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INSTRUCTION MANUAL

DISPLACER TYPE LEVEL SWITCH

HM-30, 90 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.

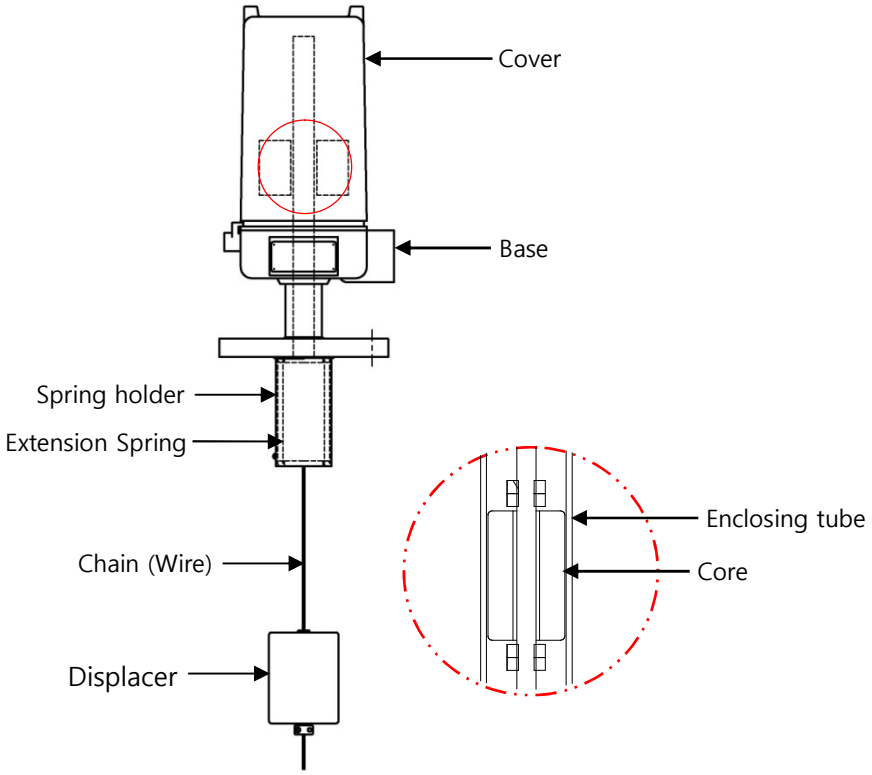
Overview

HM-30, 90 Series is a level detector with ON/OFF contact signals to detect upper and lower limits of vessel. It is firmly designed to be used in high temperature and pressure with excellent reliability. It is mainly used as a water level detector for boilers of power plants and refining equipment of petrochemical plants.

Operating Principles

HM-30, 90 Series is installed on top of tank or connected chamber and works with buoyancy of displacer and tension of spring.

If the displacer is submerged when the level of measure object rises, it becomes lighter because of the buoyancy, where the spring that was compressed by the weight of displacer is released so the core rises within the enclosing tube. The magnet which is connected with the switch responds to trigger the switch when the core rises.



Characteristic

- ■ Solid structure and long service life
- ■ Applicable to high temperature and pressure vessels
- ■ Current operation state display
- ■ Customizable with special material (Alloy)
- ■ Explosion proof version (HM-90-Ex, HM-90H-Ex)
- ■ ASME B31.1, ASME B31.3 (if chamber design is required)

Applications

Specification

Applications

- ■ Feedwater heater
- ■ Condensate drip pot
- ■ Separator
- ■ Accumulator
- ■ Steam drum
- ■ Flash tank
- ■ Receivers

Specification

Weather-Proof Version

Model		HM-30	HM-90	HM-90H
Installation		Top		
Ambient Temperature		-20˚C ~ +80˚C		
Process Temperature		Max. -40˚C ~ +120˚C	Max. -40˚C ~ +120˚C	Max. -40˚C ~ +200˚C -40˚C ~ +350˚C -40˚C ~ +500˚C
Process Pressure		ATM	Up to 63kg/cm^2 (900#)	
Contact Form		SPDT, DPDT		
Enclosure		Weather-Proof (IP65)		
Switch Type		Snap Switch, Hermetical Sealed Switch		
Process Connection		50A JIS 10K FF(6T)	80A JIS 10K RF (Std.)	
Material	Displacer	SUS 304 / SUS 316L		
	Chamber	N/A	C.S / SUS 304 / SUS316L / Others	
Cable Entry		C.S; PF 3/4"(F) / AL; PF 3/4"(F) (Std.)		

Ex-proof Version

Model		HM-90-Ex	HM-90H-Ex
Installation		Top	
Ambient Temperature		-20˚C ~ +80˚C	
Process Temperature		Max. -40˚C ~ +120˚C	Max. -40˚C ~ +200˚C -40˚C ~ +300˚C -40˚C ~ +350˚C
Process Pressure		Up to 63kg/cm^2 (900#)	
Contact Form		SPDT, DPDT	
Enclosure		Ex-Proof (Ex d IIC T4, IP65)	
Switch Type		Snap Switch	
Process Connection		80A JIS 10K RF (Std.)	
Material	Displacer	SUS 304 / SUS 316L	
	Chamber	C.S / SUS 304 / SUS316L / Others	
Cable Entry		AL; PF 3/4"(F) (Std.)	

Process Condition Rating

Application ratings for each product according to process conditions

Process \ Model	HM-30/90 Series
Ambient Temp. Change	A
Process Temp. Change	A
Vibration (Motor)	C
Corrosivity	B
Slurry	B
Steam	A
Viscosity/ Adhesive	B

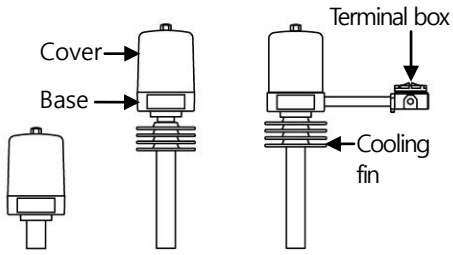
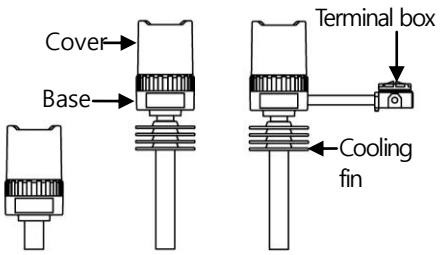
A = Very Good: It has little or no effect on the performance of the product, and is suitable for application.

B = Good: The product can handle the conditions, but it may be affected by performance, so it should be noted for maintenance. (Cleaning)

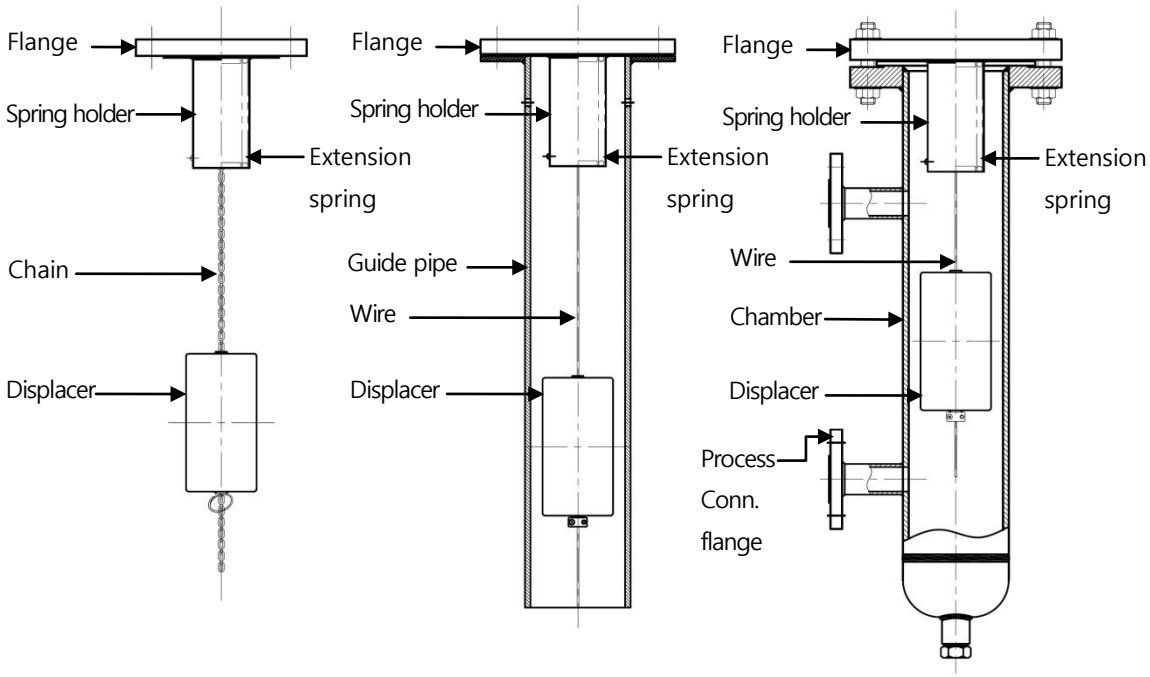
C = Poor: The product does not meet the conditions.

Product Configuration

■ HM-90 Series

Carbon Steel Housing (Weather-Proof) Carbon Steel Housing + Terminal Box (Weather-Proof)	Aluminum Housing (Weather-Proof, Ex-Proof) Aluminum Housing + Terminal Box (Weather-Proof)
	

Wetted parts

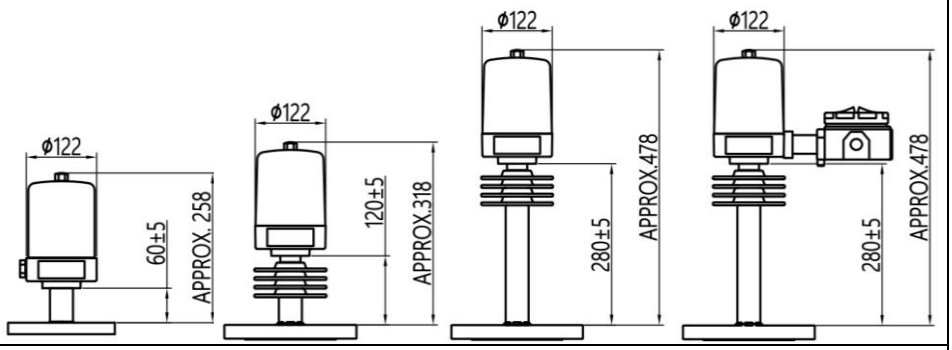
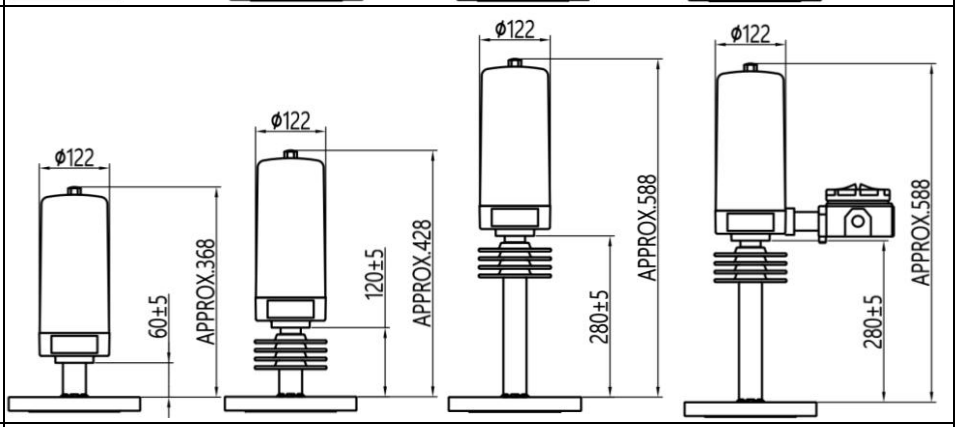
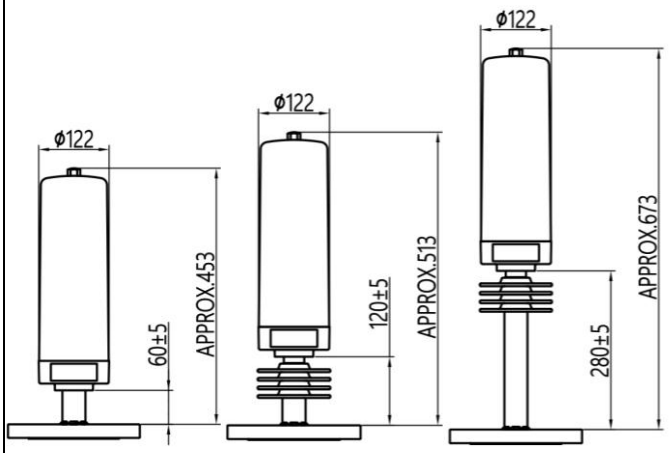


<Standard> <Protection Tube> <Side to Side>

Dimensions and Detailed Technical Specifications

Weather-Proof Version

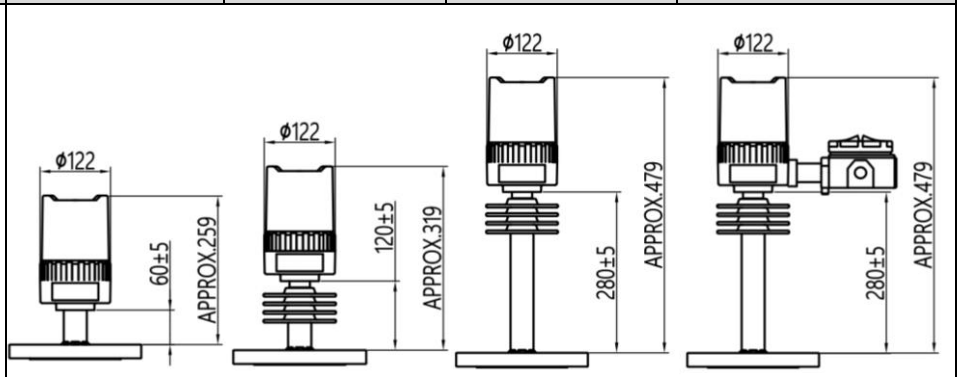
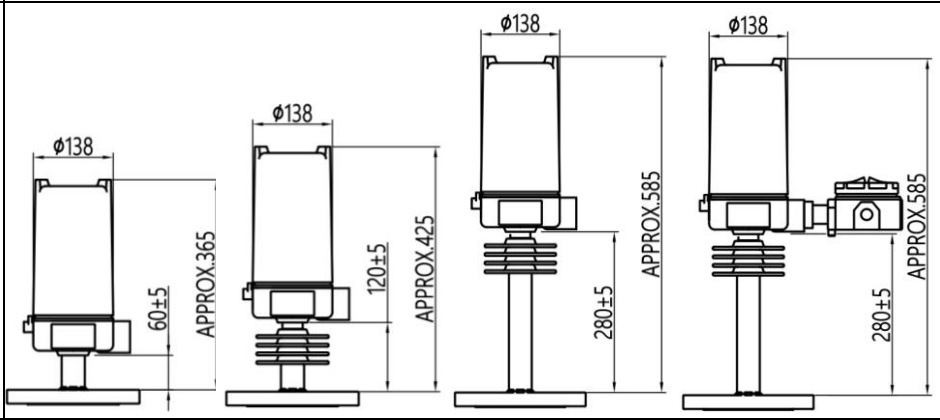
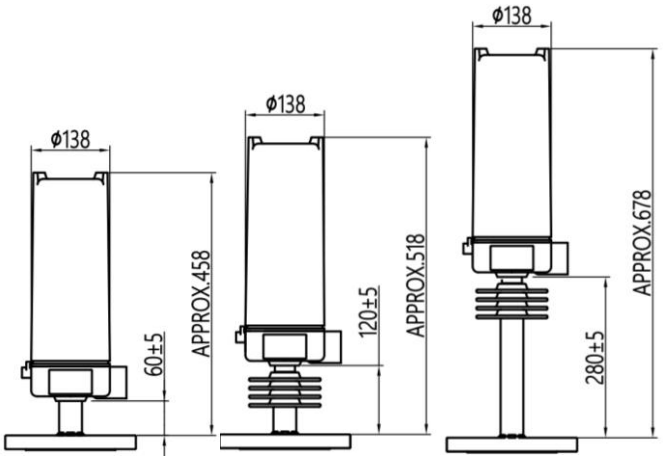
The dimensions on the following pages are indicated in [mm].

Process Temp.	~120˚C	~200˚C	~350˚C / ~500˚C	~500˚C (Opt.)
C.S + Aluminum Housing (S/W 1ea)				
C.S + Aluminum Housing (S/W 2~3ea)				
C.S + Aluminum Housing (S/W 4ea)	 * Only applied for up to 350˚C.			N/A

*** Please contact our technical department when applying the internal terminal block.**

NOTICE **Some tolerances may occur with actual products.**

NOTICE **If the fluid temperature exceeds 350 degrees, it can be manufactured up to 3F.**

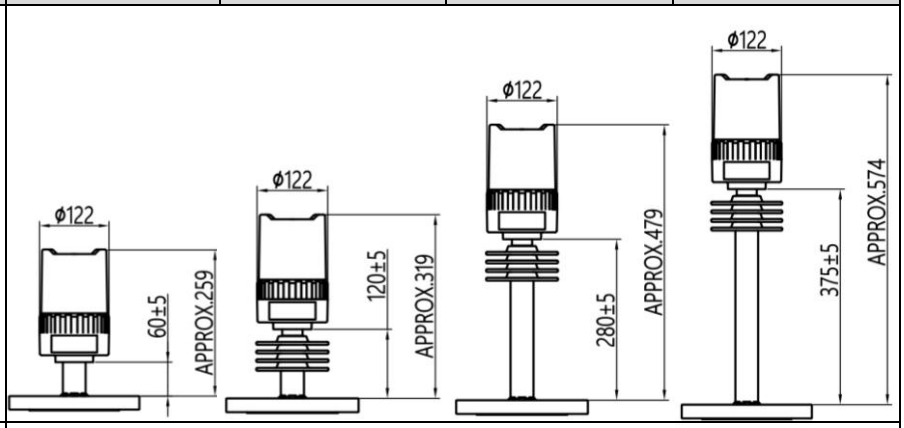
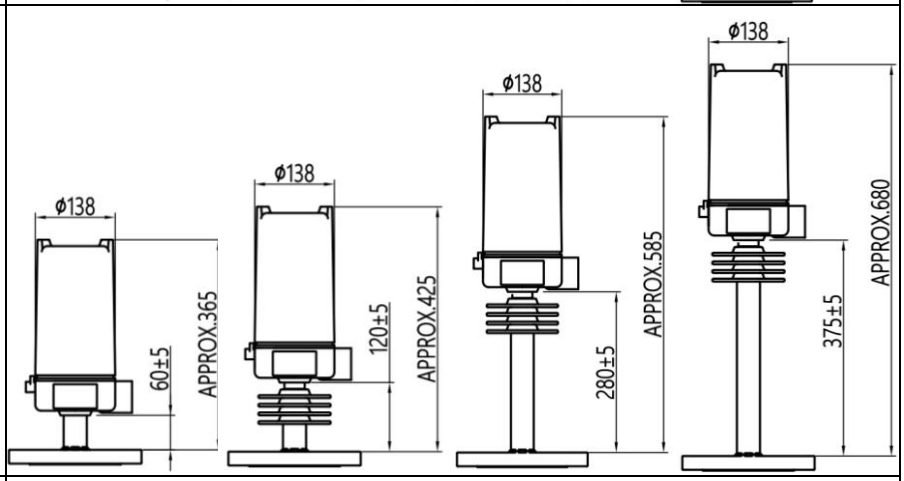
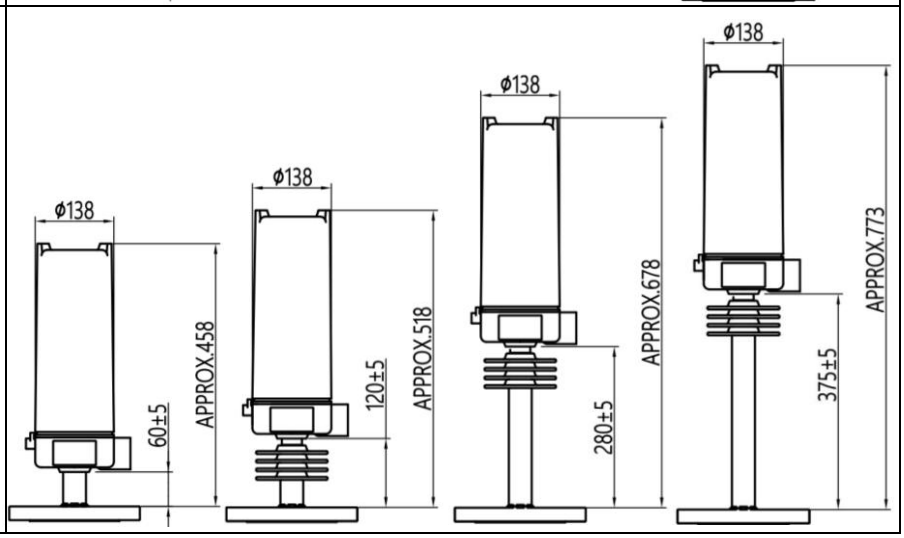
Process Temp.	~120˚C	~200˚C	~350˚C / ~500˚C	~500˚C (Opt.)
Aluminum Housing (S/W 1ea)				
Aluminum Housing (S/W 2~3ea)				
Aluminum Housing (S/W 4ea)	 * Only applied for up to 350˚C.			N/A

*** Please contact our technical department when applying the internal terminal block.**

NOTICE **Some tolerances may occur with actual products.**

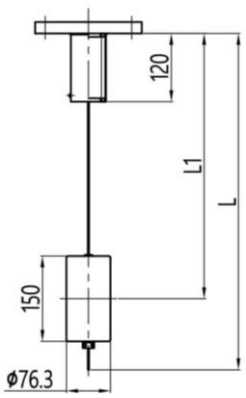
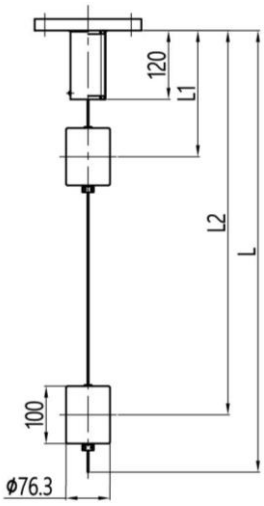
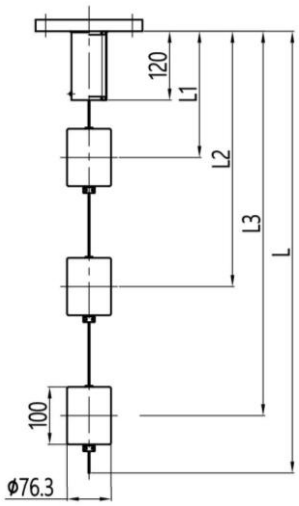
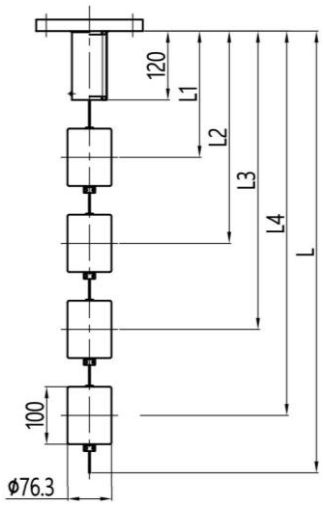
NOTICE **If the fluid temperature exceeds 350 degrees, it can be manufactured up to 3F.**

Ex-Proof Version

Process Temp.	~120˚C	~200˚C	~300˚C	~350˚C
Aluminum Housing (S/W 1ea)				
Aluminum Housing (S/W 2~3ea)				
Aluminum Housing (S/W 4ea)				

NOTICE **Some tolerances may occur with actual products.**

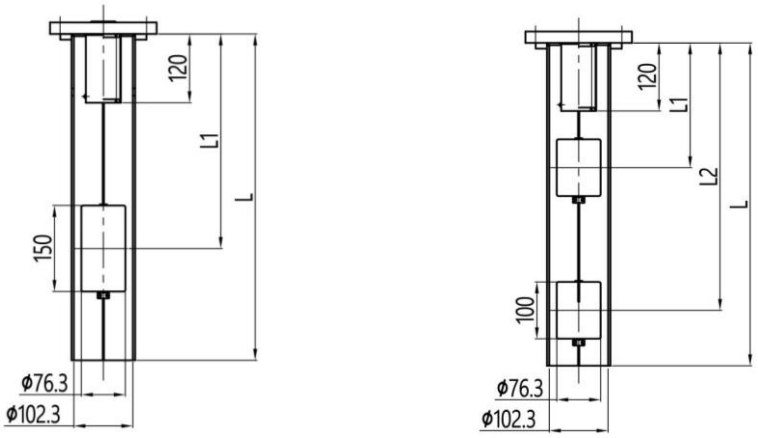
Contact Form

1F	2F
	
3F	4F
	

NOTICE **Some tolerances may occur with actual products.**

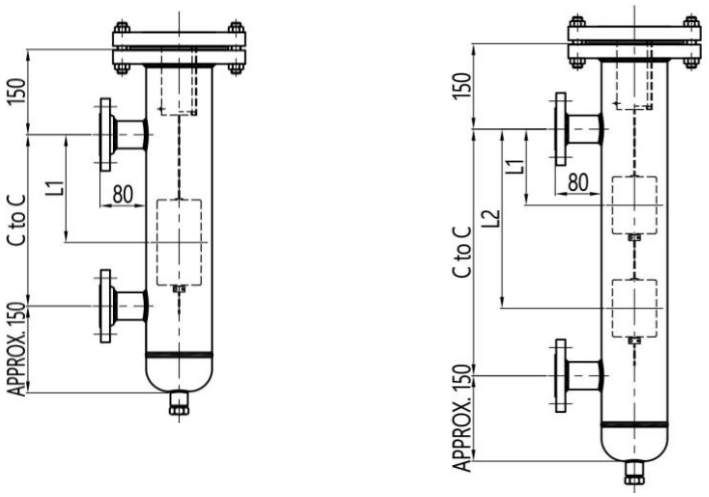
Guide Pipe Version

HM-90A



Chamber Version

HM-90B

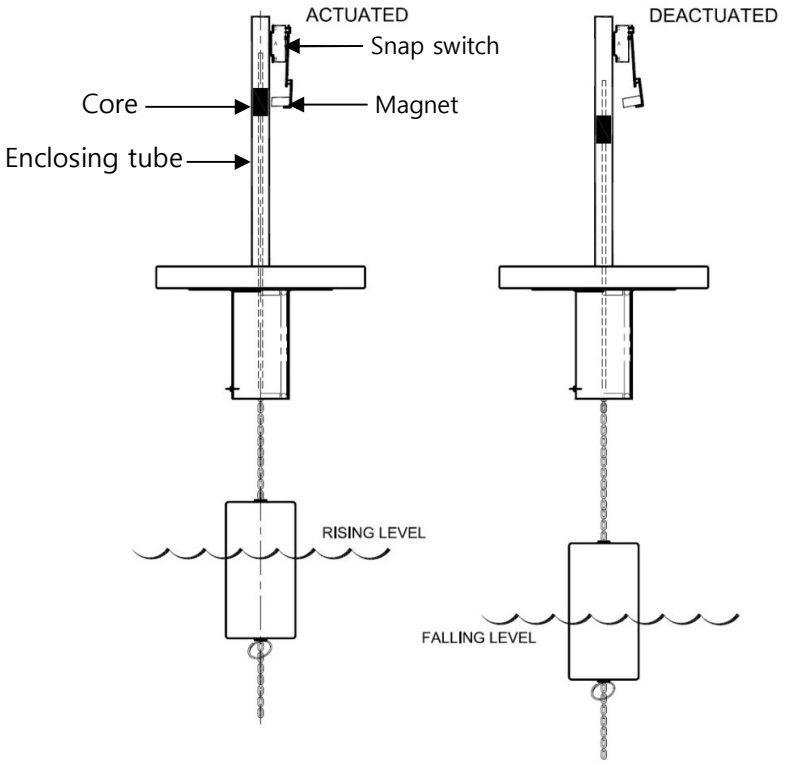


NOTICE **Some tolerances may occur with actual products.**

Switch Action and Specification

■ Switch Action

The core rises within the enclosing tube because of buoyancy when the level of measure object rises and the displacer is submerged. The magnet which is connected with the switch responds to trigger the switch when the core rises.



■ Switch Specifications by Process Temperature

Std. Type	Opt. Type	Process Temp.	Contact Rating
		~ 200˚C	AC 250V, 15A DC 125V, 0.5A
		~ 350˚C	AC 250V, 5A DC 125V, 0.5A

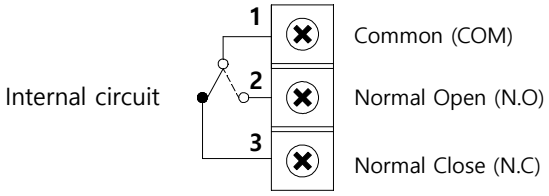
Std. Type	Opt. Type	Process Temp.	Contact Rating
	 **+ 외부 단자함**	~ 500˚C	AC 250V, 1A DC 125V, 0.4A

Specifications of Temperature and Contact Form (SPDT, DPDT) are optional.

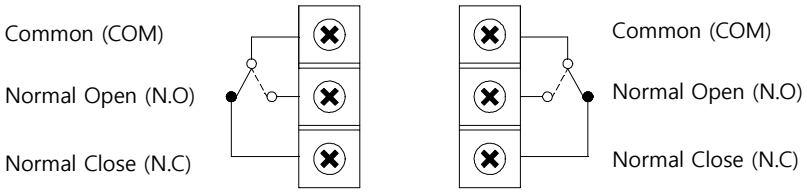
Wiring

First of all, remove the product housing cover for wiring. For High or Low alarm, connect the wires to the terminal COM-N.O of the switch block. For H/L Control, connect to COM-N.C for water supply control and COM-N.O for water drainage control. The housing is designed to prevent damage from dust or water, and if necessary, anti-corrosion (Epoxy Coated) housing is optional.

■ SPDT Wiring



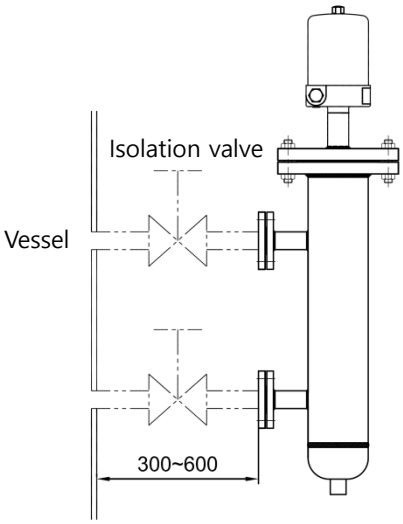
■ DPDT Wiring



Installation

■ Conditions for Installation and Adjustment

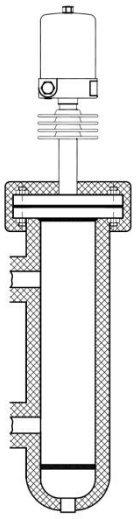
- Default connection is top type but it is customized to side to side, side to bottom. According to the dimensioned drawing, the connection and main unit must be leveled and it is recommended to install a bracket to support the product if necessary.



HM-90B

Prevent the heat of content from being transferred to the instrument when installing the product.

- Check Ex-proof rating and fluid temperature before applying an Ex-proof product. If the temperature of measure object exceeds 350˚C, cannot use an Ex-proof type product(HM-90H-Ex).
- If the temperature of measure object exceeds 120˚C, use a high-temperature product (HM-90H, HM-90H-Ex), and insulate the main unit and connection as shown below.



Do not insulate the housing and cooling fin.

Precautions for Installation

■ Use the same standard flange or screw.
■ Make sure to insert washers between bolts and nuts to prevent loosening.
■ Make sure to insert gaskets between flanges. (Select the gaskets in consideration of temperature of content and pressure of vessel.)
■ Install an Ex-proof product only in an Ex-proof zone.

Failure Check

If there is a problem with operation, check the followings first.
■ Remove the cover and check the output contact of snap switch. (Check the output by connecting COM with N.O or N.C using a tester.) *Replace the snap switch if necessary.*
■ After checking the snap switch, remove the product and move up or down the displacer and recheck the contact with the tester. When moving up of down the displacer, check the internal core (magnet) and the fixed magnet on the switch block.
■ Recheck if the measuring point of fabricated product and level of measure object are leveled.
■ When moving up or down the displacer, check if the extension spring is correct displaced.

Maintenance

Regular inspection ensures optimal performance of product. Take regular inspection and maintenance at least every year.

■ Chamber

- The chamber is designed to endure high temperature and pressure, and its safety is confirmed with non-destructive and water-pressure tests. However, corrosion can lead to leak in a harsh working environment, so regular visual check and test are required.

■ Housing of Switch

- Check the sealing of housing cover and wire inlet to prevent penetration of dust or rain and replace the sealing if it is old or damaged.
- Exposure to excessive heat or humid may damage the insulation of wire inlet. It may lead to short circuit, so check the wiring and replace it if necessary in advance.
- Tighten the terminal carefully or it may be loosened because of vibration.
- Continuous process operation may be hindered by failure of switch block, so prepare a spare switch block.
- Remove the product from the vessel and check and reset the contact of level switch using a liquid (ex. Water) on the process connection.



For maintenance, check the presence of measure object in the tank and remove it. Learn how to adjust the switch block first, and contact the headquarters or dealership for any replacement required.

Precautions for Removal

- Check the level and presence of measure object in the tank before removing it.
- Wear gloves when removing it, to prevent a burn.
- 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.
- Unlock the lock key before removing the cover.
- Disconnect the cable before removing the snap switch.

Precautions for Transportation and Assembly

- Pay special attention to prevent any impact on the device during transportation or assembly.
- Pay attention to prevent any damage to any packing when transporting or mounting the machine to the vessel.



Make sure that it is not subject to any high impact when moving the product.

Precautions for Grounding

- External ground is located on top of cable entry, and the grounding wire to connect external ground must be 4㎟ (4mmSQ). (Internal ground is connected before shipment.)



Make sure to insert a washer if the terminal lug is removed from the ground terminal and then re-connected. (Loosening prevention)

Precautions for Inserted External Wire (Ex-proof)

- Use the cable gland connection or metal pipe line lead-in on the wire inlet, and use a product with equivalent Ex-proof certificate to connect it with the external line lead-in method.
- For non-use external wire inlet, use a closed plug that passes safety certificate above equivalent performance with the product.

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

- Make sure to wire contacts correctly.
- Pay attention to prevent electric shock.

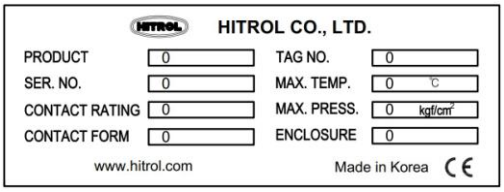
■ Disposal of Product

- Remove the snap switch of switch block from the housing before disposing a product.
- No part (ex. Mercury switch) has influence on the environment, so no special attention is required.

Marking

■ Product Identification

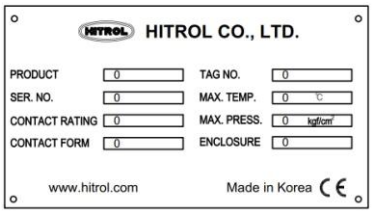
- The product identification mark is attached onto the housing and shows the model name, serial number, working temperature, working pressure, and matters regarding output. The serial number is a unique manufacturing number for the identification of products.



Weather-proof Version (C.S + Aluminum Housing)

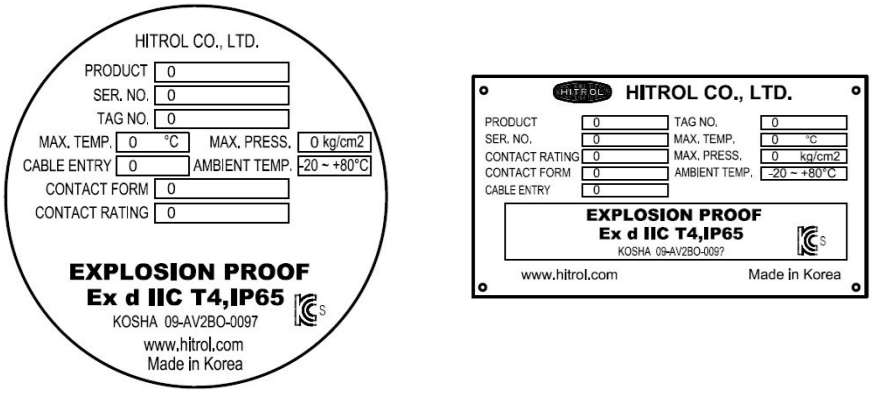


1F



2~4F

Weather-proof Version (Aluminum Housing)



Ex-proof Version (Certification No.: 09-AV2BO-0097~0099)

User Training

Understand the aforementioned and do not exceed 120℃ and 500℃ respectively for the liquid in the general and high-temperature vessels to use the product. In addition, make sure that the ambient temperature of housing is kept at -20 - +80℃. (However, Ex-Proof product is limited to a maximum temperature of 350℃ for the liquid in the container.)
Make sure to use high-temperature cables with high-temperature products.(To prevent damage to the cable). An Ex-proof product is a pressure-resistant and Ex-proof type, so never open the cover during operation. Ex-proof products are designed according to Article 34 of the Industrial Safety and Health Act and Article 58.4 of the Enforcement Rules of the same Act.

WARNING **Do not apply a Non-ex-proof product in an Ex-proof zone.**
An ex-proof product can be used where the environment and liquid inside the containers are of zone 1 and 2.

*** Additional information after product installation**

NOTICE **Since this product is set based on specific gravity 0.8 and 1, there is a slight error depending on the usage environment. If you want to measure in the correct section, you need to set it on site.**

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.

■ 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)