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INSTRUCTION MANUAL

FLOAT TYPE LEVEL TRANSMITTER

HT-100R Series

Doc. no. : HT-100R(EX) M_Kor_2015, Rev. 1

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Overview

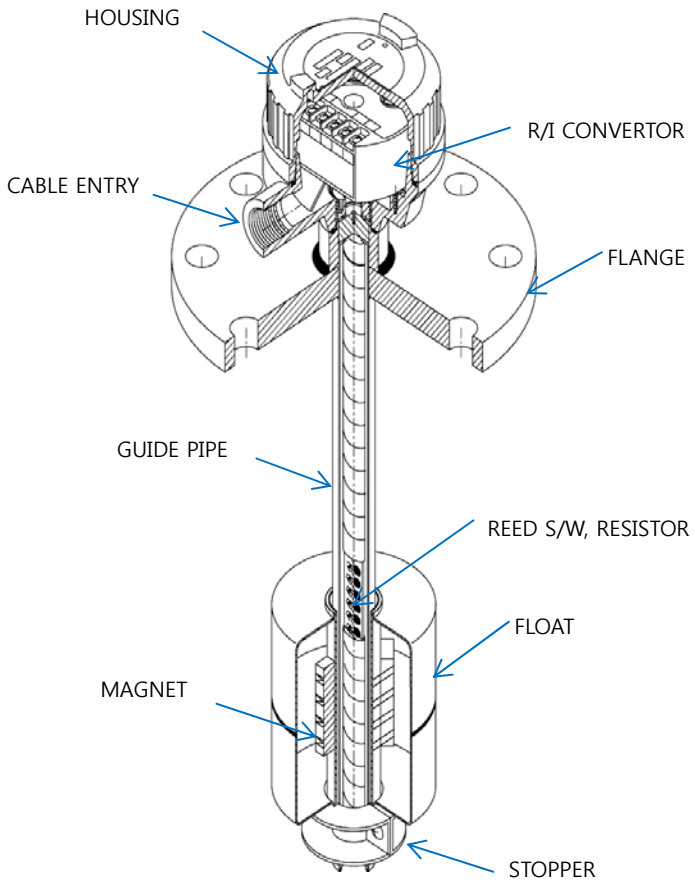
The HT-100R(Ex) Series are FLOAT TYPE LEVEL TRANSMITTERs that continuously measure water levels in containers using buoyancy. These transmitters can be easily installed and adjusted and can be used for chemicals because PVC and PTFE are used on their detecting elements. These transmitters are mainly used to measure clean water, industrial water, and liquids in LPG tanks and chemical tanks.

Characteristics

- Frequently used to measure liquids (10-mm resolution)
- The materials of the detecting element are resistant to measure objects having diverse forms of corrosiveness (PVC,PTFE)
- Have explosion-proof structures (Ex Version)
- There are products with a display function (HT-100RS-L).
- Durable and highly reliable structure

Operation principle and product composition

As the FLOAT made to fit the specific gravity of the measure object moves up and down along with the liquid surface by buoyancy, the magnet installed in the FLOAT operates the REED S/W in the GUIDE PIPE to change the resistance values connected to the REED S/W. The changed resistance values are detected by the R/I CONVERTOR inside the HOUSING to continuously output current values (DC 4–20 mA) that fit the resistance values.



Specifications

STAINLESS STEEL

Model	HT-100RS	HT-100RSH	HT-100RS-Ex	HT-100RSH-Ex
Mounting	Flange			
Temperature	Max. 80℃	Max. 150℃	Max. 80℃	Max. 150℃
Process Pressure	Up to 20kg/cm2(300#)			
Power Source	DC 24V			
Output	DC 4~20mA(2~wire)			
Enclosure	Weather-Proof		Ex-Proof(Ex d IIC T6)	Ex-Proof(Ex d IIC T4)
Wetted Part Material	SUS 304, 316			
Process Connection	100A JIS 10K			
Housing ; Cable Entry	PC. ; PF3/4"(F)	AL. ; PF 3/4"(F), IP65		
Accuracy	±10mm of F.S			

PVC

Model	HT-100RV	HT-100RV-Ex
Mounting	Flange	
Temperature	Max. 60℃	
Process Pressure	Up to 0.5kg/cm2	
Power Source	DC 24V	
Output	DC 4~20mA(2~wire)	
Enclosure	Weather-Proof	Ex-Proof(Ex d IIC T6)
Wetted Part Material	PVC	
Process Connection	100A JIS 10K FF	
Housing ; Cable Entry	PC. ; PF3/4"(F)	AL. ; PF 3/4"(F), IP65
Accuracy	±10mm of F.S	

PTFE

Model	HT-100RT	HT-100RTH	HT-100RT-Ex	HT-100RTH-Ex
Mounting	Flange			
Temperature	Max. 80℃	Max. 150℃	Max. 80℃	Max. 150℃
Process Pressure	Up to 0.5kg/cm2			
Power Source	DC 24V			
Output	DC 4~20mA(2~wire)			
Enclosure	Weather-Proof		Ex-Proof(Ex d IIC T6)	Ex-Proof(Ex d IIC T4)
Wetted Part Material	SUS 304+PTFE			
Process Connection	100A JIS 10K			
Housing ; Cable Entry	PC. ; PF3/4"(F)	AL. ; PF 3/4"(F), IP65		
Accuracy	±10mm of F.S			

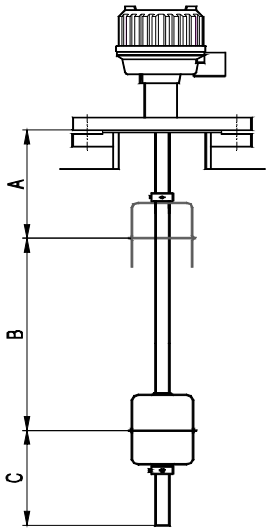
Specifications applied to the FLOAT

Float	Environment						
	Temperature	Pressure	Acid	Alkaline	Oil	Solvent	Liquid gas
SUS 304	-20℃~150℃	Up to 20kg/㎠	X	△	◎	◎	△
SUS 316	-20℃~150℃	Up to 20kg/㎠	△	○	◎	◎	△
PVC	-10℃~60℃	0.5kg/㎠	○	○	X	X	X
PTFE	-20℃~150℃	0.5kg/㎠	◎	◎	X	X	△
NBR	-48℃~60℃	Up to 20kg/㎠	X	△	◎	△	○
TITANIUM	-20℃~150℃	Up to 10kg/㎠	X	△	◎	△	○

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

*Application can be differed according to the specific gravity and the medium

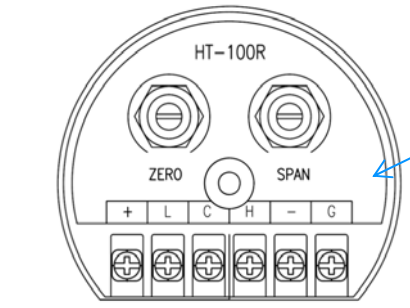
Section distance



Section	Distance (mm)		
	2"	3"	4"
A	50(100)	100	100
B	250~5,000		
C	100		

A = Standard distance that can be measured at the installation position
B = MEASURING RANGE
C = Standard distance that can be measured at the end of the product
( )= Minimum length in case of PVC material

Connection method

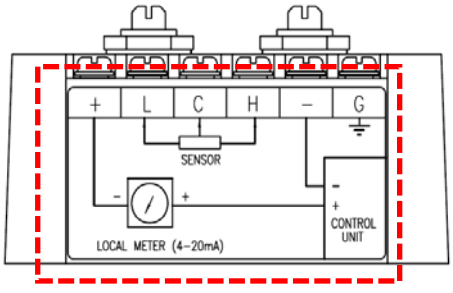


R/I CONVERTOR

+ - : DC 24V(DC 4~20mA Loop)

L.C.H : SENSOR and R/I CONVERTOR connecting lines

G : Grounding



The product should be connected in accordance with the connection diagram attached to the R/I CONVERTOR.

The internal grounding should be connected without fail

■ When connecting the power, be attentive not to be confused with the + − polarities.

■ The supplied power should be within the range of 18–30 V.

■ The connection work should not be performed when power is supplied.

■ Use terminal lugs for connection.

ZERO/SPAN Adjusting method

■ Connect cables in accordance with the connection diagram (refer to the connection method).

■ Supply the power (DC24V).

■ ZERO adjustment

Place the FLOAT at the 0% position and adjust the power so that 4 mA is outputted using the ZERO volume of the R/I CONVERTOR.

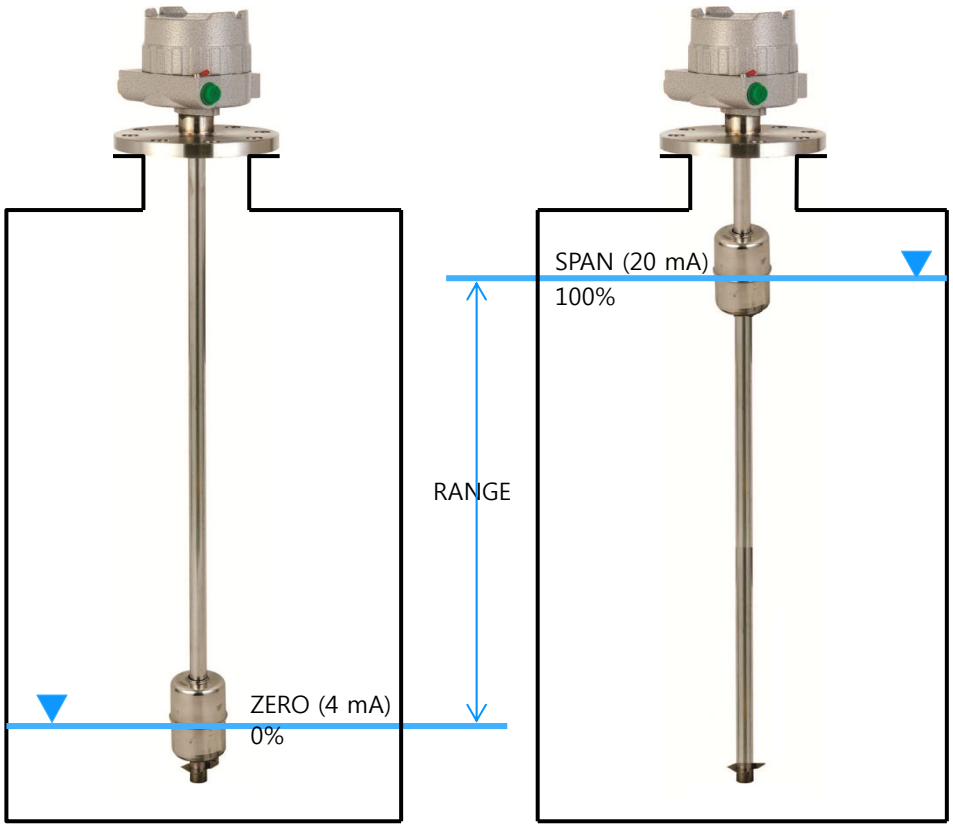
(When the product is shipped from our company, the FLOAT CL (FLOAT CENTER LINE) is adjusted to ZERO as shown in the following figure. Changes not exceeding +15% upward can be adjusted to 4 mA using the ZERO volume.)

■ SPAN adjustment

Place the FLOAT at the 100% position and adjust the power so that 20 mA is outputted using the SPAN volume of the R/I CONVERTOR.

(When the product is shipped from our company, the FLOAT CL (FLOAT CENTER LINE) is adjusted to SPAN as shown in the following figure. Changes not exceeding –15% downward can be adjusted to 20 mA using the SPAN volume.)

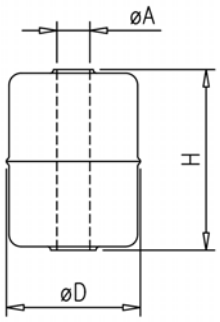
■ Repeat ZERO/SPAN adjustments at least two times to precisely adjust output current values.



ZERO CALIBRATION

SPAN CALIBRATION

FLOAT application table



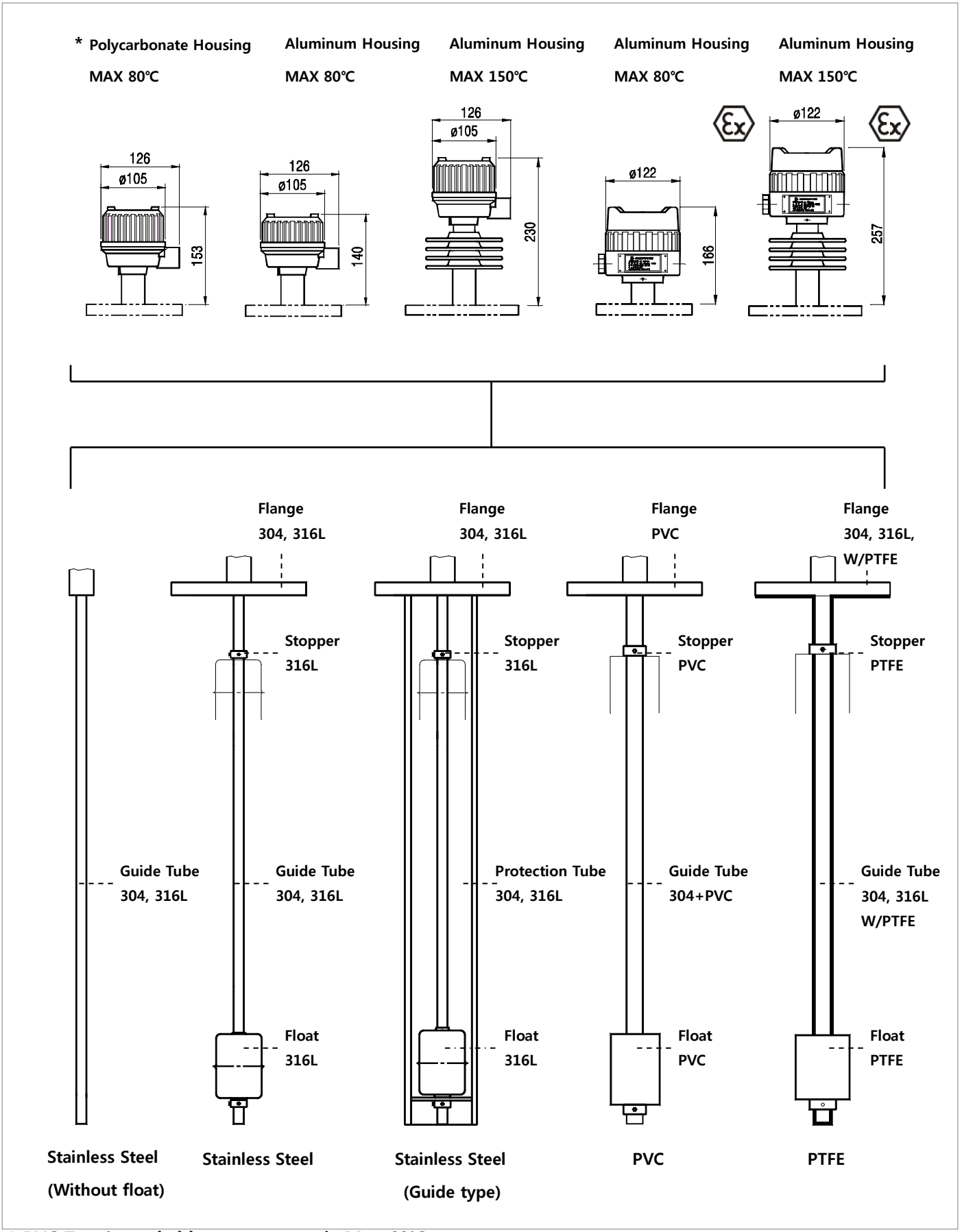
Product name	SIZE	Size (mm)			GUIDE TUBE	Material	SG range
		D	H	A			
HT-100RS	2"	Φ49	50	Φ15.5	Φ12.7	316L	0.8–1.2
		Φ50	45	Φ20	Φ15.8	Foam NBR	0.6–0.8
		Φ45	52	Φ15	Φ12.7	316L	0.8–1.2
	3"	Φ73	105	Φ23.5	Φ21.7	316L	0.8–1.2
		Φ73	116	Φ23	Φ21.7	Titanium	0.6–0.8
		Φ65	90	Φ25	Φ21.7	316L	0.8–1.2
	4"	Φ95	119	Φ30	Φ25.4	316L	0.8–1.2
		Φ95	103	Φ23	Φ21.7	Titanium	0.6–0.8
		Φ95	118	Φ23	Φ21.7	Titanium	0.4–0.6
		Φ80	80	Φ28	Φ25.4	Foam NBR	0.5–0.7

Product name	SIZE	Size (mm)			GUIDE TUBE	Material	SG range
		D	H	A			
HT-100RV	2"	Φ49	105	Φ20	Φ18	PVC	1.3–1.4
	3"	Φ76	110	Φ31.5	Φ26	PVC	1.1–1.4
	4"	Φ76	110	Φ31.5	Φ26	PVC	1.1–1.4

Product name	SIZE	Size (mm)			GUIDE TUBE	Material	SG range
		D	H	A			
HT-100RT	2"	Φ45	50	Φ17	Φ15	PTFE	1.1–1.4
	3"	Φ71	100	Φ20.5	Φ18	PTFE	1.2–1.4
	4"	Φ83	100	Φ33	Φ28	PTFE	1.2–1.4

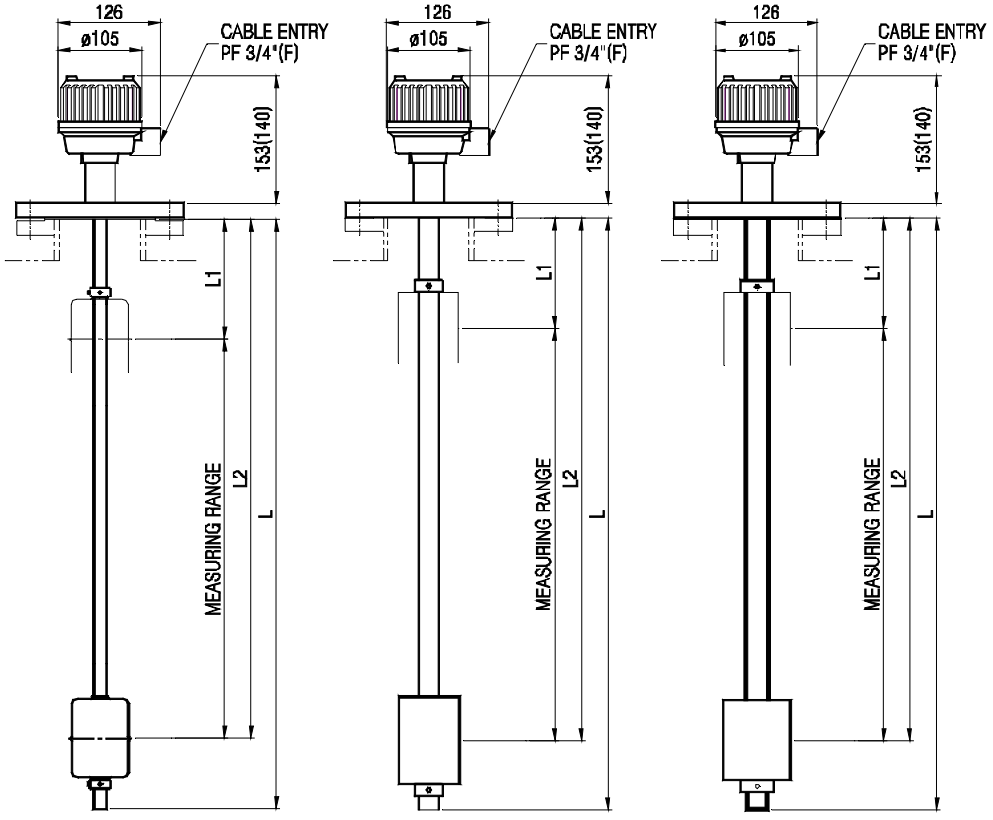
***S.G : Specific gravity**

Product composition

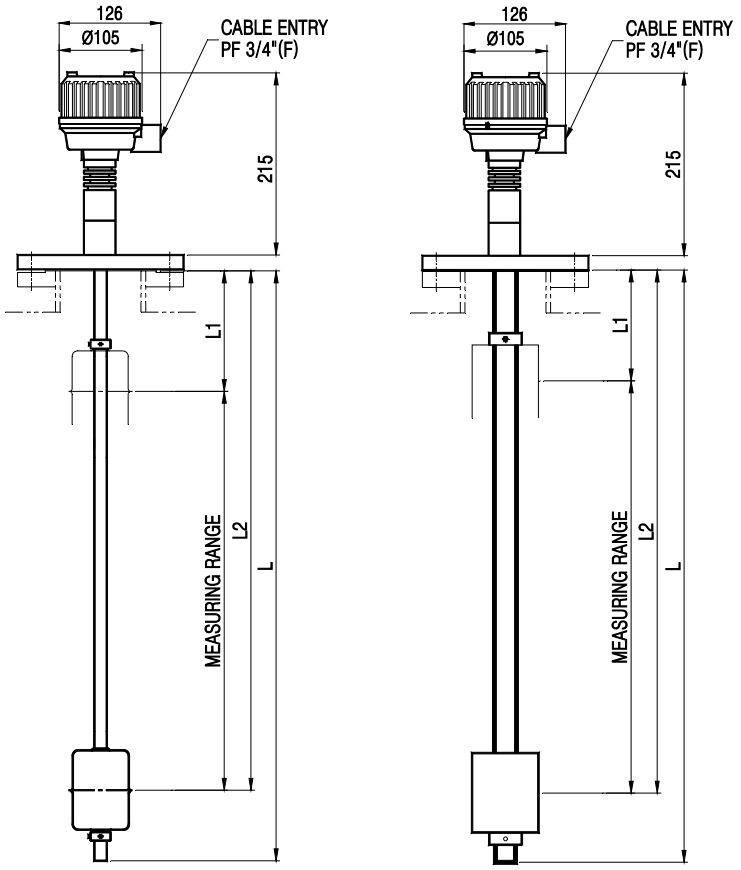


*** PVC Type's workable temperature is Max 60℃**

Product Size **<WEATHER-PROOF Version>**

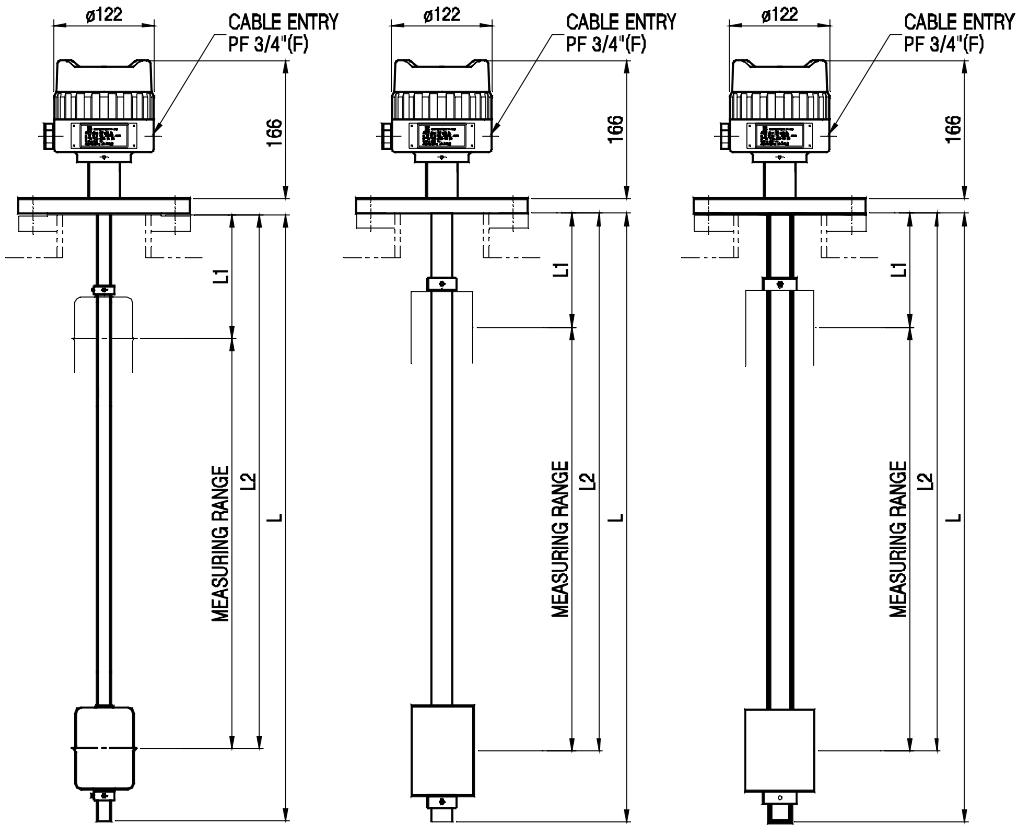


HT-100RS **HT-100RV** **HT-100RT**

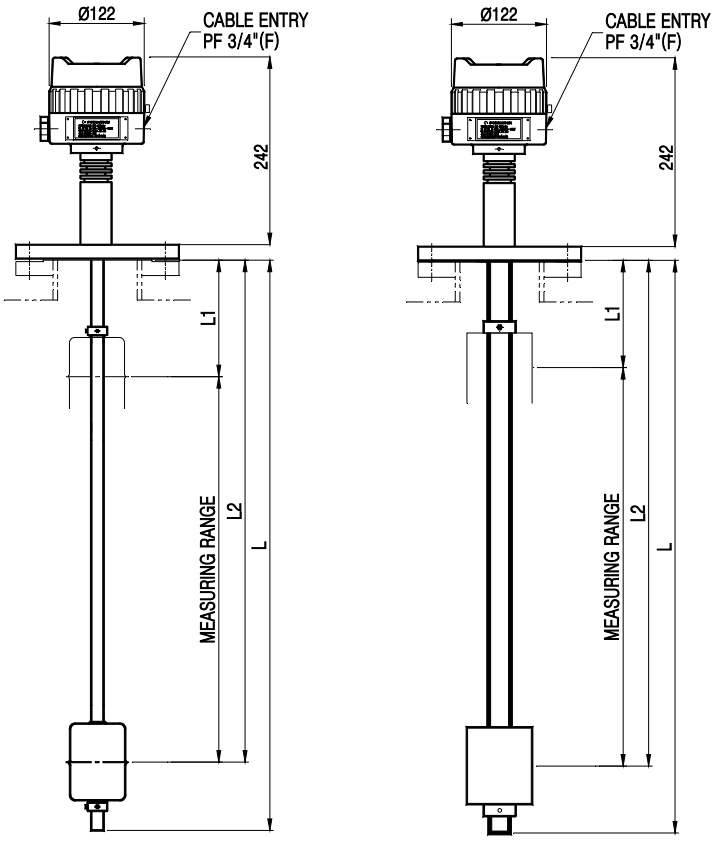


HT-100RSH **HT-100RTH**

<Ex-PROOF Version>

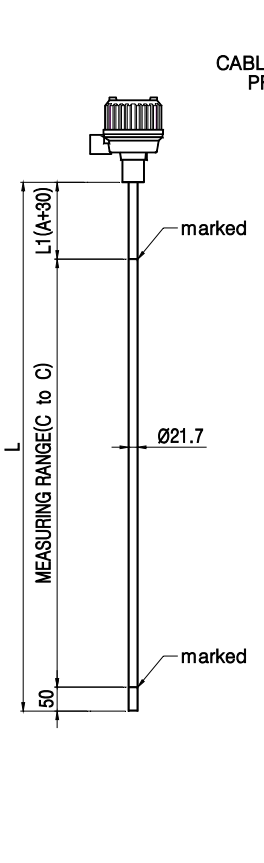


HT-100RS-Ex **HT-100RV-Ex** **HT-100RT-Ex**

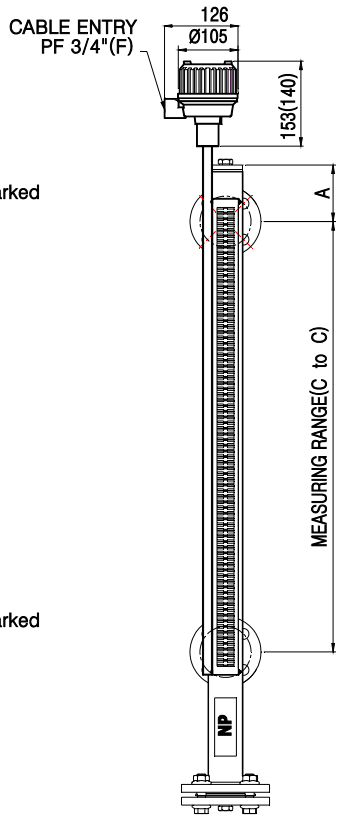


HT-100RSH-EX **HT-100RTH-EX**

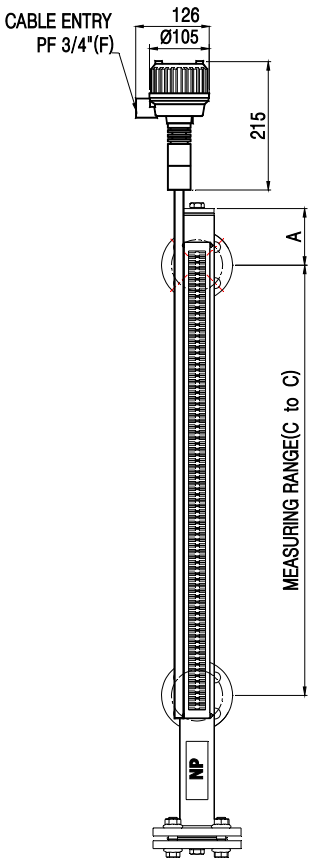
FLAP TYPE LEVEL GAUGE with HT-100R Series



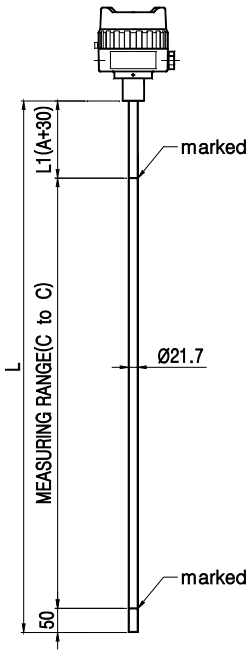
HT-100R



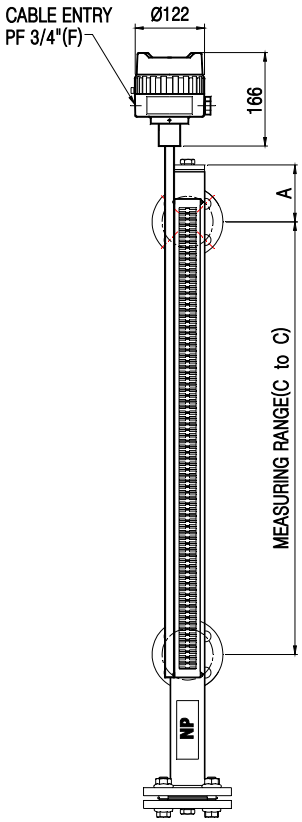
HT-100R+HLG-100F



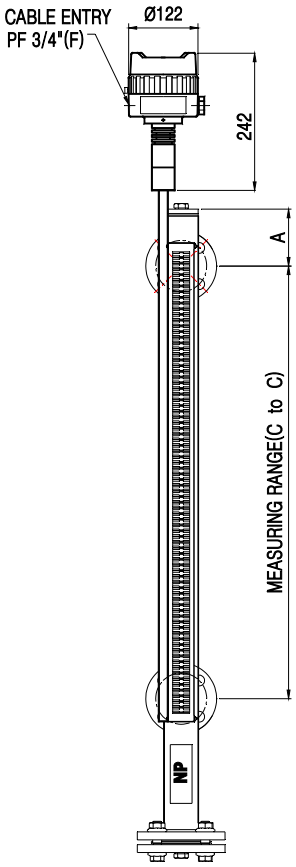
HT-100RH+HLG-100F



HT-100R-Ex



HT-100R-Ex+HLG-100F



HT-100RH-Ex+HLG-100F

Maintenance method

■ **Product inspection**

The major parts of the HT-100R (Ex) Series level transmitters to be inspected are divided into the sensor element and the transmission element.

The sensor element consists of REED S/W, resistors, and the FLOAT, and the transmission element is the R/I CONVERTOR.

The life spans of major parts vary with user environments and can be used in optimum conditions through periodic inspections.

Therefore, the user should maintain and repair the product through periodic inspections conducted at least once a year.

The appearance of the product should be visually checked to see if there is any damage, and if there

is scale caused by measure objects, it should be removed for the smooth operation of the FLOAT.

The R/I CONVERTOR can simply be inspected using a Digital Multimeter as follows.

<Sensor element inspection>

Separate the sensor lines connected to the R/I CONVERTOR's terminals L, C, and H, and measure the resistance value from the sensors.

Low and Com: resistance value of the current level

High and Com: entire levels' resistance value – current level's resistance value

High and Low: entire levels' resistance value

<Transmission element checking>

Connect one line between R/I CONVERTOR's +, − terminals to the Digital Multimeter

(refer to connection) in series and check if the current value that corresponds to the level is

For maintenance, the power of the product should be completely turned off before inspection.

Precautions for separation

■ The lines should be separated after checking the level inside the tank and whether or not there is any measure object in the tank.

■ Gloves should be worn when separating the lines as the product may have been overheated and burns may occur.

■ The cover of the product should not be opened in cases in which there is an explosive gas atmosphere.

■ In the case of explosion-proof products, the SET SCREW (explosion-proof key) should be unlocked before opening the COVER.

■ The lines should be separated after turning off the power.

■ When opening or closing the cover of the product, be attentive to prevent causing damage to the O-ring or the gasket.

Precautions for installation

■ When flanges or screws are used for fastening, the size should be the same.

■ The user should place a washer between each bolt and nut to prevent loosening.

■ When fastening flanges to each other, gaskets should be used.
(The gaskets should be selected considering the temperature of the content and the pressure of the container.)

■ The user should install appropriate products after judging whether the products are to be used in explosion-proof regions.

Great impacts should not be applied to the product when the product is moved.

Precautions for external wire lead-in method (explosion-proof products)

■ The user should use a cable grand connection method or a metal pipe wire lead-in method on wire inlets, and when external wires are led in for connection, products that have been certified for at least the same explosion-proof performance as the relevant explosion-proof equipment should be used.

■ Plugs for closing that passed safety certification tests for at least the same performance as the relevant explosion-proof equipment should be used for external wire inlets not used.

Precautions for ground connection (explosion-proof product)

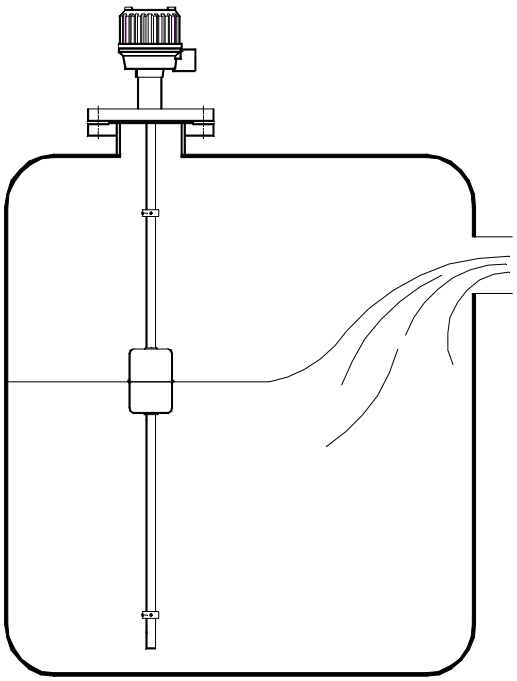
■ Ground connections are divided into external ground connections and internal ground connections. In the case of external ground connections, the size of ground wires should be at least 4 mm^2.

■ Internal ground wires should be of the same size as the power cable, and the size of internal grounding terminal lugs should be 3.1 mm^2. If the power cable is larger than 3.1 mm^2, the terminal lug should be taken out before connecting the ground wire.

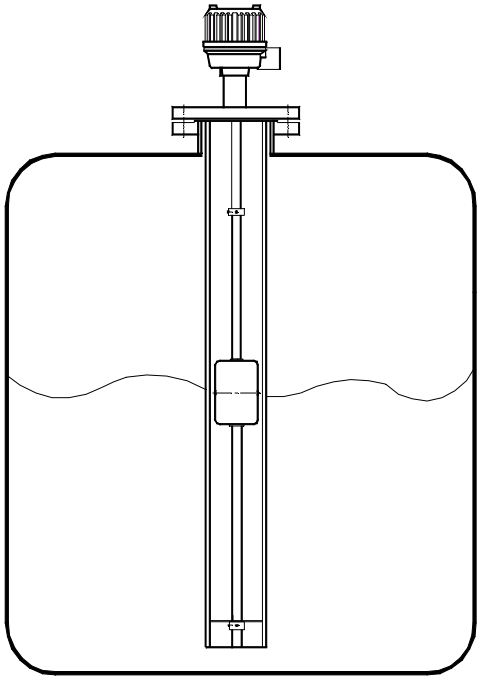
When connecting a ground wire to an internal grounding terminal after taking out the terminal lug, a washer should be used without failure (to prevent loosening).

Attachment and precautions for attachment

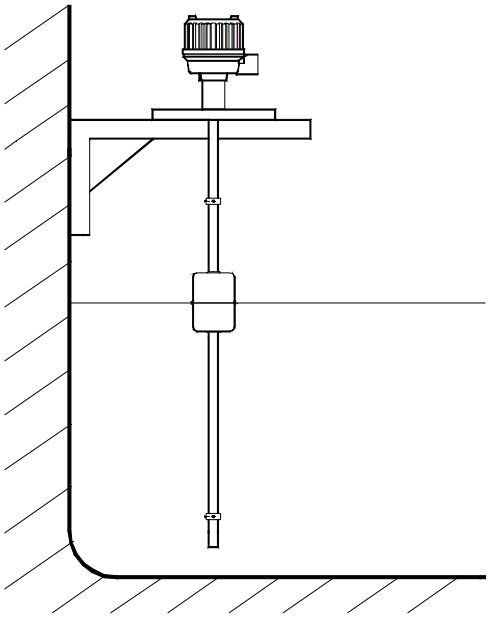
■ When attaching the product, the following matters should be considered.



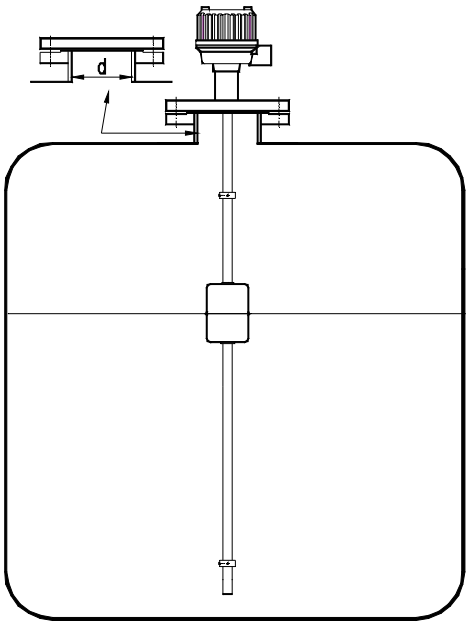
The product may malfunction if the product has been installed at the inlet through which the measure object flows in. Therefore, a guide should be installed in such case or the product should be installed at a position distant from the inlet for measure objects.



When the measure object flows or slops protecting tube type products should be used.



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



Diameter "d" should be larger than the FLOAT.

Matters regarding safety and environment

■ Matters that require attention when the product is used

When fastening the product to the container, make sure that the product is maximally pressed to the container by using tools.

- The locking device should not be lost while the product is being used and the product should be locked without failure.
- Great impacts should not be applied to the product.

■ Matters that require attention when connecting the product

- Wire should be corrected to terminals that correspond to the locations of contact points (refer to the connection method).

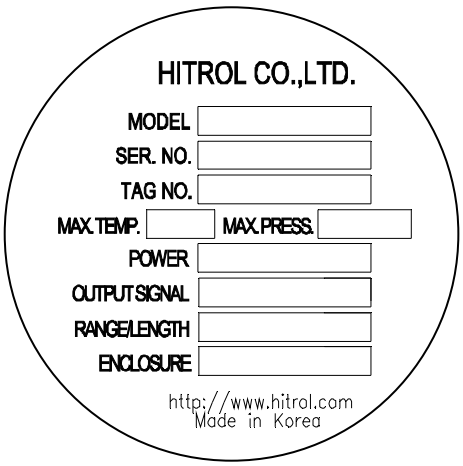
■ Disposal of the product

- When disposing of the product because it is not usable, the AMP in the product housing shall be separated and disposed of. No special attention is required because there are no parts that affect the environments (e.g., mercury switch).

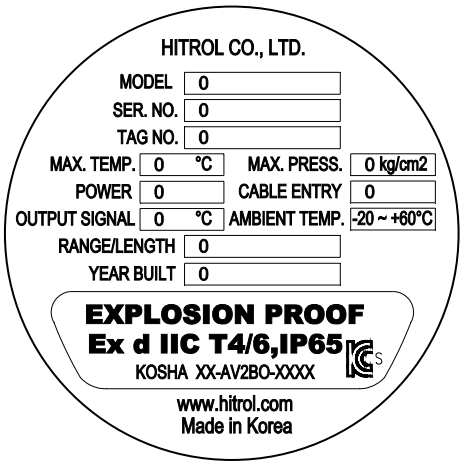
Product marking

■ Product identification mark

Product identification marks are attached to housings. These marks indicate products' model name, serial number, workable temperature, working pressure, and matters regarding output. Serial numbers are unique manufacturing numbers for the identification of products.



<For general products>



<For explosion-proof products>

Matters regarding user education

The above matters should be fully understood, and the temperature of fluids in the container where the product is used shall not exceed 80℃ in the case of general types and 150℃ in the case of high-temperature types. In addition, temperatures around the housing should be within the range of －20–60℃. (In the case of products with sensor elements made of PVC, the temperature of fluids in the container is limited to 60℃.)

Because explosion-proof products are pressure-resistant explosion-proof products, their cover should never be opened when they are in use.

Explosion-proof products have been designed pursuant to Article 34 of the Industrial Safety and Health Act and Article 58-4 of the enforcement rules of the same act.

Products that are not explosion-proof shall not be applied to explosion-proof regions.

Explosion-proof products can be used only in places where the surrounding environment and fluids in the container are class 1 or 2.

Failure modes and actions

When the output current is below 4mA

Cause	Matters to be checked
The DC24V power supply line has not been connected.	Check the power supply line and reconnect
Calibration error	Recalibrate
The FLOAT Stopper below the sensor has been loosened.	Reassemble or replace the Stopper
The sensor FLOAT lost buoyancy or has been damaged.	Replace the sensor FLOAT
The HIGH cable of the sensor has been opened.	Reconnect
The R/I Convertor interelement has been damaged.	Replace the R/I Convertor
When the resistor of the sensor has been burnt and opened and the FLOAT is located below the resistor.	Replace the sensor PCB

When the output current is above 20mA

Cause	Matters to be checked
Calibration error	Recalibrate
The FLOAT Stopper above the sensor has been loosened.	Reassemble or replace the Stopper
The LOW cable of the sensor has been opened.	Reconnect
When the resistor of the sensor has been burnt and opened, and the FLOAT is located above the resistor.	Replace the sensor PCB
The R/I Convertor interelement has been damaged.	Replace the R/I Convertor

When the output current is held at around 12mA

Cause	Matters to be checked
The COMMON cable of the sensor has been opened.	Reconnect
The HIGH and LOW cables of the sensor have been opened.	Reconnect
The sensor FLOAT broke away.	Reassemble or replace the Stopper
The short phenomenon caused by magnetization resulting from sensor reed switch burning or defect occurs above and below the sensor simultaneously, and the float is located in the section.	Replace the sensor PCB
The reed switch or resistor around sensor 12 mA is intensively burnt and opened, and the float is located in the section.	Replace the sensor PCB
The R/I Convertor interelement has been damaged.	Replace the R/I Convertor
When the resistor of the sensor has been burnt and opened, and the FLOAT is located below the resistor.	Replace the sensor PCB

Output current holding phenomenon

Cause	Matters to be 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
When the sensor resistor has been burnt intensively and massively, thereby causing short circuit, and the FLOAT is located in that position	Replace the sensor PCB (The output drastically rises or drops when the FLOAT goes out of the position. Measurement errors occur.)
When the sensor resistor has been burnt intensively and massively and opened, and the FLOAT is located in that position	Replace the sensor PCB (The output drastically rises or drops when the FLOAT goes out of the position. Measurement errors occur.)

Output hunting phenomenon

Cause	Matters to be checked
In the process for the interelement (diode) of the R/I CONVERTOR to be damaged, temporary overmeasurement (approximately 10%) caused by overcurrent and noise outputs are formed.	Replace the R/I Convertor

Warranty and contact number

Warranty and service

The warranty period of this product is two years after the shipment of the product and service will be provided free of charge during this period for problems that have occurred during normal use. If service is requested for matters other than product issues, charges may be requested regardless of the warranty period.

A/S may be requested through our home page or head office.

Head office • Factory • Laboratory contact number

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

TEL : 031-950-9700 (head office and A/S)

FAX : 031-943-5600 (head office and A/S)

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