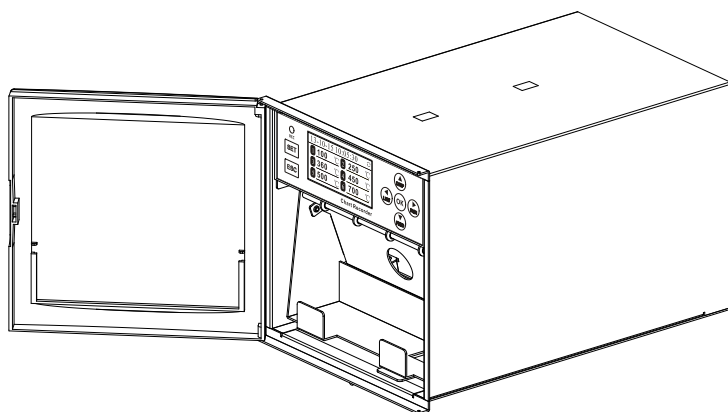User Manual & Guide

Multifunctional Chart Recorder

INSTRUCTIONS

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.

DECLAIMER

---

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

U-K2-EN1   June 2014

U-K2-EN2   June 2020

Table of contents

Safety instructions

● **Installation environment**

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

● **Safety marks**

Mark	Name
⚠	Power warning
⏚	Earth Ground connection point
100~240VAC 50/60Hz	Power specifics

● **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.

● **Power off in case of any breakdowns**

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

● **Do Not attempt to fix or refit the device.**

Unpacking

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.

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.
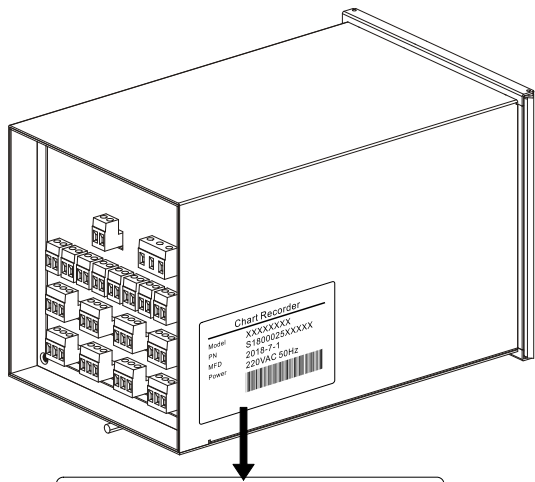
Accessories

Ind.	Part	Qty	Content
1	Recorder paper	1	Folding,120mm wide, 8000mm long
2	Mounting Clamps	2	Panel Mounting
3	User Manual	1	
4	Certification	1	
5	Label Card	1	Label Channel tag
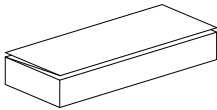
Recorder Paper
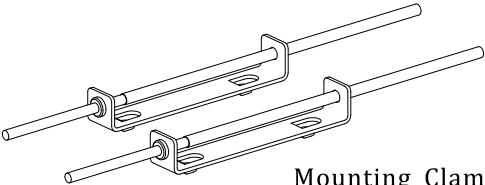
Mounting Clamps
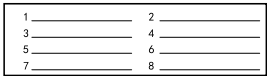
Label Card
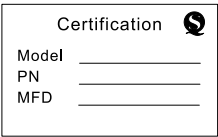
Certification

1. Overview

This chart recorder is designed for industrial field. Provide multi-channel high-precision analog signal input channel, configure multi-channel alarm, provide sensor power distribution; use high-precision thermal printer to achieve data, curve and mixed printing; equipped with high-resolution OLED LCD screen to provide real-time data display.

Features

- OLED LCD screen: rich-text display.
- Universal signal input: support 8-12channel universal signal input, support current, voltage, thermocouple, thermal resistance and other types of signals.
- Alarm function: 6 relay alarm output.
- Power distribution output: one 24V power distribution output.
- Paper feeding speed: 10 ~ 450mm / h free setting.

Technical data

ANALOG INPUT	
Channels	8-12 Channels
Signals	Voltage: 0-20mV, 0-50mV, 0-100mV, 0-5V, 1-5V, 0-10V
	Current: 0-10mA, 4-20mA
	RTD: Pt100, Cu100, Cu50
	TC: E, T, K, S, B, J, R, N

FUNCTION PARAMETERS	
Power	100~240VAC 47~63Hz, Capacity <40W
DC output	24VDC±10%,60mA

Relays	6 Relays, 250VAC 3A Normal Open
Environment	T:-10-60°C;RH:0-85%RH

Accuracy		
Signal	Accuracy	Environment influence(/10°C)
Voltage	±2‰	±0.05%
Current	±2‰	±0.05%
Pt100	±0.5°C	±0.05°C
Cu100	±0.5°C	±0.05°C
Cu50	±0.5°C	±0.05°C
K	±2°C	±1°C
J	±2°C	±1°C
E	±2°C	±1°C
T	±2°C	±1°C
S	±3°C	±1°C
B	±3°C	±1°C
R	±3°C	±1°C
N	±3°C	±1°C

Structure
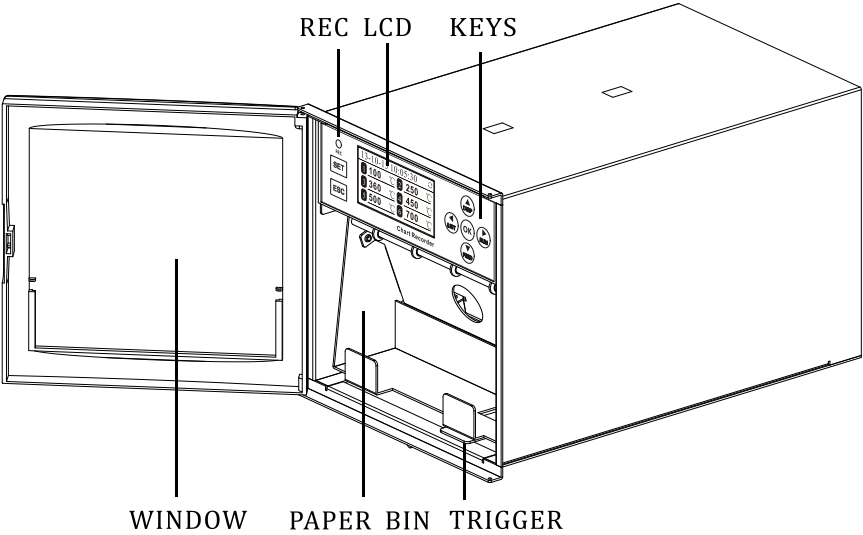
Part	Description
WINDOW	Observation of the device running
LCD	128*64 Resolution,2.4 Inch
KEYS	7 keys
REC	Recording indicator light
PAPER BIN	The place to put the record paper
TRIGGER	Release paper bin

The paper bin

PRINT ROLLER

PLATEN ROLLER
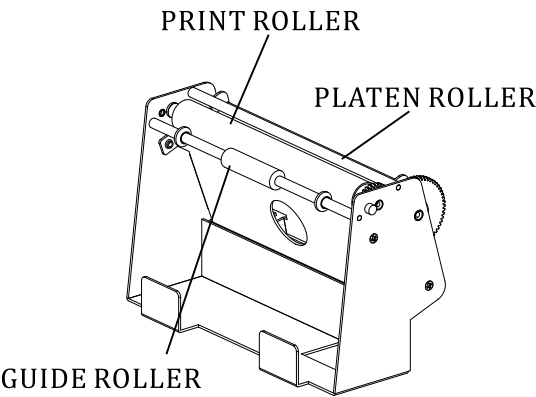
GUIDE ROLLER

Part	Description
Print Roller	Main Print Part
Guide Roller	To make the paper cling to heating heads
Platen Roller	To ensure the successful folding, exit and entrance into the chart box

Back of meter

MOUNTING CLAMP

24VDC OUT

RS485

RELAYS
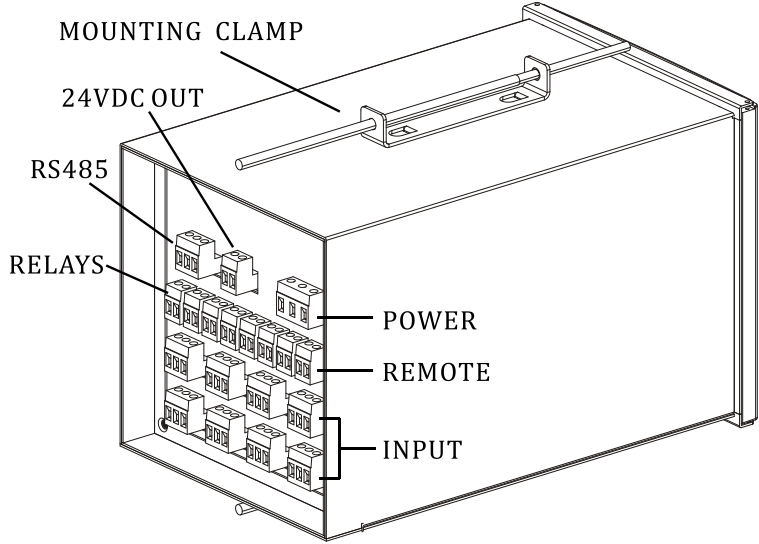
POWER

REMOTE

INPUT

Part	Description
MOUNTING CLAMP	For panel mounting
INPUT	Current,Voltage,RTD and TC
RELAYS	Alarm relays
REMOTE	Dry Contact, control printing
RS485	Communication interface
24VDC Output	24VDC Output for two-wire transmitter
POWER	100-240VAC 50/60Hz

2. Installation

WARNING

- Please mount the recorder on a meter panel
- The panel should be 2-12mm thickness
- Avoid direct sunlight and electromagnetic field

Environmental condition

Item	Condition
Temperature	0-50 °C and stable
Humidity	20-85%RH and stable
Altitude	Below 2000m
Angle	Front Left Right: 0°
	Back:0-30°
Others	Please avoid places with hot wind of 70 °C
	Please avoid places with vibration and impact
	Please avoid places with corrosive gas

Panel mounting

Insert the recorder from the front of the panel and use the mounting clamp to mount the recorder. Tighten the screws on the mounting clamp with proper torque (0.7 ~ 0.9N.m), when the instrument is vertical to the panel.

WARNING

- If the torque is exceeded, the shell may be deformed or the mounting clamp may be damaged.
- Do not insert foreign matters or tools into the mounting hole.
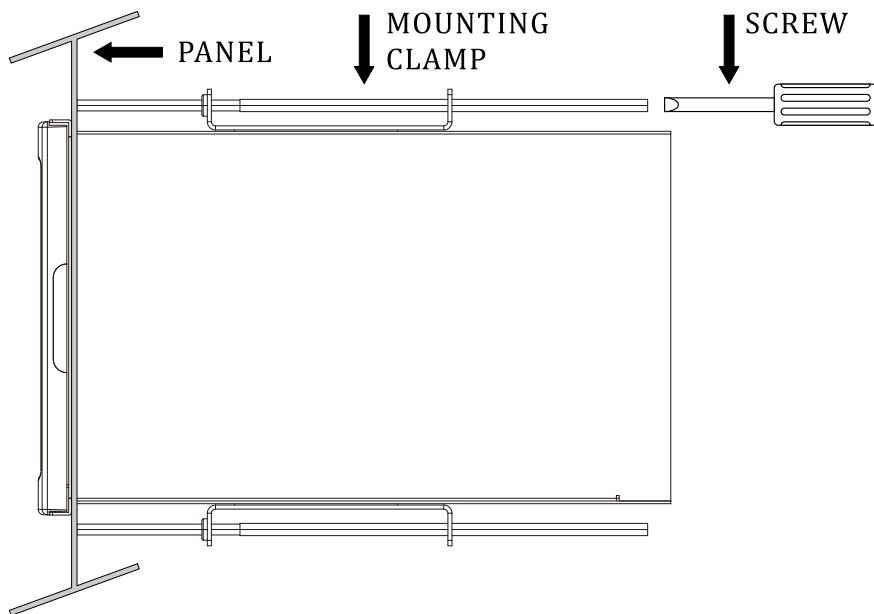
    Insert the instrument into the mounting hole from the front of the panel, the thickness of the steel plate is 2-12mm, and then install it into the mounting clamps. Use screwdriver to tighten them with appropriate torque.

Dimensions   Unit:mm
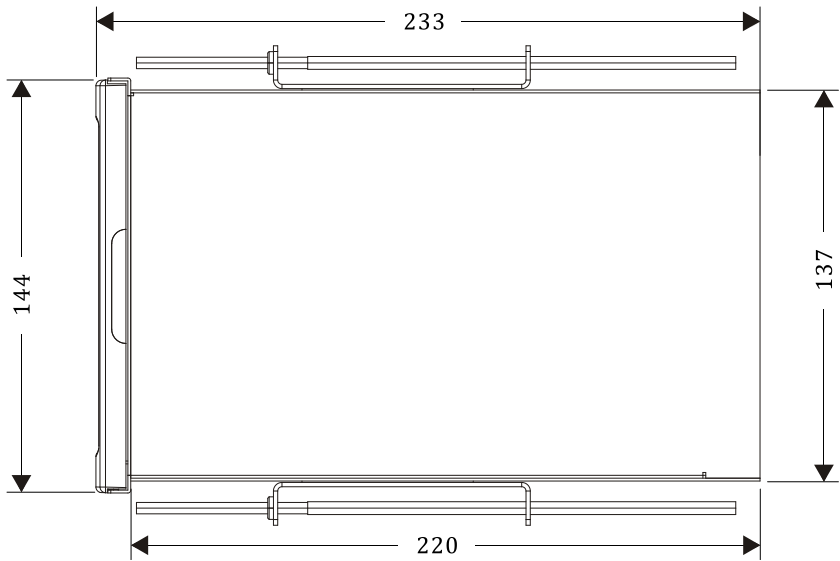
Dimension
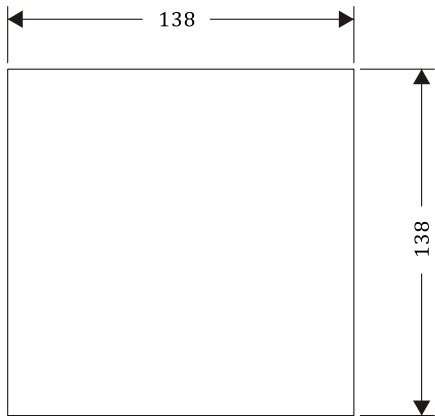
Mounting Hole

3. Electrical Connection
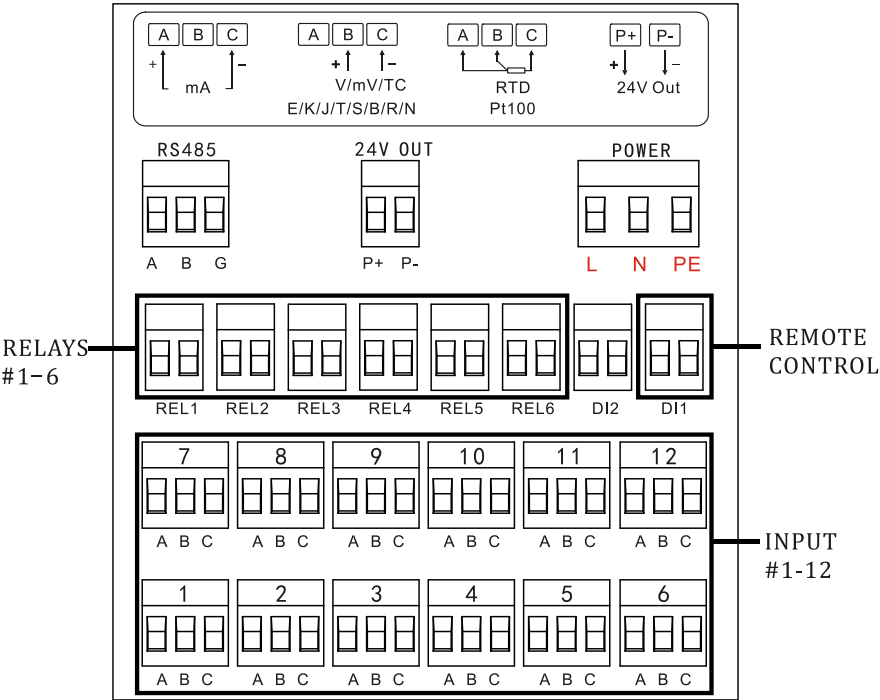
Note: the instrument provides 24VDC power output with current of 60mA. Please separate the working power supply and signal power supply, otherwise the instrument may be damaged. Please refer to the figure below for the connection method of two-wire transmitter.

Two-Wire Transmitter
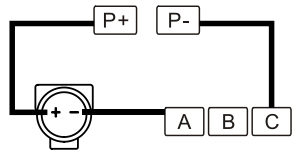
4. Paper loading

Step 1: press the paper bin trigger gently, the paper bin will automatically spring up, lift the paper bin to the position of 90 degrees, and then pull out the paper bin.
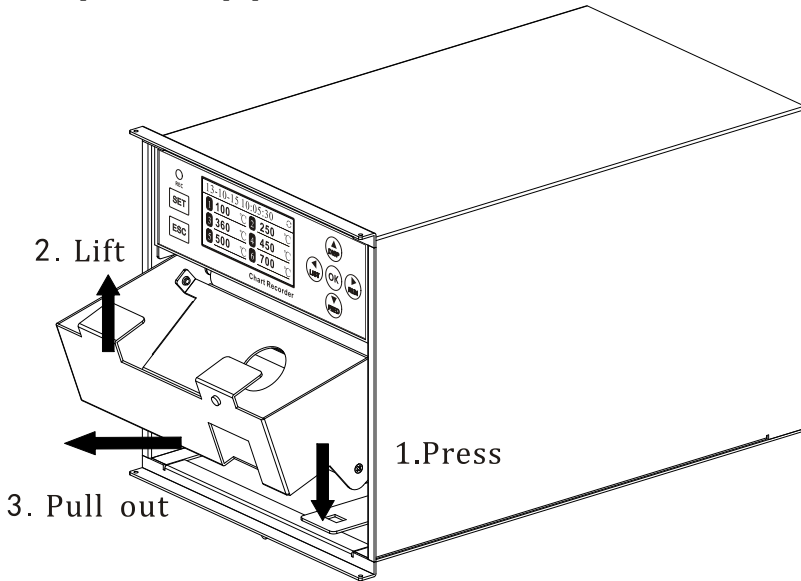
Step 2: open the cover, with the front side facing outward (use fingernail to scratch the paper surface, and the one with black mark is the front side), and load the recording paper. Then pull out 2-3 fold recording paper to pass through the paper roller, then pass through the paper guide roller, and then turn the big gear clockwise to tighten the recording paper. It is necessary to ensure that the recording paper is placed in the middle without deflection.

PRINT ROLLER

PLATEN ROLLER

GUIDE ROLLER
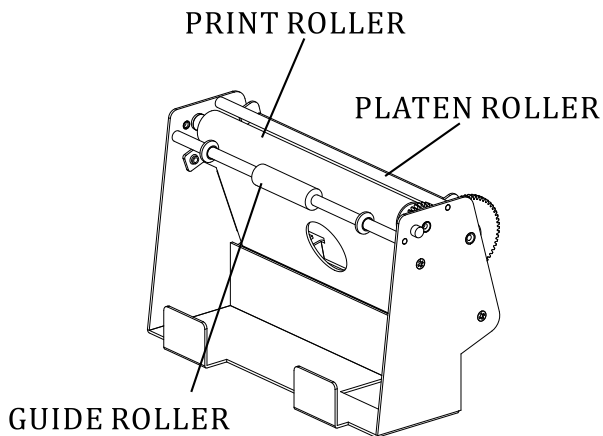
Step 3: after placing the paper bin in parallel, turn the paper bin downward and clip it into the bin buckle. The installation is completed when you hear a clear "click".

5. Keys and printing

5.1. Key functions
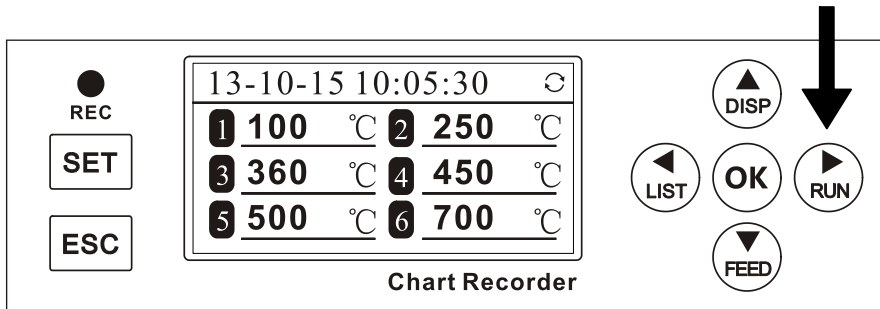
Keys	Function
RUN	Start or stop printing,light on when printing
LIST	Print configuration
DISP	Start or stop cycle display
FEED	Feed paper,120mm, automatic stop
OK	Confirm
SET	Press 3 seconds, enter configuration
ESC	Return Or Switch display

5.2. Start/Stop printing

Press [RUN] on the digital display screen to start data printing and recording, and the red light of rec is on. Press [RUN] again to stop data printing, and the red light of rec goes out.

5.3. Remote control printing

This instrument supports the external dry contact signal control the instrument to print, the signal is dry contact type. When the signal is connected, the instrument will print and record, and stop printing and recording when it is disconnected.

The connection terminal is DI1.

5.4. Printing example

The printing mode is optional: curve mode, data mode and mixed mode, which are set in the record configuration. The specific printing examples are as follows:

- **Curve mode: according to the paper feeding speed.**
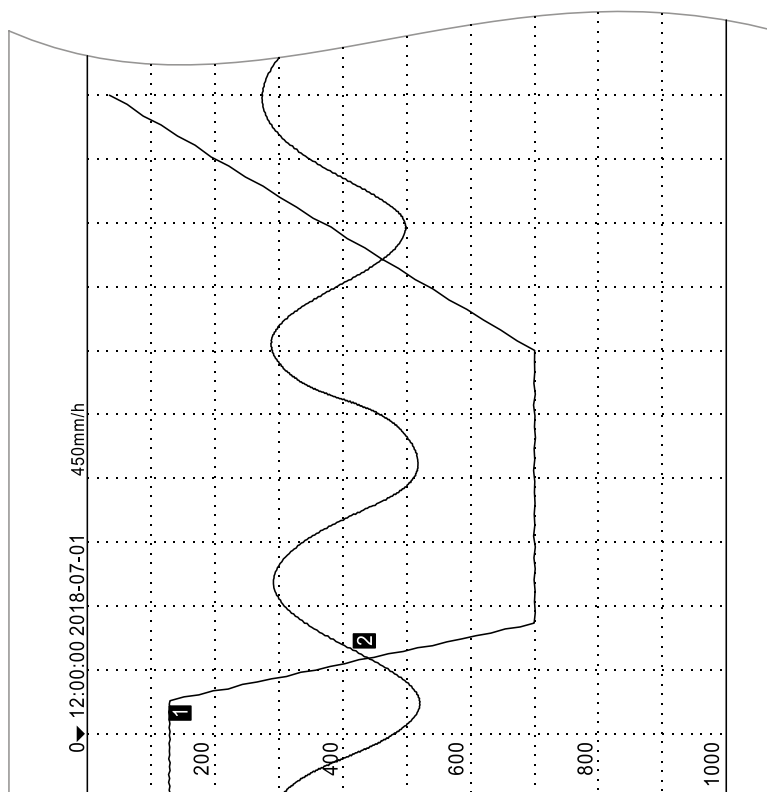
● **Data mode: according to data interval (minutes).**

18-07-01 13:15:00	1:25℃	2:165℃	3:225℃	1:525℃
18-07-01 13:10:00	1:25℃	2:170℃	3:225℃	1:525℃
18-07-01 13:05:00	1:125℃	2:160℃	3:225℃	1:525℃
18-07-01 13:00:00	1:225℃	2:180℃	3:225℃	1:525℃
18-07-01 12:55:00	1:325℃	2:170℃	3:225℃	1:525℃
18-07-01 12:50:00	1:425℃	2:160℃	3:225℃	1:525℃
18-07-01 12:45:00	1:525℃	2:165℃	3:225℃	1:525℃
18-07-01 12:40:00	1:625℃	2:175℃	3:225℃	1:525℃
18-07-01 12:35:00	1:725℃	2:180℃	3:225℃	1:525℃
18-07-01 12:30:00	1:625℃	2:175℃	3:225℃	1:525℃
18-07-01 12:25:00	1:525℃	2:160℃	3:225℃	1:525℃
18-07-01 12:20:00	1:425℃	2:175℃	3:225℃	1:525℃
18-07-01 12:15:00	1:325℃	2:180℃	3:225℃	1:525℃
18-07-01 12:10:00	1:225℃	2:175℃	3:225℃	1:525℃
18-07-01 12:05:00	1:125℃	2:170℃	3:225℃	1:525℃
18-07-01 12:00:00	1:25℃	2:160℃	3:225℃	1:525℃

● **Mixed mode: printing curve and data at the same time, print curve according to paper feeding speed, and print data according to recording interval.**

6. Data View

```
13-10-15 10:05:30    ↻
1 100    ℃ 2 250   ℃
3 360    ℃ 4 450   ℃
5 500    ℃ 6 700   ℃
```

```
13-10-15 10:05:30    ↻
○ ● ○ ● ○ ●          ℃
1        125.8
L. [■■■■■■■■■■■  ]     %
```
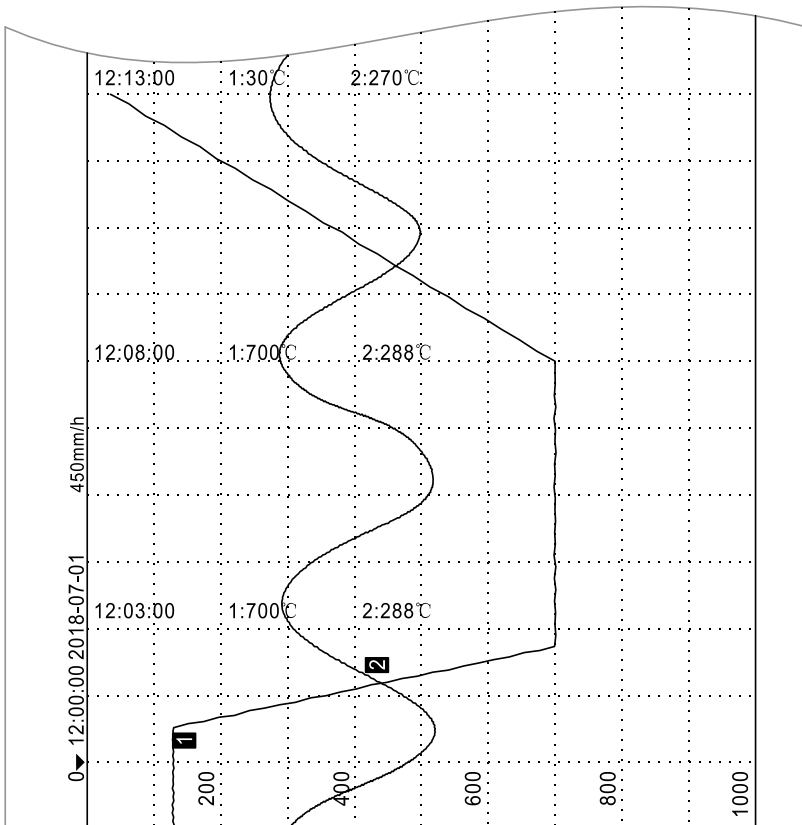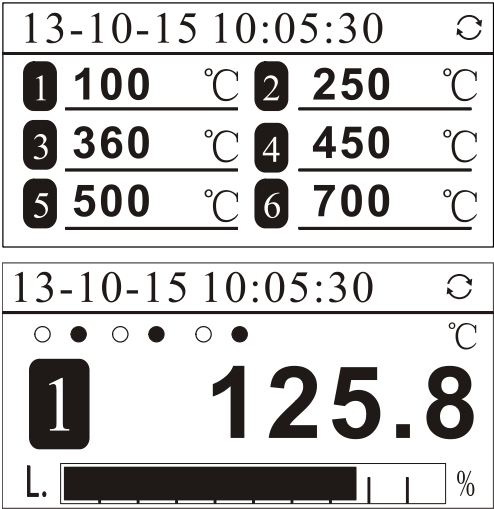
- Relay:Six circles represent relays 1-6 from left to right;● Indicates that the relay is closed,○ Indicates that the relay is opened
- Alarm:L. stands for deviation lower limit alarm; L stands for lower limit alarm; H stands for upper limit alarm; H stands for deviation upper limit alarm.
- Cycle display: Press the key [DISP], displaying current channel without Circular Display mark. Press [DISP] key again, displaying every channel with Circular Display mark.
- Press [ESC] to switch to the following screen of USB stick (it can be operated when there is a USB stick inserted)

7. Configuration

7.1. Log in

Long press the [Set] key for 3 seconds in the digital display to enter the configuration password screen, the initial password is 000000, and press the [OK] key to enter the configuration.

Configuration Category

Press the [up] and [down] keys to select the configuration category, such as system, input, alarm, etc., press the [OK] key to enter the configuration setting, and press the [return] key to return

```
┌────────┬─────────────┐ █
│ Config │ 20-06-16    │ █
│ System │ 08:38:50    │ █
│ Input  │ Cold  Auto  │ █
│ Alarm  │       25.9  │ █
└────────┴─────────────┘ █
```

Data and parameter editing

Press [up] and [down] to modify the parameter, press [up] and [down] to increase or decrease the value; press [OK] to open the value input box, press [left] and [right] to move the cursor, press [OK] to confirm the input, and press [return] to cancel the input.

```
┌──────────────────────────┐
│ Range:0.0-3000.0         │
│  ┌────────────────────┐  │
│  │      +1000.0       │  │
│  └────────────────────┘  │
└──────────────────────────┘
```

7.2. System configuration

```
Config   20-06-16
System   08:38:50
Input    Cold  Auto
Alarm          25.9
         Pass  000000
         Factory set
```

● **Date and Time**

Set meter's date and time

● **Cold-end Compensation**

Automatic: according to temperature of temperature sensor.
Manual: set the fixed temperature value of cold-end

● **Password**

The initial password is 000000

● **Factory Setting**

Restore the parameters to the factory default state. See the following table for the default values:

Config	Items	Range	Default
Syste m	Date Time	2000-1-1 ~ 2099-12-31	
	Cold-end	-99.9~99.9	Auto
	Password	0~9	000000
Input	Start Chnl	1-max channel	1
	End Chnl	1-max channel	1
	Signal	None, 4-20mA, ...	K

	Unit	°C, ...	°C
	Dot	0~3	0
	Scale	-9999~30000	/
	Filter	0.0~9.9 Seconds	0.0
	Record	ON/OFF	ON
	Boundary	-9999~30000	0-1000
	Adjust K	-9999~30000	1.000
	Adjust B	-9999~30000	0.0
Alarm	Start Chnl	1-max channel	1
	End Chnl	1-max channel	1
	Alarm	ON/OFF	OFF
	L	-9999~30000	0
	R	0~n (n is total relay number)	0
	H	-9999~30000	3000
	R	0~n (n is total relay number)	0
	DL	-9999~30000	0
	R	0~n (n is total relay number)	0
	DH	-9999~30000	3000
	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~max channel	0
	Contrast	0~3	3

7.3. Input configuration

Config	Stt Ch 1
System	End Ch 1
Input	Sig 4-20mA
Alarm	Unit ℃
	Filter 1. 0 S
	Dot 1
	Scale 0. 0
	− 100. 0
	Record Print
	Print 0. 0
	− 100. 0
	K 1. 000
	B 0. 0

● **Start / End Channel**

Set channel values in batch. To set channels 1-3 to the same parameters, the start channel is set to 1 and the end channel is set to 3.

● **Signal**

Select the channel signal type. When the signal is selected as none, the channel will not be enabled (no display and no record). The signal types supported by universal signal input instruments are as follows:

Type	Signal	Scale	Note
None	None	None	
Current	0-10mA	-9999~30000	

	4-20mA	-9999~30000	
	4-20mAsq	-9999~30000	4-20mA sqrt
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	1-5V Sqrt
	0-10V	-9999~30000	
RTD	PT100	-200~850°C	
	Cu100	-50~150°C	
	Cu50	-50~150°C	
TC	T	-270~400°C	
	E	-270~1000°C	
	K	-270~1372°C	
	S	-50~1768.1°C	
	B	0~1820°C	
	J	-210~1200°C	
	R	-50~1768.1°C	
	N	-270~1300°C	

- **Unit:**

m^3/h, km^3/h, L/h, Nm^3/h, kNm^3/h, bar, mbar, mmH_2O, mmHg, Pa, kPa, MPa, atm, kgf/cm2, 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, /s, °C, °F, kg/h, t/h

● **Filter**

$$Value = \frac{LastValue \times Filter + ThisValue}{Filter + 1}$$

● **Dot**

Channel decimal point, RTD and TC is $0\sim1$ and that of other signals is $0\sim3$

● **Scale**

Channel signals indicate scale. Configuration setting range of current and voltage is $-9999\sim30000$; not applicable for RTD and TC.

● **Record**

Three options: Print/Show/OFF. Print: Show and print data; Show: Just Show data without print; OFF: Neither show nor print.

● **Print**

The Boundary limit. 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.

● **Adjust K,B**

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

7.4. Alarm Configuration

Config	Stt Ch	1
System	End Ch	1
Input	Alarm	ON
Alarm	L	0. 0
	R	0
	H	100. 0
	R	0
	DL	0. 0
	R	0
	DH	100. 0
	R	0
	Hyster	0. 0

- **Start / End Channel**

    Set channel values in batch. To set channels 1-3 to the same parameters, the start channel is set to 1 and the end channel is set to 3.

- **Alarm**

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

- **Alarm limit and relays**

    Alarm 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.

● **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 value
Upper limit	Channel value > upper limit value	Channel value < upper limit - Backlash value
Deviation lower limit	Channel value < lower limit - deviation lower limit	Channel value > lower limit - deviation lower limit + backlash value
Deviation upper limit	Channel value > upper limit + deviation upper limit	Channel value < upper limit + deviation upper limit - backlash value

7.5. Record configuration

Config	Type	1
Record	Speed	1
Comm	Interval	1
Info	Staff	ON
	Contrast	0. 0
	Time	KEEP
	POP	ON
	DIV	10

- **Record Type**

  Three types: curve, data or mixed

- **Speed**

  Configuration setting range of paper feed speed is 10-450mm/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**

  0-n, X (n is the maximum number of channels) can be grouped. When the recording scale is 0, it is taken as the printing scale according to the percentage of 0-100%; when the recording scale is 1-N, it is taken as the printing scale according to the boundary value of a single channel; when the recording scale is x, it is taken as the printing scale according to

the boundary of each channel. The scale is printed every 500mm.

- **Contrast**

    Print contrast: 0-3. Larger the number is, deeper the printing depth is.

- **Time**

    Print working time at the begin of curve and the end of curve.
    None:Never Print; P:Positive direction; N: Negative direction.

- **POP**

    Auto start printing on power.OFF: Start print manual; ON: Auto start printing on power; KEEP: Keep the print state before power on.

- **DIV**

    The grids count of channel index printing.

7.6. Comm configuration

RS485 communication function adopts standard Modbus-RTU protocol.

Config	Addr	1
Record	Baud	9600
Comm	Parity	NONE
Info	Byte	2143

Addr: 1-247
Baudrate: 2400/4800/9600/19200/115200
Parity: None/Odd/Even
Byteswap: 1234/2143/3412/4321; 4 byte float type.

Parameter	Type	Offset	Parameter	Type	Offset
Channel 1	float	00H	Channel 5	float	08H
Channel 2	float	02H	Channel 6	float	0AH
Channel 3	float	04H	Channel 7	float	0CH
Channel 4	float	06H	Channel 8	float	0EH

Notice:The actual maximum number of registers is 16, no return if it is greater than 16.

Example:Get the data of the first channel

	Field	Hex
Query	Slave Address	01
	Function	03
	Starting Register Hi	00
	Starting Register Lo	00
	No. of Resisters Hi	00
	No. of Resisters Lo	02
	Error Check	C4 0B

|	Field	Hex
Response	Slave Address	01
	Function	03
	Byte Count	04
	Data Hi	AB
	Data Lo	44
	Data Hi	00
	Data Lo	E0
	Error Check	9B 8A

8. USB and software

8.1. USB

When you select the USB function, when the recorder prints, the data is stored in the USB flash disk, and stored according to the date and time. Each time a file is printed, you can select the data to print back. Press [return] on the display screen to switch to the USB curve screen.
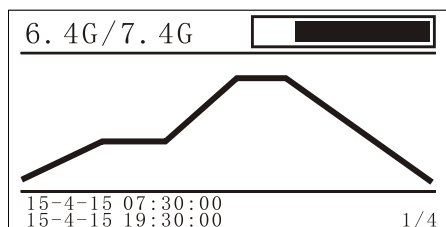
- Press [left] and [right] to switch the record file, and press [up] and [down] to switch the viewing channel.
- Press the [OK] key to print the data stored in the USB flash disk again.

USB Position

The USB interface is located at the back of the paper bin. When the paper bin is removed, you can see the USB interface.
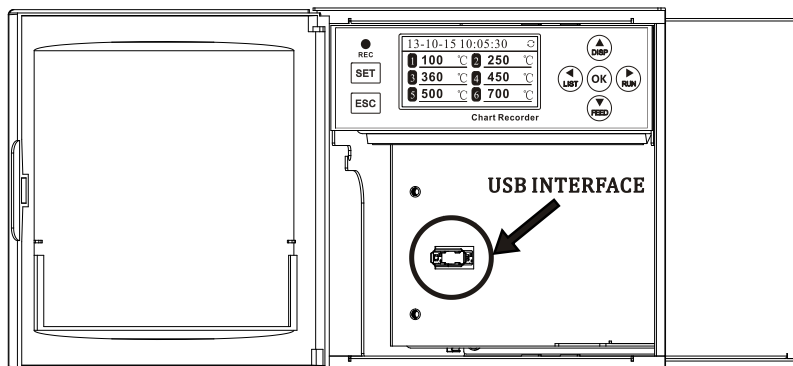
USB stick use guide

A. When the USB flash disk is inserted effectively, switch the screen and the curve screen will appear, otherwise it will not appear.

B. Press the record key, the red light is on, and the USB flash disk starts to store data at the time interval of printing. Press the record key again to stop recording, the red light is off, and the USB flash disk stops recording.

C. Only when the recording is stopped can the USB flash disk be taken out, otherwise the USB flash disk data will be lost.

D. In the curve screen, with the storage information, you can view the usage of the USB flash disk.

File format

A. The files are stored in the / hisdata folder. The subdirectory is the year month of the storage start time. (such as "2015-12")

B. The data file name exists in the format of day, hour, minute and second. DTD. (e.g. "17142325. DTD")

C. During normal operation, start recording to create a new file, and stop recording to end the file.

When it is in recording state, power off and power on again to end the current file. Enter the configuration parameter setting to end the current file. Enter the curve screen, print back the file, and end the current file.
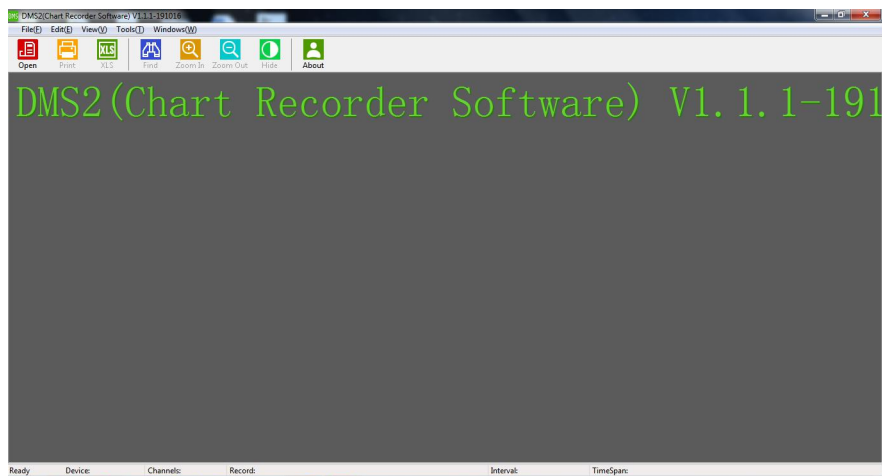
8.2. Software

Where is the software

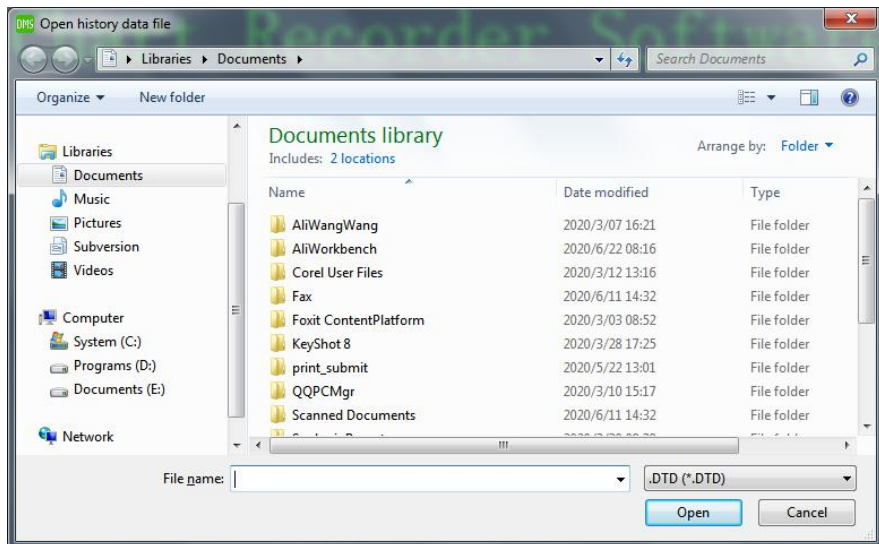The software is stored in the USB stick "/DMS" directory.

Software use guide

Double click to open the software DMS.exe .

Click the open icon to open the historical data file selection box and select the file to be opened.

9. Specification

General

Category	Data
Accuracy	±0.2%
Sample period	1 Second
Record Paper	Fold,120mm width, 8000mm long
Channels	8 channels, 12 channels
Feed Speed	10~450mm/h

Standard running condition

Category	Data
Power	100-240VAC 50Hz
Temperature	0~50°C
Humidity	0~85%RH(No condensation)
Preheating	30 minutes
Environment	Indoor

Structure

Category	Data
Installation	Panel mounting
Weight	About 3kg
Angle	Horizontal plane backward tilt < 30 degrees
Panel thickness	2-12mm
Dimensions	144(W) 144(H) 233(D) mm

Transportation and storage

Category	Data
Temperature	-10~60°C
Humidity	0~85%RH（No condensation）

Real Time Clock

Category	Data
Clock	Year 2000-2099
Battery	5 Years (25°C)

Relay

Category	Data
Capacity	220VAC 3A Normal Open

DC output

Category	Data
DC output	24VDC±10% 60mA

10. Trouble shooting

The user must carefully read this manual before installation and use, operate the instrument correctly according to the contents of this manual, and confirm whether the installation and use environment meet the requirements. The following table shows the possible faults of the paper recorder. Users can solve the problems according to the faults.

Trouble	Troubleshooting
Wrong signal data Or display ####	Wiring error: please check whether the input signal wire is connected correctly
	Configuration error: whether the signal type and range are configured correctly.
LCD no display	Check the power supply
Curve wrong	Check whether the configuration of recording boundary and paper feeding speed is correct
Alarm wrong	Check whether the alarm upper and lower limit values and relay numbers are correct

Chart Recorder User Manual

2016/12 First Version