

惠科达

Vacorda

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Electromagnetic Flow meter

VACORDA



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Vacorda Instruments Manufacturing CO., LTD
Address: Third East Road of Guanghua, Qingyang
District, Chengdu City Sichuan, China
Tel: 86-28-87362258 Fax: 86-28-87362258
Website: www.vacorda.com

Working Principle

Working principle of turbine flow meter measurement principle is based on the Faraday law of electromagnetic induction. Measurements of the flow meter tube is lined with insulating material of a non-magnetic alloy spool. Two clicks along the diameter through-wall fixing on the measuring tube. The electrode head is flush with the lining inner surface. Field coil by waves when pulsed excitation by both parties, will be measured perpendicular to the pipe axis direction produces a magnetic flux density of the magnetic field b . At this point, if you have some electrical conductivity of fluid flows through the measuring tube, cut magnetic lines of induction electromotive force E .

Electromotive force e is proportional to the magnetic flux density B , measure the inside diameter d and the product of the mean velocity v . Electromotive force e (traffic signal) checked out by electrodes and cables to the converter. Converter after the traffic signal will be amplified, to display fluid flow and energy output pulse, analog current signals for flow control and the flow adjustment.

$E=KBdv$ Type: E -for signal voltage between the electrodes (v)

B --magnetic flux density (t)

d --measuring tube diameter (m)

v --average flow velocity (m/s)

K , d is a constant, due to magnetizing current is constant, b is constant, the $E=KBdv$, is proportional to the signal voltage and volumetric flow Q E -. And volume flow rate sensor signal voltage e Q into a linear relationship. Therefore, as long as the measure to determine the flow rate Q , this is the basic operating principle of electromagnetic flow meter. By $E=KBdv$ today, the measured flow of medium temperature, density, pressure, conductivity, liquid-solid two phase media of liquid and solid ingredients than parameter does not affect the measurement results.

As for the axisymmetric flow flow state as long as it meets (such as laminar or eddying flow) does not affect the measurement results. Thus volume flow meter Electromagnetic Flow meter is a real. For manufacturers and users alike, just use plain water after the actual calibration of measuring volume flow of the fluid any other to the point, without the need for human and remediation. This is electromagnetic flow meter to highlight advantages, is not found in any other flow meters. Measuring tube and block parts of inactivity. So there is little pressure loss and extremely high reliability.

Features:

- 1.No moving and blocked flow parts in the pipeline, almost no additional pressure loss in the measurement.
- 2.Measurements results are independent of physical parameters, such as flow distribution, fluid pressure, temperature, density and viscosity.
- 3.On-site modification of the measuring range available.
- 4.LCD display, easy to use and simple to operate.
- 5.Using SMD devices and SMT technology.
- 6.Using 16-bit embedded processors with fast speed and high accuracy, enhancing the stability of measurement.
- 7.Anti-interference, reliability, measurement range up to 150:1.
- 8.Ultra low EMI switch, wide range of power supply voltage.
- 9.RS485, RS232, Hart and Modbus digital communication signal output.
- 10.Self-checking function.

Application:

Due to its unique advantages, it is widely used in the fields of petroleum, chemical industry, steel, light industry, sewage processing, environmental protection, water conservancy project and pharmacy to measure the volume flow of the conducted liquid mediums, such as acid, alkali, salt solution and so on.

Technical parameters:

Series of nominal diameters DN (mm)

PTFE Lined Pipe	10, 15, 20, 25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600
Rubber Lined Pipe	40, 50, 65, 80, 100, 125, 150, 200, 300, 350, 400, 500, 600, 800, 1000, 1200, note: special specifications can be customized
Flow direction	positive and negative, net flows Turndown
Measuring range ratio	150:1
Repeatability error	+/-0.1%
Accuracy	piped: 0.5 class, 1.0 class
Measured medium temperature	Common rubber lining: -20~+60 ° c
	High temperature rubber lining: -20~+90 ° c
	PTFE lining: -30~+100 ° c
	High temperature vinyl lining: -30~+180 ° c
Rated working pressure	pipeline: DN10~DN65: ≤ 2.5MPa; DN80~DN150: ≤ 1.6MPa; DN200~DN1200: ≤ 1.0MPa
Flow measuring range	flow measuring range corresponding to flow rate range is 0.3~15m/s
Measured fluid conductivity	5μs/cm (Most with water as the composition of the medium, its conductivity in the range 200~800 Mu s/cm, optional solenoid flow)
Output	Current: 4~20mADC (isolation), pulse frequency 0~1kHz, OCT photoelectric isolation, external power ≤ 35VDC, breakover, collector Max 25mA
Load resistance	< 600 Ω
Electrode material	316L, titanium (Ti), tantalum (Ta), Hastelloy, (h), Platinum (Pt) or other special electrode materials
Protection grade	standard: IP65; IP68
Working power supply	85~265VAC 45~63HZ
Straight pipe length	pipe: ≥ 5DN in the upper reaches, downstream of greater than or equal to 2DN
Connections	flow meter connected to the piping is used between flanges, flange connection dimensions comply with GB9119-88 requirements.
Explosion-proof mark	mdIIBT4
environment temperature	-25 ° c ~+60 ° c
Relative humidity	5%~95%
Total power consumption	<20W

Medium conductivity form

Medium	conductivity	medium	conductivity
All kinds of acid	$10 \times 10^4 \sim 801 \times 10^4$	beer	600~500
alkali lye	$8 \times 10^4 \sim 30 \times 10^4$	malt wort	500~1000
distilled water	0.01~5	milk	200~300
Water/drink	200~800	Fruit sauce	400~1000

Integrated and segregated flow meter

Integrated type: if the environment is nice, normally choose integrated flow meter, which consists of sensor and Converter.

Segregated type: sensor is apart from converter. The conditions is as follows:

1. It is more than 60℃ for environment temperature or surface temperature of flow meter.
2. occasion of Pipeline vibration strongly.
3. Occasion that it is corrosive medium for Aluminum transmitter.
4. High temperature or corrosive gas
5. Flow meter installed at high place and no easy for debugging.

Customer should note the distance of sensor and converter, generally no more than 100m and converter is hanging on the wall.

Electrode, 接地环 material:

Electrode material	corrosive medium
316L	nitric acid, <5% sulphuric acid, boiled phosphoric acid, acetic acid, aqueous alkali, sulfurous acid, seawater, acetic acid
hastelloy	oxidizing acid, sulphuric acid, seawater, aqueous alkali
Titanium	Seawater, chloride, hypochlorite, Acid chloride (fuming nitric acid), organic acid, alkali
tantalum	Except hydrofluoric acid, fuming sulfuric acid, alkali etc chemical medium
platinum	All kinds of acid, alkali, no including chloroazotic acid

Lining material:

lining material	Name	Model	function	Max temperature
rubber	chloroprene rubber		Abrasion resistance, weak acid, alkali	
	urethane rubber		Nice abrasion resistance, weak acid, alkali	<80℃
Fluoroplastic	PTFE	F4/PTFE	Fuming muriatic acid, sulphuric acid, strong alkali	<180℃
	tetrafluoroethylene	F46/FEP	Function weaker than F4	
plastics	tetrafluoroethylene	F4/ETFE	Function weaker than F4	
	polyethylene	PO	stable	<60℃
	polyphenyl thioether	PPS		<150℃

Flow measuring scope

Max flow and min flow must suit the data in the table.

Diameter (mm)	10	15	20	25	32	40	50	65
Max flow	2.8	6.4	13.3	17.7	28.9	45.0	71.0	119
Min flow	0.08	0.19	0.34	0.53	0.729	1.35	2.13	3.57
Diameter (mm)	80	100	125	150	200	250	300	350
Max flow	181	283	442	636	1130	1770	2540	3460
Min flow	5.43	8.49	13.3	19.1	33.9	53.1	76.2	104
Diameter (mm)	400	450	500	600	700	800	900	1000
Max flow	4520	5720	7070	10200	13850	18100	22900	28300
Min flow	136	172	212	306	416	543	687	849
Diameter (mm)	1200	1400	1600	1800	2000	2200	2400	
Max flow	40700	55400	72400	91600	113100	136800	162800	
Min flow	1221	1662	2172	2748	3393	4100	4480	

Installation suggestion

- 1.To avoid magnetic field environment, and magnetic device, in case that it affect magnetic and signal output.
2. Dry and ventilated place for installation.
- 3.Avoid the sun and rain, and high temperature above 60℃ and humidity above 95%
- 4.Place that easy for installation and moving
- 5.Flow meter should be installed behind pump, and valve must be connected with outflow part of flowmeter.

Installation requirement:

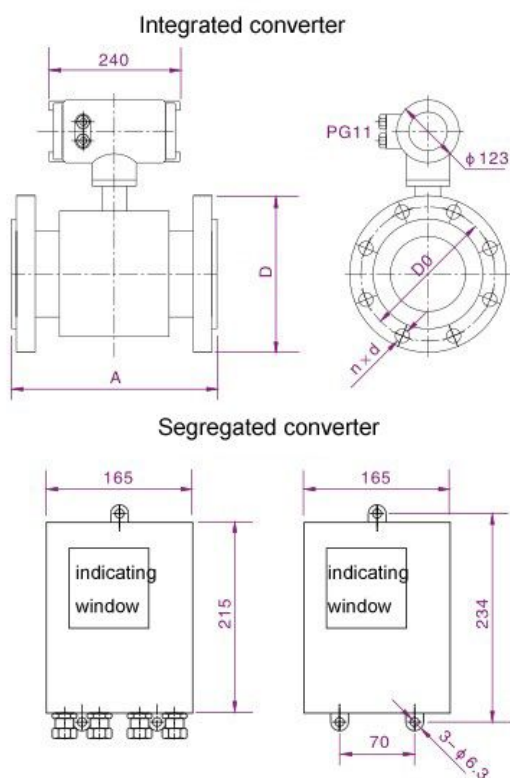
1. Transmitter can be installed on the straight pipe and horizontal pipe
2. full pipe flow to avoid the electrode touching with air.
3. Vertical installation to abrade lining equally to prolong the life time ,if the medium is mixture of liquid and water.
4. Change installation methods: choose smaller diameter flow meter if the flow rate doesn't reach the requirement.

Change

Some part pipe to make diameter same as transmitter's, but straight pipe must be: inflow part $\geq 5DN$,
outflow part $\geq 2DN$ (DN pipe diameter)

Size

Overall size



DN	A	D	D0	n x d
10	230	90	60	4 x 14
15	230	95	65	4 x 14
20	230	105	75	4 x 14
25	230	115	85	4 x 14
32	230	140	100	4 x 18
40	230	150	110	4 x 18
50	230	165	125	4 x 18
65	230	185	145	4 x 18
80	230	200	160	4 x 18
100	230	220	180	4 x 18
125	280	250	210	4 x 18
150	280	285	240	8 x 22
200	310	340	295	8 x 22
250	360	395	350	12 x 22
300	460	445	400	12 x 22
350	460	505	460	16 x 26
400	460	565	515	16 x 26
450	460	615	565	20 x 26
500	600	670	620	20 x 26
600	600	780	725	20 x 30
700	700	895	840	20 x 30
800	800	1015	950	24 x 33
900	900	1115	1050	24 x 33
1000	1000	1230	1160	28 x 33
1200	1200	1405	1340	28 x 36
1400	1400	1630	1560	32 x 33
1600	1600	1830	1760	40 x 36
1800	1800	2045	1970	44 x 39
2000	2000	2265	2180	48 x 42
2200	2200	2405	2315	52 x 45

Electrical wiring

1. Customized special cable for signal line of segregated flow meter.
2. Can choose YZ rubber cable, shorter is better.
3. Signal cable must be apart from power supply,.
4. Use U type to avoid water flow into transmitter when cable connects transmitter.

Electrical wiring

Segregated type

Integrated type

The diagram illustrates the 68000 bus structure. At the top, a horizontal bar represents the bus, with various components connected to it. On the left, the **converter** is connected to the bus. The bus components include:

- DS1** (Data Strobe 1) and **DS2** (Data Strobe 2) are connected to the bus.
- SGND** (Signal Ground) is connected to the bus.
- SIG1** (Signal 1) and **SIG2** (Signal 2) are connected to the bus.
- EXT+** (External Address/Control) is connected to the bus.
- EXT-** (External Address/Control) is connected to the bus.
- SGND** (Signal Ground) is connected to the bus.
- SIG1** (Signal 1) and **SIG2** (Signal 2) are connected to the bus.
- empty** (Empty) is connected to the bus.

The bus components are connected to the bus via a series of **converter** blocks, which are represented by circles with an 'X' inside. The bus components are connected to the bus via a series of **converter** blocks, which are represented by circles with an 'X' inside.

converter

converter

converter

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1	2	3	4	5	6	7	8	/9
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1	Flange diameter				
	Flange diameter (mm)				
2	Convertor type				
	S: compact type		L: segregated type		
3					
	M	T	D	H	P
	316L	Titanium	tantalum	hastelloy	platinum
4	Signal output				
	0	1		2	
	N/A	4~20mA/0~1kHz		4~20mA	
5	Lining material				
	X	F		P	
	rubber	PTFE		PV	
6	Local display				
	0	1			
	N/A	Local display			
7	Communication output				
	0	1	2	3	4
	N/A	RS485	RS232	MODBUS	HART
8	Max flow				
	Max flow range(m ³ /h)				