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INSTRUCTION MANUAL

VIBRATION TYPE LEVEL SWITCH




HTM(HPV)-20N Series



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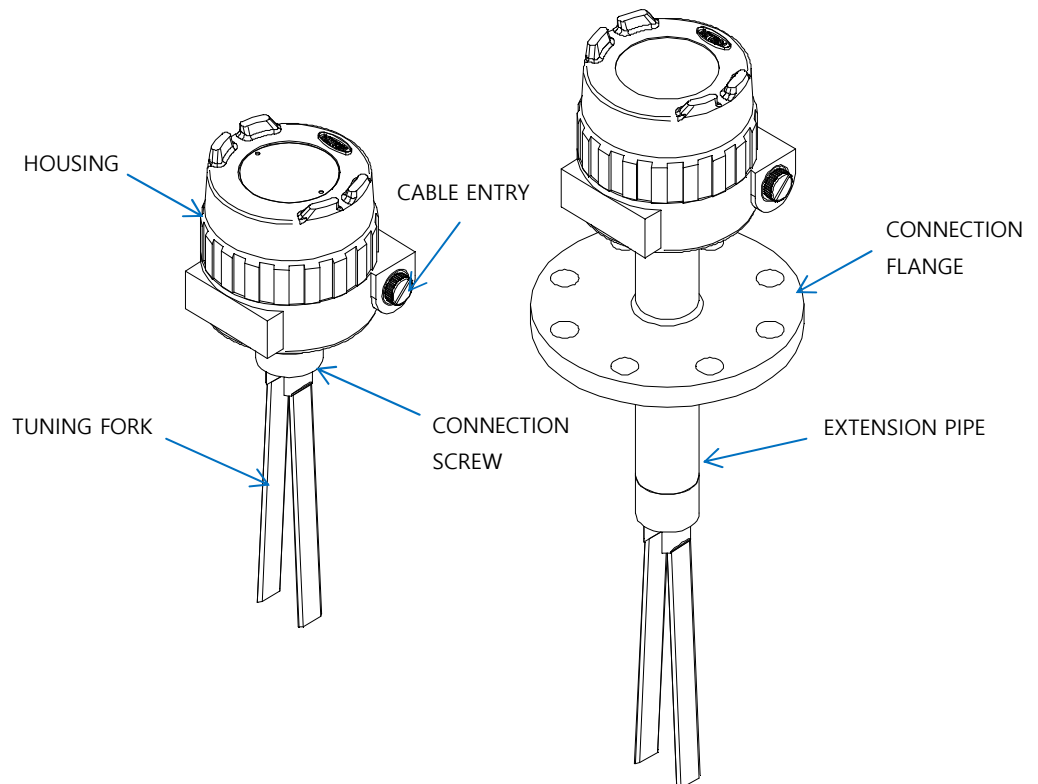
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Overview The HTM(HPV)-20N Series is a tuning fork type vibration level switch that consists of one membrane and two stainless forks to detect powder and output the state using the relay contact, which is applicable for alert and process control.

- Characteristics**
- Level of different powder, liquid types can be detected.
 - It can measure powder particles, ranging from small to large.
 - The membrane is made of stainless steel with a solid structure and a high bearing capacity.
 - The wiring is simple.
 - It is customizable with the key button.
 - It has a simple structure for easy maintenance.

Operation Principle and Appearance A certain level of electric signal is transferred to the piezo sensor so as to vibrate the tuning fork. The vibration of the latter is reduced when it comes in contact with the subject. As such, the electric signal is reduced to stop the oscillation of the piezo sensor. The electric signal is detected by the electronic circuit to operate the relay, so that the state can be detected with the contact output.



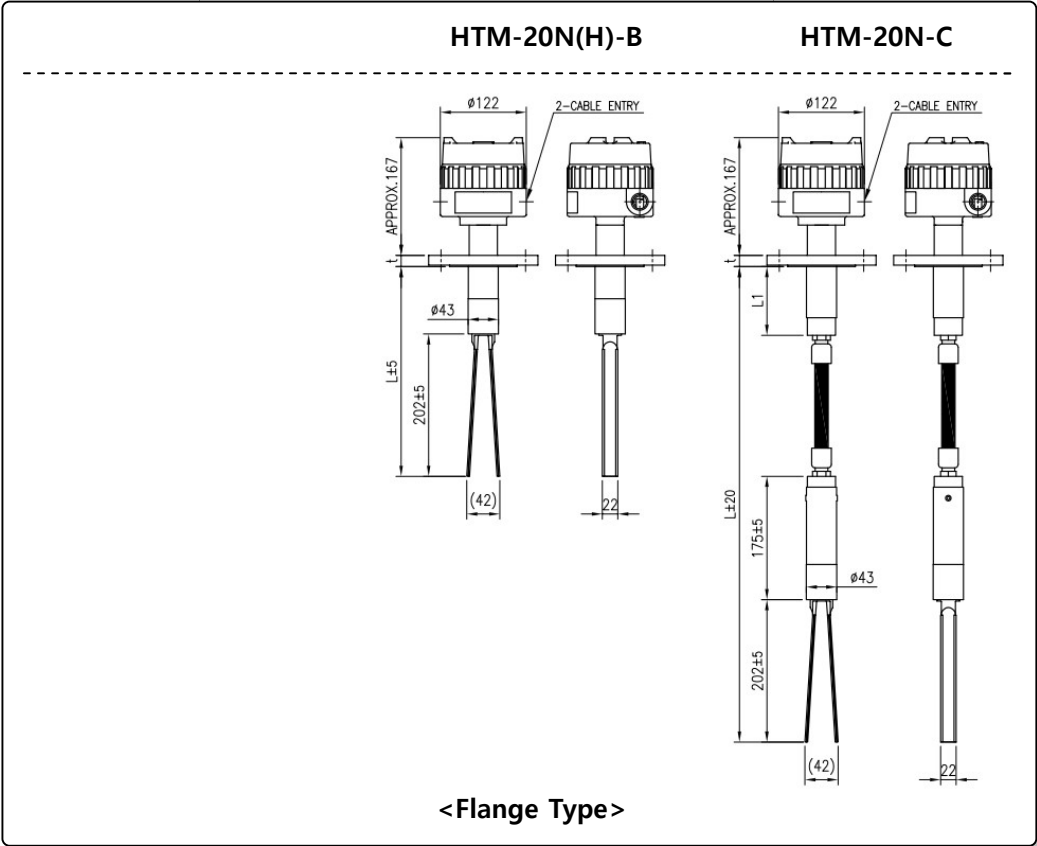
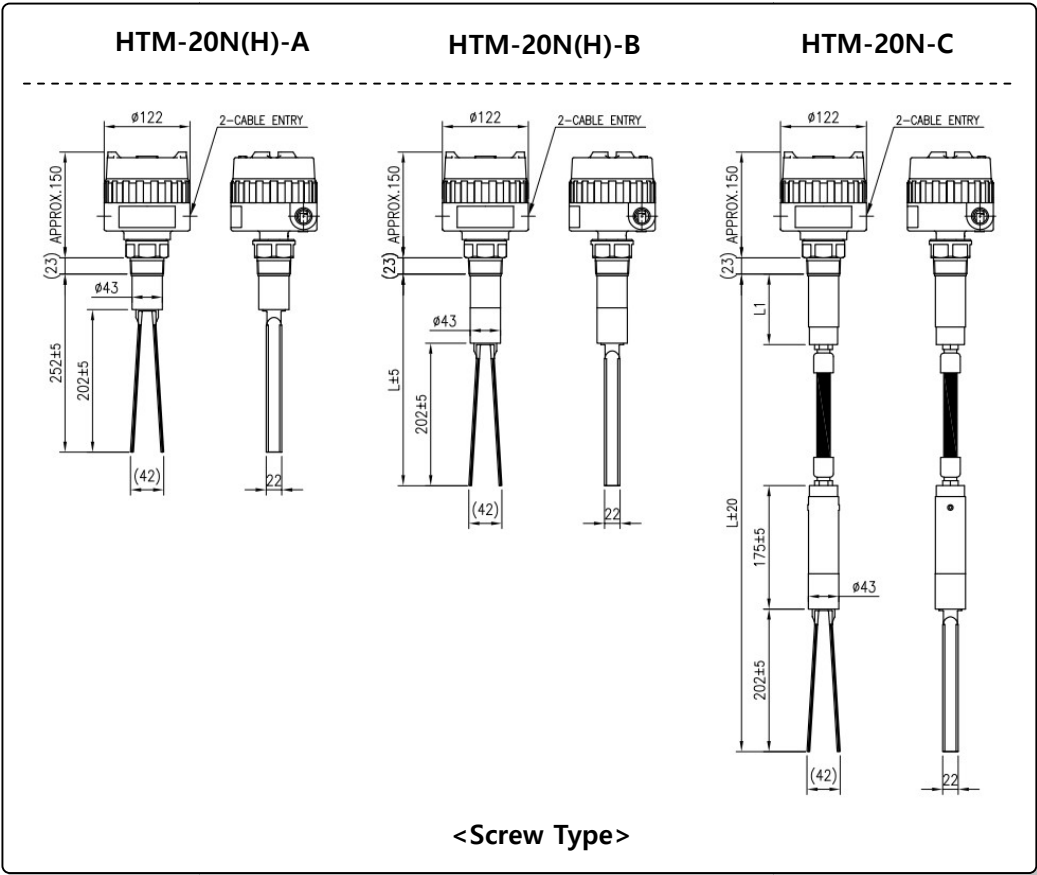
Specifications Weather-proof Version

Model		HTM-20N-A	HTM-20NH-A	HTM-20N-B	HTM-20NH-B	HTM-20N-C
Mounting		Screw		Screw, Flange		
Process Temperature		Max. 80°C	Max. 150°C	Max. 80°C	Max. 150°C	Max. 60°C
Process Pressure		Max. 10kg/cm ²				Max. 2kg/cm ²
Power Source		AC 90V~240V, 50/60Hz / DC +24V				
Power	AC	Stand-by	AC 110V @ 5.1W / AC 220V @ 8W			
		Active	AC 110V @ 6.8W / AC 220V @ 9W			
Consumption	DC	Stand-by	DC +24V @ 1.8W			
		Active	DC +24V @ 2.7W			
Output Signal		DPDT				
Enclosure		Weather-Proof, IP65				
Approvals		CE, KC				
Wetted Part Material		SUS 316L+SCS 14				
Process Connection		PT 1-1/2"(M)		PT 1-1/2"(M)(Std.), 2" Flange		
Housing ; Cable Entry		AL. ; 2-PF 3/4"(F) (Std.)				
Installation		Side		Side or Top		Top
Contact Rating		AC 250V, 5A / DC 30V, 5A				

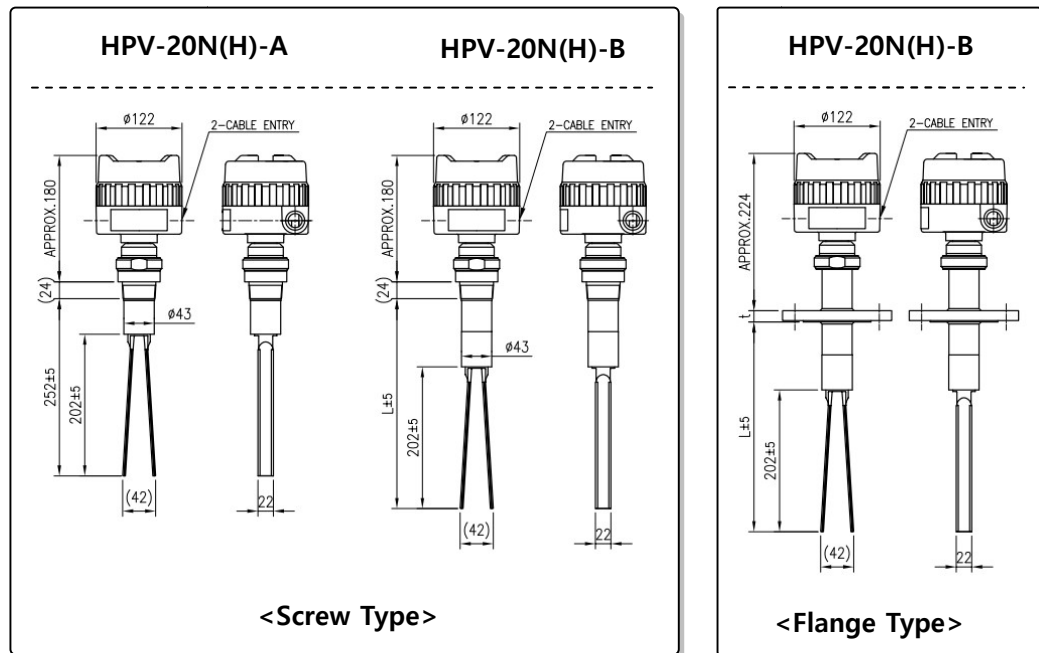
Ex-proof Version

Model		HPV-20N-A	HPV-20NH-A	HPV-20N-B	HPV-20NH-B
Mounting		Screw		Screw, Flange	
Process Temperature		Max. 80°C	Max. 120°C	Max. 80°C	Max. 120°C
Process Pressure		Max. 10kg/cm ²			
Power Source		AC 90V~240V, 50/60Hz / DC +24V			
Power	AC	Stand-by	AC 110V @ 5.1W / AC 220V @ 8W		
		Active	AC 110V @ 6.8W / AC 220V @ 9W		
Consumption	DC	Stand-by	DC +24V @ 1.8W		
		Active	DC +24V @ 2.7W		
Output Signal		DPDT			
Enclosure		Ex d IIC T6, IP65; Ex-proof Ex tD A21 IP65 T90°C / T130°C; Dust-proof			
Approvals		CE, KC, KCs			
Wetted Part Material		SUS 316L+SCS 14			
Process Connection		PT 1-1/2"(M)		PT 1-1/2"(M)(Std.), 2" Flange	
Housing ; Cable Entry		AL. ; 2-PF 3/4"(F) (Std.)			
Installation		Side		Side or Top	
Contact Rating		AC 250V, 5A / DC 30V, 5A			

Dimensions Weather-proof Version



Ex-proof Version



Actual product may have a tolerance slightly.

Attachment & Precautions

The HTM(HPV)-20N_Series is installed on the top or the side of a container and silo to detect the upper or the lower limit, respectively. The level switch can be installed on any material, so it is applicable to ferrous or nonferrous tanks and silos.

When installing this product, consider the following.



When installing the product, install it using a tool that fits the hexagon connector of the screw.

Installation on Side (Horizontal)

- A-Type or B-Type can be installed on the side of a tank. A screw-socket shape under 24mm shall be used for installing the A-Type on the side. Otherwise, dust or foreign matter may enter, resulting in a malfunction. The extended B-Type supports the screw and the flange.



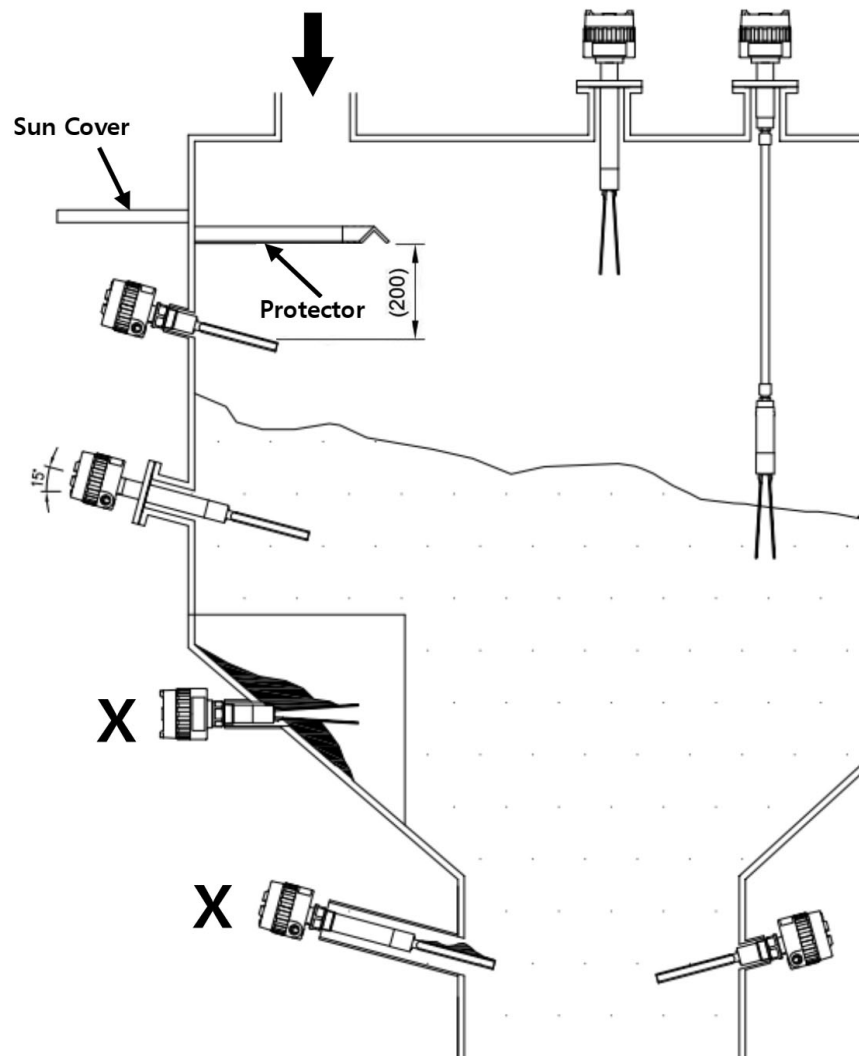
Max. Length shall be 500mm or less for a side installation.

- When side installation, it shall be installed slopingly (more than 15°) with a direction of wider side of tuning fork vertically to avoid build-up of the medium on the tuning fork. (Refer to Fig. 1)
- Sensor shall be installed at the place far from inlet of the tank and protector shall be installed in order to protect the sensor from damage by falling medium if it is installed at the inlet. The protector shall have sufficient area to protect the sensor from incoming medium and be installed at a distance that does not affect sensor operation.(Refer to Fig. 1)

- Cable lead-in inlet shall be installed facing the ground as shown in the figure. (Refer to Fig. 1)
- Sun cover shall be installed to protect the housing from the damage by direct sunlight. (Refer to Fig. 1)

Installation on Top (Vertical)

- Use the B-Type and the C-Type for installation on top of a tank or silo. Both B-Type and the C-Type can be installed with the socket or flange on top.
- Sensor shall be installed at the place far from inlet of the tank.
- Sun cover shall be installed to protect the housing from the damage by direct sunlight. (Refer to Fig. 1.)

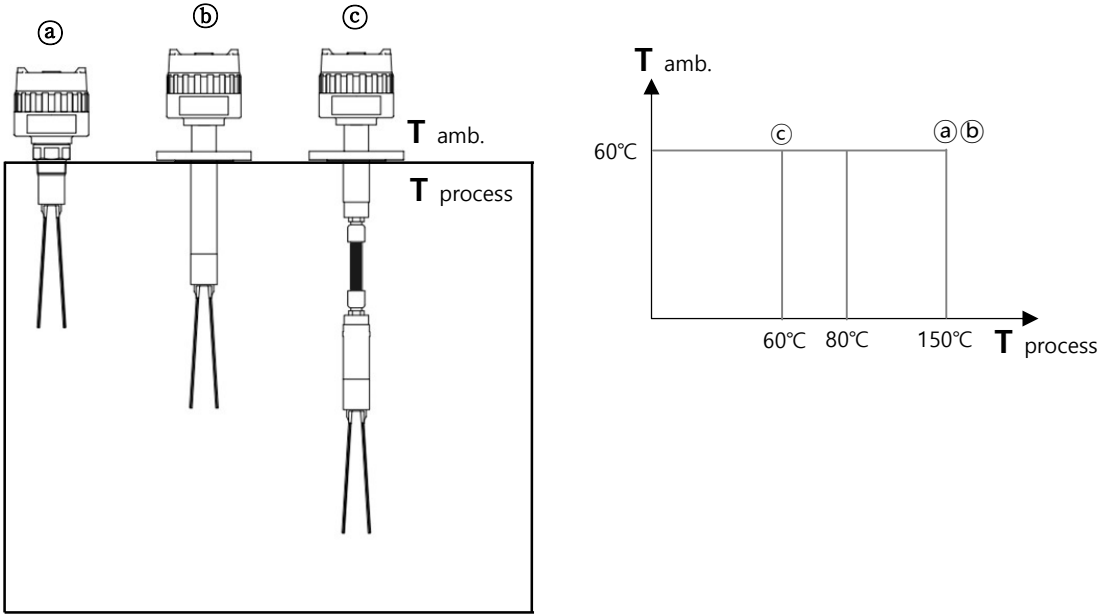


<Fig. 1.>

Technical Data

Ambient Temp. (Housing) -20 ~ +60 °C HTM(HPV)-20N Series

Process Temperature MAX. 80 °C HTM(HPV)-20N-A / HTM(HPV)-20N-B
 MAX. 150 °C HTM(HPV)-20NH-A / HTM(HPV)-20NH-B
 MAX. 60 °C HTM(HPV)-20N-C



Bulk Density Particle Density 0.2g/cm³ HTM(HPV)-20N Series

Max. Mechanical Load 400N (1kgf=9.8N) HTM(HPV)-20N-A / HTM(HPV)-20N-B
 (For stacking heavy subjects, use a protection cover.)

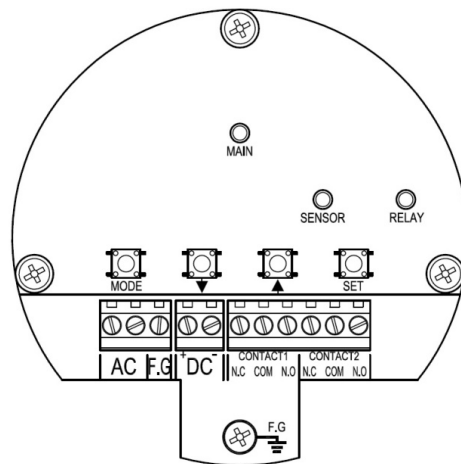
Max. Tractive Force 500N HTM-20N-C

Max. Process Pressure Up to 10kg/cm²(150#) HTM(HPV)-20N-A / HTM(HPV)-20N-B
 Up to 2kg/cm² HTM-20N-C

Relative Humidity Good for 0~100%
 (Ratio between the vapors in the air and that required for saturation at the same temperature)

AMP and Wiring

The power specifications of HTM (HPV)-20N Series is AC 90~240V and DC +24V, check and supply the power voltage before wiring, and then connect it to the output according to use.



- LED
 - MAIN: Power on/off and operation state
 - SENSOR: Detection of medium
 - RELAY: Relay operation
- Tact Switch
 - Setting button
- Terminal Block
 - AC: AC Input power
 - F.G: Field ground
 - DC: DC input power
 - CONTACT 1 & 2: Output (DPDT)

Settings

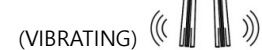
■ Sensitivity Adjustment of Solid

1) Sensitivity Setting

Set as below before installation.

STEP 1

- Press and hold the **(M)** + **(S)** + **(↓)** buttons to turn on the red LED.
- When it is vibrating state, press and hold the **(S)** button for 1 second to turn on the green LED.

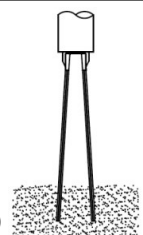


STEP 2

- Press and hold the **(M)** + **(S)** + **(↑)** buttons to turn on the red LED.
- When it is not vibrating state, press and hold the **(S)** button for 1 second to turn on the green LED.

※ The sensitivity is determined by the intensity of vibration.

(NON-VIBRATING)





STEP 3

Press the **(M)** + **(↓)** + **(↑)** + **(S)** buttons for 1 second to turn on and off the green LED and thus finish the setting.

- It doesn't matter if the order of STEP 1 and STEP2 is changed.
- When STEP 3 setup, all relay settings are initialized.
(Delay Time: 1 Sec., Return Time: 1 Sec., Relay Out: Normal Closed)



2) Build-up Point Setting

It sets the detecting point above the current point in case of build-up of foreign substance on the sensor. (However, the built-up medium shall come in contact with the sensor.)

Press and hold the  +  buttons for 1 second to turn on and off the green LED and thus finish the setting.


3) Activation Point Setting





It sets the current state as activation point. (However, the medium shall come in contact with the sensor.)

- Press and hold the  button to turn on the red LED.
 - After the red LED turns on, press  button for 1 second to turn on and off the green LED and thus finish the setting.

4) Activation Point Adjustment

It changes the activation point to user's desired point according to the specific gravity of the medium and the area that comes in contact with the sensor.

( - Adjust insensitively,  - Adjust sensitively)





- Press and hold the  button to turn on the red LED.
 - Use  or  to set the detection point. Then, press and hold the  button for 1 second.

■ Sensitivity Adjustment of Liquid

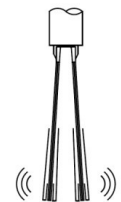
1) Sensitivity Setting

Set as below before installation.





STEP 1

- Press and hold the  +  +  buttons to turn on the red LED.
 - When it is vibrating state, press and hold the  button for 1 second to turn on the green LED.

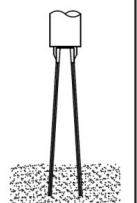
(VIBRATING)







STEP 2

- Press and hold the  +  +  buttons to turn on the red LED.
 - When it is not vibrating state, press and hold the  button for 1 second to turn on the green LED.

(NON-VIBRATING)



STEP 3

Press the  +  +  +  buttons for 1 second to turn on and off the green LED and thus finish the setting.

- It doesn't matter if the order of STEP 1 and STEP2 is changed.

- When STEP 3 setup, all relay settings are initialized.

(Delay Time: 1 Sec., Return Time: 1 Sec., Relay Out: Normal Closed)

2) Activation Point Setting

It sets the activation point to user's desired point as following the *STEP 2* → *STEP 3* of *Sensitivity Setting* (Page 10). (However, the medium shall come in contact with the sensor.)



The factory standard setting of sensitivity is set according to the medium, so please keep this in mind when using it.

■ Relay Delay Time Adjustment

It sets delay time of relay operation after the medium is detected by the sensor.

- Press and hold the **M** + **▲** buttons to turn on the red LED.
- Use **▼** or **▲** to set the Delay Time with the button. Then, press and hold the **M** + **▲** buttons for 1 second to turn on and off the green LED and thus finish the setting. (Max.60 Sec./Min.1 Sec. @ 1 Sec. Step).

■ Relay Return Time Adjustment

It sets return time of relay operation after the medium is detected by the sensor.

- Press and hold the **M** + **▼** buttons to turn on the red LED.
- Use **▼** or **▲** to set the Return Time with the button. Then, press and hold the **M** + **▼** buttons for 1 second to turn on and off the green LED and thus finish the setting. (Max. 60 Sec. / Min. 1 Sec. @ 1 Sec. Step).

■ Relay Out Control

It can change the output contact. (N.C. → N.O. → ... → N.C.)

Press and hold the **▼** + **▲** buttons for 1 second to turn on and off the green LED and thus finish the setting.

LED Color and States

Control and operation state can be checked with the main LED.

LED Color	LED State	Operation
GREEN	On	Normal Operation
	Turned on and off	Sensitivity Setting (STEP 3)
		Changes and saves the relay contact time
		Changes the relay contact time
RED	On	Enters the relay delay and return setting mode
		Enters the sensitivity
YELLOW	Turned on and off	Threshold is reached with the relay delay time setting.
	Blinking	No factory max. and min. value settings

Use The level switch that prevents the vibration of the tuning fork is good for most of the materials, but the following need to be taken in consideration. →

- Max. Ambient Temperature
- Max. Pressure
- Max. Particle Size
- Vibration

Maintenance The main inspection parts of the vibrating level switch are divided into the sensor and transmission parts. The life span of the major components depends on user's environment and can be used in optimal condition through periodic checks. Therefore, the user shall check and maintain at least once a year. Inspection of the appearance of the product shall be visually checked to see if there is any damage, and the attachment of the medium or foreign substances to the sensor will make it worse, so they shall be removed regularly.

- Remove any sticky object from the device when cleaning the tank or silo.
- If the medium moves fast or the agitator works in the tank, perform regular inspection to prevent mechanical damage to the sensor.
- It may cause sensor error and malfunction, so conduct a regular water-proof check.
- When measuring sticky material, check if such material grows. Remove them regularly if any should appear. The sticky material may cause malfunction and damage to the device.



Turn off the power of the product for maintenance.

Failure Check If there is a problem with operation, check the following first.

- Is power voltage connected correctly?
- Is power voltage supplied according to specifications correctly?
- Is output contact wiring correctly?

**Precautions
for Removal**

- Check the level and presence of liquid in the tank before removing it.
- Overheated product may cause burn, so wear gloves to remove it.
- If there is explosive gas in the atmosphere, do not open the cover.
- Remove it with the power disconnected.
- Make sure that any o-ring or gasket is not damaged while opening or closing the cover.

Precautions for Installation

- Connect the flanges or bolts with the same specifications.
- 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 inside the container.)
- Install an ex-proof product in an ex-proof zone.
- Do not bend or extend the sensor that vibrates.
- Make sure to install the product and the cover before supplying the power.



When installing the product, use the tool to tighten it.

Precautions for Transportation & Assembly

- Pay special attention to prevent any impact on the device during transportation or assembly. The impact may directly lead to failure.
- While transporting or assembling the product on a tank or silo, prevent any damage to the assembly packing.



Please do not apply high impact to the product.

Precautions for Lead-in Method of External Wiring (Ex-proof)

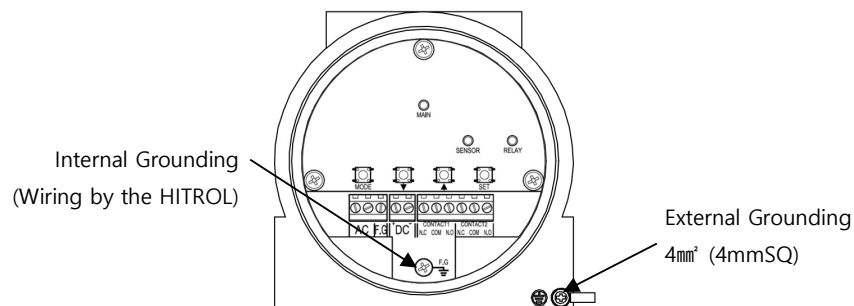
- Use the cable gland connection or metal pipe line lead-in on the wire inlet, and use a product with equivalent Ex-proof certificate to connect it with the external line lead-in method.
- For non-use external wire inlet, use a closed plug that passes safety certificate above equivalent performance with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

Precautions for Grounding (Ex-proof)

- The grounding has an external and an internal grounding. When connecting to an external ground, the ground wire shall be 4mm² (4mmSQ). (Internal Grounding is connected and shipped by the manufacturer.)



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



HEAD Internal Grounding / External Grounding

Safety and Environment

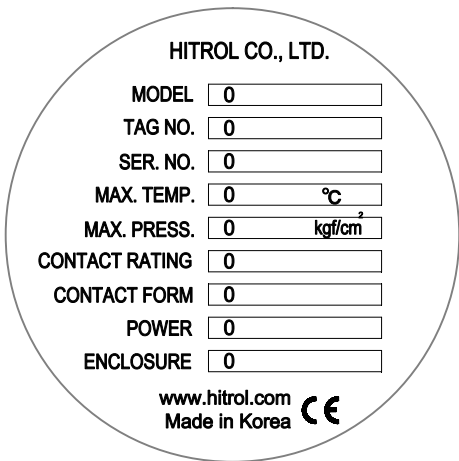
- Precautions for Use
 - Make sure to connect the product and vessel using required tools for sure.
 - Keep the lock key safe and make sure that it is locked.
 - Do not apply high impact to the product.

- Precautions for Wiring
 - Make sure to wire contacts correctly.
 - Internal ground (inside product housing) and external ground shall be connected.
 - Wire and supply the power to the product after checking the specifications.
 - Incorrect power voltage may cause damage to the product.
 - Pay attention to prevent electric shock.

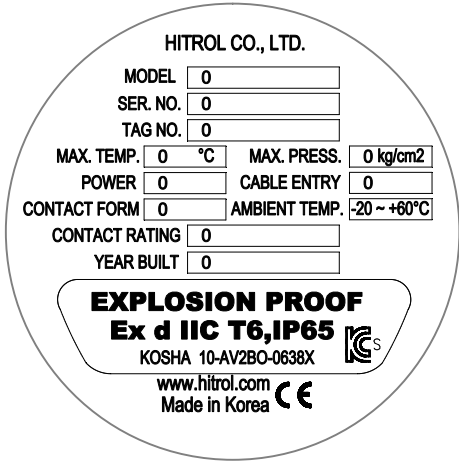
- Disposal of Product
 - Make sure to separate the amplifier and main unit from housing before disposing the products. Also, the amplifier shall be detached and discard the metal and non-metallic materials. No part (ex. Mercury switch) has influence on the environment, so no special attention is required.

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.



Weather-proof Version



Ex-proof Version

User Training

The above matters shall 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 120°C in the case of high-temperature types. In addition, make sure that the ambient temperature of housing is kept at -20°C ~ +60°C. (However, C-Type sensor's the fluid temperature of the container is limited to 60°C.)

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.



Do not apply the Non Ex-proof product in an Ex-proof zone.

The Ex-proof product can be used where the environment and liquid inside the containers are of zone 1 and 2

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

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