Electromagnetic Flowmeter

Quick Start Guide

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1. About this Manual

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The Manual includes instructions for using and managing the Product. Pictures, charts, images and all other information hereinafter are for description and explanation only. The information contained in the Manual is subject to change, without notice, due to firmware updates or other reasons. Please find the latest version of this Manual at the HIKMICRO website (*http://www.hikmicrotech.com*).

Please use this Manual with the guidance and assistance of professionals trained in supporting the Product.

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1.3 Symbols

The symbols that may be found in this document are defined as follows.

Symbol	Description
Danger	Indicates a hazardous situation which, if not avoided, will or could result in serious injury.
Caution	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance degradation, or unexpected results.
Note	Provides additional information to emphasize or supplement important points of the main text.

2. Safety Instruction

These instructions are intended to ensure that user can use the product correctly to avoid danger or property loss. The device can only be operated by trained personnel in accordance with these instructions and local safety regulations.

Electrical Safety

- Installation and wiring of the electromagnetic flowmeter should be performed by a specialist technician.
- Always unplug the device before plugging and unplugging all terminals and connections.
- When measuring hot fluids, the sensor housing will become very hot and be careful not to be burned.
- When the device is removed from the pipe containing toxic or corrosive media, the operators should avoid contact with the medium or inhaling residual gas, and clean the medium that remains in the sensor after removal.

Incoming Acceptance

Upon unboxing the device, please promptly check the following:

- Appearance: This device has been carefully checked before shipping. If damage occurs during shipping (Please pay special attention to liner and housing), please contact us.
- Nameplate: Check if the product matches the order according to the information of the nameplate.
- Accessories: Check if the accessories listed on the packing list are included in the box.

Caution

Please save all the original packing materials of your device so that if there is a problem, you can use the packing materials to pack the device and send it to the service center for disposal. The Company shall not be liable for accidental damage in transit caused by non-original packaging materials.

Storage

For long-term storage of the device, please note the following:

- The device should be stored in the original packaging.
- The place of storage should be dry, vibration-free and at a suitable ambient temperature.

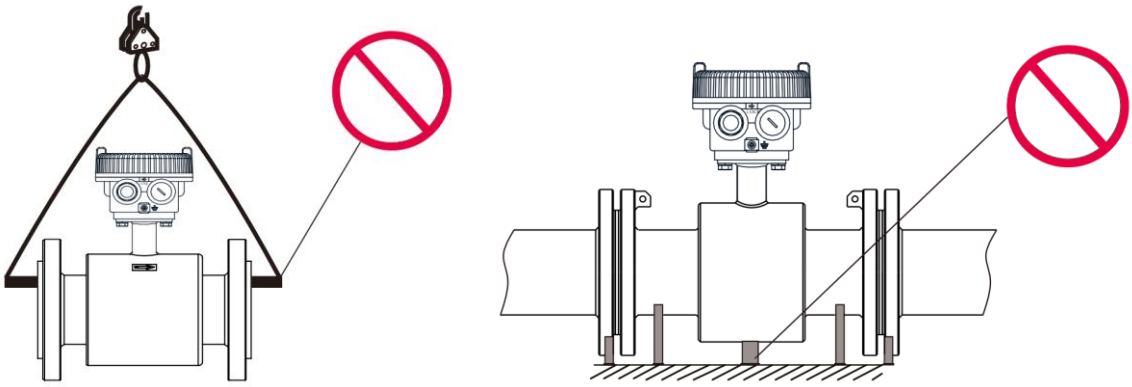
Transportation

Handle all parts carefully to prevent damage and transport the device in the original box to the place of installation. The PTFE liner has a protective cover on both sides of the sensor to prevent mechanical damage to the liner sealing surface and loose deformation. Remove the cover only before the meter is installed on the pipe.

Caution

- Damage to the liner will result in scrapped sensor.
- Failure to properly select cables, tighten cable sealing plug or device covers may result in scrap of the meter due to water ingress or moisture in the device housing.

Liners are easily damaged during shipping. Do not insert any rope, rod, etc. through the measuring tube for convenience in handling, as this will cause damage to the liner.



The device housing should be protected against external force, heavy pressure or load. And the internal coil and electrodes may be damaged by a dent in the sensor housing, making the product unrepairable.

3. Overview

An electromagnetic flowmeter (hereafter referred to as “device”) is to measure the flow of conductive liquid in a circular pipe.

The principle of operation is based on Faraday's electromagnetic induction law: When a conductor moves in a magnetic field and cuts a magnetic line, the conductor ends produce induction electromotive force perpendicular to the direction of motion and the magnetic field, which is proportional to the conductor's speed of motion (V), i.e. E = BLV (B is the field strength. L is the electrode distance). After the field current drives the coil, a magnetic field is formed in the measuring tube. When the medium flows along the measuring tube and cuts the magnetic line, the resulting induction electromotive force is transmitted to the transmitter through two electrodes on the inside wall of the measuring tube. The measured flow value is obtained after signal processing and operation through the transmitter.

The measured data is displayed on the transmitter display screen in the form of 4 to 20 mA, pulses, fieldbus (RS-485), etc.

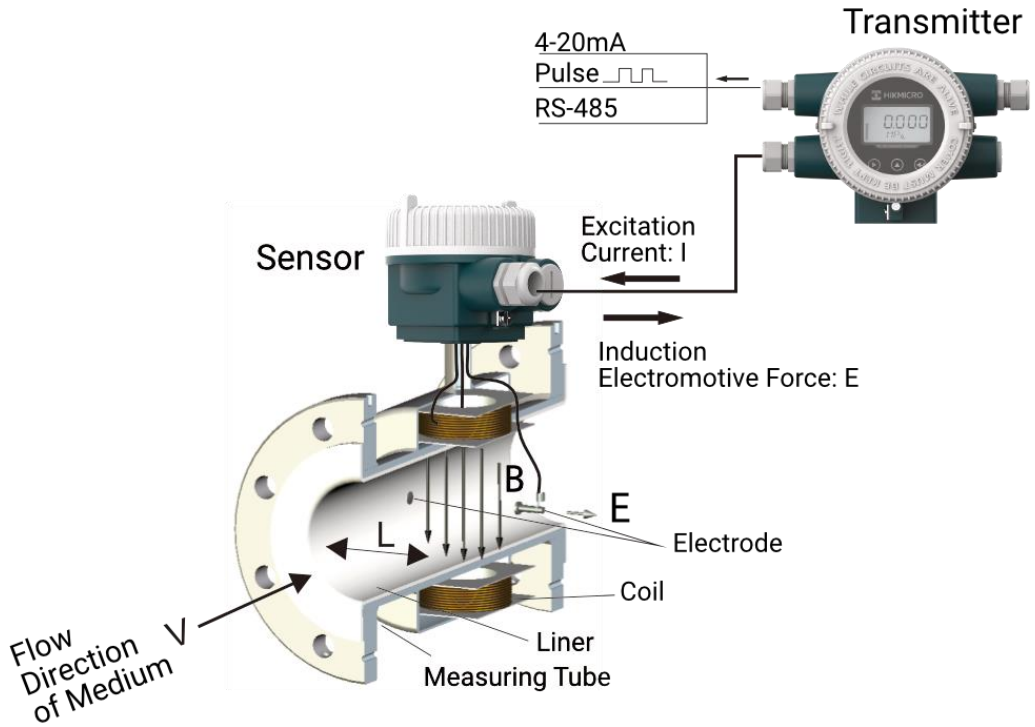


Figure 3-1 Electromagnetic Flowmeter Operating Principle

4. Appearance

4.1 Device Appearance

The electromagnetic flowmeter consists of a sensor and a transmitter. According to the way the sensor is connected to the transmitter, the device is divided into compact electromagnetic flowmeter and remote electromagnetic flowmeter.

4.1.1 Compact Electromagnetic Flowmeter

The transmitter of the compact electromagnetic flowmeter is integrated with the sensor and the internal electrical connection is made at the factory. Depending on the connection form of the sensor to the pipe, the device can be divided into flange, wafer, clamp etc.

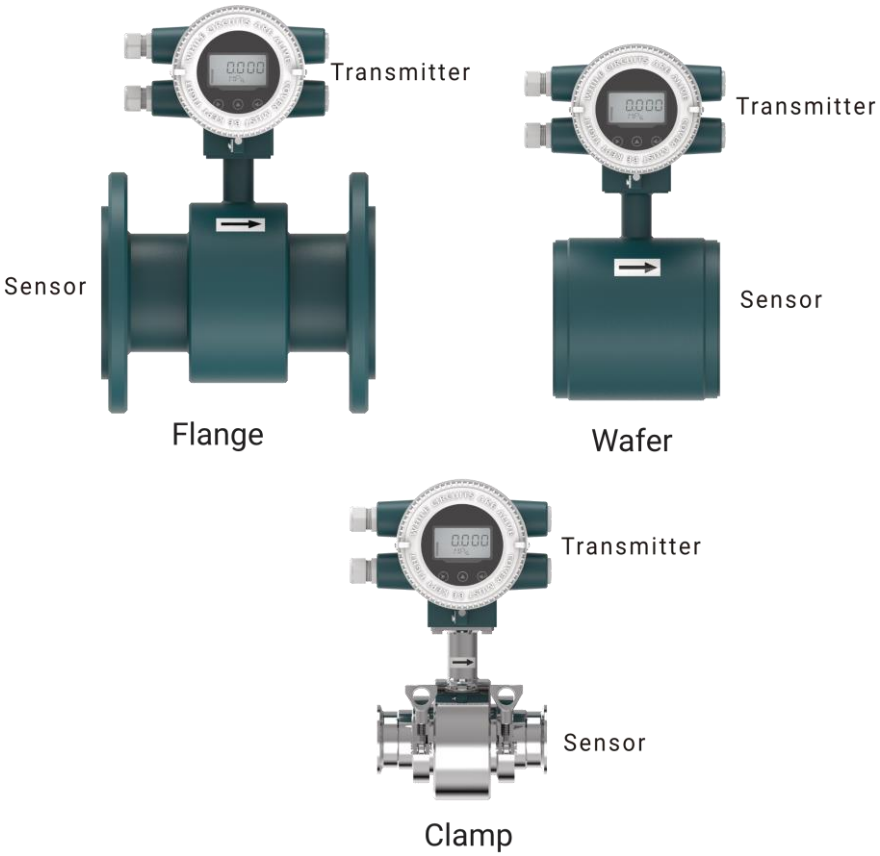


Figure 4-1 Compact Electromagnetic Flowmeter

4.1.2 Remote Electromagnetic Flowmeter

The transmitter and sensor of remote electromagnetic flowmeter are installed independently with a dedicated signal cable connecting the two components. Depending on the connection form of the sensor to the pipe, the device can be divided into flange, wafer, clamp etc.

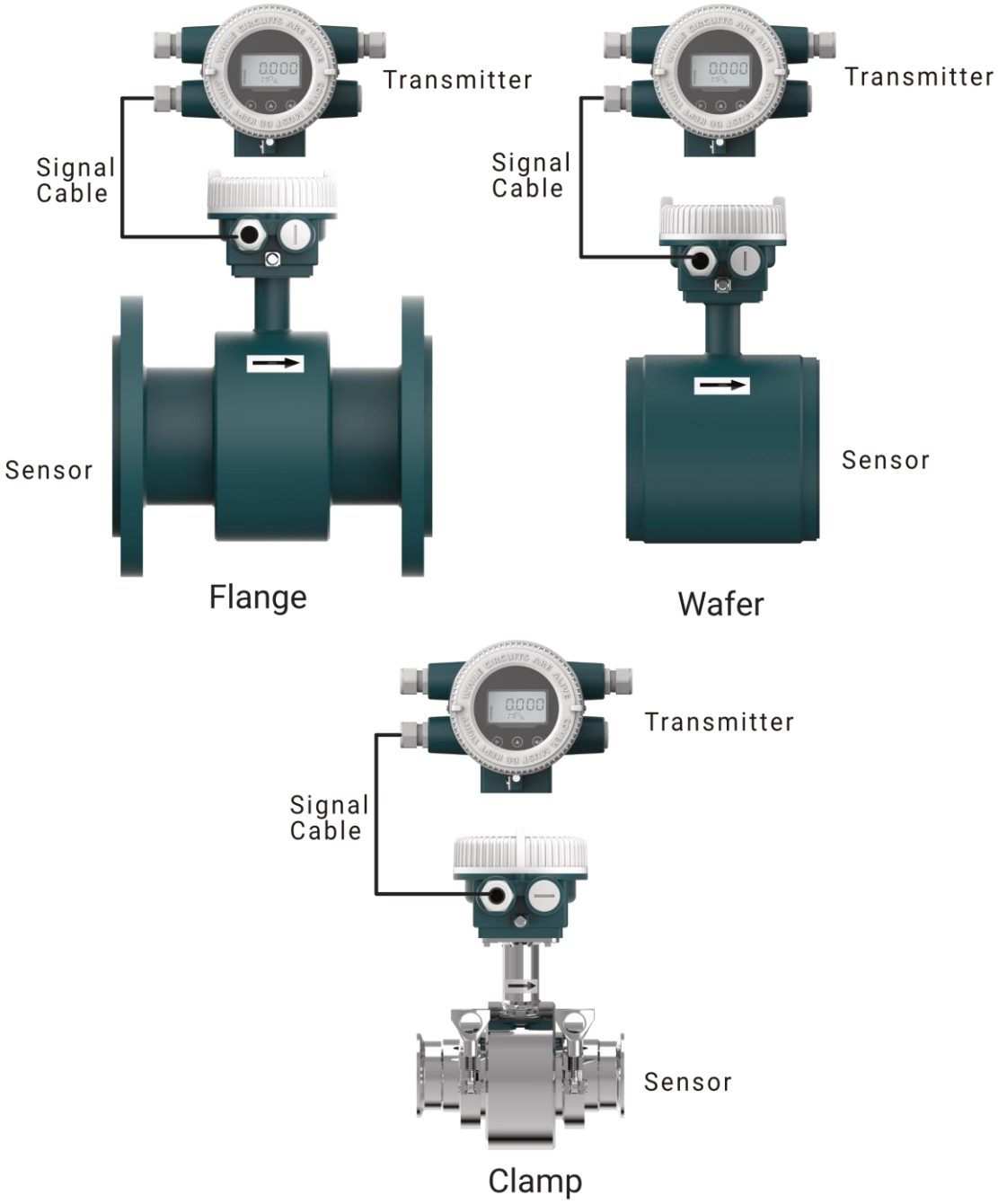


Figure 4-2 Remote Electromagnetic Flowmeter Appearance

4.2 Sensor and Transmitter Appearance

4.2.1 Sensor

The sensor consists of measuring tubes with insulated liners, coils, electrodes and enclosures.

Note

The basic components of flange, wafer and clamp sensors are similar with each other. This section illustrates the appearance of a flanged sensor as an example.

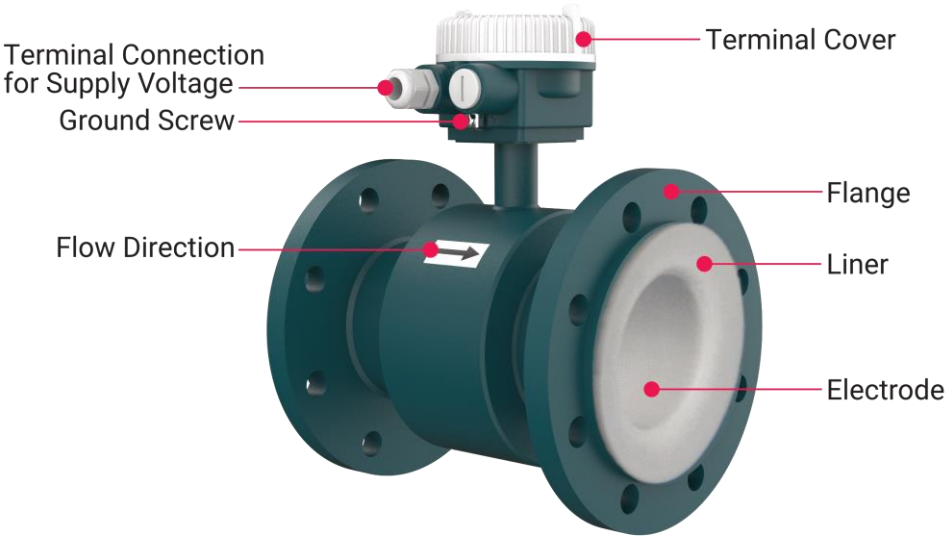


Figure 4-3 Sensor Appearance

4.2.2 Transmitter

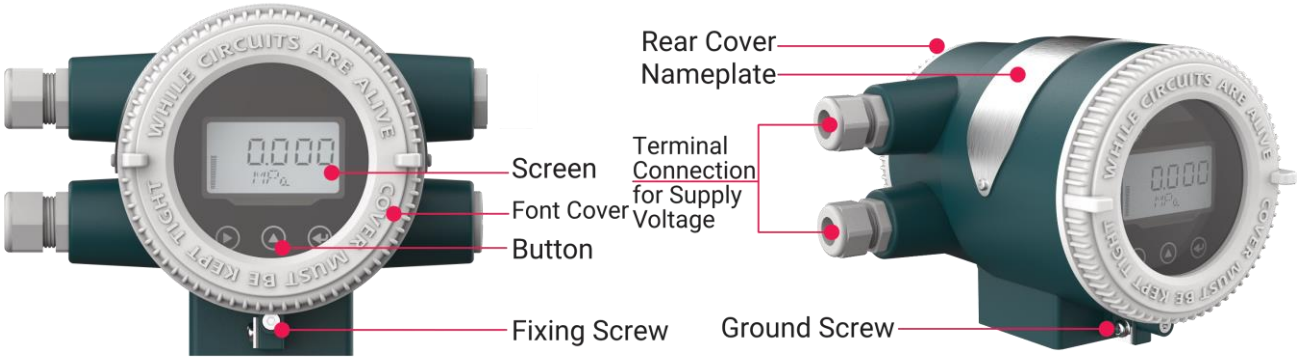


Figure 4-4 Transmitter Appearance

5. Installation

Caution

- There should be sufficient operating space around the device installation location for easy maintenance.
- Avoid areas that are prone to lightning strikes or that may be flooded and rain-fed.
- Avoid the installation in the environment of overheating, direct sunlight and corrosion. For the compact electromagnetic flowmeter, if the pipe temperature is high, take measures to ensure that the transmitter operating environment temperature meets the requirements.
- Select a location where the pipe is not vibrating or has little vibration.

5.1 Install Sensor

5.1.1 Installation Location Requirement

- The straight section of upstream and downstream shall be of sufficient length.
  - The minimum length allowed for the straight section of the sensor upstream is 5 DN and 2 DN downstream (DN is the mean of inner and outer diameter of pipe).

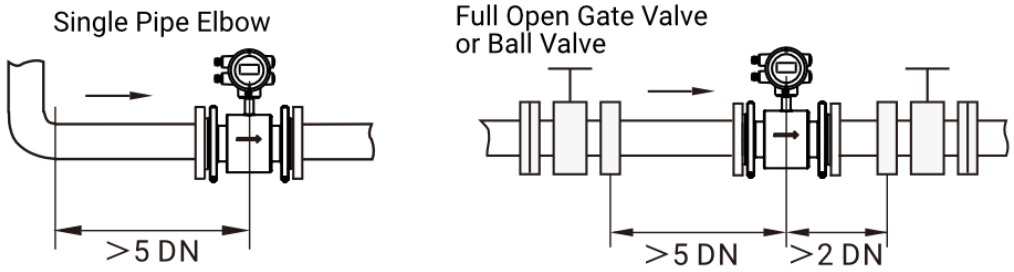


Figure 5-1 Minimum Length of Straight Pipe

  - The length of the straight pipe should be lengthened when there are flow regulators in the upstream (e.g. half-open valves, regulating valves, shut-off valves, etc.).

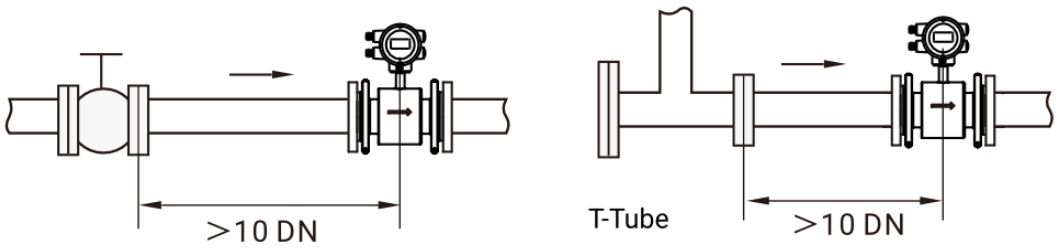


Figure 5-2 Extended Straight Pipe

- A reducing pipe with a taper less than 15° is considered a straight pipe when installed in the upstream and downstream of the measurement tube.

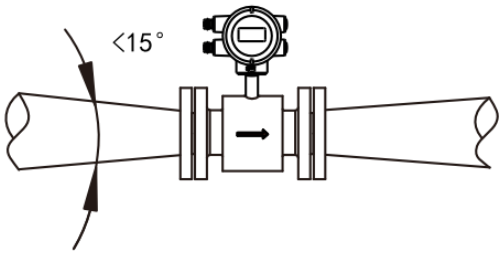


Figure 5-3 Reducing Pipe

- The sensor should be installed in a section filled with medium. Under partially filled pipe conditions, the device will exhibit large fluctuations in the displayed values and cause severe measurement errors.

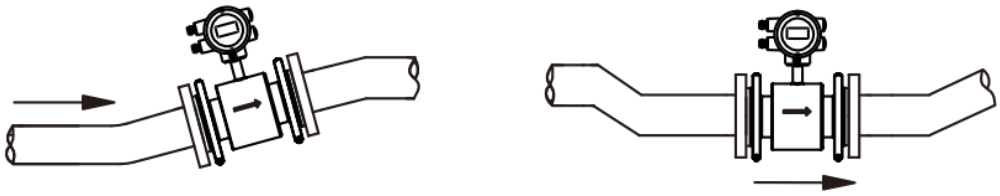


Figure 5-4 Raise the Downstream Section Outlet to Ensure Full Pipe

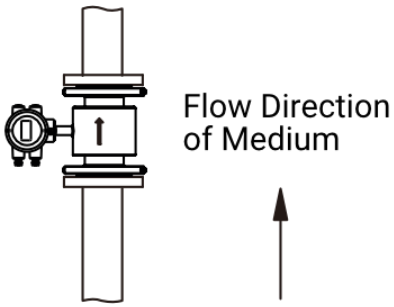


Figure 5-5 Flow from Bottom to Top Ensures Full Pipe

- Make sure that no air bubbles are created or accumulated in the location where the measuring tube is installed. If air bubbles enter the measuring tube of the sensor, they will cause significant fluctuations in the readings and cause severe measurement errors.

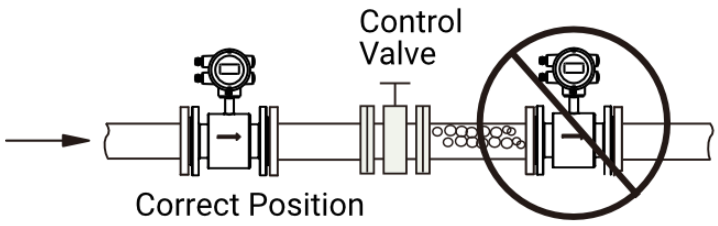


Figure 5-6 Bubbles Are Easily Created in the Downstream of the Regulating Valve

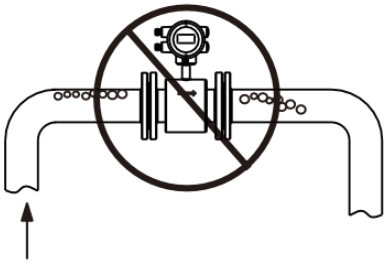


Figure 5-7 Air Bubbles Can Accumulate in the Pipe with the Outlet Facing Down

Note

In downward pipes longer than 5 m, cavitation is created due to a drop in system pressure. Therefore, it is necessary to install a siphon or relief valve in the downstream of the sensor.

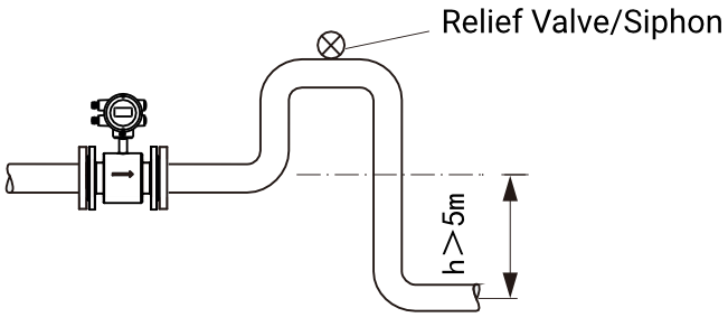


Figure 5-8 Install Relief or Siphon Valve

- The conductivity of the fluid should remain stable in the section where the measuring tube is located.

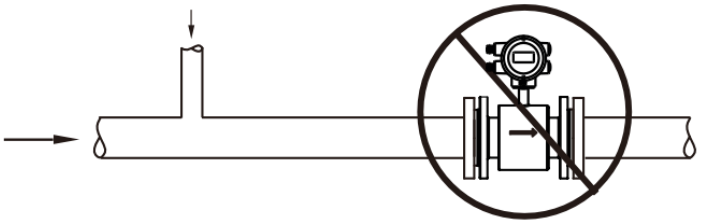


Figure 5-9 Fluid Conductivity Should Remain Stable

Caution

If there are chemical substances injected upstream, the fluid conductivity may fluctuate significantly, affecting the device's normal operation. To avoid this, it is recommended to change the injection port of the chemical material to the downstream side of the device. If it is necessary to inject substances from the upstream side, a sufficient distance (above 50 D) should be ensured to allow the fluid to mix adequately with the injected substance.

- No protrusions are allowed in the pipe close to the upstream side of the sensor.

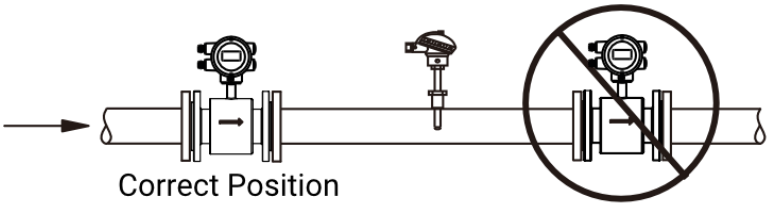


Figure 5-10 No Interceptor Allowed

- No installation is allowed in a negative pressure pipe (e.g. suction side of pump).

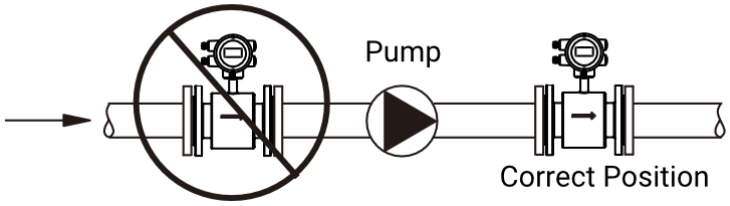


Figure 5-11 Do Not Install on the Negative Pressure Side of the Pipe

5.1.2 Sensor Installation Requirement

- Pipes should be welded before installing the device. No electrical welding is allowed after installing the device. After the device is installed, the device power should be disconnected first if other parts of the pipe need welding construction.
- Newly installed pipes generally contain foreign matter such as weld spatter. To prevent damage to the liner, please wash away the foreign matter before installing the sensor.

Caution

If a pipe is not centered or tilted, it will result in leakage or damage to the liner.

- The flow direction marker on the device should be consistent with the direction of the flow.

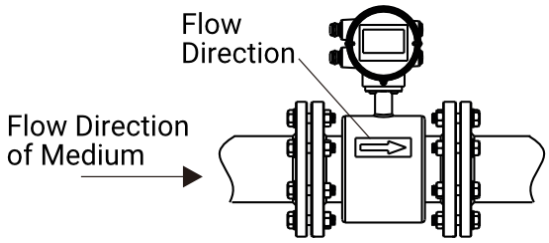


Figure 5-12 Flow Direction Arrow

Note

To facilitate device operation or data observation, the transmitter orientation can be changed as follows: Remove the four fixing screws on the bottom of the transmitter housing, rotate the transmitter by ±90° or 180°, and then reinstall the screws. Note the gasket on the bottom of the housing is properly seated during the screw tightening process.

- When the sensor is in the tube, the line XX between the two electrodes should remain horizontal.

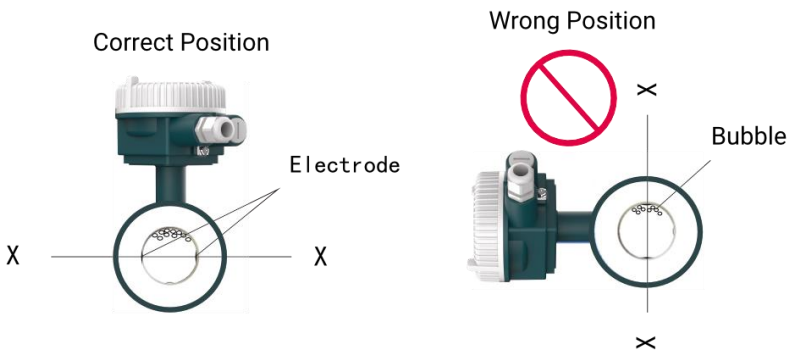


Figure 5-13 Electrode Horizontal Position

Caution

The electrode shown in the upper right image is located on the top of the measuring tube, and air bubbles escaping from the medium will cause the electrode to be isolated from the medium for a short period of time, making the measurement unstable and causing serious errors.

- Gasket should be installed at the connection of the sensor to the pipe, please note the following.
  - The gasket material should be compatible with the process fluid and operating conditions.
  - Do not use metal or spiral wound gasket as this will damage the liner.
  - Do not use graphite gaskets, as the inside of the measuring tube will form a conductive layer that can short-circuit the measuring signal.
  - Flange sealing gaskets are not allowed to protrude into the pipe cross section.

Caution

PFA, FEP, PTFE liners are generally equipped with PTFE gaskets. Ne, PU liners generally use rubber gaskets.

5.1.3 Sensor Installation

Install the flanged flowmeter as shown in the following figure. During installation, the flanges on both sides should be moved slowly and alternately to the sensor. Do not tighten one side and then tighten the other side to avoid crushing the liner.

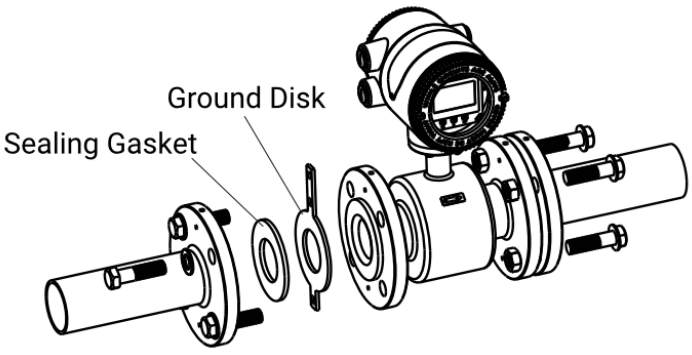


Figure 5-14 Flanged Flowmeter Installation

Install the clamp-on flowmeter as shown in the following figure. During installation, make sure that the measuring tube is coaxial with the upstream and downstream pipe with a pilot pin, which is secured to the two bolts at the bottom of the sensor.

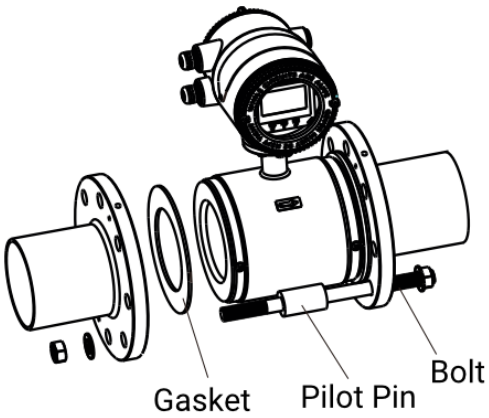


Figure 5-15 Clamp-on Flowmeter Installation

Caution

- The bolts should be tightened alternately and gradually, do not tighten the opposite bolt while any bolt is still loose.
- Do not over-tighten the bolt during initial installation. It is recommended to re-tighten after 24 hours.

5.2 Install Remote Transmitter

The transmitter should be installed as far away as possible from the high power motor or frequency converter.

Caution

- There should be sufficient operating space in the installation area to facilitate wiring and connection of the conduit.
- For wall mounting, leave sufficient length of the cable.

Once the mounting bracket is secured as shown in the figure below, secure the transmitter to the bracket with a nut.

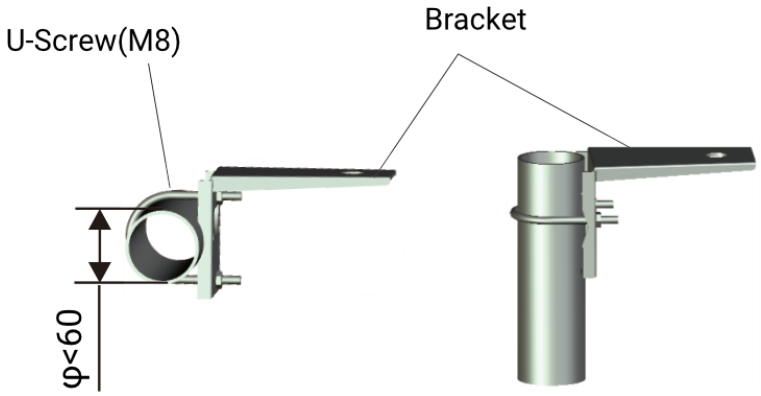


Figure 5-16 Mounting Bracket Can Be Fixed to Round Tube (Left) or Wall Mounted (Right)



Figure 5-17 The Transmitter Is Secured to the Bracket with a Nut

6. More Operations

For a detailed explanation of the device installation, commissioning and configuration, scan the QR code below:



Note

The document is aimed at those who work with the device over the entire life cycle and perform specific configurations.

7. Regulatory Information

Note

These clauses apply only to the products bearing the corresponding mark or information.

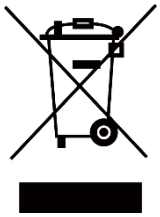
EU Conformity Statement

CE

This product and - if applicable - the supplied accessories too are marked with "CE" and comply therefore with the applicable harmonized European standards listed under the Directive 2014/30/EU (EMCD) and Directive 2011/65/EU (RoHS).

Note: The products with the input voltage of within 50 to 1000 VAC or 75 to 1500 VDC comply with Directive 2014/35/EU (LVD), and the rest products comply with Directive 2001/95/EC (GPSD). Please check the specific power supply information for reference.

Warning: This is a class A product. In a domestic environment this product may cause radio interference, in which case, the user may be required to take adequate measures.



Directive 2012/19/EU (WEEE Directive): Products marked with this symbol cannot be disposed of as unsorted municipal waste in the European Union. For proper recycling, return this product to your local supplier upon the purchase of equivalent new equipment, or dispose of it at designated collection points. For more information see: www.recyclethis.info



Regulation (EU) 2023/1542(Battery Regulation): This product contains a battery and it is in conformity with the Regulation (EU) 2023/1542. The battery cannot be disposed of as unsorted municipal waste in the European Union. See the product documentation for specific battery information. The battery is marked with this symbol, which may include lettering to indicate cadmium (Cd), or lead (Pb). For proper recycling, return the battery to your supplier or to a designated collection point. For more information see: www.recyclethis.info.

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