With the rapid development of science and technology, high and new technology has been widely used in various industries. The high-tech sensor of magnetostrictive level transmitter is applied to the liquid level measurement of various storage tanks. The liquid level meter has the characteristics of high precision, strong environmental adaptability and convenient installation. Therefore, it is widely used in liquid level measurement fields such as petroleum and chemical industry. It has gradually replaced other traditional sensors and become the best in liquid level measurement. In the liquid storage tanks of PetroChina, Sinopec and various industrial occasions, the measurement of the liquid in the storage tanks mostly adopts manual climbing tank and measuring with ruler. Measure with metric steel tape with heavy hammer or scale with scale, record the reading manually, check the table manually for conversion, and finally get the oil quantity data. This method is not only labor-intensive, but also unsafe and can not guarantee the accuracy. In some places, measurement with capacitive / diffused silicon pressure liquid level gauge. Due to the serious zero drift, large measurement deviation and poor long-term stability of this kind of sensor, it is not popular with users. In some places, equal pressure diaphragm level gauge or mechanical float level gauge is used. However, due to the influence of temperature and air leakage, the mechanical float level gauge is often stuck, so it has not been widely used.
Working principle

The Magnetostrictive level transmitter consists of three parts: probe rod, circuit unit and float. When measuring, the circuit unit generates current pulse and this pulse transmits downward along the magnetostrictive line and thus generates a ring-form magnetic field. On the outside of the probe rod is a float, which moves up and down along the probe rod with the change of the liquid level. The float also generates a magnetic field due to a set of permanent magnetic inside the float. When the current magnetic field meets the float magnetic field, a “twist” pulse, or “return” pulse, is generated. The time difference between the “return” pulse and the current pulse is converted into a pulse signal, which calculates the actual position of the float and measures the liquid level.

Outline drawing (Reference)

Case one
Material: PVDF
Typical application: Photovoltaic semiconductor industry

Case two
Material: SUS304
Typical application: Petrochemical industry, equipment manufacturing industry

Case three
Material: SUS304
Typical application: Grain and oil, central air conditioning industry
**Technical parameters**

<table>
<thead>
<tr>
<th>Measure object</th>
<th>1~2 positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>+24VDC±10%</td>
</tr>
<tr>
<td>Output method</td>
<td>0~5VDC</td>
</tr>
<tr>
<td>(reverse output</td>
<td>-5~5VDC</td>
</tr>
<tr>
<td>can be selected)</td>
<td>-10~+10VDC</td>
</tr>
<tr>
<td></td>
<td>4~20mA</td>
</tr>
<tr>
<td>Effective range</td>
<td>G.F structure: 50~5000mm</td>
</tr>
<tr>
<td></td>
<td>R structure: 4000~20000mm (can be customized according to customers’ special requirements)</td>
</tr>
<tr>
<td>Load characteristics</td>
<td>Current output</td>
</tr>
<tr>
<td></td>
<td>Voltage output</td>
</tr>
<tr>
<td>Working current</td>
<td>&lt;70mA</td>
</tr>
<tr>
<td>Working temperature</td>
<td>-40<del>85℃, -40</del>120℃, -40~200℃</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40~100℃</td>
</tr>
</tbody>
</table>

**Performance indicators**

| Nonlinear error   | ≤±0.05% F.S. Maximum error of measuring range below 300mm is 150μm |
| Repeatability error | ≤±0.002% F.S. |
| Resolution        | Use 16bitD/A conversion |
| Hysteresis        | ≤±0.002% F.S. |
| Temperature effect | ≤0.007% F.S./℃ |
| Zero adjustable range | 100% F.S. |
| Update time / sampling frequency | Range related, no more than 20ms |

**Structural material**

| Measuring rod structure   | Rigid measuring rod structure, Flexible measuring rod structure, Anti-corrosion rod structure |
| Measuring rod material    | SUS304, SUS316L, PP/PVDF |
| Withstand voltage         | Determined by selected float pressure |
| Electronic warehouse shell material | Stainless steel, aluminum |
| Electronic silo construction | Type A stainless steel, Type B aluminum alloy, Type C PP, Type D PVDF |
| Installation interface    | Threaded connections |
| Entry cable               | Straight out cable, aviation plug, terminal block |
| Explosion-proof marks     | ExdIIBT5 (flameproof type) |
| Protection grade          | IP65 (IP67 or IP68 can be achieved according to customer requirements) |

**Technology principle**

The Magnetostrictive level transmitter is used to measure the liquid level in the storage tank. Its advantages are as follows:

**High reliability**: Because the Magnetostrictive level transmitter adopts the wave guide principle and no mechanical movable part, there is no friction and wear. The whole converter is enclosed in stainless steel tube, and the measuring medium is not in contact. The sensor works reliably and has a long life.

**High precision**: Because the Magnetostrictive level transmitter works with the Waveguide pulse. The measured displacement is determined by measuring the time of the starting pulse and the ending pulse. Therefore, the measurement accuracy is high,
and the resolution is better than 0.01% F.S., which is difficult to achieve with other sensors.

**Good safety:** the Magnetostrictive level transmitter has high explosion-proof performance, safe and explosion-proof, safe to use. Especially suitable for the measurement of chemical raw materials and flammable liquids. It is not necessary to open the can over during measurement to avoid the unsafety of manual measurement.

**The Magnetostrictive level transmitter is easy to install and maintain:** The Magnetostrictive level transmitter is generally installed through the existing pipe orifice on the top of the tank, especially suitable for the installation of underground storage tank and put into operation storage tank, and can be installed without affecting normal production.

**Convenient for system automation:** The secondary instrument of the magnetostrictive level transmitter adopts standard output signal, which is convenient for the microcomputer to process the signal, easy to realize the networking work, and improve the automation

### Installation method

#### 一、Precautions before installation

Read all installation instructions carefully to prevent the installed ambient temperature, shock, vibration and pressure from exceeding the allowable range of the sensor; do not bend the measuring rod and do not shock the electronic electronic components or end of the transmitter. The sensor shall not be used in inflammable, explosive or corrosive, vapor and liquid situations where there is chemical reaction or other situations where there is damage to the sensor; the electronic parts of the sensor are splash-proof but not submersible, and the liquid must not be immersed above the six-square base. After installation, the measuring rod shall be protected.

#### 二、Installation method

Clamp the sensor with the sensor bracket and secure the bracket to the thread of the sensor with a lock nut. The open magnetic ring is fixed on the magnetic ring bracket with two anti-loosening washers #6 and two special screws M3x12, when the magnetic ring is installed on the measuring rod. The head of the screw shall be towards the six-sided base; the magnetic ring should be concentric with the measuring rod and have no contact with it as far as possible. However, a slight eccentricity of the magnetic ring will not affect the performance of the sensor. The fixing strip should be tightly wound around the end of the measuring rod and fixed with two M3×6 screws and two M3 nuts. Note: the MK-1 installation accessories strip, which is fixed within 50mm from the end of the rod; there are three fixed slats in the mounting attachment of MK-2. One is fixed within 25mm of the end, and the other two are arranged on the measuring rod. Finally, the whole sensor will be installed according to the installation requirements with self-made screws can be fixed.
### Attached 1: Selection table

**Magnetostrictive level transmitter**

- **Z:** Conventional type; **E:** Explosion proof type
- **Fl:** DN50PN1.0 flange; **M:** M20x1.5; **N:** 3/4” NPT; **S:** For special specifications, the user needs to tell us
- **R:** Soft probe; (metal material not applicable); **Y:** Hard probe
- **1:** 304; **2:** 316; **3:** PP; **4:** PVDF; **5:** 316L; **6:** PFA; **S:** Special material to note
- **50-30000 mm (Customized)**

#### Measuring type
- **A:** Level; **B:** Double level; **C:** Level + temperature

#### Float Ball types
- **T1:** -40~85°C
- **T2:** -40~120°C
- **T3:** -40~200°C

#### Measuring range
- **Select from the next Float Ball table**

#### Code | Signal Output | Power supply |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4~20mADC</td>
<td>+24VDC+10%</td>
</tr>
<tr>
<td>B</td>
<td>0~5VDC</td>
<td>+24VDC+10%</td>
</tr>
<tr>
<td>C</td>
<td>0~10VDC</td>
<td>+24VDC+10%</td>
</tr>
<tr>
<td>D</td>
<td>-5~5VDC</td>
<td>+15VDC+10%</td>
</tr>
<tr>
<td>E</td>
<td>-10~10VDC</td>
<td>+15VDC+10%</td>
</tr>
<tr>
<td>F</td>
<td>Modbus RS485</td>
<td>+24VDC+10%</td>
</tr>
<tr>
<td>G</td>
<td>Hart 4~20mA</td>
<td>+24VDC+10%</td>
</tr>
</tbody>
</table>

#### Lead mode
- **0:** Cable;
- **1:** Aviation plug; (not applicable to flameproof products)
- **2:** SUS304 junction box;
- **3:** SUS316L junction box;
- **4:** PP junction box;
- **5:** PVDF junction box;
- **6:** 300 wire box

#### Measuring liquid material
- **0:** Special liquid material to note
- **A:** Level;
- **B:** Double level;
- **C:** Level + temperature
Attached 2: Magnetic float select table

Selection No: 1
Material: SUS316
Density: 0.55g/cm³
Proof Pressure: 2.5MPa

Selection No: 2
Material: SUS316
Density: 0.80g/cm³
Proof Pressure: 2.5MPa

Selection No: 3
Material: SUS304
Density: 0.40g/cm³
Proof Pressure: 2.5MPa

Selection No: 4
Material: SUS316
Density: 0.66g/cm³
Proof Pressure: 2.5MPa

Selection No: 5
Material: SUS316
Density: 0.50g/cm³
Proof Pressure: 1.0MPa

Selection No: 6
Material: SUS316
Density: 0.90g/cm³
Proof Pressure: 2.5MPa

Selection No: 7
Material: Polypropylene
Density: 0.77g/cm³
Proof Pressure: 2.0MPa
Note: Suitable for measuring gasoline—water interface

Selection No: 8
Material: Polypropylene
Density: 0.93g/cm³
Proof Pressure: Suitable for high pressure
Note: Suitable for measuring diesel—water interface

Selection No: 9
Material: SUS316
Density: 1.10g/cm³
Proof Pressure: 2.5MPa

Selection No: 10
Material: PVDF
Density: 0.85g/cm³
Proof Pressure: 1.0MPa
Note: Suitable for measuring acid solution

Selection No: 11
Material: PP
Density: 0.85g/cm³
Proof Pressure: 1.0MPa
Note: Suitable for measuring lye solution

Selection No: 12
Material: PFA
Density: 0.85g/cm³
Proof Pressure: 1.0MPa
Note: Suitable for measuring acid and lye solution

Remark: This product can take special customization.