User Manual to Paperless Recorder and True-color Human-machine Interface Touch Screen of AI/AIP Series

Contents

1. About products

The new industrial grade touch screen is used for the paperless recorders of AI series (AI-3150S/3150W/3150Y/3170S/3170W/3170Y/3190S/3190W/3190Y) and AIP series. The main parameters are easily set in Chinese in one interface, allowing customers to use them as easily as using a mobile phone. The product comes in three sizes: 5 inches, 7 inches, and 9 inches. The thickness of the 9 inch product is only 38mm, and its low requirements for installation space make it easy to install on the operation panel of various devices.

Funtions:

• Our company's various secondary instruments can be selected as inferior computers, such as single/multiple measurement alarm devices, intelligent PID regulators/temperature controllers, etc. Please configure them according to your needs, purchase them separately, freely combine and expand them.

• Equipped with a built-in WEB server and Ethernet interface, the instrument can be remotely monitored and operated by using our company's computer configuration browser through the Ethernet interface. (Only available for 3150W/3150Y/3170W/3170Y/3190W/3190Y/AIP series - W/Y)

• It has the world's first P2P cloud function (which can penetrate internal network monitoring without the need for a public IP), and can be monitored and operated remotely through mobile devices such as smartphones and tablets. (Only available in the 3150Y/3170Y/3190Y/AIP series - Y).

The AI series true color human-machine interface touch screen (3270S/3270W/3290S/3290W) can be configured by customers according to their own needs and can be used by connecting various inferior computers such as PLCs and temperature controllers. (The fifth point of this instruction does not apply to this type. Please download the configuration software from the official website to configure it before use)

2. Features

2.1 Display

Size:5 inches, 7 inches, and 9 inches.

Color:TFT true color

Resolution ratio: 800*480

Backlight: Long life LED

Input: touch

2.2 Storage

Capacity: 150MB

Interval(S): arbitrarily set 1. 2, 3, 4

2.3 Communication

Interface:RS232, RS485, Ethernet port (10/100M adaptive Ethernet port)

Communication baud rate: 1200~57600

2.4 Parameters

Electromagnetic compatibility: IEC61000-4-4 (electrical fast transient pulse group)±4KV/5KHz, IEC61000-4-5 (surge), 4KV, and under high-frequency electromagnetic field interference of 10V/m, the instrument does not crash and I/O misoperation occurs, and the process value fluctuates less than ±5% of the range

Isolation and withstand voltage: ≥ 2300V between power supply, relay contacts, and signals; ≥ 600V Between isolated weak current signals

Power supply: 100~240VAC, -15%,+10%/50~60Hz

Power: ≤ 5W

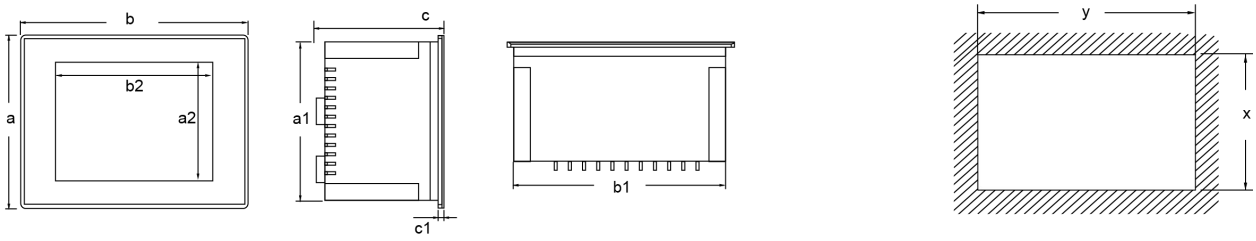
Used environment: Temperature: -10℃~+60℃; Humidity: ≤ 90% RH

Storage temperature: -20℃~+80℃

Weight: 5 inches 0.55Kg 7-linch/9-inch 0.7Kg

Cooling method: natural air cooling、

3. Installation

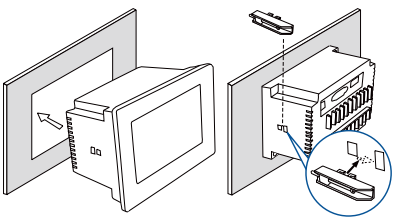


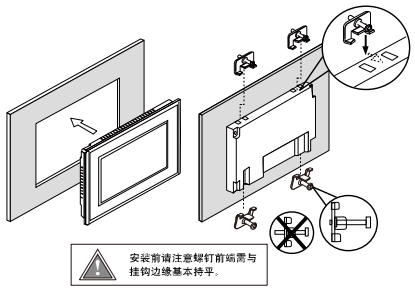
3.1 Dimension

3.2 Hook installation

AI-3150	AI-3170/3270/3190/3290

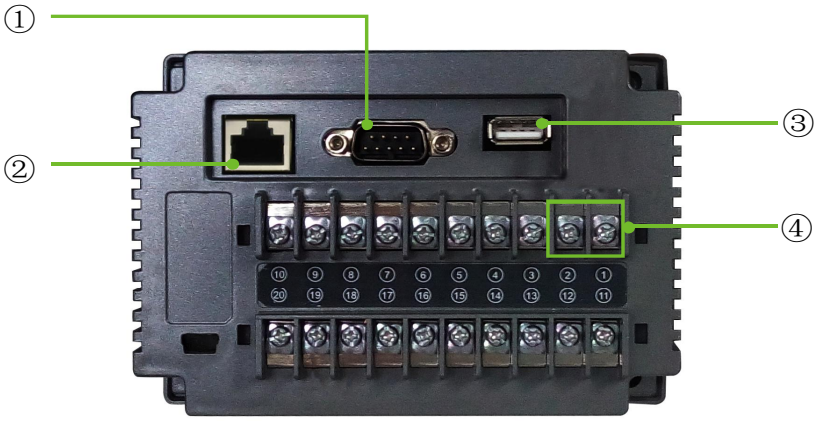
	display(mm)			shape(mm)						opening(mm)	
		a2	b2	a	b	c	a1	b1	c1	x	y
3150	5 inches	64	102	105	145	100	94	133	6	96	135
3170/3270	7 inches	86	154	150	203	40	137	190	6	139	192
3190/3290	9 inches	112	198	170	231	38	158	219	6	160	221





4. Wiring

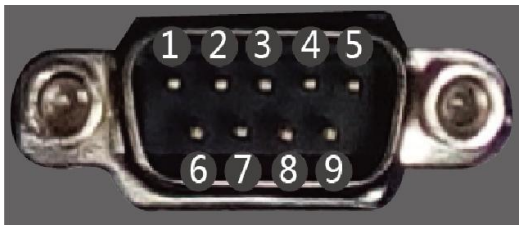
4.1 Interface of AI-3150



① RS485/RS232
② Ethernet interface
③ USB drive/mouse

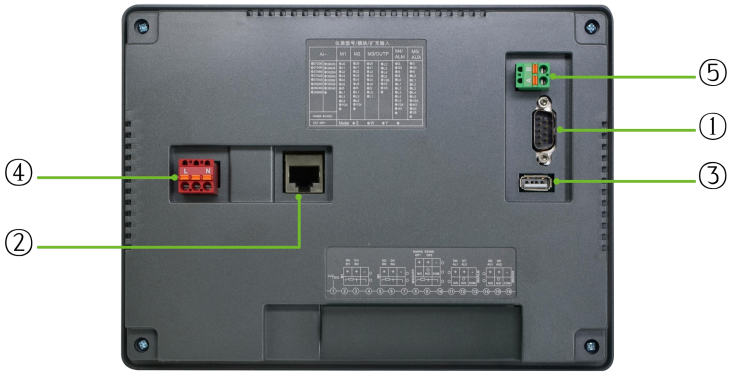
interface	COM2(RS485)		COM3(RS232)		
PIN	1	6	2	3	5
description	RS485+	RS485-	RS232 RXD	RS232 TXD	RS232 GND

Communication pins



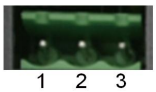
Note:wiring is not required if communication is not extended.

4.2 Interface of AI-3170/3270/3190/3290



① RS485/RS232
② Ethernet interface
③ USB drive/mouse
④ Power supply
⑤ RS485

Power supply

	interface	POWER		
	PIN	1	2	3
	description	L	/	N

Communication

	interface	COM2(RS485)	
	PIN	1	2
	description	RS485+	RS485-

	interface	COM2(RS485)		COM3(RS232)		
	PIN	1	6	2	3	5
	description	RS485+	RS485-	RS232 RXD	RS232 TXD	RS232 GND

Note:wiring is not required if communication is not extended.

4.3 Wiring of input and output for AIP5 series

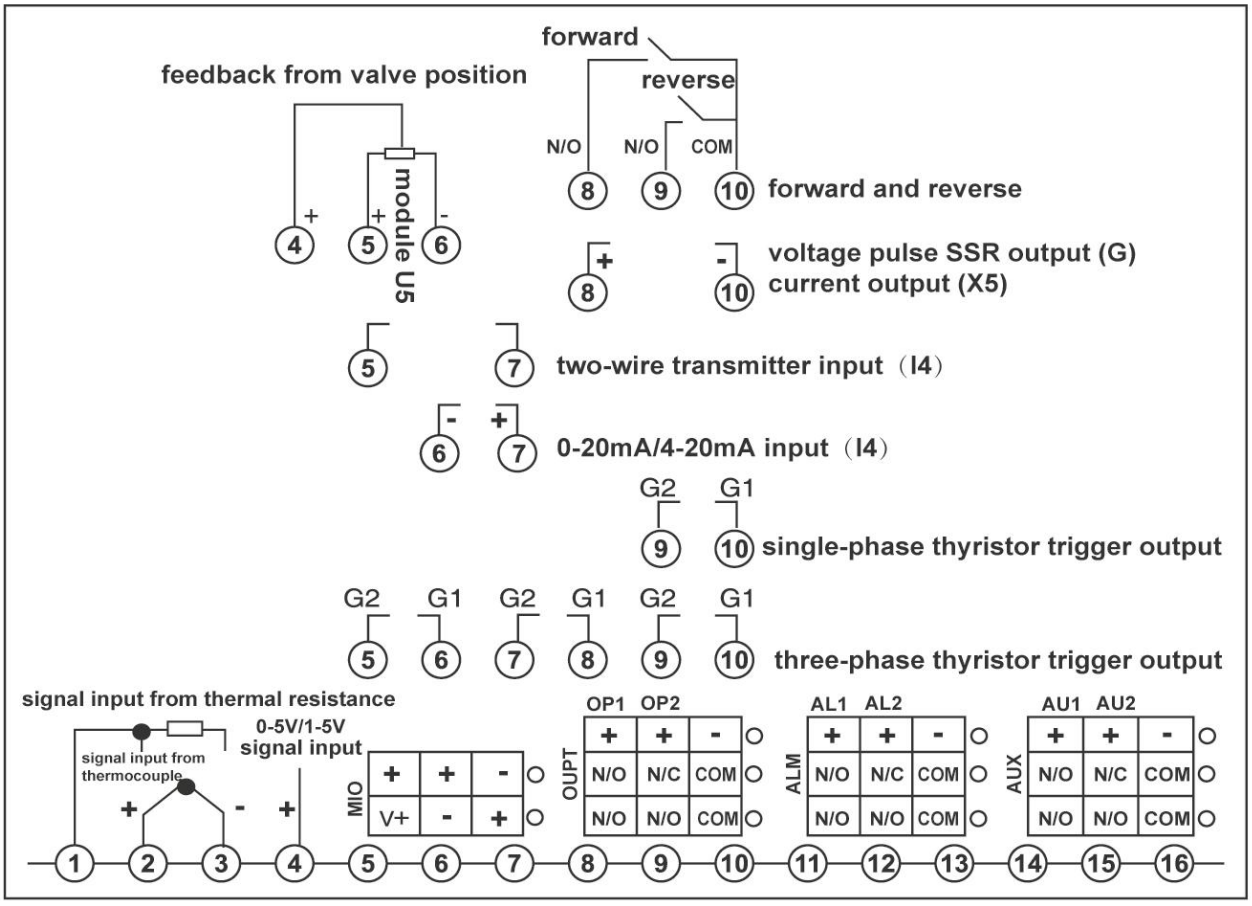
Terminals 3 and 4 of the 5-inch screen are not available. Please refer to the wiring instructions for dimension A for the connection of other terminals.

4.4 Wiring of input and output for AIP7/AIP9

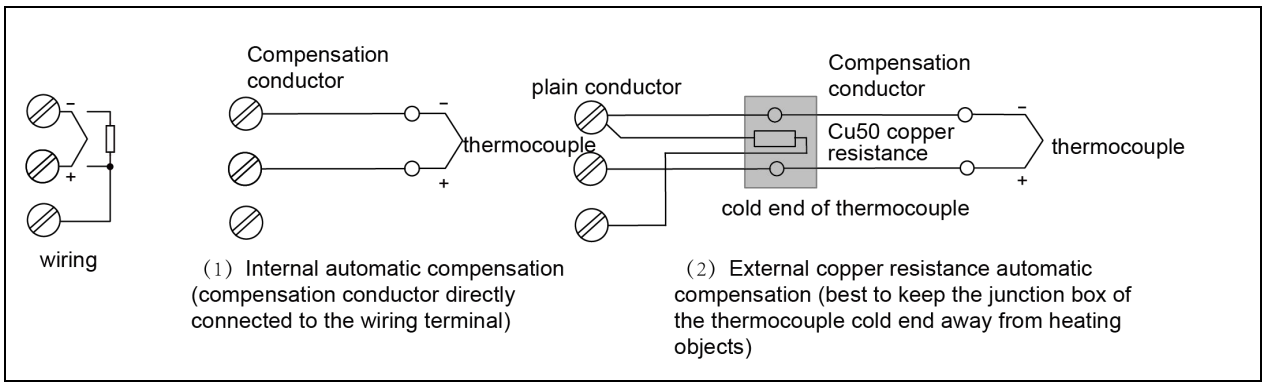
4.4.1 Single-channel controller with large screen

Note: The range of linear voltage below 1V is input from terminals 2+and 3-, while signals of 0-5V and 1-5V are input from terminals 4+and 3-. To input 4-20mA linear current, a 250 ohm resistor needs to be connected to convert it into a 1-5V voltage signal and input it from terminals 4+and 3-, or install an I4 module at MIO and input it from terminals 7+and 6-; Or directly connect the two wire transmitter from terminals 5+and 6-. Thermocouples with different graduation numbers use different thermocouple compensation wires. When using internal automatic compensation mode, the compensation wire is directly connected to the wiring terminal of the rear cover, and cannot be converted into a regular wire in the middle, otherwise measurement errors will occur.

The automatic compensation mode of thermocouple cold end can be achieved through wiring: When a thermocouple is used as an input signal, according to

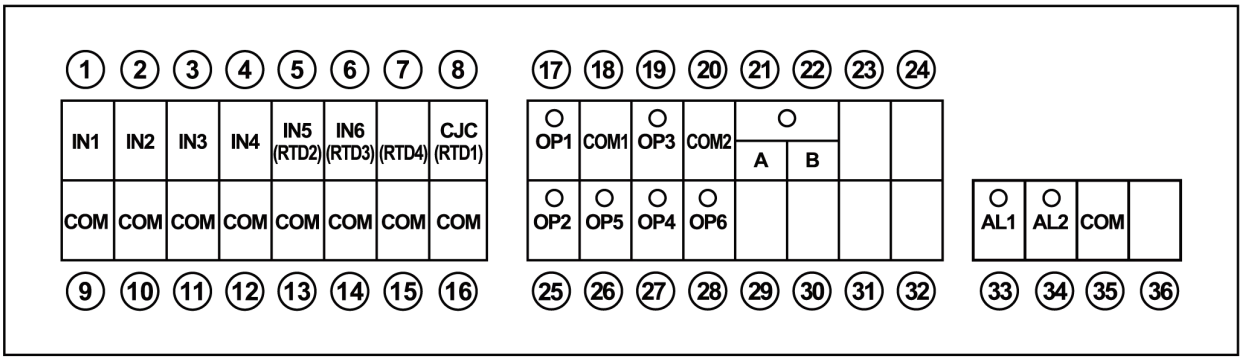


the temperature measurement principle of the thermocouple, temperature compensation is required for the cold end of the thermocouple. AI instruments can achieve this goal by measuring the temperature near the rear terminal of the instrument. However, due to errors in measuring components, heating of the instrument itself, or other heat sources near the instrument, the automatic compensation deviation is often large, and in the worst case, it may exceed 2 ℃. Therefore, when there is a high requirement for the accuracy of temperature measurement, an external junction box should be installed. The Cu50 copper resistor (to be purchased separately) and the cold end of the thermocouple should be placed together and away from various heating objects, so that the measurement difference caused by compensation can be less than 0.3 ℃. If there is a slight error at room temperature due to the inherent error of the Cu50 copper resistor, the parameter Sc can be used to correct it. If the external copper resistor is changed to a precision fixed resistor, constant temperature bath compensation can be achieved. For example, with an external 60 ohm fixed resistor, a Cu50 index meter can obtain a compensation temperature of 46.6 ℃. At this time, if the thermocouple cold end is placed in a constant temperature bath with a control temperature of 46.6 ℃, accurate compensation can also be obtained, and its compensation accuracy is better than that of copper resistors. If the external resistance is changed to a short circuit, freezing point compensation can be achieved. At this time, it is required to place the cold end of the thermocouple (at the connection between the thermocouple or compensation wire and the ordinary wire) in the ice water mixture (0 ℃), and the compensation accuracy can be as high as 0.1 ℃ or above. Wiring of the two compensation modes are as follows:



Note: For versions above 9.2, room temperature compensation has changed from Cu50 to Pt100.

4.5.2 Multi-channel Large Screen Series Controller



Note: Only the ALM port can be connected to high voltage (relay modules such as L21 and L3 are required).

Thermocouple Wiring

Connect the positive terminal of the thermocouple to IN1~6, and the negative te rminal to any COM terminal from 9~16.

When wiring the thermocouple, use qualified compensation wires and connect th em directly to the terminal block on the back cover of the instrument. Pay attention to the polarity of the compensation wires to avoid reverse connection. Failure to follo w the above wiring requirements may result in cold junction compensation errors. Ad ditionally, PT100 thermal resistors can be connected to terminals 8 and 16, which c an be used for cold junction compensation of the thermocouple. Short-circuiting can achieve ice point compensation.

Thermal Resistor Wiring Method

When using thermal resistors, you can choose between a three-wire or two-wire wiring method, which can be selected through the advanced function parameter AF. The two-wire method saves wiring and allows for more input channels, but it requires measuring and calculating the lead resistance to offset it. The three-wire method is the traditional wiring approach, which only requires equal lead resistance and does not need lead resistance calculation, but it reduces the number of input channels by half.

The AIP7/9 multi-channel integrated screen has taken various measures to reduce errors caused by lead resistance. However, if high measurement accuracy is required, the three-wire method should still be used. When wiring a two-wire thermal resistor, one wire is connected to IN1~6, and the other wire is connected to any COM terminal from 9~16.

The AIP7/9 multi-channel integrated screen can measure the resistance in the two-wire wiring method and record it in the Scb parameter, which is then offset during measurement. However, the lead resistance (made of copper or aluminum) will still change with temperature. The instrument can compensate for the change in lead resistance based on the internal room temperature sensor. However, this compensation is not suitable for situations where the lead temperature and the instrument temperature change asynchronously, such as when measuring the temperature of a cold storage room, or when the instrument is located in an air-conditioned room but the leads are not, or vice versa. For such applications, it is not recommended to use the two-wire method for measuring thermal resistors; instead, the three-wire method should be used.

When the AIP7/9 multi-channel integrated screen uses the three-wire method for resistance signal input, the maximum number of input channels is 4 (Cn must be less than or equal to 4). Taking the first channel as an example, for a three-wire thermal resistor, two wires from the same end of the resistor (usually of the same color or with lower resistance) are connected to IN1 and COM, while the single wire is connected to RTD1. Similarly, for the x-th channel, the two wires from the same end are connected to INx and COM, and the single wire is connected to RTDx. When the internal instrument model is selected as 7xx8, it supports up to 6 output channels, corresponding to OP1~OP6 for the positive terminal and 18 or 20 for the negative terminal (output modules such as G5, G6, X6, X72, etc., are required).

5.Instructions

5.1 First operation

After powering on, press the *Settings* button, enter the initial password 111, and then enter the *Settings* interface. The specific operations are as follows:

1) Select the instrument type for the current channel (AIP series automatic recognition).

Click on the 'Instrument Type' drop-down box and select the corresponding instrument type.

2) View the parameters of the current channel

After entering the *Settings* interface, when clicking on *Previous Channel* or *Next Channel* to switch channels, the system will automatically read the parameters once.

3) Modify the parameters of the current channel

Click on the edit box or drop-down identification box to set parameters.

Multi channel instruments need to perform the above three steps for each channel after completing the above operations.

After performing the above operations, follow the operating instructions to perform any other necessary operations.

Note 1: This is a general version of the manual, and some functions are only available for specific models.

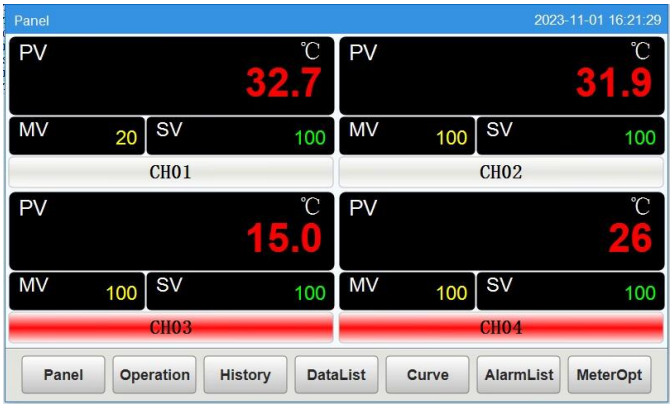
5.2 Instruction for display interface

1) Display

Display parameters such as PV, SV, and measurement units.

2) Status

When in an alarm status, the *Channel Name* displays in red and enters the *Alarm Information* to view the specific alarm content.



5.3 Instruction for operation interface

5.3.1 Display

The *Operation Screen* displays the *Channel Name* and corresponding *PV, SV, MV*, *Running Status*, and *Manual/Automatic Status;* If it is a program instrument, it w ill also display *Time Setting, Time Running,* and *Number of Running Segments*.

Modify SV: Non programmed temperature control instrument can be directly mod ified by clicking SV; The programmed temperature control instrument can enter the *Program Settings* interface by clicking on the *Program Formula* to set program para meters. Please refer to 5.3.4 for details.

Curve: Red curve *PV*, green curve *SV*.

5.3.2 Operating status

When clicking the buttons such as Run and Stop for the first time, the initial pa ssword 111 needs to be entered. The password can be modified in the' Settings' int erface (gray font indicates that the instrument does not support this function).

5.3.3 Parameter Setting

Click *Setting* to pop up *On-site Parameter Settings*, and the operation is as follo ws:

1) Reading and writing of upper limit alarm, lower limit alarm, translation correcti on, and alarm return difference.

2) Modification of MV. When instruments that support manual/automatic functions are in manual operation, the MV value can be modified.

3) Modification of program segment number.

4) Click the *Auto-tuning on/off* to switch to the auto-tuning status (PID instrumen t has this function).

5) Modification of SV. Non programmed temperature control instrument can direc tly modify SV; The programmed temperature control instrument can enter *Program S ettings* by clicking on the *Program Formula* to set program parameters. Please refer to 5.3.4 for details.

5.3.4 Program setting

1) Modification of program segment parameters:

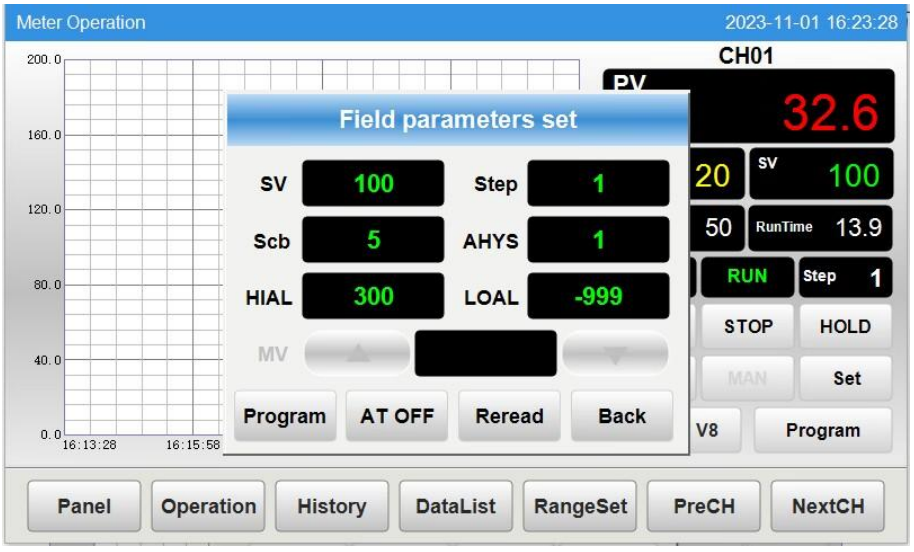
Solution 1: Click on the edit boxes under *SP1* and *T-1* to modify the correspon ding parameter values (similarly, modify the values of *SP*** and *T***, where *C*** has the same meaning as *SP***).

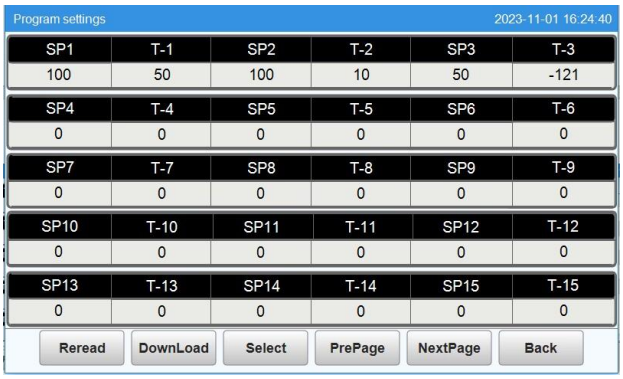
Solution 2: Click on Program Selection to open the Formula. Click on the desire d formula, such as pro1, select it, click on Apply Formula, and then click Back. The parameters in the formula will be written in batches to the corresponding editing bo x of the program settings.

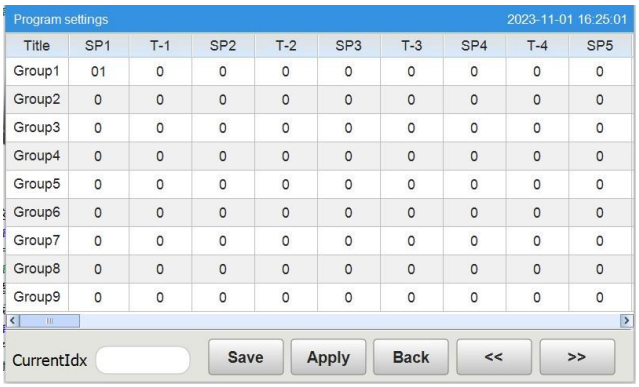
Note: After changing the parameters, they will not be immediately written to the instrument, but will be prompted in red. After clicking on Program Write, the paramet ers can be written to the instrument.

2) Formula settings

Click on Program Selection in Program Settings to open the formula window, wh ere users can modify, add, delete, and apply formulas.



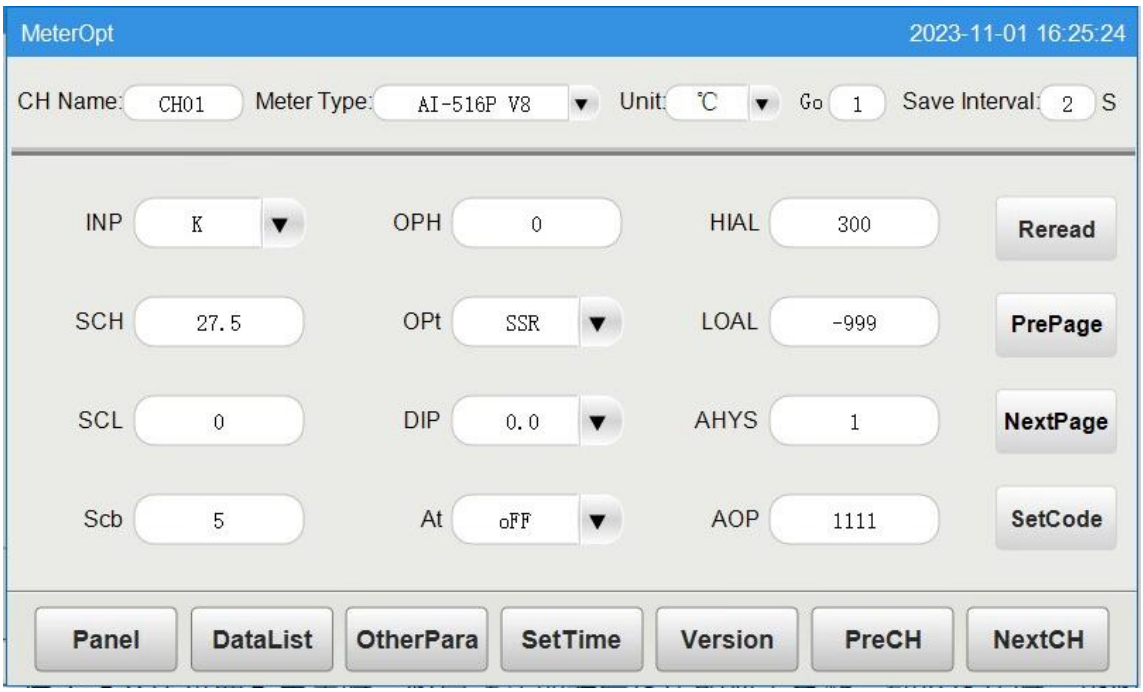




5.3.5 Range setting

Click *Range Setting* below to set the curve range and curve duration in the *Operation Screen*.

5.4 Description of System Settings



The instrument parameters of the corresponding channel will be automatically read after entering the System Settings, and the parameters will also be automatically read when switching channels. The operation is as follows:

1) Set the instrument type, unit, channel name, and recording interval separately. When setting, click on the corresponding dropdown box to select or directly input text.

2）Parameter reading: When entering the interface or switching channels, the parameters will be automatically read once. If there are changes to the parameters on the panel at this time, click *Parameter Reading* to update the instrument parameters.

3）Parameter writing: Click on the edit box or drop-down identification box to set instrument parameters. Multi channel instruments need to perform the above three steps for each channel after completing the above operations.

4）Password settings

Click on *Password Reset* in *Field Parameter Authorization* to obtain password authorization management for operation settings; Modify the system password through *Password Settings*. First, enter a 3-digit old password. After successful login, the system will prompt "Please enter a 3-digit new password". After entering the new password, click OK, and the password will be reset successfully

5) Time reset

Modify the system time through *Time Reset.*

5.5 Other Operations

Real Time Trend

1) Click the numbered button on the right to switch the visibility of the corresponding curve.

2) Click on *Real Time Settings* below to set the total duration and range of the real-time trend graph curve.

Historical Trends

1) Click the numbered button on the right to switch the visibility of the corresponding curve.

2) Click on *Historical Settings* to set the duration, range, and start time of the historical trend chart.

3) Click *Back* or *Forward* to offset the curve back or forward by 3/4 of the length of the timeline. If the offset exceeds the current system time, the offset will not occur.

Data Report

The historical table of the *Data Report* records the *PV* values of each channel.

Click '*Select Time*' to display the data according to the set time interval, and query the interval settings to display the interval time of each data.

Alarm Information

1) The alarm table of *Alarm Information* records information related to alarms and can be viewed through filtering.

2) *Alarm Information* default real-time alarm information, click *Real time Alarm* to switch to historical alarm information.

3) Click on *Display Options* above to pop up the *Alarm Display Options*, click on the required conditions to filter the required alarm information.

Data Report

1) Partial export: After inserting the USB drive, click *Select Time* in the *Data Report*, select a time span, and then click *Export*. The selected data will be exported to the USB drive with the file name **Hisdata. csv**. When exporting, view the data directly on the computer through an Excel spreadsheet.

2) 2) Export All: After inserting the USB drive, click *Export All* at the *Data Report* section. All data will be exported to the USB drive with the file name **RecData**. When viewing, please install the file Data View. exe first. After installation, the icon *Data View Run Environment* will be generated. Afterwards, right-click on *Data View Run Environment - Open File Location/Search Target - Project - Data View*, and paste the **RecData** folder from the USB flash drive into the *Data View* directory (if there is already a **RecData** folder under the *Data View* directory, please delete it before pasting). After completing the above operations, click on **Data View Run Chart** to view the data report and curves. (Please refer to the operation document of the data viewing software for details. Download address: www.yudian. com ->Data download ->Data viewing software)

Note 1: Please export after the USB flash drive is recognized.

Note 2: Partly exported data can only be viewed in reports, while all exported data can also be viewed in curve form in addition to reports.

Alarm Information

After inserting the USB drive, click on *Export* through *Alarm Information* and confirm. The data displayed in the current table will be exported to the USB drive, generating a file named "almdata. Csv"(Please export after the USB flash drive is recognized).

Ethernet access (only for screens with Ethernet)

1) LAN access:

After setting the gateway, subnet mask, and IP address, use a network cable to connect the screen to the local area network or directly connect to the computer. Enter the IP address: port number on the screen in our company's dedicated configuration browser to access it. The engineering port is 8888; and the default IP is 192.168.1.113,

2) External network access:

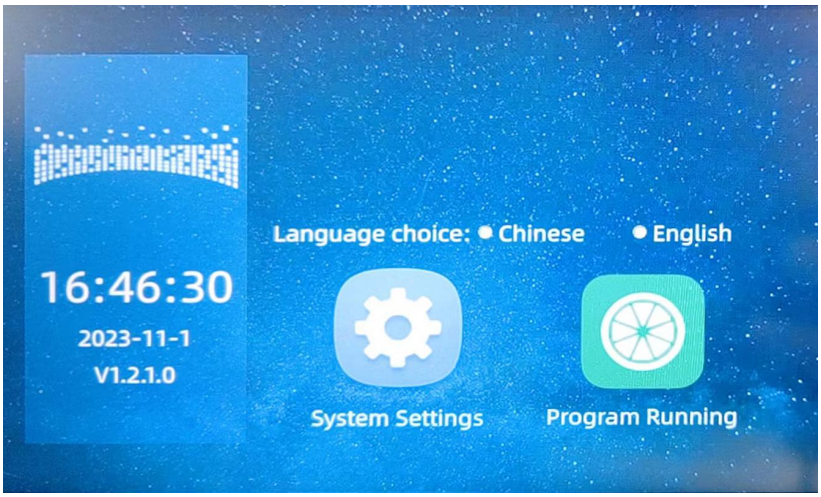
a. Fixed IP access: Mapping of public IP, IP addresses, and ports. The ports are configured in the project and can be accessed through a browser after mapping.

b. P2P cloud access: users can access it by entering the P2P: project ID from a dedicated configuration browser for our company's PC or a mobile APP (only for screens with cloud access).

Note: This guide is a simple manual, please refer to www.yudian.com for details. (For detailed documentation on network interface configuration, please download *Instructions to Network Interface Screen Connection Configuration and Software Installation Package* at www.yudian. com ->Data Download ->Software Products and Materials)

3) Screen IP settings:

Firstly, after the screen is powered on and started, long press any position on the screen. After the progress bar appears, the instrument panel will enter the internal settings of the screen. As shown in the figure:



Click on *System Settings*, enter password 111, and log in to the system settings of the screen. Click on Network Settings, as shown in the following figure: