Flow Meter

Brief Operating Instructions

QS-Q53F-E02

Contents

Chapter 1 Safety Instructions

Display Convention

Danger!

This symbol signifies related and important safety tips.

Warning!

Such warnings must be paid attention to. Slight negligence may lead to serious health threat, and may damage the equipment itself or the operating factory facilities.

Tips!

This symbol signifies related important information concerning operating instrument.

Safety Instructions for Operators

Warning!

Only corresponding personnel who got trained and authorized is allowed to install, use, operate and maintain the equipment. This document will help you to establish favorable operating conditions so as to make sure that you use the equipment in a safe and effective way.

Chapter 2 Installation

2.1 Scope of Delivery

Tips!

Please check whether the boxes are damaged or not, and whether they have been handled roughly or not. Please report the damage to the deliverer and the manufacturer.

Note!

Please check the packing list to make sure that all the goods you received are integrated.

Note!

Please check the name plate of the equipment, and confirm whether the power supply is the same as your order. If incorrect, please contact manufacturer or supplier.

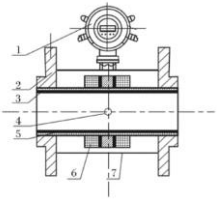
2.2 Product description

Electromagnetic flow meters are only suitable for measuring the instantaneous flow rate of liquids or liquid-solid two-phase fluids with conductivity, and have flow accumulation function.

The following models are available:

- Integrated type (signal converter directly installed on the measuring sensor)
- Split type (connecting measurement sensors and signal converters through excitation cables and signal cables)
- Pipeline type

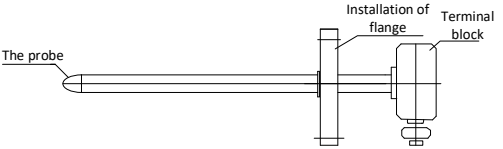
As shown in the figure below, the electromagnetic flowmeter mainly consists of the following parts:



1- conveter; 2- flange; 3- insulation lining;
4- electrode; 5- measuring tube;
6- excitation coil; 7- shell

- Insertion type

The sensor mainly consists of a detection probe, an installation flange, and a junction box (for split type installation).



2.3 Name Plate

Note！

Please check the name plate of the equipment and confirm whether the power supply is the same as your order and is correct. If incorrect, please contact the manufacturer.

The following figure shows the reference content of the nameplate:

Flow Meter

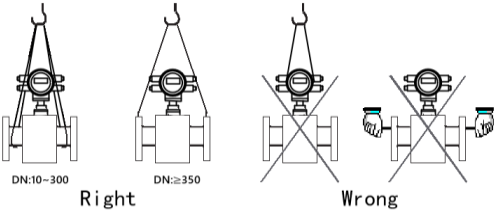
MODEL	DN40		
PRESSURE	4.0MPa	VOLTAGE	AC 220V
SIZE	DN40	PROTECTION	IP65
FACTOR	1.00000	FLUID TEMP.	(0~120)℃
RANGE	(2.3~23)m^3/h	AMB. TEMP.	(-10~60)℃
ELECTRODE	316L		
LINING	PTFE	PN	24074865
ACCUARCY	0.5%	DATE	2024-08-01

2.4 Storage

- The instrument should be stored in a dry and clean place.
- Avoid exposure in direct sunlight for long.
- Instrument should be stored in the original package.

2.5 Transport

(1) Be careful when unpacking and do not damage the instrument panel. When lifting the instrument, use an installation ring and do not use a rod or rope to pass through the sensor measuring tube to lift the instrument. The correct lifting method is shown in the following figure。



(2) Prevent instruments from being subjected to vibration

Prevent heavy drops and pressure on the instrument, especially the surface of the flange, which may damage the lining and prevent the instrument from working properly.

2.6 Installation of flow meter

2.6.1 Installation Requirements

Note!

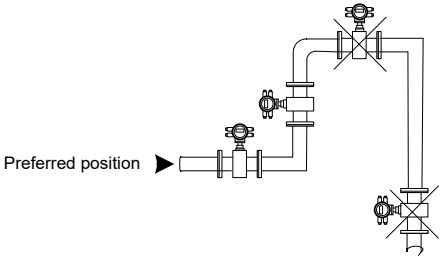
In order to ensure the installation reliably , the following measures must be taken.

- Enough space should be spared by its side
- Converter shouldn't be suffered by violent vibration

(1) Flow direction

This flowmeter can be set to automatically detect forward and reverse flow directions, and the flow arrow on the sensor housing indicates the manufacturer's specified forward flow direction.

Preferred position for electromagnetic flowmeter installation



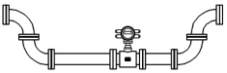
Pipe to the highest point (air bubble concentration in the measurement tube easy to generate measurement error!)

Easy to produce non - full tube measurement error!

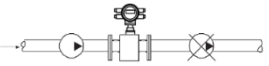
(2) The liquid should always fill the pipeline

The pipeline structure should ensure that the electromagnetic flowmeter measuring tube is always filled with liquid

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



The liquid should always fill the pipeline



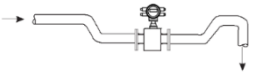
Electromagnetic flowmeter cannot be installed on the suction side of the pump

(4) Long pipeline

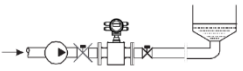
Generally, control valves are installed downstream of electromagnetic flow meters.

(5) Open discharge pipeline

The electromagnetic flowmeter should be installed at the bottom section (lower part of the pipeline)



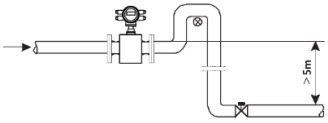
Long pipeline



Open discharge pipeline

(6) Places where the pipeline drop exceeds 5 meters

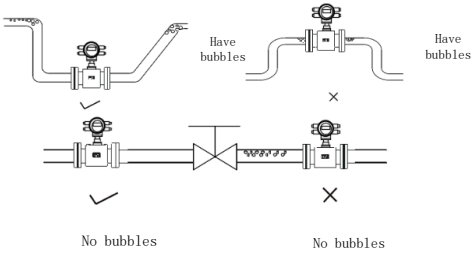
An air valve should be installed downstream of the electromagnetic flowmeter



Places where the pipeline drop exceeds 5 meters

(7) No bubbles in the pipe

The flow meter should be installed upstream of the valve. At the same time, instruments should also be installed in the low range to reduce the impact of air bubbles carried in the fluid on the measurement.



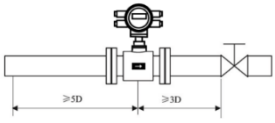
(8) Grounding

Because the induced signal voltage of electromagnetic flow meters is very small and easily affected by external noise or other electromagnetic signals, electromagnetic flow meters need to be grounded in many situations.

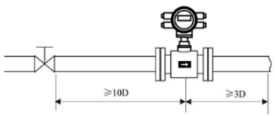
2.6.2 Installation conditions

(1) Length of straight pipe section

To ensure the measurement accuracy of the flowmeter, it is recommended to ensure that the length of the upstream straight pipe section of the sensor is at least 5 times the pipe diameter (5D), and the length of the downstream straight pipe section is at least 3 times the pipe diameter (3D).



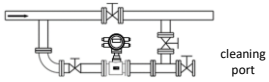
valve is located downstream of the sensor



valve is located upstream of the sensor

(2) For pipelines that do not allow flow interruption in the process

When installing an electromagnetic flowmeter, a bypass pipe and a cleaning port should be added, as shown in the figure on the right



(3) Support for electromagnetic flowmeter

Do not install electromagnetic flow meters in isolation on pipelines with free vibration. Instead, use an installation base to secure the measuring tube

2.6.3 Machinery installation

(1) Installation of flowmeter pipeline

(1) Before installing the flowmeter, the pipeline should be calibrated to ensure that the diameter of the instrument has good coaxiality with the user's pipeline. For sensors with a nominal diameter of less than 50mm, the axis should not be higher than 1.5mm, the nominal diameter of 65-300mm should not exceed 2mm, and the nominal diameter of 350mm and above should not exceed 4mm.

(2) Newly installed pipelines generally have foreign objects (such as welding slag), which should be washed away before installing the flowmeter.

(2) Installation of flow meter

(1) Installation direction

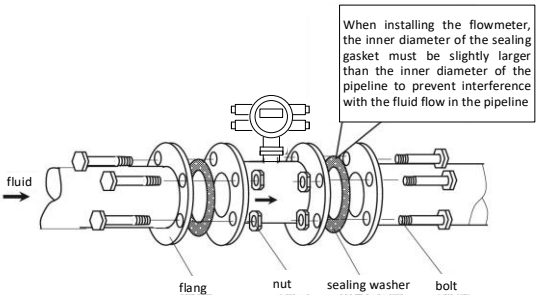
The flow direction of the measured fluid should be consistent with the flow direction mark of the flowmeter.

(2) The flange gasket installed between flanges should have good corrosion resistance and should not extend into the interior of the pipeline.

(3) Isolation measures should be taken when welding or flame cutting the pipeline near the sensor.

(4) If installed in a manhole or immersed in water for operation, the sensor junction box must be sealed with sealant after system installation and commissioning.

(5) During on-site installation, bolts are used to connect the flange on the sensor to the flange on the pipeline; Simultaneously use flat pads and spring washers.



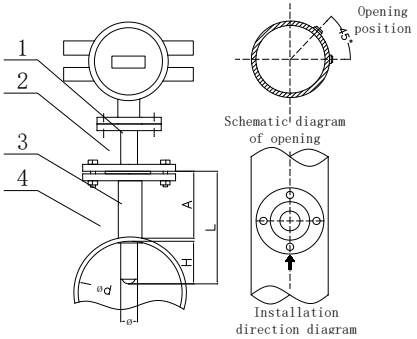
(1) After opening the instrument box, attention should be paid to the protection of the flange.

(2) Do not open the junction box cover before electrical wiring, and ensure waterproof sealing as soon as possible after wiring is completed.

(3) After the instrument is installed, long-term disuse should be avoided.

2.7 Installation of plug-in electromagnetic flowmeter

The fixing method of the sensor adopts flange connection. Calculate the length of the base connecting pipe based on the pipe diameter, and then weld the base to the pipe opening by making a hole in the pipe. The specific dimensions and material specifications are shown in the figure.



(1) DN200mm, DN300mm, DN400mm (installed without pressure)

1	Sensor (L×Φ)	182×Φ38
2	Flange	DN (40) 1.6MPa
3	Nipple	Φ45
4	Piping	Φd×S

Installation principle: Ensure the depth of electrode insertion into the water pipe

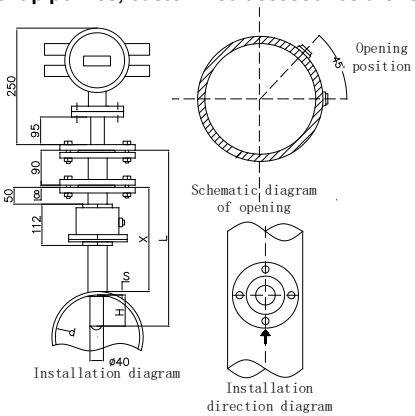
H=(d-2s) 10%, i.e. A=182- (H+S)

It is recommended to install under pressure when the production equipment is not allowed to shut down.

(2) DN100-700, DN800-1200, DN1400-3000 (pressure installation)

Name/Caliber	DN100-700	DN800-1200	DN1400-3000
Sensor (L×Φ)	400×Φ38	450×Φ38	600×Φ38
Sealing components (provided by the manufacturer)	Φ45×3		
Transition flange	DN40 1.6Mpa		
Ball valve	DN50		
Connecting pipe	Φ50		
Piping	Φd×S		

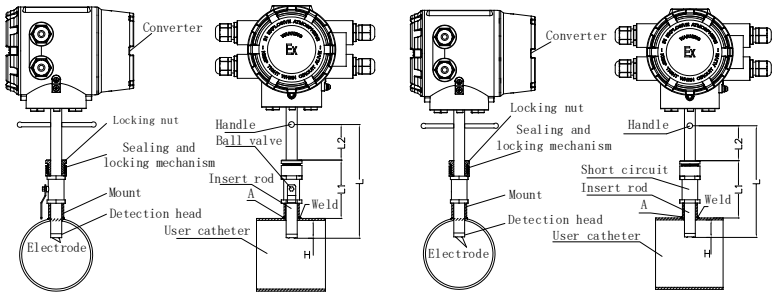
Note: The above are all steel pipe installation selections. If installing in cast iron or cement pipelines, customized accessories are required.



Step: Weld the base to the measuring pipeline, install the root ball valve, use a dedicated pipeline drilling machine to open the hole under pressure, close the ball valve to prevent overflow, connect the seal, and install the sensor. Pressure installation does not affect production, specific specifications are shown in the left figure.

Plug-in valve fastening type

The following figure shows two structures of sensors with and without ball valves.



With ball valve Without ball valve

Please follow the following program steps for installation.

Operate according to the diagram above, lift the detection rod until the electrode is level with A, then measure and record L2.

Installation steps:

1. Ensure that the user's pipeline is level, with sufficient straight pipe sections (5DN in front and 3DN in the back) before and after the sensor, and the flow control valve is located outside the downstream 3DN.
2. Drill a hole with a diameter of 60-62mm directly above the pipeline.
3. Weld the installation parts to the opening, ensuring that the lower end is flush with the inner surface of the pipeline and sealed.
4. Pull out the detection rod and detection head, and the user must not open the connection.
5. Install the ball valve and sealing mechanism onto the installation components.
6. Insert the detection rod, tighten the nut, confirm that the L2 size remains unchanged, and the installation is complete.

Extraction steps:

1. Loosen the set screw and lock nut, and loosen the sealing pressure ring.
2. Lift up the handle, close the ball valve, and remove the insertion rod.

According to the above figure, L=L1+L2+H，L2=L-L1-H， The relationship between insertion depth H and pipe diameter D is shown in the table below.

Name/Caliber	Insertion depth H
DN100	Bottom (not in contact with the pipe wall)
DN125-450	0.5D
DN500-DN700	0.25D
DN800-DN3000	0.125D

Chapter 3 Electrical Connection

3.1 Safety Tips

Danger!

Only when power is switched off, can we do all the work about electrical connections. Please pay all attention to the power supply on the name plate!

Danger!

Please observe national installation regulations

Danger!

Please strictly observe local occupational health and safety regulations. Only those who have got properly trained are allowed to operate on the electrical equipment.

Tips!

Please check the name plate of the equipment, and confirm whether the supply is the same as your order. Check whether voltage and E-supply on the nameplate is correct. If incorrect, please contact manufacturers.

3.2 Connect Signal and Magnetic Field Current Cable

Danger!

Only when power is cut off can you connect signal and magnetic field current conductor.

Danger!

The equipment must be grounded in accordance with regulations so as to protect the operator from electrical shock.

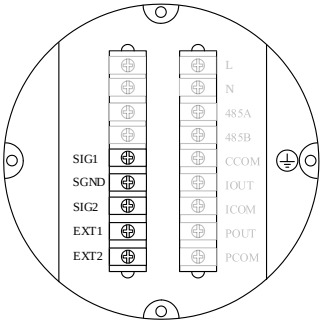
Danger!

For instruments used in areas with explosive hazards, it is also necessary to pay attention to the safety technical tips provided in the specialized explosion-proof manual.

Warning!

Please strictly observe local occupational health and safety regulations. Only those who have got properly trained are allowed to operate on the electrical equipment.

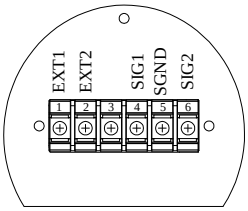
Separate type



Connection illustration

- Excitation line:
  EXT1-- Sensor excitation coil positive terminal
  EXT2--Sensor excitation coil negative terminal
- Signal line:
  SIG1--- The positive electrode sensor signal
  SIG2--- The negatve electrode sensor signal
  SGND-- Signal earth

Split junction box



SIG1，SIG2： Positive signal， negative signal
SGND： Signal ground
EXT1，EXT2： Excitation positive，Excitation negative
Excitation signal and sensor signals are connected via the signal line and split converter.

3.3 Measurement Sensor Ground

Danger!

There allows no permission of potential difference between measurement sensor and housing or converter protection ground.

- Measurement sensor must be fully grounded
- Grounding conductor should not transfer any disturbing voltage.
- Grounding conductor is not allowed to be connected to other electrical equipment at the same time.

3.4 Connected to Power

Danger!

The equipment must be grounded in accordance with regulations so as to protect the operator from electrical shock.

220VAC power supply

Tips!

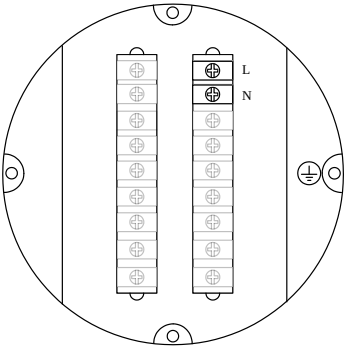
Including allowed band: 100VAC -240VAC, 50Hz-60Hz

24VDC power supply

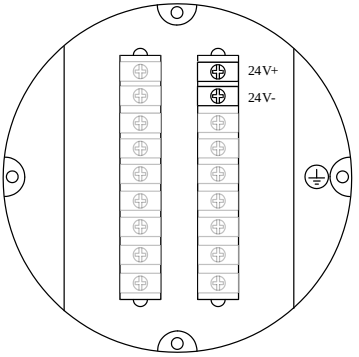
Tips!

Allowance range: 22VDC -26VDC

220VAC power supply



24VDC power supply



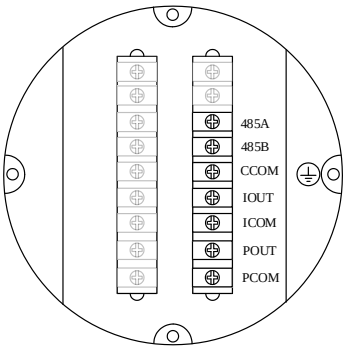
- L：AC phase line；
- N：AC neutral line；
- 24V+：Power supply positive pole；
- 24V-：Power supply negative pole；

Note: Please connect the ground wire to the grounding screw marked with the symbol ⏚ .

3.5 Output introduction

Warning!

Only personnel who have received appropriate training and obtained authorization are allowed to install, use, and operate the machine for maintenance. This document will help you establish operating conditions, which will ensure your safe and effective use of the instrument.



Current Output

- IOUT、ICOM: 4-20mA output
- Active mode: when load RL ≤ 750Ω; Imax ≤ 22mA
- Current flow percent

Communication output

- 485A、485B: 485 Serial communication output;
- CCOM: 485 Serial communication ground;
- Agreement: ModBus-RTU。

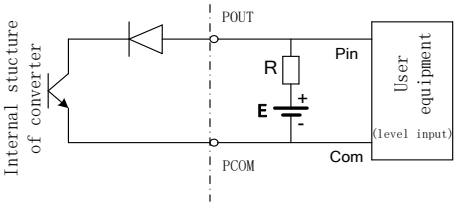
Pulse, Frequency and Alarm output

- Corresponding terminal is POUT、PCOM
- Active mode: High 24V, 5mA drive current
- Output electrical isolation: photoelectric isolation, isolation voltage: > 1000VDC;
- Scale:

Frequency output: Frequency 2KHz(configurable 0-5kHz) Corresponding to the upper limit of the flow range;

Pulse output: corresponding flow rate volume of each pulse (configurable), output Pulse width: 0.1ms ~100ms, duty cycle 1:1, Fmax<= 5000 cp/s;

- Elementary diagram:

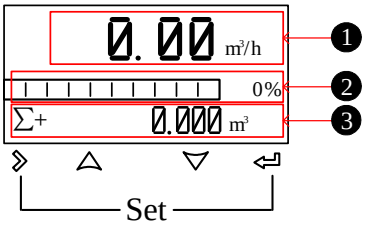


Additional remarks : pulse output for OC gate output, need external power supply. General counter all wear resistance, signal can be directly connected to the counter.

Manufacturer recommendations: upper pull resistance R is recommended to use 2 K, 0.5 W resistor, another power E recommended 24 V dc power supply.

Chapter 4 Operation

4.1 Flow display and operation Button



1. Flow line 1 (Default: Flow)

   Optional: Flow, Accu fwd (∑+: Positive flow accumulation), Accu rev(∑-: Negative flow accumulation) and Accu net (Σ: Net flow accumulation).

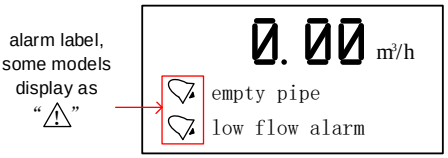
2. Flow line 2 (Default: Flow bar)

   Optional: Flow bar, Accu fwd, Accu rev, Accu net, Flow vel (current flow rate) and MT (current conductivity).

3. Flow line 3 (Default: Accu fwd)

   Optional: Flow bar, Accu fwd, Accu rev, Accu net, Flow vel and MT.

1. You can modify the parameters of [flow line 1/2/3] and [flow line 1/2/3 loop] in flow configuration 12, and the cycle interval of each parameter is 10s.



2. When alarm occurs, the cycle interval of the alarm information (including empty pipe, high flow alarm, low flow alarm, overrun pulse limit alarm and overrun flow limit) screen is 5S and the duration is 2S. This information occupies flow line 2 and 3 in the display screen, as shown in the following figure.

4.2 Operating instruction

Parameter selection and adjustment

Press ≫ and ⏎ together , enter into parameter setting interface .

Initial users password: 200000 (used for modifying the user level parameter)

After entering the configuration parameters , the parameters can be modified by the following operation :

User can conduct the switch operation in the menu by pressing the ≫ button , switch among the parameter item of menu by pressing the ⏎ button, and store a modified parameter value at the same time , adjust the parameter value by pressing the △ and ▽ buttons.

4.3 Quick setup menu

1. Press on ≫ and ⏎ at same time ,Instrument parameter is set at the interface.
2. Set the password： 300000
3. The parameters that can be set are shown in the table below.
4. After modification, move to the menu page [exit config], select Y and press on ⏎.

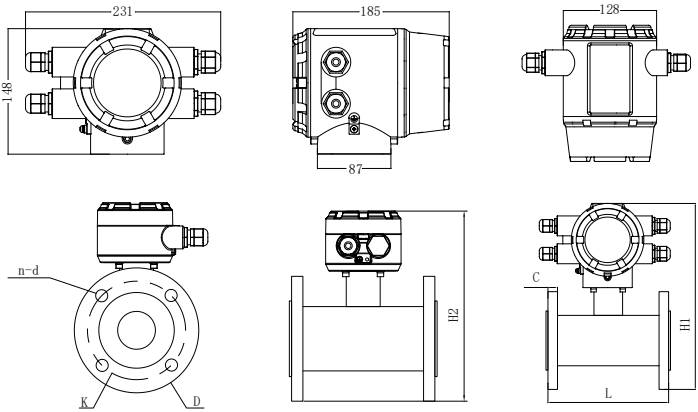
NO.	Parameter words	Setting mode	Parameter range	default
1	Diameter(mm)	Option	3-2000	50
2	Flow range	Figure	0-99999	35.000
3	Sensor coefficient	Figure	0-99999	1.000
4	Zero correction	Figure	0-99999	0.0
5	Accumulation clearance	Option	Y、N	N
6	Flow resection(%)	Figure	0-99%	1%
7	Time constant	Figure	0-99S	03
8	Pulse output type	Option	Pulse、Frequency、Alarm	Frequency
9	Max.frequency	Figure	0~5000.0	2000.0
10	Pulse value(L/P)	Figure	0-999999.999	1.000

Chapter 5 Technical data

5.1 Dimensions of the pipeline electromagnetic flowmeter

Converter size：

Linear Measure：mm



Nominal Diameter (mm)	Nominal Pressure (MPa)	Outline dimension (mm)			Connection dimension (mm)				
		L	H2	H1	D	K	d	n	C
15	4.0	200	220	315	95	65	14	4	14
20		200	220	315	105	75	14	4	16
25		200	220	315	115	85	14	4	16
32		200	220	315	140	100	18	4	18
40		200	220	315	150	110	18	4	18
50		200	225	320	165	125	18	4	20
65	1.6	200	225	350	185	145	18	8	22
80		200	275	365	200	160	18	8	24
100		250	285	380	220	180	18	8	22
125		250	315	410	250	210	18	8	22
150		300	345	440	285	240	22	8	24
200	1.0	350	400	495	340	295	22	8	24
250		450	465	560	395	350	22	12	26
300		500	505	600	445	400	22	12	26
350		550	575	670	505	460	22	16	30
400		600	625	720	565	515	26	16	32
450		600	670	765	615	565	26	20	36
500		600	725	820	670	620	26	20	38
600		600	835	930	780	725	30	20	42
700	0.6	700	915	1010	860	810	26	24	40
800		800	1015	1110	975	920	30	24	44
900		900	1115	1210	1075	1020	30	24	48
1000		1000	1215	1310	1175	1120	30	28	52

Note: The size and weight of the electromagnetic flowmeter marked here may differ from the actual product, and the actual product shall prevail.

5.2 Technical parameters

Sensor type	Pipeline sensor	Plug in sensor
Nominal Diameter	DN15 – DN1000	DN100 – DN3000
Flange	In line with GB / T9119-2000 standard carbon steel (Optional stainless-steel flanges), another standard flange can be customized	In accordance with GB / T9119-2000 standard, stainless steel
Pressure rating (High pressure can be customized)	DN15 – DN50, PN≤4.0MPa	DN100 – DN150 PN≤1.6MPa
	DN65 – DN150, PN≤1.6MPa	
	DN200 – DN600, PN≤1.0MPa	DN200 – DN600, PN≤1.0MPa
	DN700 – DN1000, PN≤0.6MPa	DN700 – DN3000, PN≤0.6MPa
Lining Material	Chloroprene rubber (CR), Silicon fluorine rubber (FVMQ) Polytetrafluoroethylene (PTFE/F4), Fluorinated ethylene propylene (FEP/F46), Teflon (PFA)	
Electrode Material	316L Stainless Steel, Hastelloy C, Hastelloy B, Ti, Ta, Pt	316L
Accuracy grade	0.5%	1.5%
Repetition	0.15%	0.5%
Degree of protection	Pipeline sensor：IP68	
	Plug in sensor：IP65	
Sensor cable	Only for the split, the standard 10 meters cable;other lengths need to be customized.	
Output	4 – 20mA； Pulse/frequency 2KHz (default), 5KHz (maximum)	
Communications	RS-485 communication, supporting standard MODBUS-RTU protocol, HART protocol	
Power supply	AC voltage：110/220VAC(100~240VAC)50Hz/60Hz	
	DC Voltage： 24VDC±10%	