# Contents

# I Principle and Installation

## 1. Features, functions and application range

### 1.1 Features

Vortex flowmeter is developed and produced based on the principle of Karman vortex. It is mainly used for flow measurement of mediums in industrial pipes, such as a gas, liquid and steam, etc.

Features: small pressure loss, wide range, high accuracy; it is hardly affected by fluid density, pressure, temperature and viscosity when measuring volume flow under working status; No moving mechanical parts, thus high reliability and low maintenance. Instrument parameters can be stable for long term. Vortex flowmeter can be used in a temperature range of -40℃ ~ +400℃.

Analog standard signals and digital pulse signal output to match with computers and other digital systems.

### 1.2 Main Use

Vortex flowmeters can be used to measure the volumetric flow of fluid in closed pipes. It is widely used for measurement of gas, liquid and steam in industrial production process, energy metering, environmental protection, transportation and food production, etc.

## 2. Working Principle

Set bluff body in the fluid, two columns of regular vortex are alternately generated from both sides of bluff body. This vortex is called Karman vortex. (see figure 1)

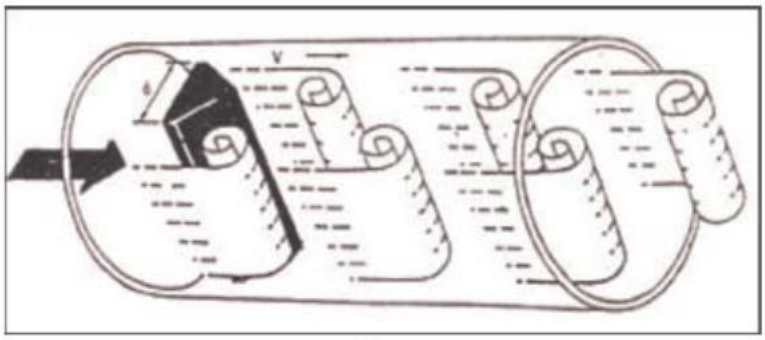

Figure 1

Alternating and regular vortex columns are formed at downstream of the bluff body. Suppose the frequency of vortex is f, the average speed of measured medium V, head width of bluff body d, according to the Karman vortex principle, existing the following relationship:

$$f = StV/d \qquad \text{Formula (1)}$$

In the formula:

f – Karman vortex frequency generated at one side of bluff body (HZ)

St – strouhal number (non-dimensional number)

V – average speed of fluid (m/s)



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d - width of bluff body (m)

Thus, instantaneous flow can be calculated by measuring isolation frequency of Karman vortex shedding. Among them, the Strouhal number (st) is a dimensionless unknown. Figure (2) shows the relationship between Strouhal number (St) and Reynolds number (Re).

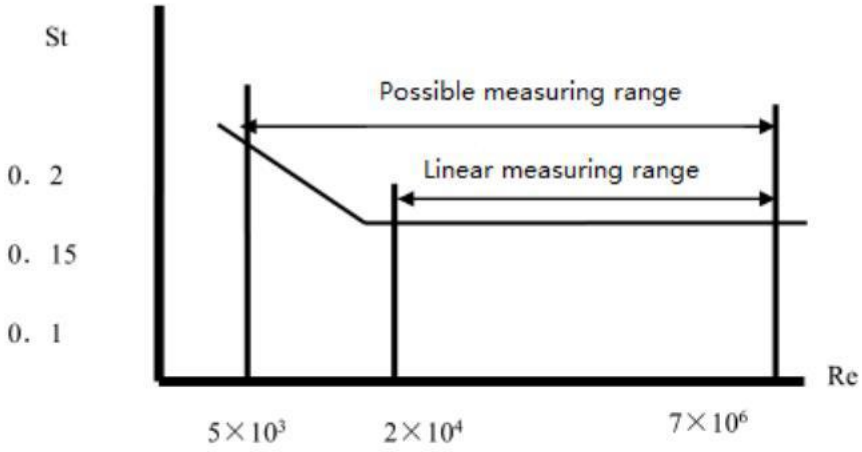


Figure 2

In the curve table, the flat part of St = 0.17, the release frequency and velocity are proportional, that is the measuring range of vortex flow sensor. As long as the frequency f is detected, the flow velocity of fluid in the pipe can be obtained. Volume flow rate is determined by the velocity V. The ratio of measured pulse number and the volume is called meter constant (K), see Formula (2)

K = 3600 f/Q (1/m3) Formula (2)

In the formula:
K= meter constant ($m^{-3}$)
f=pulse number
Q= Volumetric flow ($m^3$)

## 3. Technical Targets

Main technical targets



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| | |
|---|---|
| Nominal Diameter (mm) | 15, 20, 25, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300 (300-1000 Insertion type) |
| Nominal Pressure (MPa) | DN15-DN200 PN40, DN250 – DN300 PN16 (special ordering for other pressure rating) |
| Medium temperature (℃) | Piezoelectric type: -40 to 150, -40 to 260, -40 to 330; Capacitance type: -40 to 400 |
| Body material | SS304 |
| Allowed vibration acceleration | Piezoelectric type: 0.2g; Capacitance type: 1.0-2.0 g |
| Accuracy | ±1%R,±1.5%R; Insertion type:±2.5%R |
| Turndown | 1:6 to 1:25 |
| Power Voltage | Sensor: +12V DC, +24V DC; transmitter: +12V DC, +24V DC; Battery operated type: 3.6V battery |
| Output | Pulse: high level≥5V, low level≤1V; current: 4-20mA |
| Pressure loss factor | Conforming to JB/T9249 standard Cd≤2.4 |
| Ex | Intrinsically safe: Ex ia II CT2-T4 Isolation explosion type: Exd II CT2-T5 |
| Protection Grade | IP65, IP68 |
| Ambient conditions | Temp. -20℃ to 55℃, relative humidity 5% to 90%, atmospheric pressure 86 to 106 KPa |
| Applicable mediums<br>Transmission distance | Gas, liquid and steam<br>3 wire pulse output:≤300m, 2 wire current output (4-20mA)≤1500m; load resistance≤500Ω; RS485 / HART≤ 1200m |

## 4. Instrument Flow Range

### 4.1 Reference conditions

4.1.1 Gas: air under normal temperature and normal pressure, t = 20℃, P = 0.1 MPa (absolute pressure), ρ =1.205 kg/m3, ν = $15\times10^{-6}$ $m^2/s$

4.1.2 Liquid: water under normal temperature, t = 20℃, ρ = 998.2 kg/m3, ν = $1.006\times10^{-6}$ $m^2/s$

### 4.2 Flow range table for vortex flow sensors under reference conditions

Note: Insertion type for DN300 to DN1000



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| Diameter (mm) | Liquid | | Gas | |
|---|---|---|---|---|
| | Measuring range (m3/h) | Frequency output range (Hz) | Measuring range (m3/h) | Frequency output range (Hz) |
| 15 | 0.3-5 | 35-450 | 4-20 | 300-1600 |
| 20 | 0.6-10 | 29-380 | 6-30 | 230-1200 |
| 25 | 1.2-16 | 25-320 | 8-55 | 170-1100 |
| 32 | 1.8-20 | 18-200 | 10-120 | 100-1180 |
| 40 | 2-40 | 10-190 | 27-205 | 130-1040 |
| 50 | 3-60 | 8-150 | 35-380 | 94-920 |
| 65 | 4-85 | 6-120 | 60-640 | 90-910 |
| 80 | 6.5-130 | 4.1-82 | 86-1100 | 55-690 |
| 100 | 150-220 | 4.7-69 | 133-1700 | 42-536 |
| 125 | 20-350 | 3.2-57 | 150-2000 | 38-475 |
| 150 | 30-450 | 2.8-43 | 347-4000 | 33-380 |
| 200<br>250 | 45-800<br>65-1250 | 2-31<br>1.5-25 | 560-8000<br>890-11000 | 22-315<br>18-221 |
| 300 | 95-2000 | 1.2-24 | 1360-18000 | 16-213 |
| (300) | 100-1500 | 5.5-87 | 1560-15600 | 85-880 |
| (400) | 180-3000 | 5.6-87 | 2750-27000 | 85-880 |
| (500) | 300-4500 | 5.6-88 | 4300-43000 | 85-880 |
| (1000) | 1200-17000 | 5.8-88 | 17000-170000 | 85-880 |



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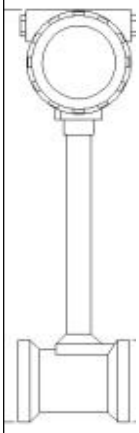
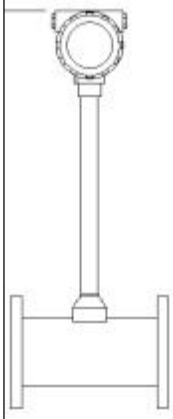
## 5. Instrument Outlook Classification and Dimensions

### 5.1 Instrument Outlook Classification



**Flanges clamping type vortex flowmeter**

Welding the flange to the pipe，install the flowmeter in the card slot of companion flanges,making the double-headed bolts through the holes of the flanges to fasten the flowmeter.This way is one of the most common flowmeter installation.

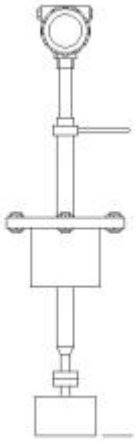


**Flanges connection type vortex flowmeter**

Connecting the flanges of the flowmeter and the flanges on the pipe with single-headed bolts，This way is also one of the most common flowmeter installation.

**Insertion type vortex flowmeter with ball valve**

By adding ball valve to ensure no cut-off
overhaul. Ideal for large size measurement.

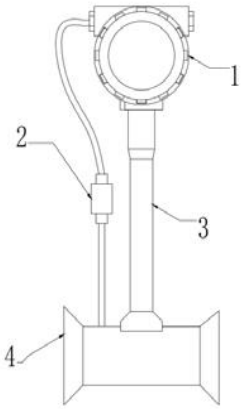


**Simplified type Vortex flowmeter**

This type is not equipped with ball valve;
it is much lighter; less maintenance in the process of operation; Ideal for large size measurement of clean mediums.

NOTE:other specialstructure can negotiate with vendor.

### 5.2 Common Instrument Sructure




Instrument Common Sructure see the left Figure
1:Instrument meter,installing intelligent convertor and instrument connection parts in it,deal with different types of intelligent convertor according to the order
2: Pressure sensor,it is used to collect medium pressure,According to the different order requirements to decide whether installing sensor or collecting the size of pressure sensor.
3:Shield connection rod,it is used to connect the meter and the body parts.
4:The body parts of instrument,installing vortex generating body and flow sensor in it,according to the order to decide the diameter and the flow sensor type.



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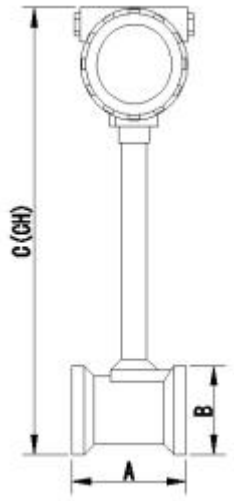
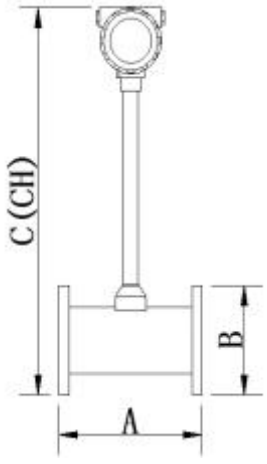
5.3 Common Instrument Dimensions （the height of the medium temperature type with temperature and pressure compensation C is equal to the height of the high temperature type CH）




| diameter（mm) | A | B | C | CH |
|---|---|---|---|---|
| DN15-32 | 70 | 55 | 385 | 445 |
| DN40 | 85 | 80 | 410 | 470 |
| DN50 | 85 | 90 | 420 | 480 |
| DN65 | 85 | 105 | 435 | 495 |
| DN80 | 85 | 120 | 450 | 510 |
| DN100 | 85 | 140 | 470 | 530 |
| DN125 | 85 | 168 | 498 | 558 |
| DN150 | 100 | 194 | 524 | 584 |
| DN200 | 100 | 248 | 578 | 638 |
| DN250 | 115 | 300 | 630 | 690 |
| DN300 | 130 | 350 | 680 | 740 |

Flanges clamping type vortex flowmeter




| diameter（mm) | A | B | C | CH |
|---|---|---|---|---|
| DN15-32 | 170 | 105/115/140 | 425 | 485 |
| DN40 | 170 | 145 | 450 | 510 |
| DN50 | 170 | 160 | 475 | 535 |
| DN65 | 190 | 180 | 490 | 555 |
| DN80 | 190 | 195 | 510 | 570 |
| DN100 | 200 | 215 | 520 | 580 |
| DN125 | 200 | 245 | 540 | 600 |
| DN150 | 200 | 280 | 585 | 645 |
| DN200 | 200 | 340 | 630 | 700 |
| DN250 | 240 | 395 | 680 | 740 |
| DN300 | 240 | 445 | 740 | 800 |

Flanges connection type vortex flowmeter



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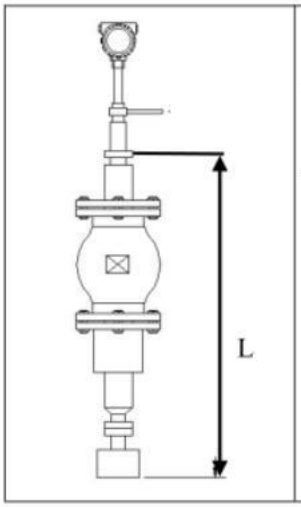
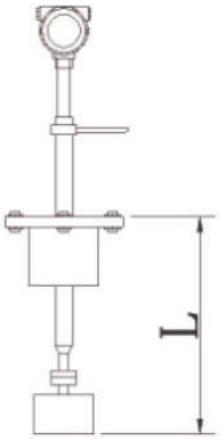



| Diameter (mm) | DN250 | DN300 | DN400 | DN500 | DN600 | DN800-2000 |
|---|---|---|---|---|---|---|
| L | 680 | 705 | 755 | 805 | 855 | 905-1555 |

Insertion type Vortex Flowmeter with Ball valve




| Diameter (mm) | DN250 | DN300 | DN400 | DN500 | DN600 | DN800-2000 |
|---|---|---|---|---|---|---|
| L | 255 | 280 | 330 | 380 | 430 | 530-1130 |

Simplified type Vortex Flowmeter



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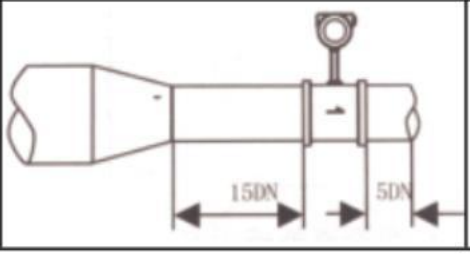
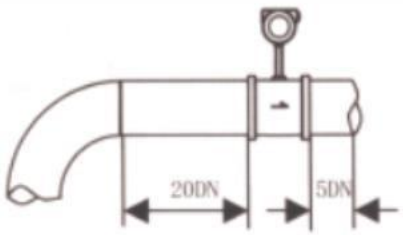
## 6. Instrument Installation

### 6.1 Ambient requirements to Instrument Installation

1. Please keep away from strong electrical equipment, high-frequency equipment and strong switching power supplies as far as possible. Please separate power supply for Instrument with these devices.
2. Avoid the direct effect of high temperature heat and radiation sources. If it must be installed, measures for thermal insulation and ventilation must be taken.
3. Avoid the gas environments with high temperature and strong corrosion. If it must be installed, measures for ventilation must be taken.
4. Vortex flow meter should be avoided to mount on pipeline with strong vibration. If it must be installed, piping fastening device shall be added at the place of 2D both upstream and downstream, as well as anti-vibration pad, to strengthen vibration resistance effect.
5. The instrument is preferably mounted in the room. Please pay attention to water if installed outdoors. Cable should be bent into U shaped at the electrical interface to avoid water entering into the amplifier housing along the cable.
6. Ample space around the installation site should be left for installation wiring and regular maintenance.

### 6.2 Installation Requirements to Pipes

There are certain requirements to upstream and downstream straight pipes at installation point, otherwise it will affect the flowing of medium in the pipe, thus affect measurement accuracy.
Please see below figure for requirements to upstream and downstream straight pipe length.
DN: nominal diameter Unit: mm

| Upstream pipe type | Straight tube length before and after flow meter | Upstream pipe type | Straight tube length before and after flow meter |
|---|---|---|---|
| Concentric contraction fully open valve |  | One 90° Elbow |  |



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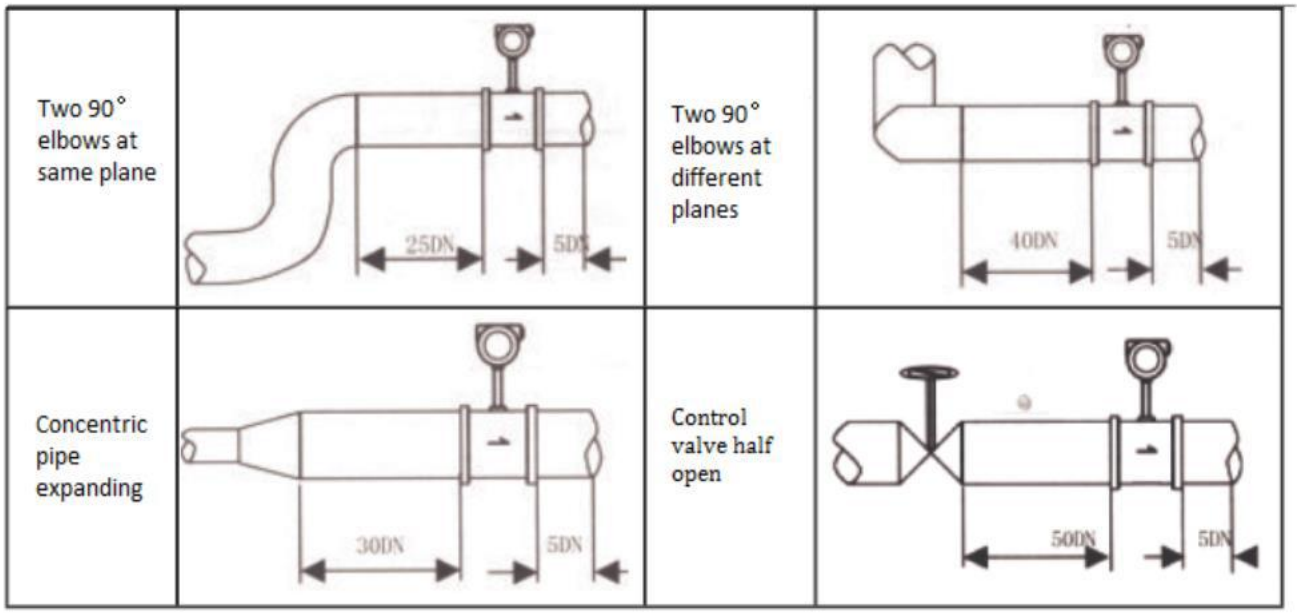


Note:

1. It is better not to install control valve at upstream of the vortex flow meter, but install it beyond 10D of vortex flow meter downstream.
2. The inner diameter of pipes at upstream and downstream should be same. In case of any differences, the inner diameter of pipe (Dp) and inner diameter of vortex flow meter (Db) should meet the following relationship: 0.98Db≤Dp≤1.05Db.
3. The pipes at upstream and downstream should be concentric with flow meter inner diameter. The misalignment between them should be less than 0.05Db.
4. The gasket between instrument and flange cannot be protruding into the pipe when installing. Its inner diameter should be 1-2mm larger than the diameter of flow meter.
5. If it is required to install temperature and pressure transmitters on measured pipe, pressure taps should be set at 3D-5D downstream and temperature hole should be set at 6D-8D downstream, see Figure (VII). D is nominal diameter and the unit is mm.
6. The flow meter can be horizontally, vertically or aslant installed on the pipeline.
7. For measuring gas, install the flow meter in a vertical pipeline while the flow direction is not limited. However, if the pipe contains a small amount of liquid, in order to prevent the liquid from entering the instrument measuring tube, the air should flow from bottom to up, as shown in Figure (IV) a.
8. When measuring liquids, in order to ensure the pipe full filled with liquid, when installing the flow meter in a vertical or inclined pipe, please ensure that the flow direction from bottom to up. If the pipe contains a small amount of gas, in order to prevent gas from entering the meter measuring tube, the instrument should be installed at a lower place of the pipeline, as shown in Figure (IV) b.



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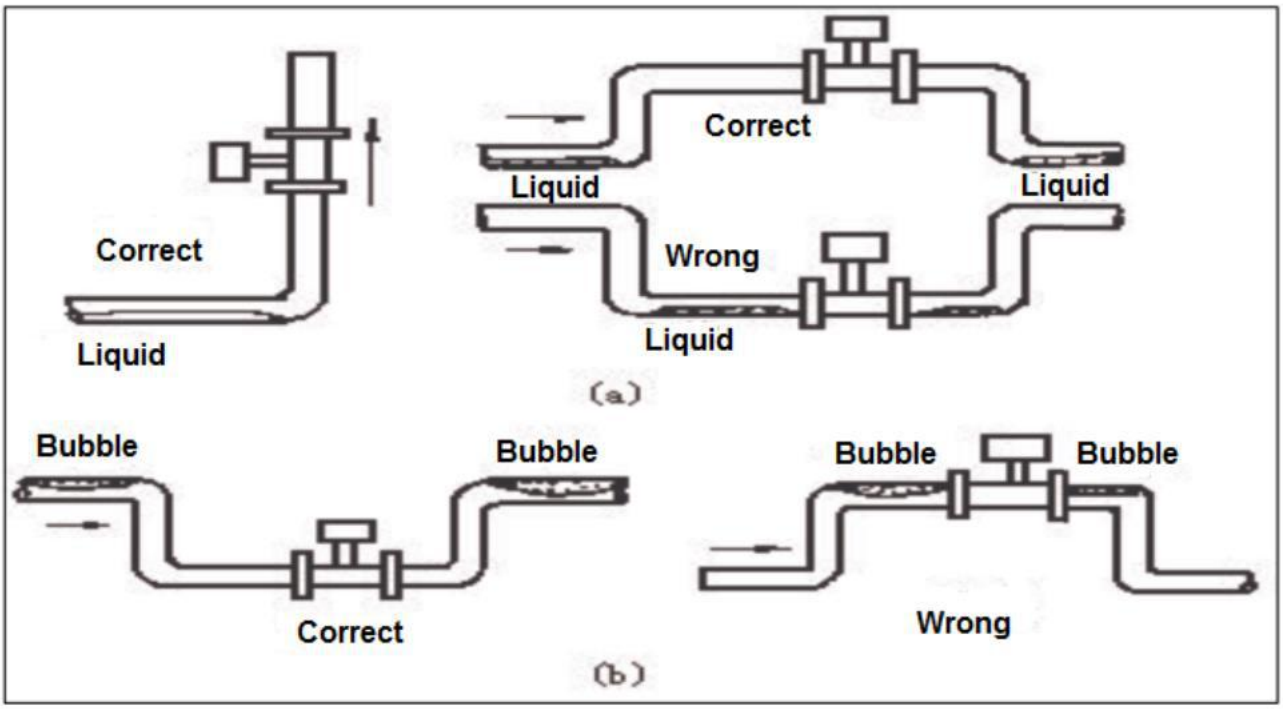


Figure (4)

9. When measuring mediums with high or low temperature, please pay attention to insulation measures. The max temperature inside the converter should generally not exceed 70 degrees; low temperature will cause condensation in the converter, reducing the insulation resistance of printed circuit board, thus affecting the normal work of instrument.

### 6.3 Installation steps for insertion type vortex flow meter:

1. Please make a hole with diameter a little smaller than 100mm on the pipeline with gas welding, and clean the burr around the hole to ensure smooth rotation of the probe.
2. Weld the flange at the hole in the pipe. The flange axis should be perpendicular to pipe axis.
3. Install the ball valve and sensor on welded flanges.
4. Adjust the screw to make the insertion depth meet the requirements (to ensure that the central axis of probe coincides with that of the pipe). The fluid direction must be consistent with the instruction arrow on the mark.
5. Tighten the screws on gland cover. (Note: the tightness of the gland determines the seal extent and if screw can be swirled)
6. Check whether all the links are completed well, slowly open the valve to see if there is any leak (pay particular attention to personal safety) . In case of disclosure please repeat step 5.

## 7. Errors Appeared before Installation

1. The reverse installation of flow meter will result in inaccurate and unstable flow rate.



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2. Online welding is prohibited because it may cause damage of sensor due to heat.
3. Severe vibration around the site will lead to instability of flow and flow reading appearing when static.
4. If actual flow range is not taken into account and the flow meter is only made in accordance with the pipe diameter when ordering, this will lead to over or insufficient flow measurement range.
5. If the field temperature and pressure do not match with the specifications when ordering, the flow meter might not work or the measuring data is not accurate, or even the flow meter is damaged.
6. Mix flow rate under working conditions with flow rate under standard conditions, or with the mass flow rate.

# II Operation and Parameter Setting

## 1. Conventional Circuit

### 1.1 Introduction of Conventional Circuit

Conventional circuit comprises pulse-type circuit board, battery-powered ordinary type circuit boards, 4-20mA ordinary type circuit boards and 4-20mA board with temperature and pressure compensation. These four circuit boards have commonality in the use and principles, and are the new thin type boards of vortex flowmeter. It is analog type amplifier circuit. It can accurately measure flow of gas, liquid and steam within conventional range. It is settable by the switch to adapt to all sizes and mediums.

### 1.2 Dial Switch Setting of Conventional Circuit

Please see annexed table for switch selection for different pipe size and medium. Please adjust expanded bandwidth of K2 and K3 first according to actual signal, and adjust charge amplifier gain K1 if necessary.

Parameter setting reference table of flow meter amplifier (Liquid)

| Diameter | K1 | | | | | | | | K2 | | | | | | | | K3 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 15 | ↑ | | ↑ | | ↑ | | ↑ | | | | | | ↑ | | | | ↑ | ↑ | ↑ | | | | | |
| 20 | ↑ | | ↑ | | ↑ | | ↑ | | | | | | ↑ | | | | ↑ | ↑ | ↑ | | | | | |
| 25 | ↑ | | ↑ | | ↑ | | ↑ | | | | | | ↑ | | | | | | | ↑ | | | | |
| 32 | ↑ | | ↑ | | ↑ | | ↑ | | | | | | ↑ | | | | | | | ↑ | | | | |
| 40 | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | | ↑ | | ↑ | ↑ | ↑ | ↑ | | | | |
| 50 | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | | ↑ | | | | | | ↑ | | | |
| 65 | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | | ↑ | | | | | | ↑ | | | |
| 80 | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | ↑ | ↑ | | | | | ↑ | ↑ | | | |
| 100 | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | ↑ | ↑ | | | | | | | ↑ | | |
| 125 | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | | | ↑ | | | | | | | ↑ | |
| 150 | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | | | ↑ | | | | | | | ↑ | |
| 200 | | | | ↑ | | | | ↑ | | | | | | | | ↑ | | | | | | | | ↑ |
| 250 | | | ↑ | ↑ | | | ↑ | ↑ | | | | | | | ↑ | ↑ | | | | | | | ↑ | ↑ |
| 300 | | | ↑ | ↑ | | | ↑ | ↑ | | | | | | | ↑ | ↑ | | | | | | | ↑ | ↑ |



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Parameter setting reference table of flow meter amplifier (Gas)

| Diameter | K1 | | | | | | | | K2 | | | | | | | | K3 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 15 | ↑ | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | | | ↑ | | | | | | | |
| 20 | ↑ | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | | | ↑ | | | | | | | |
| 25 | ↑ | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | | | ↑ | | | | | | | |
| 32 | ↑ | | ↑ | | ↑ | | ↑ | | ↑ | | | | | | | | ↑ | | | | | | | |
| 40 | ↑ | | ↑ | | ↑ | | ↑ | | | ↑ | | | | | | | | ↑ | | | | | | |
| 50 | ↑ | | ↑ | | ↑ | | ↑ | | | ↑ | | | | | | | | | ↑ | | | | | |
| 65 | ↑ | | ↑ | | ↑ | | ↑ | | | ↑ | | | | | | | | | ↑ | | | | | |
| 80 | ↑ | | ↑ | | ↑ | | ↑ | | | | ↑ | | | | | | ↑ | | ↑ | | | | | |
| 100 | ↑ | | ↑ | | ↑ | | ↑ | | | | ↑ | | | | | | ↑ | ↑ | ↑ | | | | | |
| 125 | ↑ | | ↑ | | ↑ | | ↑ | | | | | ↑ | | | | | ↑ | ↑ | ↑ | | | | | |
| 150 | ↑ | | ↑ | | ↑ | | ↑ | | | | | ↑ | | | | | | | | ↑ | | | | |
| 200 | ↑ | | | ↑ | ↑ | | | ↑ | | | | | ↑ | | | | | | | ↑ | | | | |
| 250 | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | ↑ | | | ↑ | ↑ | ↑ | ↑ | | | | |
| 300 | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | | ↑ | | | | | | ↑ | | | |

Parameter setting reference table of flow meter amplifier (Steam)

| Diameter | K1 | | | | | | | | K2 | | | | | | | | K3 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 15 | ↑ | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | | | ↑ | | | | | | | |
| 20 | ↑ | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | | | ↑ | | | | | | | |
| 25 | ↑ | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | | | ↑ | | | | | | | |
| 32 | ↑ | | ↑ | | ↑ | | ↑ | | ↑ | | | | | | | | ↑ | | | | | | | |
| 40 | ↑ | | ↑ | | ↑ | | ↑ | | | ↑ | | | | | | | ↑ | | | | | | | |
| 50 | ↑ | | ↑ | | ↑ | | ↑ | | | ↑ | | | | | | | | ↑ | | | | | | |
| 65 | ↑ | | ↑ | | ↑ | | ↑ | | | ↑ | | | | | | | | ↑ | | | | | | |
| 80 | ↑ | | ↑ | | ↑ | | ↑ | | | | ↑ | | | | | | ↑ | ↑ | | | | | | |
| 100 | ↑ | | ↑ | | ↑ | | ↑ | | | | ↑ | | | | | | ↑ | ↑ | | | | | | |
| 125 | ↑ | | ↑ | | ↑ | | ↑ | | | | | ↑ | | | | | ↑ | | ↑ | | | | | |
| 150 | ↑ | | ↑ | | ↑ | | ↑ | | | | | ↑ | | | | | ↑ | ↑ | ↑ | | | | | |
| 200 | ↑ | | | ↑ | ↑ | | | ↑ | | | | | ↑ | | | | ↑ | ↑ | ↑ | | | | | |
| 250 | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | ↑ | | | ↑ | ↑ | ↑ | | | | | |
| 300 | ↑ | | | ↑ | ↑ | | | ↑ | | | | | | | ↑ | | ↑ | ↑ | ↑ | ↑ | | | | |



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Arrow upwards indicates the position of this switch is ON; no arrow, the switch is OFF.
The above tables are for reference only. Please adjust close to the value in actual use due to different viscosity of liquid and different density of gas. In case of low frequency, you may adjust K2 / K3 to the direction of large pipe size for one to three gears; in case of high frequency, you may adjust K2 / K3 to the direction of small pipe size for one to three gears.
To enlarge gain and trigger sensitivity by virtue of four-switch adjustment, switch 1/2/3/4 respectively represents 1/2/4/8 /; the sum of number of ON is 1-15.
GB = 1-15 adjust corresponding resistance ratio of amplifier gain 300K / (100K --- 4K7), 1_15 magnification increases. General GB is set to (1 + 2) ON.
SB = 1-15 adjust corresponding resistance ratio of trigger threshold 300K / (100K --- 4K7), 1_15 sensitivity increases. General SB is set to (3) ON.

## 1.3 Operation Instructions and Distinction of Conventional Circuit

a. Pulse-type instrument
Pulse type directly outputs pulse signal and reflects medium flow by totalizer calculation. It works by adjusting corresponding dial switch of medium, simple operation, without too many settings. It can be switched to external devices like PLC. It is without LCD display, you need to connect it to external display devices.
Pulse-type distinction: without display, usually needs to be equipped with totalizer.

b. Instrument with 2 buttons, 4-20mA output and temperature and pressure compensation
This type instrument is with temperature and pressure compensation function. It can work out flow rate under the standard conditions according to temperature and pressure; it is applied for flow measurement of super heated steam and saturated steam with different temperature and pressure. It is with pulse output and 4-20mA output.

**Instructions**
Pressing the '+ / S' left and '</ E' right to switch between the interface and the secondary interface.
Left key is + and page down, press for long time to be S to exit. Right key is < and page up, press for long time to be E to enter and confirm.
Under the secondary interface, press '<E' Left for long time to enter password input status. The user can continuously press the '+ / S' key to select the code number which needs to be input in the current position; press '</ E' key to move the input cursor position. After inputting 2-digit password, press '<E' for long time to enter the corresponding function setting menu of password: under the status of password input, press '+ / S' key for long time to return to the secondary interface, to continue to update the display of measurement values.
User parameter setting menu User menu password is 22


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| Number | Menu Display | Meaning | Select item or valve range |
|---|---|---|---|
| 1 | Language | Selecting Language | Chinese / English |
| 2 | Unit Selection | Flow unit selection<br>(default 0) | 0: m3/h (algorithm 02 display N m3/h)<br>1: m3/m (algorithm 02 display N m3/h)<br>2: l/h<br>3: l/m<br>4. t/h<br>5. t/m<br>6. kg/h<br>7. kg/m |
| 3 | Algorithm selection<br>Conventional volumetric flow | Algorithm selection<br>(default 0) | 0: conventional volumetric flow<br>1: conventional mass flow<br>2: gas volumetric flow under standard status<br>3: conventional gas mass flow<br>4: saturated steam with temperature compensation<br>5: saturated steam with pressure compensation<br>6: superheated steam with temperature and pressure compensation<br>7: special algorithm (customized) |
| 4 | Flow factor | Flow factor<br>(default 3600) | Set meter flow factor<br>Unit: P/m3 |
| 5 | Fluid density | Fluid density<br>(default 1.0) | Algorithm 1 & 3 must set this item, unit: kg/m3<br>(algorithm 1: working status, algorithm 3: standard status) |
| 6 | Full scale flow range | Full scale output flow<br>(default 1000) | This value must be set and cannot be 0.<br>Unit is same as flow unit |
| 7 | Alarm flow | Alarm flow<br>(default 500) | Only set this value at alarm output<br>Unit is same as flow unit |
| 8 | Lower limit cutoff flow % | Set cutoff pulse input percentage<br>(default 1%) | Value between 0 to 20 |
| 9 | Damping time | Set output current damping time<br>(default 2s) | Set output current damping time, in order to avoid output current too large and flow fluctuation too strong<br>Range: 1 to 32 (flow rate display Synchronous and smooth) |
| 10 | HART address | Set HART communication number | Range 0-15<br>(default 0) |
| 11 | Totalizer zero | Clear totalizer | Input password “70” and press “E” key |



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## 1.4 Wiring Instruction

**4-20mA with temperature and pressure compensation**

The vortex flow meter with 4-20mA output and temperature and pressure compensation itself is with wiring ports, which are located in the rear of meter. Among them, the right 6 ports are for temperature and pressure collection, and are wired before leaving factory. The two ports in the middle are for instrument power supply and 4-20mA output.


-mA and mA+ are main power supply and main output function
-mA: connecting with 24V power supply (-) negative or 2 wire current output (-) negative
mA+: connecting with 24V power supply (+) positive or 2 wire current output (+) positive

Vss: pulse output (-) negative
Fout: pulse output signal end
V+: pulse output power supply end
(These 3 ports can be used for output of alarm signal).

TRH/TRL: positive (+) port and negative (-) port of temperature sensor, standard for PT100
PIH/PIL: positive (+) port and negative (-) port of pressure sensor
PVH/PVL: positive (+) port and negative (-) port of pressure sensor power supply

**2 wire current converted to 4 wire**

Under certain circumstances we will meet such case that the client device is four-wire, while the meter is two-wire. Then we generally connect the flow meter into the system in series. Now, we take our flow totalizer connecting with flow meter with 4-20mA output and temperature and pressure compensation for example.



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## III Frequently Asked Questions and Solutions

1. Frequency changes of field instrumentation too large, solutions:
A. Firstly, check if the straight pipe section meets requirements. For gas, please ensure 10D before the flow meter and 5D after; for liquid, if the straight pipe section does not meet requirements, then there's great impact. It is suggested to change the installation location if the straight pipe length is not enough.
B. Electromagnetic interference at site. Solution: to strengthen the filtering function and lower the sensitivity by DIP switches.
C. Site flow is too low, less than the lower limit of the instrument, for example: DN300 insertion type vortex flow meter for measuring gas, the lower limit is 1500 m3 / h, but the site indication is 500 m3 / h or so, due to flow rate at the lower limit, value is not in linear change. Flow rate can be increased by changing the meter factor (not recommended).
D. Similar situation will also appear if there's pulsating flow when measuring liquid.

2. Interference of 50Hz on-site, generally making shielded line grounded.

3. No flow signals at site
A. Low flow cutoff is too large. You can modify it in parameters setting.
B. Power not connected, no electricity
C. Flow rate is too low, not reach signal trigger point.
D. Flow range of flow meter with 4-20mA output is not set before leaving factory.

4. The actual flow rate increases, but reading reduces. Inspect site conditions (such as pipeline process, etc.).
5. The actual flow rate reduces, but reading increases. Mostly due to pipe vibration or gasket is not at the center point of pipe when installing. The instrument should be reinstalled.
6. The displays of two different flow meters under same working conditions are not consistent, with large difference.
A. The experience value of customer is wrong, or there is a difference in working conditions, such as pipe directions, straight pipe section or vibration;
B. Customer once modified parameters.
C. The flow rate under working conditions is too low, thus the lower limit flow rate is not linear.
D. The flow meter is with temperature and pressure compensation, but temperature or pressure fails

7. The flow meter with 4-20mA output, display and system display inconsistent.
A. The unit inconsistent or flow range inconsistent.
B. 4-20mA output cable is too long (over 1000 meters), thus large loss.

8. The deviation between flow meter reading and actual flow rate is very large. Mostly it is due to unit setting.
9. There's reading even if there's no fluid flowing through the flow meter. Mostly it is due to vibration from site pipes. Shock absorption measures should be taken or the sensitivity of instrument should be reduced to reduce or eliminate.



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