INSTRUCTION MANUAL

FOR

MAGNETOSTRICTIVE LEVEL MEASUREMENT

MODEL: MS 800

Issued 2014-03-13
Read and understand this manual for safe 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 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 to sales office at NOHKEN INC. for any question or comment about this manual and product.

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

<table>
<thead>
<tr>
<th>![WARNING]</th>
<th>Indicates a potentially hazardous situation which, if not paid attention to, could result in death, serious injury or serious disaster.</th>
</tr>
</thead>
<tbody>
<tr>
<td>![CAUTION]</td>
<td>Indicates a hazardous situation which, if not paid attention to, may result in minor or moderate injury or damage to the device.</td>
</tr>
<tr>
<td>![Prohibited]</td>
<td>Indicates a prohibited matter. The explanation with this mark shall be followed.</td>
</tr>
<tr>
<td>![Instructed]</td>
<td>Indicates an instructed matter. The explanation with this mark shall be followed.</td>
</tr>
</tbody>
</table>
### WARNING

This product is not explosion-proof construction. Do not install this product to the place where the flammable gas or vapor occurs. If installed, the flammable gas or vapor may be ignited, and serious disaster may occur. 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 occur. (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 occur.

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

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

### CAUTION

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.
<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Check and deeply consider the chemical compatibility for the material of product in advance. The part especially float, which is very thin, may be malfunctioned by minor corrosion.</strong></td>
</tr>
<tr>
<td><strong>Hold the stem very close to the mounting point, when carrying, installing, and removing. If held by the DIN terminal box, it may be taken off from the flange or plug, and the product may be damaged by dropping.</strong></td>
</tr>
</tbody>
</table>
| **The product is 50cm or longer**  
The product shall be kept horizontally. The product and other goods could be damaged, and minor injury may occur by falling. |
| **Provide arrester or surge absorber to avoid electrical impact such as lightning and static electricity. If not provided, the product and connected device may be malfunctioned, damaged, and fired, or minor injury and electric shock may occur.** |
INTRODUCTION
A) This manual specifies the specification of a general product. If you order a special product, some details of specification may be different with the manual.
B) We are glad to suggest and advise for Model selection and chemical resistance of material, but final decision has to be made by the customer.
C) This manual has been 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 parts may not be supplied. In this case, replacement parts or products 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 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 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, etc.
   C-c) Repair and modification are done by the person who is not an 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 "Purpose of use" 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 LEGAL RIGHTS.
# Table of Contents

1. PURPOSE OF USE .............................................. 1

2. DESCRIPTION ................................................. 1
   2.1 Description ............................................... 1
   2.2 Principle of operation .................................... 1

3. SPECIFICATIONS ............................................... 2
   3.1 Model numbering .......................................... 2
   3.2 Specifications ........................................... 2

4. HANDLING NOTES ............................................. 3

5. INSTALLATION ................................................ 4
   5.1 Unpacking ................................................ 4
   5.2 Mounting .................................................. 5
      5.2.1 Mounting location .................................. 5
      5.2.2 Mounting the sensor ................................ 5

6. WIRING ....................................................... 6
   6.1 Before Wiring ............................................ 6
   6.2 Component detail ......................................... 7
      6.2.1 DIN terminal box .................................... 7
      6.2.2 Terminal arrangement ................................ 7
      6.2.3 Fitting the cable .................................... 7
   6.3 Wiring ..................................................... 8
   6.4 Operation check .......................................... 8

7. PART NAME ................................................... 9

8. ADJUSTMENT .................................................. 10
   8.1 Necessary devices and tools ............................. 10
   8.2 Before adjustment ....................................... 10
   8.3 Zero point setting ....................................... 12
   8.4 Zero current setting ..................................... 13
   8.5 Span point setting ....................................... 13
   8.6 Span current setting ..................................... 14
   8.7 Assembly ................................................ 15

9. MAINTENANCE AND INSPECTION ................................. 16
   9.1 Maintenance and inspection .............................. 16
      9.1.1 Removing from the tank ............................ 16
      9.1.2 Maintenance procedure .............................. 17
      9.1.3 Mounting ........................................... 17
      9.1.4 Wiring ............................................... 17
      9.1.5 Output signal ....................................... 17
      9.1.6 Component replacement .............................. 17

10. STORING .................................................... 18

11. TROUBLESHOOTING .......................................... 19

12. GLOSSARY .................................................. 20
1. PURPOSE OF USE

Magnetostrictive level measurement MS800 is a level sensor that continuously detects a level of water, oil, chemical and other liquids, and gives a signal output to control alarms and pumps. Do not use the sensor for any other purpose.

2. DESCRIPTION

2.1 Description

MS800 continuously measures liquid levels using 24V DC power. The sensor is mounted on a tank using the threaded connection* or other process connections. It has a float* and a stem*. The sensor detects liquid levels as the float moves up and down on the stem as the liquid surface rises and falls.

2.2 Principle of operation

MS800 is comprised of a float in which a magnet* is attached, and a stem that incorporates a magnetostrictive wire*. The figure below shows the sensor inside. When a current pulse is passed through the magnetostrictive wire, a magnetic field encompasses the wire (Right-hand grip rule). If this wire is placed in an external magnetic field (from the magnet inside the float), the interaction generates a strain pulse that travels down the wire (Wiedemann effect). When the strain pulse reaches the coil, magnetic susceptibility is changed (Villari effect), and a voltage proportional to the magnitude of the pulse is generated at both ends of the coil. The time that elapsed from when a pulse current is applied to when a voltage is generated at the coil is measured and converted into a liquid level.

* Refer to 12. GLOSSARY.
3. SPECIFICATIONS

3.1 Model numbering

<table>
<thead>
<tr>
<th>Code</th>
<th>Wetted parts material</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>304 stainless steel (float: 316L stainless steel)</td>
</tr>
<tr>
<td>S6</td>
<td>316 stainless steel (float: 316L stainless steel)</td>
</tr>
<tr>
<td>TS</td>
<td>304 stainless steel (float: 316L stainless steel)</td>
</tr>
<tr>
<td>TS6</td>
<td>316 stainless steel (float: 316L stainless steel)</td>
</tr>
<tr>
<td>V</td>
<td>PVC (float: polypropylene foam)</td>
</tr>
<tr>
<td>P</td>
<td>PP (float: polypropylene foam)</td>
</tr>
<tr>
<td>F2</td>
<td>PVDF</td>
</tr>
</tbody>
</table>

3.2 Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>MS800S</th>
<th>MS800S6</th>
<th>MS800TS</th>
<th>MS800TS6</th>
<th>MS800V</th>
<th>MS800P</th>
<th>MS800F2</th>
</tr>
</thead>
</table>
| Operating characteristics
| Specific gravity | 0.8 | 0.8 | 0.8 | 0.8 | 0.85 | 0.85 | 0.9 |
| Electrical characteristics
| Power supply | 24V DC ±10%, 50mA Max. (except for approx. 10ms after powered up) |
| Output | 4 to 20mA DC |
| Allowable resistive load |
| Environmental
| Working temperature
| Wetted parts | -10 to +80℃ | -10 to +150℃ | -10 to +50℃ | -10 to +80℃ | -10 to +40℃ |
| Housing | -10 to +50℃ |
| Protection class | IP65 |
| Others
| Material
| Wetted parts | 304SS | 316SS | 304SS | 316SS | PVC | PP | PVDF |
| Float | 316LSS | 316LSS | 316LSS | 316LSS | PP foam | PP foam | PVDF |
| Housing assembly
| Housing | 304 stainless steel |
| Head | 304 stainless steel |
| Connector | PA |
| DIN terminal box | PA |
| Gasket | NBR |
| Sizes
| Threaded connection | G1 |
| Stem diameter | φ8 |
| Pressure on float (static pressure) | 2MPa Max. | 2MPa Max. | 2MPa Max. | 2MPa Max. | 1MPa Max. | 1MPa Max. | 1MPa Max. |
| Cable*1 | 3 core shielded cable (MVVS or equivalent) |
| Cable inlet | G1/2 (applicable cable: φ 6 to 13) |

*1 Supplied by customer.
4. HANDLING NOTES

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

Place the sensor horizontally on a flat surface. Do not place it upright, or it may fall and be damaged. Place wood pieces beneath the sensor to avoid rolling, bent stem or damaged float. Support the stem that is longer than 500mm with wood pieces at a 250mm interval.

When painting the sensor, ensure the nameplate is readable as it contains maintenance and other important information.

Avoid using or storing the sensor in corrosive atmosphere (NH₃, SO₂, Cl₂, etc.). Such atmosphere may enter into the sensor, and damage the circuit board.

Avoid using or storing the sensor where excessive vibration is expected. If such a location is inevitable, remove the source of vibration, or protect the sensor from receiving it.

Avoid using or storing in a place subjected to a strong magnetic field from a motor, solenoid valve or other devices, as the sensor operation will be adversely affected.

Do not measure liquids with metal pieces such as iron powder as they may adversely affect the sensor operation.
5. INSTALLATION

5.1 Unpacking

**WARNING**

MS800 is not of the explosion proof model. Never use it in areas where flammable or explosive gases or vapors are generated.

**CAUTION**

When carrying the sensor, hold it by two places, the housing and the stem end. Do not hold it by the DIN terminal box when mounting on or removing from the tank. The DIN terminal box may come off and the sensor may fall and be damaged.

Unpack and take out the sensor. Hold it by the housing and the stem end. Holding it by the stem only may bend the stem and damage components inside the sensor.

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

Completely remove tape, plastic, cupboard or other packing material. Those remaining on the sensor will cause faulty operation. Handle the sensor carefully not to damage the float. Tilting the sensor even slightly can move the float. It can slide on the stem and hit the threaded connection or the stopper*, resulting in float damage or change in strength of magnet inside the float, or moved stopper.

* Refer to 12. GLOSSARY.
Do not lay anything on the sensor to avoid deformation or damage due to the force applied.

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

Check the sensor for damage. If any, it may have been caused during transportation. Please contact our sales office.

5.2 Mounting

5.2.1 Mounting location

Ensure ample space above and around the tank for mounting and maintenance. Note that there must be enough space above the tank to accommodate the full length of the sensor. The space must be maintained after mounting the sensor for when maintenance is required.

When mounting the sensor, observe the following instructions. Failure to do so can result in faulty operation.

(1) Avoid proximity to outlet, agitator or other turbulent locations. These places affect correct movement of the float. When such locations are not avoidable, use a stillpipe*. Ensure the inner diameter of the stillpipe is larger than the float diameter + 20mm. If smaller, the float may touch the pipe wall, causing faulty operation. Provide a spacer* to prevent the float from touching the pipe wall.

(2) Avoid areas that are close to piping or other obstructions. They may hinder float movement and faulty operation may result.

5.2.2 Mounting the sensor

Tighten the sensor on the threaded connection onto the tank. The hexagon above the thread is of 46mm A/F. Use a suitable tool. Provide seal tape or a gasket as required.

* Refer to 12. GLOSSARY.
6. WIRING

6.1 Before Wiring

Disconnect power to the cable before wiring.

⚠️ WARNING ⚠️

Disconnect power before wiring, or electric shock, leakage, ignition or user injury due to short circuit can result.

⚠️ CAUTION ⚠️

DIN terminal box can be fitted in 4 orientations: 90, 180, 270 and 360 degrees. Ensure no water entry into the terminal box. Secure it firmly using sealing compound so that no debris, dust or rain water can enter inside.

Always use 3 core shielded cable (MVVS or equivalent). Do not run cable in parallel with power lines or magnetic switch cabling.

When the sensor is mounted on a plastic tank that is not grounded or the sensor mounting connection is of plastic material, ground the sensor using the earth terminal on the sensor. Inadequate grounding may result in incorrect output signals or other failure due to noise affection.

Remove debris, dust, or other foreign substances in the DIN terminal box. Metal chips especially can cause short circuit.

The screw on top of the DIN terminal box provides the sealing between the box and the connector, thus offering the IP65 rating. Pulling the cable or applying force on the DIN terminal box may generate a gap and compromise the sealing property.
6.2 Component detail

6.2.1 DIN terminal box

Always use the provided DIN terminal box. The box comprises of the following components.

Diagram:

6.2.2 Terminal arrangement

Arrangement of the terminals inside the DIN terminal box is as shown below.

Diagram:

6.2.3 Fitting the cable

If a cable gland is used to secure the cable, ensure the gasket grips the cable sheath and provides sealing.

The applicable outer diameters for cable are 6 to 13mm.

CAUTION

The gland on the DIN terminal box can be oriented in 90, 180, 270 and 360 degrees. Consider the gland orientation when wiring.
6.3 Wiring

See below for wiring of the sensor.

(1) When powered from Nohken PU2000 or MP2000

![Wiring Diagram]

(2) When powered from other power supplies

![Wiring Diagram]

6.4 Operation check

CAUTION

The sensor requires warm-up time of approximately 15 seconds. It will give about 22mA output when powered up. The output will correspond to the float level after the warm-up time.

Supply power to the sensor and check its operation before actual use. If it does not operate as expected, check for incorrect wiring. Contact our sale office for any question.
7. PART NAME

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Number</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>DIN terminal box</td>
<td>⑤</td>
<td>Stem</td>
</tr>
<tr>
<td>②</td>
<td>Connector</td>
<td>⑥</td>
<td>Float</td>
</tr>
<tr>
<td>③</td>
<td>Housing</td>
<td>⑦</td>
<td>Stopper</td>
</tr>
<tr>
<td>④</td>
<td>Threaded connection</td>
<td>⑧</td>
<td>External earth terminal</td>
</tr>
</tbody>
</table>
8. ADJUSTMENT

8.1 Necessary devices and tools
(1) DC digital ammeter that can measure currents between 4.000 and 20.000 DC.
(2) Phillips screwdriver

8.2 Before adjustment
(1) Disconnect power (24V DC) to the sensor.

⚠️ WARNING
Disconnect power before adjustment, or electric shock, leakage, or ignition or user injury due to short circuit can result.

(2) Remove the sensor from the tank.
(Not necessary if adjustment can be done with the sensor mounted on the tank.)

⚠️ CAUTION
When carrying the sensor, hold it by two places, the housing and the stem end. Do not hold it by the DIN terminal box when mounting on or removing from the tank. The DIN terminal box may come off and the sensor may fall and be damaged.

(3) Remove the 3 screws and the external ground terminal that are fixing the housing.
(4) Disconnect the connector from the housing, and then from the threaded connection.

(5) Connect the connector again, with the circuit board showing.

(6) Disconnect the load cable connected to the output terminals. Connect the DC digital ammeter to theses terminals.
8.3 Zero point setting

**WARNING**
Never touch electric devices not to be used for adjustment to avoid electric shock, leakage, ignition and short circuit.

**CAUTION**
The circuit board is not secured and can move easily. Make adjustment with the circuit pressed to the threaded connection. If separate, adjustment cannot be made correctly.

(1) Ensure all instructions in the 8.2 Before Adjustment are followed, and supply power (24V DC) to the sensor.

**CAUTION**
The sensor requires warm-up time of approximately 15 seconds. It will give about 22mA output when powered up. The output will correspond to the float level after the warm-up time.

(2) Supply power to the sensor. Wait for longer than 15 seconds, and ensure it is in the Measurement mode (LEDs are off).

*After approximately 30 seconds of inactivity, the sensor switches to the Measurement mode (the LEDs turn off). If the sensor switches to the Measurement mode before the adjustment is completed, make adjustment again from the start.*

(3) Place the float at the zero point (the lowest or specified position).
(4) Press the ZERO key for longer than 3 seconds.
   → The ZERO LED will flash, and the sensor will switch to the Zero setting mode.
(5) Press the ZERO key, and then the SPAN key without releasing the ZERO key.
   → The current reading is recorded as the zero point. The ZERO LED will turn on, and then off and the sensor will return to the Measurement mode.
(6) Check if the output is 4.00mA (or the specified value). If not, follow instructions in 8.4 Zero current setting. If the output is correct, proceed to 8.5 Span point setting.
8.4 Zero current setting

(1) Ensure the sensor is in the Measurement mode (LEDs are off).

* After approximately 30 seconds of inactivity, the sensor switches to the Measurement mode (the LEDs turn off). If the sensor switches to the Measurement mode before the adjustment is completed, make adjustment again from the start.

(2) Press the ZERO key, and then the SPAN key for longer than 3 seconds without releasing the ZERO key.
   → The ZERO and SPAN LEDs will flash alternately.

(3) Press the ZERO key.
   → The ZERO LED will flash, and the sensor gives an output for the zero point.

(4) Trim the output checking the value on an ammeter until 4.00mA or the specified value is gained.
   Press the ZERO key to decrease the value.
   Press the SPAN key to increase the value.

(5) After the output is trimmed, press the ZERO key, and then the SPAN key without releasing the ZERO key.
   → The current output value will be recorded. The ZERO LED will turn on, and then off, and the sensor will return to the Measurement mode.

8.5 Span point setting

(1) Ensure the sensor is in the Measurement mode (LEDs are off).

* After approximately 30 seconds of inactivity, the sensor switches to the Measurement mode (the LEDs turn off). If the sensor switches to the Measurement mode before the adjustment is completed, make adjustment again from the start.

(2) Place the float at the span point (the highest or specified position).

(3) Press the SPAN key for longer than 3 seconds.
   → The SPAN LED will flash, and the sensor will switch to the Span setting mode.

(4) Press the ZERO key, and then the SPAN key without releasing the ZERO key.
   → The current reading is recorded as the span point. The SPAN LED will turn on, and then off and the sensor will return to the Measurement mode.

(5) Check if the output is 20.00mA (or the specified value).
   If not, follow instructions in 8.6 Span current setting.
8.6 Span current setting

(1) Ensure the sensor is in the Measurement mode (LEDs are off).

* After approximately 30 seconds of inactivity, the sensor switches to the Measurement mode (the LEDs turn off). If the sensor switches to the Measurement mode before the adjustment is completed, make adjustment again from the start.

(2) Press the ZERO key, and then the SPAN key for longer than 3 seconds without releasing the ZERO key.
→ The ZERO and SPAN LEDs will flash alternately.

(3) Press the SPAN key.
→ The SPAN LED will flash, and the sensor gives an output for the span point.

(4) Trim the output checking the value on an ammeter until 20.00mA or the specified value is gained.
   Press the ZERO key to decrease the value.
   Press the SPAN key to increase the value.

(5) After the output is trimmed, press the ZERO key, and then the SPAN key without releasing the ZERO key.
→ The current output value will be recorded. The SPAN LED will turn on, and then off, and the sensor will return to the Measurement mode.
8.7 Assembly

(1) Disconnect power (24V DC) to the sensor.

--- WARNING ---

Disconnect power before adjustment, or electric shock, leakage, or ignition or user injury due to short circuit can result.

(2) Remove the connector from the circuit board.

(3) Connect the housing to the threaded connection.

(4) Connect the connector to the circuit board, and secure the housing with screws (3 places) and the external earth terminal. The location of the external earth terminal is indicated with an “E” marking.
9. MAINTENANCE AND INSPECTION

9.1 Maintenance and inspection
The sensor has to be removed from the tank for maintenance.
Read section 4. Handling Notes before starting. Ensure ample space for maintenance.

9.1.1 Removing from the tank
(1) Disconnect power to the sensor.

WARNING
Disconnect power before adjustment, or electric shock, leakage, or ignition or user injury due to short circuit can result.

(2) Remove the DIN terminal box, and disconnect cabling on the sensor.

CAUTION
When carrying the sensor, hold it by two places, the housing and the stem end. Do not hold it by the DIN terminal box. The DIN terminal box may come off and the sensor may fall and be damaged.

(3) Loosen the threaded connection. Hold the sensor by the housing and remove it from the tank.

(4) Place the sensor on a flat surface.
9.1.2 Maintenance procedure

Perform maintenance and inspection once or twice a year. More frequent maintenance will be required depending on operating conditions such as frequency of use, material type, temperature, and pressure.

(1) Check for visible damage that may impair performance. Repair or replace if any.
(2) Check for buildup on the float, and remove if any.
    Be careful for the float orientation when it is removed and then assembled again. The portion with a marking ("○" or "CLOSED") goes to the stem end.
(3) Remove debris, dust, or metal chip from the DIN terminal box, if any.
(4) Check if the stopper is properly secured. Retighten with a tool if loose.

9.1.3 Mounting

See 5.2 Mounting.

9.1.4 Wiring

See 6. WIRING.

9.1.5 Output signal

Check if the output is correct.
    If wrong, adjustment is required. See 8. ADJUSTMENT.

9.1.6 Component replacement

If a component is in the following state, replace it with a new one. All new components must be of an suitable specifications, and provided by Nohken. Be careful since some components look the same but are of different specifications.

    Float: Corrosion or damage that may impair performance is found.
10. STORING

(1) Observe the following instructions when storing the sensor after delivery before use, or after removing from the tank. Failure to do so can result in faulty operation. Store the sensor in the following conditions.
- Temperature: -10 to +50°C
- Humidity: 85% RH Max.
- Vibration: not excessive
- Atmosphere: not corrosive (without NH₃, SO₂, Cl₂, etc.)

(2) Protect the sensor from rain or other liquid. The DIN terminal box becomes drip-proof only when attached to the connector, and with an adequate sealing on the cable inlet. Without these, rain water may ingress into the terminal box.

(3) Seal the cable inlet with a cap, or dust may enter in the DIN terminal box. Place the sensor so that the cable inlet points downwards.

(4) Remove buildup, if any. Buildup left near the float can harden and adversely affect operation when the sensor is used the next time.

(5) Use wood pieces as shown to the right to prevent the sensor from rolling, float damage, or bent stem. If the stem is 500mm or longer, support it at a 250mm interval.

(6) Do not lay anything on the sensor. It may deform, or be damaged due to excess force applied.

REFERENCE
Wrap the sensor with polyethylene sheet and seal it to protect from moisture and dust. If the sensor is stored where temperature change is enormous, enclose desiccant such as silica gel in the polyethylene sheet.
# 11. TROUBLESHOOTING

**CAUTION**

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

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Possible cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>No output.</td>
<td>Power fault.</td>
<td>Ensure 24V DC±10% is supplied.</td>
</tr>
<tr>
<td></td>
<td>Incorrect wiring.</td>
<td>Wire correctly.</td>
</tr>
<tr>
<td></td>
<td>Damaged controller or sensor.</td>
<td>Contact our sales office for repair.</td>
</tr>
<tr>
<td>Reading fluctuates.</td>
<td>Turbulence.</td>
<td>Use a still pipe.</td>
</tr>
<tr>
<td></td>
<td>Magnetic field affection.</td>
<td>Use a shield.</td>
</tr>
<tr>
<td>Output does not change.</td>
<td>Buildup is obstructing float</td>
<td>Clean the float periodically.</td>
</tr>
<tr>
<td></td>
<td>movement.</td>
<td></td>
</tr>
<tr>
<td>Output stays at approx.</td>
<td>The stopper and float have</td>
<td>Attach the stopper and the float again. Remove the cause for fallen stopper/float.</td>
</tr>
<tr>
<td>2 mA DC.</td>
<td>fallen down.</td>
<td></td>
</tr>
<tr>
<td>Output stays at approx.</td>
<td>Float has sunk.</td>
<td>Check for chemical compatibility and specific gravity of the material.</td>
</tr>
<tr>
<td>4 mA DC.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Threaded connection</th>
<th>Component to mount the sensor on a tank.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Float</td>
<td>Component that floats on liquid, and whose movement is used to detect a liquid level.</td>
</tr>
<tr>
<td>Stem</td>
<td>Rod on which the float moves up and down. Incorporates a magnetostrictive wire.</td>
</tr>
<tr>
<td>Magnet</td>
<td>Component that creates a magnetic field that affects the magnetostrictive wire.</td>
</tr>
<tr>
<td>Magnetostrictive wire</td>
<td>Wire made in a material that twists due to change in the surrounding magnetic field. Detects the location of the magnet.</td>
</tr>
<tr>
<td>Stopper</td>
<td>Component that prevents the float from moving too far.</td>
</tr>
<tr>
<td>Stillpipe</td>
<td>Pipe that protects the sensor from excessive turbulence or massive flow to prevent faulty operation.</td>
</tr>
<tr>
<td>Spacer</td>
<td>Component in the stillpipe that prevents the float from contacting the pipe wall.</td>
</tr>
</tbody>
</table>