



Datasheet

Electromagnetic flow meter

AI-M240



Datasheet

Electromagnetic flow meter for flow measurement AI-M240 flow meter

The electromagnetic flow meter does not contain any moving parts, rotating gears or turbines, or bearings. Instead, it relies on two electrodes to measure the density of the induced magnetic field that results from an electrically conductive fluid, such as water, flowing through a pipe. So there is no susceptibility to bearing wear or other mechanical wear-and-tear issues.

As for the electrodes and the liner used in electromagnetic flow meter, these components can be fabricated from a variety of materials to make the mag meter compatible with virtually various electrically conductive fluid, including aggressive acids.

The only limitation of the electromagnetic flow meter is that the measured fluid media must be electrically conductive ($>5\mu\text{S}/\text{cm}$). Non-conductive fluids, such as oil and other petroleum-based fluids, cannot be measured with mag meter technology.

Applications

- Sewage treatment
- printing and dyeing
- Chemical industry
- Environmental protection
- Metallurgy
- Medicine
- Papermaking
- Tap water supply



Features

- 0.5%F.S measuring accuracy
- RS485 mod-bus communication 4-20mA output
- It can measure the flow of fluid in the forward and reverse directions.
- Unaffected by the temperature, pressure, density of the liquid.
- There is no pressure loss.
- Readings that are unaffected by changes in density or viscosity.
-

Electromagnetic flow meter

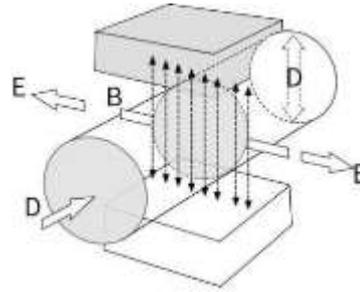
Principle

The measurement principle of magnetic flowmeters can be described as follows: when the liquid goes through the pipe at the flow rate of v with a diameter D , within which a magnetic flux density of B is created by an exciting coil, the following electromotive E is generated in proportion to flow speed v :

$$E = K \times B \times V \times D$$

Where:

- E – Induced electromotive force
- K – Meter constant
- B – Magnetic induction density
- V – Average flow speed in cross-section of measuring tube
- D – Inner diameter of measuring tube

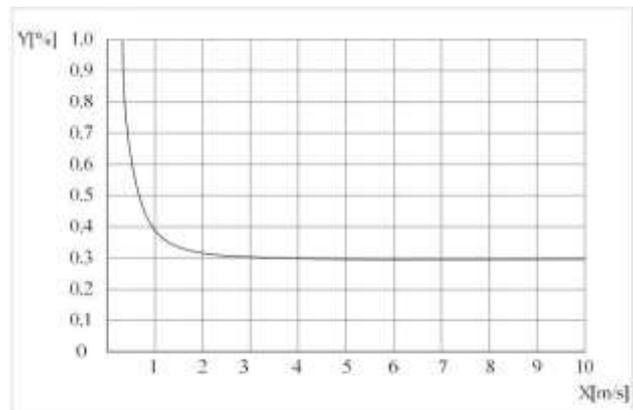


The induced voltage signal is detected by two electrodes and transmitted to the converter via a cable. After a series of analog and digital signal processing, the accumulated flow and real-time flow are displayed on the display of the converter.

Accuracy

Reference condition

- (1) Medium: water
- (2) Temperature: 20°C
- (3) Pressure: 0.1MPa
- (4) Front straight conduit: $\geq 10DN$, Rear straight conduit: $\geq 5DN$



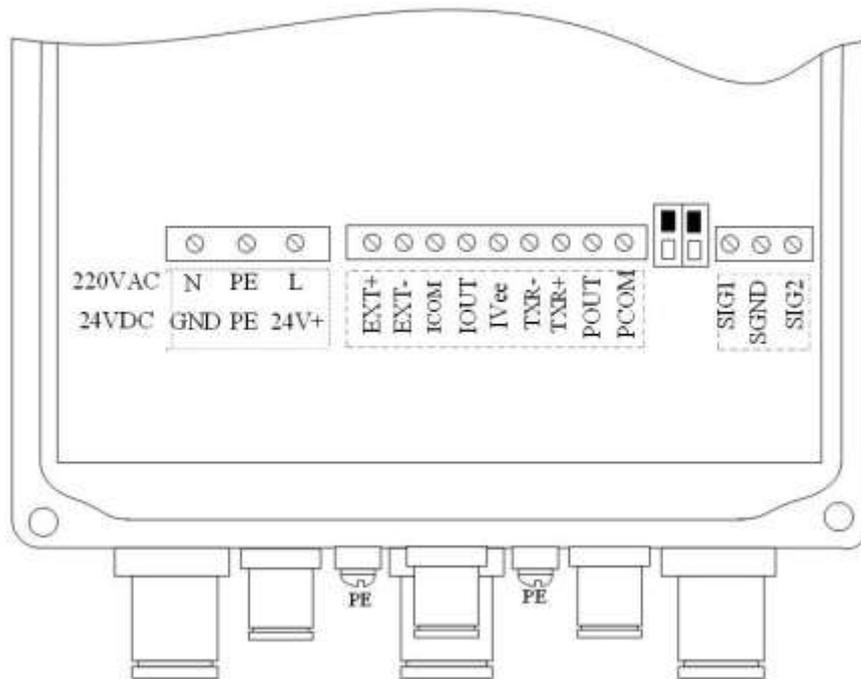
- ① X[m/s]: Flow rate
- ② Y[%]: Actual measured value deviation (mV)

Parameters

Execution Standard	JB/T9248-2015	
Measuring principle	Faraday's law of electromagnetic induction	
Function	Real-time flow rate, flow velocity, mass flow (when the density is constant), real-time measurement and flow accumulation	
Converter		
Compact Type	IP65	
Remote Type	IP65 for transmitter (IP65/IP68 for sensor)	
Measurement sensor		
Nominal Diameter	DN10~DN300	
Flange	In line with JB/T9248-2015 standard carbon steel (Optional stainless steel flanges), other standard flange can be customized	
Pressure rating (High pressure can be customized)	DN15 - DN250, PN≤1.6MPa DN300, PN≤1.0MPa	
Lining Material	Neoprene (CR), Polyurethane (PU), PTFE (F4), PFEP (F46), PFA	
Electrode Material	316L Stainless Steel, Hastelloy C, Hastelloy B, Ti, Ta, Pt	
	Remote type	Compact type
Ingress protection	IP65 for converter, IP68 for sensor	IP65
Medium temperature	Neoprene:-10℃ ~ 70℃ Polyurethane:-10℃~ 60℃ PTFE/FEP:-10℃~ 120℃ PFA:-10℃~ 180℃	Neoprene:-10℃~ 70℃ Polyurethane:-10℃~ 60℃ PTFE/FEP:-10℃ ~ 120℃ PFA:-10℃ ~ 120℃
Serial communications	Modbus RS-485	
Output	Current (4~20 mA) , pulse , frequency	
Function	Empty pipe recognition, electrode contamination, upper limit alarm, lower limit alarm	
Graphic display	Monochrome LCD display with white backlight	
Display function	2 measurement value pictures (measurements, condition, etc)	
Language	English/Chinese	
Unit	You can configure the menu to select the unit Refer to User manual "6.4"	
Operating unit	4 Mechanical keys	
Max measuring error	Measurement value $\pm 0.5\%$ (Flow speed > 0.5m/s) ; Measurement value $\pm 0.5\% \pm 2\text{mm/s}$ (Flow speed < 0.5m/s)	
Repetitiveness	≤0.16%	
Temperature		
Environment	-20℃ - 60℃	
Storage	-40℃ - 65℃	
Sensor housing	Carbon steel, stainless steel 304, stainless steel 316L	
Converter	Standard painted die cast aluminum	
Power supply	220VAC, 24VDC, 12VDC (Low power consumption)	

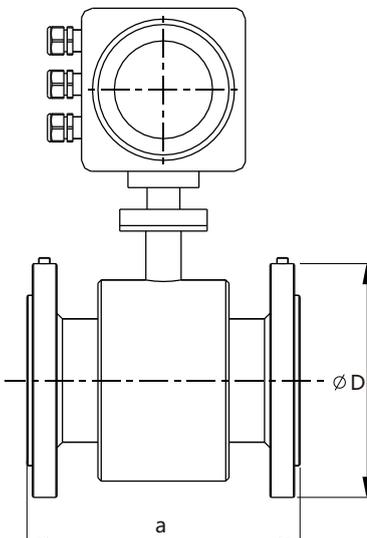
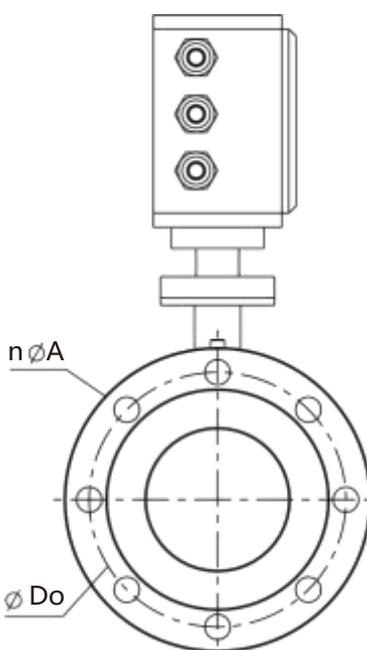
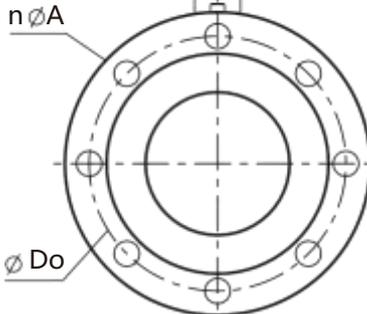
Power consumption	Max 15W, minimum 3W (12VDC power supply, suitable for solar power supply occasions)	
Signal cable	Apply only to remote type	
Current output		
Function	Measurement of volume and quality (in the case of constant density)	
Setting	Scope	4-20mA
	Max	20mA
	Min	4mA
Passive	Corresponding terminal I _{Vee} , I _{OUT} , support 5-24VDC external power supply	
Load	250Ω, Max 1000Ω	
Pulse and frequency output		
Function	Set up Pulse and frequency output	
Pulse output	Basis	Output pulse width: 0.1ms~100ms
	Setting	0.001L~10000.000L
Frequency	Max	F _{max} ≤ 10000Hz
	Setting	0~10000Hz
Active	Turn the two red DIP switch to the ON position	
Passive	Turn the two red DIP switch to the ON position	
Material	Corrosion Resistance	
Molybdenum-containing stainless steel (0Cr18N12Mo2Ti)	Applicable: Domestic/industrial water, sewage, weak acid and alkali saline as well as concentrated nitric acid at room temperature. Not Applicable : Hydrofluoric acid, hydrochloric acid, chlorine, bromine, iodine and other media.	
Parameters		
Material	Corrosion Resistance	
Molybdenum-containing stainless steel (0Cr18N12Mo2Ti)	Applicable: Domestic/industrial water, sewage, weak acid and alkali saline as well as concentrated nitric acid at room temperature. Not Applicable : Hydrofluoric acid, hydrochloric acid, chlorine, bromine, iodine and other media.	
Hastelloy B	Applicable: Non-oxidizing acid, such as hydrochloric acid and hydrofluoric acid of certain concentration and other alkali liquor with a concentration of no less than 70% sodium hydroxide Not Applicable: Nitric acid and other oxidizing acids	
Hastelloy C	Applicable: corrosion by oxidizing acids such as Nitric acid, acid mixtures and sulfuric acid and environmental corrosion by oxidation resistant salt or that contains other oxidants. For example, Hypochlorite solution higher than room temperature is strongly corrosion resistant to sea water. Not Applicable: Reducing acid and chloride such as hydrochloric acid	
Ti	Applicable: chloride, hypochlorite, sea water, oxidizing acid. Not applicable: reducing acid such as hydrochloric acid, sulphuric acid	
Ta	Applicable: most acids like concentrated hydrochloric acid, nitric acid and sulfuric acid including hydrochloric acid and nitric acid at the boiling point as well as sulfuric acid under 175 °C. Not applicable: alkali, hydrofluoric acid and smoke sulfuric acid.	
Pt	Various acids, bases and salts, excluding aqua regia.	

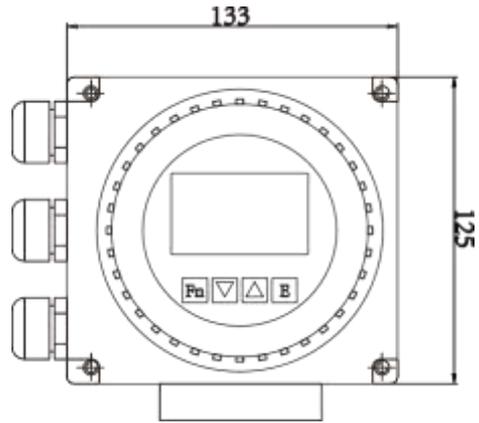
Wiring



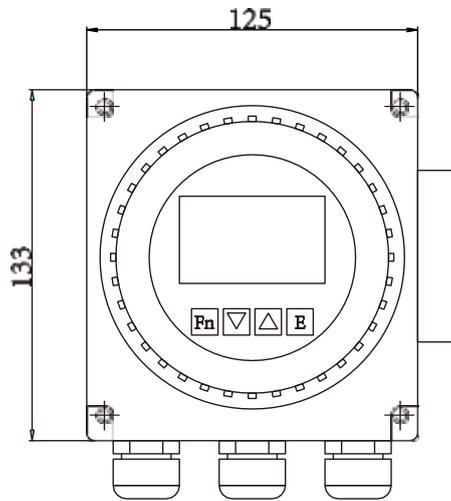
- Connect the sensor:
 - SIG 1: Signal 1
 - SGND: signal ground
 - SIG 2: Signal 2
 - EXT + : Excitation current +
 - EXT - : Excitation current-
- Current output
 - IVee: Current output power supply
 - IOU: Current output
 - ICOM: Current output ground
 - Frequency or pulse output:
 - POUT: Frequency (pulse) output
 - PCOM: frequency (pulse) output ground
 - Communication output:
 - TXR+: Communication input (485+)
 - TXR - : Communication input (48)

Wiring

	DN	a	D	Do	n*A	pressure rating
	10	200	90	60	4*14	1.6Mpa
	15	200	95	65	4*14	
	20	200	105	75	4*14	
	25	200	115	85	4*14	
	32	200	135	100	4*18	
	40	200	145	110	4*18	
	50	200	160	125	4*18	
	65	200	180	145	4*18	
	80	200	195	160	8*18	
	100	250	215	180	8*18	
	125	250	245	210	8*18	1Mpa
	150	300	280	240	8*23	
	200	350	335	295	12*23	
	250	450	405	355	12*25	
	300	500	440	400	12*23	
	350	550	500	460	16*23	
	400	600	565	515	16*25	
	450	600	615	565	20*25	
	500	600	670	620	20*25	
	600	600	780	725	20*30	
	700	700	895	840	24*30	0.6Mpa
	800	800	1015	950	24*33	
	900	900	1115	1050	28*33	
	1000	1000	1230	1160	28*36	
	1200	1200	1405	1340	32*33	
	1400	1400	1630	1560	36*36	
	1600	1600	1830	1760	40*36	
	1800	1800	2045	1970	44*39	
2000	2000	2265	2180	48*42		



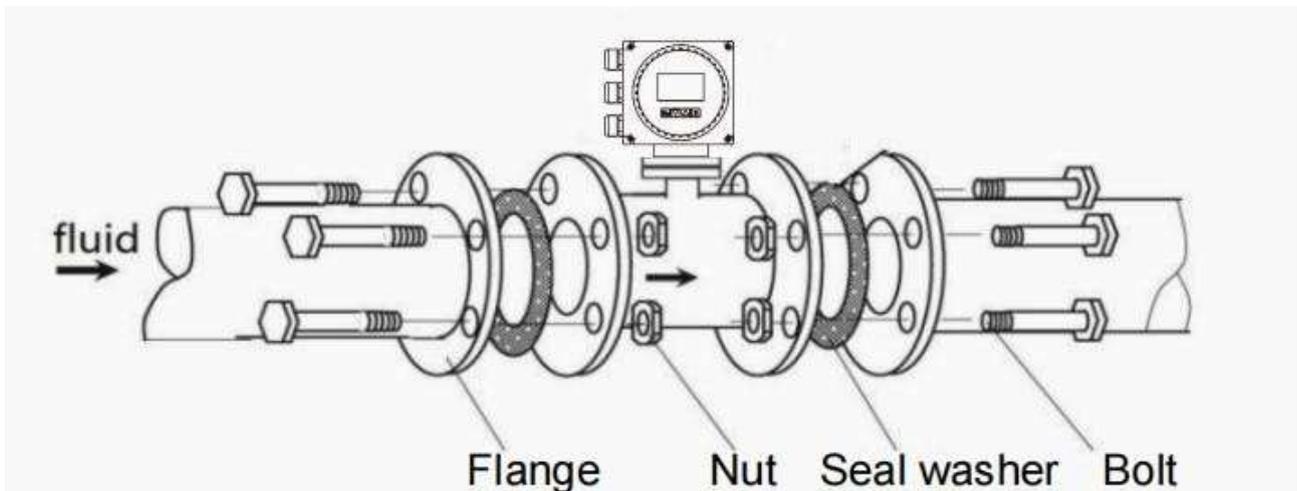
Compact type



Remote type

Dimensions

- 1. Installation direction: Measured fluid flow must match the flowmeter's mark.
- 2. Flange gaskets need corrosion resistance and no protrusion into the pipe.
- 3. Near sensor pipe welding/cutting, isolate to avoid lining heat deformation.
- 4. For well or underwater installation, seal sensor terminal box post-installation & debugging (if IP68, already waterproof).
- 5. On-site flowmeter installation: Connect sensor and pipe flanges with bolts. Bolts, nuts & threads should be intact, undamaged, lubricated, used with proper washers. Tighten with torque wrench per flange spec. Regularly retighten in daily use.



Ordering Code

AI-M240-10-J-A-MC-K-AA-M3-N6-WA-00-1-PB										Description	
AI-M240	-	-	-	-	-	-	-	-	-	-	
Nominal Diameter	10										DN10(3/8")
	15										DN15(1/2")
	20										DN20(3/4")
	25										DN25(1")
	32										DN32(1.25")
	40										DN40(1.5")
	50										DN50(2")
	65										DN65(2.5")
	80										DN80(3")
	1C										DN100(4")
	1E										DN125(5")
	1G										DN150(6")
	2C										DN200(8")
	2G										DN250(10")
	3C										DN300(12")
	3G										DN350(14")
	4C										DN400(16")
	4G										DN450(18")
	5C										DN500(20")
	6C										DN600(24")
7C										DN700(28")	
8C										DN800(32")	
9C										DN900(36")	
A0										DN1000(40")	
Thread Type Standard		J									JB/T 81 flange
		I									ISO2852 Clamp
		X									Other
Nominal pressure			A								PN6
			B								PN10
			C								PN16
			D								PN25
			E								PN40
			F								PN63
		X								Others	
Thread Type Material and Body Material				MC							Carbon steel
				M1							304SS
				XX							Other
Accuracy					K						0.5 Class

Electrode Material	M3	WA WC	4-20mA+pulse+RS485, 220VAC
	MF		4-20mA+pulse+RS485, 24VDC
	MG		Other
	T1		316LSS
	T2		Hastelloy B
	MH		Hastelloy C
	MJ		Titanium
			Tantalum
			Platinum Iridium Alloy
			Tungsten carbide
			Polytetrafluoroethylene/PTFE
			Chloroprene Rubber
	Electrical Interface, Housing Material, and Ingress Protection		
			Teflon F46/FEP
			Integrated Type, M20×1.5 Cable Gland, Aluminum Alloy, IP65
			Split Type, M20×1.5 Cable Gland, Aluminum Alloy, IP68
			0m
			10m
			15m
			20m
			25m
			30m
			40m
			50m
			Others
language	1		Chinese
	2		English
	3		Russian
	4		Spanish (Brazil)
	5		Portuguese (Brazil)
	X		Other
Accessories	PB		Paired with Carbon Steel Flange
	PC		Paired with 304SS Flange
	PE		Paired with SS316L Grounding Ring
	PF		Paired with Titanium Grounding Ring