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PREFACE

- Thank you very much for using our ultra-thin widescreen paperless recorder!
- This manual provides methods on performance indicators, installation and wiring, operation, parameter setting, troubleshooting, etc. Before using the ultra-thin widescreen paperless recorder, please read this manual carefully to correctly grasp the use of the method before the specific operation to avoid unnecessary losses caused by wrong operation.
- After you read it, please keep it properly in the place where you can read it at any time, so that you can refer to it when you operate it.

DISCLAIMMER

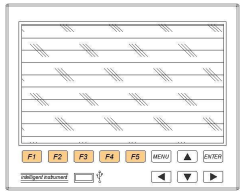
- The contents of this manual are subject to change without prior notice due to function and performance upgrades, etc.

- Reproduction or duplication of the contents of this manual, in whole or in part, is strictly prohibited.

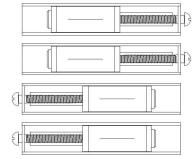
- If you find any inaccuracies or errors in this manual, please contact us.

Boxed items

Please check the following items before you use them after opening the box. Once you receive the product, the quantity is wrong or there is physical damage in appearance, please contact our company or sales outlet.



Ultra-thin widescreen paperless recorder



Mounting bracket (4pcs)）

User manual

Product Certificate of Conformity / Warranty Card

Data management software CD

Serial number	Name	Unit	Quantity	Remarks
1	Ultra-thin widescreen paperless recorder	Table	1	
2	Mounting bracket (with screws)	Root	4	For tray mounting fixing
3	Instruction manual	copy	1	
4	Product certificate of conformity/warranty card	copy	1	
5	Data management software (CD-ROM)	sheet	1	
6	USB flash drive	pcs		Optional Accessories
7	RS-232C communication cable	Root		Optional Accessories
8	RS-232C/485 conversion module	pcs		Optional Accessories
9	Micro printer (with power supply)	table		Optional Accessories

Caution

- Please contact the manufacturer if you find any damage caused by the transportation of the instrument when unpacking.

- This series of meters is suitable for general industrial applications, if there are special requirements for use, please set up separate protection devices.

- For the safety of you and the instrument, please do not install with electricity. Please use the rated voltage power supply, proper wiring, proper grounding, and do not touch the terminals on the back of the instrument after the power is turned on to prevent electric shock.

- Install the instrument indoors, in a location with good ventilation (to prevent high internal temperatures), away from rain and direct sunlight, and never in

  1.Where the temperature and humidity exceed the operating conditions

  2.Where corrosive, flammable or explosive gases are present

  3.Where there is a large amount of dust, salt and metal powder

  4.Where water, oil and chemical liquids are easily spilled

  5.Occasions with direct vibration or shock

  6.Occasions where electromagnetic sources are generated

- The instrument should take corresponding shielding measures when it is close to the power line, strong electric field, strong magnetic field, static electricity, noise or AC contactor and other interference.

- In order to avoid measurement errors, when the sensor is a thermocouple, please use the corresponding compensation wire When the sensor is a RTD, use three copper wires with the same specifications and resistance value less than 10Ω, otherwise it will cause measurement errors

- To prolong the service life of the instrument, please perform regular maintenance and servicing. Do not repair or disassemble the instrument by yourself. When wiping the instrument, please use a clean soft cloth, do not dip it in alcohol, gasoline and other organic solvents to clean it, which may cause discoloration or deformation.

- If the instrument has water, smoke, odor, noise, etc., please immediately cut off the power supply, stop using and contact with the supplier or our company in time.

Table of Contents

Chapter 1 Overview

Overview

In recent years, some industrial sites are constrained by the installation depth, the number of data collection channels and operating comfort, the general traditional products have completely failed to meet the needs of the site, and brought considerable inconvenience to the use of the unit on-site application, so a short thickness, high integration, colorful, comfortable operation, full functionality, high reliability and ideal cost performance products have great practical significance. The ultra-thin paperless recorder developed by our company aims to meet the rational needs of the instrument unit and enhance the perceptual experience of the instrument unit, mainly used in petroleum and petrochemical, chemical, paper and plastic, textile printing and dyeing, metallurgy and building materials, science and education, national defense, biological medicine, municipal environmental protection, energy measurement, food and oil, tobacco and wine, equipment manufacturing, equipment sets and agriculture, forestry, animal husbandry and fishery industries.

Function

Can support touch function (additional function).
Can support dual communication function (additional function)
Timing printing function can be supported (additional function)
Can support DC power supply (additional function)
Can support Ethernet communication function (customized function)
Vacuum degree calculation function can be supported (customized function)
Communication acquisition function can be supported (customized function)
Feeder output function can be supported (optional function)
Variable output function can be supported (optional function)
Can support alarm output function (optional function)
Can support PID control function (optional function)
Can support standard serial communication and printing function (optional function)
Support flow accumulation temperature and pressure compensation function (optional function)
Data recording / dumping backup function (standard function)
Universal analog input (standard function)

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Chapter 2 Technical indicators

Display

Screen: 7-inch true color TFT LCD (800 * 480 dot matrix)

Accuracy: Real-time display: ±0.2% F.S.

Trace accuracy: ±0.2% F.S.

(Note: thermocouple should be removed from the cold end error)

Processor

Using high-performance ARM Cortex-M3 32-bit RISC core, can simultaneously achieve multiple signal acquisition, recording, display and multiple alarms

Storage module

The use of large-capacity parallel NAND FLASH flash memory chip to store historical data, the use of serial FRAM memory chip to store system configuration parameters and other key information

Input function

Input specifications: fully isolated universal input, maximum support for 16 analog inputs

Voltage input: 0-5V, 1-5V, 0-20mV, 0-100mV

Current input: 0-10mA, 4-20mA, 0-20mA

Resistance input: Res (0~400Ω)

RTD: PT100, Cu50, G53, Cu100, BA1, BA2 (requires three-wire resistance balance, lead resistance <10Ω)

Thermocouple: S, B, K, T, R, E, N, J

Radiation pyrometer: F1, F2

Tungsten rhenium: WRe3-25, WRe5-26

Note

Other input signals (such as switch input (DI), pulse input (PI)) or indexing numbers (such as PT1000) need to be specified when ordering

Output function

Distribution output: support up to 3 groups of transmitter isolated distribution +24VDC, each group of distribution ≤ 60mA, support other specifications isolated distribution (such as 12VDC, 5VDC distribution output)

Transmission output: support up to 4 channels of standard current transmission output, with a load capacity of 750Ω (maximum), to facilitate the acquisition of display instruments or DCS/PLC, to achieve long-distance transmission of signals

Relay alarm output: up to 6 channels support relay alarm output, contact capacity 1A@250VAC/1A@30VDC (maximum contact capacity can be customized), can be configured on the upper limit, upper limit, lower limit, lower limit alarm

Communication printing

Communication interface: RS232C and RS485 two kinds of communication interface for users to choose, support simultaneous use of RS232C and RS485, support simultaneous use of RS232C and RS232C, support Modbus RTU protocol, baud rate---- (1200, 4800, 9600, 19200, 38400, 57600)

Print interface: RS232C directly connected to a micro printer, baud rate 1200

Recording function

Recording capacity: 64/128/192/248MB (FLASH capacity is optional).

Recording interval: 1 second to 240 seconds, in 11 steps.

1/2/4/8/12/24/36/60/120/180/240 seconds selectable.

Recording time: the length of the recording time is related to the FLASH memory capacity, the number of input points, and the recording interval, and the calculation formula is as follows (the units substituted into the value should be consistent with the formula)

$$\text{Recorded Days} = \frac{\text{FlASH Capacity (MB)} \times 1024 \times 1024 \times \text{Recording Interval (second)}}{\text{Number of channels} \times 16 \times 24 \times 3600} \times \text{Day}$$

Data dumping

Data backup and dumping: support USB 1.1, 2.0 USB flash drive, support 1G to 32G USB flash drive for data dumping, strong compatibility, compatible with most of the U disk on the market (recommended to use the industrial version of the flash drive)

Power supply

Power supply: 100 ~ 240VAC (rated power supply voltage 220VAC), 50/60HZ AC power supply, support 24VDC (18VDC-36VDC) DC power supply, support 12VDC (9VDC-18VDC) DC power supply (DC power supply should be specified when ordering)

Protection function

historical data, permanently stored after power failure
Clock protection: integrated hardware clock, accurate operation even after power failure

Error accuracy

Thermocouple cold end compensation error: ±2℃
Clock error: ±2 seconds/day

Working environment [prohibited in flammable, corrosive environment

Operating temperature: 0～50℃ (avoid direct sunlight)
Relative humidity: 0～85%R.H (no condensation)
Altitude: <2000m (except for special specifications)

Transportation and storage environment

Transportation and storage temperature: -20～60℃ (avoid direct sunlight)
Transportation and storage humidity: 5～95%R.H (no condensation)

Net weight of the instrument

Net weight: ≤1.5Kg

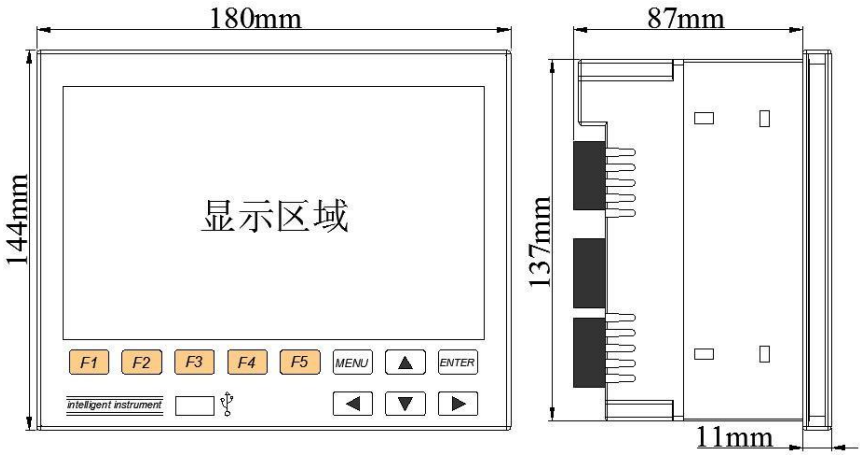
Note

Technical indicators for this series of instruments common indicators, functional configuration please prevail in kind.

If the technical indicators are inconsistent with the physical instrument, please take the physical object as the standard.

Chapter 3 Installation Wiring

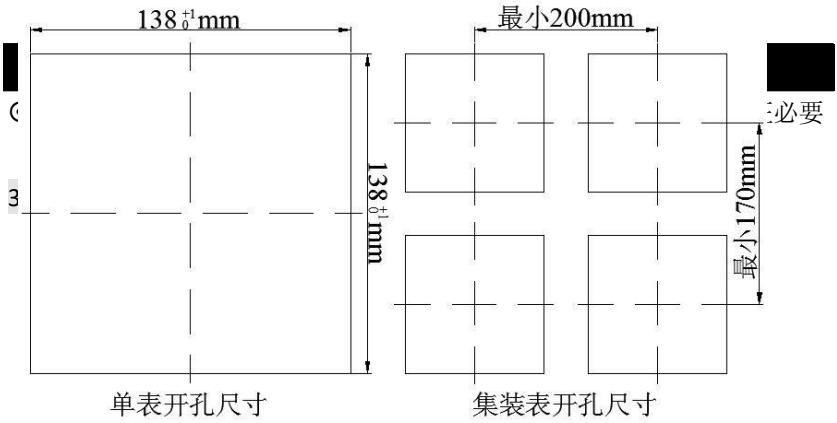
3.1 Instrument size



Note

When the set meter is installed, the minimum spacing between meters recommended in the above diagram should be referred to in order to ensure the necessary space for heat dissipation and loading and unloading.

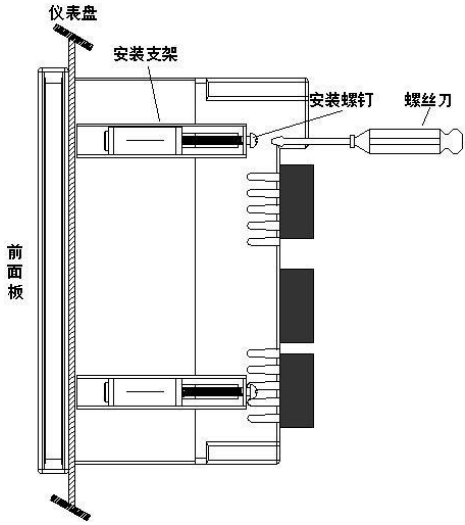
3.2 Opening size



Note

When the set meter is installed, the minimum spacing between meters recommended in the above diagram should be referred to in order to ensure the necessary space for heat dissipation and loading and unloading.

3.3 Instrument Installation



Installation method.

Step 1: Push the meter into the mounting hole from the front of the mounting panel (please use a steel plate). Where the thickness of the mounting panel is (1.5~4.0) mm.

Step 2: Use the mounting bracket that comes with the meter to install it as shown above (two brackets are installed on the left and right sides of the meter, and the screws used for the mounting bracket of the instrument panel are M3 standard screws).

Step 3: After the meter body is installed, the signal and power cables can be connected。

Note

When installing this instrument, please do not tilt it from side to side, and try to install it horizontally (it can be tilted back <30°).

3.4 Instrument Wiring

3.4.1 Wiring method

It is recommended to use U-type crimp terminals with insulating sleeve (M3 screws for power and signal terminals).

To enhance the safety of the instrument, observe the following warnings when wiring.

Note

To prevent electric shock, make sure the supply power is disconnected before wiring.

To prevent fire, use double-insulated wire (wire with a cross-sectional area ≥ 0.75 mm² is recommended for the power supply wire; wire with a cross-sectional area ≥ 0.5 mm² is required for the relay output wire with high voltage resistance).

Please set an air switch in the power circuit to isolate the meter from the main power supply.

Tighten the terminal screws firmly. Tightening torque: 0.5 N.m (5 kgf.cm).

After connecting the power cord, you should connect the power supply to check whether the meter is normal. Do not connect the signal line before that, and after confirming that the meter can work normally, disconnect the power supply and then connect the signal line.

The measurement circuit and the power circuit should be laid separately, and the measurement object should preferably not be a source of interference. If this cannot be avoided, please insulate the measurement object and the measurement circuit and ground the measurement object.

For the interference generated by static electricity, it is better to use shielded wire.

For interference caused by electromagnetic induction, it is better to connect the measurement circuit wiring in dense strands at equal distances.

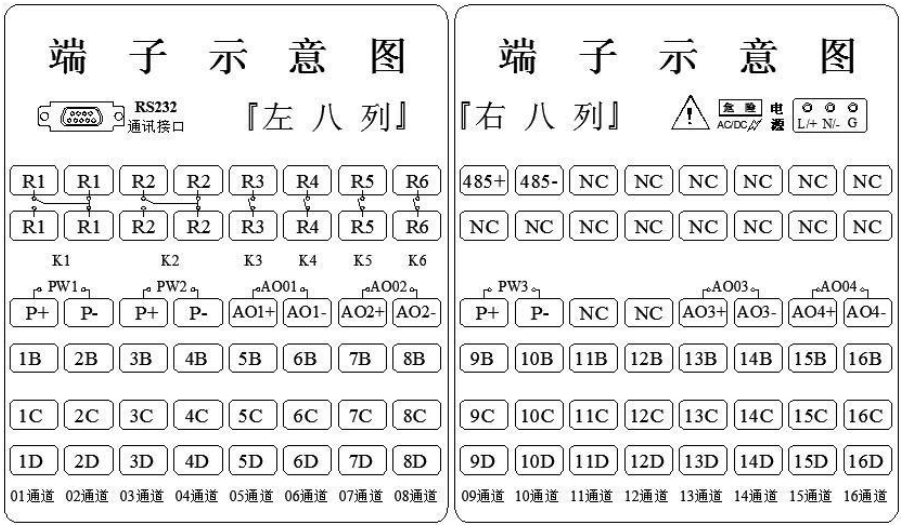
If the input wiring is connected in parallel with other instruments, the measured values will be affected by each other. When parallel connection is necessary, be careful not to switch the power supply of one of the instruments during operation, as this may have an adverse effect on the other instruments. RTDs cannot be connected in parallel in principle, and current signals cannot be connected in parallel in principle.

When thermocouple input, please do not use thick wire with good heat dissipation effect (it is recommended to use wire with cross-sectional area <0.5mm²), and take care not to make external temperature change as much as possible (especially the switch of nearby exhaust fan will produce large temperature change). The resistance of each lead should be less than 10Ω when inputting platinum resistance (the lead resistance is the same).

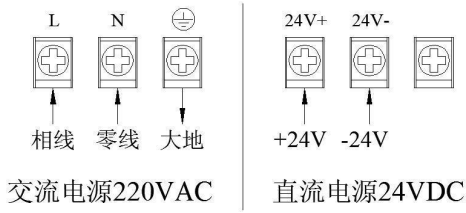
3.4.2 Terminal description

Terminal Name	Description
L/+、N/-、⏚	L is the phase end of AC power supply, N is the zero end of AC power supply, the ground end, + is the positive end of DC power supply, - is the negative end of DC power supply, please specify when ordering DC power supply
Serial communication interface	RS232C communication interface / serial printing interface (where pin 2 is RXD instrument signal receiving terminal, pin 3 is TXD instrument signal sending terminal, and pin 5 is signal ground terminal)
R1~R6	Relay output interface, specification 1A/250VAC@1A/30VDC
485+、485-	RS485 communication interface signal sending end, receiving end
P+、P-	24VDC feed output positive end, negative end, each group ≤ 60mA
AO+、AO-	Positive and negative ends of analog current output
B、C、D	Sampling signal end, the specific signal wiring see the relevant wiring diagram

3.4.3 Terminal schematic (physical subject)



3.4.4 AC/DC power input wiring

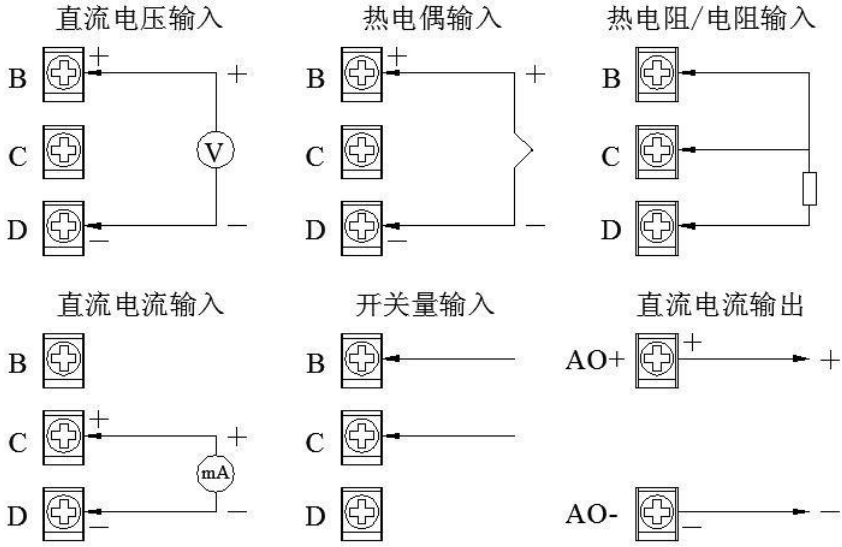


Note

The power input method at the project site must be consistent with the power input method provided by the instrument itself.

The power supply voltage at the project site must be limited to the withstand voltage range of the instrument.

3.4.5 Input/output signal wiring

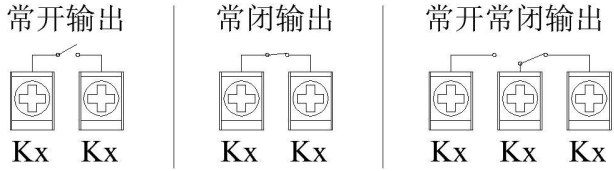


Note

Once a channel input signal is a switching signal, this channel will no longer support analog, RTD, thermocouple and other signals.

Other signals such as Pt1000, 0-10V, etc. should be specified when ordering.

3.4.6 Relay contact output wiring

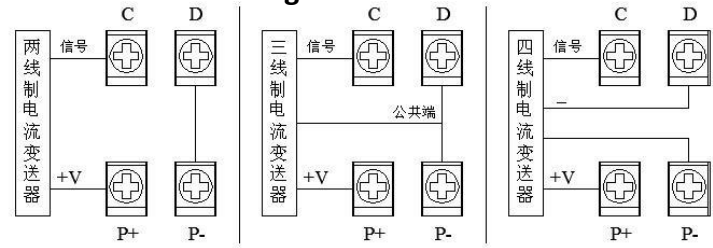


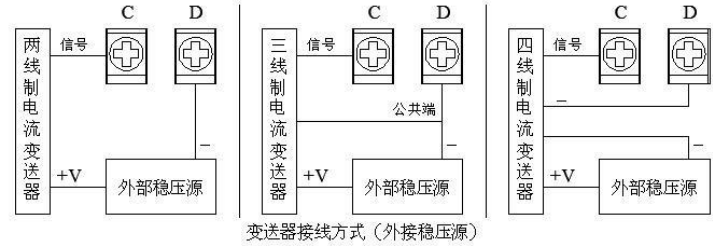
Note

Wiring wire cross-sectional area: 0.5~2.5mm2, torque: 50Nm. The machine is shipped in normally open mode by default, please specify other modes when ordering.

The default contact capacity of this machine is 1A@250VAC/1A@30VDC, other higher contact capacity factory, please specify when ordering.

3.4.7 Transmitter Wiring





Note

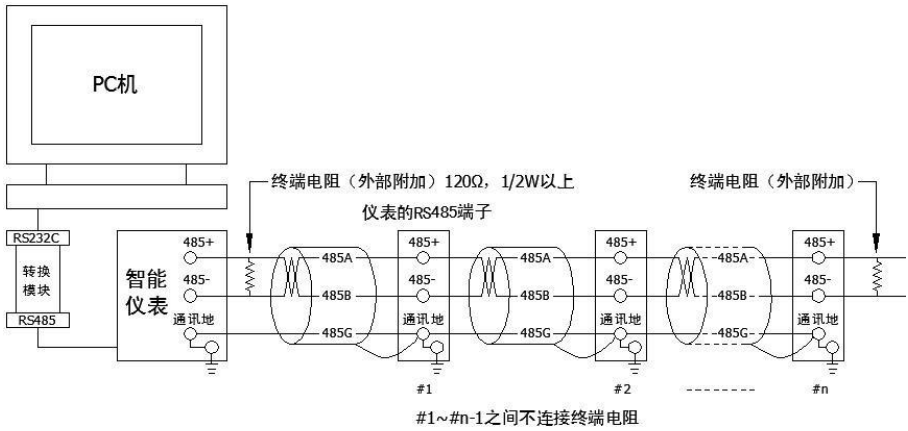
The default 24VDC feeder is shipped from the factory, please specify other specifications when ordering.

When the power consumption of the transmitter exceeds the feeder load capacity, please use an external voltage regulator to supply power.

3.4.8 Communication Wiring

RS-485 connection method

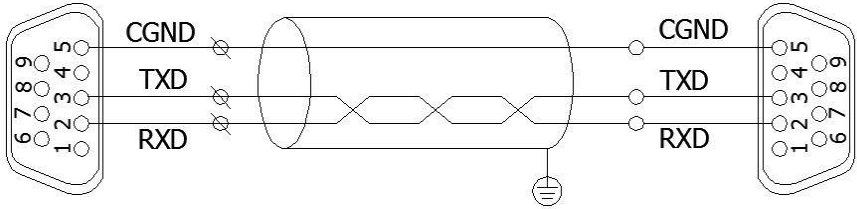
The communication cable should be shielded twisted pair (the communication length should not exceed 1000 meters), and one end of it The other end is connected to the 485 communication terminal of the instrument, as shown in the figure below.



RS-232C connection method

Users only need to connect one end of the RS-232C communication cable to the RS-232C interface of the instrument.

The RS-232C communication connection can be realized by connecting one end of the RS-232C communication cable to the RS-232C interface of the instrument and the other end to the serial port of the portable machine (or PDA), and the communication cable should be made of shielded twisted pair cable and the length of the communication cable should not exceed 10 meters.



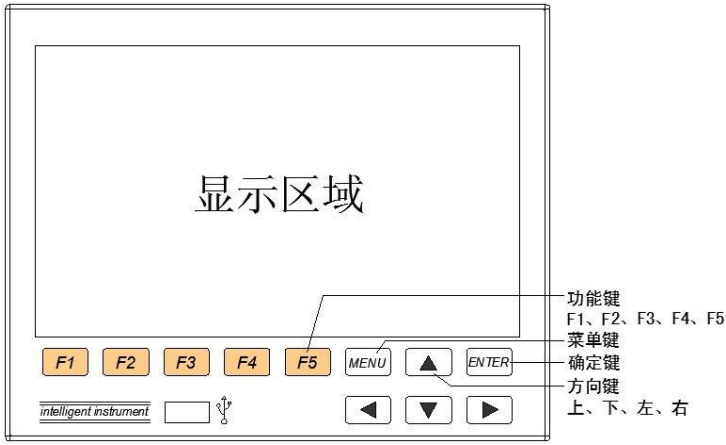
仪表侧RS232C通讯接口　　计算机侧RS232C通讯接口

Note

Please do not plug and unplug the communication cable with electricity, if you need to operate, please do so after the instrument power supply is turned off.

Chapter 4 Basic Operation and Operation Screen

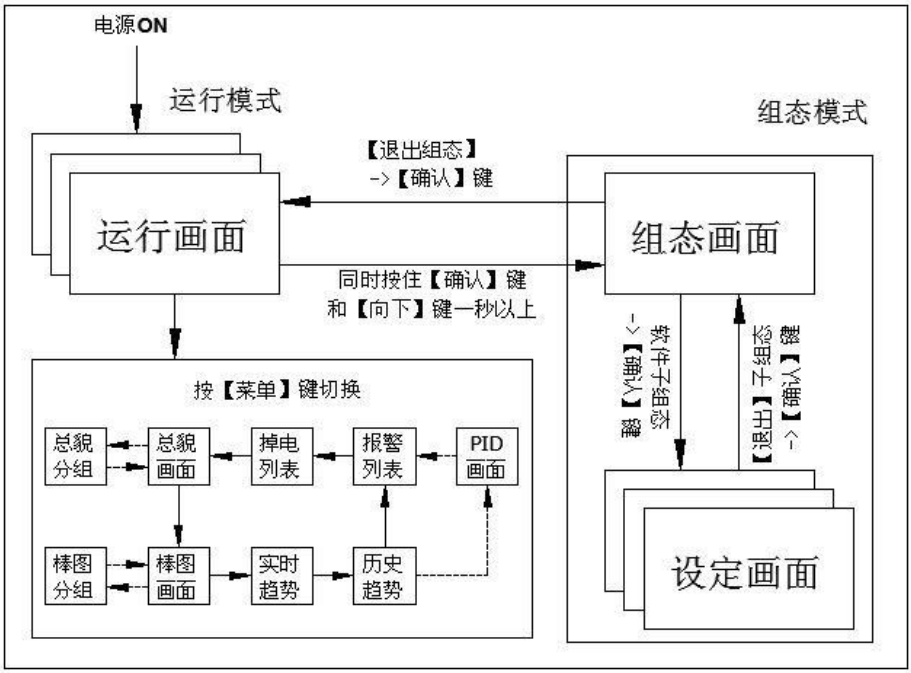
4.1 Instrument keys



Keyboard Functions

符号	名称	功能
MENU	菜单键	切换主显示页面等
◀	向左键	切换通道或向前移动光标等
▶	向右键	切换时标或向后移动光标等
▲	向上键	切换选择或增加光标所在数据值等
▼	向下键	切换选择或减少光标所在数据值等
ENTER	确认键	执行光标所在功能或编辑光标所在数据等
MENU ENTER	组合键	同时按住1秒以上，进入组态界面
F1 F2 F3 F4 F5	功能键	各画面中软按键相对应的功能操作键

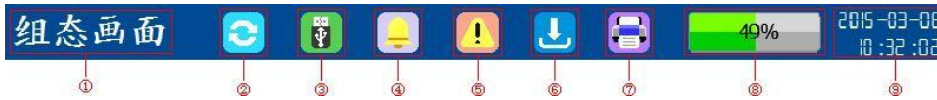
4.2 Usage Patterns



Model Type	Content	Possible operations
Operation Mode	Data display and query operation mode	Display of test/computation data
	This mode is entered when the system is powered on	
	Use [Menu Key] to switch to the next sub operation screen	
	Press and hold the [Menu Key] and [Confirmation Key] simultaneously for 1 second or more to enter the configuration login screen	
Configuration mode	Input signal, input range, alarm parameters and other settings	Various configuration parameters setting
	No measurement/operation data is displayed	

4.3 Status flags

The following information is displayed in the status display section during operation mode and configuration mode.



① **Title bar:** Display the current screen name.

② **Cycle flag:**

A. With display: Cyclic switching of each display combination.

B. No display: Fixed screen, no cyclic switching.

③ **USB device flag**

A. With display: USB is detected to connect with the instrument.

B. No display: No USB is connected to the meter.

④ **System sound logo**

A. With display: System buzzer sound is allowed when operating the key.

B. No display: The system buzzer is prohibited to make sound when operating the key.

⑤ **System alarm flag:**

A. Displayed: The system has alarm generation.

B. No display: No alarm is generated by the system.

⑥ **Data backup flag**

A. Displayed: USB is backing up data.

B. No display: USB is not backing up data.

(7) **System printing flag**

A. Displayed: The micro printer is printing data curve.

B. No display: The micro printer is not printing the data curve.

⑧ **Storage capacity flag**

A. Green: green is displayed when the used capacity is between 0% and 80%.

B. Yellow: Yellow is displayed when the used capacity is between 80% and 90%.

C. Red: red is displayed when the used capacity is between 90% and 100%.

⑨ **System time flag:** Display the current system time and date of the instrument.

4.4 Total view and flow screen

A single screen can display up to 16 channels of real-time data, the number of channels is different while its display screen is also different, of which 6 channels screen is shown below, introduced as follows.

① **Channel number：** corresponding to the channel (no such function in the total view and grouping screen of 8 channels and above).

② **Project bit number:** Display the corresponding project bit number of the channel, which can be freely configured.

③ **Real-time data:** Display the engineering measurement/operation data of the channel, if the current channel is in alarm status, the measurement/operation data turns red.

④ **Data percentage:** the percentage of the current data in the total range.

⑤ **Lower range limit:** user-defined range range, free to configure.

⑥ **Upper range:** User-defined range, free to configure.

⑦ **Bar graph:** The length of the bar graph scale is 10 cells, and the filled area of the bar graph indicates the percentage of the current data in the

total range, and the filled area turns red when the system is in alarm.

⑧ **Unit:** Display the engineering unit of the channel, which can be freely configured.

⑨ **Relay status:** Display the current relay output status, red is in the alarm state, green represents the normal state, black represents not equipped with the corresponding set relay.

⑩ **Alarm status:** from top to bottom (or from left to right, depending on the number of channels) are upper limit HH/upper limit HI/lower limit LO/lower limit LL, red indicates over limit alarm. When the system is in alarm status, the system alarm symbol appears in the status bar.

⑪ **operation:**

Press the **[F1]** function key to quickly enter the configuration landing screen.

Press the **[F2]** function key to quickly enter the flow monitoring screen (the cursor needs to select the relevant channel first and the system turns on the flow function, and press the **[F2]** function key to switch back to the total view screen when it is in the flow monitoring screen; the functions of the **[F1], [F4]** and **[F5]** function keys are the same as the total view screen).

Press **[F3]** to enter the grouping screen (need to set the corresponding display combination first, the display combination can be freely configured in [Display Configuration] (maximum support 6 display combinations, each group supports 8 channels), when in the grouping screen, you can press **[F1], [F2]** to switch the combination display, press **[F3]** to switch back to the total view screen, **[F4], [F5]** function key function The same as the total view screen, the display combination in the grouping screen can be switched automatically in a cycle, and the cycle automatic switching function can be freely configured in [System Configuration]. (If the display combination is not set in the system, there is no grouping function key).

Press the **[F4]** function key to quickly enter the [Backup Configuration] screen for data backup (need to decrypt the permission first, and jump to

the [Backup Configuration] screen directly after decrypting).

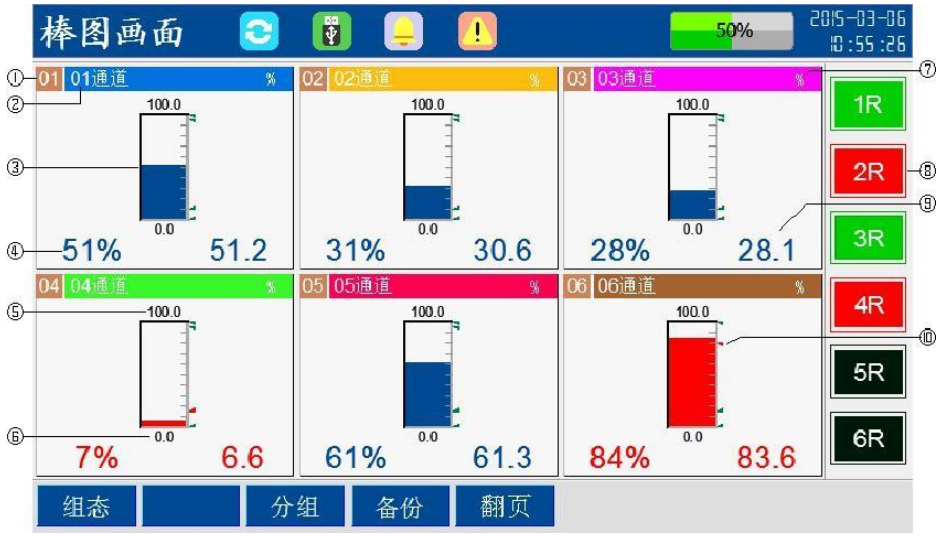
Press **[F5]** function key or [menu key] to turn the page to switch to the bar graph screen.

⑫ **Instantaneous flow rate:** The instantaneous flow rate operation value of the current channel.

⑬ **Total Accumulated Value:** The total accumulated value of the flow rate of the current channel.

4.5 Bar graph screen

A single screen can display up to 16 channels of data bar graphs, the number of channels varies while the display screen is different, where 6 channels of data bar graphs are shown in the following figure, introduced as follows.



① **Channel serial number:** Display the channel serial number corresponding to the channel (there is no such function in the channel bar graph and grouping screen for 8 channels and above).

② **Project position number:** display the corresponding project position number of the channel, which can be freely configured.

③ **Bar graph:** The length of bar graph scale is 10 cells, and the filled area of bar graph indicates the percentage of current data in the total range, and the filled area turns red when the system is in alarm.

④ **Data percentage:** the percentage of the current data in the total range.

⑤ **Upper range limit:** user-defined range, free to configure.

⑥ **Lower range limit:** user-defined range, free to configure.

⑦ **Unit:** display the engineering unit of the channel, can be configured freely.

⑧ **Relay status:** Display the current relay output status, red is in alarm status, green represents normal status, black represents no corresponding relay.

⑨ **Real-time data:** Display the engineering measurement/computation

data of the channel, if the current channel is in alarm state, the measurement/computation data turns red.

⑩ **Alarm status:** from top to bottom are upper limit HH/upper limit HI/lower limit LO/lower limit LL, red means over limit alarm. When the system is in alarm status, the system alarm symbol appears in the status bar.

⑪ **operation:** Press the [F1] function key to quickly enter the configuration landing screen.

Press the [F3] function key to enter the grouping screen (the corresponding display combination needs to be set first. Display combinations can be freely configured in [Display Configuration] (maximum 6 groups of display combinations are supported.Each group supports 8 channels).

When you are in the grouping screen, you can press [F1] and [F2] to switch the display combination, press [F3] to switch back to the bar graph screen, [F4] and [F5] to switch to the bar graph screen.

The function of [F4] and [F5] is the same as the bar graph screen, and the display combination in the grouping screen can be switched automatically in a cycle.

The display combination in the grouping screen can be switched automatically in a cycle, and the cyclic automatic switching function can be freely configured in [System Configuration]. If the system is not set to display (If the system does not set the display combination, there is no grouping function key).

Press the [F4] function key to enter the [Backup Configuration] screen for data backup (need to decrypt first).

Press the [F4] function key to quickly enter the [Backup

Configuration] screen for data backup (permission must be decrypted first, and jump to the [Backup Configuration] screen directly after decrypting).

Press [F5] function key or [menu key] to turn the page to switch to the real-time curve screen.

4.6 Real-time curve

A single screen can display up to 8 channels of real-time curves and data, of which 6 channel screens are introduced as follows.

① **Relay status:** The current relay output status is displayed, red is in alarm status, green represents normal status, black represents no corresponding relay.

② **Real-time curve:** The displayed value of current measurement/computation data corresponds to the rightmost end of the curve.

③ **Grid:** convenient for user to estimate time and data value.

④ **Grid time:** the time represented by the current grid.

⑤ **Time scale:** the length of time represented by each grid, which is related to the recording interval, and the execution function is equivalent to [F3] function key operation.

⑥ **Bit number:** Display the corresponding project bit number/channel serial number of the channel, which can be freely configured.

(7) **Real-time data:** Display the engineering quantity measurement/operation data of the channel; if the current channel is in alarm status, the measurement/operation data turns red.

⑧ **Unit:** display the engineering unit of the channel, can be freely configured.

⑨ **Show/fade flag:** "√" shows the curve, "×" hides the curve, the execution function is equivalent to [F4] function key operation.

⑩ **Alarm status:** From left to right, upper limit HH/upper limit HI/lower limit LO/lower limit LL, green indicates normal status, red indicates over limit alarm.

⑪ **Curve scale:** The percentage scale of the curve is displayed.

⑫ **Display combination:** The current display combination number can be configured freely. When all combinations are not configured, the instrument will be combined in the order of channels, 8 channels in each group. The display combination can be cyclically switched automatically, and the cyclic automatic switching function can be freely configured in [System Configuration].

⑬ **Operation:** Press [F1] or [F2] to switch up or down to view the remaining combined curve data.

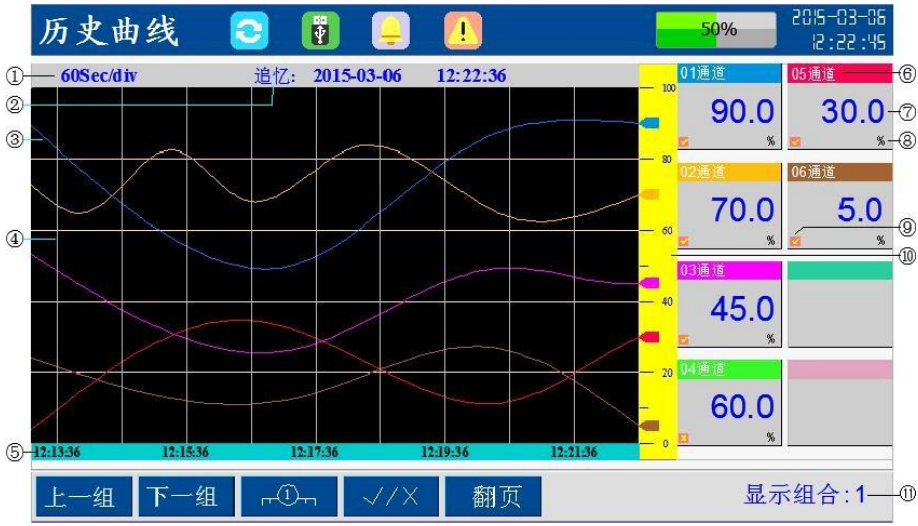
- Press [F3] to modify the time scale to switch the display data or curve width per screen; press [F4] to display/fade the selected channel curve at the cursor.
- Press [F5] or [Menu Key] to turn the page to switch to the history

curve screen.

- Press [Left Key] or [Right Key] to move the cursor.
- Press [Confirmation key] to execute the display/fade operation of the channel curve where the cursor is located.

4.7 History curve

A single screen can display up to 8 channels of historical curves and data, of which 6 channel screens are introduced as follows.



① **Time scale:** The length of time represented by each grid is related to the recording interval, and the execution function is equivalent to the [F3] function key operation.

② **Recall time:** Press [Confirm] after setting the corresponding recall time and date to perform fixed-point recall.

③ **Memories curve:** A period of history curve recorded by the instrument in multiple grid time, can own configuration curve / data color.

④ **Grid:** Convenient for users to estimate time and data values.

⑤ **Grid time:** The time represented by the current grid.

⑥ **Bit number:** Display the corresponding engineering bit number/channel serial number of the channel, which can be freely configured.

⑦ **Memorized data:** The instrument records the channel display value corresponding to the current memorial time and date.

⑧ **Unit:** Display the engineering unit of the channel, which can be freely grouped.

⑨ **Show/Fade flag:** "√" shows the curve, "×" hides the curve, the execution function is equivalent to [F4] function key operation.

⑩ **Curve scale:** The percentage scale of the curve is displayed.

⑪ **Display combination:** The current combination number is displayed and can be freely configured. When all combinations are not configured, the instrument will be combined in the order of channels, 8 channels per group. The display combination can be switched automatically in a cycle, and the cycle automatic switching function can be configured freely in [System Configuration].

⑫ **Operation:** Press [F1] or [F2] to switch up or down to view the remaining combination curve data.

Press [F3] to modify the time scale to switch the display data or curve width per screen; press [F4] to display/fade the selected channel curve at the cursor.

Press [F5] or [Menu Key] to turn the page to switch to the PID screen (if the system does not open the PID control function, then switch to the alarm list screen).

Press [Left Key] or [Right Key] to move the cursor or perform continuous recall (the cursor needs to be at the recall positioning axis).

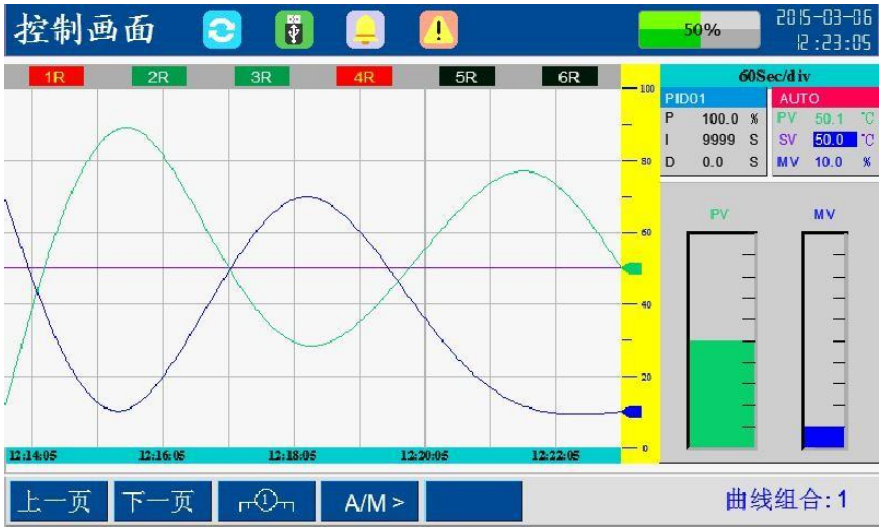
Press[Up key] or [Down key] to adjust the value.

Press [Confirmation Key] to execute the curve display/fade

operation at the curve display/fade flag of the channel where the cursor is located or execute the fixed-point recall operation at the recall time where the cursor is located or execute the positioning axis display/fade operation at the positioning axis where the cursor is located (the cursor is at the position after the recall time and before the display/fade flag).

4.8 PID screen

As shown in the figure below, a single screen displays 1-channel PID control loop parameters, curves, and numerical bar graphs, etc. The screen is introduced as follows.



① **P:** proportional band coefficient value, the larger the value, the weaker the proportional role.

② **I:** integration time, 0 has no integral effect, otherwise the larger the value, the weaker the integral effect.

③ **D:** Differentiation time, no differentiation for 0, otherwise the larger the value, the stronger the differentiation.

④ **AUTO/MAN:** Automatic state/manual state.

⑤ **PV:** Sampling value.

⑥ **SV:** Set value.

⑦ **MV:** loop output value.

⑧ **Operation:** Press [F1] or [F2] to switch up or down to see the remaining loop curve data.

- Press [F3] to modify the time scale to toggle the display data or curve width per screen.
- Press [F4] to toggle the manual auto state.
- pressing [LEFT KEY] or [RIGHT KEY] to move the cursor.
- pressing [Up key] or [Down key] to adjust the data.
- pressing [Confirmation key] to edit the data where the cursor is located.
- Press [Menu Key] to switch to the alarm list screen.

4.9 Alarm List

Up to 12 alarm messages can be displayed on a single screen, and the screen description is as follows.

① **Pointer:** The symbol that points to the search result when searching by serial number or page number.

② **Serial number:** records are arranged by time, the closer the time of occurrence, the later the arrangement, up to 48 alarms and false alarm information can be saved, and up to 12 messages can be displayed simultaneously on a single screen.

③ **Alarm channel:** The channel number that generates the current alarm information.

④ **Alarm type:** the type of the current channel alarm, upper limit alarm HH, upper limit alarm HI, lower limit alarm LO, lower limit alarm LL.

⑤ **Alarm/Cancellation time:** red is the alarm time, blue is the time of elimination, not eliminated The display shows 20//-//-//: //: //: //.

⑥ **Relay Status:** The current relay output status is displayed, red is in alarm status, green represents normal status, black represents no corresponding relay.

⑦ **Operation:**

Press [F1] or [F2] to retrieve alarm information by page.

Press [F3] or [F4] to retrieve alarm information by bar.

Press [F5] or [Menu Key] to turn the page to switch to the power-down list screen.

4.10 Power down list

Up to 12 power-down messages can be displayed on a single screen with the following screen description.

① **Pointer:** a symbol pointing to the search result when searching by serial number or page number.

② **Serial number:** records are arranged by time mode, the closer the occurrence time, the later the arrangement, up to 48 pieces of power down/up time information can be saved, and up to 12 pieces of information can be displayed simultaneously on a single screen.

③ **Power down/up time:** red is power down time, blue is power up time.

④ **Operation:** Press [F1] or [F2] to retrieve power down information by page.

Press [F3] or [F4] to retrieve power-down information by bar.

Press [F5] or [Menu Key] to turn the page to switch to the total view screen.

Chapter 5 Configuration and Auxiliary

Operations

5.1 Configuration Login

Press and hold [Menu Key] and [Confirmation Key] at the same time for one second (some screens are also available by pressing [F5] function key) to enter the configuration login screen, select the corresponding operator rights and enter the correct password to enter the configuration screen, and then select the corresponding sub-configuration entrance for configuration setting, the wrong password cannot enter the configuration screen, the screen introduction as shown in the figure.

① **Permission:** The operator's permission to enter the configuration mode is divided into operator and administrator, and the sub-groups that can be entered by different permissions are also different, while the operator's permission can only enter the input, backup and print sub-groups temporarily, the administrator's permission can enter any sub-groups.

② **Password:** The default initial password for operator privilege is '00 00 00', and the default initial password for administrator privilege is '10 00 00'.

③ **Operation:** Press [F4] to log in to the configuration.

Press [F5] to cancel the configuration login.

Press [Left Key] or [Right Key] to move the cursor.

Press [Up key] or [Down key] to toggle the selection or adjust the value.

Press [Confirmation key] to execute the function where the cursor is located.

5.2 Configuration screen

After [Login Configuration] is decrypted, it enters into [Configuration Screen], and the screen is introduced as shown in the figure.

① **Configuration:** Adopt hierarchical menu structure, with functions of system configuration, input configuration, output configuration, communication configuration, print configuration, backup configuration, display configuration, control configuration, report query, function information, software version, etc.

② **Software version:** The current software version used by the system.

③ **Operation:** Press [F5] to exit the configuration screen.

Press [Left Key] or [Right Key] to move the cursor.

Press [Up key] or [Down key] to move the cursor.

Press [Confirmation key] to enter the sub-group configuration screen where the cursor is located.

5.3 System Configuration

Move the cursor to the [System] entry in the [Configuration] screen and press the [Confirmation Key] to enter [System Configuration], the screen is introduced as shown in the figure.

① **Time and date setting:** Set the system date and time.

② **Management password:** the only password for administrator authority to log in the configuration to modify or view parameters, initial default '10 00 00'.

③ **Operation password:** the only password for operator authority to log in the configuration to modify or view parameters, initial default '00 00 00'.

④ **Recording interval:** can be set as 1/2/4/8/12/24/36/60/120/180/240 seconds. The larger the recording interval, the longer the recording time, and vice versa, the smaller the recording interval, the shorter the recording time. In general, when the measured signal changes quickly, the recording interval should be chosen smaller. On the contrary, when the measured signal changes more slowly, the recording interval can be chosen to be larger.

⑤ **Key sound:** The system allows/prohibits the buzzer to make sound when key operation.

⑥ **Automatic switching:** Cycle the time period value of each display combination screen.

⑦ **System maintenance:** [Clear power-down list] or [Clear alarm list] or [Restore default settings] and other system maintenance functions, press [Confirmation key] to enter the 'System maintenance' parameter selection. Once the system maintenance operation is confirmed, the relevant data will be cleared or the factory settings will be restored, the process is irreversible, please operate carefully.

⑧ **PID adjustment:** Allow/prohibit the adjustable function of PID screen parameters, i.e. when it is turned on, the parameters in the PID screen are allowed to be adjusted, and vice versa is not allowed.

⑨ **Shift report setting:** Set the shift and starting time of the accumulated shift report, starting from the setting time of shift 1, in the order of shift 1→shift 2→shift 3→shift 1, and ending when the next shift 1 starts, for a cycle of 24 hours in total. The shift report setting should follow the following principles: Shift 1 < Shift 2 < Shift 3, and the accumulation of each channel needs to be cleared after setting the shift report.

⑩ **Operation:** Press [F5] to quickly exit the system configuration screen.
Press [Left key] or [Right key] to move the cursor.
Press [Up key] or [Down key] to switch the selection or adjust the value.

Press [Confirmation Key] to execute the function where the cursor is located or edit the data where the cursor is located.

Note

The operation and management password is the only password to enter the configuration and modify the parameters, after losing it, you cannot enter the configuration and modify the parameters.

To change the operator password, you need to log in the system parameters under the administrator authority to change it. The operator authority does not have the authority to change the operator password.

The factory settings will initialize all configuration information and clear all stored data in the instrument, including historical data, power-down list, alarm list, etc. Please operate with caution.

5.4 Input Configuration

In the [Configuration] screen move the cursor to the [Input] entry and press [Confirm] to enter [Input Configuration], the screen is introduced as shown in the figure.

① **Channel serial number/bit number:** Channel serial number is limited by hardware, support bit number modification function, see Appendix I [Bit number configuration] for details of bit number modification.

② **Signal type:** Support universal analog signal input such as 4-20mA, 0-20mV, etc. When setting the signal type, it should be consistent with the signal of primary instrument or detection element. Press [Confirmation Key] to enter the "Type Selection" screen for quick type selection operation.

③ **Engineering unit:** user-defined engineering unit, not related to measurement signal calculation, supports user-defined expansion unit (1), and operation of the same position number modification function. Press [confirm button] to enter the "unit selection" screen for unit quick selection operation.

④ **Decimal digits:** The channel engineering quantity displays decimal

⑤ **Points. Filter time:** the setting of filter time helps to improve the smoothness of the signal, the longer the filter time the smoother the signal but the slower the response.

⑥ **Range range:** user-defined range range, divided into upper and lower limits, can be freely configured. Press [Confirm] to enter "auxiliary interface" for quick parameter change operation.

⑦ **Signal cut:** When the measurement signal is small, the measurement error is large, especially below 1%, the accuracy will be greatly reduced, engineering generally do zero processing, that is, cut small flow. When a certain percentage is set, signals smaller than the range percentage are forced to be set as the lower limit of the range.

⑧ **Linear adjustment:** allow users to adjust the deviation value of the display value, display data = measurement data * K + B, in general, the adjustment value should be set to 0.

⑨ **Cold end compensation:** When the cursor is in the cold end compensation setting box, press [Confirm] to switch [given] or [external] mode, when in the given mode, the cold end compensation value can be set freely, the cold end compensation value in [external] mode is captured automatically by the system, and the factory default is [external] mode.

⑩ **Flow configuration:** Press [F1] to enter the secondary flow accumulation parameter setting screen (the minimum accumulation value is 0, the accumulation value below 0 does not accumulate), the screen details are shown in the following figure.

⑪ **Alarm configuration:** Press [F2] to enter the secondary alarm configuration interface. The alarm configuration contains parameters such as alarm threshold, alarm contact, alarm return, etc. The parameters are described as follows.

A. Alarm threshold: the threshold value generated by the alarm, the value must be within the range of the channel, the instrument is divided into four categories: upper limit (HH), upper limit (HI), lower limit

(LO), lower limit (LL).

B, alarm contacts: relay number, such as contact 01 represents the 01 relay, that is, R1 (displayed in the instrument screen) or K1 (displayed in the instrument wiring method).

C. Alarm return difference: It prevents the relay from operating frequently when the signal oscillates near the alarm threshold. It can set a difference (hysteresis) for the occurrence and release values of the alarm.

⑫ **Copy and paste:** Copy [F3] the current channel parameters, switch the channel serial number and paste [F4] to another channel.

⑬ **Operation:**

Press [F1] to quickly enter the flow accumulation grouping screen.

Press [F2] to quickly enter the alarm configuration screen.

Press [F3] to quickly copy the currently selected channel parameters.

Press [F4] to quickly paste the copied channel parameters to the currently selected channel.

Press [F5] to quickly exit the system configuration screen.

Press [Left Key] or [Right Key] to move the cursor.

press [Up key] or [Down key] to toggle the selection or adjust the value.

Press [Confirmation Key] to execute the function where the cursor is located or edit the data where the cursor is located.

① **flow model:** different flowmeter can choose a different calculation model, the instrument temporarily provides four kinds of calculation model, differential pressure model for differential pressure flowmeter such as standard orifice plate, standard nozzle, etc., frequency type vortex model for pulse frequency flowmeter such as vortex, turbine flowmeter, etc., linear model for current output type vortex flowmeter, electromagnetic flowmeter, etc., single cumulative model for pure cumulative channel The mass flow rate formula, see Appendix II for details.

② **open type:** differential pressure model optional: native open square or differential open square.

③ **Input mode:** optional for frequency type model: counting frequency value or counting pulse number.

④ **Flow rate unit:** m^3/h, m^3/min, m^3/s, L/h, L/min, L/s, t/h, t/min, t/s, kg/h, kg/min, kg/s, k m^3/h, N m^3/h, kN m^3/h, unit involved in calculation.

⑤ **Instrument coefficient:** Instrument coefficient K is obtained according to a set of signals output from the transmitter and the corresponding flow

rate, and then back-calculated back with the flow model, see Appendix II for details.

⑥ **Cumulative coefficient:** the meter is accumulated every second by (current value * cumulative coefficient / 3600).

- When the accumulation factor is 1, it is accumulated by 1/3600 of the current value every second.
- When the accumulation factor is 60, it is accumulated by 1/60 of the current value per second.
- When the accumulation factor is 3600, it will be added up by the current value every second.

⑦ **Range upper and lower limits:** user-defined flow range, free to configure.

⑧ **Media compensation:** Media compensation mode is divided into: no compensation, general gas, superheated steam, saturated steam (temperature), saturated steam (pressure), natural gas, hot water, the meaning of each compensation type is detailed in Appendix III.

⑨ **temperature channel:** the source channel is selected when the external compensation, and the given compensation value is set when the internal compensation is given.

⑩ **Pressure channel:** Select the source channel when external compensation is applied, and set the given compensation value when internal compensation is given.

⑪ **Standard density:** The density of fluid under standard condition (e.g. 20.00℃, 0.000Mpa (gauge pressure)), unit is Kg/m³.

⑫Standard temperature: The temperature corresponding to the volume flow rate after compensation. When the calculation result is volume flow rate, the nominal temperature should be set, and its parameters are determined by the user, and the default of the instrument is 20.00℃. The calculation result of mass flow rate has nothing to do with the standard temperature.

⑬ **Standard pressure:** It refers to the pressure corresponding to the volume flow rate after compensation. When the calculation result is volume flow rate, the rated pressure should be set, its parameters are determined by the user, and the default of the instrument is 0.000Mpa. the calculation result of mass flow rate has nothing to do with the standard pressure.

Compression coefficient Zn and Zf: Zn is the compression coefficient of the gas in standard condition, Zf is the compression coefficient of the gas in flow condition.

⑭ **Turn on/off:** Press [F3] to turn on/off the current channel flow accumulation function. When it is displayed on, it means the flow accumulation function of this channel has been turned on and the parameters can be edited and adjusted to change; when it is displayed off, it means the flow accumulation function of Ben channel has been turned off and the parameters cannot be edited and adjusted to change when it is off.

⑮ **Clear the accumulation:** Press [F4] to clear all the previous accumulated data of the current channel, including the accumulated values in the total view/flow screen, and the class accumulation, daily accumulation and monthly accumulation reports in the query configuration. This instrument supports up to 16 channels of flow accumulation.

⑯ **Operation:** Press [Left Key] or [Right Key] to move the cursor.

Press [Up key] or [Down key] to adjust the data or switch the selection.

pressing [Confirmation key] to execute the function where the cursor is located or to edit the data where the cursor is located.

Press [Menu Key] to switch the number of decimal places (the cursor needs to be at the upper and lower limits of the range).

Press [F3] to turn on/off the flow function of this channel.

Press [F4] to clear the accumulated data.

Press [F5] to quickly exit the subgroup.

5.5 Output configuration

Move the cursor to the [Output] entry in the [Configuration] screen and press the [Confirmation] key to enter [Output Configuration], the screen is introduced as shown in the figure.

① **Channel serial number:** The serial number of the output channel, the number of selectable channels is limited by hardware.

② **Output type:** The output signal type of the variable transmission output channel is selected.

③ **Engineering unit:** the engineering unit of the variable output, which is not related to the measurement signal calculation.

④ **Output terminal:** The position of the output signal on the instrument terminal (i.e. terminal position).

⑤ **Signal source:** Specify the source sampling channel of the current output value of the variable output channel.

⑥ **Positive and negative action:** In positive action, the upper limit of the variation range corresponds to the upper limit of the output current and the lower limit of the variation range corresponds to the lower limit of the output current when the default variation range is used; in negative action, the upper limit of the variation range corresponds to the lower limit of the output current and the lower limit of the variation range corresponds to the upper limit of the output current.

⑦ **Source range upper and lower limits:** user-defined, the upper and lower limits of the variation output range of the signal source channel [sampling channel].

⑧ **Operation:** Press [Left Key] or [Right Key] to move the cursor.

Press [Up key] or [Down key] to adjust the data or switch the selection.

Press [Confirmation key] to execute the function where the cursor is located or edit the data where the cursor is located.

Press [F5] to quickly exit the output configuration.

5.6 Communication Configuration

Move the cursor to the [Communication] entry in the [Configuration] screen and press [Confirmation Key] to enter [Communication Configuration], the screen is introduced as shown in the figure.

① **Online mode:** It includes both PC and printer. To enter the print configuration, you must set the online mode to printer first.

② **Online address:** The communication online address is used to distinguish the instrument when it forms a network, it is the identification of the instrument in the network. It is used by the host software to access the instrument; the local address can be set between 001 and 255 in the same communication network, and cannot be repeated.

③ **Baud rate:** The baud rate can not be changed when the communication mode is 'printer' mode, and the baud rate can be selected when 'PC' mode (1200, 4800, 9600, 19200, 38400, 57600).

④ **Calibration mode:** no parity / odd parity / even parity, default odd parity.

⑤ **Stop bit:** 2 bits / 1 bit, default 2 bits.

⑥ **Operation:** Press [F5] to quickly exit the communication configuration.

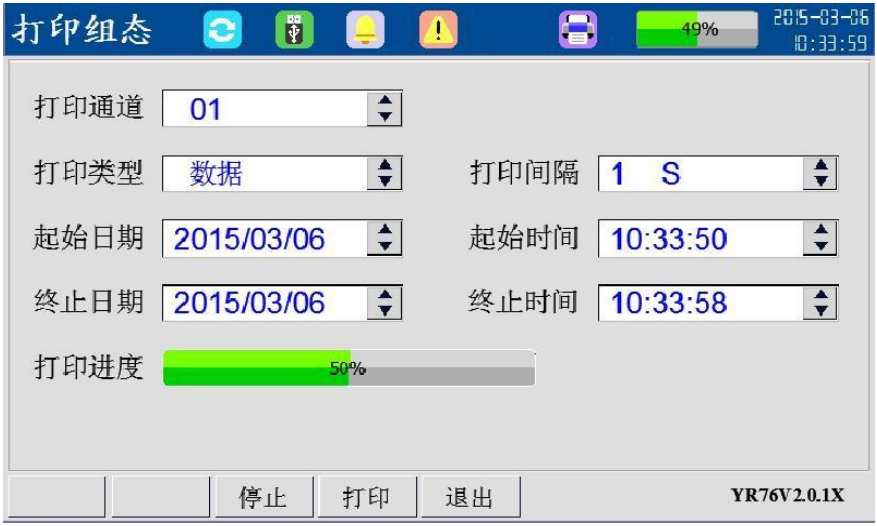
Press [Left Key] or [Right Key] to move the cursor.

Press [Up Key] or [Down Key] to adjust the data or switch the selection.

Press [Confirmation Key] to execute the function where the cursor is located or edit the data where the cursor is located.

5.7 Printing Configuration

Move the cursor to the [Print] entry in the [Configuration] screen and press the [Confirmation Key] to enter [Print Configuration], the screen is introduced as shown in the figure.



① **Print Channel:** The channel number where the user needs to print data/curves.

② **Print Type:** The type of content to be printed by the user, divided into data and curve.

③ **Print Interval:** The time interval when printing data/curves.

④ **Print Range:** The start and end time date of the data/curve to be

printed. The start and end time date must be earlier than the end time date, otherwise the data/curve cannot be printed.

⑤ **Printing Progress:** Real-time display of the current printing process progress, the filled area is the current printed part, the middle value of the progress bar is the printing progress percentage value.

⑥ **Operation:**

Press [F3] to stop printing.

Press [F4] to start data/curve printing.

Press [F5] to quickly exit the print configuration.

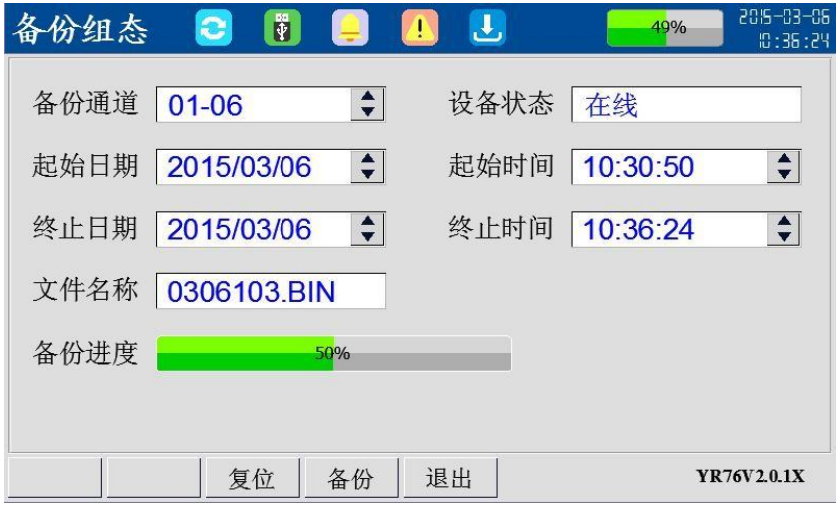
Press [Left Key] or [Right Key] to move the cursor.

Press [Up key] or [Down key] to adjust data or toggle selection.

Press [Confirmation Key] to jump quickly (the cursor is at the start and end time date).

5.8 Backup Configuration

Move the cursor to the [Backup] entry in the [Configuration] screen and press the [Confirmation Key] to enter [Backup Configuration], the screen is introduced as shown in the figure.



① **Backup channel:** the channel number where users need to backup historical data, such as 01-01 means only 1 channel is to be backed up, 01-06 means 1-6 channels are to be backed up.

② **Device Status:** Display the status of USB flash drive, including online, offline and error status.

③ **Backup range:** the start and end time date of the backup data, the start and end time date must be earlier than the end time date, otherwise the data can not be backed up.

④ **File name:** the name of the backup file, cannot be changed.

⑤ **Backup progress:** real-time display of the current backup process progress, the filled area is the current backed up part, the middle value of the progress bar is the backup progress percentage value.

⑥ **Operation:** Press [F3] to reset to restart the backup.

Press [F4] to start data backup.

Press [F5] to quickly exit the backup configuration.

Press [Left button] or [Right button] to move the cursor.

Press [Up key] or [Down key] to adjust data or toggle selection.

Press [Confirmation key] to jump quickly (the cursor is at the start and end time date).

5.9 Displaying grouping

Move the cursor to the [Display] entry in the [Configuration] screen and press the [Confirmation Key] to enter the [Display Configuration], the screen is introduced as shown in the figure.

① **Display combination:** Select the display combination serial number.

② **Start Screen:** Select the start screen displayed after the instrument starts.

③ **Channel association:** associate with any channel combination or close the channel.

④ **Curve color:** Select the display color of each curve.

⑤ **Operation:** Press [F5] to quickly exit the display configuration.
Press [Left key] or [Right key] to move the cursor.
Press [Up Key] or [Down Key] to switch the selection.

Note

⊙ When [Group screen] is selected as the starting screen, this group screen is the display combination 1 screen under the total view group

screen.

⊙ When all channels under a group display combination are closed, it means that this group display combination is not opened.

5.10 Control configuration

Move the cursor to the [Control] entry in the [Configuration] screen and press [Confirm] to enter [Control Configuration], the screen is introduced as shown in the figure.

① **Loop serial number:** The channel serial number of the control loop, limited by configuration, up to 4 channels.

②**Loop status:** Select the channel working status.

③**Setting value SV:** Select the source and value of the setting value.

④**Sampling value PV:** Select the signal source of the sampled measurement value.

⑤ **Output value MV:** Set the upper and lower limit values of the loop output.

⑥**MV preset value:** Set the initial value of MV at cold start.

⑦ **Set deadband:** Set the deadband value (the controlled variable is allowed to change within the specified range). If the deadband is too large, the system control will be delayed, and if the deadband is too small, the actuator will act frequently.

⑧**Control mode:** Set the manual automatic control mode after cold start or start control configuration.

⑨ **Proportional coefficient:** Set the proportional band coefficient P value.

⑩**Integration time:** Set the value of integration time I.

⑪ **Differential time:** Set the value of differential time D.

⑫**Integration separation:** Set the integration separation value. When there is a big deviation in the system, the integration action is canceled, and when the deviation of the system is small (the regulated quantity is close to the given value), the integration takes effect.

⑬ **Forward and reverse action:** Select the control loop action mode.

⑭ **Operation:** Press [F3] to copy the parameters.

Press [F4] to paste the parameters.

Press [F5] to quickly exit the control configuration.

Press [Left Key] or [Right Key] to move the cursor.

pressing [Up key] or [Down key] to adjust the data or switch the selection.

Press [Confirmation Key] to execute the function where the cursor is located or edit the data where the cursor is located.

5.11 Report inquiry

Move the cursor to the [Query] entry in the [Configuration] screen and press [Confirm] to enter [Report Query], the screen is introduced as shown in the figure.

The cumulative monthly report shows the cumulative details of the monthly flow rate, the annual cumulative value and the current total cumulative value of the meter in the last month of the previous year and the year in which it is located; the cumulative daily report shows the cumulative details of the daily flow rate, the monthly cumulative value and the annual cumulative value of the year in which it is located in the last day of the previous month and the month in which it is currently located; the cumulative shift report shows the cumulative details of each shift, the monthly cumulative total value and the annual cumulative value of the year in which it is located in the last day of the previous month and the month in which it is currently located. The accumulation report is not refreshed in real time. Press [Left button] or [Right button] to refresh the latest data.

Operation: Press [Left Key] or [Right Key] to move the cursor; press [Up Key] or [Down Key] to switch the selection; press [Confirm Key] to execute the function where the cursor is located or edit the data where the cursor is located; press [F5] to exit the report query, [F1]-[F4] see each function key.

Note

After resetting or switching shift report in [System Configuration], it is necessary to clear the accumulation of each channel before use.

The monthly report displays the accumulated records of up to 13 months, and the daily report and shift report display the accumulated records of up to 32 days, and the system automatically deletes the recorded data of the previous month and year after crossing the month and year.

5.12 Function Information

In the [Configuration] screen, move the cursor to the [Function] entrance and press the [Confirmation Key] to enter [Function Information], the screen introduction is shown as follows.

① **System Memory:** Displays the total memory capacity of the current system configuration.

② **Analog Inputs:** Shows the total number of analog inputs configured in the current system.

③ **Relay number:** Shows the total number of relay outputs configured in the current system.

④ **Transmission output:** Display the total number of analog output channels configured in the current system.

⑤ **Flow accumulation:** Shows whether the current system is configured with flow accumulation function.

⑥ **PID control:** Shows whether the current system is configured with PID control function.

⑦ **Serial communication:** Shows whether the current system is configured with serial communication module.

⑧ **Serial printing:** Shows whether the current system is configured with serial printing function.

⑨ **Data backup:** Shows whether the current system is configured with data backup function.

⑩ **Software version:** Display the software program version number of the current system.

⑪ **Operation:** Press [F5] to quickly exit the function information screen.

5.13 Explanation prompt and auxiliary interface

The prompt dialog box will pop up when the system does not open the function, operation authority is not enough, clear the power down or alarm list, restore factory settings, etc. The prompt dialog box is shown in the following figure.

Some parameters can be entered into the auxiliary interface for quick editing, the auxiliary interface as shown above, the auxiliary interface is mainly used for alarm upper and lower limit settings, range upper and lower limit settings, etc., enter the auxiliary interface (in the corresponding parameter setting box, press the [confirm key] to enter the auxiliary interface) can quickly adjust the multi-digit value, once the set value exceeds the settable range, the system will indicate that the parameter is outside the settable range, key Refer to "Keyboard Function" for operation.

Chapter 6 Fault Analysis and Troubleshooting

The paperless recorder adopts advanced production technology and undergoes strict testing before leaving the factory, which greatly improves the reliability of the instrument. Common faults are generally caused by improper operation or parameter setting. If you find a fault that cannot be handled, please record the fault phenomenon and contact us in time. The following are some fault imaginations and handling measures of this instrument in daily application.

Failure phenomenon	Cause Analysis	Treatment measures
The instrument does not work when powered on	1） Poor power cord contact 2） The power switch is not closed	Check the power supply
Signal display does not match the actual	1）The signal setting in the configuration is wrong 2）Wiring error	1） Checking group state 2） Check the signal line
Alarm output is not normal	1） The alarm limit is set wrongly 2） Alarm points are shared by other channels	1） Reset the limit value 2） Cancel other alarm points
Power distribution output encountered problems	1）Wiring error between transmitter and instrument 2）Multiple transmitter power supply exceeds the standard power distribution of the instrument 3）Digital signal and analog signal share the same ground during power distribution to generate interference	1）Correct wiring 2）Use external voltage regulator to supply power or return to factory to customize the maximum load 3）Use independent power supply or return to the factory to customize
USB dump failed	1）The starting and ending time is wrongly set 2）U disk format is not correct 3）U disk is not compatible	1） Set the time correctly 2） Format the U disk to FET32 3） Use genuine

	4）Lack of remaining space on the U disk 5）Misoperation in the backup process	compatible USB flash drive 4） Use a larger capacity USB flash drive or clean up the excess files in the USB flash drive 5） Correct operation
No data or abnormal display in USB dump file	1）No data in the time period selected by the user 2）The user has changed the system time 3 The user has changed the signal type 4 The user set the record interval too large, but the backup time is very short 5）U disk is not compatible 6）The data time period is too long, exceeding the maximum reading time field of the upper computer software	1）Select the time with data section 2）Erase the data area once 3）No effect on the data record 4）Record interval set smaller or backup time longer 5）Use genuine compatible USB flash drive 6） need to backup data time period set a little smaller, segmentation and batch backup
No communication	1）Communication cable is not connected properly 2）The communication parameters are set incorrectly 3）Communication serial port setting error	1）Connect the communication line correctly 2） Recorders and PC communication parameters are set to be consistent 3） Set the correct communication COM port (make sure it is not occupied by other programs)

表 2

Chapter 7 Service Guide

Dear user: Hello! Thank you for choosing this series instrument. Our company will thank you for your trust in our company with high quality service. The first time you use the instrument, first check whether the actual configuration of the product is consistent with the instrument configuration list, and whether the random data, accessories and other boxed items are complete. If you have any objection, please contact us first.

Caution

- **Read the random data:** Please read the random data and warranty principles carefully and keep them intact.
- After the purchase of the machine, keep the purchase invoice properly.

Warranty principles

Repair cycle

Five working days from the date of receipt of the product.

Repair cost

- This series of ultra-thin widescreen color paperless recorder free warranty period is one year (product quality issues).
- The warranty period is calculated from the date of purchase by the user, and is evidenced by the user's purchase invoice (indicating the product model and host serial number) or a copy. If the invoice cannot be provided, it will be calculated according to the date of our production.
- During the warranty period, if the product is damaged due to improper use by the customer, or if the customer has opened the qualified seal of the product, a certain fee will be charged. After the product is repaired, the warranty will be free for another six months.

Notice to customers

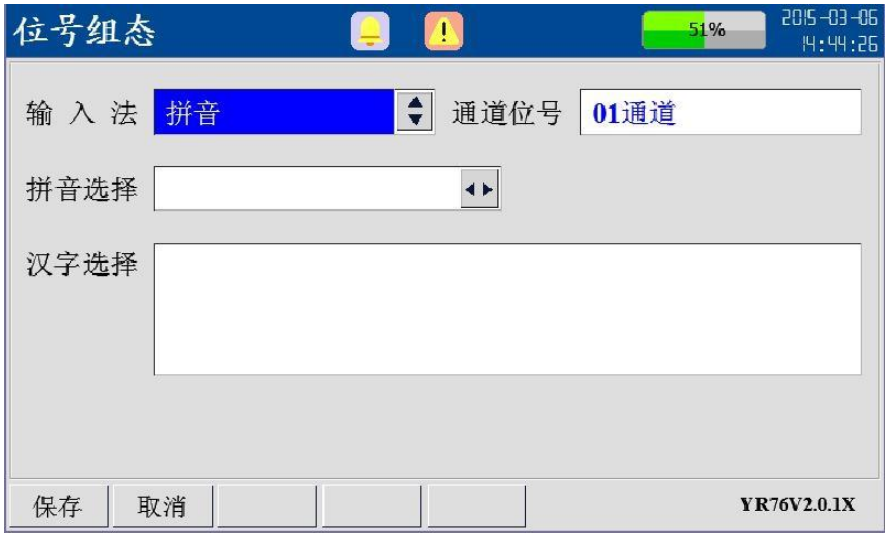
- Please make sure to send the product back with a description of the

product failure to help the engineer fix it as soon as possible.

- ⊙ Please fill in the accurate phone/fax number, mailing address and contact person for the return of the repaired product.
- ⊙ The company usually sends back by express mail (without insurance), if you need to transport by other parties, please specify in the form and pay the related fees.

Appendix I Bit Number Configuration

The bit number configuration screen is shown in Figure Appendix 1.1 and is described as follows.



Appendix 1.1 Bit Number Configuration Screen

◆ Input method.

Pinyin: for the input of Chinese characters.

English/a: for uppercase English character input.

English/a: for lowercase English character input.

Numbers: for numeric character input.

Special symbols: for special symbol input.

Operation:

Press [Up Key] or [Down Key] to switch the input method, press [Right Key] to move to the channel bit number function box.

◆ Channel bit number.

This area displays the content of the bit number, up to 5 Chinese characters or 10 common characters or a combination of Chinese characters and common characters (1 Chinese character = 2 common characters). Operation: Press **[F1]** to save the bit number modification, **[F2]** to cancel the bit number modification, **[F5]** to backspace, press [Right] or [Down] to move to the Pinyin/English/Numeric/Symbol selection function box, press [Left] or [Up] to move to the input method function box.

◆ Pinyin/English/number/symbol selection.

① **Pinyin selection [appears when input method is Pinyin]:** When the cursor is in the Pinyin selection function box, press [F1], [F2], [F3] or [F4] function key to input Pinyin letters and then a variety of Pinyin combinations can appear, up to 4 Pinyin combinations can be displayed on one screen. Operation: Press [Left Key] or [Right Key] to move the cursor or Pinyin selection page left or right, press [Down Key] to move to the Chinese character selection function box, press [Up Key] to move to the channel bit number function box.

② **English/number/symbol selection:** press [Left Key] or [Right Key] to move the cursor, press [Confirmation Key] to select the character, press [Up Key] to move to the channel bit number function box. Press [Down key] to move to the input method function box.

Chinese character selection.

Select the desired Chinese character. Operation: Press **[Left Key]** or **[Right Key]** to move the cursor left or right, press **[Up Key]** to move the cursor up or to the Pinyin selection function box, press **[Down Key]** to move the cursor down or to the input method function box.

Example: The first channel requires the bit number for "1 # tower temperature", bit number modification steps are as follows.

① Enter the bit number modification screen, the default bit number is "01 channel".

② press [up key] or [down key] to switch the input method for [number], and then press [right key] to the channel bit number function box, first press [F5] function key to the default "01 channel" all backspace, and then press [right key] to the number selection function box, at this time the cursor stays on the number [1] press [confirm key], after the selection of the channel After selecting the channel number, the bar at the function box will automatically move backward one, press [Down] to return to the input method function box.

③ Press ② to complete the operation of "#" character input and then return to the input method function box.

④ Press **[Up]** or **[Down]** to switch the input method to **[Pinyin]**, keep pressing **[Right]** to move the cursor to the Pinyin selection function box, press **[F4]** and **[F1]** where the letters "t" and "a" are located, and then press **[Right]** to move the cursor to "ta". If you make a mistake, press **[F5]** to backspace and delete the letter you just entered.

Appendix 1.2 Pinyin Selection

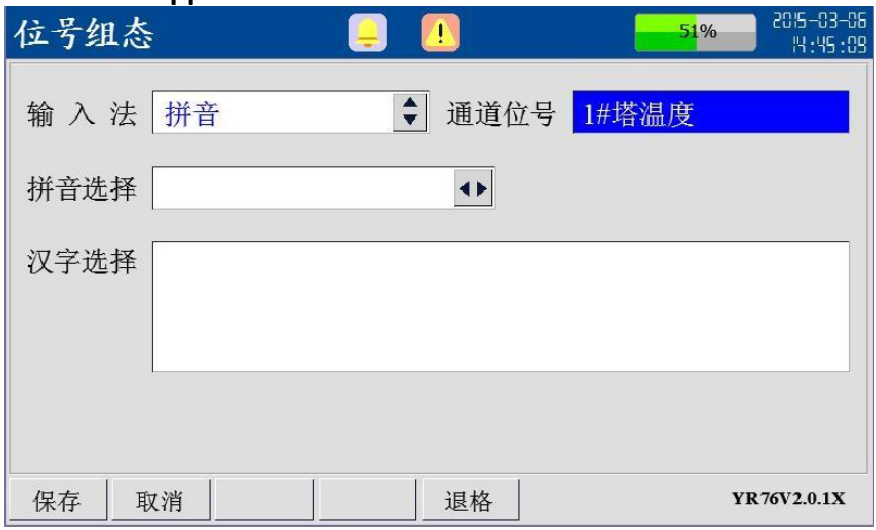
⑤ After selecting the pinyin, press [Down] to move to the Chinese character selection box, then press [Right] to move the cursor to the "tower", the screen is shown in Appendix 1.3.

After selecting the Chinese character, press [Confirmation Key] to confirm the input of Chinese character, at this time, the horizontal bar at the channel bit number function box will automatically move backward one, similarly repeat the operation ④ and ⑤ steps, after all the bit numbers are set, as shown in Figure 1.4, press [F1] to save the function key to save the set bit numbers, at this time, the system automatically returns to the input configuration screen.

Note

When you press [F2] to cancel the function key, the system does not save the set bit number and returns to the input configuration screen directly. The system returns to the input configuration screen directly.

Appendix 1.3 Chinese Character Selection



Appendix 1.4 Bit Number Saving

Appendix II Flow rate calculation formula and meter coefficients

Appendix 2.1 Mass flow rate calculation formula

① **Differential pressure flowmeter:**

$Q = K * \sqrt{\Delta P * \rho}$..... type appendix 2.1-1

K : Instrument coefficient

ΔP : the input differential pressure value

ρ: medium density

② **Vortex flow meter (K factor in times/ m³):**

$Q = 3600 * I_f * \rho / K$..... style Appendix 2.1-2

K : Instrument coefficient

I_f : Vortex frequency

ρ: Medium density

③ **Linear flowmeter:**

$$Q = K * \rho * \Delta P \text{.....} \quad \text{type Appendix 2.1-3}$$

K : Instrument coefficient

ΔP : Linear signal (volume value)

ρ: Medium density

Appendix 2.2 Instrumentation coefficients

① When the model is selected as [differential pressure type], the flow instrumentation coefficients are

$$K = \frac{Q}{\sqrt{\Delta P * \rho}} \quad \text{..... .... style Appendix 2.2-1}$$

② When the model is selected [frequency type vortex street], the unit of the meter coefficient K defaults to times/m³, and the meter coefficient unit and coefficient value are set to the unit and coefficient value of the flow meter (if the flow meter unit is times/L, the meter coefficient = flow meter coefficient * 1000).

$$\rho_f = \rho_n * \frac{(273.15 + T_n)(0.10136 + P_{f*})}{(273.15 + T_f)(0.10136 + P_n)} \frac{Z_n}{Z_f} \quad \text{... Appendix 3.1-1}$$

③ When the model is selected as [linear], the flow coefficient K is set to 1 when the medium is not compensated, the volume

Volume channel in the volume upper limit is set to the flow value corresponding to the upper limit of the linear signal, the lower limit is set to 0, the flow rate and volume units are involved in the operation. Media compensation, density involved in the operation, then the flow coefficient

K should be based on the linear flow meter formula.

Appendix III compensation type and common gas standard density

Appendix 3.1 media compensation type

① **No compensation**

When the system does not have temperature and pressure compensation, the density default is a fixed value of 1.000Kg/m³.

② **General gases**

The purpose of compensation for general gases is to convert the working volume to the volume flow at the standard condition.

The equation of state of a general gas corresponds to the ideal gas equation of state, and the relationship between the working density ρ_f and the standard density ρ_n corresponds to the following equation

where the standard temperature T_n = 20.00°C, the standard pressure (gauge pressure) P_n = 0.000Mpa, and T_f is the working condition temperature, P_f P is the working condition pressure (gauge pressure).

③ **Saturated Steam**

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

According to the saturated steam pressure (or temperature) density table to find the working density, to achieve pressure (or temperature) compensation. In this case, the density ρ in the orifice plate of the flow model is based on the actual input pressure (or temperature) of the

saturated steam pressure (or temperature) density table to obtain the working density ρ_f.

Superheated Steam

The purpose of superheated steam compensation is to obtain the mass flow rate.

The working density is obtained from the density table of superheated steam to achieve temperature and pressure compensation. In this case, the flow ρ in the orifice plate of the flow model is the working density ρ_f obtained from the density table of superheated steam according to the actual input pressure and temperature.

⑤ Natural Gas

The purpose of natural gas compensation is to convert the working volume to the volumetric flow rate at standard conditions.

The equation of state of natural gas is in accordance with the ideal gas equation of state, and the relationship between the working density ρ_f and the standard density ρ_n is in accordance with the following equation.

$$\rho_f = \rho_n * \frac{(273.15 + T_n)(0.10136 + P_f)}{(273.15 + T_f)(0.10136 + P_n)} \quad \text{...Appendix 3.1-2}$$

where the standard temperature T_n = 20.00°C, the standard pressure (gauge pressure) P_n = 0.000Mpa, and

T_f is the working temperature, P_f is the working pressure (gauge

pressure), Z_f is the compression coefficient of natural gas in the standard condition, and Z is the compression coefficient of natural gas in the flowing condition.

Appendix 3.2 Standard Density of Commonly Used Gases

The standard densities of common gases at 1 standard atmosphere and 20℃ are as follows (all units are Kg/m³).

Air (dry): 1.2041	Nitrogen: 1.1646	Oxygen: 1.3302
Helium: 0.1664	Hydrogen: 0.0838	Krypton: 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

Appendix IV Flow rate usage examples

Example 1: Using a standard orifice plate to measure the mass flow of superheated steam

Known:

Differential pressure sensor: two-wire 4-20mA differential pressure transmitter, the need for instrumentation open-side range 0.000 ~ 4.000KPa, corresponding to the volume flow range 0 ~ 500m3 / h

Pressure sensor: two-wire 4-20mA transmitter, range 0.00-0.50MPa

Temperature sensor:Pt100

Working condition: 230℃, 0.3MPa (gauge pressure), corresponding to the maximum flow rate 500m3/h

Setting: Input configuration:

1、Signal type selection [4～20mA]

2、Select [KPa] for engineering unit

3、The lower range limit is 0.000, the upper range limit is 4.000

4, other parameters are set as needed [open the alarm group in the input configuration of the flow operation channel is the flow alarm]

Flow accumulation:

1、 model selection [differential pressure type]

2、 open type select [local open]

3、Flow rate unit: [Kg/h]

4、Instrument coefficient K: [330.8]

5、The upper limit of the flow range, according to the actual mass flow range setting

6, the lower limit of the flow range is generally taken as 0

7、Medium compensation selection [superheated vapor]

8、 temperature channel: temperature channel is divided into given and external complement, if you choose to give, enter the given temperature; if you choose external complement, select the temperature channel number in the following.

9、pressure channel: pressure channel is divided into given and external complement, if you choose given, enter the given pressure afterwards; if you choose external complement, select the pressure channel number afterwards

10、standard density, standard temperature, standard pressure,

compression coefficient Z_f, compression coefficient Z_n ignored

Note: Instrument coefficient calculation process.

By checking the table, the density of superheated steam is 1.7513 Kg/m3 at 230°C and 0.3 MPa (gauge pressure).

$$K = \frac{Q}{\sqrt{\Delta P \rho}} = \frac{500 * 1.7513}{\sqrt{4 * 1.7513}} = 330.8$$ Fill in the results of the calculation

Example 2: electromagnetic flowmeter to measure the volume flow of water

Known:

electromagnetic sensor: two-wire system 4-20mA transmitter, corresponding to the flow rate range

0.00 ~ 25.00 m3 / h

Settings: Input configuration in :

1, the signal type select [4 ~ 20mA]

2.Engineering unit select [m3/h]

3、The lower range limit is [0.00], the upper range limit is [25.00]

4、Other parameters are set as needed

Flow accumulation in:

1、Model selection [linear]

2、Flow unit select [m3/h].

3、The instrument coefficient is set to [1.000].

4、The upper limit of flow range is set to [25.00]

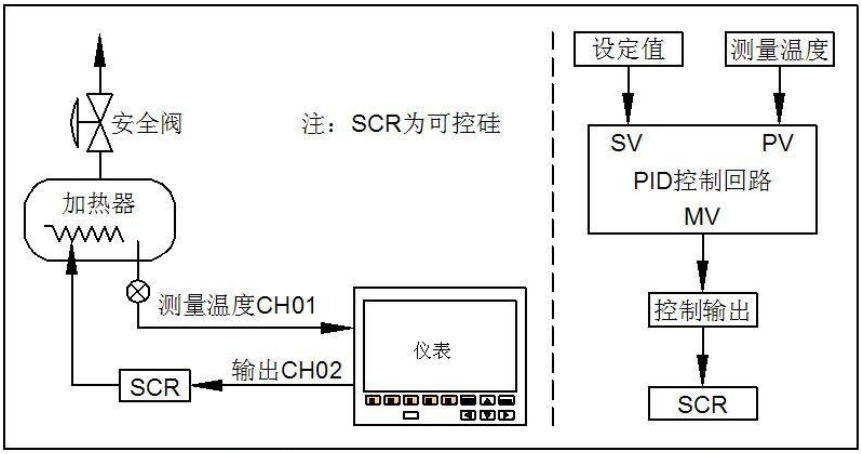
5、 the lower limit of the flow range is generally taken as [0.00]

6、 media compensation selection [no compensation]

7、Other parameters are set as needed

Appendix V PID control loop application examples

As shown in the figure, a 2-channel PID single-loop control system is composed of this series of instruments to achieve a simple temperature control, the measurement signal is the temperature of the tank, the output signal to the heating wire (assuming that the heating wire can receive a continuous signal).



流程图　　原理图

Configuration process.

- System configuration: PID rectification selection allowed (for adjusting PID screen parameters).
- Input configuration: temperature channel CH01, parameters user-defined.
- Output configuration: output channel CH02, the signal source is set to PID01, and the rest parameters are user-defined.
- Control configuration: control channel PID01, loop state is selected as enabled, set value SV is selected as internal given, sampling value PV is selected as CH01, and the rest parameters are user-defined.

Adjustment process (in PID screen).

- Manually adjust MV in the PID screen to make PV reach near the set value.
- Set the loop state to automatic and observe whether the sampling value PV reaches the requirement.
- Adjust the PID parameters to make the loop reach the stable state.