

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

F O R

M I N I A T U R E F L O A T S E N S O R

M O D E L : O L

Revision 2011-10-27

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 minor 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 minor 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 minor 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

<p>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.</p>	
<p>Check and deeply consider the chemical compatibility for material of product in advance.</p>	
<p>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.</p>	
<p><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.</p>	
<p>Earth terminal shall be grounded to JIS Class D ground (earth resistance less than 100Ω). If not grounded, electric shock may occurred by any accident.</p>	
<p>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.</p>	
<p><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.</p>	

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.

TABLE OF CONTENTS

	Page No.
1. PURPOSE OF USE	1
2. DESCRIPTION	1
2.1 Product description	1
2.2 Principle of operation	1
3. SPECIFICATIONS	1
3.1 Nomenclature	1
3.2 Specifications	2
3.3 Electric rating	2
3.4 Dimensions & operation characteristics	3
4. USAGE OF THE OL SPECIAL PARTS	4
4.1 Special parts for OL	4
4.2 Union installation	5
4.3 Assembling samples	7
5. HANDLING NOTES	8
6. INSTALLATION	10
7. WIRING	11
7.1 Wiring	11
7.2 Excessive load capacity	12
8. MAINTENANCE & INSPECTION	15
8.1 Removing	15
8.2 Maintenance & inspection	16
8.3 Re-installation	17
8.4 Wiring	17
9. STORING	17
10. TROUBLESHOOTING	17
10.1 Float rises or falls with the liquid level. Switch de-activated.	17
10.2 Float rises or falls with the liquid level. Switch often de-activated.	18
11. GLOSSARY	19

1. PURPOSE OF USE

The OL is used for liquid, oil and chemical level detection. It is used for taking out the control signal from alarms or pumps. Do not use in any other applications.

2. DESCRIPTION

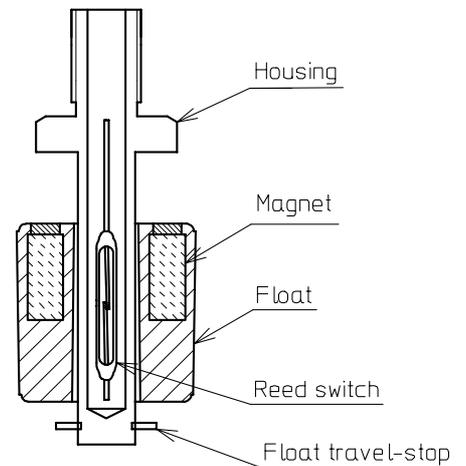
2.1 PRODUCT DESCRIPTION

The OL can be installed on the tank top by fitting nut or screw-in mounting. The float (*) moves up and down in accordance with the liquid level. This action makes the reed switch (*) ON and OFF.

2.2 PRINCIPLE OF OPERATION

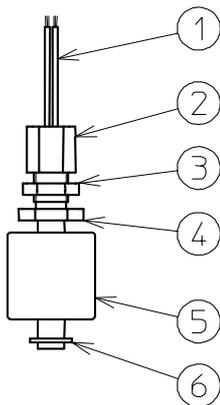
The OL operates in a combination with the magnet (*) and the magnet dynamic switch.

Like the drawing on the right, the magnet is inside the float and the reed switch is inside the Housing. As the float moves up and down along with the liquid surface, the relative position of the magnet and the reed switch changes that the reed switch will be ON and OFF.



3. SPECIFICATIONS

3.1 NOMENCLATURE



6	Float travel-stop
5	Float
4	Housing
3	Fitting nut
2	Union nut
1	Lead wire
P.No.	Name

*: See section 11 for the word explanation.

3.2 SPECIFICATIONS

Model	OLV-5	OLV-2B	OLV-2A	OLV-2P	OLV-2F
Measuring object	Water, Oil, Chemicals	Water, Oil	Water, Oil	Water, Chemicals	Chemicals
Pressure	2 MPa	1 MPa	1 MPa	1 MPa	1 MPa
Heat resistant	100	90	90	90	40
Specific gravity	0.8 or more	0.6 or more	0.6 or more	0.85 or more	0.9 or more
Liquid viscosity	5P or less	5P or less	5P or less	5P or less	5P or less
Material	None	Brass (Nickel plating)	POM	PP	None
Union nut					
Fitting Nut	316 Stainless Steel	Brass (Nickel plating)	POM	PP	PVDF
Housing	316 Stainless Steel	Brass (Nickel plating)	POM	PP	PVDF
Float	316L Stainless steel	Foamed NBR + Phenol	Foamed NBR + Phenol	Foamed PP	PVDF
Float travel -stop	316 Stainless steel	316 Stainless steel	316 Stainless Steel	PP	PVDF
Lead wire	UL1430 AWG22 *	UL1430 AWG22	UL1430 AWG22	UL1430 AWG22	UL1430 AWG22
Color of lead wire	Black *	Black	Black	Black	Black

* In case of heat resistant specification (OLV-5 only, Max. 120), the lead wire will be UL3266 AWG22, color white.

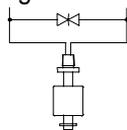
3.3 ELECTRIC RATING (Resistive)

Max. contact capacity: 50VA 50W
 Max. working current : 0.5A AC 0.5A DC
 Max. working voltage : 300V AC 300V DC

⚠ CAUTION

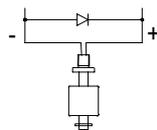
If the relay is inductive load or lamp load, the rush current and the back electromotive voltage occurs. Connect protecting circuit to the load side to avoid over voltage or overcurrent. If exceeds maximum value, the reed switch shall be damaged.

Surge absorber



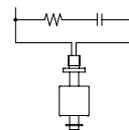
When direct/
alternating current

Diode



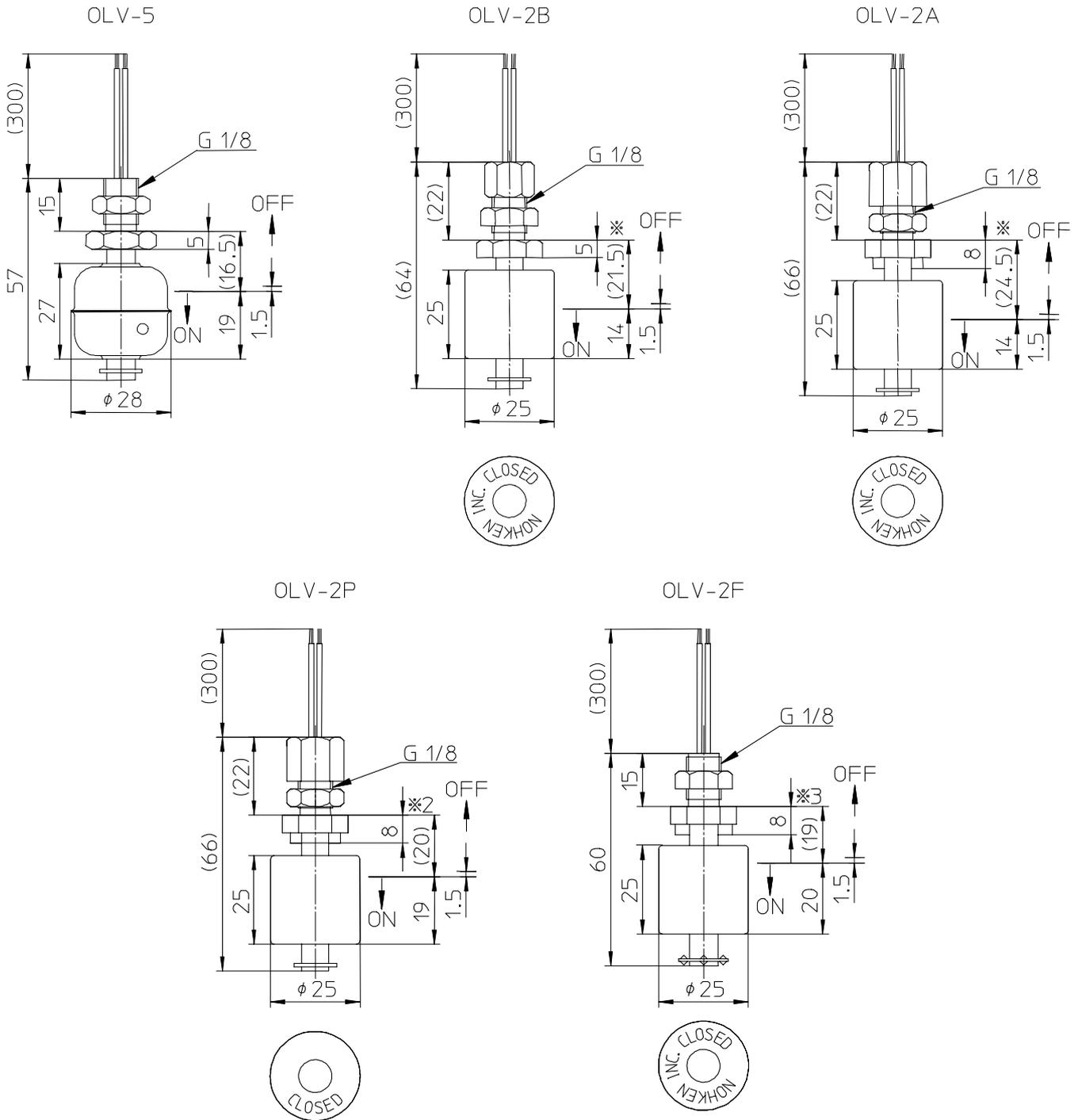
When direct current

R C



When direct/
alternating current

3.4 DIMENSIONS & OPERATION CHARACTERISTICS

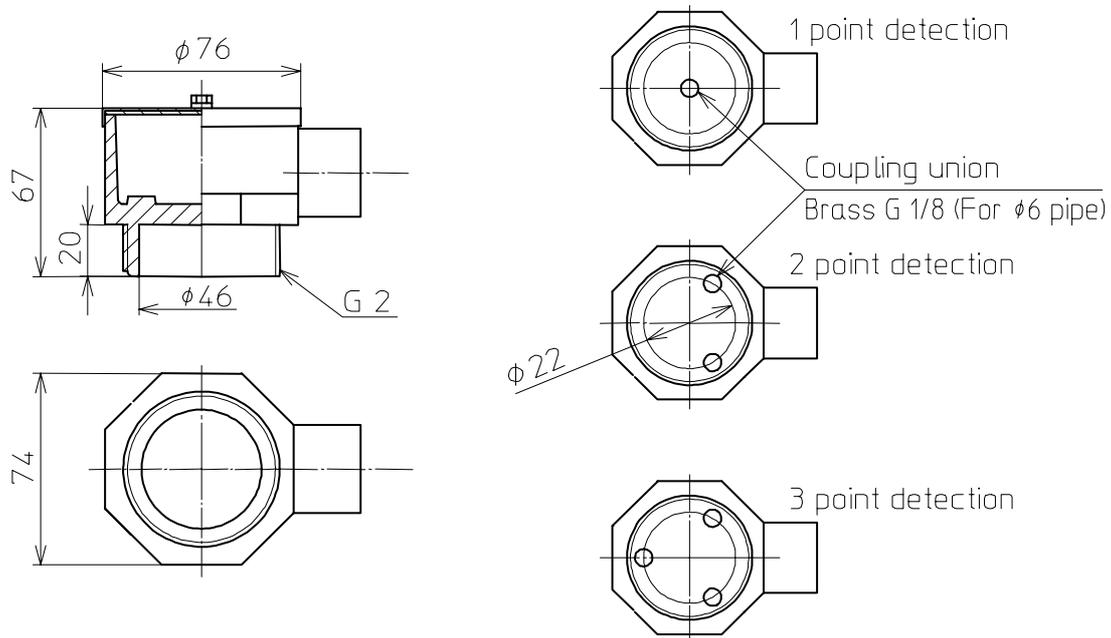


- * The drawings above shows when the specific gravity is 1, fall ON.
- * The operation changes from fall ON to rise ON by reversing the float.
When rise ON, the operating point (*) will be 2mm shorter than when fall ON.
Ex.: Operating point of the OLV-2A will be from 24.5 to 22.5.)
- For OLV-2P, the operating point (*2) will be 3mm shorter than when fall ON.
- For OLV-2F, the operating point (*3) will be 2.5mm shorter than when fall ON.
- For OLV-5, the operating point does not change.

4. USAGE OF THE OL SPECIAL PARTS

4.1 SPECIAL PARTS FOR OL

4.1.1 STANDARD TERMINAL BOX



- Materials

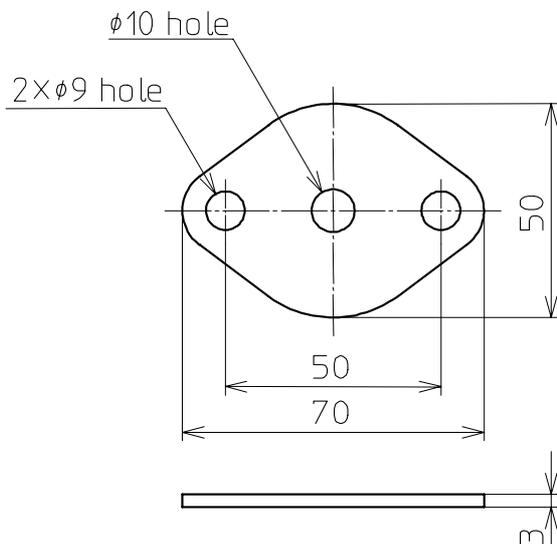
Stem : Phenol resin
 Cover : 304 Stainless steel
 Gasket : NBR

- Terminal : 6P

Number of the terminal

1 point detection: 2
 2 point detection: 4
 3 point detection: 6

4.1.2 STANDARD FLANGE



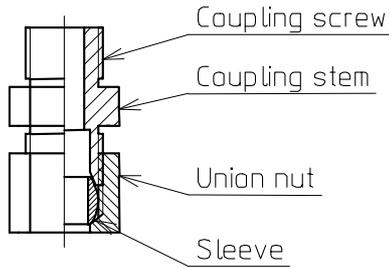
Material : SS (Chromium plating)

Accessories: Gasket (NBR)

- Same shape as the standard flange (10 hole changes to 30 hole)
- Thickness 1mm

* Silicone rubber is optionally available for the gasket.

4.1.3 COUPLING UNION



- Applicable pipe dimension: 6
- Materials and coupling screw A for the coupling union.

<Materials>	<Screw A>
1) Brass	: G1/8
2) POM	: R1/8
3) PP	: R1/8
4) 316 Stainless steel	: R1/8
5) 316 Stainless steel	: G1/8

*1 Sleeve for the 316 Stainless steel union is different from the drawing.

4.1.4 PIPES

<Materials>	<Dimensions>
1) Copper	: 6 × t 1
2) Aluminum pipe with PE covered:	: 6 × t 1
3) 304 Stainless steel	: 6 × t 0.5
4) 316 Stainless steel	: 6 × t 0.5

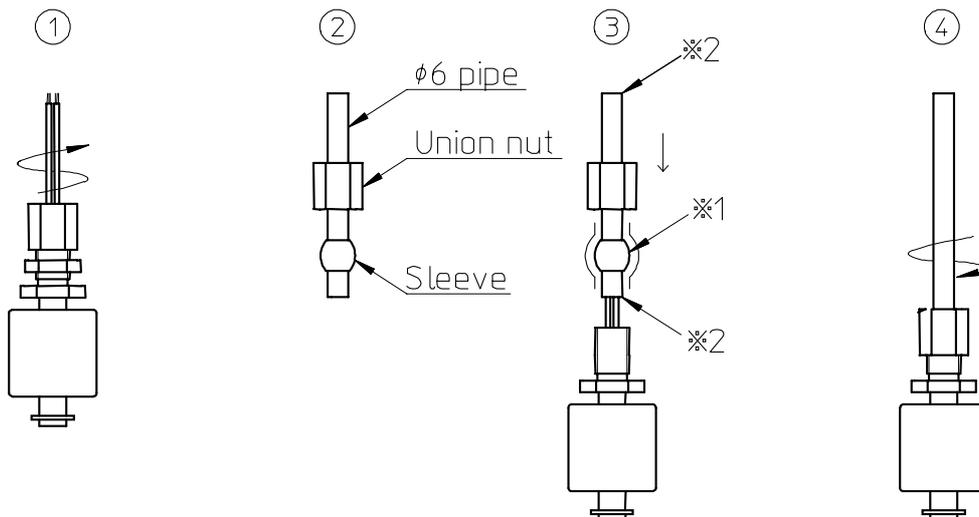
*2 Aluminum pipe with PE covered can be bent by your hands easily.

4.2 UNION INSTALLATION

4.2.1 SENSOR UNION (Standard accessory union for small level sensors)

- 1) Turn the union and the nut as drawing on the left and remove them.
- 2) Thread the union and sleeve onto the pipe.
- 3) Draw the lead wire through the pipe and insert into the stem.
- 4) Turn the union as drawing on the left and screw-in tightly.

Follow steps 1 to 4.

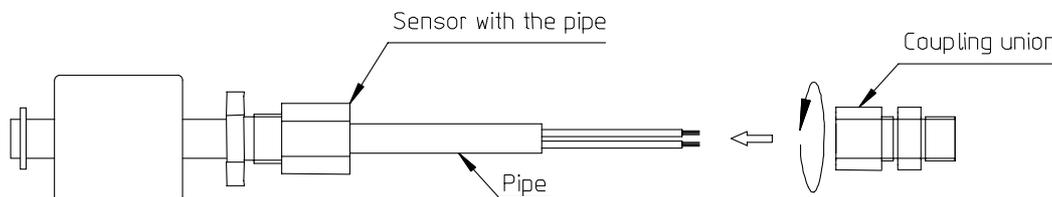


⚠ CAUTION

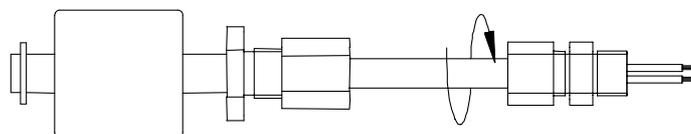
- When assembling the union, apply the silicon sealing compound to *1. Otherwise, the liquid may intrude into the pipe and damage the sensor.
- Chamfer and file to remove burrs from the tip of the pipe. Otherwise, the lead wire sheathe may be damaged and cause short circuit.
- When connecting OLV-2A/OLV-2P with the pipe on step 4, the torque for the resin union shall be 1.4 to 1.6 N·m. Otherwise, the union shall be damaged.

4.2.2 COUPLING UNION (Refer to 4.1.3)

- Loosen the union nut and insert to the pipe.



- Tighten the union nut.



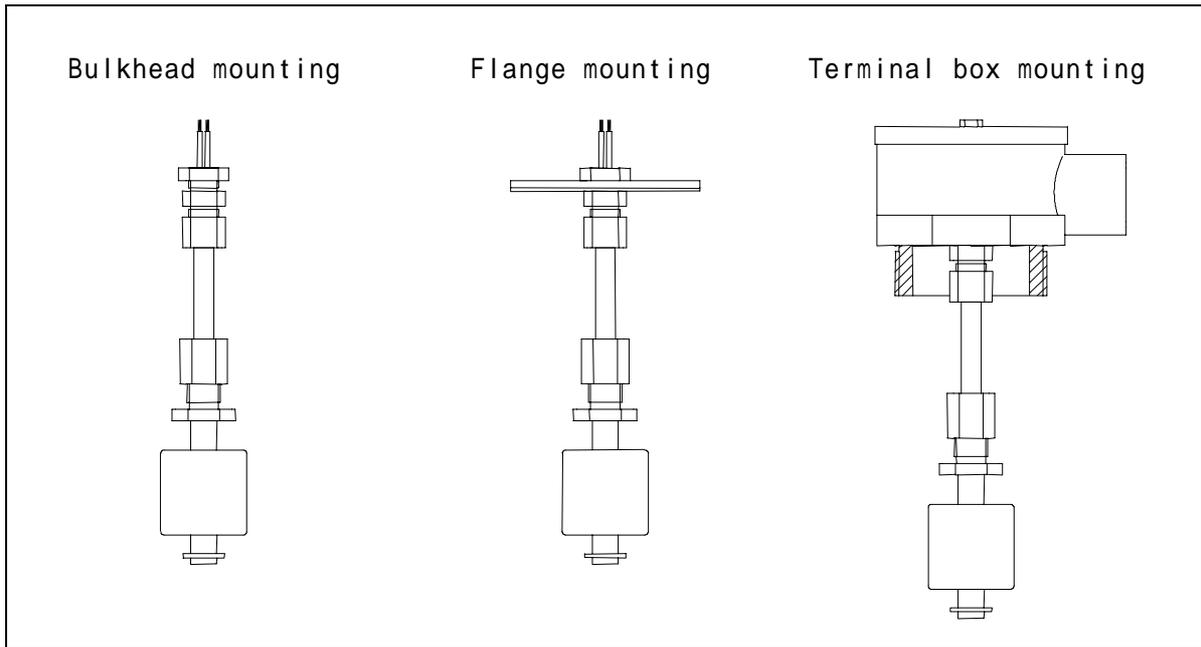
4.2.3 RECOMMENDED COMBINATIONS

	SENSOR UNION	PIPE	COUPLING UNION
OLV-2A	POM	Aluminum pipe with PE covered	Option
OLV-2P	PP	Aluminum pipe with PE covered	Brass(G1/8)+Nut(Brass)
OLV-2B	Brass	Copper	Option Brass (G1/8)
OLV-5	Option 316 Stainless steel	304 Stainless steel 316 Stainless steel	Option 316 Stainless steel (G1/8)

* Refer to 4.1, SPECIAL PARTS FOR OL.

* Material for the union and the pipe shall be comparable and similar.

4.3 ASSEMBLING SAMPLES

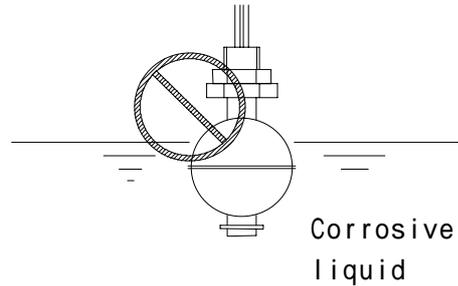


<REFERENCE>

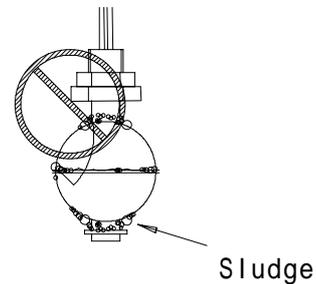
- We generally recommend you to assemble on site.
- The model which is assembled by Nohken before shipment is model OLV-10.
- If specifications are determined or it is used for the pressurized tank, we recommend to use our OLV-20 series (miniature level sensor, custom designed type).

5. HANDLING NOTES

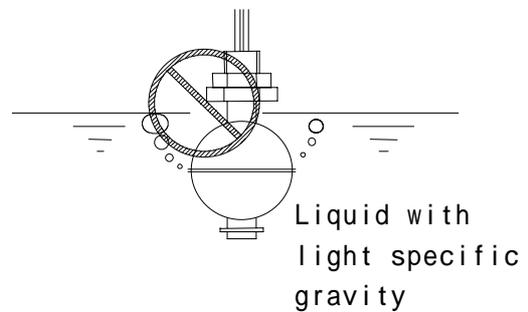
- 1) Select appropriate materials for the float when detecting corrosive liquids. Otherwise, the OL will be damaged.



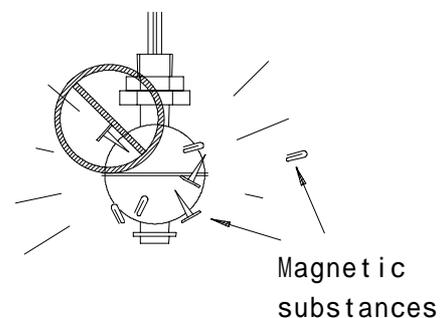
- 2) Clean the floats and housing periodically when detecting liquid is high viscous, presence of the sludge(*), adhesive and/or crystalline. Otherwise, the OL may cause malfunction.



- 3) If the specific gravity of the detecting liquid is too light, the float cannot rise with the liquid level. Refer to section 3.2, SPECIFICATIONS, and select appropriate models.

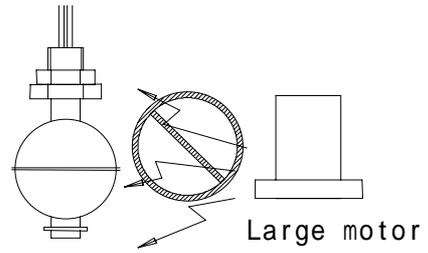


- 4) Do not use in the liquid which has metallic substances. Otherwise the OL will cause malfunction.

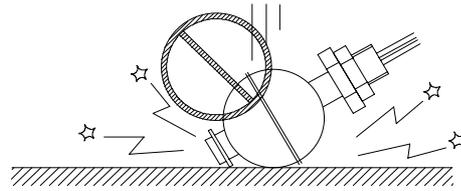


* See section 11 for the word explanation.

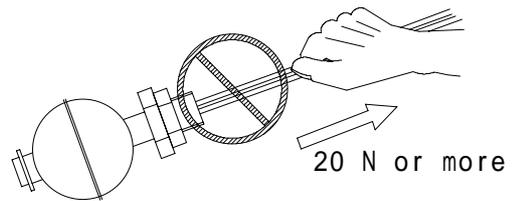
5) Do not use or store near large motors or strong magnetic fields. Otherwise, the OL will cause malfunction.



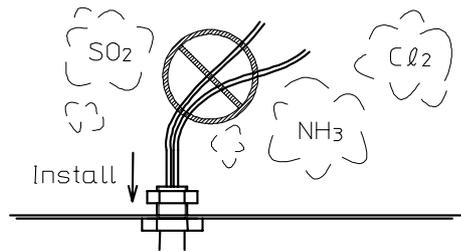
6) Avoid physical shock. Dropping, throwing or bumping will damage the sensor.



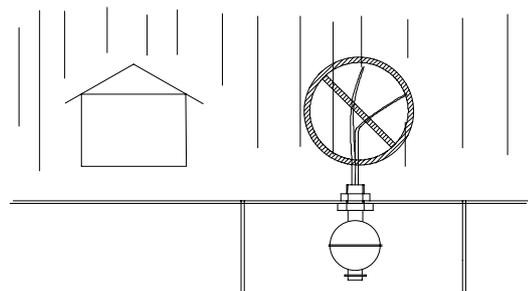
7) Do not pull the lead wire more than 20N. The internal circuit(*) will be damaged.



8) Do not use or store in a corrosive atmosphere (NH_3 , SO_2 , Cl_2 , etc.). Otherwise, the conductor will be corroded and conduction failure may occur.



9) The OL is not a water-proof construction. Do not use outdoors.

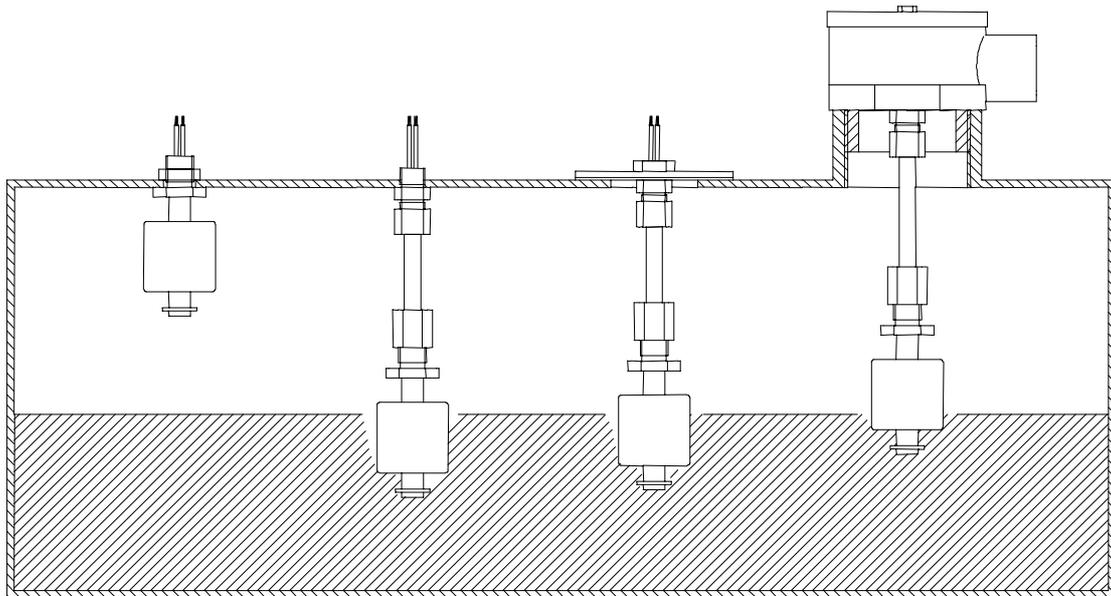


* See section 11 for the word explanation.

6. INSTALLATION

WARNING

Do not use in hazardous locations. The OL is not an explosion-proof.



1) BULKHEAD MOUNTING

- Hole dimension : 10mm
- Wall thickness : 10mm Max. (Without gasket)
- When using O-ring as a gasket, choose P8 (mounting screw G1/8).

2) SCREW-IN MOUNTING

- Mounting screw dimension: G1/8

3) FLANGE MOUNTING

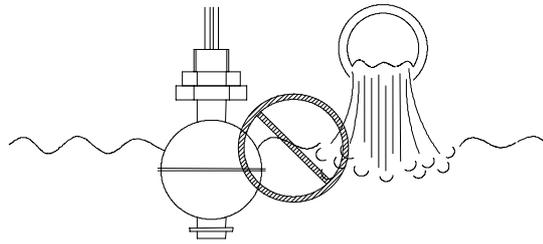
- Hole dimension : 30mm
- Bolt hole dimension: 9mm (2 holes, refer to 4.1.2, STANDARD FLANGE)
- Applicable bolt : M8 (2 bolts, bolt length depends on the plate thickness)

4) TERMINAL BOX MOUNTING

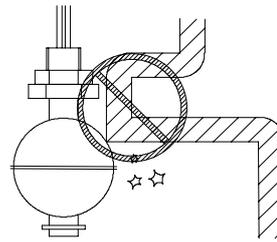
- Install a socket with mounting screw G2 or tap the G2 screw directly to the tank.
- Refer to 4.1.1, STANDARD TERMINAL BOX, for the shapes of the terminal box.

<LOCATION>

1) Do not locate near agitator or liquid inlets/outlets. The float operation will be unstable.



2) Make sure there is no obstruction for the float action such as pipes. Keep a certain free surface area to operate without interference.



7. WIRING

 **WARNING**

To avoid personal injury, the power supply shall be always turned off while wiring.

7.1 WIRING

The sensor provides 2 cores AWG22(0.3mm² equivalent). Therefore, we recommend to install solderless terminals or sleeves for connection. Then, bend the cores for easy crimp.

7.2 EXCESSIVE LOAD CAPACITY

Since the OL miniature level sensor provides a reed switch at the detecting point, the contact capacity is small. Do not exceed the contact rating.

Connect the relay or we recommend to use our relay unit model RE7000,RE7500 (Contact capacity 240V 5A AC resistive load) between the load for amplification if necessary.

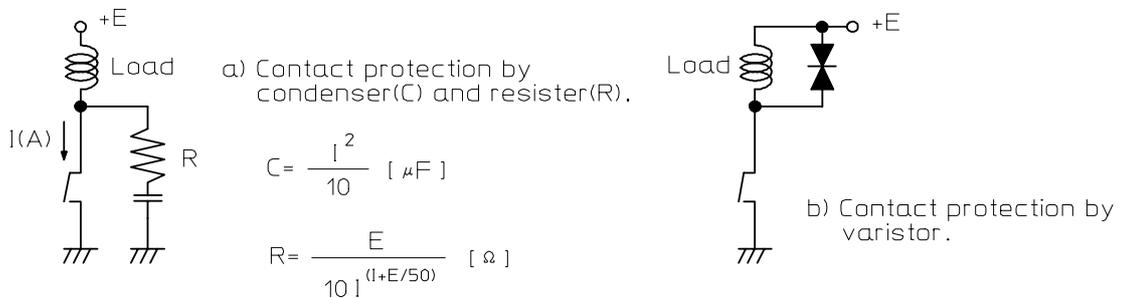
Control circuit of our relay unit is shown below.

Refer to our instruction manual for RE7000,RE7500 relay unit.

7.2.1 Protect circuit of switch contact

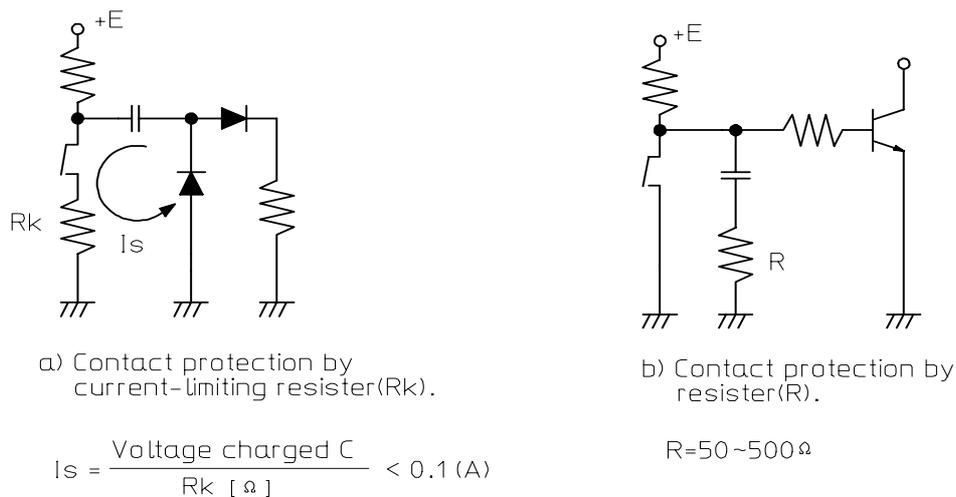
- (1) Recommend to set protective circuit against damage of switch contact and a short life by back electromotive voltage in case of using inductive load such as relay, solenoid, and transformer.

Refer to the diagram as below.

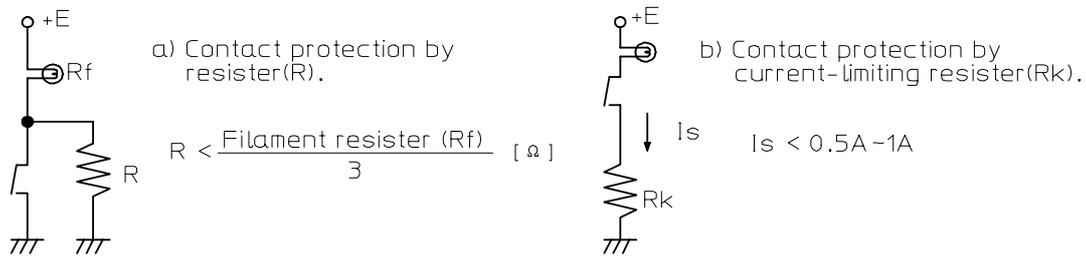


- (2) Recommend to set protective circuit against damage of switch contact and a short life, if the no-load current is flowing by charge and discharge from circuit including condenser to switch.

Refer to the diagram as below.



(3) Necessary to set protective circuit to connect with load like a lamp (electric filament lamp and etc.) due to the flowing inrush current right after turned ON. Refer to the diagram as below.

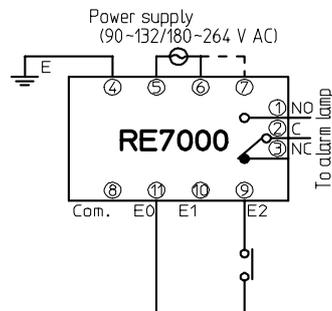


7.2.2 Model RE relay unit

We recommend the use of our relay unit model RE.

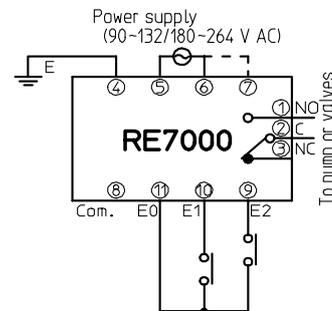
It is single level (alarm) and / or dual level (empty/fill control) relay. The latching (holding relay) feature allows pumps, valves and other devices to be turned on at one level and off at another. It also contribute to safety since it allows lower voltage and smaller currents to be used with sensor.

· SINGLE LEVEL ALARM



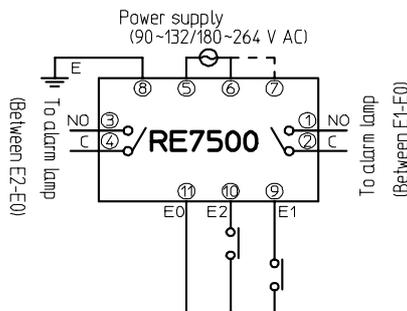
SELECT. SW. H.ON side : High alarm
 SELECT. SW. L.ON side : Low alarm

· DUAL LEVEL EMPTY/FILL CONTROL



SELECT. SW. H.ON side : Filling control
 SELECT. SW. L.ON side : Emptying control

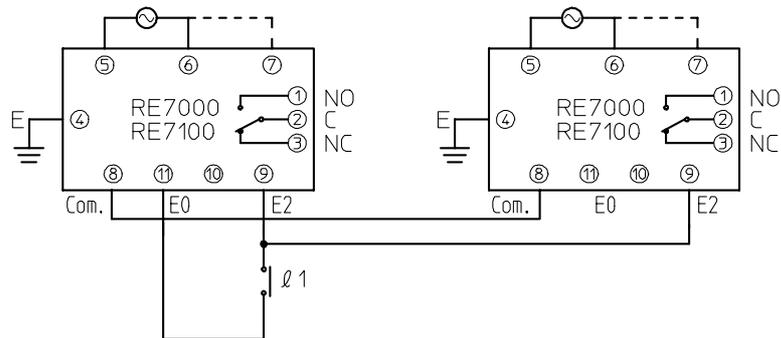
· SINGLE LEVEL ALARM



SELECT. SW. H.ON side : High alarm
 SELECT. SW. L.ON side : Low alarm

NOTE the following points:

- (1) Do not connect the plural relay unit to identical switch. Otherwise, the relay unit may be malfunction. (see Fig.6)



- (2) Power supply must be connected in phase. (see Fig.7)

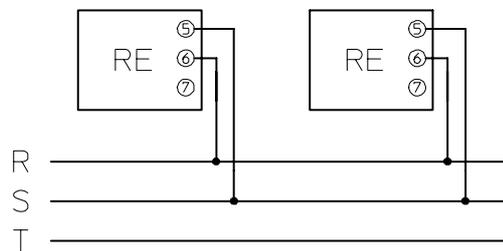


Fig 7

- (3) To avoid malfunction, the wiring distance should be used within specifications. If the wiring distance exceed specifications, the relay unit may be malfunction by stray capacitance between cables or noise.

8. MAINTENANCE & INSPECTION

Remove the sensor from the tank before maintenance. See section 5, HANDLING NOTES. Keep the ample space for maintenance.

8.1 REMOVING

8.1.1 Turn off the power supply.

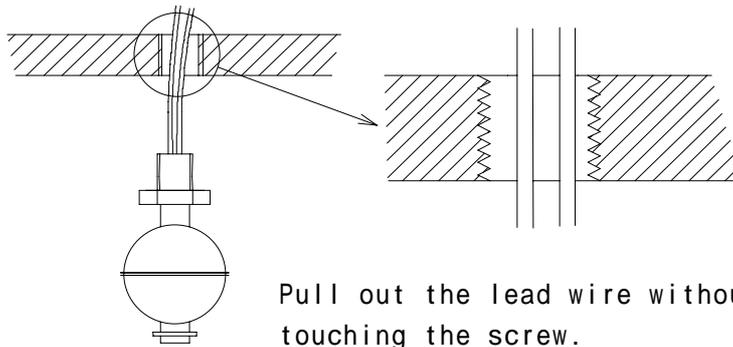
⚠ WARNING

To avoid personal injury, the power supply shall be always turned off while wiring.

8.1.2 Disconnect all wires.

⚠ CAUTION

When removing the sensor from the tank, pay attention not to nick the lead wire with a screw thread. Otherwise, the lead wire shall be broken.

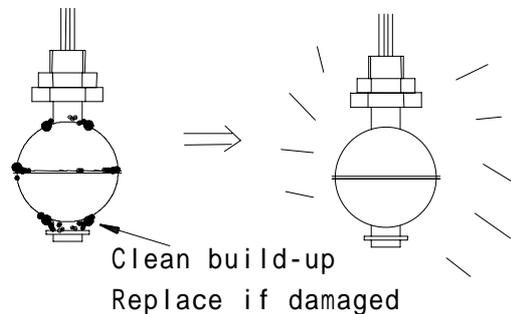
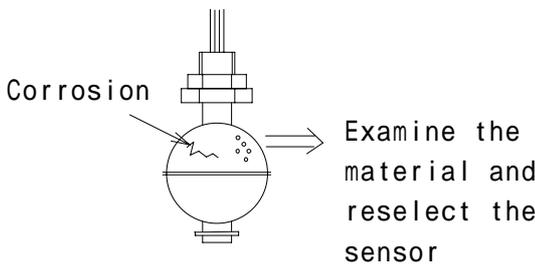
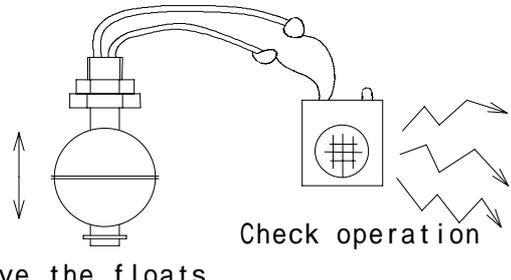


8.1.3 Unscrew the housing when bulkhead or screw-in mounting. Do not nick the lead wire with a screw thread.

8.1.4 Put the sensor on the flat and ample space.

8.2 MAINTENANCE & INSPECTION

Inspect the sensor semi-annually or annually. Since inspection intervals varies with applications and process conditions such as pressure, temperature and so on, we recommend you to inspect periodically.

<p>8.2.1 Check for and replace damaged/ collapsed parts.</p> <p>8.2.2 Clean contaminant or sticky material build-up on the float.</p>	 <p>Clean build-up Replace if damaged</p>
<p>8.2.3 Check for float/lead wire corrosion. If corroded, examine the appropriate material and replace it.</p>	 <p>Corrosion</p> <p>Examine the material and reselect the sensor</p>
<p>8.2.4 Connect an ohmmeter to lead wires. Check all the reed switch operation by moving the floats.</p> <p>Reading value is at break and 1 or less at make. If correct value is not read, see section 10, TROUBLESHOOTING.</p>	 <p>Move the floats</p> <p>Check operation</p>

8.3 RE-INSTALLATION

See section 6, INSTALLATION.

8.4 WIRING

See section 7, WIRING.

9. STORING

The sensor shall be stored under the following conditions when it is not used for a long time. Otherwise, the sensor may cause malfunction.

9.1 Environmental conditions are as follows:

- The storing temperature range is -10 to +50 .
- Relative humidity is 85% Max.
- No corrosive gases (such as NH_3 , SO_2 , C l_2 , etc.)
- Vibration is low.

9.2 Clean deposit or sticky material build-up on the float. Otherwise, the float operation will be affected after solidifying.

9.3 Wipe off the liquids on the sensor. Otherwise, the float may be corroded due to high concentration of chemicals or solvents by volatilization.

<REFERENCE>

Keep the sensor in sealed plastic bags with desiccant or other moisture-proof packing.

10. TROUBLESHOOTING

CAUTION

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

10.1 FLOAT RISES OR FALLS WITH THE LIQUID LEVEL. SWITCH DE-ACTIVATED.

10.1.1 FLOAT TRAVELS SMOOTHLY

<ALWAYS ON>

- Miswiring or short-circuited wiring. Wire correctly.
- Reed switch is damaged by sticking (*). Replace the sensor and provide The overload protection if necessary.
- Insulation is bad due to liquid penetration. Replace the sensor.

<ALWAYS OFF>

- The magnet inside the float is affected by strong magnetic field. Use shield or install in good location.
- Metallic substances sticks on the float. Clean the float and keep free from metallic substances.
- Check for miswiring or loose wiring. Wire correctly.

* See section 11 for the word explanation.

- Reed switch is damaged by welding (*). Replace the sensor and ensure your load does not exceed the switch rating. Provide the overload protection if necessary.
- The gap of leads expense and switch can not contact. Replace the sensor and keep away from shocks and/or vibrations.
- Conductors of lead wire are damaged by vapor and/or gas penetration. Replace the sensor and provide a protective tube if necessary.

10.1.2 FLOAT DOES NOT RISE OR FALL WITH THE LIQUID LEVEL

- The float buoyancy is too small. Check the liquid specific gravity and reselect the sensor.
- The float is stuck on the stem by sticky materials. Clean the float and keep free from adherents.
- Metallic float is damaged by ultrasound during ultrasonic cleaning and the liquid penetrates. Keep free from ultrasound or prepare the resin float sensor.
- Liquid penetration due to the float corrosion. Replace the sensor to anti-corrosive materials.
- The float is deformed and/or damaged by overpressure. Reselect the sensor and replace it.

10.2 FLOAT RISES OR FALLS WITH THE LIQUID LEVEL. SWITCH OFTEN DE-ACTIVATED.

- The float is pressed to the stem by liquid flow and/or turbulent. Provide a stilling tube (*) or install in good location.
- The float is in contact with the wall. Install in good location.
- The magnet inside the float is affected by strong magnetic field. Use shield or install in good location.

If above remedies are unsuccessful, ask Nohken for repair and/or replacement.

* See section 11 for the word explanation.

11. GLOSSARY

- Float : To move with liquid level to actuate the reed switch.
- Stilling tube : A depression in a container enough to reduce turbulence or flow of the liquid.
- Magnet : A part inside the float which makes or breaks the switch.
- Sticking : Problem of the damaged reed switch. The contact always makes due to overcurrent.
- Welding : Problem of the damaged reed switch. The contact always breaks due to overcurrent.
- Reed switch : The make-and-break type contact actuating by magnetic fields.
- Sludge : Water pollution object or sludge which precipitates in the sewage.
- Internal circuit : To contain the reed switch, lead wire and tube. It is inserted into the stem when using.

NOHKEN INC.

HEAD OFFICE : 15-29, Hiroshiba-cho, Suita-city, Osaka 564-0052, Japan.

TEL:06-6386-8141 FAX:06-6386-8140

TOKYO BRANCH OFFICE : 67, Kandasakumagashi, Chiyoda-ku, Tokyo 101-0026, Japan.

TEL:03-5835-3311 FAX:03-5835-3316

NAGOYA OFFICE : 3-10-17, Uchiyama, Chikusa-ku, Nagoya-city, Aichi 464-0075, Japan.

TEL:052-731-5751 FAX:052-731-5780

KYUSHU OFFICE : 14-1, 2-chome, Asano, Kokurakita-ku, Kitakyushu-city, Fukuoka 802-0001, Japan.

TEL:093-521-9830 FAX:093-521-9834