

## SHD Electromagnetic Flow meter

### 1. Description of Products

Electromagnetic flowmeter is a kind of inductive instrument designed by Faraday's law of electromagnetic induction to measure flow of conductive media in the tube. It adopts the technology of insertion of single chip to realize digital excitation and employs CAN local fieldbus.

Electromagnetic flow meter can realize local indication and output electrical current signal of 4-20mA which can be used to record, adjust and control. Electromagnetic flow meters are widely used in industrial sectors such as chemical industry, environmental protection, metallurgy, pharmaceutical, paper making, water supply and removal etc. Besides measuring flow of general conductive liquid electromagnetic flowmeter can measure flow of liquid-solid mixed fluid, high-viscosity fluid and salt, strong acid and strong alkali.



### 2. Features

- Simple structures, firm, no movable parts and long operation life
- No intercepting fluid parts, no pressure loss and fluid clogging
- No mechanical inertia, quick response and good stability, application in automatic examination, adjustment and controlling
- Measuring accuracy not influenced by physical parameters such as style, temperature, viscosity, density and pressure.
- Employ Teflon or rubber liner and different combination of electrode material such as Hastelloy C, Hastelloy B, 316L, Titanium and adapt the need of different mediums.
- Supply many styles of flowmeters such as inline type and insertion type, etc.
- Adopt EEPROM memory to measure operation data, safe and reliable protection of memory.
- Integral type flowmeters and remote type flowmeters.
- LCD back light display with high clearness

### 3. Technical Specifications and Technical Parameters

#### ① Normal Operating Conditions

Environment temperature:  $-25^{\circ}\text{C} \sim +60^{\circ}\text{C}$

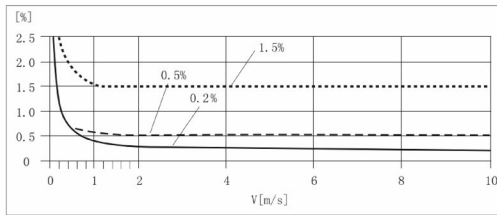
Relative Humidity: 5% ~90%

Power supply: 85VAC~250VAC; 16VDC~36VDC

Consumed power: less than 20W

#### ② Measuring Accuracy

Standard SE11/ Sanitary SE13:  $\pm 0.5\%$ ; High Accuracy SE12:  $\pm 0.25\%$  ;Inserted type SE 14 :  $\pm 1.5\%$



Basic Error

**③ Output**

**Analog Current Output**

Load Resistance: 0 mA~10 mA ,0 ~1.5 KΩ,  
 Load Resistance : 4 mA~20mA ,0 ~750Ω,  
 Intrinsic Error: 0.1% ±10μA

**Digital Frequency Output**

Frequency Output Range: 1 Hz ~ 5000 Hz  
 Output Electrical Isolation: Optoelectronic Isolation, Isolation Voltage: > 1000VDC  
 Frequency Output Driver: Field-Effect Tube Output, Max bearing Voltage 36VDC, Max load Current 250mA

**Digital Pulse Output**

Output Pulse Range: 0 pulse/second ~ 100 pulses /second. (Higher than100 pulses/second, pulse can be lost)  
 Output Pulse Equivalent: 0.001~1.000 m<sup>3</sup>/cp;  
 0.001~1.000 LRT/cp;  
 0.001~1.000 USG/cp  
 0.001~1.000 UKG/cp

Output Electrical Isolation: Optoelectronic Isolation, Isolation Voltage: > 1000VDC

Frequency Output Driver: Field-Effect Tube Output, Max bearing Voltage 36VDC, Max load Current 250mA

**Alarm Output**

Alarm Output Point: ALH –Upper limit Alarm, ALML—lower limit Alarm

Output Electrical Isolation: Optoelectronic Isolation, Isolation Voltage: > 1000VDC

Frequency Output Driver: Field-Effect Tube Output, Max bearing Voltage 36VDC, Max load Current 250mA

**Digital Communication**





MODBUS Interface: RTU Format, Physical Interface RS-485, Electrical Isolation 1000VH

Hart Interface : Standard Hart Protocol, configure HART Communicator, can display the measuring valve on line and modify the instruments parameters.

**4. Main Technical Parameters**

Main Technical Parameters of Electromagnetic Flow meter

Table 1

Picture				
Model	SE 11 Standard	SE12 High Accuracy	SE13 Sanitary	SE14 Insertion type
Medium	Conductivity Fluids			
Accuracy	±0.5%	±0.25%	±0.5%	±1.5%
Repeatability	±0.25%	±0.125%	±0.25%	±0.75%
Fluid Temperature	-25°C ~ 130 °C	-25°C ~ 130 °C	-25°C ~ 130 °C	-25°C ~ 130 °C
Conductivity	≥ 5μs/cm ( soft water should be ≥ 20μs/cm)			
Size	10~2000 mm	10~2000 mm	10~125 mm	200~3000 mm
Operation Pressure	0.6Mpa/1.0Mpa/1.6Mpa/2.5Mpa/4.0Mpa/Others			
Velocity	0.5 m/s ~ 10 m/s			
Flow Direction	Forward / Reversed			
Electrodes Material	316L / Hastelloy C2,B4/Tantalum/Titanium/Platinoiridita/others			
Liner Material	Rubber /PTFE/PFA		PFA	PTFE
Electrodes Type	Standard			
Qty of Electrodes	2 pairs ( one pair for measuring, one pair for grounding)			1pair ( measuring)
Tube Material	304 Stainless Steel			
Flange Material	Carbon steel/304 Stainless steel		304 Stainless steel	304 Stainless steel
Installation Type	Flange		Tri-clamp/screw	Flange/plug-in
Protection level	IP65/P68 ( Remote Version)			
Power	220VAC ±20% 60HZ / 24 VDC			
Signal Output	4~20mA			
Communication	Hart / Modbus/ Profibus			
Electrical connection	2* M20 * 1.5			
Explosive-Proof	Exd eia II C T3~T6			
Construction Type	Compact / Remote			
Operation	Environment temperature:-25 °C~ + 60 °C; Relative Humidity: 5% ~90%			

Environment	
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**5. Product Selection**

① **Nominal Diameter, Pressure & Flow Range**

**Table 2**

Size(DN)	Pressure	Min flow range velocity(0-0.5)m/s	Max Flow range velocity(0-10)m/s
10	4.0 Mpa	(0-2.25)L/min	(0-45)L/min
15	4.0 Mpa	(0-5)L/min	(0-100)L/min
20	4.0 Mpa	(0-7.5)L/min	(0-150)L/min
25	4.0 Mpa	(0-10L)/min	(0-200)L/min
32	4.0 Mpa	(0-20L)/min	(0-400)L/min
40	4.0 Mpa	(0-30L)/min	(0-600)L/min
50	4.0 Mpa	(0-3)m <sup>3</sup> /h	(0-60)m <sup>3</sup> /h
65	4.0 Mpa	(0-6)m <sup>3</sup> /h	(0-120)m <sup>3</sup> /h
80	4.0 Mpa	(0-9)m <sup>3</sup> /h	(0-180)m <sup>3</sup> /h
100	1.6 Mpa	(0-12)m <sup>3</sup> /h	(0-240)m <sup>3</sup> /h
125	1.6 Mpa	(0-21)m <sup>3</sup> /h	(0-420)m <sup>3</sup> /h
150	1.6 Mpa	(0-30)m <sup>3</sup> /h	(0-600)m <sup>3</sup> /h
200	1.6 Mpa	(0-54)m <sup>3</sup> /h	(0-1080)m <sup>3</sup> /h
250	1.6 Mpa	(0-90)m <sup>3</sup> /h	(0-1800)m <sup>3</sup> /h
300	1.0 Mpa	(0-120)m <sup>3</sup> /h	(0-2400)m <sup>3</sup> /h
350	1.0 Mpa	(0-165)m <sup>3</sup> /h	(0-3300)m <sup>3</sup> /h
400	1.0 Mpa	(0-225)m <sup>3</sup> /h	(0-4500)m <sup>3</sup> /h
500	1.0 Mpa	(0-330)m <sup>3</sup> /h	(0-6600)m <sup>3</sup> /h
600	1.0 Mpa	(0-480)m <sup>3</sup> /h	(0-9600)m <sup>3</sup> /h
700	1.0 Mpa	(0-660)m <sup>3</sup> /h	(0-13200)m <sup>3</sup> /h
800	1.0 Mpa	(0-900)m <sup>3</sup> /h	(0-18000)m <sup>3</sup> /h
900	1.0 Mpa	(0-1200)m <sup>3</sup> /h	(0-24000)m <sup>3</sup> /h
1000	1.0 Mpa	(0-1350)m <sup>3</sup> /h	(0-27000)m <sup>3</sup> /h
1200	0.6 Mpa	(0-2100)m <sup>3</sup> /h	(0-42000)m <sup>3</sup> /h
1400	0.6 Mpa	(0-2700)m <sup>3</sup> /h	(0-54000)m <sup>3</sup> /h
1600	0.6 Mpa	(0-3600)m <sup>3</sup> /h	(0-72000)m <sup>3</sup> /h
1800	0.6 Mpa	(0-4500)m <sup>3</sup> /h	(0-90000)m <sup>3</sup> /h
2000	0.6 Mpa	(0-5700)m <sup>3</sup> /h	(0-114000)m <sup>3</sup> /h

## ② Model Selection

Table 3

Item	Code	Description				
Factory Mark	SHD	Silver Automation Instruments				
Meter Type	SE11	Standard ( 0.5% accuracy ,DN10~DN2000)				
	SE12	High Accuracy (0.25% accuracy,DN10~DN2000)				
	SE13	Sanitary type (0.5% accuracy,DN10~DN125, Tri-clamp )				
	SE14	Insertion type (1.5% accuracy,DN200~3000)				
Meter Size	-XXX	Example:100=DN100, refer to Table 2 Nominal diameter, pressure and flow range				
Electrode Material	E0	316L SS				
	E1	Hastelloy B				
	E2	Hastelloy C				
	E3	Titanium				
	E4	Tantalum				
	E5	Pt/Iridium Alloy				
Liner Material	L1	Teflon (PTFE)				
	L2	F46 (FEP)				
	L3	PFA				
	L4	Hard rubber				
Rated Pressure	1G	GB1.6Mpa	1D	DIN PN16	1A	ANSI 150#
	2G	GB2.5Mpa	2D	DIN PN25	2A	ANSI 300#
	3G	GB4.0Mpa	3D	DIN PN40	3A	ANSI 600#
	S	Special				
Working Temperature	E	<60 °C				
	H	60~160 °C				
Protection Grade	P0	IP65				
	P1	IP 67				
	P2	IP68 (only for remote version, sensor IP68,converter IP65)				
Converter Type	0	Compact				
	1	Remote (standard cable 5 meters)				
Output Signal Communication	S0	4~20mA				
	S1	RS-485				
	S2	Hart				
	S3	Profibus-DP*1				
	S4	Pulse Output				
Housing Material	H0	Carbon steel				

	H1	304 SS
	H2	Special Demand
Material of Body Flange	F0	Carbon steel
	F1	304 SS
	F2	Special Demand
Power Supply	G0	220V AC (85~265V,45~63 Hz)
	G1	24V DC (18~36V)
	G2	Battery supply (without 4~20mA output)
Explosion Proof	0	Non(0 could be omitted)
	Ex	Exd eia II C T3~T6

**③ Selection of Liner**

**Table 4**

Liner Material	Main Function	Application
Hard Rubber	Resistant to Hydrochloric acid, acetic acid ,oxalic acid, ammonia water, phosphoric acid and 50% Sulfuric acid, sodium hydroxide and potassium hydroxide in normal temperature avoid enhancer	1. Temp. less than 65 °C 2. Common acid, alkali, salt solution
PTFE F46 PFA	Most steady plastic of chemical living energy; resist boiling hydrochloric acid, sulfuric acid, nitric acid, nitro-hydrochloric acid, thick alkali and all kinds of organic solvent; Poor abrasion and adhesion performance	1. -40°C ~130°C(PTFE) -40°C ~180°C(F46) -40°C ~180°C(PFA ) 2. Strong corrosive fluids such as acid and alkali 3. For sanitary purpose

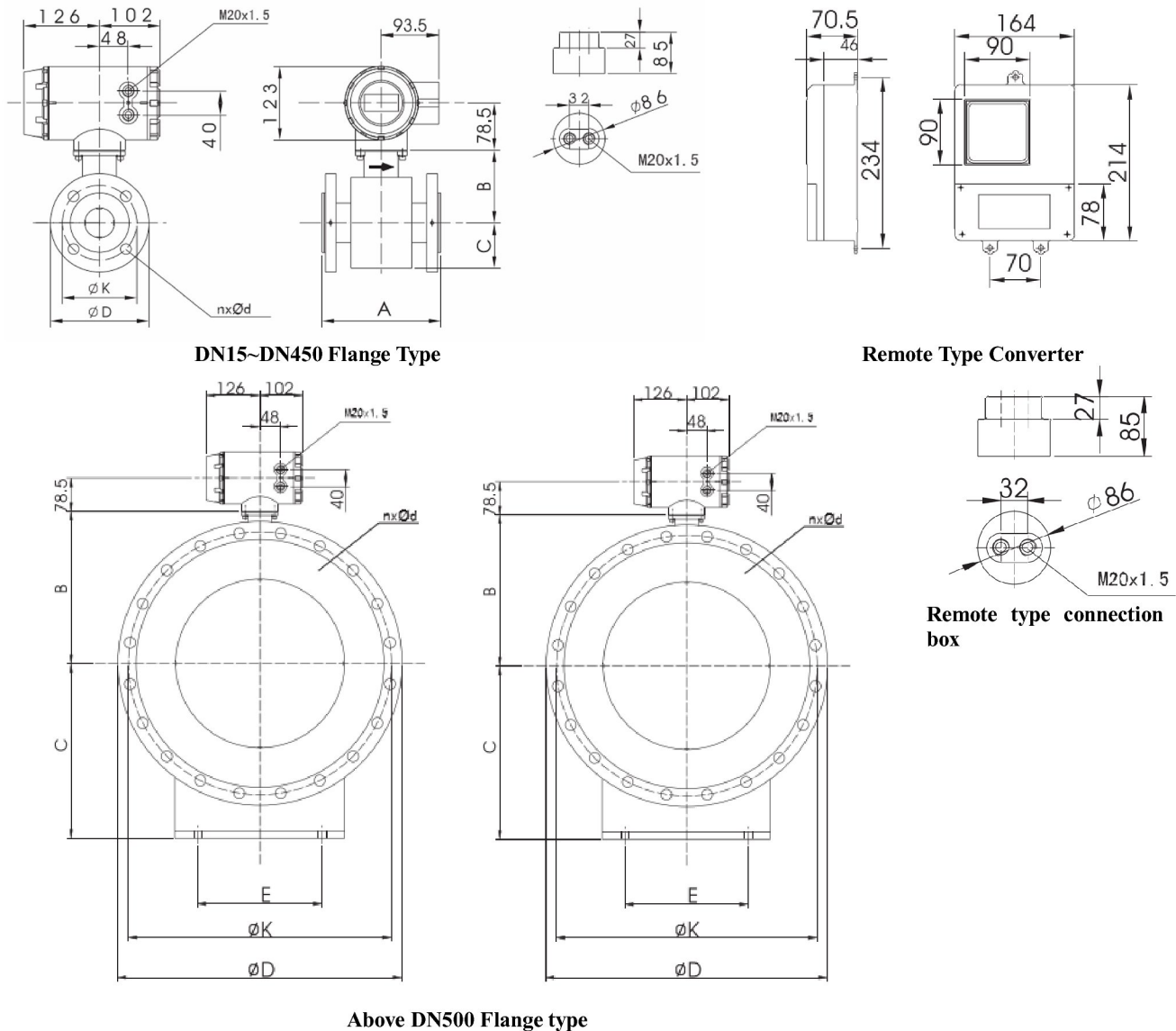
**④ Selection of Materials of Electrodes**

**Table 5**

Electrodes	Performance of resisting erosion and abrasion
Stainless steel 0Cr18Ni12Mo2Ti	Apply to industrial water, domestic water, polluted water, etc. with weak erosion, applied in petroleum chemical industry, steel and iron,etc. and fields in government and environmental protection
Hastelloy B	Good performance of resisting erosion to hydrochloric acid of all degrees of density below the boiling point; resisting sulfuric acid, phosphoric acid, hydrofluoric acid, organic acid, etc. non- chlorine acid, alkali, erosion of non-oxidized salty fluid
Hastelloy C	Resisting non-oxidized acid, such as nitric acid, nitration mixture, or the erosion of the mixture of chromic acid and sulfuric acid; resisting oxidized salt such as Fe <sup>+++</sup> , Cu <sup>++</sup> or the erosion of other oxidizers, such as the erosion of higher than normal temperature hypochlorite liquor and the sea water
Titanium	Resisting erosion of sea water, all kinds of chloride and hypochlorite, oxidized acids (including Fuming sulfuric acid), organic acid, alkali; not resisting the erosion of purer reducing acids( such as sulfuric acid, hydrochloric acid); if oxidizer exists in acids (such as nitric acid, Fe <sup>+++</sup> . Cu <sup>++</sup> ) the erosion will reduce greatly.

Tantalum	Good performance of resisting erosion, similar to glass; Besides hydrofluoric acid, fuming nitric acid, alkali, nearly can resist erosion of all chemical mediums(including boiling hydrochloric acid, nitric acid and below 150;æ sulfuric acid ). Not resisting erosion in alkali.
Pt/ Iridium Alloy	Can nearly resist all chemical matters, not fit for aqua regia and ammonium salt
Stainless Steel Painting Tungsten Carbide	Fit for mediums without erosion and strong attrition
<p>Remarks: Due to multiple types the erosion is subject to complex factors such as temperature, density, flow rate etc., this sheet is only for reference. Users should make decision according to practical conditions, if necessary make experiment of resisting erosion of to-be-chosen materials, such as the experiment of hanging pieces</p>	

**6. Dimensions**



**Table 6**

DN	Pressure	Dimensions (unit: mm)			PFFE & Rubber Liner					
	MPa	A	B	C	E	F	ΦD	ΦK	nxΦd	
10	4.0	150	95	50			90	60	4xΦ14	
15							95	65	4xΦ14	
20							105	75	4xΦ14	
25							115	85	4xΦ14	
32							140	100	4xΦ18	
40		150	110	4xΦ18						
50		197/202	121	76			165	125	4xΦ18	
65			130	85			185	145	8xΦ18	
80			135	90			200	160	8xΦ18	
100			247/252	145			100	220	180	8xΦ18
125	247/252		161	116	245	210	8xΦ18			
150	1.6	297/302	171	126	280	240	8xΦ22			
200		348/352	199	154	335	295	12xΦ22			
250		398/402	224	179	405	355	12xΦ26			
300		498/502	249	204	440	400	12xΦ22			
350			274	229	500	460	16xΦ22			
400	598/602	305	260	565	515	16xΦ26				
450		330	285	615	565	20xΦ26				
500	1.0	/600	360	403	300	240	670	620	20xΦ26	
600		/600	410	453		270	780	725	20xΦ30	
700		/700	467	560	400	350	895	840	24xΦ30	
800		/800	517	610		400	1010	950	24xΦ33	
900		/900	567	660		470	1110	1050	28xΦ33	
1000		/1000	617	712		570	1225	1160	28xΦ36	
1200		0.6	/1200	719	814	600	710	1400	1340	32xΦ33
1400			/1400	819	914		900	1625	1560	36xΦ36
1600	/1600		919	1036	800	1040	1825	1760	40xΦ36	
1800	/1800		1021	1138		1180	2045	1970	44xΦ39	
2000	/2000		1121	1238		1350	2265	2180	48xΦ42	