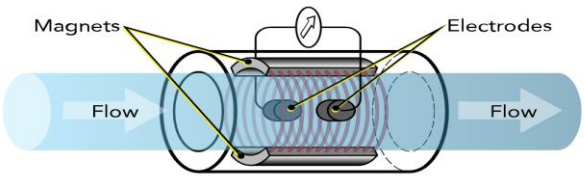
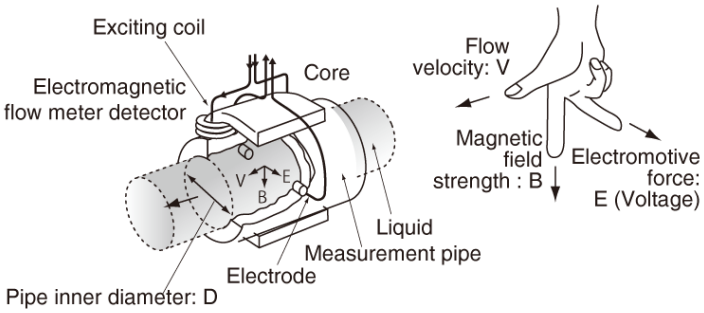


Internal Sketch



FARADAY'S LAW INDUCTION

How Electromagnetic Flow Meter Works

Electromagnetic Flow Meters are based on **FARADAY'S LAW INDUCTION**. These meters are also called as Magflow or Electromagnetic Flow Meters. A magnetic field is applied to the metering tube, which results in a potential difference proportional to the flow velocity perpendicular to the flux lines.

The physical principle at work is **Electromagnetic Induction** and mathematically defined as **E=k*B*D*V**. where, E = Induced Voltage (Linear with velocity)

K = Proportionality Constant
B = Magnetic Field Strength (Coil Inductance)
D = Distance between electrodes
V = Velocity of process fluids

The induced voltage (E) is directly proportional to the velocity (V) of the fluid moving through the magnetic field (B). The induced voltage is carried to the transmitter through the electrode circuit. The transmitter then converts this voltage into a quantifiable flow velocity. The volumetric flow rate of the fluid is calculated using this known velocity along with the area of the pipe.

When a flowmeter is installed and activated, its operations begin with a pair of charged magnetic coils. As energy passes through the coils, they produce a magnetic field that remains perpendicular to both the conductive fluid being measured and the axis of the electrodes taking measurements. The fluid moves along the longitudinal axis of the flowmeter, making any generated induced voltage perpendicular to the field and the fluid velocity. An increase in the flow rate of the conductive fluid will create a proportionate increase the voltage level.

The meter features flanged construction and is available with choice of liner and electrode material. All meters consist of a sensor and a converter that may be mounted integral to the sensor or remotely either with a field mount kit.

Selection of Flow meter type

Integral type and Remote type displaying Flow Rate & Totaliser on same Screen / Display Unit

Integral type compact structure can observe the Flow on site on the pipeline without wiring etc.

Remote type in harsher applications, such as high temperature fluids, environments, open space, pipe line at high.

Types of Electromagnetic Flow Meter

A) Integral Type with PTFE Liner

B) Integral Display Unit

A) Two Part with Rubber Liner

B) Two Part Remote Display Unit

C) Display

Specifications

Line Size	DN 25 – DN 3000 mm
Nominal Pressure	0.6 - 1.6 Mpa (2.5Mpa/4.0Mpa/6.4Mpa…Max 42Mpa)
Accuracy	+/-0.5%(Standard)
Liner	PTFE, Hard Rubber
Electrode	SS 316L, Hastelloy C, Tantalum
Type	Integral type, Remote type with 10 mtr. cable
Medium Temperature	-20~+80 deg C (Integral type)
	Remote type (Hard Rubber) -10~+80degC Remote type (PTFE) -10~+160degC
Ambient Humidity	5-100%RH (relative humidity)
Conductivity	>15us/cm
Protection Class	IP65 (Standard); IP68 (Optional for remote type)
Process Connection	Flange (Standard), Wafer, Thread, Tri-clamp etc (Optional)
Output Signal	4-20mA (Standard) / Pulse (Optional)
Communication	RS485(Standard),GPRS/GSM (Optional)
Power Supply	Integral - 24 V DC , AC 220V
	Remote - 24 V DC (Standard) , SMPS AC 220V (Optional)
Power Consumption	<20W

Main Performances of the Electrode Materials

Electrode Material	Application
SS 316L	Applicable in Water, Sewage and Low corrosive medium
Hastelloy C	Be resistant to oxidable acid such as nitric acid, mixed acid as well as oxidable salt such as Fe+++,Cu++ and sea water
Tantalum	Having strong resistance to corrosive mediums that is similar with glass. Almost applicable in all chemicals mediums except for hydrofluoric acid, oleum and alkali

Industrial Applications

The **Electromagnetic Flow Meter** does **not have any obstructions** in the pipe, so they are able to accommodate various applications.

From CLEAN to DIRTY LIQUIDS. - **Only for CONDUCTIVE LIQUIDS**.

Electromagnetic Flow Meters are very well **recommended** for:

Food Grade applications like Juices, Milk, Municipal or Industrial Water etc.

These meters are also suitable for liquids were there are lot of **suspended particles** like Sewage, Waste Water, Chemicals, Slurries etc.
The meters can be installed in **Sewage systems**, Wastewater treatment, Rainwater storage plants, Effluent, Surface water discharge systems, Cooling water pipes and various Chemical applications.

Plug and Play design – just install it and it works.

Advantages

(1) The obstruction to the flow is almost nil and therefore this type of meters can be used for measuring heavy suspensions, including mud, sewage and wood pulp.

(2) There is no pressure head loss in this type of flow meter other than that of the length of straight pipe which the meter occupies.

(3) They are not very much affected by upstream flow disturbances.

(4) They are practically unaffected by variation in density, viscosity, pressure and temperature.

(5) Electric power requirements can be low (15 or 20 W), particularly with pulsed DC types.

(6) These meters can be used as bidirectional meters.

(7) The meters are suitable for most acids, bases, water and aqueous solutions because the lining materials selected are not only good electrical insulators but also are corrosion resistant.

(8) The meters are widely used for slurry services not only because they are obstruction less but also because some of the liners such as polyurethane, neoprene and rubber have good abrasion or erosion resistance.

Disadvantages

(1) These meters can be used only for fluids which have reasonable electrical conductivity.

(2) Accuracy is only in the range of ± 1% over a flow rate range of 5%.

(3) The size and cost of the field coils and circuitry do not increase in proportion to their size of pipe bore. Consequently, small size meters are bulky and expensive.

Limitations

(1) The substance being measured must be conductive. Therefore, it can't be employed for metering the flow rate of gases and steam, petroleum products and similar liquids having very low conductivity.

(2) To render the meter insensitive to variations in the resistance of liquid, the effective resistance of the liquid between the electrodes should not exceed 1% of the impedance of the external circuit.

(3) It is a very expensive device.

(4) As the meter always measures the volume rate, the volume of any suspended matter in the liquid will be included.

(5) To avoid any trouble which would be caused by entrained air, when the flow tube is installed in a horizontal pipe-line, the electrodes should be on the horizontal diameter.

(6) As a zero check on the installation can be performed only by stopping the flow, isolating valves are required and a bypass may also be necessary through which the flow may be directed during a zero check.

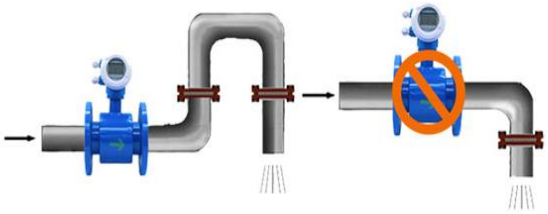
(7) The pipe must run full, in case regulating valves are installed upstream of the meter.

Installations

1. control valves should be installed downstream of the flowmeter.

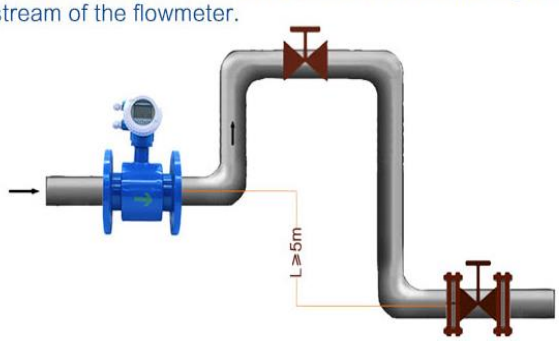
2.The pump should be installed at the upper reaches of the flowmeter.

3. flowmeter open before discharge installation.

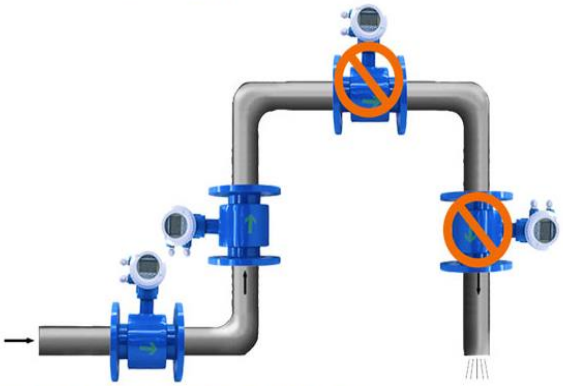


Need 10D of upstream and 5D of downstream

4. to prevent vacuum, if the drop tube is greater than or equal to 5m, the automatic exhaust valve should be installed at the highest point downstream of the flowmeter.



5. precautions for bending pipe installation.



6. precautions for bending pipe installation.

Note: Better to maximum Straight run 20D on both sides 20D UP & DOWN stream if possible.

Selection – Line Size – Flow Range

Line Size	Flow Range in m3 / hr
DN 20	0.33 ~ 11.34
DN 25	0.52 ~ 17.66
DN 32	0.86 ~ 29.93
DN 40	1.35 ~ 45.21
DN 50	2.12 ~ 70.65
DN 65	3.58 ~ 119
DN 80	5.43 ~ 180
DN 100	8.48 ~ 282
DN 125	13.25 ~ 441
DN 150	19.08 ~ 635
DN 200	33.91 ~ 1130
DN 250	52.99 ~ 1766
DN 300	76 ~ 2543

Line Size	Flow Range in m3 / hr
DN 350	103 ~ 3461
DN 400	1355 ~ 4521
DN 450	171 ~ 5722
DN 500	211 ~ 7065
DN 600	305 ~ 10173
DN 700	415 ~ 13847
DN 800	542 ~ 18086
DN 900	686 ~ 22890
DN 1000	847 ~ 28260
DN 1200	1221 ~ 40694
DN 1400	1662 ~ 55389
DN 1600	2171 ~ 72345
DN 1800	2747 ~ 91562

Model selection

Series	1	2	3	4	5	6	7	8	9	10
NEFM	Type	Line size	Liner	Electrode	Connection	Power Supply	Output	Communication	Code	Others

1	Type	A	Integral
		B	Two Part
2	Line Size	DN	20 to 1800
3	Liner	A	Hard rubber
		B	PTFE
		C	Neoprene
4	Electrode	A	SS 316L
		B	Hastelloy C
		C	Tantalum
5	Connection	A	Flange
		B	Tri clamp
6	Power Supply	A	220 V AC
		B	SMPS 220 V AC to 24 V DC
		C	24 V DC
7	Output	A	4 – 20 mA
		B	Pulse
8	Communication	A	RS 485
		B	GPRS/GSM
9	Code		
10	Others		

Plastic Pipe Installation

Tri Clamp

SS Construction

Industry Installation

Nectar Engineers

Regd. Address : JG1/27, Ground Floor, Vikaspuri, New Delhi – 110 018 India
Contact No. : +91 98107 69928
Email : nectarmktgdelhi@gmail.com; nectarsales5@gmail.com
GSTIN No. : 07AELPK4087L1ZY