

**INSTRUCTION MANUAL
FOR
Vibrating Level Switch**

TYPE : MVL-110 / MVL-120/ MVL-130

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※The operator should read this Instruction Manual carefully and handle the device correctly.

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Safety Precautions

- Be sure to thoroughly read the instruction manual before using the products.
- Keep the instruction manual in a safe, convenient location for future reference.
- All or part of the contents described in this manual may be changed without any notice.
- Due to our constant striving for further improvement of products, parts or products that differ from those described in this manual may be substituted.



WARNING (Failure to observe this WARNING may cause a fatal or serious injury.)

- Be sure to confirm that any peripheral equipment does not move before installation work. In addition, observe safety requirements for installation work where high-place work is expected.
- Be sure to turn off the power source before wiring, mounting and transportation work. (Failure to observe this WARNING may result in an electric shock/ injury or equipment damage due to short-circuit.)
- Carry out wiring work correctly with reference to a proper drawing.
- Never disassemble the equipment. (Failure to observe this WARNING may result in an electric shock.)
- Do not open the cover under an explosive environmental condition when power is entered. (Failure to observe this WARNING may result in an injury or equipment damage.)
- Do not place or store the equipment in any hostile environmental place where it will be subjected to direct sunlight, rain, water droplet, hazardous gas/water, etc..



CAUTION (Failure to observe this CAUTION may cause a moderate injury or equipment

damage.)

- Do not use the equipment for any purpose other than the original purpose of use.
- Be sure to confirm the specification of equipment and use the equipment within the range of specification. (Mounting conditions such as temperature, power source, frequency, etc.)
- Make sure a correct wiring before applying power source.
- Do not have a shock or strong impact to the equipment. (Failure to observe this CAUTION may result in equipment damage.)
- Be sure to connect necessary terminals (grounding, etc.).
- Remove all wiring to the equipment before doing electrical welding work near the equipment.
- Do not forcedly bend or pull the lead wire also do not use unnecessarily long wire.
- Tighten the cover, lead outlet, etc. properly so that dust, rainwater, etc. do not enter inside the equipment.
- Do not use the equipment under a corrosive condition (NH₃, SO₂, Cl₂, etc.).
- Be sure to tighten the cable grand so that outer air does not enter inside the equipment.
- When applying piping connection such as conduit, etc. instead of cable grand, apply putty or equivalents on the cable entry so that outer air does not enter inside the equipment.



IMPORTANT (indicates notes or information to help customers.)

Limitations of Warranty:

- Warranty period shall be one year from the date of delivery (ex-factory).
- Any damage of any other products that have occurred for use of the equipment is not covered by this warranty. Also any loss induced by failure or malfunction of the equipment is not covered by this warranty.
- Failure or malfunction caused by following are not covered by this warranty:
 - a. Modification or repair by a party other than MATSUSHIMA's authorized personnel, or replacement of parts not recommended by MATSUSHIMA.
 - b. Inadequate storage, installation, use, inspection or maintenance that does not comply with specifications.
 - c. Cause for any peripheral equipment or device.
 - d. Accident beyond control and force majeure (fire, earthquake, flood, riots, etc.).

Lack of instructions to MATSUSHIMA for information or safety requirements that can be predicted only by customers' side.

This warranty conditions do not limit customers' legal right.

Price for the equipment does not include any charge for services such as commissioning, supervising, etc..

1. Outline

Vibrating level switch can detect a storage level of particulate materials from very lightweight powders to grains.

Vibrating probe will oscillate in a fixed frequency (resonant frequency) by piezo element, if coating with powders of storage materials, vibrating amplitude will be significantly decreased. This decreased amplitude will be detected by the part of electronic circuit, and a contact signal is output as a level signal.

2. Specifications

Table 1. Standard specifications

Type	MVL-110	MVL-120	MVL-130
Product type	Standard	Cable suspended	Extension pipe
Power	AC/DC22 to 264V 50/60Hz		
Power consumption	4.7W (AC), 1.8W (DC)		
Material	Housing : ADC12 (Aluminum diecasting) Boss : SUS316L Probe : SUS316L Cable : PE (MVL-120 only) Extension pipe : SUS316L		
L Dimension	Approx. 225mm	600mm to 20000mm	350mm to 2000mm
Mounting	R1 Screw		
Lead outlet	2-G1/2		
Vibrating Frequency	Approx. 310Hz		
Bulk density	$\geq 0.02\text{g/cm}^3$		
Detector strength (Tip load)	Max. 450N	_____	Max. 450N
Allowance tensile load	_____	Max. 3000N	_____
Allowance pressure	Max. 1.5MPa	Max. 1.0MPa	Max. 1.5MPa
Output signal	SPDT \times 1 Contact capacity : AC250V/DC30V 5A		
Operation LED	At undetected : Green light At detecting : Red light		
Ambient temperature	-20°C to +60°C (No freezing)		
Detector temperature	-40°C to +150°C (No freezing)	-20°C to +85°C (No freezing)	-40°C to +150°C (No freezing)
Protection	IP67 (with cover and lead outlet closed)		
Quantity	Approx. 1.8kg	Approx. 2.5kg (L=600mm) (0.15kg/m)	Approx. 2.0kg (L=350mm) (1.6kg/m)

◆ Standard

Type : MVL-110

L Dimension: Fixed type ($\phi 16\text{mm} \times L = \text{Approx. } 225\text{mm}$ (under Screw))

Mounting on tank side wall and used for detecting upper or lower limit level

◆ Cable suspended (Specifying L dimension)

Type: MVL-120

Adjustable type with cable length on the specified L Dimension

Mounting on tank top and used for detecting upper limit level

◆ Extension pipe (Specifying L Dimension)

Type : MVL-130

Adjustable type with extension pipe length on the specified L Dimension

Mounting on tank top or side wall and used for detecting upper or lower limit level

3. Profile

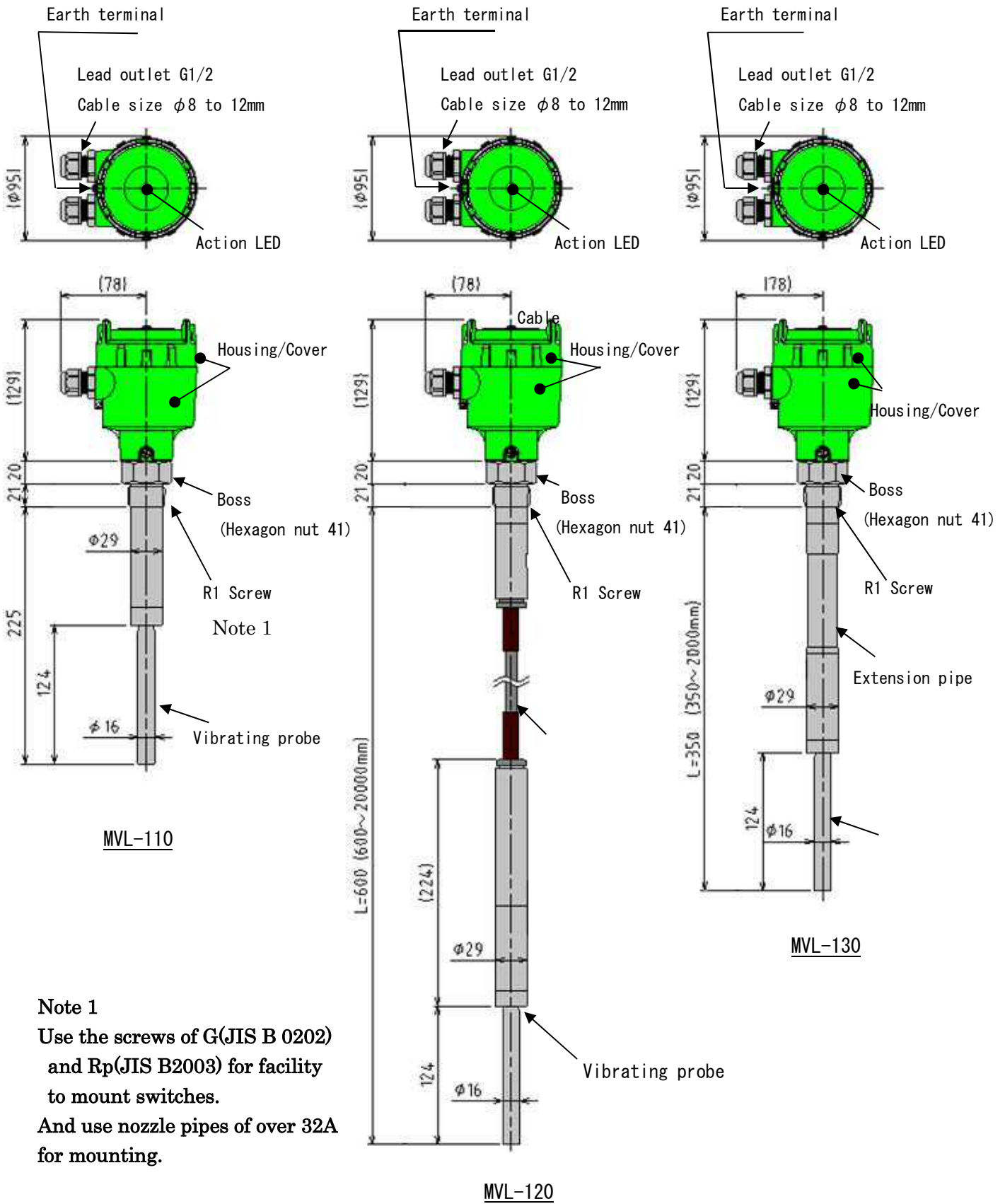



Fig. 1 Standard dimensions

4. Mounting

4-1. Mounting devices

If mounting a device, screw "Boss (Hexagon part)" using a spanner etc. after sealing a screw part.

 Note : Please do not screw by turning a case part.

4-2. Protection of vibrating probe (cable)

Mount the vibrating probe (cable) not to be hit by charging powders.

Prevent impact by mounting a protection plate to avoid damage and disconnection if the vibrating probe is hit by the charging material.

Keep over 200mm of a distance between the vibrating probe and the protection plate.

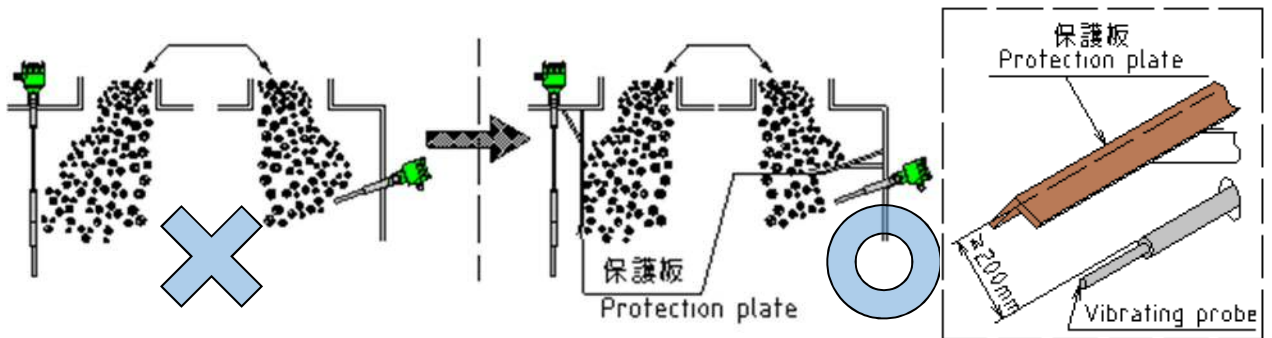



Fig. 2 protection of probe

 Important : The cable suspended type has power voltage in cable to activate the vibrating probe . Protect the vibrating probe not to directly contact with powders, because any malfunction of switch, disconnection of cables, wrong detection, electric leak and shock may occur.

4-3. Position of vibrating probe

Mount the vibrating probe projecting 20mm inside the silo.

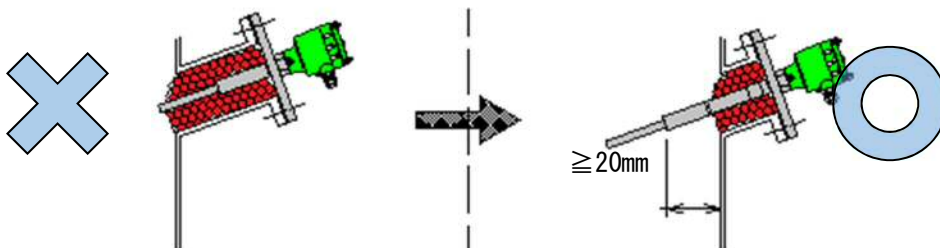


Fig. 3 Position of Vibrating probe

4-4. At horizontal mounting

Mount the switch inclined 20° deg.

It can reduce the load on the vibrating probe when removing.

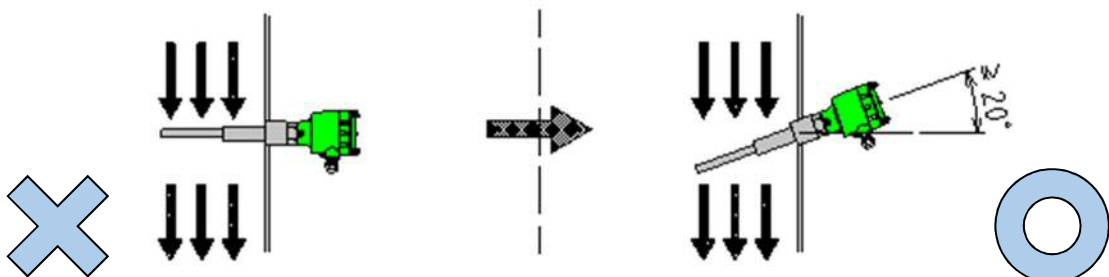


Fig. 4 Horizontal mounting

4-5. Mounting on facility with vibration

If mounting near from a vibrating source, it may cause a false detection and damages.
Mount on the place far from a vibration source.

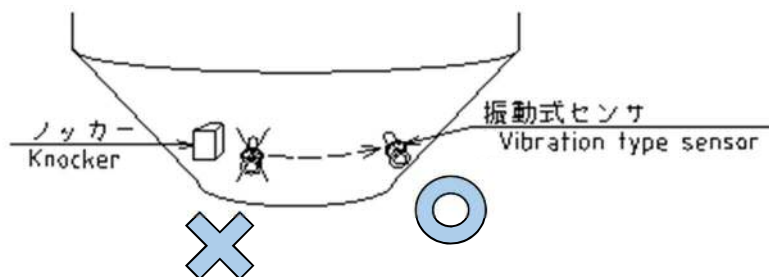


Fig. 5 Mounting on facility with vibration

4-6. Waterproof measure

Mount the switch to prevent water from the housing as shown in Fig. 6.
The housing can be turned approx. 310 degrees.

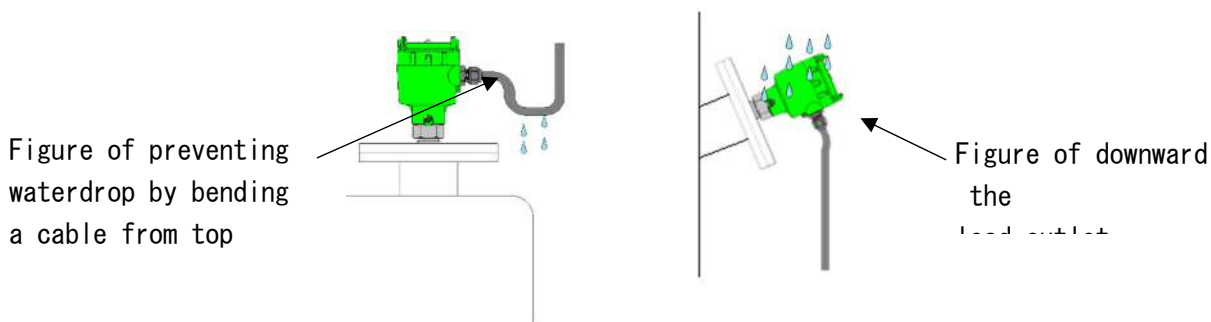


Fig. 6 Example of waterproof measure

5. Connection

The terminal arrangement is shown in Fig. 7.

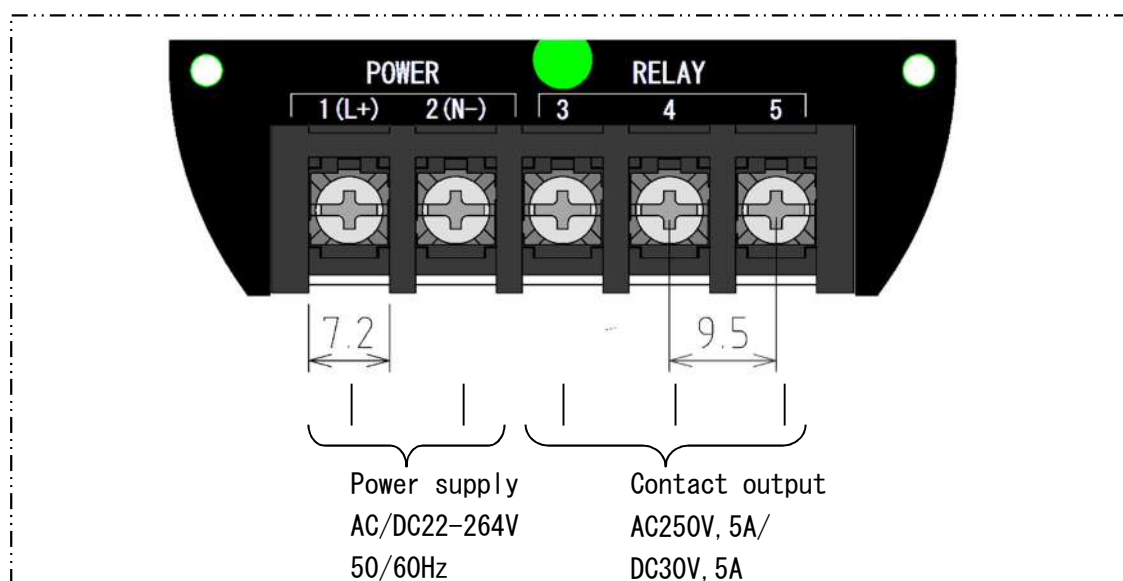


Fig. 7 Connection

⚠ Important: Size of terminal screw is M3.5, recommended cable size is 1.25mm².
The tightening torque is 0.8 to 1.2N·m.

Contact operation is shown in “6. Commissioning Fig. 9” .

⚠ Note : Terminal screw cannot be removed due to screw-up terminal base.

6. Commissioning

The below figure is a display panel.

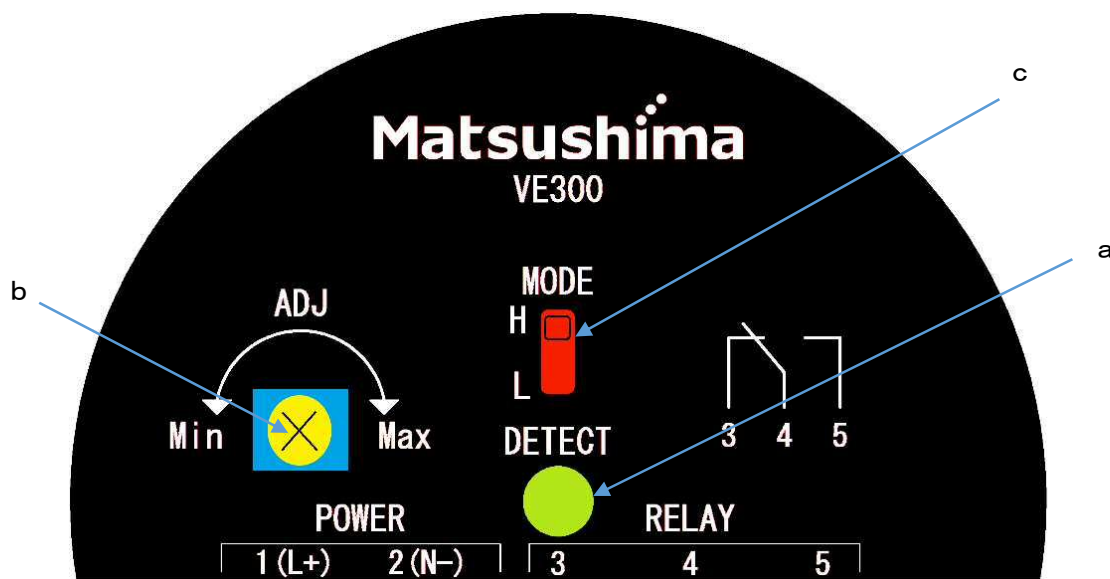


Fig. 8 Display panel

6-1. Each name and function

- a DETECT . . . Operation LED
Red light at detecting, green light at undetected
- b ADJ . . . ADJ volume 【Factory setting : Scale 3】
Volume to change a vibrating level
Decreasing a vibrating level if turning to Min direction
to detect small bulk density of powders.
(High sensitivity “Min” \longleftrightarrow “Max” Low sensitivity)
- c MODE . . . Detection mode select switch
【Factory setting : H】
Switch to select for Upper limit “H” /for Lower limit “L”

6-2. Setting ADJ volume

Detecting sensitivity is set “3” at ex-factory.

If detecting small bulk density powders or adhering powders, readjustment may be needed.

6-2-1. When detecting small bulk density powders

If turning counterclockwise (Min), the sensitivity will get higher so that it can be easily applied to small bulk density powders.

6-2-2. When detecting easily adhering powders

If turning clockwise (Max), the sensitivity will get lower so that the false detection for adhering materials can be reduced.

6-3. Setting Detection mode switch

The contact output for upper and lower limit can be set by the mode switch. Contact and LED is shown as the below Detection mode chart.

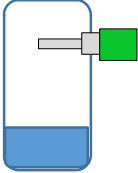
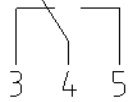

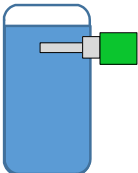
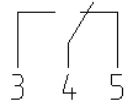

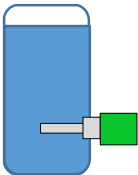
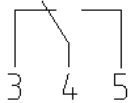

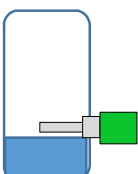
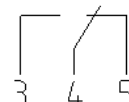

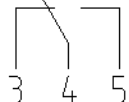

MODE switch	Detecting status	Contact status	LED status
H. Mode (For upper limit)			 緑 (green)
			 赤 (red)
L. Mode (For lower limit)			 緑 (green)
			 赤 (red)
At Power OFF	All status		 Light off (clear)

Fig. 9 Detection mode chart

7. Troubleshooting

If the switch cannot be recovered by the below treatment, please contact us.

Table 2. Troubleshooting

Problem	Presumable cause	Treatment	Reference
No lighting on operation LED	Power is not supplied.	Supply powder.	
	Power out of specifications is supplied.	Supply the specified power.	P1 See paragraph 2
(Undetected status) H. Mode : No red lighting on operation LED L. Mode : No green lighting on operation LED	Bulk density of powder is too small.	Set ADJ volume to high sensitivity. The bulk density lower than 0.02g/cm ³ cannot be detected.	P5 See paragraph 6-2
	Vibrating probe is not buried in powder.	Relocate the level switch in a position to bury the vibrating probe in powder.	
	The level switch is resonating with an outer vibration.	Relocate the level switch in a position not to be affected by an outer vibration.	
(Detection remained) H. Mode : Red lighting kept on operation LED L. Mode : Green lighting kept on operation LED	Material to be detected is adhering on the vibrating probe.	Remove the adhered materials from the vibrating probe.	
	The vibrating probe is buried in undischarged remains.	<ul style="list-style-type: none"> - Relocate in a position of no remains. - Make a countermeasure to reduce undischarged remains. 	

※The specifications and the designs are subject to change without prior notice for product improvement.