NOHKEN

TS02－0200Ⓐ

INSTRUCTION MANUAL

FOR

VIBRATING LEVEL SENSOR

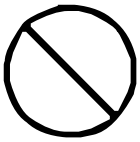
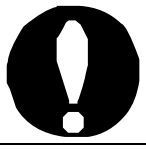
MODEL : VH

Read and understand this manual for safely usage.

- This manual describes the product of standard specification. Read the other manual for the product of explosion-proof specification.
- This manual describes the handling, inspection and adjustment of the product which model is mentioned on cover page. Read and understand this manual before handling.
- Follow the additional document and/or direction, submitted by NOHKEN INC. and our distributor or agent, even if the terms are mentioned in this manual.
- Save this manual in proper place being available to refer immediately.
- The specification of product mentioned in this manual may not be satisfied by the condition of environment and usage. Check and consider carefully before using.
- Contact to sales office at NOHKEN INC. for any question or comment about this manual and product.

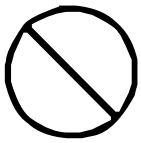
The followings are the description of the terms in this manual.

⚠ WARNING	Indicates a potentially hazardous situation which, if not pay attention, could result in death, serious injury or serious disaster.
⚠ CAUTION	Indicates a hazardous situation which, if not pay attention, may result in minor or moderate injury or damage to device.

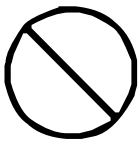
	Indicates prohibited matter. The explanation with this mark shall be followed.
	Indicates instructed matter. The explanation with this mark shall be followed.

⚠ WARNING

This product is not explosion-proof construction. Do not install this product to the place where the flammable gas or vapor is occurred. If installed, the flammable gas or vapor may be ignited, and serious disaster may be occurred. Use the product of explosion-proof construction in this case.



Do not modify or disassemble the product. Otherwise, the product and connected device may be malfunctioned, damaged, fired, or miner injury and electric shock may be occurred.（Follow the additional document and/or direction, submitted by NOHKEN INC. and our distributor or agent.）



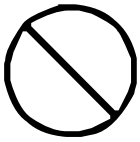
Turn off the power, before wiring and inspection. Otherwise, electric leakage, fire caused by short circuit, and electric shock may be occurred.

Ensure the wire is properly connected. The product and connected device may be malfunctioned, damaged, fired, or miner injury and electric shock may be occurred by improper wiring.

Turn off the power immediately, if the smoke, strange smell and sound are occurred.
Do not use it until the problem is solved.

⚠ CAUTION

Avoid shock and rough handling to this product. The product may be damaged by shock as dropping, falling, throwing, knocking, lugging, and etc.



Follow the specification of operating temperature, operating pressure, switch rating, and etc. Otherwise, the product and connected device may be malfunctioned, damaged, fired, or miner injury and electric shock may be occurred. Check the manual or specification sheet.

Operation test shall be done before practical usage. If the serious accident is expected to occur by malfunction of product, the other operating principle of product shall be installed in parallel.

⚠ CAUTION

Check and deeply consider the chemical compatibility for material of product in advance. The part especially float, which is very thin, may be malfunctioned by miner corrosion.

Check and deeply consider the chemical compatibility for material of product in advance.

Hold the stem very close to mounting point, when carrying, installing, and removing. If hold the terminal box, it may be taken off from the flange or plug, and the product may be damaged by dropping.

<u>The product is 50cm or longer</u>
The product shall be kept in horizontally. The product and other goods be damaged, and miner injury may be occurred by falling.

Earth terminal shall be grounded to JIS Class D ground (earth resistance less than 100 Ω). If not grounded, electric shock may occurred by any accident.

Provide arrester or surge absorber to avoid electrical impact such as lightning and static electricity. If not provide, the product and connected device May be malfunctioned, damaged, and fired, or miner injury and electric shock may be occurred.

<u>In case of connecting inductive or lamp load to the product.</u>
Provide protective circuit to the load to avoid over voltage and over current. If not provide, the contact may be damaged.

INTRODUCTION

A) This manual specifies the specification of general product. If you order special product, some details of specification may be different with the manual.

B) We are glad to suggest and advice for Model selection and chemical resistant of material, but final decision has to be made by the customer.

C) This manual has prepared with close attention. Ask sales office at NOHKEN INC. for any question or comment about the contents of this manual.

D) For replacement parts

The quality of product has frequently improved, so same spare part may not be supplied. In this case, replacement part or product may be supplied. Ask sales office at NOHKEN INC. for details.

E) The contents of this manual are subject to change any time without notice due to the improvement of product.

WARRANTY & DISCLAIMER

A) NOHKEN INC. warrants this product against defect in design, material and workmanship for a period of 1(one) year from the date of original factory shipment.

B) The warranty only covers the damage of products. The secondary and third kind disasters are not covered by NOHKEN INC.

C) NOHKEN INC. shall not be liable for the following.

C-a) Do not follow the description and direction in this manual.

C-b) Damage due to improper installation, wiring, usage, maintenance, inspection, storing, and etc.

C-c) Repair and modification are done by the person who is not employee of NOHKEN INC. and our distributor or agent.

C-d) Improper parts are used and replaced.

C-e) The damage is occurred by the device or machine except our products.

C-f) Improper usage. (See "Proper of usage" in chapter 1 in this manual)

C-g) Force Majeure including, but not limited to, fire, earthquake, tsunami, lightning, riots, revolution, war, radioactive pollution, acts of God, acts of government or governmental authorities, compliance with law, regulation, and order.

THE TERMS OF WARRANTY AND DISCLAIMER SHALL IN NO WAY LIMIT YOUR REGAL LIGHT.

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1. PURPOSE OF USE

Model VH is made specifically for the solid material level detection. This sensor is designed for powders which the bulk density is 0.02 to 0.2g/cm^3 .
It reliably detects light powders such as whisker, perlite, diatomaceous earth, or pneumatically transferred fine powders such as toner, white carbon, etc.

2. PRINCIPLE OF OPERATION

A vibration reed is mounted with two piezo-electric elements. One provides vibration and the other detects dampens of vibration amplitude. This vibration reed is welded to two sustention pipes in order to stabilize the vibration mode. Covered with solids dampens vibration of the vibration reed. The electronic circuit detects the damping and converts into relay output. See Fig. 1 and 2.

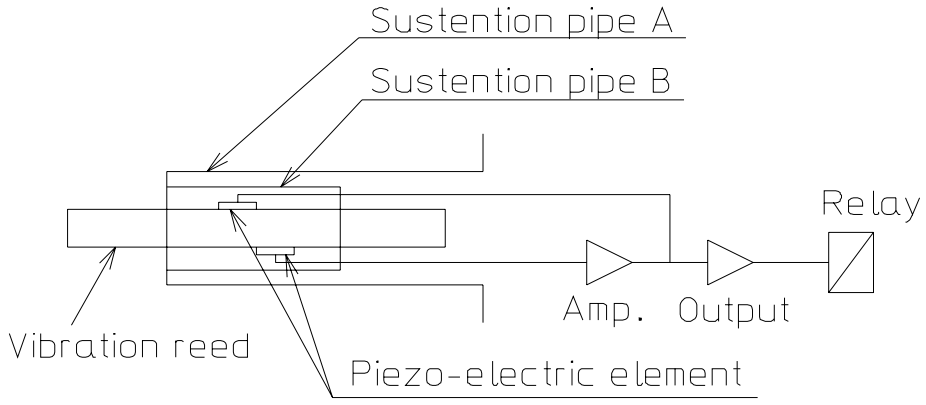


Fig.1

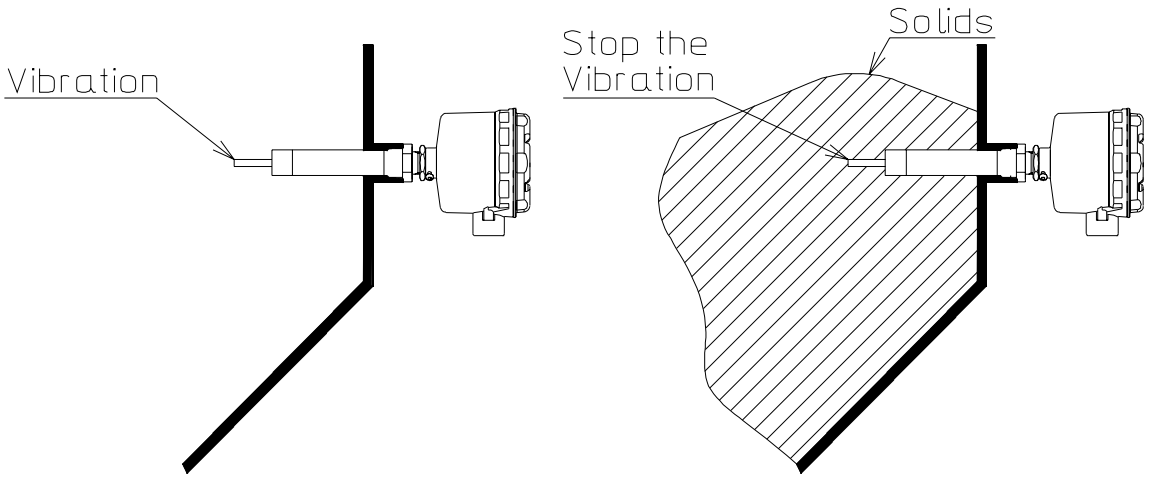


Fig. 2

3. STANDARD SPECIFICATIONS

3.1 Measuring object : Powder, Granular materials.

3.2 Operation characteristics

(a) Detection sensitivity : Bulk density ; 0.02 to 0.2 g/cm^3 Min.

(b) Indication : By Red LED for Relay status
By Green LED for Power status

(c) Frequency : Approx. 550 Hz

3.3 ELECTRICAL CHARACTERISTICS

(a) Power Supply : 90 to 132 V AC, 180 to 264 V AC 50/60 Hz

(b) Power Consumption : 5 VA Max.

(c) Output : Relay contact (1 SPDT)
Switching delay time: Turn-on, approx. 1 sec.
Turn-off, approx. 5 sec.

(d) Contact Rating : 240 V 3 A AC , 30 V 3 A DC (Resistive load)

(e) Withstand Voltage : 1500 V AC , 1 minute.
Between housing and each terminal except "E" terminal.

(f) Insulation Resistance : 500 V DC more than 100 MΩ
Between housing and each terminal except "E" terminal.

3.4 MECHANICAL CHARACTERISTICS

(a) Withstand Pressure : 1 MPa Max.

(b) Concentrated Load : Horizontal ; 0.06kN Max.
(at the tip of the detection rod)
Vertical ; 0.27kN Max.
(at the tip of the detection rod)

3.5 ENVIRONMENT

(a) Working Temperature : Detecting part ; -20 to +80 ℃ (Get rid of dew.)
Housing ; 0 to +60 ℃ (Get rid of dew.)

(b) Working Humidity : 95 % RH Max.

3.6 CONSTRUCTION : Detecting part ; IP68 or equivalent
Housing ; IP65 or equivalent

3.7 OTHERS

(a) Materials : Detecting part ; 304 Stainless steel
Housing ; Aluminum die casting (ADC12)
(Acrylic coating)

3.8 Cable Inlet : G 3/4 or equivalent

4. PART NAMES AND FUNCTIONS

4.1 EXTERNAL APPEARANCE (See Fig. 3)

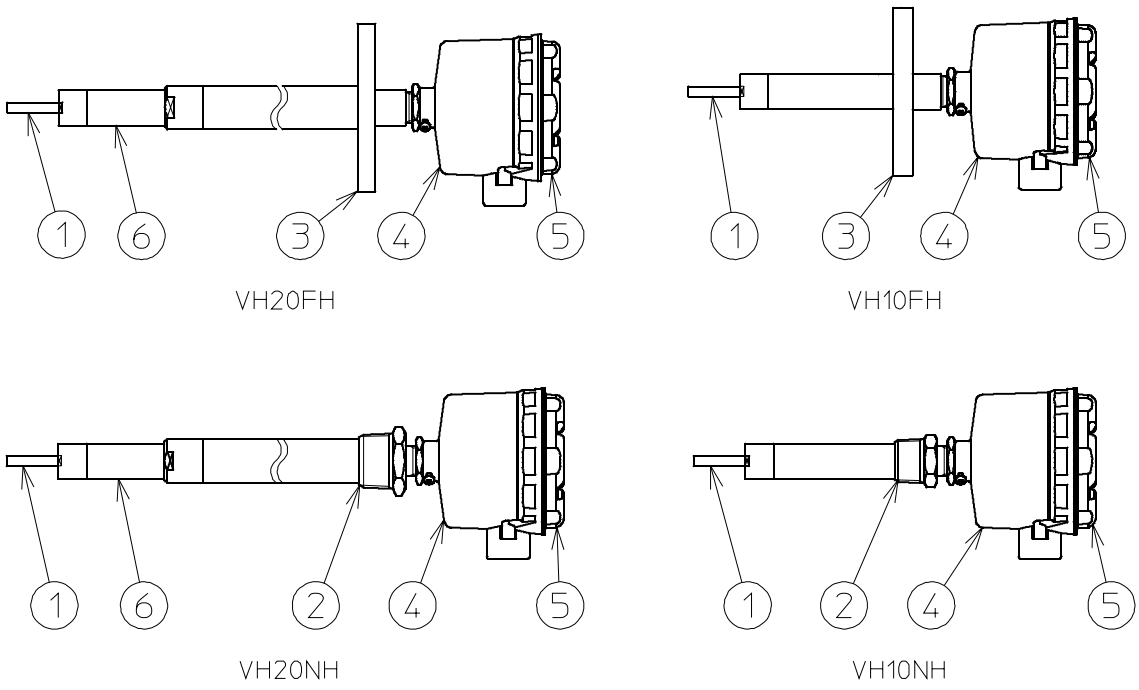


Fig. 3

① Vibration reed
Sensing part which directly makes contact with powders.

② Plug (VH10NH, VH20NH)
Screw for installing sensors to the tank.

③ Flange(VH10FH, VH20FH)
Flange for installing sensors to the tank.

④ Housing

⑤ Cover

⑥ Extension pipe

4.2 HOUSING INTERNAL

① Power indication LED (Green)
Indicates power supply

② Alarm indication LED (Red)
Indicates relay energized

③ Sensitivity setting volume
Volume for adjusting sensitivity.
・Left - Low sensitivity
・Right - High sensitivity

④ Sensitivity setting switch

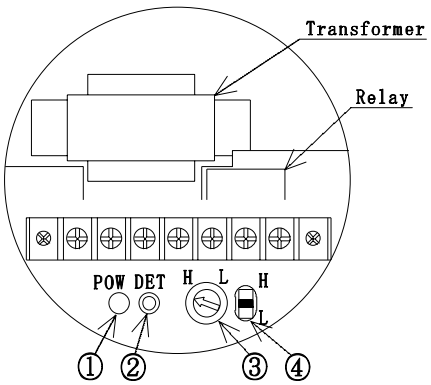


Fig. 4

Switch for setting sensitivity according to the measuring material adherence.

Sensitivity	Select SW.	General application
Standard	H	Factory setting : Bulk density 0.02～0.2g/cm^3
Low	L	For sticky materials: Bulk density 0.1～0.2g/cm^3

5. INSTALLATION

5.1 UNPACKING

When unpacking, exercise due not to subject the sensor to mechanical shock.
After unpacking, visually check the sensor exterior for damage.

5.2 INSTALLATION LOCATION

This sensor should be installed in an area which meets the following conditions:

(1) Sensor should be installed in an area where the ambient temperature range is -10℃ to 60℃.

⚠CAUTION

Install a sunshade over the housing if temperature in high. Provide appropriate means to guard against moisture if temperature in low.
Otherwise, sensor must be damaged.

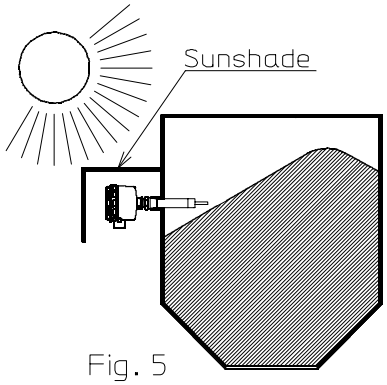


Fig. 5

(2) Select a ;action with low humidity and vibration.
(3) No corrosive gases such as NH_3, SO_4, $C\ell_2$, and so on.
(4) Provide ample space for maintenance / inspection.

5.3 INSTALLATION METHOD

Install the VH at the position where you wish to detect will actually make contact with it.

The VH mounting method varies depending on the connections you specified. For plug mounted type, thread the inlet such that the VH can be properly installed. For flange mounted type, install a clad flange with a suitable gasket.

NOTE the following points:

(1) Vibration reed shall be kept away from direct material flow. Otherwise, the vibration reed may be bent. If necessary, provide protective shield at least 10cm above the sensor. See Fig. 6.

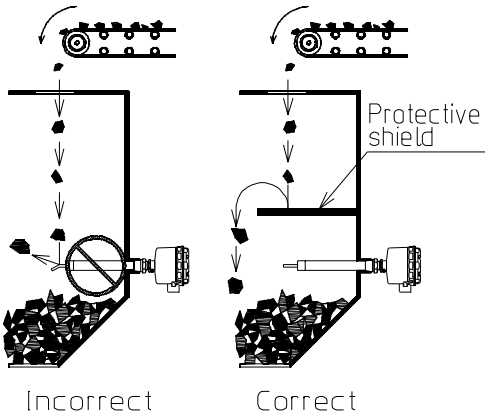


Fig. 6

(2) The cable inlet must be pointing down to the ground. If installed on the sideways, the measuring material will accumulate on the vibration reed and may cause malfunction. Besides, installing upward will intrude rain or splashing water inside the sensor. See Fig.7 and 8.

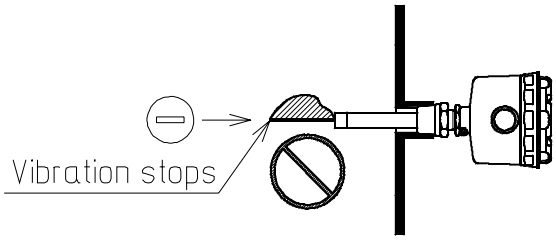


Fig.7

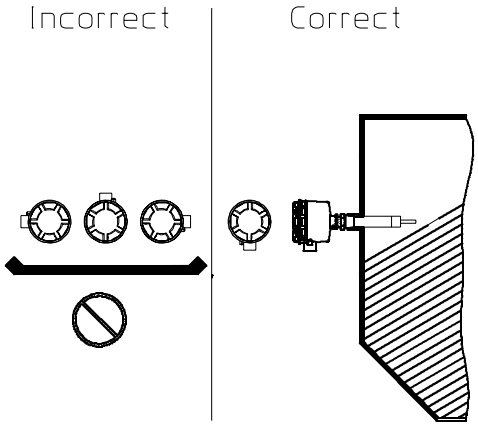


Fig. 8

(3) When used as a high level control, determine the maximum angle of repose for the material and locate the sensor low enough to insure complete coverage of the vibration reed. See Fig. 9.

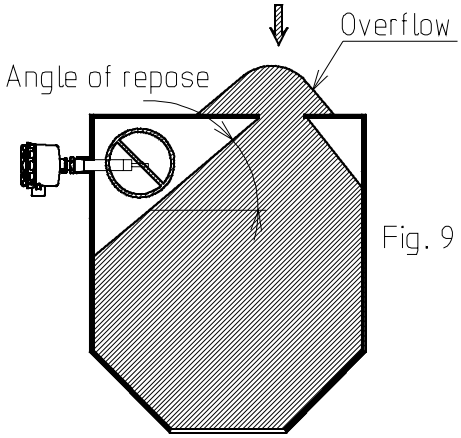


Fig. 9

(4) When used as a low level control and heavy material surges or excessive loads are anticipated, install a protective shield above vibration reed. Also, mount the unit high enough to prevent it from being surrounded by dead stock or bridge. See Fig. 10 and 11.

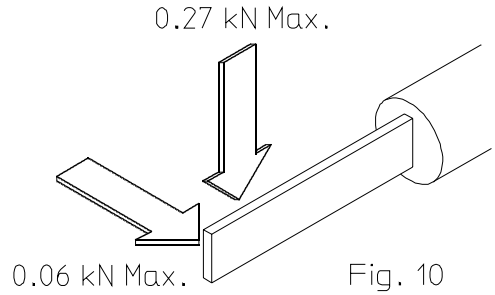


Fig. 10

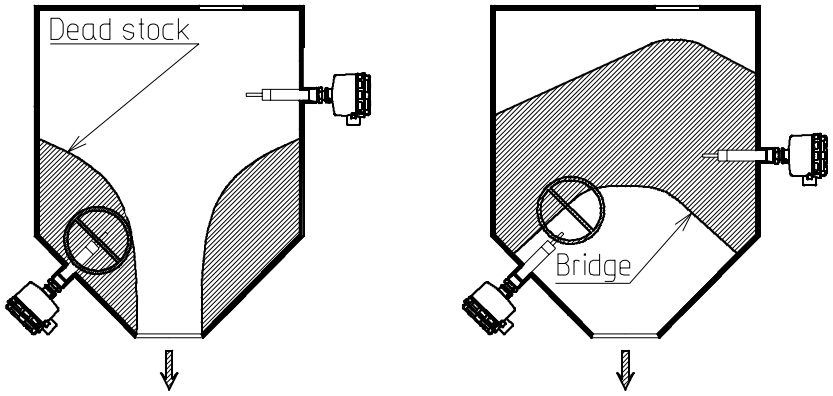


Fig. 11

(5) When side mounting, beware of the stand off pipe length.
Min, length between the hopper length and the hopper wall is 100mm.
Otherwise, the dead stock may cause malfunction. See Fig. 12.

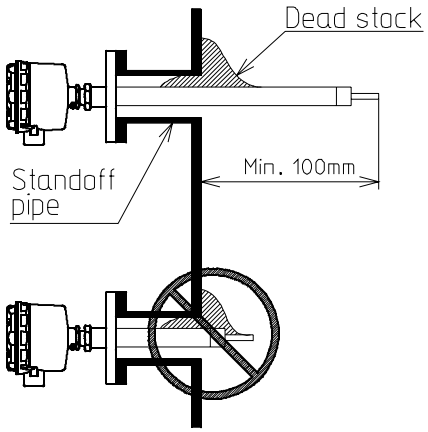


Fig.12

(6) Make sure the vibration reed is not in contact with anything. See Fig. 13.

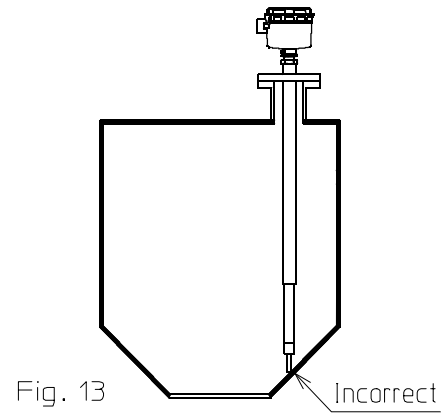


Fig. 13

6. WIRING

Before wiring, make sure the cable entry is pointing down to the ground.

Connect cables to terminals as shown below. The terminal is M3.5. The cable between 0.5mm^2 to 2.0mm^2 must be used.

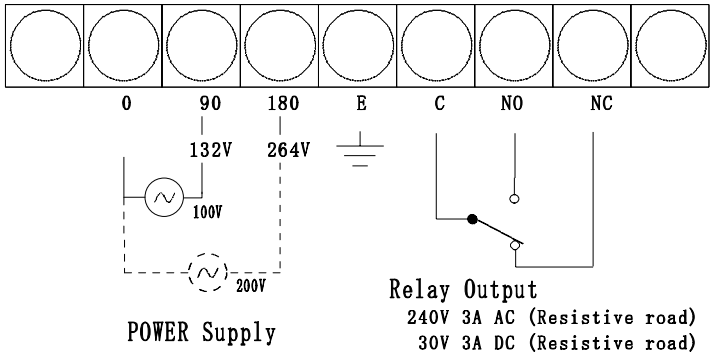


Fig. 14

NOTE the following points:

(1) NO means that the output relay is de-energized when the vibration reed is not covered by rising material or upon power loss.
NC means that output relay is de-energized when the vibration reed is covered by material or upon power loss.

(2) The cable entry must be properly fitted to preserve the protection category IP65, and to protect the sensor from rain, splashing water.

⚠WARNING

Earth terminal (E) should be grounded. If not, electrical shock may occur.

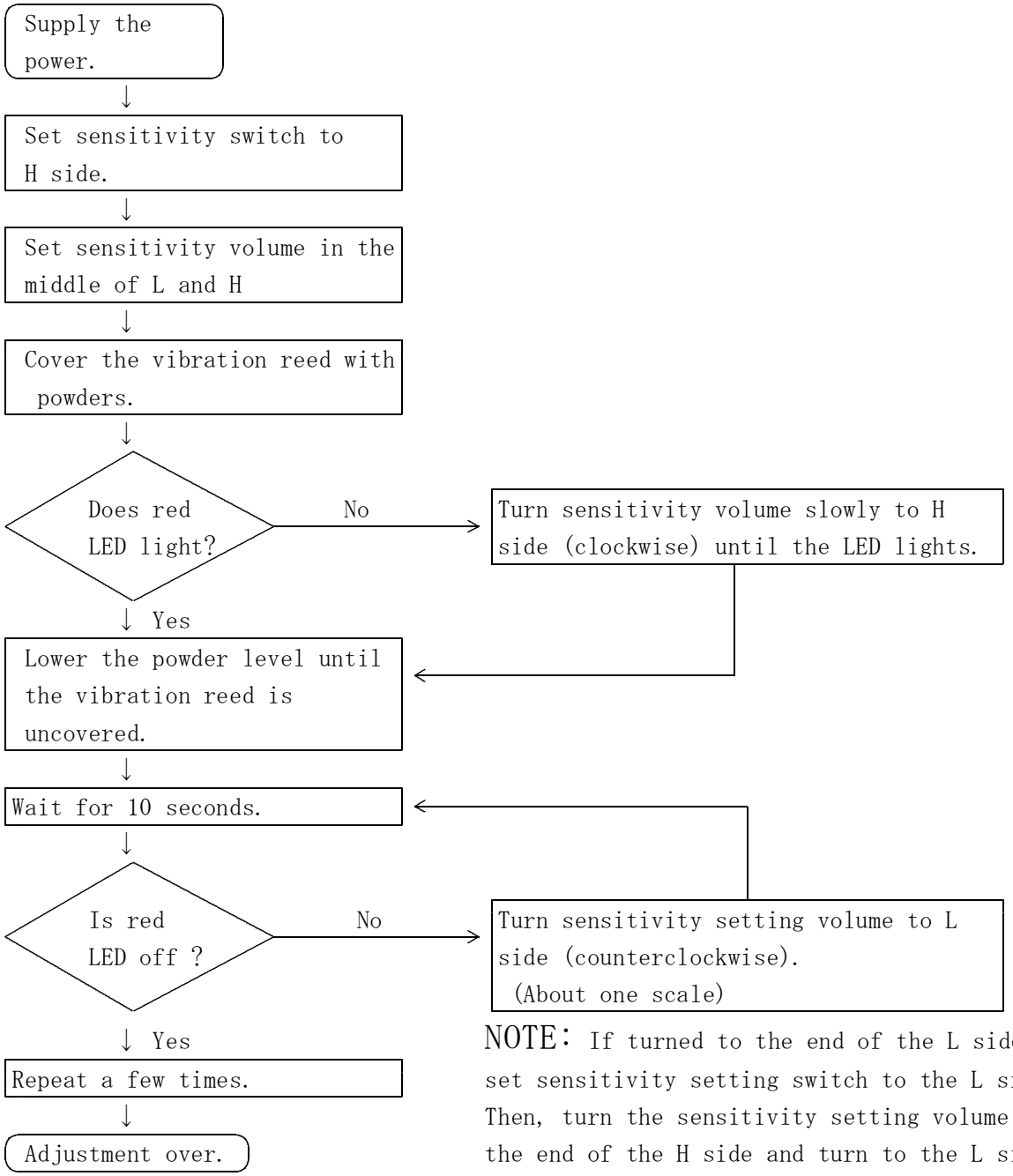
(3) The size of the cable inlet is G 3/4″.
There are two ways for connecting the sensor cable. One is fixing the cable with a cable gland. The other is connecting a conduit to the housing. In either case, an adequate sealing should be provided to prevent water or dust ingress into the housing through the sensor cable.
Secure the cable using sealing material for the conduit connection, or a proper tool when the gland is used, to protect the housing inside from dust or water.
When water or moisture comes into the housing from the conduit, use putty to fill the inside of the conduit.

7. ADJUSTMENT

VH factory setting for sensitivity is 0.02～0.2. Generally, it can be used without adjustment. But for sticky or fluidized powders, it may be necessary to adjust the sensitivity. See below for adjustment.

7.1 BUILD-UP OCCURRED

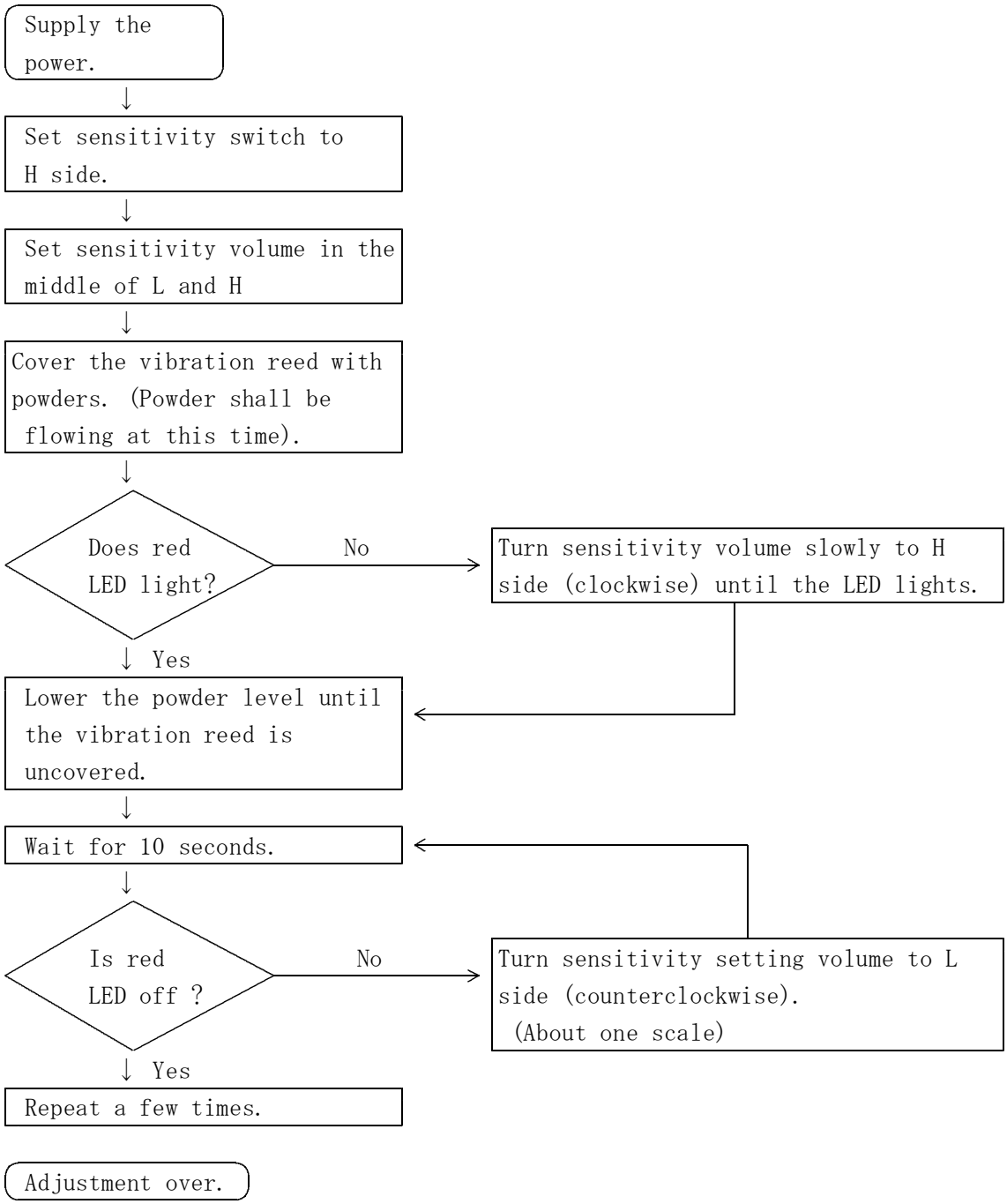
There is an occasion to set the detecting sensitivity low because of the build-up on the vibration rod. Especially when detecting strong sticky powders such as white carbon and toner, malfunction may occur for the standard sensitivity.



NOTE: If turned to the end of the L side, set sensitivity setting switch to the L side. Then, turn the sensitivity setting volume to the end of the H side and turn to the L side (counterclockwise) slowly.

7.2 FLUIDITY OCCURRED

When powder is flowing, the bulk density will be lighter than when it is still. Especially when the powder is pneumatically transferred, the mixture of the air and the powder makes it hard to detect.



8. CAUTIONS

(1) Do not drop the VH or give strong shock. An electric parts may be damaged.

(2) Dusts or dew intrusion into the sensor may damage the VH.

(3) Do not stock in the place where temperature or humidity is high.

9. MAINTENANCE

When cleaning and checking the container, keep the vibration reed free from deposits. A sensor used in sticky materials must be cleaned at periodic intervals. Tighten the housing cover and cable entry to protect the sensor from rain, splashing water, etc.

10. TROUBLESHOOTING

⚠CAUTION

Use the following chart to troubleshoot the malfunctioning sensor.
If your remedies are unsuccessful, ask Nohken for repair and replacement.

① Vibration reed is covered, but LED de-energized.

a) Are you using a proper voltage ?
- Make sure the specified voltage is supplied.
- Make sure the LED is lit.

b) Is detecting sensitivity proper ?
- Re-adjust in accordance with section 7.2, FLUIDITY OCCIRED.

c) Isn't there an intensive vibration around the sensor ?
- If there is an intensive vibration on the place where the sensor is installed, the signal may be turned off when the knocker starts operation. Reinstall the sensor where the vibration is less. Besides, turning the sensitivity setting volume to the H side (clockwise) a little may recover. Re-adjust in accordance with section 7.2, FLUIDITY OCCURRED.

d) Material may have bridge or angle of repose.
- Install the sensor in good location.

② Vibration reed in not covered by material, but LED energized.

a) Heavy deposit may be on vibration reed.
- Clean the vibration reed.

b) Check for appropriate detecting sensitivity.
- Re-adjust in accordance with section 7.1 BUILD-UP / COATING OCCIRED.

C) Material may have dead stock.
- Install the sensor in good location or isolate dead stock.

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