bd flow

flow, level, pressure, temperature

Vortex Flowmeter Instruction

1 Overview

BD-FCVX series vortex flowmeter is a kind of flow meter which adopts piezoelectric crystal as the detecting element and outputs the standard signal proportional to the flow rate. The meter can be directly matched with DDZ-III instrumentation system, and can also be used with computers and centralized systems to measure the flow parameters of different media. The instrument is based on the detection principle of fluid vortex street, its detection vortex street piezoelectric crystal does not contact with the medium, the instrument has the characteristics of simple structure, good versatility and high stability.

BD-FCVX series vortex flowmeter can be used for flow detection and metering of various gases, liquids and steam.

BD-FCVX series vortex flowmeter can be used with the company's intelligent flow accumulation meter, and other instrument manufacturers of intelligent instruments, with the characteristics of versatility.

2 Working Principle

The basic principle of vortex flowmeter is Carmen vortex principle, that is, "vortex separation frequency and flow rate is proportional to".

Flowmeter circulation body diameter and the nominal diameter of the instrument is basically the same. As shown in Figure 1, the flow body is inserted into an approximately isosceles triangular column, the axis of the column is perpendicular to the direction of flow of the measured medium, and the bottom surface is facing the fluid.

When the measured medium flows through the column, vortices are generated on both sides of the column alternately, and the vortices are continuously generated and separated, and two rows of vortices are formed downstream of the column in a staggered arrangement, namely "vortex street". Theoretical analysis and experiments have proved that the frequency of vortex separation and the column side of the medium flow rate Proportional.

$$f = Sr\frac{d}{V}$$

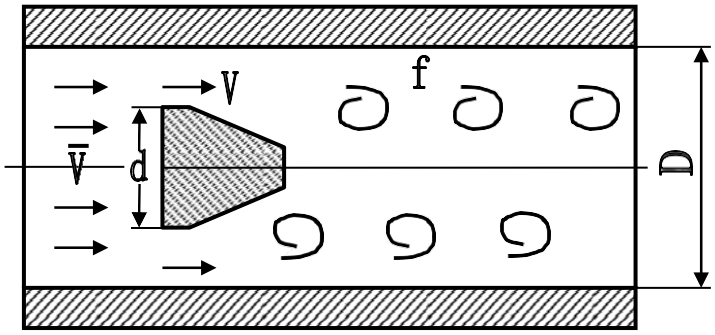
in the formula :

f——Frequency of vortex separation on the column side (Hz);

v—— Flow velocity on the column side (m/s);

d —— width of the column's headwater surface (m);

sr ——Strohal number, is a constant that depends on the shape of the column cross section and is largely independent of the fluid properties and flow velocity.



Vortex in a round tube

3 Product Features

Sensor measurement probes are packaged in a special process and can withstand temperatures up to 350°C.

Sensitive elements are sealed in the probe body, the detection element does not touch the measurement medium, long service life.

The sensor adopts compensation design to improve the instrument's shock resistance.

Simple structure, no moving parts, high durability.

In the specified range of Reynolds number, measurement is not affected by the medium temperature, pressure, viscosity.

Flowmeter can be applied to explosion-proof occasions, good safety.

Wide range ratio, up to 10:1 15:1.

Highly versatile, can measure unclean gases, liquids.

4 Technical parameters

Ambient temperature: (-40～55)℃ ;

Relative humidity: (5～90)% ;

Atmospheric pressure: (86-106)Kpa

Nominal diameter: (15~1500)mm (greater than 200mm for insertion structure);

Measuring medium: liquid, gas, steam;

Nominal pressure: 1.6Mpa 2.5Mpa 4.0Mpa

Medium temperature: (-40～+350)℃;

Accuracy class: 0.5 class, 1.0 class 1.5 class, 2.5 class;

Linearity: ≤±1.5%;

Repeatability : ≤0.5%,≤1.0% ;

Output signal: Voltage pulse; (4-20)mA DC (two-wire system);

Power supply: Voltage pulse 12V DC or 24V DC;

Current type 24V DC

Intelligent current type 24V DC

Smart Battery Type 3.6V DC

Load resistance: The maximum load resistance does not exceed 350Ω.

Body material: 304 stainless steel

Connection method: (15-300)mm for Lankan type structure; (200-1500)mm for plug-in type structure;

Protection class: IP65, IP67 ;

Cable interface: PG10

Explosion-proof type: Intrinsically safe; flame-proof type

Explosion-proof grade: Ex d IICT6 Gb

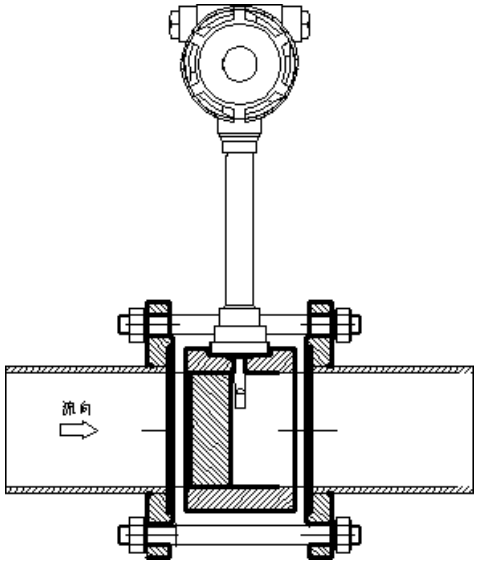
5 Working flow range

Instrument Model	Nominal diameter DN (mm)	Flow range (m3/h)		
		Liquid	Gases	Steam
BD-FCVX-	15	0.4-4	4-30	3.2-18
BD-FCVX -	20	0.7-7	6 - 40	5-32
BD-FCVX -	25	1-10	11-70	9-60
BD-FCVX -	32	1.5-15	17-150	15-130

BD-FCVX -	40	2-25	24-240	20-200
BD-FCVX -	50	3-45	37-370	32-320
BD-FCVX -	65	5.5-75	65-650	55-540
BD-FCVX -	80	8.5-110	95-950	81-810
BD-FCVX -	100	16-180	150-1500	130-1300
BD-FCVX -	125	25-270	245-2400	200-2000
BD-FCVX -	150	35-350	360-3600	290-2900
BD-FCVX -	200	60-600	600-6000	550-5000
BD-FCVX -	250	90-900	900-9000	800-8000
BD-FCVX -	300	135-1350	1350-13500	1150-11500
BD-FCVX -	350	185-1850	1850-18500	1550-15500
BD-FCVX -	400	240-2400	2400-24000	2100-21000
BD-FCVX -	450	300-3000	3000-30000	2600-26000
BD-FCVX -	500	380-3800	3800-38000	3300-33000
BD-FCVX -	600	550-5500	5500-55000	5100-51000
BD-FCVX -	700	750-7500	7500-75000	7000-70,000
BD-FCVX -	800	950-9500	9500-95000	9000-90,000
BD-FCVX -	900	1200-12000	12000-137000	11000-110000
BD-FCVX -	1000	1400-1400	14000-140000	13500-135000
BD-FCVX -	1200	2000-20000	20,000-200,000	19500-195000
BD-FCVX -	1300	2200-22000	22,000-22,000	21000-210000
BD-FCVX -	1400	2750-27500	27500-275000	27000-270000
BD-FCVX -	1500	3150-31500	31500-315000	31000-310000

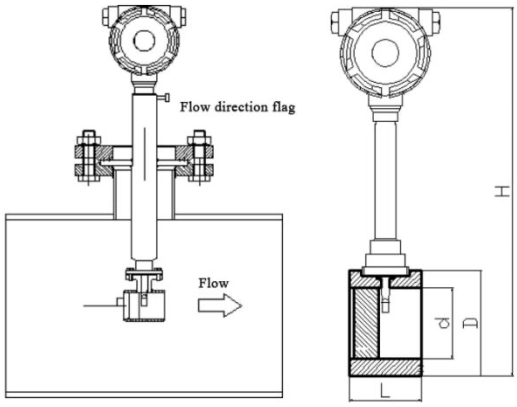
6 Flow meter installation structure diagram

6.1 Flange mounted flowmeter installation structure diagram



Flange clip-on structure diagram

6.2 Insertion type flowmeter installation structure diagram



Inserted Structure Flowmeter Structure Size

6.3 Flow meter construction dimensions

Card-mounted various different caliber flowmeter structure size

Nominal Diameter	Inner diameter	Snap-on body		
		Long L	Outer diameter D	Total height H
15	15	50	88	335
20	20	50	88	335
25	25	50	88	335
32	32	50	88	335
40	39	50	88	335
50	49	70	88	335
65	64	70	105	345
80	79	80	117	365
100	99	80	140	382
125	125	70	168	395
150	149	70	190	425
200	207			
250	259			
300	309			

7 Installation requirements

7.1 Installation site selection

Ambient temperature: the working environment temperature of the flowmeter is not less than -40 ℃, not higher than +55 ℃, such as by the heat radiation of the production equipment, should take heat insulation and ventilation measures.

Ambient air: Avoid installing the flowmeter in an environment containing corrosive gases, if it can only be installed in an environment containing corrosive gases, it is necessary to provide adequate air exhaust measures.

Mechanical vibration and shock: flowmeter structure is strong, will not be damaged by vibration, but vibration will generate interference signals, if the vibration and shock on the pipeline is strong, and the media flow rate is low, it may lead to interference signals greater than the flow signal, resulting in the value of the error. **Therefore, the flowmeter should be installed as far as possible in the vibration and impact of small places,**the installation location in 5~20Hz vibration frequency, the vibration acceleration is not greater than 1g, otherwise, vibration damping measures should be taken. For example, the flowmeter installation in the direction of the source of vibration on the pipe with fixed support, and installation

of anti-vibration pad and other measures.

Special attention: in the air compressor outlet vibration is strong, can not be installed flowmeter, should be installed in the storage tank after.

Flowmeter installation site around should be ample space, installed in high flowmeter should try to have a working platform, in order to facilitate the installation and maintenance. In addition, in order to maintain the convenience of inspection, there should be nearby for the measurement instrument with AC 220V power socket.

Flow meter is best installed indoors, must be installed outdoors, there should be sun and moisture measures.

The flow meter should be installed away from high-power motors, frequency converters, high-power transformers and radio transceivers, otherwise, it may cause the instrument can not work properly.

7.2 Installation piping requirements

The upstream side and downstream side of the flow meter must have a long enough straight section of the same diameter. The length should be in accordance with the requirements in the following table.

➢ **Flangemounted (flange connection type) flowmeter straight pipe section**

Pipeline situation	Upstream	Downstream	Pipeline situation	Upstream	Downstream
Concentric Reducing Pipe,Fully Open Valve	＞15D	＞5D	Two 90 degree straight elbows in the same plane	＞25D	＞5D
Concentric progressive expansion pipe, fully open valve	＞20D	＞5D	Two 90 degree straight bends in different planes	＞40D	＞5D
Upstream 90 degree straight elbow or T-connector	＞20D	＞5D	Half-open gate valve	＞50D	＞5D

➢ **Insertion type flowmeter straight pipe section**

Pipeline situation	Upstream	Downstream	Pipeline situation	Upstream	Downstream
Concentric Reducing Pipe, Fully Open Valve	＞30D	＞10D	Two 90 degree straight elbows in the same plane	＞50D	＞20D
Concentric progressive expansion pipe, fully open valve	＞50D	＞20D	Two 90 degree straight elbows in different planes	＞80D	＞25D
Upstream 90 degree straight elbow or T-connector	＞50D	＞20D	Fully open disc valve	＞45D	＞20D

In the specified length of the straight pipe section, the pipe into the flow section and outflow section should be visually straight. To ensure that the measured medium full tube, **flowmeter should be installed in the regulating valve, half open gate valve downstream as far as possible to avoid. In general, do not install flow transmitters after the expansion tube.**

The flowmeter can be installed vertically, horizontally or at any other angle, when the flowmeter is installed on a vertical or inclined pipe, the fluid flow direction should be bottom-up.

Need to be installed in the vicinity of the flowmeter pressure or temperature measurement points, pressure points should be installed in the flowmeter after 3D outside, temperature measurement points should be installed in the flowmeter 5 D other than.

To facilitate access to the flow meter, it is highly recommended that a bypass tube be installed. In the case that the pipe to be cleaned or the pipe where the flow meter is installed cannot be cut off, a bypass pipe must be installed.

7.3 Vortex flowmeter installation

The following points must be noted during installation:

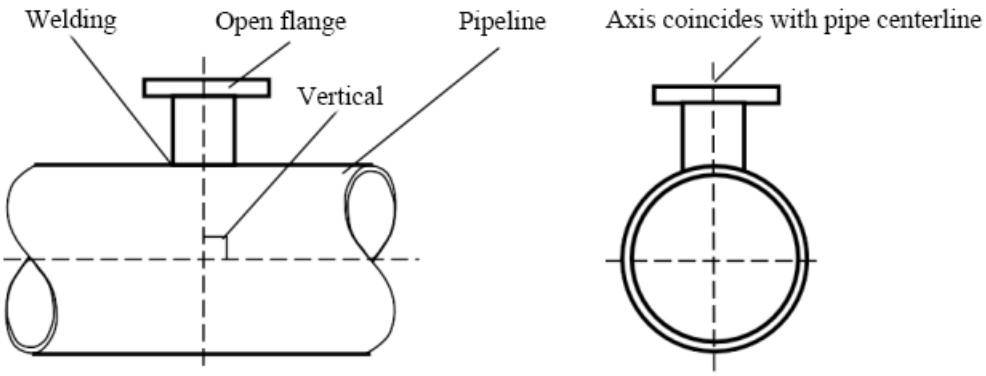
The measured medium flow direction must be consistent with the flow direction arrow mark on the flow meter.

Installation of card-mounted flowmeter, through the special concave flange of the concave surface to ensure that the pipe and flowmeter circulation body concentric. And pay attention to the gasket can not be deep into the tube.

Insertion type vortex flowmeter installed in the pipe

In the round hole welded on the connection flange provided with the flowmeter, **requiring the open flange short tube must be vertical pipe and the axis of the short tube and the pipe centerline coincide.**

The short pipe of the connecting flange has machined tabs which are aligned with the outer wall of the pipe and then welded.



Insertion type vortex flowmeter opening flange and pipe welding

8 Flow meter parameter adjustment

8.1 About the meter instrument constants

Flowmeter in the factory has been commissioned and tested, each meter meter constant K have been in the nameplate and factory certificate, its physical meaning is in the calibration state (P = 101.3 kPa, t = 20 ℃) each flow through the flowmeter 1 liter volume flow, the flowmeter output pulse number, the unit is 1 / L. Due to changes in the temperature of the measurement medium, the measurement pipe and vortex generator geometry size Due to changes in the measurement medium, the measurement pipe and vortex generator geometry changes (thermal expansion and contraction), the need to correct the flow meter constant, the correction factor KT expression is.

$$K = 1\text{-}4.8\times10\text{-}5\times(t\text{-}20)$$

where: t—the temperature of the measurement medium, ℃.

8.2 Flow unit conversion method

8.2.1 Calculate the volumetric flow rate in the actual pipe working condition according to the flow range set by the process.

The flow rate set by the process can be mass flow rate (kg/h), volume flow rate in working condition (m3/h) or volume flow rate in standard condition (N m3/h), and the method of converting mass flow rate or volume flow rate in standard condition to volume flow rate in working condition is as follows: The maximum flow rate (upper range limit) of mass flow rate Gmax (kg/h) is converted to volume flow rate in working condition Qmax (m3/h).

The calculation formula is.

$$Q_{max} = G_{max} \times \frac{1}{\rho} \ (m^3/h)$$

Where: ρ —— density of the medium under the working conditions of the instrument (kg/m3).

Converts the maximum flow rate (upper range limit) Q max (Nm3/h) of the gas in the standard state to the volume flow rate Qmax in the operating state(m3/h), calculated by the formula

$$Q_{max} = Q_{0max} \times \frac{0.1013}{0.1013 + p} \times \frac{273.15 + t}{273.15} (m^3/h)$$

Where: P - the gauge pressure of the gas under the operating conditions of the instrument (MPa).

t —— the temperature of the gas under the operating conditions of the instrument (℃).

8.2.2 Calculation of the maximum frequency fmax of the vortex street based on the maximum volume flow rate Qmax (m3/h) in the operating condition.

$$f_{max} = \frac{1}{3.6} \times Q_{max} \times K \times KT(HZ)$$

where: K —— instrumentation factor (1/L), the value of K is indicated on the instrumentation nameplate.

KT——Temperature correction factor.

9 Signal detection, adjustment and calibration methods for flow meters

9.1 Static detection

To measure the quiescent current, connect a standard resistor in series with 24V and measure with a digital voltmeter, or test with a field indicator meter.

Under the condition of no flow signal, the quiescent current is 4mA and the field indication meter is at 0% position. If there is deviation, adjust potentiometer W1, but before adjusting must be observed with an oscilloscope or frequency meter, to determine the absence of frequency signal (square wave), to ensure that the frequency current converter no input conditions, to adjust the zero is meaningful. In the condition that the coefficient board is not connected, you can directly adjust W1 to achieve zero.

9.2 Dynamic detection

Dynamic detection means that the transmitter is detected under the condition of having a signal input.

Input upper flow signal, TP4 has 1000Hz output frequency, at this time, the frequency and current conversion circuit should be full range output, the transmitter output current should be 20mA DC, such as deviation, can adjust the range potentiometer W2, so that the output is 20mA DC. generally in use to change the range, just calculate the KB value, in the code switch to adjust the KB value can change the transmitter flow range, no need to adjust the W2 potentiometer. There is no need to adjust the W2 potentiometer.

9.3 Simulation testing methods

When the circuit test is conducted in the calibration room, the analog test method is available. Use the frequency generator signal instead of the probe signal, the output shell shield of the frequency generator is not connected to the terminal, but should be received at the (common ground) end, and the signal output is received at either end of the input terminal of the amplifier board.

Frequency generator output signal frequency is adjusted within the frequency range set by the transmitter factory certificate, the signal amplitude increases slightly at high frequencies, and can generally be controlled within the range of 1~2VPP value, in order to trigger the output response of the amplifier circuit.

9.4 Damping adjustment

There are two pull switches on the amplifier circuit board, which are used to adjust the damping time of the output signal of the circuit and reduce the fluctuation of the output signal. Adjustments can be made by pulling the switches with a small screwdriver.

When the damping switches are all OFF, the circuit response time is 0.1s; when the damping switch "1" is turned ON, the circuit response time is about 1s; when the damping switch "2" is turned ON, the circuit response time is about 5s.

When the damping switches "1" and "2" are turned ON, the circuit response time is about 6s.

If the output current value of the flowmeter varies widely, the output current can be stabilized by selecting the damping switch position. Adjusting the damping switch position does not affect the zero position and range of the flowmeter.

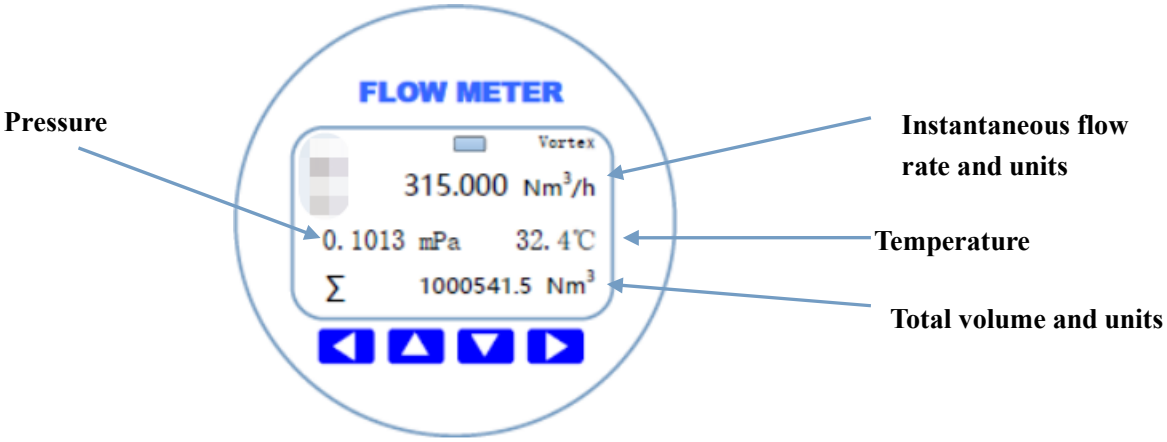
9.5 Sensitivity adjustment

When the vibration disturbance in the field is too large and has affected the normal measurement, the adjustment is made by amplifying K1 and K2 on the circuit board.

K1 is the board amplification and K2 is the board sensitivity. Due to the quantized design method, the position of the toggle switch by itself. In general, K1 does not need to be adjusted, only K2 can be adjusted to solve the problem, in special cases, K1 and K2 can be adjusted together.

10 Converter operation and parameter setting

10.1 Keyboard definition and display



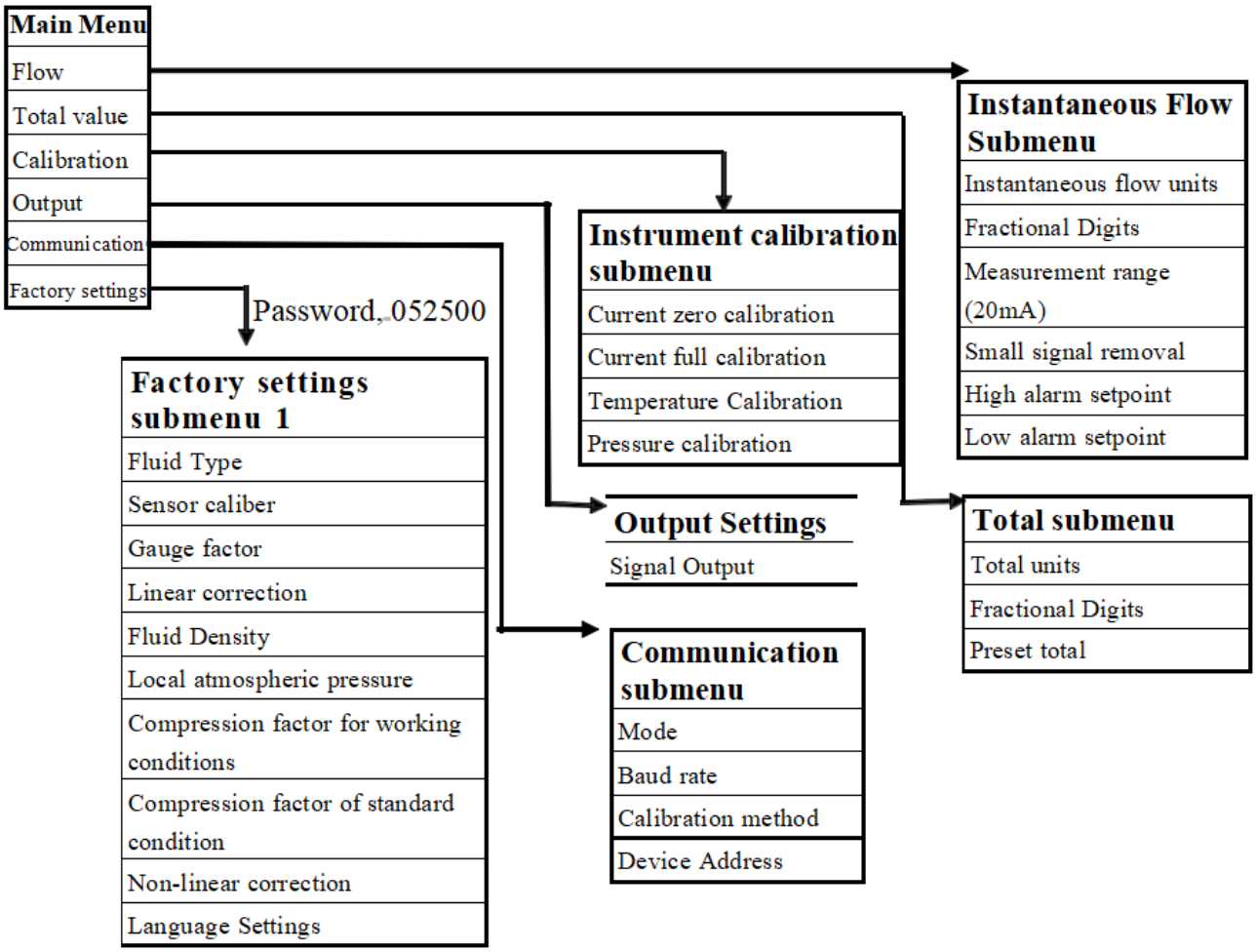
Left shift, parameter setting confirmation key and exit subdirectory key.

Factory setting fast key, downward shift, numeric decrement key.

Move up, decreasing digit keys.

Move right, enter parameter setting.

10.2 Converter menu structure



10.3 Description of converter parameters

- **Instantaneous flow parameter setting**

Flow units	Options: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 Define the units of instantaneous flow L (liters), t (tons), s (seconds), m (minutes), h (hours)
Flow several decimal places	Option:0 1 2 3 , Default:1 Defines the number of decimal places for instantaneous flow
Measurement range	Floating point:999999999.00-0.00 m³/h , default value:100.0 m³/h When the instantaneous flow rate reaches the range, the converter outputs 20mA. Changing this parameter will affect the current output, high alarm and low alarm, etc. Note: When you modify this setting value (range), please note the unit of this parameter (range), you can modify the unit of this parameter (range) as needed.
Small signal removal	Floating point number: 9.90 to 0.00 %, default value: 0.0 % This setting value is the percentage of the range
High Alarm	Floating point:99.00~1.00 %, default value:90.0 % This setting 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 × 10%), the converter outputs a

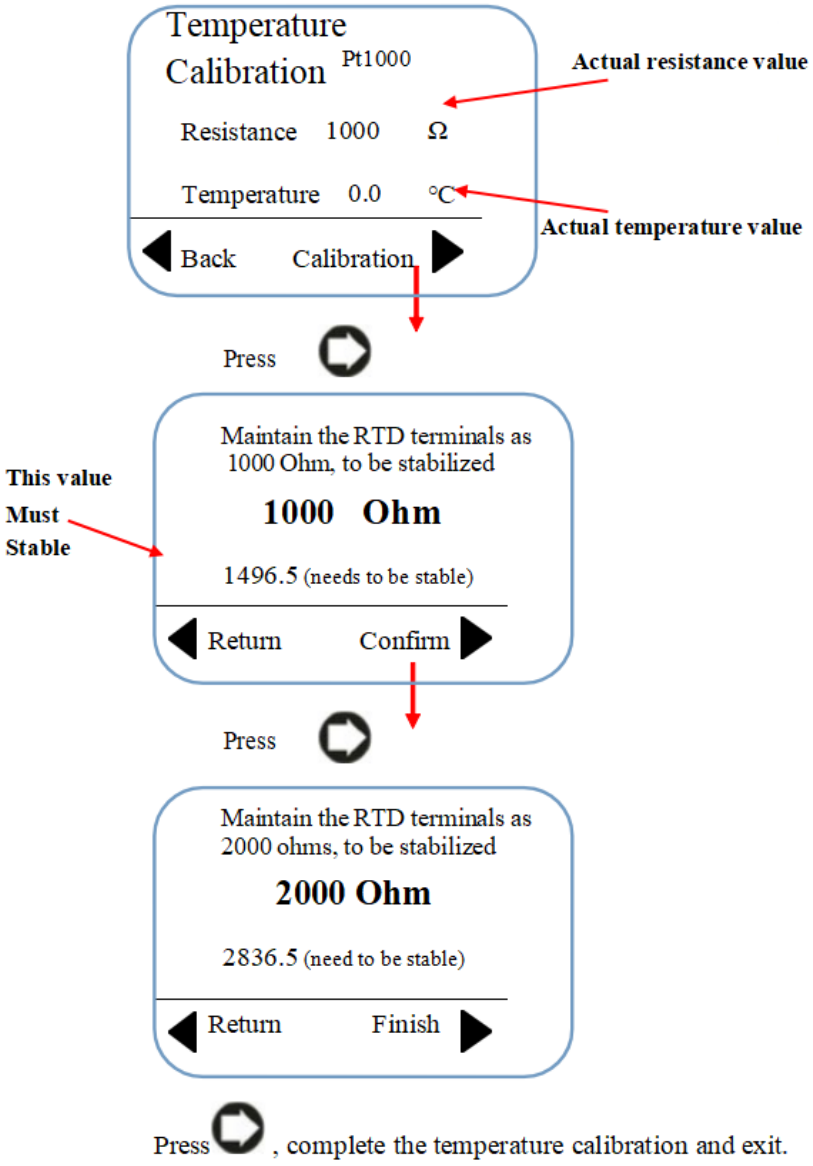
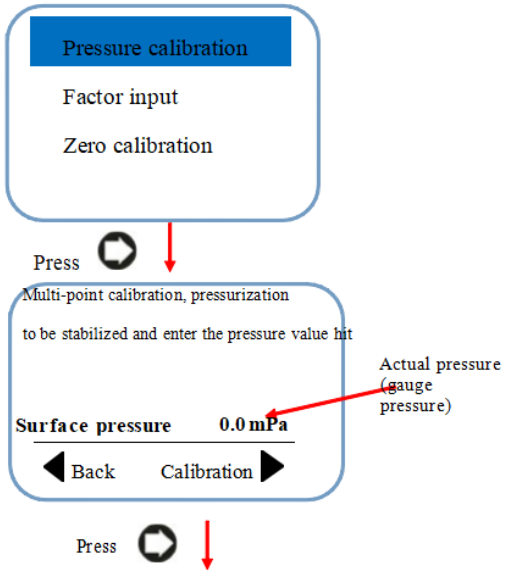
	high alarm signal and the high alarm contact is closed.
Low Alarm	Floating point: 99.00 ~ 0.00 %, default value: 0.0 % This setting value is a percentage of the range, for example, if this value is set to 10, it is equal to 10% of the range. If the absolute value of the instantaneous flow is less than (range × 10%), the converter outputs a low alarm signal and the low alarm contact is closed.
Damping time	Floating point:30.0～0.1, default value:1

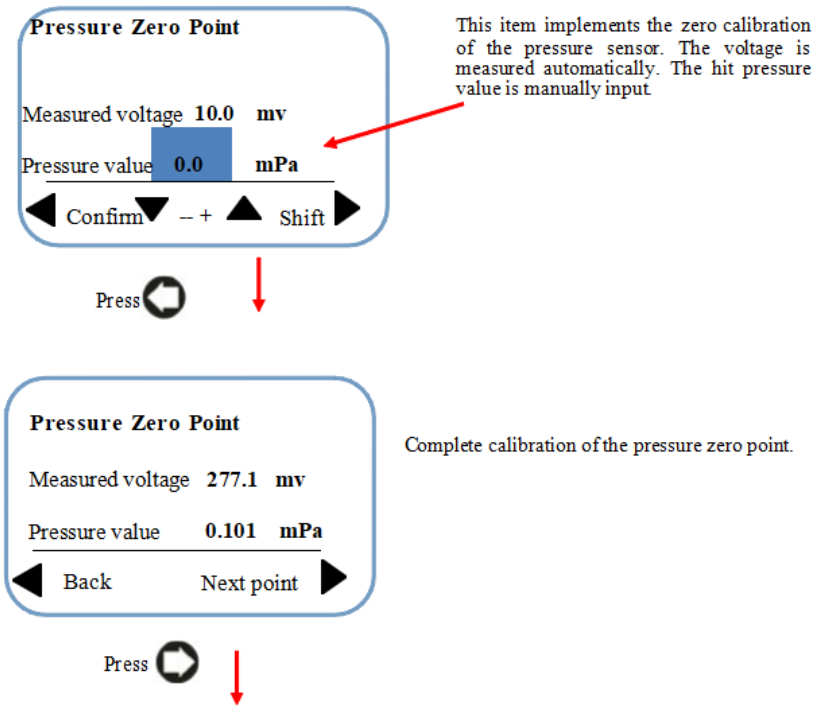
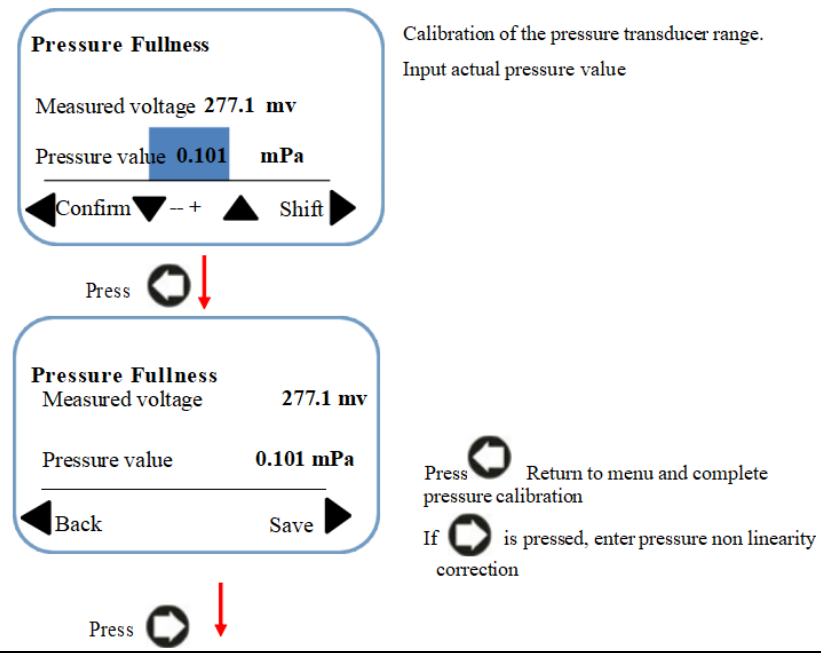
- **Total amount setting: Define the parameters related to the total amount.**

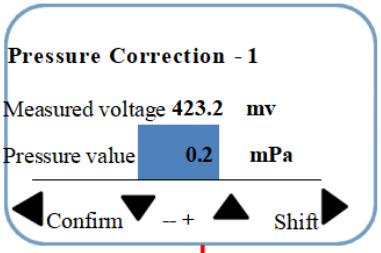
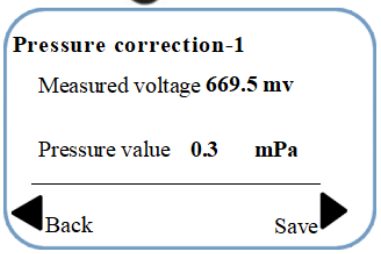
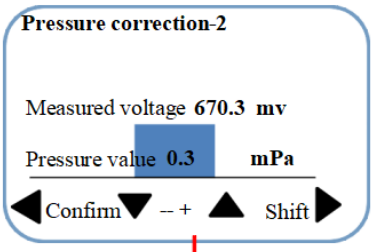
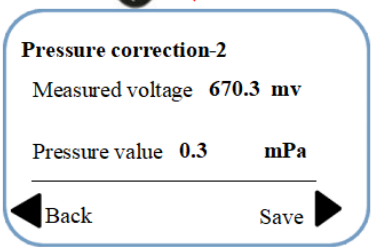
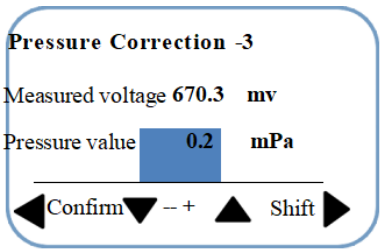
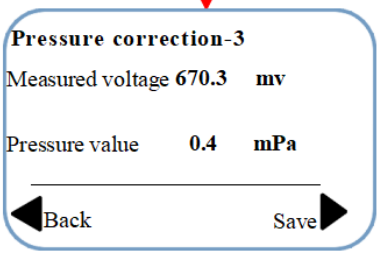
Total units	Options: L(liter) m^3 Nm^3 USG Kg t(ton), default:m^3 Define total units
Total number of decimal places	Option:0 1 2 3 , Default:1 Define the number of decimal places for the total
Preset total	Option:999999999.00-0.00 m^3/h , Default:0.0 m^3/h Clear total or set total value

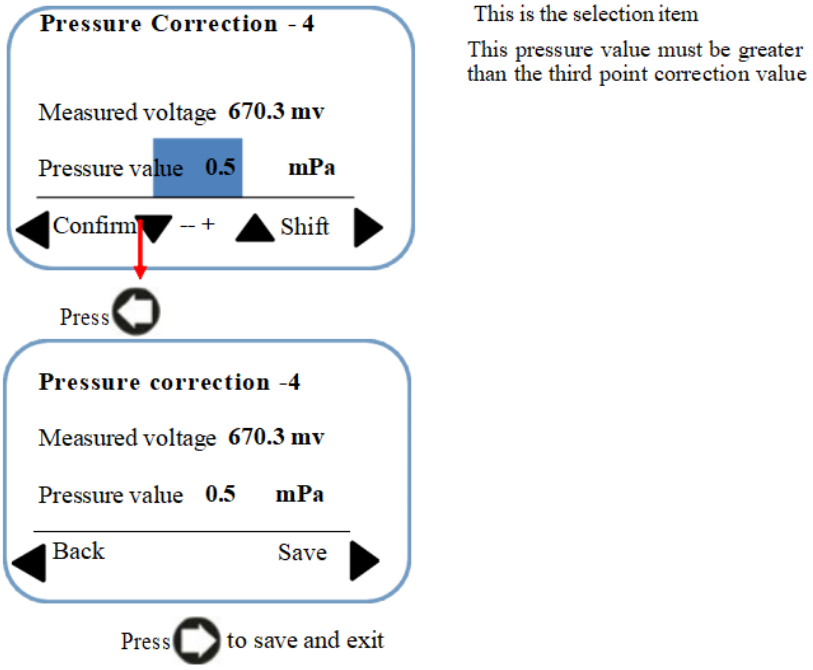
- **Instrument calibration:** Calibration of current output and calibration of temperature and pressure measurement loops.

Current zero calibration	Floating point:5.0~3.0, default value:0.0 After entering this submenu, use a multimeter to measure the current output value. If the current value is not equal to 4.0mA, then enter the true value measured by the multimeter and the converter will automatically complete the 4.0mA current output calibration. Note: If the current output deviation is too large, multiple corrections will be required to review the requirements, with a maximum input value of 5.0 for each correction.
Current Full Calibration	Floating point:21.0 ~ 19.0, default value:0.0 After entering this submenu, use a multimeter to measure the current output value. If the current value is not equal to 20.0mA, then enter the true value measured by the multimeter and the converter will automatically complete the 20.0mA current output calibration. Note: If the current output deviation is too large, multiple corrections will be required to review the requirements, with a maximum input value of 21.0 for each correction.

Temperature Calibration	
Pressure calibration	

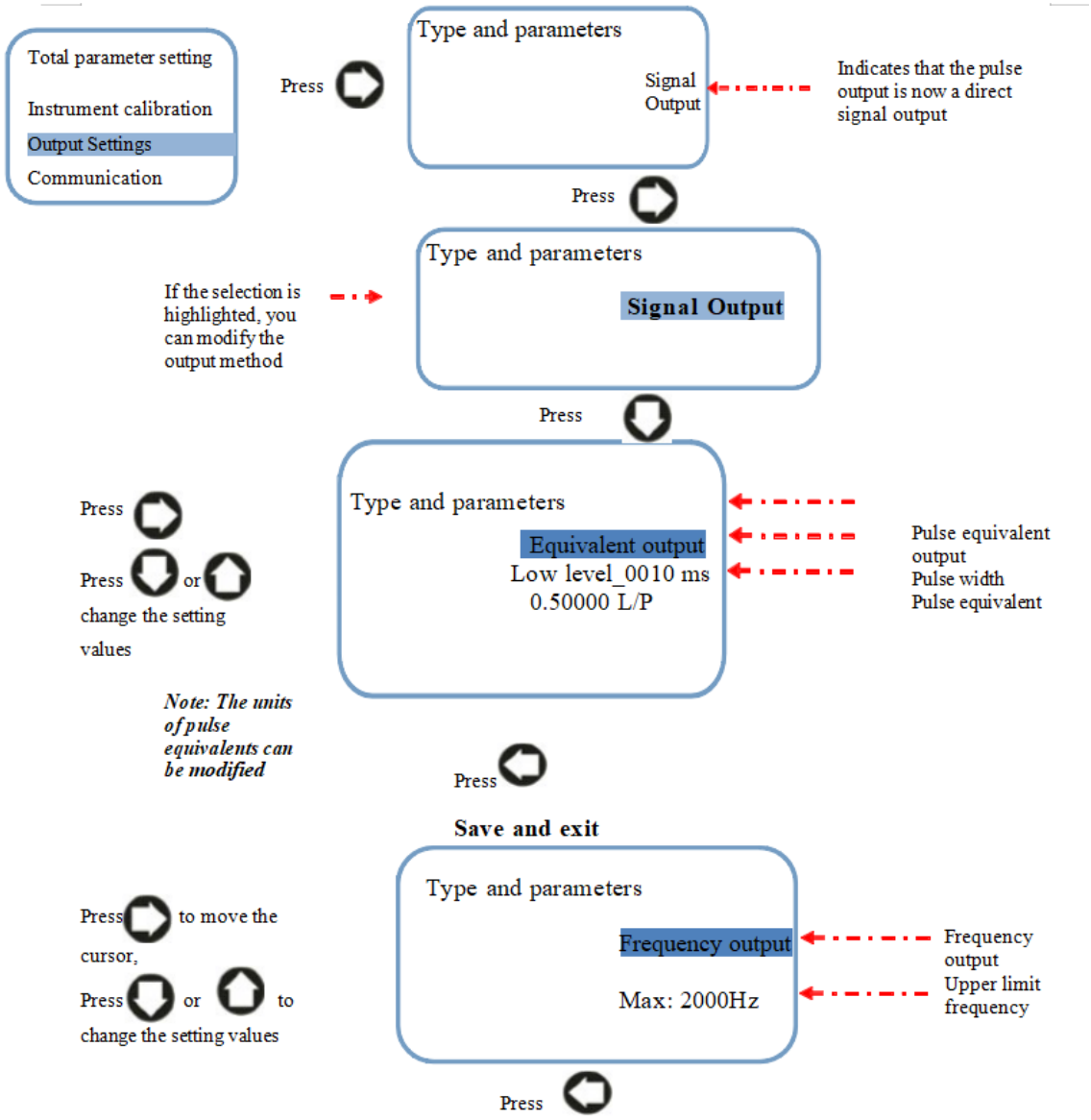
	
Pressure calibration	

	 Here is optional, if the pressure sensor is non-linear, you can adjust the pressure sensor step by step using the linearity of the pressure sensor. However, the pressure value must be greater than zero, otherwise an error occurs. Press  Optionally, press to exit the pressure next pressure calibration Press
Pressure calibration	 This is the option This pressure value must be greater than the first point correction value Press  Press Return to menu and enter to next pressure calibration Press  This is the option this pressure value must be greater than the second point correction value Press  Optionally, press to exit the pressure next pressure calibration Press

Pressure calibration	

Output setting: Set the parameters of three output modes: equivalent output, frequency output and signal output

Frequency limit	Floating point:5000.0 ~100.0 Hz, default:2000.0 Output frequency (Hz) = instantaneous flow rate (m³/h) ÷ range (m³/h) × upper frequency limit (Hz) For example: instantaneous flow rate is equal to 100m³/h, range is equal to 200m³/h, upper frequency limit is set to 2000HZ, then the output frequency corresponding to the instantaneous flow rate of 100 m³/h is 1000HZ.
Pulse Equivalent	Floating point:9999.0~0.0, default value:0.0 The unit of pulse equivalent is: L (liters) / pulse, the user can change the unit of pulse equivalent as needed: USG/P; Kg/P; t/P; Nm³/P; m³/P
Pulse width h (ms)	Floating point:1000.0~0.0ms, 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. only the difference between the frequency output and equivalent output 2.non-linear correction of the original signal output also play a role 3.Relationship with the instrumentation factor K F(HZ)=3600/(Q*K) Q: Instantaneous flow rate (m³/h);K:Instrument coefficient



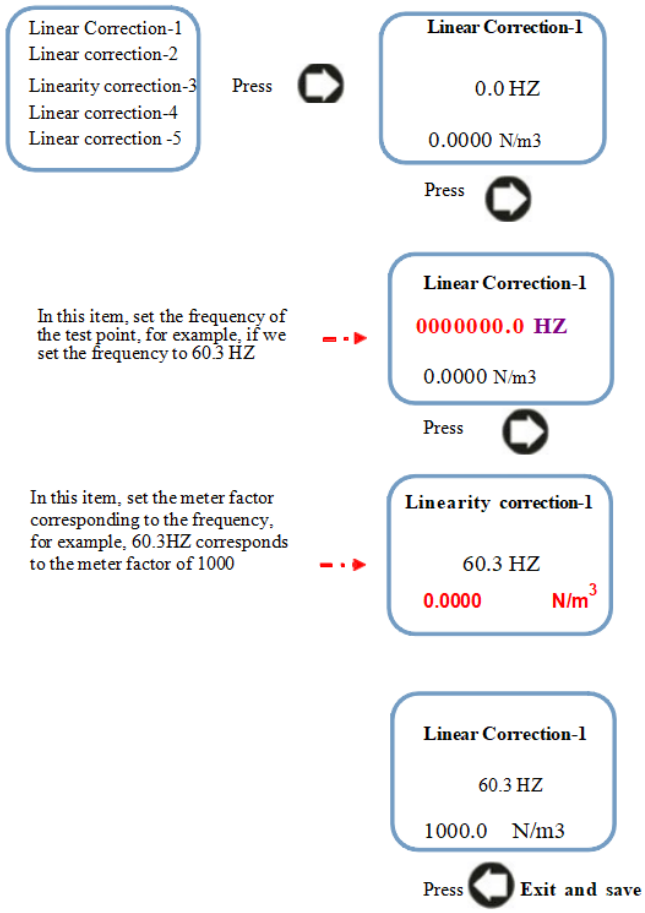
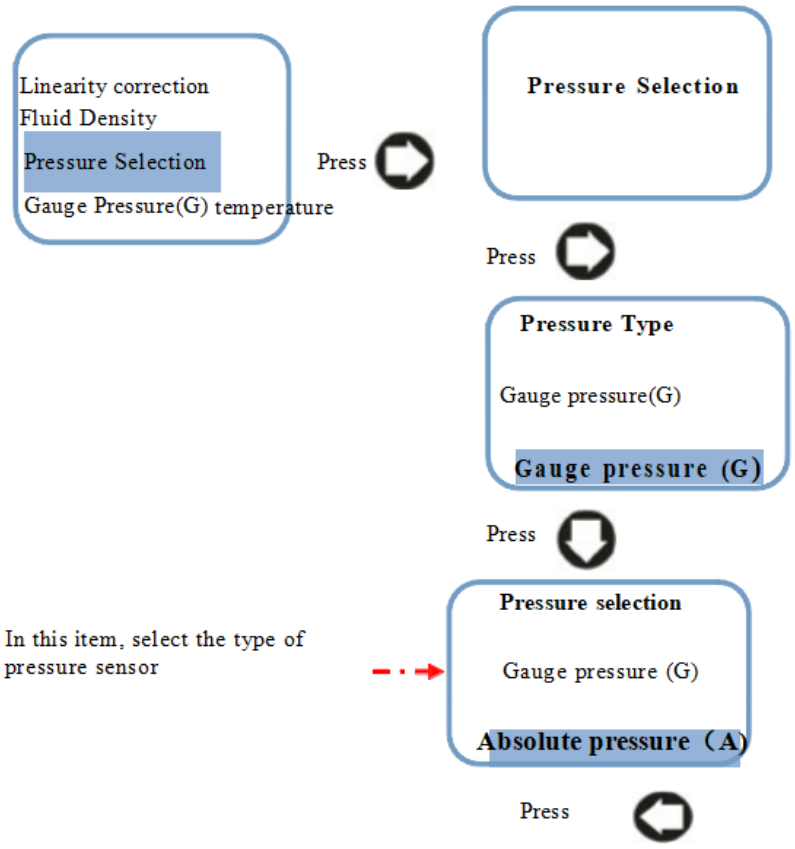
Save and Exit

➢ **Communication settings: Set the parameters of RS485 communication**

Mode	Options:Modbus-RTU; Modbus-ASCII; Default:Modbus-RTU
Baud rate	Options:1200 2400 4800 9600 19200 38400 Default:19200 Note: Please set the baud rate not lower than 9600
Calibration method	Options: no parity, even parity, odd parity Default: odd parity
Device Address	Value:247~1 , Default:1

Factory parameter setting: First password 052500 . ,

Fluid Type	Options:Gas working flow, gas standard flow Default:Gas working flow calibration flowmeter or use before, select the corresponding media. Select different options, the software performs different algorithms.
Caliber	Options: 15, 20, 25, 32, 40, 50, 65, 80, 100, 125, 150, 200 mm Default: 50 mm
Gauge factor	Floating-point number, default value: corresponds automatically to each caliber phase Q (instantaneous flow rate, m^3/h) = 3600 × F (frequency, HZ) ÷ k (k coefficient)) The final K-factor needs to be set here after the real flow detection. k (k-factor) stands for: Number of pulses per cubic meter output

Linear correction	 After completing the first point of linear correction, you will enter "Linear correction-2". **Note: The test point with the highest frequency must be the first point, and the frequency is set from large to small.**
Pressure selection	Selecting the type of pressure sensor. Options: Absolute, gauge and fixed pressure Default: Absolute pressure 

	Exit and save **If you do not have a pressure sensor installed, you can set the "Set Gauge Pressure", please note that the set pressure is the gauge pressure.**
Temperature selection	Select the type of temperature sensor. Options: PT100, PT1000 and set temperature default value: PT1000 The operation method is the same as the pressure selection operation method...
Earth's atmospheric pressure	Floating point Default value: 0.101 mPa If the medium is selected as liquid, this parameter does not have any effect.
Compression factor of standard condition	Floating point; Default value: 1; If the medium is selected as liquid, this parameter does not play any role.
Compression factor for working conditions	Floating point; Default value: 1; If the medium is selected as liquid, this parameter does not play any role.
Language Settings	Default value: Chinese (can be switched to English)

Advanced Password 905250

Set spectrum analysis parameters (if you don't understand spectrum analysis, please don't modify it casually)

Sampling rate	Floating point number, the sampling rate corresponds to the flowmeter aperture and is prohibited to change.
Spectrum limit	Define the upper limit of the signal frequency The default value corresponds to the meter aperture, but can be adjusted accordingly to the upper limit of the flow range.
Spectrum lower limit	Define the lower limit of the signal frequency The default value corresponds to the meter aperture, but can be adjusted accordingly to the lower limit of the flow range.
Power Threshold	Floating point The default value is set automatically according to the meter's aperture, you can also make corresponding changes according to the actual power threshold of the signal, which corresponds to the power threshold in the spectrum display interface "m".
Power Ratio	Floating point number, corresponding to "R" in the spectrum display, this parameter is the minimum value that meets the signal requirements.

10.4 How to set parameters

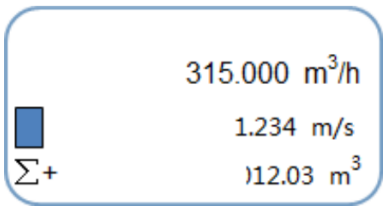


Figure 1 Instantaneous flow display interface

Press to enter the menu settings as shown in Figure 2.

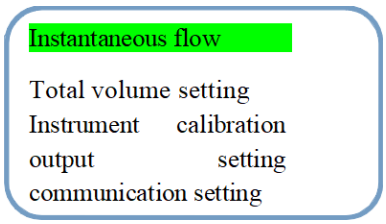


Figure 2

In the screen shown in Figure 2, or can select different submenus.pressthen return to the flow display screen as shown in Figure 1.

Press or to select submenu, press to enter the submenu to set the parameters. For example, we need to set the "Instantaneous flow parameter", when the Instantaneous flow parameter submenu becomes lighted , is displayed as shown in Figure 3 below.

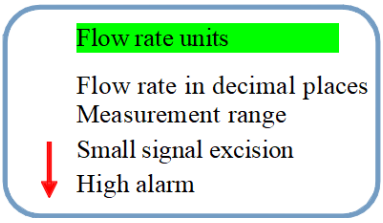


Figure 3

Press or to select the parameter you are modifying, the selected parameter will be highlighted, if you need to return to the menu shown in Figure 2, then ; if you need to go to the next level of menu, then to set the parameter, as shown in Figure 4.

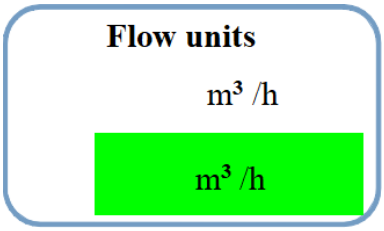


Figure 4

In this case, press or to modify the parameter, for example: As shown in Figure 4, you need to change the instantaneous flow unit " m³/h " to " m³/m ", then , the instantaneous flow unit will become " m³/m ", as shown in Figure 5.

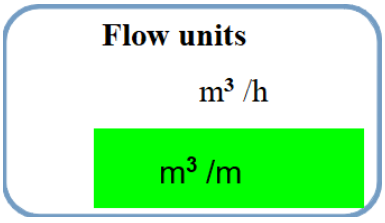


Figure 5

After modifying the parameters, if you need to save the settings, the system will automatically save them at , as shown in Figure 6.

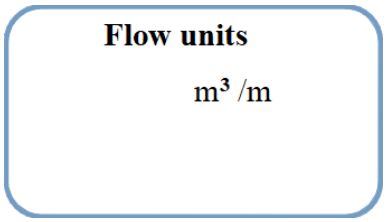
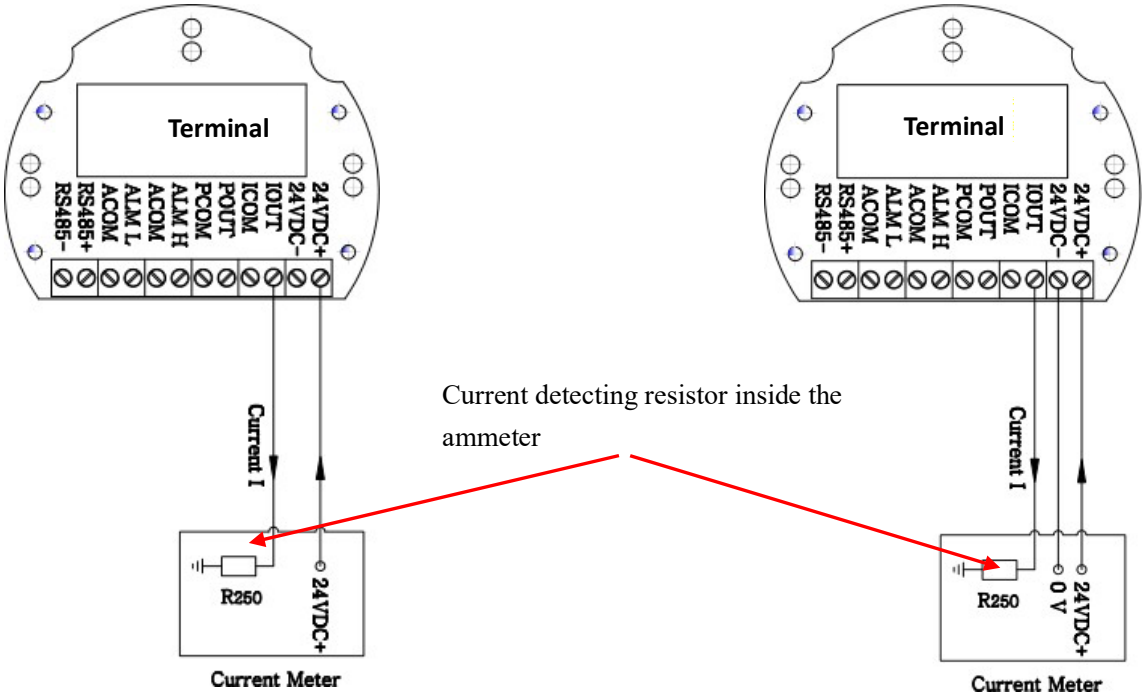


Figure 6

In this case,  , save the set value and roll out (as in Figure 3).

11 Wiring diagram and output definition

11.1 4-20mA current output wiring diagram



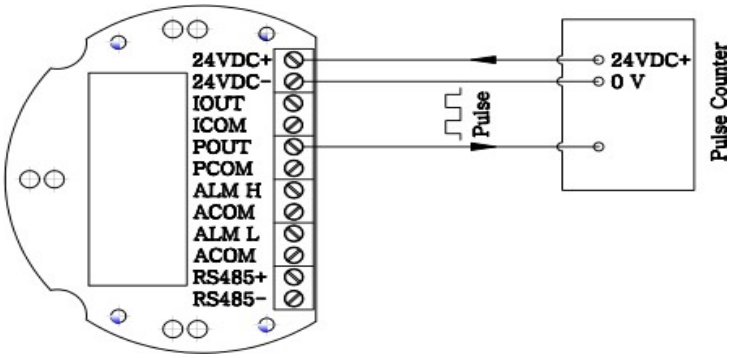
2-wire wiring diagram

3-wire wiring diagram

Wiring Terminal Definition

Wire terminal screen printing	Function	Remarks
24V +	DC 18 - 36V +	Power supply 24V +
24 -	DC 18~36v -	Power supply 24V -
IOUT	4~20Ma +	Load electricity <=- 500 ohms
ICOM	4~20mA -	
POUT	Frequency & Pulse Output+	
PCOM	Frequency & Pulse Output Common	
ALM H	High Alarm +	Recommended 24VDC intermediate relay, load current ≤ 30mA
ACOM	High Alarm Public Side	
ALM L	Low Alarm +	
ACOM	Low alarm common terminal-	
RS+	RS485 +	RS485 terminal
RS-	RS485 -	

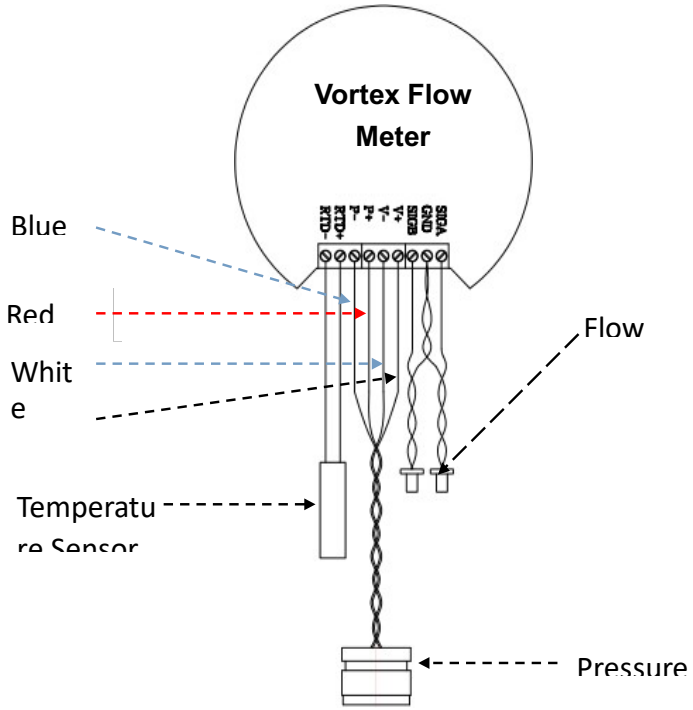
11.2 Pulse output wiring diagram



11.3 Wiring between the converter and the sensor

Definition of terminal blocks on the motherboard

Wire terminal screen printing	Function	Remarks
SIGA	Signal lines for flow sensors	
GND	Ground wire (signal common wire)	
SIGB	Signal lines for flow sensors	
V+	Power supply (+) to pressure sensor	Pressure sensor connection
V-	Power supply (-) to pressure sensor	
P+	Pressure sensor signal(+)	
P-	Pressure sensor signal(-)	
RTD+	Thermal resistance	Pt100 or Pt1000, 2-wire
RTD-		



12 Commissioning key points

12.1 Set the key parameters of the flow meter

As our converter is a rotary vortex flowmeter and vortex flowmeter common circuit design, we set a fixed dip switch as follows, in the installation of the circuit board, according to the caliber to set: (the location of the dip switch on the main board)

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

Go to <factory parameter setting>, select "Media" Go to <factory parameter setting>, select "Caliber"

Enter <flow parameter setting>, set range, unit and other parameters enter <output setting>, select output mode and set parameters.

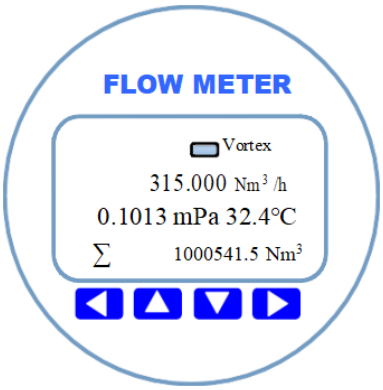
If necessary, enter the password 905250 Factory Parameters and modify the spectrum analysis parameters Caution.

- The converter is factory calibrated for temperature, so you only need to select PT100 or PT1000 in the Factory Parameters menu.
- There is no need to calibrate the temperature.
- You need to select the pressure sensor type in the "Factory Parameter Setting" menu, then connect the pressure sensor and actually pressurize it for pressure calibration.
- When using the Sonic Nozzle Test Rig or the fan system for testing, please note that the output corresponds to this by selecting "Media" in the menu: standard or service flow.

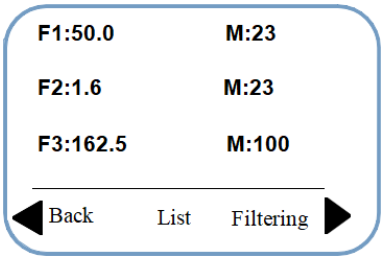
For example: if you choose "standard flow", the output 4-20mA or pulse or frequency or raw signal, corresponding to the standard flow; if you choose "working flow", the output 4-20mA or pulse or frequency or raw signal, corresponding to the working flow. frequency or raw signal, corresponding to the working flow rate.

12.2 Checking DSP Parameters

When actual traffic is available, the DSP parameters can be checked if necessary (not normally necessary).

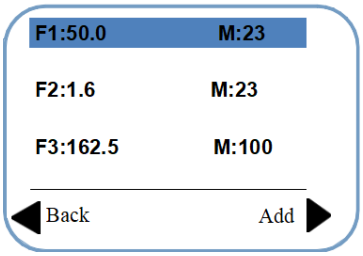


In the above menu, press the key to enter the DSP spectrum analysis screen, as shown below.

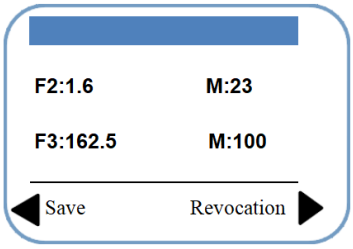


If 50HZ is an interfering signal, it can be filtered out by

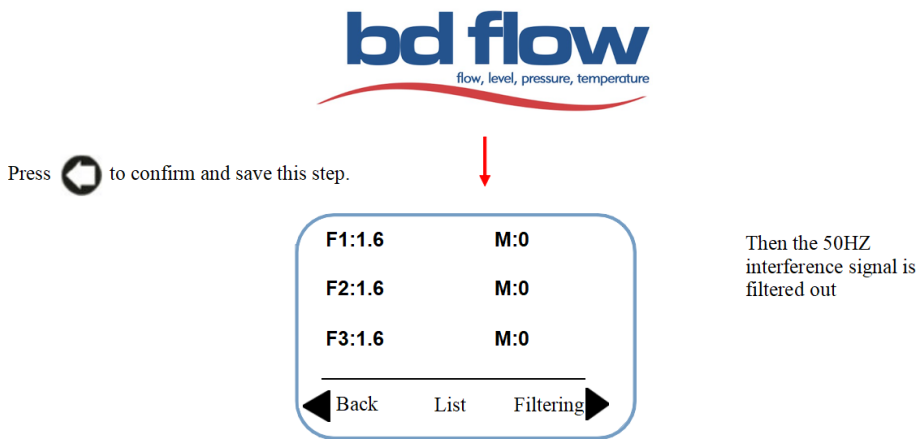
Pres



Press



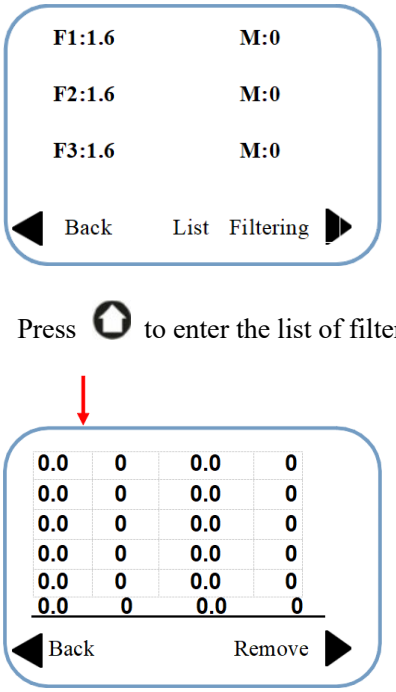
Press to undo this step.



If there are multiple interfering signals, the above method can be used to filter them out without affecting the measurement.

All filtered signals are shown in the list. You can find the filtered signals in the way shown below, and you can also restore the incorrectly filtered signals.

The method is as follows.



13 Maintenance and Troubleshooting

Flowmeter display is not normal, should check whether the process conditions to meet the requirements of the instrument, whether the process flow falls within the range of the flowmeter can measure, such as not to meet the requirements, the flowmeter display will not be normal.

Flowmeter can detect the medium should be a single-phase fluid, such as gas-liquid two-phase phenomenon of the medium, the flowmeter display will not be normal.

When the flowmeter is faulty, should correctly distinguish whether the display instrument, or other secondary instrumentation is faulty. If the flowmeter has output, and the display meter does not show, this kind of fault should be in the display meter.

Confirm the fault from the flowmeter, you can follow the table below to eliminate the processing.

Failure phenomenon	Possible causes and treatment methods
When the power is turned on, there is no zero (4mA) output from the flow meter.	The positive and negative terminals of the power cord are reversed. It should be reconnected. The power supply voltage is not correct. Check that the voltage on the meter terminals should be within the range of (17 to 30) V. Secondary meter lead wiring fault. Check the wiring.
When there is flow, the flow meter has no output current.	The pipe flow rate is less than the lower limit flow rate that can be detected by the flow meter. Change the pipe diameter and increase the flow rate. The gain of the amplifier board is not enough or the sensitivity of the trigger is too low, adjust K1 or K2. Poor contact between the connection bolts between the amplifier plate and the coefficient plate. Deal with the clean connection point, reinstall the coefficient plate, and tighten the stud nut. Instrument circuit failure, find the faulty part of the circuit to repair.
There is no flow in the pipe, but the flow meter has a signal output.	1. Zero offset. Zeroing (4mA). 2. The pipeline vibrates strongly, causing the instrument to have an output signal. Reinforce the pipeline to reduce the vibration. 3. The trigger sensitivity is too high. Adjust K2 so that TP3 output just disappears and the pointer of the field indicator goes back to 0%. 4. instrument circuit failure, find the faulty part of the circuit to repair.
The flow meter output signal is unstable and the pointer swings too much.	The process flow is at the lower flow point threshold of the meter. Adjustable K2 and damping switch for stable output. Poor circuit or lead contact, check contact points.
When the flow rate increases, the output current does not go up.	1. The load resistance of the flow meter is too large. Reduce the load, or increase the supply voltage up to 30V. 2. Circuit failure. Check according to the method in section 7.
Large deviation in flow rate display.	1. The flowmeter set range (Qmax) and the secondary instrument set range is not correct. Readjust the secondary instrument range. 2. The flowmeter conversion factor KB was calculated incorrectly. Recalculate KB and select J. 3. The design working condition is different from the actual working condition. Recalculate KB, J according to the actual working condition coefficients, and readjustment. 4. The KB code switch is in the wrong position or the J connector is connected in the wrong position. Readjust the switch and the connection tab. 5. Circuit failure, need to repair.

14 Packaging and storage

The transmitter is placed inside a special foam box to prevent damage during shipping. Random

documentation includes: operating manuals, certificates, packing lists, etc. To prevent damage to the instrument during shipment, keep it in the manufacturer's packaging until it arrives at the installation site. The storage location should meet the following conditions: placed indoors and protected from rain, moisture and low mechanical vibration.

Appendix I: RS485 communication address table

Variable Name	Register First Address	Register Length	Command Code	Type of data
Instantaneous flow	0x01	0x02	0x04	Floating point
Instantaneous flow units	0x03	0x01	0x04	Integer
Total volume	0x04	0x04	0x04	Double precision
Total units	0x08	0x01	0x04	Integer
Temperature	0x09	0x02	0x04	Floating point
Pressure	0x0b	0x02	0x04	Floating point
Total volume（m^3)	0x0d	0x02	0x03 0x04	Floating point
Continuous reading (address contiguous)				
Instantaneous flow	0x14	0x02	0x04	Floating point
Total volume	0x16	0x02	0x04	Floating point
Temperature	0x18	0x02	0x04	Floating point
Pressure	0x1a	0x02	0x04	Floating point
Instantaneous flow	0x1e	0x02	0x04	float inverse
Total volume	0x20	0x02	0x04	float inverse
Temperature	0x22	0x02	0x04	float inverse
Pressure	0x24	0x02	0x04	float inverse

Appendix II: Unit Definitions

	Unit	Code	Unit	Code
Instantaneous flow rate	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 volume	Nm^3	0x00		
	m^3	0x01		

	L	0x02	
	usg	0x03	
	kg	0x04	
Temperature	t	0x05	

```
000000-Tx:01 04 00 01 00 02 20 0B
000001-Rx:01 04 04 00 00 00 00 FB 84
000002-Tx:01 04 00 01 00 02 20 0B
000003-Rx:01 04 04 00 00 00 00 FB 84
000004-Tx:01 04 00 01 00 02 20 0B
000005-Rx:01 04 04 00 00 00 00 FB 84
000006-Tx:01 04 00 01 00 02 20 0B
000007-Rx:01 04 04 00 00 00 00 FB 84
```

The figure shows the read transient traffic sending and receiving data frames

Sending frames

01	04	00	01	00	02	20	0B
Device Address	Function Code Read Holding Register	Destination register first address instantaneous traffic address 01		Number of read registers Two registers for instantaneous flow 32 position		CRC Checksum	

Answer Frame

01	04	04	00	00	00	00	FB	84
Device Address	Function Code Read Holding Register	Next there are several bytes of data	Data Instantaneous flow as floating point, 32-bit IEE745 single precision floating point				CRC Checksum	