

Electromagnetic Flowmeter



Integral Type



Remote Type

General Description

EFM - 101 series is a range of Bipolar Pulsed DC Full Bore Type Electromagnetic Flowmeter. It is suitable for pipes with diameters of 10 mm to 600 mm. They are based on Faraday's law of Electromagnetic Induction. The meter features flanged construction and is available with choice of Liner and Electrode materials. EFM - 101 has excellent accuracy and flow rangeability. The meter is suitable for use on wide range of corrosive and aggressive range of conductive liquids.

Features

- Based on Faraday's law of Electromagnetic Induction
- Suitable for pipe sizes of diameters 10 mm to 600 mm
- Coil Assembly in hermetically sealed Welded construction
- Choice of PTFE / Neoprene Rubber / Polyurethane liners
- Integral or Remote Transmitter
- Field interchangeable electronics
- Optional LED display for Flow Rate or Totalizer indication in Engineering Units
- No pressure loss
- High linearity due to characteristic magnetic field
- Absolute Zero stability and noise elimination
- Measurement independent of liquid properties

Applications

- Chemical, Petrochemical and Process Industries
- Pharmaceutical Industry
- Food and Beverage Industry
- Mining Industries
- Dredging Industries
- Water and Waste Water Management

Operation

Electromagnetic Flowmeters are based on Faraday's law of Electromagnetic Induction. In a Electromagnetic Flowmeter, 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 Units on LED Display. 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.

$$Q = \frac{\pi ED}{4KB}$$

Where,

Q: Flow

E: Induced Voltage

D: Electrode Spacing

K: Flow tube constant

B: Magnetic field velocity

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 measure 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

Reference conditions - Power Supply: Nominal, Ambient Temperature: 27°C, Load Resistance: 500Ω

Pipe Size	DN 10 to DN 600
Media conductivity (min)	10 μS/cm
Media Pressure	PN 40 up to DN 80, PN 16 up to DN 200, PN 10 up to DN 600
Media Temperature (PTFE)	0° - 180°C (Remote Transmitter) 0° - 120°C (Integral Transmitter) 0° - 90°C max for other liners
Materials	Pipe: SS 316 (Non-magnetic) Liner: PTFE/ Neoprene/ Polyurethane Electrode: SS/ Hastelloy C/ Tantalum/ Titanium/ Platinum End Connections/ Flanges: Carbon Steel/ SS 304/ SS 316/ SS 316L Coil Housing: Carbon Steel/ SS, Epoxy painted Transmitter: Cast Aluminium (LM6), Epoxy painted Flange / End Connection Std.: DIN/ ANSI/ BS/ SMS/ TRI-CLAMP

Power Supply	230 V AC 50 Hz
Power consumption	20 W
Cable Gland Entry	½" NPT (F)
Analog Output (Isolated)	4 - 20 mA
Pulsed output (Optional)	Low Pulsed Rate Output 10 to 36000 pulses/hour a. Output to drive directly external electromagnetic counter of 12/24V DC @ 200 mA capacity OR b. Open Collector Output , High Pulse Rate Output, 0.5 KHz/1KHz/10KHz (Open Collector Output)
Communication port	RS232/ RS485 (Modbus RTU)
Load Resistance (max)	1000 Ω
Response time	5 sec
Flow Velocity Range	0.3 to 10 m/s
Display	LED (4 Digit Indication for Flow Rate and 8 Digit Indication for Totalizer Programming from Front Keyboard for Engineering Units)
Accuracy	+/- 0.5% FS (Reference conditions) +/- 1% FS (For flow between 20% to 100% FS) Note: Refer Error diagram below for flow between 0% to 20% FS
Repeatability	+/- 0.2% of span
Effect of Temperature	Less than 0.2% per 10°C
Effect of Power Supply	Less than 0.1% per 10% Voltage variation
Effect of Load Resistance	Less than 0.1% of span
Degree of protection	IP-65 (IP-68 on request)

Ordering Information

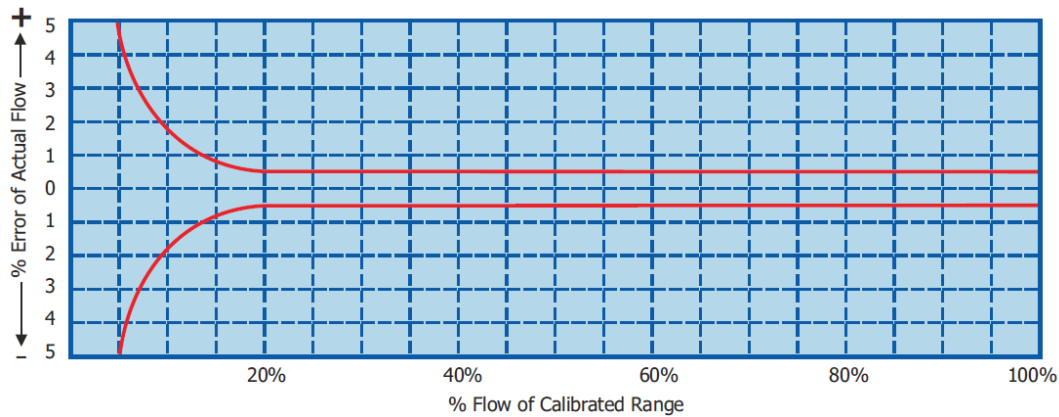
Power Supply: 1. 240 +/- 15% V AC 50 Hz 2. 110 +/- 15% V AC 50 Hz	Electrode Material: 1. SS 316 2. Hastelloy C 3. Tantalum 4. Titanium 5. Platinum 6. Any other	Flange/ End Connection standards: 1. DIN PN 40 2. DIN PN 16 3. DIN PN 10 4. ANSI 300 5. ANSI 150 6. Tri-clamp 7. Any other	Flow Meter Size: 1. DN 10 11. DN 125 2. DN 15 12. DN 150 3. DN 20 13. DN 200 4. DN 25 14. DN 250 5. DN 32 15. DN 300 6. DN 40 16. DN 350 7. DN 50 17. DN 400 8. DN 65 18. DN 450 9. DN 80 19. DN 500 10. DN 100 20. DN 600
Transmitter type: 1. Integral without Display 2. Integral with Display 3. Remote with Display 4. Remote without Display	Coil Housing: 1. Carbon Steel 2. SS 304 3. SS 316	Flange/ End Connection Materials: 1. Carbon Steel 2. SS 304 3. SS 316 4. Any other	Liner Material: 1. Teflon (PTFE) 2. Neoprene 3. Hard Rubber 4. Polyurethane 5. Any other
Pulsed Output: 1. Low Pulse output 2. High Pulse output 3. Nil	Output Signal: 1. 4-20 mA DC 2. 0-20 mA DC		
Communication Port (Optional): 1. RS - 232 2. RS - 485			

Flow Rate table:

Note: Flow rate at v = 1 m/s

DN	m ³ /hr	LPM	LPS	DN	m ³ /hr	LPM	LPS
10	0.282	4.711	0.078	125	44.18	736.198	12.270
15	0.636	10.601	0.176	150	63.61	1060.125	17.668
20	1.130	18.846	0.314	200	113.08	1884.667	31.411
25	1.766	29.447	0.490	250	176.69	2944.792	49.080
32	2.909	48.427	0.804	300	254.43	4240.500	70.675
40	4.523	75.386	1.256	350	346.31	5771.792	96.197
50	7.068	117.791	1.963	400	452.32	7538.668	125.645
65	11.944	199.100	3.317	450	572.47	9541.980	159.036
80	18.092	301.546	5.025	500	706.75	11779.169	196.321
100	28.270	471.166	7.852	600	1017.72	16962.003	282.702

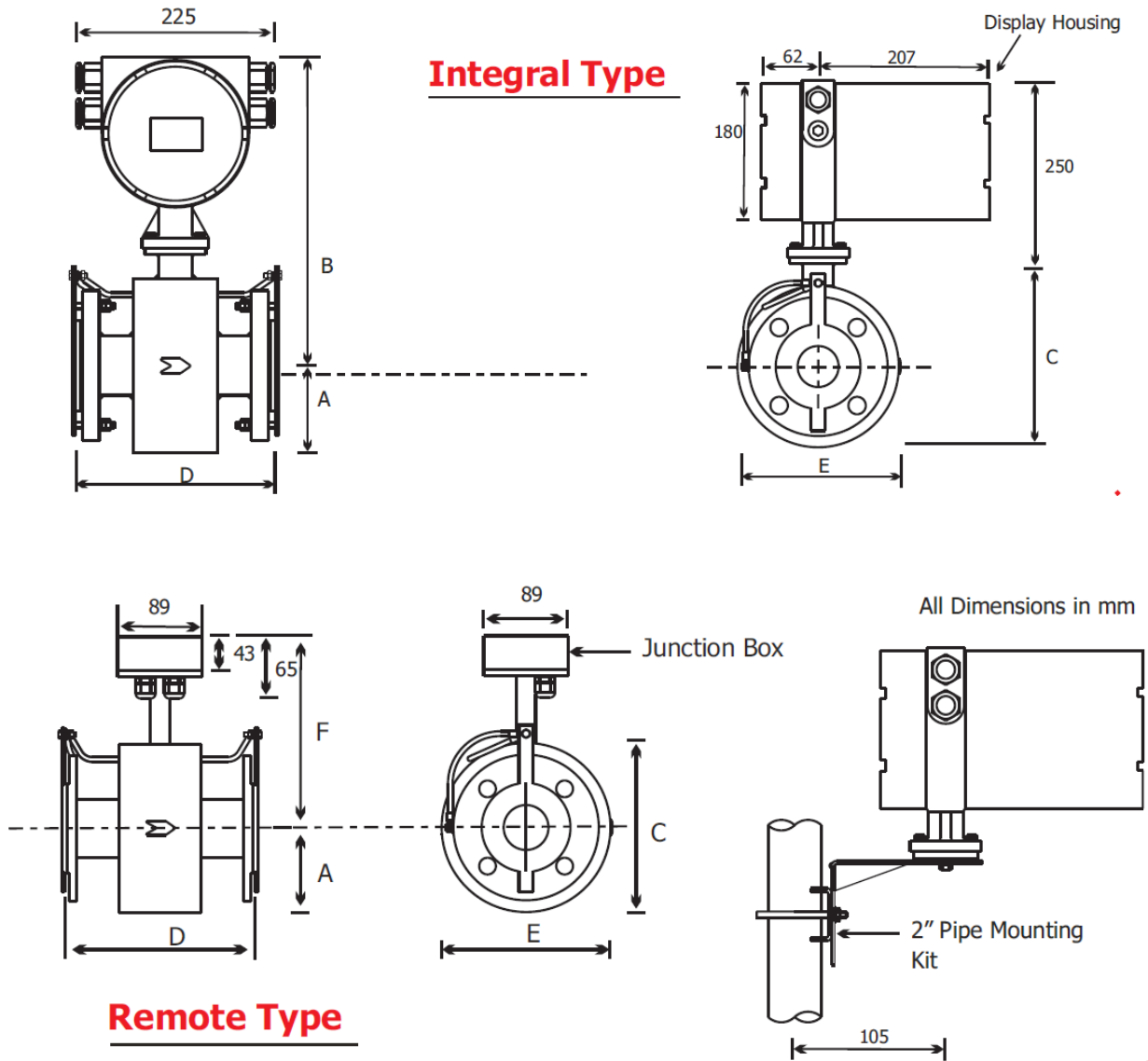
Error Diagram:



Meter Dimensions (in mm):

DN (mm)	A	B	C	D	E	F
10, 15, 20	65	310	125	200	120	190
25, 32	80	325	155	200	150	205
40, 50	120	365	230	200	225	245
65, 80	130	375	250	200	245	255
100, 125	170	415	330	250	325	295
150	190	435	370	300	365	315
200	245	490	480	350	475	370
250	295	540	580	400	575	420
300	335	580	660	500	655	460
350	360	605	710	500	705	485
400	395	640	780	600	775	520
450	430	675	855	600	850	555
500	465	710	925	600	920	590
600	550	795	1090	600	1085	675

Note: 1. Above dimensions are with ANSI 150/ DIN 16 flanges (For other flanges, contact us)
 2. Add total 6 mm for two earthing/ linear protection rings to dimension 'D'



Note: Due to continuous improvement, specifications are subject to change without prior notice.