

# MFE600H

## Electromagnetic Energy Flowmeter



### Features

- The energy meter has the function of measuring cold and heat, and is equipped with 2 Pt1000 as standard, no additional totalizer is required, which is convenient for installation and reduces installation costs;
- The converter uses a low-power single-chip microcomputer to process data, adopts SMD electronic components and surface mount SMT technology, and has reliable performance, high precision, low power consumption and stable zero point;
- Adopt multi-electrode structure, high accuracy, equipped with ground electrode, no need for ground ring, cost saving;
- Multi-electrode structure ensures high accuracy. With the grounding electrode, it doesn't need grounding ring which saves the cost;
- When power off , EEPROM can protect parameter setting and cumulative values;
- The electromagnetic energy meter has no mechanical inertia, has a sensitive response, can measure instantaneous pulsating flow, and has good linearity;
- Low frequency rectangular wave excitation improves flow stability, low power loss and excellent low flow rate characteristics.

### Introduction

MFE600H Series Electromagnetic Flowmeter (hereinafter called Electromagnetic Flowmeter) is designed and manufactured with the most advanced domestic and abroad technology, featuring high accuracy, reliability, good stability and long service life.

We pay our attention to every detail in the process of the product structure design, material selection, manufacturing, assembly and factory testing etc. With a water tower up to 37m as pressure stabilizer for actual flow calibration, we have a professional production line for electromagnetic flowmeter, also we design and develop a series of software and hardware for electromagnetic flowmeter for mass production to ensure high quality in long term use. It can be widely used in the measurement of central heating, heating, air conditioning and other heat in civil residential quarters, office buildings and enterprises and institutions.

### 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

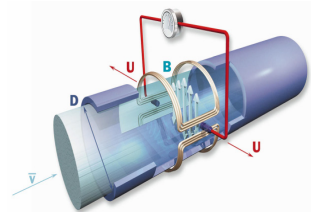


Figure 1 working principle diagram

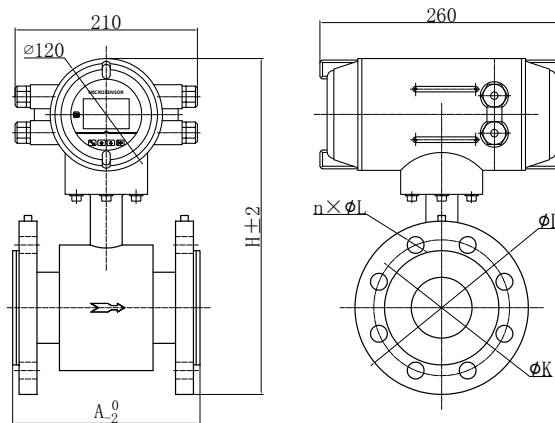
## Specifications

**Table 1 Specifications**

Diameter	Flange type: DN25~DN400
Level of accuracy	level 2
Electrode type	Standard fixed electrode, antifouling electrode
Structure type	Integrated type, separated type (cable length of separated type≤100m)
Rated pressure	GB: PN10, PN16, PN40
	ANSI: CLASS 150, CLASS 300, CLASS 600
	DIN: PN10, PN16,PN40
	JIS: 10K, 20K, 40K
	Others: customizable
Electrode material	316L, Ti, HB/HC, Ta, WC, Pt
Lining material	Neoprene (CR), Natural Rubber (NR), Polyurethane Rubber (PU)
	Polytetrafluoroethylene (PTFE), F46
Measured pipe	Stainless steel 06Cr19Ni10(304),304 ASTM,SUS 304
Flange/body flange	Carbon steel (standard), stainless steel (optional) 06Cr19Ni10(304),304 ASTM,SUS 304
Converter housing	Aluminum die-casting
Ground Ring Form	No Ground ring DN20 and below,Grounding ring material same as measuring electrode
Power supply	100 V AC~240V AC
	24V DC,12V DC
Output signal	4mA~20mA DC (4mA to 0m <sup>3</sup> ; 20mA to full scale) (load resistance 0Ω~750Ω, active output)
	Frequency, pulse output (Passive, active output optional)
	Upper and lower limit alarm output
	RS485 (standard Modbus protocol), RS232
Electrical connection	ISO M20×1.5
IP protection	IP65;IP68
Power consumption	≤5W
Display Data	Instantaneous heat, instantaneous flow, accumulated heat, accumulated flow, flow rate
Maximum flow reading	9999999999 (m <sup>3</sup> )
Heat flow unit	MJ/h; GJ/h; kWh/h; MW/h
Temperature Sensor	PT1000
Installation method	Insert installation
Environmental temp.	-20°C ~60°C
Temperature measurement range	-50°C ~200°C
Relative humidity	5%~90%

## Outline Structure

### Integrated flange connection dimensions

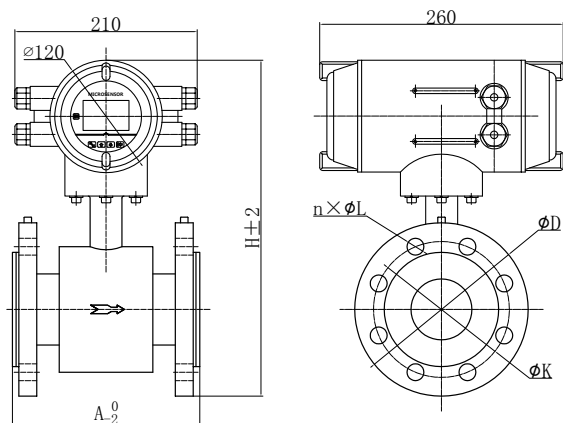


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

### Integrated flowmeter dimensions

DN	Rated Pressure (MPa)	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	$n \times \varnothing L$
25	1.0 (DIN)	150	312	115	85	$4 \times \varnothing 14$
32		150	315	140	100	$4 \times \varnothing 18$
40		150	328	150	110	$4 \times \varnothing 18$
50		200	341	165	125	$4 \times \varnothing 18$
65		200	366	185	145	$8 \times \varnothing 18$
80		200	373	200	160	$8 \times \varnothing 18$
100		250	396	220	180	$8 \times \varnothing 18$
125		250	426	250	210	$8 \times \varnothing 18$
150		300	463	285	240	$8 \times \varnothing 23$
200		350	506	340	270	$8 \times \varnothing 23$
250		400	559	395	350	$12 \times \varnothing 23$
300		500	596	445	400	$12 \times \varnothing 23$
350		500	676	505	460	$16 \times \varnothing 23$
400		600	746	565	515	$16 \times \varnothing 25$

## Integrated flange connection dimensions

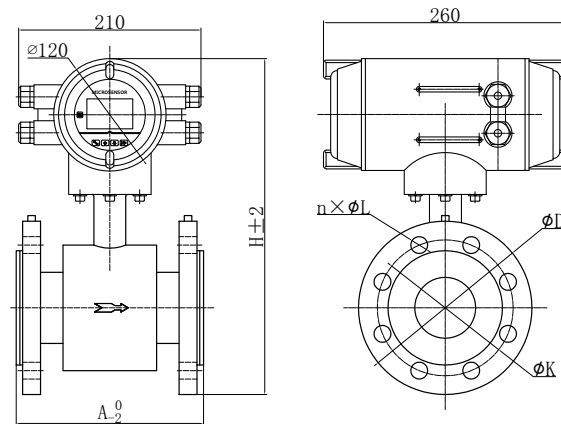


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

## Integrated flowmeter dimensions

DN	Rated Pressure (MPa)	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n×ΦL
25	1.6 (DIN)	150	312	115	85	4×14
32		150	330	140	100	4×18
40		150	340	150	110	4×18
50		200	338	165	125	4×18
65		200	358	185	145	8×18
80		200	374	200	160	8×18
100		250	402	220	180	8×18
125		250	425	250	210	8×18
150		300	458	285	240	8×23
200		350	522	340	295	12×23
250		400	574	395	350	12×25
300		500	624	445	400	12×25
350		500	678	500	460	16×25
400		600	742	565	515	16×30

## Integrated flange connection dimensions

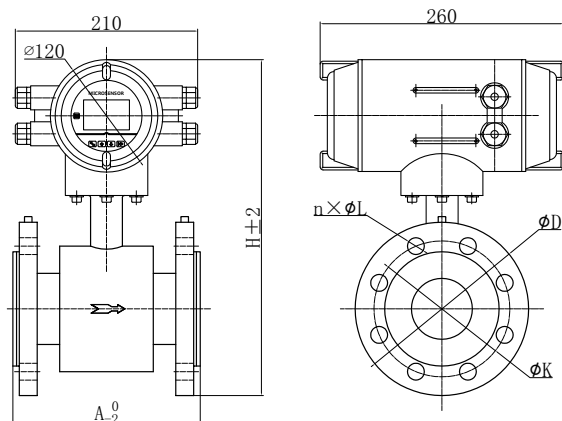


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

## Integrated flowmeter dimensions

DN	Rated Pressure (MPa)	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n×ΦL
25	4.0 (DIN)	150	312	115	85	4×14
32		150	330	140	100	4×18
40		150	340	150	110	4×18
50		200	338	165	125	4×18
65		200	358	185	145	8×18
80		200	374	200	160	8×18
100		250	402	235	190	8×22
125		250	425	270	220	8×26
150		300	458	300	250	8×26
200		350	522	375	320	12×23
250		400	574	450	385	12×30
300		500	624	515	450	16×33
350		500	678	580	510	16×36
400		600	742	660	585	16×39

## Integrated flange connection dimensions

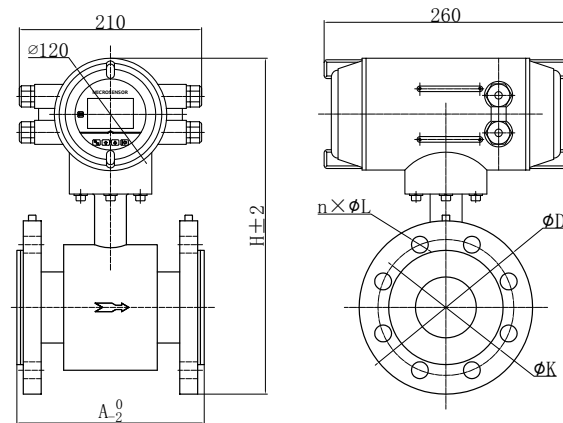


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

## Integrated flowmeter dimensions

DN	Rated Pressure	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n×ΦL
25	ANSI 150LB	150	312	110	80	4×16
32		150	330	120	89	4×16
40		150	340	130	99	4×16
50		200	338	150	121	4×18
65		200	358	180	140	4×18
80		200	374	190	153	4×18
100		250	402	230	191	8×18
125		250	425	255	216	8×22
150		300	458	280	242	8×22
200		350	522	345	299	8×22
250		400	574	405	362	12×26
300		500	624	485	432	12×26

### Integrated flange connection dimensions

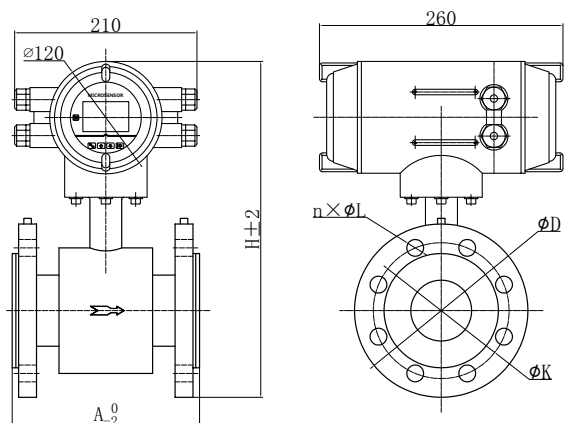


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

### Integrated flowmeter dimensions

DN	Rated Pressure	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n×ΦL
25	ANSI 300LB	150	312	125	89	4×18
32		150	330	135	98	4×18
40		150	340	155	114	4×22
50		200	338	165	127	8×18
65		250	358	190	149	8×22
80		250	374	210	168	8×22
100		250	402	255	200	8×22
125		250	425	280	235	8×22
150		300	458	320	270	12×22
200		350	522	380	330	12×26
250		450	574	445	387	16×30
300		500	624	520	451	16×32

## Integrated flange connection dimensions



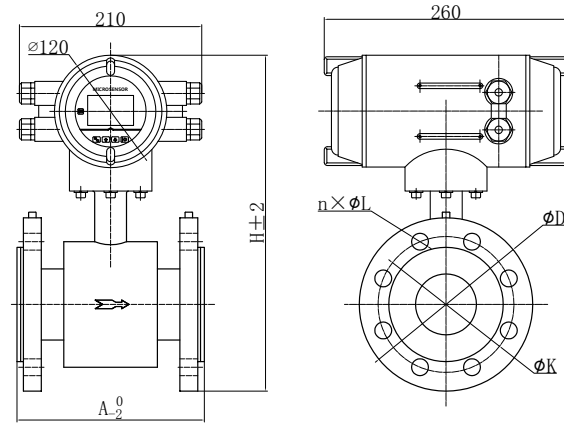
A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

## Integrated flowmeter dimensions

DN	Rated Pressure	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n×ΦL
25	ANSI 600LB	200	312	125	89	4×18
32		200	330	135	98	4×18
40		250	340	155	114	4×22
50		250	338	165	127	8×18
65		300	358	190	149	8×22
80		300	374	210	168	8×22
100		300	402	275	216	8×26
125		300	425	330	267	8×30
150		350	458	355	292	12×30
200		400	522	420	349	12×33
250		500	574	510	432	16×36
300		500	624	560	489	20×36



### Integrated flange connection dimensions

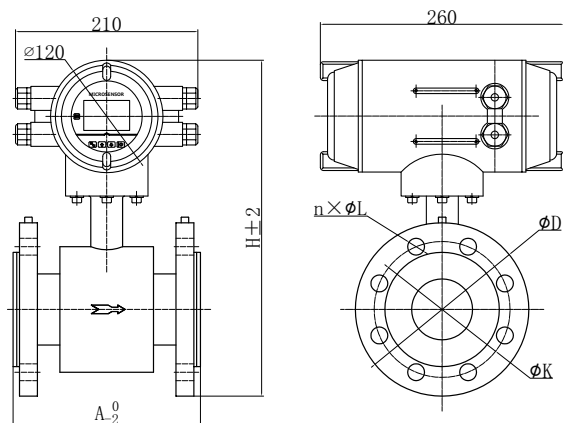


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

### Integrated flowmeter dimensions

DN	Rated Pressure	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n×ΦL
25	10K (JIS)	150	312	110	80	4×16
32		150	330	120	89	4×16
40		150	340	130	99	4×16
50		200	338	150	121	4×18
65		200	358	180	140	4×18
80		200	374	190	153	4×18
100		250	402	230	191	8×18
125		250	425	255	216	8×22
150		300	458	280	242	8×22
200		350	522	345	299	8×22
250		400	574	405	362	12×26
300		500	624	485	432	12×26

## Integrated flange connection dimensions

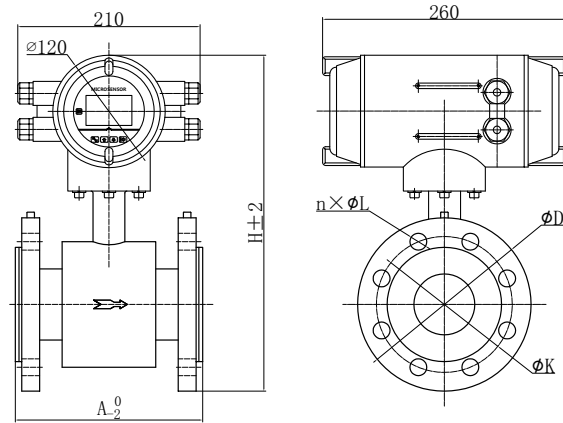


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

## Integrated flowmeter dimensions

DN	Rated Pressure	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n × $\varnothing$ L
25	20K (JIS)	150	312	125	90	4 × 19
32		150	330	135	100	4 × 19
40		150	340	140	105	8 × 19
50		200	338	155	120	8 × 19
65		250	358	175	140	8 × 19
80		250	374	200	160	8 × 23
100		250	402	225	185	8 × 23
125		250	425	270	225	8 × 25
150		300	458	305	260	12 × 25
200		350	522	350	305	12 × 25
250		450	574	430	380	12 × 27
300		500	624	480	430	16 × 27

### Integrated flange connection dimensions

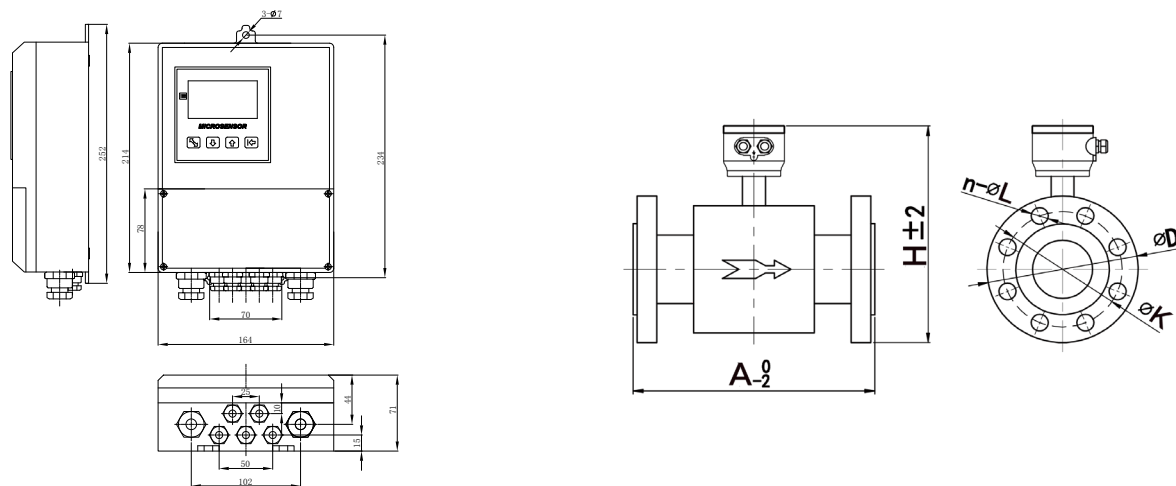


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

### Integrated flowmeter dimensions

DN	Rated Pressure	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n×φL
25	40K (JIS)	150	312	125	90	4×19
32		150	330	135	100	4×19
40		150	340	140	105	8×19
50		200	338	155	120	8×19
65		250	358	175	140	8×19
80		250	374	200	160	8×23
100		250	402	225	185	8×23
125		250	425	270	225	8×25
150		300	458	305	260	12×25
200		350	522	350	305	12×25
250		450	574	430	380	12×27
300		500	624	480	430	16×27

## Separated flange connection dimensions

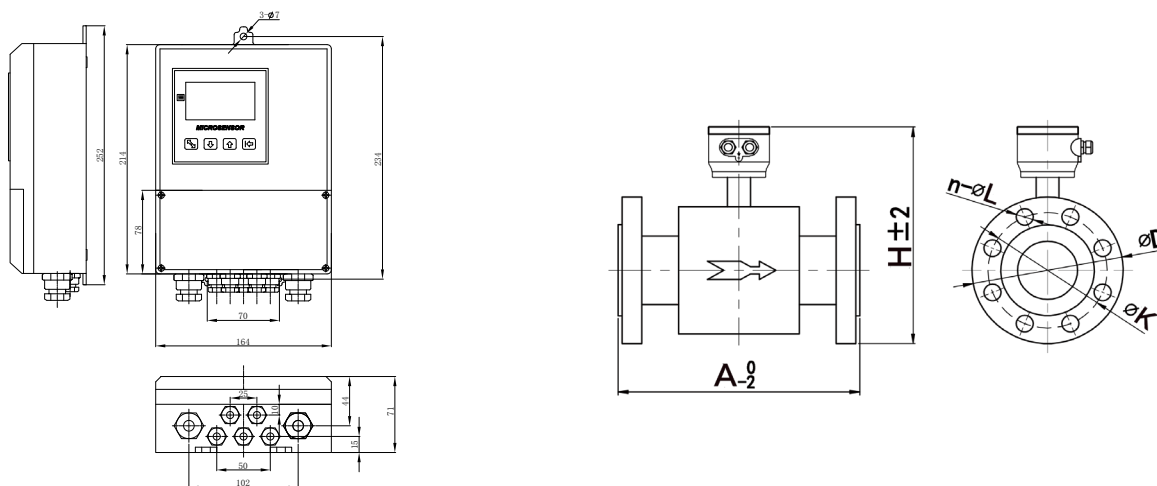


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

## Separated flowmeter dimensions

DN	Rated Pressure (MPa)	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n×φL
25	1.0 (DIN)	150	252	115	85	4×14
32		150	270	135	100	4×18
40		150	280	145	110	4×18
50		200	278	160	125	4×18
65		200	298	180	145	8×18
80		200	315	195	160	8×18
100		250	342	215	180	8×18
125		250	365	245	210	8×18
150		300	398	280	240	8×23
200		350	462	335	295	8×23
250		400	515	390	350	12×23
300		500	565	440	400	12×23
350		500	618	500	460	16×23
400		600	682	565	515	16×25

Separated flange connection dimensions

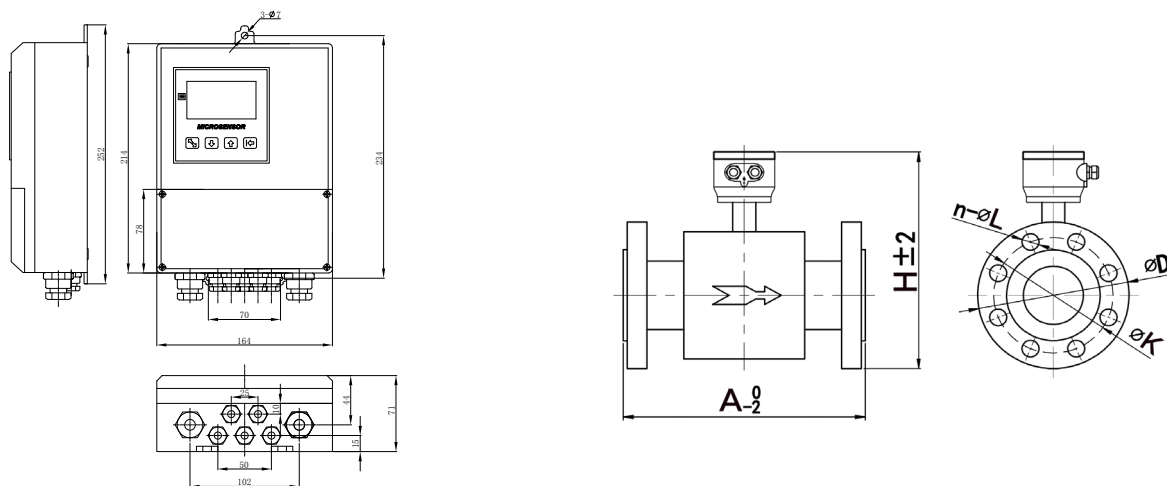


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

Separated flowmeter dimensions

DN	Rated Pressure (MPa)	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n × ΦL
25	1.6 (DIN)	150	252	115	85	4 × 14
32		150	270	140	100	4 × 18
40		150	280	150	110	4 × 18
50		200	278	165	125	4 × 18
65		200	298	185	145	8 × 18
80		200	315	200	160	8 × 18
100		250	342	220	180	8 × 18
125		250	365	250	210	8 × 18
150		300	398	285	240	8 × 23
200		350	462	340	295	12 × 23
250		400	515	395	350	12 × 25
300		500	565	445	400	12 × 25
350		500	618	500	460	16 × 25
400		600	682	565	515	16 × 30

## Separated flange connection dimensions

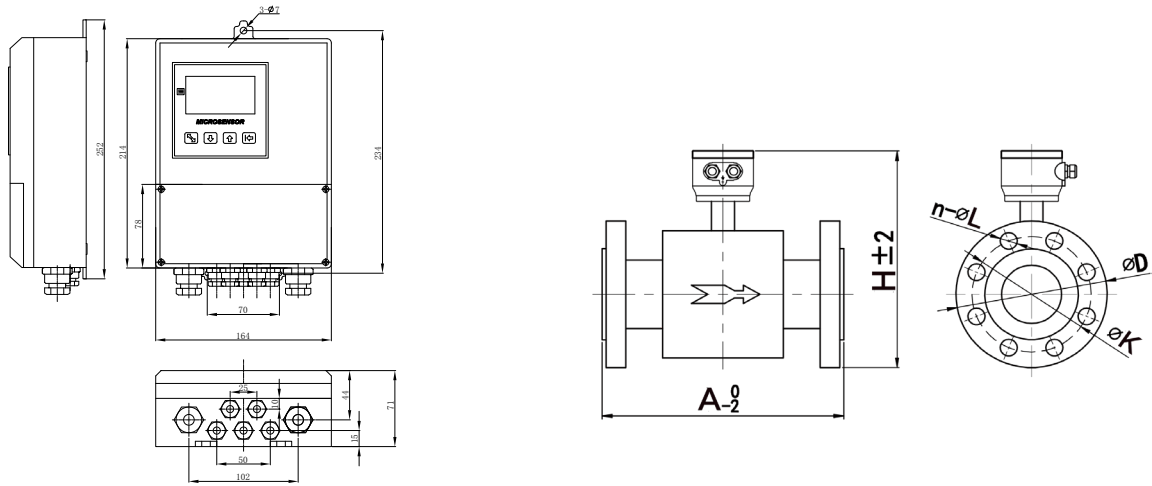


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

## Separated flowmeter dimensions

DN	Rated Pressure (MPa)	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n×φL
25	4.0 (DIN)	150	252	115	85	4×14
32		150	270	140	100	4×18
40		150	280	150	110	4×18
50		200	278	165	125	4×18
65		200	298	185	145	8×18
80		200	315	200	160	8×18
100		250	342	235	190	8×22
125		250	365	270	220	8×26
150		300	398	300	250	8×26
200		350	462	375	320	12×23
250		400	515	450	385	12×30
300		500	565	515	450	16×33
350		500	618	580	510	16×36
400		600	682	660	585	16×39

Separated flange connection dimensions

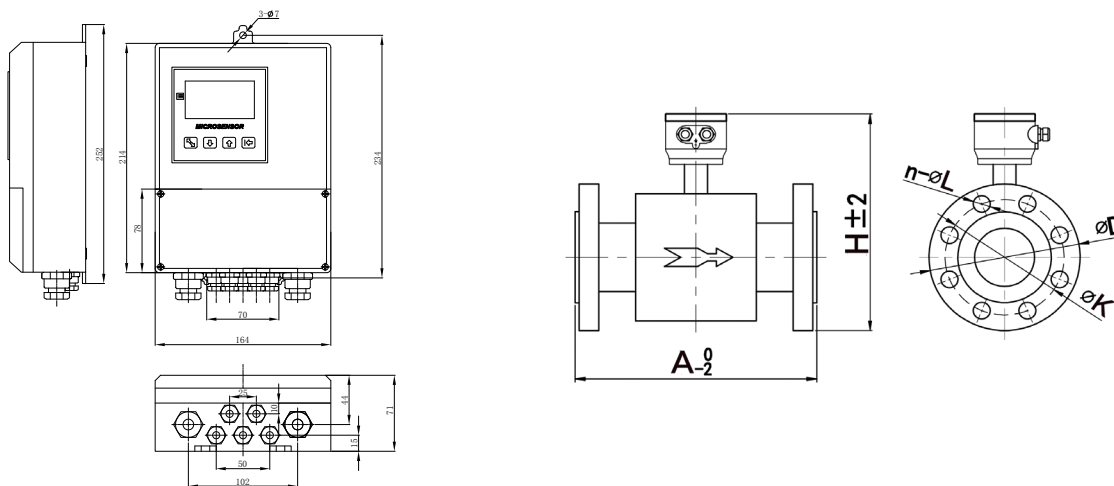


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

Separated flowmeter dimensions

DN	Rated Pressure	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n × φL
25	ANSI 150LB	150	250	110	80	4 × 16
32		150	260	120	89	4 × 16
40		150	260	130	99	4 × 16
50		200	272	150	121	4 × 18
65		200	298	180	140	4 × 18
80		200	309	190	153	4 × 18
100		250	337	230	191	8 × 18
125		250	364	255	216	8 × 22
150		300	398	280	242	8 × 22
200		350	465	345	299	8 × 22
250		400	510	405	362	12 × 26
300		500	546	485	432	12 × 26

## Separated flange connection dimensions



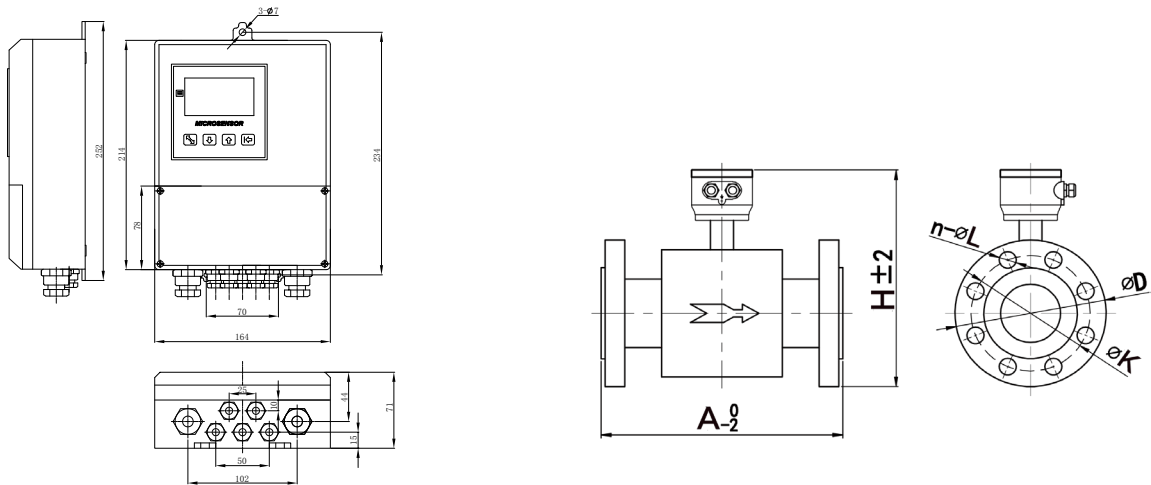
A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

## Separated flowmeter dimensions

DN	Rated Pressure	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n×φL
25	ANSI 300LB	150	252	125	89	4×18
32		150	270	135	98	4×18
40		150	280	155	114	4×22
50		200	280	165	127	8×18
65		250	300	190	149	8×22
80		250	314	210	168	8×22
100		250	342	255	200	8×22
125		250	366	280	235	8×22
150		300	400	320	270	12×22
200		350	464	380	330	12×26
250		450	516	445	387	16×30
300		500	566	520	451	16×32



Separated flange connection dimensions

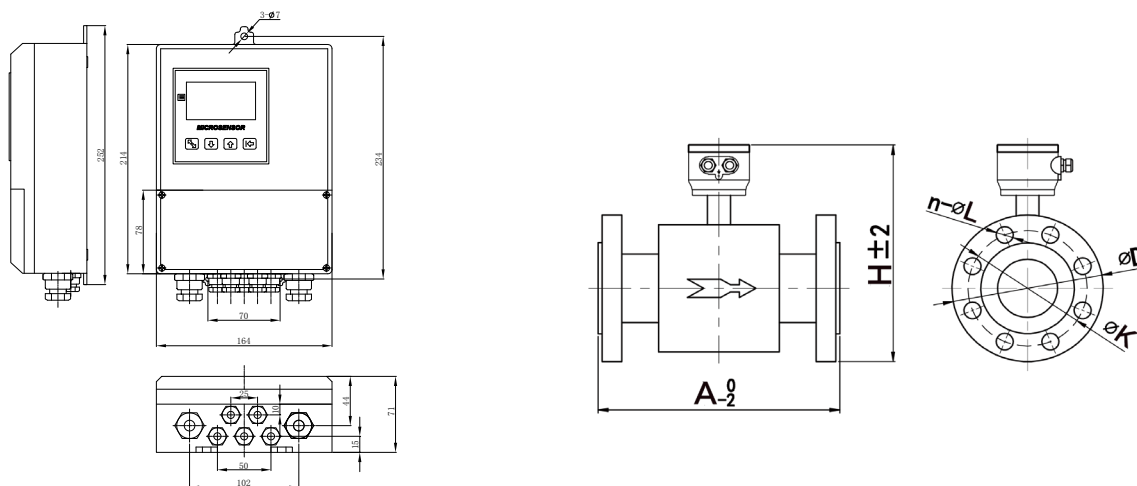


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

Separated flowmeter dimensions

DN	Rated Pressure	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n×φL
25	ANSI 600LB	150	252	130	95	4×19
32		150	270	140	105	4×19
40		150	280	160	120	4×23
50		200	280	165	130	8×19
65		250	300	200	160	8×23
80		250	314	210	170	8×23
100		250	342	250	205	8×23
125		250	366	300	250	8×27
150		300	400	355	295	12×33
200		350	464	405	345	12×33
250		450	516	475	410	12×33
300		500	566	540	470	16×39

## Separated flange connection dimensions

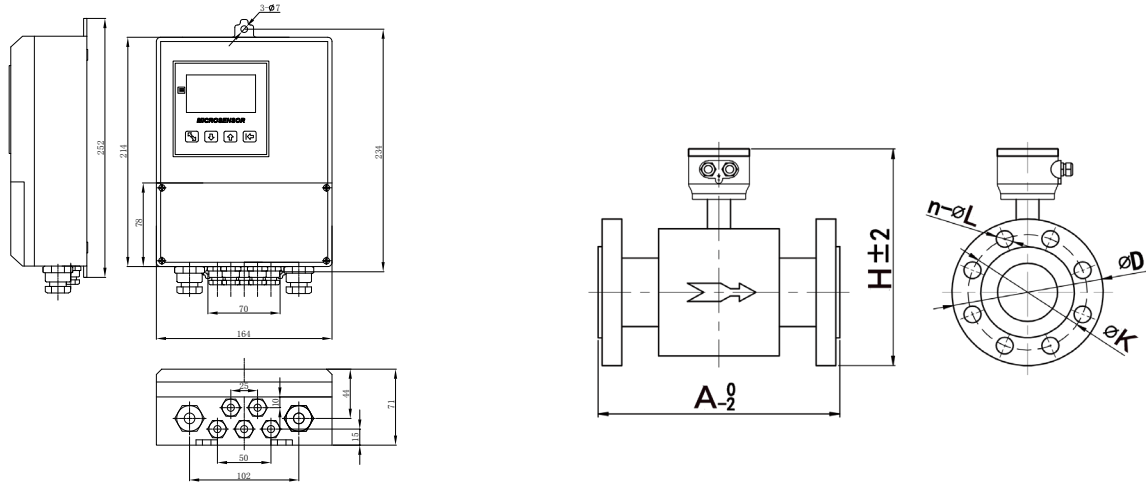


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

## Separated flowmeter dimensions

DN	Rated Pressure	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n×φL
25	10K (JIS)	150	247	110	80	4×16
32		150	267	120	89	4×16
40		150	275	130	99	4×16
50		200	270	150	121	4×18
65		200	295	180	140	4×18
80		200	307	190	153	4×18
100		250	337	230	191	8×18
125		250	366	255	216	8×22
150		300	398	280	242	8×22
200		350	460	345	299	8×22
250		400	514	405	362	12×26
300		500	566	485	432	12×26

Separated flange connection dimensions

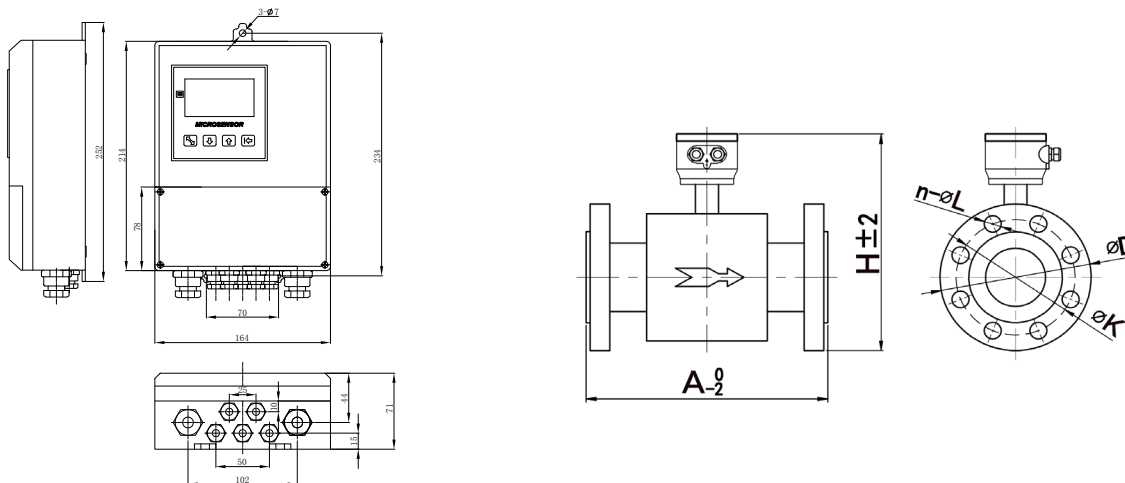


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

Separated flowmeter dimensions

DN	Rated Pressure	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n×φL
25	20K (JIS)	150	247	125	90	4×19
32		150	267	135	100	4×19
40		150	275	140	105	8×19
50		200	270	155	120	8×19
65		250	295	175	140	8×19
80		250	307	200	160	8×23
100		250	337	225	185	8×23
125		250	366	270	225	8×25
150		300	398	305	260	12×25
200		350	460	350	305	12×25
250		450	514	430	380	12×27
300		500	566	480	430	16×27

Separated flange connection dimensions

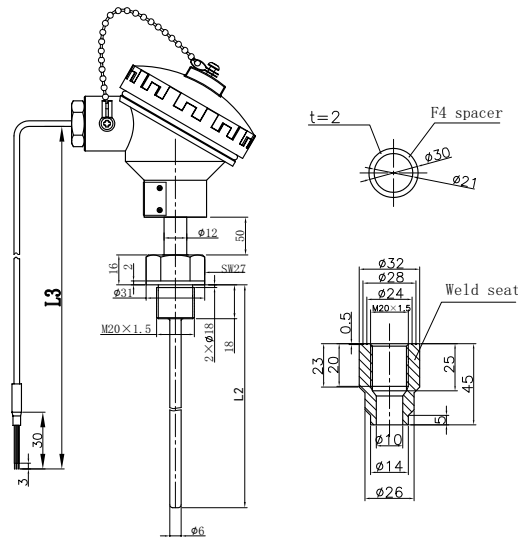


A: duct length of flowmeter; H: flowmeter height; N: bolt holes quantity; L: bolt hole diameter; K: center circle diameter of bolt hole; D: flange outside diameter.

Separated flowmeter dimensions

DN	Rated Pressure	Outline Dimension(mm)		Flange Connection Dimension(mm)		
		A	H	D	K	n × φL
25	40K (JIS)	150	247	130	95	4 × 19
32		150	267	140	105	4 × 19
40		150	275	160	120	4 × 23
50		200	270	165	130	8 × 19
65		250	295	200	160	8 × 23
80		250	307	210	170	8 × 23
100		250	337	250	205	8 × 23
125		250	366	300	250	8 × 27
150		300	398	355	295	12 × 33
200		350	460	405	345	12 × 33
250		450	514	475	410	12 × 33
300		500	566	540	470	16 × 39

## Temperature sensor dimensions (with weld seat)

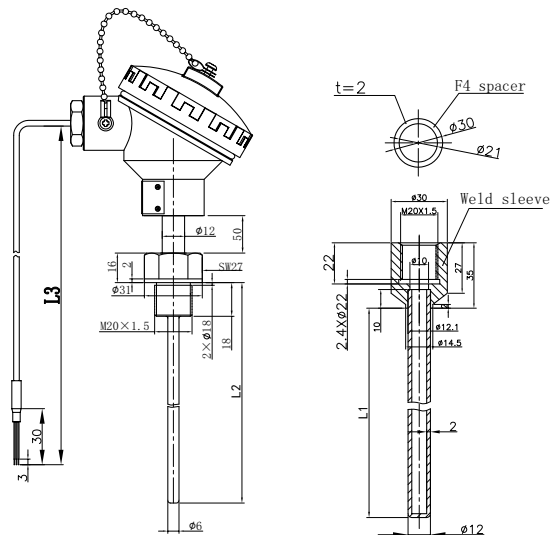


L2: Probe length; L3: length of cable

## Temperature sensor dimensions (with weld seat)

DN	Probe length L2	Length of cable L3	Specifications and models
25	55	8	WZP-55C8F
32	60	8	WZP-60C8F
40	65	8	WZP-65C8F
50	75	8	WZP-75C8F
65	85	8	WZP-85C8F
80	90	8	WZP-90C8F
100	100	8	WZP-100C8F
125	110	8	WZP-110C8F
150	125	8	WZP-125C8F
200	155	8	WZP-155C8F
250	175	8	WZP-175C8F
300	200	8	WZP-200C8F
350	225	8	WZP-225C8F
400	250	8	WZP-250C8F

## Temperature sensor dimensions (with weld sleeve)



L1: Welded length; L2: Probe length; L3: length of cable

## Temperature sensor dimensions (with weld sleeve)

DN	Welded length L1	Probe length L2	Length of cable L3	Specifications and models
25	12	45	8	WZP-612-C-45
32	16	49	8	WZP-612-C-49
40	20	53	8	WZP-612-C-53
50	25	58	8	WZP-612-C-58
65	32	65	8	WZP-612-C-65
80	40	73	8	WZP-612-C-73
100	50	83	8	WZP-612-C-83
125	65	98	8	WZP-612-C-98
150	80	113	8	WZP-612-C-113
200	100	133	8	WZP-612-C-133
250	125	158	8	WZP-612-C-158
300	150	183	8	WZP-612-C-183
350	175	208	8	WZP-612-C-208
400	200	233	8	WZP-612-C-233

Separated converter dimensions

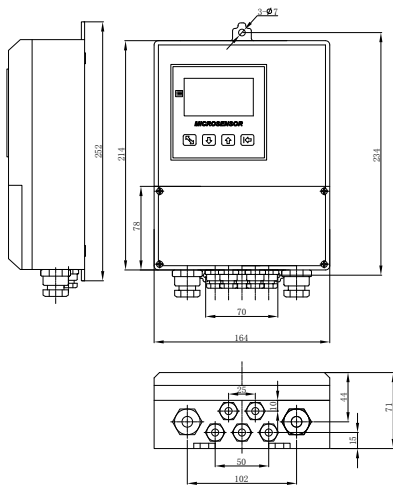


Figure 2 Separated wiring diagram

The separated type is generally used in on-site maintenance and debugging reading inconvenient occasions, but also used in more severe applications, such as high-temperature fluids and vibration sources. On most occasions, the integrated and separated types can both meet the requirements. When the diameter is  $\geq 500\text{mm}$ , the separated type is recommended or easy maintenance; when the meter is installed below the ground, the separated type. When the meter is unavoidably installed at the pump outlet, please choose a separated structure meter.

Electrical Connection

The electromagnetic flowmeter converter can be divided into integrated converter and separated converter, and the wiring diagram is shown in Figure 3 and Figure 4.

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

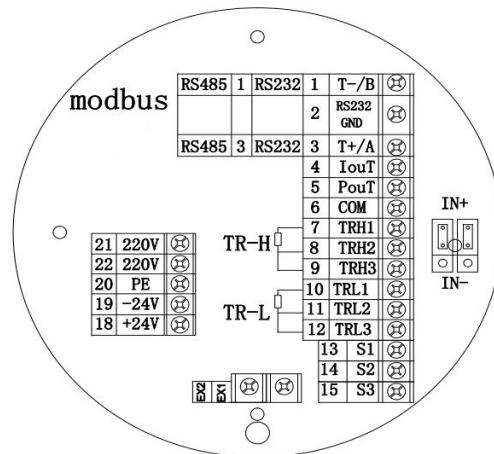


Figure 3 Integrated wiring diagram

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 4 for the specific meaning of the integrated electromagnetic flowmeter wiring terminals.

Table 2 Terminal definition of integrated type

Terminal	Symbol	Function
1	T-/B	RS485/RS232 communication output
2	RS232 GND	RS232 grounding wire
3	T+/A	RS485/RS232 communication input
4	IOuT	4mA~20mA DC output;
5	POuT	Pulse/frequency output
6	COM	Pulse/frequency output grounding wire
7	TRH1	Inlet thermal resistance
8	TRH2	
9	TRH3	
10	TRL1	Outlet thermal resistance
11	TRL2	
12	TRL3	
13	S1	Electrode wire
14	S0	Signal grounding wire
15	S2	Electrode wire
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	
	EX1	Exciting current+
	EX2	Exciting current-

## Separated wiring

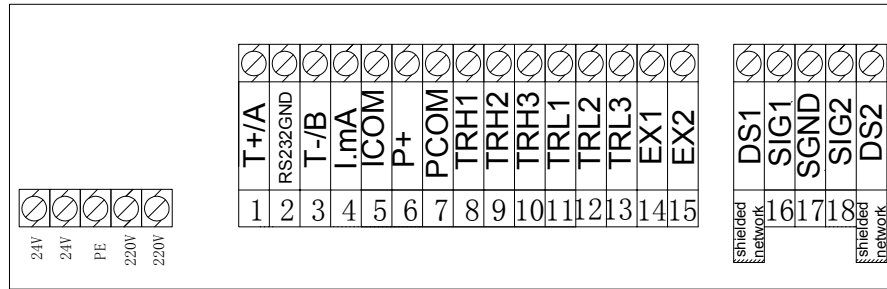


Figure 4 Separated wiring diagram

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 5 for the specific meaning of the integrated electromagnetic flowmeter wiring terminals.

Table 3 Terminal definition of separated type

Terminal Symbol	Function	
1	T+/A	RS485/RS232 communication output
2	RS232 GND	RS232 grounding wire
3	T-/B	RS485/RS232 communication input
4	I.mA	4mA~20mA DC output
5	Icom	Current output grounding wire
6	P+	2-way flow pulse output/frequency output
7	Pcom	Pulse output grounding wire
8	TRH1	Inlet thermal resistance
9	TRH2	
10	TRH3	
11	TRL1	Outlet thermal resistance
12	TRL2	
13	TRL3	
14	EX1	Exciting current+
15	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 power supply access
24V	24V	



### Installation

In order to ensure the heat accuracy, usually a single-flow sensor for measuring cold and heat should be installed at the water inlet, as shown in Figure 5. The flow direction of the fluid is the same as the arrow on the energy meter.

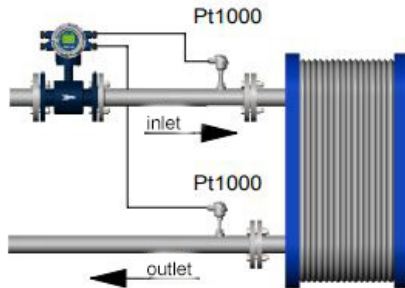


Figure 5

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

The correct installation method of the energy meter should ensure that the pipe is filled with liquid and should not be installed high on the pipe, as shown in Figure 6.

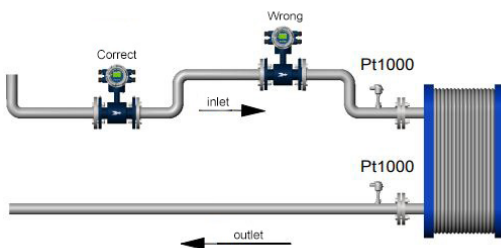


Figure 6

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

When there are valves at the front and rear of the flowmeter, the front and rear straight pipe must meet the front 5D and rear 2D installation methods at least, and the valve must be fully open, as shown in Figure 7.

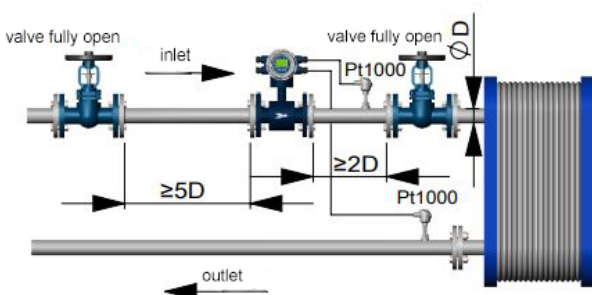


Figure 7

When energy meter is installed at the back end of T-tube, the flowmeter and T-tube shall have a minimum of 5D straight pipe segments, as shown in Figure 8.

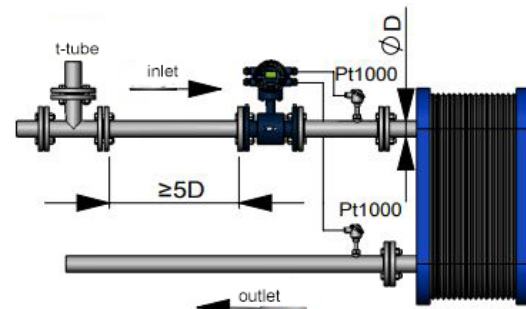


Figure 8

When energy meter is installed at the back end of 90°elbow pipe, at least 5D straight pipe are needed between the flowmeter and the tail end of the elbow, as shown in Figure 9.

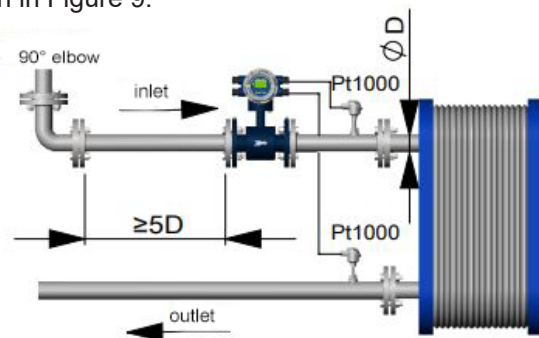


Figure 9

When energy meter is installed at the back end of the expanded diameter pipe, the flowmeter and the back end of the expanded diameter pipe need to ensure a minimum of 10D straight pipe, as shown in Figure 10.

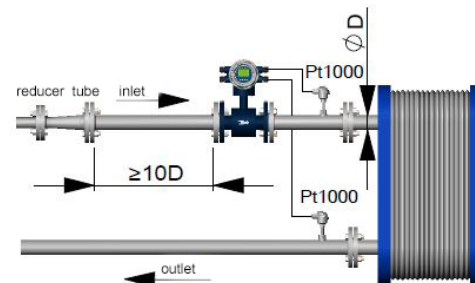


Figure 10

When the energy meter is installed at the back end of the valve and the valve is not fully open, the flowmeter and the back end of the valve need to ensure a straight pipe section of at least 10D, as shown in Figure 11.

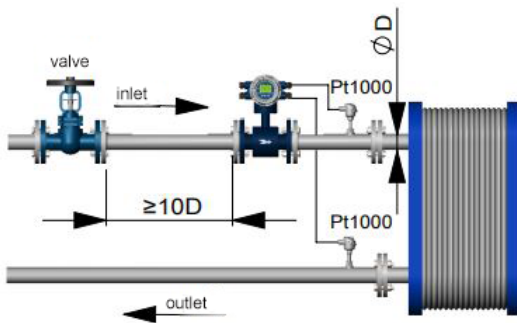


Figure 11

The energy meter should use the principle of radio frequency, strong magnetic field, strong vibration and other interference sources as much as possible, such as pumps and other equipment, to avoid their interference on the measurement, as shown in Figure 12.

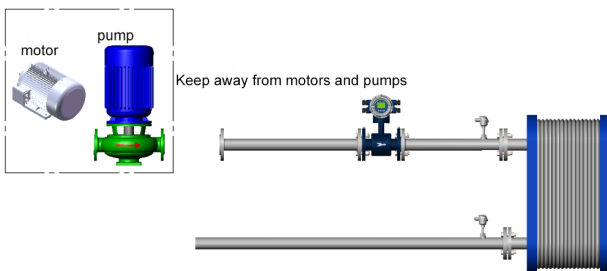


Figure 12

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.

When there are valves at the front and rear of the flowmeter, the front and rear straight pipe must meet the front 5D and rear 2D installation methods at least, and the valve must be fully open, as shown in Figure 13.



Figure 13

### Attention to wiring

1. In order to ensure the insulation in the sensor junction box and prevent poor insulation caused by moisture, do not connect cables outdoors in rainy days.
2. Both ends of the power cable and signal cable should be covered with round lugs.
3. It is recommended to use conduit, thick and strong steel pipe or flexible metal pipe can be used for the conduit.
4. All power cables and signal cables other than 4-core 24VDC must be equipped with metal cable protection tubes.
5. When the waterproof sealing cable joint is provided, the waterproof sealing cable joint should be tightened to ensure no water seepage in the box.
6. In order to protect the operator and maintenance personnel from electric shock and prevent the influence of external noise, the ground should be connected to the sign ( $\leq 10\Omega$ ).

### Noise Suppression

Do not install Electromagnetic Flowmeter near motors, transformers or power device which is easy to cause induction interference.

## Sensor Grounding

Since the voltage of inductive signal of electromagnetic flowmeter is small, it is easily affected by noise. Its reference potential must be the same to the measured liquid potential. Therefore, the reference potential of the sensor (terminal potential), the reference potential of converters and amplifiers are also the same to measured liquid potential, and the liquid potential have to be the same as the ground potential. The electromagnetic flowmeter is equipped with a ground loop, which is for establishing a liquid ground via contact with liquid, and for protecting lining meanwhile.

The instrument grounding is shown as below:

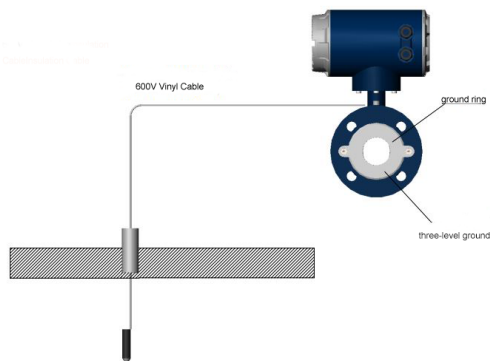


Figure 14 Instrument grounding

## Electromagnetic Energy Flowmeter Product Manufacturing Standard

- JB/T 9248-2015 Electromagnetic Flowmeter
- JJG 1033-2007 Verification Regulations
- GB/T 9124.1-2019 Steel Pipe Flange
- GB/T 17626.2-2018 EMC Electrostatic discharge test
- GB/T 17626.3-2016 EMC Radio frequency electromagnetic field radiation
- GB/T 17626.4-2008 EMC Burst disturbance
- GB/T 17626.5-2019 EMC Measurement Techniques Surge (Shock) Immunity Test
- GB/T 17626.8-2006 EMC Power frequency magnetic field disturbance
- GB/T 4208-2017 Protection class

## Order Guide

### MFE600H - AS0 - 100 - 105 - 1.6E1 - 0001 - 0110

MFE600H	Electromagnetic Energy Flowmeter		
AS0	Code	Sensor type	
	AS0	Standard	
100	Code	Pipe diameter	
	xxx	For example: 100 represents DN100	
	25	DN 25 1"	1.45 .... 20.27 m³/h
	32	DN 32 1 1/4"	2.26 .... 31.67 m³/h
	40	DN 40 1 1/2"	3.53 .... 49.48 m³/h
	50	DN 50 2"	5.97 .... 83.62 m³/h
	65	DN 65 2"	9.04 .... 126.67 m³/h
	80	DN 80 3"	14.14 .... 197.92 m³/h
	100	DN 100 4"	22.08 .... 309.25 m³/h
	125	DN 125 5"	31.80 .... 445.32 m³/h
	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
1	Code	Electrode Type	
	1	Standard	
0	Code	Electrode Material	
	0	SS316L	
	1	Platinum (Pt)	
	2	Hastelloy BB(HB)	
	3	Tantalum (Ta)	
	4	Titanium (Ti)	
5	HastelloyC (HC)		
5	Code	Lining material	
	1	PFA DN25-DN500 Max medium Temp. 150°C	
	2	NR DN25-DN1600 Max medium Temp. 60°C	
	3	CR DN50-DN1600 Max medium Temp. 60°C	
	4	PU DN25-DN500 Max medium Temp. 60°C	
	5	PTFE DN25-DN1600 Max medium Temp. 120°C	
	6	F46 DN6-DN600 Max medium Temp. 150°C	
	9	Others	

1.6	Code	Rated pressure	
	4.0	PN40 DIN2501, EN 1092-1 DN25-DN400	
	1.6	PN16 DIN2501, EN 1092-1 DN25-DN400	
	1.0	PN10 DIN2501, EN 1092-1 DN25-DN400	
	150LB	Class 150 ASME B16.5 DN25-DN300	
	300LB	Class 300 ASME B16.5 DN25-DN300	
	600LB	Class 600 ASME B16.5 DN25-DN300	
	10K	JIS 10K DN25-DN300	
	20K	JIS 20K DN25-DN300	
	40K	JIS 40K DN25-DN300	
9	Others		
E	Code	Measuring medium temperature	
	E	≤60°C	
H	≤120°C		
1	Code	Ground mode	
	1	With electrode	
	2	304 Ground ring	
	9	Others	
00	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	
	0	4mA-20mA	
	9	Others	
1	Code	Digital output	
	0	Without	
	1	RS485 MODBUS RTU	
9	Others		
0	Code	Sensor material	
	0	Carbon Steel	
	1	304 Stainless steel	
9	Others		
1	Code	Connection mod	
	1	Flange	
9	Others		
1	Code	Accessories	
	0	Without	
	1	Carbon steel companion flange	
	2	304 Stainless steel companion flange	
9	Others		
0	Code	Power supply	
	0	220V AC 100-240V	
	1	24V DC 18V-28V	
	2	12V DC	
	9	Others	

**Note:**

1. The power supply is 24V or 220V, with 4~20mA output and frequency/pulse output by default.
2. If the power supply is battery powered, the default is with RS485.
3. When the temperature is higher than 80°C , recommended to choose Separated converter.

**Example:**

MFE600H-AS0-100-105-1.6E1-0001-0110

Explanation: MFE600H Electromagnetic Energy flowmeter; DN100 diameter; fixed stainless steel 316L electrodes; PTFE lining; rated pressure 1.6MPa; media temp. 0 °C ~60 °C ; IP65 protection, integrated, with 4mADC~20mADC and RS485 digital signal; carbon steel sensor; flange connection; with companion mounting flange (including bolts and nuts), 100VAC~240VAC power supply; full range 200m<sup>3</sup>/h .

The selection of electromagnetic flowmeter should be carried out by technicians who are familiar with the on-site process conditions. The appropriate diameter, lining material, electrode, etc. should be selected according to the order guide, and determined by the end users who are familiar with the on-site process conditions.

**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

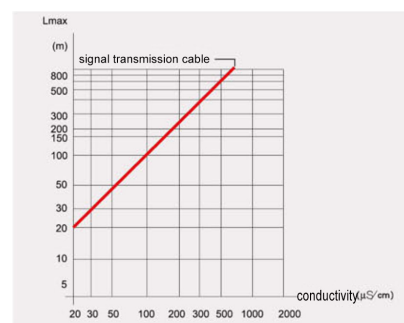
- 3) The maximum flow and the minimum flow must conform to the values of the flow range in table 7.
- 4) The actual maximum working pressure must be less than the rated working pressure of the flowmeter.
- 5) The maximum and minimum working temperature must meet the requirements specified in the flowmeter.
- 6) Confirm whether there is negative pressure in process pipeline.

**Attentions****1)Flow range**

When measuring clean media, the economical flow rate is (1.5 ~ 3) m/s. When measuring the easy-to-crystallize solution, the flow rate should be appropriately increased, (3 ~ 4) m/s is appropriate, which plays the role of self-cleaning and preventing adhesion and deposition. Practical applications rarely exceed 7m/s, and more rarely than 10m/s.

A limitation in the selection is that media with conductivity below 5  $\mu\text{S}/\text{cm}$  cannot be used.

The figure 15 below shows the relationship between the cable used in the split type and the conductivity of the medium.



For example: the conductivity of general water is about 100 $\mu\text{S}/\text{cm}$ , and the maximum distance of the split is about 100m (the conductivity of the acid-base salt solution is large, and the split distance can exceed 100m, and the specific value can be determined according to the conductivity and the copper core of the cable).

**Table 7 Flow range**

Velocity m/s Flow m <sup>3</sup> /h DN mm							
	0.5	1	2	3	4	5	7
25	0.8836	1.7671	3.5343	5.3014	7.0686	8.8357	12.3700
32	1.4476	2.8953	5.7906	8.6859	11.5812	14.4765	20.2670
40	2.2619	4.5239	9.0478	13.5717	18.0956	22.6195	31.6673
50	3.5343	7.0686	14.1372	21.2058	28.2743	35.3429	49.4800
65	5.9730	11.9459	23.8918	35.8377	47.7836	59.7295	83.6213
80	9.0478	18.0956	36.1911	54.2867	72.3823	90.4779	126.6690
100	14.1372	28.2743	56.5487	84.8230	113.0973	141.3717	197.9203
125	22.0893	44.1786	88.3573	132.5359	176.7146	220.8932	309.2505
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

## 2) Electrode material

Table 5 Electrode material property

Material	Corrosion resistance	Applicability
316L	Domestic water, industrial water, raw water, groundwater, urban sewage, treated neutral industrial sewage	<input checked="" type="checkbox"/>
	Acid, alkali, salt	<input type="checkbox"/>
Hastelloy B (HB)	Weak organic acid	<input checked="" type="checkbox"/>
	Reducing acids such as nitric acid, hydrochloric acid, phosphoric acid, and hydrofluoric acid	<input type="checkbox"/>
Hastelloy C (HC)	Oxidizing salts such as Fe <sup>3+</sup> , sea water	<input checked="" type="checkbox"/>
	Reducing acids such as nitric acid, hydrochloric acid, phosphoric acid, and hydrofluoric acid	<input type="checkbox"/>
Titanium (Ti)	Chloride (chloride/magnesium/aluminum/calcium/ammonium/iron, etc.)	<input checked="" type="checkbox"/>
	Ammonia, sodium salt, potassium salt, ammonium salt, hypochlorite, sea water	
	Sodium hydroxide, potassium hydroxide, ammonium hydroxide, barium hydroxide and other alkaline solutions with a concentration of less than 50%	
	Nitric acid, hydrochloric acid, sulfuric acid, phosphoric acid, hydrofluoric acid and other reducing acids	<input type="checkbox"/>
Tantalum (Ta)	Hydrochloric acid (concentration less than 40%), dilute sulfuric acid and concentrated sulfuric acid	<input checked="" type="checkbox"/>
	Chlorine dioxide, ferric chloride, hypochlorous acid, sodium cyanide, lead acetate, etc.	
	Oxidizing acid such as nitric acid, aqua regia with temperature lower than 80°C	
	Alkali, hydrofluoric acid	<input type="checkbox"/>
Platinum (Pt)	Almost all acid, alkali, salt solutions	<input checked="" type="checkbox"/>
	Aqua regia, ammonium salt	<input type="checkbox"/>
Wolfram carbide (WC)	Treated neutral industrial sewage, domestic sewage, can resist the interference of solid particles	<input checked="" type="checkbox"/>
	Acid, alkali, salt	<input type="checkbox"/>

## 3) Lining material

Table 6 Lining material property

Lining Material	Symbol	Property	Working temp.	Applicable liquid	Applicable diameter
Neoprene	CR	Medium abrasion resistance, resistant to corrosion by low-concentration alkali and salt	-10°C~ 60°C	Tap water, domestic sewage	DN50 ~ DN400
Natural rubber	NR		-10°C~ 60°C		
Polyurethane rubber	PU	Excellent abrasion resistance, poor acid and alkali resistance	-10°C~ 60°C	Pulp, mineral pulp and other slurries	DN50 ~ DN400
Polytetrafluoro ethylene	F4 (PTFE)	The chemical performance is very stable, resistant to the corrosion of boiling hydrochloric acid, sulfuric acid, aqua regia and concentrated alkali	-20°C~ 120°C	Corrosive acid, alkali, salt liquid	DN25 ~ DN400
Polyperfluoro ethylene propylene	F46 (FEP)	The chemical performance is equivalent to F4, and the compressive and tensile strength is better than F4	-20°C~ 150°C	Corrosive acid, alkali, salt liquid	DN25 ~ DN400
Copolymer of tetrafluoroethylene and perfluorinated hydrocarbon vinyl ether	PFA	The chemical properties are equivalent to F46, and the compressive and tensile strength is better than F4	-20°C~ 150°C	Corrosive acid, alkali, salt liquid	DN25 ~ DN400