

## 1.Application

F8.11 electromagnetic flow meter, composed of sensor and converter, works based on Faraday's law of electromagnetic induction. It is used to measure electrical conductivity of liquid or solid. Generally, the electrical conductivity should be over 5uS/cm (electrical conductivity of tap water, raw water is about 100~500uS/cm),It can also be used to measure various mediums like acid, alkali, saline solution, paper pulp, ore pulp and so on. But these mediums can't contain a lot of magnetic materials and bubbles.

F8.11 electromagnetic flow meter is, a kind of instrument, used for measuring the flow conductivity liquid. It is widely used in flow measuring of Metallurgy, Chemical industry, Paper industry, Environmental protection, Oil industry, Textile industry, Food industry and City administration, Water works, etc.



## 2.Working Principle

The Principle of the sensor is based on Faraday's law of electromagnetic induction. It is installed a pair of detection electrodes on the pipe wall, where the measurement pipe axis and magnetic field lines are vertical. When the conductive liquid moves along the measurement pipe axis, the conductive liquid cuts magnetic field lines and produces induced electromagnetic force, which can be measured by the two electrodes on the meter pipe. The result can be calculated by formula:

$$E=KBVD$$

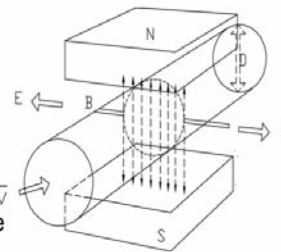
E-Induced electromotive force

K-Meter constant

B-Magnetic flux density

V-Average velocity of pipe section

D-Internal diameter of measuring pipe



When measuring flows through magnetic field which is perpendicular to the direction of the flow. Then the flow of conductive fluid induces electromotive force proportional to the average velocity. Therefore, the detected fluid requires to be higher than the minimum of electrical conductivity. Its induced voltage signal is detected through two electrodes and sent to a converter through the cable. After signal processing and related operation, the electromagnetic flow meter will display total flow and instantaneous flow in monitor.

## 3.Instrument characteristics

- ✧ No baffles and running part inside the measuring tube, therefore no additional flow loss and no jams happen. Especially for measuring the flow of solid-liquid object, for example, sewage, mud pulp and CWS (coal water slurry).
- ✧ Only liner and electrode have direct contact with the measuring medium, by choosing correct liner and electrode, then the corrosion resistance and wear resistance can be satisfied. Therefore it can be used in kinds of strong acid and alkali in chemical solutions.
- ✧ Easy for installation, 5D for front straight pipe, 2D for back straight pipe(D means inner diameter of chosen instrument).
- ✧ High accuracy, it is up to  $\pm 0.2\%$ , it is capable for testing forward/reverse Bi-directional flow.
- ✧ Dual frequency excitation is adopted to avoid the affection from public frequency.
- ✧ Low consumption.
- ✧ Good interchangeability of the converter, it is easy to have the accuracy without remark the real flow.
- ✧ Wide ranges.
- ✧ Empty pipe diagnosis automatically. When the pipe is empty, the system will set the number to zero and alarm, to prevent interference from empty pipe which will make the instruments data bounce and misuse.
- ✧ Both cone and line seal method are used in sealing the electrodes to make sure there is no leaks.
- ✧ The input impedance of the converter is more than 1012ohms, it protects the sensor from fouling, it is good for measuring the low conductivity medium.
- ✧ EMC of flow meter comply with IEC61000-1995 standard.  
Due to the advantages of electromagnetic flow meter, it is widely used in various industries, and the preferred instrument for liquid flow measuring.
- ✧ With Automatic Electrodes Cleaning.

#### 4.Feature

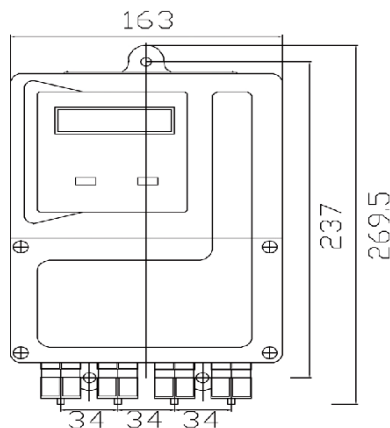
- ◇ “Fuzzy Algorithm” technology is applied on the measurement of electromagnetic flow meter and equipped with the artificial intelligence function.
- ◇ An EEPROM retains data record for approximately 10 years.
- ◇ Explosion-proof design upon request.
- ◇ High resistance, fast response design can make undistorted collection of weak signal and fast response to the flow changes. Its range rate can reach 100:1.
- ◇ It has the function of low conductivity measurement.
- ◇ Capacitance technology is applied on full and empty pipetesting to avoid wrong alarms.
- ◇ It has the consistency of converter’s interchange, which can avoid input parameters repeatedly.
- ◇ Variety of power supply mode is available (DC: 18V-36V/AC: 85V-265V).
- ◇ The function of saving settings before delivery, which can avoid the loss of the parameters.
- ◇ It adopts the international leading excitation technology, which circuit is simple, stable, and reliable.
- ◇ It has the function of infrared remote control and button operation so as to make the operation more convenient.
- ◇ It provides the function of zero correction of sensor and automatic zero adjustment.
- ◇ Multi-language interface to satisfy all the users’ need.
- ◇ It has the function of self-adjustment and self-checking.
- ◇ It has lightning-protection and electricity-protection circuits. The effective, anti-interference circuits apply to all kinds of bad environment.
- ◇ The instrument provides current flow rate and flow totalization indication with back light LCD display,
- ◇ Flow Rate Cut-off (Hi/Low) can be programmable.
- ◇ HART communication function and other output communication interfaces are available (optional).

#### 5.Specification

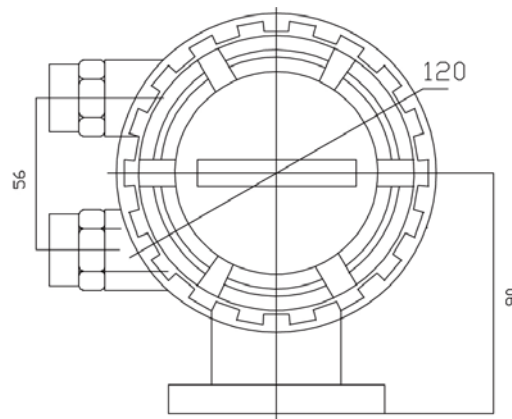
Diameter:	DN 10~DN2400	Protection:	IP65(For Intergrated type) ;IP67(For sensor,IP68 is optional)
Ambient:	-25 °C ~60 °C <0.1%/10 °C or< ± 0.25%/10°C	Output interface:	Standard output(4~20mA)、Dual current output. RS485,HART,Profibus-PA
Liner:	PTFE(-25~140°C) PU(<80°C) CR(<80°C) PFA(40-180°C) F46(40-180°C) Hard Rubber(<80°C)	Velocity:	≤20m/s
Electrode:	SS 316L,Hastelloy,Ti,Ta,PT-Ir	Electrical connection:	M20x1.5seal, G1/2, NPT1/2
Conductivity:	≥5μS/cm(Please consult us if you need special pressure)	Repetition:	≤±0.1%、±0.25%
Accuracy:	±0.5%,Optional ±0.2%		

### ► Size

#### 1.Dimension of converter

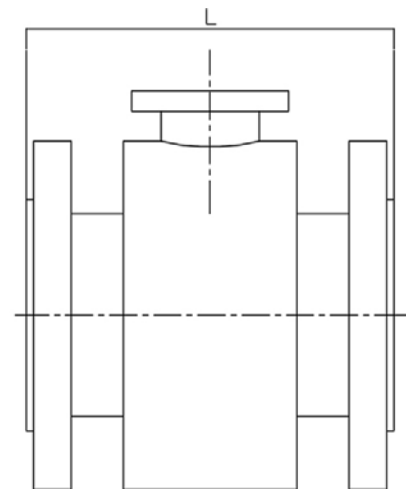
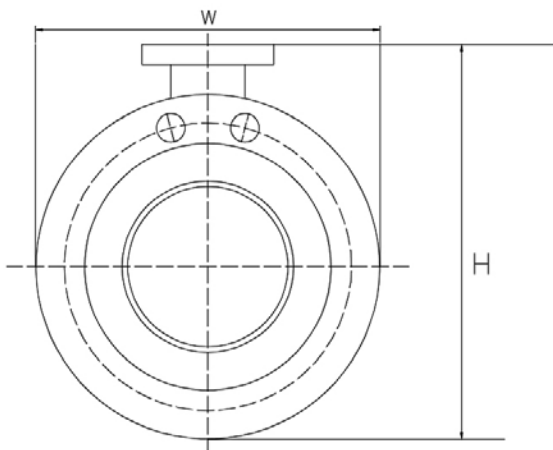


Divided type



Compact type

## 2.Dimension of the sensor



Diameter(mm)	Size(mm)		
	L	W	H
15	160	95	127
20	160	95	137
25	160	115	147
32	160	115	155
40	195	150	165
50	195	165	187
65	195	185	202
80	195	200	223
100	245	220	249
125	245	250	278
150	295	285	303
200	345	340	358
250	395	395	418
300	500	445	468
350	500	505	560
400	600	565	614
450	600	640	656
500	600	670	710
600	600	780	810
700	700	895	995
800	800	1015	1115
900	900	1115	1215
1000	1000	1230	1350
1200	1200	1405	1505

Custom-made also available (Upon request)  
(For reference only)

## ► Selection of the Sensor(Piped) Option of the Instrument Diameter

### 1.1 Sensor diameter Selection

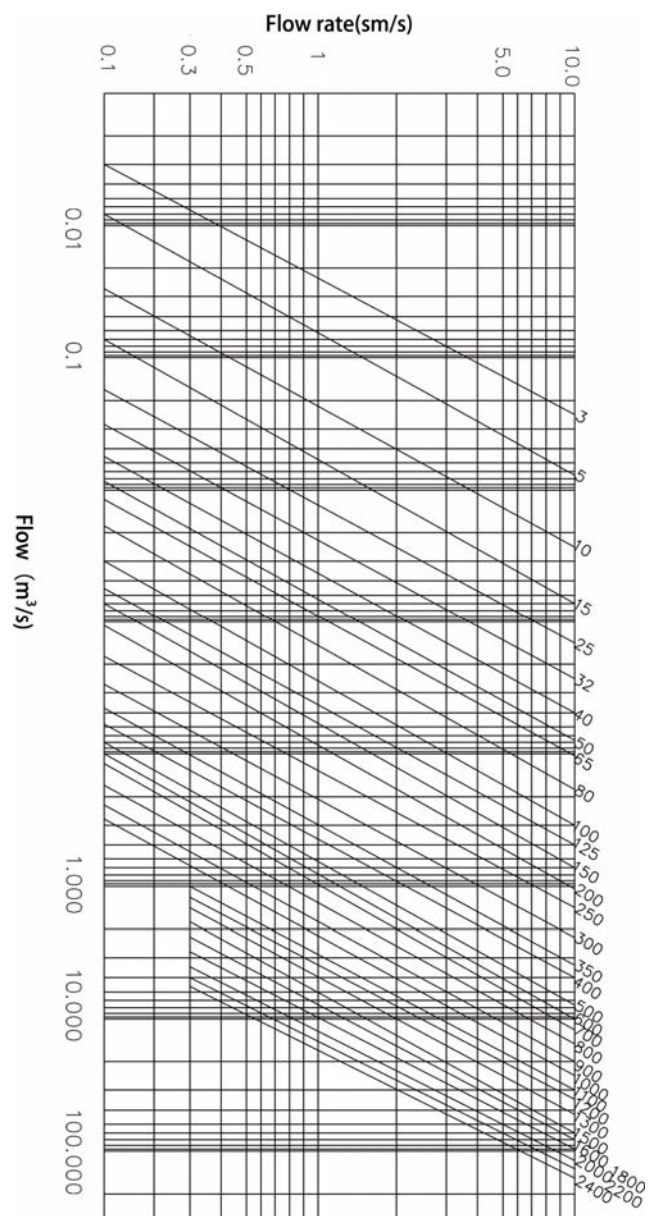
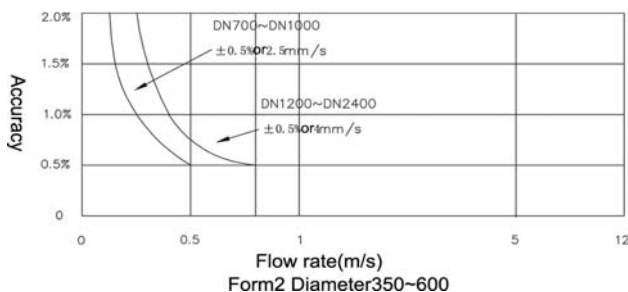
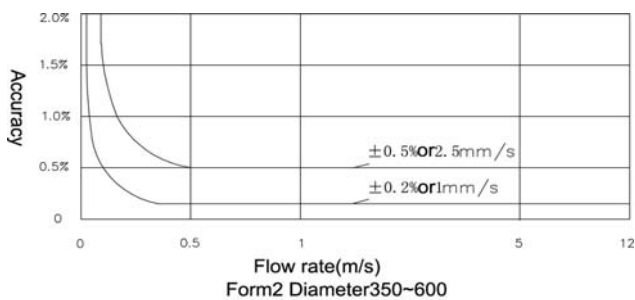
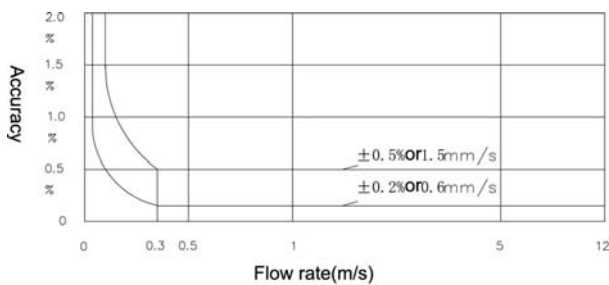
The diameter of the meter is not necessarily the same size as the diameter of pipe, it should be determined by the flow rate. Generally, the flow rate between 0.1-10 m/s is called economic flow rate, and the diameter of sensor is the same size as the diameter of pipe. Unless the medium gets a less abrasion, and use the abrasion-resistant medium, otherwise we recommend it would not exceed 7m/s for long-term working.

For the flow contains material of adhering, precipitating and scaling, we recommend flow of 2m/s, preferably up to 3-4m/s or more to achieve self-cleaning and prevent adhering and scaling; For those strong abrasive fluid like slurry, the common flow should be less than 3m/s to reduce the abrasion to the lining and electrode; for the low conductive medium within 5-10 $\mu$ S, the flow of 0.5-1m/s would be better. Du to the increase of the flow rate will increase the flow noise, the output shake will appear.

#### 1). Accuracy

Diameter(mm)	Boundaries flow rate(m/s)	Standard accuracy(A)	High accuracy	S
15~300	V $\geq$ 0.3	$\pm 0.5\%$ RS	$\pm 0.2\%$ RS	Special calibration
	V<0.3	$\pm 1.5$ mm/s	$\pm 0.6$ mm/s	
350~600	V $\geq$ 0.5	$\pm 0.5\%$ RS	$\pm 0.2\%$ RS	
	V<0.5	$\pm 2.5$ mm/s	$\pm 1$ mm/s	
700~1000	V $\geq$ 0.5	$\pm 0.5\%$ RS	Special Instructions: DN700 special order accuracy up to $\pm 0.3\%$ (Flow rate $\geq$ 1m/s or $\pm 3$ mm/s)	
	V<0.5	$\pm 2.5$ mm/s		
$\geq 1200$	V $\geq$ 0.8	$\pm 0.5\%$ RS		
	V<0.8	$\pm 4$ mm/s		

NOTING: Correction technology could be used to reduce the boundaries flow rate.



2). Selecting the diameter of instrument please refer to the above tables:

► F8.11 series magnetic flow meter selection table

**Model Selection**

Type of Instrument	F8.11	
Installation form	A	Flange, Compact Type
	B	Flange, Divided Type (5 m STD cables)
	C	Wafer, Compact Type
	D	Wafer, Divided Type (5 m STD cables)
Size	10~2400	10~2400mm
Electrode material	E	Stainless Steel 316L
	F	Hastelloy C
	G	Hastelloy B
	H	Titanium
	I	Tantalum
	J	Tungsten Carbide
	K	Others
Lining material	R	CR
	P	PTFE
	O	Others, Specify
Measuring pipe material	6	Stainless Steel 316
	4	Stainless Steel 304
Flange and Cover material	6	Stainless Steel 316
	4	Stainless Steel 304
	1	Carbon Steel Paint
Process Connection	1	ANSI 150#
	2	ANSI 300#
	3	JIS 10K
	A	JIS 20K
	B	PN 10
	C	PN 16
	D	PN 25
	E	PN 40
	O	Others, Specify
Output Signal and Communication	S	4-20mA & Pulse only
	R	4-20mA & Pulse with RS485
	H	4-20mA & Pulse with Hart
	O	Others, Specify
Power Supply	0	220/110 VAC, Specify
	1	24 VDC
	2	Battery type
Protection Level	5	IP65
	7	IP67
	8	IP68 (Divided Type only)
Accessory	N	None
	G	Grounding ring
	F	Matching flange
	B	Grounding ring& Matching flange
Option	N	None
	R	Heat with PT1000
	X	Explosion Proof
	H	High Temp:100~180℃
Accuracy	X	±0.5%
	S	±0.2%
Special Remark	X	Specify