Process Center AB

Manual Panelinstrument LCD80

www.processcenter.se

Process Center AB
Skogsbrynsvägen 8 C
236 31 Höllviken
040 452900 info@processcenter.se

LCD-NLR series LCD DISPLAY RECORDER

1 Summary:

LCD-NLR ***paperless recorder*** is a kind of intelligent multi-functional secondary instruments, which is suitable to monitor, control, record and remote transmit various process parameters.

LCD-NLR ***paperless recorder*** adopts modern computer's structure in its design: The hardware uses the new microprocessor with flash-memory, expands its capacity of data storage. The display uses large screen LCD Chart panel. The software introduces Chinese WINDOWS frame and adopt data-pressing technique. The sub-computer's structure highly embodies the superiority of microprocessor instrument and successfully solve the difficulties of store vast measured data as long as 365 days into the box of 80×160×140 mm.

LCD-NLR ***paperless recorder*** reform traditional secondary instruments in operating and displaying. The Chinese menu leads configuration operating. The collective data charts display measuring results. The definite Chinese information indicates the engineering meaning of charts' contents and directly makes users feel the "intelligent".

LCD-NLR ***paperless recorder*** can connect 3 channels of measured signals to complete the whole process of signal collecting,control, record and transmit according to user's setting.

LCD-NLR ***paperless recorder's*** printer ports can connect directly with a printer of RS232 serial port to complete time-set printing, immediate printing or alarm printing.

LCD-NLR ***paperless recorder's*** serial communicating ports can transfer data with upper computer to collectively manage recorded data.

2 Main features:

1. Multi-functional display:

The size of LCD-NLR instrument is **80×160×140 mm**, with **40×70 mm** back-light LCD display panel. It can collectively display Chinese menu, measured data, curve charts, meaning of data, engineering units, percentage bar chart, alarm state, and so on.

2. Convenient operating interfaces:

High Chinese menu, which leads user to complete parameter setting grade by grade.

Definite information, which indicates the engineering meaning of display data.

Plentiful charts, which provide the parameter groups to be displayed.

Touch-key panel, which is easy for various operating.

3. Vast capacity of storage space: the built-in vast capacity of storage can meet the need of recording data as long as 365 days.

4. High communicating rate:

There are standard bi-directional serial communicating ports, which can exchange information with upper computer or other relative devices in high rate of 28.8 kpbs.

5. Flexible attached functions:

By means of attached module and setting the relative parameters, the instrument can provide analog transmit output, printer interface, DC feed power output, standard bi-directional serial communicating ports, and so on.

6. Standard size:

The size of LCD instrument is **80×160×140 mm**（horizontal ）or **160×80×140**（vertical）, which can be convenient to replace simple instrument of the same type in order to meet the needs of system upgrading.

3 Specifications:

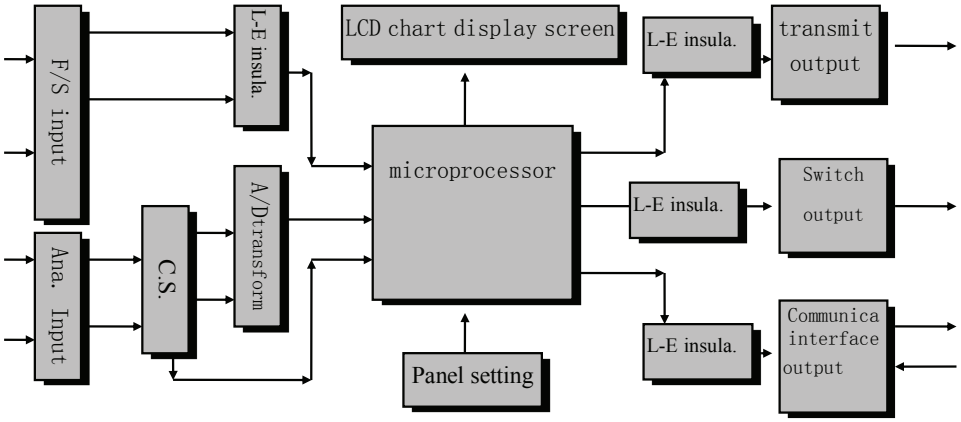
input signal	Analog input:	Standard thermocouple and thermistor	
		voltage	**0 —— 5V** **1 —— 5V**
		current	**0-----10mA**
			4 —— 20mA
	pulse input:	rectangular wave, sine wave or triangle wave, node signal	
		frequency **0 – 5KHz**	
	switch input:	lever signal, TTL signal, node signal (start, stop, clear)	
output signal	analog output:	current	**0 —— 10mA**（load≤**750Ω**） **4 —— 20mA**（load≤**500Ω**）
		voltage	**0 —— 5V**（load≥**250KΩ**） **1 —— 5V**（load≥**250KΩ**）
	switch output:	relay contact:	**AC 220V/3A , DC 24V/5A**（resistant load）
			SCR output —— **400V/0.5A**, **SSR** output —— **6 – 24V/0.05A**
		Feed output :	**DC 24V / 30mA**
Precision		**0.5 %FS±1** d **0.2%FS±1** d	
Sampling period		**1**s	
Recording interval		**nine classes (1，2，4，6，15，30，60，120，240**s **)between 1**s and **4**min are selectable.	
Storage length		**1.5** day（at intervals of 1s）——**360**day（at intervals of 4mins）	
Power-off record		can record power-off times≤ **79** times; can record accumulated value of power-off time≤**999999**s	

Process Center AB
Skogsbrynsvägen 8 C
236 31 Höllviken
040 452900 info@processcenter.se

LCD-NLR series LCD DISPLAY RECORDER

Measure range	**-9999-------999999**d
Display mode	larger screen **LCD** display with backlight. Display consist of Chinese, English, numbers, curves and light columns. By faceplate keys the following operations can be completed: turning pages, searching historical data, adjusting backlight time of **LCD** display, changing time scale of curves, and so on.
Controlling mode	**can select ON/OFF controlling** with hysterisis error
communicating output	**RS232/485** ， baud rate **1200pbs —— 28.8kpbs** (can be set)
Parameter setting	Suggested by Chinese menu, the setting can be completed by faceplate keys or the communicating ports of upper computer. The set parameters can be locked by password.
Protecting method	keep the set parameters permanently; keep the recorded data if power is broken; built in **WATCHING DOG** channel and power-off state record function
Operating environment	environment temperature: **0 — 50 ℃** relative humidity: **≤85%RH** Get rid of strong corrosive gas
	Power voltage **AC 220V+10-15%** **50 — 60Hz** **AC 90V — 260V** （switch power） **DC 24V±2V** （switch power）
Power consumption	**≤ 5W**
Installation	standard plug-in mode

4 Instrument working principle



Note: L-E insula.——light-electric insulate; C.S.------channel switch;
F/S input-----frequency/switch input; Ana. Input----analogy input

The above is the block diagram of instrument working principle . Based on microprocessor, the instrument coverts analog signals into digital signals by A/D coverter (frequency signals are directly counted by the microprocessor). The microprocessor, according to acquired data and settings, calculates, compares, then displays results and output control signals.

5 Instrument parameter setting

Front panel allocation（for example of horizontal mode instrument）

NAME		CONTENT
Operating key	SET confirm key	When choosing menu, be used in confirming select-item of the menu. When amending parameters, be used in confirming the set parameter valves When displaying, be combined with ⊙ key to return to configuration menu When displaying historical data, be used in confirming the next retrospect time modified. Combine with ◄ key to clear accumulated value and accumulated power-off time.
	▼ cursor down key	When choosing menu, be used in moving cursor down. When setting parameter, be used in decreasing value where the cursor stops. When displaying measured value, be used in displaying turn-page of the same channel. When modifying retrospect time, be used in decreasing time valve where the cursor stops.
	▲ cursor up key	When choosing menu, be used in moving cursor up. When setting parameter, be used in increasing value where the cursor stops. When needing print, be used in giving manual print command. When modifying retrospect time, be used in increasing time valve where the cursor stops.
	◄ cursor left key	When choosing menu, be used in moving cursor left. When setting parameter, be used in moving cursor left. When modifying retrospect time, be used in moving cursor left. When displaying historical data, be used in searching backward retrospect time from the present time. In searching frontward retrospect time, be used in stopping searching.
	► cursor right key	When choosing menu, be used in moving cursor right. When setting parameter, be used in moving cursor right. When modifying retrospect time, be used in moving cursor right. When displaying historical data, be used in searching frontward retrospect time from the present time. In searching backward retrospect time, being used in stopping searching.
Operating key	⊙ decimal point / return key	When setting parameter, be used in displacing the place of decimal point. After setting, be used in going into the measure display When displaying measured value, be c(SET)ed with key to return to the configuration menu
	F1	When display measured value, be used in manual turnover-screen display of different channels.

LCD-NLR series LCD DISPLAY RECORDER

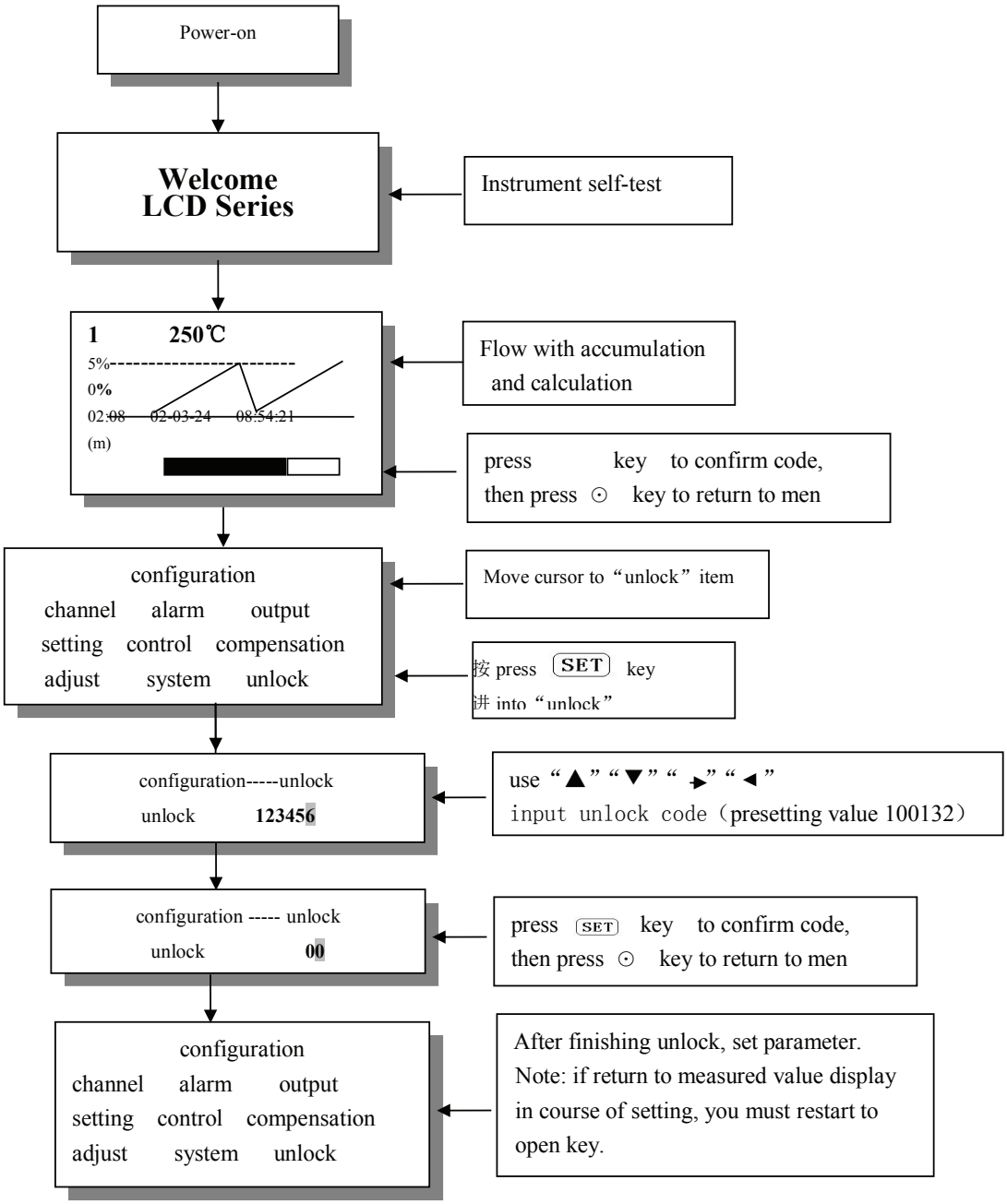
Operating key	F2	When display measured value, be used in switching over manual or automatic state display 。

controlling method

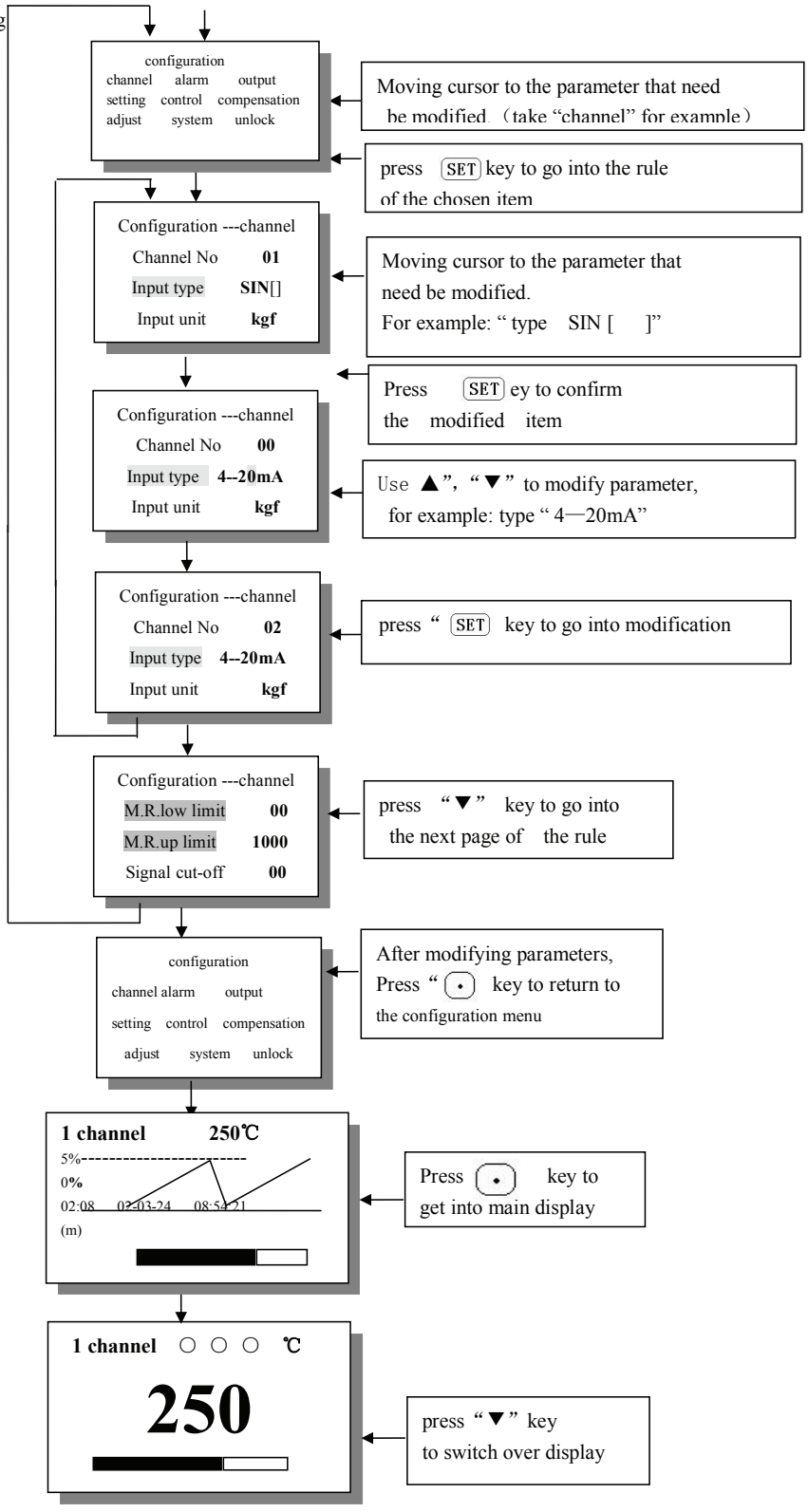
1) correct wiring After inserting the controller, connect the wires of input, output and power according to the wiring diagram.

2) Powering： There is no power switch on the controller. It works as soon as it is connected to power source.

3) instrument unlock



4) Parameters setting
（unlock）



Process Center AB
Skogsbrynsvägen 8 C
236 31 Höllviken
040 452900 info@processcenter.se

LCD-NLR series LCD DISPLAY RECORDER

1）instrument parameter:

name	Setting range	explanation	Preset value
Input channel	01	Setting channel code of the first input channel	01
Input type	Refer to “Input Type Table”	Input signal type	4——20mA
Input unit	Refer to “Eng. Unit Table”	Display Eng. Unit of value	℃
Lower-limit of measure range	-9999——999999d	Lower-limit of measure range	0
Upper-limit of measure range	-9999——999999d	Upper-limit of measure range	1000
Signal cutting	0——100%	Percentage of small signal cutting	0
Lower-limit of histogram	-9999——999999d	Lower-limit of light-beam display	0
Upper-limit of histogram	-9999——999999d	Upper-limit of light-beam display	1000
Input channel	02	Setting channel code of the second input channel	02
Input type	Refer to “Input Type Table”	Input signal type	4——20mA
Input unit	Refer to “Eng. Unit Table”	Display Eng. Unit of value	℃
Lower-limit of measure range	-9999——999999d	Lower-limit of measure range	0
Upper-limit of measure range	-9999——999999d	Upper-limit of measure range	1000
Signal cutting	Full-scale range	Percentage of small signal cutting	0
Lower-limit of histogram	-9999——999999d	Lower-limit of light-beam display	0
Upper-limit of histogram	-9999——999999d	Upper-limit of light-beam display	1000
Input channel	03	Setting channel code of the third input channel	03
Input type	Refer to “Input Type Table”	Input signal type	4——20mA
Input unit	Refer to “Eng. Unit Table”	Display Eng. Unit of value	℃
Lower-limit of measure range	-9999——999999d	Lower-limit of measure range	0
Upper-limit of measure range	-9999——999999d	Upper-limit of measure range	1000
Signal cutting	Full-scale range	Percentage of small signal cutting	0
Lower-limit of histogram	-9999——999999d	Lower-limit of light-beam display	0
Upper-limit of histogram	-9999——999999d	Upper-limit of light-beam display	1000

NOTE：The instrument can switch input channel 1with channel 2. Channel 3 only input current or voltage.

2) Alarm parameter

Name	Setting range	Explanation	Preset value
Alarm channel	01	Setting the first alarm channel (can not be modified)	01
Input channel	1—— 9	input channel corresponding to the alarm (≤9channels)	01
Alarm type	NO： no alarm AL： Lower-limit alarm of channel AH： upper-limit alarm of channel J-AUTO: Auto start， Auto reset，pulse widt “1” OUT J-H(A): Auto start，Manual reset， “1” OUT J-L(A): Auto start，Manual reset， “0” OUT J-H(H): Manual start， Manual reset，“1” OUT J-L(H): Manual start， Manual reset，“0” OUT	Alarm type When set to “J-AUTO/J-H(A)/ J-L(A)/ J-H(H)/ J-L(H)” also need “Input channel” set(7 or 8 or 9)	AL
Alarm value	-9999 —— 999999d	Setting value of alarm	50
Alarm hysterisis error	0 —— 999999d	Hysterisis error of alarm	0
Alarm channel	02	Setting the second alarm channel (can not be modified)	02
Input channel	1—— 3	input channel corresponding to the alarm (≤3 channels)	01
Alarm type	NO： no alarm AL： Lower-limit alarm of channel AH： upper-limit alarm of channel	Alarm type	AH
Alarm value	-9999 —— 999999d	Setting value of alarm	100
Alarm hysterisis error	0 —— 999999d	Hysterisis error of alarm	0
Alarm channel	03	Setting the third alarm channel (can not be modified)	03
Input channel	1—— 3	input channel corresponding to the alarm (≤3 channels)	01
Alarm type	NO： no alarm AL： Lower-limit alarm of channel AH： upper-limit alarm of channel	Alarm type	AH
Alarm value	-9999 —— 999999d	Setting value of alarm	150
Alarm hysterisis error	0 —— 999999d	Hysterisis error of alarm	0

★only three alarm contacts, can be defined arbiterily

3) output parameter

Name	Setting range	Explanation	Preset value
Output channel	01	Setting the first output channel (can not be modified)	01
Input channel	1 —— 3	Input signal corresponding to output (≤3 channels)	01
Output type	current：0 – 10 mA， 4 – 20 mA voltage ： 0 – 5 V， 1 – 5 V	Signal types of transmit output （please indicatespecial need）	4——20mA
Lower-limit of output	-9999 —— 999999d	Display value corresponding to Lower-limit of output value	0
Upper-limit of output	-9999 —— 999999d	Display value corresponding to upper-limit of output value	1000
Output channel	02	Setting the second output channel (can not be modified)	02
Input channel	1 —— 3	Input signal corresponding to output (≤3 channels)	01
Output type	current：0 – 10 mA， 4 – 20 mA voltage ： 0 – 5 V ， 1 – 5 V	Signal types of transmit output （please indicatespecial need）	4——20mA
Lower-limit of output	-9999 —— 999999d	Display value corresponding to Lower-limit of output value	0
Upper-limit of output	-9999 —— 999999d	Display value corresponding to upper-limit of output value	1000

Note: “setting、controlling、compensation” parameter (in vain)

4 Setting parameter(no opening)
5 Controlling parameter(no opening)

6) Compensation parameter

Name	Setting range	Explanation	Preset value
Calculation formula	Refer to Calculation formula notes A--B	A----------B 1:super heated steam 2:saturation steam(temp) 3:saturation steam(pres) 4:mediums(temp, pres) 5:mediums(temp) 6:mediums(pres) 7:meiums(no) 0: linear 1: unevoluted input 2:evoluted input 3:frequency	G
Air pressure	0 —— 999999	Setting air pressure of this area	0.10133
Thermal-water pressure	0 —— 999999	When measuring thermal-water, inputting working pressure value of thermal-water. kg/m2	1
Signal cutting	0 —— 999999	Setting small signal cutting value of input channel	0
ParameterK0	0 —— 999999	ParameterK0	1
ParameterK1	0 —— 999999	ParameterK0	1
ParameterK2	0 —— 999999	ParameterK0	1
ParameterK3	0 —— 999999	ParameterK0	1
ParameterK4	0 —— 999999	ParameterK0	1
ParameterK5	0 —— 999999	ParameterK0	1
ParameterK6	0 —— 999999	ParameterK0	1
ParameterK7	0 —— 999999	ParameterK0	1
ParameterK8	0 —— 999999	ParameterK0	1
Instantaneousaneous-heat KK	0 —— 999999	Quantity of heat parameter KK	1
ParameterA1	0 —— 999999	Density parameter	1
ParameterA2	0 —— 999999	Density parameter	1
Density of working state	0 —— 999999	Medium density under working state	1
Density of standard state	0 —— 999999	Medium density under standard state	1
Auto-deduction	ON：Auto-deducing K value OFF：closing auto-deducti on function	Choosing whether auto-deducing flow compensation parameter by instrument or not （ when choosing **OFF**, the following table will not display.）	**OFF**
Instantaneousaneous flow	-999999—— 999999	Filled with instantaneous flow parameter for auto-deducing of **K** value	By order
Working flow	-999999—— 999999	Filled with channel flow parameter for auto-deducing of **K** value	By order
Working	-999999——	Filled with channel temperature parameter for	By order

temperature	999999	auto-deducing of **K** value	
Working pressure	-999999——999999	Filled channel pressure parameter for auto-deducing of **K** value	By order
Deducting result		flow compensation parameter **K** auto-deduced from the parameters above	
K Parameter	**OFF** **ALL** **K0** 。 。 **K8**	**OFF**：Deduced **K** value is not written into internal unit **ALL**：Deduced **K** value is written into internal unit（**K0**，。。。**K8** internal unit **K0**：Deduced **K** value is written into **K0** internal unit **K8**：Deduced **K** value is written into **K3** internal unit	**ALL**

7) Checking Parameter

Name	Setting range	Explanation	Preset value
Input channel	01	Input channel 1 checked (can not be modified)	01
Zero point	-99999——999999d	Zero point of the channel	Adjusted value
Rate	0——999999d	Gain of the channel	Adjusted value
Input channel	02	Input channel 2 checked (can not be modified)	02
Zero point	-99999——999999d	Zero point of the channel	Adjusted value
Rate	0——999999d	Gain of the channel	Adjusted value
Input channel	03	Input channel 3 checked	03
Zero point	-99999——999999d	Zero point of the channel	Adjusted value
Rate	0——999999d	Gain of the channel	Adjusted value
Input channel	01	Input channel 1 checked (can not be modified)	01
Zero point	-99999——999999d	Zero point of the channel	Adjusted value
Rate	0——999999d	Gain of the channel	Adjusted value
Input channel	02	Input channel 2 checked (can not be modified)	02
Zero point	-99999——999999d	Zero point of the channel	Adjusted value
Rate	0——999999d	Gain of the channel	Adjusted value

8) "system" parameter

Name	Setting range	explanation	Preset value
Cipher	0 ——999999d	Parameter locking code of instrument	100132
Date	（A.D.）year，month，day	Real-time date	Real-time date
Time	hour，minute，second	Real time	Real time
Cold-compensation mode	Internal/exterior compensation	Select internal/external compensation for thermocouple cold-end	Internal compensation
Cold-compensation zero-point	-99999——999999d	Real zero-point value of cold-end compensation	0
Cold-compensation rate	0——999999d	Gradient of cold-end compensation channel	1
Setting address	1 -----255	Address code in communication	1
Baud rate	150——19200 pbs	Data rate communication	4800
Communication protocol	SWP Custom protocol MOD-O (MODBUS old format) MOD-N (MODBUS new format)	Set communication protocol type	MOD-O

LCD-NLR series LCD DISPLAY RECORDER

Timing print	1----2000min（a day）	Time intervals of timing print	1
Alarm print	**ON/OFF**	**ON**：alarm print **OFF**：no print	**OFF**
Record intervals	1----240 s	Time intervals of data record	6s
Channel 1 name	00：channel 1 01：temperature 02：pressure 03：flow 04：liquid lever 05：others	Define display subject name of the first input channel	By order
Channel 2 name	00：channel 1 01：temperature 02：pressure 03：flow 04：liquid lever 05：others	Define display subject name of the second input channel	By order
Channel 3 name	00：channel 1 01：temperature 02：pressure 03：flow 04：liquid lever 05：others	Defining display subject name of the third input channel	By order
Cumulative to zero		Whether to open	ON

NOTE：In the above "printer" items, A S stands for supporting tape-type printer and that printing format is to print **one** datum and a curve. **AS-D** stands for supporting tape-type printer and that printing format is to print **128** data and a curve. **TS** stands for supporting desk-type printer. **TS-D**'s printing format is the same as **AS-D**'s printing format.

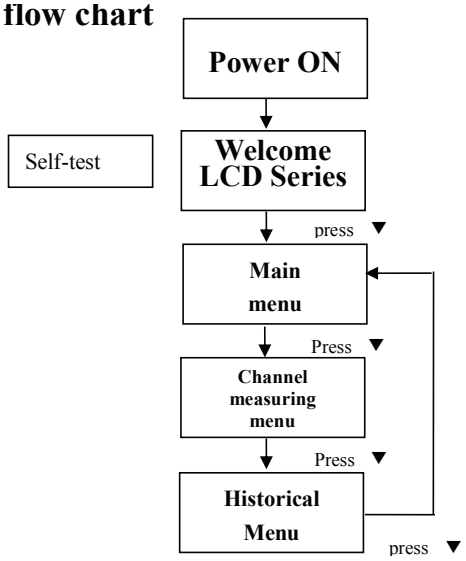
NOTE：Flow formula table

NO	**Closing calculate formula**	**Δ P-TP**	**Measuring temperature and pressure compensation of other mediums by different-pressure unevoluted input**	**$\sqrt{\Delta P}$ -J**	**Measuring heat-water by different-pressure evoluted input**
G-TP-P	**Measuring temperature and pressure compensation of super heated steam by linear input**	**Δ P-T**	**Measuring temperature compensation of other mediums by different-pressure unevoluted input**	**F-TP-p**	**Measuring temperature and pressure compensation of super heated steam by frequency input**
G-T-p	**Measuring temperature compensation of saturation steam by linear input**	**Δ P-P**	**Measuring pressure compensation of other mediums by different-pressure unevoluted input**	**F-T-p**	**Measuring temperature compensation of saturation steam by frequency input**
G-P-p	**Measuring pressure compensation of saturation steam by linear input**	**Δ P**	**Measuring no compensation of other mediums by different-pressure unevoluted input。**	**F-P-p**	**Measuring pressure compensation of saturation steam by frequency input**
G-TP	**Measuring temperature and pressure compensation of other mediums by linear**	**Δ P-J**	**Measuring heat-water by different-pressure unevoluted input**	**F-TP**	**Measuring temperature and pressure compensation of other mediums by frequency input**

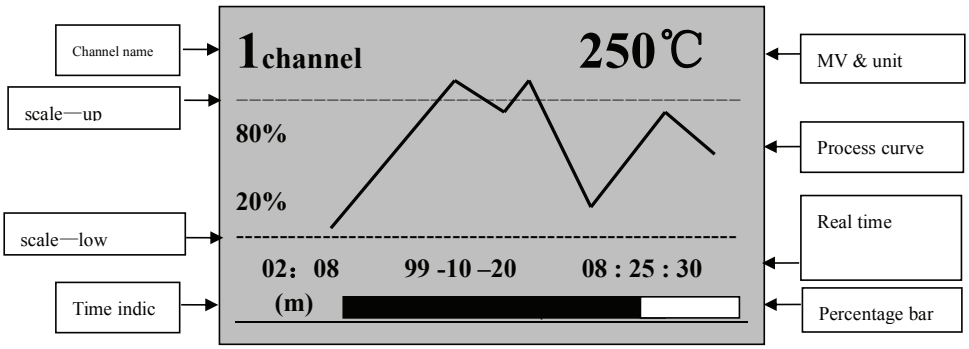
LCD-NLR series LCD DISPLAY RECORDER

	input				
G-T	Measuring temperature compensation of other mediums by linear input	$\sqrt{\Delta P}$-TP-p	Measuring temperature and pressure compensation of super heated steam by different-pressure evoluted input	F-T	Measuring temperature compensation of other mediums by frequency input
G-P	Measuring pressure compensation of other mediums by linear input	$\sqrt{\Delta P}$-T-p	Measuring temperature compensation of saturation steam by different-pressure evoluted input	F-P	Measuring pressure compensation of other mediums by frequency input
G	Measuring no compensation of other mediums by linear input	$\sqrt{\Delta P}$-P-p	Measuring pressure compensation of aturation steam by different-pressure evoluted input	F	Measuring no compensation of other mediums by frequency input
G-J	Measuring heat-water by linear input	$\sqrt{\Delta P}$-TP	Measuring temperature and pressure compensation of other mediums by different-pressure evoluted input	F-J	Measuring heat-water by frequency input
Δ P-TP-p	Measuring temperature and pressure compensation of super heated steam by different-pressure unevoluted input	$\sqrt{\Delta P}$-T	Measuring temperature compensation of other mediums by different-pressure evoluted input	Other mediums is consisted of air, nitrogen air, some liquid and some air suitable for standard gaseity formula .	
Δ P-T-p	Measuring temperature compensation of saturation steam by different-pressure unevoluted input	$\sqrt{\Delta P}$-P	Measuring pressure compensation of other mediums by different-pressure evoluted input		
Δ P-P-p	Measuring pressure compensation of saturation steam by different-pressure unevoluted input	$\sqrt{\Delta P}$	Measuring no compensation of other mediums by different-pressure evoluted input。		

6 Operating flow chart



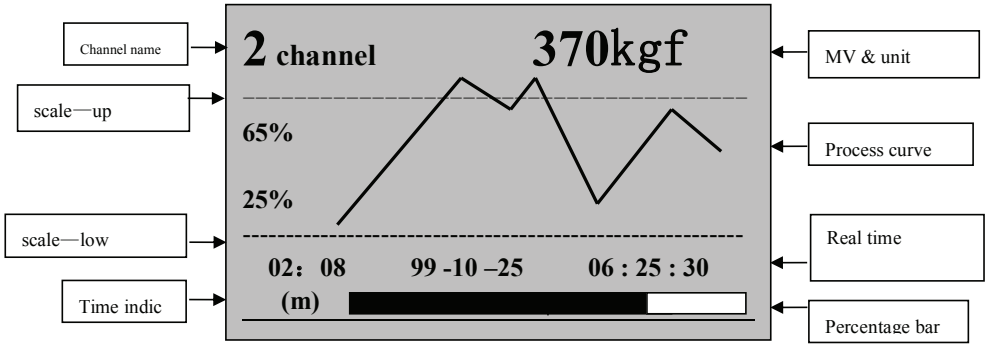
Explanation: （main display）



NOTE 1：Indication 02:08 （m）stands for that display time of all screen is 2 min. and 8 sec.
Indication 02:08 （h）stands for that display time of all screen is 2 hours and 8 min.

NOTE 2:： The scale can automatically adjust according to the curve scope in order to get as high as possible display precision under the limited instrument's resolution.

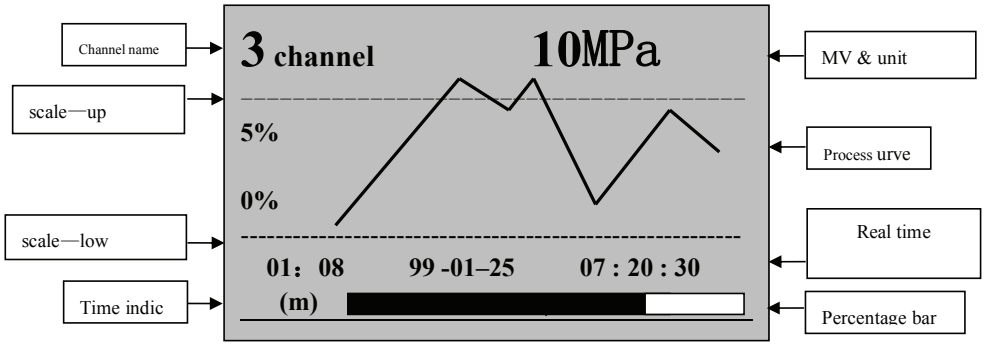
IF the recorder is for two or three channels, pressing F1 key will display the following screen:



MV-----measured value

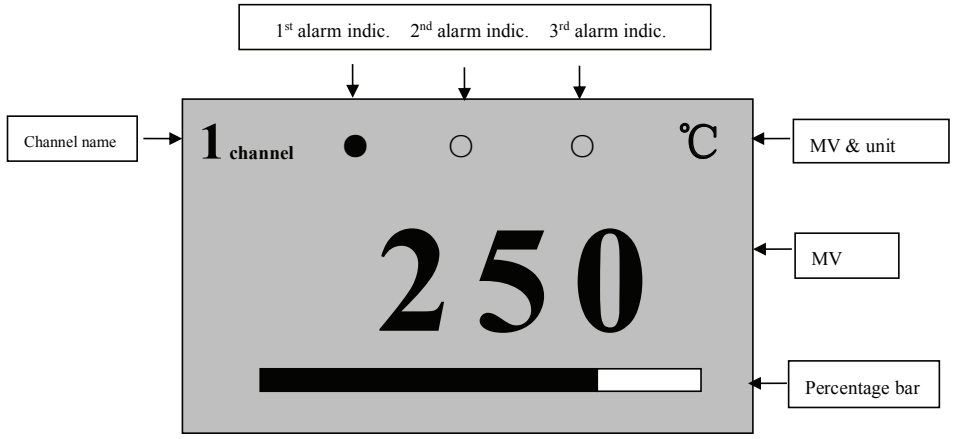
Pressing F1 key will display the following screen:

LCD-NLR series LCD DISPLAY RECORDER



NOTE 3：In the above screens, the displayed characters for measured quantity and channel name are defined by the values of *channel 1 name, channel 21 name, channel 3 name* in system configuration.

Pressing ▼key from main screen turns into channel-display screen

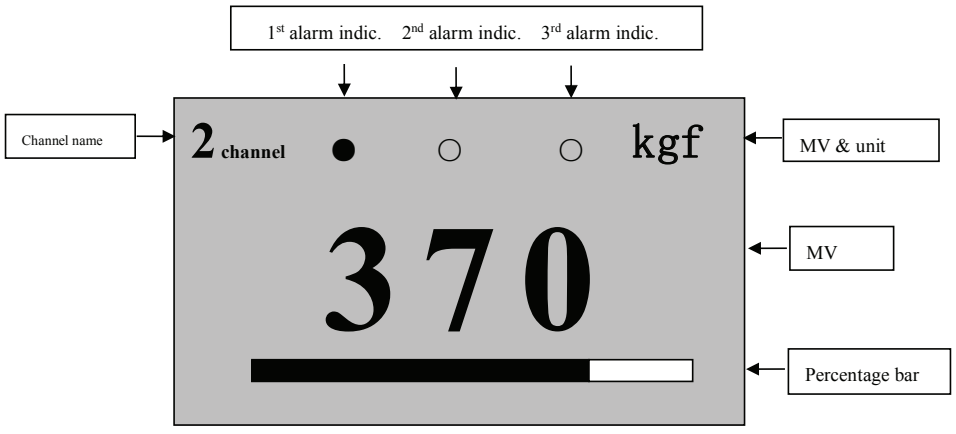


NOTE： The above 1st, 2nd, 3rd alarm can, according to user's needs, be arbitrarily define as any of the input channels and set up-limit or low-limit alarm.

NOTE： ● sands for that relay action（alarm）

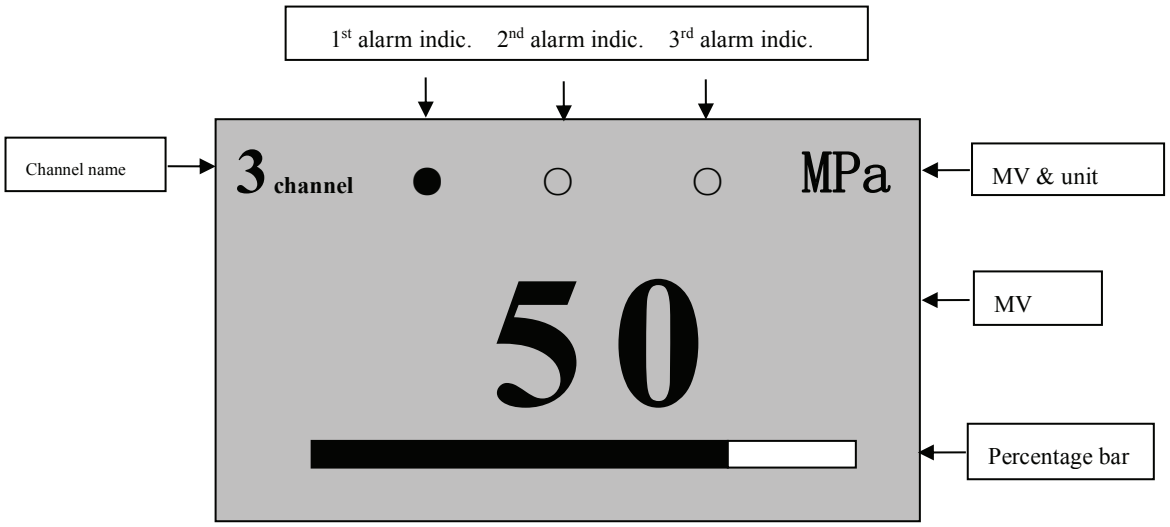
○ sands for that relay **not** action（**no** alarm）

Pressing F1 key will display the following screen:

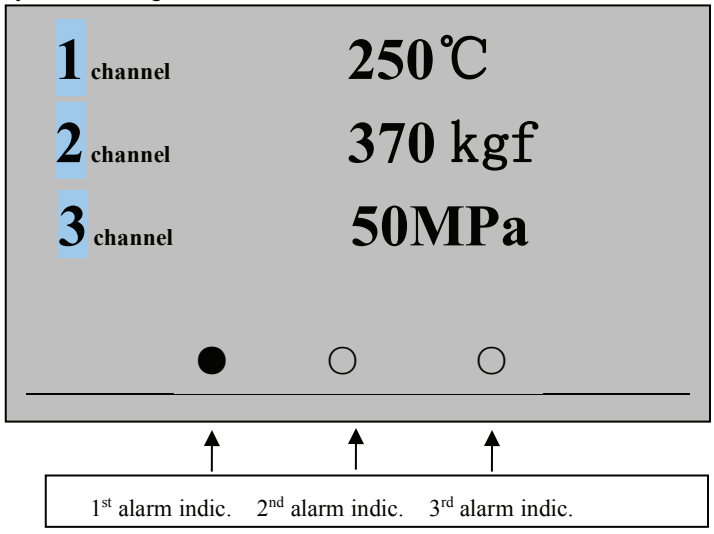


LCD-NLR series LCD DISPLAY RECORDER

Pressing F1 key will display the following screen:



Pressing F1 key will display the following screen:

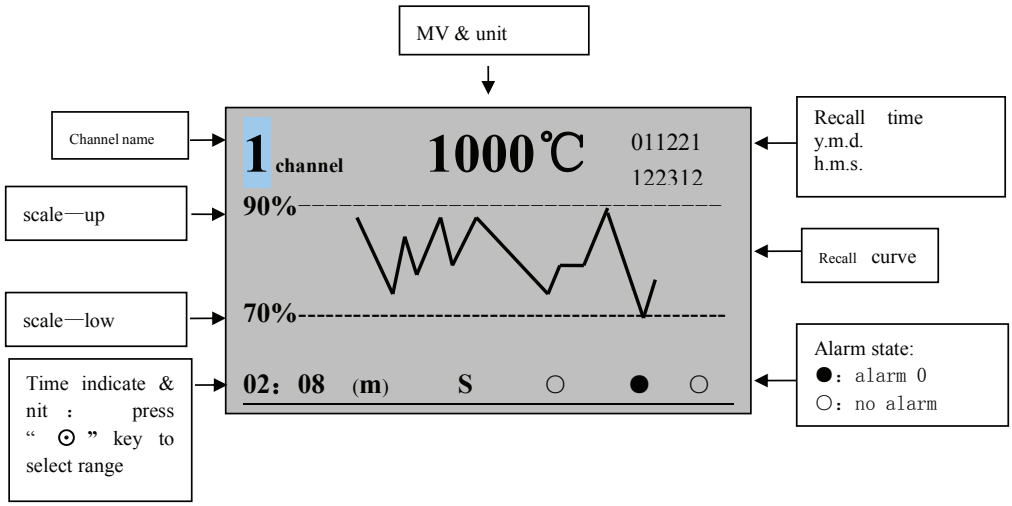


According to the different types (single channel, two channels, three channels), sometimes there is no above chart. When press F1 key, display will skip this kind of chart.

LCD-NLR series LCD DISPLAY RECORDER

On the channel display chart, press ▼ key, turn into historical record screen.

Press ▼ key to turn into recall historical recorded data screen.



[**NOTE**] About operating of recall historical data:：（when display above display）

（1）press ▶“ ” key，forwards search recorded data，press again ◀“ ” key，stop searching.
press ◀ ” key，backwards search recorded data，press again ▶ “ ” key，stop searching.

（2）press “⊙” key，change time indicate by turn to expand or compress curve range of historical data.

（3）press ”return” key，move cursor to up-right corner and use the “▶ ” and “ ” key to move cursor，use “ ▲” and “ ▼ ” key，increase/decrease value of YMD,HMS，press again SET key, to recall the needed historical data curves.

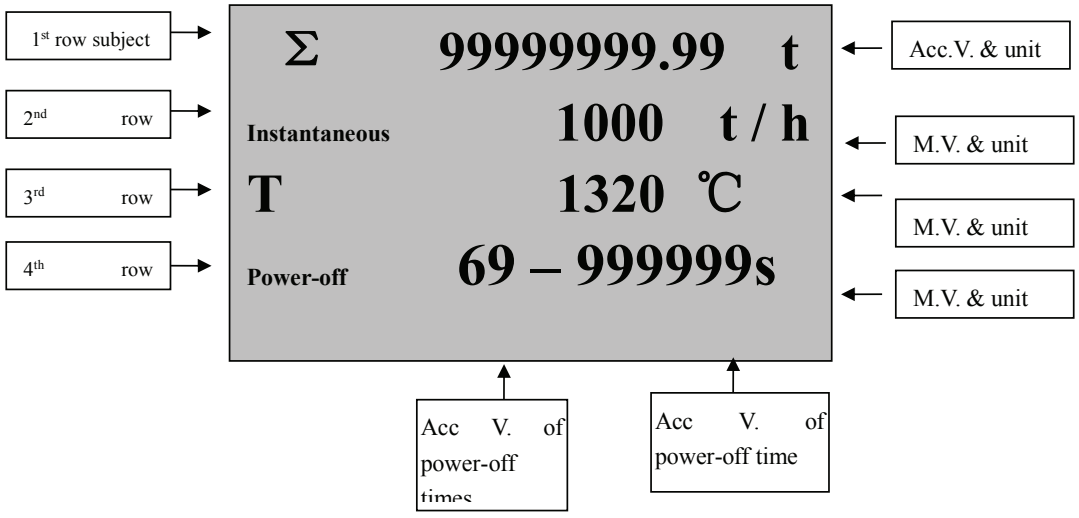
Press ▼ key to turn into recall flow and relative parameters screen.

Displays flow and relative parameters display：

There are two displays of flow and relative parameters displays, which include： time, temperature compensation, pressure compensation, pressure difference or flow channel, instantaneousaneous flow, instantaneousaneous heat energy, accumulated flow value, accumulated heat energy value, accumulated value of power-off time and times .

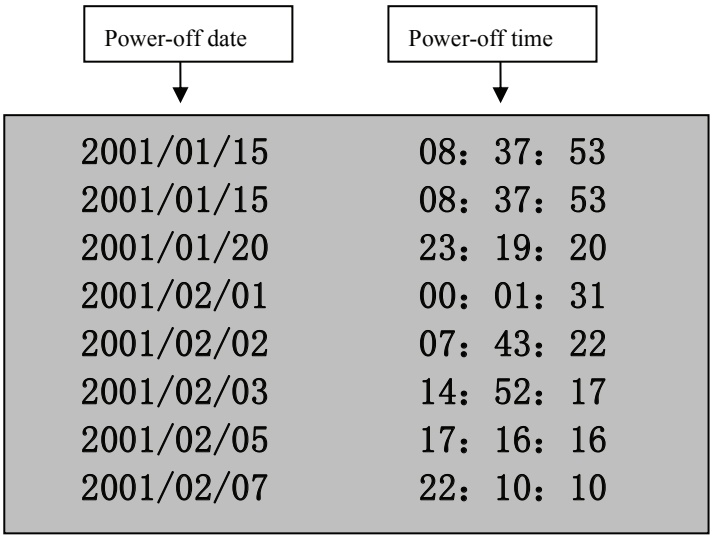
User can define the display items and their order by setting the “display 1 display” and “display 2 display” in the “system” menu.

For example:



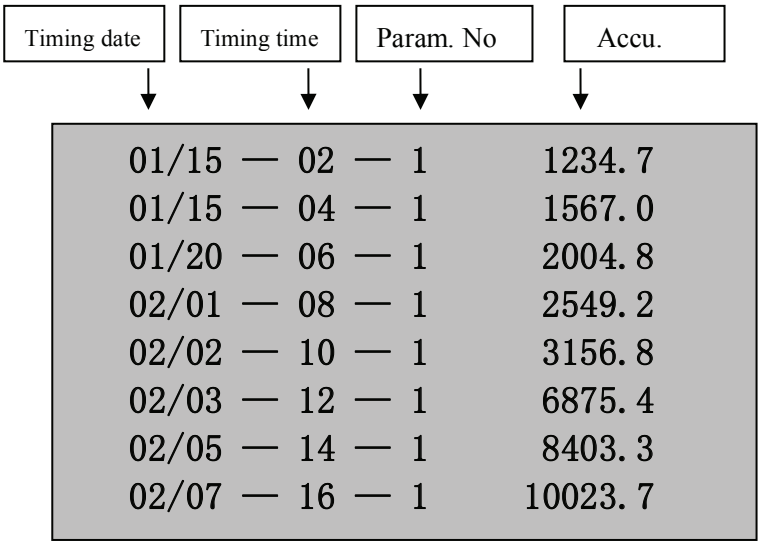
power-off time display：

power-off time display can preset the real time of power-off during work.. The following screen displays the time of last eight power-off.



flow timing copy display：

When user wants to timing copy the flow value at an designated time, it can be done by setting the needed time in “copy interval” of “system’ parameters. The instrument will automatically display the accumulated flow value at thedesignated time so that user can copy it.



Again “F1” key get into daily report, Record 16 days

Report date ↓	Flow (of 1)/ heat(of 2) ↓	Flow / heat data ↓
14/10/18	— 1	612.7
14/10/17	— 1	612.7
14/10/16	— 1	612.7
14/10/15	— 1	612.7
14/10/14	— 1	612.7
14/10/13	— 1	612.7
14/10/12	— 1	612.7
14/10/11	— 1	612.7

Again “F1” key get into Monthly report, Record 7 Month

Report date ↓	Flow (of 1)/ heat(of 2) ↓	Flow / heat data ↓
14/04	— 1	223635.5
14/05	— 1	223635.5
14/06	— 1	223635.5
14/07	— 1	223635.5
14/08	— 1	223635.5
14/09	— 1	223635.5
14/10	— 1	223635.5
2014	— 1	223635.5

Notes: Cumulative data: positive format display(123456.789)
Meter reading data: anti format display(123456.789)

[Appendix 1] Engineering Unit Table

Type of Eng. Unit	Symbol of Eng. Unit
Temperature	℃
Pressure	**Pa kPa MPa mmHg mmH_2O bar Kgf**
Flow	**Nm^3/S m^3/S m/s l/s t/s Kg/s Nm^3/m m^3/m m/m l/m t/m Kg/m Nm^3/h m^3/h m/h l/h t/h Kg/h**
weight	**t kg**
volume	**Nm^3 m^3 l**
Heat-rate	**GJ/S MJ/S GJ/M MJ/M GJ/h MJ/h GJ MJ**

electricity	**V A kV KA Hz %**
others	**M PH**
USE	**Setting unit by user**
special	Specified in ordering

4．Parameter setting example:

for example: instrument used in heating system

process requirements： Sensor: K type thermocouple （0 -- 1300℃）

upper-limit of alarm： 900℃， hysterisis error 5℃

Lower-limit of alarm： 800℃， hysterisis error : 5℃

output type： 4—20mA input channel： 01

Lower-limit of output： 0℃ upper-limit of input： 1000℃

baud rate ： 9600 pbs record intervals： 1min.

parameter setting：

Instrument power-on

↓

instrument unlock (refer to **P. 9**step)

↓

going into “channel” parameter setting (refer to P. 10 step)

[input channel：01 input type：**K**， input unit：**℃**，Lower-limit of measure range：**0**，upper-limit of measure range：**1300**，Lower-limit of histogram：**0**，upper-limit of histogram：**1000**]

↓

going into “alarm” parameter setting (refer to P. 10 step)

[alarm channel：**01**，input channel：01 , alarm type：**AH**，alarm value：**900**，alarm hysterisis error：**5**]

[alarm channel：**02**，input channel：01 , alarm type：**AL**，alarm value：**800**，alarm hysterisis error：**5**]

↓

going into “output” parameter setting (refer to P. 10 step)

[output type：**4 – 20A**，Lower-limit of output：**0**，upper-limit of output：**1000**]

↓

going into “system” parameter setting (refer to P. 10 step)

[set address：**01**，baud rate：**9600**，record intervals：**1**]

↓

Setting over

[press “ SET ” 和 “⊙” to return to main menu or go into display]

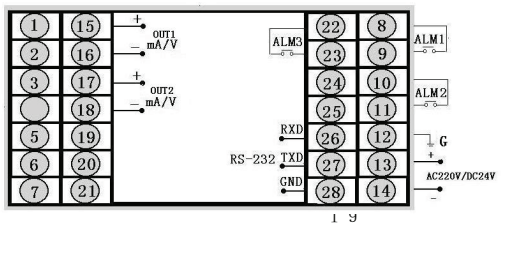
Set contrast ratio：

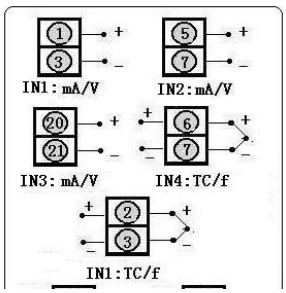
At the same time “Decimal point” and “▲”, contrast ratio Increased

At the same time “Decimal point” and “▼”, contrast ratio reduce

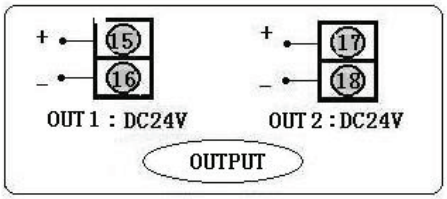
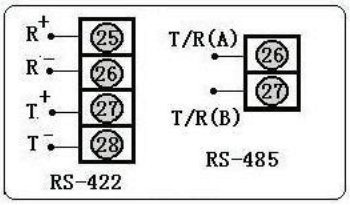
7 Wiring diagram

Wiring diagram





LCD-NLR series LCD DISPLAY RECORDER

Horizontal	 

LCD-NLR series LCD DISPLAY RECORDER

8 Type code for LCD-NLR instrument

Type	Code	Explanation
LCD-N	□□ □□□ -□□ - □ □ □ -□ □ □- □- □-□	Large screen LCD display with backlight
Instrument function	LR	Paperless recorder
Appearance dimension	8	160 × 80mm （ horizontal ） 80 × 160mm（vertical）
Compensation signal	01 02 03 04 05	No Compensation Compensation Super heated steam Saturation steam User,s special curve
Communication mode	□	Refer to “communication mode”
Transmit output	□	Refer to “transmit output mode”
Flow input type	□	Refer to “input type”
Pres input type	□	Refer to “input type”
Weng input type	□	Refer to “input type”
The first alarm mode	□	refer to “alarm output mode”
The second alarm mode	□	refer to “alarm output mode”
The three alarm mode	□	refer to “alarm output mode”
Feed output	P	DC24V feed output
Power supply mode	W T	DC24V power supply AC90～265V power supply（switch power） AC220V供电（linear power，can be omitted ）
Appearance character	S	Vertical type display instrument horizontal type display instrument

Communicating mode：

Code	0	2	4	8	9
Communicating mode	No communication	**RS-232C**	**RS-422**	**RS-485**	Special

Output mode：

Code	0	1	2	3	4	5	6	7	8	9
Output mode	No output	relay	**4～20mA**	**0～10mA**	**1～5V**	**0～5V**	**SCR** output	**SSR** output	Special	**SOT** output

Input mode：

code	Input mode	Measure range	code	Input mode	Measure range	code	Input mode	Measure range
01	**B**	**400～1800** ℃	**09**	**Pt100.1**	**-99.9~199.9**℃	**17**	**30～350 Ω**	**-1999～9999 d**
02	**S**	**0 ～1600** ℃	**10**	**Cu50**	**-50.0~150.0** ℃	**18**	Special specification	Special order
03	**K**	**0 ～1300** ℃	**11**	**Cu100**	**-50.0~150.0** ℃	**19**	**4～20 mA** evolution	**-1999～9999 d**
04	**E**	**0 ～1000** ℃	**12**	**4～20 mA**	**-1999～9999** d	**20**	**0～10mA** evolution	**-1999～9999 d**
05	**T**	**-200～400** ℃	**13**	**0～10 mA**	**-1999～9999** d	**21**	**1～ 5 V** evolution	**-1999～9999 d**
06	**J**	**0 ～1200** ℃	**14**	**1～5 V**	**-1999～9999** d	**22**	**0～5 V** evolution	**-1999～9999 d**
07	**WRe**	**0 ～3200** ℃	**15**	**0～5 V**	**-1999～9999** d	**23**	Full switchover input	
08	**Pt100**	**-200～650** ℃	**16**	**0～20 mA**	**-1999～9999** d	**24**	Frequency input	**0～10KHz**

Process Center AB
Skogsbrynsvägen 8 C
236 31 Höllviken
040 452900 info@processcenter.se

LCD-NLR series LCD DISPLAY RECORDER

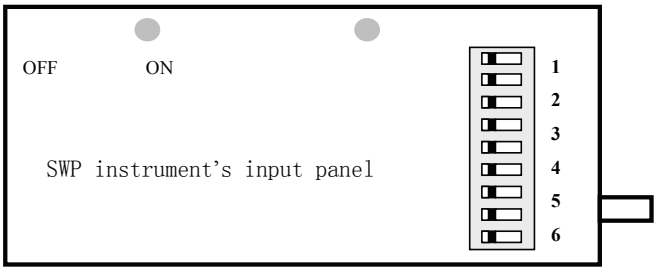
Alarm output mode：

code	N	H	L
Output mode	No alarm （can be omitted）	Upper-limit alarm	Lower-limit alarm

Type example： ①LCD-NLR8103-212-08-HL-W-S

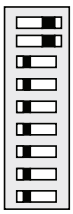
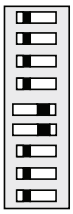
Input channel: single-channel，controlling function: measure record， communication mode: RS-232,outputmode: relay output， transmit output: 4～20 mA， input type: Pt100, the first alarm mode: upper-limit of alarm， the second alarm mode: Lower-limit of alarm, power supply mode: DC24V (vertical type)

9 Switch input signals（by dialing switches on input panel）



switch position & corresponding
：OFF
：ON

Relationship of dial switches position and input signals：

1st channel resistance / couple	1st channel voltage	1st channel current	2nd channel resistance / couple	2nd channel voltage	2nd channel current	3rd channel voltage	3rd channel current
							
As above，switches 1，2，3，4 position can select the 1st channel input signal （other switches position has nothing with the 1st channel signal selecting）			As above， switches 5,6,7,8 position can select the 2nd channel input signal （other switches position has nothing with the 2nd channel signal selecting）			As above， switches 9 position can select the 3rd channel input signal （other switches position has nothing with the 3rd channel signal selecting））	

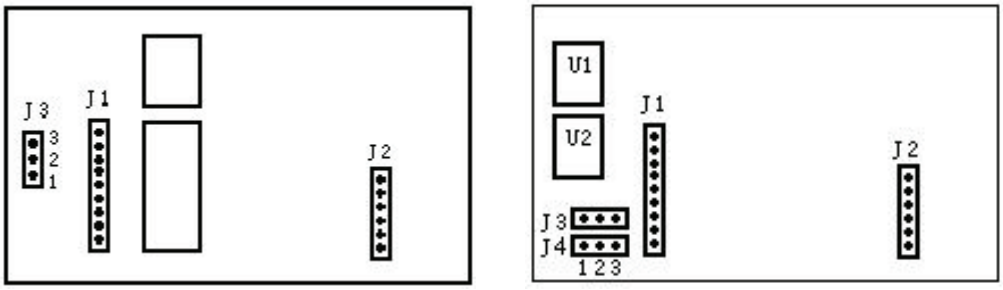
10 Transmit output methods

★ The instrument can have two channels output of current or voltage, which are insulated with each other.
★ The instrument can change its output range by modifying the 2nd grade parameters. （see: the 2nd grade parameters）
★ The instrument can change the state of short-cut ring J3(J4) to modify output mode ---- DC current output or DC voltage output。
★ The state of short-cut ring J3(J4) is as follows（J3(J4) is on the transmit output panel）

1、 Operating of R80 series dialing and short-cut ring

	DC current output	DC voltage output
State of J3(J4)		

NOTE: short-cut ring state : -------- short-cut ring open -------- short-cut ring is short-cut



NOTE：1．Changing the position of short-cut ring on output panel to modify output mode---- DC current output or DC voltage output；

2． When short-cut ring is on 1 & 2 ends, it is DC current output; When short-cut ring is on 3 & 4 ends, it is DC voltage output.

3．J3 is the short-cut ring of the 1st channel transmit output; J4 is the short-cut ring of the 2nd channel transmit output.

11 ATTACHED DOCUMENTS

One main body of instrument
A copy of operating handbook
A copy of qualified certificate about product checking

[appendix 1] Flow Calculating Formula

（1）Mass flow (M) calculating formula

1. Input signal is differential pressure (Δ P, not extracted)
(The setting corresponding to "formula selection" of "compensation" parameter : Δ P)
parameter setting: K0---K8

$$M = K \times \sqrt{\rho \times \Delta P}$$

2. Input signal is differential pressure (Δ P, not extracted), temperature compensation (T)
(The setting corresponding to "formula selection" of "compensation" parameter : Δ P -T)
parameter setting: K0---K8

3. Input signal is differential pressure (Δ P, not extracted), pressure compensation (P)
(The setting corresponding to "formula selection" of "compensation" parameter : Δ P -P)
parameter setting: K0---K8

4. Input signal is differential pressure (Δ P, not extracted), pressure compensation (P), temperature compensation (T)
(The setting corresponding to "formula selection" of "compensation" parameter : Δ P -TP)
parameter setting: K0---K8

5. Input signal is differential pressure (Δ P, extracted)
(The setting corresponding to "formula selection" of "compensation" parameter : $\sqrt{\Delta P}$)
parameter setting: K0---K8

6. Input signal is differential pressure (Δ P, extracted), temperature compensation (T)
(The setting corresponding to "formula selection" of "compensation" parameter : $\sqrt{\Delta P}$ -T)
parameter setting: K0---K8

7. Input signal is differential pressure (Δ P, extracted), pressure compensation (P)
(The setting corresponding to "formula selection" of "compensation" parameter : $\sqrt{\Delta P}$ -P)
parameter setting: K0---K8

8. Input signal is differential pressure (Δ P, extracted), pressure compensation (P), temperature compensation (T)
(The setting corresponding to "formula selection" of "compensation" parameter : $\sqrt{\Delta P}$ -TP)
parameter setting: K0---K8

9. Input signal is flow (G)
(The setting corresponding to "formula selection" of "compensation" parameter : G)
parameter setting: K0---K8

10. Input signal is flow (G), temperature compensation (T)
(The setting corresponding to "formula selection" of "compensation" parameter : G-T)
parameter setting: K0---K8

11. Input signal is flow (G), pressure compensation (P)
(The setting corresponding to "formula selection" of "compensation" parameter : G-P)
parameter setting: K0---K8

12. Input signal is flow (G), pressure compensation (P), temperature compensation (T)
(The setting corresponding to "formula selection" of "compensation" parameter :G-TP)
parameter setting: K0---K8

13. Input signal is frequency (*f*)
(The setting corresponding to "formula selection" of "compensation" parameter : F)
parameter setting: K0---K8

14. Input signal is frequency (*f*), temperature compensation (T)
(The setting corresponding to “formula selection” of “compensation” parameter : F-T)
parameter setting: K0---K8

15. Input signal is frequency (*f*), pressure compensation (P)
(The setting corresponding to “formula selection” of “compensation” parameter : F-P)
parameter setting: K0---K8

16. Input signal is frequency (*f*), temperature compensation (T), pressure compensation (P)
(The setting corresponding to “formula selection” of “compensation” parameter : F -TP)
parameter setting: K0---K8

17. Overheated steam measuring, input signal is linear (G), temperature compensation (T), pressure compensation (P)
(The setting corresponding to “formula selection” of “compensation” parameter : G -TP-p)
parameter setting: K0---K8

18. Overheated steam measuring, input signal is differential pressure (Δ P, not extracted), temperature compensation (T), pressure compensation (P)
(The setting corresponding to “formula selection” of “compensation” parameter : Δ P -TP-p)
parameter setting: K0---K8

19. Overheated steam measuring, input signal is differential pressure (Δ P, extracted), temperature compensation (T), pressure compensation (P)
(The setting corresponding to “formula selection” of “compensation” parameter : $\sqrt{\Delta P}$ -TP-p)
parameter setting: K0---K8

20. Overheated steam measuring, input signal is frequency (*f*), temperature compensation (T), pressure compensation (P)
(The setting corresponding to “formula selection” of “compensation” parameter : F-TP-p)
parameter setting: K0---K8

21. Saturated steam measuring, input signal is linear (*G*), temperature compensation (T) or pressure compensation (P)
(The setting corresponding to “formula selection” of “compensation” parameter : G -P-p pressure compensation)
(The setting corresponding to “formula selection” of “compensation” parameter : G -T-p temperature compensation)
parameter setting: K0---K8

22. Saturated steam measuring, input signal is differential pressure (Δ P, not extracted), temperature compensation (T) or pressure compensation (P)
(The setting corresponding to “formula selection” of “compensation” parameter : Δ P -P-p pressure compensation)
(The setting corresponding to “formula selection” of “compensation” parameter : Δ P -T-p temperature compensation)
parameter setting: K0---K8

23. Saturated steam measuring, input signal is differential pressure (Δ P, extracted), temperature
(The setting corresponding to “formula selection” of “compensation” parameter : $\sqrt{\Delta P}$ -P-p pressure compensation)
(The setting corresponding to “formula selection” of “compensation” parameter : $\sqrt{\Delta P}$ -T-p temperature compensation)
parameter setting: K0---K8

24. Saturated steam measuring, input signal is frequency (*f*), temperature compensation (T) or pressure compensation (P)
(The setting corresponding to “formula selection” of “compensation” parameter : F-P-p pressure

compensation)

(The setting corresponding to "formula selection" of "compensation" parameter : F-T-p temperature compensation)

parameter setting: K0---K8

（2）Standard volume flow (Q_N) calculating formula

parameters setting: ρ_{20}

（3）Density calculating formula (model)

1. Only pressure or only temperature compensation

parameters setting: A1 A2

$\rho = A1+A2\times P$ or $\rho = A1+A2\times T$

Because the relationship of pressure (or temperature) to density is basically linear within a narrow range, we can do the compensation according to their linear relationship by figuring out the values of A1 and A2. As long as you get two groups of data of pressure (or temperature) to density and make a group of two- variable simple equations, the values of A1 and A2 can be figured out. If higher precision of compensation is required, the precise density can be figured out by means of testing density table (please provide the measured flow media or its density table when ordering).

2. Pressure and temperature compensation simultaneously

parameters setting: ρ_{20} P_A

$\rho=\rho_{20}(T_0+20^{\circ}C)(P+\rho_{20})/P_0*(T+T_0)$

（4）Calculation of compensating coefficient K

1. input signal is linear:

a) flow input unit is volume (e.g.: m^3/h etc.):

K = 1

b) flow input unit is mass (e.g.: T/h etc.):

calculate compensating coefficient K according to relevant mass flow calculating formula

2. input signal is frequency:

a) if given the coefficient of frequency flow transmitter, can set K according to its nominal value.

K = flow coefficient of frequency flow transmitter K (unit: Ω/L)

b) if not given flow coefficient of transmitter, can calculate compensating coefficient according to relevant mass flow calculating formula.

3. input signal is differential pressure:

a) calculate compensating coefficient K according to relevant mass flow calculating formula.

b) calculate K according to standard formula:

$$M = K \times \sqrt{\rho \times \Delta P}$$

$K = 3.995\times \alpha \times \varepsilon \times d^2$ -- the unit of M is Kg/h; the unit of ΔP is MPa

$K = 0.1264\times \alpha \times \varepsilon \times d^2$ -- the unit of M is Kg/h; the unit of ΔP is KPa

$K = 0.01251\times \alpha \times \varepsilon \times d^2$ -- the unit of M is Kg/h; the unit of ΔP is mmH_2O

where $\alpha = \dfrac{C}{\sqrt{1-\beta^4}}$; $\beta = \dfrac{d}{D}$

Note: M--mass flow measured value; α --flow coefficient; ε --vena contracta expansion coefficient; C--flowout coefficient; β --diameter ratio; d--the diameter of throttler reducing orifice or its opening under operating condition(mm); D--inner diameter of upstream line under operating condition.

（5）Note of symbols and unit

M - mass flow measured value (unit: set by user)

Δ P - differential pressure input signal of differential pressure flow instrument (unit: set by second parameter DCA, usually is MPa)

P_A - local (unit: the same as second parameter DP, usually is MPa)

ρ_{20} - the density of measured flow under standard condition (atmosphere pressure is 0.10133MPa, temperature is 20℃)

T - temperature compensation input signal (unit:℃)

T_0 - 273.15℃; P_0 - 0.10133Mpa; ρ - density under work condition (Kg/m^3)

P - pressure compensation input signal (unit: the same as second parameter DP, usually is MPa)

A1 - compensation constant; A2 - compensation constant; K - compensation coefficient

f - frequency input signal of frequency flow instrument (unit: Hz)

G - input signal of linear flow instrument (unit: the same as output unit of flow instrument, e.g. m^3/h)

Q_N - volume flow under standard condition

（6）Accumulation and calculation of overheated steam

When measuring overheated steam, can select table-testing method to calculate. The controller will, according to the real-time measured value of flow (differential pressure) input, pressure compensation and temperature compensation, automatically test the overheated steam compensation tables built in it to calculate precisely.

（7）Accumulation and calculation of saturated steam

When measuring saturated steam user, can select temperature compensation method, pressure compensation or table-testing method to calculate. The controller will, according to the real-time measured value of flow (differential pressure) input, pressure compensation and temperature compensation, automatically test the saturated steam compensation tables built in it to calculate precisely. In this case, compensation signal can select either temperature compensation or pressure compensation. If two compensations are selected the controller will calculate according to only the real-time measured value of temperature compensation.