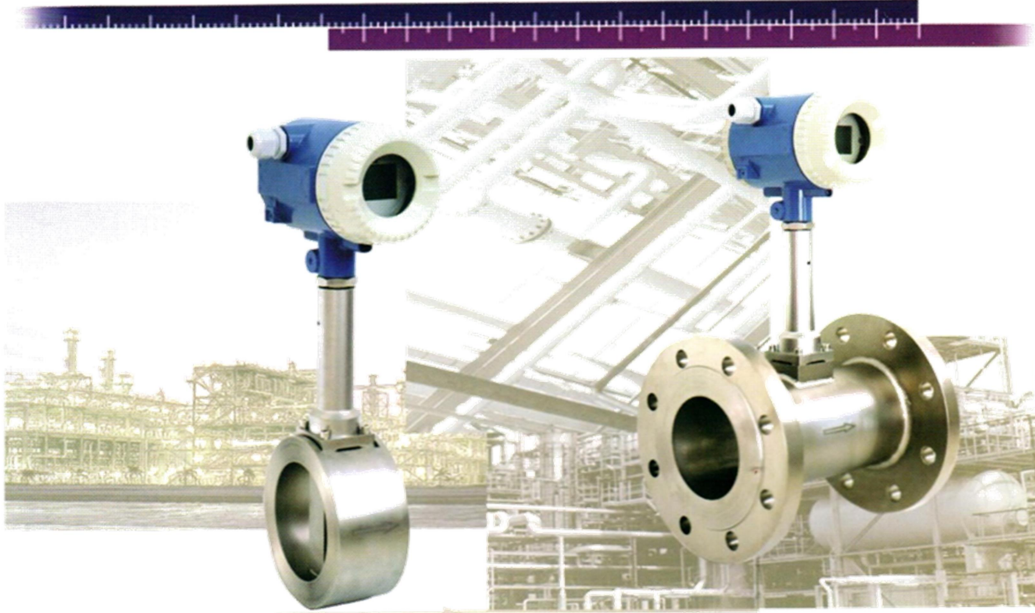


Vortex Flowmeter



- Maximum temperature 350
- High Accuracy
- Short demand for front and rear straight pipe
- Accurate digital signal processing technology

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1 Measuring principle:

Vortex flowmeter measures the flow by sensing the vortices in the flow according to “Karman Vortex Street”. When put an shedder in the path of flow, vortices are alternately shed on each side (see picture 1.2)



1.2 Von Karman vortices

The frequency of vortices (f) is in direct ratio with velocity of flow (v) and in inverse ratio with width of obstacle (d).

$$f = St \cdot v / d \quad (\text{formula 1})$$

$$v = fd / St \quad (\text{formula 2})$$

St is Strouhal Number, is a dimensionless constant related to shape of the shedder, which can be get by testing. St is Strouhal Number, is a dimensionless constant related to shape of the shedder, which can be get by test.

Because d and St is constant, flow velocity (v) and average velocity (v_0) also have certain relationship ($v_0 = v / (1 - 1.25d/D)$), so, you could get v_0 by having the frequency of vortices shedding (f), and then get the mass flow. The ration between quantity of vortex in a certain period of time and the volume of the flow pass by is called coefficient of the instrument (K)

$$K = N / V \quad (\text{formula 3})$$

2 Installation

2.1 Find Most Suitable Location

(1) Ambient temperature

Please avoid installing the flowmeter at a location where temperature could dramaticly changes. If the meter is under heavy heat radiation, please implement effective heat insulation and venting method.

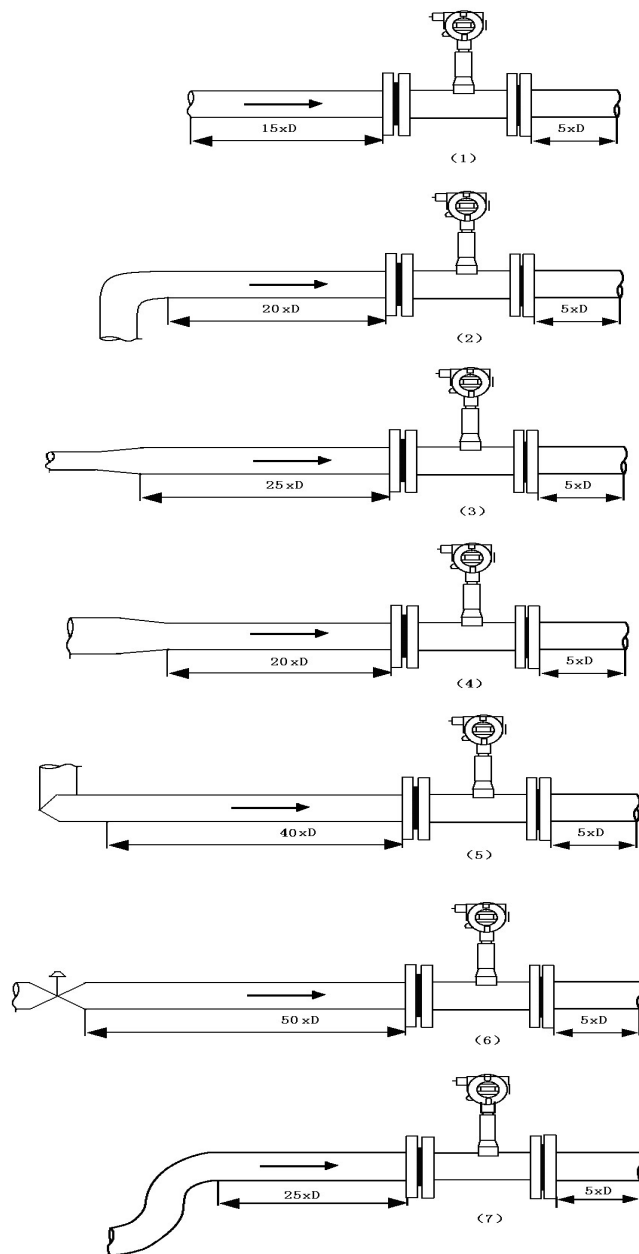
(2) Atmosphere

Please do not install the meter at a location where the atmosphere contains a high level of corrosive substance. If can not install the meter at a better location, please make sure there is enough venting.

(3) Vibration

The meter should not be installed at a location where could have strong vibration. If the mounting pipeline could has heavy vibration, the pipe line should be hold steady by some support racks.

2.2 Requirement on straight pipe line



(1) straight (2) a 90 degree elbow (3) concentric tube expanding

(4) the concentric contraction fully open the valve

(5) different planes of the two to 90 degree elbow

(6) a semi open valve regulating valve

(7) with a 90 degree bend plane two

3 Hardware

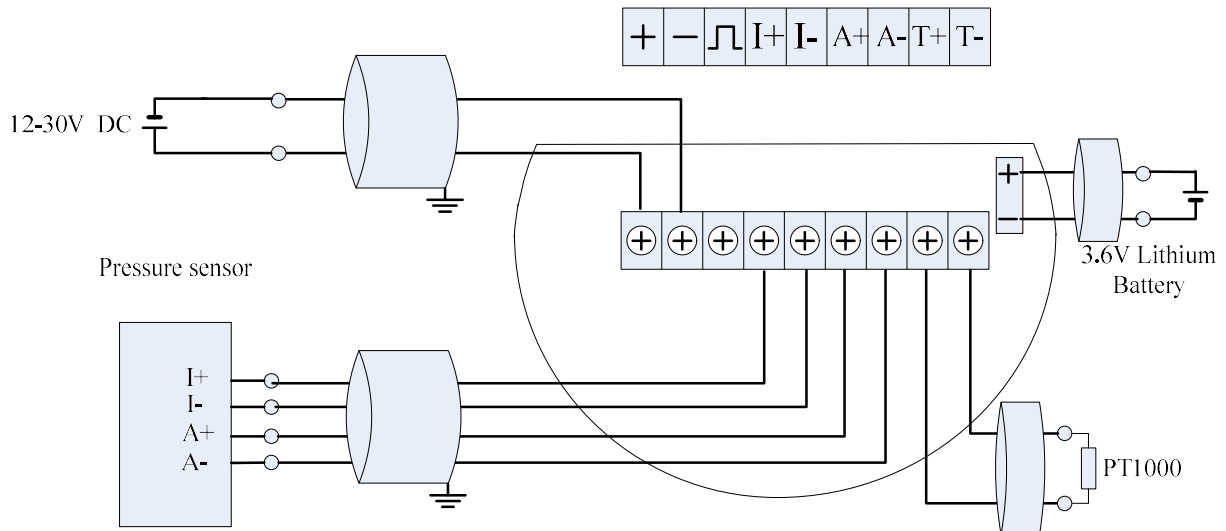
3.1 Terminal Board Wiring

The terminal board is used for connects the external power supply, output pulse, the external pressure sensor and temperature sensor.

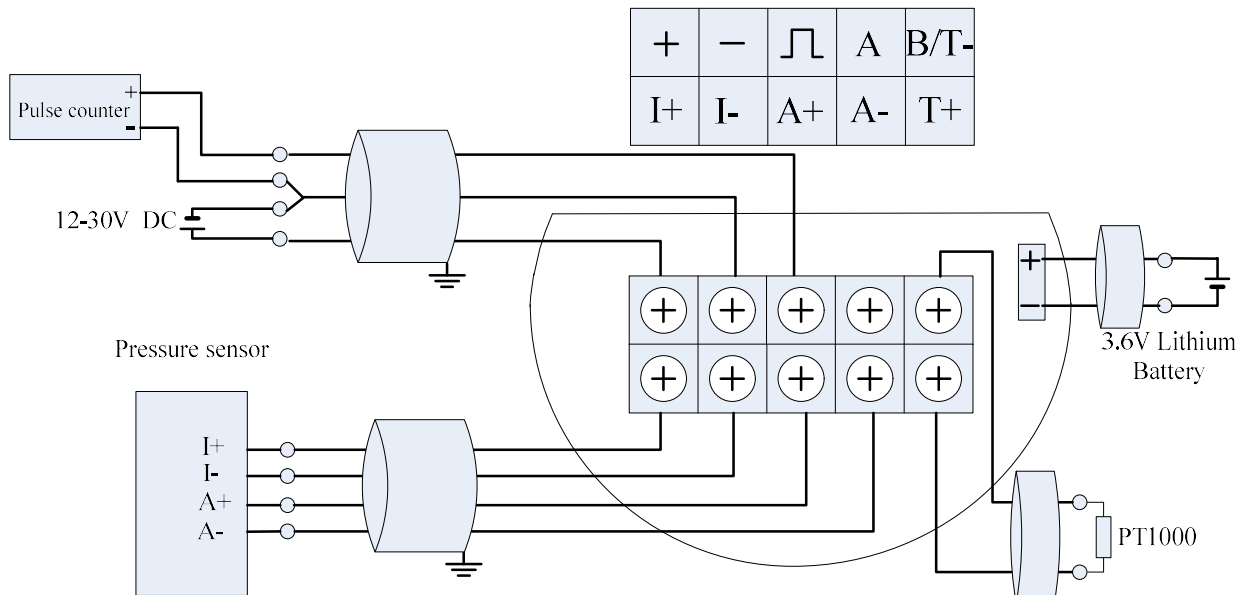
The following are common wiring.

3.1.1 Power supply + External Pressure and Temperature sensors

The terminal board can be connected as below.



The terminal board can be connected as below with RS485.



3.1.2 RS485+ Pulse Output+ External Pressure and Temperature sensors

The terminal board can be connected as below with RS485 and pulse output.

4 LCD Display

LCD Full display is as Figure 3-1:

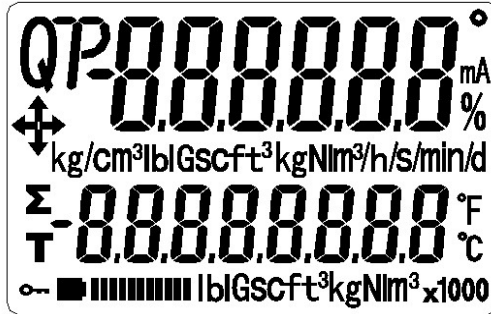


Figure 3-1 LCD Screen

Two-line LCD display. Instant flow rate and totalized flow value can be displayed simultaneously with high-brightness backlight, as Figure 3-2.



Figure 3-2 Instant flow rate and totalized flow value

Short press M to set the second line display which are the frequency, pressure, temperature, density, current, or percentages.

The following table describes the Prompt and variables.

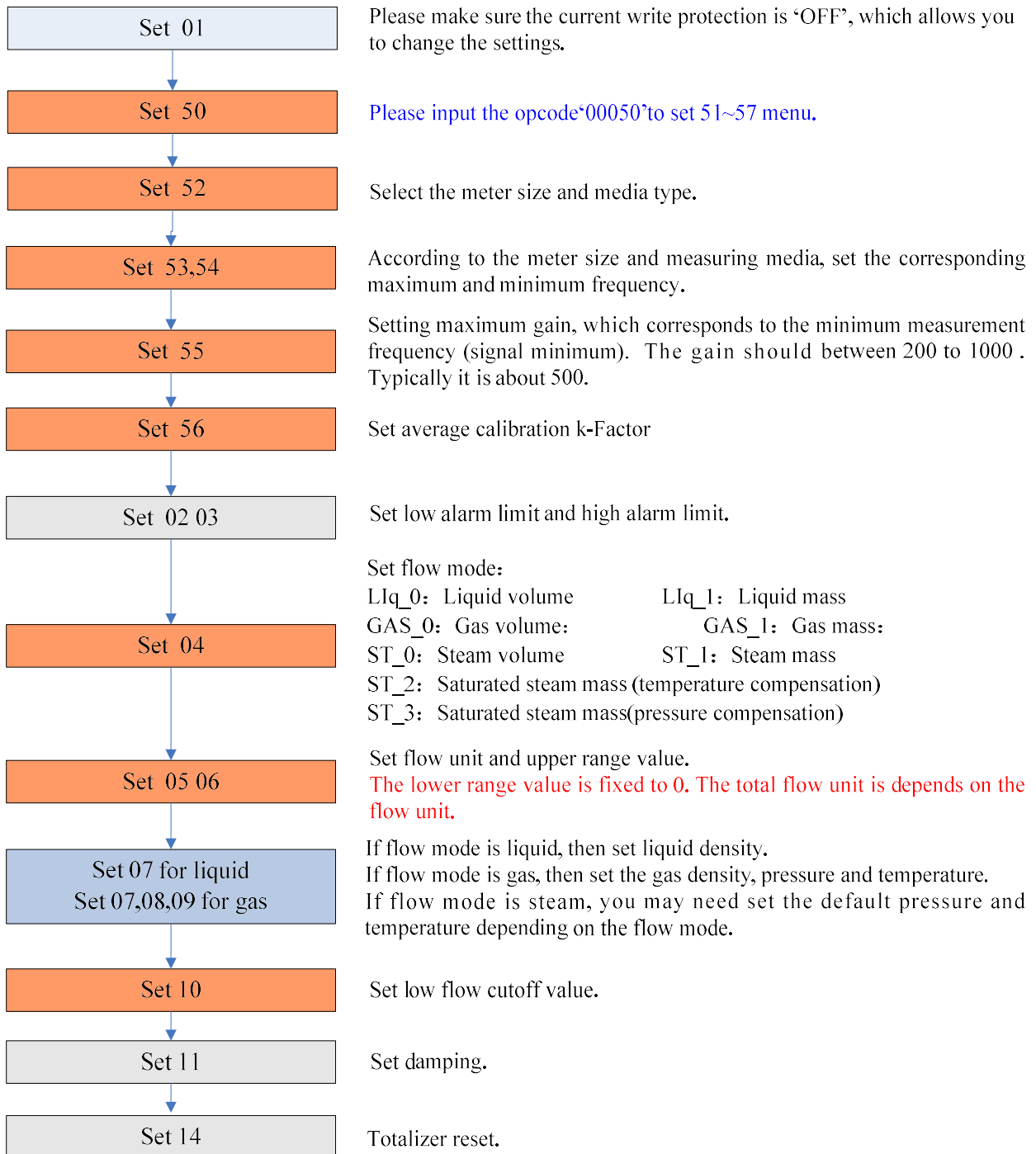
Prompt	Σ						
variable	totalized flow	frequency	density	pressure	temperature	current	percentage

Notes:

- In write protection mode, display
- Measured value is lower than the lower limit alarm value, flashing the "down arrow".
- Measured value is higher than the upper limit alarm value, flashing the "up arrow".
- If enable automatic measure pressure, and the pressure signal abnormality (sensor fault), flashing the "left arrow"
- If enable automatic measure temperature, and the temperature signal abnormality (sensor fault), flashing the "right arrow"

5 Production Process via Local Adjustment

We recommend the following steps to set parameters.



Note:

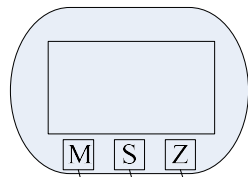
This color means that these items must be done, and easily be forgotten or be incorrectly set.

 This color means that these items

6 Data Entry

6.1 Basic Function of Keys

Data is entered using the 3 keys M, S and Z on the display.



The Z-Key is used to toggle between the operating mode and the menu mode.

The S-Key is used to scroll forward through the menu, or to shift the setting number.

Short press the M-Key is used to scroll backwards through the menu, or to increase the setting number.

Long press (over 3 seconds) the M-Key is used to enter setting, or access the parameter to be changed and to accept the new selected or entered value.

6.2 Enter or Exit Menu Mode

6.2.1 Enter Menu Mode

In the operating mode, press the "Z" key to enter the menu mode (data entry).

6.2.2 Exit Menu Mode

In the menu mode, press the "Z" key to enter the operating mode.

6.3 Local Configuration Function

The character "88" on the bottom-left of LCD corresponding menu item:

character	Menu	Setting method	Notes
01	Write Protect	from table	ON / OFF
02	Low Alarm Limit	numeric	Unit: %
03	High Alarm Limit	numeric	Unit: %
04	Flow mode	from table	Llq_0: Liquid volume Llq_1: Liquid mass GAS_0: Gas volume GAS_1: Gas mass ST_0: Steam volume ST_1: Steam mass ST_2: Saturated steam mass (temperature compensation) ST_3 : Saturated steam mass (pressure compensation)
05	Flow unit	from table	Nm ³ /h, Nm ³ /m, Nm ³ /s, m ³ /d, m ³ /h, m ³ /m, m ³ /s, l/h, l/m, l/s, t/d, t/h, t/m, kg/d, kg/h, kg/m, kg/s, g/h, g/m, g/s, Note: Totalizer flow's unit based on the flow

			unit.
06	Range (Qmax)	numeric	Qmax value for selected flow mode (= 20 mA)
07	Density	numeric	Gas density (unit: Kg/m ³) Liquid density (unit: g/cm ³)
08	Gas pressure (Gauge)	numeric	Unit: kpa.
09	Gas temperature (Degrees C)	numeric	Unit: °C.
10	Low flow cutoff value	numeric	Range: 0% ~ 20%
11	Damping	numeric	Range: 0 ~ 64S
14	Total reset	from table	When Lcd display ACC_y, press M-Key to reset the total and overflow counter.
15	Number of total overflows	read only	Display of the number of total overflows; max. 99,999 1 overflow = 10,000,000
40	Trim 4mA		Steps:
41	Trim 20mA		1. Long press M-Key, enter trim; 2. Short press M-key to decrease current. Press S-Key to increase current. Stepping is 12 microamperes. 3. Long press M-Key to save new trim value. Or press Z-Key to exit without saving.
50	Opcode	numeric	Input ****50
51	Signal status	read only	LCD display: 450.00 51 2 - 10 status: 450.00 is the gain, 51 is indicator, 2 is channel, 10 is signal amplitude, it must be greater than 9.
52	Meter size and media type	from table	Options: 15mm, 20mm, 25mm, 32mm, 40mm, 50mm, 65mm, 80mm, 100mm, 125mm, 150mm, 200mm, 250mm, 300mm, 350mm, 400mm, 450mm, 500mm, 600mm; Note: Maximum frequency, minimum frequency, maximum gain and average calibration K-Factor should be reset, if meter size or media type changed.

			<p>Media type is gas, setting interface:</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>52 G A S</p> </div> <p>Media type is liquid, setting interface:</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>d - 2 5</p> <p>52</p> </div> <p>If you change the meter size and media type, you must re-set from 53 to 56.</p>
53	Maximum frequency	numeric	According to the meter size and measuring media, set the corresponding maximum frequency.
54	Minimum frequency	numeric	According to the meter size and measuring media, set the corresponding minimum frequency.
55	Maximum gain	numeric	Between 200 and 1000 suggested. Typically about 500.
56	k-Factor	numeric	Set average calibration k-Factor
57	Pulse factor	numeric	Set the output pulse number corresponding 1m3.

Special Note:

Maximum frequency, minimum frequency, maximum gain and average calibration K- Factor should be reset, if meter size or media type changed. These parameters are very important for vortex flowmeter good working, please carefully set according to the actual application.