

Coolmay TK80 series (Vcool) programming manual

Shenzhen Coolmay technology Co., Ltd.



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1. Preface

Welcome to coolmay Technology CoolMay HMI2 series touch screen! The human-machine interface is a two-way communication bridge between the operator and the machine equipment. The user can freely combine text, buttons, graphics, numbers, etc. to process or monitor the multi-functional display screen to manage and cope with information that may change at any time. With the rapid development of mechanical equipment, the previous operation interface required skilled operators to operate, and it was difficult to operate and could not improve work efficiency. However, the use of human-machine interface can clearly indicate and inform the operator of the current status of the machine equipment, making the operation simple and vivid, and reducing operational errors. Even a novice can easily operate the entire machine equipment. The use of human-machine interface can also standardize and simplify the wiring of the machine. It can also reduce the number of IO points required for the PLC monitor and reduce production costs. At the same time, due to the miniaturization and high performance of the panel control, the entire equipment has been relatively improved. added value.

2. Hardware manual

2.1 Product structure

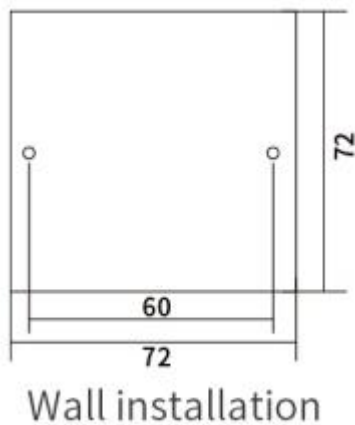
1. TK8037H

TK8037H



Pin number	Description
RS232 Communication Port Definition	
RXD	Receive
TXD	Send
GND	Ground wire/DC24V-
RS485 Communication Port Definition	
A	485+
B	485-
DC24V power supply	
24V	DC24V+
GND	Ground wire/DC24V-

Installation dimensions 72*72mm:

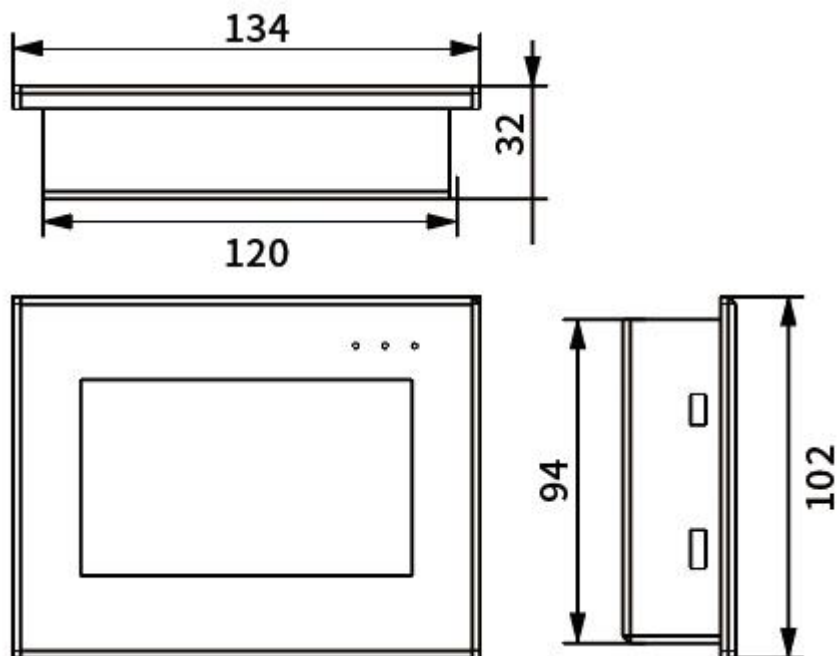


2. TK8043H

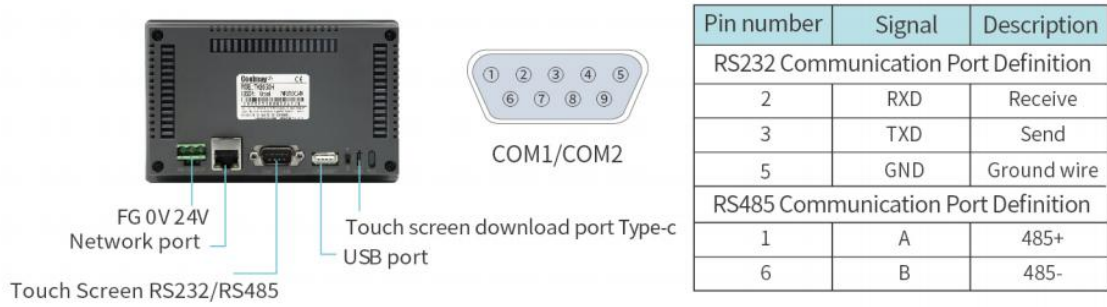


Pin number	Signal	Description
RS232 Communication Port Definition		
2	RXD	Receive
3	TXD	Send
5	GND	Ground wire
RS485 Communication Port Definition		
1	A	485+
6	B	485-

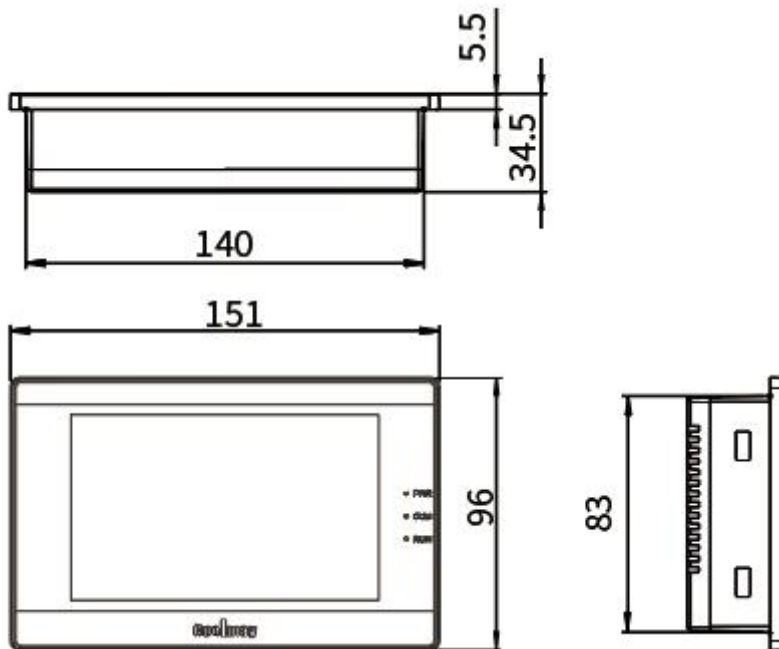
Installation dimensions: 120*94mm:



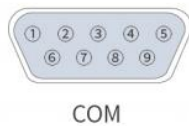
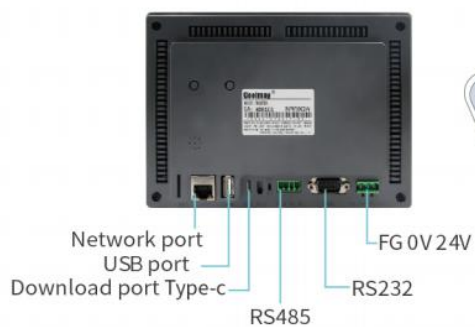
3. TK8050H



Installation dimensions 143*86mm:

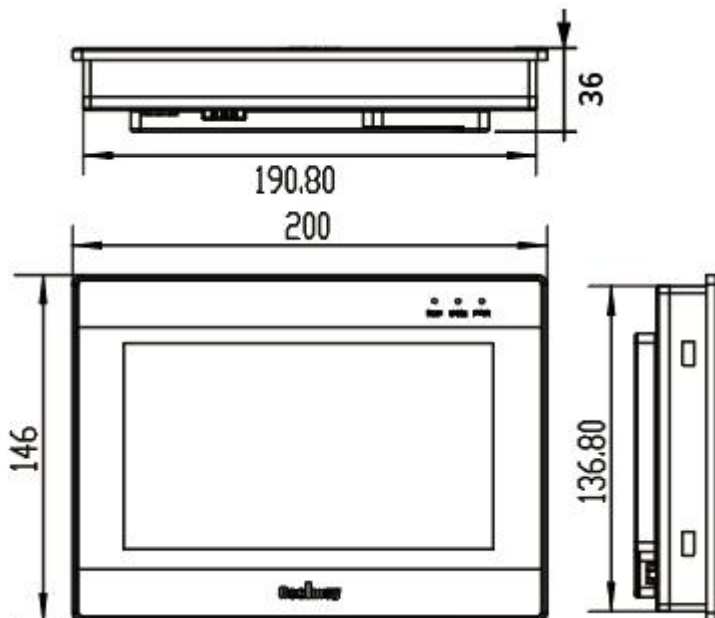


4. TK8070H/HD

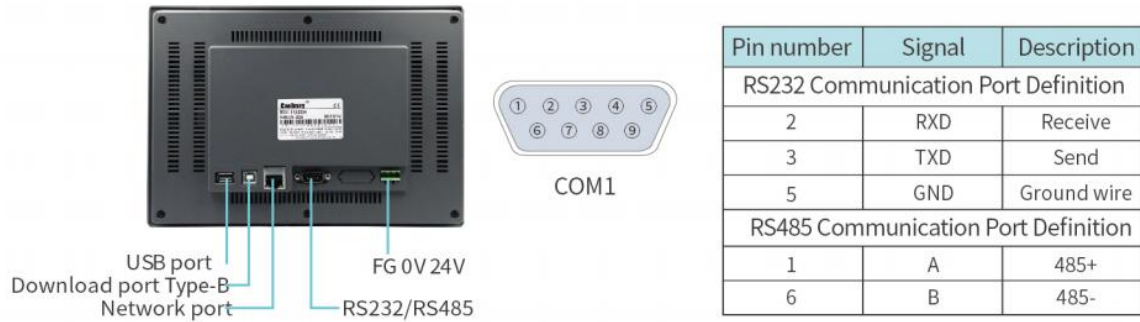


Pin number	Signal	Description
RS232 Communication Port Definition		
2	RXD	Receive
3	TXD	Send
5	GND	Ground wire
RS485 Communication Port Definition		
The first RS485	A1	485+
	B1	485-
The second RS485	A	485+
	B	485-

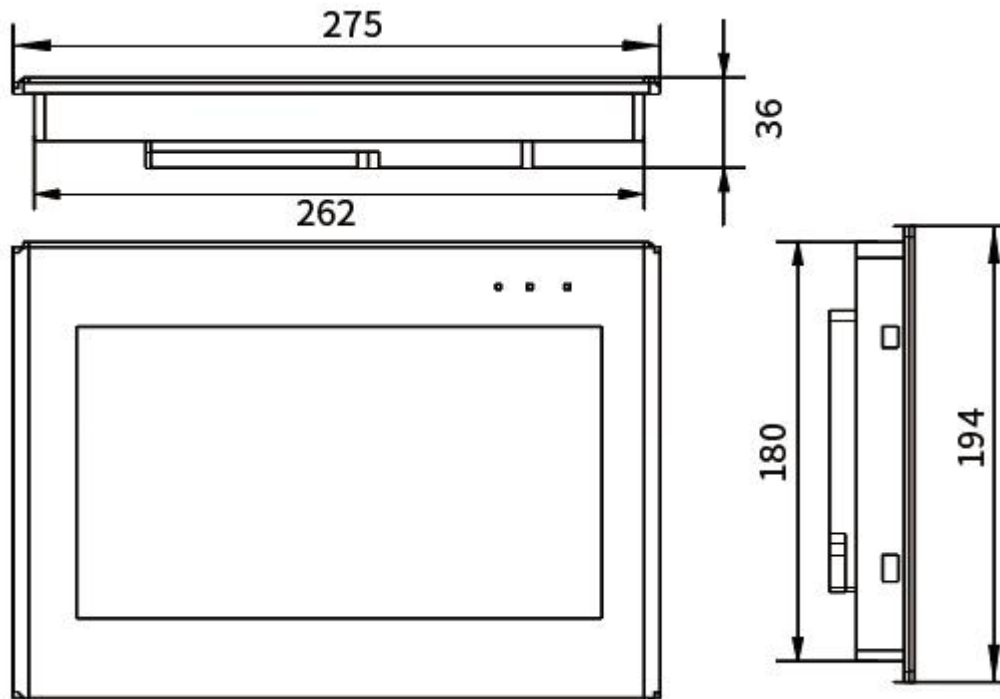
Installation dimensions 192*138mm:



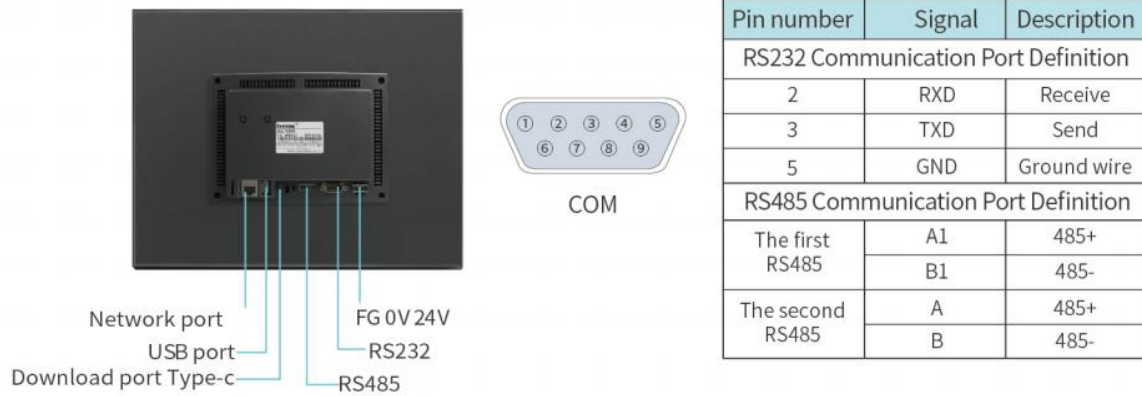
5. TK8100H



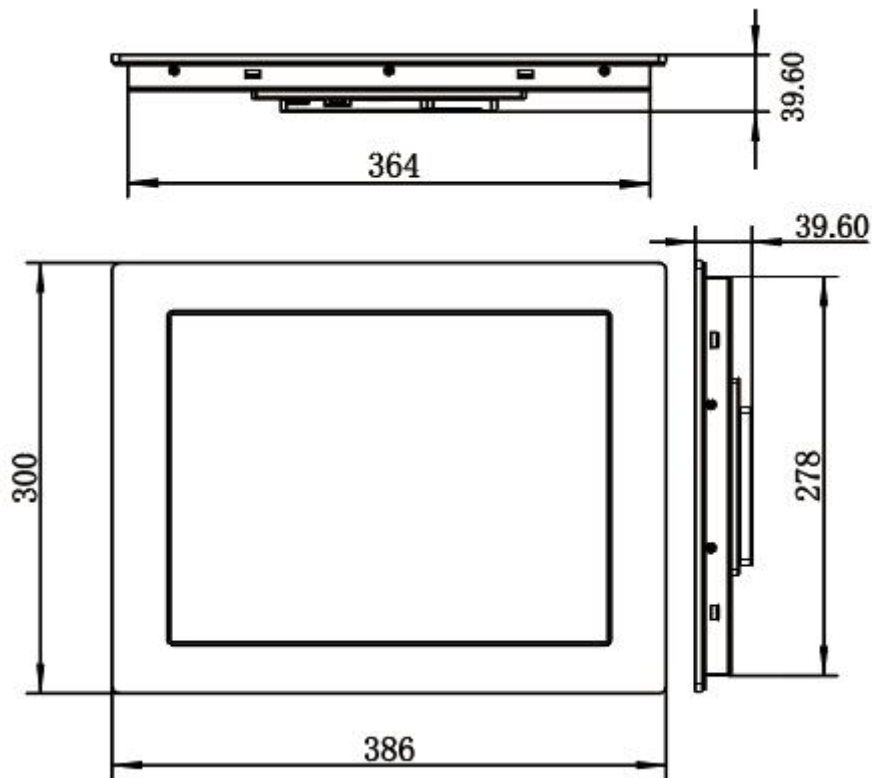
Installation dimensions 262*180mm:








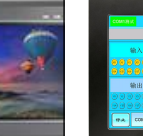






6. TK8150H



Installation dimensions 366*280mm:



2.2 Product parameters

Model	TK8037H	TK8043H	TK8050H	TK8070H/HD	TK8100H	TK8150H	
Image	Front						
	Rear						
Specification	Dimension	88*88*25mm	134*102*34mm	151*96*36mm	200*146*36mm	275*194*36mm	386*300*40mm
	Cutout size	72*72mm	120*94mm	143*86mm	192*138mm	262*180mm	366*280mm
	Display size	73*56mm	97*56mm	108*65mm	154*87mm	222*125mm	305*229mm
	Housing material	ABS+PC	Engineering plastic PBT+PC			ABS+PC	Aluminum alloy + galvanized sheet
	Weight(kg)	About 0.3 kg	About 0.33 kg	About 0.33 kg	About 0.54 kg	About 0.7 kg	About 3.3 kg
Display	Display	3.5"TFT	4.3"TFT	5"TFT	7.0"TFT	10.1"TFT	15"TFT
	Resolution (pixels)	320*240	480*272	800*480	800*480/1024*600	1024*600	1024*768
	Brightness	300cd/m ²	400cd/m ²	300cd/m ²	300cd/m ²	300cd/m ²	450cd/m ²
	Contrast ratio	400:1					
	Backlight	LED(brightness 0-100 adjustable)					
	Backlight time	60,000 hours					
	Display color	1677W true color					
Touch type	4 wire resistive screen						
Memory	ROM	NAND Flash 128MB		NAND Flash 128MB/256MB	NAND Flash 256MB	NAND Flash 128MB	
	RAM	128MB		128MB/256MB	256MB	128MB	
	CPU	Dual core 1GHZ					
Operating system	Based on Linux system						
USB Host	USB 2.0*1 (usb interface, external U disk can be used to update programs and upload and download historical data)						
Communication interface	Download port	Type-C、RS232、RS485、Network port		Type-C、RS232、RS485*2、Network port	Type-B、RS232、RS485、Network port	Type-C、RS232、RS485*2、Network port	
	EtherNet	Comes with (supports downloading programs on the network port, supports Modbus TCP protocol)					
	Serial port support protocol	Comes with 1 RS232 and 1 RS485 (Supports MODBUS protocol, free port and conventional PLC communication protocol)		Comes with 1 RS232 and 2 RS485 (Supports MODBUS protocol, free port and conventional PLC communication protocol)	Comes with 1 RS232 and 1 RS485 (Supports MODBUS protocol, free port and conventional PLC communication protocol)	Comes with 1 RS232 and 2 RS485 (Supports MODBUS protocol, free port and conventional PLC communication protocol)	
SD card	SD card can be optionally installed except for TK8037H						
Calendar	Yes						

Input Voltage	12-24VDC±10%<150mA @ 24VDC					12-24VDC±10%<500mA @ 24VDC
Consumption	42mA/24V	72mA/24V	85mA/24V	107mA/24V	145mA/24V	400mA/24V
Protection Class	IP65 (front panel)					
Temperature	Working environment -20~60 °C; Storage environment -20~70 °C					
Humidity	20%~90%RH					
Software	Vcool 1.0.8					
Reference	"CoolMay TK80 Series (Vcool) User Manual", "CoolMay TK80 Series User Manual"					

2.3 Calibration mode

There are two ways to enter calibration mode:

1. While the program is starting and loading the progress bar, continuously click the touch screen to enter the system configuration function, and click touch screen calibration to turn on the calibration function.
2. While the program is starting and loading the progress bar, press and hold the touch screen for 3 seconds to directly enter touch screen calibration.

During calibration, the words "Touch Cross Center to calibrate" and the red cross icon appear on the screen. Touch the five red crosses in sequence and restart the touch screen after calibration.

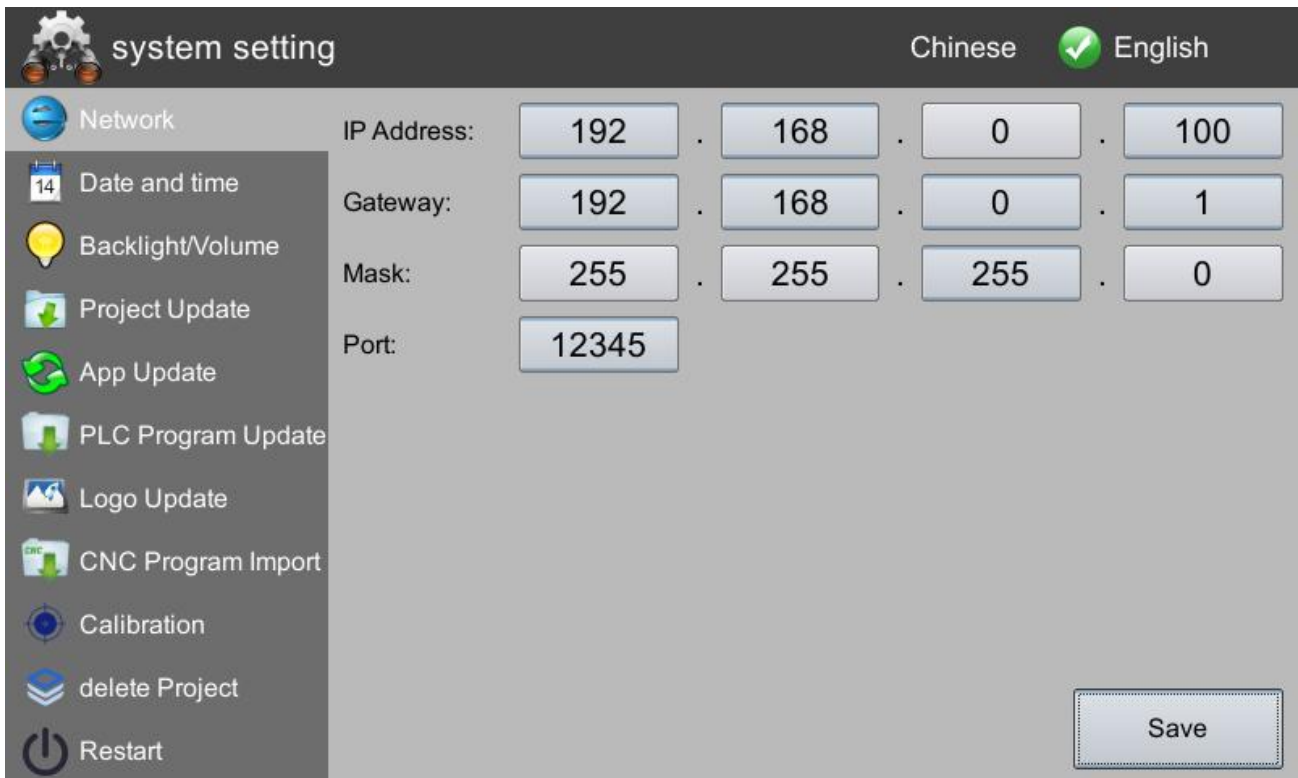
2.4 HMI parameter settings

After the startup program is started, continuously tap the screen to enter the touch screen parameter setting screen, where you can set network parameters, time, backlight brightness, volume, update and delete project files, and update lower computer programs and PLC programs.

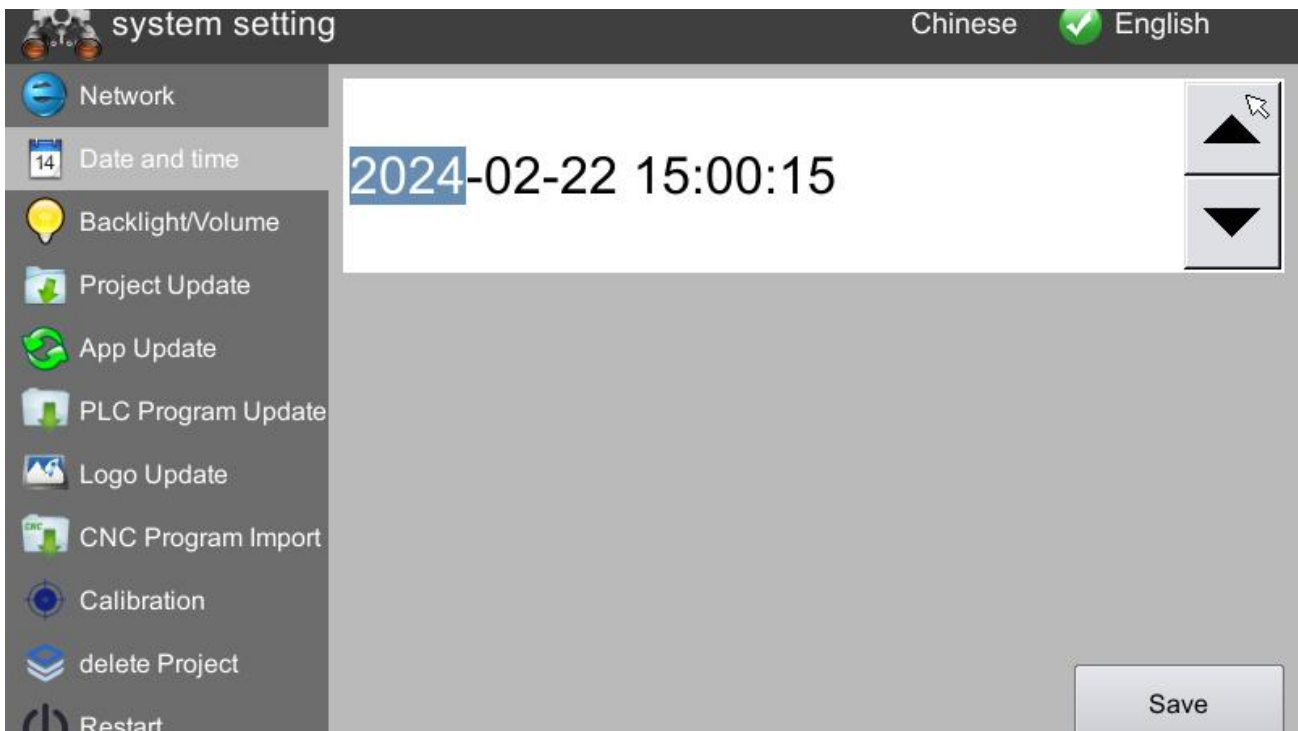
Network settings:

When the touch screen is connected to the Internet port and started, the touch screen will connect to the LAN network with the set IP address, gateway, and subnet mask. Please ensure that the address value is set correctly and that the IP does not conflict with other hosts on the LAN.

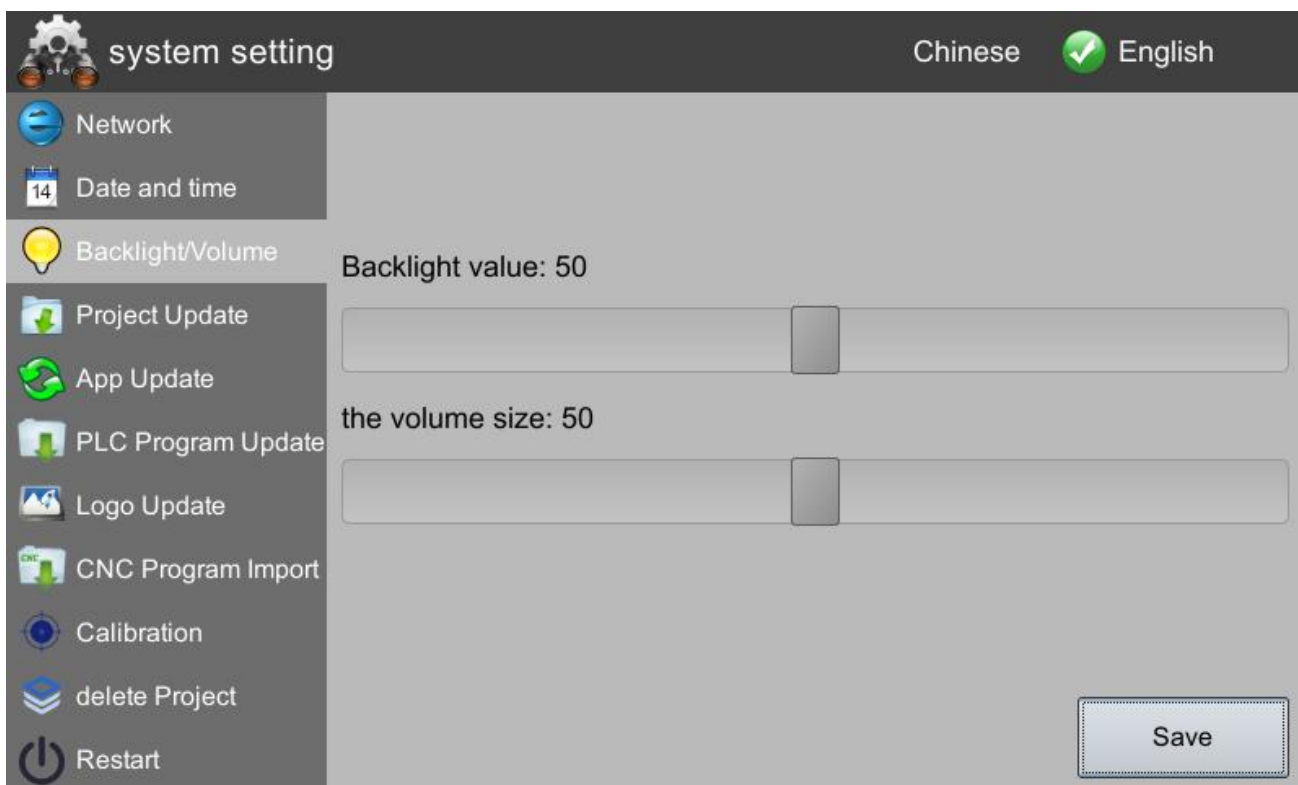
The port number is set when the configuration software uses Ethernet to download and upload data. If modified here, the port number must also be changed when using Ethernet to download and upload data.



Time setting:



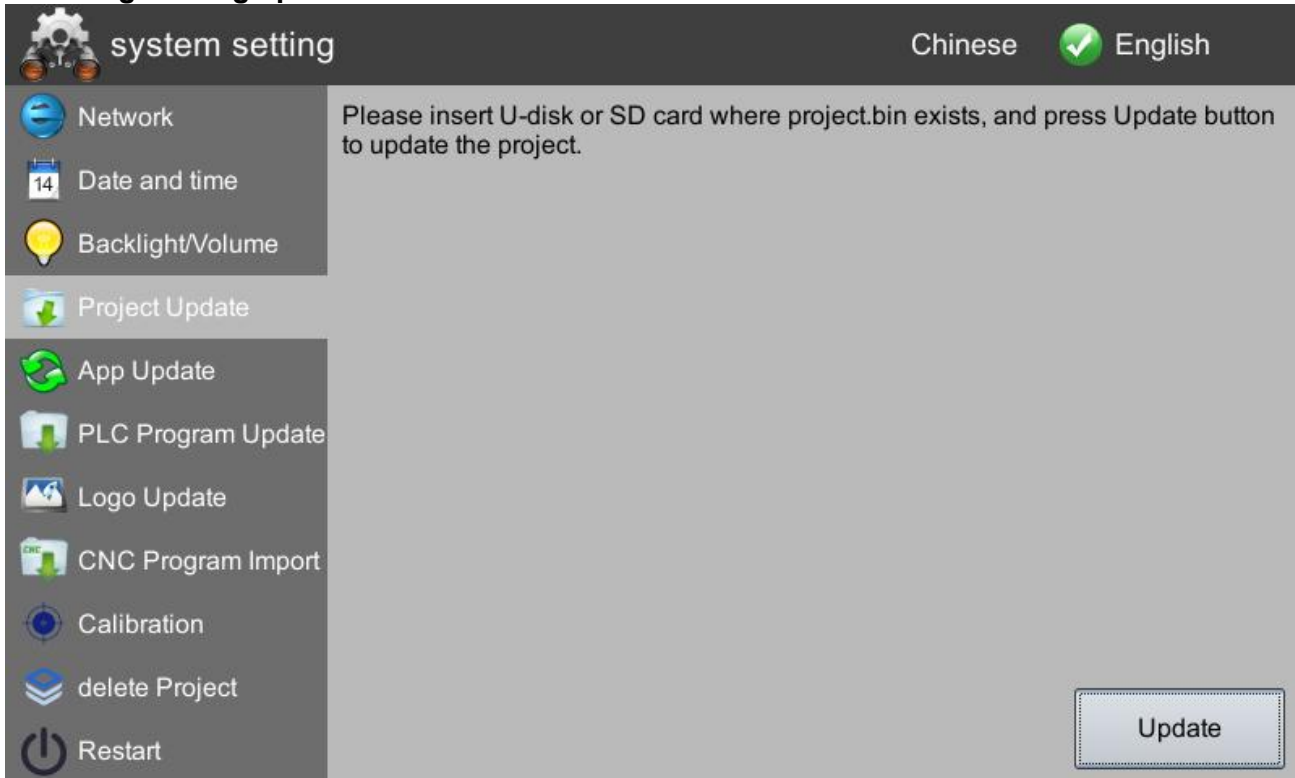
Note, please provide a battery for the touch screen to last, otherwise the system time will be reset every time the power is cut off.



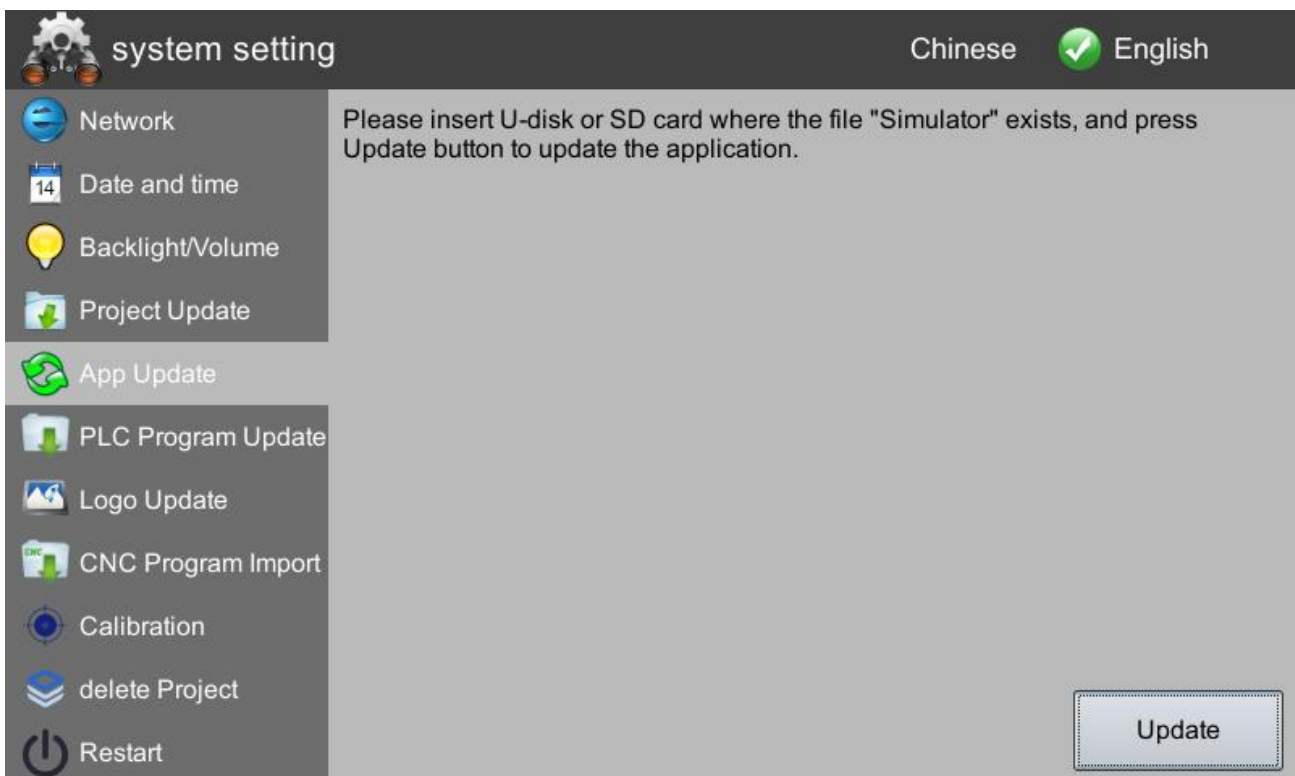
Backlight settings:

Drag the slider to set the backlight brightness, and the touch screen can remember it after saving.

Engineering update:

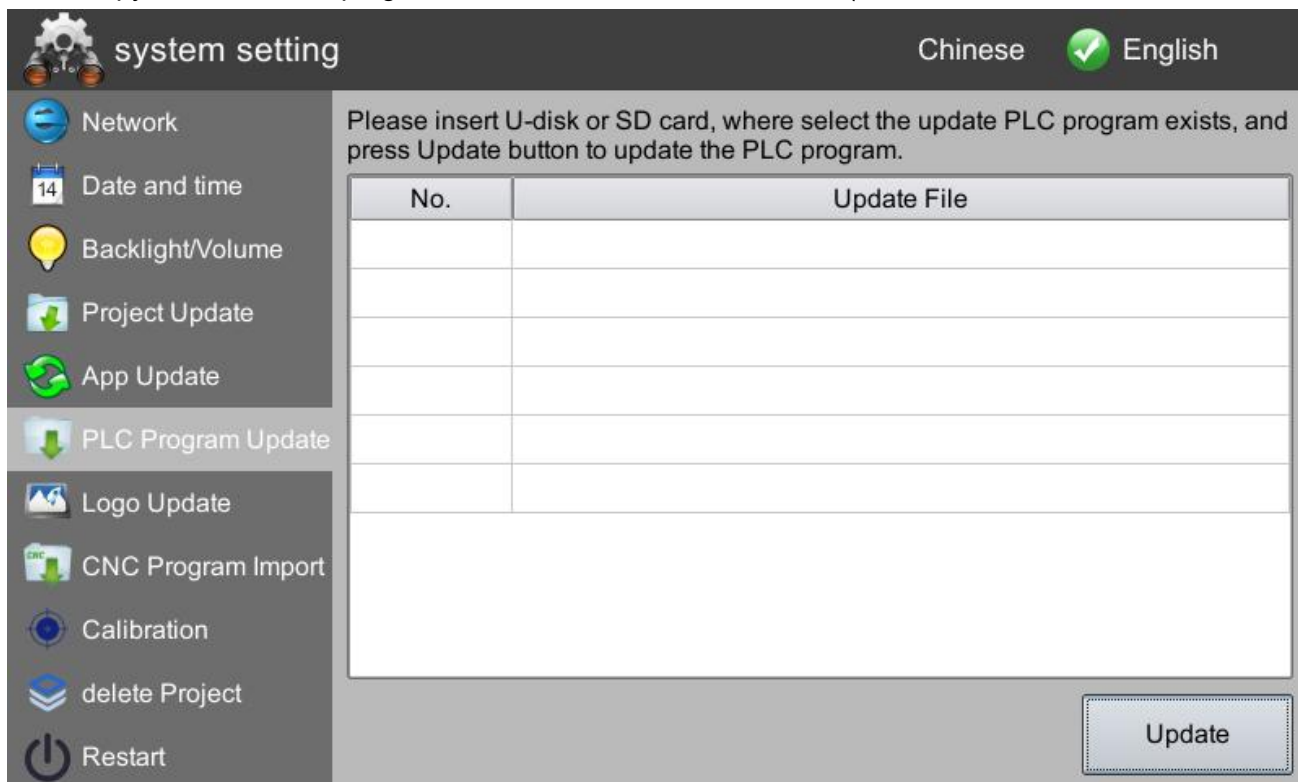


In the configuration software, open "Tools" - "Export project to U disk", export the project to a U disk or SD card (U disk is searched first), connect the touch screen, and click "Update" to update the project and resources.



Program updates:

Copy the lower-level program to a USB flash drive or SD card (the USB flash drive is searched

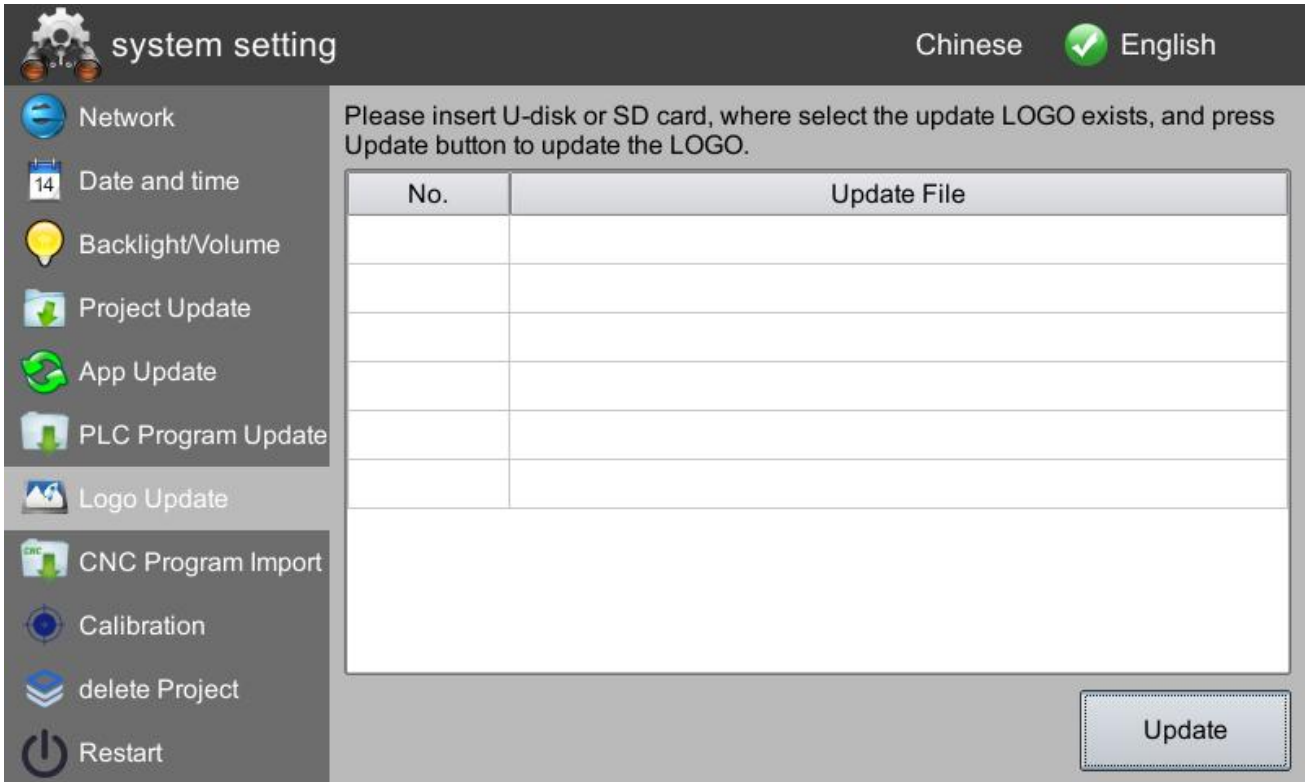


first), connect the touch screen, and click "Update".

PLC program update:

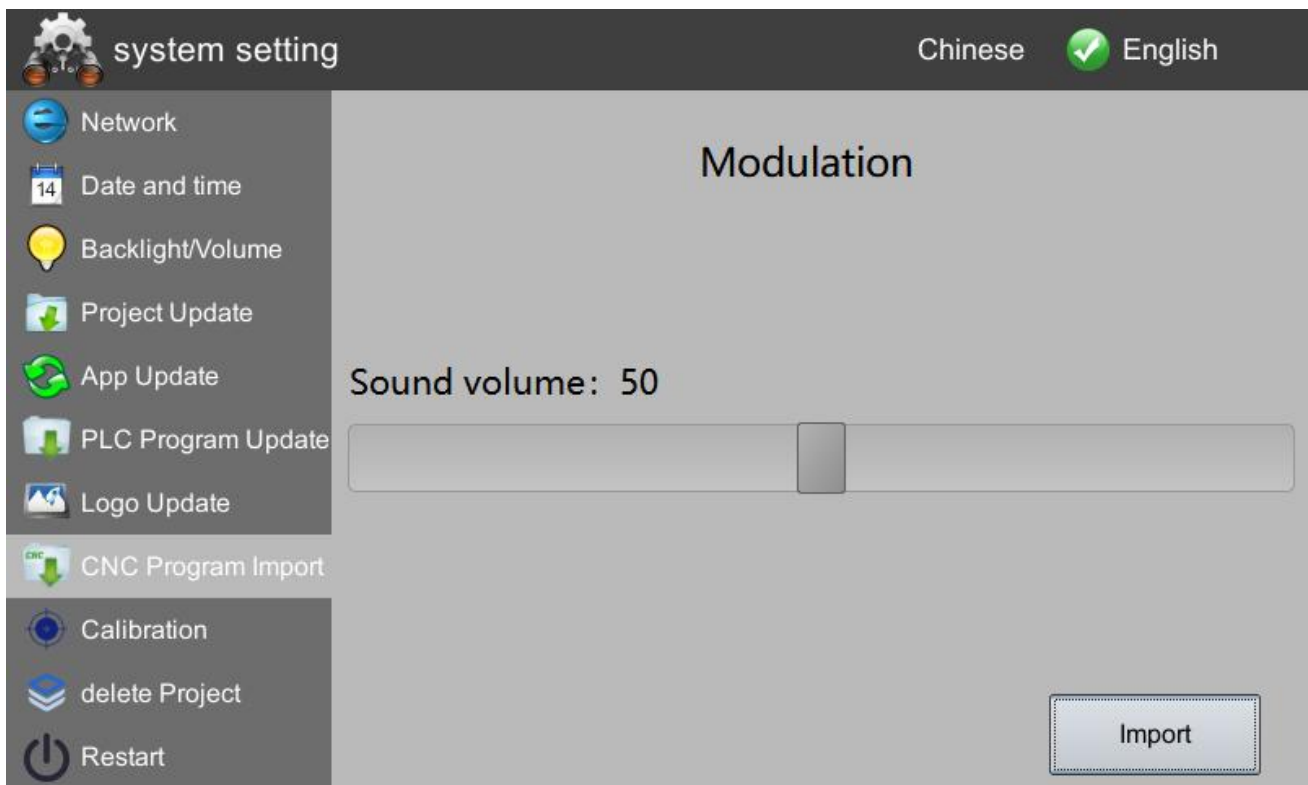
Copy the PLC program to a USB flash drive or SD card (the USB flash drive is searched first), select the file to be updated, and click "Update".

LOGO update :



Copy the startup image to a USB flash drive or SD card (the USB flash drive is searched first), select the file to be updated, and click "Update".

Sound settings:



Drag the slider to set the volume, and the touch screen can remember it after saving.

Touch screen calibration:

Click touch screen calibration to enter the calibration interface.

During calibration, the words "Touch Cross Center to calibrate" and the red cross icon appear on the screen. Touch the five red crosses in sequence and restart the touch screen after calibration.

Project deletion:

Click Project Delete, the screen prompts "Do you want to delete the project files?", click "Yes" to delete the project, click "No" to cancel the deletion.

Restart:

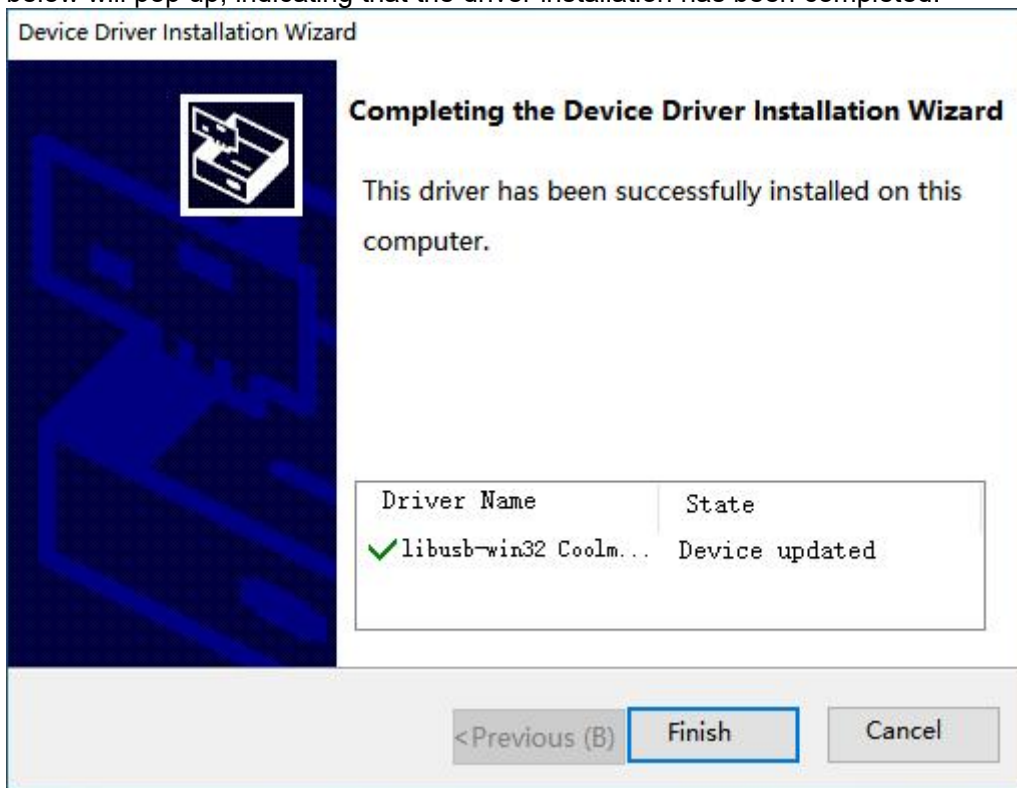
Click the restart button and the system will restart. Note: Please save all system configuration changes before using this function

2.5 USB driver installation

When installing the software, a driver installation prompt box will pop up.



If you click "Cancel", the USB driver will not be installed this time.
If you click "Next", the system will install the USB driver. After completion, the prompt box below will pop up, indicating that the driver installation has been completed.



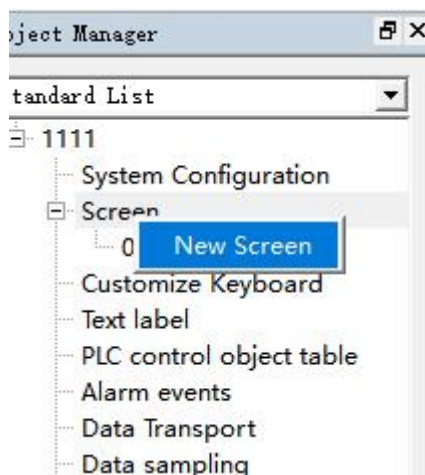
3. Configuration Software

3.1 Screen operation

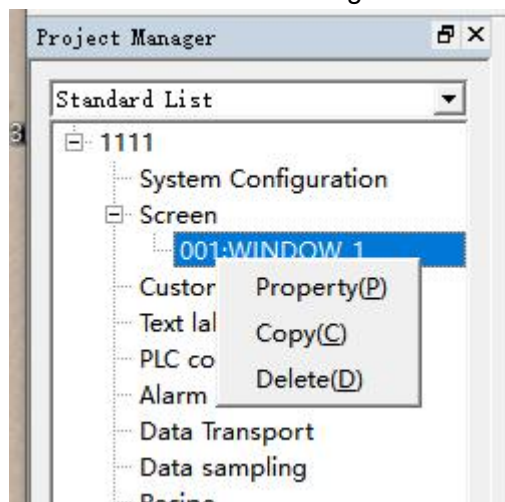
Screen is a basic element in configuration software. On the touch screen, the content of the current screen is a configuration picture, and you can switch between multiple configuration pictures in a project. In the configuration software, users can operate and set the configuration screen.

3.1.1 Create new screen

Method 1: In the project manager, right-click "Configuration Screen" and select the "New Screen" button to pop up the screen setting window.

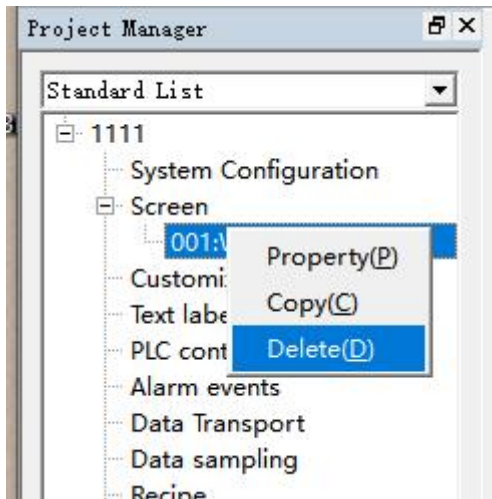


Method 2: In the project manager, right-click a configuration screen and select "Copy" to create a new identical configuration screen.



3.1.2 Delete screen

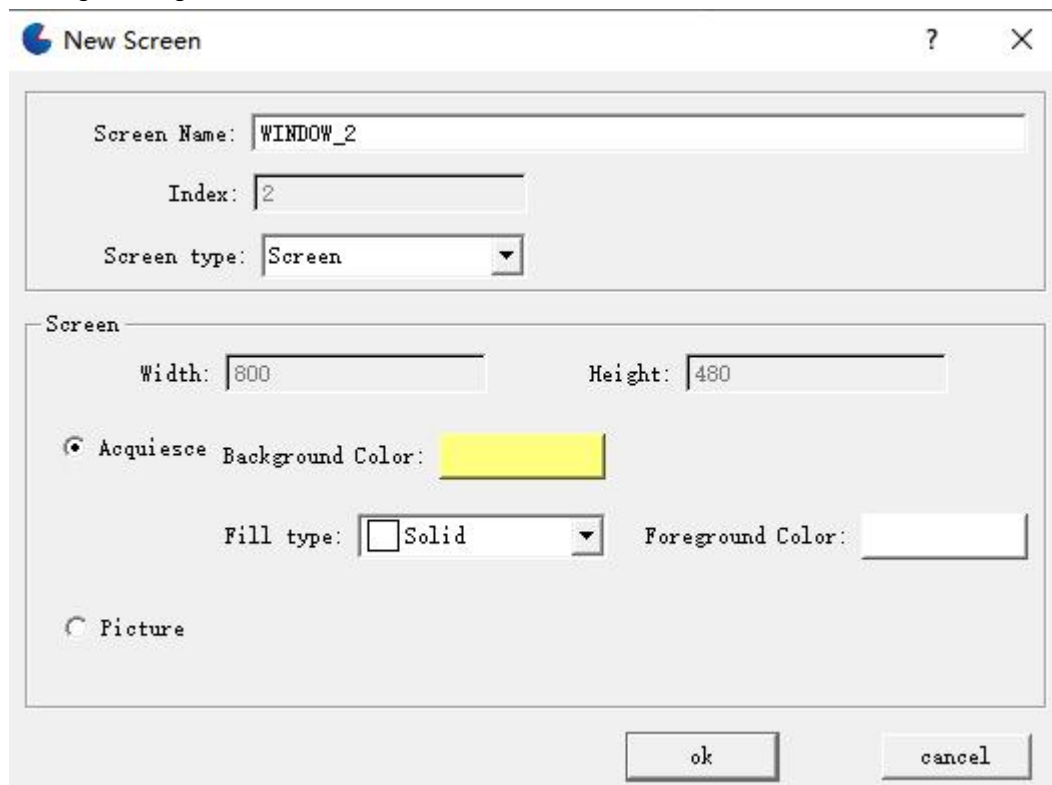
In the project manager, right-click a configuration screen and select "Delete" to delete the selected screen.



Note: After the configuration screen is deleted, it cannot be restored.

3.1.3 Screen settings

In the project manager, right-click on a configuration screen and select "Properties"; or right-click on a blank area of the configuration screen and select "Properties" to pop up the settings dialog box.



Screen name: Customize a name to identify the screen.

Screen type:

1. Basic screen: Displayed in the form of built-in screen.
2. Basic window: displayed in the form of a pop-up box.

Picture: You can select a picture on your computer as the background of the screen.

3.1.4 Screen zoom, grid display

Click the enlarge/reduce/restore button

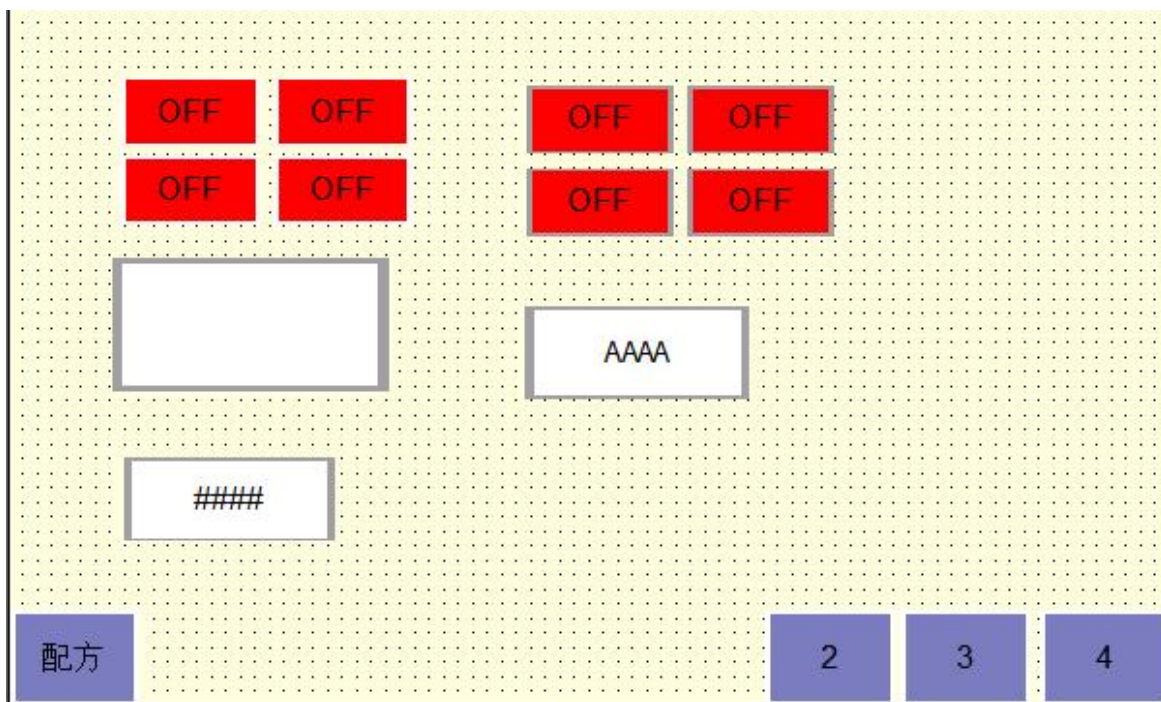


on the toolbar to control the image enlargement/reduction/restore. The zoom of the image does not affect the size of the components.

Click the grid button



on the toolbar to display the grid on the screen, and click it again to disappear. Displaying the grid does not add a grid background to the configuration screen, but is just an auxiliary when editing the screen.



3.2 Component editing

3.2.1 Group

A group is a package of multiple components or geometries into a whole. It should be noted that once the components are grouped, they lose their original characteristics. For example, if two bit state components are grouped into a whole, in the simulation state, these two components will lose their original click control bits. Register function.

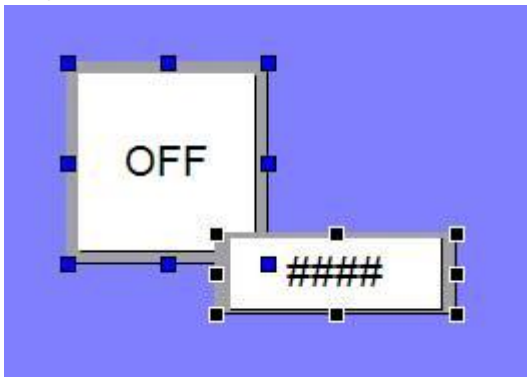
Group :

Select multiple components and click the group button on the toolbar.

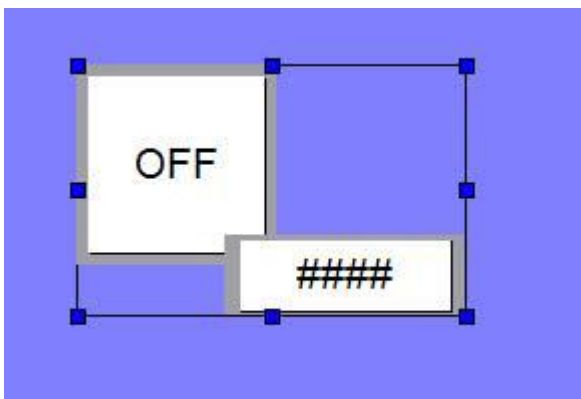
Cancel group :

Select the grouped component and click the Ungroup button on the toolbar to restore the component to its original state.

Original state of component:

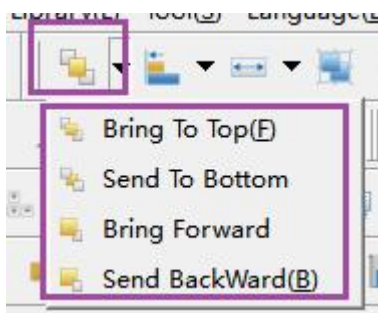


Group status:

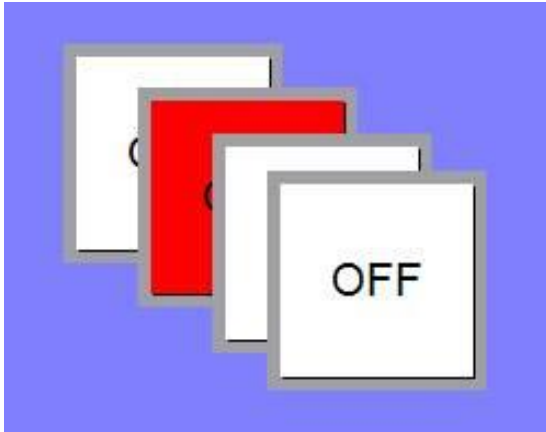


3.2.2 Hierarchy

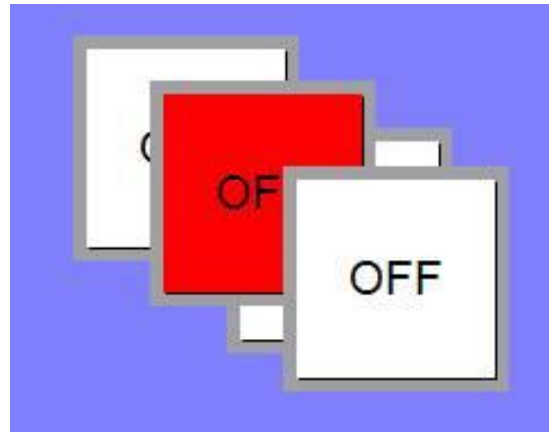
Each component has a hierarchy attribute. By default, the hierarchy of the component created later is higher than the previous one. The higher the hierarchy, the more it will be displayed on the upper layer. There are four hierarchical commands: move to the previous layer, move to the next layer, move to the bottom, and move to the top. The following uses the red component as the operation object to explain the meaning of each operation one by one.



Move to the previous layer: Select the element to be operated and click the "Move to the previous layer" button on the toolbar.

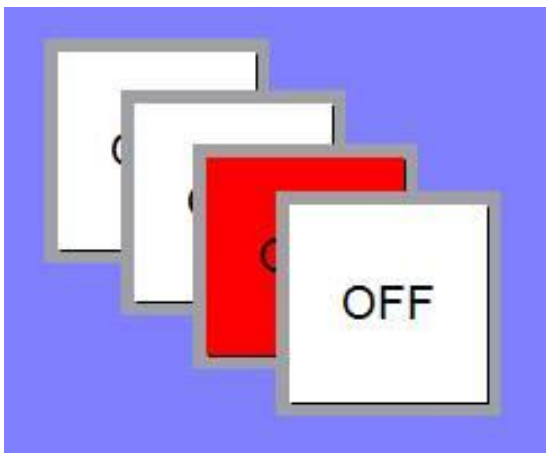


Before hierarchy moving

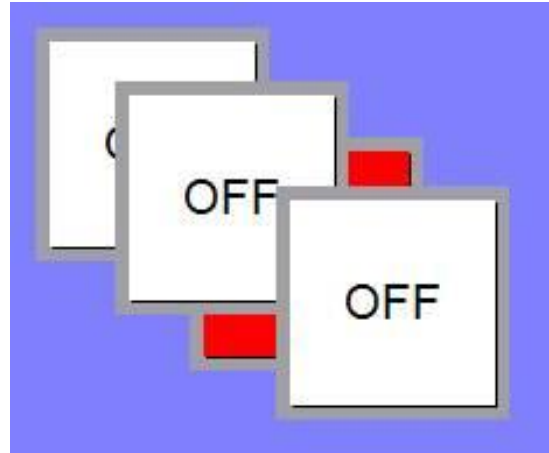


After hierarchy moving

Move to the next layer: Select the element to be operated and click the "Move to the next layer" button on the toolbar

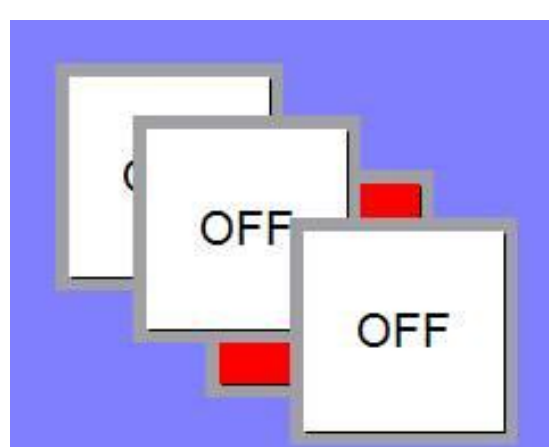
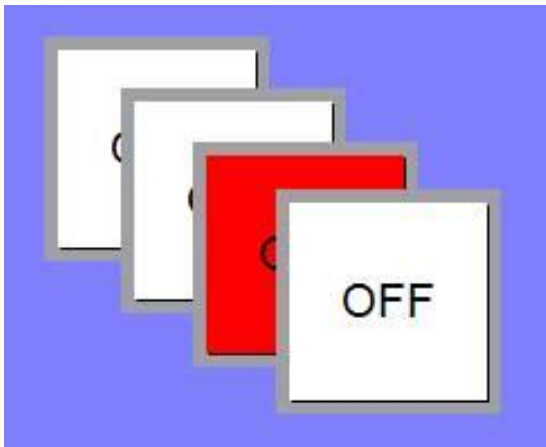


Before hierarchy moving



After hierarchy moving

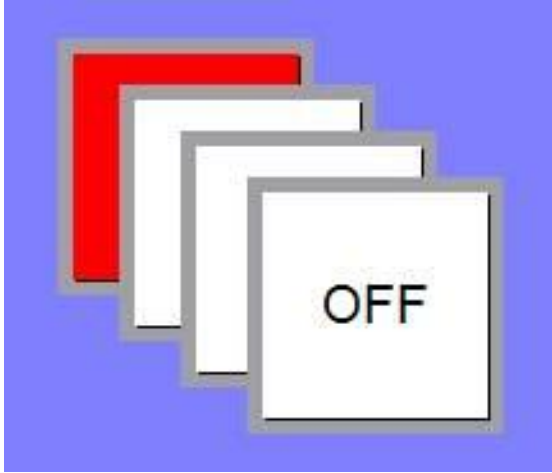
Move to the bottom: Select the element to be operated and click the "Move to the bottom" button on the toolbar.



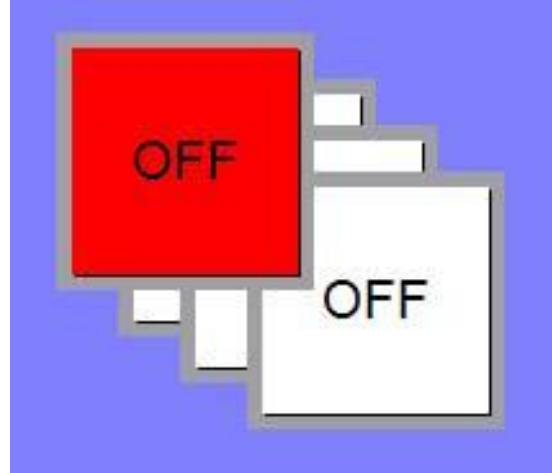
Before hierarchy moving

After hierarchy moving

Move to top: Select the element you want to operate on and click the "Move to Top" button on the toolbar.




Before hierarchy moving

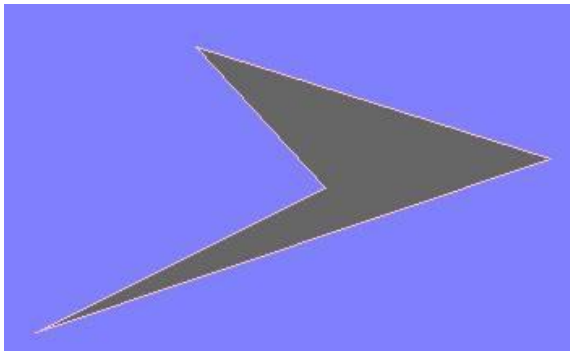


After hierarchy moving

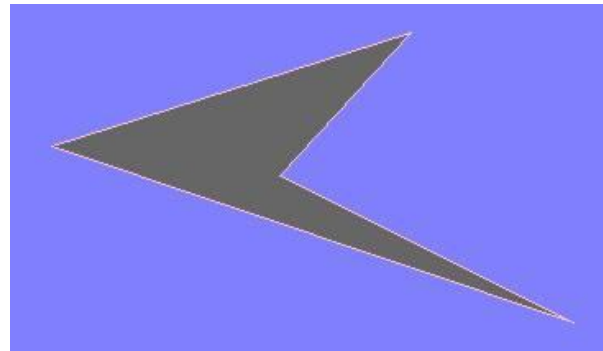
3.2.3 Flip

Flipping is only used for simple geometric components and can be divided into two types: horizontal flipping and vertical flipping.

Flip horizontal  :

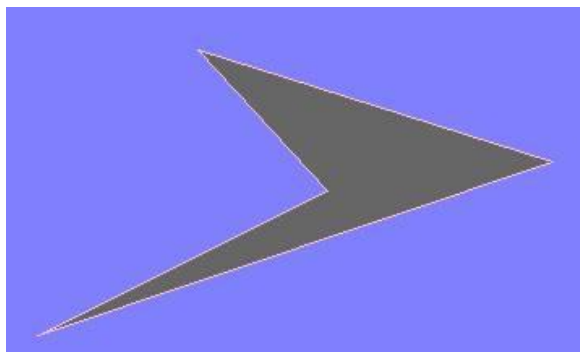


Before flipping

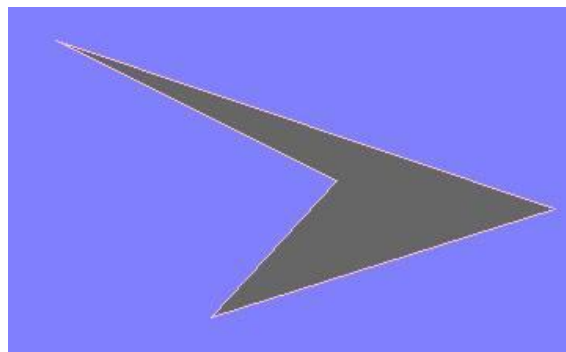


After flipping

Flip vertical  :



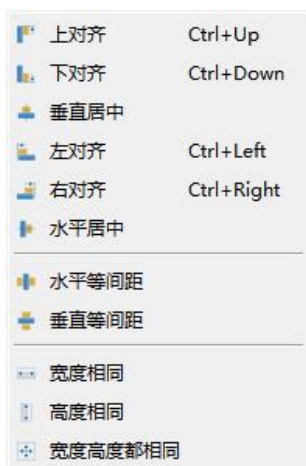
Before flipping



After flipping

3.2.4 Alignment

The alignment operation can align multiple selected components in various ways to make the arrangement more beautiful. Click the Alignment drop-down button on the toolbar to select an alignment.



Align top :



Before alignment



After alignment

Align bottom :

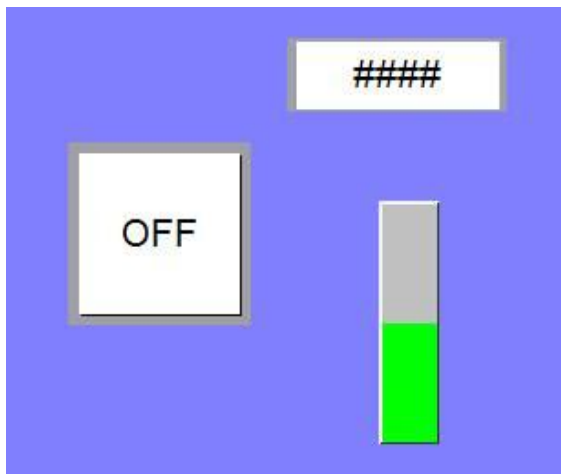


Before alignment

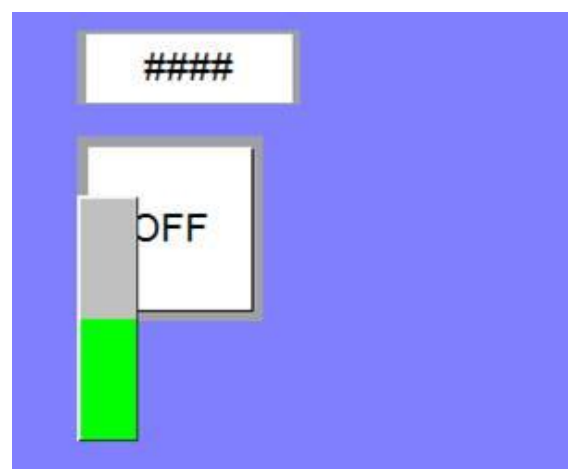


After alignment

Left aligned:

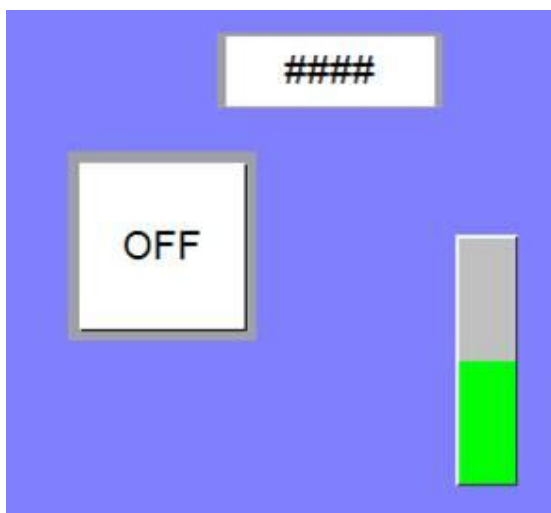


Before alignment

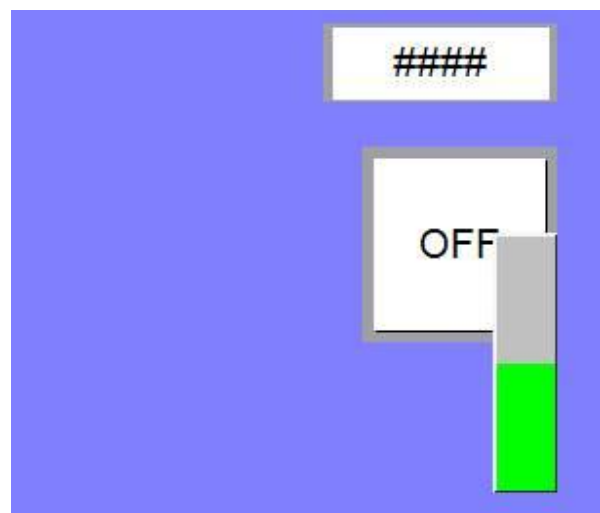


After alignment

Right aligned:

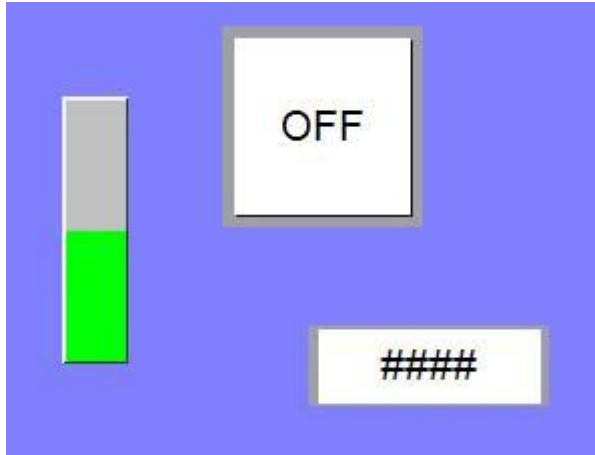


Before alignment

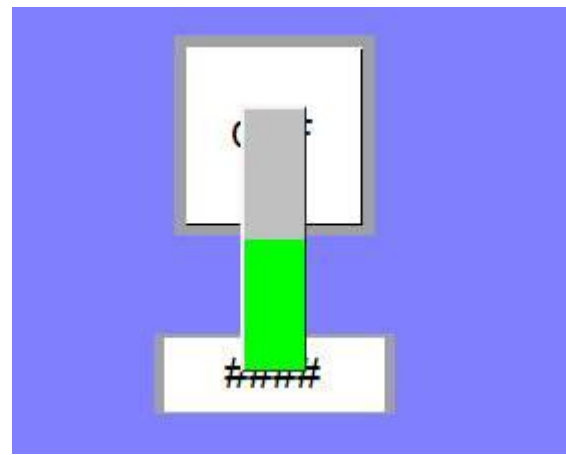


After alignment

Center vertically:

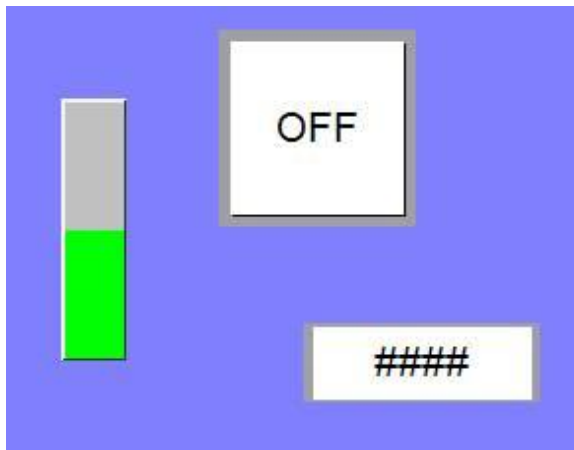


Before alignment

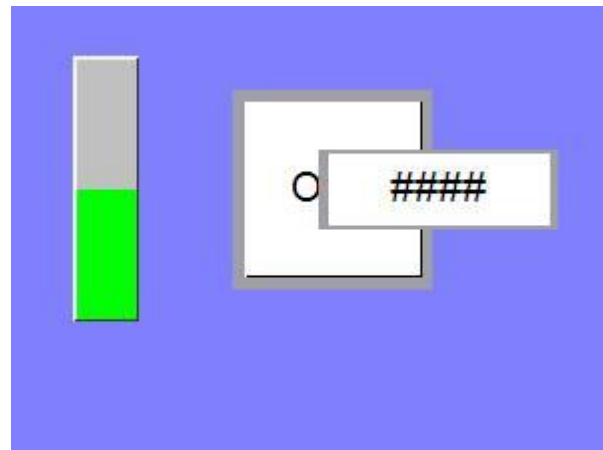


After alignment

Center horizontally:

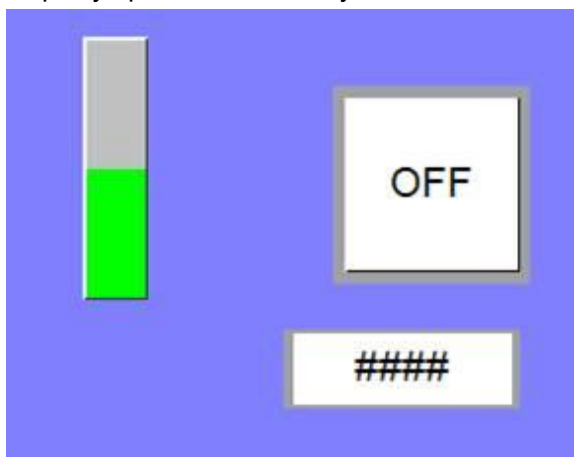


Before alignment

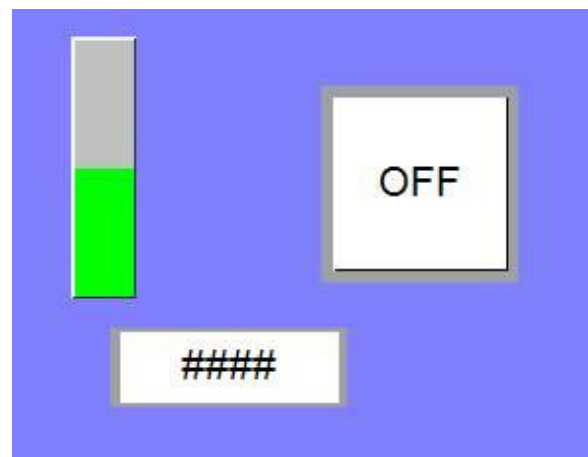


After alignment

Equally spaced horizontally:

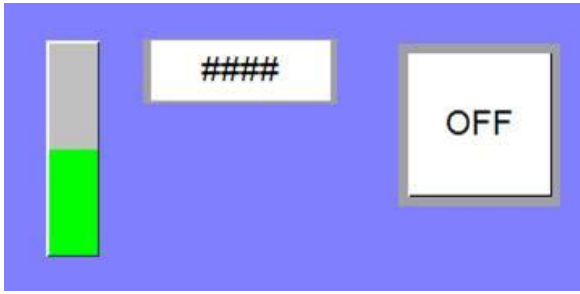


Before alignment

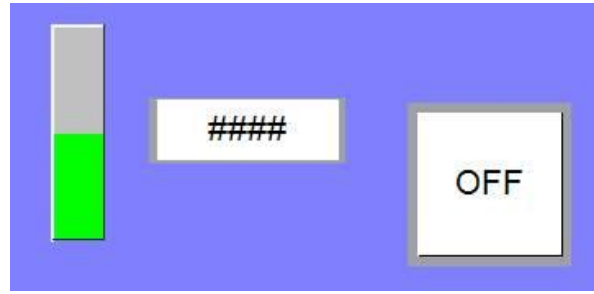


After alignment

Vertically equally spaced:

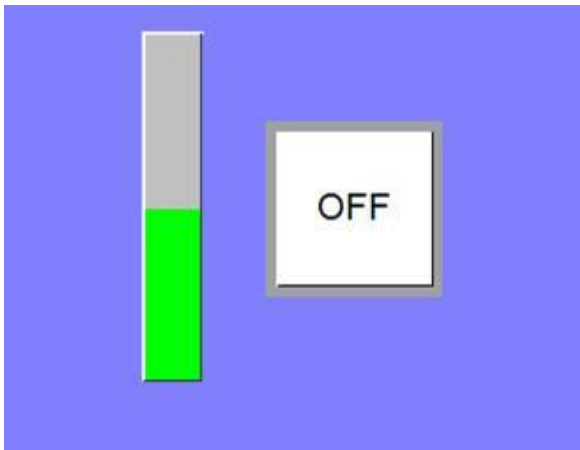


Before alignment

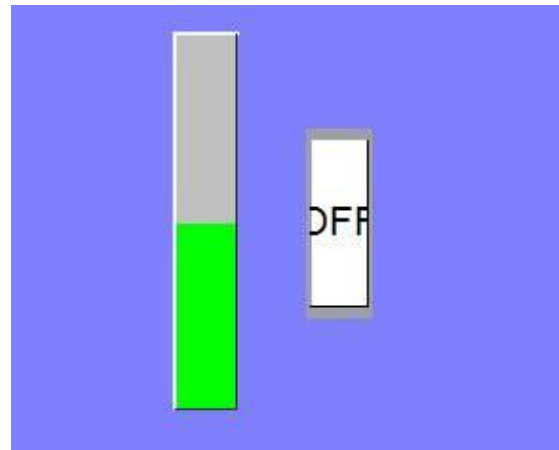


After alignment

Same width:

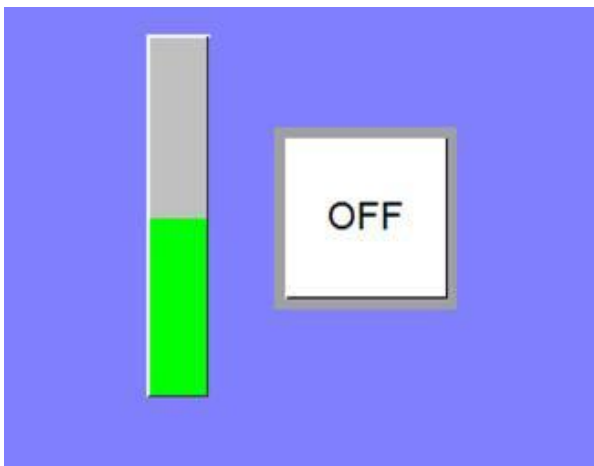


Before alignment

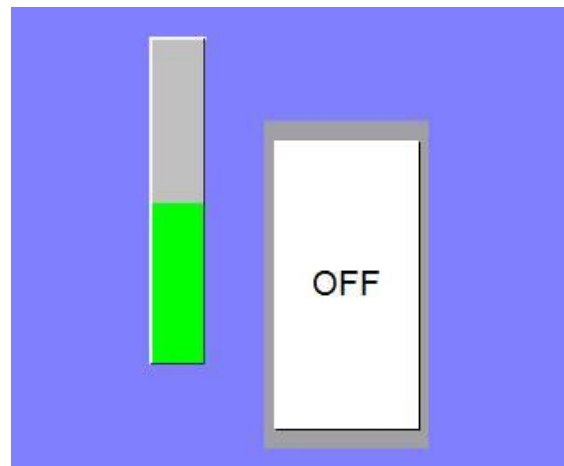


After alignment

Same height:

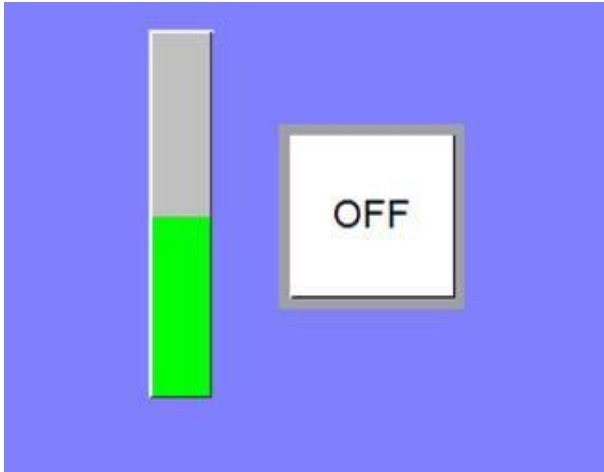


Before alignment

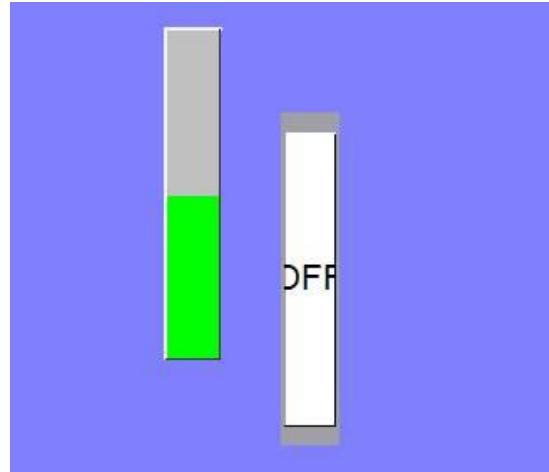


After alignment

Same width and height:




Before alignment

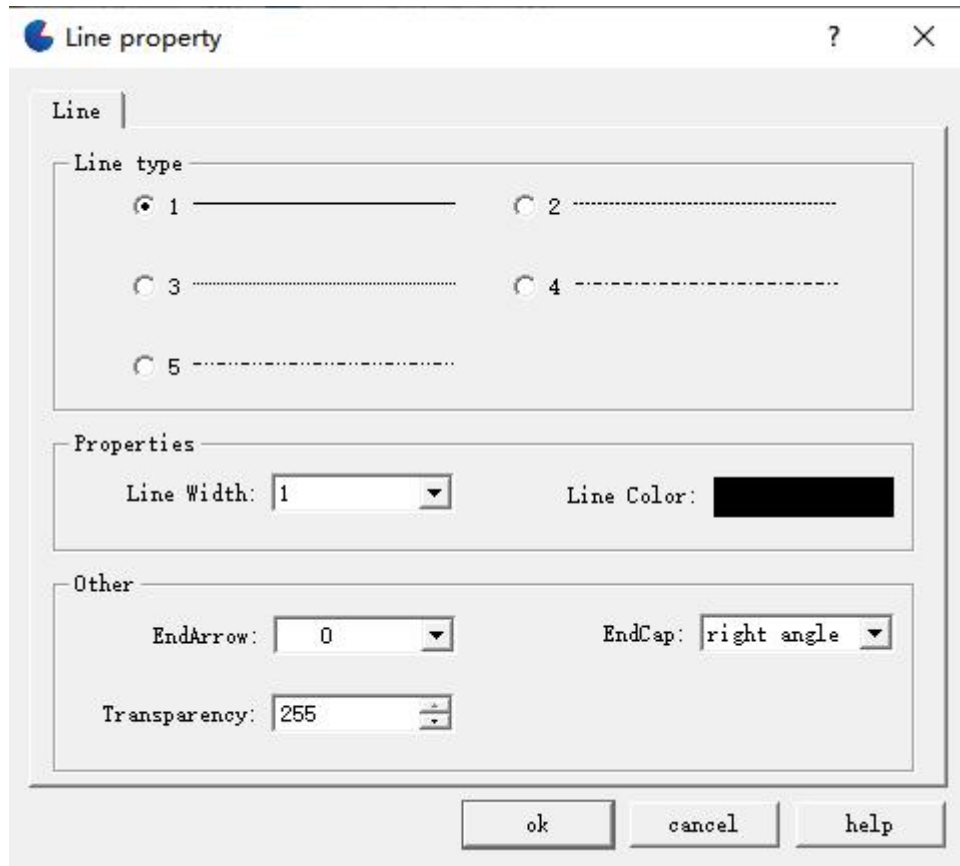


After alignment

3.3 Basic components

3.3.1 Straight line

After selecting the line option in the drawing or clicking the toolbar icon , the mouse in the drawing area will turn into a cross, and clicking will complete the addition of a line. Double click on the line component or right-click on the line and select Properties from the pop-up drop-down menu to enter the property settings of the line component.

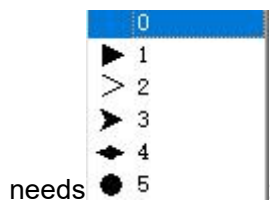


Line attribute settings

Line type selection: As shown in the picture above, you can choose 5 different line types;

Properties: Users can customize the line width and line color;


Others - end arrow: users can choose different shapes of line ends according to

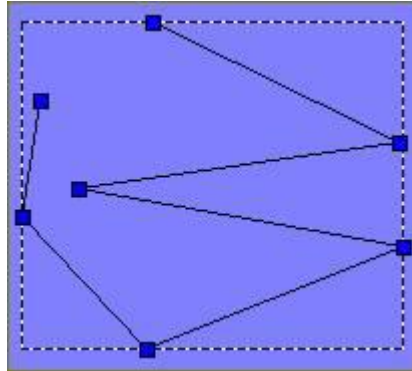


Others - endpoint shape: users can choose rounded or right-angled shapes as needed;

Others - Transparency: Setable range 0-255.

3.3.2 Polyline


After selecting the polyline option in drawing or clicking the toolbar icon , the mouse in the drawing area turns into a cross. Click the left mouse button continuously to draw the polyline as shown in the figure. When the drawing is completed, click the right mouse button.

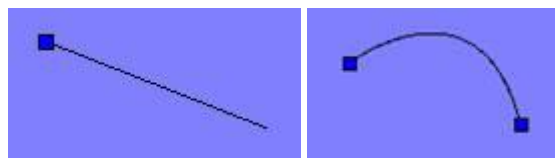


Polyline

Double-click the polyline component or right-click the selected polyline and select Properties in the pop-up drop-down bar to enter the property settings of the polyline component. The various attribute settings of the polyline can refer to the settings of the straight line.

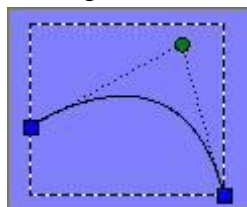
3.3.3 Curve

After selecting the Curve in Drawing option or clicking the toolbar icon , the mouse in the drawing area changes to a cross. At this time, click the left button to set the starting point of the curve, as shown in the left figure below. At this time, click and hold the left button anywhere to set the end point of the curve and slide the mouse to set the curvature of the curve, as shown on the right side of the figure below. Right-click to end the drawing of the curve.



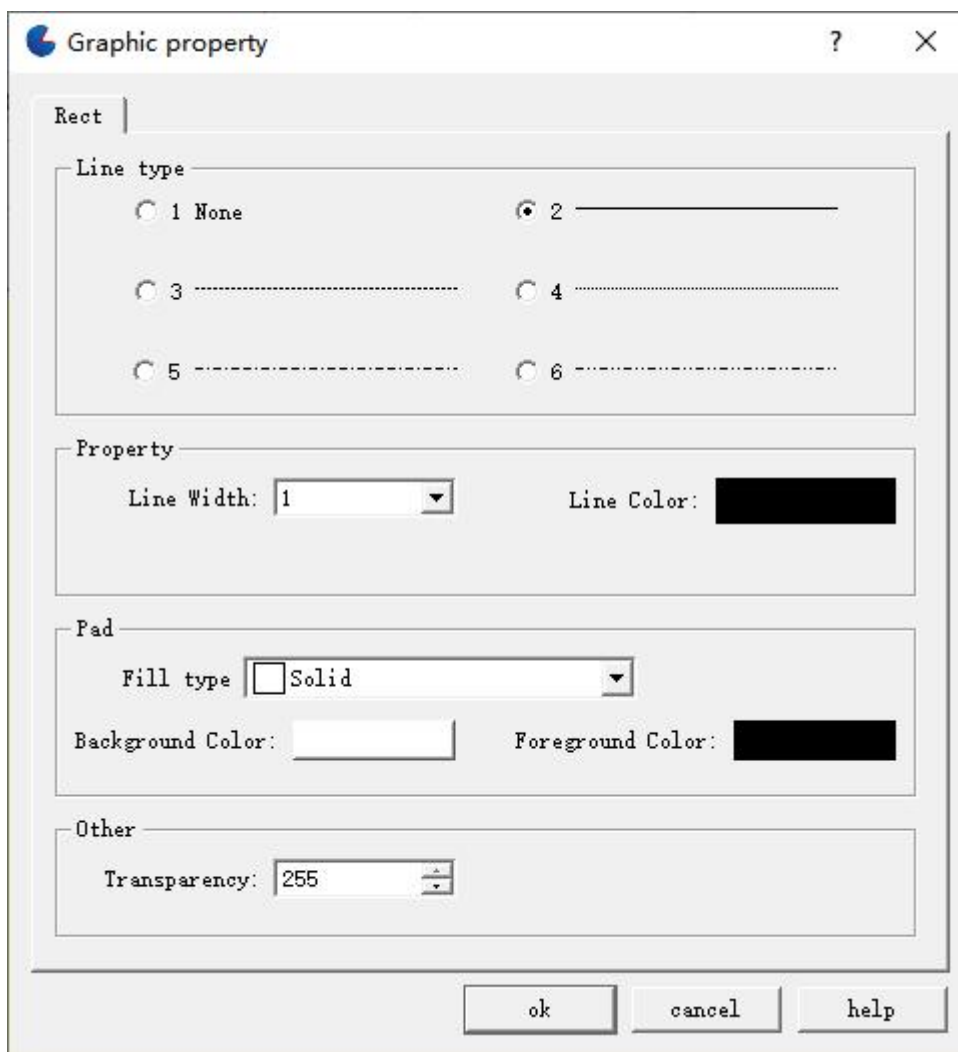
Curve drawing

After selecting the curve, as shown in the figure below, use the mouse to click on the green point in the figure and drag it to change the curvature of the curve.



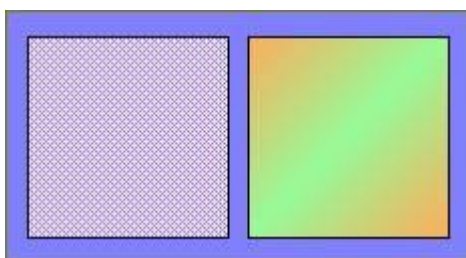
Select curve

Double-click the curve component or right-click the curve and select Properties in the pop-up drop-down bar to enter the property settings of the curve component.




Rectangle property settings

By changing the fill style and using the background and foreground colors, you can make the rectangle fill color more vivid and vivid.

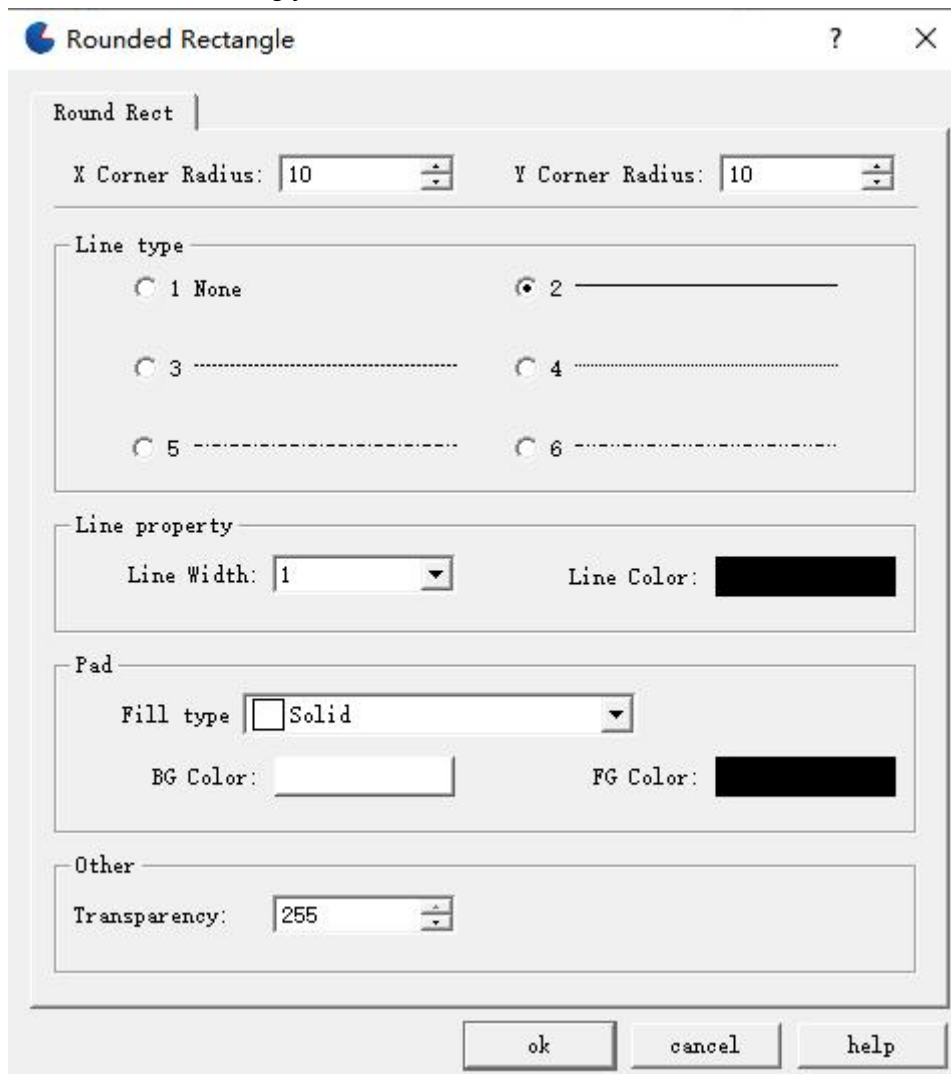


Rectangle fill effect

3.3.6 Rounded rectangle

After selecting the rounded rectangle option in drawing or clicking the toolbar icon , the mouse in the drawing area changes to a cross. At this time, clicking the left mouse button will generate a rounded rectangle. The width and height adjustment operations of the component refer to the rectangle.

Double-click the component or right-click the component and select Properties in the pop-up drop-down bar to enter the property settings of the rounded rectangular component. As shown below. The curve radius, border, line width, fill color, transparency, etc. of the rounded rectangle can be set accordingly.




Rounded rectangle property settings



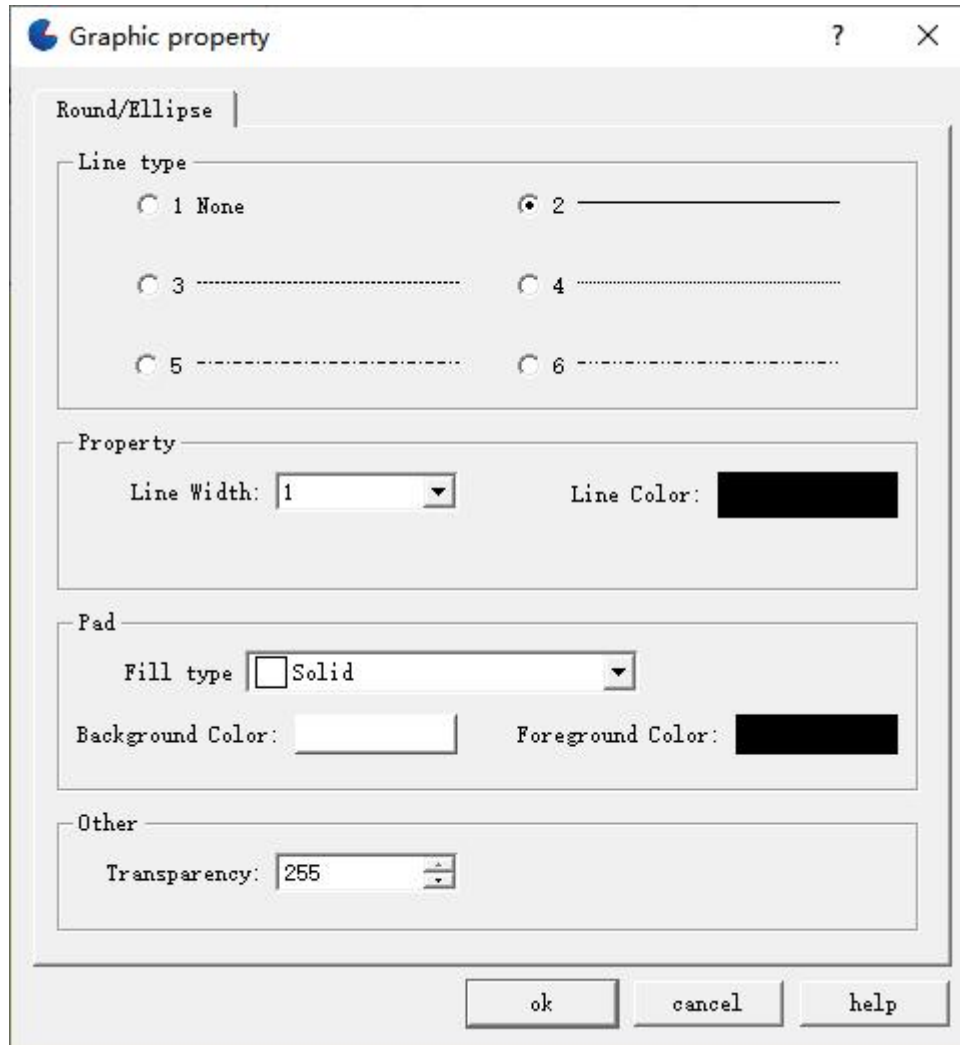
Rounded Rectangle

3.3.7 Oval

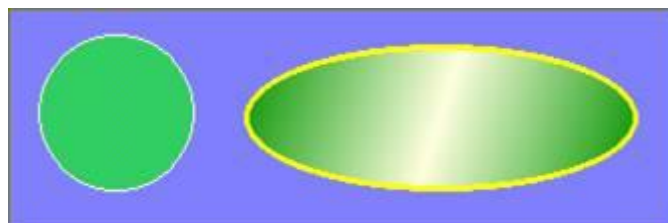
After selecting the Ellipse in Drawing option or clicking the toolbar icon , the mouse in the drawing area changes to a cross. At this time, clicking the left mouse button will generate

an ellipse. The operation reference rectangle for adjusting the width and height of the component

Double-click the component or right-click the component and select Properties in the pop-up drop-down bar to enter the property settings of the elliptical component. As shown below. The border, line width, fill color, transparency, etc. can be set accordingly.




Circle/ellipse attribute settings

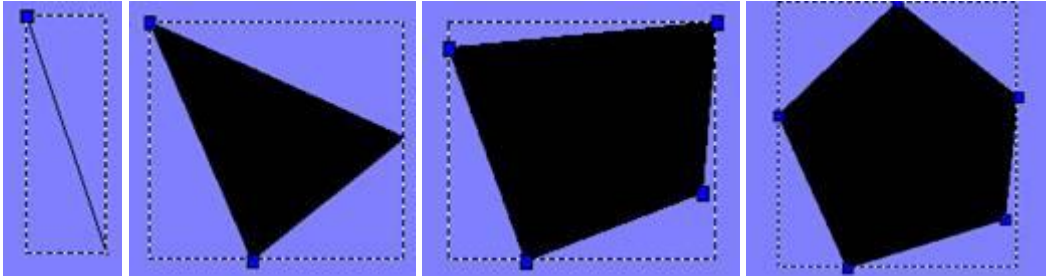


Circle/ellipse

3.3.8 Polygon

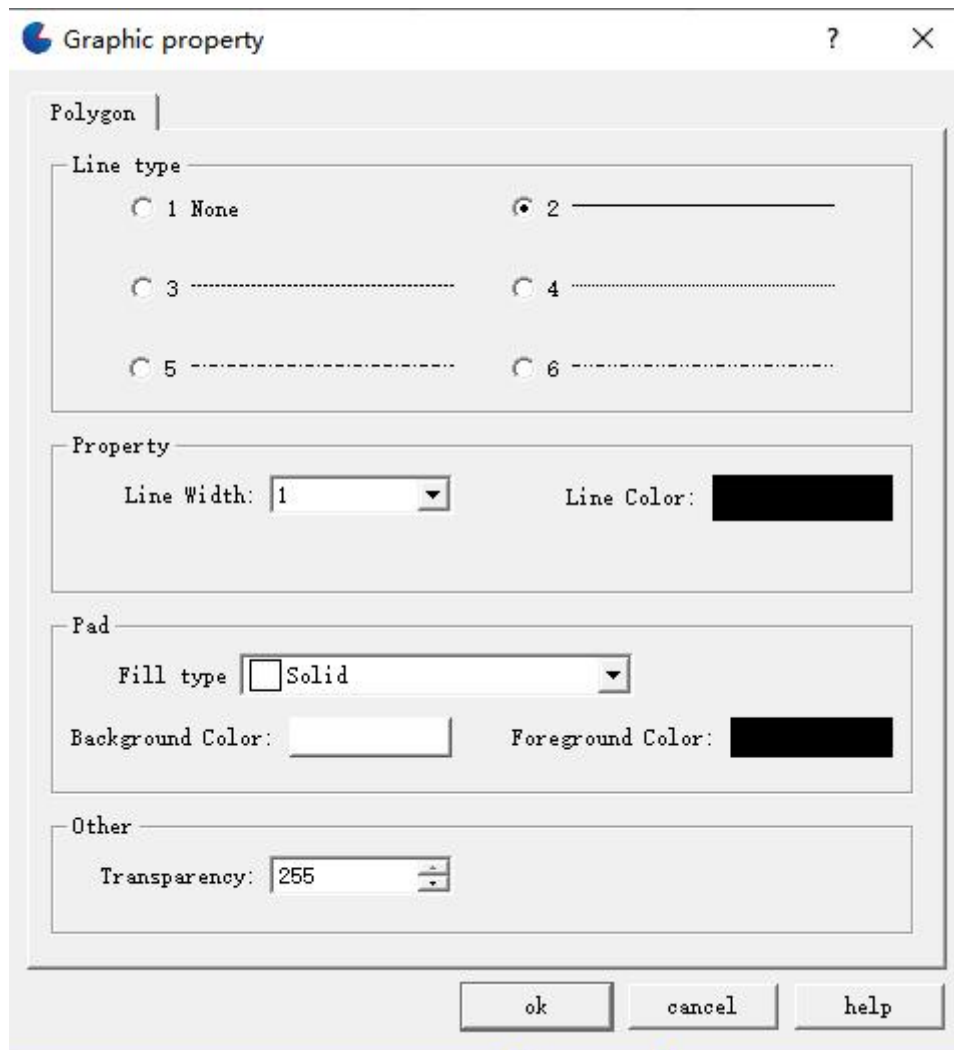
After selecting the polygon option in drawing or clicking the toolbar icon , the mouse in the drawing area changes to a cross. At this time, click the left mouse button to set a point of

the polygon. If you click the left button continuously, the angle of the polygon will increase with the number of clicks. Right click the mouse to end drawing.




Polygon drawing

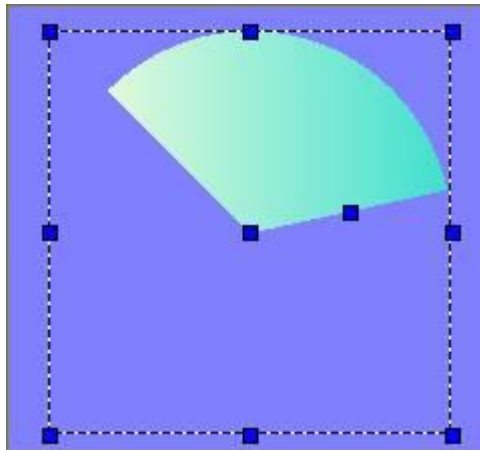
Double-click the component or right-click the component and select Properties in the pop-up drop-down bar to enter the property settings of the polygon component. As shown below. The border, line width, fill color, transparency, etc. can be set accordingly.



Polygon Property Settings Dialog

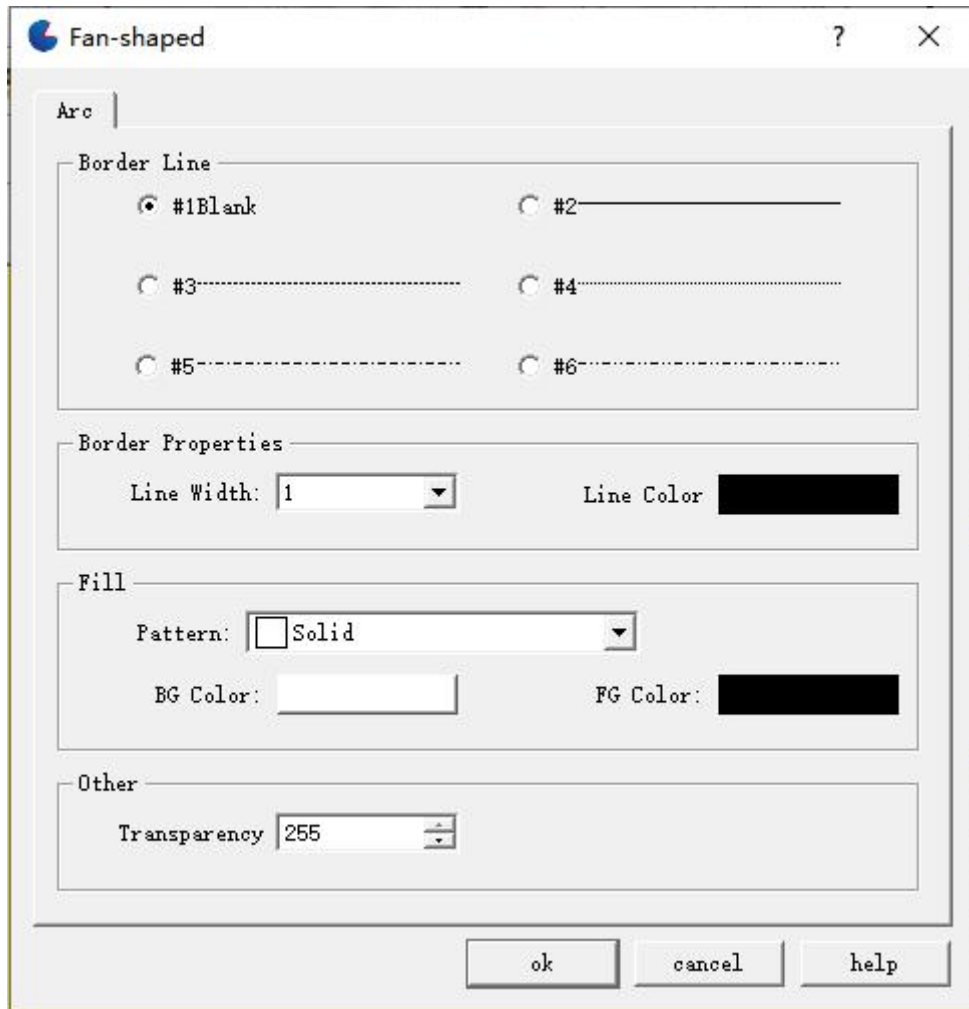
3.3.9 Sector

After selecting the sector option in the drawing or clicking on the toolbar icon , the mouse in the drawing area will turn into a cross, and clicking the left mouse button will bring up a sector component. By dragging the corresponding blue dots in the graph, the size of the fan-shaped area can be changed




Sector

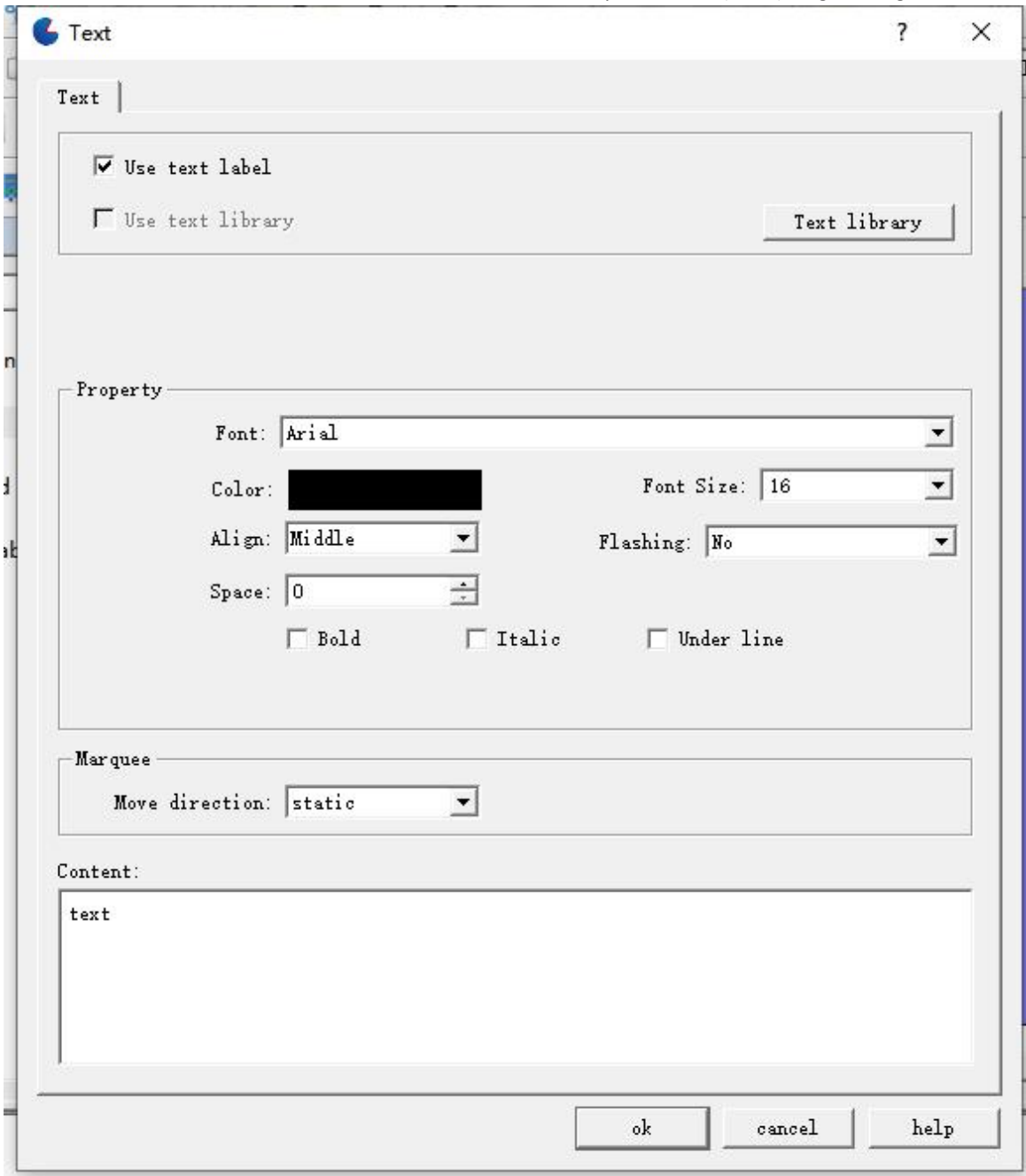
Double-click the component or right-click the component and select Properties in the pop-up drop-down bar to enter the property settings of the sector component. As shown below. The border, line width, fill color, transparency, etc. can be set accordingly.



Sector Property Settings Dialog Box

3.3.10 Word

After selecting the text option in drawing or clicking the toolbar icon , the text properties dialog box will pop up.



Text Properties Dialog

Users can use text components to input text themselves, or call the text label library.


1. Use text labels

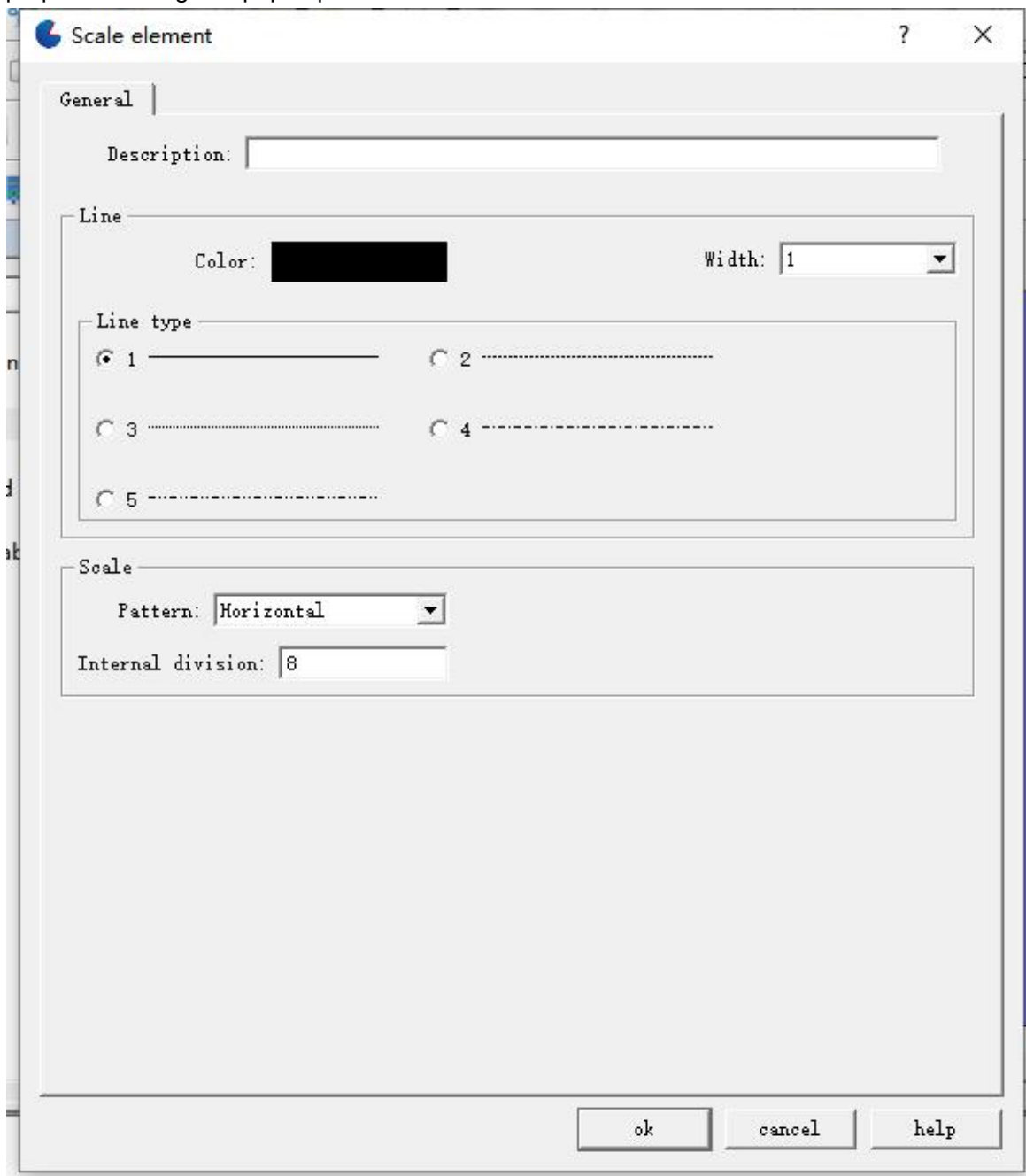
Attributes	Explanation
Alignment	There are three methods: "left alignment", "center alignment" and "right alignment"
Flash	"No": No flashing "Color Switch": text color flashes "Text Reveal": The text itself flashes
Moving direction	There are three ways: "no move", "move to the left" and "move to the right"

2. Use text tag library

Please refer to the text tag library for use.

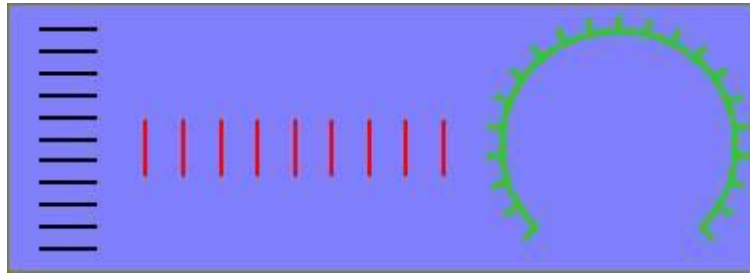
3.3.11 Scale

After selecting the scale option in the drawing or clicking the toolbar icon , the scale properties dialog box pops up.




Scale Properties dialog box

Users can set the scale color, width, line type, style (horizontal, vertical, upper semicircle, lower semicircle, full circle, 3/4 circle) and the number of scale bars (internal division).



Different styles of scales

3.3.12 Sheet

After selecting the table option in the drawing or clicking the toolbar icon , the table properties dialog box pops up.

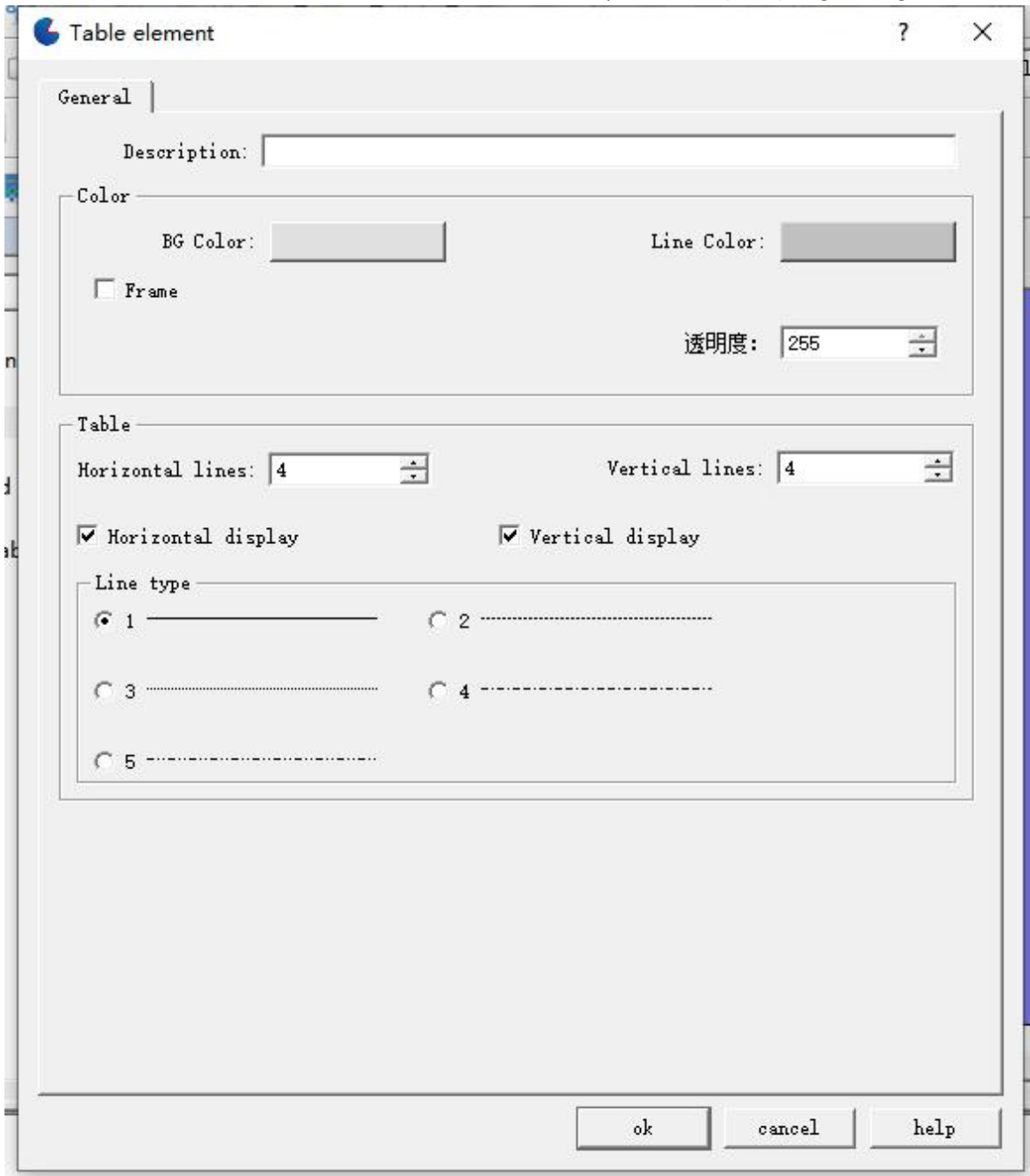


Table Properties Dialog Box

Users can set the background color, number of horizontal and vertical rows, line type and color of the table and other attributes. After the settings are completed, click the left mouse button in the drawing area to form a table component.

This type of table component is an image object and cannot add text or pictures to cells. If users need to add text and pictures, they can use a table as the underlying background and add corresponding text labels or static images and other components to the table, as shown in the figure below.




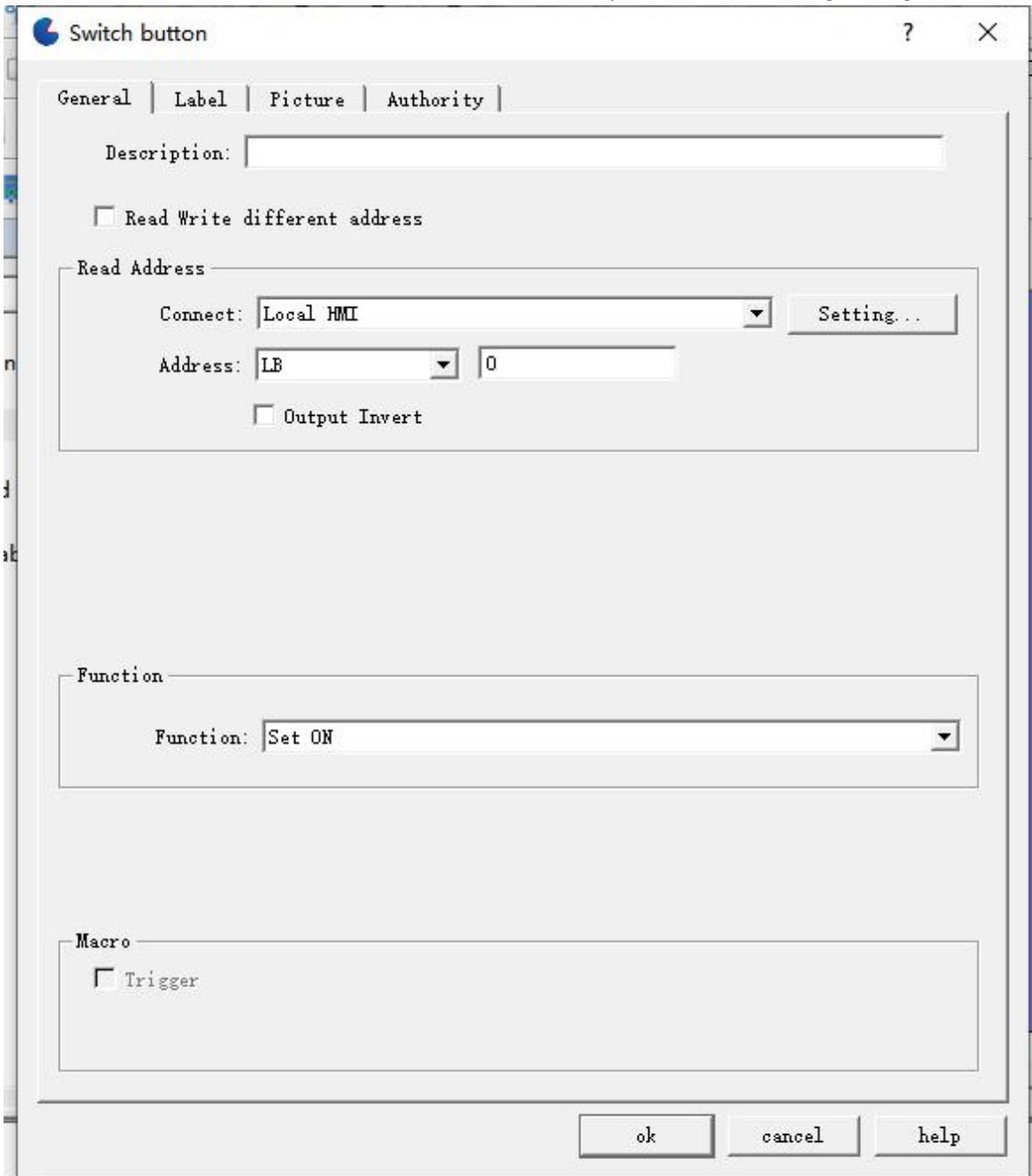
	Coolmay	

Table element

3.4 Advanced components

3.4.1 Bit switch element

The bit switch component is the most basic and commonly used component, which can set the register address bound to it to two states: ON or OFF. Click on the position switch icon  on the toolbar, and a settings dialog box will pop up:



Generally speaking, the read and write addresses of the switch should be made the same. If "Read Write to Different Address" is checked, two address bits can be set separately for reading and writing.

Output reverse phase: If checked, when the position switch is in the ON state, the output is in the OFF state. The opposite is also true.

Function type:

1. Set to ON: Only set to the ON state.
2. Set to OFF: Only set to the OFF state.
3. Switching switch: Switch back and forth in the ON/OFF state.
4. Reset type: When pressed, set to ON state; Release and return to the OFF state.

Macro instruction: When the current scene contains macro instructions, the "Trigger Macro Instruction" checkbox takes effect, as shown in the following figure. At this point, a macro

instruction can be selected to execute under the selected trigger

Macro instruction

Trigger macro instruction


Macro instruction : Macro0

Trigger conditions : OFF<->ON

condition.

3.4.2 Bit status display component

The bit status display component is similar to the bit switch, except that the bit switch can not only read the bit address but also write it, while the bit status display component can only read

the bit address. Click on the icon  on the toolbar and a settings dialog box will pop up:

Switch lamp button

General | Label | Picture | Authorize

Description:

Read Address

Connect: Local HMI

Address: LB

Output reverse

flicker

type: None

ok cancel help

The flashing mode of the component can be set in the flashing box, with the following options:

1. None

When the state is 0, display the image: When it is OFF, the image flashes back and forth between the OFF state and the ON state.


3. When the status is 1, display the image: When it is ON, it flashes back and forth between the ON state image and the OFF state.

4. Blinking when in 0 state: Blinking in a hidden/displayed manner when in OFF state.

5. Blinking when in state 1: Blinking in a hidden/displayed manner when in ON state.

3.4.3 Multi state switching element

Multi state switching elements are extensions of position switching elements. A bit switch only has two states: on and off, while a multi-state switching element can specify multiple states (up to 256). Therefore, reading and writing addresses cannot be bound to a single bit address

register, but rather a word address register (such as LW type). Click the button  on the toolbar and a settings dialog box will pop up:

Method: There are two options: data and LSB.

Data: The input data of the component is the data output to the register.

LSB: Take the first non-zero bit of the value in the register as the current state, such as:

000000 (0) is in state 0

00000001 (1) is status 1

000100010001 (17) is status 1

10000000 (128) is status 8

Properties: There are four options: keyboard input, input constant, increment, and decrement.

Keyboard input: Pop up a keyboard input box.

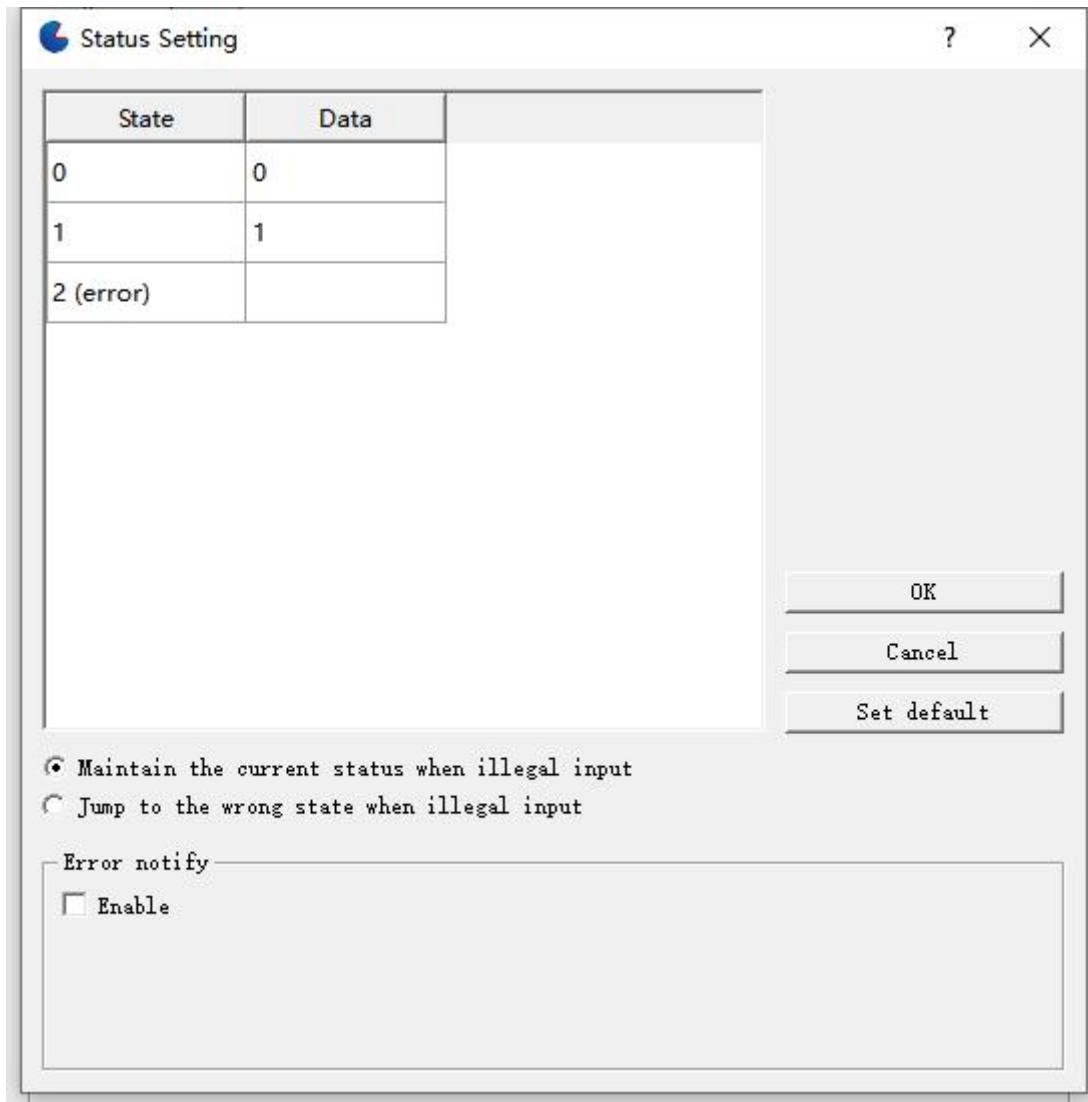
Input constant: Specify a constant value.

Progressive addition: Add 1 each time.

Decrement: Subtract 1 each time.


Loop: If enabled, it can loop when the state value boundary is exceeded when incrementing or decrementing.

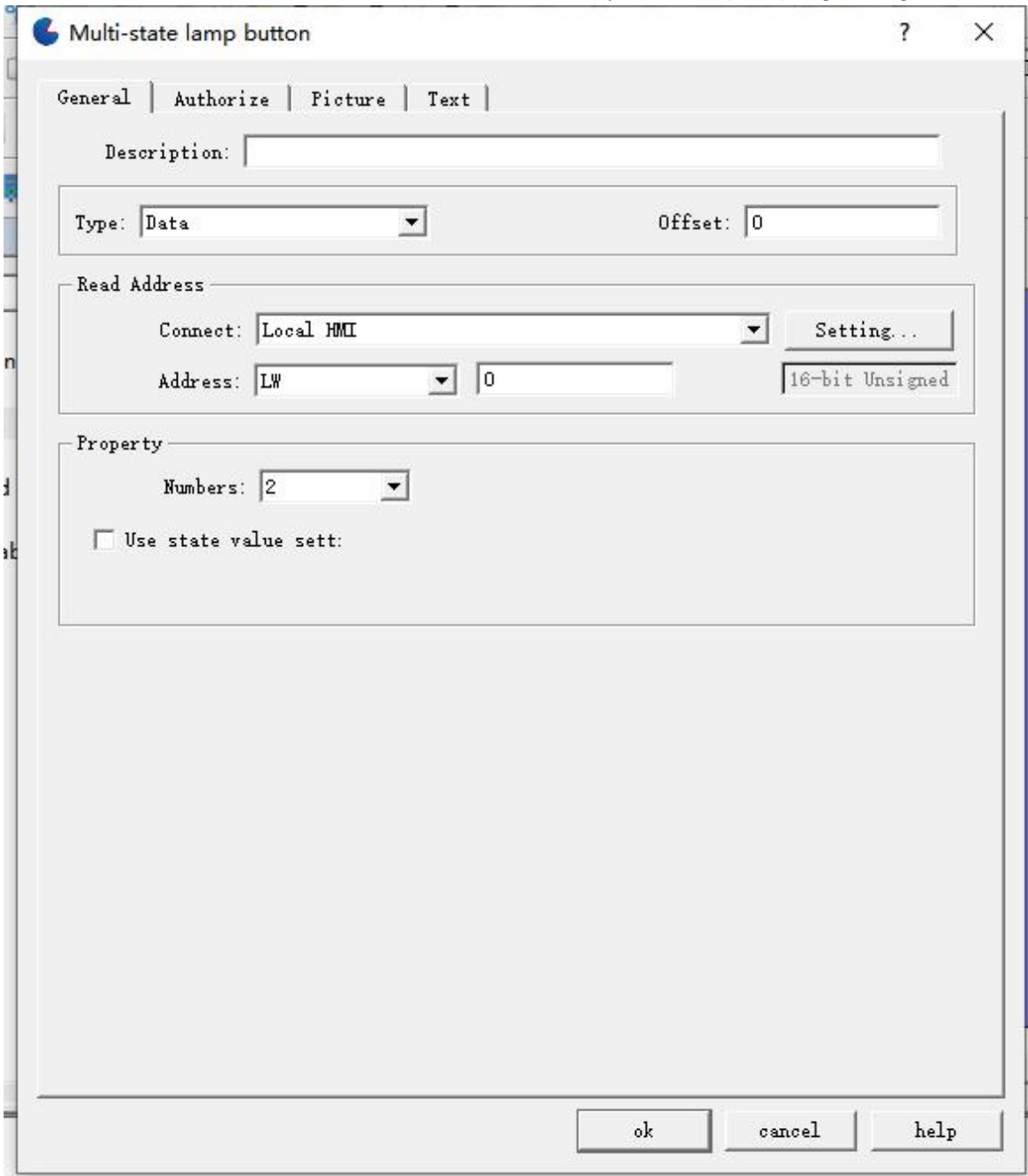
Use Status Value Setting: The following dialog box pops up, where each status value can be bound to a custom data. When the component switches between different states, the output value is the custom data.



3.4.4 Multi state display components

Multi state display components are generally used in conjunction with multi state switching


components. Click the button  on the toolbar and a settings dialog box will pop up:

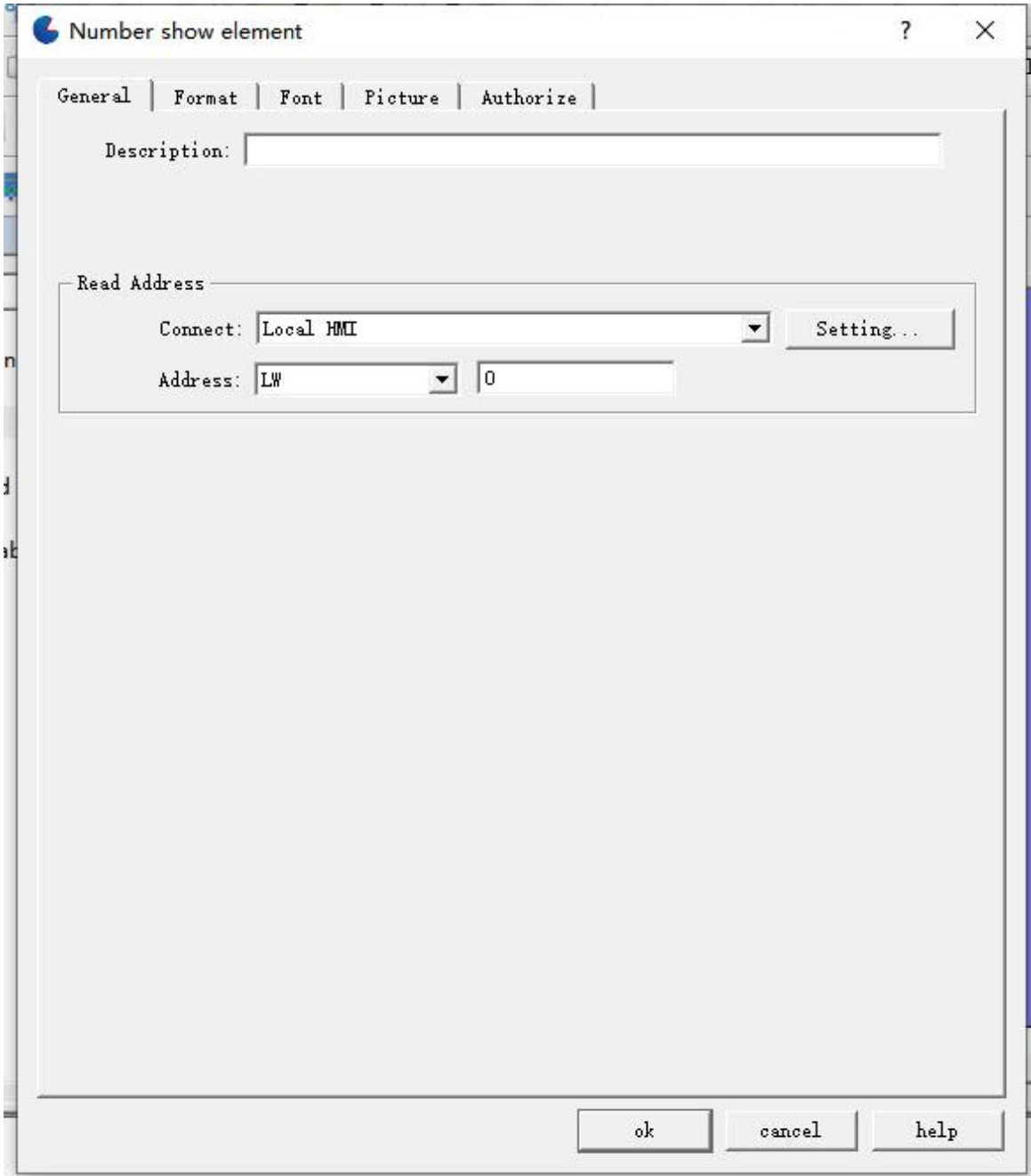


Method: There are three options: data, LSB, and cycle transition state. If "periodic transition state" is selected, the automatic transition frequency can be specified, and the component will increase its state value automatically at this frequency during simulation.

3.4.5 Numerical display components

The numerical display component displays data in registers in numerical form. Click on the


icon  on the toolbar and a settings dialog box will pop up:

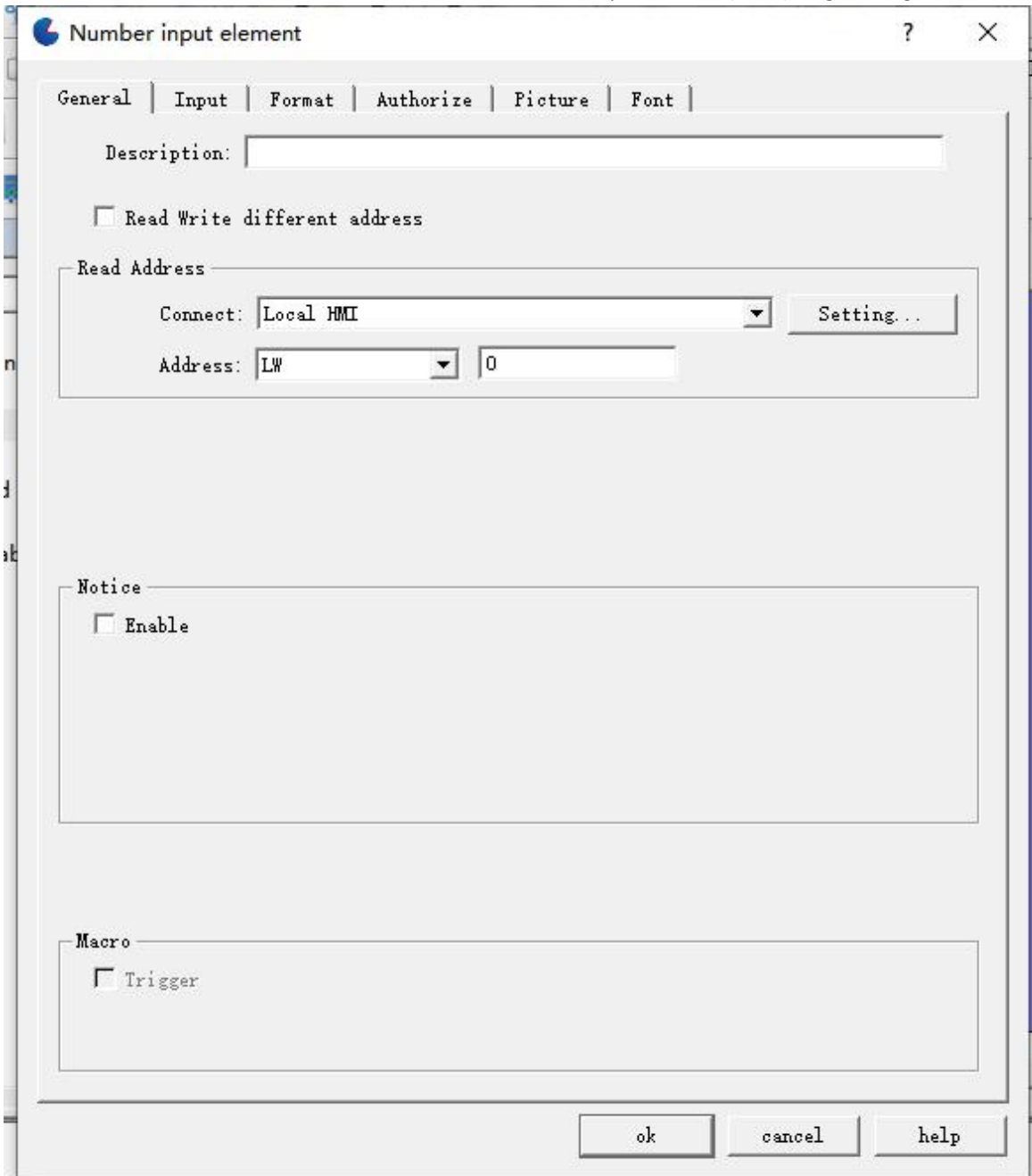


The setting method is basically the same as the "numerical input component", as it can only be used for display, only the reading address can be set, and the writing address cannot be set.

3.4.6 Numerical input element

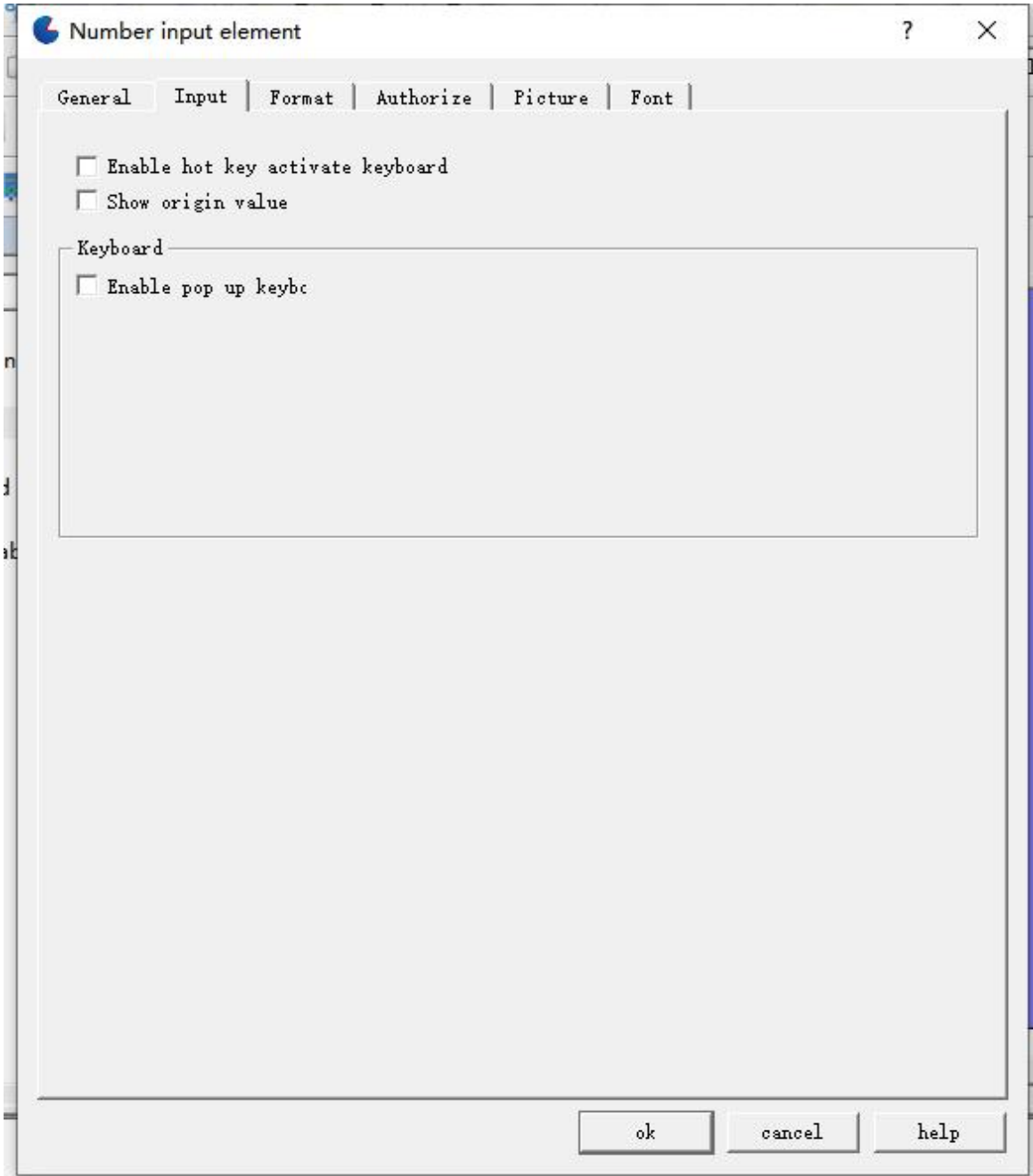
Numerical input component is one of the most commonly used components. In addition to displaying numerical values, it can also guide users to input various types of numerical values

through keyboard pop-up. Click on the icon  on the tool sample and a settings dialog box will pop up.



Read/Write Address: Set the read/write register address, which can be set to different addresses.

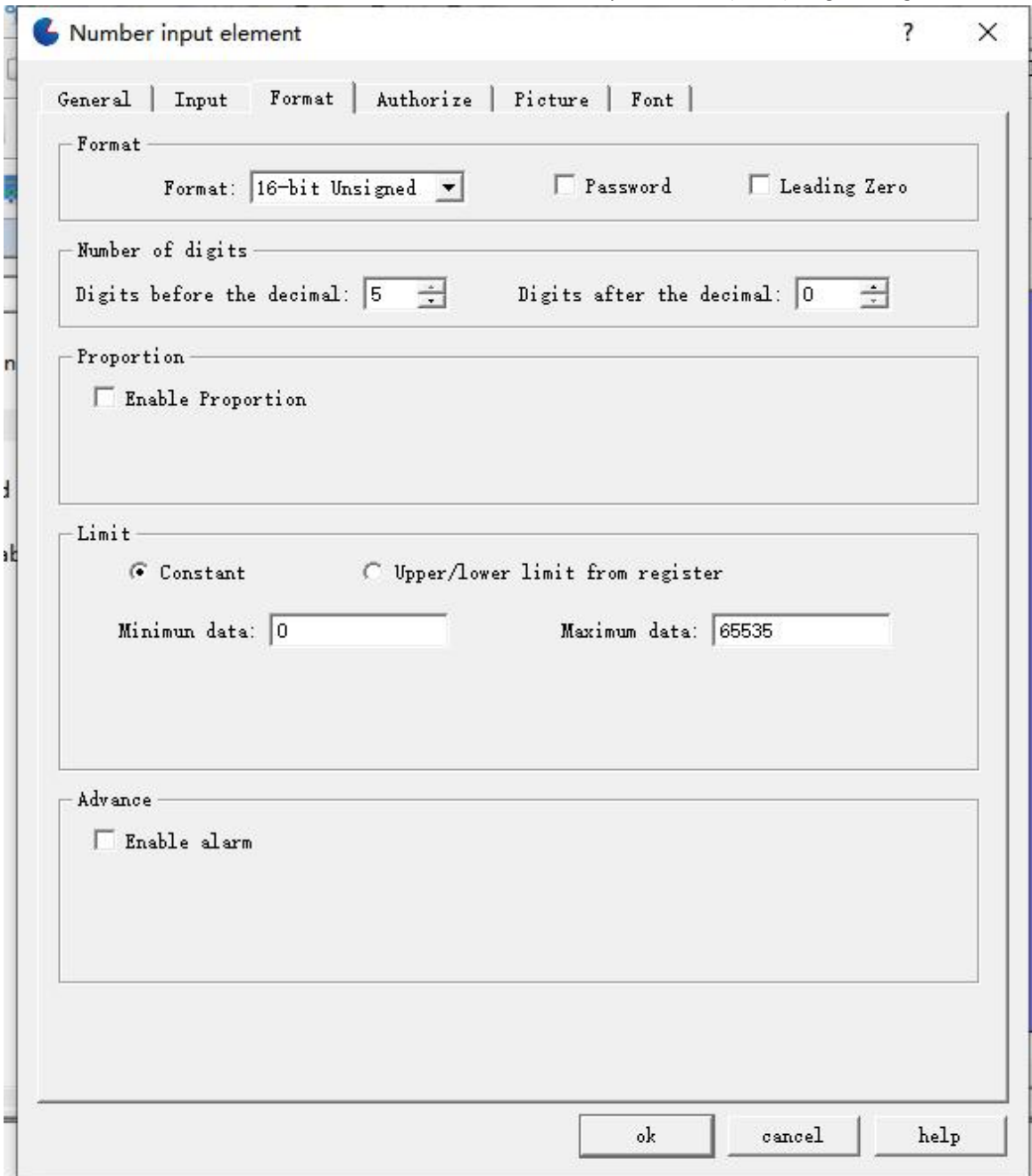
Notification: Set the pointer register before or after input completion.



Activate keyboard using hotkeys: Specify a button, press it, and the keyboard will pop up. This function is usually used on PC emulators.

Keyboard display of original value: When checked, the keyboard will pop up and display the original value. If not checked, the default value of 0 will be displayed.

Keyboard pop-up position: can specify 9 directions for keyboard display.



Data format: 16 bit BCD code, 32-bit BCD code, 16 bit hexadecimal, 32-bit hexadecimal, 16 bit binary, 32-bit binary, 16 bit unsigned integer, 16 bit signed integer, 32-bit unsigned integer, 32-bit signed integer, 32-bit floating-point type can be specified.

Password: After checking, the data will be displayed in ***** format.

Zero lead: After checking, when the number of data bits is less than the specified number, fill in with 0.

Number of digits: Specify the number of digits before and after the decimal point.

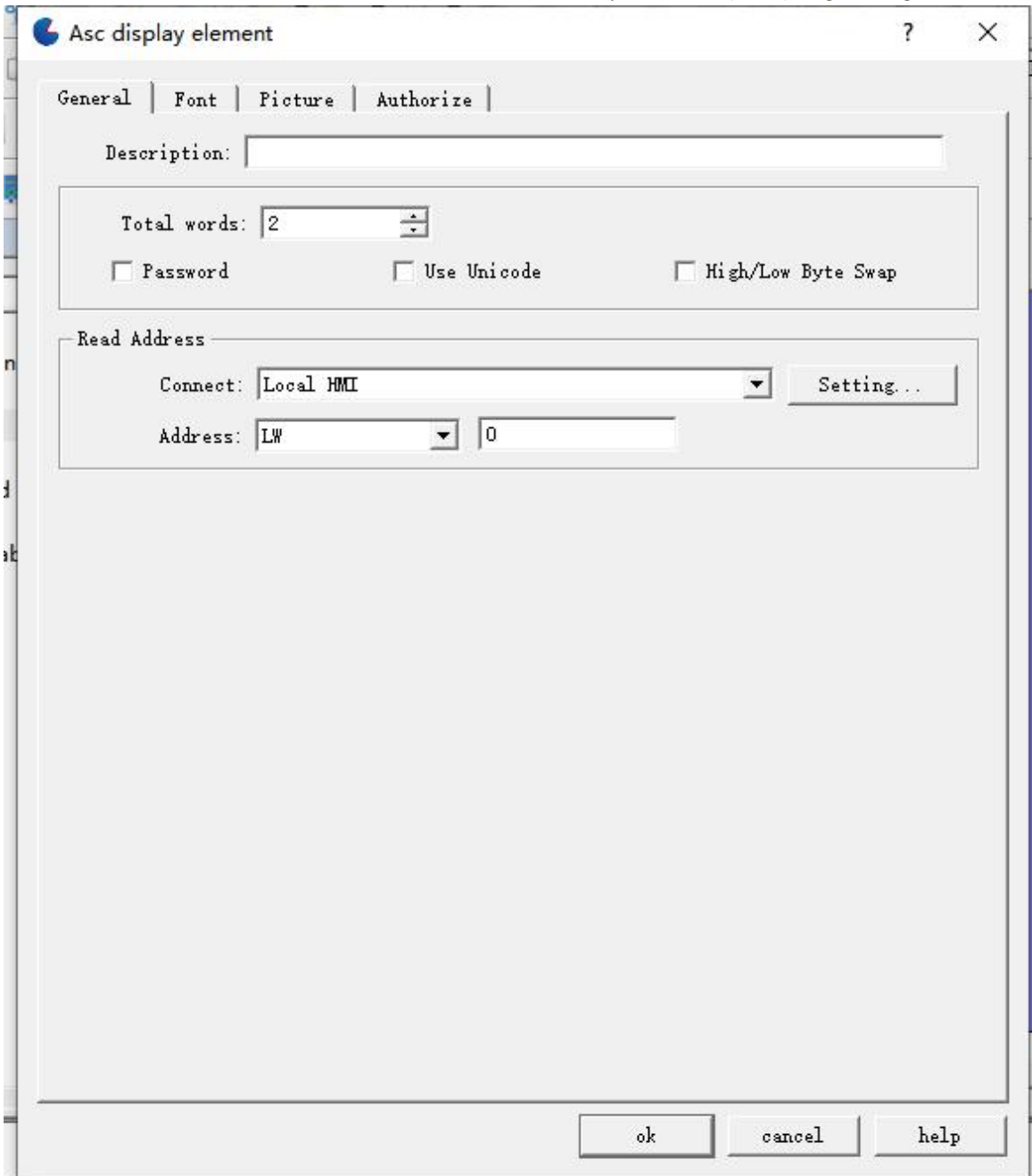
Limitations: Specify the upper and lower limits of the output value. When selecting the upper and lower limits from the register, set the lower limit value address, and the subsequent register is the upper limit value address. If the data type is 16bit, the subsequent register Address+1; The data type is 32bit, and the subsequent register Address+2.

Use Proportional Conversion: When checked, the output value will be projected in a proportional conversion manner within the range of the minimum and maximum values displayed in the proportional display. For example, if the minimum value of the proportional display is set to 0, the maximum value of the proportional display is set to 10000, the lower limit of the numerical value is set to 0, and the upper limit of the numerical value is set to 100. If 50 is entered in the pop-up keyboard, the specified value written to the register is 50, and the displayed result is 5000.

Use warning colors: If the value exceeds the upper or lower limit, the number color and flashing can be specified.

3.4.7 Character display components

Character display components display numerical values on registers in the form of ASCII characters. Click on the icon on the toolbar and a settings dialog box will pop up:



Total Word Count: Specify the character length, where one word is equivalent to two ASCII characters.

Password: After checking, it will be displayed as *****.

Using UNICODE: When checked, it is no longer parsed as ASCII characters, but as a group of two bytes, allowing for the display of more characters, such as Chinese.

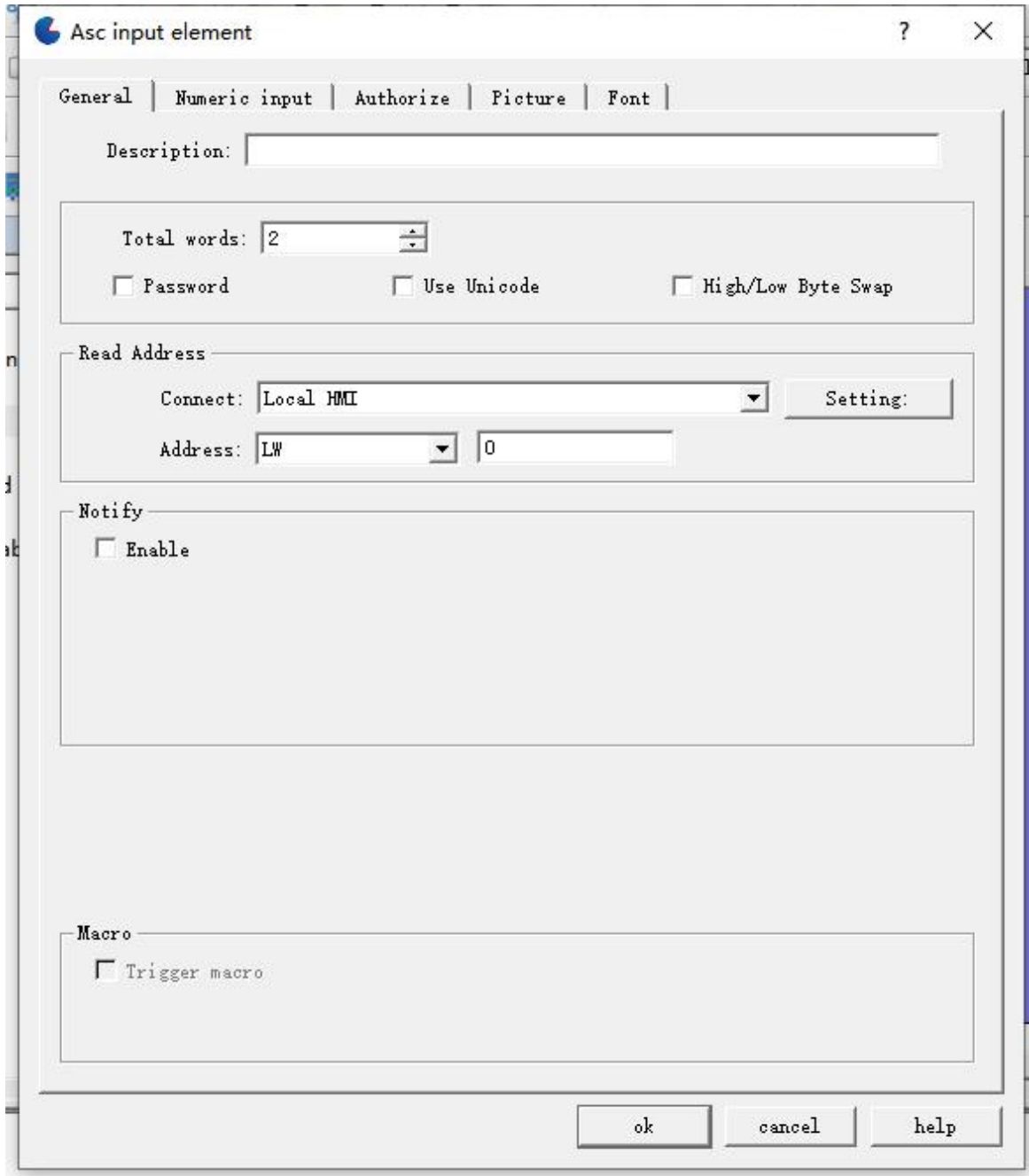
Swap high and low bytes: When checked, the high and low bytes of a 16 bit numerical value will be displayed interchangeably.

3.4.8 Character input component

Character input components and numerical input components have similar functions, except that in addition to numbers, character input components can input more characters. Click on



the icon on the toolbar and a settings dialog box will pop up:



The two labels "General Properties" and "Numerical Input" are mostly the same as the settings dialog box for character display components, except for the addition of two types of settings: "Notification" and "Macro Instruction", which can specify the triggering action of the input.

3.4.9 Screen switching element

The screen switching element is used to switch between different screens. Click on the icon



on the toolbar and a settings dialog box will pop up:




Switch Basic Window: The target window for switching is specified in the "Window Number" below.

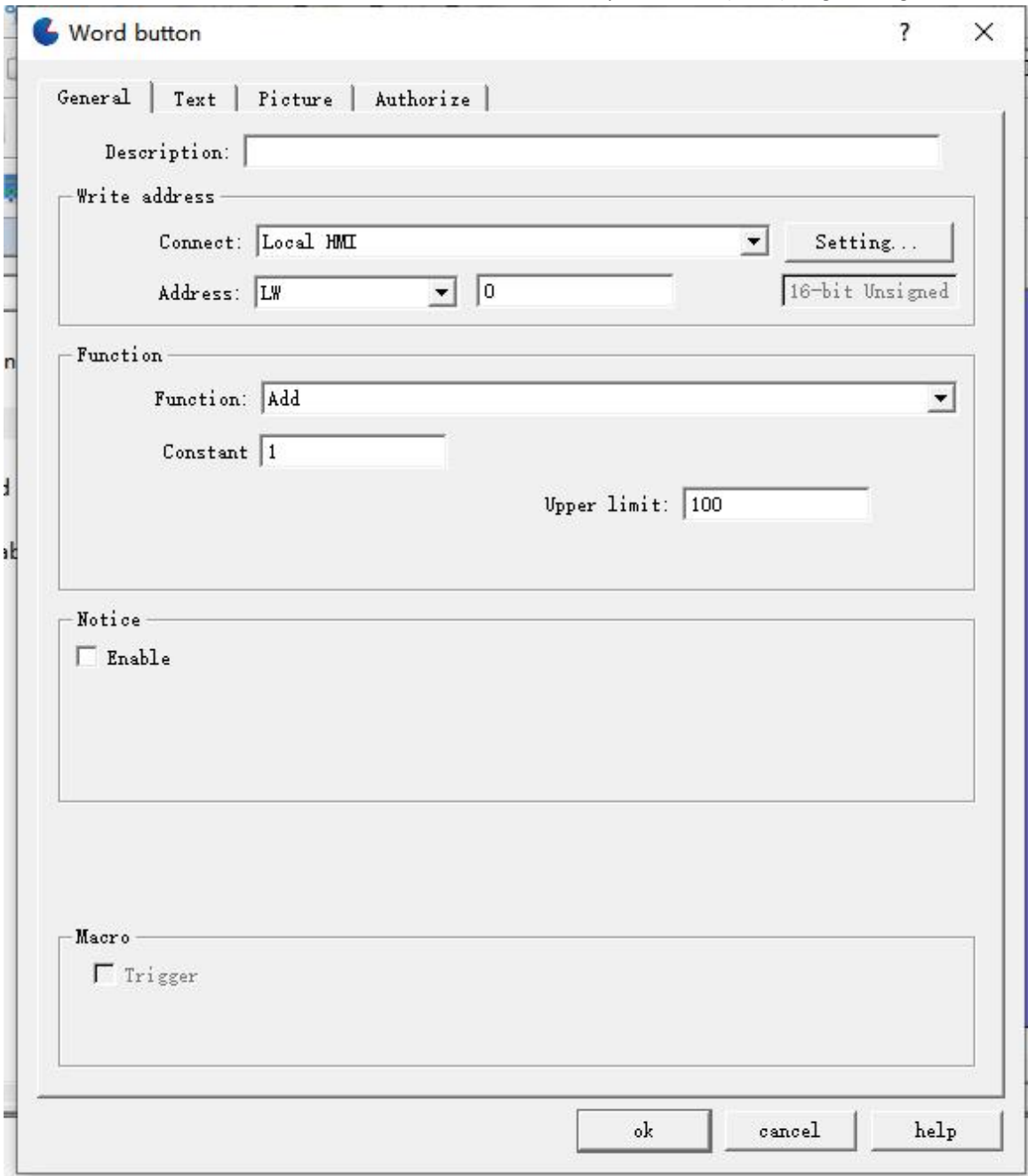
Return to the previous interface: Switch to the previous window.

Close Window: If the window where the component is located is a pop-up window, click to close this window. If it is not a pop-up window, clicking is invalid.

3.4.10 Word input component

The word input element can be regarded as an enhanced numerical input element. It can not only input numerical values, but also perform increment and decrement operations. Click on

the icon  on the toolbar and a settings dialog box will pop up:



In the "Functions" section, you can select functions such as adding, subtracting, increasing, decreasing, setting constants, entering numerical values, and entering passwords.

Add: With each click, perform the addition operation according to the specified constant.

Subtract: Subtract at a specified constant for each click.

Incremental addition: When held down, the addition operation can be performed at a specified frequency.


Decrement: When held down, subtraction can be performed at a specified frequency.

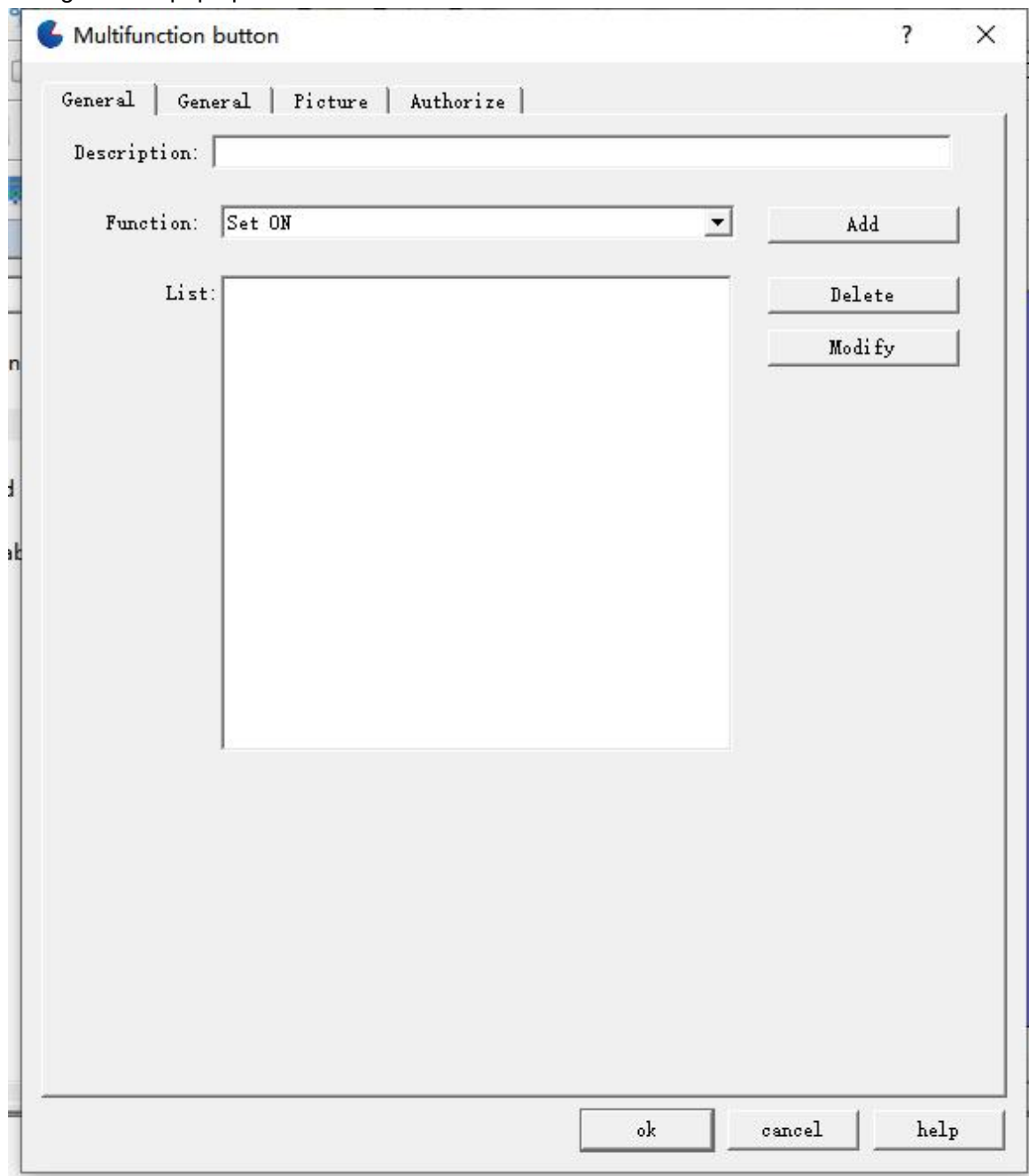
Set constant: Directly set the value of a register to a specified constant.

Enter numerical value: Pop up the keyboard for input.

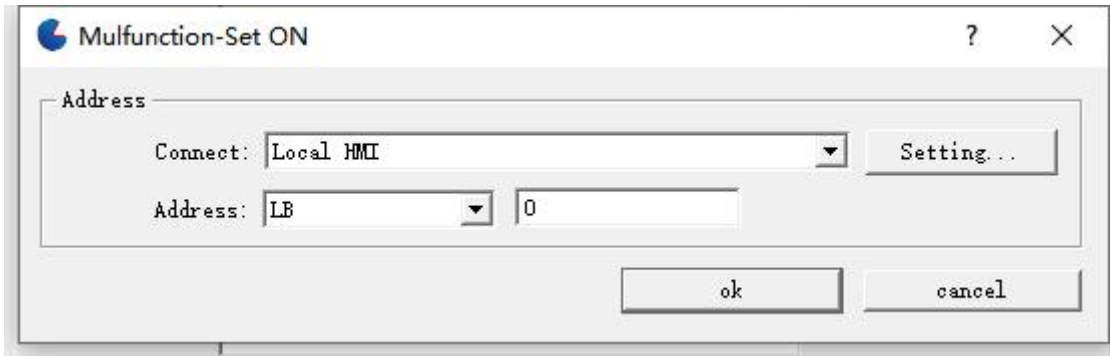
Enter password: Pop up the keyboard to enter, and the entered data is displayed with an asterisk.

3.4.11 Multifunctional button components

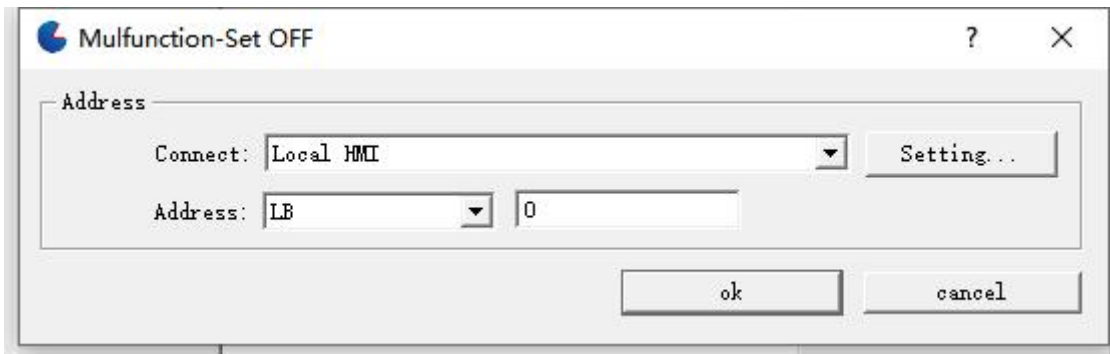
The multifunctional button integrates multiple types of operations, which can be executed by selecting one or multiple in sequence. Click on the icon  on the toolbar and a settings dialog box will pop up:



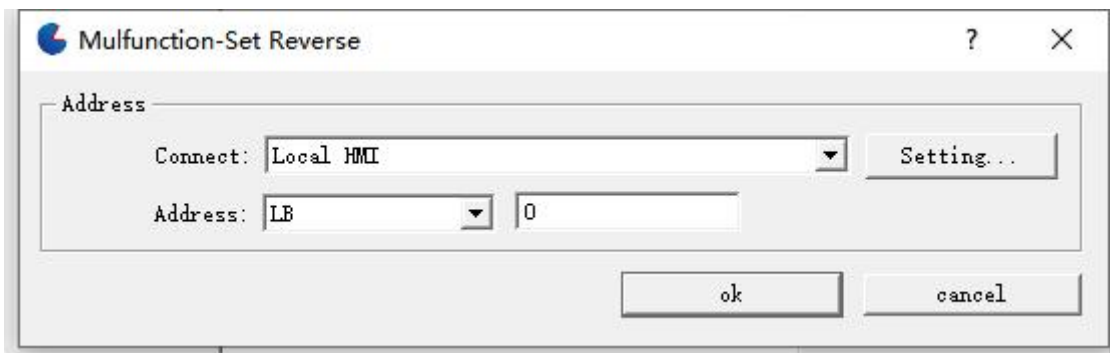
The following functional items can be selected:
Set to ON button: Set the bit address of a register to ON.



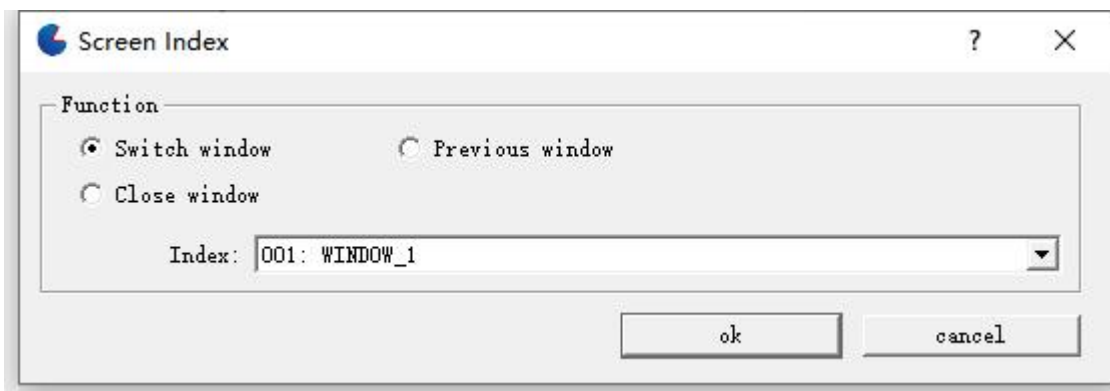
Set to OFF button: Set the bit address of a register to OFF.



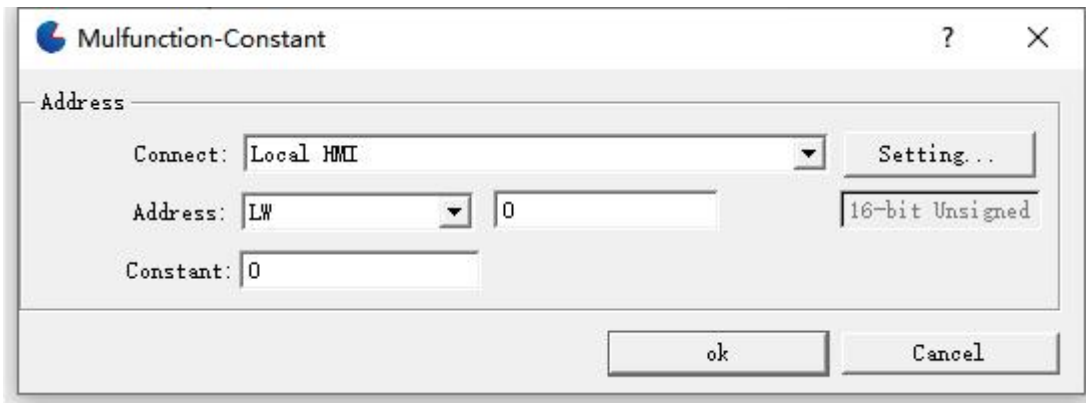
Switch button: Switch the bit address data of a register.



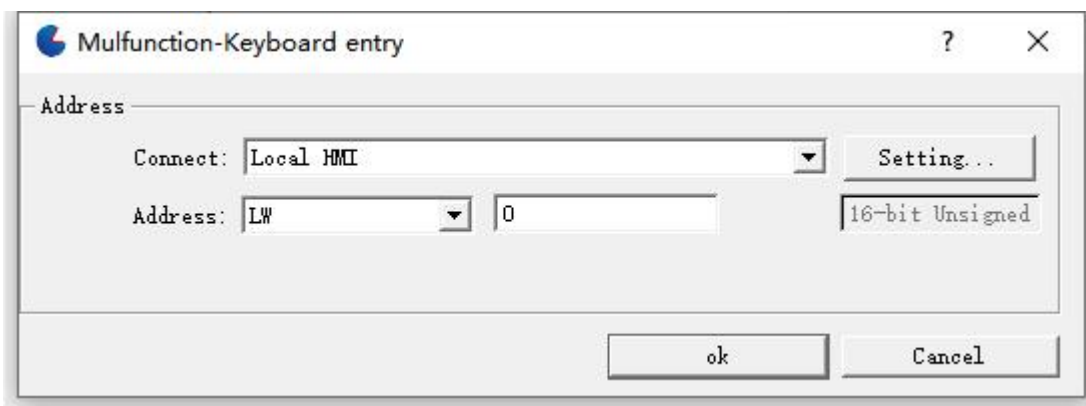
Switch button: Switch the bit address data of a register.



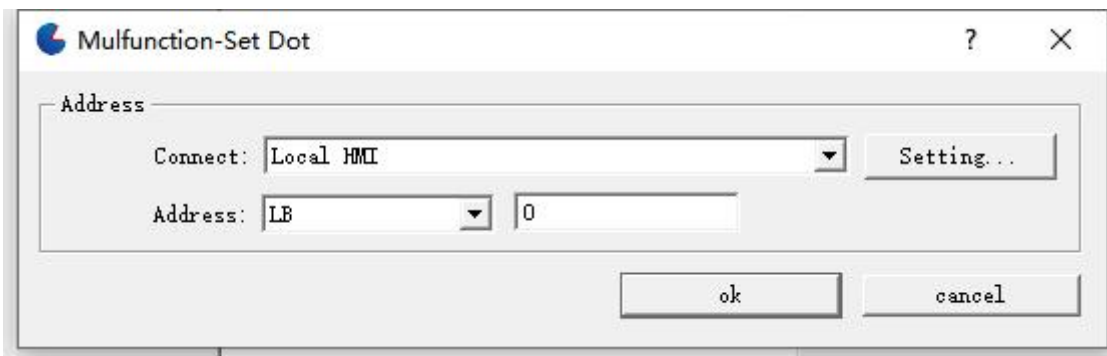
Constant writing: Set the address of a register to a constant value.



Keyboard input: Pop up keyboard input.




Reset button: Similar to the reset function of a position switch.



Macro instruction execution: Select a macro instruction to execute.



3.4.12 Function button components


Function button components are a special type of input component mainly used for customizing keyboard buttons. Click on the icon  on the toolbar and a settings dialog box will pop up:



The above lists some commonly used keyboard keys. To customize characters, you can choose "[ASCII]/[UNICODE]" and enter the custom characters in the text box displayed next to it.

3.4.13 Project menu components

There are two styles to choose from for project menu components: dropdown menu and list.

Click on the icon  on the toolbar and a settings dialog box will pop up:

The screenshot shows a dialog box titled "Combobox" with the following fields and options:

- Description:** A text input field.
- Read Address:**
 - Connect:** A dropdown menu set to "Local HMI" with a "Setting..." button next to it.
 - Address:** A dropdown menu set to "LW" followed by a text input field containing "0".
 - 16-bit Unsigned:** A checked checkbox.
- Property:**
 - Mode:** A dropdown menu set to "Combobox".
 - Numbers:** A dropdown menu set to "5".
 - Direction:** A dropdown menu set to "Down".
 - Background color:** A color selection box set to white.
- Macro:** A section containing a checkbox labeled "Trigger".

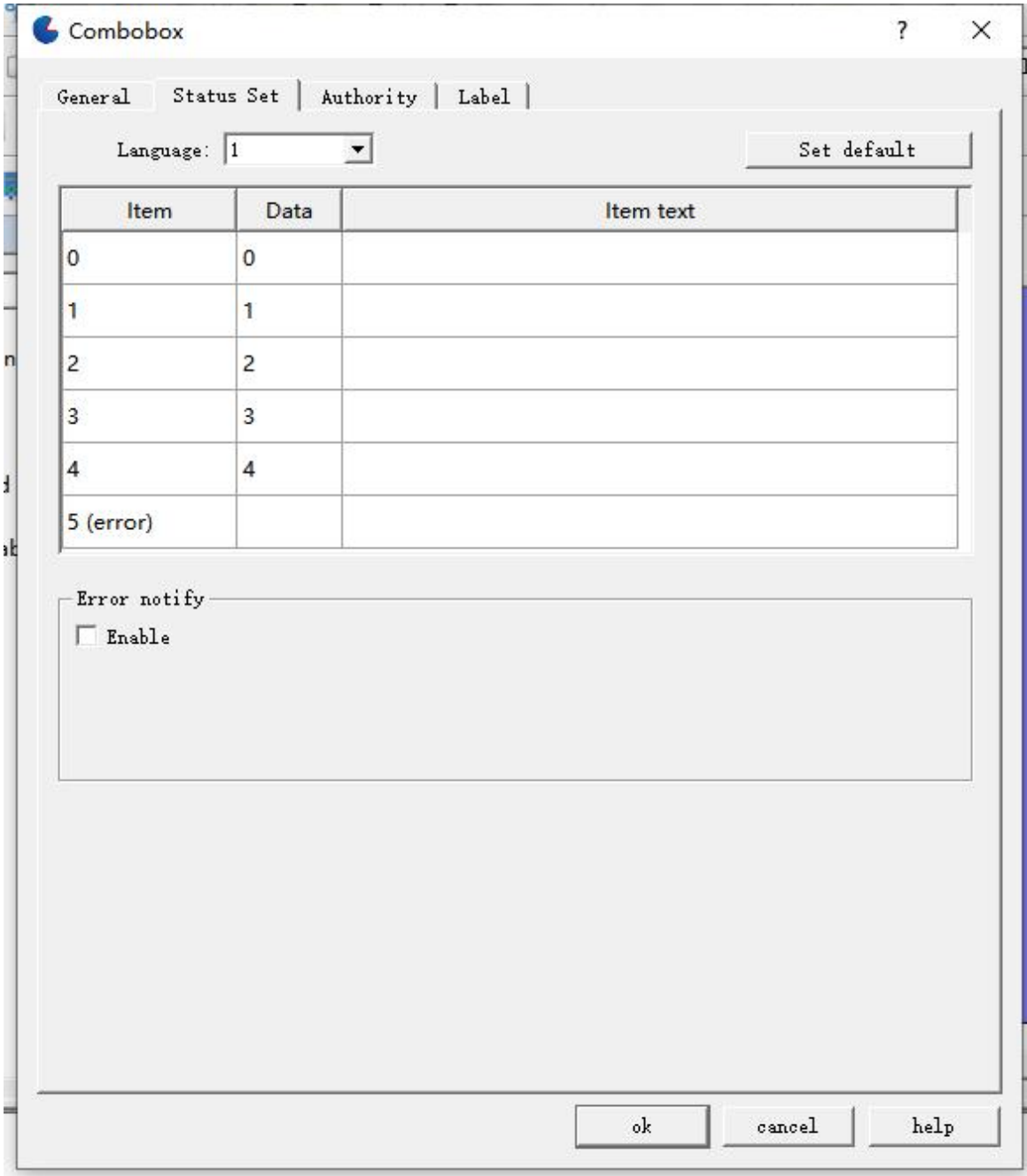
At the bottom of the dialog are three buttons: "ok", "cancel", and "help".

Mode: You can choose a dropdown box or list style.


Number of projects: Specify the maximum number of projects.

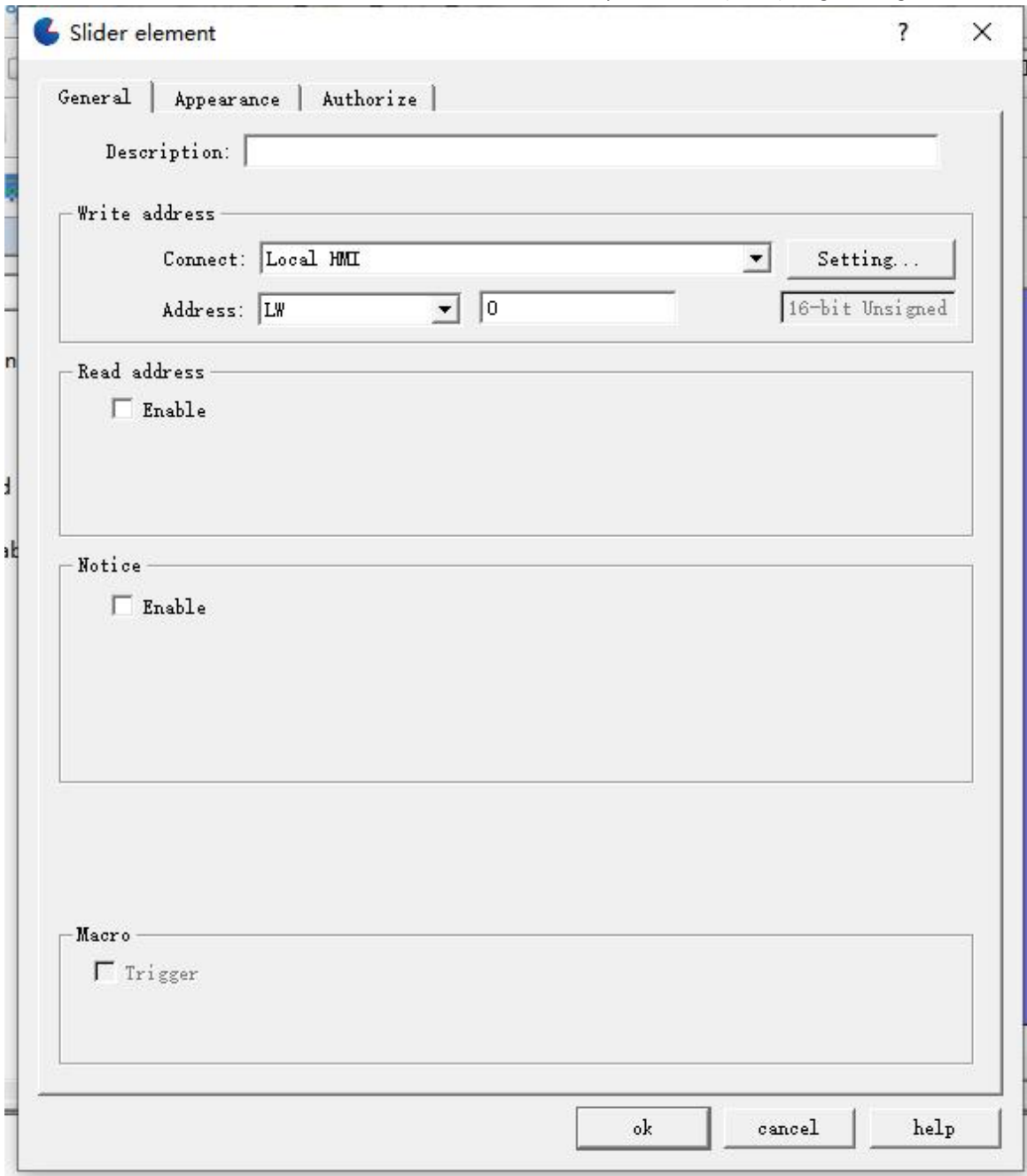
Direction: When selecting the dropdown box, you can choose whether to pop up the list box upwards or downwards.

You can specify project text on the "Labels" page and preview it in the "Status Settings" section.



3.4.14 Sliding element

After selecting the component menu bar - More buttons - slider switch components or clicking  on the toolbar, a dialog box for setting sliding component properties will pop up.



Sliding Switch General Property Page

1. General Property Page

Write address: Slide the slider to change the register address corresponding to the value.

Monitoring address: If monitoring address is selected, the position of the slider changes with the value of the register set for monitoring address.

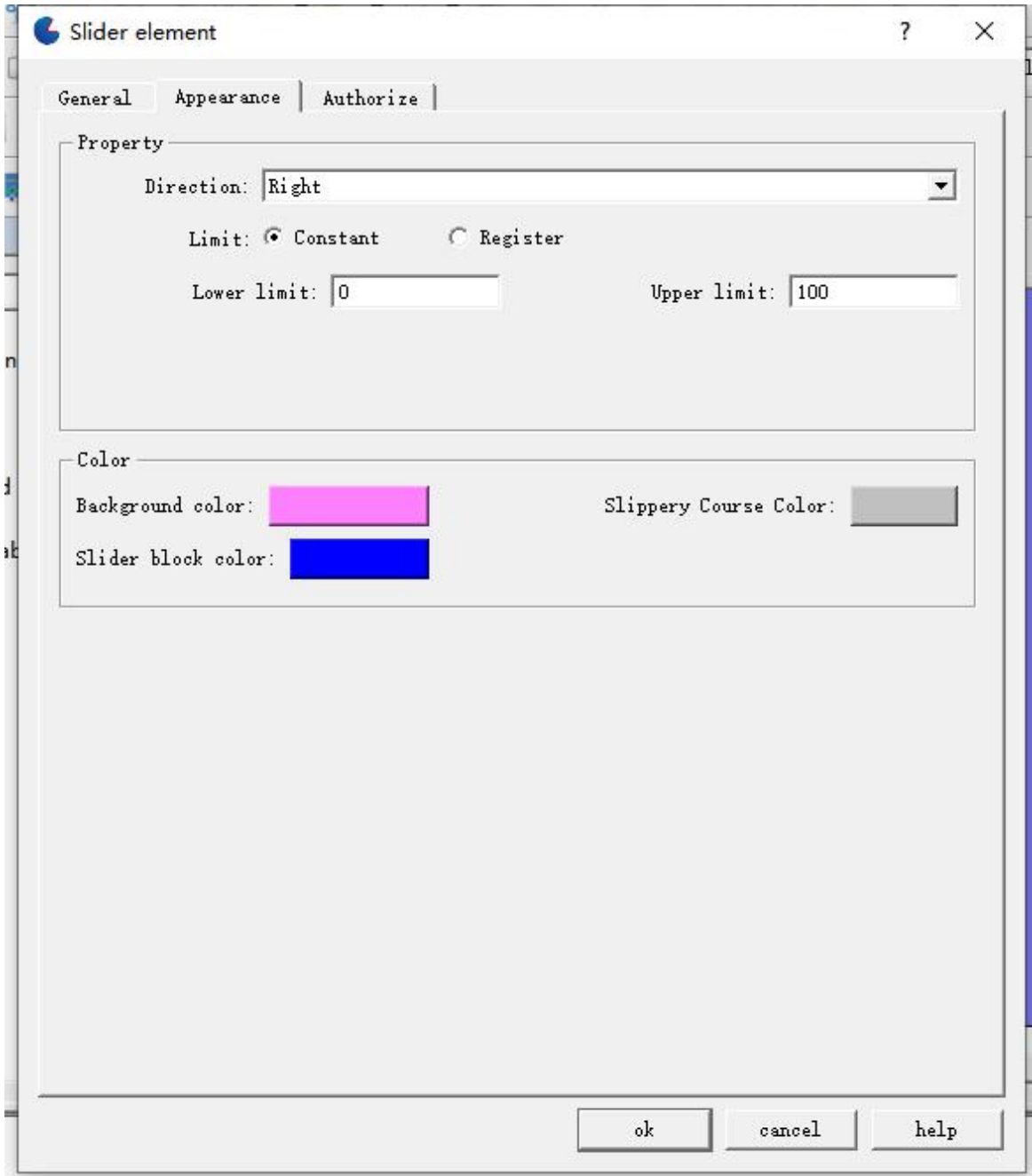
Notice: After selection, the ON/OFF of the corresponding bit register can be controlled by manipulating the slider.

2. Appearance

Direction: The direction displayed by the slider can be selected.

Upper and lower limits: set the upper and lower limits of the values corresponding to the slider; If a register is selected, the values corresponding to the upper and lower limits are the values of the set register.

Color: Set the colors of the sliders, rails, and background of the sliders accordingly.




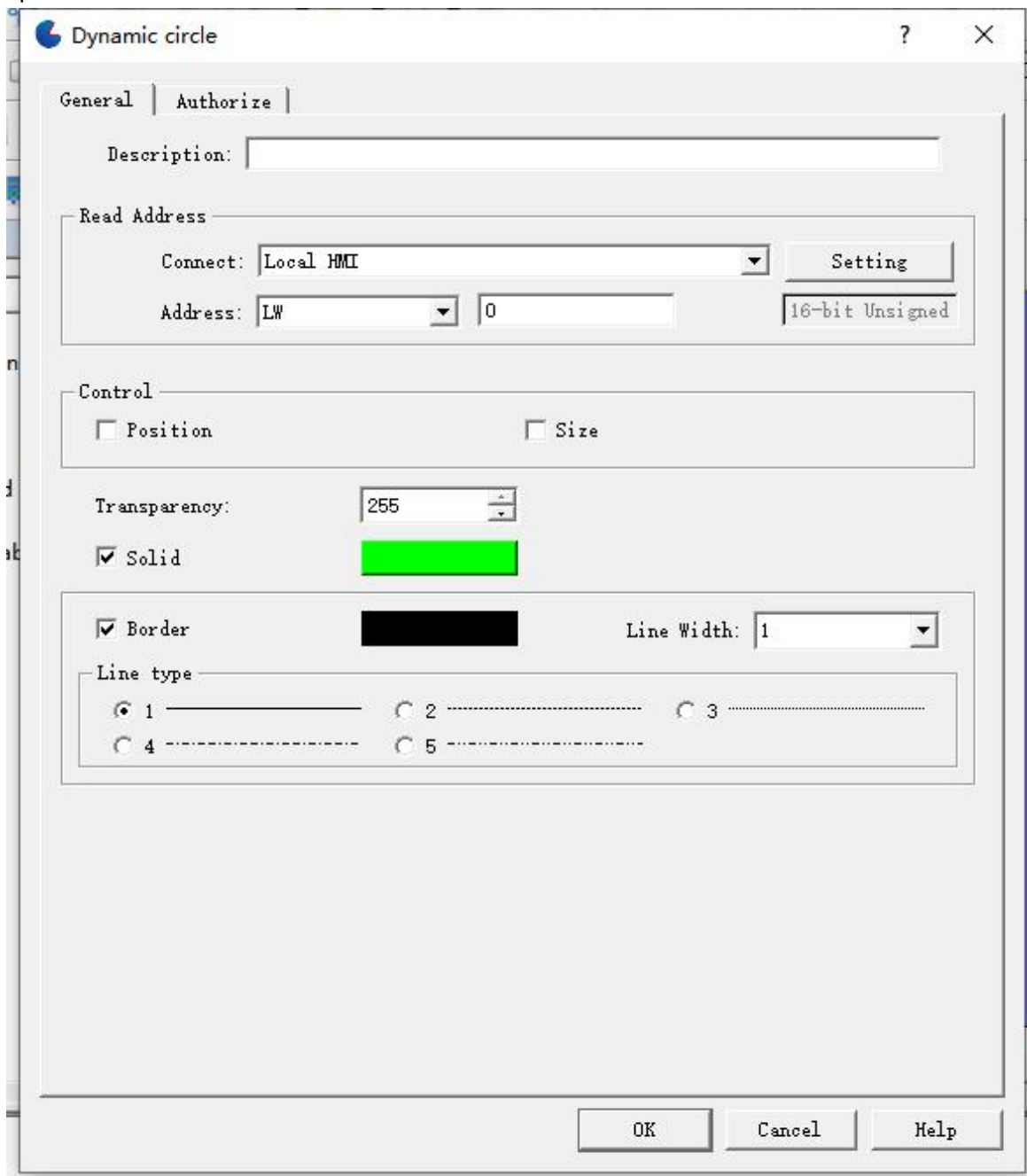
Appearance page of sliding switch

3. Safety

Refer to the input component safety page instructions.

3.4.15 Dynamic circle element

After selecting the component menu bar - dynamic graph - dynamic circle component or clicking on the toolbar , the dynamic circle component property setting dialog box will pop up.



Dynamic Circle General Property Page

1. General attributes

Read Address: Set the register address associated with the dynamic circular component, and the position and size of the component change with the set register value.

Control: The way to choose dynamic circle changes is by position or size.

Note: Starting from the set reading address, the values of the following three addresses represent the X-axis, Y-axis, and size of the component position, respectively. For example, if the set register reading address is LW0 (16 bits), then LW0 represents the X-axis position of the component, LW1 represents the Y-axis address of the component, and LW2 represents the radius size of the component. If the user selects 32 digits in the data category, the corresponding interval is 2. For example, LW X represents the X-axis position, LW (X+2) represents the Y-axis position, LW (X+4) represents the radius, where X represents the set reading address.


2. Safety

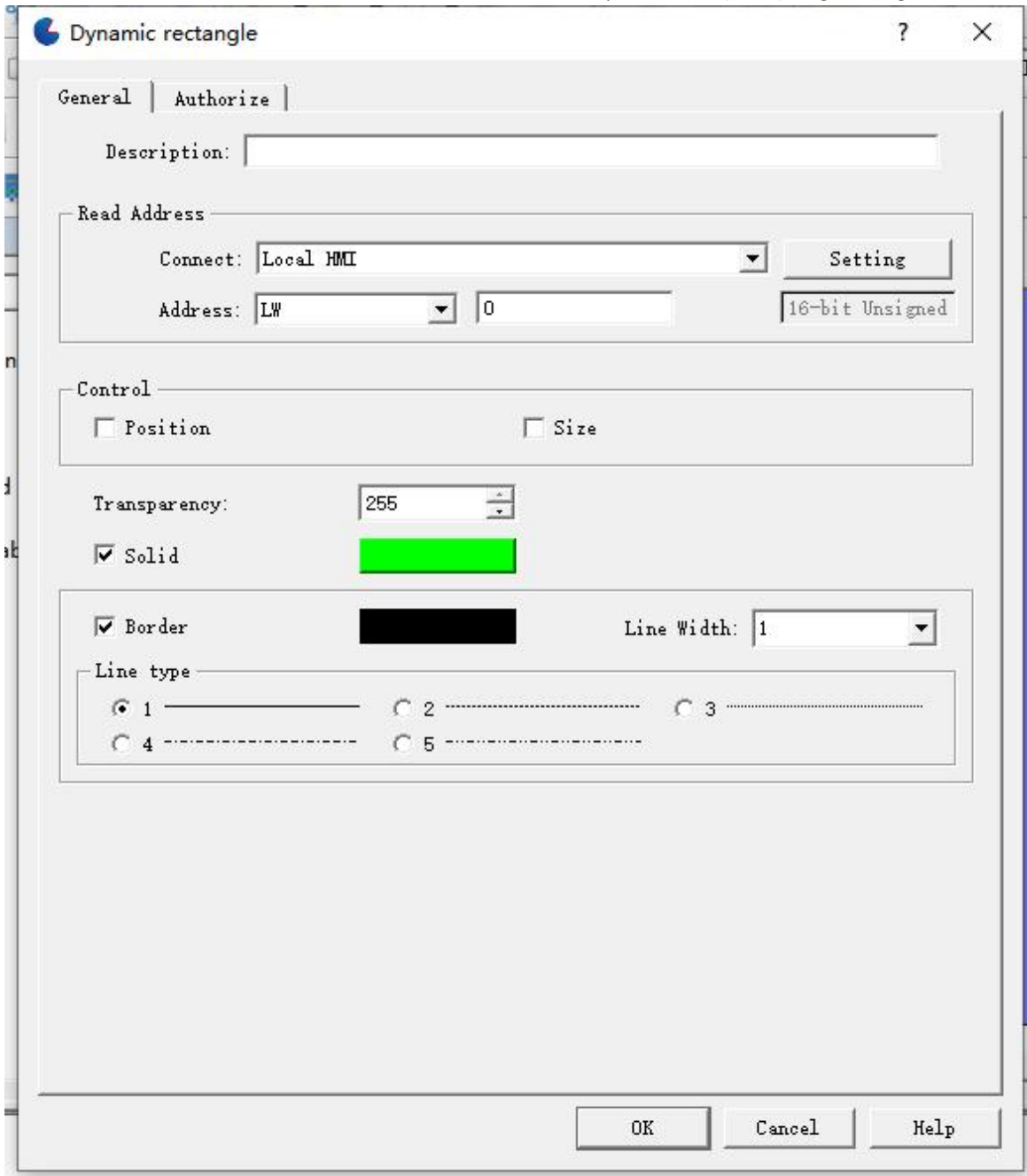
Refer to the input component safety page instructions.

3.4.16 Dynamic rectangular element

Select the component menu bar - Dynamic Diagram - Dynamic Rectangle Component, or



click  on the toolbar to bring up the Dynamic Rectangle Component Property Settings dialog box.



Dynamic Rectangle General Property Page

1. General attributes

Read Address: Set the register address associated with the dynamic rectangular component, and the position and size of the component change with the set register value.

Control: The way to choose dynamic rectangle changes is by position or size.

Fixed point: If a position is selected, this setting is not available. When selecting size control, component fixing points can be set.

Note: If the set reading address is X.

For 16 bit data, the corresponding control address correspondence of the corresponding component is:

X: Rectangle X-axis coordinate value;

X+1: rectangular Y-axis coordinate value;

X+2: rectangular width;

X+3: Rectangle height.

For 32-bit data, there are:

X: Rectangle X-axis coordinate value;

X+2: rectangular Y-axis coordinate value;

X+4: rectangular width;


X+6: Rectangle height.

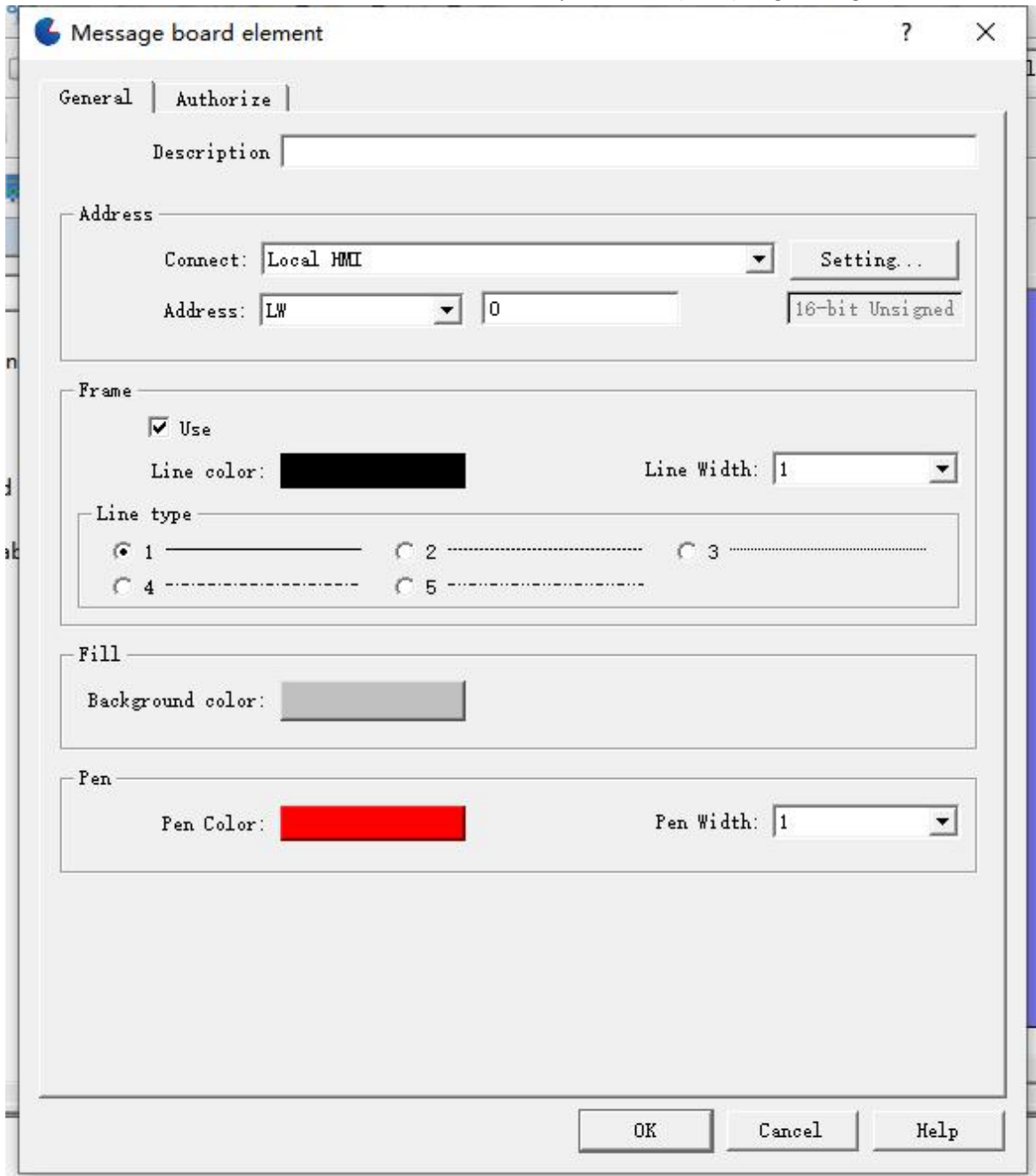
2. Safety

Refer to the input component safety page instructions.

3.4.17 Message board components

The message board component defines an area in the touch screen window where users can manually input information.

After selecting the component menu bar - message board components or clicking  on the toolbar, a message board component attribute setting dialog box will pop up.



Message Board General Property Page

1. General attributes

Operation address: Set the value of the register to control the writing, erasing, and clearing of the message board. When the address value is 0, the message board is writable, erased when it is 1, and cleared when it is 2.

2. Safety

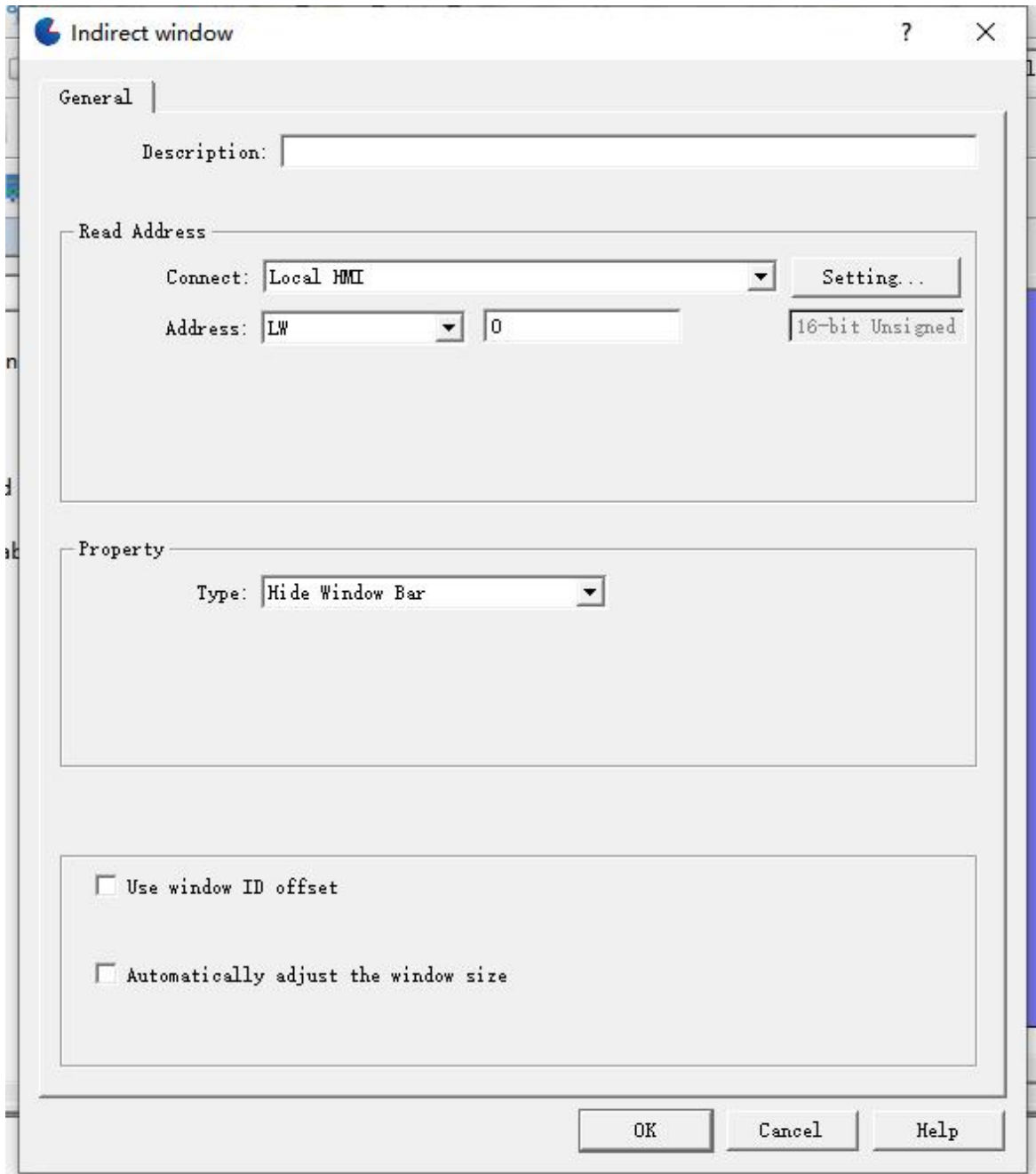
Refer to the input component safety page instructions.

3.4.18 Indirect Window

"Indirect window" refers to defining a display area within a window, and when the value of the specified register is equal to the window number to be displayed, the display area will display that window. For example, if the value of register LW0 is specified as 1, window 1 will

be displayed in the area defined by the "indirect window". If the value of LW0 is 2, window 2 will be displayed, and so on. The size of the displayed window must be smaller than the defined display area. To close this window display, simply set the value of the specified register to 0.

After clicking on the indirect window  in the toolbar, a dialog box for setting indirect window properties will pop up.




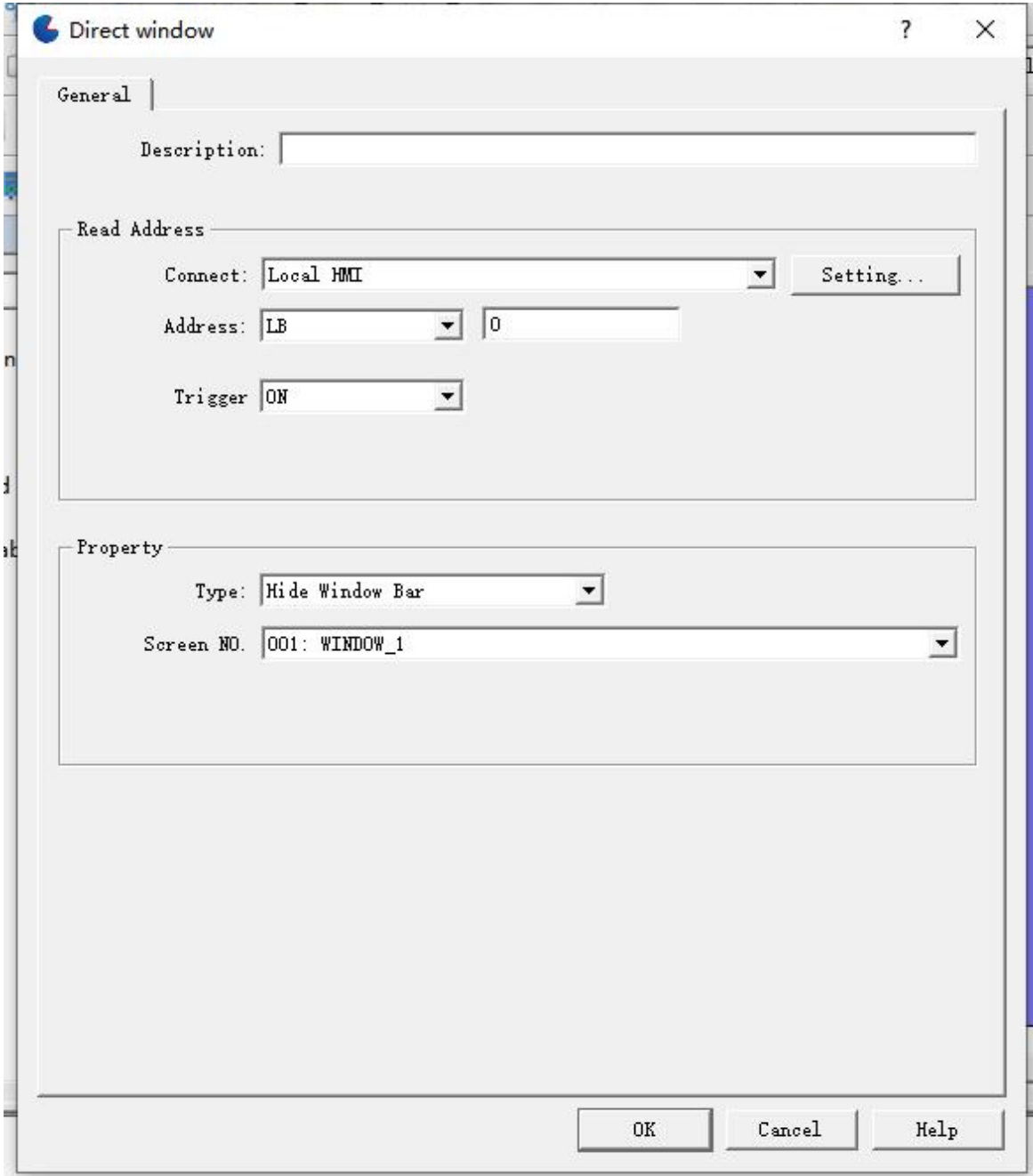
Indirect Window General Property Page

3.4.19 Direct Window

"Direct window" refers to defining a display area within the window. When the state of the specified register changes from OFF to ON, the specified window will be displayed in this area,


and the size of the window to be displayed must be smaller than the display area. When the state of the specified register changes from ON to OFF, the window in the display area is

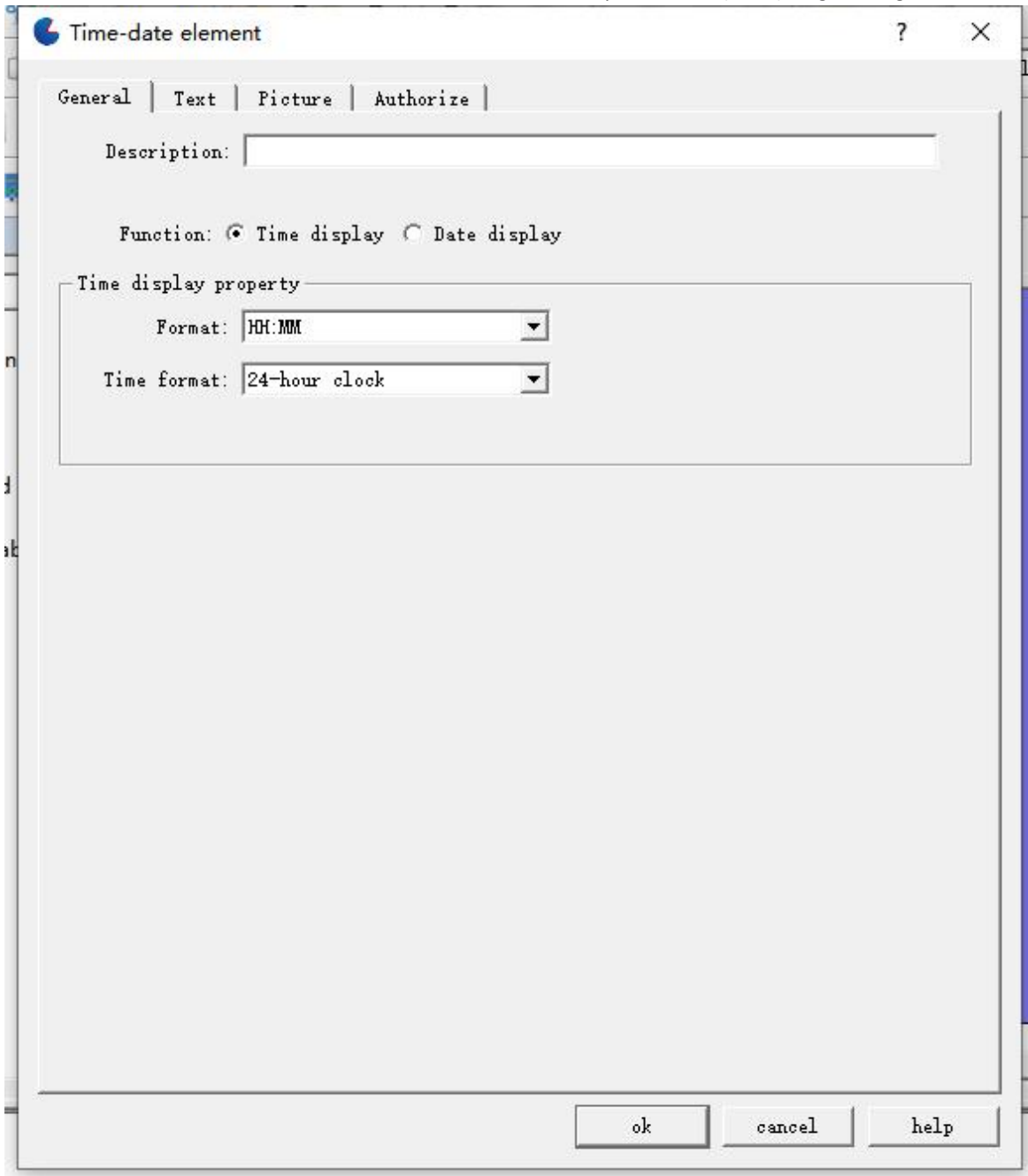
closed. Click on the "Direct Window"  on the toolbar, and a dialog box for property settings will pop up as shown in the figure below.



Direct Window General Property Page

3.4.20 Time/ date display component

The time/date display component is used to display the current time and date. Select the time and date display component in the component menu bar or click the toolbar  to pop up the time and date display component property page.



General Property Page for Time/Date Display Components

Components can be set to time or date. When set to time, there are four display methods: HH: MM, HH: MM: SS, HH-MM, HH-MM-SS (HH represents hour, MM represents minute, SS represents second), and the time formats are 12 and 24; Taking 20:08:08 as an example.

Table 1 Time Display Method

Time format	Display Format	Notes
12-hour	HH:MM	08:08 PM
	HH:MM:SS	08:08:08 PM
	HH-MM	08-08 PM
	HH-MM-SS	08-08-08 PM
24-hour	HH:MM	20:08
	HH:MM:SS	20:08:08


	HH-MM	20-08
	HH-MM-SS	20-08-08

When set to date, there are six display formats, with separators such as/. - Three ways. Taking May 1st, 2015 as an example, the following table illustrates the date.

Table 2 Date Display Method

Separator	Display Format	Notes
/	YY MM DD	15 / 05 / 01
	YYYY MM DD	2015 / 05 / 01
	MM DD YY	05 / 01 / 15
	MM DD YYYY	05 / 01 / 2015
	DD MM YY	01 / 05 / 15
	DD MM YYYY	01 / 05 / 2015
.	YY MM DD	15 . 05 . 01
	YYYY MM DD	2015 . 05 . 01
	MM DD YY	05 . 01 . 15
	MM DD YYYY	05 . 01 . 2015
	DD MM YY	01 . 05 . 15
	DD MM YYYY	01 . 05 . 2015
-	YY MM DD	15 - 05 - 01
	YYYY MM DD	2015 - 05 - 01
	MM DD YY	05 - 01 - 15
	MM DD YYYY	05 - 01 - 2015
	DD MM YY	01 - 05 - 15
	DD MM YYYY	01 - 05 - 2015

3.4.21 Week display component

The "Week Display Element" is used to display the system's week. Select the week display component  in the component menu bar, and a property settings dialog box will pop up.



The week display component Label page

1. Label

Use text labels: Users can select each status and customize the text content.

Use text label library: Use a customized label library. The selected text label library corresponds to the original status one by one according to the status serial number.

Properties: According to the selected state, the font, color, font size, kerning, alignment and other properties of the text content in that state can be changed.


Revolving lantern: Provides three text display modes: "no movement", "move left", and "move right".

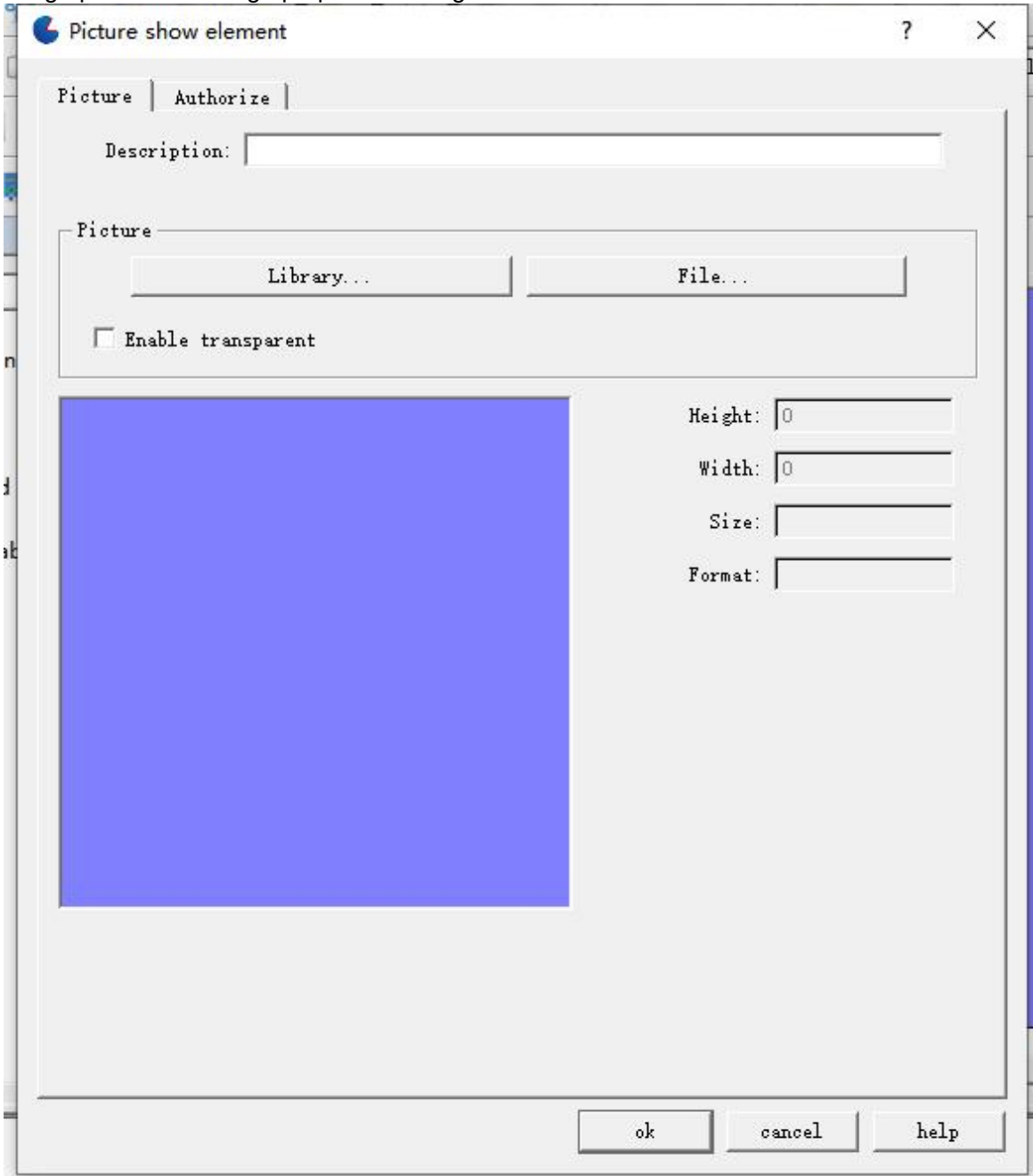
2. Images and security

Refer to input component images and safety related instructions.

3.4.22 Static image components

The "Static Image Control" is mainly used to display a static image. Users can choose existing images in the image library or choose different formats of images in the file as needed.

Select a static image component in the component menu bar or click on the toolbar  to bring up the static image properties dialog box.



Static Image Properties dialog box


1. Images

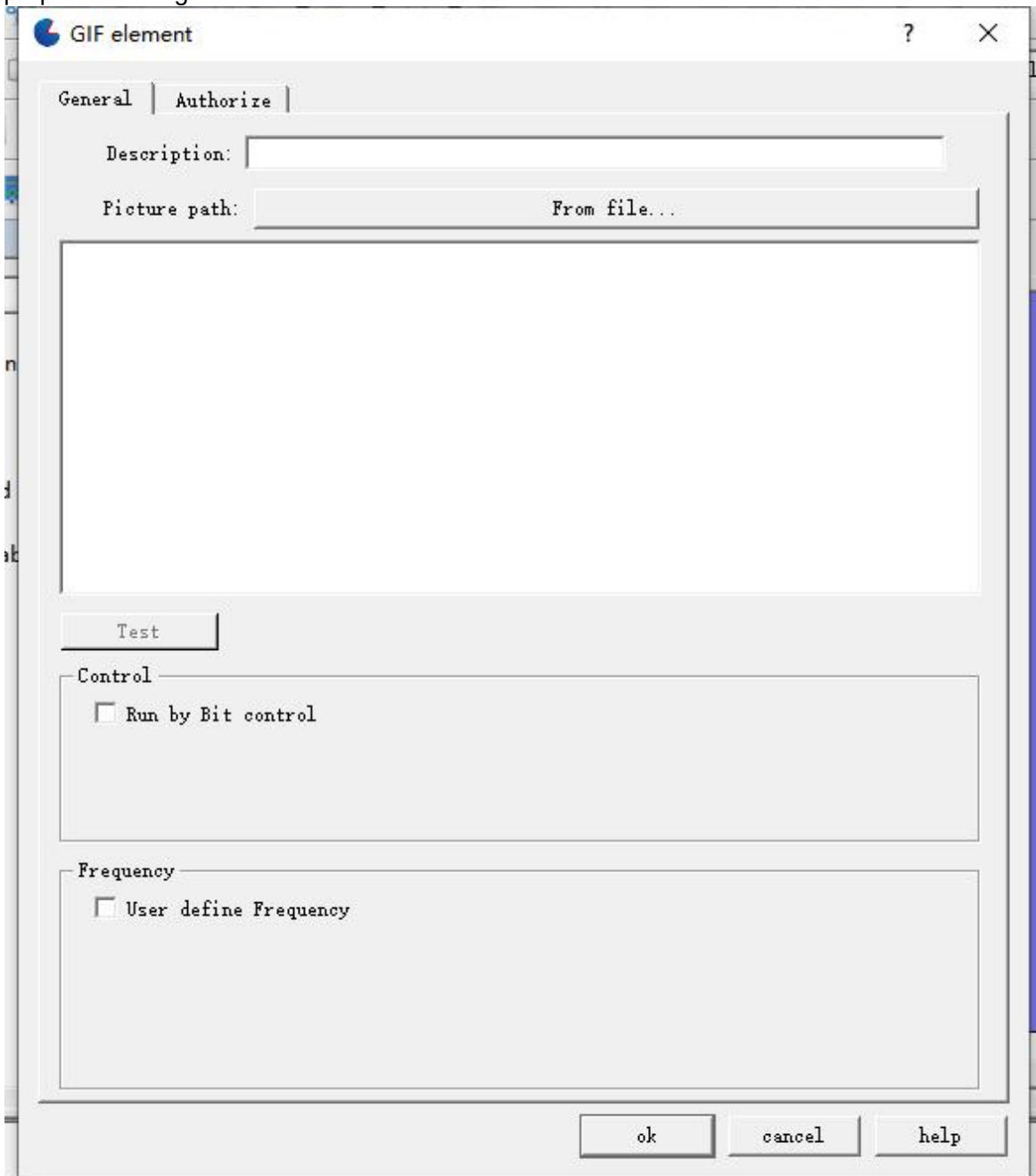
There are two ways to select images: image library and selecting from files. Users can choose according to their needs. After confirmation, left click on the drawing area with the mouse to add the selected image.

2. Safety

Refer to the safety instructions for input components.

3.4.23 GIFdisplay element

The GIF display component is mainly used to display a dynamic image. Select the GIF display component in the component menu bar or click the toolbar  to pop up the properties dialog box.



GIF Display Component Properties dialog box

1. General attributes

Image source: Only by selecting this method from the file, SimphoenixHMI currently only supports images in GIF format as the image source for GIF display components.


Control: Users can set corresponding bit registers to control the animation effect of the dynamic image. When the bit value is 0, the image becomes static, and when it is 1, the image returns to dynamic.

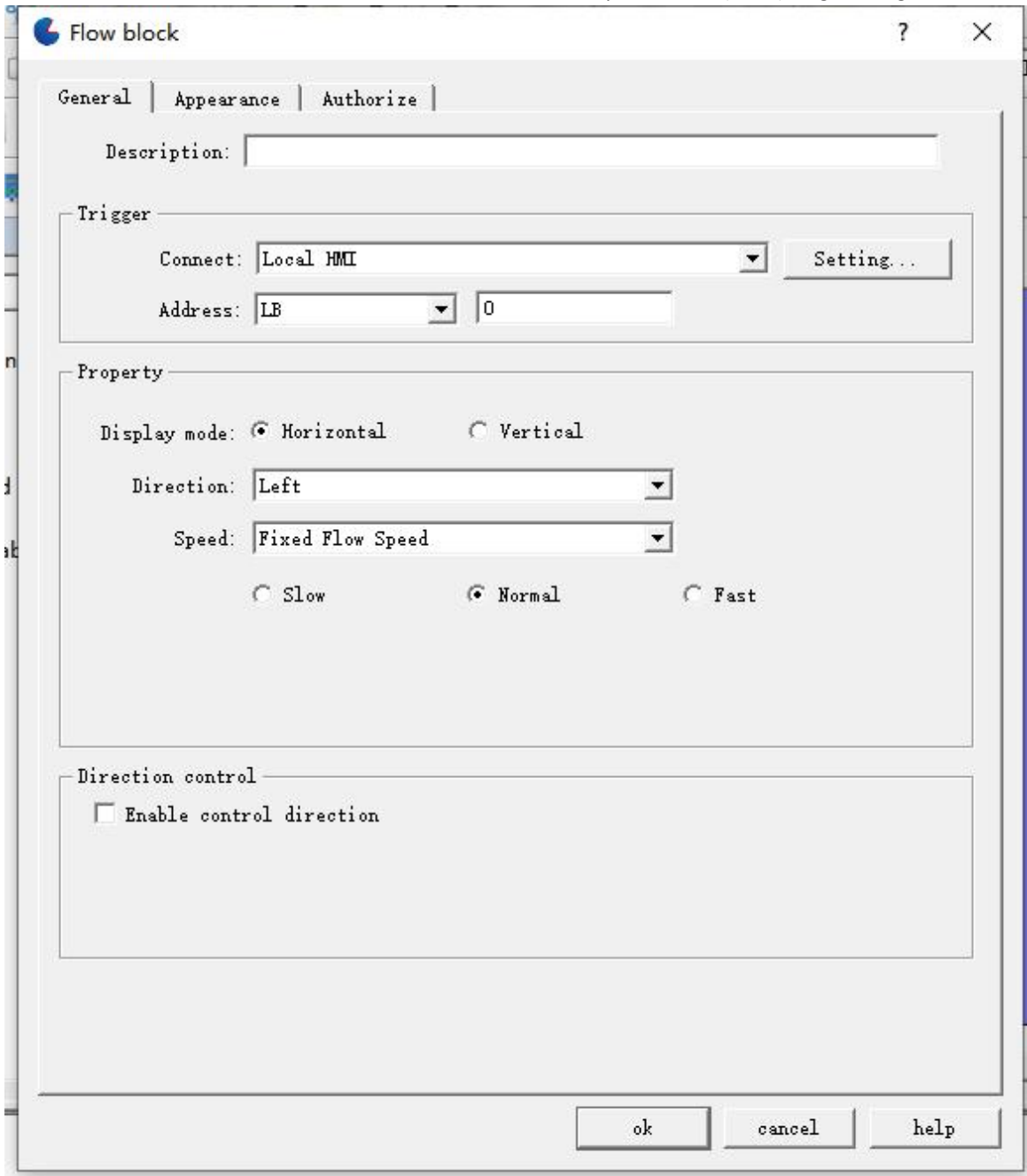
Frequency: Users can customize the animation frequency of dynamic images, which can be set to a fixed frequency, or use the dynamic frequency to connect a corresponding register value to set the switching frequency of the image.

2. Safety

Refer to the safety instructions for input components.

3.4.24 Flow block components

The "flow block element" is mainly used to simulate the display of liquid in pipelines. Select the flow block component in the dynamic diagram of the component menu bar or click on the pop-up properties dialog box  in the toolbar.



GIF Display Component Properties dialog box

1. General attributes

Trigger flow address: When the value of the specified register is set to 1, the flow block is triggered to flow, and when set to 0, the flow block stops flowing

Display mode: can be set to both horizontal and vertical modes

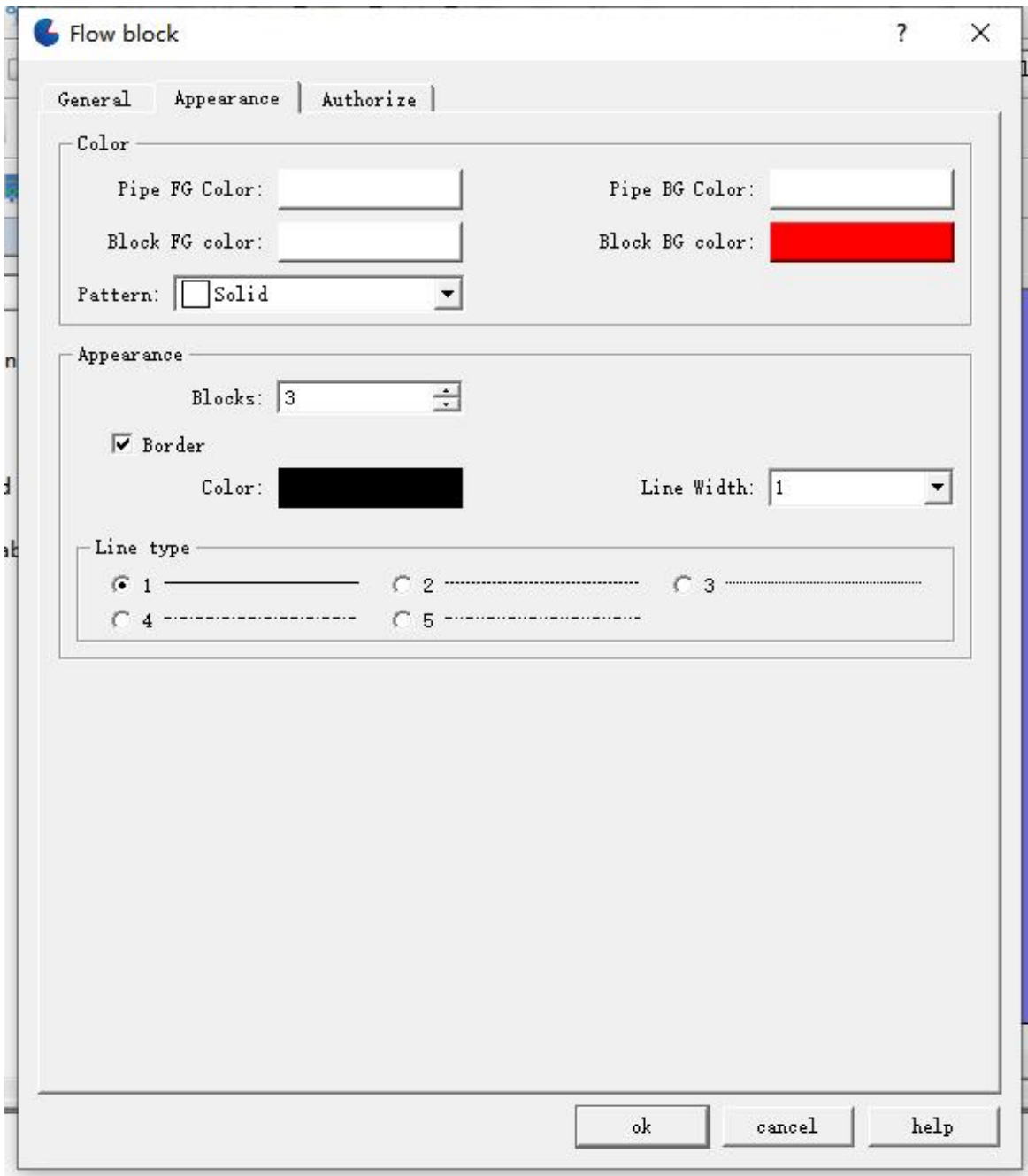
Flow direction: can be set in two ways: left and right

Flow speed: There are two control methods: fixed flow speed and dynamic flow speed. There are three types of fixed flow speeds for users to choose from: slow, normal, and fast, while the speed of dynamic flow speed is controlled by the value of the set register.

Direction control: The direction is controlled by the set bit register value. If the value is 1, it is opposite to the default set flow direction.

2. Appearance

In the appearance property page, corresponding settings can be made for the foreground color of the pipeline, the background color of the pipeline, the foreground color of the block, the background color of the block, the number of flowing blocks, and whether there is an edge color.



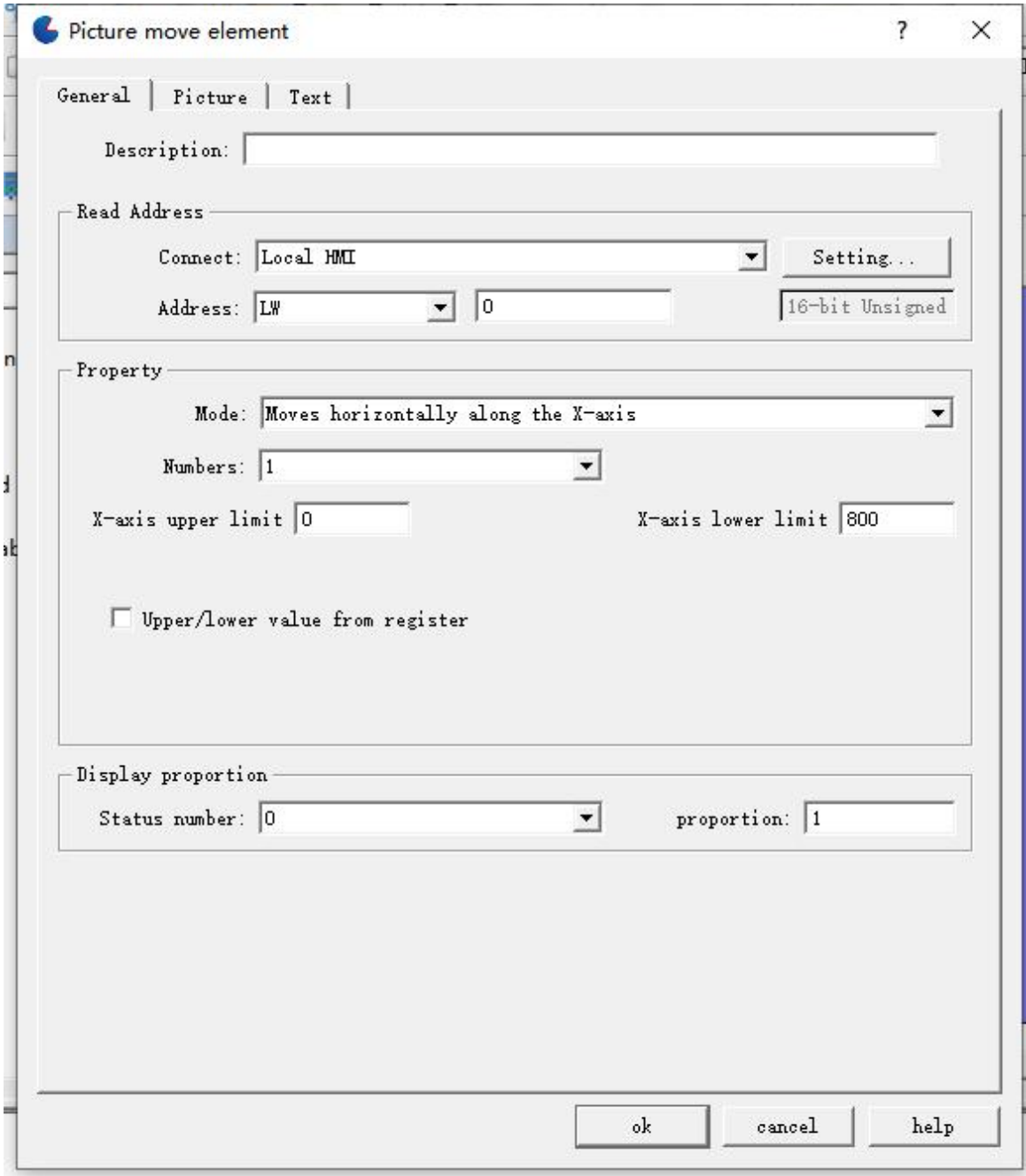
Flow Block Appearance Properties

3. Safety

Refer to the safety instructions for input components.

3.4.25 Graphic mobile components

The "graphic movement" component uses the values of three registers to control the state and movement of the component.



Graphic Mobile Component Properties dialog box

1. General attributes

Read Address: The set register address Address is the first register that controls the state of the component.

When the movement method is to move only along one direction (X-axis or Y-axis), the second register controls the horizontal or vertical position movement distance of the component. When different variable types are selected, their control addresses are different, and the corresponding relationship is:

Table 1-1 Relationship between Variable Types and Control Addresses

Variable type	State Read Address	Horizontal position movement reading address (x-axis)	Vertical position movement reading address (y-axis)

16-bit BCD	Address	Address+1	Address+1
32-bit BCD	Address	Address+2	Address+2
16-bit unsigned	Address	Address+1	Address+1
16-bit signed	Address	Address+1	Address+1
32-bit unsigned	Address	Address+2	Address+2
32-bit signed	Address	Address+2	Address+2

When the movement method is to move both the X-axis and Y-axis simultaneously, the second register controls the horizontal position movement distance of the component, and the third register controls the vertical position movement distance of the component. When selecting different variable types, their control addresses are different, and the corresponding relationship is:

Table 1-2 Variable Types and Control Address Relationships

Variable type	State Read Address	Horizontal position movement reading address (x-axis)	Vertical position movement reading address (y-axis)
16-bit BCD	Address	Address+1	Address+2
32-bit BCD	Address	Address+2	Address+4
16-bit unsigned	Address	Address+1	Address+2
16-bit signed	Address	Address+1	Address+2
32-bit unsigned	Address	Address+2	Address+4
32-bit signed	Address	Address+2	Address+4

Mobile mode: There are a total of 7 modes to choose from, and their functions are shown in Table 2.

Table 2 Graph Movement Methods

Movement Methods	Explanation
Move horizontally along the x-axis	Only the graph is allowed to move horizontally along the x-axis, and the range of movement is determined by the lower and upper limits of the x-axis.
Move vertically along the y-axis	Only the graph is allowed to move vertically along the y-axis, and the range of movement is determined by the lower and upper limits of the y-axis.
Move along both the x-axis and y-axis simultaneously	Allow the shape to move along both the x-axis and y-axis simultaneously. The movement range of the x-axis is determined by the lower and upper limits of the x-axis, while the movement range of the y-axis is determined by the lower and upper limits of the y-axis.
Move horizontally proportionally along the x-axis	Only allowed to move horizontally proportionally along the x-axis. Formula for x-axis displacement: X-axis displacement=(data - input lower limit) × (Proportional upper limit - Proportional lower limit)/(Input upper limit - Input lower limit).

Move vertically proportionally along the y-axis	Only allow vertical movement along the y-axis proportionally.
Move horizontally in reverse proportion along the x-axis	Only allow horizontal movement along the x-axis in reverse proportion. Formula for x-axis displacement: X-axis displacement=proportional upper limit - (data - input lower limit) × (Proportional upper limit - Proportional lower limit)/(Input upper limit - Input lower limit).
Move vertically in reverse proportion along the y-axis	Only allow vertical movement along the y-axis in reverse proportion.

The upper and lower limits are taken from the register: the upper and lower limits are the associated register values.

2. Images and labels

Refer to input component images and label related instructions.

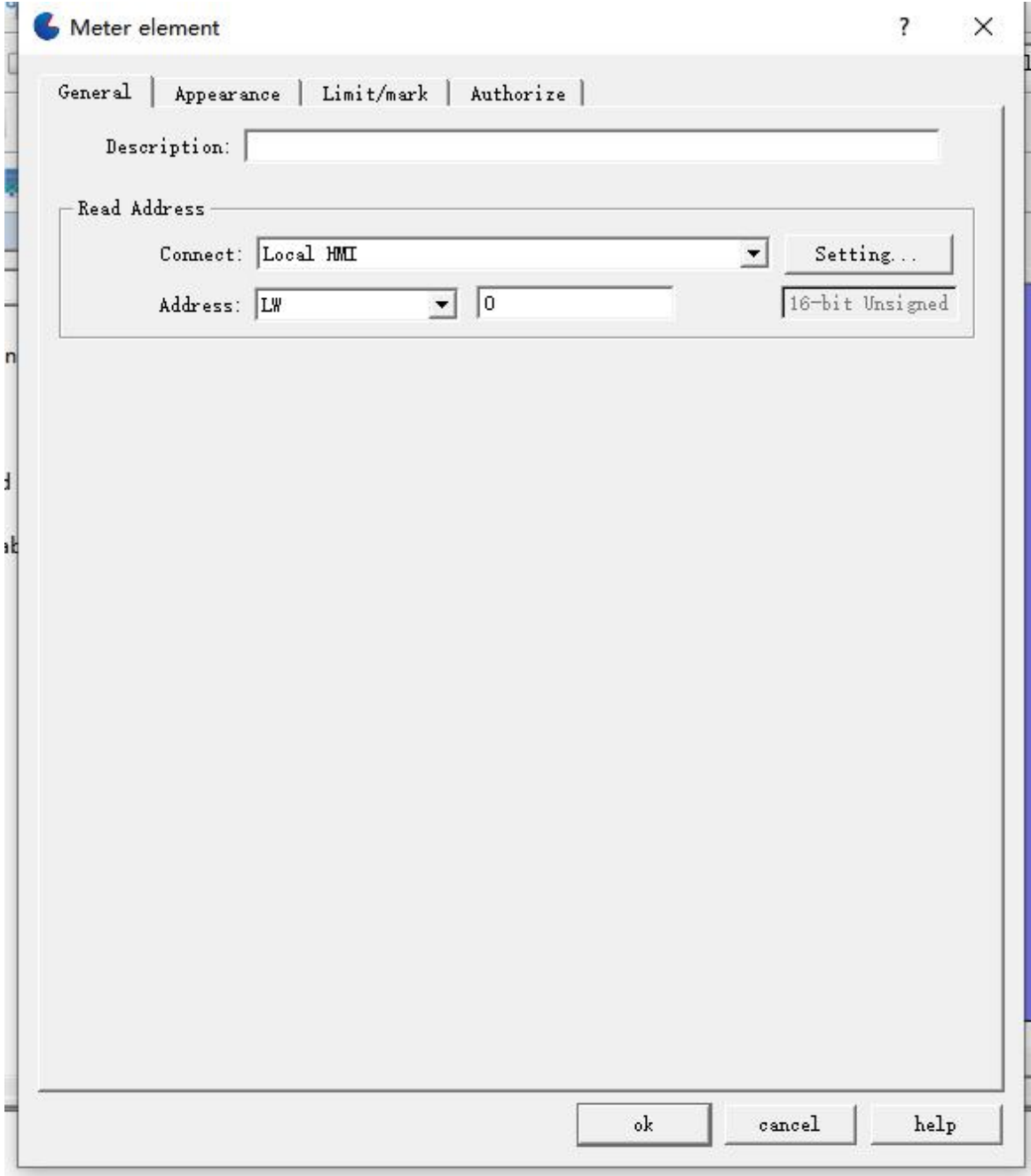
3.4.26 Animation components

3.4.27 Meter display

A pointer is a component that displays the value of a register in the form of an instrument. Select the pointer component in the component menu bar or click the pointer component icon



in the toolbar to enter the pointer component attribute setting page.



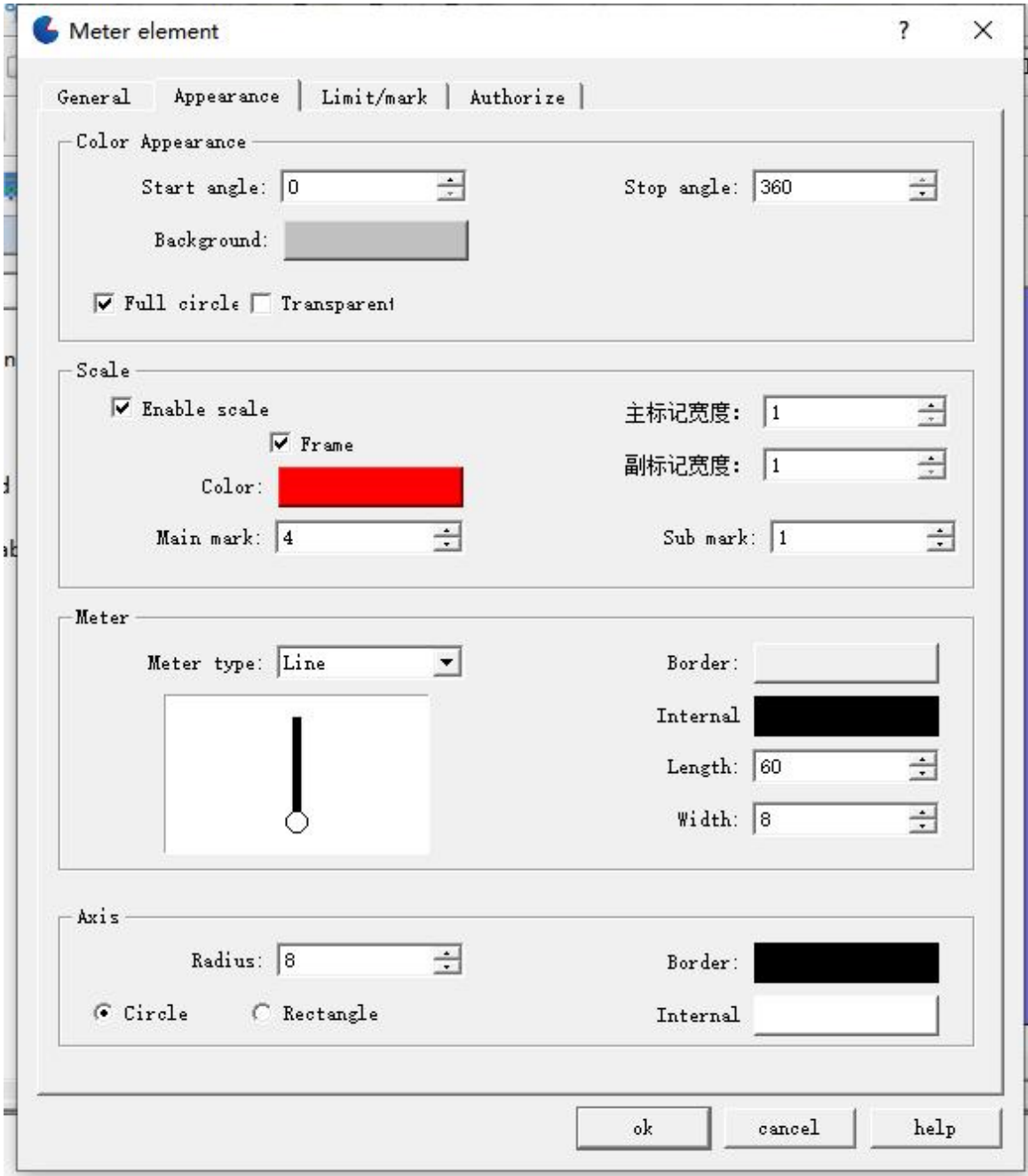
Needle Component Properties dialog box

1. General attributes

Read Address: The address of the register value to be displayed.

2. Appearance

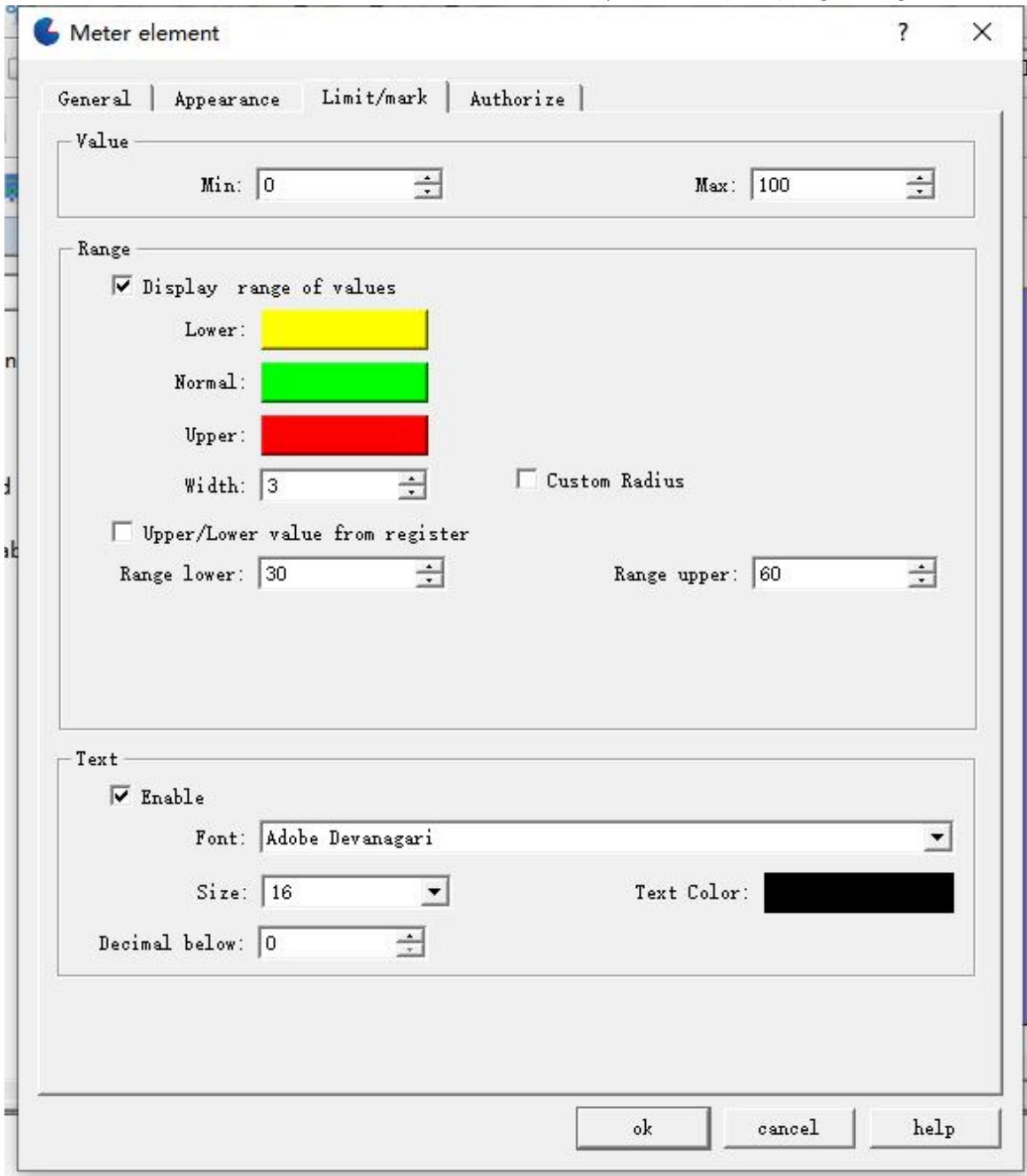
Users can set the starting and ending angles of the hands, the color of the hands, the background color of the dial, whether to display full circles, whether to display transparency, and the shape and scale of the hands.



Appearance settings for watch needle components

3. Limits/Markings

Users can set the minimum and maximum values of the register values displayed on the watch pointer, as well as the warning range and warning color.



Limit values/markings pages for dial components

If the upper and lower limits are selected to be taken from the register, the minimum value is the set register address value, and the maximum value is the subsequent register address value.


If the use of text symbols is checked, there will be text displayed on the dial scale.

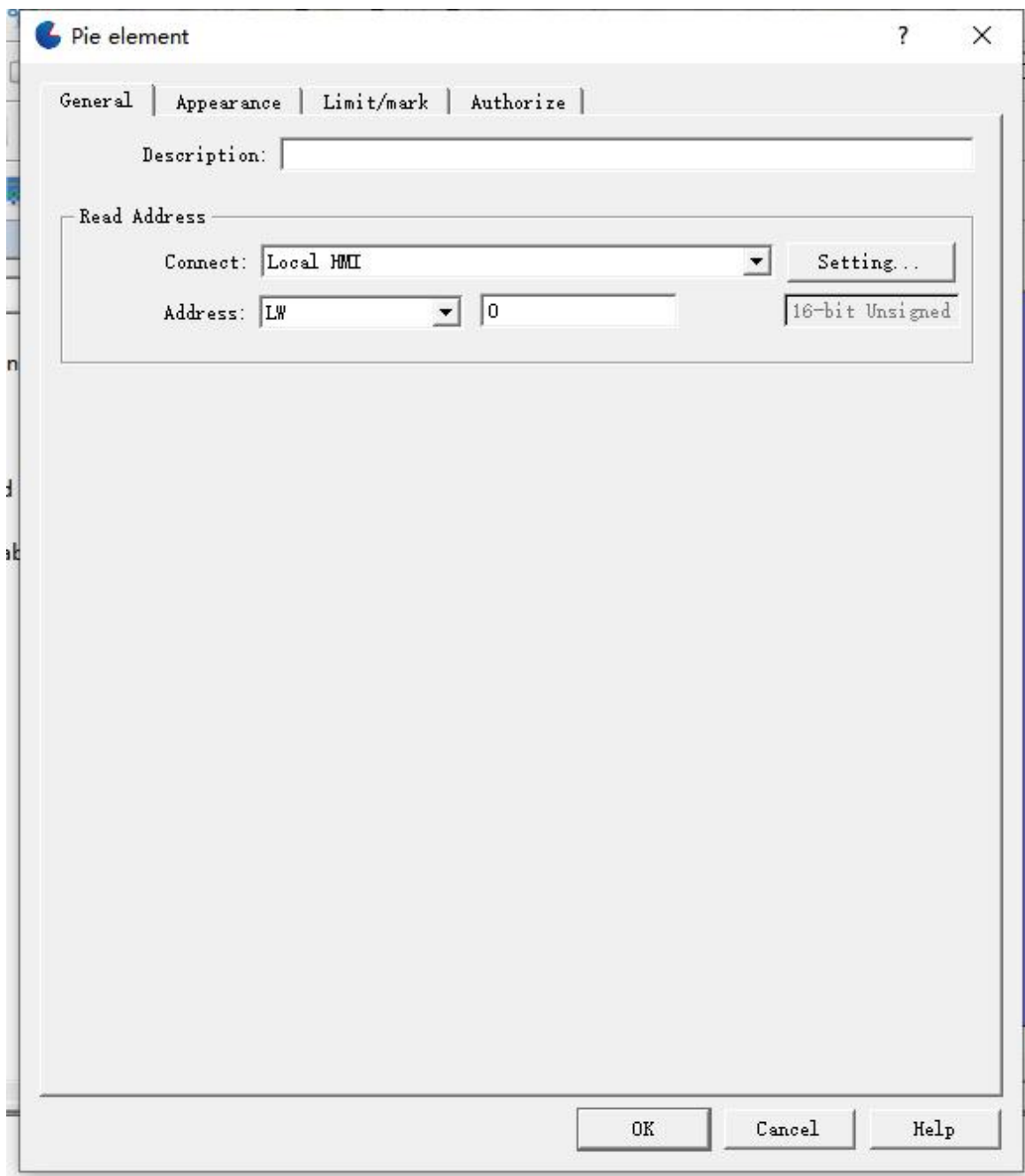
4. Safety

Reference input component safety instructions.

3.4.28 Fan-shaped component

A fan-shaped chart is similar to a watch pointer, using a fan-shaped area to display the value of a register. Select a sector chart component from the component menu bar or click on

the toolbar  to enter the sector chart component attribute settings page.



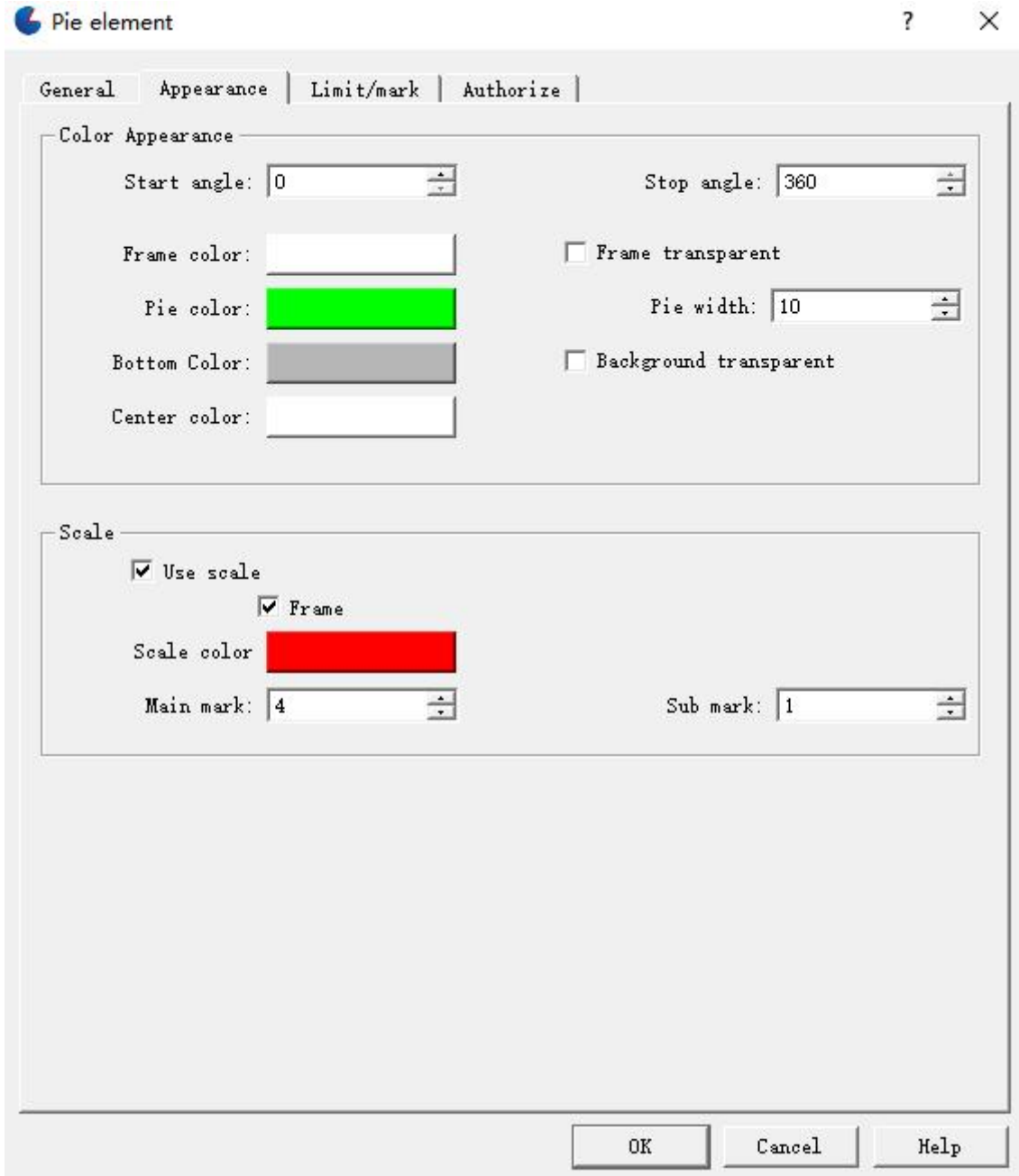
Fan Chart Component Properties dialog box

1. General attributes

Read Address: The address of the register value to be displayed.

2. Appearance

Users can set the starting and ending angles of the pie chart, the color of the outer frame, the color of the pie area and bottom, whether to display transparency, and the scale.



Fan chart component appearance settings

3. Limits/Markings

Users can set the minimum and maximum values of register values displayed in the sector chart, as well as the warning range and warning color.



Fan chart component limits/marking pages


If the upper and lower limits are selected to be taken from the register, the minimum value is the set register address value, and the maximum value is the subsequent register address value.

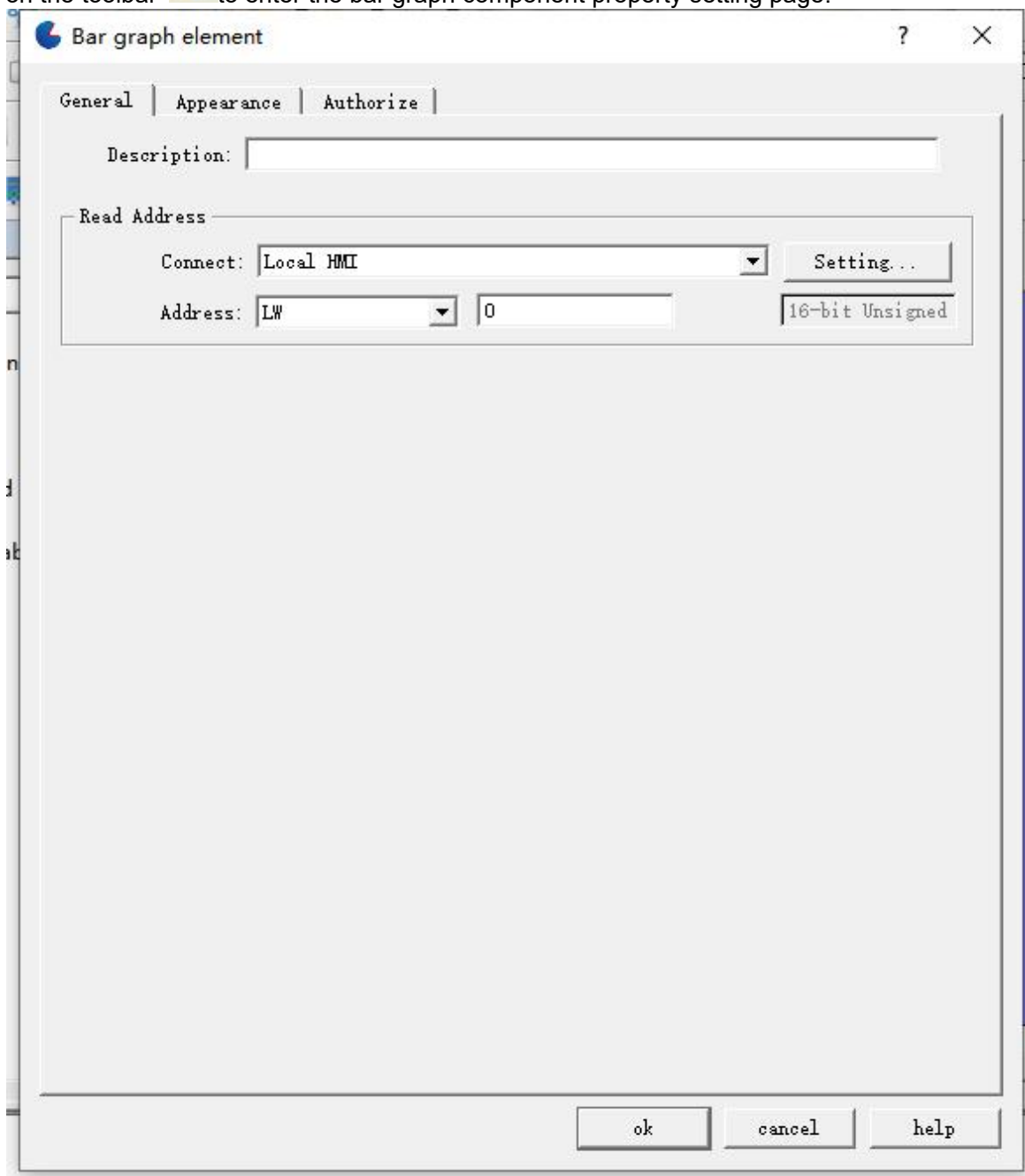
If the use of text symbols is checked, text will be displayed on the scale of the pie chart.

4. Safety

Reference input component safety instructions.

3.4.29 Stick figure component

"Bar graph" is similar to watch hands and sector graph, using a rectangular area to display the value of the register. Select the bar graph component in the component menu bar or click on the toolbar  to enter the bar graph component property setting page.



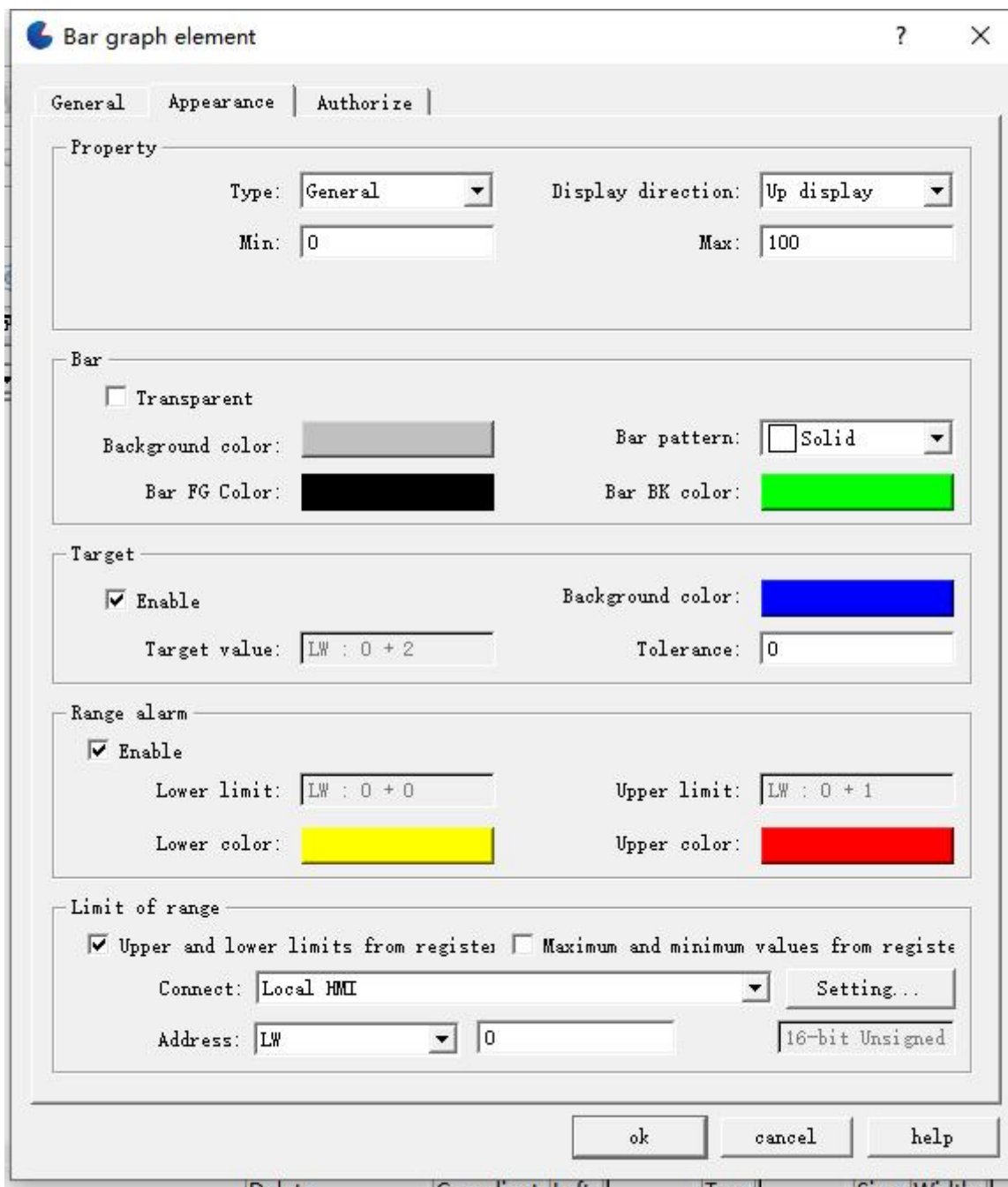
Bar Component Properties Dialog Box

1. General properties

Read address: The address of the register value to be displayed.

2. Appearance

The appearance setting of the bar graph component is as shown below.



Bar graph component appearance settings

Type: Divided into general type and deviation type. General type: The starting position of the bar graph display is 0. Deviation type: The starting position of the bar graph display is set by the **original data**.



Property

Type: **Deviation** Display direction: **Up display**

Min: **0** Max: **100**

Raw data: **50**

Comparison between general and deviation types of bar charts

Target value: When the value of the register reaches the set target value, the background color of the bar graph changes to the corresponding color set. The allowable error is that when the value of the register = target value ± allowable error, the background color of the bar graph changes to the set target value background color.

Range alarm: Set the upper and lower limits of the alarm and their corresponding displayed colors.

Range upper and lower limits: If the range upper and lower limit values are taken from the register, the lower limit of the range alarm is the value of the set register address, the upper limit is the value of the register address+1, and the target value is the value of the corresponding register address+2. As shown in the following figure.

Target

Enable Background color:

Target value: **LW : 0 + 2** Tolerance: **0**

Range alarm

Enable

Lower limit: **LW : 0 + 0** Upper limit: **LW : 0 + 1**

Lower color: Upper color:

Limit of range

Upper and lower limits from register Maximum and minimum values from register

Connect: **Local HMI** **Setting...**

Address: **LW** **0** **16-bit Unsigned**

Check to use upper and lower limits to take from registers

The maximum and minimum values are taken from the register: if this option is checked, the minimum value corresponds to the set register address value+3, and the maximum value corresponds to the set register address value+4. As shown in the following figure.

Property

Type: **General** Display direction: **Up display**

Min: **LW : 0 + 3** Max: **LW : 0 + 4**


The maximum and minimum values are taken from the corresponding address of the register

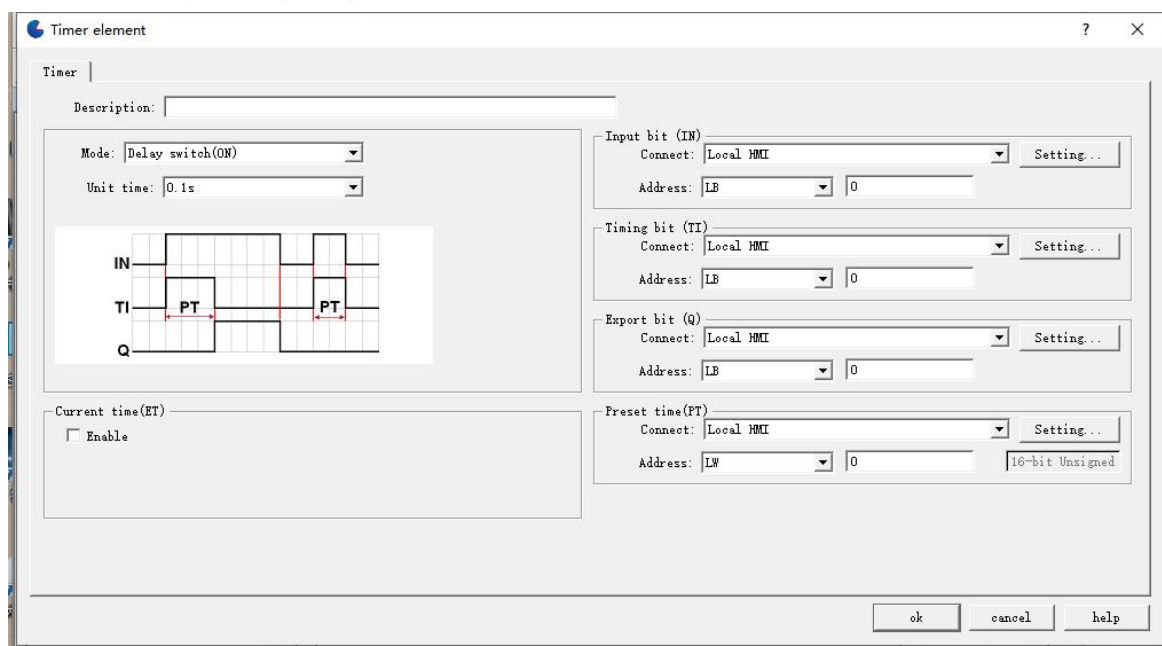
For example, if the upper and lower limits of the range are taken from the address of the register as LW0, then the lower limit corresponds to the register address as LW0, the upper limit corresponds to LW1, and the target value corresponds to the address as LW2. The minimum value corresponds to the address LW3, and the maximum value corresponds to the address LW4.

3. Safety

Refer to the input component safety instructions.

3.4.30 Timer component

The "timer" component starts and stops the corresponding timing through a bit control, and outputs the corresponding output after the timing is completed. You can select the timer component from the component menu bar or click on the toolbar  to enter the timer component property settings page.



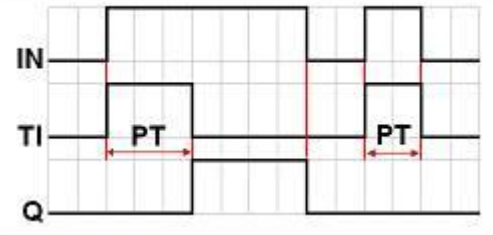
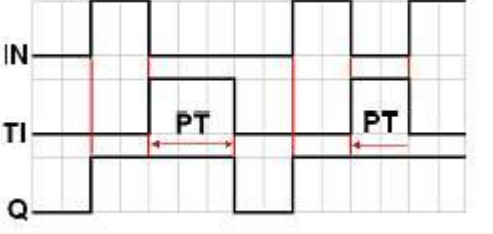
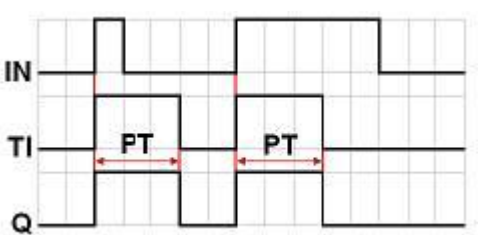
Timer Component Properties dialog box

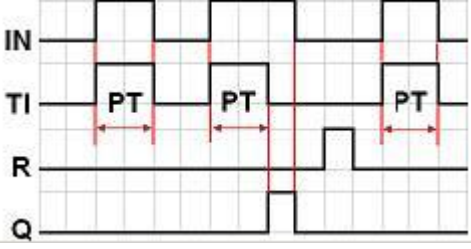
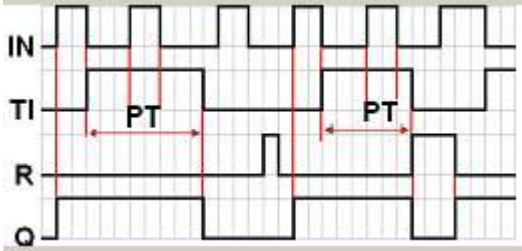
The description of timer variables is shown in the table below.

Variable	Data type	Explanation
Elapsed time (ET)	Character variable	Display the time currently elapsed by the timer
Input bit (IN)	Bit variable	The main switch of the timer controls start and stop.
Timing bit (TI)	Bit variable	Output when timing starts
Export bit (Q)	Bit variable	Timing output (output level is determined by timer mode)

Preset time (PT)	Character variable	Set timer time value
Reset bit (R)	Bit variable	Reset elapsed time (ET) to zero

Mode: Currently SimphoenixHMI provides 5 timer modes. See the table below for specific functions.


Mode	Using variables	Graphic illustration
<p>Delay switch (ON)</p>	<p>Calculated Time (ET) Input bit (IN) Timing bit (TI) Lead out bit (Q) Preset time (PT)</p>	 <p>During the operation of the timer, IN remains ON. When the timer completes the PT value, the timer is completed, and the corresponding Q output is ON. If IN becomes OFF at any time, the output Q also becomes OFF, and the timer stops timing.</p>
<p>Delay switch (OFF)</p>	<p>Calculated Time (ET) Input bit (IN) Timing bit (TI) Lead out bit (Q) Preset time (PT)</p>	 <p>After the timer IN is ON, the output Q is set to ON. When IN changes from ON to OFF, the timer starts counting. When the time is up, the output Q is reset. If IN changes to ON again during the timing process, the timer stops counting and refreshes the timing time.</p>
<p>Pulse start switch</p>	<p>Calculated Time (ET) Input bit (IN) Timing bit (TI) Lead out bit (Q) Preset time (PT)</p>	 <p>The timer IN detects the rising edge and starts the timer. Afterwards, regardless of the IN state, during the timing cycle, the output Q remains ON until the timing is completed and is set to OFF.</p>

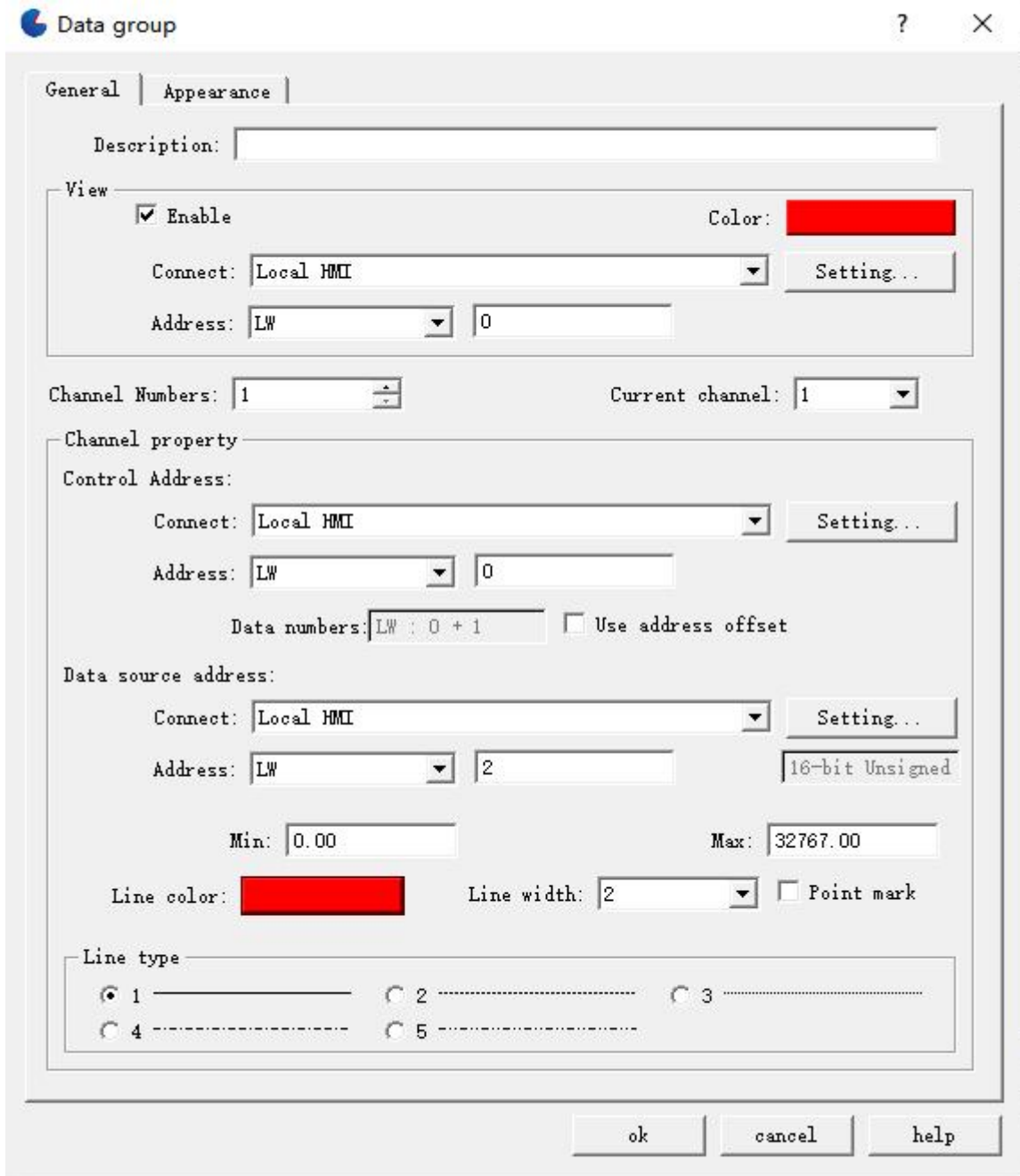
<p>Accumulated delay switch (ON)</p>	<p>Calculated Time (ET) Input bit (IN) Timing bit (TI) Lead out bit (Q) Preset time (PT) Reset bit (R)</p>	 <p>When the timer IN is ON, the timer starts counting. When IN is OFF, the completed timer will be remembered. When the next IN is ON, the timer will continue counting at the previous time point. After the timing is completed, the output Q is set to ON until IN becomes OFF before resetting. Reset bit R to reset the timer time.</p>
<p>Accumulated delay switch (OFF)</p>	<p>Calculated Time (ET) Input bit (IN) Timing bit (TI) Lead out bit (Q) Preset time (PT) Reset bit (R)</p>	 <p>After the timer IN is set to ON, the output Q is set to ON. When IN changes from ON to OFF, the timer starts counting, and TI outputs ON. During the counting period, if IN changes from OFF to ON again, the timer pauses, but TI still outputs ON. When IN becomes OFF, time continues to count after the last pause. After the counting is completed, TI becomes OFF, and the output Q is set to OFF. After completing a timer, it needs to be reset using R, otherwise it will not be able to start again.</p>

3.5 Chart components

3.5.1 Data group display components

A data group component is a chart component that reflects the changes in a set of data in the form of a line or curve, with the number of points on the X-axis and the value in the register on

the Y-axis. Click on the icon on the toolbar  to pop up a settings dialog box.



View: If checked and enabled, you can specify a register address. Click on the chart during simulation. The number of points at the clicked position and its Y value will be reflected in this register and subsequent registers.

Number of channels: Specify the number of channels. One channel reflects a set of data changes, up to 12 channels can be specified, and channel attributes can be specified for each channel.

Control address: When the value is 1, the curve is drawn; when it is 2, the curve is erased; when it is 3, the curve is erased first and then drawn. It will automatically reset after the action is completed.

Data number address: This register address is fixed to the address after the control address. When drawing a curve, you need to specify the number of points, otherwise it will not be drawn.

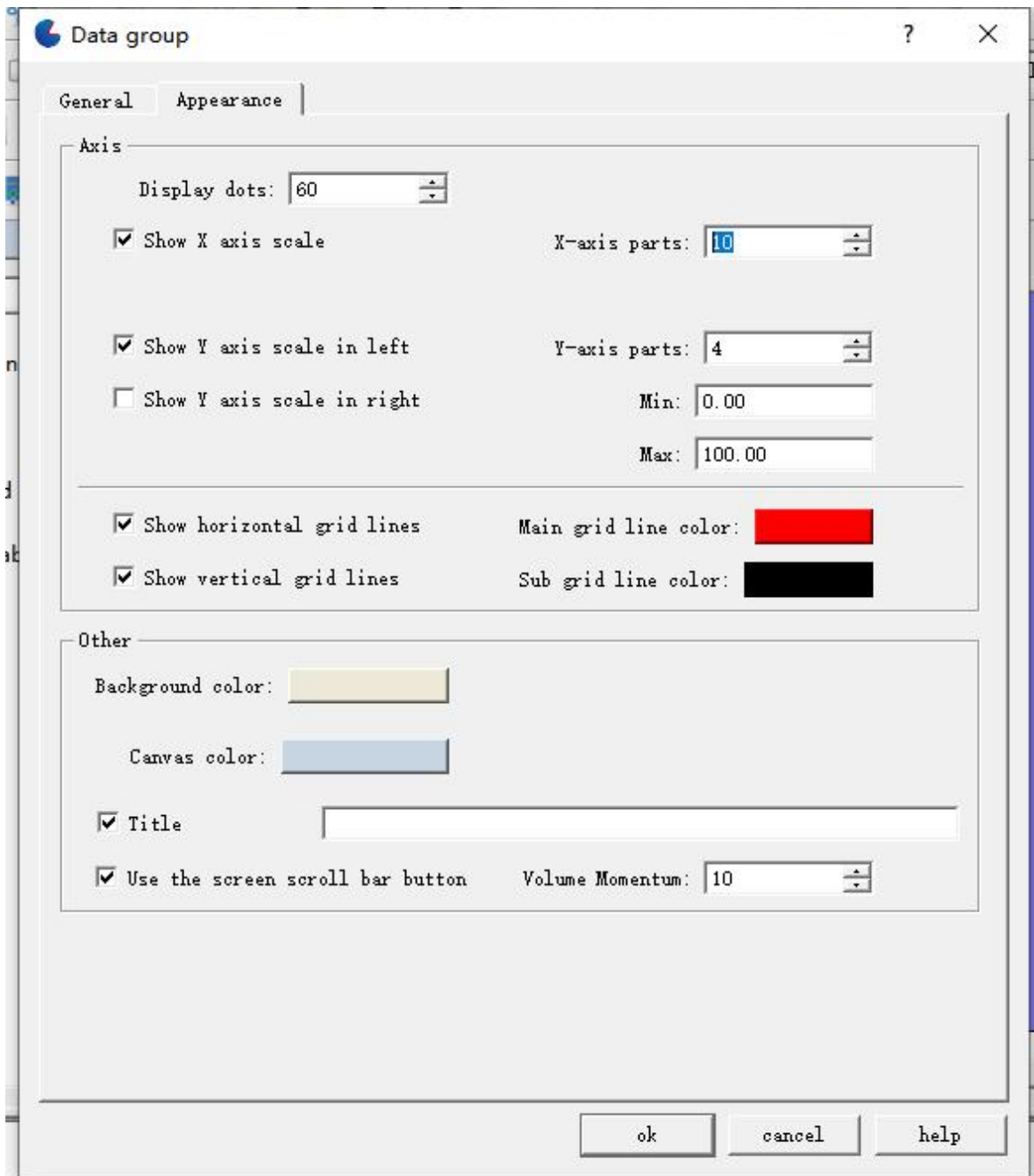
Use address offset: If checked, the data source offset address is fixed to the address after the data number address. If not checked, you can specify the starting address of the data source yourself.

Data source starting address: This address is the first Y-axis data address, and subsequent data addresses are arranged backwards. If the starting address is set to the 16-bit unsigned integer of LW10, the data of this channel will read the data of LW10, LW11, LW12... in sequence. As for how much data is displayed, it is determined by the value of "**data number address**".

Min/Max: Y-axis minimum and maximum values of the current channel.

Draw point markers: If checked, a small square will be drawn on each data point for marking.

Line type selection: Select the line type of the current channel.




Number of display points: The number of data points that can be accommodated on the X-axis within the visual range.

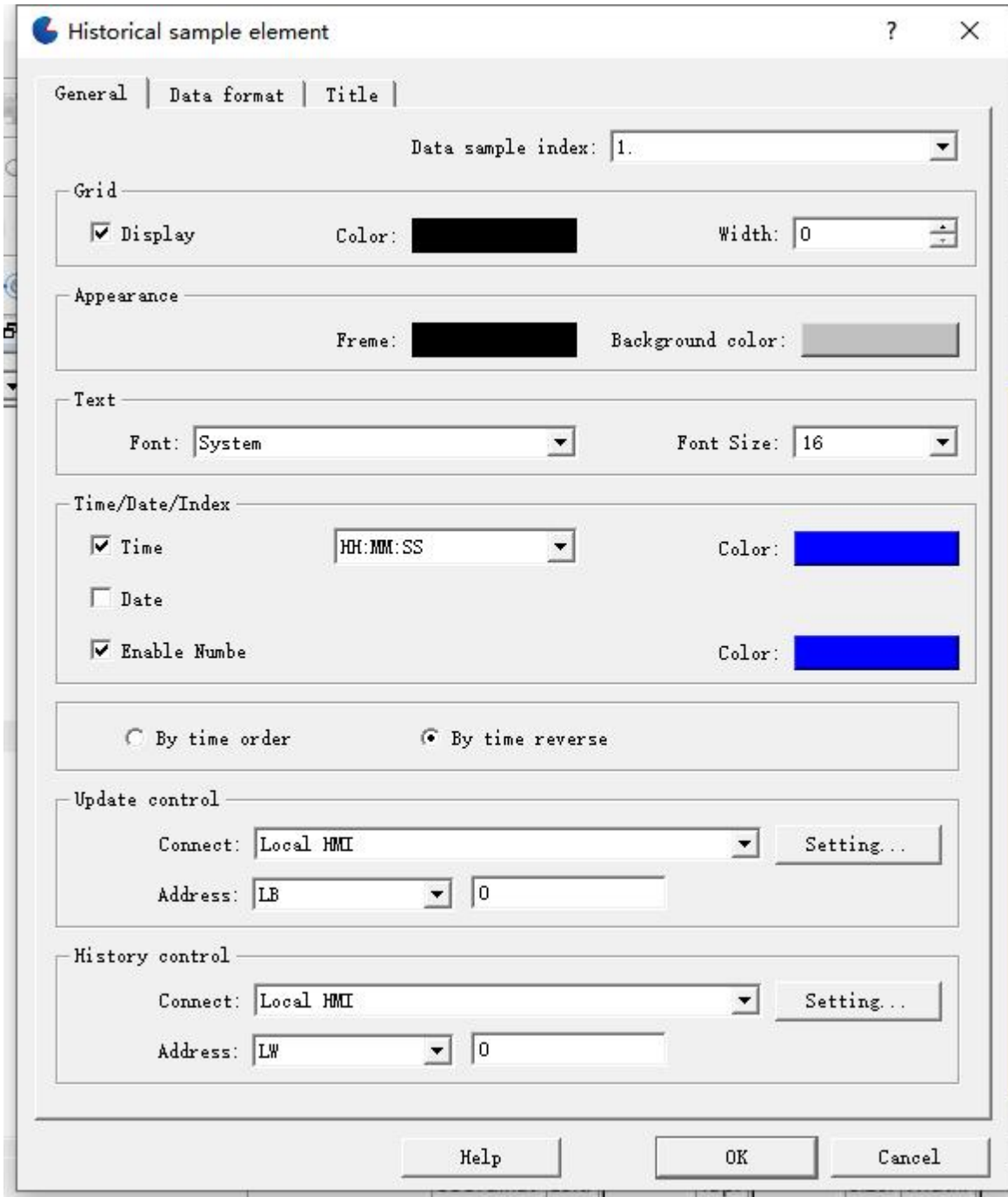
Title bar: Display the specified text at the top of the chart.

Use screen scroll axis buttons: Display scroll buttons at the bottom, and the number of data points for each scroll is specified in the scroll amount.

3.5.2 Historical data display component

The historical data display component displays historical and currently collected data in the form of a table and needs to be used in conjunction with the **data sampling table**. Click the

icon on the toolbar  to pop up the settings dialog box

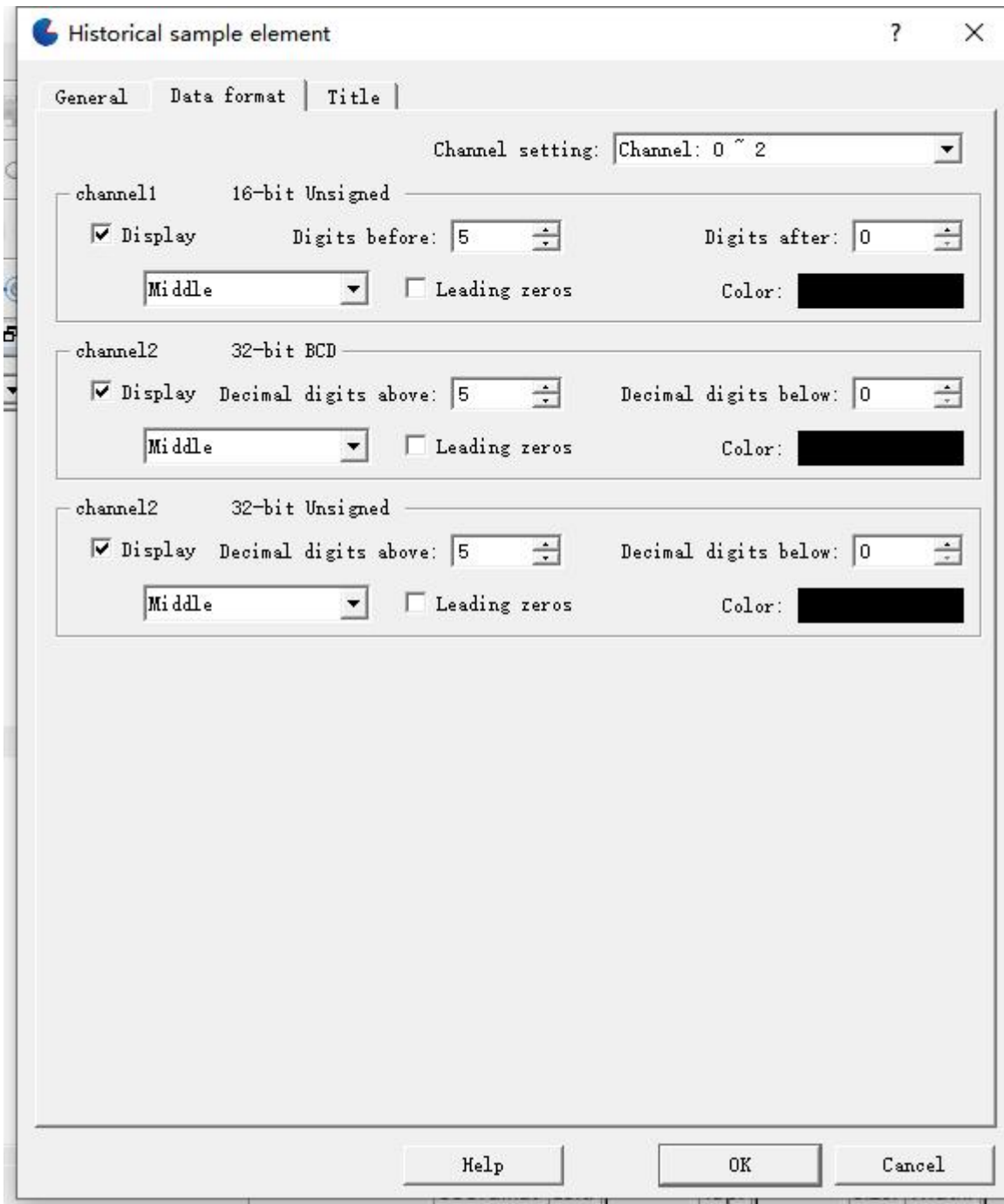


Data sampling index: Select the sampling index in the data sampling table.

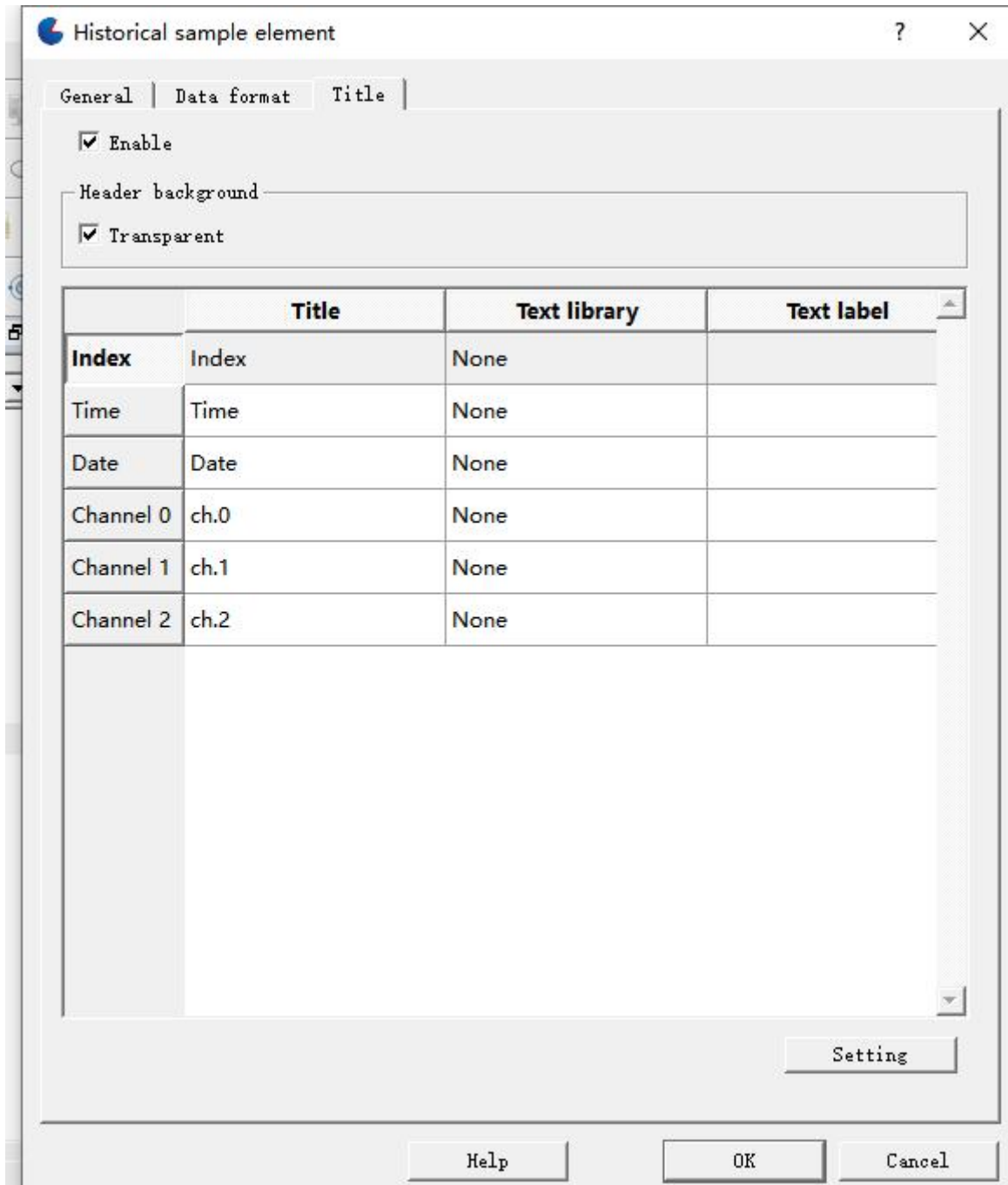
Chronological/Reverse Chronological: Specify the order in which the data is listed. The order is from the earliest column to the latest column, and the reverse order is from the latest column to the earliest column.

Refresh control: Specify a bit register. When set to ON, the data in the refresh component is displayed in the table.

History control: Specify an integer register. When set to 0, today's data will be displayed. When set to 1, yesterday's data will be displayed, and so on.




In the "Data Display Format" tab page, you can specify the display/hiding of different channels, as well as the display format, style, etc.

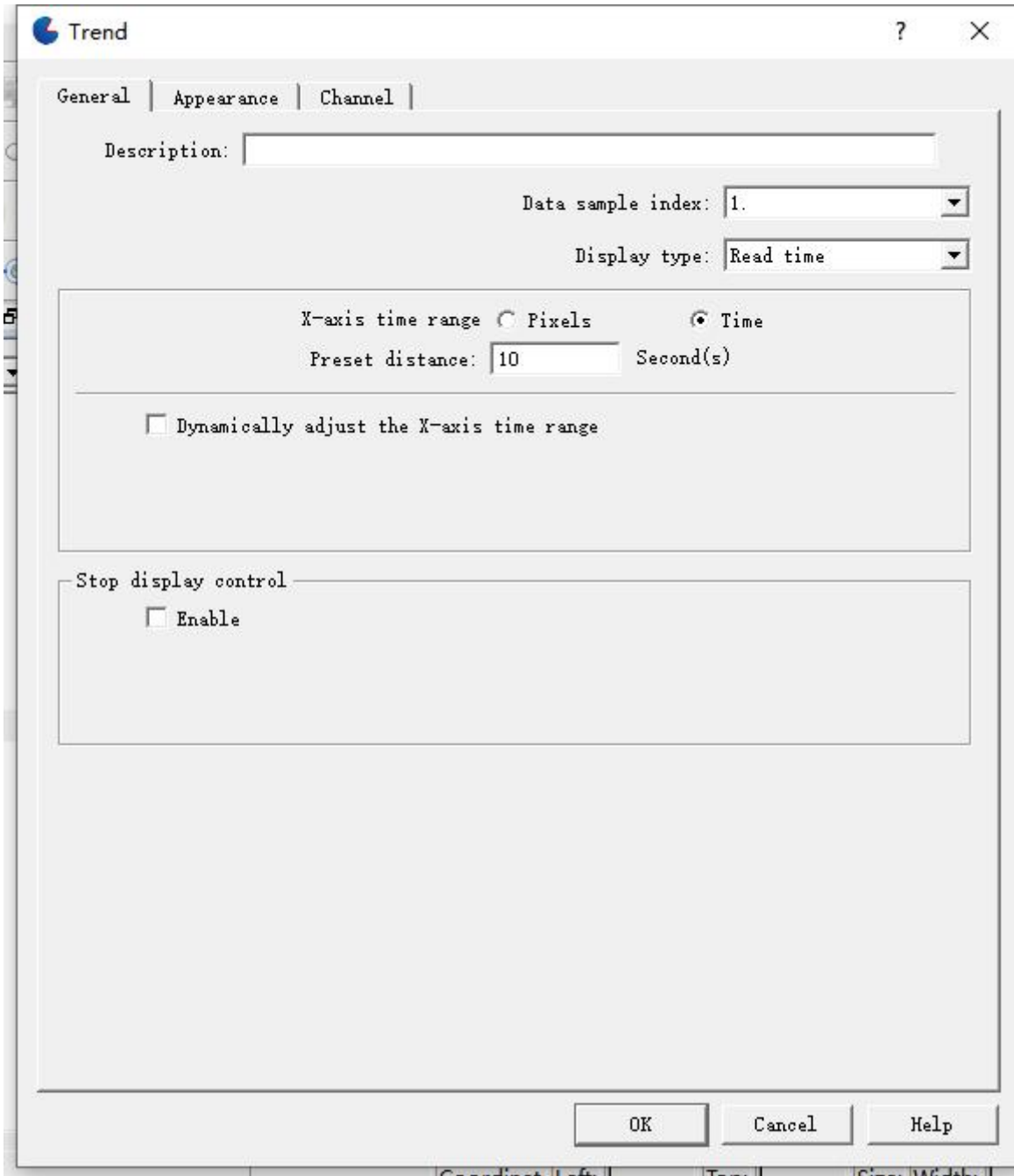


Set table header information.

3.5.3 Trend chart component

The trend chart component is a line chart that reflects the changes in data in the specified register and needs to be used in conjunction with the data sampling table. Click the icon on the

toolbar  to pop up the settings dialog box:



Data sampling index: Index in the data sampling table, select a sampling source.

Display method:

Instant: Display sampling data from startup to current. After selecting this option, "Pause Display Control" will be displayed. If enabled, a bit address can be specified to control the display of the chart. Note that sampling is still in progress when the display is paused.

History: Display the sampling history of data for a certain day. After selecting this option, "Historical Data Control" will be displayed. If enabled, a 16 bit integer register can be selected to control the displayed historical record number, which is the number when the historical records are arranged in order.

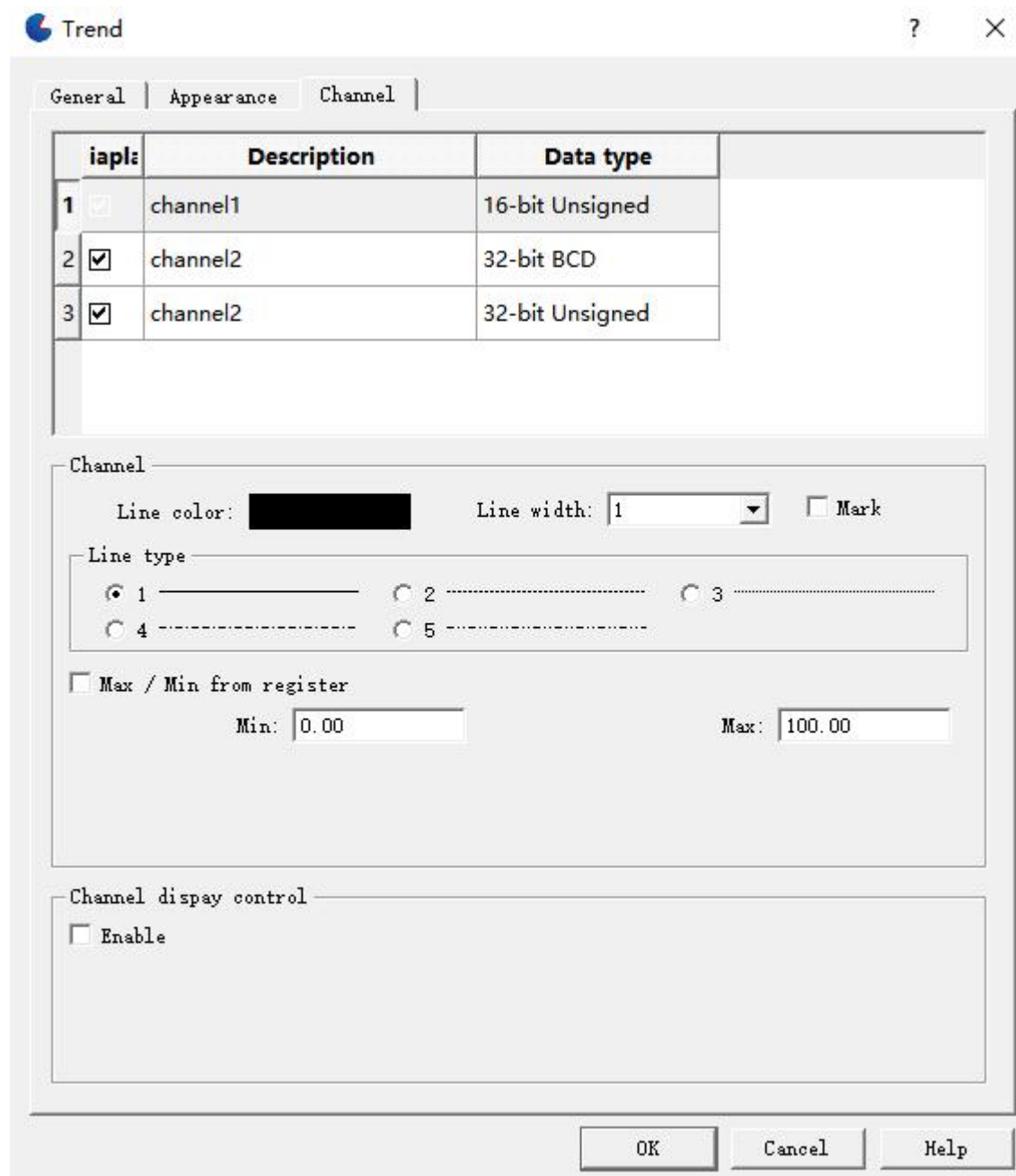
The X-axis can be measured in pixels and time points:

If "Pixel" is selected, when "Dynamic adjustment of the distance between two sampling points" is checked, the pixel distance between the two sampling points can be specified in the specified register.

If "Time" is selected, when "Dynamic adjustment of X-axis time range" is checked, the number of visible X-axis time seconds can be specified in the specified register.

Pause display control: Specify a bit register to pause display when set to ON, but data is still being collected.

The "Appearance" tab settings can refer to the appearance settings in the data group display components.

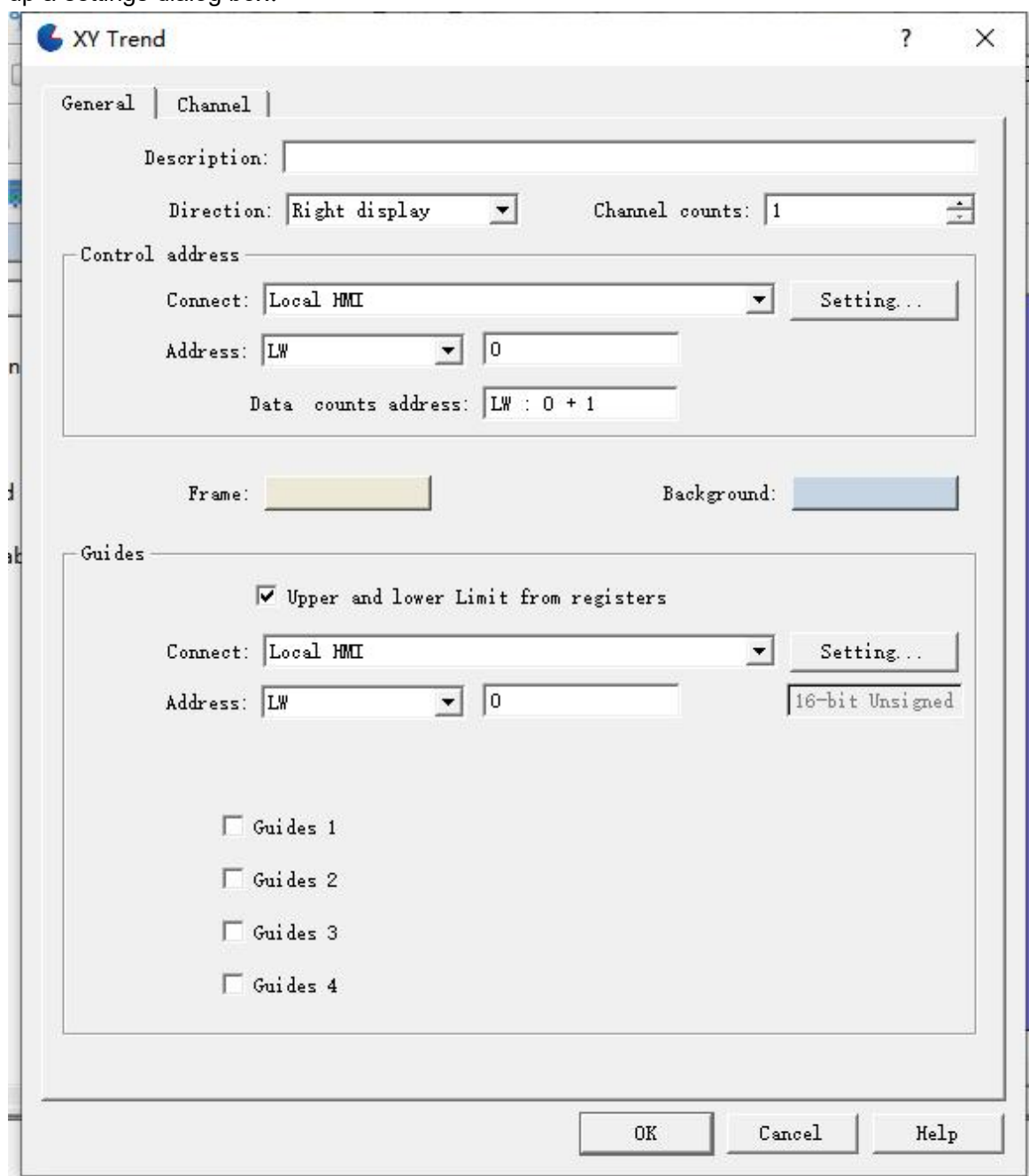


In the channel table, you can choose the sampling channel in the data sampling table. The channel settings below allow you to select the color and style of the lines for each channel.

Channel Display Control: When enabled, a display control register can be specified and the display category can be specified as "On" or "Off". When specified as on, only the channels specified in the control register are currently displayed; When specified as off, only the channel specified by the control register is currently hidden.

3.5.4 XY trend chart components

The xy trend chart component is similar to the data group display component. The difference is that the numerical changes of data group components are reflected on the Y-axis, while the X-axis represents the number of data points; The XY trend chart reflects the numerical changes on both the X-axis and Y-axis simultaneously. Click on the icon on the toolbar to pop up a settings dialog box:



Direction: You can choose to display to the left or right, and by default, it is displayed to the right.

Number of channels: Specify the number of drawn lines.

Control Address: The action of drawing control curves.

Control address value	Explanation
1	Draw a line to display the value of the control address written to 0 after completion.
2	Clear the previously drawn line, and after clearing, write the value of the control address to 0.
3	Clear the previously drawn line and draw the current line. After the display is completed, the value of the control address is written to 0.

Number of Data Address: Specify the number of data for each line.

The upper and lower limits are taken from the register: If checked, the upper and lower limits of the XY axis can be specified in the register. If not checked, you can directly enter the upper and lower limit values in the input box.



Channels: Different data sources, upper and lower limits, and line styles can be specified for each channel.

There are four possible combinations for selecting "X-axis data and Y-axis data from different registers" and "upper and lower limits taken from registers":

1. The X-axis and Y-axis come from the same register, with input settings for upper and lower limits

If the read address is LW10, then

LW10: X1 data

LW11: Y1 data

LW12: X2 data

LW13: Y2 data

... ..

2. The X-axis and Y-axis come from the same register, and the upper and lower limits are taken from the register

If the read address is LW10, then

LW10: Lower limit of X-axis

LW11: X-axis upper limit

LW12: Y-axis lower limit

LW13: Y-axis upper limit

LW14: X1 data

LW15: Y1 data

LW16: X2 data

LW17: Y2 data

... ..

3. The X-axis and Y-axis come from different registers and lower range input settings

If the X-axis reading address is LW10 and the Y-axis reading address is LW50, then

LW10: X1 data

LW11: X2 data

LW12: X3 data

... ..

LW50: Y1 data

LW51: Y2 data

LW52: Y3 data

... ..

4. The X-axis and Y-axis come from different registers, and the upper and lower limits are taken from the registers

If the X-axis reading address is LW10 and the Y-axis reading address is LW50, then

LW10: Lower limit of X-axis

LW11: X-axis upper limit

LW12: X1 data

LW13: X2 data

... ..

LW50: Y-axis lower limit

LW51: Y-axis upper limit


LW52: Y1 data

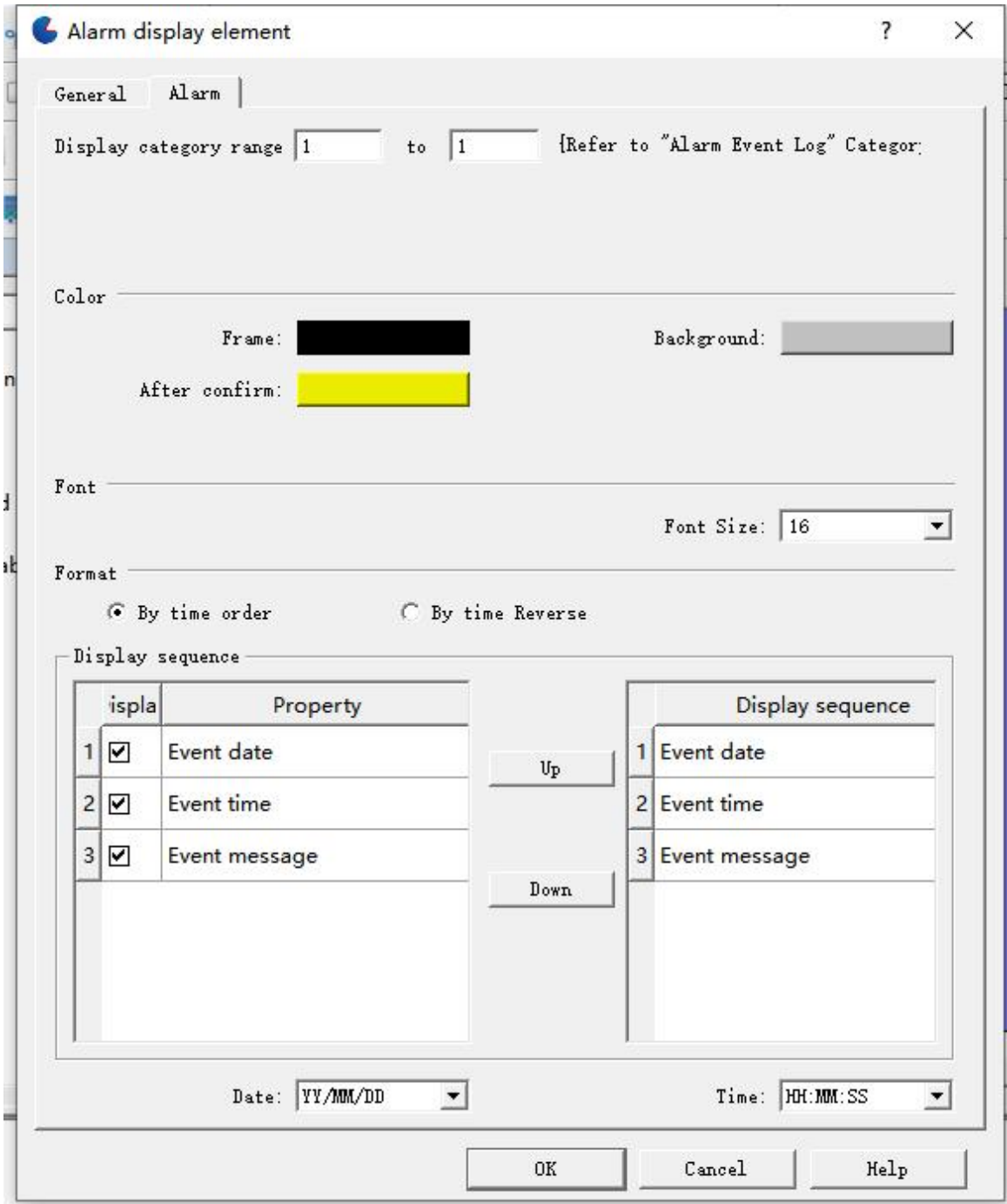
LW53: Y2 data

... ..

3.5.5 Alarm display components

The alarm display is used to display alarm events and needs to be used in conjunction with the

"Alarm Event Login Table". Click on the icon  on the toolbar to pop up a settings dialog box:




Display category range: allows the display of alarm events in a specified category.

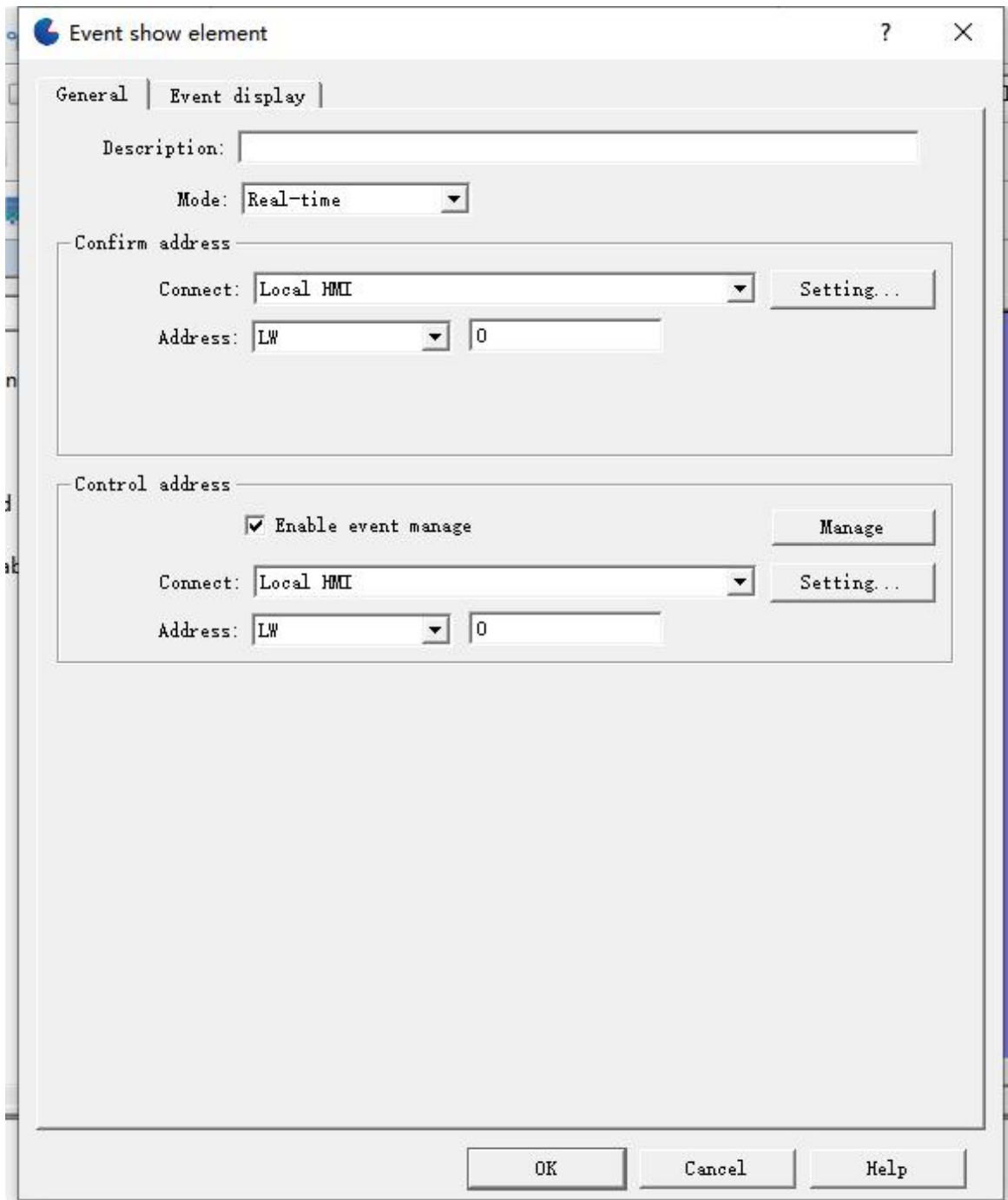
Confirmation method: After the alarm event is displayed, you can click on it, and here you can specify whether to click or double-click.

Format: Can specify display order and customize header display order.

Display order: Coco displays/hides event attributes and specifies the display order of attributes by moving them up and down.

3.5.6 Event display components

Event display components are similar to alarm display components, except that event display components can display historical alarm events. Click on the icon  on the toolbar and a settings dialog box will pop up:



There are two methods: real-time and historical.

Instant: Display event records triggered by the touch screen since startup.

History: Display historical alarm data.

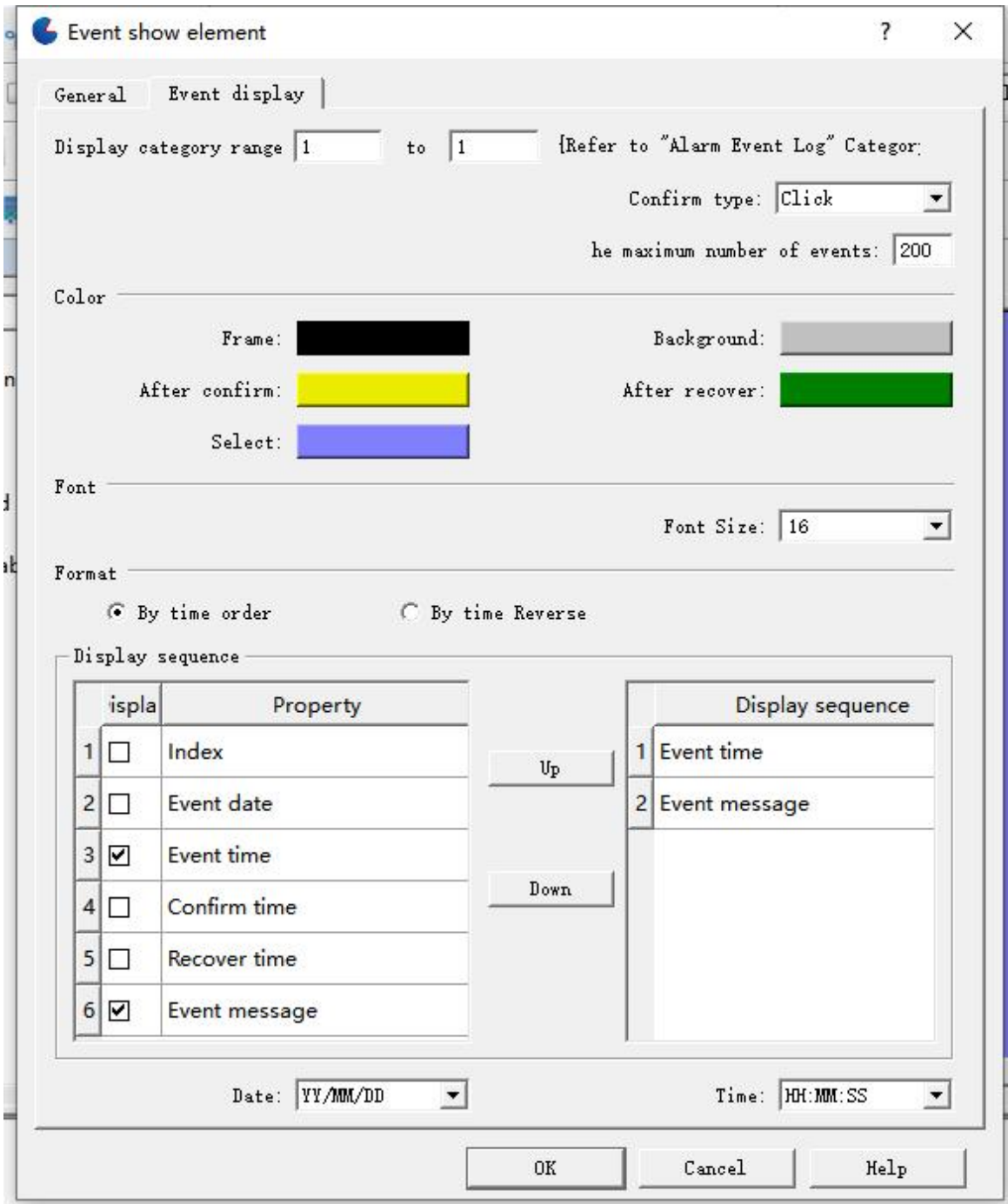
Confirm Address: This register can be set in real-time mode. After clicking on the alarm record in the list for confirmation, the confirmation value set by the alarm event login will be written into this register.

Historical data control: This register can be set in historical mode. If "Enable reading of multiple historical data" is not checked, it means setting the historical data N days ago, where N is the register value.

Enable reading multiple historical data: If enabled, two modes can be specified: "Days" and "Last Historical Data Index". Assuming that the value in the historical data control register is a and the data in its subsequent registers is b.

Days: Refers to the display of all historical data within the time range of b days, starting from the day before a day ago.

Finally, historical data index: Assuming that the data index files are arranged in reverse chronological order, starting from the a-th point and then pushing b more, the resulting index set data will be displayed in the list.

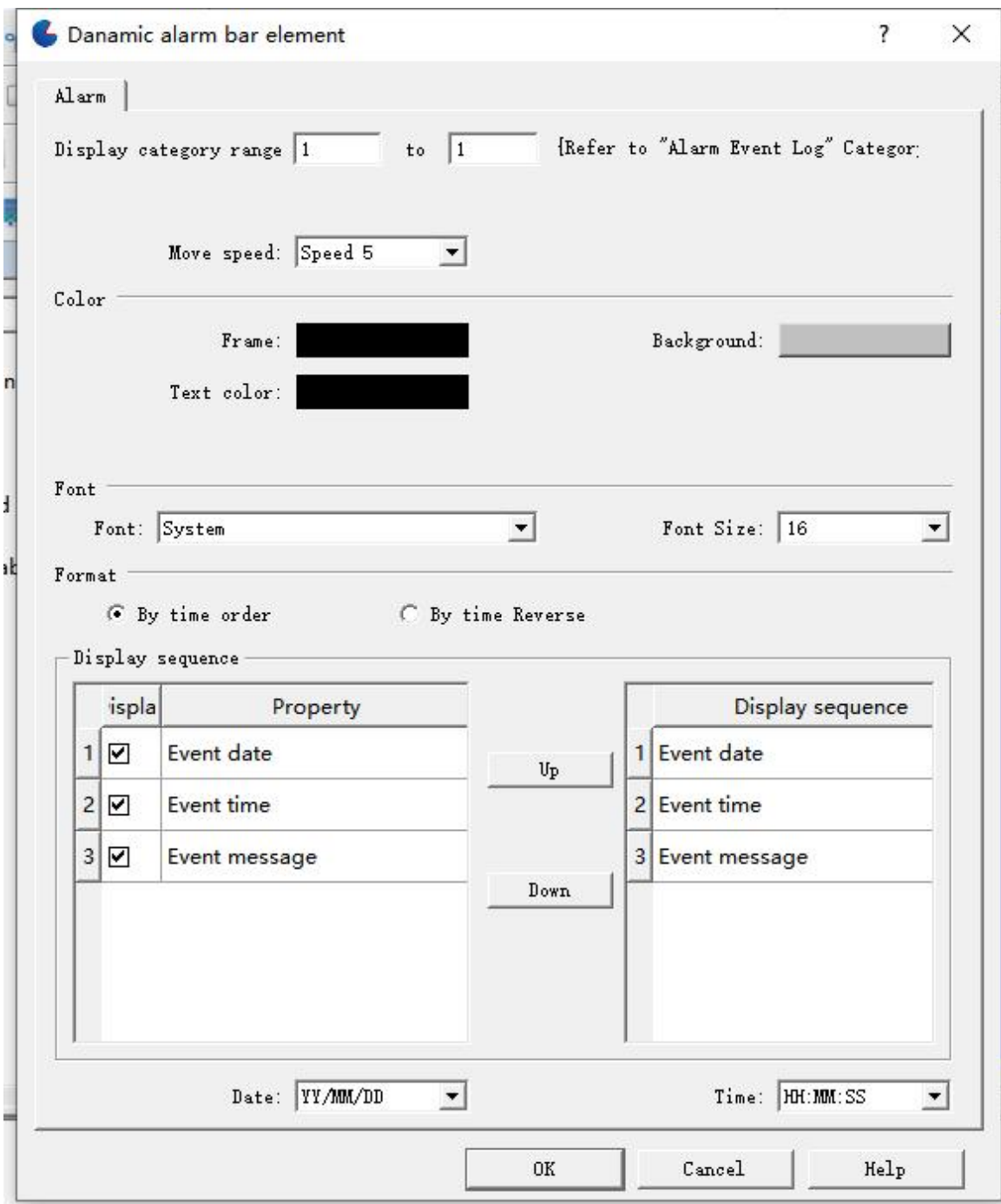


For setting options, see Alarm Display Components.

3.5.7 Dynamic alarm bar component

The dynamic alarm bar component is similar to the alarm display component. The difference is that the dynamic alarm bar component can display alarm events in a revolving door. Click the

icon  on the toolbar to pop up the settings dialog box

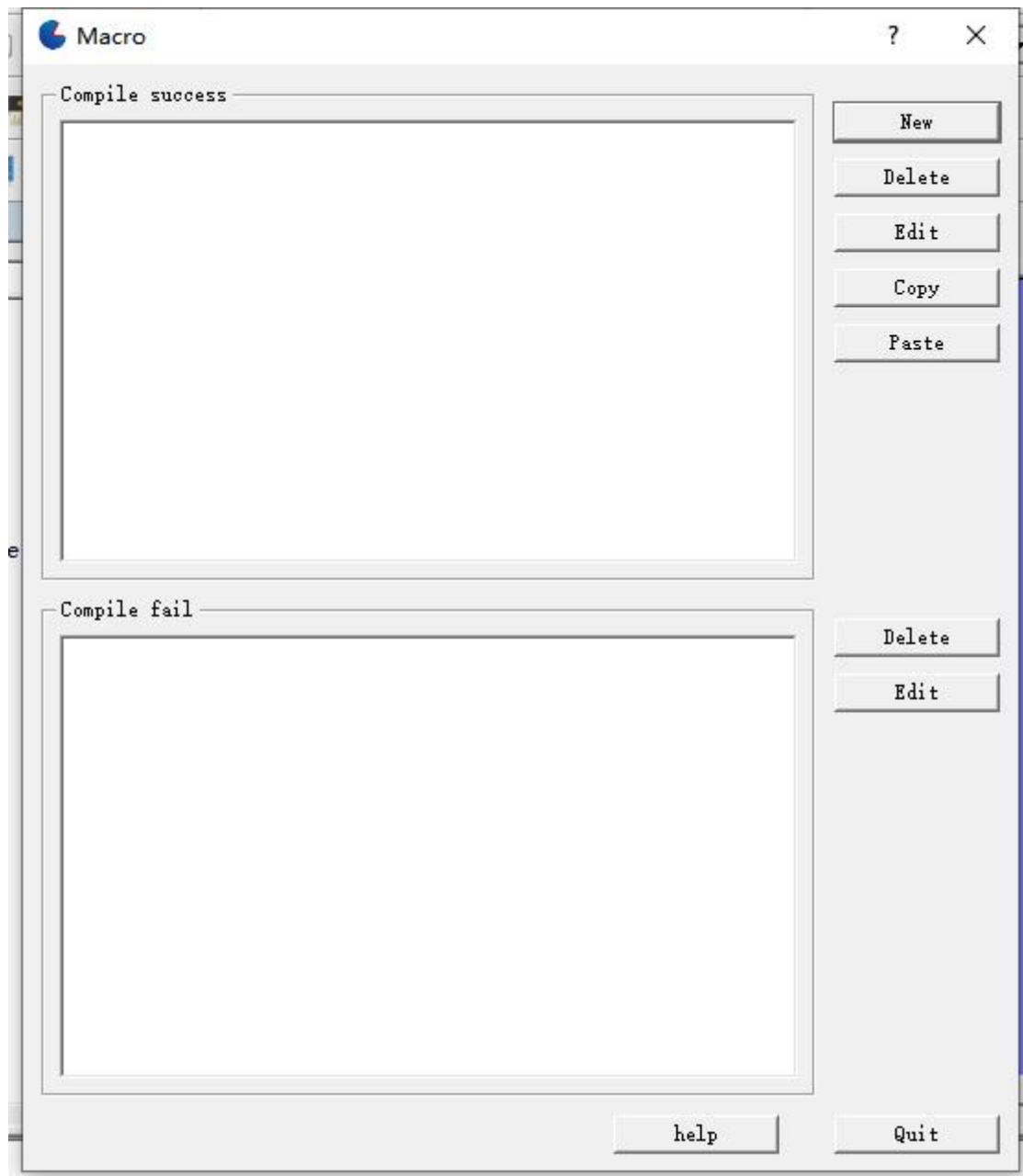


Most settings can refer to alarm display components, where "movement speed" can specify the rolling speed of the marquee.

3.6 Introduction to macro function

3.6.1 Macro management list

Select "Tools" - "Macro Editor" from the menu bar to pop up the macro management list dialog box:



The two lists on the left separate macros that have been compiled successfully and those that have not been compiled. Uncompleted compilation refers to macros that have errors in compilation.

New: A macro editing dialog box will pop up to compile macros.

Delete: Delete the selected macro.

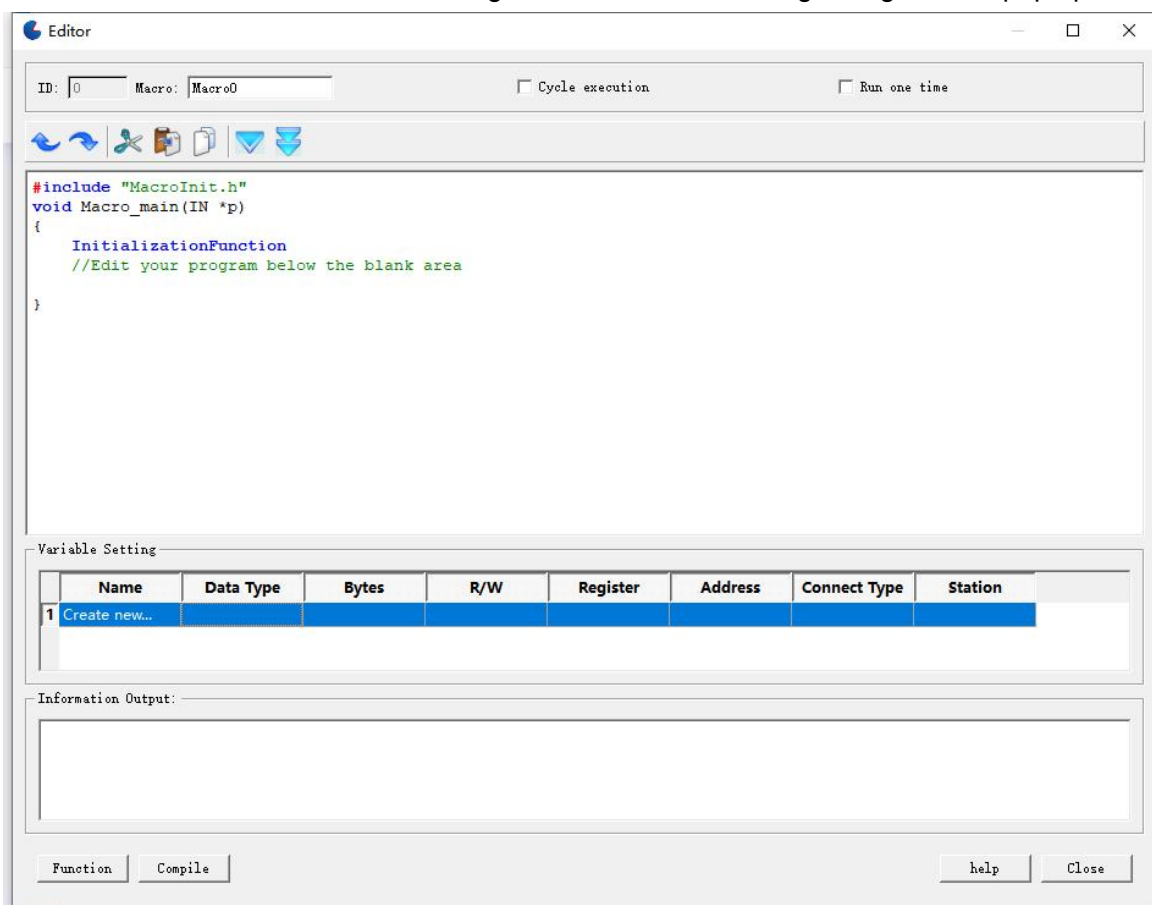
Edit: Edit the macro in the list again.

Copy: Copy the selected macro.

Paste: Paste the copied macro into the list box.

3.6.2 Macro Editor

Add or edit a macro in the macro manager, and the macro editing dialog box will pop up:



Macro name: Specify a macro name, which cannot be the same as an existing macro name.

Periodic execution: After checking, it can be executed according to the specified time period.

Enable execution conditions: After checking, you can specify a bit address register. When the data in this register changes, this macro instruction will be executed.

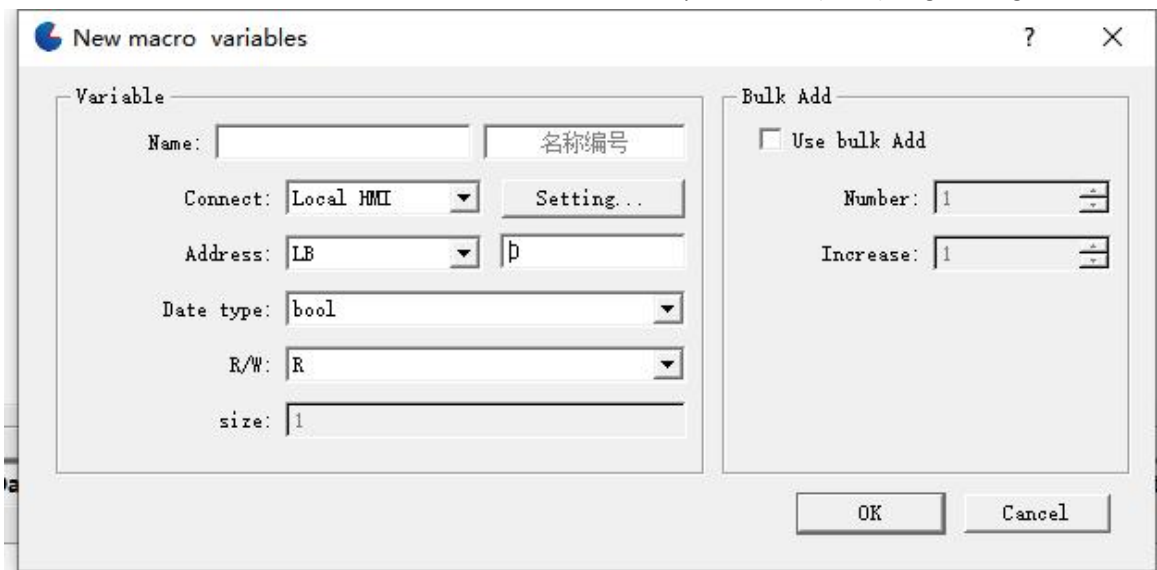
Execute once when HMI starts: If checked, execute once when HMI device or simulator starts.

Function: Call the built-in library function.

Compile: Compile macro instructions.

Macros are written in ANSI C syntax. Pay attention to the built-in parts of the code, including the reference to MacroInit.h and the use of the InitializationFunction macro. Do not modify them at will, just keep them.

Double-click the "New..." line in the variable table in "Variable Settings" to create a new macro variable. The newly created variable is associated with the register address and can be used directly in the macro code.



In addition to using variables to associate register addresses, the editor also provides three built-in array variables corresponding to LB, LW, and RWI, which can be used directly in the code, such as:

unsigned short value = LW[10];

RWI[100] = value;

3.6.3 Macro Instruction Function

1. Data Format Setting Column Table

Form at	Bit	16bit BCD	32bit BCD	16bit Hexadeci mal	32bit Hexadeci mal	16bit Signed number	16bit Unsigned number	32bit Signed number	32bit Unsigned number	32bit Floating point number
Defin ition	bool	16-bit bcd	32-bit bcd	16-bit HEX	32-bit HEX	16-bit signed	16-bit unsigned	32-bit signed	32-bit unsigned	32-bit float

2. List of operators

No.	Operator	Function
1	=	Assignment
2	+(including float type)	Addition ADD
3	-(including float type)	Subtraction SUB
4	*(including float type)	Multiplication MUL
5	/(including float type)	Division DIV
6	%	Integer remainder

7	mod	Extract surplus
8	<	less than
9	<=	Less than or equal to
10	>	greater than
11	>=	Greater than or equal to
12	==	Determine if it is equal
13	!=	Not equal to
14	&& or "AND"	Logic and
15	or "OR"	Logical OR
16	^ or "XOR"	Logical XOR
17	=! or "NOT"	Logical non

2. 2. List of Instruction Functions

No.	Instruction function	Function
1	ADDSUM	Calculate the checksum of a one-dimensional array accumulation
2	ASCII2DEC	Convert character ASCII data to decimal format data
3	ASCII2FLOAT	Convert character ASCII data to floating-point format data
4	ASCII2HEX	Convert ASCII character data to hexadecimal data
5	BCD2BIN	Convert BCD format data to BIN format data
6	BIN2BCD	Convert BIN format data to BCD format data
7	CRC	Compute the data of a one-dimensional array into a 16 bit CRC to obtain a checksum (checksum)
8	DEC2ASCII	Convert decimal data to ASCII format data
9	FLOAT2ASCII	Convert floating-point format data to ASCII format data
10	GETBIT	The state of reading data for positioning
11	HEX2ASCII	Convert hexadecimal format data to ASCII format data
12	HIByte	Read a high byte of 16 bit data
13	HIWord	Read the high-order word of a 32-bit data

14	INVBIT	Reverse the specified bit state of the data
15	LOByte	Read a low byte of 16 bit data
16	LOWord	Read the low bit word of a 32-bit data
17	SWAPB	Swap the high and low bytes of a 16 bit word
18	SWAPW	Swap the high and low bits of a 32-bit double integer data
19	SETBIT	Set the state for data positioning (ON)
20	XORSUM	Calculate the checksum of the XOR operation on a one-dimensional array
21	DELAY	Pause macro instruction execution for a specified time
22	CurrentTime	Obtain the system's time tick value: The return value represents the current time tick value
23	MakeTime	Convert date and time data to time ticking value: The return value represents the time ticking value
24	GetTime	Time tick value conversion to date time data: Return value represents date time data
25	if	When the variable condition is true, execute the program position label; otherwise, continue with the next line of instructions
26	else	In conjunction with the if or else if instruction, indicate the position to be executed when the variable condition is not true.
27	else if	When the variable condition is true, continue with the next line of instruction; otherwise, jump to the next statement (else if) to continue executing or execute the next line of instruction else
28	FOR	Program loop, using the value of the expression as a fixed number of loops
29	switch	A switch is a statement that selects a structure, and in most cases, a switch is used to make judgments and choices. Note: Switch should be used together with case break default
30	case	Case is a label used to mark the execution of different situations
31	break	Break is specifically used to jump out of a switch
32	default	Default refers to all values except for case (i.e. other)
33	While	As long as the specified conditions are met, the loop can execute a piece of code

3.6.4 Introduction to Macro Instruction Operator Grammar

Provide mathematical or logical operations between variables, and these operation symbols are called operands. The currently provided operands are listed in the column table of macro instruction operators, with a total of 17 types of operations. The expression is mainly used to set the syntax of the expression and the syntax within the instruction.

Use Cases:

Pure operation formula

```
LW256=LW254+LW252+LW250
```

```
LW286=LW280/LW282/LW284
```

Collaborate with setting operators

```
LW384=LW380 || LW382; //Perform a logical OR operation on LW380 and LW382, and store the result in LW384.
```

```
LW394=LW390 ^ LW392; //Perform logical XOR operation on LW390 and LW392, and store the result in LW394.
```

Matching instructions

```
LW350=1; //Assign 1 to LW350
```

```
LW352=1; //Assign 1 to LW352
```

```
if(LW350==1 && LW352==1) //Determine if LW350=1 and LW352 also=1;
```

```
{
```

```
    LB350=1;           //LB350 lights up
```

```
}
```

```
else //Otherwise
```

```
{
```

```
    LB350=0;           //LB350 turn off light
```

```
}
```

3.6.5 Introduction to Macro Instruction Function Grammar

1. ADDSUM

Calculate the checksum of a one-dimensional array accumulation.

Example:

```
//Calculate the cumulative value of a one-dimensional array and store it in the LW0 variable
unsigned char data[5] = {1, 2, 3, 4, 20}; //Define an unsigned string array, which are (1, 2, 3, 4, 20 (all DEC decimal)). If you need to use HEX16, please enter the format of 0x1.
```

```
LW0=ADDSUM(data, 5); //LW0=30(DEC);
```

Execution result:

```
LW0=30
```

2. ASCII2DEC

Convert character ASCII data to decimal format data.

Example:

```
//Convert character ASCII data to decimal format and store it in LW10 variables.
```

char source[4] = {'5', '6', '7', '8'}; //Define a string array, which are (5, 6, 7, 8 (all DEC decimal)). If you need to use HEX16, please enter the format of 0x1.

```
LW10=ASCII2DEC(source , 4); // LW10=5678;
```

Execution result:

```
LW10=5678
```

3. ASCII2FLOAT

Convert character ASCII data to data in floating point format.

Example:

//Convert character ASCII data (source) into floating point format data and store it in the LW20 variable.

```
char source[5] = {'5', '6', '.', '7', '8'}; //Define a string array, which are (5, 6, ., 7, 8 (all DEC decimal)). If you need to use HEX16, please enter the format of 0x1.
```

```
LW20=ASCII2FLOAT(source,5); // LW20 = 56.78;
```

Execution result:

```
LW20 = 56.78
```

4. ASCII2HEX

Convert ASCII character data to hexadecimal data.

Example:

//Convert ASCII character data (source) to hexadecimal data and store it in the LW30 variable.

```
char source[4] = {'1','2','3','4'}; //Define a string array, which are (1, 2, 3, 4 (all DEC decimal)). If you need to use HEX16, please enter the format of 0x1.
```

```
LW30=ASCII2HEX(source,4);
```

Execution result:

```
LW30 = 0x1234
```

5. BCD2BIN

Convert BCD format data to BIN format data.

Example:

//Convert BCD format data (LW40) to BIN format data (LW41).

```
LW40= 0x5678; //Define a BCD data storage to LW40
```

```
LW41=BCD2BIN(LW40);
```

Execution result:

```
LW41 = 5678
```

6. BIN2BCD

Convert BIN format data to BCD format data.

Example:

```
LW50=8765; //Define a BIN for storing data in LW50
```

```
LW51=BIN2BCD(LW50);
```

Execution result:

```
LW51 = 8765
```

7. CRC

Compute the data of a one-dimensional array into a 16 bit CRC to obtain a checksum (checksum).

Example:

```
char source[5] = {0x01, 0x10, LW61, 0xB5, 0x00}; //Store data that needs to be verified
LW60=CRC(source,5);
```

Execution result:

When LW61==0, LW60=906b; When LW61 ≠ 0, LW60=other values.

8. DEC2ASCII

Convert decimal data to ASCII format data.

Example:

//Convert decimal data to ASCII format and store them in LW71, LW72, LW73, LW74, respectively.

```
LW70 = 5678; //Define a decimal number
char result[4]; //Define a string array
DEC2ASCII(result,LW70,4); //Convert the decimal format of the string array to ASCII format
```

```
LW71=result[0]; //result[0] = 53(ASCII value);
LW72=result[1]; //result[1] = 54(ASCII value);
LW73=result[2]; //result[2] = 55(ASCII value);
LW74=result[3]; //result[3] = 56(ASCII value);
```

Execution result:

LW71=53, LW72=54, LW73=55, LW74=56

9. FLOAT2ASCII

Convert floating-point format data to ASCII format data.

Example:

//Convert floating-point format data to ASCII format data and store them in LW78, LW80, LW82, LW84, respectively.

```
LW76 = 56.9; //Defining a Floating Point Number
char result[4]; //Define a string array
FLOAT2ASCII(result,LW76); //Convert the format of the string array floating-point number to ASCII format.
```

```
LW78=result[0]; //result[0]=53(ASCII value);
LW80=result[1]; //result[1]=54(ASCII value);
LW82=result[2]; //result[2]=46(ASCII value);
LW84=result[3]; //result[3]=55(ASCII value);
```

Execution result:

LW78=53, LW80=54, LW82=46, LW84=55

10. GETBIT

The state of reading data for positioning.

Example:

```
//The state of reading data for positioning
LW90 = 8;//Set the target address for reading;
LW91 = 3; //Set the number of bits to read the target address; If the value 8 is binary and
           1000 (starting from the right, bit0, bit1, bit2, bit3), it is obvious that bit 3 is 1;
LB94= GETBIT(LW90,LW91); //Set the read state (1) to the bit register (LB94);
LW92=GETBIT(LW90,LW91); //Transfer the status read by bit3 to LW92
```

Execution result:

LB94=ON, LW92=1, LW_BIT92.0=ON

11. HEX2ASCII

Convert hexadecimal format data to ASCII format data.

Example:

```
//Convert hexadecimal format data to ASCII format data and store them in LW101, LW102,
LW103, and LW104, respectively
```

```
LW100= 0x5678;//Define a hexadecimal number
char result[4];//Define a string array
HEX2ASCII(result,LW100); //Convert the hexadecimal format of the string array to ASCII
format
```

```
LW101=result[0];//result[0]=53(ASCII value);
LW102=result[1];//result[1]=54(ASCII value);
LW103=result[2];//result[2]=46(ASCII value);
LW104=result[3];//result[3]=55(ASCII value);
```

Execution result:

LW101=53, LW102=54, LW103=55, LW104=56

12. HIByte

Read a high byte of 16 bit data.

13. HIWord

Read the high-order word of a 32-bit data.

Example (using HIWord as an example):

```
//Read the high-level word of a 32-bit data and store it in LW122
LW120= 0x12345678; //Define a 32 bit data and store it in LW120
LW122=HIWord(LW120); //Read the high-level words of LW120 data and store them in
LW122;
```

Execution result:

LW122 =0x1234

14. INVBIT

Invert the specified bit state of a data.

Execution result:

```
//Reverse the specified bit state of the data
LW130=1;//Set the target address to be reversed;
```

LW131=3; //Set the position of the reverse target address; For example, 1 (DEC)=0001 (BIN); (From left to right: bit3 bit2 bit1 bit0), it can be seen that bit 3 is 0.

LW132=INVBIT(LW130, LW131); //Transfer the reversed state (1) of bit3 to LW132=1001 (bin)

Execution result:

LW132=9, LW_BIT132.3=ON

15. LOByte

Read a low byte of 16 bit data.

Example:

//Read a low byte of 16 bit data

LW140= 0x1234; //Define a 16 bit numerical value and store it in LW140.

LW141= LOByte(LW140); //Read the low byte of LW140 data and store it in LW141.

Execution result:

LW141=34

16. LOWord

Read the low bit word of a 32-bit data.

17. SWAPB

Swap the high and low bytes of a 16 bit word.

18. SWAPW

Swap the high and low bits of a 32-bit double integer data.

Example:

//Swap high and low bits of a 32-bit double integer data

LW170= 0x12345678; //Define a numerical value

LW172=SWAPW(LW170); //Swap the high and low values of LW170;

Execution result:

LW172=0x56781234

19. SETBIT

Set the state for data positioning (ON).

Example:

//Set the state for data pointing (ON)

LW180 = 8; //Define a numerical value

LW181 = 2; //Set the position of the target address; If 8 (DEC)=1000 (BIN) (from left to right: bit3 bit2 bit1 bit0), it can be inferred that bit 2 is 0.

LW182= SETBIT(LW180,LW181,1); //Transfer the state of bit2 set to 1 to LW182=1100 (BIN)

Execution result:

LW182=12,LW_BIT182.2=ON

20. XORSUM

Calculate the checksum of the XOR operation on a one-dimensional array.

Example:

```
//Calculate checksum for XOR operations on one-dimensional arrays
char source[5] = {0x1, 0x20, 0x3, 0x48, 0x5}; //Define string arrays (16-bit HEX)
LW192= XORSUM(source, 5); //Put the checksum in LW192
```

Execution result:

LW192=0x6F

21. DELAY

Pause macro instruction execution for a specified time.

Example:

```
//Pause macro instruction execution for a specified time
int time = 5000; //Unit is ms
DELAY(time); //Execute pause macro command
```

Execution result:

Pause macro commands for 5000ms

22. CurrentTime

Obtain the system's time tick value: The return value represents the current time tick value.

Example:

```
LW210= CurrentTime(); //Obtain the current time tick value and store it in LW210
```

Execution result:

The values vary depending on the time point

23. MakeTime

Convert date and time data to time ticking value: The return value represents the time ticking value.

Example:

```
LW212 = MakeTime(LW214, LW216, LW218, LW220, LW222, LW224); //Convert date
and time data to time tick values and store them in LW212. At least the year, month, and
day need to be entered to convert, otherwise it cannot be converted.
//LW214: year
//LW216: month
//LW218: day
//LW220: time
//LW222: minute
//LW224: second
```

Execution result:

LW212 =4294967295. //The values vary depending on the time point

24. GetTime

Convert time tick values to date time data: The return value represents date time data.

Example:

```
int year, month, day, hour, minute, second; //Define year, month, day, hour, minute,
second (undefined, function cannot run)
```

```
GetTime(CurrentTime(), &year, &month, &day, &hour, &minute, &second); //Retrieve the
current system time and write it to registers LW228-LW238
```

```
LW228=year;
LW230=month;
LW232=day;
LW234=hour;
LW236=minute;
LW238=second;
```

Execution result:

For the current date and time value.

25. If

When the variable condition is true, execute the program position label; otherwise, continue with the next line of instructions.

26. else

In conjunction with the if or else if instruction, indicate the position to be executed when the variable condition is not true.

Example:

```
if (LB410==1)    //If LB410 ON
{
    LB416=1;    //LB416 lights up
}
else            //Otherwise
{
    LB416=0;    LB416 lights out
}
}
```

Execution result:

When LB410=ON, then LB416=ON;

If LB410=OFF, then LB416=OFF.

27. else if

When the variable condition is established, continue to the next line of instructions, otherwise jump to the next judgment (else if) to continue execution or execute the next line of else instructions.

Example:

```
LW430+=1;        //LW430 self increasing
if (LW430>=30){LW430=0;} //If LW430 is greater than or equal to 30, then LW430=0
else {LW430+=1;} //Otherwise, LW430 will continue to self increase
```

```
if (LW430==2)    //If LW430=2
{
    LB432=1;        //LB432 lights up
}
```

```

}
else if (LW430==4)           //Otherwise, if LW430=4
{
    LB434=1;                 //LB434 lights up
}
else if (LW430>=6 && LW430<=18) //Otherwise, if LW430 is in the closed interval of
[6,18]
{
    LB436=1;                 //LB436 lights up
}
else                         //Otherwise, execute the following instructions
{
    LB432=0;                 //LB432 lights out
    LB434=0;                 //LB434 lights out
    LB436=0;                 //LB436 lights out
}

```

Execution result:

2 seconds, LB432 lights up; 4 seconds, LB434 lights up; 6-18s, LB436 lights up; At the rest of the time, all lights will be turned off.

28. Use of multi-layer nested if

29. Example:

```

    if (LB440==1)           //If LB440 is ON, proceed to the next if
    {
        if (LB442==1)       //If LB442 is ON, proceed to the next if
        {
            if (LB444==1)   //If LB444 is ON
            {
                LB446=1;    //LB446 Light up
            }
            else             //Otherwise
            {
                LB446=0;    //LB446 Light out
            }
        }
        else                 //Otherwise
        {
            LB446=0;        //LB446 Light out
        }
    }
else                         //Otherwise
{
}

```

```

LB446=0;           //LB446 Light out
}
//If one of the three buttons is not ON, LB446 will be in the off light state

```

Execution result:

If all three buttons are set to ON, then LB446=ON; Otherwise, if one of the three buttons=OFF, LB446=OFF.

30. FOR

Program loop, using the value of the expression as a fixed number of loops.

Example:

```

for (LW450=1;LW450<=100;LW450+=1) //Execute 1+2+3++ Cyclic addition of
98+99+100
{
    LW456=LW456+LW450; //Output the results to LW456
}

```

Execution result:

LW456=5050

31. switch

A switch is a statement that selects a structure, and in most cases, a switch is used to make judgments and choices. Switch needs to be used in conjunction with case break default.

32. case

Case is a label used to mark the execution of different situations.

33. Break

Break is specifically used to jump out of a switch.

34. Default

Default refers to all values except for case (i.e. other).

Example:

```

int day; //Define an integer, day
day=LW460; //Give the value of LW460 to day
switch (day)
{
    case 1: LW461=1; break; //When LW460=1, output 1
    case 2: LW461=2; break; //When LW460=2, output 2
    case 3: LW461=3; break; //When LW460=3, output 3
    case 4: LW461=4; break; //When LW460=4, output 4
    case 5: LW461=5; break; //When LW460=5, output 5
    case 6: LW466=46; break; //When LW460=6, output Refer to the ascii code
table
    case 7: LB468=1; break; //When LW460=7, LB468 light will be on
    default: LW461=0; break; //When LW460 is not in the closed interval of [1-7],
then LW461 values are all 0
}

```

Execution result:

LW461=1

35. While

As long as the specified conditions are met, the loop can execute a piece of code.

Example:

```
LW470=0;           //Define initial value
while (LW470<=20) //When LW470<=20, the While loop will continue to execute
{
    LB471=1;       //LB471 lights up
    LW470+=1;     //Used to end a while loop
}
```

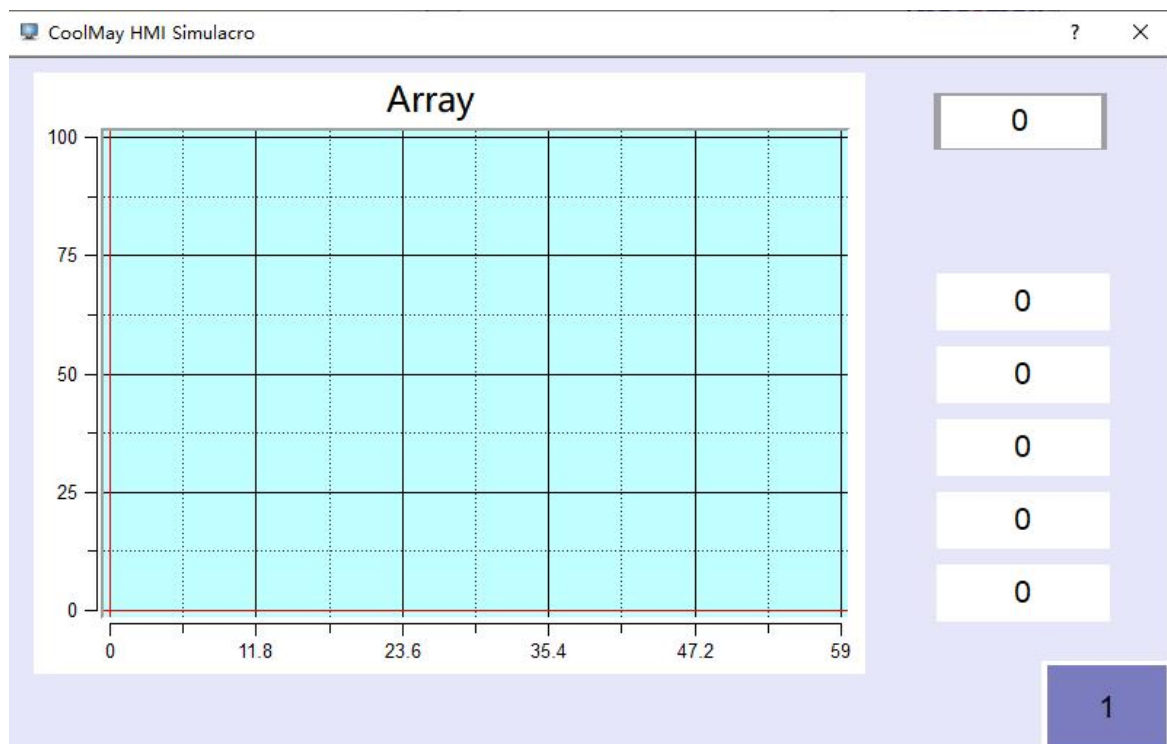
Execution result:

LW470=21, LB471=ON

3.7 Imitate

3.7.1 Off-line Simulation

After designing the configuration project, users can use offline simulation on the computer to verify whether the configuration project is correct. Click on the icon on the toolbar to pop up the emulator:



Click the close button in the upper right corner, or right-click on the simulator and select "exit" to exit the offline simulation.

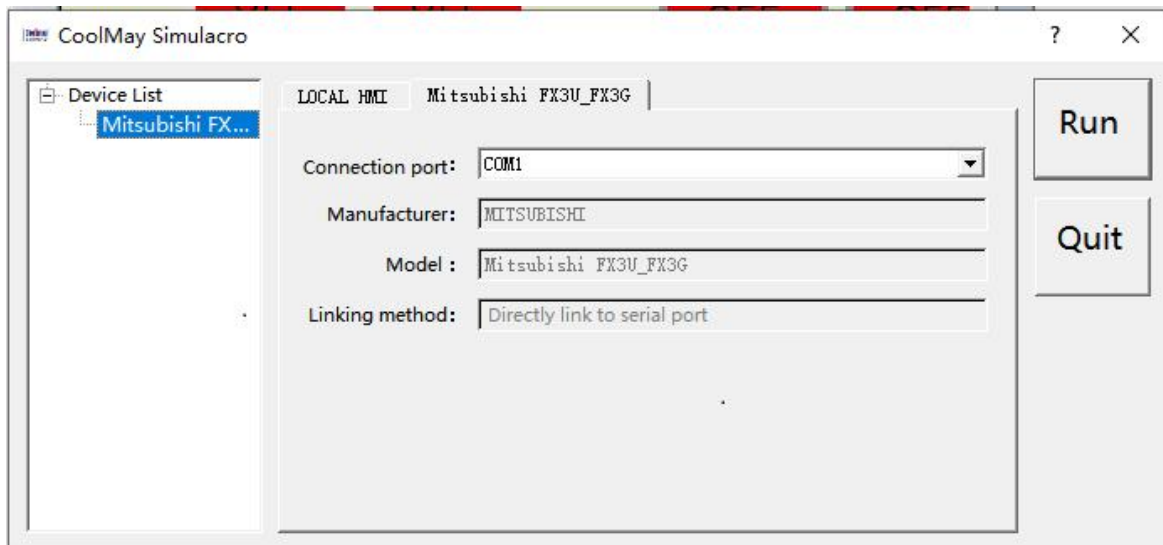
It should be noted that during offline simulation, the simulator does not communicate with the PLC. If the operating address of a component is set to a register in the PLC, reading and

writing to this register during offline simulation will not directly operate the PLC. If you need to use a simulator to operate a PLC on a computer, you can use online simulation.

3.7.2 Online Simulator

Unlike offline simulation, the online module can directly connect the computer to the PLC for communication without a touch screen. The process of online simulation is basically the same as offline simulation operation.

After adding PLC devices to the device list, users can click on the icon on the toolbar and a dialog box will pop up:

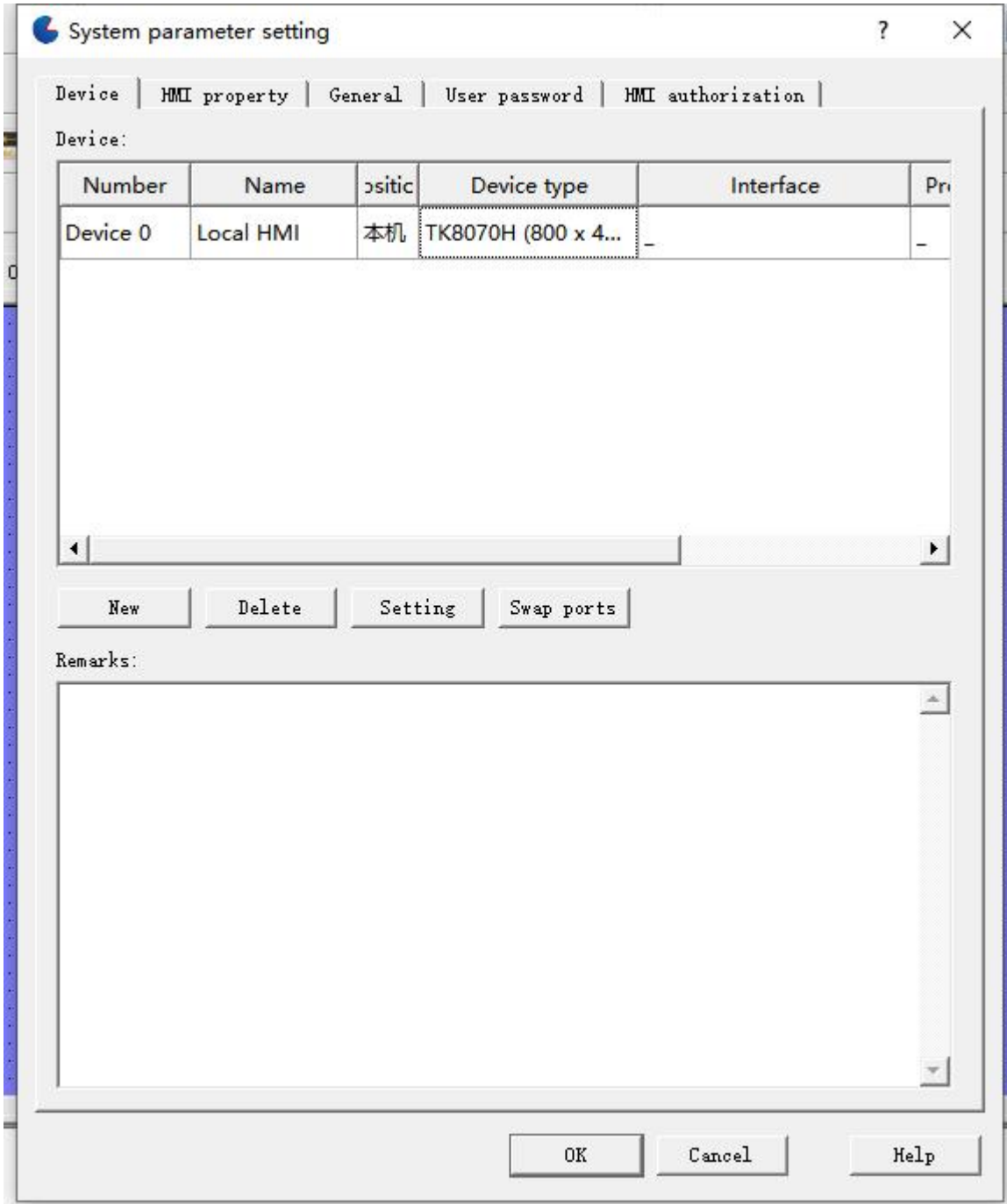


Select the correct connection port, click "Run" to start the simulator for online simulation.

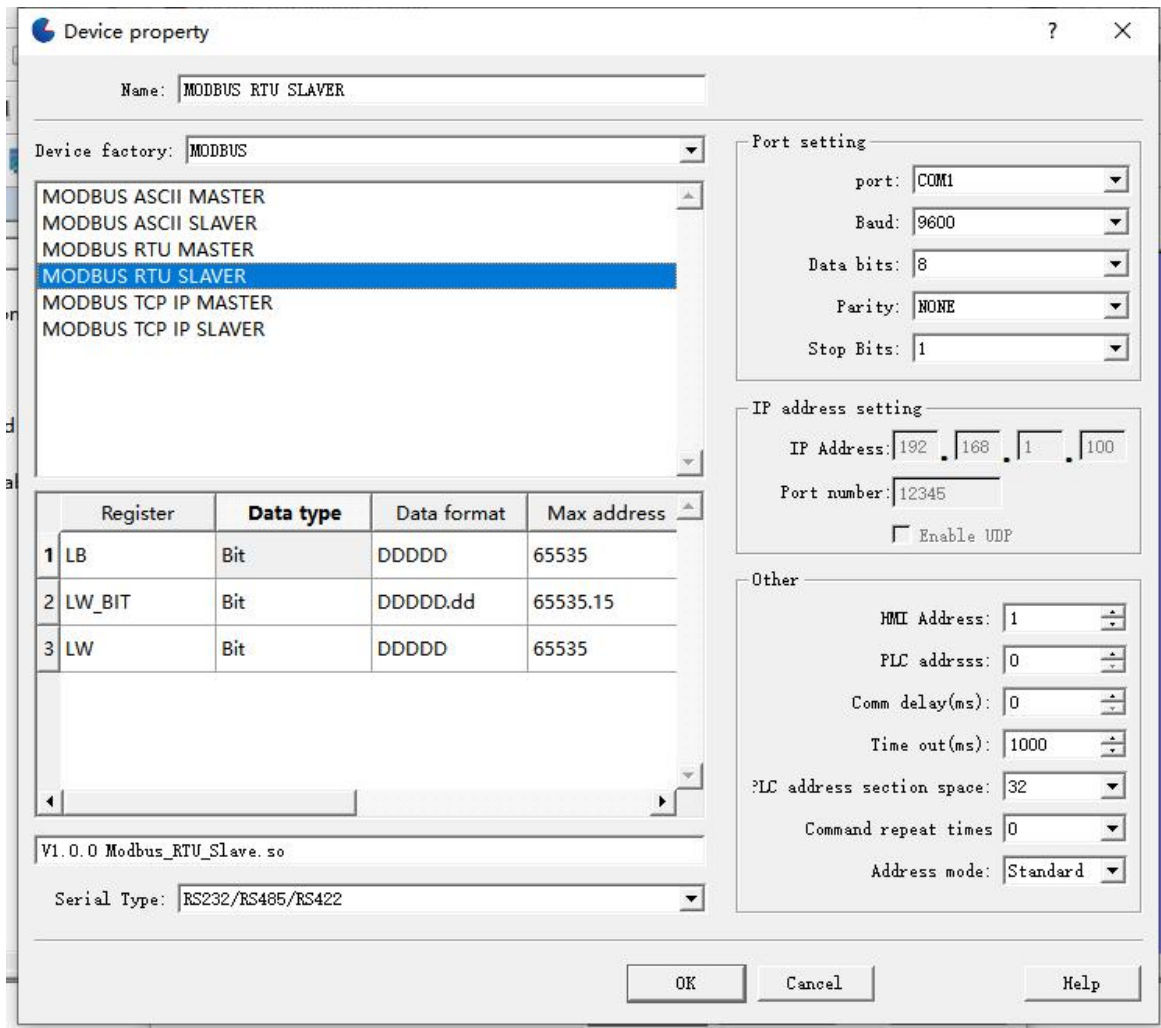
3.8 System parameter setting

3.8.1 Devices

In the "Device List" tab, you can manage the PLC devices connected to the touch screen.



New: Add a PLC device. At present, the touch screen supports more than 20 commonly used PLC communication, please note that all parameter settings are correct.



Delete: Delete the selected PLC device. Attention: The local HMI on the local touch screen is considered a special device and cannot be deleted.

Settings: Edit the selected PLC device parameters.

Swapping serial ports: When two serial port devices are added and COM1 and COM2 are used respectively, the serial port usage of these two devices can be swapped, eliminating the tedious step of deleting and then adding.

Interface type: Supports RS232, RS485, and Ethernet communication, with COM1 supporting RS232 and COM2 supporting RS485.

Address mode: Standard mode or extended mode can be used. If the expansion mode is selected, the address of the PLC can be used in the format of "station number # address", thus achieving a one screen multi machine connection method. For example, adding a Mitsubishi FX3U_ FX3G PLC, set the address mode to expansion mode, and then add a numerical input component to the project. The address can be set to the D register, 3 # 10, indicating that the PLC station number for communication with this component is set to 3. Of course, it is also possible to use standard mode without filling in the station number, so the PLC station number uses the value in the PLC settings.

3.8.1.1 Modbus protocol setting instructions

I . Modbus RTU master (touch screen as host)

1. Communication parameter settings)

1) Open the software menu bar and select "Edit - System Parameter Settings - New" or "Project Manager - Double click System Parameters - New" on the left.

2) Select the name "modbus RTU master":

Port:Select COM1 to indicate the use of the RS232 port on the touch screen, and select COM2 to indicate the use of the RS485 port on the touch screen.

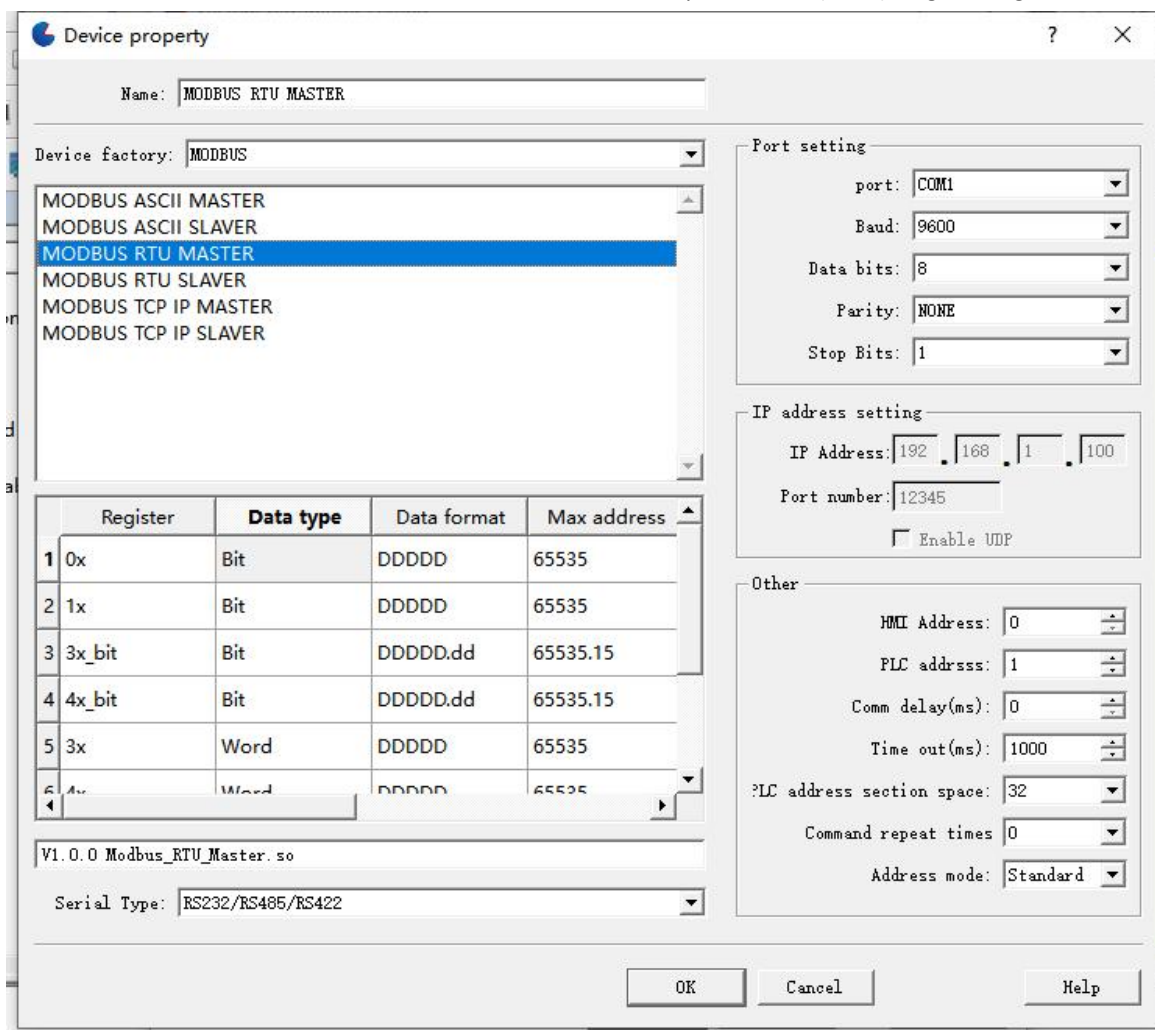
Baud rate, data bits, checksum bits, stop bits:According to your communication needs, the host and slave settings should be consistent.

Touch screen station number:Being the main station does not require setting a station number.

PLC station number: The slave station number to be read.

PLC address interval: The slave station number to be read.

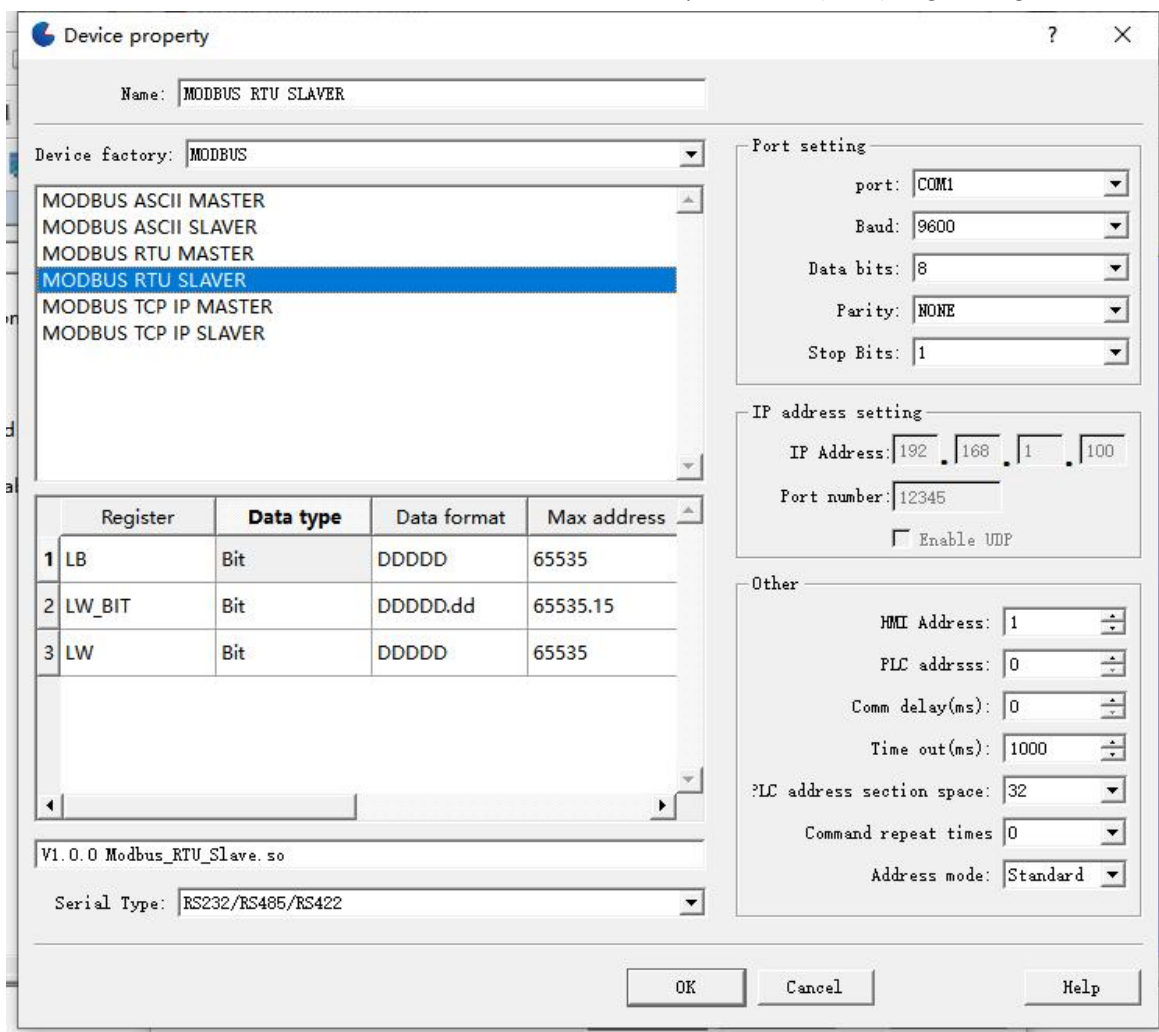
Address mode: Standard mode or extended mode can be used. If the expansion mode is selected, the address of the PLC can be used in the format of "station number # address", thus achieving a one screen multi machine connection method. For example, adding a Mitsubishi FX3U_ FX3G PLC, set the address mode to expansion mode, and then add a numerical input component to the project. The address can be set to the D register, 3 # 10, indicating that the PLC station number for communication with this component is set to 3.



2. Available addresses

Register Name	Data type	Address Format	Address range	Description
0X	Bit	DDDDD	0~65535	-
1X	Bit	DDDDD	0~65535	Read only
3X_bit	Bit	DDDDD.dd	0~65535	Read only, dd is 0-15
4X_bit	Bit	DDDDD.dd	0~65535	Dd is 0-15
3X	Word	DDDDD	0~65535.15	Read only
4X	Word	DDDDD	0~65535.15	
3X_double	DWord	DDDDD	0~65534	Read only
4X_double	DWord	DDDDD	0~65534	

II .Modbus RTU slave (touch screen as slave)

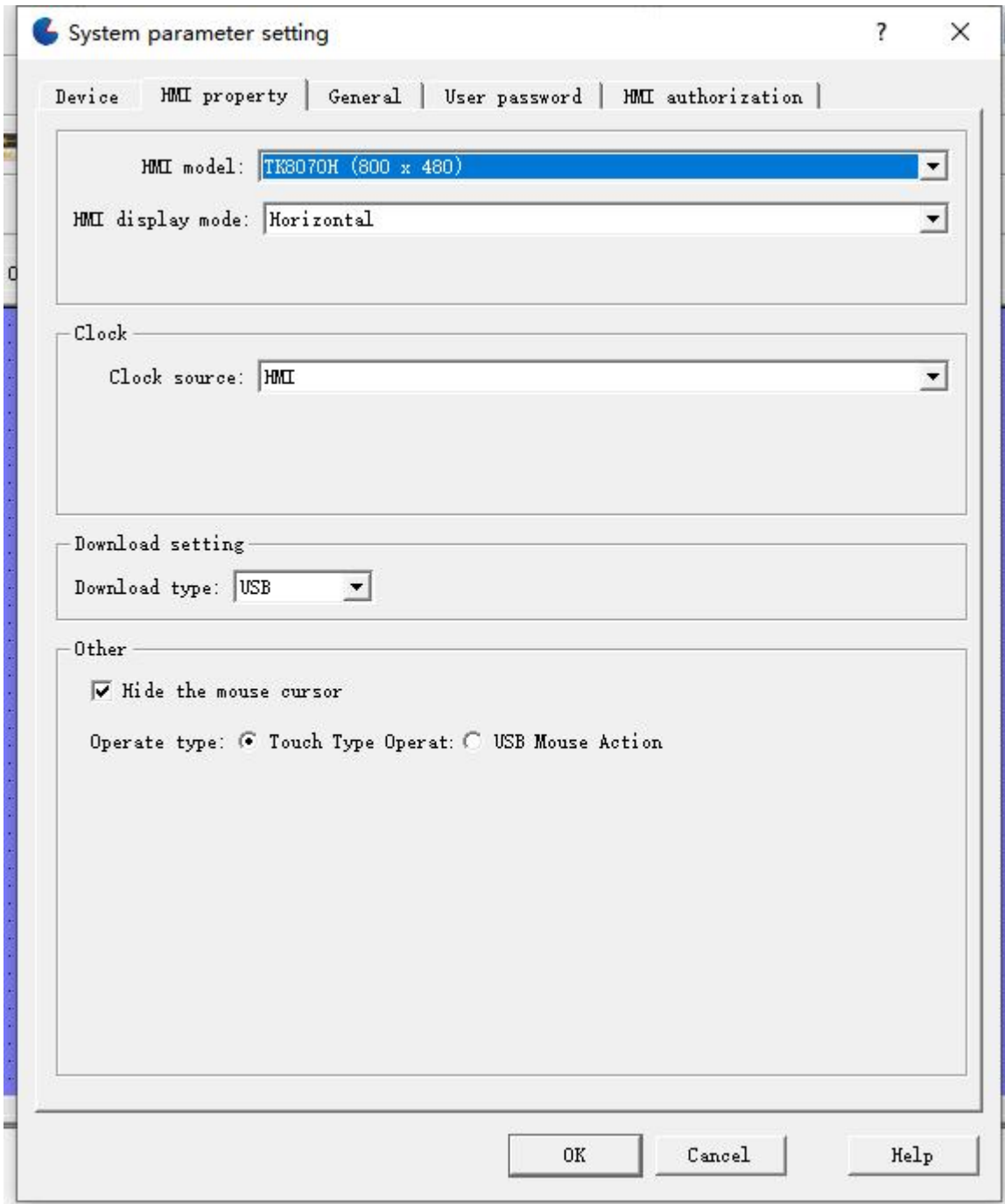


Available addresses

Register Name	Data type	Address Format	Address range	Description
LB	Bit	DDDDD	0~65535	-
LW_bit	Bit	DDDDD.dd	0~65535.15	dd 为 0-15
LW	Word	DDDDD	0~65535	

3.8.2 HMI Property Settings

HMI attribute settings and touch screen related attributes.



HMI model: Set the connected touch screen model.

HMI display mode: Set two display modes: horizontal and vertical.

Clock source: If "external device" is selected, a register address can be specified. Every minute, the touch screen will read the year, month, day, hour, minute, and second from the specified register address and its subsequent 5 register addresses, and synchronize them. The register data format is 16 bit BCD code.

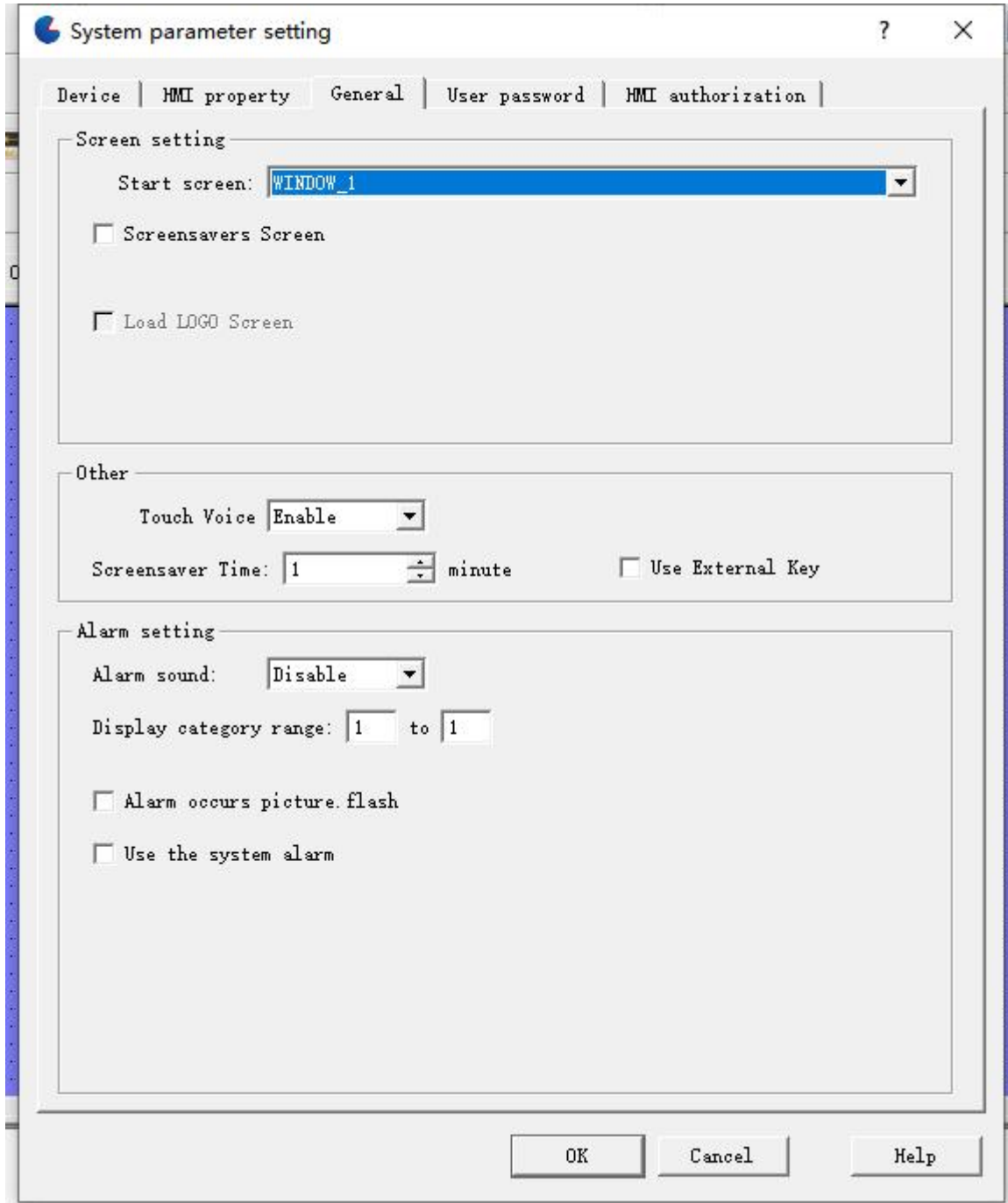
Download method: You can choose from three methods: USB, Ethernet, and serial port.

Hide mouse cursor: If checked, the mouse cursor can be displayed on the touch screen, otherwise it will not be displayed.

Operation mode: You can choose touch operation or USB mouse operation.

3.8.3 General attributes

The "General Properties" settings page is used to set the basic properties of configuration engineering.



- Initial screen: specifies the first configuration screen loaded when the touch screen starts.
- Screen saver screen: specifies the configuration screen to be displayed during screen saver.
- Whether to load the logo screen: specify the configuration screen before the initial screen is displayed.
- Touch sound: Specify whether there is a touch sound.

Screen saver time: When there is no operation after this time, turn off the screen. If a screensaver screen is specified, the screen will not turn off and the screensaver screen will be displayed.

Alarm sound: When triggering an alarm event, specify whether there is an alarm sound.

Display Category Range: Specify the category range of alarm events.

Use System Alarm: When checked, you can specify the font, display method, and location of the alarm text.

3.8.4 User password settings

"User password" is used to set the operator's permissions.

The screenshot shows the 'System parameter setting' dialog box with the 'User password' tab selected. The 'Default user' is set to 'None'. Below, a table lists users and their permissions for categories A through E. At the bottom, there are checkboxes for 'Enable upload project' and 'Project file password'.

User name	Enable	Password	A	B	C	D	E
1 user1	<input type="checkbox"/>	1111	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 user2	<input type="checkbox"/>	2222	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 user3	<input type="checkbox"/>	3333	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 user4	<input type="checkbox"/>	4444	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5 user5	<input type="checkbox"/>	5555	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6 user6	<input type="checkbox"/>	6666	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7 user7	<input type="checkbox"/>	7777	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8 user8	<input type="checkbox"/>	8888	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Enable upload project
 Password is needed when

Project file password: _____
 Enable

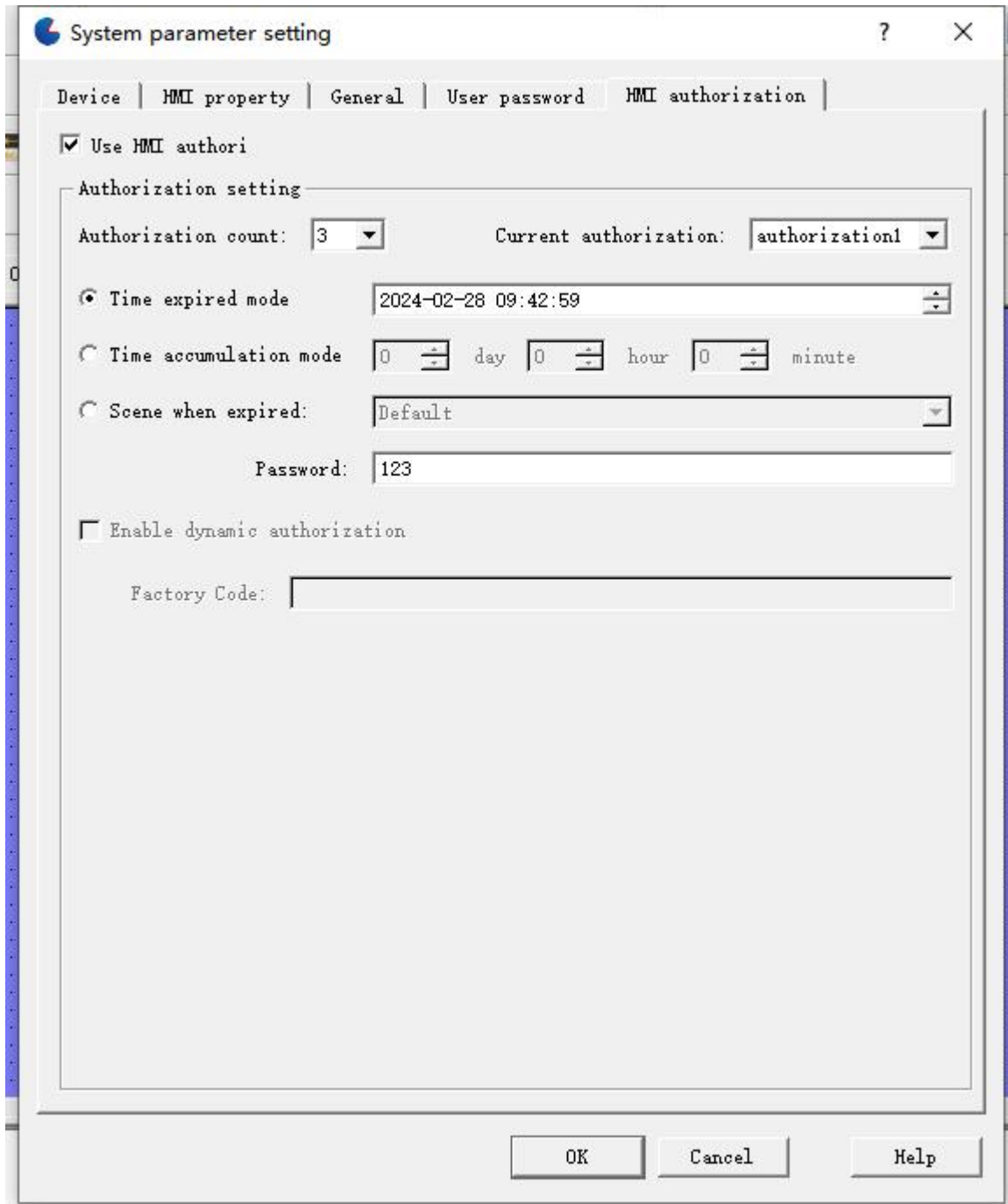
There are 8 levels of user permissions in the list, and the default password can be modified. Check "Enable" to join the list of alternative users.

Allow configuration upload: If not checked, it is not allowed to use the upload tool to upload touch screen data to the computer. After checking "Enter password during upload", you can specify the password in the password box that appears. The upload tool will prompt the user to enter the password before uploading.

Project file password: If "enable" is checked, the password can be specified in the password box that appears. The next time the project is opened using the configuration software, the user will be prompted to enter the password.

3.8.5 Touch screen authorization

"Touch screen authorization" is used to set the usage permissions for the touch screen.



The maximum number of authorizations can be selected is 10. Select the "Current Authorization" dropdown box to set the usage period and password for each group of authorizations.

Expiration time mode: A time point can be set. When the system time is later than the set time, a dialog box will pop up to prompt for password input. Only when entered correctly can it be used normally.

Accumulated time mode: A cumulative usage time can be set, which will accumulate when the touch screen is powered on and running. When the set time value is exceeded, a dialog box will pop up to prompt for password input.

After the password verification is completed, it will be remembered and will not be repeated for the next startup. To clear memory when simulating on a computer, click on the "Tools" menu - "Clear User Legacy Data".

When the touch screen is running, touch screen permissions can also be dynamically set. The following are several system registers:

LW9230: Set/Read Available Authorization Quantity

LW9231: Set the current authorization number, starting with 1

LW9232: Set/Read Authorization Method, 0 is the expiration time point mode, 1 is the cumulative time mode

LW9233: Set/Read Expiration Time Year

LW9234: Set/Read Expiration Time Month

LW9235: Set/Read Expiration Date

LW9236: When setting/reading expiration time

LW9237: Set/Read Expiration Time Minute

LW9238: Set/read expiration time in seconds

LW9239: Set/Read Accumulated Time (Double Word, in minutes)

LW9241: Set/Read Password (10 words)

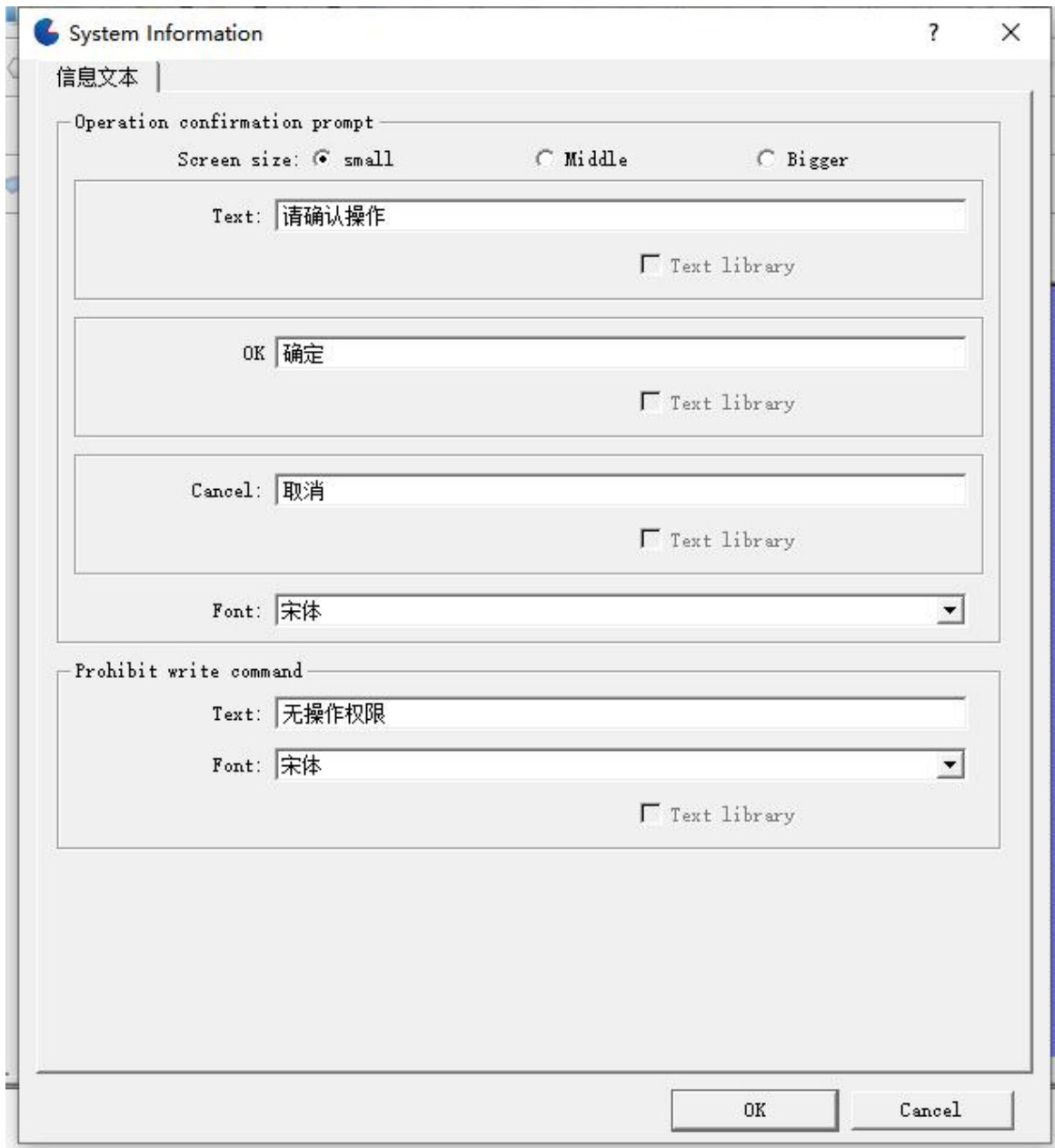
LB9300: Load the authorization parameters specified in LW9231

LB9301: Save the authorization parameters specified in LW9231

After successful setting, the original authorization parameters in the project will be overwritten until these data are cleared during the next download of the project.

3.8.6 System information

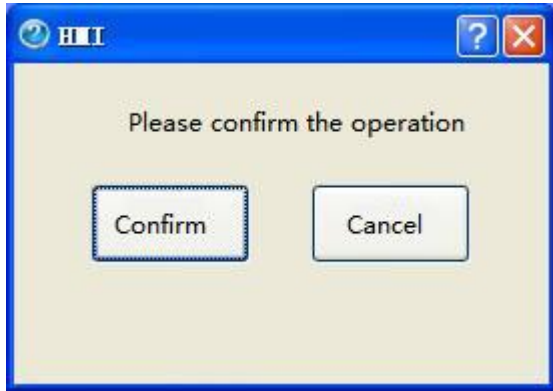
Select "System Information" from the "Element" menu to customize some prompt text during simulation.



For example, setting a component's "confirm before operation" attribute:



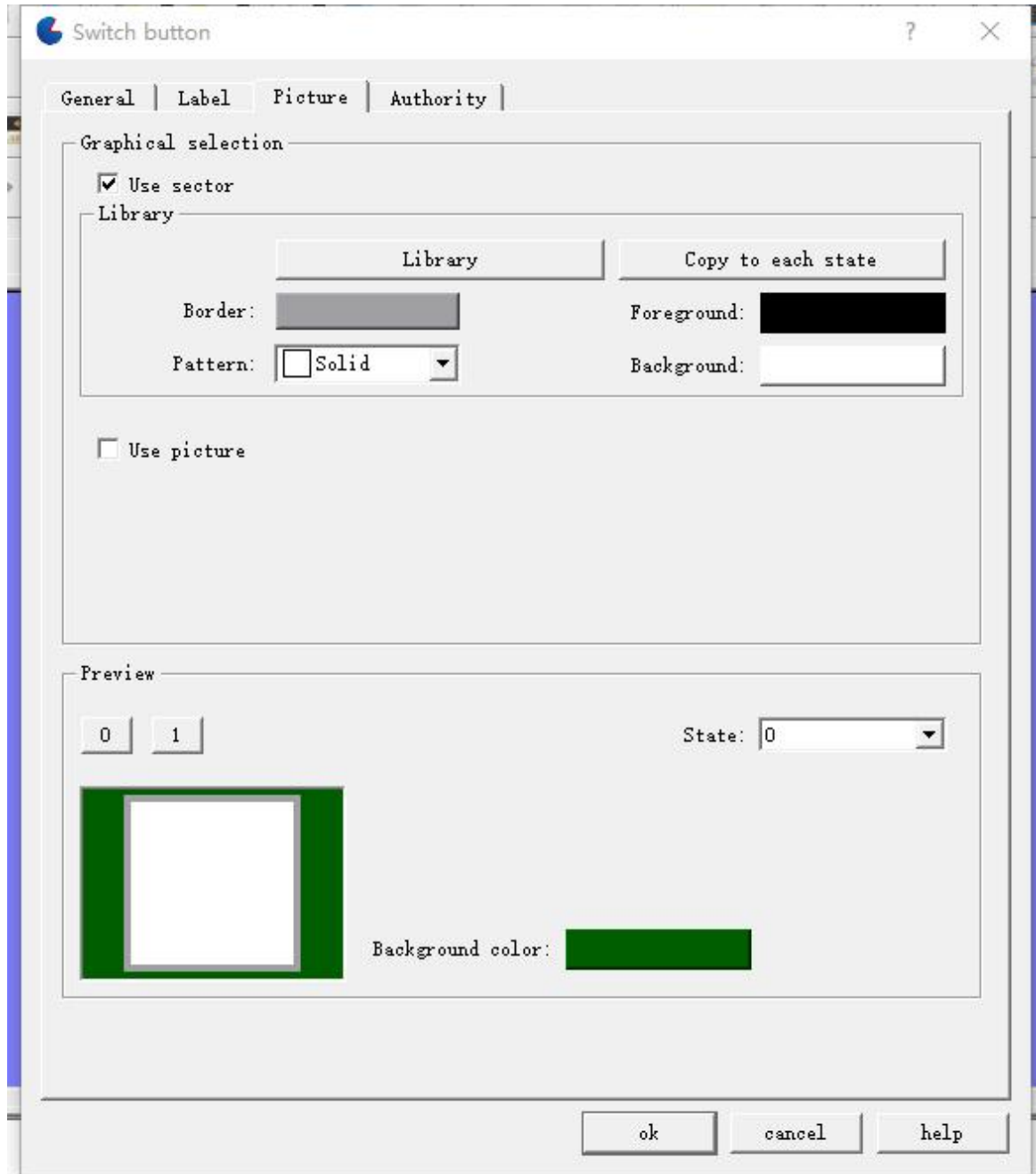
During simulation, a prompt box pops up when operating this component:



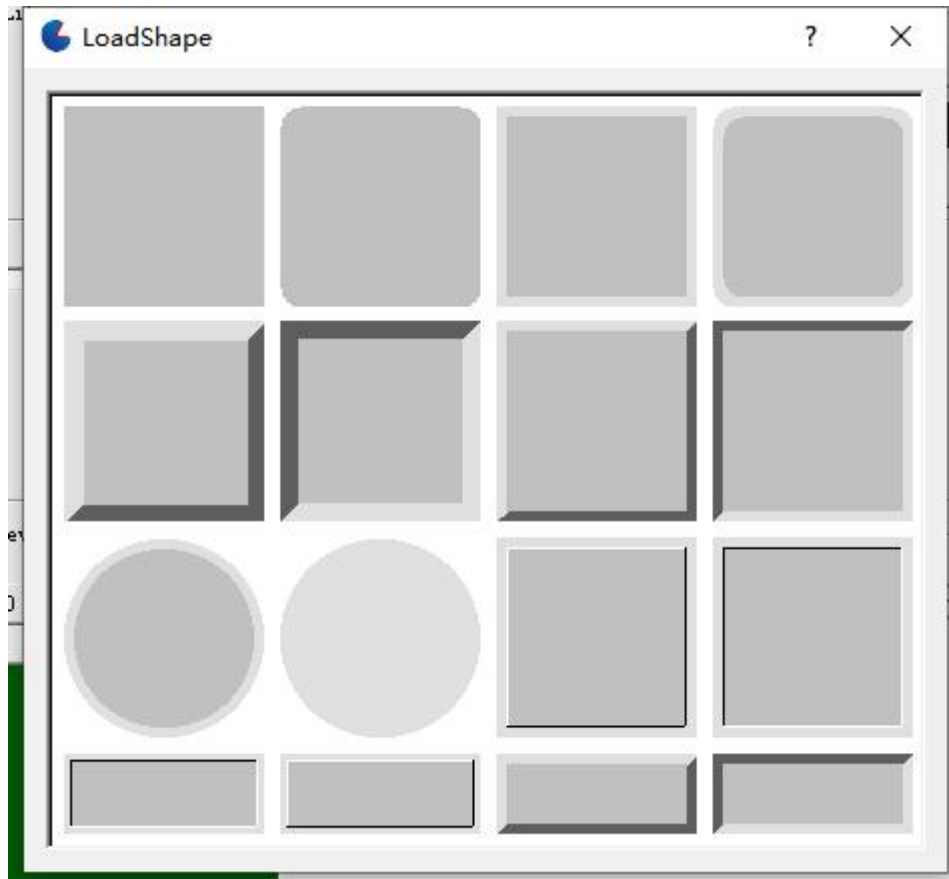
3.9 Common settings for components

3.9.1 Gallery

Images are a common attribute of many components. Taking the position switch component as an example, open the "Image" on the property page:



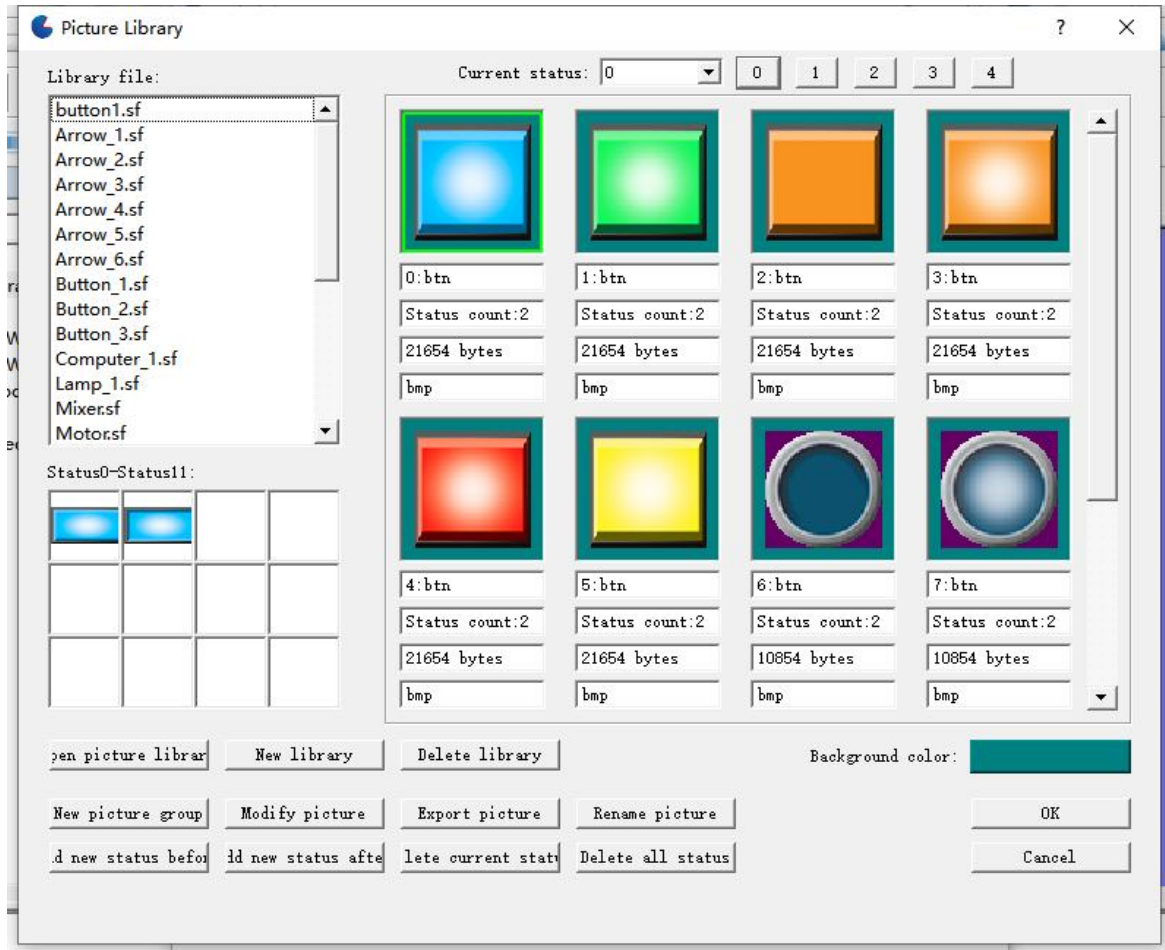
- ① Open the Vector Library, where you can select a vector dialog box.



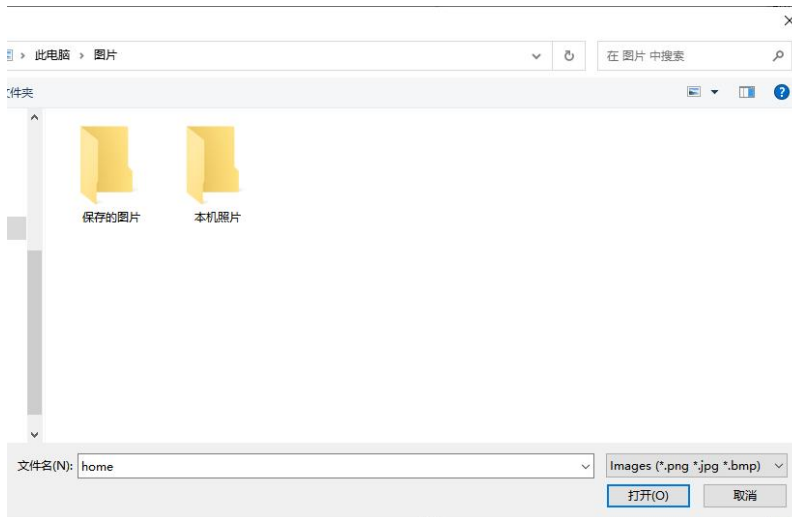
② Check "Use images" to select patterns in the gallery and on the device. The device supports three formats: PNG, JPG, and BMP.

Use transparent color: Choose a color, and if this color appears in the image, it will be processed as transparent.

--Select from the gallery: You can select, add, or delete images from the gallery.



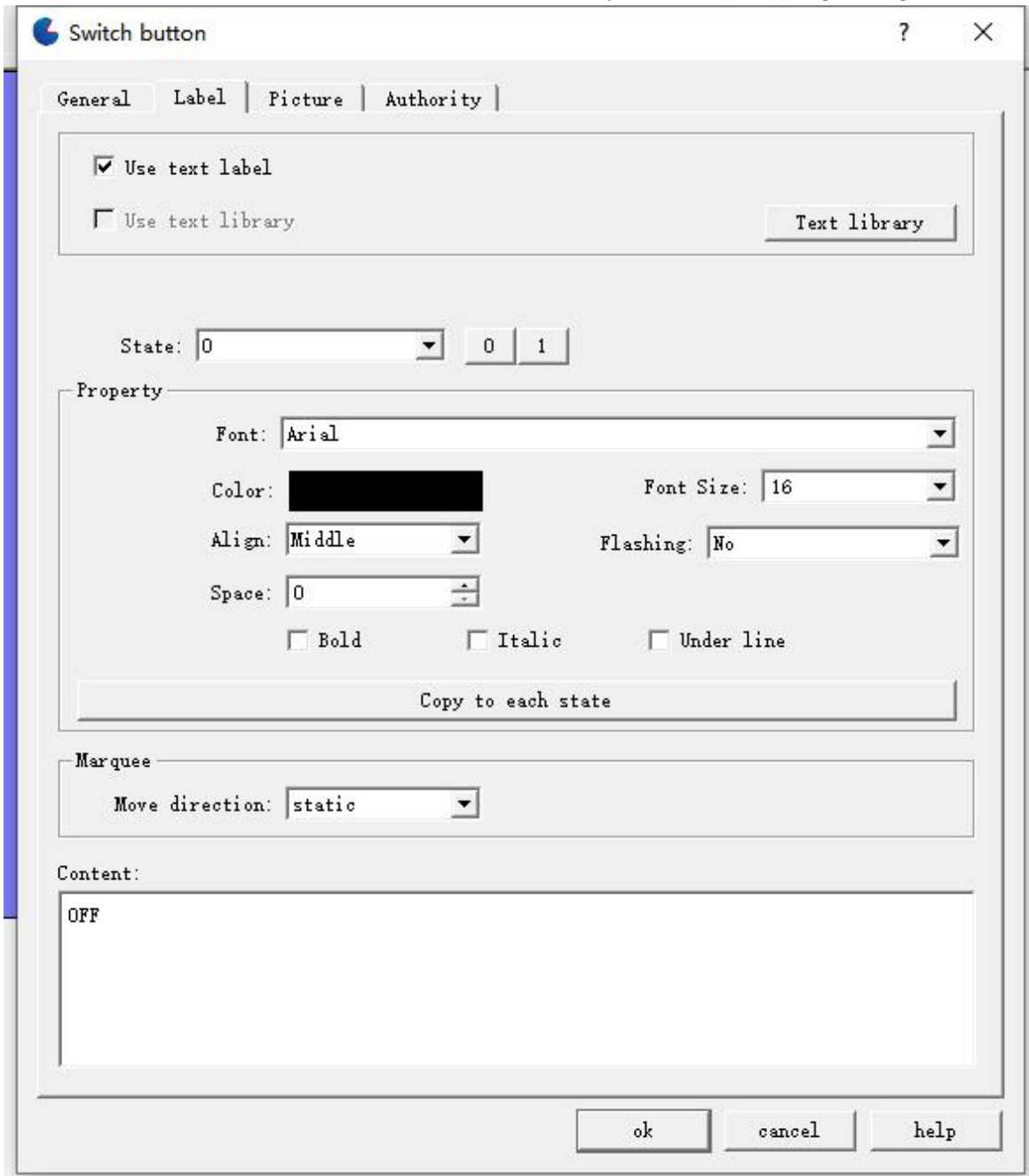
--From file selection: You can select images outside the software.



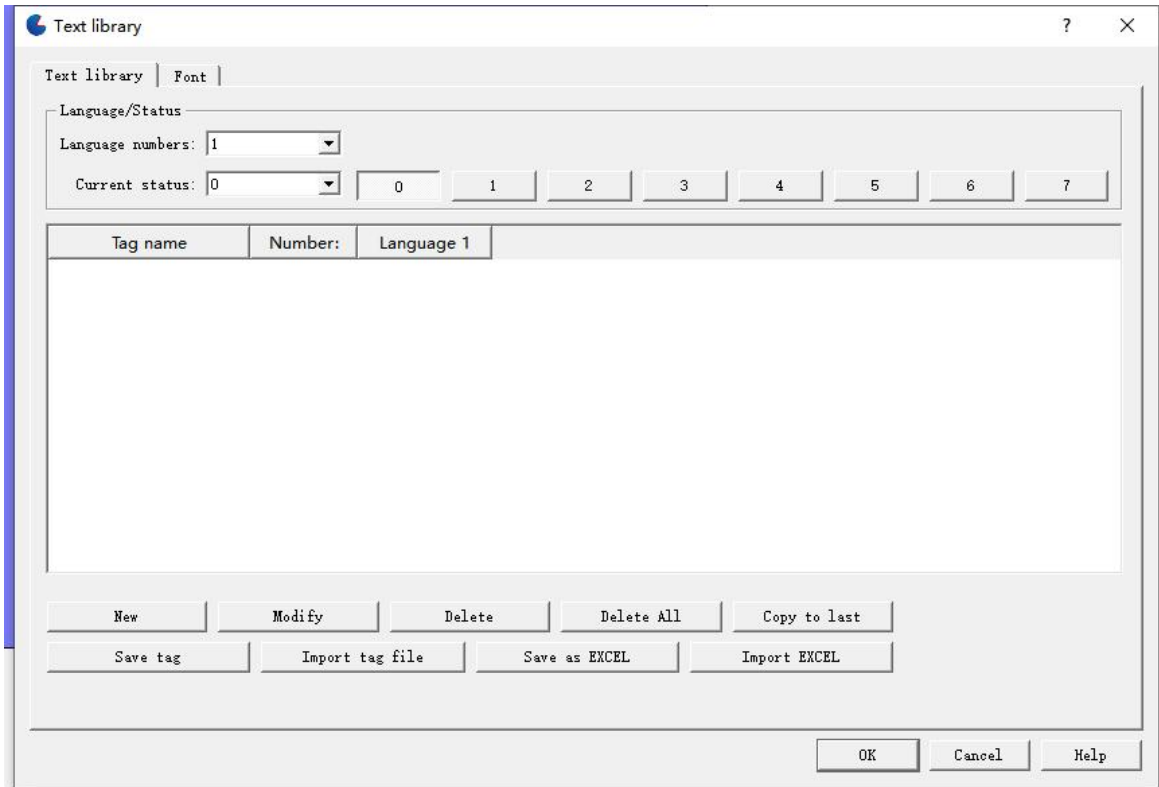
3.9.2 Text Label Library

Tags are a common attribute of many components. Taking the position switch as an example,

open the "tab" on the property page or directly click on the toolbar :



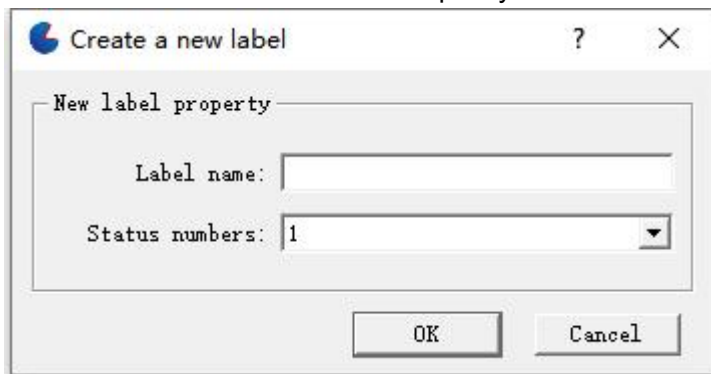
Check "Use Text Labels" to display the attribute box below.



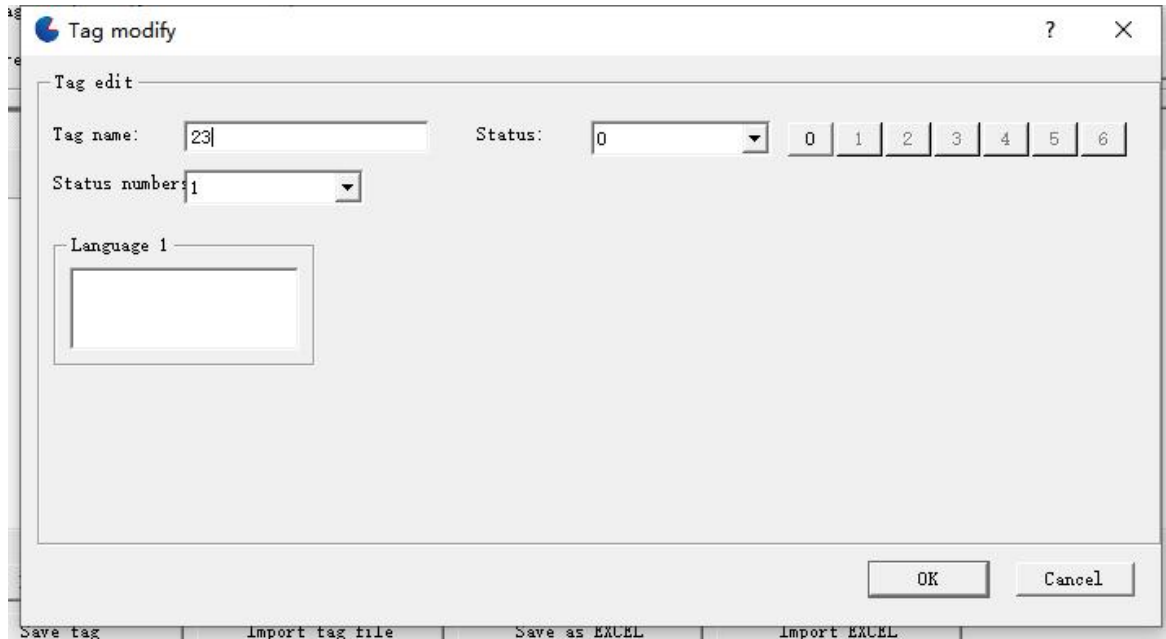
Status: If a component has two or more states, it can be selected from the dropdown menu or clicked on the status button on the right to set different properties such as font, color, and content for each state.

The text label library is a global label library that can be shared by all components. Click on "Text Label Library":

New: Create a new label that can specify the number of states, with a maximum value of 128.



Modify: Modify the selected label, including name, number of states, and label text.



Delete: Delete the selected label.

Delete All: Delete all labels.

Copy to last line: Copy the current label.

Save label file: Save the current label database to an lbl file.

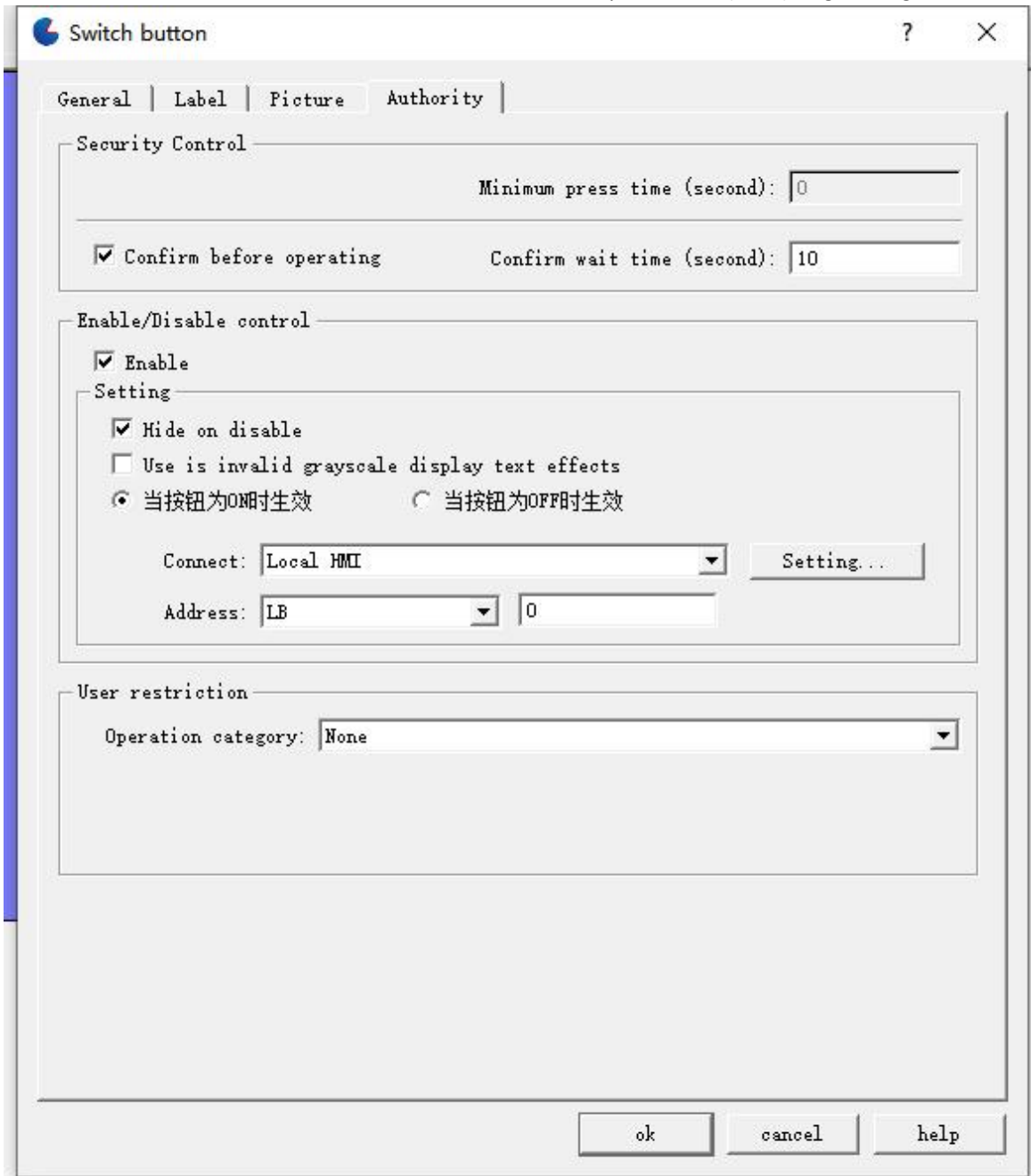
Import label file: Load a local lbl file.

Save as Excel file: Save the current label database to a CSV file.

Import Excel file: Load local CSV file.

3.9.3 Safety

Security is a common property of many components. Taking the bit switch component as an example, open "Security" in the property page:



Minimum key press time: Specify a length of time. The component must be pressed for more than this time to trigger the click action.

Confirm before operation: After clicking the component, a small dialog box will pop up, prompting whether to perform this operation. The operation will be executed only after confirmation, otherwise it will not be executed. If the waiting time is exceeded without confirmation or cancellation, the dialog box will disappear and the operation will not be executed.

Validity/invalidation: When "Use" is checked, the detailed setting options below will appear. You can specify a bit register and choose to enable or disable this component when this register is ON or OFF. If "Hide when inactive" is checked, the component will disappear in the inactive state and will be displayed in the effective state. If you check "Use grayscale effect to

display text when inactive", the text on the component will turn gray in the inactive state and return to normal in the effective state.

Operation category: You can select "None" or eight categories from A to H, which correspond to the eight categories in the "User Password" tab in the system settings. Only when the current user has this operation category restriction can he operate this component.

Cancel usage restrictions after the operation is completed: If checked, this component will no longer have usage restrictions after the operation is completed.

A prompt window will pop up when the user does not have permission to operate this category: If checked, when the current user does not have permission to operate this component, clicking on the component will pop up a prompt dialog box, and the component will not be operated.

Hide this button when the user does not have permission to operate this category: If checked, the component will be hidden when the current user does not have permission to operate this component.

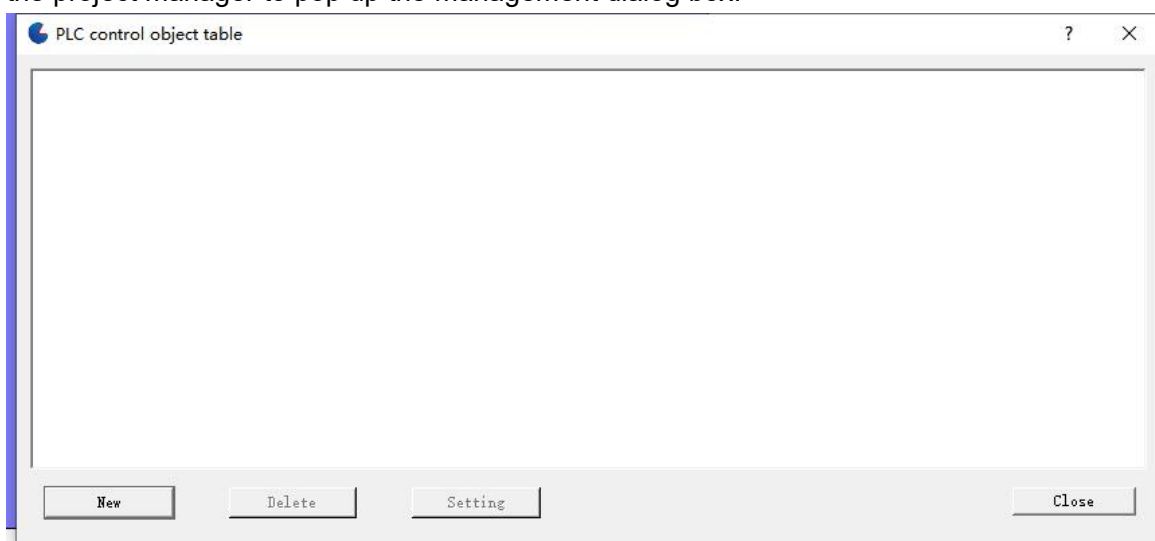
3.10 Global control

3.10.1 Custom keyboard

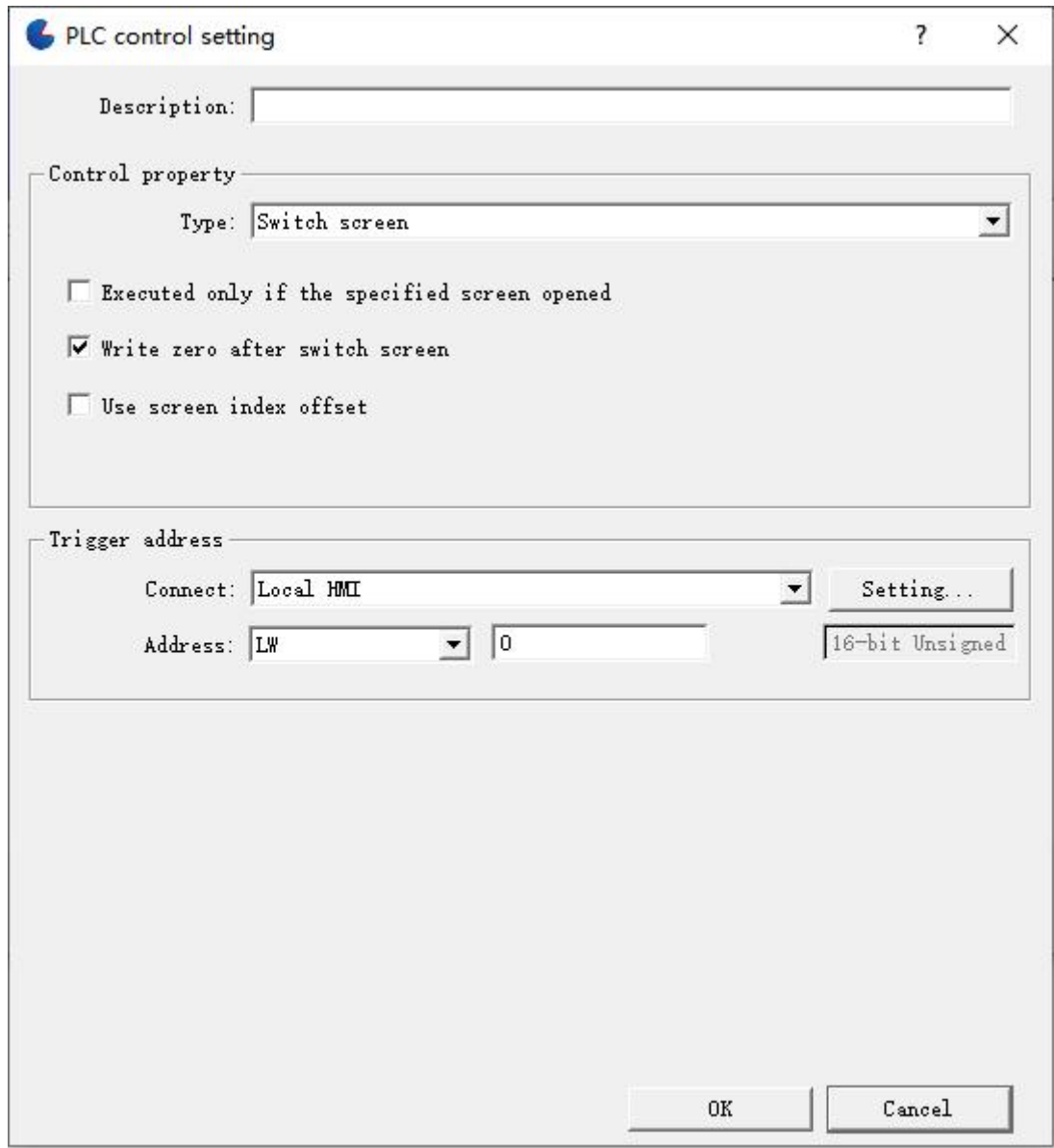
The configuration software provides users with the system default keyboard and also allows users to customize the keyboard. Right-click "Custom Keyboard" in "Project Manager" and select "Add Custom Keyboard", which will generate several custom keyboards below. These keyboard styles are defined in the CustomizeKeyboard.dat file, and users can modify them on this basis. If you save the configuration project after modification, the modified custom keyboard will also be saved together.

3.10.2 PLC control object table

The PLC control object is a function control list. Double-click the "PLC control object table" in the project manager to pop up the management dialog box:



Click the "New" button and a dialog box will pop up:



Control type: Select function control items.

Switching basic screen: The function and screen switching components are the same. In the "Trigger Address" below, a word register can be specified. By entering the screen ID into this register, the screen can be controlled to jump.

Screen ID writing device: Specify a register in the "trigger address", which will be written into the screen ID value every time the screen switches.

Backlight control (automatic reset): When the value in the specified register changes from 0 to 1, perform the operation of turning on or off the backlight, and then reset the sender data to 0.

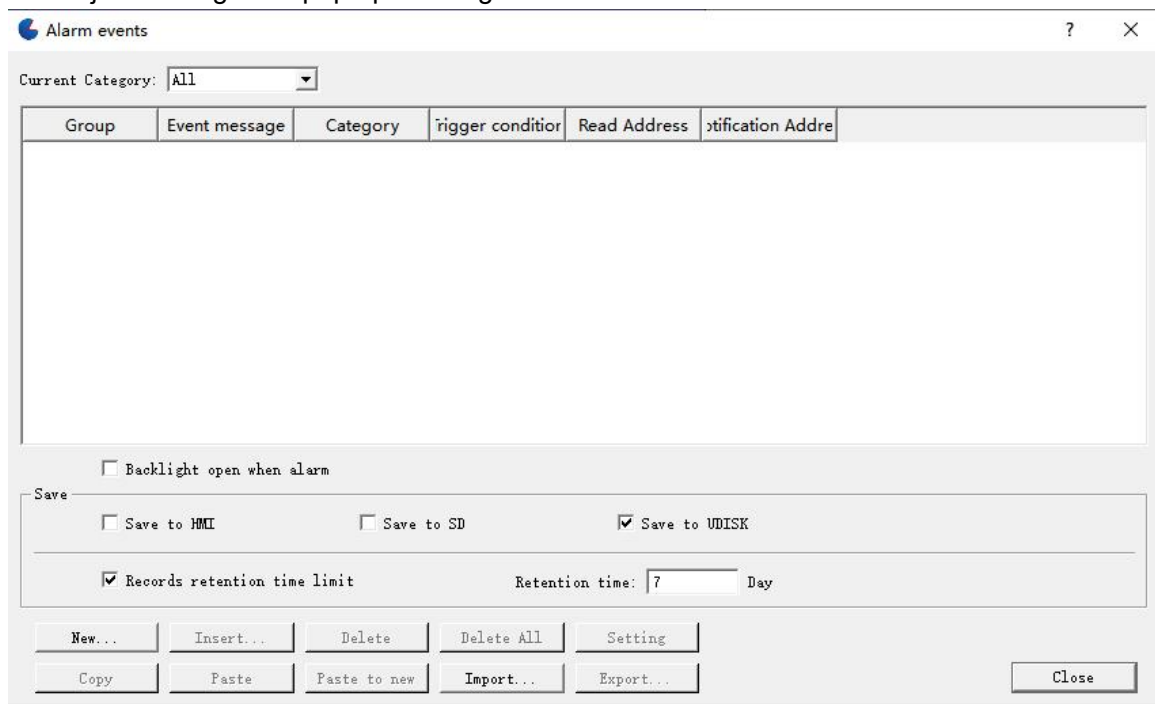
Backlight control: It has the same function as "Backlight control (automatic reset)", except that after operation, the specified register is not reset.

Screenshot: When the value in the specified register changes from 0 to 1, the current or specified screen is saved as a PNG file, named after the current time, and saved on a USB drive or SD card.

Execute macro instruction: When a value in a specified register changes from 0- to 1, execute the specified macro instruction.

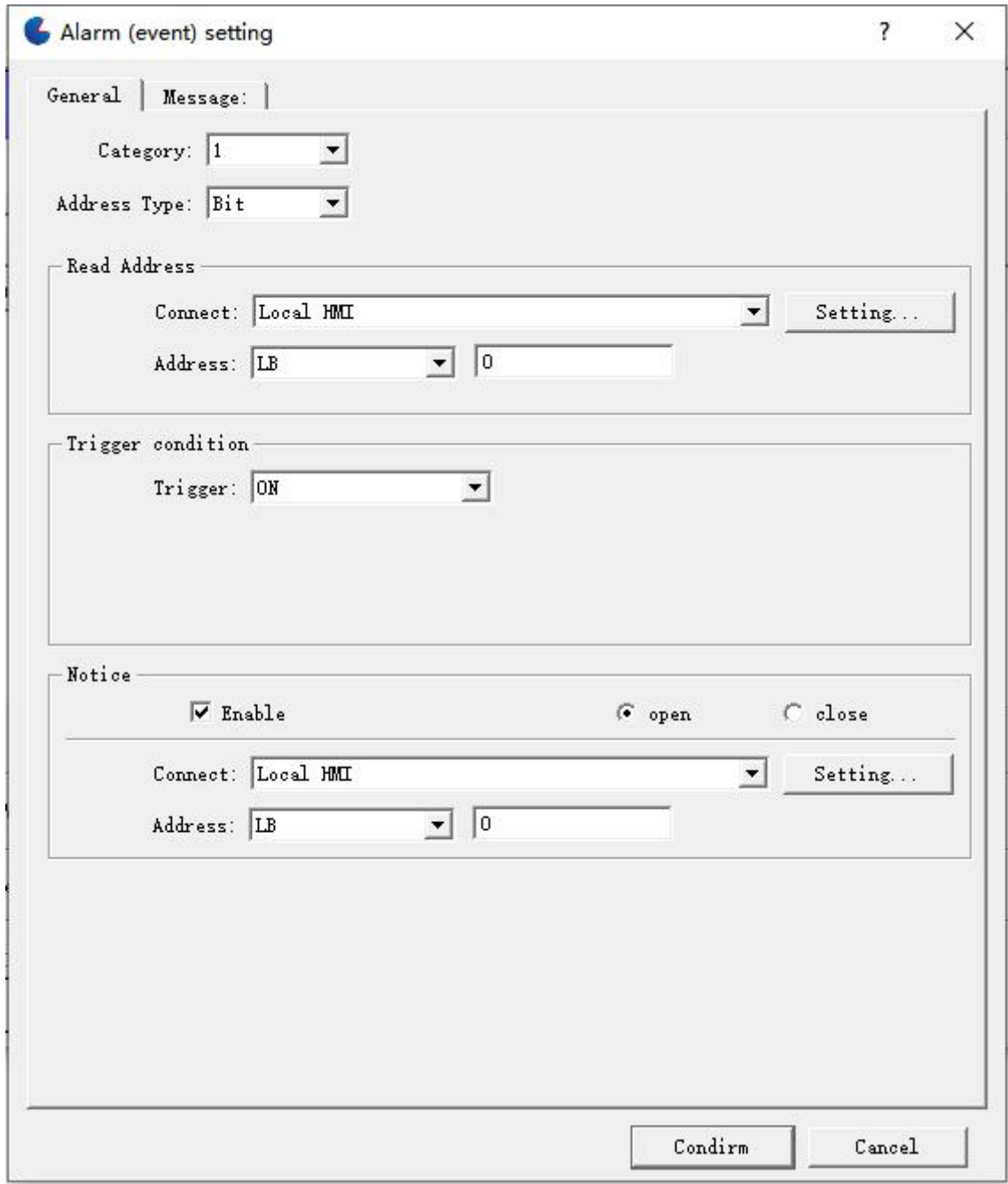
3.10.3 Alarm Event Login

Alarm event login is used to manage the alarm events of the entire configuration project. Alarm display components, event display components, and dynamic alarm bar components all need to be used in conjunction with the alarm event login table. Double click on "Alarm Event Login" in "Project Manager" to pop up a dialog box:



Current category: All alarm events can be divided into 32 categories, which are used here to filter and display alarm events.

New: Add an alarm event, click to pop up a dialog box:



Category: Select a category for the alarm event, totaling 32 categories.

Address category: can be selected as "bit" or "word". To read a register in the data, a corresponding bit register or word register needs to be specified.

Read Address: Specify a read register.

Trigger conditions: When the address category is bit, there are several trigger conditions: ON, OFF, OFF=, ON=. When the address category is a word, the triggering conditions are <, >, =(equal to), <>(not equal to), <=, >=.

Notification enabled: Check to set the corresponding position ON/OFF for the alarm.

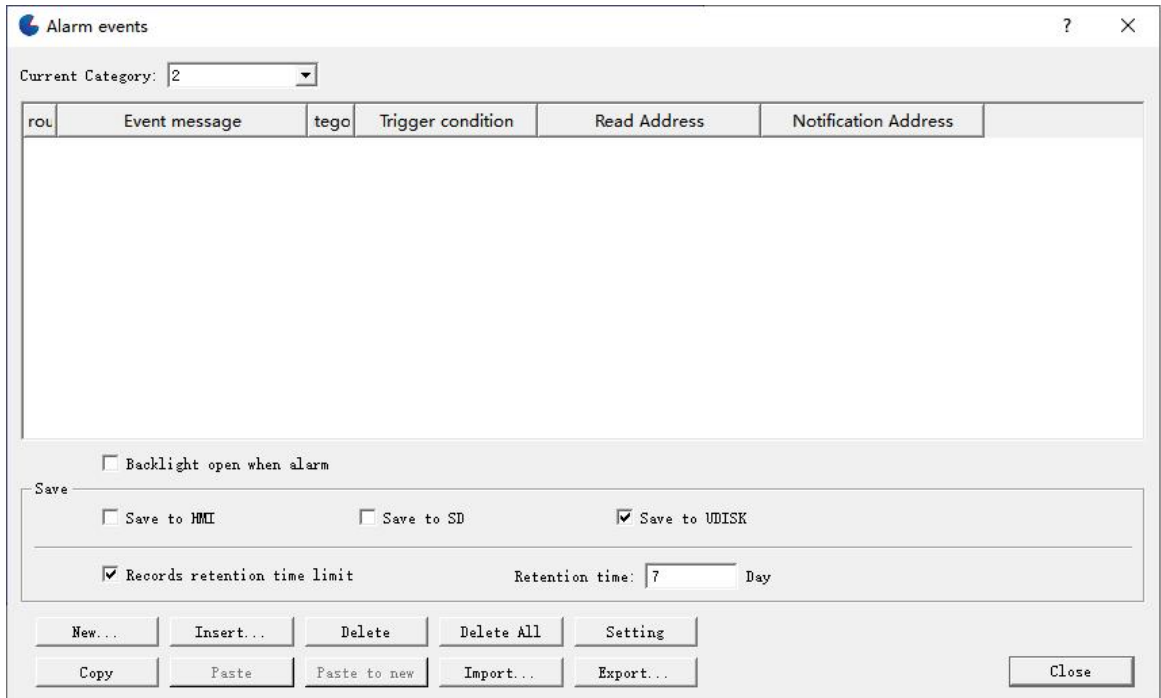


Content: Specify a string of text to display when an alarm occurs, which can also be specified using a text library.

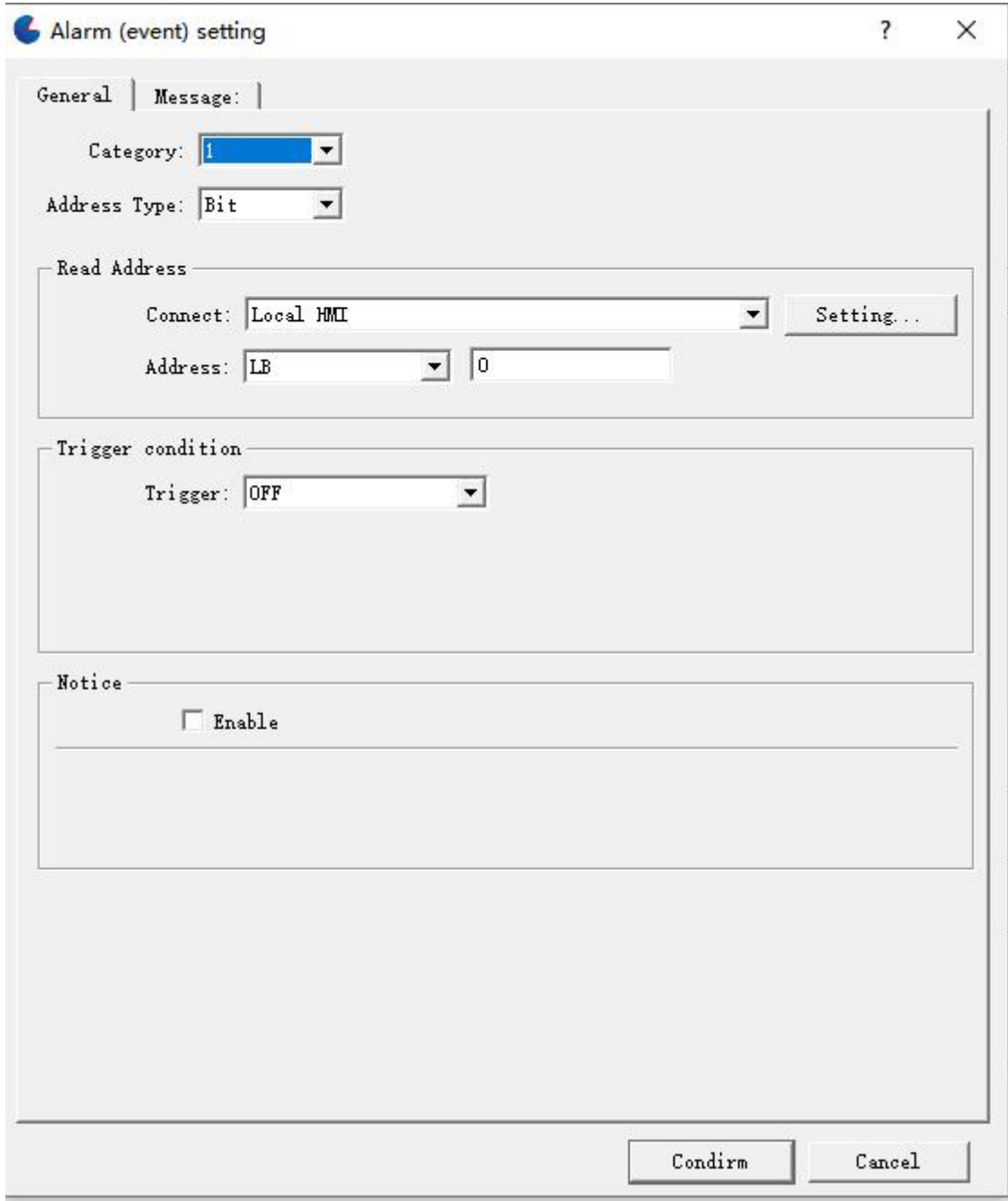
Write alarm display/event display components during event confirmation: In the settings of alarm display components and event display components, a confirmation address can be specified. After this alarm event occurs, this confirmation value will be written to the confirmation address in the component.

3.10.3.1 List of alarm events

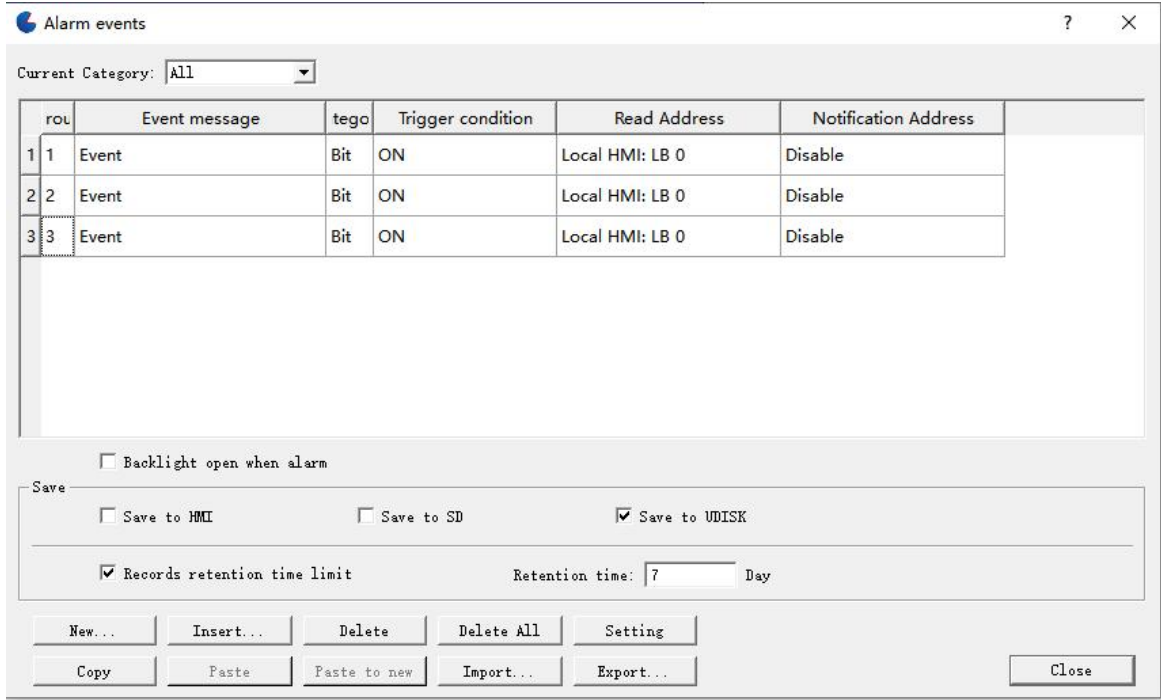
Step 1: Double click on "Alarm Event Login" in the "Project Manager" to pop up a dialog box:



Step 2: Add "Alarm Event": Select the category and reading address, set the triggering conditions, as shown in the following figure:



Multiple alarm events can be added using the same method:



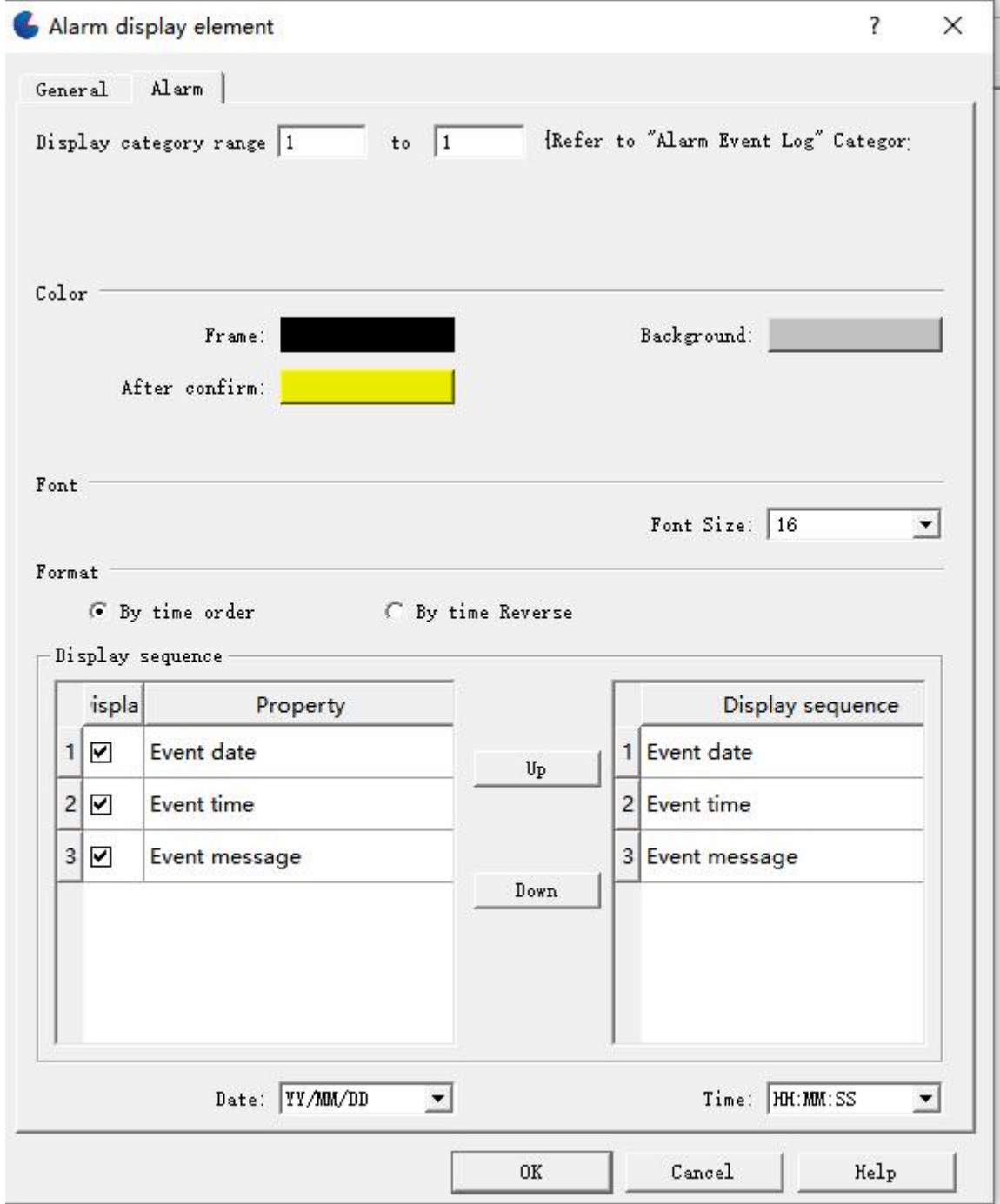
Automatically turn on backlight when an alarm occurs: Check this option. When an alarm occurs, the touch screen backlight will automatically light up

Save file: You can choose the location and retention time limit for saving the file

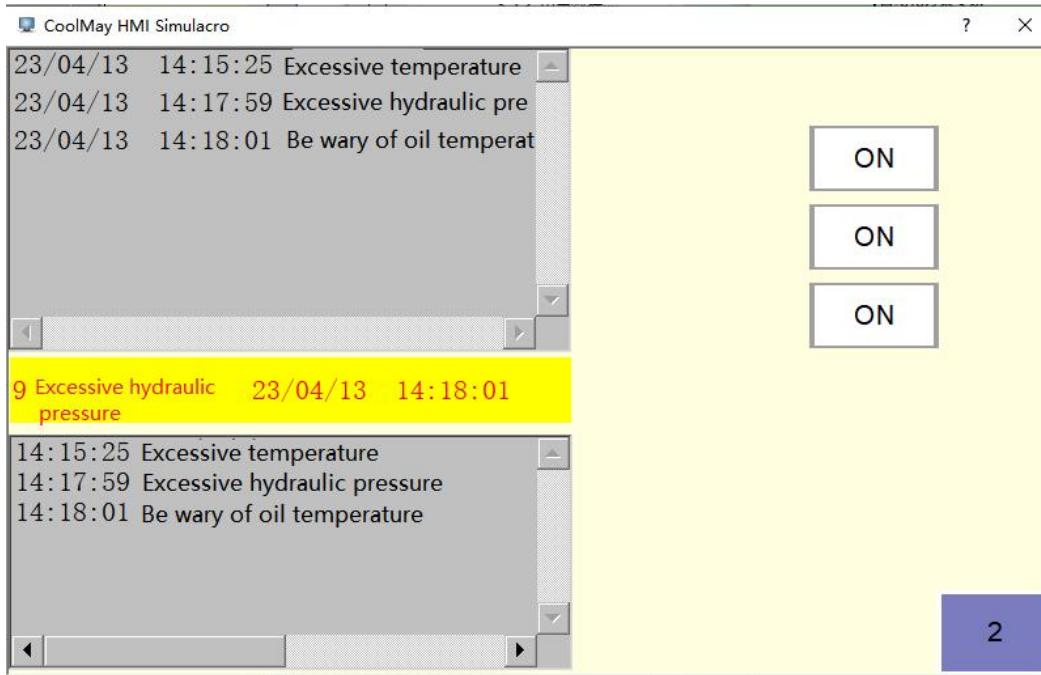
Add, Insert, Delete, Set: Select one of the alarm messages and modify it (insert settings, delete, etc.);

Import/Export: Export/import alarm information for easy use in the next project editing (note: this function requires the installation of Office software on the computer)

Step 3: Add as needed on the screen: Component → Alarm → Alarm Display Component/Dynamic Alarm Bar/Event Display Component:

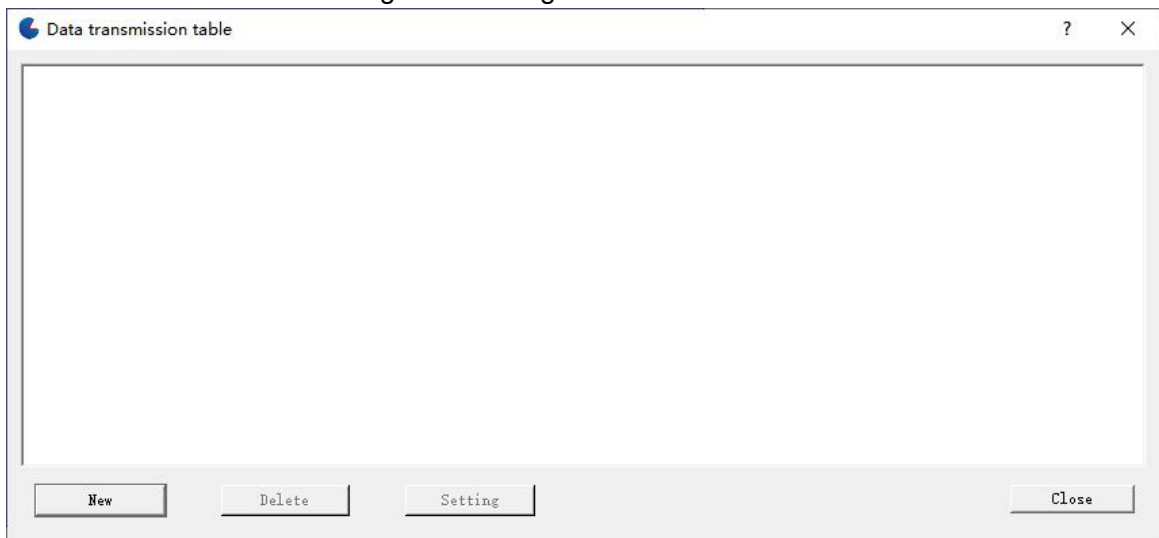


Step 4: When the alarm conditions are met, the display box will display the corresponding alarm event, as shown in the following example:



3.10.4 Data transmission table

The data transmission table, also known as the data synchronization table, is used to manage data transmission in configuration engineering, that is, to synchronize data from certain registers to specified registers. Double click on "Data Transfer" in the Project Manager to open the Data Transfer Table Management dialog box:



Click "New":

Data transmission ? X

Description:

Property:

Transmission type: Time

Data type: Bit bit/word numbers 1

Interval: 1 Second(s)

Executed only if the specified screen opening

Source address

Connect: Local HMI Setting...

Address: LB 0

Destination address

Connect: Local HMI Setting...

Address: LB 0

OK Cancel

Transmission type: You can choose between "timed data transmission" or "triggered data transmission".

- ① Select "timed data transmission" to specify the time interval for each transmission, in units of S;
- ② If "trigger data transmission" is selected, the trigger address and trigger conditions can be specified.

Address category: You can choose "bit" or "word". When selecting "bit", both the source address and destination address can only be bit registers; When selecting "word", both the source address and destination address can only be word registers.

Number of bits/words: Set the number of transmitted data.

Only execute when the specified screen is open: When checked, this function is only executed when the corresponding screen is opened.

Source Address: Specify the source data register that needs to be transmitted, which can be selected from the local HMI address and other device addresses (such as Mitsubishi FX3U FX3G).

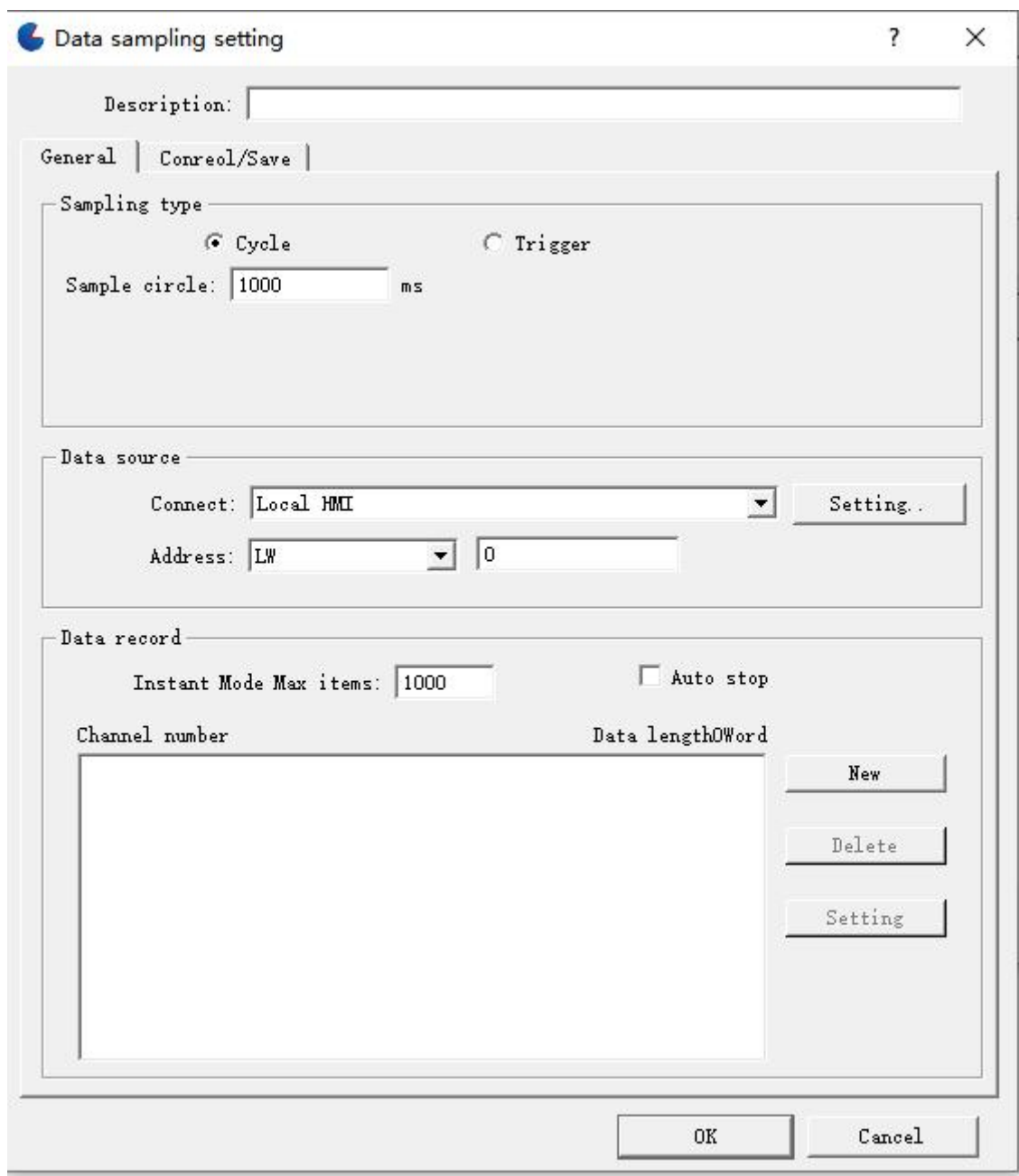
Target address: Specify the register that needs to receive data, and you can also choose the local HMI address and other device addresses (such as Mitsubishi FX3U FX3G).

3.10.5 Data Sampling Table

The data sampling setting is used to control the sampling of registers, and is used in conjunction with historical data display components and trend chart components. Double click on "Data Sampling" in the Project Manager to pop up a management dialog box:

Read Address	Length	Sampling type	Trigger address	Clear address	Stop address	Auto stop

Click "New":



Sampling method: Periodic or trigger type can be selected. When selecting periodic, the sampling period can be specified in milliseconds. When selecting the trigger type, it can refer to the positioning register and trigger method.

Data source: Specify a word register, which is a reference address. If multiple channels are added, the addresses of subsequent channels will be incremented on this reference address. If D0 is specified, the subsequent channel address will be incremented from D1 onwards...

Data recording: The maximum number of stored records can be set.

Auto stop: If "Auto stop" is checked, storage will no longer be performed when the maximum number of transactions is reached.

New: Multiple channels can be added, and each channel can specify different data types separately. Note: 32-bit data occupies two channels, namely two registers, as shown in the following figure



Clear Control: If "Enable" is checked, a bit register can be specified to clear historical data under specified conditions.

Pause sampling control: If "enable" is checked, a bit register can be specified to pause sampling under specified conditions.

History: The storage medium for historical databases, which can be selected to be saved on touch screens, SD cards, or USB drives.

Folder Name: Specify the folder name, which is generated in the dataSample folder. The database file is named after year, month, and day.

File retention time limit: Set the retention time of historical database files in days.

3.10.6 Formula

Formula information refers to the proportion relationship of ingredients required to produce a product. For example, the ingredients required for making bread include water, flour, salt, sugar, yeast, sesame oil, etc. The proportion relationship of these ingredients is a formula information, which can be simply regarded as a multi row and multi column data table. Formula data refers to the RWI register stored inside the HMI, which can be saved when powered off. Users can also save the register values on the PLC as formula data. Right click on "Recipe" in the Project Manager and select "Add Recipe":

Recipe [?] [X]

General | Data Item

Name: (recipe0)

Description:

Recipe Length: 5 Number of R: 3

Data Type: 16-Bit Unsigned Int

Read recipe to registers

Read Address

Connect: Local HMI 设置...

Address: LW 0

Write recipe from registers Write Address Identical to Read Address

Write Address

Connect: Local HMI 设置...

Address: LW 0

Recipe Number Register: RWI0 Address Range: RWI1-RWI15

Reading recipe register: LB9010 Saving recipe register: LB9012

Writing recipe register: LB9011 Restoring recipe register: LB9013

ok cancel help

Formula length: specifies the number of data in a formula.

Total number of formulas: specify the total number of formulas.

As shown in the above figure, specify a formula length of 5, a total of 3 formulas, and occupy formula registers: RWI0 (formula number), RWI1~RWI15 (formula data); RECIPE1 uses RWI1~RWI5, RECIPE1 uses RWI6~RWI10, and so on...

Data Category: The data category for each data in the formula, which can be selected as a 16 bit positive integer, 32-bit positive integer, 16 bit integer, 32-bit integer, or floating-point number. (Note: 32-bit positive integers, 32-bit integers, and floating-point numbers occupy two registers and need to be separated when used)

Read recipe to register: If checked, this recipe has the function of writing to HMI or PLC, and a register address needs to be specified.

Write recipe from register: If checked, this recipe has the function of reading data from HMI or PLC, and a register address needs to be specified.

Write address is the same as read address: If checked, the address written by the recipe from HMI or PLC is the same as the read data, and only the read address needs to be specified at this time.

RWI0 is the recipe number register, starting from 0. For example, the recipe number register of RECIPE1 is RWI0=0.

Starting from RWI1, store the recipe data address with an upper limit of RWI65535.

LB9010: Read recipe register. When triggered as ON, read a set of recipes specified by RWI0 into the specified register group, such as the register group starting from D200.

LB9011: Write recipe register. When triggered as ON, write the data from the specified register group to the recipe register specified in RWI0.

LB9012: Save the recipe register. When triggered as ON, the data in the current RWI register will be written to the HMI and can be read out the next time it is powered on.

LB9013: Restore recipe register. When triggered ON, restore the data in the RWI register to the last saved value.



In this table, initial recipe data can be specified, meaning recipe data can be set without placing recipe registers on the screen.

Source Recipe Number: Specify the source recipe number that needs to be copied, such as 0;

Target Recipe Number: Specify the target recipe number that needs to be copied, such as 1;

Copy recipe data: Copy from the source recipe to the target recipe. For example, if the source formula number is 0 and the target number is 1, the data from RECIPE1 in the table will be copied to RECIPE2.

3.10.7 System register

System registers are reserved for special purposes and are divided into two categories: bit registers and word registers.

Bit register:

LB 9000-LB 9009	Set the power to ON state
LB 9010	Read recipe data from RWI register to register
LB 9011	Write register data to RWI register
LB 9012	Save recipe data from RWI register to HMI
LB 9013	Restore the recipe data saved last time in the RWI register
LB 9016	Set system time using the values of registers LW 9010-LW 9015
LB 9018	ON shows the mouse cursor, OFF hides it
LB 9023	Delete all event log files in HMI
LB 9025	Delete the data sampling file with the earliest date in the HMI
LB 9035	Display as ON when HMI storage space is less than 3M
LB 9036	Display as ON when SD card storage space is less than 3M
LB 9037	When the storage space on the USB drive is less than 3M, it is displayed as ON
LB 9047	Restart HMI when set to ON
LB 9050	Log out the currently logged in user
LB 9059	Display as ON when there is an input error in the function button component
LB 9060	Displayed as ON when the login password is entered incorrectly
LB 9061	Update the user password by setting the values in the 8 registers LW 9500-LW 9514 (each register is 32 bits) to 1-8 user passwords
LB 9063	Turn off backlight when set to ON, turn on backlight when set to OFF
LB 9064	If COM1 communication is successful, it will be displayed as ON
LB 9065	If COM2 communication is successful, it will be displayed as ON
LB 9066	Set to ON to allow communication error window to pop up, set to OFF to not allow pop-up
LB 9068	If the USB drive is present, it will be displayed as ON, otherwise it will be displayed as OFF
LB 9070	If the SD card is present, it will be displayed as ON, otherwise it will be displayed as OFF

LB 9071	Set to ON to make sound when touching, OFF to make no sound when touching
LB 9072	If set to ON, the alarm will sound; if set to OFF, the alarm will have no sound
LB 9080	Set to ON to copy event log files to SD card
LB 9081	Set to ON to copy data sampling files to SD card
LB 9082	Set to ON to copy data sampling files to a USB drive
LB 9083	Set to ON to copy event log files to a USB drive
LB 9086	Set to ON, copy the project file project.prj to a USB drive
LB 9088	Set to ON, copy the project file project.prj to the SD card
LB 9089	Display as ON if there is currently an alarm event
LB 9090	If the current screen saver status is displayed as ON
LB 9091	Set to ON, copy the recipe file recipe. bin to a USB drive
LB 9093	Set to ON, copy the recipe file recipe. bin to the SD card
LB 9200	Save register data for LB5000~LB5999 and LW5000~LW5999
LB 9300	Load the authorization parameters specified in LW9231
LB 9301	Save the authorization parameters specified in LW9231

Word register:

LW 9010	16bit	Set current time in seconds
LW 9011	16bit	Set current time minute
LW 9012	16bit	Set current time hour
LW 9013	16bit	Set current time day
LW 9014	16bit	Set Current Time Month
LW 9015	16bit	Set Current Time Year
LW 9017	16bit	Display current time in seconds
LW 9018	16bit	Display current time in minutes
LW 9019	16bit	Display current time hour
LW 9020	16bit	Display current time day
LW 9021	16bit	Display current time month

LW 9022	16bit	Display current time year
LW 9023	16bit	Display the current day of the week
LW 9026	16bit	Display HMI operating system version - year
LW 9027	16bit	Display HMI operating system version - month
LW 9028	16bit	Display HMI operating system version - day
LW 9030	16bit	Display HMI startup runtime hours
LW 9031	16bit	Display HMI startup running time - minutes
LW 9032	16bit	Display HMI startup running time in seconds
LW 9040	16bit	Display/Set screen brightness, range from 0 to 100
LW 9041	16bit	When displayed as 1, it indicates that the HMI is being touched
LW 9042	16bit	Display the X value of the coordinates when touching the HMI
LW 9043	16bit	Display the Y value of the coordinates when touching the HMI
LW 9044	16bit	Display the X value of the coordinates when touching and releasing the HMI
LW 9045	16bit	Display the Y value of the coordinates when touching and releasing the HMI
LW 9050	16bit	Display the currently displayed window number value
LW 9072	32bit	Display HMI storage available space in KB
LW 9074	32bit	Display SD card storage available space in KB
LW 9076	32bit	Display the available storage space on a USB drive, in kilobytes
LW 9081	16bit	Display/Set Screen Saver Time
LW 9122	16bit	Display project file creation time - year
LW 9123	16bit	Display project file creation time in months
LW 9124	16bit	Display project file creation time - day
LW 9129	16bit	IP address segment 1
LW 9130	16bit	IP address segment 2
LW 9131	16bit	IP address segment 3
LW 9132	16bit	IP address segment 4
LW 9133	16bit	Display the port number set for Ethernet upload and download

LW 9134	16bit	Display current language
LW 9135	16bit	Device MAC address segment 1
LW 9136	16bit	Device MAC address segment 2
LW 9137	16bit	Device MAC address segment 3
LW 9138	16bit	Device MAC address segment 4
LW 9139	16bit	Device MAC address segment 5
LW 9140	16bit	Device MAC address segment 6
LW 9150	32bit	Display the characters currently entered on the keyboard
LW 9190	10bit	Display the maximum number of characters on the current keyboard
LW 9200	10bit	Display the minimum characters on the current keyboard
LW 9219	16bit	Enter user ID for login
LW 9220	32bit	Enter user password for login
LW 9222	16bit	The current user's permission category, from category A to category H by position
LW 9230	16bit	Set/Read Available Authorization Quantity
LW 9231	16bit	Pre authorization number, starting with 1
LW 9232	16bit	Set/Read Authorization Method
LW 9233	16bit	Set/Read Expiration Year
LW 9234	16bit	Set/Read Expiration Time Month
LW 9235	16bit	Set/Read Expiration Date
LW 9236	16bit	When setting/reading expiration time
LW 9237	16bit	Set/Read Expiration Time Minutes
LW 9238	16bit	Set/read expiration time in seconds
LW 9239	32bit	Set/Read Accumulated Time (in minutes)
LW 9241	10bit	Set/Read Authorization Password
LW 9251	10bit	Set/read the register address of the password (used for expiration jump screen)
LW 9500	32bit	Display/Set User 1 Password
LW 9502	32bit	Display/Set User 2 Password
LW 9504	32bit	Display/Set User 3 Password

LW 9506	32bit	Display/Set User 4 Password
LW 9508	32bit	Display/Set User 5 Password
LW 9510	32bit	Display/Set User 6 Password
LW 9512	32bit	Display/Set User 7 Password
LW 9514	32bit	Display/Set User 8 Password
LW 9540	16bit	Display ASC keyboard case switching status
LW 9551	16bit	PLC device 1 baud rate serial number
LW 9552	16bit	PLC device 1 data bit number
LW 9553	16bit	PLC device 1 checksum number
LW 9554	16bit	PLC device 1 stop bit number
LW 9555	16bit	PLC device 1 HMI station number
LW 9556	16bit	PLC equipment 1 PLC station number
LW 9557	16bit	PLC device 1 whole address interval
LW 9558	16bit	PLC device 1 communication delay, measured in milliseconds
LW 9559	16bit	PLC device 1 communication retry count
LW 9560	16bit	PLC device 1 address mode serial number
LW 9561	16bit	PLC device 1 timeout time, in milliseconds
LW 9566	16bit	PLC device 2 baud rate serial number
LW 9567	16bit	PLC device 2 data bit number
LW 9568	16bit	PLC device 2 checksum number
LW 9569	16bit	PLC device 2 stop bit number
LW 9570	16bit	PLC device 2 HMI station number
LW 9571	16bit	PLC equipment 2 PLC station number
LW 9572	16bit	PLC device 2 whole segment address interval
LW 9573	16bit	PLC device 2 communication delay, measured in milliseconds
LW 9574	16bit	PLC device 2 communication retry count
LW 9575	16bit	PLC device 2 address mode serial number
LW 9576	16bit	PLC device 2 timeout time, in milliseconds
LW 9600	16bit	The coordinate X value of the touched component

LW 9601	16bit	The coordinate Y value of the touched component
LW 9602	16bit	The width of the component touched
LW 9603	16bit	The height of the component touched
LW 9630	16bit	Set Current Language
LW 9720	16bit	Take a screenshot when set to 1
LW 9721	16bit	Screenshot storage location settings, where 0 is a USB drive and 1 is an SD card
LW 9730	16bit	Temperature measurement source setting, 0 is PLC temperature measurement, 1 is screen temperature measurement
LW 9731	16bit	External key values
LW 9732	16bit	External indicator light values

3.11 Upload and download

3.11.1 Configuration Engineering Download

Design the configuration project and download it to the touch screen using this method after compilation is completed. Click on the icon on the toolbar to pop up a dialog box:



To select "USB Download", it is necessary to connect the touch screen and computer via USB and ensure that the touch screen driver is installed correctly.

To select "Ethernet", you need to connect the touch screen to the network, and then specify the IP address and port.

Clear recipe data: After downloading, set all recipe data to 0.

Clear event record data: After downloading, clear the historical event database.

Clear data sampling records: After downloading, clear the data sampling database.

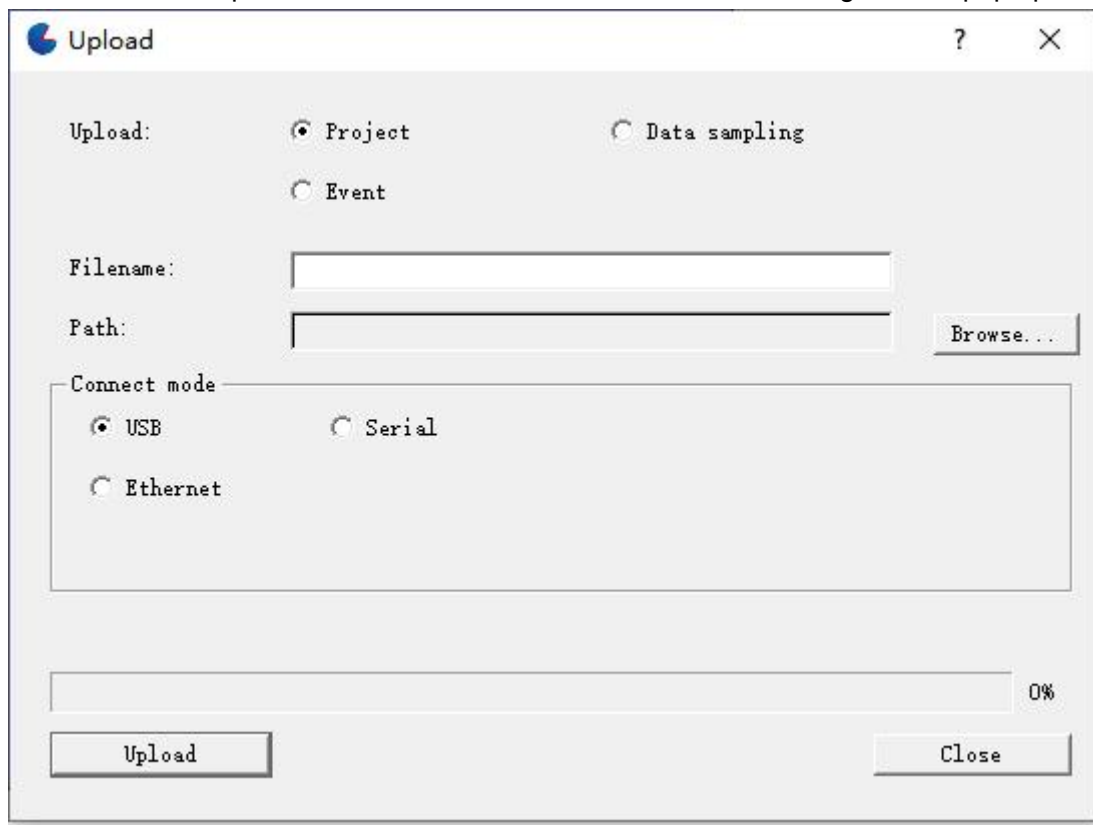
Update lower level program: Download the attached lower level program to HMI simultaneously and complete the update, which can be used for upgrading the lower level program. Note: This feature is temporarily unavailable for use

Synchronize HMI time with computer: Synchronize HMI with the current computer.

Click download, the currently copied resources will be displayed in the list box, and the touch screen will also display the download progress.

3.11.2 Configuration engineering upload

Uploading refers to uploading configuration engineering, event data, etc. from the touch screen to the computer. Click on the icon on the toolbar and a dialog box will pop up:



Upload content: You can choose engineering files, data sampling, or event records.

Connection method: USB or Ethernet transmission can be selected, and the default port for Ethernet transmission is 12345.

When you choose to upload the "project file", you will receive a PRJ project file.

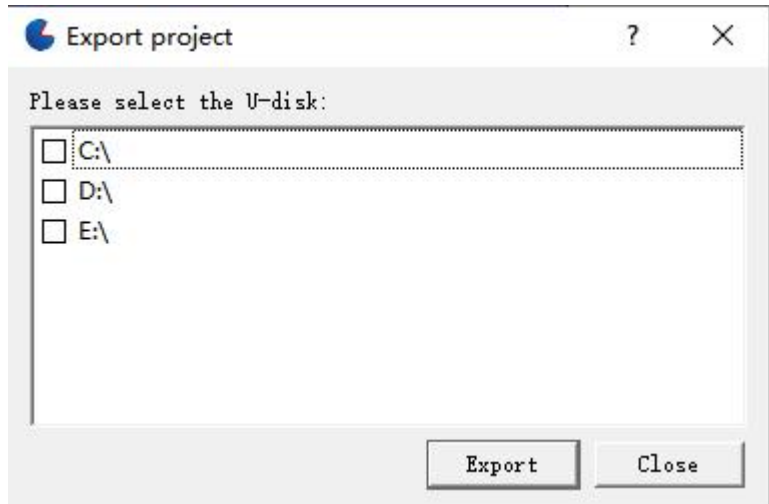
When choosing to upload "data sampling", a tar.bz2 compressed file can be obtained, and decompression can obtain the data sampling database file.

When selecting to upload "event records", a tar.bz2 compressed file can be obtained, which can be decompressed to obtain the event database file.

3.11.3 Update project files on USB drive

In addition to downloading configuration project files through USB and Ethernet, there is another method for exporting projects, which is to update them through a USB drive.

Select the "Tools" menu - "Export Project to USB Drive":

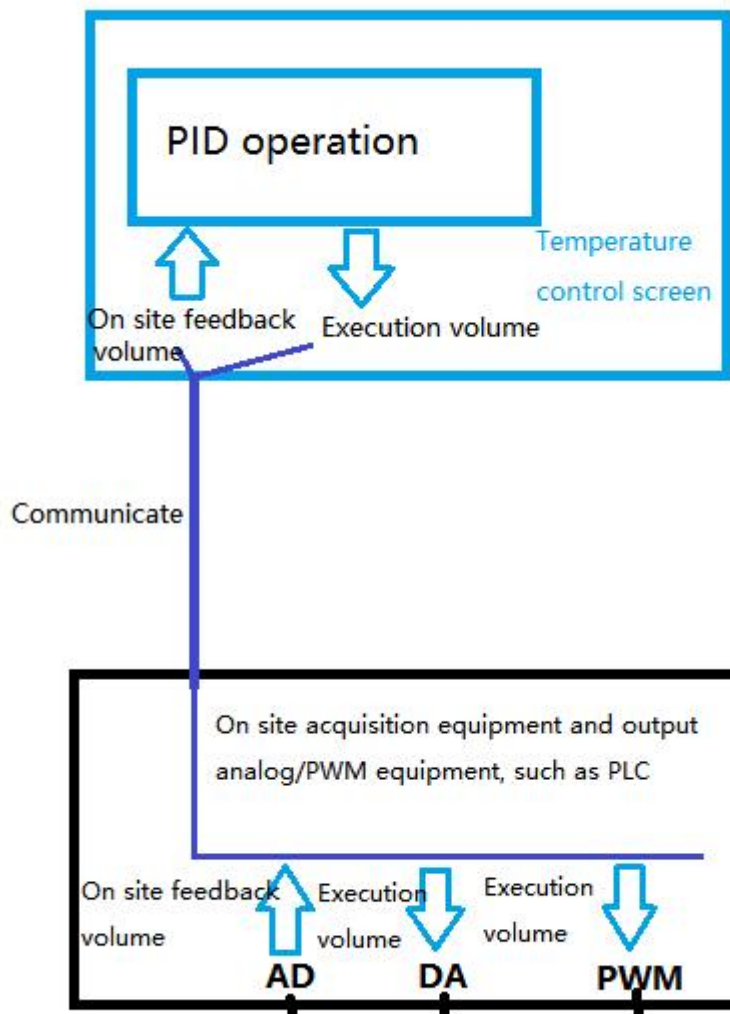


Select a USB drive path (multiple options can be selected, or the local disk can be used as a USB drive), click "Export", and the current project will be compiled first. After successful compilation, the generated project.bin file will be copied to the selected USB drive. By using this USB flash drive, combined with the "Engineering Update" section in "Touch Screen Parameter Settings", the configuration engineering in the touch screen can be updated.

3.12 Solution

3.12.1PID configuration

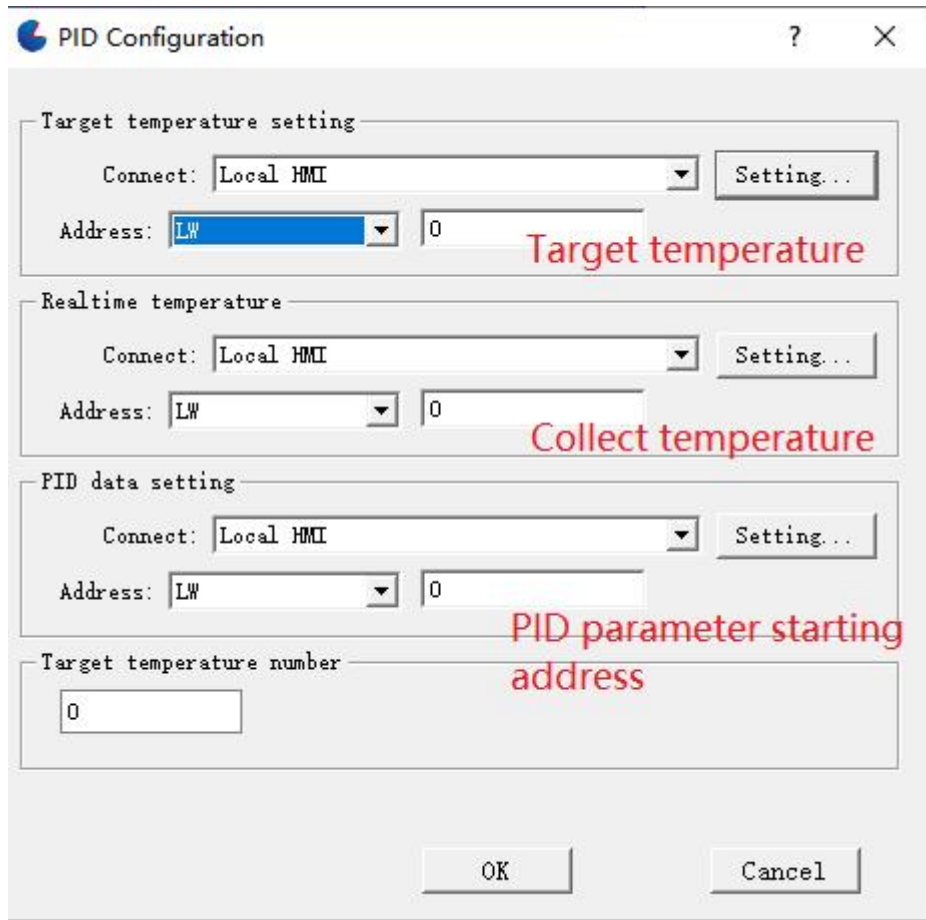
1. Control schematic diagram



2. Configuration design

Select menu bar solution - PID configuration





3. Parameter Configuration Description

1) Real time temperature:

First address: Collect temperature (16 integer, 1 decimal);

First address+1: PID mode (16 bit integer);

PID mode==7, disable self-tuning;

PID mode==8, enable self-tuning;

PID mode==9, update PID parameters, use current PID parameters, and write them to the screen for saving;

PID mode==10, PID temperature control;

PID mode=11, turn off PID temperature control;

PID mode=12, restore screen default value;

First address+2: PID output (16 bit integer);

First address+3: Self setting zero crossing times (16 bit integer), when equal to 9, self setting is completed;

2) PID data settings:

First address: P-value (floating-point number, 3 decimal places)

First address+2: I value (floating-point number, 3 decimal places)

First address+4: D value (floating-point number, 3 decimal places)
First address+6: Large control band (16 digit integer, 2 decimal places)
First address+7: Small control band (16 digit integer, 2 decimal places)
First address+8: Fine control band (16 integer, 2 decimal)
First address+9: Cooling coefficient (16 integer, 2 decimal places)
First address+10: Full power equivalent (16 bit integer)
First address+11: First level suppression ratio (16 integer, 1 decimal)
First address+12: Second level suppression ratio (16 integer, 1 decimal)
First address+13: Equal amplitude error (16 integer, 1 decimal)
First address+14: Initial power equivalent (16 bit integer)
First address+15: Stepwise heat equivalent (16 bit integer)
First address+18: PID control cycle (16 bit integer)

3) Setting instructions:

Target temperature setting LW200:

So, the target temperature address for LW200;

Real time temperature setting LW300:

LW300: Collect temperature (16 integer, 1 decimal);

LW301: PID mode (16 bit integer);

LW301==7, close self-tuning;

LW301==8, enable self-tuning;

LW301==9, update PID parameters, use current PID parameters, and write them to the screen for saving;

LW301==10, PID temperature control;

LW301==11, turn off PID temperature control;

LW301==12, restore the default screen value;

LW302: PID output (16 bit integer);

LW303: Self setting zero crossing frequency (16 bit integer), when it is equal to 9, self setting is completed;

PID data setting LW400:

LW400: P-value (floating-point number, 3 decimal places)

LW402: I value (floating-point number, 3 decimal places)

LW404: D value (floating-point number, 3 decimal places)

LW406: Large control band (16 integer, 2 decimal places)

LW407: Small control band (16 integer, 2 decimal places)

LW408: Fine control band (16 integer, 2 decimal places)

LW409: Cooling coefficient (16 integer, 2 decimal places)

LW410: Full power equivalent (16 bit integer)

LW411: First level suppression ratio (16 integer, 1 decimal)

LW412: Second level suppression ratio (16 integer, 1 decimal)

LW413: Equal amplitude error (16 integer, 1 decimal)

- LW414: Initial power equivalent (16 bit integer)
- LW415: Stepping Heat Equivalent (16 bit integer)
- LW418: PID control cycle (16 bit integer)

4. Interface Design Cases

Parameter screen:

Curve chart design:



5. 5. Interface operation instructions

1) When applied to a device for the first time, PID parameters need to be self-tuning and learned. Before self-tuning, relevant parameters need to be set, which can be clicked on as default values or set according to actual needs; The default values are as follows:

PID data settings:

P-value (does not affect self-tuning)

I value (does not affect self-tuning)

D value (does not affect self-tuning)

Large control strip (set to 100.00)

Small control strip (set to 80.00)

Fine control strip (set to 50.00)

Cooling coefficient (set to 0.50)

Full power equivalent (4000, as needed)

First level suppression ratio (0.5)

Secondary inhibition ratio (0.5)

Equal amplitude error (2.0, absolute difference between upper and lower amplitudes as needed)

Initial power equivalent (4000, set this parameter to the core value of temperature control as needed, and self-tuning will be quickly completed)

Stepwise heat equivalent (optional)

PID control cycle (400)

2) After performing self-tuning, after reaching 9 zero crossing times, the self-tuning will automatically switch to temperature control mode, that is, PID mode=3. If you feel that the PID parameters are ideal, you can update the PID parameters (PID mode==9), store the PID parameters, and let (PID mode=10) again to normal temperature control.

3) The specific interface button design can refer to case engineering.

3.12.2 IoT terminals

Stay tuned...

Annex

Version change record

Date	Revised version	Changes
Jan. 2024	V24.11	◆ First version release
Feb.2024	V24.21	◆ System registers added LB9050, LW9251, LW9730, LW9731, LW9732