Working Principle

Electromagnetic Flowmeters are based on Faraday's Law of Electromagnetic Induction.

In an Electromagnetic Flowmeter, the magnetic field is generated by a set of coils. As the conductive liquid passes through the electromagnetic field, an electric voltage is induced in the liquid, which is directly proportional to its velocity. This induced voltage is perpendicular to both the liquid flow direction and the electromagnetic field direction. The voltage sensed by the electrodes is further processed by the transmitter to give standardised output signal or displayed in appropriate engineering unit.

The flux density of the electromagnetic field in a given Flowmeter and the distance between the electrodes are constant. Therefore, the induced voltage is only a function of liquid velocity.

$$E = K \times B \times \bar{v} \times D$$

where **E** : Induced voltage
K : Flow tube constant
B : Magnetic field strength
$\bar{v}$: Mean flow velocity
and **D** : Electrode spacing

Volume flow is calculated by equation

$$Q = \bar{v} \times D^2 \times \pi/4$$

$$\text{Therefore, } Q = \frac{E \times D \times \pi}{K \times B \times 4}$$

The induced voltage is not affected by the physical properties of liquid like temperature, viscosity, pressure, density and conductivity, as long as conductivity of the measured liquid is above minimum threshold level. For reliable measurement, the pipe must be completely full of liquid.

The electromagnetic field coil assembly is excited by pulsed DC technique, which eliminates the interfering noise and provides automatic zero correction.

Technical Specifications :

Nominal dia (mm)	10 to 2000
Working pressure (kg/cm^2)	10, 16, 25, 40
Working temperature	Integral PTFE - 120^{0}C Remote PTFE - 180^{0}C Others - 70^{0}C
Electrode material	SS 316 Std.*
Sensor lining	Std. Rubber*
Display version	Integral/Remote
Measuring tube material	SS304 Std.*
Sensor housing material	Std. CS*
End connection	Flange/Wafer/Tri-clamp
Flange - Standard	ANSI 150*
Measuring range	0.2 to 12 m/sec. Bidirectional
Accuracy % of measured value	±0.5 (±0.2% consult factory)
Repeatability	±0.2% of span
Display	2 line LCD/LED
Display units	All standard engineering units in m^3, litre, gallon, ft^3, Imperial gallon
Output	Std. 4-20 mA*
Power supply	24 V DC or 80-300 V AC
Protection class for sensor	Std. IP 65 Option IP 68 for flow tube in remote type
Protection class for transmitter	IP 67
Cable length for remote	Std. 10 m
Installation	Inline flanged type

*** Please refer to order code for options.**

Electromagnetic Flowmeter Components

Minimum - Maximum Flow Table

Velocity range - 0.2 m/sec. for minimum & 12 m/sec. for maximum

DN in mm	m^3/hr.		LPM		LPS		USGPM	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
10	0.06	3.38	0.94	56.53	0.02	0.94	0.25	14.94
15	0.13	7.63	2.12	127.21	0.04	2.11	0.56	33.61
20	0.23	13.56	3.77	226.15	0.06	3.77	1.00	59.75
25	0.35	21.19	5.89	353.36	0.10	5.88	1.56	93.35
32	0.58	34.91	9.65	578.96	0.16	9.65	2.55	152.95
40	0.90	54.28	15.08	904.63	0.25	15.07	3.98	238.98
50	1.41	84.82	23.56	1413.49	0.39	23.56	6.22	373.40
65	2.39	143.28	39.82	2389.20	0.66	39.80	10.52	631.06
80	3.62	217.08	60.31	3618.55	1.01	60.30	15.93	955.92
100	5.65	339.24	94.23	5653.99	1.57	94.22	24.89	1493.63
125	8.84	530.16	147.24	8834.38	2.45	147.24	38.90	2333.80
150	12.72	763.32	212.03	12721.50	3.53	212.02	56.01	3360.66
200	22.60	1356.00	376.93	22616.00	6.28	376.93	99.58	5974.51
250	35.20	2112.00	588.96	35337.50	9.82	588.96	155.59	9335.18
300	50.89	3053.16	848.10	50886.00	14.14	848.10	224.04	13442.65
350	69.26	4155.72	1154.36	69261.50	19.24	1154.36	304.95	18297.00
400	90.46	5427.84	1507.73	90464.02	25.13	1507.74	398.30	23898.12
450	114.49	6869.64	1908.40	114503.76	31.81	1908.43	504.10	30246.00
500	141.35	8481.00	2355.83	141350.03	39.26	2355.85	622.35	37340.76
600	203.54	12212.52	3392.40	203544.04	56.54	3392.42	896.18	53770.68
700	277.04	16622.40	4618.08	277084.68	76.96	4617.47	1219.90	73193.88
800	365.44	21926.40	6090.65	365439.00	101.51	6090.48	1593.20	95592.24
900	457.98	27478.80	7633.87	458032.32	127.23	7634.04	2016.79	121007.52
1000	568.16	34089.60	9469.50	568169.76	157.82	9469.44	2489.38	149362.92
1200	814.18	48850.80	13569.60	814176.12	227.27	13636.44	3584.74	215084.16
1400	1108.18	66490.80	18471.94	1108316.28	307.88	18472.68	4880.30	292818.24
1600	1447.42	86845.20	24125.37	1447522.44	402.08	24124.68	6372.82	382369.20
1800	1831.90	109914.00	30809.45	1848566.76	513.50	30810.12	8139.39	488363.16
2000	2261.60	135696.00	37880.56	2272833.60	631.34	37880.52	9957.53	597451.80

Installation precautions

1. Installation location should be such that the Flowmeter will always remain full with liquid.
2. A minimum 5D upstream & 3D downstream straight lengths should be maintained at installation locations where D is the pipe diameter.
3. The Flowmeter installation location should be free of bends, elbows, tees, valves, etc.

Ordering Code : JayceeMag

Transmitter Type
- I - Integral
- R - Remote

View Software
- Y - Required (select communication interface)
- N - Not required

Power Supply
- P1 - 24 V DC
- P2 - 80 to 300 AC
- P3 - Solar powered
- P4 - Battery powered (6420, 6440, 6450)
- P5 - Any other (Pl. specify)

Output
- OP1 - 4 - 20 mA DC
- OP2 - 0 - 20 mA DC
- OP3 - Pulse output
- OP4 - Relay output
- OP5 - Combinations of above
- OP6 - Any other (Pl. specify)

Communication Interface
- C1 - Not applicable
- C2 - RS 232 (Modbus RTU)
- C3 - RS 485 (Modbus RTU)
- C4 - HART
- C5 - GSM
- C6 - GPRS

Data Logger
- Y - External (Pl. specify)
- N - Not required

Sensor Size
- 0010 - 10 (¼")
- 0015 - 15 (½")
- 0020 - 20 (¾")
- 0025 - 25 (1")
- 0032 - 32 (1.25")
- 0040 - 40 (1.50")
- 0050 - 50 (2")
- 0065 - 65 (2.5")
- 0080 - 80 (3")
- 0100 - 100 (4")
- 0125 - 125 (5")
- 0150 - 150 (6")
- 0200 - 200 (8")
- 0250 - 250 (10")
- 0300 - 300 (12")
- 0350 - 350 (14")
- 0400 - 400 (16")
- 0450 - 450 (18")
- 0500 - 500 (20")
- 0600 - 600 (24")
- 0700 - 700 (28")
- 0800 - 800 (32")
- 0900 - 900 (36")
- 1000 - 1000 (40")
- 1200 - 1200 (48")
- 1400 - 1400 (56")
- 1600 - 1600 (64")
- 1800 - 1800 (72")
- 2000 - 2000 (80")
- Any other (Pl. specify)

Approval
- D - None
- F - Flameproof
- G - Any other (Pl. specify)

Protection Class for Sensor
- A - IP 65
- B - IP 67
- C - IP 68

Coil Housing
- CH1 - CS / MS
- CH2 - SS 304
- CH3 - SS 316
- CH4 - Any other (Pl. specify)

Measuring Tube
- T1 - SS 304
- T2 - SS 316
- T3 - Any other (Pl. specify)

Earthing Rings
- 1 - None (Earth electrode)
- 2 - SS 316
- 3 - SS 316L
- 4 - Any other (Pl. specify)

Electrode Material
- E1 - SS 316
- E2 - SS 316L
- E3 - Hastelloy C
- E4 - Titanium
- E5 - Tantalum
- E6 - Platinum
- E7 - Any other (Pl. specify)

Pressure Rating
- R1 - 5 kg/cm² (6420)
- R2 - 10 kg/cm²
- R3 - 16 kg/cm²
- R4 - 25 kg/cm²
- R5 - 40 kg/cm²
- R6 - Any other (Pl. specify)

Design of Measuring Sensor
- S1 - Flange ANSI 150
- S2 - Flange DIN PN
- S3 - Flange BS 10 Table D/E
- S4 - Wafer
- S5 - SMS
- S6 - Tri clamp
- S7 - Any other (Pl. specify)

Flange Material
- F1 - CS / MS
- F2 - SS 304
- F3 - SS 316
- F4 - Any other (Pl. specify)

Sensor Lining
- L1 - Hard rubber
- L2 - Neoprene
- L3 - PTFE
- L4 - Polyurethane
- L5 - PFA
- L6 - HDPE
- L7 - Any other (Pl. specify)