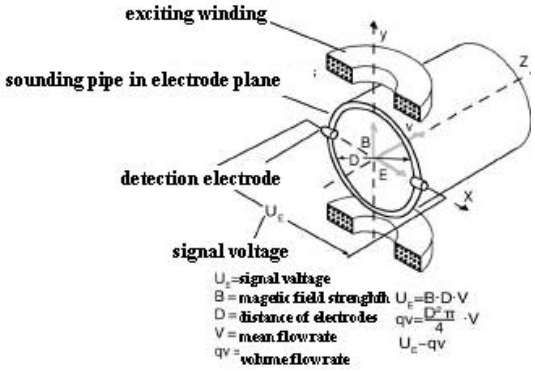
LD Smart Electromagnetic Flow Meter

Summary

Product execution standard: JB/T9248-1999 electromagnetic flow meter.
LD electromagnetic flow meter is a kind of electromagnetic measuring flow instrument, used to measure all kinds of the volume flow of conductive liquid. This product is mainly used in petrochemical, steel, electric power, metallurgy, textile, food pharmaceutical, paper making industries and municipal environmental protection, water conservancy and other fields.



Operating Principle

Operating principle is based on Faraday's electromagnetic induction law. That is: when electrical conductor is cutting in magnetic field, The UE for induction electromotive force is: U_E=BDV

$U_{E:}$ induction electromotive force

B: magnetic field strength

D: The length of the conductor (diameter)

V: The conductor cuts speed (average flow velocity)

When meter is measuring flow rate, liquid flow through perpendicular to the flow direction of magnetic field, the electrical conductivity of the liquid flow sense a voltage that is proportional to the average flow velocity (i.e. volume flow), Induced voltage signal, Induced voltage signal by two electrode directly contacting with the liquid detection, and send to the amplifier, and then convert it into a standard signal output.

LD electromagnetic flow meter is composed of sensor and signal converter,according to the structure type: Flange connection (LD1 type, in figure 2) and Insert-type (LD2 type, as shown in figure 3); According to the converter and sensor assembly form can be divided into one-piece and split type two kinds of structure.

Figure 2 flange connection type

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integrated type split type

Figure 3 plug-in tpye

Main technical parameters

1. Sensor parameter

1.1Flange connection (LD1)

Suitable diameter: DN15-DN1000, other diameters are non-standard, according to user request

Measuring pipe lining material: F46 (FEP Teflon), P0 (polyolefin), PUR (polyurethane)

The electrode material: 316L, Hc(Hastelloy C),Hb(Hastelloy B),Ta()

Operating pressure: DN15-DN80 diameter: 4.0Mpa (standard)

DN100-DN150 diameter: 1.6 Mpa(standard)

DN200-DN1000 diameter: 1.0Mpa (standard)

More than the pressure standard is non-standard type, according to user requirement order other flange standard

Fluid temperature:F46lining：－40℃-180℃，P0lining: －20℃-80℃;PUR lining: 0-50℃

Technology of connecting flange:Flange standard of this book is HG/T20592 — 2009,or according to user requirement order other flange standard.

Grounding ring material：304、321、316、Hc、Ti、Cu

1.2 Insert-type(LD2)

Suitable diameter: ≥80mm

Sensor material: Stainless steel(1Cr18Ni9Ti)+ Polytetrafluoroethylene(PTFE)

The diameter of sensor probe: φ37mm

The sensor inserts the depth of pipe:1/8D and≤40mm(D is tube diameter)

Operating pressure:1.0MPa,1.6MPa,4MPa,25MPa(special)

Fluid temperature: －40℃-100℃,100℃-180℃(high temperature)

2 The converter parameter

Measure range:flow rate 0.1-10m/s,each diameter flow= Tube cross-sectional area×flow rate

Accurcy class:0.3、0.5（flow rate≥0.5m/s）,1.0(flow rate＜0.5m/s),2.0(flow rate＜0.2m/s)

Electrical conductivity: ＞5μs/cm

Output signal:4-20mA，load≤750Ω；0-100Hz output pulse, with power24V, ＞10mA;RS485;

4-20mA+HART; RS485 MODBUS COMMUNICATION

Supply power:220VAC±10%,50Hz±1Hz;24VDC±10%

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Power consumption: ＜7W

Explosion proof: Exd(ia)iaqIICT6，Exd(ia)iaqIIBT4

Housing protection: integrated：IP65; Split type：sensor IP68、converterIP65

Ambient temperature：－25℃-60℃(Explosion proof to50℃)

Ambient humidity: ≤85%RH(20℃)

Electrical interface size:M20×1.5,1/2NPT(outside diameter of cableφ6-φ10)

Model	Symbol and meaning															
LD1-	□	×	□	-	□	□	□	-	□□□		-	□	□	□	-	Range
	Nominal diameter In figure 1		Nominnal Pressrue In figure 2		Medium Temperature In figure3	Lining Material In figure 4	Electrode Material In figure 5		Structure							m³/h
									Structure style	Grounding ring	install accessories					
LD1-	200B	×	40	-	E	1	4	-	F110		-	1	1	D	-	1000

Note: accuracy class:0.3,0.5,1.0,2.0 or shall be marked.

Example Selection

Example Selection: LD1-200B×40 － E14-F110-11D-1000.Note: Electromagnetic flowmeter is:Flanged connection,Nominal Diameter DN200,Nominal Pressure 4.0Mpa,Medium Temperature 0-80℃, Pipe lining material is FEP, Electrode Material 316L,

Integrated structure, Grounding ring is standard,Power supply is 200VAC、Output signal is 4-20mADC,Explosive-proof: Exd(ia)iaqIIBT4、flow measuring range 0-1000m³/h.

Table 1:Nominal Diameter code

Symbol		15	15B	20	20B	25	25B	32	32B
Diameter	mm	21.3	18	26.9	25	33.7	32	42.4	38
	in	1/2		3/4		1		1-1/4	
Symbol		40	40B	50	50B	65	65B	80	80B
Diameter	mm	48.3	45	60.3	57	76.1	76	88.9	89
	in	1-1/2		2		2-1/2		3	
Symbol		100	100B	125	125B	150	150B	200	200B
Diameter	mm	114.3	108	139.7	133	168.9	159	219.1	219
	in	4				6		8	
Symbol		250	250B	300	300B	600	600B	400	400B
Diameter	mm	273	273	323.9	325	355.6	377	406.4	426
	in	10		12		14		16	
Symbol		450	450B	500	500B	600	600B	700	700B
Diameter	mm	457	480	5085	530	610	630	711	720
	in	18		20		24		28	
Symbol		800	800B	900	900B	1000	1000B	1200	1200B
Diameter	mm	813	820	914	920	1016	1020	1219	1220
	in	32		36		40		48	
Symbol		1400	1400B	1600	1600B	1800	1800B	2000	2000B
Diameter	mm	1422	1420	1626	1620		1820		2020

	in	56		62		72		80	

Table 2: Nominal Pressure code

Symbol	6	10	16	20	25	40	50	60
Unit	bar	bar	bar	bar	bar	bar	bar	bar

Table 3:Measured Medium Temperature code

Symbol	A	C	E	M
Medium temperature℃	－40＜A≤0	－20＜C≤0	0＜E≤800＜M	≤180

Table 4:Lining material code

Symbol	1	2	3	4
Mean	F46 FEP	PO polyolefin	PUR polyurethane	else
Suitable temperature	－40℃-180℃	－20℃-80℃	0-50℃	

Table 5: Electrode material code

Symbol	1	2	3	4
Mean	HC Hastelloy C	HB Hastelloy B	Ta tantalum	316L

Table 6:structure code

The type of structure symbol	F1	F2		
Mean	Integrated	Disintegrated		
Grounding ring symble	1	2	3	4
Mean (outline in figure 4)	Standard	With neck	Protect	None
Mounting accessories symbol	1	2	3	4
Mean (outline in figure 5)	Board mounting with flexible holder	Pipe mounting with flexible holder	Wall mounting	Integrated

Table 7:Supply power selection

Symbol	1	2		
Mean	220VAC、50Hz	24VDC		

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Table 8:Output signal

Symbol	1	2	3	4

Mean	4-20mA	4-20mA+HART	0-1kHz pulse	RS485

Table 9: Explosion-proof

Symbol	D	d	The default	
Mean	Exd(ia)iaqIIBT4	Exd(ia)iaqIICT6	Common (no request)	

2 Insert (LD2) electromagnetic flow meter selection table

Model	Symbol and mean														
LD2-	□	( )	×	□	—	□	—	□	□	—	□	□	□	—	Range
	Process piping diameter	process piping wall thickness		Nominal pressure In figure 2		Medium Temperature In figure 3		structure: Structural type	structure: Mounting accessory		Supply power In figure7	Output In figure 8	Explosion-proof In figure 9		m³/h
								In figure 6							
LD2—	150	(4.5)	×	16	—	E	—	F	14	—	1	1	D	—	600

Note: Accurcy class:1.0、2.0 or exceptionally mark

Selection example:

LD2－150(4.5) ×16－E－F14－11D－600. Explainment: Electromagnetic flow meter is inserting and the diameter of the pipe is

150mm,process piping wall thickness is 4.5mm,nominal pressure is 1.6 Mpa,medium temperature 0-80℃, integrated structure, power 220VAC,output signal:4-20mA , Explosive-proof: Exd(ia)iaqIIBT4,measuring range 0-600m³/h.

3 Flow range and flow diagram

3.1 Flow range(in below table)

Diameter (DN)	The minimum flow measuring range (m/s)0-0.5m/s	The maximum flow measuring range (m/s)0-10m/s
15	0-0.3 m³/h	0-6.4 m³/h
25	0-0.9 m³/h	0-17.7 m³/h
32	0-1.5 m³/h	0-28.9 m³/h
40	0-2.3 m³/h	0-45.2 m³/h
50	0-3.5 m³/h	0-70.2 m³/h
65	0-6.0 m³/h	0-119.4 m³/h
80	0-9 m³/h	0-180 m³/h
100	0-14 m³/h	0-282.6 m³/h
125	0-22 m³/h	0-441.6 m³/h
150	0-31.8 m³/h	0-636 m³/h
200	0-56.5 m³/h	0-1130 m³/h
250	0-88.3 m³/h	0-1766 m³/h

300	0-127.2 m³/h	0-2543 m³/h
350	0-173.1 m³/h	0-3462 m³/h
400	0-226.1 m³/h	0-4522 m³/h
500	0-353.3 m³/h	0-7065 m³/h
600	0-508.7 m³/h	0-10174 m³/h
700	0-692 m³/h	0-13847 m³/h
800	0-904 m³/h	0-18086 m³/h
900	0-1145 m³/h	0-22890 m³/h
1000	0-1413 m³/h	0-28260 m³/h
1200	0-2035 m³/h	0-40694 m³/h
1400	0-2770 m³/h	0-55390 m³/h
1600	0-3617 m³/h	0-72346 m³/h
1800	0-4578 m³/h	0-91562 m³/h
2000	0-5652 m³/h	0-113040 m³/h

3.2 The conversion relation of the flow meter's diameter ,flow rate and flow.

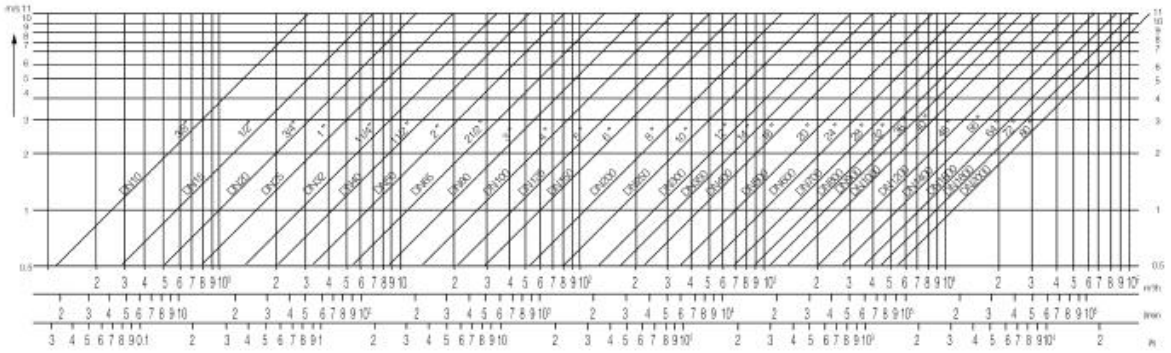
Formula:$Q=\pi D2V/4$

Q:flow(m³/h)

D:pipe diameter(m)

V:flow rate(m/h)

3.3 flow line figure



4. Material of liner selection (flange connection type LD1)

Material	Character	Range of application
F-46 fluorinated ethylene-propylene	1. Chemical stability, resistance to almost all chemical media corrosion. 2. heat-resistant, long-term work at 180 ℃. 3. High mechanical strength, good wear resistance. 4. The inner surface is smooth, and is not easy to adhere to precipitate. 5. The inner lining with metal mesh, vacuum-resistant, anti-vacuum.	All fluid addition to strong wear medium such as mortar. It can be used to medium has sanitary requirement such as drinks.
PO polyolefin	1. Has good physical and chemical properties, is a more advanced anti-corrosion materials now.	All fluid in addition to gasoline, diesel and acetaldehyde, the temperature is not higher than

	2. Long-term using at 80 ℃. 3. Has good stress cracking resistance, better than rubber. 4. Has good impact resistance. 5. Has good rigidity.	80 ℃.
PUR polyurethane	Good wear resistance, isn't resistant to corrosion, operating temperature can not exceed 50 ℃	Mortar and other strong abrasive fluids

5. Material of electrode selection (flange connection type LD1)

Material	Corrosion resistance
Hc hastelloy C	Anti-oxidizing acids such as nitric acid, chromic acid and sulfuric acid mixture. Also resistant to oxidizing salts or other oxidant-containing corrosive environment. Seawater, alkali solution, chloride solution with good corrosion resistance.
Hb hastelloy B	Sulfuric acid, phosphoric acid, hydrofluoric acid and other non-oxidizing acid, alkali, salt, with good corrosion resistance.
Ta tantalum	Addition to hydrofluoric acid, it can resist almost all chemical media. Because of its price is so high, it is only used for hydrochloric acid and concentrated sulfuric acid.
316L stainless steel	It is used for weak corrosive medium such as industrial water, domestic water and waste water, neutral solution and weak acid such as carbonic acid and acetic acid.

6. Ground ring selection (flange connection type LD1 has this) as figure 4.

6.1 Standard ground ring: both sides of sensor must install ground ring on plastic and cathodic protection pipes.

6.2 protection ring with neck: if medium has strong abrasiveness, you should select protection ring with neck to protect liner.

6.3 protection ring: F46 liner sensor should select protection ground ring, fixed on flange via screw to protect the flanging of liner from damage.

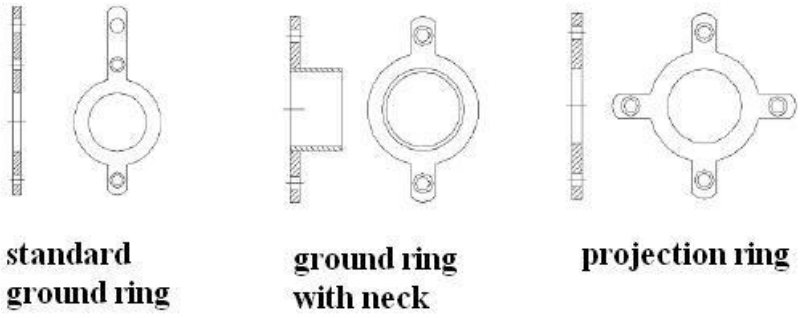


figure 4 outline of ground ring

The material of ground ring is stainless steel 1Cr18Ni9Ni, if you have special requirement, please tell us when ordering goods.

7. Protection class selection of house

Protection class of the housing on integrated flow meter is IP65, the sensor section is IP68, and transmitter section is IP65.

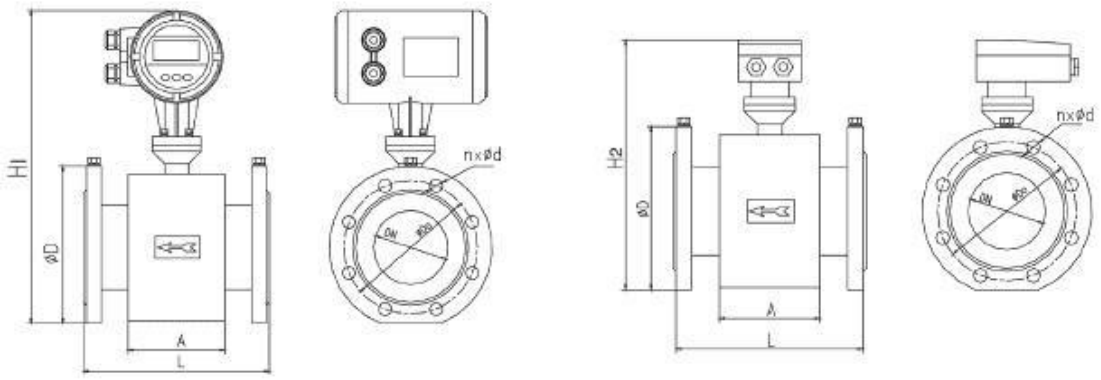
8. The determination of the fission

You should use split type flow meter in hostile environment such as ponding, corrosion, high temperature, low temperature, strong vibration and maintenance inconveniently, etc.

Transmitter is connected to sensor only with a cable. Please ensure the specific length with the manufacturer when ordering goods, if not, the length is only 5 meters. Others select integrated flow meter. When you can't make the decision, you can ask to manufacturer.

Outline and installation dimension

1、Structure and size of flange connection type(LD1 type)



integrated type

split type

Figure 5 Flange connection type(LD1) electromagnetic flow meter

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Structure、size and weight

Nominal diameter DN(mm)	Nominal voltage (Mpa)	Dimension of meter(mm)				Connecting size of flange(mm)			Weight(kg)	
		L	A	H1	H2	D	Do	n×φd		
15	4	150	65	330	230	95	65	4×14	7	5
25		200	100	390	330	115	85	4×14	9	7
32		200	100	390	330	140	100	4×18	11	9
40		200	100	390	330	150	110	4×18	11	9
50		200	100	390	330	165	125	4×18	14	12
65		200	100	386	286	185	145	8×18	15	13
80		200	100	400	300	200	160	8×18	18	16
100	1.6	250	130	426	326	220	180	8×18	19	17
125		250	130	455	355	250	210	8×18	24	22
150		300	140	486	386	285	240	8×22	30	28
200	1	350	180	547	447	340	295	8×22	37	35
250		400	210	604	504	395	350	12×22	45	43
300		500	240	654	554	445	400	12×22	74	72
350		500	305	715	615	505	460	16×22	110	108
400		600	385	775	675	565	515	16×26	180	178
450		600	385	818	718	615	565	20×26	210	208
500		600	385	870	770	670	620	20×26	240	238
600		600	385	980	880	780	725	20×30	330	328
700		700	464	1090	990	895	840	24×30	430	428
800		800	545	1210	1110	1015	950	24×33	540	538
900		900	635	1310	1210	1115	1050	28×33	650	648
1000		1000	705	1430	1330	1230	1160	28×36	800	798

2. Structure and size of plug-in type (LD2 type)

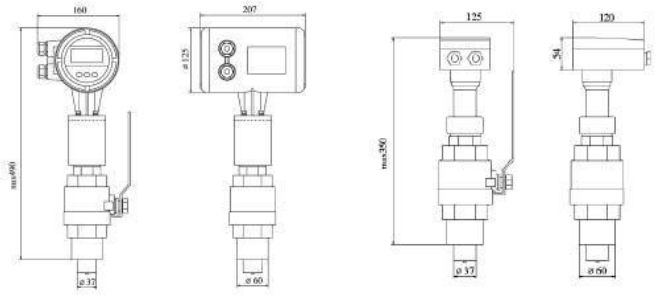

Figure 6 Plug-in type (LD2) electromagnetic flow meter

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3. Installation and size of fission structure

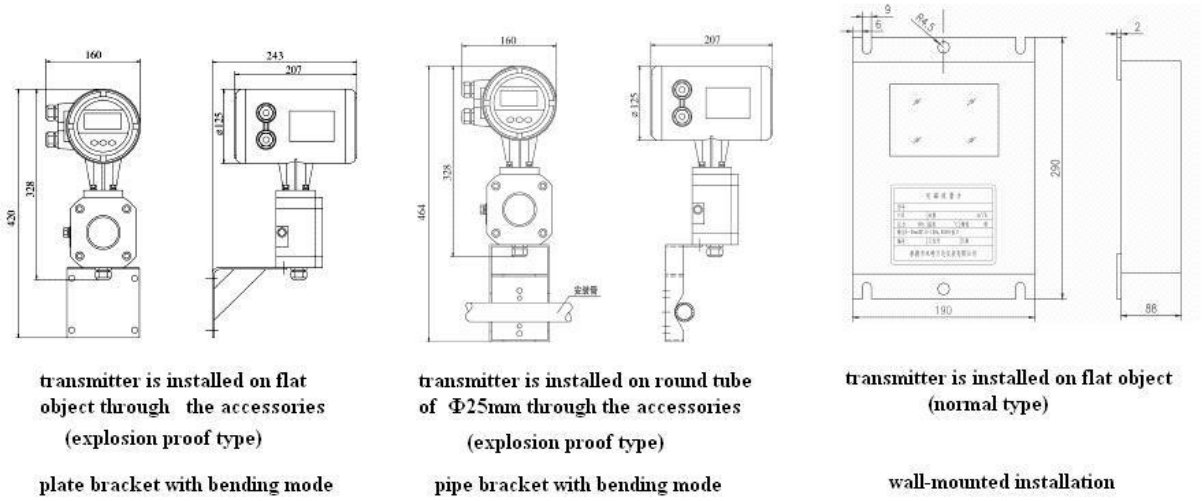

Figure 7 Fission structure installation

Order requirements

When users order the goods, please read this selection model sample fully and select suitable flow meter according to the situation of fluid and field requirement, then provide following information to manufacturer.

- Model of electromagnetic flow meter
- Character and physical property parameter of fluid
- Max. operating pressure、Max. and Min. operating temperature of fluid
- Frequently-used flow、Max. and Min. flow of the fluid