Electromagnetic flow meter

Sup-LDG series Datasheet



Supmea®

Datasheet

Electromagnetic flow meter for flow measurement LDG-DNXX flow meter

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 (> 5μS/cm). Non-conductive fluids, such as oil and other petroleum-based fluids, cannot be measured with mag meter technology.

Application

- Sewage treatment
- Printing and dyeing
- Chemical industry
- Environmental protection
- Metallurgy
- Pharmaceutical
- Paper making
- Tap water supply



Electromagnetic flowmeter

Features

- 0.5%F.S measuring accuracy
- RS-485 modbus 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.
- The grounding screws are available by default

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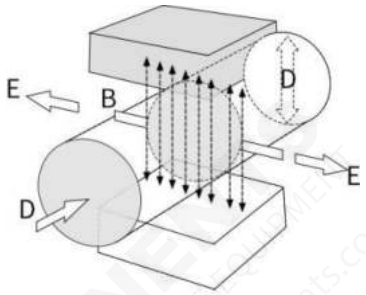
Principle

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

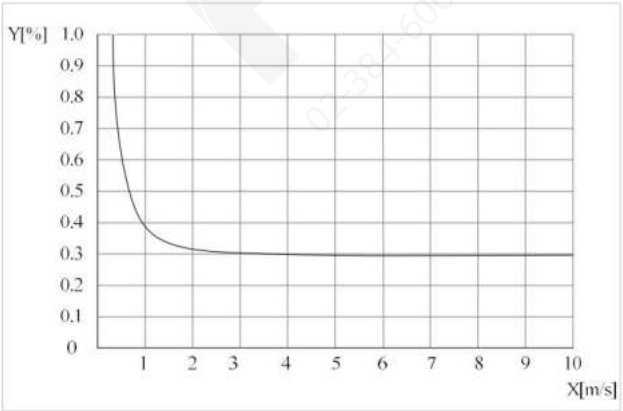


The induced voltage signal is detected by two electrodes and transmitted to the converter via a cable. After a series of analog and digital signal processing, the accumulated flow and instant flow are displayed on the display of the converter.

Accuracy

Reference condition

(1) Medium: water;
(2) Measuring medium temperature: 20℃;
(3) Ambient temperature: 20℃;
(4) Pressure: 0.1MPa;
(5) Recommended installation conditions: straight section >10 DN before the inlet, straight section >5 DN after the outlet



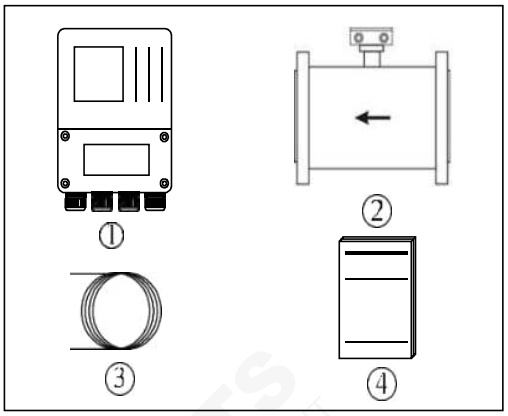
① X[m/s]: Flow rate
② Y[%]: Actual measured value deviation

Parameter

Type

Remote type

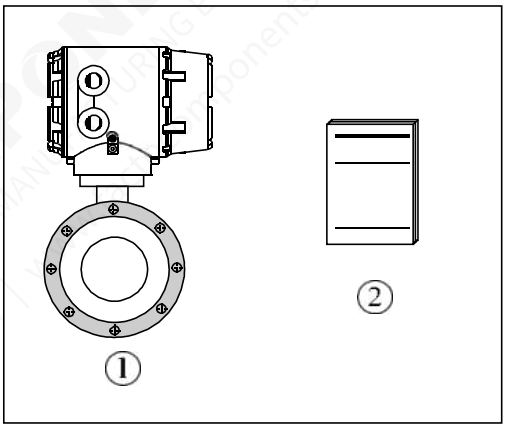
① Remote type flowmeter signal converter
② Remote type electromagnetic flowmeter sensor
③ Signal cable
④ User manual



Compact type

Compact type

① Compact type electromagnetic flowmeter
② User manual



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Parameter

Power supply		
Power supply	85-245 VAC，50/60 Hz, 22-26 VDC	
Power consumption	Max 15W	
Insulation resistance	⩾20MΩ	
Signal cable	Apply only for remote type	
Output		
Current output		
Function	Measurement of volume or mass flow (if the density is constant)	
Setting	Scope	4-20 mA
	Max	20 mA
	Min	4 mA
Internal voltage	24 VDC	
Load	≤750Ω	
Pulse and frequency output		
Function	Set up pulse and frequency output	
Pulse output	Basis	Output pulse width: 10-200 ms Duty cycle: 50% (Pulse frequency ⩾5Hz) Fmax ⩽ 5000 cp/s
	Settings	0.001L ~ 1 m^3
Frequency	Max	Fmax ≤ 5000Hz
	Setting	0-5000Hz
Passive	$U_{External}$ ⩽ 36VDC	
Active	$U_{internal}$ ⩽ 24VDC I ⩽ 4.52mA	
Status switch output		
Function	Can be used as alarm status output	
Passive	U_{Outer} ⩽ 36VDC	
Active	Active output voltage U internal ⩽ 24VDC Active output current I ⩽ 4.52mA	
Communications		
Serial communications	RS-485, HART	
Output	Current (4-20 mA), pulse, frequency, state switch	
Function	Empty pipe recognition, electrode contamination	
Measurement Accuracy		
Max measuring error	Measuring accuracy ±0.5% F.S.（Flow speed > 1m/s） Measuring accuracy ±0.5% F.S.±2mm/s（Flow speed <1m/s）	
Repetitiveness	0.16%	

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Operating Environment	
Environment temperature	-10 - 55℃ for Compact Type Flowmeter -10 - 60℃ for Sensor of Remote Type Flowmeter -10 - 55℃ for Converter of Remote Type Flowmeter
Storage temperature	-40 - 65℃
Electric Conductivity	
Water	Min. 20 μS/cm (The best measurement results can be achieved, when electric conductivity is greater than 30 μS/cm)
Other medium	Min. 5 μS/cm (The best measurement results can be achieved, when electric conductivity is greater than 30 μS/cm)
Materials	
Sensor housing	Carbon steel, stainless steel 304, stainless steel 316L
Converter	Standard painted die cast aluminum
Cable gland material	M20*1,5. Polyamide.
Cable material	Polyurethane
Display User Interface	
Graphic display	Monochrome LCD, white backlight; Size: 128*64 pixels
Display function	2 measurement value pictures (measurements, condition, etc)
Language	Chinese/ English/Spanish
Unit	Units can be selected via the configuration menu
Menu navigation	4 mechanical buttons (Compact Type) or 4 touch buttons (Remote Type)
Measuring System	
Measuring principle	Faraday's law of electromagnetic induction
Function	Instant flow rate, flow velocity, mass flow rate (if the density is constant), flow totalizer function.
Module configuration	Measurement system consists of signal converter and measuring sensor
Converter	
Compact Type	IP65
Remote Type	IP65 for transmitter (IP65/IP68 for sensor)
Measurement sensor	
Nominal Diameter	DN15-DN1200
Flange	In line with GB/T9119-2000, JB/81-2015 standards carbon steel (Optional stainless steel flanges), other standard flange can be customized (according to DIN:EN 1092-1, ASME: ANSI150 etc.)
Pressure rating	DN15 - DN250, PN ≤1.6MPa DN300 - DN1000, PN ≤1.0MPa DN1200, PN ≤0.6MPa Higher pressure can be customized
Lining Material	Neoprene (CR), Polyurethane (PU), PTFE (F4), PFEP (F46), PFA

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Electrode Material	316L Stainless Steel, Hastelloy C, Hastelloy B, Ti, Ta, Pt	
Parameter	**Remote type**	**Compact type**
Ingress protection	IP65 for converter, IP68 for sensor	IP65
Medium temperature	Neoprene: -10…+60℃ Polyurethane: -10…+60℃ PTFE/FEP: -10…+120℃ PFA: -10…+180℃	Neoprene: -10…+60℃ Polyurethane: -10…+60℃ PTFE/FEP: -10…+120℃ PFA: -10…+120℃
Buried depth	Not deeper than 5 meters (only for remote type sensors with IP68 protection)	
Immersion depth	Not deeper than 3 meters (only for remote type sensors with IP68 protection)	
Sensor cable	Suitable only for remote type instruments. The standard cable length is 10 m; flowmeters can be equipped with a cable of optional length up to 100 m.	

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Parameter

Electrode selection	
Material	Corrosion Resistance
Molybdenum-containing stainless steel (0Cr18N12Mo2Ti)	Applicable: domestic water, industrial water, sewage, weak acid-base salt solutions, normal temperature concentrated nitric acid Not applicable: hydrofluoric acid, hydrochloric acid, chlorine, bromine, iodine and other media.
Hastelloy B	Applicable: non-oxidizing acids, such as hydrochloric acid and hydrofluoric acid of certain concentration, alkaline solutions with a concentration of no less than 70% sodium hydroxide. Not applicable: nitric acid and other oxidizing acids.
Hastelloy C	Applicable: oxidizing acids, such as nitric acid, mixed acid, or sulfuric acid mixed corrosive media, corrosive environments with oxidizing salts or other oxidizing agents such as hypochlorite solution above room temperature, seawater. Not applicable: reducing acids such as hydrochloric acid and chlorides.
Ti	Applicable: chloride, hypochlorite, seawater, oxidizing acid. Not applicable: reducing acids such as hydrochloric acid, sulfuric acid, etc.
Ta	Applicable: most acids, such as concentrated hydrochloric acid, nitric acid and sulfuric acid, including hydrochloric acid with boiling point, nitric acid and sulfuric acid below 175℃. Not applicable: alkalis, hydrofluoric acid, sulfur trioxide.
Pt	Applicable: various acids (excluding aqua regia), alkalis and salts.

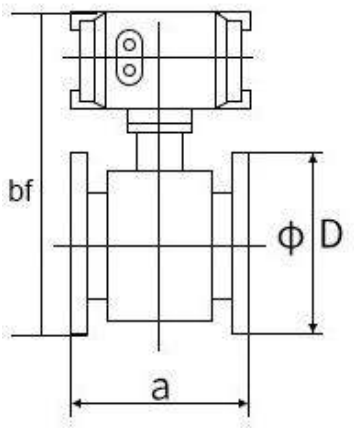
Notes: Due to the wide variety of media, and its corrosiveness is affected by temperature, concentration, flow rate and other complex factors and changes, so this table is only for reference, the user should make their own choice according to the actual situation. For general media, you can consult the relevant anti-corrosion manual. For mixed acid and other components of complex media, the proposed material should be done to choose the corrosion test

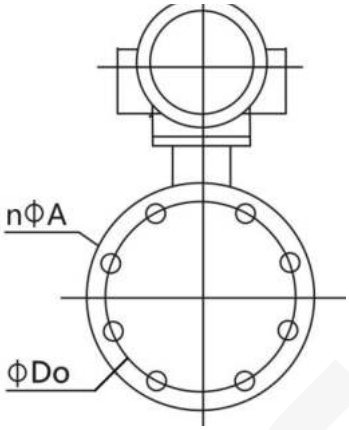
Lining Selection					
Lining material	**Symbol**	**Properties**	**Max. operating temperature**	**Applicable medium**	**Nominal diameter**
Neoprene	CR	Average abrasiveness, good for acids, alkalis, and salts solutions.	<60℃	Domestic water, sea water, industrial water	≥DN50
Polyurethane	PU	Has very good antiabrasive quality; not good for acids, alkali solutions	<60℃	Slurry such as mine slurry, pulp and paper	≤DN600

PTFE	F4	Stable chemical property, proof against the corrosion of boiling hydrochloric acid, sulphuric acid, nitric acid and aqua regia, concentrated alkalis	<120℃	Strong corrosive acids, alkali solution	DN15-1200
FEP	F46	Same chemical properties as F4, but with better tensile strength and pressure resistance.	<120℃	Corrosive acids, alkali, and salts solutions	DN15-1200
PFA	PFA	Same chemical properties as F46, but with better tensile strength and pressure resistance.	<120℃ (Compact） <180℃ (Remote)	Corrosive acids, alkali, and salts solutions	≤DN500

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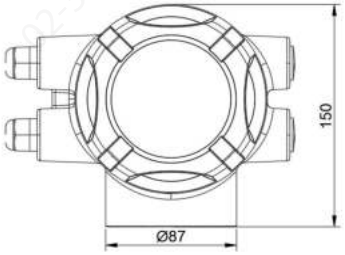
Dimension and Pressure

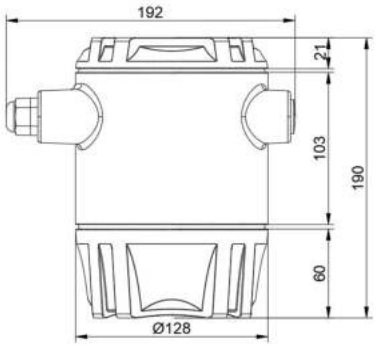




DN	a	bf	D	Do	n*A	Pressure resistance
15	200	326	95	65	4*14	1.6 MPa
20	200	326	105	75	4*14	
25	200	316	115	85	4*14	
32	200	331	135	100	4*18	
40	200	339	145	110	4*18	
50	200	358	160	125	4*18	
65	200	370	180	145	4*18	
80	200	389	195	160	8*18	
100	250	410	215	180	8*18	
125	250	440	245	210	8*18	
150	300	469	280	240	8*23	
200	350	522	335	295	12*23	
250	450	824	405	355	12*25	
300	500	624	440	400	12*23	1 MPa
350	550	1029	500	460	16*23	
400	600	737	565	515	16*25	
450	600	786	615	565	20*25	
500	600	839	670	620	20*25	
600	600	944	780	725	20*30	
700	700	1052	895	840	24*30	
800	800	1164	1015	950	24*33	
900	900	1264	1115	1050	28*33	
1000	1000	1374	1230	1160	28*36	
1200	1200	1589	1405	1340	32*33	0.6 MPa

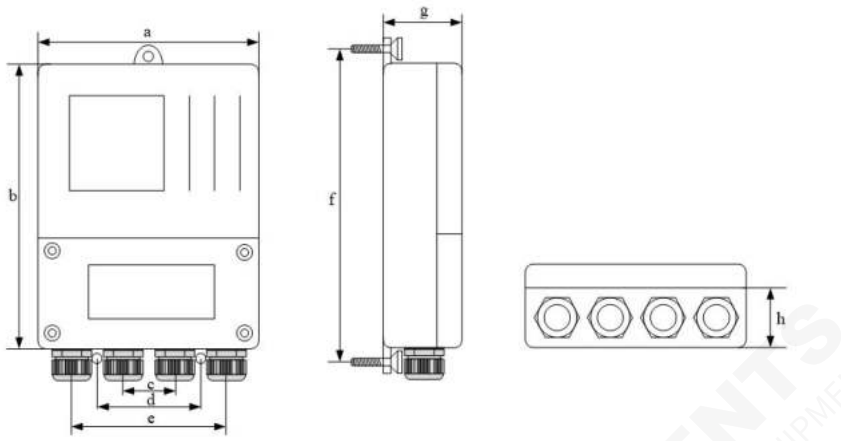
Compact Type





Unit:mm

Remote Type



Unit:mm

Dimension[mm]								Weight[kg]
a	b	c	d	e	f	g	h	
164	214.5	34	70	102	233.5	69.7	45.7	0.6

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Flow Range

Nominal Diameter (mm)	Flow range (m^3/h)		
	The optional lower range value can be selected from the following array	Standard	The optional upper range value can be selected from the following array
15	0.0636-0.6	0.8-3.0	4.0-7.632
20	0.131-1.0	1.2-5.0	6.0-13.6
25	0.176-1.6	2.0-8.0	10-21
32	0.2895-2.5	3.0-12	16-35
40	0.4524-4.0	5.0-20	25-45
50	0.707-6.0	8.0-40	50-85
65	1.195-10	12-60	80-143
80	1.81-16	20-120	160-217
100	2.83-25	30-160	200-339
125	4.42-40	50-250	300-530
150	6.36-60	80-400	500-763
200	11.3-100	120-600	800-1357
250	17.7-160	200-800	1000-2120
300	25.45-250	300-1200	1600-3054
350	34.6-300	400-1600	2000-4157
400	45.2-400	500-2000	2500-5429
450	57.3-500	600-2500	3000-6871
500	70.7-600	800-3000	4000-8482
600	102-800	1000-4000	5000-12216
700	139-1200	1600-5000	6000-16620
800	181-1600	2000-6000	8000-21720
900	229-1600	2000-8000	10000-27480
1000	283-2000	2500-10000	12000-33924
1200	407-2500	3000-12000	16000-48833

Reduction formula: (Flow)Q = (flow velocity) V× π ×(DN/2)², Units: m/s and m^3/h

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Flow and Velocity

Velocity (m/s) / Flow (m³/h) / DN(mm)	0.5	5
DN15	0.32	3.2
DN20	0.56	5.6
DN25	0.88	8.8
DN32	1.4	14
DN40	2.3	23
DN50	3.5	35
DN65	6	60
DN80	9	90
DN100	14	140
DN125	22	220
DN150	32	320
DN200	56	560
DN250	88	880
DN300	127	1270
DN350	173	1730
DN400	226	2260
DN450	286	2860
DN500	353	3530
DN600	509	5090
DN700	693	6930
DN800	905	9050
DN900	1150	11500
DN1000	1410	14100
DN1200	2040	20400

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Parameter

★ Process connection

Note : Flanges can be customized, and the pressure need to be considerate



Clamp on (Stainless steel)



Flange (Stainless steel)

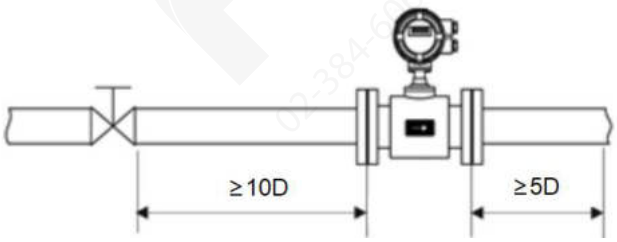


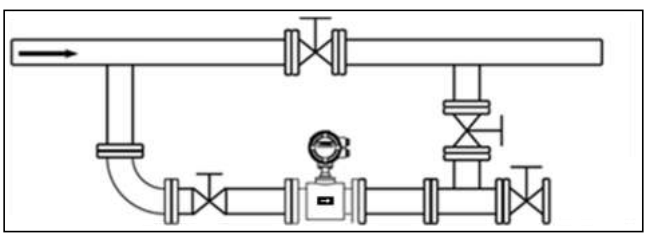
Flange (Carbon steel)

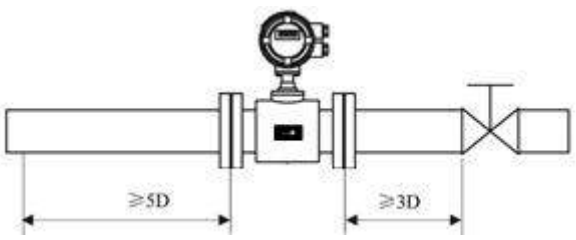
DN15 - DN250, PN ≤1.6MPa
DN300 - DN1000, PN ≤1MPa
DN1200, PN ≤0.6MPa

★ Location

Do not install the electromagnetic flowmeter on a free-vibrating pipe without any support. Instead, a mounting base shall be used to secure the measuring tube. When the electromagnetic flowmeter is required to be installed underground, the pipes at both inlet and outlet ends shall be provided with support items, and a metal protection plate shall be installed above the flowmeter.



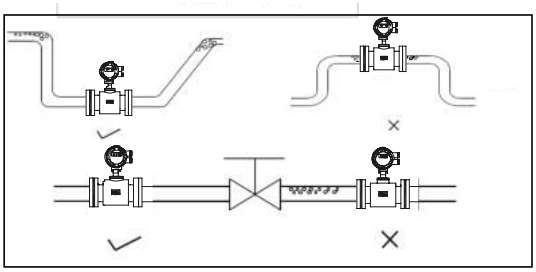




(1) No bubbles shall be observed in the pipes.

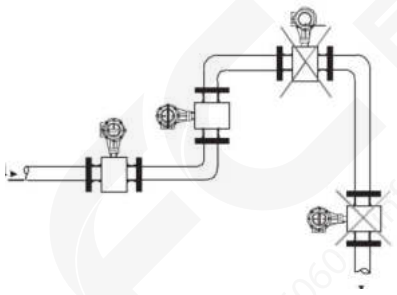
Pipes shall be designed to prevent the air bubbles in the fluids from accumulating the measurement pipe of a sensor. If a valve exists near the flowmeter, try to mount the flowmeter on the valve's upstream side for preventing a decrease of pressure inside the pipe possibly, consequently avoiding the possibility of air bubbles.

ensure that no gas can be separated from the liquid.



(2) Flow direction

The flowmeter can be set to automatically detect the positive and negative flow direction. The flow direction arrow on the sensor casing indicates the positive flow direction specified by the manufacturer. Generally, when installing the meter, the user shall make the flow arrow consistent with the on-site process flow.

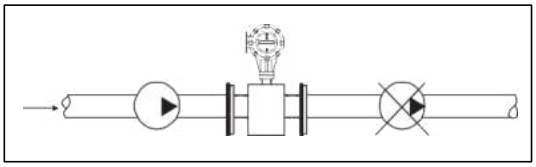


The pipe is routed to the highest point

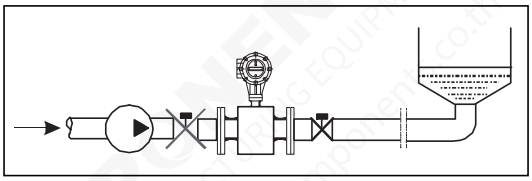
(Bubble accumulation in the measuring tube is likely to cause produce measurement errors!)

Make sure the pipeline is always full.

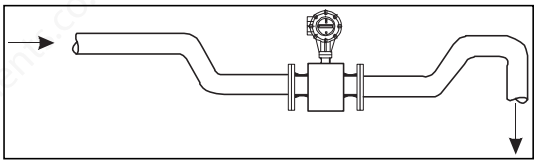
(3) The electromagnetic flowmeter cannot be installed on the suction side of the pump



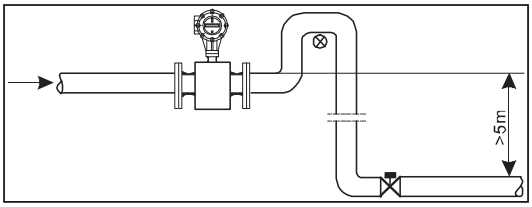
(4) For long pipelines, control valves are generally installed on the downstream of the electromagnetic flowmeter.



(5) For pipes with open discharges, the electromagnetic flowmeter shall be installed at the bottom section (lower part of the pipe).



(6) For places where fall head of pipes is over 5 m, the air valve shall be installed on the downstream of the electromagnetic flowmeter



(7) Measurement error caused by incidental gas and damage of lining caused by vacuum shall be avoided

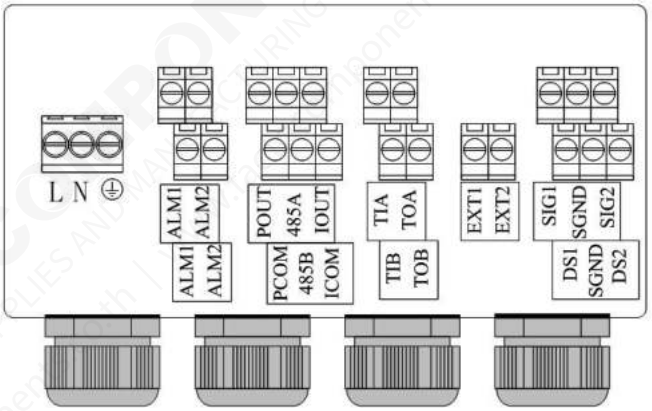
(8) Grounding

As the voltage of induced signal of electromagnetic flowmeter is small, it's more prone to be affected by noises or other electromagnetic signals. This is why the electromagnetic flowmeter needs to be grounded in many occasions. This functions to form an internal space for shielding external interference through the grounding of flowmeter casing, thereby improving measurement accuracy.

Wiring

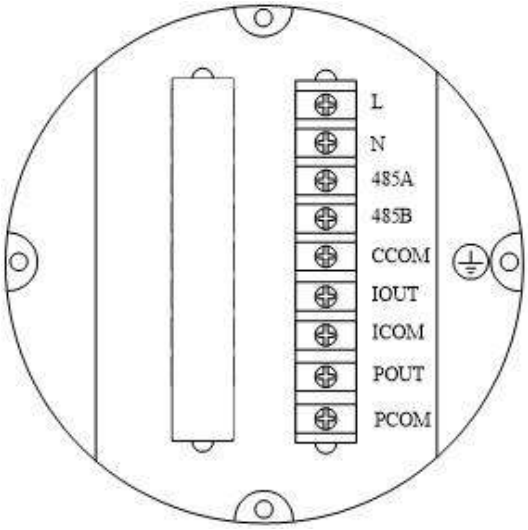
Remote

L, N:	100-240VAC power supply 24VDC power supply
ALM1，ALM2	Relay out
POUT，PCOM	Pulse/Frequency output
485A，485B:	RS-485 communication
IOUT，ICOM:	4-20mA output
EXT1，EXT2	Excitation signal
SIG1，SIG2，SGND	Electrode signal
DS1，DS2	Electrode shield



Compact type

L, N:	100-240VAC power supply 24VDC power supply
485A，485B:	RS-485 communication
IOUT，ICOM:	4-20mA output connection
POUT，PCOM:	Pulse/Frequency
CCOM:	RS-485 communication ground
	Protective earth



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Ordering code

LDG-M1-DNxx-Jx-O1-PWM1-D1-I1-V1-P1-E1-L1-G1-B1-IP1																Description
LDG	-		-	-	-	-	-	-	-	-	-	-	-	-		
Type		M1														Compact type
		M2														Remote type
Pipe size			DNXX													DN15 - DN1200
Accuracy				J5												0.50%
Transmit output					O1											4-20mA output
Frequency output						PWM1										Frequency (pulse) output
Communication							D1									RS-232
							D2									RS-485
							D3									HART
Installation								I1								Thread
								I2								Flange
								I3								Wafer connection
								I4								Clamp
Power supply									V1							24VDC
									V2							220VAC
Pressure rating										P1						0.6MPa
										P2						1.0MPa
										P3						1.6MPa
										P4						2.5MPa
										P5						4.0MPa
										P6						6.3MPa
										PZ						Others
Electrode material											E1					Stainless steel 316L
											E2					Titanium
											E3					Tantalum
											E4					Hastelloy B
											E5					Hastelloy C
											E6					Platinum
											E7					Tungsten carbide
											E8					Others
Lining material												L1				Neoprene(CR)
												L2				Polyurethane(PU)
												L3				F4/PTFE
												L4				F46/FEP
												L5				PFA
												LZ				Others
Grounding													G1			Grounding electrode

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G2			Grounding ring
Body material	B0		Carbon steel
	B1		Stainless steel 304
	B2		Stainless steel 316
Ingress protection		IP1	IP65
		IP3	IP68 (remote type only)

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