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INSTRUCTION MANUAL
DISPLACER & FLOAT TYPE LEVEL SWITCH
HM-90&95-Ex Series

Table of Contents

Overview	3	Cautions for Installation	15
Features	3	Cautions for Grounding	15
Applications	3	Cautions for Inserted External Wire	16
Operating Principles	3	Safety and Environment	16
Switch Action	4	Marking	16
Specification	6	Product Notation	17
Components	7	User Training	18
Dimensions and Detailed Technical Specifications	10	Warranty and Contact	18
Process temperature Switch specification	10		
Detail Dimensions	11		
Wiring	13		
Installation	13		
Maintenance	14		
Failure Check	15		
Cautions for Removal	15		
Transportation and Cautions for Assembly	15		

-  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-90&95-Ex 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.

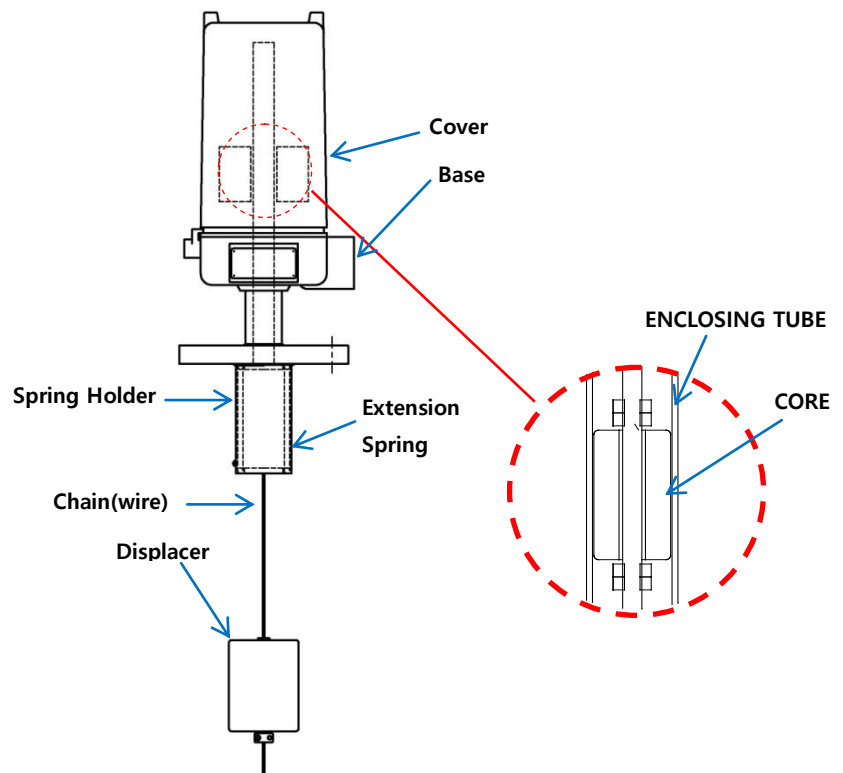
Features

- Solid structure and long service life
- Applicable in high temperature and pressure
- Current operation state display
- Customizable with special material (alloy)
- Pressure-resistant and ex-proof type available
- ASME B31.1, ASME B31.3 (If chamber design is required.)

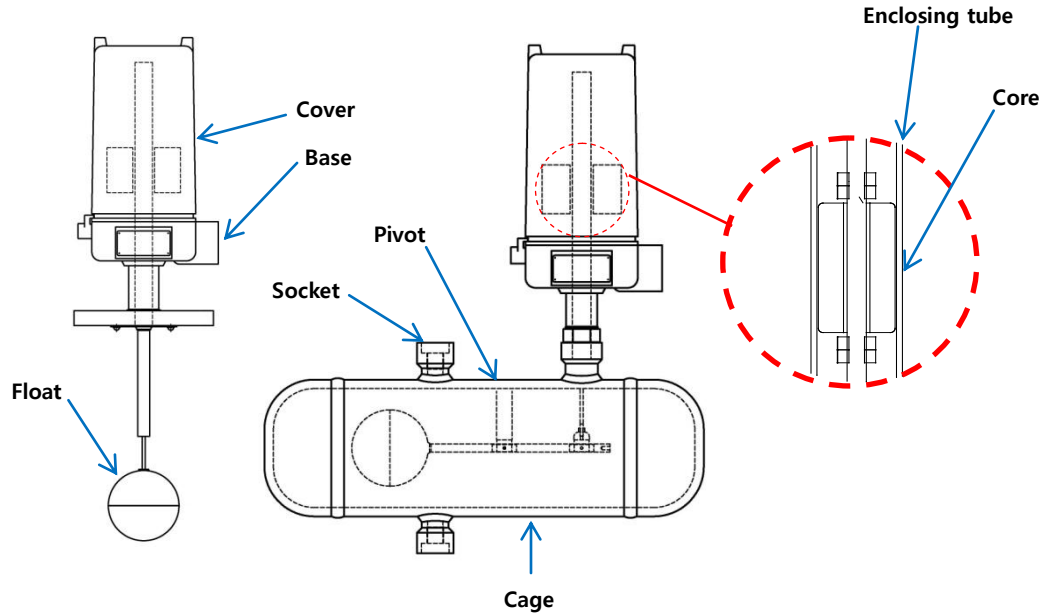
Applications

- Feedwater heaters
- Steam drums
- Condensate drip Pot
- Flash tank
- Separators
- Receivers
- Accumulator

Operating Principles HM-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.

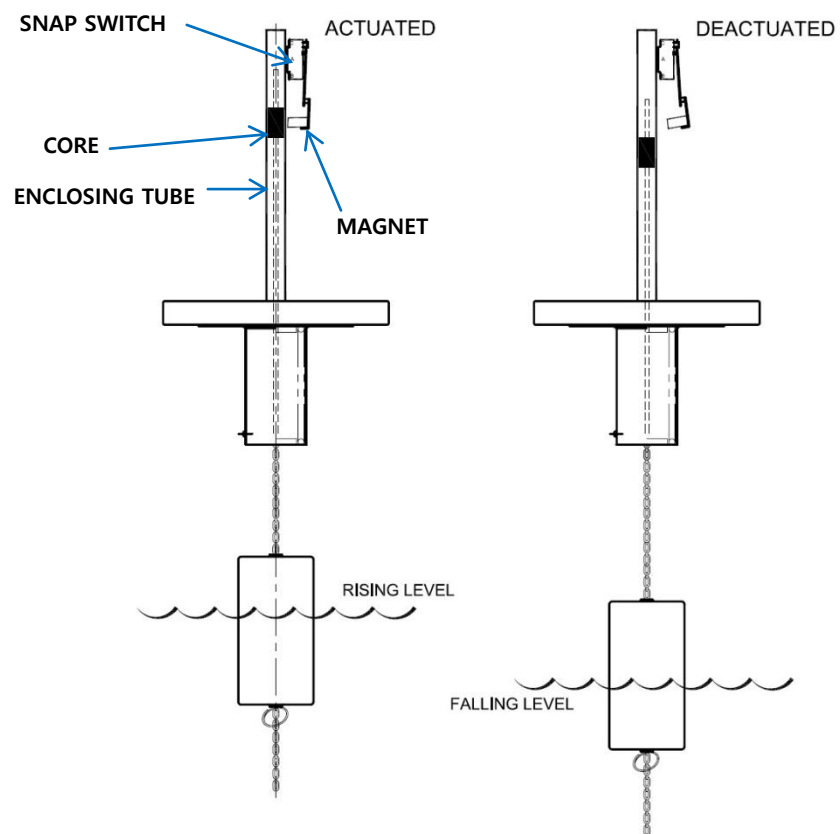


When the level of the object to be measured rises, the float also rises due to buoyancy and, accordingly, the connected core also rises. When the core rises, a switch block magnet responds to the core so as to trigger the switch.

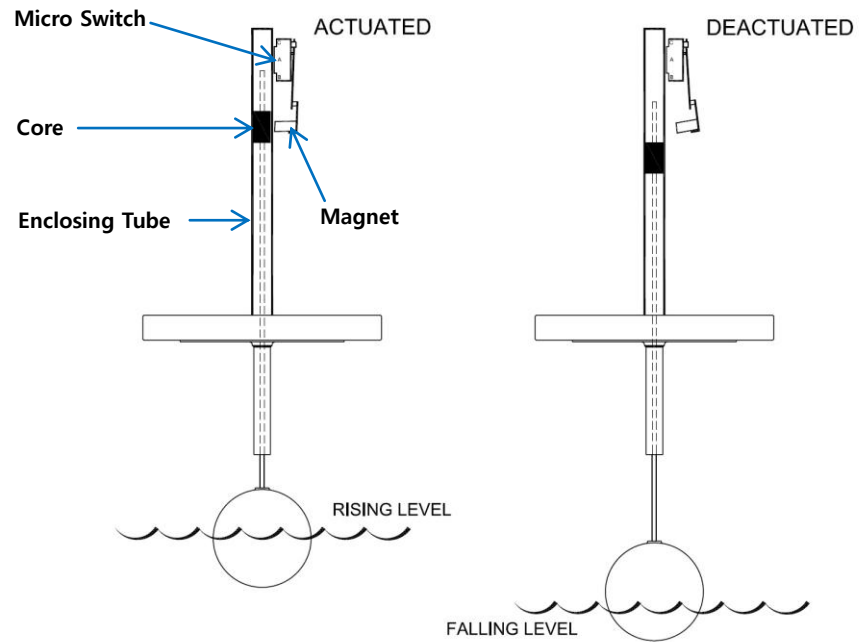


Switch Action

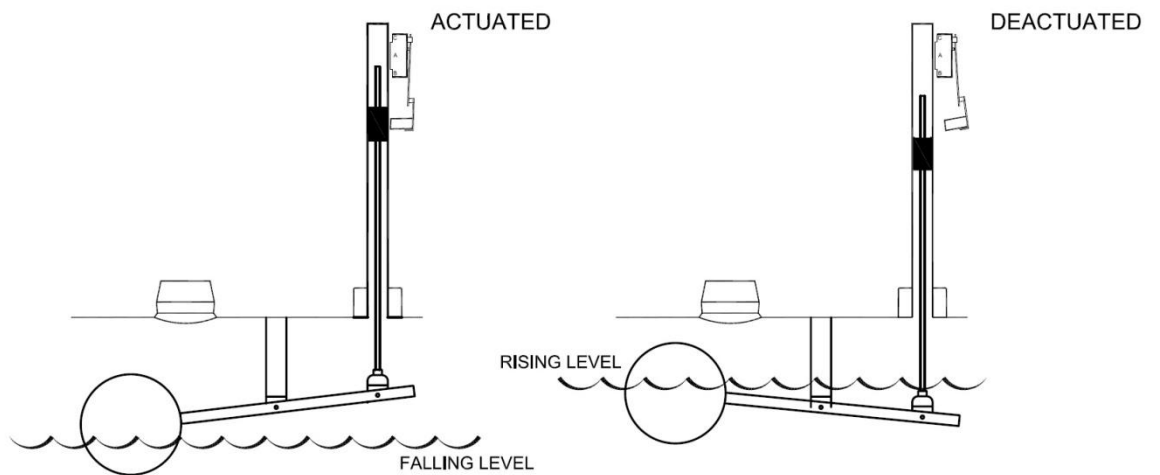
The core rises within the enclosing tube because of buoyancy when the level of measure object rises and the displacer is submerged. The magnet which is connected with the switch responds to trigger the switch when the core rises.



When the level of the object to be measured rises, the core also rises and switch block magnet responds to the core so as to trigger the switch.



When the level of the object to be measured is lowered, the core rises and the switch block magnet responds to the core so as to trigger the switch.



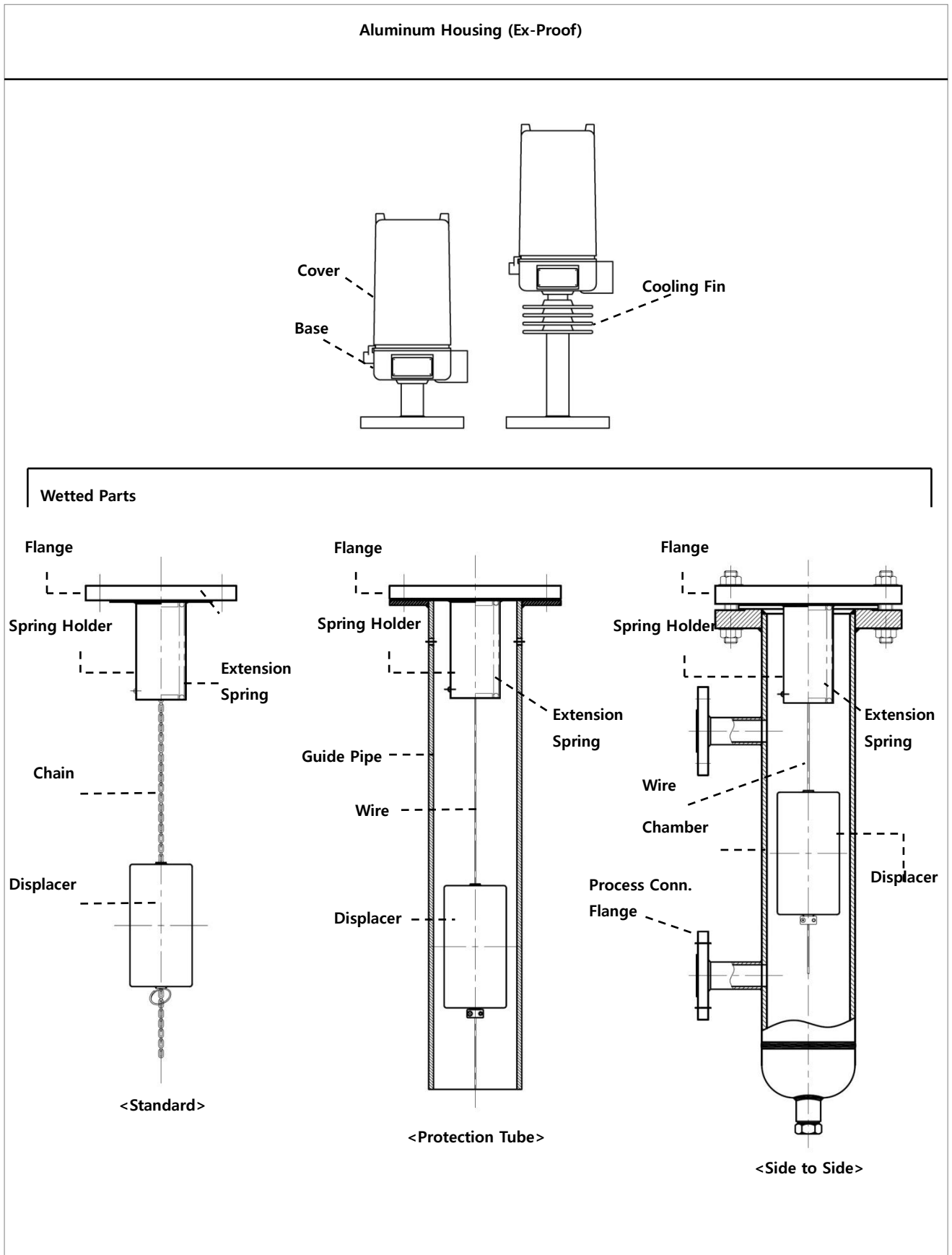
Specification

Model	HM-90-Ex		HM-90H-Ex	
Process connection	80A JIS 10K RF (Std.)			
Ambient Temperature	-20°C to +60°C			
Max. Process Temp.	-40°C to +75°C -40°C to +120°C		-40°C to +190°C -40°C to +285°C -40°C to +435°C	
Max. Process Pressure	Up to 63kg/cm ² (900#)			
Switch Type	Micro Switch			
Contact Form	SPDT, DPDT			
Contact Rating (Maximum)	AC 250V, 15A / DC 125V, 0.5A AC 250V, 5A / DC 125V, 0.5A AC 250V, 1A / DC 125V, 0.4A			
Enclosure	Ex-Proof (Ex d IIC T6/T4 Gb)		Ex-Proof (Ex d IIC T3/T2/T1 Gb)	
Material	Displacer	304, 316L		
	Chamber	C.S, 304, 316L, Other		
Housing; Cable Entry	AL; PF 3/4"(F) (Std.)			
Installation	Top			

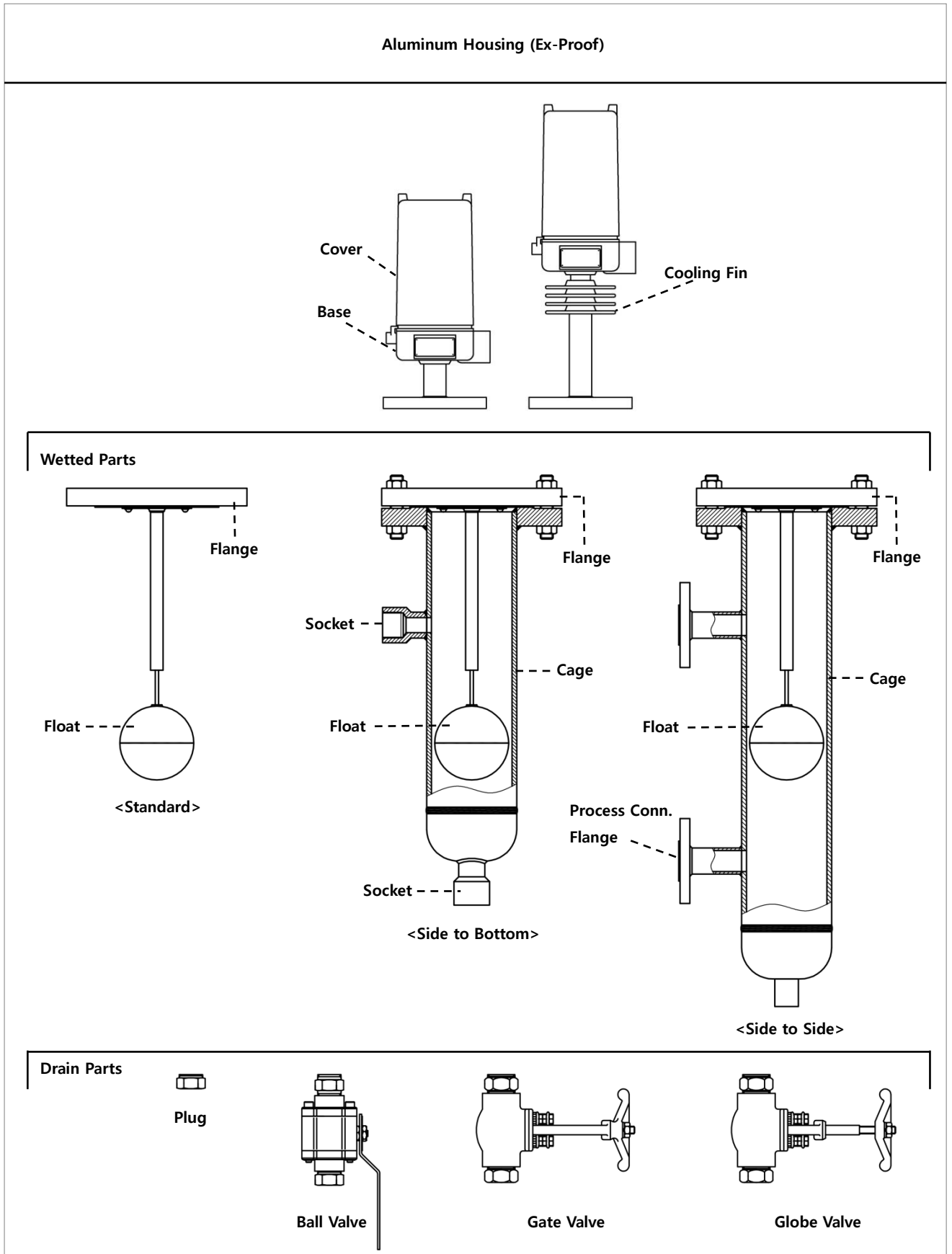
Model	HM-95-Ex	HM-95H-Ex	HM-95V-Ex	HM-95VH-Ex
Process connection	100A JIS 10K RF (Std.)		1" Socket (Std.)	
Ambient Temperature	-20°C to +60°C			
Max. Process Temp.	-40°C to +75°C -40°C to +120°C	-40°C to +190°C -40°C to +285°C -40°C to +435°C	-40°C to +75°C -40°C to +120°C	-40°C to +190°C -40°C to +285°C -40°C to +435°C
Max. Process Pressure	Up to 63kg/cm ² (900#)		Up to 105kg/cm ² (1500#)	
Switch Type	Micro Switch			
Contact Form	SPDT, DPDT			
Contact Rating (Maximum)	AC 250V, 15A / DC 125V, 0.5A AC 250V, 5A / DC 125V, 0.5A AC 250V, 1A / DC 125V, 0.4A			
Enclosure	Ex-Proof (Ex d IIC T6/T4 Gb)	Ex-Proof (Ex d IIC T3/T2/T1 Gb)	Ex-Proof (Ex d IIC T6/T4 Gb)	Ex-Proof (Ex d IIC T3/T2/T1 Gb)
Material	Float	316L		
	Cage	Opt.		C.S, 304, 316L, Others
Housing; Cable Entry	AL; PF 3/4"(F), Other			
Installation	Top		Top and Bottom, Side to side	

Components

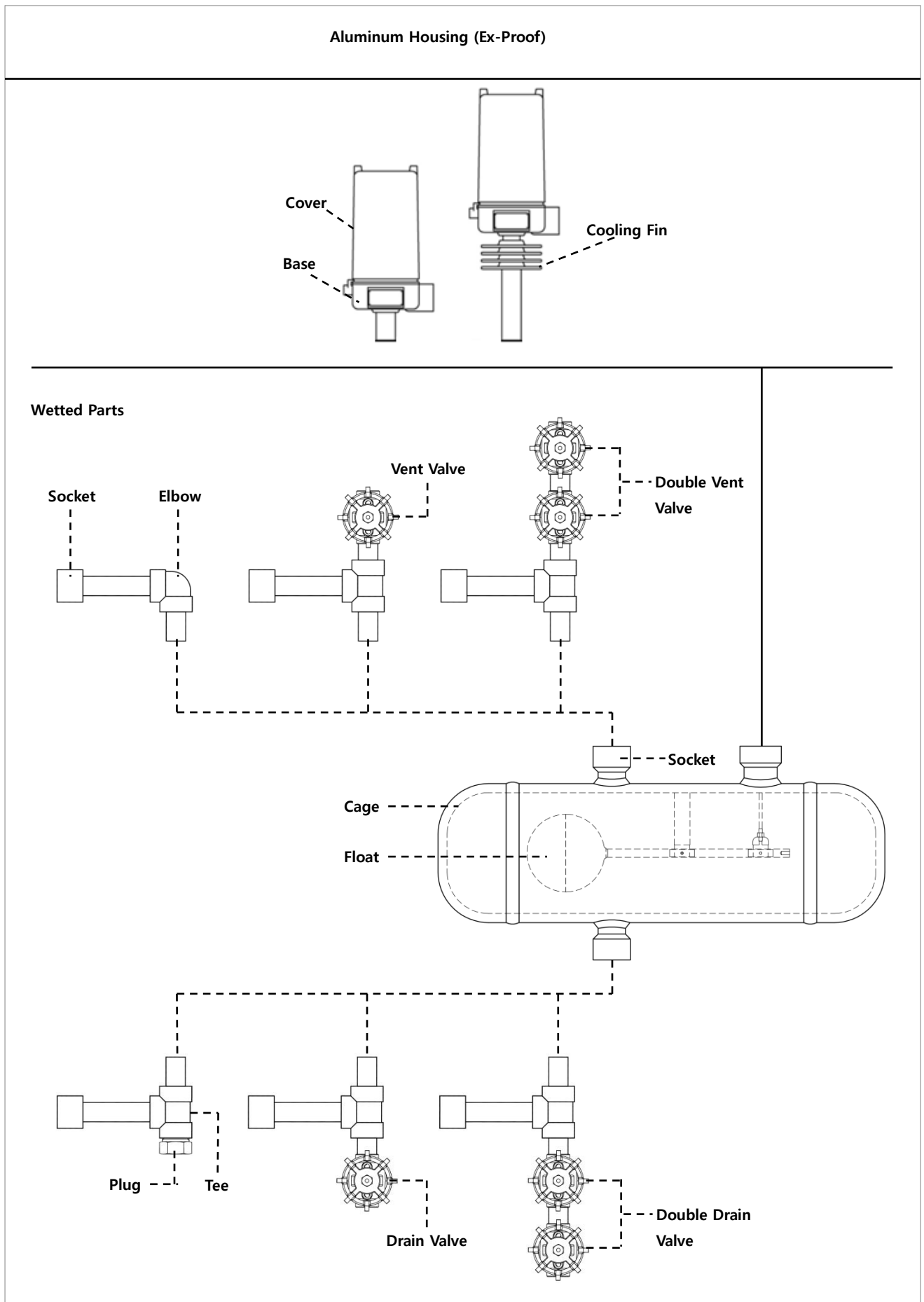
HM-90-Ex Series



HM-95-Ex Series

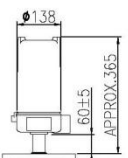
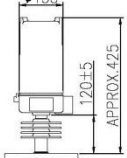
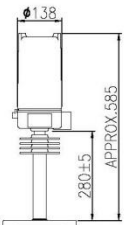
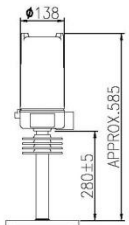


HM-95V-Ex Series



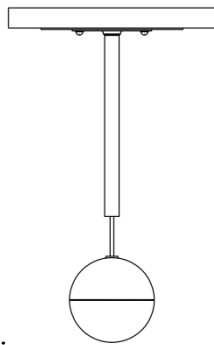
Dimensions and Detailed Technical Specifications

Ex-Proof Version

측정유체온도	~120°C	~190°C	~285°C	~435°C
Micro Switch	BZ-2RW824-A2		BZ-2RW8244-A2	TZ-1GV
Aluminum Housing (SW 1~3EA)				

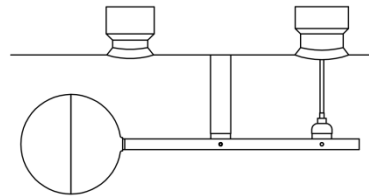
The unit of length is expressed in mm.

HM-95 Series Float



HM-95 Series

Float Size	Minimum Specific Gravity
Ø94	0.8
Ø114	0.5



HM-95V Series

Float Size	Minimum Specific Gravity
Ø94	0.8

※ Based on pressure 10kgf/cm², temperature of 120°C, Std. Length.

Process temperature

Switch specification

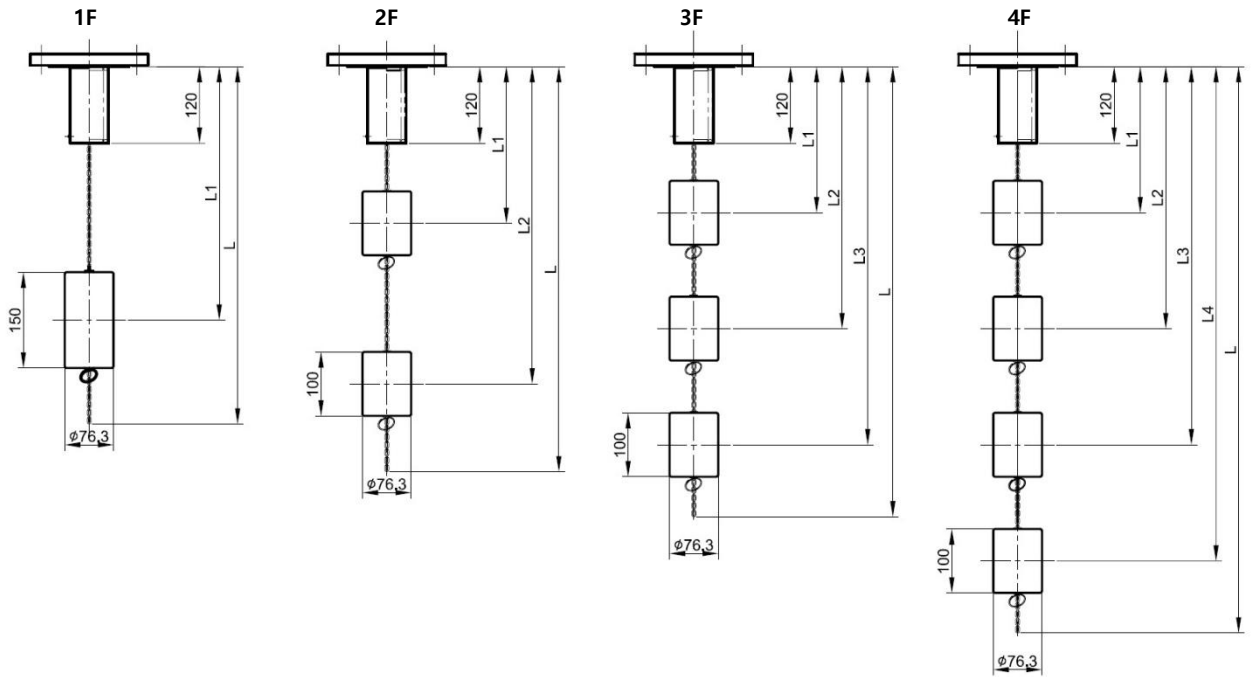
공정온도	SWITCH 사양
~120°C	AC 250V, 15A DC 125V, 0.5A
~190°C	AC 250V, 15A DC 125V, 0.5A
~285°C	AC 250V, 5A DC 125V, 0.5A
~435°C	AC 250V, 1A DC 125V, 0.4A



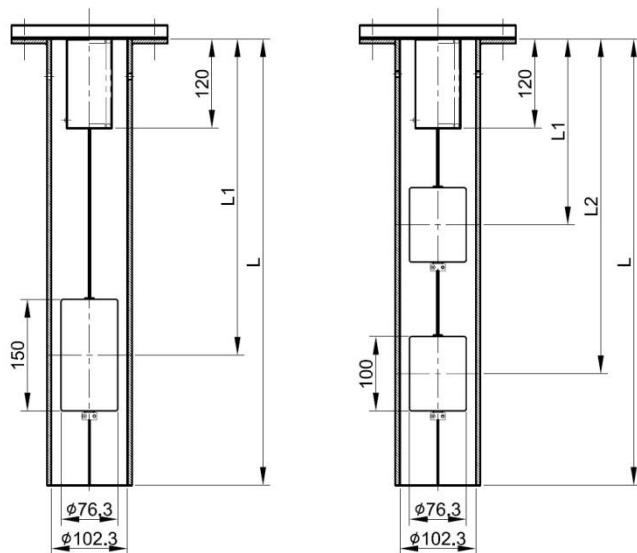
Specifications of Temperature and Contact Form (SPDT, DPDT) are optional.

Detail Dimensions

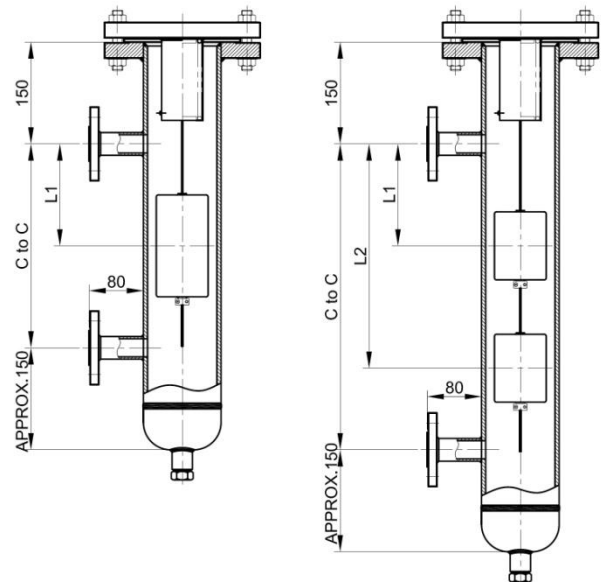
HM-90-Ex Series
Contact composition



Guide Pipe Version



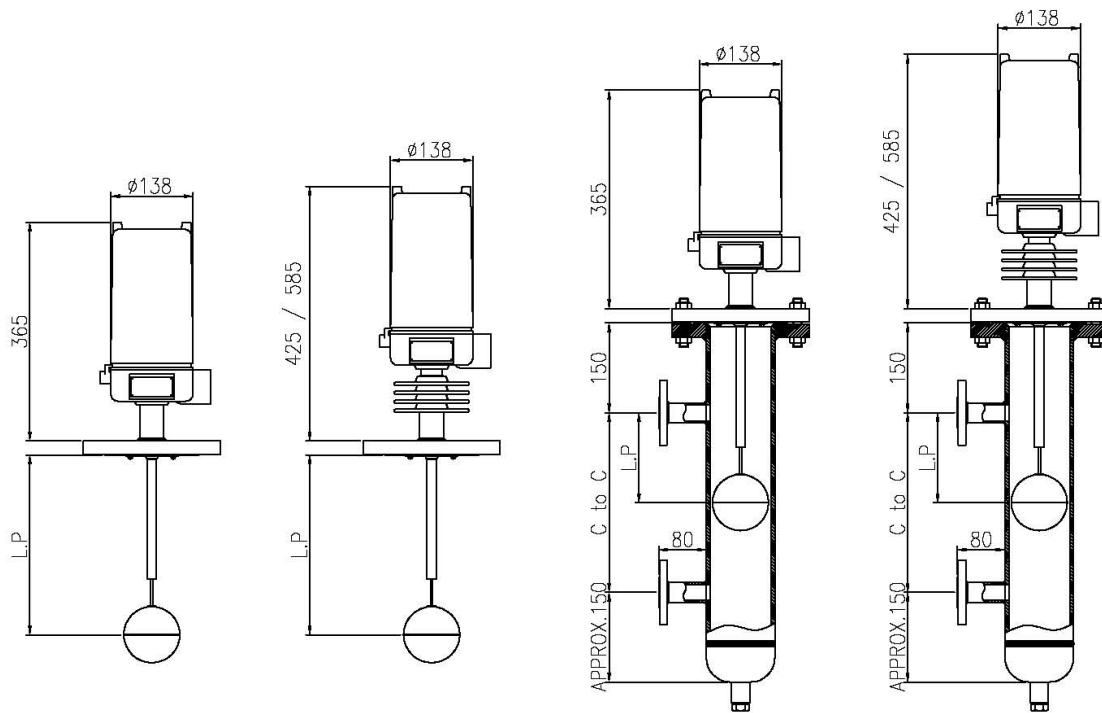
Chamber Version



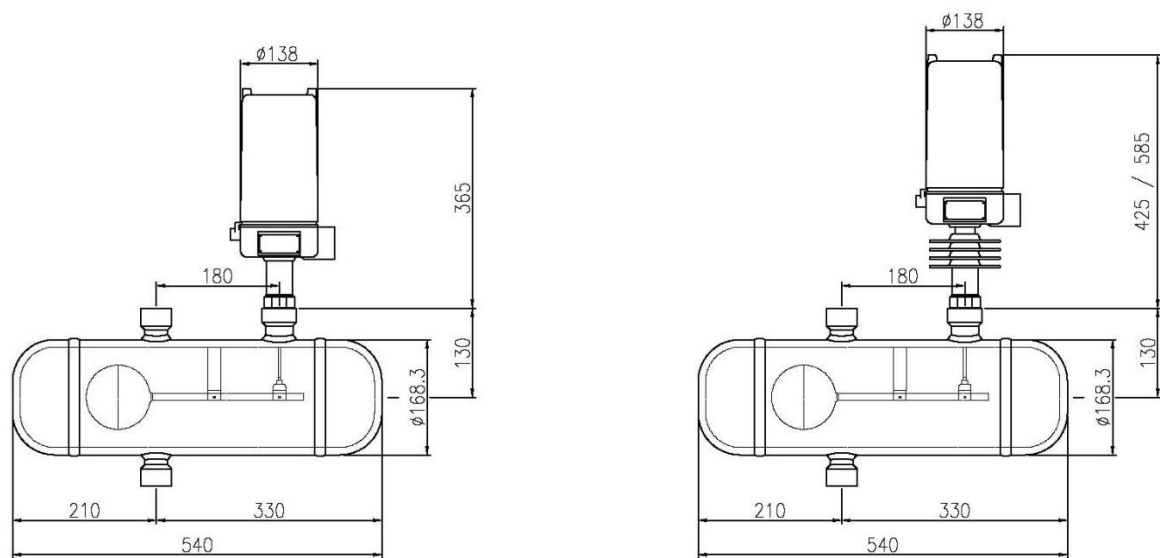
Some tolerances may occur with actual products.

The unit of length is expressed in mm.

HM-95-Ex Series



HM-95V-Ex Series



Some tolerances may occur with actual products.

The unit of length is expressed in mm.

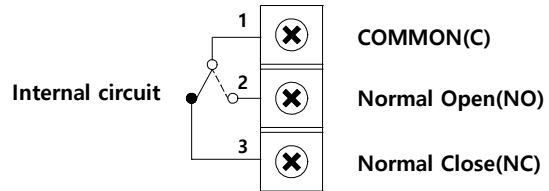
Wiring

First of all, remove the product housing cover for wiring.

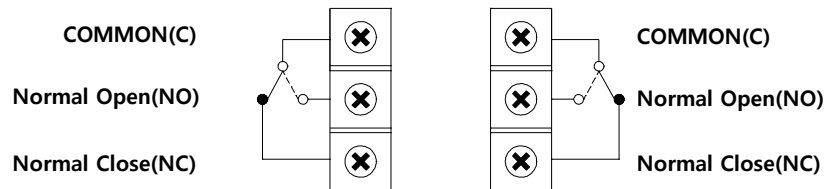
After that, connect the wires to COM, N.O, and N.C terminals of switch block.

The housing is designed to prevent damage from dust or water, and if necessary, anti-corrosion (Epoxy Coat) housing is optional.

SPDT wiring



DPDT wiring



Installation

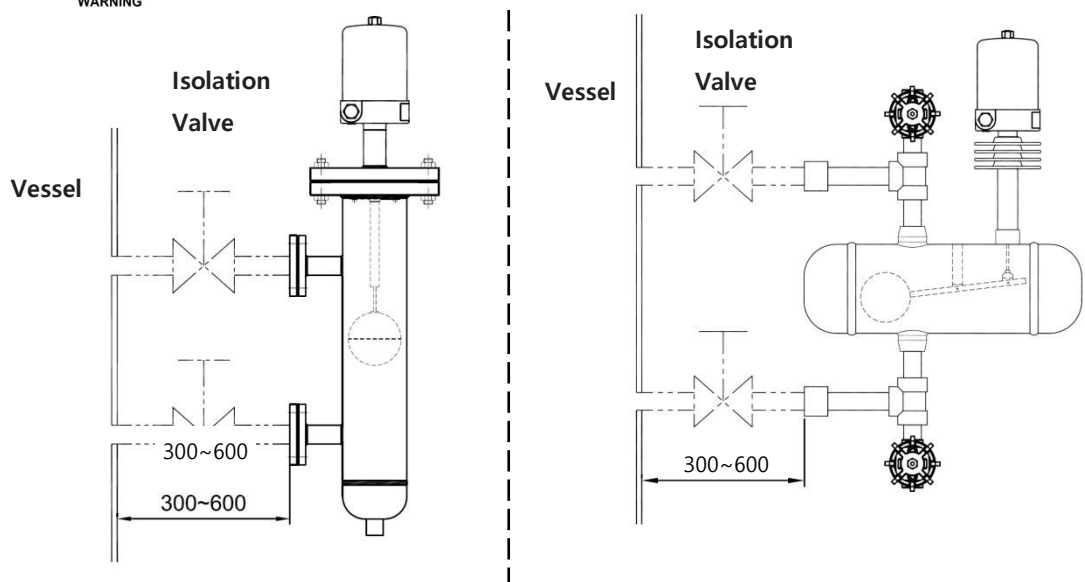
Default connection is Top type, but it is customizable to Side to Side or Side to Bottom.

According to the dimensions of the drawing, the connection and main unit must be leveled.

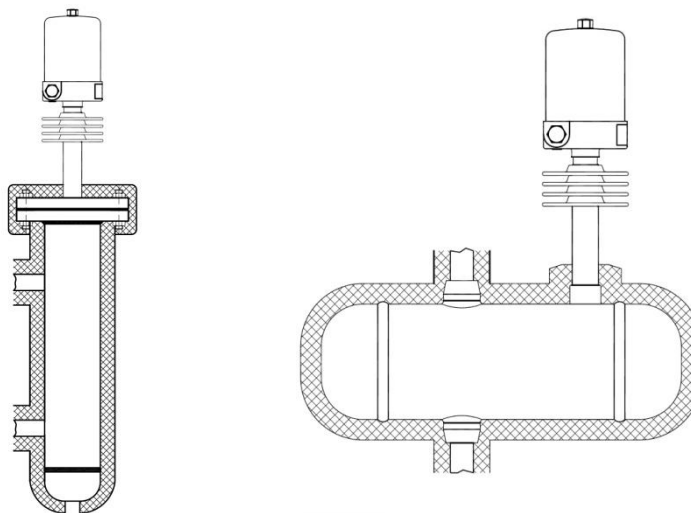
Also, it is recommended to install a bracket to support the product if necessary.



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.
- If the temperature of measure object exceeds 120°C, use a high-temperature product, and insulate the main unit and connection as shown below.



Do not insulate the housing and cooling fin.

Maintenance

Regular inspection helps in using the product in the optimal condition. As such, it is recommended to conduct annual inspection and maintenance.

■ Cage

The cage is designed to endure high temperature and pressure, and its safety is confirmed with nondestructive and water-pressure tests. However, corrosion can lead to leakage in a harsh working environment. As such, regular visual inspection and test are required.

■ Housing

Check the sealing of the housing cover and wire inlet to prevent dust or rain from penetrating. Also, replace the sealing if it is old or damaged.

Exposure to excessive heat or humidity may damage the wire inlet insulation. It may lead to short circuit, so check the wiring and replace it if necessary in advance.

If the terminal is not tightened, vibration may cause it to loosen.

Prepare a spare switch block so that the process can continue even if there is a problem with the switch block.

The product can be removed from the vessel to check the contact of level switch using liquid (e.g., water) and then reconfigure it.

For maintenance, check for the presence of the object to be measured in the tank first.



Learn how to adjust the switch block before adjusting it, and contact the headquarters or dealership for any replacement required.

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. (HM-90-Ex Series)
 - Recheck if the float is positioned on top of the object to be measured. (HM-95-Ex Series)

Cautions for Removal

- Check the level and presence of object to be measured in the vessel before removing it.
- The product may be overheated so wear gloves to prevent burns.
- If there is explosive gas in the atmosphere, do not open the cover.
- Make sure that any O-ring or gasket is not damaged while opening or closing the cover.
- To remove the cover of an ex-proof product, release the lock key first.

Transportation and Cautions for Assembly

- Pay special attention to prevent any impact on the product during transport or assembly. The impact may directly lead to a failure.
- When attaching the product to a vessel, pay attention to prevent any damage to the assembly packings.



Make sure that the product would not be subject to any high impact during transport or assembly.

Cautions for Installation

- Use the same standard flange or screws.
- 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 the temperature of the content and the pressure of the container.)
- Install an ex-proof product in an ex-proof zone.

Cautions for Grounding

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



Make sure to insert a washer if the terminal lug is removed from the ground terminal and then reconnected (to prevent loosening).

**Cautions for
Inserted External
Wire**

- Use the cable gland connection or metal pipe line lead-in on the wire inlet, and use a product with an equivalent ex-proof certificate to connect it using the external line lead-in method.
- For an unused external line inlet, use a closing plug with an equivalent ex-proof certificate.

**Safety and
Environment**

- Cautions for Use
 - Make sure to connect the product and container using the required tools.
 - Store the key safely and make sure that it is locked.
 - Do not apply high impact to the product.
- Cautions for Wiring
 - Make sure to correctly connect the contacts.
 - Pay attention to prevent electric shocks.
- Disposal
 - Make sure to separate the microswitch of a switch block from the housing before wasting the product.

No part affects the environment so no special attention is required (e.g., mercury switch).

Marking

- The label is attached on the housing to state the model, serial number, working temperature, working pressure, and output. The serial number is a unique manufacturing number.



Ex-Proof Version

■ IECEx and Atex Certification standard

IEC 60079-0 : 2017 Edition : 7.0

Explosive atmospheres – Part 0 : Equipment – General requirements.

IEC 60079-1 : 2014 Edition : 7.0

Explosive atmospheres – Part 1 : Equipment protection by flameproof enclosures "d" IEC

EN 60079-0 : 2018

Explosive atmospheres – Part 0 : Equipment – General requirements. (IEC 60079-0:2017)

EN 60079-1 : 2014

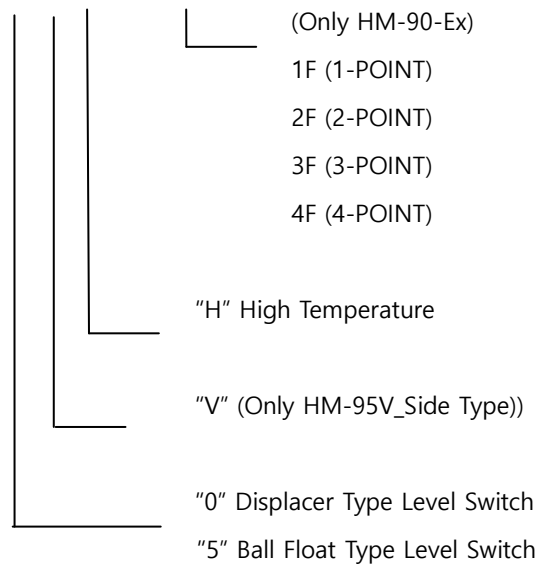
Explosive atmospheres – Part 1 : Equipment protection by flameproof enclosures "d"



Product Notation

The composition of the product is as follows.

HM-9 * * * - Ex- *



User Training

Read and understand the aforementioned and make sure that the temperature of the object to be measured does not exceed 120°C for general purpose. For an ex-proof type, the maximum is 435°C. In addition, make sure that the ambient temperature of the housing is kept at -20 ~ +60°C.

Ensure that a high-temperature cable is used for high-temperature products (to prevent cable damage).

An ex-proof product is a pressure-resistance and ex-proof type, so do not open the cover while using it.



Do not apply a non-ex-proof product in an ex-proof zone.

An ex-proof product can be used where the environment and containers of the object to be measured are type 1 and 2.

Warranty and Contact

■ Warranty and Service

This product is subject to a two-year warranty upon shipment and free service will be provided for any damage found under normal operating conditions. If troubles that occur are not due to product failure, service charge will apply.

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

■ Headquarters, Factory, and Research Center (Contacts)

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