

Precession Vortex Flow Meter

— Converter Operation Manual



(Version3.2)

Catalogue

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1.Product Description

1.1 Basic Functions

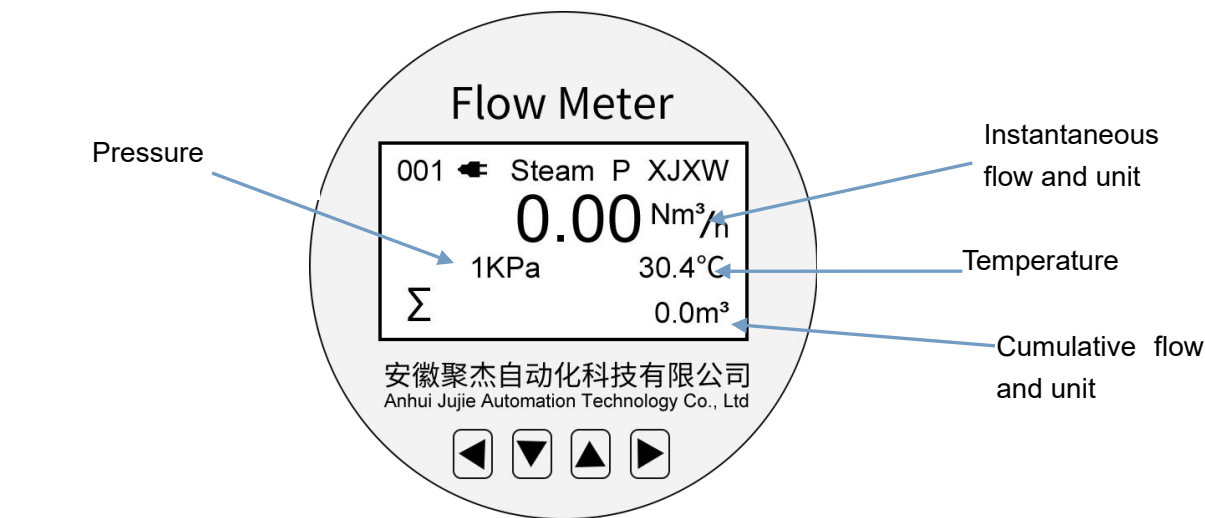
Suitable for sensor size: DN15 ~ DN200
Dual power supply (24VDC and 3.6 lithium battery)
Wide measurement range proportion : 25:1
Two-wire and three-wire universal design
Current output and RS485 with isolated output
Standard configuration with 4-20MA output, pulse output, high and low alarm, RS485 communication;
Optional HART protocol
Standard equipped with temperature and pressure compensation, measure and display flow in Nm³/H and m³/H.
LCD display, Chinese and English menu
Multistage nonlinear correction
DSP spectrum analysis technology, excellent seismic performance and anti-electromagnetic interference.

1.2 The working conditions

The environment temperature: - 20~+65℃; humidity: 5%~90%

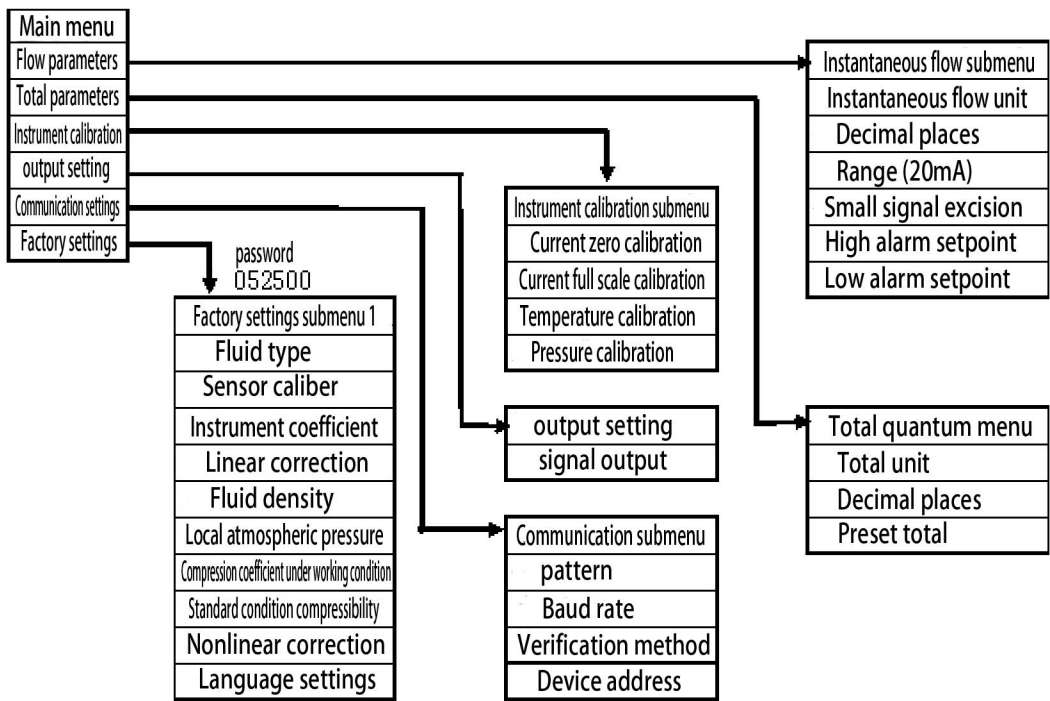
2. Converter operations and parameter Settings

2.1Keyboard definition and display



-  Left shift, parameter setting confirm key and exit subdirectory key;
-  Factory setting fast key, down shift, number decline key;
-  Up, number decline key;
-  move right、enter parameter Settings.

2.2 Converter menu structure



2.3 Converter Parameter Description

● Parameter setting of instantaneous flow

Flow unit	option: L/s L/m L/h m3/s m3/m m3/h Nm3/h USG/s USG/m USG/h Kg/s Kg/m Kg/h t/s t/m t/h default value: m3/h set the unit of instantaneous flow L (Liter), H(hour), T(ton), S(second) , M(minute)
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Decimal place selection	Option: 0 1 2 3 , Default value: 1 Defines the number of decimal points of instantaneous flow
Measuring range	floating number: 99999999.00-0.00 m ³ /h, The default value: 100.0 m ³ /h When the instantaneous flow reaches the range, the converter output 20mA, changing this parameter will affect the current output, high alarm and low alarm. Note: When you change this set value (measure range) , please note the unit of this parameter. You can change the unit of this parameter as needed.
Small signal removal	floating number: 9.90 ~ 0.00 % , default-value: 0.0 % This set value is a percentage of the range.
High alarm	Floating point Numbers: 99.00 ~ 1.00 % , The default value: 90.0 % This set value is a percentage of the range. For example, if this value is set to 10, it is equal to 10% of the range. If the absolute value of the instantaneous flow is greater than (range x 10%), the converter outputs a high alarm signal and the high alarm contact is closed.
Low alarm	Floating point Numbers: 99.00 to 0.00 %. Default value: 0.0 % This set value is a percentage of the range. For example, if this value is set to 10, it is equal to 10% of the range. If the absolute value of the instantaneous flow is less than (range x 10%), the converter outputs a low alarm signal and the low alarm contact is closed.
Damping time	Floating point Numbers: 30.0 ~0.1 , Default value: 1

● **The total set:** Define related parameters of total.

Total units	Option: L(liter) m ³ Nm ³ USG Kg t(ton) , The default value : m ³ Define total unit
Decimal of the total value	Option: 0 1 2 3 , The default value: 1 Define the number of decimal points in the total

Default volume	Option: 99999999.00-0.00 m ³ /h , The default value : 0.0 m ³ /h Clear the total or set the total value
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- **The instrument calibration :** Calibrate current output and temperature and pressure measurement loop.

Zero calibration of current	floating number: 5.0~3.0 , Default-value: 0.0 After entering this submenu, use the multimeter to measure the current output value. If the current value is not equal to 4.0mA, input the true value measured by the multimeter, and the converter automatically completes the 4mA current output calibration standard value. Note: If the current output deviation is too large, multiple corrections are required to check the requirements, with the maximum input value of 5.0 for each correction
Current full scale calibration	floating number: 21.0 ~19.0 , default-value: 0.0 After entering this submenu, use the multimeter to measure the current output value. If the current value is not equal to 20.0mA, input the true value measured by the multimeter, and the converter automatically completes the 20mA current output calibration. Note: If the current output deviation is too large, multiple corrections will be required to check the requirement, with the maximum input value of 21.0 for each correction

Temperature
calibration

Temp Ad just ^{Pt100}

R : **111.8 Ω**

Temp : **30.4 °C**

◀Bcak Start▶

Actual resistance value

Actual temperature value

Press 

Connect the following resistance to the temperature terminal (RTD+,TRD-)

100 ohm

704.9(be stable)

◀Bcak Next▶

This value must be stable

Press 

Connect the following resistance to the temperature terminal (RTD+,TRD-)

200 ohm

704.9(be stable)

◀Bcak Done▶

Press the right button to
complete temperature
calibration and exit

Pressure
calibration

Press Ad just

Press k&b

Press cutoff

Press 

put pressure to the sensor
enter value of the pressure

0.001 Mpa

Absolute

◀Bcak

Start▶

Actual pressure
(gauge pressure)

Press 

Pressure Zero

voltage **-2720mV**

pressure **00.100MPa**

◀Next

▼-

+▼

Shift▶

Zero point calibration of the
sensor, voltage is measured
automatically, pressure is
measured manually

Press 

Pressure Zero

voltage **-2720mV**

pressure **00.100MPa**

◀Back

Next▶

Complete zero point
calibration

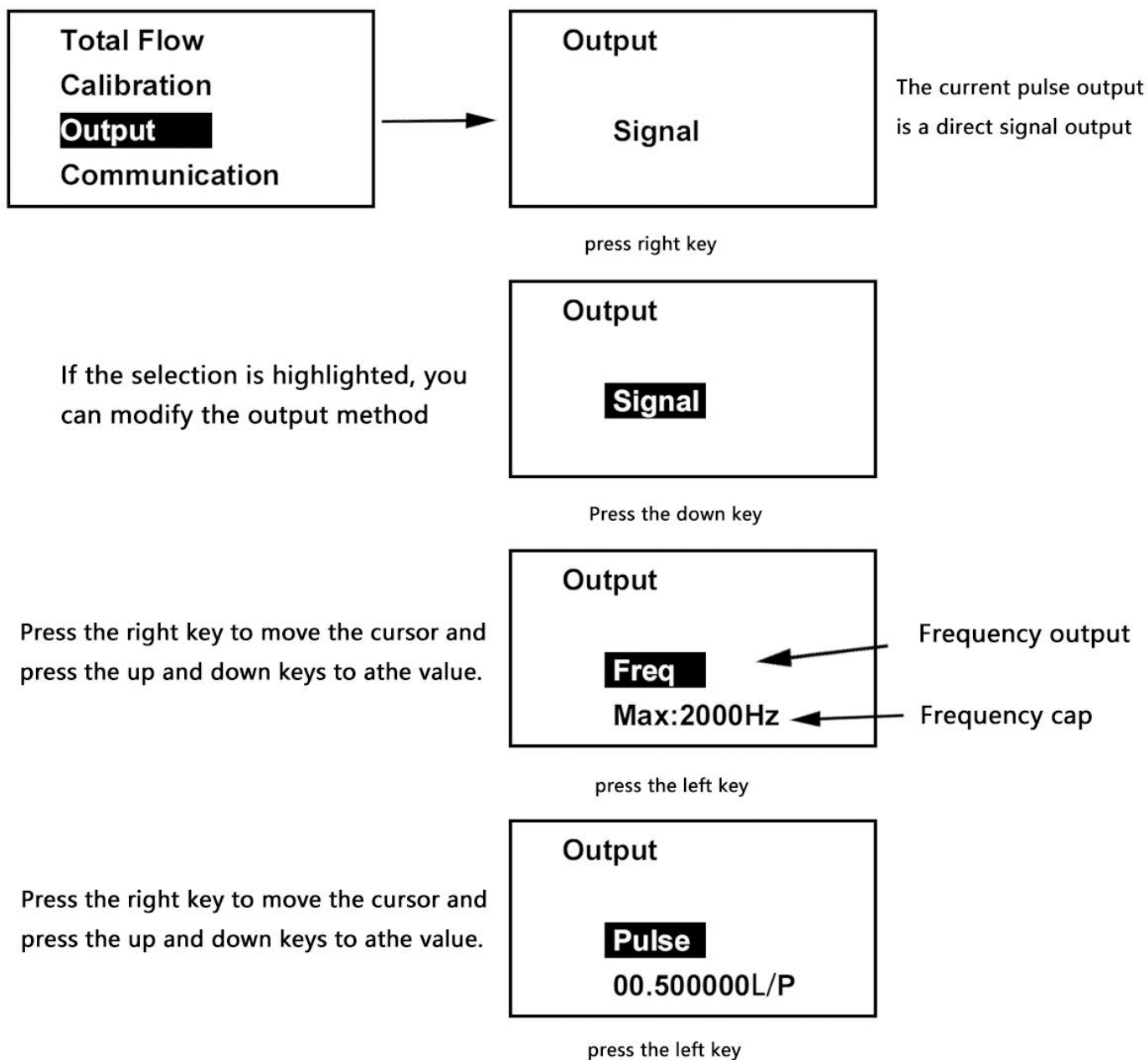
Press 

Pressure calibration	Pressure Full voltage -2720mV pressure 00.100MPa ◀Next ▼- +▼ Shift▶ Calibration of sensor range, input actual pressure value Calibration of sensor range, input actual pressure value Press   Pressure Full voltage -2720mV pressure 00.100MPa ◀Next Next▶ Press the left button to return to the menu and complete pressure calibration
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- **Output Settings:** set **equivalent output**、**frequency output** and **Signal output** three output Parameters.

Upper frequency limit	floating number: 5000.0 - 100.0 Hz , default-value: 2000.0 output frequency (Hz) =instantaneous flow (m3/h) ÷ measuring range (m3/h) × upper frequency limit (Hz) For example, if the instantaneous flow is equal to 100m3/h, the measuring range is equal to 200m3/h, and the upper limit of frequency is set to 2000HZ, then the output frequency corresponding to the instantaneous flow of 100m3/h is 1000HZ.
Pulse equivalent	floating number: 9999.0 - 0.0 , default-value: 0.0 The unit of pulse equivalent is: L (L)/pulse. Users can change the unit of pulse equivalent as required: USG/P, Kg/P , t/P, Nm³/P, m³/P
Pulse width h (ms)	floating number: 1000.0 ~ 0.0 ms , default-value: 0.0 When the pulse width is set to 0, the duty cycle of the pulse is 1:1

Signal output	Raw signal output note: 1、 It is only used to distinguish between frequency output and equivalent output 2、 The nonlinear correction also works on the original signal output 3, it is related to the instrument coefficient K $F(HZ)=3600/(Q*K)$ Q: instantaneous flow rate (m3/h) ;K:Instrument coefficient
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- Communication Settings: Set RS485 communication parameters

Model	Option: Modbus-RTU Modbus-ASCII Default value: Modbus-RTU
Baud rate	Option: 1200 2400 4800 9600 19200 38400 Default value: 19200 Note: Set the baud rate no lower than 9600

Verification mode	Options: no check, even check, odd check Default value: odd check
Device address	numerical value: 247 ~ 1 , default-value: 1

- **Factory parameter setting:** The first password 052500 . ,

Fluid type	Options: gas flow rate, gas standard flow rate Default value: gas flow rate Select the appropriate medium before verifying the flowmeter or using it. With different options selected, the software executes different algorithms.
Caliber	Options: 15、20、25、32、40、50、65、80、100、125、150、200 mm default-value: 50 mm
Instrument coefficient	Floating-point number, default value: corresponds to each caliber automatically Q (instantaneous flow rate,m ³ /h) = 3600 × F(frequency,HZ) ÷ k (k coefficient)) After the real flow detection is completed, the final K coefficient needs to be set here. K (K coefficient) represents: the number of pulses per cubic meter output.

Linear
correction

(Q Max)_1

linear_2

linear_3

linear_4

Press 

(Q Max)_1

0.0Hz

0.0000 N/m³

Press 

In this item, set the frequency of the test poin

(Q Max)_1

000000.0 Hz

0.0000 N/m³

Press 

In this item, set the instrument coefficient
corresponding to the frequency

(Q Max)_1

0.0 Hz

000000.0000 N/m³

(Q Max)_1

0.0Hz

0.0000 N/m³

Press 

After completing the first linear correction, go to "Linear Correction -2".

Note: the highest test point of frequency must be the first point. Set the frequency from large to small.

Pressure choose	Select the type of pressure sensor: option: Absolute pressure, gauge pressure and fixed pressure Default value: absolute pressure Linearity Density Pressure Type Temp Type Press  Pressure Type Gauge Press   Pressure Type Gauge Gauge In this item, select the type of pressure sensor  Pressure Type Gauge Absolute Press  If you do not have a pressure sensor installed, you can set the "set meter pressure", please note: the set pressure is the gauge pressure.
Temperature selection	Select the type of temperature sensor: options: PT100、PT1000 and set temperature The default value: PT1000 The operation method is the same as the pressure selection operation method.
To atmospheric pressure	floating number default-value: 0.101 mPa If the medium is selected as liquid, this parameter has no effect.
Compression coefficient of m³ /h	floating number; default-value: 1; If the medium is selected as liquid, this parameter has no effect.

Compression coefficient of Nm ³ /h	floating number ; default-value: 1 ; If the medium is selected as liquid, this parameter has no effect.
Language settings	Chinese / English.

Senior password 905250 . Set spectrum analysis parameters (if you do not understand spectrum analysis, please do not modify)

Sampling rate	Floating point number, the sampling rate corresponds to the diameter of the flow meter, and it is forbidden to change
Upper limit of spectrum	Define the upper limit of signal frequency The default value corresponds to the meter diameter, but can also be adjusted according to the upper limit of the flow range.
Lower limit of spectrum	Define the lower limit of signal frequency The default value corresponds to the meter diameter, but can be adjusted according to the lower limit of the flow range.
Power threshold	floating number Default values are set according to the diameter of the flow meter automatically , or you can change them according to the actual signal power threshold. The power threshold corresponds to "M" in the spectrum display interface.
Power ratio	A floating point number, corresponding to "R" in the spectrum display interface. This parameter is the minimum value that meets the signal requirements.

2.4 How to Set parameters

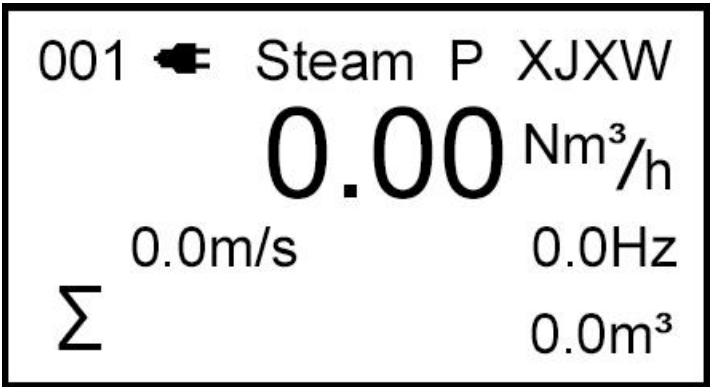


Figure 1 Instantaneous flow display interface

Press  Enter the menu Settings, as shown in Figure 2:

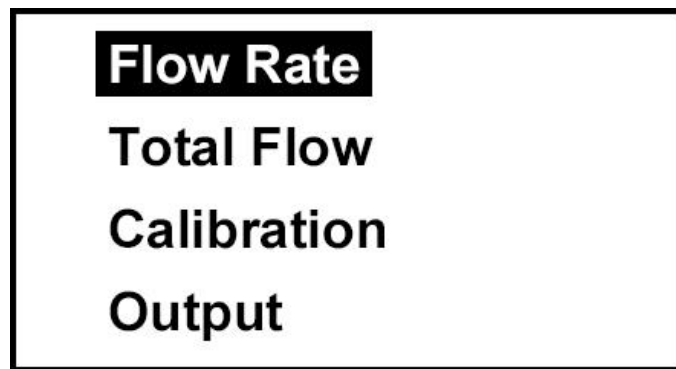


Figure 2

In the interface shown in Figure 2, press  or  Different Sub menu can be selected. Press  Then back to flow display interface, as shown in Figure 1.

Press  or  choose Sub menu, Press  Enter the sub menu to set the parameters. For example, we need to set the "instantaneous flow parameter", When the instantaneous flow parameters sub menu becomes bright, press  then it is shown as figure 3 below:

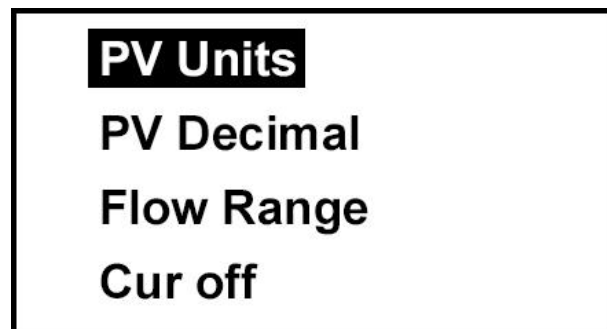


Figure 3

Press  or  to select the parameters that you need modify, The selected parameter will be highlighted, and if you need to return to the menu shown in Figure 2, press  ; If you need to go to the next level menu, press  to set parameters, as shown in Figure 4:

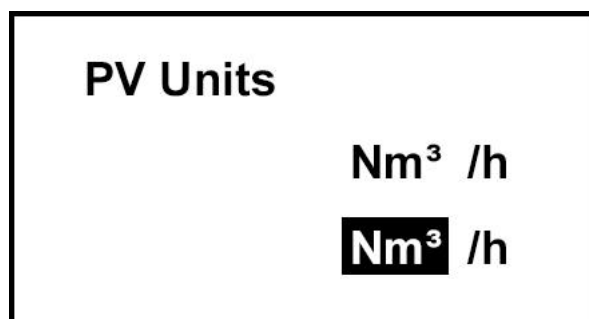


Figure 4

In this case, press  or  to modify the parameters,for example: As shown in Figure 4,you need to change the unit of instantaneous flow " m^3/h " to " m^3/m ", press  , The unit of instantaneous flow will become " m^3/m ", as shown in Figure 5:

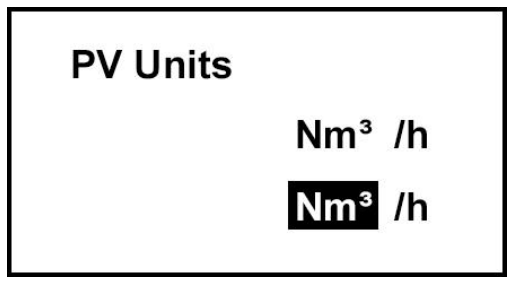


Figure 5

After modifying parameters, If you need to save your Settings,press  , The system will save it automatically , as shown in Figure 6:

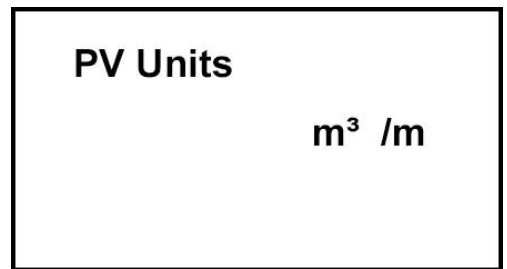
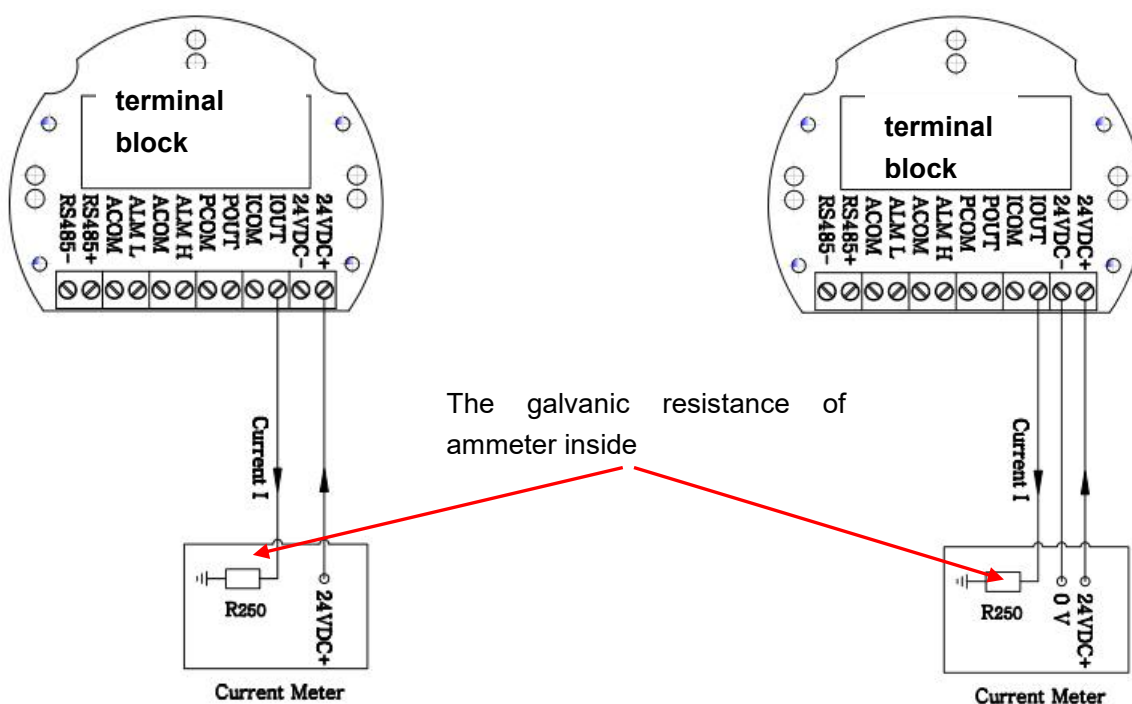


Figure 6

In this case, press  , Save the Settings and exit (Figure 3).

3. Wiring diagram and output definition

3.1 4-20mA wiring diagram of current output



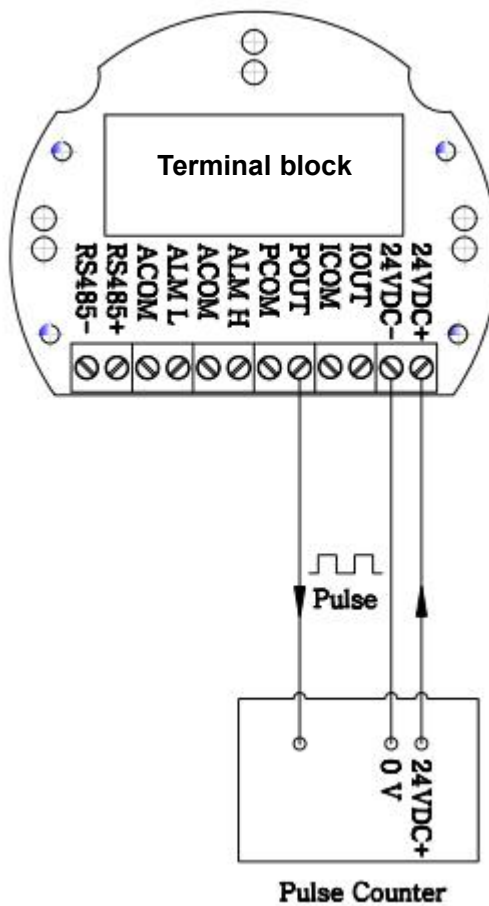
Two-wire wiring diagram

Three-wire wiring diagram

Definition of wiring terminals

interface	function	note
24V +	DC 18 - 36V +	power supply 24V +
24 -	DC 18~36v -	power supply 24V -
IOUT	4~20Ma +	The load current<=- 500Ohm
ICOM	4~20mA -	
POUT	frequency & pulse output +	
PCOM	frequency & pulse output common terminal	
ALM H	high alarm +	It is recommended to use a 24VDC intermediate relay with a load current ≤ 30mA
ACOM	High alarm public port	
ALM L	Low alarm +	
ACOM	Low alarm public port -	
RS+	RS485 +	RS485 wiring terminal
RS-	RS485 -	

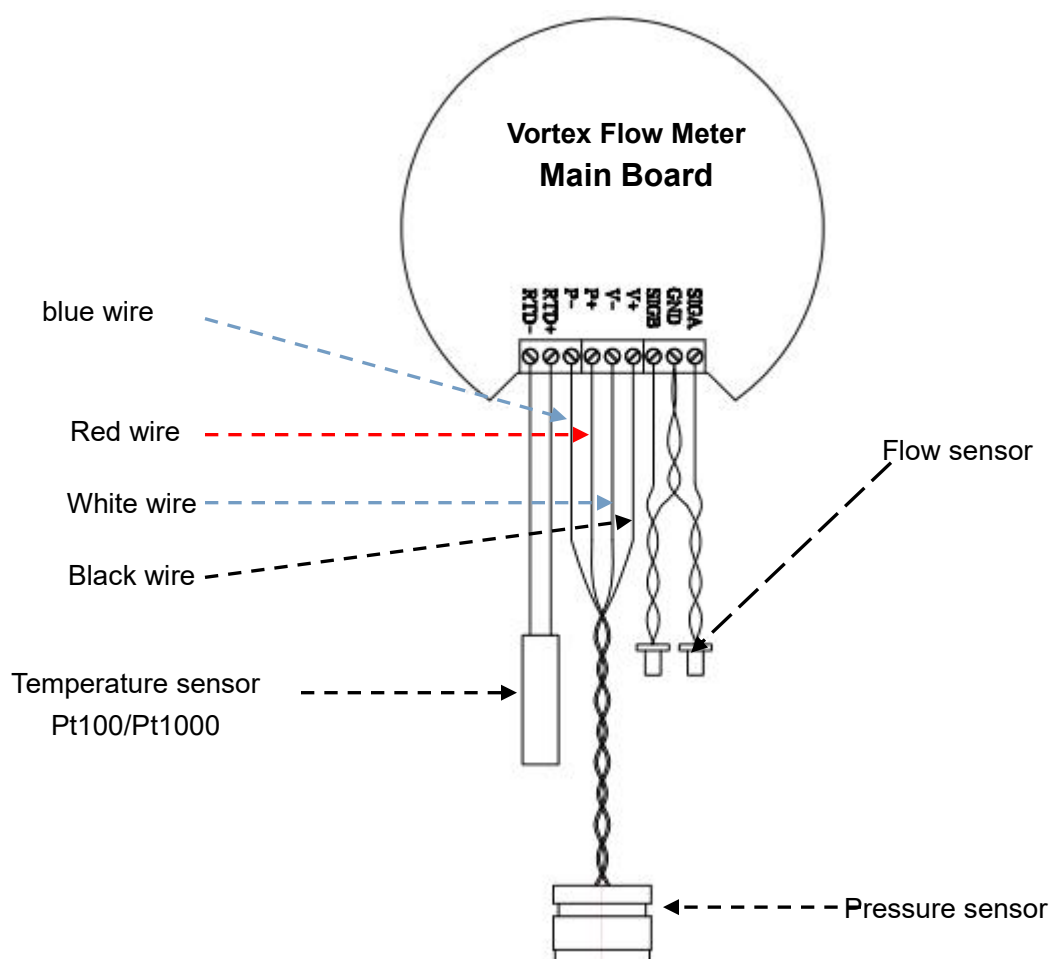
3.2 Wiring diagram for pulse output



3.3 Wiring between converter and sensor

Definition of wiring terminals on the motherboard

printing	function	note
SIGA	Signal cable for flow sensor	
GND	Ground line (signal common line)	
SIGB	Signal cable for flow sensor	
V+	power supply (+)to pressure sensor	Connect pressure sensor
V-	power supply (-)to pressure sensor	
P+	Pressure sensor signal(+)	
P-	Pressure sensor signal(-)	
RTD+	thermal resistance	Pt100 or Pt1000, two-wiring
RTD-		



4. Debug key points

4.1 Set the key parameters of the flow meter

Since our converter is a universal circuit design for Precession vortex flow meter and vortex flow meter, We set the fixed dip switch as follows, which is set according to the caliber when install the circuit board :(the position of the dip switch is on the motherboard)

口径	K1=K2=0N	K3=0N
DN15	2	1
DN20	2	2
DN25, DN32, DN40	1	3
DN50, DN65, DN80, DN100	1	4
DN125, DN150, DN200	1	5

Enter<factory parameter setting>, choose “medium”

Enter<factory parameter setting>, choose “caliber”

Enter<flow parameter setting>, Set the **range**, **Unit** and **other parameters**

Enter<Output Settings>, Select the output mode and set parameters

If necessary, Enter the password **905250** Factory parameter setting, Modify spectrum analysis parameters.

Note:

- The temperature of the converter has been calibrated before delivery, so you only need to select

PT100 or PT1000 in the menu of "Factory Parameter Setting", and there is no need to calibrate the temperature.

- You need to select the type of pressure sensor in the "Factory Parameter Settings" menu, and then connect to the pressure sensor, and actually press down for pressure calibration.

When using sonic nozzle test device or fan system for testing, please pay attention to select "medium" in the menu: standard condition or working flow rate, and the output corresponds to this.

For Example: if you choose "Nm³/h", then the output 4-20mA or pulse or frequency or original signal corresponds to standard condition flow; If you choose "m³/h", then the output 4-20mA or pulse or frequency or original signal corresponds to the working condition flow.

5.The appendix: RS485 communication address table

Name	Register first address	Register length	Instruction code	Data types
Instantaneous flow	0x01	0x02	0x04	floating number
Unit of instantaneous flow	0x03	0x01	0x04	integer
Total flow	0x04	0x04	0x04	double precision
The total units	0x08	0x01	0x04	integer
Temperature	0x09	0x02	0x04	floating number
Pressure	0x0b	0x02	0x04	floating number
Total flow (m3)	0x0d	0x02	0x03 0x04	floating number
Linking (Addresses are consecutive)				
Instantaneous flow	0x14	0x02	0x04	floating number
Total flow	0x16	0x02	0x04	floating number
Temperature	0x18	0x02	0x04	floating number
Pressure	0x1a	0x02	0x04	floating number
Instantaneous flow rate	0x1e	0x02	0x04	float inverse
Total flow	0x20	0x02	0x04	float inverse
Temperature	0x22	0x02	0x04	float inverse
Pressure	0x24	0x02	0x04	float inverse

The appendix 8: unit definition

Instantaneous flow	unit	code	unit	code
	Nm ³ /h	0x00	usg/h	0x09
	Nm ³ /m	0x01	usg/m	0x0a
	Nm ³ /s	0x02	usg/s	0x0b
	m ³ /h	0x03	kg/h	0x0c
	m ³ /m	0x04	kg/m	0x0d
	m ³ /s	0x05	kg/s	0x0e
	L/h	0x06	t/h	0x0f

	L/m	0x07	t/m	0x10
	L/s	0x08	t/s	0x11
Total flow	Nm3	0x00		
	m3	0x01		
	L	0x02		
	usg	0x03		
	kg	0x04		
Temperature	t	0x05		