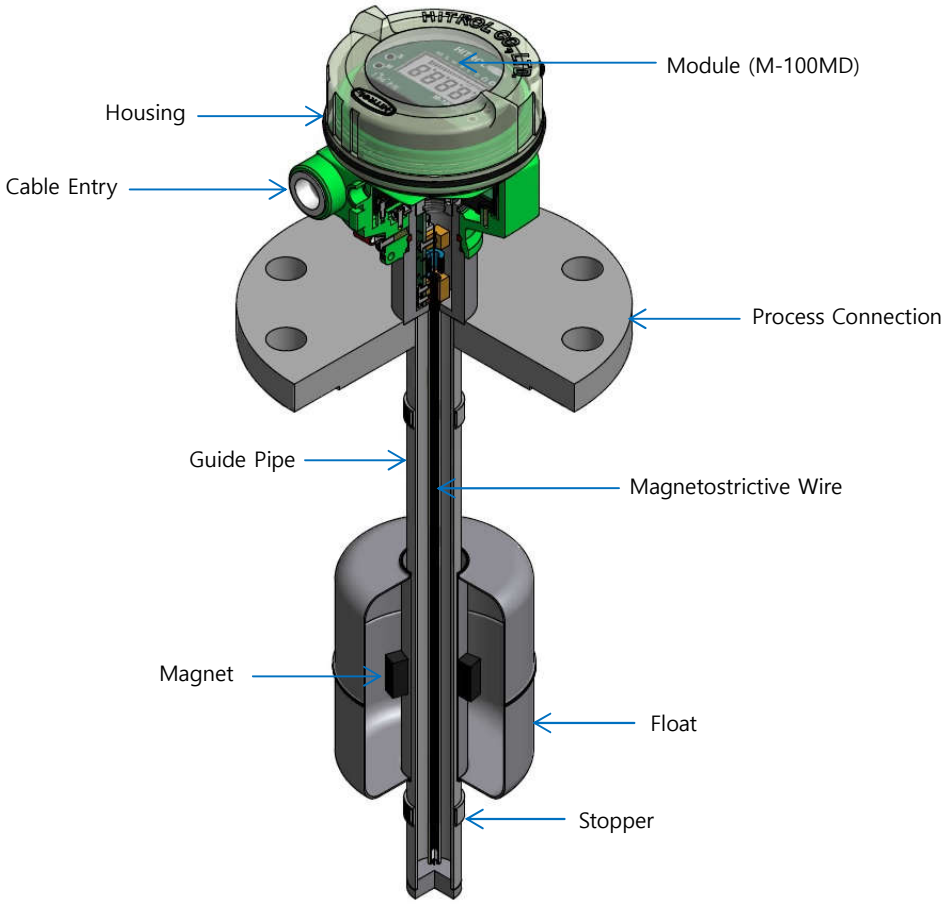
HT-100M Series are MAGNETOSTRICTIVE TYPE LEVEL TRANSMITTER that continuously measure water levels in containers using buoyancy. These transmitters can be easily installed and adjusted and can be used for chemicals because PVC and Teflon are used on their detecting elements. These transmitters are mainly 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).



NOTICE **Product images are for reference only.**

Specifications

STAINLESS STEEL

Model	HT-100MS	
	Std.	Opt.
Mounting	Banding at HLG-100F	Flange
Process Temperature	Max. 90℃	
Process Pressure	None	Up to 20kg/cm2(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℃
Process Pressure	Up to 0.5kg/cm2
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℃
Process Pressure	Up to 0.5 or 3kg/cm2
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

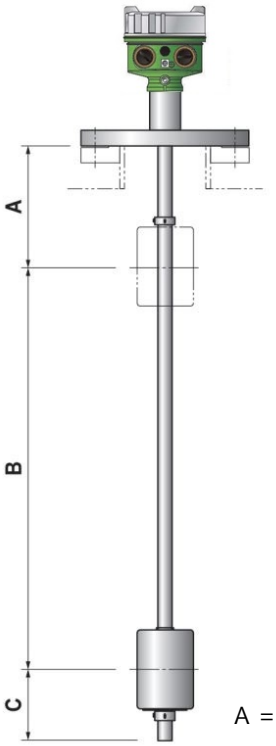
Float Application

Float	Environment						
	Temp. (℃)	Press. (kg/㎠)	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

NOTICE **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	100(50)			
B	1340(1390)	3340(3390)	5300(5350)	5300(5350)
C	60	60	100	100

Section	HT-100MV		(Unit : mm)
	2"	3"	4"
A	100(50)		
B	3320(3370)	3800(3850)	3800(3850)
C	80	100	100

Section	HT-100MT			(Unit : mm)
	1"	2"	3"	4"
A	100(50)			
B	1330(1380)	2830(2880)	4300(4350)	4300(4350)
C	70	70	100	100

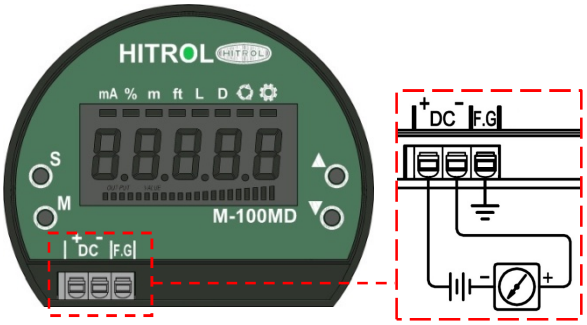
A = Upper Dead Band; Minimum length which cannot be measured from the bottom of flange

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.

( )= Option

Wiring



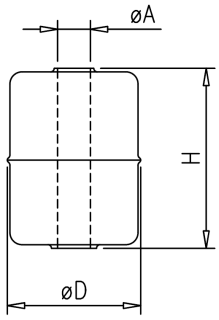
<M-100MD>

- + -: 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.
- The external ground must be connected.

Float Application

Table



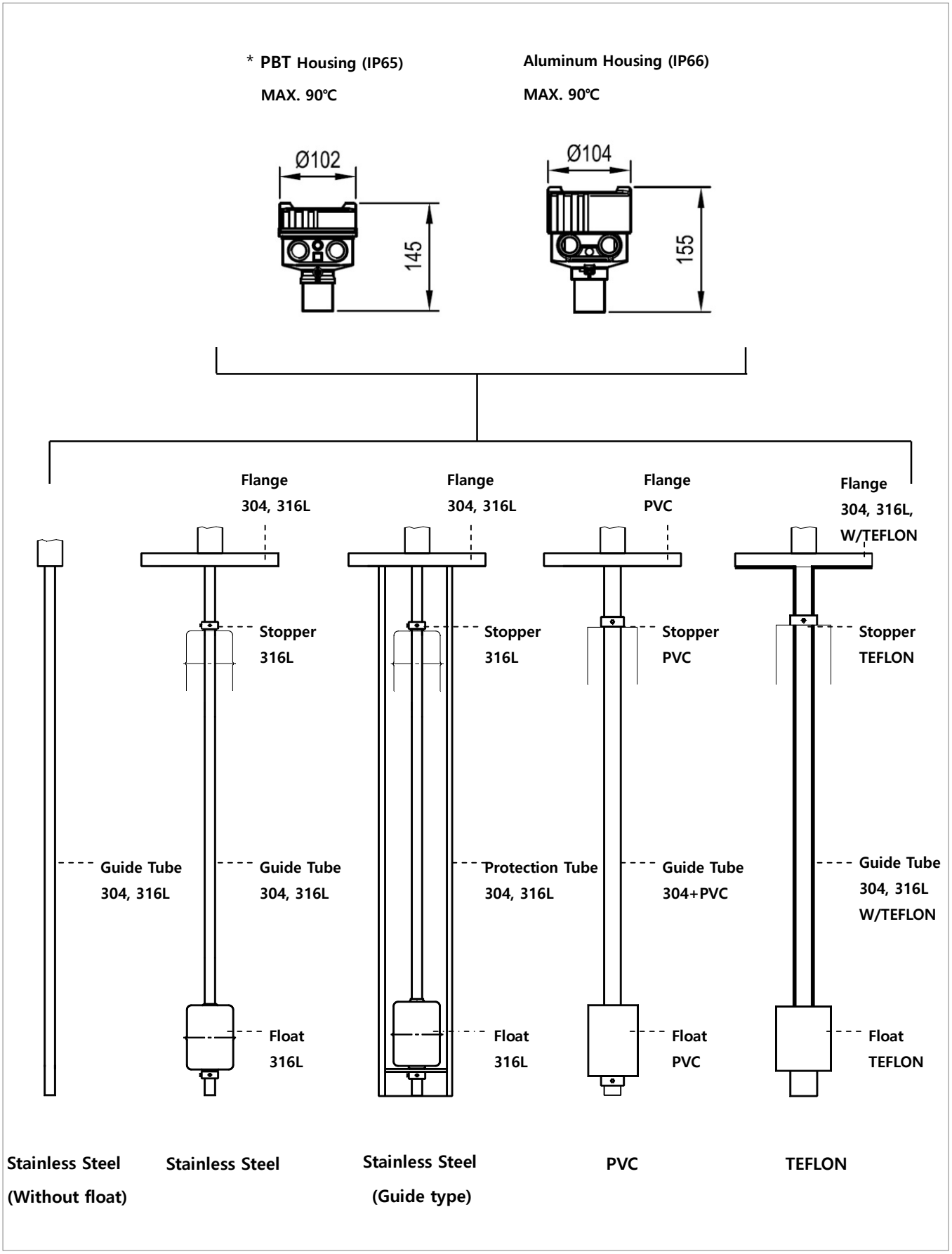
Product	Size	Dimensions (mm)			Guide Tube	Material	S.G Range
		D	H	A			
HT-100MS	1"	Ø28	28	Ø9.5	Ø8	316L	0.9~1.4
		Ø26	15	Ø9.5	Ø8	발포 NBR	0.8~1.3
	2"	Φ49	50	Φ15.5	Φ12.7	316L	0.7~1.0
		Φ50	45	Φ20	Φ15.8	NBR	0.6~0.9
		Φ42	50	Φ15	Φ12.7	316L	0.8~1.3
	3"	Φ73	105	Φ23.5	Φ21.7	316L	1.0~1.5
		Φ73	108	Φ23	Φ21.7	Titanium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

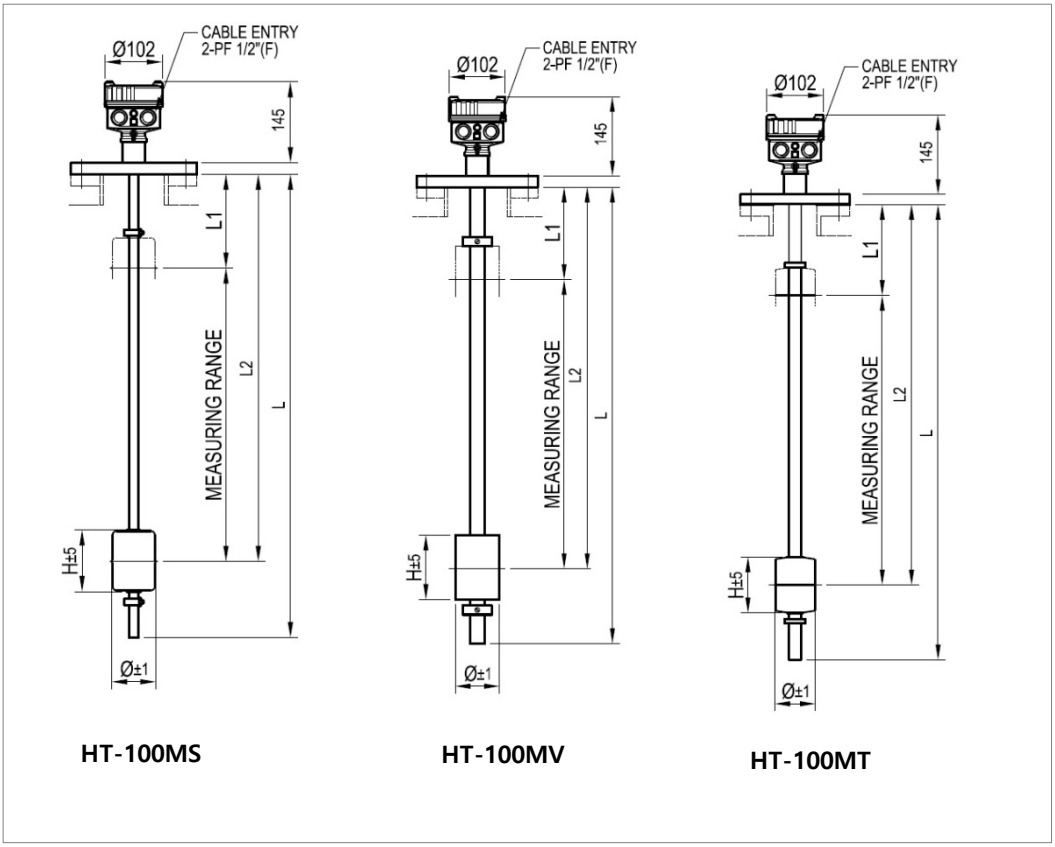
(*)S.G: Specific Gravity

Product Composition

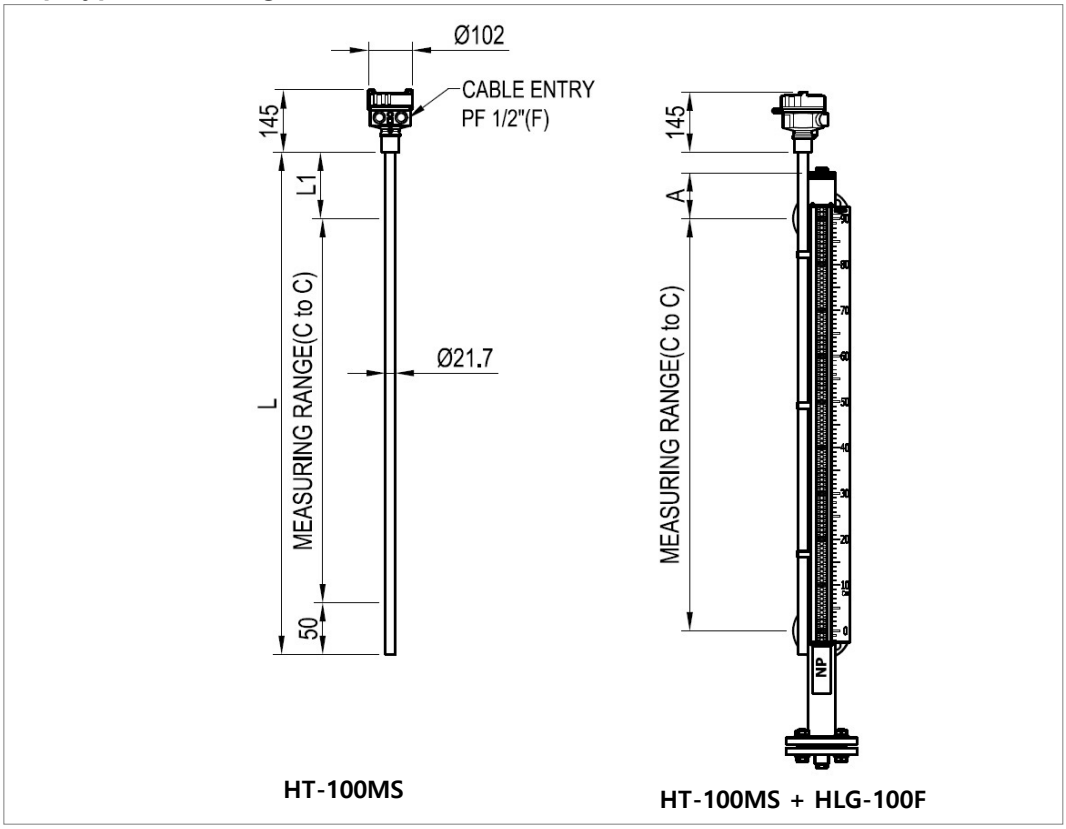


*** PVC Type's workable temperature is Max 60℃**

Dimensions



Flap Type Level Gauge with HT-100MS



NOTICE	VENT PLUG	: L1= A+30mm
	VENT VALVE /w PLUG	: L1= A+100mm

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

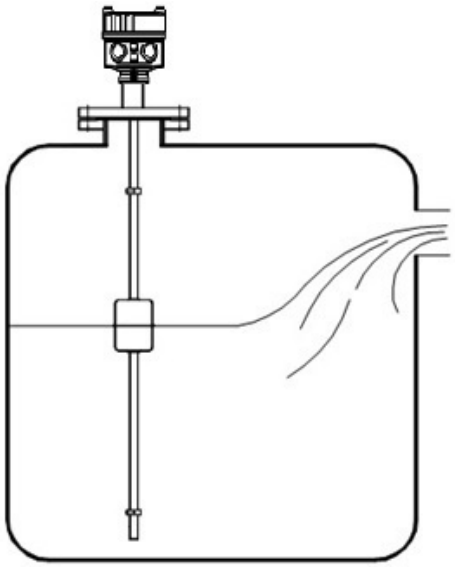
- Check the level and presence of measurements in the tank before removing it.
- Wear gloves when removing it, to prevent a burn.
- Disassemble work shall be done with the power off.
- If there is explosive gas atmosphere, do not open the cover.
- Make sure that any O-ring or gasket is not damaged while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

Precautions for Installation

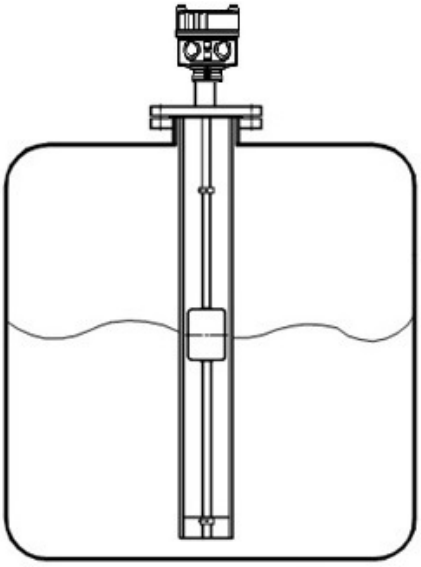
- Use the same standard flange or screw.
- Make sure to insert washers between bolts and nuts to prevent loosening.
- When you attach the product to a hopper, make sure that it is as bonded as possible by means of tools.
- Make sure to insert gaskets between flanges. (Select the gaskets in consideration 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.

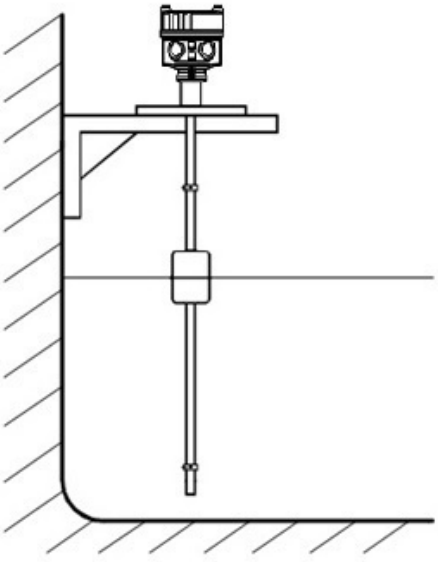
Installation Below recommendation shall be considered when installation.



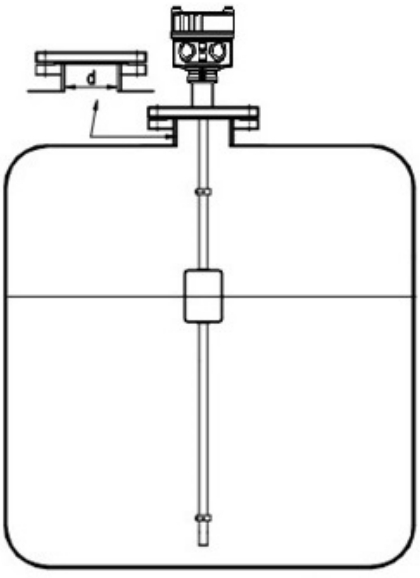
The product may malfunction if the product has been installed at the inlet through which the measure object flows in. Therefore, a guide should be installed in such case or the product should be installed at a position distant from the inlet for measure objects.



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.

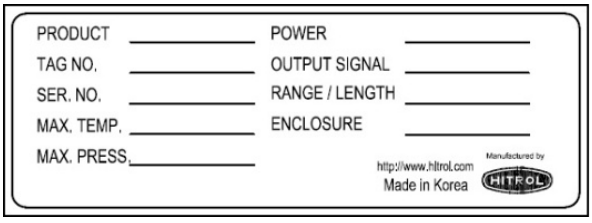
■ Disposal of Product

- 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℃ in the case of general types. In addition, make sure that the ambient temperature of housing is kept at -20℃ ~ +60℃. (However, product with PVC sensor part, the fluid temperature of the container is limited to 60℃.)

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
When the ground is not connected	Check internal and external grounding

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.

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

■ Headquarters . Factory . Laboratory Contact Number

ADRESS: 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

Magnetostirctive Type Level Transmitter

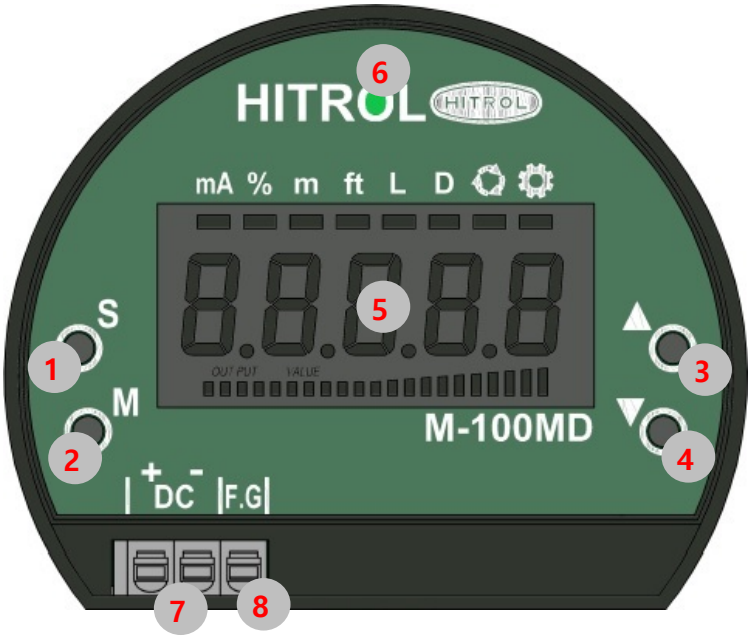
Doc. no. : Rev.1.0

Issue date : 2025.04.01

Version : 25C55~

Always The Best Solution
HITROL CO., LTD.

1. M-100MD Module Configuration & Function



No.	Configuration	Function
1	**S Key**	■ Function setting ■ Save the setting
2	**M Key**	■ Mode change ■ Cancellation
3	**▲ Key**	■ Span Set ■ Setting the value left & up
4	**▼ Key**	■ Zero Set ■ Setting the value right & down
5	**LCD**	■ Display of operating and setting status
6	**LED**	■ Display of power and status
7	**PWR**	■ For supply power and current output ■ Check for output current
8	**F.G**	■ Field Ground

2. Specifications

Items	Specifications	
Enclosure	Weather Proof	
Material	PBT	
Microprocessor	16Bit Microprocessor	
Current Loop Interface	2-Wire Loop Current	
Supply Voltage	DC+17V ~ +40V @ Typ.+24V	
Output Current Resolution	± 1 ㎜	
Output Current Range	■ 3.8mA ~ 20.5mA @ Alarm, 3.6mA, 21mA [NAMUR NE43]	
	■ 4.0mA ~ 20.0mA @ NAMUR NE43 Holding	
Self-Diagnosis	■ Missing the float from sensor	3.6mA current out
	■ Disconnected Sensor Cable	
	■ Lower than Zero Position	3.8 mA 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]	Normal Operation
	■Tri-Color LED [Red]	Abnormal Operation
	■Tri-Color LED [Orange]	Zero, Span Not Set
Field Ground	F.G	
Setting Method	Quick Setting / Set Mode Setting	
Wire Connection	One-Touch Conner (AWG 16~26)	
Display	mA, %, m, ft, Level, Distance, Rotation	
Ambient Temperature	-20℃ ~ +60℃	

[Table 1] Specification

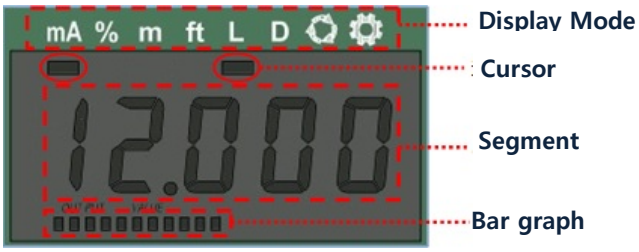
3. Configuration of Setting Menu

No.	Contents	Description	Note
[00]	mA / % Unit Set	▲ : mA ▼ : Percent (※ [02]. [03] Setting Unit)	
[01]	Level / Distance Set	▲ : Level ▼ : Distance	Quick Menu
[02]	Zero Point Set	0.0 ~ 95.0% or 4.000 ~ 19.200mA Setting	Quick Menu
[03]	Span Point Set	5.0 ~ 100.0% or 4.800 ~ 20.000mA Setting	Quick Menu
[04]	Zero Height Set	Level Setting Criteria ※ 0 ~ 99.999m (User Setting)	
[05]	Span Height Set		
[06]	Tank Height Set		
[08]	NAMUR NE43 Set	NAMUR NE43 On or Holding	
[11]	'mA' Offset Adjustment	mA Offset Adjustment	
[12]	'%' Offset Adjustment	% Offset Adjustment	
[13]	'mm' Offset Adjustment	mm Offset Adjustment	
[14]	'mA' Decimal Place Set	1. mA Decimal Point One Place Display(Default) 2. mA Decimal Point Two Place Display	
[15]	Filter Size Set	Ability to reduce chattering or adjust and soften output Higher Values delay Output speed Default : 6(1~10 Select @ 1Step)	
[30]	Rotation Time Set	0.5 ~ 10 sec	
[31]	'mA' Display On/Off	Rotation 'mA' Select Display	
[32]	'%' Display On/Off	Rotation '%' Select Display	
[33]	'Meter' Display On/Off	Rotation 'Meter' Select Display	
[34]	'Feet' Display On/Off	Rotation 'Feet' Select Display	
[40]	4mA Output	Output '4mA' for 5 sec	Quick Menu
	12mA Output	Output '12mA' for 5 sec	Quick Menu
	20mA Output	Output '20mA' for 5 sec	Quick Menu
[87]	Calculation 설정	Adjust the ratio to be a Liner Output. "0 : Default, 1 : Use There may be a delay of up to 20 seconds in use depending on the speed and measurement range of the water level	
[88]	Save Set	Save Settings Set Value saved at Factory initialization	
[90]	Error Number Output	Error numbers based on abnormal conditions display	
[91]	Sensor measurement output	'Zero, Span' Sensor measuring value display	
[99]	Firmware Version	Firmware Version display	
[100]	Factory Initialization	Set Value at Factory initialization	

[Table 2] Setting Menu List

4. Setting and Operating

5. ■ LCD Composition



DISPLAY MODE	
mA	mA Mode
%	Percent Mode
m	Meter Mode
ft	Feet Mode
L	Level Mode(User Setting)
D	Distance Mode(User Setting)
↻	Rotation Mode
⚙	Setting Mode

The cursor moves sequentially whenever the Ⓜ button is pressed.

The order of movement is as follows.

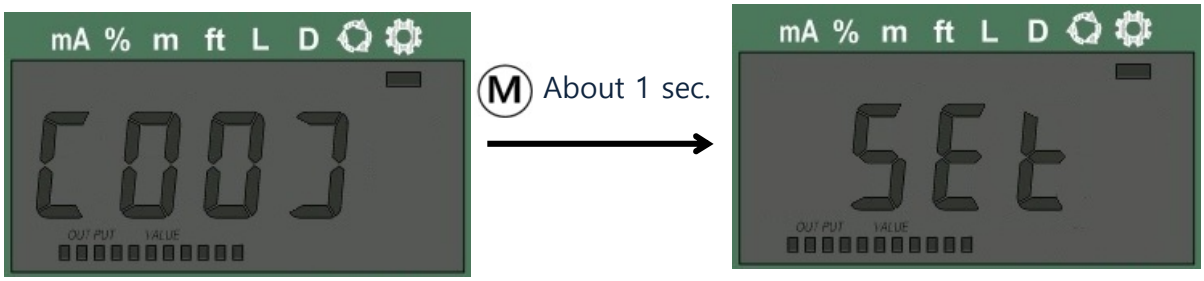
mA → % → m → ft → ↻ → ⚙ → mA → % →...

※ 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.

■ Into the Setting Menu

In the Setting Mode, press Ⓢ button for 1 second then the green LED will be flickering and you can go into the Setting Menu.

■ Return to [SET] Mode



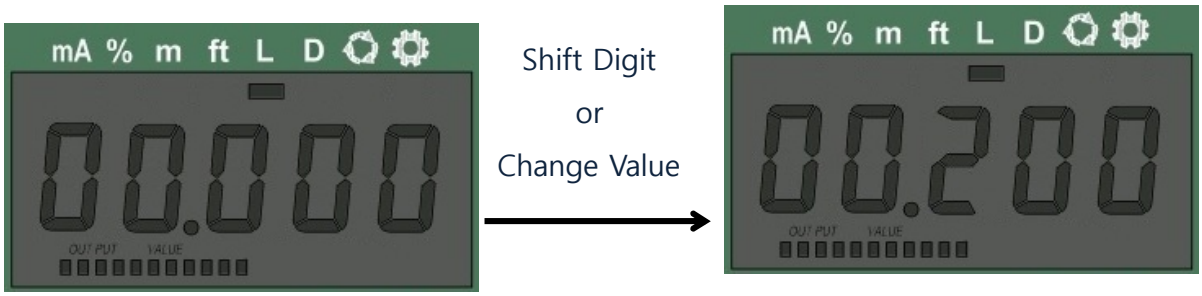
In the Setting Mode, press Ⓜ button for 1 second then the green LED will be flickering and you can go into the Setting Menu.

■ Select the Setting Menu

In the Setting Menu, use ▼/▲ buttons to select the user setting function.

Pressing Ⓢ button for 1 second will enter the function.

■ Change the User Setting



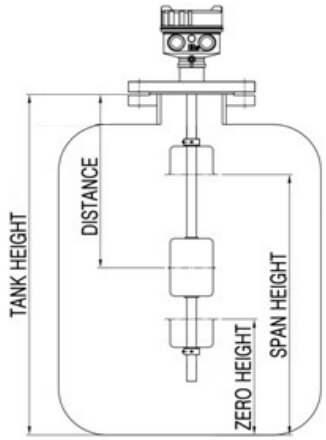
If **just 1 digit is flickering**, it can be moved between the digits.

If **full digits are flickering**, it can only be set up to the specified number.

Key Button	Function
▲ Press more than 1 sec.	Increasing of digits(Left)
▼ Press more than 1 sec.	Decreasing of digits(Right)
▲ Press shortly	Increasing of the numerical value
▼ Press shortly	Decreasing of the numerical value
Ⓢ Press more than 1 sec.	Save and Leave
Ⓜ Press more than 1 sec.	Leave without Save

[Table 3] Key Button Guidance

■ 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 Setting

☐ Zero

- When the measurement is in the Zero position.
- In setting mode, enter item 02.
- Set the Zero value and press the (S) button for about 1 second to save.

☐ Span

- When the measurement is in the Span position.
- In setting mode, enter item 03.
- Set the Span value and press the (S) button for about 1 second to save.

■ Offset

☐ mA

- In setting mode, enter item 11.
- Set the current value and press the (S) button for about 1 second to save.

☐ %

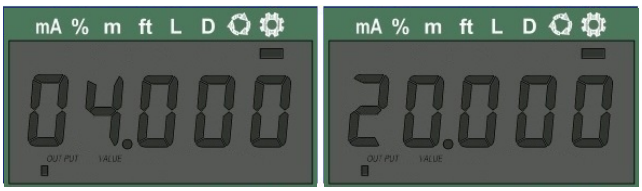
- In setting mode, enter item 12.
- Set the current value and press th(S) button for about 1 second to save.

☐ mm

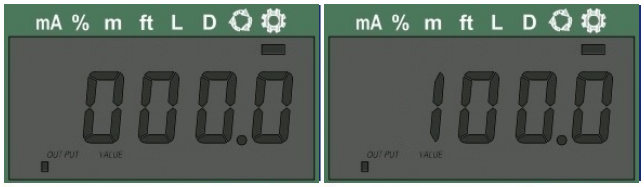
- In setting mode, enter item 13.
- Set the current value and press the (S) button for about 1 second to save.

■ Zero, Span Quick Setting

☐ Setting Screen



mA Setting



Percent Setting

※ The default unit is set to "%".

☐ Zero Setting

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

☐ Span Setting

No.	Contents	Quick Menu Setting
[02]	Span Setting	▲ Press for 1 sec. → input the value → S Press for 1sec.

※ Span setting when the level are more than 50%.

☐ Others

- ▶ Zero & Span can be set regardless of display mode status
- ▶ It can set, save, and cancel the values. (Refer to Table 3)
- ▶ The level shall not be changed when Zero & Span are setting.