# Paperless Recorder Manual



## Version V2.6

## Notice

- Dear Customer: Thanks for your using Kehao products. Please read the instruction carefully before using the recorder.
- Please check whether the appearance of your meter is ok when you open your meter package. Then check whether item no. is same as what you order. Please contact us to change your meter immediately if there are above problems.
- Please shall know the connections and operations of your meter first before you test and install the meter.
- Please use your recorder in its required operating conditions. Please do not open the meter arbitrarily in order to avoid danger in normal case. Please contact our technical team to open the meter under the instruction and approval of our technical team if the meter has error.
- Please do not clean LCD screen of your recorder in organic solution in order to avoid destroying the screen.
- Please test your meter one time every year. If the error of your meter is beyond of its range, which is usually because of moisture, dust and corrosive gas. You can clean and make dry the inner part of your meter. Please contact our technical team if the meter has still errors.
- This series recorder is being improved and updated gradually. Please contact our techninical teams or see the recorder as approval if there is some difference between the recorder and instruction.

## 1、General Introduction

### 1.1、Main Feature

- ✧ Adopts 128x64 dot-matrix LCD display: high -accuracy, graph screen, easy screen, rich information
- ✧ Application：Petroleum, metallury, food, mdeical, environment protection, storage, heat dealing, electrical motor etc.
- ✧ Good man-machine screen, easy to use and play, convenient operation.
- ✧ Modular construction, configuration flexibly,. Easy to be updated.
- ✧ Adopts SMT technology: its design is more concise and advanced.
- ✧ T.C./RTD adopts non-linear modification, high-accuracy, good stability.
- ✧ Standard MODBUS communication protocol: can network easily with other industrial control equipment to achieve networking application.

### 1.2、Specification

●Input specification

T.C : K、S、E、J、T、B、N

RTD : Cu50、Pt100、Cu100

Linear voltage : 0 - 5V、1 - 5V

Linear current : 0 - 10mA、4 - 20mA (connect with 500Ω or 250Ω precision resistor when order)

●Measure range

K ( -50 ~ 1300□ )、S ( -50 ~ 1700□ )、T ( -200 ~ 350□ ) 、E ( 0 ~ 800□ )、

J ( 0 ~ 1000□ )、B ( 300 ~ 1800□ )、N ( 0 ~ 1300□ )

Cu50 ( -50 ~ 150□ ) 、Pt100 ( -200 ~ 600□ )

●Linear input：-20000 - 20000(customized)

● Measure precision: 0.2 grade (when RTD, linear voltage, linear current and T.C input adopting freezing point compensate the cold-joint)
0.2%FS±2.0□ (when T.C input and compensates cold-joint by internal components of the recorder)

● Respond time: ≤1 s (when the filter parameter FiL=0)

● Output type:
Relay contract switch output: minimum capacity: 220VAC/0.8A
One channel transmission output: 4-20m A, any channel can be specified optionally.

●Alarm function: four limits alarm per channel: high limit, higher limit, low limit, lower limit. The output position can be set optionally. Maximum output channels no.: 8

● Power : 85 - 240VAC，-15%，+10% / 50 - 60Hz

● Power consumption ≤5W

●Ambient temperature : 0 - 50

●Ambient humidity : ＜85%RH

●Protection Class: IP40

## 1.3、Order Code

KH2｜A｜B｜C｜D｜E｜F｜G｜H｜

A. Channel No.
01: one channel
02: two channels
……..
15: fixteen channels
16. Sixteen channels

B.Screen Color
B-. Blue

C. Panel size
D-: 160X80MM (LX W)

D. Alarm Output No.
N: None
1. One alarm output
2. Two alarms output
……..
8．Eight alarm output

E. Alarm Output Type
N: No

R1A: relay contact output module, NO (capacity: 30VDC/0.8A, 220VAC/0.8A)

R1B: relay contact output module, NC ((capacity: 30VDC/0.8A, 220VAC/0.8A)

**F. Communication or Printing Output**

N: None

S1:RS485 communication interface

S2: RS232 communication interface

P: RS232 printing interface, supporting Weihuang A5 mini printer (if you match mini-printer by yourself, please advise the model no.)

**G. Feed Output(Auxiliary Power Supply for Sensors)**

N. None

U1: isolated 5V DC voltage output, power supply module of the external transducers & sensors and used for other circle. Max current is 100m A

U2: isolated 12V DC voltage output, power supply module of the external transducers & sensors and used for other circle. Max current is 100m A

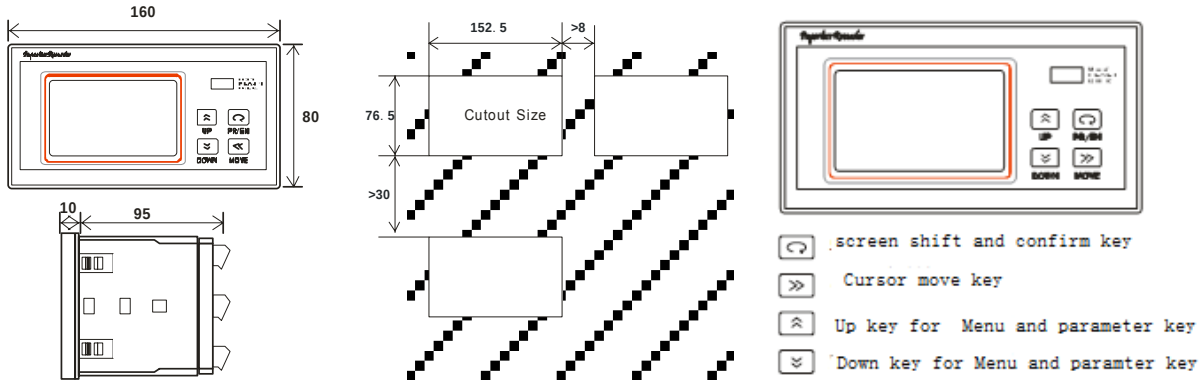
U3: isolated 24V DC voltage output, power supply module of the external transducers & sensors and used for other circle. Max current is 100m A

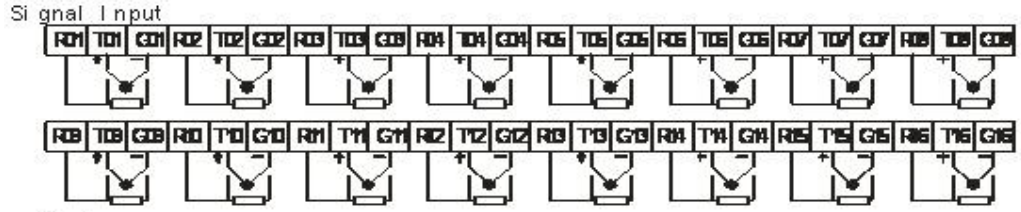
**H. USB port**

N: None

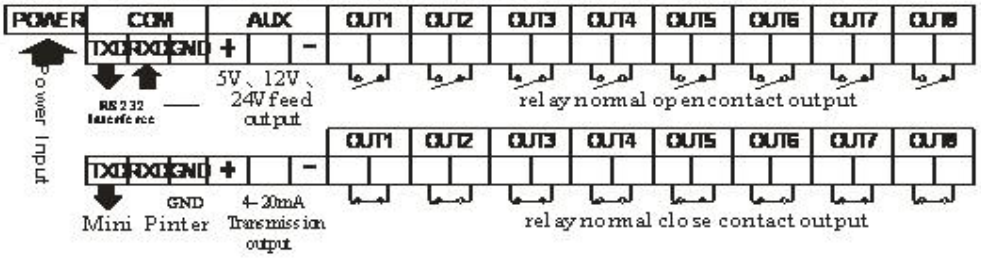
U: Yes

## 2、Connection



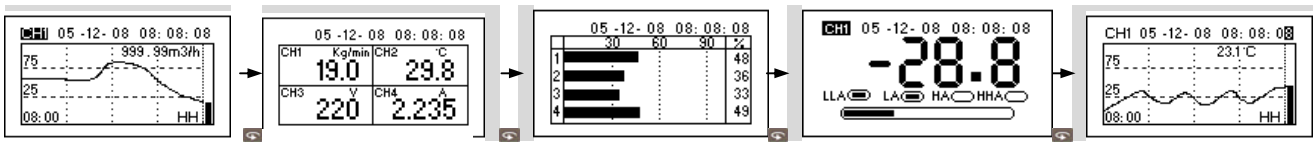

Note:
1. T.C. and 0-5V, 0-10m A, 4-20m A linear input: Txx as the positive terminal input, GXX as the negative input; Three linear RTD: Gxx as the public terminal, RXX and TXX as the other input terminals ("xx" means from "01" to "16")
2. Current input: if there is no special instruction, the sampling resistance should be connected in input terminal in daily usage. (4-20m A-250 ohm, s 0-10m A-500 ohm)s.



# 5、Operation Introduction

## 5.1 Screen Display and Operation

Real time curve screen | Multi Channel display | Bargraph Display | Single Channel display | History Curve display




It is real time curve display of current channels of 120 pcs of display interval, current measured value display, percentage bar graph. Please press ▲ or ▼ key to shift channel.

Press

Digital display of current measured value, max.4 channels in a screen Press ▲ or ▼ key to shift channel.

Bar graph display of current measured value, max.4 channels in a screen. Press ▲ or ▼ key to shift channel.

Check real time measured value in long distance. It displays current channels measured value, percentage bar graph and the alarm state as follows : “HA” : High limit alarm

“LA” : Low limit alarm

“HH” : Higher limit alarm

“LL” : Lower limit alarm

Check the history curve and data. Press » key to move the cursor on channel no., date or time. Press ▲ or ▼ key to modify value to required one. Then check the history measuring data you need.

System Alarm

Channel Exit ▽

Print Screen

Download data screen

CH:-CH01-Disp.

Hi : 2000.0

Output: 1 Disp.

Lo: 100.0

System parameter’ configuration and save. Includes the system parameter, channel parameter and alarm parameter. Press ▲ or ▼ key to move menu. Press ↩ key to enter into parameter setting and operation. After finishing parameter setting, please move the cursor to “save +exit”, press ↩ to save the modified parameter and exit. If do not save the parameter, press “exit” menu , please press ↩ key to exit without saving parameter. This operation is mainly used for checking the parameter.

Print data

Start fixed time print

Press ▲ to start

Press ▼ to stop

Press » to manual print now.

Password Screen

Download data. Please insert U disk.

Parameter Setting

Password 000000

Input correct password: 000001 to enter system configuration screen. Press » key to move cursor in password. Please press ▲ or ▼ to change password. If password is correct, it enters into “system configuration screen display”. If not, it will shift to “real time curve screen display”.

USB flash drive to transfer data. Indicate the operation process and state.

The parameter configuration screen is system parameter configuration, channel parameter configuration and alarm parameter configuration. These screens are used for setting parameter. Please see below operation for your reference.

Indicate the data state and operation. Press ▲ to start fixed time printing. Press ▼ to stop fixed printing. Press » to start manual printing, to print current all channels data and alarm state

## 5.2 Parameter Setting Operation

There are two types of parameter in recorder: character type and integral type. The setting operation is as follows:

1. Enter into the relative parameter configuration screen. Press or to move the cursor in the modified parameter (just parameter name is inverse display now).Press to enter into parameter modification state (just parameter name and value is inverse display now). 2. After modifying parameters, press to return the parameters state (just parameter name is inverse display) 4. If the parameter is integral, in parameter modified state (as above 2 point), please also press to move the cursor to the modified. 5. Please repeat the operations if you need to modify other parameters. 6. After modifying all parameters for configuration of specified parameters, please move the cursor to “EXIT” and press 7. After modifying all parameters in parameter configuration screens, please move the cursor to “save & exit”. Press to exit.

## 5.3. System Parameter

| Parameter | Value Range | Description |
|---|---|---|
| Date | Valid date value | System real date |
| Time | Valid time value | System real time |
| Password | character | System password. it is to prevent system parameter from being modified viciously. Its original password of the system is 000001. |
| Rec-Time | 1 – 30000s | Record interval time setting: The longer the record interval time, the longer the total record time is. Otherwise, shorter. When the measured object changes slowly, the parameter value can be set higher, on the contrary, can be set lower. Generally, this value should be set as the half or lower than the measured changing time. |
| Pnt-Time | 1 – 30000s | Print Interval Time Setting. The interval time of fixed-time print, unit is “s”. There is not fixed print when the interval time is set as “0”. When the print interval time is not set “0”, press the "DOWN" key to pause fixed time print; press "UP" key to restart the fixed time print. In any case, press the "MOVE" key to start immediately manual print the data. |
| Address | 0 – 255 | Communication Address. The address should be different when multi -recorder communication. |
| Baud rate | 2400、4800、9600、19200 | Communication baud rate. The baud rate must be same as PC when there is multi-meter communication. |
| Check | Null, EvEn, Odd | Parity check. Null: communication without even-odd check<br>EvEn:Communicaiton even check<br>Odd: Communication odd check |
| Tran.CH | CH1-CH16 | Channel no. with 4-20mA signal |

| | | |
|---|---|---|
| | | output-retransmission. E.g.: trCH=2, means CH2 is with 4-20mA signal output. |
| Input. E | 0-8 | Input Error Handing for alarm. When the recorder is in short-circuiting, open-circuit and over-range, it displays “OPEN”. And according to” Input.E.” parameter, please operate as follows:<br>0: when the alarm output is completely invalid, the measured value is max. (32751)<br>1: when the alarm outputs are all invalid, the measured value keep same.<br>2. When the alarm outputs are all invalid, the measured value is maximum (-20000)<br>3. when alarm output is valid, the measured value is maximum (32751)<br>4. When alarm output is valid, the measured value keeps same.<br>5.When alarm output is valid, the measuring value is minimum(-20000)<br>6.When input is default and the alarm output is invalid, the measured value is maximum (32751)<br>7. When input is default and the alarm output is invalid, the measured value keeps same.<br>8. When input is default and the alarm output is invalid, the measured value is minimum(-20000) |

## 5.4 Channel Parameter Configuration：

| Code | Parameter | Range | Description |
|---|---|---|---|
| none | CH | CH1~CH16 | the corresponding channel no. of current parameter |
| | Tag. No. | character | Tag. No. |
| | Copy From | CH1~CH16 | Move the cursor to “copy form” to set the original channel no. needing being copied. And then press key, the parameter of original channel. will be copied to current channel. That is to say that all the parameters including alarm parameter are same as the original channel parameter. After finishing setting, the channel no. will be the current channel no. automatically. |
| 1 | Input | T.C.:K,S,B,T,E,J,N,<br>RTD:Pt100,Cu50,Cu100<br>mV:0-5V,1-5V<br>mA:0-10mA,4-20mA<br>Wre325 | Input type setting |

| | | | |
|---|---|---|---|
| 3 | Decimal | 0-4 | Decimal point number, When the input signal is temperature, there is just a bit decimal point. |
| 6 | Disp. Lo | -20000 – 20000 | Low limit of span. T.C and RTD range is fixed. The parameter is used with high limit of range, for drawing real time curve. When it is linear input, the parameter is also low limit of range. When the input signal is temperature, there is just a decimal point(0.1) |
| 7 | Disp. Hi | -20000 – 20000 | High limit of span. T.C and RTD range is fixed. The parameter is used with low limit of range, for drawing real time curve. When it is linear input, the parameter is also high limit of range. When the input signal is temperature, there is just a decimal point (0.1). |
| 4 | Filter | 0 – 99 | Filter Coefficient. When the digits are changing lead by the input interference, the filter coefficient can make it normal. The FiL range can be 0-99. "0": no filter. The higher the filter is, more stable the measured value is but slower its responding rate. Generally when the measurement is quite interfered, please increase Fil value gradually so that the instantaneous change of the measured value can be less than 2-5 digits. When make measurement calibration in lab, please set Fil as " 0 " to increase the respond rate. |
| | Unit | ℉ etc | Engineer Unit. When unit is "F" and input is temperature sensor, the unit of the measured value will be ℉ instead of ℃ |
| 2 | CJC | null , diod | Cold-junction compensation. "null": none compensation, "diod": compensation by internal temperature component of the recorder. |
| 5 | Adjust | -10000 - 10000 | Offset. It is used to modify the static error of measured value. Generally it is set as "0". It will be set just when there is the static error and some special requirement. When the input signal is temperature, there is just a bit decimal point. |
| 17 | Low Cut | -20000-20000 | Little signal removal. when the measured value is lower than the signal removal value (except"0"), the measured value will be instead by "Cut to" (removal replacement) |
| 18 | Cut to | -20000-20000 | |

| | | | |
|---|---|---|---|
| 19 | Multiple | -2.0000-2.0000 | Override coefficient. Used for modifying the slope rate of the measured value. The measured value of the recorder equals with the value of the un-modified value plus " multiple"( override coefficient) |

## 6.3 Alarm parameter：

| code | parameter | range | description |
|---|---|---|---|
| | CH | CH1~CH16 | Channel no. |
| 8 | Low | -20000 – 20000 | Low limit alarm value. Low limit alarm works when the measured value of current channel is lower than this value. |
| 13 | Output | None<br>Out1~ Out 8 | Low limit alarm output point. Means low limit alarm output position<br>None: no output |
| 9 | High | -20000 ~ 20000 | High limit alarm value. High limit alarm works when the measured value of current channel is higher than this value. |
| 14 | Output | None<br>Out1~ Out 8 | High limit alarm output point. Means high limit alarm output position<br>None: no output |
| 10 | L. Low | -20000 ~ 20000 | Lower limit alarm output point. Lower limit alarm value. Lower limit alarm works when the measured value of current channel is lower than this value. |
| 15 | Output | None<br>Out 1~ Out 8 | Means the lower limit alarm output position<br>None: no output |
| 11 | H. High | -20000 ~ 20000 | Higher limit alarm value. Higher limit alarm works when the measured value of current channel is higher than this value |
| 16 | Output point | None<br>Output 1~ output 8 | Lower limit alarm output point. Means the lower limit alarm output position<br>None: no output |
| 12 | Diff. | 0 – 2000 | Hysteresis. The buffer of alarm output. It is used to avoid the alarm generated frequently or relieved caused by measured input value changing. When the input signal is temperature, there is just a decimal point (0.1). |

# 6、Function Introduction

## 6.1 Printing Function

1.The connection of the recorder and mini-printer adopts RS232 interface. Thus, the print and communication function cannot be used in a recorder at the same time.
2. Please keep the baud rate of the recorder same with one of the mini-printer.(normally as 9600b/s).
3. If start fixed time print function, the parameter “print interval” should not be set as “0”.

## 6.2 Communication Function

The recorder adopts the standard “MODBUS” protocol. “03H”: the function code for reading the measured value. If the recorder want to read the sixteen channels data of address “1”, the PC will make a command “0103 00 00 00 00 10 44 06”(hexadecimal) to the recorder.

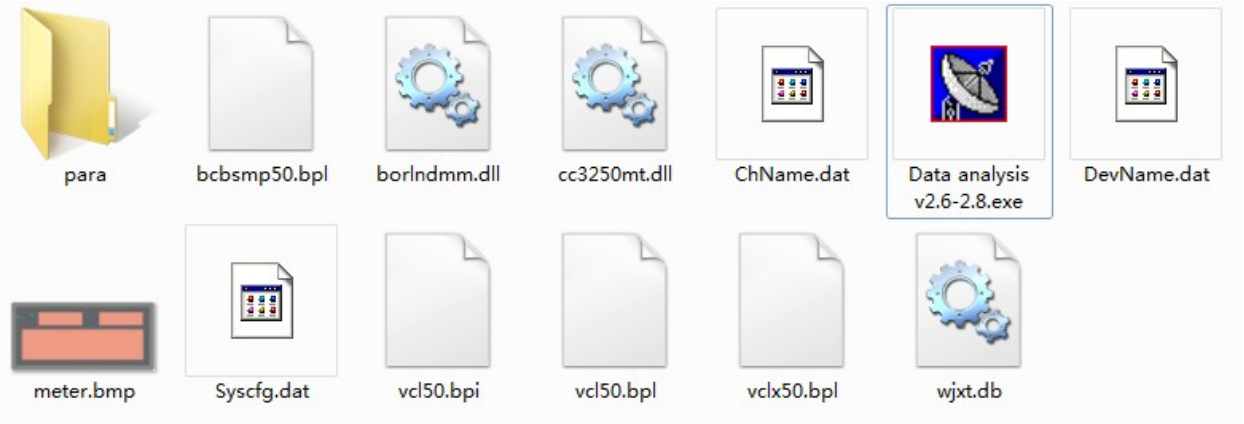
# 7、Data Analysis Software

## 7.1、Data Output

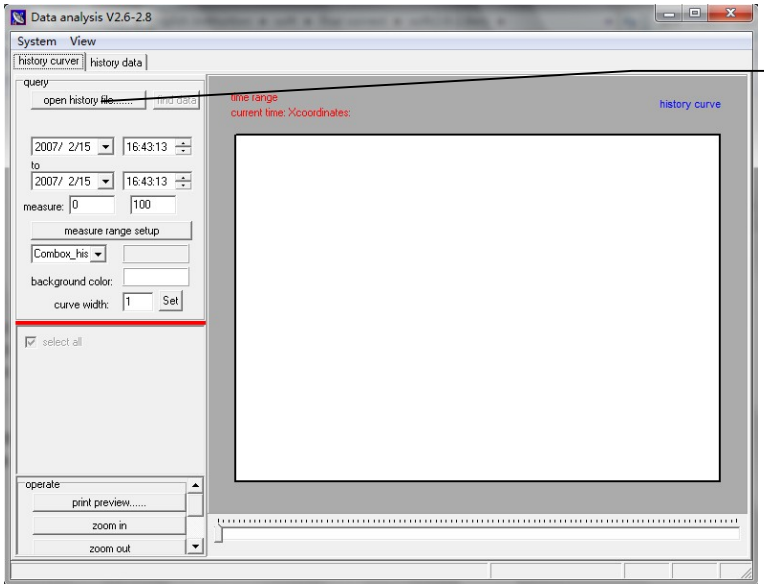
1. Please be advised that USB flash drive file format is ‘FAT16’ when exwork. If not, please format it to ‘FAT16’.
2. Please make USB flash drive with enough spare space, which should be more than storage capacity of the recorder (4MB).
3. Please insert USB flash drive into USB interface at the front panel of recorder. The recorder will start to save name the data as DAT. file automatically to USB flash drive, which DAT file is named by current year, date and time, such as 10082701.DAT. When saving data, it will display “Save data…” in the top of the screen and USB with red light flashing.
4. Please see the saving process in USB screen, displaying process “Downloading _%” and USB drive with red light flashing.
4. If there is something wrong during saving data, please pull out USB flash drive out and confirm above point 1 and point 2 again. If screen display error, please press “ENT” key to shift the screen.
5. When the screen displays: “Finished. Please pull out the USB flash drive” and the red light of USB drive is not flashing, please pull out USB drive. Finish data save in USB drive.

## 7.2、Data Analysis Software

1. Please insert the USB flash drive into computer USB port after finishing data output. If you want to save the data please copy the data to the hard disk of the computer.
2. Please save the data analysis software from USB flash drive and CD to PC. The data analysis software as follows:

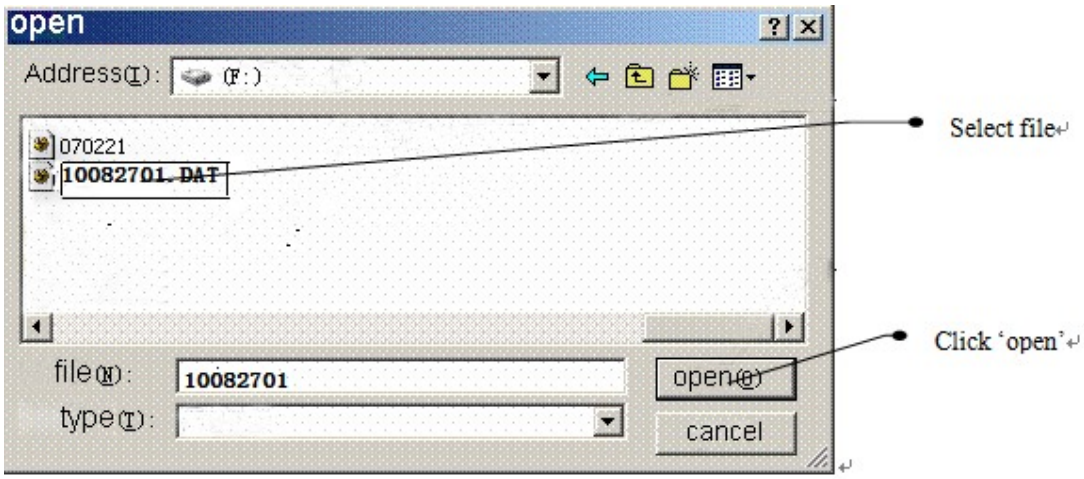


3. After opening Data analysis v2.6-v2.8.exe in data analysis software. Please click “open history file”




Click “open history file”

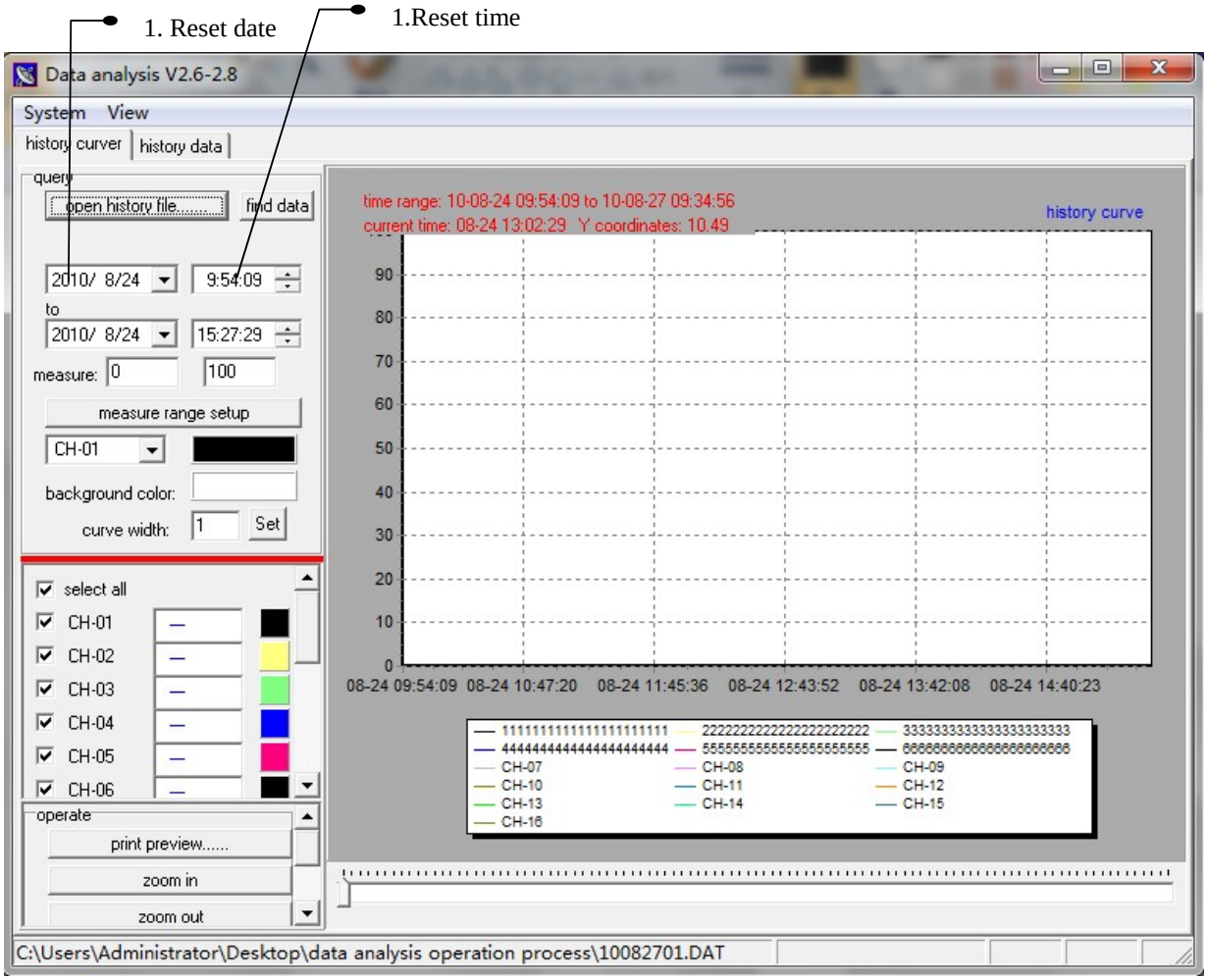
3.Select the data file as .DAT file format：



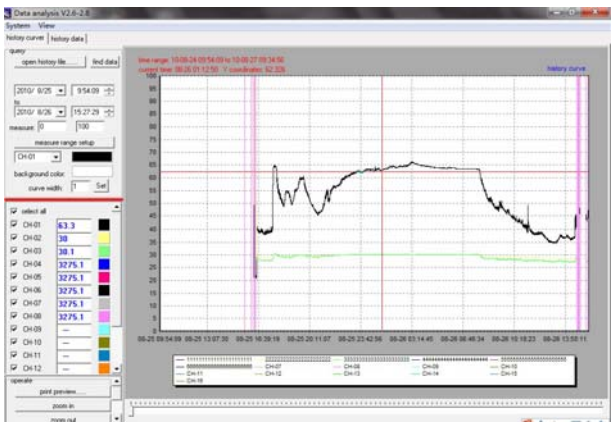

Select file

Click ‘open’

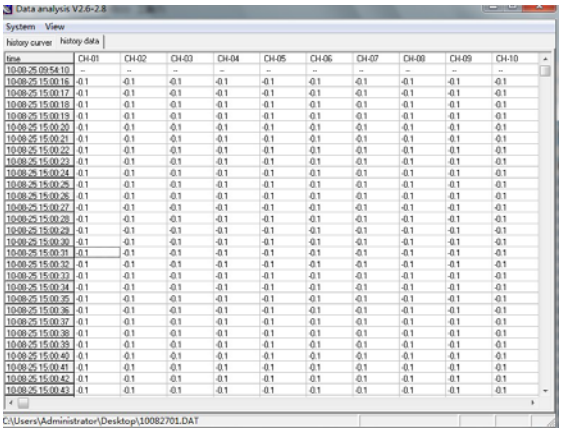
4. After clicking “open”, Please reset the data and time as record data time. Then click “find data” to get the data in curve and digital display.



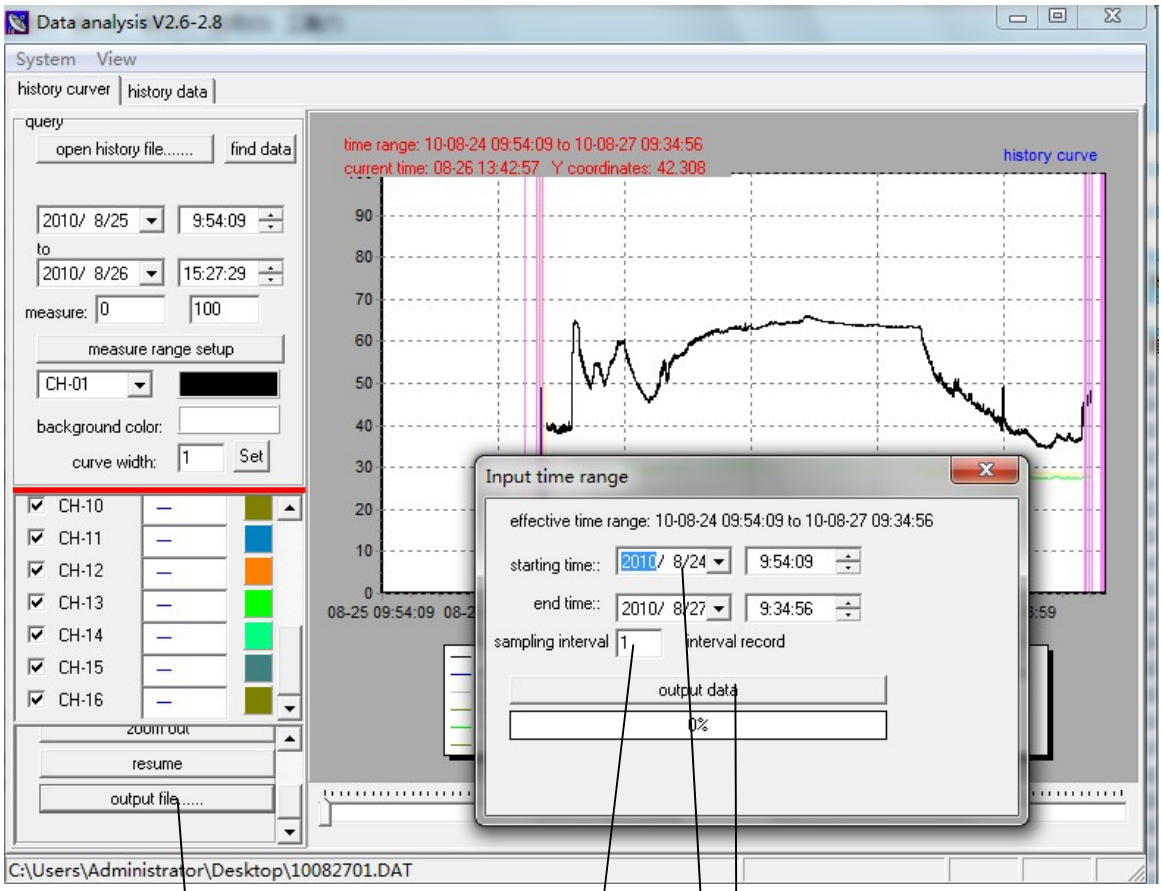

. Curve Display and digital value display per with the cursor moving



Please click “history data” to see total digital display in the time range of all channels.



3. Data output to excel format: Please click “output file” then set the starting and ending time, sampling interval in below dialogue. Then please click “output data” to save and name the excel file in PC.




1. Output data as Excel file

3. Set the interval time of data output: get a data every some records

4. Click “output data”, save and name the file in save dialogue to get excel format data

2. Set starting and end time of the data

# 8、Communication

## 8.1、Communication

KH200 series meters have serial communication function. It can communicate with computer by RS232 or RS485 interface (should connecting RS485/RS232 converter with PC) and receive read and write operation on recorder to achieve DCS control. Standard MODBUS communication protocol is available, strong universality, good compatibility and high communication stability etc. Up to 255 meters can be connected on a communication bus (the repeater is required).

## 8.2 DCS Software

Please check that the connection is ok between recorder and PC before using DCS Software. On RS485 communication, the operation as follows:

**1. Connection**

Recorder communication port( RXD A, TXD B) -----RS485-RS232 converter(A,B),two wires.------PC( desktop computer). If it is laptop computer, extra RS232 to USB converter will be needed to connect PC.

Note: Usually connection is that recorder A to converter A, recorder B to converter B. If connection is not successfully, please try: recorder A to converter B, recorder B to converter A.

RS485-RS232 converter

2. Communication Parameter Setting

Recorder ---DCS software as follows:

1) Recorder" address" parameter same with DCS software " address"

Eg. if recorder" address" is 1, the DCS software " address" should be " 1". If address" 2" in recorder, " address" for each channel (ch1, ch2, ....ch8) in DCS software should be all changed as " 2". and click:" change" and " save".

2) Baudrate between recorder and DCS software should be same, operation is same as aboved operation.

DCS software -----your Computer

Serial no. should be same. If not same, please change serial no in DCS software. And click" change" and " save".

PS: if password is needed for communication parameter setting in DCS software, password is 000000 after click:" sign in system configuration" at the left top of the software if needing.

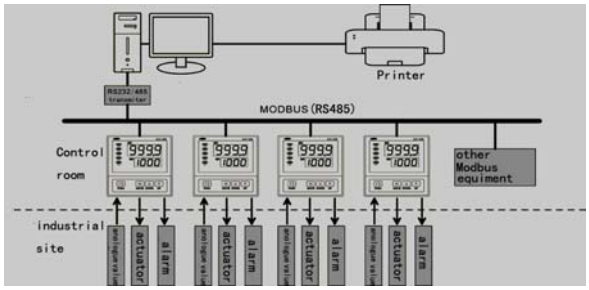
Sincerly

## 8.2、Agreement

### 8.2.1、Agreement standard：

**MODBUS-RTU protocol**

### 8.2.2、Communication mode：Asynchronous communication




**Caution on Safety**

**Read instruction manual before using the product**

**Information in the catalog is subject to change without notice.**