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INSTRUCTION MANUAL

FLOAT TYPE LEVEL SWITCHES

HR-30 Series



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Overview

The HR-30 Series are measuring instruments that operate with the use of lead switches and magnets; can be applied to various storage containers, including those in chemical factories, which are highly oxidative and corrosive; can be widely used in all industrial areas; and have high reliability and long life spans.

Operation principle

In the case of the HR-30 Series, 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 to generate contact points. Multiple detection positions can be set to issue the level of the upper/lower limit alarms or adjust the alarm levels.

Characteristics

- Frequently used to measure most liquids (HH, H, L, LL)
- Materials of the detecting element are resistant to corrosive measure objects (PVC, PTFE)
- Have explosion-proof structures (Ex Version)
- Durable and highly reliable structure
- Shows high reliability in level detection

Specification

STAINLESS STEEL (FLANGE MOUNTING)

Model	HR-30S	HR-30SH	HR-30S-Ex	HR-30SH-Ex
Mounting	Flange			
Temperature	Max. 80℃	Max. 150℃	Max. 80℃	Max. 150℃
Process Pressure	Up to 20kg/cm2(300#)			
Switch Type	Reed S/W			
Switch Form	SPST, SPDT			
Enclosure	Weather-Proof		Ex-Proof(Ex d IIC T6)	
Wetted Part Material	SUS 304, 316			
Process Connection	80A JIS 10K			
Housing ; Cable Entry	PC. ; PF3/4"(F)	AL. ; PF 3/4"(F), IP65		

STAINLESS STEEL (SCREW MOUNTING)

Model	HR-30C	HR-30CH	HR-30C-Ex	HR-30CH-Ex
Mounting	Screw			
Temperature	Max. 80℃	Max. 150℃	Max. 80℃	Max. 150℃
Process Pressure	Up to 20kg/cm2(300#)			
Switch Type	Reed S/W			
Switch Form	SPST, SPDT			
Enclosure	Weather-Proof		Ex-Proof(Ex d IIC T6)	
Wetted Part Material	SUS 304, 316			
Process Connection	PT 2″(M)			
Housing ; Cable Entry	PC. ; PF3/4″(F)	AL. ; PF 3/4″(F), IP65		

PVC

Model	HR-30V	HR-30V-Ex
Mounting	Flange	
Temperature	Max. 60°C	
Process Pressure	Up to 0.5kg/cm ²	
Switch Type	Reed S/W	
Switch Form	SPST, SPDT	
Enclosure	Weather-Proof	Ex-Proof(Ex d IIC T6)
Wetted Part Material	PVC	
Process Connection	80A JIS 10K FF	
Housing ; Cable Entry	PC. ; PF 3/4"(F), IP65	AL. ; PF 3/4"(F), IP65

TEFLON

Model	HR-30T	HR-30TH	HR-30T-Ex	HR-30TH-Ex
Mounting	Flange			
Temperature	Max. 80℃	Max. 150℃	Max. 80℃	Max. 150℃
Process Pressure	Up to 0.5kg/cm2			
Switch Type	Reed S/W			
Switch Form	SPST, SPDT			
Enclosure	Weather-Proof		Ex-Proof(Ex d IIC T6)	
Wetted Part Material	SUS 304+TEFLON			
Process Connection	80A JIS 10K			
Housing ; Cable Entry	PC. ; PF3/4″(F)	AL. ; PF 3/4″(F), IP65		

Specifications applied to the FLOAT

Float	Environment						
	Temperature	Pressure	Acid	Alkaline	Oil	Solvent	Liquid gas
304	-20°C~150°C	Up to 20kg/cm ²	X	△	◎	◎	△
316	-20°C~150°C	Up to 20kg/cm ²	△	○	◎	◎	△
PVC	-10°C~60°C	0.5kg/cm ²	○	○	X	X	X
TEFLON	-20°C~150°C	0.5kg/cm ²	◎	◎	X	X	△
NBR	-48°C~60°C	Up to 20kg/cm ²	X	△	◎	△	○
TITANIUM	-20°C~150°C	Up to 10kg/cm ²	X	△	◎	△	○

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

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

Contact point**Capacity****SPST**

FLOAT	Max. switching voltage	Max. switching current
1"	24VDC	0.5A
2",3",4"	250VAC/24VDC	1A/0.5A

SPDT

FLOAT	Max. switching voltage	Max. switching current
1",2"	24VDC	0.25A
3",4"	250VAC/24VDC	1A/0.5A

Latching Switch SPST&SPDT

FLOAT	Max. switching voltage	Max. switching current
1",2"(SPST)	24VDC	0.25A
3",4"(SPST)	220VAC/24VDC	1A/0.5A
3",4"(SPDT)	220VAC/ 24VDC	0.5A/0.5A

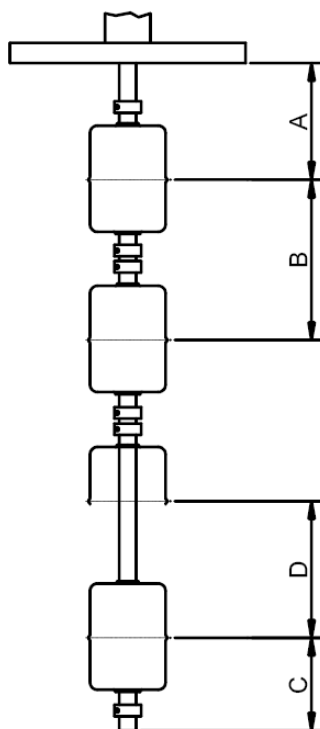
<Ex-PROOF Version>**SPST/SPDT/ Latching Switch SPST&SPDT**

FLOAT	Max. switching voltage	Max. switching current
1",2",3",4"	110VAC/24VDC	1A/0.5A

Contact form**SPST/SPDT Max. Contact form**

FLOAT	Contact form	
1"	4-SPST	2-SPDT
2"	6-SPST	3-SPDT
3"	6-SPST	4-SPDT
4"	6-SPST	4-SPDT

Minimum section distance

**STAINLESS STEEL**

STANDARD TYPE	FLOAT SIZE			
	1"	2"	3"	4"
Section A (mm)	40	50	100	100
Section B (mm)	55	80	160	170
Section C (mm)	40(100)	50(100)	100	100

LATCHING TYPE	FLOAT SIZE			
	1"	2"	3"	4"
Section D (mm)	20	20	20	20

PVC

STANDARD TYPE	FLOAT SIZE		
	2"	3"	4"
Section A (mm)	100	100	100
Section B (mm)	150	150	150
Section C (mm)	100	100	100

LATCHING TYPE	FLOAT SIZE		
	2"	3"	4"
Section D (mm)	20	20	20

TEFLON

STANDARD TYPE	FLOAT SIZE			
	1"	2"	3"	4"
Section A (mm)	40	50	100	100
Section B (mm)	55	80	150	150
Section C (mm)	40(100)	50(100)	100	100

LATCHING TYPE	FLOAT SIZE			
	1"(1.5")	2"	3"	4"
Section D (mm)	20	20	20	20

A = Minimum distance for operation at the installed position

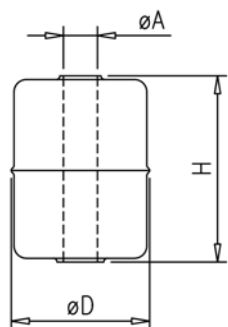
B = Minimum distance for operation between floats

C = Minimum distance for operation at the end of the product

D = Minimum distance for outputting two set points with one FLOAT

() = Minimum distance for operation at the Latching type

FLOAT application table



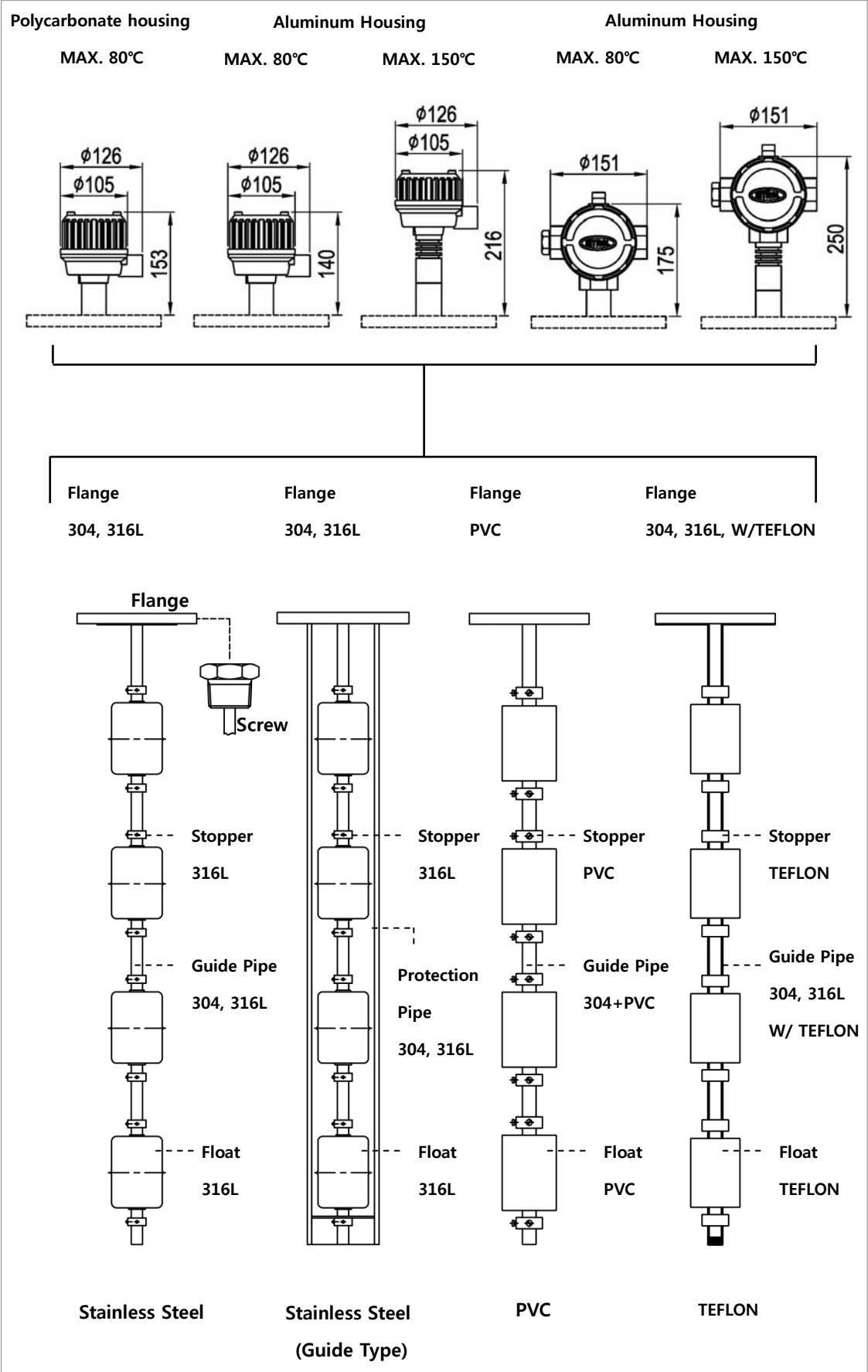
Product name	SIZE	Size (mm)			GUIDE TUBE	Material	SG range
		D	H	A			
HR-30S HR-30C	1"	Φ28	28	Φ9.5	Φ8	316L	0.9–1.3
		Φ26	15	Φ9.5	Φ8	Foam NBR	0.8–1.3
	2"	Φ49	50	Φ15.5	Φ12.7	316L	0.7–1.0
		Φ50	45	Φ20	Φ15.8	Foam NBR	0.6–0.9
		Φ45	52	Φ15	Φ12.7	316L	0.7–1.1
HR-30S	3"	Φ73	105	Φ23.5	Φ21.7	316L	1.0–1.5
		Φ73	116	Φ23	Φ21.7	Titanium	0.6–0.9
		Φ65	90	Φ25	Φ21.7	316L	0.8–1.3
	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	Foam NBR	0.5–0.7

Product name	SIZE	Size (mm)			GUIDE TUBE	Material	SG range
		D	H	A			
HR-30V	2"	Φ49	105	Φ20	Φ18	PVC	1.2–1.7
	3"	Φ76	110	Φ31.5	Φ26	PVC	1.0–1.6
	4"	Φ76	110	Φ31.5	Φ26	PVC	1.0–1.6

Product name	SIZE	Size (mm)			GUIDE TUBE	Material	SG range
		D	H	A			
HR-30T	1"	Φ28	28	Φ11	Φ8	TEFLON	1.2~1.7
	1.5"	Φ30	30	Φ11	Φ8	PP	1.0~1.7
	2"	Φ45	50	Φ17	Φ15	TEFLON	1.1–1.7
	3"	Φ71	100	Φ20.5	Φ18	TEFLON	1.1–1.7
	4"	Φ83	100	Φ33	Φ28	TEFLON	1.2–1.7

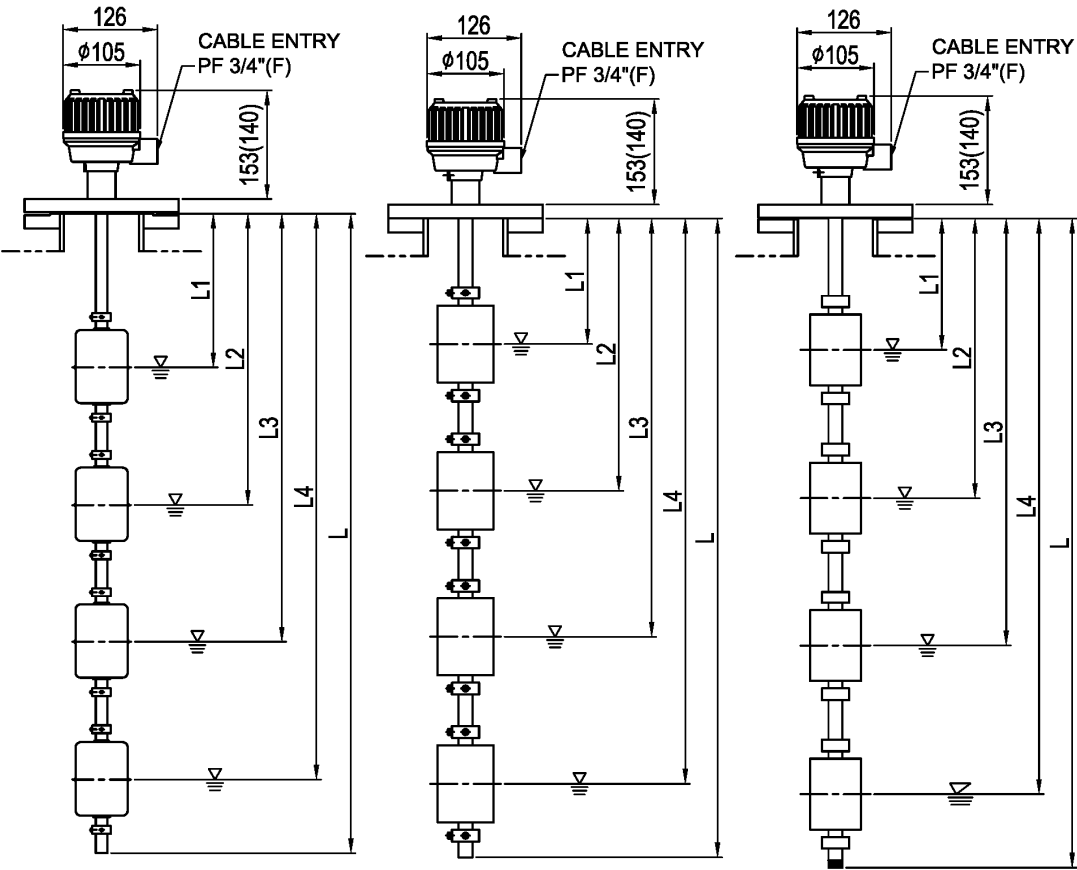
*S.G : Specific gravity

Product composition



Product
size

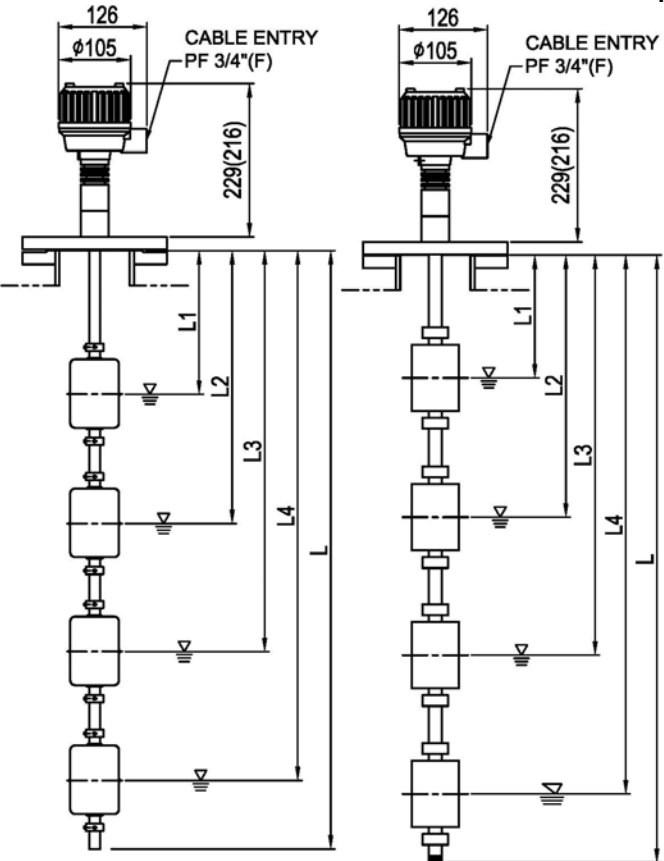
<WEATHER-PROOF Version>



HR-30S

HR-30V

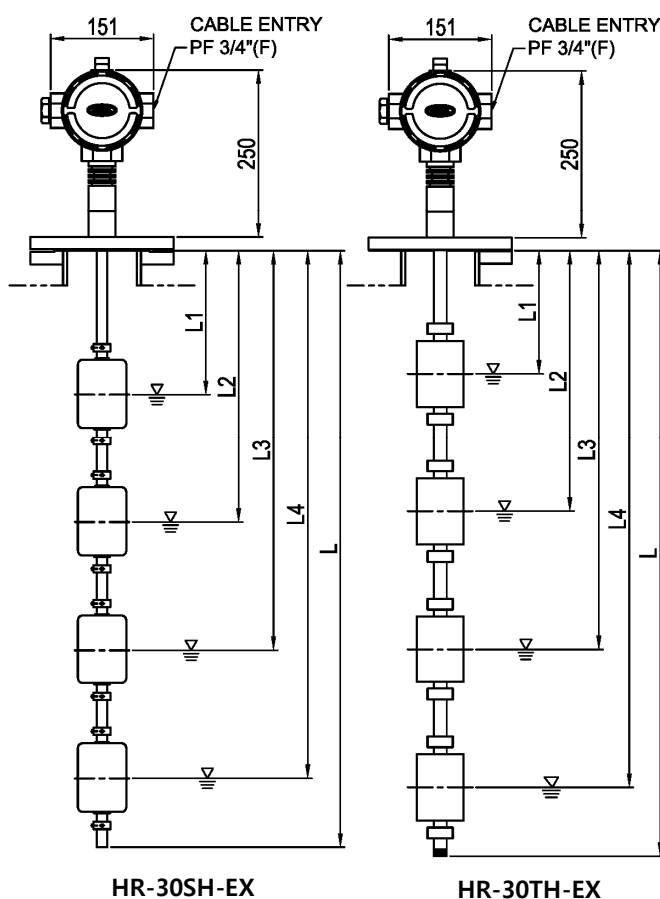
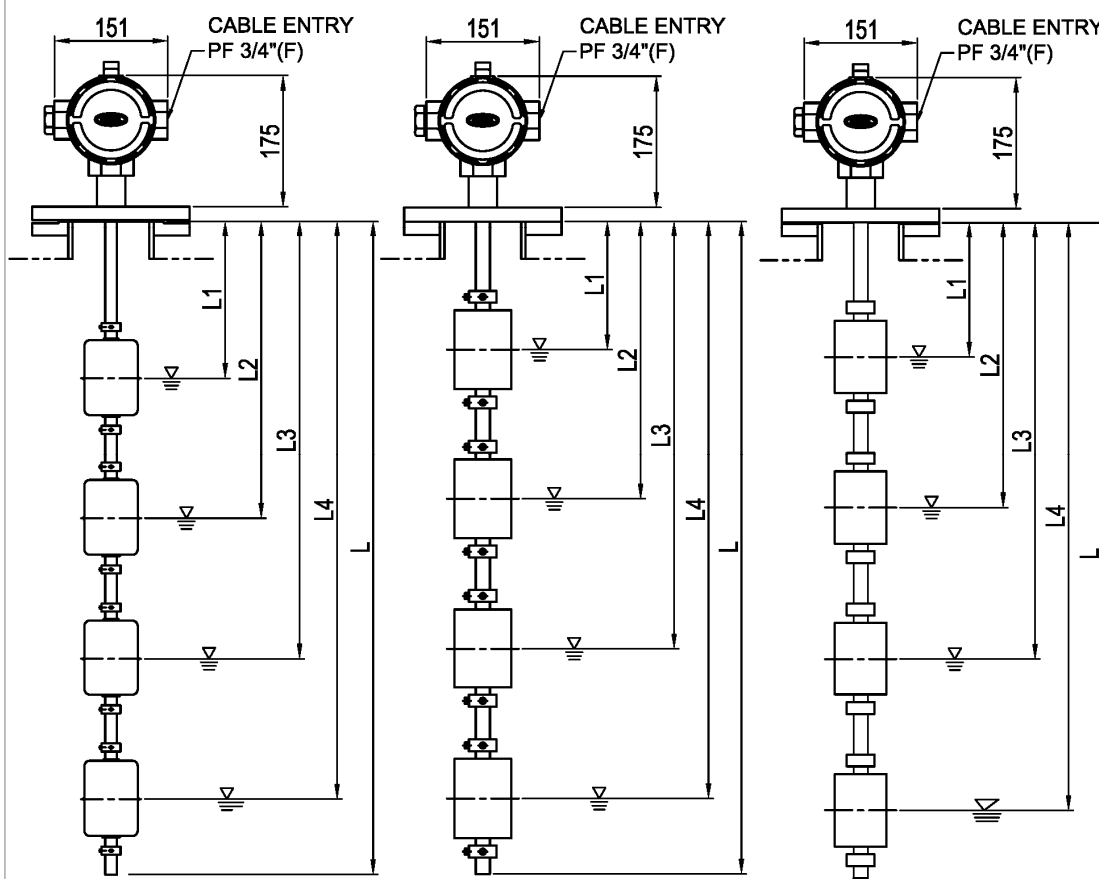
HR-30T



HR-30SH

HR-30TH

<Ex-PROOF Version>



Maintenance method

The major parts of HR-30 Series to be inspected are the FLOAT and REED S/W in the sensor element. 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 per 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 REED S/W can simply be inspected using a Digital Multimeter as follows.

Select the buzzer of the Digital Multimeter and connect it to one of product's terminal blocks, E1–E4, and the COM terminal.

When the FLOAT is moved, if the buzzer rings at the lower or upper limit contact point, the REED S/W is normal.

When checking contact point conditions based on resistance, if the Digital Multimeter indicates 0Ω when the FLOAT is moved, the REED S/W is normal in the NC (Normal Close). In the NO (Normal Open) state, the Digital Multimeter indicates 0Ω when the REED S/W is normal.

Moreover, when the product is used for highly viscous liquids, the sensor element should be periodically cleaned.



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 in the case of products for high temperatures because 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.
- The power should be supplied when the installation has been completed and the cover has been fastened.



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

Precautions for external wire lead-in method

- The user should use a cable gland 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 products)

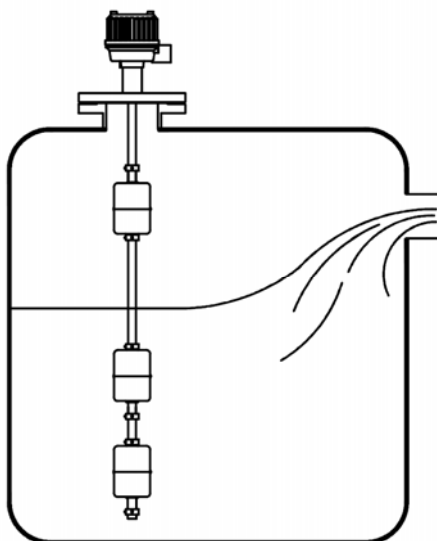
- Ground connections are divided into external ground connections and internal ground connections.
In the case of external ground connections, the size of ground wires should be at least 4mm² (4mmSQ).
- Internal ground wires should be of the same size as the power cable and the size of internal grounding terminal lugs should be 3.1mm² (3.1mmSQ). If the power cable is larger than 3.1mm², the terminal lug should be taken out before connecting the ground wire.



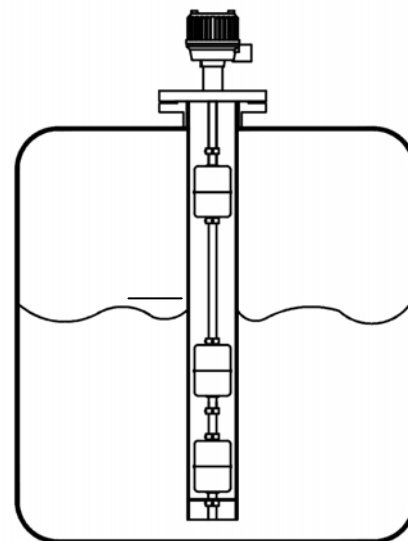
When connecting a ground wire to an internal grounding terminal after taking out the terminal lug, a washer should be used without failure (to prevent loosening).

Attachment and precautions for attachment

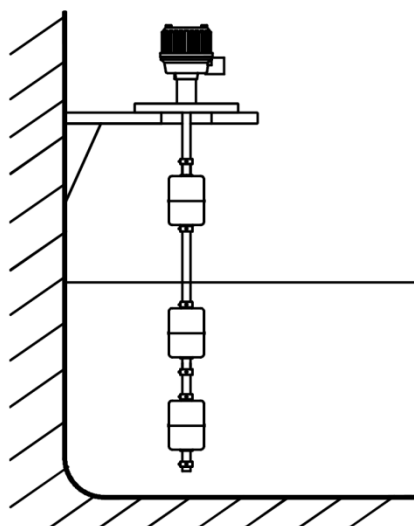
When attaching the product, the following matters should be considered.



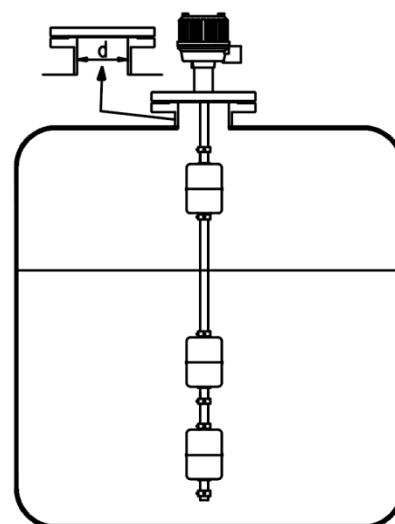
The product may malfunction if the product has been installed at the inlet through which the measure object flows in. Therefore, a guide should be installed in such case or the product should be installed at a position distant from the inlet for measure



When the measure object flows or stops; 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.



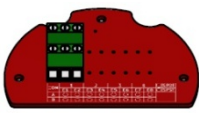
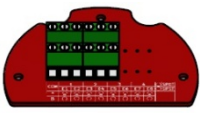



Diameter "d" should be larger than the FLOAT.

Connection
method

The terminals of the products are composed as the following according to contact points and shall be connected as follows.

- Open the product COVER and insert the cables through the wire inlet.
- Identify the contact points (E1, E2,...) on the terminal block and connect the cables.

<div>Weather-Proof</div>  <div>Ex-Proof</div> 			
	1F ~ 2F SPST 1F SPDT	3F ~ 5F SPST 2F SPDT	6F SPST 3F ~ 4 SPDT




















■ Contact Form Indication

E.p) 3-SPST A Contact order indication

COM	1		2		3		4		<input type="radio"/> SPDT
	E1	E2	E3	E4	E5	E6	E7	E8	<input type="radio"/> SPST
A	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
B	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

COM	1		2		3		4		<input type="radio"/> SPDT
	E1	E2	E3	E4	E5	E6	E7	E8	<input checked="" type="radio"/> SPST
A	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
B	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

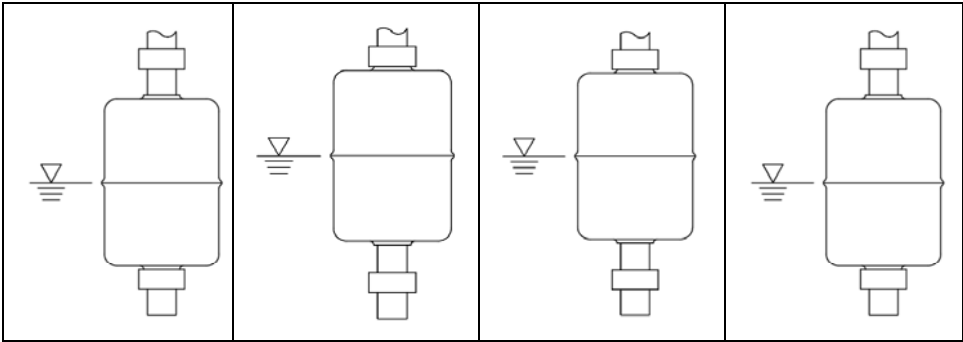
E.p) 3-SPST B Contact order indication

COM	1		2		3		4		 SPDT  SPST
	E1	E2	E3	E4	E5	E6	E7	E8	
A									
B									

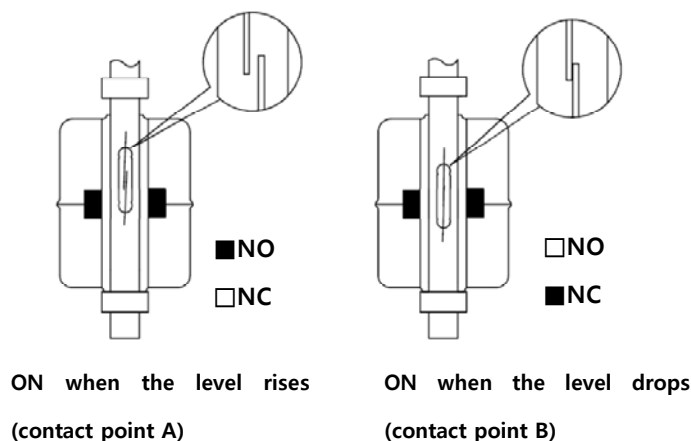
Matters regarding
operation and
use

The product may be made with NO (contact point A) or NC (contact point B) as ordered by the customer and is made with NO (contact point A) unless there is a special request regarding contact points.

The shapes of the contact points are as shown by the following figures.



Contact point A (OFF) Contact point A (ON) Contact point B (OFF) Contact point B (ON)



The stopper that fixed the FLOAT should not be arbitrarily moved.

Matters regarding safety and environment

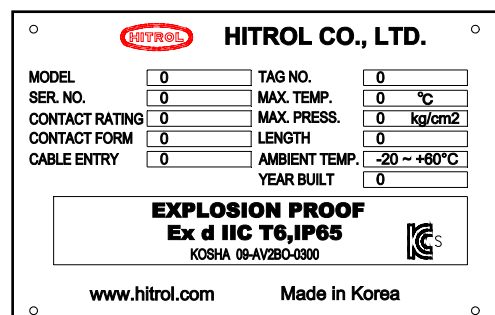
- Matters that require attention when the product is used
 - When fastening the product to the container, make sure that the product is maximally pressed to the container by using tools.
 - The locking device should not be lost while the product is being used, and the product should be locked without 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 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.



<Weather-Proof Version>



<Ex-Proof Version>

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°C in the case of general types and 150°C in the case of high-temperature types. In addition, temperatures around the housing should be within the range of -20~60°C. (In the case of products with sensor elements made of PVC, the temperature of fluids in the container is limited to 60°C.)

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.

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

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