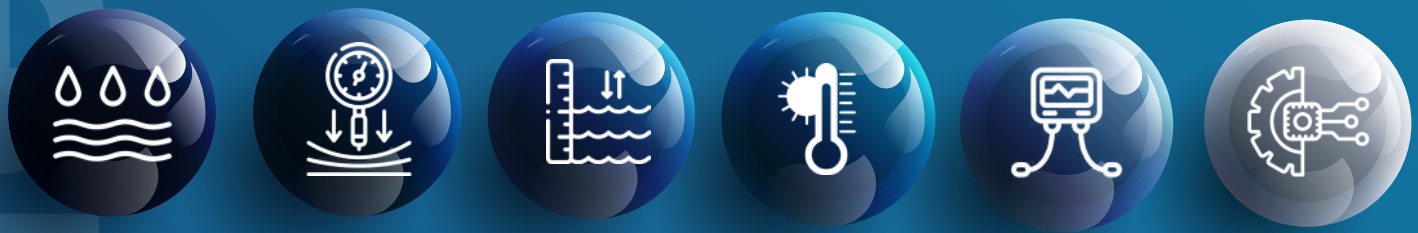
enelsan

We Measure

ELECTROMAGNETIC FLOWMETERS



Flow | Pressure | Level | Temperature | Datalogger | Control and Automation

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ELECTROMAGNETIC FLOWMETERS

Electromagnetic flowmeters are devices used to measure the flow rates of conductive liquid flows. Electromagnetic flowmeters work according to Faraday's Law of Induction, the flow rate of the liquid moving in the magnetic field is converted into electricity and the flow rate is measured. There are no moving parts in the internal structure so it requires less maintenance, the measurement scale is 10 times higher than other flow meters. In liquids with corrosive properties, sensor and electrode selection can be changed to provide healthy and long-lasting measurement.

Square Designed Remote Type Electromagnetic Flowmeter

Etrans-M410R (Teflon)
Etrans-M210R (Ebonite)

Square Designed Compact Type Electromagnetic Flowmeter

Etrans-M410C (Teflon)
Etrans-M210C (Ebonite)

Circle Designed Compact Type Electromagnetic Flowmeter

Etrans-M410K (Teflon)
Etrans-M210K (Ebonite)

TURKAK Accredited Calibration Opportunity

Made In Türkiye

HART REGISTERED

Technical Specifications	
Pipe Sizes	DN10...DN3000
Measuring Range	0,2 ... 12 m/s
Accuracy	±0.50% or ±0.2% (of Measured Value)
Process Temperature	Ebonite -10°C...+60°C / Teflon(PTFE) -20°C...+150°C
Process Conductivity	>5 µS/cm (>20 µS/cm for demineralised water)
Process Pressure	PN10, PN16, PN25, PN40, PN63, PN100 (depend on pipe size)
Power Supply	85-265 VAC 50-60 Hz, 24 VDC, Battery Operated
Output	Pulse, Frequency, RS485 MODBUS, 4...20mA, (Opt. HART)
Alarms	1x passive pulse (12-36VDC, 100 mA, 1.5 kΩ) (selectable one of Empty Pipe, Sensor Error, Over Limit)
Straight Pipe Distance	5x DN front 3x DN behind of the flowmeter
Indicator	3 Line 30 digit with 4 push buttons LCD
Special Options	Stainless Steel Body, Loose Flange, Wafer Type

ELECTROMAGNETIC FLOW MEASUREMENT

It is a flow measurement method based on the principle of the electromagnetic field.
The physical foundation of this principle dates back to 1831, when the English physicist Michael FARADAY discovered that electric current could be generated using a magnetic field. In 1941, Swiss inventor Bonaventura Thurlmann applied this knowledge to conductive liquids passing through pipes and produced the world's first electromagnetic flowmeter.

Every electromagnetic flowmeter contains two coils. Using metal parts placed over these coils, a constant magnetic field is generated across the cross-sectional area of the measurement tube. Two electrodes that detect the voltage are positioned perpendicularly inside the measurement tube. An insulating material lining the inner surface prevents short circuits between the conductive liquid and the metallic measurement tube.

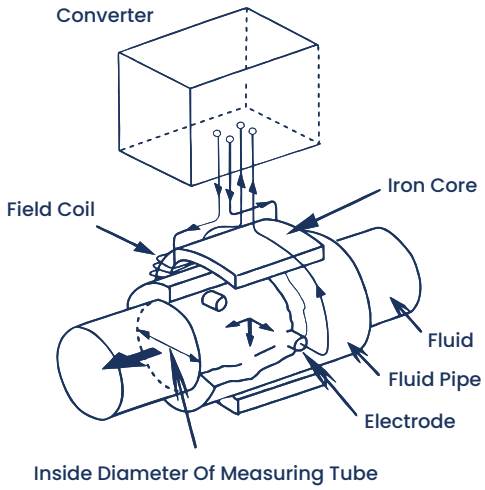
When there is no flow, no electrical voltage is genera-ted between the two electrodes. In aconductive liquid, negative and positive ions are present in equal amounts. Once flow begins, the magnetic field exerts a force on the charged ions within the liquid. As a result, the negatively and positively charged ions separate and move to opposite sides of the measurement tube. This creates an electrical voltage detected by the electrodes.

This voltage is directly proportional to the flow velocity in the pipe. By combining the known volume of the measurement tube with the velocity data, the instantaneous flow rate can be calculated. As the flow velocity increases, the separation of charged particles also increases, resulting in higher voltage between the electrodes. Occasionally, the measurement electrodes may detect magnetic noise from the surrounding environment, which must be distinguished from the actual measurement signal. To achieve this, the magnetic field must be generated using pulsed direct current.

By continuously altering the positions of the charged ions relative to the electrodes with pulsed direct current, the effect of magnetic noise is eliminated, ensuring precise and stable flow measurement. Simply put, flow rate information is calculated using the above simplified formula based on the electromagnetic measurement principle.

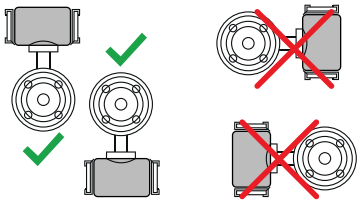
▶ To ensure accuracy under ideal conditions, the following requirements must be met:
▶ The tested liquid must have electrical conductivity.
▶ The pipe must be fully filled with liquid.
▶ The components within the liquid must be uniformly mixed.
▶ If the liquid induces magnetic fields, the magnetic field of the device will change, requiring recalibration.
▶ Appropriate straight pipe lengths must be maintained.

$$Q=f(v,k,B,D)$$
$$\text{and}$$
$$Q=v*(k*D*B)$$

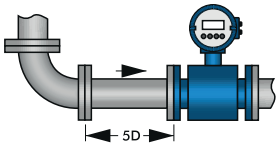


ELECTROMAGNETIC FLOWMETER INSTALLATION CONDITIONS

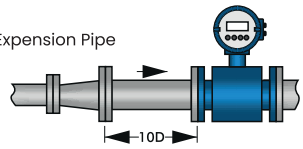
Assembly Type



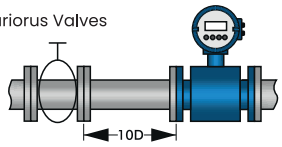
90° Elbow



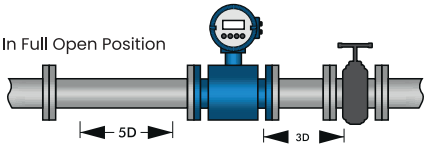
Expension Pipe



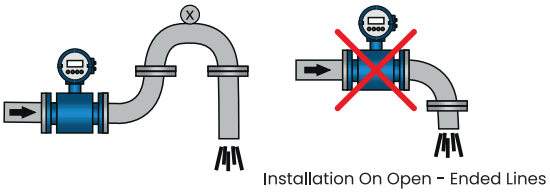
Variorus Valves



Valve In Full Open Position

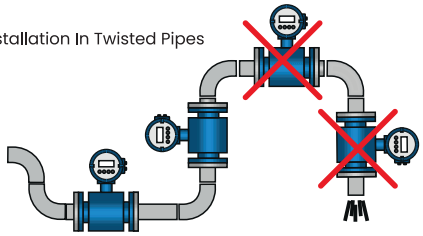


Air Thrower

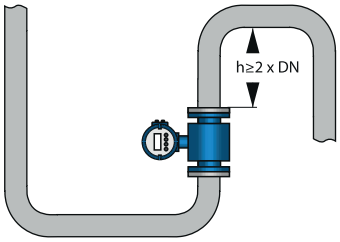


Installation On Open - Ended Lines

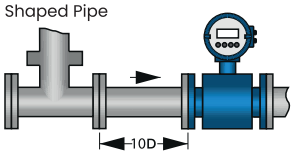
Installation In Twisted Pipes



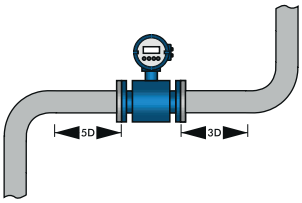
Installation In Downstream Process Lines



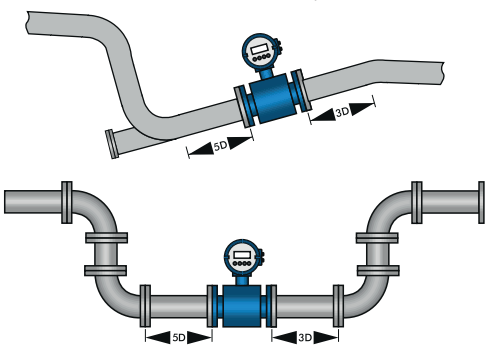
T Shaped Pipe



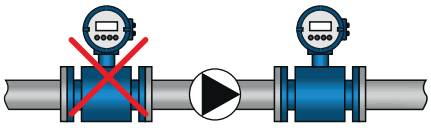
Input - Output Mounting Application



Installations That Are Not Fully Filled

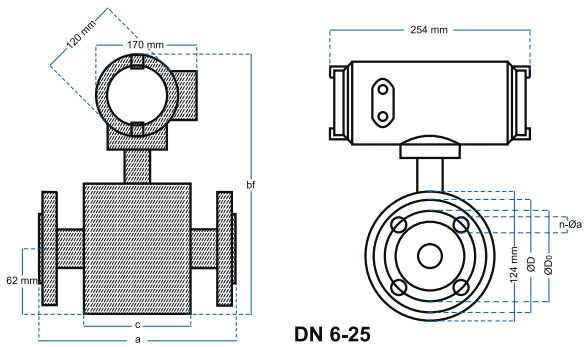


Installation In The Pump Process

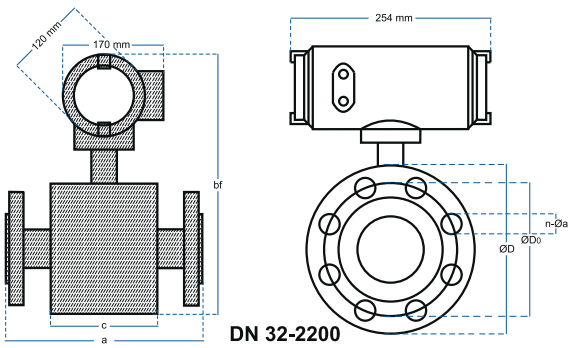


CONTTECTION DIMENSIONS

DN (mm)	Pressure Class	Device Outer Diameters			Flange Connection Dimensions		
		a	bf	c	D	D0	n x a
10	4.0MPa (40Bar)	150	322	82	90	60	4-Ø14
15		150	322	82	95	65	4-Ø14
20		150	322	78	105	75	4-Ø14
25		150	312	78	115	85	4-Ø14
32		150	327	74	135	100	4-Ø18
40		150	335	74	145	110	4-Ø18
50		200	354	86	160	125	4-Ø18
65		200	366	92	180	145	8-Ø18
80		200	385	92	195	160	8-Ø18
100	1.6MPa (16Bar)	250	406	114	215	180	8-Ø18
125		250	436	114	245	210	8-Ø18
150		300	465	136	280	240	8-Ø23
200	1.0MPa (10Bar)	350	518	156	335	295	8-Ø23
250		400	570	202	390	350	12-Ø23
300		500	620	230	440	400	12-Ø23
350		500	675	278	500	460	16-Ø23
400		600	733	320	565	515	16-Ø25
450		600	782	374	615	565	20-Ø25
500		600	835	388	670	620	20-Ø25
600		600	940	408	780	725	20-Ø30
700		700	1048	520	895	840	24-Ø30
800		800	1160	580	1010	950	24-Ø34
900		900	1260	660	1110	1050	28-Ø34
1000		1000	1370	720	1220	1160	28-Ø34
1200	0.6MPa (6Bar)	1200	1585	1130	1405	1340	32-Ø34
1400		1400	1810	1260	1630	1560	36-Ø36
1600		1600	2040	1450	1830	1760	40-Ø36
1800		1800	2250	1640	2045	1970	44-Ø39
2000		2000	2460	1820	2265	2180	48-Ø42
2200		2200	2670	1990	2510	2390	52-Ø45



DN 6-25



DN 32-2200