

I N S T R U C T I O N M A N U A L

F O R

VIBRATING LEVEL SENSOR




MODEL: V L X 5 □ 2 - □ □



Revision 2015-04-24

Read and understand this manual for safe usage.

- This manual describes the product of explosion specification. Read the other manual for the product of standard specification.
- This manual describes the handling, inspection and adjustment of the product whose model is mentioned on the 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 a proper place being available to refer to 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 NOHKEN INC. sales office for any question or comment about this manual and product.

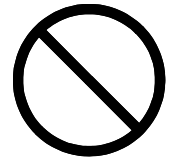
The following are the description of the terms in this manual.

 DANGER	Indicates an imminent hazardous situation which, if not paid attention to, could result in death, serious injury or serious disaster.
 WARNING	Indicates a potentially hazardous situation which, if not paid attention to, could result in death, serious injury or serious disaster.
 CAUTION	Indicates a hazardous situation which, if not paid attention to, may result in minor or moderate injury or damage to the device.

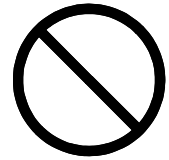
	Indicates a prohibited matter. The explanation with this mark shall be followed.
	Indicates an instructed matter. The explanation with this mark shall be followed.

 **DANGER**

Do not modify or disassemble the product. Failure to observe this can result in ignition of flammable gas or vapor.

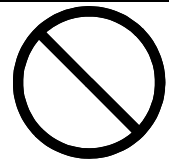


Never open the housing while the product is powered. Failure to observe this can result in ignition of flammable gas or vapor. Before opening the cover, turn off power and leave the product for longer than three minutes to ensure the inside components have cooled down.

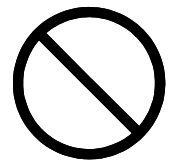


 **WARNING**

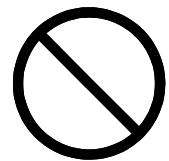
This product can be used in hazardous areas of Zone 1 and 2. Never use it in a Zone 0 area.



Do not damage the housing, joint surfaces or screw threads of the product. This is because change in the pressure resistance of housing, the width or depth of gap between joint surfaces will impair the explosion proof integrity.



Never remove components except for those required to do so according to this manual for the purpose of inspection, adjustment and maintenance. Failure to observe this will result in impairing the explosion proof integrity.



Ensure that the screw for the earth terminal and the bolts fixing the cover and mounting seat are tightened securely using spring washers to prevent them from being loosened. Loose screws and bolts will impair the explosion proof integrity.



Adjustment, inspection and maintenance of an explosion proof product must be carried out by qualified personnel who have received training including that for explosion protection.



Ensure that flammable gas or vapor is not generated while inspection or maintenance other than visual check is carried out.



For maintenance, use electric measuring instruments approved for use in the hazardous area where maintenance is carried out.



⚠ WARNING

Turn off power immediately if smoke, unusual smell or sound is generated. Do not use the product until problems are solved.



Ensure correct wiring. Wrong wiring can cause malfunction, damage, ignition, user injury or electric shock.



⚠ CAUTION

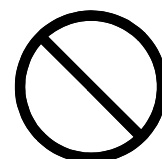
Ground the product using the earth terminal inside the housing. The one outside the housing can deteriorate depending on the application conditions.



Use cable for grounding whose sheath is green or green and yellow, or make it green with tape to indicate that the cable is for grounding.



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



Follow the specification of operating temperature, operating pressure, switch rating, etc. Otherwise, the product and connected device may be malfunctioned, damaged, fired, or minor injury and electric shock may occur. 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 the product, the other operating principle of product shall be installed in parallel.



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



When removing a threaded product from a tank, do not rotate the housing, or the internal wiring can be broken.
Rotate the threaded connection with a proper tool on the connection to remove the product.



 CAUTION

When carrying, mounting or removing the product, hold the product on the flange (or somewhere close to it) or the threaded connection (or somewhere close to it). Do not hold it on the housing, or the housing can be separated from the flange or threaded connection to drop, resulting in product damage or user injury.



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



The product is 500mm or longer

The product shall be kept horizontally. The product and other goods could be damaged, and minor injury may occur by falling.



INTRODUCTION

- A) This manual is applied to products of standard model.
If you order a special product, some details may be different from those shown in this manual.
- B) We are glad to provide support for model selection and information about chemical resistance of material, but the final decision has to be made by the customer.
- C) This manual has been prepared with close attention. Contact Nohken sales office for any question or comment about the contents of this manual.
- D) For replacement parts
The quality of product is frequently improved, so same spare parts may not be supplied. In this case, replacement parts or products may be supplied. Contact Nohken sales office for detail.
- E) The contents of this manual are subject to change any time without notice due to the improvement of the 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 in the following cases.
 - C-a) The description and direction in this manual were not followed.
 - C-b) Damage due to improper installation, wiring, usage, maintenance, inspection, storing, etc.
 - C-c) Repair and modification done by the person who is not an employee of NOHKEN INC. and our distributor or agent.
 - C-d) Improper parts were used and replaced.
 - C-e) The damage caused by the device or machine except our products.
 - C-f) Improper usage. (See "Purpose of use" in chapter 1 in this manual)
 - C-g) Damage caused by 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 LEGAL RIGHTS.

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1. PURPOSE OF USE

VLX sensor is designed to detect presence of measured material at a desired level, and give a signal. The signal is used to trigger alarms or to control other devices. The sensor is capable of detecting solids, granular materials, and sediment in water (sludge and sand). Do not use it for other purpose.

2. DESCRIPTION

2.1 Description

The sensor is mounted on a hopper with a flange or a thread. When the detecting pipe* is covered by the material, a relay* in the housing changes states.

2.2 Principle of operation

The sensor has a magnet and an electromagnet in the detecting pipe to vibrate the pipe. Current flowing on the electromagnet changes when the material covers the pipe. The sensor detects the change in a current value, and gives a signal to indicate material presence.

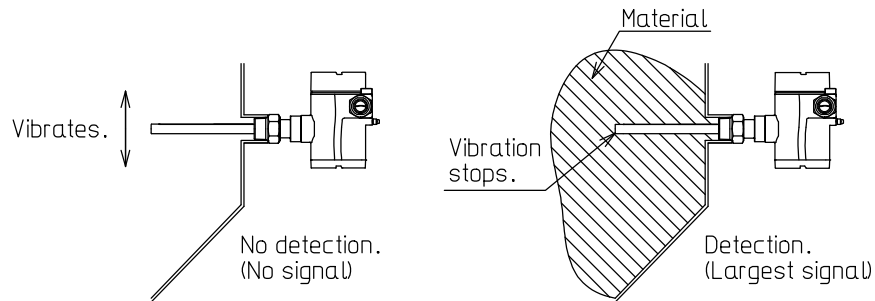


Fig. 2-1

3. SPECIFICATIONS

3.1 Model code

Model code denotes as follows.

VLX5□2 - □ □

Code	Material
	0 304 stainless steel
	1 316 stainless steel
Code	Process connection
	0 Flange, flat face
	1 Flange, raised face
	2 Sliding flange* ¹
	3 Sanitary fitting
	4 Thread
Code	Detecting pipe length (Dimension "L")
	0 270 mm
	1 271 to 329 mm* ²
	2 330 to 2200 mm

*1 Available only for detecting pipe length option "2".

*2 Available only for process connection option "4".

* See 12. Glossary.

3.2 Specifications

Product	Vibrating Level Sensor	
Model	VLX5□2-□□	
Measured material	Solids, granular materials, sediment	
Operating characteristics		
Sensitivity	Bulk density ≥ 0.2 (not applied to sediment in water)	
Switch-on phase	Relay de-energized for 15 seconds after supplying power.	
Vibration frequency	300 to 500 Hz	
Electric characteristics		
Power supply	100 to 240V AC $\pm 10\%$, 50/60 Hz	
Power consumption	0.7W at 100V AC, 1.5W at 240V AC (Power factor*=0.27 to 0.53)	
Relay output	Dry contact (SPDT) Detection: energized/de-energized switchable Switching delay: Set 3 to 5 seconds Reset 3 to 5 seconds	
Contact rating	Maximum: 250V, 3A AC (resistive) /30V, 3A DC (resistive) Minimum: 5V, 10mA DC (resistive)	
Insulation resistance	100M Ω Min. at 500V DC, between housing and each terminal except E terminal	
Withstand voltage	1500V AC for 1 minute, between housing and each terminal except E terminal	
Mechanical characteristics		
Withstand pressure (static)	2 MPa Max. (except process connection)	
Lateral load	0.55 kN Max. (static)	
Environmental		
Working temperature	Process	-10 to +120°C
	Ambient	-10 to +60°C (no dew condensation)
Humidity	95% RH Max.	
Protection class		
Ingress protection	Wetted parts: IP68 Housing: IP68 (2 meter, 50 hours) / IP66	
Hazardous area protection	Flameproof* IIIS certification Exd II BT4	
Others		
Material	Wetted parts: 304 stainless steel (316 stainless steel) Housing: Cast aluminum (blue acryl coated), NBR 304 stainless steel, Brass (C3604, nickel plating)	
Cable inlet	With flameproof packing type cable gland*, G3/4 or G1/2 Cable dia. : G3/4 ϕ 12.0 to 14.0, ϕ 14.0 to 16.0 G1/2 ϕ 6.0 to 8.0, ϕ 8.0 to 10.0, ϕ 10.0 to 12.0	

3.3 Explosion proof approval

- (1) Type of protection : Flameproof IIIS certification Exd II BT4
- (2) Certificate numbers : TC20925 (application model: VLX510-50)
TC20748 (application model: VLX510-51)
TC20926 (application model: VLX520-90)
TC20750 (application model: VLX520-91)

* See 12. Glossary.

3.4 Outline drawing

- ① Cover: cover for sensor terminal.
- ② Lock arm: locks the cover to maintain the flameproof integrity.
- ③ Flameproof packing type cable gland: cable gland to maintain the flameproof integrity.
- ④ Earth terminal: terminal for grounding
- ⑤ Housing: houses electronic circuits.
- ⑥ Side cover: cover for sensitivity and failsafe switches.
- ⑦ Boss: maintains the flameproof integrity.
- ⑧ Threaded connection: threaded process connection to mount the sensor on a hopper.
- ⑨ Detecting pipe: component that directly contacts the measured material. Vibrates with no material around pipe. Vibration decreases when the material covers the pipe.
- ⑩ Stopping plug: closes unused cable inlet.
- ⑪ Packing: seal for stopping plug.
- ⑫ Flange: process connection to mount the sensor on a hopper.
- ⑬ Extension pipe: extends measurement range.

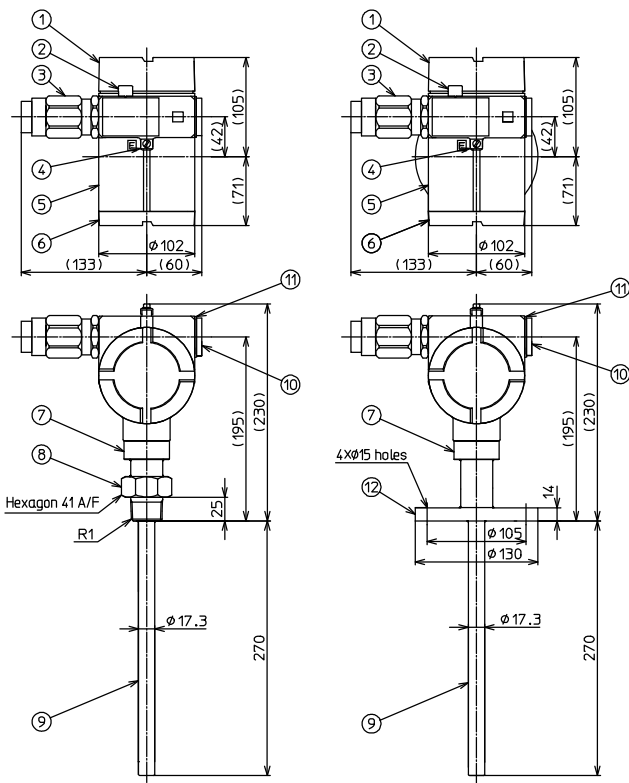


Fig. 3-1 VLX502-□□

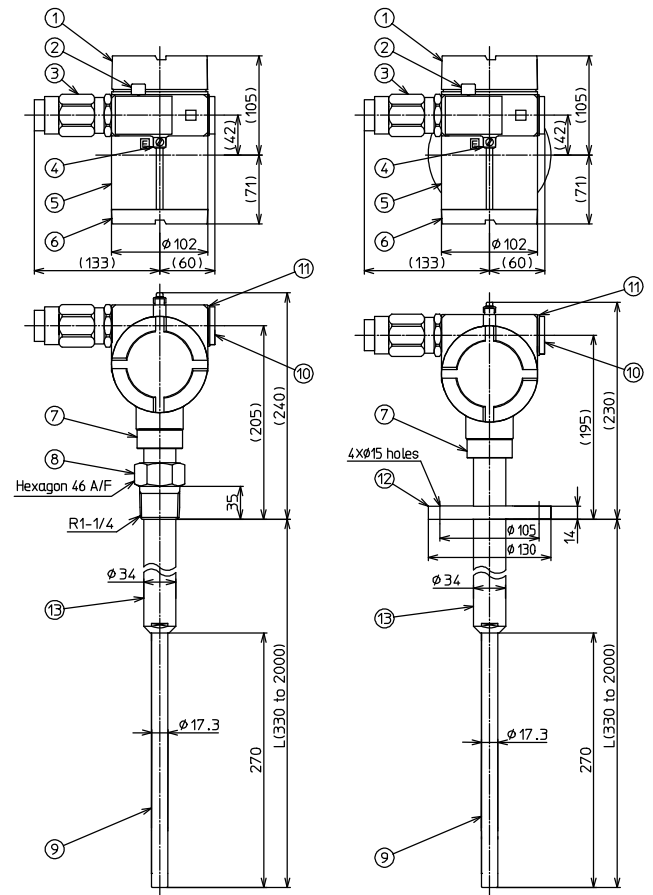


Fig. 3-2 VLX522-□□

4. HANDLING NOTES



DANGER

Never open the housing while the sensor is powered up, or explosion may result. Disconnect power and wait for at least 3 minutes before opening the housing.

Never modify or disassemble the sensor, or explosion may result.



WARNING

The sensor is designed for use in Zone 1* and Zone 2* hazardous areas*. Never use it in Zone 0* areas.

Do not give mechanical shock to the housing, joints*, and threads of the sensor. Pressure durability, and gap and depth of joints are crucial to prevent transmitting explosion to the external atmosphere. Damage to these parts compromises flameproof integrity.

Only remove components you are instructed to do so in inspection, adjustment or maintenance sections of this manual, and never other components. Otherwise the flameproof integrity will be compromised.

Properly tighten grounding screws and lock screws. Otherwise the flameproof integrity will be compromised.

For maintenance, use electric meters approved for the hazardous area they are used in.



CAUTION

Ground the sensor using either internal or external grounding terminal. (Grounding resistance: 100Ω Max.)

The grounding terminals are located outside and inside of the housing. Use the one inside the housing whenever possible, since the external terminal is exposed to external conditions and may degrade.

For the earth wire, use green or green-yellow striped wire of cross section larger than 4mm². If wire in such color is not available, wind a green tape around the wire to show it is for grounding. In either case, ensure the sensor is properly grounded.

* See 12. Glossary.

4.1 Notes for use in hazardous areas

The VLX sensor has a flameproof enclosure. The sensor is designed for use in Zone 1 and Zone 2 areas.

Follow the instructions below to maintain the flameproof integrity. Failure to do so may result in explosion.

4.1.1 Never open the housing while the sensor is powered up.

4.1.2 Before opening the housing, disconnect power and wait for at least 3 minutes.

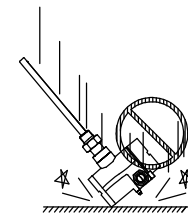
4.1.3 Never modify or disassemble the sensor

4.1.4 Never mount the sensor housing in a Zone 0 area.

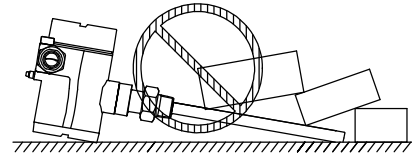
4.2 Handling notes

Observe instructions below when handling the sensor, or faulty operation or user injury may result.

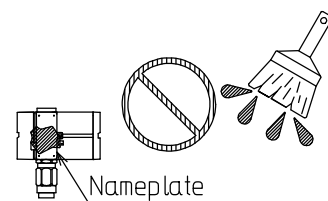
4.2.1 Do not drop, throw, crush or give a strong shock to the sensor to avoid damage.



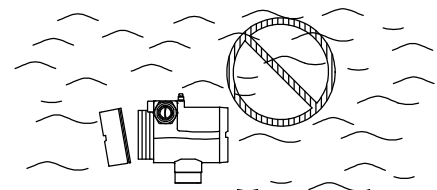
4.2.2 Do not place anything on the sensor to avoid deformation or damage.



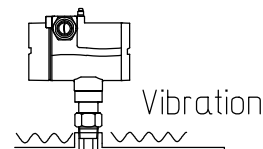
4.2.3 The nameplate contains maintenance and other important information. When painting the sensor, ensure such information is legible.



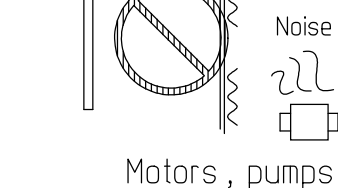
4.2.4 Avoid using, or storing the sensor in corrosive atmosphere (NH₃, SO₂, Cl₂). Such atmosphere may ingress into the housing and corrode the internal circuit.



4.2.5 Avoid places where vibration is expected. If inevitable, remove the source or protect the sensor from receiving the vibration.



4.2.6 Avoid proximity to motors, pumps, invertors or other noise sources, or ultrasonic cleaners, transceivers or other devices generating a high frequency electric field. These may cause faulty operation.



5. INSTALLATION



DANGER

Never modify or disassemble the sensor, or explosion may result.



WARNING

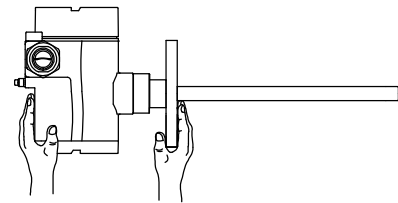
The sensor is designed for use in Zone 1 and Zone 2 hazardous areas. Never use it in Zone 0 areas.

Do not give mechanical shock to the housing, joints, and threads of the sensor. Pressure durability, and gap and depth of joints are crucial to prevent transmitting explosion to the external atmosphere. Damage to these parts compromises flameproof integrity.

Properly tighten grounding screws and lock screws. Otherwise the flameproof integrity will be compromised.

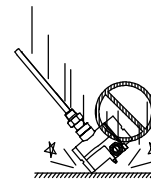
5.1 Unpacking

5.1.1 Unpack and carefully take out the sensor. Support the sensor at more than one position, the process connection and somewhere else.

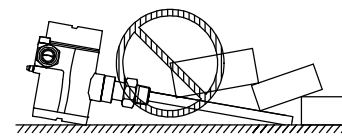


5.1.2 Completely remove tapes, cushions, cupboard and other packing material to avoid faulty operation.

5.1.3 Do not drop, throw, crush, drag or give a shock to the sensor to avoid damage.

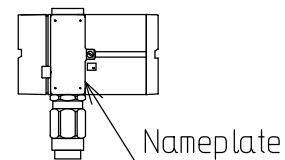


5.1.4 Do not place anything on the sensor to avoid deformation or damage.



5.1.5 Check against the nameplate that the product is as ordered. If not, contact our sales office.

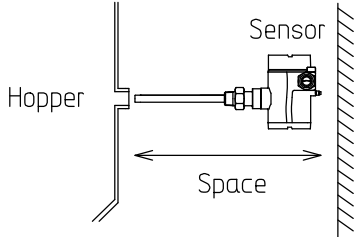
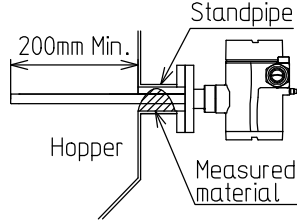
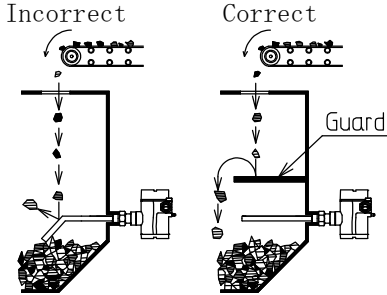
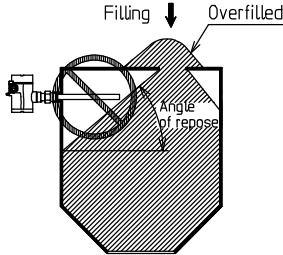
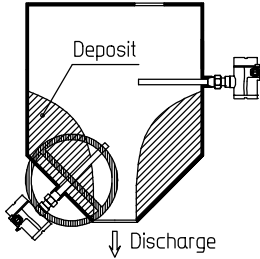
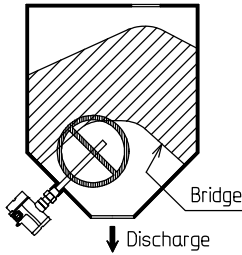
5.1.6 Check the sensor for visible damage. If any, it may have been caused during transport. Contact our sales office.



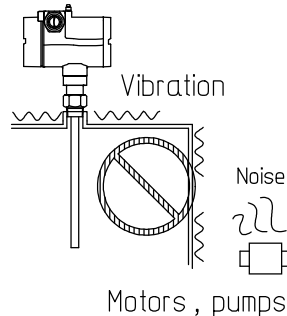
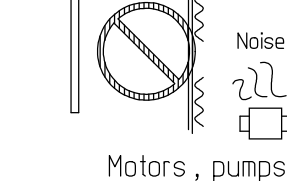
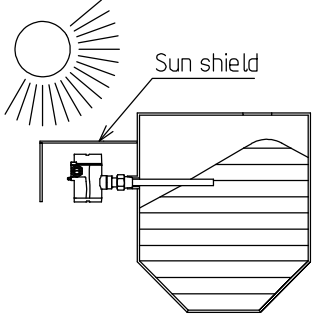
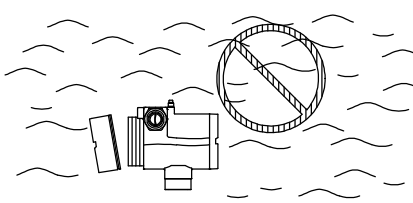
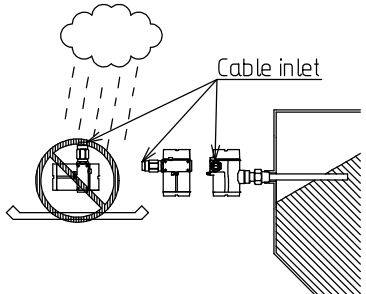
5.2 Mounting the sensor

5.2.1 Mounting location

Observe instructions below when mounting the sensor, or faulty operation may result.

<p>(1) Ensure ample space around the mounting point for easy handling and maintenance. Note that the space has to be large enough to contain overall length of the sensor. This must be ensured after mounting the sensor for future maintenance.</p>	
<p>(2) Use a standpipe as short as possible. Ensure measured material will not remain inside the standpipe. Ensure the detection pipe projects into the hopper for at least 200mm.</p>	
<p>(3) Avoid fill path. Ensure excessive load will not be applied to the detecting pipe. Load exceeding 0.55kN may damage the detecting pipe and cause faulty operation. Note that flowing material may cause load heavier than this value. Provide a guard* over the sensor as necessary.</p>	
<p>(4) Avoid locations where the material does not reach the sensor due to the angle of repose*.</p>	
<p>(5) Avoid places where the sensor may erratically detect deposit*.</p>	
<p>(6) Avoid places where bridge* formation is expected. Bridge may cause faulty operation, and also damage the sensor when it falls.</p>	

* See 12. Glossary.

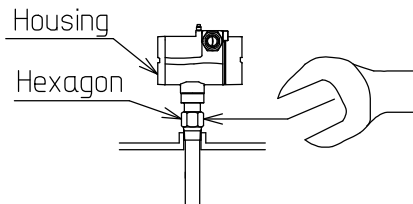
<p>(7) Avoid areas where vibration occurs. Mounting close to a vibrator* or a knocker* will cause malfunction or damage the sensor.</p>	
<p>(8) Avoid proximity to motors, pumps, invertors or other noise sources, or ultrasonic cleaners, transceivers or other devices generating a high frequency electric field. These may cause faulty operation.</p>	
<p>(9) Avoid exposure to direct sunlight. Otherwise, especially in summer, temperatures inside the housing may exceed ratings. Provide a sun shield*.</p>	
<p>(10) Avoid corrosive atmosphere (NH₃, SO₂, Cl₂). Such atmosphere may enter the housing and damage the electronics inside.</p>	
<p>(11) Avoid water (rain) entry into the housing. Improperly tightened cover or cable gland will cause water entry and then sensor damage or faulty operation. For horizontal mounting, orient the sensor so that the cable gland rests horizontal.</p>	

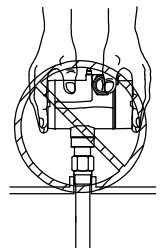
5.2.2 Mounting

(1) Threaded unit

⚠ CAUTION

Tighten the hexagon above the thread with a suitable tool. Never tighten the housing, or wiring inside may be broken.





Use sealing material for pressure applications to prevent leak.

(2) Flanged unit

Place the sensor flange on the hopper flange, and secure them using a proper tool and bolts according to applicable standards. Use a gasket for pressure applications to prevent leak. Note that bolts and gaskets are optional components.

* See 12. Glossary.

6. WIRING

6.1 Before wiring

6.1.1 Disconnect power to cabling to be wired.

DANGER

Never open the housing while the sensor is powered up, or explosion may result. Disconnect power and wait for at least 3 minutes before opening the housing.

Never modify or disassemble the sensor, or explosion may result.

WARNING

The sensor is designed for use in Zone 1 and Zone 2 hazardous areas. Never use it in Zone 0 areas.

Do not give mechanical shock to the housing, joints, and threads of the sensor. Pressure durability, and gap and depth of joints are crucial to prevent transmitting explosion to the external atmosphere. Damage to these parts compromises flameproof integrity.

Properly tighten grounding screws and lock screws. Otherwise the flameproof integrity will be compromised.

CAUTION

Ground the sensor using either internal or external grounding terminal. (Grounding resistance: 100Ω Max.)

The grounding terminals are located outside and inside of the housing. Use the one inside the housing whenever possible, since the external terminal is exposed to external conditions and may degrade.

For the earth wire, use green or green-yellow striped wire of cross section larger than 4mm². If wire in such color is not available, wind a green tape around the wire to show it is for grounding. In either case, ensure the sensor is properly grounded.

- 6.1.2 Loosen the lock screw with the attached tool (hex key, 3mm A/F) to unlock the lock arm, and then remove the housing cover.
When working on multiple units, ensure the cover is replaced on its original sensor.

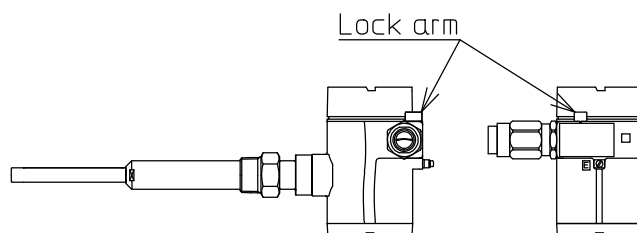


Fig. 6-1: Lock arm

6.2 Wiring through flameproof packing type cable gland

6.2.1 Cable

Use cable protected against damage and corrosive materials, and that resists 85°C or higher temperatures. (Recommended: control cable according to JIS C 3401, polyethylene cable specified in JIS C 3605 to 3606, or instrument cable specified in JCS364)

Table 6-1

Inlet size	Cable diameter
G 3/4	φ 12.0 to 14.0 mm or φ 14.0 to 16.0 mm
G 1/2	φ 6.0 to 8.0 mm, φ 8.0 to 10.0 mm, or φ 10.0 to 12.0 mm

6.2.2 Orientation of flameproof packing type cable gland

Housing can be rotated for approximately 150 degrees. Loosen the lock screw with a hexagon socket (2 mm A/F) on the neck of the housing, and rotate the housing until the cable gland comes to the best position. Do not forget to tighten the lock screw after adjustment.

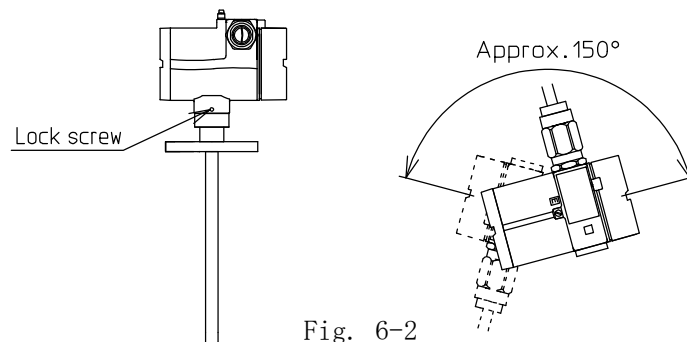


Fig. 6-2

6.2.3 Securing the cable

For the flameproof packing type cable gland, select a packing size suitable for your cable. Loosen the hex socket head screw, and remove the union nut. Loosen the packing gland, and then remove the washer and the packing. Thread cable through components in the following order: nut, packing gland, washer, packing, washer, and the body of flameproof packing type cable gland. Ensuring enough length for wiring, tighten the packing gland. Fix the cable to the packing gland with the Philips head screw and the clamp. Tighten the union nut, and then the hex socket head screw.

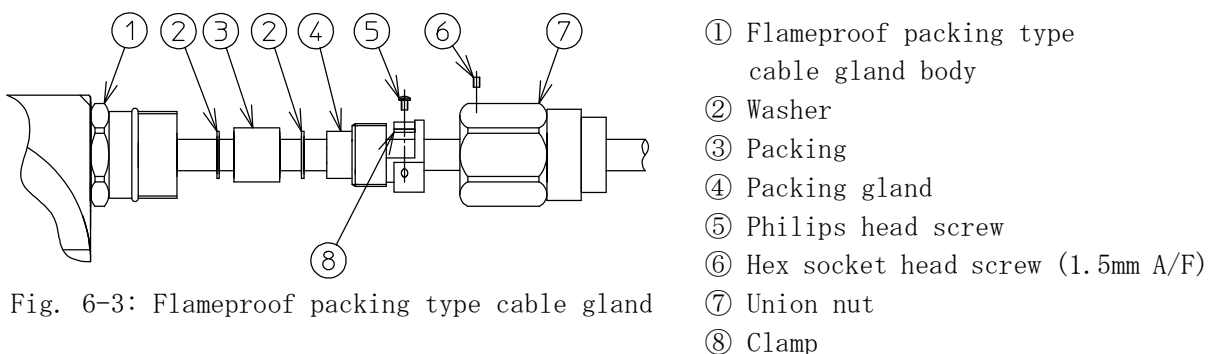


Fig. 6-3: Flameproof packing type cable gland

See below for how to secure cable with the clamp.

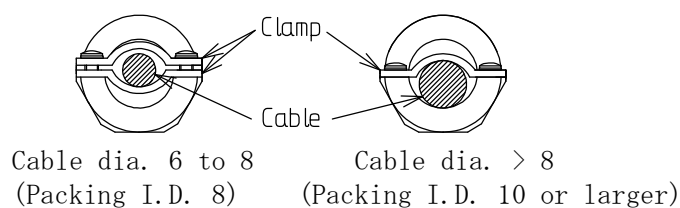


Fig. 6-4

6.3 Grounding

Ground the sensor using an internal or external earth terminal.

(Grounding resistance: 100Ω Max.) Use an earth wire of conductor section area 4 mm² or larger. Ensure the sensor is properly grounded.

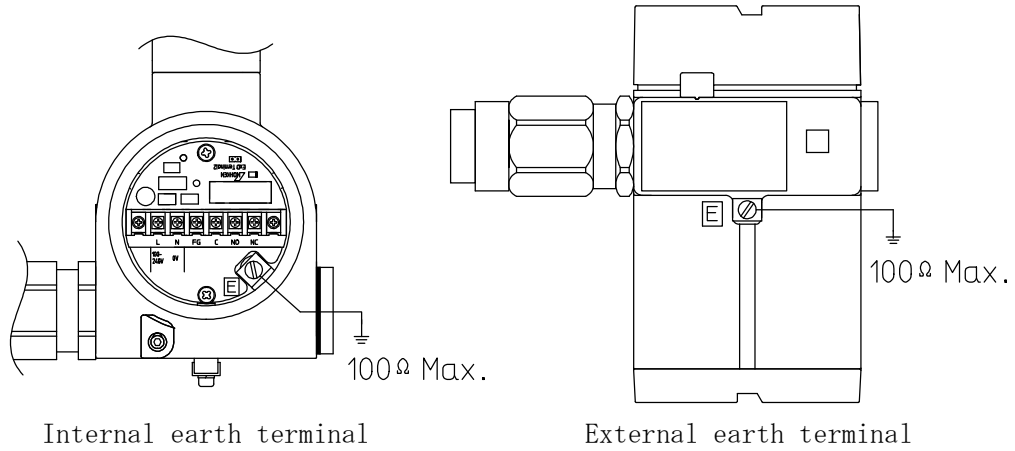


Fig. 6-5

6.4 Wiring

Wire as shown below. Always use a tool to tighten screws. Terminal screws are of M3.5. Use cable lugs of V1.25-M3 or an equivalent size.

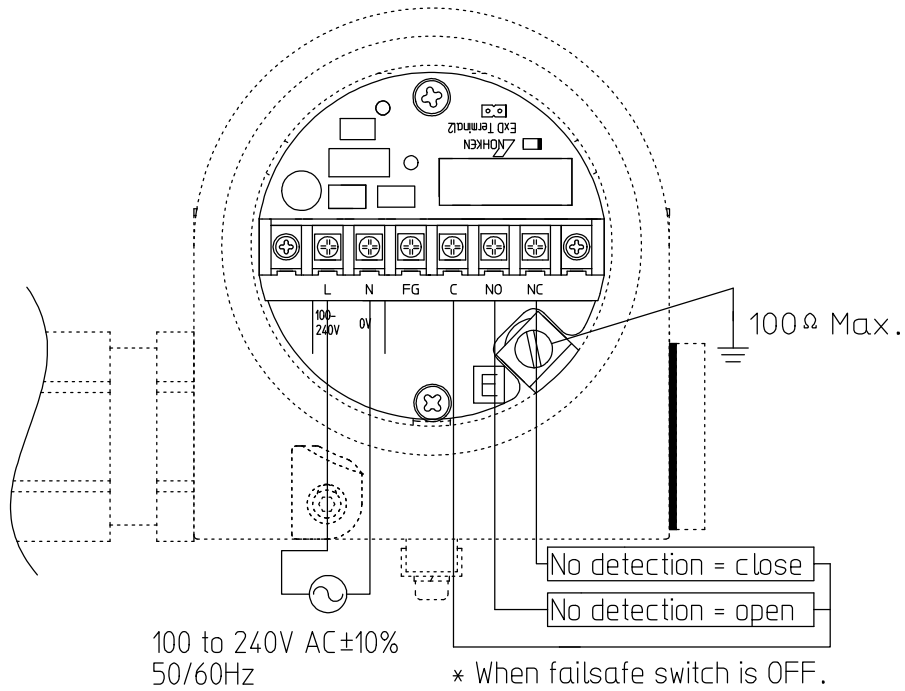
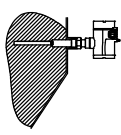



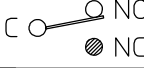



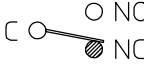
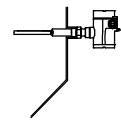



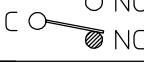



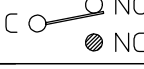


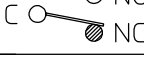


Fig. 6-6: Wiring

6.4.1 Relay operation

Failsafe switch setting determines relay operation. See Table 6-2.

Table 6-2: Relay operation

Failsafe	SW1	LED		Relay contact
		DET(red)	POW(green)	
		 ON	 ON	
		 OFF	 ON	
		 OFF	 ON	
		 ON	 ON	
Power - OFF		 OFF	 OFF	

⚠ CAUTION

Relay contacts are rated for 250V, 3A AC (resistive) or 30V, 3A DC (resistive). Do not exceed these ratings, or relay contacts may be damaged. Connect another relay capable of switching the large load between the load and the output terminal of the sensor.

6.5 Cable inlet

Ensure water will not enter the housing.

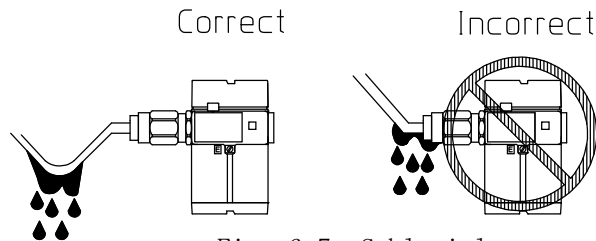


Fig. 6-7: Cable inlet

6.6 Placing the cover

Before placing the cover, ensure no condensation, dust, or metal debris is inside the housing. Tighten the cover until it comes to a stop, ensuring no gap between the cover and the housing. Loose cover allows entry of water or dust, and may cause corrosion, shortcircuit or faulty operation. Lock the cover with a screw using the attached tool (hex key, 3mm A/F), and secure the lock arm.

6.7 Operation check

⚠ DANGER

Never open the housing while the sensor is powered up, or explosion may result. Disconnect power and wait for at least 3 minutes before opening the housing.

- 6.7.1 Ensure no dust or debris inside the housing. Metal debris especially may cause shortcircuit.
- 6.7.2 Check operation before actual use using a hopper and solids. If erratic operation is observed, check wiring. Also, read this manual. Contact our sales office for any question.

7. PART NAMES AND FUNCTIONS

⚠ DANGER

Never open the housing while the sensor is powered up, or explosion may result. Disconnect power and wait for at least 3 minutes before opening the housing.

Never modify or disassemble the sensor, or explosion may result.

⚠ WARNING

The sensor is designed for use in Zone 1 and Zone 2 hazardous areas. Never use it in Zone 0 areas.

Do not give mechanical shock to the housing, joints, and threads of the sensor. Pressure durability, and gap and depth of joints are crucial to prevent transmitting explosion to the external atmosphere. Damage to these parts compromises flameproof integrity.

Only remove components you are instructed to do so in inspection, adjustment or maintenance sections of this manual, and never other components. Otherwise the flameproof integrity will be compromised.

Properly tighten grounding screws and lock screws. Otherwise the flameproof integrity will be compromised.

For maintenance, use electric meters approved for the hazardous area they are used in.

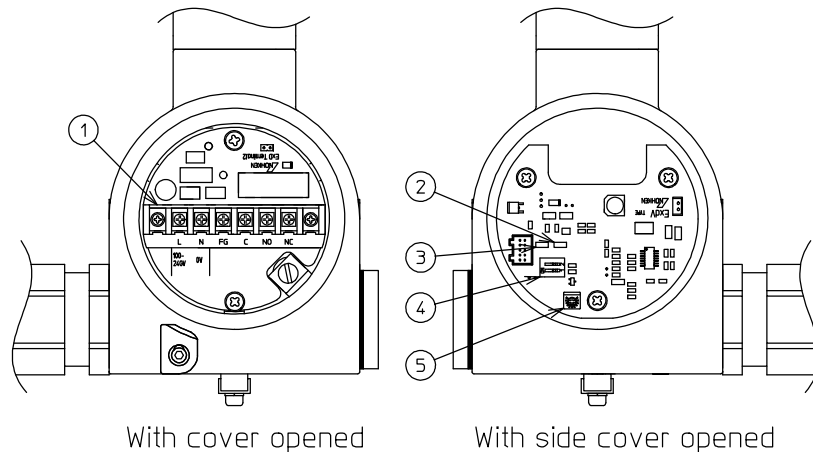
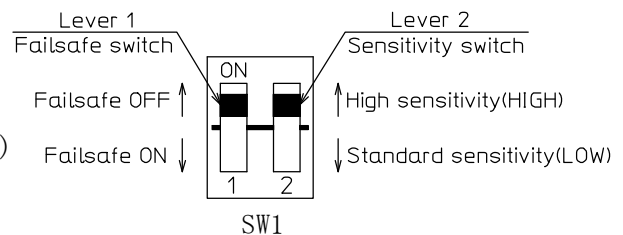


Fig. 7-1: Housing

- ① Terminal block
For power connection and relay contacts.
- ② Alarm lamp (DET)
Indicates relay status. (Red LED)
- ③ Power lamp (POW)
Lights when the sensor is powered up. (Green LED)
- ④ Failsafe switch / Sensitivity switch (SW1)
Switches outputs and sensitivity settings.
- ⑤ Sensitivity trimmer (SENS)
Adjusts sensitivity.



8. ADJUSTMENT



Never open the housing while the sensor is powered up, or explosion may result. Disconnect power and wait for at least 3 minutes before opening the housing.

Never modify or disassemble the sensor, or explosion may result.

VLX sensor is adjustment free. Use the sensor in the as-delivered state.

8.1 Tools required for sensitivity adjustment (check)

A small slotted screwdriver is used. The recess on the sensitivity trimmer is 0.7mm x 5mm.

8.2 Removing the side cover

Loosen the lock screw, and remove the side cover.

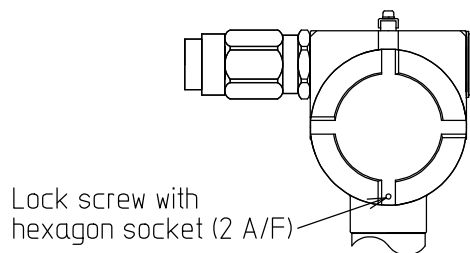


Fig. 8-1: Side cover

8.3 Sensitivity adjustment

Follow instructions below to adjust sensitivity. See Table 8-1.

(1) High sensitivity setting

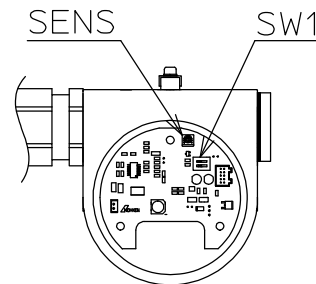
From standard sensitivity setting (Lever 2 of SW1 at a low position), set Lever 2 of SW1 to a high position. The sensitivity trimmer (SENS) is not used.

(2) Low sensitivity setting

From standard sensitivity setting (Lever 2 of SW1 at a low position), turn the sensitivity trimmer (SENS) counterclockwise.

Table 8-1: Sensitivity setting

Sensitivity	SENS	SW1
High		
Standard		
Low		



View with side cover removed.

8.4 Operation check



Never open the housing while the sensor is powered up, or explosion may result. Disconnect power and wait for at least 3 minutes before opening the housing.

After adjustment is complete, check operation using the material to be measured.

9. MAINTENANCE AND INSPECTION

Remove the sensor from the hopper, and perform maintenance in a safe area. See section 4 Handling Notes beforehand. Ensure ample space for maintenance.



DANGER

Never open the housing while the sensor is powered up, or explosion may result. Disconnect power and wait for at least 3 minutes before opening the housing.

Never modify or disassemble the sensor, or explosion may result.



WARNING

The sensor is designed for use in Zone 1 and Zone 2 hazardous areas. Never use it in Zone 0 areas.

Do not give mechanical shock to the housing, joints, and threads of the sensor. Pressure durability, and gap and depth of joints are crucial to prevent transmitting explosion to the external atmosphere. Damage to these parts compromises flameproof integrity.

Only remove components you are instructed to do so in inspection, adjustment or maintenance sections of this manual, and never other components. Otherwise the flameproof integrity will be compromised.

Properly tighten grounding screws and lock screws. Otherwise the flameproof integrity will be compromised.

For maintenance, use electric meters approved for the hazardous area they are used in.



CAUTION

Ground the sensor using either internal or external grounding terminal. (Grounding resistance: 100 Ω Max.)

The grounding terminals are located outside and inside of the housing. Use the one inside the housing whenever possible, since the external terminal is exposed to external conditions and may degrade.

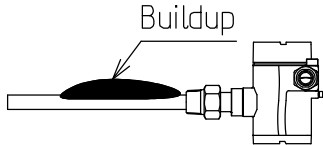
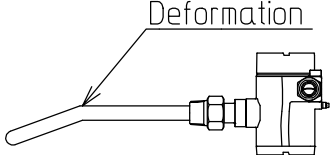
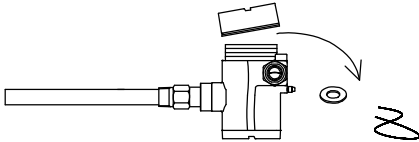
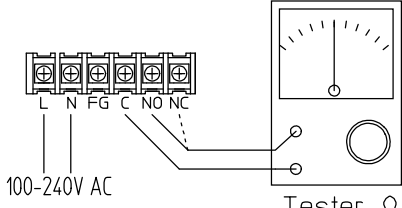
For the earth wire, use green or green-yellow striped wire of cross section larger than 4mm². If wire in such color is not available, wind a green tape around the wire to show it is for grounding. In either case, ensure the sensor is properly grounded.

9.1 Removing from the hopper

- 9.1.1 Always disconnect power before removing the sensor from the hopper for maintenance.
- 9.1.2 Loosen the lock screw with the attached tool and unlock the lock arm. Then remove the housing cover, and disconnect cabling.
- 9.1.3 Place the sensor on a flat surface.

9.2 Maintenance

To maintain the flameproof integrity, ensure authorized personnel performs initial and regular inspections. Carry out maintenance and inspection of devices used in hazardous area once or twice a year. More frequent maintenance will be required depending on the measured liquid, temperature or other working conditions.

<p>9.2.1 Remove buildup on the detecting part.</p>	
<p>9.2.2 Check for damage that may impair performance. If found, repair or replace components**.</p>	
<p>9.2.3 Remove condensation, dust or metal debris from the housing.</p>	 <p>Remove dust or metal debris.</p>
<p>9.2.4 Check relay operation. Procedures: Supply power. Grab the end of the detecting pipe to stop vibration, and see if the relay switches correctly by measuring resistance with a tester, or using an electric buzzer. If relay does not switch correctly, repair is required.</p>	

** Contact our sales office when repair or replacement is required.

In the event of incorrect operation, please contact our sales office.

⚠ WARNING

Use electric meters approved for the hazardous area they are used in.

9.3 Replacing components

Components of flameproof sensor must be replaced with those from Nohken and without compromising flameproof integrity. Therefore, components replacement must be done in our factory. Please contact our sales office when components require replacement.

9.4 When to replace the sensor

Sensor needs to be replaced generally 3 to 5 years after installation. This is because contact damage, or corrosion or abrasion of detecting pipe occurs over the years. The time period varies with operating conditions such as frequency of use, material type, temperature and pressure.

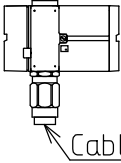
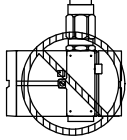
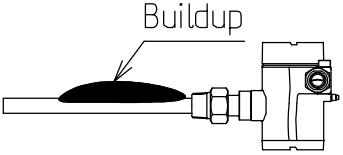
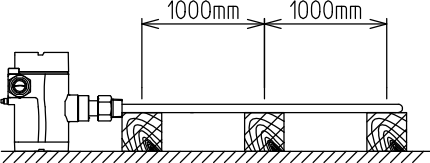
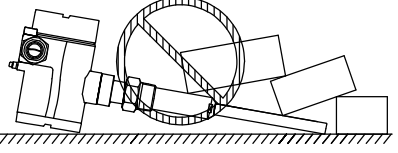
10. STORING

Observe following instructions when the sensor is not to be used right after delivery and stored, or is removed from service and stored.

Failure to observe these instructions may result in faulty operation.

10.1 Store the sensor indoors in the following conditions.

- Temperature: -10 to +60°C
- Humidity: 95%RH Max.
- Atmosphere: not corrosive (without NH₃, SO₂, or Cl₂)
- Vibration: not excessive

<p>10.2 Wrap the housing with polyethylene sheet to prevent dust entry into the housing. Place the sensor so that the cable inlet points downwards.</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Correct</p>  <p>Cable inlet</p> </div> <div style="text-align: center;"> <p>Incorrect</p>  </div> </div>
<p>10.3 Remove buildup. Buildup on the electrode can harden over time and adversely affect operation the next time used.</p>	 <p style="text-align: center;">Buildup</p>
<p>10.4 Support the sensor with wood pieces to prevent rolling, bending or damage.</p>	
<p>10.5 Do not place anything on the sensor to prevent deformation or damage.</p>	

11. TROUBLESHOOTING

 **CAUTION**

In the event of trouble, perform the following and nothing else. If you have any question, please contact our sales office.

Problems	Possible causes	Remedies	Reference
No output given with material reaching the detection point. Hopper was overfilled.	Bulk density is too low. The sensor cannot detect bulk densities lower than 0.2 g/cm ³ .	Sensitivity needs to be increased. Contact our sales office.	
	Angle of repose.	Relocate the sensor.	Section 5.2.1 (4), page 7
	Bridge formation.	Relocate the sensor.	Section 5.2.1 (6), page 7
	Measured material is flowing.	Sensitivity needs to be increased. Contact our sales office.	
	Excessive vibration.	Relocate the sensor.	Section 5.2.1 (7), page 8
Output given without material reaching the detection point. (Relay keeps ON state regardless of level)	Incorrect wiring.	Wire correctly.	Section 6, page 9
	Deposit.	Relocate the sensor.	Section 5.2.1 (5), page 7
	Buildup on the detecting pipe.	Remove buildup. Sensitivity needs to be degreased. Contact our sales office.	

12. GLOSSARY

Terms used in this manual are defined in the chart below.

This chart excludes the terms which have already been defined earlier in this manual.

Detecting pipe	Component that vibrates and detects the presence of measured material. Vibration stops when material covers the pipe.
Relay	Electric device that responds to small current or voltage change by opening or closing its contacts. The contacts close when the material reaches or covers the detecting pipe, and trigger an alarm.
Power factor	Ratio of the real power flowing to the load, to the apparent power in the circuit.
Guard	Board or semi-circular pipe that protects detecting pipe from falling or flowing material.
Angle of repose	Angle between the horizontal surface and the surface of pile formed by granular substance poured on a horizontal surface.
Deposit	Solid remaining inside the cone of a hopper. The amount depends on the angle of the cone.
Bridge	Material forming itself into a shape of bridge in a hopper.
Vibrator	Device that vibrates a hopper from outside to remove buildup or deposit on the wall.
Knocker	Device that gives shocks to a hopper from outside to remove buildup or deposit on the wall.
Sun shield	Component to be placed over the housing and protects the housing from direct sunlight.

Terms for explosion protection

Flameproof	Type of design to withstand internal explosion and prevent it from transferring to the explosive atmosphere.
Flameproof packing type cable gland	Cable gland designed not to transfer internal explosion to the external atmosphere. Has a packing and a clamp at the cable inlet.
Hazardous area	Area where explosive gas or vapor exists or is likely to exist. Equipment used in this area has to be designed to prevent ignition to such atmosphere.
Zone 1	Areas in which hazardous concentration of flammable gasses/vapors are present occasionally under normal operating conditions.
Zone 2	Areas in which hazardous concentrations of flammable gases/vapors are not expected under normal operating conditions.
Zone 0	Areas in which hazardous concentrations of flammable gasses/vapors are present continuously or over long periods under normal operating conditions.
Joint	Interface between housing & cover, housing & side cover, and housing & boss, which is responsible for maintaining flameproof integrity.

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