MFE600C
Insert Electromagnetic Flowmeter

Features

- The special structure of the insert flowmeter can be easily installed and disassembled under the condition of low pressure and non-stop water. Therefore, it is very suitable for fluid measurement of existing pipelines and facilitates the maintenance and repair of instruments;
- Adopt advanced low frequency square wave excitation. The zero point is stable, the anti-interference ability is strong, and the work is reliable;
- Compared with the general electromagnetic flowmeter, the manufacturing cost and installation cost are lower;
- Two-way measurement system can measure forward flow and reverse flow; low frequency rectangular wave excitation improves flow stability, low power loss, and excellent low flow rate characteristics.

Introduction

Insert electromagnetic flowmeter is a new type of flow measuring instrument developed on the basis of pipeline electromagnetic flowmeter. On the basis of retaining the advantages of the pipeline electromagnetic flowmeter, the defects of difficult installation and high cost of the pipeline electromagnetic flowmeter on large pipelines are avoided. In particular, the method of opening under pressure and installation under pressure can be adopted, so that the plug-in flowmeter can be constructed and installed without stopping the water. It provides a new method for the measurement and installation of liquid flow. At present, it has been widely used in chemical industry, water supply and drainage, sewage treatment and other industries.

Working Principle

The working principle of Electromagnetic Flowmeter is based on Faraday's Law of Electromagnetic Induction, that is, when the conductive liquid flows through the electromagnetic flowmeter, the induced electromotive force will be produced in the liquid conductor, and the induced electromotive force is directly proportional to the velocity of conductive liquid, magnetic flux density and width of conductor (interior diameter of flowmeter). Such induced electromotive force is detected by a pair of electrodes on the tube wall of the flowmeter, and the equation of induced electromotive force is as follows:

$U = K \times B \times V \times D$

U: Induced electromotive force
K: Instrument Constant
B: Magnetic flux density
V: Velocity
D: Interior diameter of measuring pipe

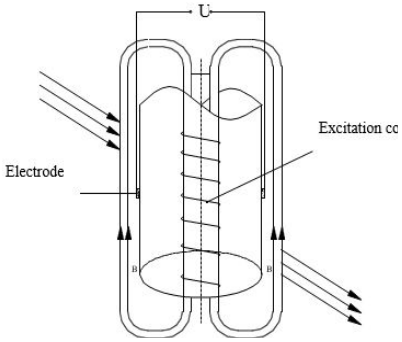


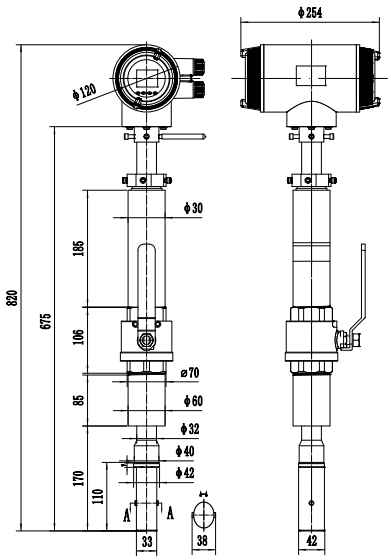
Figure 1

Specifications

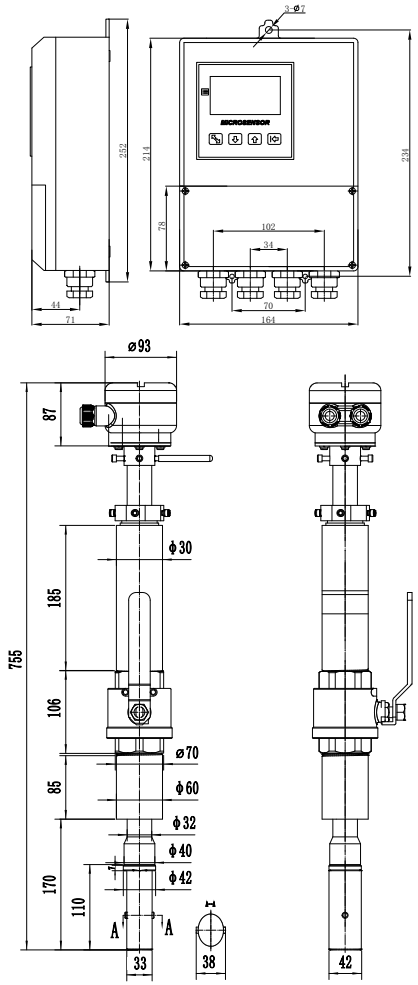
Diameter	DN150 ~ DN1600
Accuracy	±2.5%
Electrode type	Standard fixed electrode
Pressure port	ANSI 1/2 NPT, JIS G1/2
Structure type	Integrated type, separated type(cable length of separated type≤100m)
Rated pressure	DIN: 0.6MPa, 1.0MPa, 1.6MPa
Electrode material	316L，Ti
Probe	ABS
Flange/body flange	Stainless steel 06Cr19Ni10（304）
Ball valve material	Stainless steel 06Cr19Ni10（304）
	Ball valve size (2 inches)
Converter housing	Aluminum die-casting
Power supply	100V ~ 240V AC
	12V DC, 24V DC
Battery supply	3.6V, RS485 output, wireless output, frequency/ pulse output, and the frequency/pulse output is used only for calibration purposes
Output signal	4mA~20mA DC (4mA to 0m³; 20mA to full scale) load resistance 0Ω~750Ω, active output
	Hart,RS485 (Modbus protocol); Hart and RS485/ RS232 outputs cannot exist at the same time
	Profibus-DP
	4G wireless transmission
Electrical connection	ISO M20×1.5
IP protection	IP65; IP67; IP68 (sensor part only)
Environmental temp.	-20℃ ~60℃
Storage temp.	-40℃ ~60℃
Relative humidity	5% ~ 90%

Outline Structure

Integrated



Separated



The split type is generally used in occasions where the reading is inconvenient for on-site maintenance and debugging, as well as in harsher applications, such as high-temperature fluids and vibration sources. In most occasions, the integrated and split types can meet the requirements of use.For large-diameter flow measurement, when the diameter is ≥ 500mm, it is recommended to use a split type for easy maintenance; when the meter is installed below the ground, a split type, IP68 protection level structure must be selected; when the meter is inevitably installed at the pump outlet, Please choose a split structure meter.The electromagnetic flowmeter converter can be divided into integrated converter.

Electrical Connection

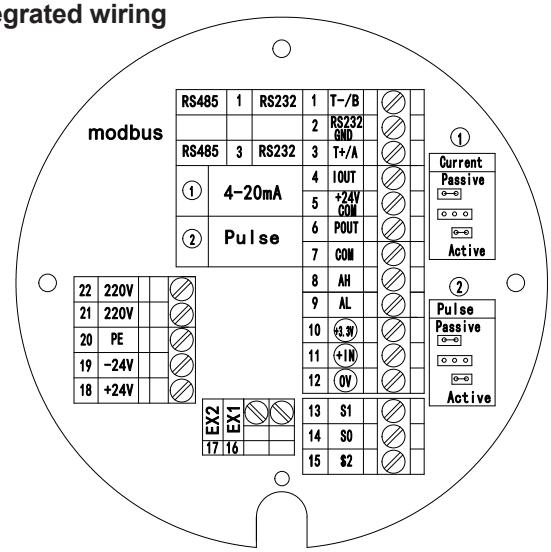
The electromagnetic flowmeter converter can be divided into integrated converter and separated converter, and the wiring diagram is shown.

When wiring, please note:

a) RS485 communication cable needs to use two-core twisted pair shielded wire;

b) The same cable shall not be used for the power line and 4mA~20mA DC signal line. Two cables shall be connected separately.

Integrated wiring

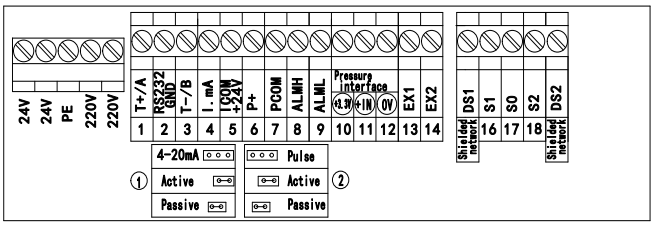


When wiring, select the corresponding power terminal to connect to the power line according to the product specifications, and then connect to the signal line according to the required output signal. See Table 1 for the specific meaning of the integrated electromagnetic flowmeter wiring terminals.

Table 1 Terminal definition of integrated type

Terminal Symbol		Function
1	T-/B	RS485/RS232 output
2	RS232 GND	RS232 grounding wire
3	T+/A	RS485/RS232 communication input
4	IOUT	4mA~20mA DC output
5	+24V DC COM	4mA~20mA DC output grounding
6	POUT	Pulse/frequency output
7	COM	Pulse/frequency output grounding
8	AH	Alarm output for Upper Limit of flow
9	AL	Alarm output for Lower Limit of flow
10	+3.3V	Pressure transmitter +IN
11	+IN	Pressure transmitter output terminal
12	0V	Pressure transmitter GND
13	S1	Electrode wire
14	S0	Signal grounding wire
15	S2	Electrode wire
16	EX1	Exciting current+
17	EX2	Exciting current-
18	+24V	24V DC (12V DC) power supply access
19	-24V	
20	PE	Power grounding wire
21	220V	220V AC power supply access
22	220V	
Short Circuit lugs	Passive	When lugs are connected to Passive,output an active signal.
	Active	When lugs are connected to Active,output a passive signal.

Separated wiring



When wiring, select the corresponding power terminal to connect to the power line according to the product specifications, and then connect to the signal line according to the required output form. See Table 2 for the specific meaning of the integrated electromagnetic flowmeter wiring terminals.

Table 2 Terminal definition of separated type

Terminal Symbol		Function
1	T-/A	RS485/RS232 output
2	RS232 GND	RS232 grounding wire
3	T+/B	RS485/RS232 communication input
4	I.mA	4mA~20mA DC output
5	Icom +24V	4mA~20mA DC output grounding
6	P+	2-way flow pulse output/frequency output
7	Pcom	Pulse output grounding wire
8	ALMH	Alarm output for Upper Limit of flow
9	ALML	Alarm output for Lower Limit of flow
10	+3.3V	Pressure transmitter +IN
11	+IN	Pressure transmitter output terminal
12	0V	Pressure transmitter GND
13	EX1	Exciting current+
14	EX2	Exciting current-
Shielding network	DS1	
16	S1	Electrode wire
17	S0	Signal grounding wire
18	S2	Electrode wire
Shielding network	DS2	
220V	220V	220V AC power supply access
220V	220V	
24V	24V	24V DC (12V DC) power supply access
24V	24V	
Short Circuit lugs	Passive	When lugs are connected to Passive,output an active signal.
	Active	When lugs are connected to Active,output a passive signal.

Installation

The electromagnetic flowmeter must work under the condition of full pipe, and the flowmeter cannot work normally when the pipe is not full or empty.

During installation, the positive direction of liquid flow should be consistent with the direction of the flow arrow on the sensor, and there must be enough space for installation and maintenance near the flowmeter. as shown in Figure 2.

When installing the plug-in electromagnetic flowmeter, in order to eliminate the influence of the gas at the top of the pipeline, it is generally recommended to install the plug-in electromagnetic flowmeter on a horizontal line, or at a position of 30° ～ 45° with the horizontal line.

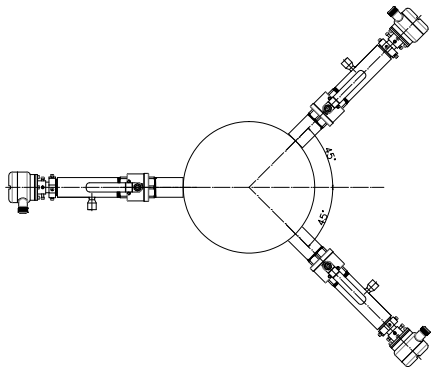


Figure 2

The correct installation method of the plug-in electromagnetic flowmeter must ensure that the pipeline is filled with liquid, so the electromagnetic flowmeter needs to be installed at the low point of the pipeline and cannot be installed at the high point of the pipeline, as shown in Figure 3.

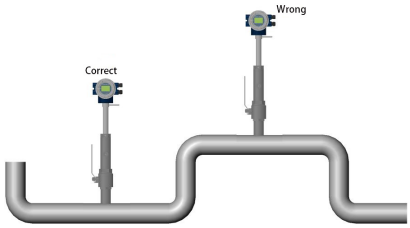


Figure 3

In order to ensure the upstream piping conditions required for high accuracy measurement of the flowmeter, the piping installation as shown in the figure below is recommended.

According to the position where the electromagnetic flowmeter is installed, when there are valves at the front and rear, the smallest straight pipe section must meet the installation distance of the first 10D and the rear 5D, and the valve needs to be fully opened, as shown in Figure 4.

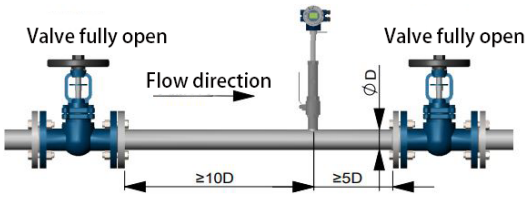


Figure 4

When the plug-in electromagnetic flowmeter is installed at the back end of the T-shaped tube, the electromagnetic flowmeter and the T-shaped tube need to ensure a straight pipe section of at least 20D in the front and 10D in the back, as shown in Figure 5.

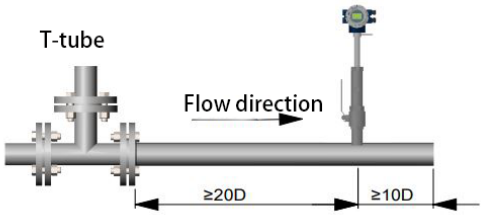


Figure 5

When the plug-in electromagnetic flowmeter is installed at the near end of the 90° elbow, the electromagnetic flowmeter and the tail of the elbow need to ensure a straight pipe section of at least the first 10D and the near 5D, as shown in Figure 6.

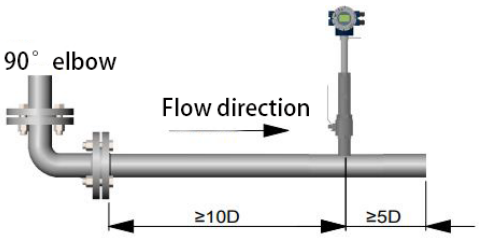


Figure 6

When the electromagnetic flow is installed at the rear end of the valve and the valve is not fully open, the plug-in electromagnetic flowmeter and the rear end of the valve must be at least the first 20D straight pipe section, as shown in Figure 7.

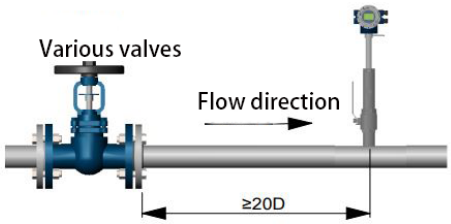


Figure 7

Order Guide

MFE600C - AS1 - 200- 0P1E1 - 11 -010

MFE600C	Insert Electromagnetic Flowmeter		
AS1	Code	Sensor type	
	AS0	Standard	
	AS1	With pressure port	
200	Code	Pipe diamete	
	xxx	For example: 100 represents DN100	
	150	DN 150 6"	56.55 .... 791.68 m³/h
	200	DN 200 8"	88.35 .... 1237.00 m³/h
	250	DN 250 10"	127.18 .... 1781.28 m³/h
	300	DN 300 12"	173.18 .... 2424.52 m³/h
	350	DN 350 14"	226.19 .... 3166.73 m³/h
	400	DN 400 16"	286.28 .... 4007.89 m³/h
	450	DN 450 18"	353.43 .... 4948.01 m³/h
	500	DN 500 20"	508.93 .... 7125.13 m³/h
	600	DN 600 24"	692.72 .... 9698.10 m³/h
	700	DN 700 28"	904.77 .... 12666.90 m³/h
	800	DN 800 32"	1145.11 .... 16031.54 m³/h
	900	DN 900 36"	1413.71 .... 19792.03 m³/h
	1000	DN 1000 40"	2035.75 .... 28500.53 m³/h
	1200	DN 1200 48"	2770.88 .... 38792.39 m³/h
	1400	DN 1400 56"	3619.11 .... 50667.61 m³/h
	1600	DN 1600 64"	3619.11 .... 72382.29 m³/h
0	Code	Electrode Material	
	0	SS316L	
	1	Titanium (Ti)	

P1	Code	Rated pressure
	P1	PN16 DIN2501, EN 1092-1 DN150-DN1600
	P2	PN10 DIN2501, EN 1092-1 DN150-DN1600
	P3	PN6 DIN2501, EN 1092-1 DN150-DN1600
	P9	Others
E	Code	Measuring medium temperature
	E	≤60°C
	H	≤120°C
1	Code	Installation form
	0	Fixed length installation
	1	Pluggable installation
11	Code	Converter mode
	00	Integrated IP65
	11	Separated IP65 (Converter IP65, Sensor IP65)
	20	Separated IP68 (Converter IP65, Sensor IP68)
	90	Others
0	Code	Analog output
	*	Without
	0	4mA-20mA
	1	4mA-20mA+Hart (Without RS485)
	9	Others
1	Code	Digital output
	0	Without
	1	RS485 MODBUS RTU
	2	Profibus-DP
	3	Wireless transmission 4G
	9	Others
0	Code	Power supply
	0	220V AC 100-240V
	1	24V DC 18V-28V
	2	12V DC
	3	Battery Power supply (With RS485)
	9	Others

Example: MFE600C-AS1-200-0P1E1-11-010

Description: MFE600C plug-in electromagnetic flowmeter, DN200 pipe diameter, with pressure measurement interface, 316L electrode, rated pressure 0.6MPa, measuring medium temperature 0 °C ～ 60 °C , IP65 protection grade, split type, 4mA ～ 20mA DC output, RS485 Communication, 100V ~ 240V AC power supply.

The selection of electromagnetic flowmeter is best carried out by technicians who are familiar with on-site process conditions. Select the appropriate diameter, lining material, electrode, etc. according to the measurable flow range table in the selection data.

Order Notes

According to statistics from authoritative organizations in the world, one-third of the cases of flow meter failure are caused by the quality of the product itself, and two-thirds of the cases are caused by product selection and on-site installation that do not meet the requirements. The selection of electromagnetic flowmeter requires the implementation of the following parameters.

1. Collect process data

a) The name of the measured fluid, and the composition of the chemical substance contained;

b) Max. flow, min. flow, common flow; c) Max. Working pressure; d) Max. Temp., min. Temp.

2. The measured fluid must be conductive, conductivity ＞ 5μS/cm.

3. The maximum flow and the minimum flow must conform to the values of the flow range in table 4.

4. The actual maximum working pressure must be less than the rated working pressure of the flowmeter.

5. The maximum and minimum working temperature must meet the requirements specified in the flowmeter.

6. Confirm whether there is negative pressure in process pipeline.

Table 3 Flow range

v m/s V m^3/h DN mm	0.5	1	2	3	4	5	7
150	31.8086	63.6173	127.2345	190.8518	254.4690	318.0863	445.3208
200	56.5487	113.0973	226.1947	339.2920	452.3893	565.4867	791.6813
250	88.3573	176.7146	353.4292	530.1438	706.8583	883.5729	1237.0021
300	127.2345	254.4690	508.9380	763.4070	1017.8760	1272.3450	1781.2830
350	173.1803	346.3606	692.7212	1039.0818	1385.4424	1731.8030	2424.5241
400	226.1947	452.3893	904.7787	1357.1680	1809.5574	2261.9467	3166.7253
450	286.2776	572.5553	1145.1105	1717.6658	2290.2210	2862.7763	4007.8868
500	353.4292	706.8583	1413.7167	2120.5750	2827.4334	3534.2917	4948.0083
600	508.9380	1017.8760	2035.7520	3053.6281	4071.5041	5089.3801	7125.1320
700	692.7212	1385.4424	2770.8847	4156.3271	5541.7694	6927.2118	9698.0964
800	904.7787	1809.5574	3619.1147	5428.6721	7238.2295	9047.7868	12666.9014
900	1145.1105	2290.2210	4580.4421	6870.6631	9160.8842	11451.1052	16031.5470
1000	1413.7167	2827.4334	5654.8668	8482.3002	11309.7336	14137.1669	19792.0334
1200	2035.7520	4071.5041	8143.0082	12214.512	16286.0163	20357.5204	28500.5281
1400	2770.8847	5541.7694	11083.538	16625.308	22167.0778	27708.8472	38792.3854
1600	3619.1147	7238.2295	14476.458	21714.459	28952.9179	36191.1474	50667.6055