TEKTROL

Technology Solutions

TEK-FLUX 1400A

Electromagnetic Flowmeter

FLOW

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Flow | Level | Temperature | Pressure | Valves | Analyzers | Accessories | TekValSys

Introduction

Electromagnetic flowmeters are also called as Magmeters. They are non-contact instruments used for measuring the volumetric flow rates of any fluids that can adequately conduct electricity in closed pipelines. These instruments are highly accurate, reliable, and stable devices that are used in various high-pressure industrial processes.

Measuring Principle

The Tek-Flux 1400A flowmeter operates on the principle of Faraday's Law of Induction. According to this principle, any change in the magnetic flux linked to an electric circuit causes an electromotive force (or voltage) to be induced in this circuit. The induced voltage is therefore directly proportional to the rate of change of magnetic flux with time.

Operation

The flowmeter typically consists of two electromagnetic coils that are mounted on opposite sides of a non-magnetic measuring tube. Two electrodes are fitted inside the tube to detect the voltage generated by the conducting fluid. Although these electrodes come into contact with the fluid, they do not obstruct its flow.

When current is applied to the coils, they generate an alternating magnetic field across the cross-sectional area of the tube. A fluid flowing through the magnetic field acts as a conductor, and a voltage is induced. The induced voltage is picked up by the electrodes and sent to a transmitter that is either mounted on the flowmeter or connected remotely. The transmitter calculates the volumetric flow rate and displays the output.

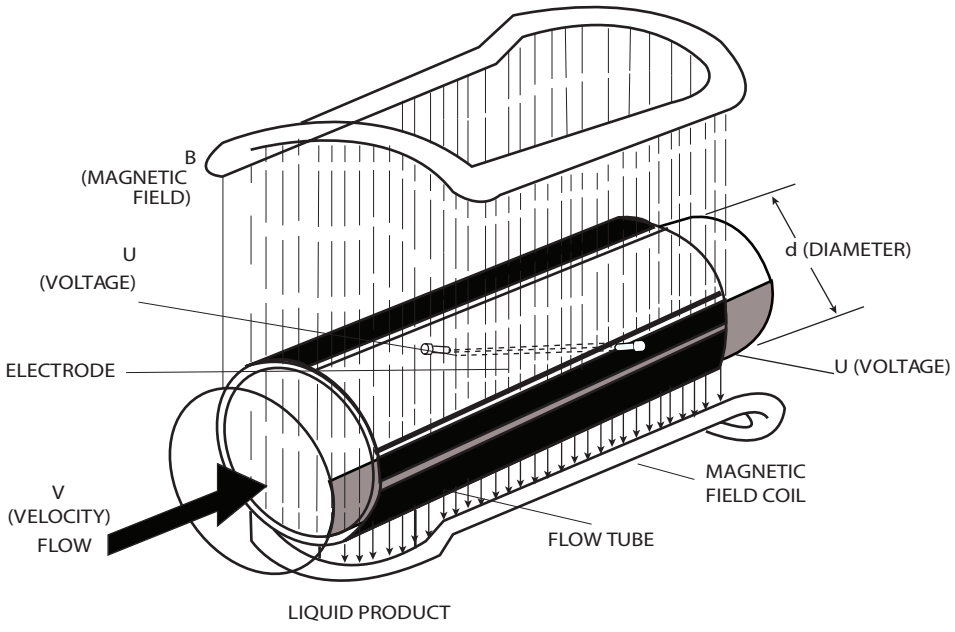

Fig. Operation of an Electromagnetic Flowmeter

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The induced voltage is calculated using the following equation:

U = B x d x v

Where,

U = Voltage Induced by the Conducting Fluid
B = Magnetic Flux Density
d = Distance Between the Electrodes
v = Average Velocity of the Conductor (i.e. fluid flowing in the tube through the magnetic field)

Since the magnetic flux density and the distance between the electrodes remain constant, the induced voltage is directly proportional to the conductor velocity.
The value of the velocity is used to calculate the volumetric flow rate as follows:

Q = A x v

Where,
Q = Flow Rate
A= Area
v= Average velocity

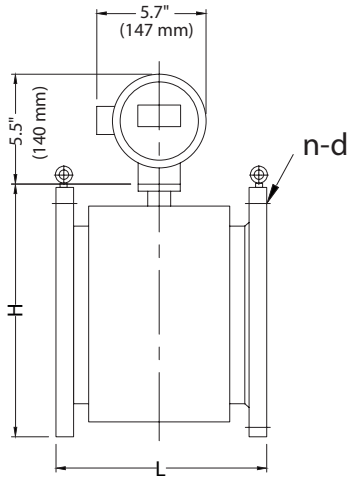
Features/Benefits

- Wide range of nominal diameter size ½" to 28" (15 mm to 700 mm) with IP68 protection
- Easy maintenance due to no moving parts
- Not influenced by temperature, pressure, viscosity, or density
- Used for wide spread application, can measure conductive fluid, without reference to fiber, solid, or suspending material contained in the liquid
- High turn-down ratio up to 1:100
- It features high intelligence, with back light LCD display, menu setting control, three grade password protection, two-way measuring available, slight signal removal, auto flow compensation, and other functions
- High intelligence also ensures empty pipe detection, self-detection, self-diagnostic functions, and safety alarms for upper and lower limits
- Features SMART excitation, which ensures zero-point stability, high reliability, and low power consumption
- Lining and electrodes are available in various materials that can measure nearly all conductive fluids
- It has multiple signal output, pulses: Modbus RS485, HART®, or 4 to 20 mA
- The power supply system has good voltage vibration ability

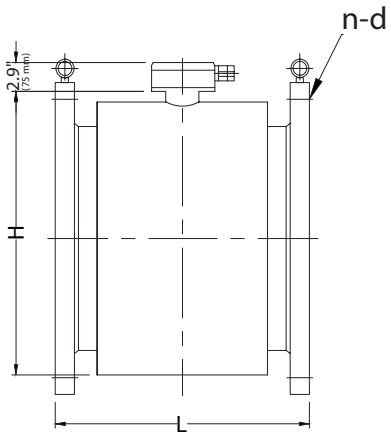
Applications

- It can measure highly corrosive medium such as concentrated acid and concentrated alkaline using PTFE lining material
- By using Titanium electrode we can measure seawater, various chloride, and hypochlorite

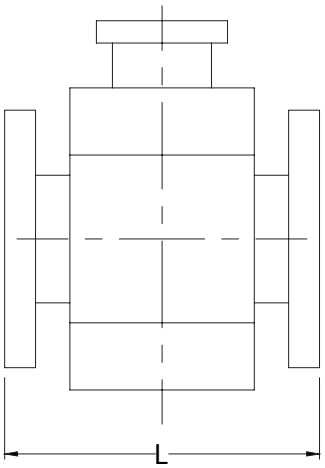
Dimensional Drawing



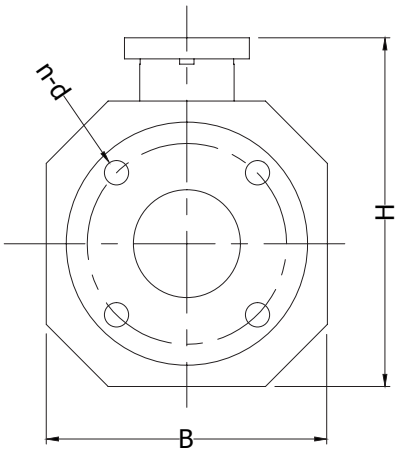
Integral Type (≥4")



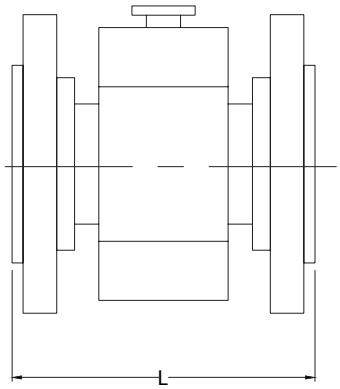
Separate Type (≥4")

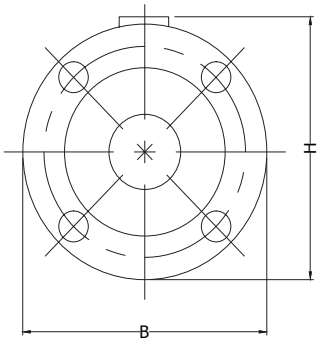


Sensor (½"to 3")

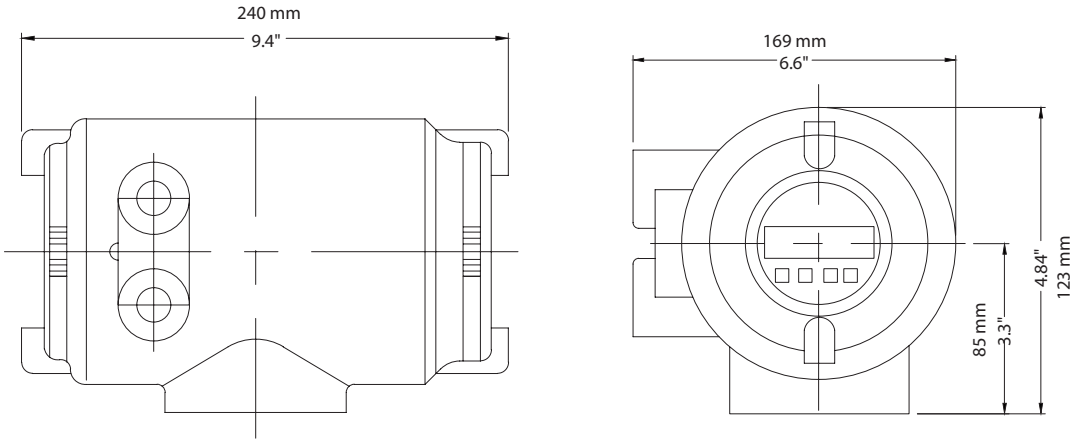


Sensor(½" to 3")





Outline Dimension of Medium and High Pressure Sensors



Direct Mount Converter

Size Inches (mm)	Sensor dimensions Inches (mm)			Flange Connection Dimension (mm)	Net Weight lb. (kg)
	L	B	H	n-d	
½" (15)	7.87" (200)	5.11" (130)	8.66" (220)	4-Φ14	17.63 (8)
1" (25)	7.87" (200)	5.59" (142)	9.05" (230)	4-Φ14	26.45 (12)
2" (50)	7.87" (200)	6.69" (170)	10.23" (260)	8-Φ18	39.68 (18)
3" (80)	7.87" (200)	7.87" (200)	11.22" (285)	8-Φ18	57.32 (26)
4" (100)	9.84" (250)	9.25" (235)	11.41" (290)	8-Φ23	66.13 (30)
5" (125)	9.84" (250)	10.62" (270)	12.79" (325)	8-Φ25	79.36 (36)
6" (150)	11.81" (300)	11.81" (300)	13.77" (350)	8-Φ25	92.59 (42)
8" (200)	13.77" (350)	13.38" (340)	15.15" (385)	12-Φ23	121.25 (55)
10" (250)	15.74" (400)	15.94" (405)	17.51" (445)	12-Φ25	154.32 (70)
12" (300)	19.68" (500)	18.11" (460)	20.27" (515)	12-Φ25	187.39 (85)
18" (450)	23.62" (600)	25.19" (640)	27.16" (690)	20-Φ30	330.69 (150)
20" (500)	23.62" (600)	28.14" (715)	29.92" (760)	20-Φ34	440.92 (200)
24" (600)	23.62" (600)	33.07" (840)	34.64" (880)	20-Φ41	573.20 (260)
28" (700)	27.55" (700)	35.23" (895)	38.18" (970)	24-Φ30	793.66 (360)

Specifications

Technical Specification

Accuracy			±0.5%
Repeatability			0.15%
Ambient Temperature	Sensor (Remote Type)		-4 °F to 158 °F (-20 °C to +70 °C)
	Converter		-4 °F to 122 °F (-20 °C to +50 °C)
	Integral Type		14 °F to 122 °F (-10 °C to +50 °C)
Humidity			5% to 95% RH (no frost)
Vibration Frequency			55 Hz
Amplitude			0.55 mm
Ambient Magnetic Field			≤400 A/m
Fluid Temperature	Direct Mount		≤176 °F
	Separate Type	Rubber Lining	≤176 °F
		PTFE Lining	≤248 °F
Nominal Pressure			150 psi for ½" to 6"
			232 psi for 8" to 24"
			145 psi for 28" to 40"
Power Supply			24 VDC ±5%, 100 to 240 VAC
Enclosure			IP68
Output Signal			Pulse and 4 to 20 mA or Modbus RS485 or 4 to 20 mA with HART
Alarm			Normally open
Electrode Material			Stainless Steel, Hastelloy C
Lining Material			PTFE and Synthetic rubber
Flange Material			Carbon Steel
Measuring Tube Material			Stainless Steel 1Cr18Ni9Ti

Electrode Material Selection

Electrode Material	Application
Stainless Steel	Used for measuring water, waste water, inorganic acid, organic acid, or other corrosive medium
Hastelloy C	Used for measuring oxidizing acids such as nitric acid, mixed acid, and vitriol mixed liquid, also oxydized salts such as Fe^{++}, Cu^{++}, and other oxidizing agents such as pypocholoride solution whose temperature is higher than normal, and seawater

Lining Material

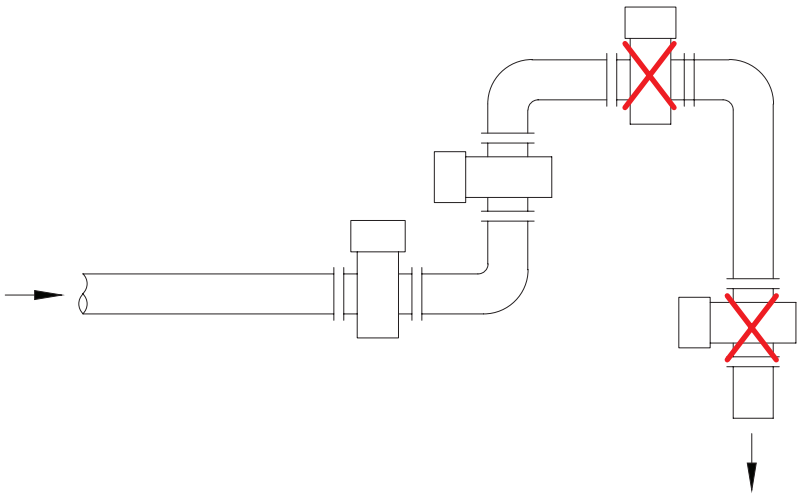
Lining material	Main performance	Application scope
PTFE	• Stable chemical performance, resists acid, alkali, saline solution and organic solvent. • Does not resist the corrosion of chlorine trifluoride, liquid oxygen at high flow rate or ozone • Common wear-resisting property	-112 °F to 248 °F Highly corrosive medium such as concentrated acid and concentrated alkaline
Synthetic Rubber	• Excellent elasticity, good breaking tenacity, good wear-resisting property • Resists acid solution, aqueous alkali, saline solution at normal low concentrations of acid solution • Does not resist corrosion from oxidant medium	<176 °F Neutral abrasive pulp, slurry and coal slurry

Flow Range and Nominal Diameter Selection

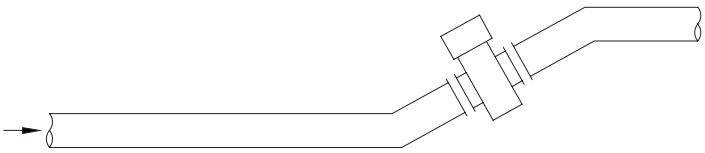
Size	Flow Range	
Inch (DIN)	Velocity 0.98 - 32.8 ft/s	Velocity 0.3 - 10 m/s
½" (15)	0.84 - 28 GPM	0.19 - 6.4 m^3/hr
1" (25)	2.33 - 78 GPM	0.53 -17.7 m^3/hr
2" (50)	9.38 - 213 GPM	2.13 - 71.0 m^3/hr
3" (80)	23.9 - 797 GPM	5.43 -181 m^3/hr
4" (100)	37.4 - 1246 GPM	8.49 - 283 m^3/hr
6" (150)	84.1 - 2800 GPM	19.1 - 636 m^3/hr
8" (200)	149 - 4975 GPM	33.9 - 1130 m^3/hr
10" (250)	233 - 7793 GPM	53.1 - 1770 m^3/hr
12" (300)	335 - 11183 GPM	76.2 - 2540 m^3/hr
18" (450)	757 - 25185 GPM	172 - 5720 m^3/hr
20" (500)	933 - 31129 GPM	212 - 7070 m^3/hr
24" (600)	1347 - 44910 GPM	306 - 10200 m^3/hr
28" (700)	1831 - 60981 GPM	416 - 13850 m^3/hr

Installation

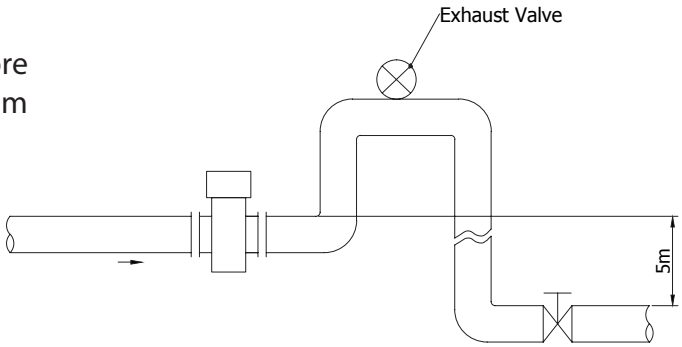
Install flowmeter at relative low of horizontal pipe or in upward vertical direction. Do not install the flowmeter at the highest point of the pipe and in the downward vertical direction.



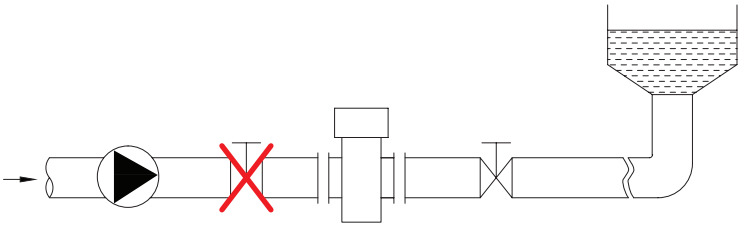
Install flowmeter at the rising pipe



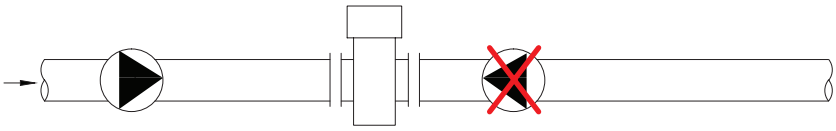
For installing at an open pipe, the flowmeter should be installed at a relative low point. If the fall in the pipe is more than 5m, the vent valve should be installed at sdownstream of the sensor where it should have back pressure



The control valve and stop valve should be installed at the downstream of the sensor not on the upstream side.

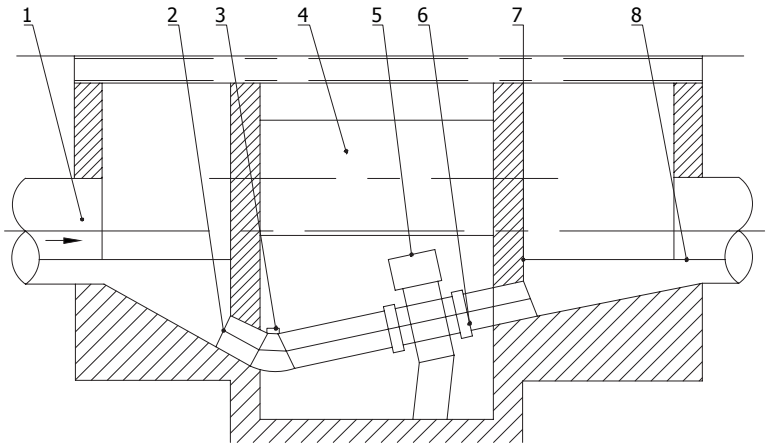


Sensor should be installed at the outlet of the pump not the inlet.



Flowmeter installation in a measuring well:

1. Inlet
2. Entrance Gate
3. Cleaning Hole
4. Overflow Pipe
5. Flowmeter
6. Nozzle Stub
7. Outlet
8. Drain Valve



Model Chart

Example	Tek-Flux 1400A	25	1	I	SS	1	1	T	Tek-Flux 1400A-25-1-I-SS-1-1-T
Series	Tek-Flux 1400A								Electromagnetic Flowmeter
Size		15							½" (PTFE Liner/HC Electrodes)
		25							1" (PTFE Liner/HC Electrodes)
		50							2"
		80							3"
		100							4"
		150							6"
		200							8"
		250							10"
		300							12"
		450							18"
		500							20"
		600							24"
		700							28"
Transmitter			1						Direct Mount
			2						Remote Mount
Output				I					4-20 mA
				S					Modbus RS485
				H					4-20 mA/HART
Electrodes					SS				316L SS
					HC				Hastelloy C
Process Connection						1			150# ANSI Flange
						2			AWWA Flange
Power Supply							1		18-28 VDC
							2		85-220 VAC
Liner Material								T	PTFE
								H	Hard Rubber

Popular Models

Model Number	Description
1400A-50-1-I-SS-1-1-H	2", Hard Rubber, SS Electrodes, 150# Flange
1400A-80-1-I-SS-1-1-H	3", Hard Rubber, SS Electrodes, 150# Flange
1400A-100-1-I-SS-1-1-H	4", Hard Rubber, SS Electrodes, 150# Flange
1400A-150-1-I-SS-1-1-H	6", Hard Rubber, SS Electrodes, 150# Flange
1400A-25-1-I-HC-1-1-T	1", PTFE, Hastelloy C Electrodes, 150# Flange
1400A-50-1-I-HC-1-1-T	2", PTFE, Hastelloy C Electrodes, 150# Flange
1400A-80-1-I-HC-1-1-T	3", PTFE, Hastelloy C Electrodes, 150# Flange
1400A-100-1-I-HC-1-1-T	4", PTFE, Hastelloy C Electrodes, 150# Flange
1400A-150-1-I-HC-1-1-T	6", PTFE, Hastelloy C Electrodes, 150# Flange

Accessories

Model Number	Description
1400A-GR-2	Two 2" Stainless Steel Grounding Rings
1400A-GR-3	Two 3" Stainless Steel Grounding Rings
1400A-GR-4	Two 4" Stainless Steel Grounding Rings
1400A-GR-6	Two 6" Stainless Steel Grounding Rings
1400A-GR-8	Two 8" Stainless Steel Grounding Rings
1400A-GR-10	Two 10" Stainless Steel Grounding Rings
1400A-GR-12	Two 12" Stainless Steel Grounding Rings
1400A-GR-18	Two 18" Stainless Steel Grounding Rings
1400A-GR-20	Two 20" Stainless Steel Grounding Rings
1400A-GR-24	Two 24" Stainless Steel Grounding Rings

Customer Service and Support

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