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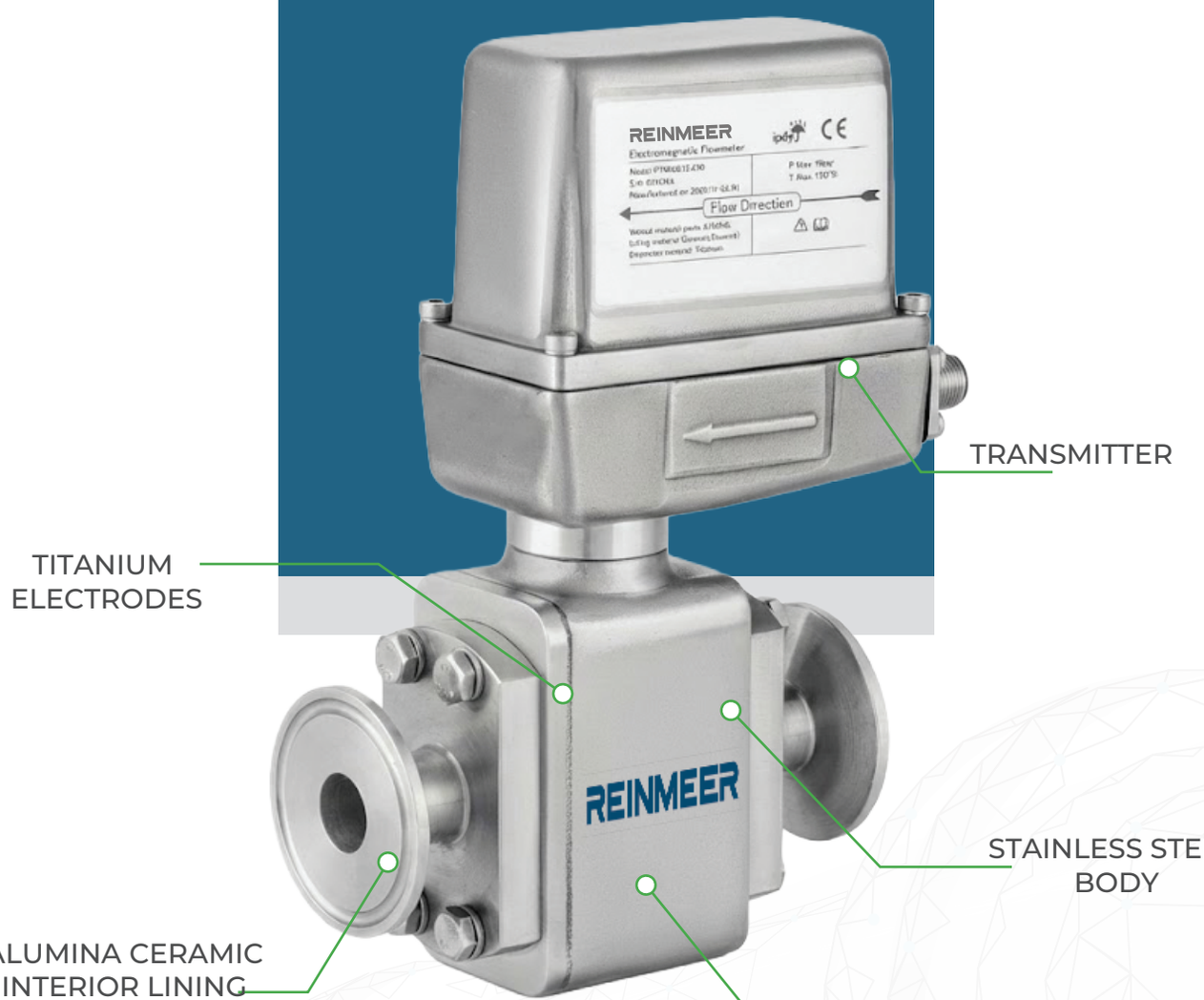
REMFIL
FOR FILLING
STAINLESS STEEL
ELECTROMAGNETIC FLOWMETER

Modbus RTU | 22 ~ 26V DC |

RELIABLE MEASUREMENTS FOR CORRECT DECISIONS.

REINMEER

REMFIL FOR FILLING STAINLESS STEEL ELECTROMAGNETIC FLOWMETER



Modbus RTU | 22 ~ 26V DC

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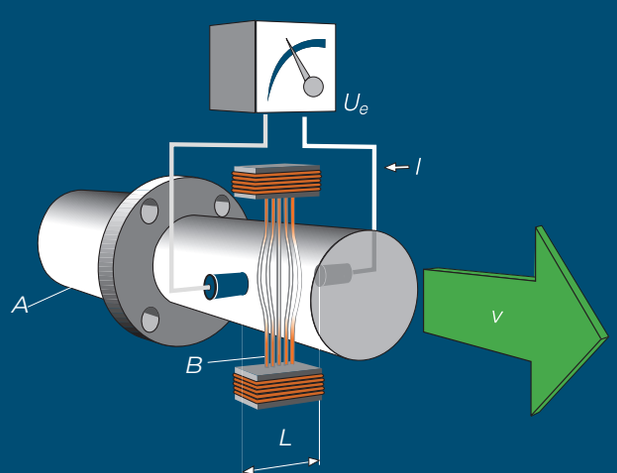
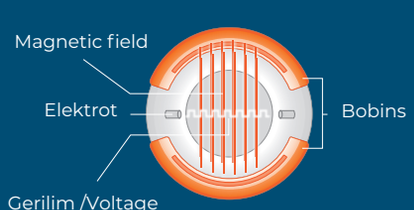
WORKING PRINCIPLE

Electromagnetic flow measurement: It is a flow measurement method based on the principle of the electromagnetic field.

The physical foundations of this principle date back to the English physicist Michael Faraday, who discovered in 1831 that electric current could be generated with the aid of a magnetic field. In 1941, Swiss scientist Bonaventura Thurlemann applied this knowledge to conductive liquids flowing through pipes and produced the world's first electromagnetic flowmeter.

Ue = B .L . v
B = magnetic induction (magnetic field)
L = distance between electrodes
v = flow rate
Q = volume flow
A = pipe cross-section





Current-proportional induced voltage

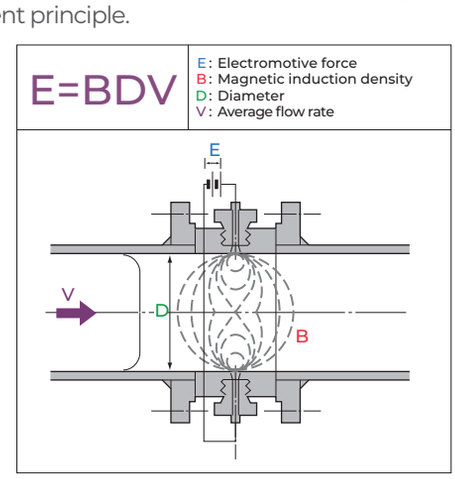
REMFil Stainless Steel Electromagnetic Flowmeter contains two coils. These coils create a continuous magnetic field across the cross-sectional area of the measuring tube with the help of metal blocks placed on them. Two voltage-sensing electrodes are placed perpendicular to each other inside the measuring tube. The insulating material coating the inner surface prevents short circuits between the conductive liquid and the metal measuring tube. When there is no flow, no electrical voltage occurs between the two electrodes.

In a conductive liquid, negatively and positively charged ions are present in equal amounts. When flow begins, the magnetic field applies a force to the charged ion particles in the liquid. As a result, the negatively and positively charged ions in the liquid separate and move toward opposite sides of the measuring tube. This results in an electrical voltage detected by the electrodes.

This voltage is directly proportional to the flow velocity within the line. The instantaneous flow rate can be calculated using the known volume of the measuring tube and the velocity information.

As the flow velocity increases, the separation of charged particles also increases, and the voltage between the electrodes will increase. The measuring electrodes may occasionally detect magnetic noise present in the environment. This noise signal must be clearly distinguished from the actual measurement signal. To achieve this, the magnetic field must be generated using pulsed direct current. By continuously changing the positions of the charged ions between the electrodes using pulsed direct current, the effect of magnetic noise is eliminated, enabling accurate and stable flow measurement.

Flow information is calculated using the following simplified formula based on the electromagnetic measurement principle.



APPLICATION AREAS

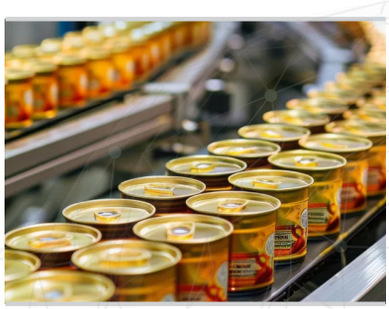
"The Rem Fil Stainless Steel Electromagnetic Flowmeter is an ideal solution, particularly for industrial liquid filling systems that require high precision and speed. Holding critical importance in the food, beverage, pharmaceutical, and chemical sectors, this device provides excellent repeatability in bottling lines, packaging units, and precision dosing processes. Thanks to its compact size options ranging from 6 mm to 25 mm and its fast response time, it can be easily integrated into modern linear and rotary filling machines, maximizing efficiency in mass production.

Designed to withstand harsh process conditions, RemFil can be safely used in hot filling applications up to 150°C and in CIP/SIP (Cleaning-In-Place / Sterilization-In-Place) processes. Its alumina ceramic inner lining and titanium electrodes demonstrate superior resistance to corrosion when measuring conductive corrosive acids, bases, and aggressive chemicals. Its structure, which fully complies with hygienic standards, offers uninterrupted performance in sterile production environments where product safety and long-term measurement stability are mandatory.

Chemical Industry

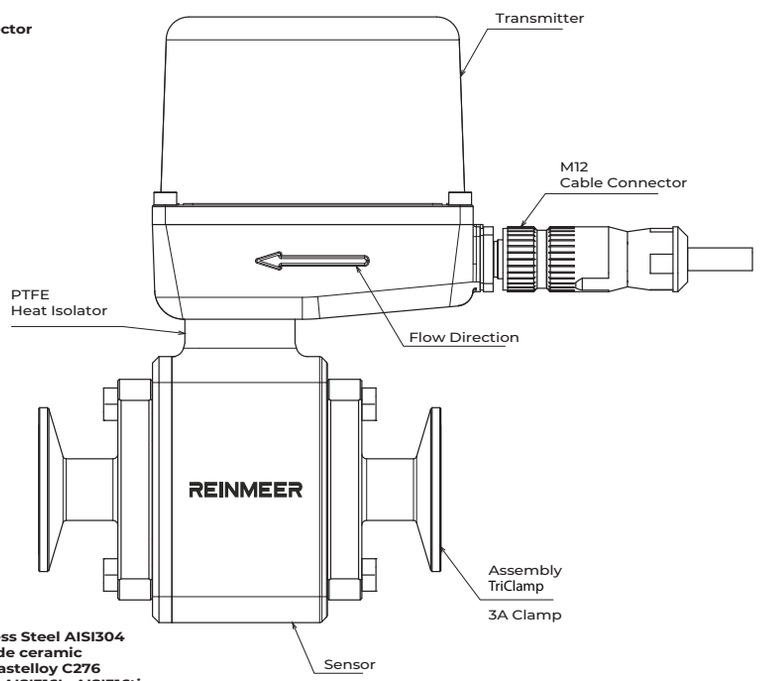
Beverage Industry

Food Industry



LOCATION OF MAGFIL TRI-CLAMPS AND GASKETS

Transmitter:
Materials: Housing: AISI304
Housing gasket: Viton
Cable connection:
5-pin / 8-pin M12 Connector



Sensor:
Materials:
Sensor housing: Stainless Steel AISI304
Coating: Zirconium oxide ceramic
Electrodes: Titanium/Hastelloy C276
Mounting connections: AISI316L, AISI316ti

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Revision

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1. All dimensions are shown.

Designer

Scale

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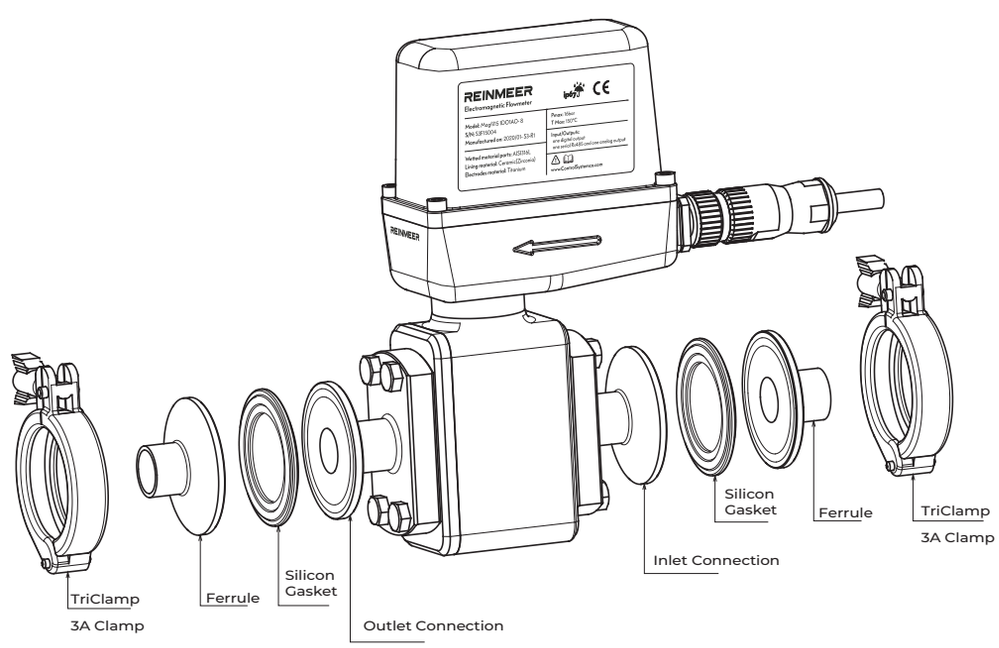

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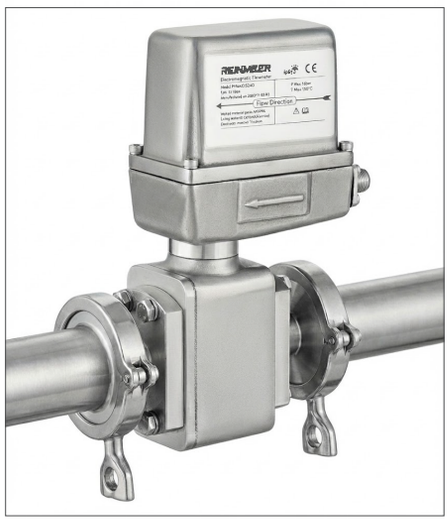


GENERAL FEATURES

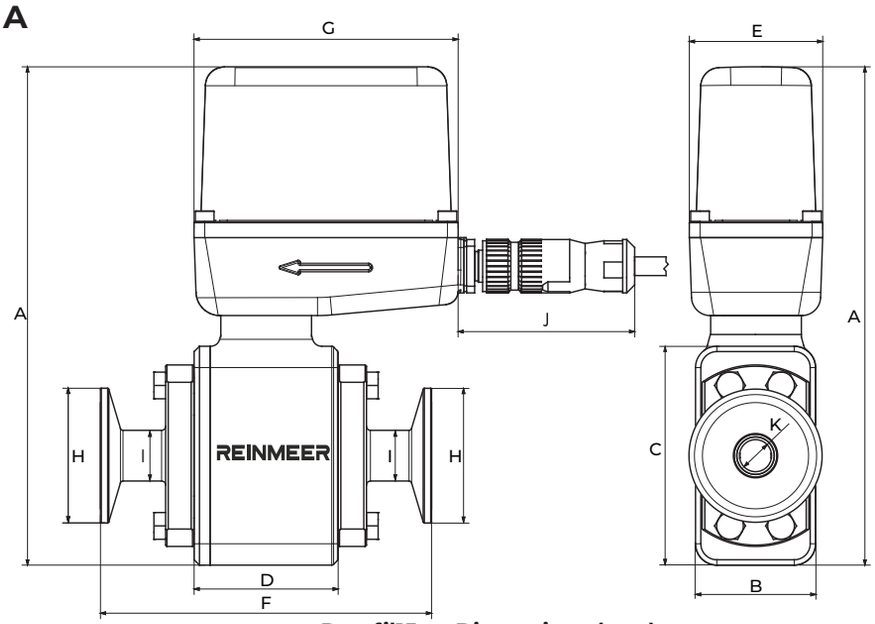
High Accuracy	Precise filling control with ±0.3% measurement accuracy.
Durable Design	AISI 304 stainless steel body and alumina ceramic (Al2O3) interior coating.
Hygienic Structure	Temperature resistance up to 150°C (CIP/SIP compliant).
Advanced Control	Ability to manage the filling process without the need for an external controller.
Connection	The Modbus RTU protocol allows for networking up to 200 devices.
Protection	High resistance to moisture, dust and vibration (IP68)
Bidirectional Measurement	Ability to measure in both forward and reverse flow directions.

TECHNICAL SPECIFICATIONS

Model	Magfil Series (Prismatic)
Nominal Diameters (DN)	6, 8, 10, 15, 25 mm
Measurement Accuracy	± %0.3
Body Material	AISI 304 Stainless Steel
Connector Material	AISI 316L Stainless Steel
Inner Lining	Alumina Ceramic (Al2O3)
Electrode Material	Titanium
Supply Voltage	22 ~ 26V DC (Nominal 24V DC)
Operating Temperature	Maksimum 150°C
Digital Output	1 Unit (Pulse / Frequency / Alarm)
Digital input	1 Unit (24V DC, 5mA)
Communication Protocol	Modbus RTU
Electrical Connection	M12 Standard Connector
Process Connection	DN15 or DN25 3A Clamp / Flange / Nut
Protection Class	IP68

PRODUCT TYPES TECHNICAL DRAWING

Version A



Remfil15 xx Dimensions (mm)

Model	A	B	C	D	E	F	G	H	I	J	K	Ağırlık
Remfil 6	187	45	82	54	50	124	99	50.5	19	66	6	1.75 kg
Remfil 8	187	45	82	54	50	124	99	50.5	19	66	8	1.75 kg
Remfil 10	187	45	82	54	50	124	99	50.5	19	66	10	1.75 kg
Remfil 15	187	45	82	54	50	124	99	50.5	19	66	12	1.75 kg

REINMEER

Proje /Çizim

Revision

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Designer

Scale

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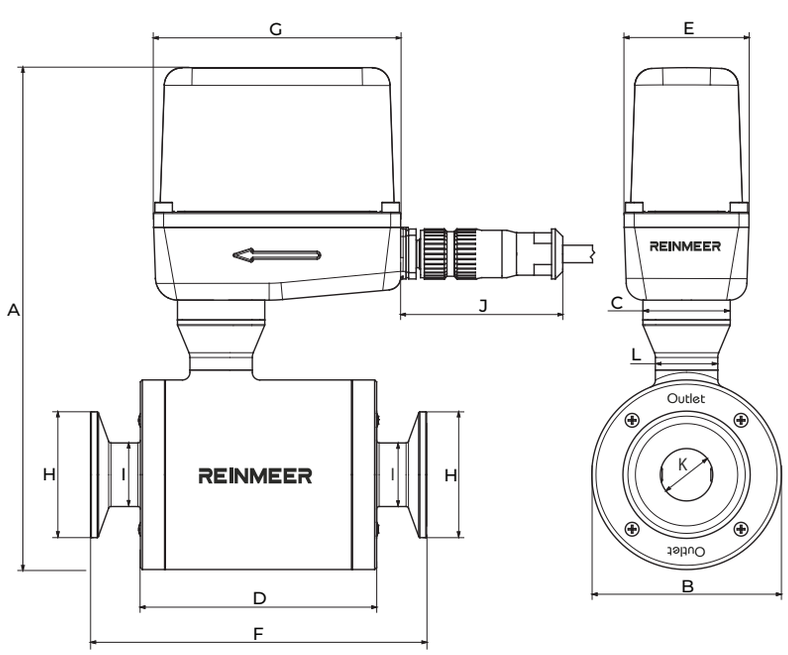
Version B



Remfil25 xx Dimensions (mm)

Model	A	B	C	D	E	F	G	H	I	J	K	Ağırlık
Remfil 25	201	76	35	95	50	135	99	50.5	25.5	66	2	2.5 kg

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Proje /Çizim

Revision

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Designer

Scale

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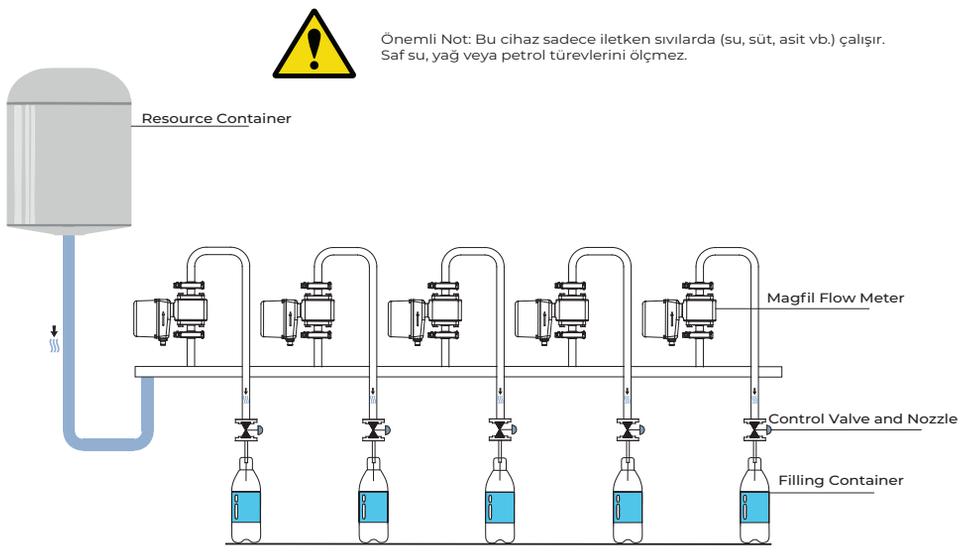
APPLICATION EXAMPLES



Installation on linear filling machine.

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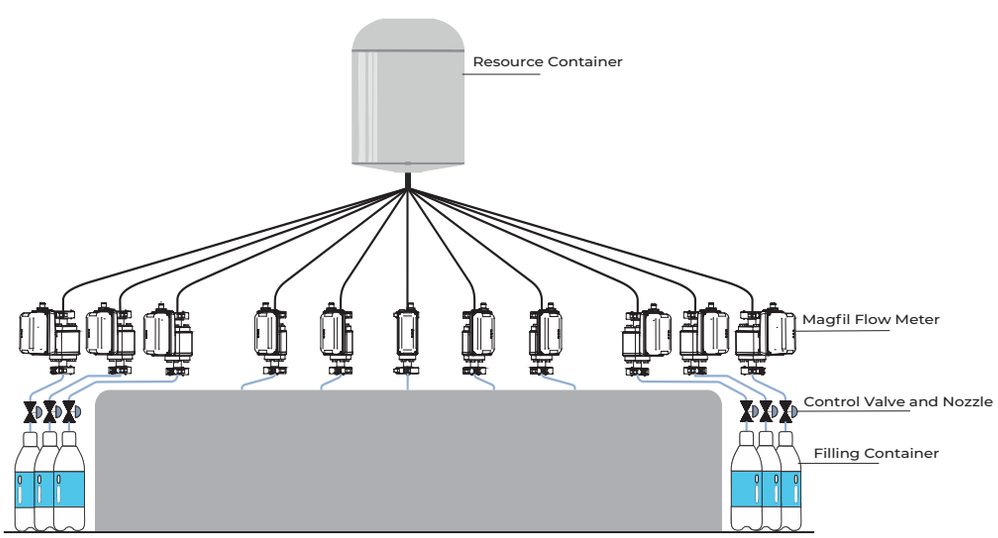

Installation on the rotary filling machine.

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Designer

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MEASUREMENT RANGE AND ACCURACY

DN (mm)	Minimum Flow Rate	Maximum Flow Rate	Accuracy / Precision	Unit
4	2	400	16	L/h
6	5	900	3.6	L/h
8	7	1600	6.4	L/h
10	13	2500	10	L/h
15	25	4200	17	L/h
25	58	14000	56	L/h

"Measurement ranges are specified based on water-based liquids. They may vary depending on product viscosity."

What do these values mean?

This table answers the customer's question, "Which size should I choose?". The columns are defined as follows:

- **DN (mm):** This is the width of the tube through which the liquid passes in the device.

  Example: DN4 is a very narrow opening (for filling eye drops, etc.), while DN25 is suitable for filling a large water dispenser.

- **Minimum & Maksimum Flow Rate:** This is the operating range within which the device can take accurate measurements.

  Example: Example (for DN 10): This device can measure a minimum fluid flow of 13 liters per hour. If the flow rate falls below this limit (e.g., dripping), the device may register it as '0' or provide an inaccurate measurement.

  The same device has a maximum measurement capacity of 2500 Liters per hour. Exceeding this flow rate may cause the device to display an 'Error' or result in pipe damage due to excessive pressure.

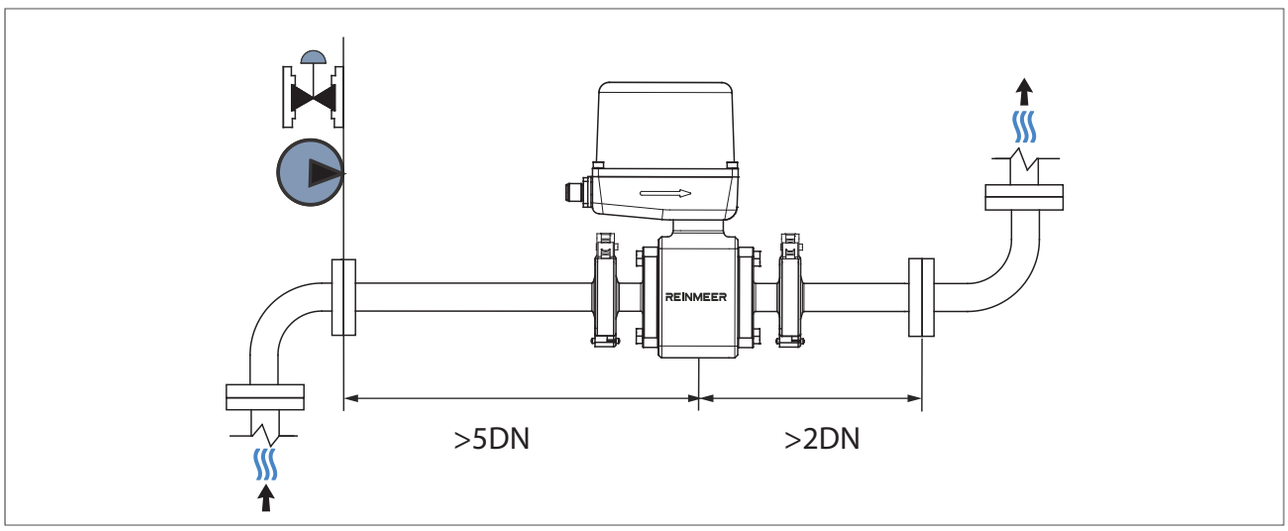
- **Accuracy :** It shows how much the device can "shock" during measurement.

  Technical Details: If you look closely at the numbers in the table (e.g., Max 14000 for DN25, Accuracy 56), this value corresponds to 0.4% (four thousandths) of the maximum flow rate.

  For the customer, this means: "If I operate this machine at full speed (DN25 model), my maximum error margin at 14,000 liters per hour will be 56 liters." This is a very good value for industrial filling.

- **Unit :** L/h stands for "Liters per Hour". Therefore, all flow rates in the table are expressed in liters per hour.

GENERAL ASSEMBLY



INSTALLATION AND ASSEMBLY | MAGFIL

Electromagnetic flowmeters can be mounted on pipes of larger or smaller diameters; furthermore, the dimensions and weight of the sensor must be considered when mounting the device on a pipeline. The table below shows the correct general mounting conditions.

Inlet Run	> 5 DN
Outlet Run	> 2 DN
Process connections	3A Clamp 19mm for Magfil15 model 3A Clamp 25mm for Magfil25 model

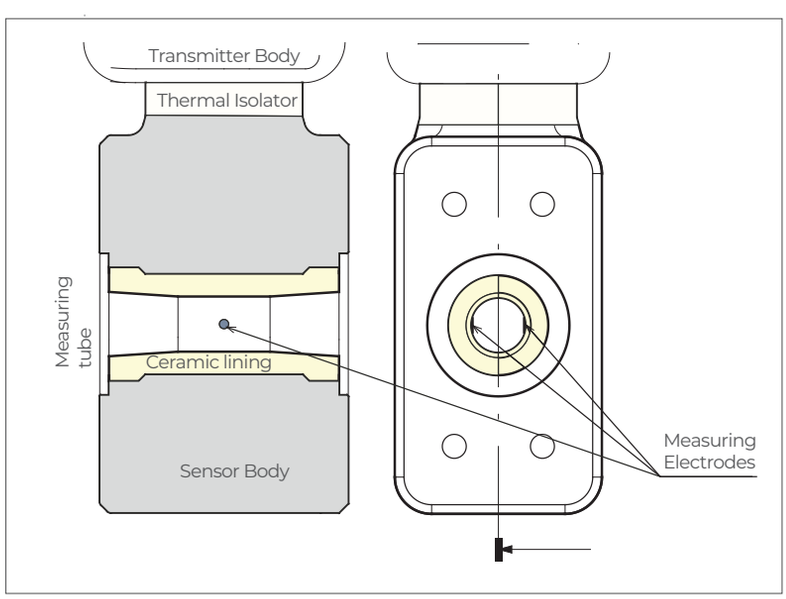
According to the table:

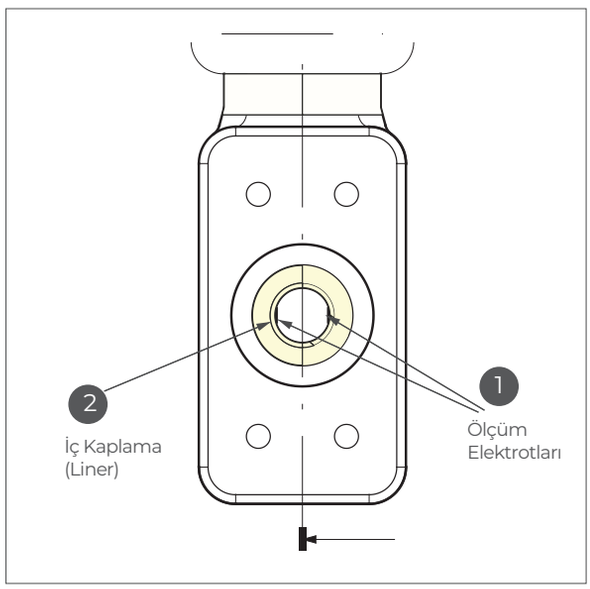
(i) The minimum required distance upstream of the sensor (to equipment such as valves, pumps, and T-junctions) must be 5 times the pipe diameter (5 x DN).

(ii) The minimum required distance downstream of the sensor (to equipment such as valves, pumps, and T-junctions) must be 2 times the pipe diameter (2 x DN).

Orientation of the measuring electrodes

In all mounting poses the optimum measurement takes place when the pipe system is completely filled with the medium so the measuring electrode in horizontal pipe lines plane must be horizontal. This prevents brief insulation of the two measuring electrodes by entrained air bubbles.





1. ELECTRODE POSITION

Correct procedure: In electromagnetic flowmeters, the measuring electrodes should always be positioned horizontally, i.e., opposite each other at the 3 and 9 o'clock positions.

- **Reason: T**he device's coils (the parts that generate the magnetic field) are usually located at the top and bottom (in the 12 and 6 directions). According to Faraday's law, when a liquid passes through a magnetic field, a voltage is generated perpendicular to this field (i.e., sideways).
- **Visual Inspection:** If the image shows two small metal buttons/protrusions opposite each other on the inner wall of the tube, precisely in the middle (right and left), the position is correct. If the electrodes appear to be on the ceiling or floor, it is technically incorrect.

2. INNER LINING (LINER)

The truth is: There must be an insulating layer (PTFE/Teflon) between the metal casing of the pipe and the liquid inside.

- **Visual Inspection:** If a thin layer of white or a different color is visible between the outer stainless steel and the inner cavity on the cross-sectioned surface, this is an accurate detail. If the milk appears to be directly touching the metal, this is an incomplete representation.

GENERAL ASSEMBLY

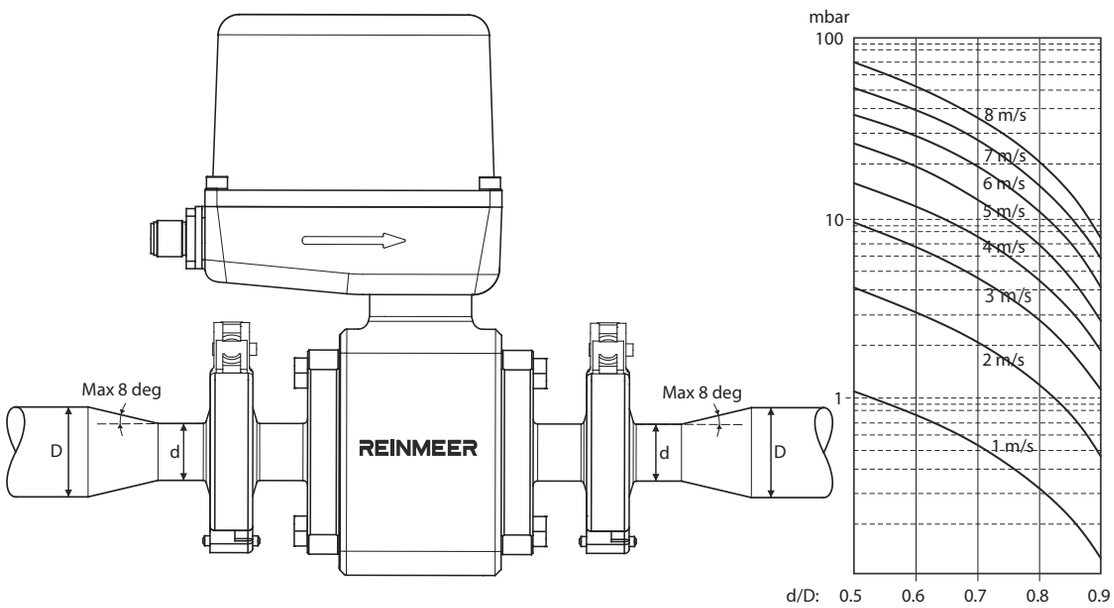
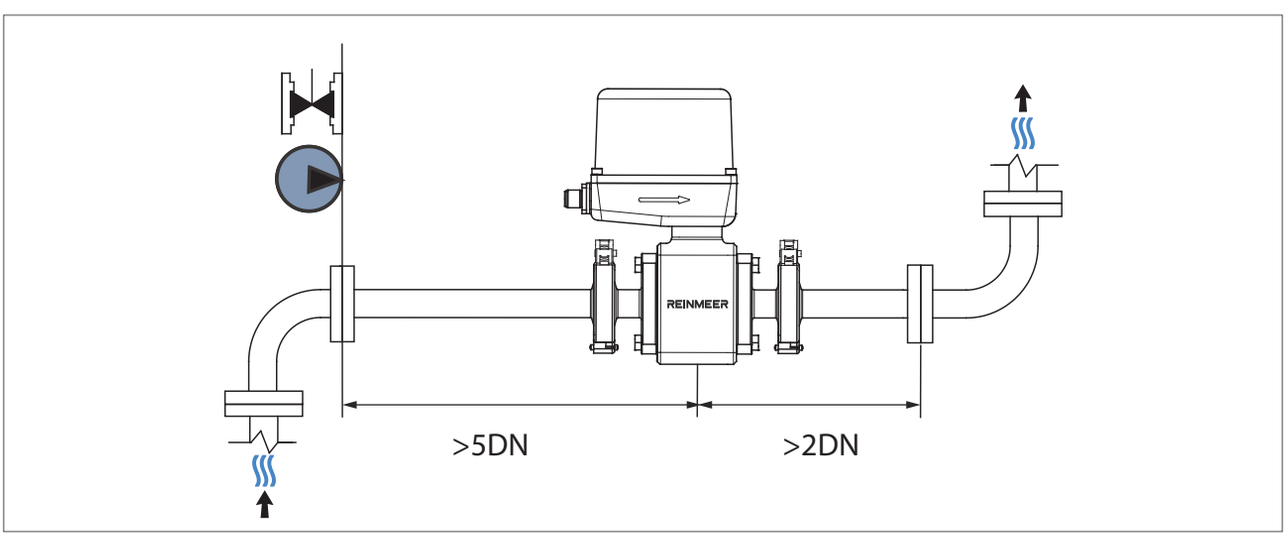


Figure 1) Pressure loss due to pipe diameter reduction.

3. REDUCED PIPE LINE DIAMETER

In the case of using pipe diameter reducers, a pressure loss occurs and the velocity of fluid passing through the sensor increases and this leads to preventing the liquids to produce coating on the internal wall of the pipe line and consequently the measurement accuracy improves. Figure 3-4 illustrates the pressure loss duo to the diameter reduction.

- The minimum required distance before the sensor until the reducer must be 5 times of the main pipe diameter.
- The minimum required distance after the sensor until the reducer must be 2 times of the main pipe diameter.



ASSEMBLY CONDITIONS

1) Siphon shaped pipe Installation

To avoid air bubble to aggregate in the sensor mounting position one can install the sensor on a U shaped siphon pipe line as below.

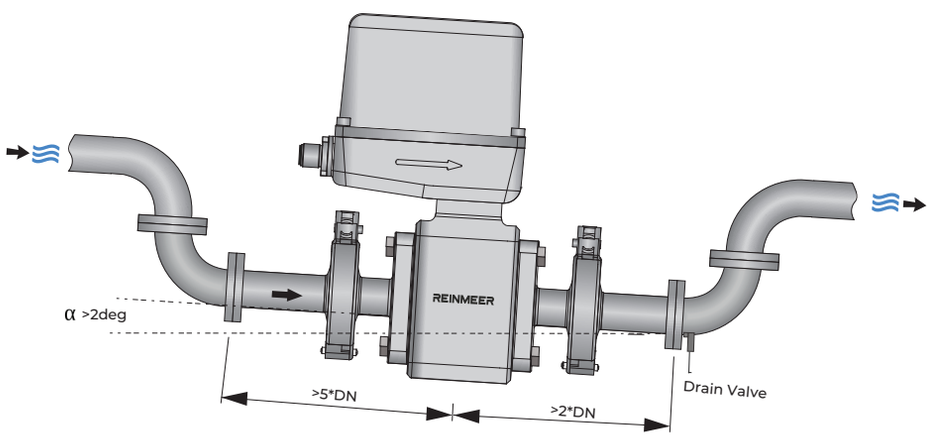
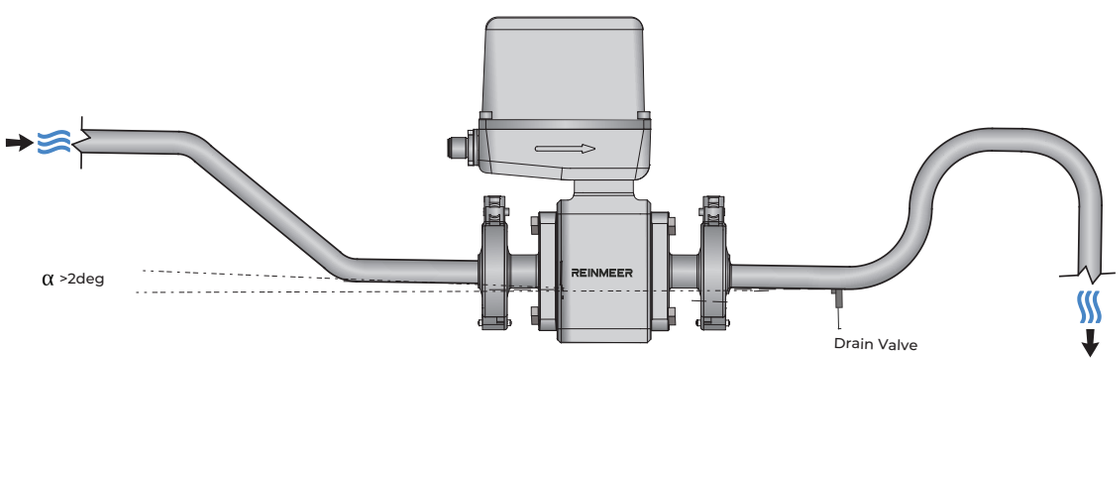


Figure 1: Siphon-shaped pipe installation.

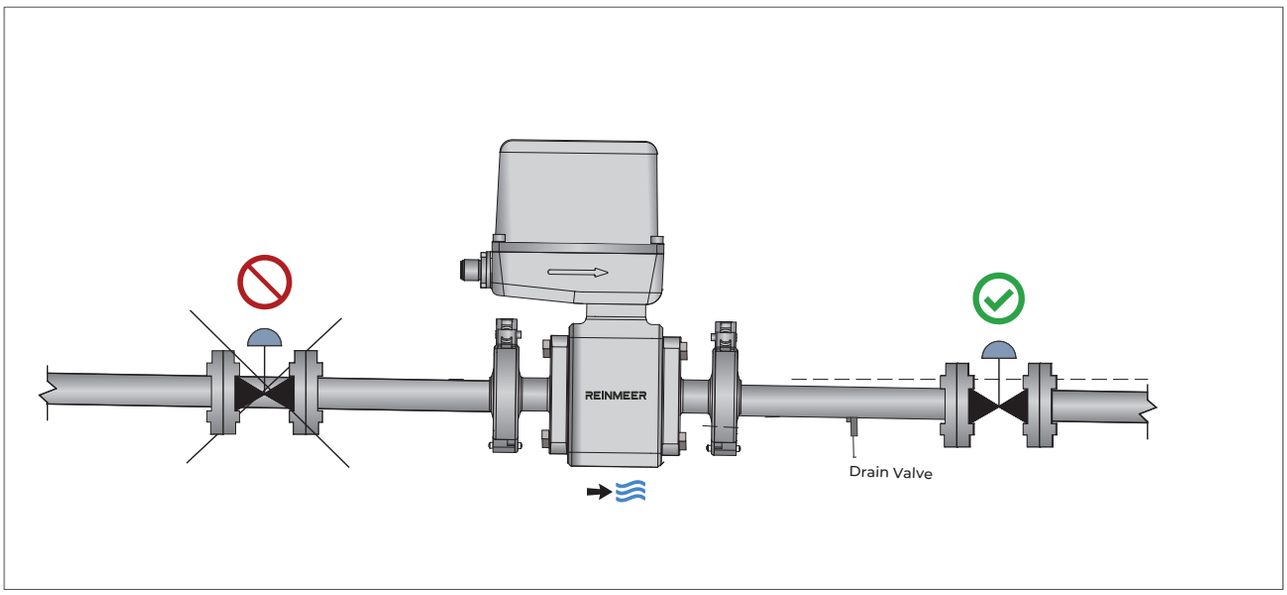
2) Zero pressure discharge

It is extremely recommended that in the case of open discharge the u shape siphon with slightly angled installation position is needed.



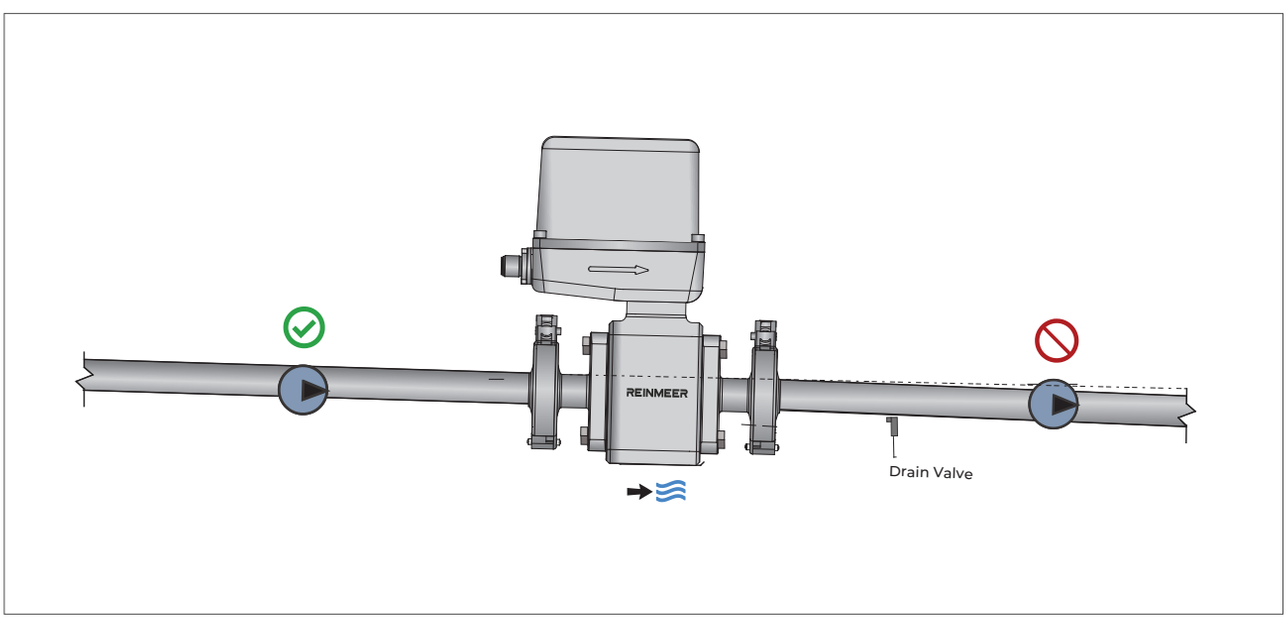
3) Installation Before the Control Valve

Do not install the sensor after the control valves.

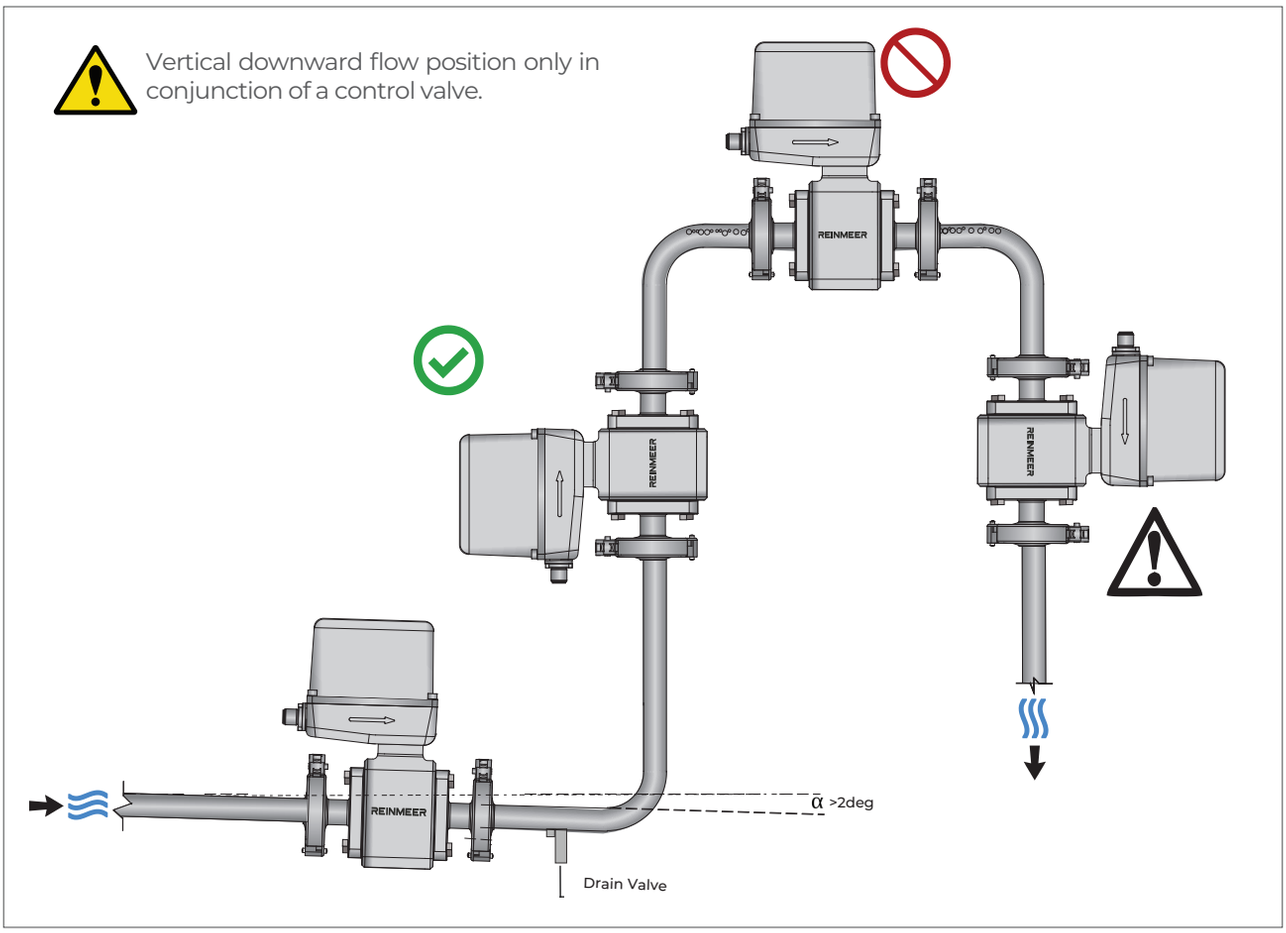


4) Post-pump installation

Do not mount the sensor in front of the pumps.



5) Different mounting positions along a pipe



6) Downward pipes mounting

Install a siphon with a vent valve downstream of the sensor in down pipes whose length h≥5m.This precaution is to avoid low pressure and the consequent risk of damage to the measuring tube. This measure also prevents the bubbles too.

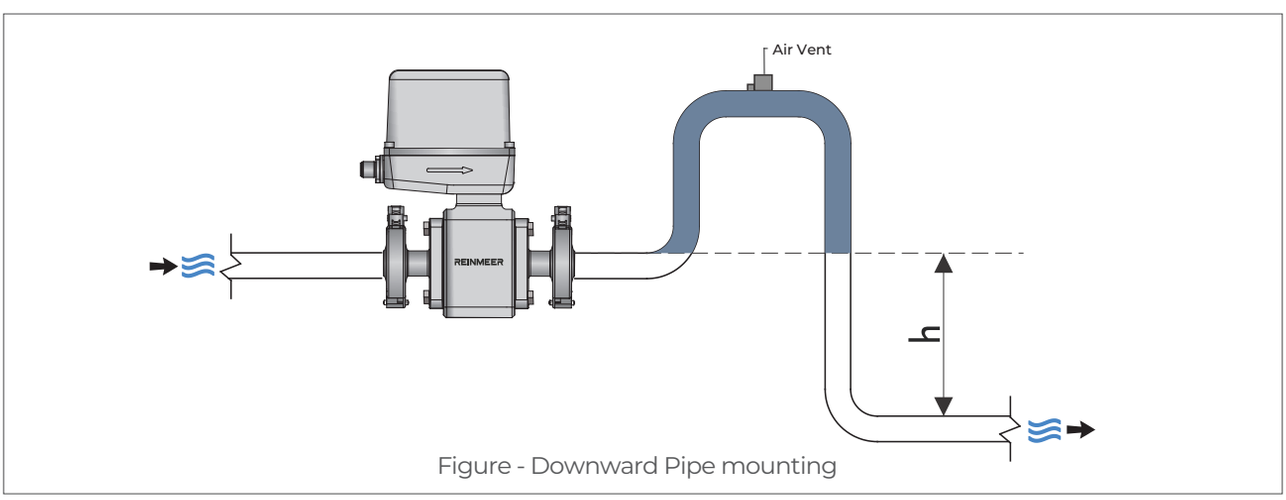
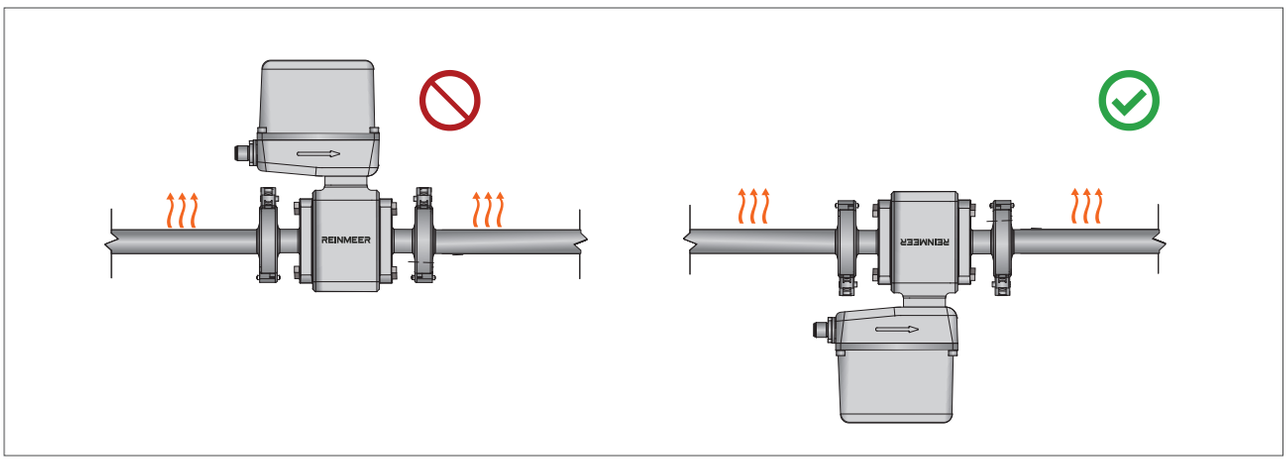


Figure - Downward Pipe mounting

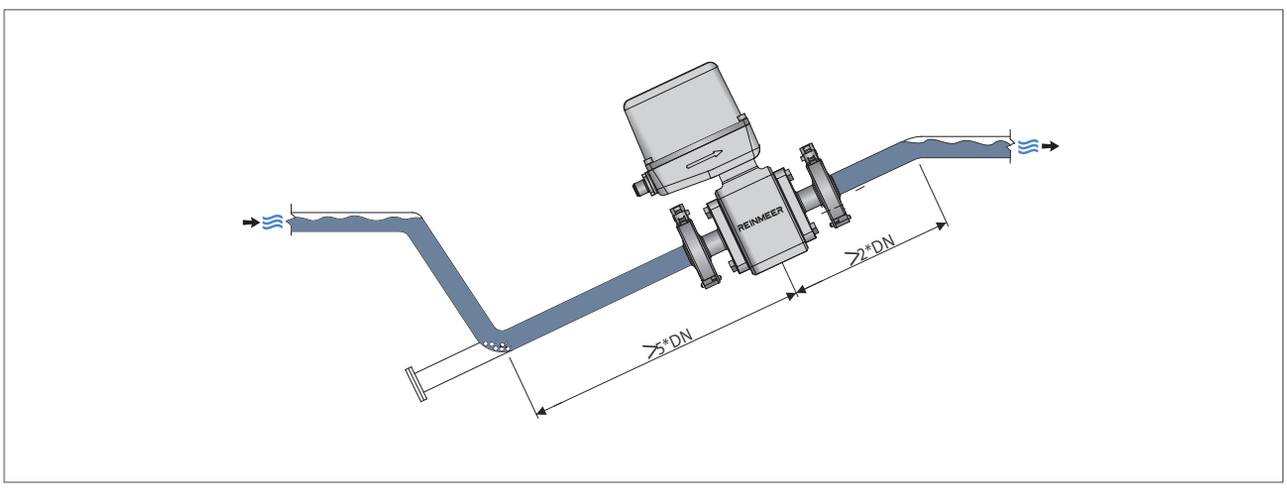
7) Extremely heated pipe lines

The transmitter unit pointing downward reduces the risk of the electronic components overheating in the case of mounting on extremely hot process medium.



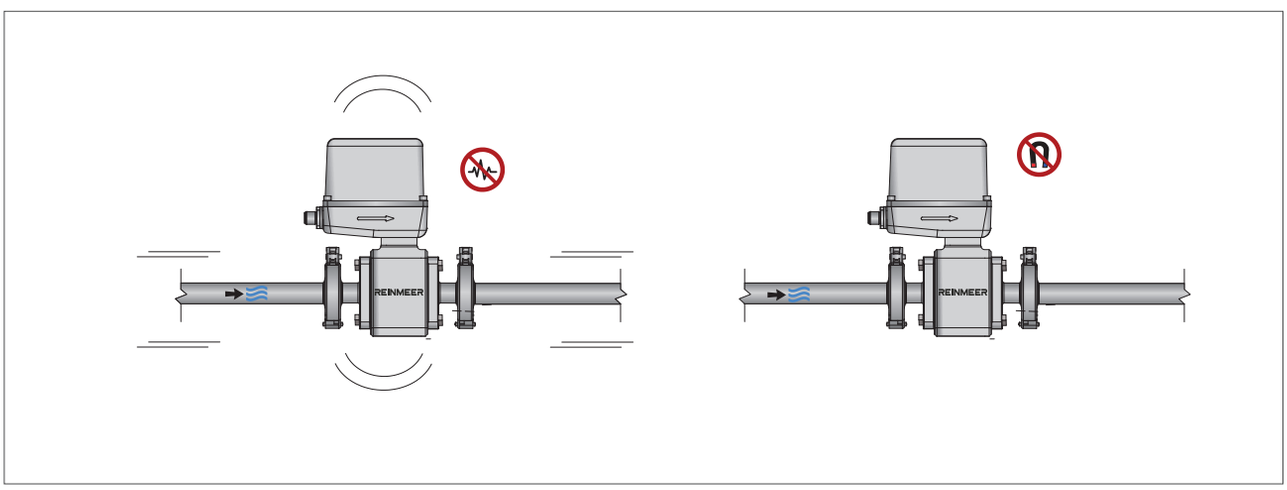
8) Mounting on a partially filled pipe with immersed solid particles

In the case of solid particles in the medium a drain for solid particles is necessary.



9) Prohibited mounting situations

Avoid to mount the device on pipe lines with extreme mechanical vibrations or in the existence of powerful magnetic fields.



Contact us

Reinmeer Factory Address
Eutiner Str.12,22143
Hamburg, Germany
reinmeer@reinmeer.com