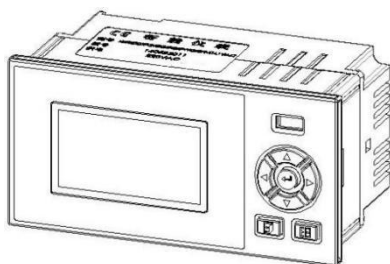


Foreword

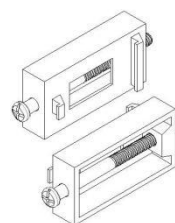
Thank you for purchasing the **Exquisite quantitative controller**.

The use's manual contains useful information about the functions of the instrument, installation, operation procedures, parameter setting and troubleshooting . To ensure correct use, please read this manual carefully before installation and operation. And keep this manual in a safe place for quick reference in the event a question arises.

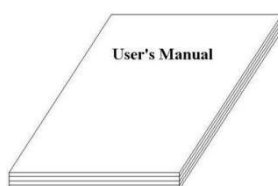
Packing Details



Exquisite quantitative controller



Mounting Bracket



User's Manual



Quality Certification

No.	Name	Unit	QTY	NOTE
1	Exquisite quantitative controller	pcs	1	
2	Mounting Bracket (with screws)	pcs	2	Suit for embedded installation mode
3	User's Manual	book	1	
4	Quality Certification/ Warranty Card	pcs	1	
5	Data Management Software (CD)	pcs		optional
6	RS232C/485 Convert Modula	pcs		optional
7	RS232C Lines	pcs		optional

Attention

- If you find that the instrument is damaged by transportation, please contact the manufacturer.
- This series of instruments is suitable for general industrial occasions. If you have special use requirements, please set up a separate protective device.
- For the safety of you and the instrument, please do not install with electricity. Please use the rated voltage power supply, the correct wiring, properly grounded, after the power supply, please do not touch the back of the instrument wiring terminal, in case of electrical shock.
- The instruments should be installed indoors, and the installation position is to ensure that the ventilation is smooth (in case the temperature inside of the instrument is too high), avoid the wind, rain and direct sunlight, do not install in the following situations:
 - An occasion where temperature and humidity exceed the conditions of use
 - An occasion in which a corrosive, flammable or explosive gas is present.
 - Occasions with large amounts of dust, salt and metal powder.
 - Occasions where water, oil and chemical liquids are easily spattered.
 - An occasion of direct vibration or shock.
 - Electromagnetic source.
- The instrument should take appropriate shielding measures when it is close to power line, strong electric field, strong magnetic field, static electricity, noise or AC contactor, etc.
- In order to avoid measuring error, when the sensor is thermal resistance, use three copper conductors of the same size and resistance value less than $10\ \Omega$, otherwise the measurement error will be caused.
- In order to extend the service life of the instrument, please carry out regular maintenance and maintenance. Do not repair and disassemble the instrument by yourself. When wiping the instrument, please use a clean soft cloth, do not dip in alcohol, gasoline and other organic solvents cleaning, may cause discoloration or deformation.
- If the meter has influent, smoke, smell, noise and so on, please immediately cut off the power supply, stop using and get in touch with the supplier or our company in time.

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Chapter 1: Summary

● Summary

The refined quantitative controller is a flow measurement and control system based on ARM microprocessor and matched with various flow transmitters, sensors (such as turbine, vortex street, electromagnetic flowmeter, etc.) and solenoid valve pump body, which can accumulate the flow and control the quantitative.

This exquisite quantitative controller has good man-machine interface and soft and hard protection measures. It has simple control operation, reliable safety performance, excellent anti-interference performance and excellent stability. It is mainly used in fields that need quantitative packaging and control in petroleum, chemical, pharmaceutical and food industries: quantitative charging / feeding, loading, batching, discharging, dispensing, gas filling, etc

● Feature

- Applicable to a wide range of flow meters and fluid media.
- Automatic conversion of flow units and automatic calculation of flow coefficient of differential pressure flowmeter.
- Call function: support quick call of common quantity.
- Audit records: power failure records and quantitative records.
- Cumulative report: support cumulative flow daily report, monthly report and annual report query.
- Communication function: Standard Modbus RTU protocol, supporting RS485 and RS232C communication interfaces.
- Transmission function: it supports standard current transmission output, and the signal source channel is optional.
- Feeding function: support multiple groups of specifications of feeding output to supply power to the sensor.
- Protection function: built in memory to protect parameters and historical data, which will be permanently saved after power failure; Integrated hardware clock can operate accurately after power failure.

Chapter 2 Technical Indicators

● Display

Screen: 128*64 monochrome LCD (LCD)

Accuracy: Display accuracy $\pm 0.2\%$ F.S.

● Processor

High performance arm Cortex-M3 32 bit RISC core.

● Input Function

Flow Channel: Analog signal: 0-10mA, 4-20mA

Frequency signal: Fr(range: 0.0-5000.0HZ, Vil: $\leq 1V$, Vih: $\geq 5V$

Temperature channel:0-10mA, 4-20mA, PT100 and other signals.

Pressure channel: 0-10mA, 4-20mA and other signals

Attention

- Other input signals , need to be indicated when ordering.

● Output Function

Distribution Output: Provide one group (F12) of 12VDC and two groups (Q24 and P24) of 24VDC sensor power supply. The maximum output current is 30mA. The flow current 24V distribution (Q24) and pressure 24V distribution (P24) are grounded together.

Transmission Output: Support 1 channels standard current 4-20mA transmission output, load capacity 500 Ω (maximum).

Relay output: Support 3 relay output, contact capacity 3A@ 250VAC / 3A@ 30VDC.

● Communication Function

Communication Interface: providing RS232C and RS485 communication interfaces for users to choose from, supporting Modbus RTU protocol, baud rates- (1200/2400/4800/9600)

Printing interface: RS232C is directly connected to the micro printer, with a baud rate of 1200

● Power Supply

AC Power supply: 220VAC/50HZ AC power supply.

DC Power supply:24VDC (18VDC-36VDC) DC power supply; 12VDC (9VDC-18VDC) DC power supply (DC power supply to be indicated when ordering).

Attention

DC power supply shall be indicated when ordering

- **Error Precision**

Clock error: ± 2 seconds / day

- **Working Environment [prohibited from working in flammable, corrosive]**

Working temperature: 0 °C ~ 50 °C (avoid direct sunlight)

Relative humidity: 0 ~ 85% R.H (without condensation)

Altitude: < 2000m (other than special specifications).

- **Instrument Net Weight**

Net weight: ≤ 1.0 kg

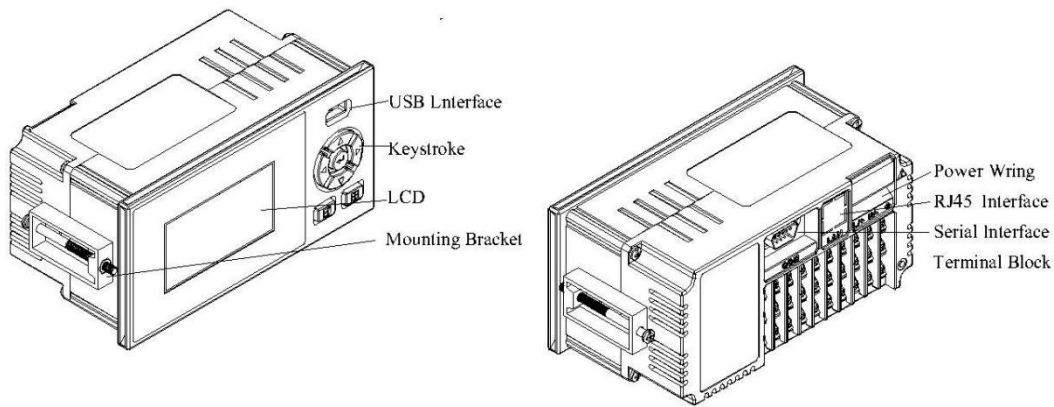
Attention

© The technical index is the general index of this series instrument, the function configuration please take the material object as the standard.

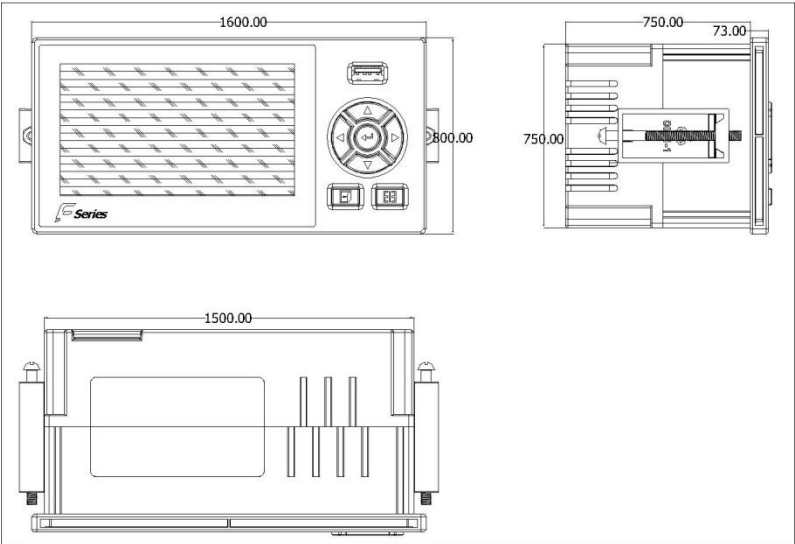
© If the technical index is inconsistent with the physical instrument , please take the object in kind .

Chapter 3 Installation Wiring

3.1 Instrument Structure

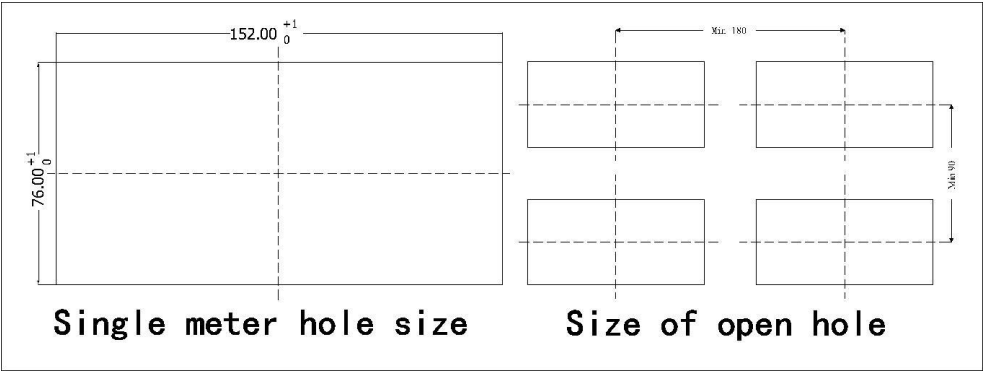


3.2 Instrument Dimensions



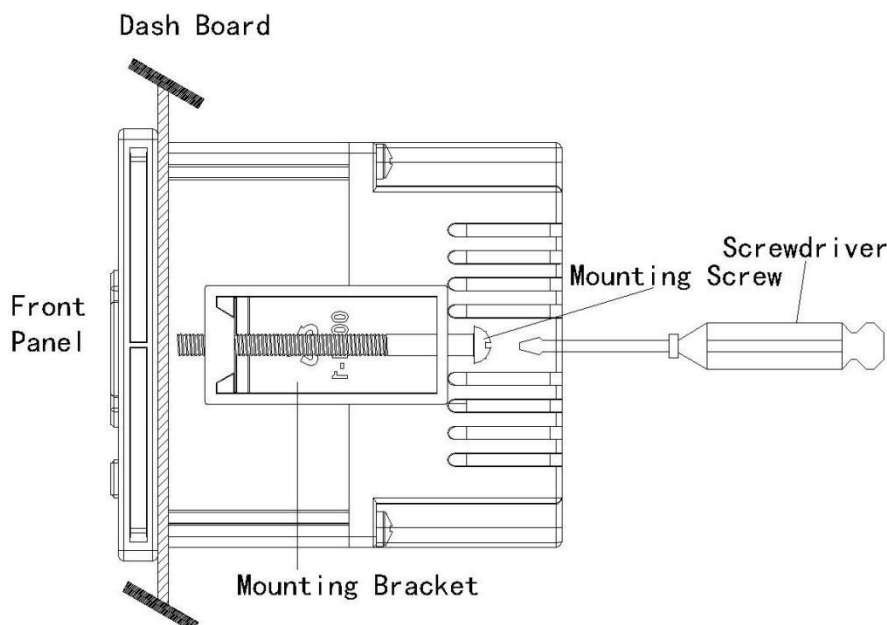
The above graphic unit: mm

3.3 Size Of Opening



When assembling the meter, refer to the minimum spacing between meters recommended in the above table to ensure the necessary heat dissipation and loading and unloading space.

3.4 Instrument Installation



Installation Method:

- ◎ Step 1: push the meter into the installation hole from the front of the mounting panel (please use the steel plate). The thickness of the mounting panel is (1.5 ~ 6.5) mm.
- ◎ Step 2: install the mounting bracket with the instrument as shown above (two supports on both sides of the instrument and M4 standard screw for the instrument panel mounting bracket).
- ◎ Step 3: after the meter body is installed, the signal line and power line can be connected.

3.5 Instrument Wiring

3.5.1 Wiring Methods

U-type voltage terminal with insulated sleeve (M 3.5 screw for power terminal and M 3 screw



for signal terminal) is recommended.

In order to improve the safety of the instrument, please follow the following warning when wiring.

Attention

- To prevent electric shock, please confirm that the power supply has been cut off in the wiring.
- In order to prevent fire, please use double insulated wire (the recommended cross-sectional area of power line is $\geq 1\text{mm}^2$, insulation 600V conductor; The output wiring of the relay shall have strong voltage resistance, and the cross-sectional area shall be $\geq 0.5\text{mm}^2$ A wire of).
- Please set an air switch in the power circuit to separate the meter from the main power supply.
- Firmly tighten the terminal screws. Tightening torque: 0.5N. M (5kgf. Cm).
- After connecting the power line, connect the power supply to check whether the instrument is normal. Before that, do not connect the signal line. After confirming that the instrument can work normally, disconnect the power supply and then connect the signal line.
- The measuring circuit and the power circuit shall be laid separately. The measuring object is not the interference source. If it is unavoidable, please insulate the measuring object from the measuring circuit and ground the measuring object.
- For the interference caused by static electricity, it is better to use shielded wire.
- For the interference caused by electromagnetic induction, it is better to densely twist the measuring circuit wiring at equal distance.
- If the input wiring is connected in parallel with other instruments, the measured value will be affected by each other. When parallel connection is not necessary, please do not switch the power supply of one of the instruments during operation, which will have adverse effects on other instruments. The thermal resistance cannot be connected in parallel in principle, and the current signal cannot be connected in parallel in principle.
- When platinum resistance is input, the resistance of each lead shall be less than $10\ \Omega$ (the lead resistance value is the same).

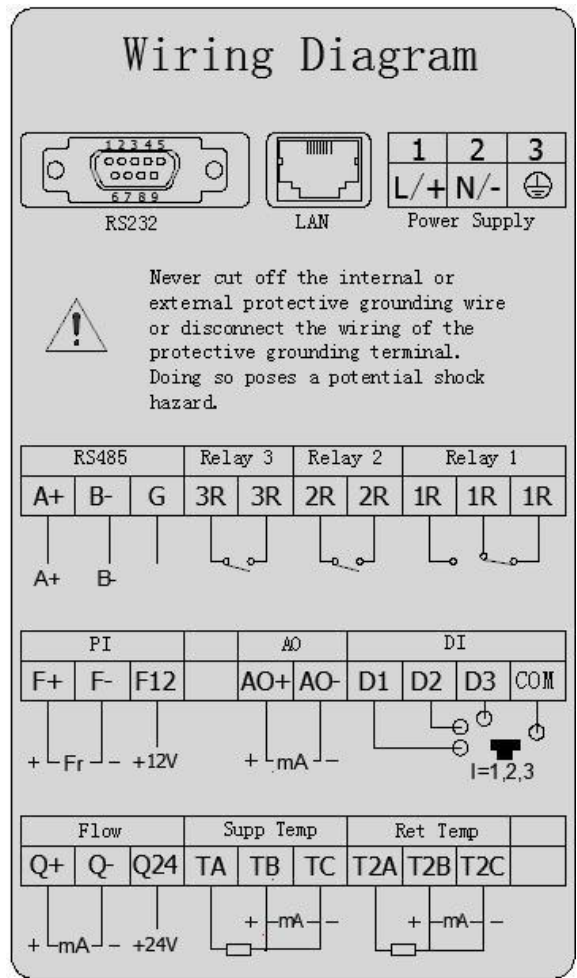
3.5.2 Terminal Description

Terminal name	Explain
L/+、N/-  或 为+、-、NC	L is the AC power source phase line end, N is the AC power source zero end,  is the ground end, + is the DC power source positive end, - is the DC power supply negative end, the DC power supply, please indicate when ordering.
A+、B-、G	Signal sending end, receiving end and communication ground end of RS485 communication interface
1R,2R,3R	Relay output interface of large valve (1R), small valve (2R) and pump body (3R) Specification 250VAC/ 3A@30VDC /3A
Start, stop, reset public	Quantitative start button, quantitative stop button, quantitative reset / reset button Common button contact
F+、F-、F12	Signal end of frequency flowmeter, signal end, 12VDC feed input end
AO+、AO-	The positive and negative end of the current output
Q+、Q-、Q24	Signal end of differential pressure flowmeter, signal end, 12VDC feed input end
TA、TB、TC	Analog input terminal of temperature supply channel (TA, TB, TC); Signal terminal (TB) and signal ground terminal (TC) of temperature transmitter
P+、P-、P24	Signal terminal (P +), signal ground terminal (P -), 24VDC feed input terminal (P24) of pressure transmitter
COM	RS232C communication interface / serial port print interface (where 2 feet are RXD instrument signal receiving terminal and 3 pin is TXD instrument signal transmitter terminal 5 pin is signal ground end)
LAN	Ethernet RJ45 interface

Attention

Note: Touching the terminal while electricity are strictly prohibited

3.5.3Wiring Diagram

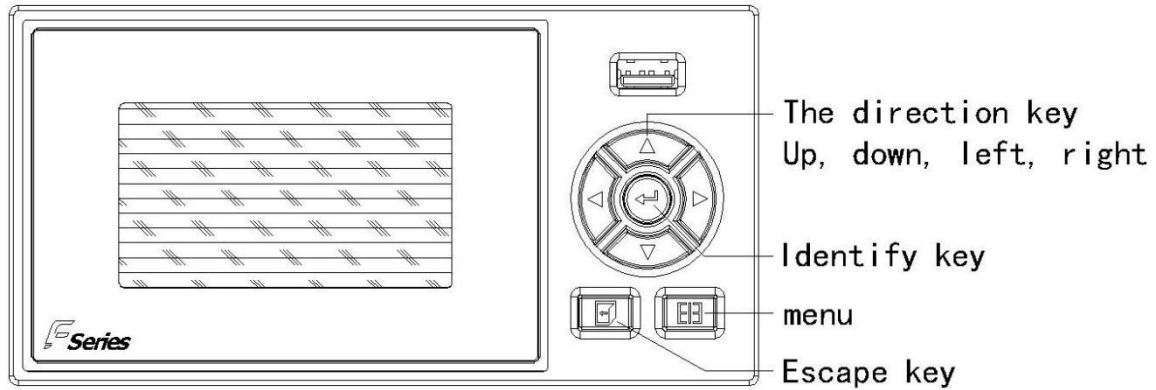


Attention

- ◎The power supply voltage at the project site shall be limited to the withstand voltage range of the instrument.
- ◎When the power consumption of the transmitter exceeds the feeding load capacity of the machine, please use an external stabilized voltage source for power supply.
- ◎ Please do not plug and unplug the communication cable with power.
- ◎This instruction gives the basic wiring diagram. When the instrument function conflicts with the basic wiring diagram, please take the physical object as the standard.

Chapter 4 Basic Operation and Running Picture

4.1 Instrument Keys



● Keyboard Function

- ◎ Upward key: Switch to select or increase cursor data values, etc.
- ◎ Down key: Switch to select or reduce cursor values, etc.
- ◎ Left key: Switch channels or move the cursor forward, etc.
- ◎ Right key: Switch timescale or move back cursor, etc.
- ◎ Confirmation key: Perform cursor location function or edit cursor location data, etc.
- ◎ Escape Key: Exit the current screen.
- ◎ Menu key: Switch main display pages, etc.
- ◎ Escape+Menu Combination key: Hold down more than 1 second at the same time, enter the configuration Interface.

4.2 Operation screen

4.2.1 General Picture

Set value		
Flow	1000	m³
Run.	1	
Wait	0	S
OK		Back

Input quantitative
value screen



End status
Press the up key



running state

Press the OK key

General appearance pause

status screen

2022 / 08 / 05			15:05:15		
SetCum	1000		m³		
NowCum	0		m³		
AllCum	0		m³		
Runs	0001 / 0001	End			

Left
and
right
keys

Flow	0	m³/h
Freq	0	Hz
Acc.	677.	m³

General appearance end status
screen



End status
press down key



Press the exit key

General appearance sub
information screen

Select Used		
Set		
	1000	m³

Call quantitative
value screen

T i p s	Give up this ration?	
	OK	Back

Abandon quantitative
picture

The default power on state of the machine is the end state of the general appearance screen. When it is in the general appearance screen, press the [left key] or [right key] can switch to the sub information screen, press the [up key] to enter the set quantitative value screen (the general appearance screen needs to be in the end state), press the [down key] to enter the call quantitative value screen (the general appearance screen needs to be in the end state), press the [exit key] to enter the abandonment of this quantitative screen, and press the [OK key] to switch the start operation / pause stop state (the general appearance screen needs to be in the run / pause state), Press [menu key] to switch to the digital display screen.

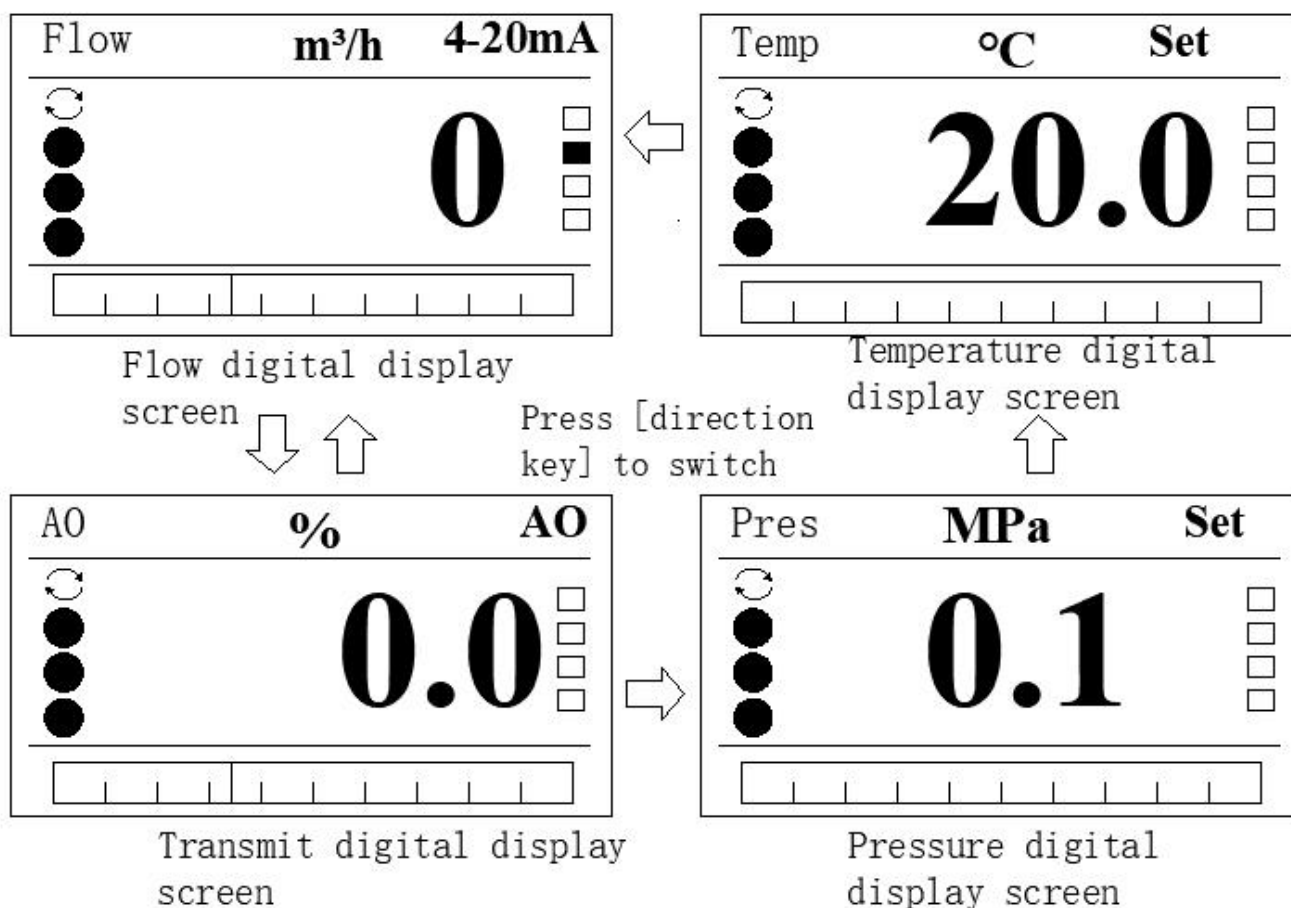
- General picture: display quantitative value, sub cumulative value, batch cumulative value, batch number and end / run / pause/completion / countdown status.

- Input quantitative value screen: input the pre issued quantitative value, batch number and interval time, start quantitative control after confirmation, and return to the end state of the general appearance screen after cancellation.
- Call the quantitative value screen: display the set common quantity value or set quantitative value, press the [up] or [down] key to switch the common quantity value or set value, press the [OK] key to select the common quantity value or set value and start quantitative control.
- The sub information screen displays instantaneous flow, differential pressure / frequency / volume value (the relevant parameters also change with different flow models), temperature, pressure, density (press the up and down keys to switch), total cumulative value, etc.
- When the temperature or pressure is given, the given value of temperature or pressure is displayed in the relevant screen.

Attention

- The flow displayed in the general picture is the value under standard condition, and the density displayed is the value under fluid working condition.
- After the flow accumulation is cleared, the cumulative value in the general appearance related screen will be cleared.
- The accumulated total flow overflows and returns to zero.
- When the system does not compensate, the relevant interface or parameters are automatically hidden and not displayed.
- When the general picture is in the running / pause state, press the [up key] or [down key] to enter the setting / calling screen to prompt relevant instructions.
- When the general picture is in the end state, pressing [OK] is invalid.
- When in the call quantitative value screen, the quantitative stop button is equivalent to the [up key], and the quantitative reset button is equivalent to the [down key].

4.2.2 Digital Display Screen



When in the digital display screen, press [direction key] to manually switch the sub digital display screen, and press [menu key] to switch to the query screen.

- Status bar: display the channel name, unit, signal type / given (when the temperature or pressure is given, [given] is displayed here).
- When the relay acts, its status mark changes from a hollow circle to a solid circle, and when the system alarms, its status mark changes from a hollow box to a solid box.
- Bar chart: the filled area of the bar chart represents the percentage of the current data in the total range.
- When the temperature or pressure is given, the given value of temperature or pressure is displayed in the relevant screen.
- Σ : Total cumulative flow.

Attention

- The flow displayed in the digital display screen is the value under standard condition.
- When the system does not turn on transmission output, patrol display switching and other functional parameters, the relevant interfaces and signs are not displayed.
- The cumulative value in the flow digital display screen will be cleared after the flow accumulation

is cleared.

- When [switching] is not set to 0s, automatic patrol display switching can be carried out between digital display screens according to the set time. When the switching time is set to 0s, patrol display switching will not be carried out and the patrol display switching flag will not be displayed.

4.3.3 Query Interface

D e m a n d	Ration	Days
	Power	Month
	Msg.	Year

Query list screen

Star	22-07-22 17:29:33
End	22-07-22 17:29:43
Ration	1000 m³
This	0 m³
Date	003

Quantitative query screen

DayCum	Date: 22-08-05
04:0	
05:0	
06:0	
Σ 0	m³

Daily cumulative Report

01	00/00/00 00:00:00	
	22/07/22 17:20:18	
02	22/07/22 17:30:23	
	22/08/05 13:47:03	
03	22/08/05 13:47:07	
	22/08/05 13:47:45	

Power down list screen

MothCum	Date: 22-08
22-07:677	
22-08:0	
22-09:0	
Σ 677.	m³

Monthly cumulative Report

22YearCum
677. m³
TotalCum
Σ 677. m³

Annual cumulative Report

When in the query list screen, press [OK] to enter the sub list screen where the cursor stays, and press [menu] to switch to the general picture screen; When in each sub list screen, press the [exit key] to exit to the query list screen.

- Quantitative query screen:
- Start / end time: the quantitative start time and end time of the current query.
- Quantitative value: the pre issued quantitative value of the current query.

- Score accumulation: the actual quantitative value of the current query.
- Query: the current number of queries, saving up to the last 200 groups of quantitative records.
- ✧ Power down list screen:
 - Power down / power on time: in each group of power down information in the power down list, the upper row is the power down time, and the lower row is the power on time.
 - Power down serial number: save up to 24 groups of power down information, and a single screen can display up to 3 groups of information.
 - Scroll bar: indicates the proportion of the current page in the total number of pages.
- ✧ Cumulative report screen:
 - The cumulative daily report shows the cumulative details of daily flow and monthly cumulative value of the instrument system in the current month.
 - The cumulative monthly report shows the cumulative details of monthly flow and annual cumulative value of the instrument system in the current year.
 - The cumulative annual report shows the cumulative value and total cumulative value of the current annual flow of the instrument system.
 - The monthly report can display the cumulative records of 12 months at most every year, the daily report can display the cumulative records of 31 days at most every month, and the annual report can display the cumulative records of 1 year at most. After the cross month and cross year, the system will automatically delete the data recorded in the previous month and the previous year. Please record the report data in time.
- ✧ Information list screen:
 - Version: display the current software version [not yet open].

Attention

- After clearing the power down list, the data in the corresponding list screen is cleared.
- After performing cumulative reset, the data in the corresponding cumulative report and quantitative record screen are cleared.

Chapter 5 Parameter Settings and Auxiliary

5.1 Configuration Login and System Configuration

Pass:	00	00	00*
SET	Pump	Used	
Flow	Temp	PRES	
SYS	Oput	Comm	

Configuration screen

Time	22-08-05	15:55:57
Pass	00	00 00
SCRN	0 S	SysMaint
		Exit

System configuration

5.1.1 Configuration Login

◎ Press and hold the [exit key] and [menu key] at the same time for more than one second to enter the "configuration" entry, press the [exit key] to return to the general picture, and press the [direction key] between sub configurations to switch the cursor.

◎ The initial password of "configuration" is 00 00 00. After entering the correct password, press the [OK] key to enter the hierarchical menu, and then select the corresponding sub configuration entry for configuration settings. If the '*' does not disappear, it means that the password is wrong or not confirmed, and if the password is wrong, you cannot enter the configuration screen.

◎ The "configuration" adopts a hierarchical menu structure, and has the functions of configuration login password input, quantitative configuration, pump valve configuration, common configuration, flow configuration, temperature configuration, pressure configuration, system configuration, output configuration, communication configuration, etc.

5.2.2 System Configuration

In the [configuration] screen, move the cursor to the [system] entry, and press the [OK] key to enter the [system configuration]. The screen is introduced as follows:

- Time setting: set the system date and time of the instrument.
- User password: set the password of user management configuration permission.
- Patrol display switching: used for patrol display switching between child and parent images in general appearance, digital display and other images. 0s means no patrol display. Press [OK] to enter the "auxiliary interface" for rapid parameter change.
- System maintenance: [clear the power down list] or [restore the default setting] and other system maintenance functions. Once the system maintenance is confirmed, the relevant data will be cleared or the factory settings will be restored. The process is irreversible. Please operate with

caution.

- Operation: press [left key] or [right key] to move the cursor, press [up key] or [down key] to switch selection or adjust the value, press [OK key] to execute the function of the cursor or edit the data of the cursor, and press [exit key] to exit the system configuration quickly.

Attention

◎ The operation and management password is the only password that can enter the configuration modification parameter. It is suggested that the user should modify the password as soon as possible after purchasing the instrument and keep it properly.

◎ You can enter the quantitative configuration directly without decryption.

◎ Factory settings will initialize all configuration information and clear all stored data in the instrument, including historical data, power loss list, alarm list, etc.

5.2 Quantitative Configuration, Pump Valve Configuration And Common Configuration

Mode	Flow	
Flow	1000	m ³
Run	1	
Wait	0	S
Exit		

Quantitative configuration screen

Advance	Act.	
Valve1	0	m ³
Valve2	0	m ³
Pump	0	m ³
Delay	0	S
Exit		

Pump valve configuration screen

Used	1	Yes
	500.0	m ³
Exit		

Common configuration screen

5.2.1 Quantitative Configuration

In the [configuration] screen, after decryption, move the cursor to the [quantitative] entry, press the [OK] key to enter the [quantitative configuration], and the screen is introduced as follows:

- Mode: select the control mode: quantitative, timed (not yet open), localized (not yet open).
- Quantitative value: set the pre issued quantitative value.
- Batch number: set the total number of quantitative times in a batch.
- Quantitative interval: set the automatic start-up control interval of two quantitative controls. When it is 0s, it is manual start-up control.
- Operation: press [left key] or [right key] to move the cursor, press [up key] or [down key] to switch selection or adjust the value, press [OK key] to execute the function of the cursor or edit the data of the cursor, and press [exit key] to quickly exit quantitative configuration.

Attention

- You can enter the quantitative configuration directly without decryption.

- The set quantitative value needs to be retrieved from the call quantitative value screen.

5.2.2 Pump Valve Configuration

In the [configuration] screen, after decryption, move the cursor to the [pump valve] inlet, press the [OK] key to enter the [pump valve configuration], and the screen is introduced as follows:

- Advance amount of valve closing: set the remaining amount of valve closing in advance.
- Advance amount of closing small valves: set the remaining amount of closing small valves in advance.
- Pump shutdown advance: the remaining amount of pump shutdown in advance.
- Pump start delay time: after starting the quantitative control, open the valve first, and start the pump after the valve is fully opened. This parameter is the pump delay start time.
- Operation: press [left] or [right] to move the cursor, press [up] or [down] to switch selection or adjust the value, press [OK] to execute the function of the cursor or edit the data of the cursor, and press [exit] to quickly exit the pump valve configuration.

5.2.3 Common Configurations

In the [configuration] screen, after decryption, move the cursor to the [common] entry, press the [OK] key to enter the [common configuration], and the screen is introduced as follows:

- Constant quantity: set the common quantity values to be called during quantitative control. 8 groups can be configured, which are valid for use and invalid for disabling.
- Operation: press [left key] or [right key] to move the cursor, press [up key] or [down key] to switch selection or adjust the value, press [OK key] to execute the function of the cursor or edit the data of the cursor, and press [exit key] to quickly exit the common configuration.

5.3.Flow Configuration

Mode	Diff	Info
K	1.000	
DL Unit	m ³ Point	0
Flow Cut	0 m ³ /h	
Med.	Cum	Exit

Mode	Frequency
K	1.000
DL Unit	m ³ Point 0
Flow Cut	0 m ³ /h
Med.	Cum Exit

Mode	Line	Info
K	1.000	
DL Unit	m ³ Point	0
Flow Cut	0 m ³ /h	
Med.	Cum	Exit

Flow configuration screen

- [Orifice plate] model is applicable to differential pressure flowmeter: various standard and non-standard throttling parts, V-cone, elbow, averaging tube (XX bar), tachometer, probe, etc. When the cursor is in the [Orifice plate] setting box, press [OK] to enter [Orifice details] to set the formula type:
 - ◎ Local square root: this setting is selected when the differential pressure transmitter has not been square root and the instrument is required to square the differential pressure signal.

◎Differential quadrature: select this setting when the differential pressure signal of the differential pressure transmitter has passed the quadrature.

- [Frequency vortex street] model is applicable to all kinds of fixed value frequency signal and pulse signal flowmeter: vortex street, turbine flowmeter, etc. When the cursor is in the [frequency vortex] setting box, press [OK] to enter the setting of the required frequency value or pulse value.
- [Linear] model is applicable to linear signal flowmeter: current output vortex street, electromagnetic, precession, ultrasonic, target, float, thermal mass, Coriolis mass flowmeter, etc.
- **Mass flow calculation formula (Q is mass flow)**

◎DP: difference pressure flow meter: $Q = K * \sqrt{\Delta P * \rho}$

K : Flow coefficient **ΔP** : Input differential pressure value **ρ** : Dielectric density

◎Frequency type flowmeter (K coefficient unit is (times per cubic meter))

$$Q = 3600 * I_f * \rho / K$$

K : Flow coefficient **I_f** : Vortex frequency **ρ** : Dielectric density

◎Linear: Linear Flow meter: $Q = K * \rho * \Delta P$

K : Flow coefficient **ΔP** : Linear signal (volumevalue) **ρ** : Dielectric density

✧ **Differential pressure / volume configuration**

- When the model is selected as [orifice], you can enter the differential pressure configuration to set the signal type, engineering unit, upper and lower limits of the range, etc. of the differential pressure transmitter.
- When the model is selected as [linear], you can enter the volume configuration to set the linear signal type, upper and lower limits of linear range, linear signal engineering units, etc.

✧ **Flow K:**

- When the model is selected as [Orifice plate], the coefficient of flow meter is:

$$K = \frac{Q}{\sqrt{\Delta P * \rho}}$$

- When the model is selected [Frequency vortex street], the unit of flow coefficient is time/m³ by default, and the unit and coefficient value of instrument coefficient are set to the unit and coefficient value of Flowmeter (if the Flow meter unit is time/L, the instrument coefficient = Flowmeter coefficient is 1000).
- When the model is selected [Linear], When the medium is not compensated, the volume upper limit is set to the flow value corresponding to the upper limit of linear signal, and the lower limit is set to 0. Both the flow and density takes part in the calculation, When the medium is compensated, the density takes part in the calculation, and the flow coefficient is calculated

according to the calculation formula of linear Flowmeter.

✧ **Flow Unit:**

m³/h, m³/min, m³/s, L/h, L/min, L/s, t/h, t/min, t/s, kg/h, kg/min, kg/s, km³/h, Nm³/h, kNm³/h

✧ **Small signal removal**

When the measurement signal is small, the measurement error is large, especially below 1%, and the accuracy will be greatly reduced. In engineering, it is generally treated as zeroing, that is, cutting off small flow.

✧ **Range**

User defined flow range, freely configurable, up to 9999. When modifying the range value, press [menu key] to modify the decimal places (up to 3 digits are supported, i.e. 9.999), and press [OK] to enter the auxiliary screen for parameter change.

✧ **Media configuration**

From the common calculation formula of flow, it can be seen that the flow of fluid is directly proportional to the density of fluid. In order to accurately measure the flow of fluid, the density of fluid must be compensated, and most fluid densities change with the change of pressure and temperature under working conditions, so the compensation of fluid density can be converted into the compensation of temperature and pressure of fluid. According to different fluid media, media compensation methods are divided into: non compensation, general gas, saturated steam, superheated steam, and natural gas.

● **No compensation**

When the system does not have compensation, only [no compensation] can be selected in the [medium] configuration. At this time, it is also necessary to set the working density of the fluid in the medium configuration $\rho = 0$. When several other compensation methods are selected, the density defaults to a fixed value of 1.000kg/m³.

● **General gas**

The purpose of general gas compensation is to convert the volume under working conditions into the volume flow under standard conditions. The state equation of general gas conforms to the ideal gas state equation, and the working condition density P_f and standard density P_n . The relationship of conforms to the following formula:

$$P_f = P_n * \frac{(273.15 + T_n)(0.10136 + P_f)}{(273.15 + T_f)(0.10136 + P_n)}$$

Where, the standard condition temperature $T_N = 20.00\text{ }^{\circ}\text{C}$, the standard condition pressure (gauge pressure) $\text{mmHg} = 0.000\text{mpa}$, T_f is the working condition temperature, and P_f is the working condition pressure (gauge pressure).

- Saturated steam

The purpose of saturated steam compensation is to obtain mass flow.

Check the working condition density according to the saturated steam pressure (or temperature) density table to realize pressure (or temperature) compensation. At this time, the density in the orifice of the flow model ρ_f It refers to the working condition density obtained by checking the saturated steam pressure (or temperature) density table according to the actual input pressure (or temperature) ρ_f .

- Superheated steam

The purpose of superheated steam compensation is to obtain mass flow

Check the working condition density according to the superheated steam density table to realize temperature and pressure compensation. At this time, the density in the orifice of the flow model ρ_f It refers to the working condition density obtained by checking the superheated steam density table according to the actual input pressure and temperature ρ_f .

- Natural gas

The purpose of natural gas compensation is to convert the volume under working conditions into the volume flow under standard conditions.

The state equation of natural gas conforms to the ideal gas state equation, and the working condition density ρ_f and standard density ρ_n The relationship of N conforms to the following formula:

$$\rho_f = \rho_n * \frac{(273.15 + T_n)(0.10136 + P_f)}{(273.15 + T_f)(0.10136 + P_n)} * \frac{Z_n}{Z_f}$$

Where, the standard condition temperature $T_N = 20.00\text{ }^{\circ}\text{C}$, the standard condition pressure (gauge pressure) $P_N = 0.000\text{ mpa}$, T_f is the working condition temperature, P_f is the working condition pressure (gauge pressure), Z_n is the compression coefficient of natural gas in the standard state, Z_f Is the compressibility of natural gas in flowing state.

✧ Standard condition temperature T_N : refers to the temperature corresponding to the volume flow after compensation. When the calculation result is volume flow, the rated temperature shall be set, and its parameters shall be determined by the user. The default value of the instrument is $20.00\text{ }^{\circ}\text{C}$. The calculation result of mass flow is independent of the standard condition temperature.

✧ Standard condition pressure P_N : refers to the pressure corresponding to the volume flow

after compensation. When the calculation result is volume flow, The rated pressure shall be set, and its parameters shall be determined by the user. The default value of the instrument is 0.000mpa. The calculation result of mass flow is independent of the standard pressure.

- ✧ Standard condition density ρ_n : Gas density under standard conditions (such as 20.00 °C, 0.000mpa (gauge pressure)), single The level is kg / m³.
- ✧ Flow accumulation configuration
 - Start date: the start date of accumulation. Before this set date, the flow is not accumulated; After reaching this date, the instrument starts to accumulate the flow. When using accumulation for the first time, a start date must be set. Even if the start date displayed by the instrument is already the required value, it needs to be changed and reset.
 - Cumulative reset: clear all previous cumulative data, including cumulative values in the general appearance screen, daily cumulative, monthly cumulative, and annual cumulative reports in the list query.
 - Report link: quickly link to the list query screen to quickly query various cumulative reports.
- ✧ Standard condition density of common gas

The standard density of common gases at 1 standard atmospheric pressure and 20 °C is as follows (both in kg / m³):

Air (Dry): 1.2041	Nitrogen: 1.1646	Oxygen: 1.3302	Helium: 0.1664
Hydrogen: 0.0838	Krypton Gas: 3.4835	Methane: 0.6669	Ethane: 1.2500
Propane: 1.8332	Ethylene: 0.9686	Propylene: 1.7495	Carbon Monoxide: 1.165
Carbon Dioxide: 1.829	Hydrogen Sulfide: 1.4169	Sulfur Dioxide: 2.726	

5.4 Temperature And Pressure Configuration

Mode	Ext	Type	Pt100
Adj	0.0	Unit	°C
F.	1 S	Cut	0.0 %
RGE	-99.9 ~ 850.0		
Exit			

Temperature external
compensation configuration

Mode	Set
SetVal	20.0 °C
Exit	

Temperature setting
configuration

Mode	Ext	Type	4-20mA
Adj	0.0	Unit	MPa
F.	0 S	Cut	0.0 %
RGE	0.000 ~ 100.0		
Exit			

Pressure compensation
configuration

Mode	Set
SetVal	0.1 MPa
Exit	

Pressure setting
configuration

✧ **Mode:**

When the temperature supply / return compensation is input by an external sensor, the mode is [external compensation]. When it is given internally, the given temperature supply / return value needs to be set at [given value], and the mode can be selected by [up key] or [down key].

Attention

- [Given] Unit cannot be changed. If you need to change the unit, you need to change the unit under [supplementary] input mode.

✧ **Type**

Input signal type. When setting the signal type, it should be consistent with the signal of primary instrument or detection element.

✧ **Adjustment**

The user is allowed to adjust the deviation value of the displayed value. The displayed value = measured value + adjusted value. Generally, the adjusted value should be set to 0.

✧ **Unit**

Temperature engineering units only support °C, which can be customized and increased according to user needs.

✧ Filtering

The setting of filtering time helps to improve the smoothness of the signal, which ranges from 0 to 99 seconds. The longer the filtering time is, the smoother the signal is, but the slower the response is.

$$\text{Display value} = \frac{\text{last measured value} * \text{filtering time constant} + \text{this measured value}}{\text{Filtering time constant} + 1}$$

✧ Excision

When the measured value is less than (upper range value lower range value) × When the percentage value of small signal + the lower range value, the measured value is displayed as the lower range value.

✧ Range

User defined temperature range, freely configurable. Press [menu key] when modifying the range value. You can modify the number of decimal places. Press [OK] to enter the auxiliary screen for parameter change.

5.5 Output Configuration And Communication Configuration

Chnl	04	Type	AO
REL	P		
SignSour	Nu		
			Exit

Output Configuration

Mode	PC	Addr	001
Stop	2 Bit	CKS	None
Baud	9600		
			Exit

Communication configuration
[PC]

Mode	Prinf	Addr	001
Baud	1200		
			Exit

Communication configuration
[printer]

✧ Output Configuration

In the [configuration] screen, after decryption, move the cursor to the [output] entry, press the [OK] key to enter the [output configuration], and the screen is introduced as follows:

- Type: select the type of transmission output signal.
- Function: when the transmission output range (range) is not changed by default, Ao is under positive effect, the upper limit of the transmission range corresponds to the upper limit of the transmission output current, and the lower limit of the transmission range corresponds to the lower limit of the transmission output current; Under the reaction of Ao, the upper limit of the transmission range corresponds to the lower limit of the transmission output current, and the lower limit of the transmission range corresponds to the upper limit of the transmission output

current.

- Lower limit of transmission range: the sampling measurement value of the source channel corresponding to the lower limit of transmission current.
- Upper limit of transmission range: the sampling measurement value of the source channel corresponding to the upper limit of transmission current.
- Calculation formula of transmission current:
- $$\text{Output current} = \frac{\text{Source channel sampling measurements} - \text{Lower limit of transmission range}}{\text{Upper limit of transmission range} - \text{Lower limit of transmission range}} * (\text{Upper current limit} - \text{Lower current limit}) + \text{Lower current limit}$$

✧ Communication Configuration

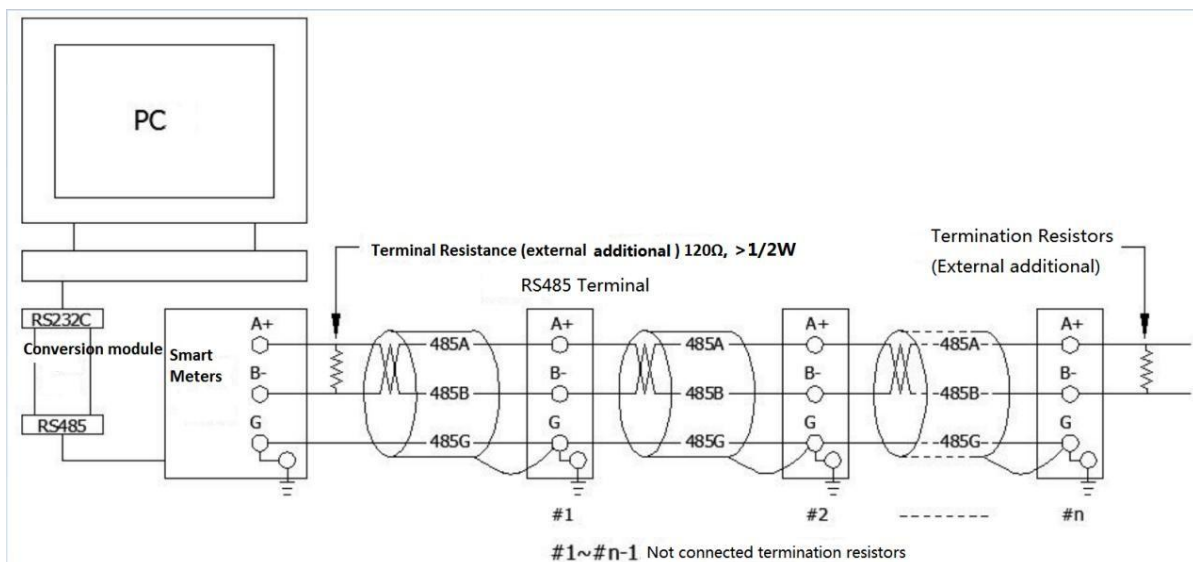
- Mode: including PC and printer two ways to enter the print configuration must first set the online mode as a printer to be effective.
- Addr: the communication address is used to distinguish when the instrument is made up of the network. It is the identity of the instrument in the network. The host computer software is used to access the instrument. The local address of the same communication network can be set between 001 and 255, and it can not be repeated.
- Baud: when the communication mode is 'printer' mode, baud rate can not be changed. PC ways, baud rate can be changed (1200、2400、4800、9600)
- CKS: no check / odd check / even check, default odd check.
- Stop: 2 bit / 1 bit, default 2 bit.
- Number of printed copies: the number of copies of quantitative results will be printed after the quantitative end. The maximum is 2, and when it is 0, it will not be printed.

Attention

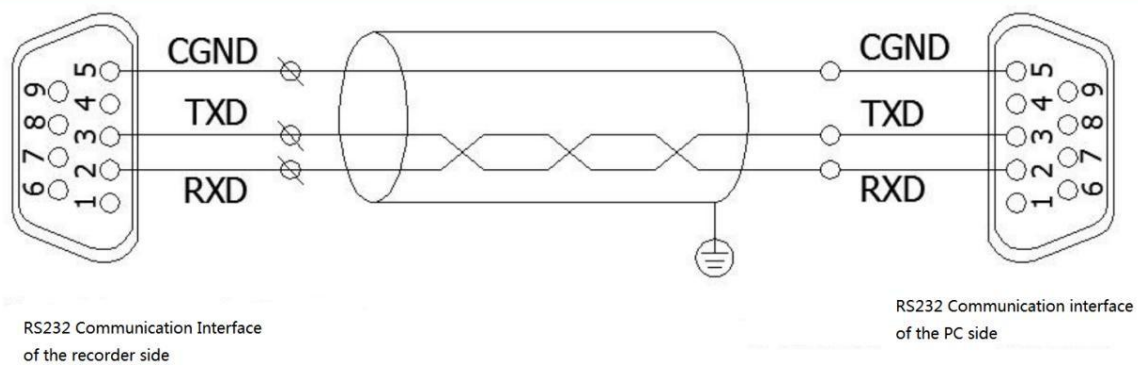
- The printing configuration can be valid under the [printer] communication mode [the customer needs to configure the printing function].
- If the printer is not powered on or offline, the instrument does not respond when executing the printing function. At this time, the user should check the printer power supply and status indicator to see whether each status is correct and whether the printing paper is installed in place. If it cannot print normally, please check the printer settings (baud rate, data format, serial and parallel port settings, etc.).

✧ Communication Wiring

- RS485 connection mode



- RS232 connection mode



Chapter 6 Fault Analysis and Troubleshooting

Quantitative controller adopts advanced production technology and carries out strict test before leaving the factory, which greatly improves the reliability of the instrument. Common failures are generally caused by improper operation or parameter setting. If you find a failure that can not be handled, please record the failure and contact us in time. The following are some troubleshooting and handling measures for this instrument in its daily application:

Fault Phenomenon	Cause Analysis	Solution
The recorder not working with electricity	①Poor contact with power cord ②Power switch is not closed	Check power supply
The signal display does not match the actual situation	①Signal setting error in configuration ②wiring error	①Inspection configuration ②Check signal line
Alarm Output Abnormal	①Alarm limit setting error ②Alarm points shared by other channels	①Reset the limit ②Cancel other alarm points
Problems in distribution output	①Transmitter and instrument wiring error ②Power distribution with multiple transducers exceeding the standard distribution of this instrument ③Interference between digital and analog signals during distribution	①Correct wiring ②Use external voltage stabilizer to supply power ③Use independent power supply
USB Transfer Failure	①Incorrect start and end time settings ②U disk format is incorrect ③U disk incompatibility ④Insufficient spare space on U disk ⑤Misoperation during backup	①Setting time correctly ②Format U disk to FET32 ③Use a genuine compatible U disk ④Use larger capacity U disk or clear redundant files in U disk. ⑤proper operation

No data or abnormal display in USB transfer file	①No data for the time period selected by the user ②User changed system time ③User changed signal type ④The user sets the record interval too big, but the backup time is very short ⑤U disk incompatibility ⑥The time period of the data is too long, which exceeds the maximum read time domain of the upper computer software.	①Select the time to have a data segment ②》Erasing the primary data area ③No impact on data recording ④Record interval is set to be small or backup time is longer ⑤Use a genuine compatible U disk ⑥The time period for backing up the data is smaller, piecewise and batch backup
Variable output Problem	①Variable output	①Check the signal source