

## Specification Sheet

### TMF2011- I Series

### Insert-type Electromagnetic Flowmeter



- Without moving parts in a sensor, simple and reliable;
- Easily mounted and disassembled under low pressure or pressure;
- Measurement accuracy is independent of changes in any physical parameters, such as density, viscosity, humidity, temperature, pressure and conductivity (as long as the conductivity is more than  $20 \mu\text{S}/\text{cm}$ );
- No pressure loss for sensor;
- Lower cost of installation, which is suitable for measuring the flow of big size;
- Adopting advanced low frequency square wave excitation. Zero stable, strong anti-interference capability, and reliable work.
- Large flow range, full-scale flow velocity can be set arbitrarily from  $1 \text{ m/s}$  to  $10 \text{ m/s}$ , output signal and flow rate appears linear;
- $0-10 \text{ mA}$  or  $4-20 \text{ mA}$  standard current signal and  $1-5 \text{ kHz}$  frequency output.

#### 1. Technical Parameters:

- Measuring pipe nominal diameter : DN32~3000mm
- Flow range : Full-scale can be continuously adjustable under the range of  $1-10 \text{ m/s}$
- Accuracy :  $\pm 1.5\%$  under full-scale flow rate  $> 1 \text{ m/s}$
- Medium conductivity :  $\geq 20 \mu\text{S}/\text{cm}$
- Working pressure :  $\leq 0.6 \text{ MPa}$  (Optional  $1 \text{ MPa}$  or  $1.6 \text{ MPa}$ )
- Electrode material : SS316L, HC, Ti
- Measuring pipe material : ABS
- Medium temperature : Max.  $60^\circ\text{C}$  (Optional  $100^\circ\text{C}$ )
- Protection class : IP67
- Output signal for sensor :  $0.209 \text{ mVp-p}/1 \text{ m/s}$
- The maximum signal transmission distance between the sensor and converter:  $50 \text{ m}$   
(please contact the factory for special request)
- Output signal : DC current:  $0 \sim 10 \text{ mA}$  load resistance  $0 \sim 1 \text{ k}\Omega$ ;  
 $4 \sim 20 \text{ mA}$  load resistance is  $0 \sim 500 \Omega$ ;  
Frequency:  $1 \sim 5 \text{ kHz}$ , load resistance is  $250 \sim 1.2 \text{ k}\Omega$ ;

## 1.1 Structure

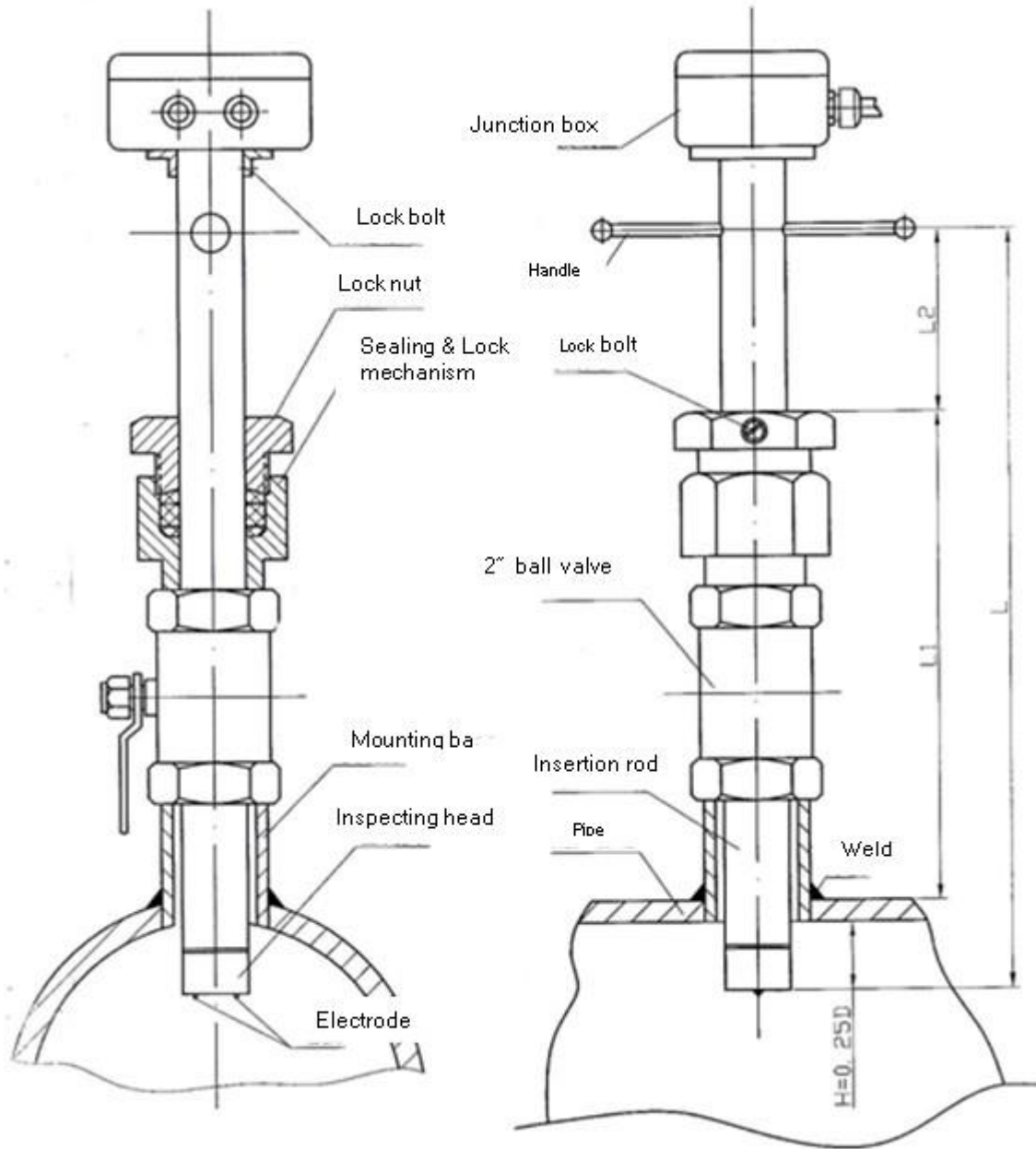


Figure 1

## 2. Installation and Use

### 2.1 The preparation before installation

#### 2.1.1 The selection for installation environment

- It should be far away from the strong magnetic field equipment, such as big motor, big transformer, variable frequency equipment.
- The installation place should not have strong vibration.

There is not too much change on ambient temperature.

- The installation environment should be easy to install and maintain.

#### 2.1.2 The selection for installation position

- It must be ensured that the pipeline is always full of fluid at installation position.
- Choose small pulse position, where should be far away from the pump, valve, elbow etc.
- Avoid negative pressure at measurement position.
- It easy to measure the pipeline diameter or perimeter, and the elliptic degree should be small.

#### 2.1.3 Straight pipe length

The upstream straight pipe length should be more than or equal to 15D, the downstream should not be less than 10 D (D for nominal diameter of pipeline).

#### 2.1.4 Flow control valve and regulating valve

Flow control valve should be installed at upstream of sensor, the flow adjusting valve should be installed at downstream. The flow control valve should be under full open state when measuring.

#### 2.1.5 Welding of mounting base

- The axis of the mounting base is perpendicular to the axis of measured pipe.
- Use stainless steel electrode flat welding. Ensure that the flange end surface is parallel to the tube axis, and the welding can be withstand the 1.6 MPa pressure and no leakage phenomenon.

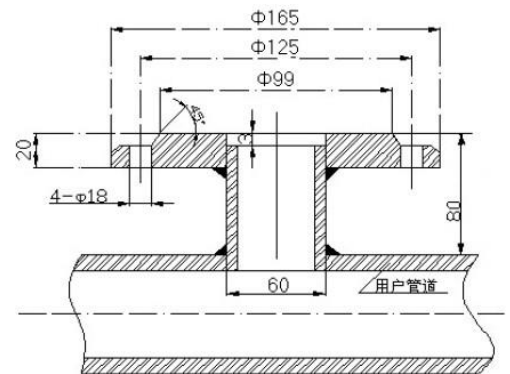


Figure 2

## 2.2 The Sensor Installation

### Clean the welding slag and burr of install base.

#### 2.2.1 Turn off the upstream flow control valve or use the low pressure water supply.

Ensure that the insert-type electromagnetic of insert depth (insert-type electromagnetic flow sensors have two electrodes in the position of the pipeline).

2.2.2 According to the Figure 2, DN50 ball valves should be installed on the mounting base. Note that the ball valve long cavity upward. Check if the ball valve can be full open and full closed. The screw seat, gland nut and rubber sealing should be installed on the ball valve. Loosen positioning bolt and gland nut, make sensor insert into measured pipe through ball valve. Insert depth refers to Figure 2, use vernier caliper or steel tape to measure, then tighten gland nut and positioning bolt.

2.2.3 Insertion length  $H1 = 0.125D$  (D is pipe size)

## 2.3 Cable Laying and Wiring

Cable laying have two methods: distinct apply and dark apply. Laying method depends on the specific site condition.

Figure 3 for the electrical wiring diagram between sensor and converter. There are two cables between the sensor and converter. One is excitation coil which is used for converter providing the exciting current to the sensor, the other is signal line which is used for sensor outputting electromotive force to converter. Pay more attention to the following:

- Signal cables should not parallel laying close to large current power cable. The signal cables should be electrically shielded with the outside cable through threading steel pipe. Threading steel pipe should be connected with the grounding line.
- When open-laying, there should be more than 1m distance between the signal cable and power cable. The signal cable and excitation cable should also keep a certain distance. When laying through steel pipe, the excitation cable should also threading pipe respectively.
- The distance between the sensor and the converter should be less than 15 meters, contact factory for special requirements. The signal cable and the excitation model is RVVP double core polyethylene insulated shielded sheath cable, specification is 2 x 32/0.2, outer diameter is  $\Phi$  8 mm, length is 15 m.
- Converter power supply lines and output current and frequency cable are not offered.

## 2.4 Grounding

The flow signal generated by the sensor is very weak, and it is usually microvolts or millivolt. Grounding is a very effective measure to solve the electrical interference. The terminal "C" connects with the metal-shielded wire of flow signal cable, and also connects with measured medium through the inserted pole.

## 2.5 Preparation Before Use

- Open the flow control valve upstream of sensor and flow regulating valve downstream of sensor, make fluid discharge for several minutes. Close flow regulating valve downstream and flow control valve upstream to make pipeline full of fluid without flowing.
- Use multimeter to inspect the following technical parameters:
  - A The resistance between excitation terminal "X", "Y" and grounding terminal "C" is infinite. B The resistance between grounding "C" and inserted pole is zero
  - C When multimeter is positioned at  $\times 1K\Omega$ , use black pen to connect with terminal "C", use red pen to connect with terminal "A", "B", the resistance is 10-30K $\Omega$  with the phenomenon of charge and discharge.
- Ensure that power voltage and frequency conform with the regulations of converter instructions, then turn on the power of converter.
- Measure the voltage between converter terminal "X" and "Y" by multimeter with direct voltage 2.5V or 10V. If multimeter pointer has several times per second of low frequency oscillation phenomena, which means sensor excitation system works properly.

## 2.6 Adjustment and Use

- If the pipeline flow is known, you can set the flow range according to the flow in the measured pipeline and the range set method in converter installation instructions.
- After finishing the preparation, firstly open the upstream flow control valve of sensor, then slowly open the downstream flow regulating valve. The flow of converter should change from small to large. If the flow displayed is negative, signal lines "SIG1" and "SIG2" should swap after power off.
- Open the upstream flow control valve of sensor, and also open the downstream flow regulating valve, then make the fluid discharge for several minutes. Close the downstream flow regulating valve and the upstream flow control valve to make the pipeline full of fluid without moving. Adjusting-zero as the methods in the converter installation instructions.

- Open the upstream flow control valve, then slowly open the downstream flow regulating valve. The flow meter can work properly under requirements.

### 3. The maintenance, repair and common trouble shooting

#### 3.1 Maintenance

Generally, the sensors do not need regular maintenance. But if the medium is easily to make the surface of electrode and measuring head (measuring tube) scaling, regular maintenance is necessary. When cleaning electrode and measuring head (measuring tube), ensure that don't make the electrode damage.

#### 3.2 Repair

Please contact with the factory for any fault, users should not repair by yourself. Please note to close ball valve when disassemble the sensor.

#### 3.3 Common trouble shooting

fault phenomenon	Reasons	Solutions
converter flow is negative	1. Converter direction indication rod is in an opposite direction to fluid flow 2. X and Y or A and B in sensor junction box reverse connect.	1. Rotate 180 degrees 2. Converter rewiring
Converter outputs over range	1. The range of flow meter is less than measured value 2. The pipeline is not full of fluid 3. Excitation coil open	1. Expand flow meter range 2. Turn down the flow regulating valve 3. Rewiring
Output signal fluctuation is too large	The electrode has gas or sediment	1. Eliminate the gas in the pipeline 2. Clean electrode
Output signal gradually drifted toward zero	1. Fill the sensor with water 2. Electrode is covered	1. Replace sensor 2. Clean electrode

### 4. Standard configuration

- |  |         |
|--|---------|
| ■ Insert-type electromagnetic flow sensor                        | 1 set   |
| ■ Electromagnetic flow converter                                 | 1 set   |
| ■ Signal cable RVVP type double conductor PVC insulated shielded | 2 x 10m |
| ■ Ball valve Q41-16 (DN50, PN1.6)                                | 1 pcs   |
| ■ Mounting base  | 1 pcs   |