# *Vortex Flow Meter Model:* HGVF

## Vortex Flow Meter

## Operation Manual

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# 1. GENERAL INFORMATION

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

***Warning***

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

1. Use only fluids that are compatible with the housing material and wetted components of your Vortex.
2. When handling hazardous liquids, always exercise appropriate safety precautions.
3. When measuring flammable liquids, observe precautions against fire or explosion.
4. When working in hazardous environments, always exercise appropriate safety precautions.
5. Handle the sensor carefully. Even small scratches or nicks can affect accuracy.
6. For best results, calibrate the meter at least 1 time per year.
7. Do not purge the flow meter with compressed air.
8. During Vortex removal, liquid may spill. Follow the manufacturer's safety precautions for clean up of minor spills

## 1.1 Application

vortex flow meter is a speed flow meter, widely used in petroleum, chemical, power, light industry, power, heating and other industries.

## 1.2 Operation Principle

LUGB series Vortex flow meters are designed for measuring the volume/mass flow of liquids, gases and steam based on Karman vortex principle.

Adopting advanced differential algorithm along with measurement of isolation, shielding and wave filtering, LUGB series vortex flow meters have the advantages of immunity on vibration and noise. Meanwhile, the liabilities of LUGB series vortex flow meters are well guaranteed by unique sensor packaging technology.

## 1.3 Product Structure

The basic structure of the vortex flow meter is shown in Diagram 1. It is mainly composed of body, probe, vortex generator, meter rod, condenser pipe and converter.





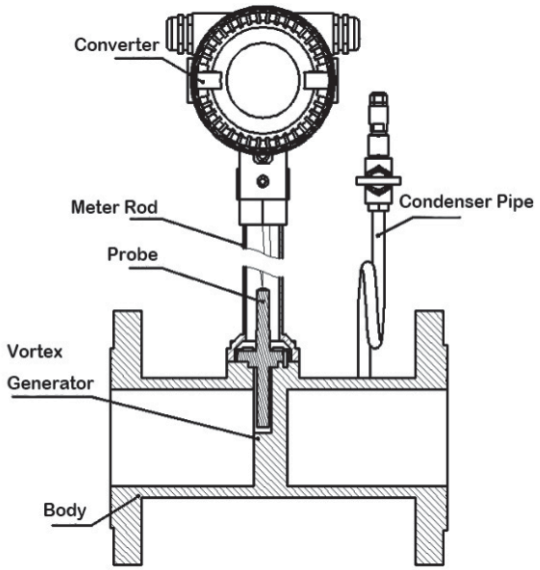



Diagram 1

# 2. TECHNICAL DATA

## Measuring System

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

## Measuring Accuracy

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

## Design

| Features | |
|---|---|
| Modular Construction | The measurement system consists of a flow sensor and a signal converter. It is available as compact and as separate version. |
| Converter Function | N Type: 24V DC; Pulse output; No display; Ex |
| | A Type: 24V DC; 4-20mA output; No display; Ex |
| | V Type: 24V DC; 4-20mA/Pulse output (V type is only for Gas/ Steam application); Digital display; Ex |
| | D Type: 24V DC; 3-wire 4-20mA/Pulse output; Temperature & Pressure Compensation; Digital display; Ex |
| | Notice: 1) Modbus RS485 is optional for C、V、D series<br>2) Dual power(24V DC+ Battery) is optional for C、V、D series |
| Connection | Flange: DN15-DN300 |
| | Wafer: DN15-DN300 |
| Measurement Ratio | Standard – 10:1 |

## Operating Condition

| Temperature | |
|---|---|
| Process Temperature | T1 Level: -20...+70°C |
| | T2 Level: -20...+250°C |
| | T3 Level: -20...+350°C |
| Ambient Temperature (all versions) | Standard (with aluminum converter housing) |
| | -10...+55°C |
| Storage Temperature | -20...+70°C |
| **Pressure** | |
| EN 1092-1 | DN200...DN300: PN10 |
| | DN100...DN200: PN 16 |
| | DN15...DN80: PN 25 |
| | Other pressures on request |
| ASME B16.5 | 1/2"..8": 150 lb RF |
| | Other pressures on request |
| JIS | 1/2"..8": 10 K ; 20 K; etc |
| | Other pressures on request |





## Installation Condition

| | |
|---|---|
| **Installation** | Make sure that flow sensor is always fully filled |
| | For detailed information see chapter "Cautions for Installation" |
| **Flow Direction** | Forward |
| | Arrow on flow sensor indicates flow direction. |
| **Inlet Run** | ≥ 10 DN |
| **Outlet Run** | ≥ 5 DN |

## Materials

| | |
|---|---|
| **Sensor Housing** | SS304 |
| | Other materials on request |
| **Flange** | Flange Connection: SS304 |
| | Wafer Connection Mating(Flange: Carbon Steel) |
| **Converter Housing** | Standard: polyurethane coated die-cast aluminum |

## Process Connection

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

## Measurable Flow Range

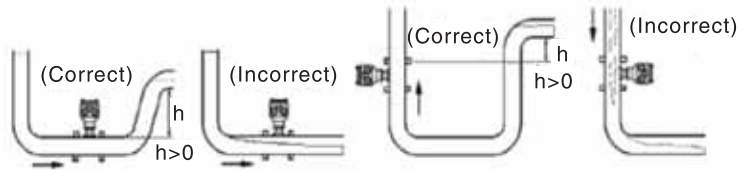
| Nominal Diameter | | Gas |
|---|---|---|
| (mm) | (In.) | Flow ($m^3/h$) |
| 15 | 1/2” | 5~30 |
| 20 | 3/4” | 5 ~50 |
| 25 | 1” | 7.5-75 |
| 40 | 1-1/2” | 12~180 |
| 50 | 2” | 17~260 |
| 65 | 2-1/2” | 25~380 |
| 80 | 3” | 40~600 |
| 100 | 4” | 60~900 |
| 125 | 5” | 100~1500 |
| 150 | 6” | 220~3300 |
| 200 | 8” | 450~6750 |
| 250 | 10” | 970~8000 |
| 300 | 12” | 1380-11000 |

*Note: The flow range above is for reference only. Consult the factory if you have special requirement. Refer to the nameplate or certificate for actual flow range.*

# 3.CAUTIONS FOR INSTALLATION

## 3.1 Mounting Position

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

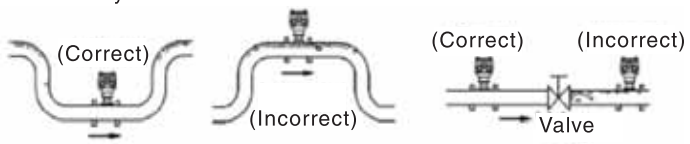



**Mounting Positions**





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




**Avoiding Air Bubbles**

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

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

★ Install the meter with enough room for future access for maintenance purposes

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

## 3.2 Required Length of Straight Runs

Flow altering device such as elbows, valves and reducers can affect accuracy. check diagram 2 for typical flow meter system installation

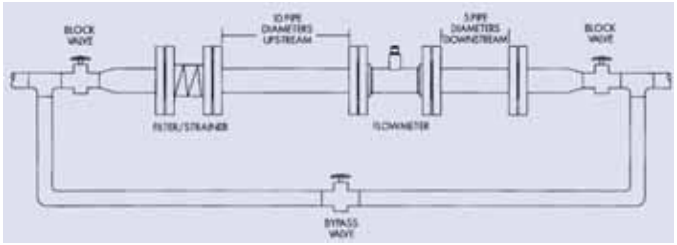
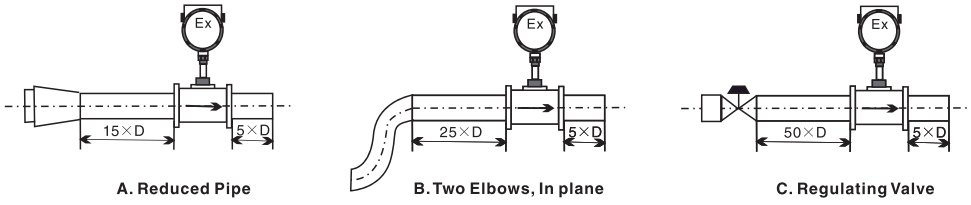



Diagram 2 General Flow Meter System Installation



The recommended guidelines are given to enhance accuracy and maximize performance. Distance given here are minimum requirements; Double them for desired straight pipe lengths.

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

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

## 3.3 Anti-Cavitation

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

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

In formula 1: (Pb: Back pressure; Pv: Vapor Pressure; Pin: Inlet Pressure; Pout: Outlet Pressure)

Create backpressure by installing a control valve on the downstream side of the meter at the proper distance detailed above.

*Special Notice*

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

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

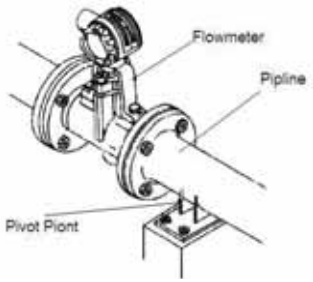


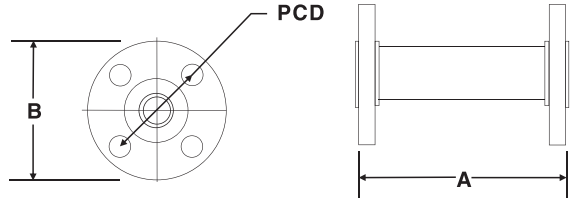


## 3.4 CONNECTIONS

### 3.4.1 Flange Connection

| | |
|---|---|
| **Installation** | Make sure that flow sensor is always fully filled |
| | For detailed information see chapter "Cautions for Installation" |
| **Flow direction** | Forward |
| | Arrow on flow sensor indicates flow direction. |
| **Inlet run** | ≥10DN |
| **Outlet run** | ≥5DN |



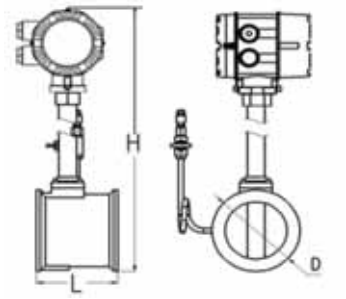




| DIN PN16 Flange Meter Dimensions | | | | | | | |
|---|---|---|---|---|---|---|---|
| Size Code | | A | DIN Flange Pressure Rating | Flange Diameter (B) | Bolt Hole Diameter | Bolt Circle Diameter (PCD) | Bolt Hole Quantity |
| (Inch) | (mm) | (mm) | Mpa | (mm) | (mm) | (mm) | |
| 1/2" | 15 | 180 | 1.6 | 95 | 14 | 65 | 4 |
| 3/4" | 20 | 180 | 1.6 | 105 | 14 | 75 | 4 |
| 1" | 25 | 180 | 1.6 | 115 | 14 | 85 | 4 |
| 1-1/4" | 32 | 180 | 1.6 | 140 | 18 | 100 | 4 |
| 1-1/2" | 40 | 180 | 1.6 | 150 | 18 | 110 | 4 |
| 2" | 50 | 180 | 1.6 | 165 | 18 | 125 | 4 |
| 2-1/2" | 65 | 200 | 1.6 | 185 | 18 | 145 | 4 |
| 3" | 80 | 200 | 1.6 | 200 | 18 | 160 | 8 |
| 4" | 100 | 200 | 1.6 | 220 | 18 | 180 | 8 |
| 5" | 125 | 220 | 1.6 | 250 | 18 | 210 | 8 |
| 6" | 150 | 220 | 1.6 | 285 | 22 | 240 | 8 |
| 8" | 200 | 220 | 1.6 | 340 | 22 | 295 | 12 |
| 10" | 250 | 250 | 1.6 | 405 | 26 | 355 | 12 |
| 12" | 300 | 300 | 1.6 | 460 | 26 | 410 | 12 |

*Note: For model with temperature and pressure compensation, the flowmeter length should be increased 50mm compared to the value (A) in table above.*

### 3.4.2 Wafer Connection

| | |
|---|---|
| **Installation** | Make sure that flow sensor is always fully filled |
| | For detailed information see chapter "Cautions for Installation" |
| **Flow direction** | Forward |
| | Arrow on flow sensor indicates flow direction |
| **Inlet run** | ≥10DN |
| **Outlet run** | ≥5DN |




| Diameter mm | L mm | L0 mm | D mm | H mm | Pipe Specification |
|---|---|---|---|---|---|
| 15 | 66 | 94 | 66 | 425 | φ18*1.5 |
| 20 | 66 | 94 | 66 | 425 | φ25*2.5 |
| 25 | 66 | 94 | 66 | 425 | φ32*3.5 |
| 32 | 66 | 94 | 66 | 425 | φ39*3.5 |
| 40 | 80 | 112 | 77 | 425 | φ49*4.5 |
| 50 | 80 | 120 | 89 | 435 | φ59*4.5 |
| 65 | 93 | 137 | 102 | 445 | φ74*4.5 |
| 80 | 100 | 144 | 113 | 460 | φ89*4.5 |
| 100 | 125 | 173 | 135 | 485 | φ109*4.5 |
| 125 | 145 | 197 | 158 | 515 | φ134*4.5 |
| 150 | 165 | 217 | 181 | 545 | φ159*4.5 |
| 200 | 196 | 252 | 248 | 600 | φ219*11 |
| 250 | 120 | 166 | 300 | 650 | φ273*11 |
| 300 | 135 | 185 | 350 | 700 | φ325*12 |

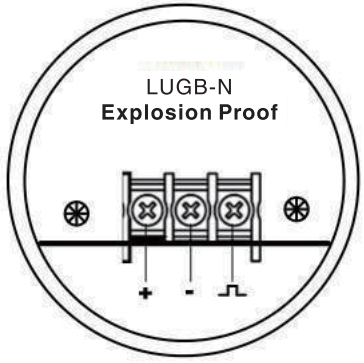




## 4. ELECTRICAL WIRING

***Warning: Electrical Hazard Disconnect power before beginning wiring.***

### 4.1 HGVF-N : Pulse Output, Explosion Proof Model

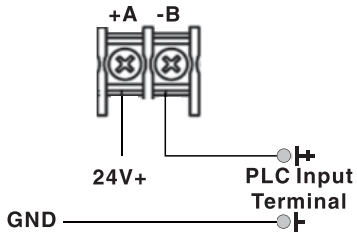



Terminal Configuration

| Terminal Symbols | Description |
|---|---|
| + | Power Supply: "24V+" |
| - | GND |
| ⎍ | Pulse Output |

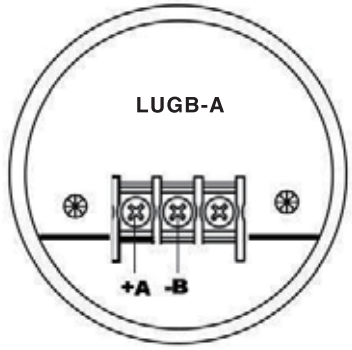
Terminal Wiring

### 4.2 HGVF-A: Two-wire 4-20mA Output, No Local Display




| Terminal Symbols | Description |
|---|---|
| +A | Power Supply: "24V+" |
| -B | Current Output |

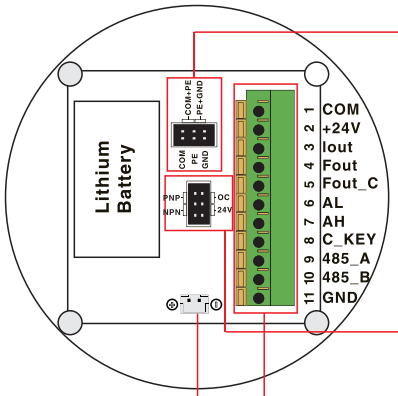
Terminal Wiring




Terminal Configuration

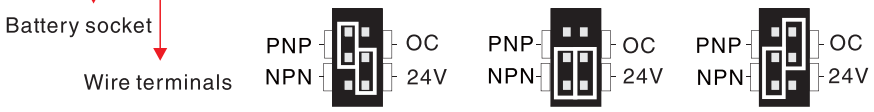
## 4.3 HGVF-V: Local Display

### 4.3.1 Terminal Board of V Type



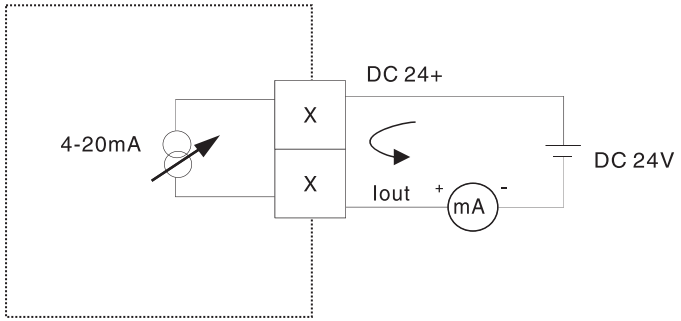

If the signal is interfered at working site, please try to short the terminals as following drawing(a). After "a" step, if the situation is not improved, please short the terminals as drawing(b)


The PNP, NPN and OC output could be chosen by shorten the followingterminals.




### 4.3.2 Wiring Description

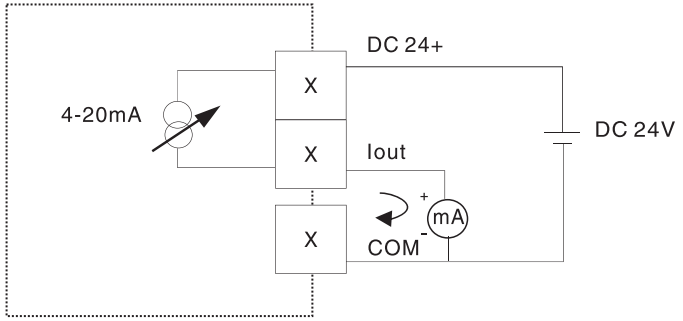
**(1) 2 wire 4-20mA output**



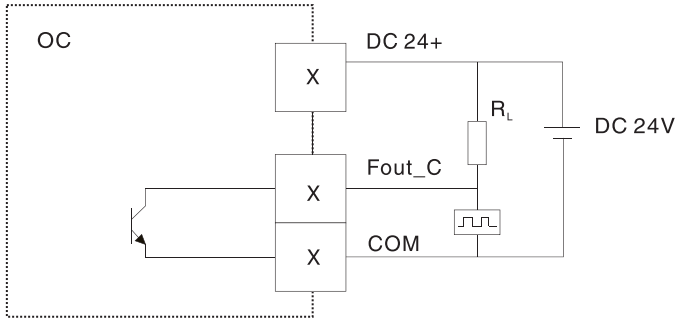


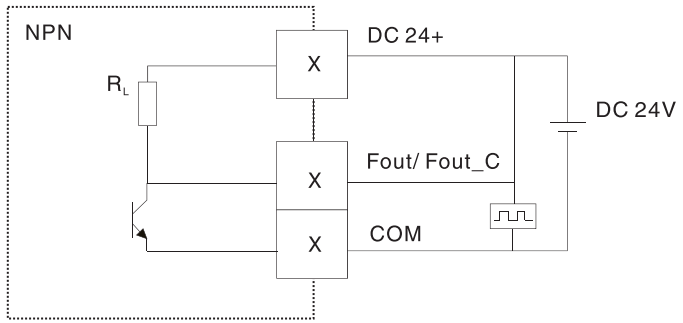


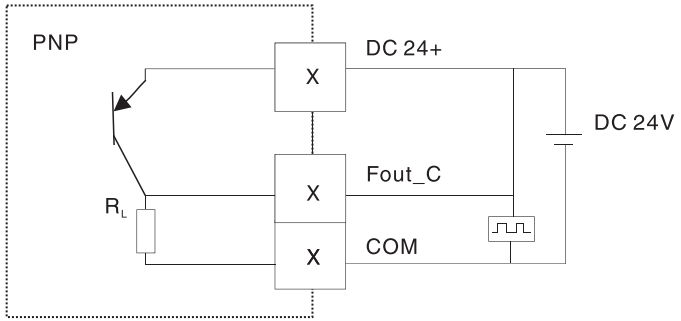

**(2) 3 wire 4-20mA output**



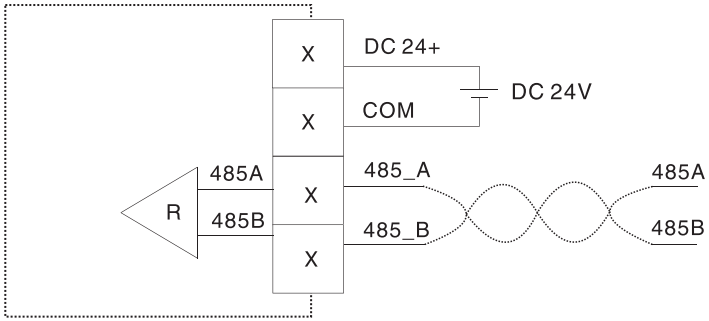

**(3) Pulse Output/ Scaled Pulse Output**






**(4) RS485 Communication**

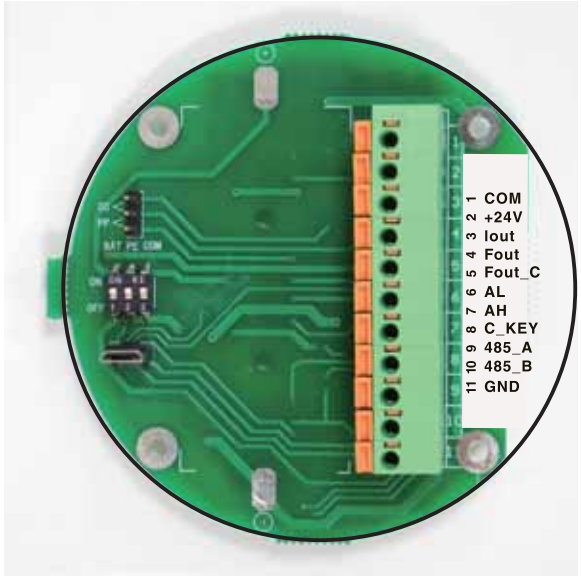







## 4.4 HGVF-D : Local Display

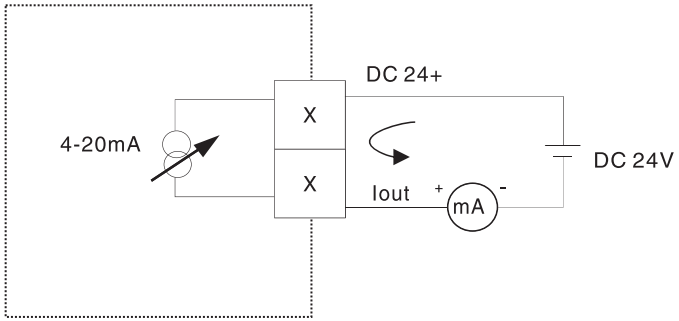
### 4.4.1 3 Wire Terminal Description




| Terminal No. | Terminal Symbols | Terminal Description | Note |
|---|---|---|---|
| 1 | COM | 24V DC - | |
| 2 | DC24+ | 24V DC+ | |
| 3 | Iout | 4-20mA Current Output | |
| 4 | FOUT | Pulse output | ONLY FOR CALIBRATION |
| 5 | FOUT_C | Frequency or scaled pulse output | |
| 6 | AL | Alarm for low level | |
| 7 | AH | Alarm for high level | |
| 8 | C_KEY | Connect to external reset button terminals | Pressing the external button for over 5 second. |
| 9 | 458_A | RS485A | |
| 10 | 485_B | RS485B | |
| 11 | GND | Grounding terminal for the external reset | Use with C_KEY terminal |

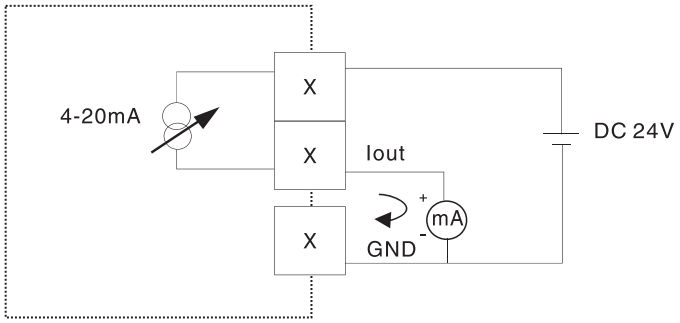
### 4.4.2 3 Wiring Output

**(1) 2 wire 4-20mA output**




2 wire 4-20mA current output wiring diagram

**(2) 3 wire 4-20mA current output wiring instructions**

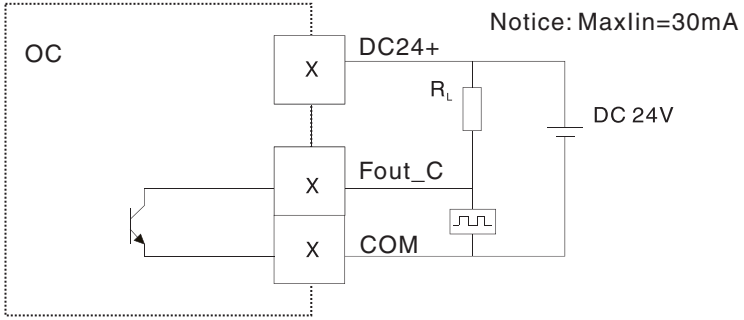



3 wire 4-20mA current output wiring diagram

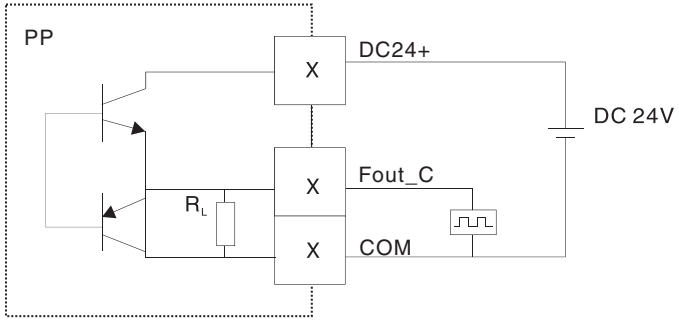




**(3) Pulse output wiring instructions**

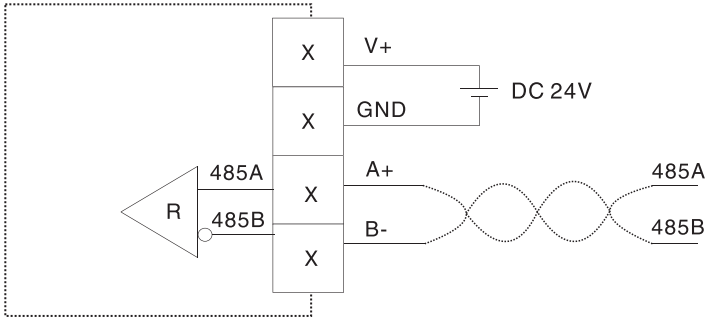



OC Pulse output wiring diagram




PP Pulse output wiring diagram

**(3) RS485 communication wiring instruction**



**Notice:**

1. The requirement for the pulse output as following:
2. High level amplitude ＞22V; Low level amplitude＜0. 8V; Pulse frequency＜3000Hz
3. The load resistor＜500Ω
4. The protocol is MODBUS-RTU

Pulse output:


Push-pull output


OC output

## 5. PROGRAMMING AND SETUP

***All flowmeters are tested and calibrated prior before left the factory, and the key K-factor is provided on the calibration certificate. Keep the calibration certificate well to avoid the loss of K-factor.***

### 5.1 HGVF-N : No display; Pulse output

Customer should set the correct K-factor into PLC or flow totalizer in order to get the correct flow rate.

### 5.2 HGVF-A : No display; 4-20mA output

Only perform the Zero Point Calibration where it's necessary.

#### 5.2.1 Zero Point Calibration

(1) Shut off the value where the flowmeter is installed, ensure there is no flow rate in pipe.

(2) Put high accuracy amperometer into the circuit loop as series connection.

(3) Adjust the potentiometer W502 to make sure the display on amperometer is 4mA.

**5.2.2 Full Scale Calibration:** It's ONLY available for factory; Return the flowmeter to factory for full scale calibration where is applicable.



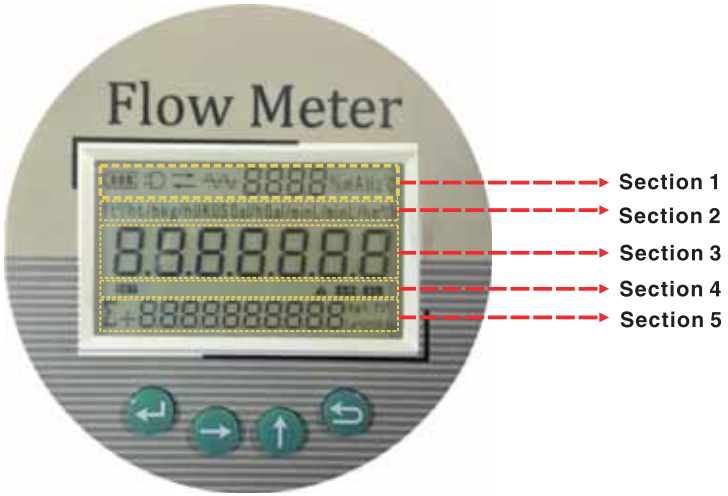


### 5.3 HGVF-V : Local Display; 4~20mA/ Pulse Output

*Note: all menus are present in all signal converter versions, but some parameter settings are ONLY valid for specified models.*

#### 5.3.1 Display and Key Button

**Five Sections on Display Screen**




**Section 1:** Functional region which consists of battery situation, communication, current, frequency, flow percentage (Temperature could be available on request)

**Section 2:** Units section which consists of 10 units: $m^3/h$, L/h, L/min, US Gal/min, UK Gal/min, US Gal/h, UK Gal/h, kg/h, t/h, $ft^3/h$

**Section 3:** Flow rate (7 digital figure upper line)

**Section 4:** Alarm sign which consists of SET prompt and alarm prompt

**Section 5:** Total flow (11 digital figure lower line) with two decimal places

## Buttons

Interface buttons (four keys)

| Buttons | | |
|---|---|---|
| Interface Buttons |  | Turn page/Confirm |
| |  | Move cursor |
| |  | Increase number/ Turn page |
| |  | Exit |

## Operation

| Menu | ↵ | → | ↑ | ↩ |
|---|---|---|---|---|
| Main menu | Go to sub-menu | × | × | × |
| Sub-menu | Go to password menu | × | × | Back to main menu |
| Password Menu | a. False or No password will go to the next menu<br>b. Correct password: The parameter is settable. | Move cursor | Set parameter | Back to main menu |
| Settable Menu | Set/Save | Move cursor | a. Settable status: increase number or choose number;<br>b. Un-settable status:Turn to previous menu. | Cancel the setting and back to main menu |
| Un-settable Menu | Turn to next menu | × | Turn to previous menu | Back to main menu |





### 5.3.2 Parameter Set

#### Password

| Type | Passwords | Note |
|---|---|---|
| User password | 1234 | It will display "1234" |
| Engineer password | 1010 | It will display "1010" |
| Total flow reset | 5555 | It will display "5555" |
| Storage factory defaulted | 5678 | It will display "5678" |
| Reload factory defaults | 1111 | It will display "1111" |
| Total flow set | 9999 | It will display "9999" |
| Fixed current output | 0101 | It will display "0101" |

***Note: It will display "0000" before input password. If the password is incorrect, it will go to P1 menu automatically under un-settable status.***

| Password | code | Function | Parameter | Note |
|---|---|---|---|---|
| 0000 | Main menu | Normal display | Display working condition, flow rate, total flow | |
| | Sub-menu | Frequency display | The second line is original frequency | |
| | | | The third line is corrected frequency/signal intensity | Up key can be used to switch |
| | Password | Password input | 4 digital figure | |

| Password | Code | Function | Parameter | | Note |
|---|---|---|---|---|---|
| 1234 | P1 | Unit | 0- m³/h | 5- US Gal/h | Other parameters setting, the variables associated with units will be related automatically, according to the units of P1 to calculate, such as total flow, flow rate, scaled pulse and so on. |
| | | | 1- L/h | 6- UK Gal/h | |
| | | | 2- L/min | 7- kg/h | |
| | | | 3- US Gal/min | 8- t/h | |
| | | | 4- UK Gal/min | 9- ft³/h | |
| | P2 | Damping Time | 01-99s | | To slow flow changes and prevent jump |
| | P3 | Maximum Flow Rate | Maximum Flow settings, the unit corresponds to the flow. | | Exceed the maximum flow, showing the imum flow |
| | P4 | Minimum Flow Rate | Minimum flow settings, the unit corresponds to the flow. | | When the flow rate is lower than minimum flow rate, the flow rate will show “0” |
| | P5 | Max Frequency Output | The upper limit setting of measuring frequency | | When it exceeds the upper limit, it will display max value |
| | P6 | Relative Density | Absolute density of medium, Unit: kg/m3 | | Use quality units It will be used in the calculation |
| | P7 | Frequency Output Mode | 0- Shut down and keep low level | | This parameter just aims at Fout_c port operation, Fout is not restricted by this menu |
| | | | 1- Negative pulse correction frequency | | |
| | | | 2- Positive pulse correction frequency | | |
| | | | 3- Negative scaled pulse | | |
| | | | 4- Positive scaled pulse | | |
| | P8 | Scaled-pulse Output | 0.001, 0.01, 0.1, 1, 10, 100, 1000 | | Unit is in accord with P1 menu |
| | P9 | Pulse Width | 1 ~ 2000 ms | | The width setting of scaled pulse |
| | P10 | Communication | 0: RS485 1: Hart | | 1: It’s available to current output with HART version |





| Password | Code | Function | Parameter | | | Note |
|---|---|---|---|---|---|---|
| 1234 | P11 | Communication Parameter | RS485 | Address | 0-255 | |
| | | | | Baud Rate | 1200, 2400, 4800, 9600, 19200 | |
| | | | | Verification | N, O, E | No verify、Odd fy、Even verify |
| | | | | Data Length | 7, 8 | |
| | | | | Stop Bits Length | 1, 2 | |
| | | | HART | Address | 0-255 | |
| | P12 | High Limit Alarm | Switch Settings | | Yes | On |
| | | | | | no | Close |
| | | | Alarm Level | | HIGH | High Level |
| | | | | | LOW | Low Level |
| | | | Alarm Value | | 0-100% | Alarm Value |
| | P13 | Low Limit Alarm | Switch Settings | | Yes | On |
| | | | | | no | Close |
| | | | Alarm Level | | HIGH | High Level |
| | | | | | LOW | Low Level |
| | | | Alarm Value | | 0-100% | Alarm Value setting, corresponding to flow rate |
| | P14 | Backlight | Working Mode | | 0- Off mode | 2：2-wire power supply shuts down; 3-wire power supply normally opens; battery powered button turns off the delay. Long press Esc key to switch 0 mode and 1 mode, searching network. |
| | | | | | 1- Automatic mode | |
| | | | | | 2- On mode | |
| | | | Brightness Setting | | 0-30% | |
| | | | | | 1-70% | |
| | | | | | 2-100% | |

| Password | Code | Function | Parameter | Note |
|---|---|---|---|---|
| 9999 | P15 | Total Flow | Modifying total flow value | |
| 1010 | P16 ~ P23 | Linearization of the Flowcurve | The first line is corrected frequency，the second line is coefficient error P16-P23<br>F1~F8：eight coefficient modification<br>Wn=Kn / KP（n：1~8）3 | F1 must be started，and F2-F8 are started in proper order. If the factor is 0, this point and following corrected points should be stopped. |
| | P24 | Correct Coefficient | The first line shows the corrected frequency;the second line shows the meter coefficient, and the unit of coefficient is pulse/m³ | It could be any of the coefficient (Kn) from F1~F8 or Max one or Average. |
| | P25 | Diameter | Selecting the diameter of body and sensor | Unit：mm |
| | P26 | Medium | 0- Gas<br>1- Liquid | the type selection of measured fluid |
| | P27 | Min Vibration Strength | The collection value in second line in the process of learning can be manually changed. | P27-P30 Self learning antivibration ： Continue to press the up button 5 seconds,and the countdown is completed in 60 seconds.<br>Notice: this operation is prohibited when there is flow rate. |
| | P28 | Max Vibration Strength | The third line shows the strength of the current signal. | |
| | P29 | Min Vibration Frequency | The collection value in second line in the process of learning can be manually changed. | |
| | P30 | Max Vibration Frequency | The third line shows the frequency of the current signal. | |
| | P31 | Min Working Frequency | Lowest acceptable signal frequency<br>The third line shows the current signal frequency. | Meter working area setting Instruction: in the pipeline of having slight vibration, it can significantly enhance the capacity of resisting disturbance through the three screen parameter settings and strict limit of effective range. |
| | P32 | Max Working Frequency | Highest acceptable signal frequency<br>The third line shows the current signal frequency. | |
| | P33 | Min Signal Intensity | Lowest acceptable signal frequency<br>The third line shows the current signal intensity. | |
| 0101 | P34 | Fixed Current Output | Input Range：0-99<br>Effective Value：4-20<br>Unit：mA | The utility model is suitable for the current loop test, the system adjustment and the instrument calibration. |





| Password | Code | Function | Parameter | Note |
|---|---|---|---|---|
| 5555 | | Total flow reset | | |
| 5678 | | Storage factory defaulted | Save factory defaults | Backup current settings |
| 1111 | | Reload factory defaults | Reload factory defaults | Restore factory parameters from backup area |

## 5.4 HGVF-D with Temperature and Pressure Compensation

### 5.4.1 The Basic Structure of Converter

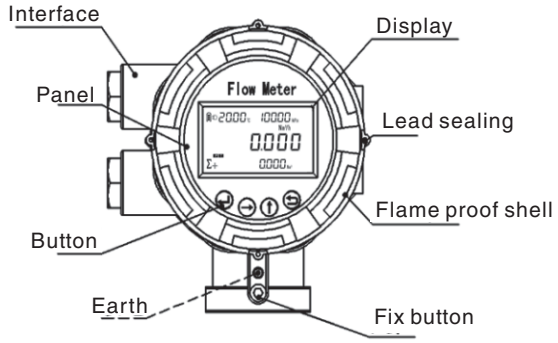



Diagram 6-1 The basic structure of converter

### 5.4.2 Button Description

| Buttons | | |
|---|---|---|
| Interface Buttons |  | Turn page/Confirm |
| |  | Move cursor |
| |  | Increase number/ Turn page |
| |  | Exit |

External button
1. Press short time
The first short time press will display the communication parameters and the software version number
2. Press long time
When external clear function set to “0", it will shut down the clear function.
When external clear function set to “1", the first time long press( over 3s), the value will reset. If long press again after the first long press menu, the total go to zero, and return to the main menu; if no operation for 100s, it will return to main menu automatically.
When external clear function set to “2", the total flow will be reset after press 3 second

**Measuring Mode Description**


**Function display area**

| Symbols | Introductions |
|---|---|
| | Battery status |
| | 24VDC external power |
| 20.00℃ | Temperature , 4 digits , containing up to two decimal , ℃ as default |
| 100.00 kPa | Pressure value ,5 digits,containg up to two decimal places, kPa as default |

**Unit display**

There are 14 units available, namely as m³/h, m³/min, L/h, L/min, t/h, t/min, kg/h, kg/min, US Gal/h , US Gal/min, UK Gal/h , UK Gal/min, ft³/h, ft³/min

The third line is flow rate, and the middle raw could have seven digits with three decimal places at most , when the flow rate are big ,it exchange to the decimal display digits automatically





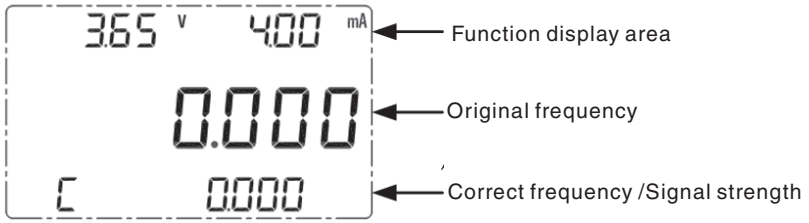
The fourth line is communication sign, warning sign, Temperature, Pressure compensation setting sign etc.

| Sign | Introductions |
|---|---|
| AH | Upper alarm for the flow rate |
| AL | Lower alarm for the flow rate |
| | Rs485 communication symbol<br>← is send display ,<br>→ is receive display |
| | HART communication symbol |
| P T | Temperature and Pressure compensating display symbol |

**Total Flow**

The fifth line is total flow symbol. The total flow can double direction display, the total flow are 10 digits display, decimal fixed three digits display, bottom right is operations of total flow unit, against the flow rate. This line are bum steady.

**Auxiliary interface description**



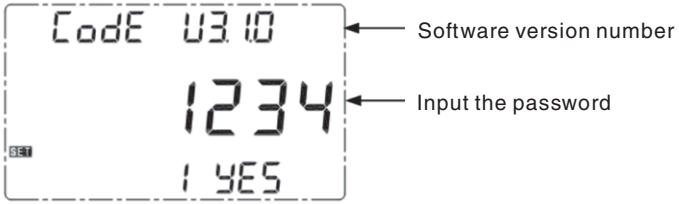

At the measuring menu, press ↵ go to the auxiliary interface for checking

| Symbol | Introductions |
|---|---|
| 3.65 V | **There is battery supply , show the battery voltage** |
| 000 mA<br>000% | **There is output current, show the output current value or flow percentage** |

The second line is original frequency , show the transmitter output frequency value .

The third line is fixed frequency or signal strength , fixed frequency is frequency value after the multi-point K value fold line corrected.

**Password interface introductions**




Password interface diagram

Under auxiliary interface condition, press ↵ go to the password interface and input password,

| DV type flow transmitter password setting form | | |
|---|---|---|
| Input password | Password function | After input password the screen statue |
| 1234 | User menu | The screen show the password is correct |
| | P1-P14 parameters | Press Enter again go to the parameters setting |
| 1010 | Engineer menu | The screen show the password is correct , |
| | P16-p41 parameters | Press “ Enter” again enter the parameters setting |
| 5555 | Total flow clear zero | The screen show the password is correct, |
| | | Press “Enter” enter clear zero screen and Press “Enter” again return to measuring menu |
| 6666 | The special function screen (According to the site usage , upgrade in late period ) | The screen show the password is correct |
| | | Press “Enter” enter clear zero screen |
| | | Press “ Enter” again return to measuring interface |
| 5678 | Save parameters as factory reset | The screen show the password is correct |
| | | Press “Enter” enter clear zero screen |
| | | Press “ Enter” again return to measuring interface |
| 1111 | Restore parameters are factory reset. | The screen show the password is correct |
| | | Press “Enter” enter clear zero screen |
| | | Press “ Enter” again return to measuring interface |
| 9999 | Total flow setting | The screen show the password is correct |
| | P17 menu | Enter the parameters setting after press “Enter” |
| 0101 | The special debugging function screen | The screen show the password is correct |
| | P42 menu | Enter the parameters setting after press “Enter” |

Introductions: When the password is wrong, you can check P1-P41 screen parameters, but cannot set the parameters.

**User menu parameters introductions**

| Flow transmitter password setting form | | |
|---|---|---|
| **Functions code** | **Parameters meaning** | **Description** |
| | Main screen | The main screen is displayed in five lines.<br>1. The first line is displayed power symbol,temperature and pressure<br><br>2. The battery provide the power, the battery symbol is displayed , when there is external supply , the external supply is displayed ; The battery power prompt follow as below: |

| The battery voltage | The battery symbol display |
|---|---|
| ≧3.4V | |
| 3.4V＞U≧3.2V | |
| 3.2V＞U≧3V | |
| U＜3V | PS: When the battery are empty ,please exchange another battery immediately |

3.Temperature is 4 digits, at most two decimal , default unit is ℃

**Flow transmitter password setting form**

| Functions code | Parameters meaning | Description |
|---|---|---|
| | Main screen | |

| Temperature setting | The temperature symbol |
|---|---|
| Temperature abnormity | —— |
| Under working condition | Temperature hidden |
| Under Temperature compensation algorithm | Value display and the fouth line display SET T |

4. Pressure is 5 digits with two decimal at most. The default unit is Kpa, and the display introductions as following

| Pressure setting | The pressure symbol display |
|---|---|
| Temperature abnormity situation | —— |
| Under working condition algorithm | The pressure hidden or showing percentage of flow or current value |
| Under presssure compensation algorithm | Value display and the fouth line display SET T |

The second line display flow rate unit
The third line display flow rate value , 7-digit display of valid digits ,At most three decimal, the flow value are big, it is exchange decimal display automatically





**Flow transmitter password setting form**

| Functions code | Parameters meaning | Description |
|---|---|---|
| | Main screen | |

| Fault | Flow rate symbol display |
|---|---|
| When the algroithm conflicts with the unit | Err0 |
| For example: select the working condition, select t/h as unit | Err0 |
| Temperature failure | Err1 |
| Pressure failure | Err2 |
| Flow exceeds the flow rate range | Err3 |

The fourth line can display flow unit , Communication symbol , Alarm symbol , when the pressure or temperature compensating ,display T or P, when one is setting compensation,display “SET”

| Algorithm select | Compensation method | Symbol display | Flow unit |
|---|---|---|---|
| Working condition volume flow | Setting compensation | SET P T | Volume unit |
| Mass flow under working | Setting compensation | does not display | Mass unit |
| Volume flow under standard condition | Setting compensation | SET P T all display | unit Volume |
| | Automatically compensation | P T both display | |
| Mass flow under standard condition | Setting compensation | SET P T all display | Mass unit |
| | Automatically compensation | P T both display | |

<table>
<tr><th colspan="3">Flow transmitter password setting form</th></tr>
<tr><th>Functions code</th><th>Parameters meaning</th><th>Description</th></tr>
<tr><td></td><td>Main screen</td><td>
<table>
<tr><td>Algorithm select</td><td>Compensation method</td><td>Symbol display</td><td>Flow unit</td></tr>
<tr><td rowspan="2">Saturated steam with temp. compensation</td><td>Setting compensation</td><td>SET T both display</td><td rowspan="2">Mass unit</td></tr>
<tr><td>Automatically compensation</td><td>T display</td></tr>
<tr><td rowspan="2">Saturated steam with pressure compensation</td><td>Setting compensation</td><td>SET P both display</td><td rowspan="2">Mass unit</td></tr>
<tr><td>Automatically compensation</td><td>P display</td></tr>
<tr><td rowspan="2">Super heat steam temper. and press. compensation</td><td>Setting compensation</td><td>SET P T all display</td><td rowspan="2">Mass unit</td></tr>
<tr><td>Automatically compensation</td><td>P T both display</td></tr>
</table>
The fifth line is displayed total flow, 10-digits valid digit display ,display up to three decimal places ,Automatically switch decimal display digits when the flow rate is large</td></tr>
<tr><td></td><td>Sub-menu</td><td>Divided into three lines<br>he first line is displayed the battery voltage , flow percentage or current value<br>The second line is displayed the original frequency value<br>The third line is displayed fixed frequency or signal strength db,Switched by “RIGHT”</td></tr>
<tr><td></td><td>Password</td><td>Divided into two lines<br>The first line is displayed on the left “Code” , displayed on the right software version number “V1.0.0”;<br>The second line is four-digit password, with initial display 0000</td></tr>
</table>





| Flow transmitter password setting form | | |
|---|---|---|
| Functions code | Parameters meaning | Description |
| P1 | Unit | The first line select unit, there is unit is displayed<br>**0: Setting flow rate unit is $m^3/h$, Total flow unit is $m^3$**<br>**1:** Setting flow rate unit is **$m^3/min$**, Total flow unit is **$m^3$**<br>**2: Setting flow rate unit is L/h, Total flow unit is L**<br>**3:Setting flow rate unit is L/min, Total flow unit is L**<br>**4:** Setting flow rate unit is **t/h**, Total flow unit is **t**<br>**5:** Setting flow rate unit is **t/min**, Total flow unit is **t**<br>**6:** Setting flow rate unit is **kg/h**, Total flow unit is **kg**<br>**7:** Setting flow rate unit is **kg/min**, Total flow unit is **kg**<br>**8:** Setting flow rate unit is **US Gal/h**, Total flow unit is **US Gal**<br>**9:** Setting flow rate unit is **US Gal/min**, Total flow unit is **US Gal**<br>**10:** Setting flow rate unit is **UK Gal/h**, Total flow unit is **UK Gal**<br>**11:** Setting flow rate unit is **UK Gal/min**, Total flow unit is **UK Gal**<br>**12:** Setting flow rate unit is **$ft^3/h$**, Total flow unit is **$ft^3$**<br>**13:** Setting flow rate unit is **$ft^3/min$**, Total flow unit is **$ft^3$**<br><br>The second line setting flow algorithm ,The instrument calculates the instantaneous flow rate of the working condition according to the algorithm.<br>0: working condition flow (Regardless of working condition of gas and liquid flow )<br>**1:** Working condition quality flow (Working condition density must be set )<br>**2:** Standard condition gas volume flow<br>**3:** Standard condition gas quality flow<br>**4:** Saturated steam PT compensation<br>**5:** Saturated steam Pressure compensation<br>**6:** Super heated steam PT compensation<br><br>Introduction: When the unit and algorithm doesn’t match, the first line is displayed Err symbol, as a reminder . |
| P2 | Damping Time | 01-99s: 0-99s |
| P3 | Maximum Flow Rate | Maximum Flow settings, the unit corresponds to the flow |
| P4 | Minimum Flow Rate | Minimum flow settings, the unit corresponds to the flow |
| P5 | Max frequency output | The upper limit settings of measuring frequency |

| Flow transmitter password setting form | | | |
|---|---|---|---|
| Functions code | Parameters meaning | Description | |
| P6 | Relative Density | Absolute density of medium , Unit :kg/m³ | |
| P7 | Frequency Output Mode | 0: Shut down and keep low level<br>1 : Frequency output<br>2 : Scaled pulse | |
| P8 | Scaled-pulse Output | The parameters volume unit consistent with total flow unit | |
| P9 | Pulse Width | 1-2000ms | |
| P10 | Communication | 0: RS485<br>1: HART | |
| P11 | Communication Parameters | RS485 | Communication Address : 001-255 |
| | | | Baud rate: 1200,2400,4800,9600,19200 |
| | | | Verification :N,O,E |
| | | | Date Length: 7, 8 |
| | | | Stop Bits Length :1, 2 |
| | | Hart | Communication Address : 00-15 |
| P12 | High Limit Alarm | Switch Settings :Yes/No<br>Alarm Value : 0-100%<br>Alarm type :Flow (Qn),Temperature (Te),Pressure (Pr)<br>Alarm Level : HIGH or LOW | |
| P13 | Low Limit Alarm | Same As the Settings of High Limit Alarm | |
| P14 | Backlight | When the screen is always displayed, use the ESC button and press and hold 5S to complete the switching between the normally closed state and the normally open 1 and record this state. When power is turned on again, the setting state will be maintained.<br><br>If the backlight is always on when the battery is powered, it must be changed to normally open through the menu. | |
| P15 | Total Flow (Default 0) | Modifying total flow value | |

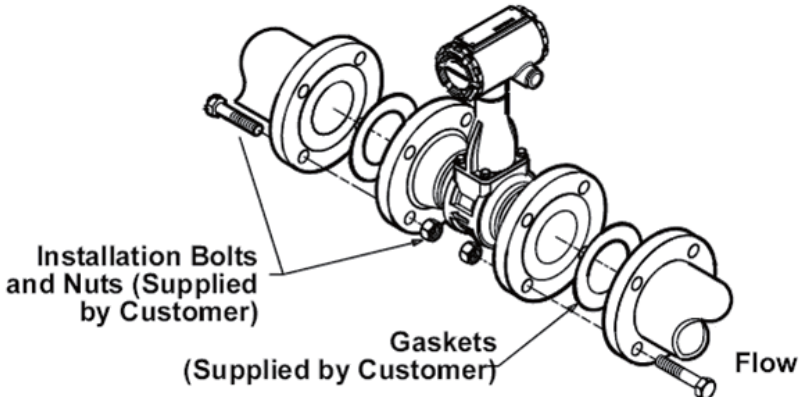




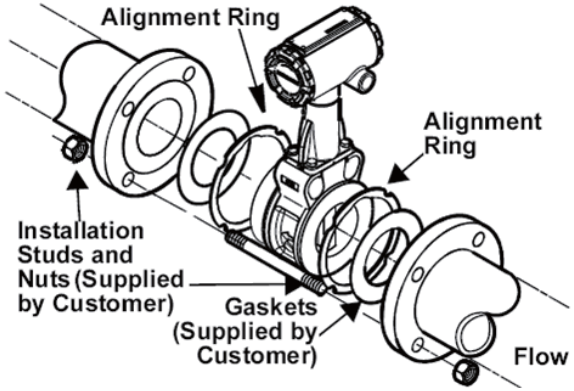
## 6. TROUBLESHOTTING

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

# 7. QUICK INSTALLATION




Flange-Style Flow Meter Installation




Wafer-Style Flow Meter Installation