FOREWORD

Thank you for purchasing the paperless recorder!
The user's manual contains useful information about the functions of the instrument, installation, wiring, operation procedures, and troubleshooting . To ensure correct use, please read this manual thoroughly before operation. Keep this manual in a safe place for quick reference in the event a question arises.

Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact us.
- Copying or reproducing all or any part of the contents of this manual without our permission is strictly prohibited.

Revisions

March, 2019, The fourth edition

SAFETY PRECAUTIONS

Make sure to comply with the following safety precautions. If the instrument is used in a manner not specified in this manual, the protection provided by the instrument may be impaired. We assume no liability for the customer's failure to comply with these requirements.

WARNING

- **Power Supply**
  Before connecting the power cord, ensure that the power supply voltage matches the voltage rating for the instrument.
- **Protective Grounding**
  Make sure to connect the protective grounding to prevent electric shock before turning ON the power.
- **Necessity of Protective Grounding**
  Never cut off the internal or external protective grounding wire or disconnect the wiring of the protective grounding terminal. Doing so poses a potential shock hazard.
- **Defect of Protective Grounding**
  Do not operate the instrument when the protective grounding or the fuse might be defective. Also, make sure to check them before operation.
- **Do not operate in explosive atmosphere**
  Do not operate the instrument in the presence of flammable liquids or vapors. Operation of any electrical instrument in such an environment constitutes a safety hazard.
- **Do not remove covers**

Some areas inside the instrument have high voltages. Do not remove the cover if the power supply is connected. The cover should be removed by our qualified personnel only.

- **External Connection**
  Connect the protective grounding before connecting to the item under measurement or control unit.
- **Damage to the protection**
  Using the instrument in a manner not specified in this manual may damage the instrument's protection.

CONTENTS OF THE PACKAGE

Unpack the box and check the contents before operating the paperless recorder. If some of the contents are not correct or missing or there is any physical damage, contact us or the dealer which you purchased it.

Standard Accessories

The following standard accessories are supplied with the instrument. Make sure that all items are present and undamaged.

No.	Name	Unit	QTY	NOTE
1	Paperless recorder	PCS	1	
2	User 's Manual	book	1	
3	Mounting bracket （with screws）	PCS	4	
4	Application	set	1	
5	Standard Software（CD）	set	1	
6	U disk	PCS		Optional
7	RS232C lines	PCS		Optional
8	RS232C/485 convert module	PCS		Optional
9	RS232C/CAN convert module	PCS		Optional
10	Micro printer（accessory）	PCS	1	

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CHAPTER 1 TECHNICAL INDEX

■ SCREEN

SCREEN: 128*64 dot matrix blue LCD screen
ACCURACY: Real time display: ±0.2% f.s.
Recall accuracy: ±0.2% f.s.
Note: Thermocouple should minus the cold end error

■ PROCESSOR

Using high-performance ARM Cortex-M3 32 bit RISC cores can realize multi-channel collection, record, display and alarm at same time.

■ MEMORY MODULA

Use large parallel capacity NAND FLASH MEMORY chip to storage history data, using serial FRAM chip to storage key system configuration parameters.

■ INPUT FUNCTION

INPUT SPECIFICATIONS: Isolate universal input，support Max 4 channel analog input.
INPUT VOLTAGE:0-5V、1-5V、0-20mV、0-100mV
CURRENT INPUT:0-10mA、4-20mA（0-20mA Noted when place order）
INPUT RESISTANCE: Res
INPUT FREQUENCY:FREQENCY SIGNAL（PI）（frequency range：0.5-5000HZ，The other can be customized）
THERMAL RESISTANCE:PT100、Cu50、G53、Cu100、BA1、BA2（require three balance wire resistance, Lead Resistance<10Ω）
THERMOCOUPLE:S、B、K、T、R、E、N、J

RADIATION PYROMETER:F1、F2

RHENIUM:WRe3-25、WRe5-26

Note: Other signal input （such as switch value input（DI））or index number（such as PT1000）need noted when place order.

■ Out put function

POWER DISTRIBUTION: Transmitter Concentration distribution +24VDC，standard distribution ＜30mA（MAX load capacity can be customized ）,Supports a variety of specifications and concentration distribution（such as 12VDC、5VDC）

ANALOG OUTPUT：Max support 2 channel 4-20mA standard current analog output, load capacity 750Ω（max），convenient for collection of indicating instrument or DCS/PLC，realize the long signal transmitter

OUTPUT OF RELY ALARM: Max support 4 channel rely alarm output, contact capacity 1A@220VAC/1A@30VDC,Can be configured on the High High Limit（HH）/High Limit（HI）/Low Limit（LO）/Low Low Limit（LL） alarm

■ COMMUNICATION PRINTER

COMMUNICATION INTERFACE:RS232C or RS485，support Modbus RTU protocol，baud rate----（1200、2400、9600、19200、38400、57600bps）

PRINT INTERFACE:RS232C contact with the micro printer directly，baud rate ----1200bps

■ RECORDING FUNCTION

RECORDING CAPACITY:64/128/192/248MB（Flash capacity can choose）

RECORDER INTERVAL:1sec to 240secs， divided into 11 levels：1s/2s/4s/8s/12s/24s/36s/60s/120s/180s/240s can be choosed

TIME STORAGE LENGTH: The length of time data storage is related to the Flash capacity. Input point, recorder interval, the computation formula as follows:（THE NUMERICAL UNITS to be consistent with the formula）:

$$\text{TIME STRORAGE LENGTH} = \frac{\text{FLASH CAPACITY(MB)} \times 1024 \times 1024 \times INTERVAL(SEC)}{CHANNELS \times 16 \times 24 \times 3600} (DAY)$$

■ DATA BACKUP

U DISK: Various data can be saved to the U disk. The capacity is from 256MB to 32GB

■ POWER SUPPLY

POWER: 220VAC, 50HZ

NOTE：DC POWER SUPPORT NEED DECLARE WHEN PLACE ORDER

■ PROTECTION FUNCTION

POWER OFF PROTECTION: Internal memory protect parameters and historical data forever even if power off.

CLOCK PROTECTION: Integrated hardware clock, run accurately when power off

■ ERROR PRECESION

THERMOCOUPLE CJC ERROR:±2℃

CLOCK ERROR: ±2 sec/day

■ WORKING ENVIRONMENT

AMBIENT TEMPERATURE:0～50℃（avoid direct sun light）

AMBIENT HUMIDITY:0～85%RH(non-condensing)

■ NET WEIGHT

WEIGHT: Approx 1.0 Kg

Note: Technical index is the universal index of the instrument, Functional configuration please refer to the real machine

CHANPTER 2 INSTALLATION AND WIRING

2.1 PRECAUTIONS OF USE OF THE INSTRUMENT

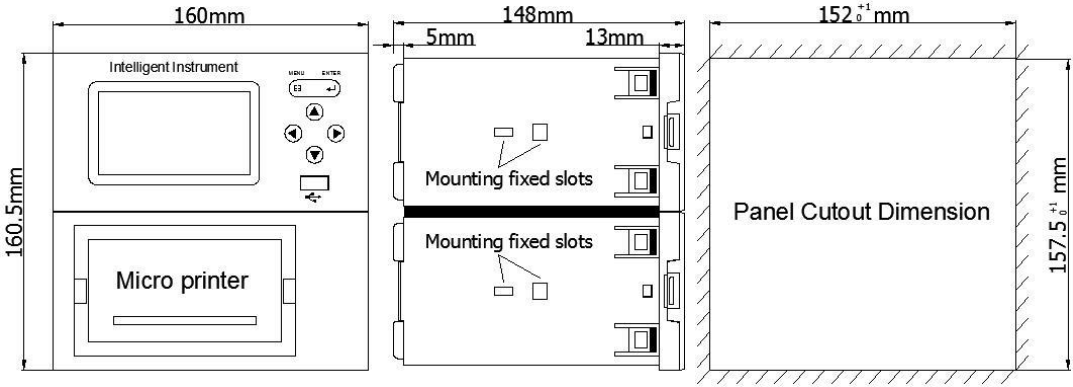
Read the following precautions before using the instrument and the external storage medium.

Handling precautions

- Be careful when cleaning the instrument, especially any plastic parts. When cleaning, wipe with a dry, soft cloth. Do not use chemicals such as benzene or thinner, since these may cause discoloration and deformation.
- Keep electrically charged objects away from the instrument as this may cause malfunction.
- Do not apply shock to the instrument.
- If there are any symptoms of trouble such as strange odors or smoke coming from the instrument, immediately turn OFF the power and unplug the power cord. Then, contact the dealer or our company.

2.2 INSTALLING INSTRUMENT

- **Instrument dimension**



To prevent overheating, install the instrument in a well-ventilated location.

- **Minimum mechanical vibrations**

Choose an installation location with the minimum mechanical vibration.

NOTE

- Condensation may occur if the instrument is moved to another place where both the ambient temperatures and humidity are higher, or if the temperature changes rapidly. In this case, let the instrument adjust to the new environment for at least one hour before using it.
- The lifetime of the LCD may be shorted if the instrument is used in a high-temperature environment over a long period of time.

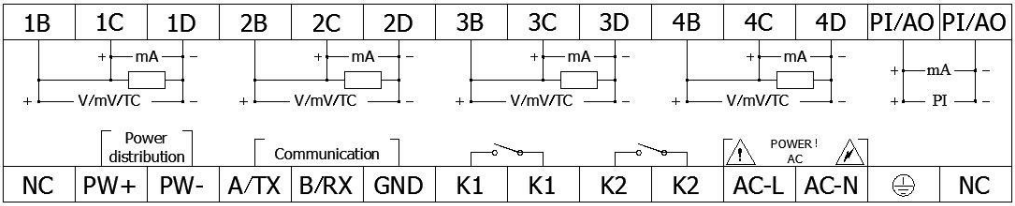
- **Do not install the instrument in the following**

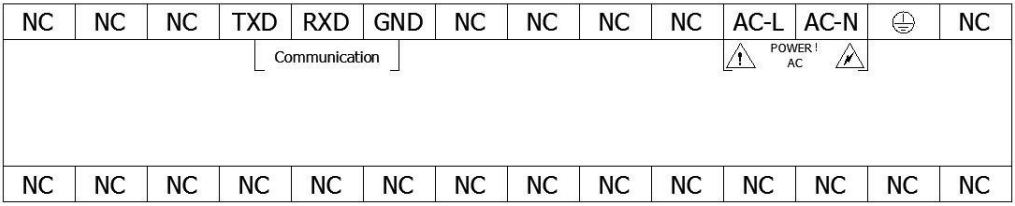
places

- **In direct sunlight or near heat sources**
  Install the instrument in a place with small temperature fluctuations near room temperature (23℃). Placing the instrument in direct sunlight or near heat sources can cause adverse effects on the internal circuitry.
- **Where an excessive amount of soot, steam, moisture, dust, or corrosive gases are present**
  Soot, steam, moisture, dust, and corrosive gases will adversely affect the instrument. Avoid such locations.
- **Near strong magnetic field sources**
  Do not bring magnets or instrument that produce electromagnetic fields close to the instrument. Operating the instrument in strong magnetic fields can cause errors in the measurements.
- **Bad angle for viewing the screen**
  Because the instrument uses a "liquid crystal display (LCD)", it is difficult to view the display from an extreme angle. Please install the instrument so that the monitor can be viewed from the front.

2.3 SIGNAL WIRING

- **Input terminal position and wiring diagram**

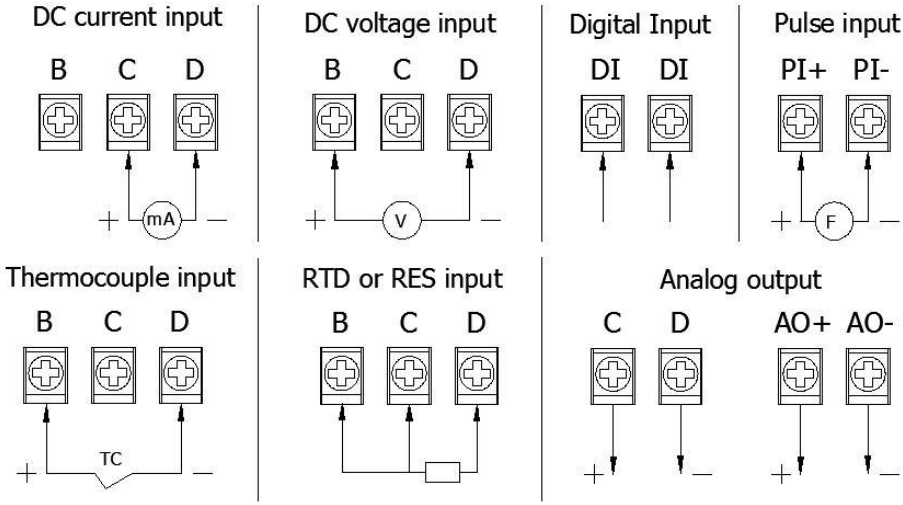




- **Take the following precautions when wring the input/output signal cables**

CAUTION

If a strong tension is applied to the cable wired to the instrument, the terminals of the instrument and/or the cable can be damaged. In order to prevent tension from being applied directly on the terminals, fasten all wiring cables to the rear of the mounting panel.



- **Take measures to prevent noise from entering the measurement circuit**
  - Move the measurement circuit away from the power cable (power circuit) and ground cable.
  - It is desirable that the item being measured does not generate noise.
  - However, if this is unavoidable, isolate the measurement circuit from the item. Also, ground the item being measured.
  - Shielded wires should be used to minimize noise caused by electrostatic induction. Connect the shield to the ground terminal of the instrument as necessary (make sure you are not grounding at two points).
  - To minimize noise caused by electromagnetic induction, twist the measurement circuit wires at short, equal intervals.

- Make sure to earth ground the protective ground terminal through minimum resistance.

- **When using internal reference junction compensation on the thermocouple input, take measures to stabilize the temperature at the input terminal**
  - Do not use thick wires which may cause large heat dissipation (cross sectional area 0.5 mm^2 or less is recommended).
  - Make sure that the ambient temperature remains reasonably stable. Large temperature fluctuations can occur if a nearby fan turns ON or OFF.

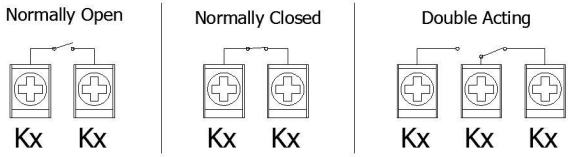
- **Connecting the input wires in parallel with other devices can cause signal degradation, affecting all connected devices**

  If you need to make a parallel connection, then:
  - Ground the instruments to the same point.
  - Do not turn ON or OFF another instrument during operation. This can have adverse effects on the other instruments.
  - RTD can not be wired in parallel.
  - Current signal can not be wired in parallel.

WARNING

To prevent electric shock, ensure the main power supply is turned OFF.

2.4 RELAY OUTPUT WIRING



Relay output

WARNING

- To prevent electric shock, ensure the main power supply is turned OFF.
- If a voltage of more than 30 VDC or 60 VDC is to be applied to the alarm output terminal, use ring-tongue crimp-on lugs with insulation sleeves on all terminals to prevent the wires from slipping out when the screws become loose. Furthermore, use double-insulated wires (dielectric strength of 2300VAC or more) for the signal wires on which a voltage of more than 30VAC or 60VDC is to be applied. For all other wires, use basic insulated wires (dielectrics strength of 1350 VAC). To prevent electric shock, attach the terminal cover after wiring and make sure not to touch the terminals.

- **Wiring Procedure**
  - Turn OFF the instrument.
  - Connect the alarm output cables to the terminal.
  - When wiring is completed, power ON.
- **Contact Specifications**

Item	Specification
Output	Relay transfer contact (energize/de-energize switch able).
Output capacity	250VAC/1A 30VDC/1A

2.5 POWER WIRING

- **Precautions to be taken when wiring the power supply**

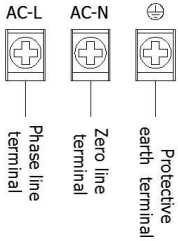
  To prevent electric shock and damage to the instrument, observe the following warnings.

WARNING

- To prevent electric shock, ensure the main power supply is turned OFF.
- To prevent the possibility of fire, use 600 V PVC insulated wire (AWG18) or an equivalent wire for power wiring.
- Make sure to earth ground the protective earth terminal through a grounding resistance less than 100Ω before turning ON the power.
- Use crimp-on lugs (designed for 4 mm screws) for power and ground wiring termination.
- Make sure to provide a power switch (double-pole type) on the power supply line in order to separate the instrument from the main power supply. Put an indication on this switch as the breaker on the power supply line for the instrument. Switch Specification Rated power current 3A or more.
- Connect a fuse (between 2A and 15A) to the power line.

- **Wiring Procedure**
  - Make sure the power is off.
  - Connect the power supply wires and the protective ground wire to the power terminals.
  - Connect to the power.

- **Power supply wiring terminal permutation**



Power 220VAC

- **Specifications**

Item	Conditions
Input voltage	220VAC
Input frequency	50Hz

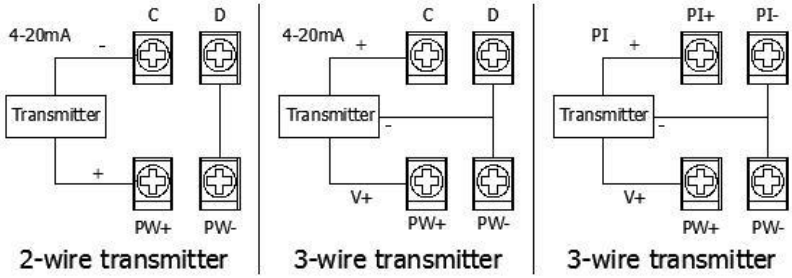
2.6 TRANSMITTER POWER SUPPLY WIRING

- **Transmitter power output**

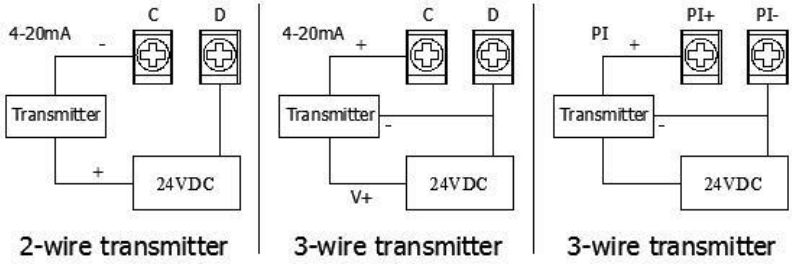
CAUTION

Never short-circuit the power supply terminals or apply an external voltage, otherwise it will damage to the instrument.

- **Wiring Diagram**



Transmitter power supply connection



Transmitter power supply (External 24VDC) connection

● Connection Procedure

- ➢ Turn OFF the power.
- ➢ Connect the power cord to the power connector on the rear panel of the instrument.
- ➢ When wiring is completed, power ON.

NOTE

To avoid connection failure, please tighten screws seriously while wiring.

● Specifications

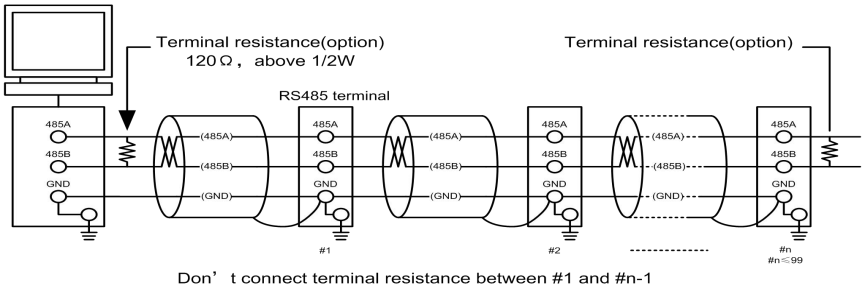
Item	Conditions
Output voltage	22VDC ～ 25VDC（rate output current）
Maximum output current	60mA DC

2.7 RS232C/RS485 COMMUNICATION WIRING

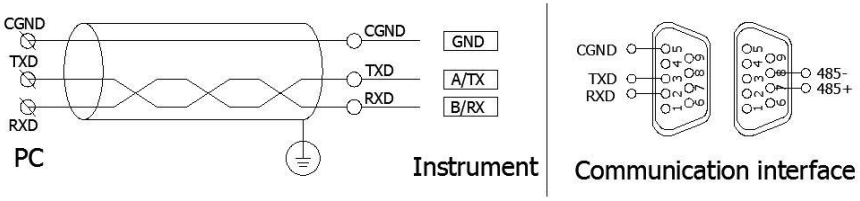
- **Communication interface permutation**

Communication interface	RS232C	RS485
A/TX	RXD	A(+)
B/RX	TXD	B(-)
GND	CGND	/

- **RS485 connect mode**



- **RS232C connect mode**

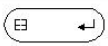


- **Communication Specifications**

Item	Specification
Baud rate	1200/4800/9600/19200/38400/57600

CHAPTER 3 KEYBOARD FUNCTION AND OPERATION

3.1 NAMES OF PARTS AND FUNCTIONS

Sign	Name	Description
	Key Menu	Used to switch operation screens or decimal places, etc.
	Key Left	Used to switch the channel or move the cursor forward, etc.
	Key Right	Used to switch the channel or move the cursor backward, etc.
	Key Up	Used to switch or increase the value,etc.
	Key Down	Used to switch or decrease the value,etc.
	Key Enter	Used to activate the input box
	Key Combination	Used to switch from operation mode to setting mode（Pressing for 1 second）

3.2 USING THE EXTERNAL THE STORAGE MEDIUM

This section describes the procedures to insert and remove the external storage medium.

USB disk can be used depending on the specification. For the handling procedure of the storage medium, see section 『Backup history data』.

Procedure

- Open the front cover and insert the medium into the drive until a click is heard.
- If the storage medium is detected, an external storage medium icon is displayed in the status display section of the screen.
- Accessing to the backup screen, the instrument backup the dates.
- Backup data

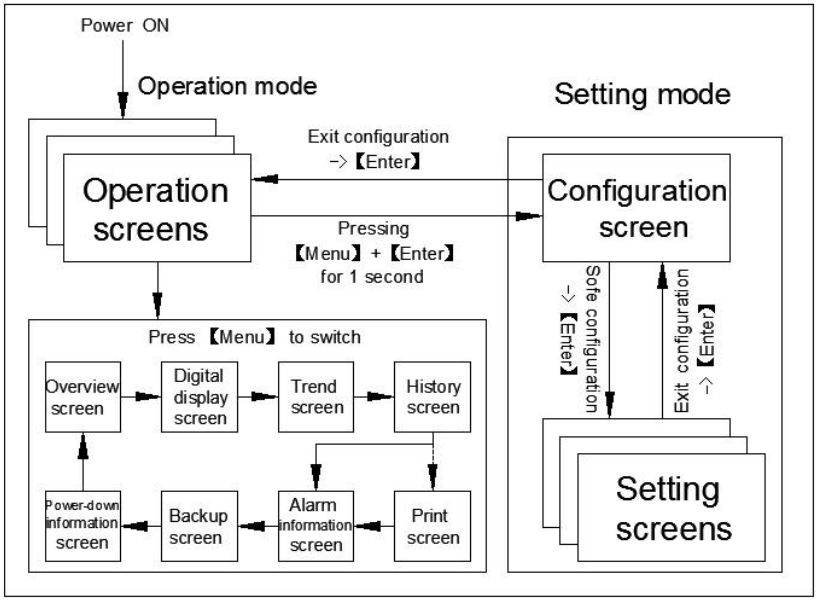
NOTE

- ✧ Pay attention to anti-electrostatic measures when uses USB disk.
- ✧ Formatting the external storage medium before use. The instrument does not afford the format function.
- ✧ We recommend using our company's products.

Specification

Item	Content
USB interface	Support USB2.0 protocol
Support U disk size	Maximum 16GB

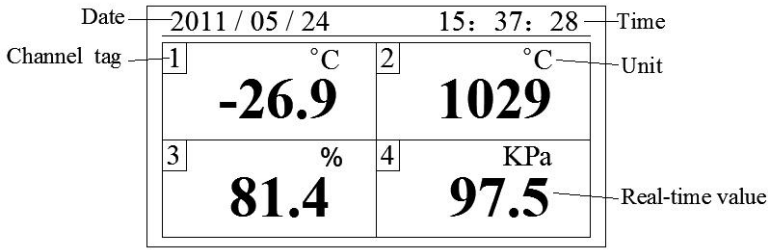
3.3 RUN MODE



Mode Type	Description	Possible Operations
Operation mode	This mode is used for daily operation. This mode is entered when the power is turned ON.	Monitoring operation Data acquisition
Setting mode	This mode is used to configure the instrument operation such as input range and alarms. This mode is entered by pressing the left/right key in the operation mode. Measured data cannot be displayed in this mode.	Setting the operation Operation related to the file on the external storage medium.

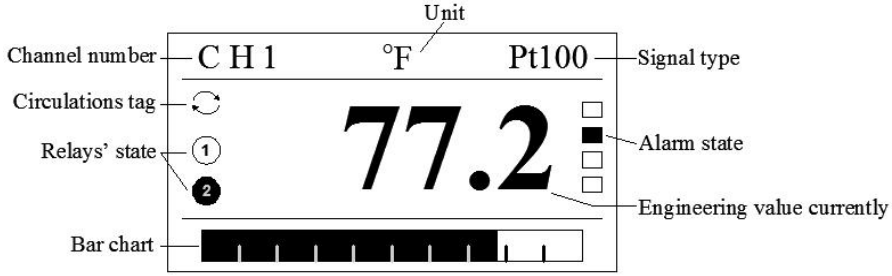
	Operations such as measurements, alarm detection, and data acquisition are continued.

3.4 OVERVIEW SCREEN



- Real-time value: Display the engineering data of the channel engineering .
- Unit: Display the engineering unit, can free configuration.

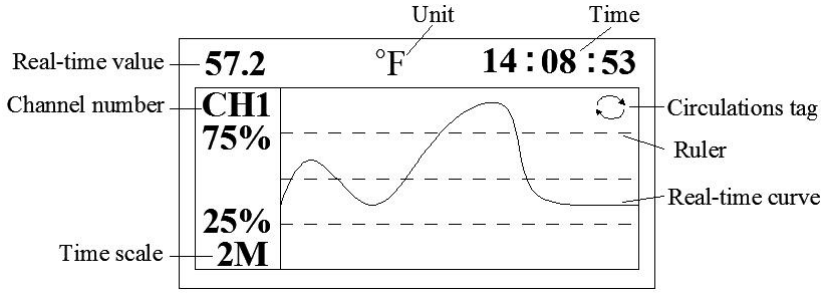
3.5 DIGITAL DISPLAY



- Bar chart: Filled area shows the present measurement percent of the range.

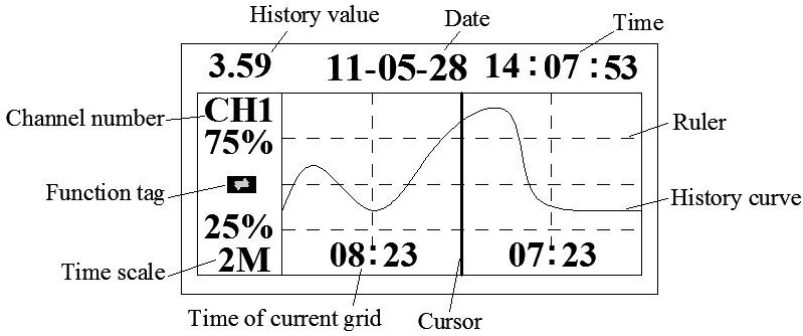
- Alarm status: From top to bottom respectively is upper limit/ limit /low limit/lower limit, □Normal condition, ■ Transfinite alarm
- Relay output status: Relay out put dispaly, ❷ shows k2 relay action is in output alarm status, ① shows K1 relay no action status.
- Circulation state: In system configuration open auto switch , means switching cycle each channel's digital screen, Switching interval is adjustable； No auto switch, no display.

3.6 CURRENT TREND



- Time scale: 2M indicate the 2mins curve-segment.
- Real-time curve: Measure channel/computation data is correspondingly to the left end of the curve.
- Ruler: The weight scale of the screen curve, is correspondingly to the left screen percentage of the current screen and the component can be adjustable.

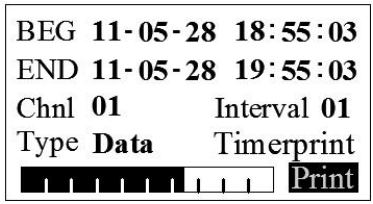
3.7 HISTROY TREND



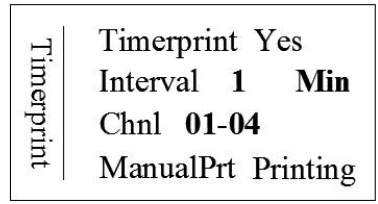
- Function tag: The present recall position, when the cursor is on ⇌ ,press【Enter】hidden/display cursors; press【Up】or 【Down】 realize continuous and rapid recall history curve.
- Fixed point recall: When the cursor is at the position of the recall time, press 【Up】or【Down】adjust the number then press【Enter】can realize fixed point recall.

3.8 PRINT SCREEN

Printing configuration:[print] for communication mode, in accordance with the『RUN MODE』operating switch:



ManualPrint



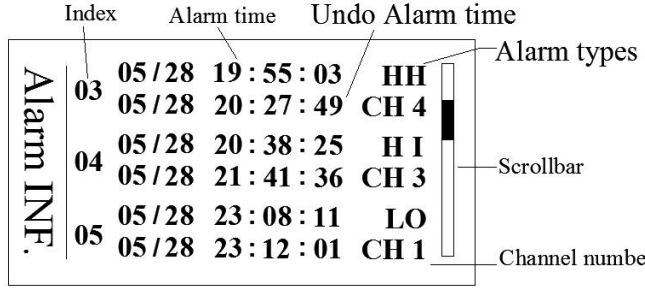
Timerprint

- Begin/end time: Begin time< end time< clock time.
- Print/stop: Manual start/stop button.
- Channel/type: Manual printing only print a single channel of

historical data or curve, Timing printing can print multi-channel current data at the same time. Type be data and curve.

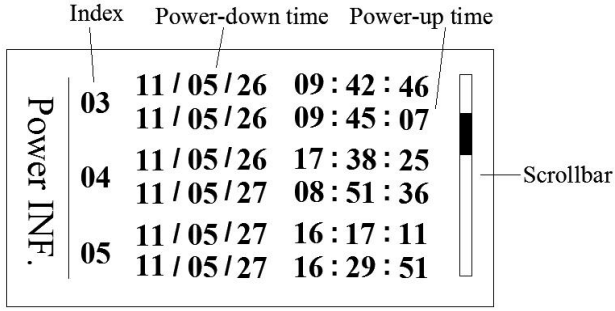
- Timing/manual printing button: Manual switch/timing printing link button.
- Manual printing interval: The interval is according to unit recording interval.
- Regular print interval: Regular print interval, the minimum interval of 1 min.
- Timed open print button:[open] when open, auto printing after opening, no manual.

3.9 ALARM INFORMATION



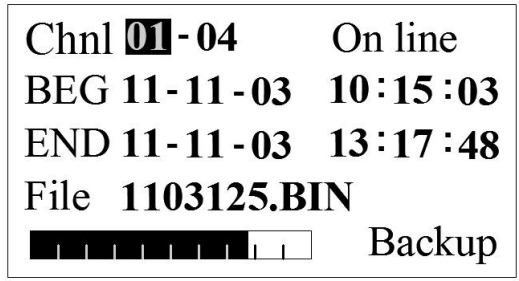
- Alarm index: Max keep 24 groups alarm information, singal channel can show 3 group information at most.
- Alarm/Undo alarm time: Line first is alarm time, second line is Undo alarm time, no Undo alarm time is --/-- --:--:--.
- Alarm types: High High Limit（HH）、High Limit（HI）、Low Limit（LO）、Low Low Limit（LL）.
- Channel number: Current alarm information channel number
- Scrollbar: Current page.
-

3.10 POWER INFORMATION



- Power-down index: Keep most 24 power-down/up information.
- Power-down/up time: First line is power-down time, second line is power-up time.
- Scrollbar: Current page.

3.11 BACKUP HISTORY DATA

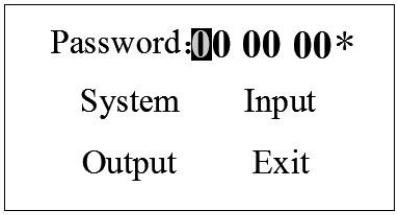


- Equipment: Show mode of U disk, on line, off line, fault state, can not detect U disk[off line],error in the back processing[fault].
- Channel: The number of backup channel,01-01 indicate backup 1 channel，01-04 indicate 1-4 channel need backup.

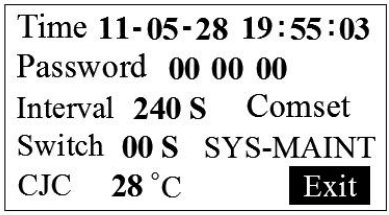
- Begin: Need backup the start time of historical data
- End: Need backup the end time of historical data.
- File: Backup file name.
- Progress bar: Show the current progress of the backup process.
- Backup/reset/complete: Start, reset, backup complete status button.
- When the cursor is in the [BEG]or [END]Settings box, press 【Enter】 into quickly jump.
- Such as an error in the way or need to copy again, put the cursor on [backup]button, press【Up】or【Down】choose to be[reset],press【Enter】then can into detecting the storage device again, when backup finish,[backup] or [reset] button come to be [complete],if need continue copy put the cursor on the [complete] button and press 【Up】or【Down】to choose [backup] and press【Enter】.

CHAPTER 4: SETTING SYSTEM PARAMETERS

4.1 CONFIGURATION SCREEN AND SYSTEM CONFIGURATION



Configuration screen



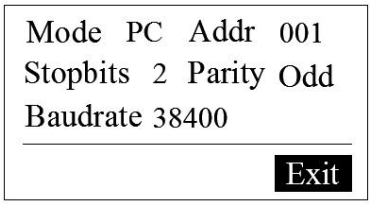
System configuration

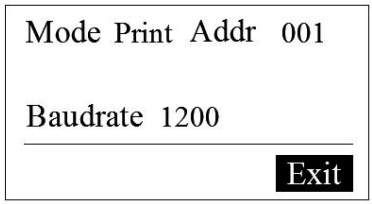
- Hold on【Menu】 and【Enter】 1 sec later, enter in 『configuration』 screen
- 『Configuration』initial password is [00 00 00],after enter in the correct password press【Enter】into classification menu, '*' no disappear indicate error password or no press【Enter】 in confirm
- Time setting: System date and time set
- User password: User password authority set
- Record interval: Can be 1/2/4/8/12/24/36/60/120/180/240s.The longer the record interval is, the longer of record time, or the short the record interval is, the short of the record time, Usual, the rapid change of the measured signal, need choose the short record interval. Or opposite, when the measured signal changes slowly, can choose the long record interval.
- Auto switch: Use to auto switch current curve digital screen channel, start with 0S,indicate not auto switch, can adjust the numbers on secondary screen rapidly

- Cold junction compensation (CJC):has setting and external two mode. When cursor at [CJC], press【Enter】into『Cold setting』configuration to choose the two mode,[setting]the code data under setting can be adjustable,[external]the cold data mode can catch by auto, system is under external mode
- System maintenance: Use to default Settings/ clear alarm information/power information and so on

4.2 COMMUNICATION CONFIGURATION

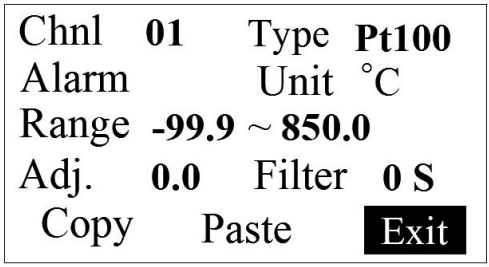
In『system configuration』the [communication configuration] can set the different on line mode:





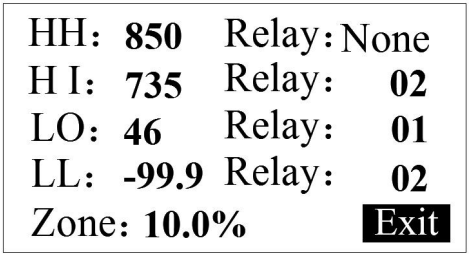
- Address: Communication address is a use of identify in the network, it is the identification of the instrument in network; pc software use this to access the instrument; in a same communication address of the machine can be set up in 001-255, can not be repeat
- Stopbits and parity: Need the same setting of the pc software, default setting
- Baud rate: PC mode baud rate can be changed（must the same to pc software）,Printer mode baud rate can't be changed

4.3 INPUT CONFIGURATION



- Channel
  According to customer demand, 4 is the most.
- Type
  It support several type message, and the analog signal support for universal input, change different signal types without change module ,only need change the terminal connection and set the right signal type. Instrument support a variety of signal types such as :0～20mV、0～100mV、0～5V、1～5V、0～10mA、0～20mA、4～20mA、Pt100、Cu50、Cu100、G53、BA1、BA2、B、E、N、R、J、K、S、T、WRe3-25、WRe5-26、F1、F2、PI、Res（resistance）.
- Unit
  The instrument has the following engineering unit for choose: m3/h、m3/min、m3/s、L/h、L/min、L/s、t/h、t/min、t/s、kg/h、，kg/min、kg/s、℃、Pa、kPa、MPa、kgf/cm^2、Bar、mmH_2O、mmHg、%、ppm、r/min、ph、mm、Hz、kHz、mA、A、kA、mV、V、kV、VA、kVA、W、kW、MW、J、kJ、kg、kWh and so on.

- Measurement range
  User-defined range scope, the high limit and low limit, can configurate freely. Press【Menu】to adjust the decimal digits of measurement range , press【Enter】into『secondary screen』to rapid change the parameters.
- Alarm setting



①**Alarm threshold:** HH、HI、LO、LL is refer to high high limit, high limit, low limit, low low limit alarm, the value under is correspondingly to the alarm threshold, when actual value bigger than correspondingly limits, differential and difference , can appear or eliminate alarm signal.

②**Alarm contactor:** Relay serial, such as contactor 01 is No.1 relay. When value of signal out of setting, corresponding contactor will have an action, close contactor. Choose "No" indicate no matter signal value over or not, the relay key no action, still in alarm list has alarm data.

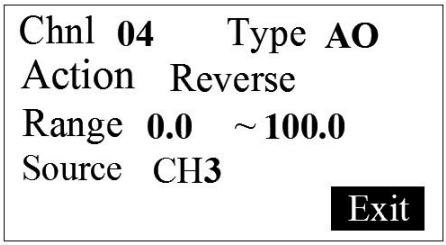
③**Alarm differential:** Alarm differential is to avoid instrument repeat alarm at alarm edge, such as range at 0~100, upper alarm dot is80， lower alarm dot is 20, alarm difference is 5.0%, when happen high alarm, the range of instrument is less 80-100*5%=75, then cancel the alarm this time, the same, when happen lower alarm, the data range at 20+100*5%=25, then cancel the alarm this time.

- Adjust
  Allow the user adjust the deviation value, value = measurement value +adjustable value, normally , set the adjustable value at 0.
- Filter
  Filtering time constant setting, Filter setting method:

$$\text{Show value} = \frac{\text{Last value} \times \text{Input filter} + \text{Current value}}{\text{Input filter} + 1}$$

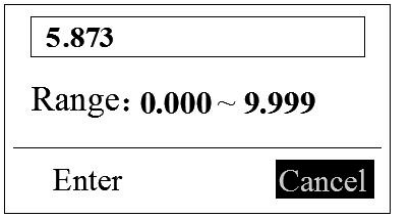
- Copy and paste function
  If the setting of each channel is the same, after one channel setting press cursor to [copy]，press enter, to copy next setting, press cursor to "channel" setting box, to change the channel, then press cursor to [paste],press enter can copy the function setting of the last into every setting box.

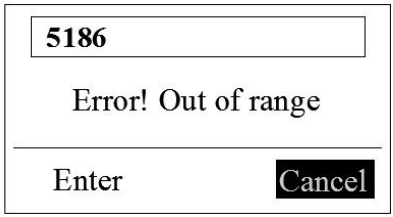
4.4 OUTPUT CONFIGURAION



- **Action**：Under direct of AO【Analog Output】 ,Transmitting range high limit to the output 20mA, Transmitting range low limit of output 4 mA；Under reverse of AO, Transmitting range high limit of output 4 mA, Transmitting range low limit of output 20mA.
- **Signal source:** setting the transmitting output signal source channel, CH3 is the third channel.

4.5 SECONDARY SCREEN





Secondary screen is mainly use to auto switch setting. Cold junction compensation setting. Alarm limit setting, measuring range limit setting and so on. Enter into secondary screen can quickly adjust value, once the value is beyond the scope , the system will note you it is out of parameter range, key operate, please refer to『NAMES OF PARTS AND FUNCTIONS』.