FULLKON

INSTRUCTION MANUAL

Contents

Preface

Thank you for buying the vortex flow meter independently developed and produced by our company.

The vortex flow meter description records how to use this product correctly and safely. In order to prevent the instrument from being damaged or unable to play the best performance and ensure the stable operation of the instrument, please carefully read this manual before installing and commissioning.

Step 1: Read the box inspection must be read

1. Check the box; check whether the accessories are complete.
2. Appearance check; whether the inspection instrument is complete and whether the transportation is damaged.
3. Power -powered test; if the battery is powered,turn on the battery dial and switch to the "NO" position, and check the default interface of the instrument display screen.After using external power supply, you can observe whether the default interface is displayed in the default interface after wiring.
4. Check whether the installation accessories are complete; ready to install.

Step 2: The installation step must read

1. Select the appropriate installation environment; the ambient temperature should be **-20-55 °** C, and the environmental humidity should be within **5%-90%**. For details, **please refer to the requirements of the 6.1 instrument installation environment.**
2. When welding and product supporting accessories, the instrument should not be welded online (flanges holding instrument), and online welding will cause the sensor to be damaged by heating.
3. **Blow and sweep the pipeline;** ensure that there are no residues in the pipeline.
4. When installing the instrument, pay attention to the flow of the instrument, **prohibit reverse installation**, and ensure that the front and rear direct pipe segments meet the requirements. For details, please refer to **the installation requirements of 6.2 instrument pipelines**.
5. **Slowly turn on** the front valve to prevent the damage instrument in the hammer or water hammer phenomenon.
6. Pipeline **testing and leakage**; ensure that the pipeline does not leak air.
7. Gas tight test; ensure that the installation instrument meets the seal requirements.
8. **Slowly open** the rear -end valve to ensure the smooth and stable medium passed.
9. Normal running instrument.
10. The installation environment should **avoid severe vibrations.** The vibration environment will cause unstable traffic or static traffic. The slightly vibrating environment can be added to the upstream and downstream of the upstream and downstream. connect.
11. Vortex flow meter **installation diagram** is as follows:

Remarks: The icon is a schematic diagram of the L -shaped vortex street, which is for reference only. The ordering products are subject to the real object.

1. Product overview

The Lub -type vortex street flowmeter is a type of speed flowmeter. Based on the research and design of the Karman vortex principle, it is mainly used for the traffic measurement of the industrial pipeline intermediary fluid. Such as the flow control and measurement of various media such as gas, steam, or liquid.
The Lub -type vortex street flowmeter can achieve the following functions according to different selection; measure the temperature, pressure, instantaneous flow and cumulative flow of the industrial pipeline medium fluid, and have pulse output, 4 ~ 20mA analog signal output, RS485 communication (Modbus RTU (Modbus RTU (Modbus RTU (Modbus RTU Agreement), HART protocol, IoT GPRS far -pass and other functions.
Vortex flowmeters are widely used in heating, gas supply, chemical, environmental protection, metallurgy, textiles, steel, medicine, papermaking, drainage and other factory and mining companies. , Gas gas, gas, etc.), water and liquid (water, gasoline, alcohol, stupid, etc.).

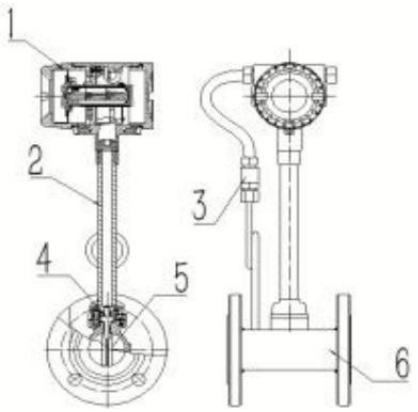
2. Product characteristics

- The main part of the product's subject, high reliability, long -term stability, simple structure and easy maintenance.
- The measuring meter measuring the measurement is the pulse frequency. The frequency is linearly with the actual flow of the measured fluid. There is no drift at zero point, and the performance is very stable.
- Various forms of pipeline flowmeter, insertion flowmers, and other forms.
- The pressure loss is small (about 1/4-1/2 of the pore board flow meter), which is an energy-saving flow instrument.
- The installation method is flexible. Depending on the on -site process pipeline, it can be installed horizontally, vertical or different angles.
- The circuit adopts a variety of protection modes to resist waves and strong adaptability.
- High -precision probe, a voltage chip vortex sensor is used, the signal is stable. The sensor shell uses 316L stainless steel to have strong corrosion resistance. It also has good corrosion resistance to alkaline solution and most organic acids and inorganic acids.
- Long life lithium battery; equipped with a 3.6V high-poly energy lithium battery, has high storage energy density, and has a service life of about 1-2 years.
- The product high and low temperature adaptability, green environmental protection and other advantages.
- In a certain range of Renault, the frequency of the signal is not affected by the physical properties of the fluid and the changes of the component. The instrument coefficient is only related to the shape and size of the vortex. Re-calibrate the instrument coefficient.

3. Product structure and working principle

3.1 Product structure

The basic structure of the LUB series vortex street flow meter is shown in Figure 1; it is mainly composed of the main accessories such as the accumulation instrument, shielding rod, pressure sensor, flow/temperature sensor, vortex body, shell and other main accessories.



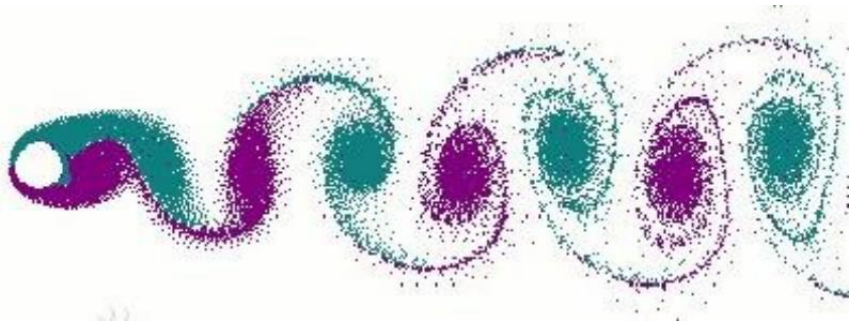
1. Accumulator
2. Shielding rod
3. Pressure sensor
4. Flow/temperature sensor
5. Vortex occur in the body
6. Shell

Figure 1 Lub vortex street flowmeter product structure

3.2 Working principle

The vortex flow meter is a speed -type flowmeter produced according to the principle of Kamen vortex, which can be used for measurement and measurement of conventional gases, steam and liquids. The vortex flowmeter has high accuracy and a wide range ratio, and there are no mobilized parts in use, which can improve mechanical stability and reduce maintenance. The vortex street is almost not affected by the temperature, pressure and components of the medium when measured the volume of the working conditions. Therefore, it is convenient for the calibration of the instrument. Therefore, the vortex flow meter is widely used in production and life.

When setting a triangular column vortex in the fluid, the rotor vortexes are produced alternately from the sides of the vortex. This vortex is called the Karman vortex. The vortex street is produced according to this principle. The vortex generates vortex and the high sensitivity sensor is generated to detect the number of vortexes. The amount of vortex generated in a certain range is proportional to the flow, so the traffic can be calculated through the precision processor.



In the vortex flow meter, the relationship between the number of vortex and the generated vortex generated can be the following formulas:

$$Q = \frac{3600F}{K}$$

Q: The volume flow of the measuring medium is based on m^3/h.

F: The frequency of vortex generated by the body, the company is based on Hz.

K: It refers to calculating or calibrating the flow coefficient, which means how many frequency signals each cuber has. This coefficient is generally obtained by calibration.

Standard table method calibration coefficient k Formula:

$$K = \frac{\text{The monitored traffic Q is}}{\text{Standard meter flow Q standard}} \times K_{\substack{\text{Standard meter flow} \\ \text{Q standard}}}$$

(This formula can also be used for traffic correction)

4. Technical performance indicators

4.1 Basic parameter

Execution standard	《JB/T9249-2015 Vortex Street Traffic Meter》
Nominal diameter (mm)	French card installation:DN15~DN300 flange connection: DN15~DN400 Ball valve insertion:DN200~DN1000 and above simple insertion:DN200~DN1000 and above Thread connection:DN15~DN50 card hoop connection:DN15~DN50
Nominal pressure(MPa)	National standard card installation: DN15~DN50：Applicable within 4.0 MPa，Greater than 4.0MPa Need to customize. DN65~DN100：0KPa~2.5MPa，Greater than 2.5MPa Need to customize. DN125~DN300：0KPa~1.6MPa，Greater than 1.6MPa Need to customize. National standard： DN15~DN50：0KPa~4.0MPa，Greater than 4.0MPa Need to customize。 DN65~DN300：0KPa~1.6MPa，Greater than 1.6MPa Need to customize。
Medium temperature	Normal temperature type: -40~100℃, medium temperature type:-40~250℃, low temperature type: -200~100℃ High temperature type:-40~330℃, ultra-high temperature type:-40~400℃, ultra-low temperature type: special customization
Use conditions	Environmental temperature: -20℃~55℃, relative humidity: 5%~90%, atmospheric pressure: 86~106kPa
Material	Table body: 304, 316, with PTFE coating (other materials are supplied under agreement). Accumulator case: Cast aluminum. Sensor: 316L (including HCP, titanium, etc., other materials, supplied under agreement).
Allow vibration acceleration	Cases: 0.2g (conventional models), capacitance: 1.0 ~ 2.0g (upgrade)
Accuracy	Conventional model：±1%R，±1.5%R Insert formula：±2.5%R
Quantity ratio	Upgrade：1：10~1：40
Power supply voltage	Flowmeter: DC (12-32V), 3.6V lithium battery, dual power supply
Output signal	Pulse output, 4 ~ 20mA current output, RS485 (MODBUS-RTU protocol), HART protocol, and Internet of Things GPRS.
Pressure loss coefficient	Comply with the JB/T9249 standard Cd≤2.4
Explosion -proof	Ex ia IIC T4 Ga；Ex db IIC T6 Gb
Protection level	IP66
Electrical interface	Conventional: internal thread M20*1.5 or 1/2NPT （Special customization）
Applicable medium	Gas, liquid, steam Measurement of hydrogen pipeline pressure must be greater than 0.3MPa, ≤0.3MPa special customization

Transmission distance	Three -line pulse output type: ≤300m， Two -line standard current output type (4~20mA) ≤1500m， Load resistance≤500Ω，RS485 、Hart ≤1200m

4.2 Vortex street convoken level class

Accuracy level		1	1.5	2	2.5
Maximum impact error	$q_t \leq q < q_{max}$	±1.0%	±1.5%	±2.0%	±2.5%
	$q_{min} \leq q < q_t$	±2.0%	±3.0%	±4.0%	±5.0%
Note: Division of traffic refers to0.2qmax					

4.3 Measurement

Different diameter instruments will have different range of traffic. During the selection of the instrument, you must select the instrument according to the range of traffic use. The most taboo is to select the instrument according to the thickness of the pipeline. The biggest disadvantage of pipeline selection instrument is that the measurement error is easy to cause measurement errors due to insufficient flow.

The determination of the flow range of vortex street flowmeters is based on working conditions flow. Therefore, the flow of flow is converted into the working conditions flow and then compared the flow range range, so that the common traffic is as much as possible in the middle range of the instrument measurement.

4.3.1 Reference condition

1. Gas: normal temperature and air pressure，t=20℃, P= 101.325kPa（Absolute pressure），ρ= 1.205 kg/m^3.
2. Liquid: room temperature water，t=20℃，ρ=998.2kg/m^3.

4.3.2 In the reference conditions, vortex street flow sensor work conditions flow reference range table

4.3.2.1 Conventional model

Instrumental caliber (mm)	Liquid		gas	
	Measuring range (m3/h)	Output frequency range (Hz)	Measuring range (m3/h)	Output frequency range (Hz)
DN15	0.3~5	27~450	3~15	275~1382
DN20	0.6~10	29~480	6~30	254~1271
DN25	1.2~16	25~330	9~48	183~978
DN32	1.8~20	17~190	10~150	96~1450
DN40	3.6~36	18.2~182	20~200	101~1010
DN50	3~60	8~150	35~350	90~902
DN65	4~85	2.5~100	60~600	71~710
DN80	8.5~110	5.3~68	65~1000	41~630
DN100	16~180	5.1~58	100~1500	31~466
DN125	25~270	4.1~43.8	150~2200	26~384
DN150	35~350	3.4~34	350~3500	34~243
DN200	65~650	2.6~26	600~6000	24~161
DN250	95~950	1.9~19	900~9000	19~148
DN300	150~1500	1.8~18.5	1300~13000	16~134
DN350	230~2300	1.6~16	2000~20000	13~120
DN400	320~3200	1.5~15	3000~30000	11~108
DN(300)	150~1500	5.5~87	1560~15600	85~880
DN(400)	180~3000	5.6~87	2750~27000	85~880
DN(500)	300~4500	5.6~88	4300~43000	85~880
DN(600)	450~6500	5.7~89	6100~61000	85~880
DN(800)	750~10000	5.7~88	11000~110000	85~880
DN(1000)	1200~17000	5.8~88	17000~170000	85~880
>(1000)	protocol		protocol	

Note: The diameters (300) to (1000) in brackets in the table are plug-in type.

4.3.2.2 Upgraded

Instrumental caliber (mm)	Liquid		gas	
	Measuring range (m^3/h)	Output frequency range (Hz)	Measuring range (m^3/h)	Output frequency range (Hz)
DN15	0.3~5	27~447	3~15	279~1395
DN20	0.5~10	23~463	6~30	289~1446
DN25	1.25~16	24.3~311	9~90	182~1823
DN32	1.9~20	17.6~186	9~170	87~1645
DN40	2.5~40	12.2~194.7	16~240	81~1215
DN50	3~60	7.5~155	30~370	42~971
DN65	4~85	4.3~92	40~640	45~723
DN80	6.9~130	4~78	40~1200	25~750
DN100	14.5~220	5.1~78	70~2000	22~660
DN125	18.5~350	3.3~62	120~2800	19.7~460
DN150	31.5~450	3.3~48	200~3000	19.6~294
DN200	41~800	1.85~36	400~5000	16.7~208
DN250	57~1250	1.3~28.5	600~8000	12.6~168
DN300	99~2000	1.3~26	1200~12000	14.6~146
DN350	230~2300	1.3~23	2000~20000	12.8~130
DN400	320~3200	1.2~20	3000~30000	12.2~123
DN(300)	150~1500	5.5~87	1560~15600	85~880
DN(400)	180~3000	5.6~87	2750~27000	85~880
DN(500)	300~4500	5.6~88	4300~43000	85~880
DN(600)	450~6500	5.7~89	6100~61000	85~880
DN(800)	750~10000	5.7~88	11000~110000	85~880
DN(1000)	1200~17000	5.8~88	17000~170000	85~880
>(1000)	protocol		protocol	

Note: The diameter with (300) ~ (1000) in the table is inserted

Working flow refers to the meter measured the current volume of the pipeline medium, which is a medium under work. For example, gas can be compressed. When there is pressure in the pipeline, the volume of the gas is compressed is the traffic flow. The traffic flow will change with the changes in the working environment.

Standard condition flow refers to the volume of the medium under standard atmospheric pressure and 0 ° C (or 20 °C) standard. When the compressed gas is released to the volume of transformation in the label environment. The bid traffic will not change in any environment.

The measurement of the vortex street flow meter is obtained by the volume of the working conditions. Only after the temperature of the temperature is made, the marking volume can be obtained. Generally, when the

trade measurement is used, the gas is based on the volume of the gas and the quality of the steam is subject to the quality.

$$Q_{\text{Working volume}} = Q_{\text{Standard volume}} \times \frac{0.101325}{P_{\text{manometer pressure}} + 0.101325} \times \frac{273.15 + T^{\text{temperature}}}{293.15}$$ (Transformation formula of working condition and standard condition)

5. Product classification and size

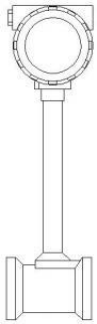
5.1 Product classification

5.1.1 Classification according to function:

1. The general on -site display type vortex flow meter is integrated with the calculation of the vortex street traffic sensor. The main performance indicators have reached the leading domestic level. It is an ideal instrument in oil, chemical, electricians, light industry, power heating and other industries.
2. Temperature pressure compensation type vortex street flowmeter is a collection of vortex street flow sensors and flow accumulation instruments. It has the function of temperature pressure compensation. The main performance indicators have reached the domestic leading level. The ideal instrument in the heat and other industries.
3. The split vortex street flowmeter is the separation of the vortex flow sensor from the flow accumulation instrument. It has the function of the split display, which can achieve a low -altitude installation low -altitude display and facilitate the high -altitude installation instrument meter copy.

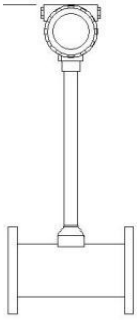
5.1.2 Classified by installation:

1. Francales installation (clamp) vortex street flowmeter
2. Flastic connection vortex street flowmeter
3. Simple, ball valve insertion vortex street traffic meter
4. Thread -connecting vortex street flowmeter
5. Card hoop connecting vortex street traffic meter
6. Separation, split vortex street traffic meter
7. Other special structures can communicate with the supplier agreement and customize



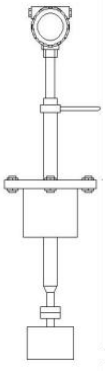
Flange clamp vortex flowmeter

The pairing flange welding pipe, installing the instrument in the card slot of the pairing flange, and using the bolt to fix the flange clamp the instrument. It is the most common instrument installation method.



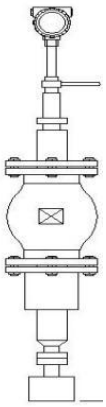
Flange connection vortex flowmeter

Through the welding of the welded Frank, it is directly connected to the original flange of the pipeline during use, which is also one of the common instrument installation methods.



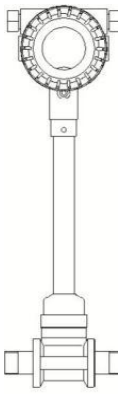
Simple insertion vortex flowmeter

Simple insertion vortex streets are not equipped with ball valves. They are relatively light. Generally, less maintenance during use, suitable for measuring large -caliber relatively clean medium.



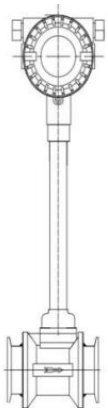
Ball valve insertion vortex flowmeter

The ball valve inserted vortex street is a type of inserting the vortex street. It can be used to ensure that the instrument can be used after disassembling the instrument. Generally, it can not affect the use of ventilation in the pipeline. Generally, there are many instruments.



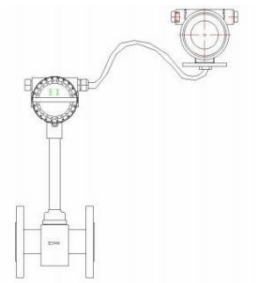
Thread-connected vortex flowmeter

The thread connection refers to a connection method that spines a thread with a thread into another with the same or opposite thread parts to achieve a fixed and fixed purpose. This connection method is mostly used in small -caliber pipes.



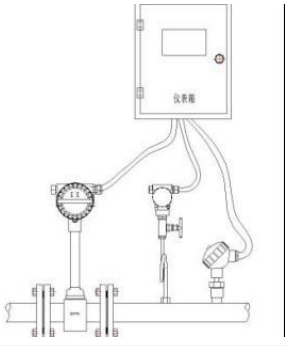
Clamp connection vortex flowmeter

Card hoop is a connection device for pipes, valves and pipeline accessories that connect the groove. It is used to connect to the fast connector. Generally, the joints have pads, rubber, silicone and four fluorine. It has good performance, high sealing, and easy installation.



Separate vortex flowmeter

The separation vortex street flowmeter is the separation of the head and the surface, the display part is separated from the sensor part, and the middle is connected by the shielding wire. It is mainly used in an environment where high -altitude pipelines or other special terrain are inconvenient to observe on -site observation.



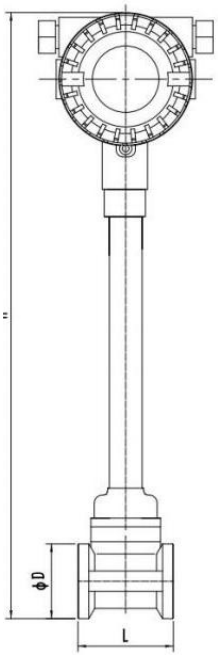
Splitted vortex flowmeter

The split vortex flow meter is a method of measuring the accumulation instrument through the shielded line connection to the accumulated calculation instrument. It is mainly used for high requirements for integration, which is convenient for centralized observation and monitoring.

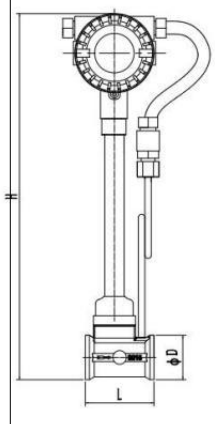
5.2 Product installation size

Ordinary model

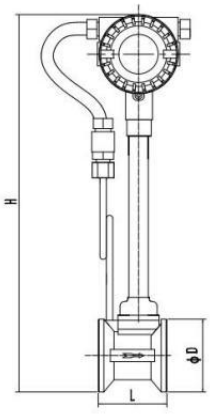
5.2.1 Flange Clamp Vortex flowmeter Installation size



Caliber（mm)	L	ΦD	H	
			Temperature≤250℃ (Low temperature, medium temperature)	Temperature＞250℃ (high temperature)
DN15	70	55	393	453
DN20	70	55	393	453
DN25	70	55	393	453
DN32	70	55	393	453
DN40	85	80	405	465
DN50	85	90	414	474
DN65	85	105	429	489
DN80	85	120	444	504
DN100	85	140	464	524
DN125	85	168	489	549
DN150	100	194	516	576
DN200	100	248	568	628
DN250	115	300	619	679
DN300	130	350	669	729
Flange vlamp vortex flowmeter				



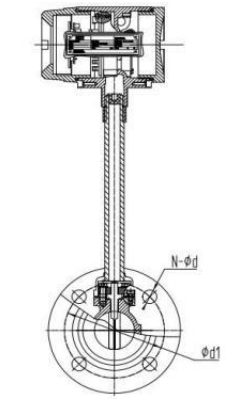
DN15-DN32 caliber

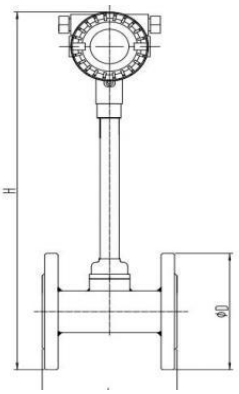


DN40-DN50 caliber

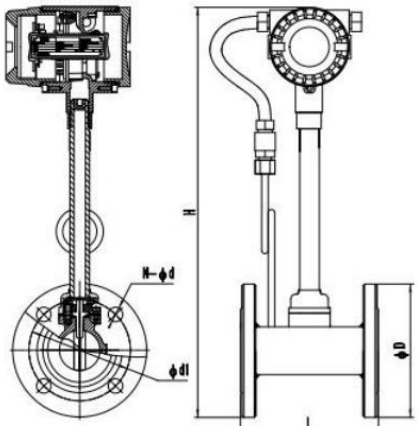
caliber（mm)	L	ΦD	H
DN15	85	55	453
DN20	85	55	453
DN25	85	55	453
DN32	85	55	453
DN40	85	80	465
DN50	85	90	474
DN65	85	105	489
DN80	85	120	504
DN100	85	140	524
DN125	85	168	549
DN150	100	194	576
DN200	100	248	628
DN250	115	300	679
DN300	130	350	729
Flange clamp with temperature pressure compensation vortex flowmeter			

5.2.2 Flange connection vortex flowmeter Installation size





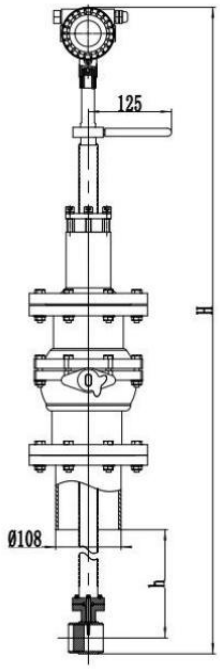
Caliber（mm)	L	ΦD	H		Φd1	N	Φd
			Temperature ≤250℃（Low temperature, medium temperature）	Temperature >250℃ （high temperature）			
DN15	170	95	413	453	65	4	14
DN20	170	105	418	453	75	4	14
DN25	170	115	423	453	85	4	14
DN32	170	140	435	453	100	4	18
DN40	170	150	438	498	110	4	18
DN50	170	165	455	515	125	4	18
DN65	190	185	473	533	145	8	18
DN80	190	200	490	550	160	8	18
DN100	200	220	509	569	180	8	18
DN125	200	250	537	597	210	8	18
DN150	200	285	569	629	240	8	22
DN200	200	340	622	682	295	12	22
DN250	240	405	681	741	355	12	26
DN300	240	460	735	795	410	12	26
DN350	300	520	795	855	470	16	26
DN400	320	580	850	910	525	16	30
Flange connection vortex flowmeter							



caliber（mm)	L	ΦD	H	Φd1	N	Φd
DN15	170	95	453	65	4	14
DN20	170	105	453	75	4	14
DN25	170	115	453	85	4	14
DN32	170	140	453	100	4	18
DN40	170	150	498	110	4	18
DN50	170	165	515	125	4	18
DN65	190	185	533	145	8	18
DN80	190	200	550	160	8	18
DN100	200	220	569	180	8	18
DN125	200	250	597	210	8	18
DN150	200	285	629	240	8	22
DN200	200	340	682	295	12	22
DN250	240	405	741	355	12	26
DN300	240	460	795	410	12	26
DN350	300	520	855	470	16	26
DN400	320	580	910	525	16	30

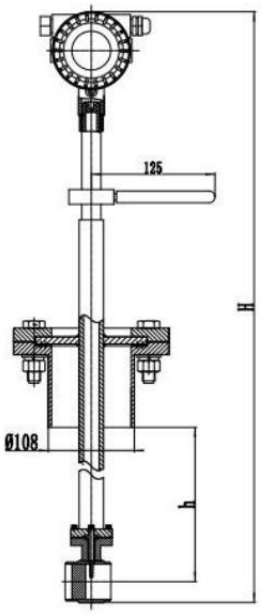
Flange connection with temperature pressure compensation vortex flowmeter

5.2.3 Ball valve insertion vortex flowmeter Installation size



caliber（mm)	H	h
DN200	970	100
DN250	970	125
DN300	970	150
DN350	1070	175
DN400	1070	200
DN450	1070	225
DN500	1070	250
DN550	1200	275
DN600	1200	300
DN650	1200	325
DN700	1200	350
DN750	1200	350
DN800	1200	350
DN850	1200	350
DN900	1200	350
DN950	1200	350
DN1000 and above	1200	350
Ball valve insertion vortex flowmeter		

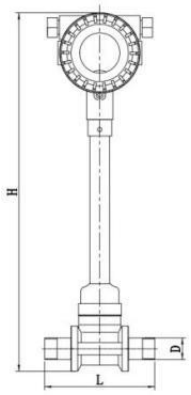
5.2.4 Simple insertion vortex flowmeter installation size



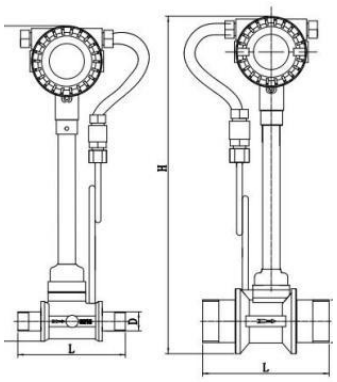
caliber（mm)	H	h
DN200	660	100
DN250	660	125
DN300	660	150
DN350	660	175
DN400	660	200
DN450	660	225
DN500	760	250
DN550	760	275
DN600	760	300
DN650	760	325
DN700	760	325
DN750	760	325
DN800	760	325
DN850	760	325
DN900	760	325
DN950	760	325
DN1000 and above	760	325
Simple insertion vortex flowmeter		

5.2.5 Thread connection vortex flowmeter installation size

5.2.5.1 outer-Thread connection vortex flowmeter installation size



caliber（mm)	L	ΦD	H	
			Temperature≤250℃（Low temperature, medium temperature）	Temperature＞250℃（high temperature）
DN15	146	G1/2	393	453
DN20	146	G3/4	393	453
DN25	146	G1	393	453
DN32	146	G1¼	393	453
DN40	160	G1½	405	465
DN50	170	G2	414	474
outer-Thread connection vortex flowmeter				

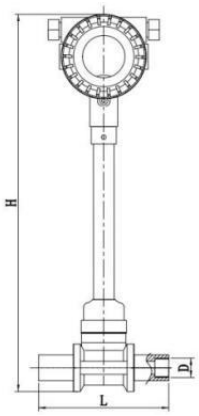


DN15-DN32calibe DN40 and above

caliber（mm)	L	ΦD	H
DN15	160	G1/2	453
DN20	160	G3/4	453
DN25	160	G1	453
DN32	160	G1¼	453
DN40	160	G1½	465
DN50	170	G2	474

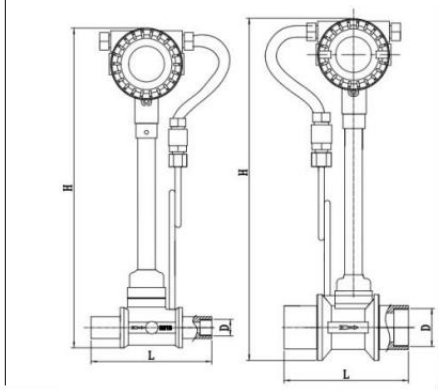
Outer thread connection belt temperature pressure compensation compensation vortex flow meter

5.2.5.2 Internal thread connection flowmeter Installation size



caliber（mm)	L	ΦD	H	
			Temperature≤250℃ （Low temperature, medium temperature）	Temperature＞250℃ （high temperature）
DN15	146	G1/2	393	453
DN20	146	G3/4	393	453
DN25	146	G1	393	453
DN32	146	G1¼	393	453
DN40	160	G1½	405	465
DN50	170	G2	414	474

Internal thread connection flowmeter

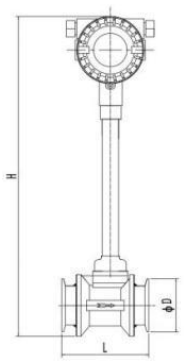


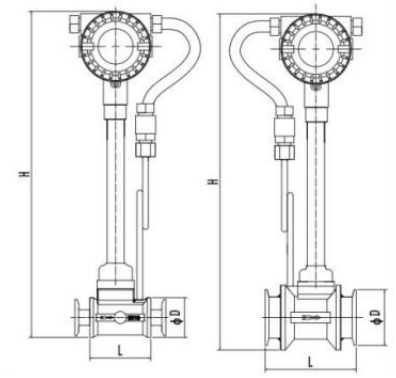
DN15-DN32caliber DN40 and above

caliber（mm)	L	ΦD	H
DN15	160	G1/2	453
DN20	160	G3/4	453
DN25	160	G1	453
DN32	160	G1¼	453
DN40	160	G1½	465
DN50	170	G2	474

Inner thread connection belt temperature pressure compensation vortex flow meter

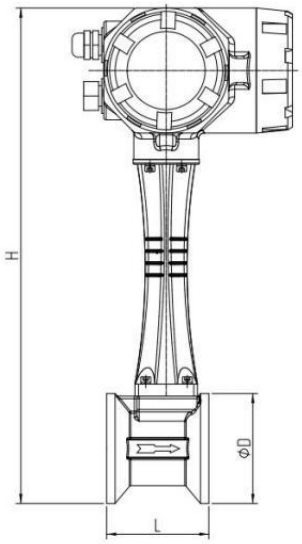
5.2.6 Clamp connection vortex flowmeter Installation size

	caliber（mm)	L	ΦD	H	
				Temperature≤250℃ （Low temperature, medium temperature）	Temperature＞250℃ （high temperature）
	DN15	110	50.5	393	453
	DN20	110	50.5	393	453
	DN25	110	50.5	393	453
	DN32	110	50.5	393	453
	DN40	125	64	405	465
	DN50	125	77.5	414	474
	Clamp connection vortex flowmeter				

 DN15-DN32 caliber DN40-DN50 caliber	caliber（mm)	L	ΦD	H
	DN15	125	50.5	453
	DN20	125	50.5	453
	DN25	125	50.5	453
	DN32	125	50.5	453
	DN40	125	64	465
	DN50	125	77.5	474
	Clamp connection belt temperature pressure compensation vortex flowmeter			

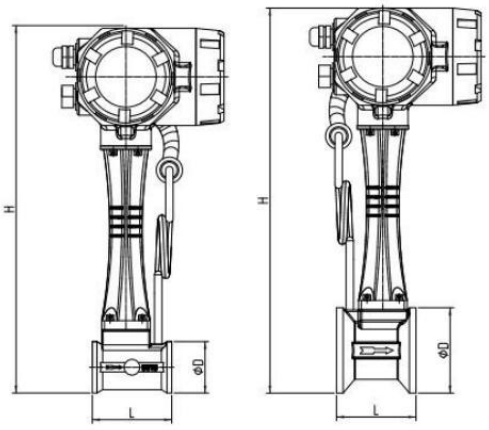
Upgrade

5.2.7 Flange Clamp L -shaped Vortex flowmeter Installation size



caliber（mm)	L	ΦD	H
DN15	70	55	386
DN20	70	55	386
DN25	70	55	386
DN32	70	55	386
DN40	85	80	398
DN50	85	90	407
DN65	85	105	422
DN80	85	120	437
DN100	85	140	457
DN125	85	168	482
DN150	100	194	509
DN200	100	248	561
DN250	115	300	612
DN300	130	350	662

Flange Clamp L -shaped Vortex flowmeter

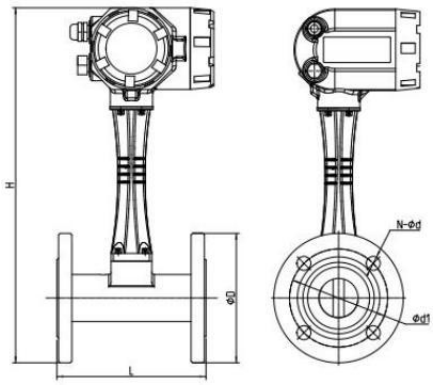


DN15-DN32 caliber DN40-DN300 caliber

caliber（mm)	L	ΦD	H
DN15	85	55	386
DN20	85	55	386
DN25	85	55	386
DN32	85	55	386
DN40	85	80	398
DN50	85	90	407
DN65	85	105	422
DN80	85	120	437
DN100	85	140	457
DN125	85	168	482
DN150	100	194	509
DN200	100	248	561
DN250	115	300	612
DN300	130	350	662

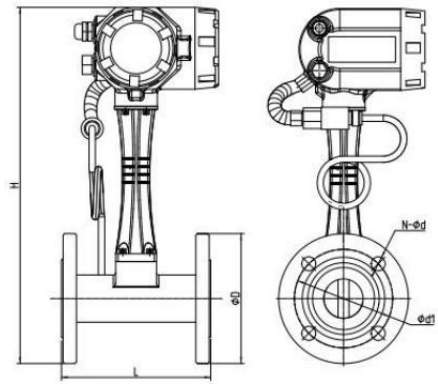
Flange Clamp L -shaped with temperature pressure compensation vortex flowmeter

5.2.8 Flange connection L -shaped vortex flowmeter installation size



caliber（mm)	L	ΦD	H	Φd1	N	Φd
DN15	170	95	417	65	4	14
DN20	170	105	422	75	4	14
DN25	170	115	427	85	4	14
DN32	170	140	440	100	4	18
DN40	170	150	445	110	4	18
DN50	170	165	452	125	4	18
DN65	190	185	475	145	8	18
DN80	190	200	490	160	8	18
DN100	200	220	510	180	8	18
DN125	200	250	540	210	8	18
DN150	200	285	570	240	8	22
DN200	200	340	625	295	12	22
DN250	240	405	685	355	12	26
DN300	240	460	735	410	12	26
DN350	300	520	795	470	16	26
DN400	320	580	850	525	16	30

Flange connection L -shaped vortex flowmeter



caliber（mm)	L	ΦD	H	Φd1	N	Φd
DN15	170	95	417	65	4	14
DN20	170	105	422	75	4	14
DN25	170	115	427	85	4	14
DN32	170	140	440	100	4	18
DN40	170	150	445	110	4	18
DN50	170	165	452	125	4	18
DN65	190	185	475	145	8	18
DN80	190	200	490	160	8	18
DN100	200	220	510	180	8	18
DN125	200	250	540	210	8	18
DN150	200	285	570	240	8	22
DN200	200	340	625	295	12	22
DN250	240	405	685	355	12	26
DN300	240	460	735	410	12	26
DN350	300	520	795	470	16	26
DN400	320	580	850	525	16	30

Flange connection L -shaped with temperature pressure compensation vortex flowmeter

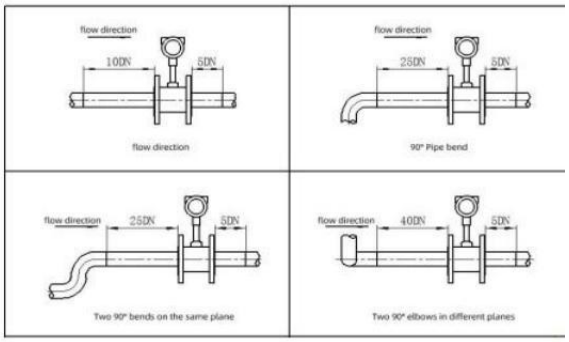
6. Product installation and use

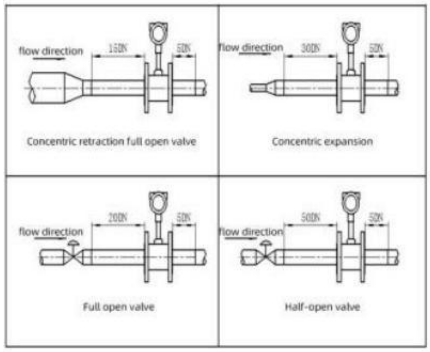
6.1 Instrument installation environment requirements

1. The flowmeter should be installed indoors. If it is installed outdoors, there should be covers on it to prevent rainwater invasion and scorching sun exposure. The shell line is from bottom to top to avoid rainwater from entering the inside of the case).
2. There must be no strong external magnetic field interference, strong electricity equipment, high -frequency equipment, and avoid sharing power supply with these devices.
3. Do not share the power supply with the equipment that pollute the power supply such as the inverter and the welding machine, and install the purification power supply if necessary.
4. Avoid high temperature, cold, corrosive or extremely humid environment.
5. The flowmeter should be avoided on the pipes with strong vibrations. If it is necessary to install, a pipeline fastener device must be added at the upstream and downstream 2D, and the anti -vibration pad is added to strengthen the anti -vibration effect.
6. There should be plenty of space around the instrument installation point to install wiring and regular maintenance.

6.2 Installation requirements of instrument pipelines

The vortex flow instrument has certain requirements for the upstream and downstream direct pipe sections of the installation point, otherwise it will affect the flow field of the medium in the pipeline and affect the measurement accuracy of the instrument. The length of the upstream and downstream of the instrument must be executed according to the requirements of the figure below. (DN is the instrument nominal diameter unit: mm)





Install precautions:

1. The adjustment valve is not installed on the upstream of the vortex flow instrument as much as possible, but it should be installed on the downstream 10D of the vortex flow instrument.
2. The inner diameter of the upstream and downstream pipes should be the same. If there are differences, the inner diameter DP and the inner diameter DB of the vortex instrument watch should meet the following relationship 0.98db ≤DP ≤ 1.05DB.
3. The upstream and downstream pipes shall be the same as the inner diameter of the flow instrument watch, and the different axis between them should be less than 0.05DB.

4. The sealing cushion between the instrument and the flange cannot be uneven into the tube during installation.

5. Installation design of the pressurehole and temperature measurement holes; when the testing pipe needs to install temperature and pressure transmitter, the pressure measurement hole should be set at 3-5D downstream, and the temperature measurement hole should be set at 6-8D downstream. (D is the nominal caliber, unit: mm)

6. The instrument can be installed horizontally, vertically or tilted on the pipeline.

7. As shown in the mixed installation diagram of liquid gas in Figure 2; when measuring the gas, install the instrument in the vertical pipeline, and the gas flow is not limited. However, if the pipe contains a small amount of liquid, in order to prevent the liquid from entering the instrument measurement tube, the airflow should flow from the bottom up.

8. As shown in the mixed installation diagram of liquid gas in Figure 2; in order to ensure that the liquid is full of liquid in the tube, when installing the instrument of vertical or tilting pipelines, the liquid flow direction should be guaranteed from the bottom. If the pipe contains a small amount of gas, in order to prevent the gas from entering the instrument measurement tube, the instrument should be installed at a lower point of the pipeline.

9. When measuring high temperature and low temperature media, pay attention to thermal insulation measures. The high temperature inside the converter (inside the header) generally should not exceed 70 ° C. Low temperatures can easily cause condensation inside the converter, reduce the insulation impedance of the circuit board, and affect the normal operation of the instrument.

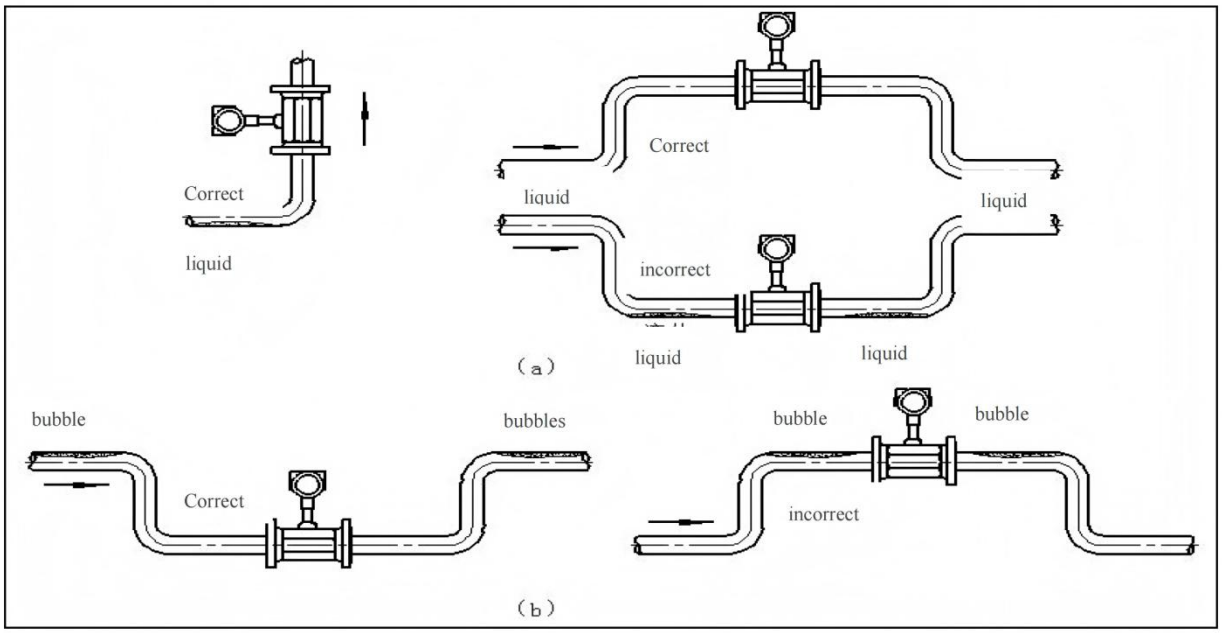
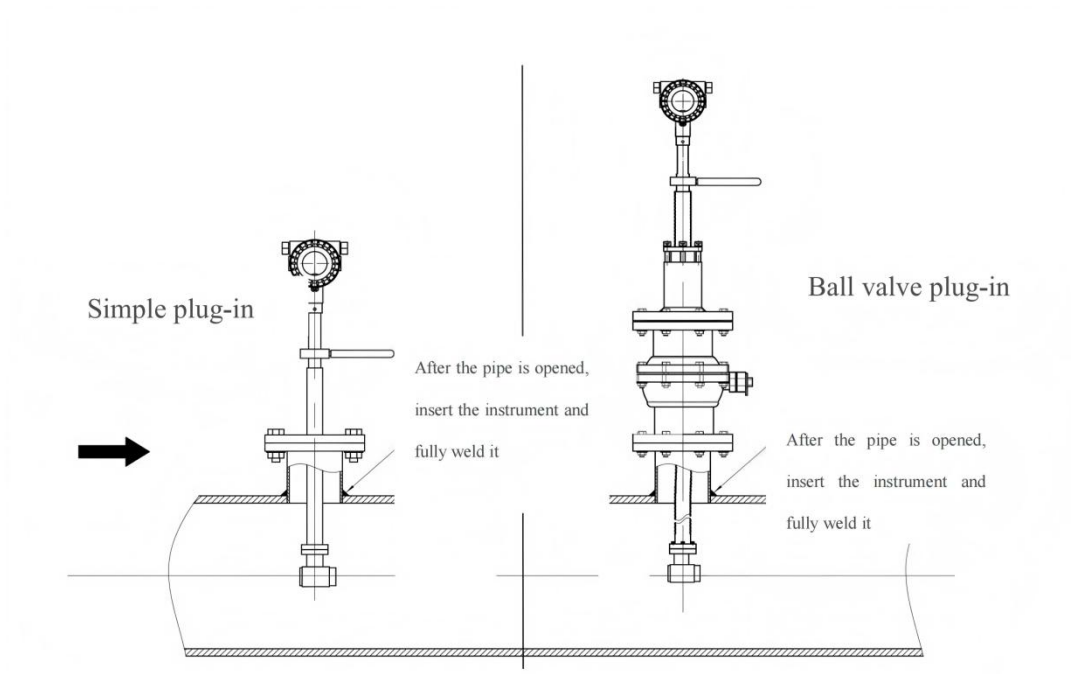


Figure 2 Silent diagram of hybrid gas mixed installation

6.3 Inserting the installation step of inserting vortex street flow instrument

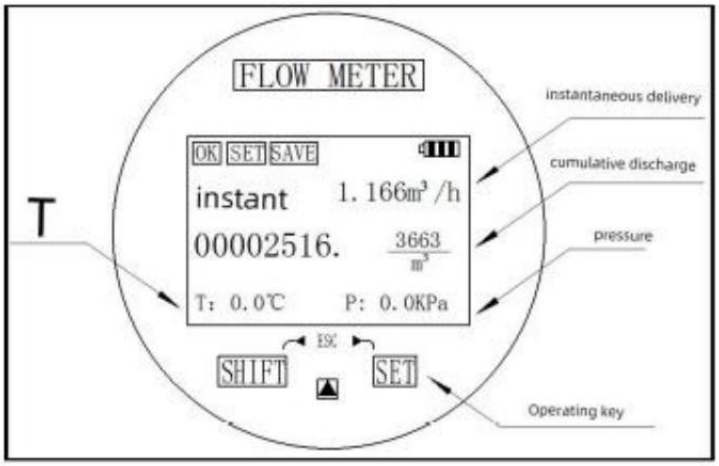
1. Open a round hole with a slightly smaller than φ100mm on the pipeline, and remove the burrs around the round hole to ensure that the head rotation is fluent.
2. Welding the flanges provided by the manufacturer at the pipeline round hole are required to be vertical with the pipe axis.
3. Install the ball valve and sensor on the welded flange.
4. Adjust the screw to make the insertion depth meet the requirements to ensure that the central axis of the head measures and the central axis of the pipeline are converged. The fluid flow must be consistent with the indicator arrows on the direction.
5. Tighten the screws on the cover evenly. (Note: The degree of loosening of the cover determines the degree of sealing the instrument and whether the screw can move)
6. Check whether each link is completed, and slowly open the valve to observe whether there is leakage (need to pay special attention to personal safety). If there is a leak, please repeat steps 5 and 6.



7. Instructions for the operation instrument operation

7.1 Ordinary model

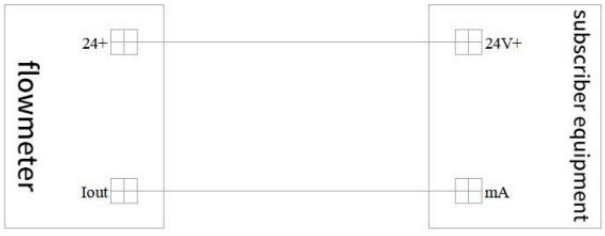
7.1.1 Display interface



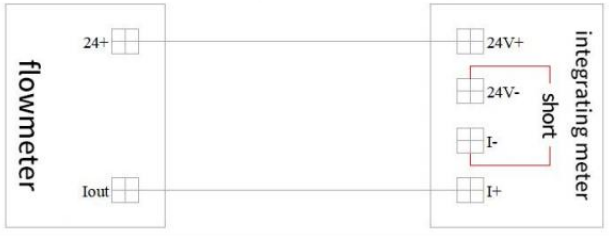
Main interface

7.1.2 Wiring schematic diagram

Two-wire 4-20mA current output cable with display



Two-wire system 4~20mA current output integrator with display (two-wire to four-wire)



With display three-wire system 4~20mA current output cable

With display three wire system 4~20mA current output integrator

Four-wire 485 communication cable with display

Four-wire 485 communication integration meter with display

Three wire pulse output cable with display (24V supply)

Three wire pulse output integration device with display

Three wire pulse output connection without display (24V power supply)

Three wire pulse output integrator without display

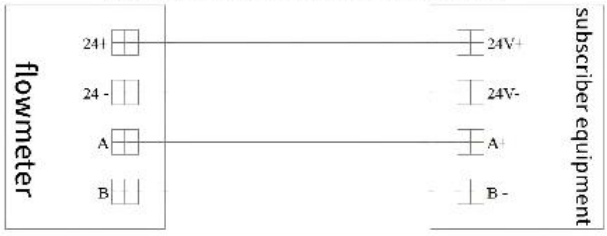
Two-wire 4-20mA current output cable with display

Two-wire system 4~20mA current output integrator with display (two-wire to four-wire)

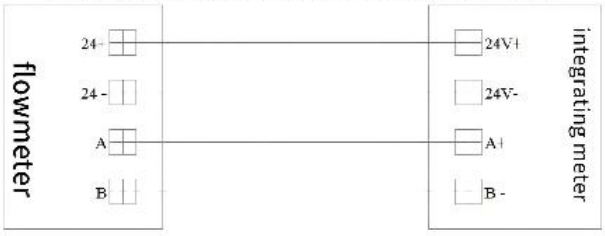
With display three-wire system 4~20mA current output cable

With display three wire system 4~20mA current output integrator

Four-wire 485 communication cable with display

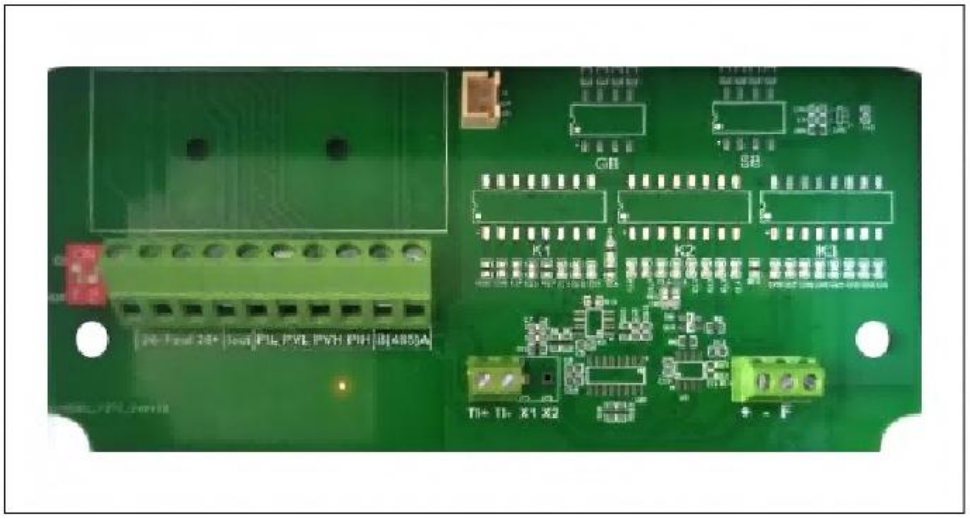


Four-wire 485 communication integration meter with display



Three wire pulse output cable with display (24V supply)

Three wire pulse output integration device with display



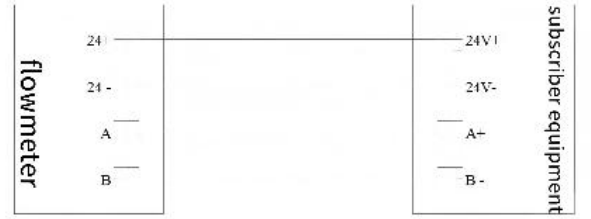
Four-wire 4-20mA current output cable with display

Two-wire system 4~20mA current output integrator with display (two-wire to four-wire)

With display three-wire system 4~20mA current output cable

With display three wire system 4~20mA current output integrator

Four-wire 485 communication cable with display



Four-wire 485 communication integration meter with display

Three wire pulse output cable with display (24V supply)

Three wire pulse output integration device with display

Note: For on-site 24V power supply, it is recommended to use brand power supply with power less than 50W.

7.1.3 Operation description

1. Key introduction

Shift button, Δ button, SET button -related introduction:

Shift:

a. Switch the screen; you can switch to the menu screen by pressing this key on the main interface.

b. Switch the menu item; press this key on the menu screen to switch different menus.

c. The displacement key; in the parameter settings, you can use this button to move.

d. Exit; in the parameter settings, press this button in the displacement item to exit the menu item.

Δ: Digital items plus functions. In the items that can enter numbers, according to this, you can adjust the size of the number, and the number of numbers can be displayed in a cycle.

For example, the current display 6 can be displayed at 2 times, or another 3 times to display as 1.

SET:

a. Confirmation function is to press this button after modifying the parameters to confirm the parameter.

b. Switch the menu. In the parameter settings, press the key directly to other parameters, and the parameter list loop display.

2.Common function settings

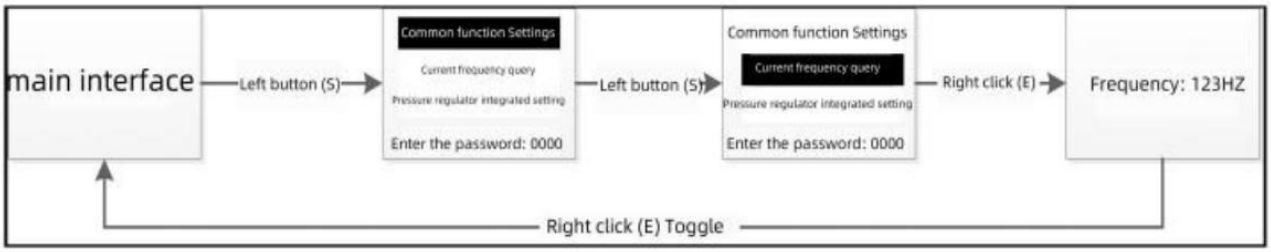
Menu name	Parameter value	Meaning
Language	0: Chinese 1: English	Set the instrument language.
Algorithm	Normal volume (working condition by volume) Standard condition volume (standard condition for volume) Conventional quality (quality under working conditions) Standard condition quality (Standard condition for quality) Pressure compensation(saturated steam) Temperature compensation Temperature and pressure compensation(superheated steam)	Different algorithms are selected depending on the medium and different units selected.

Unit	m3/h； L/m；Nm3/h NL/m ； t/h ； kg/m m3/m；CFM ； Nm3/m kg/h	The unit to be displayed by the fluid is matched with the algorithm.
Frequency	0/1/2	0: Original pulse, 1: correction pulse, 2: 2 equivalent output (high level = 24V, low level = 0)
Upper limit flow	1000	Set the instantaneous flow corresponding to the fullness when the 20mA current output (not allowed to set to 0). The unit is consistent with the unit selected in the "unit selection".
Density setting	1000	For the density value of the fluid, the unit KG/M3 (not allowed to be set to 0) (the mass algorithm needs to be calculated with the density value of this setting, which does not work for the volume class algorithm and the steam algorithm).
Lower limit cut-off	10	Setting is lower than the setting frequency does not display flow (interference caused by environmental conditions when eliminating static).
Password	2010	Used to set the password to enter the parameter menu, the on -site administrator can modify the password to prevent malicious tampering parameters.
Communication address	1	Set the 485 mailing address of the slave.
Gauge pressure setting	0000	For setting the pressure when setting the value, such as connecting the sensor to automatically collect this menu and the temperature setting menu must be 0 at the same time, if one item is not 0, it becomes a fixed value calculation. (Note the gauge pressure here).
Temperature setting	0000	Set the temperature when the value is used. If the connection sensor automatically collects this menu and the pressure settings menu, it must be 0 at the same time, and one item does not 0 becomes a fixed value calculation.

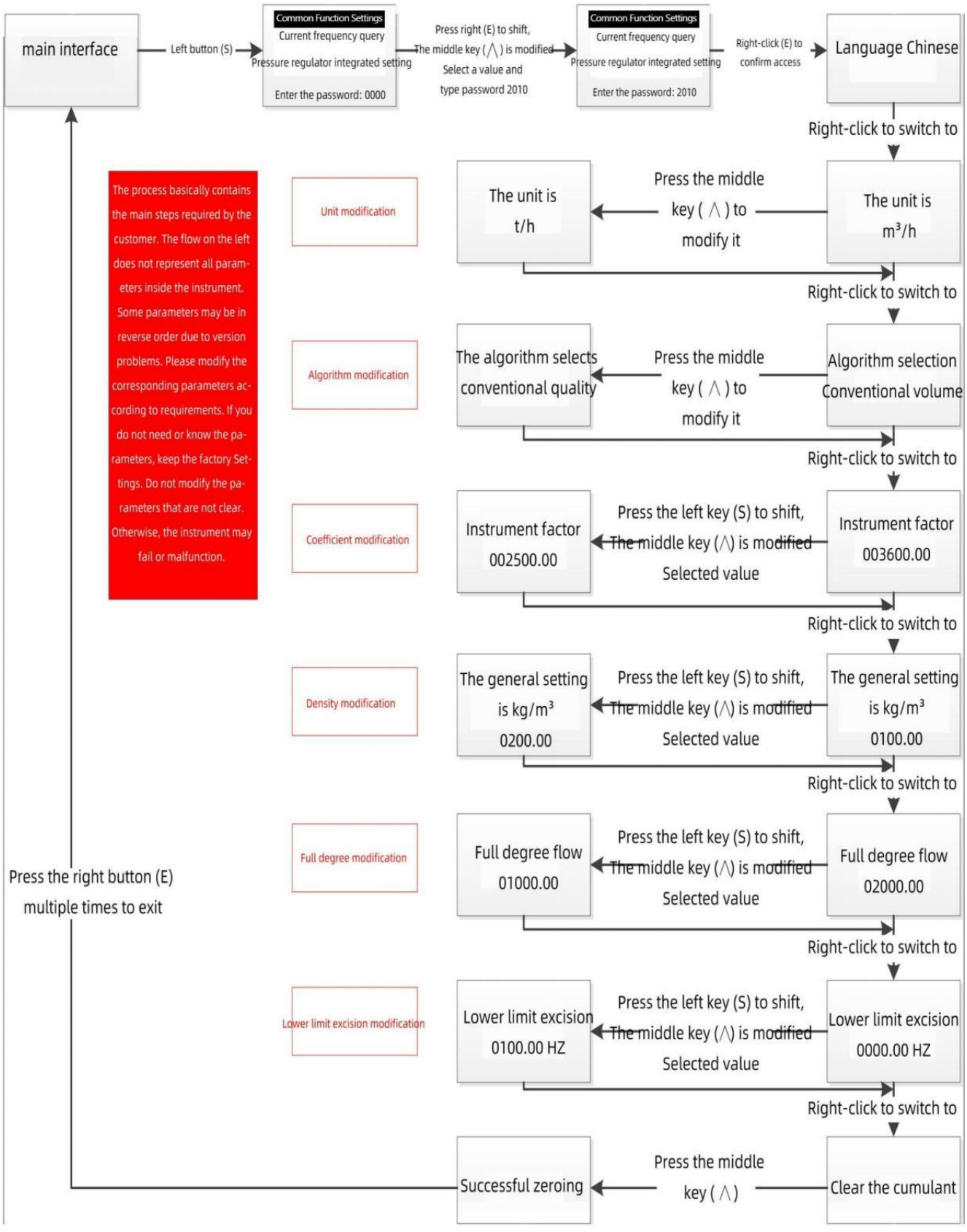
Cumulative reset to zero	Reset to zero	Clear cumulative traffic.
Speed	0	Set as a 1 -bit filter algorithm for unstable on -site traffic.
Gain	0/1	The probe signal gain setting, 0 is low, 1 is high.
Vibration coefficient	10.000	Seismic settings, set to 00.003 when needed,
Segmentation correction	0	This menu is the frequency of frequency correction.
Segmentation coefficient	0	This menu is the segment coefficient corresponding to each segment frequency.
Average coefficient	3600	The flow beyond the section coefficient range is calculated according to this coefficient.
Equivalent	0	The number of pulses corresponding to the cumulative flow is used to connect the IC card control, and the minimum number is 0.0001.
Give an alarm	0	Set alarm value. Selected to 1 is the lower limit alarm, and 0 is the upper limit alarm.

3.Common parameter settings

3.1 View **frequency** operation steps



3.2 The operation step of the unit, algorithm, coefficient, density, fullness and lower limit removal



7.2 Upgrade

7.2.1 Function introduction

1. Technical support

Conventional circuits include four common circuit boards such as pulse line boards, battery power supply ordinary circuit boards, 4-20ma normal circuit boards, and 4-20ma temperature pressure compensation type line boards. These four line boards are common in use and principle. They are high -performance Hart protocol circuit boards of vortex flowmeters. The amplifier circuit is digital. The flow of gas, liquid and steam can be accurately measured within the conventional flow range.

2. Main performance indicators

Power supply voltage 1: calibration voltage: 12V ～ 30V DC

Power supply voltage 2: Working voltage: 3.6V DC

Work temperature range: -20 ℃ ~+70 ℃ (with backlight LCD display), -40 ℃ ~+85 ℃ (no LCD display)

3. Main functions

Output function: 4 ~ 20mA output, pulse output, 485 output (overlap Hart communication).

Configuration function: Engineering unit, testing medium, medium density, range, display, alarm value, etc., and have zero -clearing function on cumulative flow.

Alarm function: You can set up the upper and lower limit of the alarm. The lower limit liquid crystal display has the lower arrow flashes, which is higher than the upper LCD display shows the upper arrow.

Flow calibration function: You can modify the K coefficient of the instrument 2 to 5 points.

Local configuration function: For engineering units, testing medium, medium density, range, display, alarm value and other configurations, and have accumulated cumulative traffic zero,

Data recovery function;

LCD display function: backlight and three lines display. The first line shows instantaneous traffic, and the second line shows cumulative flow. The third line can display percentage,

Output current, temperature value, pressure value, density value, etc. At the same time, a variety of engineering units can be displayed on the LCD screen.

Temperature pressure compensation function: support two temperature calibration and two -point pressure calibration. Temperature and pressure can be set to manual input or automatic collection.

Monitor dynamic variable function: instantaneous flow, percentage, cumulative flow, frequency, temperature value, pressure value, etc.

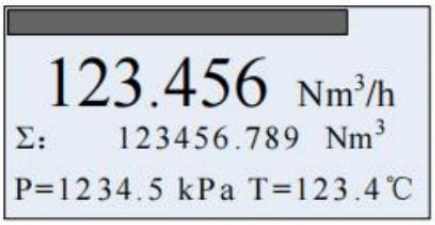
The instrument has the function of power loss protection and traffic accumulation.

7.2.2 Display

Users can set the variables of LCD display through the configuration software or button. LCD uses 128*64 -point lines to support multiple variable display. This instrument supports two display modes.

1. Three -line display mode

When the third line display is turned on, the display is shown below



Display the current percentage in the form of a progress bar
Display instantaneous traffic
Display cumulative traffic
Can be set to display frequency, density, pressure, temperature, current or percentage

Other display descriptions:

If the pressure or temperature sensor is set to "automatic collection" mode, and the sensor failure is detected, the corresponding value will be "hand

The "set value replacement and flash display. The manual setting value here refers to the" gas pressure "and" gas temperature "entered in the menu.

When the flow mode is compensated by saturated steam pressure, the temperature value will not be activated without starting the temperature sensor, and the temperature value will be displayed as "---", which means

Not used.

When the flow mode is compensation for saturated steam temperature, the pressure value will not be activated without starting the pressure sensor, and the pressure value will be displayed as "————"

Show unused.

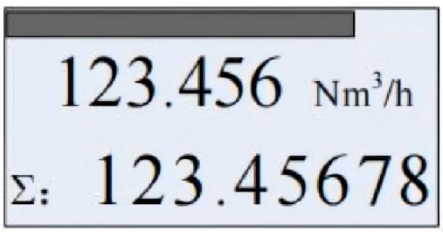
In the normal display state, you can set the frequency, pressure, temperature, density, current, percentage percentage in the third line to display the frequency, pressure, temperature, density, current, and percentage in the third line.

The third line display variable prompts are as follows:

Prompt	F:	Den:	P:	T:	Curr:	Per:	P= T=
Display variables	Frequency	Density	Pressure	Temperature	Current	Percent	Pressure and Temperature

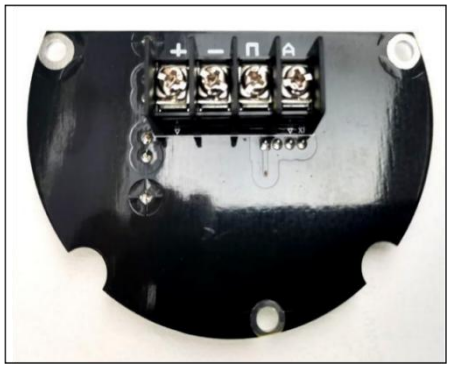
2. Two -line display mode

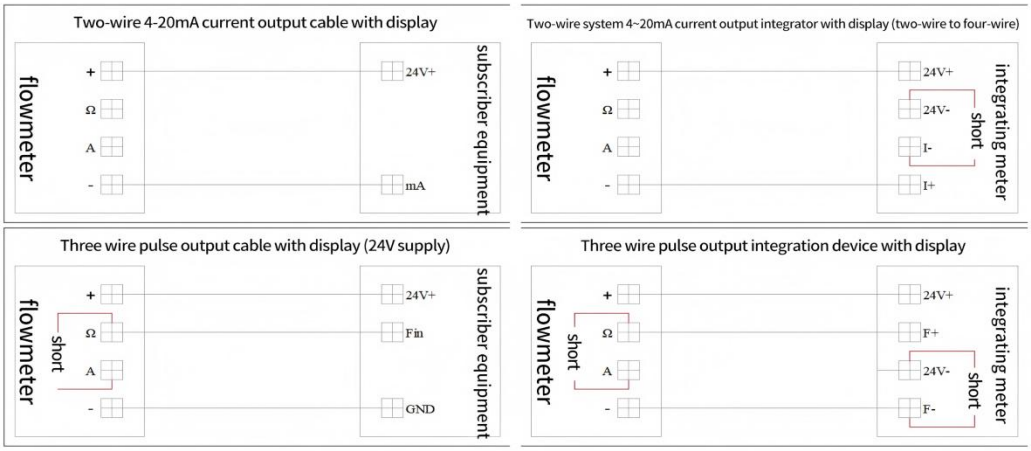
When the third line display is closed, the second line display is fixed, as shown in the figure below:



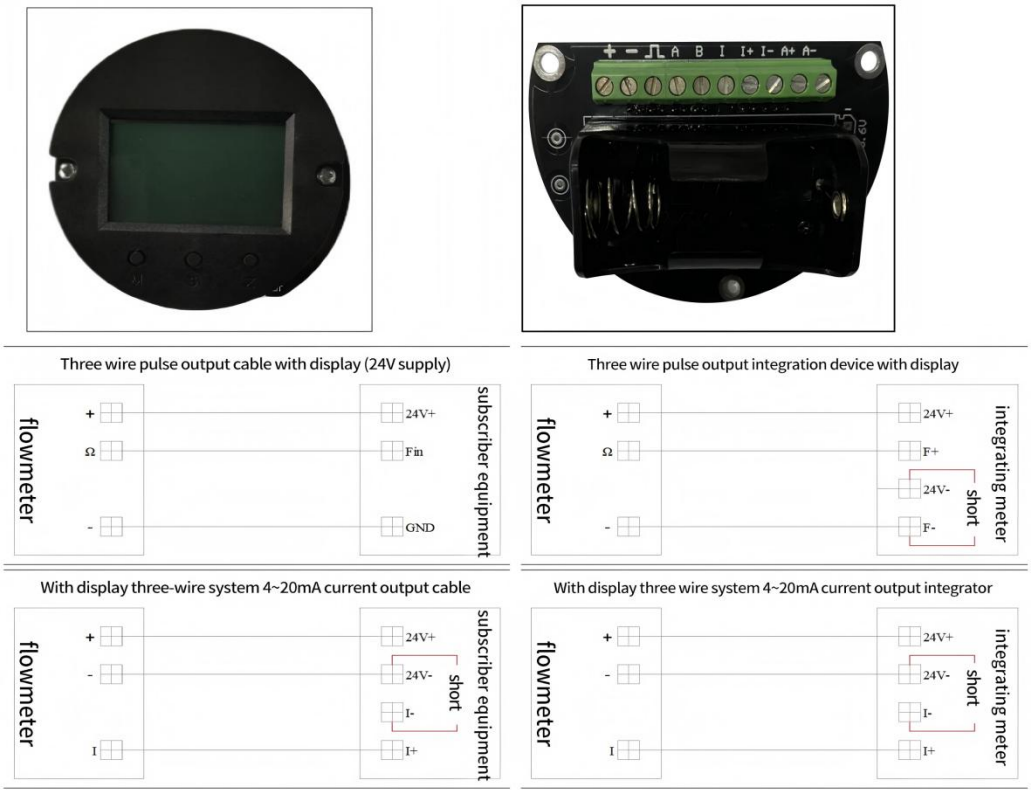
Display the current percentage in the form of a progress bar
Display instantaneous traffic
Display cumulative traffic

7.2.3 Wiring schematic diagram





Note: For on-site 24V power supply, it is recommended to use a branded power supply with a power rating of less than 50W.



Four-wire 485 communication cable with display

Four-wire 485 communication integration meter with display

Remarks: On -site 24V power supply is recommended to use brand power, the power is less than 50W.

With display three-wire pulse output wiring (24V power supply)

Instrument with display and three-wire pulse output for accumulation calculation

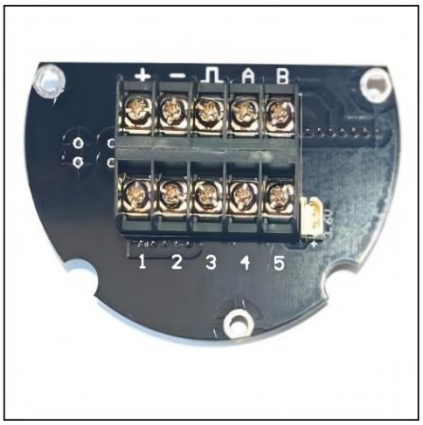
With display, three-wire 4-20mA current output wiring

Instrument with display, three-wire 4-20mA current output for accumulation calculation

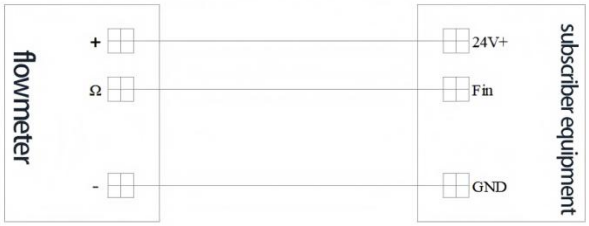
With display and 4-wire 485 communication wiring

Instrument with display and 4-wire 485 communication for cumulative calculation

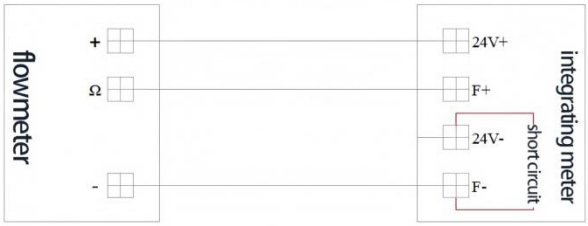
Note: For on-site 24V power supply, it is recommended to use a branded power supply with a power rating of less than 50W.



With display three-wire pulse output wiring (24V power supply)

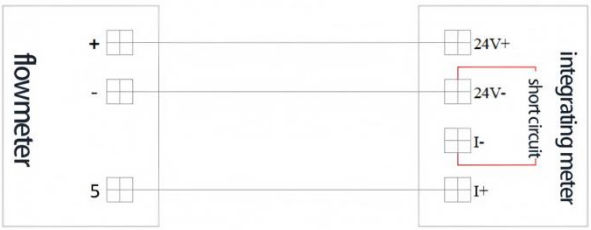


Instrument with display and three-wire pulse output for accumulation calculation



With display, three-wire 4-20mA current output wiring

Instrument with display and three-wire 4-20mA current output for accumulation calculation



With display and 4-wire 485 communication wiring

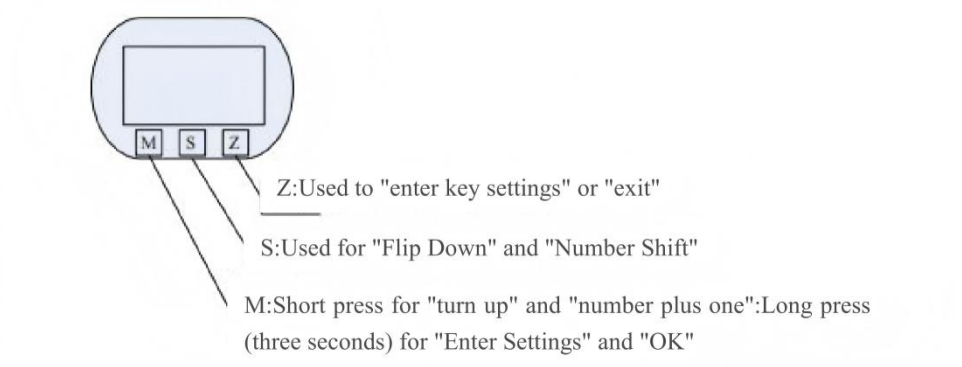
Instrument with display and 4-wire 485 communication for cumulative calculation

Note: For on-site 24V power supply, it is recommended to use a branded power supply with a power rating of less than 50W.

7.2.4 Operation description

1.Key introduction

This product supports the "three keys" operation mode. The basic functions of the three keys are as follows:



1.1 Enter the on -site configuration

In the "normal display" state, press the "Z" key to enter "on -site configuration". The "on -site configuration" parameters can be set up "Direct Digital Input" and "Menu Selection" method.

1.2 Exit the site configuration

In the "on -site configuration" state, press the "Z" key, exit the "on -site configuration", and enter the "display" state.

Note: This instrument records the status of the last exit key settings. Press "Z" to return to the state when the last exit.

1.3 Data setting method

The on -site setting parameters are divided into two types: "menu selection" and "direct digital input".

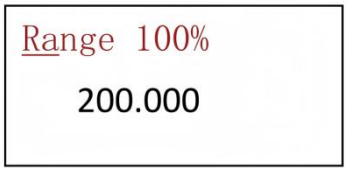
1.4 "Menu Selection" setting method

- Long press the M key and move the line to the second line, indicating that the settings can be changed.
- Press the M key, flip the options, or press the S key, and flip the option.

During the data setting process, press M key and save the settings. After saving, the lower line is automatically moved to the first line.

1.5 "Direct Digital Input" setting method

- Long press the M key and move the line to the second line, indicating that the settings can be changed.
- Press M key to switch symbols.
- Press the S key to the right, and move the lower line to the first digital bit, indicating that it can be modified, press M key, and the number is added.
- Press the S key again and set the number in turn. The setting method is exactly the same as the first digit.
- During the data settings, press the M key to save the settings data; or press the Z key to exit the settings. For example, the upper limit of the original range is 200, and the upper limit of the newly input range is 400.
- The English menu is displayed as an example.

➢ First press the "Z" key to enter the key setting function. ➢ Shortly press the "M" key to move the setting item forward one position; press the "S" key to move the setting item backward one position. Follow the prompts to enter the setting "upper" range .	Setting the upper limit of the measuring range interface 
➢ Press and hold the "M" key for more than three seconds to enter the function of setting the upper limit of the range. At this time, there is an underline under the set number to indicate that the setting has been entered.	Start setting the upper limit of the measuring range interface 
➢ At this time, press the "M" key to switch between "+" and "-". If "-" is displayed, it means that the input is a negative number. ➢ At this time, press the "S" key to shift the setting bit to the right by 1 position. Start entering data. If the highest digit is set, the number that can be entered is between 0 and 9; if it is other digits, the decimal point can also be selected. ➢ After the input is completed, press and hold the "M" key for three seconds to end the data setting. and save the data into the instrument. ➢ When entering data, press the "Z" key to exit the current setting, return to the previous menu, or return to the "normal display" state.	

Special Note:

- ➢ During the setting process, press and hold the "M" key for three seconds to save and end the data setting.
- ➢ During the setting process, press the "Z" key to exit the current setting without saving it. Or return to the previous menu.
- ➢ After completing the settings or exiting the settings, you will stay in the current setting interface.

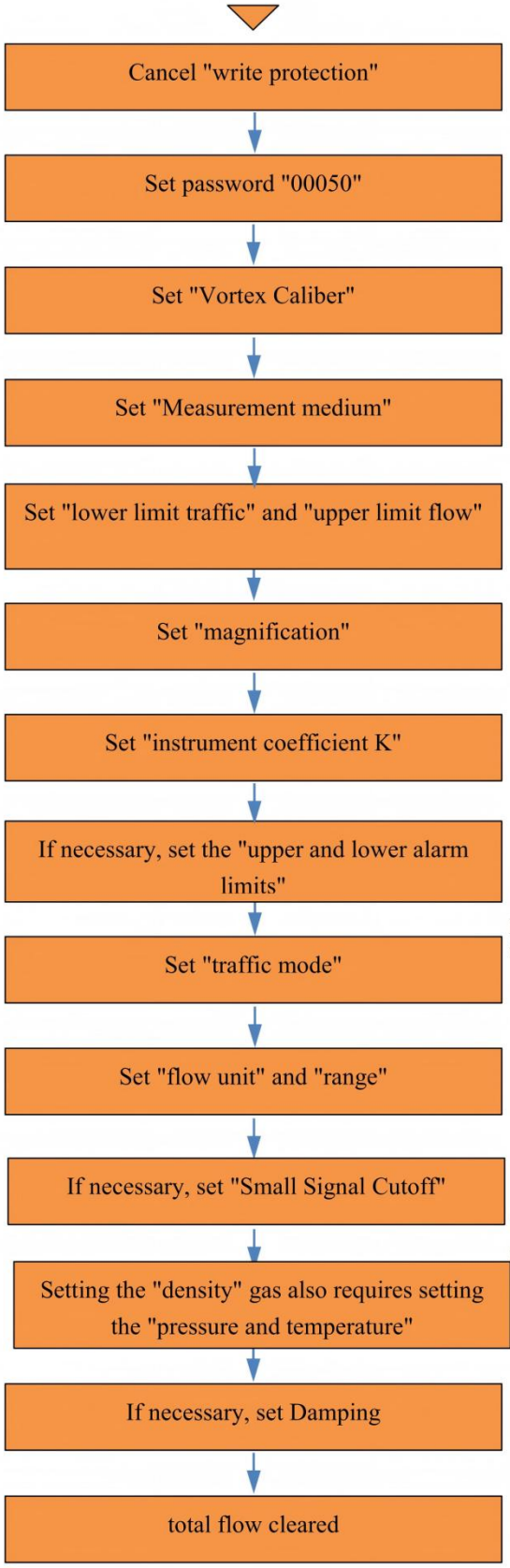
2.Common function settings (no password)

Set variables	English prompt	Chinese prompt	Setting method	Remarks
Contrast	Contrast	Contrast	Menu selection	1~5, the larger the value, the darker the font. Generally, you can choose 3.
Write protection	Protection	Write protection	Long press M key to switch	open（Write Disable） close（Write Enable）
Lower alarm limit	Min Alarm(%)	Lower alarm limit(%)	Direct digital input	Unit:%

Upper limit of alarm	Max Alarm(%)	Upper limit of alarm(%)	Direct digital input	Unit:%
Vortex Caliber	Meter Size	Caliber	Read only	Allowed to view the caliber without entering a password.
Flow Mode	Flow Mode	Flow Mode	Menu selection	Menu selection Liquid Qv Liquid Qm Gas volume (Gas Qv) Gas quality (Gas Qm) Steam Qv Superheated steam quality (PT) (Stea m(P/T)) Saturated steam mass (T) (Sat_Steam(T)) Saturated steam mass (P) (Sat_Steam(P))
instantaneous flow unit	Unit_Qv Unit_Qm	Flow Volume Unit Flow Mass Unit	Menu selection	Volume unit support:Nm^3/h ， Nm^3/m ， Nm^3/s， l/s，l/m，l/h， m^3/s，m^3/m，m^3/h，m^3/d， Scf/s， Scf/m， Scf/h， cf/s， cf/m， cf/h， USG/s， USG /m， USG /h， UKG/s， UKG /m， UKG /h， bbl/h， bbl/d， Special (custom unit) Mass unit support: g/s ， g/m，g/h，kg/s，kg/m ，kg/h，kg/d， t/m，t/h，t/d，lb/h ，lb/d Special(custom unit) Note: The cumulative flow unit is determined based on the instantaneous flow unit, see the "Correspondence Table between Instantaneous Flow Unit and Cumulative Flow Unit".
Upper limit of measuring range	Range 100%	Upper limit of measuring range	direct digital input	

Density	Density (kg/ m^3) Density (g/c m^3)	Density (kg/m3) Density (g/cm3)	direct digital input	Gas density (unit: kilogram/cubic meter) Liquid density (unit grams/cubic centimeter)
Gas pressure (gauge pressure)	Gauge Pre.(kPa)	Gas gauge pressure (kPa)	direct digital input	Unit: kPa, this item is not available when measuring liquids
Gas temperature (Celsius)	Temperature (℃)	Gas temperature (℃)	direct digital input	Unit: °C, this item is not available when measuring liquids
Low flow resection	PV Cutoff(%)	Low flow resection (%)	direct digital input	Range: 0% ~ 20%
Damping	Damping (S)	Damping (S)	direct digital input	Range: 0 ~ 64S
Number of decimal points for instantaneous flow rate	Disp. Point	Number of decimal places	Menu selection	Range: 0, 1, 2, 3
Display mode	Display Mode	Display mode	Menu selection	2_line Display: only displays instantaneous and cumulative flow. 3_line Display: Add a third line of display.
Accumulated flow cleared	Total Reset	Accumulated flow cleared	Menu selection	"Yes" to clear the accumulated traffic. "No" (No), do not perform the operation.
Cumulative traffic overflow times	Total Overflow	Cumulative traffic overflow times	Read only	If the cumulative flow is greater than 99999999,the number of overflows will be increased by one.
Instrument coefficient (K value) [57]	K-Factor	Instrument coefficient K	Read only	You can view the instrument coefficients without entering the password.

3. Common parameter settings



You should confirm that the current write protection is "Off", which allows changing settings.

Use the "Scroll Up" and "Scroll Down" buttons to select the prompt that displays "Password (Code)".
Enter the opcode.
Enter the operation code "00050", enter "Signal Monitoring", "Scroll down" to enter the setting "Vortex Port"
Path menu

Choose the right caliber

Select the correct type of measuring medium: gas or liquid

Set the appropriate lower limit flow rate according to the type and diameter of the measurement medium.
The lower limit of actual measurement is about half of the set value.

The upper limit flow rate defaults to 10 times the lower limit flow rate, and the actual measured upper limit flow rate is 2.5 times the set value.
When the actual required range ratio exceeds 20:1, the upper limit flow value can be modified manually.

Set the amplification factor corresponding to the lower flow rate (minimum signal). Usually around 400 is sufficient.

Determined based on caliber and measuring medium.

If necessary, set the upper and lower alarm limits (the unit is fixed in %).
To set the traffic mode, you can choose:
Liquid volume (Liquid Qv), liquid mass (Liquid Qm)
Gas volume (Gas Qv), gas mass (Gas Qm)
Steam Qv
Superheated steam quality (PT) (Steam(P/T))
Saturated steam mass (T) (Sat_Steam(T))
Saturated steam mass (P) (Sat_Steam(P))

Set the instantaneous flow unit and upper limit of measurement.
The lower limit of measurement is fixed at 0; the cumulative flow unit is determined based on the instantaneous flow unit.

Depending on the type of measuring medium, the liquid sets the density;
For gas, set the density, gas pressure, and gas temperature.
Please make correct settings according to the flow mode and pressure/temperature acquisition mode.

If necessary, set the small signal cutoff amount (the unit is fixed in %).

If required, set the damping time (units are fixed in seconds).

8. Daily maintenance

Vortex flowmeter is a high -precision measuring instrument. In the process of using, there will always be some wrong methods to reduce its service life. Many users now only know the use of equipment, but do not know that equipment is like people. Maintenance is very important while use. Our company has its own unique insights and rich experience in the daily maintenance of vortex traffic meters. Based on the high sense of responsibility for customers, customers can enjoy the guidance and maintenance of experts in the after -sales service after purchasing. Any worries. Our company proposes the following daily maintenance suggestions for vortex street traffic gauges for your reference:

1. Clean, check and resume the vortex flowmeter. According to the national measurement and verification regulations, "JJG1029-2007 Vortex Flower", the verification cycle of the vortex flow meter is two years.

2. View the display instrument, evaluate the readings of the display instrument, and check in time if there are abnormalities.

3. Keep the filter unblocked and the filter is blocked by impurities. It can be judged from the increase of the difference in the pressure of the pressure gauge at the entrance and exit, and it can be excluded in time when blocking. Otherwise, the traffic will be severely reduced.

4. Maintaining vortex street flow time, the vortex should be specially protected. When you do not know the failure, you must not disassemble it at will, so as not to damage the probe or damage the sealing performance, and cause the sensor leakage. When you encounter a failure that cannot be resolved, you should contact the manufacturer to help resolve.

9. Product common problems and solutions

1. The frequency of on -site instrument changes greatly. Exclusion method:

A.First check whether the direct pipe section meets the requirements. The gas can relax and ensure that the first 10D is 5D. The liquid direct tube section does not meet the requirements. It has a greater impact. It is not long enough to change the installation position.

B.Electromagnetic interference may be available at the scene. Methods: Strengthen the filtering function, lower the sensitivity, and achieve it by dial -dial -dial switch.

C. The on -site traffic is too small, lower than the lower limit of the instrument. For example: inserted gas measurement gas with a diameter of DN300, the lower limit is 1500m^3/h, but the on -site shows a instantaneous flow of about 500 m^3. Due to the lower limit, the value is not linear, and the flow of flow can be increased by changing the instrument coefficient (not recommended).

D. Similar situations will occur in the liquid measuring liquid.

2. There are 50Hz interference at the scene. Generally, the shielding line is not grounded.

3. No traffic signal on the spot:

A. The instrument signal is too large to modify it in the parameter settings.

B. The power supply is not connected well and does not connect.

C. The traffic is very low.

D.4-20mA output was not set up before the factory.

4. The actual traffic increases, and the cheetable display decreases. Check the cause of the site (such as pipeline technology, etc.).

5. Decreased actual traffic and increased cheerful display. Most of the pipes are vibrating or the pads are not at the center of the pipe during installation. The instrument should be reinstalled.

6. The instrument display of the working conditions is inconsistent, and the difference is large.

A. There are differences in the working conditions of each meter, such as the problem of pipeline direction, the problem of the tube segment, and the problem of vibration.

B. The parameters of the instrument instrument have been modified.

C. The traffic flow is too low, and the lower limit is not linear.

D. The temperature and pressure compensation table fails.

7. 4-20mA output instrument, display and system display is inconsistent.

A. The units set by parameters are inconsistent, or the range is not consistent.

B.4-20mA output cable is too long (more than 1000 meters), and the loss is large.

8. The flow of the instrument display is very different from the actual situation, most of the reasons is the problem of the parameter setting unit.

9. Most of the static flow of instruments is caused by on -site pipeline vibration. Take shock absorption measures or reduce the sensitivity of the instrumental duct can be reduced or eliminated.

Appendix 1 Ordinary RS-485 communication protocol

The vortex circuit adopts the MODBUS-RTU protocol, only supports the 03 reading command, and does not support writing operations. The Potter rate is 9600 and does not support other Potter rates.

MOD Bus Poll software RTU connection:

Display Option -Floating PT (data display format -floating point number)

Command 03: Holding Register.

Device ID: internal address of the instrument.

Address: Start address of the instrument parameters, from 1-14.

Length: data length length + address <= 14.

Parameter address: 40001-2: The temperature of the medium, liquid turbine and thermal gas flowmeter, this part is always 0.

40003－4：Instant traffic

40005－6：Pressure (the instrument LCD screen is greater than 1000kPa display MPA,and the 485 communication unit is always KPa).

40007－8：Frequency。

40009－10：More than 100 cumulative traffic （1234）

40011－12：Beyond 100 cumulative traffic （87.89）

Cumulative flow ＝ 1234 × 100 ＋ 87.89 = 123487.89

40013－14：Current instantaneous traffic use unit (0： m^3/h，1：L/m，2：Nm^3/h 3：NL/m，4：t/h，5：Kg/m，6：m^3/m，7：L/h，8：Nm^3/m，9：Kg/h)

Appendix 2 Upgraded RS-485 communication protocol

1. Brief description of the agreement

This product uses standard MODBUS-RTU mode. Supported function codes include:

Function code: 03, read the value of the holding register, including configuration data and other settings.

Function code: 04, read the value of the input register, here refers to reading the dynamic variable.

Function code: 06, write a holding register.

Function code: 16, write multiple holding registers.

The MODBUS operating principle is based on the "register" concept, and its standard function numbers are basically read and write operations on the designated "register". Based on this concept, some commonly used parameters are set as "registers" to facilitate common use with other systems.

1.1 Communication parameter settings

Parameter name	Value range	Default value
Converter address	1--247	1
Baud rate	9600	9600
Data bits	8	8
Parity	none	none
Stop bit	1	1

1.2 Communication data format

Supported data type:

1) FLOAT: floating point data

4 byte standard IEE-754 format.

For example, take 100.0 (hexadecimal expressed: 0x42, 0xc8, 0x00, 0x00) as an example. The order of transmission is: 0x42, 0xc8, 0x00, 0x00.

Unsigned short： 2 bytes Non -symbolized plastic surgery.

For example: Take 4660 (hexadecimal: 0x12, 0x34) as an example. The order of transmission is: 0x12,0x34.

2） Unsigned char： single byte without symbolic number.

1.3 Communication interface data format

1.4 Command 03 (read holding register)

Example: Reading the upper limit of the main variable range (assuming its current value is 100.0), the corresponding register starting address is: 524 (hexadecimal: 0x020C).

Request message:

Address	Function code	Register address	Number of registers	CRC check
0x01	0x03	0x02,0x0C	0x00,0x02	0x05,0xB0

Response message:

Address	Function code	Data length	Data	CRC check
0x01	0x03	0x04	0x42,0xC8,0x00,0x00	0x6F,0xB5

1.5 Command 04 (read input register, that is, read variables)

Example: Read the cumulative amount (assuming its current value is 100.0), the starting address of the corresponding register is: 1034 (hexadecimal: 0x040A).

Request message:

Address	Function code	Register address	Number of registers	CRC check
0x01	0x04	0x04,0x0A	0x00,0x02	0x50,0xF9

Response message:

Address	Function code	Data length	Data	CRC check
0x01	0x04	0x04	0x42,0xC8,0x00,0x00	0x6E,0x02

1.6 Command 16 (write holding register)

Example: Set the upper limit of the main variable range to 100.0, and the corresponding register starting address is: 524 (hexadecimal: 0x020C).

Request message:

Address	Function code	Register address	Number of registers	Data	Data	CRC check
0x01	0x10	0x02,0x0C	0x00,0x02	0x04	0x42,0xC8,x00,0x00	0x7F,0x1C

Response message:

Address	Function code	Register address	Number of registers	CRC check
0x01	0x10	0x02,0x0C	0x00,0x02	0x80,0x73

2.Register description

Register address (Hex)	**Parameter Name**	**Access Type data**	**Data length(word)**	**Data type**	**Description**
0x0402	Percent	R	2	float	
0x0404	Instantaneous flow rate	R	2	float	Register 0x021C stores the unit of instantaneous flow rate.
0x0408	sensor value	R	2	float	sensor frequency value

0x040A	Accumulated flow value	R	2	float	float Register 0x021D stores the unit of accumulated flow.
0x040C	Number of cumulative flow overflows	R	2	float	
0x0414	Actual magnificatio	R	2	float	
0x041C	Actual working channel	R	1	unsigned short	
0x0421	Current value	R	2	float	
0x0423	Pressure value	R	2	float	
0x0425	Temperature value	R	2	float	
0x0427	Density value	R	2	float	
0x0429	Pressure original value	R	2	float	
0x042B	Temperature original value	R	2	float	

2.1 Input register list (dynamic variables)

Register address (Hex)	Parameter Name	Access Type data	Data length (word)	Data type	Description
0x0200	address	R/W	1	unsigned short	Value range 1 ~ 247
0x0201	Flow pattern	R/W	1	unsigned short	{ 0, "Liquid_QV liquid volume"}, {1, "Liquid_QM liquid quality"}, {2, "Gas_QV gas volume"}, {3, "Gas_QM gas quality"}, {4, "Steam_QV steam volume"}, {5,"Steam_PT superheated steam temperature and pressure compensation"}, {6,"Steam_SAT_T saturated steam temperature compensation"}, {7,"Steam_SAT_P saturated steam pressure compensation"}

0x0202	Media type and vortex diameter	R/W	1	unsigned short	{ 0x0000, "Liquid N15" }, { 0x0001, "Liquid DN20" }, { 0x0002, "Liquid DN25" }, { 0x0003, "Liquid DN32" }, { 0x0004, "Liquid DN40" }, { 0x0005, "Liquid DN50" }, { 0x0006, "Liquid DN65" }, { 0x0007, "Liquid DN80" }, { 0x0008, "Liquid DN100"}, { 0x0009, "Liquid DN125"}, { 0x000A, "Liquid DN150"}, { 0x000B, "Liquid DN200"}, { 0x000F, "Liquid DN400"}, { 0x0010, "Liquid DN450"}, { 0x0011, "Liquid DN500"}, { 0x0012, "Liquid DN600"}, { 0x0100, "Gas DN15" }, { 0x0101, "Gas DN20" }, { 0x0102, "Gas DN25" }, { 0x0103, "Gas DN32" }, { 0x0104, "Gas DN40" }, { 0x0105, "Gas DN50" }, { 0x0106, "Gas DN65" }, { 0x0107, "Gas DN80" }, { 0x0108, "Gas DN100"}, { 0x0109, "Gas DN125"}, { 0x010A, "Gas DN150"}, { 0x010B, "Gas DN200"}, { 0x010C, "Gas DN250"}, { 0x010D, "Gas DN300"}, { 0x010E, "Gas DN350"}, { 0x010F, "Gas DN400"}, { 0x0110, "Gas DN450"}, { 0x0111, "Gas DN500"}, { 0x0112, "Gas DN600"},
0x0204	Maximum magnification	R/W	2	float	0~1500
0x0206	Minimum frequency	R	2	float	
0x0208	Maximum frequency	R	2	float	

0x020A	Instrument coefficient K value	R/W	2	float	>0
0x020C	Upper limit of measuring range	R/W	2	float	>0
0x020E	Damping	R/W	2	float	0 ~ 32.0
0x0210	Alarm upper limit	R/W	2	float	
0x0212	Alarm lower limit	R/W	2	float	
0x0214	Gas standard density (kg/m3)	R/W	2	float	
0x0216	Gas pressure (gauge pressure)	R/W	2	float	
0x0218	Gas temperature (℃)	R/W	2	float	
0x021A	Liquid density (g/cm3)	R/W	2	float	
0x021C	instantaneous flow unit	R/W	1	unsigned short	{ 188 , "Nm^3/h" }, { 189 , "Nm^3/min" },

					{ 190 , "Nm^3/s" }, { 29 , "m^3/d" }, { 19 , "m^3/h" }, { 131 , "m^3/min"}, { 28 ,"m^3/s" }, { 138, "l/h" }, { 17, "l/min" }, { 24, "l/s" }, { 185, "Scf/h" }, { 123, "Scf/m" }, { 186, "Scf/s" }, { 130, "cf/h" }, { 15 , "cf/m" }, { 26 , "cf/s" }, { 136, "USG/h" }, { 16 , "USG/m" }, { 22 , "USG/s" }, { 30 , "UKG/h" }, { 18 , "UKG/m" }, { 137, "UKG/s" }, { 135, "bbl/d" }, { 134, "bbl/h" }, { 253, "special_Qv" } { 79, "t/d" }, { 78, "t/h" }, { 77, "t/min" }, { 76, "kg/d" }, { 75, "kg/h" }, { 74, "kg/min"}, { 73, "kg/s" }, { 72, "g/h" }, { 71, "g/min" }, { 70, "g/s" }, { 83, "lb/d" }, { 82, "lb/h" }, { 254, "special_Qm" }
0x021D	Cumulative flow unit	R	1	unsigned short	{ 43, "m^3" }, { 41, "l" }, { 172, "Nm^3"}, { 168, "Scf" }, { 112, "cf" }, { 40, "USGal" },

					{ 42, "UKgal" }, { 46, "bbl"}, { 61, "kg" }, { 60, "g" }, { 62, "ton"}, { 63, "lb"}, { 253, "special"}, { 254, "special"},
0x0250	display mode	R/W	1	unsigned short	{ 0, "3 lines display" }, { 1, "2 lines display" },
0x021E	The third line shows the variables	R/W	1	unsigned short	{ 0, "Current value" }, { 1, "Percent value" }, { 4, "frequency value" }, { 6, "density value" }, { 7, "Pressure value" }, { 8, "Temperature value" }, { 9, "Temperature and pressure value" },
0x021F	Number of decimal points for instantaneous flow rate	R/W	1	unsigned short	{ 0, "0" }, { 1, "1" }, { 2, "2" }, { 3, "3" },
0x0220	write protect	R/W	1	unsigned short	{ 0, "Not write protected" }, { 1, "write-protect" }
0x0221	User Calibration: Points	R/W	1	unsigned short	{ 0x00, "0" }:No user calibration { 0x02, "2" }, { 0x03, "3" }, { 0x04, "4" }, { 0x05, "5" }
0x0222	User calibration: Frequency value 1	R/W	2	float	
0x0224	User calibration: Frequency value2	R/W	2	float	
0x0226	User calibration: Frequency value3	R/W	2	float	
0x0228	User calibration: Frequency value4	R/W	2	float	
0x022A	User calibration: Frequency value5	R/W	2	float	

0x022C	User calibration: correction factor 1	R/W	2	float	
0x022E	User calibration: correction factor 2	R/W	2	float	
0x0230	User calibration: correction factor 3	R/W	2	float	
0x0232	User calibration: correction factor 4	R/W	2	float	
0x0234	User calibration: correction factor 5	R/W	2	float	
0x0236	(%)Low flow cutoff value (%)	R/W	2	float	0 ~ 20.0
0x023B	Function flag	R/W	1	unsigned short	{ 0x0001, "Accumulated traffic cleared" }
0x0247	Pulse unit	R/W	1	unsigned short	{ 43, "m^3" }, { 172, "Nm^3"} { 61, "kg" }, { 62, "ton"}, { 168, "Scf" }, { 112, "cf" }, { 40, "USGal" }, { 42, "UKgal" }, { 46, "bbl"}, { 63, "lb"},
0x023F	Number of output pulses in 1 pulse unit	R/W	2	float	>0
0x0244	Operating mode	R/W	1	unsigned short	{ 0x0000, "F1: Anti-seismic mode" }, { 0x0001,"F2: Standard mode" }, { 0x0002,"F3: Turbo mode" }, { 0x0003,"F4: Test mode" },
0x0245	Temperature and pressure collection method	R/W	1	unsigned short	{ 0x0000, "Manual input of pressure, manual input of temperature"}, { 0x0001, "Manual input of pressure, automatic collection of temperature"}, { 0x0010, "Automatic collection of pressure, manual input of temperature"}, { 0x0011, "Automatic pressure collection,

					automatic temperature collection"},
0x0246	Communication baud rate	R/W	1	unsigned short	{ 0, "9600bps, 8bits, 1stop, no parity" }, { 1, "4800bps, 8bits, 1stop, no parity" }, { 2, "2400bps,8bits, 1stop,no parity" }, { 3, " 1200bps,8bits, 1stop,no parity" }, { 4, "600bps, 8bits, 1stop, no parity" }
0x024A	Lower limit traffic	R/W	2	float	>0， unit：m^3/h
0x024C	Maximum traffic	R/W	2	float	>0， unit：m^3/h
0x024E	frequency correction factor	R/W	2	float	0~20
0x2400	Pressure calibration zero point collection value	R/W	2	float	unit： mV
0x2402	Pressure calibration full point collection value	R/W	2	float	unit： mV
0x2404	Temperature calibration low point acquisition value	R/W	2	float	unit：Ω
0x2406	Temperature calibration high point acquisition value	R/W	2	float	unit：Ω
0x2408	Pressure calibration zero point value	R/W	2	float	unit： Kpa
0x240A	Pressure calibration full point value	R/W	2	float	unit： Kpa
0x240C	Temperature Calibration Low Point Resistor Value	R/W	2	float	unit：Ω
0x240E	Temperature calibration high point resistance value	R/W	2	float	unit：Ω

0x2410	small pressure cutoff value	R/W	2	float	unit： Kpa
0x2412	Pressure migration value	R/W	2	float	unit： Kpa

Appendix 3 General gas density table

NO.	Gas	Density (g/L 0℃)	NO.	Gas	Density (g/L 0℃)	NO.	Gas	Density (g/L 0℃)
1	Air	1.2048	20	Trichloroethane $C_3H_3Cl_3$	5.95	39	Neon Ne	0.9
2	Argon Ar	1.6605	21	Carbon monoxide CO	1.25	40	Ammonia NH_3	0.76
3	Arsane AsH_3	3.478	22	Carbon dioxide CO_2	1.964	41	Nitric oxide NO	1.339
4	Boron tribromide BBr_3	11.18	23	Cyanide gas C_2N_2	2.322	42	Nitrogen dioxide NO_2	2.052
5	Boron trichloride BCl_3	5.227	24	Chlorine Cl_2	3.163.	43	Nitrous oxide N_2O	1.964
6	Boron trifluoride BF_3	3.025	25	Germanium tetrachloride D_2	0.1798	44	Oxygen O_2	1.427
7	Borane B_2H_6	1.235	26	Fluorine gas F_2	1.695	45	Phosphorus trichloride PCl_3	6.127
8	Carbon tetrachloride CCl_4	6.86	27	Germanium tetrachloride $GeCl_4$	9.565	46	Phosphane PH_3	1.517
9	Carbon tetrafluoride CF_4	3.9636	28	Germane GeH_4	3.418	47	Phosphorus pentafluoride PF_5	5.62

10	Methane CH_4	0.715	29	Hydrogen H_2	0.0899	48	Phosphorus oxychloride $POCl_3$	6.845
11	Ethylene C_2H_4	1.251	30	Hydrogen bromide HBr	3.61	49	Silicon tetrachloride $SiCl_4$	7.5847
12	Ethane C_2H_6	1.342	31	Hydrogen chloride HCl	1.627	50	Silicon tetrafluoride SiF_4	4.643
13	Proyne C_3H_4	1.787	32	Hydrogen fluoride HF	0.893	51	Silane SiH_4	1.433
14	Propylene C_3H_6	1.877	33	Hydrogen iodide HI	5.707	52	Silicon dichloride SiH_2Cl_2	4.506
15	Propane C_3H_8	1.967	34	Hydrogen sulfide H_2S	1.52	53	Trichlorosilane $SiHCl_3$	6.043
16	Butyne C_4H_6	2.413	35	Helium He He	0.1786	54	Sulfur hexafluoride SF_6	6.516
17	Butene C_4H_8	2.503	36	Krypton gas Kr	3.739	55	Sulfur dioxide SO_2	2.858
18	Butane C_4H_{10}	2.593	37	Nitrogen N_2	1.25	56	Titanium tetrachloride $TiCl_4$	8.465
19	Pentane C_5H_{12}	3.219	38	Xenon Xe	5.858	57	Tungsten hexafluoride WF_6	13.29