MFE Electromagnetic Flowmeter

Installation and Wiring Manual

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Inspection upon Receipt

Every electromagnetic flowmeter passed strict calibration testing and inspection before leaving factory. Please follow the guidelines below when receiving your order.

- If the shipping box shows sign of damage, have the carrier unpack the flowmeter. If the meter was damaged during shipping, file a claim with the carrier, and contact your vendor as soon as possible.
- Open the shipping box, find the Packing List, and check if the items in the box match the list. If anything is missing, contact your vendor.
- Verify that the model number on the nameplate matches that on your purchase order. If it is different, do NOT proceed or install the meter, and contact your vendor as soon as possible.
- If you have any doubts about the meter you received, DO NOT proceed or install the meter. Contact your vendor as soon as possible.

Storage

If you need to store flowmeter for an extended period after receipt:

- Keep flowmeter in the original box.
- Do not put flowmeter under the rain.
- Do not put flowmeter in place with continuous vibration.
- Do not open junction box on sensor and transmitter in order to avoid moisture.
- Ambient temperature: -20 to 60°C
- Relative humidity: 5 to 90%

Before Installation

Please read following carefully before installing flowmeter:

- Be careful to not damage meter when opening the box. It is suggested you open the box at the job site. Hang the flowmeter by the installation rings.
- Do not press or damage the liner. If the lining is damaged, the flowmeter may not work properly.
- Protect the flange surface. Do not place the flange on the ground without any protection.
- Do not open wire connection box before wiring.
- Preparing pipeline: dross usually exists inside new pipeline (for example welding dross). It is important to remove dross before installing flowmeter to avoid damage to lining and causing measuring errors.

Installation of Flowmeter on Pipeline

1. Install the flowmeter in a place where there is no direct sunshine and ambient temperature is -20 to 60°C. If the meter is installed close to a heat source, protect with insulation or use a ventilation device.

- Do NOT install the meter in an environment filled with strong corrosive air or explosive air (for non-explosion-proof type flowmeter).
- Do NOT install the meter near an electromagnetic field, such as electromotor or transformer.
• If the meter’s protection rating is IP65, do NOT install meter under water; For IP67, do NOT install under water over 1 meter; for IP68, do NOT install under water over 5 meters.

2. To ensure measurement accuracy, the upstream pipe of flowmeter must be straight for at least 5D, and the downstream must be straight for at least 2D, where D is the diameter of the pipe.

3. Do not install the flowmeter on a vibrating pipe. Pipes should be fixed with an installation foundation. For underground installation, supports are required at the two ends of the pipeline.

4. Flow direction: the flowmeter can self-check forward/reverse flow, and the flow arrow on sensor indicates forward flow direction. User should ensure the flow arrow is the same as the actual flow direction when installing the meter.

5. Installation orientation: sensor can be installed horizontally or vertically.

6. Pipes must be fully filled with fluid. Ensure electrodes are completely immersed into the flow liquid to achieve good measurement accuracy.

7. Do not install the flowmeter on the pumping side.
8. For long pipelines, the control valve is usually installed downstream of the flowmeter.

9. For pipes with an open end, the flowmeter should be installed at the lower section on pipeline.

10. For pipes exceeding 5 meters vertically, air valve (vacuum) should be installed at downstream flowmeter.

11. No air bubbles in the pipeline

   - Flowmeters should be installed on the upstream before the valve. Due to the action of valve, the pressure inside the pipeline may decrease and cause air bubbles.
   - Flowmeters should be installed on the lower section of pipeline to prevent air bubbles

12. Liquid conductance

   - Don't install the flowmeter at a place where conductance fluctuates.
   - Filling chemical liquid on the upstream from flowmeter will easily cause liquid conductance to vary irregularly, which may result in false reading on flowmeter. It’s suggested to fill chemical liquid on the down-stream. If filling chemical liquid on the upstream cannot be avoided, ensure that the length of the straight pipe before flowmeter is at least 5 times of the upstream section, so that liquid can be adequately mixed on the upstream.
13. Ground Connections for Sensor

★ Notice: Since inductive signal generated from flow is very faint, it is very important to have a good earth connection, in order to avoid interference.

The following diagrams show the grounding connection methods for sensor in the different conditions:

A. Metal pipe grounding

B. Plastic pipe grounding

C. Pipeline with cathode protection

14. Ground Connections for Transmitter

- Just connect the housing of transmitter to earth with copper wire.

Wiring

1. **Cable** (Cable is for remote version of flowmeter only. No cable wiring is needed for integral version.)

- Working temperature: -25 to ~70°C
- Cable's specification and colors are as shown below
- The diameter of cable is 11.5±0.5mm.
2. Wiring in Regular (non-explosion proof) Transmitter

*Note: The junction box on the sensor has been filled with the sealing glue in the factory. So user normally does not need to wire cable on sensor.*

Open the cover of transmitter junction box, the connecting terminals are shown below.

- For integral version, the connections between sensor and transmitter are completed by the manufacturer.
- For remote version, the connections can be done by the manufacturer as well, if user requests.

Refer to the following diagrams for wiring in transmitter junction box. Diagram A ~ E are the connections for outputs.
A. Frequency Outputs:

- Electromagnetic counter connection

B. Alarm Output Connections:

★ Note ★

1. Connections between sensor and transmitter must be correct and having good contact, free from short circuit and open circuit.

2. Do not connect wires outdoors under rain.

3. When wiring is completed, screws must be securely tightened on the transmitter junction box in order to maintain good seal.

4. Do not add other power supply to the 4–20mA output.

5. Voltage fluctuation must be lower than +/-10%.

6. External fuse: rated current 20A.
C. Contact Input Connections:

- **Volt-free contact**
- **Voltage or Logic Signal**
- **Open Collector (or Grounded Contact)**

D. PLC Interface

- **PLC Common — Ve**
- **PLC Common + Ve**

E. Current Output Connections

- **Current Output Connections (Standard)**
- **Current Output Connections (Dual Current Option)**
F. Power Supply Connections

A.C. Power Supply Connections (AC 220V)

Wiring in Explosion Proof Transmitter

Note: The junction box on the sensor has been filled with the sealing glue in the factory. So user normally does not need to wire cable on sensor.

For integral mounting, the connections between sensor and transmitter are completed by the manufacturer. For remote mounting, the connections can be done by the manufacturer as well, if user requests. Use the cable supplied by the factory.

For remote explosion proof transmitters, there are two junction boxes. The upper for outputs, and the lower for the cable connection to the sensor. The connection terminals in the lower junction box are shown as below:
The following diagrams show the connections in the upper junction box:

A. RS232 Connections

★ Notice: Please disconnect the power supply when wiring.

The following diagrams show the output connections in the upper junction box:
B. RS485 Connections

C. HART Connections

D. Frequency Outputs Connections
E. Alarm Output Connections

Telemetry, Electronic Counters, Etc

F. Contact Input Connections

Open Collector (or Grounded Contact)
G. PLC Interface
H. Current Output Connections

I. Power Supply Connections

A.C. Power Supply Connections (AC 220V)
### Spec Sheet

1. **Dimensions and Weight of Sensor (Flange-type)**

*Common Sizes:*

![Diagram of sensor dimensions](image)

<table>
<thead>
<tr>
<th>Nominal size (inch)</th>
<th>Dimension (inch)</th>
<th>Weight (lbs) 150# ANSI</th>
<th>Flow Range (gpm)</th>
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### Large Sizes:

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<th>Flow Range (gpm)</th>
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</table>
3. Technical Specifications

**Flange**: ANSI 150. Carbon (Stainless also available)

**Sizes**: DN15 ~ 600mm (24”). Smaller and larger sizes also available

**Sensor Housing Material**: Carbon steel

**Pressure rating**: 290psi

**Accuracy**: ±0.2% (~DN300); ±0.5%

**Sensor Lining**: Chloroprene rubber, PTFE, PFA, FEP

**Minimum Conductivity**: 5 µS/cm

**Flow velocity range**: ~ 20m/s (suggest 0.5m/s at minimal for best accuracy)

**Electrode Material**: 316L stainless, Hastelloy C, Ti, Ta, Pt-Ir Alloy

**Ambient Temperature**: -25 to 60°C (-13 to 140°F)

**Liquid Temperature**: -25 to 140°C (-13 to 284°F) depending on lining

**Communications**: Standard: 4-20mA and Pulse. Optional: HART, RS485, Profibus PA

**Power**: 100-230v AC, 11-40v DC

**Protection**: IP65, IP67

**Cable Entry**: NPT ½, M20x1.5