# AiMag G Electromagnetic Flow Meter

# Technical Specifications

HANGZHOU ARTANG INTELLIGENT EQUIPMENT CO., LTD

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# 1. Overview

## 1.1 Summary

This manual mainly describes the measurement principle, product composition, technical parameters, installation and maintenance of AiMag G electromagnetic flowmeter (hereinafter referred to as electromagnetic flowmeter), so that product maintenance personnel can further study and understand the technical information of this product.

## 1.2 Measurement principle

The measurement principle of an electromagnetic flowmeter is based on Faraday's law of electromagnetic induction, and the movement of a conductor in a magnetic field will generate an induced voltage.

The electromagnetic flowmeter generates a constant alternating magnetic field through the switching direct current I with alternating polarity, and the direction of the magnetic field is perpendicular to the direction of medium flow. During flow measurement, the medium flows through the magnetic field, and the flowing medium is equivalent to a moving conductor, which induces an electromotive force Ue proportional to the flow velocity of the medium, as shown in Figure 1.

$$Ue = B*L*v$$

B: Magnetic strength

L: Electrode spacing

V: Medium flow rate

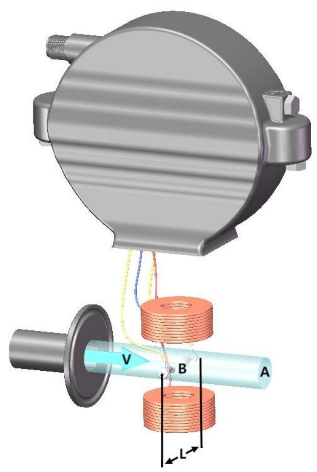


**FIG. 1: Electromagnetic flow meter measurement principle**

The electromagnetic flowmeter detects the induced electromotive force through two measuring electrodes and transmits it to the converter for processing. Based on the cross-sectional area A of the measuring pipe, the volume flow Q of the fluid can be calculated.

$$Q = A \cdot v$$

## 1.3 Product composition and futures

### 1.3.1 Product composition

The electromagnetic flowmeter consists of a sensor and a converter.

The sensor primarily includes:

a) an electrically insulated measuring tube through which the conductive liquid being measured flows;

b) a pair of diametrically opposed electrodes that measure the signal generated by the conductive liquid flow;

c) an electromagnet that generates a magnetic field within the measuring tube.

The converter's main functions are:

a) providing excitation current to the sensor's excitation coil;

b) amplifying, converting, and displaying the flow signal, outputting a signal that can be received by other devices.

### 1.3.2 Product features

a) The electromagnetic measurement principle is completely unaffected by pressure, density, temperature, and viscosity, resulting in high measurement accuracy and reliable performance.

b) No shut-off components within the measuring tube, resulting in no additional pressure loss.

c) No moving parts within the measuring tube, ensuring maintenance-free operation.

d) Hygienic design allows for easy assembly and disassembly, ensuring ease of cleaning.

e) High-quality linings and electrodes are available, making them suitable for use in the food and beverage industry.

f) Non-conductive fluids such as gases, oils, and organic solvents cannot be measured

# 2. Parameters

## 2.1 Nominal diameter

Aimag G electromagnetic nominal diameter range: DN6-DN25

## 2.2 Measurement range

Typical flow rate range v=0.3~10 m/s

| DN | | Flow ($m^3$ /h) | | Factory Set Full Scale Flow rate 3m/s | Factory Set Pulse Value (ml) |
|---|---|---|---|---|---|
| mm | Inches | Flow rate 0.3m/s | Flow rate 10m/s | | |
| 6 | 1/8 | 0.03 | 1.02 | 0.31 | 0.005 |
| 8 | 1/4 | 0.05 | 1.81 | 0.54 | 0.02 |
| 12 | 1/2 | 0.08 | 2.8 | 0.84 | 0.1 |
| 15 | 1/2S | 0.19 | 6 | 1.91 | 0.1 |
| 25 | 1 | 0.53 | 17 | 5.30 | 0.2 |

**Table 1: Flow Rate VS. Velocity**

## 2.3 Accuracy

### 2.3.1 Reference working condition

a) Ambient temperature: 25°C ± 2°C;

b) Relative humidity: 60%–70%;

c) Medium: Water;

d) Medium temperature: 25°C ± 2°C;

e) Both the sensor and transmitter are grounded;

f) Process pressure: <1.6 MPa;

g) Installation conditions: Upstream straight pipe length > 5 × DN; Downstream straight pipe length > 2 × DN.

### 2.3.2 Measurement Curve

Volume flow accuracy under reference conditions:

±0.2%MV(measured value)

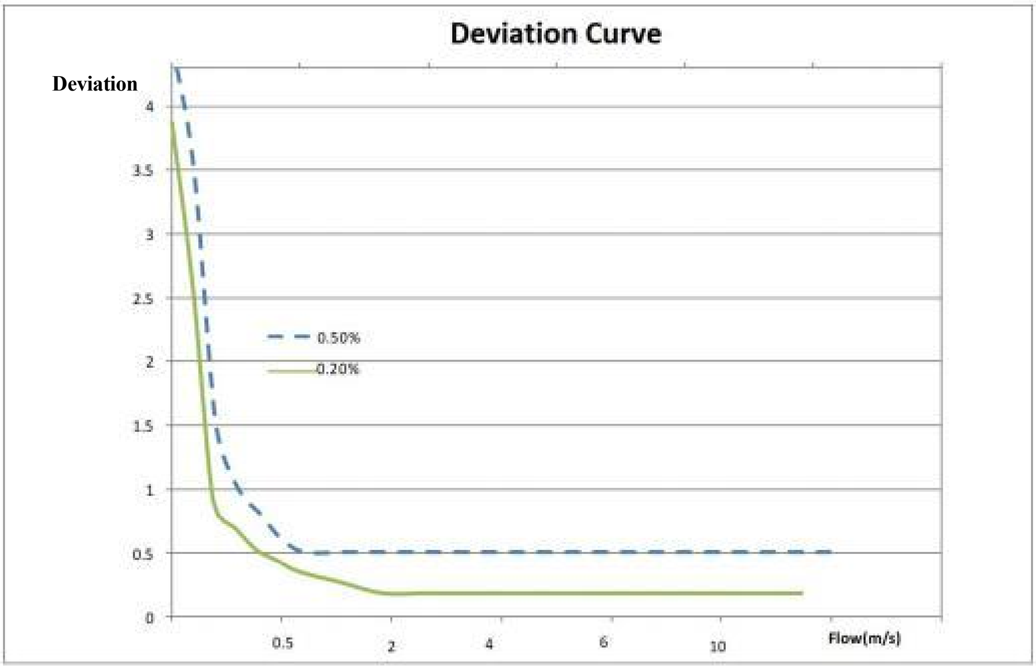


**FIG. 2 Deviation Curve**

# 3. Ambient conditions

## 3.1 Ambient temperature and relative humidity

| Ambient conditions | Sensor | Converter |
|---|---|---|
| Ambient temperature | -40~60℃ | |
| Relative humidity | 5%~95% | |

**Table 2: Working ambient temperature and relative humidity**

## 3.2 Storage temperature

a) The storage temperature is consistent with the working temperature range of the measurement converter and the corresponding measurement sensor;

b) During storage, the measuring equipment should be protected from direct sunlight to avoid excessive flowmeter surface temperature;

c) When choosing a storage location, it is necessary to prevent the accumulation of moisture in the measuring equipment, to avoid the growth of bacteria and germs, and damage to the

lining of the measuring tube;

d) Do not remove the protective cover or protective cap from the measuring device before installation.

### 3.3 Protection grade

IP67

## 4. Process conditions

### 4.1 Medium conductivity

≥ 5 μ S/cm, conventional conductive liquid

### 4.2 Process temperature

a) -20℃~ 150℃, PFA liner

### 4.3 Flow rate limit

The nominal diameter of the sensor depends on the inner diameter of the pipe and the flow rate of the medium. The optimal flow rate is between 1 and 2 m/s. In addition, the flow rate must match the physical properties of the fluid.

## 5. Structure features

### 5.1 Dimension＆weight

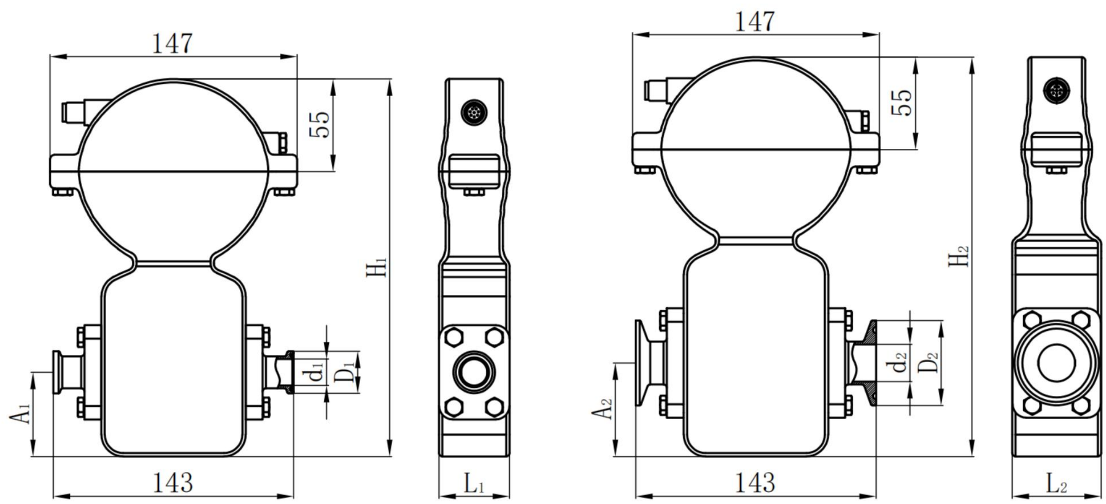


**FIG. 3 Dimension 1**

| Tri-clamp | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DN | Mating piping (O.D. * wall thickness) | A1 | H1 | D1 | d1 | L1 | A2 | H2 | D2 | d2 | L2 |
| 6 | 12.7*1.65 | 50 | 224.5 | 25 | 9.4 | 42 | | | | | |
| 8 | 12.7*1.65 | 50 | 224.5 | 25 | 9.4 | 42 | | | | | |
| 12 | 12.7*1.65 | 50 | 224.5 | 25 | 15.75 | 42 | | | | | |
| 15 | 19.05*1.65 | 50 | 224.5 | 25 | 15.75 | 42 | | | | | |
| 25 | 25.4*1.65 | | | | | | 55.5 | 237.5 | 50.5 | 22.1 | 53 |
| DIN 32676 | | | | | | | | | | | |
| DN | Mating piping (O.D. * wall thickness) | A1 | H1 | D1 | d1 | L1 | A2 | H2 | D2 | d2 | L2 |
| 6 | 14*2 | 50 | 224.5 | 34 | 10 | 42 | | | | | |
| 8 | 14*2 | 50 | 224.5 | 34 | 10 | 42 | | | | | |
| 12 | 14*2 | 50 | 224.5 | 34 | 16 | 42 | | | | | |
| 15 | 20*2 | 50 | 224.5 | 34 | 16 | 42 | | | | | |
| 25 | 30*2 | | | | | | 55.5 | 237.5 | 50.5 | 26 | 53 |
| ISO2852 | | | | | | | | | | | |
| DN | Mating piping (O.D. * wall thickness) | A1 | H1 | D1 | d1 | L1 | A2 | H2 | D2 | d2 | L2 |
| 6 | 13*1.4 | 50 | 224.5 | 34 | 10.2 | 42 | | | | | |
| 8 | 13*1.4 | 50 | 224.5 | 34 | 10.2 | 42 | | | | | |
| 12 | 13*1.4 | 50 | 224.5 | 34 | 15.2 | 42 | | | | | |
| 15 | 18*1.4 | 50 | 224.5 | 34 | 15.2 | 42 | | | | | |
| 25 | 25.6*1.5 | | | | | | 55.5 | 237.5 | 50.5 | 22.6 | 53 |

**Table 3: DN6~DN25 Dimensions (Unit:mm)**

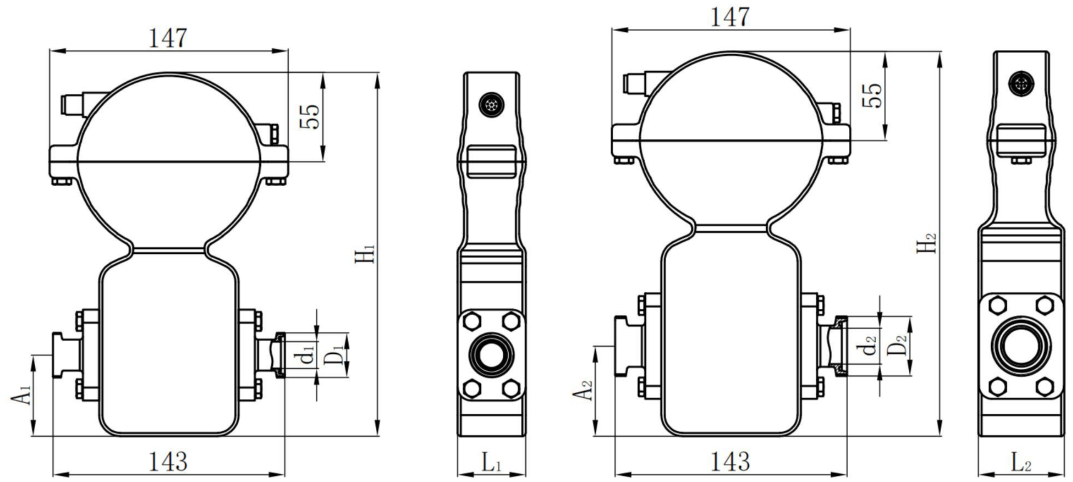


**FIG. 4 Dimension 2**

| DIN 11851 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DN | Mating piping (O.D. * wall thickness) | $A_1$ | $H_1$ | $D_1$ | $d_1$ | $L_1$ | $A_2$ | $H_2$ | $D_2$ | $d_2$ | L2 |
| 6 | 13*1.5 | 50 | 224.5 | RD28× 1/8 ″ | 10 | 42 | | | | | |
| 8 | 13*1.5 | 50 | 224.5 | RD28× 1/8 ″ | 10 | 42 | | | | | |
| 12 | 13*1.5 | 50 | 224.5 | RD34× 1/8 ″ | 16 | 42 | | | | | |
| 15 | 19*1.5 | 50 | 224.5 | RD34× 1/8 ″ | 16 | 42 | | | | | |
| 25 | 29*1.5 | | | | | | 55.5 | 237.5 | RD52 × 1/6 ″ | 26 | 53 |

**Table 4: DN6~DN25 Dimensions (Unit:mm)**

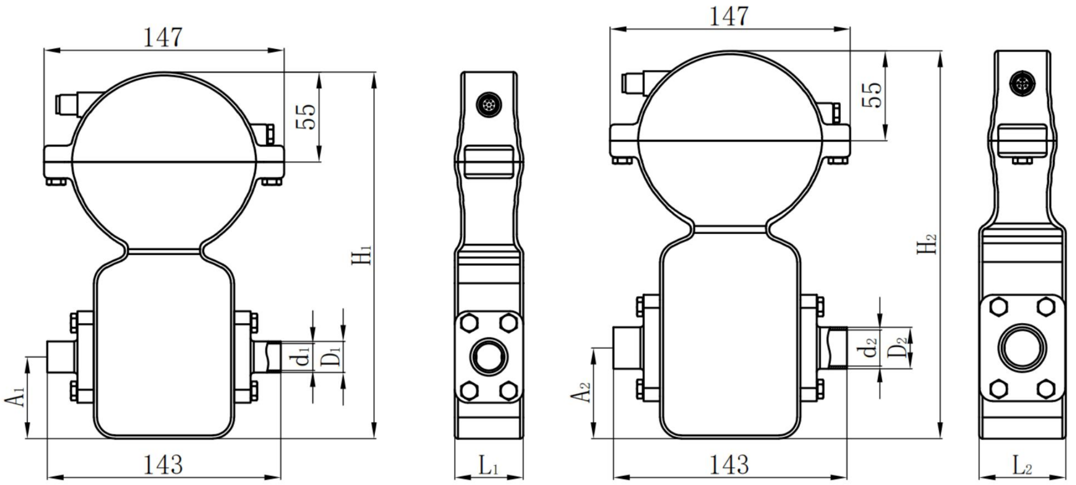


**FIG. 5 Dimension 3**

| DIN 11850 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DN | Mating piping (O.D. * wall thickness) | A1 | H1 | D1 | d1 | L1 | A2 | H2 | D2 | d2 | L2 |
| 6 | 13*1.5 | 50 | 224.5 | 13 | 10 | 42 | | | | | |
| 8 | 13*1.5 | 50 | 224.5 | 13 | 10 | 42 | | | | | |
| 12 | 13*1.5 | 50 | 224.5 | 19 | 16 | 42 | | | | | |
| 15 | 19*1.5 | 50 | 224.5 | 19 | 16 | 42 | | | | | |
| 25 | 29*1.5 | | | | | | 55.5 | 237.5 | 29 | 26 | 53 |
| ASME BPE | | | | | | | | | | | |
| DN | Mating piping (O.D. * wall thickness) | A1 | H1 | D1 | d1 | L1 | A2 | H2 | D2 | d2 | L2 |
| 6 | 12.7*1.65 | 50 | 224.5 | 12.7 | 9.4 | 42 | | | | | |
| 8 | 12.7*1.65 | 50 | 224.5 | 12.7 | 9.4 | 42 | | | | | |
| 12 | 12.7*1.65 | 50 | 224.5 | 19.05 | 15.75 | 42 | | | | | |
| 15 | 19.05*1.65 | 50 | 224.5 | 19.05 | 15.75 | 42 | | | | | |
| 25 | 25.4*1.65 | | | | | | 55.5 | 237.5 | 25.4 | 22.1 | 53 |

**Table 5: DN6~DN25 Dimensions (Unit:mm)**

## 5.2 Electrodes

a) Stainless steel

b) Hastelloy C

c) Tantalum

d) Titanium

e) Platinum

### 5.3 Liner

a) PFA

### 5.4 Process connection

a) Tri-Clamp

b) DIN32676

c) ISO2852

d) DIN11851

e) DIN11850

f) ASME BPE

## 6. Electrical features

### 6.1 Power supply

18~28VDC

a) 85～265VAC, 45～63Hz;

b) 18～28VDC

### 6.2 Output signal

#### 6.2.1 Frequency output

a) Frequency output range: 1~10000Hz

b) Meaning of output value: Flow rate percentage=(Measured value/Full scale value) * Frequency

#### 6.2.2 Pulse output

a) Pulse output can be read out as accumulated flow rate by selecting pulse equivalent;

b) Maximum pulse rate: 10,000 pulses/s;

c) Pulse equivalent refers to the volume represented by each pulse.

6.2.3 Communication protocol

MODBUS: Physical interface RS-485, electrical isolation, RTU format

# 7. Mounting

a. The instrument can be installed anywhere on the running pipe, preferring vertical installation. When measuring, it is necessary to ensure that the measuring tube is completely filled with medium, and the electromagnetic flowmeter does not work properly in the case of non-full tube. This is shown in Figure 6.

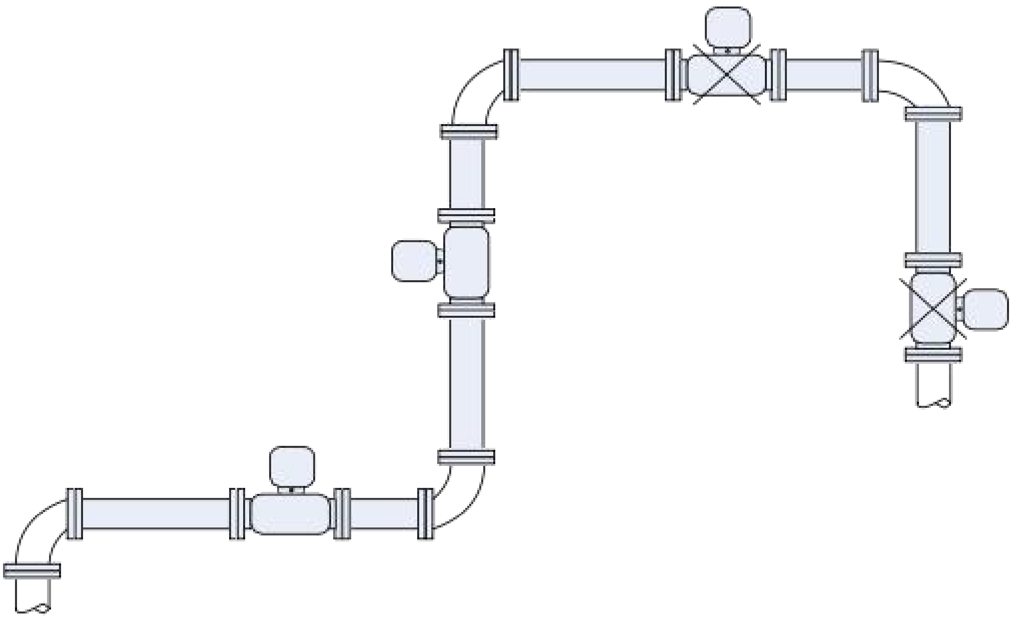

**FIG. 6 Mounting position**

b. The flow direction of the medium in the pipe should match the arrow pointing on the sensor.

c. Front and rear straight pipe segments: The length of the inlet straight pipe segment is ≥ 5XDN (DN = measuring pipe diameter), 10XDN is recommended if possible. The length of the outlet straight pipe segment ≥2×DN, as shown in Figure 7.

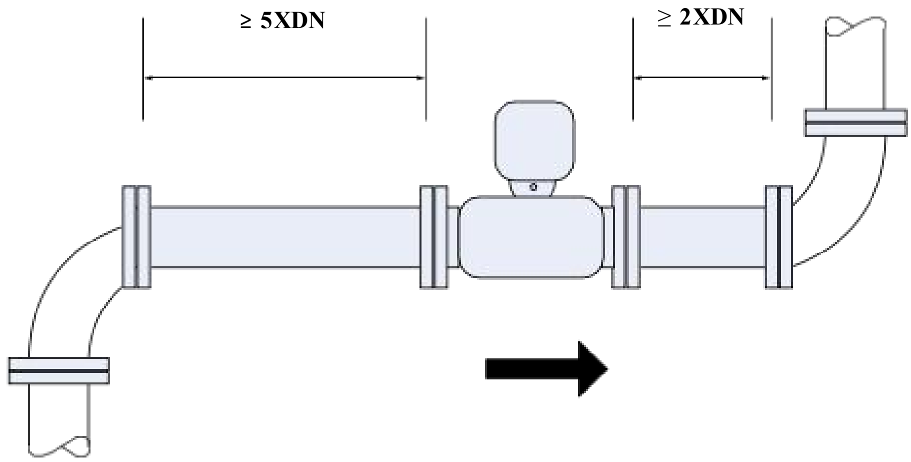


**FIG. 7 Front/Rear Straight Pipe Segment**

d. When lifting the meter, avoid inserting a pipe or basket into the measuring tube or using a rope to lift it to avoid damaging the lining. Instead, loop the rope around the neck of the measuring tube for lifting.

e. Do not install measuring equipment in the pipeline downstream of the filling valve. When the measuring equipment is completely empty, the measured value will be severely distorted, as shown in Figure 8.

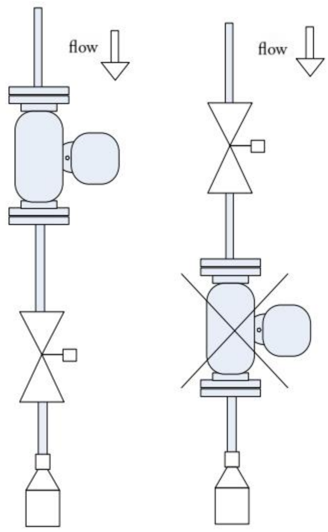


**FIG. 8**