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USER MANUAL

VORTEX FLOW METER

Content

1. General Information

This manual will assist you in installing, using and maintaining your Vortex Flow Meter. It is your responsibility to make sure that all operators have access to adequate instructions about safe operating and maintenance procedure.

Warning

For your safety, review the major warnings and cautions below before operating your equipment.

1. Use only fluids that are compatible with the housing material and wetted components of your Vortex.

2. When measuring flammable liquids, observe precautions against fire or explosion.

3. When handling hazardous liquids, always follow the liquid manufacturer's safety precautions.

4. When working in hazardous environments, always exercise appropriate safety precautions.

5. During Vortex removal, liquid may spill. Follow the liquid manufacturer's safety precautions for clean up of minor spills.

6.Handle the sensor carefully. Even small scratches or nicks can affect accuracy.

7. When tightening the Vortex, use a wrench only on the wrench flats.

8. For best results, calibrate the meter at least 1 time per year.

1.1 Product Description

MTGBseries Vortex flow meters are designed for measuring the volume/mass flow of liquids, gases and

steam based on Karman vortex principle.

Adopting advanced differential algorithm along with measurement of isolation, shielding and wave filtering,

MTGBseries vortex flow meters have the advantages of immunity on vibration and noise. Meanwhile, the

liabilities of MTGBseries vortex flow meters are well guaranteed by unique sensor packaging technology.

Upon receipt, examine your meter for visible damage. The Vortex is a precision measuring instrument and

should be handled carefully. Remove the protective plugs and caps for a thorough inspection. If any items

are damaged or missing, contact METERN.

Make sure the Vortex flow model meets your specific needs. For your future reference, it might be useful

to record this information on nameplate in the manual in case it becomes unreadable on the Vortex. Refer

to the nameplate for your customized product's specification.

2. Technical Data

Measuring system

Application range	(1) Gas; (2) Liquid; (3) Steam
Measured Value	
Primary measured value	Flow Rate
Secondary measured value	Volume flow ; (Pressure and Temperature is available for model with compensation)

Design

Features	(1) Gas; (2) Liquid; (3) Steam
Modular construction	The measurement system consists of a flow sensor and a signal converter. It is available as compact and as separate version.
Compact version converter	N Type: Pulse output without local display
	A Type: 4-20mA Output without local display
	B Type: Local Display; Lithium Battery Power; No Output (Battery Part No.: ER26500)
	C Type: Local Display; 24V DC Power; 4-20mA Output; Optional Function: (1) Backup Power Supply: Lithium Battery (2) Modbus RS485 (3) Pulse Output
Connection	

Connection	Flange: DN15-DN300
Connection	Wafer: DN15-DN300
Measurement Ratio	Standard – 10:1

Design

Reference conditions	Flow conditions similar to EN 29104
	Medium: Water / Gas
	Electrical conductivity: ⩾ 300 μS/cm
	Temperature: +10...+30°C / +50...+86°F
	Inlet section: ⩾ 10 DN
	Operating pressure: 1 bar / 14.5 psig
Flow Meter Accuracy	
	For Liquid: 1.0% of rate
	For Gas and Steam: 1.5% of rate

Operating conditions

Temperature	
Process temperature	T1 Level: -20...+70°C
	T2 Level: -20...+250°C
	T3 Level: -20...+350°C
Ambient temperature (all versions)	Standard (with aluminum converter housing):
	- 10...+55°C
Storage temperature	- 20...+70°
Pressure	
EN 1092-1	DN200...DN300: Pn10
	DN100...DN200: PN 16
	DN15...DN80: PN 25
	Other pressures on request
ASME B16.5	1/2"...8": 150 lb RF
	Other pressures on request
JIS	1/2"...8": 10 K
	Other pressures on request

Installation conditions

Installation	Take care that flow sensor is always fully filled
	For detailed information see chapter "Cautions for Installation"
Flow direction	Forward
	Arrow on flow sensor indicates flow direction.
Inlet run	⩾ 10 DN
Outlet run	⩾ 5 DN

Materials

Sensor housing	SS304 Other materials on request
Flanges	SS304
	Other materials on request
Converter Housing Outlet run	Standard: polyurethane coated die-cast aluminum

Process connections

Flange	
EN 1092-1	DN15...300 in PN 6...25
ASME	1/2"...12" in 150 lb RF
JIS	1/2"...12" in 10...20K
Design of gasket surface	RF
	Other sizes or pressure ratings on request
Wafer	DN15...DN300

Measurable Flow Rate Range:

Note: The flow range as blow is for reference only. Consult the factory if you have special requirement.

Refer to the nameplate or certificate for actual flow range.

Nominal Diameter		Liquid	Gas
(mm)	(in.)	Flow (m3/h)	Flow (m3/h)
15	1/2"	0.8 to 6	6 to 40
20	3/4"	1to 8	8to 50
25	1"	1.5 to 12	10 to 80
40	1-1/2"	2.5 to 30	25 to 200
50	2"	3 to 50	30 to 300
65	2-1/2"	5 to 80	50 to 500
80	3"	8 to 120	80 to 800
100	4"	12 to 200	120 to 1200
125	5"	20 to 300	160 to 1600
150	6"	30 to 400	250 to 2500
200	8"	50 to 800	400 to 4000
250	10"	80 to 1200	600 to 6000
300	12"	100 to 1600	1000 to 10000

3.Flow and density

Table 1　Saturated steam mass flow measurement range

Absolute pressure (MPa)		0.07	0.1	0.14	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0	1.2	1.4	1.6	2.0	2.5	3.0	4.0	Flow unit
temperature (℃)		90.0	99.6	109	120	134	144	152	159	165	170	180	188	195	201	212	224	234	250	
density (kg/m³)		0.432	0.59	0.809	1.13	1.65	2.16	2.67	3.17	3.67	4.16	5.15	6.13	7.11	8.09	10.1	12.5	15.0	20.1	
DN(20)	Q_{min}	3.6	4.2	4.9	6.2	7.6	9.1	10	12	13	14	16	18	20	22	25	29	33	40	kg/h
	Q_{max}	25	35	48	68	99	130	160	190	220	250	300	360	420	480	600	750	900	1200	
DN(20)	Q_{min}	4.2	5.0	6.0	7.5	9.2	11	12	14	15	17	19	21	23	26	30	34	39	48	
	Q_{max}	50	71	97	140	200	260	320	380	440	500	610	740	850	970	1200	1500	1800	2400	
DN 40	Q_{min}	11	12	15	18	23	28	31	35	38	42	48	54	59	65	74	86	98	120	
	Q_{max}	130	190	260	360	520	690	850	1000	1200	1300	1600	1900	2300	2600	3200	4000	4800	6400	
DN 50	Q_{min}	18	21	25	31	38	45	51	57	64	71	81	92	100	110	120	140	160	200	
	Q_{max}	210	300	400	560	820	1100	1300	1600	1800	2100	2600	3100	3600	4000	5000	6300	7500	10000	
DN 80	Q_{min}	0.04	0.05	0.06	0.08	0.09	0.11	0.12	0.14	0.15	0.17	0.19	0.21	0.24	0.26	0.30	0.34	0.39	0.48	t/h
	Q_{max}	0.53	0.74	1.0	1.4	2.1	2.7	3.4	4.0	4.6	5.2	6.5	7.7	9.0	10	13	16	19	25	
DN 100	Q_{min}	0.06	0.07	0.08	0.10	0.12	0.14	0.16	0.18	0.20	0.22	0.25	0.29	0.32	0.35	0.40	0.45	0.51	0.62	
	Q_{max}	0.85	1.2	1.6	2.2	3.3	4.3	5.3	6.3	7.3	8.3	10	12	14	16	20	25	30	40	
DN 150	Q_{min}	0.15	0.17	0.20	0.25	0.31	0.37	0.42	0.47	0.50	0.54	0.63	0.73	0.81	0.89	1.0	1.1	1.3	1.6	
	Q_{max}	1.9	2.6	3.6	5.0	7.3	9.6	12	14	16	18	23	27	32	36	45	56	67	89	
DN 200	Q_{min}	0.23	0.27	0.32	0.40	0.44	0.58	0.67	0.76	0.81	0.87	1.0	1.2	1.3	1.4	1.6	1.8	2.1	2.4	
	Q_{max}	3.4	4.7	6.5	9.0	13	17	21	25	29	33	41	49	57	65	80	100	120	160	
DN 250	Q_{min}	0.35	0.41	0.48	0.60	0.70	0.90	1.0	1.1	1.2	1.3	1.4	1.7	1.8	2	2.4	2.8	3.1	3.8	
	Q_{max}	5.2	7.3	9.9	14	20	26	33	39	45	51	63	75	87	99	120	150	180	240	
DN 300	Q_{min}	0.43	0.50	0.59	0.74	0.91	1.1	1.2	1.4	1.6	1.7	1.9	2.2	2.4	2.6	3.0	3.5	4.0	4.8	
	Q_{max}	7.5	10	14	20	29	38	47	56	65	74	92	110	120	160	180	220	270	360	

Table two　the density of superheated steam with respect to pressure and temperature

Company: kg/m³

Absolute pressure (MPa) \ temperature (℃)	140	180	220	260	300	340	380	420	460
0.15	0.78	0.71	0.65	0.60	0.56	0.52	0.49	0.46	0.44
0.2	1.05	0.95	0.87	0.80	0.75	0.70	0.65	0.62	0.58
0.25	1.32	1.19	1.09	1.00	0.93	0.87	0.82	0.77	0.73
0.3	1.59	1.43	1.31	1.21	1.12	1.05	0.98	0.93	0.87
0.36	1.92	1.73	1.58	1.45	1.35	1.26	1.18	1.11	1.05
0.4		1.93	1.75	1.62	1.50	1.40	1.31	1.23	1.16
0.5		2.42	2.20	1.99	1.88	1.72	1.64	1.54	1.46
0.6		2.93	2.66	2.44	2.26	2.10	1.97	1.85	1.75
0.7		3.44	3.11	2.86	2.64	2.46	2.30	2.16	2.04
0.8		3.96	3.58	3.27	3.02	2.82	2.63	2.48	2.34
0.9		4.5	4.04	3.69	3.41	3.17	2.98	2.79	2.63
1		5.04	4.52	4.12	3.8	3.53	3.5	3.1	2.93
4			6.46	5.85	5.37	4.98	4.65	4.37	4.05
1.8			8.51	7.64	7.00	6.46	6.02	5.64	5.31
2			9.58	8.56	7.81	7.21	6.71	6.28	5.91
2.4				10.45	9.48	8.72	8.1	7.57	7.12
2.8				12.41	11.19	10.26	9.51	8.88	8.34
3.2				14.46	12.94	11.83	10.94	10.20	9.57
3.6				169.61	14.76	13.43	12.39	11.54	10.91

Note: when the density value is between two values in the table, the interpolation method can be used to calculate the.

Table three measuring range of liquid and gas

Company: m³/h

caliberDN /mm	liquid	Gas	caliberDN /mm	liquid	Gas
	Measurable range	Measurable range		Measurable range	Measurable range
15	0.25 ~ 5.00	4.0 50.0	125	10.0 ~ 400	133 4000
20	0.33 ~ 10.0	5.0 60.0	150	15.0 ~ 600	200 6000
25	0.40 ~ 16.0	6.0 160	200	25.0 ~ 1000	333 10000
32	0.63 ~ 25.0	10.0 250	250	40.0 ~ 1600	533 16000
40	1.00 ~ 40.0	16.0 400	300	580.0 ~ 2000	666 20000
50	1.50 ~ 60.0	25.0 600	350	75.0 ~ 3000	1000 30000
65	2.50 ~ 100	40.0 1000	400	1400 ~ 4000	1330 40000
80	4.00 ~ 160	60.0 1600	450	125 ~ 5000	1660 50000
100	6.00 ~ 250	80.0 2500	500	150 ~ 6000	2000 60000

Note: reference fluid: liquid: water at room temperature (t=20, p=1000kg/m3); gas: air at room temperature and atmospheric pressure (t=20,P=0.1MPa, P =1.205kg/m3)

Table four common gas density

Company: Kg/m³

Gas name	0℃ 760mmHg	20℃,760mmHg(ρ_n)	Gas name	0℃ 760mmHg	20℃,760mmHg(ρ_n)
atmosphere	1.2928	1.205	acetylene	0.1717	1.091
nitrogen	1.2506	1.165	methane	0.7167	0.668
hydrogen	0.0899	0.084	ethane	1.3567	1.263
oxygen	1.4289	1.331	propane	2.005	1.867
chlorine	3.214	3.00	ethylene	1.2604	1.174
ammonia	1.771	0.719	propylene	1.914	1.784
carbon monoxide	1.2504	1.165	natural gas	0.828	
carbon dioxide	1.977	1.842	coal gas	0.802	

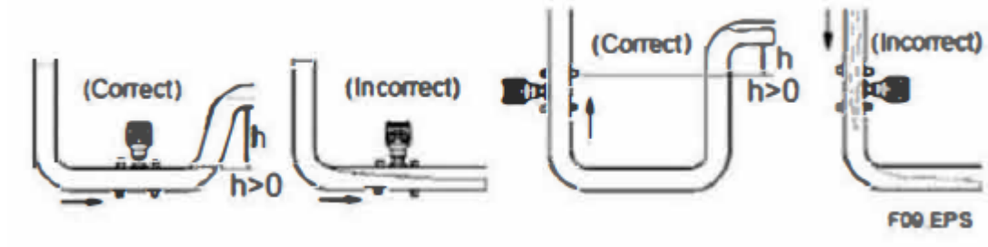
Note: according to the relationship between the pressure or temperature and density can be approximated by a linear relationship between the gas density, pressure and temperature of other P under TApply formula:

$$\rho = \rho_0 \times 2893P \div (T+273.15)\text{Available}_\circ$$

4. Cautions for Installation

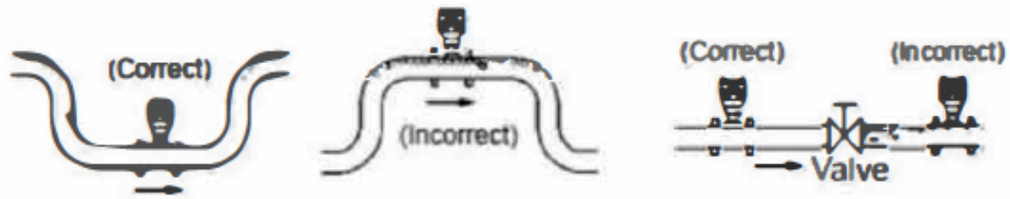
4.1 Mounting Positions

• Pipes must be fully filled with liquids. It is essential that pipes remain fully filled at all times, otherwise flow rate indications may be affected and measurement errors may be caused.



Mounting Positions

• Avoid Air Bubbles. If air bubbles enter a measurement pipe, flow rate indications may be affected and measurement errors may be caused.



Avoiding Air Bubbles

• Avoid all pipe locations where the flow is pulsating, such as in the outlet side of piston or diaphragm pumps.

• Avoid locations near equipment producing electrical interference such as electric motors, transformers, variable frequency, etc.

• Install the meter with enough room for future access for maintenance purposes.

Warning: Precaution for direct sunshine and rain when the meter is installed outside.

4.2 Required Lengths of Straight Runs

Flow altering device such as elbows, valves and reducers can affect accuracy. See diagram below for typical

flow meter system installation.

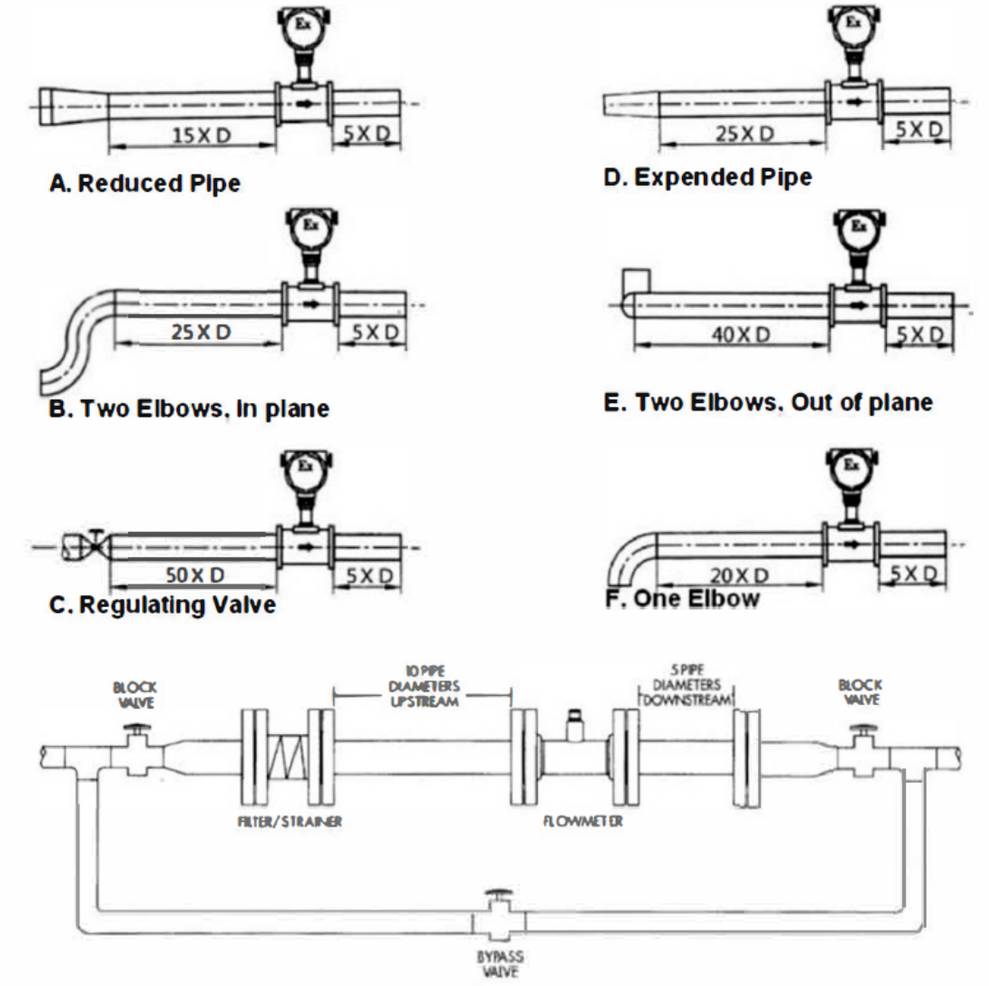


Diagram 1. Typical Flow Meter System Installation

The recommended guidelines are given to enhance accuracy and maximize performance. Distance given

here are minimum requirements; double them for desired straight pipe lengths.

• Upstream: allow a minimum straight pipe length at least 10 times the internal diameter of the pipe. For example, with the 50mm pipe, there should be 500mm of straight pipe immediately upstream. Desired upstream straight pipe length is 1000mm.

• Downstream: allow a minimum straight pipe length at least 5 times the internal diameter of the pipe. For example, with the 50mm pipe, there should be 250mm of straight pipe immediately upstream. Desired upstream straight pipe length is 500mm.

4.3 Anti-Cavitation (When the fluid is liquid)

Cavitation can be caused by entrained air. An amount higher than about 100 mg/l of entrained air or gas can produce error. In addition, cavitation can be caused by too little backpressure on the flow meter. For SURE Vortex flow meters, you should provide a backpressure (downstream pressure) of at least 1.25 times the vapor pressure, plus 2 times the pressure drop through the flow meter. See formula 1.

Formula 1: $Pb \geqslant 1.25 \times Pv + 2 \times (Pin - Pout)$

In formula 1: (Pb: Back pressure; Pv: Vapor Pressure; Pin: Inlet Pressure; Pout: Outlet Pressure) Create backpressure by installing a control valve on the downstream side of the meter at the proper distance detailed above.

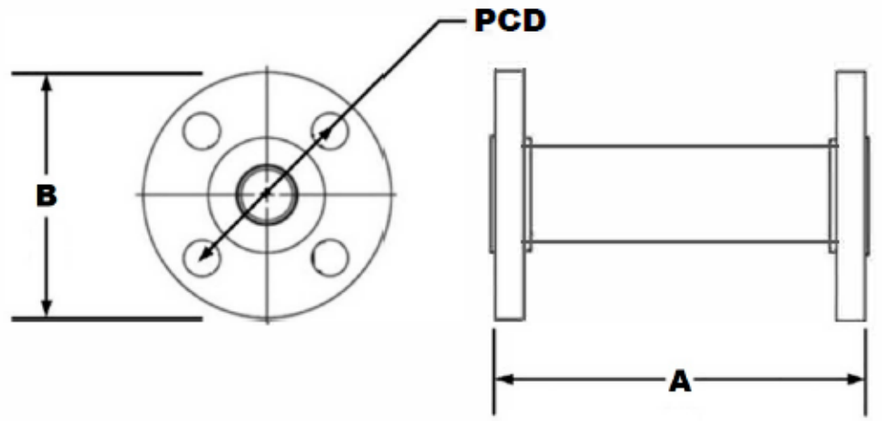
Special Notice

♦ When the fluid is liquid, to ensure accurate measurement, drain all air from the system before use.

♦ When the meter contains removable coverplates. Leave the coverplate installed unless accessory modules specify removal. Don't remove the coverplates when the meter is powered, or electrical shock and explosion hazard can be caused.

4.4 Connections

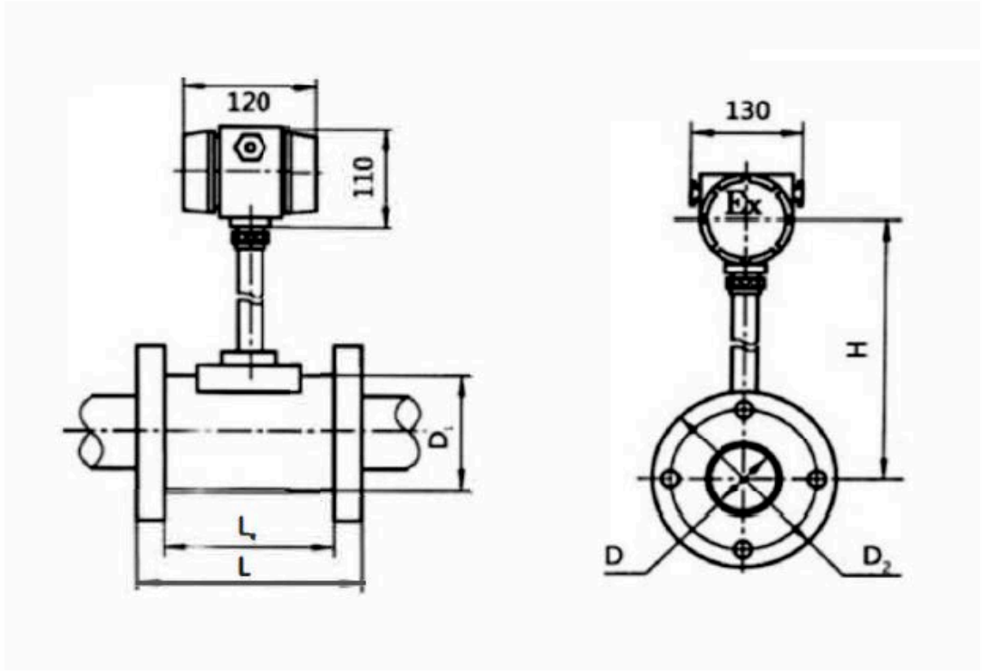
4.4.1 Flange Connection



DIN Flange Meter Dimensions							
Size Code		A	DIN Flange Pressure Rating	Flange Diameter(B)	Bolt Hole Diameter	Bolt Circle Diameter (PCD)	Bolt Hole Quantity
(inch)	(mm)	(mm)	Mpa	(mm)	(mm)	(mm)	
1/2"	15	200	1.6	95	14	65	4
3/4"	20	200	1.6	105	14	75	4
1"	25	200	1.6	115	14	85	4
1-1/4"	32	200	1.6	140	14	100	4
1-1/2"	40	200	1.6	150	18	110	4
2"	50	200	1.6	165	18	125	4
2-1/2"	65	200	1.6	185	18	145	4
3"	80	250	1.6	200	18	160	8
4"	100	250	1.6	220	18	180	8
5"	125	250	1.6	250	18	210	8
6"	150	250	1.6	285	22	240	8
8"	200	300	1.6	340	22	295	12
10"	250	300	1.6	405	26	355	12
12"	300		1.6	460	26	410	12

Note: For model with temperature and pressure compensation, the flowmeter length should be increased50mm compared to the value (A) in table above.

4.4.2 Wafer Connection



Diameter: D (mm)	Pipe Specification	H	L	L0	D1	D2
15	Φ19×1.5	290	120	90	68	125
20	Φ26×3	290	120	90	68	125
25	Φ32×3.5	290	120	90	68	125
40	Φ49×4.5	295	130	100	80	145
50	Φ59×4.5	300	140	100	88	160
65	Φ74×4.5	308	140	100	105	180
80	Φ89×4.5	315	140	100	120	195
100	Φ109×4.5	328	160	110	148	215
125	Φ133×4.5	340	170	120	174	245
150	Φ159×4.5	351	185	135	196	280
200	Φ219×9	378	205	155	250	335
250	Φ273×11	402	230	170	300	405
300	Φ325×12	428	250	190	350	460

5. Circuit instructions

Warning: Electrical Hazard Disconnect power before beginning wiring.

5.1 Flowmeter circuit parameters

Power supply: 12~24VDC/30mA (-20%~+15%); internal power 3V6 lithium battery two automatic switch.

(1) three line 4~20mA linear correction current output (Iout and GND @24V when the circuit load is less than or equal to 600 Ohm).

(2) programmable pulse output: high level more than 5V (voltage -1V); low level <0.5V; with 3K pull-up resistance in output.

(3) temperature measurement supports Pt100 and Pt1000 software selection.

(4) pressure supports the following 3K selection of silicon piezoresistive pressure sensor and 4-20mA pressure transmitter jumper.

(5) communication support MODBUS-RTU 485 communication protocol.

5.2 Circuit description

1 Current output:

(1) When the output current is linear 4-20mA, output range [4-22.4]mA. when the instantaneous flow rate is less than or equal to the lower removal of the flow, or the signal frequency 0. Output 4mA current. The current according to the flow output 4mA resection and full scale flow output 20mA linear calculation output current value, such as fruit to calculate the current value exceeds 22.4mA, is the highest output 22.4mA.

(2) Modbus communication function:

Transmitter support to MODBUS 4800 and 9600 baud communication by Modbus RTU protocol No. 3 Command (read holding registers) and dynamic reading instrument for real-time operation of the various parameters, response time is less than 50ms;

MODBUS continuous command minimum interval 100mS;

5.3、Circuit connection

(1) Main power supply and output signal terminal (middle 4 large hanging frame type terminal)

Iout	GND	Fout	V+

"Iout"： 4~20mA Discharge current output from the "Iout" to the computer or display meter 10-250 sampling resistor, after sampling resistance and other negative class load flow back to the power - "-".

"GND"： 12~24V "-"

"Fout"： For the pulse signal output terminal output and flow related pulse signal, the pulse output of the 2K7 on the pull resistance of the open collector output. High level for the power supply voltage -1V, a low level of less than 0.7V。 VH=Vi-1；VL<0.7V。

"V+"： 12~24V "+"

(2) Left communication connection (2 bit low terminal)

B-	A+

"B-"： RS485 "B-"

"A+"： RS485 "A+"

(3) Right temperature pressure wiring (6 bit low terminal)

TRH	TRL	PIH	PVH	PVL	PIL

TRH、TRL——Pt100/Pt1000

(4) Lower battery wiring (2 bit low terminal)

-3V6	3V6+

"-3V6"： 3.6V "-"。

"3V6+"： 3.6V "+"。

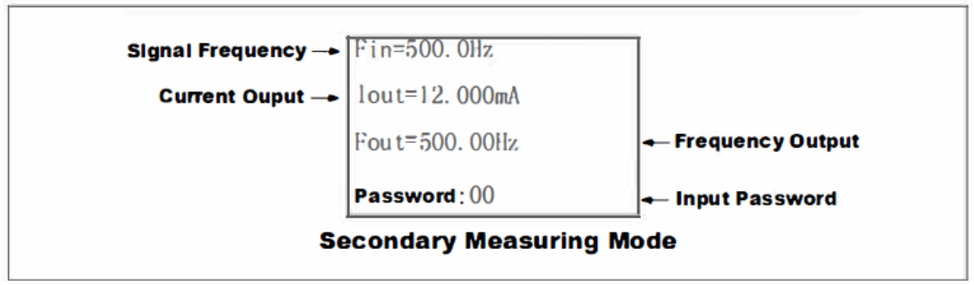
Near the switch only controls whether the 3.6V lithium battery power supply circuit to. "On" switch on the circuit, "off" cutting off the pathway between the battery and the circuit.

In the "ON" allows the battery with the V+ external power supply automatic conversion.

When the battery power supply automatically cut off the current and the pulse output signal, there is an external power output automatically.

5.4 Flow meter working interface

Flow meter working interface includes two interfaces, one is the main interface, one is the auxiliary interface:



Secondary Measuring Mode

one is the auxiliary interface:

In the auxiliary interface, the different names of the signal frequency lines represent different running states.

- Fin—Normal signal frequency
- FinCV—Signal amplitude is weak, the output is removed, at this time do not calculate the flow
- FinC5—Signal belongs to the 50Hz noise, the output is removed, at this time does not calculate the flow
- FinFL—Signal is lower than the frequency band, the output is removed, at this time does not calculate the flow
- FinFH—Signal is higher than the frequency band, the output is removed, at this time does not calculate the flow
- FinSL—Signal wave number is too low, the output is removed, at this time does not calculate the flow
- FinSM—Signal wave over clutter, the output is removed, at this time do not calculate the flow
- FinCS—Signal features belong to the noise, the output is removed, at this time does not calculate the flow
- In the auxiliary interface, the output frequency line is different from the name on behalf of the different output status
- F_bas—basic signal output, that is, in accordance with the measured signal frequency output
- F_adj—correction output, according to the multi point K value correction output detailed algorithm see the following chapters
- F_out—frequency output, according to the measured signal, calculate the output of a certain frequency of the signal.

Signal frequency = instantaneous flow * 1000 / full degree flow (Hz)

- Pulse—pulse output, according to the "pulse factor" in the menu to calculate the output pulse number
- H-AL=0—high alarm not generated
- L-AL=0—low alarm not generated
- H-AL=1—high alarm generation
- L-AL=1— low alarm generation
- NO—current output is not valid

In the auxiliary interface, the output power is popular in the back of the value, in the power supply mode, for the actual output of the current value; in the battery power supply mode, the fixed display 0 (because this time no current output)

The main interface and auxiliary interface between the "+/S" by pressing the left and the '</E' right switch.

Click + and next page, press S to exit.

Right click for < and flip, long press E to enter and confirm.

In the auxiliary interface, long press' </E 'the left key enter the password input state. The user can through continuous press' +/S' button to select the input position need to enter the password for the digital, according to' </E 'key mobile input cursor position. When two password losers, long press the enter </E and password on the function corresponding to the set menu; under the state to enter a password, long press' +/S' key return auxiliary interface to update the display value measurement.

5.5 Flow meter parameter setting menu

In menu, long press the '< / E' key into the selected item to modify the parameters of the state, if the parameter is a type of digital input, through '+/S' keys to input numbers,' "/ E 'keys to move the cursor input position, after the input long press' < / e' key input validation transmitter automatic updates setting parameters and stored; if the parameter is selected item type, the +/S or '< / E' turn option selection for the long press' < / E 'key confirmation, transmitter automatic update setting parameters and storage.

User menu

Enter the password "22" to enter the user menu, each menu function and the parameters are as follows: Table 1 user menu

Number	Menu name	Function description
1	Unit selection The default is: m3/h	Set instantaneous flow unit, according to the type of flow algorithm Volume class: m3/h; m3/m; l/h; l/m Quality class: t/h; t/m; kg/h; kg/m
2	Algorithm selection By default: Conventional volume flow	Set flow algorithm, the instrument according to the algorithm to measure the instantaneous flow rate of compensation Conventional volume flow (without gas-liquid flow) Conventional mass flow (must be set up for working conditions) Standard gas volume flow Conventional gas mass flow (must be set up in the case density) Saturated steam temperature compensation Saturated steam pressure compensation Superheated steam temperature and pressure compensation
3	discharge coefficient The default is: 3600.0	The flow meter factor needed to calculate the flow rate. The unit is P/m3 (pulse / side).
4	Fluid density The default is: 1000.0	Set the density of the fluid, the unit kg/m3 (not allowed to set to 0) (the quality of the algorithm required tocalculate the density of this setting, the volume of the algorithm is useless)
5	Full flow The default is: 1000.0	Sets the 20mA current output corresponding to the instantaneous flow rate (not allowed to set to 0)
6	Minimum cut flow The default is: 0%	The percentage of the total flow rate of the discharge is set, and the flow rate is 0, and the output 4mA current is calculated when the measured flow rate is lower than the percentage of the total flow rate.
7	Upper limit alarm flow The default is: 990.0	Set the upper limit alarm flow threshold, when the flow rate is higher than this value, then the output alarm. Units with selected units.
8	Minimum alarm flow The default is: 10.0	Set the lower limit alarm flow threshold, when the flow rate below this value, then the output alarm. Units with selected units.
9	Damping time	Values for 2~32 seconds, for display and current output smoothing. Default value is: 4 seconds
10	Correspondence address	Set the 485Modbus device address, range 0-254 Default value: 0
11	Clear tired measurement	The cumulative amount of the total amount of 0 values, cleared the password: 70"e: 0

5.6 Modbus communication

Three wire transmitter according to the Modbus RTU communication protocol fast read keep the operation parameters of each register. Read the holding register value of Modbus command directive No. 3. Supports only 4800 and 9600 baud rate, response time within 50ms; MODBUS continuous command minimum interval 100mS;

Able 5 is the Modbus command in the various values of the offset address, data format, etc.

Address offset	Operation object	Data format	Number of data bytes
0	Standard flow rate	Floating point type	4
4	Working flow	Floating point type	4
8	Low accumulation	Integer type	4
12	High accumulation	Integer type	4
16	Fluid temperature	Floating point type	4
20	fluid pressure	Floating point type	4
24	Measuring frequency	Floating point type	4
28	Output current	Floating point type	4
32	Instantaneous flow unit code	Short integer type	2

is the Modbus cTable 5 transmitter Modbus read and maintain register command parsing

On the cumulative amount, the cumulative amount of two parts from the high and low, the cumulative amount of the low part is a fixed point integer, the data is converted to 10 decimal, the cumulative amount of high part of the cumulative amount divided by 100000 of the integer value of the business.Formula for:

The cumulative amount (floating point) = cumulative amount of high (integer) * 1000000 + cumulative low (integer) / 1000

The cumulative flow unit is the unit of volume or mass that is left out of the time portion of the instantaneous flow unit.

On the flow unit code, the flow unit from the flow unit code value in the physical units matched with the following table.

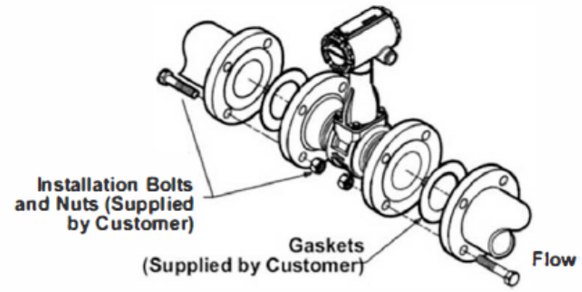
Unit code	0	1	2	3	4	5	6	7
Physical unit	m^3/h	m^3/m	1/h	1/m	t/h	t/m	kg/h	kg/m

Table 6 instantaneous flow unit code table

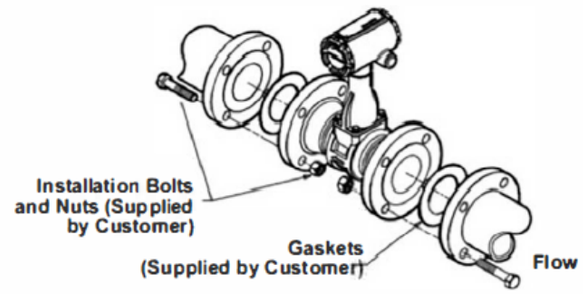
6. Troubleshooting

Symptom	Probable Cause	Solution
Measurement is not accurate	1. Parameter wrong	Check the parameters (Transmitter, detector factor and size)
	2. Pipe is not fully filled	Check if meter is fully filled
Flow rate indication is unstable	1. Vibration Problem	Add support to the line near the meter to damp the vibration
	2. Air	Make sure fluid does not contain air bubbles when fluid is liquid
	3. Amplifier location – outside electrical interference	Make sure amplifier is not too close to sources of electrical interference
No Display	1. No power	Apply correct power
	2. Incorrect power	Check power value
	3. Wiring connections	Check power input/output connections

7. Quick Installation



Flange - Style Flow Meter Installation



Wafer - Style Flow Meter Installation