# Color Paperless Recorder YB01


## 1. Product Introduction

The YB01 series color paperless recorder has a compact structure and powerful functions. The large screen TFT LCD with high-definition adopted makes the a display clear and colorful. The instrument kernel is high-speed and high performance 32-bit ARM microprocessor, which makes the instrument operation easy and the response quick. The powerful functions such as recording, storage and control makes the product fully functioned, easy to operate, accurate and reliable, and cost-effective, and widely used in all industries.

## 2. Technical Parameters

| | |
|---|---|
| Measurement Input | |
| Input signal | Current: 0 – 20mA, 0 – 10mA, 4 – 20mA, 0 – 10mA (square root) and 4 – 20mA (square root)<br>Voltage: 0 – 5V, 1 – 5V, 0 – 10V, ±5V, 0 – 5V (square root), 1 – 5V (square root), 0 – 20 mV, 0 – 100mV, ±20mV, ±100mV<br>Thermal resistance: Pt100, Cu50, Cu53, Cu100, BA1 and BA2<br>Liner resistance: 0 – 400Ω<br>Thermocouple: B, S, K, E, T, J, R, N, F2, Wre3–25 and Wre5-26 |
| Output | |
| Output signal | Analog output: 4 - 20 mA (load resistance ≤380 Ω), 0 - 20 mA (load resistance ≤380 Ω), 0 - 10 mA (load resistance ≤760 Ω), 1 - 5 V (load resistance ≥250 KΩ), 0 - 5 V (load resistance ≥250 KΩ), 0 - 10 V (load resistance ≥500 KΩ)<br>(!Note: The output type is changed from current to voltage. Users have to connect a precision resistor to the current output port for the conversion, or choose the voltage output module when ordering. |
| | Alarm output: output through normally open contacts of the relays; The contact capacity are 1A/250VAC and 1A/24VDC (resistive load)<br>(!Note: When the load exceeds the relay contact capacity, do not load directly.) |
| | Feed output: DC24V± 10%, load current ≤ 200mA |
| | Communication output: When the RS485 communication port is used, the baud rate is 2400 – 19200bps (settable); The standard MODBUS RTU communication protocol is adopted, and the |

| | |
|---|---|
| | communication distances of the RS485 port can reach 1 km. When the EtherNet communication port is used, the MODBUS TCP/IP communication protocol is adapted, and the adaptive communication rate is 10M/100M |
| Integrated parameters | |
| Measurement precision | 0.2%FS±1d |
| Sampling cycle | 1s |
| Setting mode | The parameter can be set by tapping the panel and locked by password. The set value can be saved permanently when powering off the instrument. |
| Display mode | Apply a 4.3-inch 480×272 dot matrix (Type A) or a 3.5-inch 480×320 dot matrix (Type C) wide-screen TFT high brightness color graphic LCD with backlit to create clear images and wide FOV. Contents displayed include Chinese characters, numbers, process curves and bar graphs. The screen can be switched, the historical data can be searched forward and backward, and the curve time scale can be changed using buttons on the front panel. The English and Chinese can be switched. |
| Data backup | Support data backup to the USB drive. The maximum capacity is 32GB, and FAT and FAT32 formats are supported. |
| Storage capacity | Internal Flash memory capacity: 16M Byte |
| Record Interval | Nine levels can be selected, including 1s, 2s, 4s, 6s, 15s, 30s, 60s, 120s and 240s |
| Storage length<br>(continuous recording) | 12 days (interval: 1 second for 8 channels) — 5825 days (interval: 240s for 4 channels)<br>Formula: Recording time (day) = $\frac{16\times1024\times1024\times\text{recording interval (S)}}{\text{Channel number}\times2\times24\times3600}$<br>(! Note: Channel number computing: The program divides the channels into two levels, 4 and 8. If it is less than or equal to 4 channels, computed as 4 channels; if it is greater than 4 channels but less than 8 channels, computed as 8 channels. |
| Operation environment | Ambient temperature: -10 – 50°C; relative humidity: 10 - 90%RH (non-condensing); prevented from strongly corrosive gases<br>(!Note: If the site environment is severe, special instructions must be made when ordering.) |
| Power supply | AC100 – 240V (SMPS), 50/60Hz |
| Power consumption | ≤ 15W |

★ Scan the QR code on the label for the user manual, wiring diagrams, register address, communication software, truth-checking code, the official website of Hongrun, etc.

## 3. Ordering Description

YB01-□T-□-□-□-□-□

① ② ③ ④ ⑤ ⑥

| ① Input channel number | | ② Dimension | |
|---|---|---|---|
| Code | Input channel | Code | W×H×D |
| 01 | First-channel input | A | 160×80×120 mm |
| 02 | Second-channel input | C | 96×96×120 mm |
| 03 | Third-channel input | | |
| 04 | Fourth-channel input | | |
| 05 | Fifth-channel input | | |
| 06 | Sixth-channel input | | |
| 07 | Seventh-channel input | | |
| 08 | Eighth-channel input | | |
| ③ Transmitter output channel number | | ④ Alarm output channel number | |
| Code | Output channel | Code | Alarm channel |
| X | No output | X | No output |
| 01 | First-channel output | 01 | First-limit alarm |
| 02 | Second-channel output | 02 | Second-limit alarm |
| 03 | Third-channel output | 03 | Third-limit alarm |
| 04 | Fourth-channel output | 04 | fourth-limit alarm |
| ⑤ Power supply | | | |
| Code | Voltage range | | |
| A | AC100 – 240V (50/60Hz) | | |
| ⑥ Additional functions (All the following functions can be selected and isolated by “/”. Unselected functions can be omitted.) | | | |
| Communication output | | Print function | |
| Code | Communication Port (communication protocol) | Code | Print port |
| D1 | RS485 communication port (Modbus RTU) | D3 | RS232C print port |
| Feed output | | USB transferring function | |
| Code | Feed output | Code | USB transferring |
| P | DC24V | U | USB transferring (USB drive) |
| EtherNet communication function | | | |
| Code | EtherNet communication | | |
| E | EtherNet communication (Modbus TCP/IP) | | |

## 4. Precautions and Installation

4.1 Precautions

4.1.1 Precautions for Instrument Using

● The instrument has many plastic components. Use the dry and soft cloth to clean the instrument. Do not use the benzoene agent, lacquer thinner, etc. to clean the instrument. Otherwise, discoloration or deformation may be caused.

● Do not make the live products near to the signal terminal. Otherwise, malfunction may be caused.

● Do not impact on the instrument.

● If any abnormality is found, for example, the instrument is smoking, or the odor is smelled, or the abnormal noise is heard, disconnect the power supply immediately and contact the local distributor or the manufacturer in a timely manner.

● To ensure the normal working of the instrument, power on and heat the instrument for 30 min before use.

4.1.2 Precautions for External Storage Medium

● The storage medium is precision product. Use it carefully.

● Except inserting and withdrawing the storage drive, close the operation cover during running the instrument. Prevent the storage medium and USB ports from the dust.

● When the USB drive is used, perform ESD.

● Products manufactured by the manufacturer are recommended.

● When using the storage medium in the high temperature (higher than 40℃ approximately), only insert the storage medium when saving the data. After the data is saved, withdraw the storage medium and store it appropriately. Do not insert the storage medium in the instrument for a long time.

● Before powering on/off the instrument, withdraw the storage medium.

● Refer to the user manual of the storage medium for the using precautions of the storage medium.

4.2 Instrument Installation

4.2.1Installation Site

Install the instrument at the following sites.

● Installation panel

The instrument is the panel-mounting type.

● Installation site

Install the instrument indoors, and prevent it from wind, rain and direct sunlight.

● Well-ventilated places

To prevent internal temperature rise of the instrument, install it at the well-ventilated place.

● Place with less mechanical vibration

Install the instrument at the place with less mechanical vibration.

● Horizontal place

During the installation, do not tilt the instrument left or right. Keep the instrument level. (The instrument can be tilted back for 30° maximally.)

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! Notes

★ When moving the instrument from a place with lower temperature and humidity to a place with higher temperature and humidity, if the temperature changes greatly, condensation sometimes occurs, and the TC input measurement errors may occur. At this time, make the instrument adopt to surrounding environment for more than 1 hour before use.

★ If the instrument is used at high temperature for a long time, the LCD lifetime will be reduced, causing screen quality decline. Do not use the instrument at high temperature (higher than 40℃ approximately).

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Do not install the instrument at the following sites.

● Where is under the direct sunlight or near to the heat apparatus;

Select the place with lower temperature change and the temperature is near to the normal value (23℃) as far as possible. If the instrument is installed at a place with direct sunlight or heat appliance, a bad impact on the instrument inside may be caused.

● Places with excessive fume, steam, moisture, dust and corrosive gas

The fume, steam, moisture, dust and corrosive gas may cause bad impact on the instrument.

● Places near to the electromagnetic source

Do not approach magnetic appliances or magnets to this instrument. If the instrument is installed near to the strong electromagnetic source, the electromagnetic filed may cause error to the instrument.

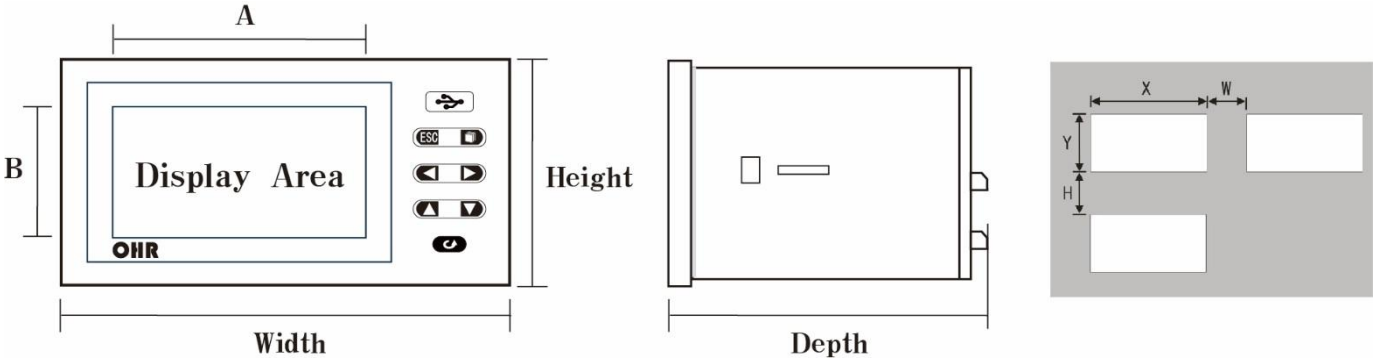
To prevent the instrument from abnormal working, when the RF generator is used at the site, keep it more than 20cm from the instrument.

● Places uneasy to view the screen

The display part of the instrument is a TFT true color LCD. If viewing the screen from an extremely partial perspective, it will be difficult to see the display clearly. Therefore, install the instrument in a place where the observer can view the screen in the front as far as possible.

4.2.2. Installation Method (Unit: mm)

● Installation dimension (unit: mm)




| | Outside Dimension (mm) | | | Display Area (mm) | | Hole Size (mm) | | Minimum Distance between Instruments (mm) | |
|---|---|---|---|---|---|---|---|---|---|
| Dimension Type | Width | Height | Depth | A | B | X | Y | W | H |
| Type A | 160 | 80 | 120 | 96 | 55 | 152+0.5 | 76+0.5 | 38 | 34 |
| Type C | 96 | 96 | 120 | 74 | 50 | 92+0.5 | 92+0.5 | 38 | 38 |

● Installing the instrument

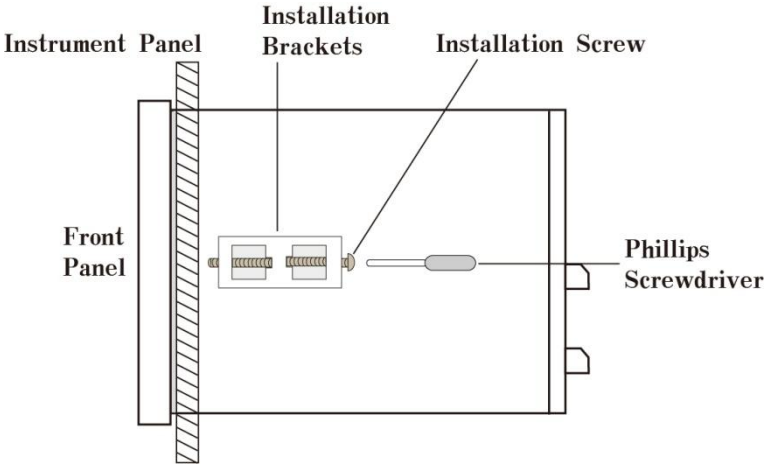
(1) Installation methods

A. Install the instrument at the front of the instrument panel.

B. Install the instrument by the installation brackets provided with the instrument, as shown in the right figure.

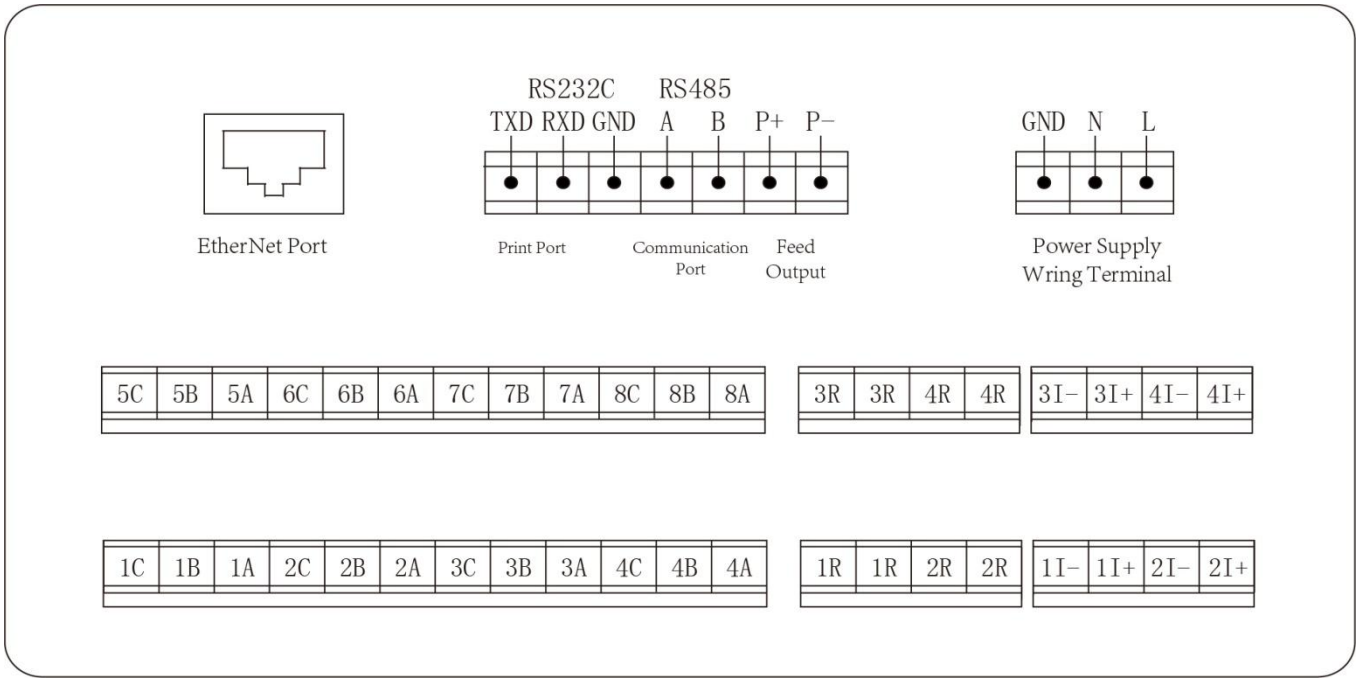
▲ Use two installation brackets to fix the instrument at the two sides.

(2) The installation diagram is in the right.

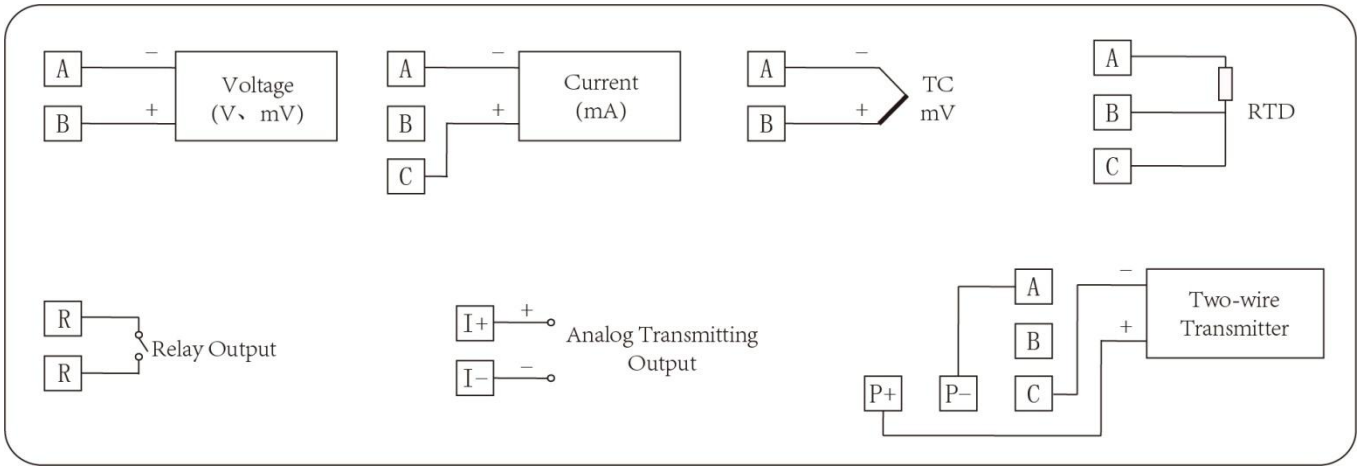



● Instrument wiring diagram

Diagram of Terminals at Instrument End



Wiring description



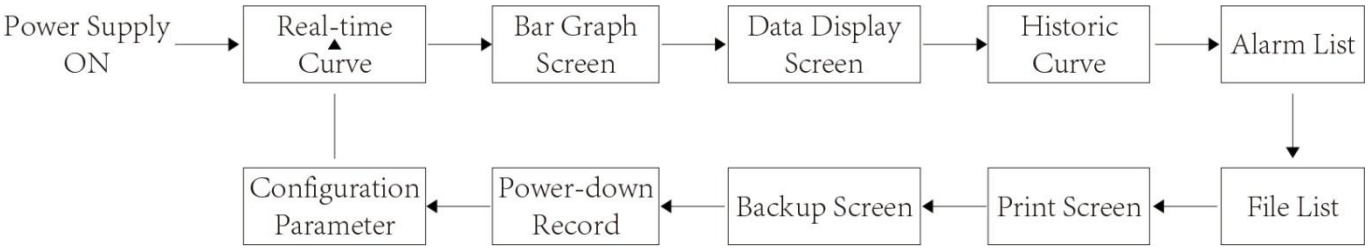

## 5. Instrument Functions and Operation

The color paperless recorder has several operation display screens and configuration screens. The display is clear, the information amount is large, and the configuration is convenient. Users can operate the instrument easily without professional training. After powering on the instrument, the system initial screen is displayed. When the initiation finishes, the real-time curve is entered. The operation display screens and all configuration screens are described in the following.

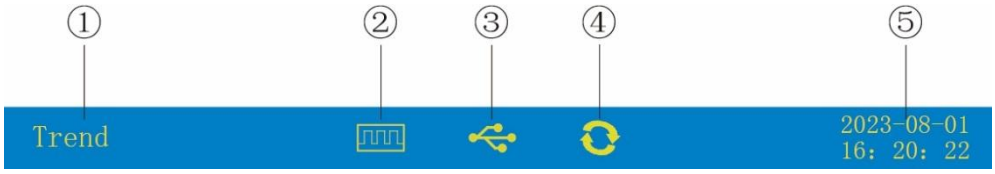
### 5.1 Running Screen Switch

The running screen consists of the real-time curve screen, bar graph screen, digital display screen, historic curve screen, alarm list, file list, print screen, backup screen, power-down record screen, and configuration parameters.

Use the “Switch” button to toggle among all screens.




### 5.2 Status Display Part




①: Display the names of all running screens.

②: File recording icon

Displayed: Files are being recorded in cycle.

Displayed with arrow: Files are being recorded without cycle.

Hidden: Files recording stops.

③: USB drive icon

Displayed: The USB drive is connected to the instrument.

Hidden: The USB drive is disconnected from the instrument.

⑤: Loop display icon

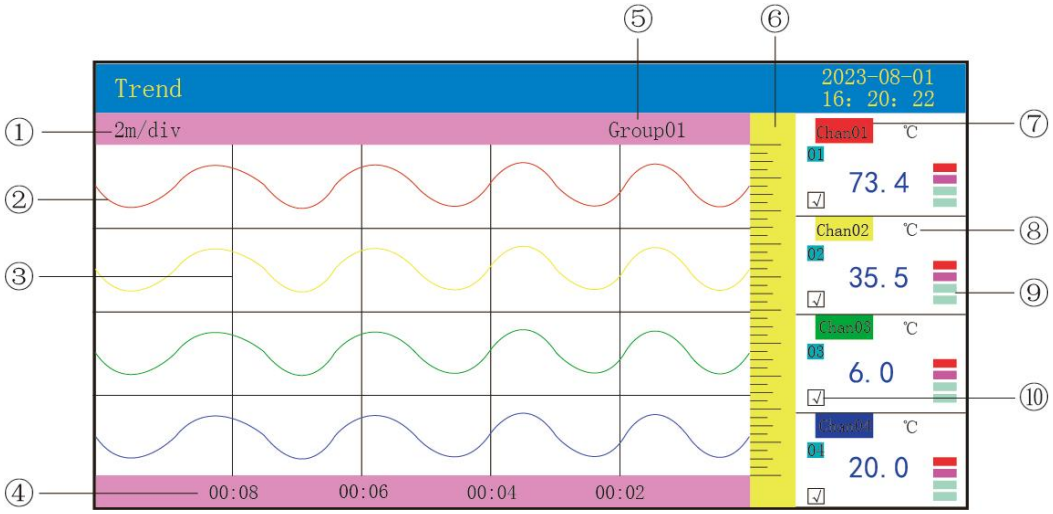
Displayed: All groups are displayed in cycle.

Hidden: The screen is fixed and not displayed in cycle.

④: Display the instrument running date and time.

## 5.3 Real-time Curve Screen

Set the screen according to the curve groups. The real-time curves and data of four channels are displayed simultaneously (curve precision: 0.5%±1 digit).




①: Time scale: The time length of each grid. The time scale is related to record interval. Refer to the following table for details.

| Record Interval | 1s | 2s | 4s | 6s | 15s | 30s | 1 min | 2 min | 4 min |
|---|---|---|---|---|---|---|---|---|---|
| Time scale | 2 min/grid | 4 min/grid | 8 min/grid | 12 min/grid | 30 min/grid | 1 hour/grid | 2 hour/grid | 4 hour/grid | 8 hour/grid |
| | 4 min/grid | 8 min/grid | 16 min/grid | 24 min/grid | 1 hour/grid | 2 hour/grid | 4 hour/grid | 8 hour/grid | 16 hour/grid |
| | 8 min/grid | 16 min/grid | 32 min/grid | 48 min/grid | 2 hour/grid | 4 hour/grid | 8 hour/grid | 16 hour/grid | 32 hour/grid |
| | 16 min/grid | 32 min/grid | 64 min/grid | 96 min/grid | 4 hour/grid | 8 hour/grid | 16 hour/grid | 32 hour/grid | 64 hour/grid |

②: Data curve: At most four curves can be displayed at one screen. (The curves have six colors and the color can be set in the display configuration settings.)

③: Grid: It can facilitate users to estimate the time and data values.

④: Time represented by the current grid.

⑤: Curve groups: Display the current curve group name. (Each curve group includes four curves. Users can put the associated channels into one curve group according to their needs to facilitate channel data comparison.)

⑥: Scale: Display the percentage scale of the curve. Percentile range: 0 - 100% from top to bottom.

⑦: Channel name: The work bits of corresponding displayed channels (with font library for edition).(Refer to Section “5.12.5.1 Channel Bit Input Method” for the settings.) The background color is same to that of the corresponding curve.

⑧: Unit: Display the unit of current channel data (with font library for edition). (Refer to Section “5.12.5.2 Channel Unit Input Method” for the settings.)

⑨: Over limit alarm indicators: From top to the bottom, the blocks represent the over limit alarm indications of the uppermost limit, upper limit, lower limit and lowest limit. If the block is gray, the alarm function is not supported. If the block is green, no alarm exits. If the block is red/pink, alarm occurs.

⑩: Curve display/hiding icons: “√” refers to curve display. Otherwise, the curve is hidden.

⑾: Operating buttons

Tap the “ ” button to display to other screens;

Tap the “ ” button to switch the time scale;

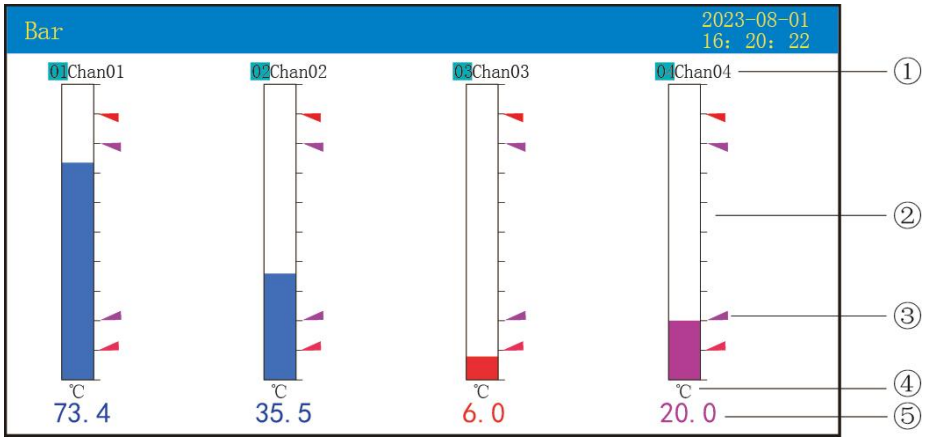
Tap the “ ” button to view the previous curve group;

Tap the “ ” button to view the next curve group;

Tap the “ ” and “ ” buttons simultaneously, and the loop icon “ ” is displayed on the screen. The next curve group can be switched automatically according to the set loop interval in the display configuration.

## 5.4 Bar Graph Screen

Data of four channels and the percentage bar graphs can be displayed at the same time.




①: Channel name: The work bits of corresponding displayed channels (with font library for edition). (Refer to Section “5.12.5.1 Channel Bit input Method” for the settings.)

②: Bar graph: The length of bar graph scale is ten-grid. The filled length of color block is the percentile of the measured value in the range. Blue indicates that the measurement value is not in the alarm status; Red indicates that the instrument value is on the uppermost limit alarm or lowest limit alarm status; Pink indicates that the measurement value is in the upper limit or lower limit alarm status.

③: Alarm site icons for the uppermost limit, upper limit, lower limit and lowest limit.

④: Unit: Display the unit of current channel data (with font library for edition). (Refer to Section “5.12.5.2 Channel Unit Input Method” for the settings.)

⑤: Work amount data: The current work amount data of the channel. Blue indicates that the measured value does not meet the alarm output; Red indicates that the measured value meets the alarm output.

⑥: Operating buttons:

Tap the “ ” button to display to other screens;

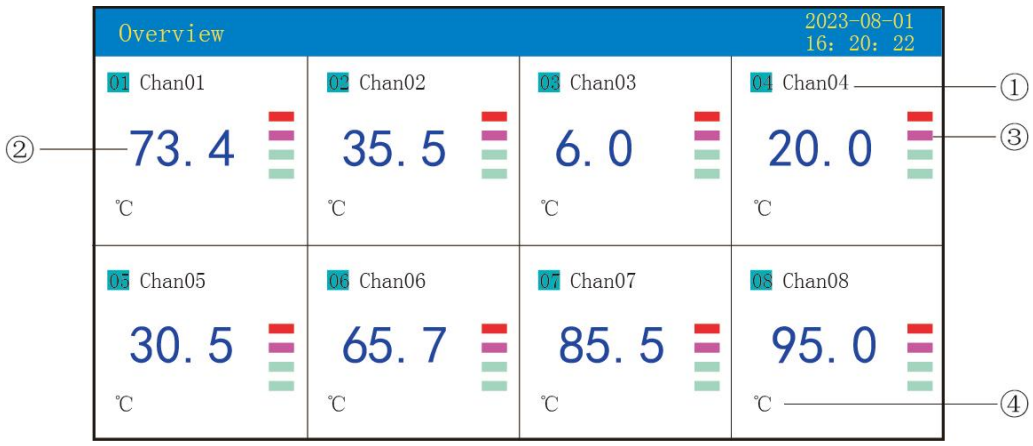
Tap the “ ” button to view the previous bar graph group;

Tap the “ ” button to view the next bar graph group;

Tap the “ ” and “ ” buttons simultaneously, and the loop icon “ ” is displayed on the screen. The next bar graph group can be switched automatically according to the set loop interval in the display configuration.

## 5.5. Data Display Screen

The real-time data and alarm status of several channels can be displayed at the same time.




①: Channel name: The work bits of corresponding displayed channels (with font library for edition). (Refer to Section “5.12.5.1 Channel Bit input Method” for the settings.)

②: Work amount data: The current work amount data of the channel.

③: Over limit alarm indicators: From top to the bottom, the blocks represent the over limit alarm indications of the uppermost limit, upper limit, lower limit and lowest limit. If the block is gray, the alarm function is not supported. If the block is green, no alarm exits. If the block is red/pink, alarm occurs.

④: Unit: Display the unit of current channel data (with font library for edition). (Refer to Section “5.12.5.2 Channel Unit Input Method” for the settings.)

⑤: Operating buttons:

Tap the “ ” button to display to other screens;

Tap the “ ” and “ ” buttons to toggle among the screen display channels, including one channel, two channels, four channels and eight channels;

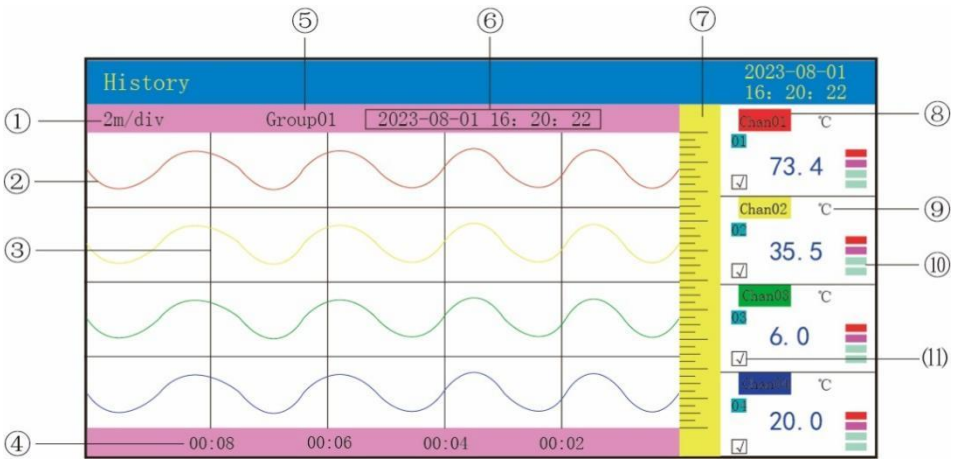
Tap the “ ” button to view the previous digital display group;

Tap the “ ” button to view the next digital display group;

Tap the “ ” and “ ” buttons simultaneously, and the loop icon “ ” is displayed on the screen. The next digital group can be switched automatically according to the set loop interval in the display configuration.

5.6. Historic Curve Screen

Set the screen according to the curve groups. The four channels of historic data curves can be displayed at the same time (curve precision: 0.5%±1 digit).




①: Time scale: The time length of each grid. The time scale is related to record interval. Refer to the description in Section 5.3 Real-time Curve Screen.

②: Data curve: At most four curves can be displayed in one screen. (The curves have six colors that can be set in the display configuration settings.)

③: Grid: It can facilitate users to estimate the time and data values.

④: Time represented by the current grid.

⑤: Curve groups: Display the current curve group name. (Each curve group includes four curves. Users can put the associated channels into one curve group according to their needs to facilitate channel data comparison.)

⑥: Recall Time: yy-mm-dd h:m:s.

⑦: Scale: Display the percentage scale of the curve. Percentile range: 0 - 100% from top to bottom.

⑧: Channel name: The work bits of corresponding displayed channels (with font library for edition). (Refer to Section “5.12.5.1 Channel Bit Input Method” for the settings.) The background color is same to that of the corresponding curve.

⑨: Unit: Display the unit of current channel data (with font library for edition). (Refer to Section “5.12.5.2 Channel Unit Input Method” for the settings.)

⑩: Over limit alarm indicators: From top to the bottom, the blocks represent the over limit alarm indications of the uppermost limit, upper limit, lower limit and lowest limit. If the block is gray, the alarm function is not supported. If the block is green, no alarm exits. If the block is red/pink, alarm occurs.

⑪: Curve display/hiding icons: “√” refers to curve display. Otherwise, the curve is hidden.

⑫: Operating buttons:

Tap the “ ” button to display to other screens;

Tap the “ ” and “ ” buttons simultaneously to recall the historical data forward according to the current recall time.

Tap the “ ” and “ ” buttons simultaneously to recall the historical data backward according to the current recall time.

Tap the “▼” button to switch the time scale;

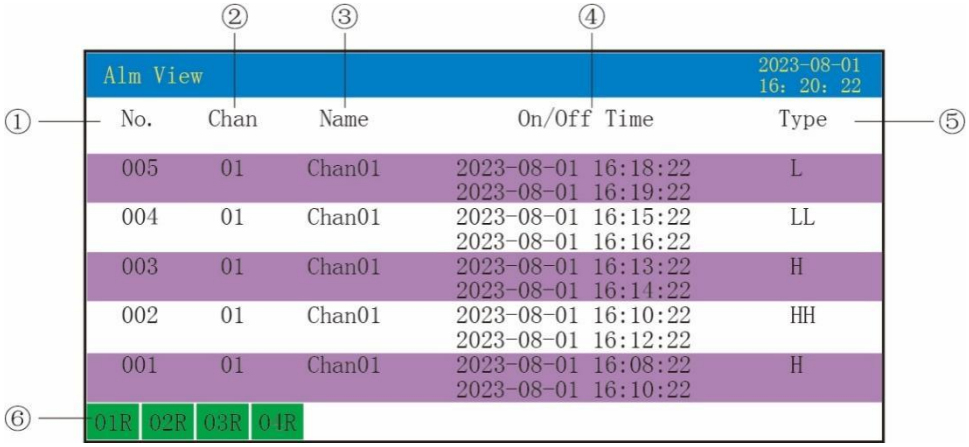
Tap the “▶” button to view the previous curve group;

Tap the “◀” button to view the next curve group;

Tap the “↵” button to change the recall time, “yy-mm-dd h:m:s”.

## 5.7 Alarm List Screen

Display the channel alarm information and relay output status. At most 100 alarm massages can be saved. When the saving limit is reached, the newest alarm record will cover the earliest alarm record.




①: No.: The alarm serial number. The numbers are arranged by time. The closer the occurrence time is, the larger the serial number is.

②: Channel: Number of input channel generating the alarm.

③: Bit: Bit of input channel generating the alarm.

④: Alarm/elimination time: alarm starting time and elimination time; The top line is the alarm time, and the bottom line is the elimination time.

⑤: Alarm type: uppermost limit, upper limit, lower limit and lowest limit

⑥: Current relay status: The current relay status for limit 1 to limit 4 are displayed from left to right successively. Green indicates that the relay contact is open; Red indicates that the relay contact is closed.

⑦: Operating buttons:

Tap the “▣” button to display to other screens;

Tap the “▲” button to move up to view the alarm list;

Tap the “▼” button to move down to view the alarm list;

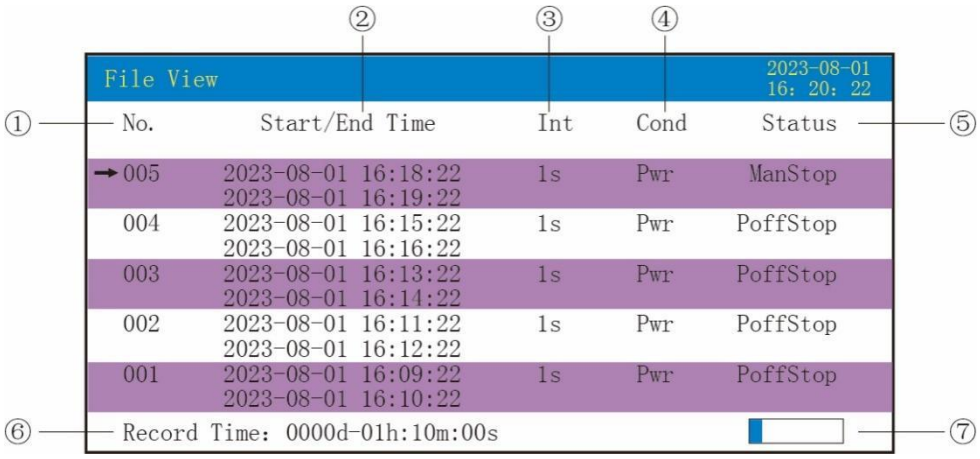
Tap the “↵” and “▲” buttons simultaneously to turn up the page to view the alarm list;

Tap the “↵” and “▼” buttons simultaneously to turn down the page to view the alarm list.

Note: Only five alarm records in the list can be displayed on one screen.

## 5.8. File List Screen

Display the file storage messages and status. At most 100 file list messages can be saved. When the saving limit is reached, the newest file record will cover the earliest file record.




①: No.: The serial number of the file. The numbers are arranged by time. The closer the occurrence time is, the larger the serial number is.

②: Start/end time: Start time and end time of file data recording. The top line is the start time, and the bottom line is the end time.

③: Interval: time interval for file recording; The recording interval set in the record configuration is displayed.

④: Triggering: file recording triggering condition; The triggering condition set in the record configuration is displayed.

⑤: Status: Display the current file recording status. The file status are shown in the following:

Recording: Data is being recorded.

Manual stop: File recording ends due to configuration data modification.

Power-down stop: File recording ends due to instrument power-down.

Alarm stop: File recording ends due to alarm elimination.

Timed stop: File recording ends due to the set end time.

⑥: Total recording time: Compute the total file recording time.

⑦: File storage capacity progress bar (Note: It is displayed when the recording mode in the record configuration is non-cycling.)

⑧: Operating buttons:

Tap the “” button to display to other screens;

Tap the “” button to move up to view the file list;

Tap the “” button to move down to view the file list;

Tap the “” and “” buttons simultaneously to turn up the page to view the file list;

Tap the “” and “” buttons simultaneously to turn down the page to view the file list;

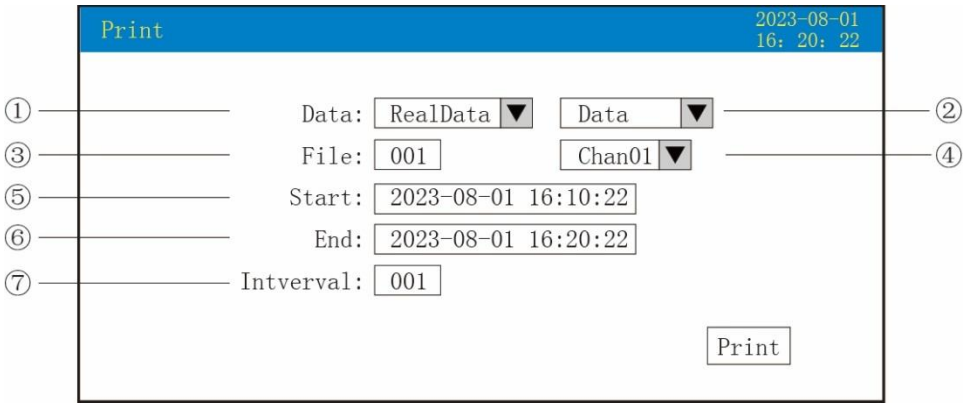
Tap the “” and “” buttons simultaneously to skip to the historic curve screen indicated by arrow to view the historic curve data. For the detailed operation, see Section “5.6 Historic Curve Screen”. Tap the “” and “” button to switch to the file list screen;

Tap the “” and “” buttons simultaneously to skip to the backup screen to back up single historic file or all historic files. For the detailed operation, see Section “5.10 Backup Screen”. Tap the “” and “” button to switch to the file list screen.

Note: Only 5 file storage records in the list can be displayed on one screen.

5.9 Print Screen (for instrument with print function)

The paperless recorder can be connected to the micro printer through the RS232C print port to print the historic data and curves. Baud rate of the printer: “4800”; data bit: 8; ODD/EVEN check: none




①: Printed content: The real-time data and historical data can be selected and printed. When the real-time data is selected, move the cursor the “Print” and tap the “ ” button to print the data directly; When the historical data is selected, the following contents can be changed.

②: Print mode: The data report and historic curve can be selected and printed.

③: File No.: Serial numbers of the recorded files.

④: Print channel: Select the channel to be printed (01 - 08).

⑤: Start time: start time of the data segment for printing.

⑥: End time: end time of the data segment for printing.

⑦: Print interval: Select the time interval for data printing. Set the unit as print interval × record interval (effective to the data printing only).

⑧: Operating buttons:

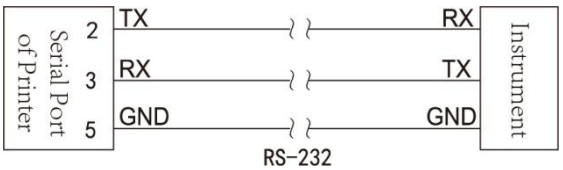
Tap the “ ” button to display to other screens;

Tap the “ ” button to start printing;

Tap the “ESC” button to cancel the printing;

Tap the “ ” and “ ” buttons to move the blue cursor, and then tap the “ ” button to modify the content beside the cursor. After modification, tap the “ ” button to exit from the screen.

Instrument and serial printer connection diagram:




A: Manual printing

Move the cursor to “Print”, tap the “ ” button to enable the print progress bar, and the instrument starts printing data or curves.

Curve print record format:

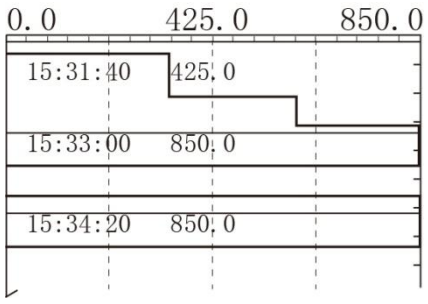
---

Start time: 23-08-01 15:31:40

End time: 23-08-01 15:34:20

Print interval: 1s

Channel 01: Unit: ℃




---

Data print format:

---

Start time: 23-08-01 15:31:40

End time: 23-08-01 15:32:00

Print interval: 1s

Channel 01: Unit: ℃

Time Data

23-08-01 15:31:40 850.0 ----------Start time measurement value

23-08-01 15:31:41 850.0

23-08-01 15:31:42 850.0

..... .....

23-08-01 15:31:58 425.0

23-08-01 15:31:59 425.0

23-08-01 15:32:00 425.0 ----------End time measurement value

---

B. Timed print

Set the time interval and start time of the timed printing in “System Configuration”. When the set time interval is reached, the instrument controls the printer automatically to perform the timed printing.

Timed print format:

---

Print time: 23-08-01 14:30:02 ----------Date/time

Channel 01: 100.0℃ ----------Measurement value of Channel 01

Channel 02: 100.0℃ ----------Measurement value of Channel 02

..... .....

Channel 07: 100.0℃ ----------Measurement value of Channel 07

Channel 08: 100.0℃ ----------Measurement value of Channel 08

---

C. Alarm print

Enable the alarm print in the “System Configuration” screen and the alarm status will be displayed during printing.

Alarm print format:

---

Print time: 23-08-01 14:30:02 ----------Date/time

Channel 01: 100.0℃ H ----------Measured value and alarm status of Channel 01

Channel 02: 100.0℃ HH ----------Measured value and alarm status of Channel 02

. . . . . . . . . .

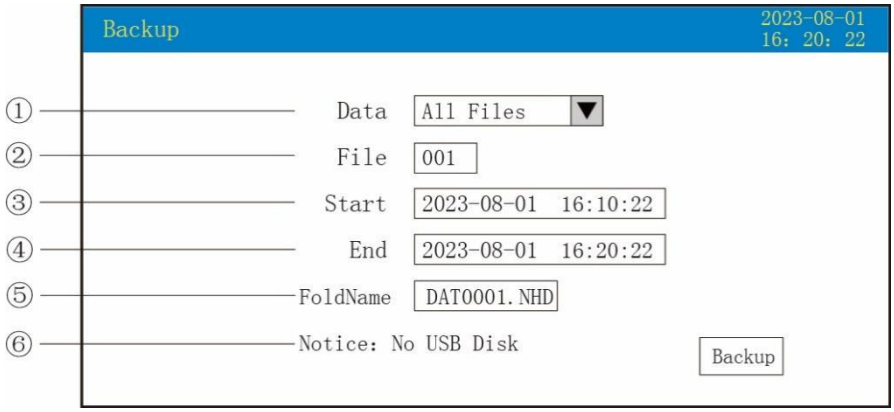
Channel 07: 100.0℃ H ----------Measured value and alarm status of Channel 07

Channel 08: 100.0℃ HH ----------Measured value and alarm status of Channel 08

Note: The data and curve can be printed manually, while only the data can be printed by timed print.

5.10 Backup Screen (for instrument with backup function)

The paperless recorder can back up the recorded data in the instrument by using the USB drive. The USB drive port is on the front panel. Unplug the silicone plug and insert the USB drive into the port. Then, back up data when the USB drive icon appears in the display status bar. After the backup data is stored into the computer, the data can be reproduced, analyzed and printed by the host software DTM.




①: Backup contents: All files, single historical file, alarm records, power-down records, file lists can be selected.

②: File No.: Serial numbers of the recorded files.

③: Start time: Start time of data segment backup.

④: End time: End time of data segment backup.

(Note: The start time and end time are automatically generated by the instrument in accordance with the current selected file number. If the time frame is shaded, the time cannot be changed. If the time frame is not shaded, the start time and end time can be changed. If the changed time exceeds the actual range of the curve start time and end time, an error indication is displayed.)

⑤: Content name: Select the file names for backup data in the USB drive. If the contents to be backed up are all files, the default prefix of the folder name is F+Date; If the content is a single historical file, the default prefix of the folder name is DAT; If the contents are alarm lists, the default prefix of the folder name is ALM; If the contents are power-down lists, the default prefix of the folder name is PWR; If the contents are file lists, the default prefix of the folder name is REC. The file name can be changed according to user's demand.

⑥: If no USB drive is connected, move the cursor to "Backup" and tap the "" button, and the prompt "No USB drive" is displayed; If an USB drive is connected, the corresponding icon is shown in the display status bar. Tap the "" button, and the prompt "Backing up" is displayed. When the USB progress bar runs out, the meter will prompt "Backup complete" is displayed.

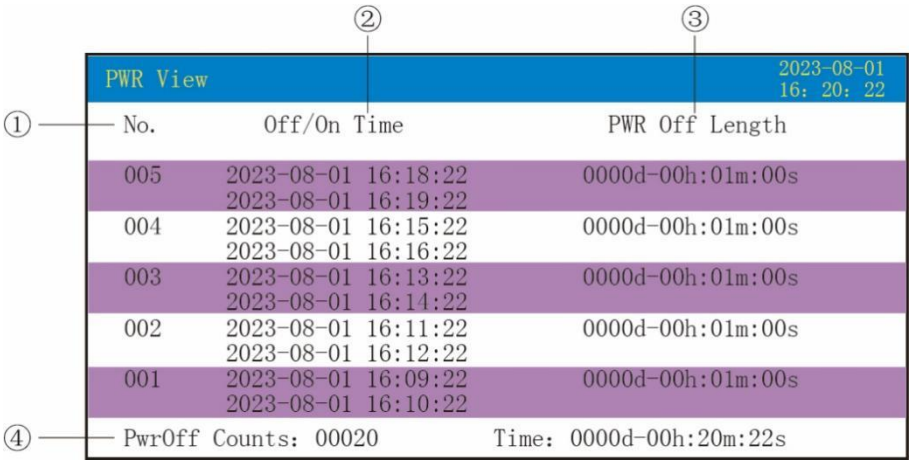
⑦: Operating buttons:

Tap the "" button to display to other screens;

Tap the "" and "" buttons to move the blue cursor, and then tap the "" button to modify the content beside the cursor. After modification, tap the "" button to exit from the screen.

## 5.11. Power-down Record Screen

Display the instrument power-down and power-on time records, including the power-on/down times, total power-down times and power-down duration. At most 100 alarm massages can be saved. When the saving limit is reached, the newest power-down record will cover the earliest power-down record.




①: No.: The serial number of the power-down record. The numbers are arranged by time. The closer the occurrence time is, the larger the serial number is.

②: Power-down/power-on time: power-down/power-on time of the instrument; The top line is the power-down time, and the bottom line is the power-on time.

③: Power-down duration: time duration for each power-down.

④: Power-down times: total power-down times.

Total duration: time duration for each time of power-down.

⑤: Operating buttons:

Tap the "" button to display to other screens;

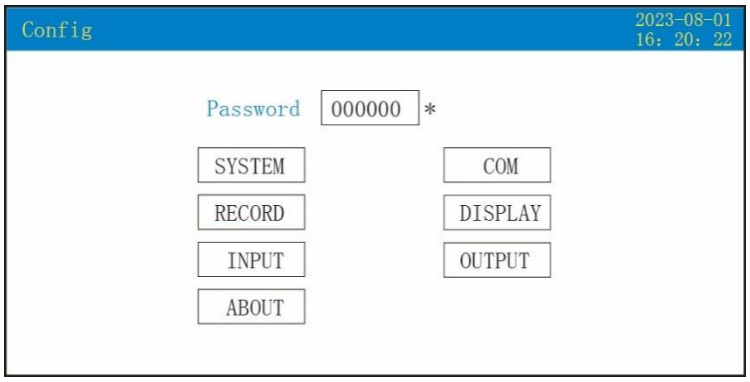
Tap the "" button to move up to view the power-down record list;

Tap the "" button to move down to view the power-down record list;

Tap the "" and "" buttons simultaneously to turn up the page to view the Power-down record list;

Tap the “ ” and “ ” buttons simultaneously to turn down the page to view the Power-down record list.

## 5.12. Configuration Screen



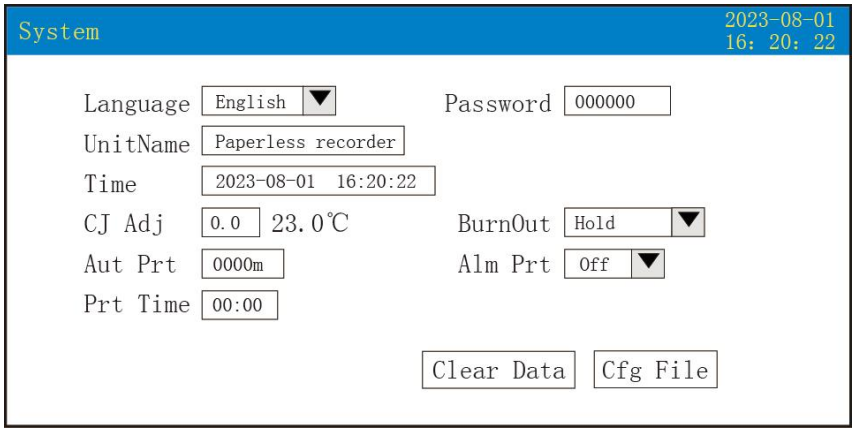

The password consists of six numbers and a “*”.

Tap the “ ” and “ ” buttons to move the cursor; Tap the “ ” and “ ” buttons to adjust the integral value, and tap the “ ” button to confirm the entered password. Tap the “ ” and “ ” buttons to move the cursor, and tap the “ ” button to enter the configuration screens.

Note: If the password is incorrect, all configuration screens cannot be entered. Factory default password: 000000.

The configuration screen of each group is described as follows:

### 5.12.1. System Configuration




★ Language selection: Simplified Chinese or English.

★ User password: The password can be set according to users’ requirement.

★ Instrument name: The instrument name can be set according to users’ requirement. Factory default name: Paperless Recorder.

★ Date&time: Displayed as yy-mm-dd h:m:s. Time can be changed.

★ Cold junction adjustment: Adjust and display the cold junction temperature. Cold junction adjustment range: -20.0 - 20.0.

★ Treatment of interruption: The upper range limit, lower range limit and current value keeping, and -.-- can be selected.

★ Timed print: Set the timed print interval.

★ Alarm print: enabled or disabled.

★ Start time: Set the start time of timed print.

★ Clear data: Clear all data saved in the instrument, including the historic data, alarm list, file list and power-down list.

★ Configuration files: Move the cursor to “Configuration File”, and tap the “ ” button to enter the configuration file settings screen. After the file name is set, insert the USB drive. Tap “Export Configuration” to export the “System Configuration”, “Record Configuration”, “Display Configuration”, “Input Configuration”, “Analog Configuration” to the NHR folder in the USB drive. Then insert the USB drive to another instrument. Tap “Import Configuration”, and the configurations of the previous instrument can be imported to the instrument. If the configurations of several instruments are same, the configuration time can be reduced greatly by using this function.

Operation: On the screen

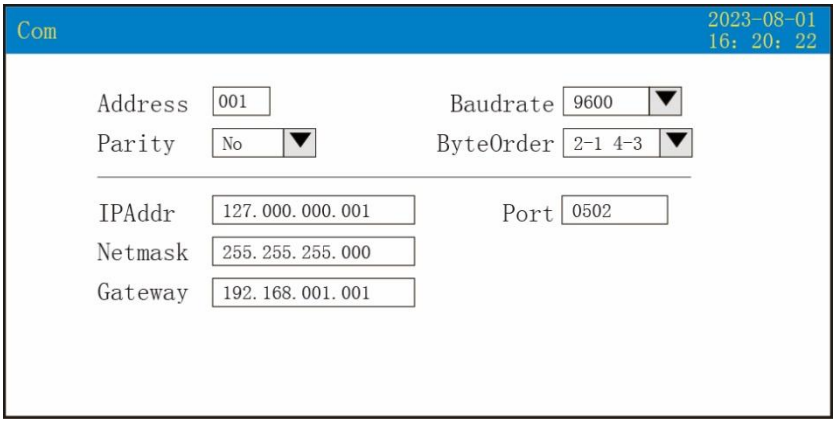
Tap the “ ” and “ ” buttons to move the cursor;

Tap the “ ” and “ ” buttons to adjust the value or select the required content;

Tap the “ ” button to confirm the operation; Move the cursor to “Clear Data”, and tap the “ ” button, and the dialog box “Sure to clear all data?” is popped up. Select “Yes” to clear all data, or select “No” to give up data clearing;

Tap the “ESC” button to exit from the screen. If the contents in the screen are changed, the prompt “Save the changed parameter?” is popped up. Select “Yes” to save the changed parameter, or select “No” to give up saving the changed parameter.

5.12.2 Communication Configuration




★Communication address: address range: 1 - 255.

★ Baud rate: 2400, 4800, 9600, 19200bps (selectable)

★ Check mode: No: No parity check; Odd: odd parity check; Even: even parity check

★ Byte order: Four byte orders in order from lowest to highest, 1-2 3-4, 2-1 4-3, 3-4 1-2 and 4-3 2-1, can be selected.

★ IP address: After the EtherNet communication IP address is set, restart the instrument for one time, and the set IP takes effect.

★ Port: port number of EtherNet communication.

★ Subnet mask: Set according to the different IP address default subnet mask is 255.255.255.000

★ Default gateway: Gateway address.

Operation: On the screen

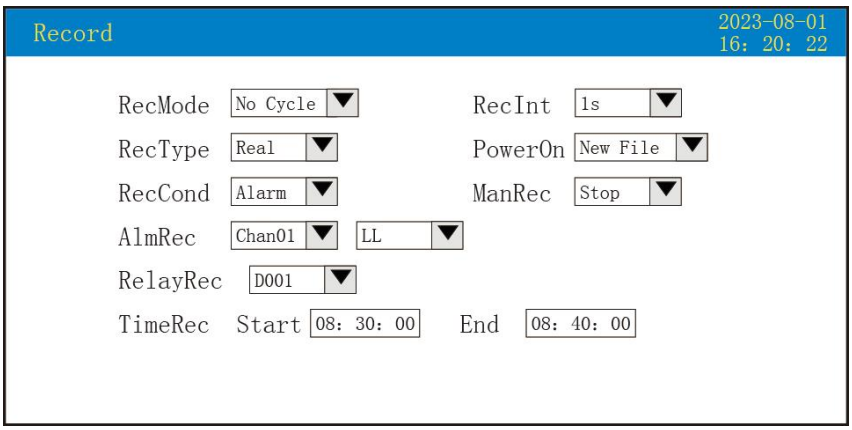
Tap the "◀" and "▶" buttons to move the cursor;

Tap the "▲" and "▼" buttons to adjust the value or select the required content;

Tap the "↵" button to confirm the setting;

Tap the "ESC" button to exit from the screen. If the contents in the screen are changed, the prompt "Save the changed parameter?" is popped up. Select "Yes" to save the changed parameter, or select "No" to give up saving the changed parameter.

### 5.12.3 Record Configuration




★ Record mode: cycling or non-cycling

Non-cycling: When the instrument recording space is full, or 100 files are recorded, the recording stops automatically.

Cycling: When the recording space is full, new data will cover the earliest. The historical data will be recorded in cycle by replacing old files by the new. When 100 files are recorded, the first file will be deleted, and the serial numbers of other files will decrease by one. Then the new recording file will be created.

★ Record interval: can be selected among 1s, 2s, 4s, 6s, 15 s, 30s, 1 min, 2 min, and 4 min

★ Record type: Can be selected among real-time value, average value, maximum value and minimum value.

Real-time value: Take the real-time value corresponding to the recording time directly.

Average value: Take the weighted average value of the real-time data between the first and last recording points.

Maximum value: Take the maximum value of the real-time data between the first and last recording points.

Minimum value: Take the minimum value of the real-time data between the first and last recording points.

★ Power-on record: Can be selected between new file and continuing before power-down.

New file: Record the new files list created after powering on.

Continuing before power-down: After powering on, the file that are being recorded before powering down can be recalled and recorded again; If the function is selected, the data displayed during the power-down is -.--.

★Triggering condition: Can be selected among manual, power-on, alarm, relay and timed. (Note: When the triggering condition is selected, the corresponding triggering mode can be displayed and changed.)

Manual triggering: Enter the instrument storage operation screen, and the data storage and recording can be disabled or enabled manually.

Power-on triggering: After powered on for each time, the instrument creates new files and starts recording automatically.

Alarm triggering: It can be set that when only the certain alarm corresponding to a channel occurs, the data storage recording is enabled, and when the alarm is over, the recording stops.

Relay triggering: It can be set that when only the certain alarm corresponding to the relay of a certain limit occurs, the data storage recording is enabled, and when the relay alarm is over, the recording stops.

Timed triggering: The fixed timed cycling is 24 hours. Set the start time and end time to make the instrument record data storage in the set time segment each day.

Operation: On the screen

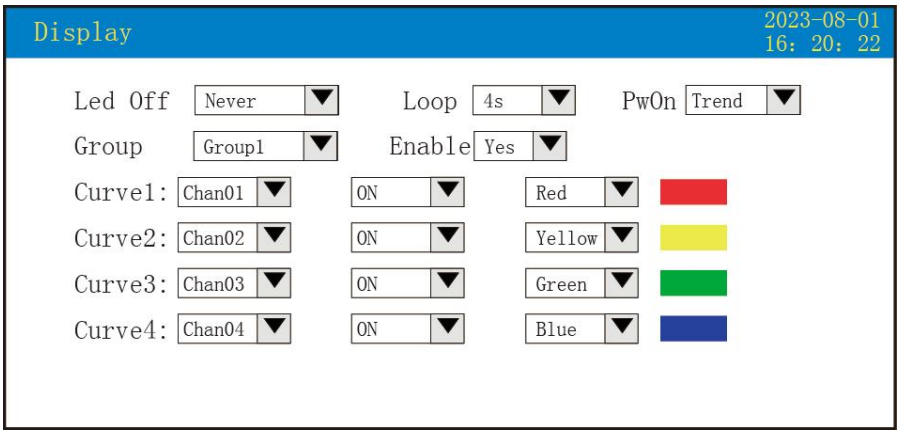
Tap the "◀" and "▶" buttons to move the cursor;

Tap the "▲" and "▼" buttons to adjust the value or select the required content;

Tap the "↵" button to confirm the setting;

Tap the "ESC" button to exit from the screen. If the contents in the screen are changed, the prompt "Save the changed parameter?" is popped up. Select "Yes" to save the changed parameter, or select "No" to give up saving the changed parameter.

5.12.4 Display Configuration




★ Turn off LCD: Turn off the LCD, and the LDC starts hibernating and goes black. The display could be restarted until the next operation. The hibernation time can be set as 5 min, 10 min, 30 min, 1 h or never.

★ Cycle: The time interval to display the next group in cycle. The interval can be set as 4s, 8s, 15s or 30s.

★ Startup: The startup screen can be set as real-time curve, bar graph screen, digital display screen, historical curve, file list, power-down record and screen before power-down.

★ Curve group: Each curve group includes four curves and total 10 curve groups can be selected. The group can be selected according to actual requirements and the selected curve group can be displayed in the real-time curve screen.

★ Enable: Select "Yes" and the corresponding curve groups can be displayed on the real-time curve screen.

Select “No”, and the curve group is not displayed.

★ Curve 1 to Curve 4: Select the channel name, display status and curve color to be displayed.

Operation: On the screen

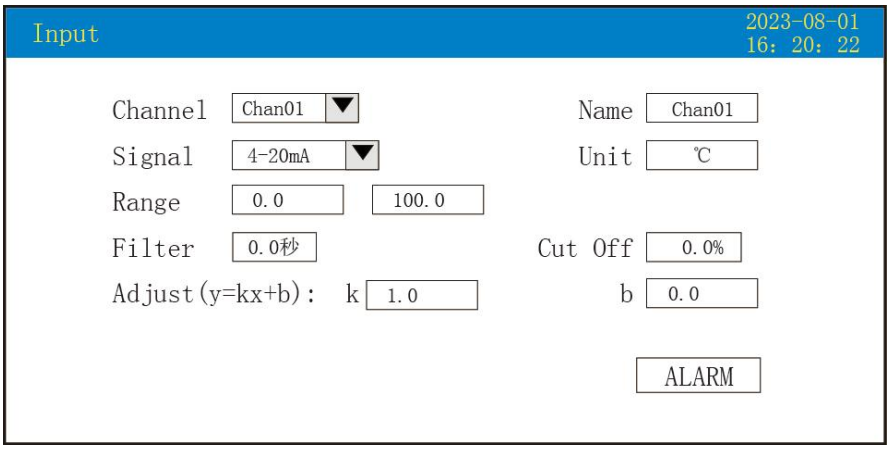
Tap the “◀” and “▶” buttons to move the cursor;

Tap the “▲” and “▼” buttons to select the desired content;

Tap “↵” confirm the setting;

Tap the “ESC” button to exit from the screen. If the contents in the screen are changed, the prompt “Save the changed parameter?” is popped up. Select “Yes” to save the changed parameter, or select “No” to give up saving the changed parameter.

5.12.5 Input Configuration




★ Configuration channel: Select the channel displaying configuration.

★ Bit: The work bits of corresponding displayed channels (with font library for edition). (Refer to Section 5.12.5.1 “Bit” input method introduction.)

★ Signal type: B, S, K, E, T, J, R, N, F2, Wre3-25, Wre5-26, Cu50, Cu53, Cu100, Pt100, BA1, BA2, 0 - 400Ω, 0 - 20mV, 0 - 100mV, ±20mV, ±100mV, 0 - 20mA, 0 - 10 mA, 4 - 20 mA, 0 - 5V, 1 - 5V, ±5V, 0 - 10V, √0 - 10 mA, √4 - 20 mA, √0 - 5V, √1 - 5V, None

Ranges allowed by each signal are described in the following.

| Signal Type | Range | Signal Type | Range | Signal Type | Range |
|---|---|---|---|---|---|
| B | 400 – 1800℃ | Cu50 | -50.0–150.0 ℃ | 0 – 20mA | -99999 – 99999 |
| S | -50–1600 ℃ | Cu53 | -50.0–150.0 ℃ | 0 – 10mA | -99999 – 99999 |
| K | -200 – 1300℃ | Cu100 | -50.0–150.0 ℃ | 4 – 20mA | -99999 – 99999 |
| E | -200 – 1000℃ | Pt100 | -200.0 – 650.0℃ | 0 - 5V | -99999 – 99999 |
| T | -200.0 – 400.0℃ | BA1 | -200.0 – 600.0℃ | 1 - 5V | -99999 – 99999 |
| J | -200 – 1200℃ | BA2 | -200.0 – 600.0℃ | ±5V | -99999 – 99999 |
| R | -50–1600 ℃ | 0 – 400Ω linear resistance | -99999 – 99999 | 0 - 10V | -99999 – 99999 |

| | | | | | |
|---|---|---|---|---|---|
| N | -200 – 1300℃ | 0 - 20mV | -99999 – 99999 | 0 – 10mA (square root) | -99999 – 99999 |
| F2 | 700 – 2000℃ | 0 - 100mV | -99999 – 99999 | 0 – 20mA (square root) | -99999 – 99999 |
| Wre3-25 | 0 – 2300℃ | ±20mV | -99999 – 99999 | 0 - 5V (square root) | -99999 – 99999 |
| Wre5-26 | 0 – 2300℃ | ±100mV | -99999 – 99999 | 1 - 5V (square root) | -99999 – 99999 |

★ Unit: The work units of corresponding displayed channels (with font library for edition). (Refer to Section 5.12.5.2 “Unit” input method introduction.)

★ Measurement range: The upper and lower range limits of the recorded data. The set range is -99999 - 99999. The decimal places of the channel can be determined by modifying the decimal point position of the upper range limits.

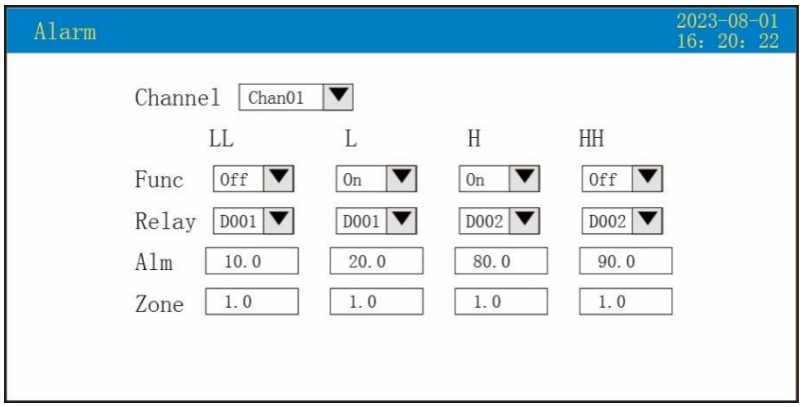
★ Filtering time: Modify the instrument sampling times to prevent from measurement displayed value skipping. Range: 0 - 9.9s

Relationship between the displayed value and the filtering time: For example, when the analog is input, set the filtering time as 3.0 seconds, and the instrument will average the sampled values within 3 seconds (filter time 3×sampling cycle 1 second), and the displayed values are updated by using the recursive method.

★ Small signal cutting: measurement value < (URV - LRV) × small signal cutting percentage + LRV. The measurement value displayed is the LRV. Set it as zero to disable the small signal cutting function. Range: -25.0 - 99.9%

★ Linear modification: The work amount conducts the linear modification according to the formula y = Kx + b, where K is the linear coefficient, and b is the zero-point modification. In the default status, K=1.0 and b=0.0, the modification is not performed. x is the work amount of the channel before modification, and y is the channel value after modification.

★ Move the cursor to “Alarm Settings”, and tap the “ ” button to enter the “Alarm Configuration” screen.




★ For the lowest limit, lower limit, upper limit and uppermost limit alarms and return values of the channel, the following should be paid attention to：

The set ranges of the lowest limit, lower limit, upper limit and uppermost limit and return value are all -99999 - 99999, and they are input by the method same to the range input method.

Alarm function: Off — The alarm function is closed. On — The alarm function is open.

Alarm contact: Select the relay contact number. D001 to D004 are corresponding to No.1 relay contact output to No. 4 relay contact output. “None”: No output.

Operation: On the screen

Tap the “◀” and “▶” buttons to move the cursor;

Tap the “▲” and “▼” buttons to adjust the value or select the required content;

Tap the “↵” button to confirm the setting;

Tap the “ESC” button to exit from the screen. If the contents in the screen are changed, the prompt “Save the changed parameter?” is popped up. Select “Yes” to save the changed parameter, or select “No” to give up saving the changed parameter.

5.12.5.1 Introduction of the “Bit” input method in the channel configuration:

The T6 input method used by the instrument is similar to the mobile phone input method. Users can input the Chinese characters, numbers, English, special symbols by using less keyboard operation. The operation is easy to learn and use. The international code is used to solve the Chinese character bit and special unit input problems.

Move the cursor to “Bit”, and tap the “↵” button, and the following input method is displayed:


①: Input display bar: Display the characters to be input

②: Soft keyboard: Display the 26 Chinese Pinyin letters when the pinyin input is used

Display the 26 capital letters when the capital letter input is used

Display the 26 lower-case letters when the lower-case input is used

Display 0-9, short dash and decimal point when the number input is used

Display 30 special symbols when the special symbol input is used

③: Chinese Pinyin combination display bar (only available when the Chinese Pinyin input is used.)

④: Character alternative bar (only available when the Chinese Pinyin input is used.)

⑤: Input method selection bar: Select required input method.

⑥: Operating buttons:

Tap the “◀”,“▶” and “▲” buttons to move the cursor to select required character;

Tap the “▼” button to move the cursor to the input method selection bar to toggle among the input method. When the character alternative bar is displayed, tap the “▼” button to show a “▲”, and then tap the “◀” and “▶” button to select desired characters;

Tap the “↵” and “◀” buttons simultaneously to delete the character beside the cursor;

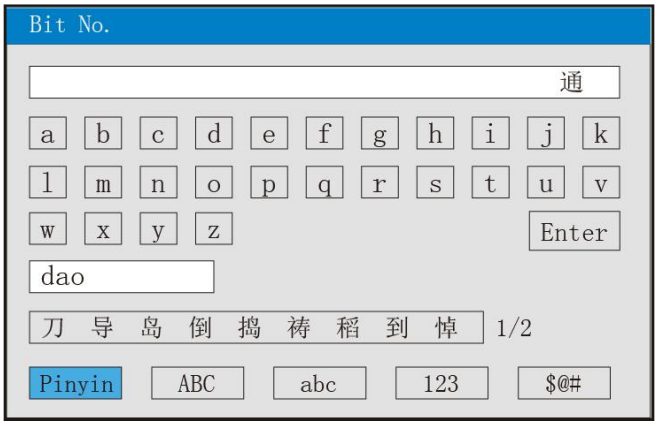
Tap the “↵” button to select required character beside the cursor;

Tap the “▼” button to move the cursor to “Enter”, and then tap the “↵” button to exit from the input

method. The bit input finishes;

Tap the "ESC" button to exit the input method screen.

Ⅰ. Chinese Pinyin input method screen




Using the Chinese Pinyin input method: representing Chinese pronunciation in pinyin.

Inputting the Chinese character "道":

1. Tap the "" button to enter the input method screen (default input method: Chinese Pinyin input).
2. Tap the "", "" and "" buttons to move the cursor to select the Chinese Pinyin letter "d".
3. Tap the "" button to select, and the letter "d" is displayed in the Chinese Pinyin combination display bar.
4. Tap the "", "" and "" buttons to move the cursor to select the Chinese Pinyin letter "a".
5. Tap the "" button to select, and the letter "da" is displayed in the Chinese Pinyin combination display bar.
6. Tap the "", "" and "" buttons to move the cursor to select the Chinese Pinyin letter "o".
7. Tap the "" button to select, and the letter "dao" is displayed in the Chinese Pinyin combination display bar.

Then the Chinese character "道" is displayed in the character alternative bar.

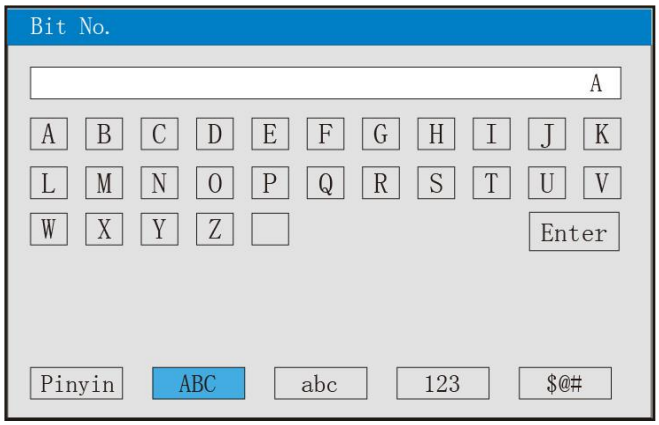
8. Tap the "" button, and a "▲" is displayed below the character alternative bar.
9. Tap the "" and "" buttons to select the Chinese character "道".

10 Tap the "" button to select "道" displayed in the input bar

11. Tap the "" button to move the cursor to "Enter", and then tap the "" button to exit from the input method. The bit input finishes.

Note: When there are more than 9 Chinese characters with same sound, tap the "" button to move to the next page.

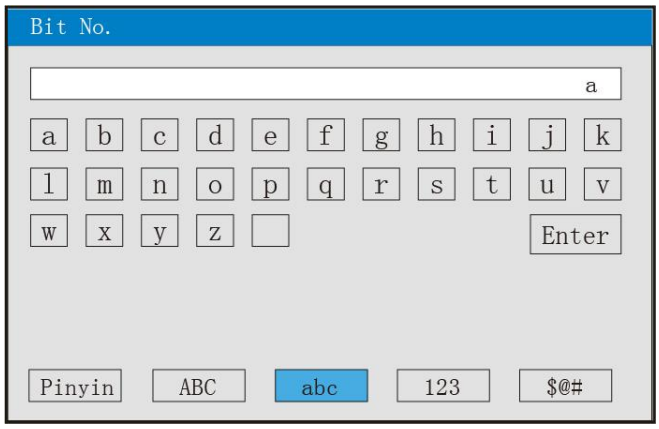
II. Capital letter input method screen




Inputting the capital letter “A”:

1. Tap the “” button to enter the input method screen.
2. Tap the “” button to move the cursor to the input method selection bar.
3. Tap the “” and “” buttons to move the cursor for selection.
4. Tap the “” button to move the cursor to the capital letter input soft keyboard.
5. Tap the “” button to select “A” displayed in the input bar.
6. Tap the “” button to move the cursor to “Enter”, and then tap the “” button to exit from the input method. The bit input finishes.

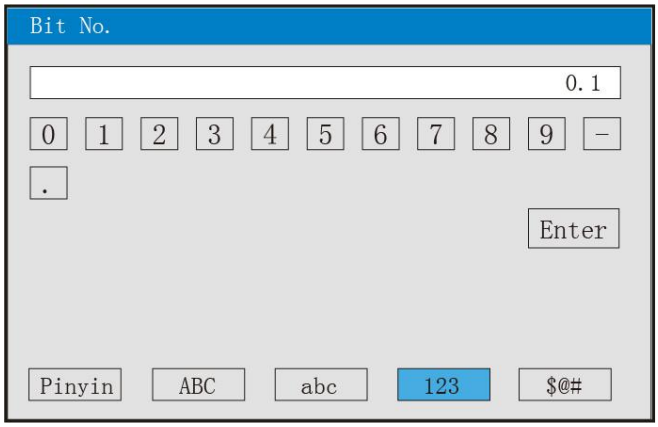
III. Lower-case letter input method screen




Inputting the lower-case letter “a”:

1. Tap the “” button to enter the input method screen.
2. Tap the “” button to move the cursor to the input method selection bar.
3. Tap the “” and “” buttons to move the cursor to select abc.
4. Tap the “” button to move the cursor to the lower-case input soft keyboard.
5. Tap the “” button to select “a” displayed in the input bar.
6. Tap the “” button to move the cursor to “Enter”, and then tap the “” button to exit from the input method. The bit input finishes.

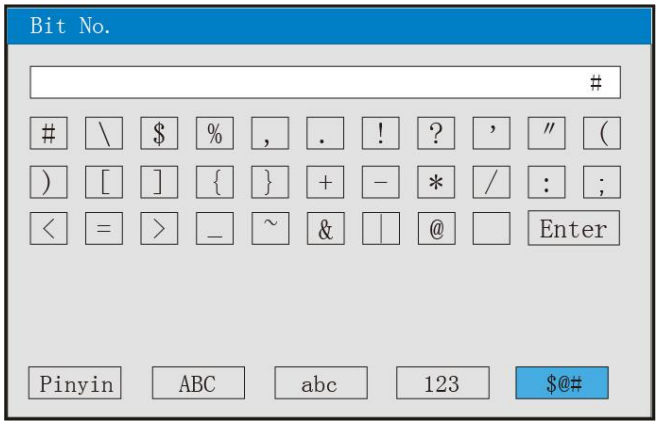
IV. Digital input method screen




Inputting the number “0.1”:

1. Tap the “” button to enter the input method screen
2. Tap the “” button to move the cursor to the input method selection bar
3. Tap the “” and “” buttons to move the cursor for selection
4. Tap the “” button to move the cursor to number input soft keyboard
5. Tap the “” button to select “0” displayed in the input bar.
6. Tap the “”, “” and “” buttons to move the cursor to select “.”
7 Tap the “ ” button to select “0” displayed in the input bar.
8. Tap the “”, “” and “” buttons to move the cursor to select “1”
9. Tap the “” button to select “0.1” displayed in the input bar.
10. Tap the “” button to move the cursor to “Enter”, and then tap the “” button to exit from the input method. The bit input finishes

V. Special symbol input method screen



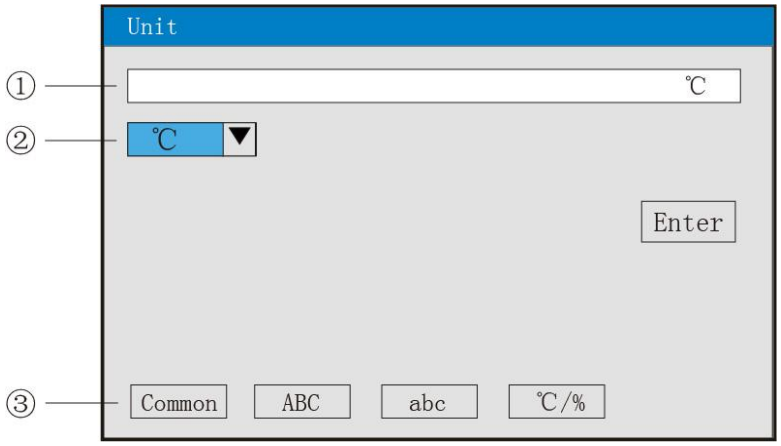

Inputting the special symbol “#”:

1. Tap the “” button to enter the input method screen
2. Tap the “” button to move the cursor to the input method selection bar
3. Tap the “” and “” buttons to move the cursor for selection
4. Tap the “” button to move the cursor to special symbol input soft keyboard
5. Tap the “” button to select “#” displayed in the input bar.

6. Tap the “▼” button to move the cursor to “Enter”, and then tap the “↵” button to exit from the input method. The bit input finishes

5.12.5.2. Introduction of the “Unit” input method in the channel configuration:

Move the cursor to “Unit”, and tap the “↵” button, and the following input method is displayed




①: Input display bar: Display the unit symbols to be input.

②: Soft keyboard: Display the common units

Display the 26 capital letters when the capital letter input is used

Display the 26 lower-case letters when the lower-case input is used

Display 16 special symbols when the special symbol input is used

③: Input method selection bar: Select required input method.

④: Operating buttons:

Tap the “◀”, “▶” and “▲” buttons to move the cursor to select required character.

Tap the “▼” button to move the cursor to the input method selection bar to toggle among the input method.

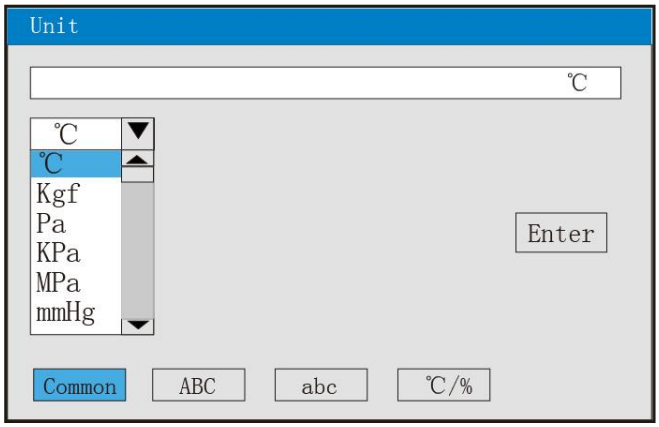
Tap the “↵” and “◀” buttons simultaneously to delete the character beside the cursor.

Tap the “↵” button to select required unit character beside the cursor.

Tap the “▼” button to move the cursor to “Enter”, and then tap the “↵” button to exit from the input method. The bit input finishes.

Tap the “ESC” button to exit the input method screen.

I. Common unit input method screen




Inputting the common unit " C":

1. Tap the "" button to enter the unit input method screen (default input method: common unit input).

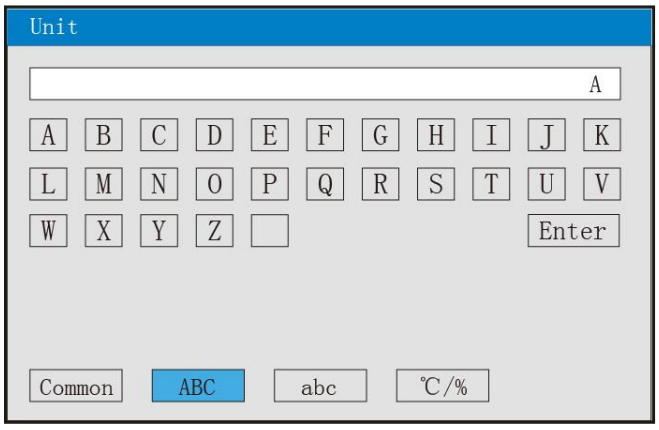
2. Tap the "" button, and the drop-down box for common units is displayed. The common units includes ℃, Kgf, Pa, KPa, MPa, mmHg, $mmH_2O$, bar, t/h, Kg/h, L/h, $m^3/h$, $Nm^3/h$, t/m, Kg/m, L/m, $m^3/m$, $Nm^3/m$, t/s, Kg/s, L/s, m /s, $Nm^3/s$, t, Kg, g, $Nm^3$, $m^3$, L, KJ/h, KJ/m, KJ/s, MJ/h, MJ/m, MJ/s, GJ/h, GJ/m, GJ/s, KJ, MJ, GJ, V, A, KW, Hz, %, mm and rpm

3. Tap the "" and "" buttons to select the required common unit "℃".

4. Tap the "" button to confirm and the "℃" is displayed in the common unit input display bar.

5. Tap the "" button to move the cursor to "Enter", and then tap the "" button to exit from the input method. The unit input finishes.

II. Capital letter input method screen




Inputting the capital letter "A":

1. Tap the "" button to enter the input method screen.

2. Tap the "" button to move the cursor to the input method selection bar.

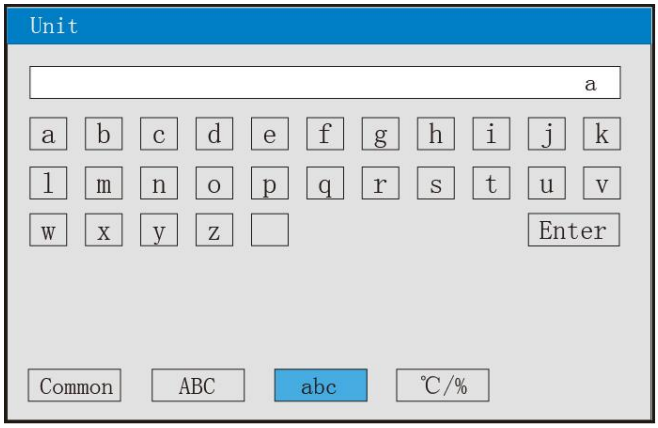
3. Tap the "" and "" buttons to move the cursor for selection.

4. Tap the "" button to move the cursor to the capital letter input soft keyboard.

5. Tap the "", "" and "" buttons to select the letter, and tap the "" button, the letter "A" is displayed in the input bar.

6. Tap the "" button to move the cursor to "Enter", and then tap the "" button to exit from the input method. The unit input finishes.

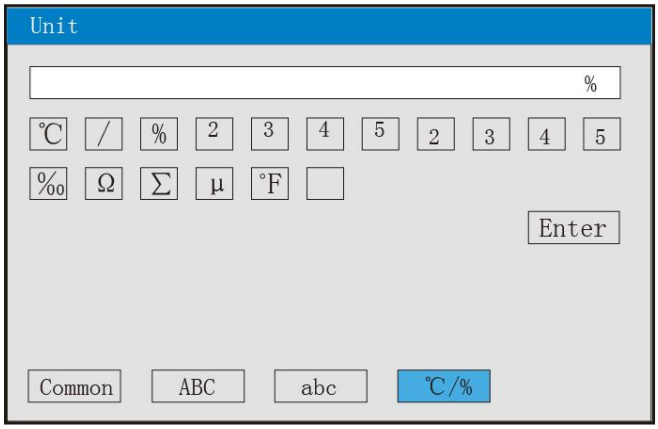
III. Lower-case letter input method screen




Inputting the lower-case letter “a”:

1. Tap the “ ” button to enter the input method screen.
2. Tap the “ ” button to move the cursor to the input method selection bar.
3. Tap the “ ” and “ ” buttons to move the cursor to select abc.
4. Tap the “ ” button to move the cursor to the lower-case input soft keyboard.
5. Tap the “ ”, “ ” and “ ” buttons to select the letter, and tap the “ ” button, the letter “a” is displayed in the input bar.
6. Tap the “ ” button to move the cursor to “Enter”, and then tap the “ ” button to exit from the input method. The unit input finishes.

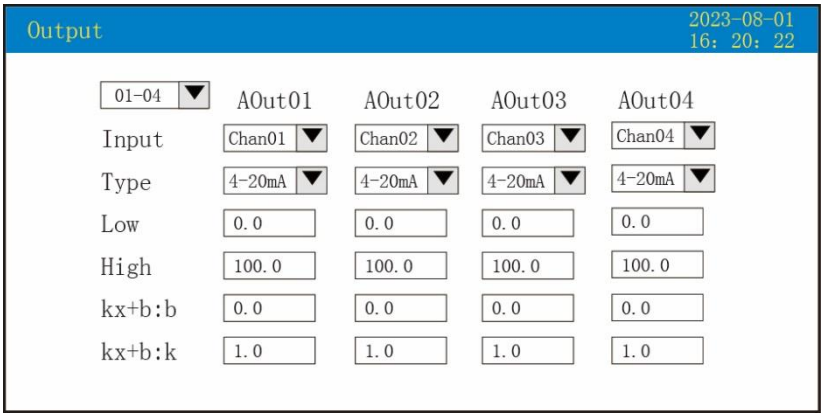
IV. Special unit input method screen




Inputting the special unit “%”:

1. Tap the “ ” button to enter the input method screen.
2. Tap the “ ” button to move the cursor to the input method selection bar.
3. Tap the “ ” and “ ” buttons to move the cursor to select ℃/%.
4. Tap the “ ” button to move the cursor to special unit input soft keyboard.
5. Tap the “ ”, “ ” and “ ” buttons to select the letter, and tap the “ ” button, and “%” is displayed in the input bar.
6. Tap the “ ” button to move the cursor to “Enter”, and then tap the “ ” button to exit from the input method. The unit input finishes.

5.12.6. Analog Output




★ Output channel: Channel 01 - Channel 04

★ Input channel: input channels corresponding to output channels. Example: “Channel 05” is corresponding to “Output 02”, and the analog output of Channel follows the measured value of input channel 5 to transmit the output.

★ Output Type :0 - 10 mA, 0 - 20 mA, 4 - 20 mA, 0 - 5V, 1 - 5V, 0 - 10V and None could be selected. (Note: The output type is changed from current to voltage. Users have to connect a precision resistor to the current output port for the conversion, or choose the voltage output module when ordering.)

★Lower Output Limit/Upper Output Limit: Adjust the upper and lower limit ranges of the transmitting output. The set range is -9999 - 19999. The decimal places of the channel can be determined by modifying the decimal point position of the upper range limits.

★kx+b: Analog output linear modification formula; b: zero-point shift of the analog output; k: output zoom scale.

Operation: On the screen,

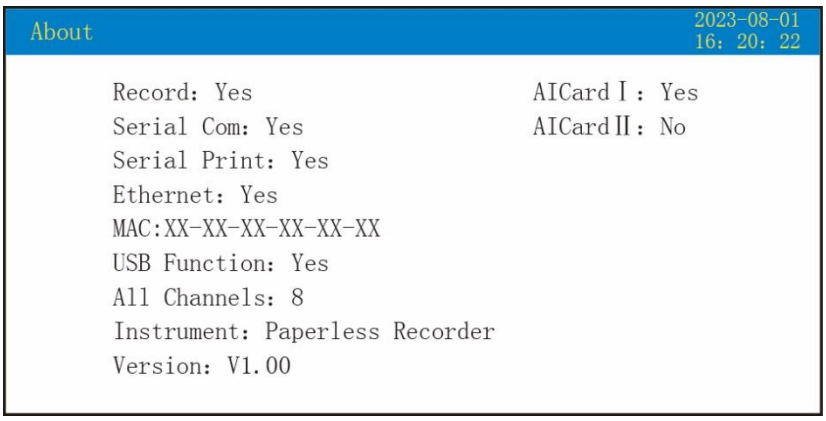
Tap the “◀” and “▶” buttons to move the cursor;

Tap the “▲” and “▼” buttons to adjust the value or select the required content;

Tap the “↵” button to confirm the setting;

Tap the “ESC” button to exit from the screen. If the contents in the screen are changed, the prompt “Save the changed parameter?” is popped up. Select “Yes” to save the changed parameter, or select “No” to give up saving the changed parameter.

5.12.7 Function List




★ Instrument function viewing list: All functions of the instrument can be viewed on the screen. If one

function is supported, the mark “Supported” is displayed; If a function is not supported, the mark “None” is displayed.

Operation: On the screen, tap the “ESC” button to exit from the screen.

## 6. Communication

This instrument can communicate to the host. The host can finish the parameter setting, data capture and supervisory control for this slave. Used with the industrial control software, this instrument can realize dynamic image display, instrument data settings, chart generation, data recording and report printing under the WINDOWS of the Chinese version. The host management software manufactured by the manufacturer can also be used to achieve real-time data and curve capturing, record historic data and curves, and export the historic data and curves to the Excel for processing.

The instrument provides two standard ports, RS485 and EtherNet to achieve the communication between the instrument and the host.

★ If the RS485 communication port is used, several recorders are allowed to communicate with the host. This communication method is applicable for making a network between the user's terminal instruments and the recorder to receive recorder data in real time, and connecting to all kinds of control systems.

★ The EtherNet communication allows several recorders to be connected to the host computer for data exchange at a 10M/100M communication rate. It is applicable for the extensive data communication between the terminal instrument and the recorder. If the communication distance exceeds 300 m, the communication can be achieved by fiber optic network. Select the IP address in the recorder system configuration, perform corresponding settings in the computer management software, and the EtherNet communication can be achieved.

Refer to the Table 1 and Table 2 for specific parameters.

Table 1: Inputting Register Addresses Corresponding to 0x04 Read Command

| No. | Input Register Address (Decimal) | Parameter Name | Data format | Type | Note |
|---|---|---|---|---|---|
| Dynamic Variables | | | | | |
| 1 | 00 | Measured value of Channel 1 | Float | R | |
| 2 | 02 | Measurement value of channel 2 | Float | R | |
| 3 | 04 | Measured value of Channel 3 | Float | R | |
| 4 | 06 | Measured value of Channel 4 | Float | R | |
| 5 | 08 | Measurement value of channel 5 | Float | R | |
| 6 | 10 | Measured value of Channel 6 | Float | R | |
| 7 | 12 | Measured value of Channel 7 | Float | R | |

| | | | | | |
|---|---|---|---|---|---|
| 8 | 14 | Measurement value of channel 8 | Float | R | |
| 9 | 120 | Contact output status | Long | R | Bit 0 to Bit 3 represent the 1st to 4th contact output status respectively.<br>0: Open; 1: Close |

Table 2: Holding Register Addresses Corresponding to 0x03 Read Command and 0x10 Write Command

| No. | Input Register Address (Decimal) | Parameter Name | Data format | Type | Note |
|---|---|---|---|---|---|
| Instrument Model | | | | | |
| 1 | 0 | Instrument Model | Char | R | 0x8C |
| Instrument Configuration Parameters | | | | | |
| 1 | 1 | Language selection | Char | R/W | 0: Chinese 1: English |
| 2 | 2 | Cold junction adjustment | Short | R/W | The communication value is ten times bigger than the adjustment value. For example, if the cold junction adjustment value is -1.0, the communication value would be -10 |
| 3 | 3 | Instrument address | Char | R/W | |
| 4 | 4 | Baud rate | Char | R/W | Number 1 to 4 represent the baud rate 2400 to 19200bps successively. |
| 5 | 5 | Check bit | Char | R/W | |
| 6 | 6 | Byte swap | Char | R/W | |
| 7 | 7 | Open treatment | Char | R/W | 0: Upper range; 1: Lower range; 2: Keep current value |
| 8 | 8 | 1st and 2nd bytes of IP address | Short | R/W | Example: If the IP address is 192.168.100.2, the two bytes of register address from low to high are 192 and 168 respectively. (If the IP address is modified on the host computer, power down the instrument and then power on it again) |
| 9 | 9 | 3rd and 4th bytes of IP address | Short | R/W | As the example above, the two bytes of the register address from low to high are 100 and 2 respectively. |

| | | | | | |
|---|---|---|---|---|---|
| 10 | 10 | 1st and 2nd bytes of subnet mask | Short | R/W | Example: If the subnet mask is 255.255.255.0, the two bytes of register address from low to high both are 255 and 255 respectively. |
| 11 | 11 | 3rd and 4th bytes of subnet mask | Short | R/W | As the example above, the two bytes of the register address from low to high are 255 and 0 respectively. |
| 12 | 12 | 1st and 2nd bytes of gateway address | Short | R/W | Example: If the gateway address is 192.168.1.1, the two bytes of register address from low to high are 192 and 168 respectively. |
| 13 | 13 | 3rd and 4th bytes of gateway address | Short | R/W | As the example above, the two bytes of the register address from low to high are 1 and 1 respectively. |
| 14 | 14 | ETHERNET port No. | Short | R/W | |
| 15 | 15 | Print interval | Short | R/W | |
| 16 | 16 | Print start time (h) | Char | R/W | |
| 17 | 17 | Print start time (min) | Char | R/W | |
| 18 | 18 | Alarm print | Char | R/W | 0: Disabled 1: Enable |
| 19 | 19 | 1st and 2nd characters of instrument name | Short | R/W | |
| 20 | 20 | 3rd and 4th characters of instrument name | Short | R/W | |
| 21 | 21 | 5th and 6th characters of instrument name | Short | R/W | |
| 22 | 22 | 7th and 8th characters of instrument name | Short | R/W | |
| 23 | 23 | 9th and 10th characters of instrument name | Short | R/W | |
| 24 | 24 | 11th and 12th characters of instrument name | Short | R/W | |
| 25 | 25 | 13th and 14th characters of instrument name | Short | R/W | Note: The 14th character must be 0 |
| 26 | 100 | Input channel No. | Char | R/W | Value range: 0 to 7 are corresponding to channel 1 to 8 respectively. (Note 1) |

| | | | | | |
|---|---|---|---|---|---|
| 27 | 101 | 1st and 2nd characters of bit number | Short | R/W | Refer to “Channel Parameters” in the instrument user manual. |
| 28 | 102 | 3rd and 4th characters of bit number | Short | R/W | |
| 29 | 103 | 5th and 6th characters of bit number | Short | R/W | |
| 30 | 104 | 7th and 8th characters of bit number | Short | R/W | |
| 31 | 105 | Input Type | Char | R/W | |
| 32 | 106 | 1st and 2nd characters of unit | Short | R/W | |
| 33 | 107 | 3rd and 4th characters of the unit | Short | R/W | |
| 34 | 108 | 5th and 6th characters of the unit | Short | R/W | |
| 35 | 109 | Channel decimal place | Char | R/W | |
| 36 | 110 | Lower range limit | Float | R/W | |
| 37 | 112 | Upper range limit | Float | R/W | |
| 38 | 114 | Reserved | Char | R/W | |
| 39 | 115 | Filtering time | Char | R/W | |
| 40 | 116 | Signal cutting | Short | R/W | Ten times bigger than the parameter value. |
| 41 | 117 | Linear correction scaling factor k | Float | R/W | Refer to “Channel Parameters” in the instrument user manual. |
| 42 | 119 | Linear correction zero-point coefficient b | Float | R/W | |
| 43 | 121 | Alarm type | Char | R/W | Number 0 to 3 are corresponding to the lowest limit, lower limit, upper limit and uppermost limit successively (Note 2) |
| 44 | 122 | Alarm function | Char | R/W | |
| 45 | 123 | Alarm contact | Char | R/W | |
| 46 | 124 | Alarm value | Float | R/W | |
| 47 | 126 | Alarm return difference | Float | R/W | |
| 48 | 200 | Output channel No. | Char | R/W | Refer to “Output Parameters” in the |

| | | | | | |
|---|---|---|---|---|---|
| 49 | 201 | Input channel | Char | R/W | instrument user manual. |
| 50 | 202 | Output type | Char | R/W | |
| 51 | 203 | Lower output limit | Float | R/W | |
| 52 | 205 | Upper output limit | Float | R/W | |
| 53 | 207 | Output correction scaling k | Float | R/W | |
| 54 | 209 | Output correction zero-point b | Float | R/W | |
| 55 | 250 | Turn off LCD | Char | R/W | |
| 56 | 251 | Loop display interval | Char | R/W | |
| 57 | 252 | Startup screen | Char | R/W | |
| 58 | 253 | Curve group No. | Char | Write-only | |
| 59 | 254 | Enable or disable | Char | R/W | 0 - 9, including 10 curve groups |
| 60 | 255 | Curve No. | Char | Write-only | 0 - 3; Four curves are included in one group. |
| 61 | 256 | Channel No. corresponding to curves | Char | R/W | |
| 62 | 257 | Display curve or not | Char | R/W | |
| 63 | 258 | Curve color | Char | R/W | |
| 64 | 300 | Record mode | Char | R/W | Refer to “Record Parameters” in the instrument user manual. |
| 65 | 301 | Record interval | Char | R/W | |
| 66 | 302 | Record type | Char | R/W | |
| 67 | 303 | Power-on record | Char | R/W | |
| 68 | 304 | Record triggering | Char | R/W | |
| 69 | 305 | Manual triggering | Char | R/W | |
| 70 | 306 | Input channel for alarm triggering | Char | R/W | |
| 71 | 307 | Alarm type of alarm triggering | Char | R/W | |

| | | | | | |
|---|---|---|---|---|---|
| 72 | 308 | Relay for relay triggering | Char | R/W | |
| 73 | 309 | Start of timed triggering: h | Char | R/W | |
| 74 | 310 | Start of timed triggering: min | Char | R/W | |
| 75 | 311 | Start of timed triggering: sec | Char | R/W | |
| 76 | 312 | End of timed triggering: h | Char | R/W | |
| 77 | 313 | End of timed triggering: min | Char | R/W | |
| 78 | 314 | End of timed triggering: sec | Char | R/W | |

Note 1: At most eight input channels are supported. All input channel parameters share one register address, and the input channel number (register address 100) can be used to determine which channel the parameter belongs to. Therefore, to read and write parameters of a channel, the input channel number should be written in advance.

Note 2: Each channel has four alarm types, the lowest limit alarm, lower limit alarm, upper limit alarm and the uppermost limit alarm, which share one register address. The alarm type (register address 121) can be used to determine which type the parameter belongs to. Therefore, to read and write alarm parameters of an input channel, the alarm type should be written in advance.

## 7. Instrument Accessories

| Name | Quantity | Note |
|---|---|---|
| User manual | 1 | User manual |
| Certificate | 1 | Manufacture date |
| Installation brackets | 2 | Used for panel installing and fixing |
| Screwdriver | 1 | Used for the instrument terminal wiring |
| USB drive | 1 | It is provided when users order the USB drive transferring function. The capacity is subject to users' order. |