Chart Recorder

User's Manual

Contents

Preface

Appreciate for purchasing our company's chart recorders. This manual illustrates how to install, wire and operate the device. In order to accurately operate the recorder, please read the manual before any operation.

Disclaimer

1. Any reprinting and copying of this manual is prohibited.
2. With regard to constant improvement of the device, the company reserves the right to alter specifications without notice.
3. The information contained in this document is believed to be correct and complete, but the company accepts no liability for any errors it contains. If any errors or omission are found, please contact the company.

Version

First Version of U-K2-EN1 June 2014

Safe use instructions

1. Installation environment

The device is not allowed to be operated or stored in a place where is flammable or vaporous.

2. Safety marks

Following marks are shown on this device

Mark	Name	Location
	Power warning	On the right of the power wiring point
	Earth Ground connection point	Power wiring point
100~240VAC 50/60Hz 21.5~26.5VDC	Power specifics	Power wiring point

3. Reliable Earth Ground connection

To avoid the possible electric shock, please make sure that the grounding is effective and reliable before turning on the power.

4. Power off in case of any breakdowns

When abnormal scent, sound, smoke, or high temperature is found, please shut down the power supply.

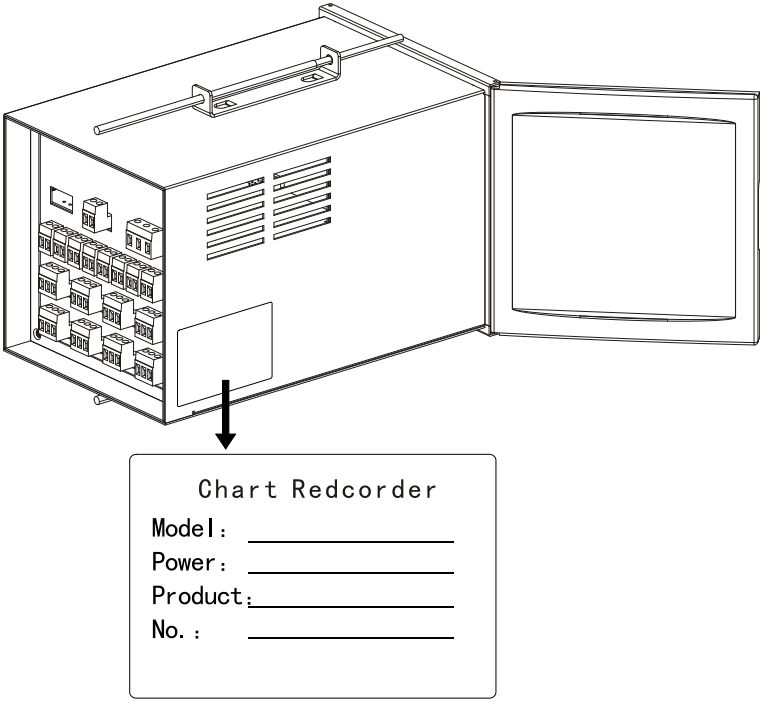
5. Do Not attempt to fix or refit the device.

Checking items in the package

The first thing is to check all the items in the package upon unpacking. If any wrong model or quantity, or physical damages are found, please contact the company or the agent from whom you bought this device.

1. The nameplate

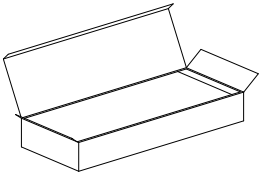
The nameplate is adhered to the side of the recorder. And double check whether the model and specifications written on the nameplate is exactly the same as your order.



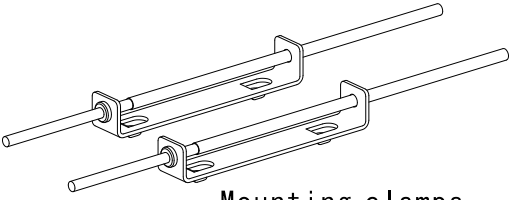
2. Attachment

The following items are packed in the carbon. Please make sure that all the items are accounted for:

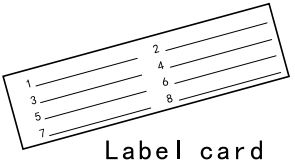
Item	QTY	Usage or content
1. Recording paper	3 volumes	Folding,110mm wide, 8000mm long
2. Mounting clamps	2	Panel Mounting
3. Manual	1	User guide
4. Certification	1	Proof of qualified merchandize
5. Label card	1	Label Channel tag



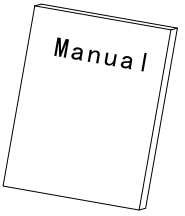
Recording Paper

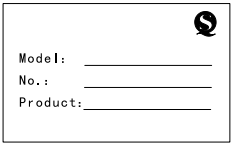


Mounting clamps



Label card





Certification

1. Overview

1. Overview

This chart recorder, specially designed for industrial setting, is an intelligent and multi-functional device, which is able to provide 8 high accurate universal channels that can receive analog signals, 8 alarming channels and sensor power as well. The device adopts high accurate thermal printer, realizing data printing, chart printing or the mixed printing. And also the high-definition OLED display is used in this device which can display real-time single screen, multi-screens, bar charts and alarming. In addition, the unique design of the paper box enables efficient change of printing paper. The factors including humanized appearance, practical functions, reliable hardware and excellent craftsmanship, make our products to be competitive.

This recorder embodies many functions, such as signal processing, display, printing, alarming and so on, and it is an ideal device to collect, analyze and store data and information in industrial processes. This device is mainly applied on the industrial spots like metallurgy, petrol, chemicals, building material, paper-making, food, medicine, heat or water treatment industry.

2. Main features

Display: Rich information is presented simultaneously, such as timing, data, chart, and alarming and so on; two types of display: set-channel and circular

Input function: A maximum of 8 universal channels, receiving many types of signals like current voltage, thermocouple and thermal resistance and so on.

Alarming: A maximum of 8 relay alarms

Power supply: A maximum of 1 channel power output at 24 voltage.

Recording: The imported vibration-resistant thermal printer has 832 thermal printing points within 104 mm and it has zero consumption of pens or ink and no errors caused by the pen's position; It records in the form of data or charts and for the latter form, it also prints scale label and channel tag.

Real-time timing: The high accurate clock can work normally when the power is shut down.

Separate channel charts: By setting up the recording margin, different channel charts are separated.

Chart speed: Free setting range of 10-2000mm/h.

3. Main technical norms

3.1 Technical parameters

Analog Input	
Channel number	A maximum of 8, universal signal input
Signal type	Voltage:
	Current
	Thermal resistance
	Thermocouple
Common mode rejection ratio	Above 120dB
Series-mode rejection ratio	Above 60dB
Other parameters	
External power source	AC: 100-240VAC, frequency of 47-63Hz,maximum power＜40W
Internal power supply	
Relay input	Maximum 8 channels, 250VAC, normally open contact: 5A
The hardware watchdog	Separate chip for watchdog, securing

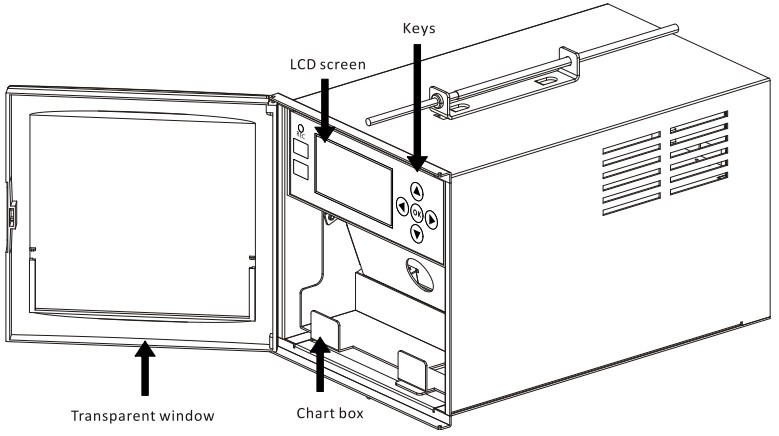
	system's safe and reliable running
Real-time clock	Separate chip for timing, powered by lithium battery ensuring normal timing in a power failure
Power failure protection	No data will be missing in a power failure
Working condition	Environment temperature: relative humidity

3.2 Error range of analog input

Signal type	Maximum permissible errors（‰）	Environment temperature influence（%/10℃）
Voltage	±2	±0.05
Current	±2	±0.05
Signal type	Maximum permissible errors（‰）	Environment temperature influence（%/10℃）
PT100	±0.5	±0.05
Cu100	±0.5	±0.05
Cu50	±0.5	±0.05
T	±2	±1
E	±2	±1
K	±2	±1
S	±3	±1
B	±3	±1
J	±2	±1
R	±3	±1
N	±3	±1

2. Components

1. Front

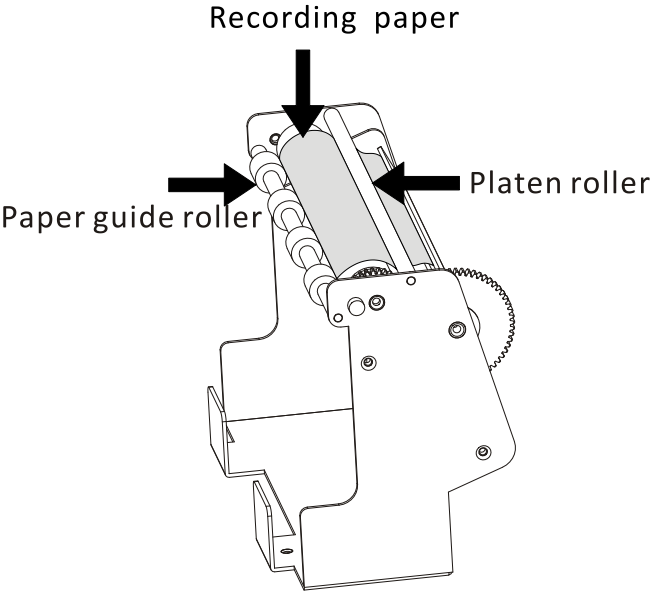


Transparent window; LCD screen; chart box; keys; chart box bottom
The front of the device consists of the transparent window, LCD screen and chart box.

Parts	Description
Transparent window	High transparent PC material makes clear observation of the device running
LCD screen	Image resolution
Keys	7 keys
REC	When the recording light is on, the recorder is working.
Chart box	The place to put the charts

2. The chart box

2.Components

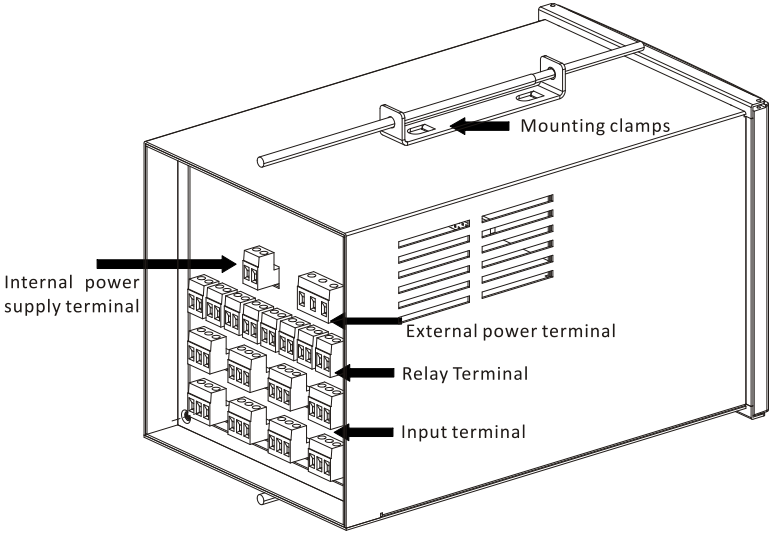


Paper guide roller; Printing charts; Platen roller

The chart box consists of the box, paper guide roller and platen roller.

Parts	Description
Chart box	To place thermal paper
Paper guide roller	To make the paper cling to heating heads
Platen roller	To ensure the successful folding, exit and entrance into the chart box

3. Back



Power supply terminal; mounting clamps; external power terminal; relay terminal; input terminal

The back of the device consists of wiring terminals and mounting clamps.

Parts	Description
Mounting clamps	Mounting brackets for the panel meters
Input terminal	Input of current, voltage, thermal resistance and thermocouple
Relay Terminal	Relay output
Internal power supply terminal	24VDC output
External power terminal	Power output

3. Installation

1. Installation methods and environmental condition

Warning
Please install the recorder on a meter panel. To avoid falling over, the panel should be made of a steel plate of 2-12mm thickness. The device should not be set in a place where there is direct sunlight or electromagnetic field.

1.1 Installation environmental condition

Parameter	Condition
Temperature range	Steady; 0-50
Moisture range	Steady;
Height	Below 2000m
Mounting angle	Front, left,right: Back:
Others	Please avoid places with hot wind of 70
	Please avoid places with vibration and impact
	Please avoid places with corrosive gas

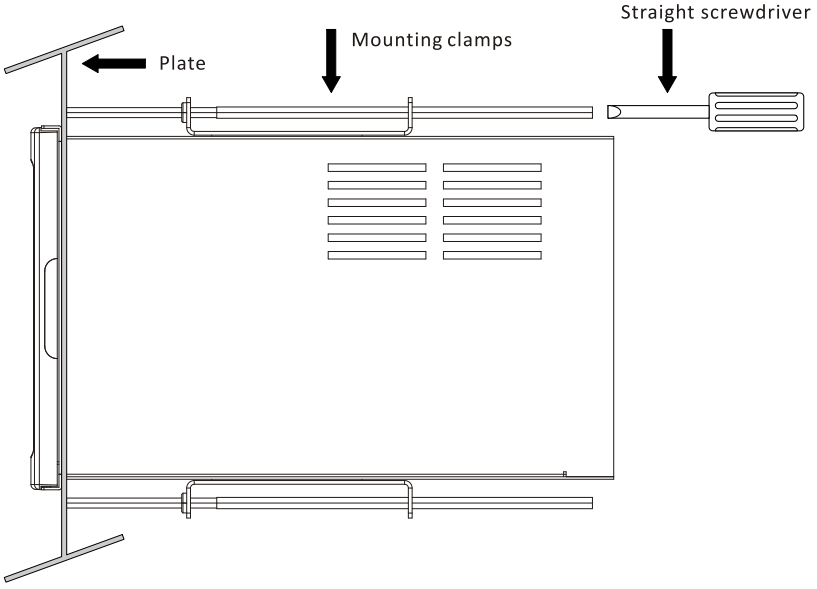
1.2 Insert the device from the front of the panel.

1.3 Install both mounting clamps in the attachment and insert the recorder into the panel.

1.4 Use appropriate strength of 07-0.9 N.m to tighten screws on the clamps until the panel is perpendicular to the plate.

Warning
If the strength was over the foresaid standard, it would twist the case or damage mounting clamps. Do not put in things or tools in the opening of mounting clamps.。

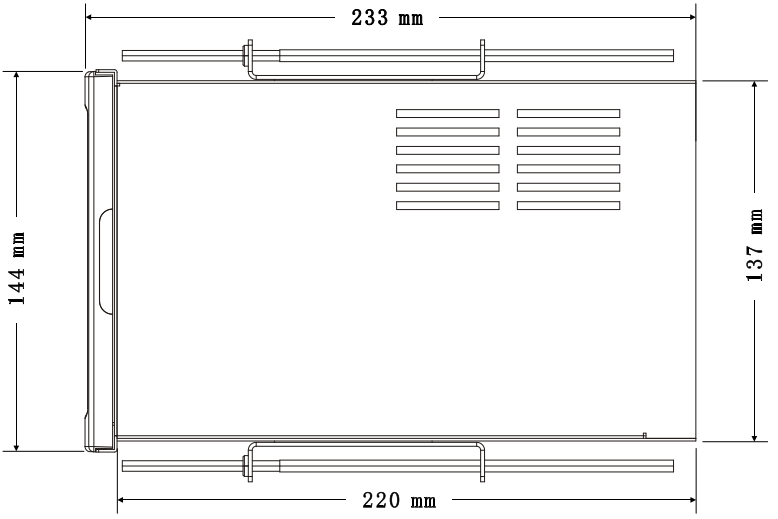
2. Diagram of panel installation



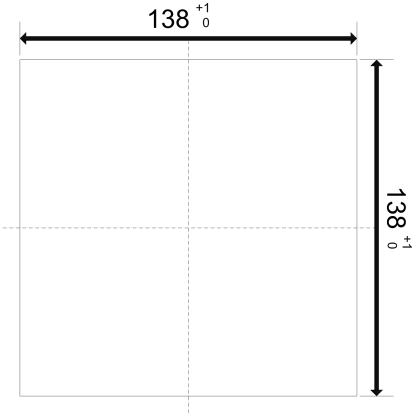
Insert the recorder from the front of steel plate of 2-12 thickness and install mounting clamps and use the straight screwdriver to tighten under an appropriate strength. Make sure that the recorder is horizontal.

3. Appearance and cutout dimensions

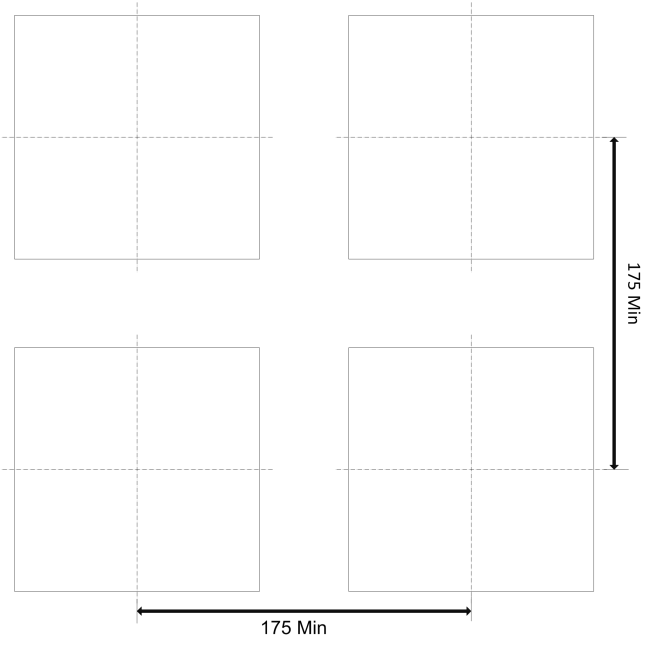
Dimensions in mm



Cutout dimensions in mm

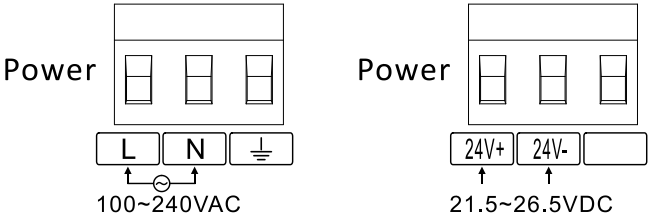


Cluster dimensions in mm



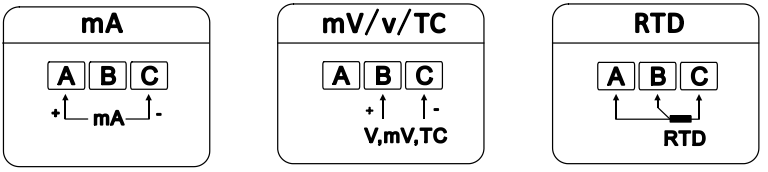
4. Wiring

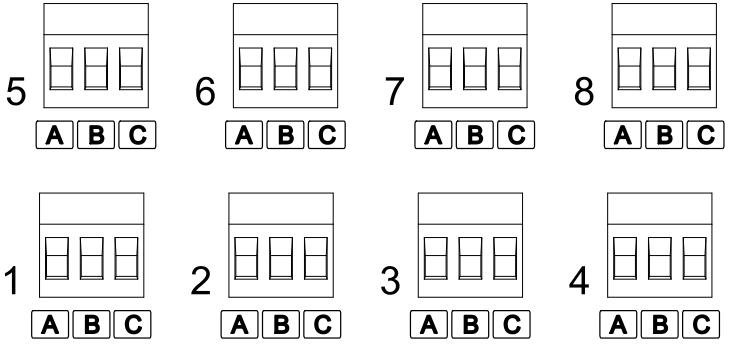
1. External power end wiring



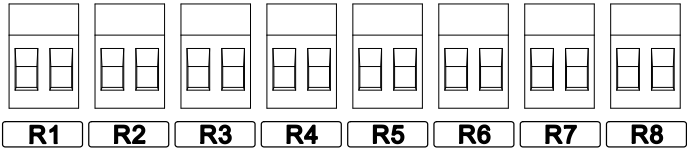
According to the chart recorder model, select 220VAC or 24 VDC wiring.

1. Input wiring



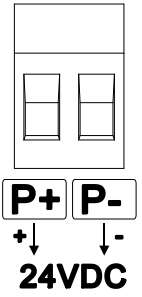


2. Alarm wiring



R1-R8 represent 8 normal open relays

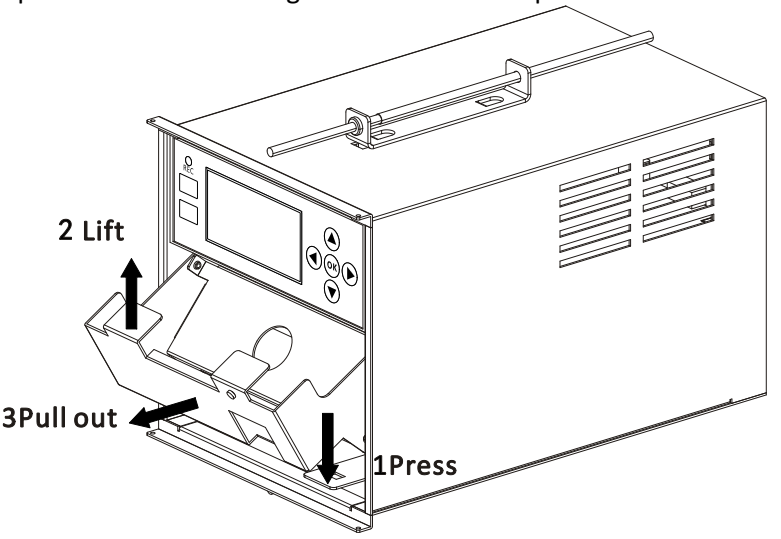
3. Internal power supply wiring



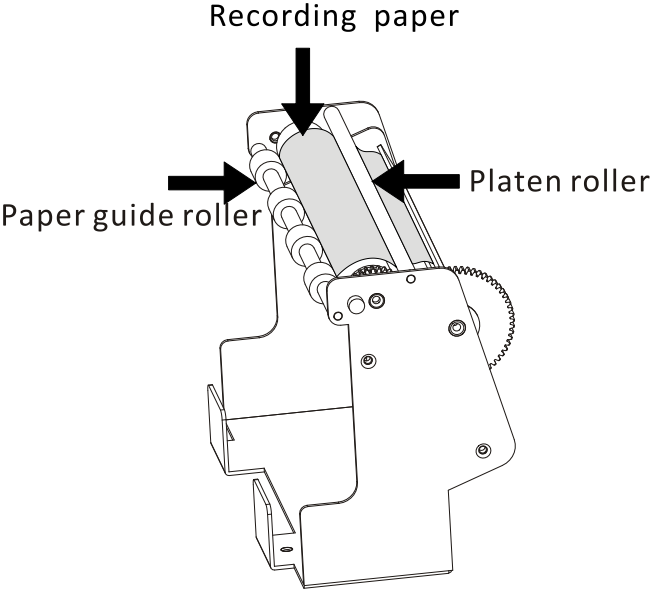
The chart recorder provides an output of 24V, 60mA.

5. Changing printing paper

Step 1: Press hard on the chart box button, and the box would pop up. Lift the box to 90 degrees of vertical and pull out the box.



Step 2: Open the lid of paper case, and place the thermal paper with the thermal side facing upward. Then pull out some paper to squeeze underneath the platen roller and place the paper scroll between the paper guide roller and platen roller. Finally turn the gear clockwise to lead in the thermal paper.



Step 3: Horizontally place the paper case into the chart box. Turn the chart box clamps into the button. Hearing a “crack” sound, the chart change is completed.

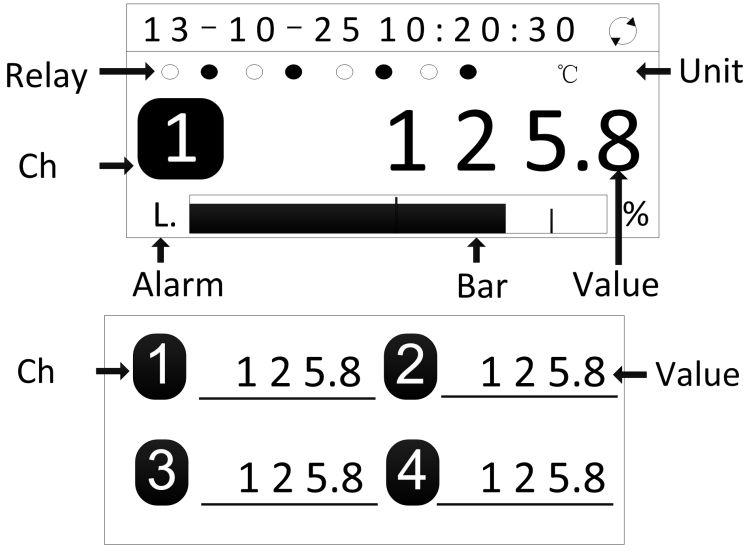
6. Interface and Key Operation

1. Interface and Operation

1.1 Interface

Interface is displayed as long as the recorder is connected to power (detailed or simple display options); functions of real-time data print, data, alarm display, etc. can be carried out.

Relay alarm, channel number, alarm type, bar chart, channel value, unit, circular display.



- Relay : 8 circles from left to right stand for No. 1-8 relays.
  ● Means this relay is closed; ○ means this relay is open.
- Ch: which channel number(s) current interface is displaying.
- Alarm: L. stands for deviation lower limit alarm; L stands for lower limit alarm; H stands for upper limit alarm; H stands for deviation upper limit alarm.
- Circular display: Press the key SETPOINT, displaying current

channel without Circular Display mark. Press SETPOINT key again, displaying every channel with Circular Display mark.

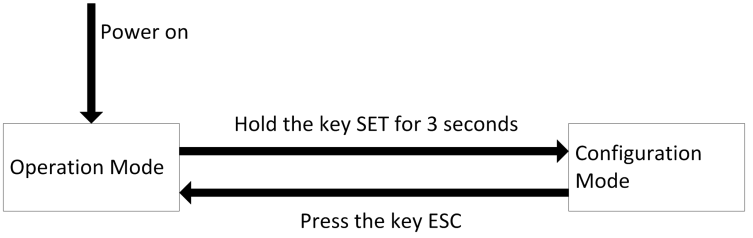
- Unit: Display current channel unit.
- Value: Display measured data of the current channel.
- Bar: Display current channel's 0~100% bar chart.

1.2 Interface Key Operation

KEY NAME	FUNCTION DESCRIPTION
Record	Press once, REC goes on, carrying out real-time chart/data printing.
	Press again, REC goes off; no printing, only data display.
Reports	When REC goes on, press once, printing current time and data.
	When REC goes off, press once, printing configuration information.
Setpoint	Press once, every 5 seconds displaying each channel's value in a circle.
	Press again, only displaying current channel's value.
Paper Feed	Press once, speedy paper feed.
	Press again, stopping speedy paper feed and back to the previous status.
OK	Channel Shift.
Set	Long press for 3 seconds, entering the configuration mode.
ESC	Shift between detailed interface and simple interface.

6. Interface and Key Operation

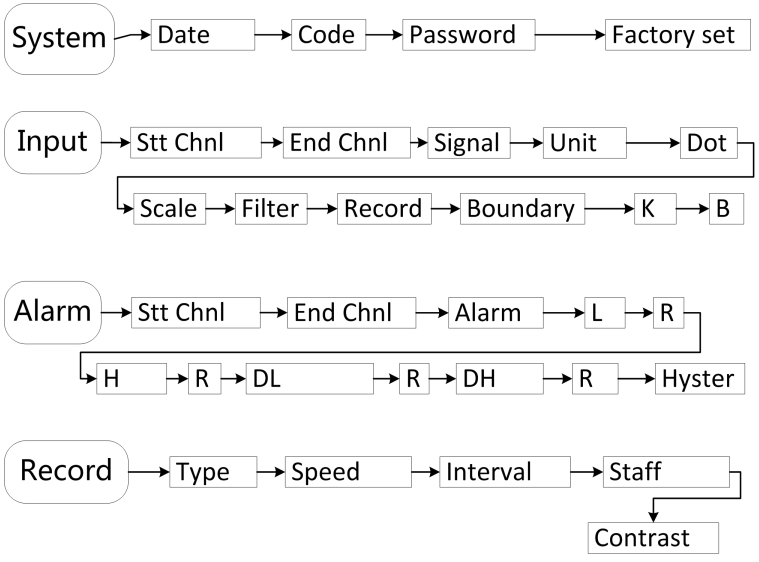
1.3 Shift between display interface and configuration interface



2. Configuration interface and operation

2.1 Configuration Interface Parameter List

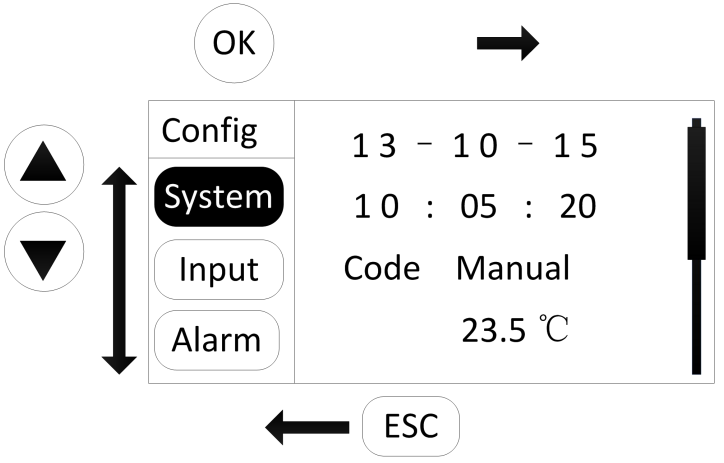
The parameter of time, signal, span, alarm, record, etc. can be set in the configuration interface. Configuration interface parameter list is as below:



2.2 Configuration Interface Key Operation

- Configuration Menu Selection

  Press key UP、 DOWN to select configurations; press key OK to set parameter; press key ESC to back to configuration selections.



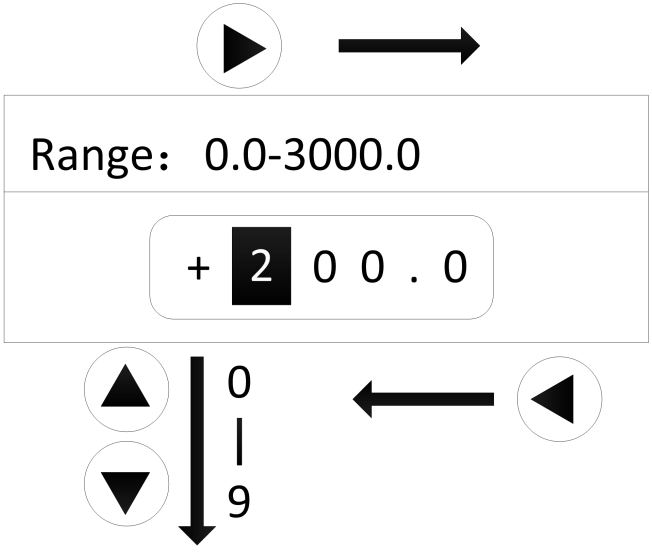
6. Interface and Key Operation

- Change values or parameters

  Press key UP 、 DOWN to increase or decrease values/parameters; hold the key to speedily change values/parameters.

- Value Input

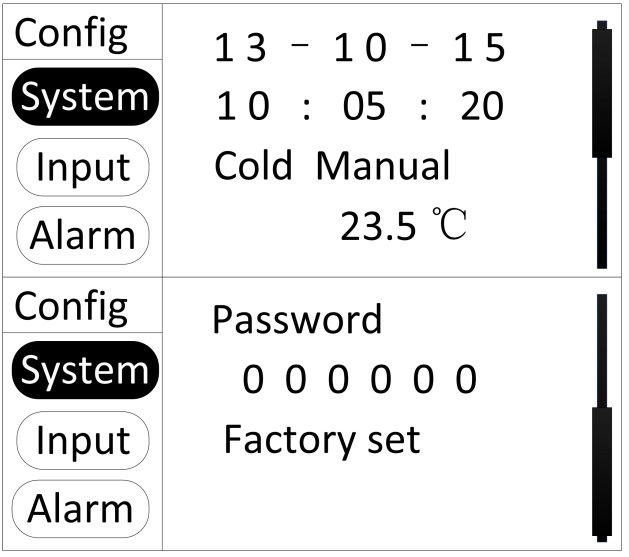
  Press the key OK and value input dialog box pops out; press the key UP、DOWN to increase or decrease values. Press Key LEFT、RIGHT to move the cursor left or right. Press key OK to confirm the value. Press key ESC to cancel input and exit the dialog box.



7. Functions

1. System Setting

System time, cold junction, password and factory defaults reset can be set in system configurations.



- System Time
  Set current system time
- Cold
  Auto: Process Cold Junction Compensation of thermocouple based on the temperature sensor's value.
  Manual: Process Cold Junction Compensation of thermocouple by setting fixed temperature value.
- Password
  Password setting.
- Factory set
  Reset to factory defaults. Factory defaults are as follows:

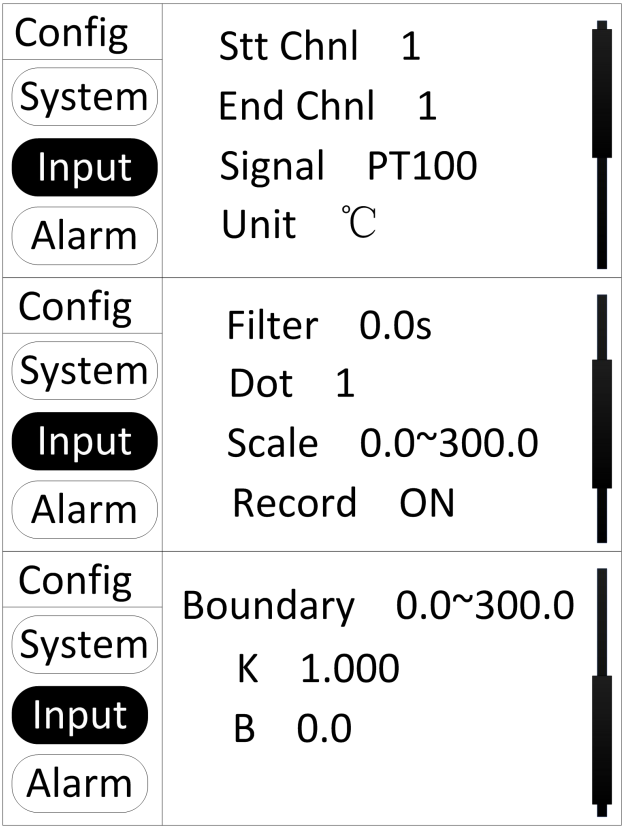
7.Functions

CONFIG	MENU	RANGE	DEFAULT
System		01/01/2000~12/31/2099	Current t
	Cold	-99.9~99.9	Auto
	Password	0~9	000000
Input	Start Chnl	1-n (n is total channel)	1
	End Chnl	1-n (n is total channel)	1
	Signal	NO, 4-20mA、…	4-20mA
	Unit	℃、…	℃
	Dot	0~3	1
	Scale	-9999~30000	0.0~300.0
	Filter	0.0~9.9 seconds	0.0
	Record	ON/OFF	ON
	Boundary	-9999~30000	0.0~300.0
	K	-9999~30000	1.000
	B	-9999~30000	0.0
Alarm	Start Chnl	1-n (n is total channel)	1
	End Chnl	1-n (n is total channel)	1
	Alarm	ON/OFF	OFF
	L	-9999~30000	0.0
	R	0~n (n is total relay number)	0
	H	-9999~30000	300.0
	R	0~n (n is total relay number)	0
	DL	-9999~30000	0.0
	R	0~n (n is total relay number)	0
	DH	-9999~30000	300.0
	R	0~n (n is total relay number)	0
	Hyster	0~30000	0.0
Record	Type	Curve/Data/Mixed	Mixed
	Speed	10~2000mm/h	100
	Interval	1-9999 min	10

	Staff	0~n (n is total channel number)	0
	Contrast	0~3	3

2. Input Function

Signal input of voltage, current, RTD and TC. Input configurations can set signal types, decimal point, scale, record boundary, etc.



- Stt chnl/End chnl

  Channel value's batch setting If Channel 1-3 need same parameter setting, Initial channel should be set 1, and Ending

channel should be 3.

◆ Signals

Select channel signal types. When selection is none, this channel is not available (No display, no record). Signal types the recorder supports are as follows:

TYPE	SIGNAL	Scale	NOTE
No	No	No	Enabled channel
Current	0-10mA	-9999～30000	
	4-20mA	-9999～30000	
	4-20mAsq	-9999～30000	Square root of 4-20mA
Voltage	0-20mV	-9999～30000	
	0-50mV	-9999～30000	
	0-100mV	-9999～30000	
	0-5V	-9999～30000	
	1-5V	-9999～30000	
	1-5Vsq	-9999～30000	Square root of 1-5V
	0-10V	-9999～30000	
RTD	PT100	-200～850℃	
	Cu100	-50～150℃	
	Cu50	-50～150℃	
TC	T	-270～400℃	
	E	-270～1000℃	
	K	-270～1372℃	
	S	-50～1768.1℃	
	B	0～1820℃	
	J	-210～1200℃	
	R	-50～1768.1℃	
	N	-270～1300℃	

- Unit: units that the recorder adopts are as follows; units are not considered into calculation.

Units	m^3/h,km^3/h,L/h,Nm^3/h,kNm^3/h,bar,mbar,mmH_2O,mmHg,Pa,kPa,MPa,atm,kgf/cm^2,mm,cm,m,km,Wh,kWh,W,kW,MW,kJ,Hz,kHz,MHz,g,kg,t,mV,V,kV,mA,A,kA,kJ/h,MJ/h,GJ/h,ppm,%,‰,$ppmO_2$,$ppmH_2$,$\%O_2$,%LEL,NTU,μg/h,μg/kg,rpm,μS/cm,mS/cm,MΩcm,r/min,PH,RH,N,mg/L,g/L,kg/m^3,$kcal/m^3$,m/min,m/s,℃,℉,kg/h,t/h

- Filter

Inertial Filtering Formula:

Displayed Value = $\frac{\text{Previous Measured Value} * \text{Filter Period Constant} + \text{Current Measured Value}}{\text{Filter Period Constant} + 1}$

- Dot

Channel decimal digits. Configuration setting range of RTD and TC is 0～1 and that of other signals is 0～3.

- Scale

Channel signals indicate scale. Configuration setting range of current and voltage is -9999～30000; not applicable for RTD and TC.

- Record

When Record is ON, the record function is enabled; when it is OFF, the record function is disabled.

- Boundary

Boundary upper limit and lower limit respectively correspond to printing paper's left boundary and right boundary. Boundary lower limit corresponds to chart paper's zero point; boundary upper limit corresponds to chart paper's calibration 100%. Boundary setting can realize curve shift.

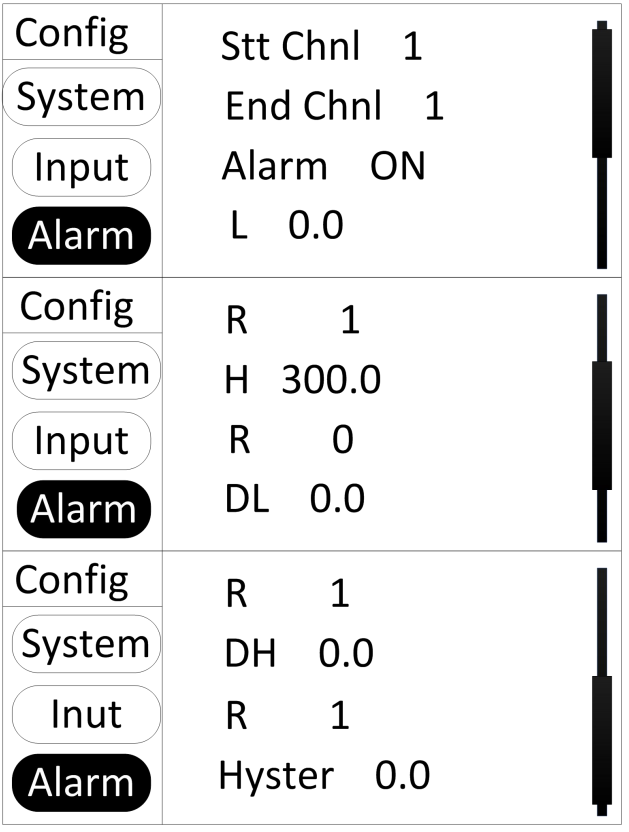
7.Functions

- K, B

  Linear adjustment; displayed value = measured value*K+B

3. Alarm functions

Signal alarming and relay output functions enable alarm configuration setting of alarm switch, limiting sphere, deviation sphere and respectively corresponding output relay.



- Stt chnl/End chnl

  Batch setting of channel alarm types. If need to set Channel 1-3 at the same parameter, Initial channel value shall be set 1,

and Ending channel value shall be set 3.

- Alarm

  When alarm is ON, the alarm function of this channel is enabled; when it is OFF, the function is disabled.

- L & Relay

  Lower limit value and the corresponding relay number. When R is 0, there is no relay output; when R is 1, No.1 corresponding relay outputs and the like.

- H & Relay

  Upper limit alarm value and the corresponding relay number.

- DL & Relay

  Deviation lower limit alarm value and relay number.

- DH & Relay

  Deviation upper limit alarm value and relay number.

- Hyster: Alarm backlash setting, avoiding frequent alarms in the event of signal vibration around alarm setting value.

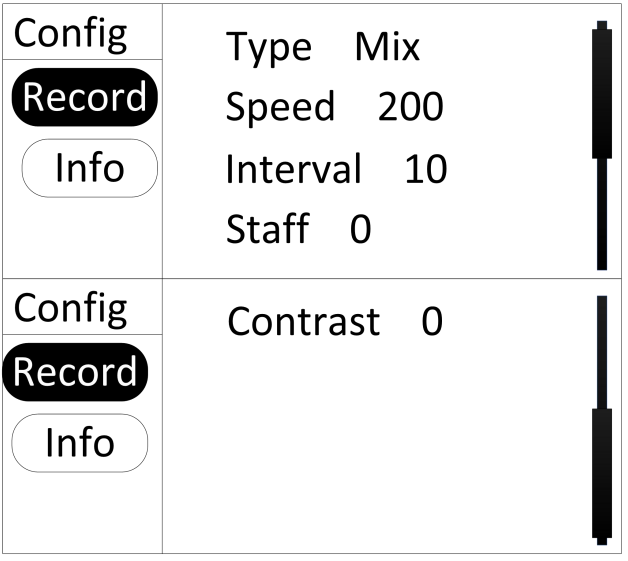
ALARM TYPE	ALARM CONDITION	CANCELLATION CONDITION
Lower limit	Channel value < lower limit value	Channel value > lower limit + backlash error
Upper limit	Channel value > upper limit value	Channel value < upper limit - backlash error
Deviation lower limit	Channel value < lower limit - deviation lower limit	Channel value > lower limit - deviation lower limit + backlash error
Deviation upper limit	Channel value > upper limit + deviation upper limit	Channel value < upper limit + deviation upper limit - backlash error

Example: Lower limit alarm value is 10℃; upper limit alarm value is 250℃; deviation lower limit is 5℃; deviation upper limit is 8℃. Then alarming will be as follows:

	DEVIATION LOWER LIMIT	LOWER LIMIT	UPPER LIMIT	DEVIATION UPPER LIMIT
CHANNEL VALUE	<10-5=5℃	<10℃	>250℃	>250+8=258℃

4. Record Function

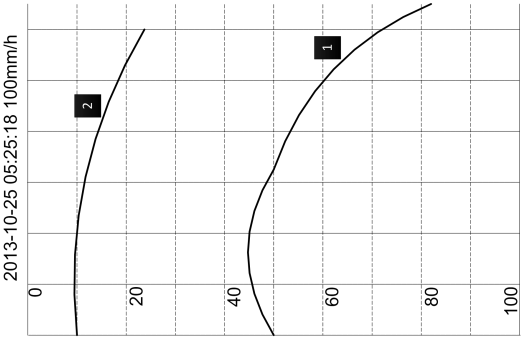
Real-time data and curve printing allows record configuration setting of record mode, paper feed speed, print intervals, record scale and print depth.



- Type

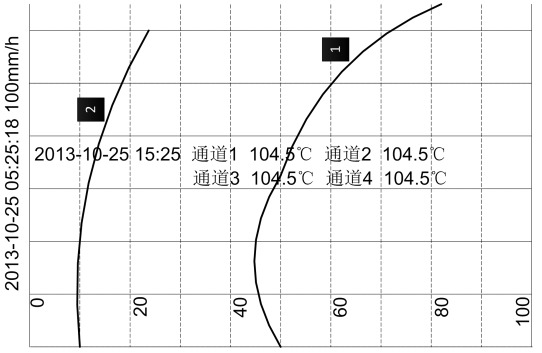
  Configuration setting can be curve, data or mixed.

RECORD MODE	DESCRIPTION
Curve	Process curve record in terms of paper feed

<table>
<tr><td></td><td> 

speed.</td></tr>
<tr><td>Data</td><td>Process data record in terms of data intervals (minutes).
<table>
<tr><td>2013-10-25 09:32</td><td>通道1 104.5 ℃</td><td>通道2 104.5 ℃</td><td>通道3 104.5 ℃</td><td>通道4 104.5 ℃</td></tr>
<tr><td>2013-10-25 09:31</td><td>通道1 104.5 ℃</td><td>通道2 104.5 ℃</td><td>通道3 104.5 ℃</td><td>通道4 104.5 ℃</td></tr>
<tr><td>2013-10-25 09:30</td><td>通道1 104.5 ℃</td><td>通道2 104.5 ℃</td><td>通道3 104.5 ℃</td><td>通道4 104.5 ℃</td></tr>
<tr><td>2013-10-25 09:29</td><td>通道1 104.5 ℃</td><td>通道2 104.5 ℃</td><td>通道3 104.5 ℃</td><td>通道4 104.5 ℃</td></tr>
<tr><td>2013-10-25 09:28</td><td>通道1 104.5 ℃</td><td>通道2 104.5 ℃</td><td>通道3 104.5 ℃</td><td>通道4 104.5 ℃</td></tr>
</table></td></tr>
<tr><td>Mixed</td><td>Process mixed record in terms of the combination of curve and data.</td></tr>
</table>

7.Functions



- Speed

  Configuration setting range of paper feed speed is 10-2000mm/h, suggested setting by decades; recorder prints paper feed speed once every 100mm.

- Interval

  Configuration setting range is 1-9999 minutes. The recorder processes data print in terms of printing time intervals.

- Staff

  Configuration setting range is 0-n (n is the maximum channel number). When record scale is set 0, the device records according to each channel's respective scale. When the scale is set 1-8, it records according to corresponding channel's boundary. Record scale is printed every 100mm.

- Contrast

  Configuration setting range is 0-3. Larger the number is, deeper the printing depth is.

8. Specifications

General Specifications

ITEM	SPECIFICATION
Accuracy	±0.2% of input scale
Sampling Cycle	1 second
Chart Paper	Folding, valid chart format 104mm
Record Points	Maximum 8 Channels
Paper Feed Speed	10-2000mm/h

Standard Operation Environment

ITEM	SPECIFICATION
Power Voltage	220VAC/24VDC
Power Frequency	50Hz
Environmental Temperature	0～50℃
Humidity	0 ～ 85%RH（non-condensation）
Warm-up Time	30 mins after power connection
Installation location	Indoors

Power

ITEM	SPECFICATION
Rated Voltage	220 VAC/24VDC
Permitted Voltage Range	100～240VAC/22～26VDC
Rated Power Frequency	50/60Hz
Power Consumption	<40W
Maximum Common Mode Voltage	AC200V
Common Mode Rejection	>120dB
Series Mode Rejection	>60dB

8. Specifications

Structure

ITEM	SPECIFICATION
Mounting Method	Panel
Weight	About 3 kg
Mounting Angle	<30 degrees backwards of horizontal
Mounting Plate Thickness	2-12mm
External Dimensions	144 (W) * 144 (H) * 233 (D)
LCD	Monochrome
Key	7

Transportation & Storage Conditions

ITEM	SPECIFICATION
Environmental Temperature	-10～60℃
Environmental Humidity	0～85%RH （non-condensing）

Clock

ITEM	SPECIFICATION
Clock	Year 2000 to 2099 available
Battery Life	About 10 years (at room temperature)

Relay

ITEM	SPECIFICATION
Capacity	220VAC 5A

Power Distribution

ITEM	SOECIFICATION
Output	24VDC±10% 60mA

9. Troubleshooting

Please carefully read this manual before installation and use, and correctly operate this chart recorder based on the instructions in this manual and check whether installing and using environment complies with the requirements. The table below lists possible breakdowns of the chart recorder; users can troubleshoot problems according to trouble symptom.

COMMON BREAKDOWNS	TROUBLESHOOTING METHOD
Incorrect or #### display of signal data	Wiring error: Please check whether the input signal wiring is correct.
	Configuration error: Please check whether the signal types, scale etc. is in correct configurations.
No LCD display	Please check whether the main power is connected and open.
Incorrect record of curve	Please check whether the configurations of recorder boundary and paper feed speed are correct.
Alarm error	Please check whether alarm limit values and relay numbers are correct.

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