METERY TECHNOLOGY INC

Magnetostrictive Level Meter MT100ML series

Operation Manual

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Two-wire Magnetostrictive Level Sensor

Two-wire magnetostrictive level sensor is a new generation of high-prevision level measuring sensor researched and manufactured with magnetostrictive principle. It is characterized by high prevision, high reliability, long life, high stability, exquisite structure, strong environmental adaptability and convenient installation, and compared with the level sensors of other principles, it has significant advantages. It can be widely used in the level monitoring, measuring and control of tanks, pools and grooves for petroleum, chemical industry, pharmacy and food etc.

1. Work principle

The structure of magnetostrictive level sensor consists of stainless steel tube (measuring rod), magnetostrictive wire (waveguide wire), moveable floater (with permanent magnetic) etc., as shown in Figure 1.

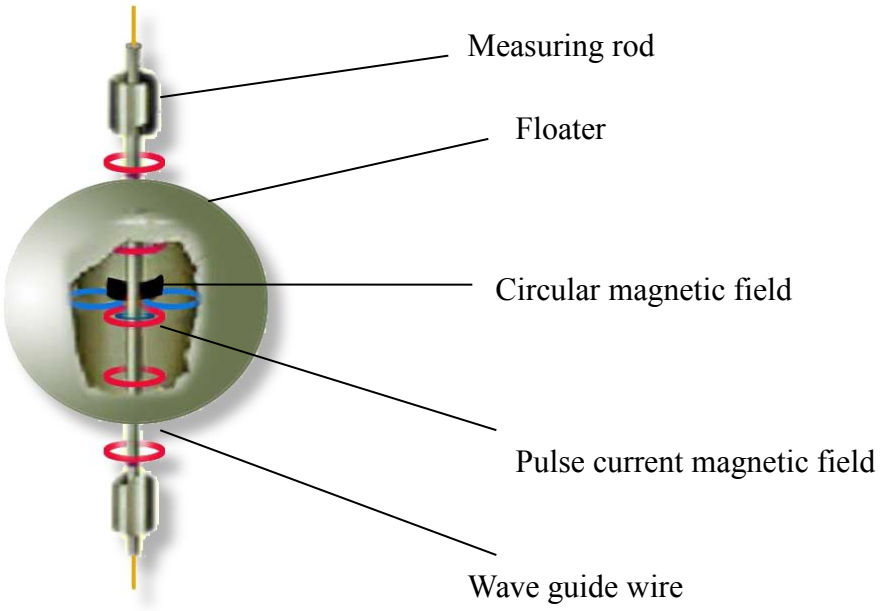

Figure 1 Magnetostrictive level sensor

During working of the sensor, the circuit part of the sensor excites pulse current on the waveguide wire, and the current will generate pulse current magnetic field when transmitted along the waveguide wire. There is a floater outside the sensor measuring rod, which can move up and down with the level along the measuring rod. Within the floater, there is a group of permanent magnetic ring. When the pulse current magnetic

field meets the circular magnetic field generated by the floater, the magnetic field surrounding the floater will be changed, so that the waveguide wire made of magnetostrictive material generates a torsional wave pulse in the position of floater, and this pulse is transmitted back along the waveguide wire at a fixed speed and is detected by the detection mechanism. By measuring the time difference between the pulse current and torsional wave, it is possible to accurately determine the position of floater, i.e. the position of level.

2. Main performance characteristics

● Advanced principle, more functions, wide application scope

● High precision, stability, reliability and resolution

● Non-contact measuring, long service life

● Low power consumption, high cost performance

● 4-20mA two-wire output mode

● Exquisite structure, strong environmental adaptability, pollution-proof, dustproof and waterproof (IP 65)

● Simple installation and debugging, convenient maintenance

●Wide application scope of power supply voltage, strong anti-jamming capacity

● Real-time measuring, liquid display

● Reverse polarity protection function

● Lightening protection, RF disturbance resistance

3. Technical parameters

3.1 Power supply: 24VDC±2.4VDC

3.2 Work temperature: -40℃- +70℃; Medium temperature max 200 C Degree

3.3 Main technical performance indicators

3.3.1 Measuring range: hard rod 0.2m-5m; soft cable 5-14m;

3.3.3 Output form: standard two-wire system 4-20mA; Hart, RS485 Communication optional

3.3.3 Nonlinearity error: ±0.05%F.S; maximum error 150um for range below 300mm;

3.3.4 Response time: <1s;

3.3.5 Resolution rate: 16it D/A conversion

3.3.6 Reputability

3.3.6 Repeatability: ≤0.05%FS;

3.3.7 Hysteresis: ≤0.05%FS;

3.3.8 Output temperature drifting: 50ppm/℃;

3.3.9 Zero full scale adjustable range: 1005 F.S;

3.3.10 Insulation resistance: 50V, 50MΩ;

3.3.11 Dead zone: standard dead zone: upper dead zone: 1500mm; lower dead zone: 50mm (may be changed appropriately as required by the user)

3.4 Other parameters

3.4.1 Material: measuring rod material 0Cr18Ni9, 1Cr18Ni9Ti, sealing material chemigum

3.4.2 Wiring mode: four-direction wiring terminals;

"+" position : power positive; **-" position:** power earth; **"EARTH" position:** connected to earth or cable shield

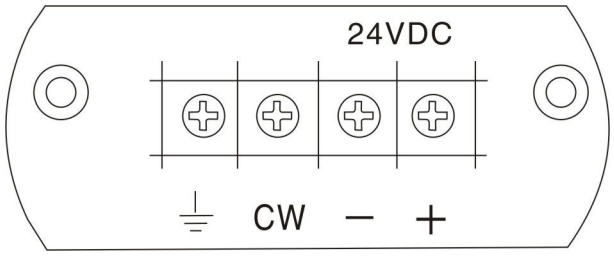

Figure 2 Schematic diagram of wiring position

3.4.3 Medium used: applicable to the measuring of clean level like water, oil and alcohol.

3.4.4. Measuring rod pressure resistance ≤3MPa. High pressure customized accepted.

3.4.5 Tightness: all sealing faces contacting with the medium are welded, without leakage when examined with 1.5-time use pressure; chemigum O-ring sealing is used between the electronic case base and external shield, waterproof joint and tail cover; the tail cover and external shield are of welding sealing, without leakage when examined with 0.4MPa pressure.

3.4.6 Appearance: the sensor appearance should conform to the drawing requirements, and the mark plate should be clear and complete.

3.4.7 Connection form: M18×1.5, M20×1.5, M27×1.5 or specially customized as

required by the user

4. Product appearance diagram

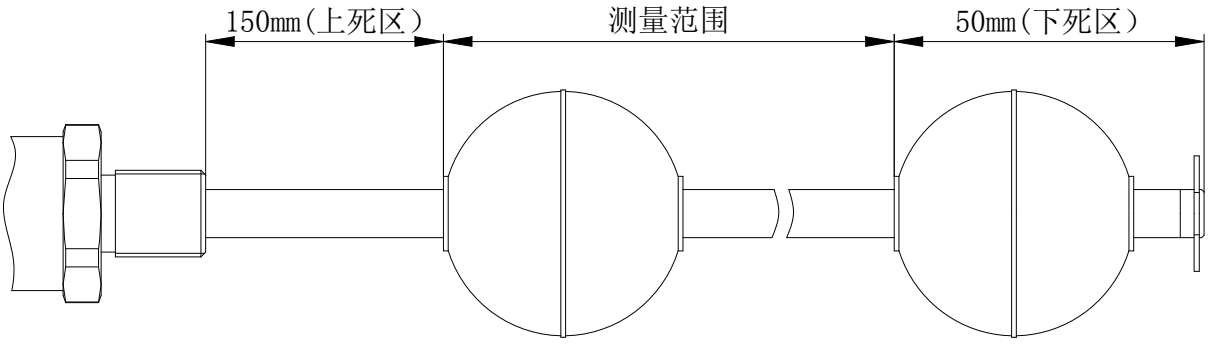

Figure 3: Product appearance diagram

5. Installation method

Note: please read the installation instruction carefully to prevent that the ambient temperature, shock, vibration etc. exceed the allowable scope of sensor; it is not allowed to bend the measuring rod; never make the electronic case and final end of the sensor suffer from great shock; select different types of sensors according to different service environments; the electronic case of the sensor is water splash-proof, but may not be soaked. After installation, it is required to protect the measuring rod.

5.1 Installation method

For vertical installation, the installation inclination may not be more than 5°

a) In the floater installation method, the floating ball has been determined when leaving factory and may not changed at will.

b) There is a measuring dead zone on both sides of the measuring rod, see Figure 3.

c) When the locking clamp ring is fixed, the lower end should be in the same level with the rod bottom, see Figure 3.

5.2 Wiring method

When the wiring method of the level sensor is wiring terminal, there are 4-direction wiring terminals. The wring is described as follows:

"+" position: power positive; **-" position:** power ground; **"EARTH" position:** connected to earth or cable shield

5.3 Liquid display

The data displayed by the LCD screen are the absolute value in mm of the scale from the current level to the lower dead zone, accurate to the unit's digit.

5.4 Thread installation

The flange is generally installed at the outlet of the liquid tank, and a screw hole is processed and installed on the flange cover, and the flange can be directly installed on the flange screw hole. M18×1.5, M20×1.5 threads are optional or the threads can be customized as required by the user.

5.5 Zero full scale migration

When the sensor upper and lower limits migrate, the data displayed on the LCD screen are the absolute value from the current level to the lower dead zone.

When the scale is migrated downward, after the floating ball position is stable, press the key below the LCD screen and several second later, an arrow appears on the left side of the LCD screen, then immediately loosen the key, and at this moment, the lower position is migrated successfully, and the output current is 4mA;

When the scale is migrated upward, after the floating ball position is stable, press the key below the LCD screen, several seconds later, an arrow appears on the left side of the LCD screen, immediately loosen the key, at this moment, the lower limit position is successfully migrated, and the output current is 20mA.

Figure 4 Schematic diagram of migration of LCD scale

6. Notes

Before ordering or installation, the user should understand the condition of installation site, and read the operation instruction carefully, so that the environmental temperature, shock, vibration, pressure and size on the installation site conform to the allowable installation range of the sensor, the purchaser or user should be responsible for the application, anti-corrosion and functional selection of the products, and the products purchased should conform to the requirements of use environment;

6.1 The measuring rod should not be bent, after use, it is required to put the product back to the packing tube; the electronic base and measuring rod end of the level sensor are not allowed to suffer from great shock or vibration;

6.2 The level sensor should not be directly used in the flammable, explosive, corrosive, steam and liquid occasions with chemical pressure or damaging the level sensor, and if necessary, there should be protective measures;

6.3 The electronic part of the level sensor is splash-proof, but should not be soaked; never make the liquid soak above the hexangular base. After installation, it is required to protect the electronic base;

6.4 The shield cable of the level sensor must avoid high power supply, RF signal source and other transmission lines with noise.

Note: various sealing parts of the electronic case must be tightened, so as to ensure the sealing requirements of the products.

7. Common faults and elimination method

See Table 1

Sensor output form	Phenomena	Possible fault reason	Solution
4-20mA output	Output 0mA	1. No power source 2. Wrong wiring	1. Provide work power source 2. Inspect wiring
	Output 24mA	Falling of floating ball	Inspect floating ball
	Unstable output	Power not clean	Change a power source with good quality

Table 1 Common faults and elimination method

Note: 1) if the fault cannot be eliminated according to the method above, please send the product to the manufacture for repair.

2) The product damage cause for the reason of customer is not wiring the warranty scope.