Datasheet

electromagnetic flow meter

SUP-LDG

Supmea®

Committed to process automation solutions

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Datasheet

Electromagnetic flow meter for flow measurement
SUP-LDG-DNXX flow meter

Supmea's 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
- medicine
- papermaking
- Tap water supply

Electromagnetic flow meter

Features

PROS

- 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.

CONS

- Cannot detect gases and liquids without electrical conductivity.

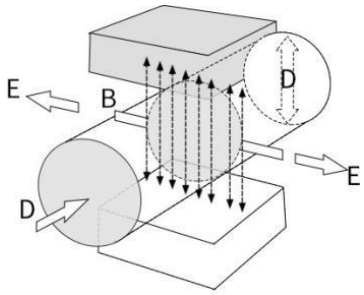
Principle

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

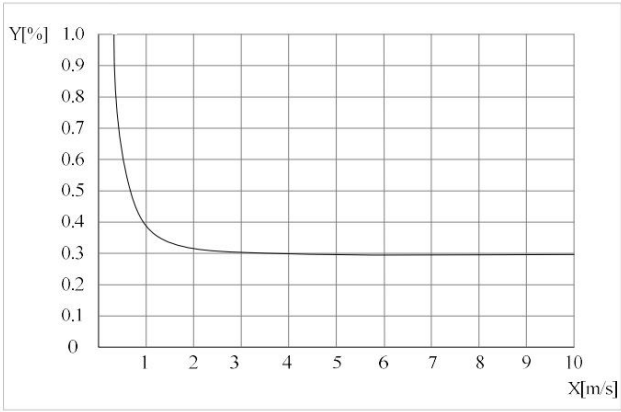


The induced voltage signal is detected by two electrodes and transmitted to the converter via a cable. After a series of analog and digital signal processing, the accumulated flow and real-time flow are displayed on the display of the converter.

Accuracy

Reference condition

(1) Medium: water
(2) Temperature: 20℃
(3) Pressure: 0.1MPa
(4) Front straight conduit:
≥5DN, Rear straight conduit: ≥2DN



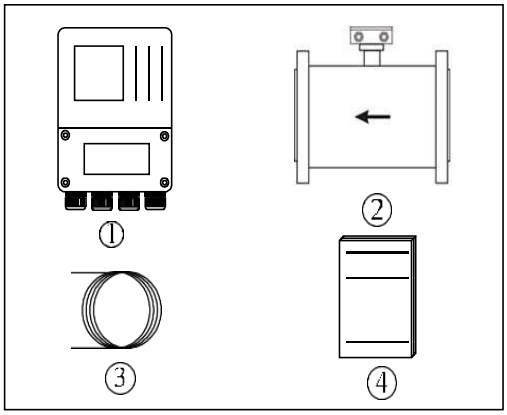
① X[m/s]: Flow rate
② Y[%]: Actual measured value deviation（mV）

Parament

Type

Remote type

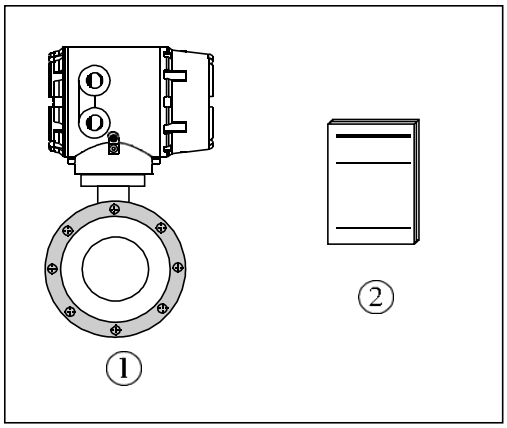
① Remote type flowmeter signal converter
② Remote type electromagnetic flowmeter sensor
③ Signal cable
④ User manual



Compact type

Compact type

① Compact type electromagnetic flowmeter
② User manual



Parameter

Power supply		
Power supply	100-240VAC，50/60Hz, 22VDC—26VDC	
Power consumption	Max 15VA	
Signal cable	Apply only to remote type	
Shielded cable	Signal section，wire: 0.5mm2 Cu /AWG20	

Output		
Current output		
function	Measurement of volume and quality (in the case of constant density)	
Setting	scope	4-20mA
	Max	20mA
	Min	4mA
Internal voltage	24VDC	
loading	≤750Ω	
Pulse and frequency output		
function	Set up Pulse and frequency output	
Pulse output	basis	Output pulse width: 0.25ms ~100ms Duty cycle: 50% (Pulse frequency ≥5Hz) Fmax ≤ 5000 cp/s
	setting	0.001L – 1m3
frequency	Max	Fmax ≤ 5000Hz
	setting	0-5000Hz
passive	UOuter ≤ 36VDC	
Status output		
function	Output as alarm	
passive	U_{Outer}≤ 36VDC	

Communications	
Serial communications	RS-485
Output	Current (4-20 mA) , pulse , frequency , state switch
Function	ATC recognition, electrode contamination

Measurement Accuracy	
Max measuring error	Measurement value ±0.5%（Flow speed > 1m/s）； Measurement value ±0.5% ±2mm/s（Flow speed <1m/s）
Repetitiveness	0.15%
Temperature sensor measuring range	-20℃~120℃
Maximum measurement error	±0.1℃(Within the measuring range of temperature sensor)

Operating Environment	
Temperature	
Environment	-10℃ - 55℃ for Compact-Type Flowmeter -10℃ - 60℃ for Converter of Remote-Type Flowmeter -10℃ – 55℃ for Converter of Remote-Type Flowmeter
Storage	-40℃ - 65℃

Electric Conductivity	
Water	Min. 20μS/cm (Actual electric conductivity should be greater than 50μS/cm)
Other	Min. 5μS/cm (Actual electric conductivity should be greater than 50μS/cm)

Material	
Sensor housing	Carbon steel
Converter	Standard die cast aluminum

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
Unit	You can configure the menu to select the unit Refer to "6.5 Configuration details" --- "flow units 1-1"
Operating unit	4 Mechanical keys (Compact Type) or 4 touch key (Remote Type)

Measuring System	
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
Module configuration	Measurement system is made up of signal converter and measurement sensor

Converter	
Compact Type	IP65
Remote Type	IP65(IP68 optional)

Measurement sensor		
Nominal Diameter	DN15-DN1000	
Flange	In line with GB/T9119-2000 standard carbon steel (Optional stainless steel flanges), other standard flange can be customized	
Pressure rating (High pressure can be customized)	DN6 - DN80, PN<4.0MPa DN100 - DN150, PN<1.6MPa DN200 – DN1000, PN<1.0MPa DN1200 – DN2000, PN<0.6MPa	
Lining Material	Chloroprene rubber (CR), Polytetrafluoroethylene (PTFE/F4), Fluorinated ethylene propylene (FEP/F46), Teflon(PFA)	
Electrode Material	316L Stainless Steel, Hastelloy C, Hastelloy B, Ti, Ta, Pt	
	IP68	IP65
Medium temperature	-25 – 180℃	-10 – 80℃
Buried depth	Less than 5 meters (only IP68 protection of remote type sensor)	
Immersion depth	Less than 3 meters (only IP68 protection of remote type sensor)	
Sensor cable	Only for remote type, the standard 10m cable; other cables suggest custom no longer than	

Parameter

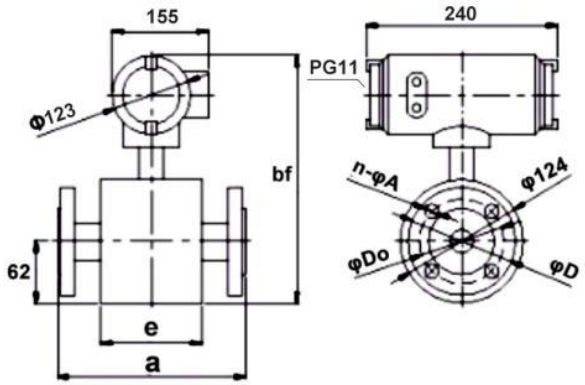
Electrode selection

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 ℃. Not applicable: alkali, hydrofluoric acid and smoke sulfuric acid.
Pt	Various acids, bases and salts, excluding aqua regia.

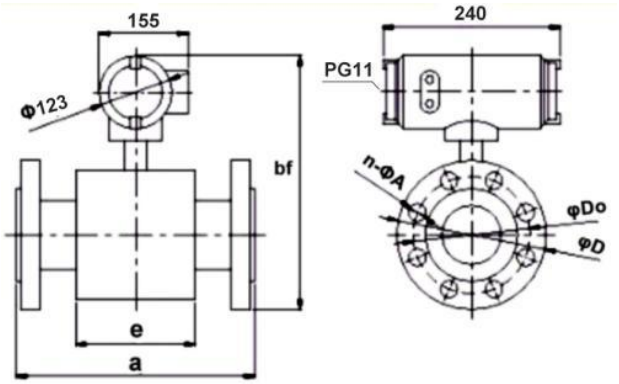
Lining Selection

Lining material	Symbol	Properties	Max .operating temperature	Applicable medium	Nominal diameter
Neoprene	CR	Average abrasiveness, good for acidic, alkali, and salts solutions.	<60℃	Water, sea water,industrial water	⩾DN50
Polyurethane	PU	With very good antiabrasiveness; No good for acid, alkali solutions	<60℃	Slury like mine slury, paper slurry	DN25~500
Teflon	PTFE	Stable chemical property, proof against the corrosion of boiling hydrochloric acid, sulphuric acid, nitric acid and aqua regia, concentrated alkali	<100℃	Strong corrosive acid, alkali solution	⩾DN10
FEP(F46)	FEP(F46)	Same chemical properties as F4, but with better tensile strength and pressure resistance.	<120℃	Corrosive acidic,alkali, and salts solutions	DN10~200
PFA	PFA	Same chemical properties asF46, but with better tensile strength and pressure resistance.	<120℃ (Compact）<180℃ (Remote)	Corrosive acidic,alkali, and salts solutions	DN10~300

Dimensions and Pressure



DN6-25



DN32-2200

DN	flowmeter(mm)			Flange (mm)			Pressure
	a	bf	e	D	Do	n*A	(Mpa)
6	102	252	62	76	58	4-φ7	4
10	150	322	82	90	60	4-φ14	
15	150	322	82	95	65	4-φ14	
20	150	322	78	105	75	4-φ14	
25	150	312	78	115	85	4-φ14	
32	150	327	74	135	100	4-φ18	
40	150	335	74	145	110	4-φ18	
50	200	354	86	160	125	4-φ18	
65	200	366	92	180	145	8-φ18	
80	200	385	92	195	160	8.φ18	
100	250	406	114	215	180	8-φ18	1.6
125	250	436	114	245	210	8-φ18	
150	300	465	136	280	240	8-φ23	
200	350	518	156	335	295	8-φ23	1
250	400	570	202	390	350	12-φ23	
300	500	620	230	440	400	12-φ23	
350	500	675	278	500	460	16-φ23	
400	600	733	320	565	515	16-φ25	
450	600	782	374	615	565	20-φ25	
500	600	835	388	670	620	20-φ25	
600	600	940	408	780	725	20-φ30	
700	700	1048	520	895	840	24-φ30	
800	800	1160	580	1010	950	24-φ34	
900	900	1260	660	1110	1050	28-φ34	
1000	1000	1370	720	1220	1160	28-φ34	
1200	1200	1585	1130	1405	1340	32-φ34	0.6
1400	1400	1810	1260	1630	1560	36-φ36	
1600	1600	2040	1450	1830	1760	40-φ36	
1800	1800	2250	1640	2045	1970	44-φ39	
2000	2000	2460	1820	2265	2180	48-φ42	

Flow Range

Nominal Diameter (mm)	Flow range (m^3/h)		
10	0.02827-0.25	0.3-1.6	2.0-3.3924
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
1400	554-3000	4000-16000	20000-66468
1600	723-4000	5000-20000	27000-86815

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

Flow and Velocity

DN (mm) / Flow (m/s) / Flow (m³/h)	0.5	5
DN10	0.14	1.4
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
DN1400	2770	27700
DN1600	3620	36200

Parameter

★ Process connection

Clamp on (Stainless steel)

Flange (Stainless steel)

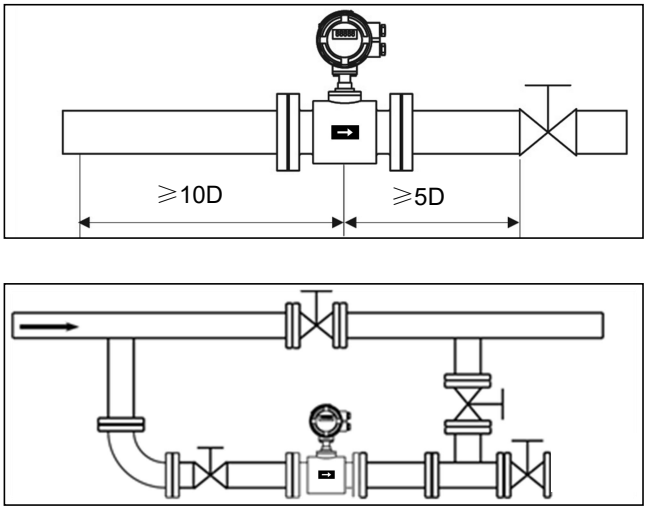
Flange (Carbon steel)

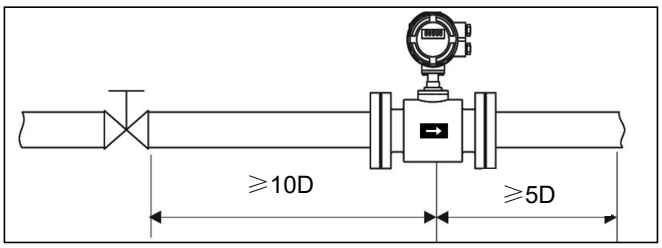
Note : Flange can be customized,and the pressure need to be considerate

DN6 - DN80, PN<4.0MPa
DN100 - DN150, PN<1.6MPa
DN200 – DN1000, PN<1.0MPa
DN1200 – DN2000, 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.

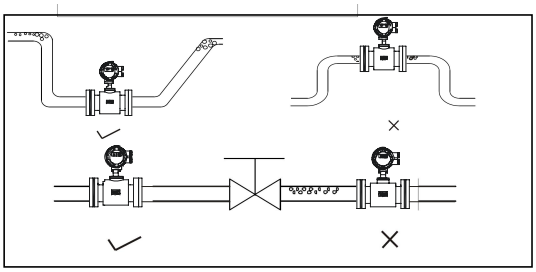




(1) No bubbles shall be observed in the pipes.

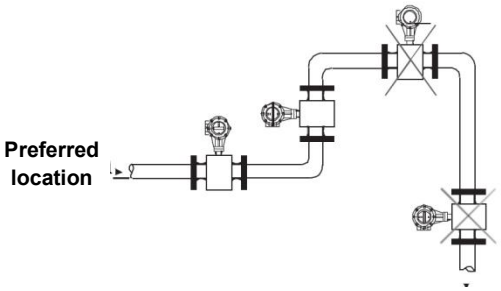
Pipes shall be designed to prevent the air bubbles in the fluids from accumulating the measurement pipe of a sensor. If a valve exists near the flowmeter, try to mount the flowmeter on the valve's upstream side for preventing a decrease of pressure inside the pipe possibly, consequently avoiding the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

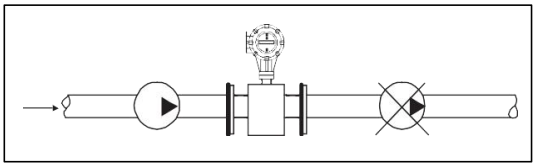


The pipe is routed to the highest point

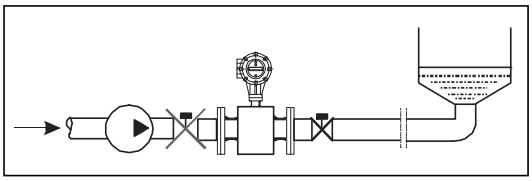
(Bubble accumulation in the measuring tube is likely to cause produce measurement errors!)

It is easy to cause a non-full tube

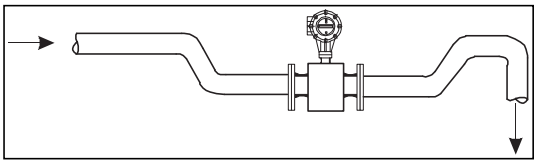
(3) The electromagnetic flowmeter cannot be installed on the suction side of the pump



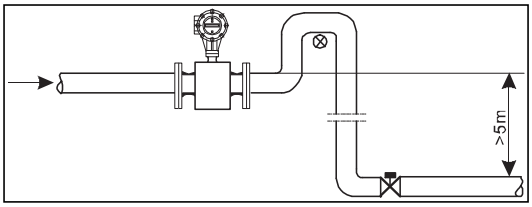
(4) For long pipelines, control valves are generally installed on the downstream of the electromagnetic flowmeter.



(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

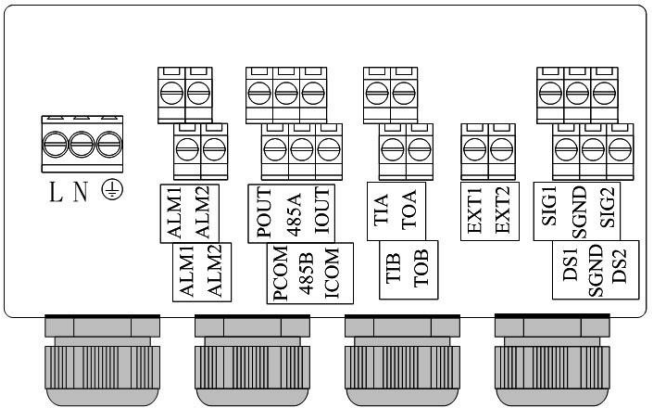
(8) Grounding

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

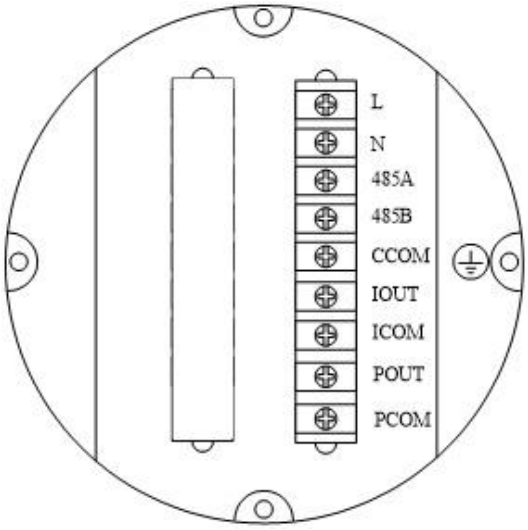
Remote

L, N:	100-240VAC power supply 24V power supply
ALM1，ALM2	Relay out
POUT，PCOM	Pulse/Frequency output
485A，485B:	RS485 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 24V power supply
485A，485B:	RS485 communication
IOUT，ICOM:	4-20mA output connection
POUT，PCOM:	Pulse/Frequency/Relay out
CCOM:	RS485 communication ground
	Converter instrument grounding protection



Ordering code

LDG-SUP -M1-DN50-J5-D2-I2-V1-P3-F1-E1-L2-G2-B1-IP1	Description
LDG-SUP- - - - - - - - - - - - - - - -	
Type M1	Compact type(IP65)
Type M2	Remote type(IP68)
Pipe size DNXX	DN10 - DN2000
Accuracy J5	0.50%
Transmit output O1	4-20mA output
Frequency output PWM1	Frequency (pulse) output
Communication D1	RS232
Communication D2	RS485
Communication D3	HART
Installation I1	Thread installation
Installation I2	Flange installation
Installation I3	Clamp mounting
Installation I4	Clamp installation
Power supply V1	24VAC
Power supply V2	220VDC
Pressure rating P1	0.6MPa
Pressure rating P2	1.0MPa
Pressure rating P3	1.6MPa
Pressure rating P4	2.5MPa
Pressure rating P5	4.0MPa
Pressure rating P6	6.3MPa
Pressure rating PZ	Others
Flange standard F1	JB
Flange standard F2	GB
Flange standard F3	HB
Flange standard F4	SH
Flange standard F5	ANSI
Flange standard FZ	Others
Electrode material E1	316L stainless steel
Electrode material E2	Titanium
Electrode material E3	Tantalum
Electrode material E4	Hastelloy B
Electrode material E5	Hastelloy C
Electrode material E6	Platinum
Electrode material E7	Tungsten carbide
Electrode material E8	Others
Lining material L1	Neoprene（CR）

	L2			Polyurethane（PU）
	L3			F4/PTFE
	L4			Teflon（F46/FEP）
	L5			Tetrafluoroethylene（PFA）
	LZ			Others
Grounding		G1		Grounding electrode
		G2		Grounding ring
Body material			B0	Carbon steel
			B1	304 stainless steel
Ingress protection				IP1 IP65
				IP3 IP68