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INSTRUCTION MANUAL

VIBRATION TYPE LEVEL SWITCH

HTM-20N Series



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WARNING

You should be well-informed of the contents where WARNING is marked before carrying out the work.



CAUTION

You should be careful where CAUTION is marked to carry out the work.



NOTICE

You should be aware of where NOTICE is marked to

Overview

The HTM-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.

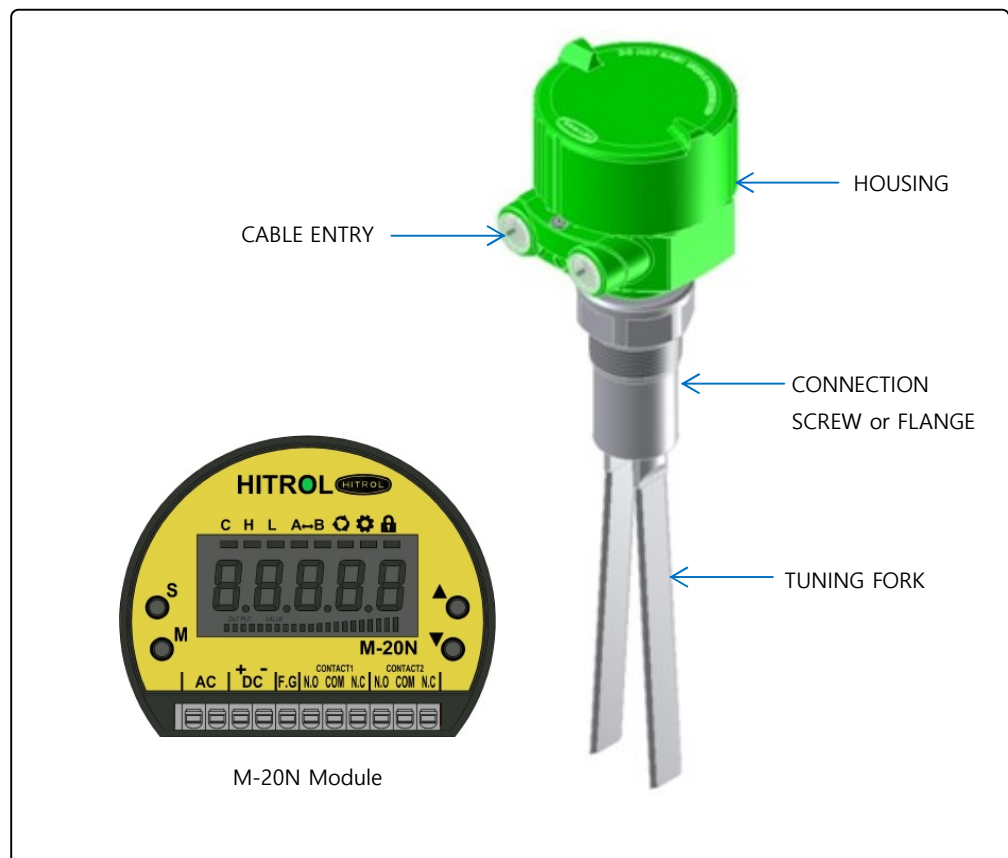
Characteristics

- Level of different powder 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.
- Operation can be checked at the site.
- 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 Product Spec.

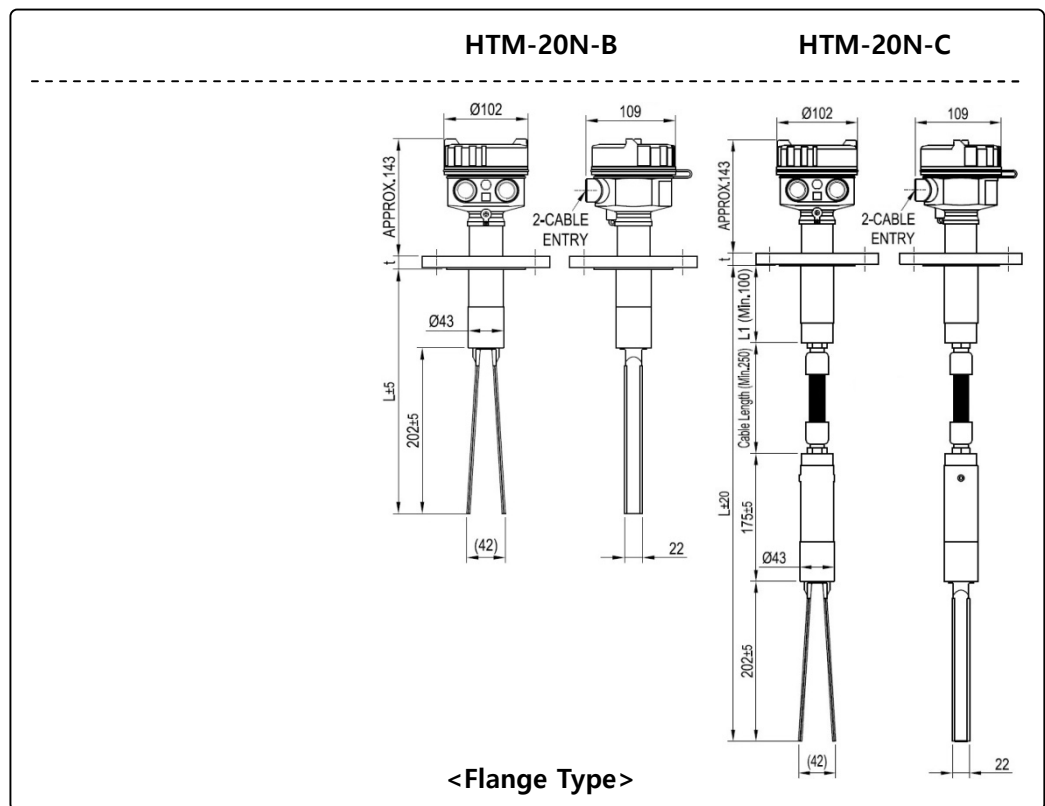
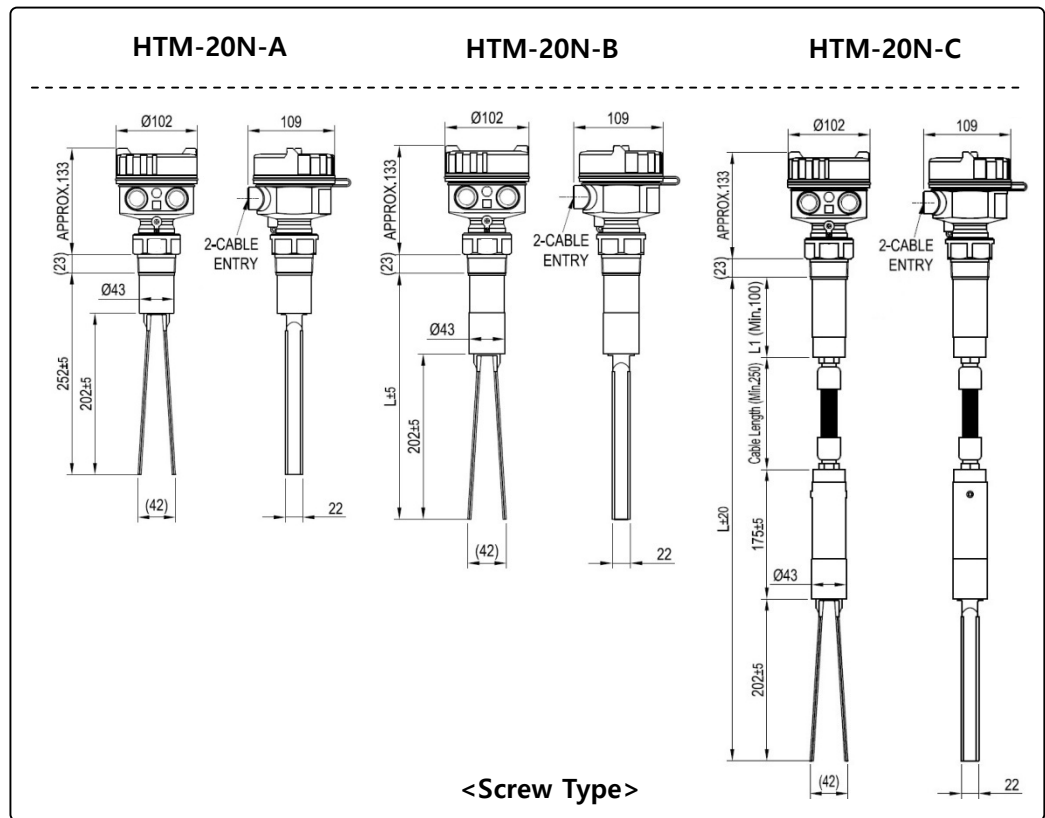
Model	HTM-20N-A	HTM-20NH-A	HTM-20N-B	HTM-20NH-B	HTM-20N-C
Mounting	Screw		Screw, Flange		
Max. Temperature	80℃	150℃	80℃	150℃	60℃
Max. Process Pressure	10kg/cm²				2kg/cm²
Power Source	AC 90V~240V, 50/60Hz / DC +24V				
Output Signal	DPDT				
Enclosure	Weather-Proof, IP65				
Wetted Part Material	SUS 316L+SCS 14				
Process Connection	PT 1-1/2”(M)		PT 1-1/2”(M) (Std.), 2” Flange		
Housing ; Cable Entry	PBT (Opt. AL.C) ; 2-PF 1/2”(F) (Std.)				
Installation	Side or Top				Top
Contact Rating	AC 250V, 5A / DC 30V, 5A				

Electrical Spec.

Module	M-20N		
Microprocessor	16Bit Microprocessor		
Power Consumption	AC	Stand-by	AC110 @ 4.8W / AC220V @ 9W
		Active	AC110 @ 5.6W / AC220V @ 9.8W
	DC	Stand-by	DC+24V @ 1.5W
		Active	DC+24V @ 2.3W
Oscillation Frequency	85Hz @ ±5Hz		
Sensitivity Resolution	0.1V		
Function (Adjustment)	■ Sensitivity ■ Relay Delay ■ Relay Return Time ■ Relay Contact Control (Normal/Reverse) ■ Monitoring		
Status Indicator	Tri-Color LED [Green / Red / Orange]		
Detection Indicator	Red LED		
Relay Control Indicator	Green LED		
Dimension	80mm x 65mm x 58mm		
Ambient Temperature	-20°C ~ 80°C		

Dimensions

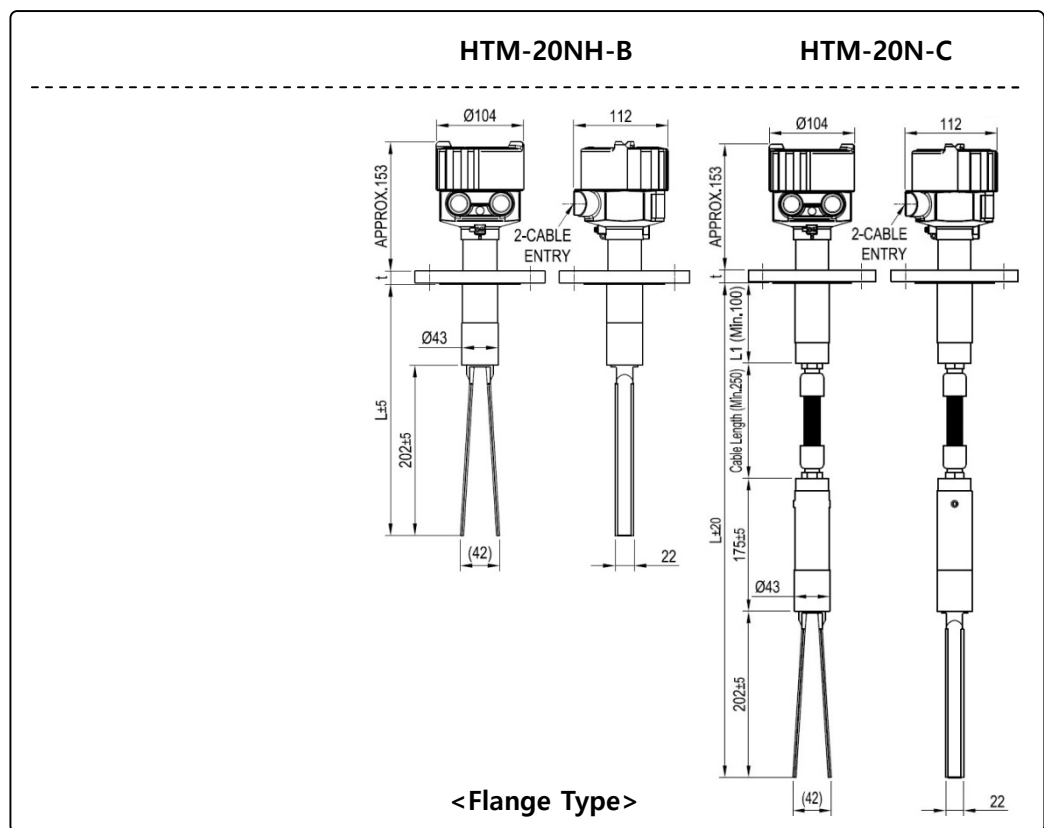
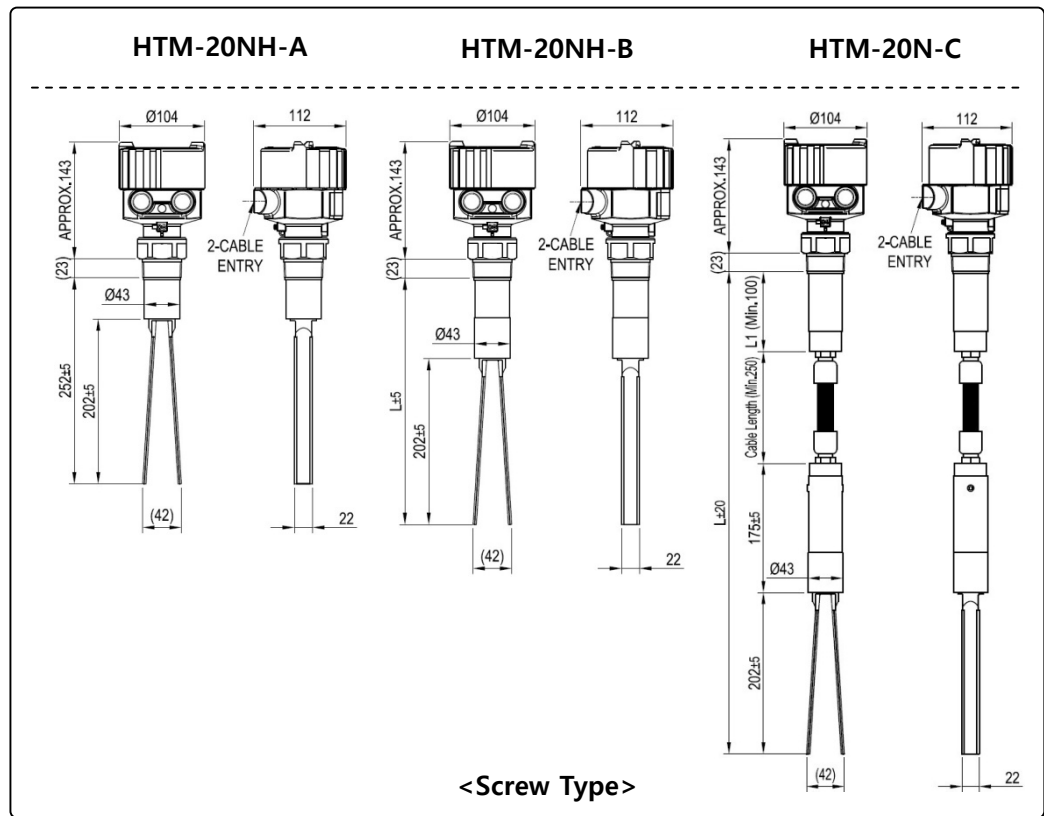
Weather-proof Version (PBT)



NOTICE

Actual product may have a tolerance slightly.

Weather-proof Version (AL.C)



Actual product may have a tolerance slightly.

Attachment & Precautions

The HTM-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, considering the following:



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

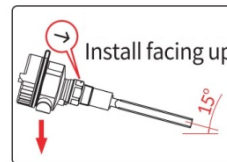
Side Installation (Horizontal Installation)

- 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 the side installation.

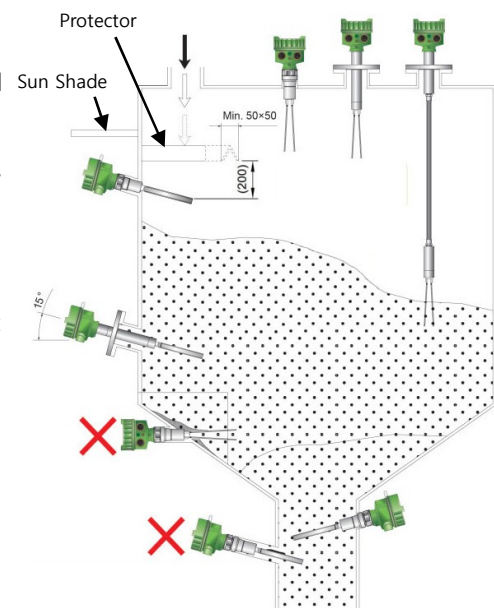
For the side installation, an arrow on the connection shall be located on the top.



- 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)

Top Installation (Vertical Installation)

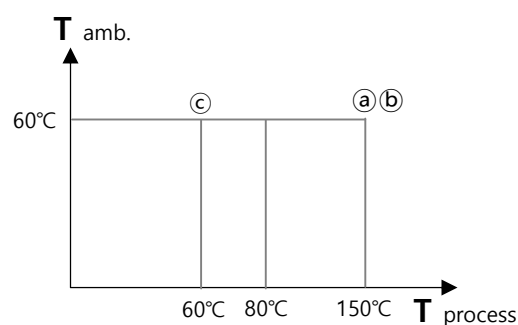
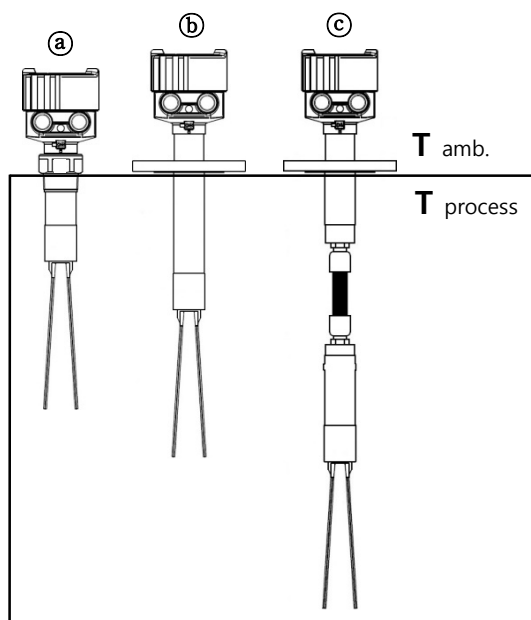
- Both B-Type and the C-Type can be installed with the socket or flange on top.
- Sensor shall be installed at the place far from inlet of the tank.
- Sun cover shall be installed to protect the housing from the damage by direct sunlight. (Refer to Fig. 1.)



<Fig. 1>

Technical Data

Ambient Temp. (Housing)	-20 ~ +60 °C	HTM-20N Series
Process Temperature	MAX. 80 °C	HTM-20N-A / HTM-20N-B
	MAX. 150 °C	HTM-20NH-A / HTM-20NH-B
	MAX. 60 °C	HTM-20N-C



Bulk Density	Particle Density 0.2g/cm ³	HTM-20N Series
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Max. Mechanical Load	400N (1kgf=9.8N) (For stacking heavy subjects, use a protection cover.)	HTM-20N-A / HTM-20N-B
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Max. Tractive Force	500N	HTM-20N-C
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Max. Process Pressure	Up to 10kg/cm ² (150#)	HTM-20N-A / HTM-20N-B
	Up to 2kg/cm ²	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)
--------------------------	---

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

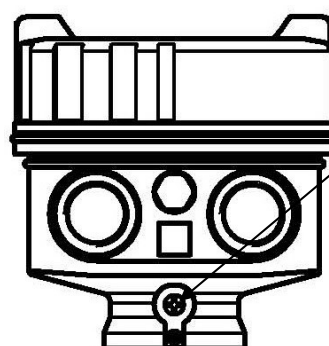
for Grounding

(Ex-proof)

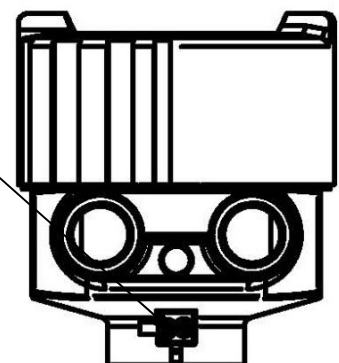
- The grounding has an external and an internal grounding. When connecting to an external ground, the ground wire shall be 4mm² (4mmSQ). (Internal Grounding is connected and shipped by the manufacturer.)



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



Outside of Head (PBT)



Outside of Head (ALC)

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.

HITROL		HITROL CO., LTD.	
PRODUCT	0	TAG NO.	0
SER. NO.	0		
MAX. TEMP.	0 °C	MAX. PRESS.	0 kg/cm ²
CONTACT FORM	0	CONTACT RATING	0
POWER	0	ENCLOSURE	0

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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 150°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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APPENDIX O



M-20N

User Manual

Vibration Type Level Switch



Doc. no. : Rev1.0

Issued Date : 2023.12.07



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1. Configuration of Module (M-20N)

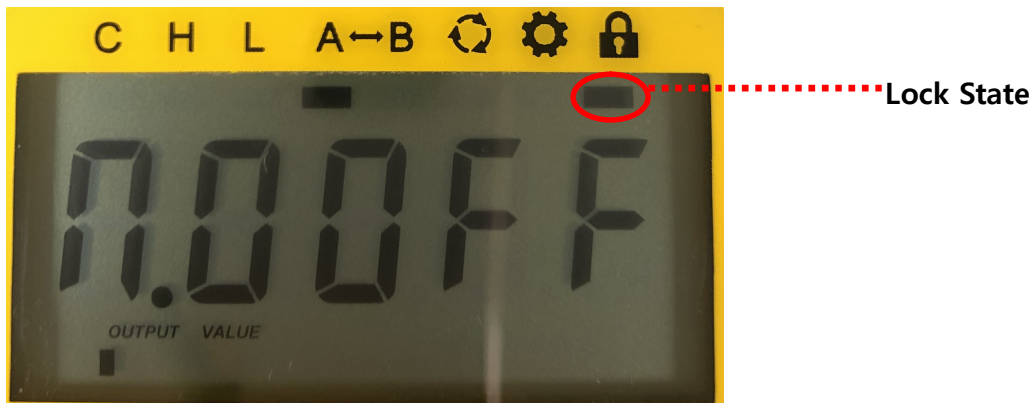


No	Configuration	Function
1	S Key	- Function setting - Save the setting
2	M Key	- Mode change - Cancellation
3	▲ Key	- High Set - Setting the value up
4	▼ Key	- Low Set - Setting the value down
5	LCD	Display of operating and setting status
6	LED	Display of power and status
7	Power	For supply power (AC / DC)
8	F.G	Frame Ground
9	Relay Out	Relay Contact Out (DPDT)

2. Configuration of Setting Menu

No.	Contents	Description
[02]	Low Value Set	Set the Low value by viewing the current Voltage value
[03]	High Value Set	Set the High value by viewing the current Voltage value
[08]	Relay Contact Type	N.O or N.C (Default : N.O)
[09]	Relay Delay Time Set	0.5 ~ 10 sec. (Default 0.5 sec @ 0.5 sec Step ADJ.)
[11]	LOW Capacity fine Adjustment	Find adjustment from settled capacitance value. (0.001V, 0.01V, 0.1V)
[12]	HIGH Capacity fine Adjustment	
[30]	Rotation Time Set	0.5 ~ 10 sec. (Default 3 sec @ 0.5 sec Step ADJ.)
[31]	'C' Display On/Off	Rotation 'C' select display (Current Voltage value)
[32]	'H' Display On/Off	Rotation 'H' select display (High Voltage setting value)
[33]	'L' Display On/Off	Rotation 'L' select display (Low Voltage setting value)
[34]	'A↔B' Display On/Off	Rotation 'A↔B' select display (Relay Contact Type & ON/OFF)
[90]	Error Number Output	Display of error number according to malfunction
[91]	Voltage value Output	Low, High, display current Voltage value
[99]	Firm Ware Version	Display of Firm Ware Version
[100]	Reset	Reset the all setting

3. M-20N LOCK Turn off/Setting Way



※ When power is applied, the initial screen shows Relay Contact Type, Lock status. (When in the LOCK state, the key does not respond.)

■ Key LOCK Turn off

- (S), (M), (▼), (▲) Press for approximately 1 second at the same time to release.
- In the photo, the cursor bar under the lock disappears.

■ Key LOCK Setting

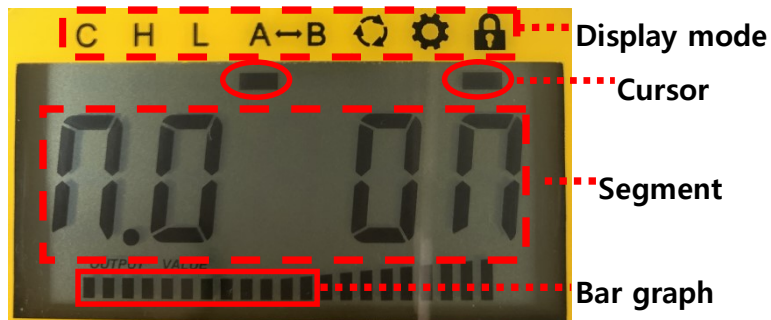
- (S), (M), (▼), (▲) Press for approximately 1 second at the same time to set it up.
(Set in the unlocked state.)
- When locked, it automatically switches to relay display mode.
- In the photo, a cursor bar is displayed under the lock.

■ Display mode automatic switching

- If the button key is not pressed, it automatically switches to the LOCK state after counting 3 minutes.
- If you press the button key along the way, the count will resume after initialization.
- It does not switch when setting the SET Menu.

4. Setting and Operating

■ LCD configuration



Display Mode	
C	Voltage Value
H	High Setting Value
L	Low Setting Value
A↔B	A : Relay Contact Type N.O B : Relay Contact Type N.C
↻	Rotation Mode
⚙	Setting Mode
🔒	Key Lock Statu

- The cursor moves sequentially whenever the (M) button is pressed.
- The order of movement is as follows.

C → H → L → A↔B → ↻ → ⚙ → C → H → ...

■ Into the Setting Menu



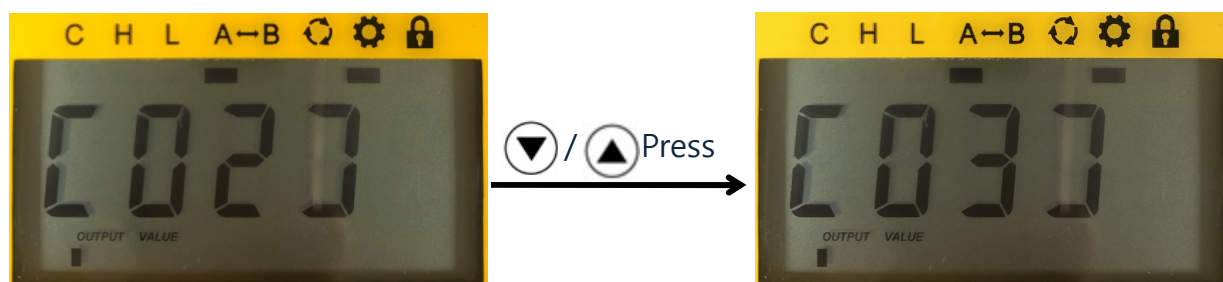
- Press the (M) button to move the display screen to Setting Mode.
- In the Setting Mode, press (S) button for 1 second then the green LED will be flickering and you can go into the Setting Menu.

■ Return to Setting Menu



- In the Setting Menu, press (M) button for 1 second then the green LED will be flickering and you can go back to the Setting Mode.

■ Select the Setting Menu



■ In the Setting Menu, use  /  button to select the user setting function.

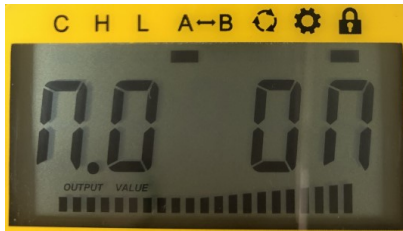
■ Pressing  button for 1 second will enter the function.

Key Button	Function
 Press shortly	Increasing numerical value
 Press shortly	Decreasing numerical value
 Press more than 1 sec	Save and Leave
 Press more than 1 sec	Leave without Save

5. SETTING Way

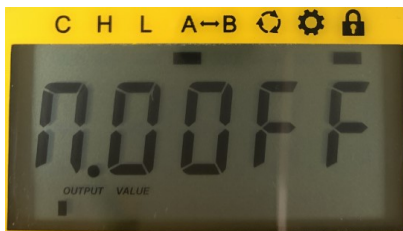
5.1. EASY SETTING

■ When the Fluid is touched the Sensor



- (S), (M), (▲) When pressed at the same time for about 1 second, The LED turns on and off and the value is set.
- Because the initial value is OFF, setting the current value to HIGH Changes to ON and the LED keeps blinking.
- When the High value is set, the Low value is automatically set to be about 3% lower than the High value.

■ When the Fluid is not touched the Sensor



- (S), (M), (▼) When pressed at the same time for about 1 second, the LED turns on and off and the value is set.
- Since the initial value is OFF, if the current value is set to a LOW value, the LED stays on while maintaining the OFF state.
- When the Low value is set, the High value is automatically set to be about 3% higher than the Low value.

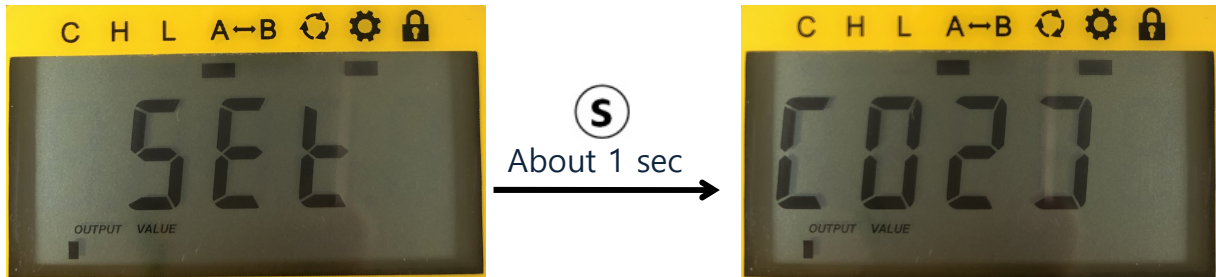
■ Easy Setting and confirm

- Press (M) to confirm C(current value), H(High value), and L(Low value).
- If the value of C is higher than H, the Relay ON status LED keeps blinking.
- If the value of C is lower than L, the Relay OFF status LED is ON.

5.2. DETAIL SETTING

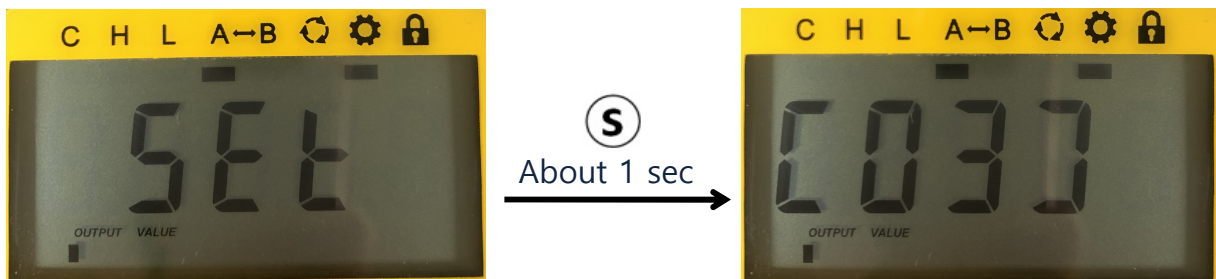
- SETTING Condition : HIGH value $\geq$ LOW value
- HIGH value < LOW value : LED RED is briefly turned on and off witho

■ LOW SETTING



- Enter item 2 in Setting Mode.
- The value displayed on the LCD is the Voltage value.
- When the desired value is reached, press the (S) button for About 1 second to save it.
- For safe operation, set it to the current value.

■ HIGH SETTING



- Enter item 3 in Setting Mode.
- The value displayed on the LCD is the Voltage value.
- When the desired value is reached, press the (S) button for About 1 second to save it.
- For safe operation, set it to the current value.

6.3. Fine Adjustment After EASY/DETAIL SETTING

- Use when you want to adjustment values.

0.1% Up / Down : ▲ / ▼ Press shortly

1% Up / Down : ▲ / ▼ Press for 1 sec.

10% Up / Down : (S) + ▲ / ▼ Press shortly

■ LOW value fine Adjustment



- Enter item 11 in Setting Mode.
- The value displayed on the LCD is the set LOW value.
- Use button operation to increase and decrease values and save them.

■ HIGH value fine Adjustment



- Enter item 11 in Setting Mode.
- The value displayed on the LCD is the set HIGH value.
- Use button operation to increase and decrease values and save them.

6. Precautions for Use

- Do not impact the product.
- Wiring must be done according to the polarity of the power supply.
- Wire and supply the power to the device after checking the specifications.
- Pay attention to prevent electric shock.
- Please refer to the Instruction Manual of this product for more information.

◆ More product information can be acquired at our website. (www.hitrol.com)