LD ELECTROMAGNETIC FLOW METER

Summary

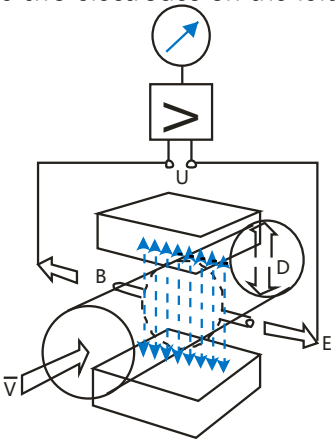
LD series electromagnetic flowmeter is suitable for conductivity greater than 5μS/cm conductive medium, wide nominal diameter range, to adapt to a variety of practical Environmental conditions, with a variety of power supply mode, a variety of signal output, the use of standard RS-485 serial communication interface, support international General standard MODBUS-RTU communication protocol and GPRS and other wireless and wired communication networking methods, with cumulative Pulse-equivalent output. Provide a wireless meter reading system (computer management software and database) with remote network access.

Features

1. Excellent measurement repeatability and linearity
2. Good reliability and immunity to interference
3. Good pressure tightness
4. Low pressure loss measuring tubes
5. Intellectualize
6. Maintenance-free

Operating Principle

The operating principle of electromagnetic flowmeter is based on Faraday's law of electromagnetic induction. The right figure in the upper and lower ends of the two electromagnetic coils to produce a constant or alternating magnetic field, when the conductive medium flows through the electromagnetic flowmeter, the flowmeter wall The induced electric potential can be detected between the two electrodes on the left and right of the conductive medium, and the size of the induced electric potential depends on the flow rate of the conductive medium and the magnetic induction of the magnetic field. Strength, conductor width (inside diameter of the pipe measured by the flowmeter) is proportional to the flow rate of the medium, which is then calculated.



The process parameter equation for the induction potential is: E = K B V D

In the formula.
E - induced electric potential; D - measured inner diameter of tube;
B - magnetic susceptibility.

V - average flow velocity; K - coefficient related to magnetic field distribution and axial length.

Technical Parameters

Implementation standards	JB/T9248- 2015		
Nominal diameter	15~2000mm		
Flow rate range	0 - 10m/s		
Accuracy	±0.5 %R, ±1%R (up to DN20) Dielectric conductivity		
Nominal pressure	Theoretical value ≥ 5uS/cm, actual use ≥ 30uS/cm		
	1.0、1.6、2.5、4.0MPa		
Environmental temperature	LCD Display	-10℃~55℃	
	OLED Display	-30~55℃	
Medium temperature	Lining materials	Temperature limit	
	Neopren （CR)	0~ 80℃	
	Polytetrafluorethylen (PTFE)	0~120℃	
	Perfluorethylen Hexafluor-propylen Copolymer (FEP)	0~120℃	
	Schmelzbares Teflon (PFA)	-10 ~180℃	
	Silikon-Fluorelastomer (FVMQ)	70 ~250℃	
	Polyurethan (PU)	-20 ~60℃	
Output Signal	4-20 mA; pulse/frequency 2 kHz (default), 5 KHz (Max)		
Cable Outlet Size	M20 × 1.5 (standard nylon waterproof connector, explosion-proof metal connector optional)		
Power supply voltage	110/220VAC (100-240VAC)，50Hz/60 Hz；24 VDC ±10%		
Power consumption	≤15VA		
Communication Method	RS-485, support standard MODBUS-RTU protocol, HART protocol; GPRS		
Signal and ground electrode materials	Stainless Steel 316 L, Hastelloy C, Hastelloy, Titanium, Tantalum, Platinum		
Electrode type	Interpolation, external electrode on request		
Number of electrodes	Standard 3-4 electrodes (2 measuring electrodes + 1 grounding electrode), configured according to the diameter.		
Connection Flange Standard	In line with the national standard GB9119 (can be customized according to user requirements)		
Connection Flange Material	Standard carbon steel, stainless steel on request		
Grounding Ring Material	Stainless steel, molybdenum-containing stainless steel, etc.		
	DN15-DN450	Stainless steel 1 Cr18 Ni9 Ti (ordinary austenitic stainless steel SUS321)	
Shell material	Standard carbon steel, stainless steel on request		
Protection class	Split type		IP68、IP65
	All-in-one type		IP65
Pitch/wiring length (split type)	Standard 10m connection cable, optional 1~300m		

Model Selection Table

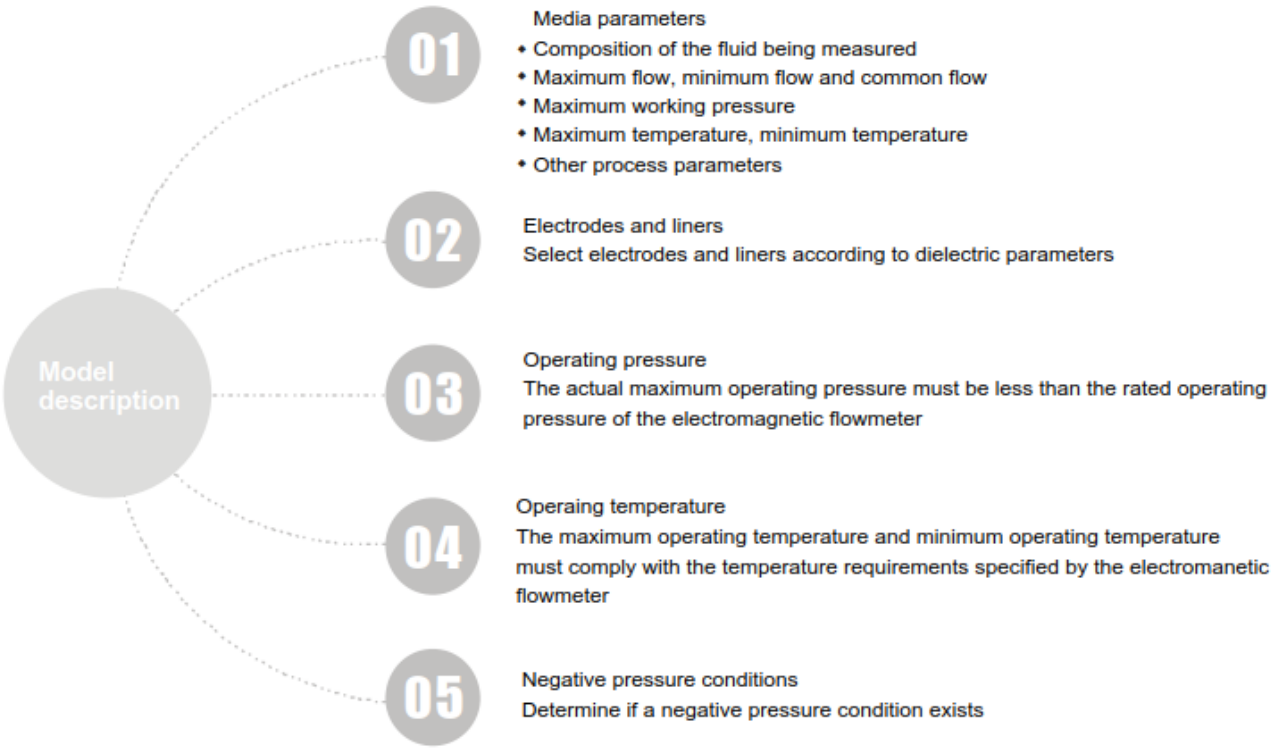
LD Electromagnetic flow meter Model Selection Table

Model	Suffix code										Description
LD ━	□	□	━	□	□	□	□	□	□	□	
Pressure rating	1.0										Sensor pressure class * 1 (1.0, 1.6, 2.5,4.0MPa)
Installation type		A1									LGB1 flange mounting * 2
Calibre				50							Sensor size (see size selection table) * 3
Electrode materials					K1						Stainless steel 316L
					K2						Hastelloy C (HC)
					K3						Hastelloy B (HB)
					K4						Titanium (Ti)
					K5						Tantalum (Ta)
					K6						Platinum (Pt)
Lining materials						F1					Neoprene(CR)
						F11					Silicone fluoroelastomer (FVMQ)
						F12					Nitrile rubber (NBR)
						F2					Perfluoropropene F46 (FEP)
						F21					Perfluoropropene F46 (FEP) stencil
						F3					PEA plastic (PFA)
						F31					PEA plastic (PFA) stencil
						F4					Polytetrafluoroethylene (FEP)
						F5					Polyvinylidene fluoride (PVDF)
						F6					Polyurethane (PU)
Max. operating temperature							A1				≤80℃*4
							A2				≤120℃*5
							A3				≤250℃*6
Flow meter structure								C3			Integral*4
								S			Separate*8
Power supply									P0		AC power supply 110/220V *9
									P1		DC power supply 24 V *10
Optional features										/T 1	1 channel 4-20mA output
										/T H1	HART communication (including 4-20mA output)
										/C3	RS-485 Communication
										/TF1	1 frequency/pulse output
										/KB1	Infrared touch buttons*11
										/KD1	OLED display*12

*1 Sensors are available in pressure ratings of 1.0 MPa, 2.5 MPa, 4.0 MPa.
For selection of the maximum pressure rating for each caliber range:
DN15·DN50, PN≤4.0MPa; DN65·DN150, PN≤1.6MPa; DN200-DN450, PN≤1.0MPa.
*2 Flange: Carbon steel in accordance with GB/T9119-2000 standard, other installation methods can be specified at the time of order.
*3 Please select the caliber from the caliber selection table. When selecting the caliber, the measured flow rate of the medium should be kept within the appropriate range.
*4 When selecting A1 for the maximum operating temperature, a neoprene (CR) or polytetrafluoroethylene F4 (PTFE) liner may be used.
*5 The maximum use temperature ≤ 120 ℃, you can choose PTFE F4 (PTFE) lining, polytetrafluoroethylene F46 (FEP) lining or Teflon (PFA).
*6 Maximum operating temperature of 250 degrees Celsius, optional fluorine silicone rubber (FVMQ).
*7 For C3 monoblock mounting, QX5100 or QX5300 converters are available.
*8 In case of 5-part mounting, QX3300 converter QX5300 converter can be used. The standard length of converter and sensor signal cable is 10m; 15m, 20m, 25m and 30m can be selected.
*9 AC 110/220V power supply allowable voltage range: 100-240VAC, 50/60Hz.
*10DC 24V power supply allowable voltage range: 22-26VDC.
*11The default key function is a mechanical key.
*12The default display is the LCD.
Note: When choosing grounding ring, please specify when ordering, the price of grounding ring is extra. If some parameters of electromagnetic flowmeter are not listed in the selection table, it needs to be customized, and the customized model will be determined separately.

Model Description

Instrument selection is a very important work in the application of instrumentation, the data show that in the actual application of 2/3 of the fault is caused by the wrong instrumentation or wrong installation, please pay special attention.



Example

LD-1.0A1-80K1F1A1C3P0/T1: operating pressure 1.0MPa, flange mounting LGB1, diameter 80mm, stainless steel 316L electrode, LDR lining, the highest use temperature ≤ 80 ℃, integral structure (meter head and sensor mounted together), 1 channel 4-20mA signal output, AC power supply.

Selection Table Details

① Pressure rating

- The pressure rating is the rated pressure level that the sensor can withstand. Usually, the pressure on the sensor by the device (such as pumps, etc.) on the measured flow of the pipeline medium exerted pressure, beyond the rated pressure of the sensor, will lead to electromagnetic flowmeter leakage and can not work properly or even damage the electromagnetic flowmeter.
- The main pressure levels are 1.0MPa, 1.6MPa, 2.5MPa and 4.0MPa.
- In the selection of pressure level, there should be a certain margin. For example, the working pressure

of the pipeline medium is 0.8MPa, then at least 1.6MPa electromagnetic flowmeter pressure level should be used.

② Installation type

- It needs to be compatible with the way the piping is installed for the measured flow rate. Flanged installation requires a flanged interface to the pipe in which the measured flow is to be installed.
- Electromagnetic flowmeter can be installed in stainless steel pipe, cast iron pipe, PE pipe and so on, different pipes need to choose different forms of installation of electromagnetic flowmeter, installation need to be reliable grounding, PE pipe and other non-metallic pipes need special attention.

③ Caliber

The caliber of the electromagnetic flowmeter should generally match the caliber of the measured flow pipe, while the choice of caliber should also match the measured medium flow rate, see the caliber selection table, as far as possible to make the measured medium of the common flow rate in the yellow font area of the table.

④ Caliber selection table

Caliber DN(mm)	Volume flow rate q_v (m^3/h)													
v(m/s)	0.57	0.7	0.9	1.1	1.4	1.7	2.3	2.8	3.4	4.5	5.7	6.8	9.1	
25	1.0	1.2	1.6	2.0	2.5	3.0	4.0	5.0	6.0	8.0	10	12	16	
32	1.6	2.0	2.5	3.0	4.0	5.0	6.0	8.0	10	12	16	20	25	
40	2.5	3.0	4.0	5.0	6.0	8.0	10	12	16	20	25	30	40	
50	4.0	5.0	6.0	8.0	10	12	16	20	25	30	40	50	60	
65	6.0	8.0	10	12	16	20	25	30	40	50	60	80	100	120
80	10	12	16	20	25	30	40	50	60	80	100	120	160	
100	16	20	25	30	40	50	60	80	100	120	160	200	250	
125	25	30	40	50	60	80	100	120	160	200	250	300	400	
150	40	50	60	80	100	120	160	200	250	300	400	500	600	
200	60	80	100	120	160	200	250	300	400	500	600	800	1000	
250	100	120	160	200	250	300	400	500	600	800	1000	1200		
300	160	200	250	300	400	500	600	800	1000	1200	1600	2000		
350	200	250	300	400	500	600	800	1000	1200	1600	2000	2500		
400	250	300	400	500	600	800	1000	1200	1600	2000	2500	3000		
450	300	400	500	600	800	1000	1200	1600	2000	2500	3000			

Notes.

1. The flow/rate data in the table are approximate values, the yellow area is the recommended flow/rate measured by the flow meter.

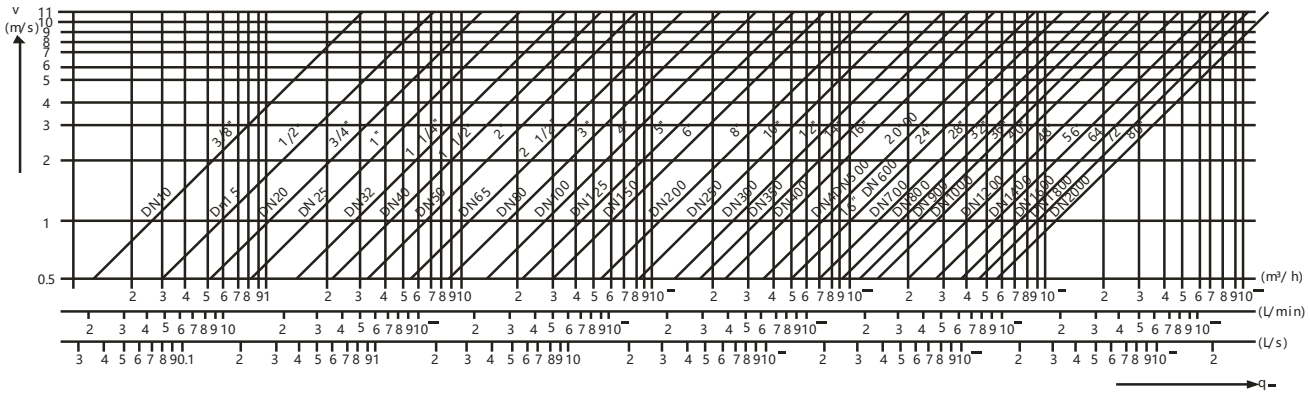
2. Other calibers can be customized.

Flow rate flow conversion formula. $v=354\times q/D^2$

In the formula: q -m^3/h,v-m/s,D(DN)-mm

Flow rate range: 0.3 ~ 10m/s

⑤ Curve of relationship between meter size, flow rate and flow rate



⑥When the size of the sensor is selected to be the same as the size of the connected process pipe

- Usually choose the flowmeter caliber and process pipe caliber, both to meet the engineering needs, and easy to install, no pressure loss, the proposed flow rate in the pipe 0.5 ~ 5m / s range.
- The new design of the project is designed to take into account both current operating conditions and future conditions when the equipment is operating at full capacity when choosing the flow rate. When the new equipment is operating, the flow rate is at a lower state, and when normal production occurs, the flow rate in the pipe is at a higher state.
- With the correct selection, the instrument can be adapted to different flow rates simply by changing the range setting.

Electrode Materials

- The electrode is used to get the electric signal of the flow rate and will be in direct contact with the measured medium, so when choosing the electrode material, the adaptability of the electrode material and the measured medium should be considered, i.e. the corrosion resistance, passivation, wear and other factors of the electrode material should be considered.
- A variety of electrode materials are available (including stainless steel 316L, Hastelloy B (HB), Hastelloy C (HC), Titanium (Ti), Tantalum (Ta), Platinum (Pt), etc.) to suit different measurement media.
- The choice of electrode material should be determined by the corrosiveness of the medium to be measured, the corrosion resistance of the electrode material is shown in the table of corrosion resistance and range of use of electrode material, more detailed information can be found in the anticorrosion manual.

Table of corrosion resistance and range of use of electrode materials (this table is for reference only, please consult the manufacturer for selection)

Material	Corrosion resistance
Stainless steel316L	Application : 1. domestic water, industrial water, raw water well water, urban sewage 2. Weakly corrosive acid, alkali and salt solutions
Hastelloy B(HB)	Application: 1. non-oxidizing acids, e.g. hydrochloric acid (concentration less than 10%), etc. 2. Alkali (partial), e.g. sodium hydroxide (less than 50% concentration), all concentrations of ammonium hydroxide base solution. 3. Acids (partial), e.g. phosphoric acid, organic acids Not applicable : Nitric acid
Hastelloy C(HC)	Application : 1. Mixed acid, e.g. chromic acid and sulphuric acid solutions. 2. Oxidizing salts, e.g. Fe^{3+}、Cu^{2+}、seawater Not applicable : Hydrochioric acid
Titanium(Ti)	Application : 1. Salt (partial), e.g. (1) Chloride (chloride/magnesium/aluminium/calcium/ammonium/iron etc.) (2) Sodium salt, potassium salt, ammonium salt, hypochlorite, seawater 2. Alkali (partial), e.g. less than 50% potassium hydroxide, ammonium hydroxide, barium hydroxide base solution Not applicable: Reducing acids such as hydrochloric acid, sulphuric acid, phosphoric acid, hydrofluoric acid, etc.
Tantalum(Ta)	Application: 1. Strong acids such as hydrochloric acid (less than 40% concentration), dilute sulfuric acid and concentrated sulfuric acid (excluding oleum). 2. Chlorine dioxide, ferric chloride, hypochlorous acid, sodium cyanide, lead acetate, etc. 3. Oxidizing acids, e.g. nitric acid (including fuming nitric acid), etc., in aqua regia at temperatures below 80°C Not applicable : alkali, hydrofluoric acid
Platinum(Pt)	Applicable : Almost all acid, alkali, salt solutions (including fuming sulfuric acid, fuming nitric acid) Not applicable : Aqua regia, ammonium salts

Lining Material

- Lining materials according to the corrosiveness of the medium under test, abrasion and temperature to choose, commonly used lining materials, see commonly used lining materials, performance table.
- Rubber has wear-resistant characteristics and is widely used to measure water, industrial water, waste water, sewage, mineral slurry, mud, fiber slurry and other media.
- Polytetrafluoroethylene (PTFE) lining has excellent resistance to strong acid and strong alkali corrosion, it also has reliable high temperature resistance, high temperature does not deform, does not reduce insulation resistance; it also has a non-stick, that is, does not phase with other substances, the surface is smooth. Therefore, the measurement of viscosity (such as syrup) or easy scarring medium (such as alumina), strong corrosive medium (such as sulfuric acid, nitric acid, hydrochloric acid, phosphoric acid, etc.), higher temperature medium or regular steam flushing pipeline occasions and health requirements of the food (such as wine, milk, malt juice) can be used PTFE liner.

Performance table for common lining materials

Lining material	Name	Symbol	Performance	Maximum working temperature	Operating diameter
Rubber	Neoprene	CR	① Oil resistant, solvent resistant, oxidation resistant, resistant to general acid salt and other media corrosion ② Excellent elasticity, abrasion resistance, but poor cold resistance	① 0 ℃ - +80 ℃ non-strong acid, strong alkali, strong oxidizing medium ② Can measure sewage, mud	DN6-DN2200
Fluorine plastic	PTFE	PTFE or F4	① Resistant to boiling hydrochloric acid, sulfuric acid, nitric acid and aqua regia, as well as concentrated alkalis and various organic solvents ② Poor resistance to wear and tear ③ Poor resistance to negative pressure	① -25℃ - +1 0℃ ② Strongly corrosive media such as concentrated acids and alkalis ③ Sanitary medium	DN10-DN600
	Perfluorethyl-eenhexafluor-propyleen copolymeer	FEP or F46	① Hydrophobic and non-sticky Corrosion resistance second only to PTFE ② Metal mesh can be added when high negative ③ pressure resistance is required to improve negative pressure resistance. ④ Slightly worse wear resistance	① -25℃ - +120℃ non-abrasive media ② Sanitary medium	DN6-DN200
	Teflon	PFA	Performance similar to PTFE	① -10℃- +180℃ non-abrasive media ② Sanltary medium	Customization required

Maximum operating temperature

- The maximum operating temperature is determined by the temperature of the medium to be measured, the condition of the flow field (flow rate, etc.) and, in some cases, the influence of the ambient temperature.
- The temperature of the medium in a pipeline flow is usually higher than the temperature at rest. If the temperature of the medium to be measured at rest is close to the upper range of one of the ranges in the selection (e.g. 80°C in the maximum use temperature A1 range), the higher maximum use temperature option is selected. For example, if the temperature of the medium to be measured at rest is 70℃, it is recommended that the user select the maximum use temperature option A2 ⩽ 120℃.
- In order to obtain an accurate temperature of the medium to be measured, it is recommended that the user install a temperature measuring instrument inside the medium to be measured.

Flow Meter Structure

① Integrated type

Under good field conditions, a monobloc type is generally used, i.e. the sensor and the converter form a single unit.

- The sensor and smart converter are assembled together for an economical price and installation cost and an intuitive display.
- If installed in an inaccessible location, maintenance will be difficult.
- Protects the electronics of the smart converter from the temperature of the fluid in the piping.
- Direct installation outdoors or in harsh operating environments should be avoided.
- The default protection rating for the all-in-one model is IP65.

② Split type

Separate models are used when.

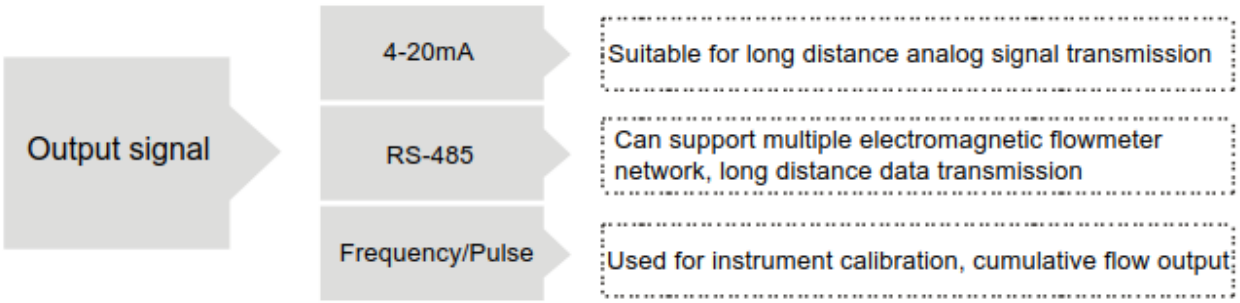
- Where the ambient or converter surface temperature is greater than 55°C.
- Occasions where the pipe vibrations are high.
- Where the aluminum housing of the converter is subject to severe corrosion.
- Where humidity is high or corrosive gases are present.
- The flow meter is installed at high altitude or underground where commissioning is not convenient.
- The default protection class for the split type is IP68. IP65 protection class for the split type is available when not submerged in water or other special conditions and should be specified when ordering.

Description

- The sensor of the split electromagnetic flowmeter is installed in the process piping or permanently buried in a waterlogged area (type IP68), while the smart converter is installed in the instrument room or near the sensor.
- When using the split type electromagnetic flowmeter, the intelligent converter can be far away from the scene of the harsh environment, it is convenient for the users to check, adjust and set the working status of the instrument.
- Consideration should be given to the effect of cable transmission distance and installation, which is generally not more than 30m.
- The connection cable between the sensor and the converter, field installation requires that the cable be protected by a wire duct.

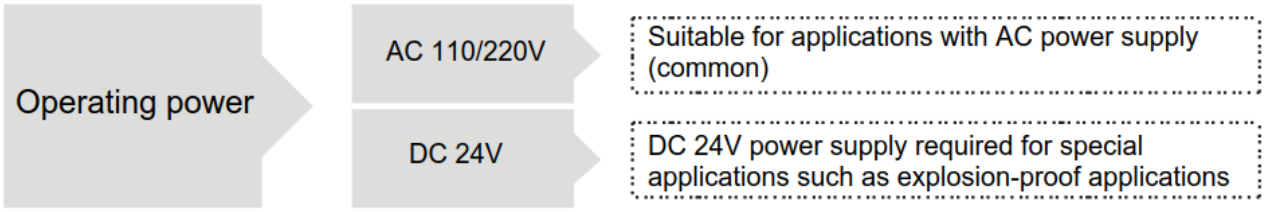
Output signal

The output signal of LD series electromagnetic flowmeter has three types: 4-20mA, RS-485 and frequency/pulse. Users need to select the output signal according to the actual situation and supporting equipment.



Operating power

The operating power of LD series electromagnetic flowmeter has two kinds: AC110/220V(100-240V) and DC24V.

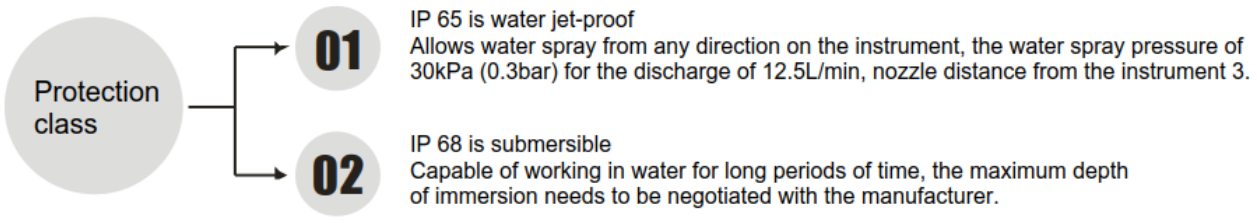


Grounding ring option

- The grounding ring is used to ground the measured medium to improve the stability of electromagnetic flowmeter measurement. However, the grounding ring needs to be in contact with the measured medium, there is the possibility of corrosion and wear, usually after a period of use, need to be replaced.
- LD series electromagnetic flowmeter generally uses grounding electrode instead of grounding ring, which can achieve a better grounding effect and increase the convenience and reliability of use.
- Some small diameter electromagnetic flowmeter only 2 electrodes, the user can configure double grounding ring according to field needs.
- When installing the grounding ring, the grounding ring needs to be installed in the exact pipe location so as not to affect the flow field of the medium being measured.

Protection Class

According to the national standard GB 4208-48 or IEC standard (IEC 529-76) for enclosure protection class.



IP68 should be used if the instrument is below ground level and subject to frequent flooding; IP65 should be used if the instrument is installed above ground level in a non-exposed environment.

Notes for Use of Electromagnetic Flowmeter.

- See "Electromagnetic Flowmeter with Reducer Pipe Technical Description" or "Electromagnetic Flowmeter Instruction Manual" for additional reducer pipe.
- The installation and use of electromagnetic flowmeter has corresponding technical requirements, please refer to "Electromagnetic flowmeter installation and use instructions" or "Electromagnetic flowmeter operating instructions".
- For the wiring of electromagnetic flowmeter, please refer to "electromagnetic flowmeter wiring instructions" or "electromagnetic flowmeter operating instructions".
- Consult your supplier for other matters.

Ordering Information

The selection of an electromagnetic flowmeter should clarify the following issues.
(1) The measured medium must be conductive fluid, for gas, oil, organic solvents and other non-conductive medium can not be measured.
(2) When ordering, you should provide the factory with the measurement range of the electromagnetic flowmeter when you choose the model specifications, and the factory will calibrate the measurement range to ensure the accuracy of the instrument measurement.
(3) The user should provide the measured medium, process parameters, flow rate, operating temperature, pressure and other parameters in the selection table to the manufacturer, according to these parameters, choose a suitable flowmeter.
(4) When choosing the split type electromagnetic flowmeter, the user should provide the wiring length requirement to the factory according to the distance from the converter installation position to the sensor.
(5) If users need to install accessories, such as matching flanges, metal ring gasket, bolts, nuts, washers and other additional requirements, can be proposed at the time of ordering.