

User's Manual



Office: 33 West 19th St, Suite 327, New York, NY 10011

Factory: 15-17 Libella Court, Essex County, Newark, NJ 07105

Tel: +1-646-619-1289 Fax: +1-212-400-7201

F4001-Vortex Flowmeter



O Series

T Series

---

# CONTENTS

<b>INTRODUCTION.....</b>	<b>3</b>
<b>GENERAL.....</b>	<b>7</b>
1.1 Feature.....	8
1.2 Technical data.....	8
1.3 Application Fields.....	9
1.4 Flow range.....	9
1.5 Outline Dimension.....	11
1.6 Model selection.....	14
<b>HANDLING PRECAUTIONS.....</b>	<b>15</b>
2.1 precaution regarding transportation and storage location.....	15
<b>INSTALLATION.....</b>	<b>16</b>
3.1 Precautions Regarding Installation Locations .....	17
3.2 Pipeling .....	17
3.3 Gas or Steam Measuring Precautions.....	22
3.4 Piping to Improve Durability.....	24
3.5 Maintenance for High Process Temperature Applications.....	25
3.6 Installing the Vortex Flowmeter.....	26
<b>OPERATION OF TRANSMITTER.....</b>	<b>30</b>
4.1 Wiring Precautions.....	30
4.2 Wiring of T series vortex flowmeter.....	30
4.2.1 wiring .....	30
4.2.2 Terminal Illustration.....	31
4.2.3 Operation of key and panel for C series flowmeter .....	32
4.3 Wiring of O series vortex flowmeter .....	35
4.3.1 Wiring .....	35
4.3.2 Keyboards description and setting.....	36
<b>MAINTENANCE AND TROUBLE SHOOTING.....</b>	<b>41</b>

---

## INTRODUCTION

---

F4001 series vortex flowmeters have been fine-tuned to your order specifications prior to shipment. Before use, read this manual thoroughly and familiarize yourself fully with the features, operations and handling of F4001 series vortex flowmeter to have the instrument deliver its full capabilities and to ensure its efficient and correct use.

### ■ Notices Regarding This Manual

- This manual should be passed to the end user.
- The contents of this manual are subject to change without prior notice.
- All rights reserved. No part of this document may be reproduced or transmitted in any form or by any means

without the written permission of Golden Promise Equipment Inc. (hereinafter simply referred to as GPE Inc).

- This manual neither does warrant the marketability of this instrument nor it does warrant that the instrument will suit a particular purpose of the user.
- Every effort has been made to ensure accuracy in the contents of this manual. However, should any questions

arise or errors come to your attention, please contact your nearest GPE Inc. sales office that appears on the back of this manual or the sales representative from which you purchased the product.

- This manual is not intended for models with custom specifications.
- Revisions may not always be made in this manual in conjunction with changes in specifications, constructions and/or components if such changes are not deemed to interfere with the instrument's FUNctionality or performance.

### ■ Notices Regarding Safety and Modification

- For the protection and safety of personnel, the instrument and the system comprising the instrument, be sure to follow the instructions on safety described in this manual when handling the product. If you handle the instrument in a manner contrary to these instructions, GPE Inc. does not guarantee safety.
- If this instrument is used in a manner not specified in this manual, the protection provided by this instrument may be impaired.
- As for explosionproof model, if you yourself repair or modify the instrument and then fail to return it to its original form, the explosion-protected construction of the instrument will be impaired, creating a hazardous condition. Be sure to consult GPE Inc. for repairs and modifications.

### ■ Safety and Modification Precautions

- The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS given elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. GPE Inc. assumes no liability for the customer's failure to comply with these requirements. If this instrument is used in a manner not specified in this manual, the protection provided by this instrument may be impaired.
- The following safety marks are used in this user's manual and instrument.

### WARNING



A WARNING sign denotes a hazard. It calls attention to procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death of personnel.

### CAUTION

A CAUTION sign denotes a hazard. It calls attention to procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

### NOTE

A NOTE sign denotes information necessary for essential understanding of operation and features.

-  FUNCTIONAL grounding terminal
-  Direct current

### Warranty

- The warranty of this instrument shall cover the period noted on the quotation presented to the Purchaser at the time of purchase. The Seller shall repair the instrument free of charge when the failure occurred during the warranty period.
- All inquiries on instrument failure should be directed to the Seller's sales representative from whom you purchased the instrument or your nearest sales office of the Seller.
- Should the instrument fail, contact the Seller specifying the model and instrument number of the product in question. Be specific in describing details on the failure and the process in which the failure

occurred. It will be

helpful if schematic diagrams and/or records of data are attached to the failed instrument.

- Whether or not the failed instrument should be repaired free of charge shall be left solely to the discretion of the Seller as a result of an inspection by the Seller.

■ **The Purchaser shall not be entitled to receive repair services from the Seller free of charge, even during the warranty period, if the malFUNCTION or damage is due to:**

- improper and/or inadequate maintenance of the instrument in question by the Purchaser.
- handling, use or storage of the instrument in question beyond the design and/or specifications requirements.
- use of the instrument in question in a location not conforming to the conditions specified in the Seller's General Specification or Instruction Manual.
- retrofitting and/or repair by an other party than the Seller or a party to whom the Seller has entrusted repair services.
- improper relocation of the instrument in question after delivery.
- reason of force measure such as fires, earthquakes, storms/ floods, thunder/lightning, or other reasons not attributable to the instrument in question.

■ **Using the Vortex Flowmeter Safely**

**WARNING**

**(1) Installation**

- Installation of the vortex flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to installation.
- The vortex flowmeter is a heavy instrument. Be careful that no damage is caused to personnel through accidentally dropping it, or by exerting excessive force on the vortex flowmeter. When moving the vortex flowmeter, always use a trolley and have at least two people carry it.
- When the vortex flowmeter is processing hot fluids, the instrument itself may become extremely hot. Take sufficient care not to get burnt.
- Where the fluid being processed is a toxic substance, avoid contact with the fluid and avoid inhaling any residual gas, even after the instrument has been taken off the line for maintenance and so forth.
- All procedures relating to installation must comply with the electrical code of the country where it is used.

**(2) Wiring**

- The wiring of the vortex flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to wiring.
- When connecting the wiring, check that the supply voltage is within the range of the voltage specified for this instrument before connecting the power cable. In addition, check that no voltage

is applied to the power cable before connecting the wiring.

- The FUNctional ground  $\perp$  must be connected securely at the terminal with the mark to avoid danger to personnel.

### (3) Operation

- Only expert engineer or skilled personnel are permitted to open the cover.

### (4) Maintenance

- Maintenance on the vortex flowmeter should be performed by expert engineer or skilled personnel. No operator shall be permitted to perform any operations relating to maintenance.
- Always conform to maintenance procedures outlined in this manual. If necessary, contact GPE Inc

- Care should be taken to prevent the build up of dirt, dust or other substances on the display panel glass or data plate. If these surfaces do get dirty, wipe them clean with a soft dry cloth.

### (5) Explosion Protected Type Instrument

- For explosion proof type instrument, the description in Chapter 10 "EXPLOSION PROTECTED TYPE INSTRUMENT" is prior to the other description in this user's manual.
- Only trained persons use this instrument in the industrial location.
- The FUNctional grounding must be connected to a suitable IS grounding system.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.
- Do not open the cover in wet weather or high humidity. If the cover is opened, provided protection with the enclosure is not warrantable.

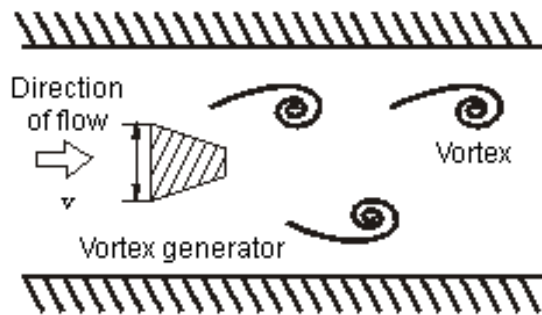
# GENERAL

F4001- Series vortex flowmeter is manufactured and designed according to the principle of Kamen vortex flow.

Put a drum vertically into a burette and let some fluid flow down along the drum, by two sides of which there formed, in rotation, regular vortexes , which is called the Karman Street. A output frequency of the Karman Street is related to fluid velocity and drum diameter, Where,

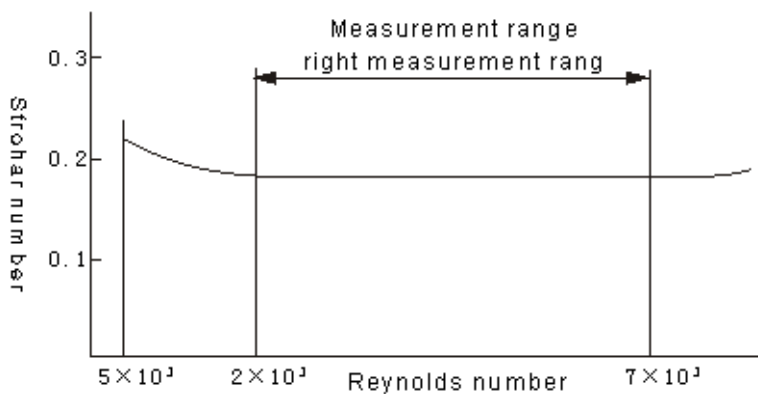
$$f = St \cdot v / d$$

- f-Output frequency of the Karman Street
- St-Coefficient (called as Strohar number)
- v-velocity
- d-Diameter of drum



$$Q = f/k$$

- Note:** Q: the quantity flow
- f: the frequency of the flow
- k: the instrument coefficient



Relationship between Strohar number and Reynolds number

As a output frequency of the Karman Street  $f$  is direct proportional to a velocity  $v$ . It may work out an instantaneous flow rate by using a tested output frequency of the Karman Street. The Strohar number is a key coefficient for vortex street flow meters. Within the lineal section of the curve, where  $St \approx 0.17$ , the output frequency is direct proportional to the flow velocity, so a velocity  $v$  is derivable by using a tested frequency  $f$ .

### 1.1 Feature

- Compact and durable, high reliability, with no movable parts, can be stably used in a long run.
- Easy to install and maintain
- No direct contact between transducer and tested material, reliable and have a long life circle.
- Output is a pulse signal that is proportional to traffic; has high precision and no zero offset.
- A Large rang of measurement with up to 1:10 rang ratio.
- Lower pressure loss and operating cost makes more sense on energy saving.
- Within certain rang of Renault figure, the output signal frequency is free from the influence of physical property and grouping variety, and its instrument factors only involve with figure and size of vortex generators. Thus, no compensation is needed when measuring volume traffic, while no instrument factors needed to be recalibrated when a part changed.
- It's so widely used that it can measure steam and gas as well as liquid.

### 1.2 Technical Data

- Nominal pressure : 1.6~32MPa
- Medium temp. : -40°C~300°C
- Power Supply
  - G series flowmeter: 24VDC±10%
  - C Series Flowmeter:DC18~24V
- Ambient Temp. : -25°C~60°C
- Relative humidity : 5%~95%
- Atmospheric pressure : 86~106Kpa
- Test medium : liquid, gas and steam
- Accuracy grade
  - Pulse: +/- 1% (liquid)
  - +/- 1% (gas, less than 35m/s)
  - +/- 1.5% (gas, more than 35m/s)
  - Current:
    - +/- 1.2% (liquid)
    - +/- 1.2% (gas, less than 35m/s)
    - +/- 1.7% (gas, more than 35m/s)



- Output signal    Analog signals and current
- Painting: Option (select the prefer color in the color table which attachment at the end of this manual)
- Reynolds No. range: 2x10<sup>4</sup>~7x10<sup>6</sup> (DN25~DN100)  
4x10<sup>4</sup>~7x10<sup>6</sup> (DN150~DN300)

### 1.3 Applications Fields

- ⊙ Waste water treatment, sewage process
- ⊙ Heat exchangers, Cooling systems
- ⊙ Oil field metallurgy
- ⊙ Ground water remediation
- ⊙ And other conductive liquid
- ⊙ Chemical industry, petrol-chemical light industry
- ⊙ food beverage dispensing
- ⊙ Pharmaceutical
- ⊙ process control
- ⊙ Other field use

### 1.4 ENGINEERING FLOW RANGE

#### ENGINEERING FLOW RANGE (GENERAL FLUID Table 1 )

DN (mm)	Normal measure range (m <sup>3</sup> /h)	
	Liquid	Gas
15	0.4~4	5~30
25	1.5~15	10~100
40	3.6~36	15~300
50	6~60	35~500
80	11~110	60~1050
100	17~170	100~1850
150	27~360	170~3600
200	60~780	400~7000
250	90~1200	700~11000
300	160~1720	1000~16000

**ENGINEERING FLOW RANGE OF SATURATED STEAM(Table 2)**

DN Pressure	25mm		32mm		40mm		50mm		65mm		80mm		100mm		125mm		150mm		200mm		Temp °C	Density Kg/h
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
0.1	20	101	22.5	150	36	229	59	358	93	600	129	917	220	1.43	348	2.25	479	3.22	840	5.73	120.1	1.126
0.2	21	136	29.5	210	47	333	77	520	124	880	168	1.33	288	2.08	463	3.30	628	4.68	1.10	8.34	133.3	1.638
0.3	24	151	36	280	56	436	92	680	162	1.15	201	1.74	345	2.78	567	4.30	750	6.13	1.32	11.0	143.2	2.140
0.4	27	186	42	340	65	536	105	836	171	1.40	231	2.14	396	3.39	640	5.24	862	7.54	1.51	13.6	151.4	2.635
0.5	30	248	46	410	72	636	118	994	188	1.69	259	2.55	444	3.98	691	6.23	966	8.95	1.70	15.9	158.3	3.127
0.6	34	256	50	470	80	733	130	1.15	206	1.95	285	2.94	489	4.66	766	7.20	1.07	10.3	1.87	18.6	164.4	3.615
0.7	37	325	54	530	87	833	142	1.30	225	2.20	310	3.34	531	5.22	832	8.15	1.16	11.7	2.08	20.9	169.8	4.099
0.8	39	325	58	600	93	931	152	1.45	243	2.47	334	3.73	572	5.91	888	9.10	1.25	13.1	2.19	23.6	174.7	4.581
0.9	42	394	62	650	100	1.03	163	1.61	253	2.73	357	4.12	612	6.44	936	10.0	1.34	14.5	2.34	25.8	179.2	5.064
1.0	45	441	66	720	106	1.13	173	1.70	272	3.00	379	4.51	650	7.16	1.00	11.0	1.42	15.8	2.49	28.6	183.3	5.553
1.1	47	479	70	780	112	1.23	183	1.92	289	3.26	401	4.91	687	7.67	1.07	12.0	1.50	17.3	2.63	30.7	187.2	6.033
1.2	50	463	73	850	118	1.32	193	2.05	306	3.50	422	5.29	723	8.4	1.12	13.0	1.58	18.5	2.76	33.6	190.8	6.509
1.3	52	555	77	910	123	1.42	202	2.22	314	3.77	422	5.68	757	8.88	1.17	13.9	1.65	20.0	2.89	35.5	194.2	6.980
1.4	54	593	79	970	129	1.51	211	2.37	328	4.00	461	6.07	792	9.49	1.22	14.8	1.73	21.3	3.02	37.0	197.5	7.456
1.5	57	630	82	1.00	135	1.60	219	2.52	341	4.30	481	6.47	825	10.3	1.26	15.8	1.80	22.6	3.15	41.4	200.5	7.934
1.6	59	669	86	1.1	140	1.71	229	2.68	353	4.55	501	6.86	858	10.7	1.31	16.8	1.87	24.1	3.28	42.9	203.5	8.419
1.7	61	707	89	1.15	146	1.81	237	2.83	365	4.80	519	7.24	890	11.3	1.36	17.7	1.94	25.9	3.40	45.3	206.2	8.897
1.8	63	746	93	1.22	151	1.91	246	2.98	385	5.07	538	7.64	922	11.9	1.41	18.7	2.01	26.9	3.53	47.8	208.9	9.388
1.9	66	784	96	1.28	155	2.01	254	3.14	395	5.33	556	8.03	954	12.6	1.46	19.6	2.08	28.3	3.65	50.0	211.5	9.868
2.0	68	822	98	1.35	161	2.10	262	3.27	404	5.60	574	8.43	985	13.2	1.50	20.6	2.15	29.6	3.76	53.5	213.9	10.35
3.0	87	1.21	128	1.98	207	3.10	338	4.84	532	8.21	743	12.4	1.27	19.3	1.95	30.3	2.78	43.5	4.86	77.4	234.6	15.21
4.0	106	1.61	158	2.60	251	4.11	409	6.43	647	11.0	898	16.5	1.53	25.7	2.40	40.2	2.35	57.8	5.87	102.8	250.7	20.21
4.3	111.0	1.730	161.0	2.80	264.0	4.43	429.0	6.91	666.0	11.6	942.0	17.7	1.61	27.7	2.47	43.0	3.52	62.2	6.17	110.6	254.9	21.74

1.5 OUTLINE DIMENSION

1.5.1 G series vortex flowmeter have two types of connection methods and outline size.

- 1) Wafer connection, which is for size from DN15mm to DN100mm vortex flowmeter.( see Fig. 1 and table 3)
- 2) Flange connection, which is for size from DN125mm to DN200mm.( see Fig. 2 and Table 3)

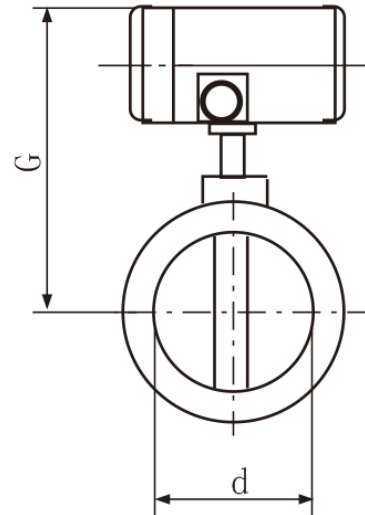
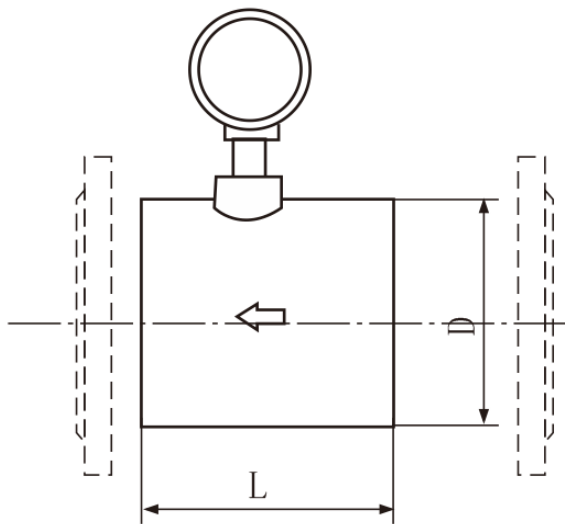


Fig.1

Wafer connection

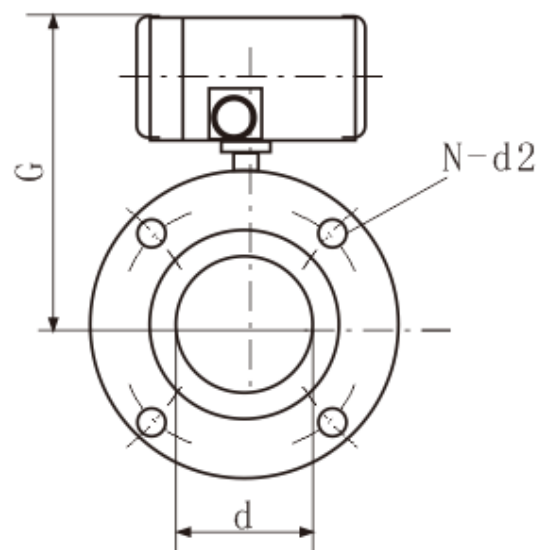
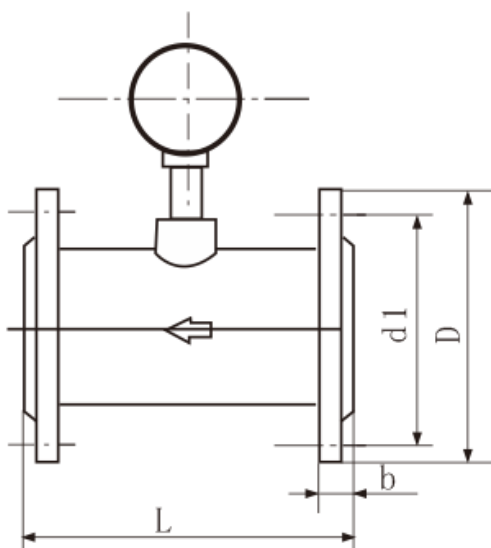


Fig.2

Flange connection

Outline DIMENSION(Table 3)

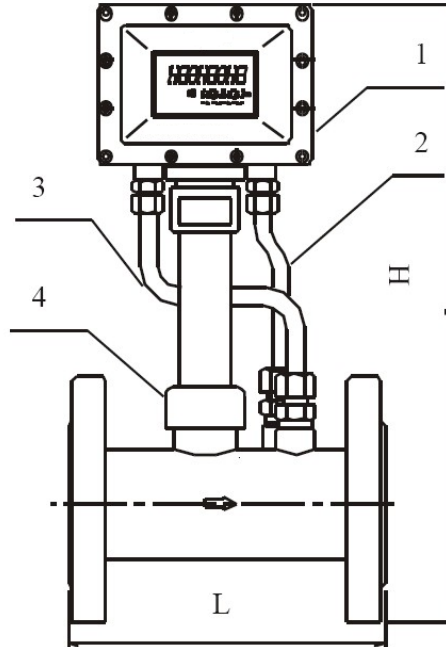
Coonection Type	DN (mm)	Pressur (MPa)	L (mm)	G		D (mm)	dl (mm)	Weight (Kg)
				General	High			
				Temp.	Temp.			
Wafer Connection	15 (20)	2.5 4.0	66	280	500	65	-	7.5
	25	2.5 4.0	66	280	500	65	-	7
	32	2.5 4.0	66	285	505	72	-	10
	40	2.5 4.0	70	290	510	80	-	11
	50	2.5 4.0	85	295	515	90	-	12.5
	65	1.6	98	310	530	105	-	17
	80	1.6	110	320	540	120	-	20
	100	1.6	110	330	550	150	-	27
Flange Connection	25	4.0	150	280	500	115	85±1	7
	32	4.0	150	285	505	140	100±1	10
	40	4.0	150	290	510	150	110±1	11
	50	4.0	167	295	515	165	125±1	12.5
	65	2.5	160	310	530	185	145±1	17
	80	2.5	196	320	540	200	160±1	20
	100	2.5	160	330	550	235	190±1	27
	125	1.6	250	323	545	245	210	22
	150	1.6	300	335	555	280	240	24
	200	1.6	320	370	590	335	295	31
	250	1.6	320	400	620	405	355	40
	300	1.6	320	420	640	460	410	48

**1.5.2 T type vortex flowmeter**

T Series vortex flowmeter is an flange connection type flowmeter the outline dimension is as following, Figure 3

Which will include following parts:

- Part 1. Intelligent flow computer
- Part 2: Pressure sensor
- Part 3: temperature sensor
- Part 4: flowmeter body



**Fig. 3 C Series( Temp. and Pressure Compensation)**

**Vortex flowmeter**

**table 4 ( Outline Dimension)**

DN mm	H (mm)	L (mm)
25	410	200
32	415	200
40	420	200
50	430	200
65	460	230
80	480	230
100	500	230
125	520	250
150	550	300
200	600	300
250	650	320
300	700	320

**Dimension ( table 4)**

H= total height

L= total width

1.6 Model selection

Model selection is a very important work for the use of instruments. For your special notice, it's shown by relative data that two thirds of the troubles in practical use of instruments are due to the improper model selection and incorrect installation of instruments.

**Table 5( Model Selection**

Type	DN	Transmitter	PN	Connection	Protection	Output	Indicator	Compensation	Note
F4001									Vortex flowmeter
	01								15mm
	02								25mm
	04								40mm
	05								50mm
	08								80mm
	10								100mm
	XX								XXmm
	CL								Compact Version for liquid
	CG								Compact version for Gas
	RH								Remote version(250℃)
	RX								Remote version(350℃)
			016						PN:1.6MPa
			025						PN:2.5MPa
			063						PN:6.3MPa
			160						PN:16MPa
			250						PN:25MPa
			320						PN:32MPa
				W					Wafer connection
				F					Flange connection
					A				General
					B				Explosion-Proof
						F			One Pulse
						I			one 4~20mA
						R			RS485
							O		No indicator
							X		Wth Indicator
								O	No compensation
								T	With Temp. and Pressure compensation

## HANDLING PRECAUTIONS

The F4001 Series Vortex Flowmeter are thoroughly tested at the factory before shipment. When these instruments are delivered, perform a visual check to ascertain that no damage occurred during shipment. This section describes important cautions in handling these instruments. Read carefully before using them. If you have any problems or questions, contact your nearest GPE Inc. service center or sales representative.

### 2.1 Precautions Regarding Transportation and Storage Location

To protect against accidental damage to vortex flowmeter while transporting it to a new location, pack it in the original packing as when shipped from the GPE Inc. factory.

#### WARNING!

The Vortex Flowmeter is a heavy instrument. Please be careful to prevent persons from injuring when it is handled. Deterioration in insulation or corrosion can occur for unexpected reasons if vortex flowmeter is left uninstalled for a prolonged period after delivery. If vortex flowmeter is likely to be stored over a prolonged period, observe the following precautions.

- Store the vortex flowmeter with forwarded statement.
- Choose a storage location that satisfies the following requirements:
  - Not exposed to rain or splashwater.
  - Less susceptible to mechanical vibration or shock.
  - Kept within the temperature and humidity ranges shown in the following table, preferably at normal temperature and humidity (approximately 25°C, 65%)

Temperature	-25°C to +60°C
Humidity	5 to 95% (no condensation)

### 2.2 Precautions Regarding Installation Locations

#### (1) Ambient Temperature

Avoid an area which has wide temperature variations. When the installation area is subjected to heat radiation from process plant, ensure adequate heat prevention or ventilation.

#### (2) Atmospheric Conditions

Avoid installing the vortex flowmeter in a corrosive atmosphere. When the vortex flowmeter must be installed in a corrosive atmosphere, adequate ventilation must be provided

#### (3) Mechanical Shock or Vibration

The vortex flowmeter is of sturdy construction, but elect an area subject to minimize mechanical vibration or impact shock. If the flowmeter is subject to vibrations, it is recommended that pipeline supports to be provided as shown in Figure 4.

#### (4) Other Considerations

- Choose a location where is sufficient clearance around vortex flowmeter exist to allow such work as routine inspections.
- Choose a location that ensures easy wiring and piping.

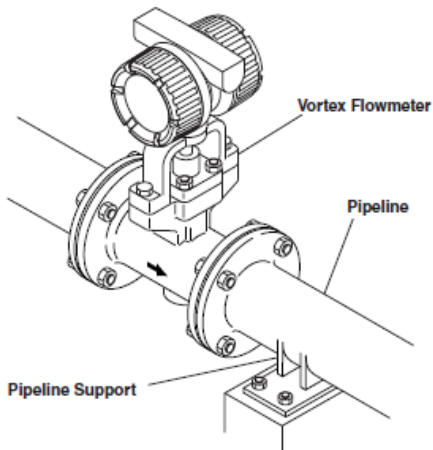


Fig.4

#### (5) Precautions Regarding Piping

- Ensure that the process connector bolts are tightened firmly.
- Ensure that no leak exists in the process connection pipeline.
- Do not apply a pressure higher than the specified maximum working pressure.
- Do not loosen or tighten the flange mounting bolts when the assembly is pressurized.
- Handle the vortex flowmeter carefully when measuring dangerous liquids, so that the liquids do not splash into eyes or on face. When using dangerous gases, be careful not to inhale them.

## INSTALLATION

### **WARNING!**

This instrument must be installed by expert engineer or skilled personnel. The procedures described in this chapter are not permitted for operators.

### **3.1 Precautions Regarding Installation Locations**

#### **(1) Ambient Temperature**

Avoid an area which has wide temperature variations. When the installation area is subjected to heat radiation from process plant, ensure adequate heat prevention or ventilation.

#### **(2) Atmospheric Conditions**

Avoid installing the vortex flowmeter in a corrosive atmosphere. When the vortex flowmeter must be installed in a corrosive atmosphere, adequate ventilation must be provided



### (3) Mechanical Shock or Vibration

The vortex flowmeter is of sturdy construction, but elect an area subject to minimize mechanical vibration or impact shock. If the flowmeter is subject to vibrations, it is recommended that pipeline supports to be provided as shown in Figure 5.

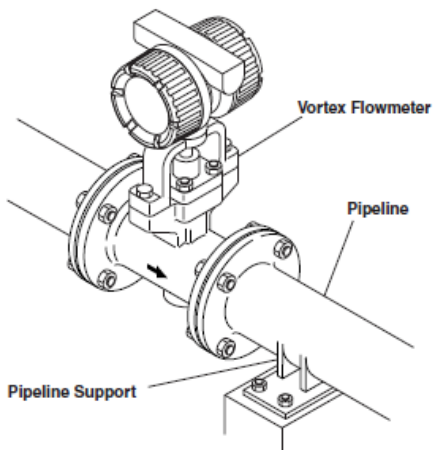


Fig.5

### (4) Precautions Regarding Piping

- (a) Ensure that the process connector bolts are tightened firmly.
- (b) Ensure that no leak exists in the process connection pipeline.
- (c) Do not apply a pressure higher than the specified maximum working pressure.
- (d) Do not loosen or tighten the flange mounting bolts when the assembly is pressurized.
- (e) Handle the vortex flowmeter carefully when measuring dangerous liquids, so that the liquids do not splash into eyes or on face. When using dangerous gases, be careful not to inhale them.

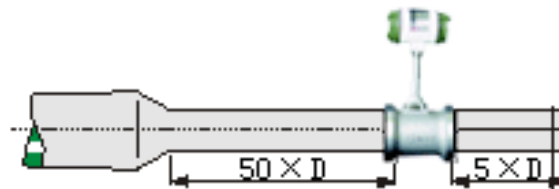
## 3.2 Pipling

As an installation problem will either affect measurement precision, shortens lifespan, or even damages the flowmeter, it is important to select installation points and install transducers properly.

Requirements for a straight pipe section

Upstream and downstream a flowmeter installation point, certain requirements for a straight pipe

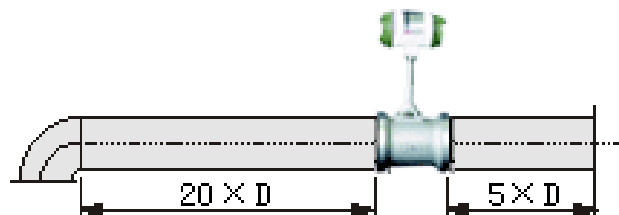
section have to meet; otherwise the measurement precision will be affected. If there is a widening pipe upstream a flowmeter installation point, you shall place a section of no-less-than-15D cylindrical straight pipe upstream the transducer, and place a section of no-less-than-15D cylindrical straight pipe downstream it.



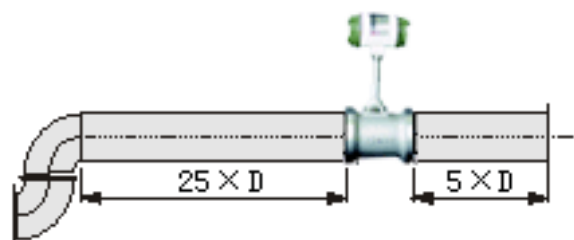
If there is a reducing pipe upstream a flowmeter installation point, you shall place a section of no-less-than-18D cylindrical straight pipe upstream the flowmeter, and place a section of no-less-than-5D cylindrical straight pipe downstream.



If there is a 90° elbow or a T-shape joint upstream a flowmeter installation point, you shall place a section of no-less-than-20D cylindrical straight pipe upstream the flowmeter, and place a section of no-less-than-5D cylindrical straight pipe downstream.

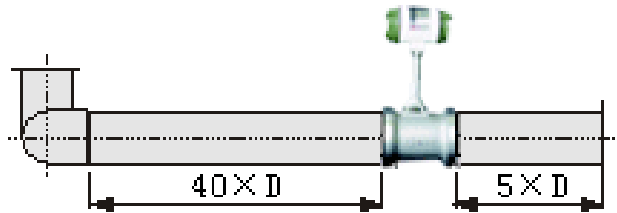


If there are two 90°elbows at the same level upstream a flowmeter installation point, you shall place a section of no-less-than-25D cylindrical straight pipe upstream the flowmeter, and place a section of no-less-than-5D cylindrical straight pipe downstream.

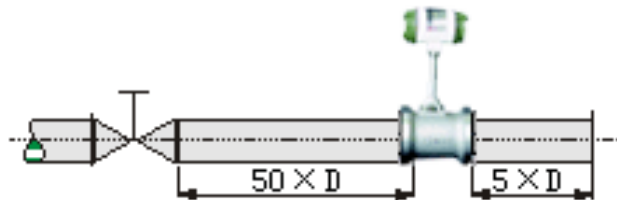


If there are two 90°elbows at the different levels upstream a flowmeter installation point, you shall

place a section of no-less-than-40D cylindrical straight pipe upstream the flowmeter, and place a section of no-less-than-5D cylindrical straight pipe downstream.



The flow control valves or pressure control valves have to be installed as 5D beyond the downstream of the flowmeter as possible, but If they have to be installed upstream a transducer, you shall place a section of no-less-than-50D cylindrical straight pipe upstream the flowmeter, and place a section of no-less-than-5D cylindrical straight pipe downstream.



### Special Notices:

If a valve is nearby mounted upstream the installation point, its frequent on and off will seriously affect the lifespan of the flowmeter, and even likely result in a perpetual damage to the transducer. You shall avoid installing a flowmeter on an extremely long over-hanged pipe; otherwise a long term of reclination of the transducer would eventually break the sealing between the flowmeter and its flange; but if you have to install it in this way, you must place tightening devices on the pipe, 2D upstream and downstream the transducer respectively.

### 3.2.1 Requirements for piping:

Certain requirements for the straight pipe sections - upstream and downstream a flowmeter installation point - have to meet; otherwise the measurement precision will be affected. Inner diameter of the joint pipes - upstream and downstream a flowmeter installation point - shall be equal to that of the flowmeter, where specifications in following formula shall meet.

$$0.98DN \leq D \leq 1.05DN$$

### Notes:

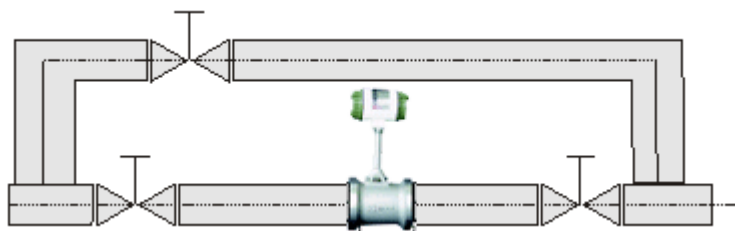
DN-----Inner diameter of a flowmeter

D-----Inner diameter of the pipe

The jointing pipe shall be homocentric with the flowmeter, and the coaxial error shall be no more than 0.05DN. The sealing gasket between the flowmeter and its flange shall not protrude into the pipe, and it may have a slightly wider inner diameter than the flowmeter.

### 3.2.2 Requirements for bypass pipes:

To facilitate troubleshooting, you'd better equip bypass pipes for transducers. In addition, in case of following conditions, you shall install transducers on bypass pipes: (I) the pipe is required to be cleaned on regular basis; or (II) the liquid supply in the pipes is not interruptible for the troubleshooting of transducers.



### 3.2.3 Requirements for pipe vibration:

You may as much as possible avoid installing a flowmeter on a quite vibrant pipe; but if the installation is unavoidable, you have to take following vibration absorption measure: equip the pipe with tightening devices and vibration pads, 2D upstream and downstream the flowmeter respectively.

Special notice: As vibration at the output of an air compressor is quite strong, you shall not install a flowmeter thereby but install it behind an air tank.

#### a) Installation types:

Either horizontal installation or vertical installation is acceptable for F4001 Vortex flowmeter with both wafer connection and flange connection.

Wafer connection flowmeter means the two ends flange of pipeline clamp the flowmeter in the middle and the bolts fix the body of flowmeter and the pipeline together, however, do not make the seal gasket heave into the pipe and block the flow inside the pipe.

Flange connection flowmeter means the bolts fix the flanges of flowmeter and the pipeline together and also do not make the seal gasket heave into the pipe and block the flow inside the pipe.

Notes: Vertical installation for liquid requires the medium should flow down to up so that the pipeline will be full of liquid.

#### b) Ambient requirements:

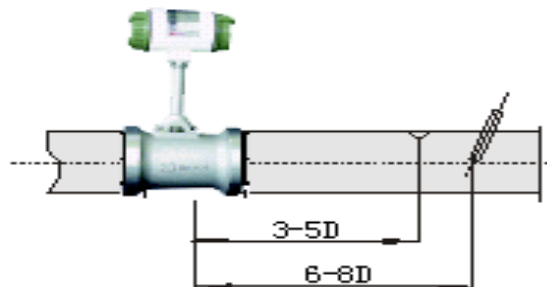
1. You may avoid installing a flowmeter at the place where temperature varies greatly and

equipment suffers with heat radiation; but if it's unavoidable, you have to take proper measures for heat isolation and ventilation.

2. You may avoid installing a flowmeter at the place with corrosive gas; but if it is unavoidable, a ventilation measure is indispensable.
3. You'd better install a flowmeter indoors; but if outdoor installation is unavoidable, you have to take proper measures for moisture-proof and sun-proof, and prevent water from flowing into an amplification box along its cable(s).
4. To install flowmeter, sufficient space has to be available, while the necessary lamps and electrical outlets are helpful to wiring and regular maintenance.
5. You shall properly connect a cable to the flowmeter where the cable shall be far away from any electric noise sources such as high-power transformer, motors, and power supplies.
6. You shall not install any flowmeter near a transceiver; otherwise the normal operation will be interfered by the high frequency noise.

### **3.2.4 How to select pressure and temperature test points:**

If it is required to test pressure and temperature near a transducer, you shall select 3 - 5 points downstream the transducer for the pressure test, while 6 - 9 points downstream the transducer for the temperature test.



### **3.2.5 Preparations before you start to use the transducer:**

1. Verify a flowmeter carefully for aspects including installation and wiring.
2. Power on the displaying instrument and make sure the flow rate indication is active.
3. Open up a valve slowly until a relative small value of pressure. Check the flowmeter, overall, for leakage and make sure the flow rate indication is active in the display instrument.
4. If it's normal, open up the valve widely; and hold on for a while, then check the displaying instrument for normal flow rate indication.

### **3.2.6 Precaution for Anti-explosion type flowmeter:**

The series of intrinsic safety explosion-proof products are made under inspection and authentication of the National Supervision and Inspection Center for Explosion Protection and Safety of instrumentation (NEPSI). The products comply with the National Standard

GB3896.1/4-83, of which the explosion-proof mark is ExibII CT1-6 and the certificate of conformity is CXB00285. The products can match with safety shelves to form intrinsic safety explosion-proof systems that are applicable to explosive fields. Please notice that following items shall be concerned for your field installation.

- . Before using it, please make sure the product, of which the shell is equipped with ground terminals, has been reliably grounded.
- . Only when intrinsic safety vortex street flow transducers work with the safety shelves that have passed the authorization of an explosion-proof inspection authority, are intrinsic safety explosion-proof systems well FUNCTIONED.
- . You may connect the transducers to the intrinsic safety side of safety shelves with shielded tricore cables (enclosed by isolated sheaths) of which, the cross section is 0.5 mm<sup>2</sup>, the shielded layers separately grounded, and the wiring shall be protected from electromagnetic interfere as much as possible.
- . Ambient temperature range of the products is -25~+50°C and the relationship between the temperature class in explosion-proof marks and temperature of material tested are shown below.

### 3.2 Precautions Regarding Installation

#### **WARNING**

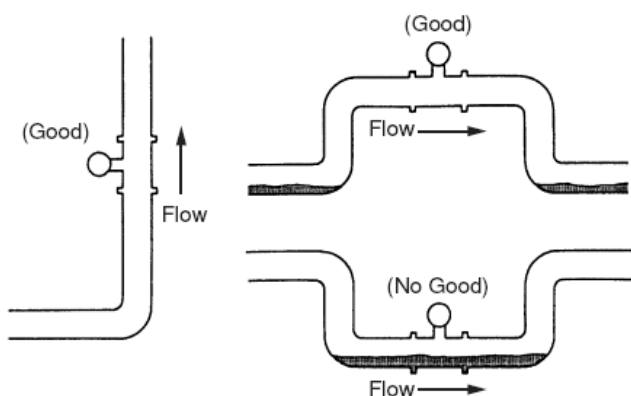
In case of high process temperature, care should be taken not to burn yourself because the surface of

body and case reach a high temperature.

#### 3.2.1 Gas or Steam Measuring Precautions

##### a) Piping to Prevent Standing Liquid

(1) Mount F4001 Series vortex flowmeter in a vertical pipeline to avoid liquid traps. When vortex flowmete is installed horizontally, raise that part of the pipeline in which the vortex flowmeter is installed.



**Fig.7**

##### b) Liquid Measurement Precautions

To insure accurate measurement, the F4001 series vortex flowmeter must always have a full

pipe.

**c) Piping Requirements for Proper Operation**

Allow the flow to flow against gravity. When the flow is moving with gravity, lift the down-stream pipe length above the F4001 series vortex flowmeter installation level to maintain full pipeline.

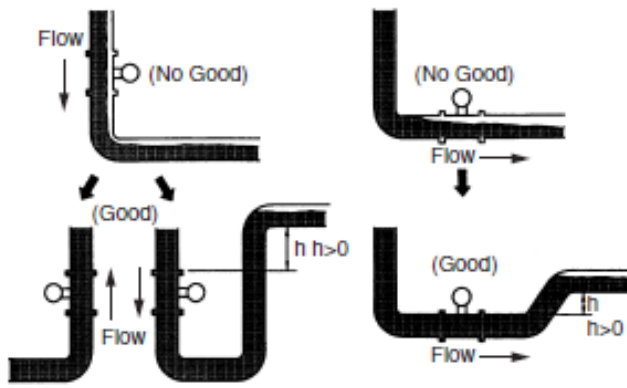


Fig.8

**d) Piping for Avoiding Bubbles**

Flows containing both gas and liquid cause problems. Avoid gas bubbles in a liquid flow. Piping should be carried out to avoid bubble generation. Install the valve on the downstream side of the flowmeter because pressure drop across the control valve may cause gas to come out of the solution.

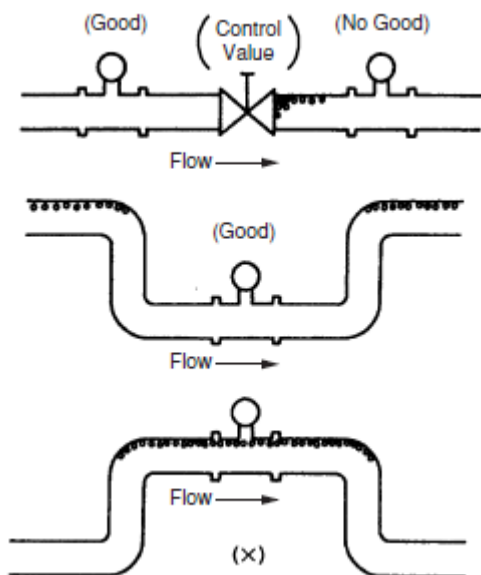


Fig.9

**e) Multi-Phase Flow**

F4001 series vortex flowmeter can measure gas, liquid and steam when there is no change in state. However, accurate measurement of mixed flows (e.g. gas and liquid) is not possible.

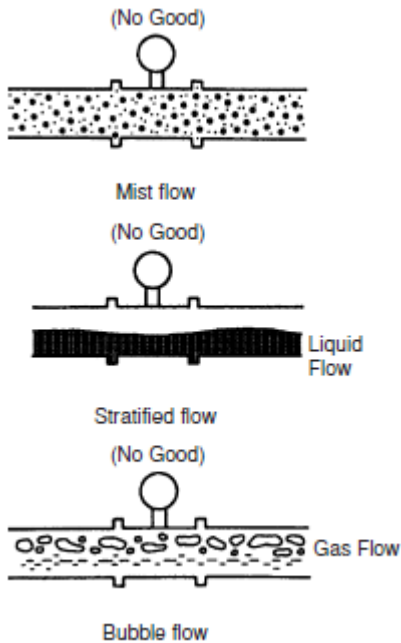


Fig.10

**f) Pipeline Diameter and vortex flowmeter**

The process pipeline inner diameter should be slightly larger than the vortex flowmeter inner diameter, schedule 40 or lower pipe should be used for 1/2 to 2 inch flowmeters and schedule 80 or lower pipes for 3 to 8 inch flowmeters.

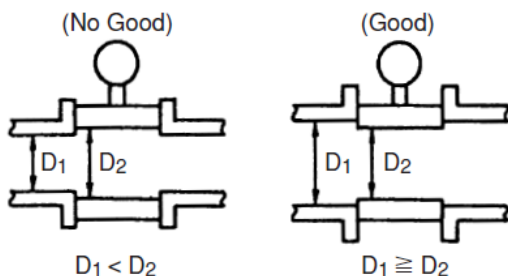


Fig.11

**3.2.2 Piping to Improve Durability**

**a) Pipe cleaning**

- Flushing of pipe line (Cleaning)

Flush and clean scale, incrustation and sludge on the inside of pipe wall for newly installed pipe line and repaired pipe line before the operation.

- Fluid Carrying Solids

Do not measure fluids that carry solids (e.g. sand and pebbles). Make sure users periodically remove solids adhering to the vortex shedder.

- Obstruction of flow fluids may cause to make a chemical reaction and the fluid will be crystallized and hardened, and be deposited on the pipe wall and shedder bar. In those cases, clean shedder



bar.

**b) Bypass piping**

Bypass piping is convenient for the maintenance of F4001 vortex flowmeter (vortex shedder cleaning, etc.).

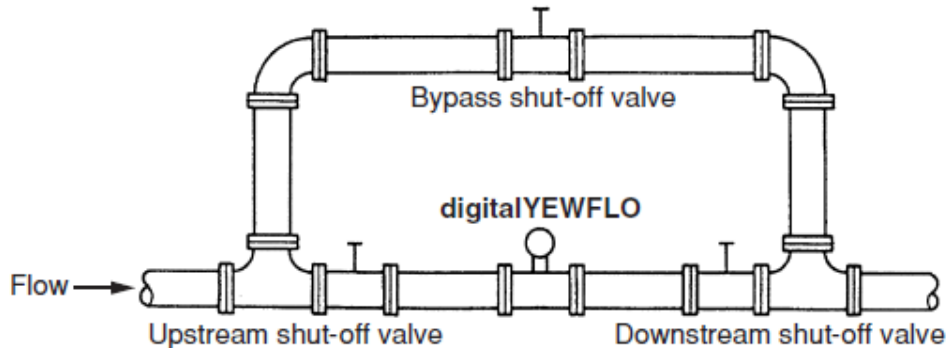


Fig.12

**c) Installing High Process Temperature Vortex Flowmeter**

Installation of the flowmeter is the same as the standard type. Cover the flowmeter body with heat insulating material following instruction of “CAUTION”.

**CAUTION!**

Keep the upper limit of heat insulating material to prevent overheating of the terminal box. Seal the Heat-Insulator to avoid hot-air leakage.

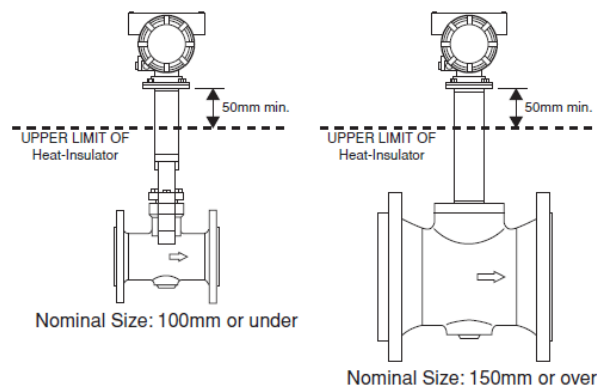


Fig.13

**3.3 Maintenance for High Process Temperature Applications**

F4001 series vortex flowmeter uses special materials that produce vortex flowmeter for High Process Temperature applications

When you are replacing a shedder bar or a gasket, specify High Process Temperature type

**3.4 Installing the Vortex Flowmeter**

**WARNING!**

The Vortex Flowmeter is a heavy instrument. Please be careful to prevent persons from injuring when it is handled.

Before installing the instrument verify the following. The direction of flow should match to the arrow mark on the instrument body. Installation of Vortex flowmeter of the wafer and flange type is shown in Table 6.

When installing the wafer type vortex flowmeter, it is important to align the instrument bore with the inner diameter of the adjacent piping. To establish alignment, use the four collars supplied with the instrument.

1. Four collars are supplied for 1/2 inch (15mm) to 1- 1/2 inch (40mm), 2 inch of JIS 10K or ANSI class 150 and 3 inch of ANSI class 150. Install the instrument as illustrated in Table 6

2. If the adjacent flanges have eight bolt holes, insert the stud bolts in the holes on the instrument shoulder. Refer to

Size mm (inch)	Flange Rating	Major Diameter of External Thread of Stud Bolt d (mm)	Length R(mm)
15mm (1/2")	JIS10K,20K/DIN10,	12	160
	16,25,40	16	160
	JIS 40K	12.7	155
	ANSI 150, 300, 600		
25mm (1")	JIS 10K, 20K, 40K	16	160
	ANSI 150	12.7	155
	ANSI 300, 600	15.9	160
	DIN 10, 16, 25, 40	12	160
40mm (1-1/2")	JIS 10K, 20K/DIN	16	160
	10,16, 25, 40	20	170
	JIS 40K	12.7	155
	ANSI 150	19.1	170
50mm (2")	ANSI 300, 600		
	JIS 10K, 20K, 40K	16	200
80mm (3")	DIN 10, 16, 25, 40	15.9	
	ANSI 150, 300, 600		
	JIS 10K/DIN 10,	16	220
	16,25, 40 JIS 20K,	20	
100mm (4")	40K ANSI 150	15.9	240
	ANSI 300, 600	19.1	
	JIS 10K/DIN 10, 16	16	220
	JIS 20K/DIN 25, 40	20	240
JIS 40K		22	270
	ANSI 150	15.9	240
	ANSI 300 ANSI 600	19.1	240
		22.2	270

**Table 6**

Figure 14

Stainless steel stud bolts and nuts are available on order. When they are to be supplied by the user, refer to Table 2.2 for stud bolt length. Gaskets must be supplied by the user.

3. Gasket:

Avoid mounting gaskets which protrude into the pipeline. This may cause inaccurate readings.

Use gaskets with bolt holes, even if vortex flowmeter is of the wafer type. Refer to Figure 15

When using a spiral gasket (without bolt holes), confirm the size with the gasket-manufacturer, as standard items may not be used for certain flange ratings.

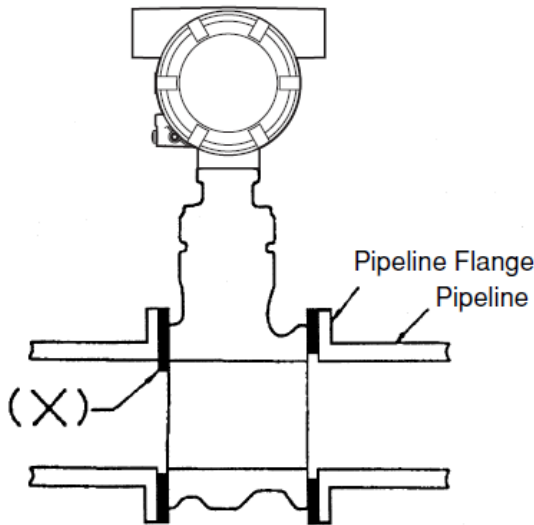


Fig.15

Fig.14

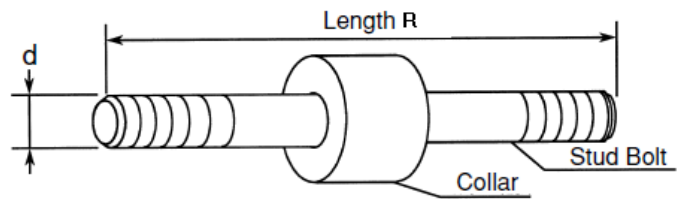
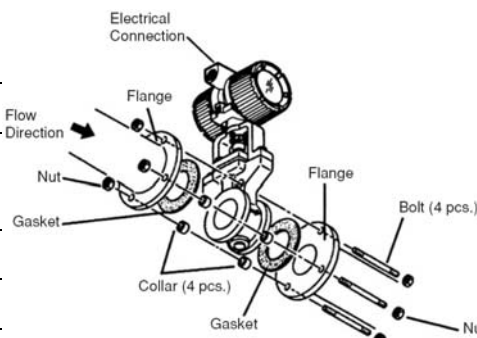
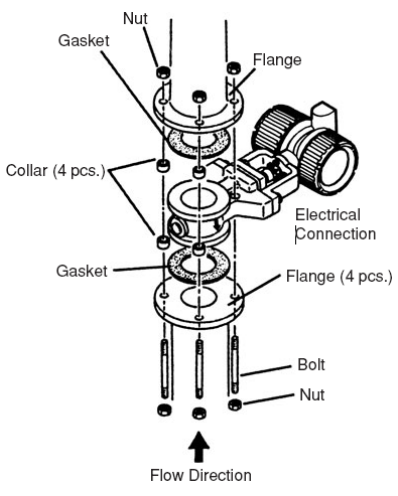
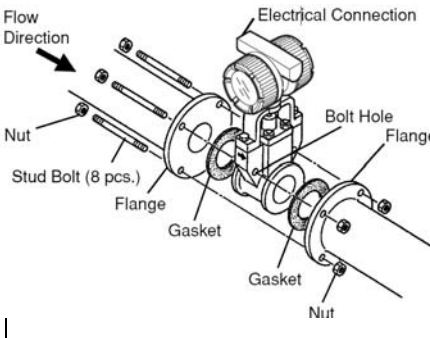
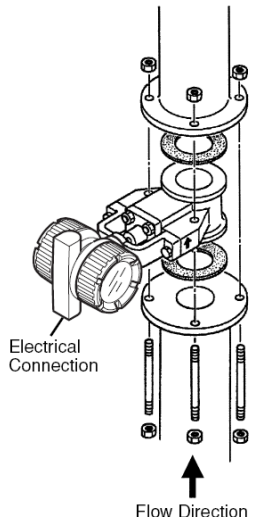
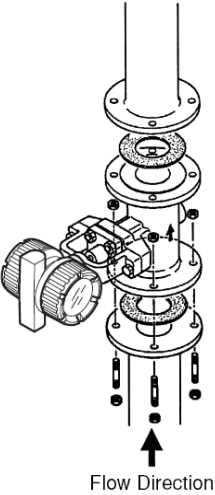
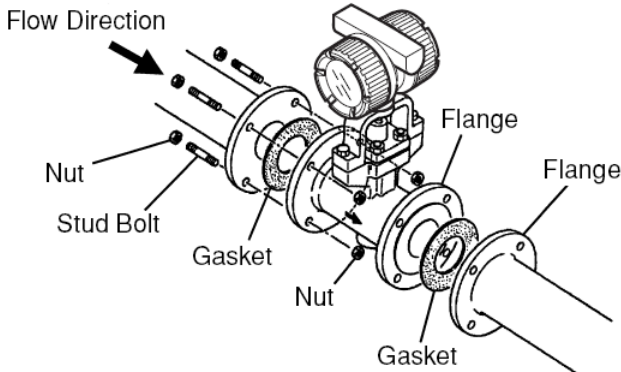


Table 7 Installation of Wafer Type Vortex Flowmeter

Wafer type		Description
When Installation Collar are required, the installation vortex flowmeters applied to the following line sizes and flange ratings.		<p><b>Horizontal Installation</b></p>  <p><b>Vertical Installation</b></p> <ol style="list-style-type: none"> <li>(1) Insert two collars on each two bolts of bottom side of the flowmeter.</li> <li>(2) Fit the flowmeter body to the collars. And tighten the four bolts and nuts uniformly.</li> <li>(3) Check for leakage from the flange connections.</li> </ol> 
<b>Size mm(inch)</b>	<b>Flange Rating</b>	
15~40 (1/2 to 1-1/2)	All ratings	
50(2)	JIS 10K, ANSI class 150,	
80(3)	ANSI class 150, JPI class 150	
<p><b>WARNING</b></p> <p>The inside diameter of the gasket must be larger than the pipe inner diameter so that it will not disturb the flow in the pipeline.</p> <p><b>WARNING</b></p> <p>When installing the Flowmeter vertically in the open air, change the electrical connection port direction to the ground. If the electrical connection port is installed upwards, rain, water might leak in.</p> <p><b>WARNING</b></p> <p>In case of vertical installation, two collars in the upper part might move after the installation. But it doesn't influence the performance, please use the flowmeter under such condition.</p>		
When Installation Collars are not required, the installation vortex flowmeters applied to the following line sizes and flanges.		<p><b>Horizontal Installation</b></p>   <ol style="list-style-type: none"> <li>(1) Insert two stud bolts in the bolt holes on the flowmeter shoulder to align the instrument body with the inner diameter of the adjacent piping.</li> <li>(2) Tighten all bolts uniformly and check that there is no leakage between the instrument and the flanges.</li> </ol>
<b>Size mm(inch)</b>	<b>Flange Rating</b>	
50(2)	JIS 20K, 40K ANSI class 300,600	
80(3)	JIS 10K, 20K, 40K ANSI class 300, 600	
100(4)	JIS 10K, 20, 40K ANSI class 150, 300, 600	

Flange type	Description
<p>Use the stud bolts and nuts supplied with the flowmeter of the user.</p> <p>The gaskets should be supplied by the user.</p> <p><b>CAUTION</b></p> <p>The inside diameter of the gasket must be larger than the pipe inner diameter so that it will not disturb the flow in the pipeline.</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p><b>Vertical Installation</b></p> </div> <div style="text-align: center;"> <p><b>Horizontal Installation</b></p>  </div> </div>

## OPERATION OF TRANSMITTER

### WARNING!

The wiring of the vortex flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to wiring

---

### CAUTION!

Once all wiring is complete, check the connections before applying power to the instrument. Improper arrangements or wiring may cause a unit malFUNCTION or damage.

### 4.1 Wiring Precautions

Be sure to observe the following precautions when wiring:

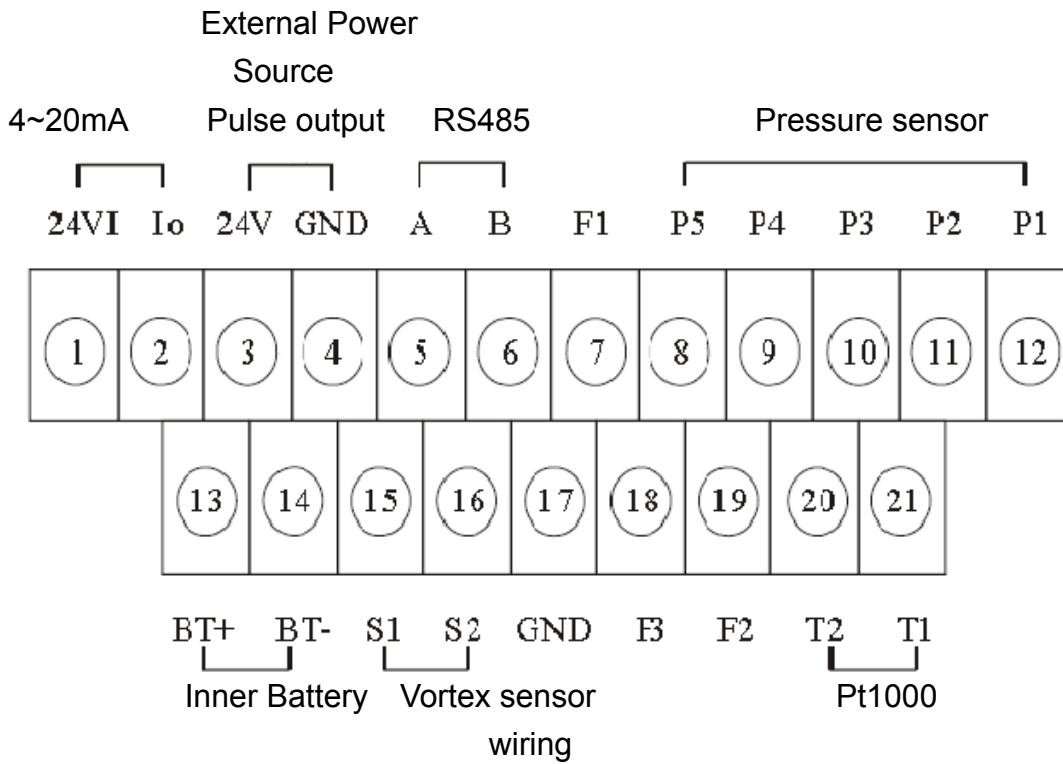
#### CAUTION!

- In cases where the ambient temperature exceeds 50 °C (122 °F), use external heatresistant wiring with a maximum allowable temperature of 70 °C (158 °F) or above.
- Do not connect cables outdoors in wet weather in order to prevent damage from condensation and to protect the insulation.
- Do not splice the cable between the flowtube terminal and the converter if it is too short. Replace the short cable with a cable that is the appropriate length.
- All the cable ends must be provided with round crimp-on terminals and be securely wired.
- Be sure to turn power off before opening the cover.
- Before turning the power on, tighten the cover securely.
- Explosion protected types must be wired in accordance with specific requirement (and, in certain countries, legal regulations) in order to preserve the effectiveness of their explosion protected
- The terminal box cover is locked by the clamp. In case of opening the terminal box cover, use the hexagonal wrench attached.
- Be sure to lock the cover by the clamp using the hexagonal wrench attached after installing the cover.

### 4.2 Wiring of T series vortex flowmeter ( with Temp. and pressure compensation)

#### 4.2.1 wiring

When open the back cover of the flowmeter. You will see the wiring terminal as following( Figure 20)



**Figure 20: Wiring terminal graph**

**4.2.2 Terminal Illustration**

1. 24VI: two wires 4~20mA output, 24V+(15~28VDC)
2. Io: 4~20mA output, 24-
3. +24V: External 24V+ (15~28VDC)
4. GND: External 24V-
5. A: RS 485+
6. B: RS 485-
7. F1: for option
8. P1: Power terminal + for pressure sensor( Red cable)
9. P2: Signal terminal + for pressure sensor( Yellow cable)
- 10.P3: Signal terminal - for pressure sensor(white cable)
- 11.P4: Power terminal - for pressure sensor(green cable)
- 12.P5: Power terminal- for pressure sensor( Black cable)
- 13.BT+: Built-in battery terminal +
- 14.BT-: Built-in battery terminal -
- 15.S1: Vortex sensor signal terminal
- 16.S2: Vortex sensor signal terminal
- 17.GND: for option

- 18.F3: Engineering condition pulse output (Open Collector output, no pull-up resistor, original vortex pulse output)
- 19.F2: Engineering condition pulse output (with pull-up resistor, original vortex pulse output)
- 20.T2: Pt1000(temp. sensor) terminal 1 ( Red cable)
- 21.T1: Pt1000 Pt1000(temp. sensor) terminal 2

#### 4.2.3 Operation of key and panel for T series flowmeter

##### a) Description of display mode

Flow meter will display in two lines.

**X.XXXXXXX NM<sup>3</sup> Total flow**

X.XXXX NM<sup>3</sup>/h (Flow rate)

X.XXX Kpa (Pressure)

X.XXX Hz (Frequency)

X.XX °C (Temperature)

Description

1. Total flow would be displayed in the up line
2. Flow rate, Pressure, Temperature and Frequency will display in cycle every two seconds in the down line
3. The down line values will stop to cycle when pressing the button of "E", then press it again, the down line values will return to cycle normally.
4. when there are liquid/gas flowing through flowmeter.Pressure and Temperature will be displayed in a cycle every 4 seconds.
5. when there are no flow, the pressure and temperature will be displayed in a cycle every 16 seconds for saving energy.

##### b) Keyboards description and setting

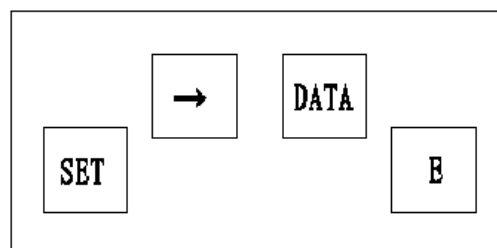


Fig.21 Key pad

- Opening the back cover of the transmitter, four FUNCTION keys can be seen, there are "SET",



"→", "DATA", "E".

- When flowmeter is working. Press the key of "SET" at the first time to enter the interface of password authentication, "P---0000" will be displayed on the screen and the first figure starts blinking. Press the key of "DATA" to modify data ( cycling from 0 to 9). When values modified well,press key "→" to move the blinking figure to next values for modifying and so forth. After all values modified well , you can check and confirm the password values once again by pressing the key of "SET". If the password is correct, you can enter the interface of parameter for setting.otherwise re-enter them.

### c) Parameter setting interface illustration

Table 8 .

Parameter No.	OSD(on screen display)	Illustration	Note
1	P---XXXX  no—XX	Password Authentication Universal passport is 9012  Local communication address(Only for check)	0000-9999 Key in correct password to enter next interface
2	CLr---X	Total Reset , change value "0" into "3". Press the key "SET" to zero-reset	
3	--XXXXXX ---qH	20mA corresponds to volumetric flowrate (NM3/H)	1-999999
4	P1—XXXX	Modify password Default Password: 1000	0000-9999
5	PH-XXXX.X kPa	Pressure sensor Max. measurable value (kPa)	
6	PU—X.XXX	Lower limit Pressure correspond to voltage value (v)	
7	PL-XXXX.X kPa	Low limit value (KPa)	
8	bt-X-XXXX	Baud rate	0-2400;1-4800;2

			-9600
9	no—XX	Communication address	00-31
10	XXXXX.XXX ----H	Meter factor K	unit: times/m <sup>3</sup>
11	FC-XXXX	FC low flow cut-off frequency	Small-signal cut-off
12	----END— ----USER--	User parameter End mark	Pressing "SET" to return to the second display interface to cycle setting, press "E" to read-in/save data and back to running status

Note: 1. In setting state, it can be back to running status when pressing the key of "E"

2. If pressing the key of "E" in the process of parameters setting , the current parameter will lose but the previous parameter could be saved.

### 4.3 Wiring of O series vortex flowmeter

#### 4.3.1 Wiring

When you open the back cover of O series Vortex flowmeter. You can see the wiring terminal as right side in Figure 22

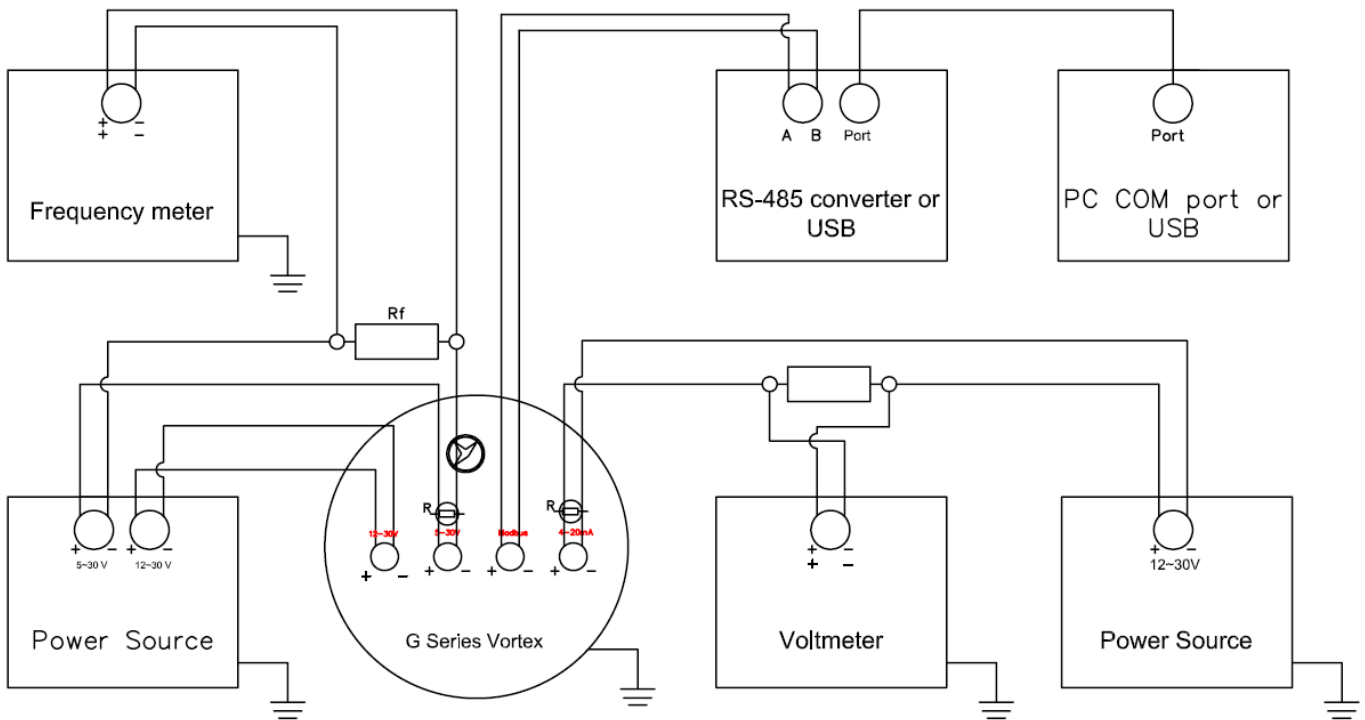
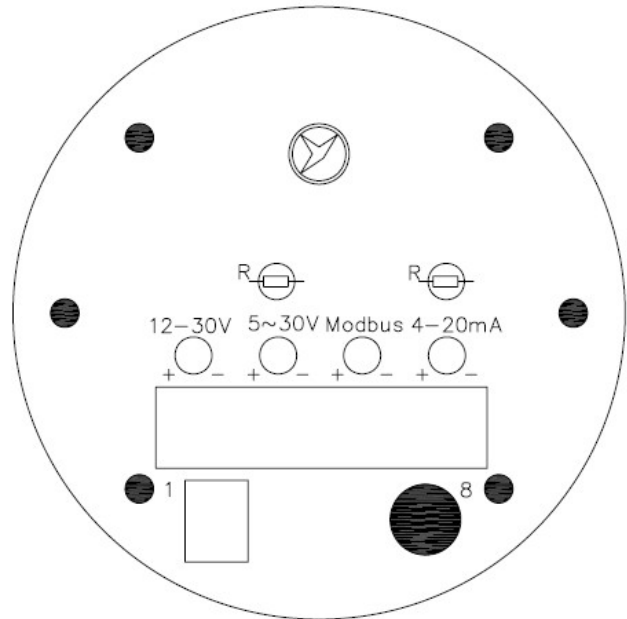
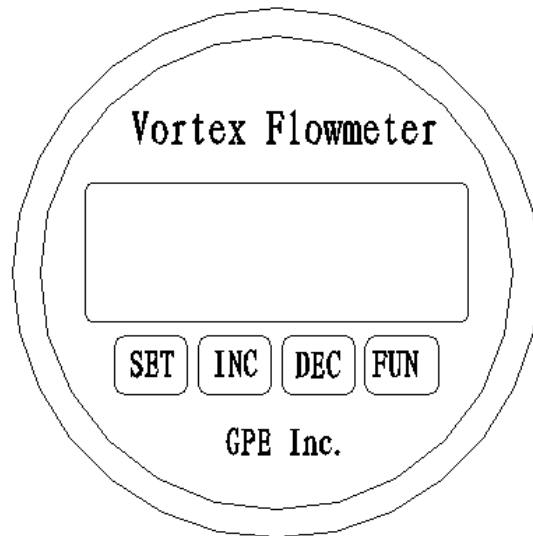


Figure 23: Wiring terminal graph.

### 4.3.2 Keyboards description and setting



1. The LCD display of F4001 Vortex flowmeter includes 6 digits instantaneous flow value and 9 digits accumulative flow value. The instantaneous flow value will contain 1 decimal digit (0~99999.9m<sup>3</sup>/h) or no decimal digit (0~999999m<sup>3</sup>/h) and the accumulative flow value will contain 4 decimal digits (0~99999.9999m<sup>3</sup>).
2. The transmitter could display the instantaneous flow and the accumulative flow, and supply the Pulse Output of three-wire system (powered by DC24V±5%, V<sub>H</sub>≥20V, V<sub>L</sub><1V and output load <200Ω) or the Current Output through Current converter (with resolution is 1/65536).
3. For wiring connection, please open the back-cover and the long-distance transmission of flowmeter's signal can be connected as follows:

### 4.3.3 BASIC OPERATING PROCEDURES

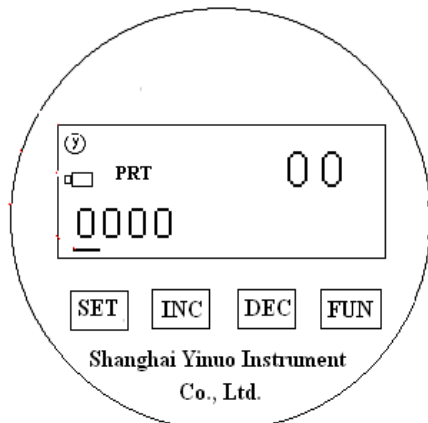
Data setting can be performed with the four keys on the front panel (SET, INC, DEC and FUN)

#### a) Operation of key and panel:

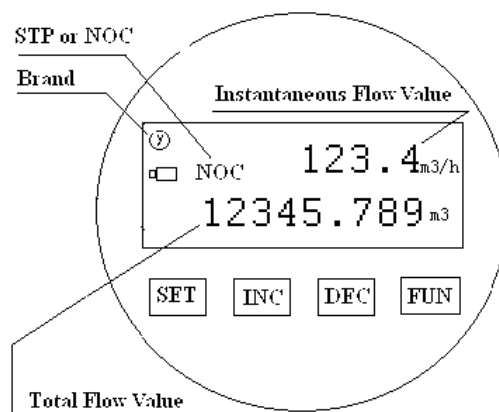
There are totally four buttons on the panel of LCD: "SET", "INC", "DEC" and "FUN" (as shown in the picture 1).

First, press the buttons of FUN and SET together at the same time and Picture 3 will be shown (PRT means Parameters).

Second, input the password of “5136” and press the button of SET to enter into the menu of parameter setting (see Picture 4), and then press the SET to select the parameter which should be modified. After modification, press FUN and SET together at the same time again to exit the display of parameter setting;



Picture 3

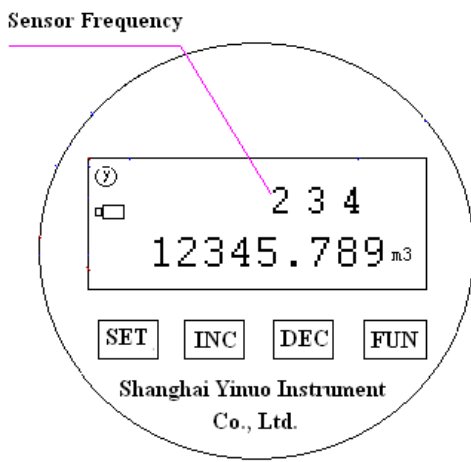


Picture 4

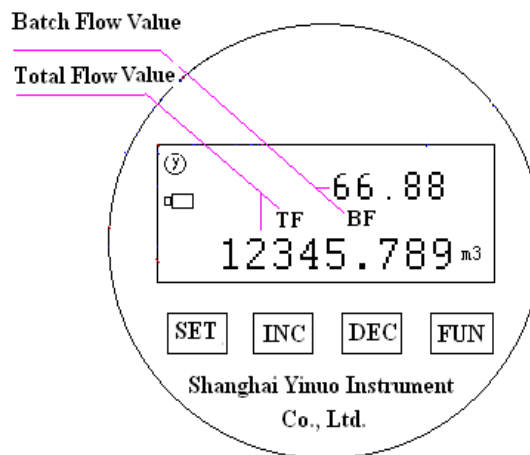
Among them, press the button of INC, the value marked by the cursor will increase one while press the button of DEC, the value marked by the cursor will decrease one. Press the buttons of FUN and INC together at the same time, the cursor will move one digit toward left side while press the buttons of FUN and DEC together at the same time, the cursor will move one digit toward right side;

Note: When picture 3 is showing, inputting “8057” and pressing the button of SET will restore factory default setting, while press INC and DEC at the same time, the tantalizer will be reset to zero.

Press the button of INC to inter-change the displays among Picture 4, Picture 5, Picture 6, Picture 7 and Picture 8.

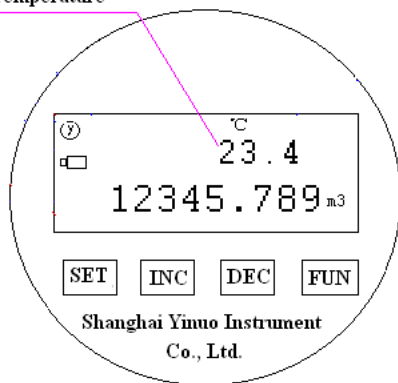


Picture 5



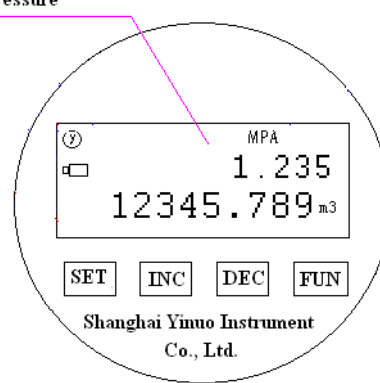
Picture 6

Temperature



Picture 7

Pressure



Picture 8

## b) Parameter setting:

K0: Pulse weight equivalent, which is reciprocal of Instrument Coefficient.

K1: density

K2: options for DN(Nominal Diameter)

0: DN25mm

1: DN40mm

2: DN50mm

3: DN80mm

4: DN100mm

5: DN125mm

6: DN150mm

7: DN200mm

8: DN250mm

9: DN300mm

K3: option for liquid or gas

0: liquid

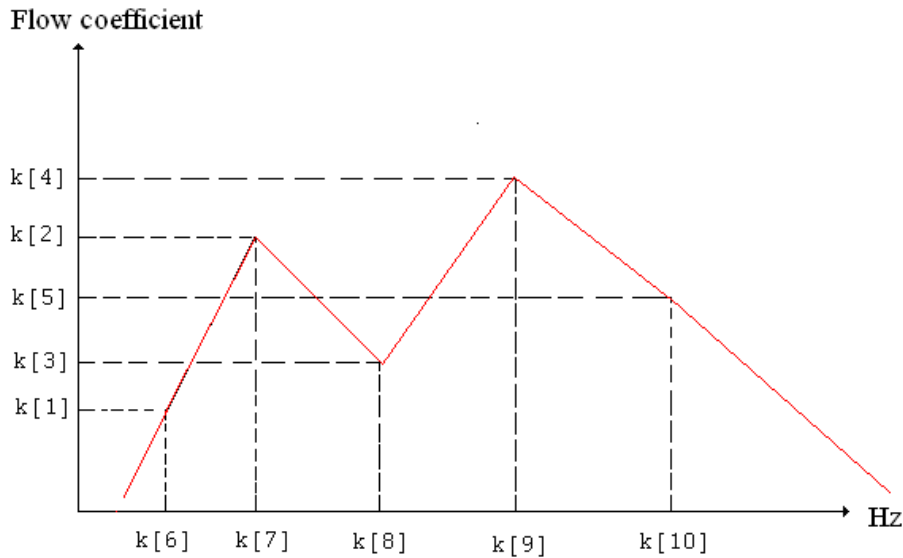
1: gas

K4: reservation

Output of pulse: V-h=24V and V-l=0V

**K[1] ~ K[5]: flow coefficient and K[6] ~ K[10]: flow signal section points.**

The correction curve is as bellow:



Calculation of flowrate section points coefficients, i.e.:  $K_x$  ( $x=[6\sim 10]$ ) :

$$K[x-5]_{new} = K[x-5]_{old} \times (\text{standard flow/ displayed flow})$$

**For example:** Suppose  $K[6]=100$  relevant coefficient  $K[1]=1223$

Displayed flow value of the Tested Meter is 1500L while actual flow value of Master Meter is 1523L, then the new coefficient:

$$K[1]_{new} = K[1]_{old} \times 1523L/1500L = 1242$$

**K[11]: linear correction coefficient**

Move the curve parallel under conditions of keeping the inner correction curve unchanged.

$$\text{Calculation: } K[11]_{new} = K[11]_{old} \times (\text{standard flow/ displayed flow})$$

For Example:  $K[11]_{old} = 1100$ , the displayed flow value in the course of the calibration is 1300L while the actual flow value is 1345L, then

$$K[11]_{new} = 1100 \times 1345/1300 = 1138.$$

**K[12]option of the instantaneous flowrate decimal:**

- $K[12]=0$  instantaneous flowrate without decimal;
- $K[12]=1$  instantaneous flowrate with one decimal;
- $K[12]=2$  instantaneous flowrate with two decimal;
- $K[12] \geq 3$  instantaneous flowrate with one decimal.

**K[13] option of temperature and pressure compensation:**

- $K[13]=0$  no pressure and temperature compensation;
- $K[13]=1$  pressure and temperature compensation;

K[13]>1 no pressure and temperature compensation.

***K[14] upper limitation of the pressure:***

Upper limitation of the pressure sensor's range

***K[15] pressure zero-amendment:***

Zero point amendment value of the pressure sensor

***K[16] maximum flowrate:***

The relevant instantaneous flowrate of 20mA under 4~20mA output

***K[17] upper limitation of the temperature:***

Upper limitation of the temperature sensor's range, which has been set before delivery

***K[18] temperature zero-reset:***

Zero point amendment value of the temperature sensor, which has been set before delivery

***K[19]communication address:***

RS232/R485 communication address range 0~255

***K[20]communication baud rate:***

K[20]=0 frequency=1200;

K[20]=1 frequency=2400;

K[20]=2 frequency=4800;

K[20]=3 frequency=9600;

K[20]>3 frequency=9600

***K[21] type of the flowmeter***

K[21]=0 for liquid;

K[21]=1 for gas;

K[21]≥2 for liquid

***K[22] diameter of the flowmeter:***

Input the flowmeter's nominal diameter directly with unit of mm

***K[23] flowmeter's unit:***

K[23]=0 Cubic meter(m<sup>3</sup>);

K[23]=1 Liter(L);

K[23]=2 Ton(T);

K[23]=3 Kilogram(Kg);



K[23]=4 US. Gallon(G);

K[23]≥4 Cubic meter(m3)

**K[24] frequency distribution coefficient:**

Reserved by factory

**K[25] option of pulse equivalent (L/P):**

K[25]=0 pulse equivalent=10;

K[25]=1 pulse equivalent=1;

K[25]=2 pulse equivalent=0.1;

K[25]=3 pulse equivalent=0.01;

K[25]=4 pulse equivalent=0.001

## MAINTENANCE AND TROUBLE SHOOTING

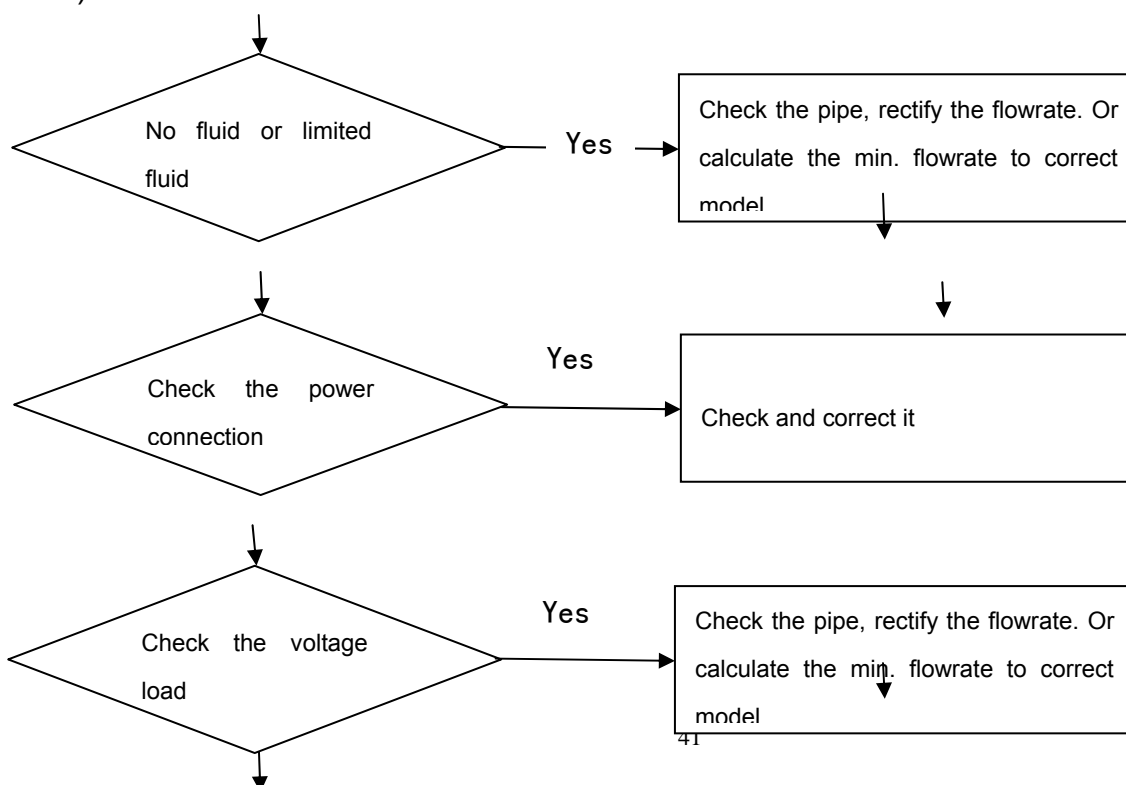
a) F4001 series Vortex flowmeter can only be used for measuring single-phase liquid, gas or steam. No additional work need to be done when measuring the liquid or fluid which contains very limited bubble or particles. When there is too much impurity, it must be cleaned.

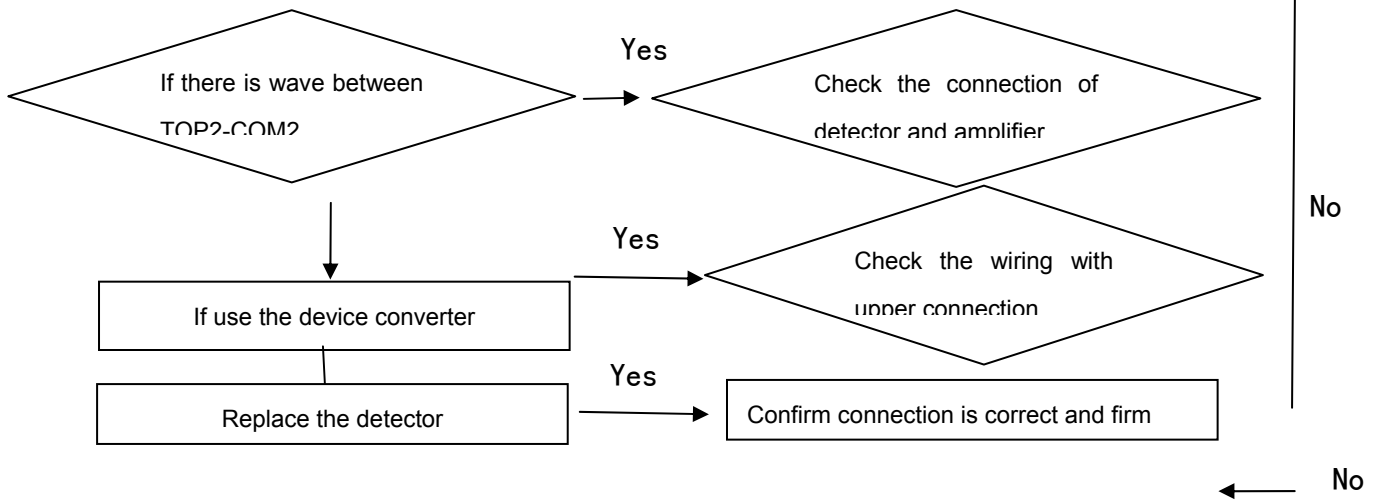
After maintenance the measuring part should be installed very carefully with some attention to the flow direction.

If short-circuit happens( $R \geq 20M\Omega$  under normal temperature) , the user should contact the manufacture to replace the new detector.

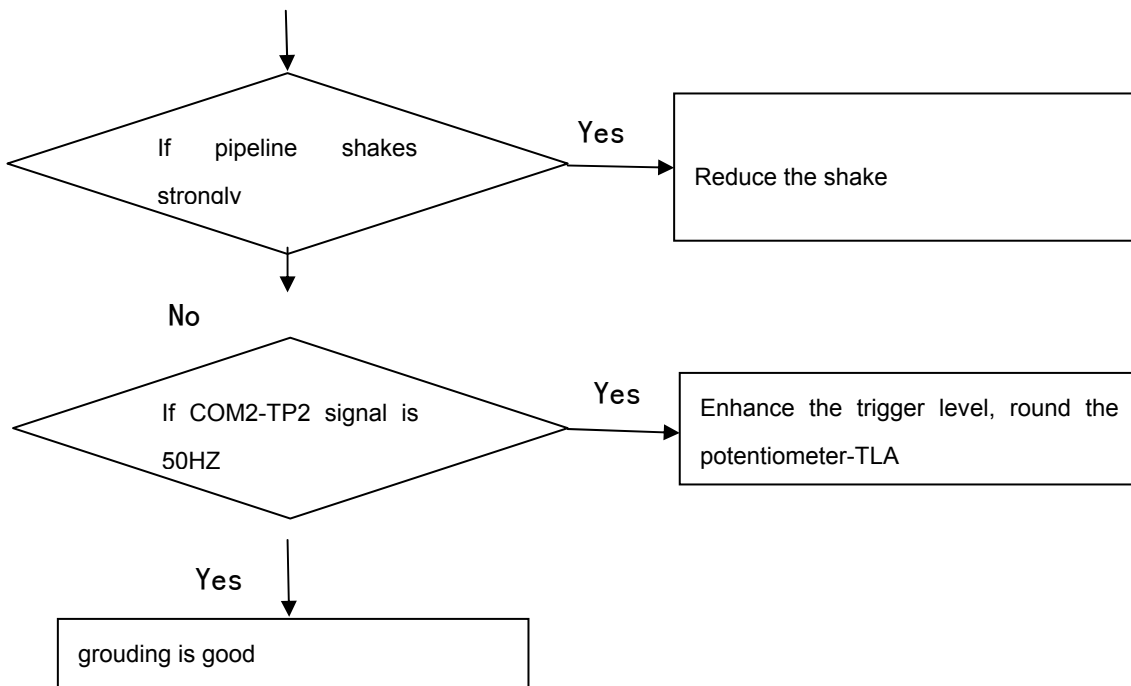
**b) Trouble shooting (Refer to Picture of Wiring Terminal)**

1) The flowmeter does not work

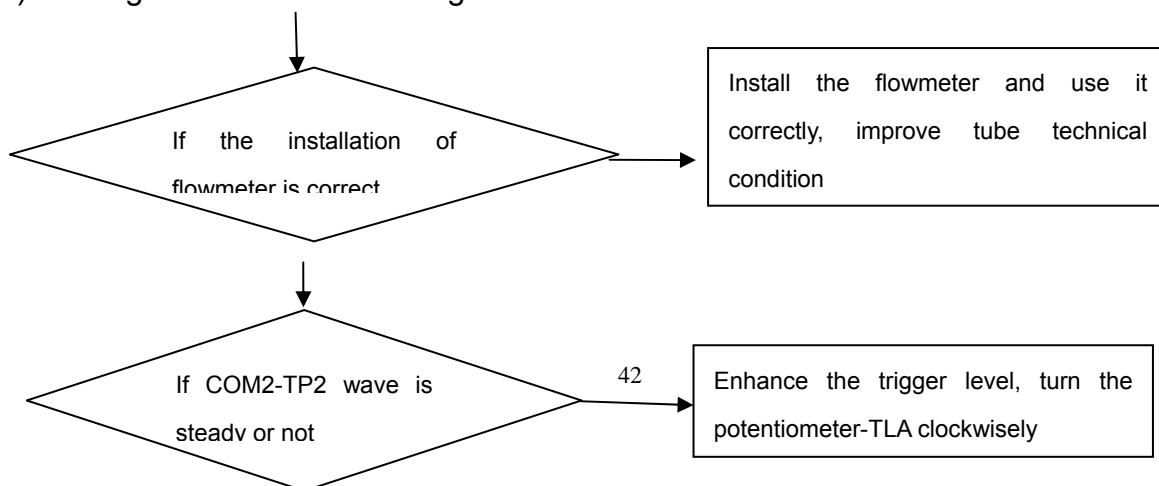


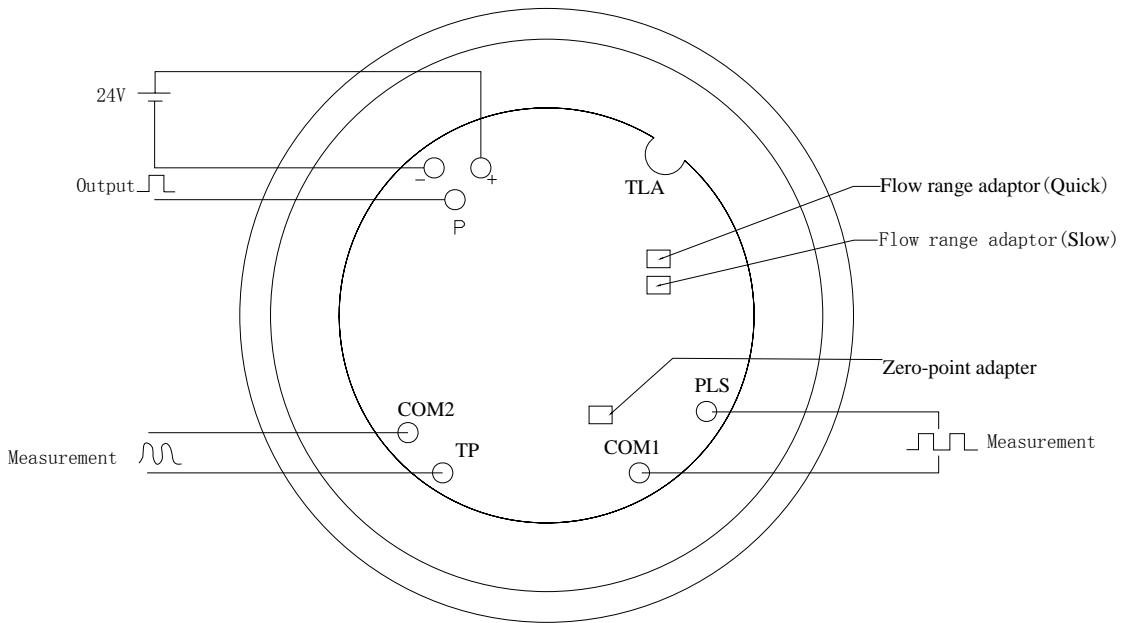


2) Pulse output happens when there is no fluid in the tube



3) The significant wave is too big





**Picture of Wiring Terminal**