VEICHI

Manual

VI20Studio HMI Configuration Software

Revision History

Date	Version	Revision History
2025.01	01	Initial publication

Content

Preface

Overview

Thank you for choosing Veichi products. This manual provides a detailed introduction to the configuration methods of VI20Studio (unless otherwise specified, the operations in this document are illustrated using version 3.0 as example) and guides users in visual configuration for HMI.

The content provided in this manual only serves as general guidance and does not guarantee coverage of all usage scenarios for all product models. Due to reasons such as version upgrades, different device models and configuration files, the content provided in the manual may not match the actual device interface used by the user. Please refer to the actual information displayed on the user's device interface. The manual will not provide a detailed explanation of the differences caused by the aforementioned situations.

For the purpose of functional introduction and configuration examples, the manual may use IP addresses, URLs, domain names, etc. Unless otherwise specified, the aforementioned content is for illustration only and does not represent any actual significance.

Target Reader

This document is mainly intended for readers who are interested in learning about the configuration methods of VI20Studio, the configuration software for Veichi HMI products. It includes system administrators, HMI configuration engineers, etc. This document assumes that readers have a certain level of knowledge in the following areas:

- Basic network communication protocols such as TCP/IP
- Modbus protocol
- HMI operating principle

Format Convention

This manual follows the following content formatting conventions:

Content	Description
Bold	Bold represents the names and contents of various controls on the software interface. For example, “Select **Window/Current Window Properties** from the menu bar to enter the **Modify Window** page, and select the **Timer** tab.”
/	When describing the operation steps on the software interface, slash is used to isolate the clicked objects (menu item, sub-menu, button, etc.). For example, “Select **Component/Switch/Bit Set** from the menu bar, and create a new bit set switch component”.

Content	Description
Italic	Variables, must be replaced by actual values accordingly. For example, “Enter ‘ftp://*the IP of HMI*’ in the browser address bar, and press Enter to enter the file directory interface of the HMI.”

This manual follows the icon formatting conventions below.

Icon	Description
	Tips, operation tips for users to solve problems.
	Description, supplementary and explanatory information for the main text.
	Caution, reminders for operation precautions, improper operation may cause potential device damage or data loss.
	Warning, the content following this icon requires special attention, otherwise it may result in personal injury.

Get Help

If you have any problem during use, please contact Veichi technical support engineers.

1 Product Overview

1.1 Product Introduction

VI20Studio is a software specifically designed by Veichi for designing human-machine interface (HMI) for its related HMI products (please refer to the Applicable HMI Models). The role of VI20Studio is to connect the industrial control equipment (such as PLC, DCS, etc.) with Veichi HMI, making production process automation more convenient and efficient.

VI20Studio enables various devices, sensors, actuators, and other industrial components to work together in coordination. It displays operation information and state monitoring results through the HMI interface, making control and data processing simpler and easier to understand, thus improving the working efficiency of operators. In addition, VI20Studio allows users to perform graphical programming, providing a more three-dimensional and visualized display of the relationships between devices and monitoring charts, making it easier for users to understand and manage industrial production information and control.

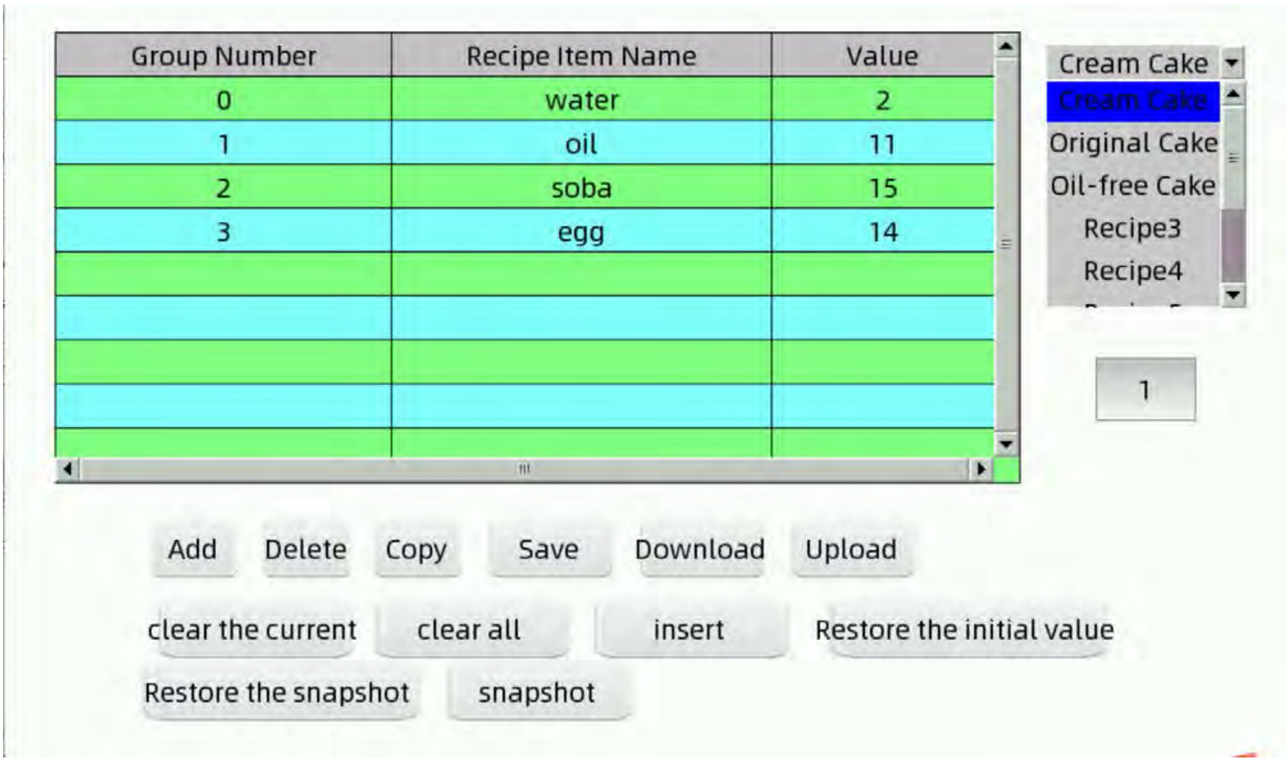
1.2 Technical Advantages

1.2.1 Strongly Compatible Recipe Function

VI20Studio V3.0.12849.0 and above versions support the new recipe function, in which the recipe component is displayed in both two-dimensional list and drop-down list formats. This greatly enhances compatibility with different user habits.

- The two-dimensional list can conveniently display a large amount of data, making it easier for users to search for information.

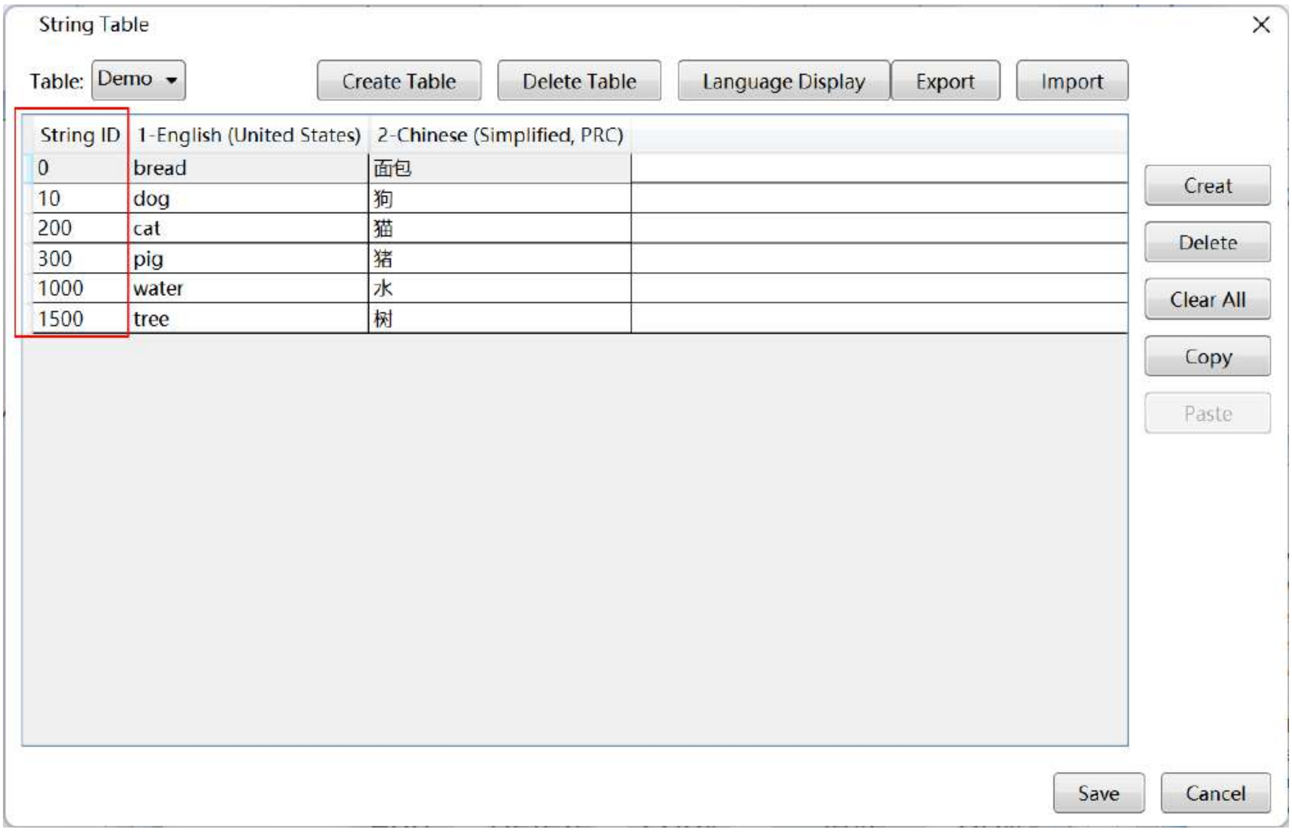
- When there are too many recipe data items or the names are too long, they can be presented in the form of a drop-down list.



Combining the two-dimensional list and the drop-down list can provide greater flexibility in configuring and adjusting the interface. By combining two-dimensional list and drop-down list, options can be better managed and controlled, providing users with a better interactive experience.

Using two-dimensional list and drop-down list can greatly improve operational efficiency and reduce the probability of user errors. Users can quickly select the desired options.

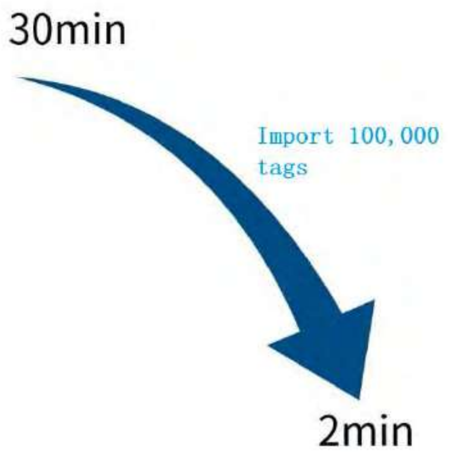
1.2.2 Discrete Digitization of String Table



Using discrete numbers to represent string table IDs has the following advantages:

- Save memory space: Using discrete numbers, string table IDs can be converted into integer data, greatly saving memory space. For applications that need to frequently read and process a large number of string table IDs, this approach can effectively reduce memory occupation and improve program efficiency.
- Accelerate comparison operations: After using discrete numbers, numerical value comparison can be performed directly for string table IDs. String-by-string comparison is no longer necessary, thereby reducing computational workload and accelerating program execution speed.
- Facilitate programming implementation: String table IDs using discrete numbers can simplify programming implementation and avoid errors caused by tedious string processing. At the same time, in practical use, all string table IDs can be mapped to a fixed range, making the code more readable and maintainable.
- Provide data security capabilities: Using discrete numbers as string table IDs can effectively conceal the real string information, providing a certain level of data security and preventing sensitive information from being leaked.

1.2.3 Fast Import of Siemens Tags



Siemens tag communication is a commonly used communication method in industrial control systems. VI20Studio supports fast import of Siemens tags, which brings the following advantages:

- Improve software operation efficiency: By optimizing the speed of importing Siemens tags, the data reading, writing, and updating in VI20Studio can be made faster and more stable, thereby improving the operation efficiency of the software.
- Reduce workload: The traditional method requires manually adding tags one by one, which can be very time-consuming and labor-intensive when there are a large number of tags. By managing tags through one-time import, a lot of time and effort can be saved.
- Enhance reliability: After the import speed is improved, the probability of errors can be reduced, and the stability and reliability of the software can be improved. In actual use, each tag will be accurately imported, avoiding problems caused by some tedious human errors.
- Improve user experience: By optimizing the import speed of Siemens tags, users can import and configure tags more conveniently, improving their experience and satisfaction.

1.2.4 Strong Macro Usability

The macro instructions in VI20Studio are flexible and easy-to-use, which can achieve functions similar to those in C language. They have the following advantages:

- Flexibility: Macros can be freely written and used, making it easy to use and adjust in a project. Additionally, they support multiple common data types and arithmetic operations, which can meet the different user needs and suit different user habits.
- Customizability: Macros are typically written based on specific user needs, allowing for better fulfillment of customized requirements and reducing reliance on external tools or libraries.
- Reusability: Macros can be defined as generic objects, such as functions or variables, which can be referenced in other modules. This reduces code quantity, while also decreasing the probability of errors.
- Internationalization: Compared to the C language, the macros used in VI20Studio can be flexibly used according to the requirements of the local language, character set, and character encoding. This greatly facilitates the internationalization of VI20Studio.
- Convenient for viewing user operation records: As a type of abstraction layer similar to scripts, macro instructions use macro to define complex variables, functions, and method, which makes it more convenient to record user operations. This also makes it quicker and more efficient when viewing, debugging, and modifying the records.

2 Install VI20Studio

2.1 Pre-installation Preparation

2.1.1 Get the Installation File

Enter https://www.veichi.cn/ in the browser address bar and press Enter. Select "Service & Support > Download" from the main menu and enter "VI20" in the search box to download the VI20Studio package.

2.1.2 Provide Installation Environment

To install VI20Studio, it is necessary to provide the installation environment, including hardware installation environment and software installation environment.

2.1.2.1 Hardware Installation Environment

To ensure that VI20Studio runs smoothly, it is recommended that the PC on which VI20Studio is installed meets the following minimum hardware configuration requirements.

Hardware	Minimum Requirement
CPU	Dual core, clock speed 2.4GHz
Memory	8GB
Installation Disk	50GB
Network Interface	One gigabit Ethernet interface
USB Interface	One USB interface

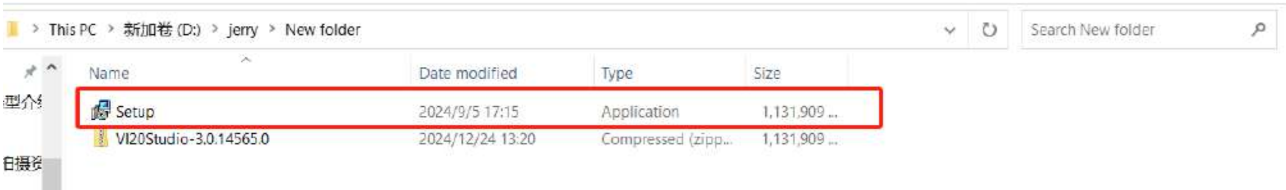
2.1.2.3 Software Installation Environment

It is necessary to ensure that the operating system of the PC on which VI20Studio will be installed is one of the following:

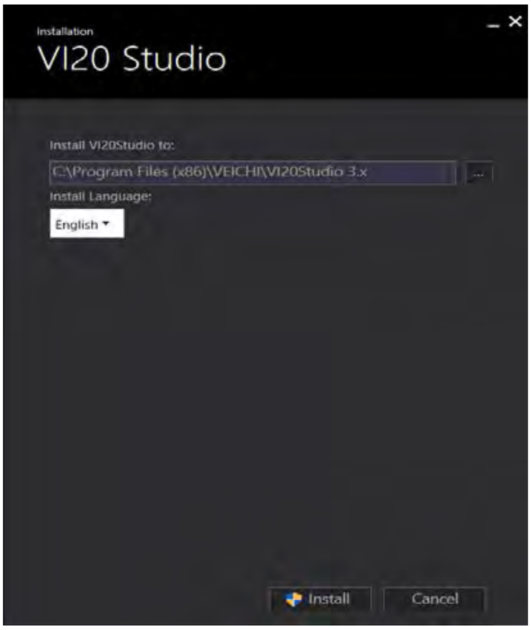
- Windows XP
- Windows 7
- Windows 8
- Windows 10
- Windows 11

2.2 Installation Steps

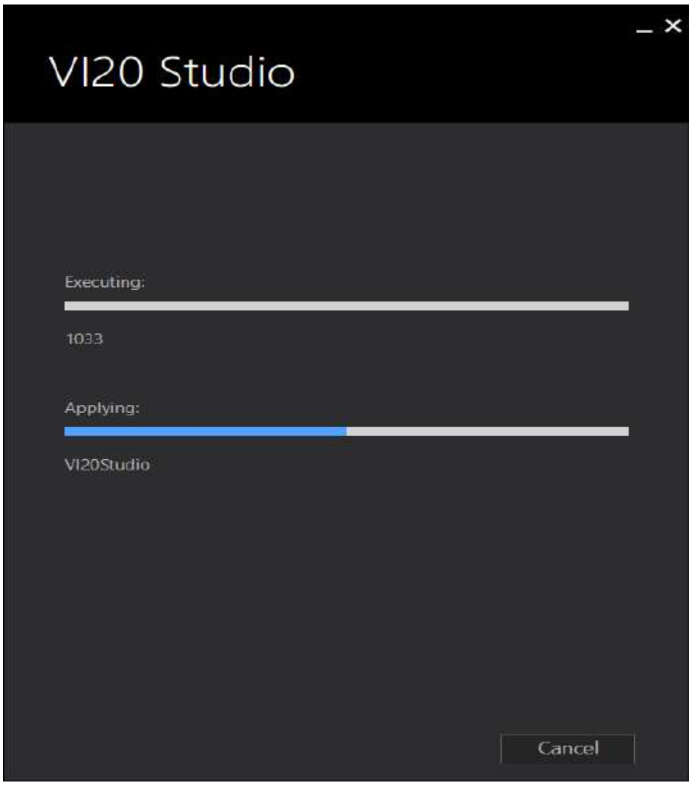
Step 1. Double-click the installation file Setup.exe.



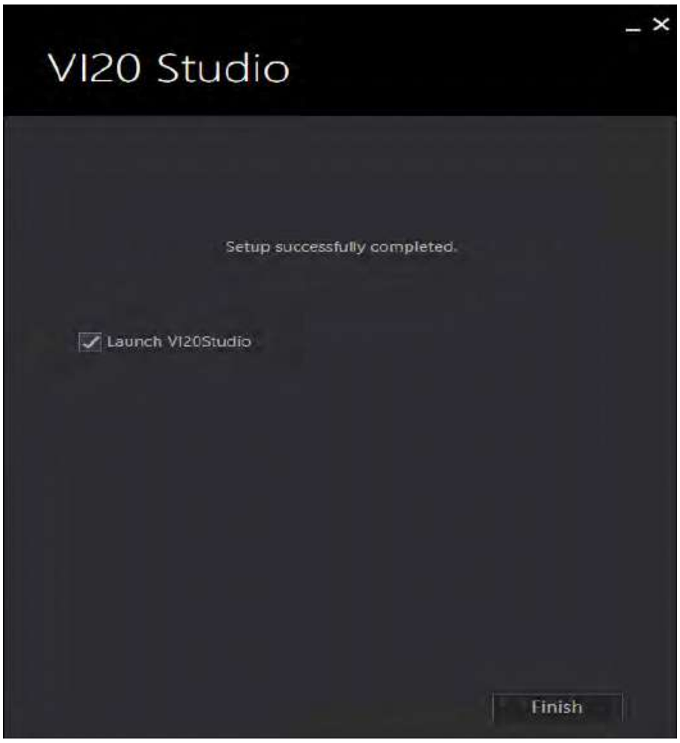
Step 2. Click the icon, set the installation path (the default path is C:\ProgramFiles(x86)\Veichi\VI20Studio3.x), select language, and click **Install**.



Step 3. The system will automatically execute the installation program. If the the components such as Wincap are not installed on the operating system, the installation program will prompt you to install the relevant components. Please follow the installation wizard to install the relevant components.

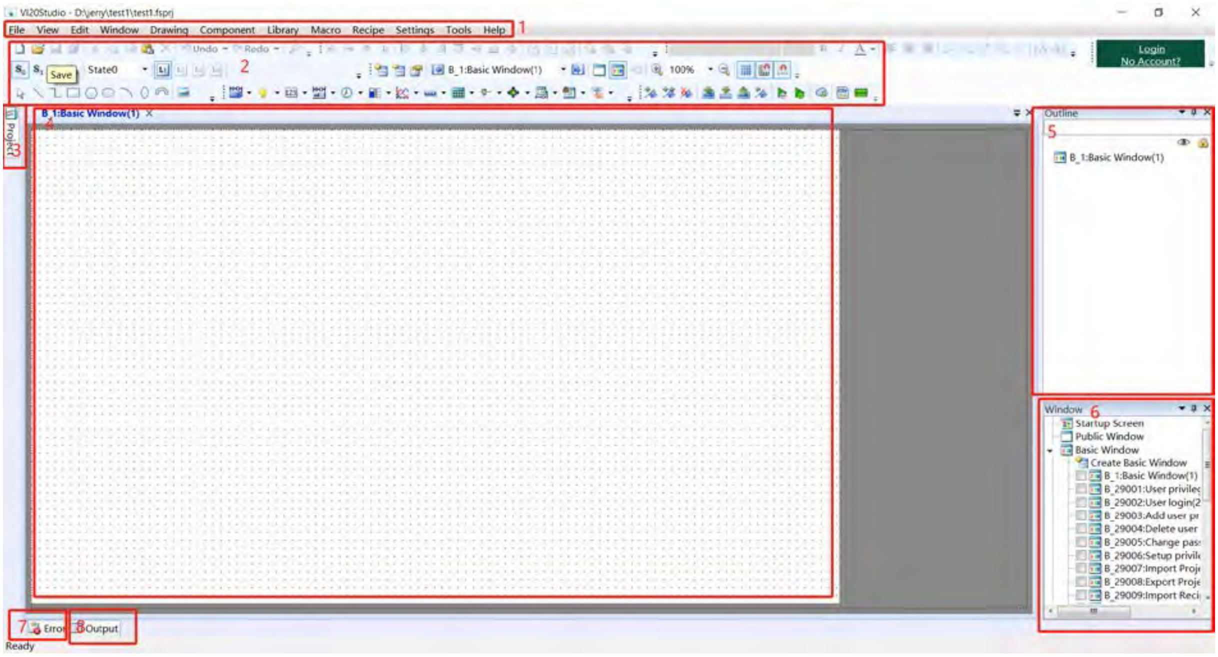


Step 4. Wait for the program to finish installing, and click **Finish**.



3 Introduction to the Configuration Interface

VI20Studio provides a convenient configuration interface, as shown in the following figure (using the default view as an example).



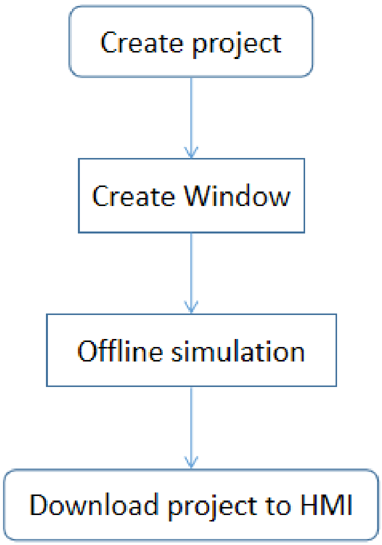
Please refer to the following table for detailed description of each area.

SN	Area	Description
1	Menu bar	Provides configuration entry for each feature, making it convenient for users to switch according to their actual needs.
2	Toolbar	Provides quick configuration entry for commonly used functions, making it convenient for users to operate.
3	Project	Displays the properties of the current project in a tree view, making it convenient for users to set project properties.
4	Window design	Configure the screen window.
5	Outline	Displays all the components of the current window in an outline view.
6	Window	Displays all the windows of the current project, making it convenient for users to modify the windows.
7	Error	Displays the compilation error messages of the current project.
8	Output	Displays the compilation output messages of the current project.

4 Quick Start

4.1 Main Operating Procedures

The main operating procedures of VI20Studio are shown in the following figure.



Step 1.Create Project

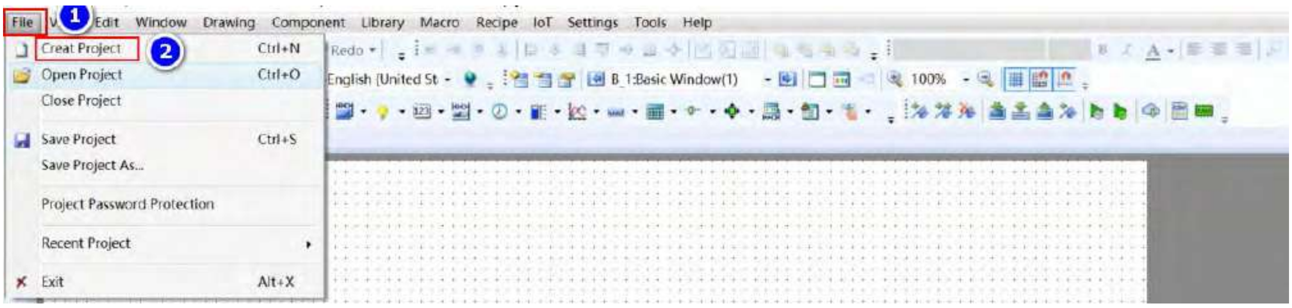
Step 2.Create Window

Step 3. Offline simulation

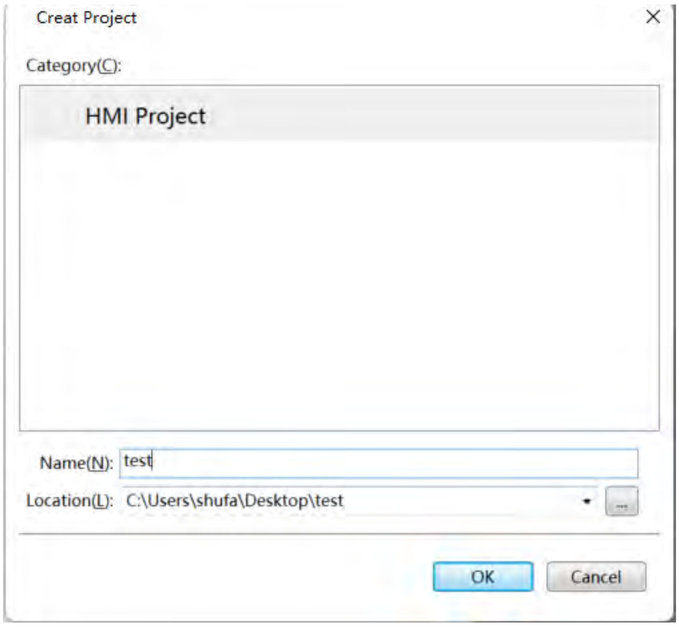
Step 4. Download project to HMI

4.1.1 Create Project

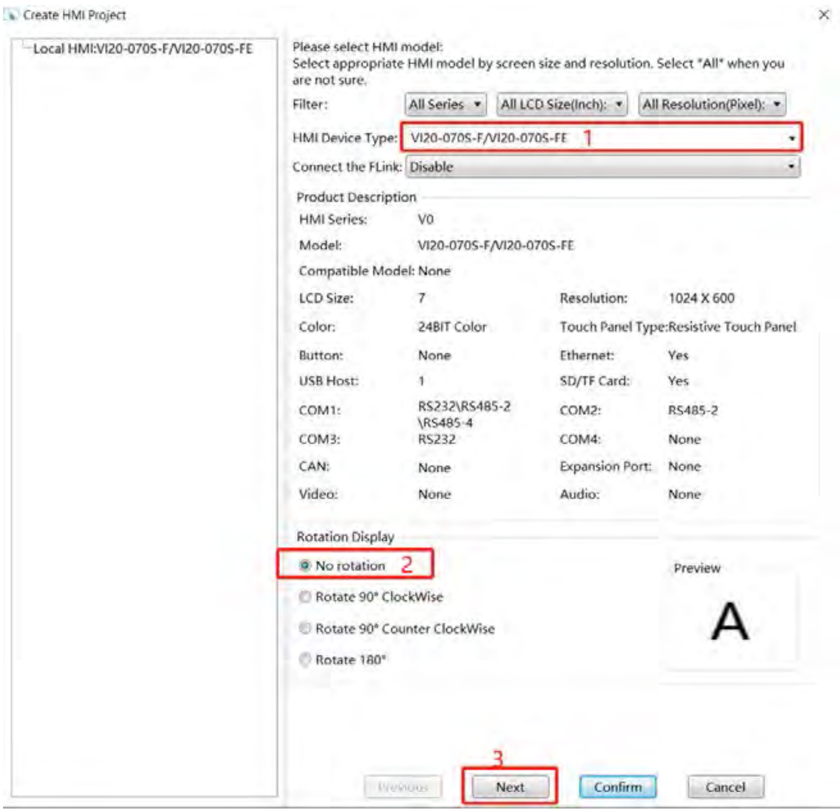
Step 1. Select **File/Create Project** from the menu bar.



Step 2. Set the name and location in the pop-up window, click **OK**.

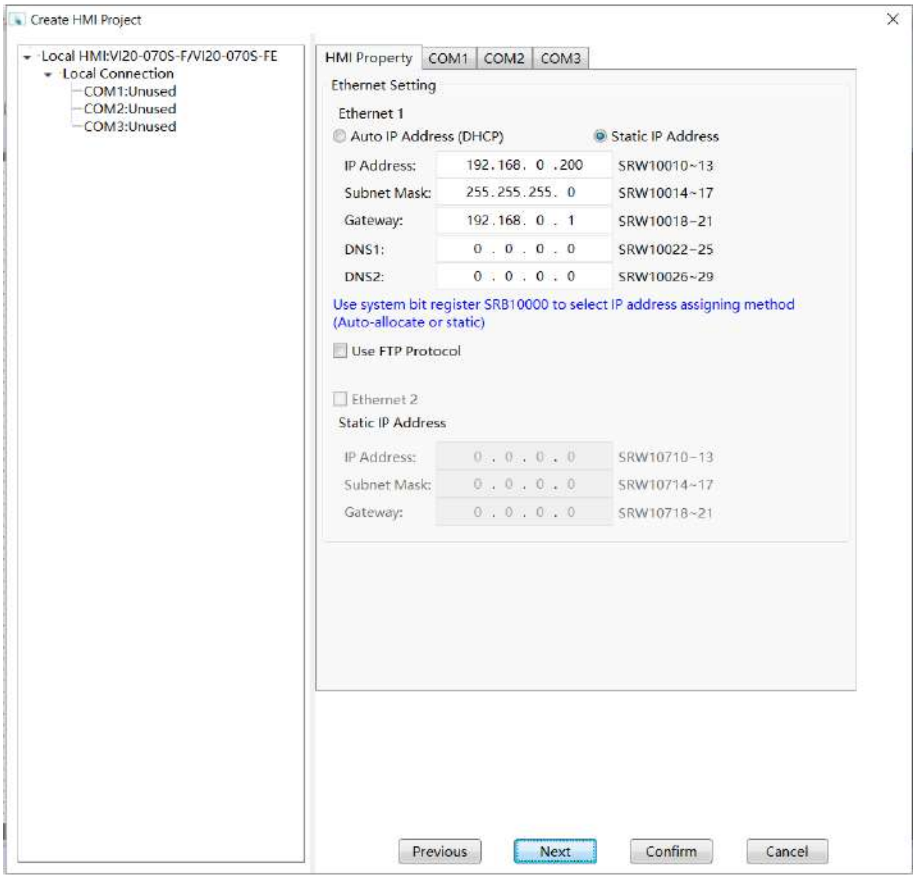


Step 3. Select HMI Device Type, set Rotation Display, and click **Next**.



Step 4. Set HMI Property.

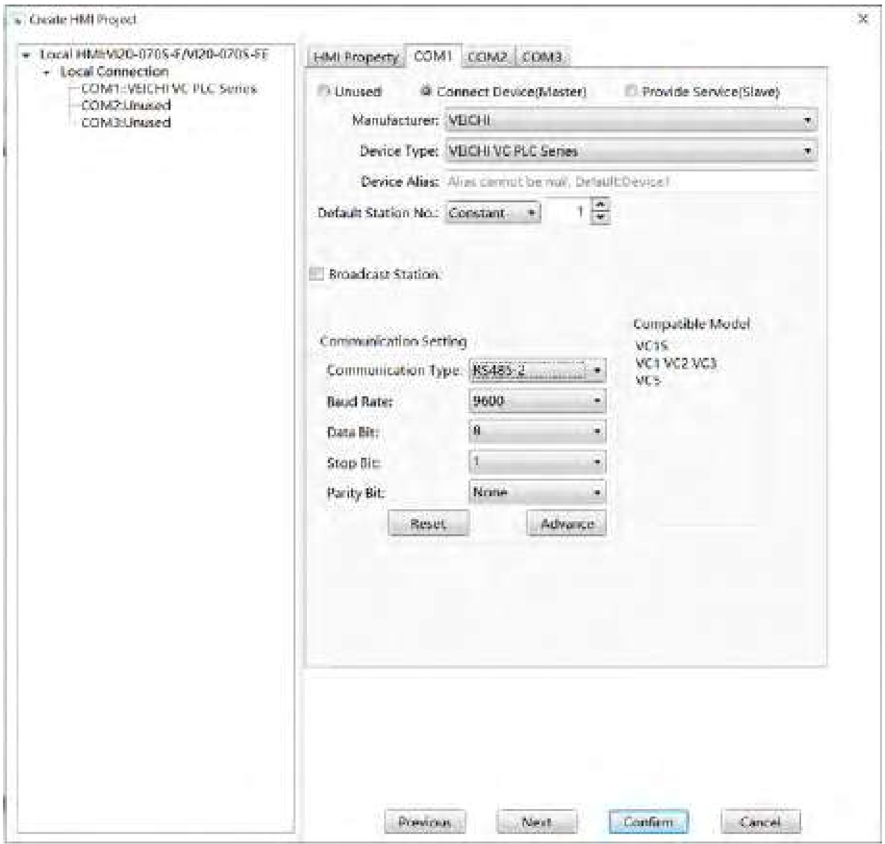
Set the IP address of the HMI device according to the actual situation, and select whether to Use FTP Protocol.



Please refer to the following table for the configuration method of some parameters.

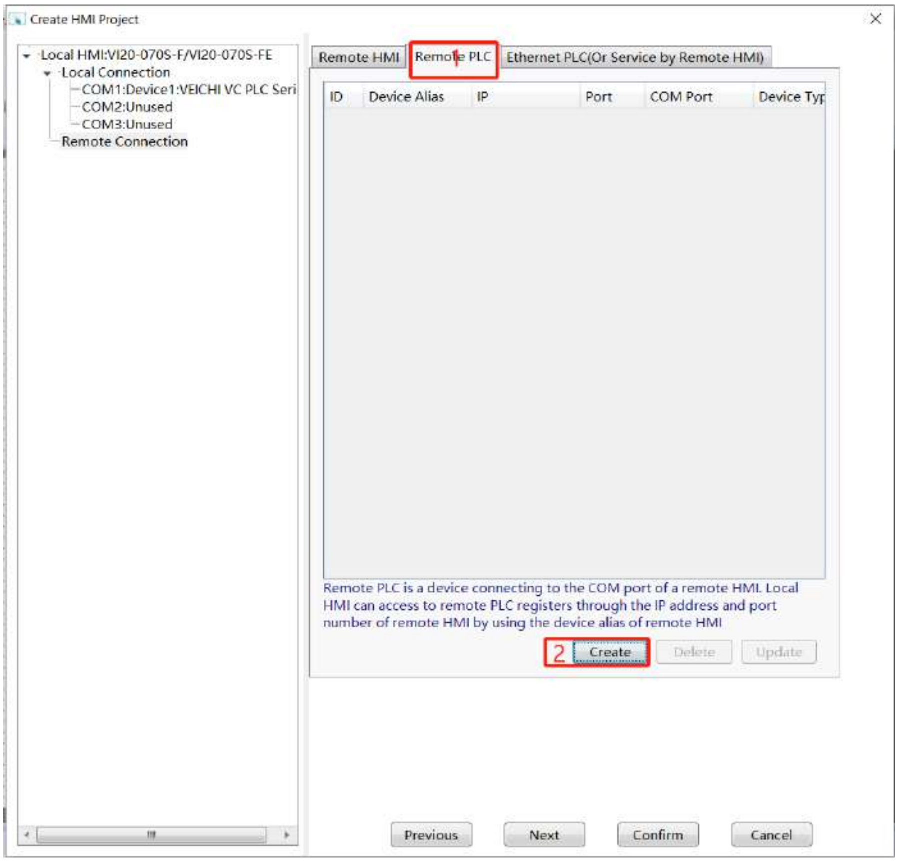
Parameter	Description
Ethernet Setting	◆ Auto IP Address (DHCP): Automatically obtain an IP address from a DHCP server. Please ensure that the HMI and DHCP server are accessible to network. ◆ Static IP Address: Manually set the IP address for the HMI.
Use FTP Protocol	After enabling the FTP function, you can access the internal data storage area of the HMI (where historical data and alarm event data are saved) or the data on an external USB drive/SD card using the FTP protocol on a PC. A password is required to be set for the HMI's FTP service.

Step 5. Set up the local connection (HMI COM port connected to PLC; for configuration methods, refer to Appendix A -Communicaiton Between HMI and PLC). Click **Next**.

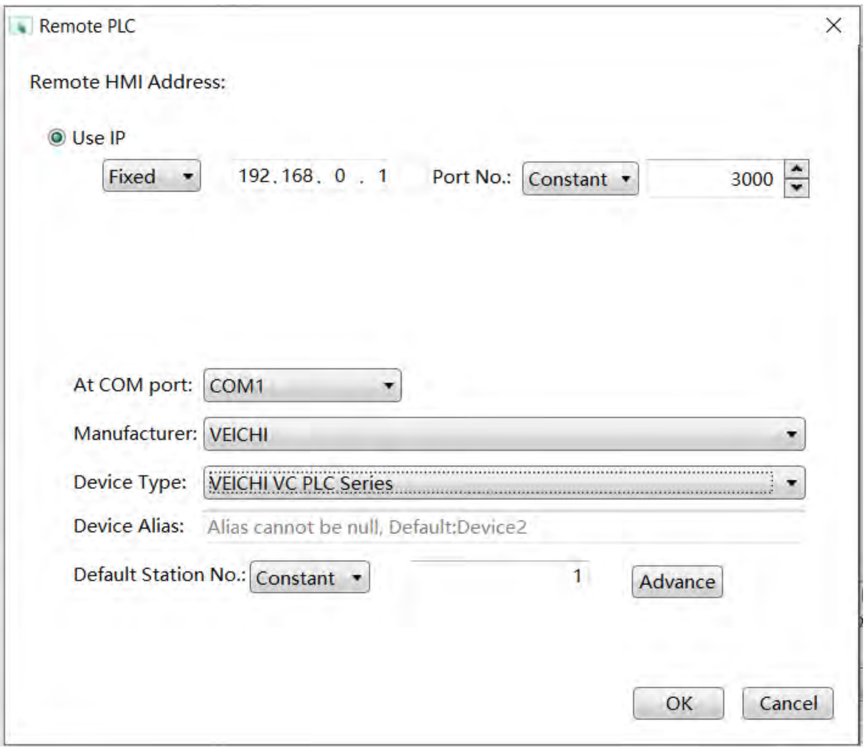


Step 6. Set up remote connection (connect to HMI or PLC through remote access).

1) Select the type of remote device to connect to (such as remote PLC), and click **Add**.



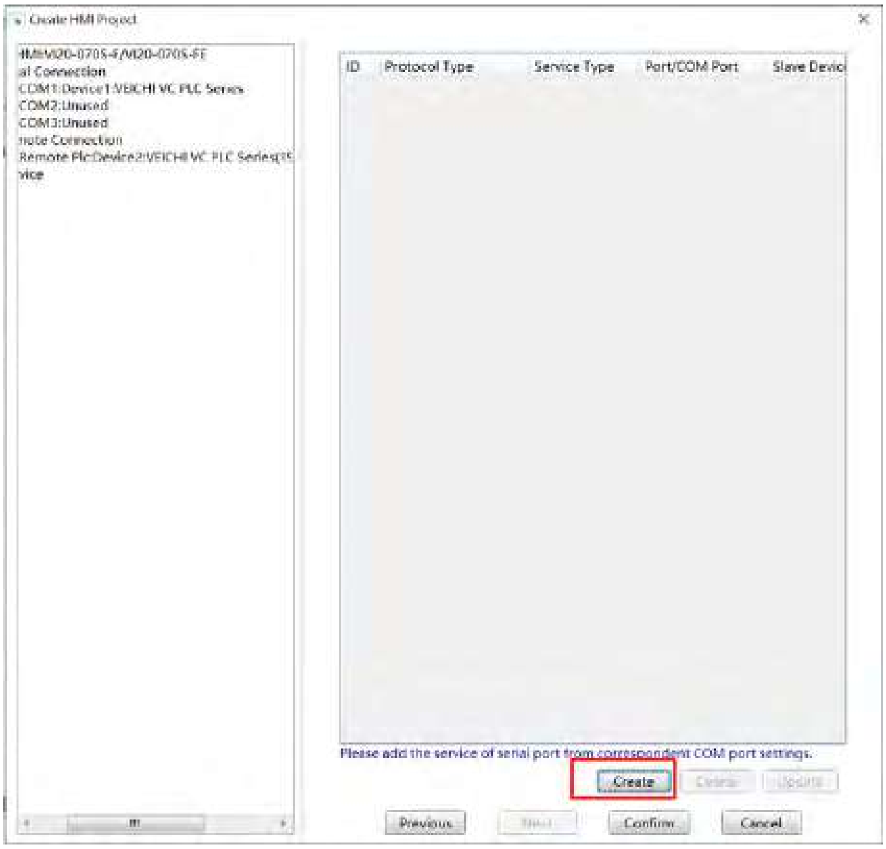
2) Set the relevant parameters in the pop-up window, and click **OK**.



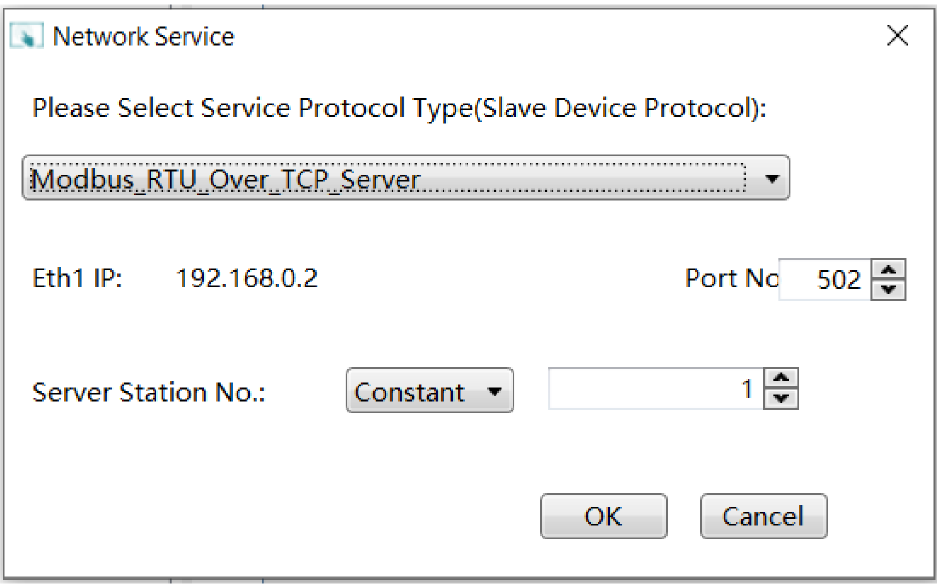
3) Click **Next**.

Step 7. Add network service

1) Click **Add**.

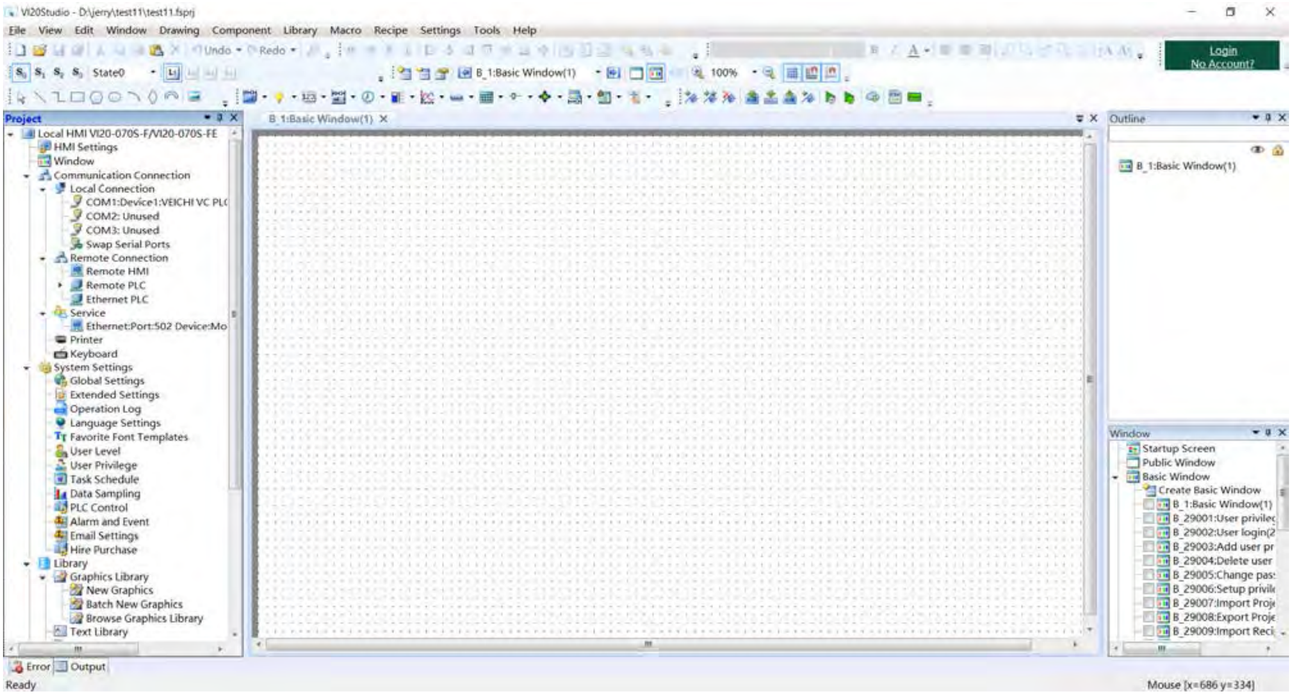


2) Configure relevant parameters in the pop-up window, click **OK**.

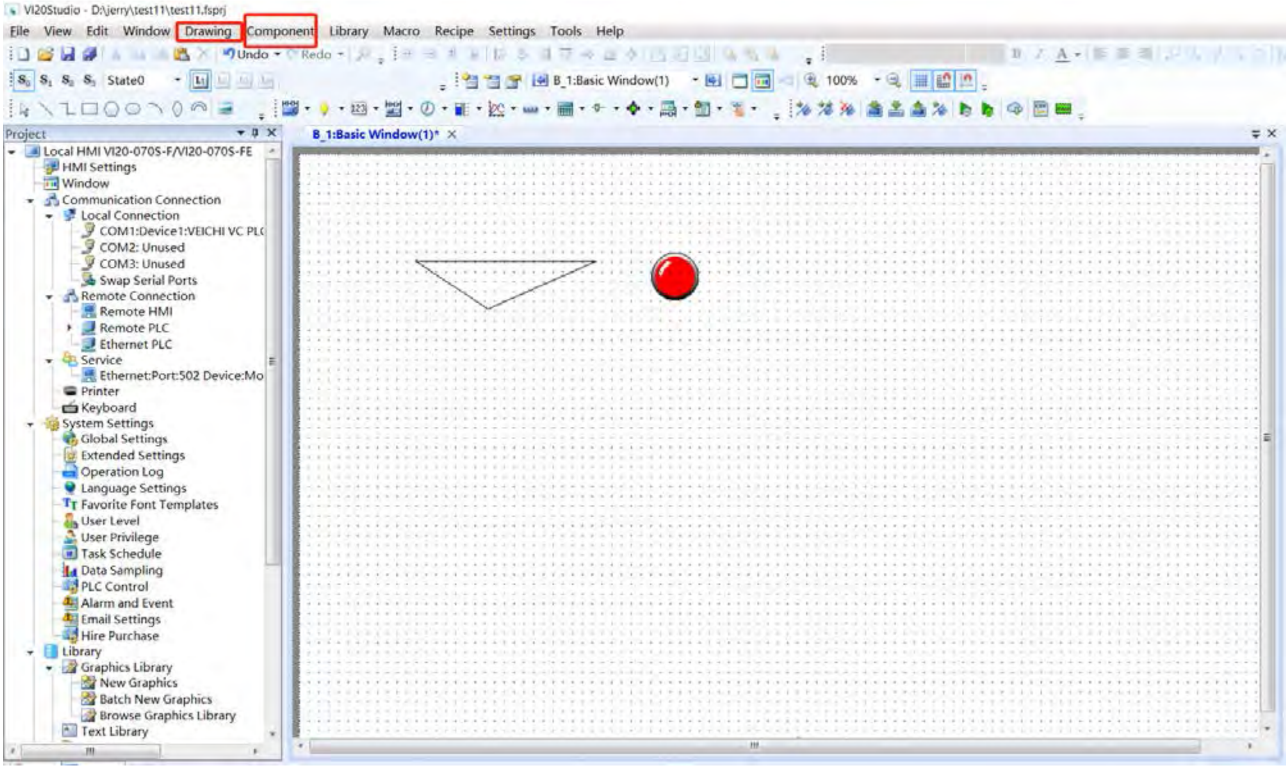


Step 8. Click **Confirm**.

Step 9. The result of creating a new project is as follows.



Step 10. After creating a new project, the system will automatically generate a series of default windows (such as user privilege windows, change password windows, etc.) and enter the basic window page. You can insert corresponding components, graphics, macro instructions, etc.

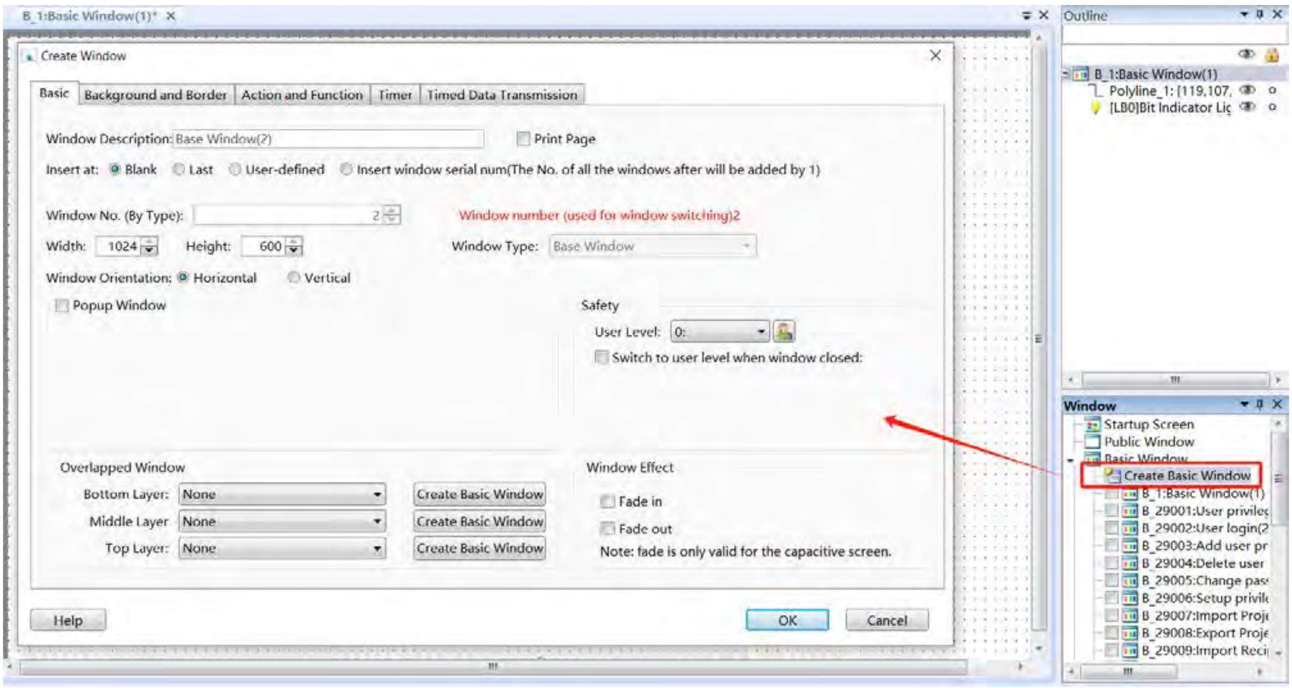


4.1.2 Create Window

The steps to create a new window are as follows:

Step 1. Select **Window/Create Window** from the menu bar (or double-click **Create Basic Window** in the **Window** control on the right-hand side of the interface.)

Step 2. Set the basic properties of the window in the pop-up window and click **OK**.



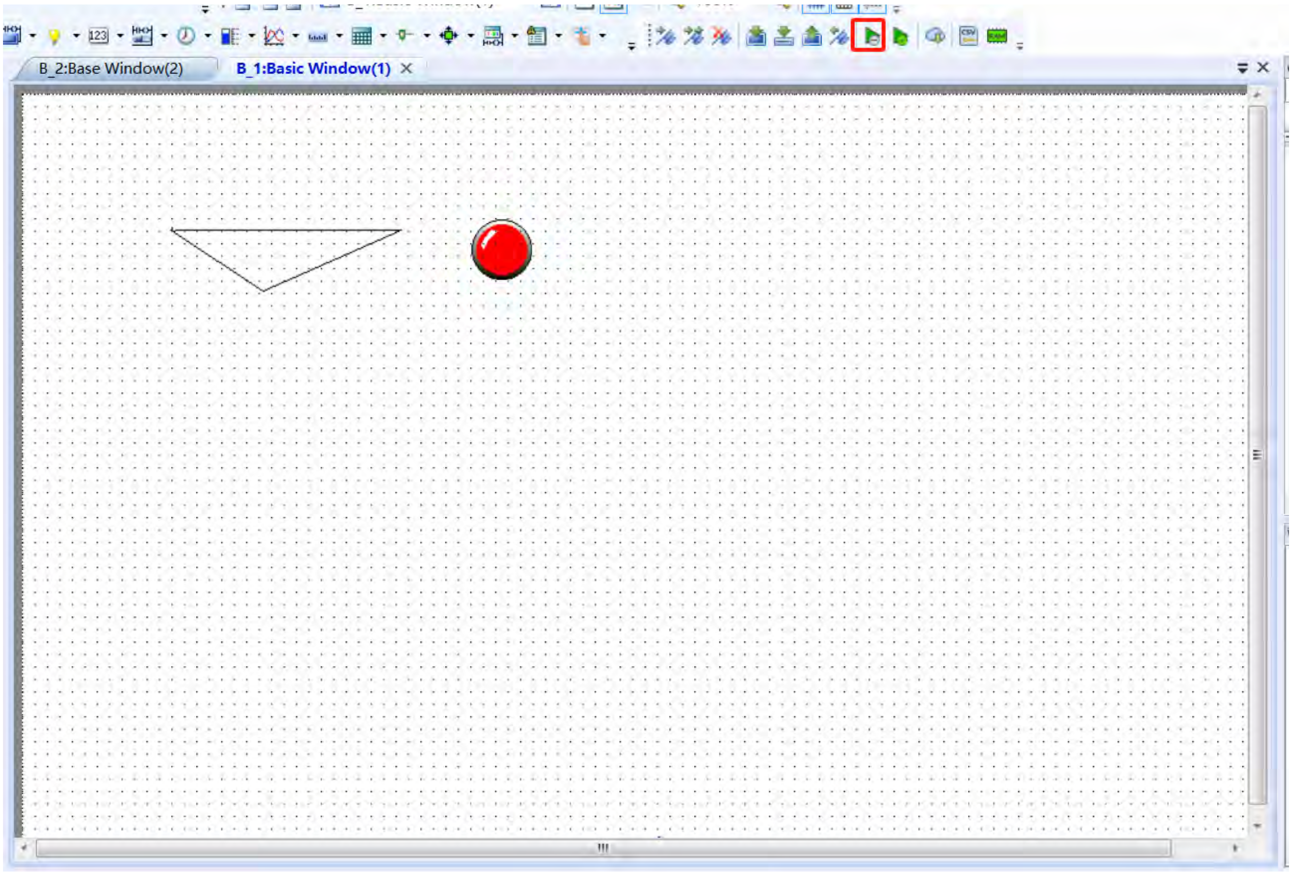
If you need to modify window properties later, you can refer to the Modify Window Properties section.

Step 3. Add relevant elements (such as Drawing and Component) to the window. For detailed configuration methods, please refer to the Drawing and Component sections.

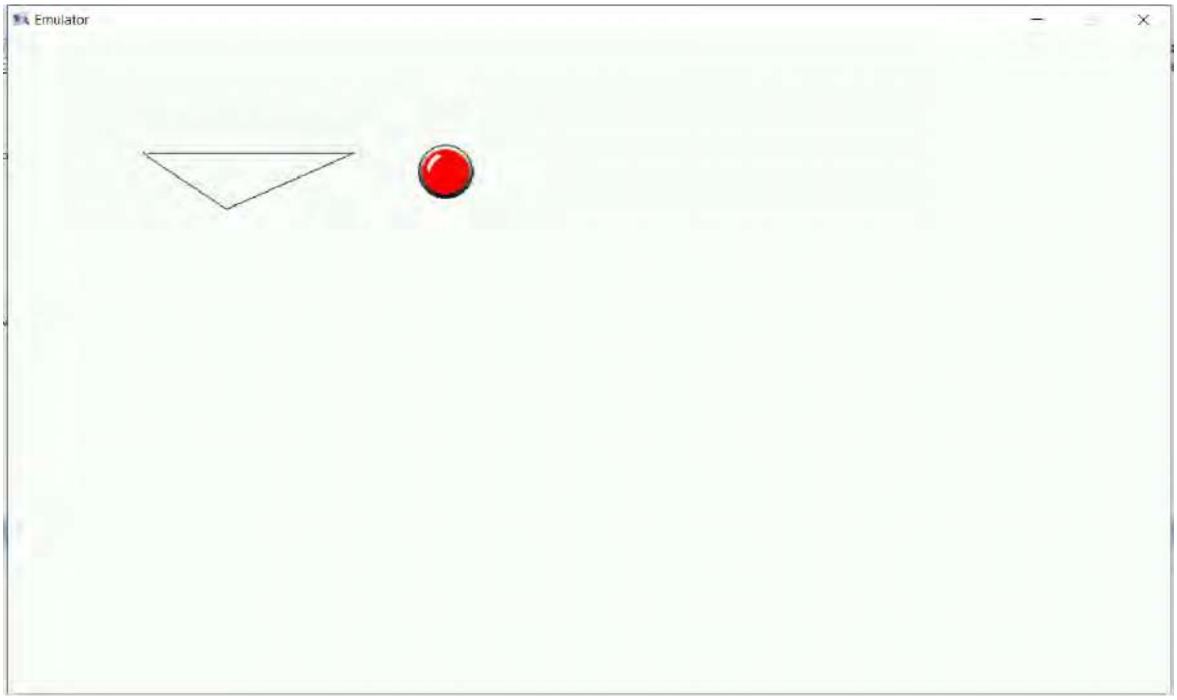
4.1.3 Offline Simulation

VI20Studio provides an offline simulation tool that enables offline simulation (without connecting the HMI to external devices). The steps to use this tool are as follows:

Step 1. Click the icon in the toolbar, click **OK** in the pop-up window, and wait for the program to compile.



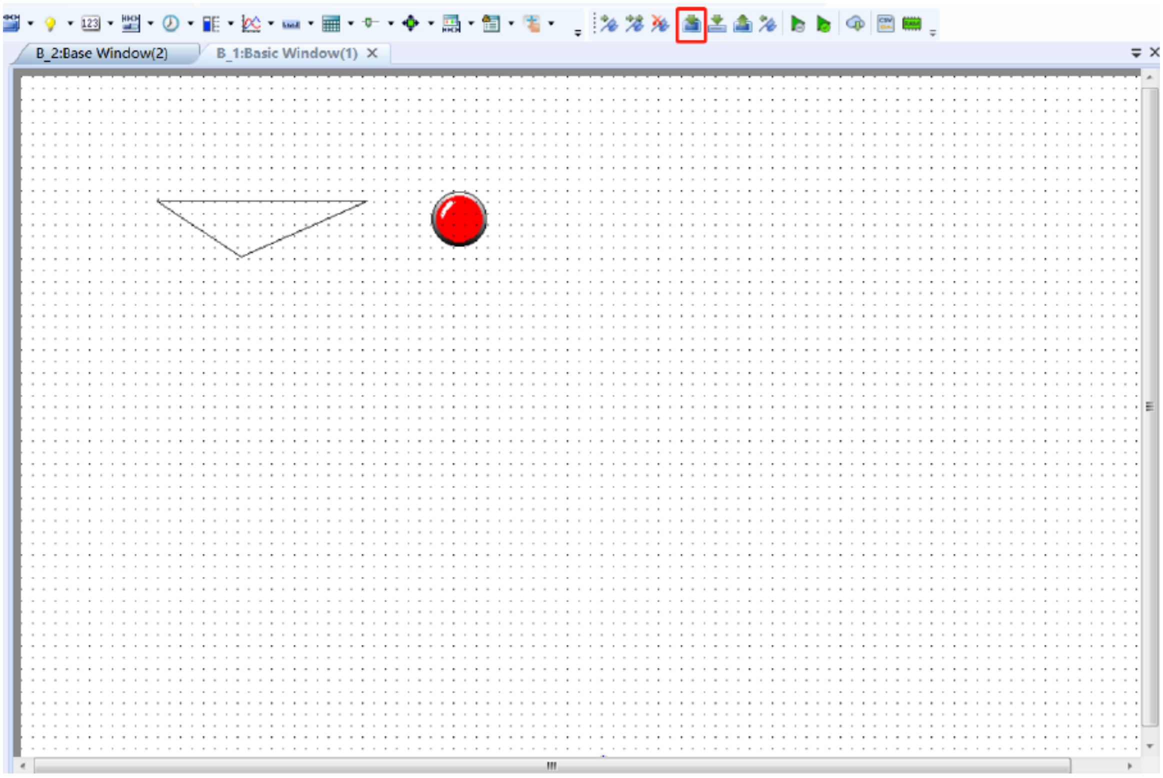
Step 2. If the compilation is successful, you will enter the **Emulator** interface, where you can verify the configuration results.



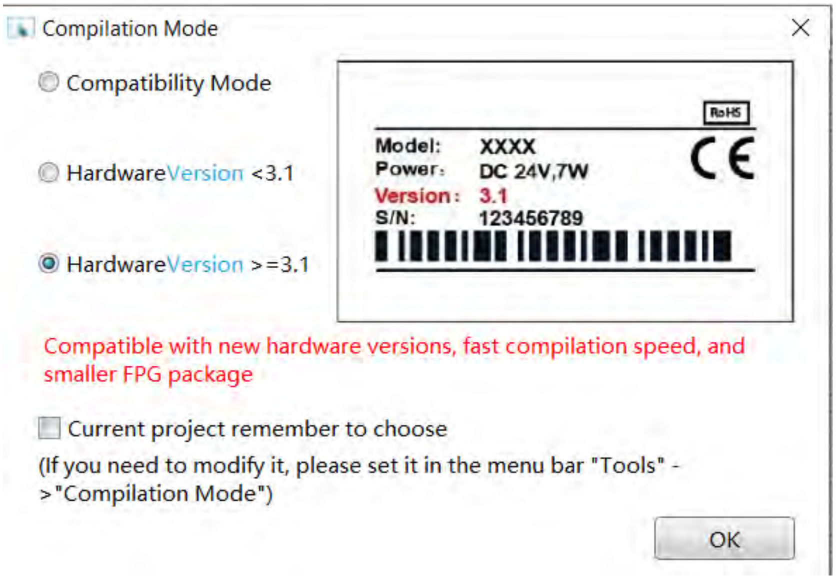
4.1.4 Download Project to HMI

Step 1. Connect HMI and PC using network cable or USB cable. Power on and start HMI.

Step 2. Click the  icon in the toolbar, wait for the program to finish compilation.

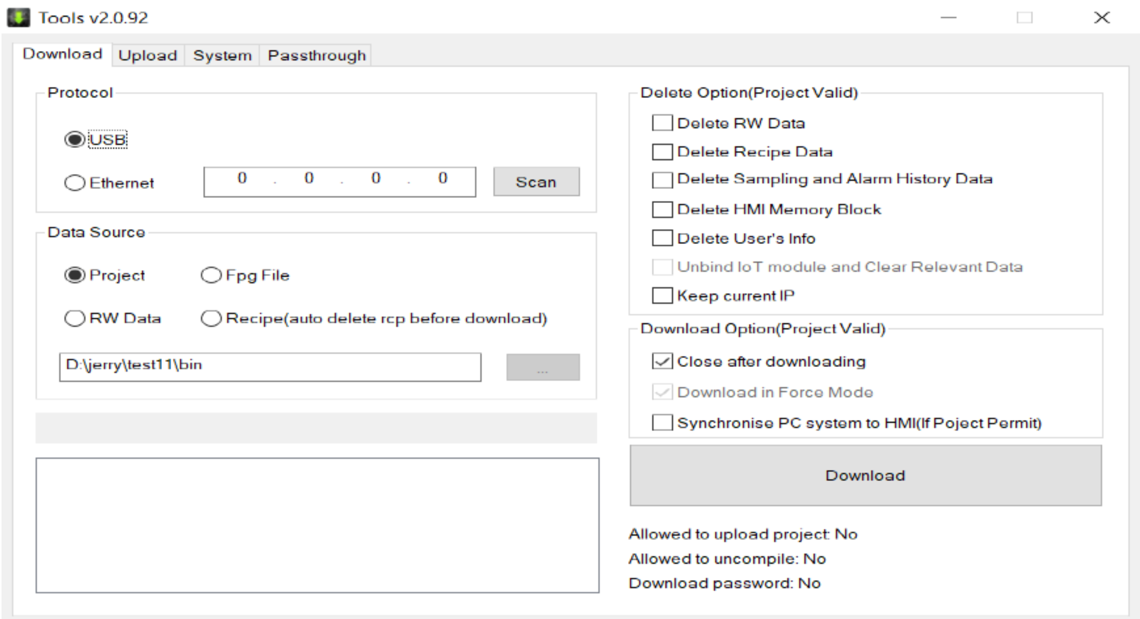


Step3. Selcte compilation mode (keep consistent with the actual hardware version of HMI or selct **Compatibility Mode**),click **OK** in the pop-up **Compilation Mode** dialog box, wait for the program to finish compilation.



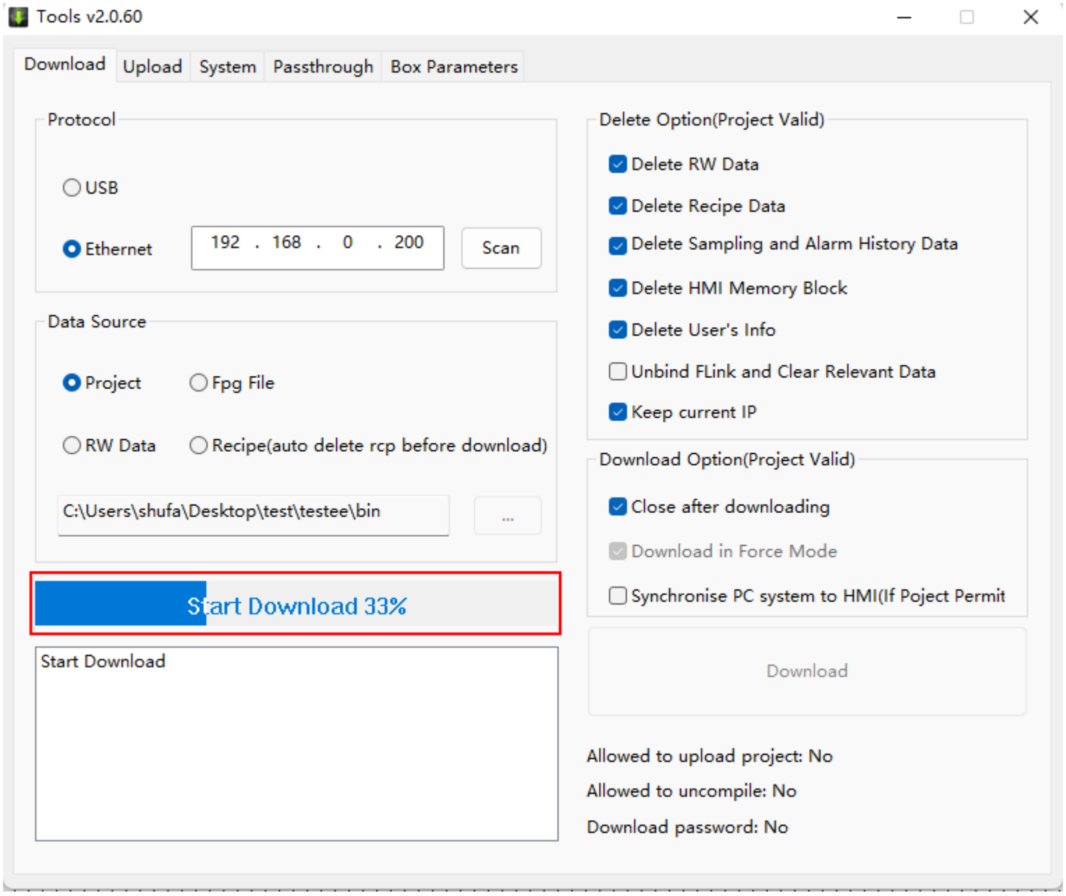
Step 4. Select communication method (USB or Ethernet), click **Download** to download the project file to HMI.

When selecting Ethernet, you need to set the IP address. Click **Scan** to find the IP address of the HMI connected via Ethernet, then select that IP address and click **Download**.

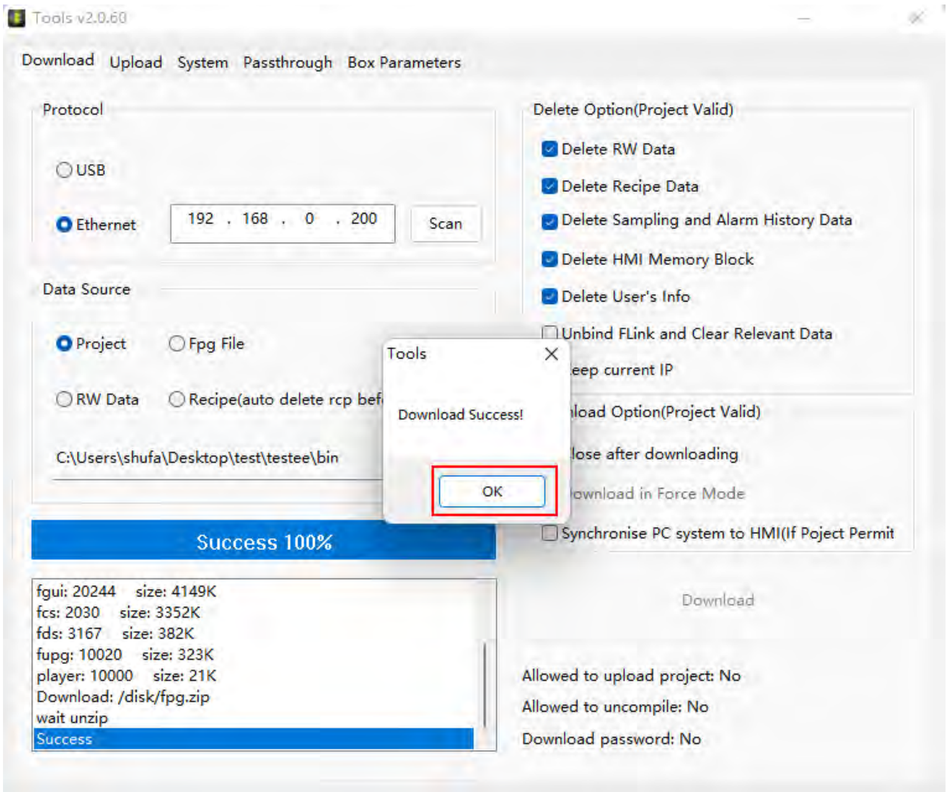


- ◆ If an error message appears saying "Communication Failed", please check if the download cable (USB cable or Ethernet cable) is connected properly.
- ◆ If an error message appears saying "Failed to Start the Slave Computer", please power off the HMI and restart it, then try again.

Step 5. Wait for the download to complete.



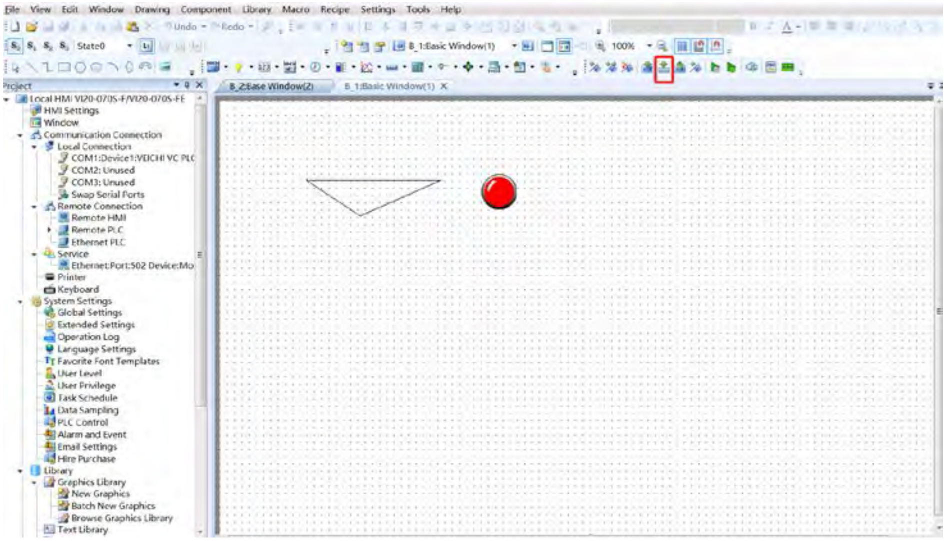
Step 6. Click **OK** after download is completed.



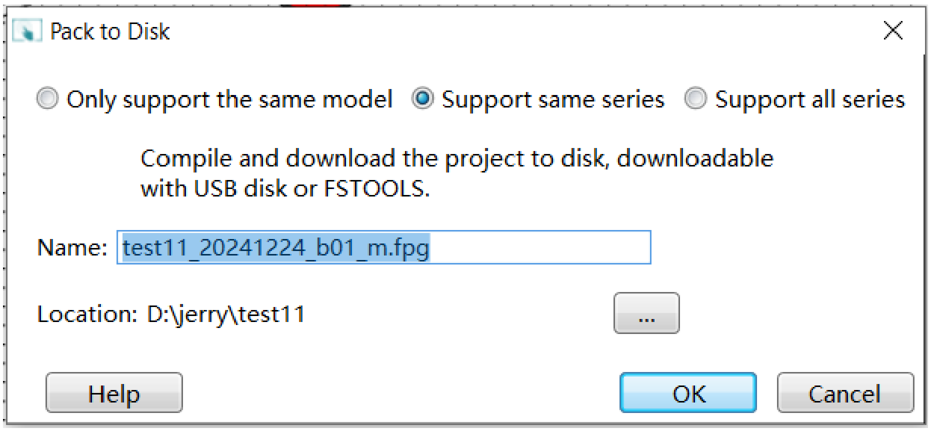
4.2 Common Operations of Project File

4.2.1 Download Project to HMI Using USB Drive

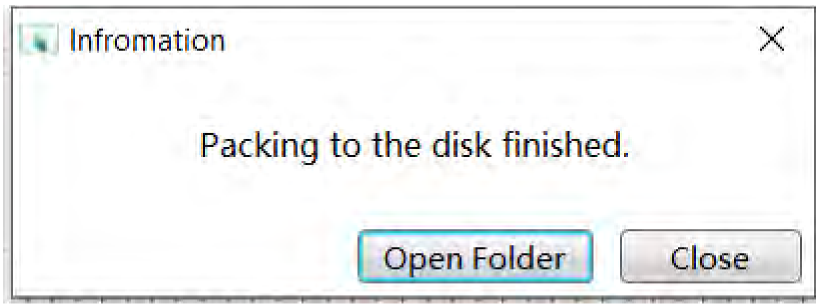
Step 1. Click the  icon in the toolbar.



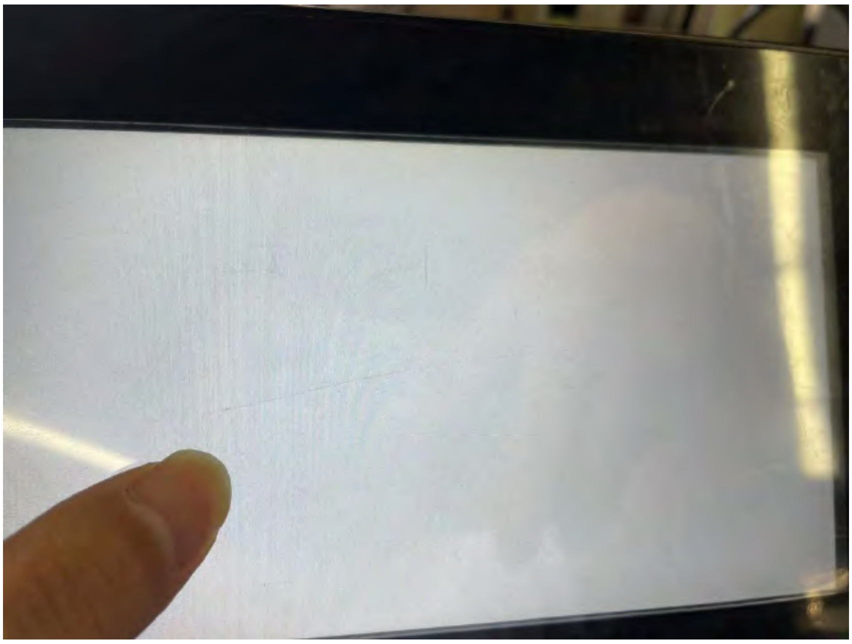
Step 2. Select the supported model in the pop-up window, select the Location, and click **OK**.



Step 3. After packaging is completed, click **Open Folder** to view the downloaded project file, and copy the project file to the USB drive.

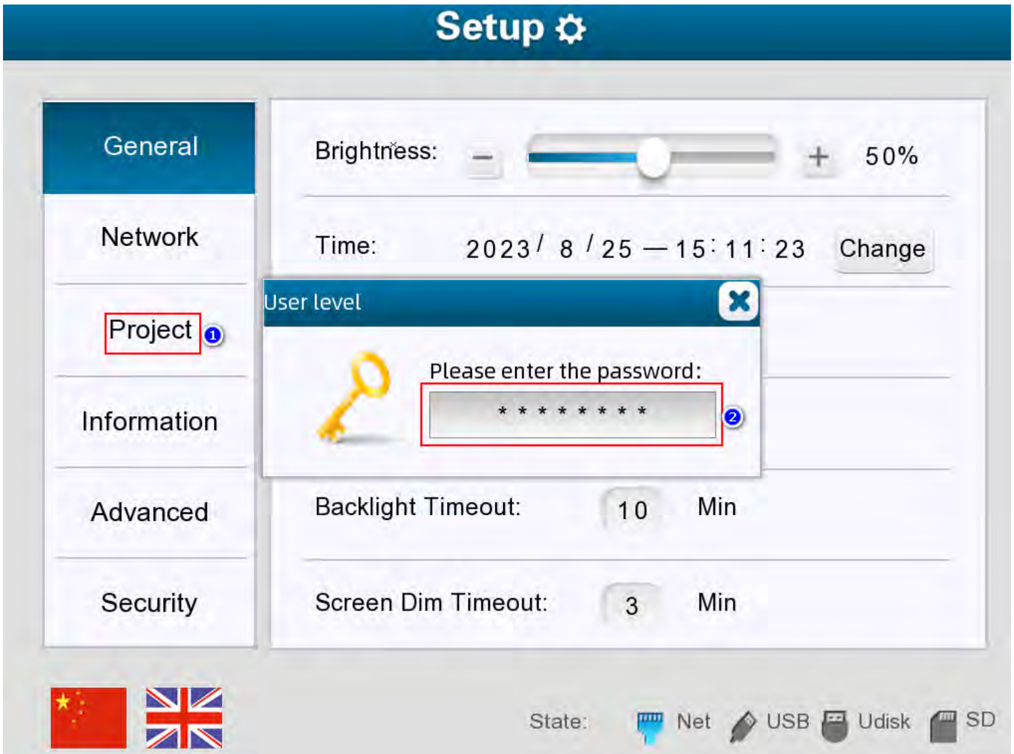


Step 4. Couple the USB drive to the USB interface (Type-A) on the HMI, power on the HMI, meanwhile, press and hold down any point on the screen with your finger.

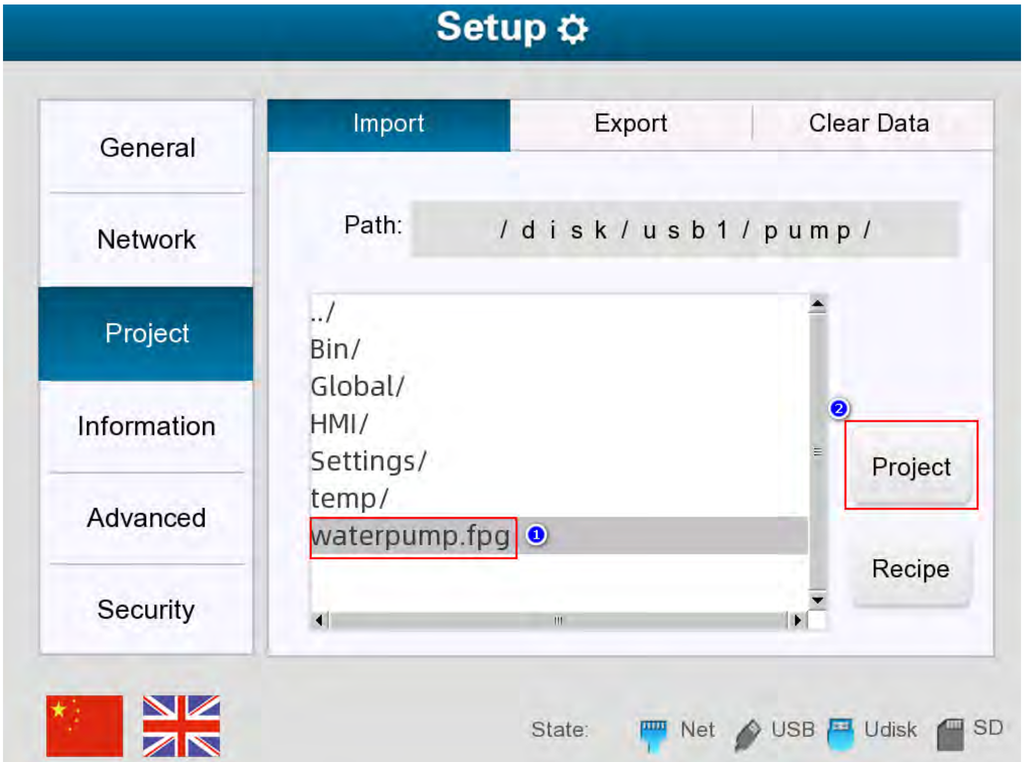


Step 5. Tap on the  icon to enter the setting interface.

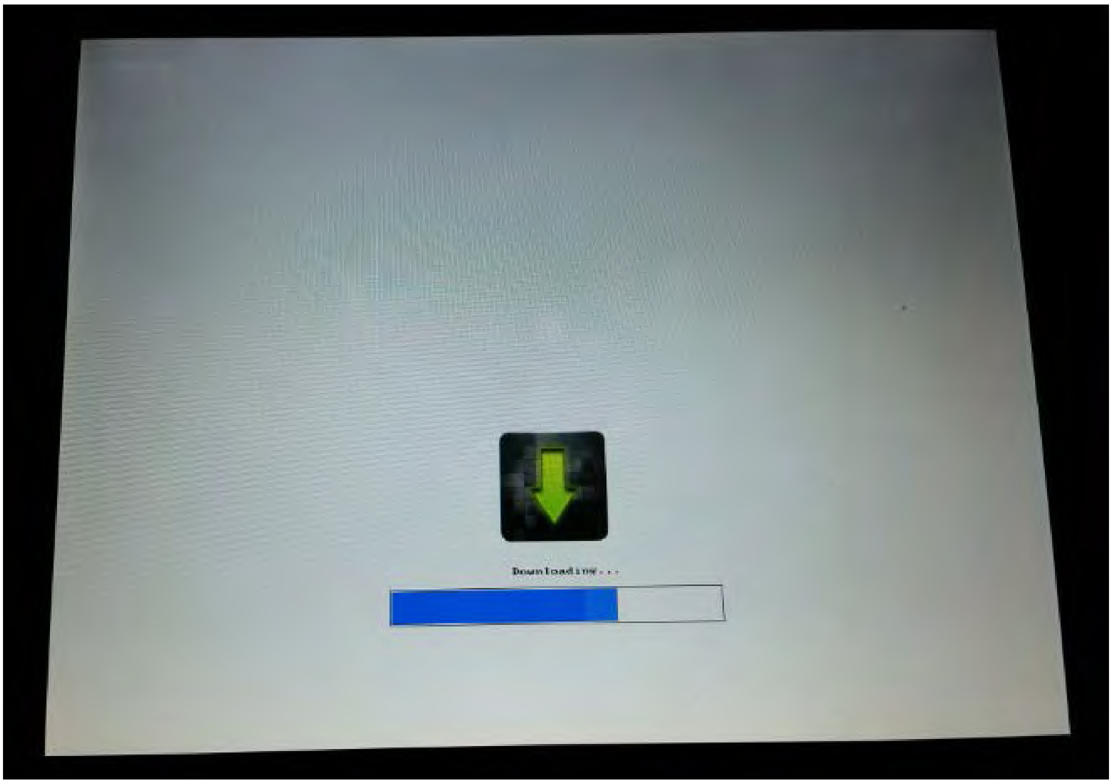
Step 6. Tap on **Project Management** and enter the password (default password of project management is 888888, the password can be changed in VI20Studio through **Settings/System Settings/Global Settings**)



Step 7. Select the path to store the packaged files on the USB drive, and tap on **Project**.

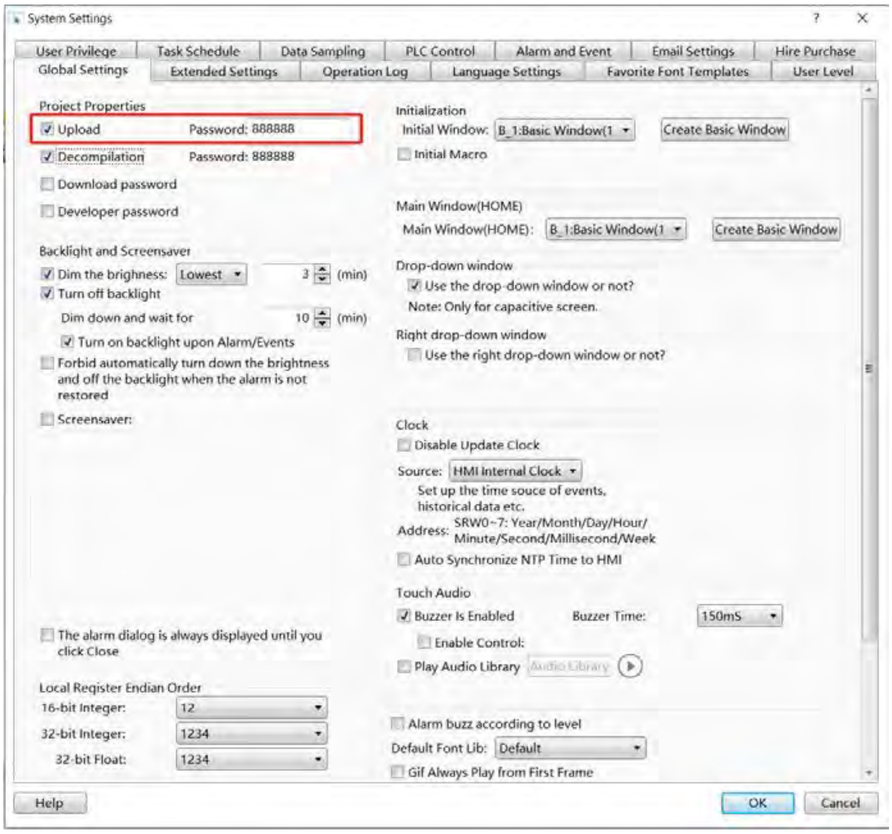


Step 8. Enter the download password and developer password (only if the project has any download password or developer password) in the pop-up window and tap on **OK** to download the project files from the USB drive to the HMI.

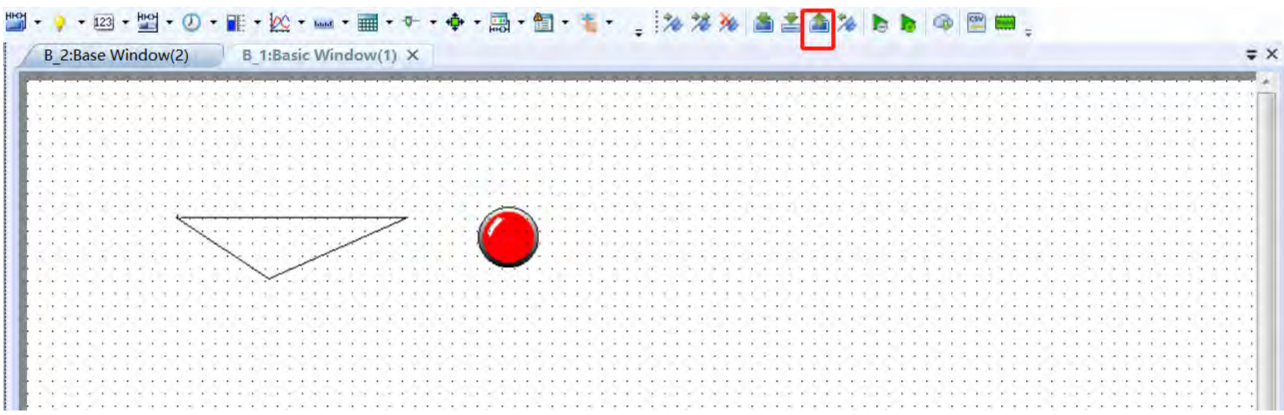


4.2.2 Upload Project to PC

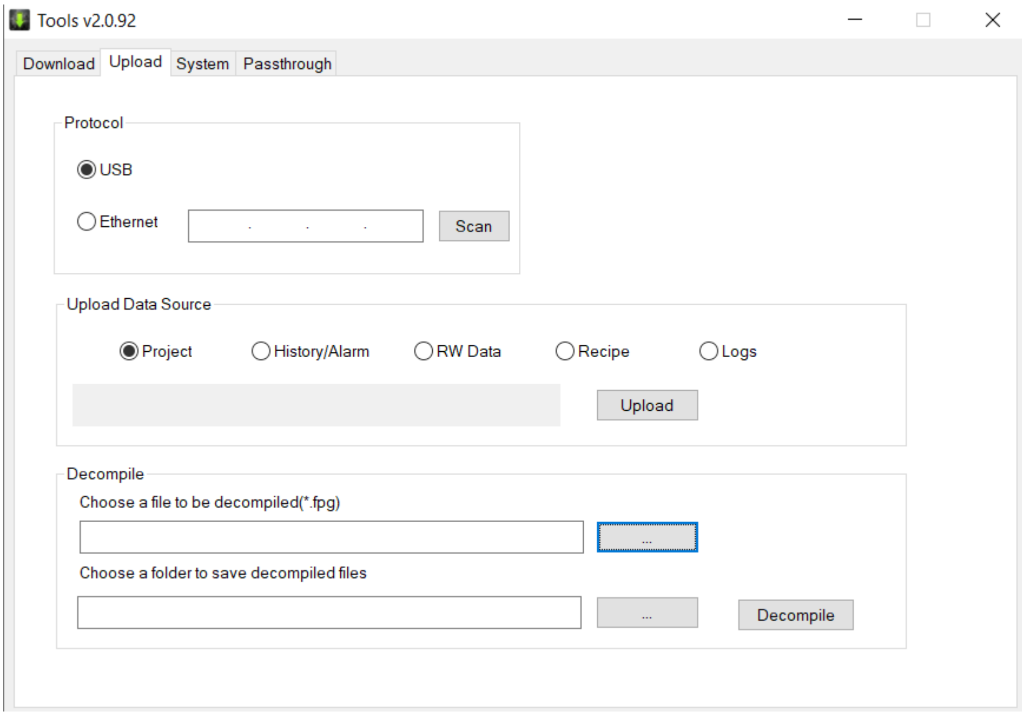
After enabling **Upload** in the **Settings/System Settings/Global Settings** interface and setting the upload password, you can upload project to PC.



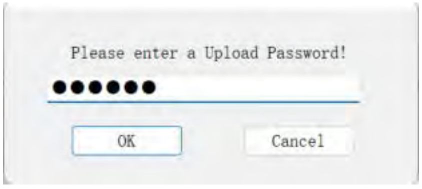
Step 1. Click the  icon in the toolbar.



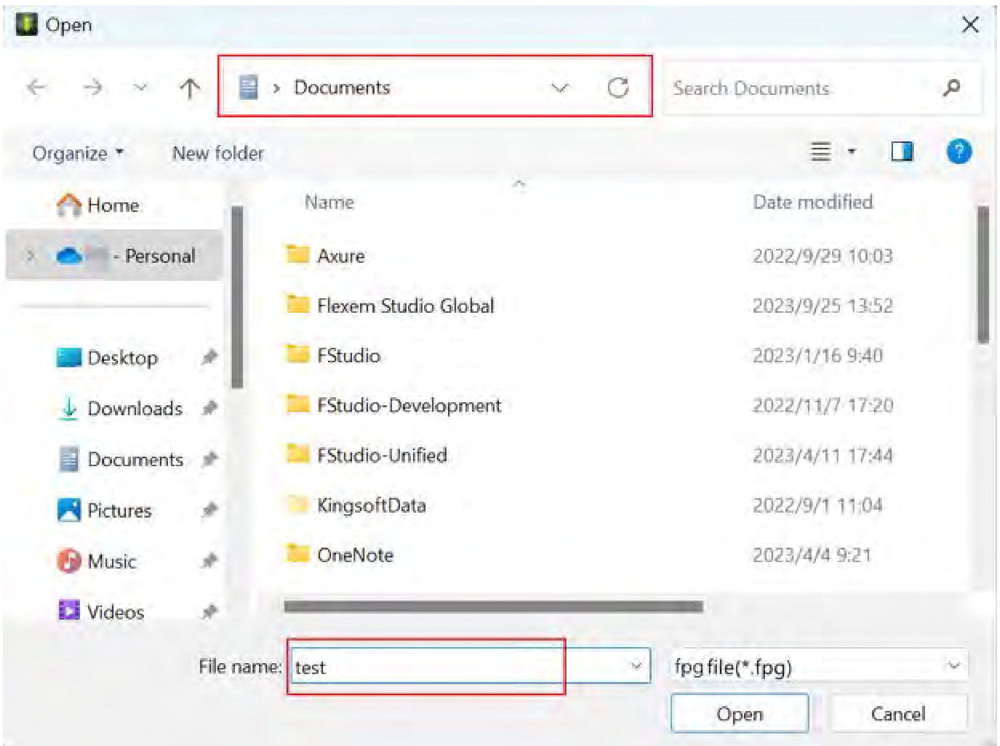
Step 2. Select upload protocol (USB or Ethernet), select **Project**, click **Upload**.



Step 3. Enter upload password (default password is 888888), click **OK**.



Step 4. Set the upload pathway and file name in the pop-up window, click **Open**.

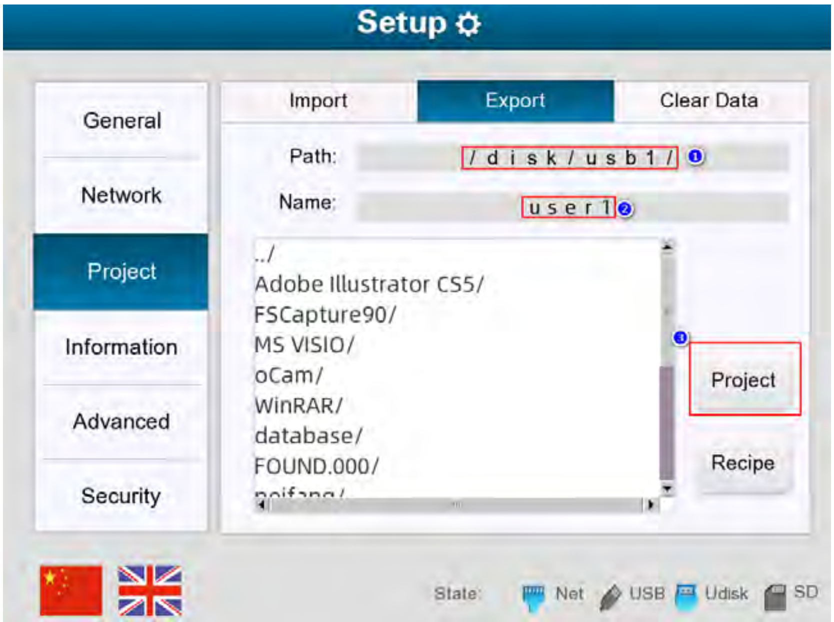


Step 5. When upload completed, upload pathway will be opened automatically.

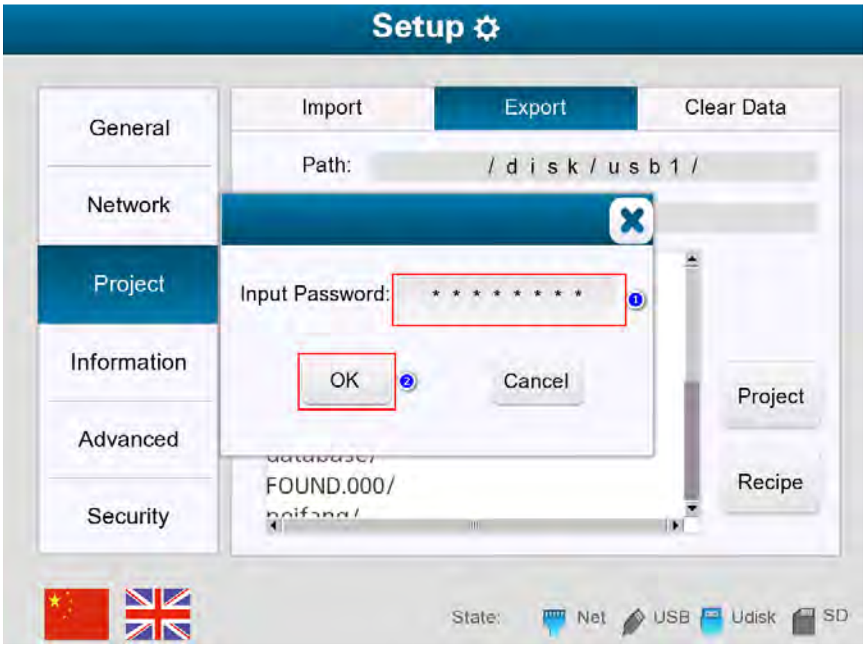
4.2.3 Export HMI Project to USB Drive

Before exporting the project, you need to check the option **Upload** and set an upload password in the **Settings/System Settings/Global Settings** interface.

Step 1. On the **Project** interface, select the **Export** tab, choose the export path, enter name (name of the exported project file), and tap on **Project**.

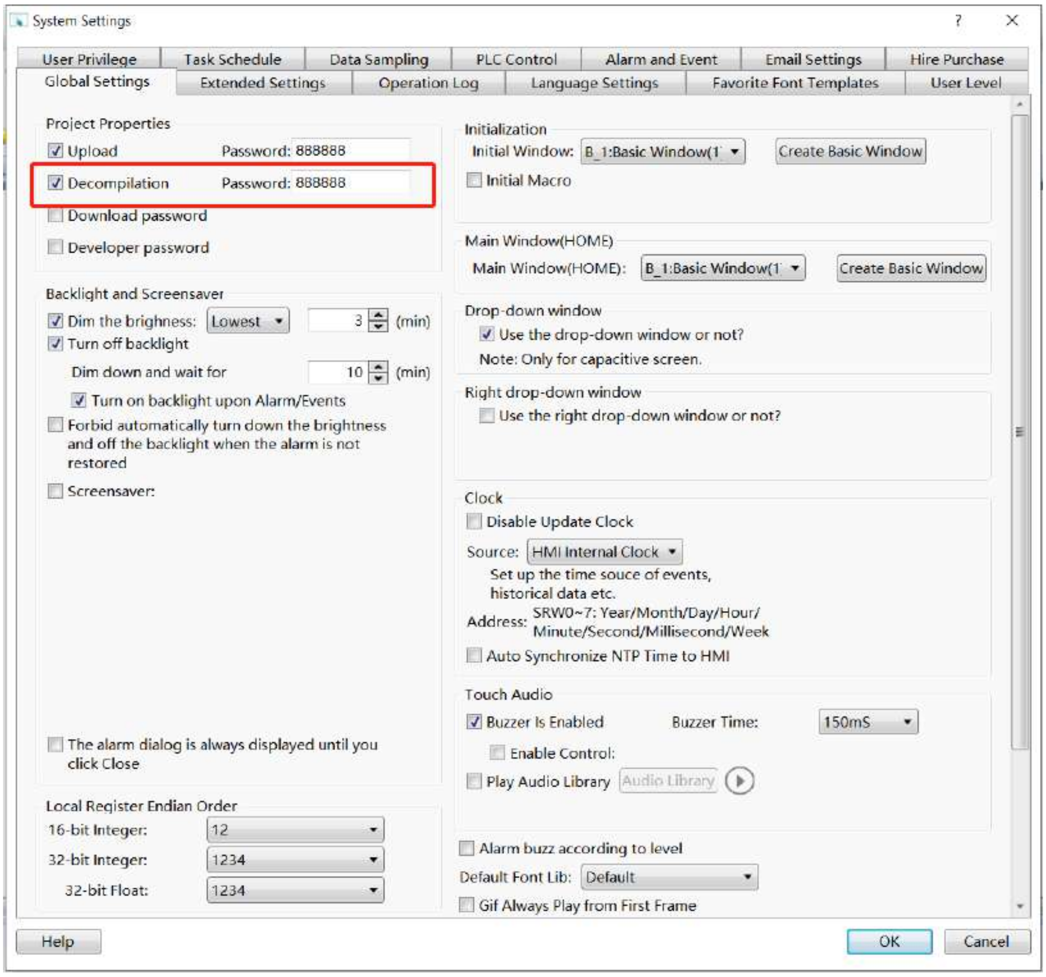


Step 2. In the pop-up dialog box, click the password input field to enter the password (i.e. the upload password set in the **Settings/System Settings/Global Settings** interface), and then tap on **OK**. The project file will then be exported to the specified path.



4.2.4 Decompile Uploaded Project

You need to enable the option **Decompilation** and set a password in the **Settings/System Settings/Global Settings** interface before you can decompile uploaded project files.

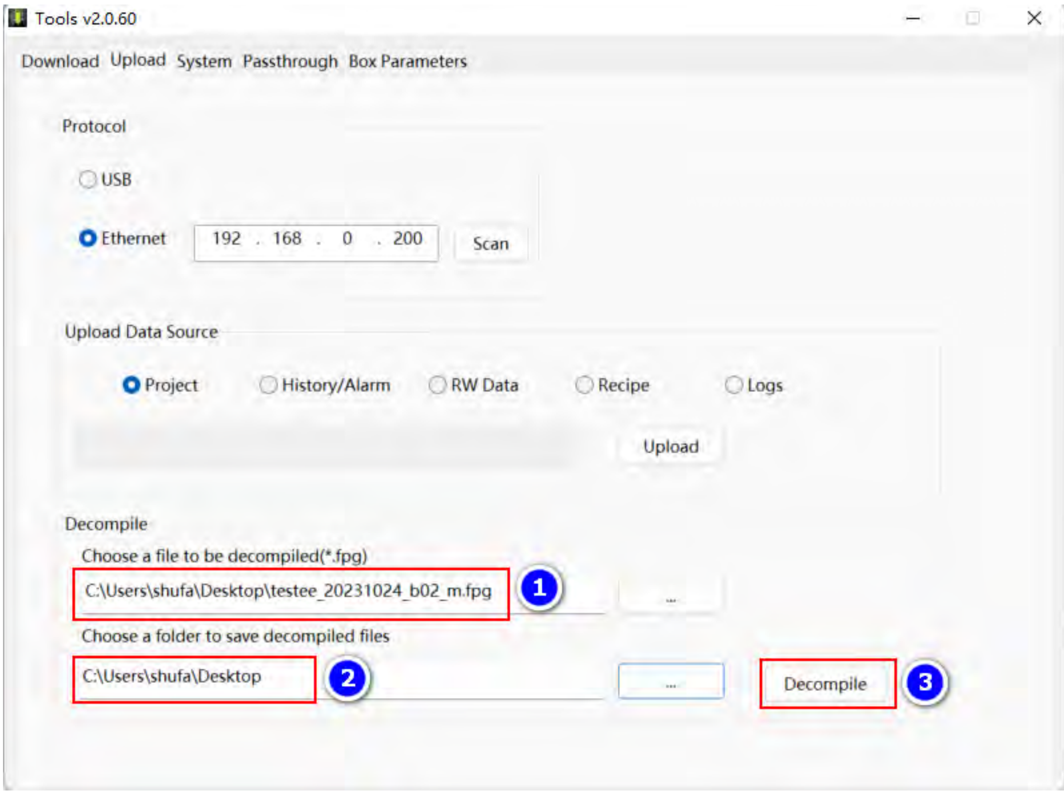


You can decompile uploaded project files (.fpg files). The method for uploading project files can be found in Upload Project File to PC or Export HMI Project File to USB Drive.

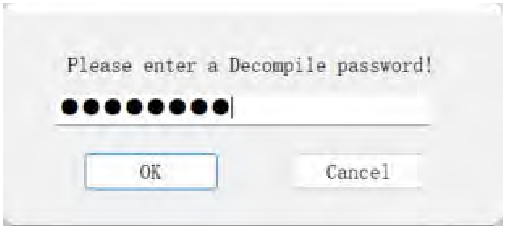
Steps to decompile uploaded project files are as follows:

Step 1. Click the  icon in the toolbar.

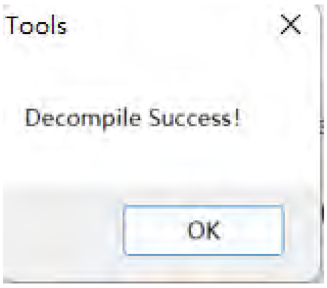
Step 2. Choose a file to be decompiled in the pop-up dialog box and choose the target folder (the path where the decompiled project will be located) , click **Decompile**.



Step 3. Enter the decompilation password (default is 888888) and click **OK**.



Step 4. A message saying “Decompile Success!” appears, click **OK**.



5 File

5.1 Create Project

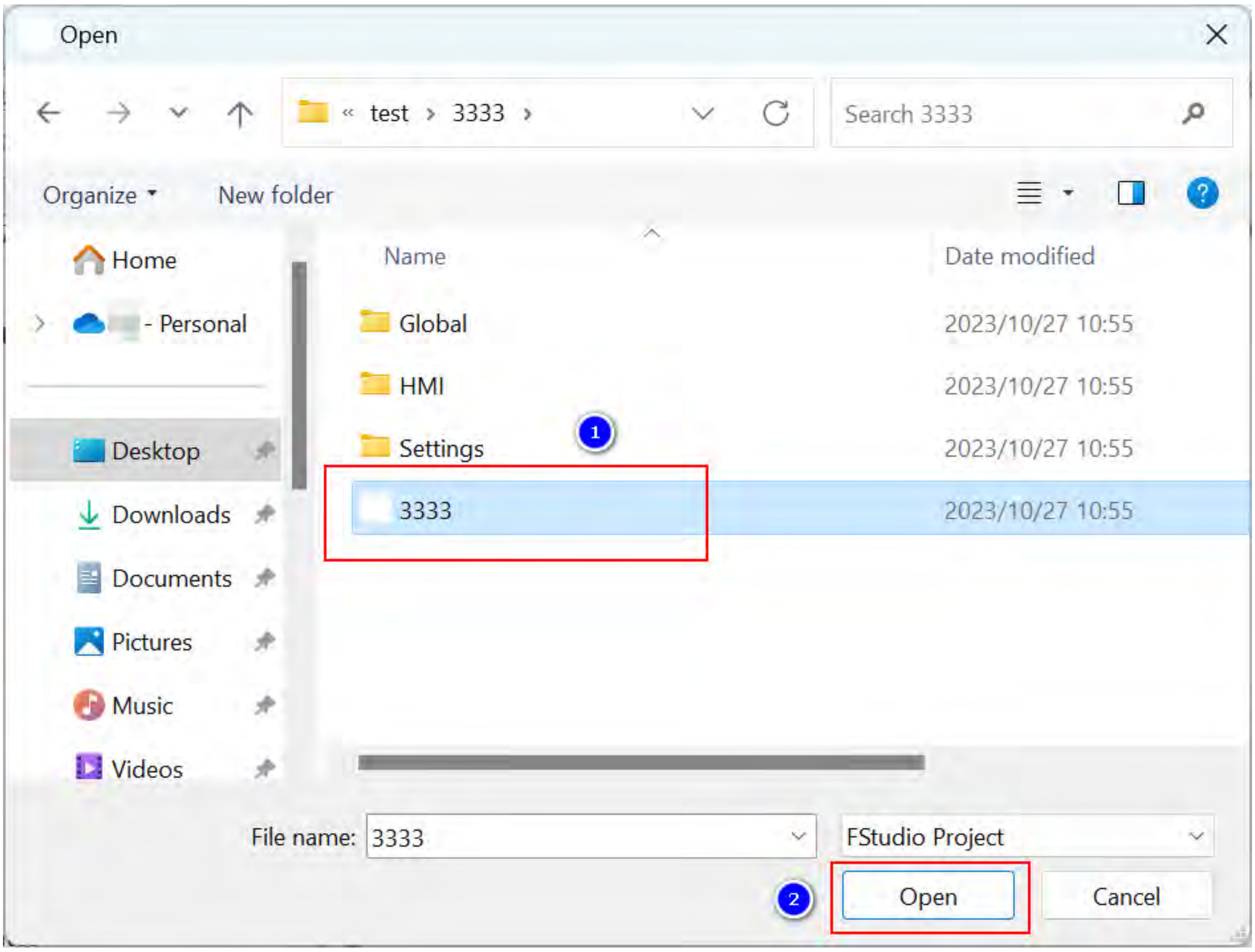
Project is a graphical program that runs on HMI and defines the window content and control functions displayed on the HMI.

The shortcut key for creating a new project is “Ctrl+N”. For detailed instructions on how to create a new project, please refer to the Create Project section.

5.2 Open Project

Step 1. Select **File/Open Project** from the menu bar (shortcut key “Ctrl+O”).

Step 2. Open the directory where the project file is located in the pop-up dialog box, select the file with the suffix .fsprj, and click **Open**.



You can directly enter the project file directory, double-click the project file with the suffix .fsprj, and open the project directly.

5.3 Close Project

Close the current project without exiting the program, used for switching projects. The steps are as follows:

Select **File/Close Project** from the menu bar to close the current project.

5.4 Save Project

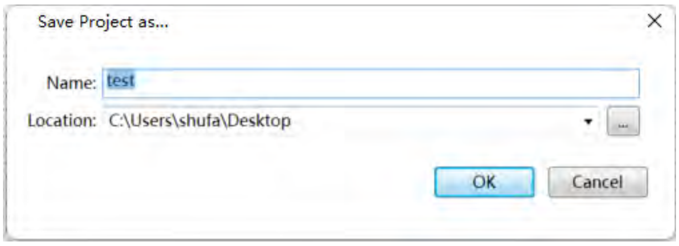
Select **File/Save Project** from the menu bar (shortcut key “Ctrl+S”) to save the current project.

5.5 Save Project As

The Save Project As operation allows users to make modifications to the existing project while preserving the original project. The steps are as follows:

Step 1. Select **File/Save Project As** from the menu bar.

Step 2. Set Name in the pop-up dialog box, select the location and click **OK**.

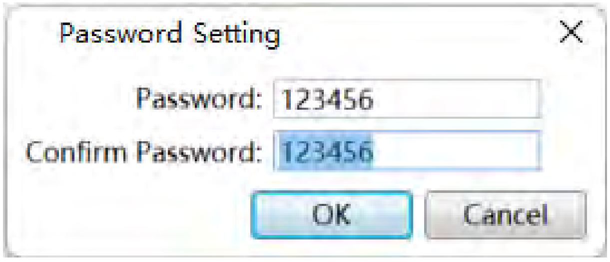


5.6 Project Password Protection

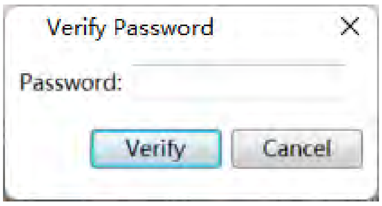
You can set a password for the project, and when opening the project, a password is required to prevent unauthorized use of the project file.

Step 1. Select **File/Project Password Protection** from the menu bar.

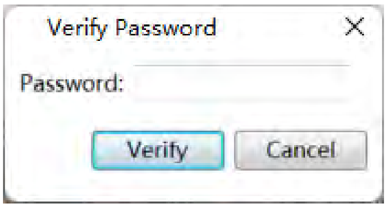
Step 2. In the pop-up dialog box, set a password and confirm the password (the password must be at least 6 characters long), and click **OK**.



Step 3. When you open this project again, the program will require you to enter the password for verification. Enter the password, click **Verify**, and the project will open.

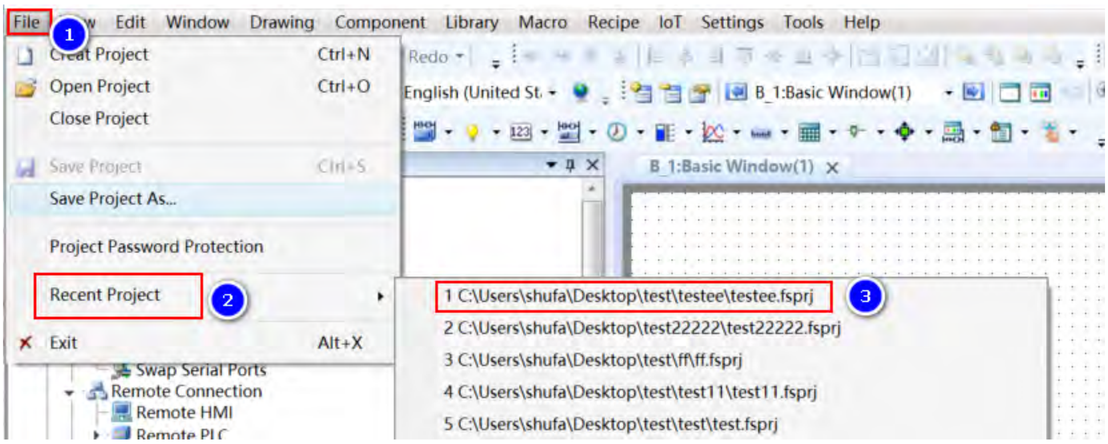


Step 4. Select **File/Project Password Protection** from the menu bar, enter the password in the pop-up **Verify Password** dialog box, click **Verify**, and you can cancel the password.



5.7 Recent Project

To facilitate users in opening recently used projects (up to a maximum of 10 projects). Follow these steps: Select **File**/**Recent Project** from the menu bar, select the project to open it.



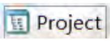
5.8 Exit Program

Select **File/Exit** from the menu bar (shortcut key “Alt+X”) to close current project and exit the program.

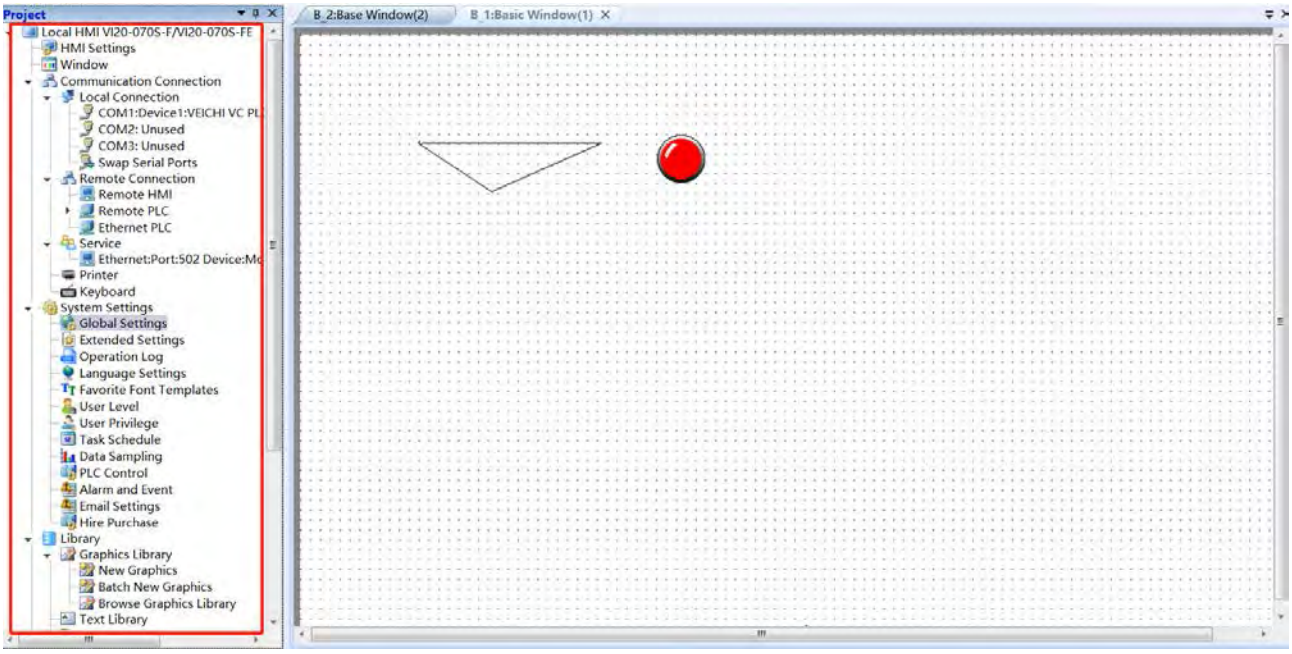
6 View

The View is used to configure the controls displayed on the software interface (including project, window, error, output, and outline). It also allows you to restore the default view.

6.1 Project

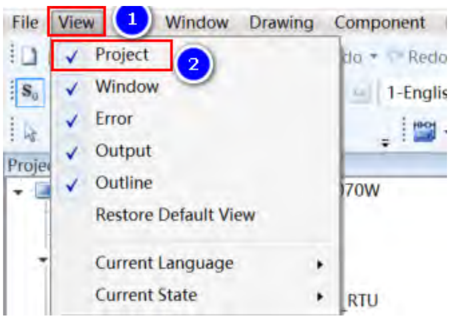
The Project control is displayed on the left side of the software interface. When you hover your mouse over the 

icon, it displays the project's contents in a tree structure, including HMI Settings, Window, Communication Connection, System Settings, etc. Double-clicking on the relevant item (such as HMI Settings) within the project controls allows you to set the corresponding content.



Clicking on the  icon will pin the project control to the left side of the interface.

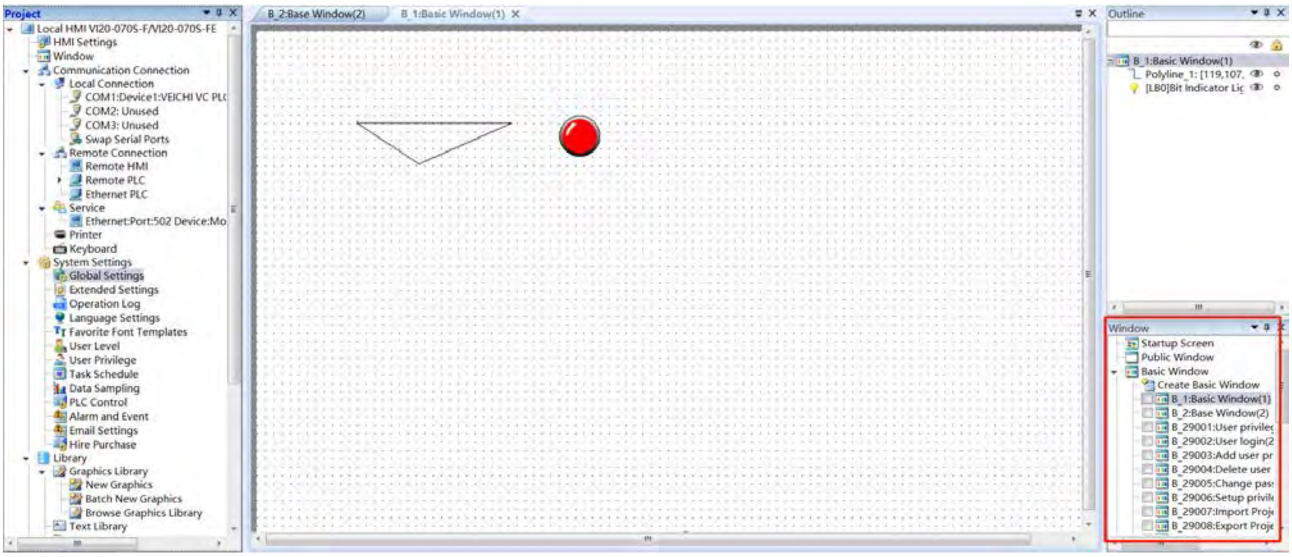
Select **View/Project** from the menu bar to open or close project control.



6.2 Window

HMI project file contains multiple windows, the designing of the components within these windows decides the display effect of the HMI.

Selecting **View/Window** from the menu bar allows you to open or close the **Window** control. The Window control are displayed on the right side of the software interface and include features such as Startup Screen, Public Window, Basic Window, Keyboard Window, and System Window.



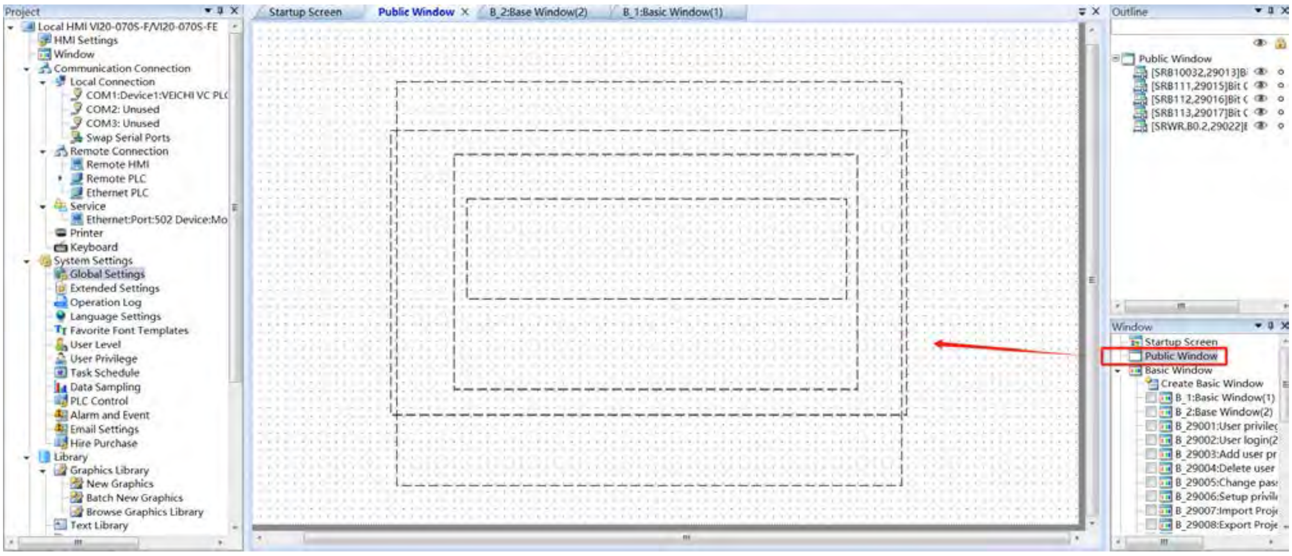
6.2.1 Startup Screen

The startup screen refers to the screen displayed when HMI is started. By double-clicking on the Power-on Screen icon within the Window control, you can set the startup screen. For detailed editing methods regarding the startup screen, please refer to Edit Startup Screen. Typically, the startup screen can be set to display the company's LOGO image, with supported image formats including PNG, JPG, and BMP. The startup screen will be displayed for a certain period of time and automatically disappears, transitioning to the configuration screen.

6.2.2 Public Window

Public window refers to an interface that exists in all basic windows. In the common window, you can configure macros, timers, and other settings that are globally applicable.

Double-clicking on the Public Window icon allows you to create or design the public window.

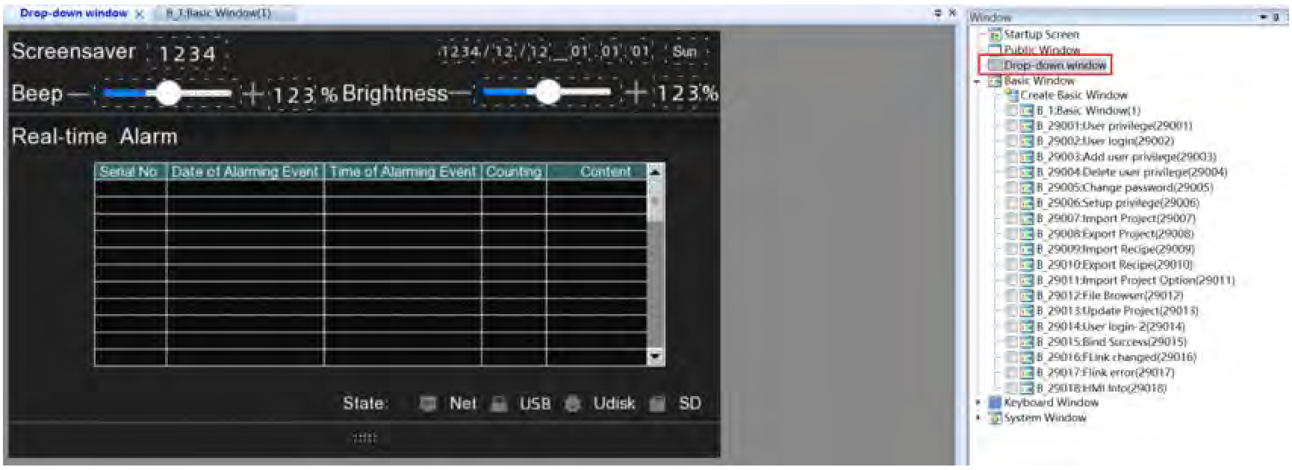


6.2.3 Drop-down Window

Only capacitive HMIs support drop-down window.

Drop-down window refer to a window that can be expanded or collapsed, allowing for the display of additional content within a single window.

By double-clicking on the Drop-down window icon within the **Window** control, you can create or design a drop-down window.



6.2.4 Basic Window

A basic window is a window page that displays fundamental control functions of the HMI. VI20Studio includes some built-in basic windows (such as the user previlege login window, etc). Users can also customize basic windows according to their requirements.

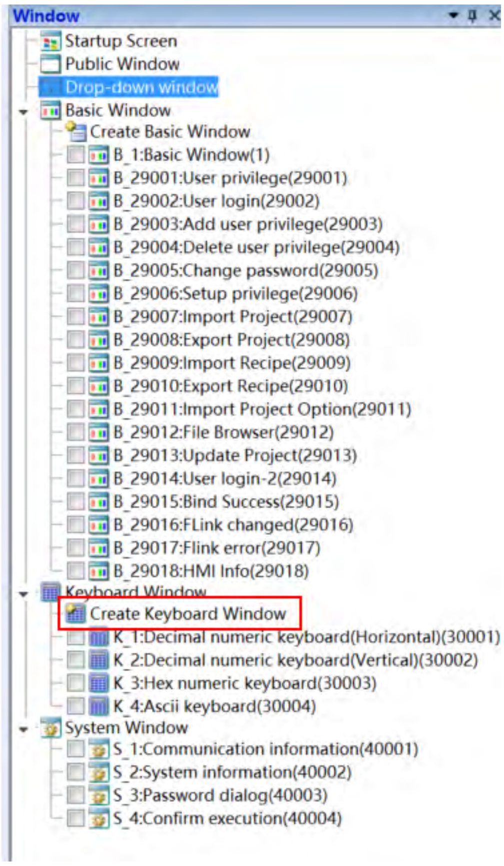
6.2.5 Create Basic Window

Double-click **Create Basic Window** within the **Window** control to enter the **New Window** interface. Please refer to Create Window for detailed subsequent steps.

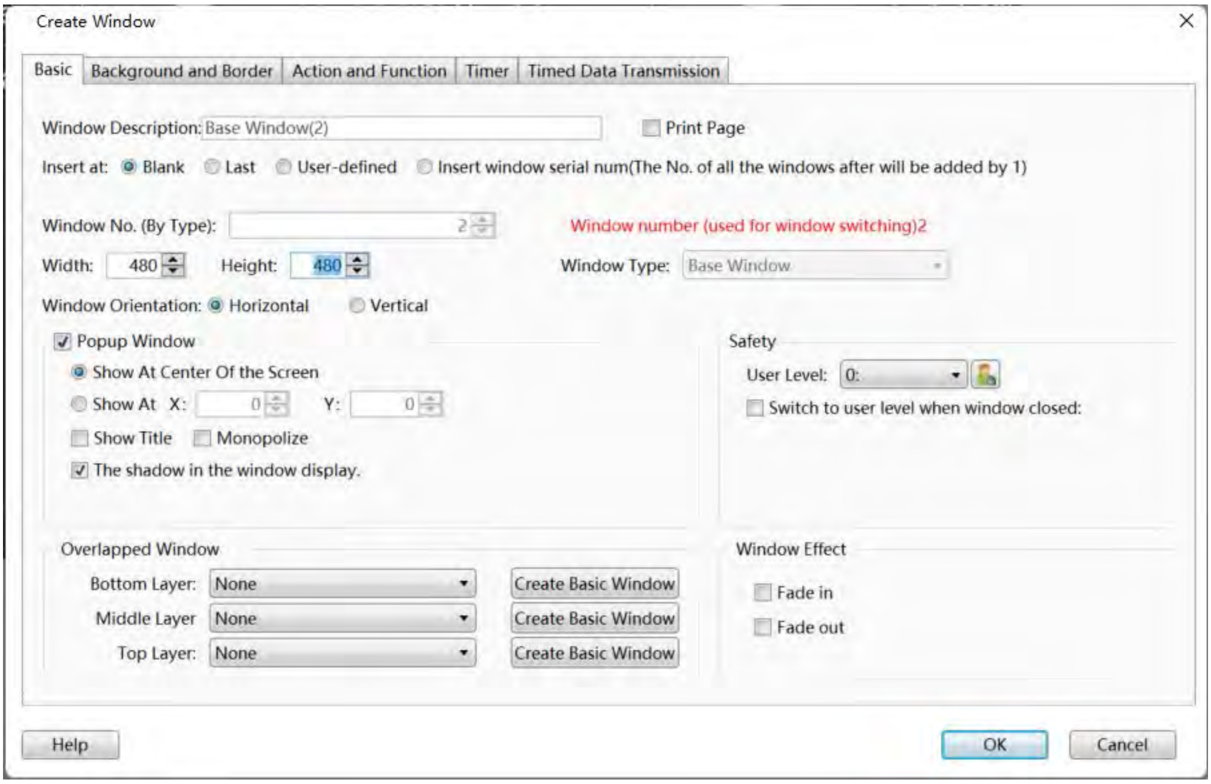
6.2.6 Keyboard Window

Keyboard window is used to display a keyboard input interface. VI20Studio has four built-in keyboard windows, and users can also customize keyboard windows. The steps to create a new keyboard window are as follows:

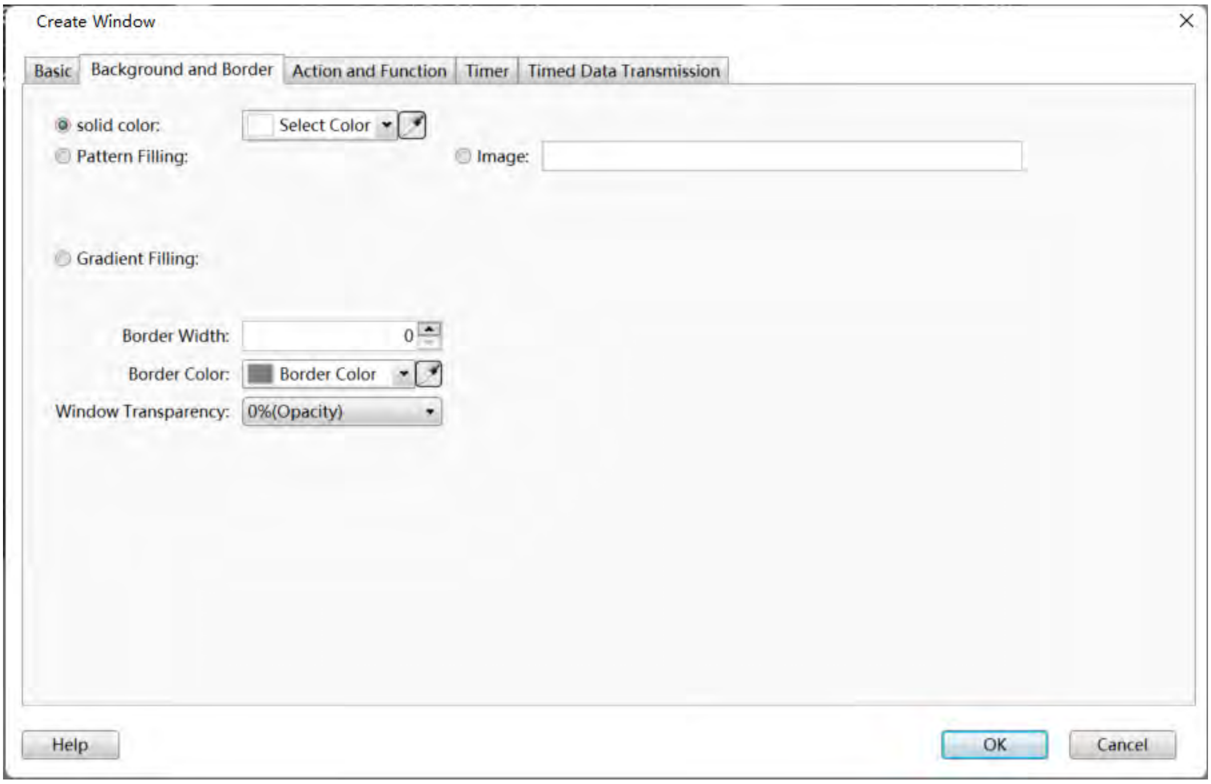
Step 1. Double click **Create Keyboard Window** in the **Window** control.



Step 2. Set the Basic properties in the pop-up **Create Window** dialog box.



Step 3. Select the **Background and Border** tab to set parameters such as background color, border width, and border color. Click **OK**.



Step 4. Add keyboard elements (take the example of the Unicode keyboard with the characters "F" and "E").

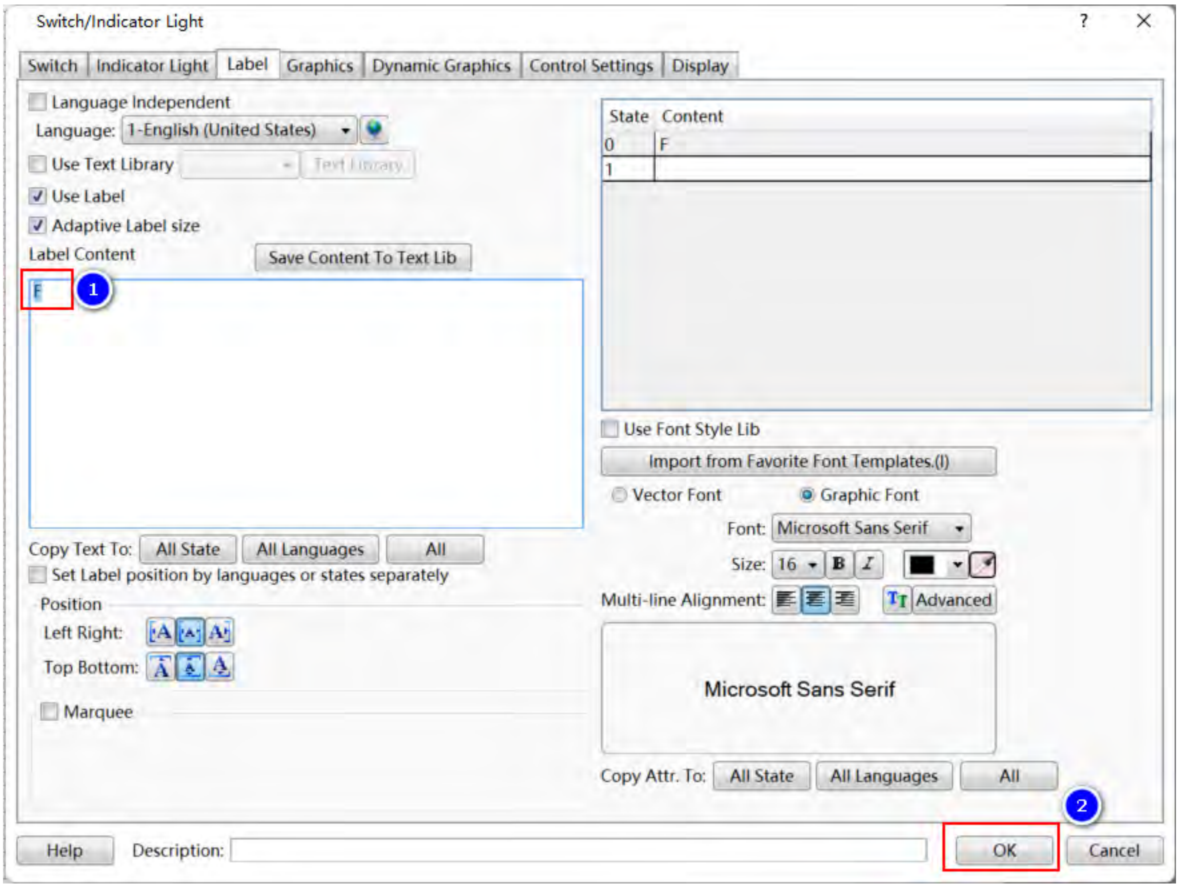
1) Select **Component/Switch/Function Key** from the menu bar.

2) Set relevant parameters in the pop-up dialog box, click **OK**.

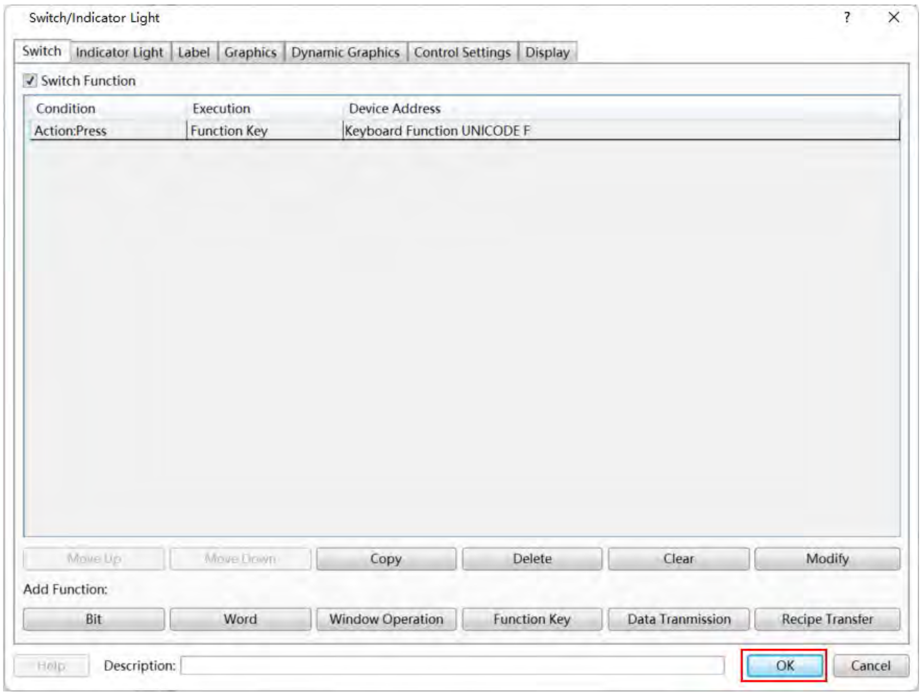
Detailed configuration methods are as shown in the table below.

Parameter	Description
Action	Select "**Press**".
Function Setting	Select "Keyboard Function".
Function Operation	Select "UNICODE" and set the value as "F".

3) Select the **Label** tab, set the label Content as "F". Click **OK**.



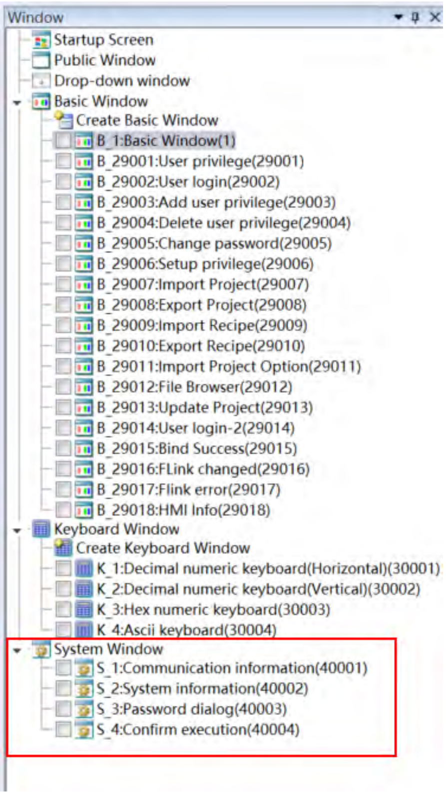
4) Click **OK**.



5) Use similar methods to create the keyboard “E”.

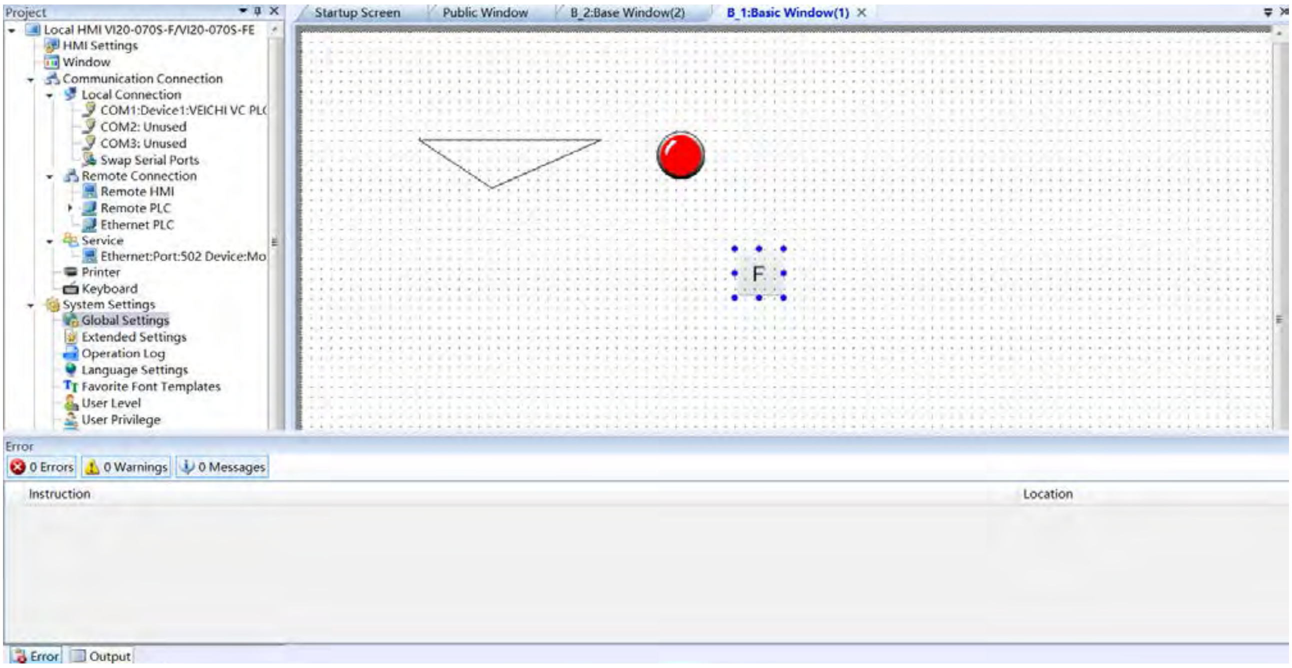
6.2.7 System Window

System window is used to display system information. VI20Studio has four built-in system windows (Communication information, System information, Password dialog, and Confirm execution). Custom system windows are not supported in VI20Studio.



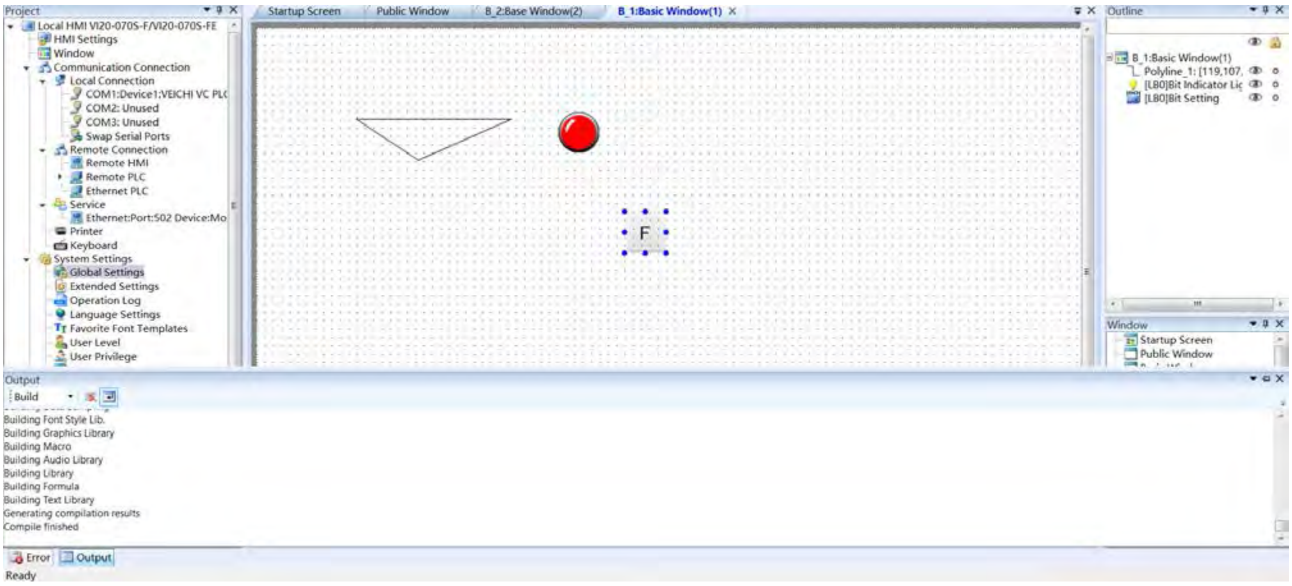
6.3 Error

Select **View**/**Error** from the menu bar to open or close the **Error** control. The **Error** control is located in the bottom left corner of the software interface and is used to display compilation errors, including three levels of error information, which are errors, warnings and messages.



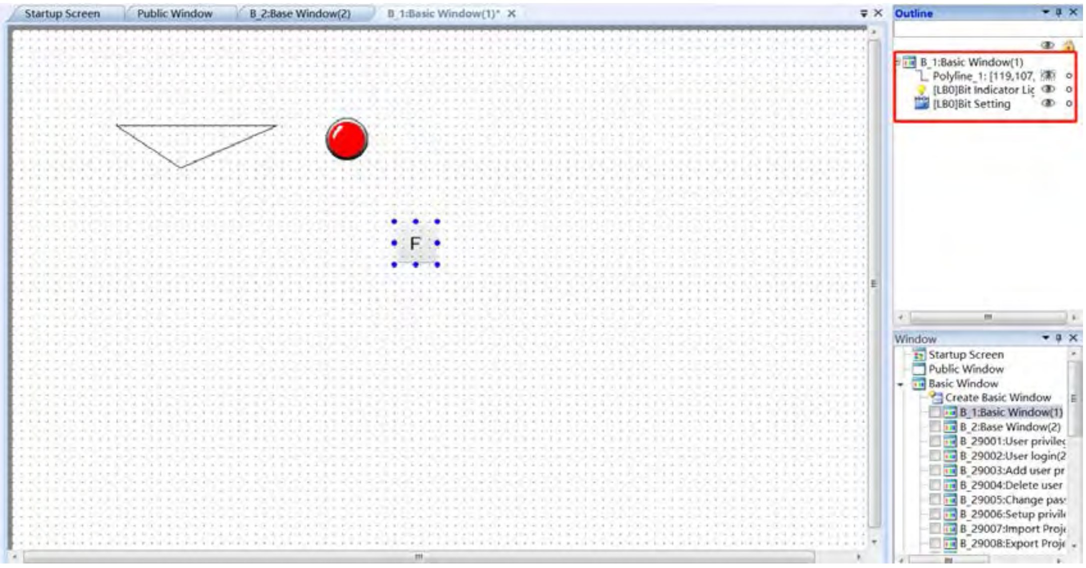
6.4 Output

Select **View/Output** from the menu bar to open or close the **Output** control. The **Output** control is used to display compilation output information of project files.



6.5 Outline

Select **View/Outline** from the menu bar to open or close the **Outline** control. The **Outline** control is located in the top right corner of the interface. It provides a detailed list of all the components in the current window. Clicking on the icon can hide the corresponding component, while clicking on the icon can lock the component (after being locked, the component can not be moved or resized). This feature facilitates the editing of other components for users.



6.6 Restore Default View

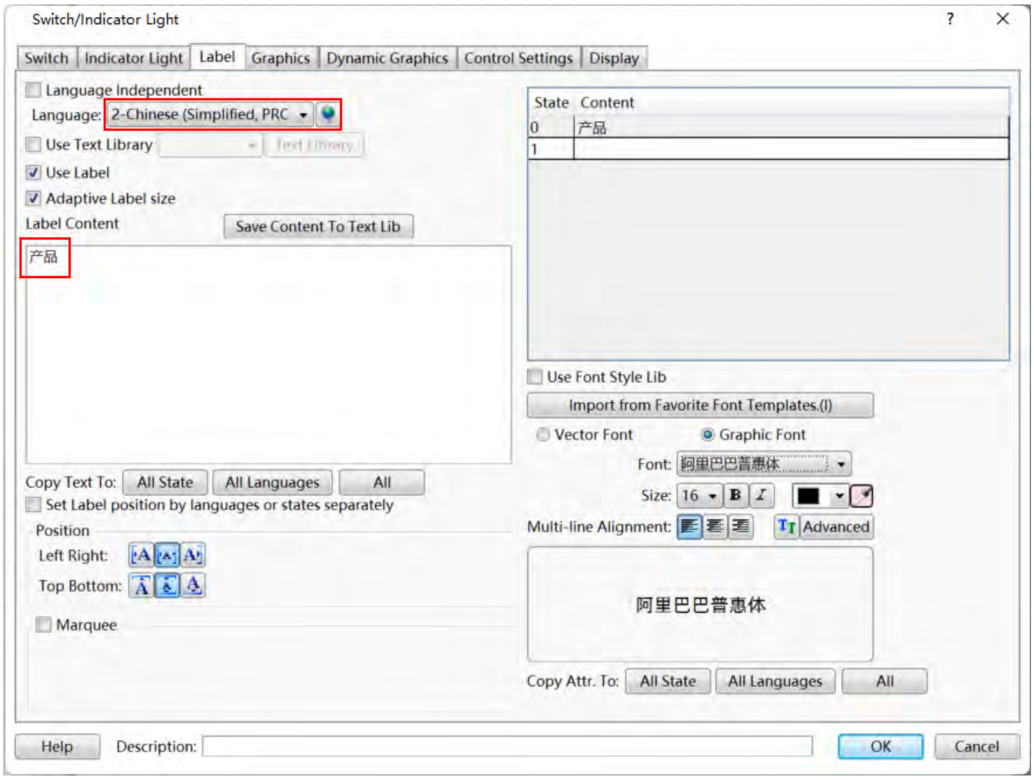
To restore the default view, select **View**/**Restore Default View** from the menu bar. This will reset the software interface to its default layout state.

6.7 Change Component Label Language

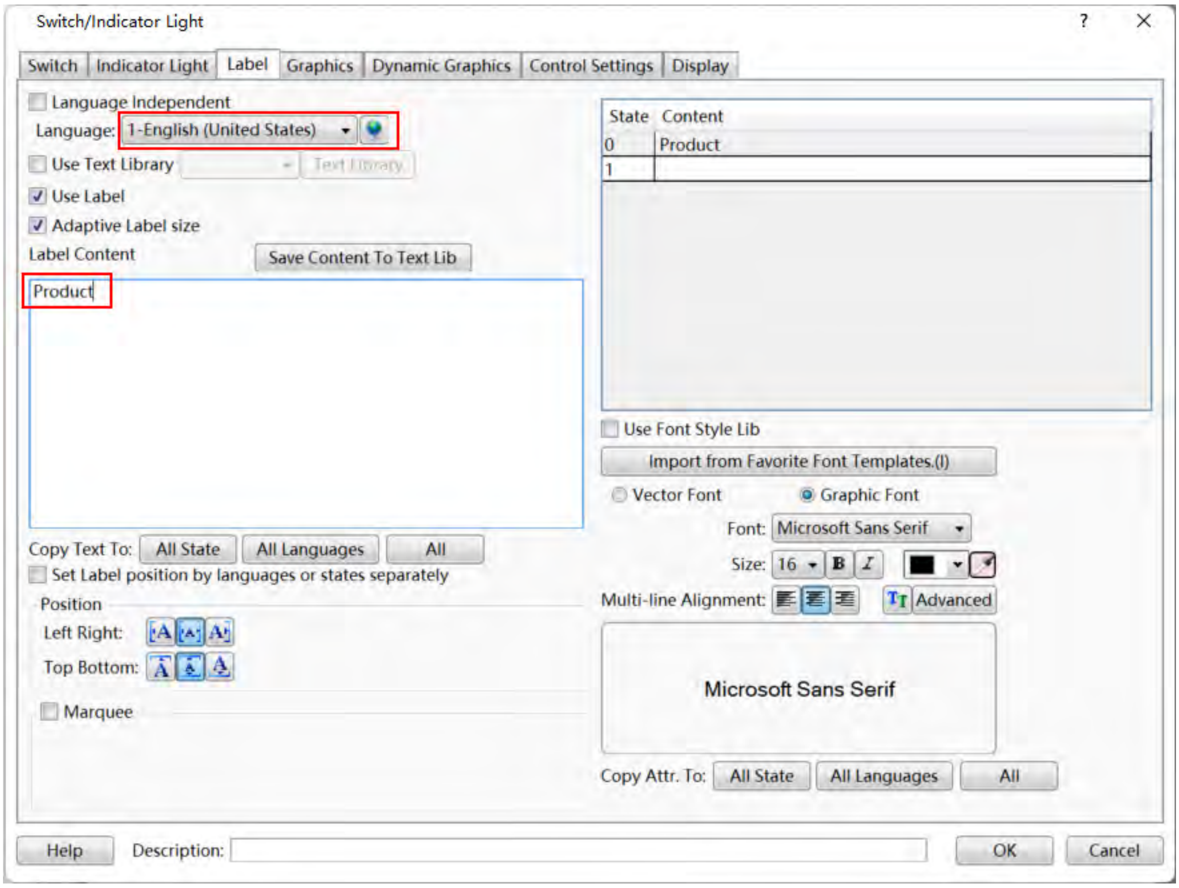
Select **View**/**Current Language** from the menu bar, select the language you need, then content in the component labels will be displayed in the corresponding language.

It is necessary to set the label content for each language in advance. If the label content is not set, switching to the corresponding language will result in the labels being displayed without any content.

As shown in the figure below, when the label language of the component is set to Chinese, the label content is “产品”.



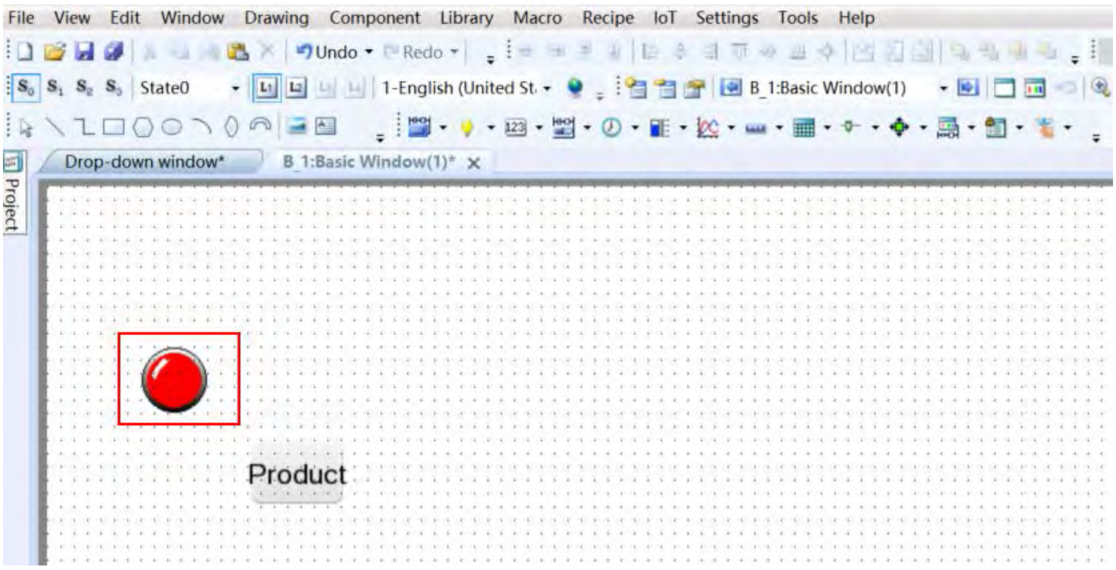
As shown in the figure below, when the tag language of the component is set to English, the label content is "Product".



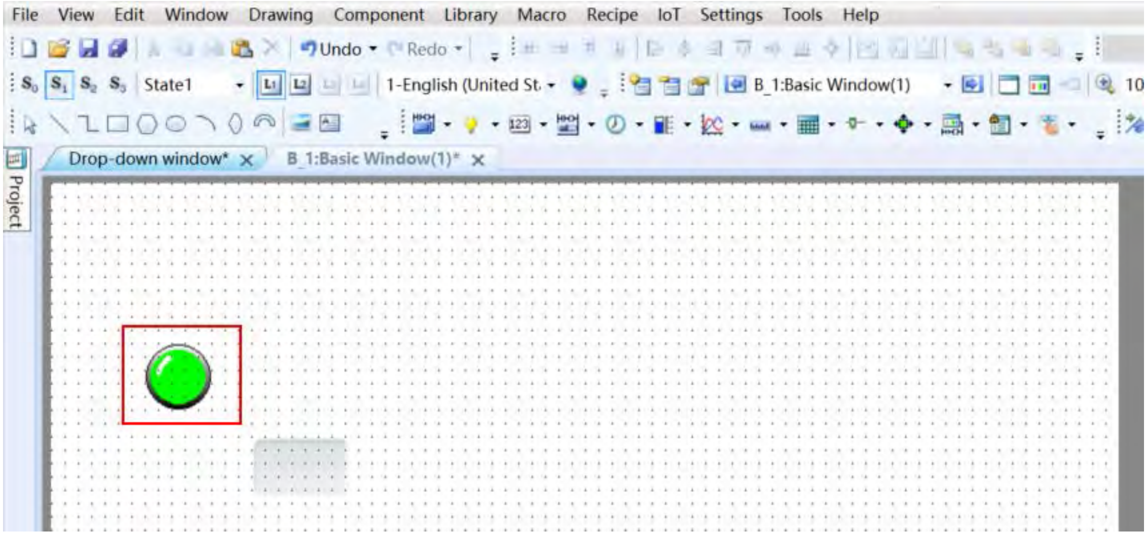
6.8 Current State

By selecting the Current State, you can quickly show the display effect of the components in the current window.

Select **View/Current State/State 0** from the menu bar (the value of the state ranges from 0 to 255, depending on the actual situation of the component), and it will show the display effect of the window component when State 0 is selected.



Select **View/Current State/State 1** from the menu bar, and it will show the display effect of the window components when State 1 is selected.



7 Edit

The **Edit** menu provides a range of tools to assist in configuring screen, including undo, redo, find and replace, etc.

7.1 Undo

Select **Edit/Undo** (shortcut key “Ctrl+Z”) from the menu bar to undo the current operation.

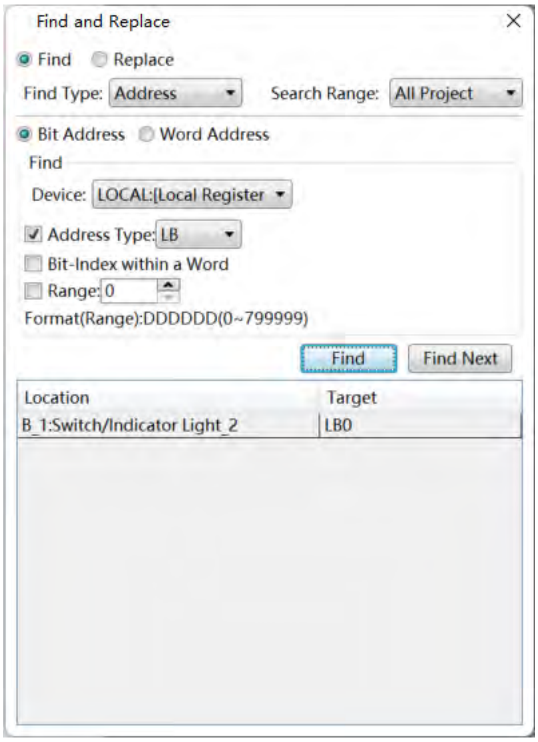
7.2 Redo

Select **Edit/Redo** (shortcut key “Ctrl+Y”) from the menu bar to redo the most recent undone operation.

7.3 Find and Replace

This feature facilitates users to quickly find or replace specified addresses.

Step 1. Select **Edit/Find** from the menu bar (shortcut key “Ctrl+F”) to bring up the **Find and Replace** dialog box. Configure relevant parameters, click **Find**, and you can find addresses that meet the requirements.

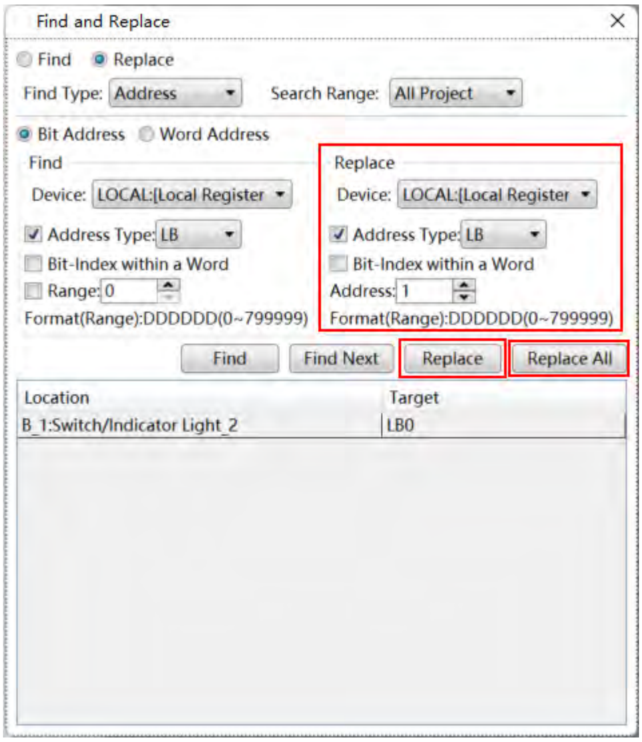


Detailed configuration methods please refer to the table below.

Parameter	Description
Find Type	Supports address only.
Search Range	Whole project or the current window.

Parameter	Description
Bit Address	The address of a bit storage unit in a register.
Word Address	The address of a word storage unit in a register.
Device	HMI local register, recipe register, register of PLC.
Address Type	The address type of a register, please refer to the actual situation.
Range	Set the address range to find, e.g. 0~255.

Step 2. Select **Replace**, set the parameters such as the selected Device and Address Type in the **Replace** area, click **Replace** to replace the current address; click **Replace All** to replace all the addresses found.



7.4 Cut

VI20Studio provides the clipboard feature, which makes it easy for users to copy and cut components.

Select a component in the window, select **Edit/Cut** from the menu bar (shortcut key “Ctrl+X”), and you can remove the component from the current window and temporarily store it in the clipboard.

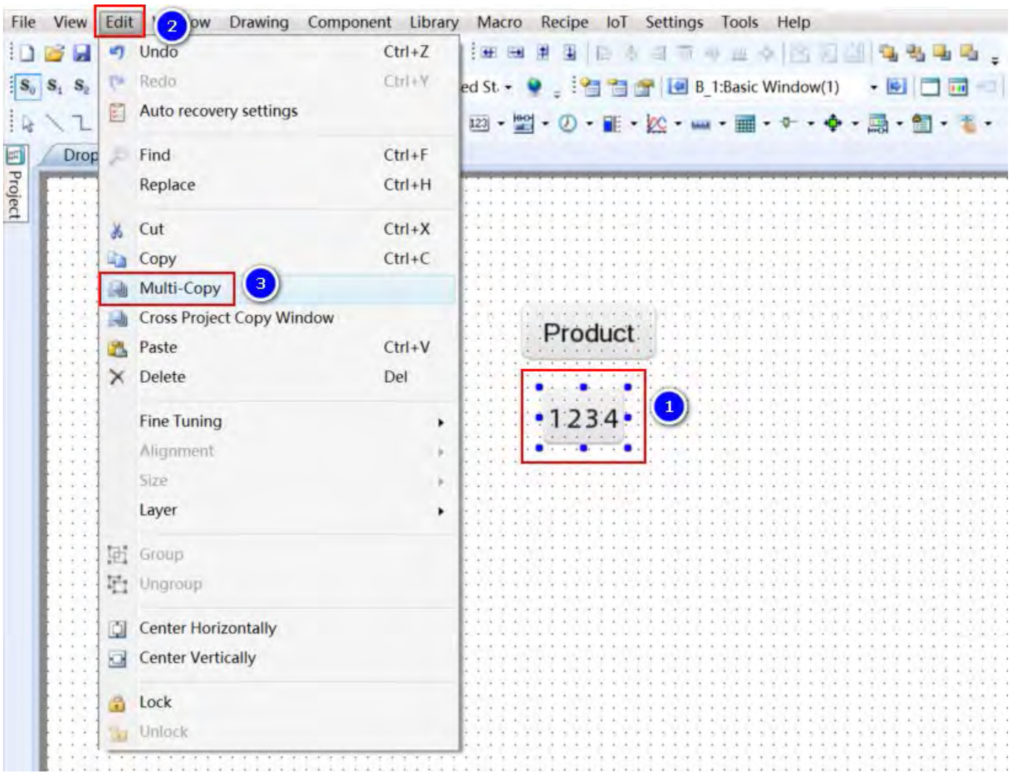
7.5 Copy

Select a component in the window, select **Edit/Copy** from the menu bar (shortcut key “Ctrl+C”), and you can copy the selected component and temporarily store it in the clipboard.

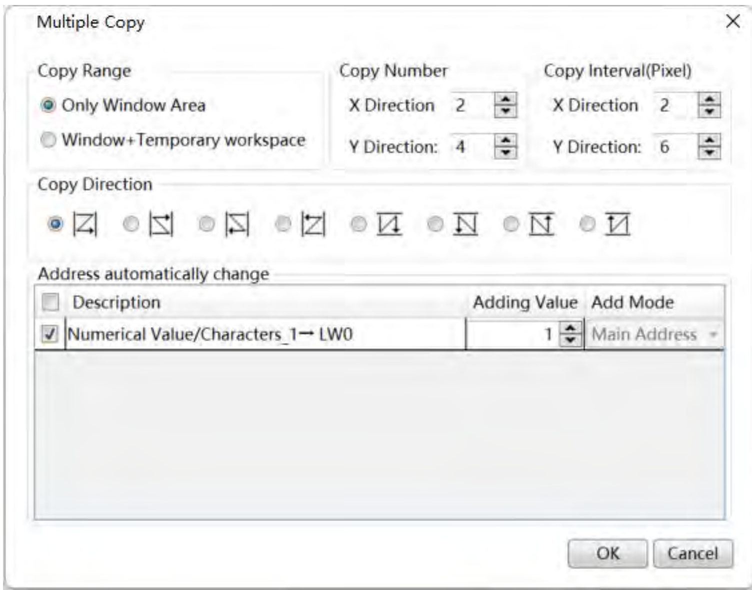
7.6 Multi-Copy

Multi-copy refers to make multiple copies of the specified component to get multiple components. Operation steps are as follows:

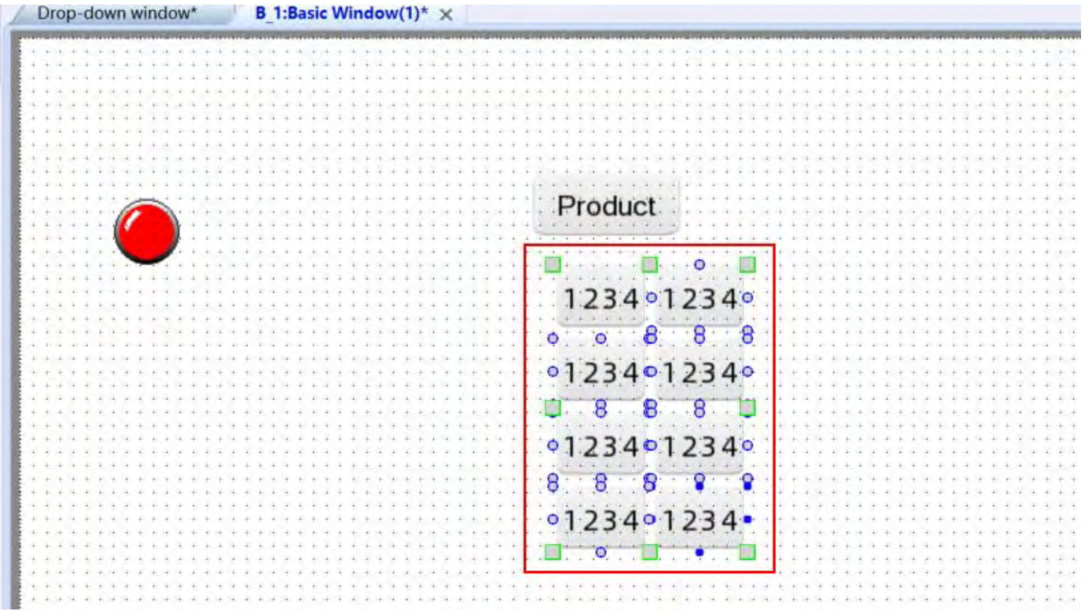
Step 1. Select the the component in the window, select **Edit/Multi-Copy** from the menu bar.



Step 2. Set the parameters such as copy range, number of copies, copy interval in the pop-up **Multi-Copy** dialog box, click **OK**.



Step 3. The figure below shows the result of multi-copy.



7.7 Paste

Copy or cut is necessary before executing the paste operation.

Select **Edit/Paste** from the menu bar, and you can paste the component in the clipboard to the target window.

7.8 Delete

Select an component in the window, select **Edit/Delete** from the menu bar (shortcut key "**Delete"**), and you can delete the component.

7.9 Fine Tuning

Fine tuning refers to the precise adjustment of the position of an component. The operation steps are as follows:

Select the component in the window, then select **Edit/Fine Tuning/Nudge Left** (supports nudge left, nudge right, nudge up, nudge down) from the menu bar. This will move the component one grid to the left.

7.10 Alignment

You can set the alignment mode of multiple components to improve the visual appearance. The steps are as follows:

Hold down the "Ctrl" key, select multiple components, navigate to the menu bar and choose **Edit/Alignment/Align Left** (supports Align Left, Align Vertical Center, Align Right, Align Top, Align Horizontal Center, Align Bottom, and Align Center). It will align the selected components to the left based on the position of the first component that was selected.

7.11 Size

You can adjust the size of other components to be the same width, height, or size as a reference component. The steps are as follows (taking same width as an example):

Hold the "Ctrl" key and select multiple components. Select **Edit /Size/Same Width** from the menu bar. This will adjust the width of the selected components to match the width of the first selected component.

7.12 Layer

You can adjust the layer of components (including Bring to Front, Send to Back, Bring Forward, or Send Backward). Alternatively, you can also make the horizontal or vertical spacing between multiple components equal. This example focuses on Bring to Front.

Select the component in the window, then go to the menu bar and select **Edit/Layer/Bring to Front**. This will place the selected component on the front layer (when the component overlaps with others, only this component will be displayed in the overlapping area).

7.13 Group

To combine multiple components into a single entity. Select multiple components (hold the "Ctrl" key and click each component, or click and drag to select multiple components). Select **Edit/Group** from the menu bar. This will combine the selected components into a single entity, and make it easy to adjust the position and size of the grouped entity.

7.14 Ungroup

To cancel a group, select it and select **Edit/Ungroup** from the menu bar. This will separate the components of the group into multiple independent components.

7.15 Center Horizontally

Select the component and select **Edit/Center Horizontally** from the menu bar to place the component in the horizontal center of the window.

7.16 Center Vertically

Select the component and select **Edit/Center Vertically** from the menu bar to place the component in the vertical center of the window.

7.17 Lock

Select an component, select **Edit/Lock** from the menu bar to lock the component. After the component is locked, the position and size of the component can not be changed. This is convenient for editing other components.

7.18 Unlock

Select the locked component, select **Edit/Unlock** from the menu bar, and you can unlock the component. When an component is unlocked, the position and size of the component can be changed.

8 Window

The **Window** menu is used to manage the windows, including create new window, modify window property, edit startup screen, etc.

8.1 Create Window

Please refer to Create Window for detailed steps.

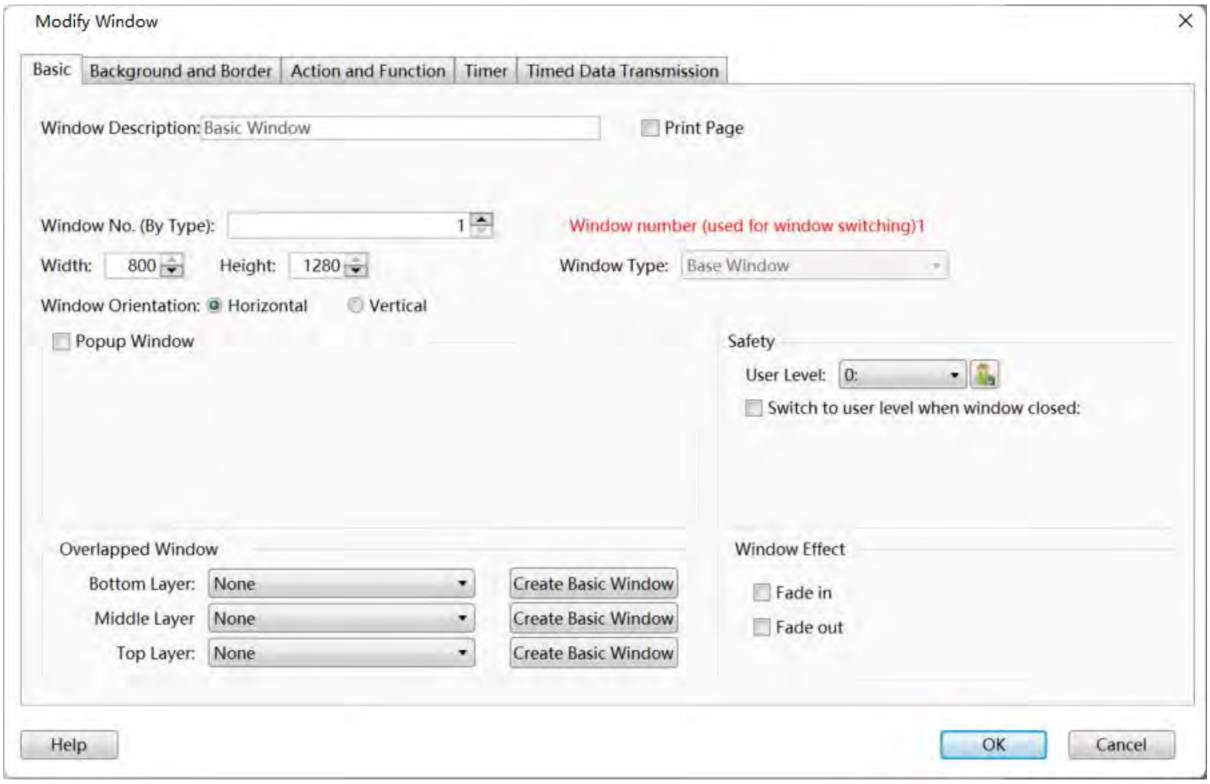
8.2 Delete Window

Select **Window/Delete Window** from the menu bar, click **Yes** in the pop-up dialog box to delete the current window.

8.3 Modify Window Property

To modify the properties of the current window, select **Window/Current Window Properties** from the menu bar. After modifying the window properties, click **OK** to apply the changes.

8.3.1 Basic

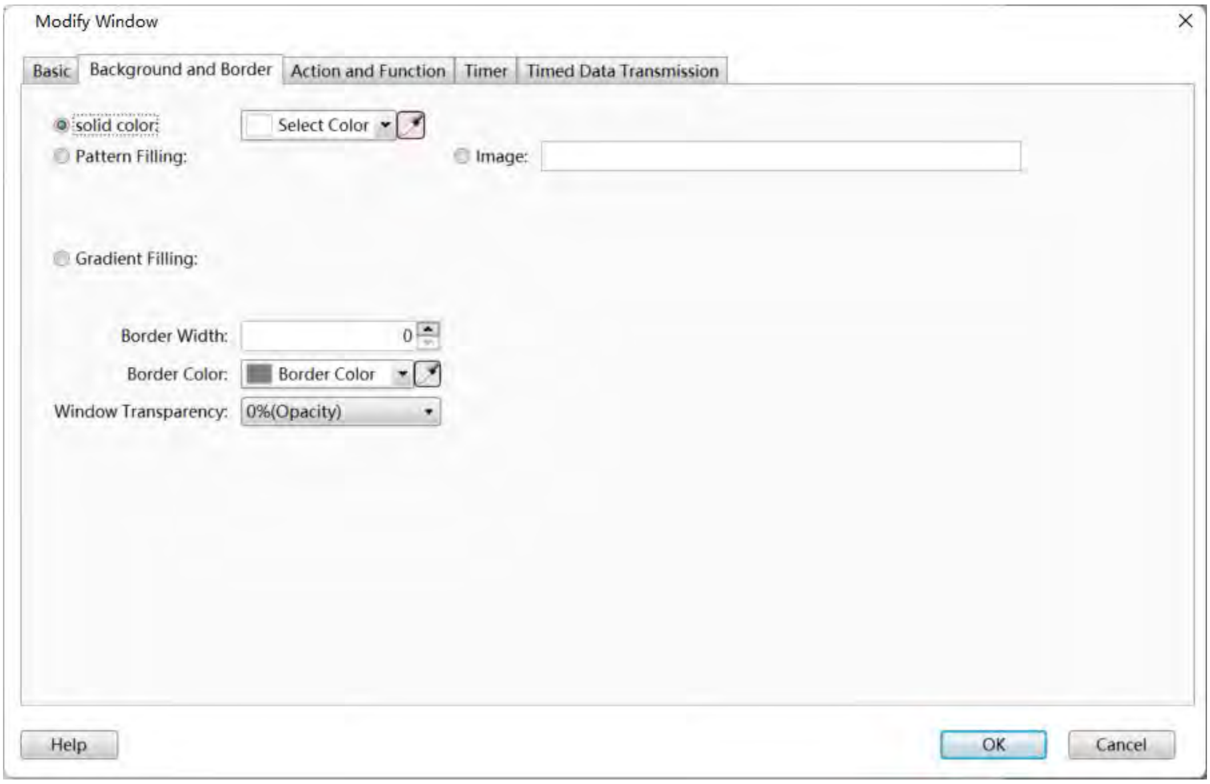


Please refer to the table below for detailed configuration methods.

Parameter	Description
Window Description	Define the window name.
Print Page	After checking this option, the contents of this window can be printed. The printout page cannot include any popup or overlapping windows.
Width	The width of the window is measured in pixels and cannot exceed the HMI screen width.
Height	The height of the window is measured in pixels and cannot exceed the HMI screen height.
Window Orientation	Include horizontal and vertical.
Popup Window	Set the properties of a pop-up window: ◆ Position: You can choose to show the window at the center of the screen or at a specified location (determined by the X and Y pixel coordinates). ◆ Monopolize: When **Monopolize** is enabled, the pop-up window prevents interaction with the main window behind it. When **Monopolize** is disabled, the pop-up window can be interacted with while the main window is still accessible.
Safety	Configure the security of HMI user access windows, only users with the corresponding level are allowed to view the windows. ◆ User Level: The HMI supports a maximum of 16 user levels. For detailed information about user levels, please refer to the User Level. ◆ Switch to user level when window closed: When this window is closed, switch to the user level required to access other window screens.
Overlapped Window	You can overlay windows of different levels in the current window to create an overlapping effect. This includes the bottom layer, middle layer, and top layer. You can choose to overlay existing windows or create new ones. The overlapped windows will be positioned below the current window.
Window Effect	These special effects are applicable to capacitive HMIs only: ◆ Fade in: An animation effect when a window appears. ◆ Fade out: An animation effect when a window disappears.

8.3.2 Background and Border

By selecting the **Background and Border** tab, you can configure the background and border of the window.



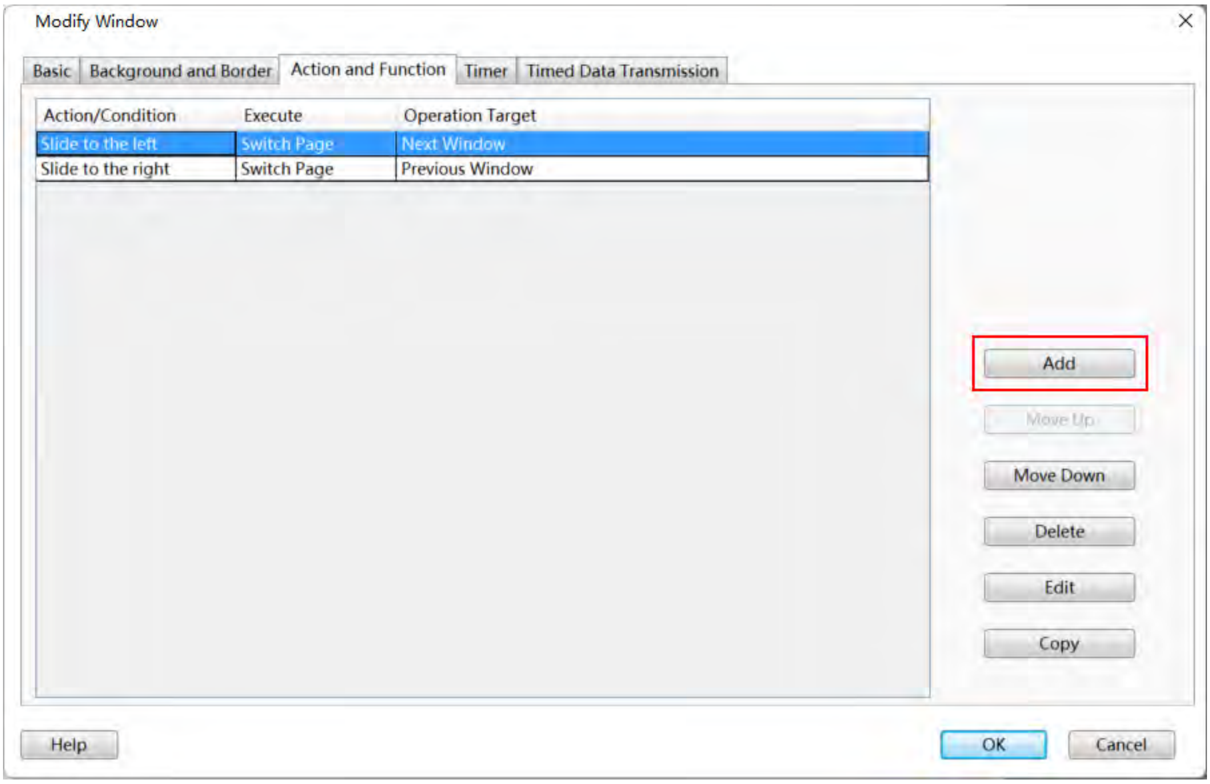
Please refer to the following table for detailed configuration instructions.

Parameter	Description
solid color	To set the filling color of the window, click **Select Color** to choose the filling color; click the icon to pick the color of a target object.
Pattern Filling	Select the filling pattern. You can choose built-in pattern in the system or custom pattern.
Gradient filling	Fill the window with gradient color, you can set the gradient color and orientation.
Border width	Default value is 0.
Border Color	Set the border color. Click **Border Color**, select Color; click the icon to pick up the color of the target object.
Window Transparency	0% refers to not opacity, 100% refers to completely transparent.

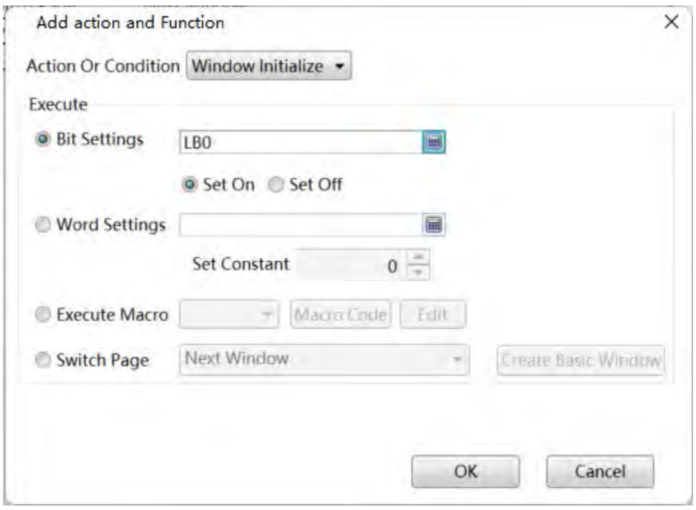
8.3.3 Action and Function

When the window meets certain conditions (such as when it appears), it can trigger specific functionalities (such as executing a macro).

Step 1. Select the **Action and Function** tab, click **Add**.



Step 2. Configure relevant parameters in the pop-up dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

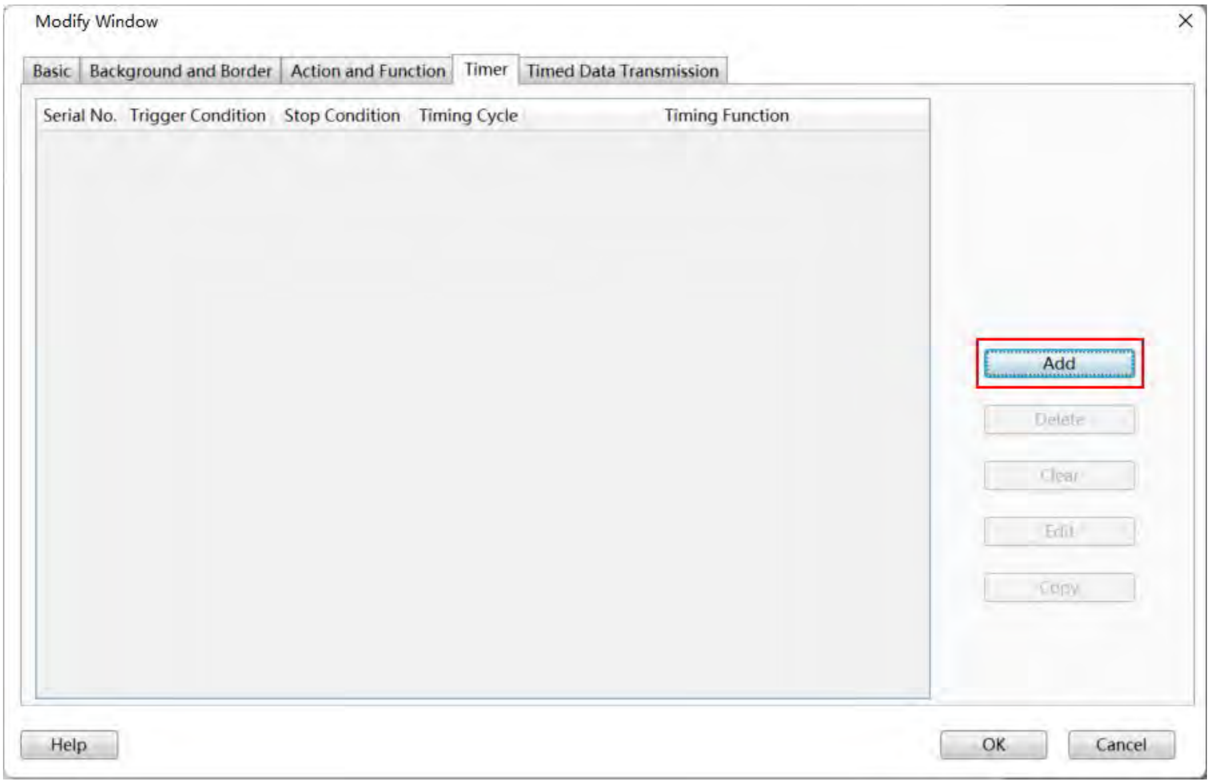
Parameter	**Description**
Action or Condition	Actions or conditions that trigger the function: Window initialize, Window Exit, Slide to the left (for capacitive HMIs only), Slide to the right (for capacitive HMIs only), Slide to the top (for capacitive HMIs only), Slide to the bottom (for capacitive HMIs only).

Parameter	Description
Bit Settings	Set the bit state of a specified bit address.
Word Settings	Set the value of specified word address.
Execute Macro	Execute the target macro instruction.
Switch Page	Switch to the specified window.

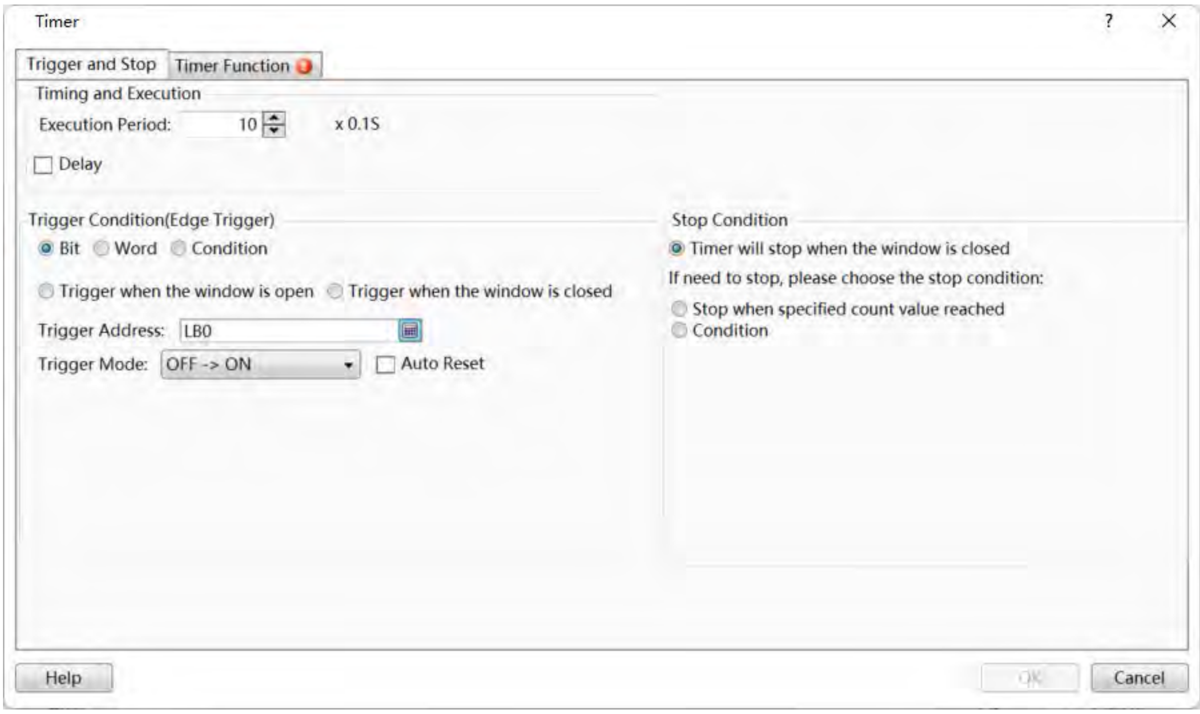
8.3.4 Timer

Timers are used to set up actions to be executed within an execution cycle, if a triggering condition is met (such as setting the state of a bit address, etc).

Step 1. Select the **Timer** tab, click **Add**.



Step 2. Set the trigger condition and stop condition.

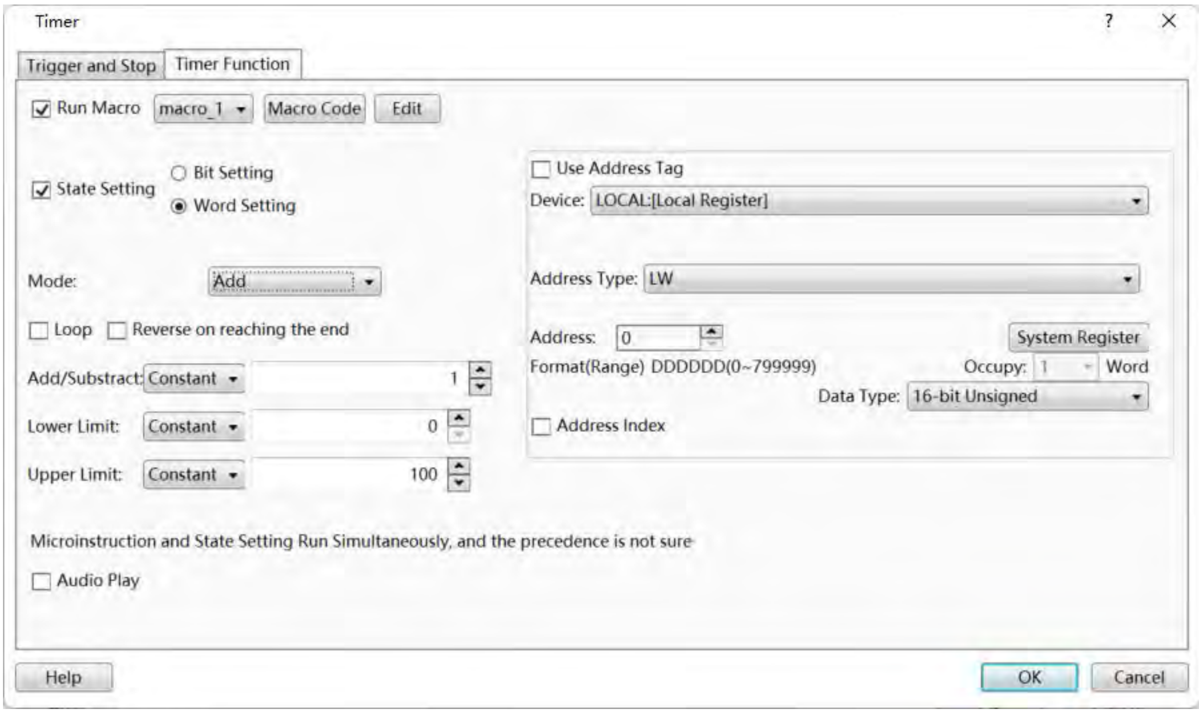


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Execution Period	Cycle of the timer, range from 0.1 ~ 6553.5 seconds.
Delay	Number of delayed execution cycles.
Trigger Condition	Trigger condition for executing the timer function: ◆ Bit: Refers to the change in the state of a specified bit address, which requires setting the trigger address and trigger mode. ◆ Word: Refers to the change in value of a specified word address, which requires setting the trigger address. ◆ Condition: Refers to meeting specific logical conditions (such as the state of LB0 being ON and the state of LB1 being OFF). ◆ Trigger when the window opens. ◆ Trigger when the window closes.
Stop Condition	Conditions for stopping the timer: ◆ The timer stops when the window is closed. ◆ Stop when specified count value reached: the timer repeats the specified number of times. ◆ Condition: meeting specific logical conditions (such as the state of LB0 being ON and the state of LB1 being OFF).

Step 3. Set the Timer Function.

Select **Timer Function** tab, configure relevant parameters, click **OK**.



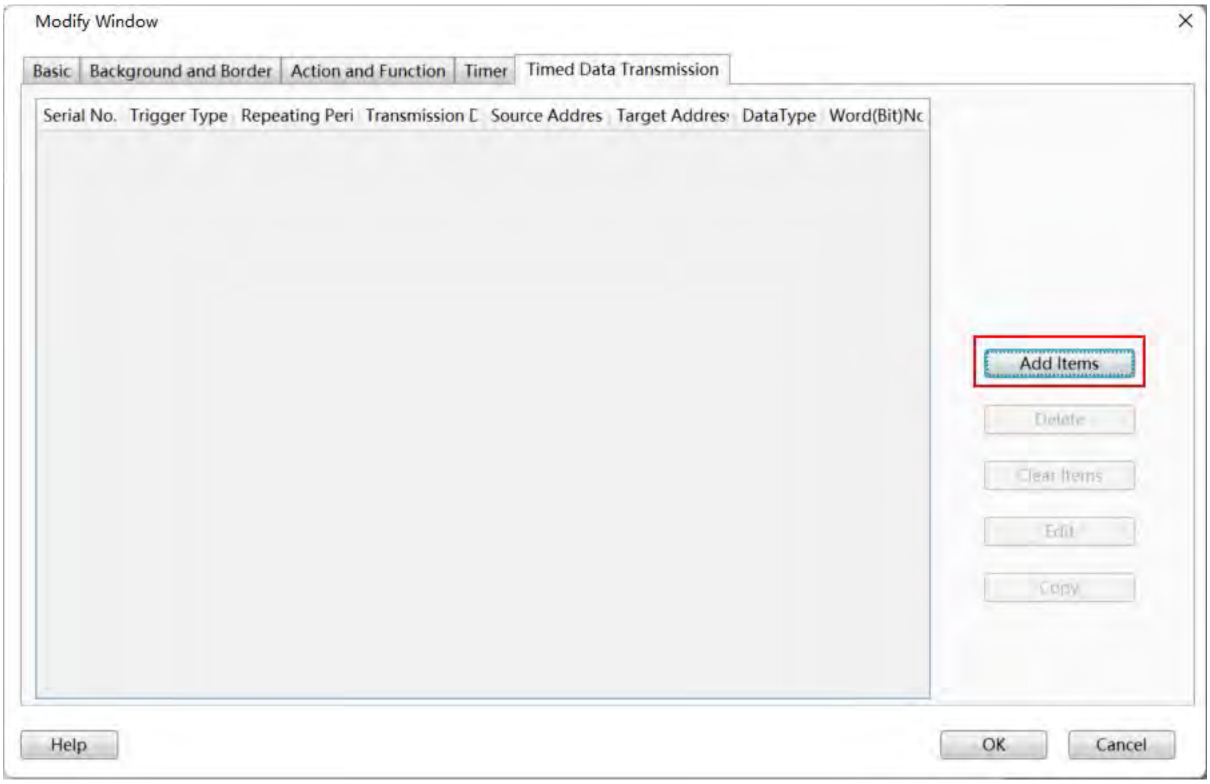
Please refer to the table below for detailed configuration methods.

Parameter	Description
Run Macro	Select the target macro instruction to run it.
Bit Setting	Set the state of the specified bit address. Select the specified address and set the mode(set ON, set OFF, periodic inverse).
Word Setting	Set the value change of a specified word address (including adding a value, subtracting a value, or setting it to a constant).
Loop	When the value of the word address reaches the limit value, it will start the addition/subtraction calculation again from the starting value.
Reverse on reaching the end	When the value of a word address reaches the upper or lower limit, it will wrap around and increment or decrement back to the starting value.
Audio Play	Select the audio to be played. For detailed information on the sound library, please refer to the Audio Library.

8.3.5 Timed Data Transmission

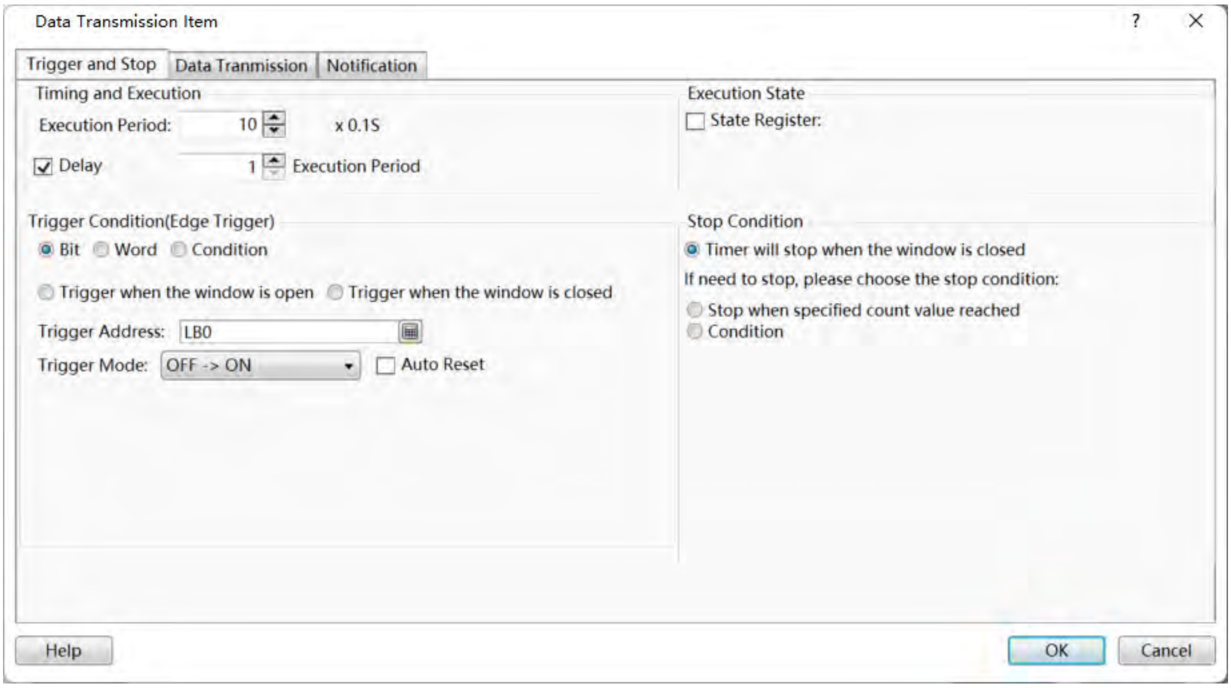
Timed transfer the value of the source address to the target address, and set the action before or after the write.

Step 1. Select the **Timed Data Transmission** tab, click **Add Items**.

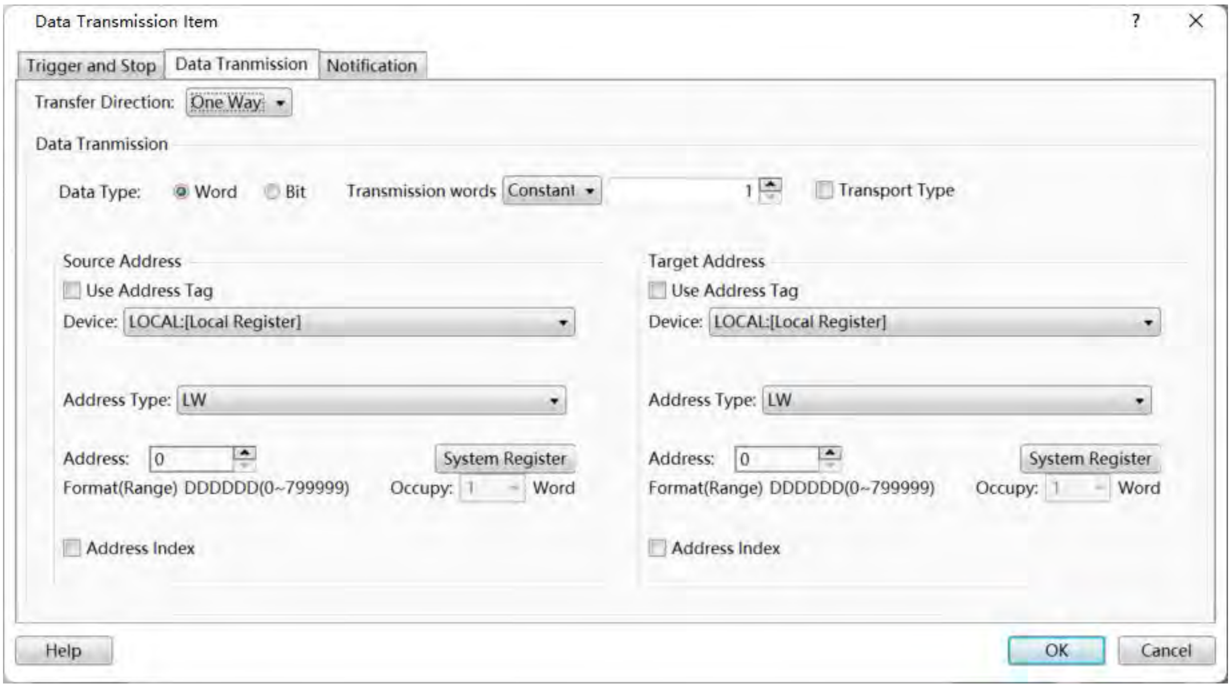


Step 2. Set the trigger condition and stop condition.

Please refer to Timer for detailed configurations.



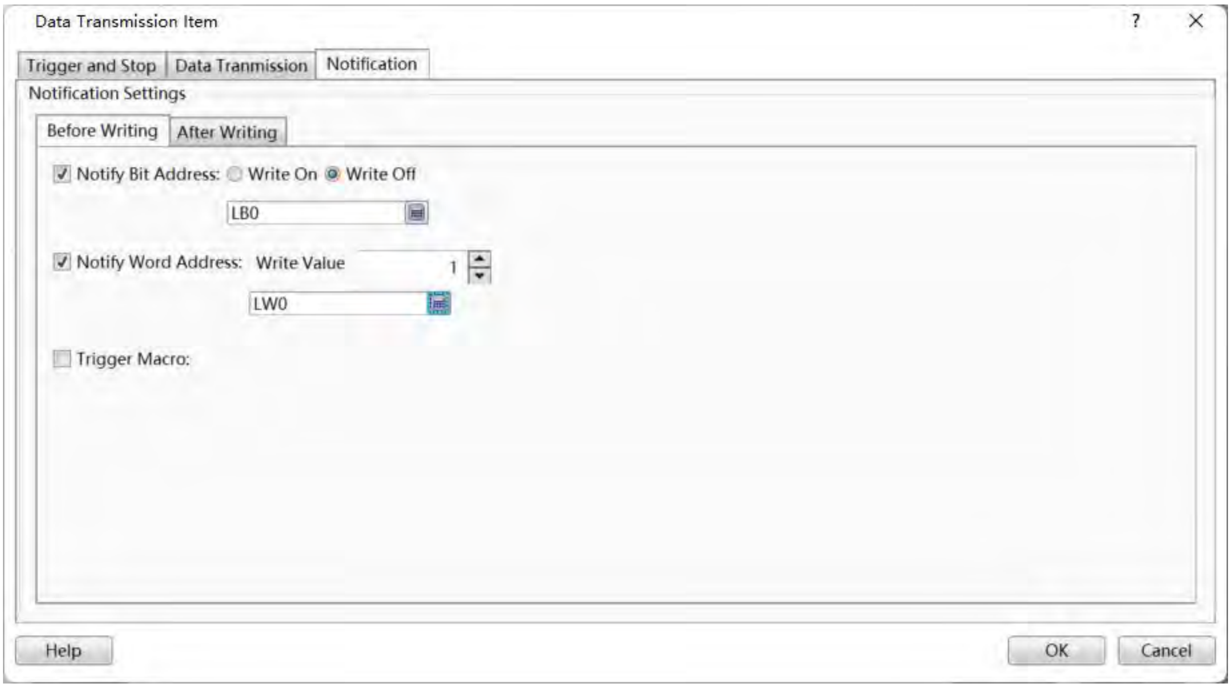
Step 3. Set Data Transmission.



Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Transfer Direction	◆ One Way: transfer data from the source address to the target address. ◆ Two Way: transfer data from the source address to the target address, and transfer data from the target address to the source address.
Data Type	Includes word and bit. It can be set as a constant or a variable, and the data type for transmission can be configured (such as a 16-bit integer).
Device	Device to transfer data, such as HMI or PLC.
Address Type	Refer to the actual situation of the device.
Address	Address numbering, refer to the actual situation.
Address Index	You can change the currently configured address using another word address. For example, if the current address is LB0, the address index is set to LW0, and the offset is set to 2, then the actual address would be LB(0 + *the value of LW0* + 2).

Step 4. Set notification method before and after data writing.



Please refer to the table below for detailed configuration methods.

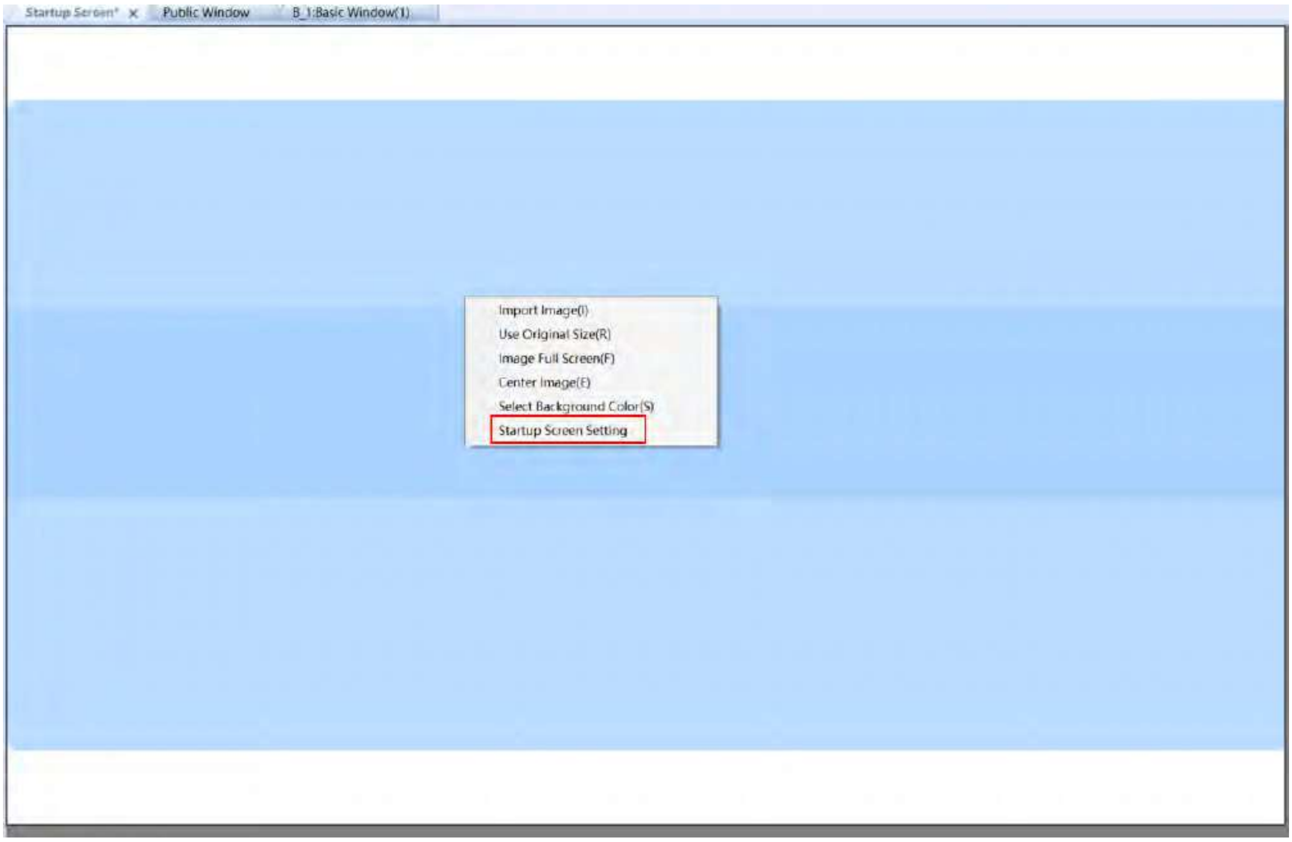
Parameter	Description
Notify Bit Address	Set the value of the specified bit address to ON or OFF before (or after) writing data.
Notify Word Address	Write the specified word address to the specified value before (or after) writing data.
Trigger Macro	Trigger a specified macro before (or after) writing data.

8.4 Edit Startup Screen

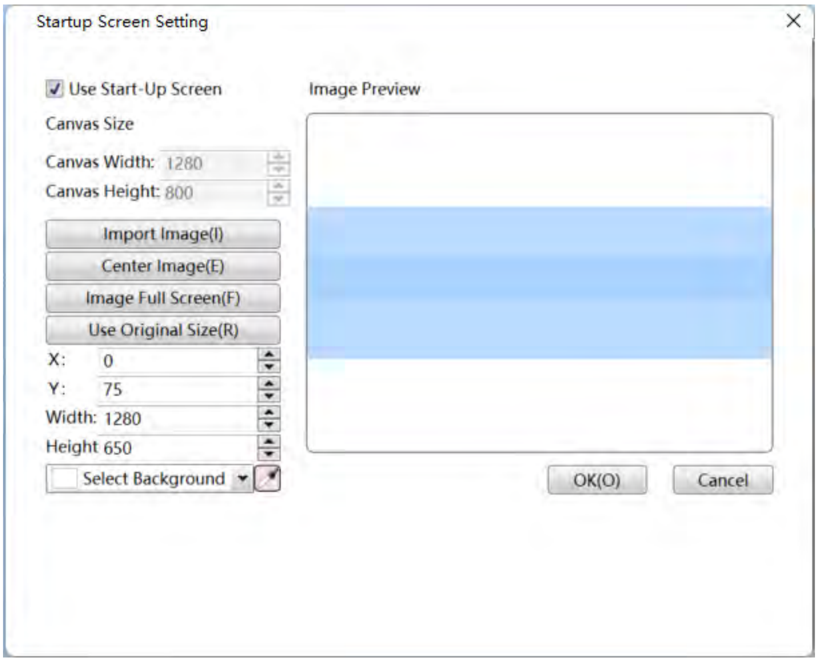
The startup screen is the screen displayed when the HMI starts up. Users can customize the startup screen.

Step 1. Select **Window/Edit Startup Screen** from the menu bar.

Step 2. Enter the startup screen window, right click and select **Startup Screen Setting**.



Step 3. Configure relevant parameters in the pop-up dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Use Start-Up	Choose whether to enable startup screen or not.

Parameter	Description
Screen	
Import Image	Click **Import Image** and select the image file for the startup screen (PNG, BMP, JPG formats are supported, and the image size should not exceed 2048 * 2048 pixels).
Center Image	Click **Center Image** to position the image in the center of the window.
Image Full Screen	Click **Image Full Screen** to display it in full screen mode.
Use Original Size	Click **Use Original Size** to display the image in its original size.
X	The horizontal position of the first pixel in the image.
Y	The vertical position of the first pixel in the image.
Width	Set the width of the image, which cannot exceed the width of the canvas.
Height	Set the height of the image, which cannot exceed the height of the canvas.
Select Background Color	Click **Select Background Color** to select the background color of the image.

8.5 Show/Hide Public Window

Select **Window/Show the Public Window** from the menu bar to enable users to view the effect of displaying or hiding public window on the basic window.

8.6 Show/Hide Overlapped Window

Select **Window/Show the Lower Layer Window** from the menu bar to view the effect of displaying or hiding overlapped windows on the basic window.

8.7 Jump to Target Window

When the selected component has a window switching function (such as **Pop Up Window** or a switch component to **Switch to Basic Window**), you can use this function to jump to the target window. The operation steps are as follows:

Select the component with window switching function, and then select **Window/Jump to the Target Window** from the menu bar to jump to the target window.

8.8 Show Grid

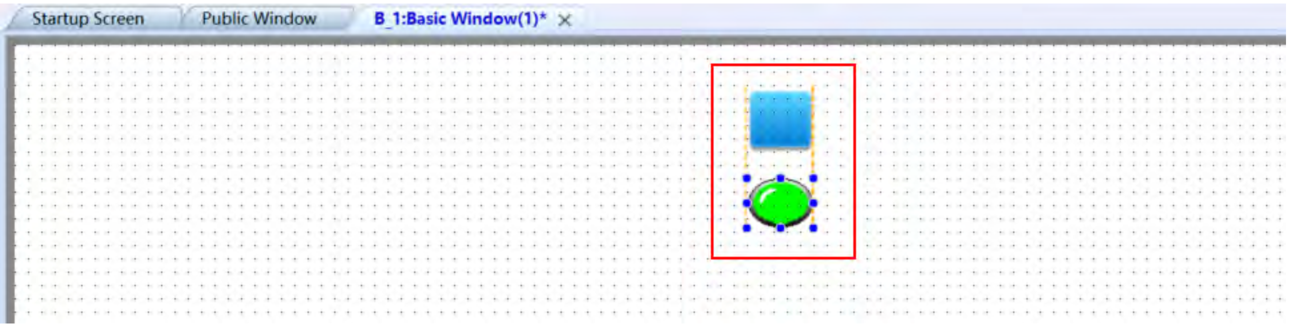
Select **Window/Show Grid** from the menu bar to show the grid in the window, which is helpful for users to check if the components are aligned.

8.9 Align to Grid

Select **Window/Align to Grid** from the menu bar to align the components to the grid when drawing them.

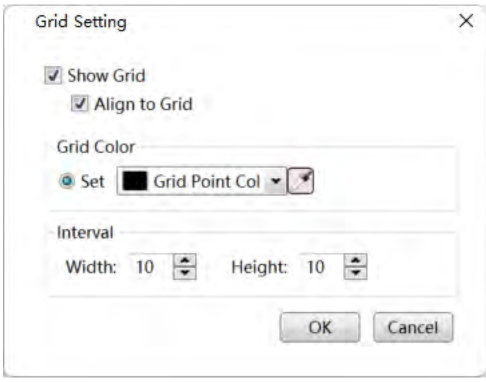
8.10 Align to Baseline

Select **Window/Align to Baseline** from the menu bar. This will display baselines on the interface, making it easier to align multiple components when drawing (the yellow dashed lines in the figure below are baselines).



8.11 Grid Settings

Select **Window/Grid Setting** from the menu bar, configure relevant parameters in the pop-up dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Show Grid	Whether to show the grid in the window.
Align to Grid	Whether to align the component to the grid.
Grid Point color	Click **Grid Point Color**, select the desired color; or click the  icon to pick up the color of target object.

Parameter	Description
Interval	Set the width and height of the grid.

8.12 Window Zoom

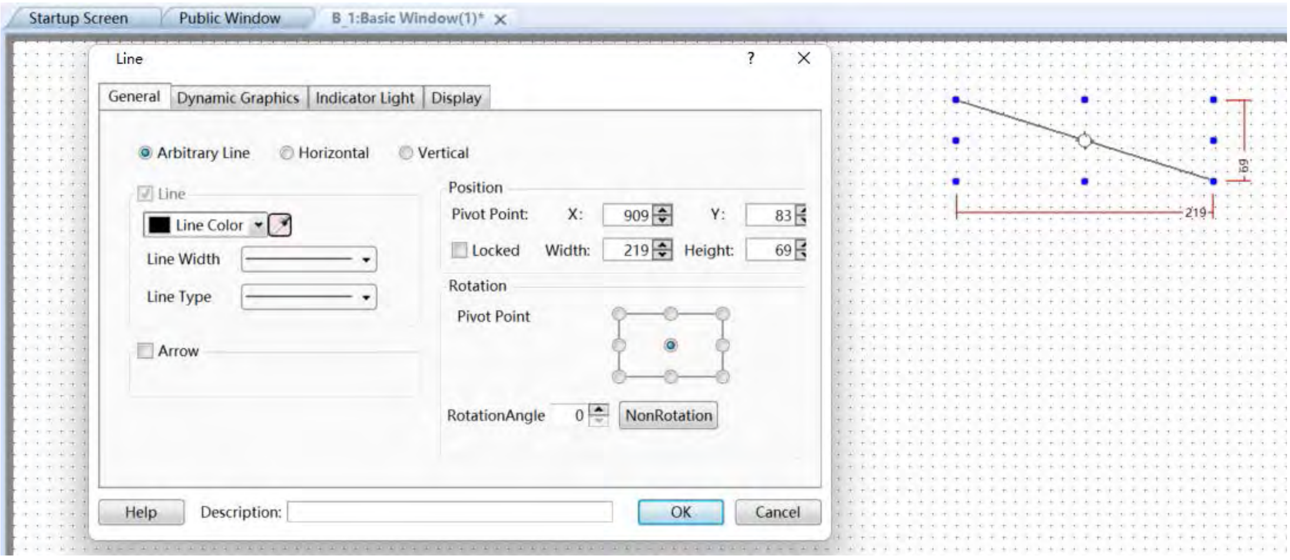
The window can be scaled for better visual effect. Select **Window/Window Zoom** from the menu bar and choose a percentage (50%, 75%, 100%, 125%, 150%, 175%, or 200% are applicable).

9 Drawing

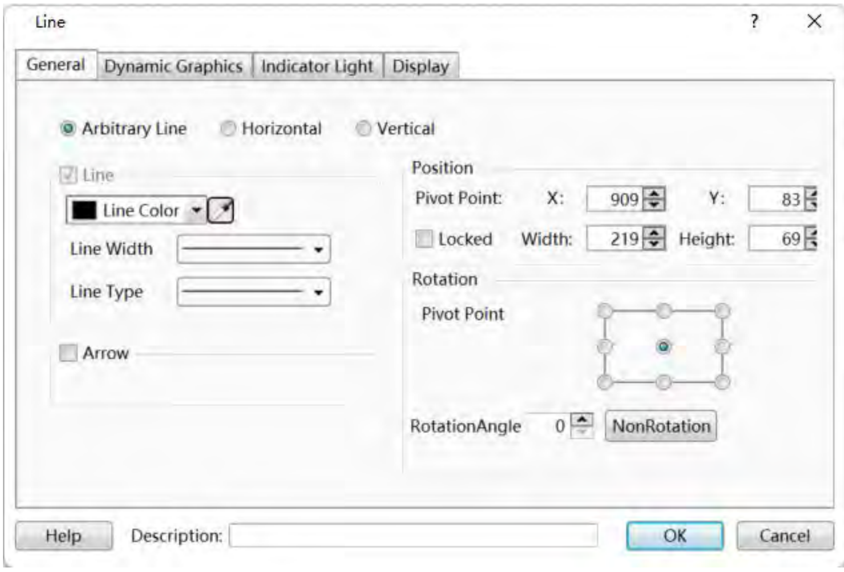
The **Drawing** menu is used to draw geometric shapes, static images, and static text.

9.1 Straight Line

Step 1. Select **Drawing/Straight Line** from the menu bar, hold down the left mouse button, drag in the window, and release the left mouse button to draw a straight line.



Step 2. Set the General properties.



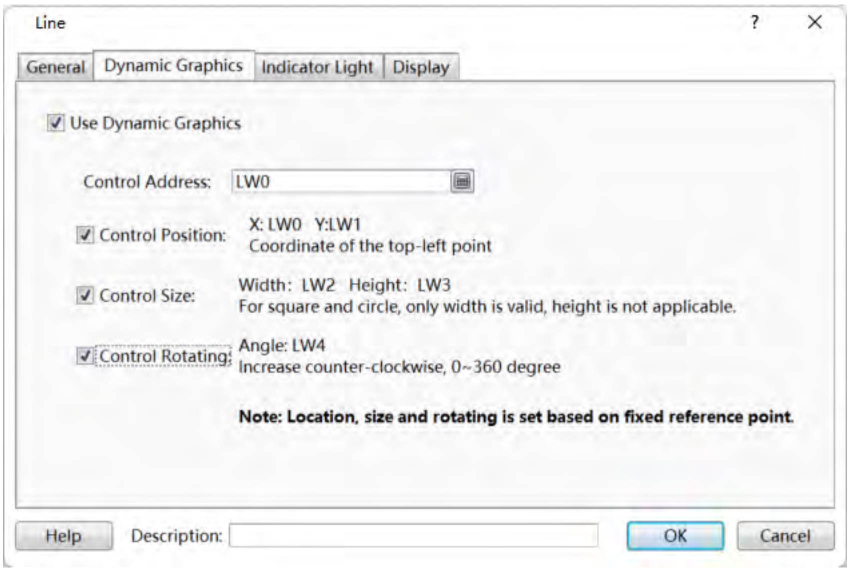
Please refer to the table below for detailed configuration methods.

Parameter	Description
Arbitrary Line	A line in any direction.

Parameter	Description
Horizontal	A line in the horizontal direction.
Vertical	A line in the vertical direction.
Line Color	Click **Line Color** to select the color. Or click the icon to pick up the color of the target object.
Line Width	Select line width.
Arrow	Check the **Arrow** box and select the arrow style.
Pivot Point	The coordinates of the Pivot Point of a straight line.
Width	The length of the line in the horizontal direction.
Height	The length of the line in the vertical direction.
Pivot Point	Set the reference point for rotating the line. There are nine reference points on the shape, and you can choose one of them as the Pivot point.
Rotation Angle	The angle of rotation (in a clockwise direction) of the line based on the Pivot point.

Step 3. Set Dynamic Graphics.

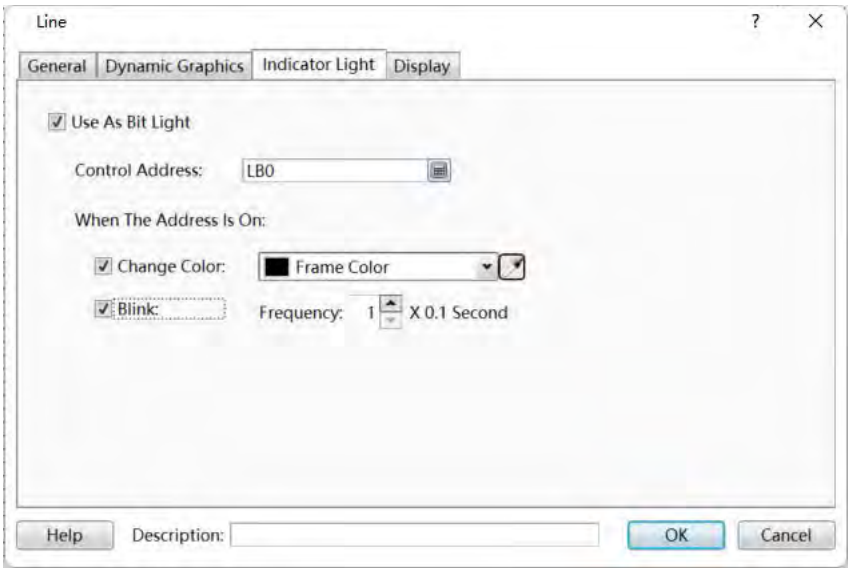
Dynamic Graphics refer to graphics whose position, size, and rotation properties are controlled dynamically using registers.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Use Dynamic Graphics	Whether to use dynamic graphics or not.
Control Address	Click the icon to set the starting address of the controlled parameter.
Control Position	X is the value of the *control address*, and Y is the value of the *control address + 1*. X and Y are the coordinates of the fixed point.
Control Size	The width of the line is the value of the *control address + 2*, and the height is the value of the *control address + 3*.
Control Rotating	The rotation angle of the line is the value of the *control address + 4*.

Step 4. Set an Indicator Light.

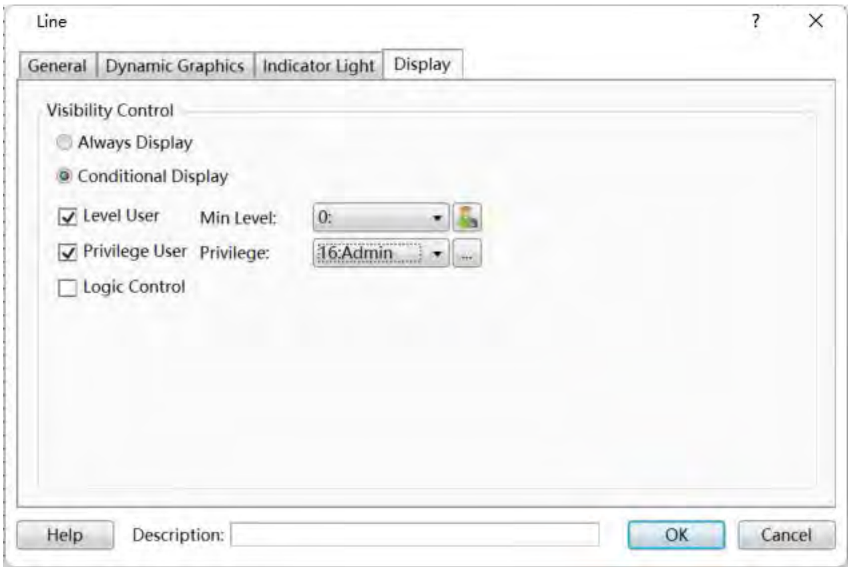


Please refer to the table below for detailed configuration methods.

Parameter	Description
Use as Bit Light	Use the straight line as a bit indicator light.
Control Address	Click the icon to set the control address.

Parameter	Description
Change Color	When the value of the control address is ON, change the color of the border. Click **Border Color** to select a color, or click the icon to pick the color of the target object.
Blink	Set the blink frequency of thestraight line.

Step 5. Set the **Display** properties.



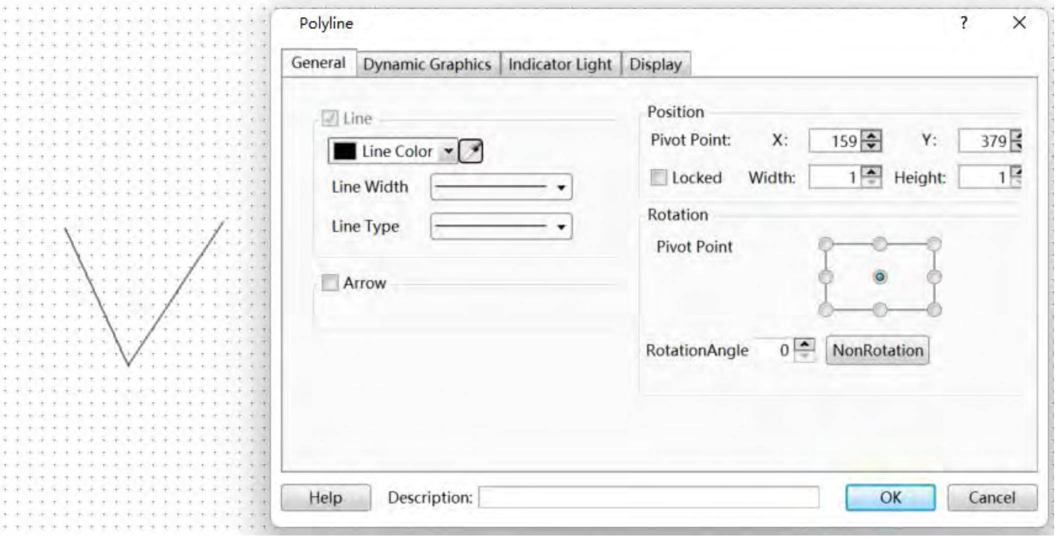
Please refer to the table below for detailed configuration methods.

Parameter	Description
Always Display	Always display the straight line.
Conditional Display	Display the straight line when the conditions are met.
Level User	Display the straight line when the HMI user's level reaches or exceeds the set level.
Privilege User	Display the straight line when the HMI user has the specified privilege.
Logic Control	Display the straight line when the logical condition is met (for example, when the value of LB0 is ON).

Step 6. Click **OK** to complete drawing.

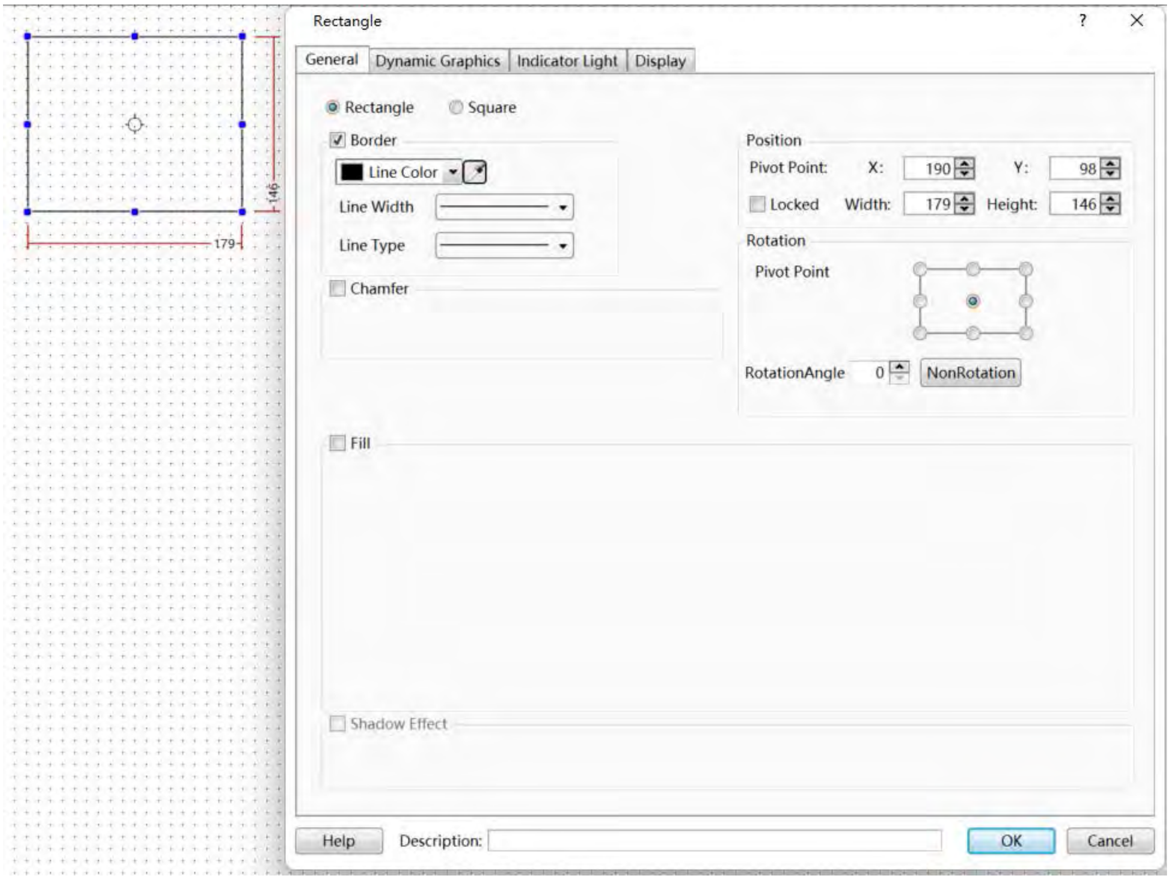
9.2 Polyline

Select **Drawing/Polyline** from the menu bar, click the bend points of the polyline in the window, click the last bend point, right-click the mouse to bring up the **Polyline** dialog box, and follow the same steps as for setting a straight line. Please refer to Straight Line setting method for more details.

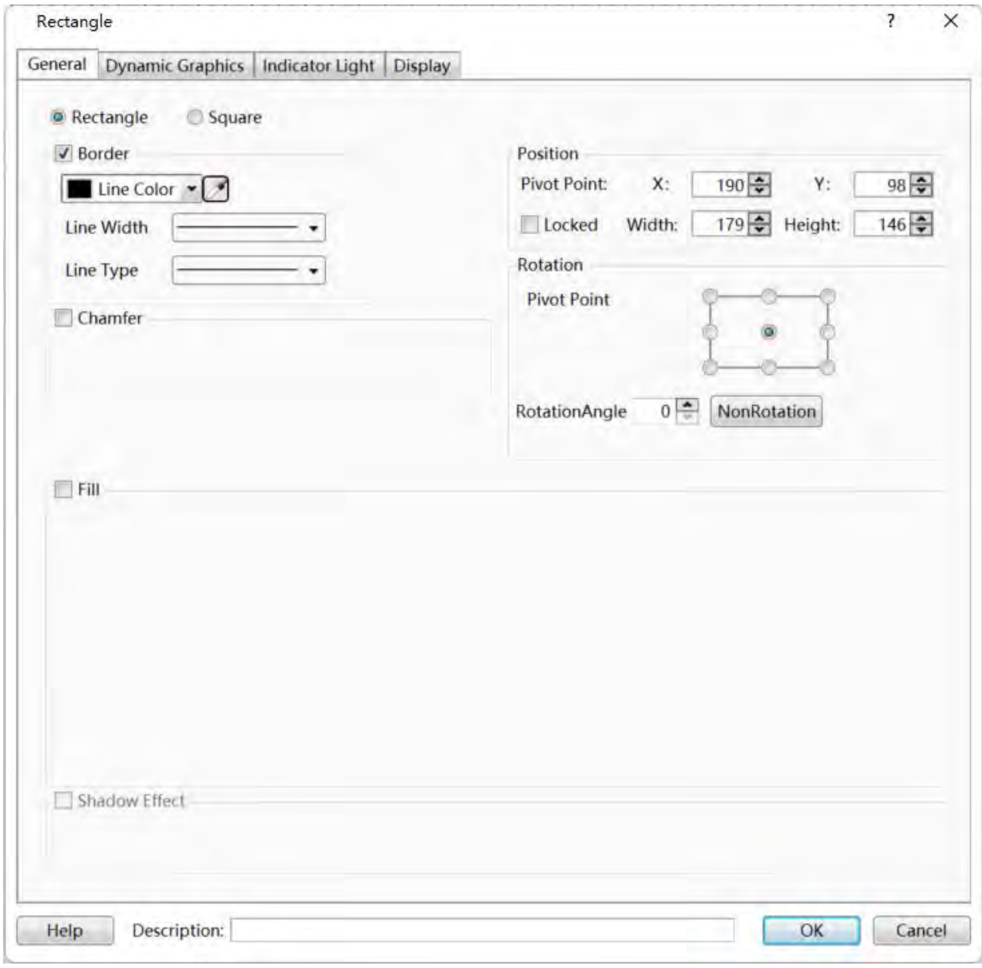


9.3 Rectangle

Step 1. Select **Drawing/ Rectangle** from the menu bar, hold down the left mouse button in the window, drag the mouse, and release the left mouse button.

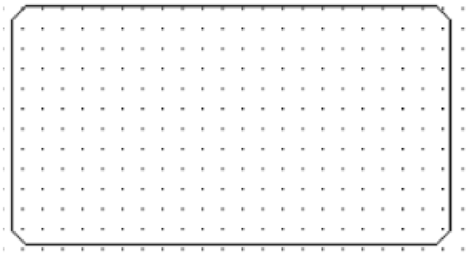
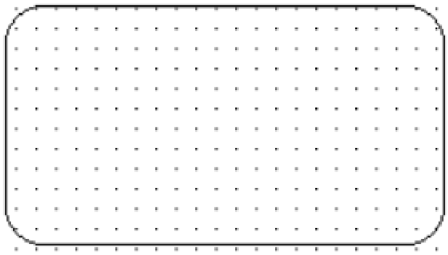


Step 2. Set the General properties.



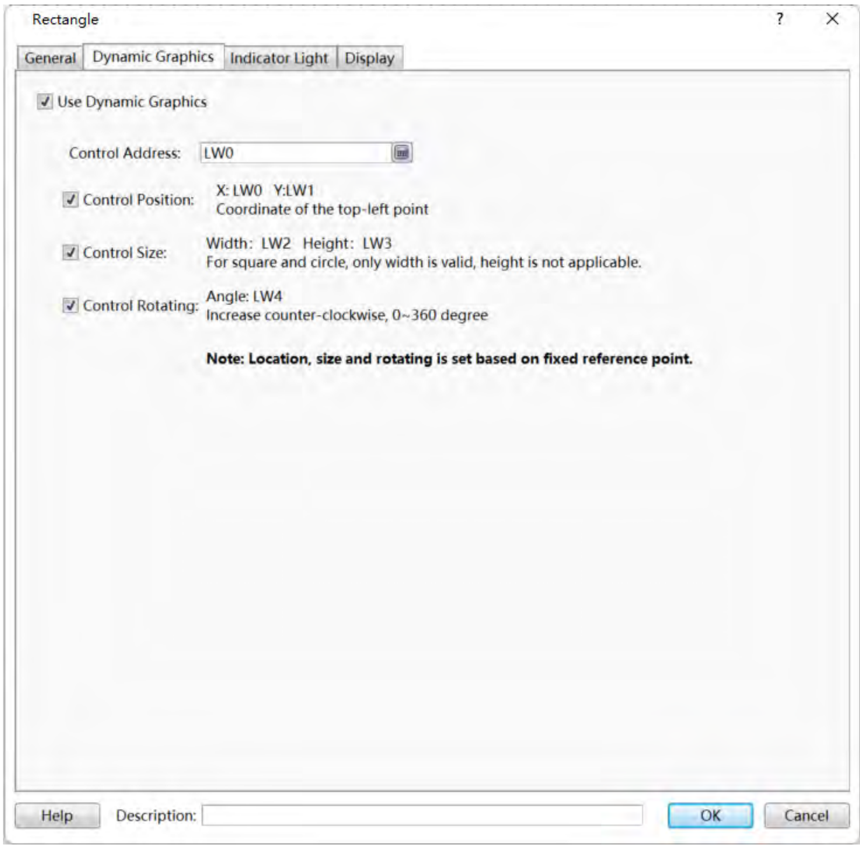
Please refer to the table below for detailed configuration methods.

Parameter	Description
Rectangle	Draw a rectangle.
Square	Draw a square.
Border	Check **Border** to set up border properties.
Line Color	Click **Line Color** to set up the color of the border.
Line Type	Select the form of the border line, including solid and dashed lines.
Chamfer Type	◆ For straight lines, set the size of the chamfer. The result is shown in the following figure.

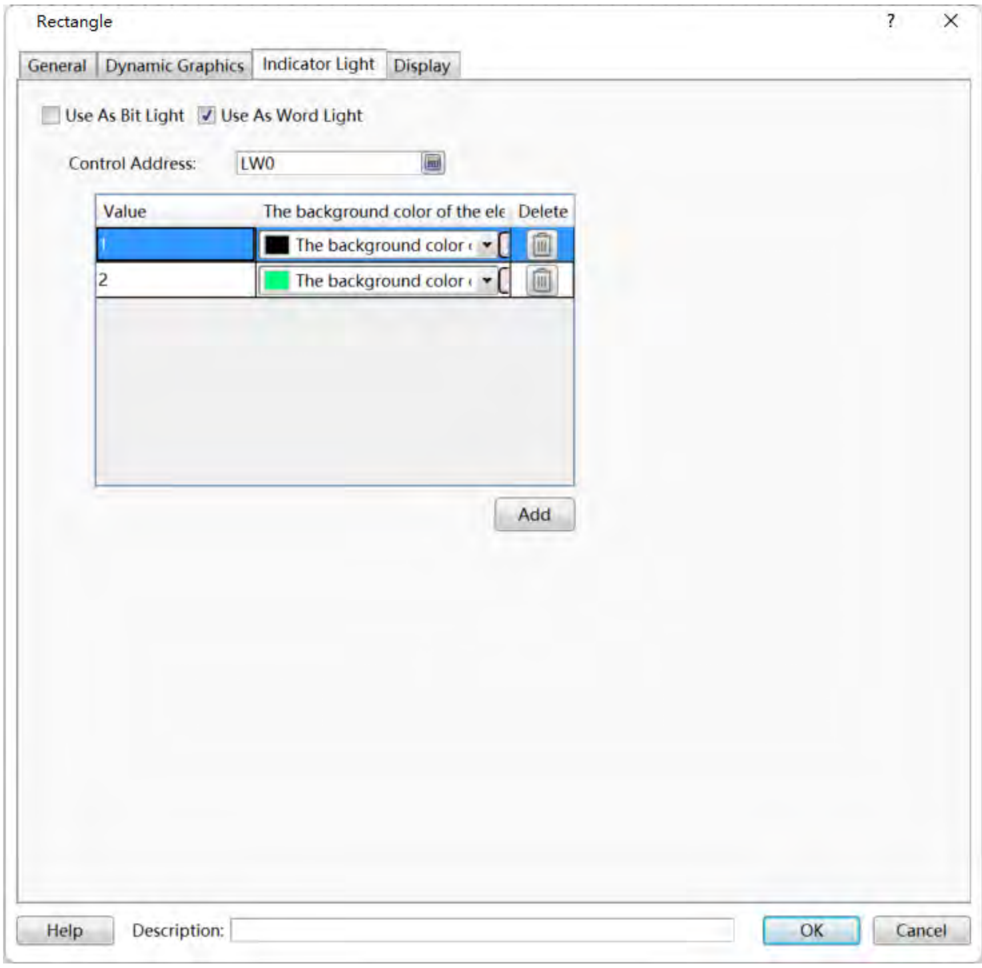
Parameter	Description
	 ◆ For rounded corners, set the radius. The result is shown in the following figure. 
Pivot Point	The coordinates of the Pivot point, including the position in the horizontal and vertical directions.
Width	Width of the rectangle.
Height	Height of the rectangle.
Pivot Point	Fixed point that remains stationary during rotation. One of the nine points can be selected as the Pivot point.
Rotation Angle	The angle of rotation (in a clockwise direction) of the rectangle based on the Pivot point.
Fill	Check the **Fill** box and set the fill effect for the rectangle.
Background Color	When filling with a solid color, only the background color needs to be set.
Foreground color	When filling with a pattern or gradient, the foreground color needs to be set.
Shadow Effect	Check the **Shadow Effect** box and set the shadow for the rectangle. It need to set the shadow color and shadow offset.

Step 3. Set the Dynamic Graphics.

The configuration method is the same as for a straight line. Please refer to Straight Line.



Step 4. Set the Indicator Light.



Please refer to the table below for detailed configuration methods.

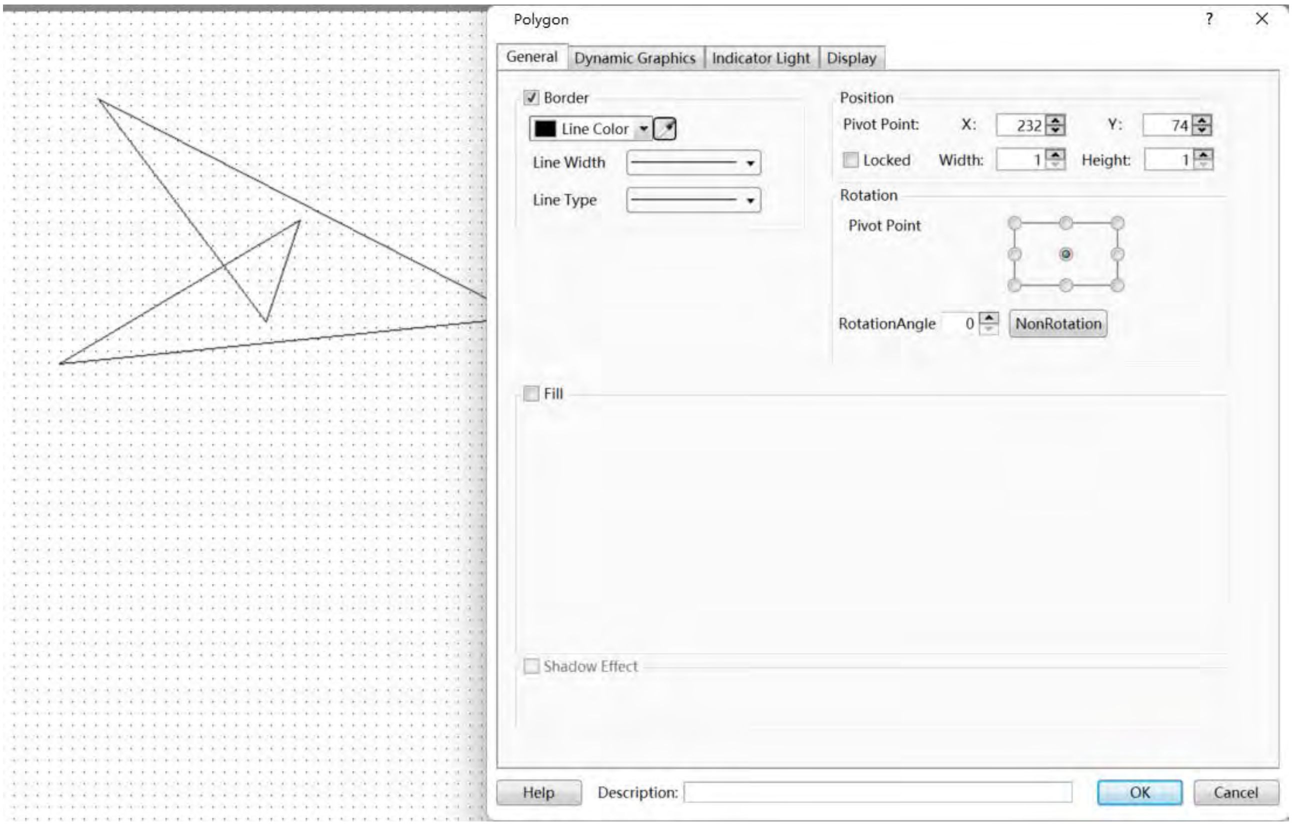
Parameters	**Description**
Use as Bit Light	Use a rectangle as a bit indicator light. Set the control Address, when the value of the control Address changes to ON, the color of the rectangle border can be changed, the rectangle can blink at a specified frequency, and the rectangle can be filled with a specified color or pattern.
Use as Word Light	Use a rectangle as a word indicator light. The background color of the rectangle is determined based on the value of the control address.
Control Address	Click the icon to set the control address. Background color of the rectangle can be changed based on the value of the control address.
Add	Click **Add** and set the value of the control address and the background color of the rectangle.

Step 5. Set the **Display** properties.

Please refer to Step 5.

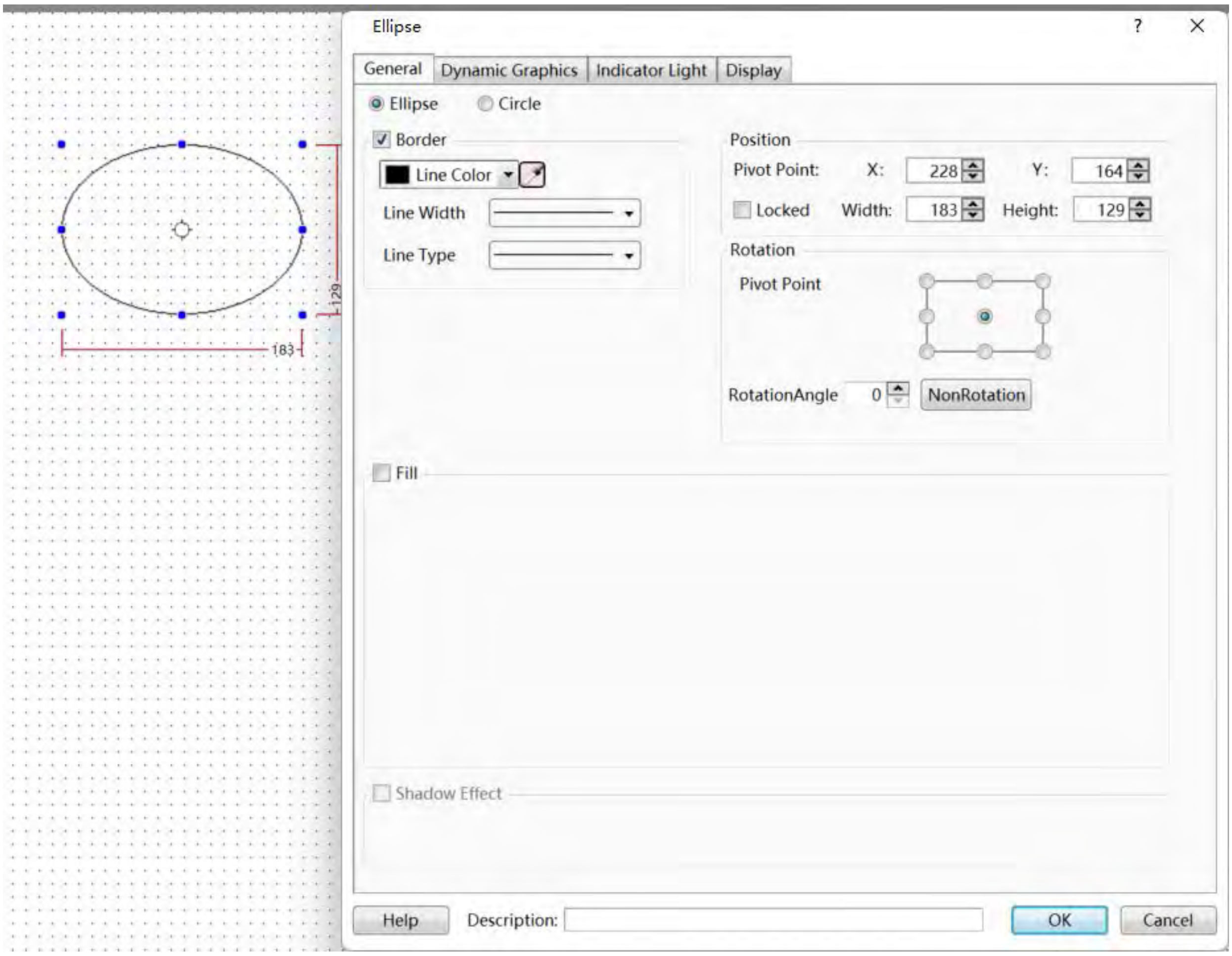
9.4 Polygon

Select **Drawing/Polygon** from the menu bar, click in the window to set the vertices of the polygon, right-click the mouse to complete the outline drawing of the polygon. Follow-up operations are similar to those for a rectangle. Please refer to the Rectangle for more information.



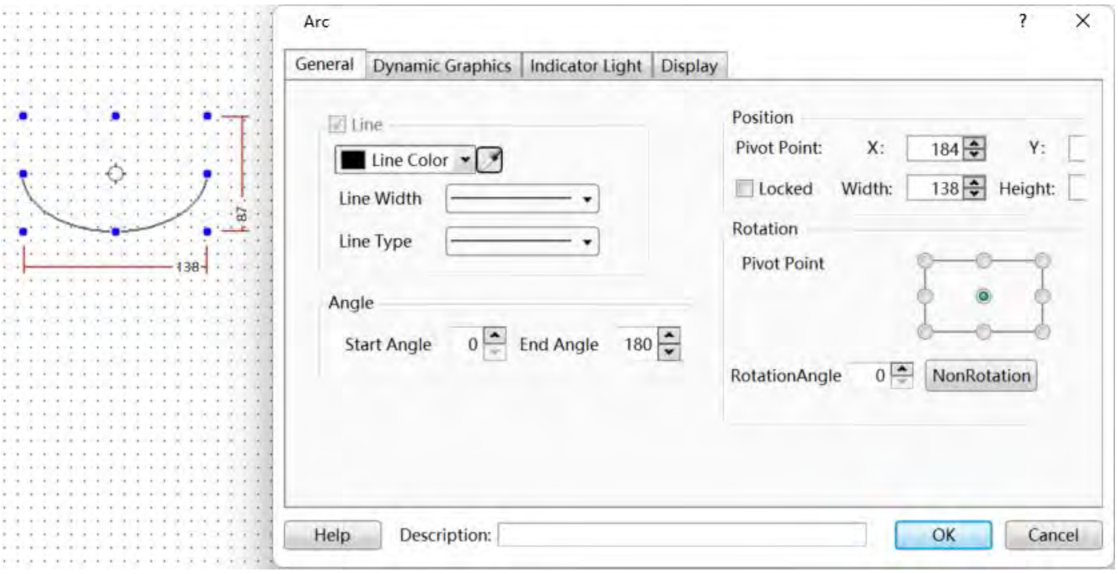
9.5 Ellipse

Select **Drawing/Ellipse** from the menu bar, hold down the left mouse button in the window and drag, then release the left mouse button to draw the outline of the ellipse. Follow-up operations are similar to those for a rectangle. Please refer to the Rectangle for more information.



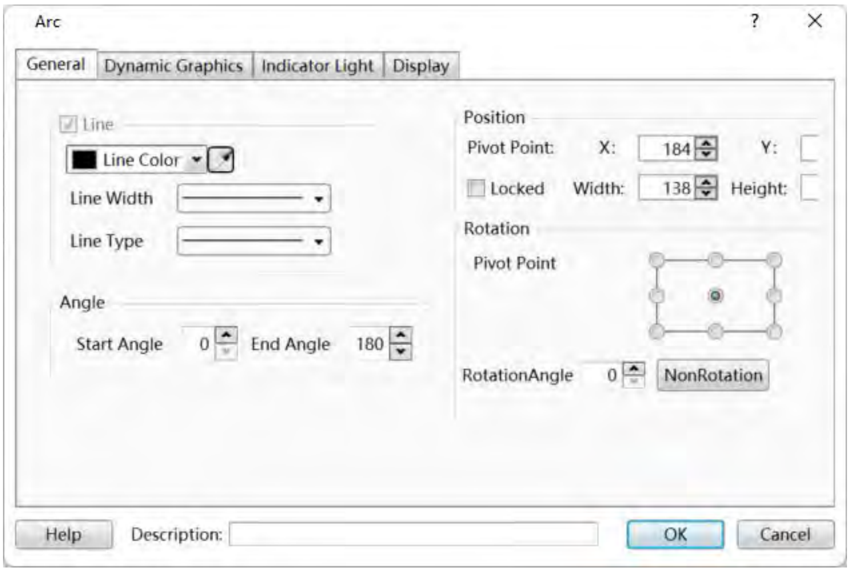
9.6 Arc

Step 1. Select **Drawing/Arc** from the menu bar, hold down the left mouse button in the window, drag, and then release the left mouse button to draw the outline of the arc.



Step 2. Set the General properties.

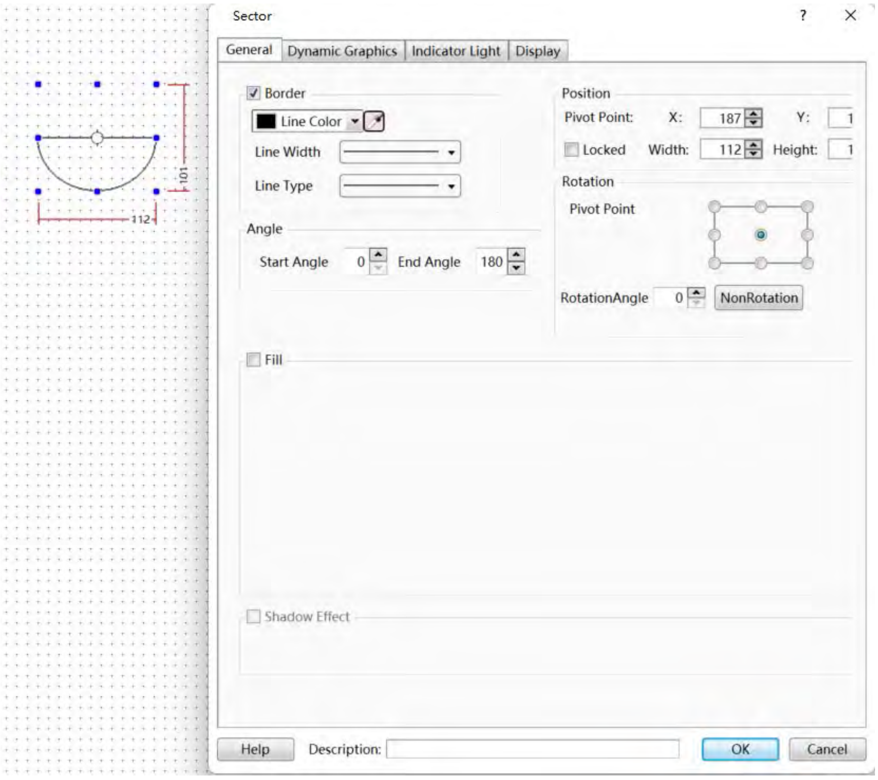
The direction of drawing the arc and the angle setting are based on the clockwise direction (the starting angle is the angle at the starting point of the arc, and the ending angle is the angle at the ending point of the arc).



Step 3. Follow-up operations are the same as for setting a straight line. Please refer to Straight Line for more information.

9.7 Sector

Step 1. Select **Drawing/Sector** from the menu bar, hold down the left mouse button in the window, drag, and then release the left mouse button to draw the outline of the sector.



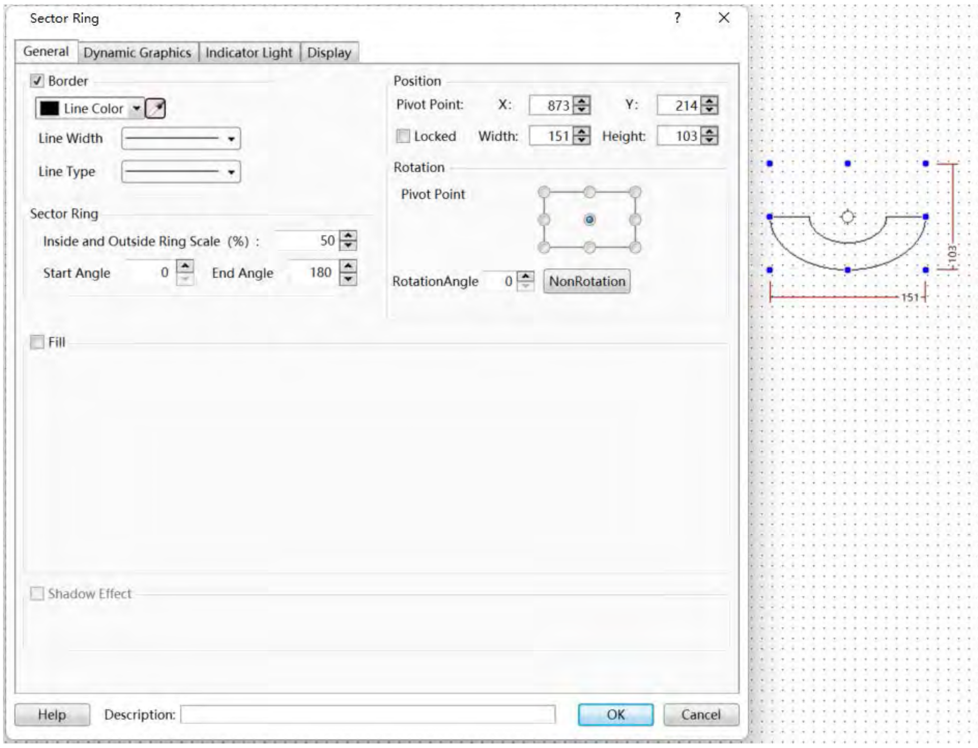
Step 2. Set the General properties.

Set the starting angle and the ending angle of the sector (the drawing direction and angle direction of the sector are both in a clockwise direction) . The configuration of other parameters is the same as for a rectangle.

Step 3. Follow-up operations are similar to those for a rectangle. Please refer to the Rectangle for more information.

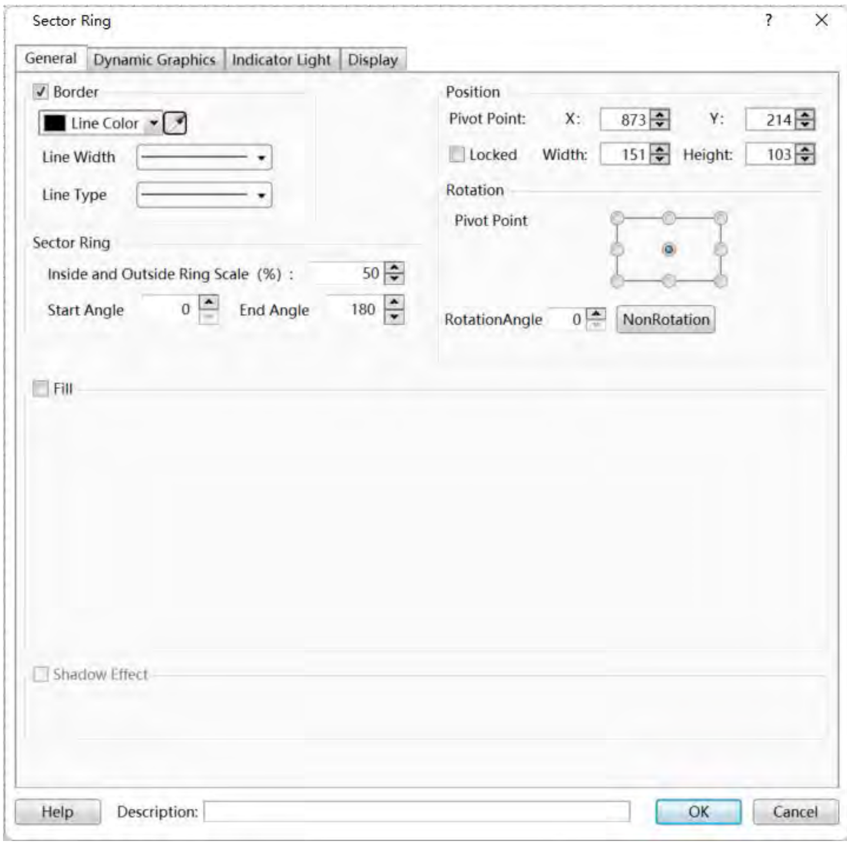
9.8 Sector Ring

Step 1. Select **Drawing/Sector Ring** from the menu bar, hold down the left mouse button in the window and drag, then release the left mouse button to draw the outline of the sector ring.



Step 2. Set the General properties.

Set the ratio of the inside and outside rings, starting angle, and ending angle of the sector ring (the drawing direction and angle direction of the sector ring are both in a clockwise direction) . The configuration of other parameters is the same as for a rectangle.

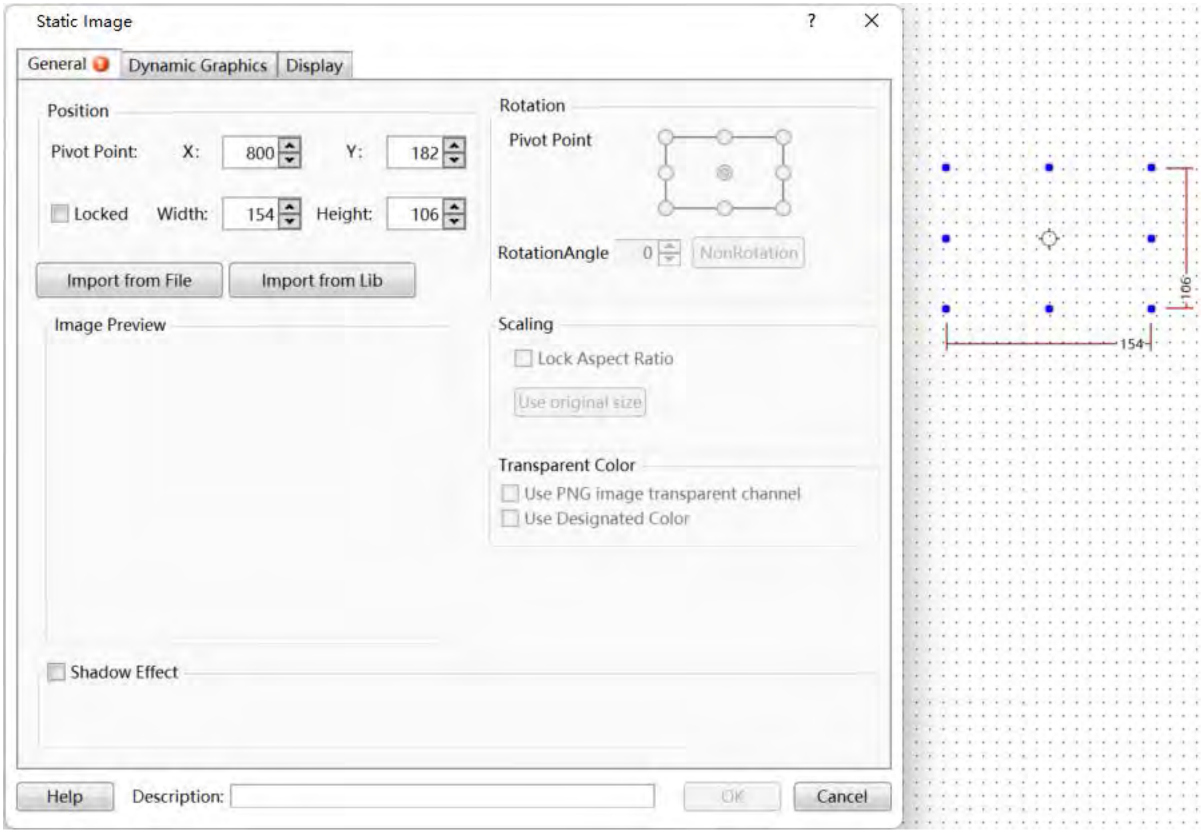


Step 3. Follow-up operations are same as those for a rectangle. Please refer to the Rectangle for more information.

9.9 Static Image

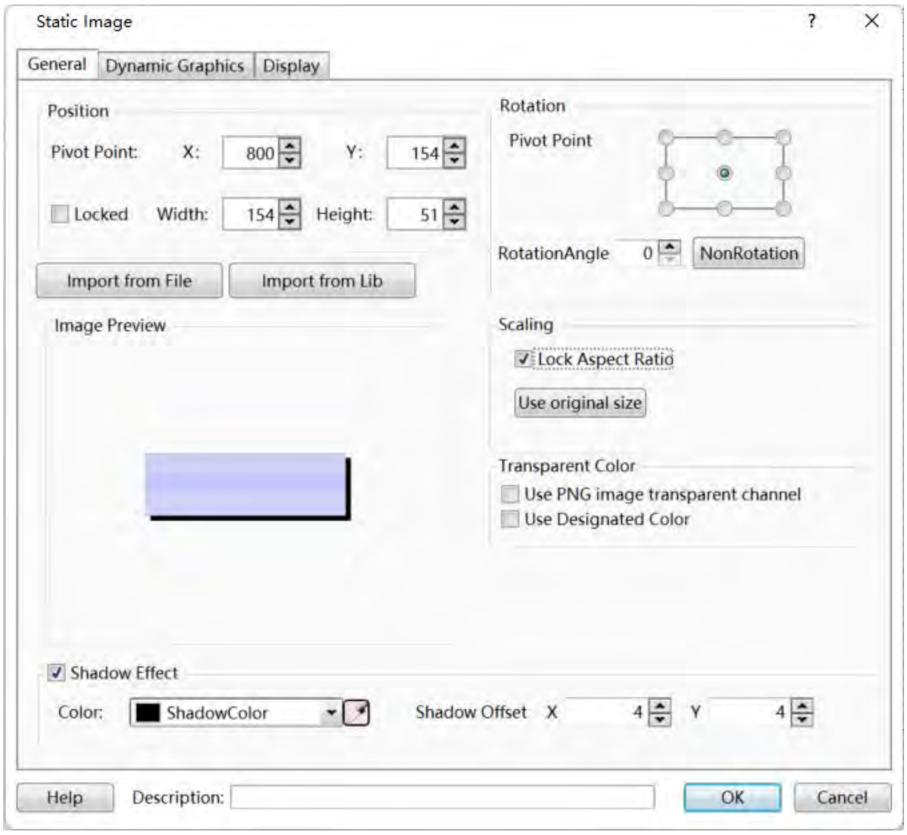
The static image function allows you to import images from a library or use custom images to improve the visual appeal of the screen.

Step 1. Select **Drawing/Static Image** from the menu bar, hold down the left mouse button in the window and drag to specify the position of the image.



Step 2. Set the General properties.

1) Click **Import from File** to import a custom image from your local files, or click **Import from Lib** to import an image from the image library.
2) Set other parameters.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Lock Aspect Ratio	When adjusting the size of the image, scale the width and height of the image proportionally.
Use Original Size	Click **Use Original Size** to use the image in its original size.
Use PNG image transparent channel	When using PNG images, the transparency channel of the PNG image can be selected. PNG images can define 256 levels of transparency for the original image, allowing the edges of color images to blend smoothly with any background, thus completely eliminating jagged edges.
Use Designated Color	Select a specified color (a color that already exists in the image) as the transparent color.
Shadow Effect	To set the shadow effect for an image, the shadow color and shadow offset need to be set.

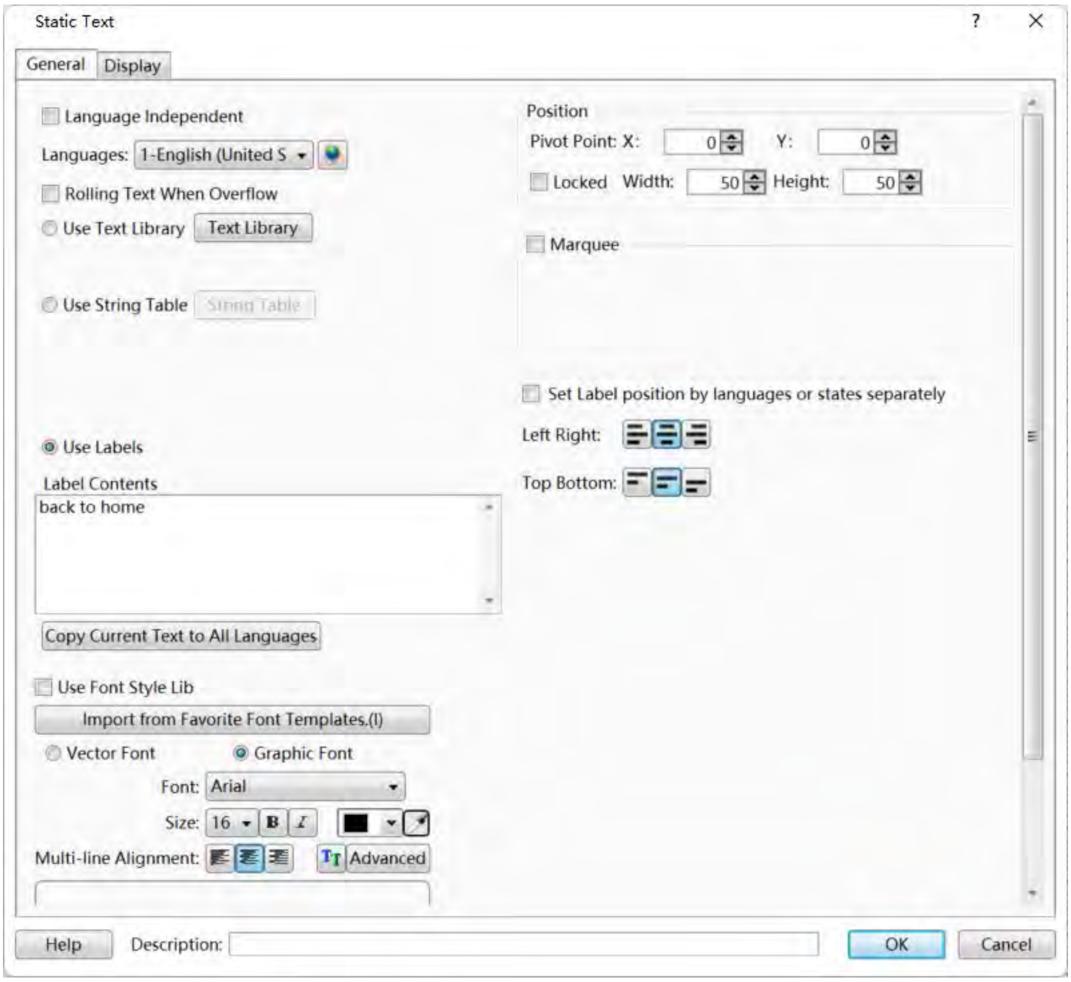
9.10 Static Text

When configuring screen, static text can be used to provide explanations for the components, making it easier for users to understand their functions.

The steps to create a new static text are as follows:

Step 1. Select **Drawing/Static Text** from the menu bar.

Step 2. Set the General properties.



Please refer to the table below for detailed configuration methods.

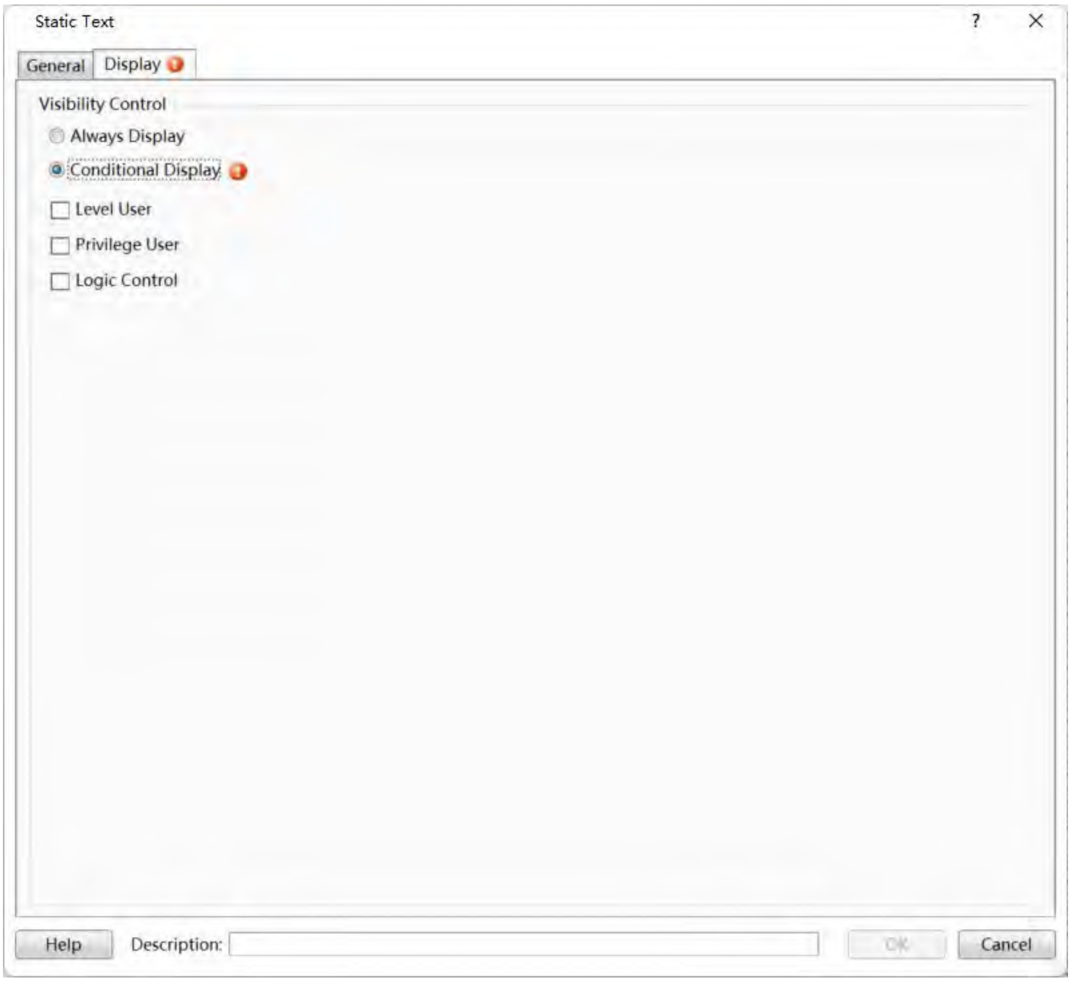
Parameters	Description
Language Independent	Checking **Language Independent** means that the entered text does not vary when switching language view.
Languages	Select the current display language.
Rolling Text When Overflow	When the content of the text exceeds the display range, the text information will be rolling displayed.
Use Text Library	Use the text in the text library. For more information about the text library, please refer to

Parameters	Description
	Text Library.
Use String Table	Click **String Table** to add a new string table. This is useful in scenarios where there are many text statees. The string table function can be used to dynamically adjust the text using pre-defined numbers.
Table	Select the string table.
String ID	Select a custom string ID.
Use Labels	The tag content can be customized.
Copy Current Text to All Languages	This text will be displayed in all language views.
Set label position by languages or states separately	Set the alignment and margin of the text separately for different languages or states.
Use Font Style	Use the fonts in the font style library. For more information about the font style library, please refer to Font Style Library.
Import from Favorite Font Templates	Click **Import from Favorite Font Templates** to select a font from the favorite font templates. For more information about the common font templates, please refer to Favorite Font Template.
Vector Font	The fonts in the font library are vector graphics. When the character encoding is Unicode, a vector font must be selected.
Graphic Font	The fonts in the font library are bitmaps. The entire string is captured as a bitmap and saved to the project.
Copy Current Properties to All Languages	The font properties of the text are consistent for all language views.
Position	Set the coordinate of the Pivot point.

Parameters	Description
Width	The width of the text box.
Height	The height of the text box.
Locked	Checking **Locked** prevents change of the position and size of the text box.
Marquee	Text is displayed by moving in a certain way.
Moving Direction	Includes moving from left to right, moving from right to left, moving from top to bottom, and moving from bottom to top.
Step Length	The distance of movement.
Speed	The speed of movement. When set to 10, it means one step is moved per second.

Step 1. Set the **Display** properties.

Configuration methods please refer to Step 5.



10 Component

Component is the basic element of a screen and is used to display the data of the automation equipment and to implement control functions for the PLC. Components include switch, indicator light, numerical value and text display, etc.

10.1 Switch

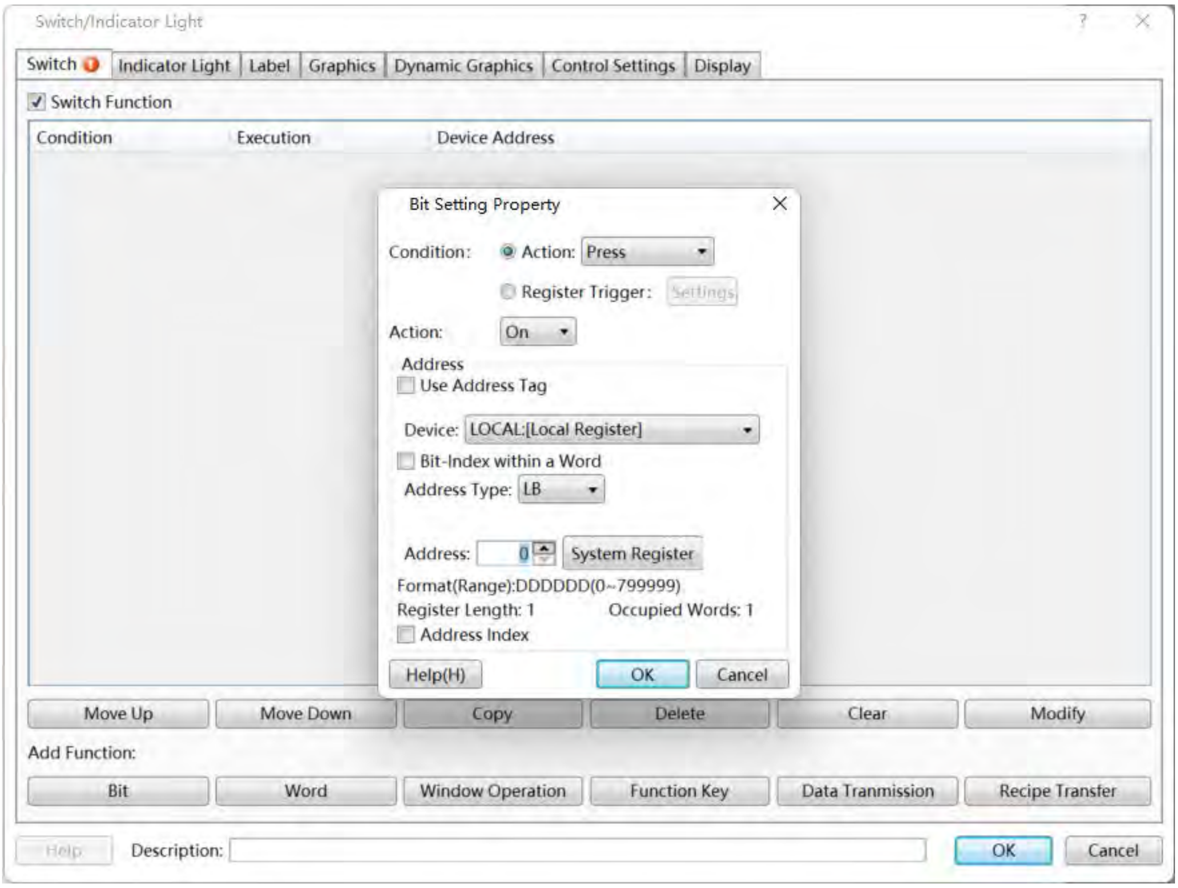
Switch refers to setting the value of the switch in different state, and switching functions when the switch state changes (such as setting the value of a specified bit address, transferring data to PLC, window operation, etc.).

10.1.1 Bit Set

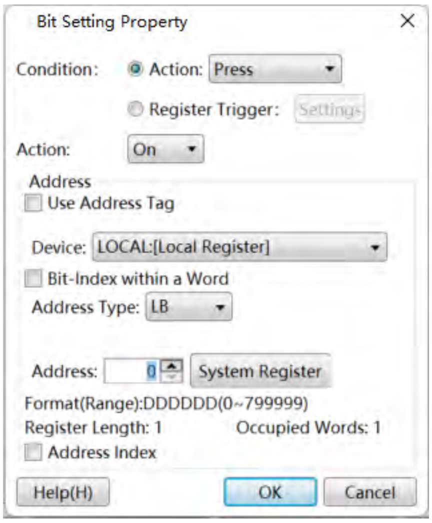
A bit set switch is a component that sets the value of the internal bit address of HMI or the bit address of the PLC connected to HMI. The bit set functions include ON, OFF, inverse, reset, ON pulse, and OFF pulse.

The steps to create a bit set switch are as follows:

Step 1. Select **Component/Switch/Bit Set** from the menu bar, and the following dialog box will pop up.



Step 2. Set the Bit Setting Property.



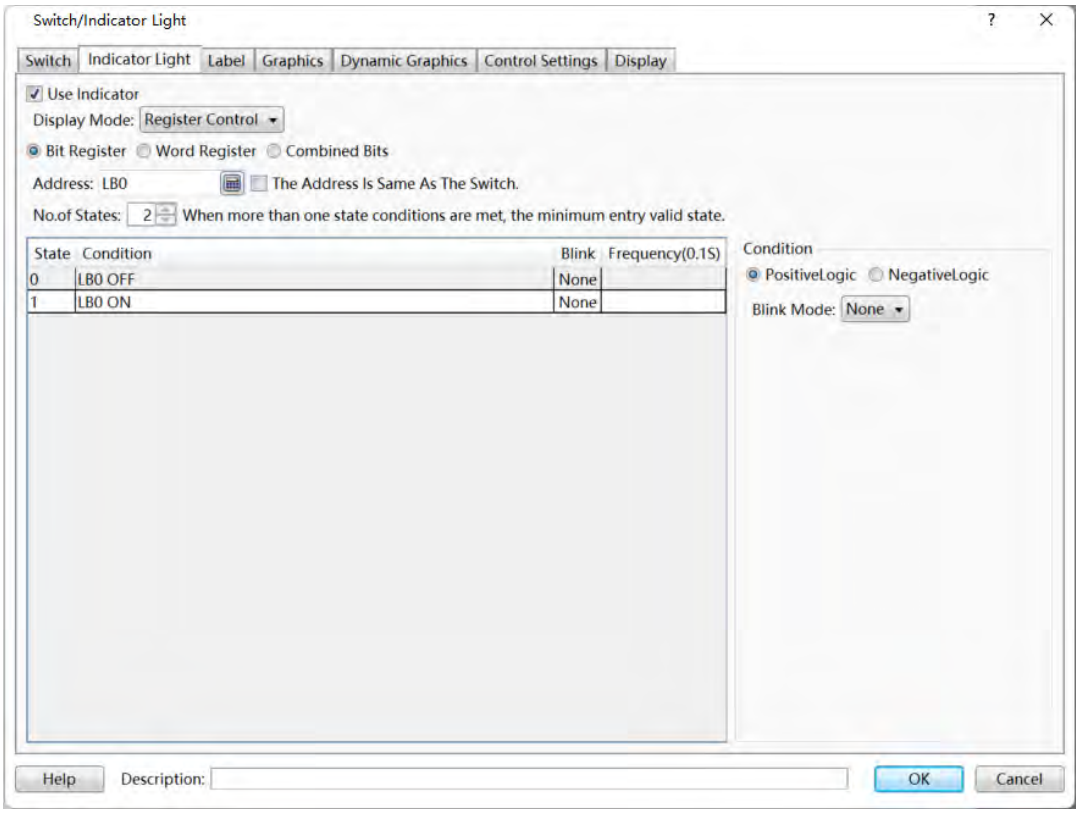
Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Action	Includes press and release.
Register Trigger	The switch is triggered by a change in the value of the register. Click **Settings** to set the trigger conditions.
Action	After performing an action on the bit set switch（or when the trigger conditions are met）, the following steps need to be executed: ◆ On: Set the value of the specified bit address to ON. ◆ Off: Set the value of the specified bit address to OFF. ◆ Inverse: Inverse the value of the specified bit address. For example, if the value of the specified bit address is ON and the action is executed (such as the switch is pressed) the value of the specified bit address will be set to OFF. ◆ Reset: When the bit set switch is pressed（or when the trigger conditions are met）, the value of the bit address is set to ON.When the bit set switch is released (or when the trigger conditions are not met), the value of the bit address is set to OFF. ◆ ON Pulse: Set a rising edge pulse of a specified time width for the bit address. For example, if the ON pulse time is set to 1 second and the current bit state is OFF, when executing an action to the bit set switch (such as press), it will set a 1-second ON pulse signal, which will then return to OFF. If the current bit state is ON, when executing an action to the bit set switch (such as press), it will set a 1-second ON pulse, and then the bit state will return to OFF. ◆ OFF Pulse: Set a falling edge pulse of a specified time width for the bit address. For example, if the OFF pulse time is set to 1 second and the current bit state is ON, when

Parameters	**Description**
	executing an action to the bit set switch (such as press), it will set a 1-second OFF pulse signal, which will then return to ON If the current bit state is OFF, when executing an action to the bit set switch (such as press), it will set a 1-second OFF pulse, and then the bit state will return to ON.
Use Address Tag	Use Tag values to map commonly used addresses. For more information about address tags, please refer to Address Tag Library.
Device	HMI local registers, recipe registers, and PLC registers.
Bit-Index within a Word Register	To present bit address in a word register. The format is DDDDD.DD, for example, 799999.15.
Address Type	Please refer to the actual situation.
Address	The address number of the register. Please refer to the actual situation.
Address Index	Change the current address with the value of the specified word address. For example, if the current address is set to LB1, the address index is LW0, and the offset is 2, then the actual address is LB(1 + *the value of LW0* + 2).
Offset	The address offset .

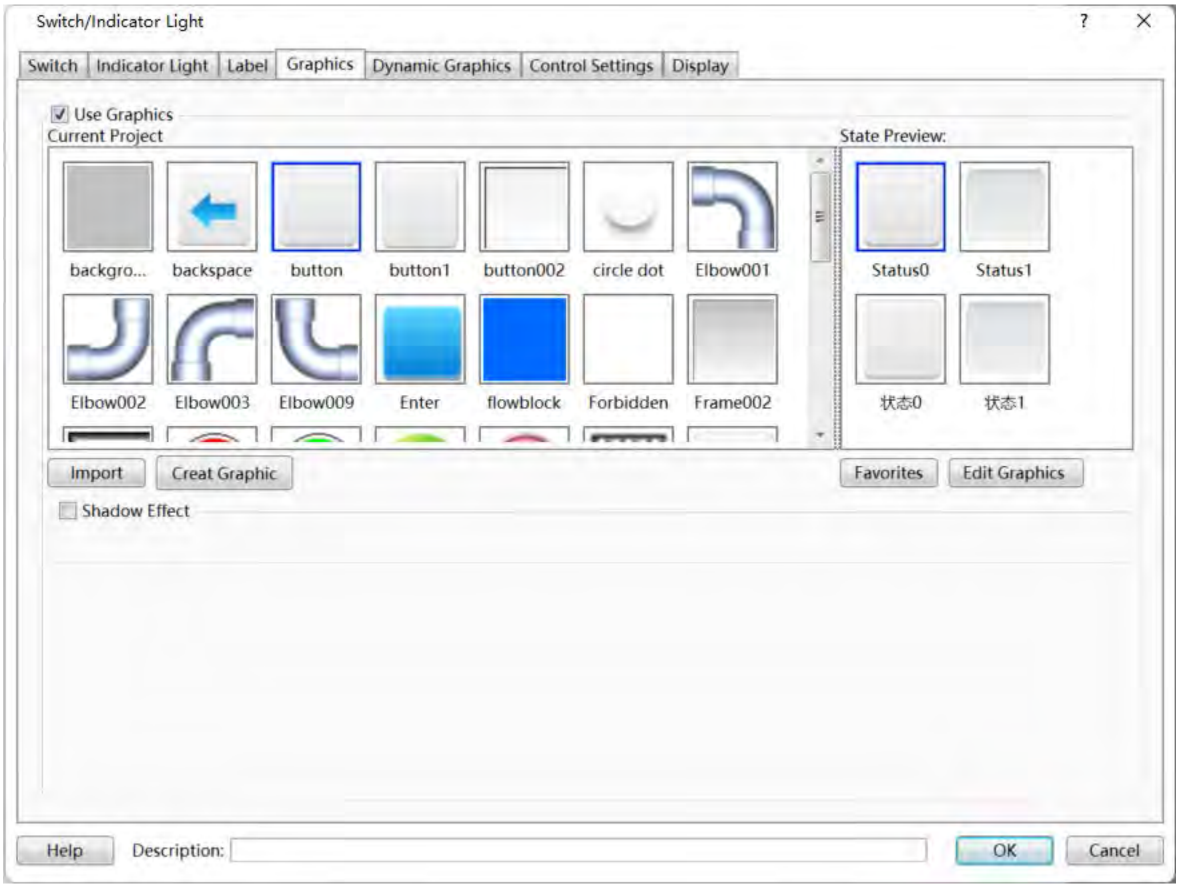
Step 3. Set an indicator light.

Select the **Indicator Light** tab and check **Use Indicator**. For detailed configuration information about the indicator light, please refer to Indicator Light.



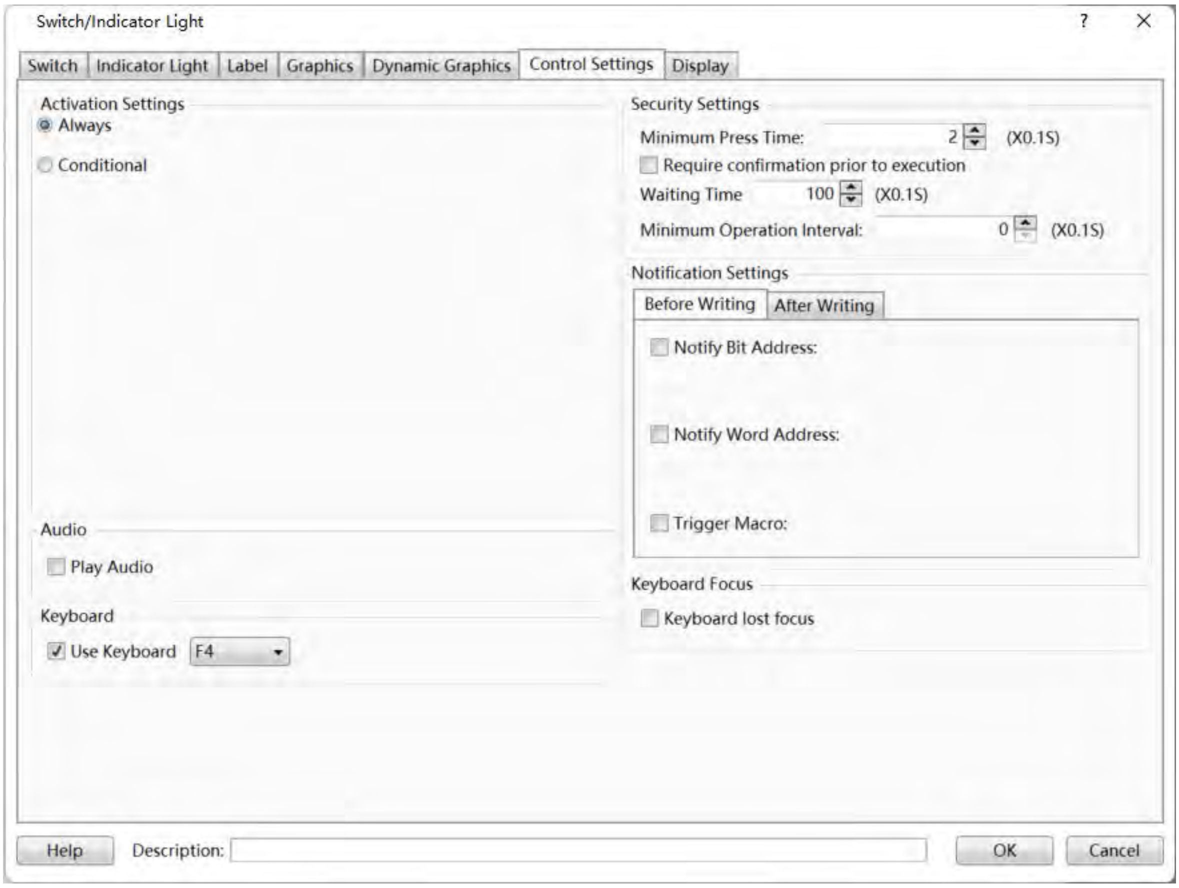
Step 4. Set the Graphics.

Select the **Graphics** tab, choose the graphics and use them to beautify the bit set switch interface.



Step 5. Set the Control Settings.

Select the **Control Settings** tab and configure relevant parameters.



Please refer to the table below for detailed configuration methods.

Parameters	Description
Conditional	The bit set switch can only be operated when a specified condition is met.
Level User	Operate the bit set switch only when the HMI user's level reaches or exceeds the set level.
Privilege User	Operate the bit set switch only when the HMI user has the specified privilege.
Logic Control	The bit set switch can only be operated when specific logical conditions are met (such as the value of LB0 is ON and the value of LB1 is OFF).
Keyboard	When an external keyboard is used with the HMI, the switch control function can be implemented through the external keyboard keys.
Minimum Press Time	It takes effect when the duration of pressing the switch reaches the set value.

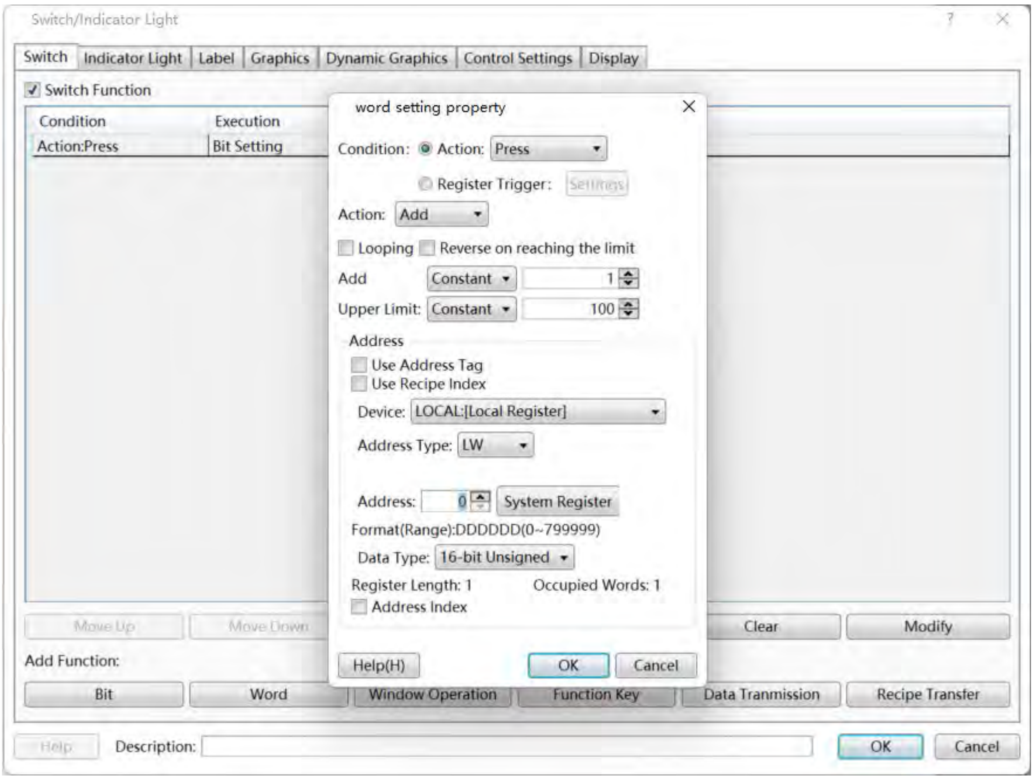
Parameters	Description
Require confirmation prior to execution	When checked, an operation confirmation dialog box will pop up when the switch is touched to prevent accidental operation.
Waiting Time	The display time of the operation confirmation dialog box.
Minimum Operation Interval	The minimum interval time for repeated operations.
Keyboard lost focus	Whether the auxiliary X icon is displayed when an external keyboard is used.

Step 6. Click **OK**.

10.1.2 Word Set

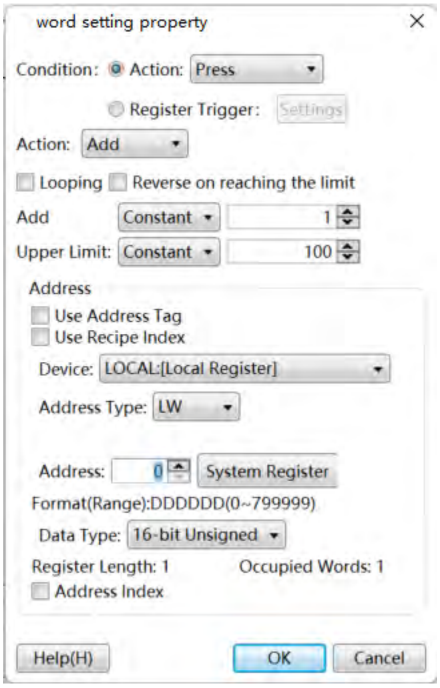
The word set switch component is a component that performs relevant operations (such as addition) on the value of the internal word register of the HMI or the word register of the PLC connected to the HMI.

Step 1. Select **Component/Switch/Word Set** from the menu bar to enter the following interface.



Step 2. Set the word setting property.

Configure relevant parameters, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Action	Includes press or release. The default **action** is “Press”, which means that the corresponding

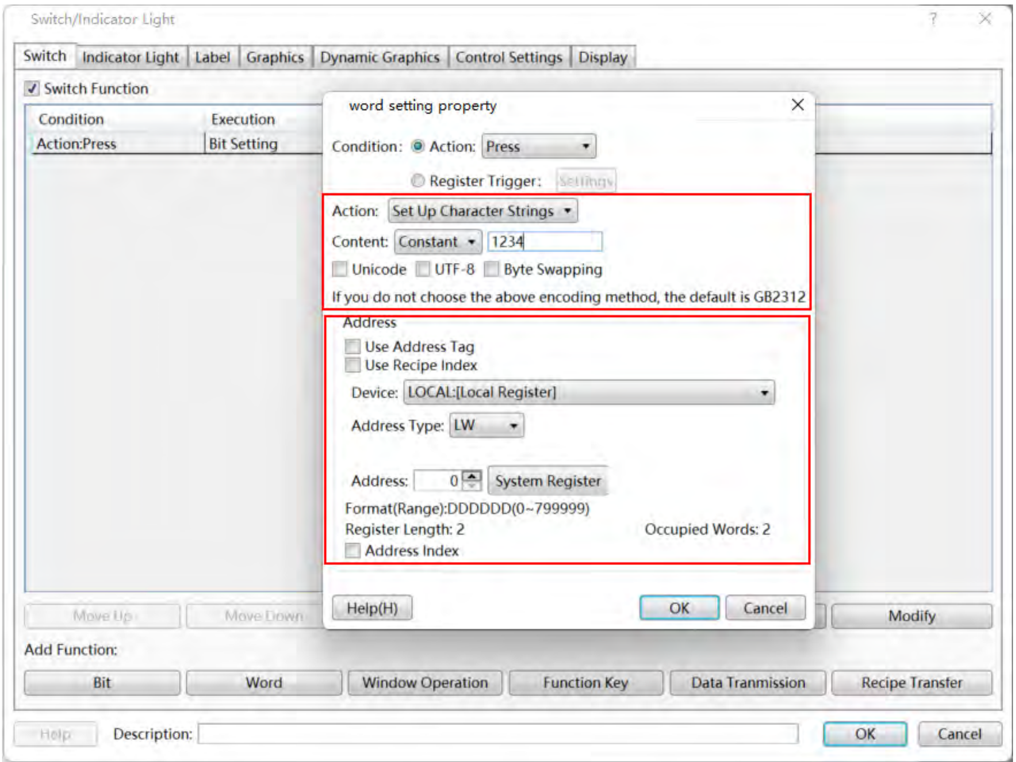
Parameter	Description
	operation is performed when the component is pressed. You can also choose “Release”, which means that the corresponding operation is performed when the pressed component is released. For “increase” and “decrease” operations, since these operations are only performed when the component is pressed, there is no released action.
Register Trigger	Changes in the state of the register can trigger switch actions. Click **Settings** to set the trigger conditions.
Action	After performing an action (such as press on the word setting switch)or when the trigger conditions are met, perform the corresponding operation: ◆ Add: Add the addend. The addend can be set as a constant or a variable. When the value of the word address plus the value of the addend reaches the maximum limit value, the addend will not be added when performing an action (such as press) on the word set switch again. The maximum limit value can be set as a constant or a variable. When using a variable, the data type of the variable must be consistent with the data type of the set word register, otherwise calculation errors may occur. ◆ Subtract: Subtract the subtrahend. The subtrahend can be set as a constant or a variable. When the value of the word address minus the value of the subtrahend reaches the minimum limit value, the subtrahend will not be subtracted when performing an action (such as press) on the word set switch again. The minimum limit value can be set as a constant or a variable. ◆ Increase: The difference between increment and addition is that “Add” performs the operation once when a word-setting switch is operated (such as being pressed). Even if the word-setting switch is continuously pressed, the Add operation is only performed once. On the other hand, increment performs the add operation continuously as long as the word-setting switch is continuously pressed, until it is released or the value reaches the set maximum limit value. Unlike add, the properties of increment include **immediately execute the increase/decrease action**, **lag time**, and the **execution time**. **Immediately execute the increase/decrease action**: This property is common to both increment and decrement. When checked, the increment or decrement operation will be performed immediately after the word-setting switch is pressed, without waiting. **Lag Time:** When the **Immediately execute the increase/decrease action** is unchecked, you can set this parameter. Otherwise, it cannot be set. The time is set to

<table>
<tr><th>Parameter</th><th>Description</th></tr>
<tr><td></td><td>

0.1 seconds by default and the maximum is 1.5 seconds. For example, setting the lag time to 0.1 seconds means that the increment operation will be delayed by 0.1 seconds after the word-setting switch is pressed.

Execution Time: The time range is also 0.1 seconds to 1.5 seconds, which represents the time it takes to perform one increment operation.

- **Decrease:** The properties and settings of decrement are similar to those of increment. When the word-setting switch is continuously pressed, the decrement operation will be continuously performed until it is released or the value of the word address reaches the minimum limit value.
- **Set Up Constants**: Set a specified data for the word address. The data can be a constant or a variable.
- **Set Up Character Strings**: Set a string for the word address. The following image shows an example of setting the value of the HMI registers LW0 and LW1 to “A123”.



Check **UNICODE** to indicate that the set string is encoded in UNICODE. To display the string correctly, the UNICODE encoding must be used. Otherwise, the string may not be displayed correctly.

</td></tr>
</table>

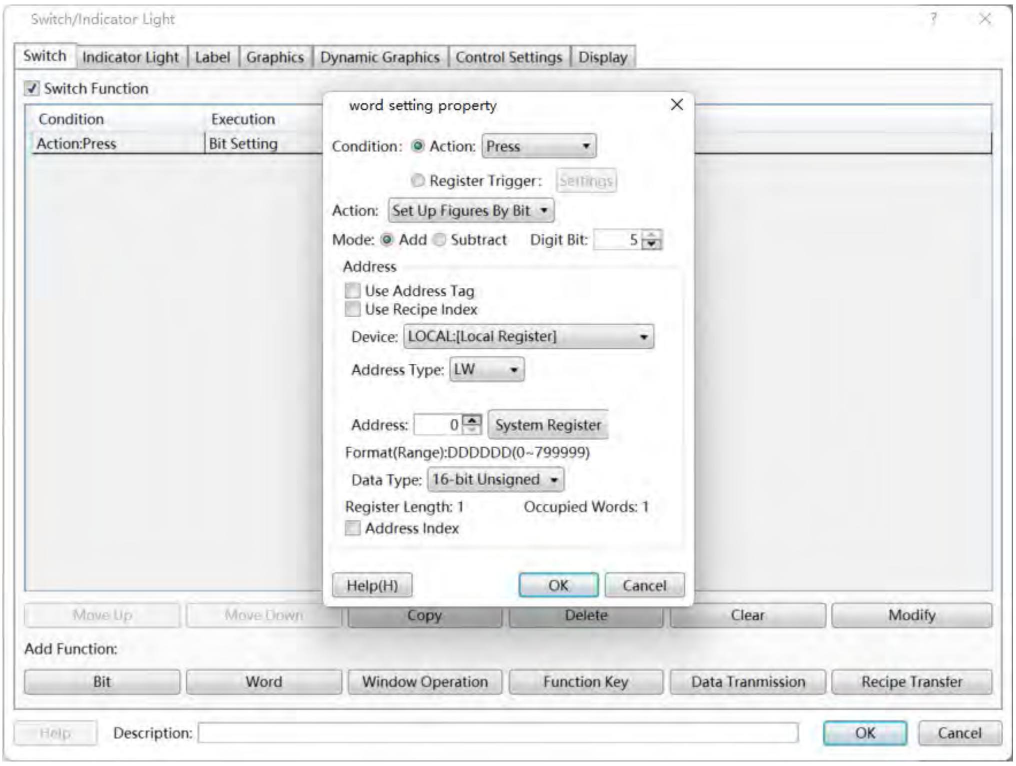
<table>
<tr><th>Parameter</th><th>Description</th></tr>
<tr><td></td><td>

Check **UTF-8** to indicate that the set string is encoded in UTF-8.

Check **Byte Swapping** to swap the high-byte and low-byte of the specified string and write it to the specified word register address.

◆ Set Up Figures By Bit

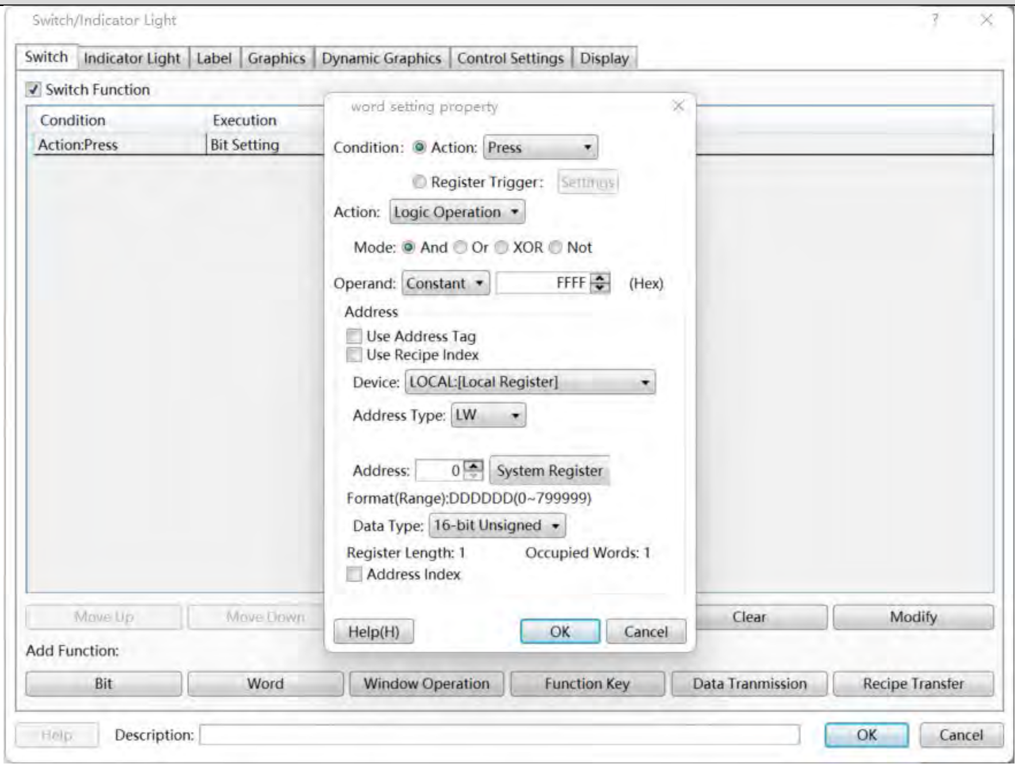
Set Up Figures By Bit: Represents performing an addition or subtraction operation on a certain bit (such as the units digit) of the value of the specified word address.



The Set Up Figures by Bit operation is only applicable to 16-bit unsigned numbers, 32-bit unsigned numbers, and 64-bit unsigned numbers. As shown in the figure above, when the data type is “16-bit unsigned number”, the value range is 0~65535, so the range of the “Digit” parameter that can be set is from 1 to 5, which represents the length of the number from 1 to 5. 1 represents the units digit, 2 represents the tens digit, 3 represents the hundreds digit, 4 represents the thousands digit, and 5 represents the ten-thousands digit, and so on. For example, if the Digit parameter is set to 3 and the **mode** is set to Add, it means that the Add operation will be performed on the third digit (hundreds digit) of the data. Assuming that the current value of the hundreds digit of the word address is 6, when the bit-setting

</td></tr>
</table>

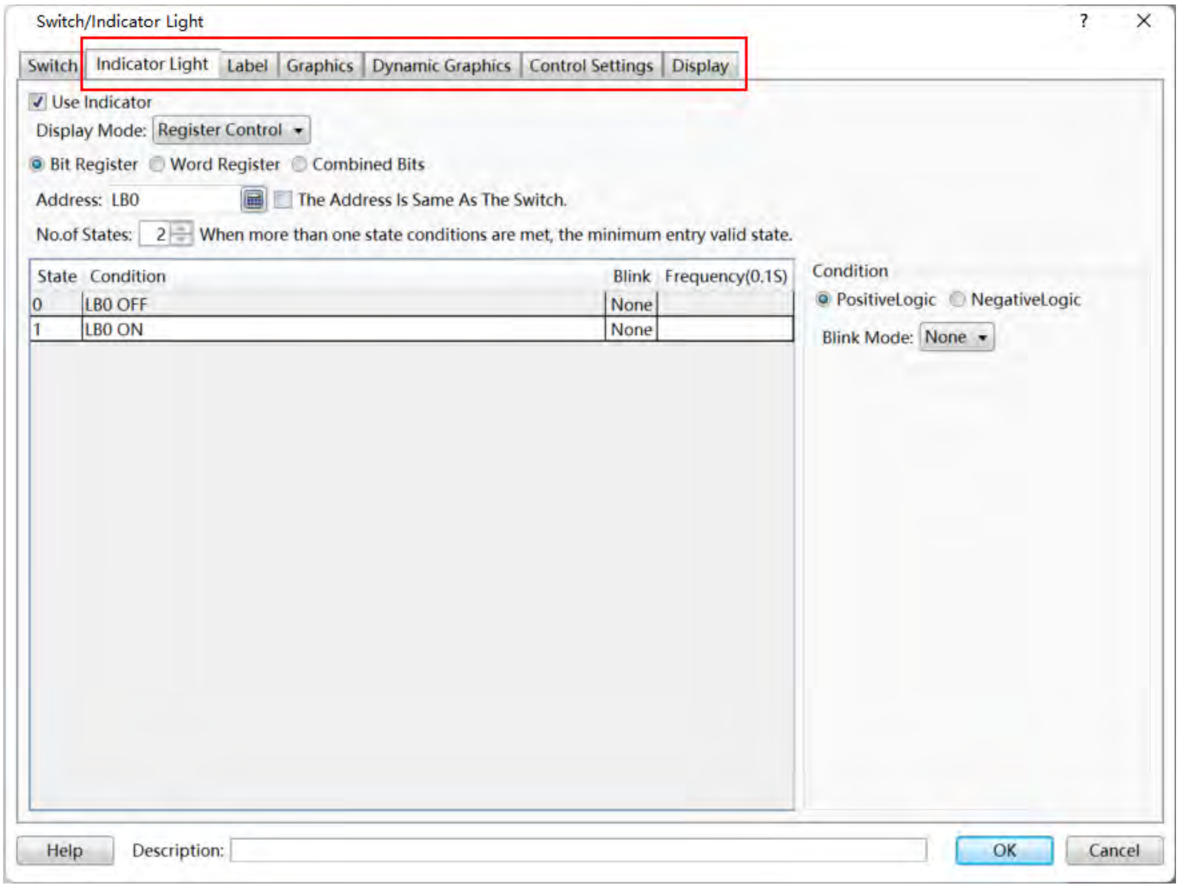
Parameter	Description
	switch is operated (such as being pressed), the value of the hundreds digit will be changed to 7. Pressing the bit-setting switch again will change the hundreds digit to 8, pressing it again will change the hundreds digit to 9, pressing it again will change the hundreds digit to 0, and pressing it again will change the hundreds digit to 1, and so on. For example, if the **Digit** parameter is set to 3 and the mode is set to Add, and the current value of the word address is 18668, pressing the word-setting switch once will change the value to 18768, pressing it again will change the value to 18868, pressing it again will change the value to 18968, and so on, with the hundreds digit following the cycle of 0 to 9. Since the maximum value of a single word is 65535, if the **Digit** parameter is set to 5, the value of the ten-thousands digit will cycle from 0 to 5. If it exceeds 5, the minimum value will be 68668, which is greater than 65535 and exceeds the maximum value range of a single word, so the data can only go up to 58668. When the **mode** is set to Subtract, the corresponding digit will be decremented by 1. In addition, when the number format is set to 32-bit unsigned number, you can refer to the maximum value of an unsigned double word, which is 4294967295, to perform the operation. ◆ Logical Operation: The modes of logical operation include AND, OR, XOR, and NOT.

Parameter	Description
	 As shown in the figure above, when the bit-setting switch is pressed, the value in register LW0 is ANDed with 0xFFFF, and the calculation result is assigned to LW0. The configuration methods for the other three modes are similar. **Operand:** The default is a constant with a data format of hexadecimal. It can also be a variable, but when selecting a variable, make sure that the data type of the operand matches the data type of the specified register address. The logical operation supports register data types of 16-bit unsigned number, 32-bit unsigned number, 64-bit unsigned number, 16-bit BCD, and 32-bit BCD format.
Looping	◆ When the **Action** is set to Add: When **Looping** option is checked, an additional parameter “Lower Limit” will appear. When the value of the word address is added to the upper limit value, continuing to operate the word-setting switch (such as pressing it) will cause the Addend value to continue to increase from the set Lower Limit value with each operation, and so on in a loop. For example, if the Lower Limit is set to 0, the Addend is set to 1, and the upper limit value is set to 100, when the value of the word address is 100, continuing to operate the word-

Parameter	Description
	setting switch (such as pressing it) will cause the value to become 0, and then continuing to operate it will cause the value to become 1, 2, 3, and so on, until it becomes 100. Therefore, the change of the value of the word address is 0->1->2…->98->99->100->0->1->2…->98->99->100->0->1..., and so on in a loop. ◆ When the **Action** is set to Subtract: When the **Looping** option is checked, an additional parameter “Upper Limit” will appear. When the value of the word address is subtracted to the lower limit value, continuing to operate the word-setting switch (such as pressing it) will cause the Subtrahend value to continue to decrease from the set Upper Limit value with each operation, and so on in a loop. For example, if the Lower Limit is set to 0, the Subtrahend is set to 1, and the upper limit value is set to 100, when the value of the word address is 0, continuing to operate the word-setting switch (such as pressing it) will cause the value to become 100, and then continuing to operate it will cause the value to become 99, 98, 97, and so on, until it becomes 0. Therefore, the change of the value of the word address is 100->99->98…->2->1->0->100->99->98…->2->1->0->100->99…, and so on in a loop.
Reverse on reaching the limit	◆ When the **Action** is set to Add: Enable **Reverse on reaching the limit** option: when the value of the word address reaches the upper limit value, continuing to operate the word-setting switch (such as pressing it) will cause the value to gradually decrease to the lower limit value. When the lower limit value is reached, if the word-setting switch is operated again (such as pressing it), the value will gradually increase to the upper limit value, and so on in a loop. For example, if the “Addend” is 1, the “Upper Limit” is 100, and the “Lower Limit” is 0, the data loop process is as follows: 0->1->2…->98->99->100->99->98...2->1->0->1->2..->98->99->100->99->98…, and so on in a loop. ◆ When the **Action** is set to Subtract: Enable **Reverse on reaching the limit** option: when the value of the word address is

Parameter	**Description**
	reduced to the lower limit value, continuing to operate the word-setting switch (such as pressing it) will cause the value to start increasing from the “ower Limit” value, up to the “Upper Limit” value. Continuing to operate the word-setting switch (such as pressing it) will cause the value to gradually decrease to the “Lower Limit” value, and so on in a loop. Each time the operation is performed, the value changes by the value set in the 'Subtrahend'. For example, if the “Subtrahend” is 1, the “Upper Limit” is 100, and the “Lower Limit” is 0, the data loop process is as follows: ...->0->1->2...98->99->100->99->98…->2->1->0->1->2…, and so on in a loop.
Use Address Tag	Using Tag values to map addresses. For more information about address tags, please refer to the Address Tag Library.
Use Recipe Index	When a new recipe is created in the project, recipe data items will generate related addresses that can be directly indexed and used by components.
Device	HMI local register, recipe register, register of PLC.
Address type	Please refer to the actual situation. ◆ LW: The internal word register of the HMI, data is not saved when power is lost, and the address range is 0~799999. ◆ RW: The internal word register of the HMI, data is saved when power is lost, and the address range is 0~524288. ◆ SRW: The internal special register of the HMI, and the address range is 0~11023. For more information, please refer to Word Register.
Address	The address numbers for registers should be based on the actual situation.
Data type	Please refer to the actual situation.
Address Index	Using the value of a specified word address to change the current address, for example, if the current address is set to LW1, the address index to LW2, and the offset to 3, then the actual address would be LW(1 + *the value of LW2* + 3).

Step 3. Set properties such as Indicator Light, Graphics, Control Setting, etc., and click **OK**.

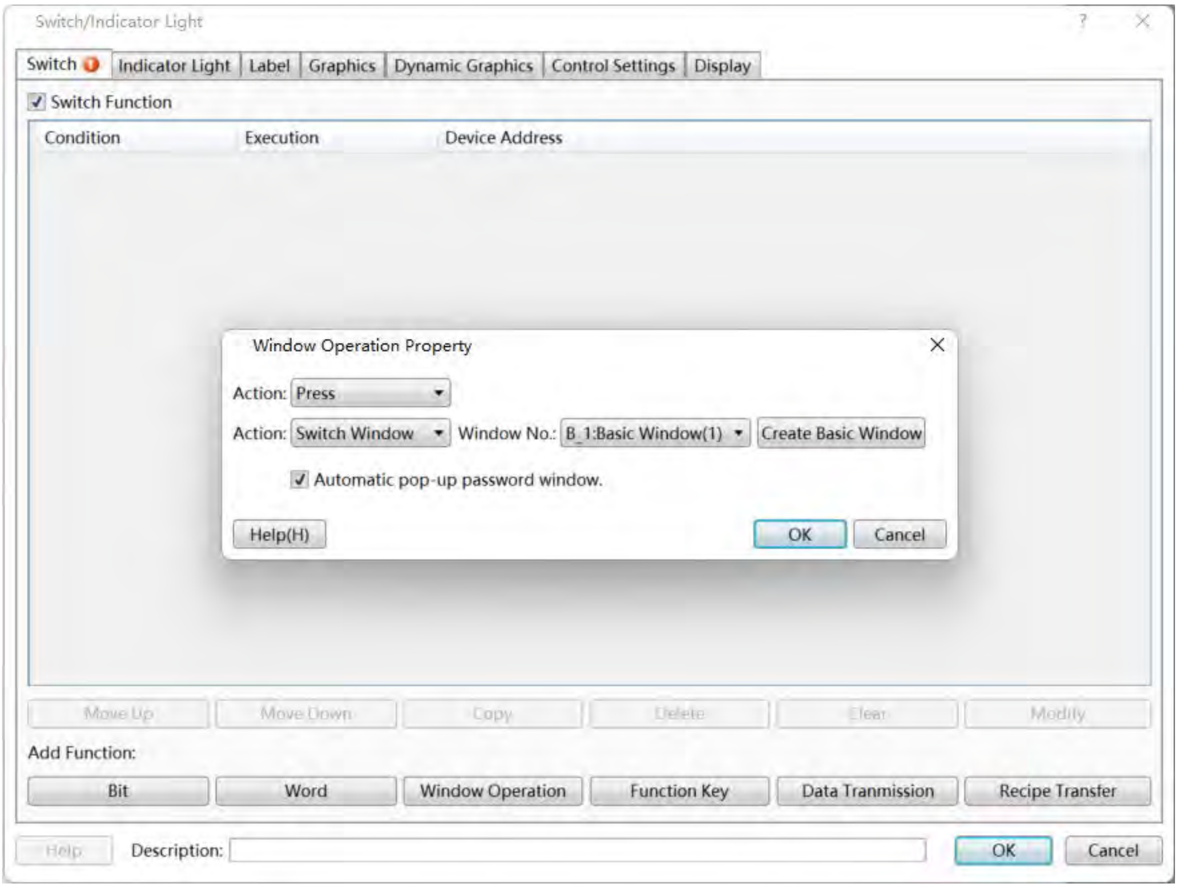


10.1.3 Window Operation

The window operation switch is used to control the window (such as popping up a window, switching windows, etc.).

The steps to create a new window operation switch are as follows:

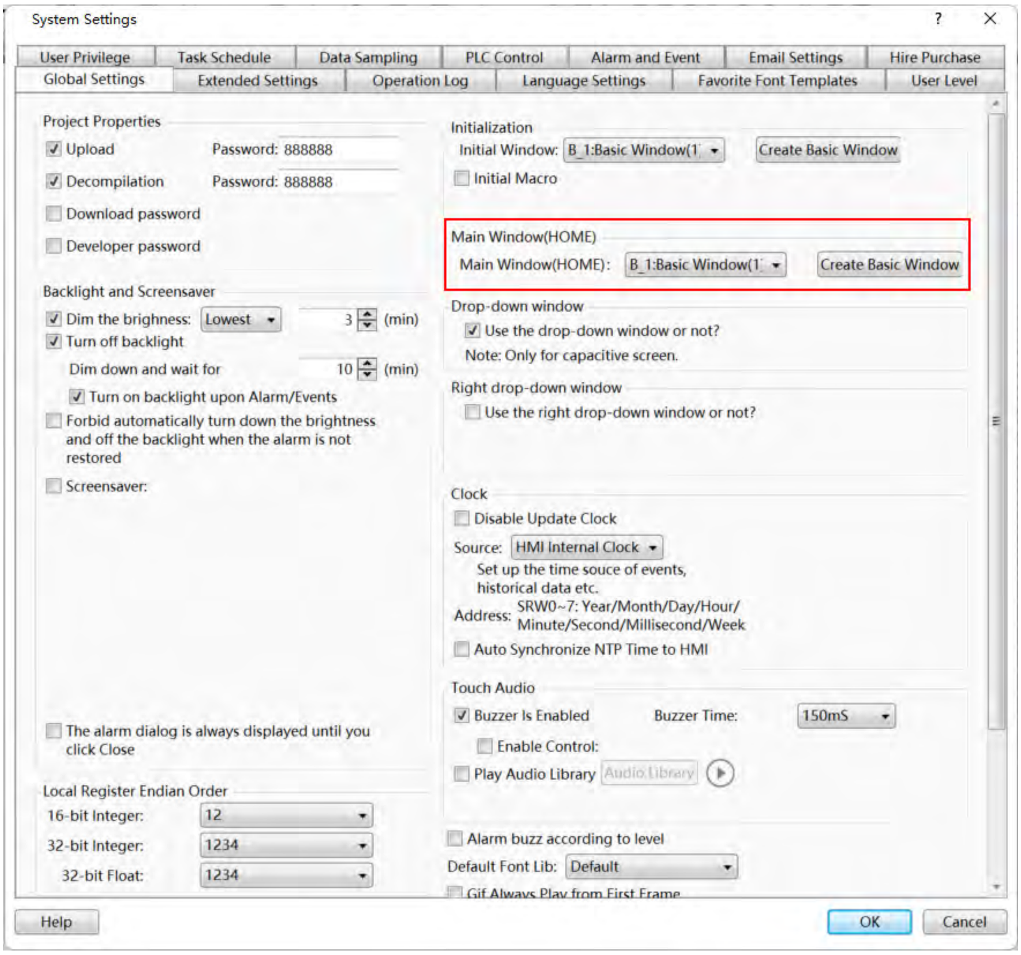
Step 1. Select **Component/Switch/Window Operation** from the menu bar to enter the following interface.



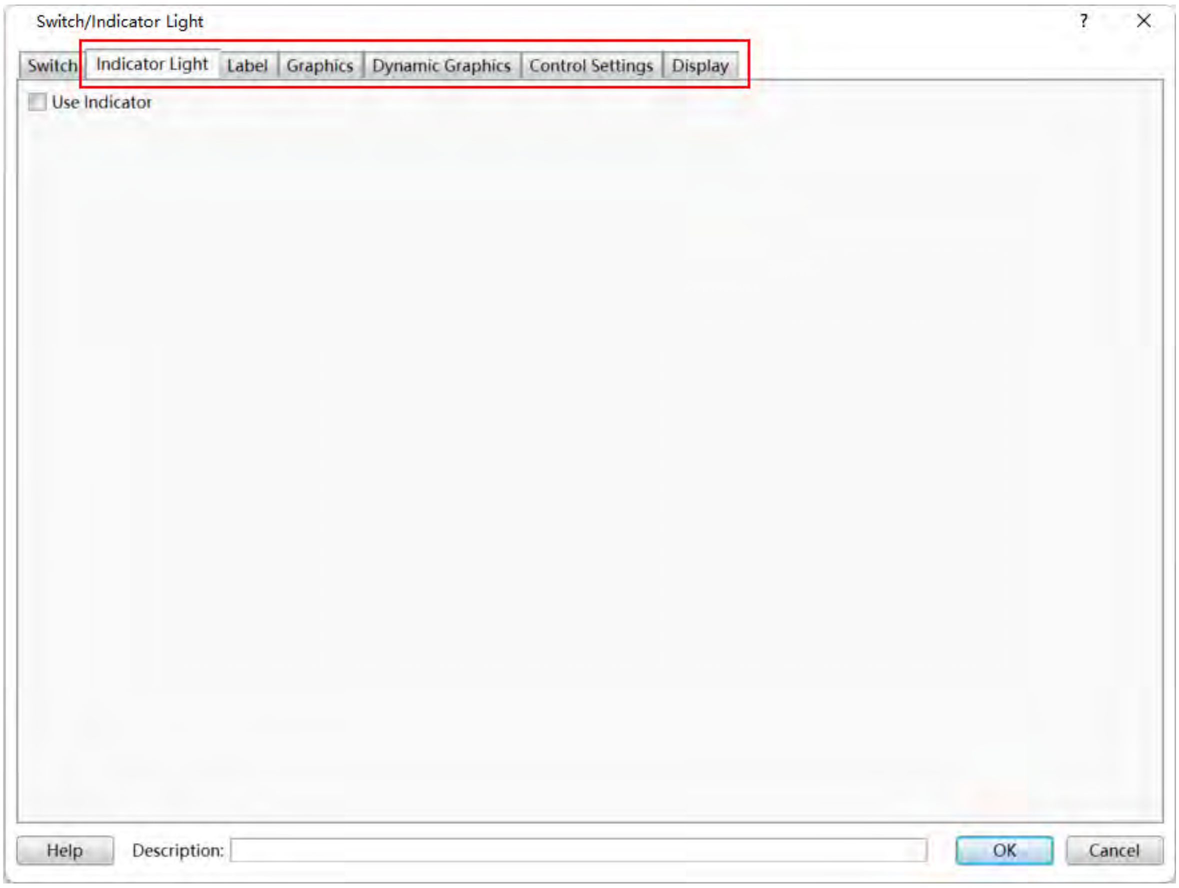
Step 2. Set the window operation property.

Please refer to the table below for detailed configuration methods.

Parameters	Description
Action	Includes the Press and Release actions.
Action	After performing an action on the window operation switch, the following functions can be executed: ◆ Switch Window: close the current window and switch to the specified window. ◆ Close Pop-up Window: to close a popped up window, you need to place a **Close Pop-Up Window** switch in the popped up window. ◆ Pop-up: Pop up specified window. ◆ Return to Previous Window: Close the current window and return to the previous window.

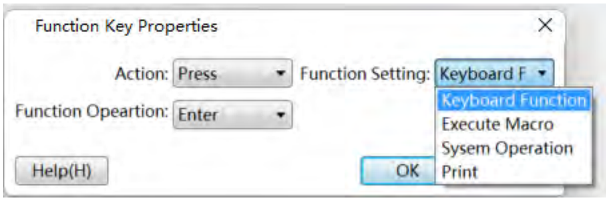
Parameters	Description
	◆ Window Control Bar: used to move the position of the popped up window. You need to place a **Window Control Bar** switch in the popped up window. ◆ Return to the Main Window: Return to main window. Select **Setting/System Settings/Global Settings** from the menu bar. In the **Main Window (HOME)** area, you can customize the main window. 

Step 3. Set the properties for Indicator Light, Label, etc., and click **OK**.



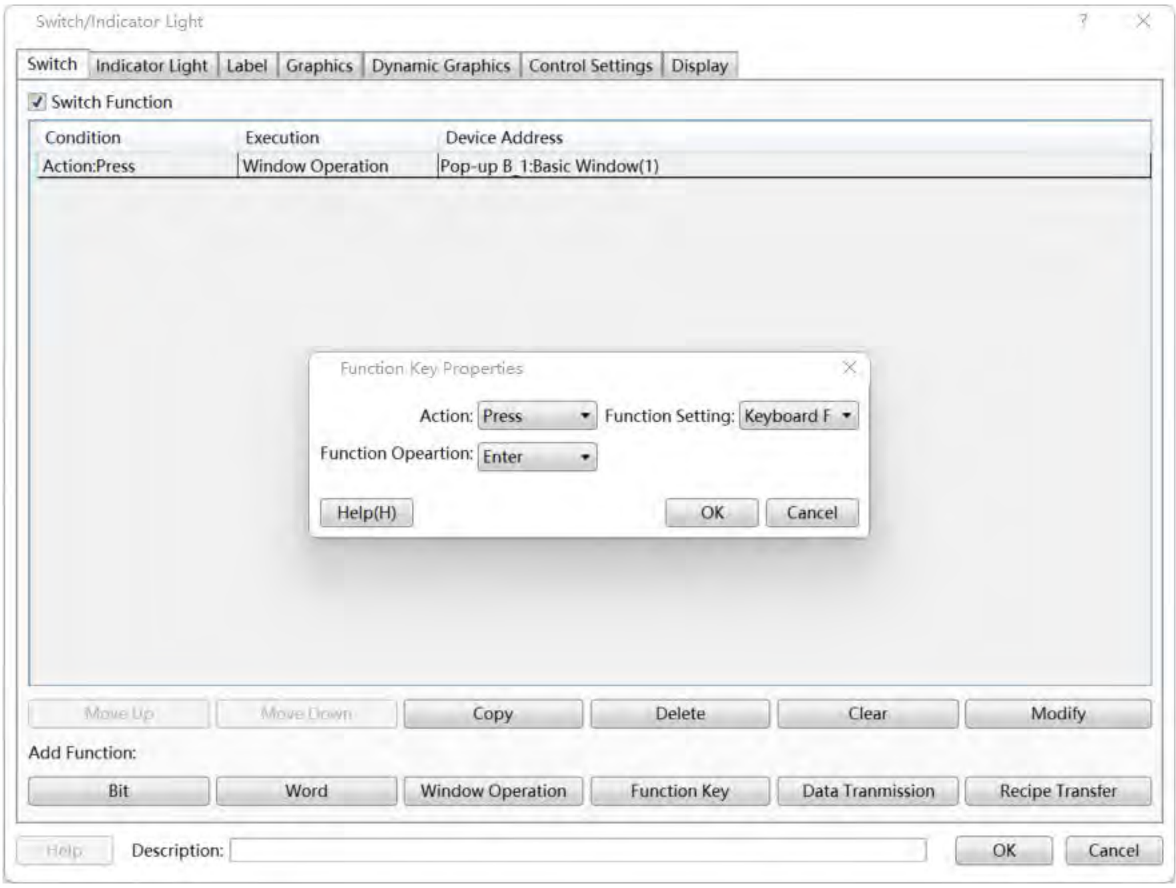
10.1.4 Function Key

The function key component is a component used to perform specific operations, including keyboard function, execute macro, system operation, and print.

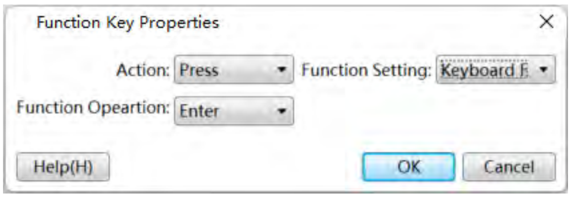


10.1.4.1 Keyboard Function

Step 1. Select **Component/Switch/Function Key** from the menu bar to enter the following interface.



Step 2. Set the **Function Setting** to “Keyboard Function”, edit the relevant parameters, and click **OK**.

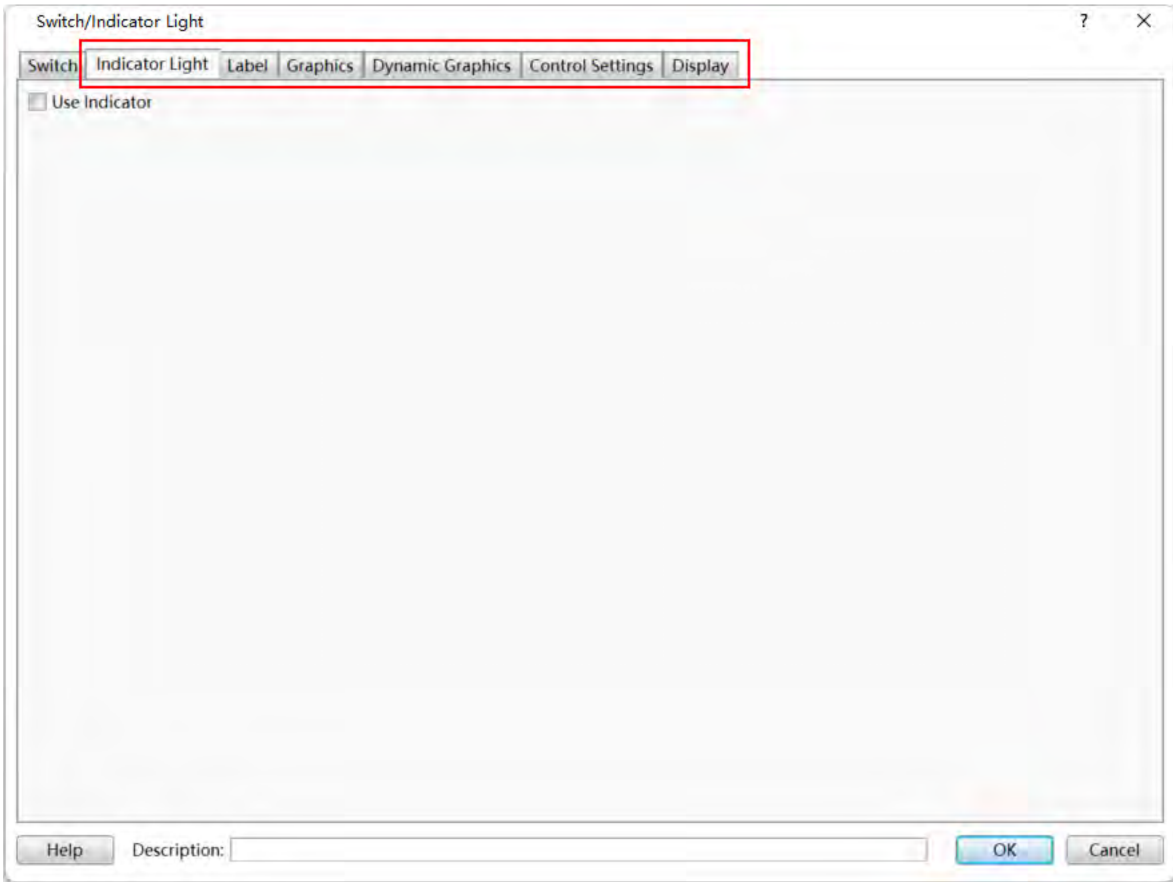


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Action	Includes the Press and Release actions.
Function Operation	◆ Enter: Enter a new line. ◆ Backspace: Move the cursor back to the previous character and delete the previous character. ◆ Clear: Clear the current input content of the **numeric input** or **text input** component. ◆ Cancel: Cancel the previous operation. ◆ UNICODE: Set the input character of the **text input** component, which can be a numeric key (0~9), ASCII code, or Unicode character.

Parameter	Description
	◆ Move the Cursor: Move the cursor in the set direction, including up, down, left, right, to the beginning of the line, to the end of the line, to the first character, or to the last character. This function is only effective for input components. ◆ Select the Text: Set the operation for selecting text content, including start selecting and end selecting. This function is only effective for input components. ◆ Text Operation: Operations on text content, including copy, cut, and paste. This function is only effective for input components. ◆ Mapping Keyboard: You can map the corresponding function to the built-in function keys (F1~F8) of the HMI, including forward, backward, up, down, cancel, and enter.

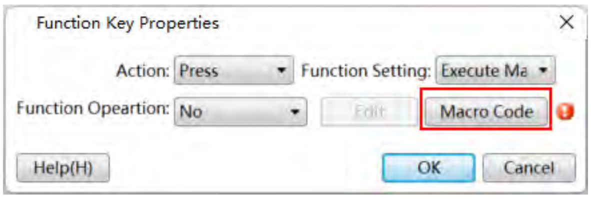
Step 3. Set the properties for Indicator Light, Label, etc., and click **OK**.



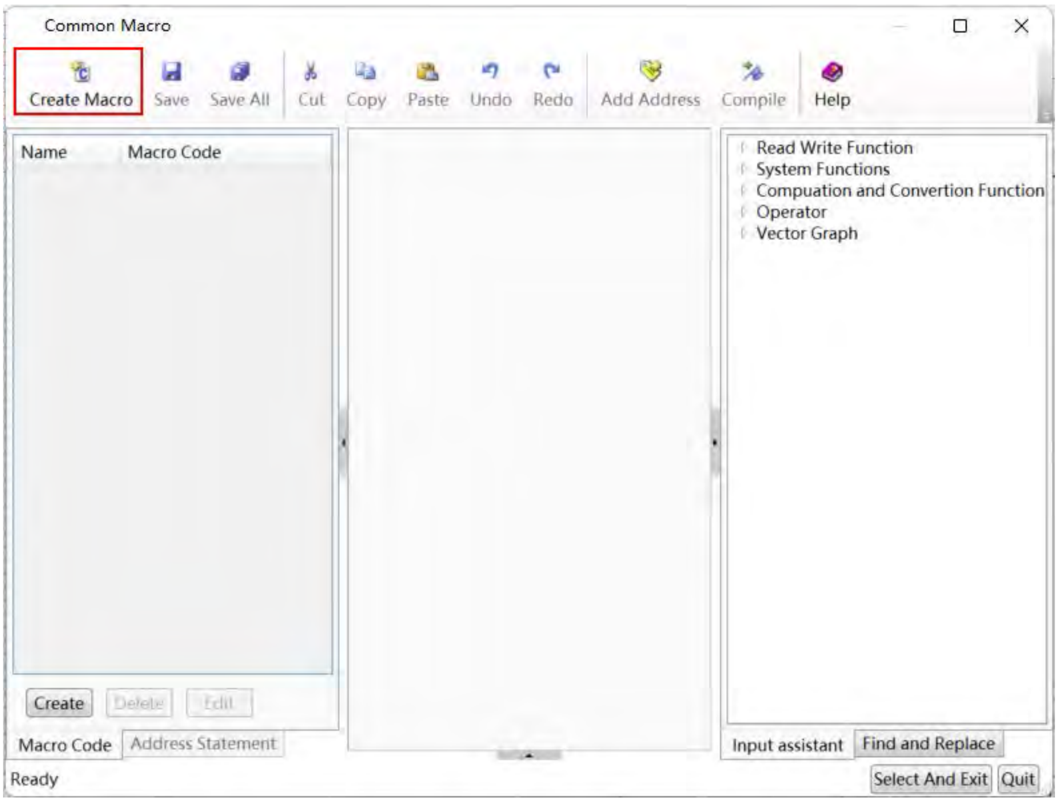
10.1.4.2 Execute Macro

Perform actions (such as press and release) to the Execute Macro component, then you can execute the specific marco. You can select an existing macro in the project or create a new one.

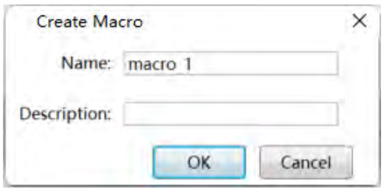
Step 1. In the **Function Key Properties** dialog box, set the **Function Setting** to “Execute Macro” and click **Macro Code**.



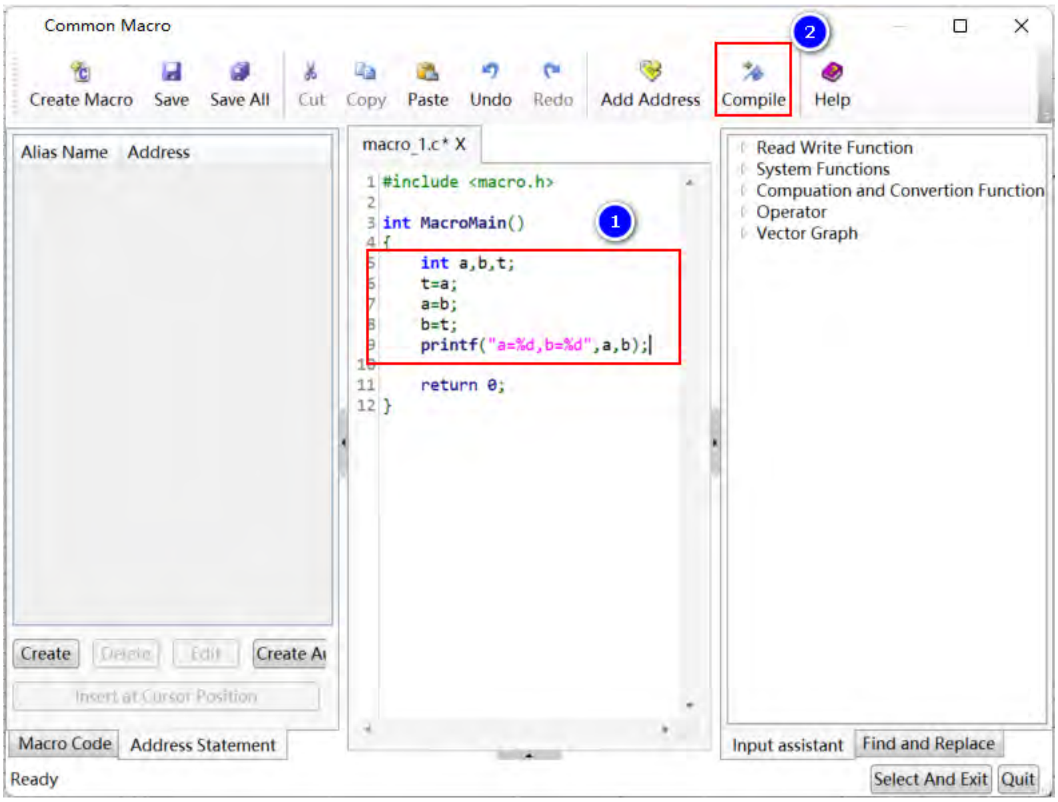
Step 2. Click **Create Macro** in the popup **Common Macro** dialog box.



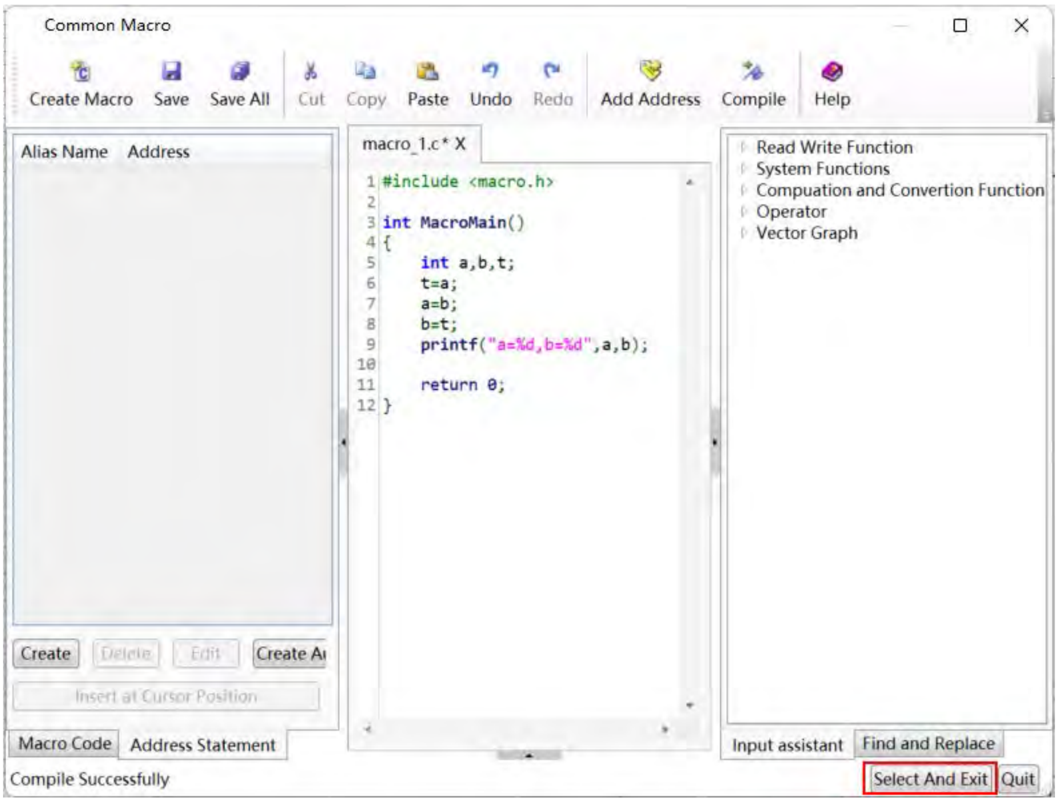
Step 3. In the popup **Create Macro** dialog box, edit the macro name and description, and click **OK**.



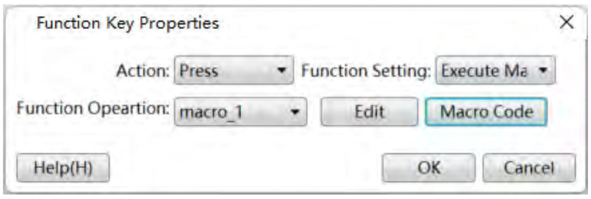
Step 4. Edit the macro code (in C language) and click **Compile**.



Step 5. After successful compilation, click **Select and Exit.**



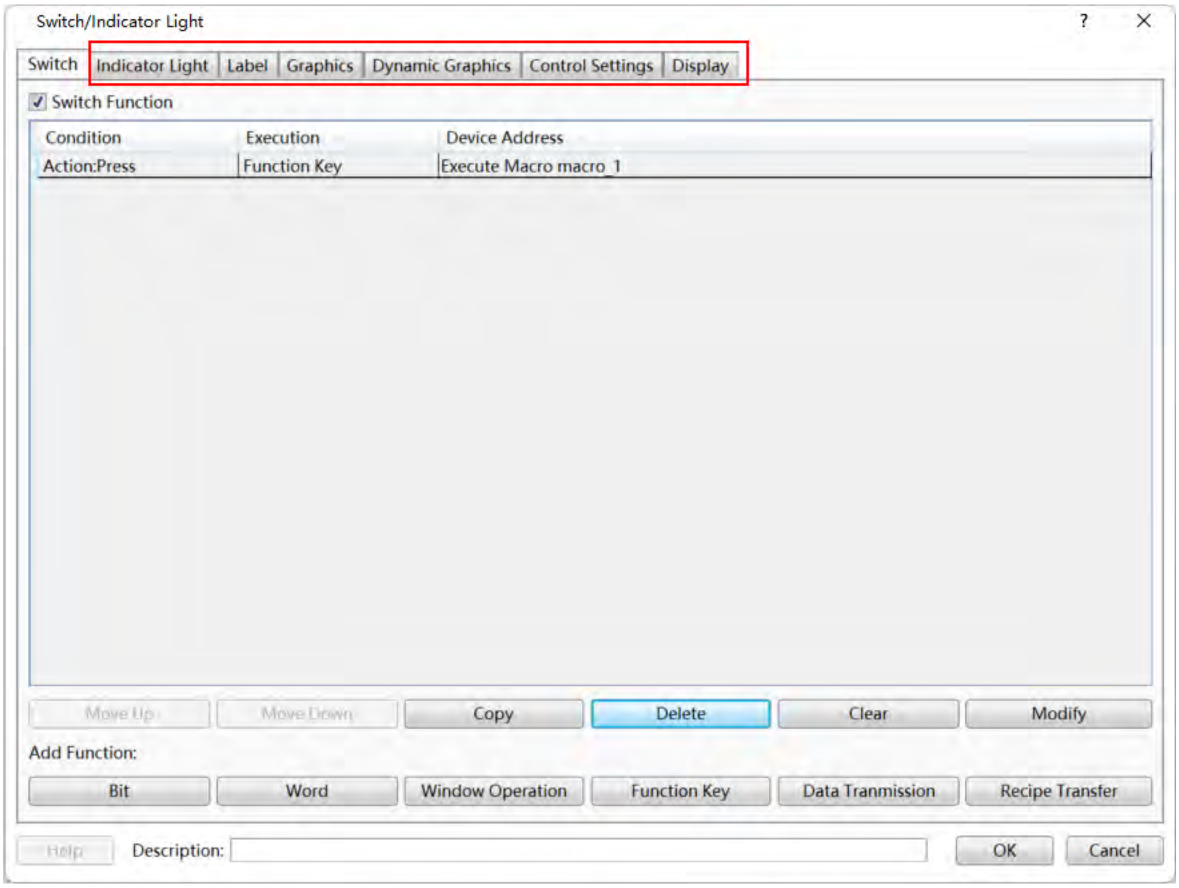
Step 6. Edit the relevant parameters and click **OK**.



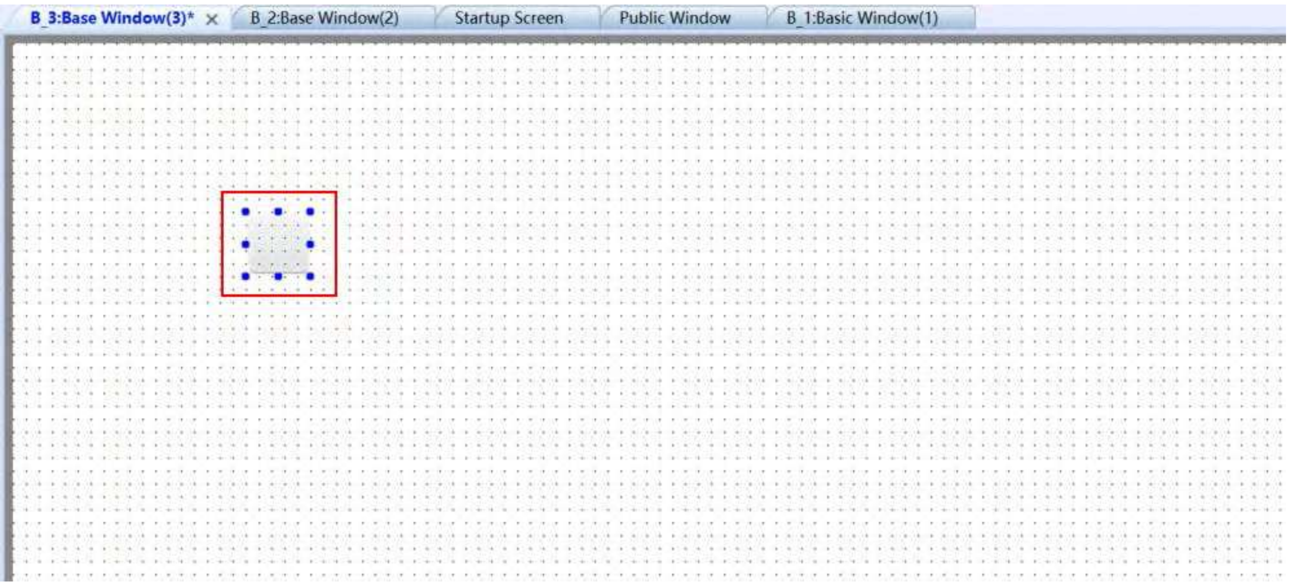
For detailed configuration please refer to the table below.

Parameter	Description
Action	Includes the Press and Release actions.
Function Operation	Select specified macro, click **Edit** to modify the macro, and click **Macro Code** to create a new macro.

Step 7. Set the properties for Indicator Light, Label, etc., and click **OK**.



Step 8. Click any position in the window to insert the **Execute Macro** component.



10.1.4.3 System Operation

After performing an action (press or release) on the system operation component, perform the related operation (including touch panel calibration, import/export, etc).

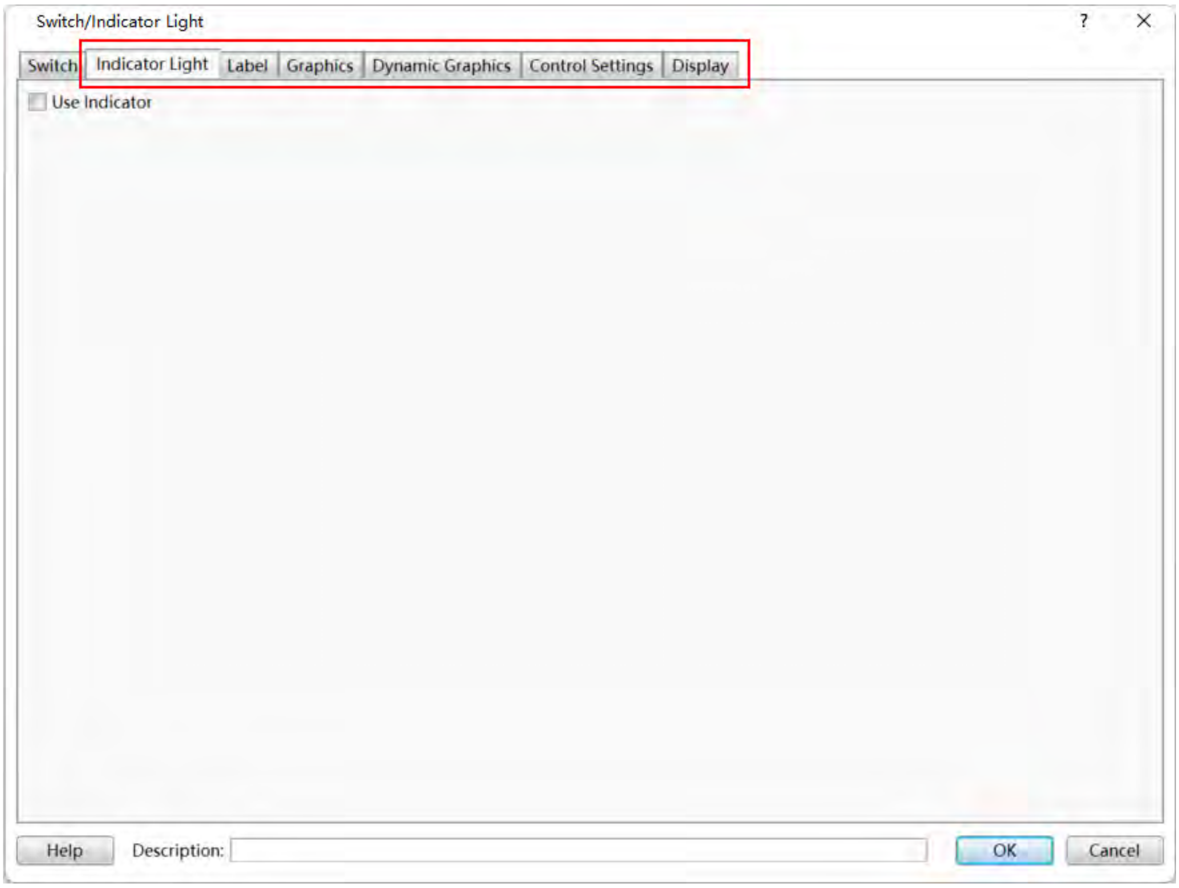
Step 1. In the Function Key Properties dialog box, set the **Function Setting** to System Operation, edit the relevant parameters, and click **OK**.

Please refer to the table below for detailed configuration methods.

Parameter	Description
Action	Includes the Press and Release actions.
Function Operation	◆ Touch Panel Calibration: Calibrate the touch screen of the HMI. ◆ Import/Export: Includes importing a project to HMI, exporting a project from HMI, importing a recipe to HMI, exporting a recipe from HMI, exporting RW data from HMI, and importing RW data to HMI. This function needs to be used with a file browser and is only applicable to HMIs with a USB HOST interface or SD card slot. ◆ Save Screenshot to Extended Storage: Save the HMI screen content in BMP image format to an external storage device for printing or viewing the running state of the HMI screen. This function is only applicable to HMIs with a USB HOST interface. ◆ Clear Event: Clear the alarm events by event group. ◆ Clear All Recipes.

Parameter	Description
	◆ Clear RW: Clear the contents of all power-off saved RW storage areas. ◆ Clear All Historical Data.

Step 2. Set the properties for Indicator Light, Label, etc., and click **OK**.



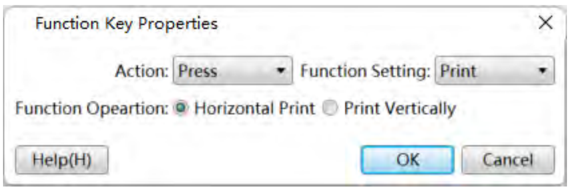
Step 3. Click anywhere in the window to insert the **System Operation** component.

10.1.4.4 Print

To implement the printing function, the HMI needs to be connected to a printer, and the printer information needs to be set in the **Settings/Communication Settings/Printer** interface.

Performing an action (such as pressing) on the Printer component will print the window screen information.

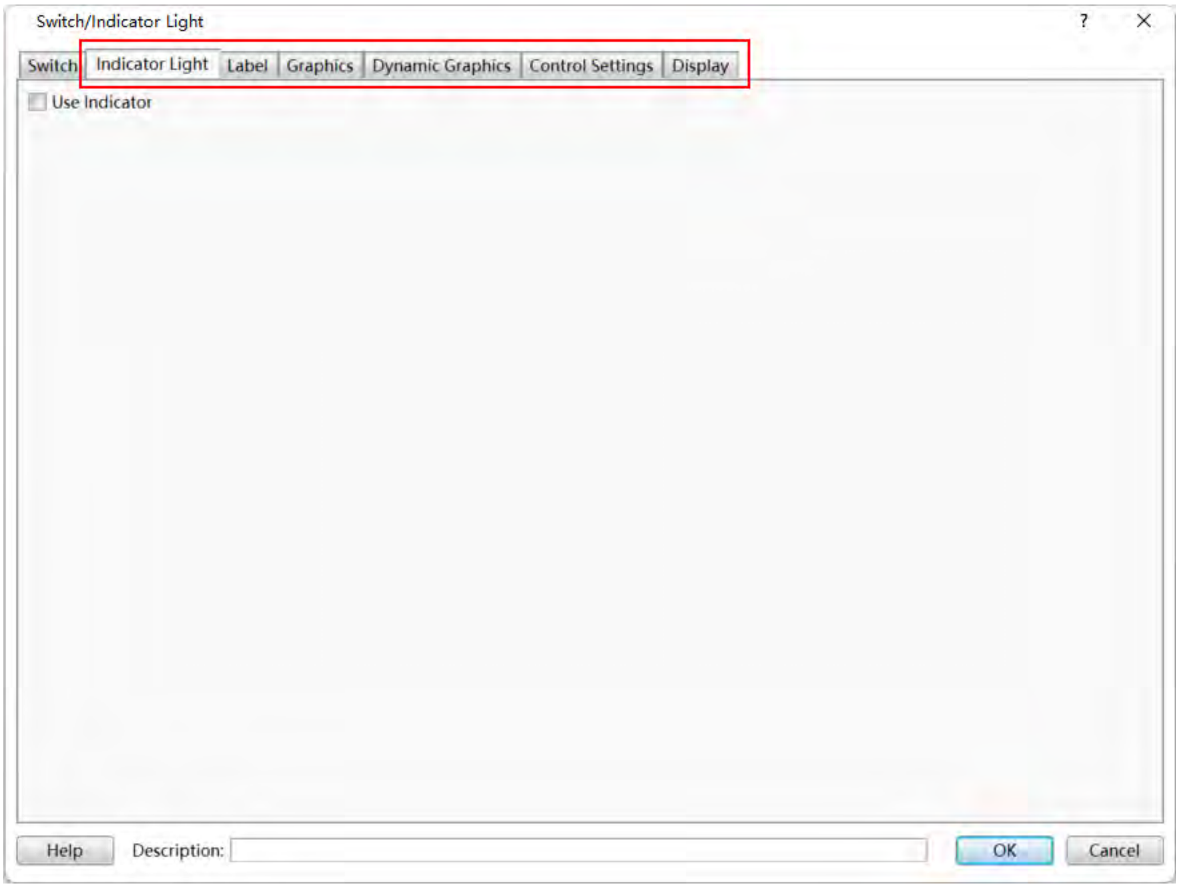
Step 1. In the Function Key Properties dialog box, set the **Function Setting** to “Print”, configure relevant parameters, and click **OK**.



For detailed configuration please refer to the table below.

Parameters	Description
Action	Includes the Press and Release actions.
Function Operation	Includes horizontal print and vertical print.

Step 2. Set the properties for Indicator Light, Label, etc., and click **OK**.

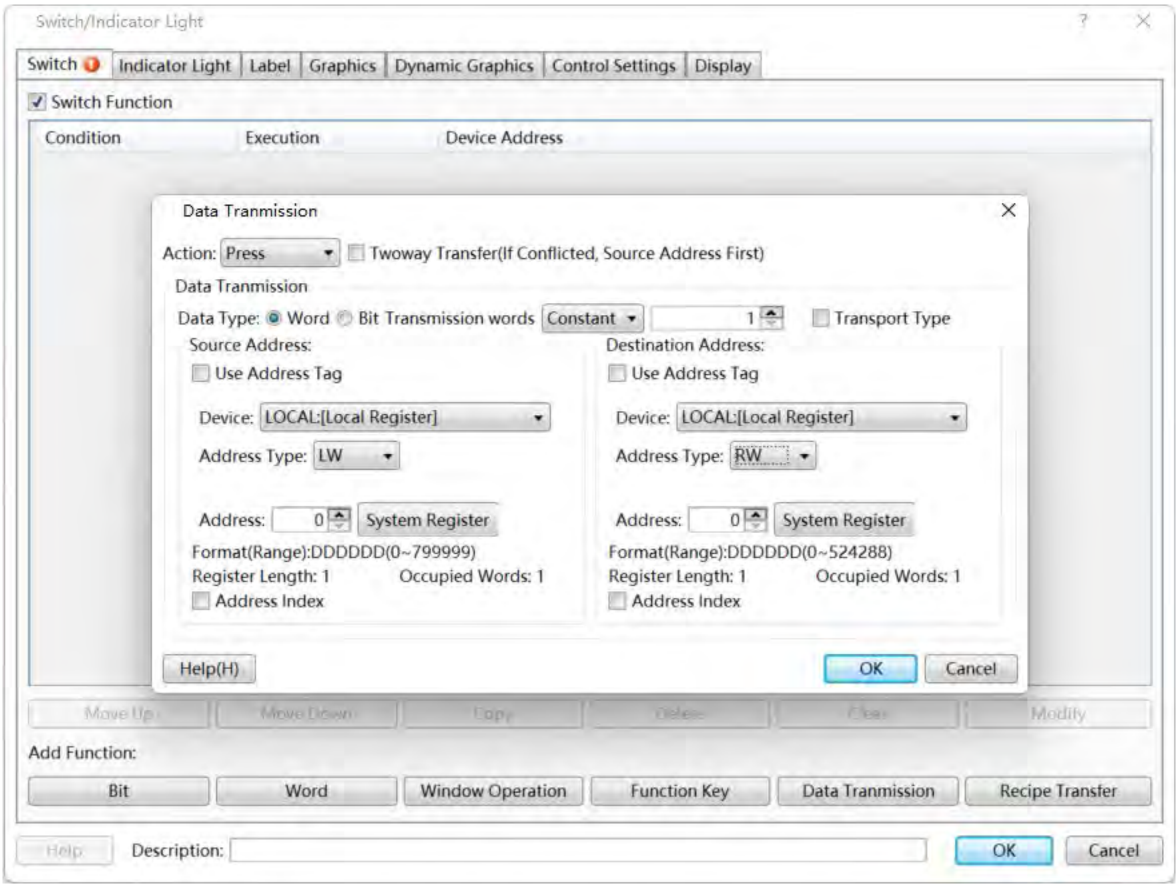


Step 3. Click any position in the window to insert the Print component.

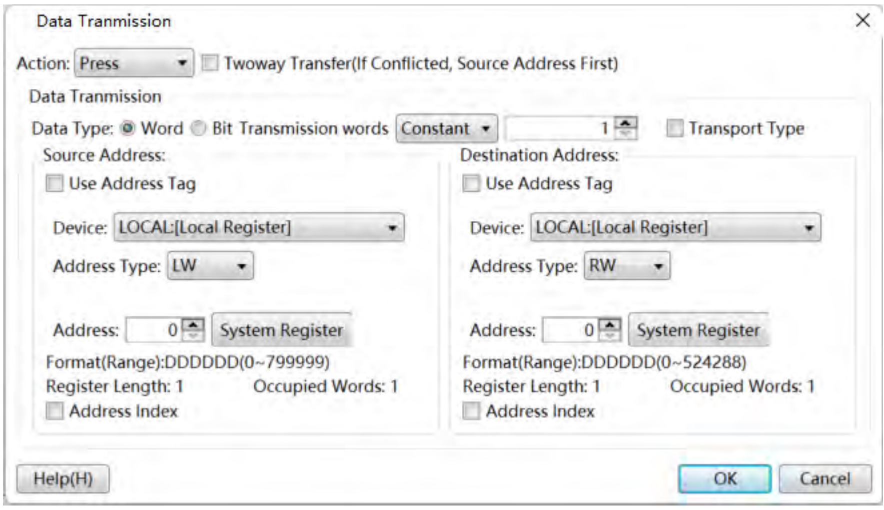
10.1.5 Data Transmission

The purpose of the Data Transmission component is to transfer data from a specified address to a target address.

Step 1. Select **Component/Switch/Data Transmission** from the menu bar to enter the following interface.



Step 2. Configure relevant parameters and click **OK**.

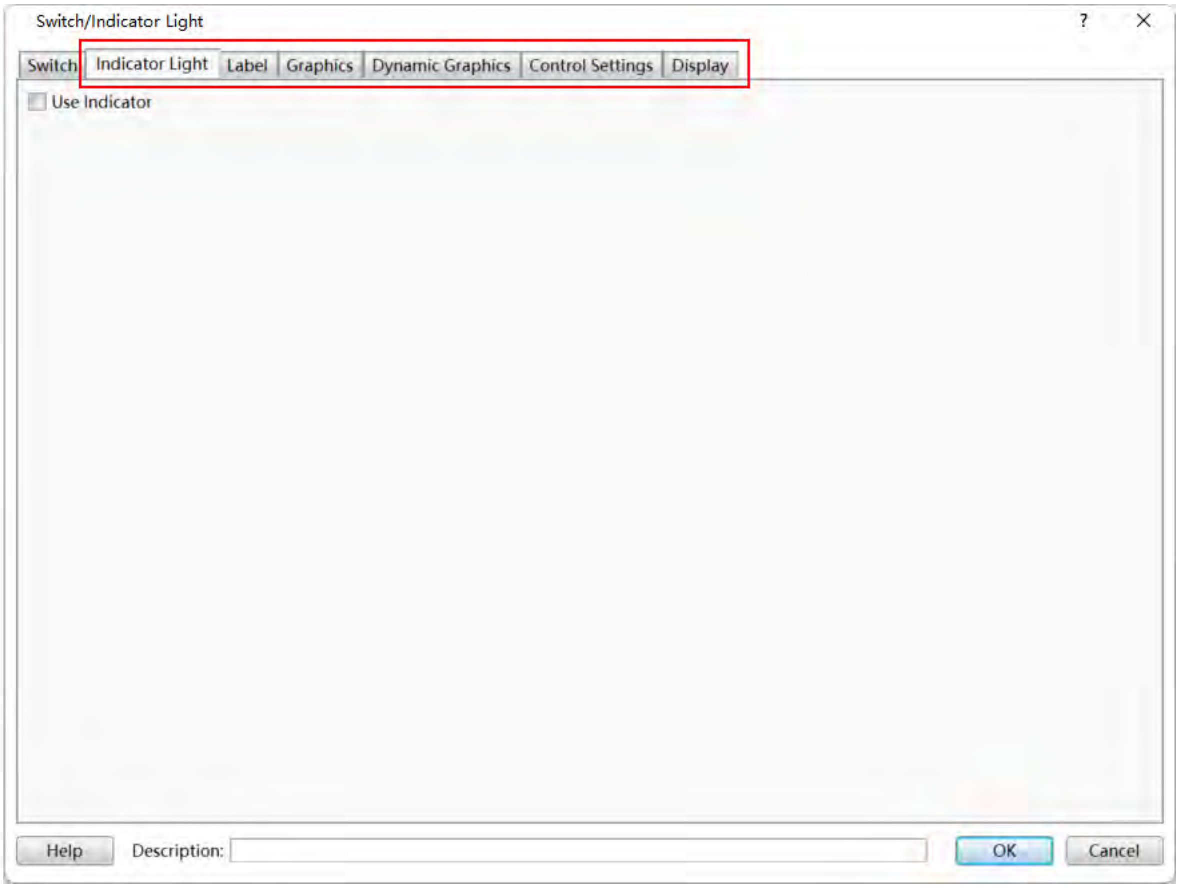


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Action	Includes the Press and Release actions.
Two-way Transfer	Select **Two-way Transfer** to transfer data from the source address to the target address and from the target address to the source address.

Parameter	Description
Data type	◆ Word: data of word address ◆ Bit: data of bit address
Transmission words/Transmission bits	The number of data to be transferred at one time. It can be set as a constant or using a variable. When using a variable, you need to specify the register address. VI20Studio limits the maximum number of transfers to 8192 words.
Use Address Tag	Using tag values to map addresses. For more information about address tags, please refer to the Address Tag Library.
Device	HMI local register, recipe register, register of PLC.
Address Type	Please refer to the actual situation, such as LW, RW, etc.
Address	Register address. Please refer to the actual situation.
Address Index	Use the value of the specified word address to change the current address. For example, if the current address is LW1, set the address index to LW2 and the offset to 3, then the actual address would be LW(1 + *the value of LW2* + 3).

Step 3. Set the properties for Indicator Light, Label, etc., and click **OK**.

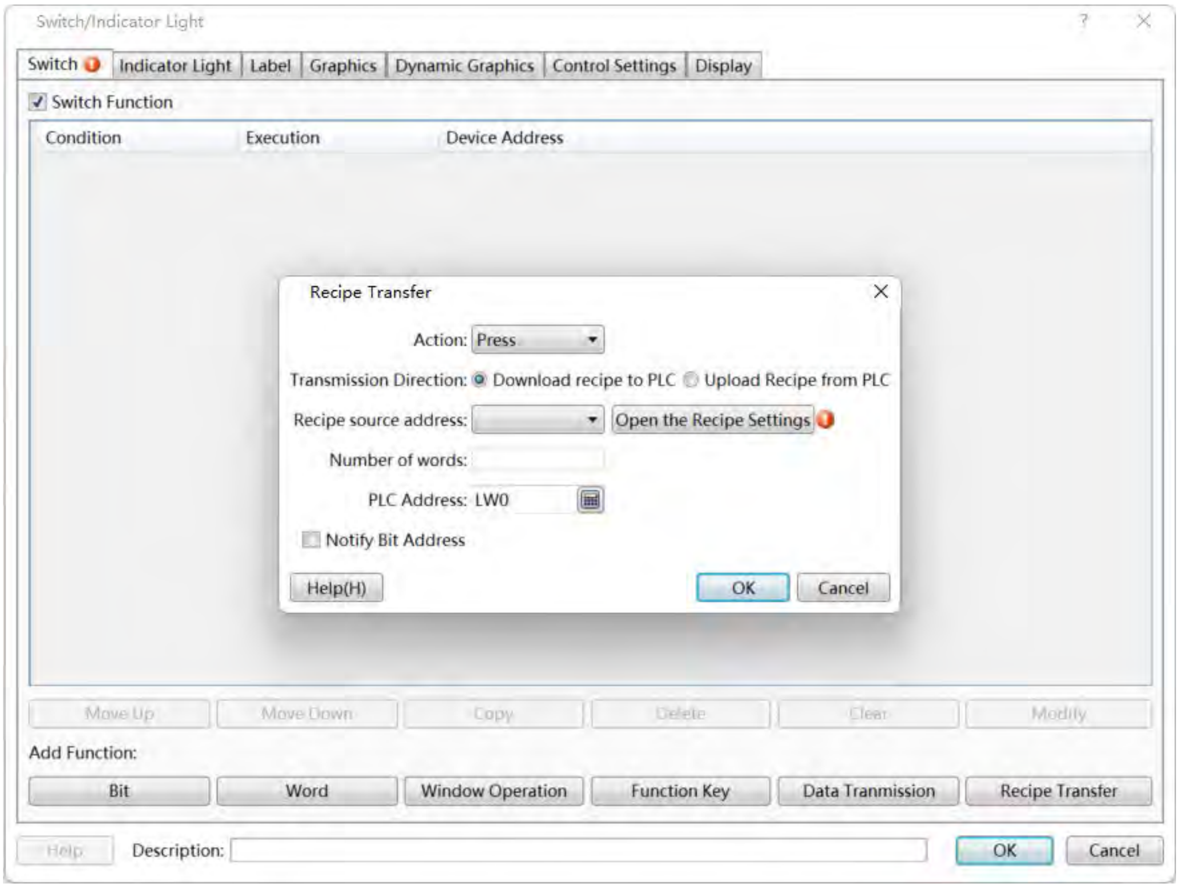


Step 4. Click any position in the window to insert the data transmission component.

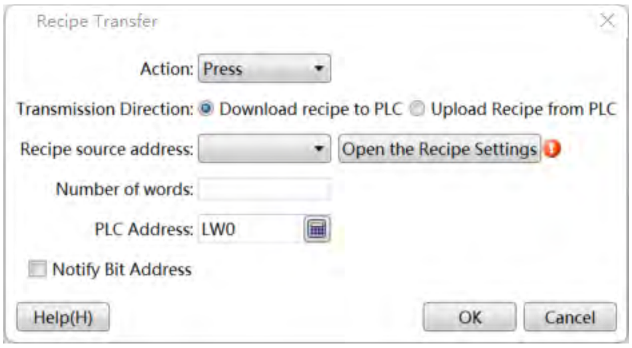
10.1.6 Recipe Transmission

A recipe refers to a set of data. For example, a production line needs to produce multiple products, and each product has the same composition elements, only the proportions of different elements are different. When different products need to be produced, only the values of different elements (i.e., recipe data) need to be changed. The recipe data can be stored in consecutive storage units. The memory capacity of the PLC control system is limited (the capacity of the power-off storage memory is even more limited). Therefore, the recipe data can be stored in the HMI, and the recipe data can be transferred to the PLC through the HMI.

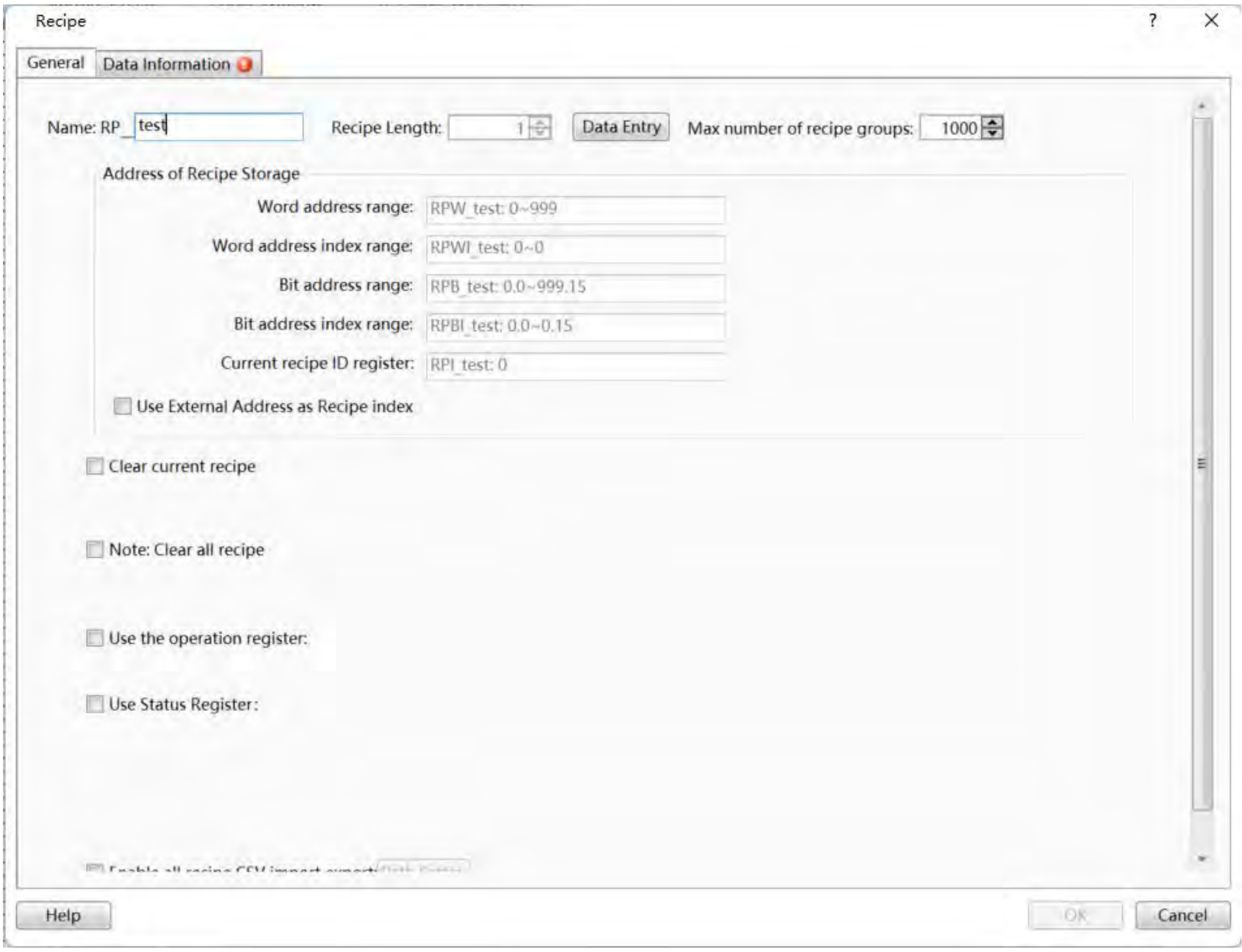
Step 1. Select **Component/Switch/Recipe Transmission** from the menu bar to enter the following interface.



Step 2. Click **Open the Recipe Settings**.



Step 3. Configure relevant parameters in the pop-up **Recipe** dialog box.



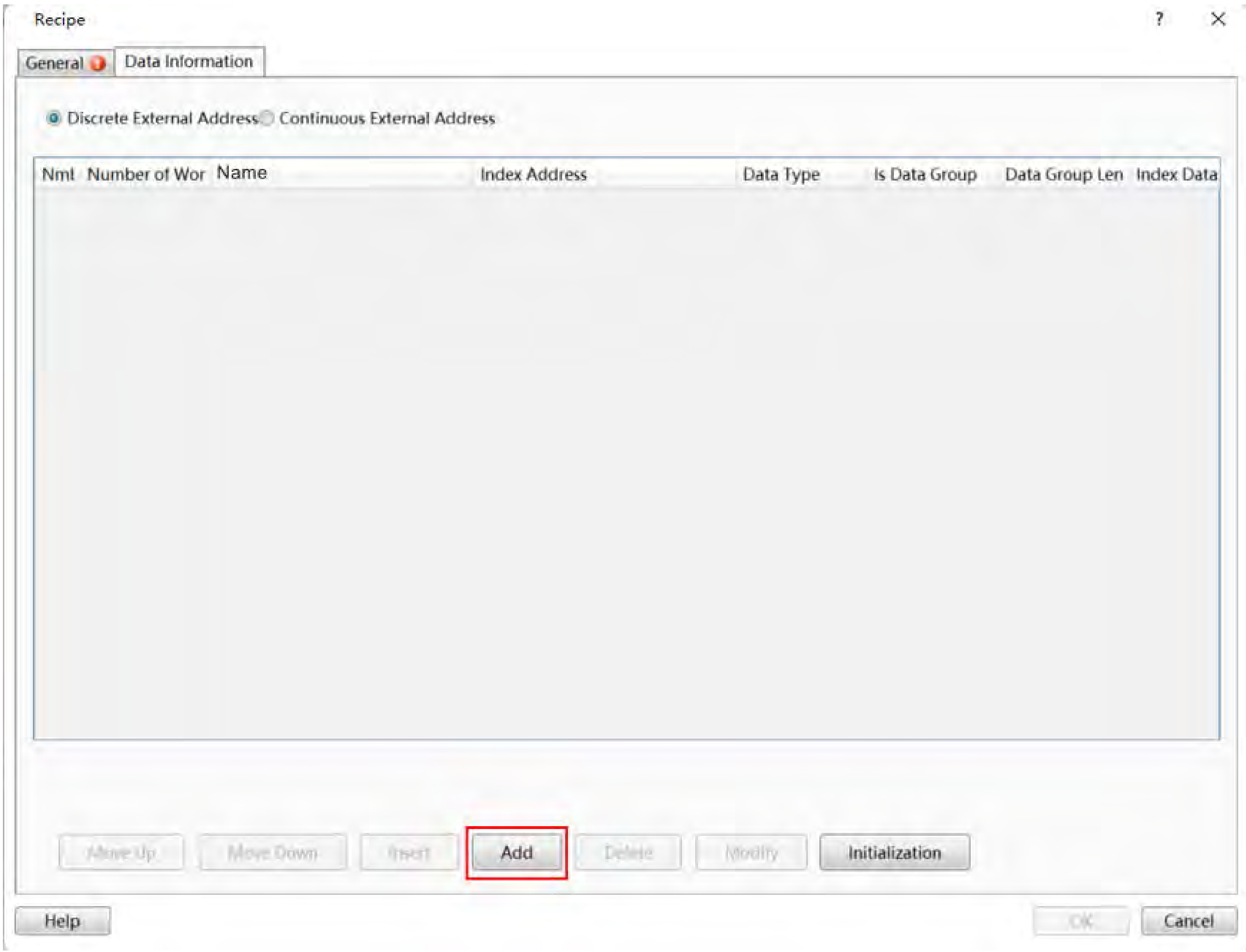
Please refer to the table below for detailed configuration methods.

Parameters	Description
Name	Recipe name. It should not exceed 16 bytes, where each Chinese character counts as 2 bytes.
Data Entry	Click **Data Entry** to edit the recipe data.
Max Number of Recipe Groups	The value range is 1 to 65535.
Clear Current Recipe	Check **Clear Current Recipe** and choose the bit address. When the state of clearing the current recipe bit address is ON, the data of the current recipe group will be cleared. After clearing the data, the value of the bit address will be set to OFF.
Clear All Recipe	Check **Clear All Recipe** and choose the bit address. When the state of clearing all recipe bit addresses is ON, all recipe group data will be cleared. After clearing the data, the value of the bit address will be set to OFF.
Use the operation	The trigger recipe operation bit address is 21 bits in total. When set to ON, the corresponding operation will be executed, and the bit address will be set to OFF after the operation is

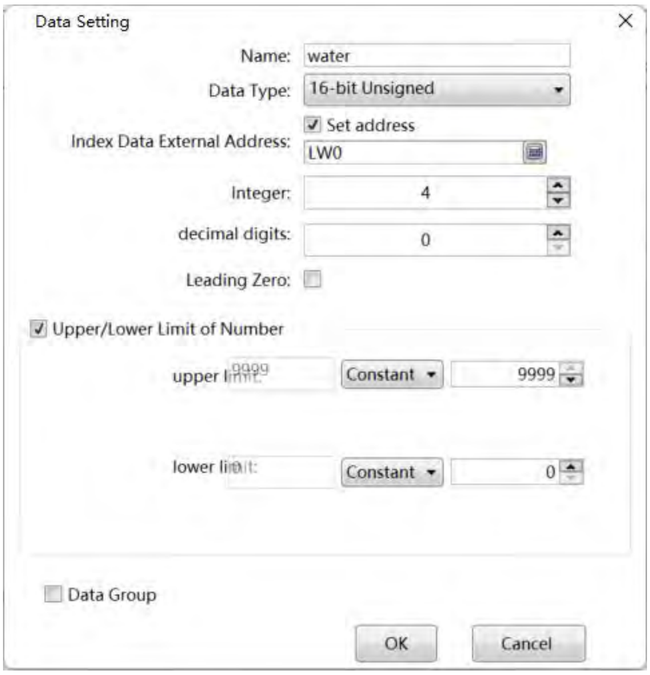
Parameters	Description
register	completed. When the bit address is set to LB0, the following operations will be performed: Insert Row Above: When LB0 is ON, a new group will be inserted above the current recipe group pointed to by RPI. Insert Row Below: When LB1 is ON, a new group will be inserted below the current recipe group pointed to by RPI. Copy: When LB2 is ON, the current recipe group pointed to by RPI will be copied. Cut: When LB3 is ON, the current recipe group pointed to by RPI will be cut. Paste (Replace): When LB4 is ON, the content of the copied or cut recipe group will be pasted into the current recipe group pointed to by RPI. Copy to Next Row: When LB5 is ON, the current recipe group pointed to by RPI will be copied to the next row. The serial number of next rows will increase in order without overwriting the original data. Save Snapshot: When LB6 is ON, the current recipe group will be saved as a snapshot. One-Click Restore to Initial Value: When LB7 is ON, the recipe data will be restored to the initial value set in the editing state. Restore Snapshot: When LB8 is ON, the snapshot saved by LB6 will be restored. Upload: When LB9 is ON, data will be uploaded from an external address to the current recipe group data. Download: When LB10 is ON, the current recipe group data will be downloaded to an external address. Delete Row: When LB11 is ON, the currently selected row or the checked row during the query will be deleted. Delete All: When LB12 is ON, all recipe groups in the recipe will be deleted. Reserved Operation Bit: LB13~LB20.”
Use State Register	Trigger recipe operation state word address register. When the address is set to LW0: The value of LW0 is 1, indicating that the command was executed successfully. The value of LW0 is 2, indicating that the selected record does not exist. The value of LW0 is 3, indicating an unknown command. The value of LW0 is 4, indicating that the maximum number of records has been reached and no new records can be added. The value of LW0 is 5, indicating that another command is being executed. The value of LW0 is 6, indicating that the download failed. The value of LW0 is 7, indicating that the upload failed. The value of LW0 is 8, indicating that the command was not executed successfully.

Parameters	Description
	The value of LW0 is 9, indicating that the data was not saved.
Enable Import/Export of All Recipe CSV Files	Set the path and other information for importing recipe data from a CSV file; set the path information for exporting recipe data to a CSV file.

Step 4. Select the **Data Information** tab and click **Add**.



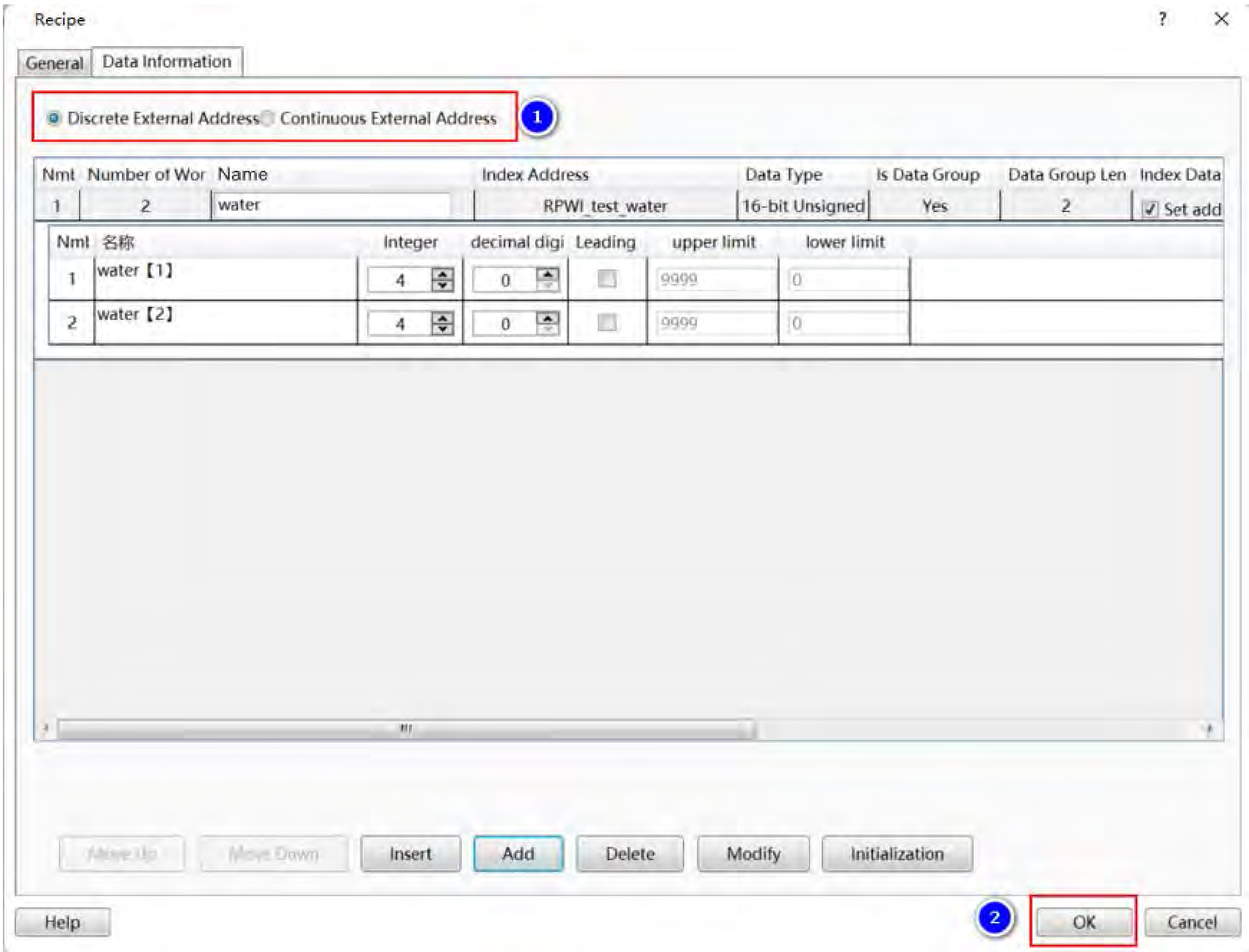
Step 5. Configure relevant parameters in the pop-up **Data Setting** dialog box and click **OK**.



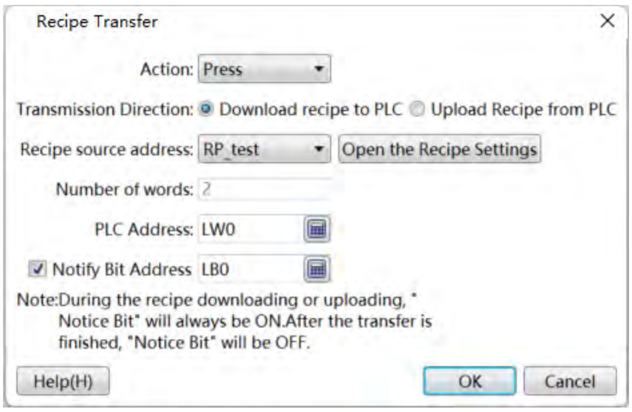
Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Name	Data entry name.
Data type	Please refer to the actual situation.
Set Address	Whether to associate an external address (such as the address of a PLC) to achieve the upload and download functions of recipe data.
Index Data External Address	Click the  icon to edit address information.
Leading Zero	When displaying data, fill the empty integer digits with 0. For example, if the integer part has 4 digits and the actual data is 123, the HMI will display it as 0123.
Upper and Lower Limits	The upper and lower limits of the value, which can be set as constants or variables.
Data Group	Check **Data Group** and specify the group length.

Step 6. Set the type of address associated with the recipe data and click **OK**.



Step 7. Configure relevant parameters and click **OK**.

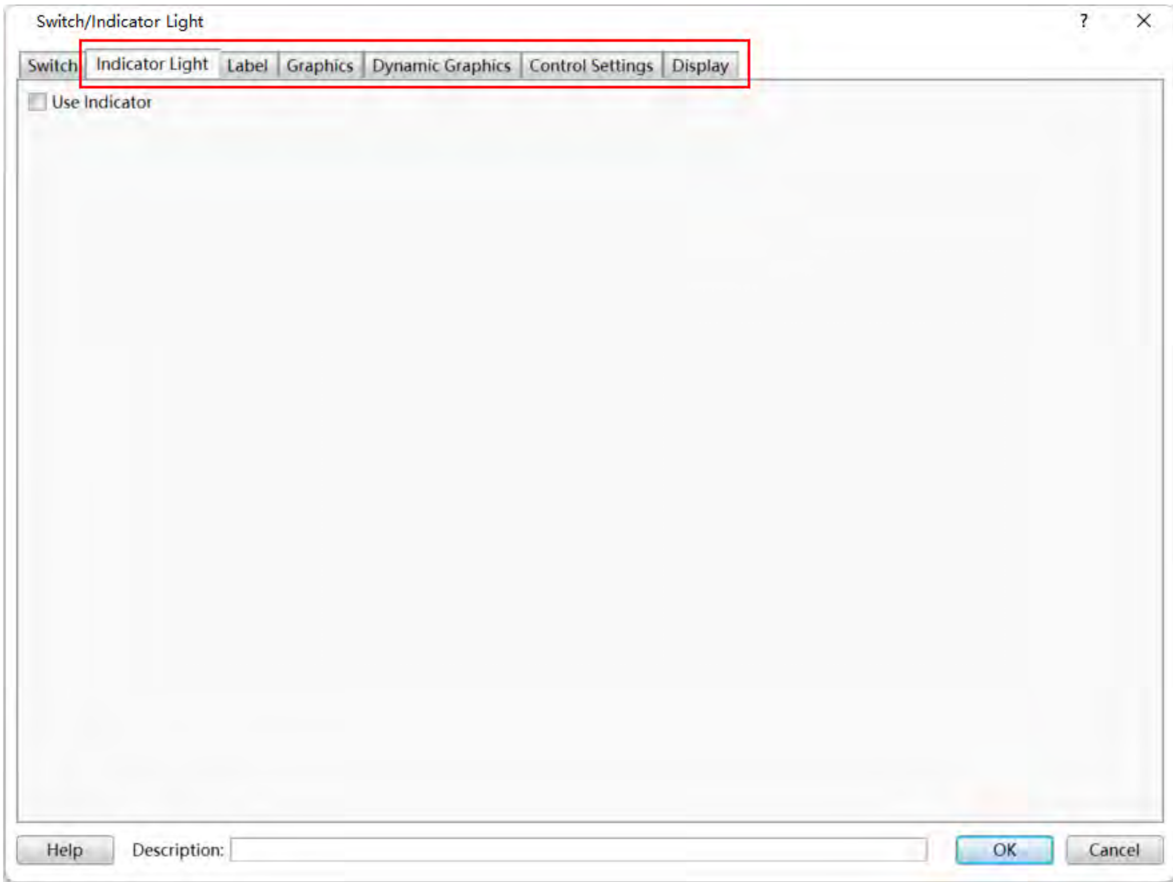


Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Action	Includes the Press and Release actions.
Transmission Direction	◆ Download Recipe to PLC: Transfer recipe data from HMI to PLC. ◆ Upload Recipe from PLC: Transfer recipe data from PLC to HMI.

Parameters	Description
Recipe Source Address	The source address of the recipe data. Click **Open the Recipe Setting** to modify the recipe data.
PLC Source Address	The address in the PLC where the recipe data is stored.
Notify Bit Address	The notification address for data transmission. During recipe download or upload, the notification bit address will remain in the ON state, and when the data transmission is completed, it will be set to the OFF state.

Step 8. Set the properties of the Indicator Light, Label, etc., and click **OK**.



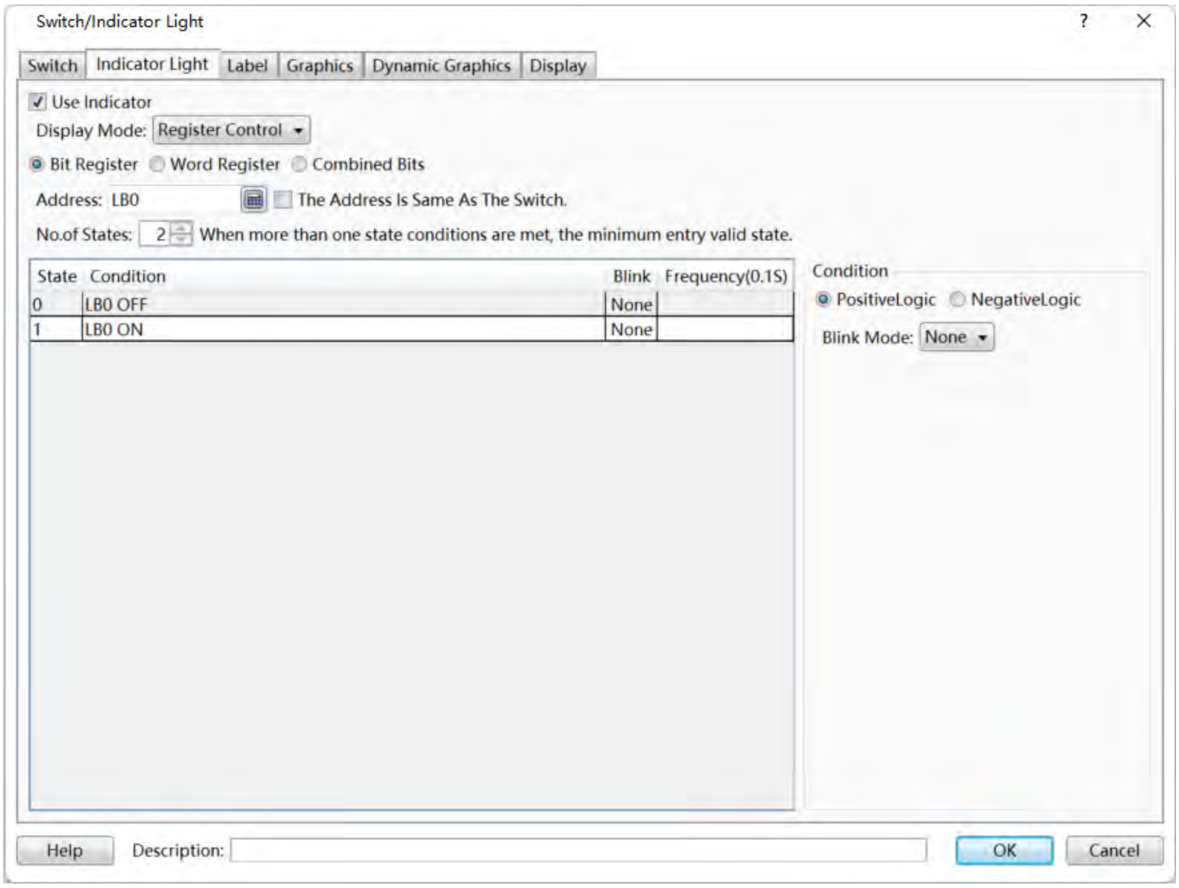
Step 9. Click anywhere in the window to insert the Recipe Transmission component.

10.2 Indicator Light

The indicator light component indicates the value of a specified bit address or word address by the state of the indicator light (such as blinking text). It includes bit indicator lights, word indicator lights, and combined bits indicator lights.

10.2.1 Bit Indicator Light

Step 1. Select **Component/Indicator Light/Bit Indicator Light** from the menu bar to enter the following interface, configure relevant parameters, and click **OK.**

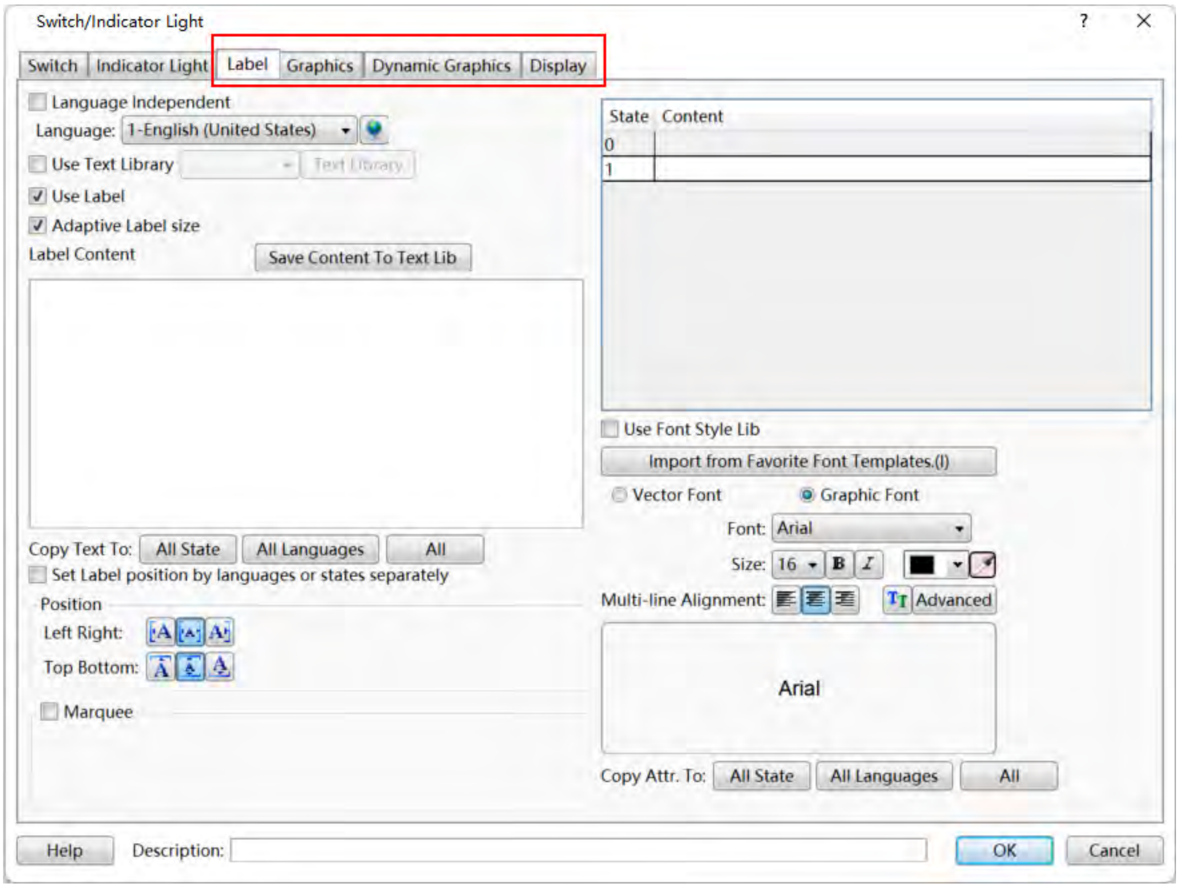


Please refer to the table below for detailed configuration methods.

Parameter	Description
Use Indicator	Whether to use the indicator light feature or not.
Display Mode	◆ Register Control: The state of the indicator light is determined by the state of the specified register. This parameter must be selected when the switch type is a bit indicator. ◆ Automatic Looping: The state is automatically switched at a set frequency.
Bit Register	The state of the indicator light is determined by the value of the bit register.
Word Register	The state of the indicator light is determined by the value of the word register.
Combined Bits	The combined bits indicator light displays image or text content based on multiple statees generated by logical operations on multiple bit addresses.

Parameter	Description
Address	Specific bit address or word address.
No. of States	The number of statees for a switch. It is fixed at 2 for a bit switch.
State	The states of bit switch are 0 and 1.
Positive Logic	When the value of a bit address is OFF, the state of the switch is 0. When the value of a bit address is ON, the state of the switch is 1.
Negative Logic	When the value of a bit address is ON, the state of the switch is 0. When the value of a bit address is OFF, the state of the switch is 1.
Blink mode	It includes None, Blink Text, and Blink Picture. When set to Blink Text or Blink Picture, the blink frequency needs to be configured. ◆ Blink Text: It refers to the text set in the **Label** property, which blinks gradually from invisible to visible according to the specified frequency. ◆ Blink Picture: It refers to the picture set in the **Graphic** property, which blinks gradually from invisible to visible according to the specified frequency.

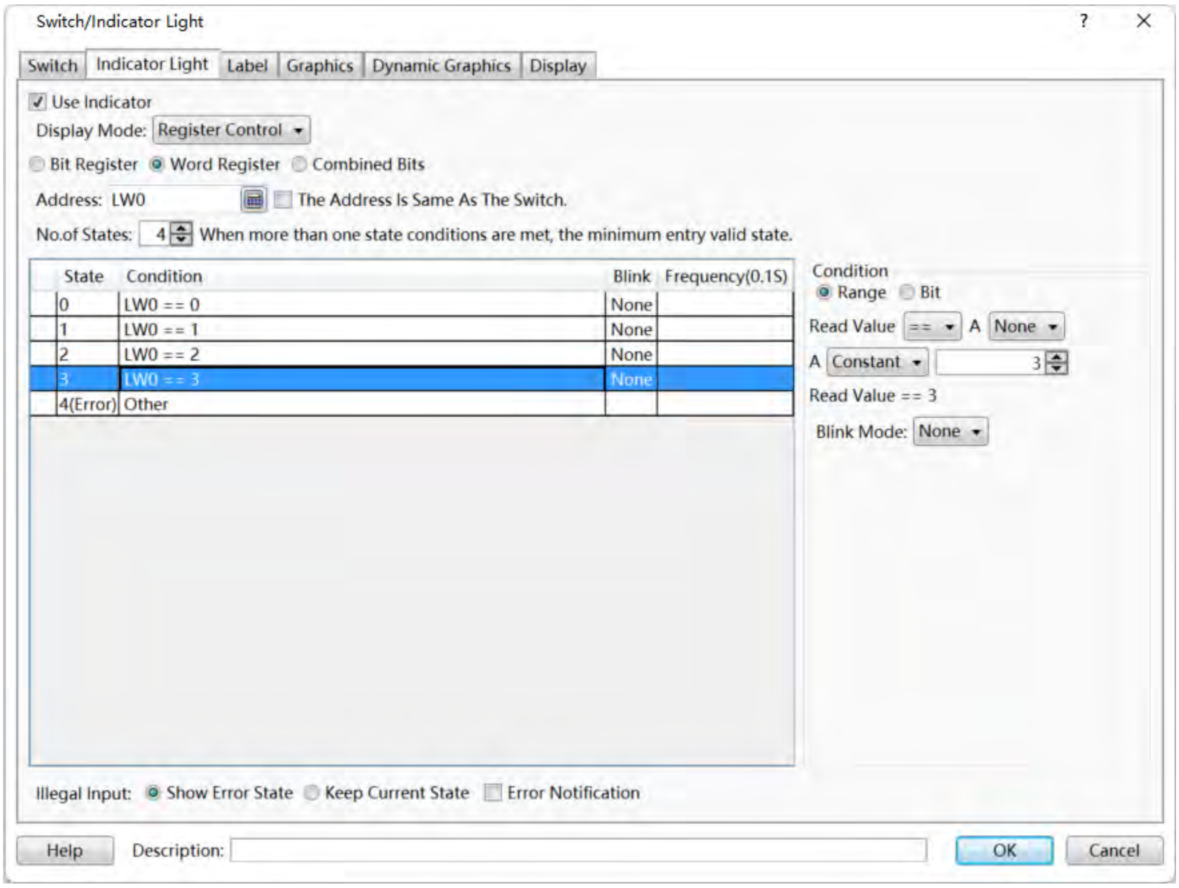
Step 2. Set other properties such as Label, click **OK**.



Step 3. Click anywhere in the window to insert bit indicator light.

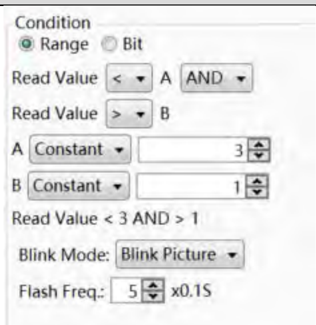
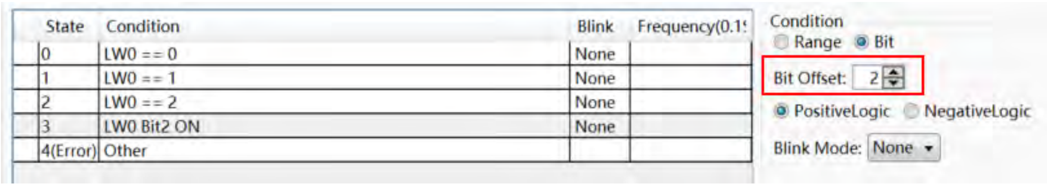
10.2.2 Word Indicator Light

Step 1. Select **Component/Indicator Light/Word Indicator Light** from the menu bar, configure relevant parameters in the pop-up dialog box.



Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Use indicator	Whether to use indicator light feature or not.
Display Mode	◆ Register control: The state of the switch is determined by the value of the specified word register. When the switch type is word indicator light, this parameter must be selected. ◆ Automatic loop: Continuous switching the state according to the set frequency.
Address	Click the  icon to set word address.
No. of States	Number of states for word switch.
State	Switch states, 256 states are supported (state 0 ~ state 255)
Condition	◆ Range: The allowed range of values for the setting can be specified. You can set a logical AND (or OR) relationship between two conditions. For example, you can read a value that is greater than 1 and less than 3.

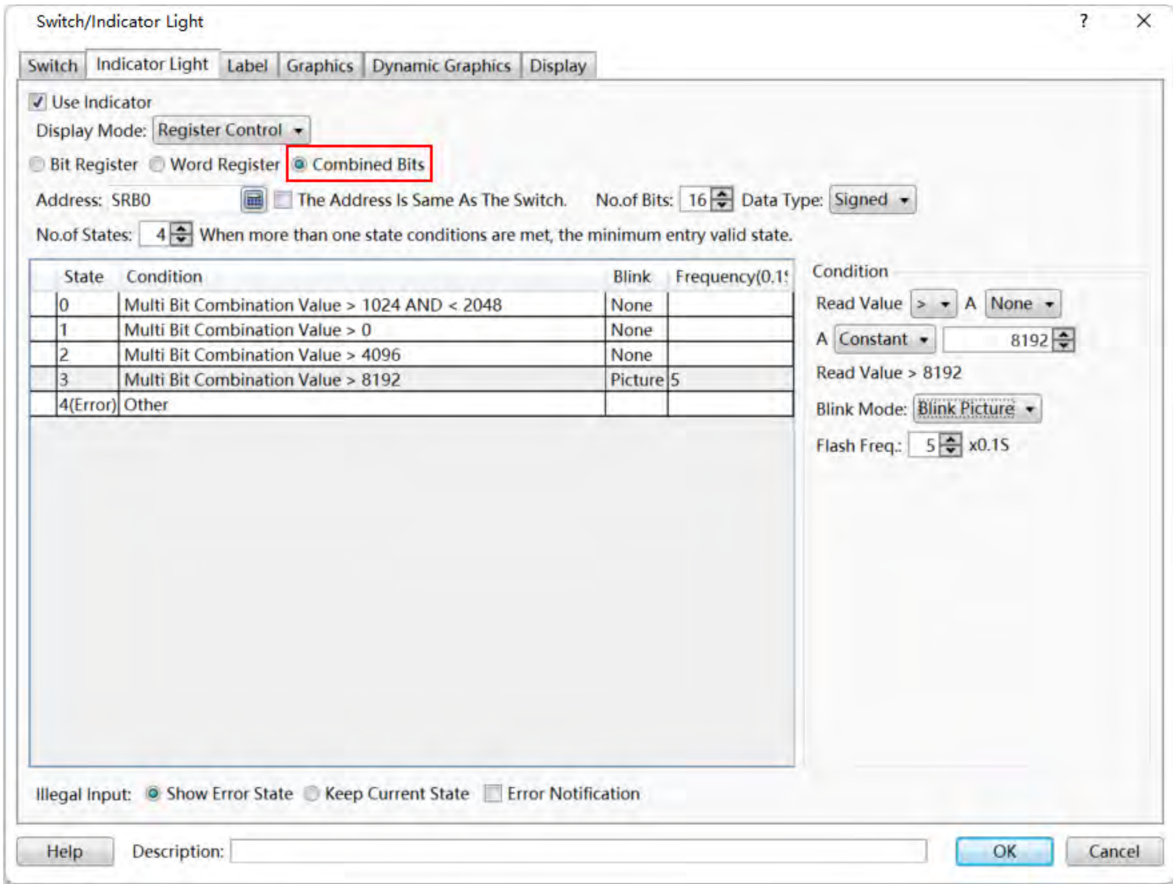
Parameter	Description
	 ◆ Bit: The value of specified bit is ON or OFF, if the bit offset is set to 2, it indicates that the value of the second bit of specified word address is ON (positive logic) or OFF (negative logic). 
Positive Logic	When the value of a bit address is OFF, the state of the switch is 0. When the value of a bit address is ON, the state of the switch is 1.
Negative Logic	When the value of a bit address is ON, the state of the switch is 0. When the value of a bit address is OFF, the state of the switch is 1.
Blink Mode	It includes None, Blink Text, and Blink Picture. When set to Blink Text or Blink Picture, the blink frequency needs to be configured. ◆ Blink Text: It refers to the text set in the **Label** property, which blinks gradually from invisible to visible according to the specified frequency. ◆ Blink Picture: It refers to the picture set in the **Graphic** property, which blinks gradually from invisible to visible according to the specified frequency.
Illegal Input	When the value of a word address does not meet the current setting of state conditions, it is considered an illegal input. ◆ Show Error State: the state of an indicator light showing an error state, specifically the state indicated in the last row of the state table. ◆ Keep Current State: no change of state.
Error Notification	Select a bit address, and when the value of the word address does not meet the specified condition, notify the bit address to set it to ON. When the condition is met, set the bit address

Parameter	Description
	to OFF again.

10.2.3 Combined Bit Indicator Light

Combined bit indicator light refers to an indicator light whose switch states is determined by the values of multiple bits.

Step 1. Select **Component/Indicator Light/Bit Indicator Light** from the menu bar, select **Combined Bits** in the pop-up **Switch/Indicator Light** dialog box, configure relevant parameters.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Display Mode	The display mode of a combined bit indicator light must be Register Control.
Address	The bit addresses of HMI or PLC. The starting address and the number of bits are inseparable. For example, if the starting address is LB0 and the number of bits is 2, then the combination from the highest bit to the lowest bit would be LB1, LB0.

<table>
<tr><th>Parameter</th><th>Description</th></tr>
<tr><td>No. of Bits</td><td>The number of bits for a value ranges from 2 to 32. For example, if the number of bits is 2 and the starting address is LB0, the combination would be as shown in the diagram below:
Number of bits: 2
The start address is LB0, then the combination of LB1 and LB0 include: 00, 01, 10, 11<table>
<tr><th colspan="2">Unsigned number</th><th colspan="2">Signed number</th></tr>
<tr><td>0</td><td>00</td><td>-2</td><td>10</td></tr>
<tr><td>1</td><td>01</td><td>-1</td><td>11</td></tr>
<tr><td>2</td><td>10</td><td>0</td><td>00</td></tr>
<tr><td>3</td><td>11</td><td>1</td><td>01</td></tr>
</table></td></tr>
<tr><td>Data Type</td><td>◆ Signed: The highest bit of the data represents the sign of the value (1 for negative numbers, 0 for positive numbers). When the number of bits is n, the range of possible values for the combination is -2^{n-1} ~ $(2^{n-1}-1)$.
◆ Unsigned: The highest bit of the data represents the specific value itself. When the number of bits is n, the range of possible values for the combination is 0~$(2^{n}-1)$.</td></tr>
<tr><td>No. of States</td><td>The number of states for an indicator light.</td></tr>
<tr><td>State</td><td>The state of indicator light, such as 0, 1, 2, etc.</td></tr>
<tr><td>Condition</td><td>The condition satisfied by a combined bit value, for example, a multi-digit combination value that is less than 2048 and greater than 1024.</td></tr>
<tr><td>Blink Mode</td><td>Including None, Blink Text, and Blink Picture. When set to Blink Text and Blink Picture, it is necessary to set the blink frequency.
◆ Blink Text: It refers to the text set in the Label property, which blinks gradually from invisible to visible according to the specified frequency.
◆ Blink Picture: It refers to the image set in the Graphics property, which blinks gradually from invisible to visible according to the specified frequency.</td></tr>
<tr><td>Illegal Input</td><td>When the value of an address does not meet the current setting of state conditions, it is considered as an illegal input.
◆ Show Error State: the state of an indicator light showing an error state, specifically the state indicated in the last row of the state table.
◆ Keep Current State: no change of state.</td></tr>
<tr><td>Error</td><td>Select a bit address, and when the value of the word address does not meet the specified</td></tr>
</table>

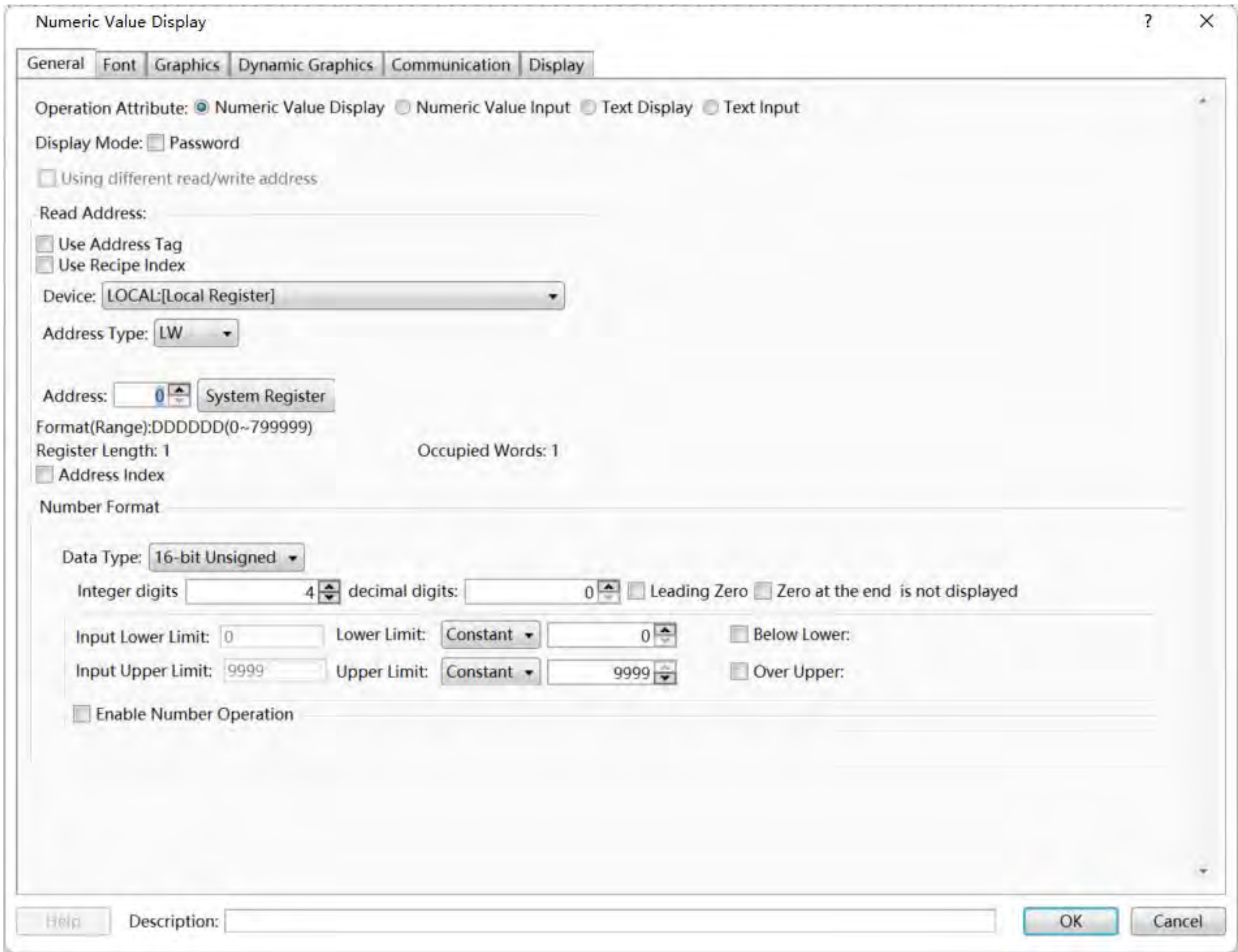
Parameter	Description
Notification	condition, notify the bit address to set it to ON. When the condition is satisfied, set the bit address to OFF again.

10.3 Numeric Value and Text

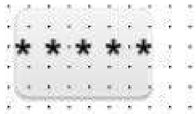
The Numeric Value and Text component is used to display or input values from specified addresses. There are four types, including numeric value display, numeric value input, text display, and text input.

10.3.1 Numeric Value Display

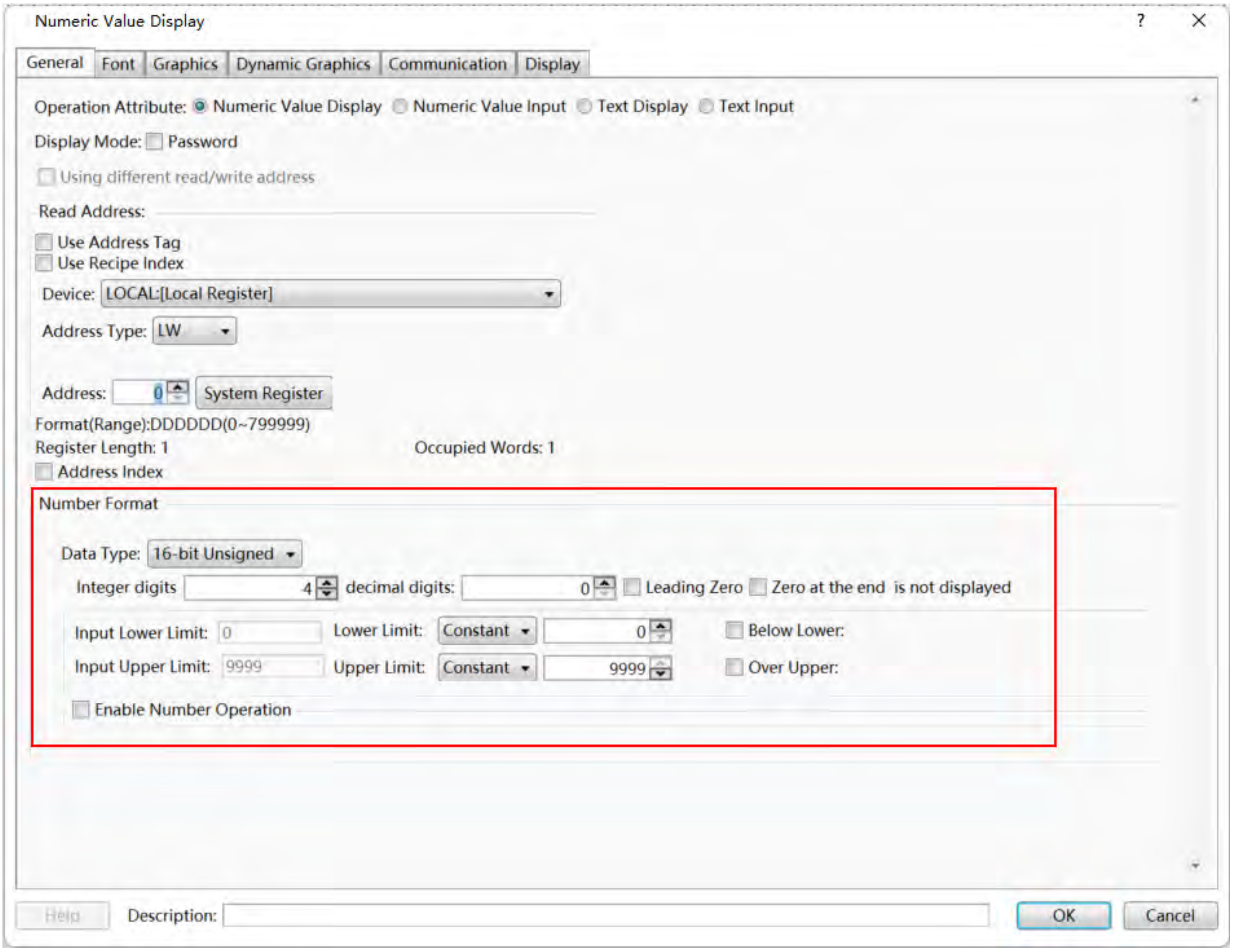
Step 1. Select **Component/Numeric Value and Text Display/Numeric Value Display** from the menu bar to enter the following interface. Configure relevant parameters.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Operation Attribute	Select **Numeric Value Display**. Operational attributes of the component can be modified in this interface. If you initially selected a numeric display component but want to change it to a numeric input component, you can simply select **Numeric Value Input** without having to delete the existing component and add a new numeric input component. This helps improve the efficiency of configuration.
Display Mode	If you check the **Password** option, you will need to set the data type. When set as a password attribute, the component will display * instead of the actual value. It is not recommended to check the **Password** option for a numeric display component. 
Use Address Tag	Using tags to refer to addresses. For more information about address tags, please refer to the Address Tag Library.
Use Recipe Index	When a new recipe is created, recipe data entry will generate related addresses that can be directly indexed and used by components. For more detailed information about recipe index, please refer to Recipe.
Device	HMI local register, recipe register, register of PLC.
Address Type	Please refer to the actual situation.
Address	Please refer to the actual situation for the address numbering.
Address Index	Using address index to change the current address. For example, if the current address is set to LW1, the address index is set to LW2, and the offset is 3, then the actual address would be LW(1 + *value of LW2* + 3).

Step 2. Set the Number Format.

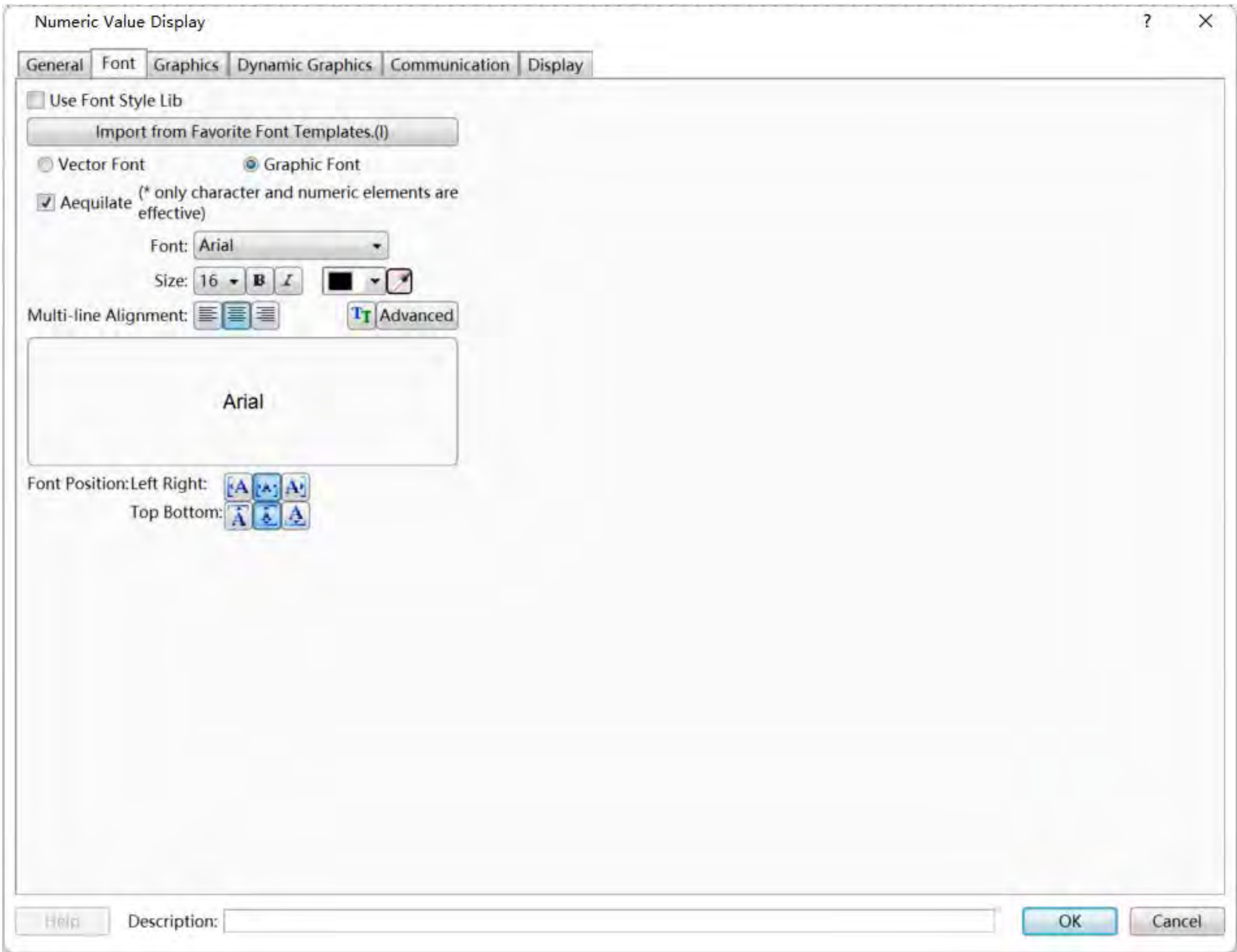


Please refer to the table below for detailed configuration methods.

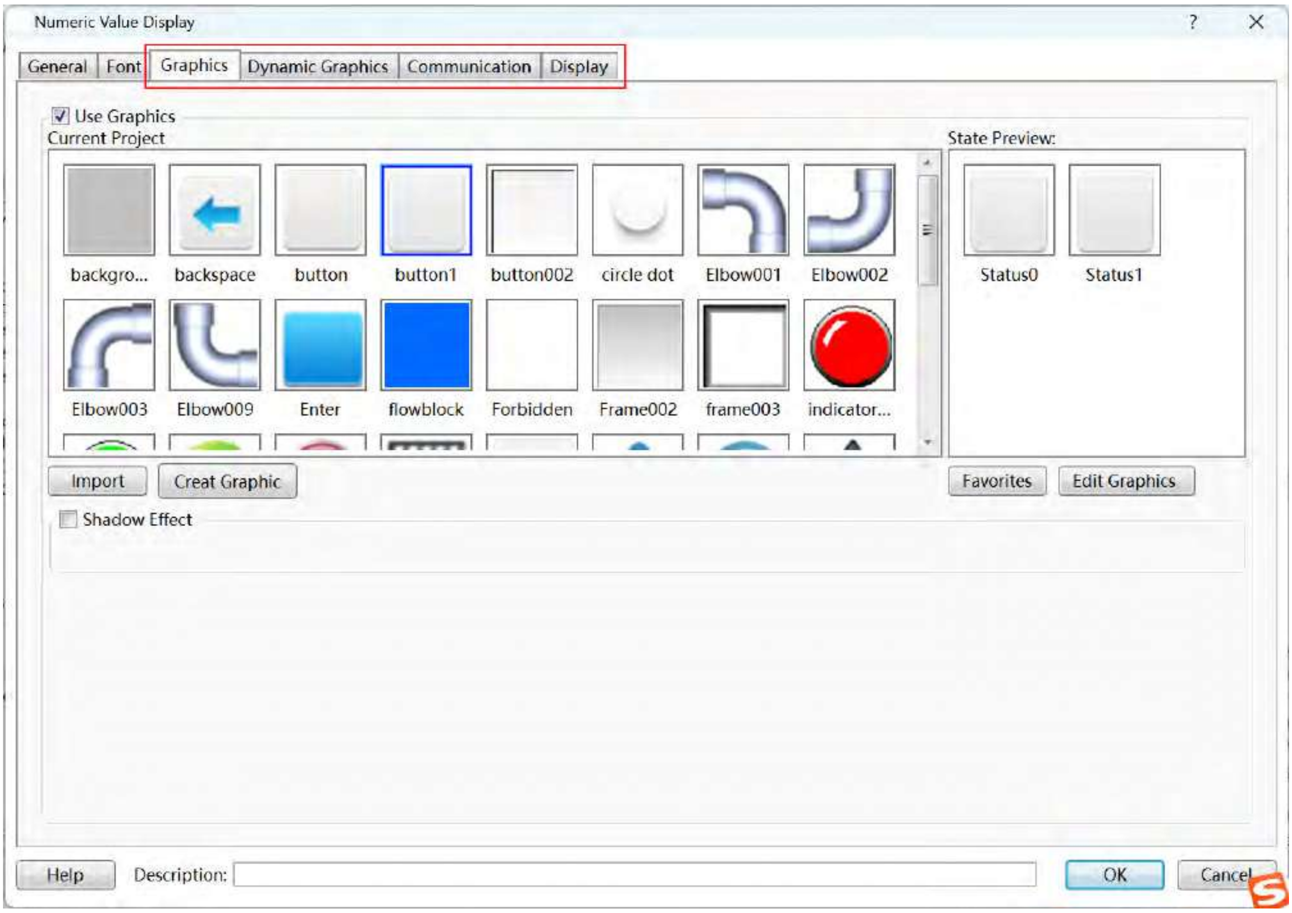
Parameter	Description
Data Type	Please refer to the actual situation.
Integer Digits	The number of digits for the integer part.
Decimal Digits	The number of decimal digits. When the data type is set to integer, if the decimal places are nonzero, the displayed value will be the actual data scaled down by the corresponding multiple. For example, if the data to be displayed is the integer number 55 and you set it to have two decimal digits, the actual displayed value will be 0.55. This functionality only changes the display value of the data, and the actual size and data type of the data remain unchanged, still representing the integer number 55.
Display the Positive Sign	For example, display “1234” as “+1234”.

Parameter	Description
Leading 0	Display leading 0 for numbers, such as showing “0005” for the value 5.
Lower Limit	The minimum value for the number. It can be set as a constant or a variable.
Upper Limit	The maximum value for the number. It can be set as a constant or a variable.
Below Lower	When the number falls below the lower limit value, you can set the color and blink effect for the value to indicate it is below the limit.
Above Upper	When the number exceeds the upper limit value, you can set the color and blink effect for the value to indicate it is above the limit.

Step 3. Set the Font.



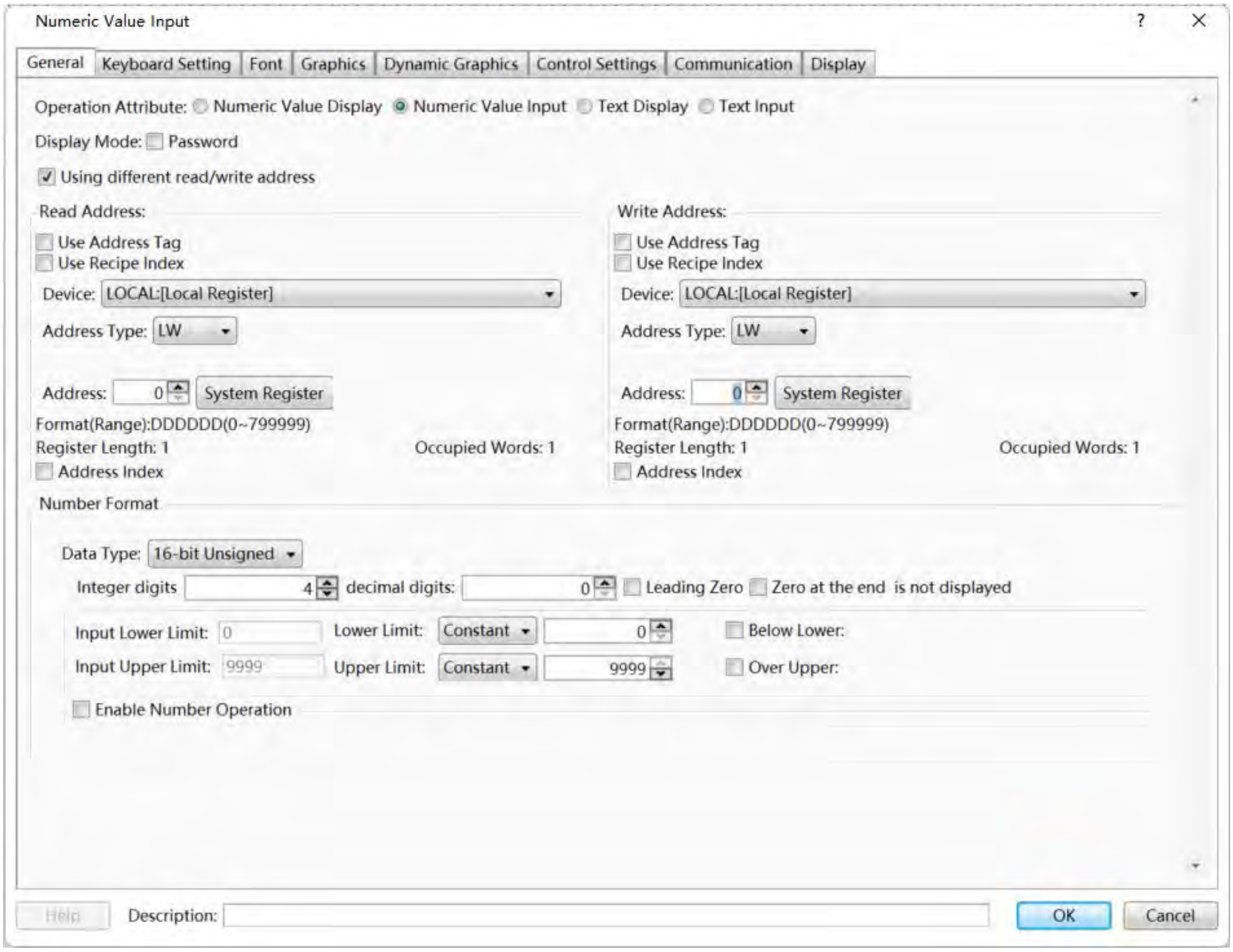
Step 4. Set properties such as Graphics, Dynamic Graphics, etc., click **OK**.



Step 5. Click anywhere in the window to insert Numeric value display component.

10.3.2 Numeric Value Input

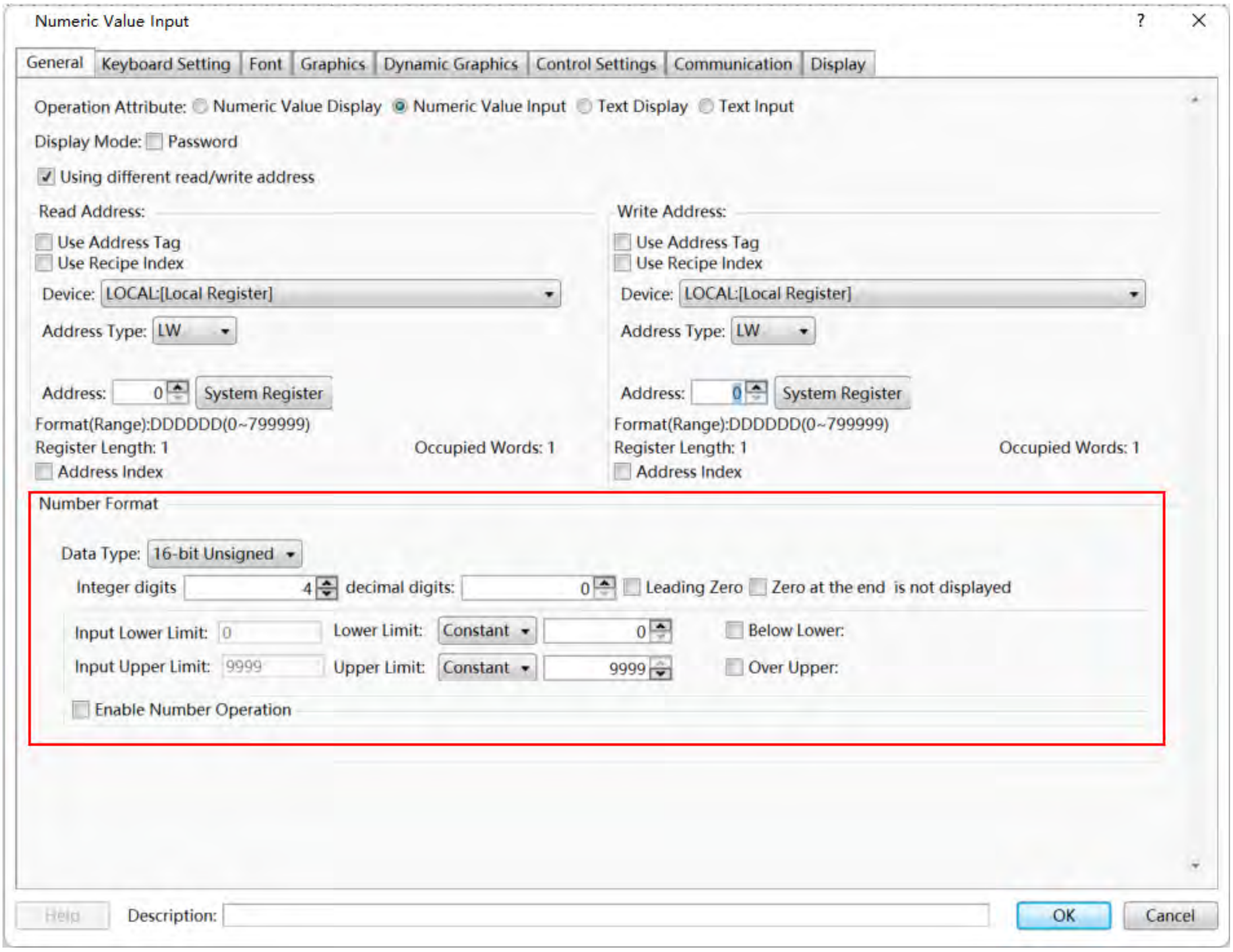
Step 1. Select **Component/Numeric Value and Text Display/Numeric Value Input** from the menu bar, the **Numeric Value Input** dialog box pops up, configure relevant parameters.



Please refer to the table below for detailed configuration methods.

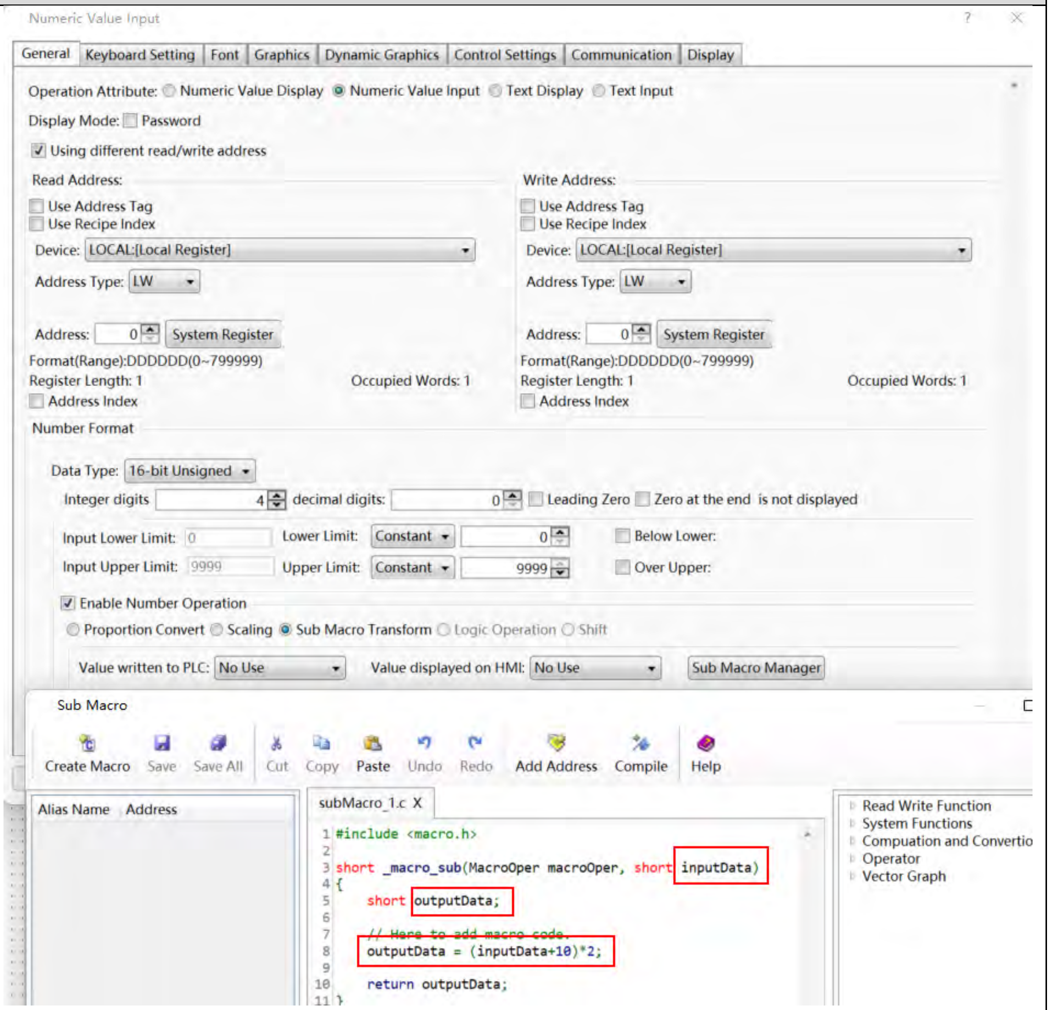
Parameter	Description
Display Mode	Check **Password**, and it is required to set the data type. After setting it as password property, the component will display “*”.
Using different read/write address	Check **Using different read/write address**, set the **Read Address** and **Write Address**. Write the data of **Read Address** to **Write Address**.

Step 2. Edit the Number Format.

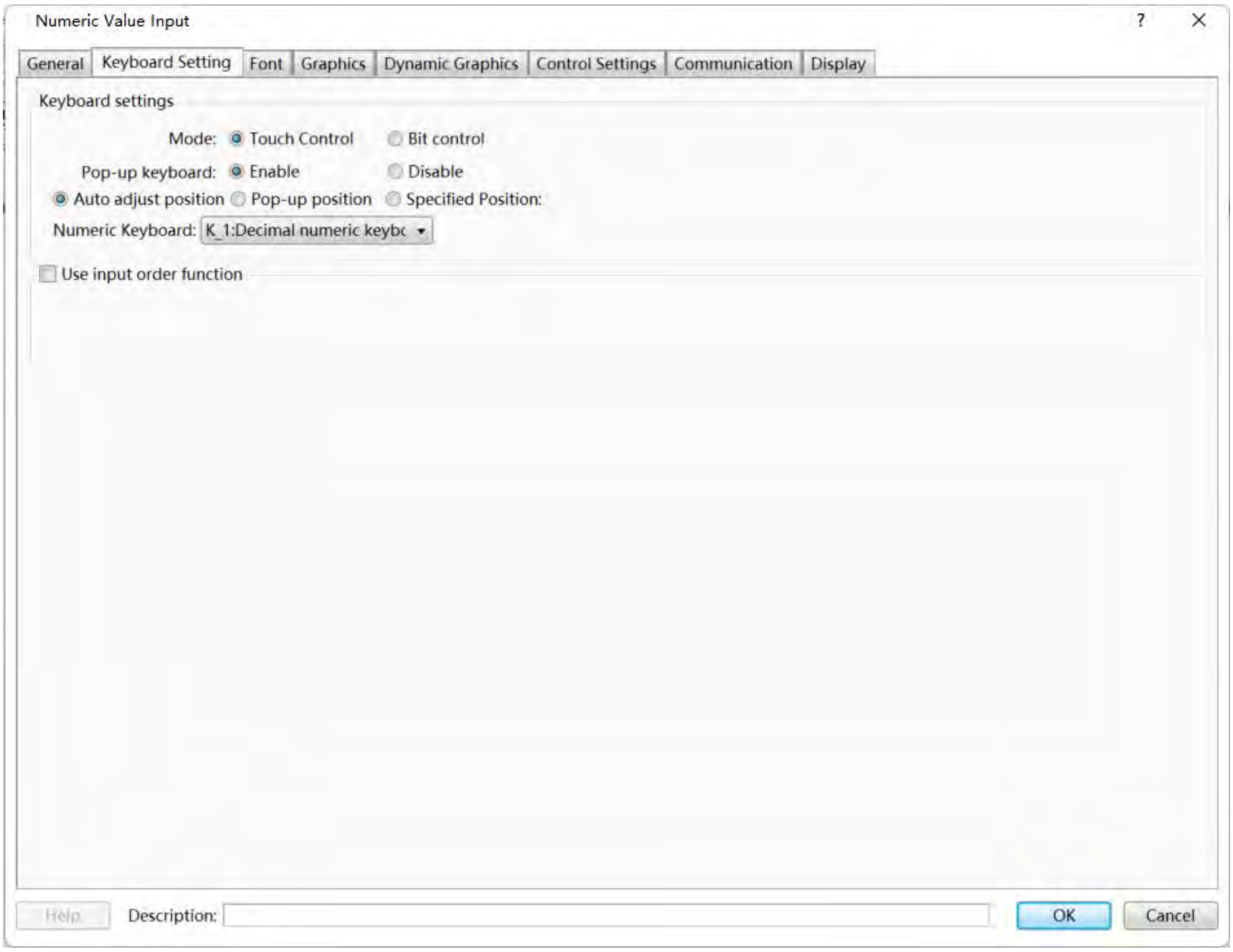


Please refer to the table below for detailed configuration methods.

Parameter	Description
Data Type	Please refer to the actual situation.
Enable Number Operation	Whether to enable number operation or not.
Proportion Convert	Convert the value of the read address to the target value in proportion (minimum value of the ratio is corresponding to the lower limit, maximum value of the ration is corresponding to the upper limit). Click **Explain** to view the conversion formula.
Scale	Scale the data according to the calculation formula.
Sub Macro Transform	Execute the corresponding Macro to the value of the source address, write the result value into PLC and display on HMI. Click **Sub Macro Management** to create a new sub macro.

Parameter	**Description**
	
Logic Operation	Perform logic operations to the data, such as bit AND, OR, XOR, and display the result of logic operation.
Shift	Perform logic operations to the data, such as shift to left or right based on the bits, and display the result of logic operation.

Step 3. Edit **Keyboard Setting** to set the parameters.

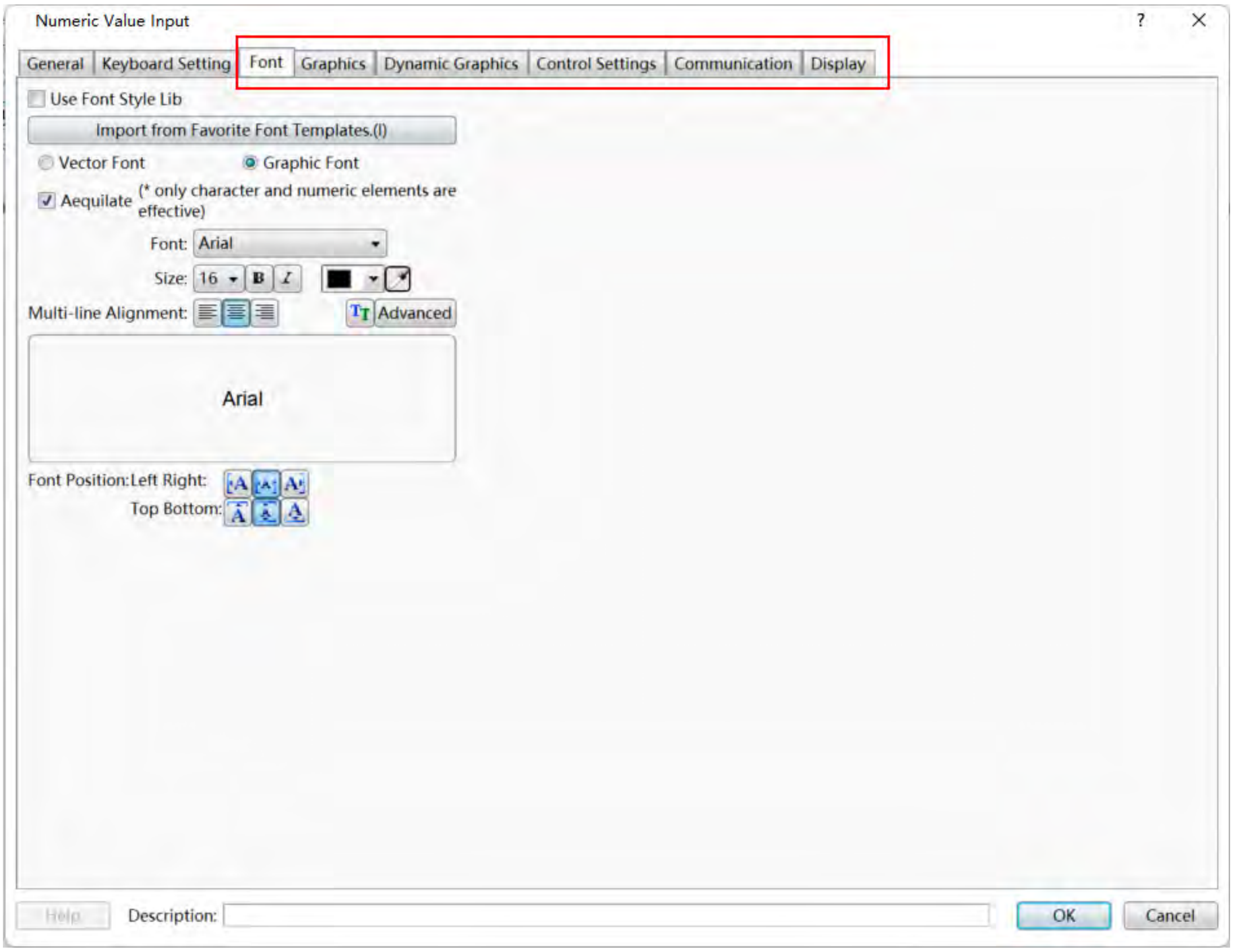


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Mode	◆ Touch Control: touch the numeric input component in the HMI window with your finger. ◆ Bit Control: When the value of the specified bit address is ON, the component triggers input state.
Pop-Up Keyboard	◆ Enable: use the system keyboard component. ◆ Disable: Select this parameter when an external keyboard or an input keyboard drawn in the interface is used.
Auto ajust position	Automatically adjust the position of the pop-up keyboard.
Pop-up Position	Select the position of the popped- up keyboard.
Specified Position	Define the position of popped- up keyboard by coordinate.

Parameter	Description
Numeric Keyboard	Select the keyboard window. For detailed information about the keyboard window, please refer to Keyboard Window.
Use input order function	Whether to enable **Use Input Order** function or not.
Input Order	According to the settings within the group, the numerical input component of each group should be inputted sequentially without interruption, in ascending order.
Group	You can group the input components and input them in ascending order within each group.

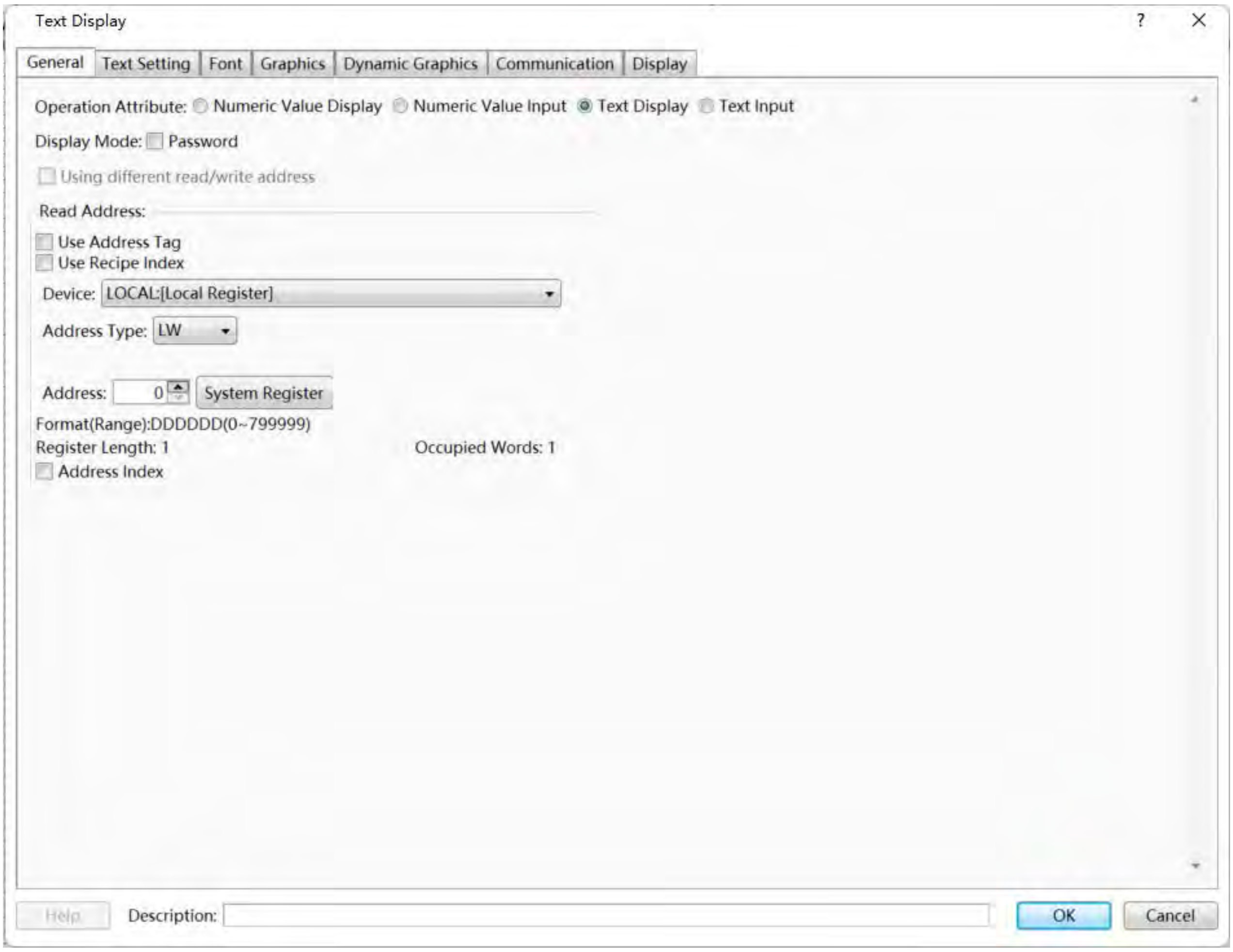
Step 4. Set the properties such as Font, Graphics, etc., click **OK**.



Step 5. Click anywhere in the window to insert the numeric value input component.

10.3.3 Text Display

Step 1. Select **Component/Numeric Value and Text Display/Text Display** from the menu bar to enter the following interface, and configure relevant parameters.

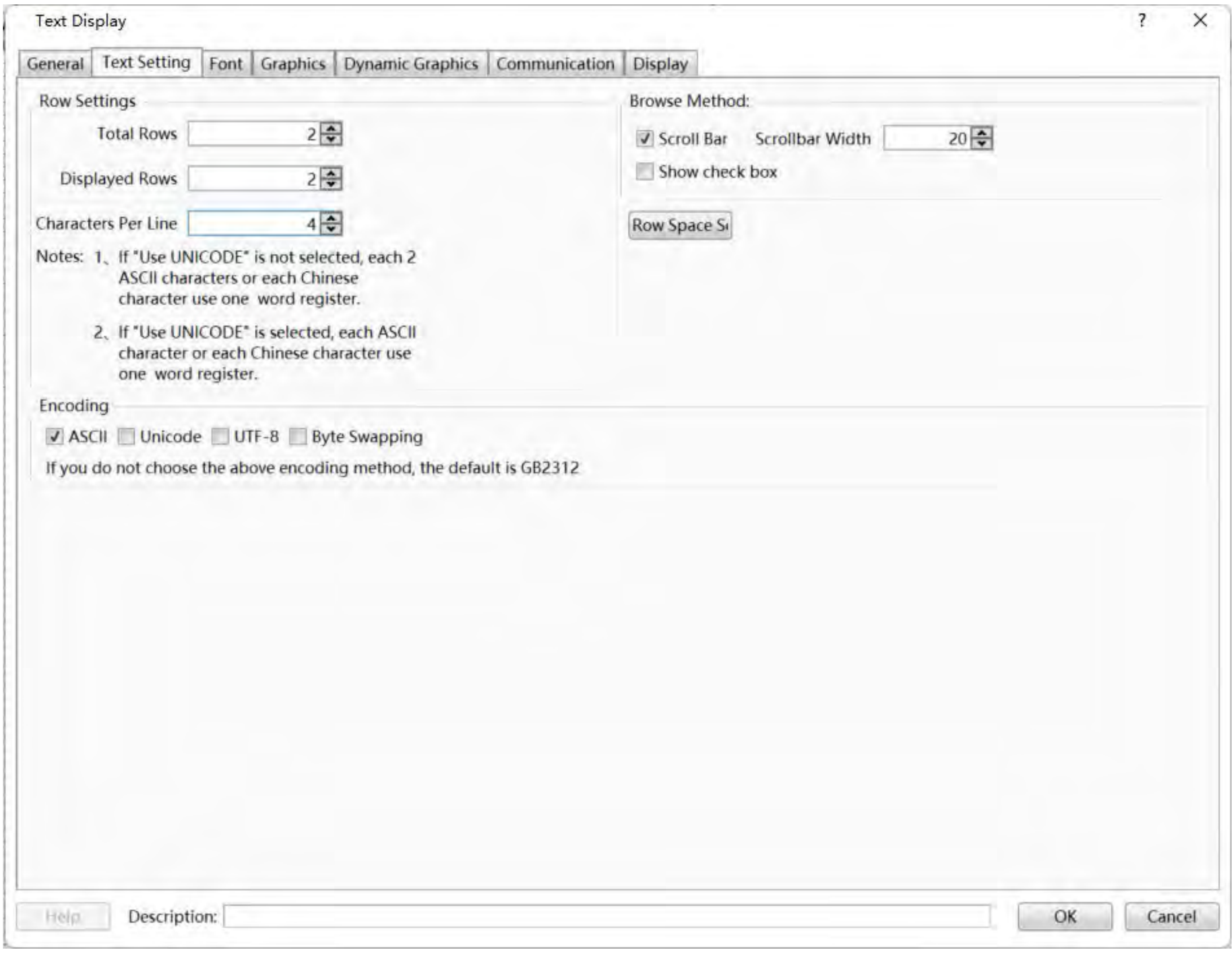


Please refer to the table below for detailed configuration.

Parameter	**Description**
Operation Attribute	Select “Text Display”.
Password	Check **Password**, display “*” on the component.
Use Address Tag	Components can be directly connected to variables within the Address Tag Library(For detailed information about the Address Tag Library, please refer to Address Tag Library). Using the Address Tag Library can enhance the efficiency of configuration. For example, if multiple components in the project are connected to the same address, when there is a need to

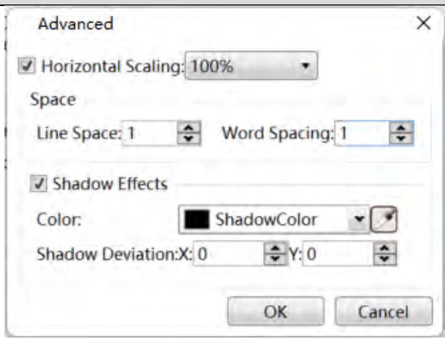
Parameter	Description
	change the address value, you can simply modify the variable connected within the Tag Library, without having to modify multiple components individually.
Use Recipe Index	When a new recipe is created, HMI will assign an address to recipe data entirs, other components can use the recipe addresses through the index. For more detailed information about recipe index, please refer to Recipe.
Device	HMI local register, recipe register, register of PLC.
Address type	Please refer to the actual situation.
Address	The address of register. Click **System Register** to view detailed information about the special system register.
Address Index	Change the current address by the address index. For example, if the current address is LW1, the address index in LW2, offset is 3, the actual address should be LW (1+*value of LW2*+3)

Step 2. Select the **Text Setting** tab, configure relevant parameters.



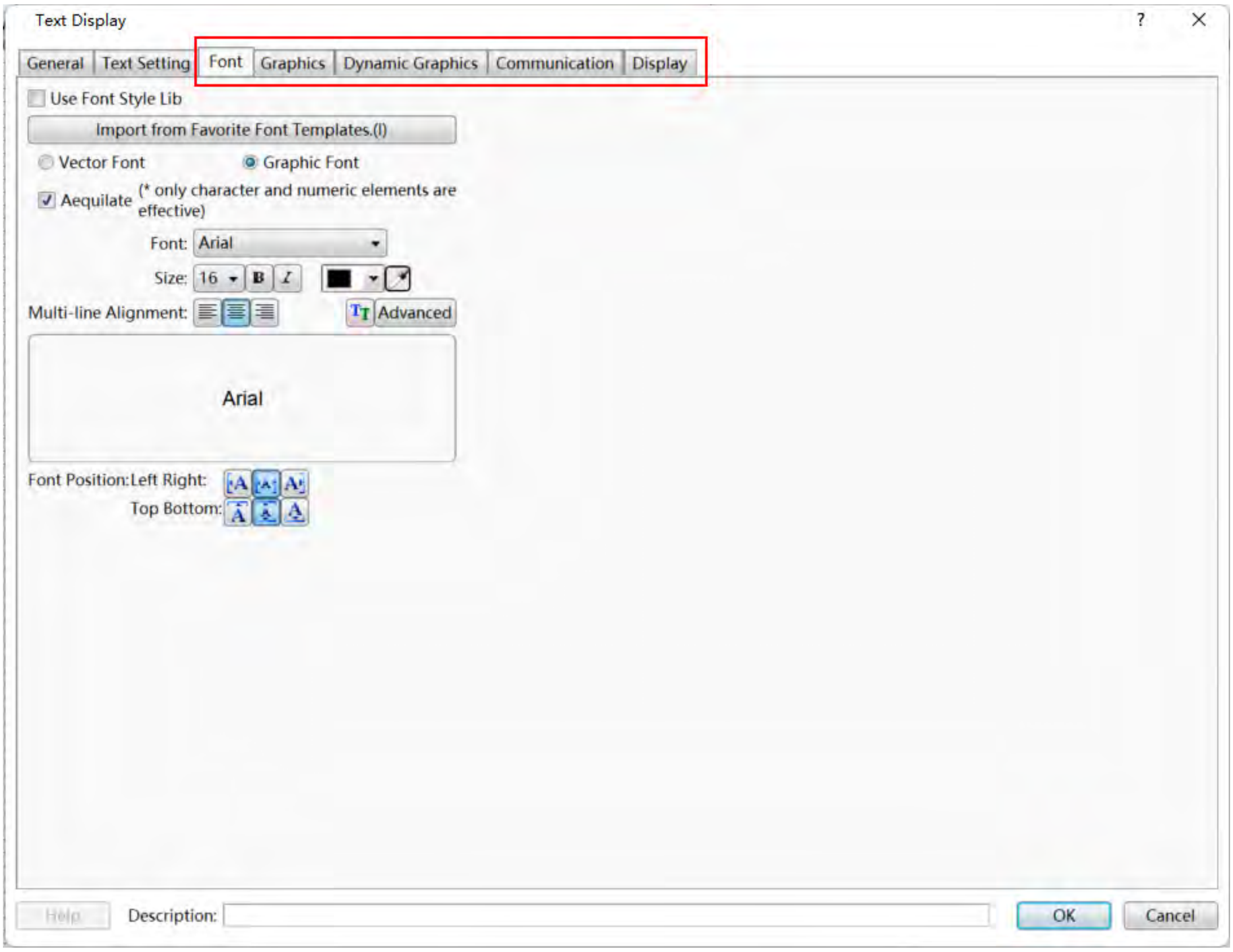
Please refer to the table below for detailed configuration methods.

Parameter	Description
Total Rows	The total number of rows refers to the number of rows occupied by the entire component.
Displayed Rows	The displayed number of rows in a component. If the displayed rows are fewer than the total rows, the component will show a scrollbar to facilitate viewing all the numerical content.
Characters Per Line	The number of characters displayed per row in a component.
Scroll Bar	Whether to display a scrollbar or not. If a scrollbar is enabled, you can set the width of the scrollbar.
Show Check Box	Whether to display the check box or not.
Row Space Settings	Click **Row Space Settings**, and you can set the horizontal scaling, line space, word space and shadow effects.

Parameter	Description
	
Encoding	Select the character encoding: ◆ ASCII only : This option includes numbers, symbols, and English letters but does not support Chinese characters. ◆ UNICODE: Regardless of whether it is Chinese or English, each character occupies one word (two bytes). ◆ UTF-8: UTF-8 is one of the implementations of Unicode character encoding. It can represent almost all characters worldwide. UTF-8 uses a variable-length encoding format and can be used in different countries and regions. Byte Swapping: Byte swapping refers to the operation of swapping the high and low bytes of a two-byte (16-bit) data. This means exchanging the positions of the upper 8 bits and the lower 8 bits. For example, the binary number 1111000011110000, after byte swapping, becomes 0000111100001111. In computer systems, byte swapping is commonly used in low-level data exchange and network communication. For example, within a processor, different processor architectures may have different byte orders (Endian), which can affect the outcome of a program. Therefore, byte swapping is necessary to ensure data correctness. In network communication, a uniform byte order is required to transmit data across different computer platforms, hence the need for byte swapping. GB Byte Swapping: GB (Guobiao) character encoding typically adopts a two-byte encoding method, where the high byte stores the zone code of the character, and the low byte stores the position code of the character. If you need to perform byte swapping, you can follow the steps below: Step 1: Separate the original two-byte representation into high and low bytes. Step 2: Swap the positions of the high and low bytes. Step 3: Combine the swapped high and low bytes to form a new two-byte representation.

<table>
<tr><th>Parameter</th><th>Description</th></tr>
<tr><td></td><td>When combining single-word characters into double-word characters, perform a high-low byte order test. In little-endian format, the low byte comes first, while in big-endian format, the high byte comes first.
Example: see the table below.
<table>
<tr><td>Double-word LW0</td><td colspan="2">0x12345678</td></tr>
<tr><td>High/low end</td><td>Low byte first(little-endian)</td><td>High byte first(big-endian)</td></tr>
<tr><td>Front word LW0</td><td>0x5678</td><td>0x1234</td></tr>
<tr><td>Rear word LW1</td><td>0x1234</td><td>0x5678</td></tr>
</table>
PS: Byte swapping in a word is only available when ASCII is checked.
If none of the encoding above is selected, GB2312 is used in default.</td></tr>
</table>

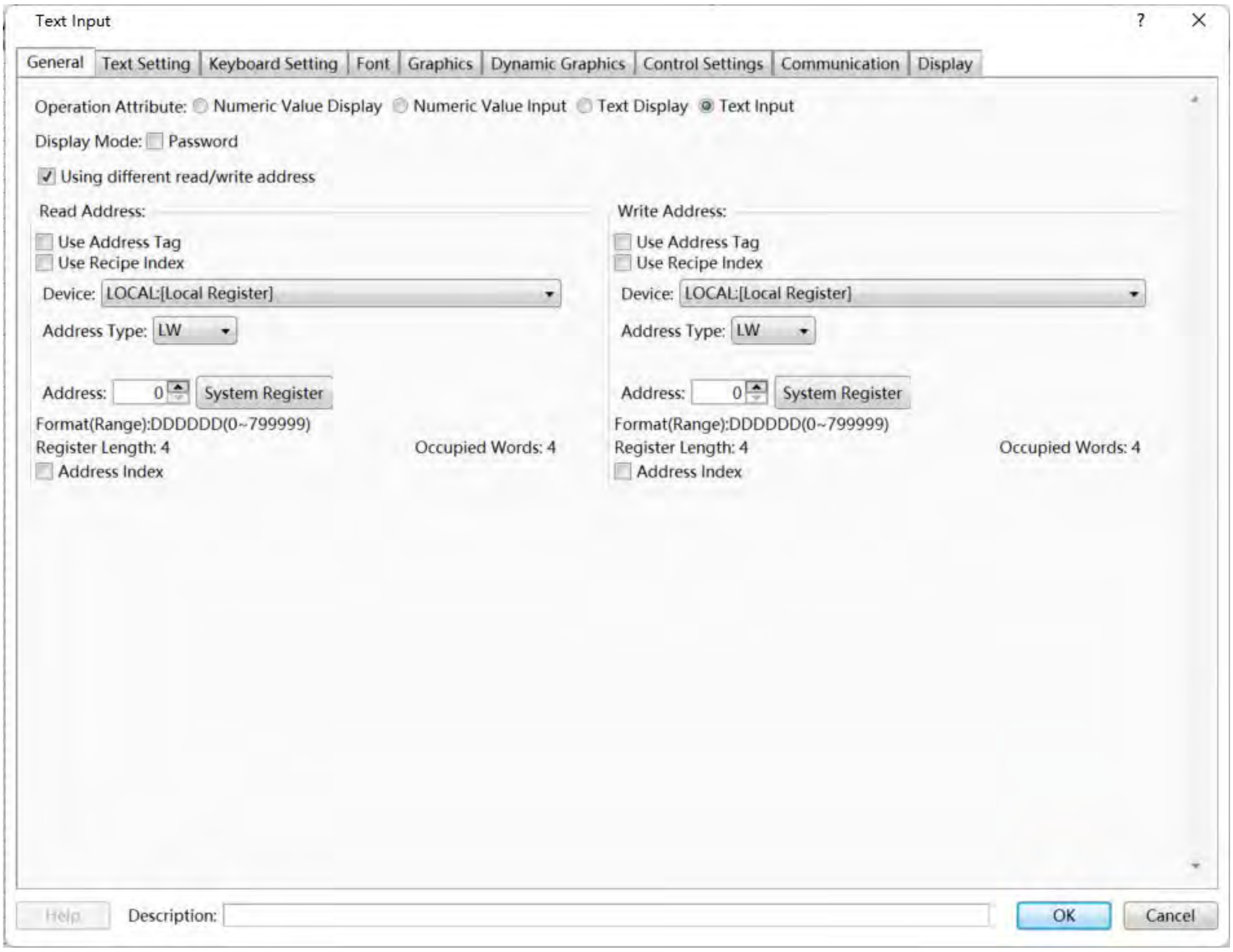
Step 4. Set properties such as Font, Graphics, etc., click **OK**.



Step 5. Click anywhere in the window to insert the character display component.

10.3.4 Text Input

Step 1. Select **Component/Numeric Value and Text Display/Text Input** from the menu bar, edit general properties in the popped up **Text Input** dialog box.

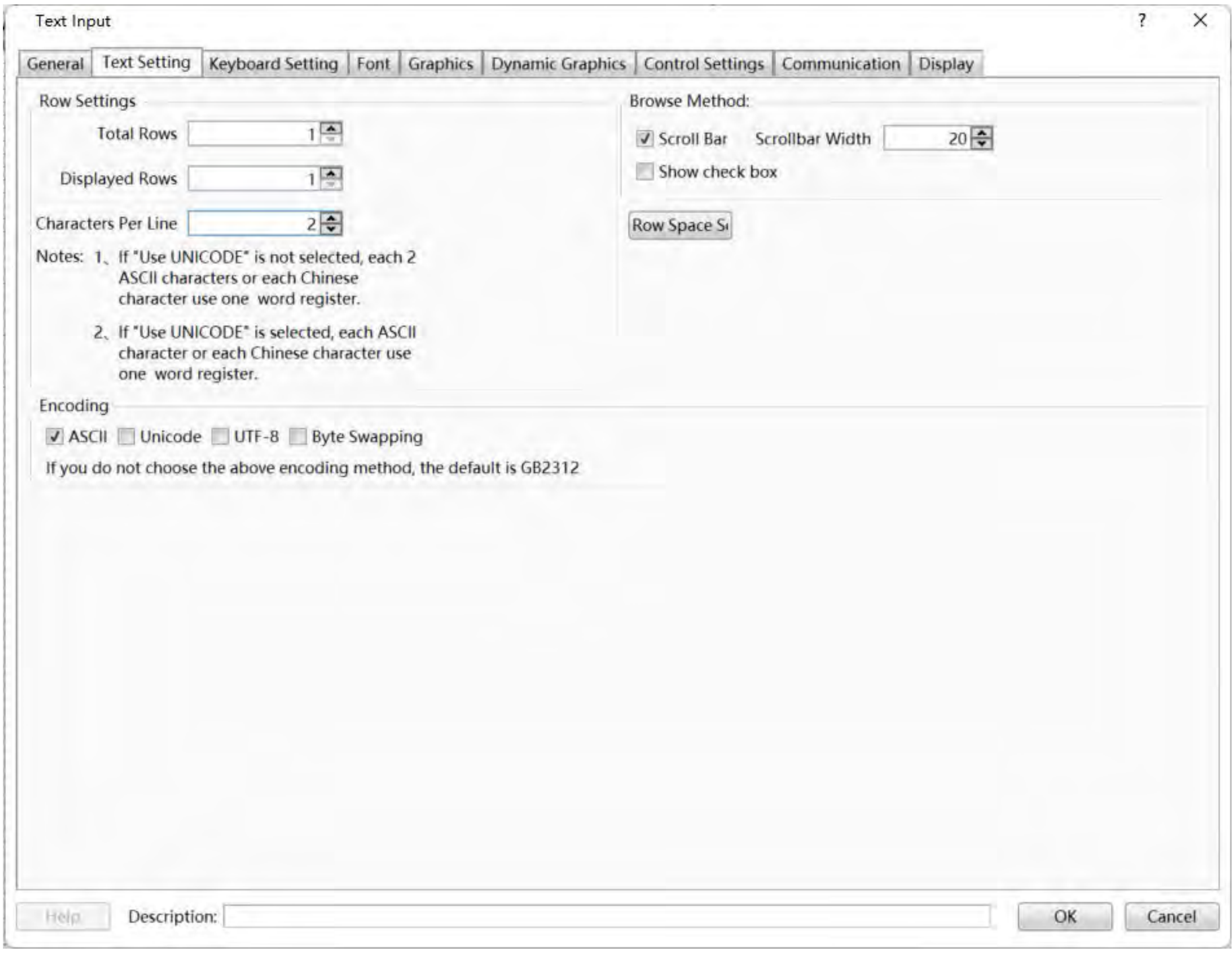


Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Operation Attribute	Select **Text Input**.
Password	Check **Password**, the character input component will display “*”.
Using different read/write address	Write the value of the read address into the write address.

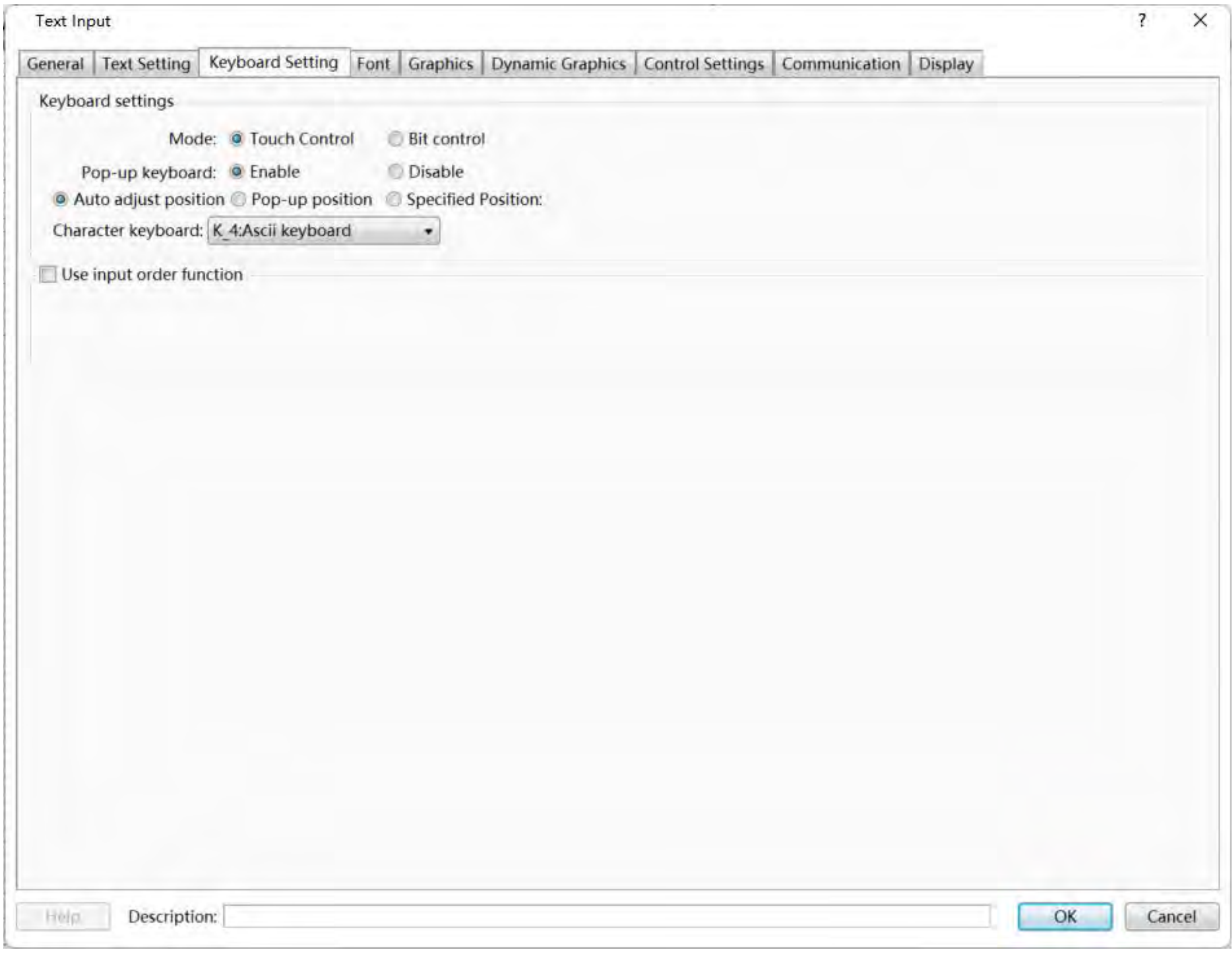
Step 2. Set the **Character Setting** property.

Please refer to Step 2 for detailed configuration methods.

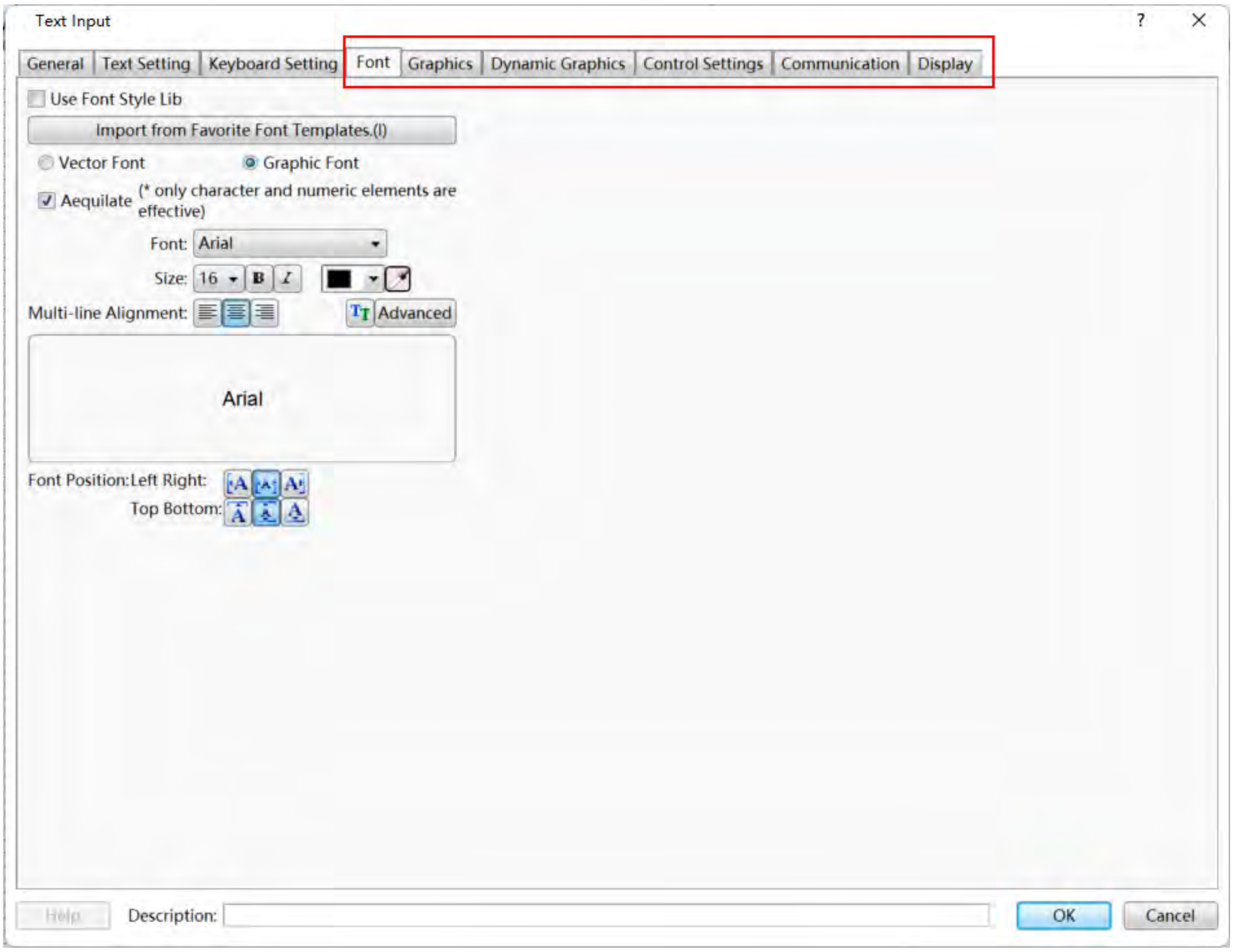


Step 3. Edit the **Keyboard Setting** properties.

Please refer to Step 3 for detailed configuration methods.



Step 4. Set properties such as Font, Graphics, click **OK**.



Step 5. Click anywhere in the window to insert the text input component.

10.4 Toggle Switch and Menu

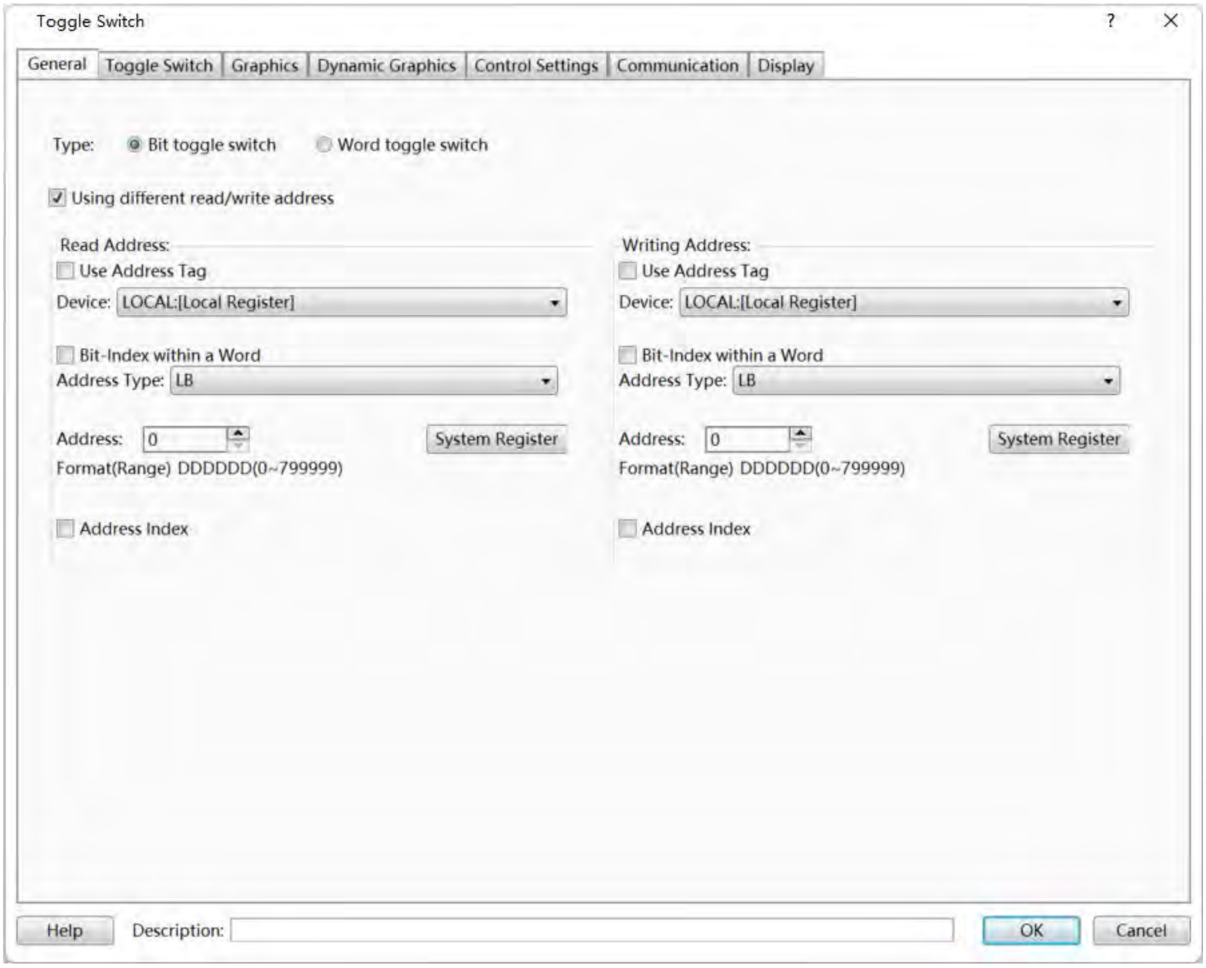
The Toggle Switch and Menu component is used to toggle states, display option values, and perform actions such as file selection. It includes bit toggle switch, word toggle switch, checklist and selection box, drop-down list, file browser boxes, and user privilege.

10.4.1 Bit Toggle Switch

The bit toggle switch combines the functions of a bit set and a bit indicator light. While changing the bit state, the graphics and text of the component will also be changed.

The steps to create a new bit toggle switch are as follows:

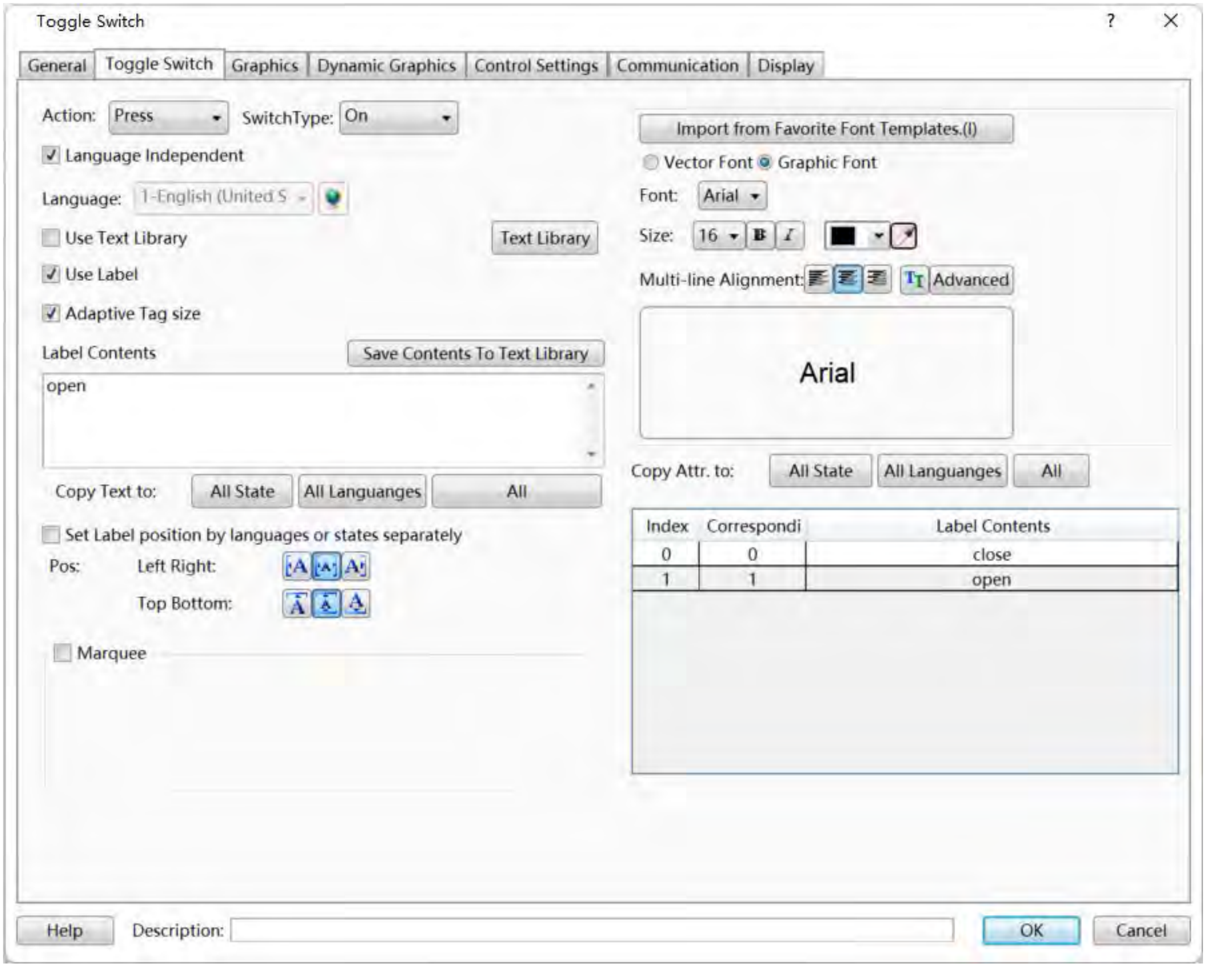
Step 1. Select **Component/Toggle Switch and Menu/Bit Switch** from the menu bar, and configure relevant parameters in the pop-up **Toggle Switch** dialog box.



Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Type	Includes bit toggle switch and word toggle switch.
Using different read/write address	When **Using different read/write address** box is checked, perform an action on the component (e.g., pressing) will read the value from the “Read address” and perform a corresponding calculation (e.g., negation). The resulting value will then be written to the “Write address”. By default, the “Read address” and “Write address” are the same.

Step 2. Select the **Toggle Switch** tab and configure relevant parameters.

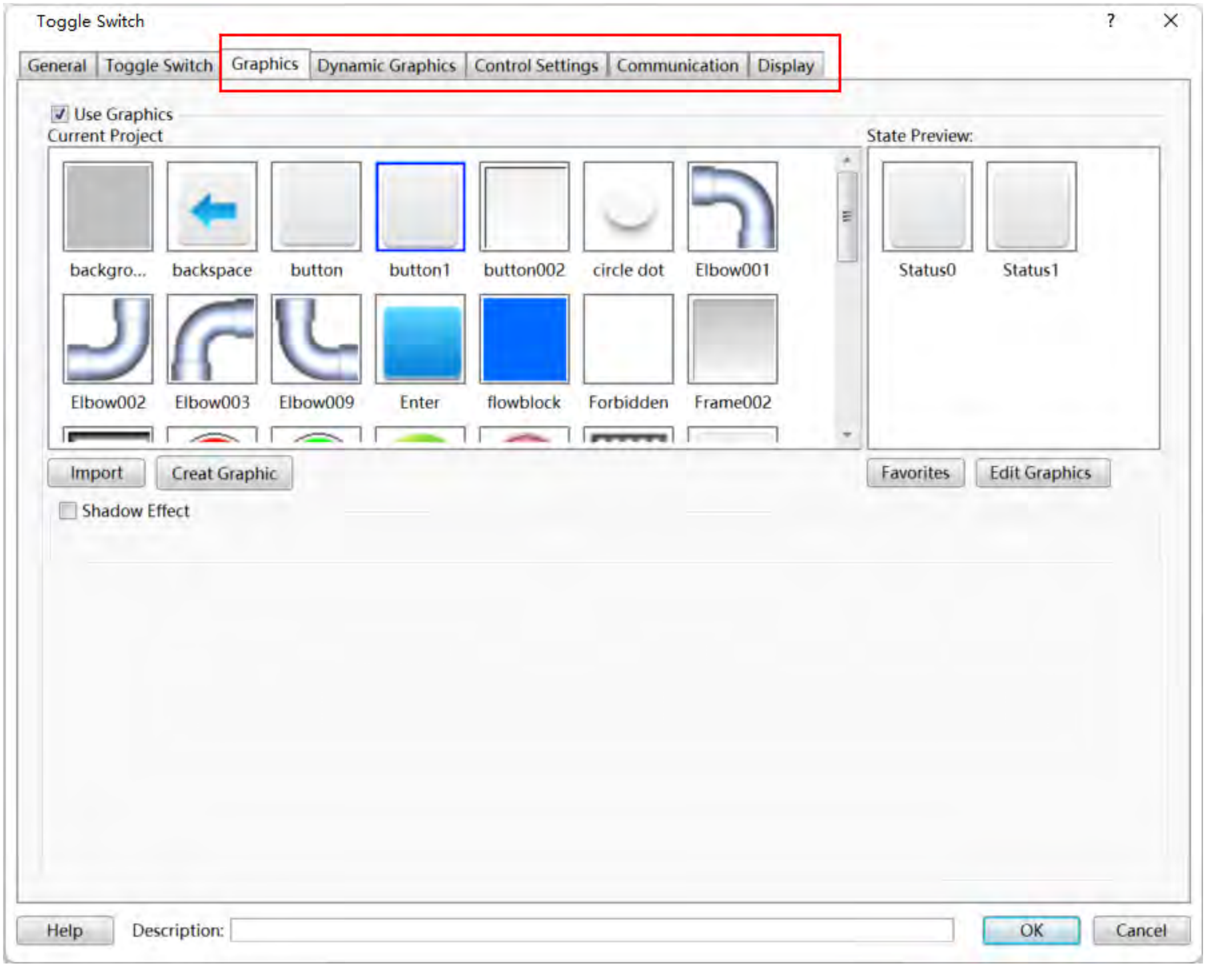


Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Action	Includes Press and Release.
Switch Type	◆ On: Set the state of a specific bit address to ON. ◆ Off: Set the state of a specific bit address to OFF. ◆ Inverse: To toggle the state of a specific bit address, for example, if the current state of the specified bit address is ON, when the bit toggle switch is activated (e.g., pressed), the state of the specified bit address will be set to OFF. ◆ Reset: When the switch is pressed， set the state of specified bit address to state ON,then release the switch， set the state of specified bit address to state OFF.
Language Independent	If this box is checked, label content of the component doesn’t change when language is changed.
Language	Change the language of text contents.
Use Text	Whether to use the text library or not. For detailed information about the text library, please

Parameters	**Description**
Library	refer to Text Library.
Use Label	If the **Use Label** box is checked, label content is required.
Label Content	Set the tag value under different states and different languages.
Adaptive tag size	If the tag content exceeds the size of the component, enabling the option will automatically increase the size of the component. If the option is not selected, the tag content will be automatically truncated.
Marquee	To display the tag content in a moving manner. ◆ Moving Direction: Specify the direction in which the tag content moves. Options include moving from left to right, right to left, top to bottom, or bottom to top. ◆ Step Length: Determine the length of the displayed portion of the tag content. ◆ Speed: Set the speed of movement.
Vector Font	The fonts in the Font Library are vector fonts. When the character encoding is Unicode, it is necessary to select a vector font.
Graphic Font	The entire string is captured as a bitmap and saved to the project.

Step 3. Set properties such as Graphics, Dynamic Graphics, etc., click **OK**.



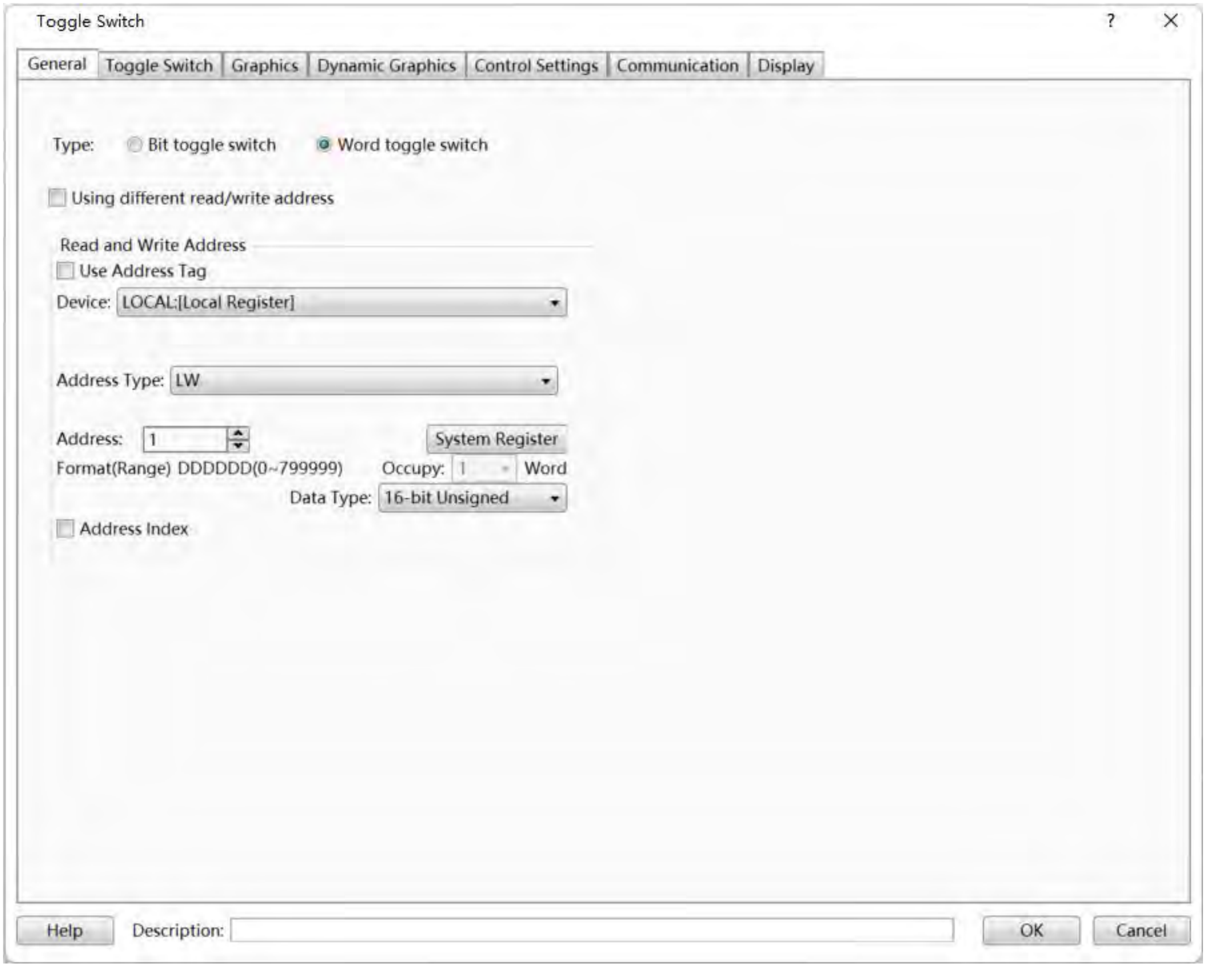
Step 4. Click anywhere in the window to insert the bit toggle switch component.

10.4.2 Word Toggle Switch

The word toggle switch combines the functions of a word set and a word indicator light. While changing the word state, the graphics and text of the component will also be changed.

The steps to create a new word switch are as follows:

Step 1. Select **Component/Toggle Switch and Menu/Word Switch** from the menu bar, and configure relevant parameters in the pop-up **Toggle Switch** dialog box.

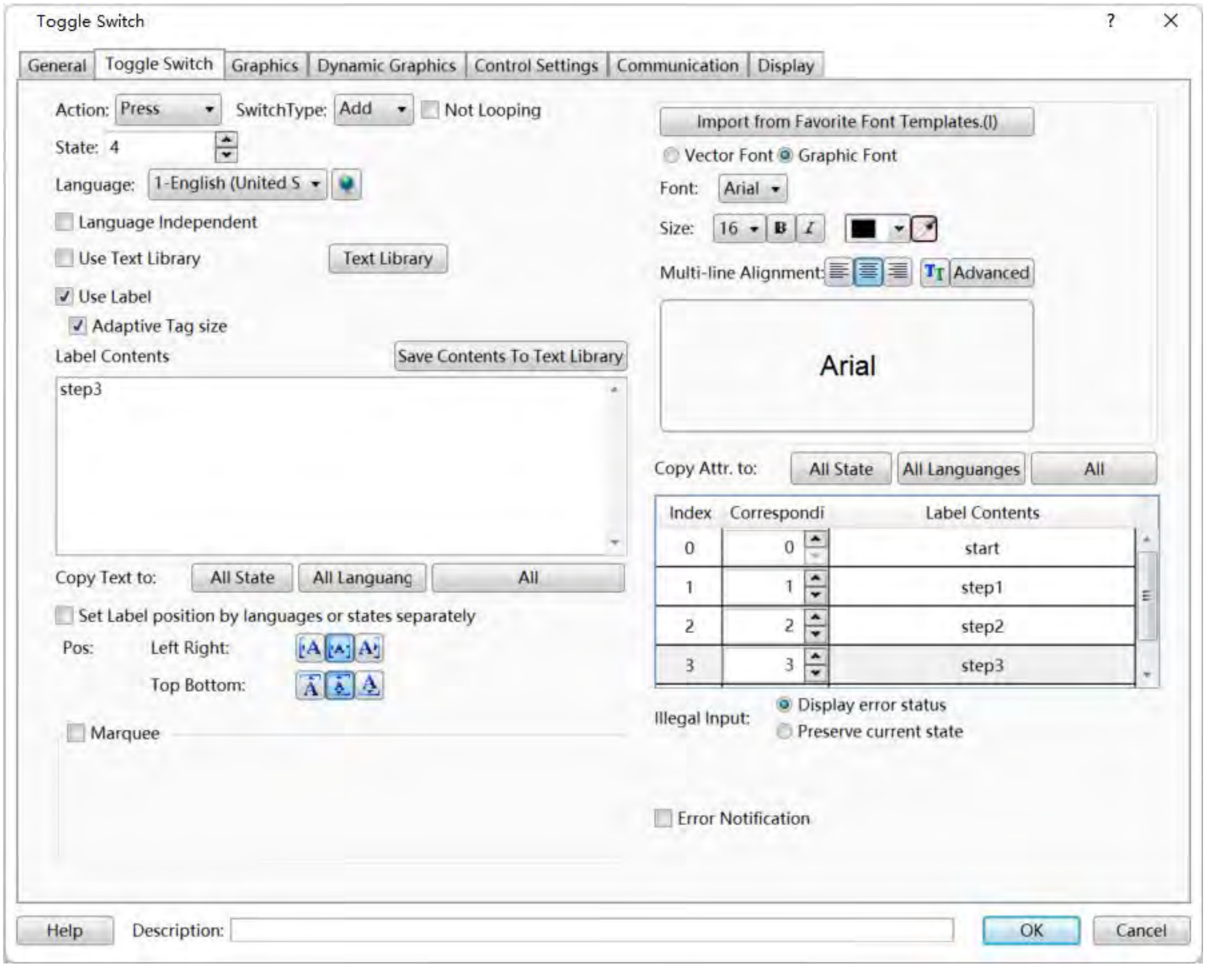


Please refer to the table below for detailed configuration methods.

Parameter	Description
Type	Includes bit toggle switch and word toggle switch.
Using different read/write adress	When **Using different read/write adress** box is checked, perform an action on the component (e.g., pressing) will read the value from the “Read address” and perform a corresponding calculation (e.g., negation). The resulting value will then be written to the “Write address”. By default, the “Read address” and “Write address” are the same.
Use Address Tag	Use tags to represent the addresses. For detailed information about the Address Tag, please refer to Address Tag Library.
Device	HMI local register, recipe register, register of PLC.
Address type	Please refer to the actual situation.
Address	Specific word address. Click **System Register** to view the detailed information of system

Parameter	Description
	register with special function.
Address Index	Use address index to change the current address. For example, if current address is LW1, address index is LW2, offset is 3, then the actual address is LW (1+*the value of LW2*+3).

Step 2. Select the **Toggle Switch** tab and configure relevant parameters.

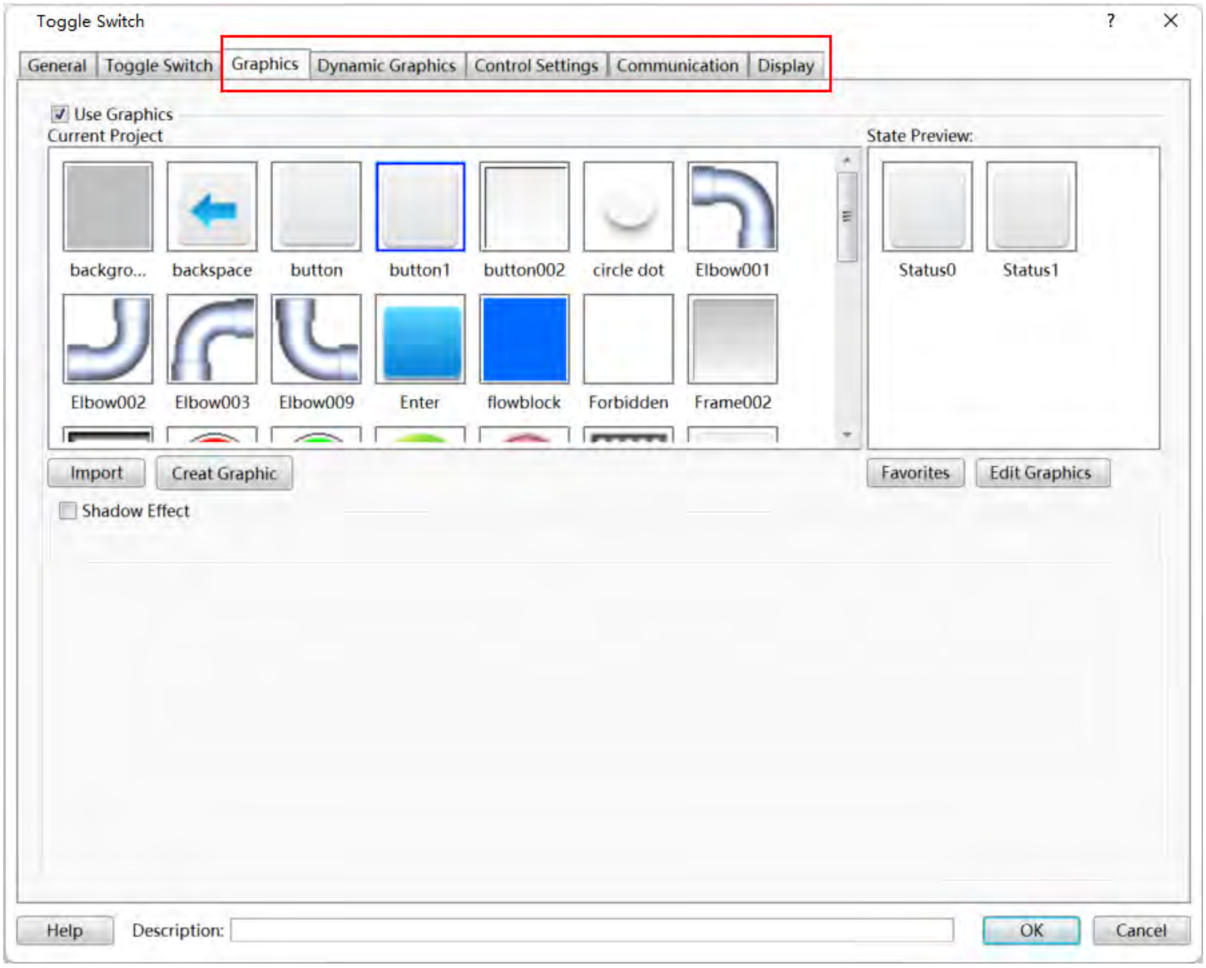


Please refer to the table below for detailed configuration methods.

Parameter	Description
Action	Includes Press and Release.
Switch Type	◆ Add: the value of specified word address increases. ◆ Subtract: the value of specified word address decreases.
Not Looping	Check the **Not Looping**, and the switch type is set to Add, if the value of the specified word address reaches the maximum value and an action is performed on the component (e.g.,

Parameter	Description
	pressing), the value of the specified word address will no longer change. If the option **Not Looping** is unchecked**,** when the value of the specified word address reaches the maximum value and an action is performed on the component (e.g., pressing) again, the value of the specified word address will become the minimum value. Subsequent actions(e.g., pressing) on the component will then gradually increase the value of the specified word address in a loop.
State	Number of states of specified bit address.
Language	Current language display (applicable for text content).
Language Independent	Text content of the component doesn't change when language is changed.
Use Text Library	Use the text in the text library . For detailed information about the text library, please refer to Text Library.
Use Label	Whether to use label or not. Label content is required when use label.
Label Content	Set the label content under different states and different languages.
Pos	Position of the label in the component. Including the alignment method in the horizontal direction and vertical direction.
Illegal Input	When input is illegal, you can select display error state or maintain current state.
Error Notification	When an error occurs, set the value of the notification bit address to ON.
Index	State index.
Corresponding	The value of specified word address in different states.

Step 3. Set properties such as Graphics, Dynamic Graphics, etc., click **OK**.



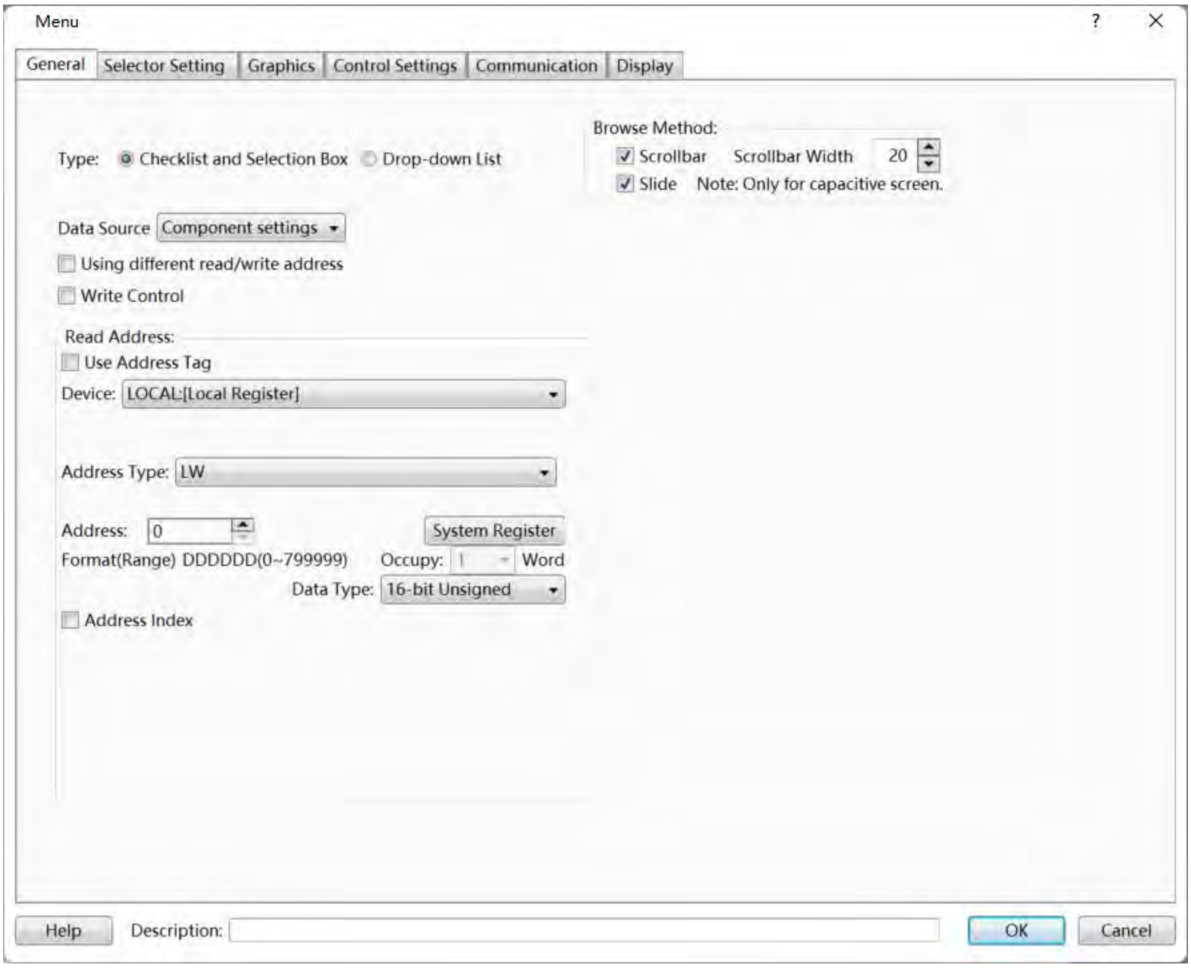
Step 4. Click anywhere in the window to insert the word toggle switch component.

10.4.3 Checklist and Selection Box

The Checklist and Selection Box component is used to toggle the values of specified word addresses. By selecting the value corresponding to the state index in the Checklist and Selection Box, the value of the specified word address switches to the value associated with that state. The Checklist and Selection Box is displayed in the form of a list box in HMI.

The steps to add a Checklist and Selection Box component are as follows (takes the **component setting** as an example of **data source** here):

Step 1. Select **Component/Toggle Switch and Menu/Checklist and Selection Box** from the menu bar, edit the relevant parameters in the pop-up dialog box.

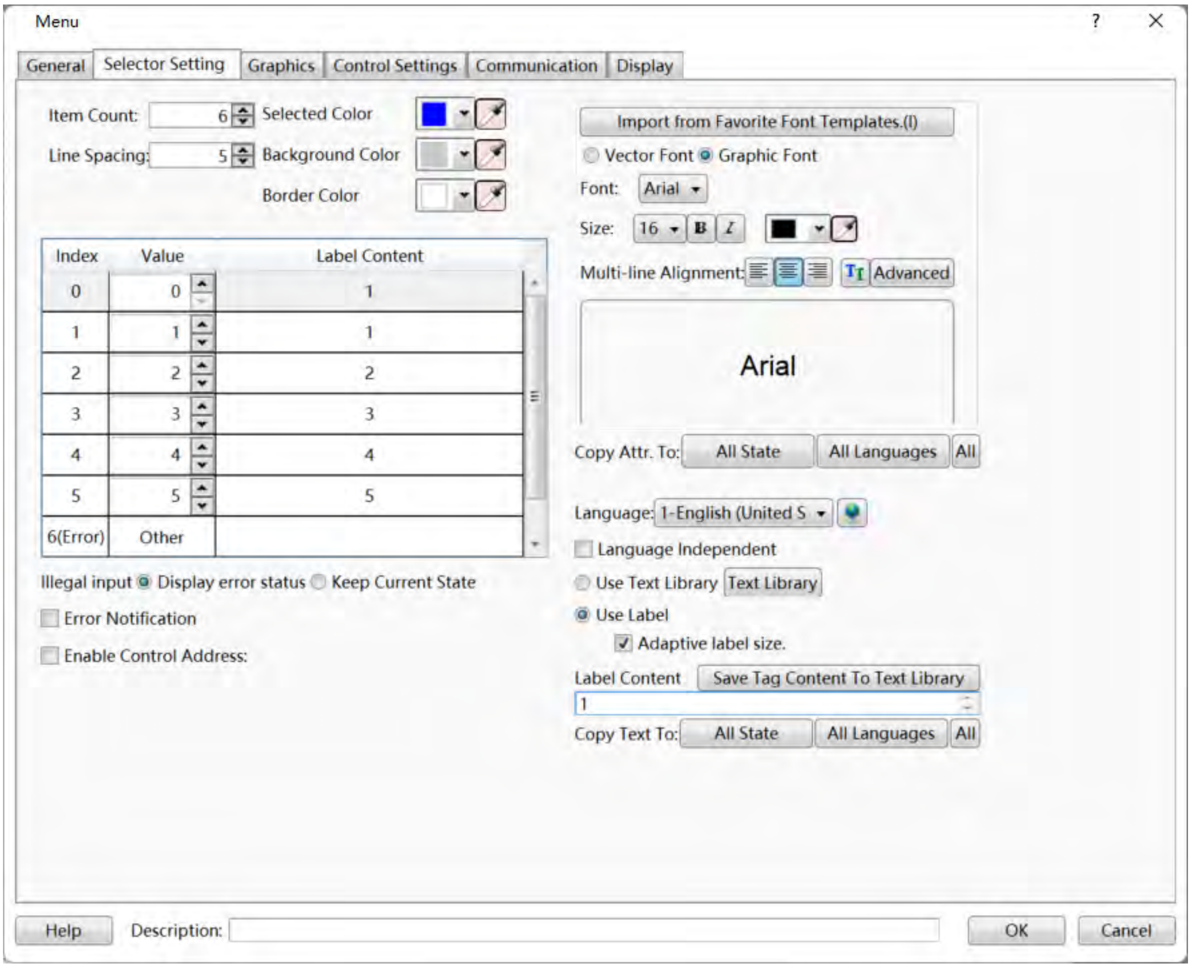


Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Type	Including list and check-box, drop-down list.
Browse Method	Set the browse mode of the component: ◆ Scrollbar: Use the scrollbar to browse the content of the component. The width of the scrollbar can be set. ◆ Slide: Slide the scrren to view the component content. This feature is only applicable to capacitive HMIs.
Data Source	Set the data source in the component: ◆ Component Settings: custom component data. ◆ Authorized User Names: User's Privilige information. For detailed information about user privilege, please refer to the User Privilege. ◆ Component (customize selector): custom selector data. ◆ Data Sampling: For detailed information about data sampling, please refer to Data Sampling.

Parameters	Description
	◆ Alarm and Event Time: Alarm and the time when the event happens. For detailed information about Alarm and Event Time, please refer to Alarm and Event. ◆ Recipe Group Name: Recipe data. For detailed information about recipe, please refer to Recipe.
Using different read/write address	Check **Using different read/write address**, when an action (such as press) is performed to the component, the value of the reading address will be written into the writing address. Default setting is that reading and writing address are the same.
Write Control	Pulse-triggered, when switching menu items, the corresponding value is written to the specified address.

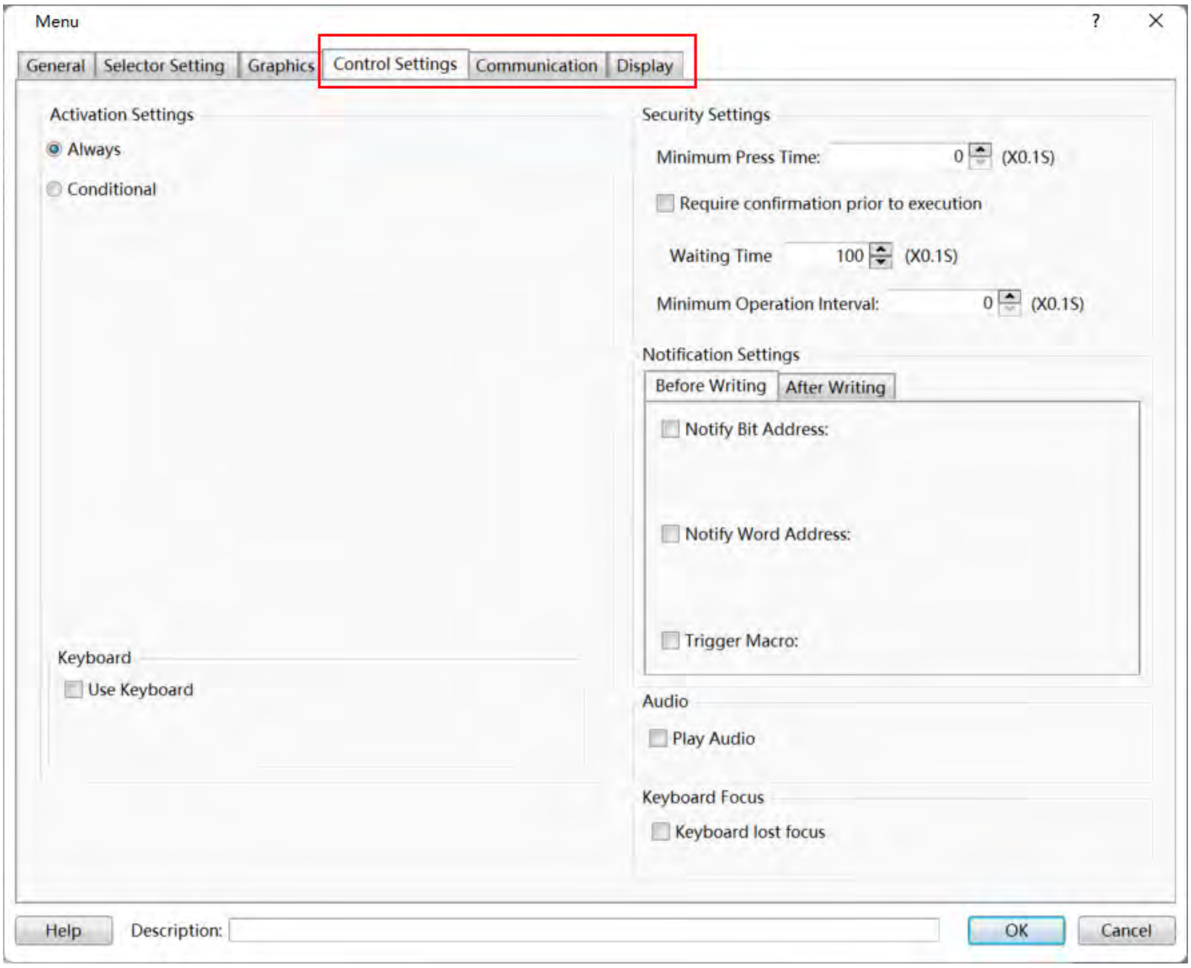
Step 2. Select the **Selector Setting** tab, configure relevant parameters.



Please refer to the table below for detailed configuration methods.

Parameters	Description
Item Count	The number of component data items.
Selected Color	Set the color of the selected items to highlight them.
Background Color	Set the background color of the components.
Border Color	Set the color of the border.
Index	The index value of different states.
Value	The value of specified word addresses in different states.
Label Content	Label content of the component. You can customize the content of labels for different states and different languages.
Illegal input	When an illegal input is provided, you can choose to display an error state or keep the current state.
Error Notification	When an error occurs, set the value of the notification bit address to ON.
Language	Current display language (applicable to text content).
Language Independent	When the language is changed, the content of text library or labels does not change.
Enable Control Address	If the corresponding bit value of the specified word address is 0, it enables the value in that state. If it is 1, it disables the value in that state.
Use Text Library	Use text from the specified text library. For detailed information about the text library, please refer to Text Library.

Step 3. Set properties such as Control Settings, click **OK.**



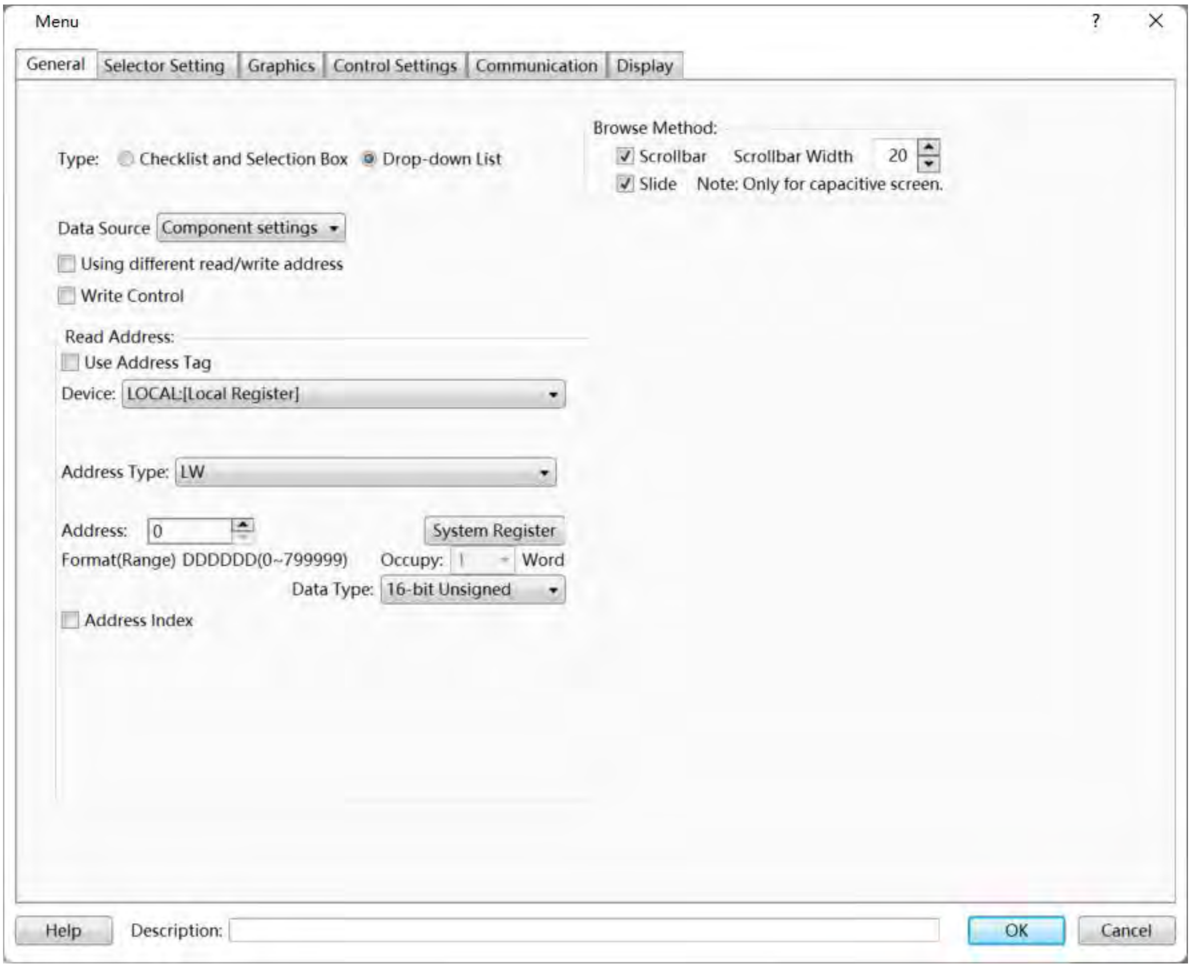
Step 4. Click anywhere in the window to insert the Checklist and Selection Box component.

10.4.4 Drop-down List

The drop-down list is used to change the value of specified word address. Select a value corresponding to the state index in the drop-down list, the value of the specified word address will be switched to the value of the corresponding state. The drop-down list is displayed as a drop-down box in the HMI screen.

The steps to create a new drop-down list component are as follows:

Select **Component/Toggle Switch and Menu/Drop-down List**, the configuration method is similar to configuring Check List and Selection Boxes, please refer to Checklist and Selection Box.

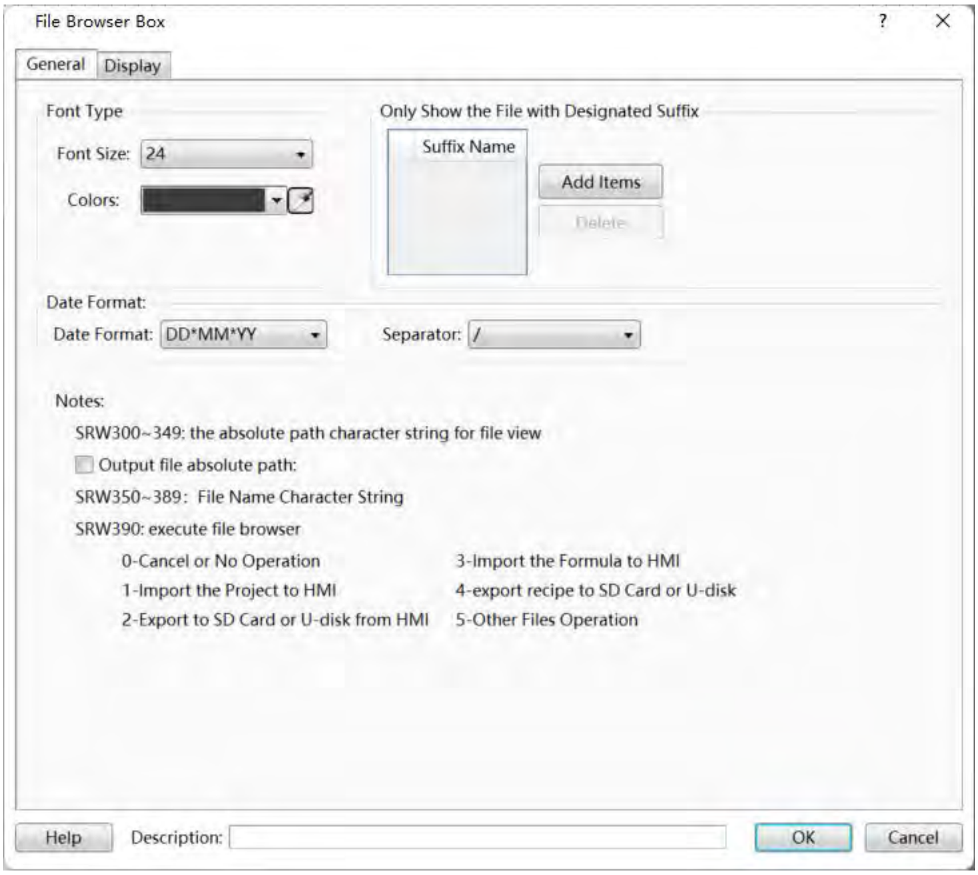


10.4.5 File Browser Box

The file browser box is used to display file information from the HMI or external storage device.

The steps to create a new file browser box component are as follows:

Step 1. Select **Component/Toggle Switch and Menu/File Browser Box** from the menu bar, edit the relevant parameters in the pop-up **File Browser Box** dialog box.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Font Size	Set the font size of a file path.
Colors	Set the font color of a file path.
Only Show the File with Designated Suffix	Click **Add Items**, set the suffix name (such as .exe etc.), then it will only show files with the designated suffix.
Date Format	Set the date format.
Separator	A separator is used to separate year, month, and date. It includes “/”, “-”, “.”. For example, 2023/6/13.
Ouput file absolute path	It requires to set the address where the file path is located. The address information for the file path in the HMI can be found in the **notes** in the interface .

Step 2. Set the **Display** properties, click **OK**.

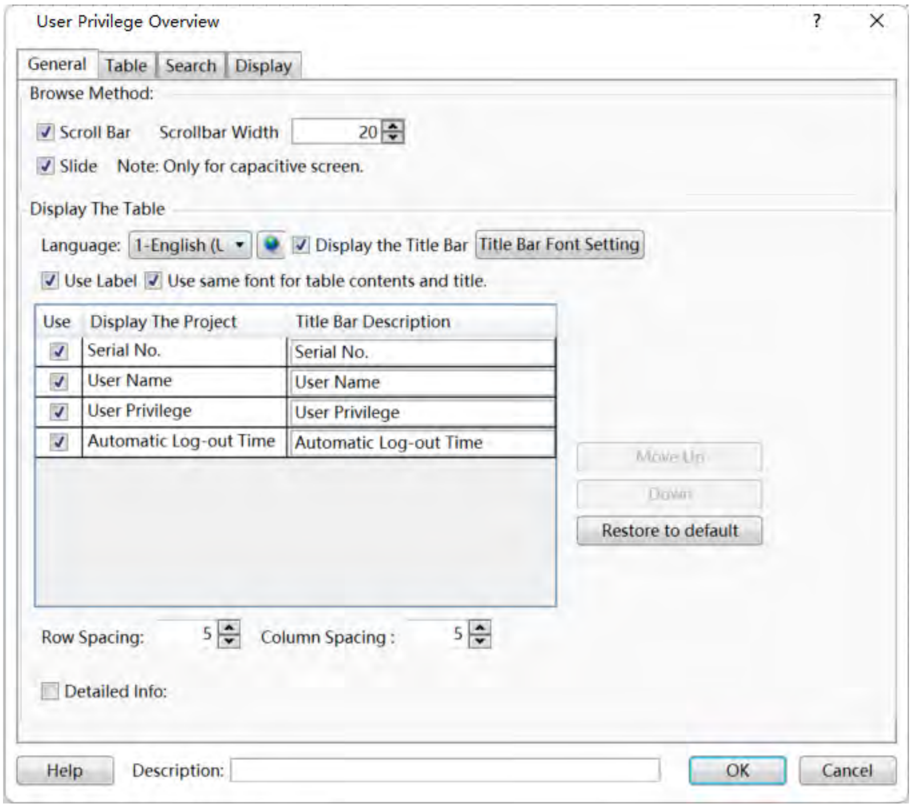
Step 3. Click anywhere in the window to insert the file browser box component.

10.4.6 User Privilege

The User Privilege browsing component is used to display the user privilege information in the HMI. For detailed information about user privilege, please refer to the User Privilege.

The steps to create a new user privilege component are as follows:

Step 1. Select **Component/Toggle Switch and Menu/User Privilege** from the menu bar, and eidt relevant parameters in the pop-up dilog box.

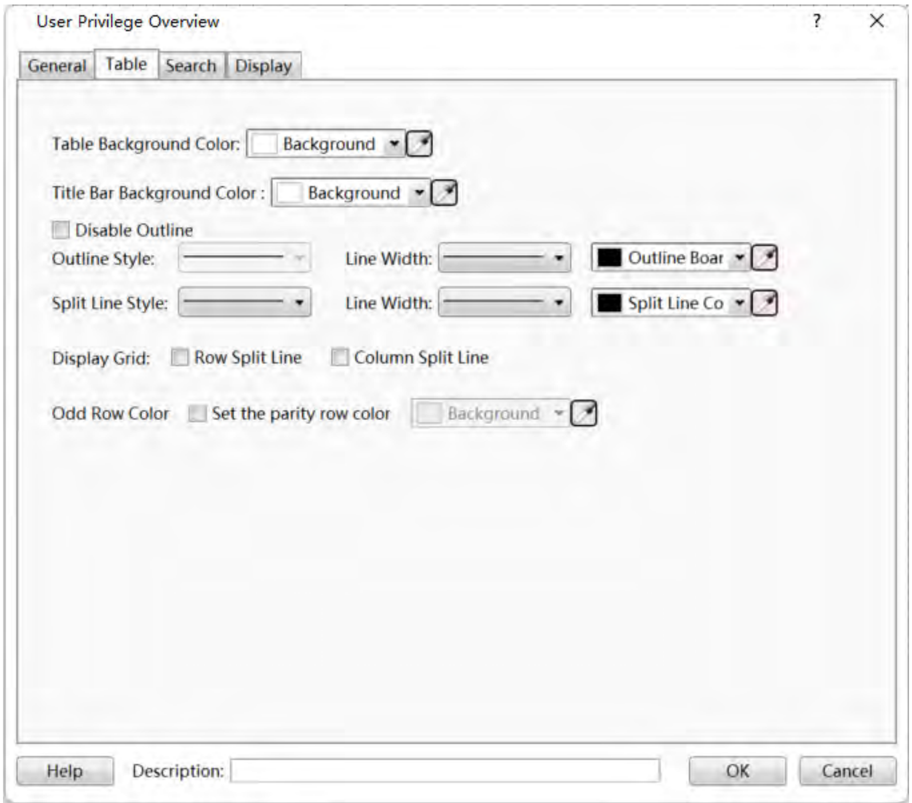


Please refer to the table below for detailed configuration methods.

Parameters	Description
Browse Method	Set the browse method of the component. ◆ Scrollbar: Drag the scrollbar to view the component content. Scrollbar width can be set. ◆ Slide: Slide the screen to view the component content. Only applicable for capacitive HMI.
Language	Set the display languge of the component. You can set the display content in different languages.
Display the Title Bar	You can select whether to display the title bar or not. Click **Title Bar Font Setting** to set the title bar font.
Use Label	Use text label to define **Title Bar Description**. If this parameter is unchecked, use text from the text library to define **Title Bar Description**.
Use same font for table contents and title	If **Use same font for table contents and title** is unchecked, you need to set the table font separately.

Parameters	Description
Row Spacing	Set rowing spacing of the table.
Column Spacing	Set column spacing of the table.
Detailed Info	Clicking or double-clicking the user privilege browsing component in the HMI screen will pop up a related window (either a system-built-in window or a custom window) to display detailed user privilege information.

Step 2. Select the **Table** tab to customize the style of user privilege table.

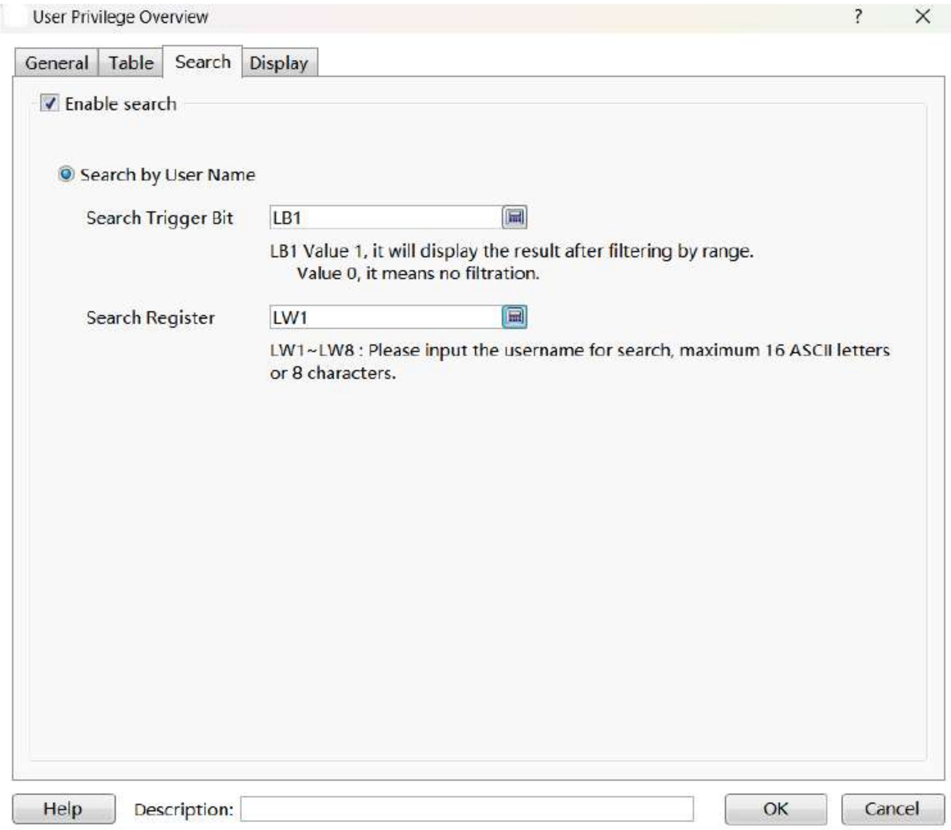


Please refer to the table below for detailed configuration methods.

Parameters	Description
Table Background Color	Set the table background color.
Title Bar	Set the title bar background color.

Parameters	Description
Background Color	
Line Width	Set the table outline width.
Line Color	Set the outline color.
Display Grid	Whether to display row split line and column split line.
Odd Row Color	Distinguish the color of odd row in the table.

Step 3. Select **Search** tab and configure relevant parameters.

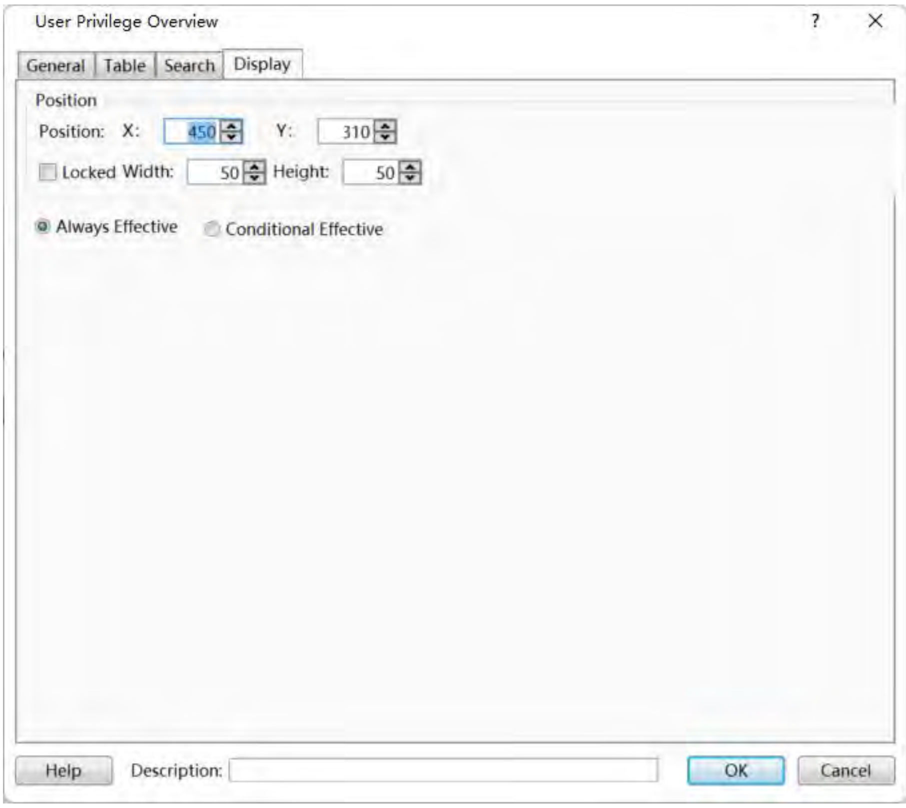


Please refer to the table below for detailed configuration methods.

Parameter	Description
Enable search	Whether to enable the search feature or not.
Search Trigger Bit	When the value of the specified bit address is 1, display the user information filtered by the values in the query register. When it is 0, do not filter the user information.

Parameter	Description
Search Register	Input the username to be queried in the specified word address query register. The maximum length is 16 ASCII characters or 8 Chinese characters

Step 4. Set the Display properties, click **OK**.



Step 5. Click anywhere in the window to insert the user privilege browse component.

10.5 Timer and Data Transmission

When there is a need to periodically execute tasks, timer and timed data transmission components can be used.

10.5.1 Timer

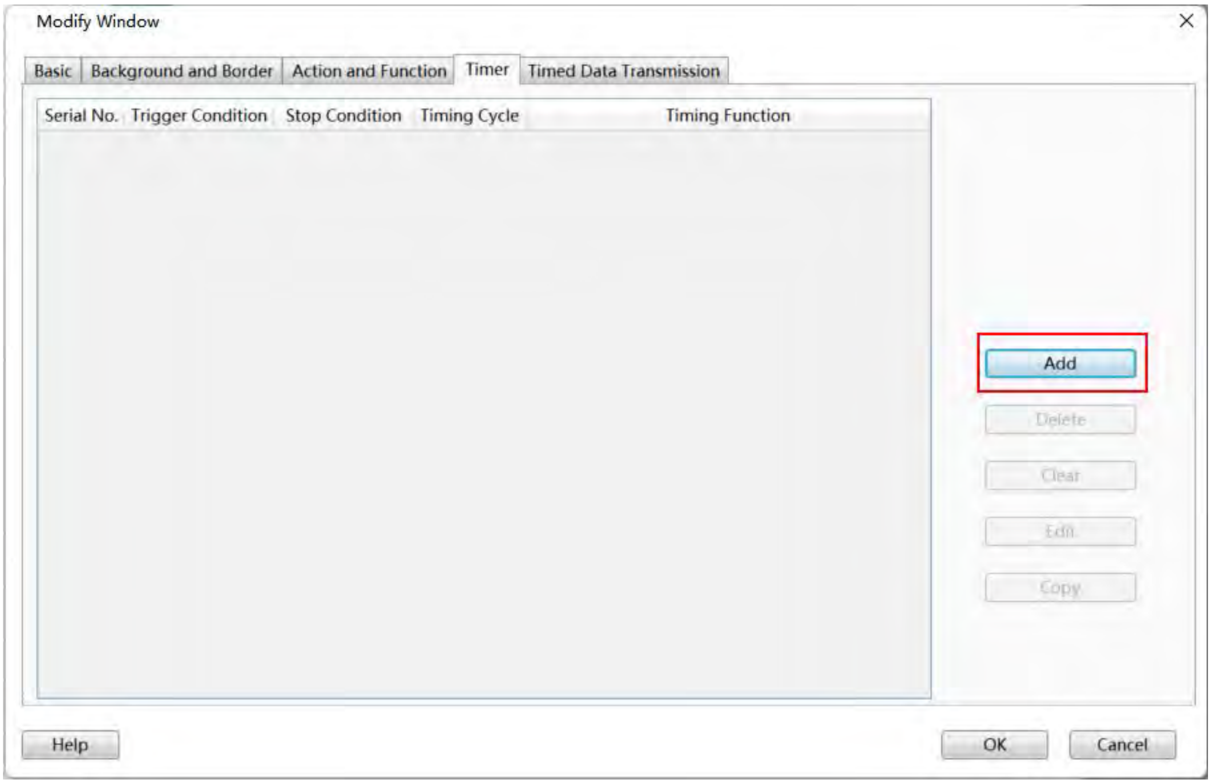
The Timer component is used to periodically execute tasks (such as execute macros).

When a window is running, the timer runs according to the set rules. If you want the timer to be unaffected by window switching, you can associate the timer with a public window.

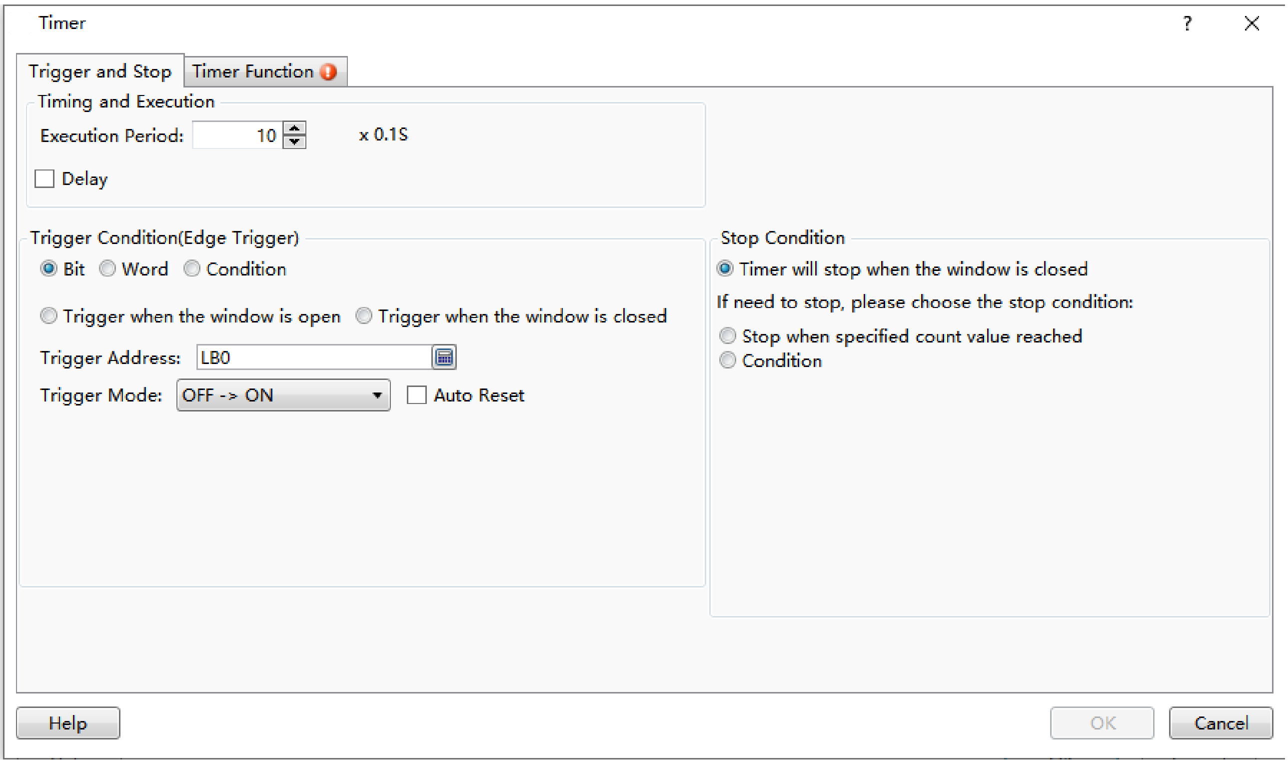
The steps to create a new timer component are as follows:

Step 1. Select **Component/Timer and Data Transmission/Timer** from the menu bar, click **Add** in the pop-up **Modify Window**.

Select **Window/Current Window Properties** from the menu bar, select the **Timer** tab in the pop-up dialog box, you can also enter the configuration page of the timer.



Step 2. Configure relevant parameters in the pop-up **Timer** dialog box.

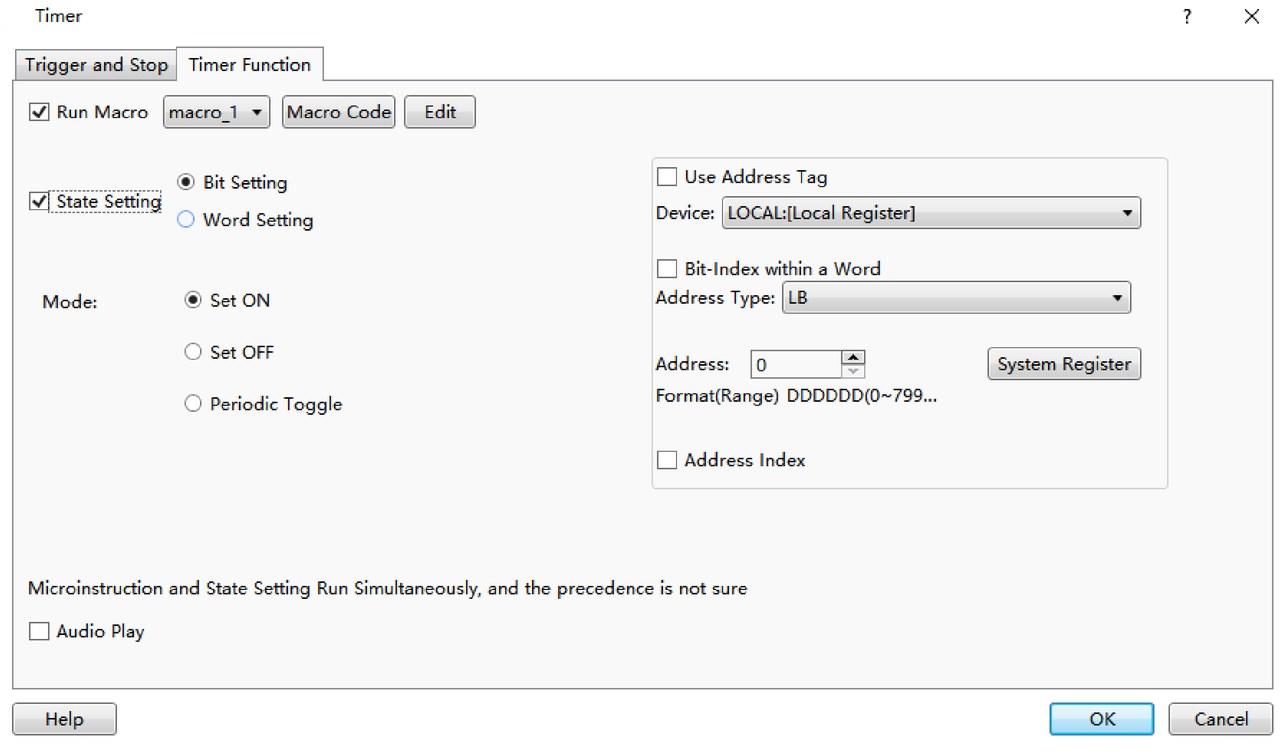


Please refer to the table below for detailed configuration methods.

Parameters	Description
Execution Period	The task execution period of the timer. Range of values: 0.1~6553.5 seconds.
Delay	Set the number of periods for delayed task execution.
Trigger Condition	Trigger conditions for task execution: ◆ Bit: The state of the specified bit address changes (for example, the state of LB0 changes from ON to OFF). ◆ Word: The value of specified word address changes. ◆ Condition: Meet certain logic conditions (for example, the state of LB0 is ON and the state of LB1 is OFF) ◆ Trigger when the window is open. ◆ Trigger when the window is closed.
Stop Condition	Stop condition for the timer task execution period: ◆ Timer will stop when the window is closed. ◆ Stop when specified count value reached: timer reaches the specified number of periods, such as 2 periods. ◆ Condition: Meet certain logic conditions (for example, the state of LB0 is ON and the state of LB1 is OFF)

Step 3. Set the Timer Function.

Select the **Timer Function** tab, configure relevant parameters and click **OK**.

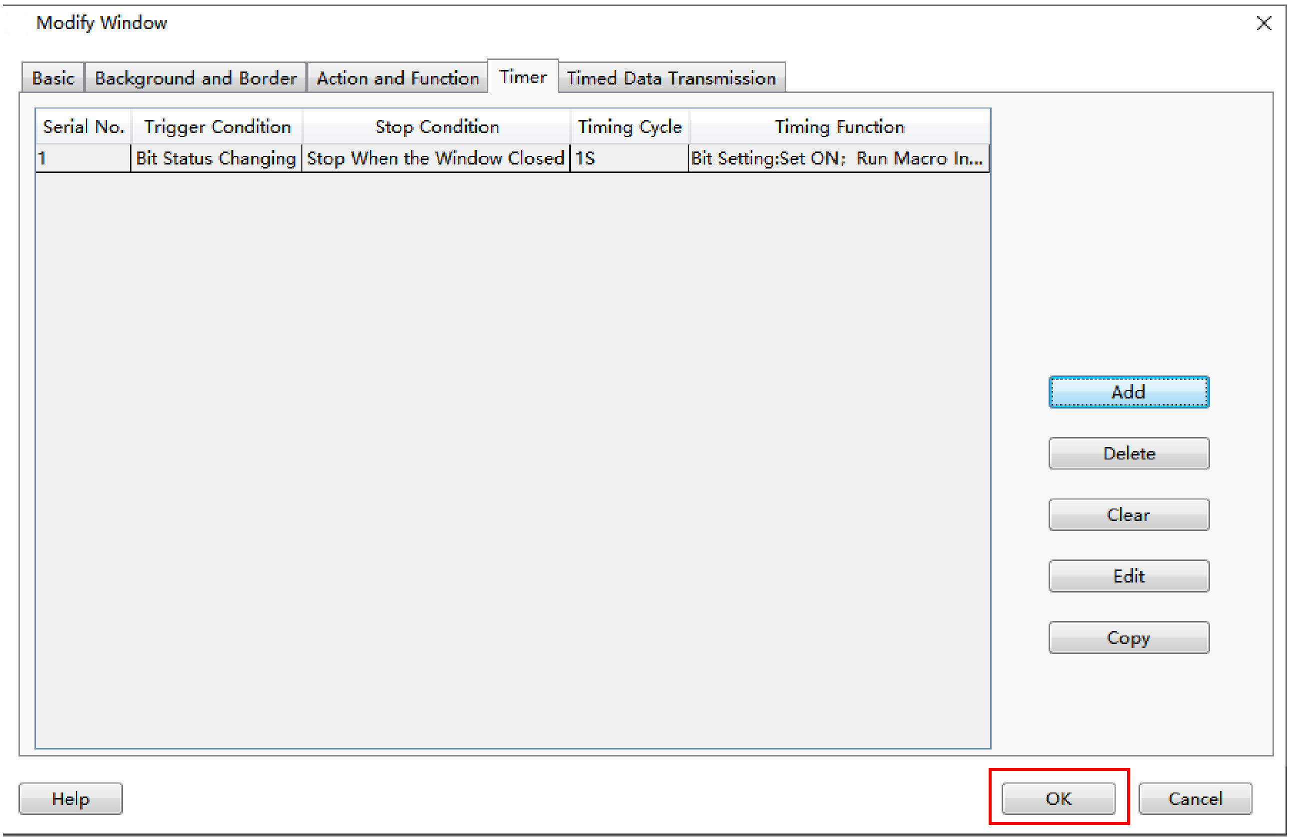


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Run Macro	Run corresponding macros. Click **Macro Code** to create a new macro instruction. Click **Edit** to modify the macro.
State Setting	◆ Bit Setting: ●Set ON: Set the value of specified bit address to ON. ●Set OFF: Set the value of specified bit address to OFF. ●Periodic Toggle: Inverse the value of specified bit address (such as from ON to OFF). ◆ Wrod Setting: ● Add: Add a value to the value of specified word address. ● Subtract: Subtract a value from the value of specified word address. ● Constant: Set the value of specified word address to a constant. Loop: For example, for the operation 'Add', when the value reaches the upper limit, perform the 'Add' operation again, resetting the value to the lower limit, and then continue adding the increment. Repeat this period. Reverse on reaching the end: For example, with the “add” operation, when the value reaches the upper limit, performing the “add” operation again will subtract the increment instead,

Parameter	Description
	creating a loop in this manner.
Audio Play	Play the audio in the Audio Library. For detailed information about the Audio Library, please refer to Audio Library.

Step 4. Click **OK** in the **Modify Window** dialog box.



10.5.2 Timed Data Transmission

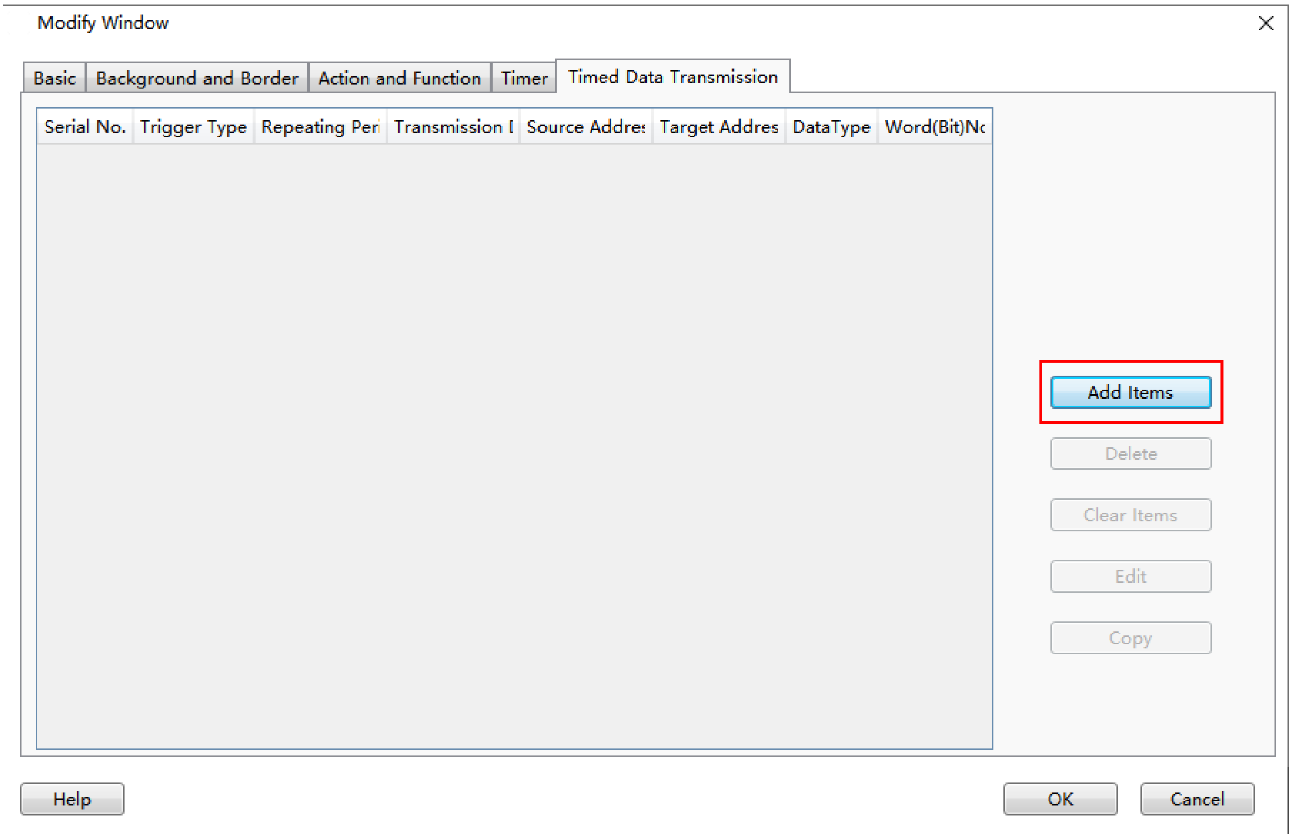
The timed data transmission component allows for periodic execution of data transmission tasks. Similar to a timer, this component needs to be added to a specified window. If you want to execute it globally, you can add it to a public window.

Timed data transmission is typically used in scenarios where there is a need to exchange batch data between devices (such as between HMI and a PLC).

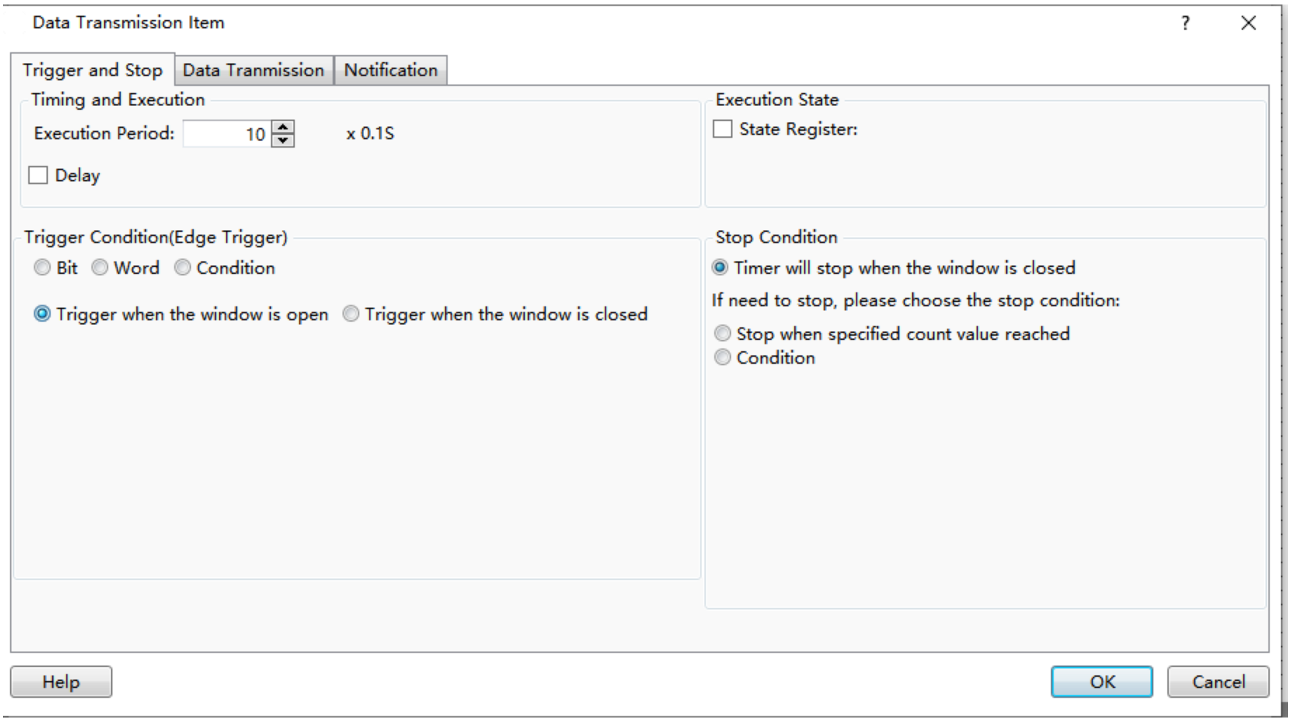
The steps to create a new timed data transmission component are as follows:

Step 1. Select **Component/Timer and Data Transmission/Timed Data Transmission**, click **Add Items** in the pop-up **Modify Window** dialog box.

Select **Window/Current Window Properties** from the menu bar, select the **Timed Data Transmission** tab in the pop-up dialog box, you can also enter the configuration interface of the timed data transmission.



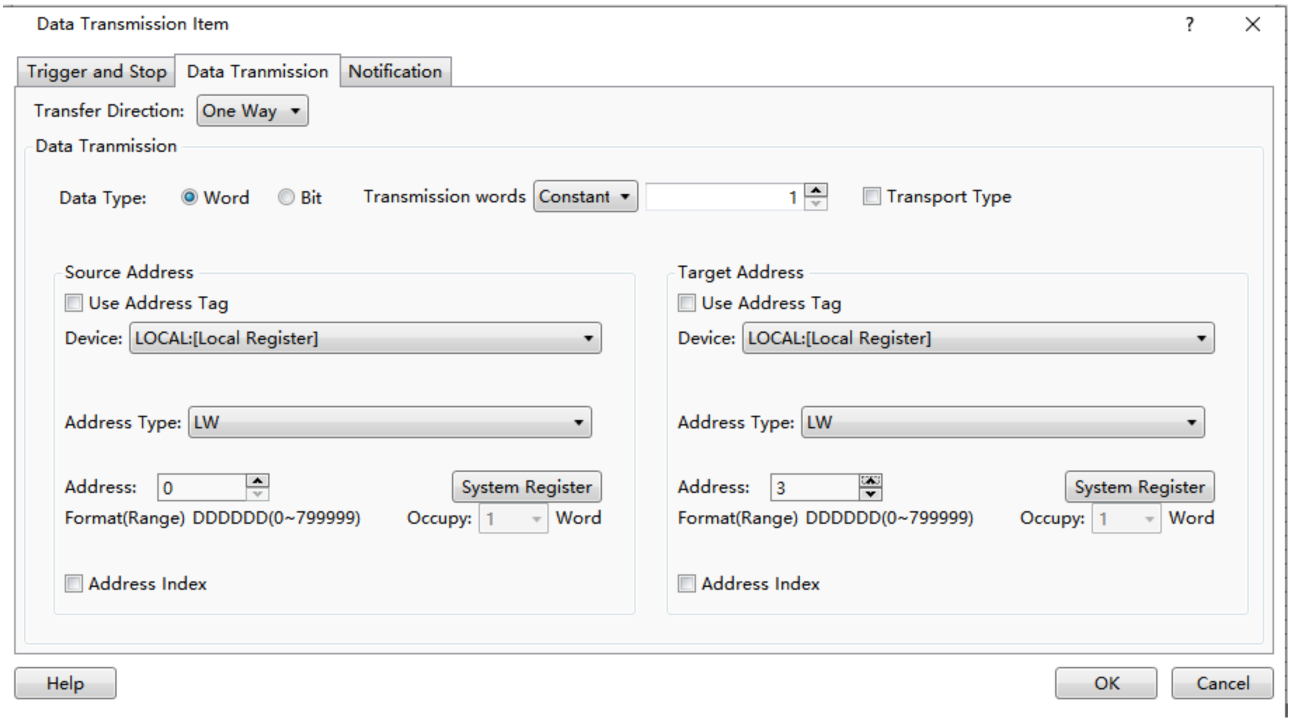
Step 2. Configure relevant parameters in the pop-up **Data Transmission Item** dialog box.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Execution Period	The execution period of the timed data tranmission task. Range of values: 0.1~6553.5 seconds.
Delay	The delay time for executing timed data transmission tasks.
Trigger Condition	Trigger conditions for timed data transmission tasks: ◆ Bit: The state of the specified bit address changes (for example, the state of LB0 changes from OFF to ON). ◆ Word: The value of specified word address changes. ◆ Condition: Meet certain logic conditions (for example, the state of LB0 is ON and the state of LB1 is OFF) ◆ Trigger when the window is open. ◆ Trigger when the window is closed.
Stop condition	Stop condition for the timed data transmission tasks: ◆ Timer will stop when the window is closed. ◆ Stop when specified count value reached: repeated for the specified numebr of periods. ◆ Condition: Meet certain logic conditions (for example, the state of LB0 is ON and the state of LB1 is OFF)

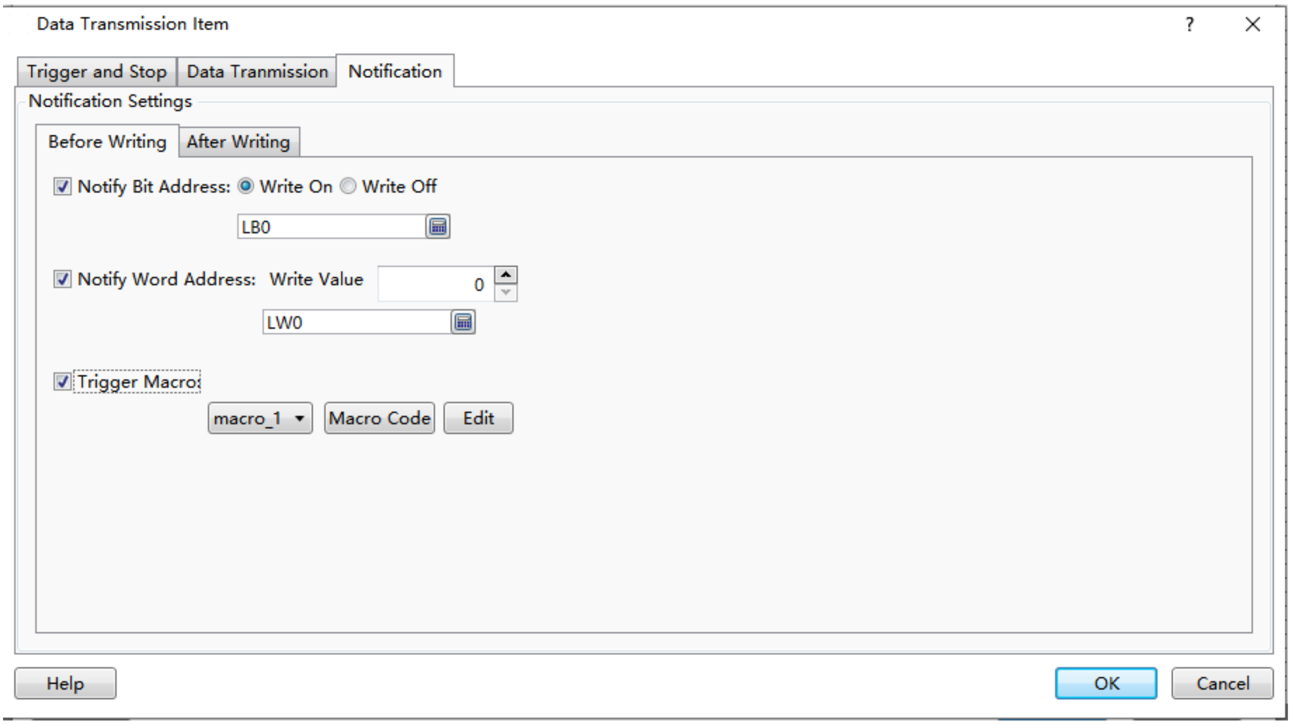
Step 3. Select the **Data Transmission** tab and configure relevant parameters.



Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Transfer Direction	◆ One Way: Transfer data from source address to target address. ◆ Two Way: Transfer data from source address to target address, and from target address to source address.
Data Type	Including word and bit.
Transmission words/bits	Amount of word/bit to be transferred, it can be a constant or variable.
Source Address	The address of sending data, please refer to the actual situation.
Target Address	The address of receiving data, please refer to the actual situation.
Address Index	Use address index to change the current address. For example, if the current address is set to LW1, the address index is LW2, offset is 3, then the actual address is LW(1+*the value of LW2*+3)

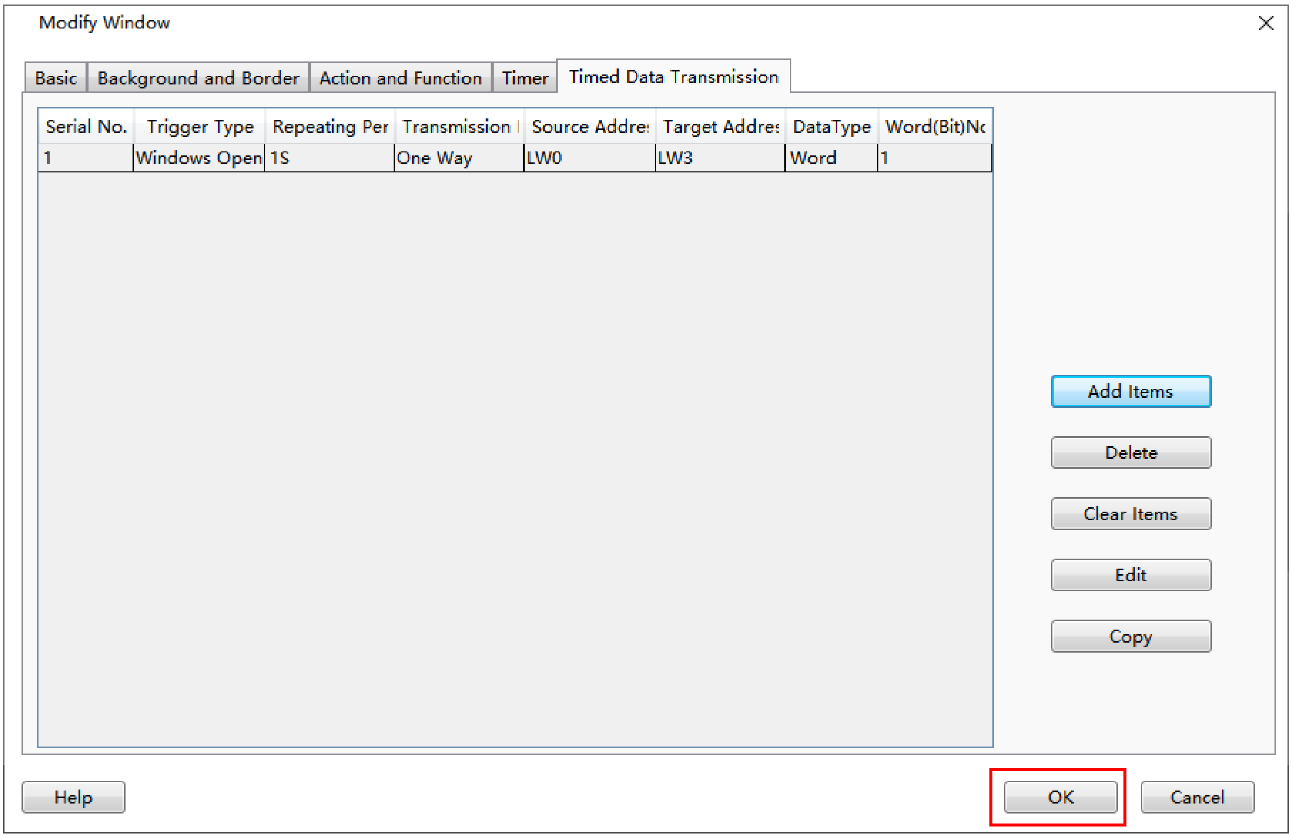
Step 4. Set the notification methods before and after writing, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameters	Description
Notify Bit Address	The value of specified bit address is set to ON or OFF.
Notify Word Address	The value of specified word address is set to a specific value (such as 0).
Trigger Macro	Tigger specified macros.

Step 5. Click **OK** in the **Modify Window** dialog box.



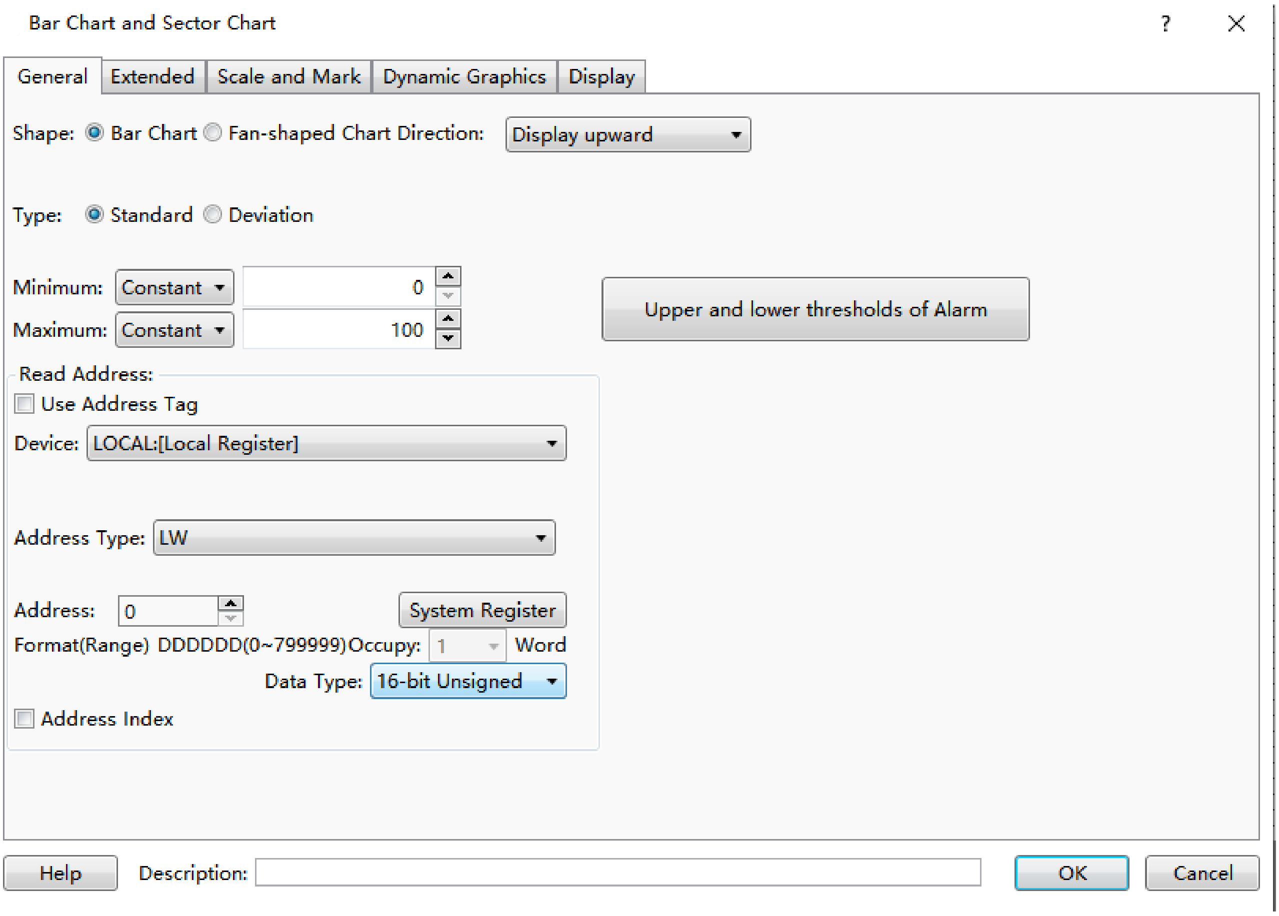
10.6 Bar and Meter

Bar and Meter is commonly used to display the trend of data changes in HMI or PLC systems, facilitating analysis and scheduling of production processes. These chart types include bar chart, sector chart, meter, and pie chart.

10.6.1 Bar Chart

The steps to create a new bar chart component are as follows:

Step 1. Select **Component/Bar and Meter/Bar Chart** from the menu bar, configure relevant parameters in the pop-up **Bar Chart and Sector Chart** dialog box.

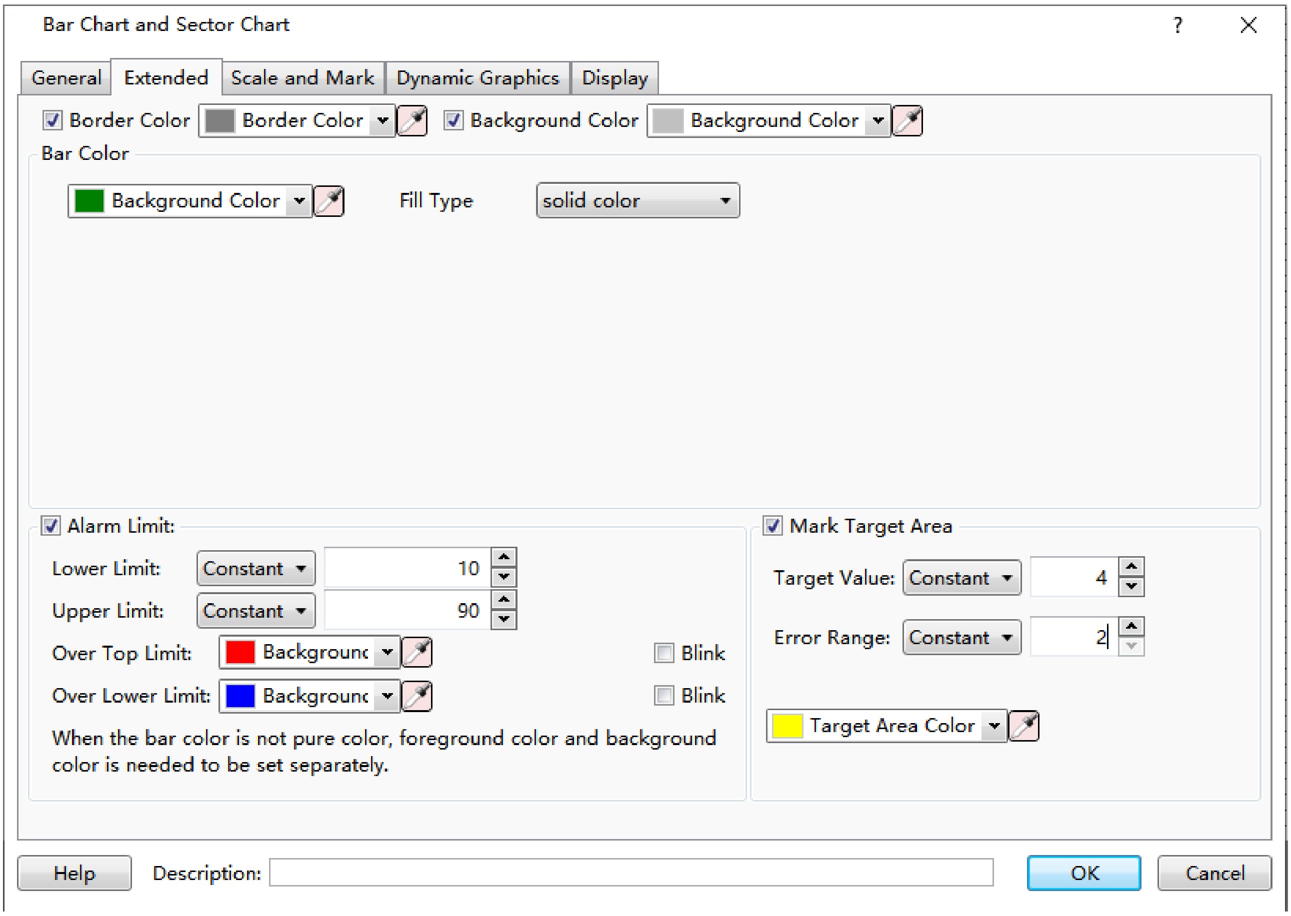


Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Shape	Including bar chart and sector chart.
Direction	Including dispaly upward, display downward, display leftward, display rightward.
Type	◆ Standard: the data displayed is the actual value of specified address. ◆ Deviation: the data displayed is actual value of specified address minus the reference point value.
Maximum	It can be set as a constant or variable.
Minimum	It can be set as a constant or variable.
Read Address	Data source of bar chart. Device: HMI local register, recipe register, register of PLC. Address Type: please refer to the actual situation. Address: please refer to the actual situation.

Parameters	Description
Use Address Tag	Use address tag to represent specific address. For detailed information about address tag, please refer to Address Tag Library.
Address Index	Use address index to change the current address. For example, if the current address is LW1, the address index is LW2, offset is 3, then the actual address is LW(1+*the value of LW2*+3)

Step 2. Select the **Extended** tab and configure relevant parameters.

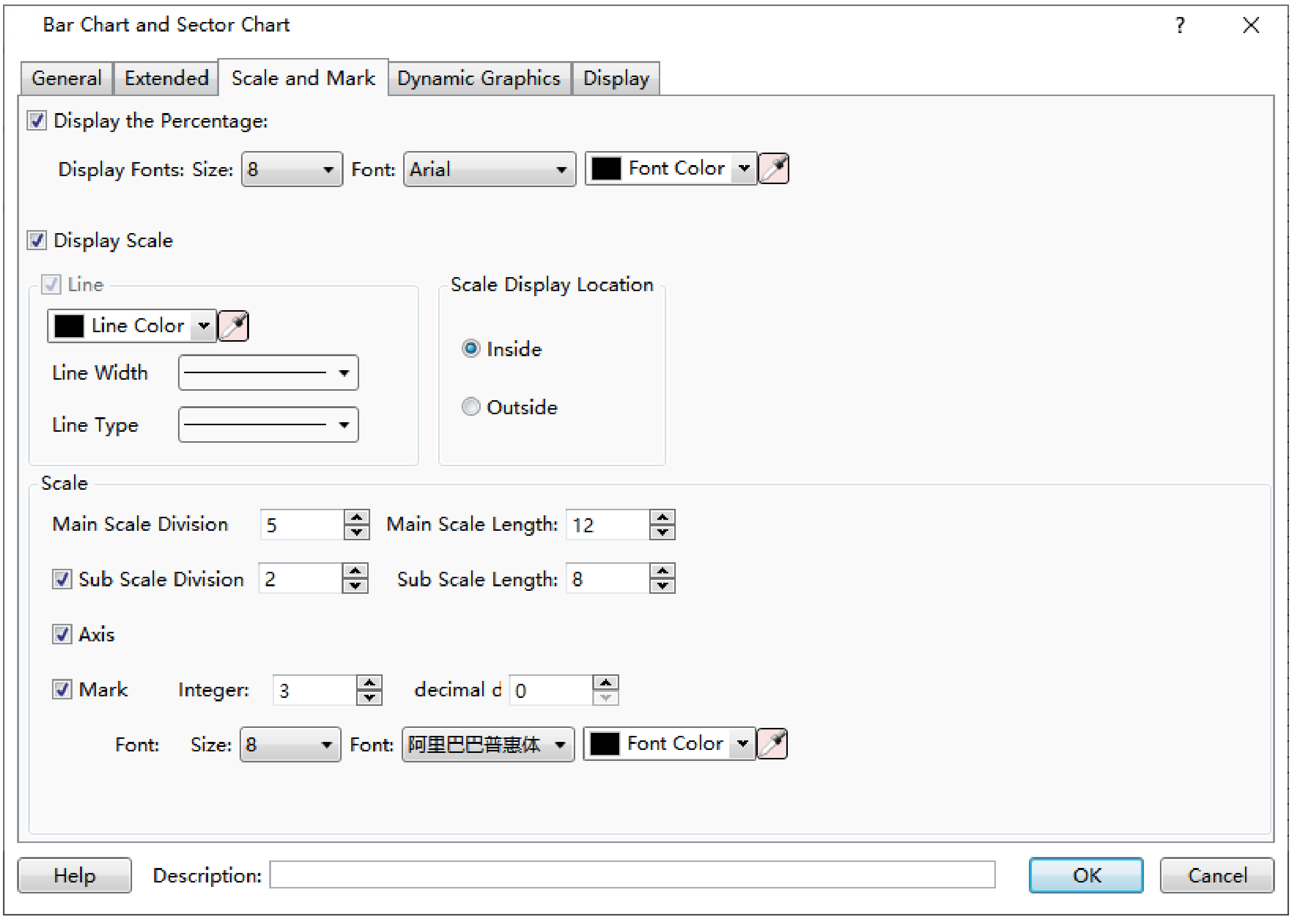


Please refer to the table below for detailed configuration methods.

Parameters	Description
Border Color	Set the border color of bar chart.
Background Color	Set the background color of bar chart.

Parameters	Description
Bar Color	Set the fill type of bars, including solid color, pattern and gradient.
Alarm Limit	Alarm when the value exceeds the upper or lower thresholds, the way of alarming is to mark with specified color and whether to blink or not.
Mark Target Area	Use specified color to mark the target area. Target value, error range and target area color need to be set.

Step 3. Set Scale and Mark.

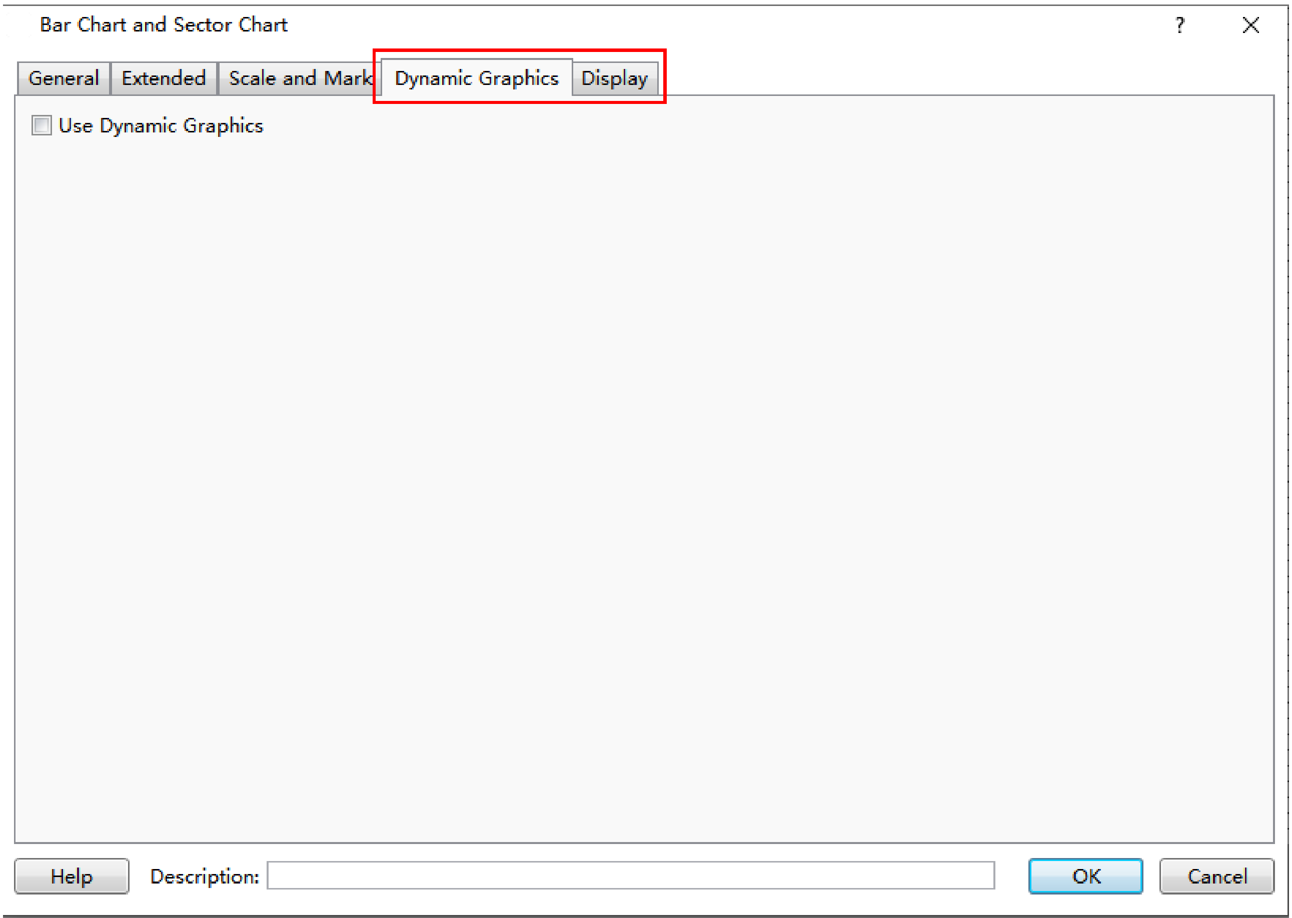


Please refer to the table below for detailed configuration methods.

Parameters	Description
Display the Percentage	Display the value of the percentage. Font, size and color can be set here.
Display Scale	Display scale to highlight the precision of data. Sub scale is used to devide each section

Parameters	**Description**
	of the main scale.
Mark	Used to display scale value. Mark font, size and color can be set here.

Step 4. Set up properties in **Dynamic Graphics** and **Display**, click **OK**.

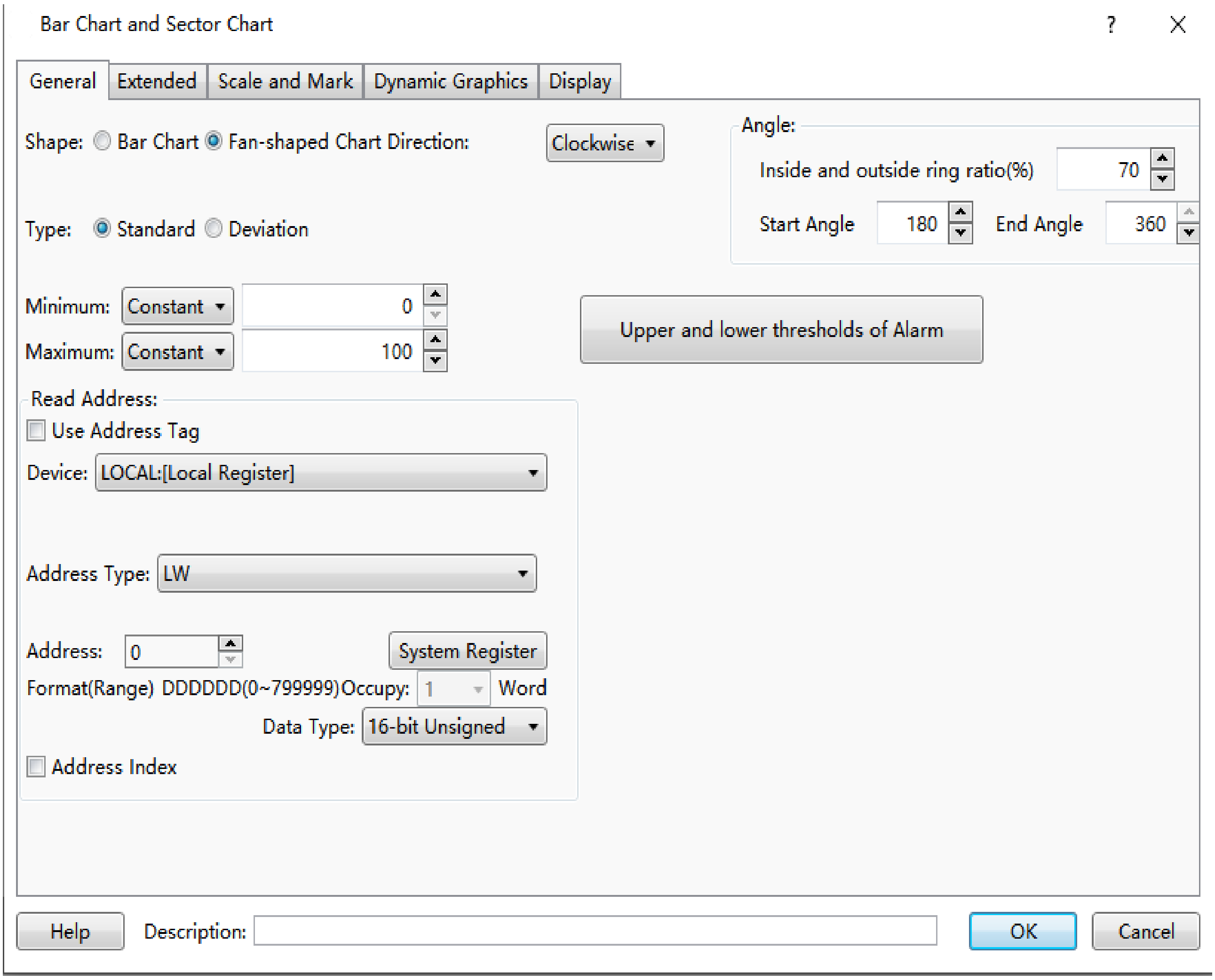


Step 5. Click anywhere in the window to insert the bar chart component.

10.6.2 Sector Chart

Steps to create a new sector chart are as follows:

Step 1. Select **Component/Bar and Meter/Sector Chart** from the menu bar, configure relevant parameters in the pop-up **Bar Chart and Sector Chart** dialog box.



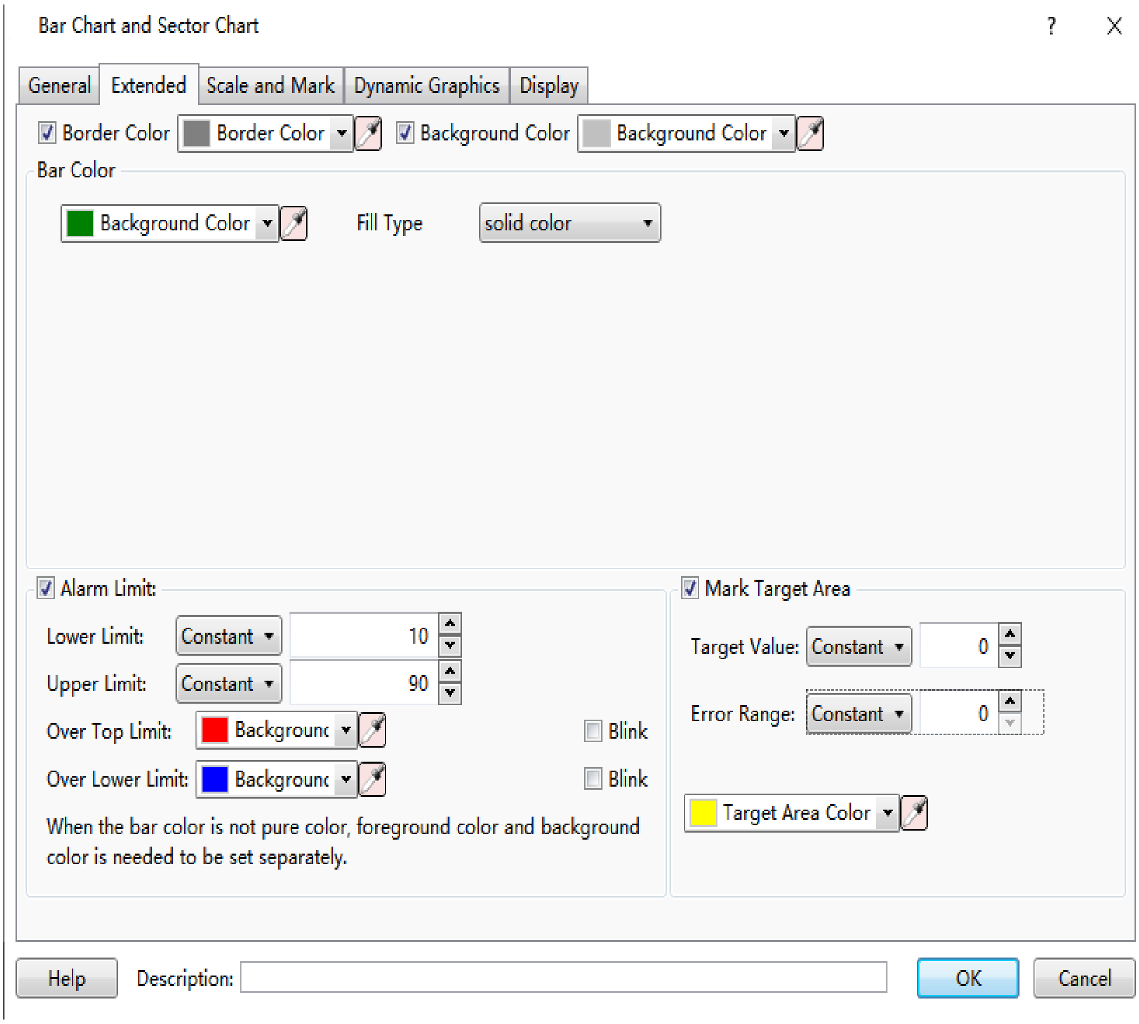
Please refer to the table below for detailed configuration methods.

Parameter	Description
Direction	Including clockwise and counter-clockwise.
Inside and outside ring ratio	The ratio of the inner ring radius to the outer ring radius.
Start Angle	Start angle of the sector.
End Angle	End angle of the sector.
Type	◆ Standard: the data displayed is the actual value of specified address. ◆ Deviation: the data displayed is the actual value of specified address minus the reference point value.
Minimum	It can be set as a constant or variable.
Maximum	It can be set as a constant or variable.
Read Address	Data source of sector chart, i.e. display the value of read address. Device: HMI local register, recipe register, register of PLC.

Parameter	Description
	Address Type: register type, please refer to the actual situation. Address: register address, please refer to the actual situation.
Use Address Tag	Use address tag to represent specific address. For detailed information about address tag, please refer to Address Tag Library.
Address Index	Use address index to change the current address. For example, if the current address isset to LW1, the address index is LW2, offset is 3, then the actual address is LW(1+*the value of LW2*+3)

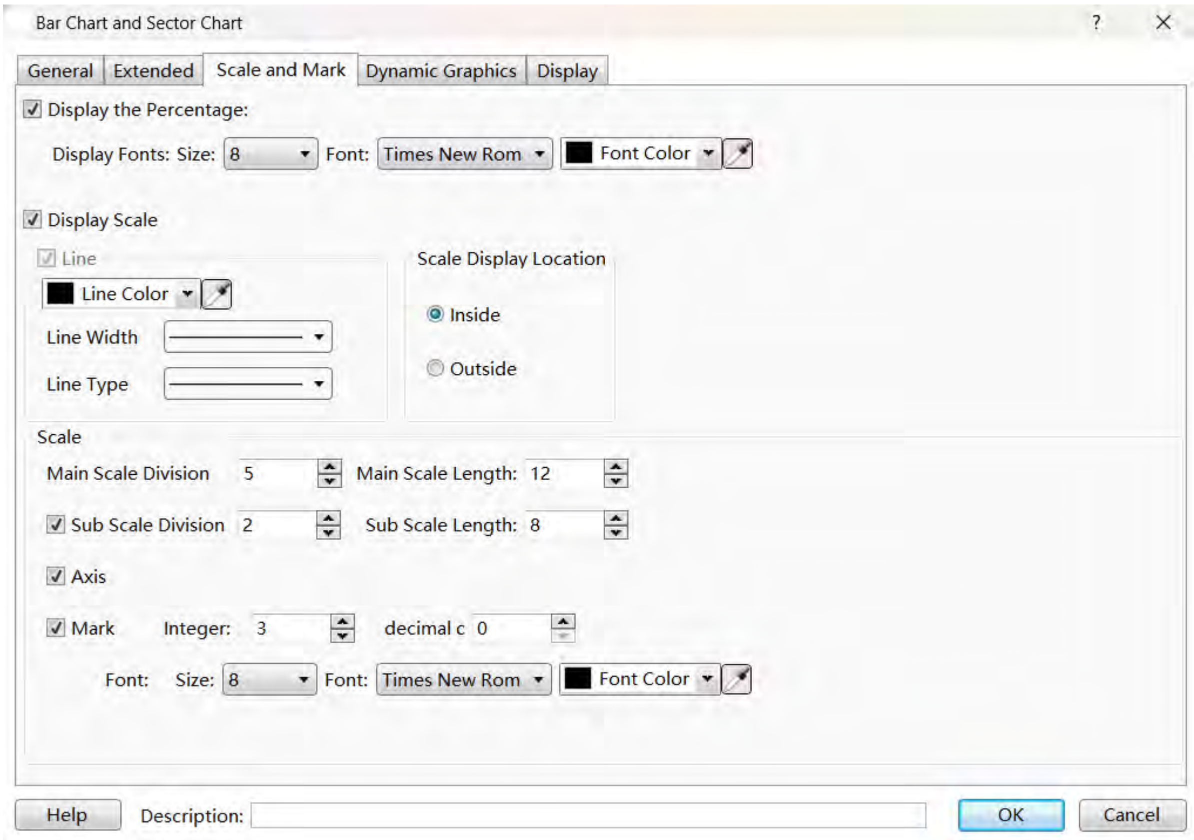
Step 2. Set the Extended properties.

Please refer to Step2 for configuration methods.

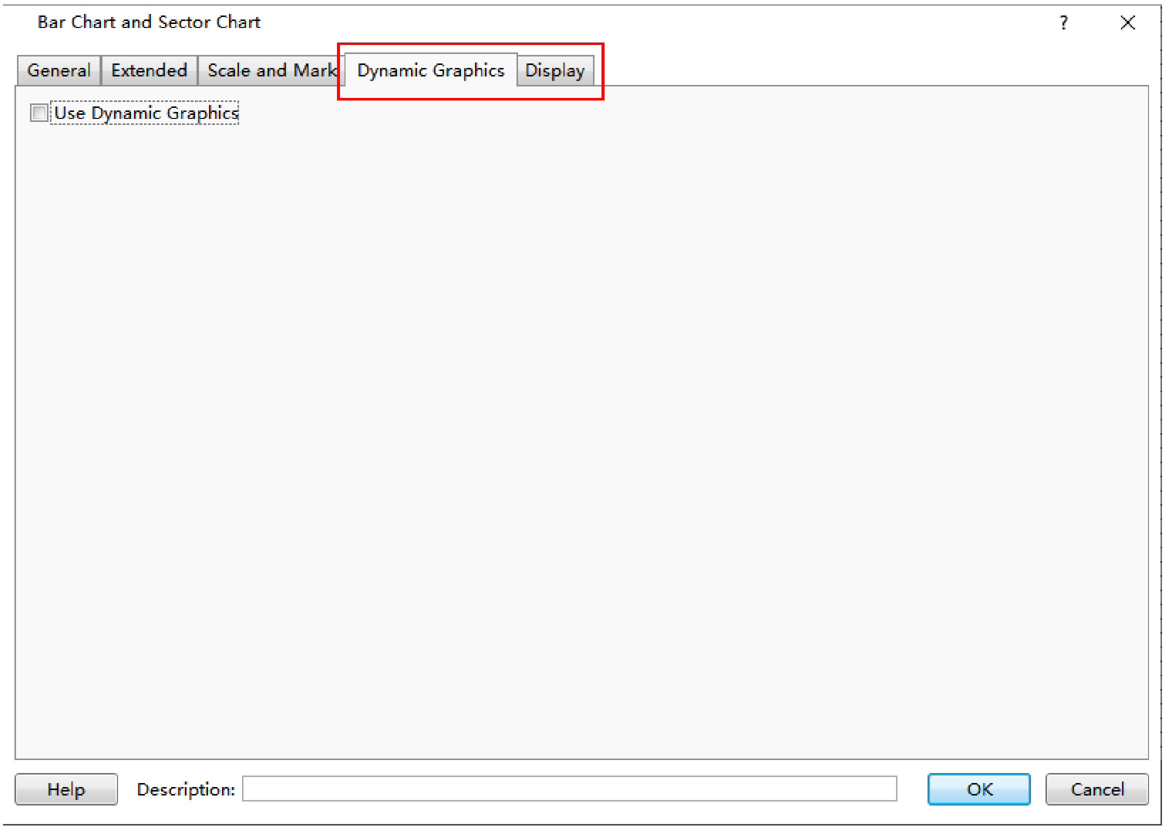


Step 3. Set the Scale and Mark.

Please refer to Step3for configuration methods.



Step 4. Set the properties of **Dynamic Graphics** and **Display**, click **OK**.

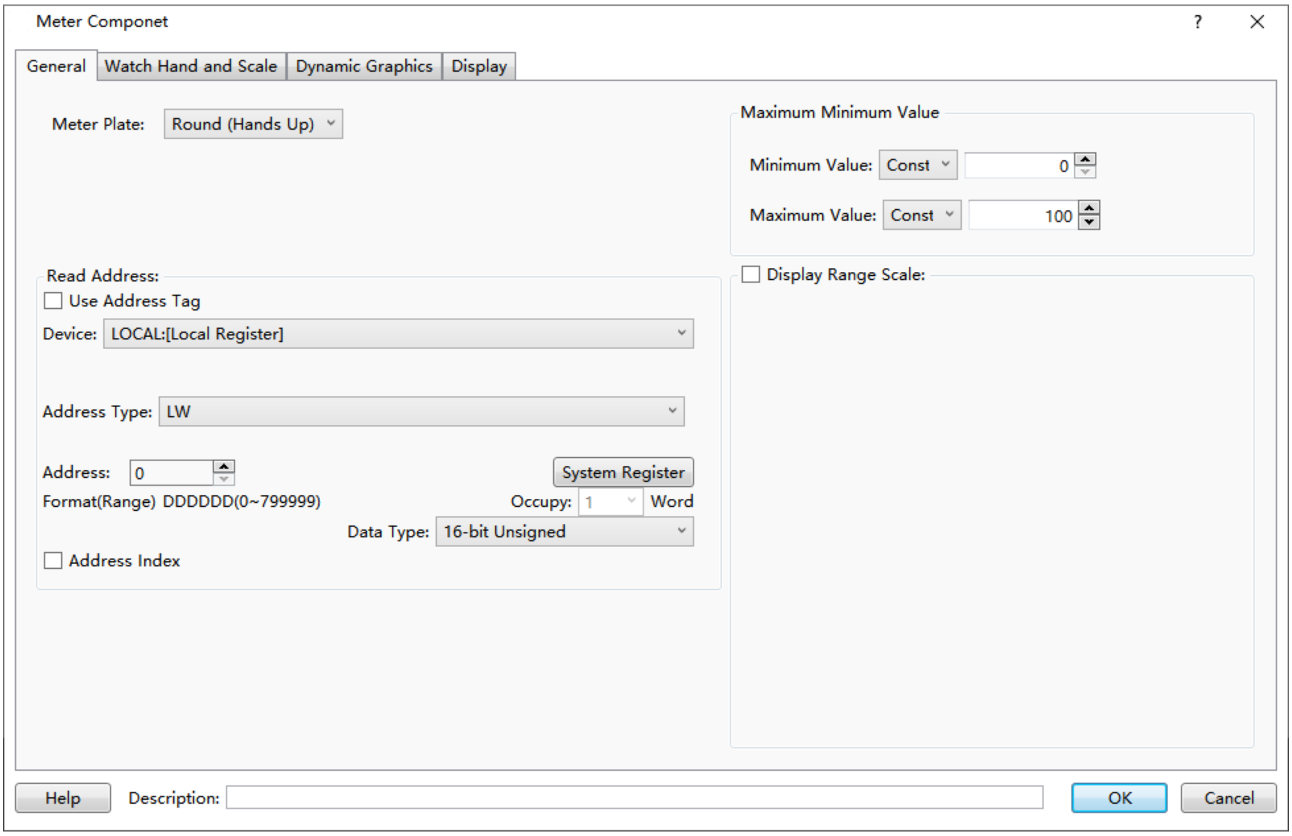


Step 5. Click anywhere in the window to insert the sector chart component.

10.6.3 Meter

The steps to create a new meter component are as follows:

Step 1. Select **Component/Bar and Meter/Meter** from the menu bar, configure relevant parameters in the pop-up **Meter Component** dialog box.

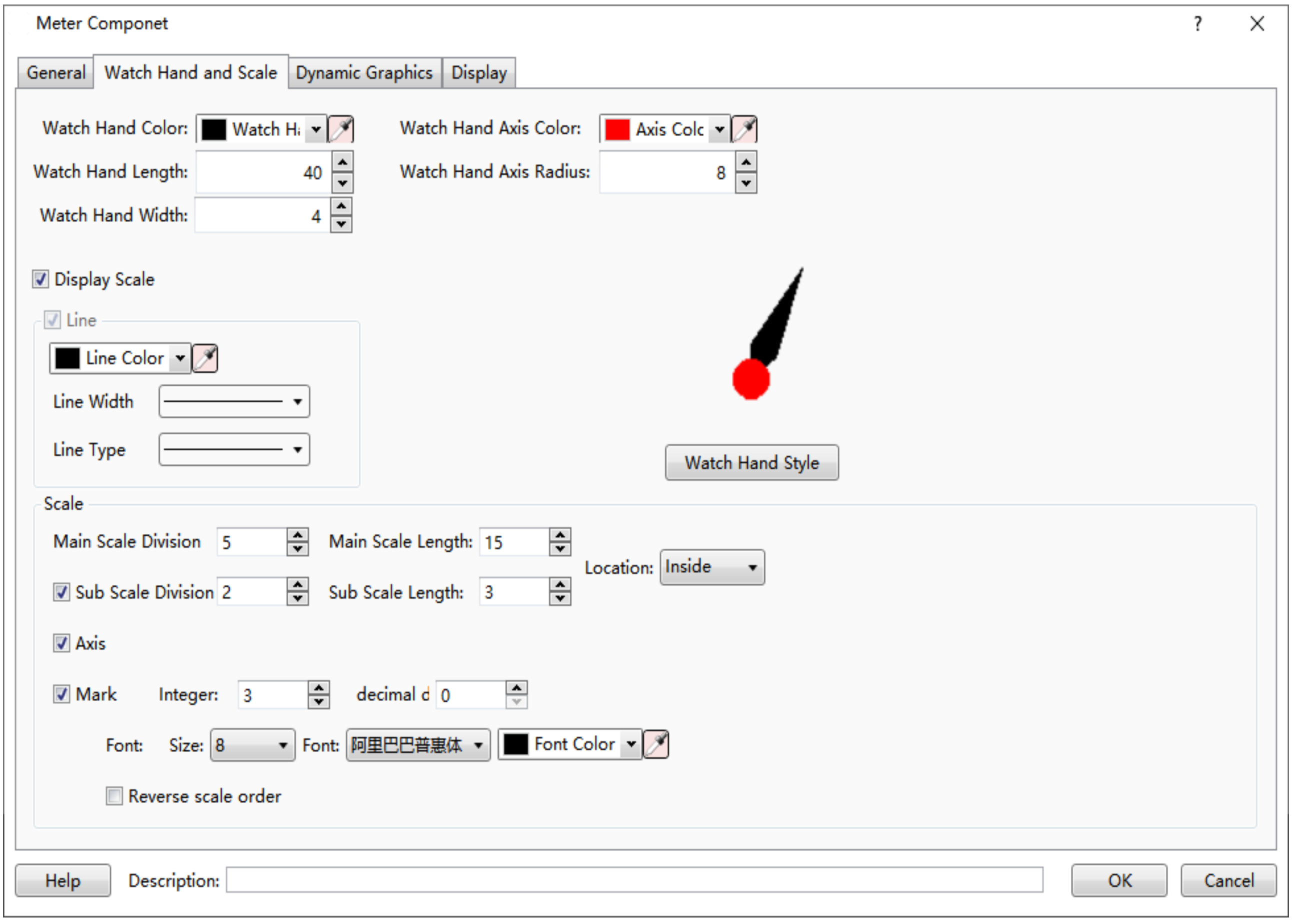


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Meter Plate	Select the meter plate type: round(hands up), round(hands dow), upper semi-circle, lower semi-circle, arc(Set Automatically).
Minimum Value	It can be set as a constant or variable.
Maximum Value	It can be set as a constant or variable.
Read Address	Read the value of specified address: Device: HMI local register, recipe register, register of PLC. Address Type: register address type, please refer to the actual situation. Address: register address, please refer to the actual situation.

Parameter	Description
Display Range Scale	Display the range scale.
Lower Limit	Lower limit of the scale, can be set as a constant or variable.
Upper Limit	Upper limit of the scale, can be set as a constant or variable.
Sector Ring Width	Set the width of sector ring, default value is 10.
User-defined Outer Radius	Set the radius of outer ring, default value is 40.
Color for value within limits	Set the color for value within limits.
Color for value below lower limits	Set the color for value below lower limits.
Color for value above upper limits	Set the color for value above upper limits.

Step 2. Set Watch Hand and Scale.

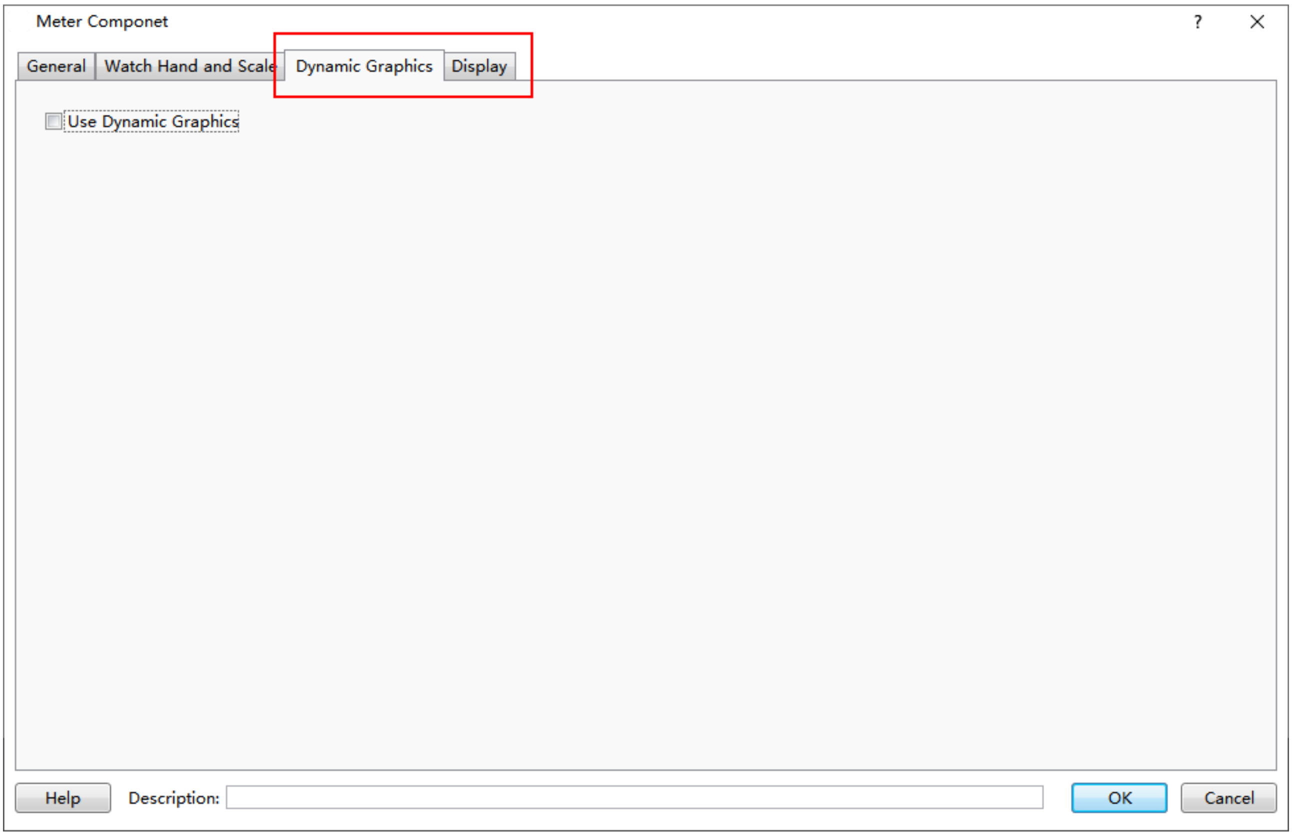


Please refer to the table below for detailed configuration methods.

Parameter	Description
Watch Hand Color	Set the watch hand color.
Watch Hand Axis Color	Set the watch hand axis color.
Watch Hand Length	Set the watch hand length, defalut value is 10.
Watch Hand Axis Radius	Set the watch hand axis radius, defalut value is 8.
Watch Hand Width	Set the watch hand width, defalut value is 4.
Display Scale	Whether to display the scale of the meter or not. The use of scales enhances the discrimination of data.
Main Scale Length	Set the main scale length, default value is 12.

Parameter	Description
Main Scale Division	Main scale division number, default number is 5.
Sub Scale Length	Sub scalelength, default number is 8.
Sub Scale Division	Divide each main scale into equal subdivisions, then equally divide the subdivisions to enhance the precision of the data. The default value is 2.
Location	The location of scales, including inside, outside and center.
Axis	Whether to display axis (circle or arc) or not.
Mark	Mark value of the scale.

Step 3. Set up the **Dynamic Graphics** amd **Display** properties, click **OK**.



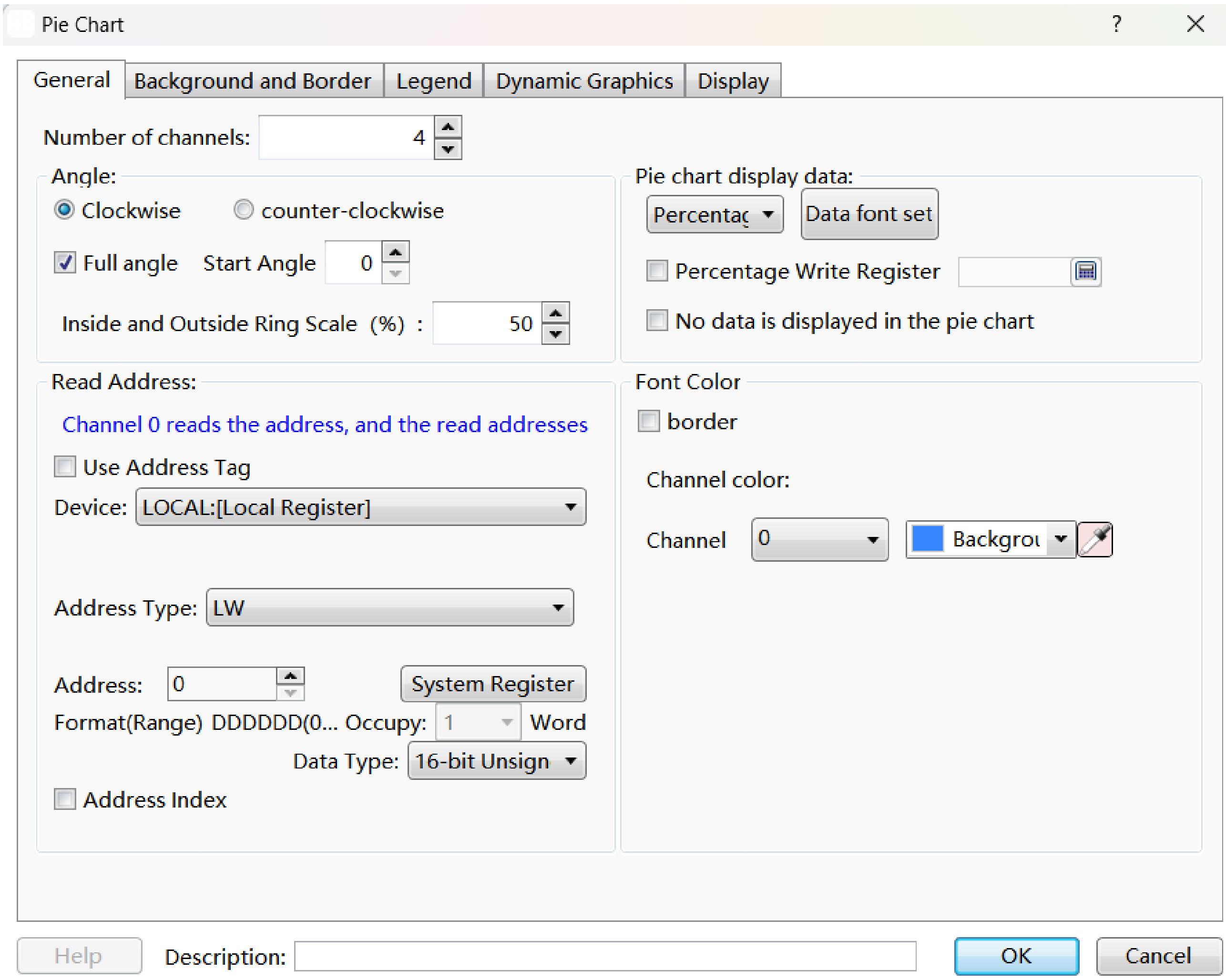
Step 4. Click anywhere in the window to insert the Meter component.

10.6.4 Pie Chart

Only VI20Studio V3.0 supports the **Pie Chart** feature.

Pie charts are usually used to show the proportion of different elements. The steps to create a new pie chart component are as follows:

Step 1. Select **Component/Bar and Meter/Pie Chart** from the menu bar, configure relevant parameters in the pop-up **Pie Chart** dialog box.

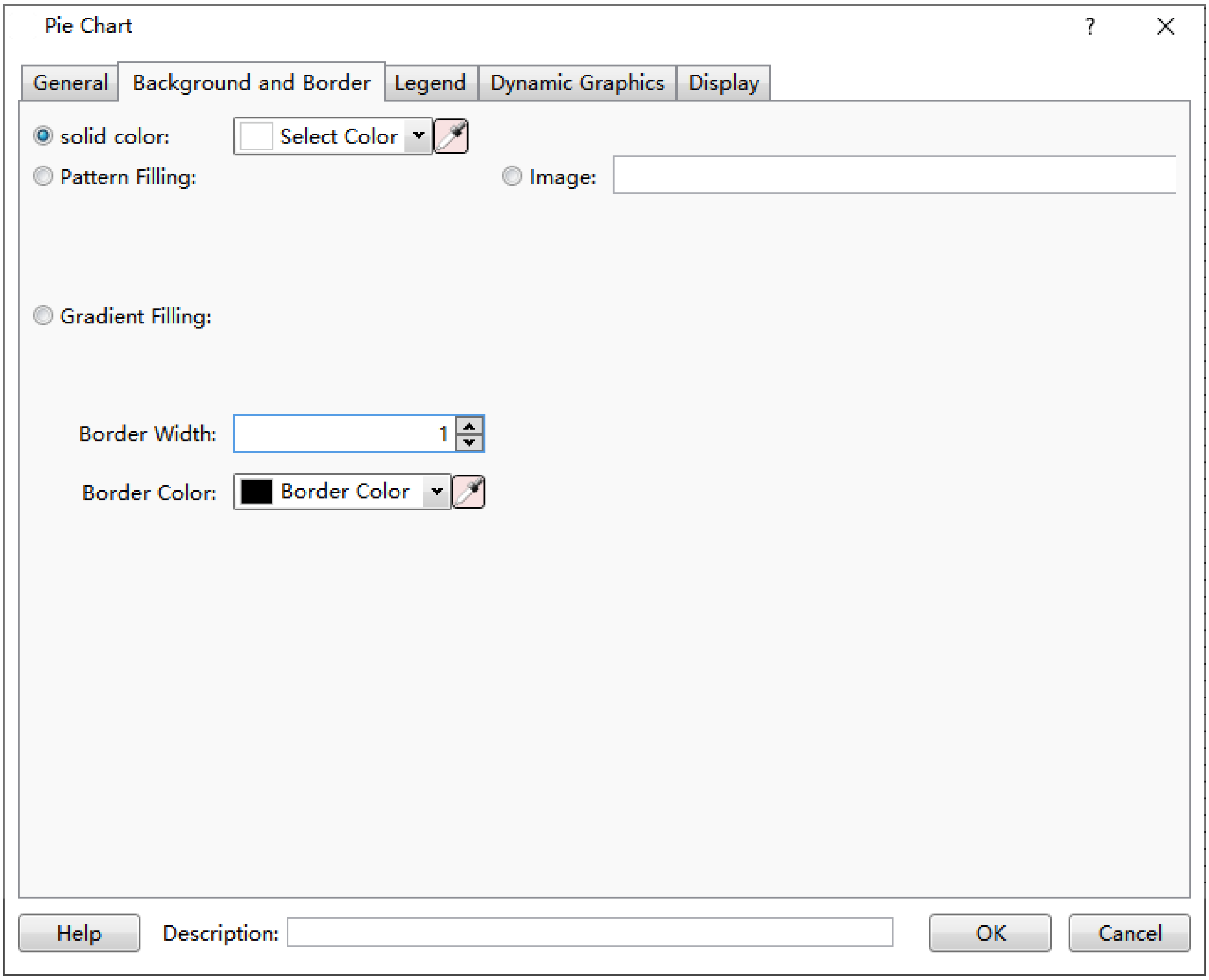


Please refer to the table below for detailed configuration methods.

Parameter	Description
Number of channels	For each channel, there is a corresponding value at a specific address. As the number of channels increases, it indicates that there are more address values to be retrieved.
Angle	Display different channels in a clockwise or counterclockwise direction.
Full angle	A 360° circular ring. When the Full angle option is unchecked, you have the flexibility to customize the starting angle and ending angle.
Inside Ring Scale	The ratio between the inner radius and outer radius. Default value is 50%.
Pie chart display data	Select the data to display in the pie chart: None, Percentage (percentage of different channels) or Numerical Value (the actual read value of different channels).
Percentage	Write the percentage values of different channels to specified word address registers. For

Parameter	Description
Write register	example, Channel 0 percentage value is stored in word address LW5, Channel 1 percentage value is stored in word address LW6, and so on.
Read Address	set the read address for Channel 0 and calculate the read addresses for other channels based on the number of occupied words.
Device	HMI local register, recipe register, register of PLC.
Address Type	Register address type, please refer to the actual situation.
Address	Address of register, please refer to the actual situation.
Border	Set the color of the pie chart outer frame.
Channel color	Set the color of different channels.

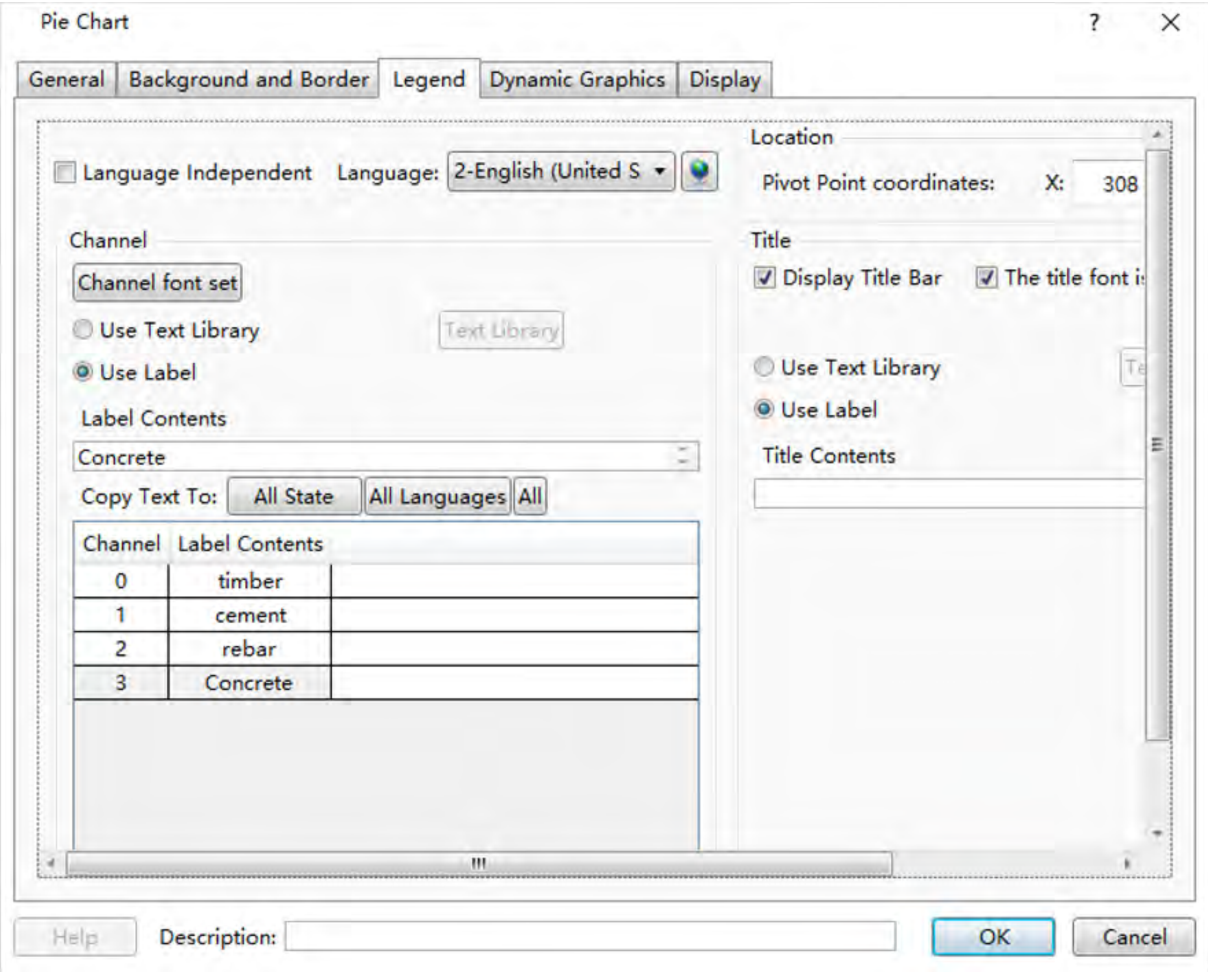
Step 2. Set Background and Border.



Please refer to the table below for detailed configuration methods.

Parameters	Description
Solid Color	Solid color filling, you can set the background color.
Pattern Filling	Use pattern to fill, you can set the pattern color and background color.
Gradient Filling	Use gradient color to fill.
Border Width	Set border width.
Border Color	Set border color.

Step 3. Select the **Legend** tab and configure relevant parameters.

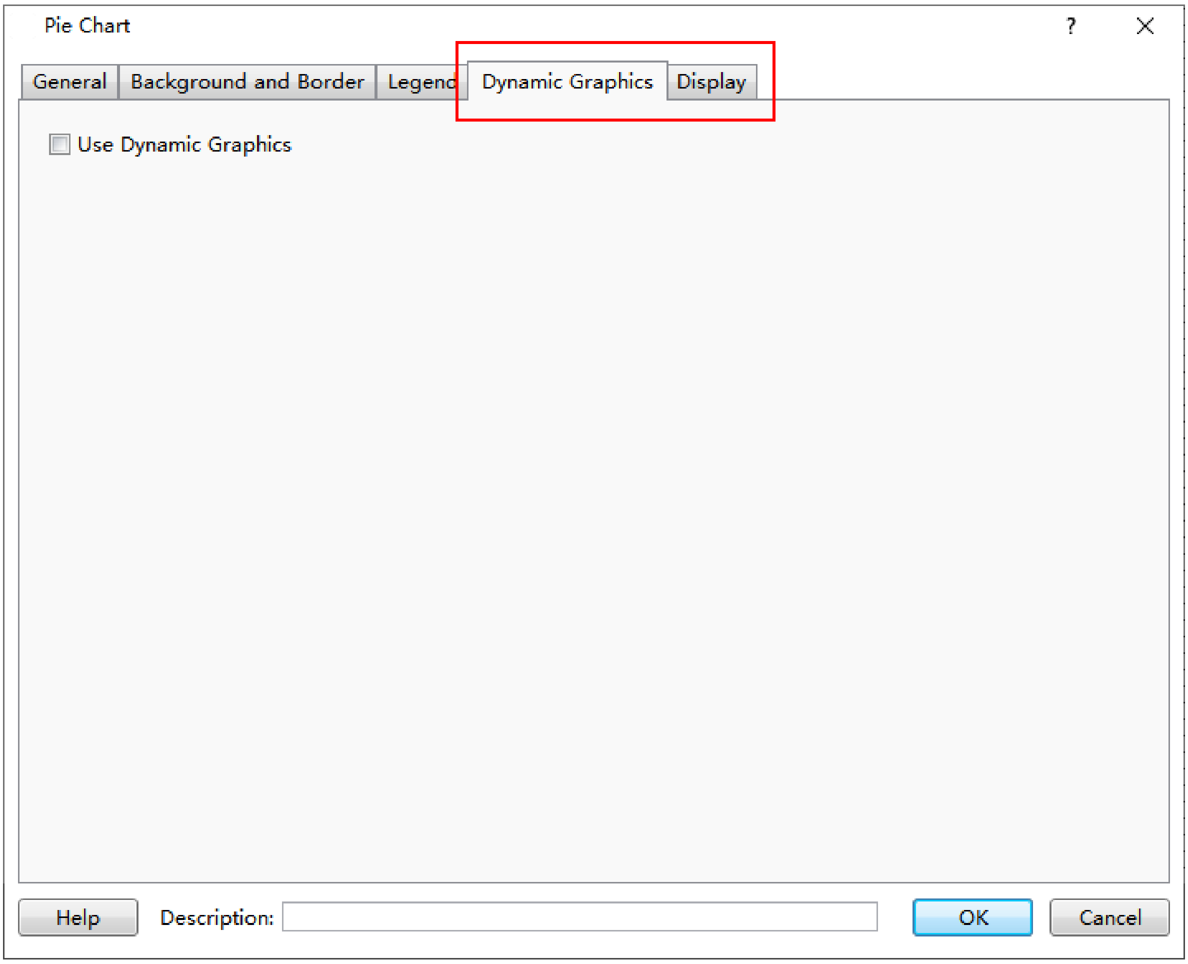


Please refer to the table below for detailed configuration methods.

Parameter	Description
Language Independent	When switching languages, the text content of the component does not change.

Parameter	Description
Language	Set the text content of components for different languages, suitable for scenarios that require the use of multiple languages.
Channel font set	Click **Channel font set** to set channel font.
Use Text Library	Use the text content from the text library. For detailed information about the text library, please refer to the Text Library.
Use Tag	Click different channels in the table to set the tag content of different channels.
Location	Set the coordinates of channel text.
Display Title Bar	Whether to display the title bar or not. If the title bar is displayed, the text content of the title bar needs to be set, you can use text library or tags.

Step 4. Set the **Dynamic Graphics** and **Display** properties, click **OK**.



Step 5. Click anywhere in the window to insert the pie chart component.

10.7 Curve Chart

Curve charts are usually used to visualize the trends in data, making it easier for users to analyze the production process. They include three types of components: trend , XY curve, and data block chart.

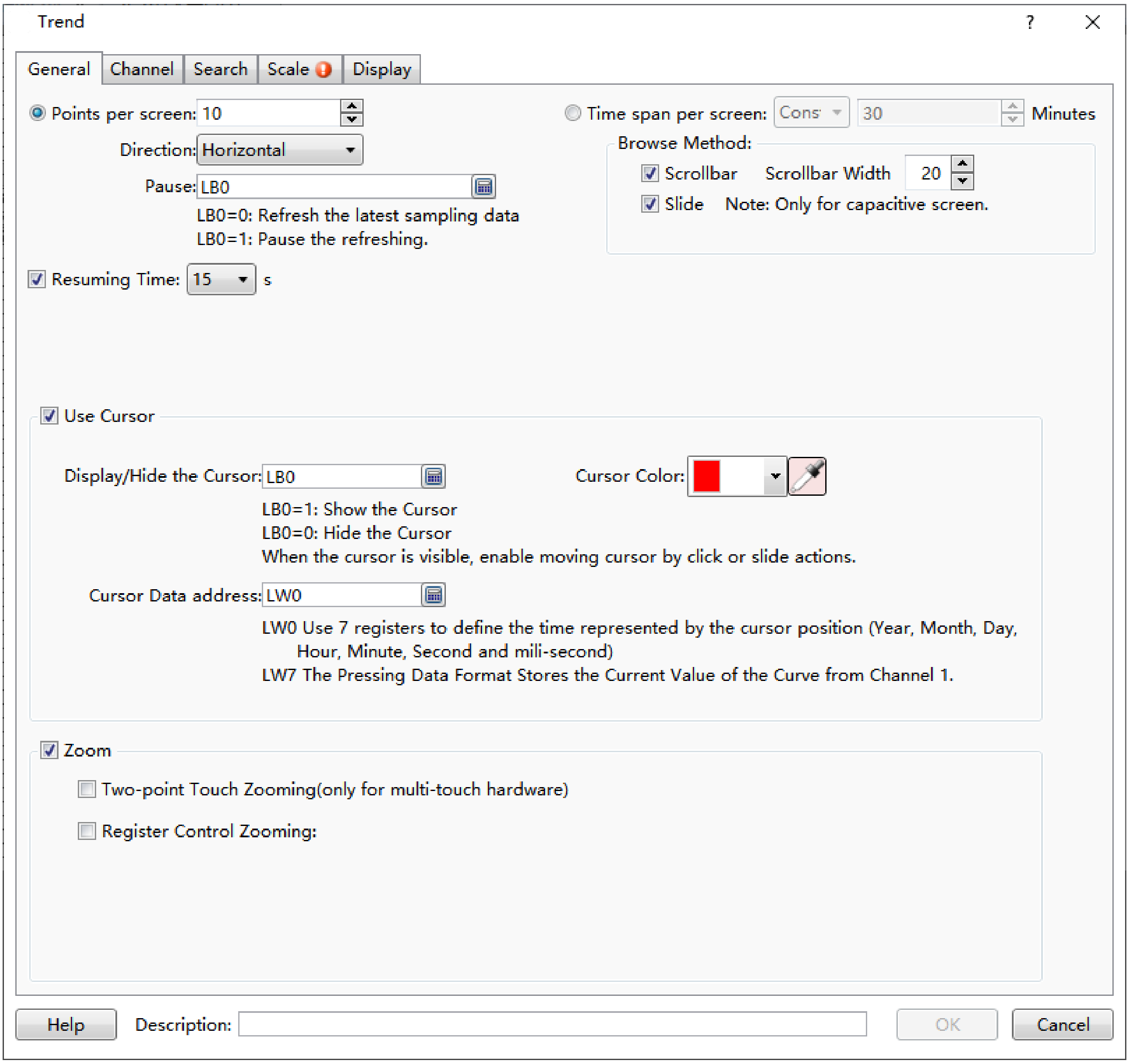
10.7.1 Trend

The trend component is used to display the data collected by **Data Sampling** tools in a visual manner, showcasing the trend of data changes. It allows users to gain an understanding of the production situation.

For detailed information about data sampling, please refer to the Data Sampling.

The steps to create a new trend component are as follows:

Step 1. Select **Component/Curve Chart/Trend** from the menu bar, configure relevant parameters in the pop-up **Trend** dialog box.

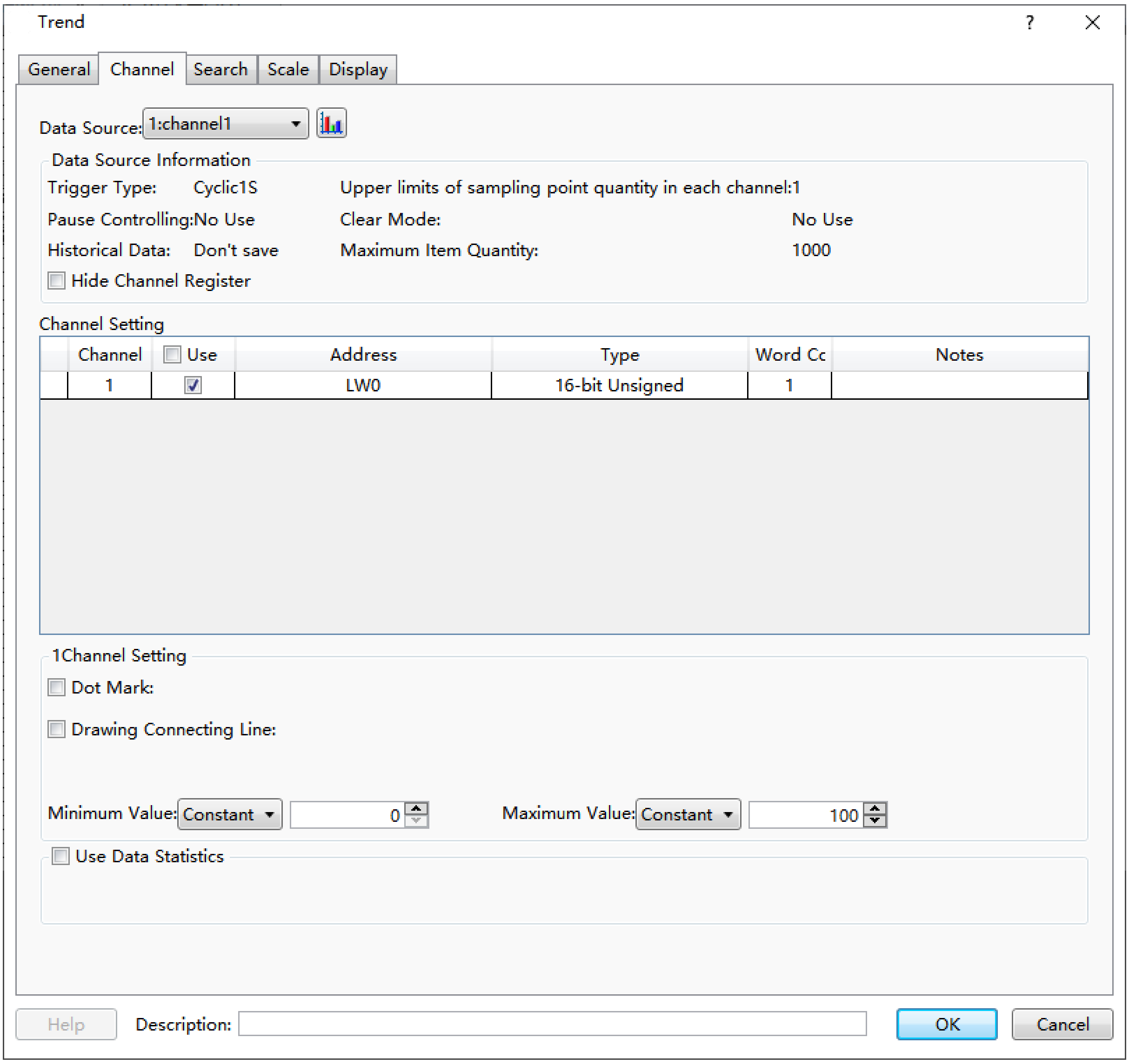


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Points per screen	Number of sampling points displayed in each screen.
Direction	Including horizontal and vertical.
Pause	If the value of specified bit address is 0, refresh for the most updated sampling data; if the value is 1, pause refreshing.
Time span per	Sampling data of a specified time span displayed per screen. It can be a constant or variable.

Parameter	Description
screen	
Browse Method	Browse the sampling data of different periods of time: ◆ Scrollbar: use scrollbar to switch time span. ◆ Slide: slide the screen to switch time span. Only applicable for capacitive HMI. ◆ Page control: switch time span by changing the word address value.
Resuming Time	When refreshing of the sampling data is paused, after the set pause recovery time, the sampling data will be refreshed again.
Display Type	◆ Immediate: disply real-time data. ◆ History: use history file to control. For example, if LW0 is 0, it refers to the latest data; if LW0 is 1, it refers to the previous set of data, and so on. It is recommended to use it in conjunction with a checklist component during data sampling.
Use Cursor	Whether to use cursor or not. Display/Hide the Cursor: if the value of specified bit address is 0, hide cursor; if the value is 1, display cursor. After displaying the cursor, you can click or slide the cursor to move it on the HMI screen, making it convenient to display the values at different points.
Cursor Color	Set the color of cursor.
Cursor Data Area	Starting from the initial address, the 7 registers represent the time of current cursor position. The current value of Channel 1's curve is stored starting from the 8th register address.
Zoom	◆ Two-point Touch Zooming: The curve can be zoomed by using a two-finger touch gesture. This feature is only applicable to HMIs that use a capacitive touch screen. ◆ Register Control Zooming: The value of a register represents the percentage of displayed points after zooming compared to the current number of points. For example, if the current number of points is 20 and the zoom value is 50, it will display 10 points. If the zoom value is 200, it will display 40 points. A zoom value of 0 indicates no zooming.

Step 2. Set Channel.

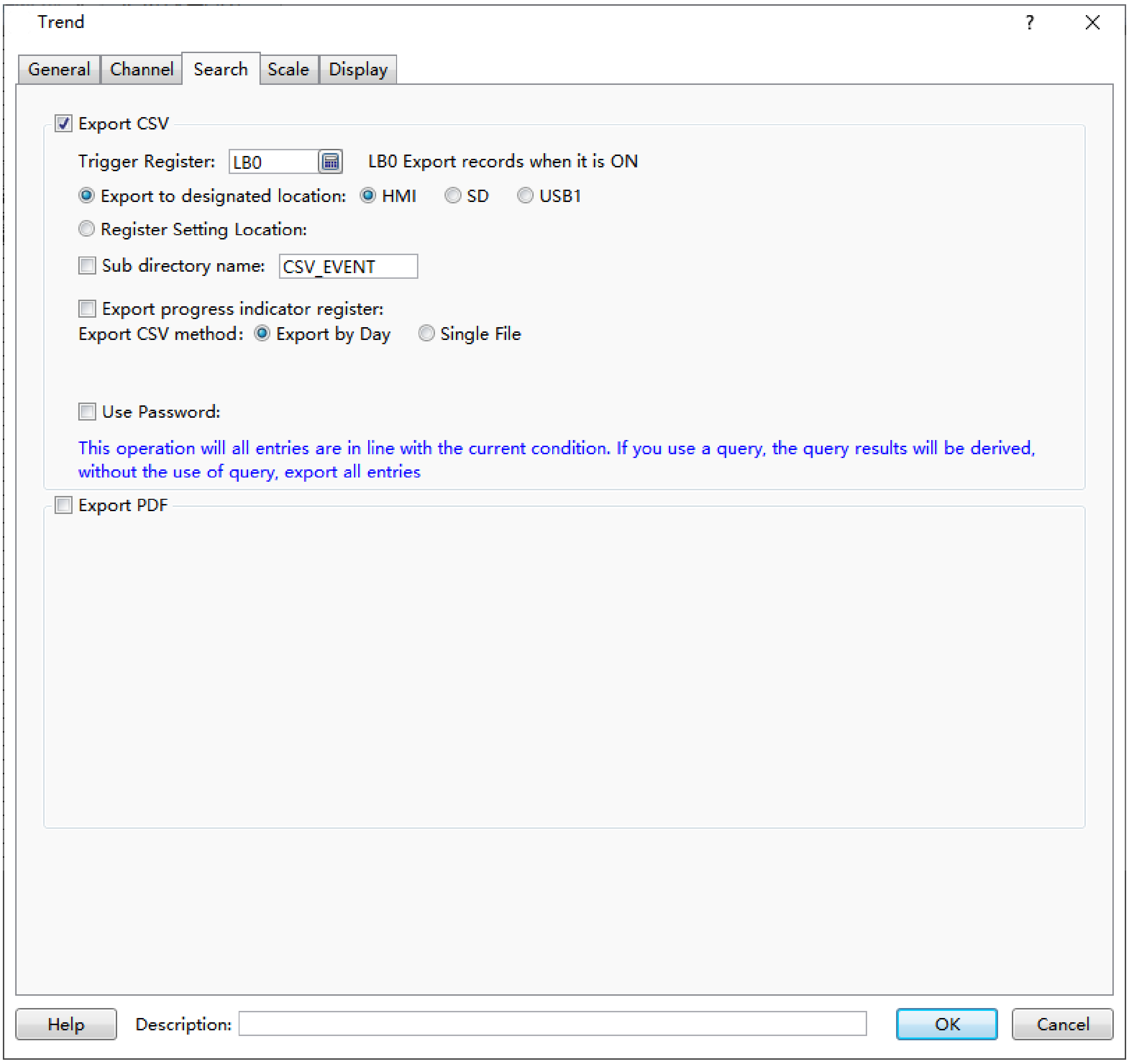


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Data Source	The data source is data sampling. Select the corresponding data sampling project.
Hide Channel Regiser	Use the value of a register to control the display and hiding of the corresponding channel curve. For example, if the value of the register is 5, it means that Channel 5's curve will be hidden.
Channel Setting	Select the channel to be used.
Dot Mark	Sampling values can be marked as dots on the trend curve. You can set the size and type of the dots.
Draw connecting line	The values of different sampling points can be connected using lines.
Minimum Value	The minimum value displayed on the vertical axis of the trend curve can be set using a

Parameter	Description
	constant or a variable. For example, if the channel value is below the minimum value, it will be displayed as the minimum value.
Maximum Value	The maximum value displayed on the vertical axis of the trend curve can be set using a constant or a variable. For example, if the channel value is higher than the maximum value, it will be displayed as the maximum value.
Use Data Statistic	Write the minimum and maximum values of the current data statistics to specified word addresses.

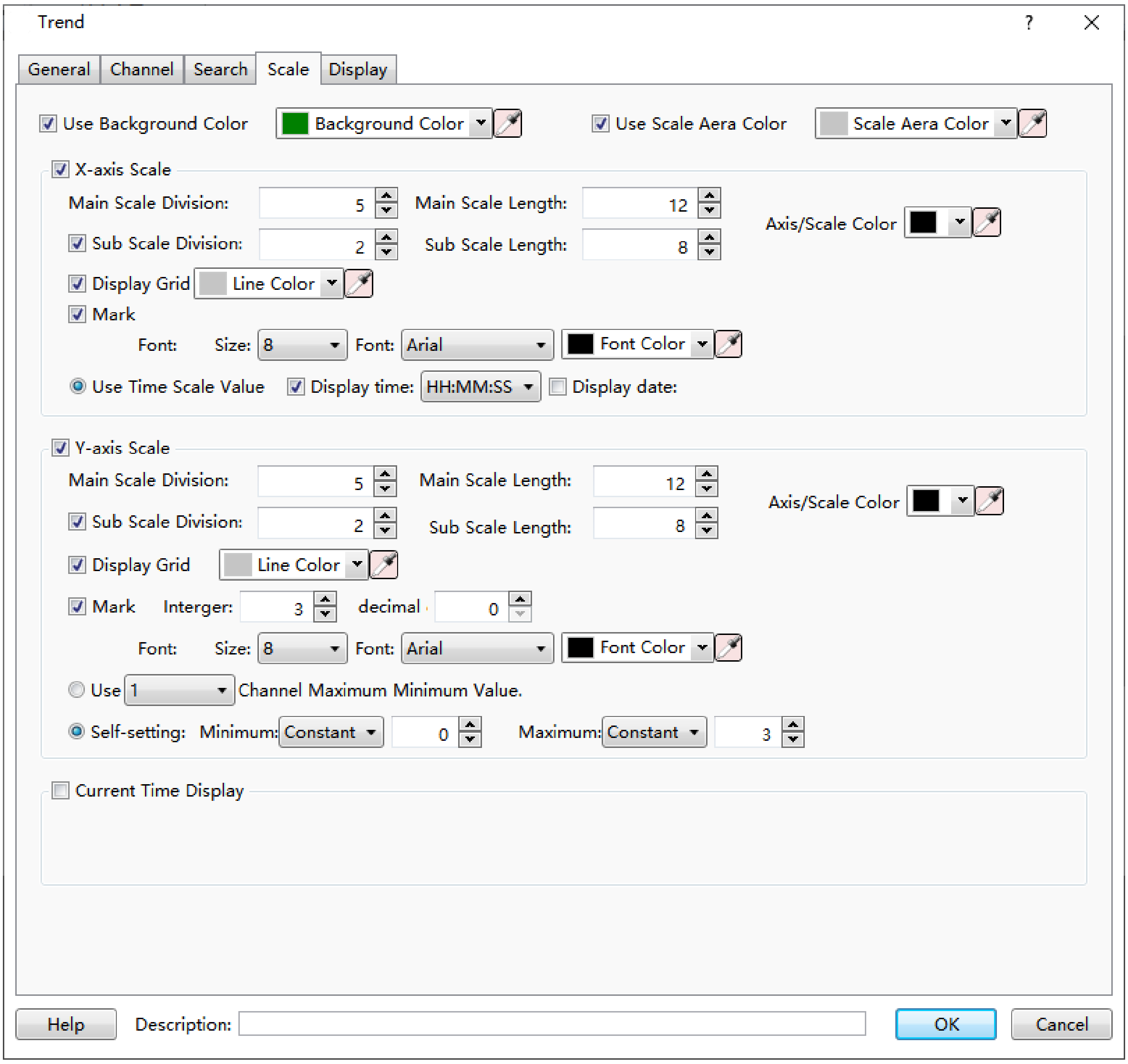
Step 3. Select the **Search** tab, and configure relevant parameters.



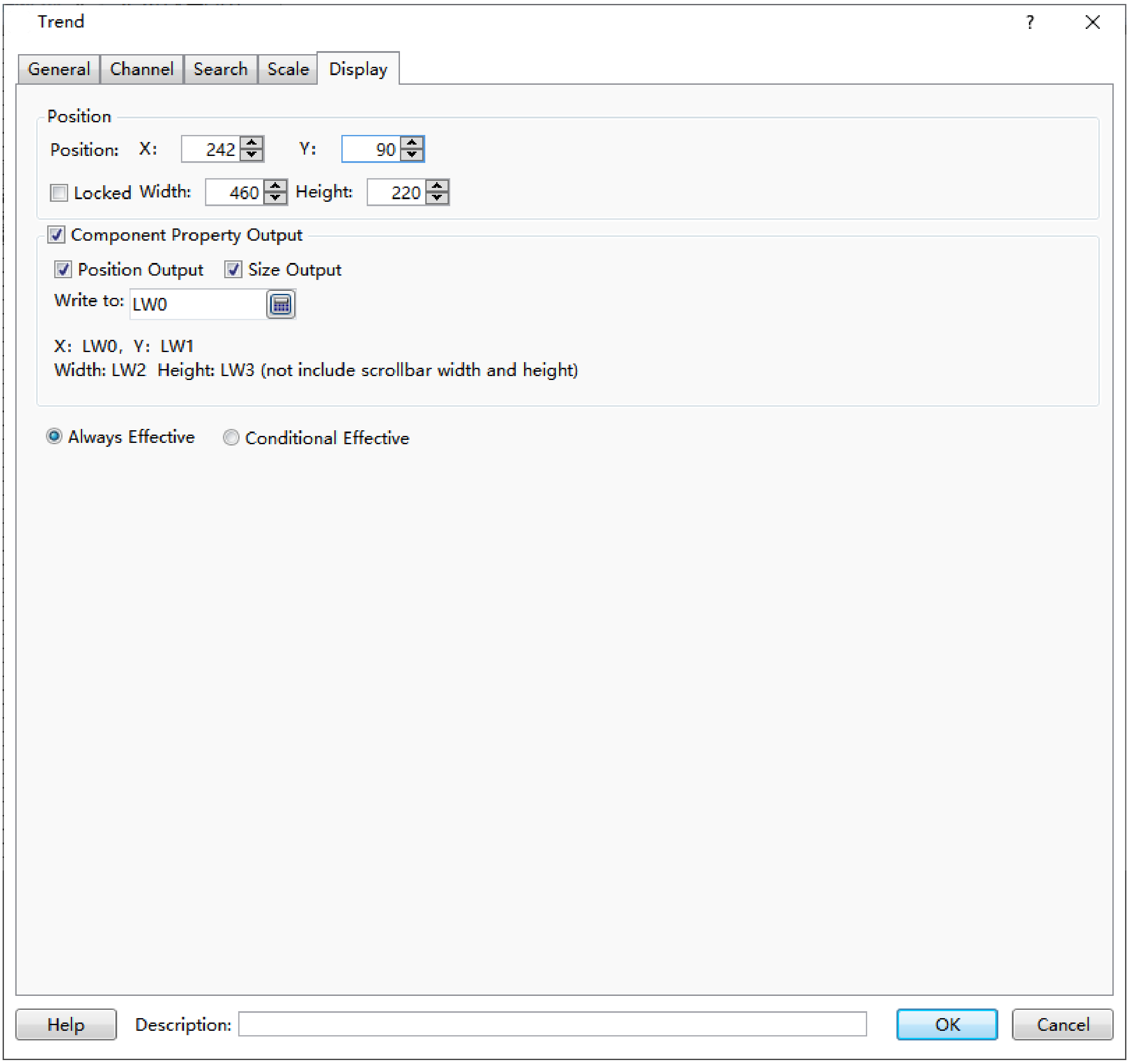
Please refer to the table below for detailed configuration methods.

Parameter	Description
Export CSV	The trend curve data can be exported in CSV format.
Trigger Register	The trend curve data can be exported when the specified bit register value is set to ON.
Export to designated location	Export the trend curve data to a specified storage device, such as an HMI, SD card, USB medium, etc.
Sub directory name	The folder name for the export CSV file can be specified using the value of a designated register.
Export progress indicator register	The export progress value (ranging from 0 to 100) can be stored in the specified word register.
Export CSV method	Select the export method for the CSV file: ◆ Export by day: Export trend curve data using multiple files, with each day's data in a separate file. ◆ Single file: Export trend curve data in a single file.
Use Password	After setting a password, the exported CSV file will be encrypted and cannot be displayed properly. To generate a normal CSV file, you will need to use a decryption tool and enter the password. For detailed information about the decryption tool, please refer to Decryption Tool.

Step 4. Set Scale.



Step 5. Set **Display** properties, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Position Output	The coordinates of the component can be stored in a specified word address register.
Size Output	The width and height of the component (excluding the width of the scrollbar) can be stored in a specified word address register.

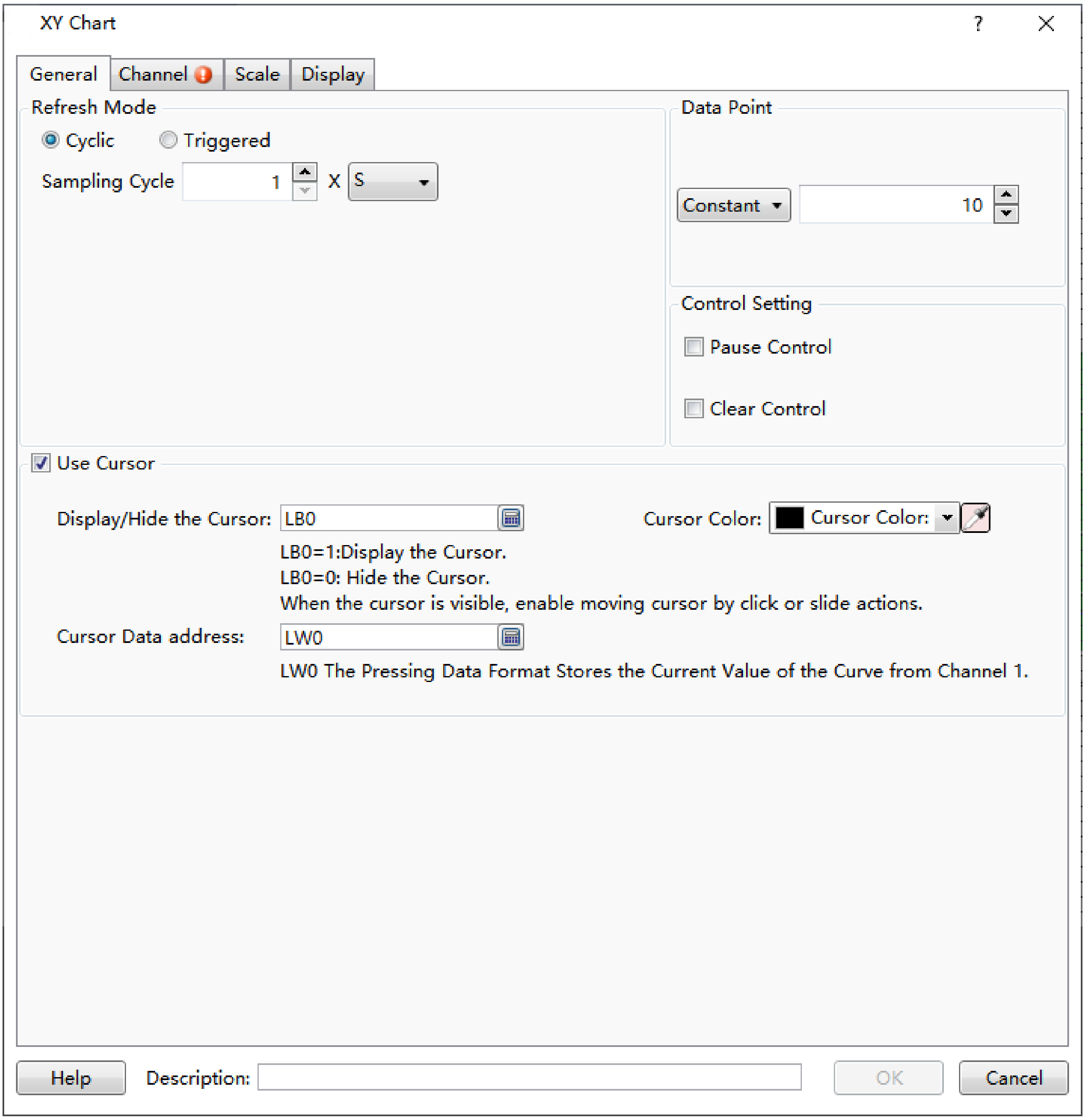
Step 6. Click anywhere in the window to insert the Trend Curve component.

10.7.2 XY Curve

The XY curve reads data from two different word address registers and draws the correponding data into dots (the values from the first register represent the X-axis values, and the values from the second register represent the Y-axis values), these points are connected to form the curve. This is commonly used to depict the numerical relationship between two variables.

The steps to create a new XY curve component are as follows:

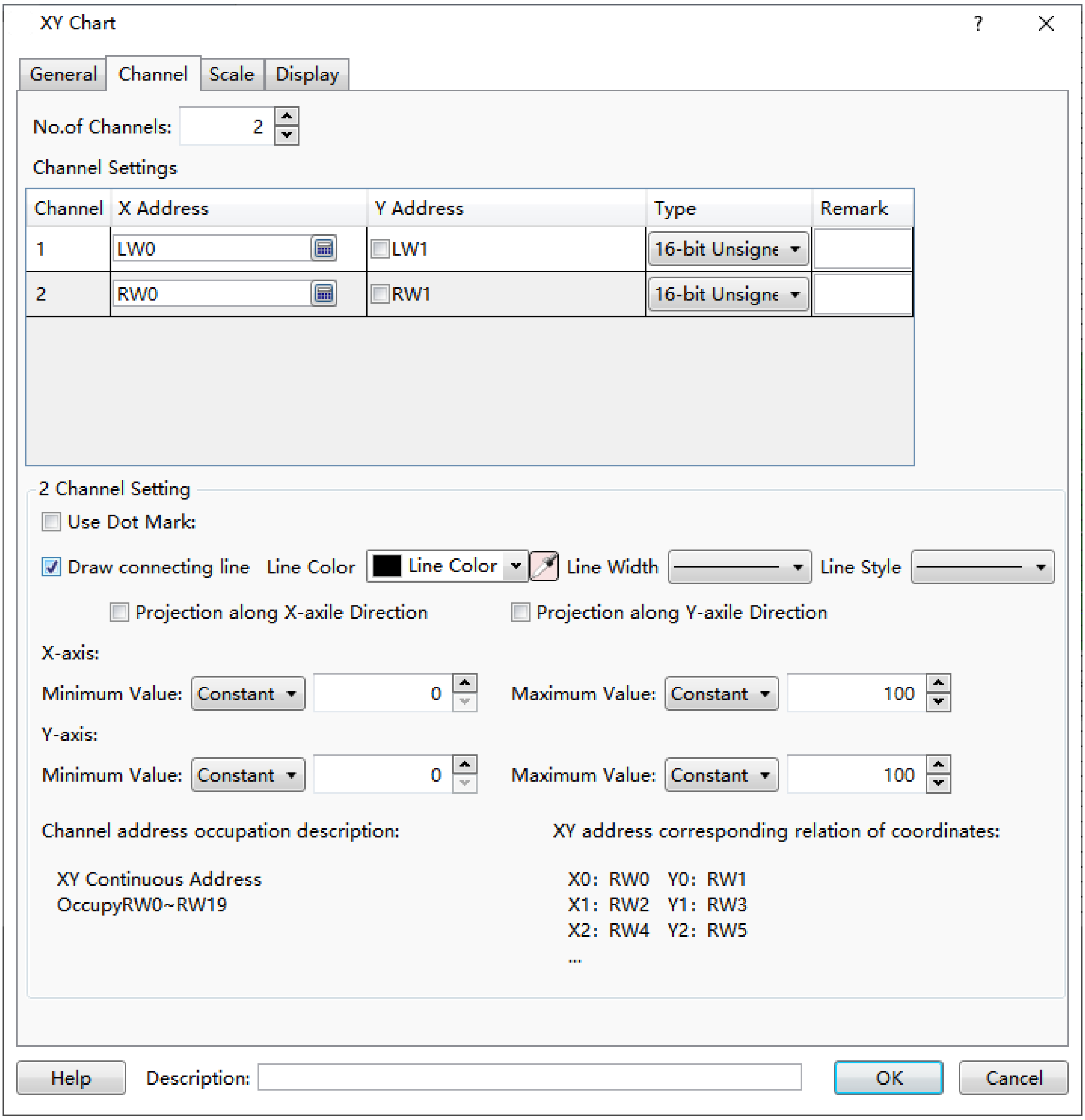
Step 1. Select **Component/Curve Chart/XY Curve** from the menu bar, configure relevant parameters in the pop-up **XY Curve** dialog box.



Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Cyclic	To sample within one cycle, you need to set the sampling cycle.
Triggered	Sample when certain conditions are triggered: ◆ Bit: the state of a specified bit address meets the trigger condition (for example, the state of LB0 changes from ON to OFF). ◆ Word: the state of a specified word address meets the trigger condition (for example, the value of LW0 is greater than 1).
Data Point	The number of sampling points. Can be set as a constant or a variable.
Pause Control	If the value of specified bit address is 0, refresh for the latest sampling data; if it is 1, pause refresh.
Clear Control	The specified bit address controls the clearing of sampled data. When the value of the bit address is ON, the data is cleared, and it is automatically reset after clearing.
Display/Hide the Cursor	If the value of specified bit address is 1, display cursor; if the value is 0, hidecursor. After displaying the cursor, you can click or slide to move the cursor, making it convenient to display X value and Y value of specific points.
Cursor Color	Set the color of cursor.
Cursor Data address	Starting from the specified word address, the current values of the curves are stored beginning with Channel 1.
Data Point	The number of sampling data points. Can be set as a constant or a variable.

Step 2. Set Channel.

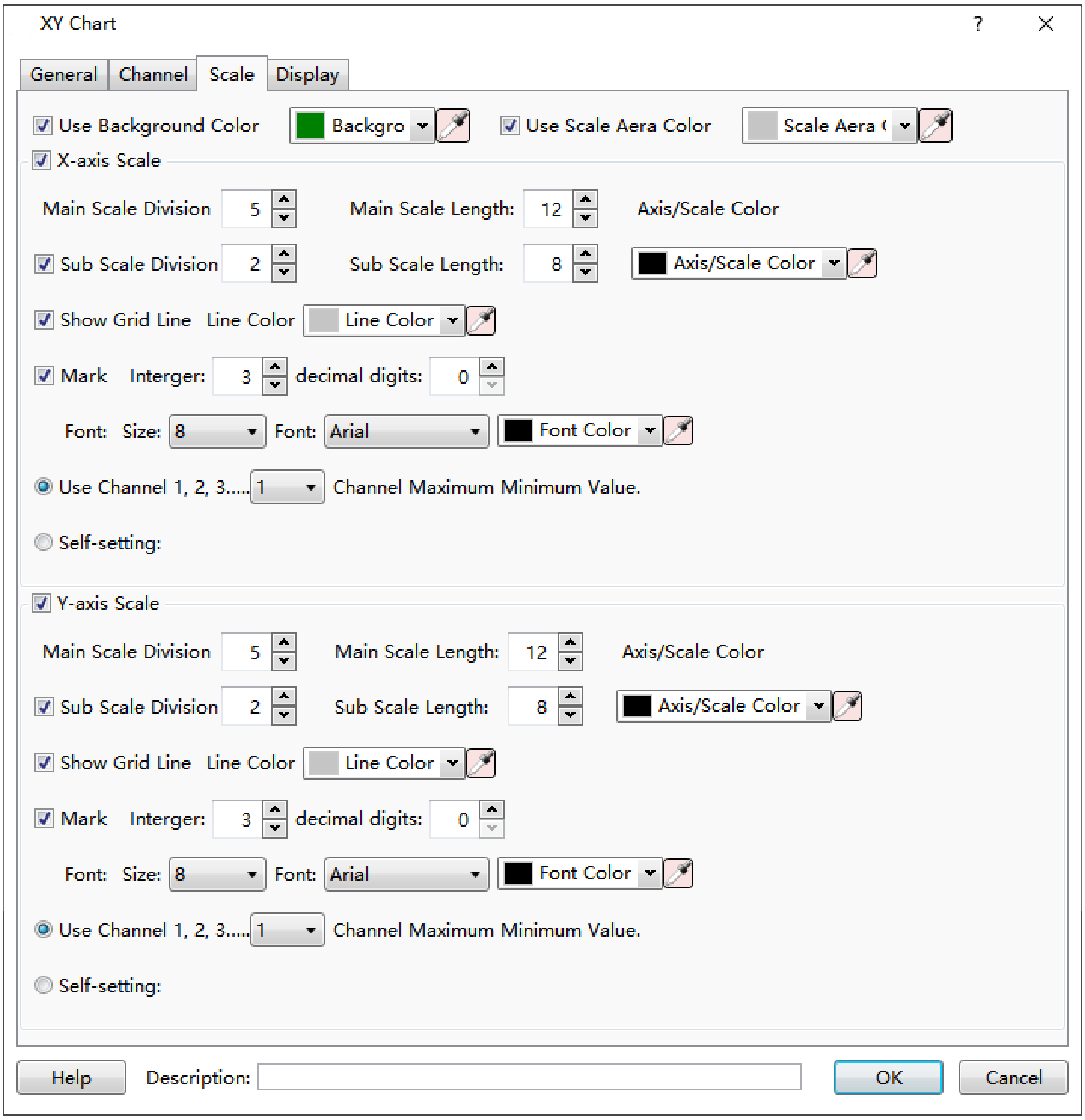


Please refer to the table below for detailed configuration methods.

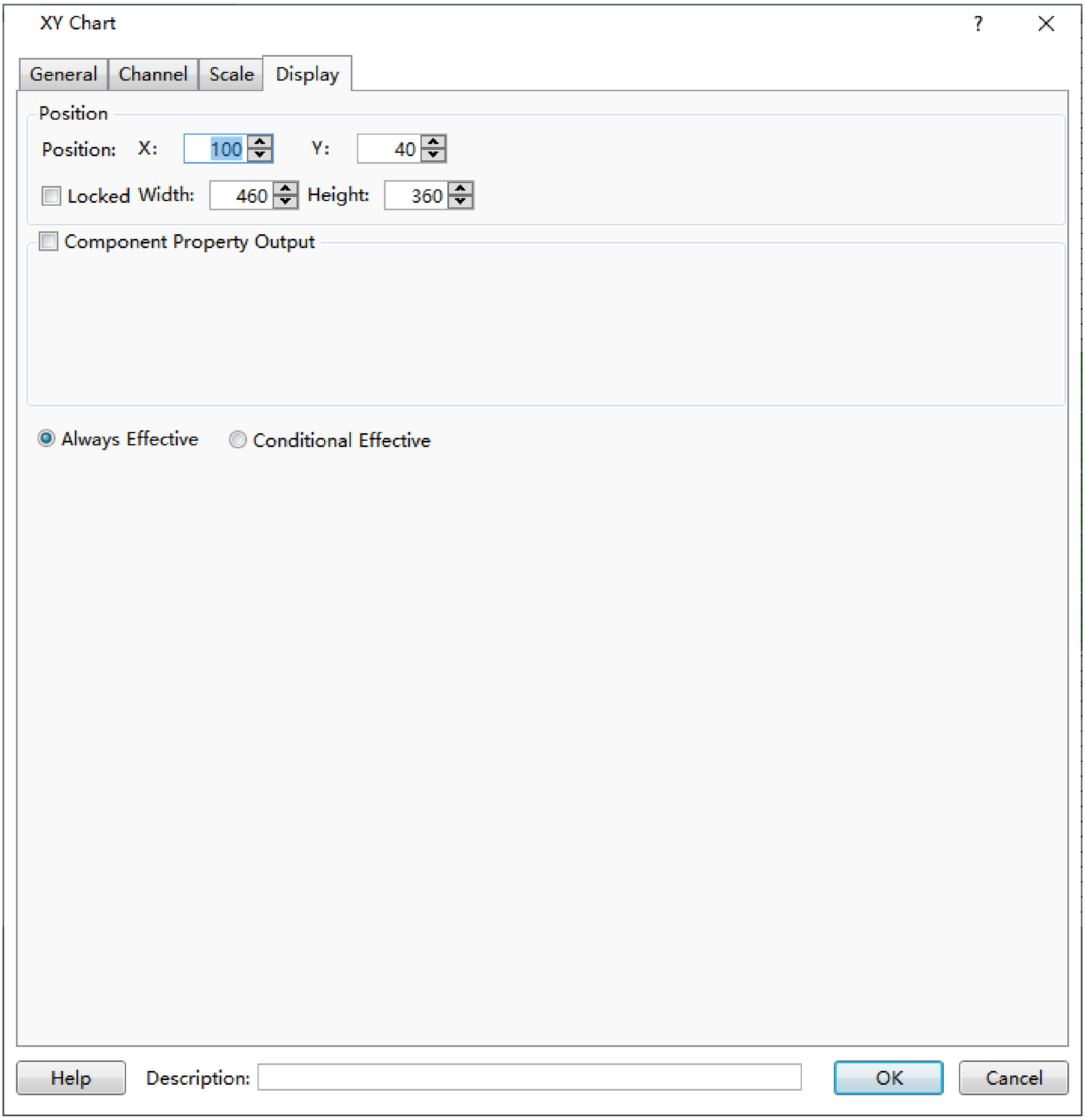
Parameters	Description
No. of Channels	Set the number of channels, which is the number of curves to be displayed.
Channel	Serial number of the channel, automatically allocated by the system.
X Address	The address for sampled data X.
Y Address	The address for sampled data Y is set by default as the address of X plus 1. For example, if the address of X is LW0, then the address of Y would be LW1. You also have the option to customize the address for Y.

Parameters	Description
Type	Data type, please refer to the actual situation.
Use Dot Mark	The sampled data can be marked using dots, and you can customize the size, color, and type of the dots.
Draw connecting line	The adjacent sampled points can be connected using straight lines, and you can customize the line type, color, and width.
Minimum value/Maximum value	You can set the minimum and maximum values for the X-axis or Y-axis.

Step 3. Set Scale.



Step 4. Set **Display** properties, click **OK**.



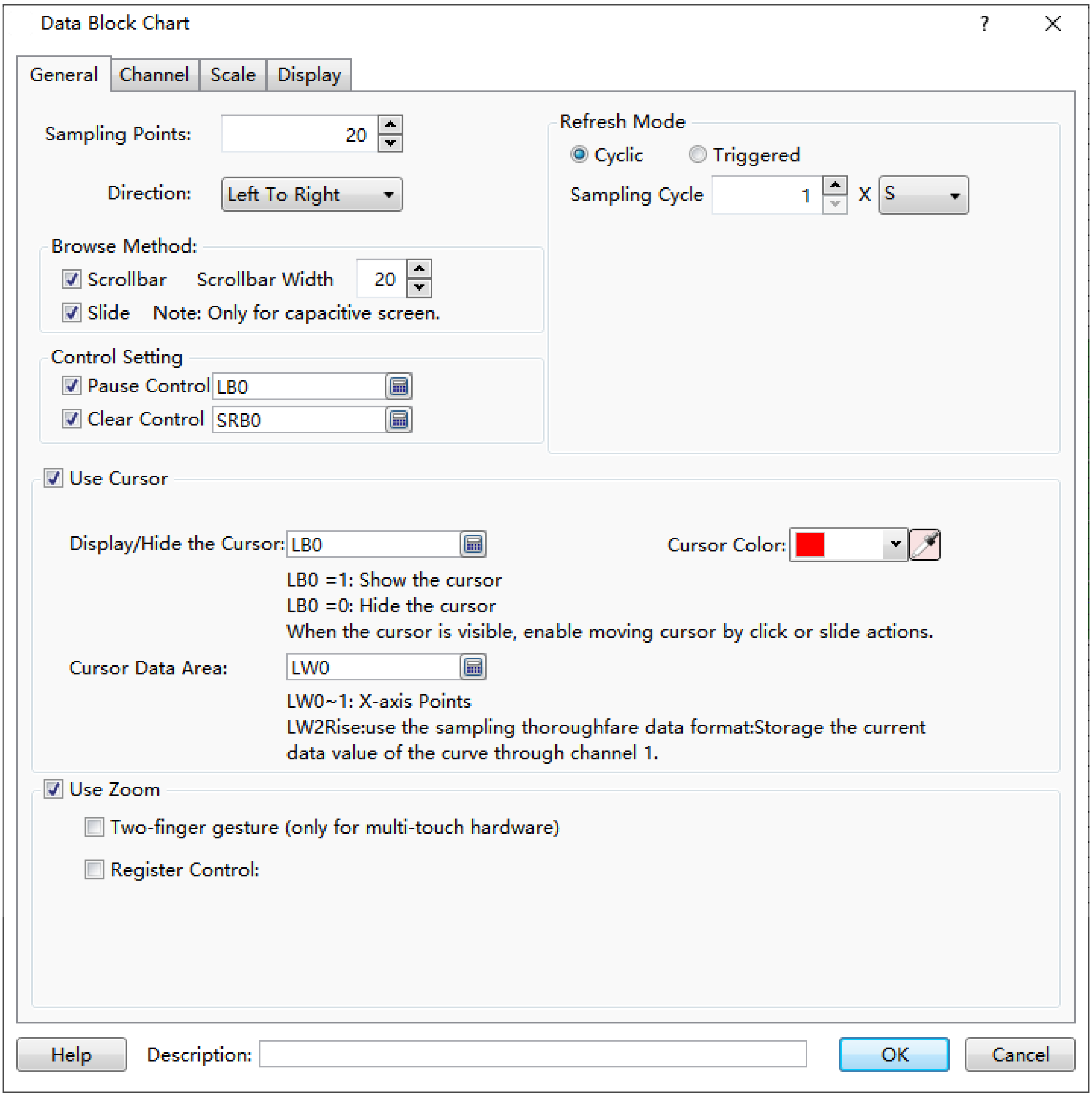
Step 5. Click anywhere in the window to insert the XY curve component.

10.7.3 Data Block Chart

The Data Block Chart component uses a line chart to show the data from a specific group address. For example, the number of sampling points is determined by the value of a specified register LW0. When the value of LW0 is 20, the data block chart component displays the values from LW1 to LW20.

The steps to create a new data block chart component are as follows:

Step 1. Select **Component/Curve Chart/Data Block Chart** from the menu bar, edit the relevant parameters in the pop-up **Data Block Chart** dialog box.

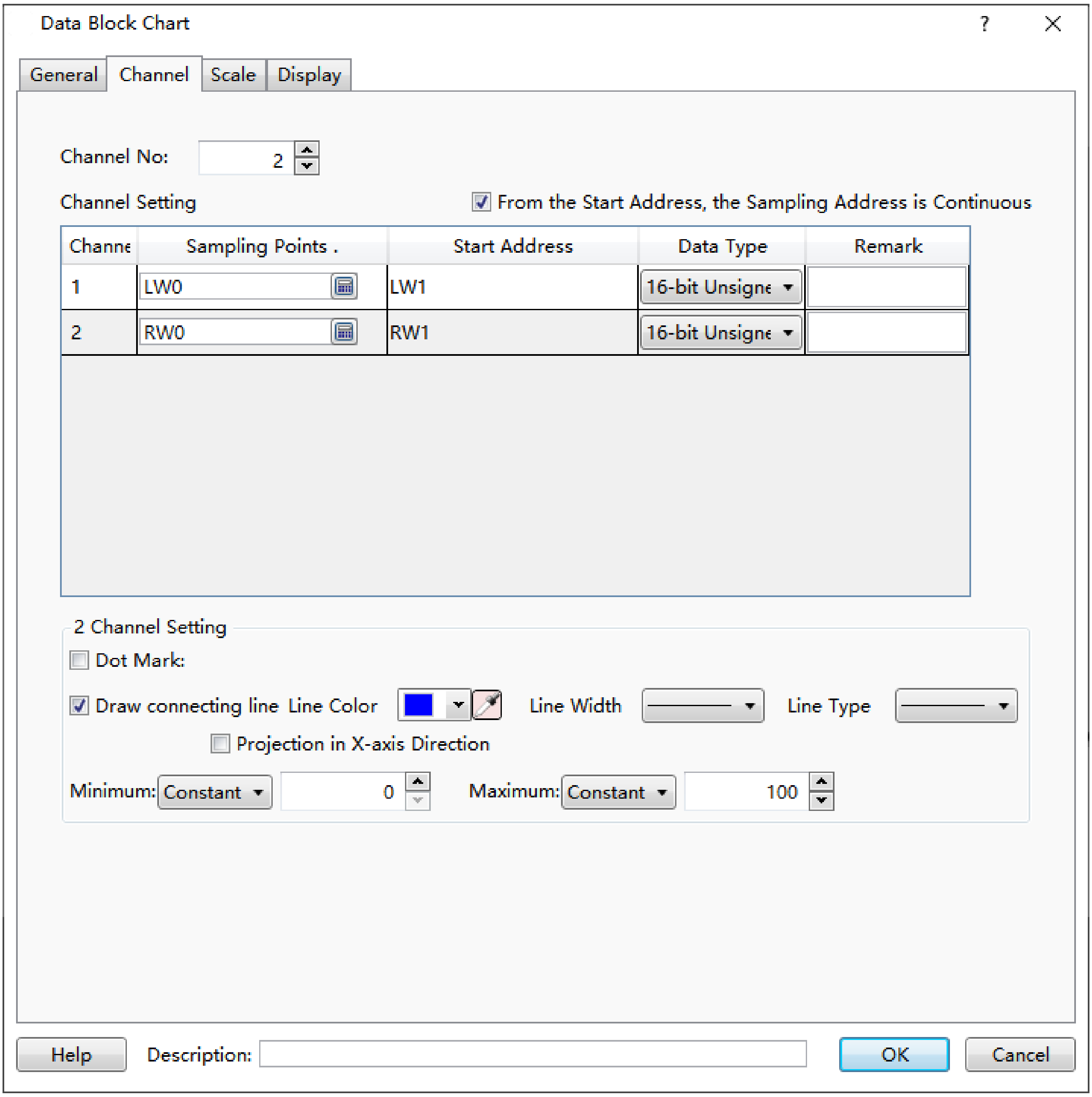


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Sampling points	The component displays the number of sampled points. When the number of sampled points for a channel exceeds the number of points per screen, it will be limited to the number of points per screen
Direction	Including from let to right, and top down.
Browse Method	Browse method to view the data:

Parameter	Description
	◆ Scrollbar: click the scrollbar to view the data. ◆ Slide: slide the screen to view the data, applicable for capacitive HMIs only.
Pause Control	You can control the pause of sampling by specifying a bit address. When the value of the bit address is 1, the sampling will pause, and when it is 0, the sampling will continue.
Clear Control	You can control the clearing of sampled data by specifying a bit address. When the value of the bit address is ON, the data will be cleared, and it will automatically reset after clearing.
Display/Hide the Cursor	If the value of specified bit address is 1, display cursor; if the value is 0, hide cursor. After displaying the cursor, you can click or slide to move the cursor on HMI screen. The cursor is used to display the value of the current point.
Cursor Data Area	Set the word address where the data is stored. For example, if the starting address is set to LW0, then LW0 ~ LW1 can be used to store the number of points on the X-axis. From LW2 onwards, the data can be stored in the format specific to the sampling channels being used.
Two-finger gesture	The curve can be zoomed by using a two-finger touch gesture. This feature is only applicable to HMIs that use a capacitive touch screen.
Register Control	The value of the register represents the percentage of the displayed points after zooming compared to the current number of points. For example, if the current number of points is 20 and the zoom value is 50, it will display 10 points. If the zoom value is 200, it will display 40 points. A zoom value of 0 indicates no zooming.

Step 2. Set Channel.

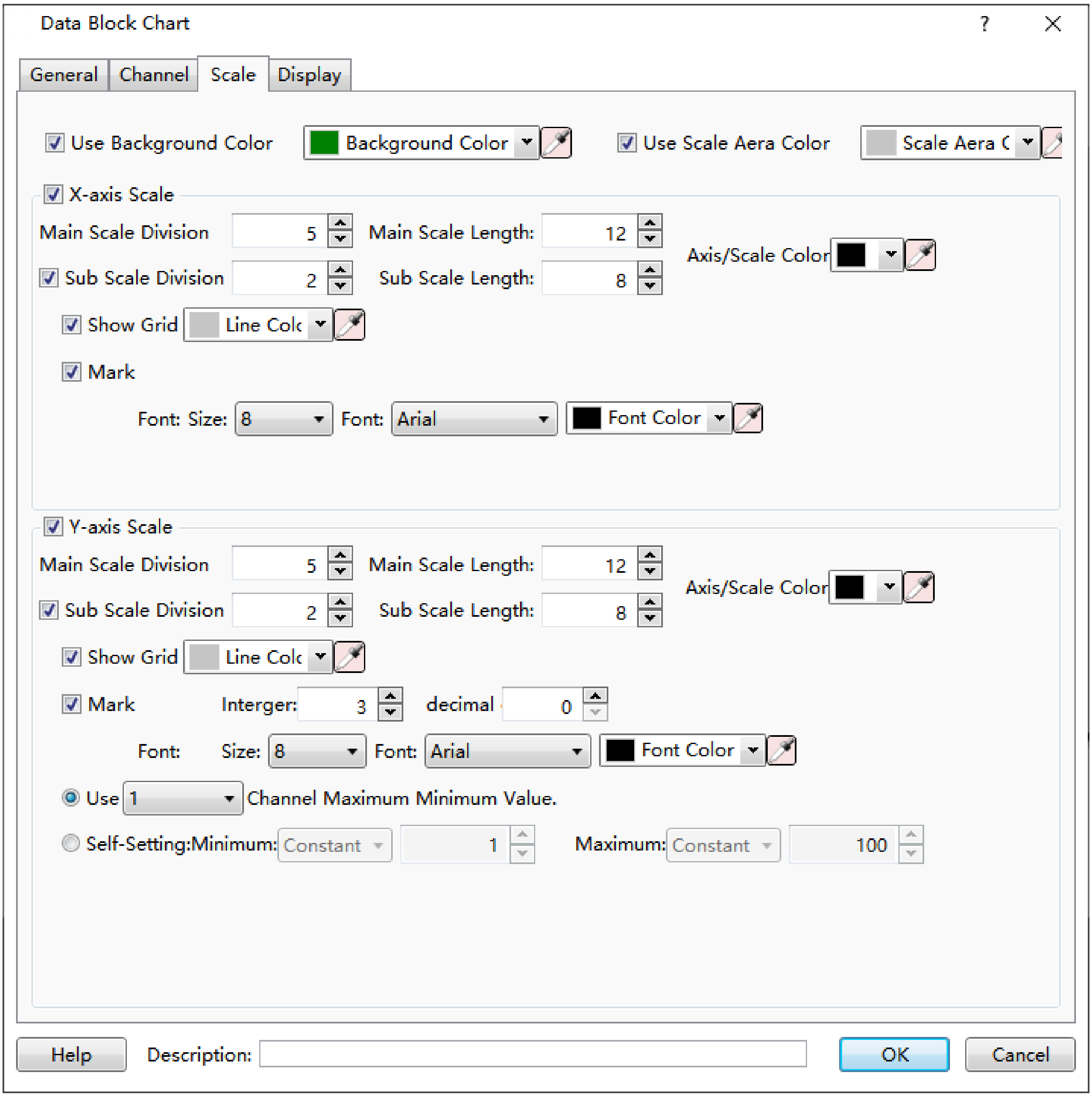


Please refer to the table below for detailed configuration methods.

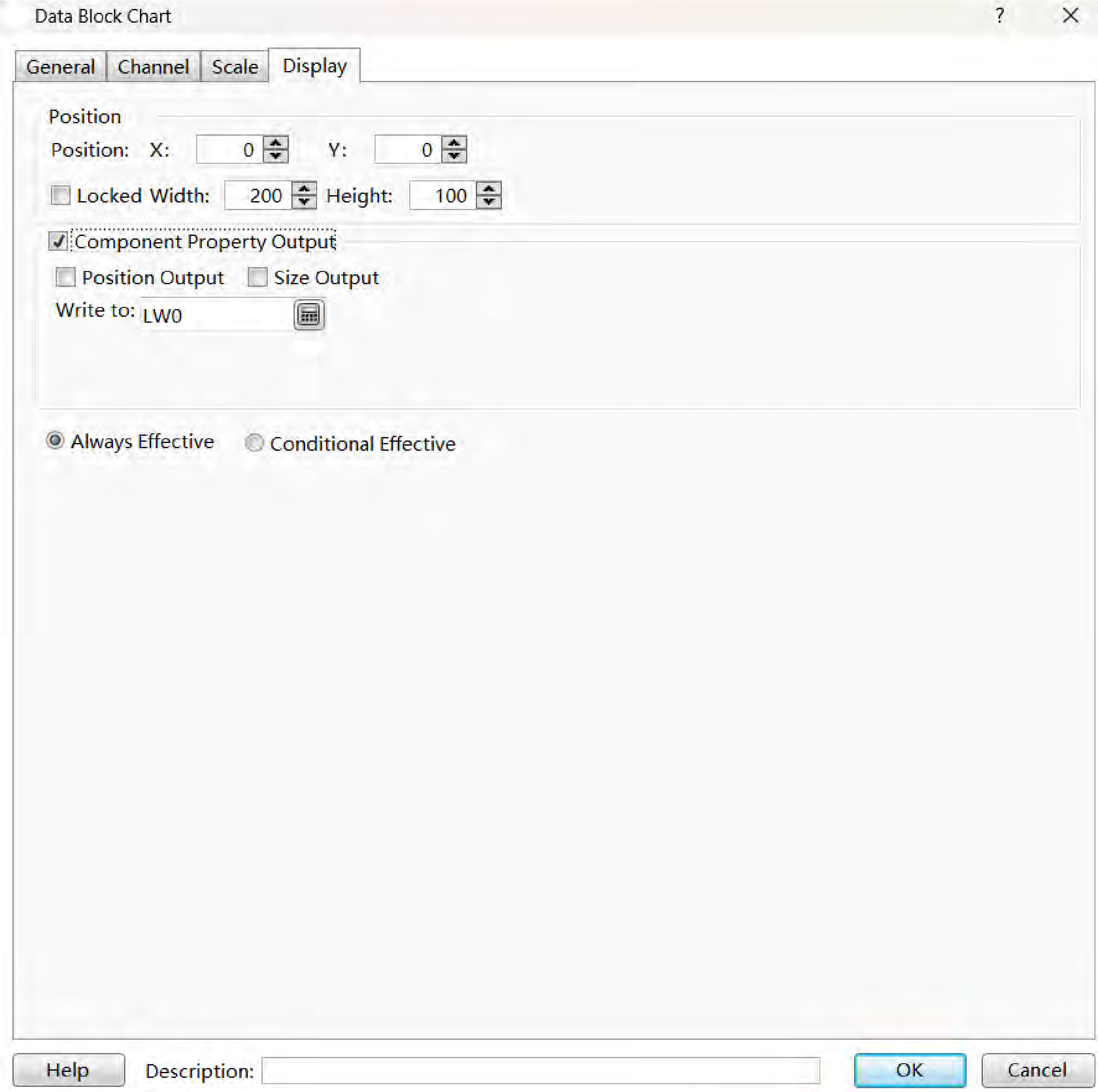
Parameters	**Description**
Channel No.	Number of curves.
Sampling Points	Number of data sampling points.
Start Address	Start word address where the sampling data is stored.
Data Type	Data type, please refer to the actual situation.
Dot Mark	The sampled data can be marked using dots, and you can customize the size, color, and type of the dots.
Draw conneting	The adjacent sampled points can be connected using straight lines to form a curve, and you

Parameters	Description
line	can customize the line type, color, and width.
Projection in X-axis Direction	Curve projects in the X-axis direction.
Minimum	Minimum of sampling data, can be set as a constant or variable.
Maximum	Maximum of sampling data, can be set as a constant or variable.

Step 3. Set Scale.



Step 4. Set **Dispaly** properties, click **OK.**



Please refer to the table below for detailed configuration methods.

Parameter	Description
Position	Set the coordinates of the first point of the component.
Width	Set the width of the component.
Height	Set the height of the component.
Position Output	Store the position data of the component.

Parameter	Description
Size Output	Store the width and height data of the component.
Output Adress	Starting word address to store the attribute data of the component. For example, if set to LW0, LW0 stores the X value of the component's top-left vertex, LW1 stores the Y value of the top-left vertex, LW2 stores the width value of the component, and LW3 stores the height value of the component.
Always Effective	Always display component.
Conditional Effective	Only display component when certain conditions are met: ◆ Level User: The user's level reaches the minimum enable level. ◆ Privilege User: Only users with specified permissions can view the component. ◆ Logic control: Meet specific logical conditions (e.g., when the value of LB0 is ON and the value of LB1 is OFF).

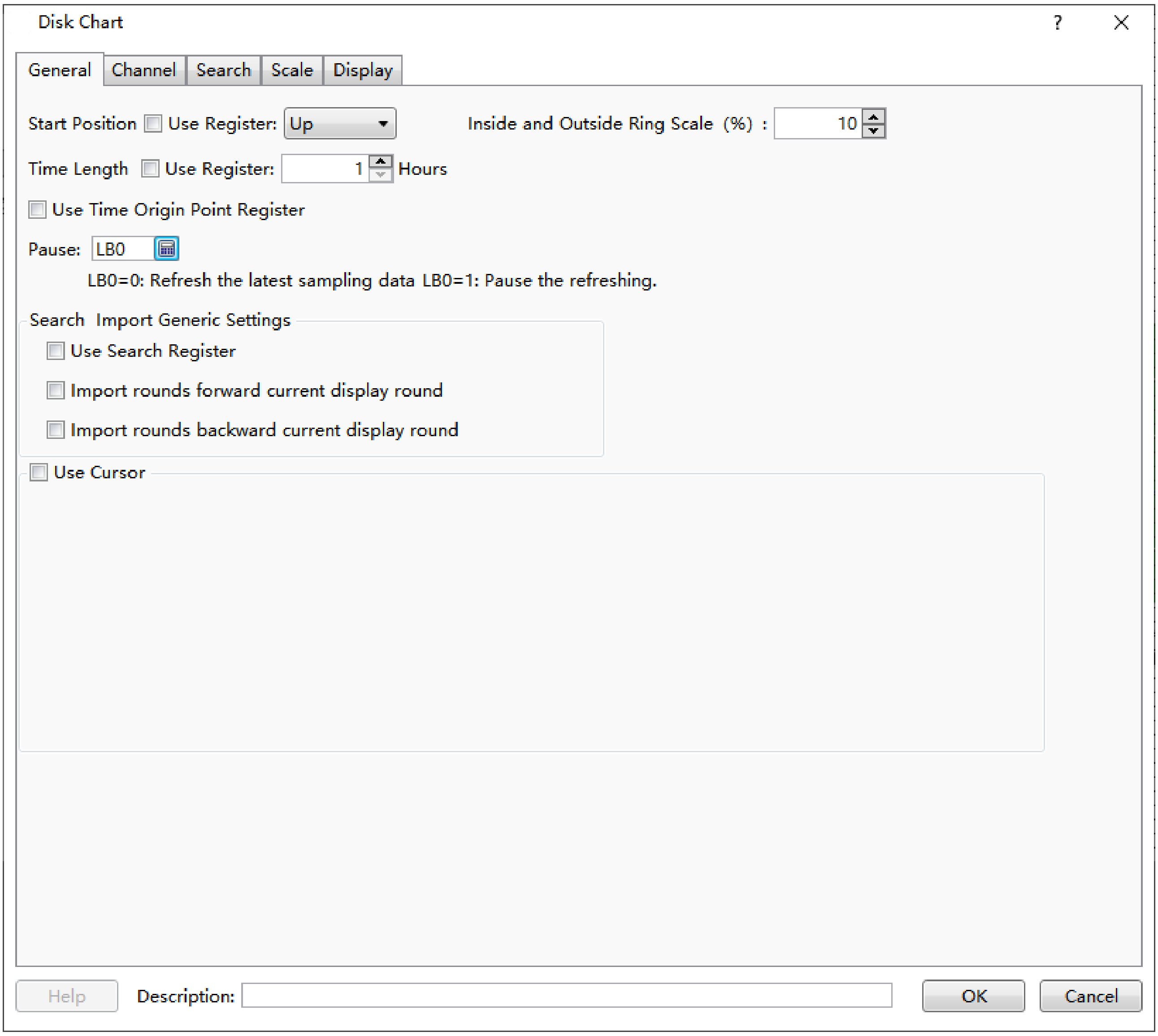
Step 5. Click anywhere in the window to insert the Data Block Chart component.

10.7.4 Disk Chart

Disk chart can represent historical recorded data from data sampling as a circular curve chart in a polar coordinate system. The radius represents the Y variable, and the angle represents the X variable. This is commonly used in scientific research projects.

The steps to create a new disk chart component are as follows:

Step 1. Select **Component/Curve Chart/Disk Chart** from the menu bar, edit the relevant parameters in the pop-up **Disk Chart** dialog box.

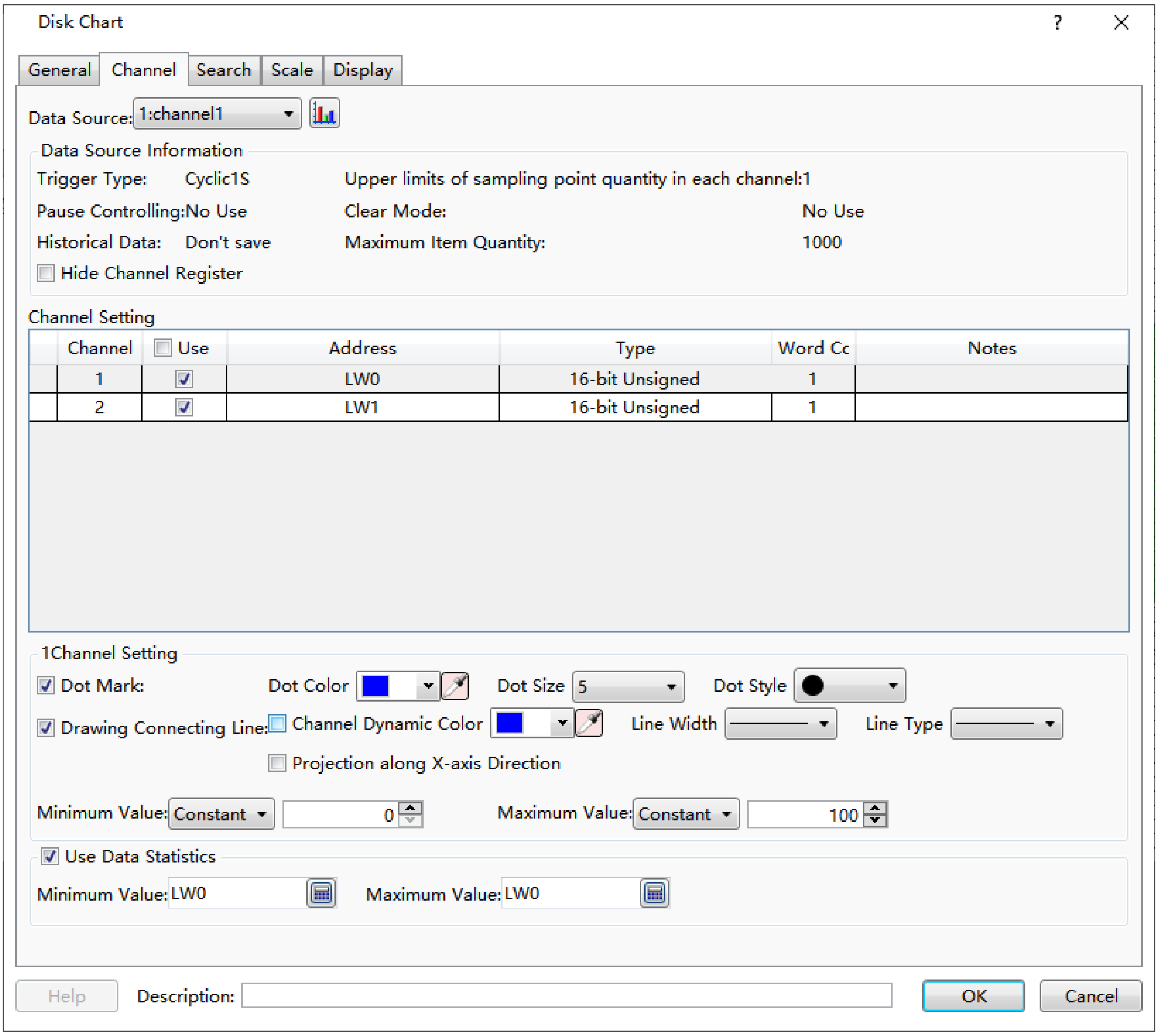


Please refer to the table below for detailed configuration methods.

Parameters	Description
Start Position	Start Position of disk chart. Uncheck **Use Register** to manually select up, down, left or right. When **Use Register** is checked, the start position of disk curve will be determined by the value of specified register.
Inside and Outside Ring Scale	The ratio between the inner radius and the outer radius.
Time Length	Time range for data sampling.When **Use Register** is unchecked, you can manually set it;

Parameters	Description
	when **Use Register** is checked, it is determined by the value of specified register.
Use Time Origin Point Register	Set a specified word address to store the time origin data. For example, if set to LW1, LW1 to LW6 will store the year, month, day, hour, minute, and second of the time origin, respectively.
Pause	Set a pause control address, for example, LB0. When LB0 is 0, it refreshes the sampled data, and when LB0 is 1, it pauses the refresh.
Use Browser Register	By controlling a specified word address, enable browsing of different time periods. For example, using a variable LW1=1 to represent the time duration, setting LW3=0 would indicate data from the most recent 1 hour. When LW3=1, it would represent data from the previous 1 hour.
Import rounds forward current display round	By setting a specified word address, you can export data for different time periods, specifically the time period before the current browsing circle. The calculation of the time period requires the use of a variable representing the time length in conjunction with the query browsing register.
Import rounds backward current display round	By setting a specified word address, you can export data for different time periods, specifically the time period after the current browsing circle. The calculation of the time period requires the use of a variable representing the time length in conjunction with the query browsing register.

Step 2. Set Channel.

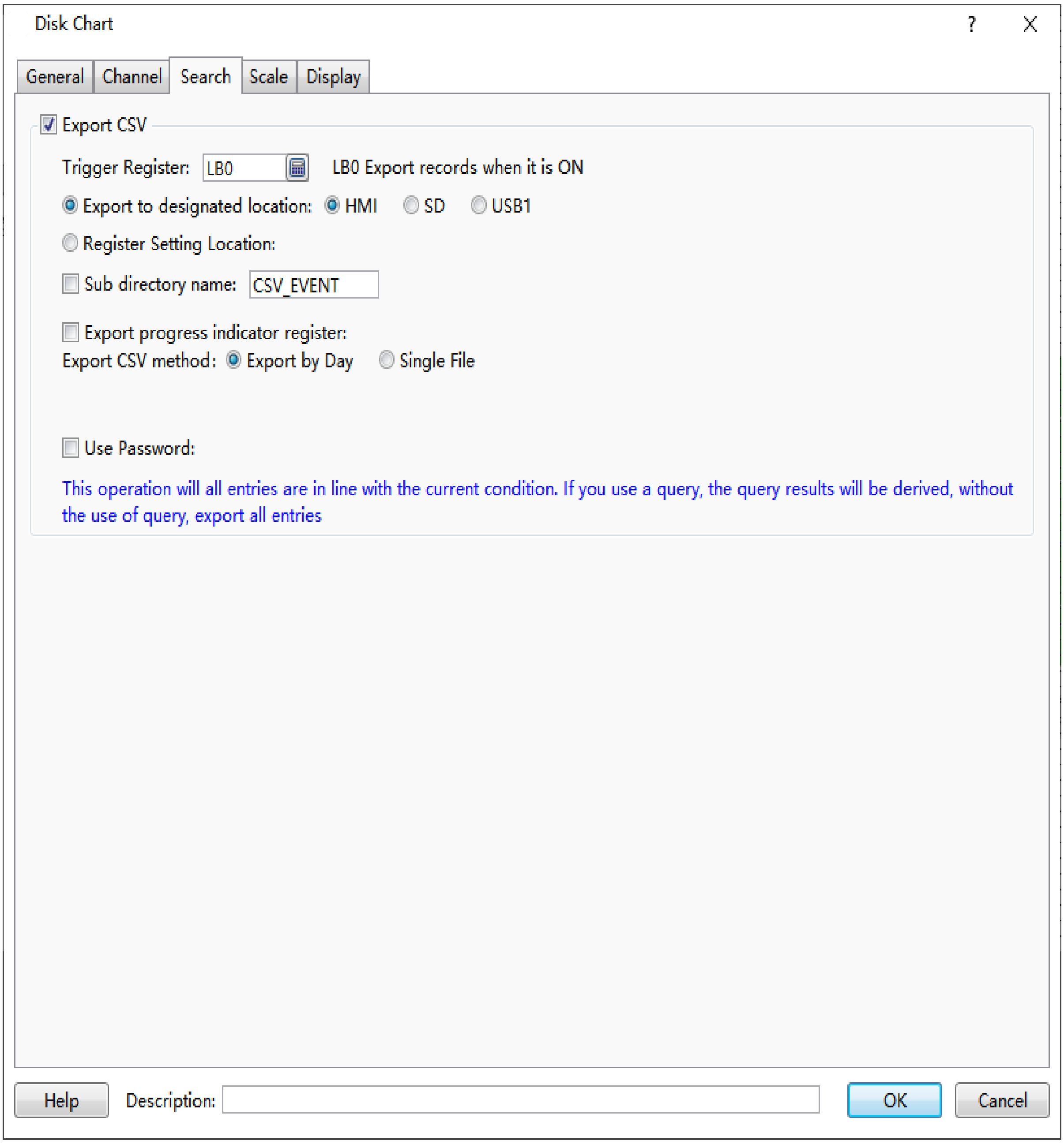


Please refer to the table below for detailed configuration methods.

Parameter	Description
Data Source	The data source is data sampling. For detailed information about data sampling, please refer to Data Sampling.
Dot Mark	The data points can be marked using dots, and you can customize the size, color, and type of the dots.
Drawing connecting line	The adjacent sampled points can be connected using straight lines, and you can customize the line type, color, and width.
Projection in X-	Curve projects in the X-axis direction.

Parameter	Description
axis Direction	
Minimum Value	Set minimum of sampling data, can be set as a constant or variable.
Maximum Value	Set maximum of sampling data, can be set as a constant or variable.
Use Data Statistic	Set specified word addresses to store the minimum value and maximum value of current statistic data respectively.

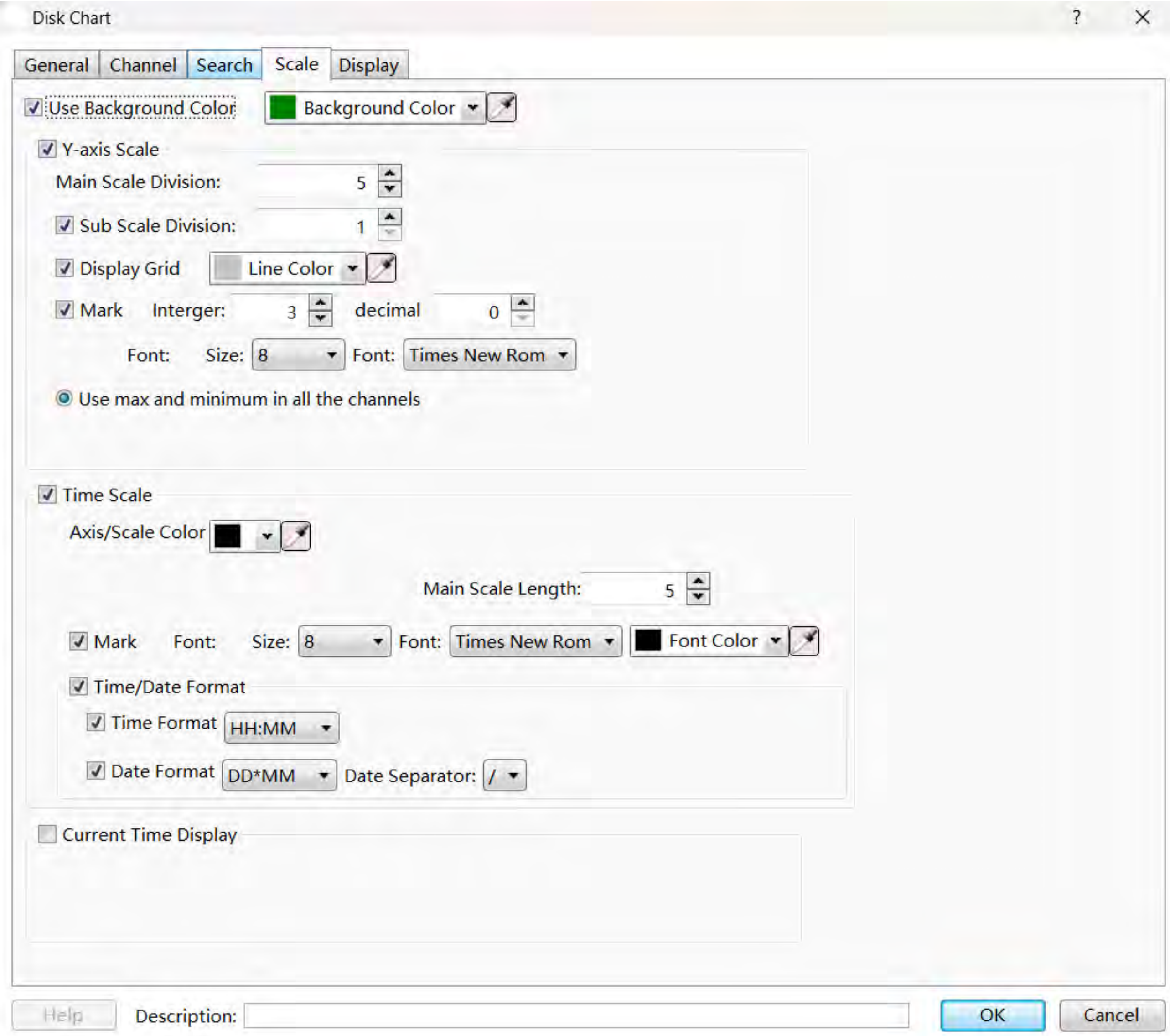
Step 3. Set search properties.



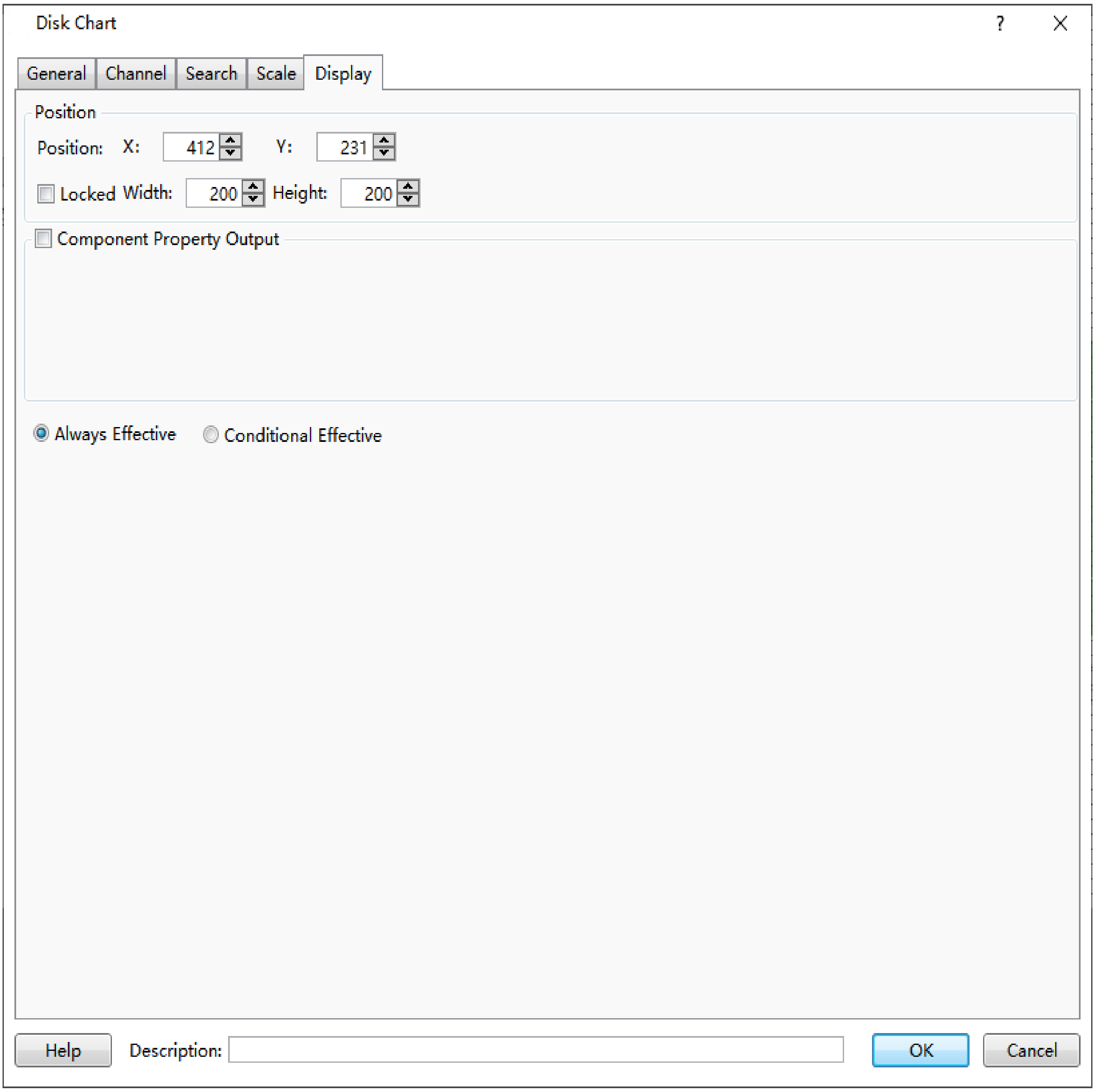
Please refer to the table below for detailed configuration methods.

Parameters	Description
Export CSV	Export the sampling data in the CSV file format.
Trigger Resgister	Export sampling data when the value of the specified bit address is ON.
Export to designated location	Storage location of CSV file: HMI, SD and USB.
Sub directory name	When checked, use the value of the specified word address as the filename for exporting the CSV file. For example, if set to LW0, LW0 to LW15 can be used as the filename, allowing for entering 16 Chinese characters or 32 ASCII characters.
Export progress indicator register	Set a specified word address to store the progress value of the CSV file export, with a range of 0 to 100.
Export CSV method	◆ Export by day: Export a separately CSV file for each day's data. ◆ Single file: Export all data in a single CSV file.
Use Password	After setting a password, the exported CSV file will be encrypted and cannot be displayed properly. To generate a normal CSV file, you will need to use a decryption tool and enter the password. For detailed information about the decryption tool, please refer to Decryption Tool.

Step 4. Set Scale.



Step 5. Set **Display** properties, click **OK**.



Step 6. Click anywhere in the window to insert the Disk Chart Component.

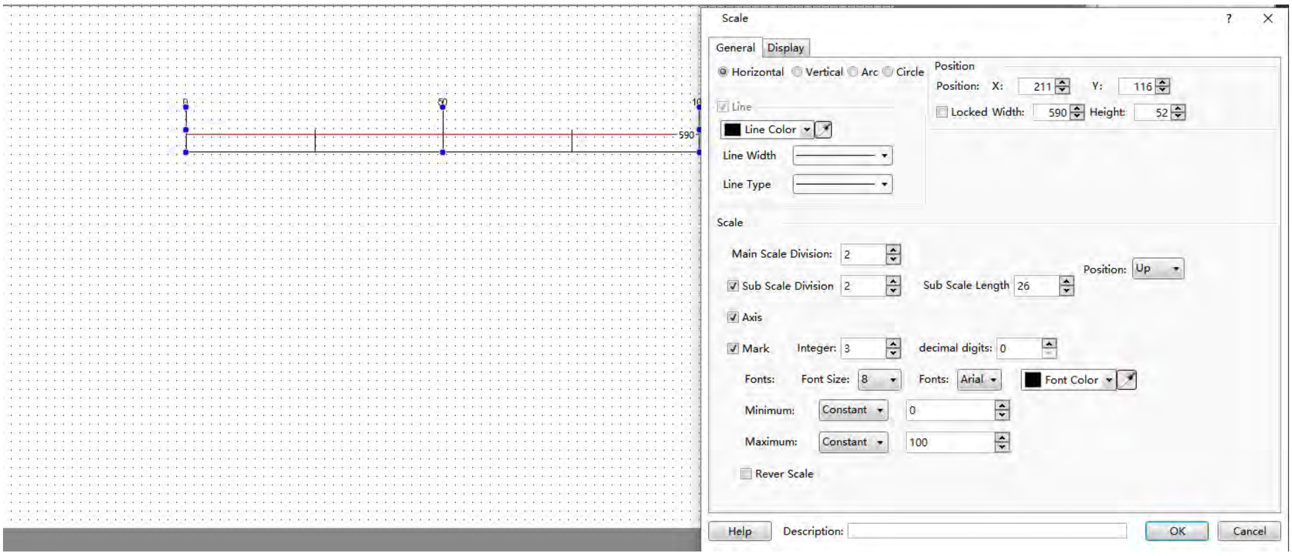
10.8 Scale

The scale components are used to visually represent numerical values. They are commonly applied in devices such as level gauges and measuring instruments to display measurement values. Scale components can come in various forms, including horizontal scales, vertical scales, arc scales, and round scales.

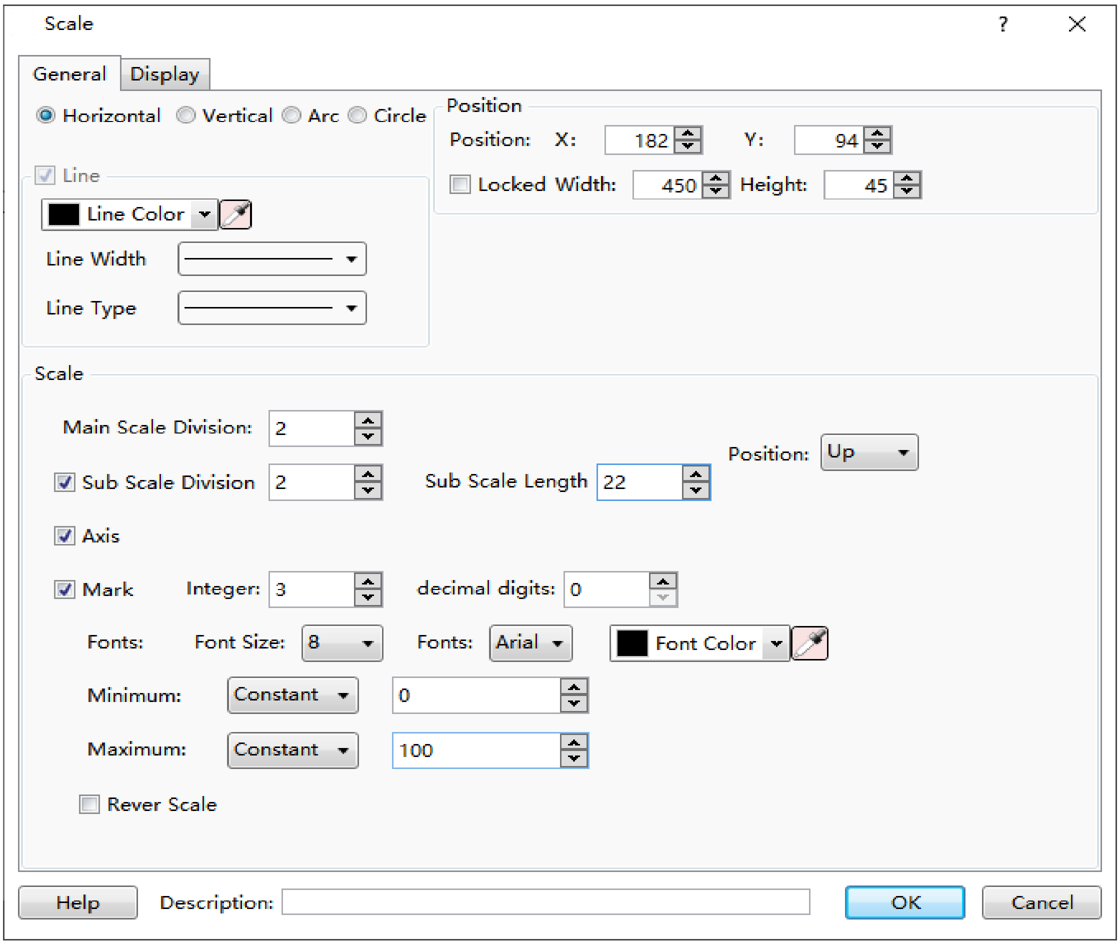
10.8.1 Horizontal Scale

Horizontal scales are typically used to display the length of an object. The steps to create a new horizontal scale component are as follows:

Step 1. Select **Component/Scale/Horizontal Scale** from the menu bar. Click and hold the left mouse button, then drag within the window. Release the left mouse button to enter the following interface.



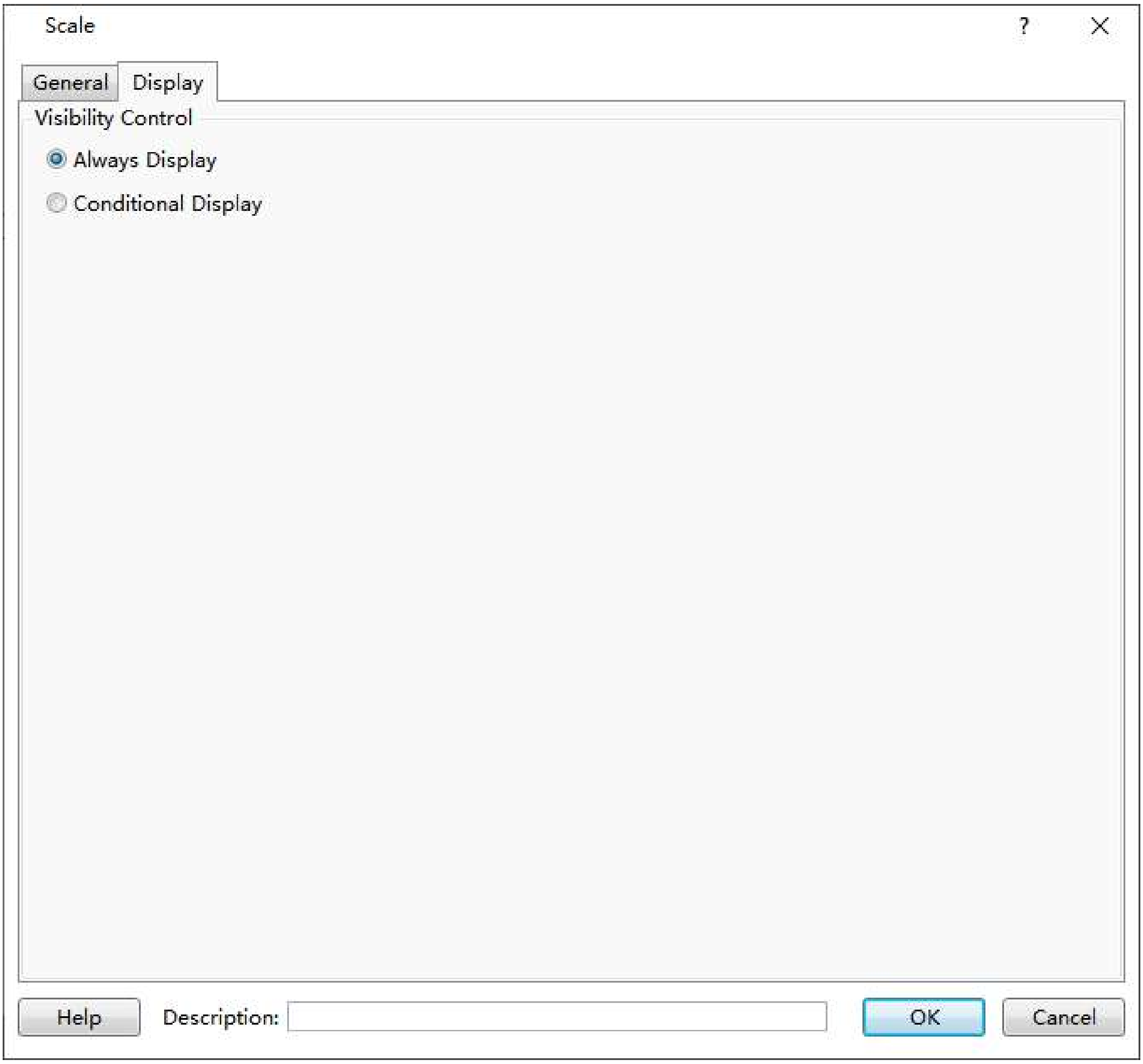
Step 2. Set general properties.



Please refer to the table below for detailed configuration methods.

Parameter	Description
X	The X-coordinate value of the top-left vertex of the horizontal scale.
Y	The Y-coordinate value of the top-left vertex of the horizontal scale.
Width	Width of the component.
Height	Height of the component.
Main Scale Division	The number of equal divisions for the main scale.
Sub Scale Division	Further evenly dividing each main scale to enhance the precision of the scale.
Sub Scale Length	The Length of the sub scale.
Position	The position of the scale, including top, center, and bottom.
Axis	Horizontal axis.
Mark	Scale mark, which can be set for both integer and decimal places.
Fonts	Set the font, size and color of marks.
Minimum Value	Minimum Value of the scale mark, can be set as a constant or a variable.
Maximum Value	Maximum Value of the scale mark, can be set as a constant or a variable.
Rever Scale	From left to right, the scale ranges from the maximum value to the minimum value.

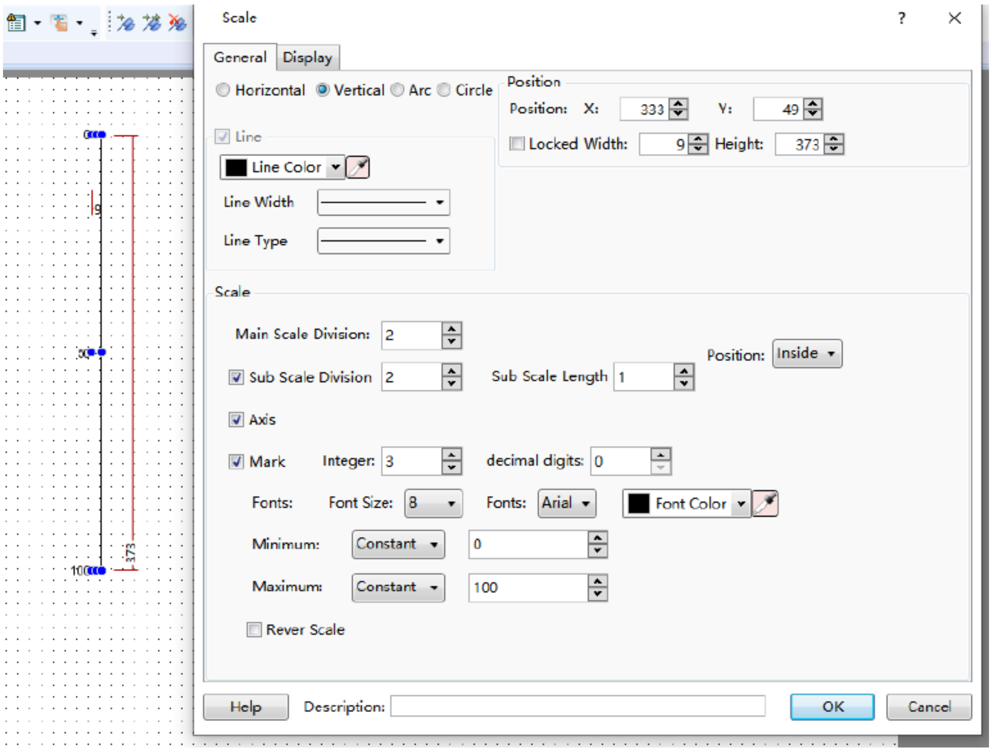
Step 3. Set **Display** properties, click **OK**.



10.8.2 Vertical Scale

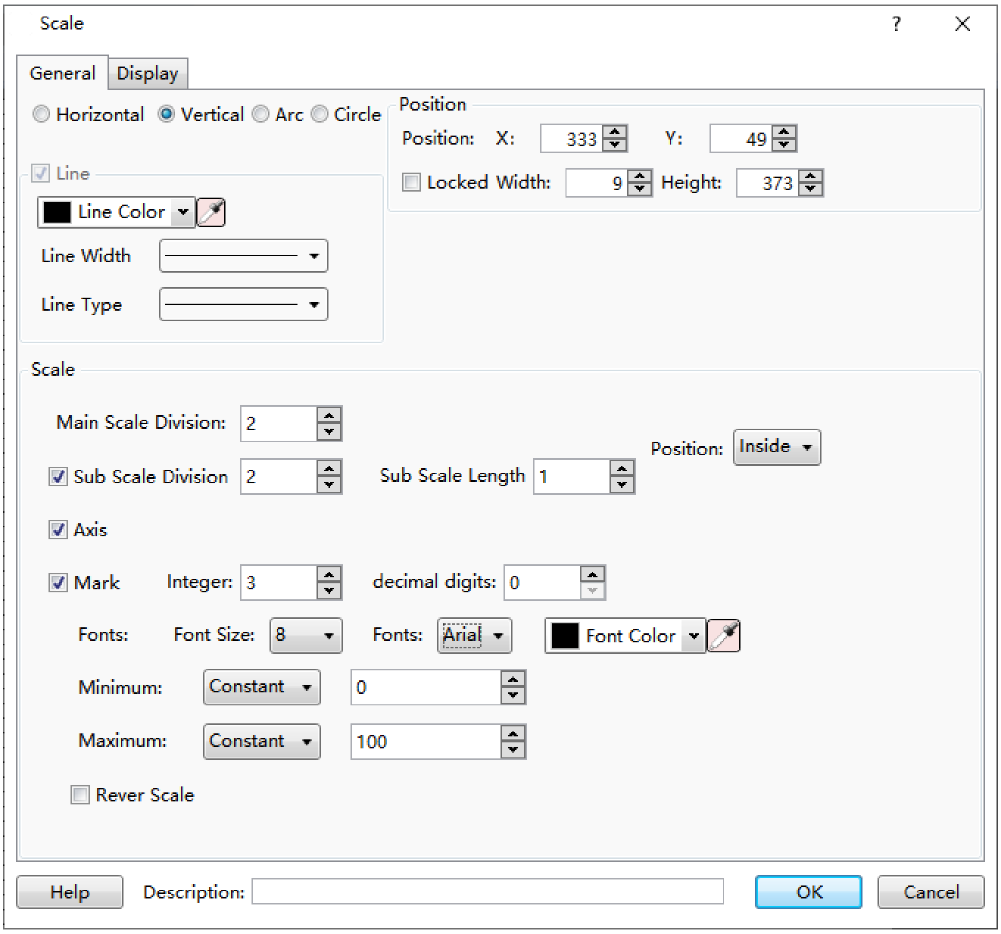
Vertical scales are typically used to display the height, depth of an object. The steps to create a new vertical scale component are as follows:

Step 1. Select **Component/Scale/Vertical Scale** from the menu bar. Click and hold the left mouse button, then drag within the window. Release the left mouse button to enter the following interface.

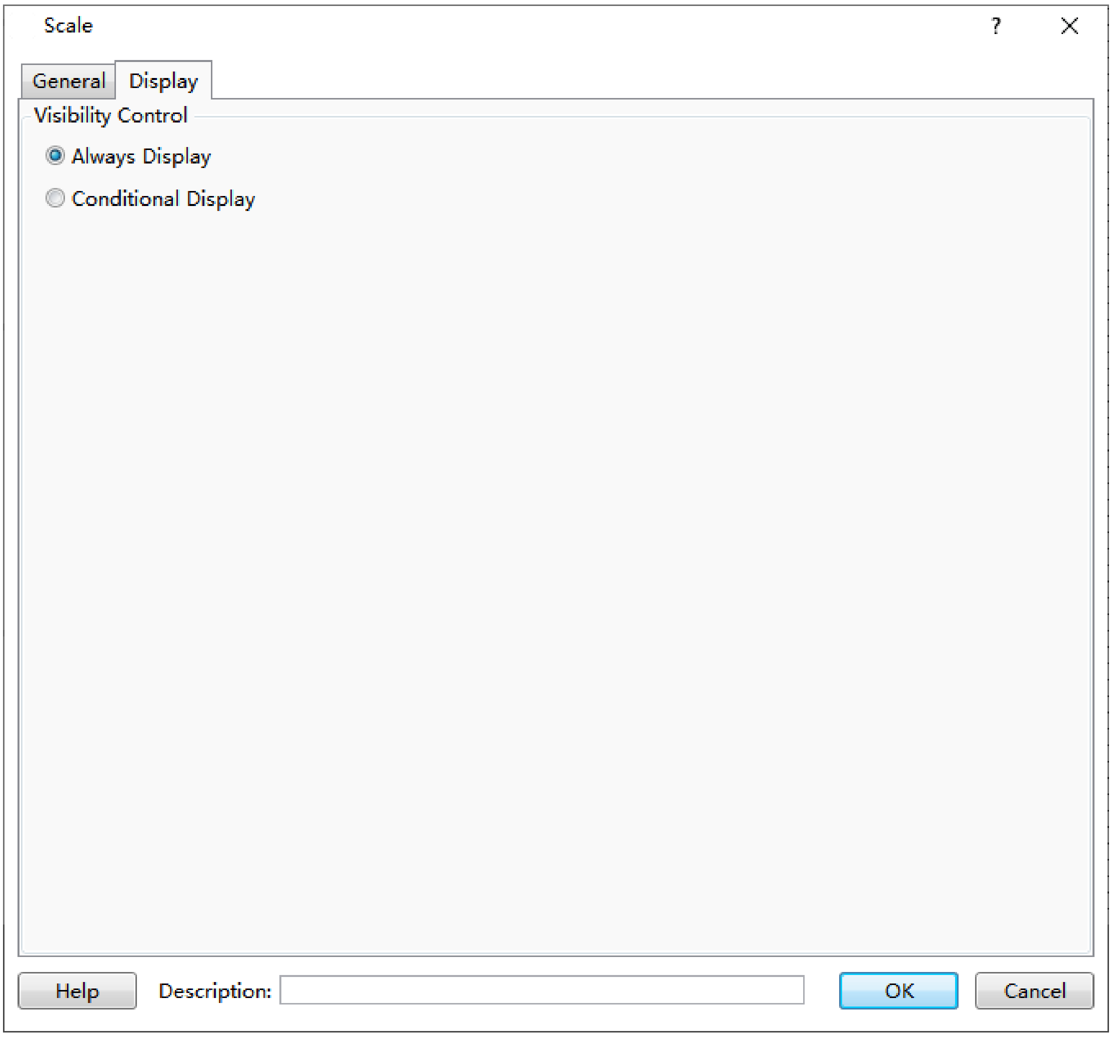


Step 2. Set General properties.

The configuration method is similar to tthat for horizontal scales. You can refer to [Horizontal Scale](#).



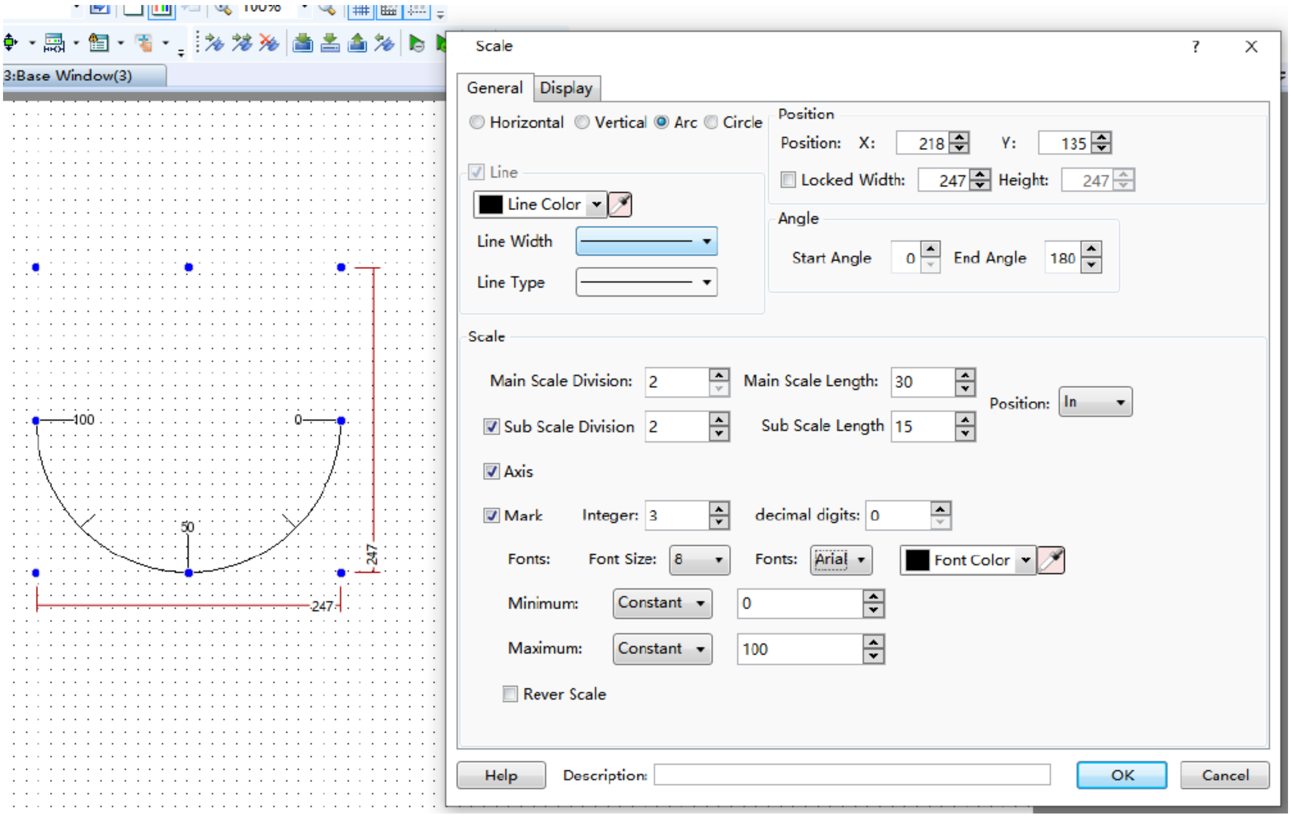
Step 3. Set **Display** properties, click **OK**.



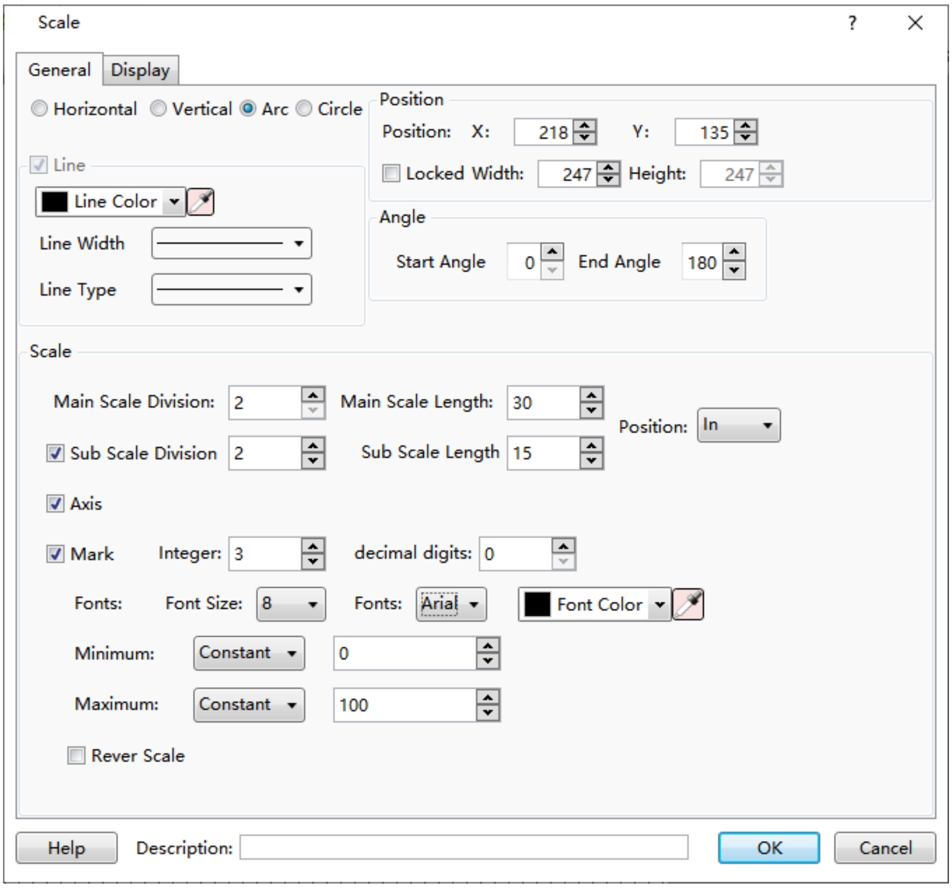
10.8.3 Arc Scale

Arc scale components are commonly used to display speed, remaining material, etc. The steps to create a new arc scale component is as follows:

Step 1. Select **Component/Scale/Arc Scale** from the menu bar. Click and hold the left mouse button, then drag within the window. Release the left mouse button to enter the following interface.



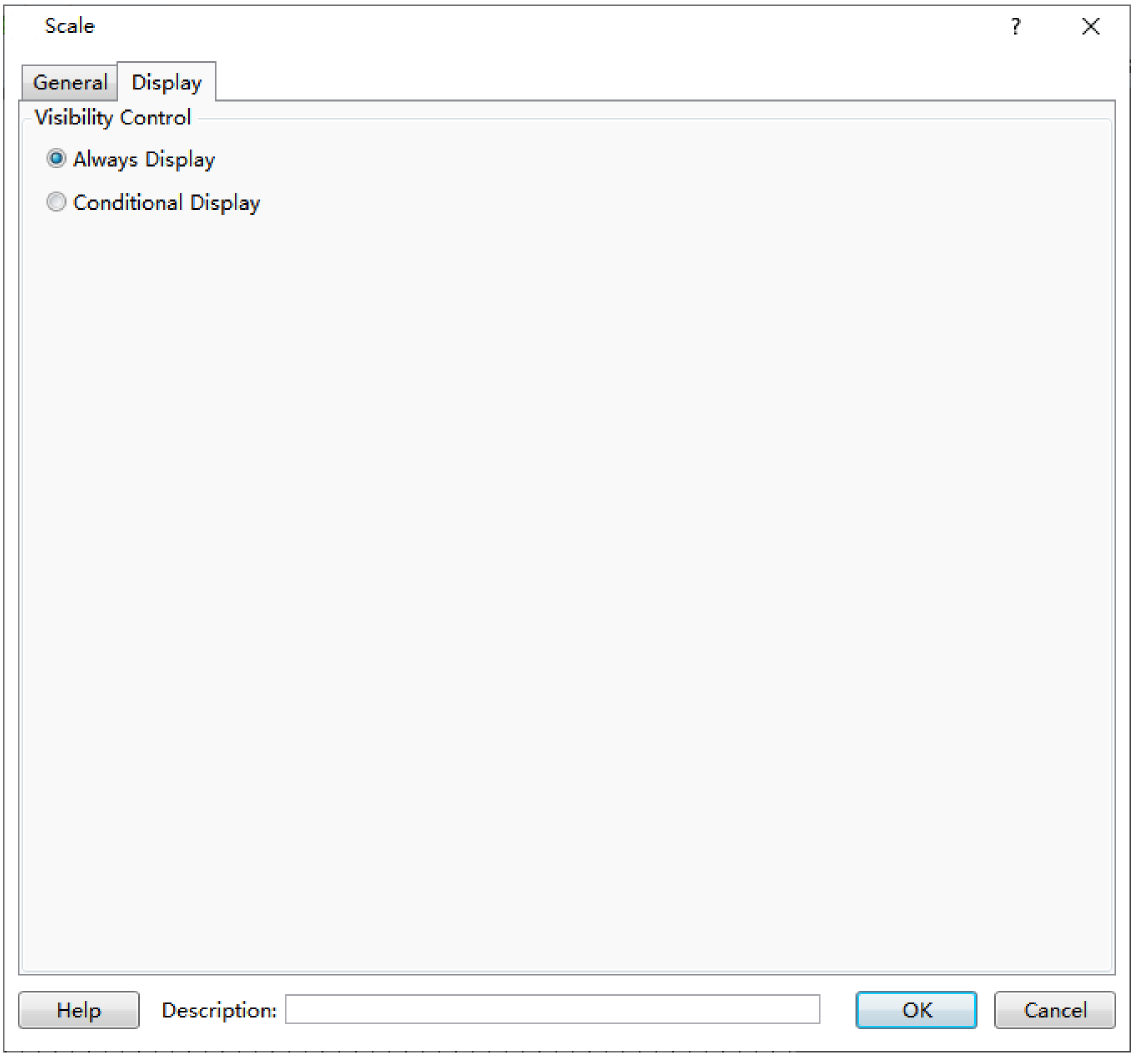
Step 2. Set General properties.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Start Angle	The angle between the starting point and the horizontal axis. The direction of the arc and the angle are both in the clockwise direction.
End Angle	The angle between the end point and the horizontal axis.
Main Scale Division	The number of equal divisions for the main scale.
Main Scale Length	The Length of the main scale.
Sub Scale Division	Further evenly dividing each main scale division to enhance the precision of the scale.
Sub Scale Length	The Length of the sub scale.
Position	The position of the scale, including in, out, and center.
Axis	Arc axis.
Mark	Scale mark, which can be set for both integer and decimal places.
Font	Set the font, size and color of marks.
Minimum	Minimum of the scale mark, can be set as a constant or a variable.
Maximum	Maximum of the scale mark, can be set as a constant or a variable.
Rever Scale	Display the Minimum to the Maximum in a counterclockwise direction.

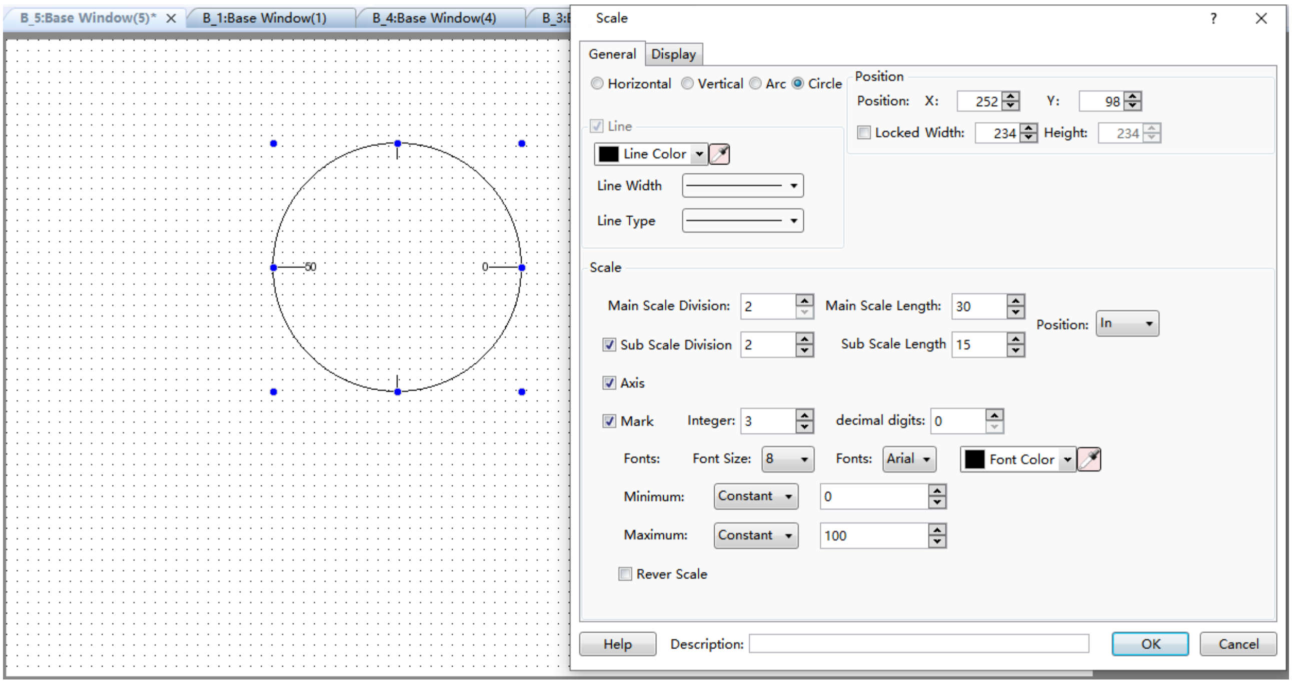
Step 3. Set **Display** properties, click **OK**.



10.8.4 Round Scale

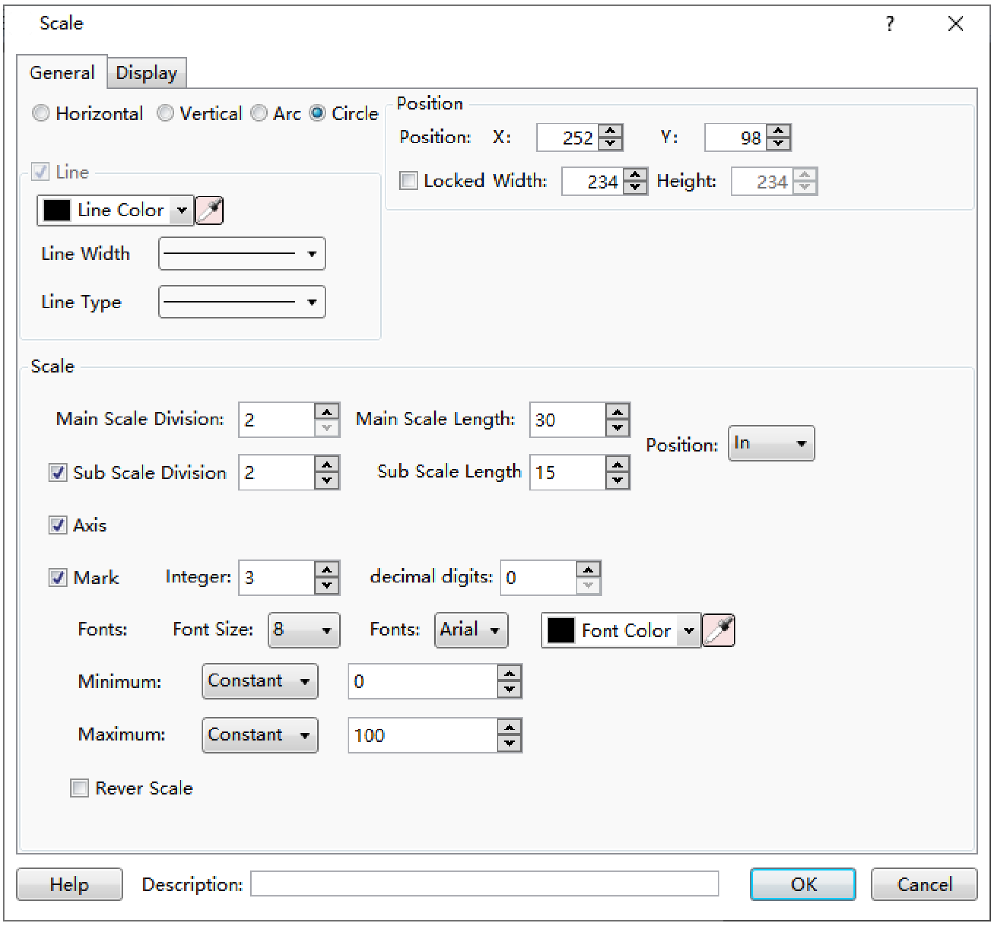
Round scale components are commonly used to clock scales. The steps to create a new round scale component is as follows:

Step 1. Select **Component/Scale/Round Scale** from the menu bar. Click and hold the left mouse button, then drag within the window. Release the left mouse button to enter the following interface.

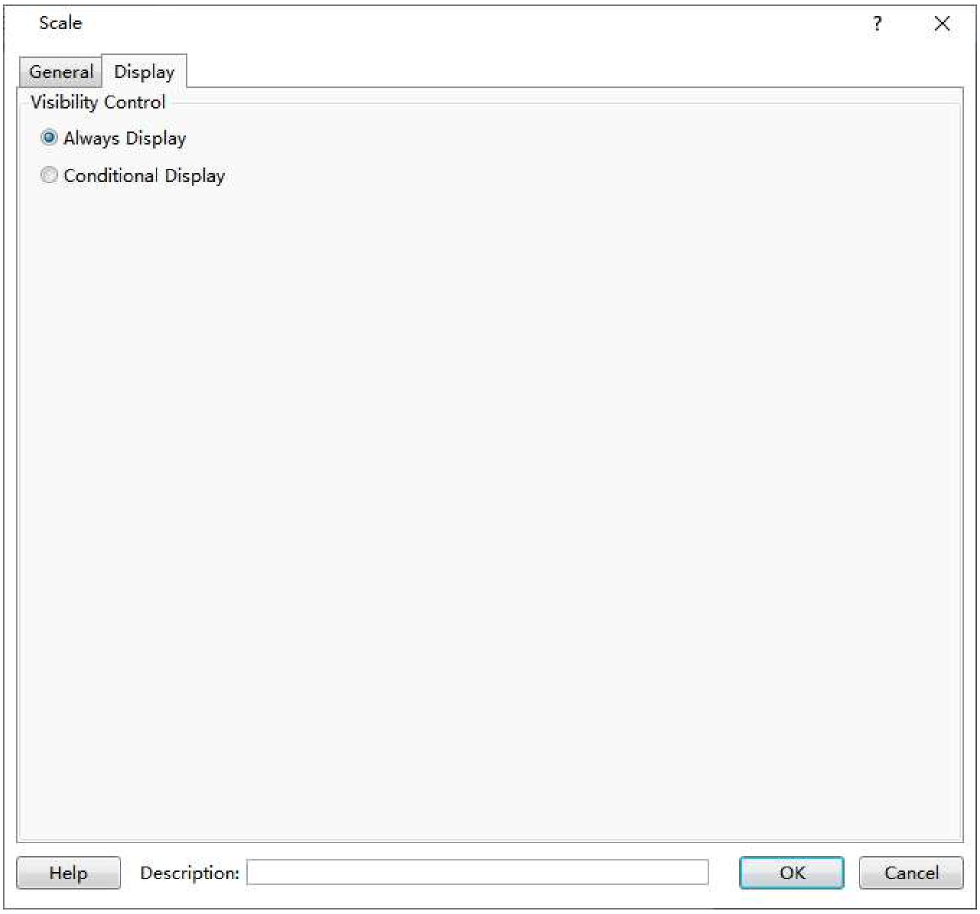


Step 2. Set the General properties.

The configuration method is similar to that for arc scale. You can refer to Arc Scale.



Step 3. Set **Display** properties, click **OK**.



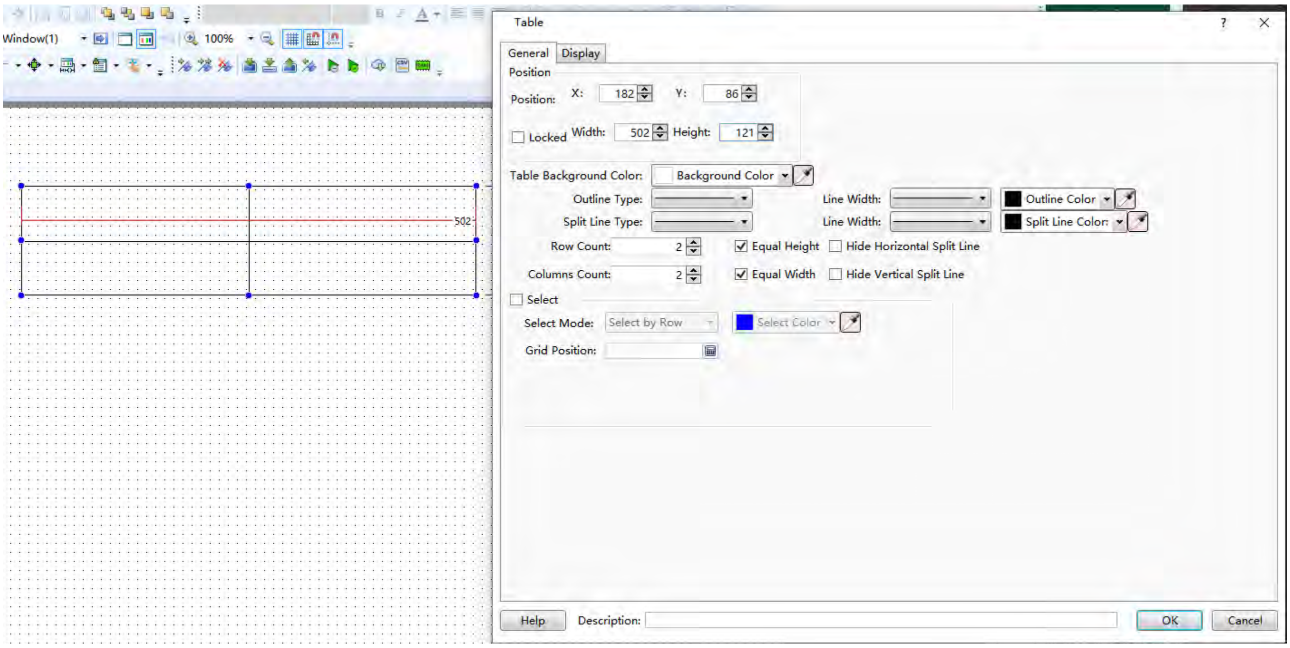
10.9 Table

Table components are usually used to display parameters such as material specification, properties, etc. It includes equal-size table and non-equal-size table.

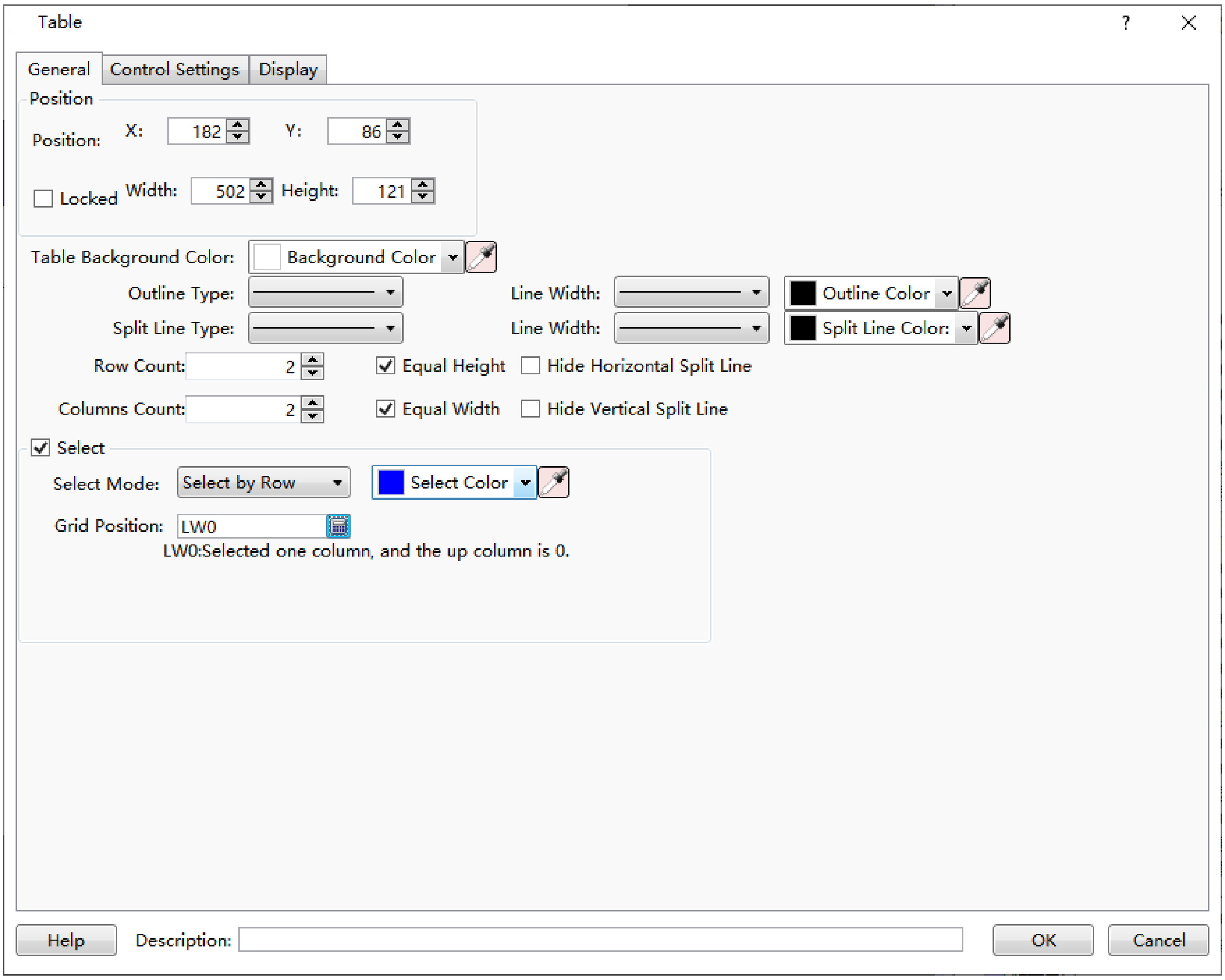
10.9.1 Equal-size Table

The steps to create an equal-size table component are as follows:

Step 1. Select **Component/Table/Equal-size Table** from the menu bar. Click and hold the left mouse button, then drag within the window. Release the left mouse button to enter the following interface.



Step 2. Set the General properties.

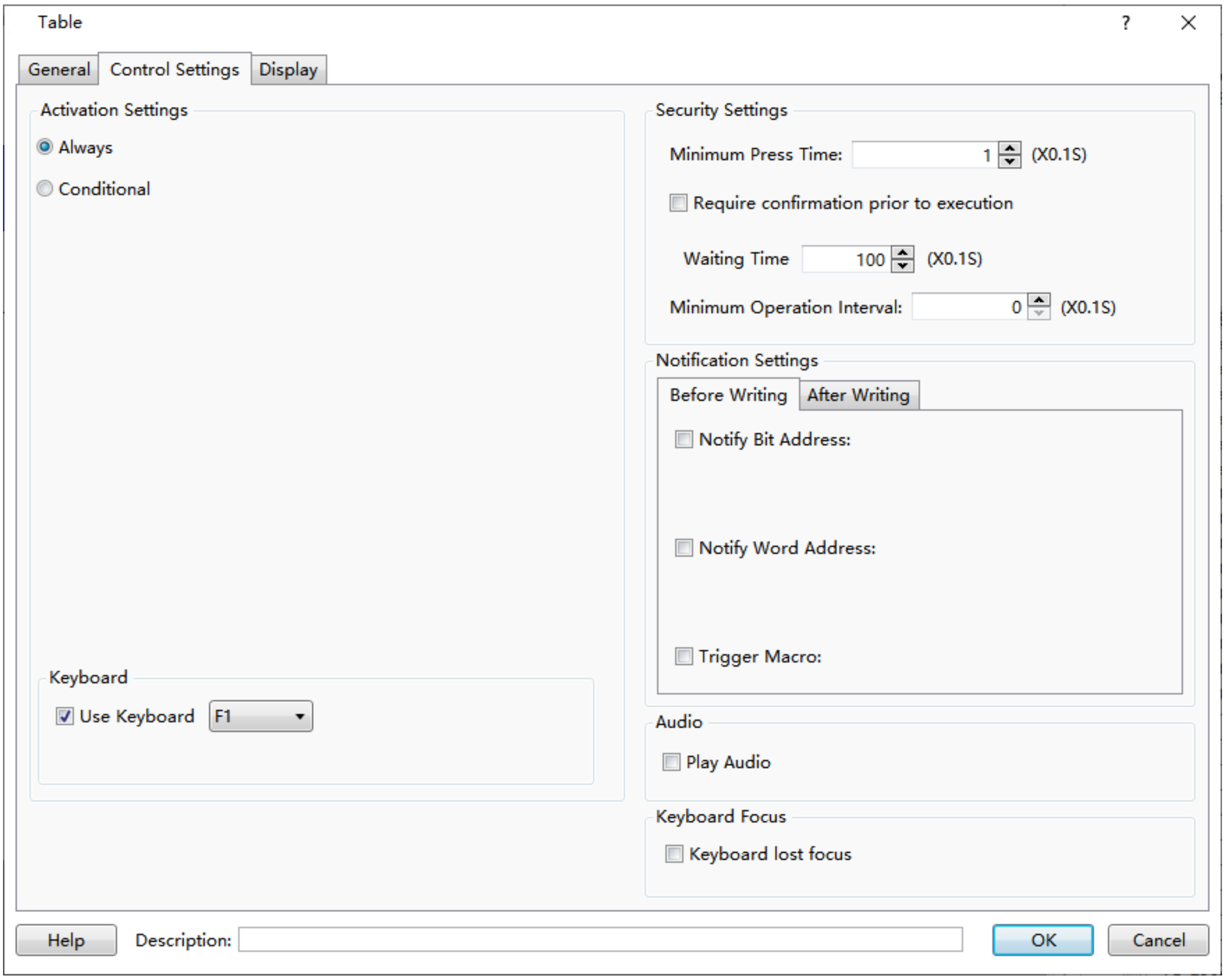


Please refer to the table below for detailed configuration methods.

Parameters	Description
X	The X-coordinate value of the vertex(top left) of the component.
Y	The Y-coordinate value of the vertex(top left) of the component.
Width	Width of the component.
Height	Height of the component.
Table Background Color	Set the background color of the table.
Outline Type	Set the outline type, including solid line and dash line.
Line Width	The width of border line or split line.
Row Count	Number of rows in the table, check **Equal Height**, the height of each row will be equal.
Columns Count	Number of columns in the table, check **Equal Width**, the width of each row will be equal.
Select	Hightlight the selected units.
Select Mode	Including select by row, select by column and select by cell. You can set the select color here.
Grid Position	Select the value of row number or column number, store it in the specified word address register.

Step 3. Set the **Control Settings** properties.

Only when **Select** in the **General** is checked, you can set the properties in the **Control Settings**.

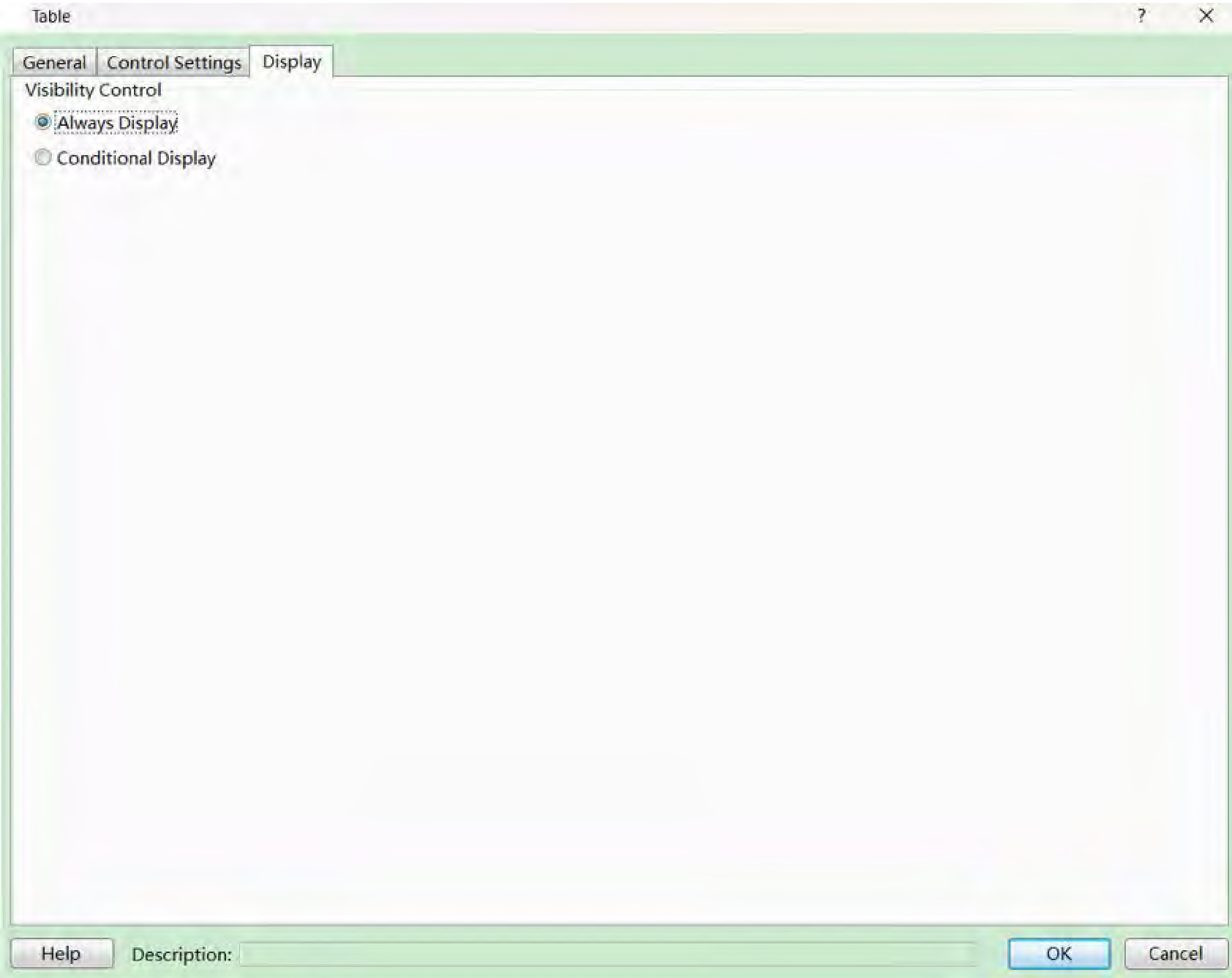


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Always	Always display the component.
Conditional	Only display the component when certain conditions are met: ◆ Level User: HMI user reaches the lowest enable level. ◆ Privilege User: HMI user has specified privilege. ◆ Logic Control: Meet certain logic condition. For example, if the value of LB0 is ON and the value of LB1 is OFF.
Use Keyboard	Use an external keyboard and set the corresponding key to move the position after pressing the key.
Minimum Press Time	Press and hold the component for a specified duration (e.g., selecting a cell) to activate it, preventing accidental operations.
Require confirmation prior to execution	After pressing the component, an automatic confirmation dialog box will pop up to prevent accidental operations.

Parameter	Description
Waiting Time	The display duration of the confirmation dialog box.
Minimum Operation Interval	The minimum interval time for repeating the operation on the component (such as selecting a cell) to prevent accidental operations.
Notification Settings	Set the notification methods before and after writing: ◆ Notify Bit Address: Write On, write OFF, set On pulse, set OFF pulse for specified bit address. ◆ Notify Word Address: Set the value of specified word address to a specific value. ◆ Trigger Macro: Trigger specified macro.
Play Audio	Play the audio in the Audio Library. For detailed information about the Audio Library, please refer to Audio Library.
Keyboard lost focus	Whether the auxiliary X icon is displayed when an external keyboard is used.

Step 4. Set the **Display** properties, click **OK**.



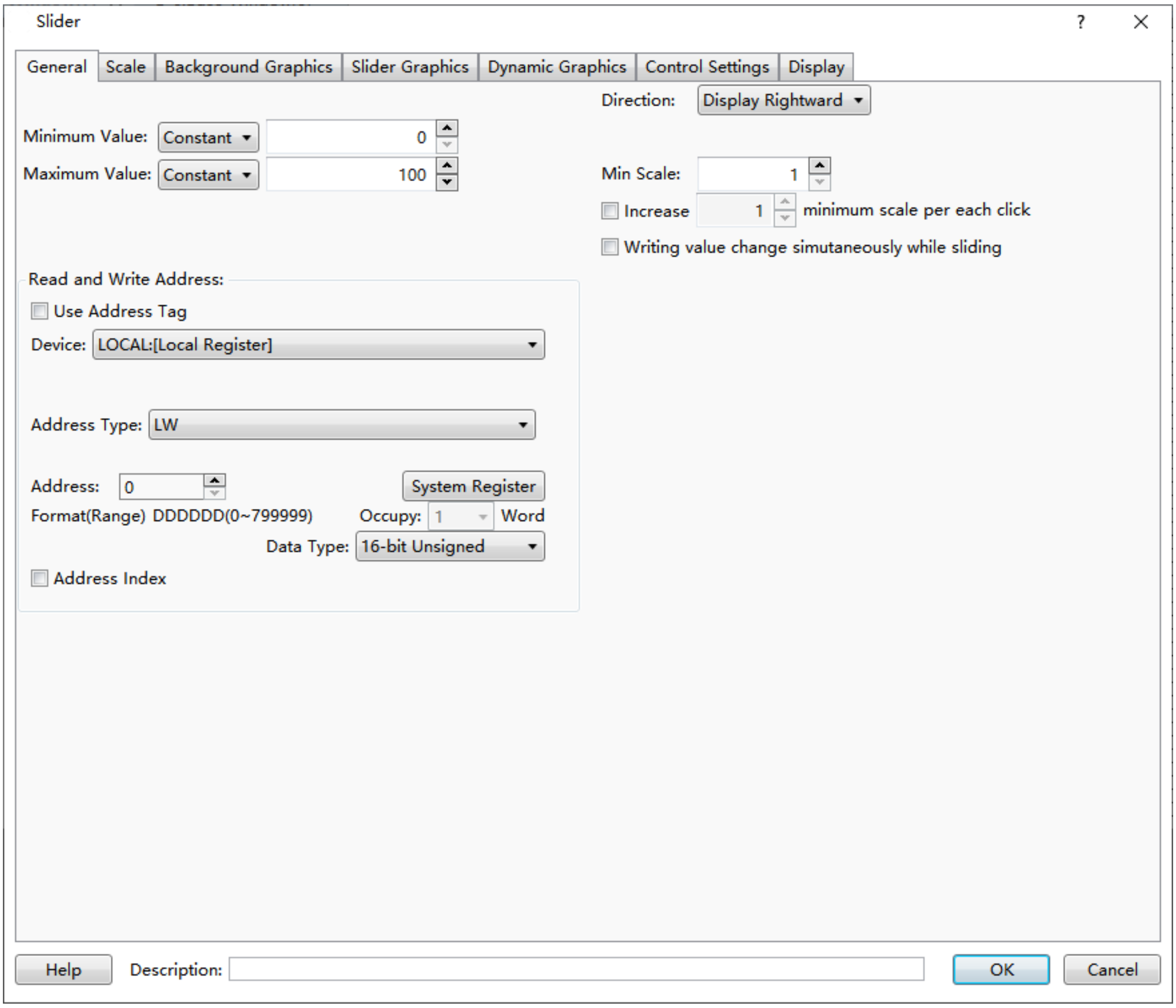
10.9.2 Non-euqal-size Table

A non-equal-size table refers to a table where the width or height of the cells is not equal. The procedure for creating a new non-equal-size table component is similar to creating an equal-size table. Please refer to Equal-size Table.

10.10 Slider

Slider components are commonly used in scenarios where adjustment of process parameters is required. The steps to create a new slider component are as follows:

Step 1. Select **Component/Slider/Slider** from the menu bar, and edit General properties in the pop-up **Slider** dialog box.

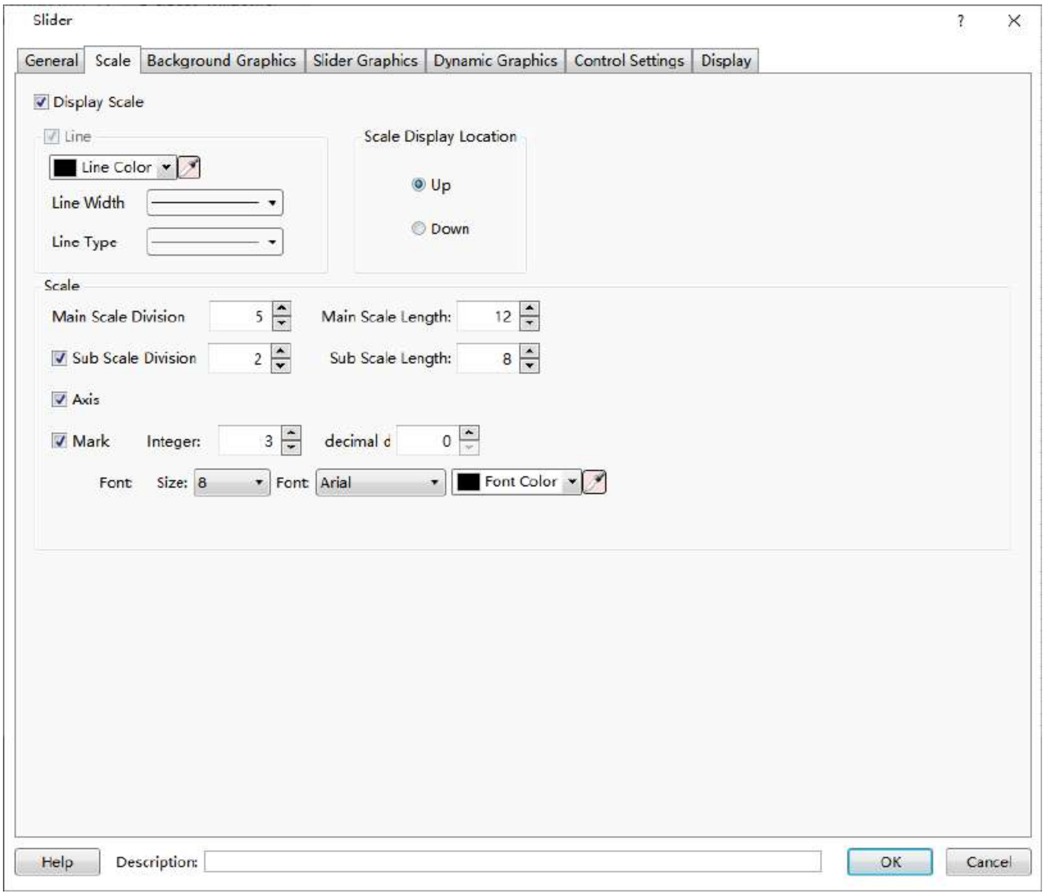


Please refer to the table below for detailed configuration methods.

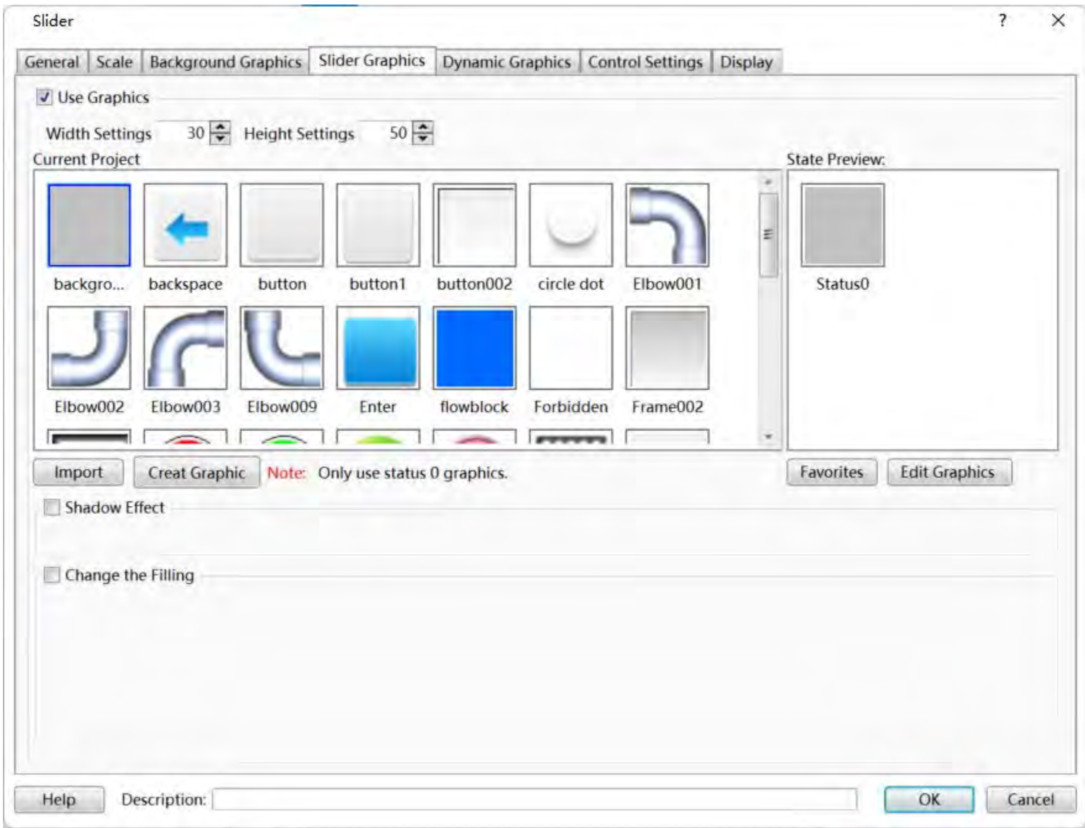
Parameter	Description
Direction	Including display rightward, display leftward, display upward, and display downward.

Parameter	Description
Minimum Value	Minimum Value of the slider, can be set as a constant or a variable.
Maximum Value	Maximum Value of the slider, can be set as a constant or a variable.
Min Scale	The smallest distinguishable measurement value.
Increase n times of the minimum scale per click	Each time when the component is clicked, the increment/decrement value is n times of the minimum scale.
Writing value changes simultaneously while sliding	Real-time updating of the written value to the read/write address during the sliding process.
Read and Write Address	Read and write address of the slider value (read and write address are the same). Device: HMI local register, recipe register, register of PLC. Address Type: Address type of register, please refer to the actual situation. Address: address of the register, please refer to the actual situation.
Address Index	Use address index to change the current address. For example, if the current address is set to LW1, the address index is LW2, offset is 3, then the actual address is LW(1+*the value of LW2*+3)

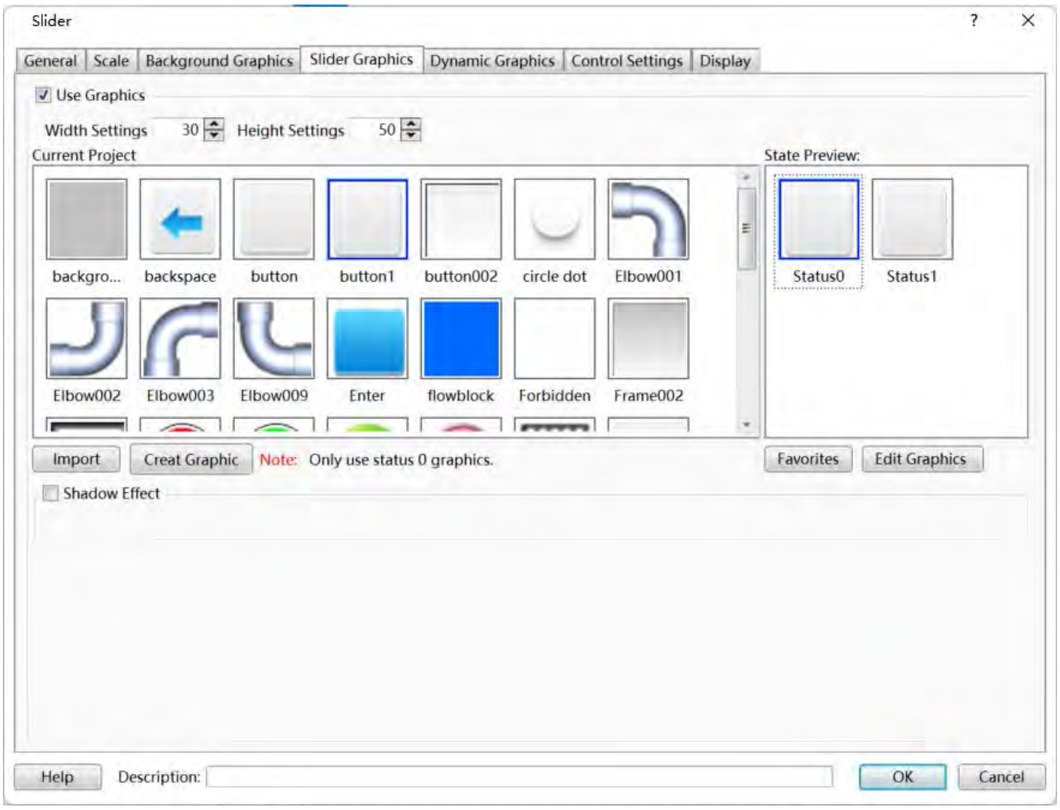
Step 2. Set Scale.



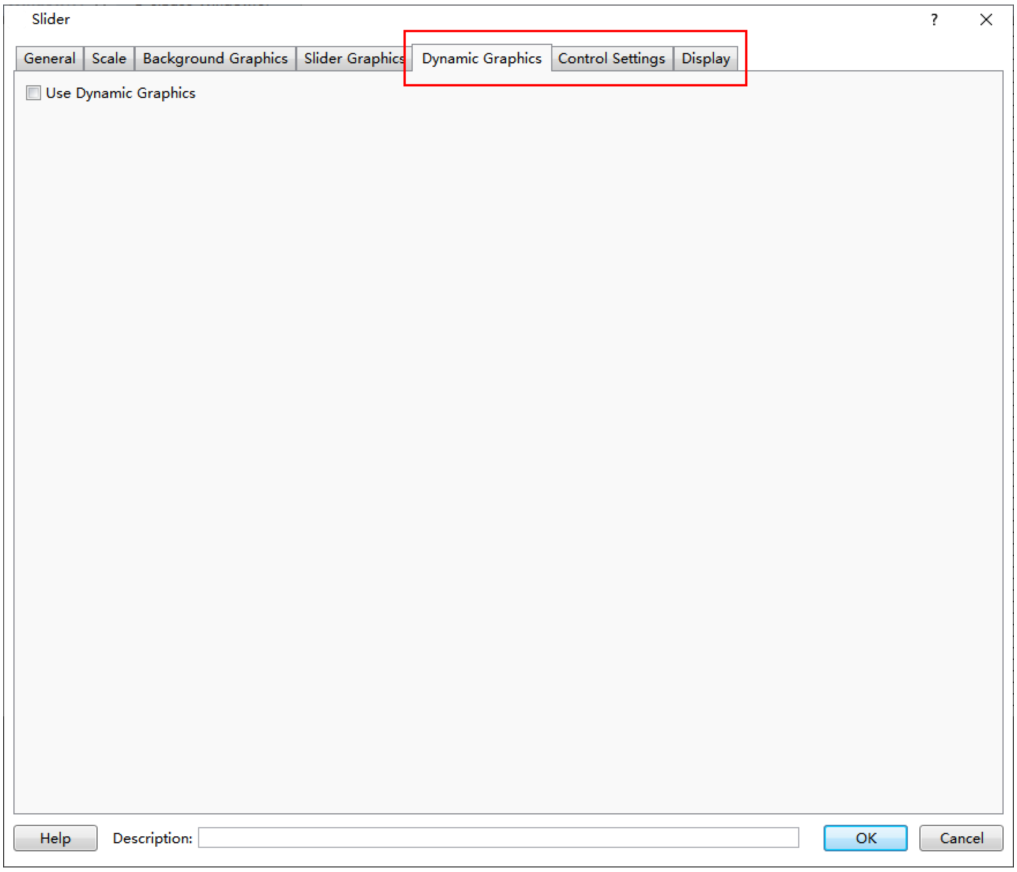
Step 3. Set the Background Graphics.



Step 4. Set the Slider Graphics.



Step 5. Set the **Dynamic Graphics, Control Settings, Display** properties, click **OK**.

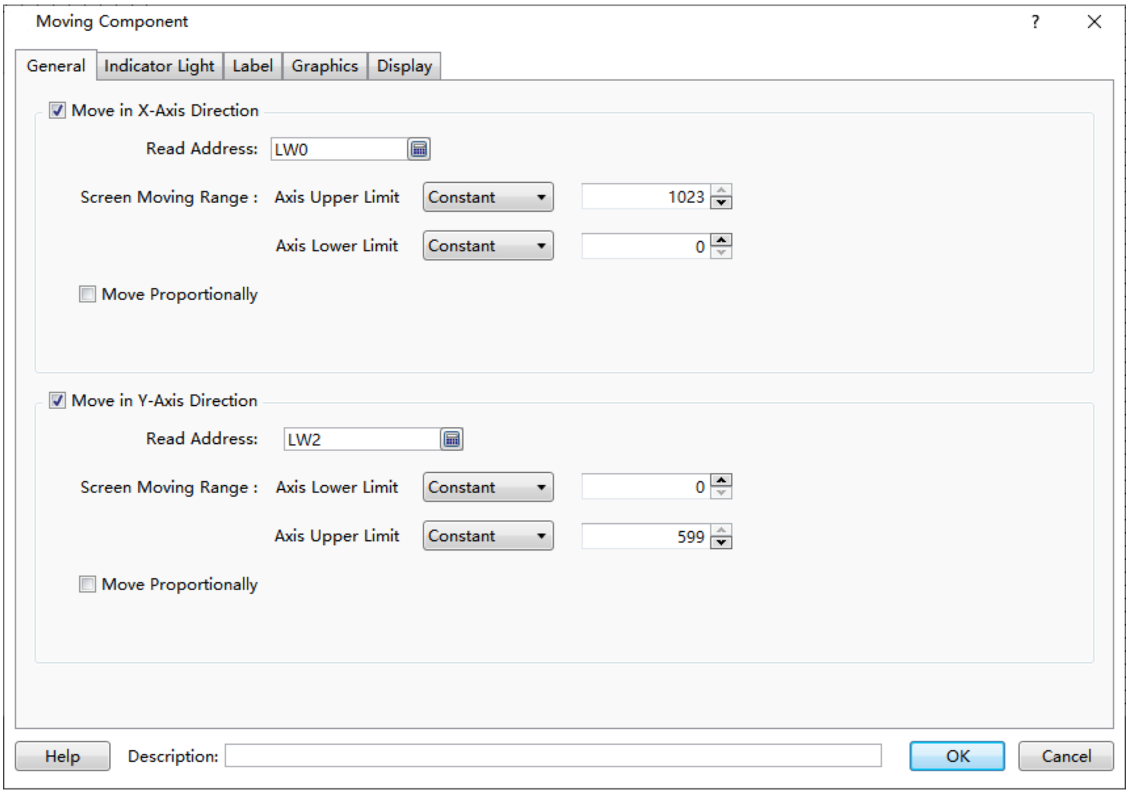


Step 6. Click anywhere in the window to insert the slider component.

10.11 Moving Component

A moving component is used to display the displacement of control tools (including both horizontal and vertical directions). The steps to create a new moving component are as follows:

Step 1. Select **Component/Moving Component/Moving Component** from the menu bar, set the General properties in the pop-up **Moving Component** dialog box.

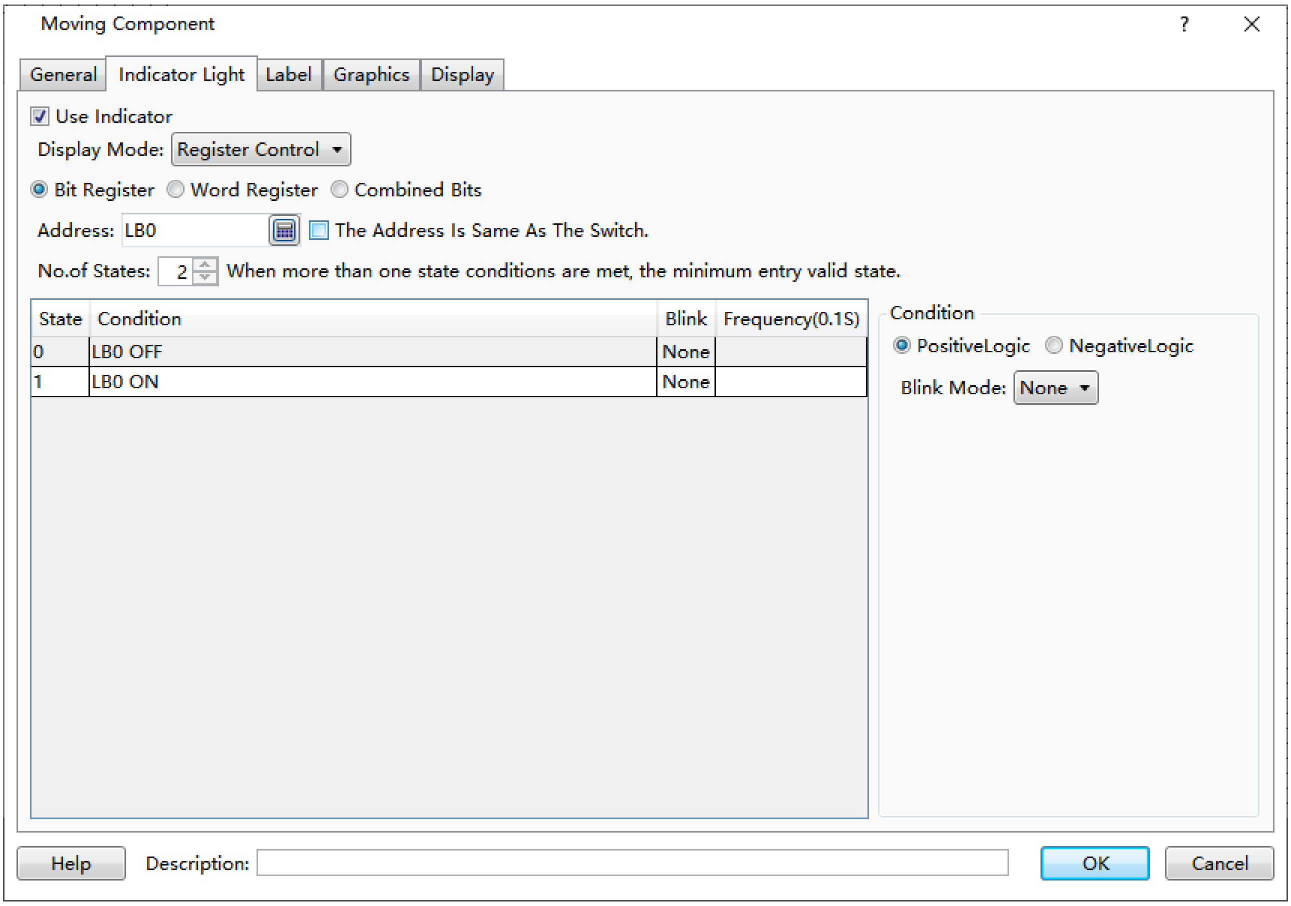


Please refer to the table below for detailed configuration methods.

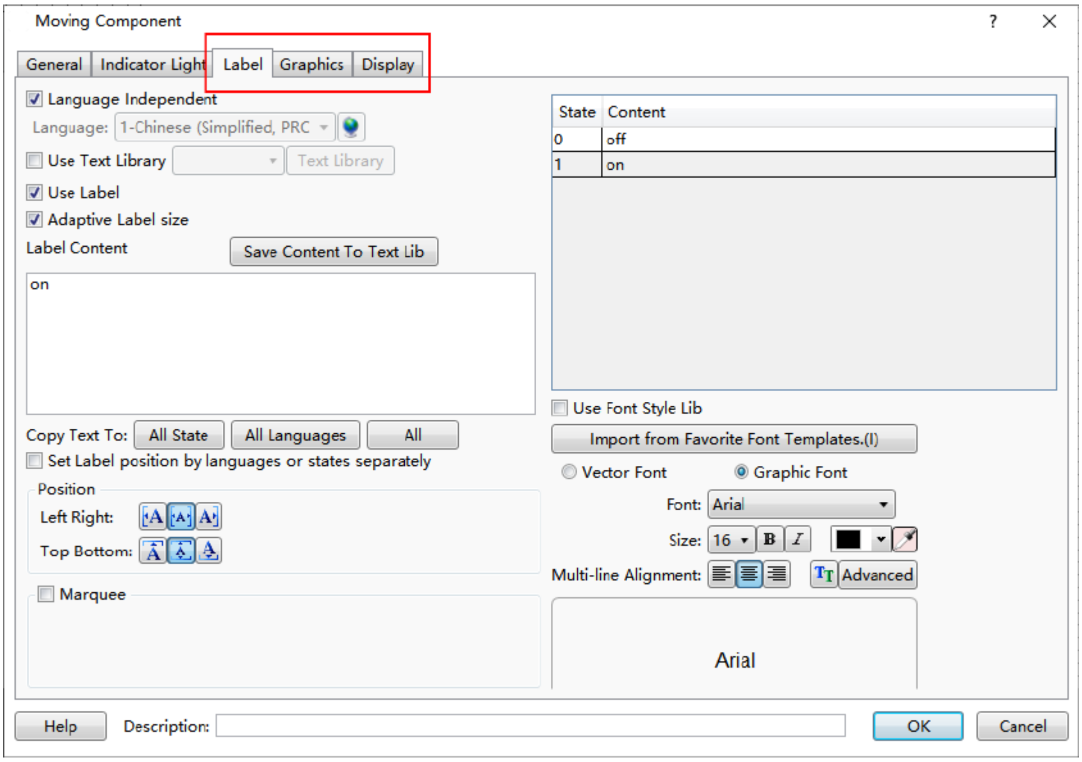
Parameters	**Description**
Read Address	The read address for X-axis or Y-axis displacement data. It is typically set as the word address of PLC.
Axis Upper Limit	The upper limit of the X-axis or Y-axis coordinates can be set as a constant or a variable.
Axis Lower Limit	The lower limit of the X-axis or Y-axis coordinates can be set as a constant or a variable.
Move Proportionally	Move the specific numerical value based on the proportion between the coordinate upper (lower) limit and the input upper (lower) limit.

Step 2. Set the Indicator Light properties.

Please refer to Indicator Light or configuration methods.



Step 3. Set the **Label, Graphics**, and **Display** properties, click **OK**.



Step 4. Click anywhere in the window to insert the moving component.

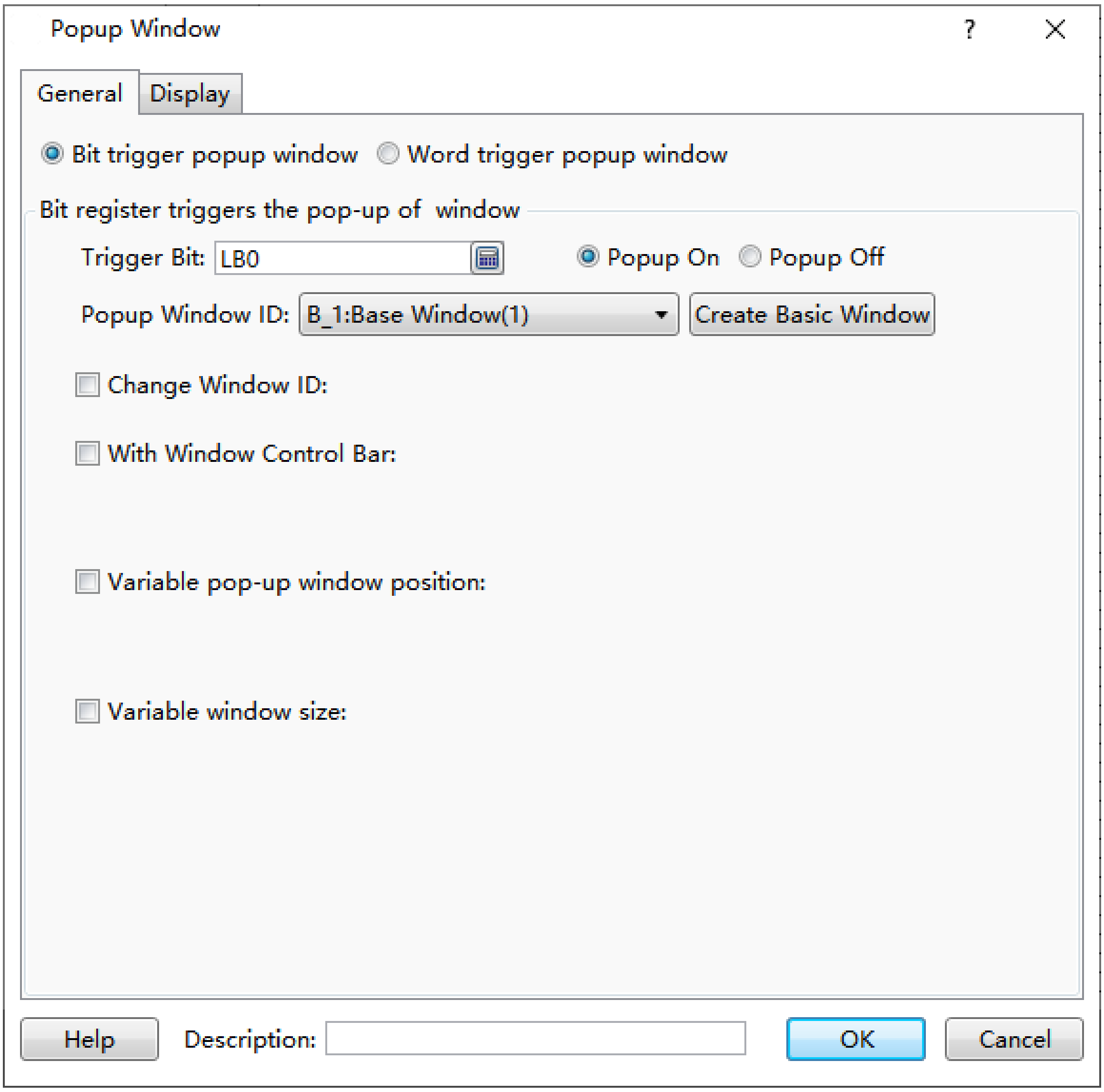
10.12 Window

Window components trigger the display of specified windows by specifying the value of a bit address or word address. This includes bit control windows and word control windows.

10.12.1 Bit Control Window

The steps to create a new bit control window are as follows:

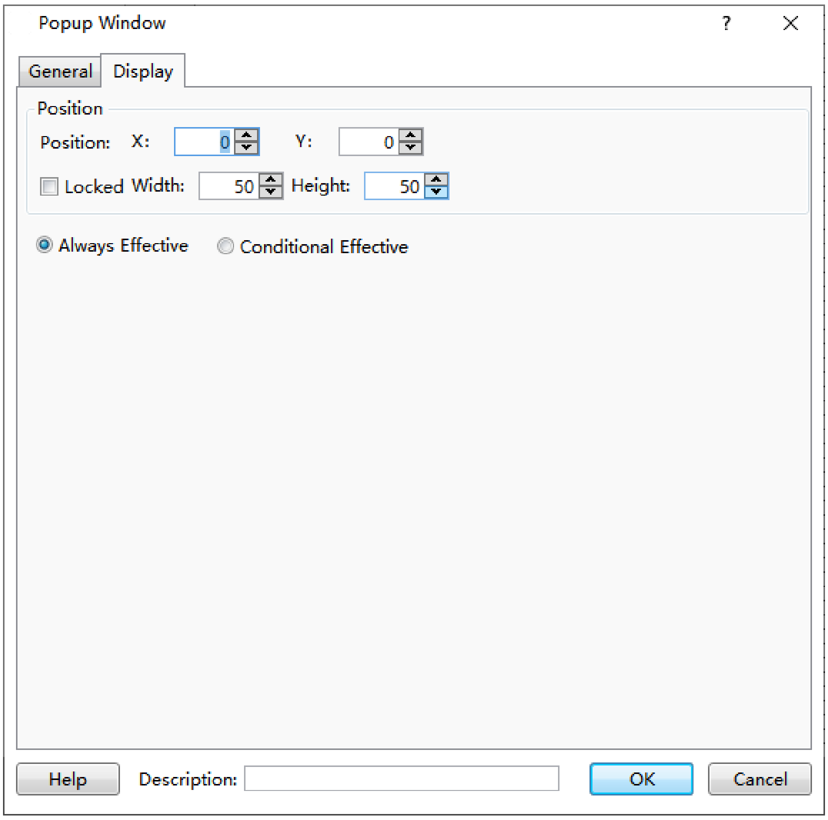
Step 1. Select **Component/Window/Bit Control Window** from the menu bar, set the General properties in the **Popup Window**.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Bit trigger popup window	When the value of the specified bit address is set to ON or OFF, it triggers the display of the specified window.
Trigger Bit	The trigger bit address can be set as the bit address of HMI or the PLC.
Popup ON	When the value of the trigger bit is set to ON, the specified window will pop up.
Popup OFF	When the value of the trigger bit is set to OFF, the specified window will pop up.
Popup Window ID	The window to be popped up, you can select from the windows available in the project.
Use Variable Window ID	The window ID of the window to be popped up, decided by the value of specified word address register.
With Window Control Bar	To configure control options for the pop-up window: ◆ Close Button: Clicking this button will close the pop-up window. ◆ Title: Set a title for the pop-up window. If the pop-up window already has a title, the title set here shall prevail.
Variable pop-up window position	The position of the pop-up window is determined by the value of the specified word address.
Variable window size	The size of the pop-up window is determined by the value of the specified word address.

Step 2. Set **Display** properties, click **OK**.



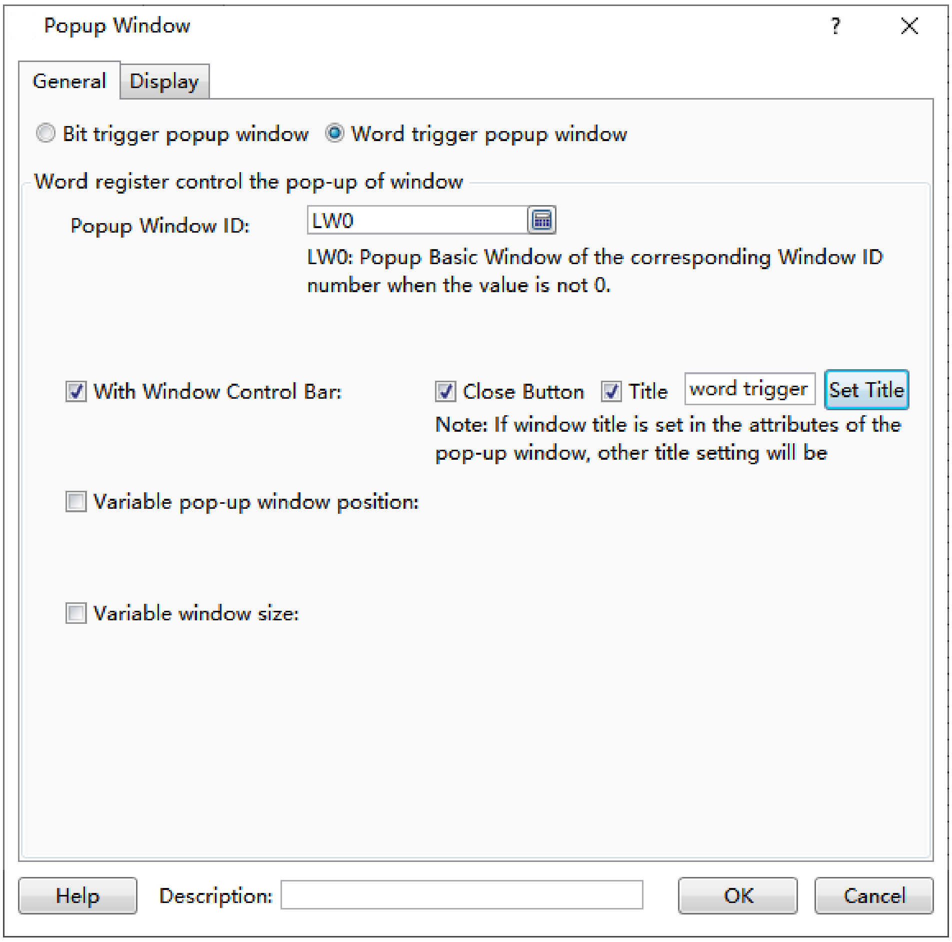
Step 3. Click anywhere in the window to insert the bit control window component.

10.12.2 Word Control Window

A word control window component refers to a component where the value of a specified word address determines the ID of the window to be displayed. Based on the window ID, the corresponding window will be popped up. This is suitable for scenarios where different windows need to be displayed based on control parameters.

The steps to create a new word control window are as follows:

Step 1. Select **Component/Window/Word Control Window** from the menu bar, set the General properties in the **Popup Window**.

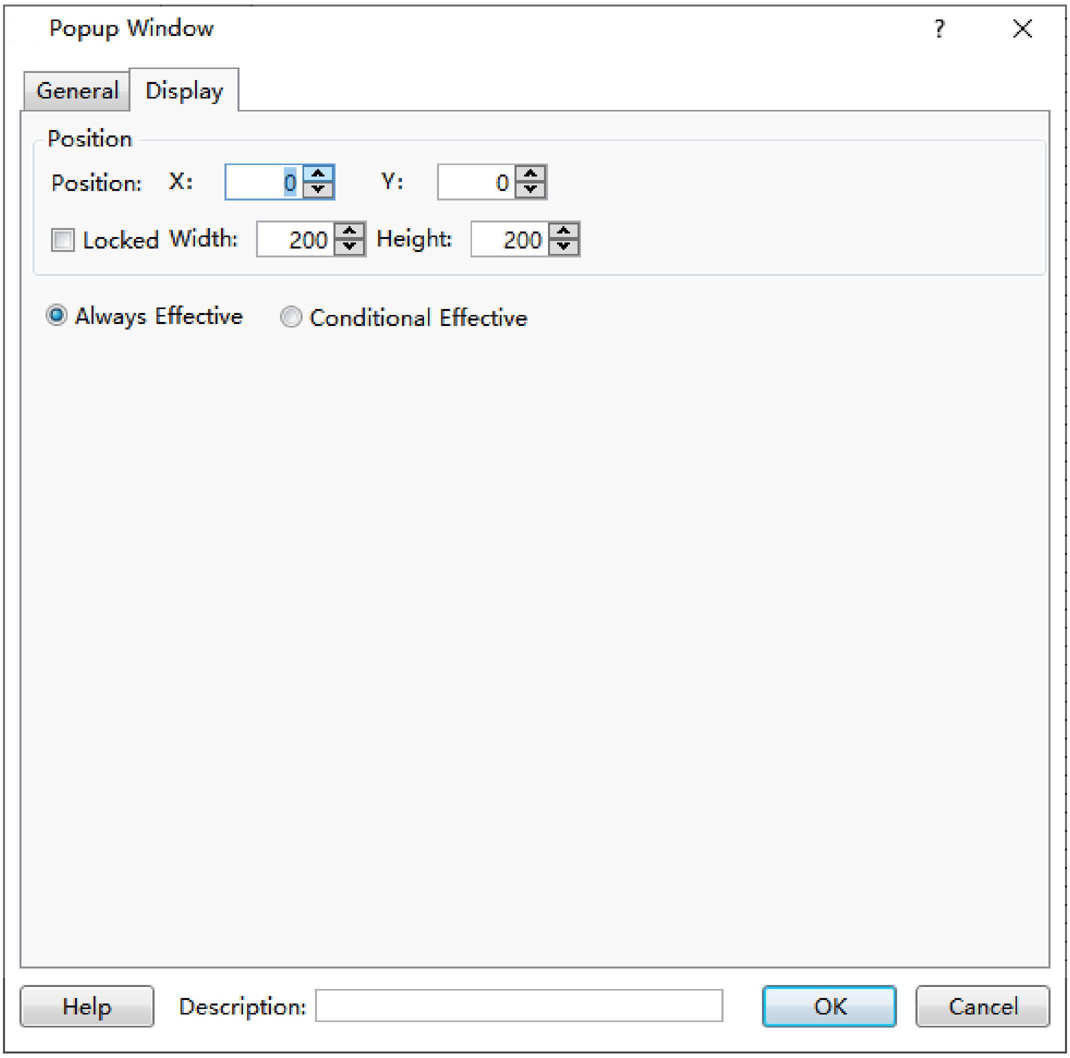


Please refer to the table below for detailed configuration methods.

Parameters	Description
Word trigger popup window	The value of the specified word address controls the ID of the pop-up window to be displayed, thus triggering the display of the specified window.
Popup Window ID	Set the word address. Assign a value to the word address that corresponds to the ID of the window you want to pop up.

Parameters	Description
With Window Control Bar	Control options for the pop-up window: ◆ Close Button: Clicking this button will close the pop-up window. ◆ Title: Set a title for the pop-up window. If the pop-up window already has a title, the title set here shall prevail.
Variable pop-up window position	The position of the pop-up window is determined by the value of the specified word address.
Variable window size	The size of the pop-up window is determined by the value of the specified word address.

Step 2. Set the **Display** properties, click **OK**.



Step 3. Click anywhere in the window to insert a word control window component.

10.13 List

List components are used to display alarm events, historical data, and operation log data in a list format. They are designed to provide users with an overview of the control system's operational state.

10.13.1 Alarm and Event Display

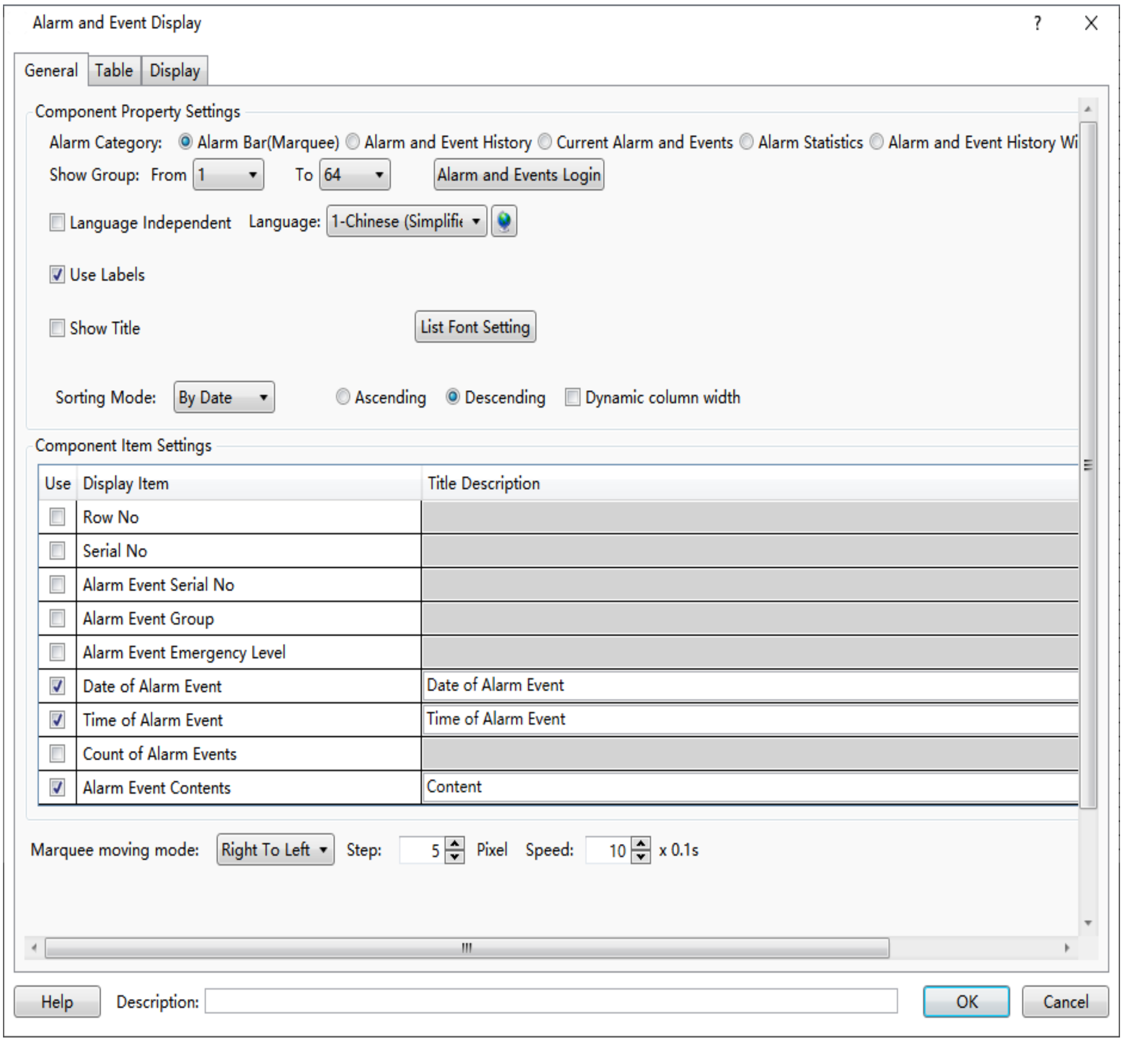
The Alarm and Event Display component includes five types: alarm bar, alarm and event history, current alarm and event, alarm statistics, alarm and event history with statistics.

10.13.1.1 Alarm Bar

The alarm bar displays alarm content in a single-row table format and utilizes a marquee effect to scroll through the alarm content. This allows users to easily track the current alarms in the control system.

The steps to create a new alarm bar component are as follows:

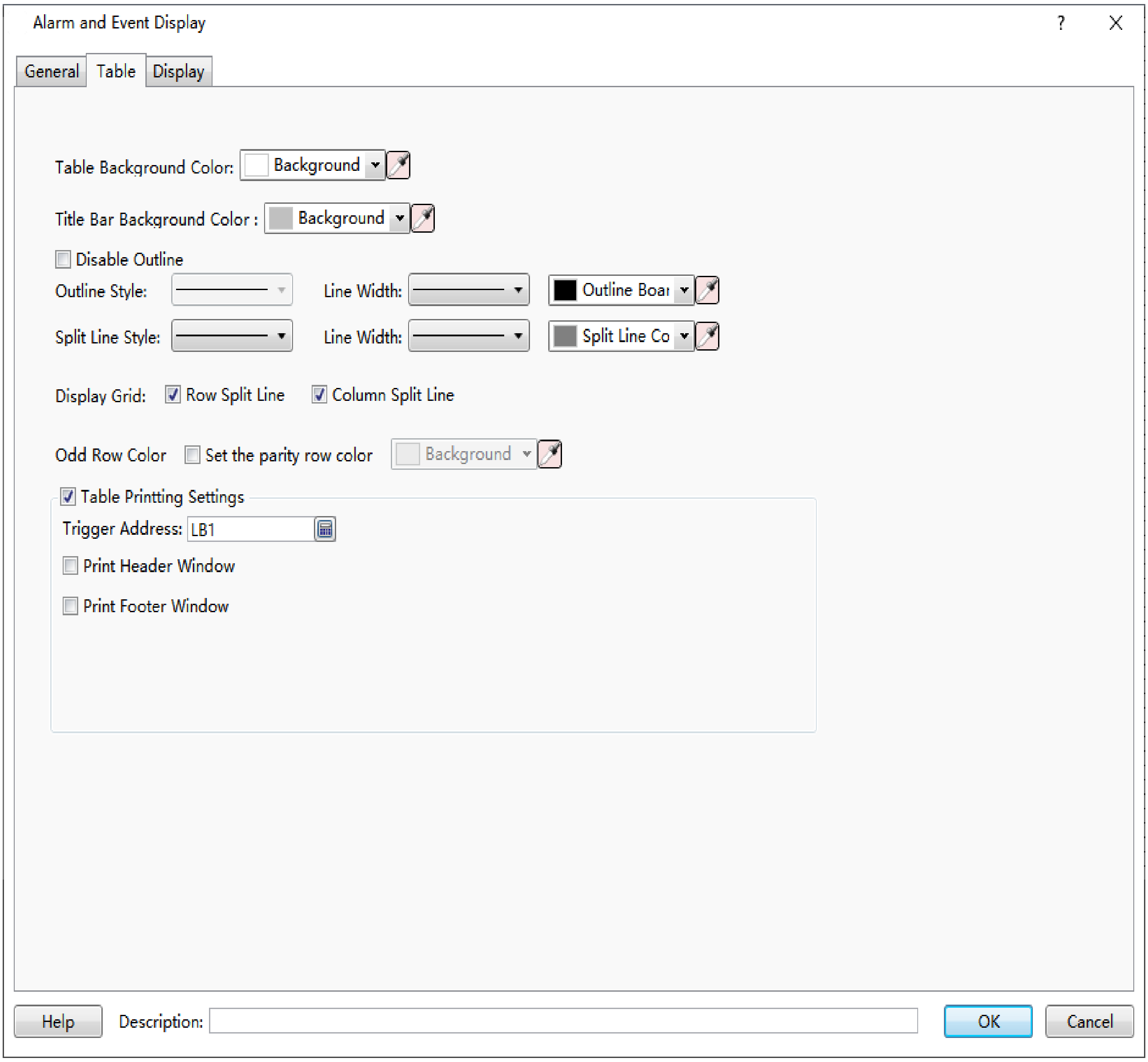
Step 1. Select **Component/List/Alarm and Event Display** from the menu bar, set the General properties in the pop-up **Alarm and Event Display** window.



Please refer to the table below for detailed configuration methods.

Parameters	Description
Alarm Category	Select "Alarm Bar (Marquee)".
Show Group	Select the group of alarm and event.
Alarm and Events Login	Click **Alarm and Events Login** to set the alarm and events. For detailed information about alarm and events, please refer to Alarm and Event.
Language Independent	When language is changed, the displayed text content does not change.
Language	Current language. You can set the text content of different languages.
Use Labels	The title bar description information is populated using label content.
List Font Setting	Click **List Font Setting** to set the font for the list.
Sorting Mode	The sorting options for alarm entries include sorting in ascending or descending order based on date and level.
Use	Whether to use display item or not.
Title Description	Edit the description information of title.
Marquee moving mode	Including left to right, right to left, top down, bottom up.
Step	The length of marquee text.
Speed	Text moving speed.
Date Format	Select date format.

Step 2. Draw a table.

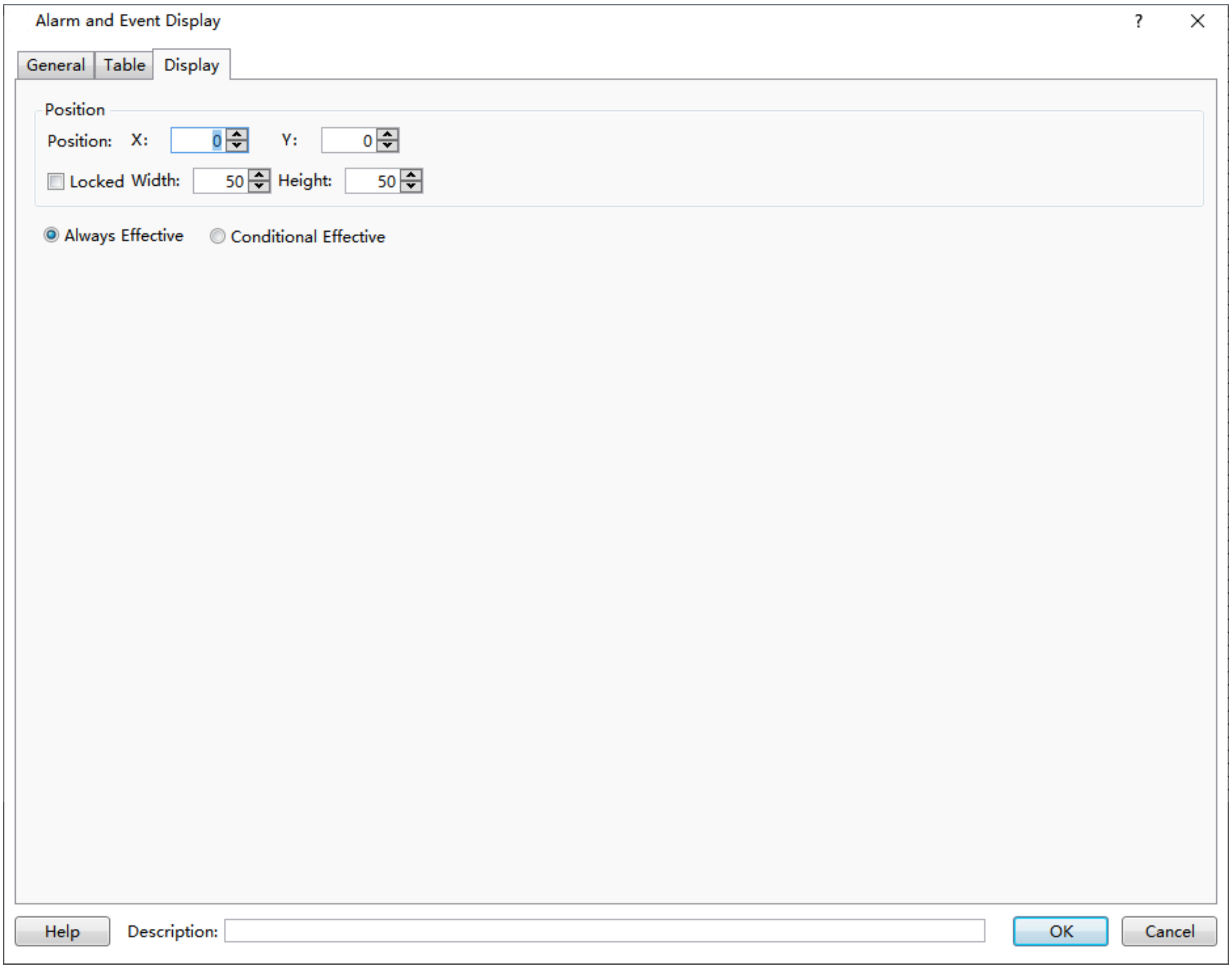


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Table Background Color	Set the background color of table.
Title Bar Background Color	Set the background color oftitle bar.
Outline Style	Style of outline, including solid line and dash line.
Line Width	The width of table outline or split line.
Split Line Style	Style of split line in the table, including solid line and dash line.

Parameter	Description
Row Split Line	Whether to display row split lint.
Column Split Line	Whether to display column split lint.
Trigger Address	When the value of the specified bit address is ON, print the table.

Step 3. Set **Display** properties, click **OK**.



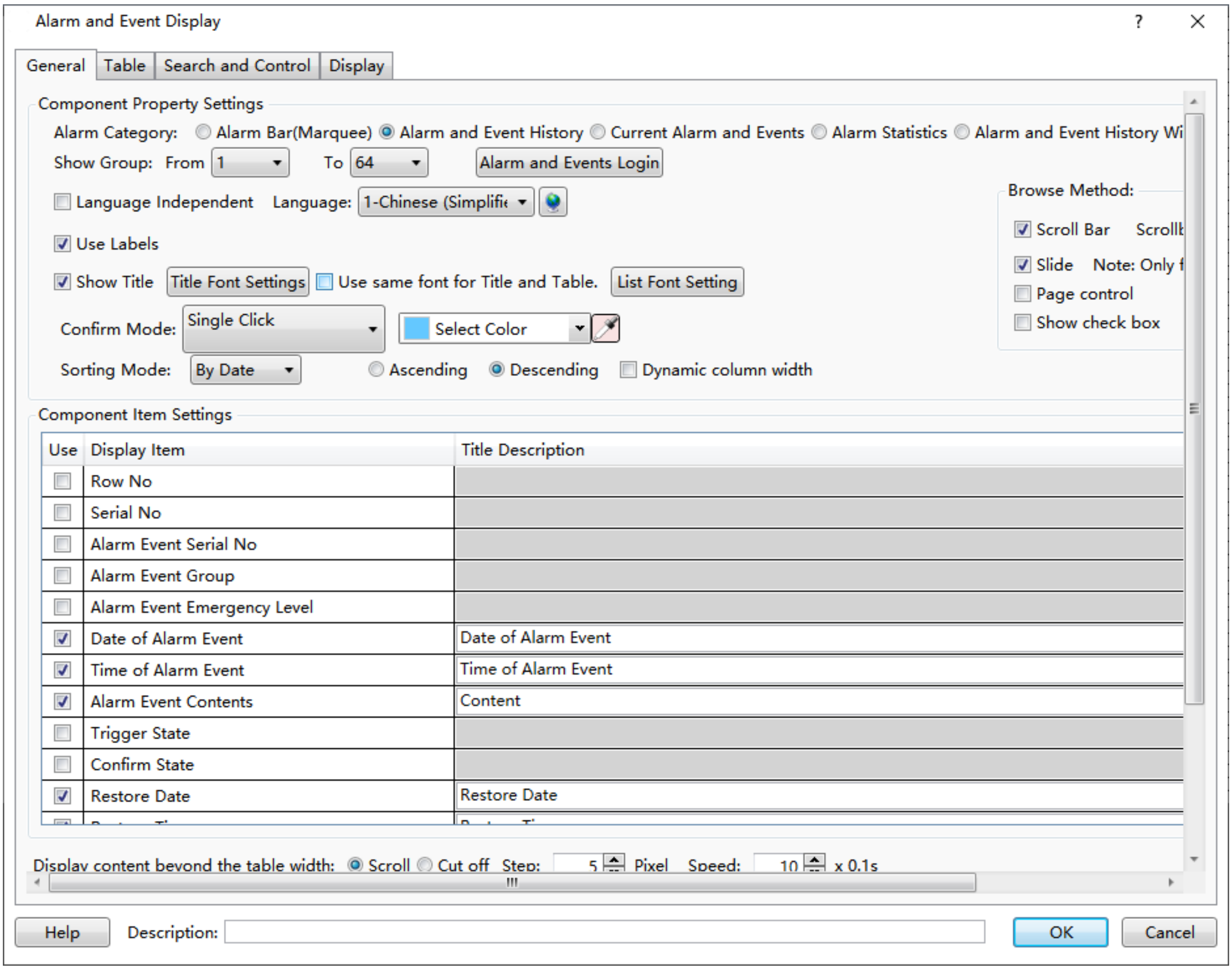
Step 4. Click anywhere in the window to insert the alarm bar component.

10.13.1.2 Alarm and Event History

The Alarm and Event History component dispalys alarm bars of all states in table form, including current alarm and events, history alarm and events.

The steps to create an alarm and event history component are as follows:

Step 1. Select **Component/List/Alarm and Event Display** from the menu bar, set the General properties in the pop-up **Alarm and Event Display** window.

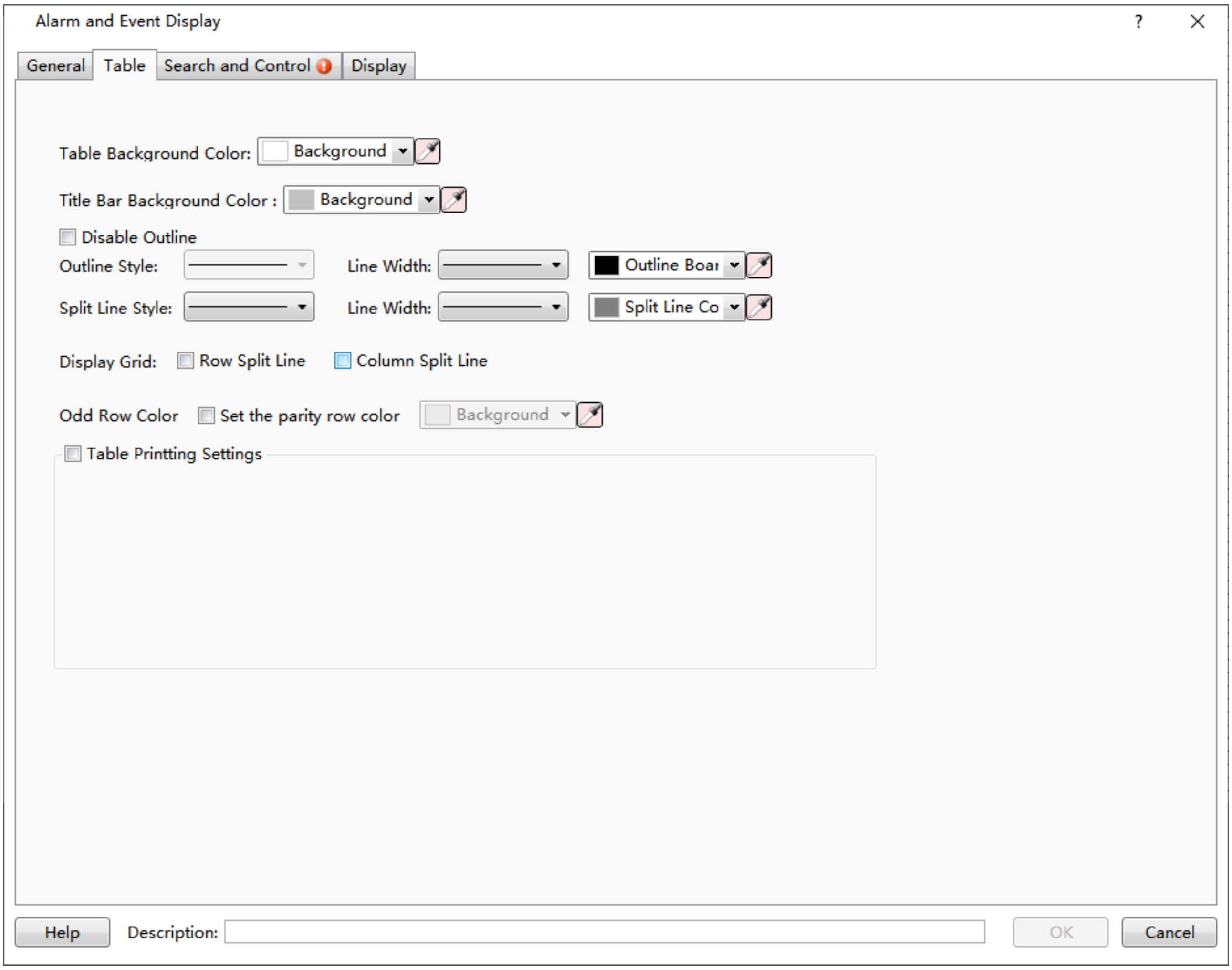


Please refer to the table below for detailed configuration methods.

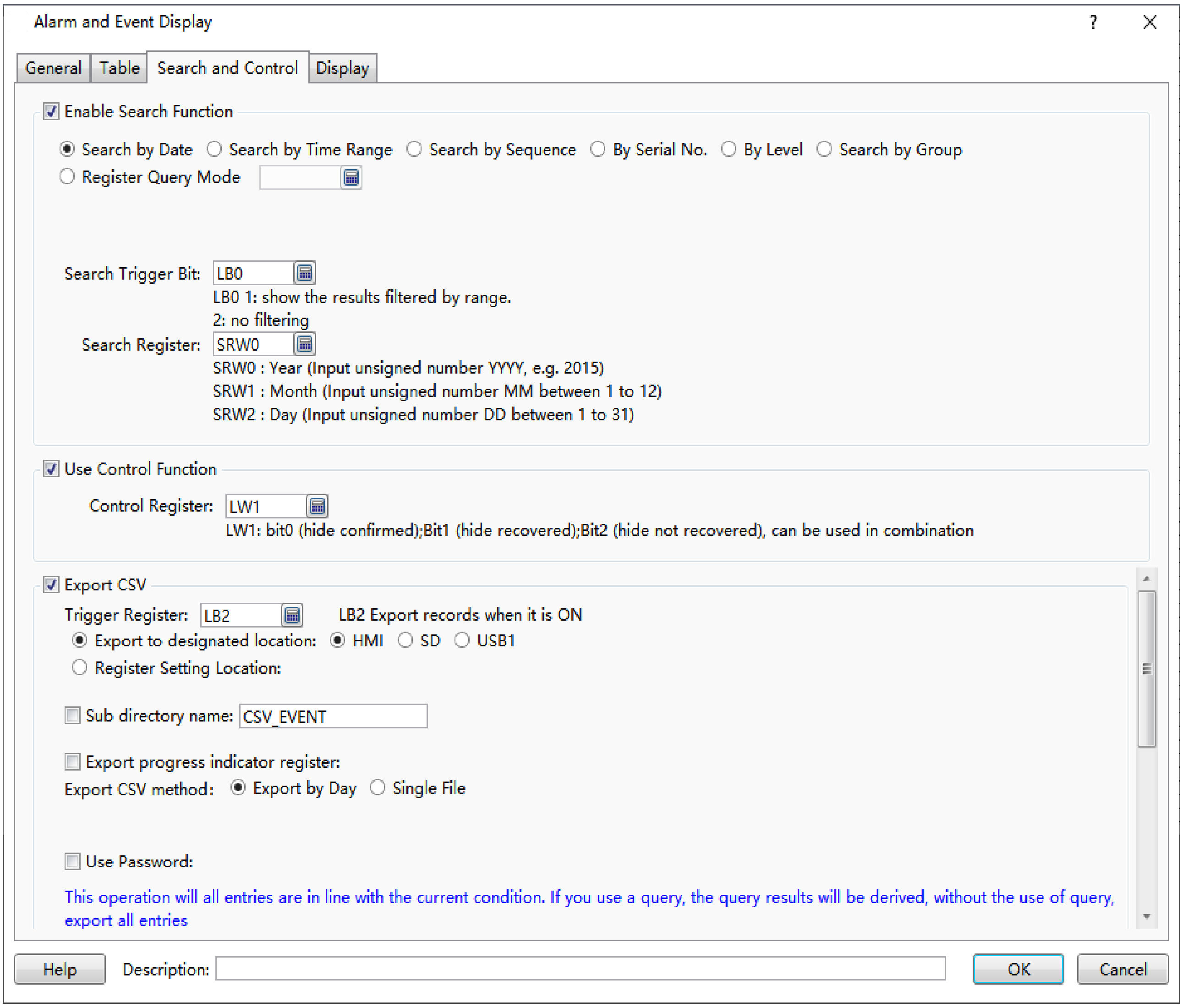
Parameters	Description
Alarm Category	Select "Alarm and Event History".
Confirm Mode	Confirmation to the alarms, including single click, double click, press and hold. You can set the select color.
Display content beyond the table width	When the displayed content exceeds the width of the list component, you have two options for displaying the text: ◆ Scroll: display in the form of marquee. ◆ Cut off: display in the truncated text form.
Alarm Status	Set different colors for various alarm states, including triggered, recovered, confirmed,

Parameters	Description
	unconfirmed.

Step 2. Draw a table.



Step 3. Set the **Search and Control** properties.

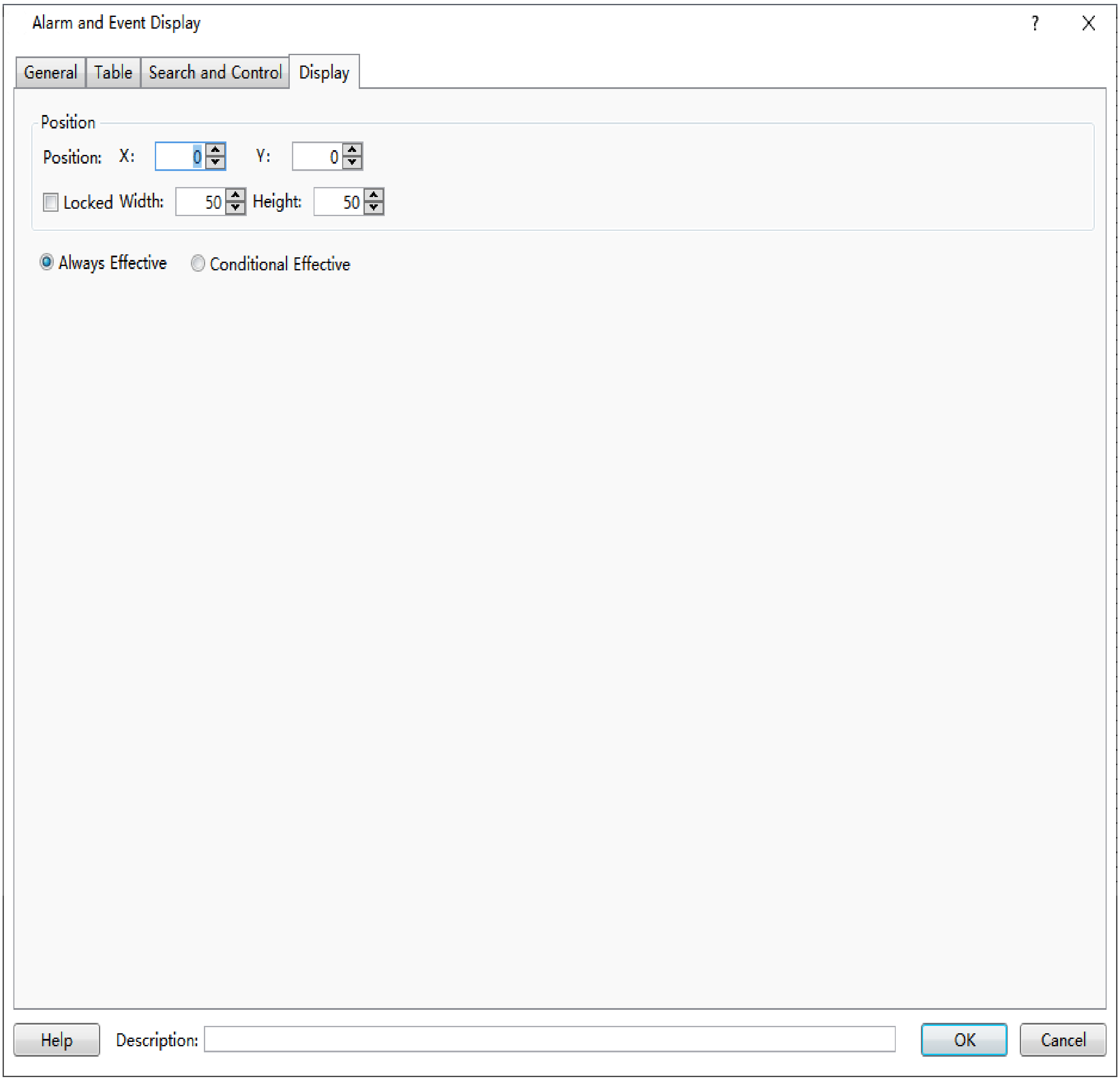


Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Enable Search Function	Select the search mode: ◆ By Date ◆ By Time Range ◆ By Sequence ◆ By Serial No.: by serial number of the event group ◆ By Level: by the level of the even ◆ Register Query Mode: query mode decided by the value of specified word address.
Search Trigger Bit	If the value of the specified bit address is 1, display the filtered results based on a specified range. If the value is 0, no filtering is applied.
Control	If the value of the specified bit address is 1, hide the confirmed, recovered, and un-recovered

Parameters	Description
Register	alarms.

Step 4. Set the **Display** properties, click **OK**.



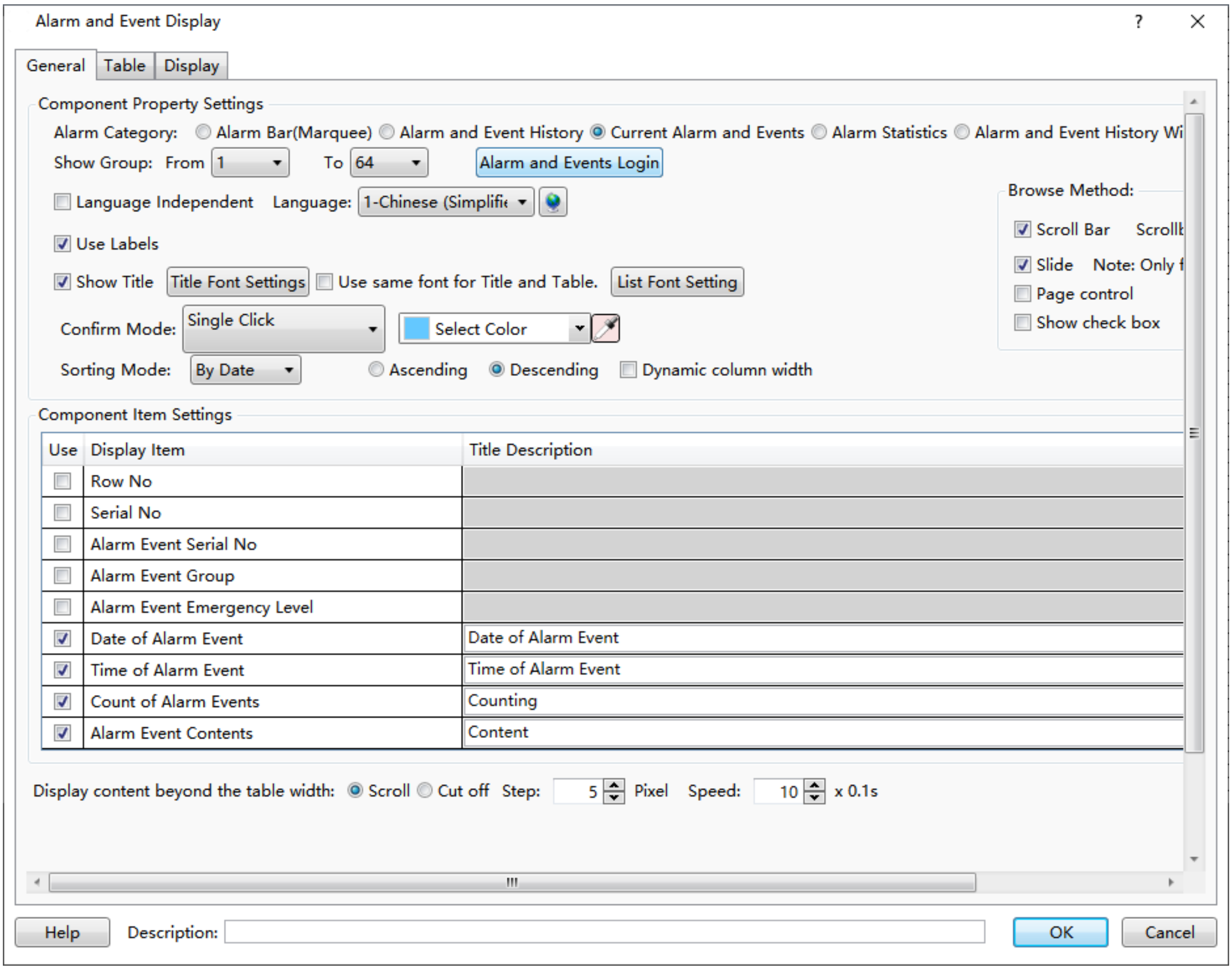
Step 5. Click anywhere in the window to insert the alarm and event history component.

10.13.1.3 Current Alarm and Event

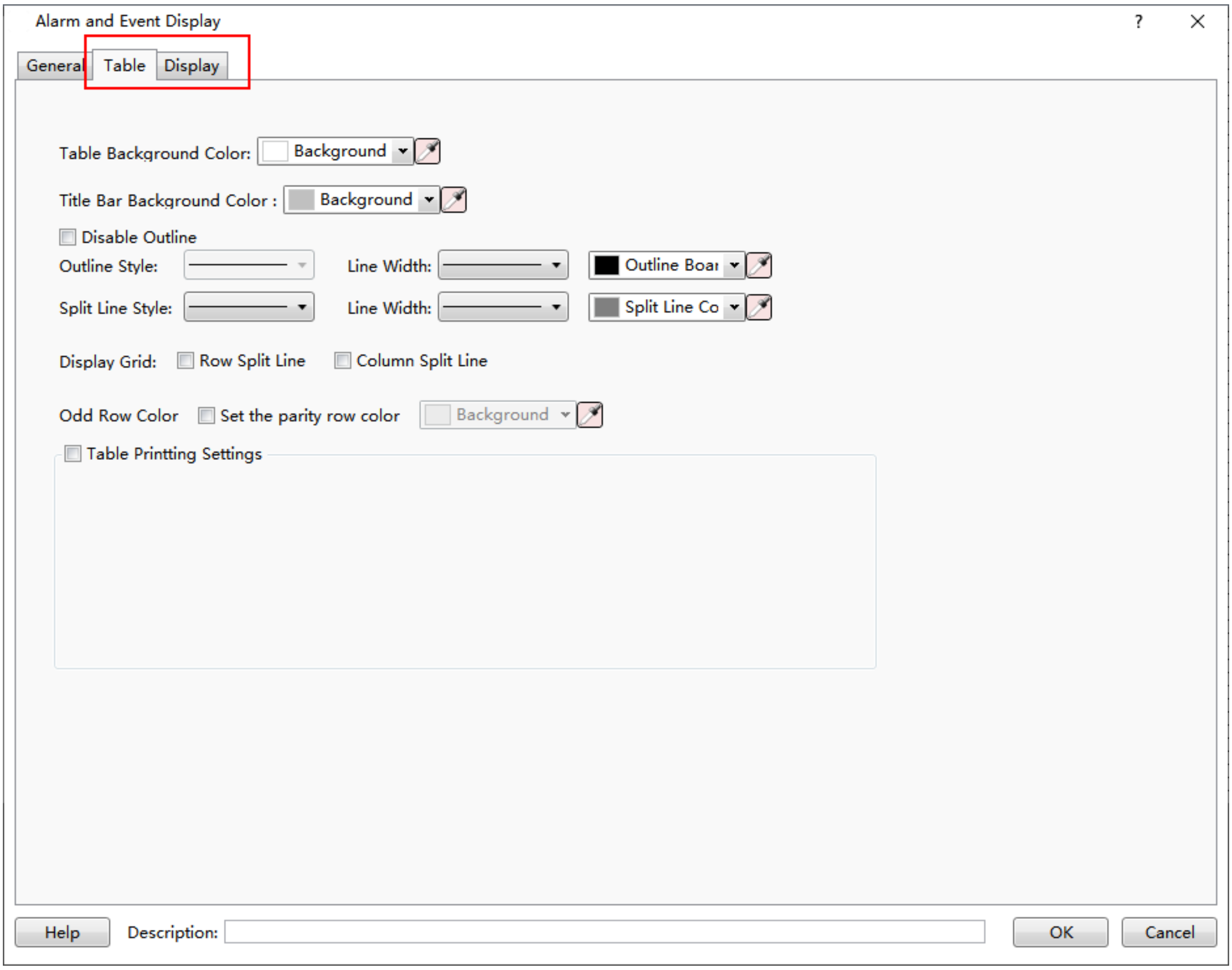
Display current alarm and events in a table form, and display the triggered alarms only. The steps to create a current alarm and event component are as follows:

Step 1. Select **Component/List/Alarm and Event Display** from the menu bar, set the General properties in the pop-up **Alarm and Event Display** window.

Select “Current Alarm and Event” for the **Alarm Category,** configuration method for other parameters is similar to that of the Alarm and Event History component, please refer to Alarm and Event History.



Step 2. Set the **Table** and **Display** properties, click **OK.**



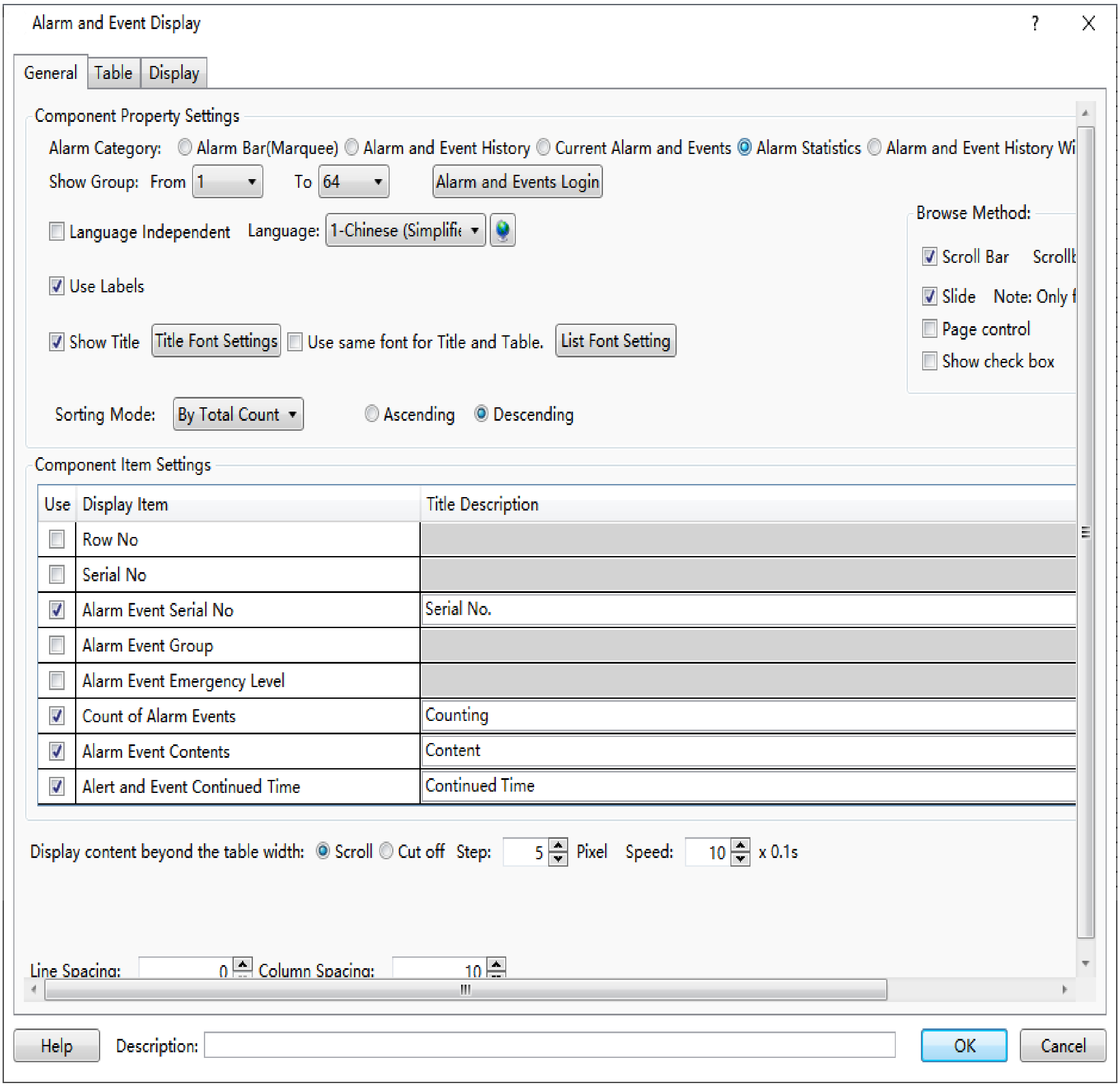
Step 3. Click anywhere in the window to insert the current alarm and event component.

10.13.1.4 Alarm Statistics

The alarm statistics component is used to gather statistics on alarm events. It provides information such as alarm event number, alarm event group, alarm event urgency level, number of occurrences, alarm event content, and cumulative duration of the alarm event.

The steps to create an alarm statistics component are as follows:

Step 1. Select **Component/List/Alarm and Event Display** from the menu bar, set the General properties in the pop-up **Alarm and Event Display** window.

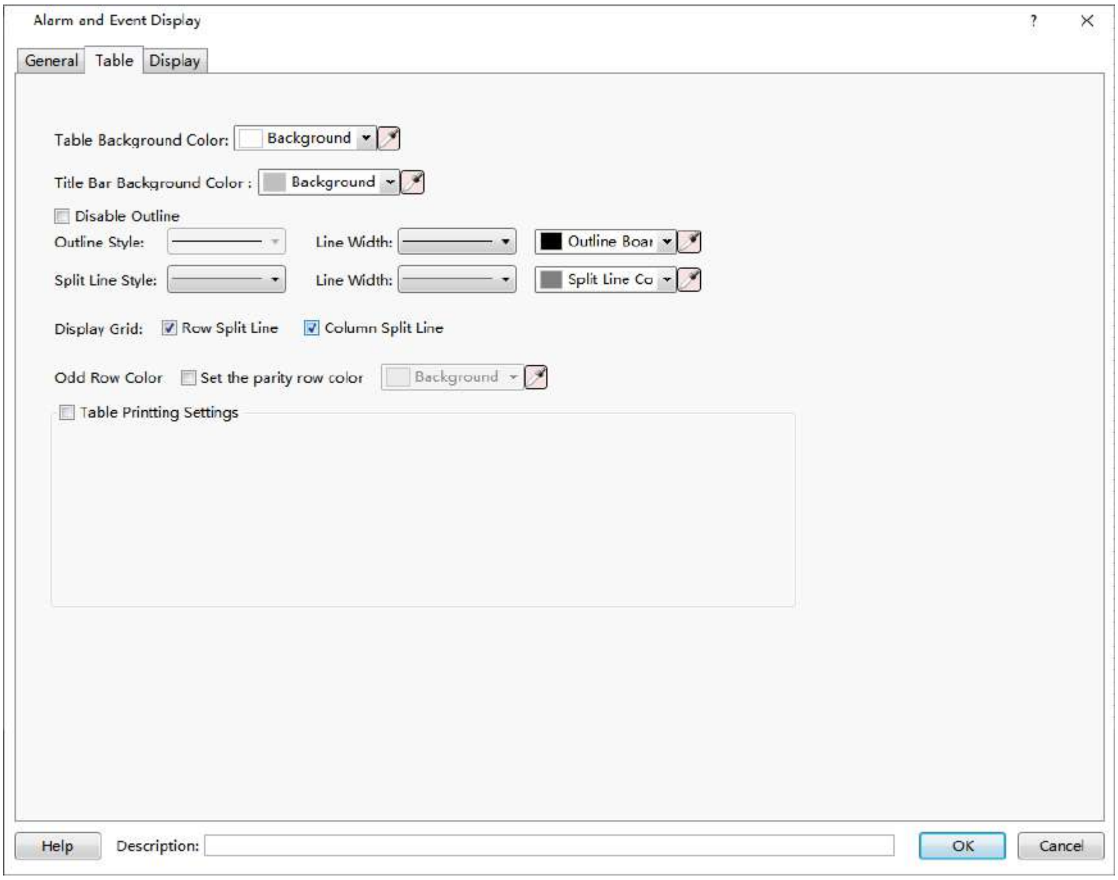


Please refer to the table below for detailed configuration methods.

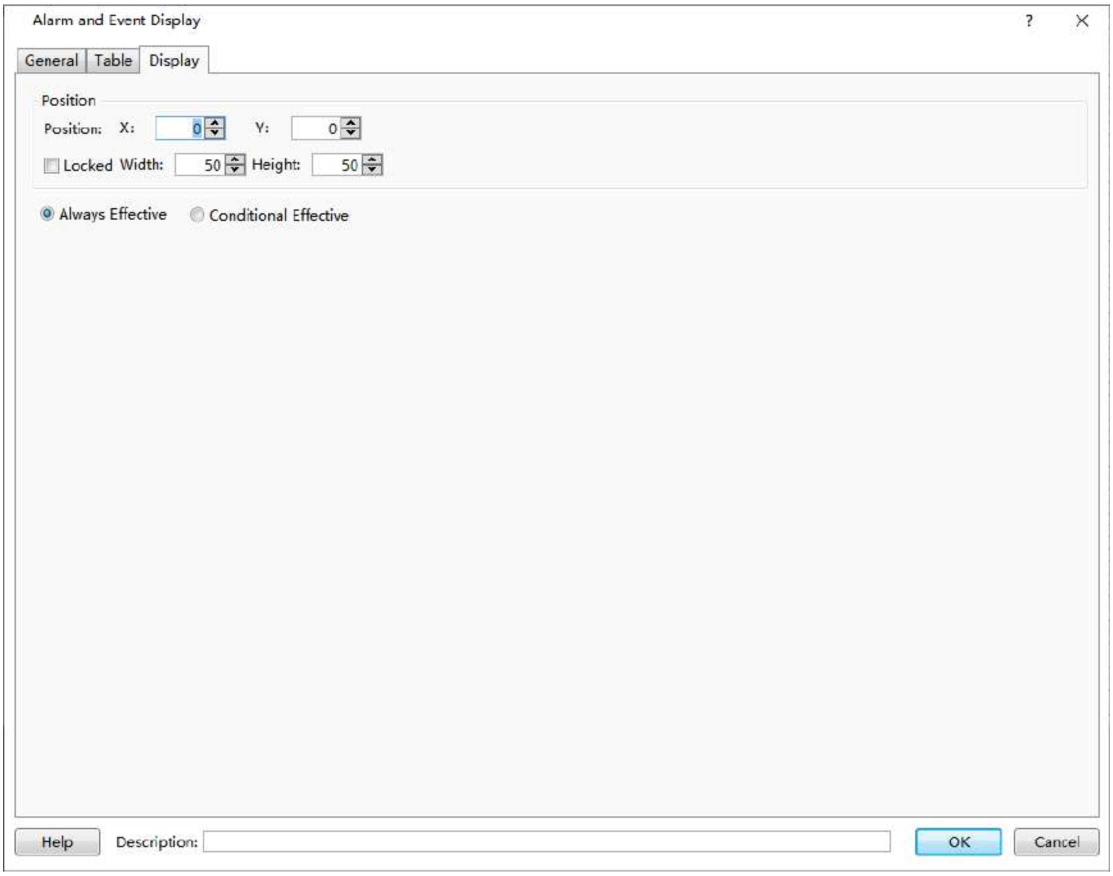
Parameter	Description
Alarm Category	Select “Alarm Statistics”.
Show Group	Display the group of alarm events, up to 64 groups.
Alarm and Events Login	Click **Alarm and Events Login** to set the alarm and events. For detailed information about alarm and events, please refer to Alarm and Event.
Language Independent	When language is changed, the text content in the component interface does not change.
Language	Select current language, click the  icon to set the language.

Parameter	Description
Use Labels	Use label to display description information of the title bar. If labels are not used, you need to use text library to display description information of the title bar.
Scroll-bar	Drag the scroll-bar to view the entire alarm and event statistics information.
Slide	Slide the screen to view the entire alarm and event statistics information. Only applicable for capacitive HMIs.
Page Control	Turn pages to view the entire alarm and event statistics information. The page control method is stored in specified word address.
Sorting Mode	Sorting mode of alarm events, including by total count, accumulate time, serial number, register control, ascending/descending order.
Use	Whether to display corresponding items in the table.
Display Item	Display items of the table.
Title Description	Use label or text library to set the description information of the title bar.
Display content beyond the table width	When the displayed content exceeds the width of the list component, you have two options for displaying the text: ◆ Scroll: display the table content in the form of marquee. You need to set the step and speed. ◆ Cut off: display the table content in the truncated text form.
Line Spacing	Line spacing of the table.
Column Spacing	Column spacing of the table.

Step 2. Set the border and background color of the table.



Step 3. Set the **Display** properties, click **OK.**



Step 4. Click anywhere in the window to insert the alarm statistics component.

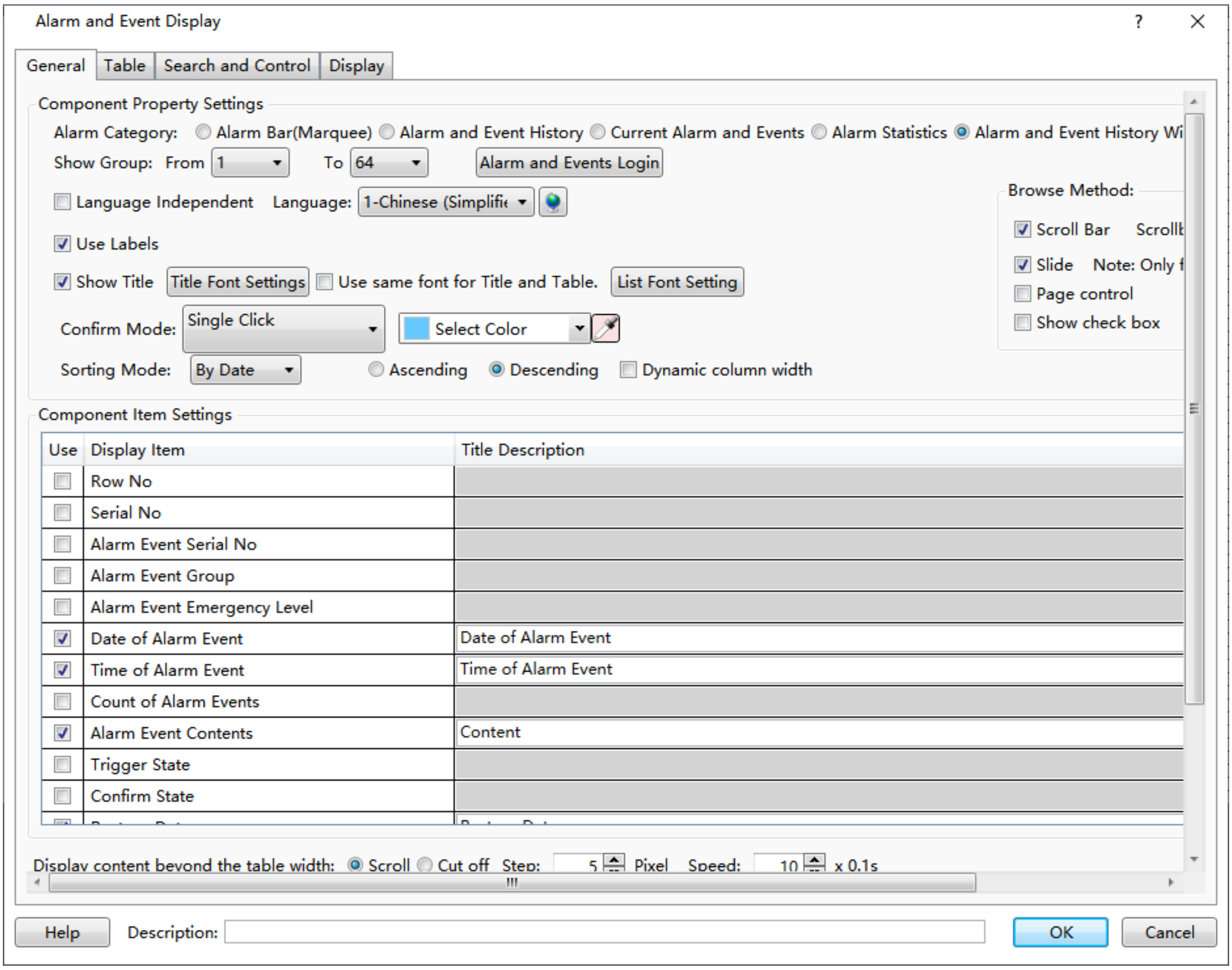
10.13.1.5 Alarm and Event History with Statistics

Only VI20Studio V3.0 supports the **Alarm and Event History with Statistics** feature.

The Alarm and Event History with Statistics component displays alarm items of all statees in the table form, including current alarm and events, history alarm and events. Additionally, it provides statistical information about the alarm events.

The steps to create an alarm and event history with statistics component are as follows:

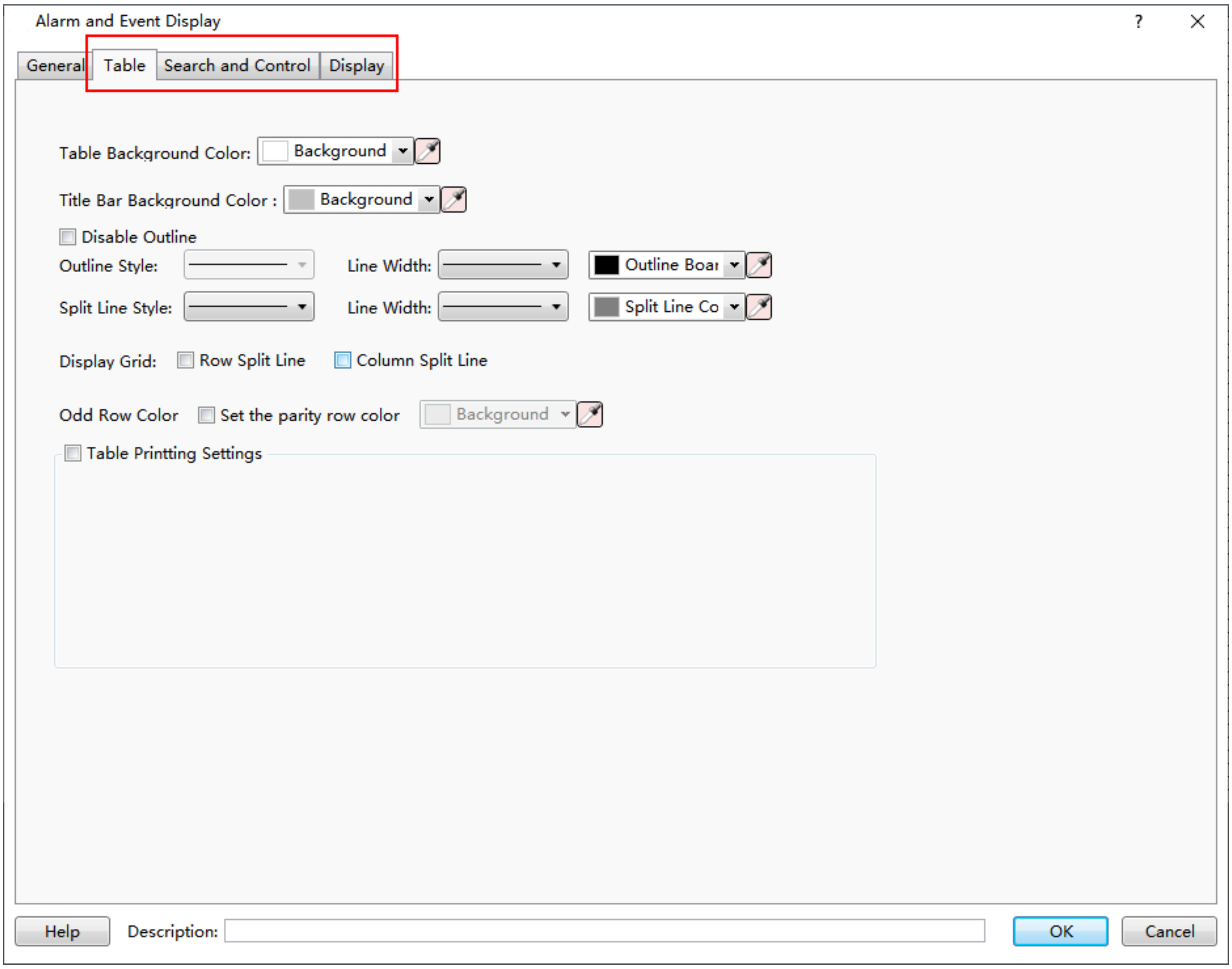
Step 1. Select **Component/List/Alarm and Event Display** from the menu bar, set the General properties in the pop-up **Alarm and Event Display** window.



Configuration method is similar to that of the Alarm and Event History component, please refer to [Alarm and Event History](#).

Step 2. Set the **Table**, **Search and Control, Display** properties, and click **OK.**

Detailed configuration method please refer to Alarm and Event History.



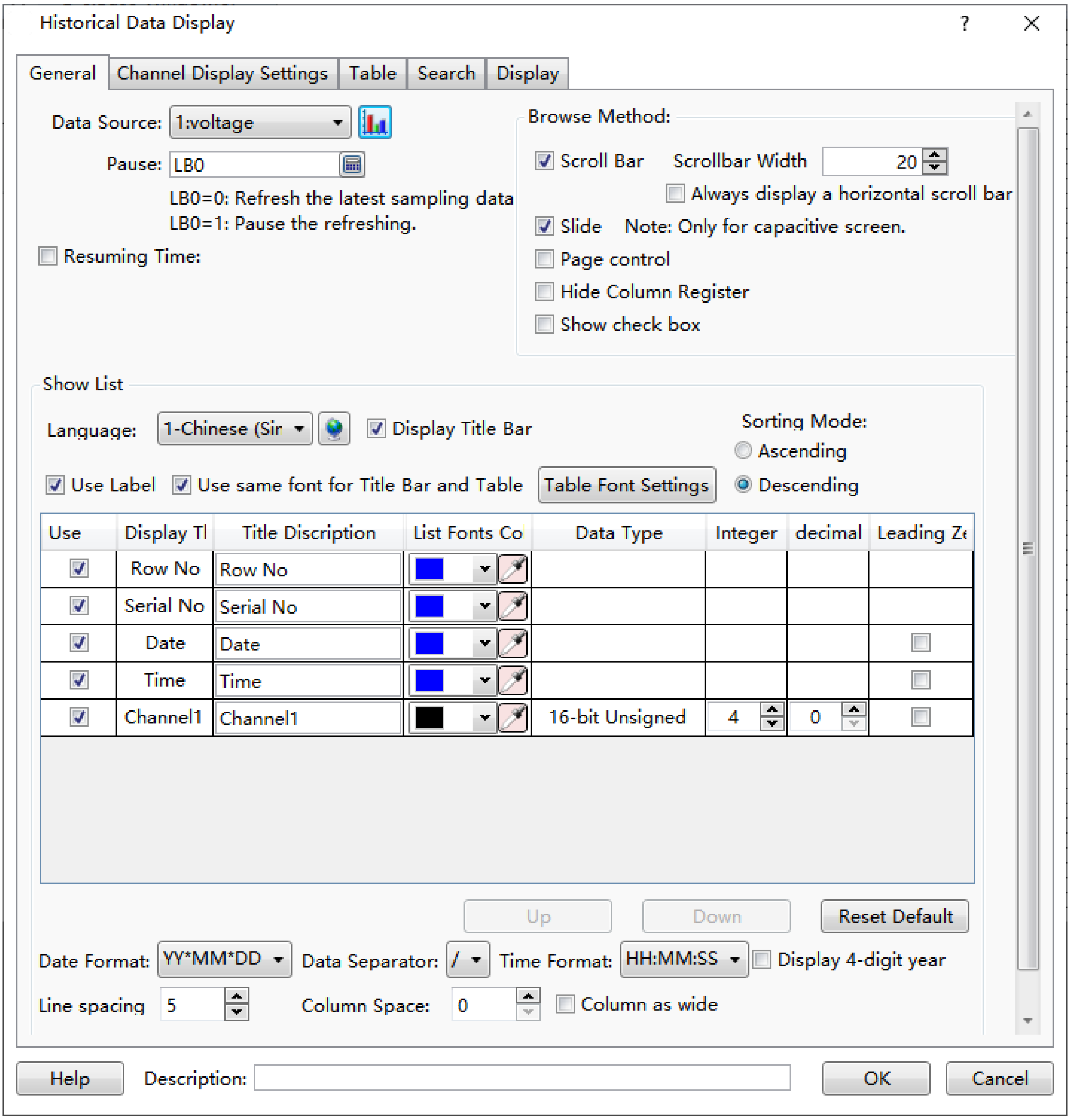
Step 3. Click anywhere in the window to insert the Alarm and Event History with Statistics component.

10.13.2 Historical Data Display

The historical data display component displays the sampling data result in the form of tables, and refresh the results at a set frequency.

The steps to create a historical data display component are as follows:

Step 1. Select **Component/List/Historical Data Display** from the menu bar, set the General properties in the pop-up **Historical Data Display** window.

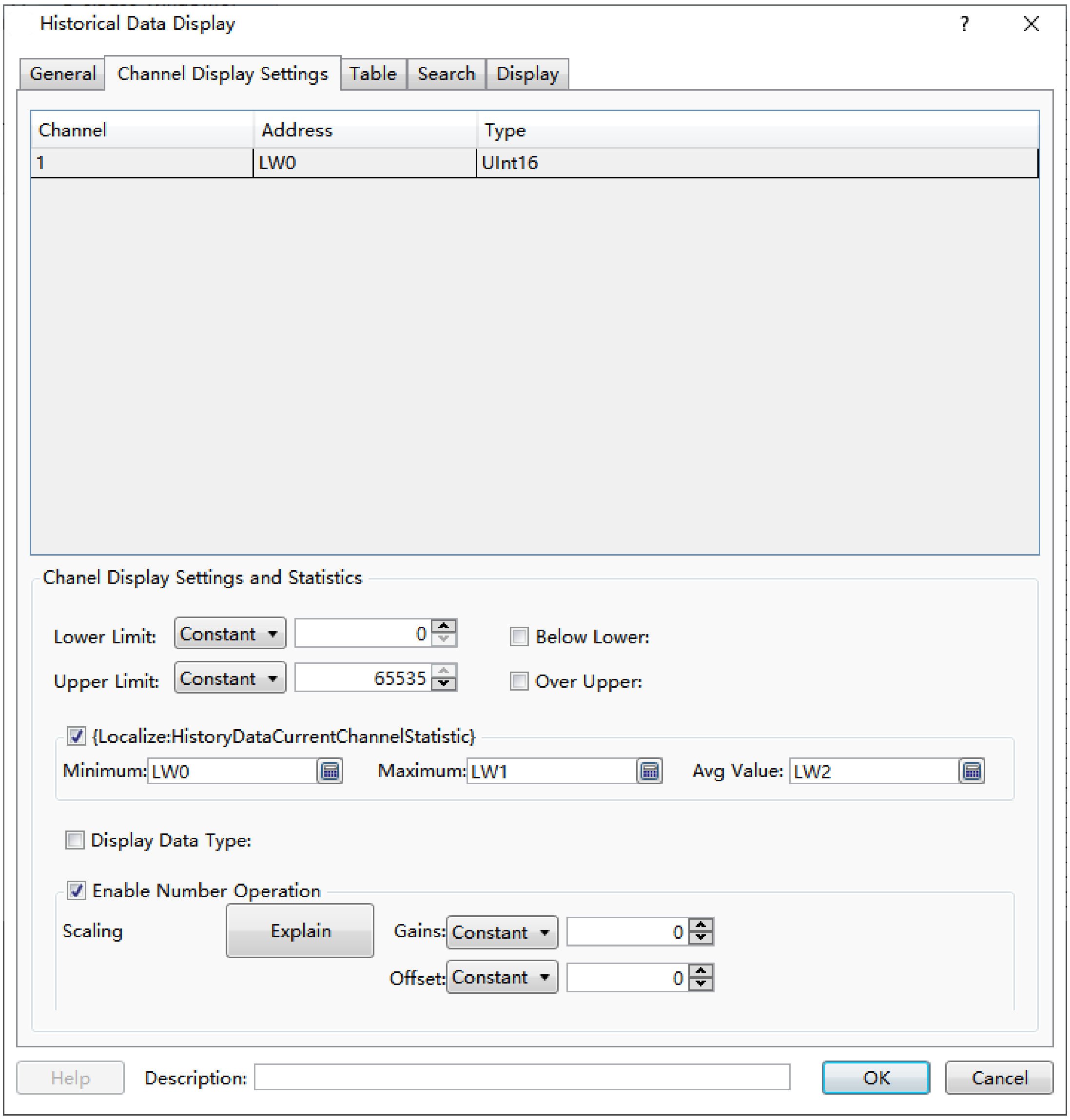


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Data Source	The data is sourced from data sampling. Click the icon to configure data sampling. For detailed information about data sampling, please refer to Data Sampling.
Pause	Set the bit address for pausing the refresh of sampled data. When the value of the bit address is 0, refresh the sampled data. When the value is 1, pause the refresh.

Parameter	Description
Resuming Time	After pausing the refresh, the sampled data will be refreshed again after the designated pause recovery time.
Scrollbar	Click the scroll bar to view the complete history data. The width of the scroll bar can be adjusted.
Slide	Slide the screen to view the complete history data. This feature is applicable only to capacitive HMIs.
Page Control	Turn pages to view the the complete history data. You need to set the word address where the page control information will be stored.
Hide Column Register	Set the address of the column hiding register where the value at that address controls the columns to be hidden (For example, if the word register is set to LW200, when LW.B200.0 is ON, the first column will be hidden; when LW.B200.1 is ON, the second column will be hidden, and so on. Note that the number of columns should not exceed 16, as it may result in a compilation error).
Language	Set the current display language, suitable for scenarios where multiple languages need to be displayed.
Use Label	Whether to use labels to display title bar description information.
Title Description	Set the title bar description information using either labels or text libraries.
Use	Whether to use the corresponding display item.

Step 2. Set the **Channel Display Settings**.

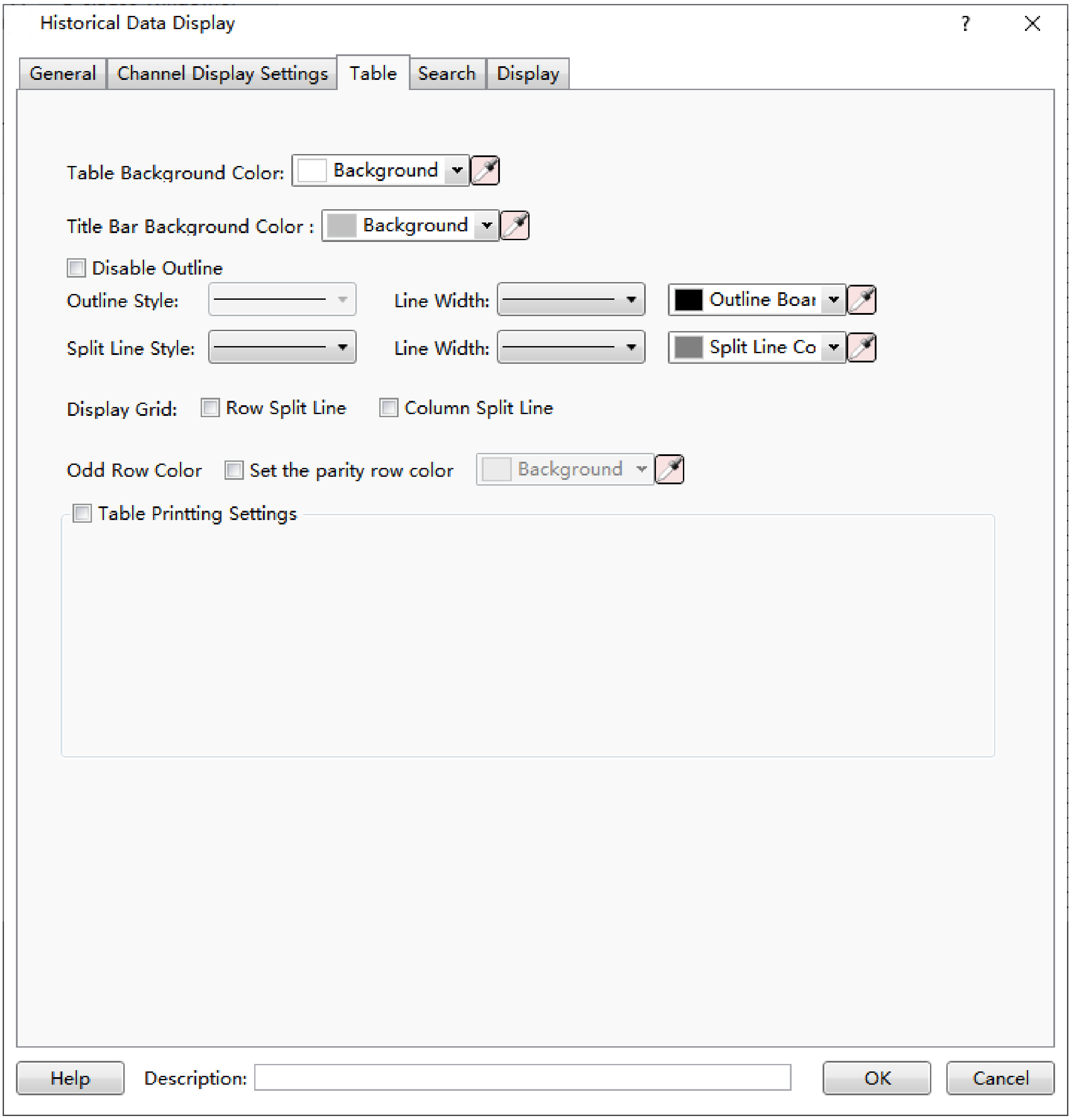


Please refer to the table below for detailed configuration methods.

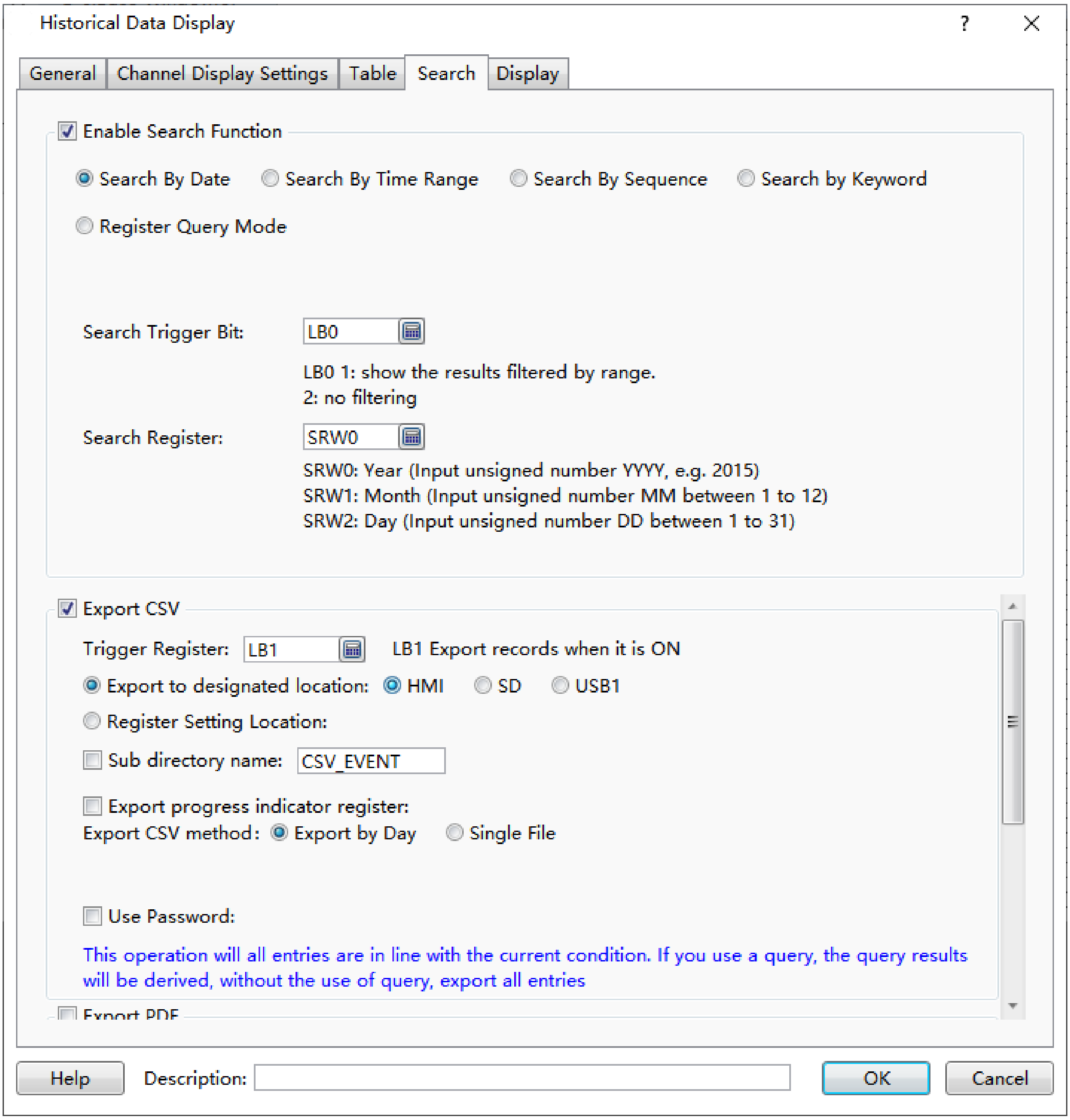
Parameters	**Description**
Lower Limit	Set the lower limit for displaying data, which can be set as a constant or a variable. When the actual sampled data is below the lower limit, the current sampled value will still be displayed, but you can set a color to indicate it is below the limit.
Upper Limit	Set the upper limit for displaying data, which can be set as a constant or a variable. When the actual sampled data is above the upper limit, the current sampled value will still be displayed, but you can set a color to indicate it is above the limit.
Current Channel Statistics	Write the minimum value, maximum value and average value of the current channel statistics to specified word address.

Parameters	Description
Data Display Type	Set the data type for display, including 16-bit binary numbers, 32-bit binary numbers, 16-bit hexadecimal numbers, and 32-bit hexadecimal numbers. You can also set the integer digits for the display.
Enable Nnmber Operation	Value write to PLC = (input value - offset) / gain; HMI display value = (output value * gain) + offset.

Step 3. Draw the table.



Step 4. Select the **Search** tab, and configure relevant parameters.

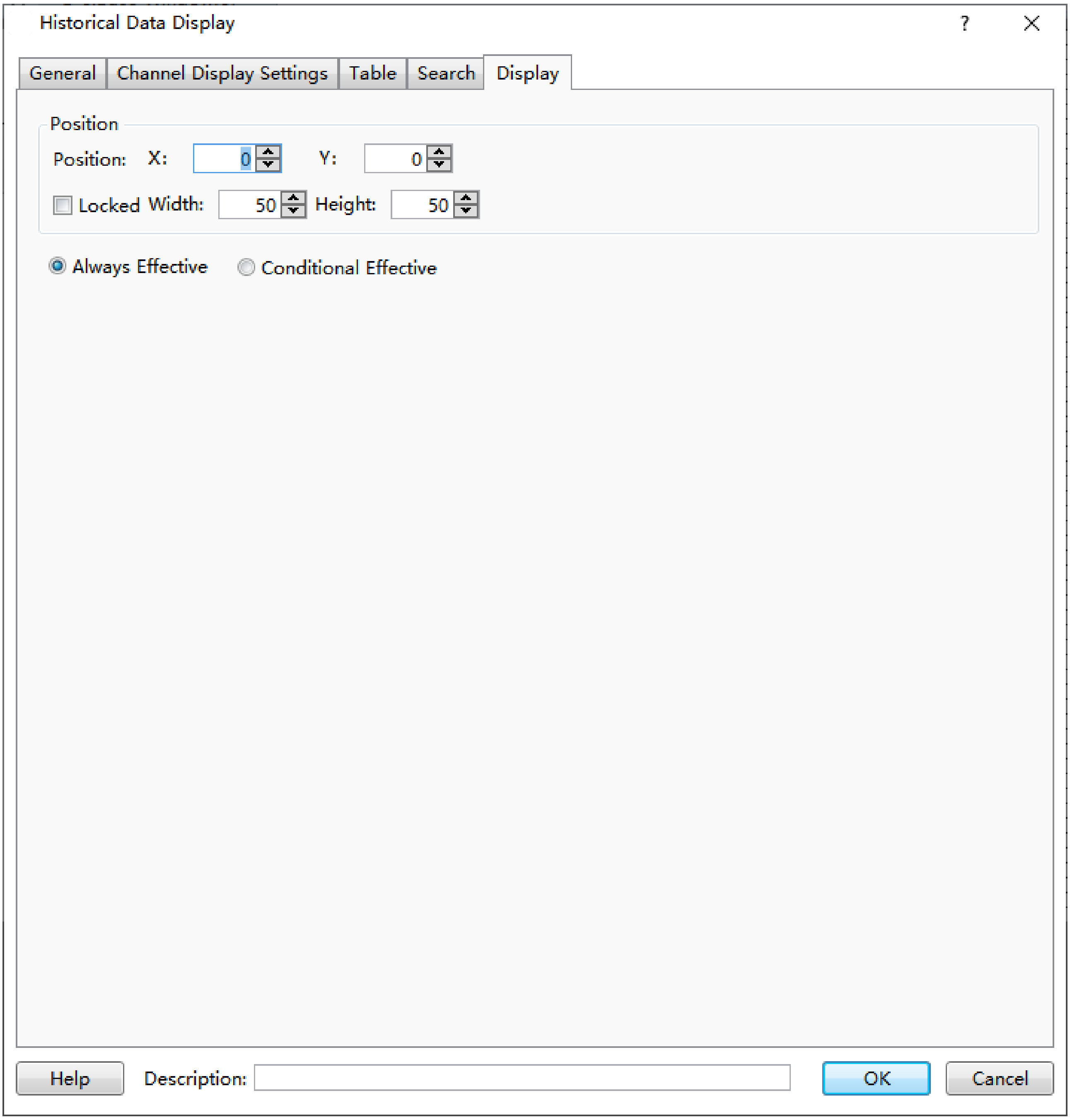


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Enable Search Function	Check **Enable Search Function**, set the search method: ◆ By Date ◆ By Time Range ◆ By Sequence ◆ By Keyword ◆ Register Query Mode: The value of specified word address register determines the query mode. When the value is 0, it represents a query by date. When the value is 1, it represents a query by time range. When the value is 2, it represents a query by sequence. When the value is 3, it represents a query by keyword.
Search Trigger	Set the bit address for triggering the query. When the specified bit address has a value of 1,

Parameter	Description
Bit	display the filtered results based on the query conditions. When the value is 0, do not filter the results based on the query conditions.
Search Register	Set the word address of the query condition register, where the value of the register stores the query conditions.
Trigger Register	Set the bit address of the trigger register. When the value of the bit address is ON, export the data as a CSV file.
Export to designated location	Set the export location for the CSV file, including HMI, SD, and USB1.
Register Setting Location	The value of the specified word address register determines the export location of the CSV file: When the value is 0, export to HMI; When the value is 1, export to SD; When the value is 2, export to USB1.
Sub directory name	When checked, use the value of the specified word address as the filename for exporting the CSV file. For example, if set to LW0, the values of LW0 ~ LW15 will be used as the filename, allowing up to 16 Chinese characters or 32 ASCII characters. If the option to **Use Variable as Subdirectory Name** is not checked, you can customize the subdirectory name, which defaults to CSV_EVENT.
Export Progress Indicator Register	Write the progress value (0-100) of the CSV file export to the progress indicator register. You can customize the word address of this register.
Export CSV Method	◆ Export by day: export history data each day. ◆ Single File: Export all data in a single CSV file.
Use Password	After setting a password, the exported CSV file cannot be displayed properly. To generate a normal CSV file, you will need to use a decryption tool and enter the password. For detailed information about the decryption tool, please refer to Decryption Tool.

Step 5. Set the **Display** properties, click **OK**.



Step 5. Click anywhere in the window to insert the history data display component.

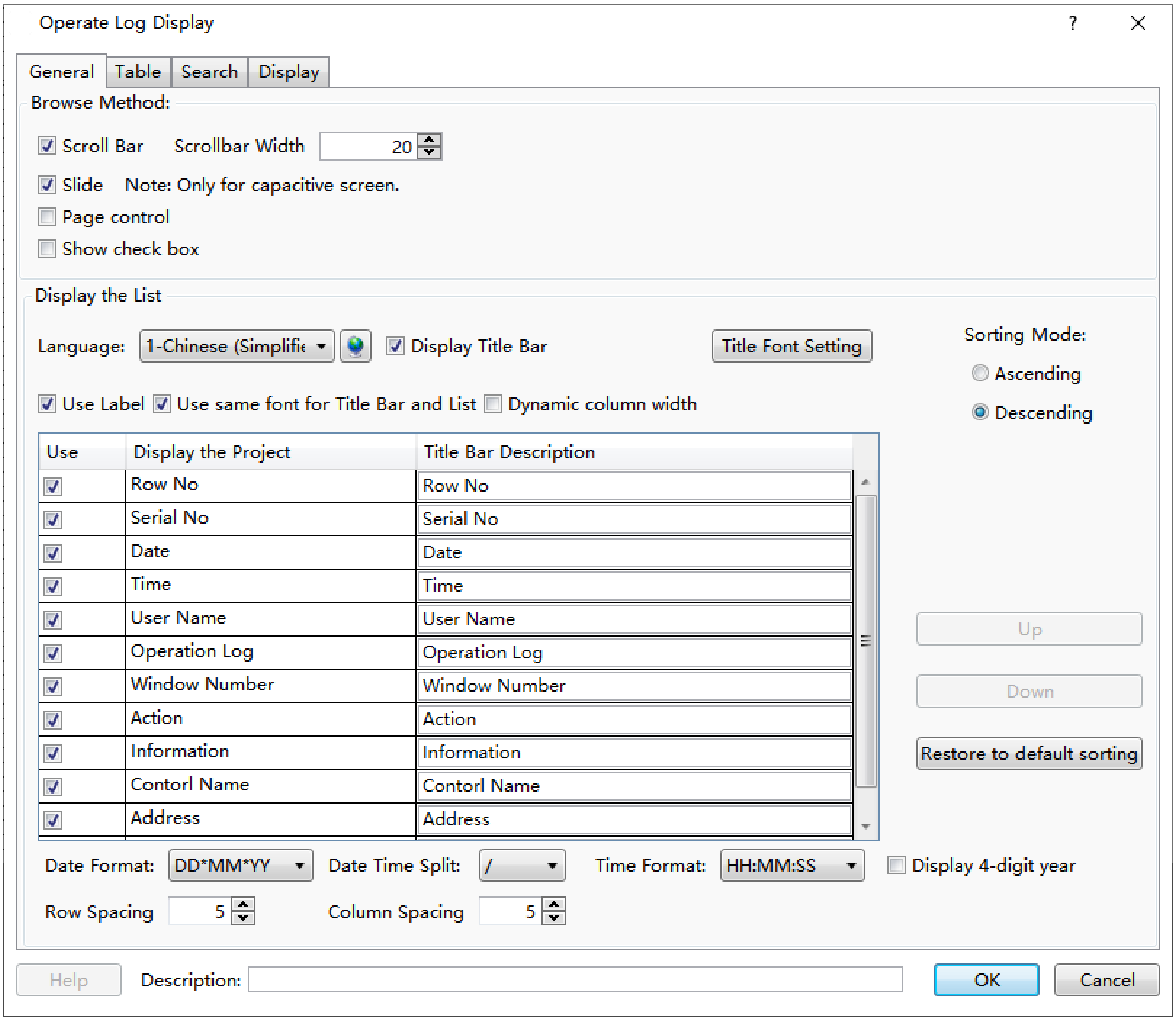
10.13.4 Operation Log

The operation log component displays the user's actions performed on the HMI in the form of a table, including information such as time, username, action, window operated, and the component involved.

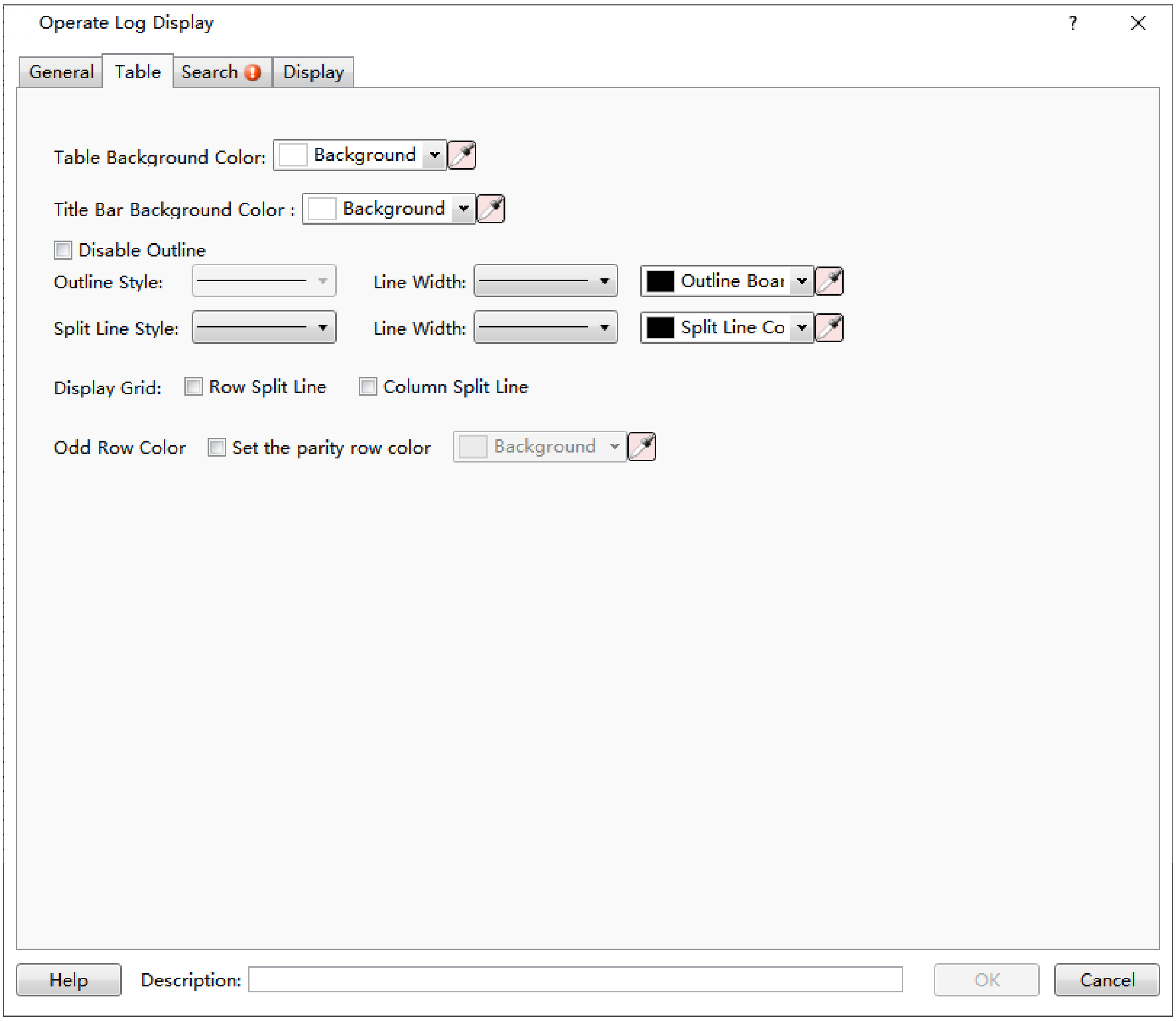
- By default, the component does not log operation history. To enable operation logging for a specific component, you need to enable component operation log funtion in **System Settings/Operation Log** interface.
- The operator's username will only be recorded in the operation log if user privileges are enabled and a user is logged into the HMI. Otherwise, the username field in the operation log will be displayed as empty.

The steps to create an operation log component are as follows:

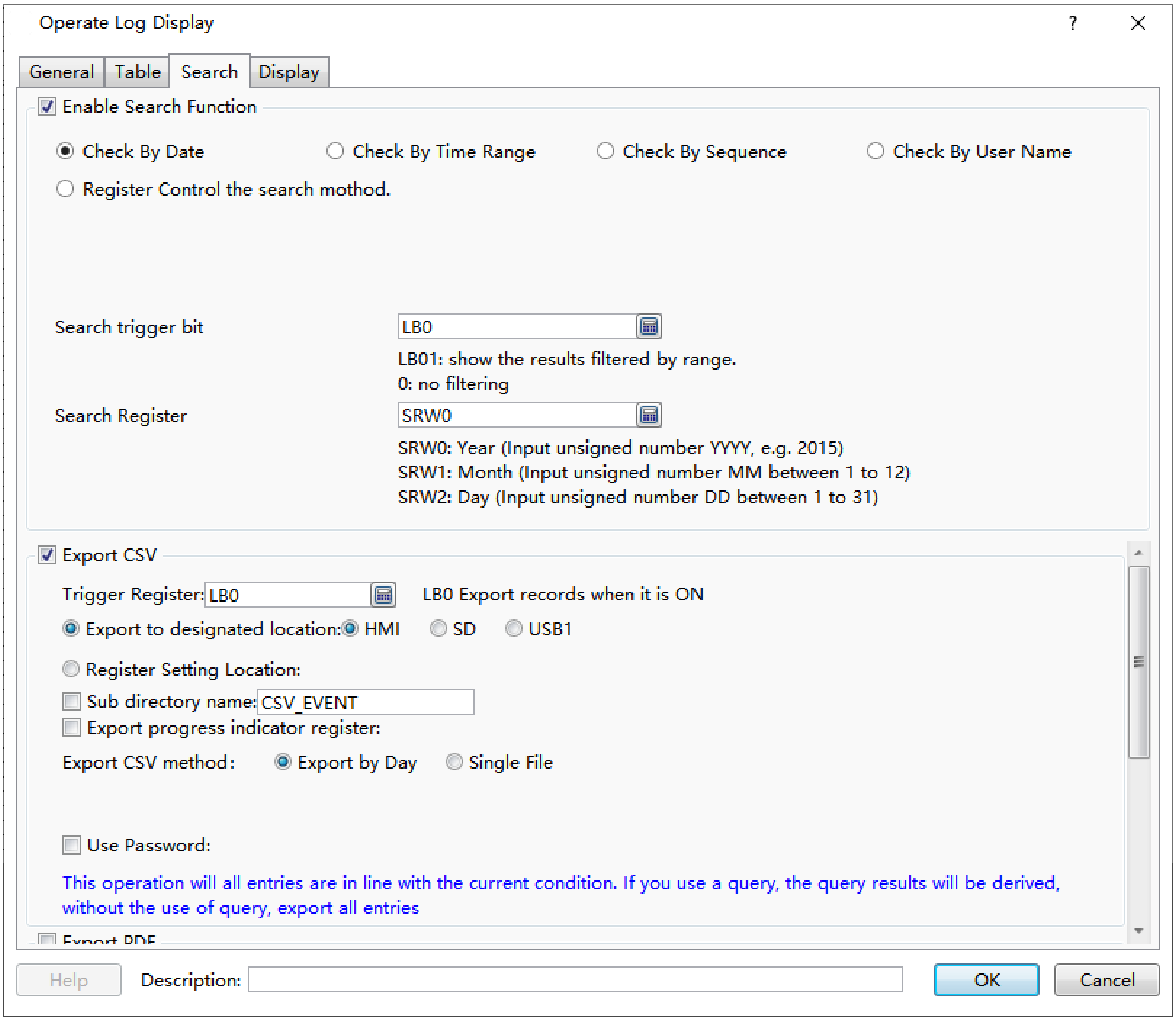
Step 1. Select **Component/List/Operation Log** from the menu bar, set the General properties in the pop-up **Operation Log** window.



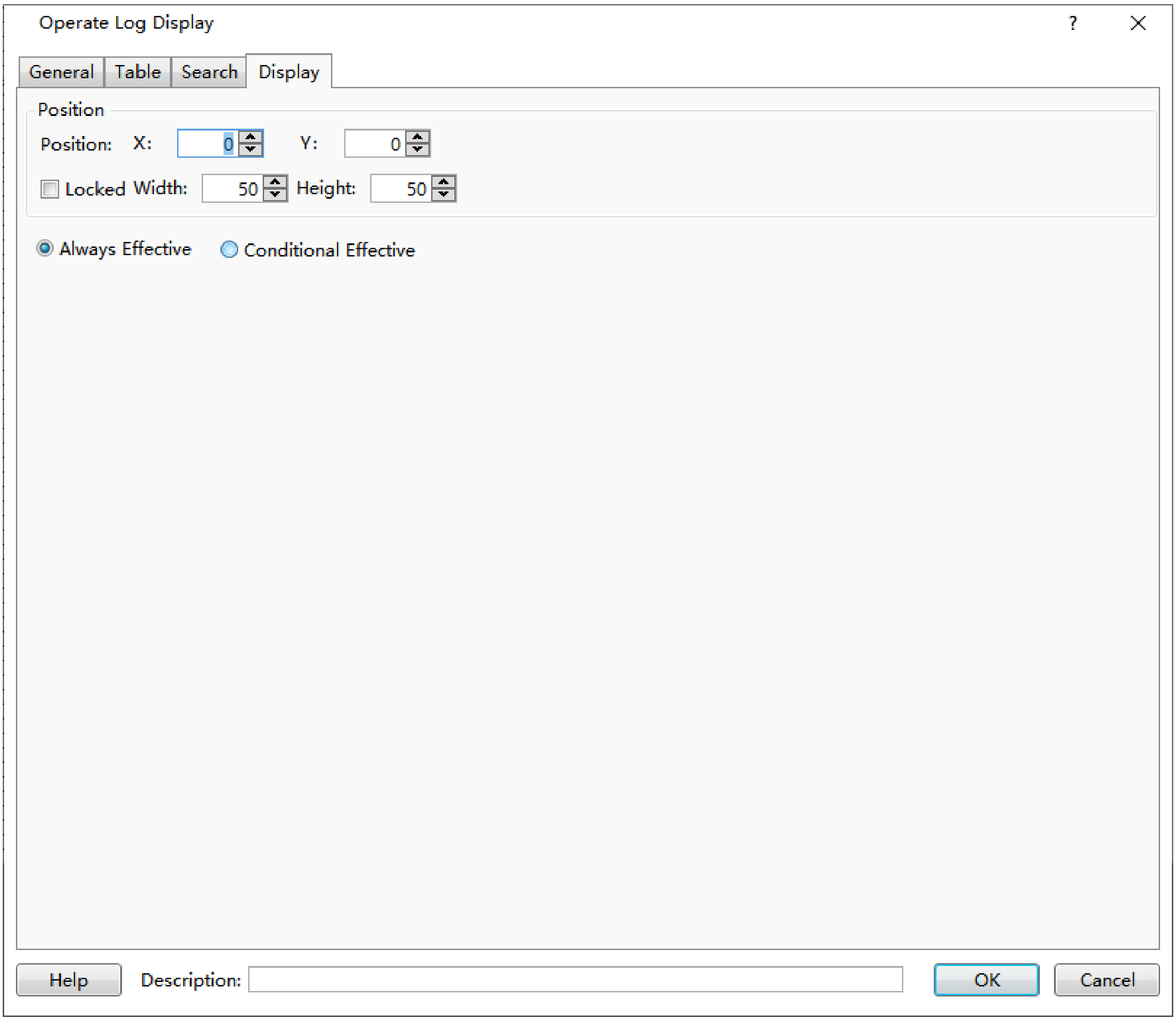
Step 2. Set the background color and outline of the table.



Step 3. Set the **Search** properties.



Step 4. Set the **Display** properties, click **OK**.



Step 5. Click anywhere in the window to insert the operation log component.

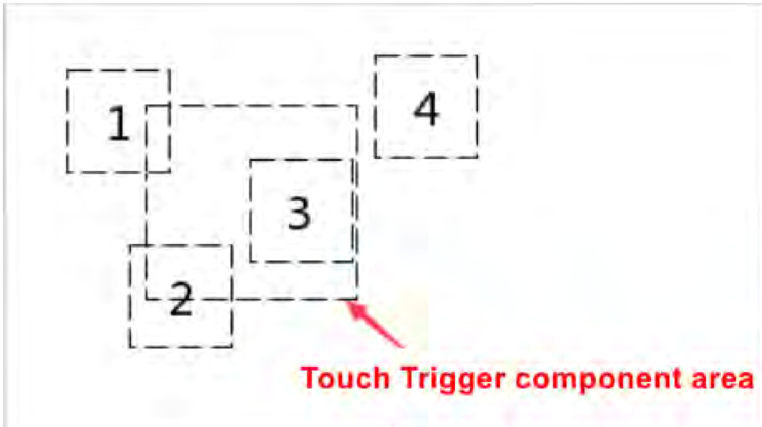
10.14 Tools

VI20Studio provides a range of tool components that enable specific functionalities. These tool components include Touch Trigger, Canvas, Calendar and Clock, QR Code, Barcode, PDF Document/Image, Media Player, and VNC Client.

10.14.1 Touch Trigger

The Touch Trigger component can be used in scenarios where actions of one or multiple components are triggered without directly touching the target components. When the specified register of the Touch Trigger component meets the conditions set for the triggering mode, it can trigger actions (such as a single click) of all components placed within the effective area of the Touch Trigger component.

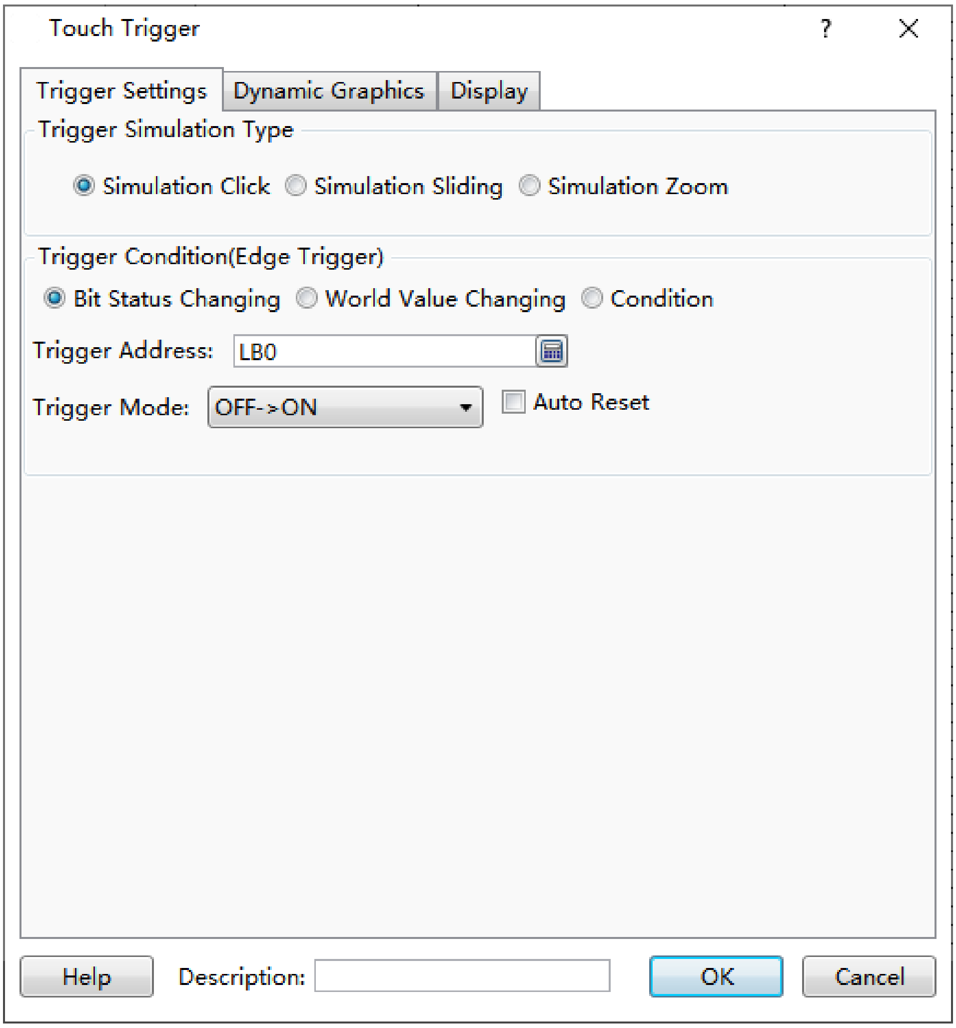
As shown in the diagram below, when the trigger conditions of the Touch Trigger component are met, actions will be triggered for components 1, 2, and 3 that overlap with its region. However, component 4 will not be triggered because it does not overlap with the region of the Touch Trigger component.



The steps to create a new touch trigger component are as follows:

Step 1. Select **Component/Tools/Trigger** from the menu bar, set the General properties in the pop-up **Touch Trigger** window.

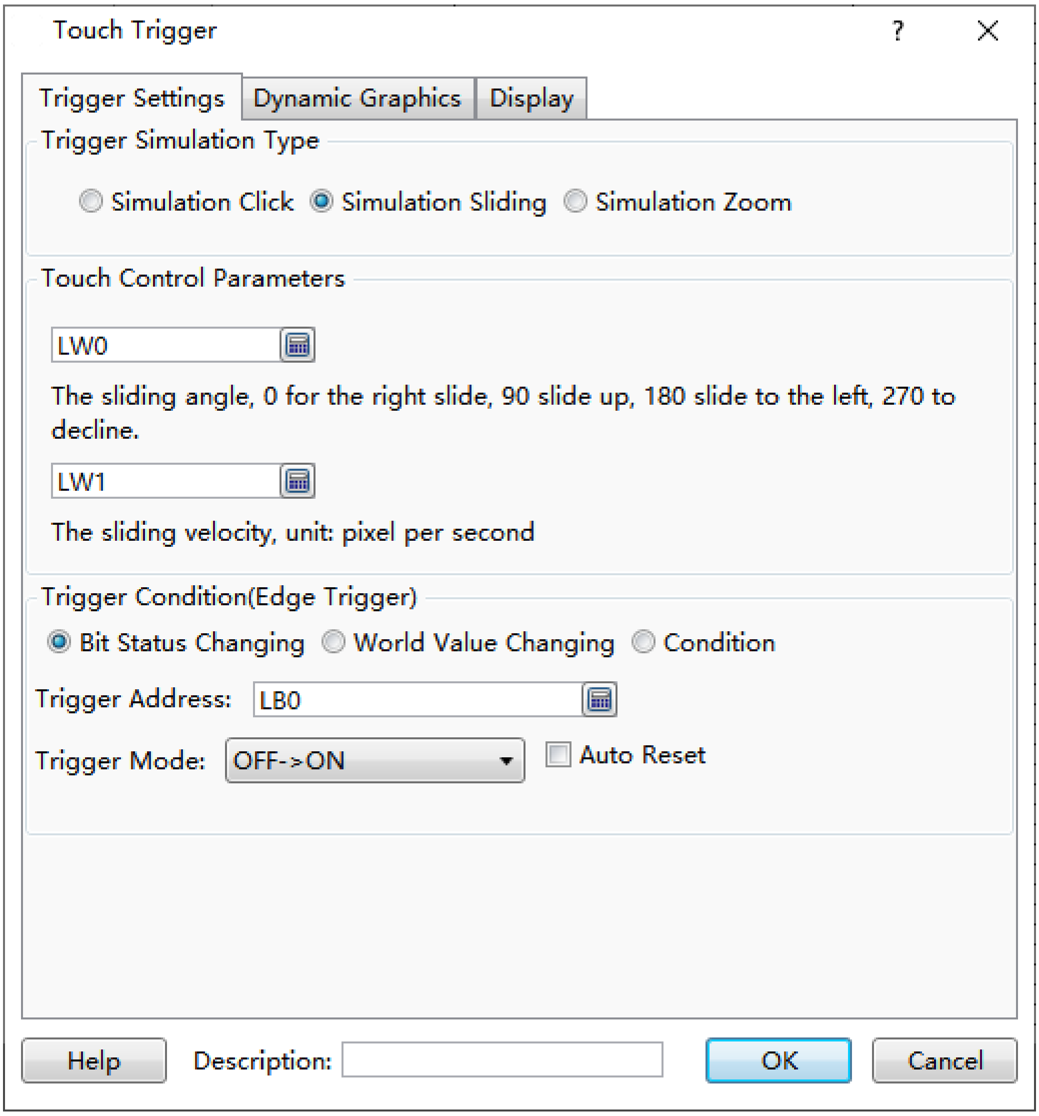
- When trigger simulation type is "Simulation Click"



Please refer to the table below for detailed configuration methods.

Parameters	Description
Simulation Click	When the trigger conditions are met, it simulates a single click the components within the touch trigger region.
Trigger Condition	◆ Bit state changing: refers to the change in state of a specified bit address(such as transitioning from ON to OFF or from OFF to ON) ◆ Word value changing: refers to the change in value of a specified word address . ◆ Condition: meets certain logic conditions (for example, the state of LB0 is ON and the state of LB1 is OFF).

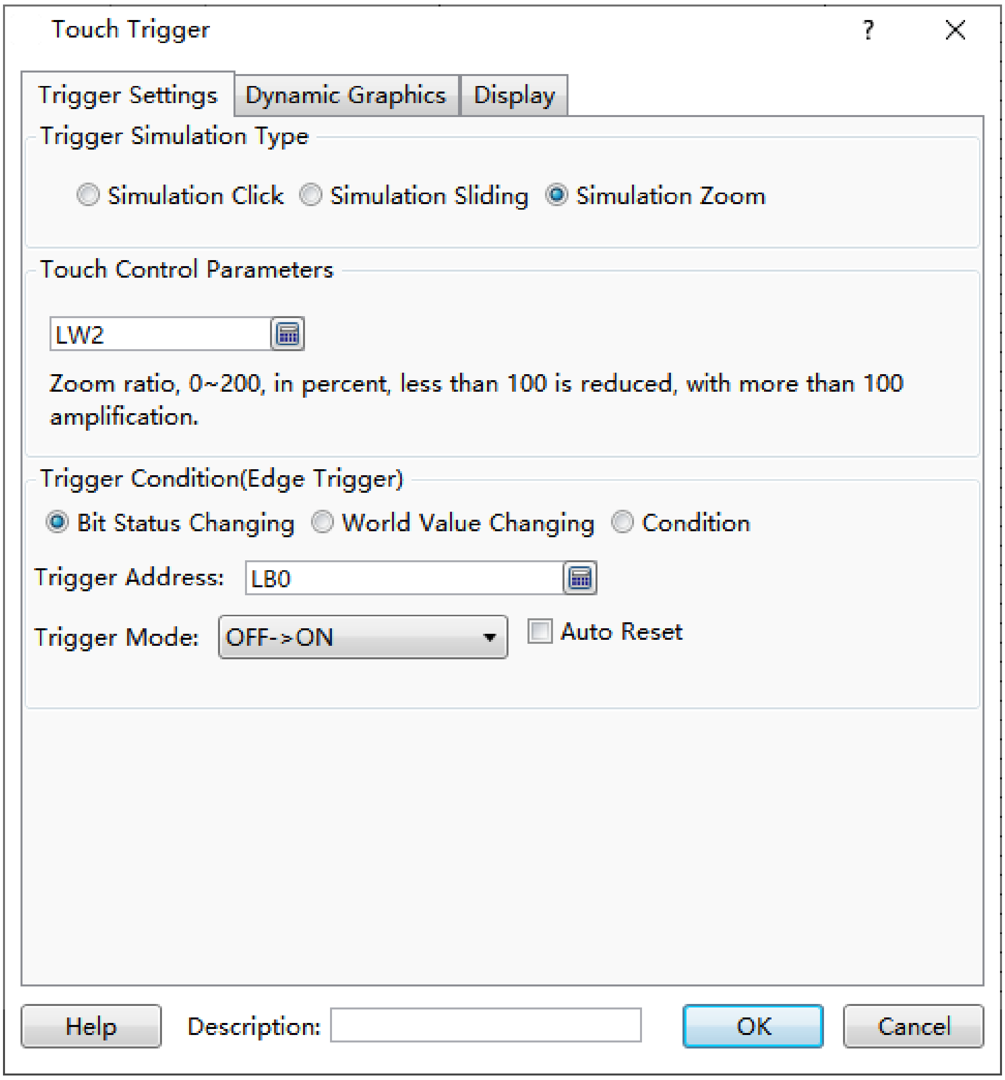
- When trigger simulation type is “Simulation Sliding”



Please refer to the table below for detailed configuration methods.

Parameters	Description
Simulation Sliding	When the trigger conditions are met, it simulates sliding action on the components within the touch trigger region.
Sliding Angle	When the value of the specified word address is 0, it represents a right slide. When the value is 90, it represents an upward slide. When the value is 180, it represents a left slide. When the value is 270, it represents a downward slide.
Sliding velocity	The unit is pixels/second, determined by the value of the specified word address.
Trigger Condition	◆ Bit state changing: refers to the change in state of a specified bit address(such as transitioning from ON to OFF or from OFF to ON) ◆ Word value changing: refers to the change in value of a specified word address. ◆ Condition: meets certain logic conditions (for example, the state of LB0 is ON and the state of LB1 is OFF).

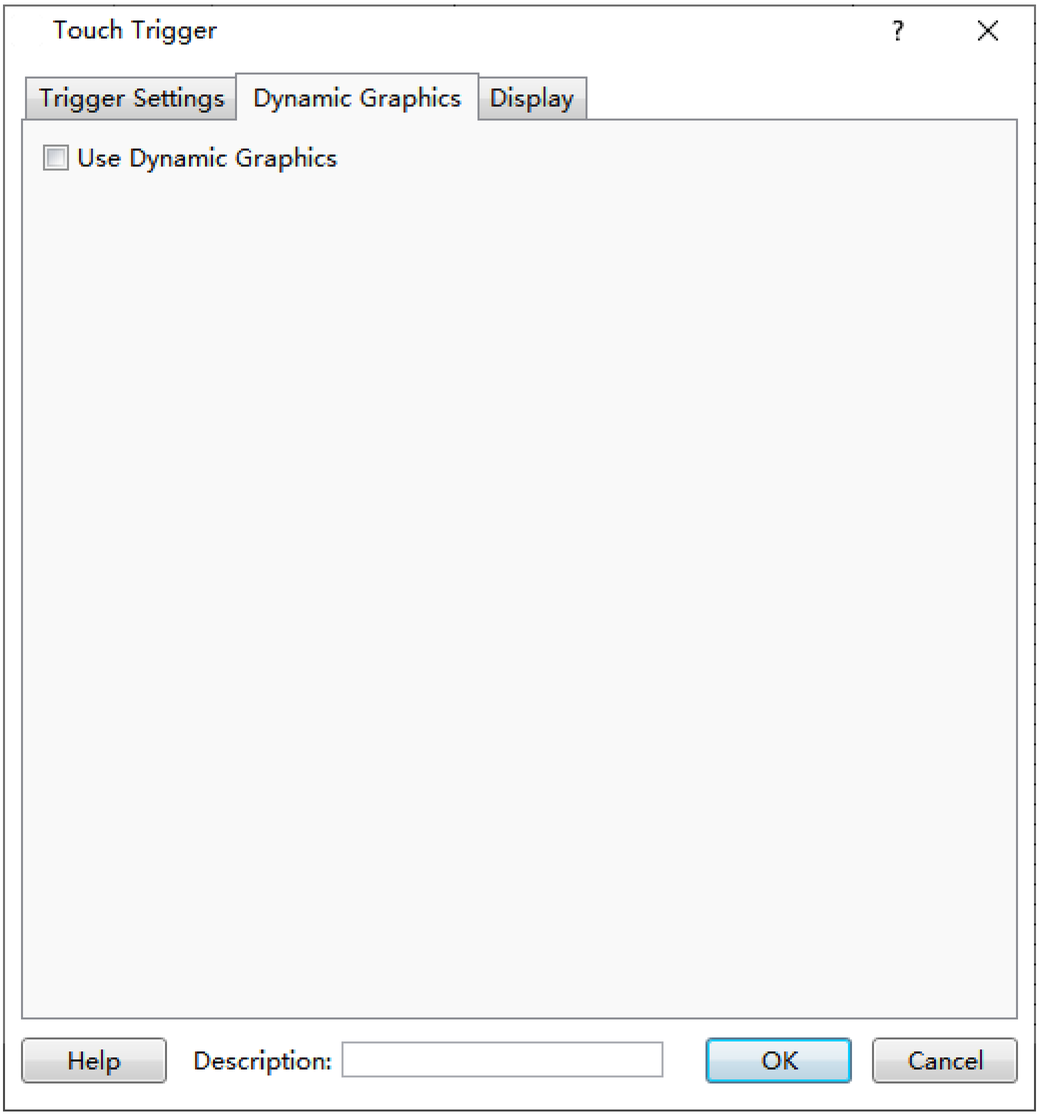
- When trigger simulation type is "Simulation Zoom"



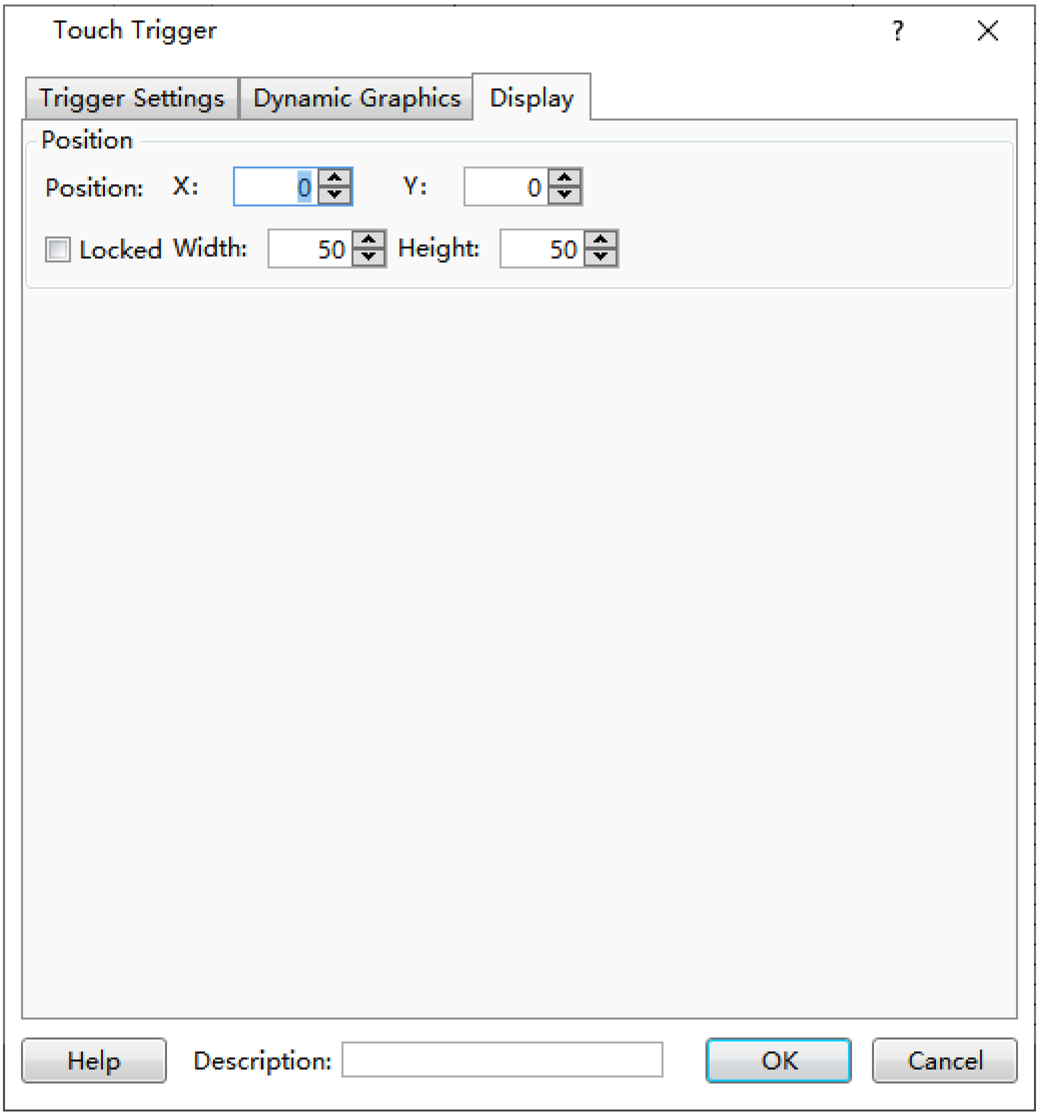
Please refer to the table below for detailed configuration methods.

Parameter	Description
Simulation Zoom	When the trigger conditions are met, it simulates a proportional zoom on the components within the touch trigger region.
Zoom Ratio	Determined by the value of the specified word address. The range of valid values is from 0 to 200, with a unit of percentage. Values less than 100 indicate a zoom-out (reduction) effect, while values greater than 100 indicate a zoom-in (enlargement) effect.
Trigger Condition	◆ Bit state changing: refers to the change in state of a specified bit address(such as transitioning from ON to OFF or from OFF to ON) ◆ Word value changing: refers to the change in value of a specified word address . ◆ Condition: meets certain logic conditions (for example, the state of LB0 is ON and the state of LB1 is OFF).

Step 2. Set the **Dynamic Graphics** properties.



Step 3. Set the **Display** properties, click **OK**.



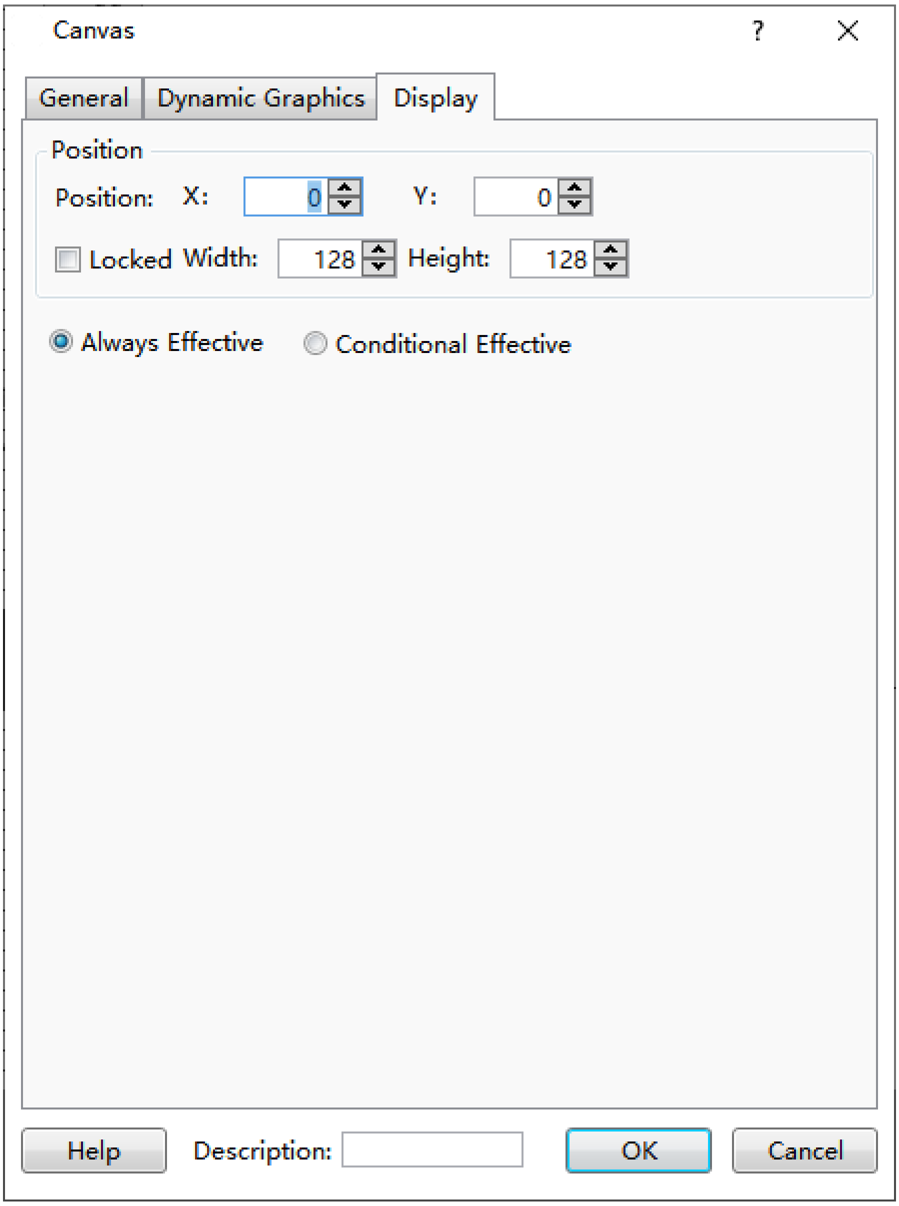
Step 4. Click anywhere in the window to insert the Touch Trigger component.

10.14.2 Canvas

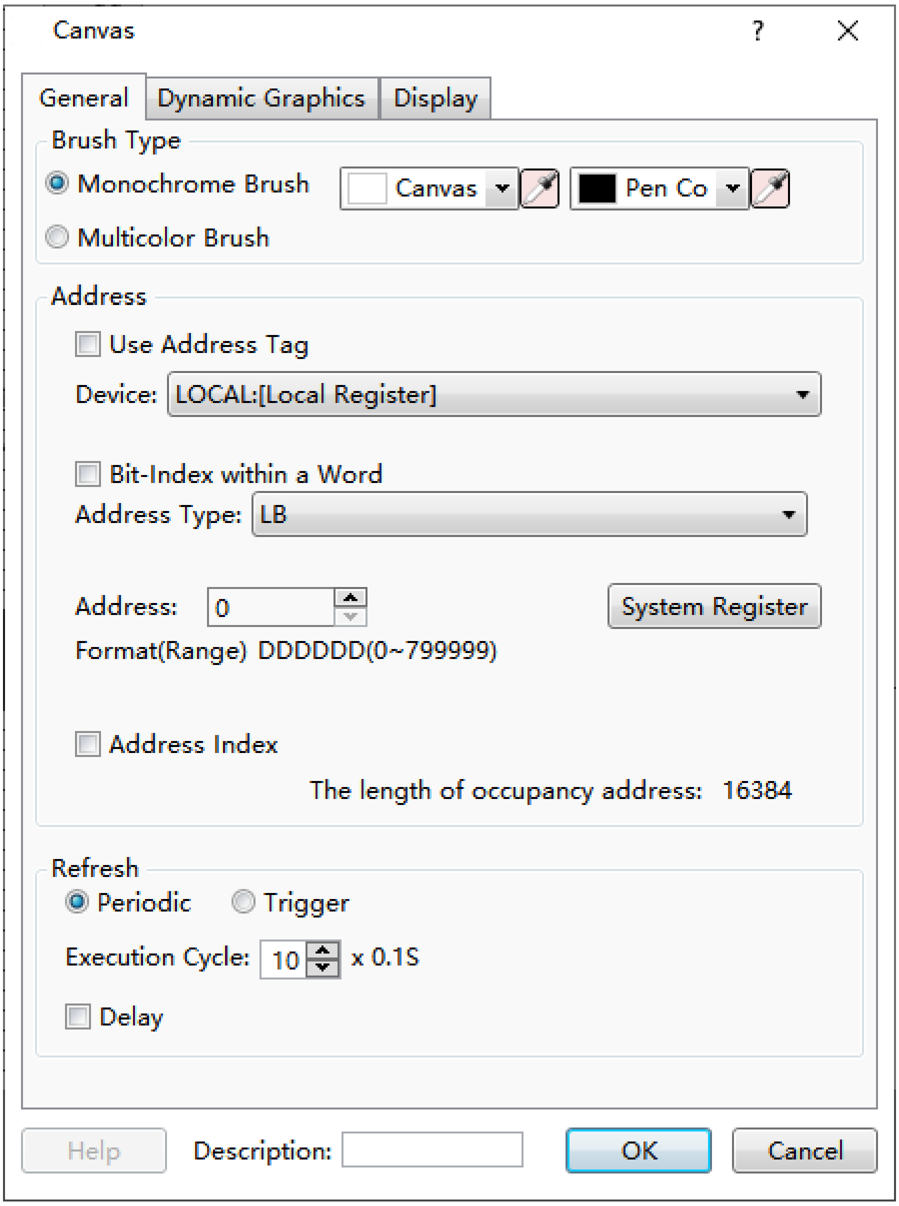
The Canvas component is used to control the background color of window pixels. It includes two types: Monochrome Brush and Multicolor Brush.

10.14.2.1 Monochrome Brush

Step 1. Select **Component/Tools/Canvas** from the menu bar, select the **Display** tab in the pop-up **Canvas** dialog box, set the size of the canvas.



Step 2. Set the General properties.

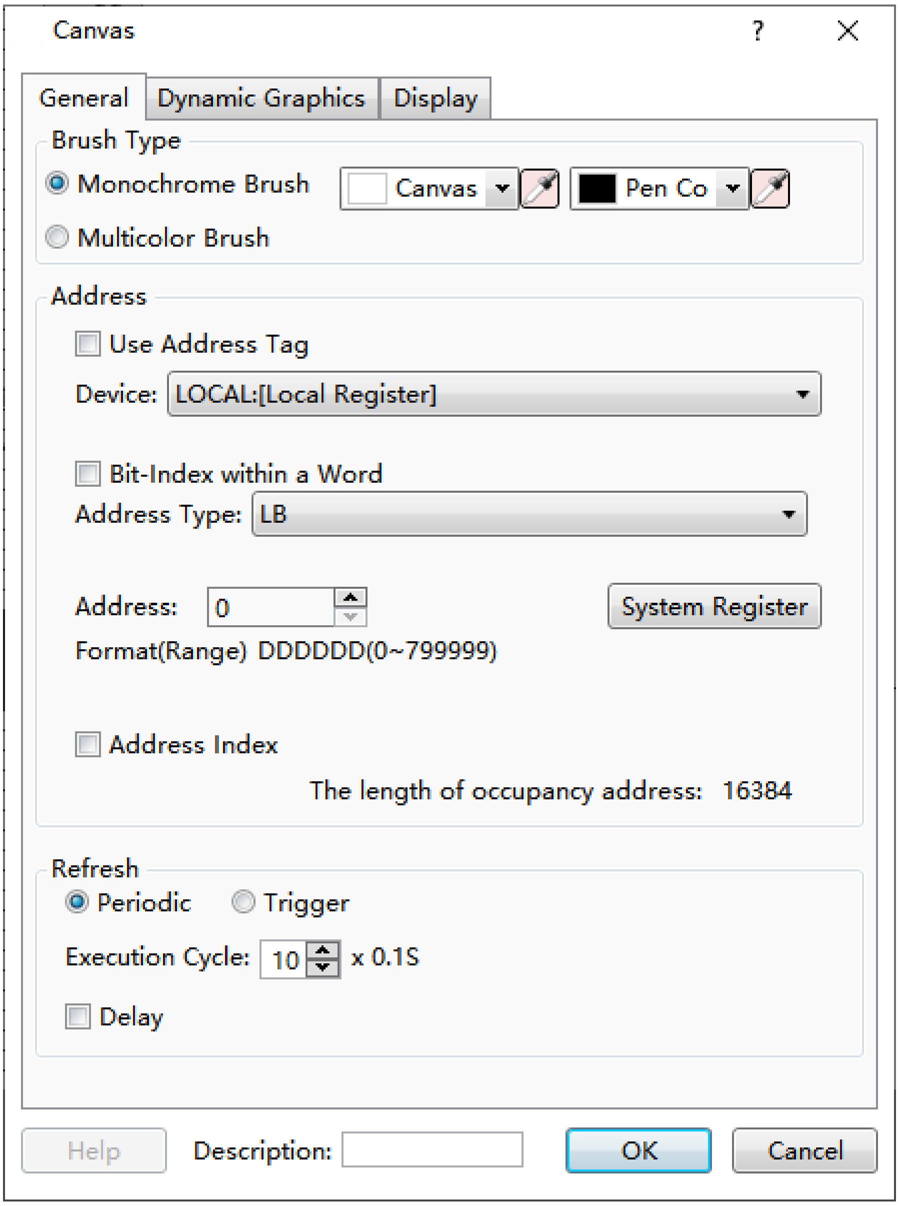


Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Monochrome Brush	Set the canvas color and brush color. The canvas color refers to the color of a pixel when the value of the specified bit address is 0. The brush color refers to the color of a pixel when the value of the specified bit address is 1.
Use Address Tag	Use address tag to represent specific address. For detailed information about address tag, please refer to Address Tag Library.
Device	HMI local register.
Address Type	Bit address type, please refer to the actual situation.
Address	The starting bit address, each bit address represents a single pixel on the canvas.
Bit-index	Each 0 to 15 bit of each word register corresponds to a pixel point on the canvas.

Parameters	Description
within a word	
Periodic	Refresh the canvas color periodically.
Trigger	When the value of the specified bit address changes (for example, from ON to OFF), the canvas color is refreshed.

Step 3. Set the **Dynamic Graphics** properties, click **OK**.



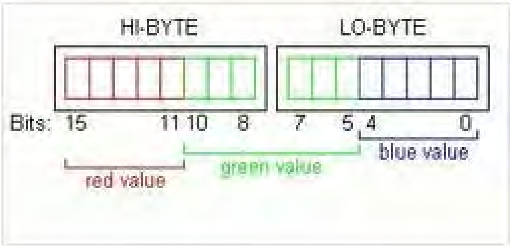
Step 4. Click anywhere in the window to insert a monochrome brush canvas.

10.14.2.2 Multicolor Brush

The default background color of a Multicolor Brush Canvas is white. Each pixel's color on the canvas is controlled using local word address registers. The brush color is automatically determined based on the value of the local word address, which uses the RGB565 format.

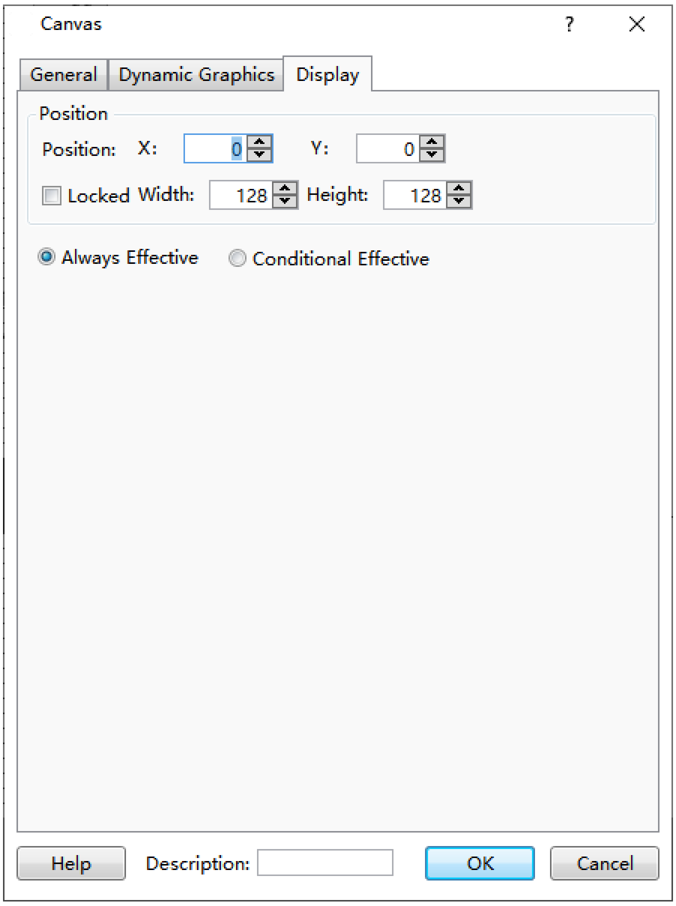
In the RGB565 color mode, each pixel occupies two bytes, where:

- The first 5 bits of the low byte represent the value of the blue color (B).
- The last three bits of the low byte, combined with the first three bits of the high byte, represent the value of the green color (G).
- The last 5 bits of the high byte represent the value of the red color (R).

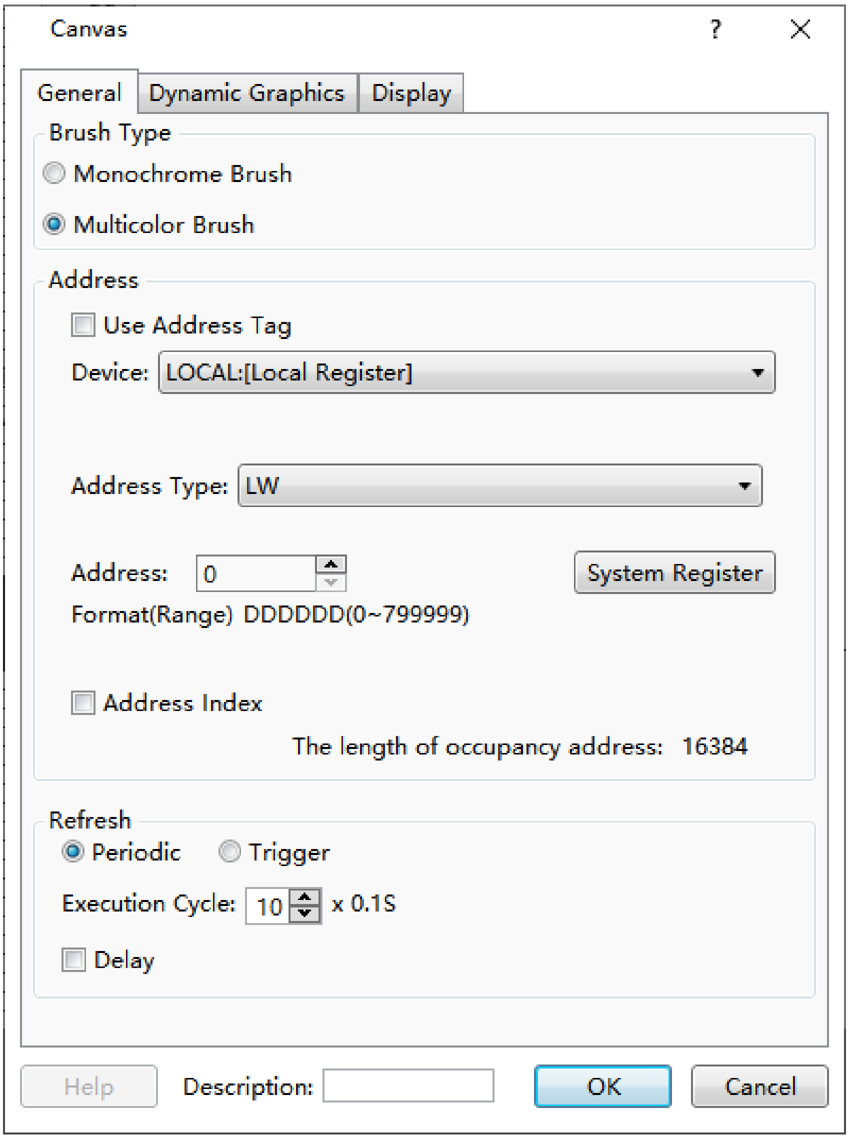


The steps to create a multi-color brush canvas component are as follows:

Step 1. Select **Component/Tools/Canvas** from the menu bar, select the **Display** tab in the pop-up **Canvas** dialog box, set the size of the canvas.



Step 2. Set the General properties.

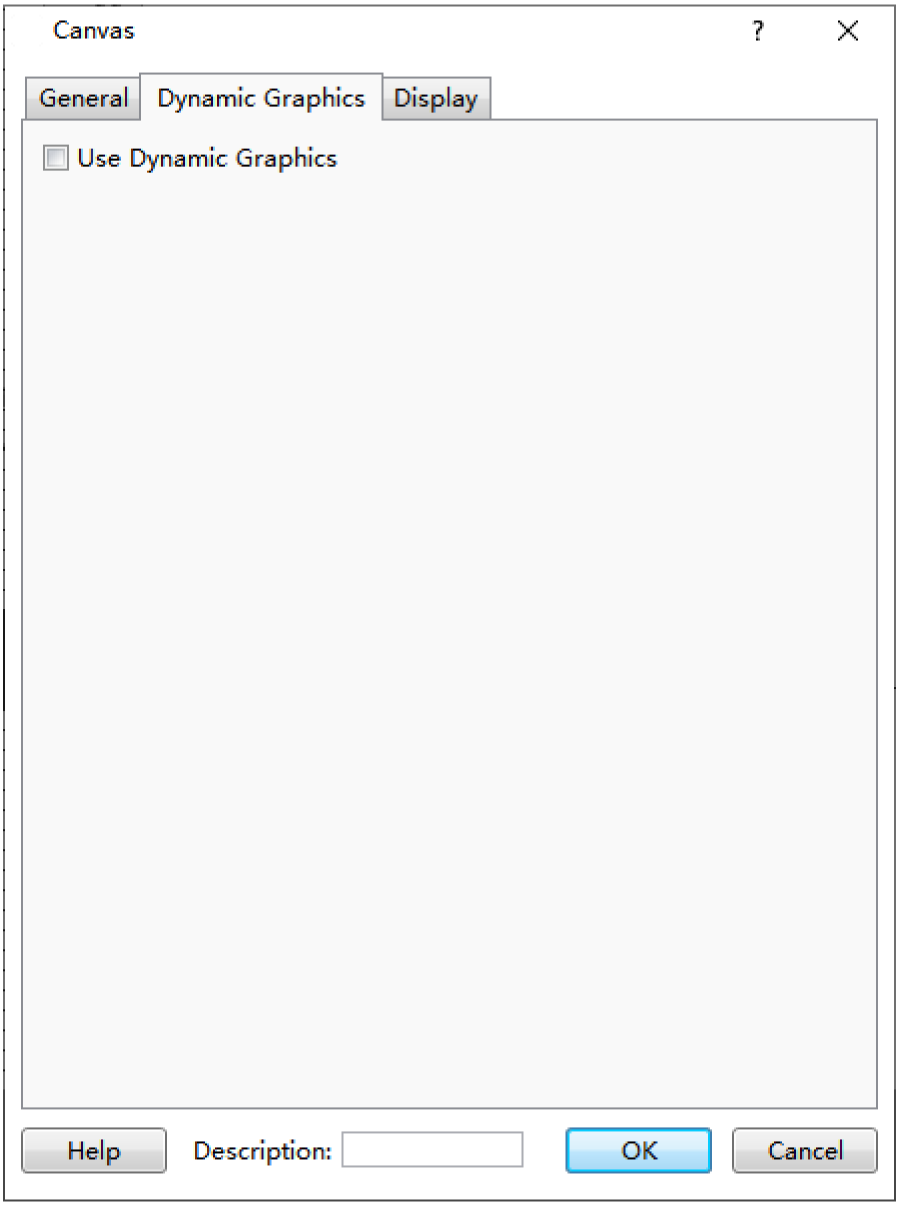


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Multi-color Brush	The value of the specified word address is used to determine the color of each pixel in the canvas, using the RGB565 color mode.
Use Address Tag	Use address tag to represent specific address. For detailed information about address tag, please refer to Address Tag Library.
Device	HMI local register.
Address Type	It is recommended to use LW.
Address	The starting word address, the value of each word address represents the color of a single pixel on the canvas.
Address Index	Use address index to change the current address. For example, if the current address is set to LW1, the address index is LW2, offset is 3, then the actual address is LW(1+*the value of*

Parameter	Description
	*LW*2+3)
Periodic	Refresh the canvas color periodically.
Trigger	When the value of the specified bit address changes (for example, the state of LB0 changes from ON to OFF), the canvas color is refreshed.

Step 3. Set the Dynamic Graphics properties, click **OK**.

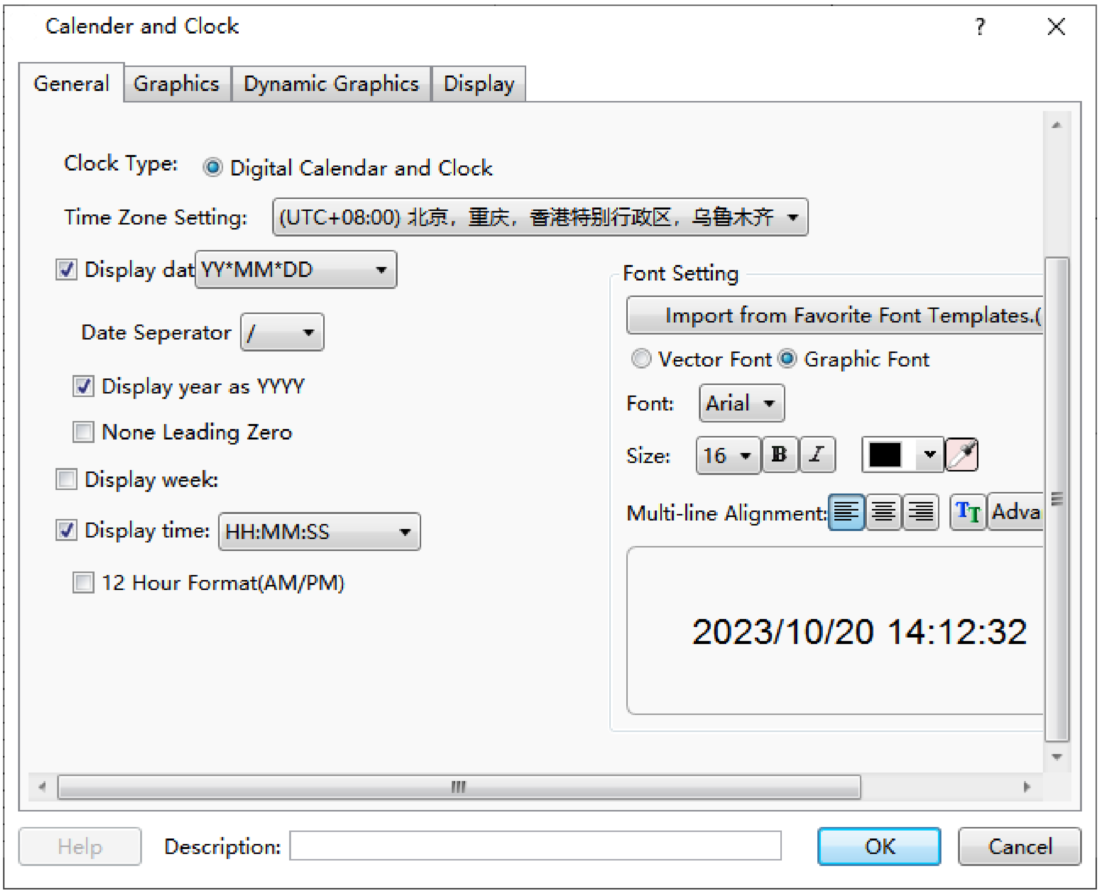


Step 4. Click anywhere in the window to insert the multicolor brush canvas component.

10.14.3 Calendar and Clock

The Calendar and Clock components are used to display the current date and time. The steps to create a new Calendar and Clock component are as follows:

Step 1. Select **Component/Tools/Calendar and Clock** from the menu bar, set the General properties in the pop-up dialog box.

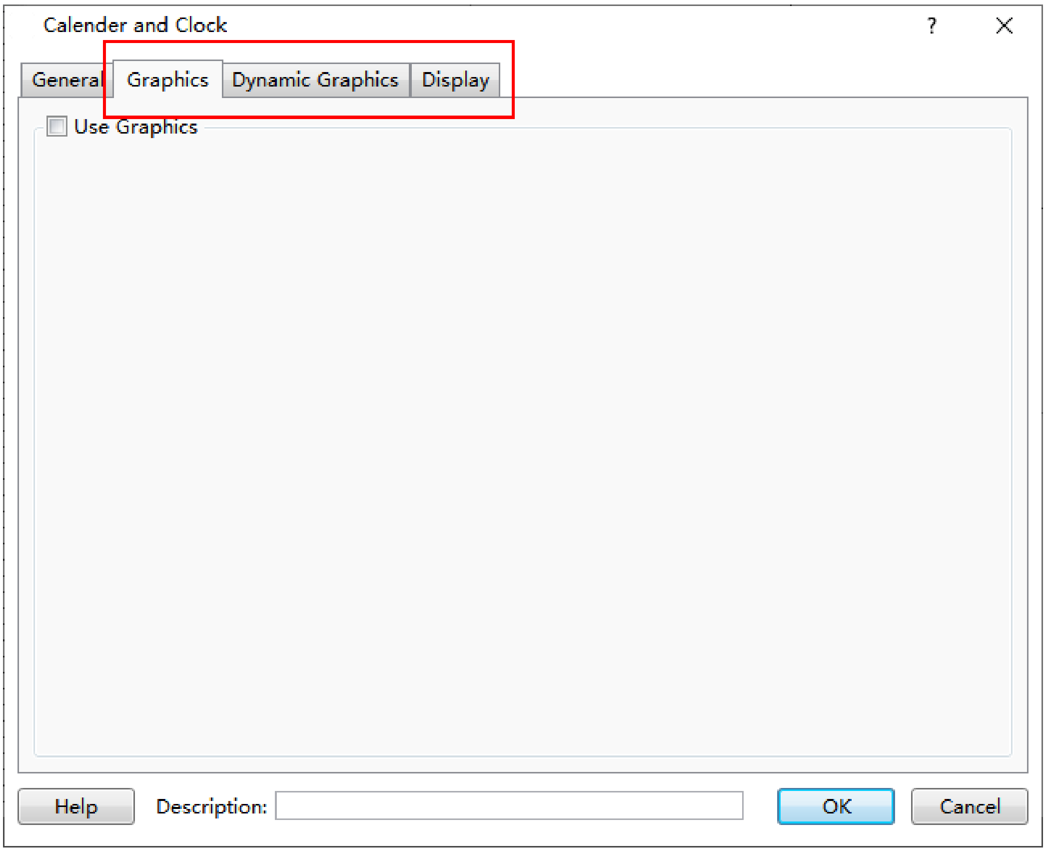


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Time Zone Setting	Please refer to the actual situation.
Display Date	Display the current date. Date formats include YY*MM*DD, MM*DD*YY and DD*MM*YY.
Date Separator	Used to separate year, month and date, including “/”, “.”, “-”.
Display year as YYYY	Display as YY in default. For example 2023 will be display as “23”. When display as YYYY, it will display “2023”.
None Leading Zero	Display two digits for month and date in default. For example, February will be display as “02”, after clearing 0 it will be “2”.

Parameter	Description
Display Week	For example, Tuesday will be display as “Tue”.
12-Hour Format	It’s 24-hour format by default. You can choose 12-hour format.
Vector Font	The characters in the font library are in the form of vector graphics. When the character encoding is Unicode, it is necessary to select a vector font.
Graphic Font	The entire string is treated as a whole and can be captured as a bitmap, which can then be saved in the project.

Step 2. Set properties such as **Graphics**, **Dynamic Graphics**, **Display**, click **OK**.



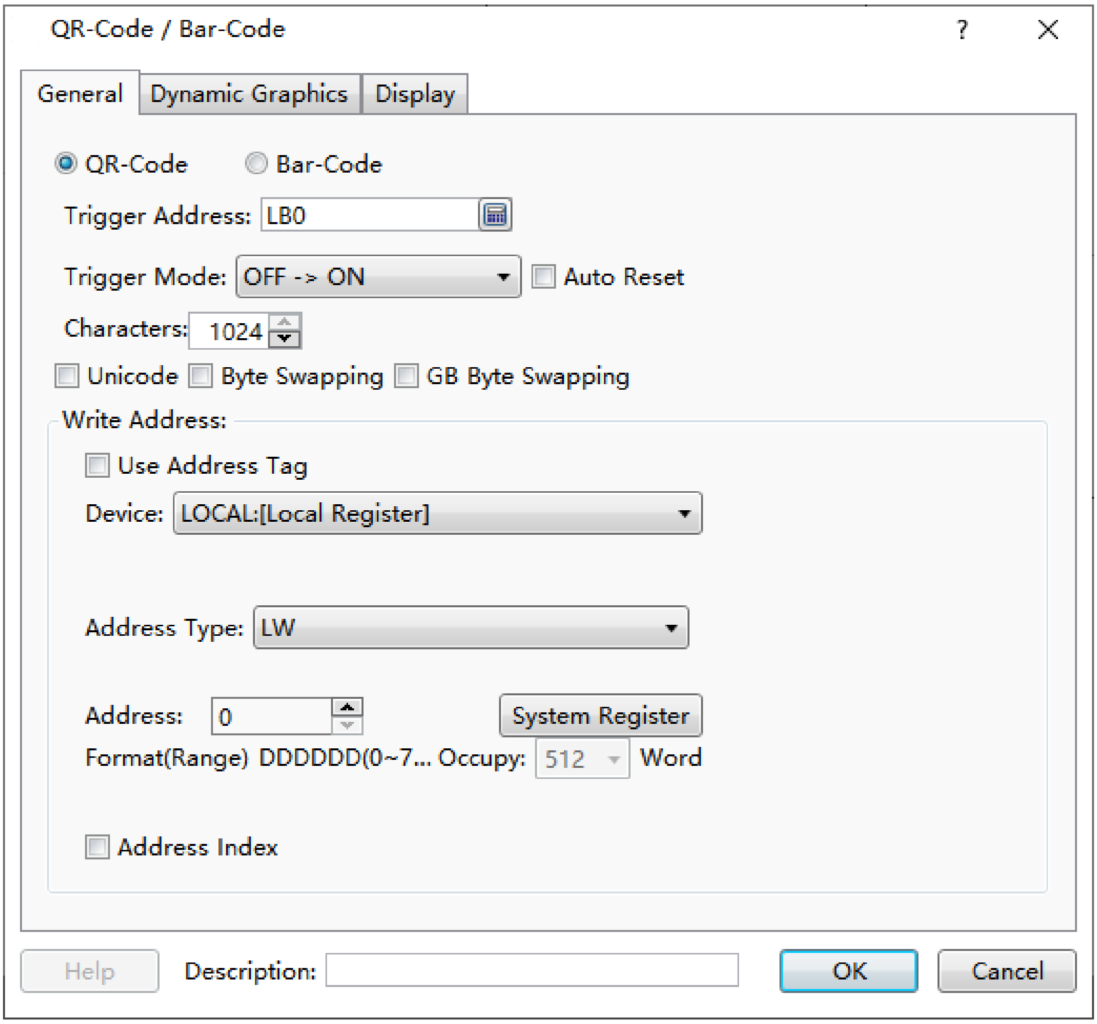
Step 3. Click anywhere in the window to insert the calendar and clock component.

10.14.4 QR Code

QR(Quick Response) code, also known as a two-dimensional barcode, is a type of encoding method. It can store more information compared to traditional barcodes and can represent a wider range of data types.

The steps to create a QR code component are as follows:

Step 1. Select **Component/Tools/QR-Code/Bar-Code** from the menu bar, set the General properties in the pop-up dialog box.



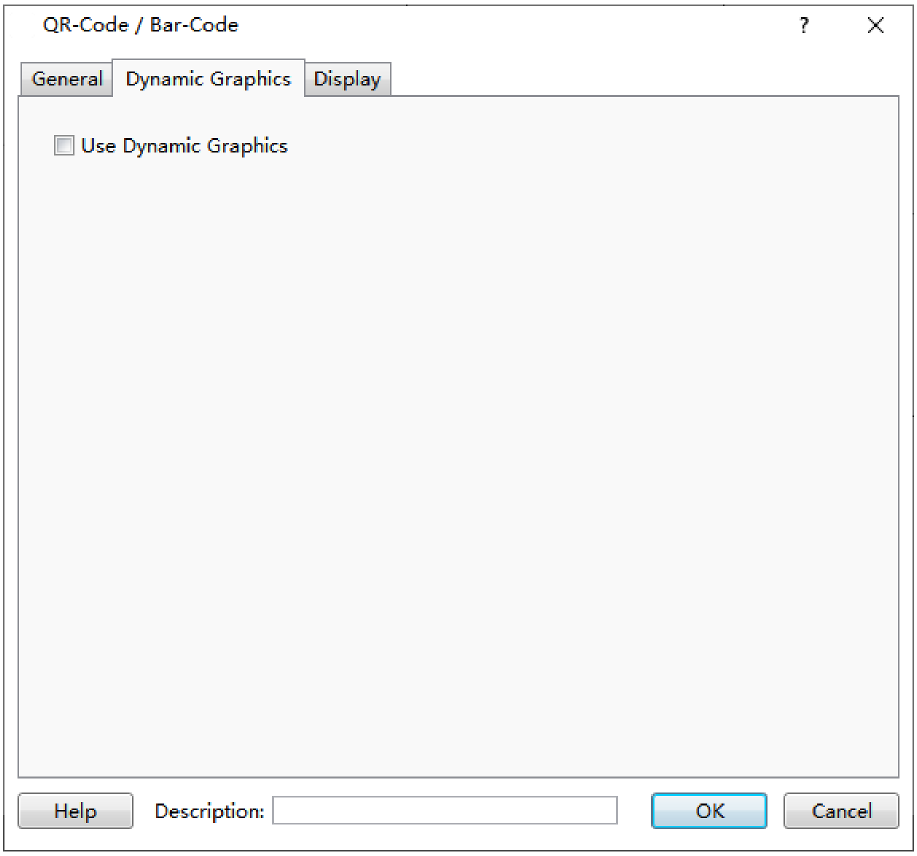
Please refer to the table below for detailed configuration methods.

Parameter	**Description**
QR-Code	QR code component.
Trigger Address	Trigger bit address.
Trigger Mode	The value of the specified bit address changes from ON to OFF, from OFF to ON, or undergoes a state change (including transitioning from ON to OFF and from OFF to ON).
Characters	Number of characters of a QR code. When using Unicode encoding, the maximum number of characters supported is limited to 512.
Unicode	Check **Unicode** to use Unicode encoding. ASCII encoding is used by defalt.

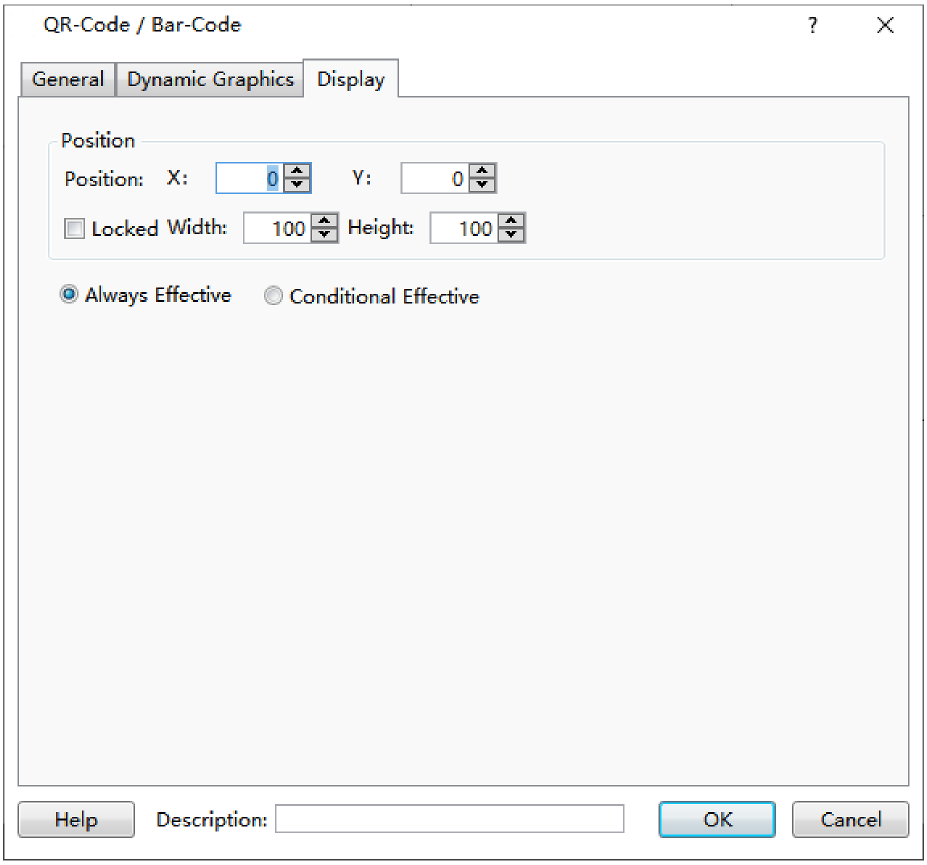
Parameter	Description
Byte Swapping	Take the character encoding of the **Write Address**, swap the positions of the high byte and low byte, and generate a QR code with the modified encoding.
GB Byte Swapping	Using the GB2312 encoding, swap the positions of the high byte and low byte, and generate a QR code with the modified encoding.
Write Address	The starting value of the word address is written, and the value of the specified word address is written into the QR code.
Device	HMI register or PLC register.
Address Type	Word address register type, including LW, RW, SRW etc.
Address	Start word address.
Use Address Tag	Use address tag to represent specific address. For detailed information about address tag, please refer to Address Tag Library.
Address Index	Use address index to change the current address. For example, if the current address is set to LW1, the address index is LW2, offset is 3, then the actual address is LW(1+*the value of LW2*+3)

Step 2. Set the Dynamic Graphics properties

To facilitate easy scanning of QR code, it is not recommended to use dynamic graphics.



Step 3. Set the **Display** properties, click **OK**.



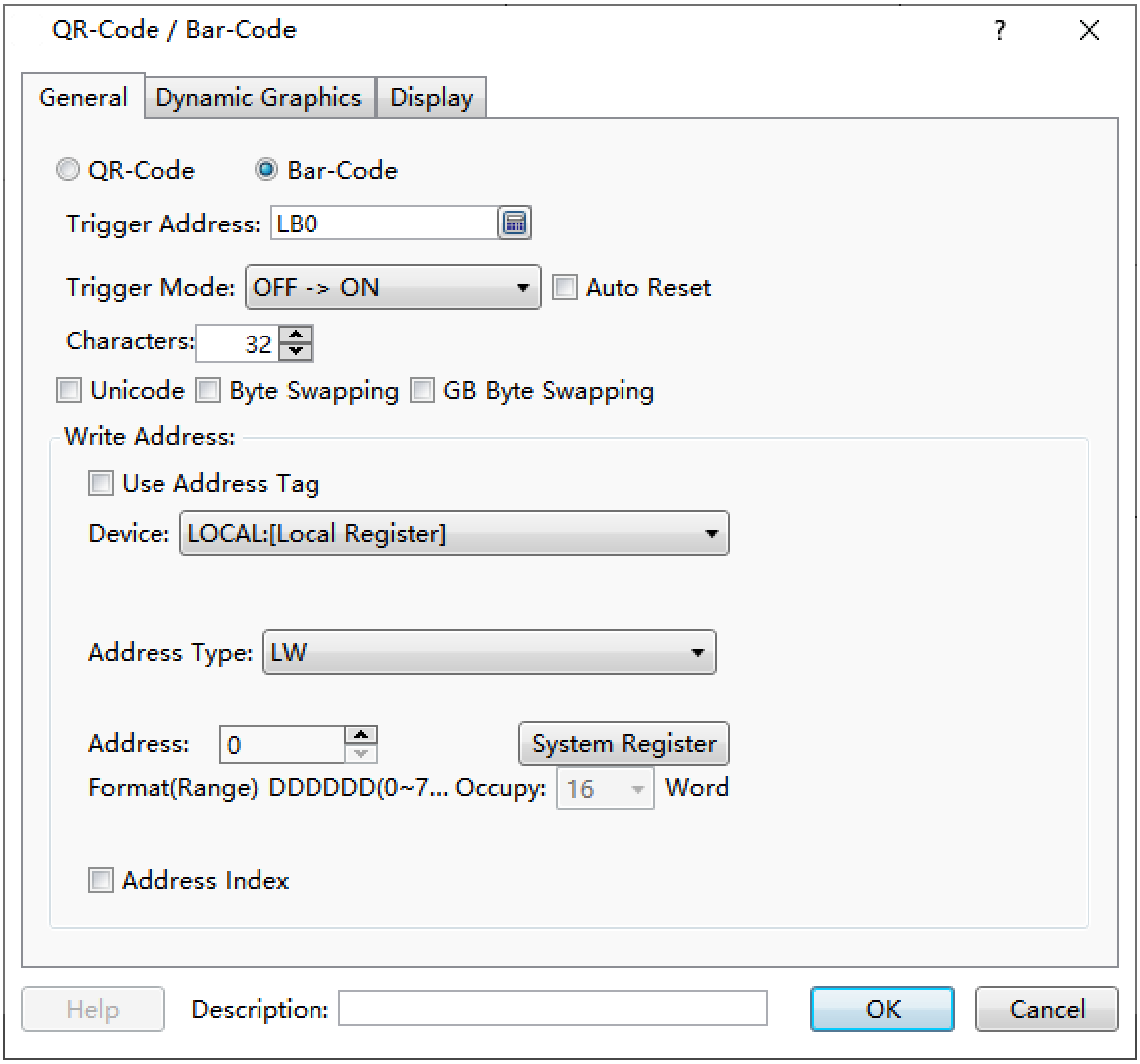
Step 4. Click anywhere in the window to insert the QR code component.

10.14.5 Barcode

Barcode is a graphical identifier that represents a group of information by arranging multiple black bars and spaces of varying widths according to a specific encoding rule. The common barcode consists of parallel lines formed by alternating black bars (referred to as bars) and white bars (referred to as spaces) with significant differences in reflectivity. Barcodes can convey information such as the country of origin, manufacturer, product name, production date, book classification number, mailing addresses, categories, and dates of various items. As a result, barcodes have found extensive applications in fields such as product distribution, library management, postal services, banking systems, etc.

The steps to create a Barcode component are as follows:

Step 1. Select **Component/Tools/QR-Code/Bar-Code** from the menu bar, set the General properties in the pop-up dialog box.

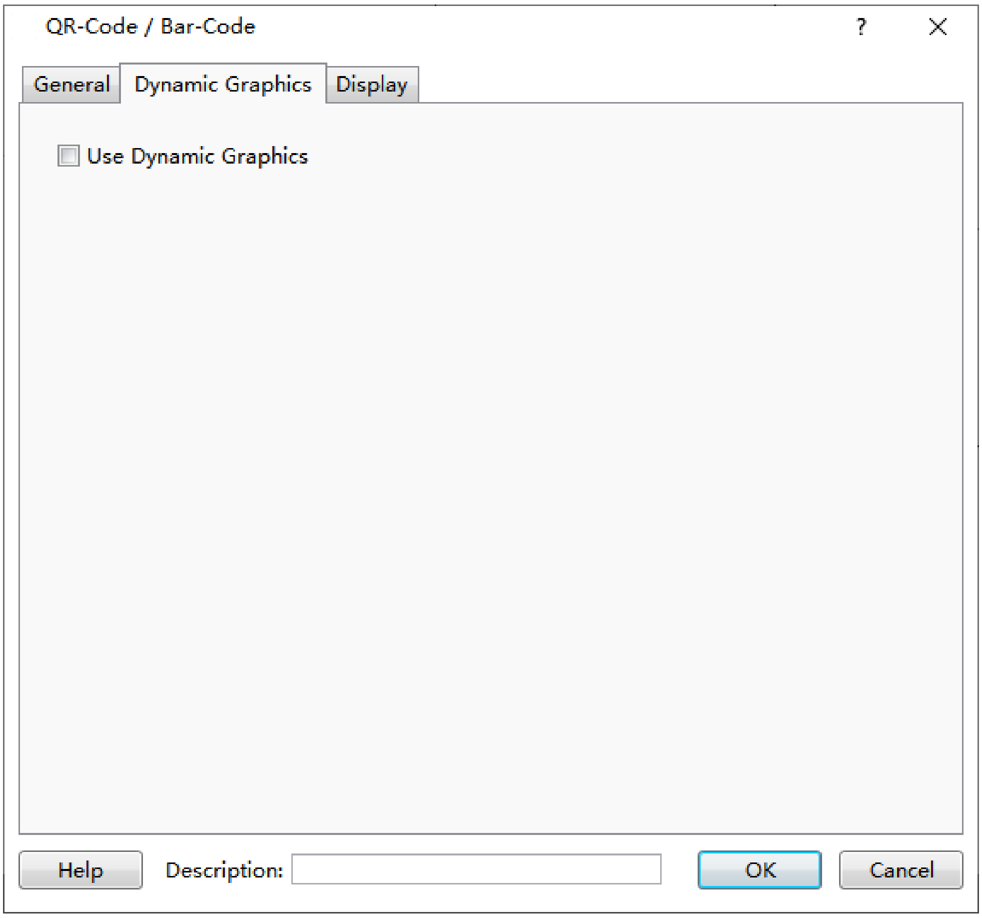


Please refer to the table below for detailed configuration methods (configuration method of other parameters please refer to QR Code).

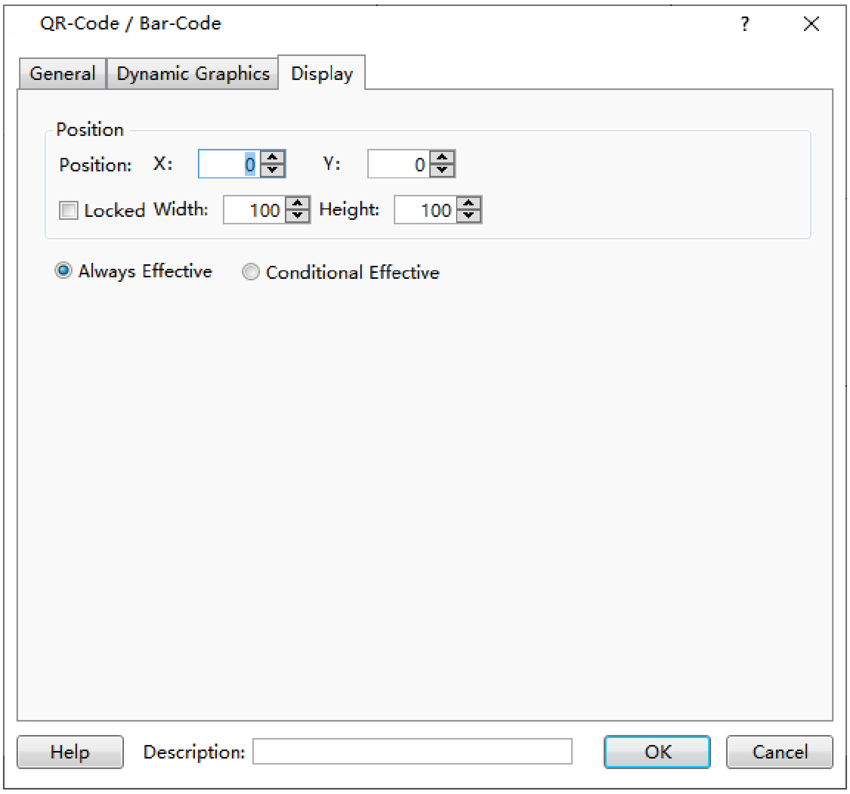
Parameters	Description
Bar-code	Barcode component.
Characters	When using Unicode encoding, the maximum character limit for a barcode is 29 characters; when using other encoding methods, the maximum character limit is 58 characters.

Step 2. Edit the Dynamic Graphics properties.

To facilitate easy scanning of barcodes, it is not recommended to use dynamic graphics.



Step 3. Set the **Display** properties, click **OK**.



Step 4. Click anywhere in the window to insert a barcode component.

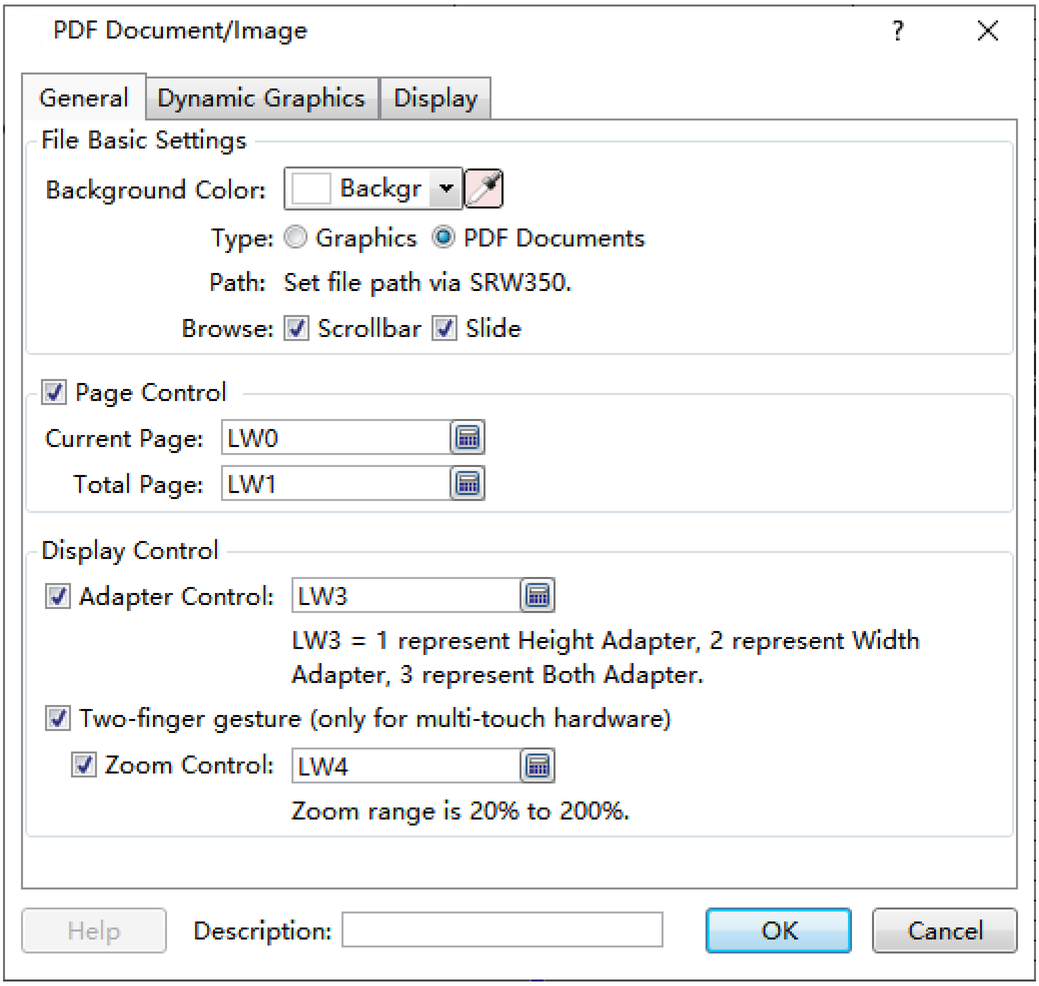
10.14.6 PDF Document/Image

The PDF Document and Image components are used to view PDF documents and images, respectively. They are used in conjunction with a File Browser component. The configuration methods for the PDF Document and Image components are similar, and this article provides an example using the PDF Document component to illustrate the process.

- The image component only supports viewing jpg, jpeg, bmp and gif formats.
- Due to the limitations of HMI's memory capacity and CPU performance, it is recommended not to exceed 5MB for PDF files and 1MB for image files when viewing them. Otherwise, it may result in a laggy performance of the HMI.

10.14.6.1 Create PDF Document Component

Step 1. Select **Component/Tools/PDF Document/Image** from the menu bar, set the General properties in the pop-up dialog box.

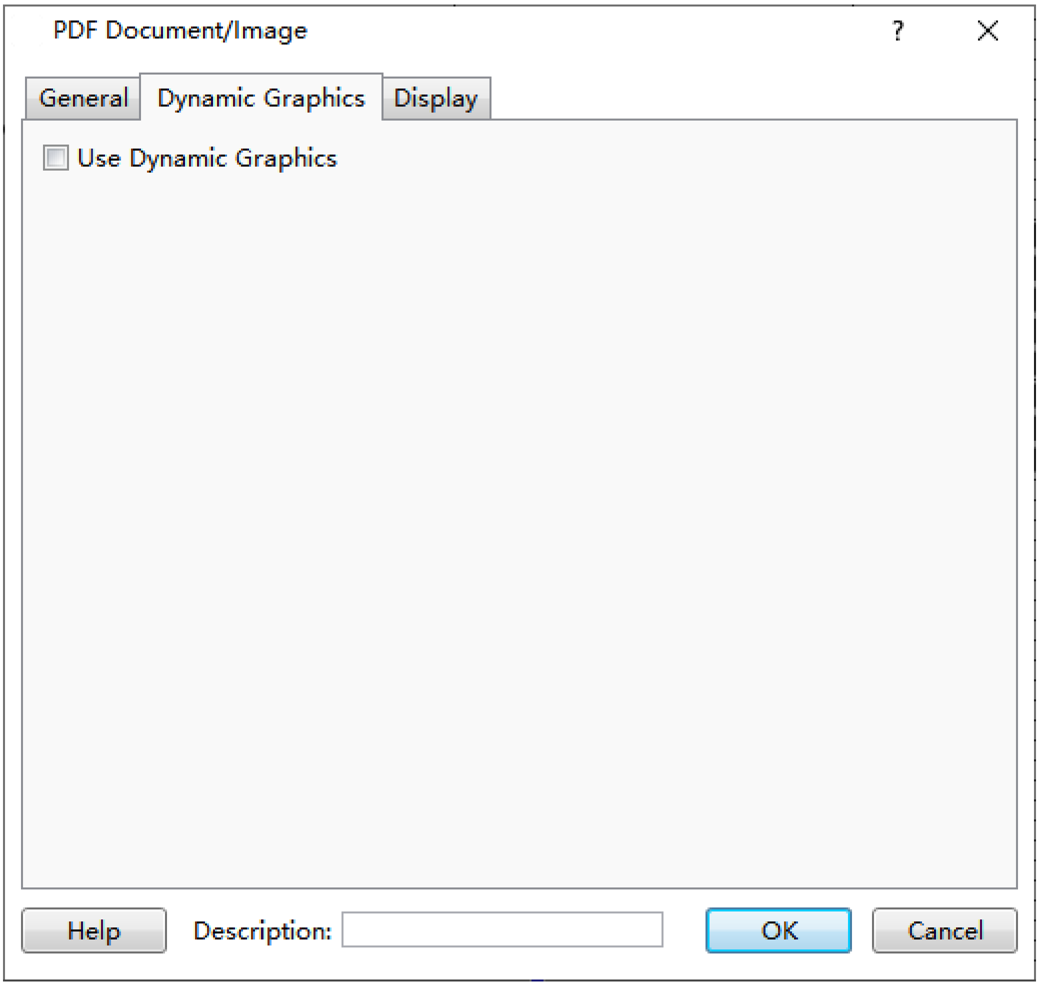


Please refer to the table below for detailed configuration methods.

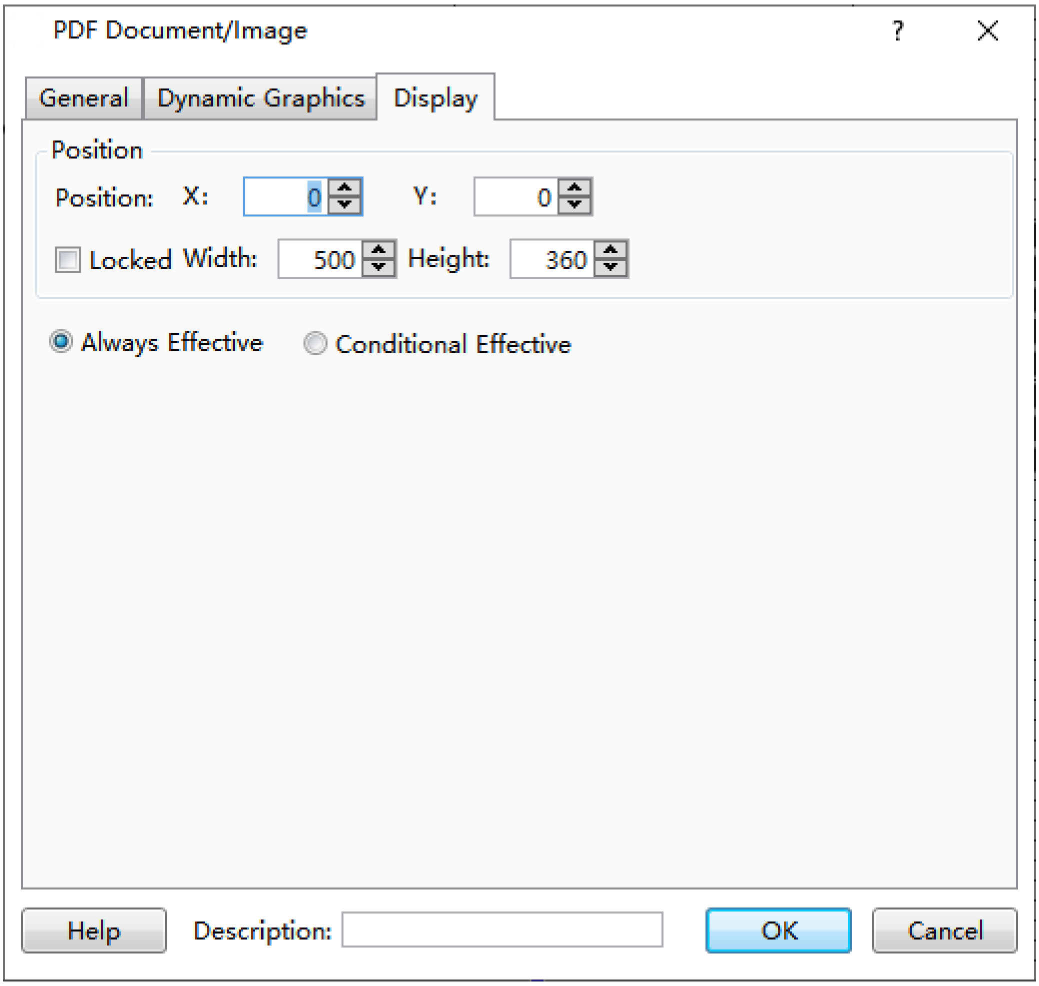
Parameter	**Description**
Background Color	Set the background color of components.
Type	Including Graphics and PDF documents.
Browse	◆ Scrollbar: use scrollbar to view the file. ◆ Slide: slide the screen to view the file. Only applicable for capacitive HMIs.
Current Page	The value of a specified word address displays the current page number of the document, and it can also be used to set up page turning functionality according to requirements.
Total Page	The value of a specified word address displays the total number of pages in the document.
Adapter Control	The browsing interface adapts the size of the page based on the value of a specified word address. When the value is 1, it indicates height adaptation. When the value is 2, it indicates width adaptation. When the value is 3, it indicates adaptation of both height and width.
Two-finger gesture	Zoomed the component by using a two-finger touch gesture. This feature is only applicable to HMIs that use a capacitive touch screen.

Parameter	Description
Zoom Control	The scaling ratio of components, determined by the value of specified word address. Zoom range is 20%~200%.

Step 2. Set the Dynamic Graphics properties.



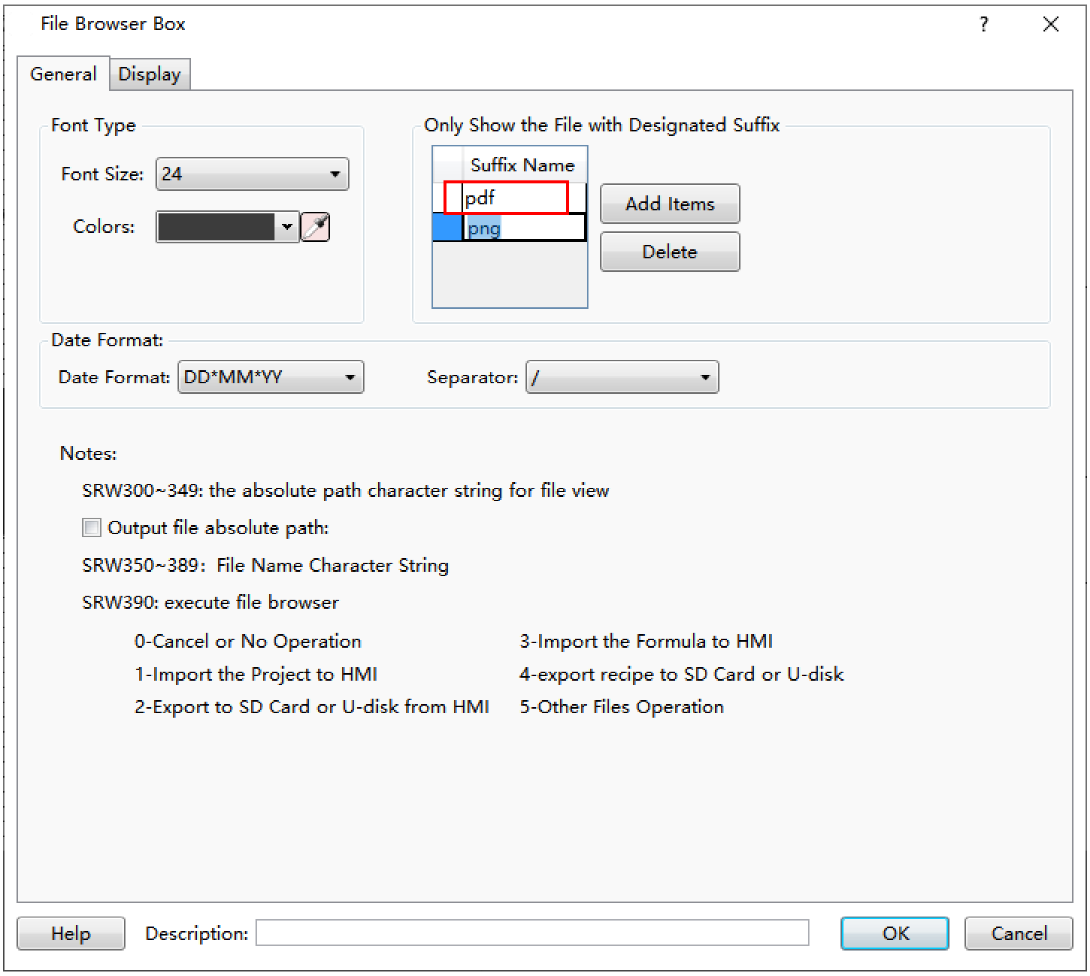
Step 3. Set the **Display** properties, click **OK**.



Step 4. Click anywhere in the window to insert the PDF document component.

10.14.6.2 Create File Browser Box

The steps to create a file browser box please refer to File Browser Box. The suffix .pdf needs to be added.



10.14.7 Media Player

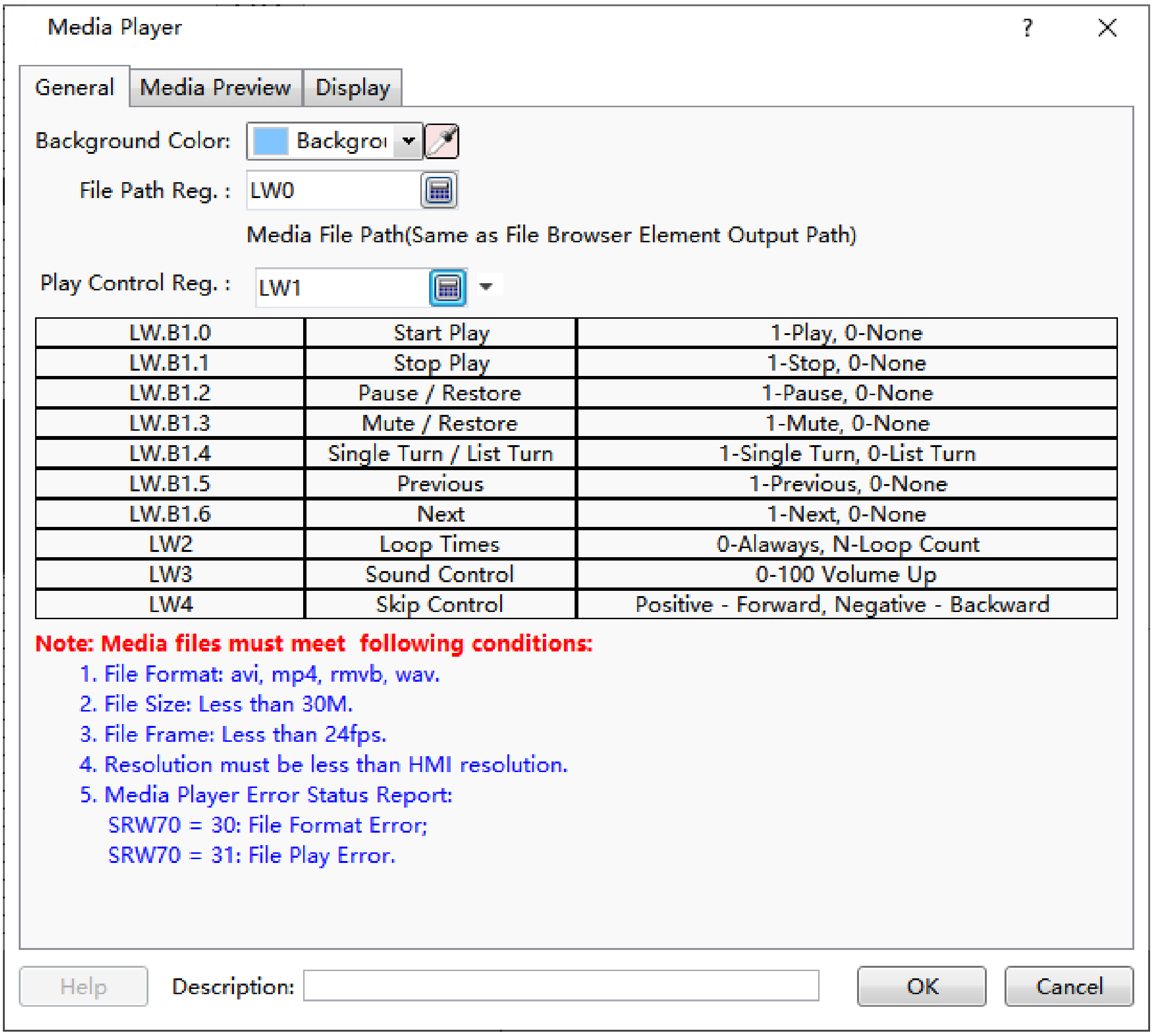
The media player component is used to play media files. Supported media files supported have the following restrictions:

- Media file formats supported are avi, mp4, rmvb, wav.
- Media file size needs to be less than 30MB.
- Media file frame rate needs to be less than 24 fps.
- The original resolution of the media file needs to be smaller than the resolution of the HMI.

Media player error state feedback:
- The value of SRW70 is 30, it indicates a media file format error.
- The value of SRW70 is 31, it indicates a media file playback failure.

The steps to create a media player component are as follows:

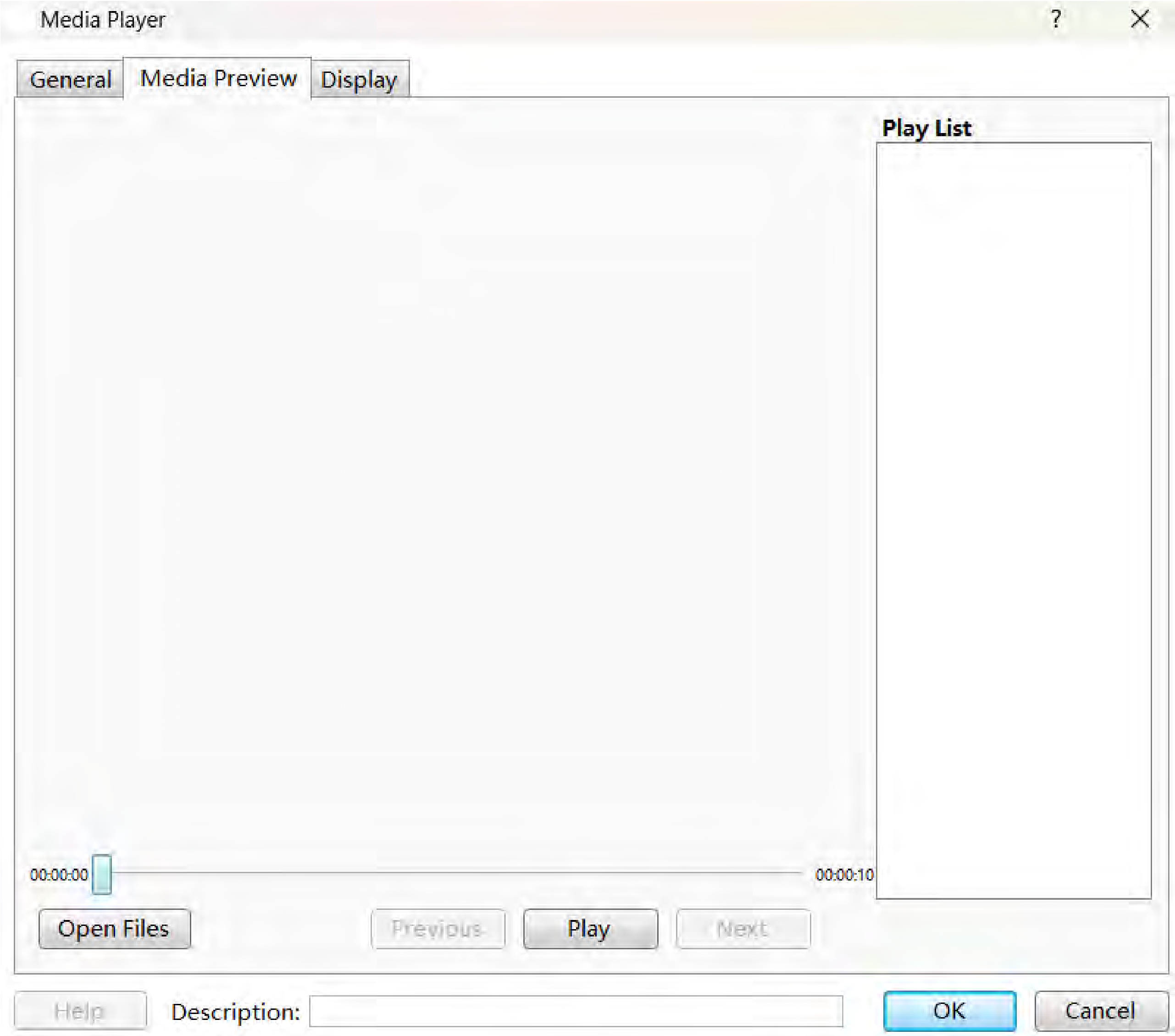
Step 1. Select **Component/Tools/Media Player** from the menu bar, set the General properties in the pop-up dialog box.



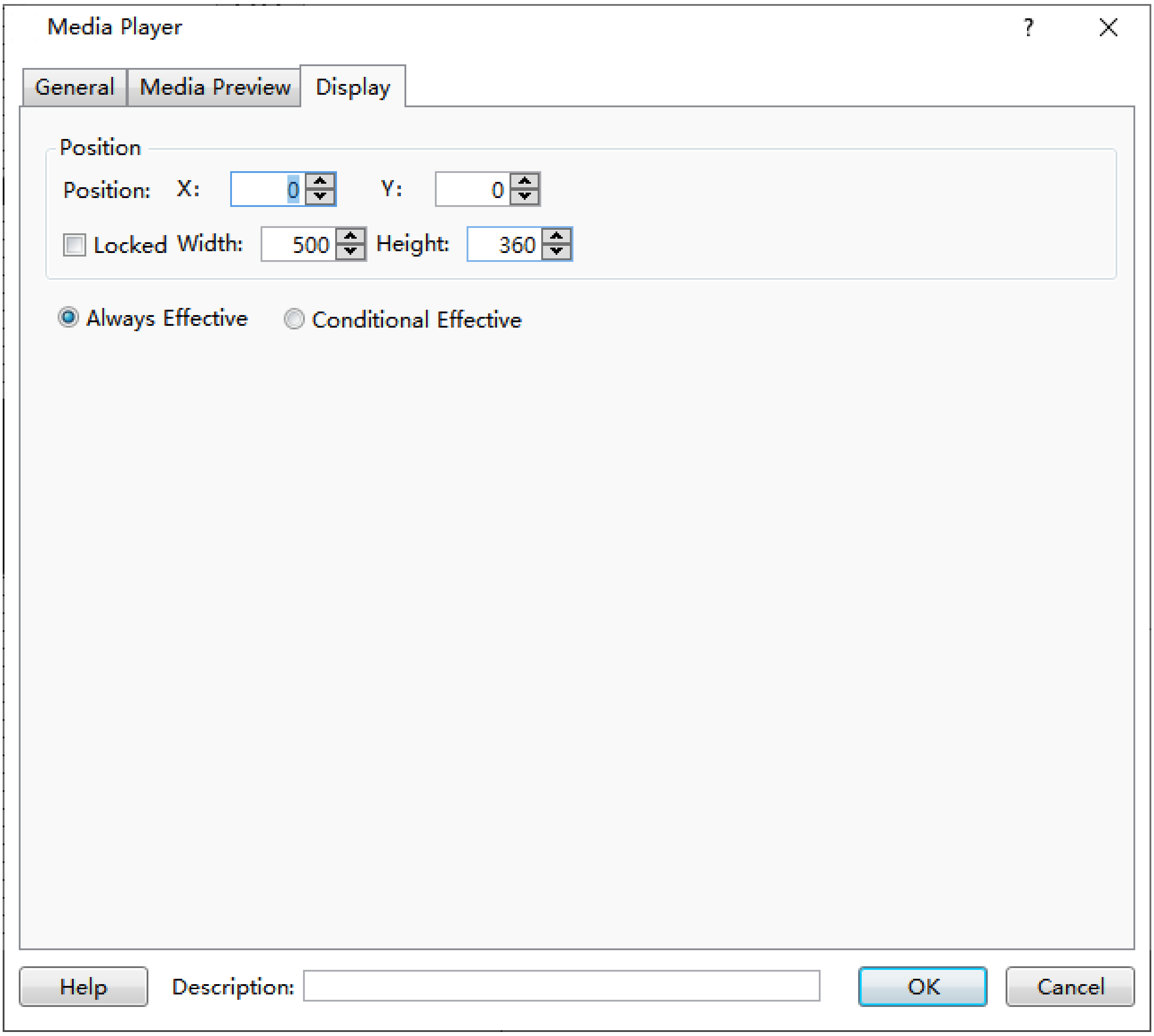
Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Background Color	Background color of the media player.
File Path Reg.	The path to store media files, determined by the value of specified word register.
Play Control Reg.	Start address of the specified word register, and the values at different addresses are used to control playback. See the interface prompts for control details.

Step 2. Select the **Media Preview** tab, click **Open Files** to preview the play effect.



Step 3. Set the **Display** properties, click **OK**.



Step 4. Click anywhere in the window to insert the media player component.

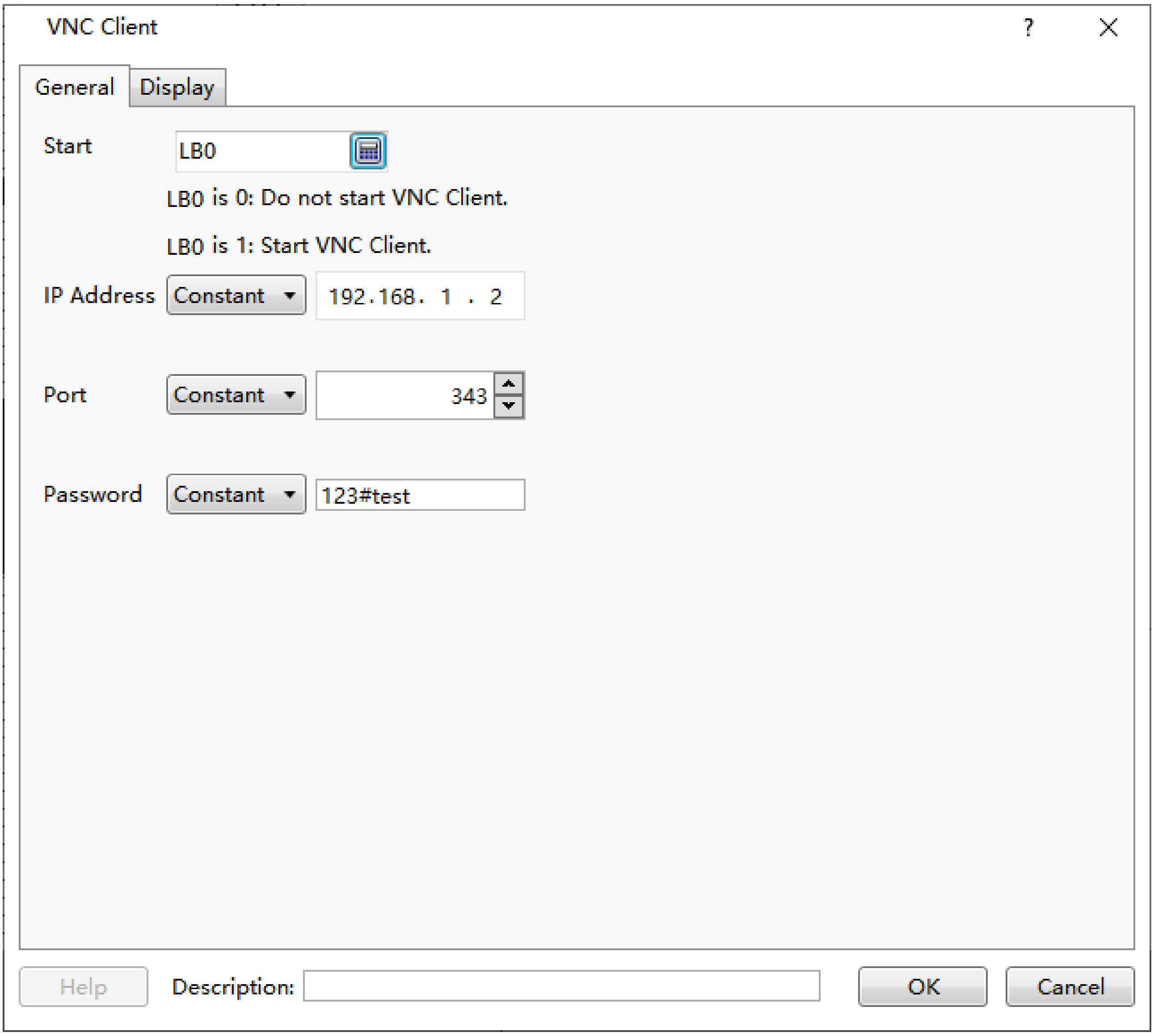
10.14.8 VNC Client

Only VI20Studio V3.0 supports the VNC client feature.

The VNC client component is used to connect to the remote desktop of VNC servers (such as HMI, PC, PLC). In specific production scenarios where direct on-site operation of devices is not allowed, the target device can enable VNC services, and remote operation can be carried out through the VNC client feature of the HMI.

The steps to create a VNC client component are as follows:

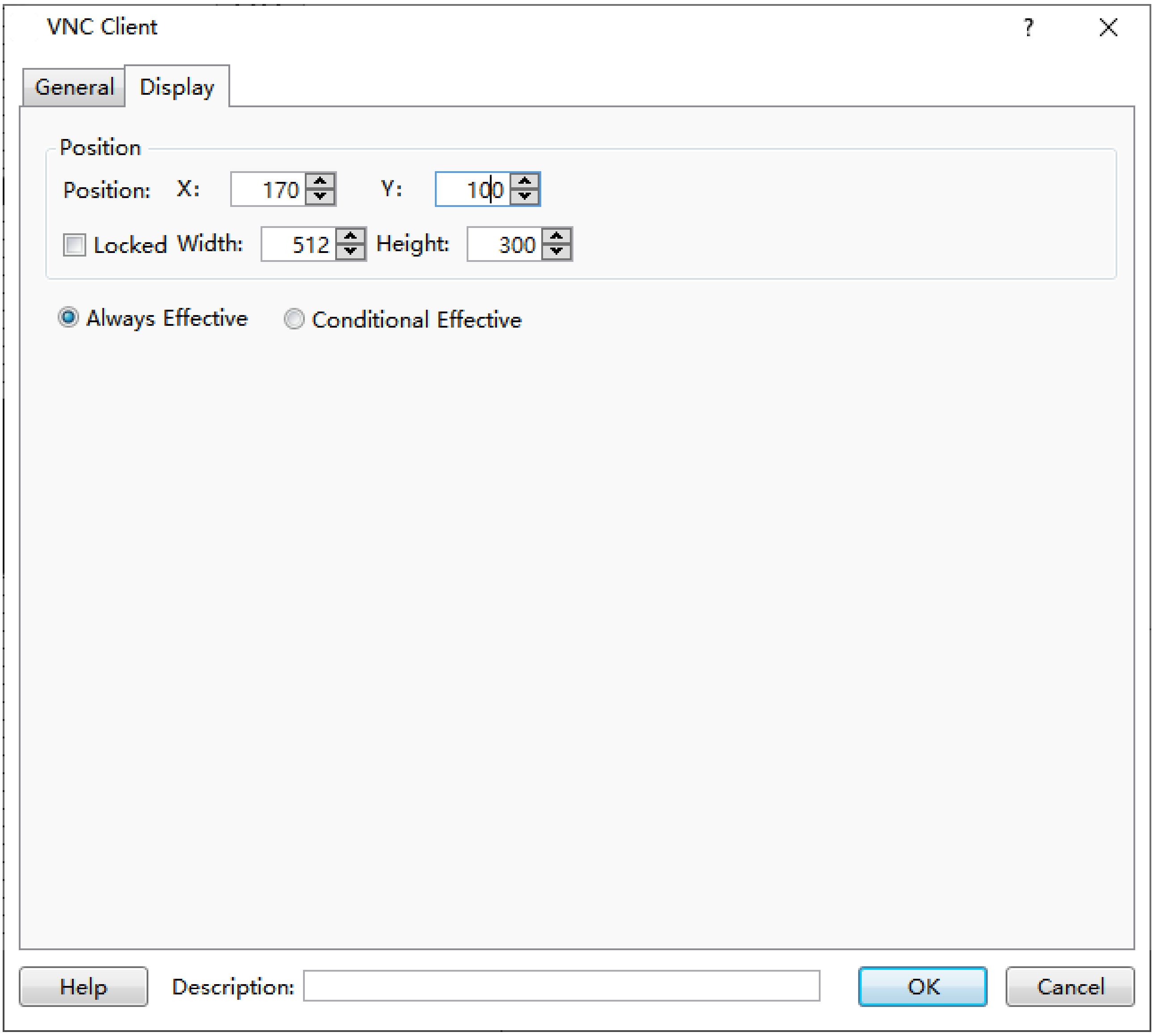
Step 1. Select **Component/Tools/VNC Client** from the menu bar, set the General properties in the pop-up dialog box.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Start	If the value of specified bit address is 0, VNC client will not be started; if value is 1, VNC client will be started.
IP Address	IP address of VNC server.
Port	Port of VNC server.
Password	Login password of VNC server.

Step 2. Set the **Display** properties, click **OK**.



Step 3. Click anywhere in the window to insert the VNC client component.

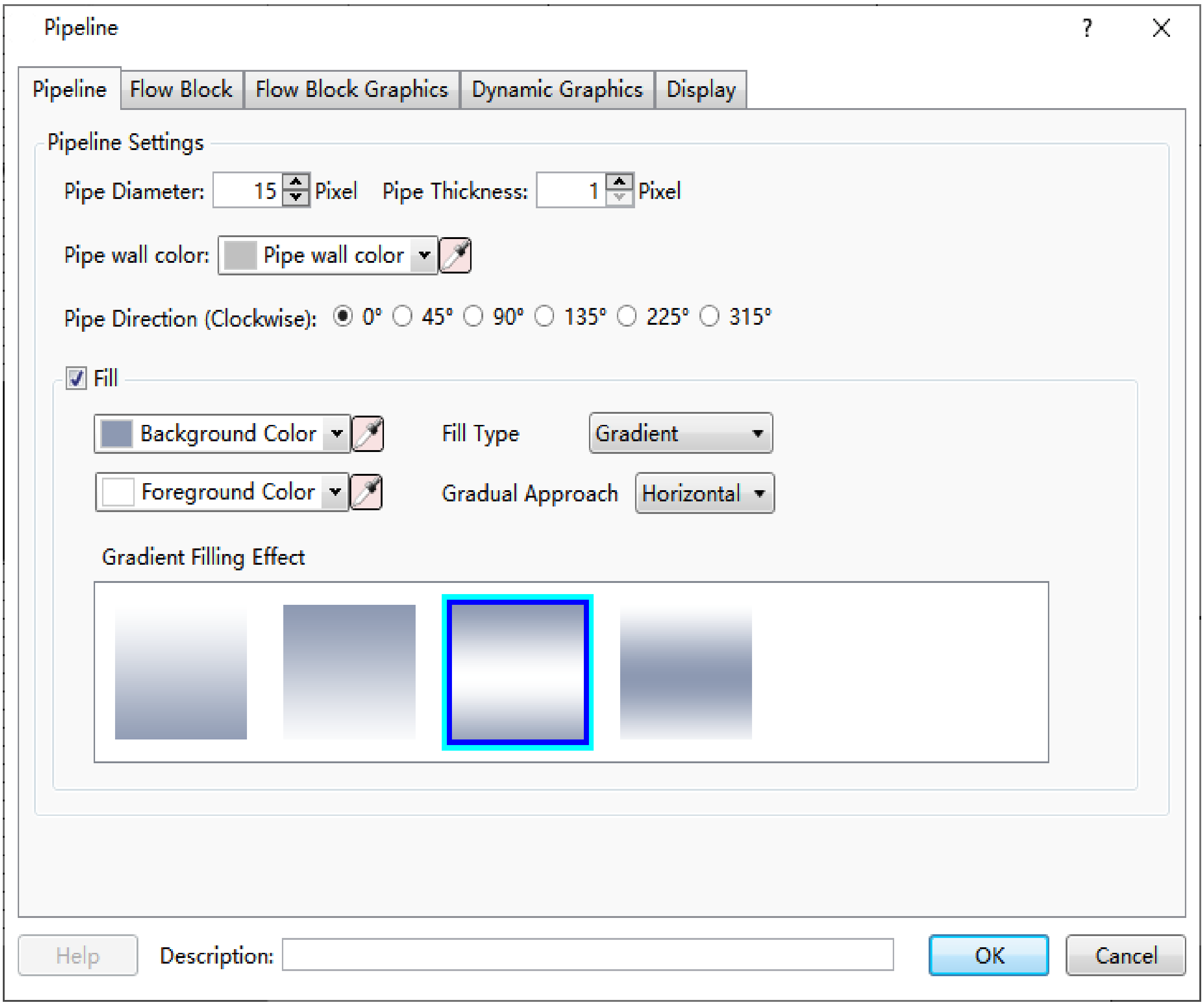
10.15 Pipeline

The pipeline component is used for real-time simulation of the fluid flow state in a production environment, allowing users to have real-time understanding of the production situation of liquid materials. The pipeline component is divided into three types: horizontal pipeline, vertical pipeline, and elbow.

10.15.1 Horizontal Pipeline

A horizontal pipeline represents a pipe where the flow direction of the liquid is horizontal. The steps to create a horizontal pipeline component are as follows:

Step 1. Select **Component/Pipeline/Horizontal** from the menu bar, set the Pipeline properties in the pop-up dialog box.



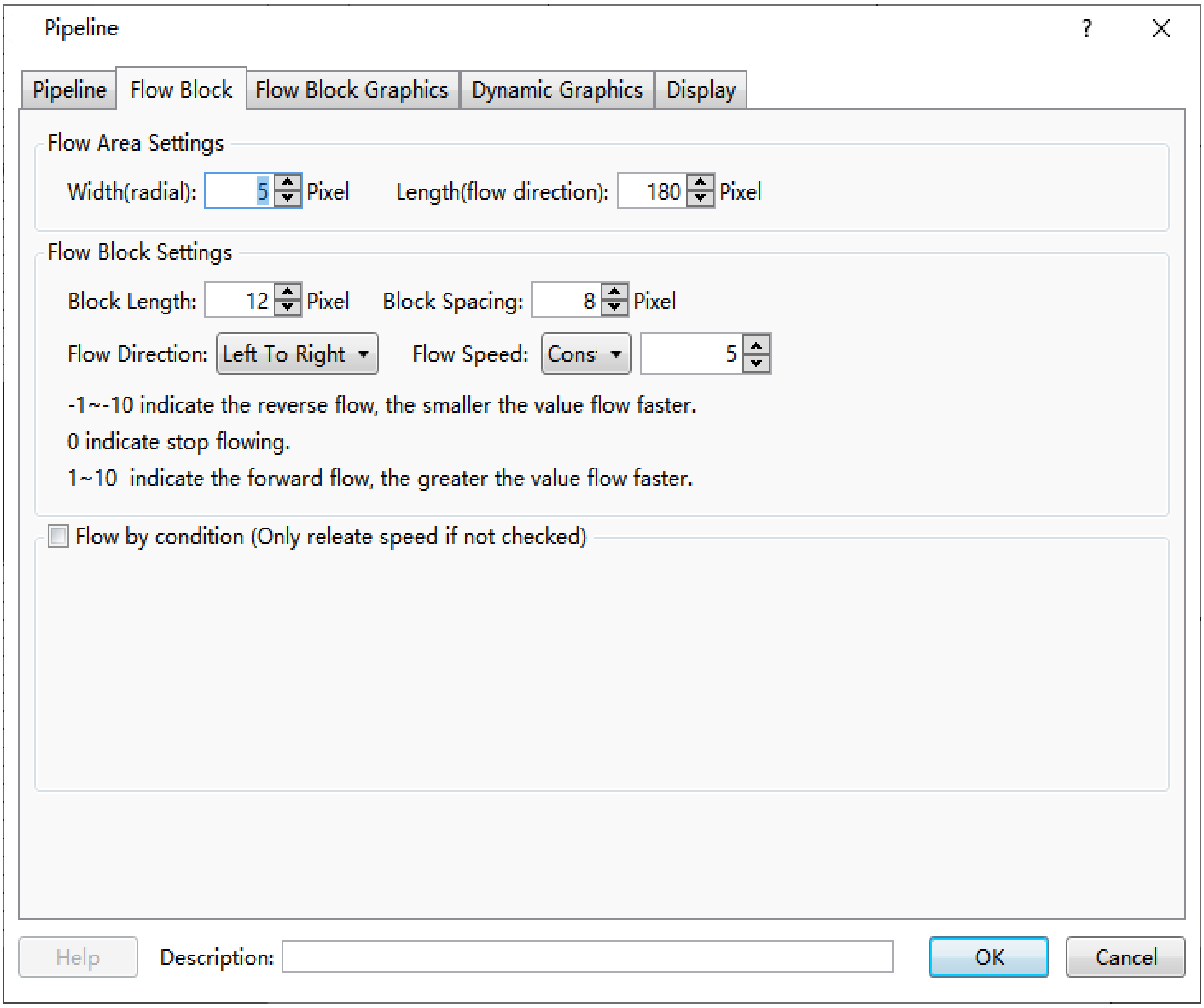
Please refer to the table below for detailed configuration methods.

Parameters	Description
Pipe Diameter	Diameter of the pipeline in pixels. Default value is 15.
Pipe thickness	Thickness of the pipeline in pixels. Default value is 1, it is not recommended to change this value.
Pipe Direction	Direction of pipe inclination (clockwise), including 0°, 45°, 90°, 135°, 225° and 315°.
Background Color	Background color of pipeline.

Parameters	Description
Fill Type	◆ Solid Color: filled with solid color, the color can be customized. ◆ Pattern: use pattern to fill, you can select pattern. ◆ Gradient: use gradient color to fill. You can set the background color, foreground color and gradient direction.

Step 2. Set the Flow Block properties.

Flow block is used to simulate the fluid in the pipeline.



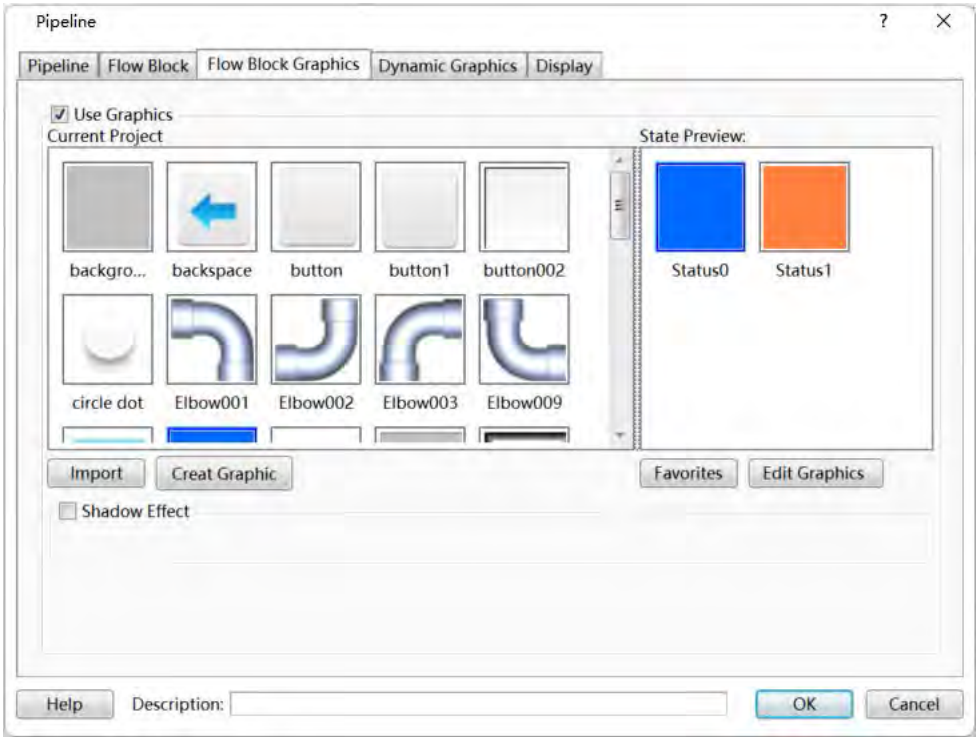
Please refer to the table below for detailed configuration methods.

Parameters	Description
Width (radial)	The width in the direction of the pipe diameter, do not exceed the pipe diameter.
Length (flow direction)	The length in the flow direction.

Parameters	Description
Block Length	The length of flow block.
Block Spacing	Spacing between flow blocks.
Flow Direction	Including left to right, right to left.
Flow Speed	The flow speed of the flowing block can be set as a constant or a variable. The value range is -10 to 10. Values from -1 to -10 indicate reverse flow, where smaller values represent faster flow velocity. A value of 0 represents no flow (i.e., the flow is stopped). Values from 1 to 10 indicate forward flow, where larger values represent higher flow velocities.
Flow by condition	Set a logical condition, such as the value of LB0 being ON, to control the start and stop of the flow. If you do not select that parameter, the flow will be controlled by the flow velocity itself.

Step 3. Set the Flow Block Graphics properties.

Check **Use Graphics**, select the graphic.

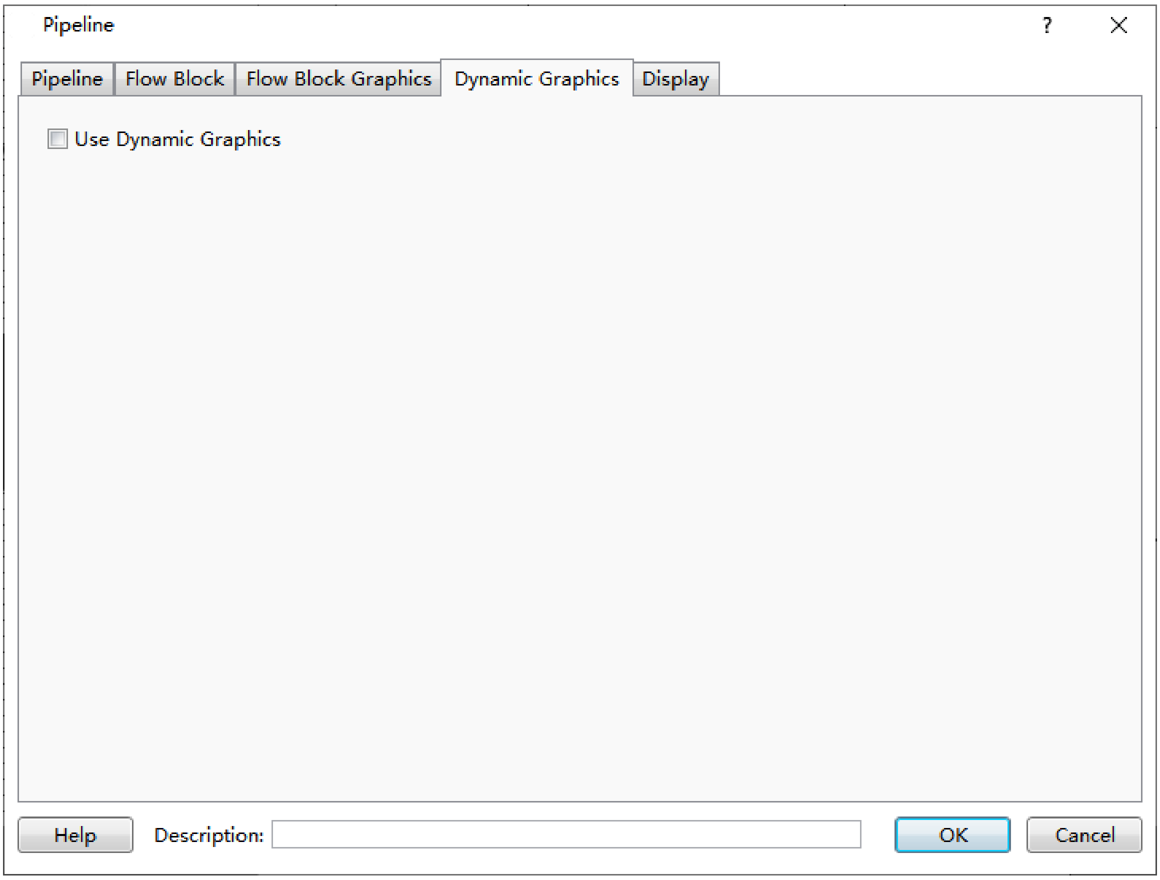


Please refer to the table below for detailed configuration methods.

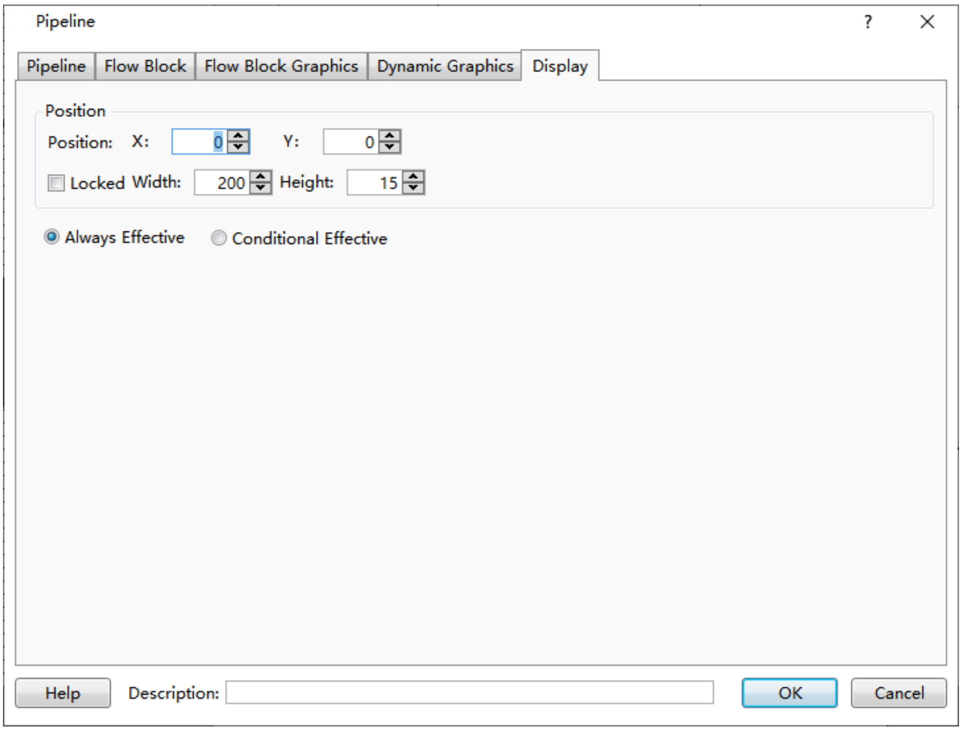
Parameters	Description
Import	Click **Import** to import the system graphic library and custom graphic library. For detailed information about graphics library, please refer to Graphics Library.
Create graphic	Click **Create graphic** to add a new one (you can modify the width and height of the image on an existing graphic). This includes setting the graphic name, size, and number of statees.
Edit Graphics	Click **Edit Graphics** to customize a graphic (you can edit graphics of different statees).
Shadow Effect	Check **Shadow Effect** to set the shadow color and offset.

Step 4. Set the Dynamic Graphics properties.

It is not recommended to use dynamic graphics.



Step 5. Set the **Display** properties, click **OK**.

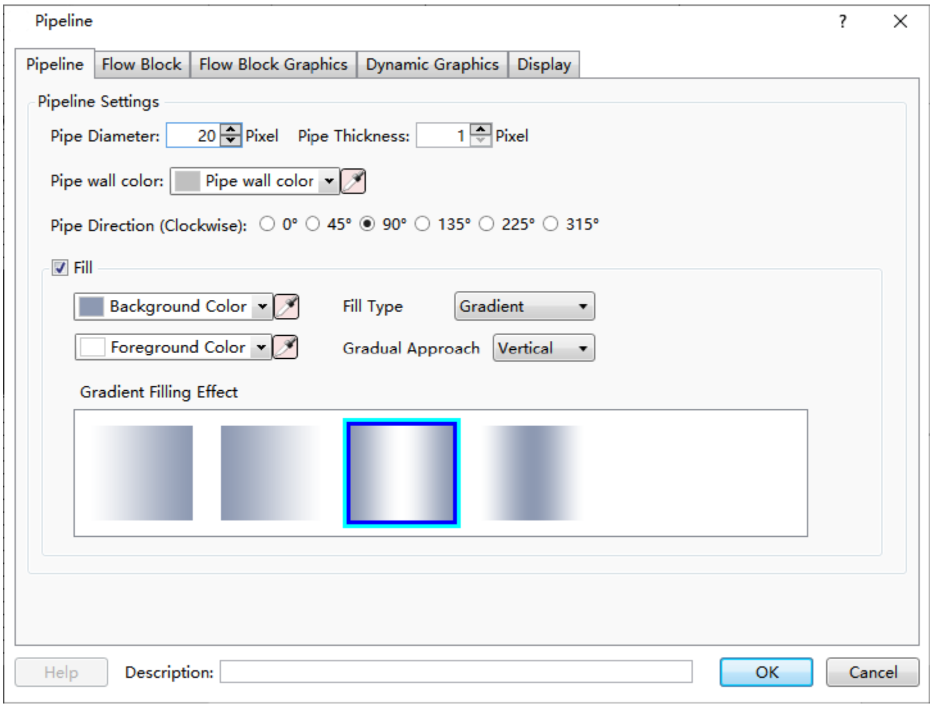


Step 6. Click anywhere in the window to insert the horizontal pipeline component.

10.15.2 Vertical Pipeline

A vertical pipeline represents a pipe where the flow direction of the liquid is vertical.

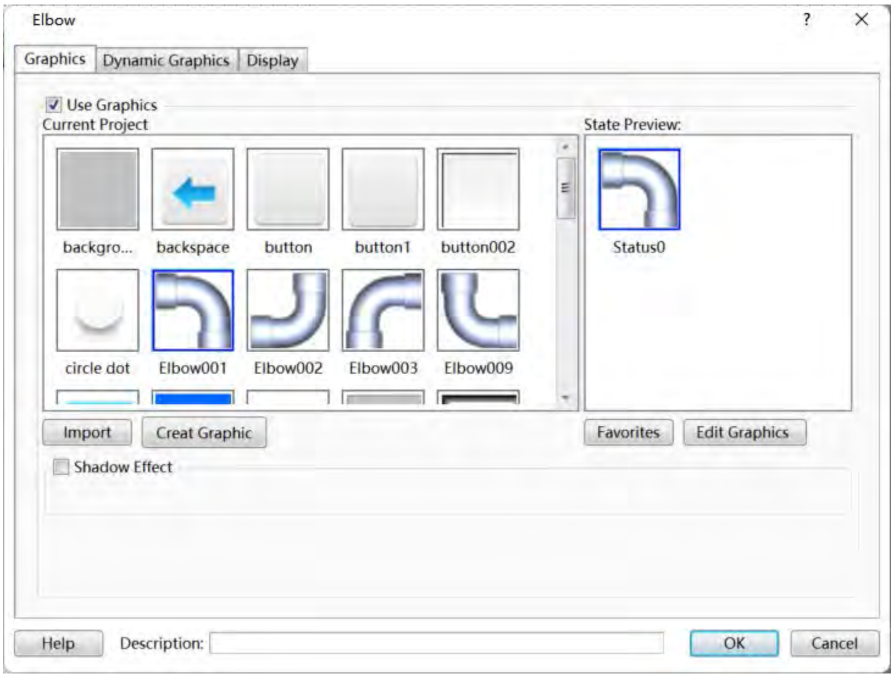
Select **Component/Pipeline/Horizontal** from the menu bar to enter the configuration page for vertical pipeline. The configuration method of vertical pipelines is similar to that of horizontal pipelines, please refer to Horizontal Pipeline.



10.15.3 Elbow

Elbow is used to connect different pipeline. The steps to create a elbow component are as follows:

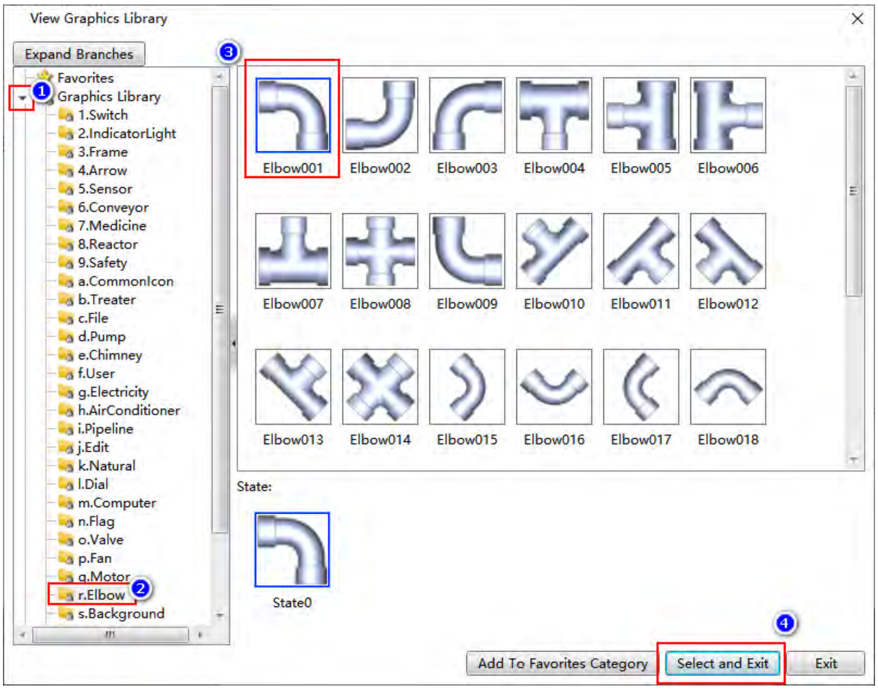
Step 1. Select **Component/Pipeline/Elbow** from the menu bar, set the Graphics properties in the pop-up dialog box.



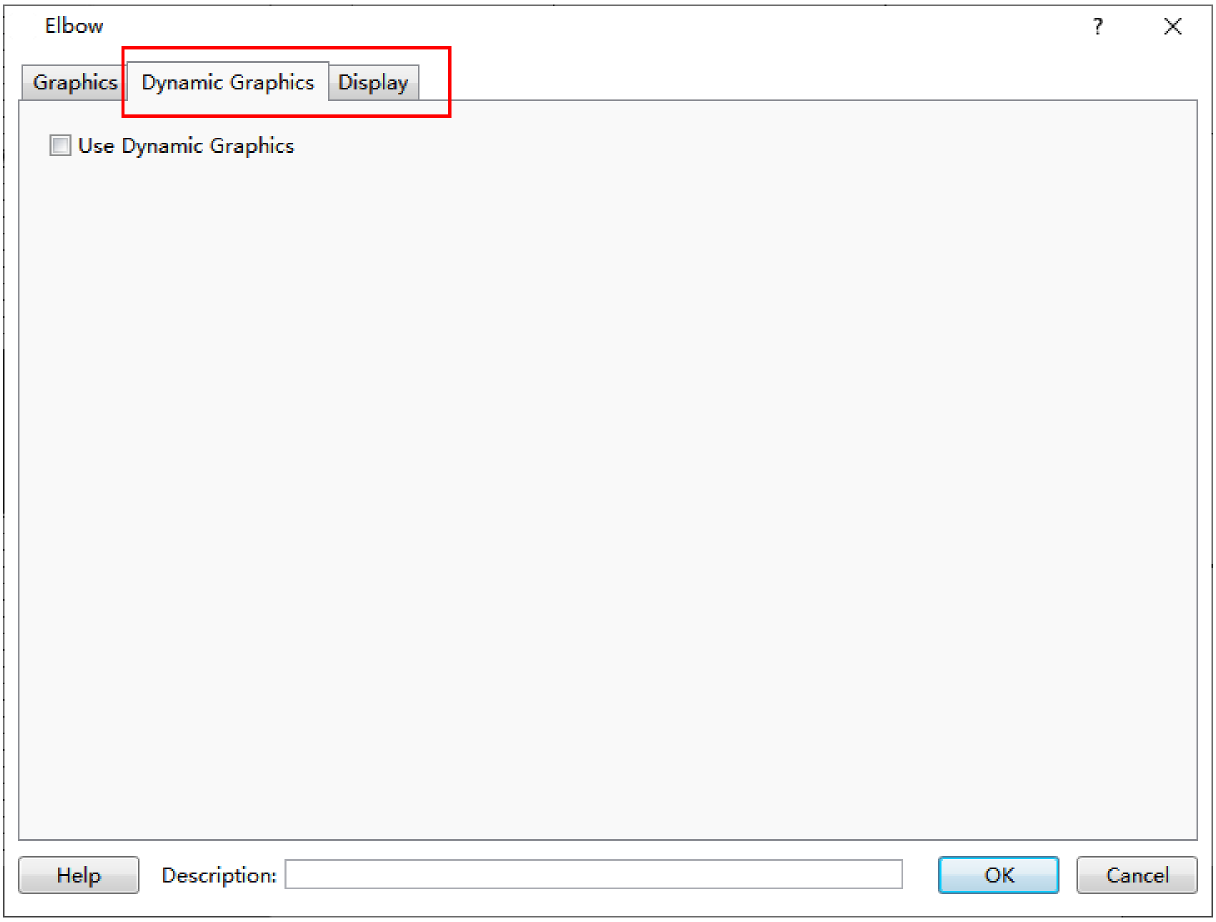
It is recommended to import elbow graphics from the system graphic library.

1) Check **Use Graphics**.

2) Click **Import**, expand the system graphic library is the popup dialog box, select **Elbow**, and select the corresponding graphic, click **Select and Exit**.



Step 2. Set the **Dynamic Graphics**, **Display** properties, click **OK**.



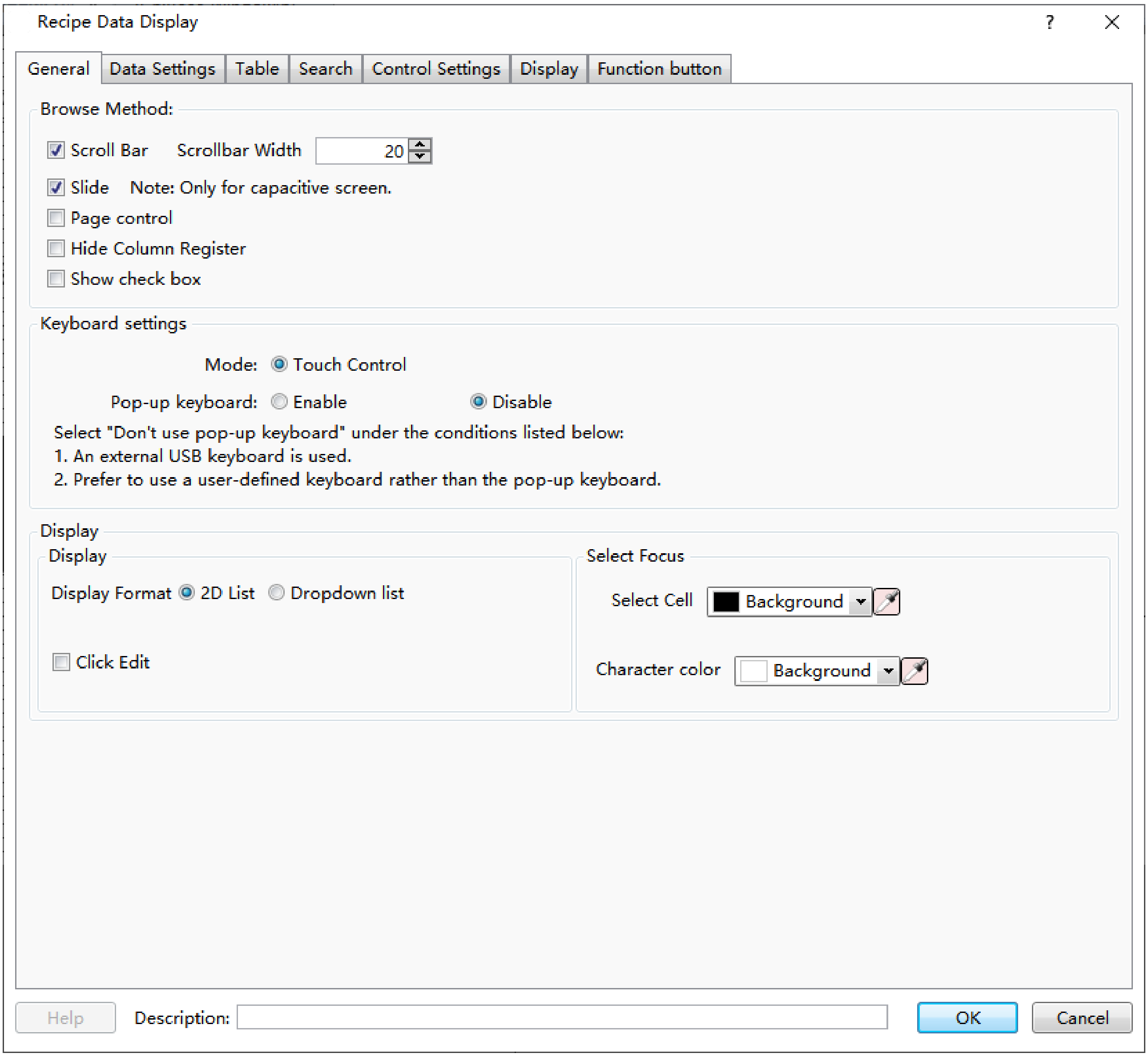
Step 3. Click anywhere in the window to insert the elbow component.

10.16 Recipe Data Display

The recipe data display component is used to display real-time data of a specified recipe and allows for the modification of recipe data. Before creating a recipe data display component, you need to create a recipe. For detailed information about recipes, please refer to the Recipe.

The steps to create a recipe data display component are as follows:

Step 1. Select **Component/Recipe/Recipe Data Display** from the menu bar, set the General properties in the pop-up dialog box.

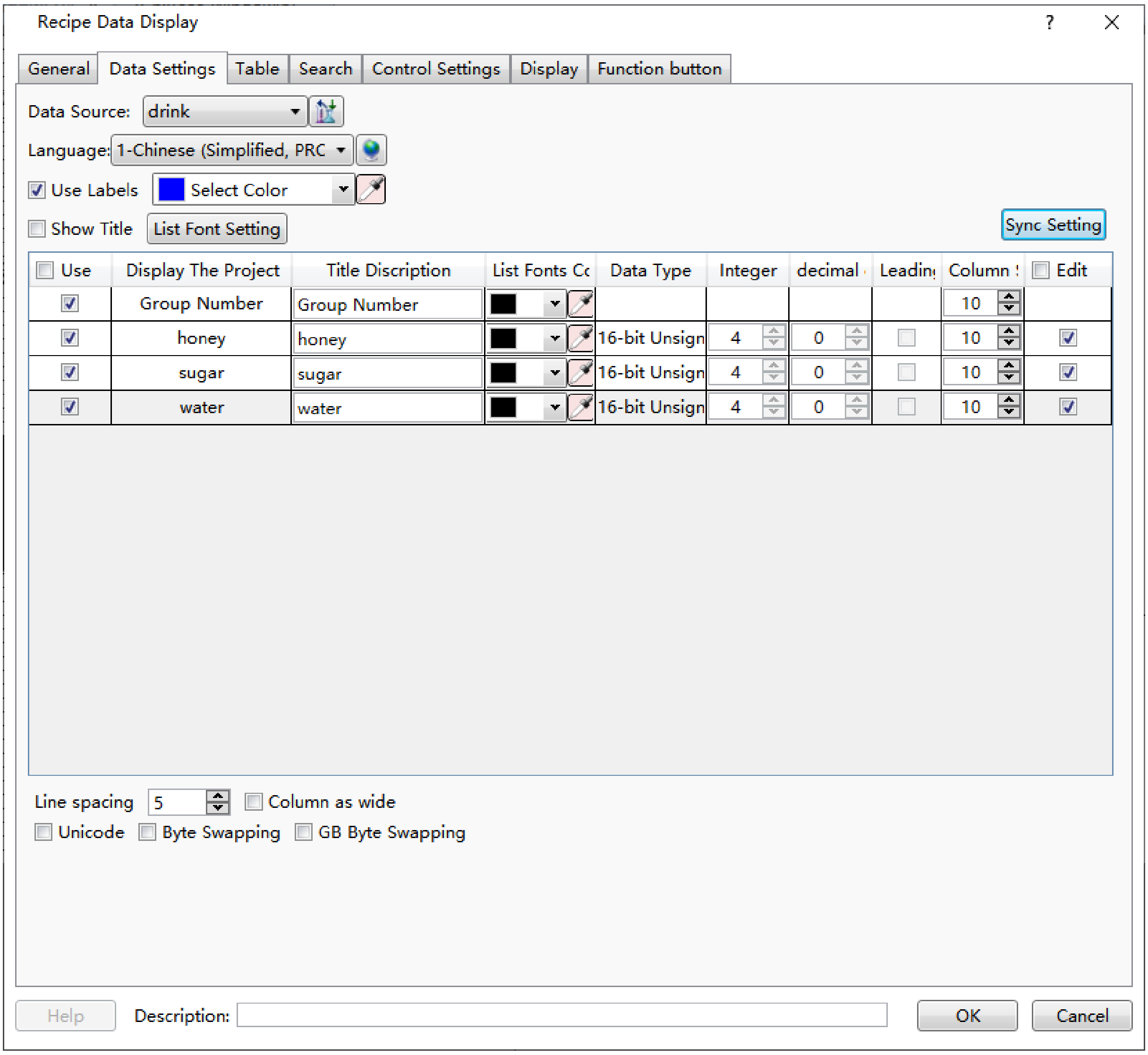


Please refer to the table below for detailed configuration methods.

Parameters	Description
Scrollbar	Click the scrollbar to view the complete recipe data.
Slide	Slide the screen to view the complete recipe data. This function is only applicable for capacitive HMIs.
Page Control	When browsing through a long page of recipe group data, it is possible to use a word register to set data navigation to a specific page.
Hide Column Register	The bits of a specified word address are used to control the columns to be hidden. For example, if the designated word address is LW400, LW.B400.0 represents hiding the first column, LW.B400.1 represents hiding the second column, and so on.
Show Checkbox	Whether to show the checkbox.

Parameters	Description
Pop-up Keyboard	When clicking a recipe data item, whether a pop-up keyboard appears to set the data item. Scenarios where a pop-up keyboard is not needed are as follows: ◆ The HMI is connected to an external USB keyboard. ◆ The window screen already contains a pre-configured input keyboard.
Display Format	◆ Two-dimensional list: display all recipes in a tabular format, with recipe data items as columns and each recipe group as a row. ◆ Drop-down list: with the data items as rows and the data values as column names. This allows for the selection of a recipe group using a drop-down component.
Click Edit	Single click the data in the recipe display component to edit the data. ◆ For a drop-down list, default is to single click edit. ◆ For a two-dimensional list, the default setting is that the first single click to select this row, second single click to edit the data. When **Click Edit** is checked, the first single click will allow you to edit.

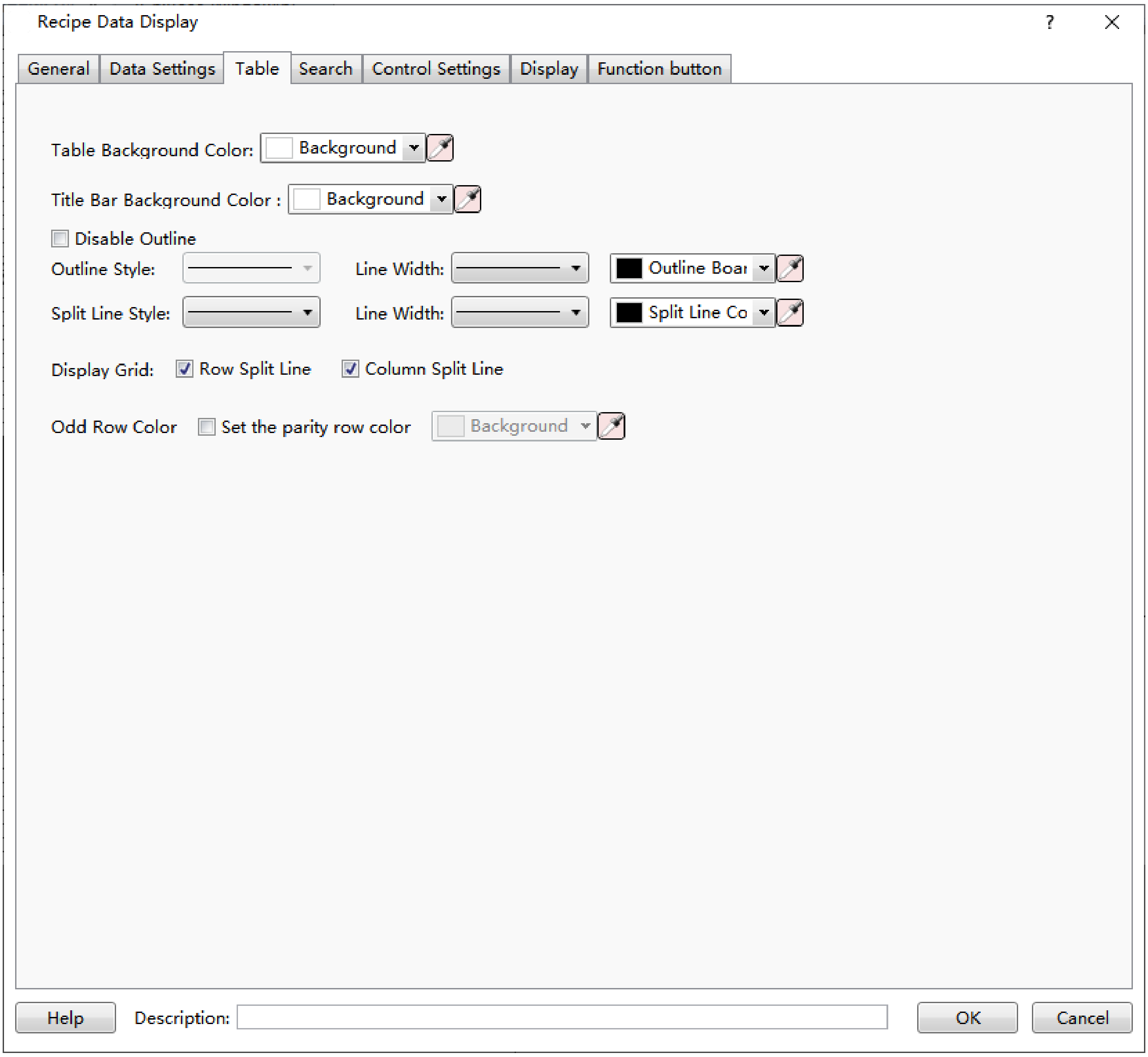
Step 2. Set the Data Settings.



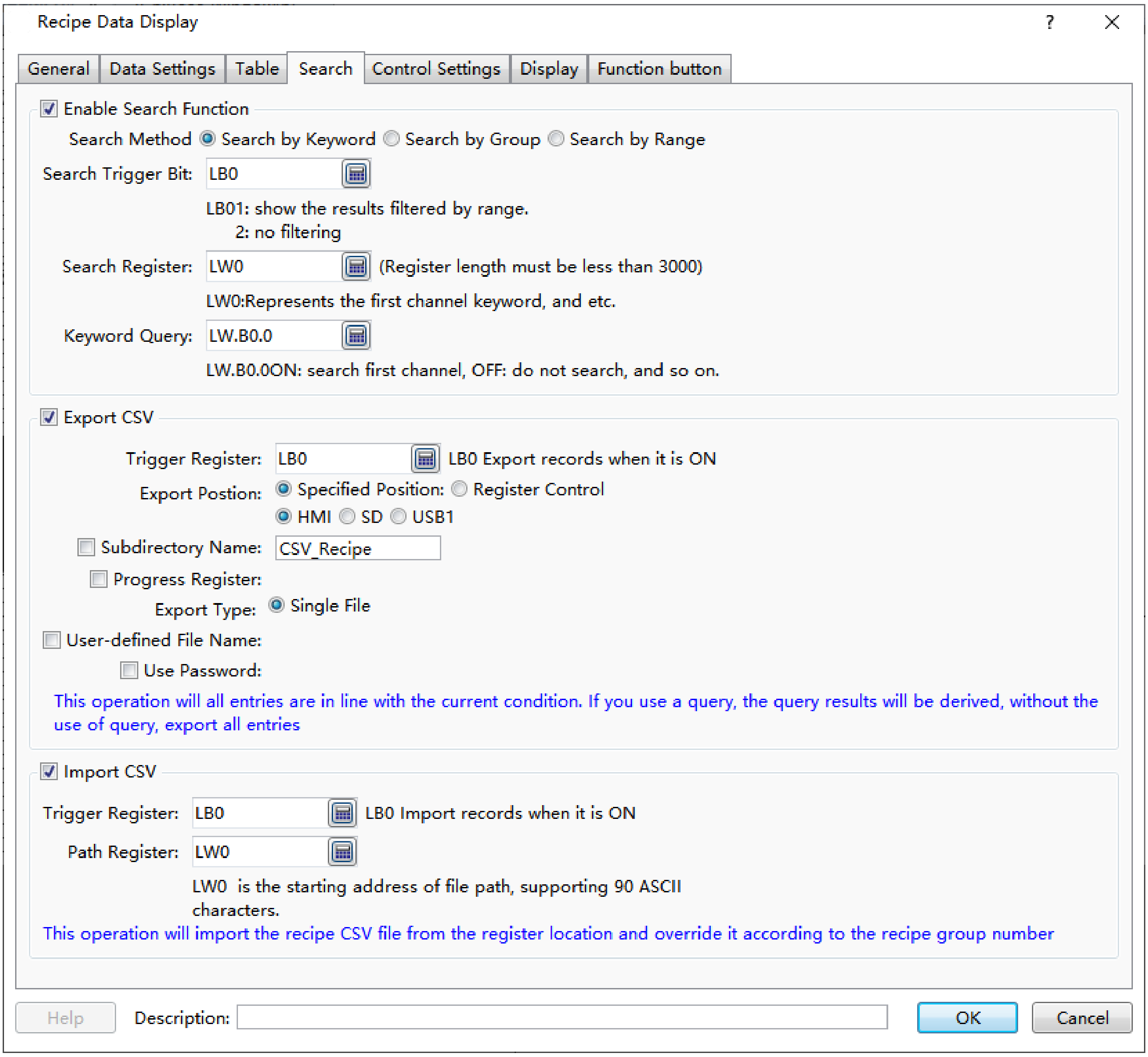
Please refer to the table below for detailed configuration methods.

Parameter	Description
Data Source	The data is sourced from the recipe and requires selecting a recipe. By clicking the icon, the recipe can be modified.
Language	The current display language, text content of different languages can be set.
Use Label	Use labels to display title bar description information. If labels are not used, you need to use text library to set the title bar description information.
Select Color	Color of the selected recipe group.
Use	Whether to display the corresponding item.
Title Bar Description	Use label or text library to set the description information of title bars.
Edit	Whether editing this recipe group is allowed.
Line Spacing	Set the row spacing of the list.
Unicode	Check **Unicode** to use Unicode encoding. ASCII encoding is used by default.
Byte Swapping	Encode the data, and then swap the positions of the high byte and low byte.
GB Byte Swapping	Using the GB2312 encoding, swap the positions of the high byte and low byte.

Step 3. Set the background color and outline of the table.



Step 4. Set the Search properties.

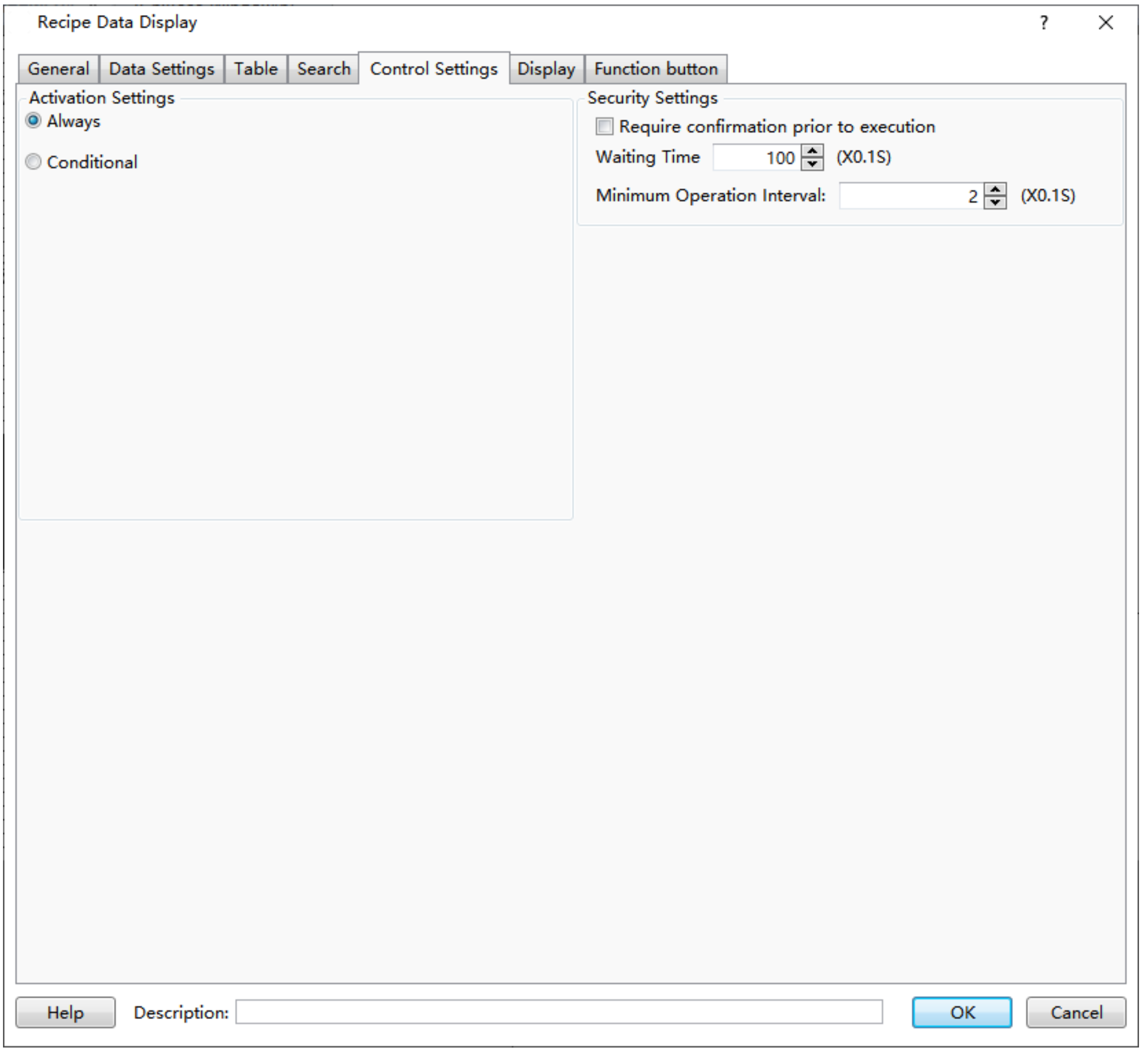


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Enable Search Function	Check **Enable Search Function** to use the search function.
Search Method	Including by keyword, by group and by range.
Search Trigger Bit	When the specified bit address has a value of 1, display the filtered results based on the query conditions. When the value is 0, do not filter the results based on the query conditions.
Search Register	The value of a specified word address represents the query condition, and the meaning of the query registers varies depending on the query method. Please refer to the interface.

Parameter	Description
Export CSV	If the query functionality is enabled, the data that matches the query condition will be exported to a CSV file. If the query functionality is not enabled, all data will be exported.
Trigger Register	If the value of a specified bit address is set to ON, the operation to export a CSV file will be executed.
Export Position	Storage location of the exported CSV file: ◆ Specified position: including HMI, SD and USB1. ◆ Register Control: The value of a specified word address register determines the export destination. If the value is 0, it indicates exporting to the HMI. If the value is 1, it indicates exporting to the SD. If the value is 2, it indicates exporting to USB1.
Subdirectory Name	If the **Subdirectory Name** option is selected, the value of a specified word address represents the subdirectory name where the exported CSV files will be stored. If the option is not selected, you can customize the subdirectory name for storing the exported CSV files. By default, it is set to CSV_Recipe.
Progress Register	The value of a specified word address register represents the progress of the file export, with a value range of 0 to 100.
User-defined File Name	The value of a specified word address register represents the filename for the exported CSV file. The filename can have a maximum of 16 Chinese characters or 32 ASCII characters.
Use Password	After setting a password, the exported CSV file cannot be displayed properly. To generate a normal CSV file, you will need to use a decryption tool and enter the password. For detailed information about the decryption tool, please refer to Decryption Tool.
Import CSV	The value of a specified word address register represents the path of the CSV file to be imported. The CSV file is imported from this path, and the recipe data is overwritten based on the recipe group number.
Trigger Register	If the value of a specified bit address is set to ON, the operation to import a CSV file will be executed.
Path Register	The value of a specified word address represents the path information for importing the CSV file. The path should not exceed 90 ASCII characters in length.

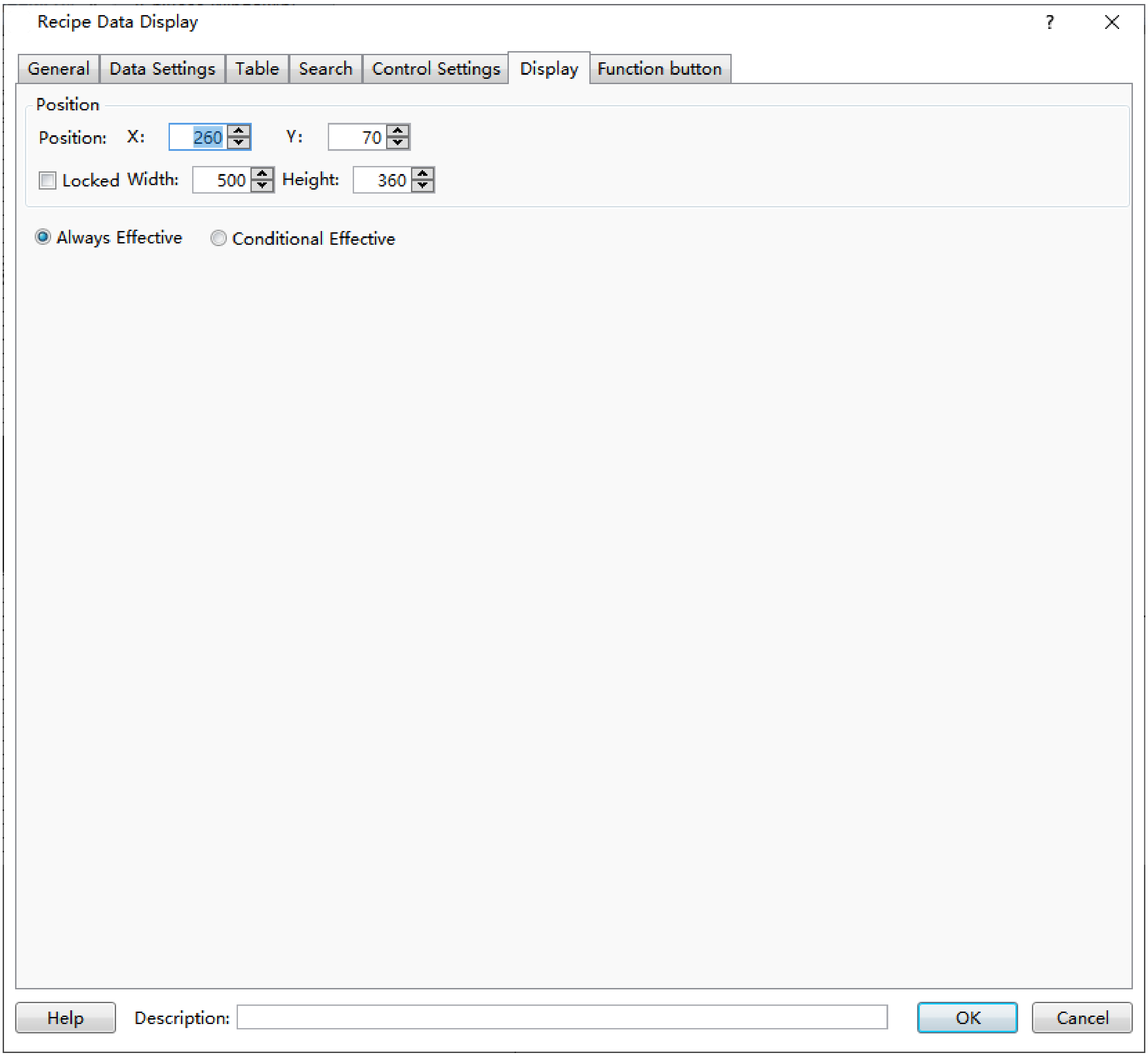
Step 5. Set the **Control Settings** properties.



Please refer to the table below for detailed configuration methods.

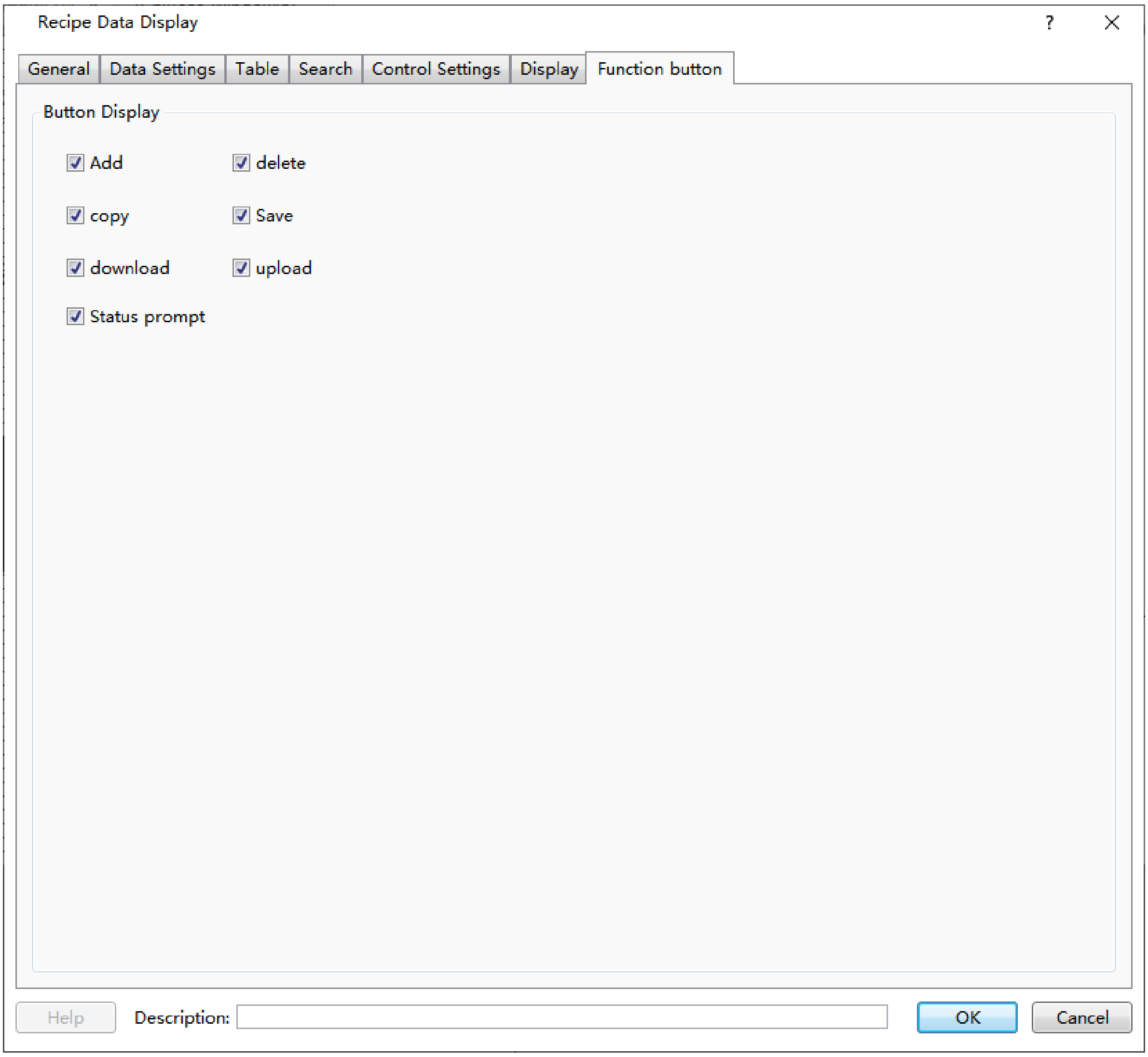
Parameters	Description
Conditional	Certain conditions need to be met to operate this component: ◆ Level User: HMI user reaches the lowest enable level. ◆ Privilege User: HMI user has specified privilege. ◆ Logic Control: Meet certain logic condition. For example, if the value of LB0 is ON and the value of LB1 is OFF.
Require confirmation prior to execution	Before operating this component, an automatic confirmation dialog box will pop up to prevent accidental operations.
Waiting Time	The display duration of the confirmation dialog box.
Minimum Operation Interval	The minimum interval time for repeating the operation on the component to prevent accidental operations.

Step 6. Set the **Display** properties.



Step 7. Set the Function Button, click **OK**.

Check the corresponding buttons to add them in the component.



Please refer to the table below for the meaning of each function button.

Function button	**Description**
Add	Add a row.
Delete	Delete current row.
Copy	Copy current row.
Save	Save current operation.
Download	Transfer recipe data in the HMI to external address.
Upload	Transfer data in the external address to HMI recipe data.
Status Prompt	State feedback after recipe operation.

Step 8. Click anywhere in the window to insert the recipe data display component.

11 Library

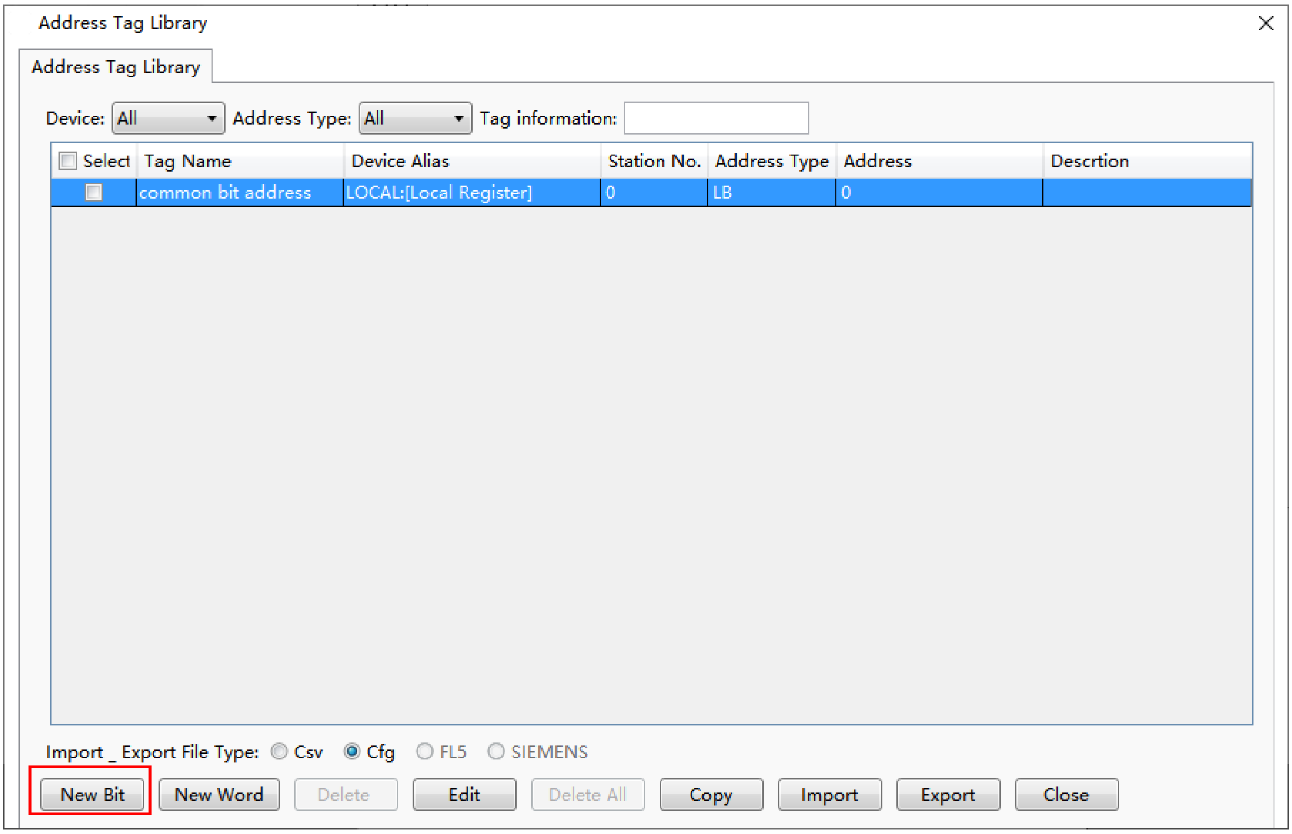
A library is a collection of similar elements in VI20Studio, which allows users to reference them easily when configuring screens. It includes address tag library, text library, sound library, address monitoring table, device tag library, font format library, variable tag library, OPC UA nodes, graphic library, and string table.

11.1 Address Tag Library

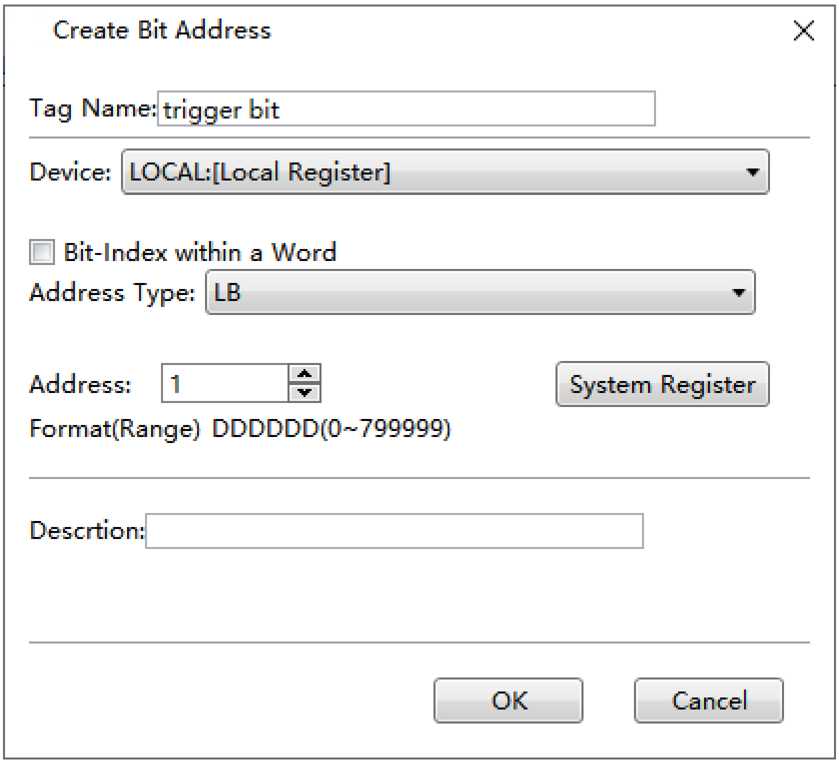
The address tag library uses tags to represent corresponding bit addresses (or word addresses), making it convenient for users to reference and categorize addresses during operations such as editing elements.

11.1.1 Add Bit Tag

Step 1. Select **Library/Assress Tag Library** from the menu bar, click **New Bit** in the pop-up **Address Tag Library** dialog box.



Step 2. Configure relevant parameters in the pop-up **Creat Bit Address** dialog box, click **OK**.

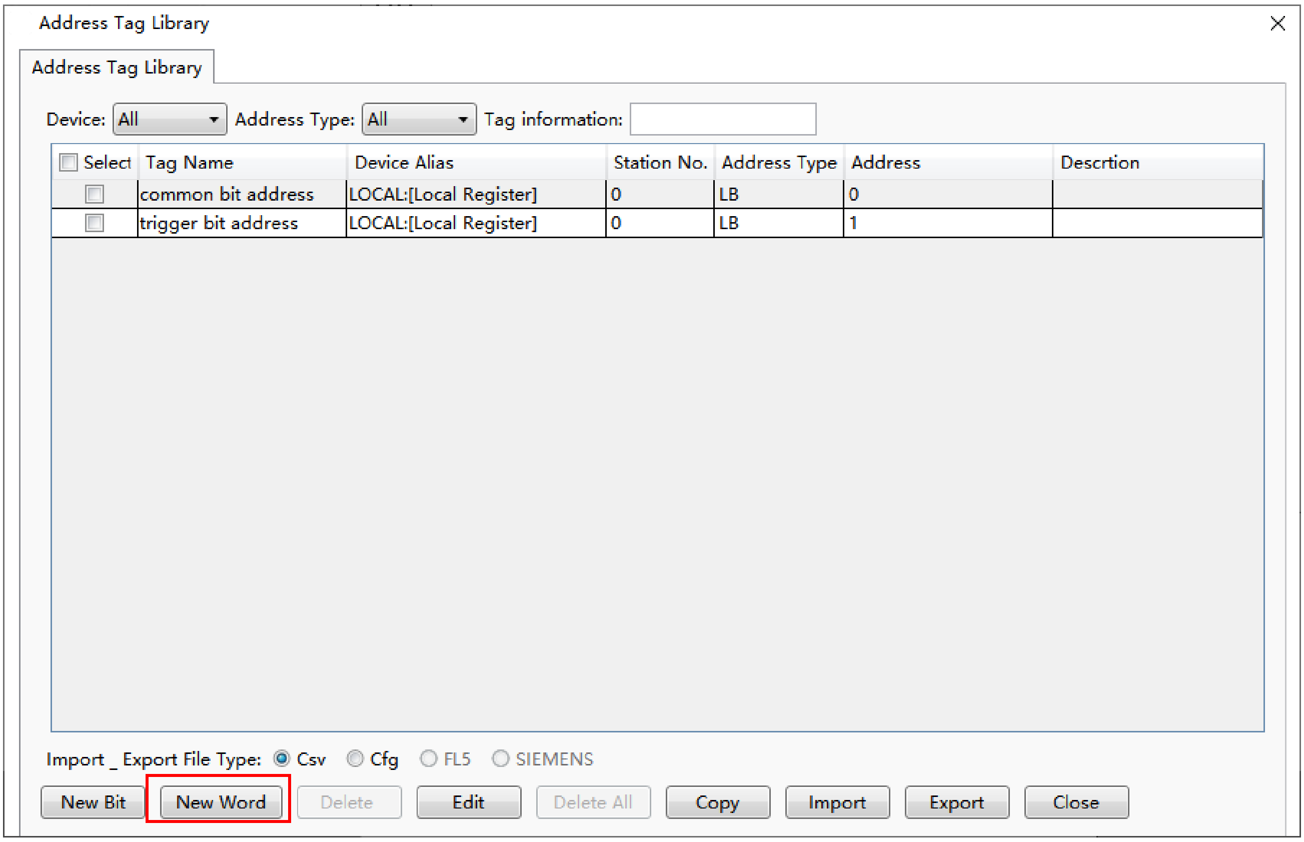


Please refer to the table below for detailed configuration methods.

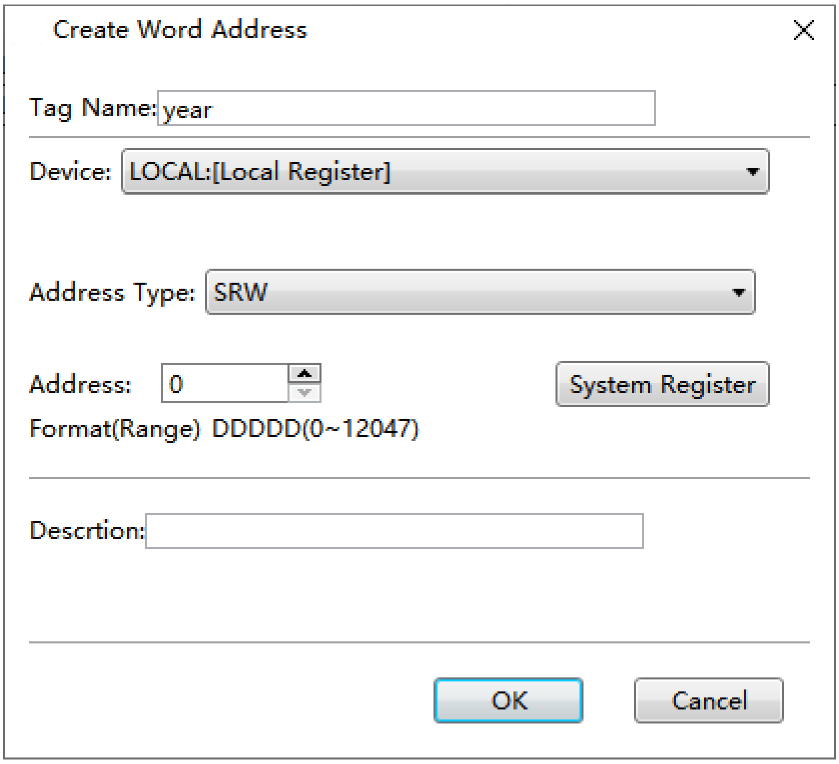
Parameters	Description
Tag Name	Used to identify bit address.
Device	HMI local register, recipe register, PLC register.
Bit-index within a Word	To present the specified bit register in a word register.Each word register has 16 bit registers. The format is DDDDD.DD, for example, 799999.15.
Address Type	Bit address type, please refer to the actual situaton.
Address	Address numbering, please refer to the actual situation.
Description	Description information of tags.

11.1.2 Add Word Tag

Step 1. Select **Library/Assress Tag Library** from the menu bar, click **New Word** in the pop-up **Address Tag Library** dialog box.



Step 2. Configure relevant parameters in the pop-up **Create Word Address** dialog box, click **OK**.

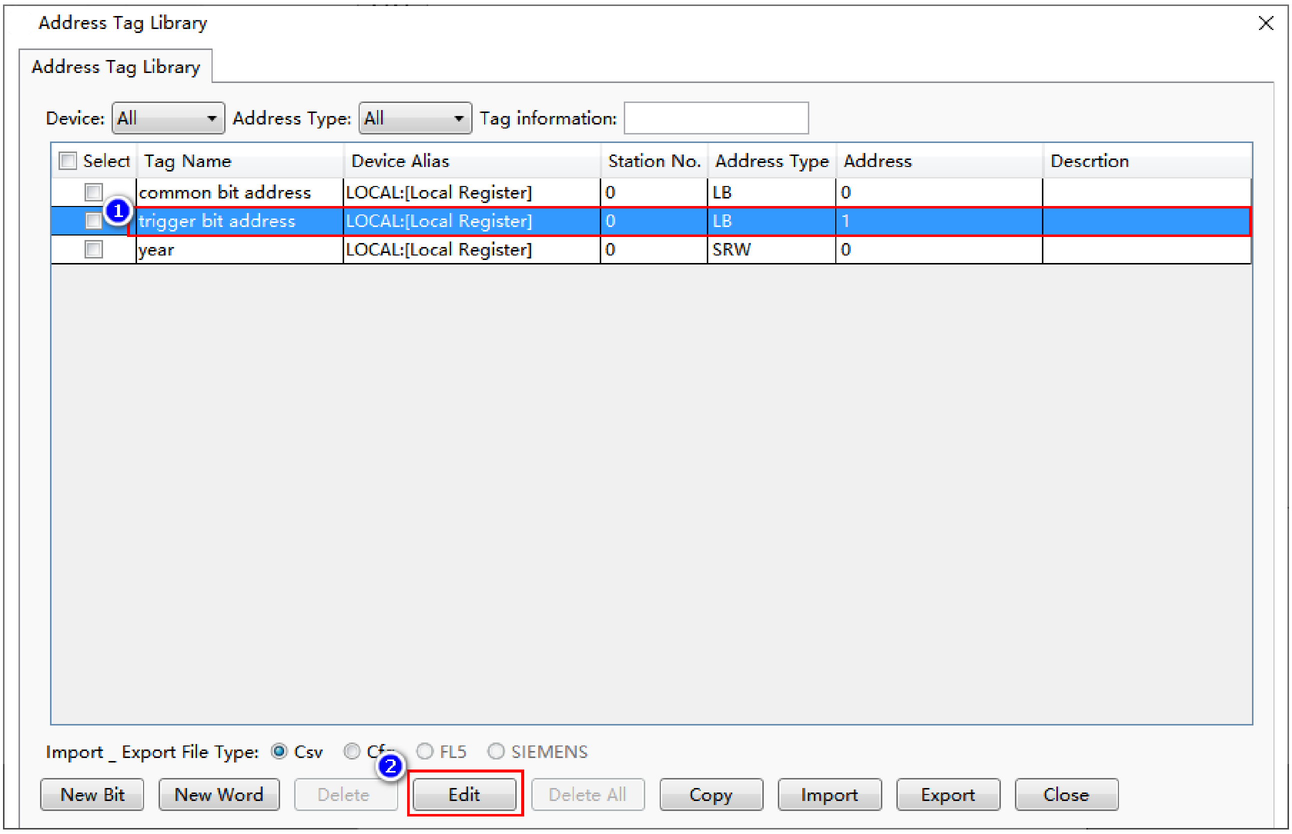


Please refer to the table below for detailed configuration methods.

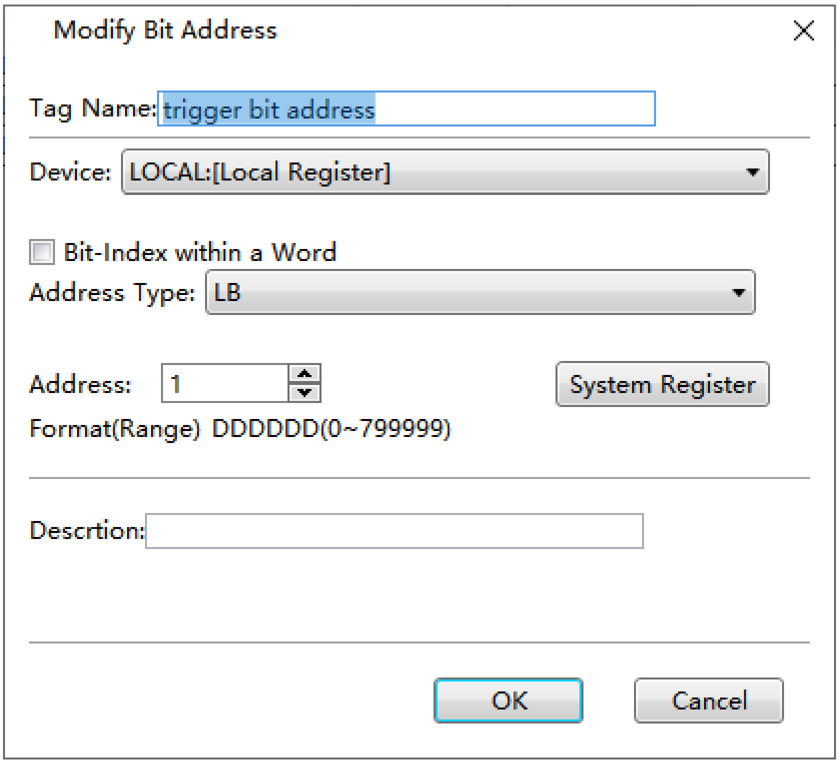
Parameter	Description
Tag Name	Used to identify word address.
Device	HMI local register, recipe register, PLC register.
Address Type	Word address type, please refer to the actual situaton.
Address	Address numbering.
Description	Description information of tags.

11.1.3 Modify Tag

Step 1. Select **Library/Assress Tag Library** from the menu bar, select a tag and click **Edit** in the pop-up **Address Tag Library** dialog box.



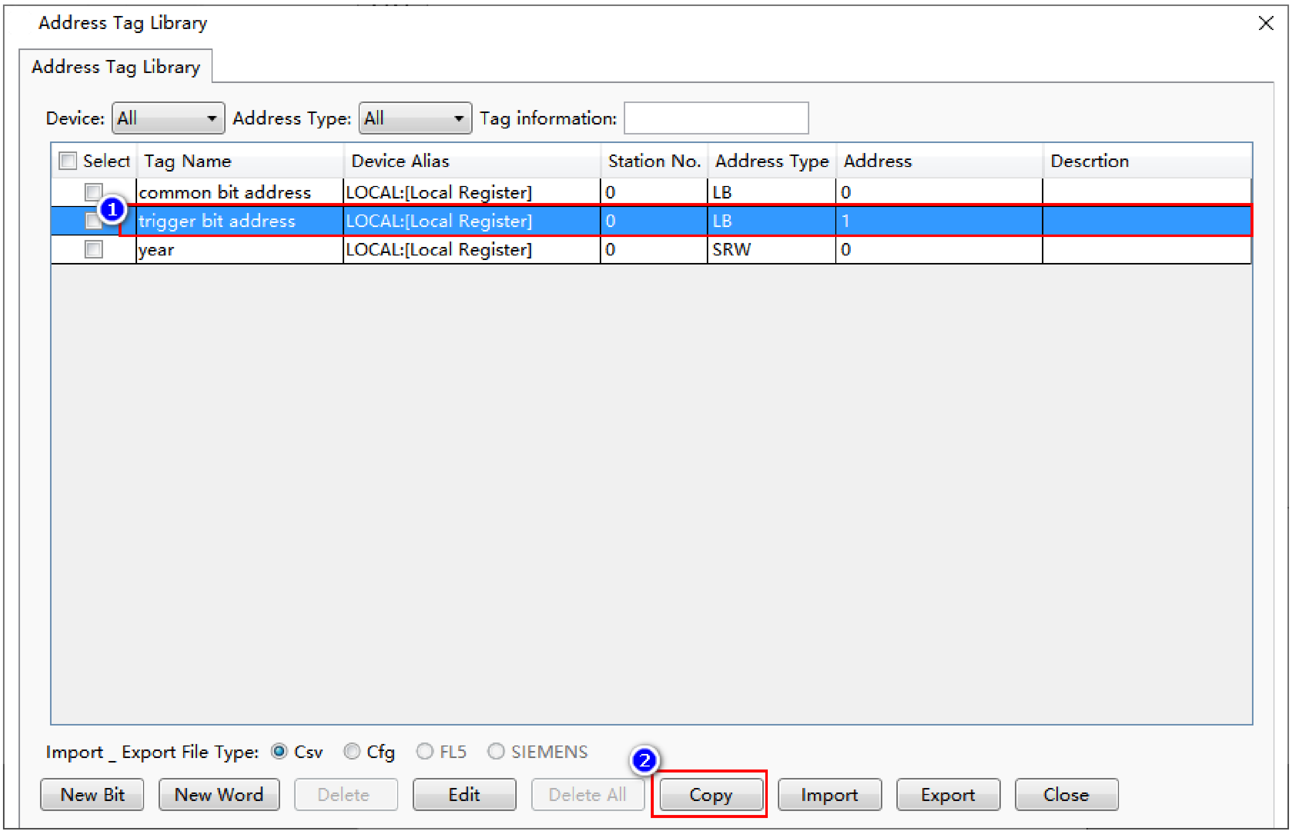
Step 2. Configure relevant parameters in the pop-up dialog box, click **OK**.



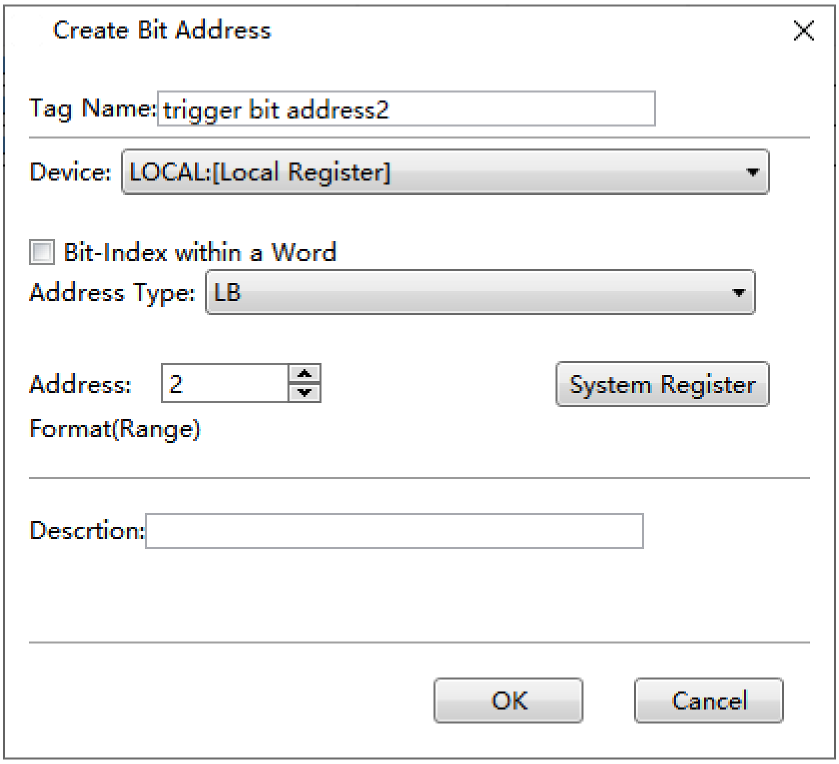
11.1.4 Copy Tag

Copy tags to make it convenient for users to modify original tags while maintaining the original tags. The steps to copy a tag are as follows:

Step 1. Select **Library/Assress Tag Library** from the menu bar,select a tag and click **Copy** in the pop-up **Address Tag Library** dialog box.



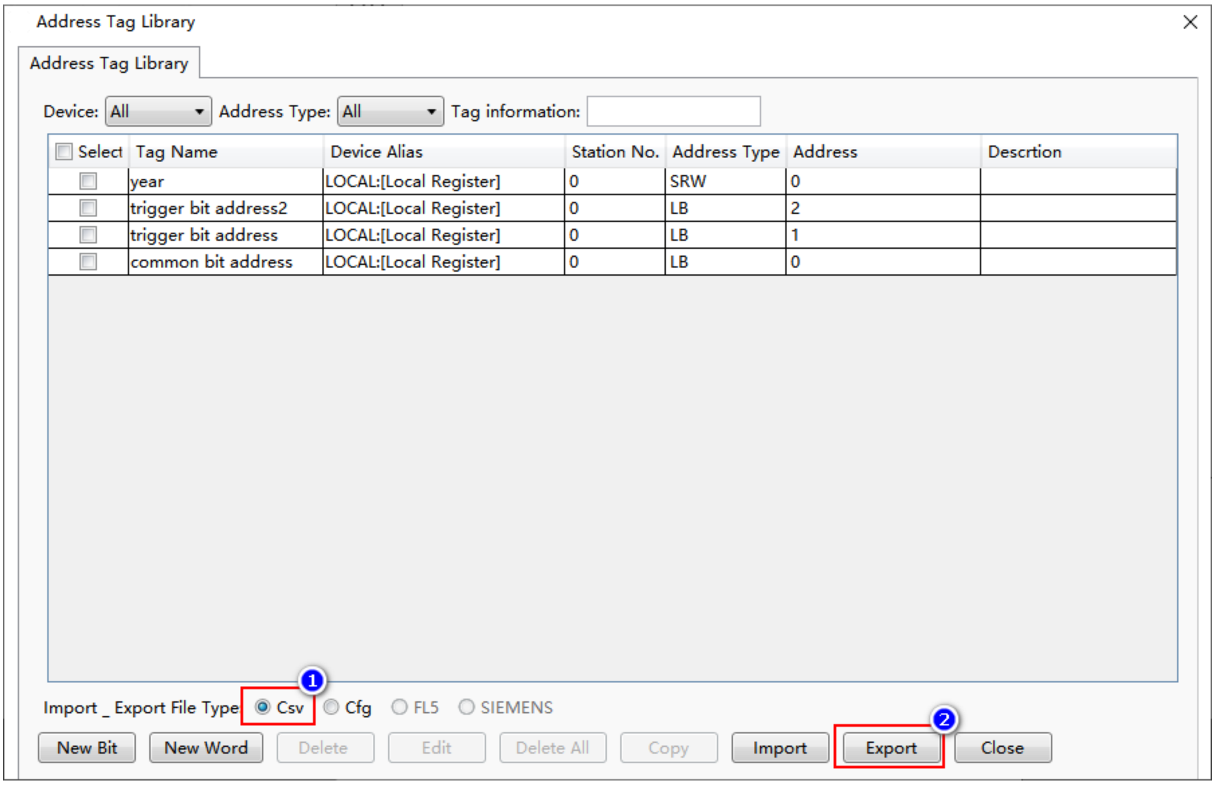
Step 2. Configure relevant parameters in the pop-up dialog box, click **OK**.



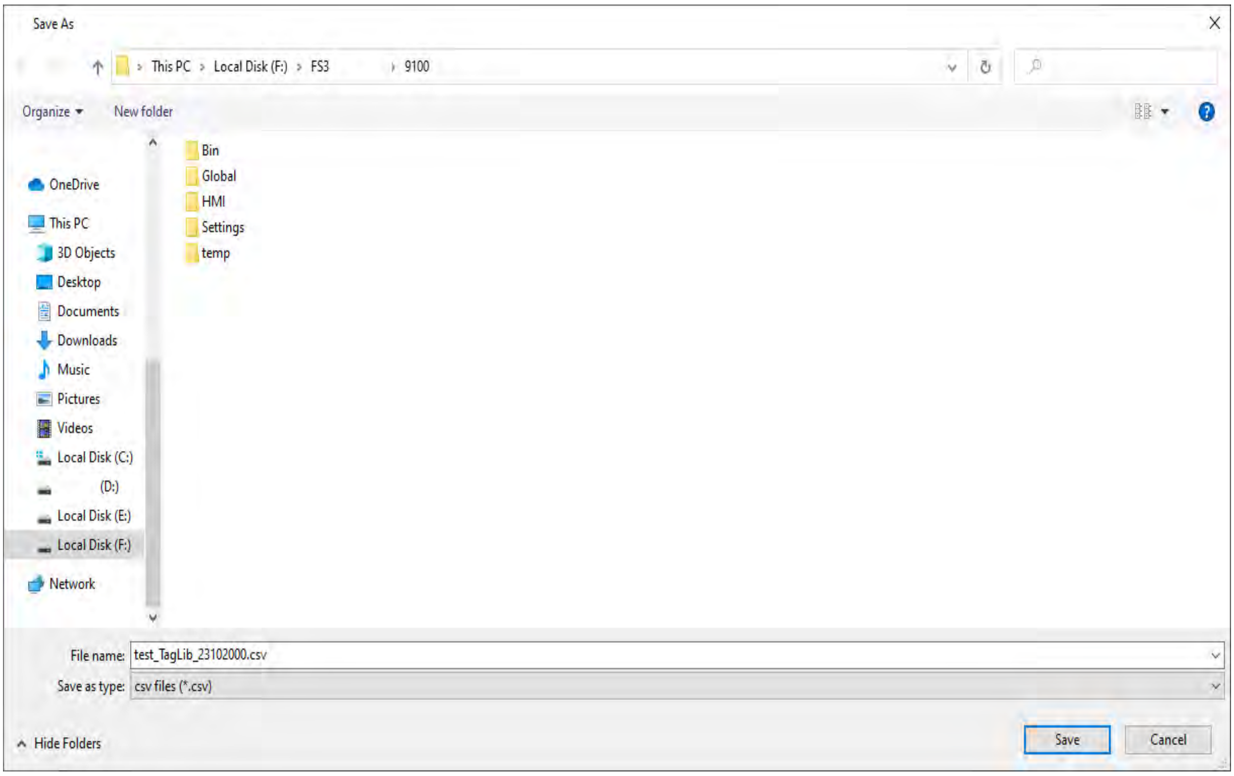
11.1.5 Export Tag

This feature allows users to export tags from the address tag library and modify, then import the tags again. The steps to export a tag are as follows:

Step 1. Select **Library/Address Tag Library** from the menu bar, select **Import_Export File Type** (csv file or cfg file) in pop-up **Address Tag Library** dialog box, click **Export** .



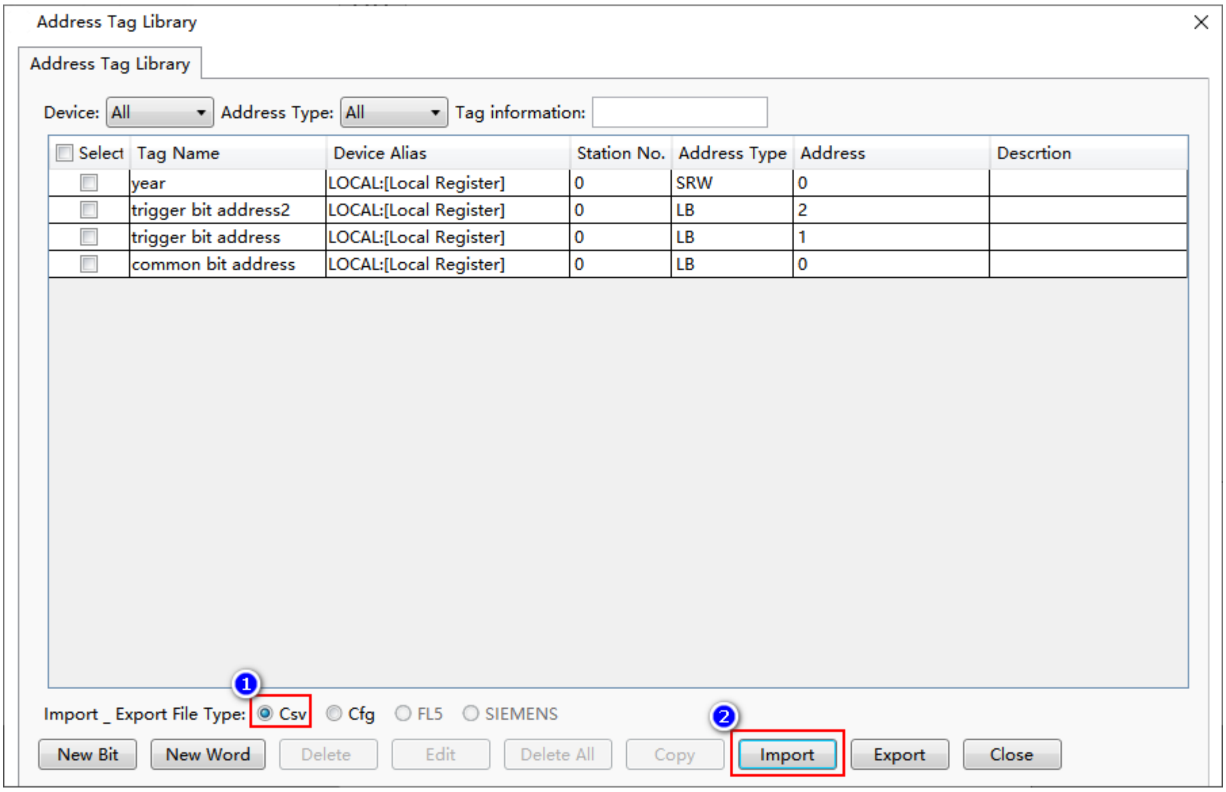
Step 2. Select the save path in the pop-up **Save As** dialog box, input the file name, click **Save**.



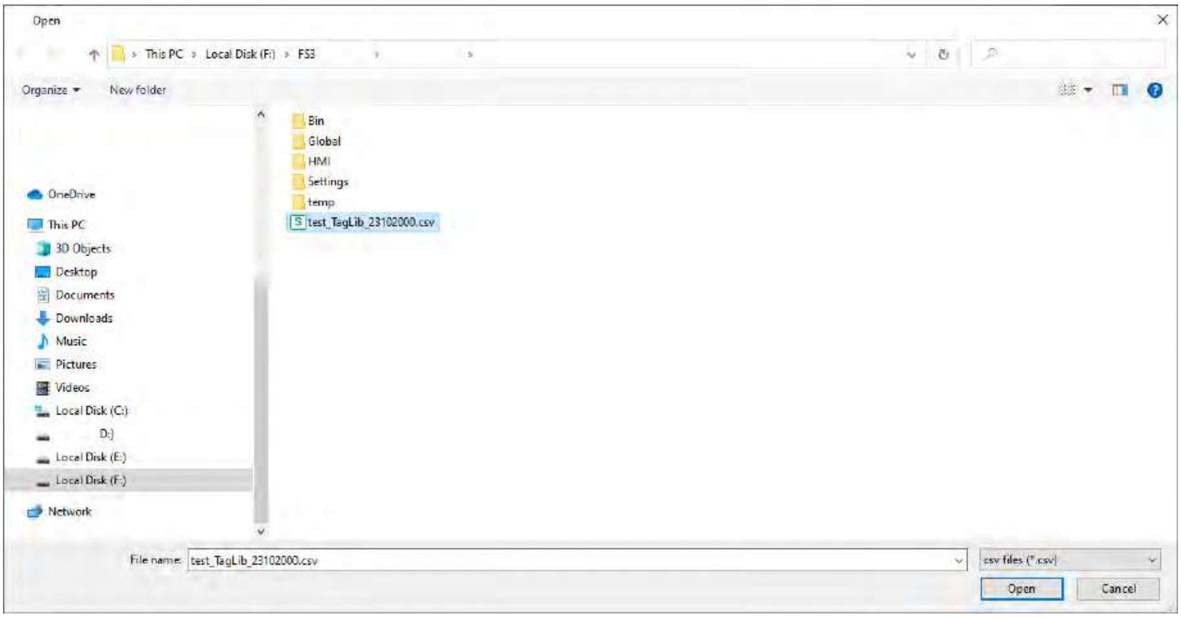
11.1.6 Import Tag

Using the import tag feature is able to improve the efficiency of creating new tags. The steps are as follows:

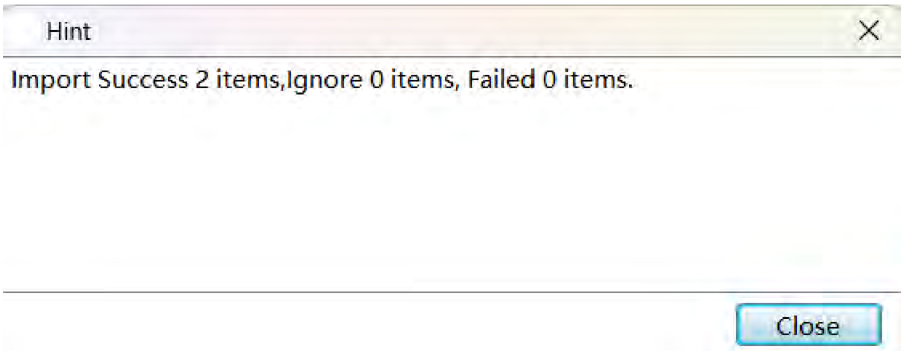
Step 1. Select **Library/Address Tag Library** from the menu bar, select **Import_Export File Type** in pop-up **Address Tag Library** dialog box, click **Import**.



Step 2. Select the file to be imported in the pop-up dialog box, click **Open**.

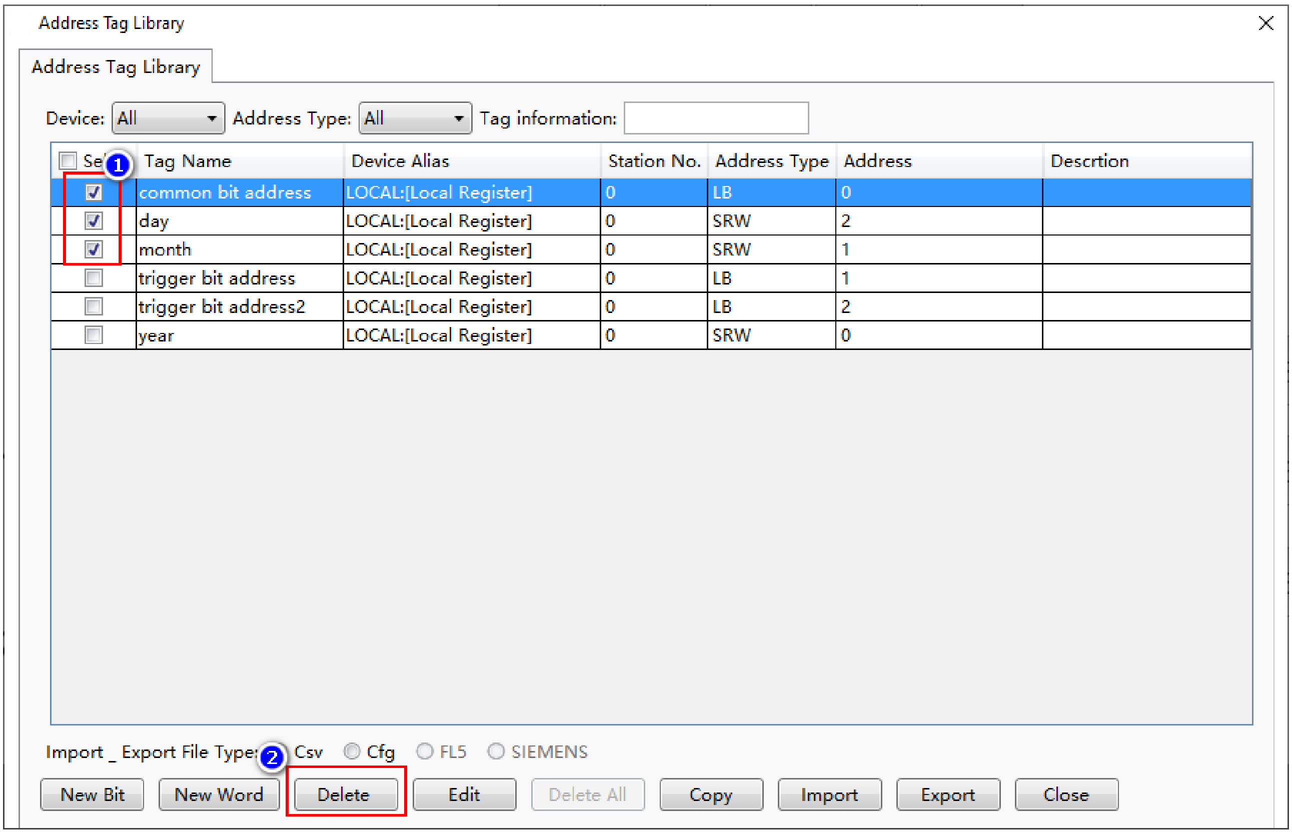


Step 3.Click **close**.

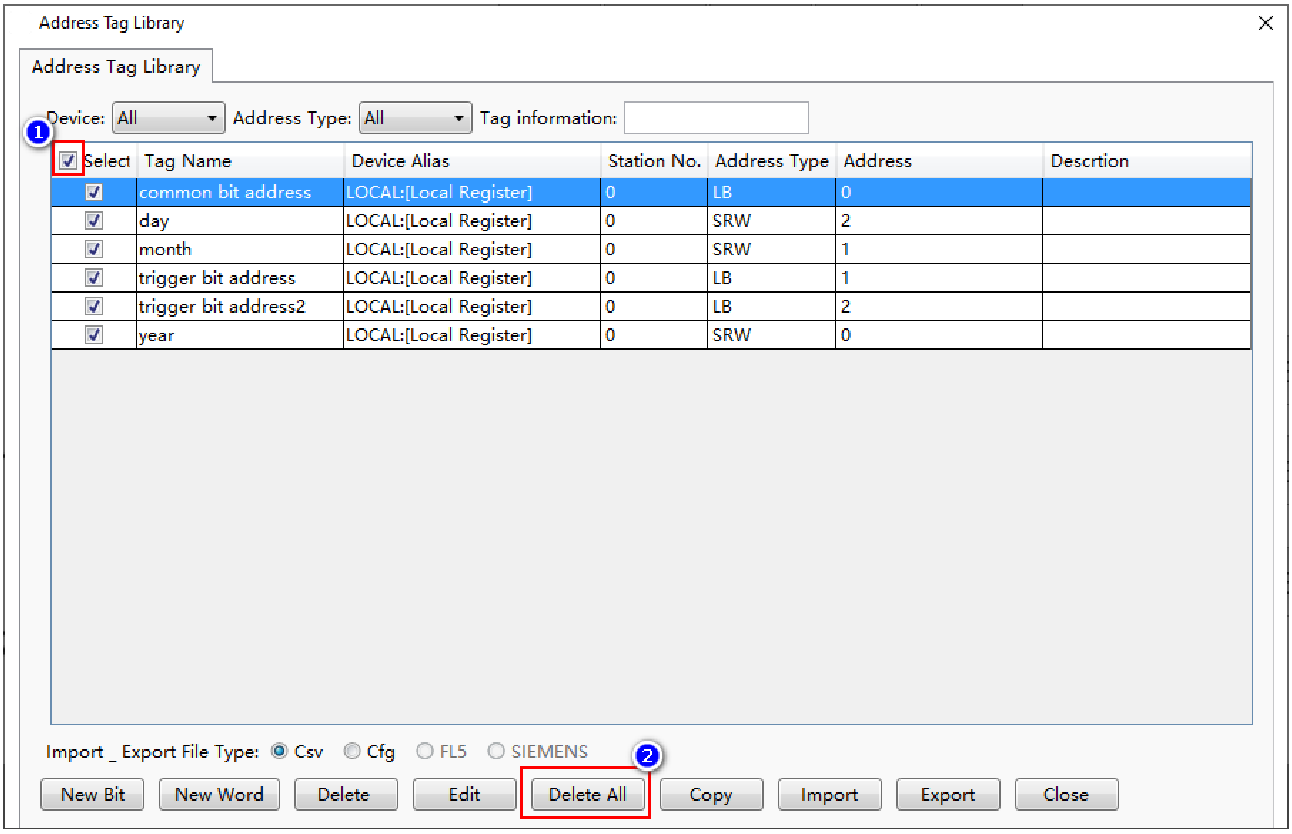


11.1.7 Delete Tag

- Delete batch: Check the tags you want to delete, click **Delete**, and then click **Yes** in the pop-up dialog box to delete the selected tags in bulk.



- Delete all: Check the select all button, click **Delete All**, then click **Yes** in the pop-up dialog box to delete all tags.

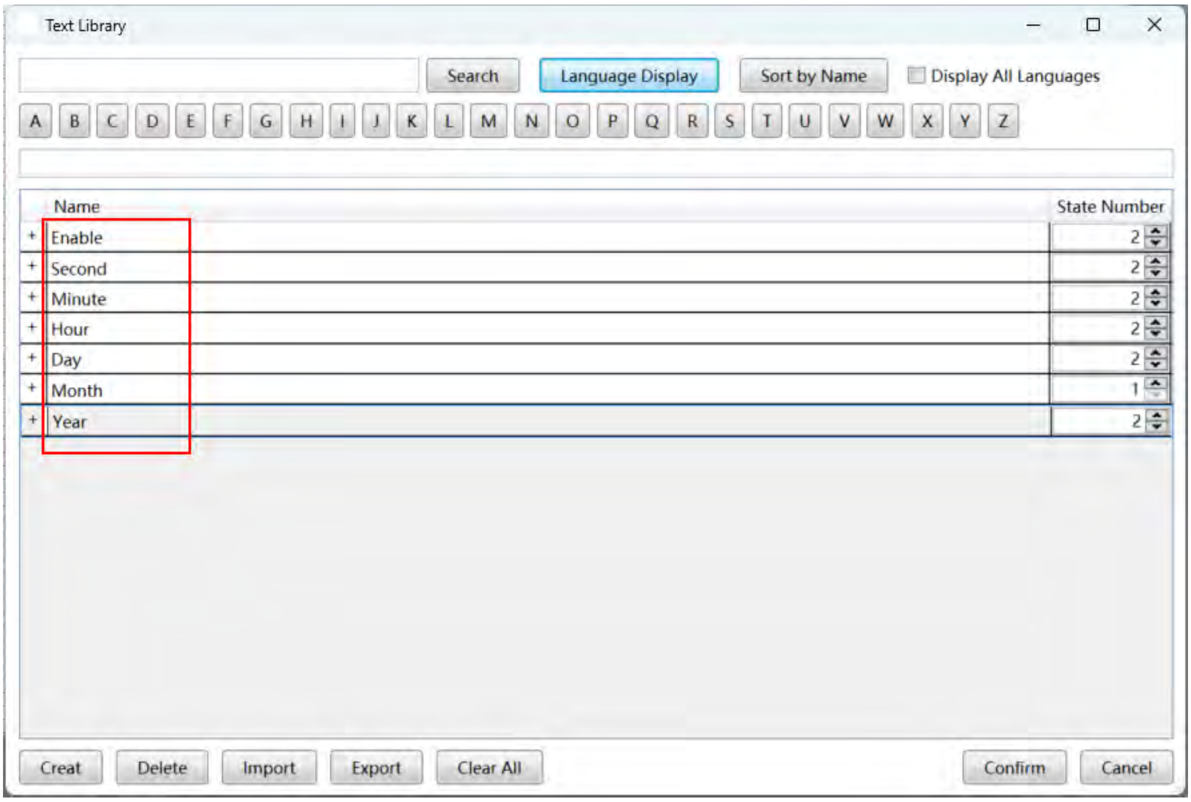


11.2 Text Library

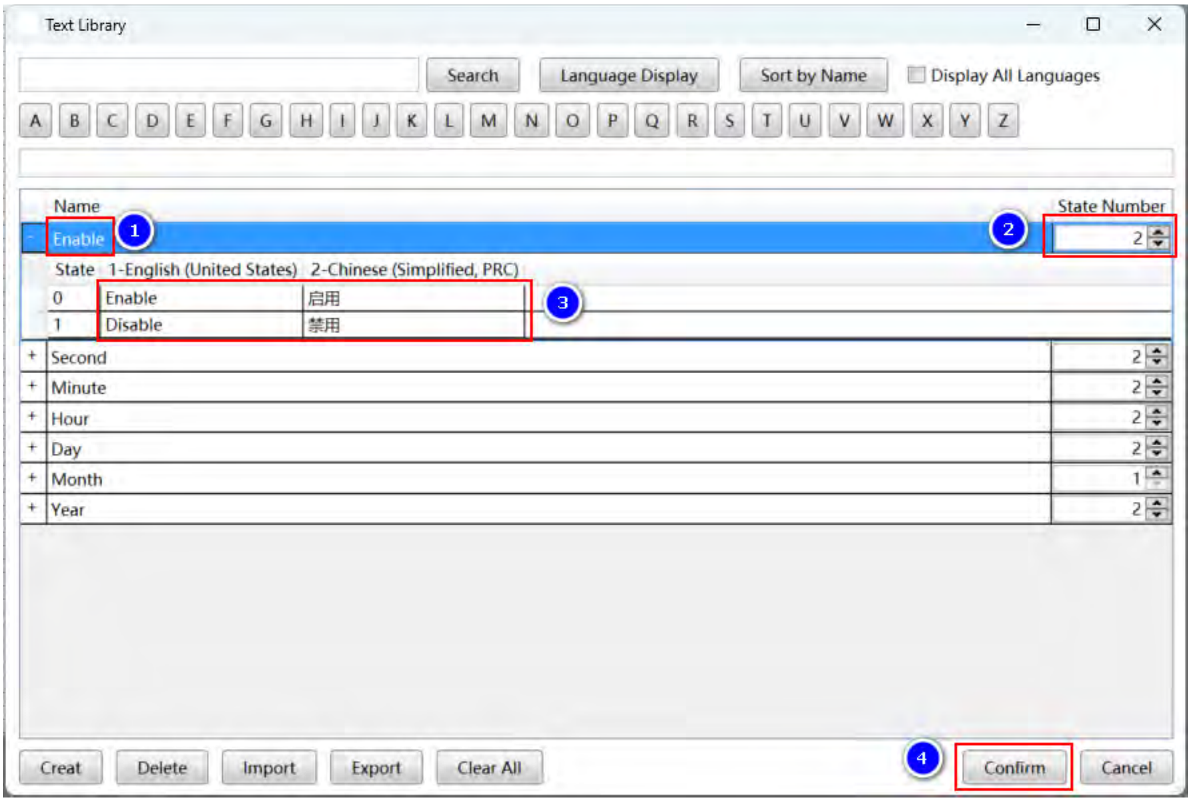
The text library refers to tagging commonly used words or phrases (including different languages and states) for convenient referencing when configuring screens.

11.2.1 New Text

Step 1. Select **Library/Text Library** from the menu bar, click **Creat** in pop-up **Text Library** dialog box.



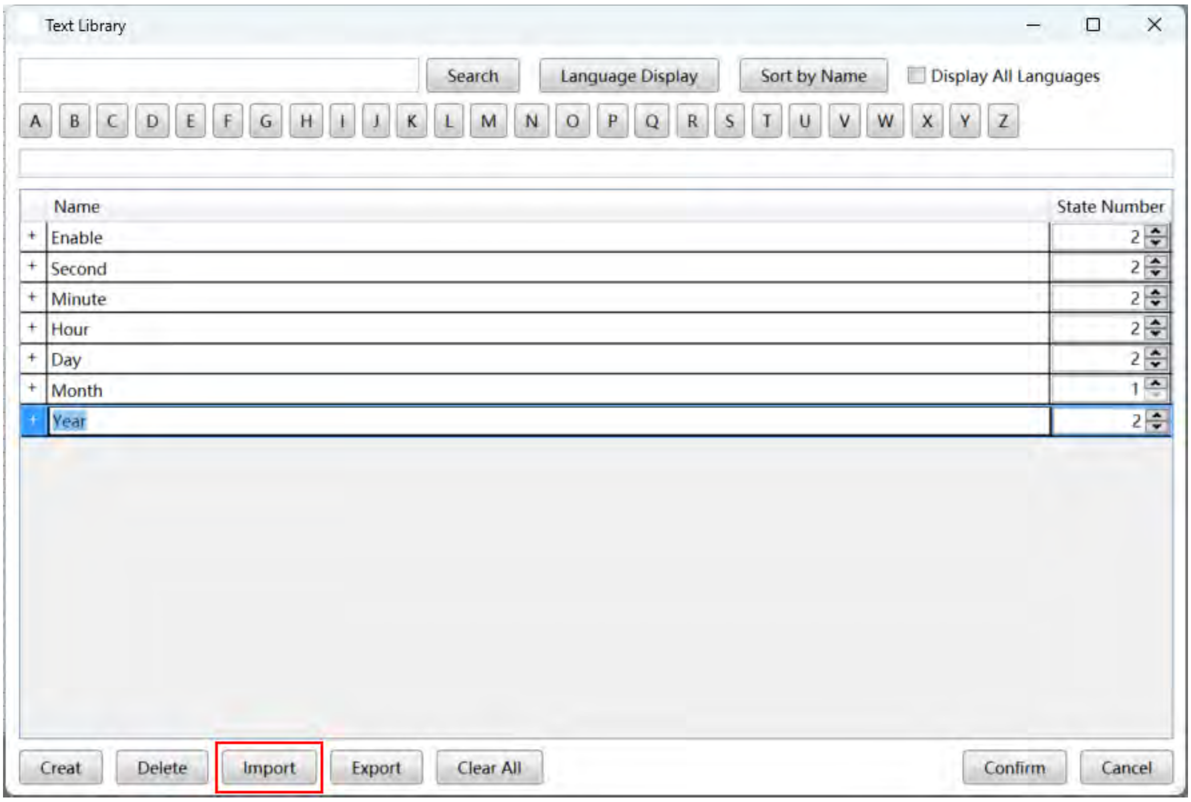
Step 2. Edit name and number of states, set the values in different states and different languages, click **Confirm**.



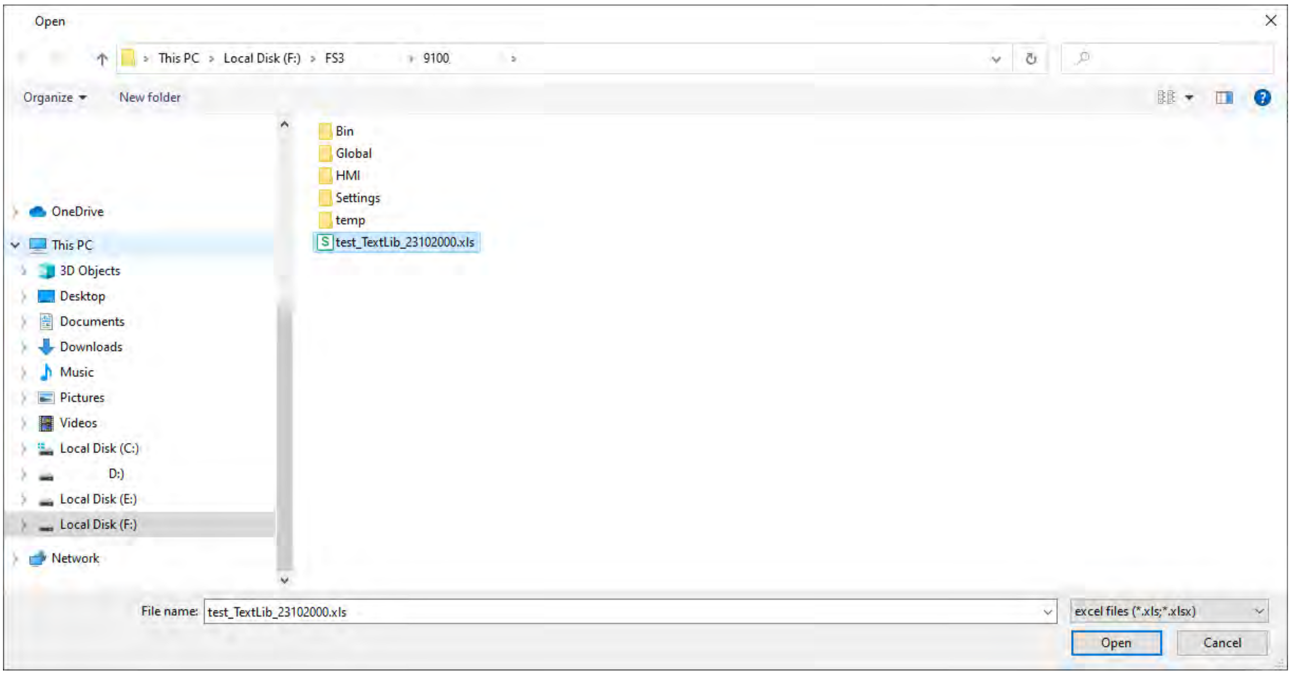
11.2.2 Import Text

Importing texts can improve the efficiency of creating new texts. The format of the imported file should follow the format of the exported file.

Step 1. Select **Library/Text Library** from the menu bar, click **Import** in pop-up **Text Library** dialog box.



Step 2. Select the file to be imported in the pop-up dialog box, click **Open**.



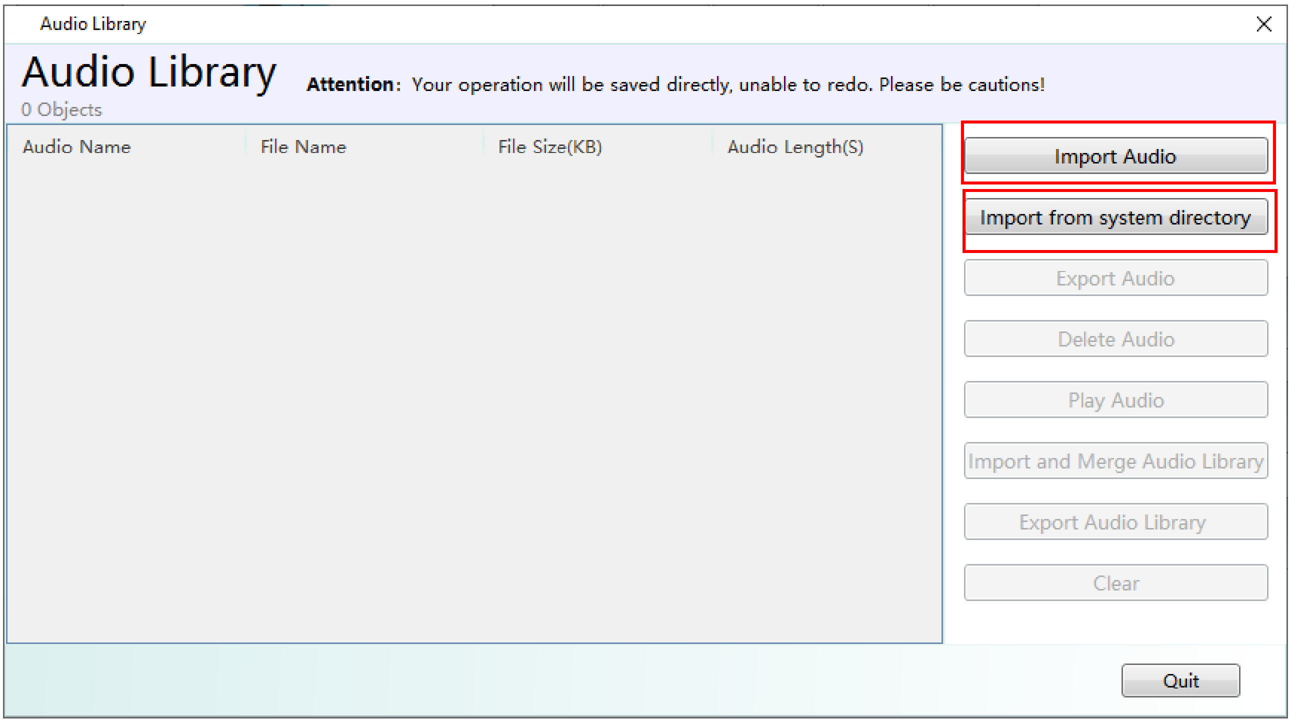
11.3 Audio Library

When designing certain elements (such as a slider), you can enhance the user experience by playing audios. The audio library allows you to import audio files, making it convenient for users to reference them when configuring elements.

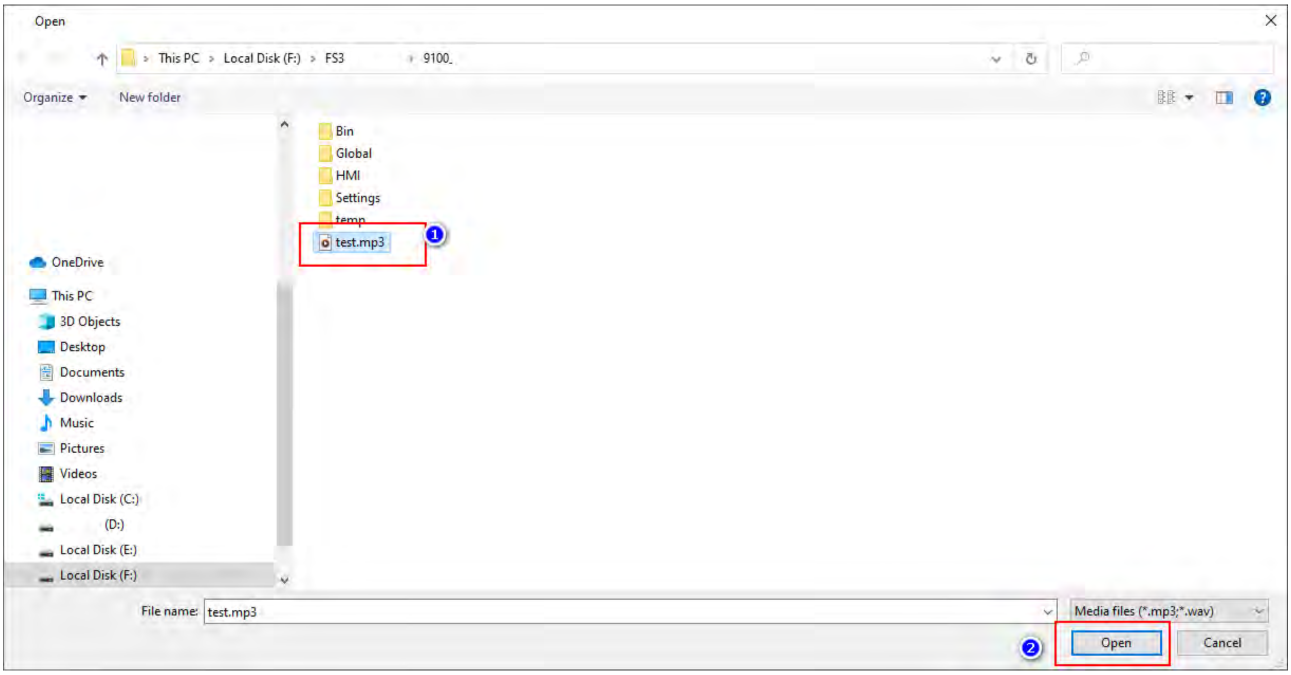
The steps to import an audio are as follows:

Step 1. Select **Library/Audio Library** from the menu bar, click **Import Audio** or **Import from system directory** in pop-up dialog box.

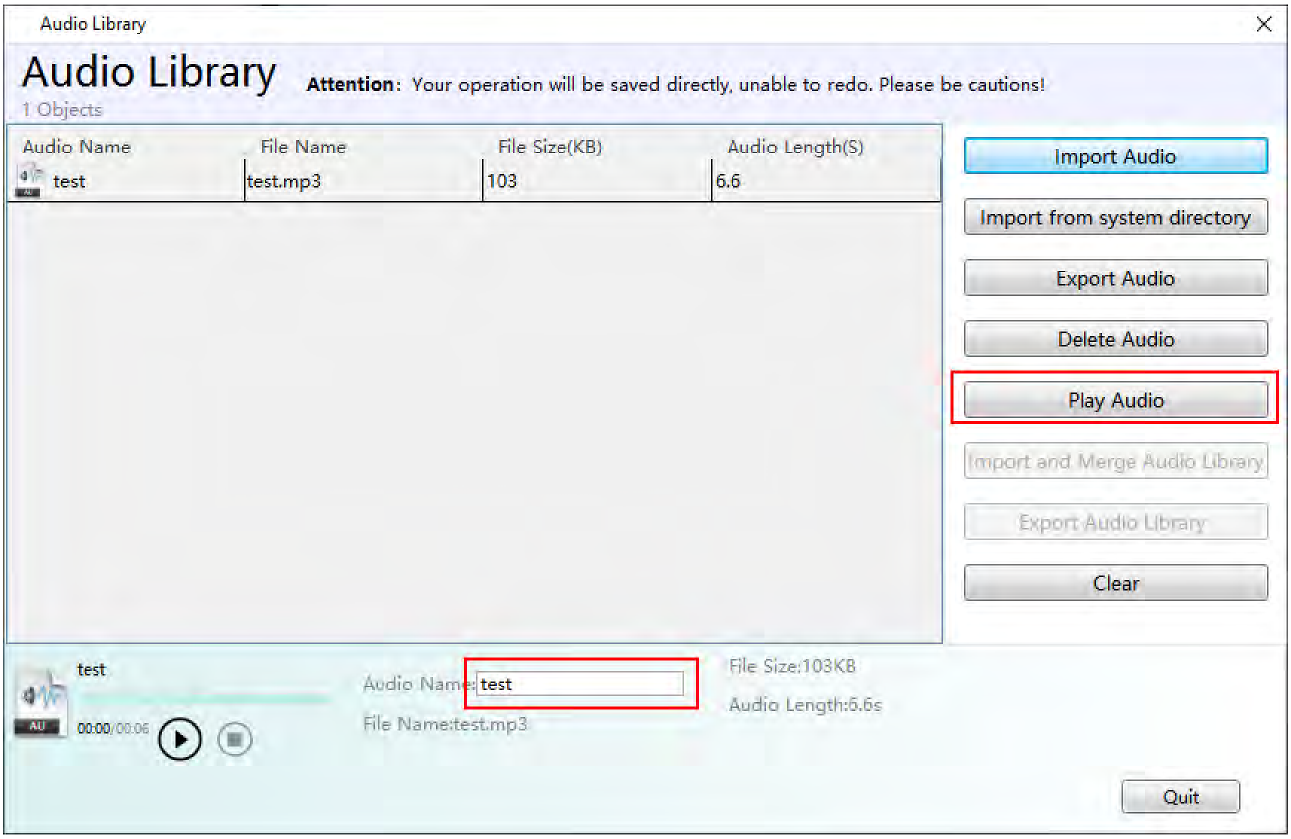
- Import audio: import a single audio file.
- Import from system directory: import all the audio files form the specified directory.
- Supports import mp3, wav formats only.



Step 2. Select the audio file or the directory where the audio file is located in the pop-up dialog box, click **Open**.

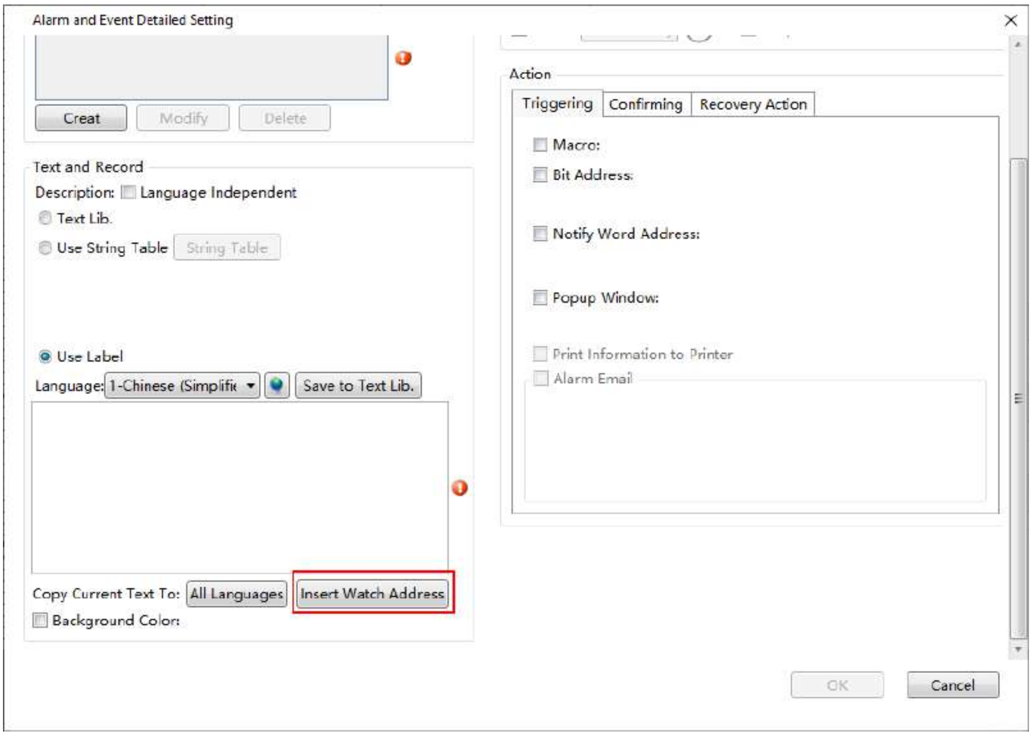


Step 3. After importing the audio, select the audio file, then click **Play Audio** to play the sound. The name of the audio file can be revised.



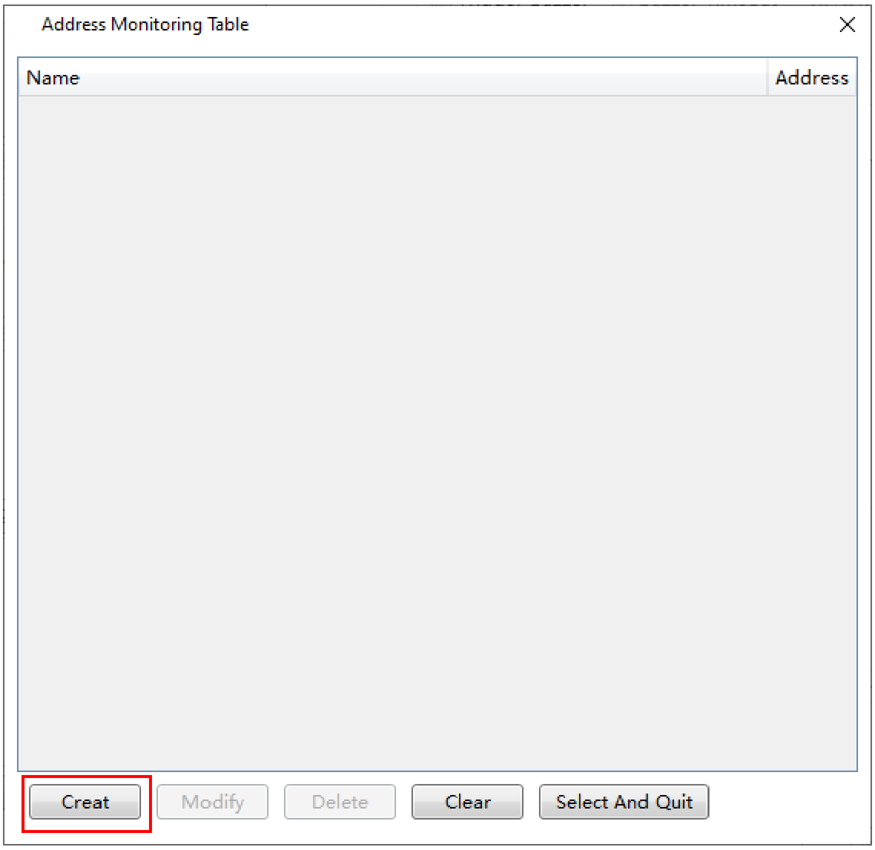
11.4 Address Monitoring Table

The address monitoring table refers to the addresses that need to be monitored. Addresses should be referenced in **Aarm and Event Detailed Setting**. For detailed information about alarm and event detail settings, you can refer to the Alarm and Event.

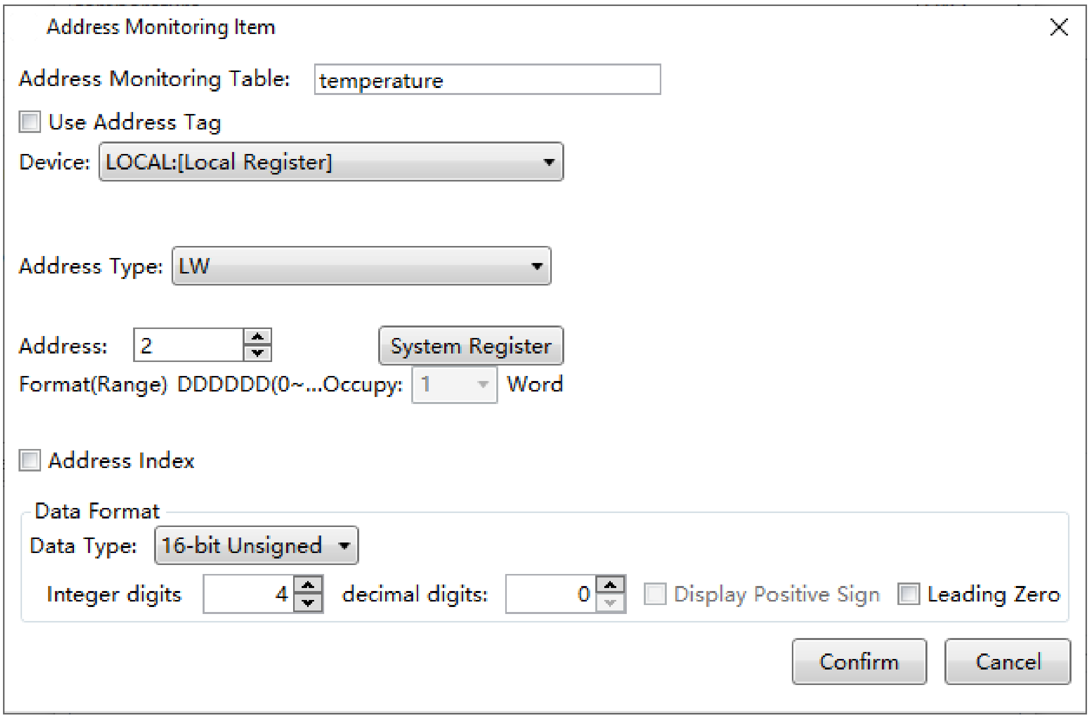


Steps to add a new monitoring address are as follows:

Step 1. Select **Library/Monitoring Address Table** from the menu bar, click **New** in pop-up **Monitoring Address Table** dialog box.



Step 2. Edit relevant information in the pop-up **Monitoring Address Item** dialog box, click **Confirm**.



Please refer to the table below for detailed configuration methods.

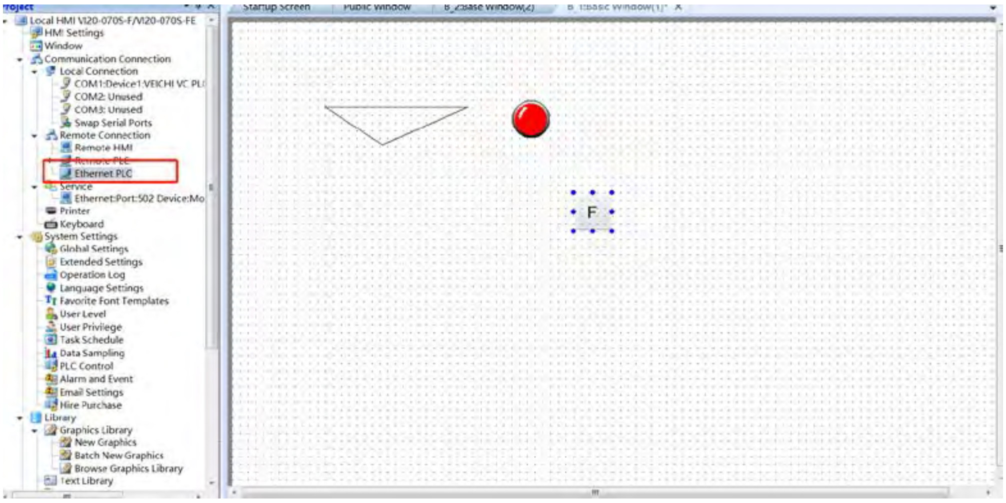
Parameters	**Description**
Address Monitoring Table	Used to distinguish monitoring addresses.
Use Address Tag	Use address tags to represent the corresponding addresses.
Device	HMI local register, recipe register, register of PLC.
Address Type	Word address type, please refer to the actual situation.
Address	Address numbering.
Address Index	Use address index to change the current address. For example, if current address is LW0, address index is LW2, offset is 3, then the targetaddress is LW (0+the value of LW2+3).
Data type	Please refer to the actual situation.
Integer Digits	The number of digits for the integer part.
Decimal Digits	The number of decimal digits. When the actual value is 55, set the decimal digits as 2, then the displayed value is 0.55.
Display Positive Sign	Display the positive sign for signed numbers.
Leading Zero	Use 0 to represent when the high digits are empty. For example, 16 would be displayed as 0016.

11.5 Device Tag Library

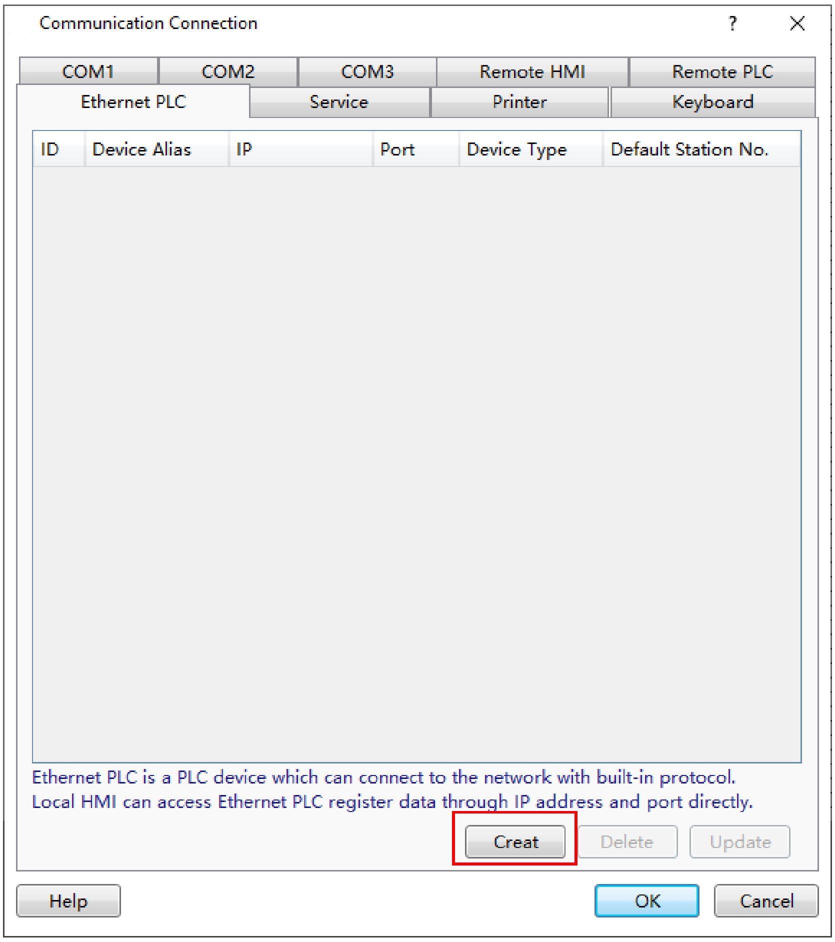
Device tag uses tag to refer to the addresses of PLC register, applicable for communication scenarios between HMI and PLCs that support address tag.

Step 1. Add PLCs that support address tag.

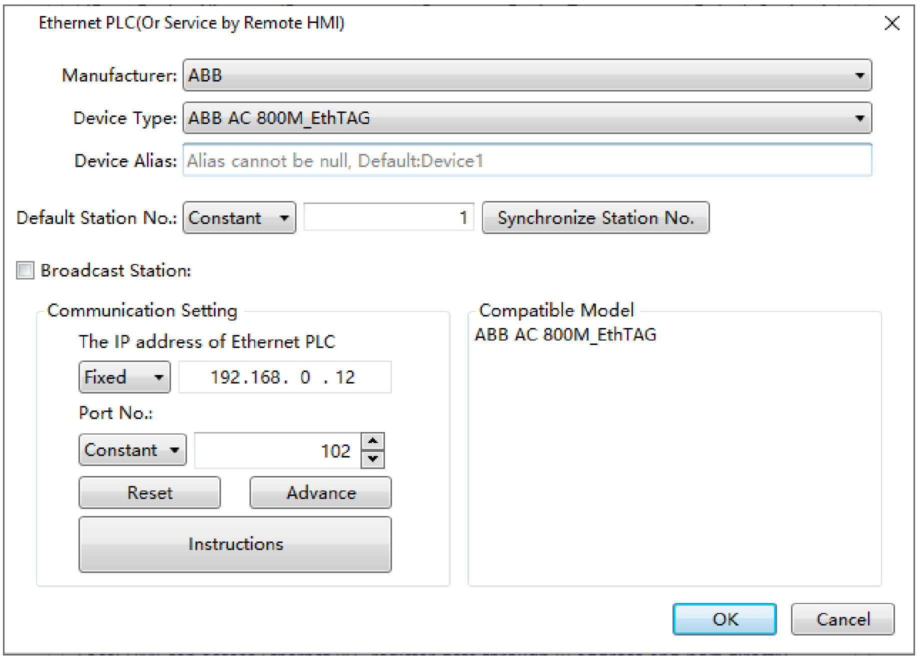
1) Double click **Network PLC** in **project** controls.



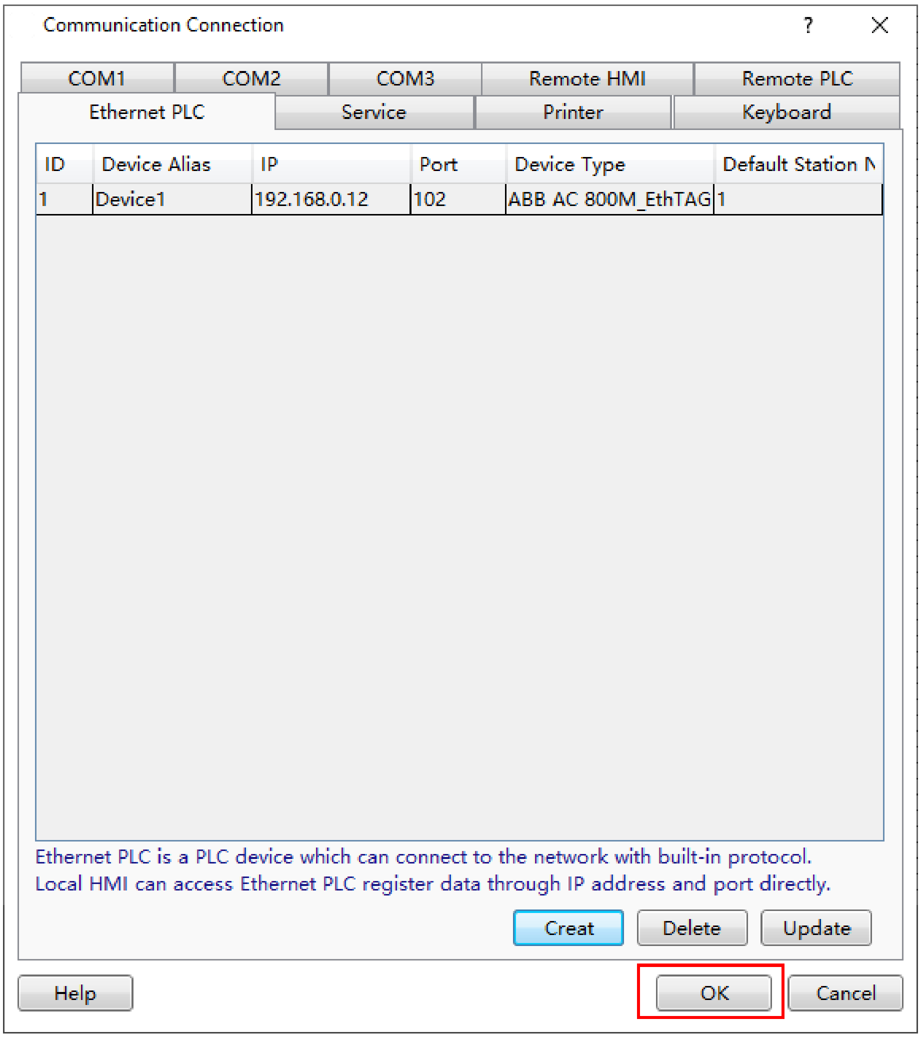
2) Click **Create** in the pop-up dialog box.



3) Edit parameters related to PLC in the pop-up dialog box, click **OK**.

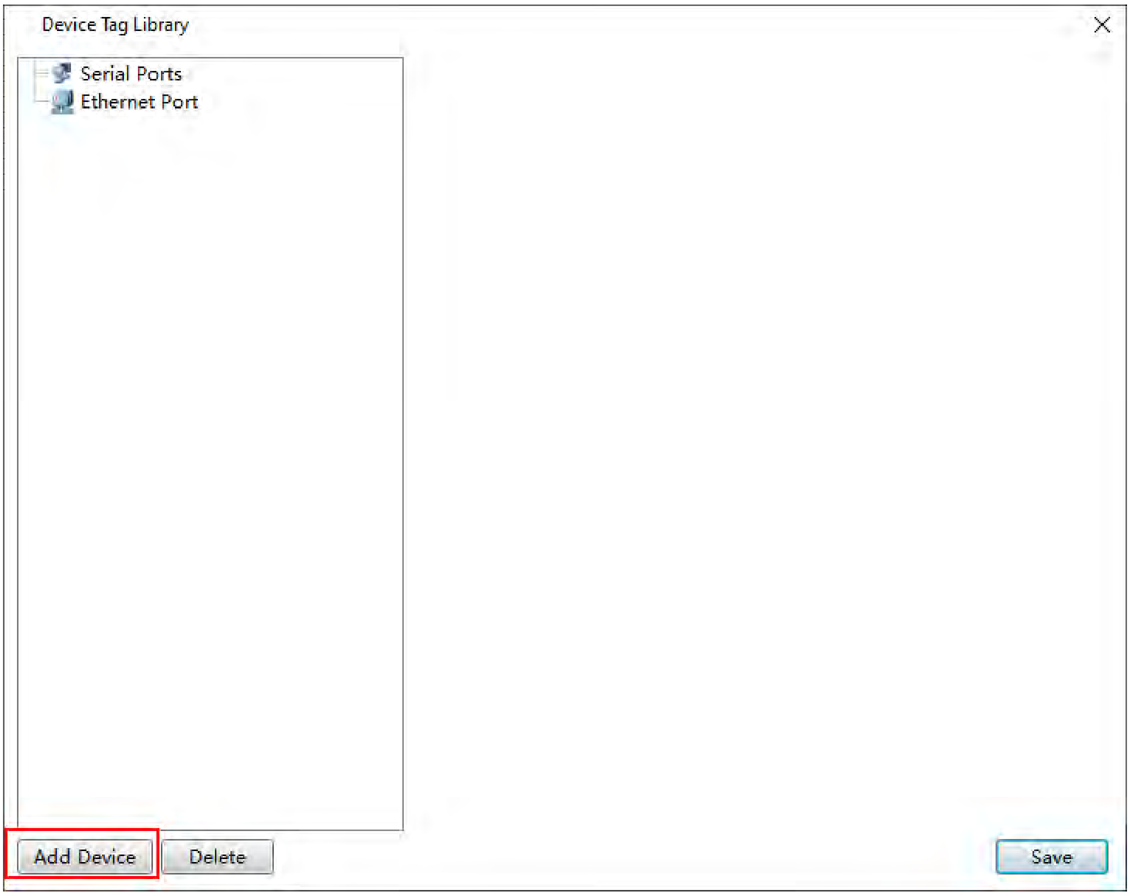


4) Click **OK**.

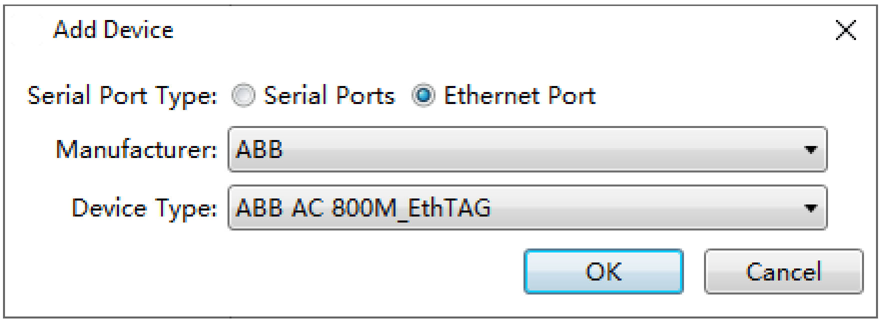


Step 2. Add device tag.

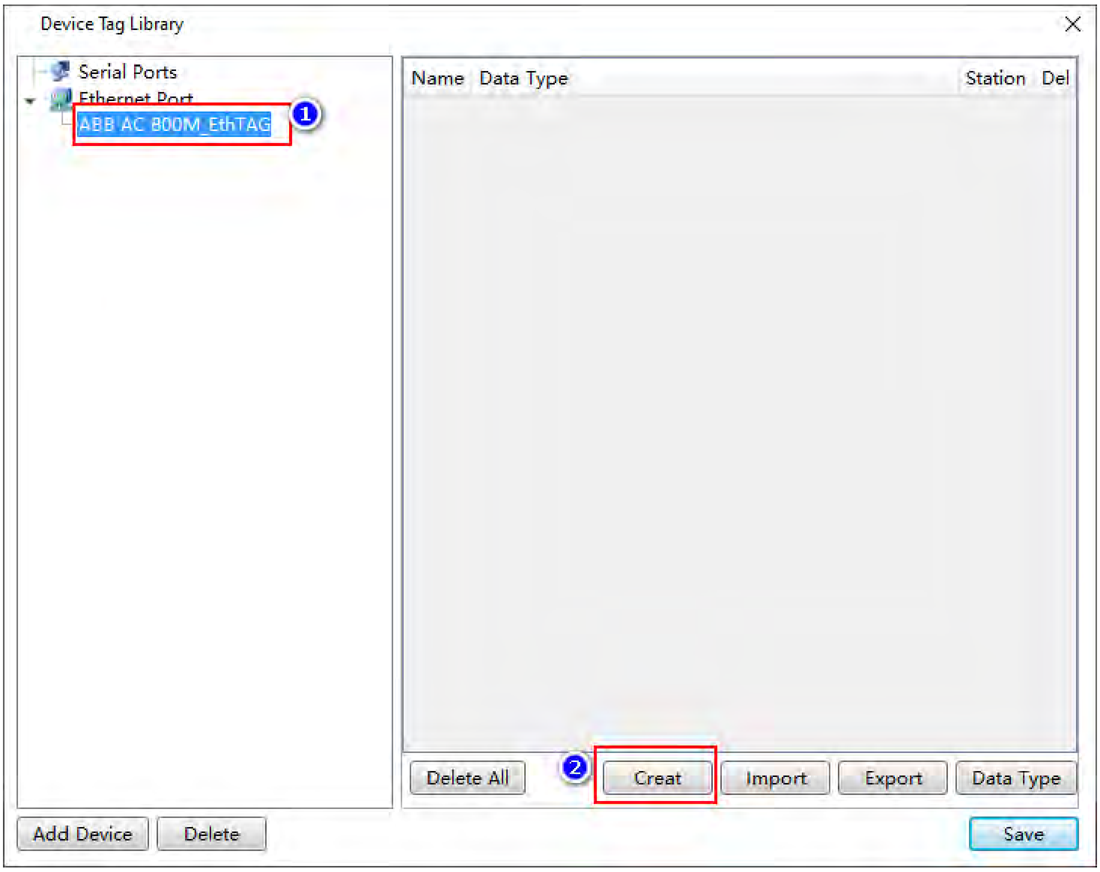
1) Select **Library/Device Tag Library** from the menu bar, click **Add Device** in the pop-up dialog box.



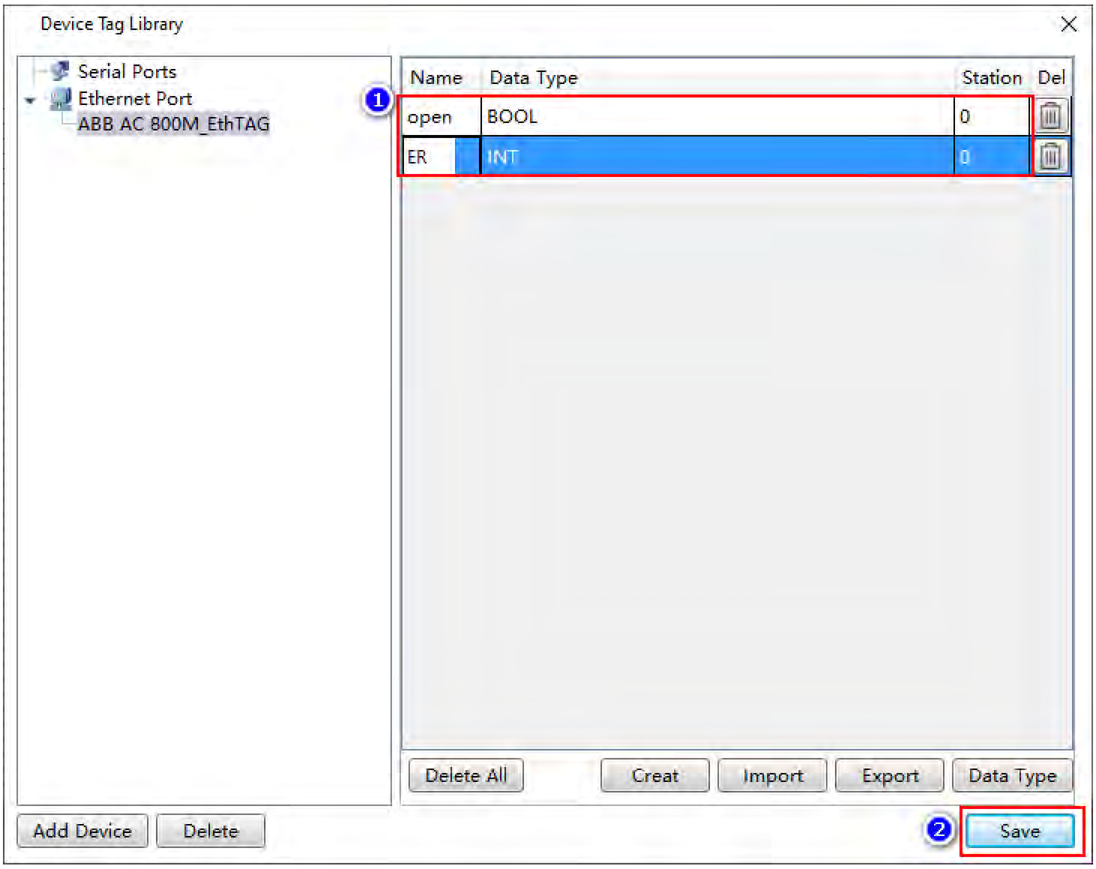
2) Select serial port type, manufacturer and device type in the pop-up dialog box, click **OK.**



3) Select the added PLC, click **Create**.



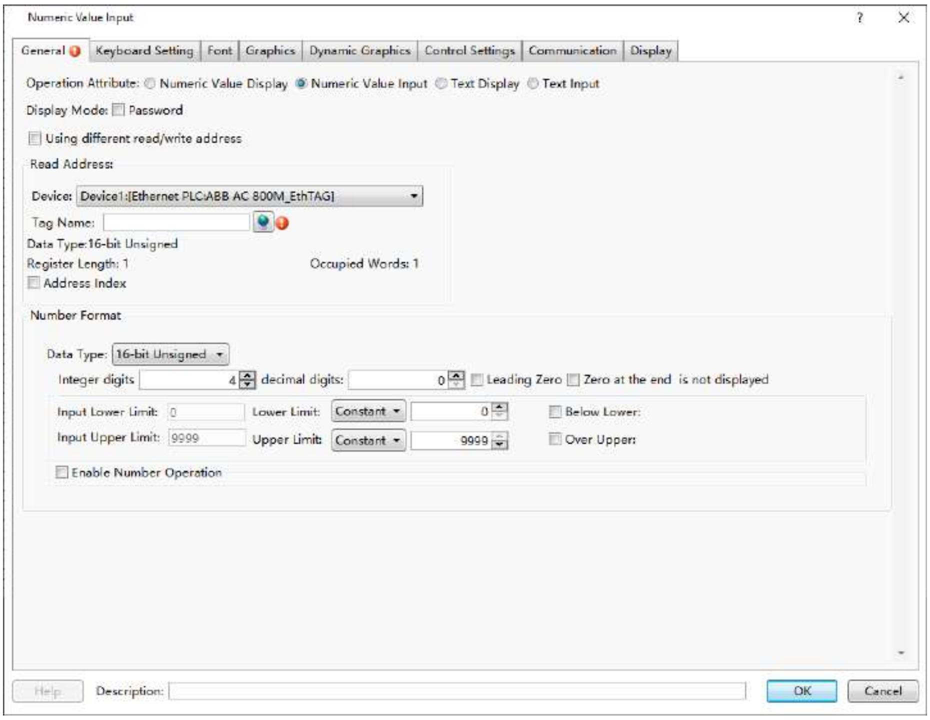
4) Add tag data, clcik **Save**.



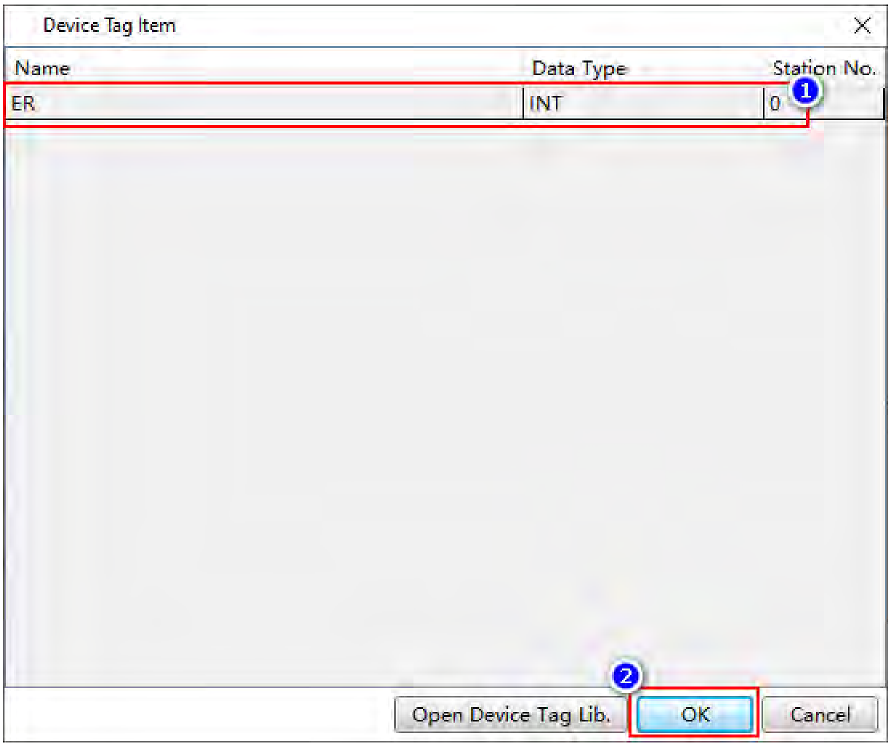
Step 3. Reference device tag.

Device tags can be referenced when creating elements, and this example illustrates the creation of a numeric input element.

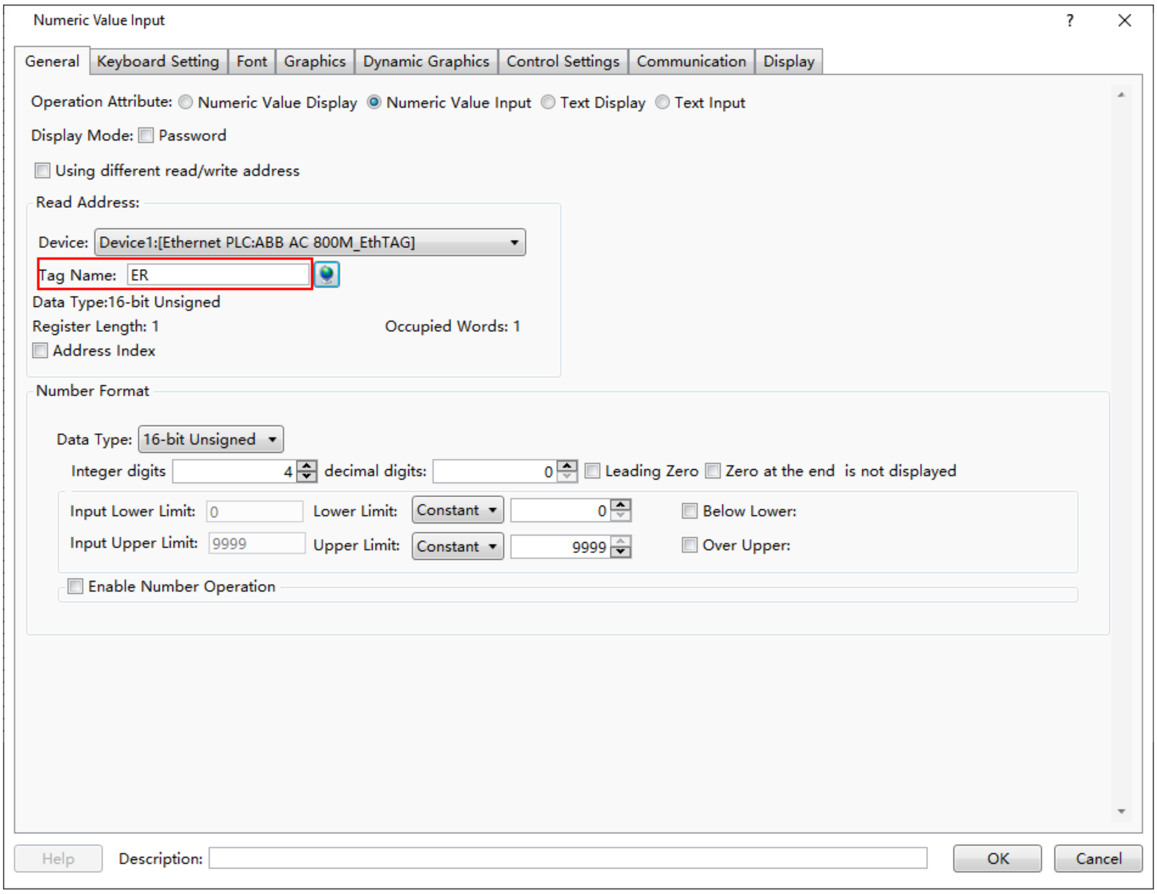
1) Select **Elements/Numeric Value and Text Display/Numeric Value Input** from the menu bar, select PLC device in the pop-up dialog box.



2) Click the  icon, select device tag in the pop-up dialog box, click **OK**.



3) The result of referencing device tags are shown in the figure below.

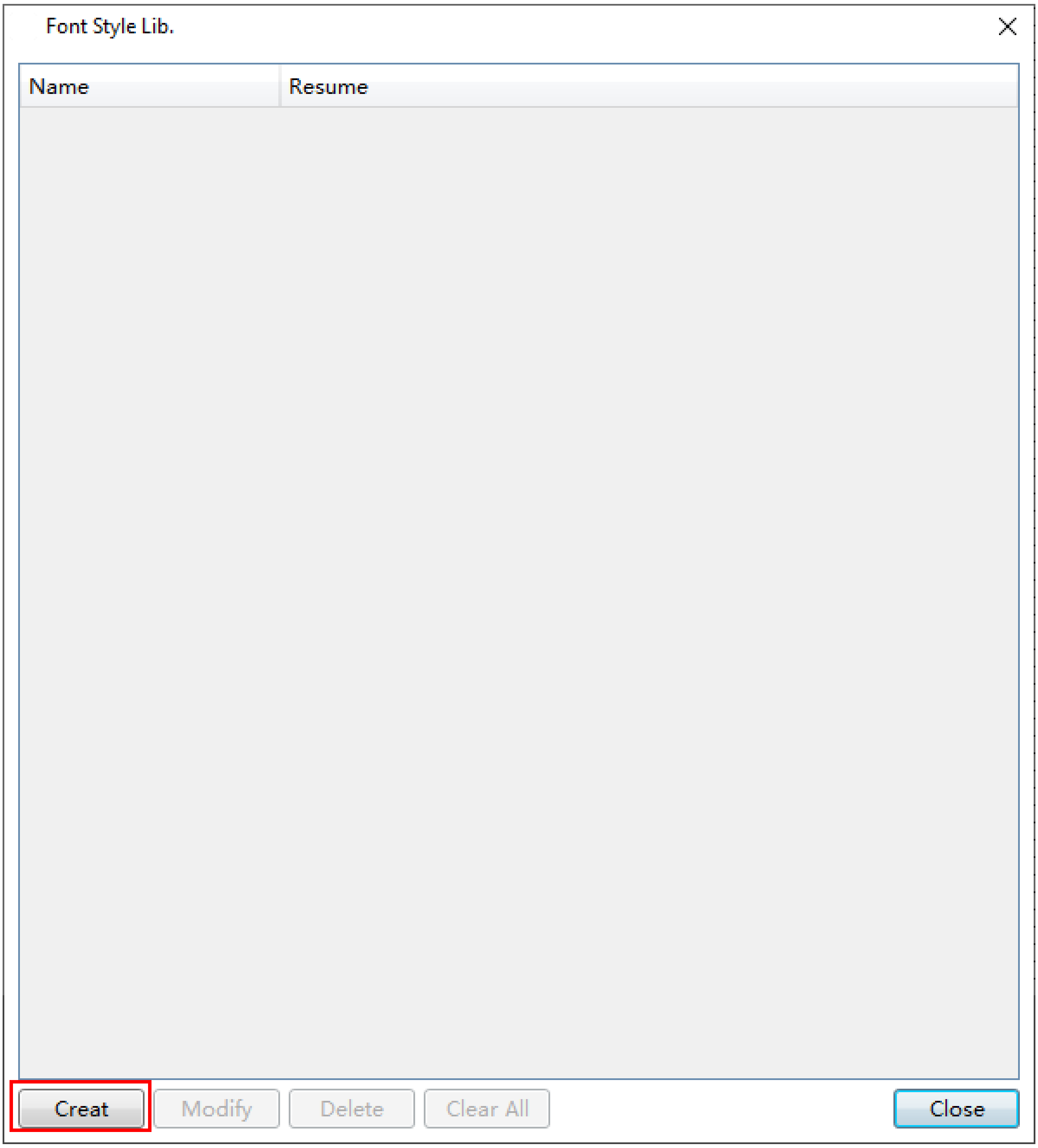


11.6 Font Style Library

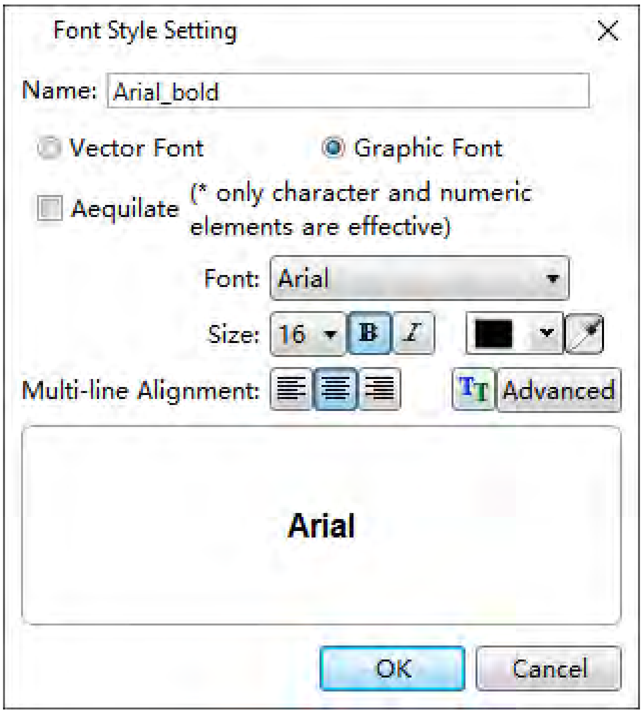
Font Style Library is a collection of custom font formats. It allows users to quickly apply font styles from the library to set the desired formatting of text content when creating textual content.

The steps to add a new font style are as follows:

Step 1. Select **Library/Font Style Library** from the menu bar, click **Create** in the pop-up dialog box.



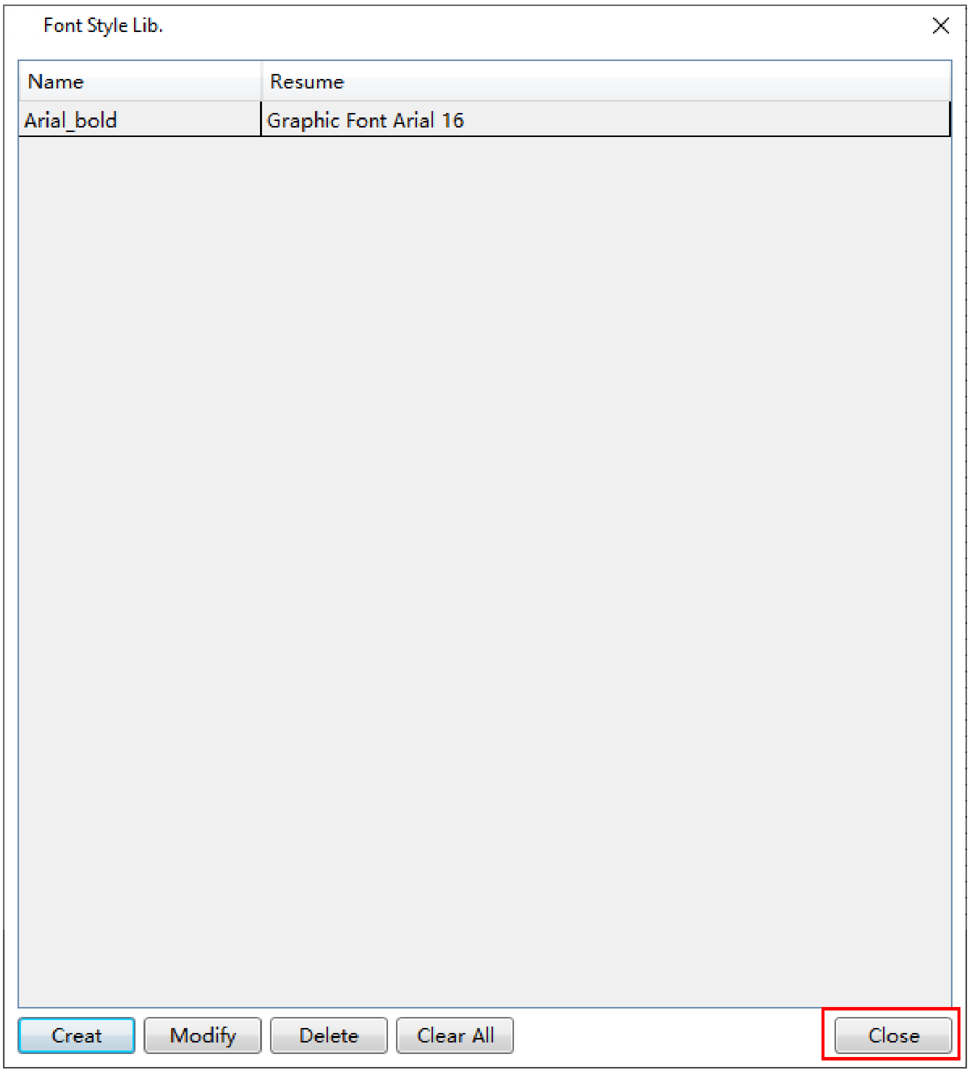
Step 2. Configure relevant parameters in the pop-up **Font Style Setting** dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameters	Description
Name	Used to identify a font.
Vector Font	The fonts in the font library are vector-graphs. When the character encoding is Unicode, Vector Font must be selected.
Graphic Font	The entire string is treated as a single entity and extracted as a bitmap, which is then saved within the project.
Aequilate	All characters are of equal width, and this applies exclusively to character value components.
Font	Select font.
Size	Set font size.
Color	Set font color.
Multi-line Alignment	Set the multi-line alignment mode, including Align Left, Align Center and Align Right.
Advanced	Click **Advanced**, set the Horizontal Scaling, Line Space, Word Space and Shadow Effects.

Step 3. Click **Close**.



11.7 Variable Tag Library

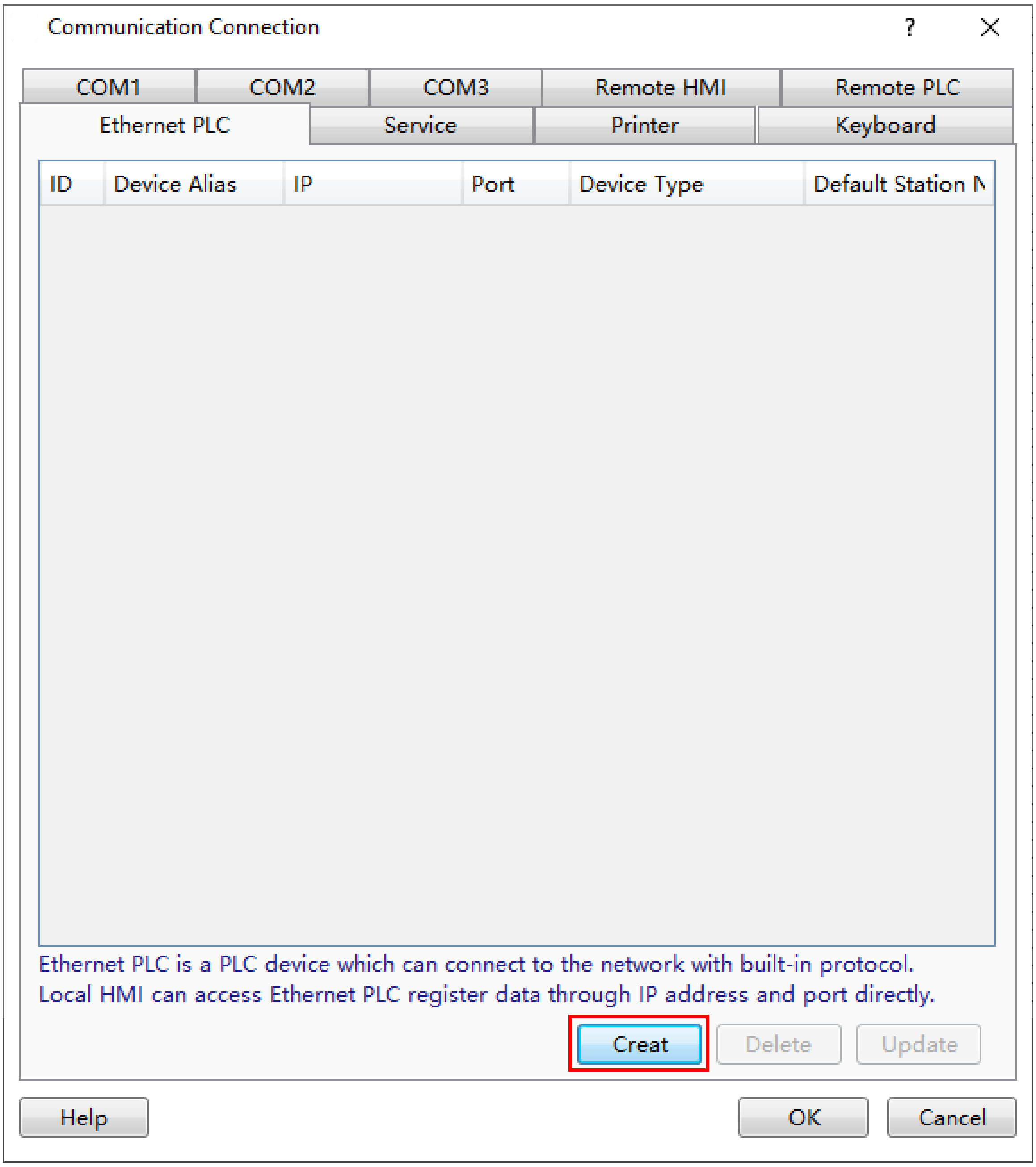
Only VI20Studio V3.0 supports the **Variable Tag Library** feature.

Variable tags refer to the variable tags of a PLC. After importing the variable tags of PLC into the Variable Tag Library, the HMI can identify the register addresses of the PLC through the variable tags. Prior to importing variable tags, it is necessary to establish a connection with a PLC that supports variable tag feature (such as Siemens PLC, Beckhoff PLC, CODESYS PLC, Allen-Bradley PLC, HCFA PLC, Inovance PLC, Keyence PLC, OMRON PLC, and others).

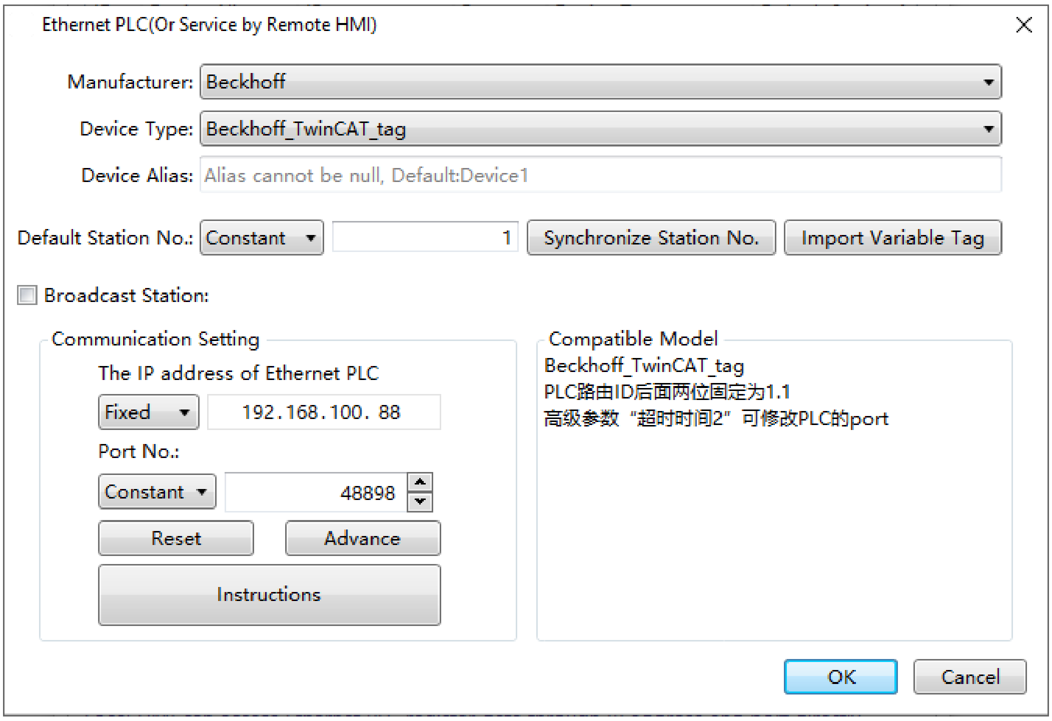
The steps to import variable tags are as follows (using Beckhoff PLC variable tags as an example here):

Step 1. Connect PLC.

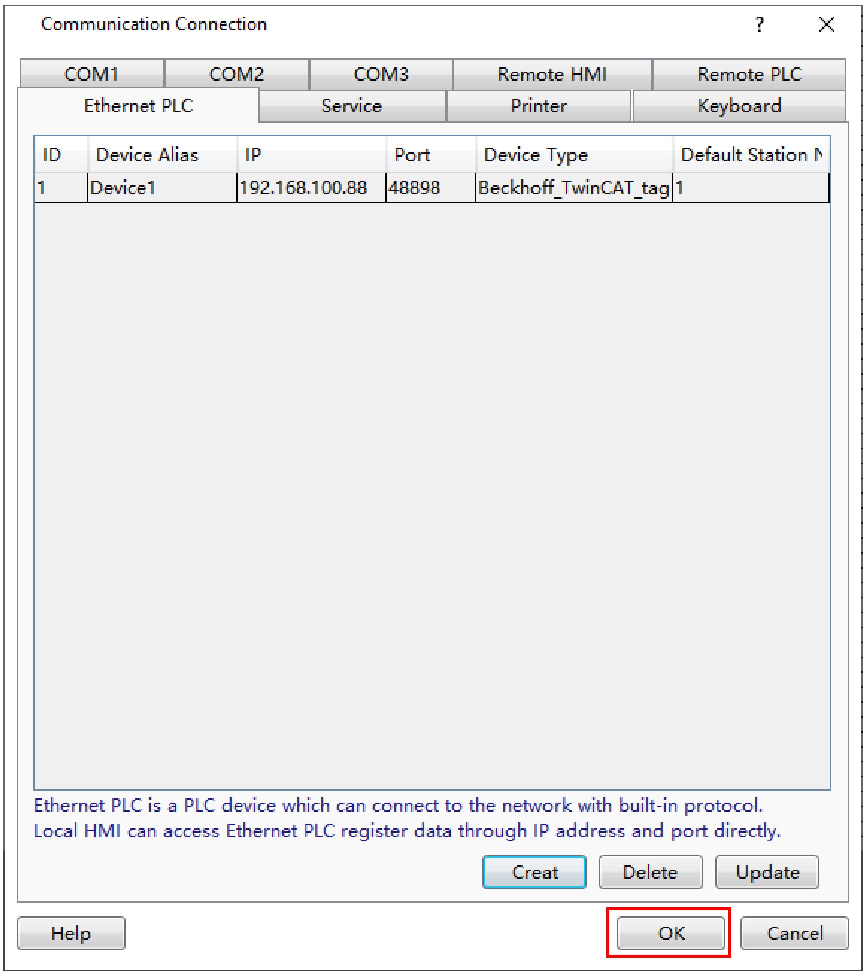
1) Select **Settings/Communication Settings/Remote Connection** from the menu bar, select **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box.Click **Create**.



2) Configure relevant parameters in the pop-up dialog box, click **OK**.

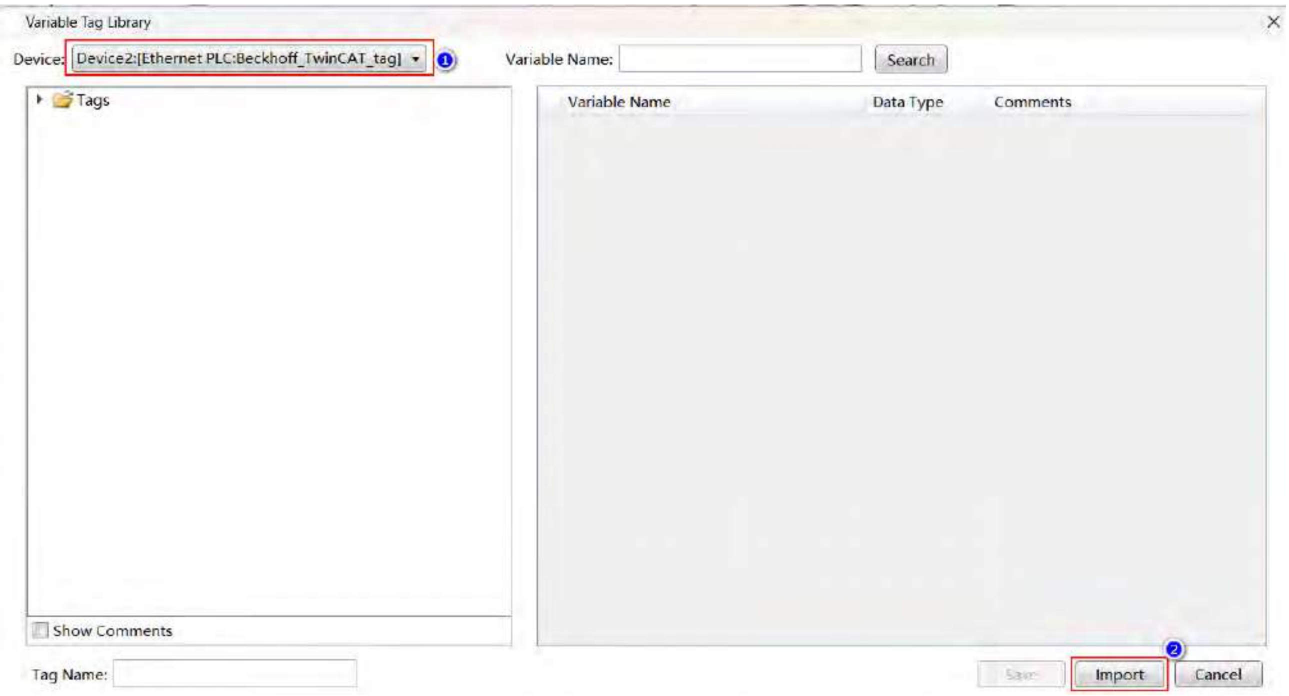


3) Click **OK**.



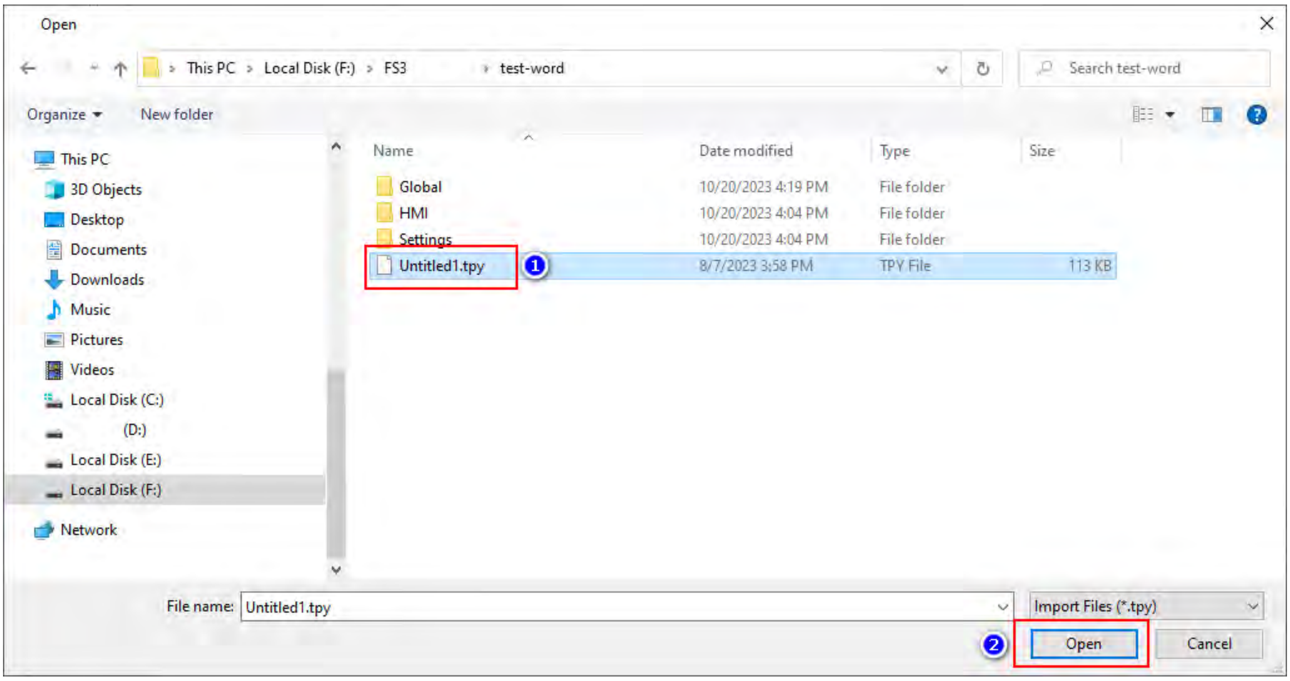
Step 2. Select **Library/Font Style Library** from the menu bar.

Step 3. Select PLC in the pop-up dialog window, click **Import**.

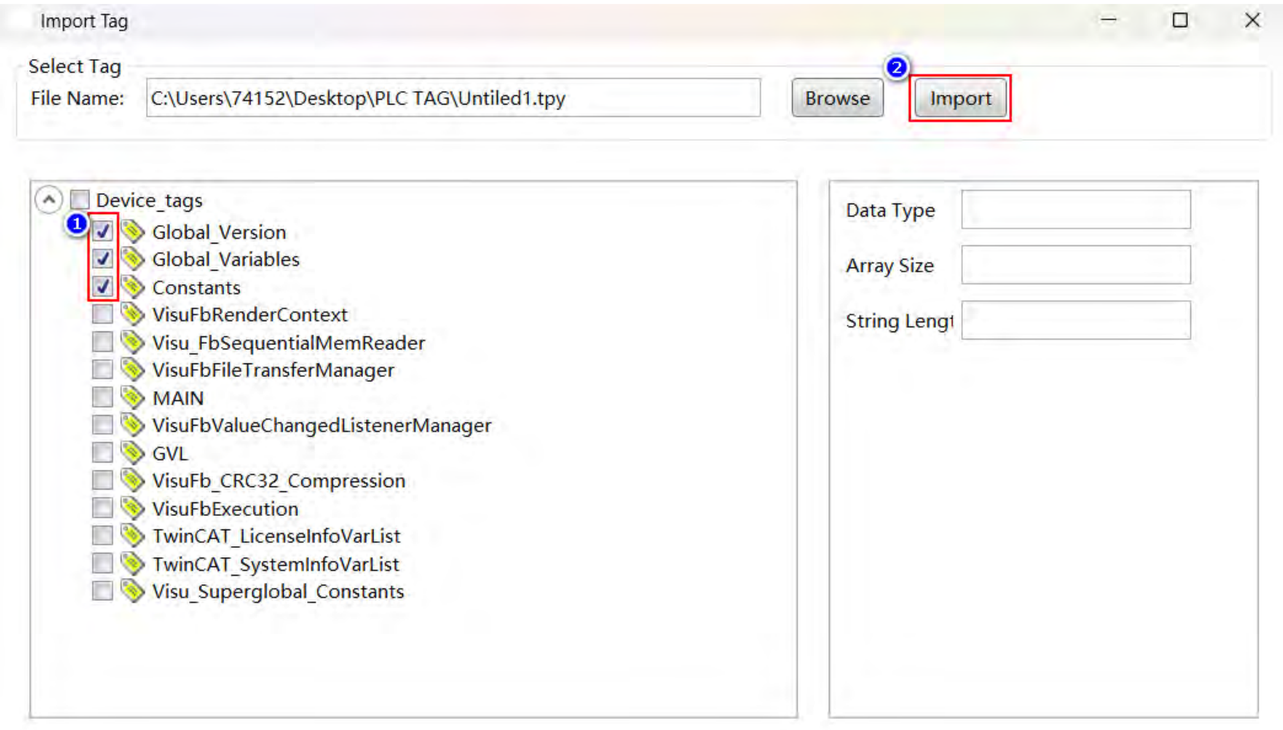


Step 4. Click **Browse** in the pop-up dialog box.

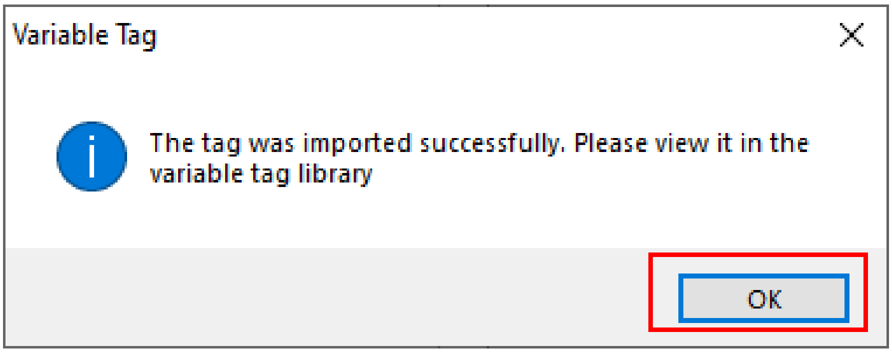
Step 5. Select the PLC variable tag file in the pop-up dialog box (please refer to the user manual from the corresponding PLC manufacturer for the method to obtain variable tag file), click **Open**.



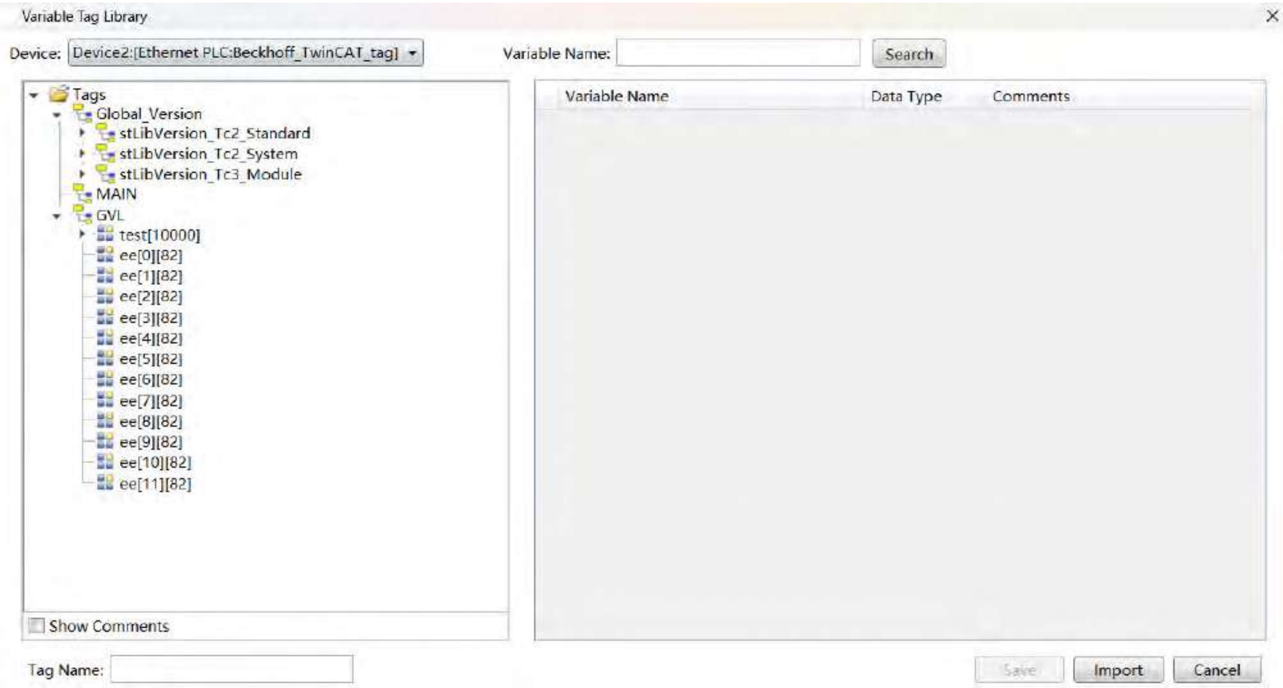
Step 6. Select tags， Click **Import**.



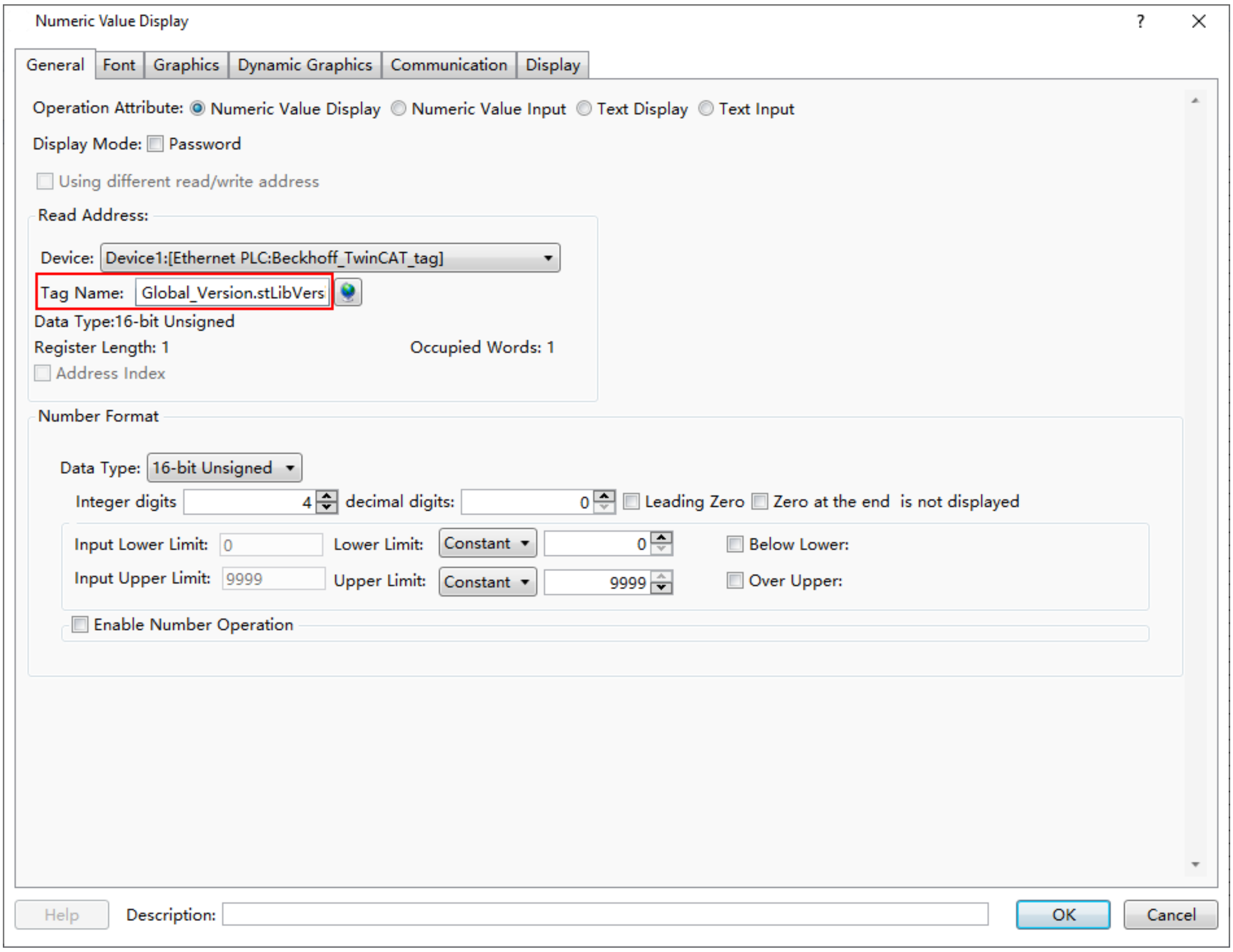
Step 7. Waiting for the system to automatically import the vairable tag, click **OK** in the pop-up dialog box.



Step 8. You can view the imported variable tag in the Variable Tag Library.



After importing the variable tags, you can use the tag names to refer to the register addresses of the PLC when adding numeric value and text display components.



11.8 OPC UA Node

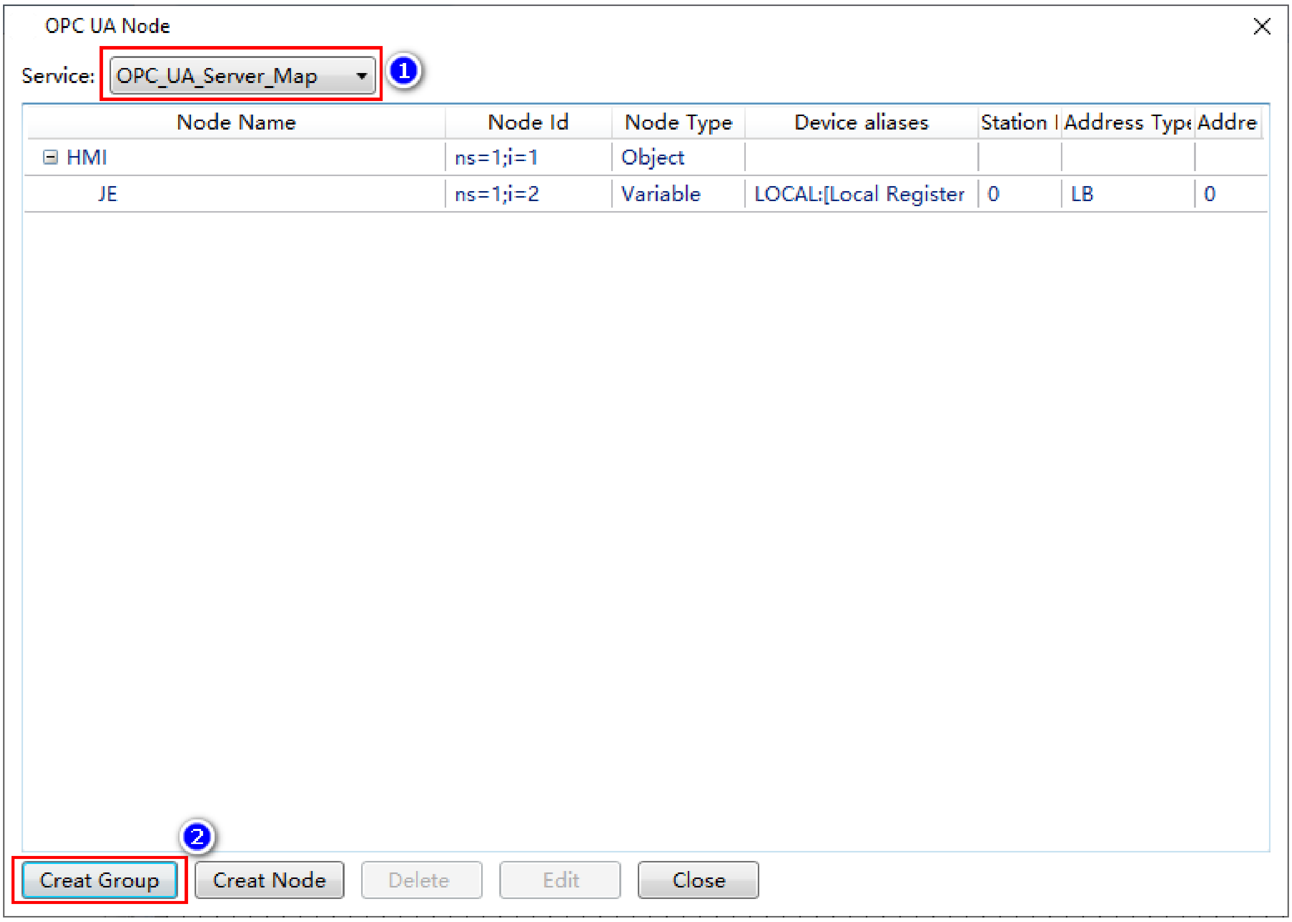
Only VI20Studio V3.0 supports the **OPC UA Node** feature.

OPC UA nodes are nodes that use the OPC UA protocol to transmit information. Before adding an OPC UA node, you need to create an OPC UA service, and the HMI needs to communicate with the OPC UA server. Refer to Service for the methods for creating a new OPC UA service.

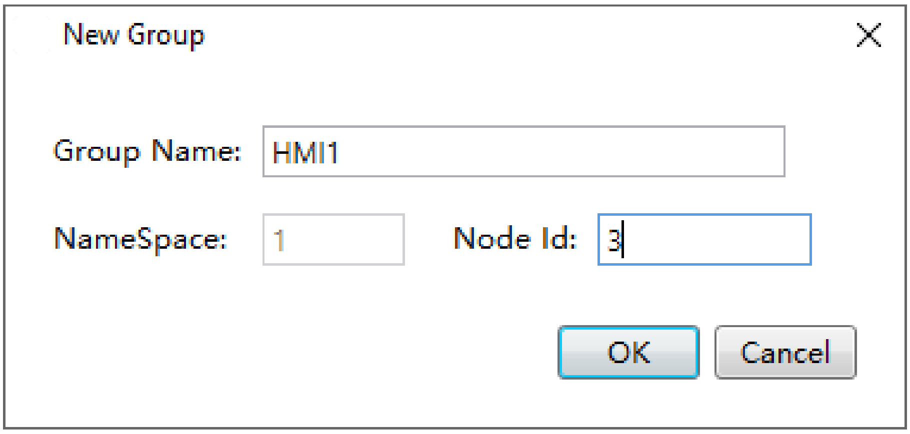
OPC UA nodes can be grouped to facilitate categorized management of OPC UA nodes.

The steps to create a new OPC UA node are as follows:

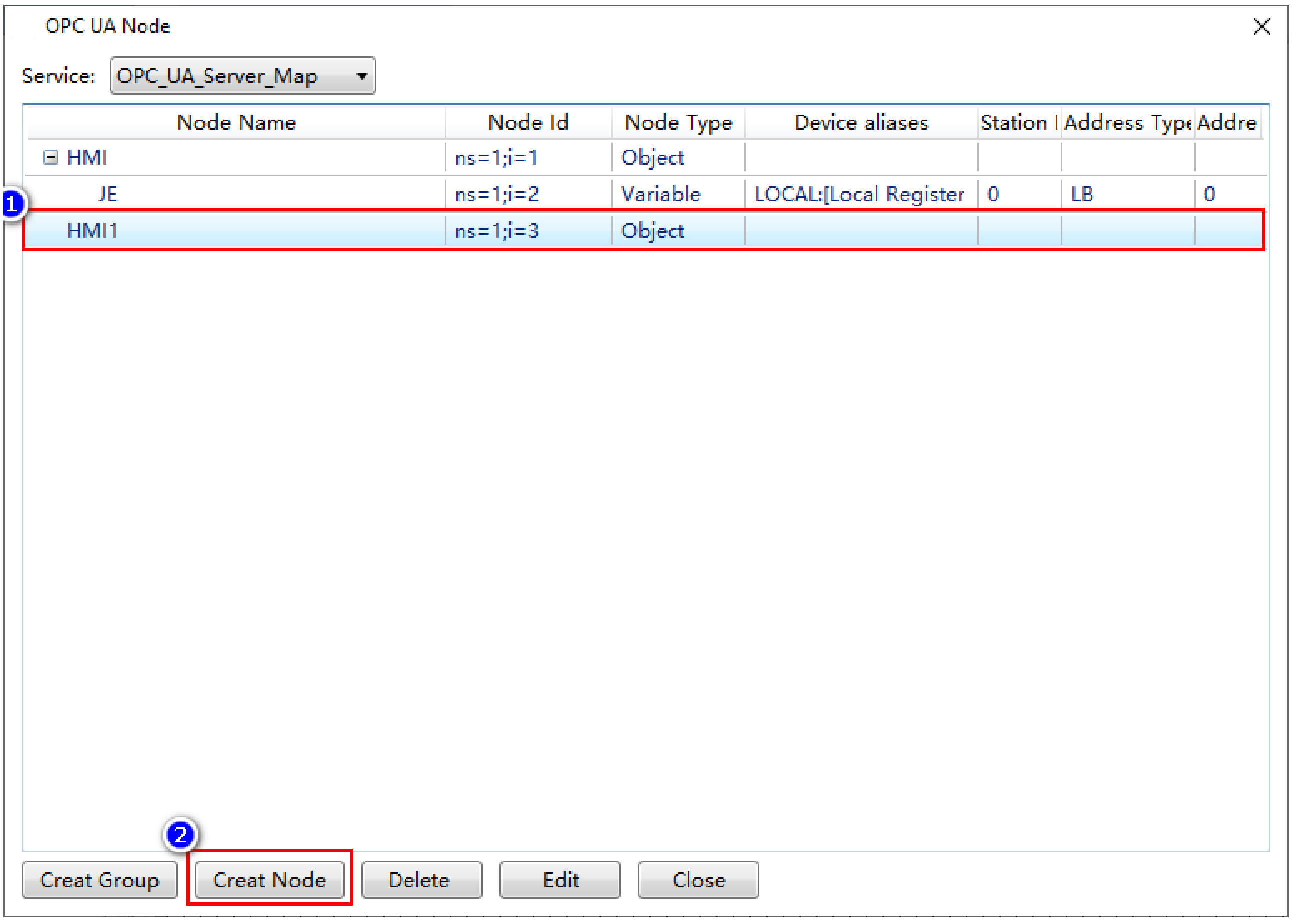
Step 1. Select **Library/OPC UA Node** from the menu bar, select OPC UA Service in the pop-up dialog box, click **Create Group**.



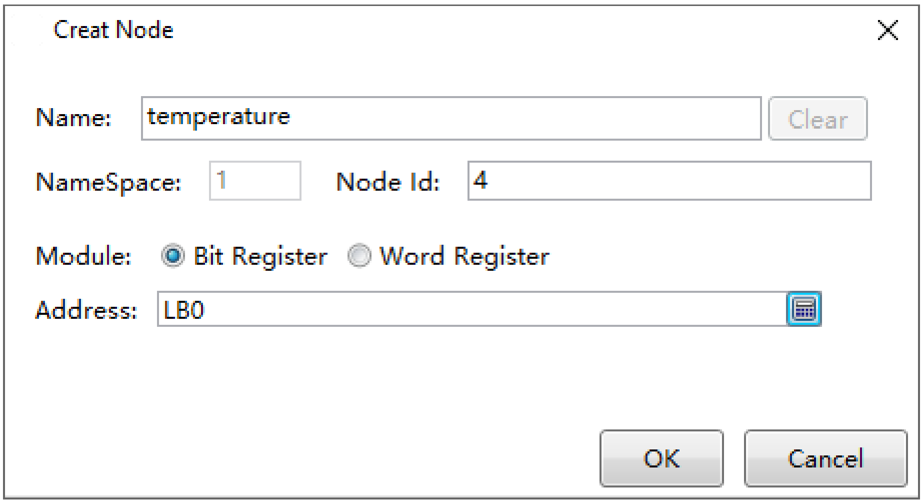
Step 2. Edit Group Name and Node ID in the pop-up **New Group** dialog box, click **OK**.



Step 3. Select group, click **Create Node**.



Step 4. Configure relevant parameters in the pop-up dialog box, click **OK**.



Please refer to the table below for the detailed configuration methods.

Parameter	Description
Name	Node Name.
Node ID	The Node ID is used to uniquely identify a node within the address space. It must be consistent with the configuration on the OPC UA server side.

Parameter	Description
Module	Including bit register and word register.
Address	Register address of HMI or PLC.

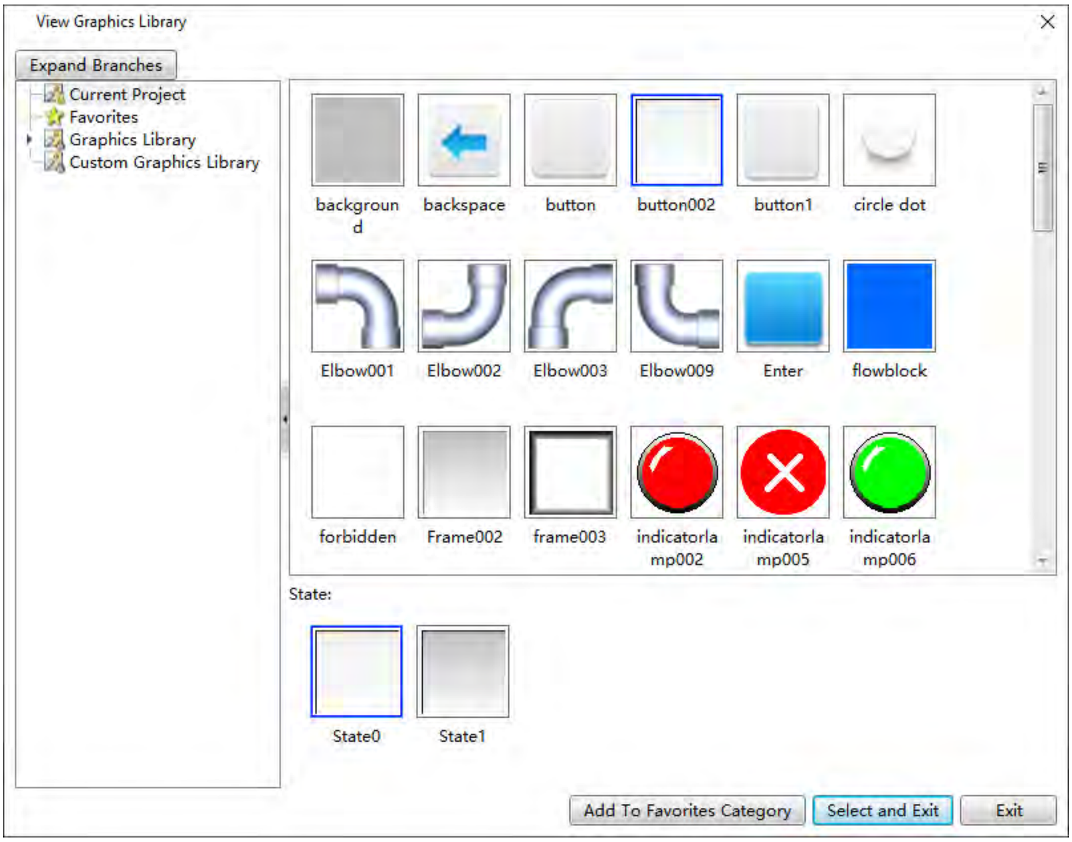
11.9 Graphics Library

The Graphics Library includes a collection of commonly used graphics, and users can add new graphics to facilitate their use when configuring components.

11.9.1 Browse Graphic Library

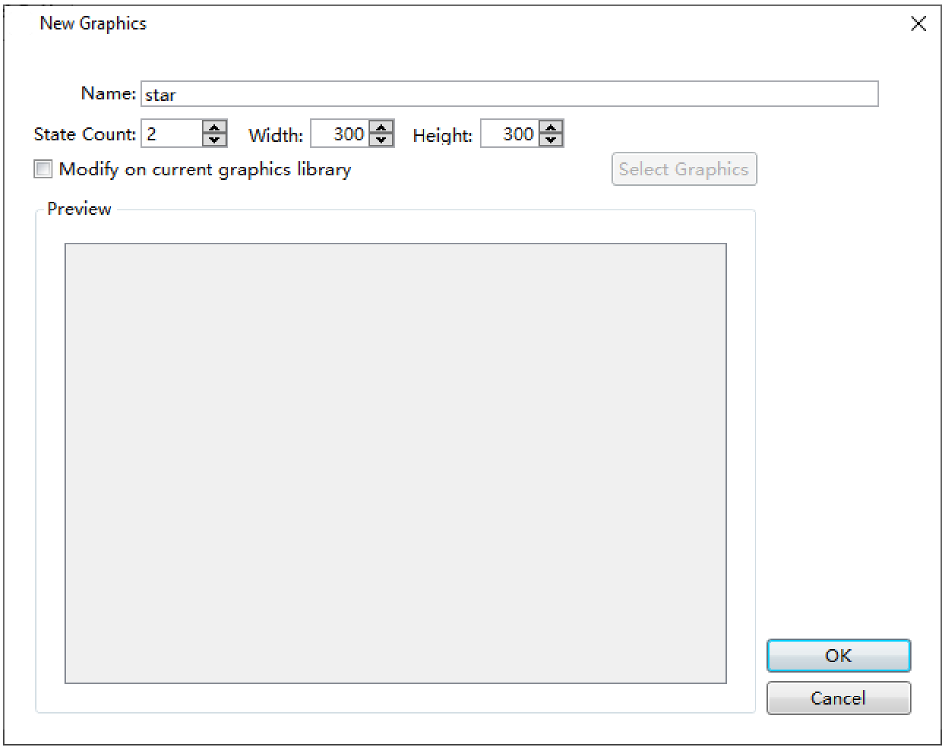
Select **Library/Browse Graphics Library** from the menu bar to view the Graphics Library.

- Current Project: Existing projects in the current project.
- Favorites: Graphics favored by users.
- Graphics Library: Built-in graphics in the system.
- Custom Graphics Library: Custom defined graphics.



11.9.2 New Graphic

Step 1. Select **Library/New Graphics** from the menu bar, configure relevant parameters in the pop-up dialog box, click **OK**.

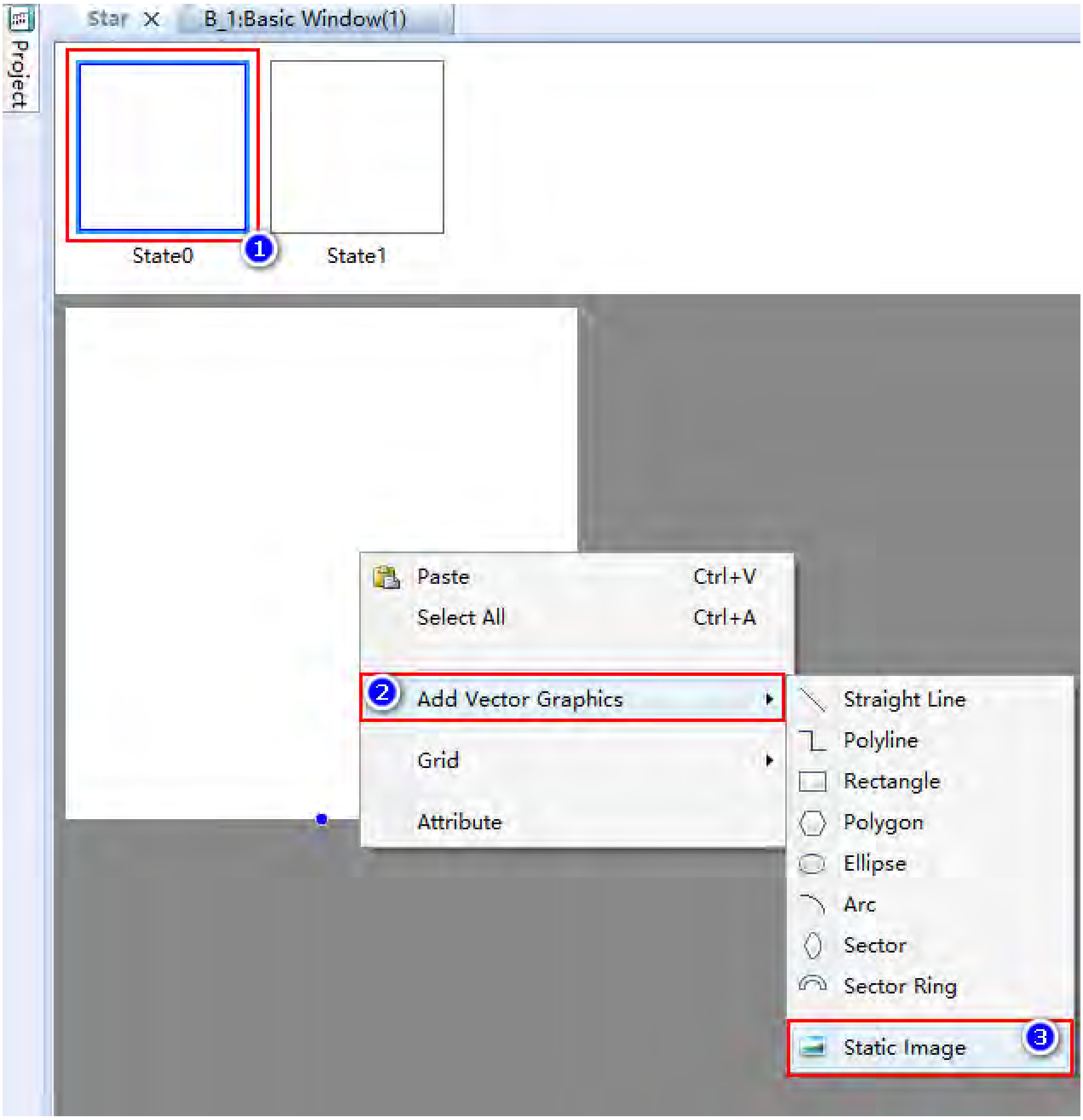


Please refer to the table below for detailed configuration methods.

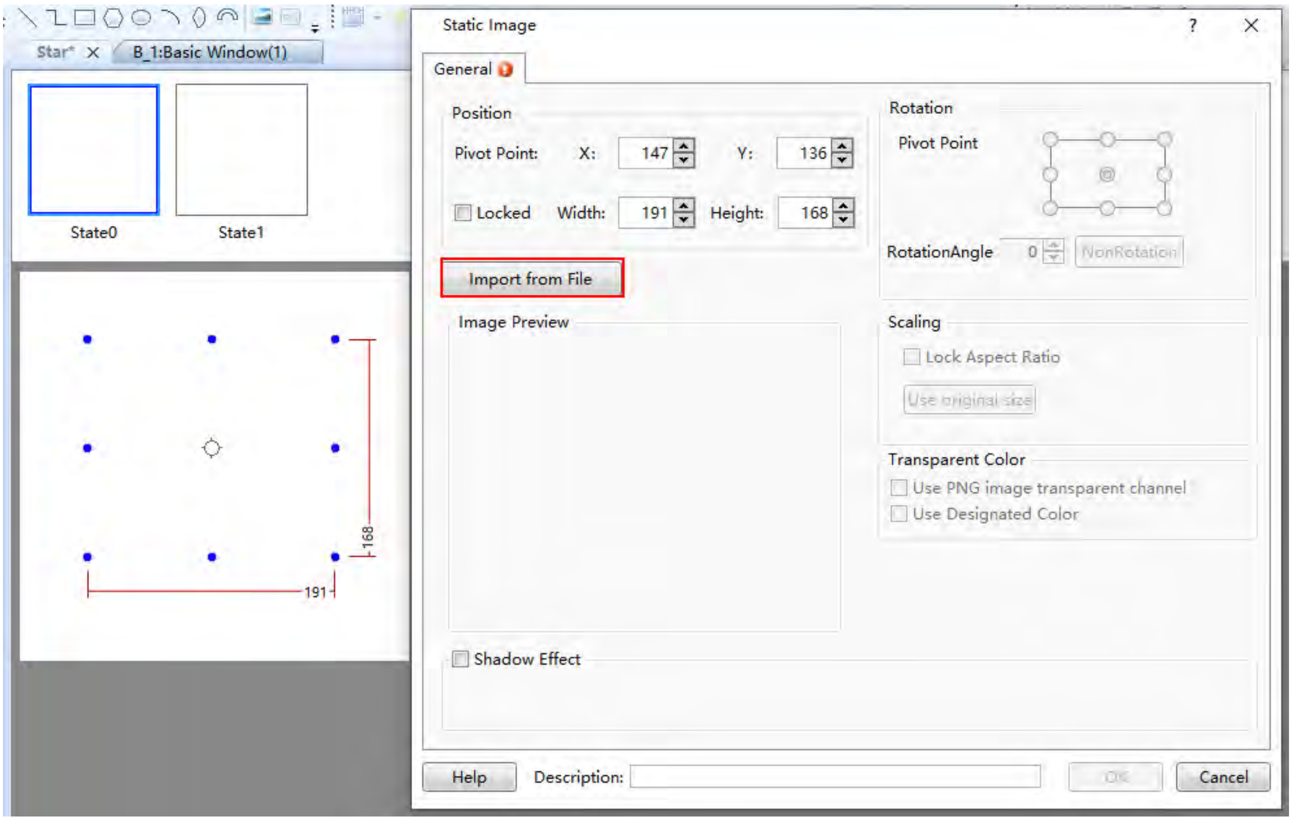
Parameter	**Description**
Name	Name of new graphics, no more than 64 characters.
State Count	State count of graphics.
Width	The width of the graphic in pixels.
Height	The height of the graphic in pixels.
Modify on current graphics library	Select current graphics library to modify.

Step 2. Enter the graphic editing interface, select state, right click in the graphic drawing area, select **Add Vector Graphics/Static Image**.

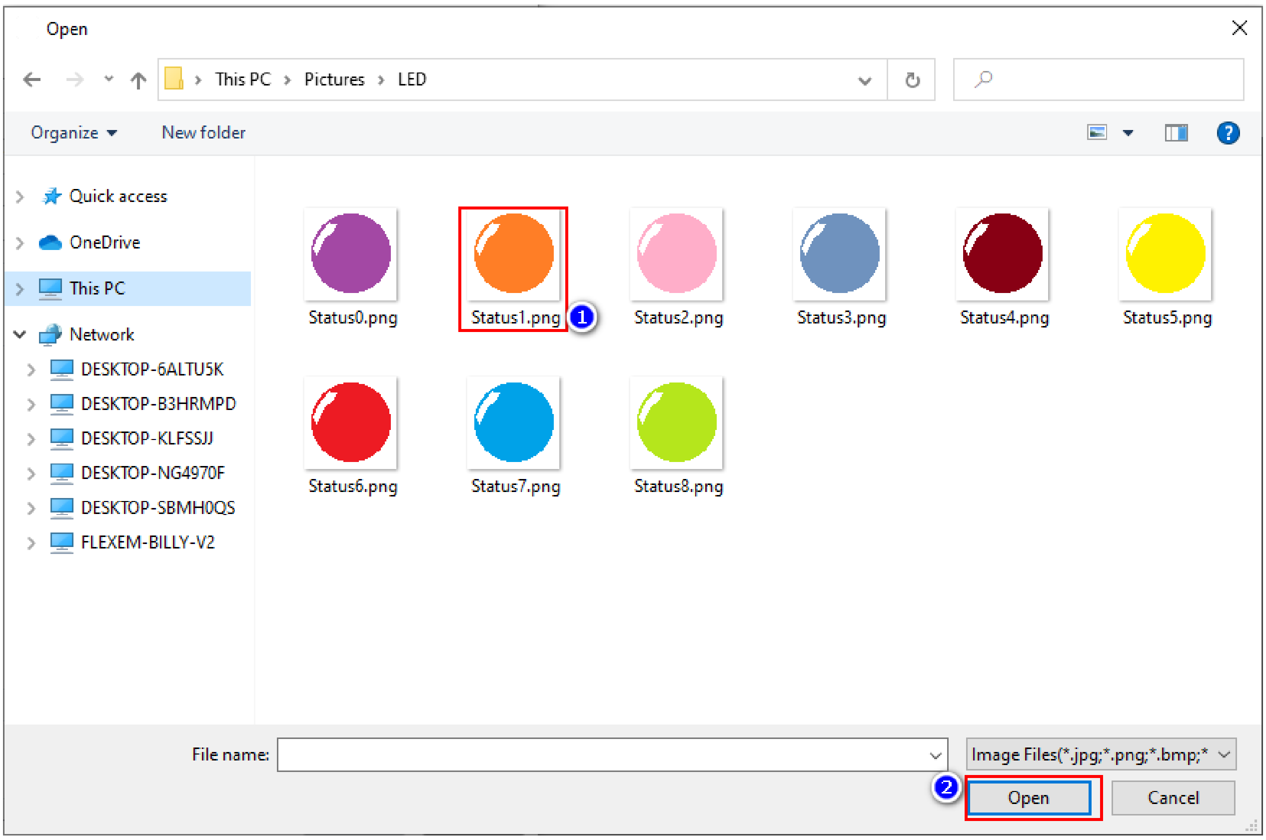
Taking static image as an example to describe here.



Step 3. Press and hold the left mouse button, drag within the graphic drawing area, and release the left mouse button to create an insertion area for the static image. This will take you to the following interface. Click **Import from File**.

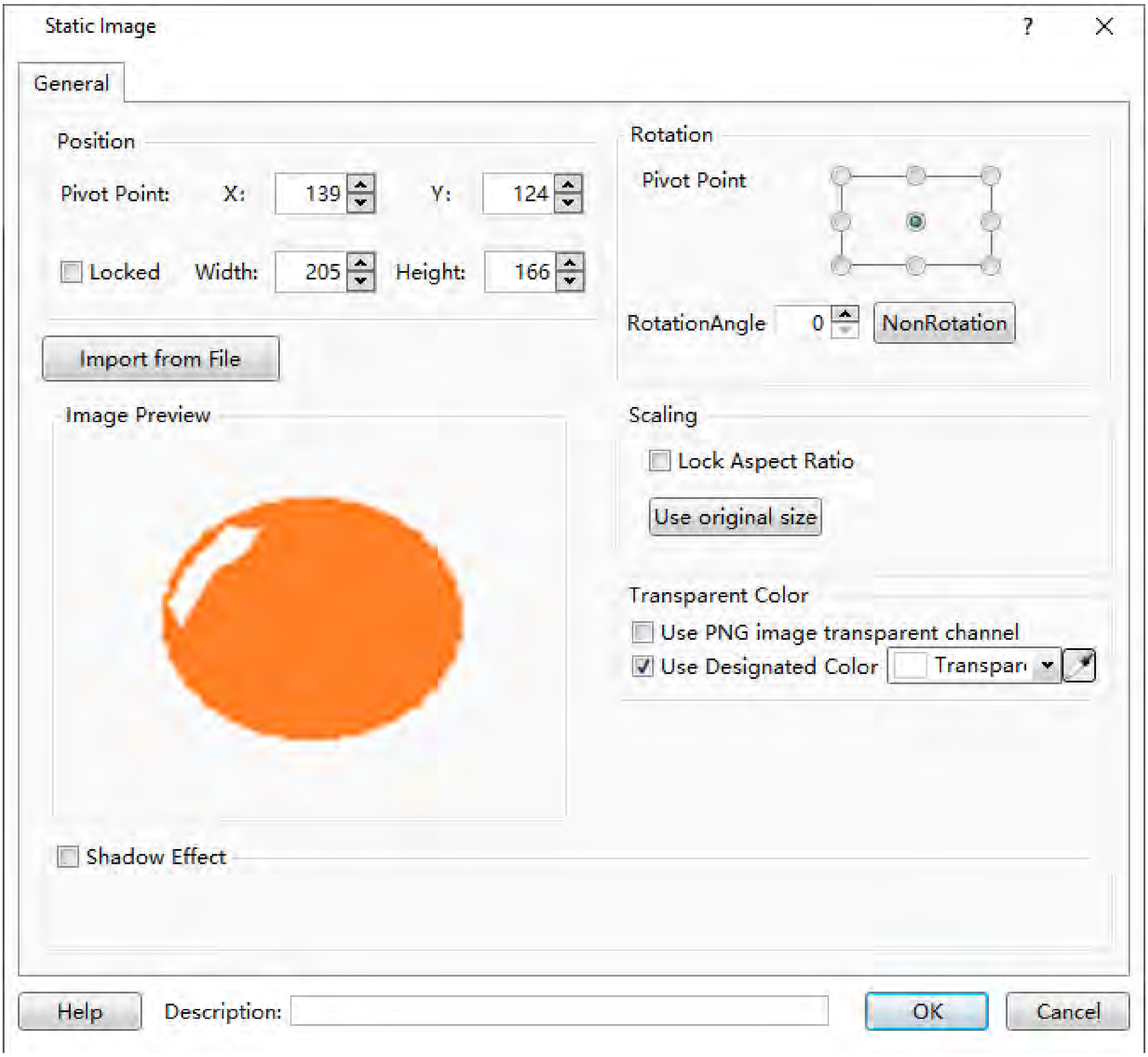


Step 4. Select the graphic file in the pop-up dialog box (supports bmp, jpg, png, gif, svg formats), click **Open**.



Step 5. Set parameters such as Position, Rotation Angle etc.

Step 6. Use similar methods to draw the graphics of other state (such as state 1).

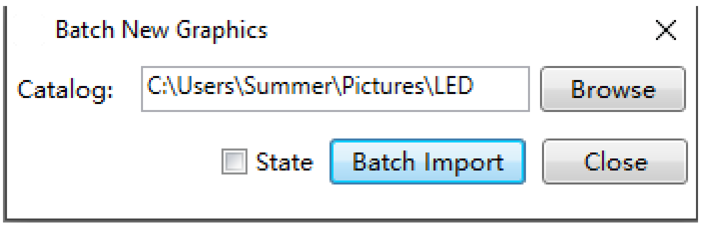


11.9.3 New Graphic in Batches

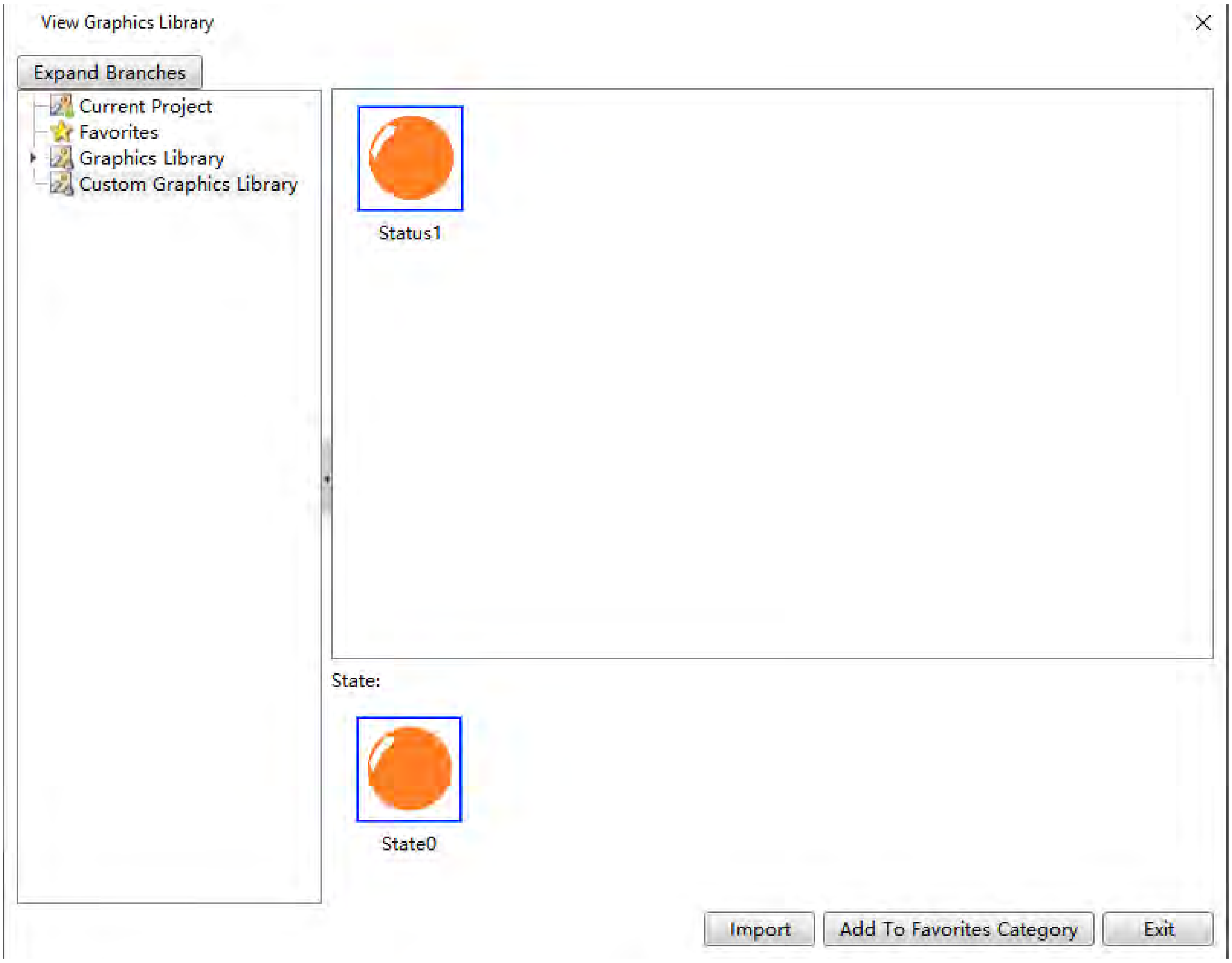
You can add graphics in batches by importing graphic files from a specified directory.

Step 1. Select **Library/Batch New Graphics** from the menu bar.

Step 2. Click **Browse** in the pop-up dialog box, select the directory where the graphic files are located, select to check State or not, click **Batch Import**.



Step 3. After a successful import the interface will display a message stating Convert complete, and the imported graphics will be stored in the custom graphics library.

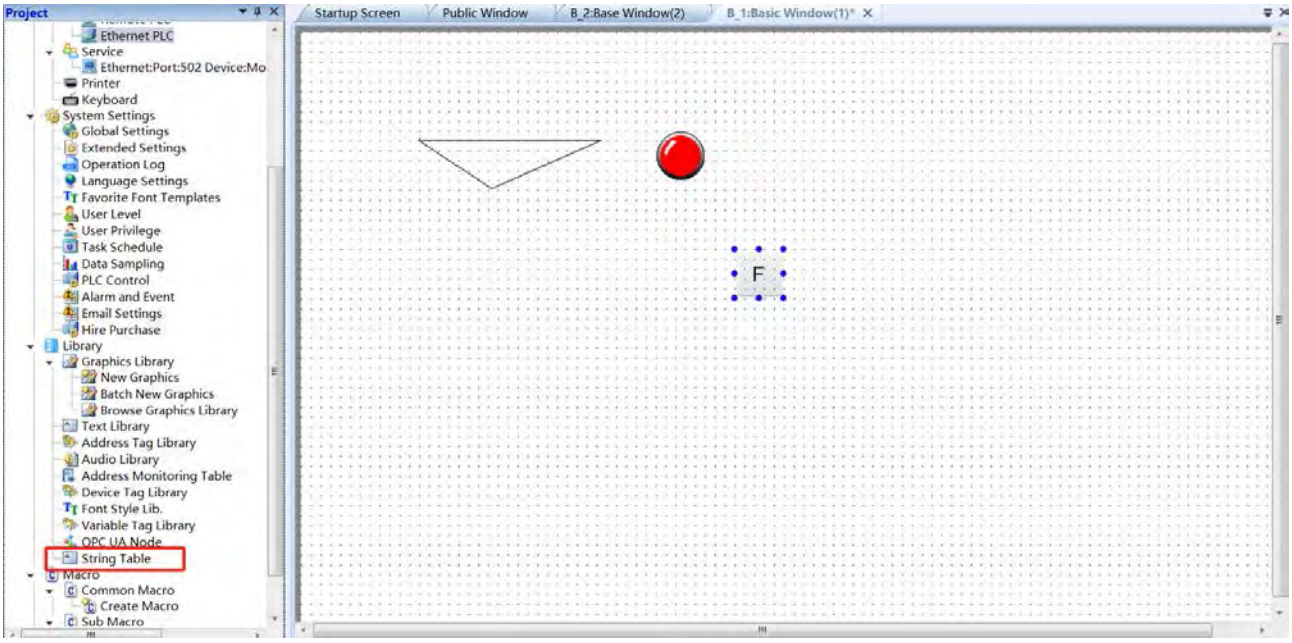


11.10 String Table

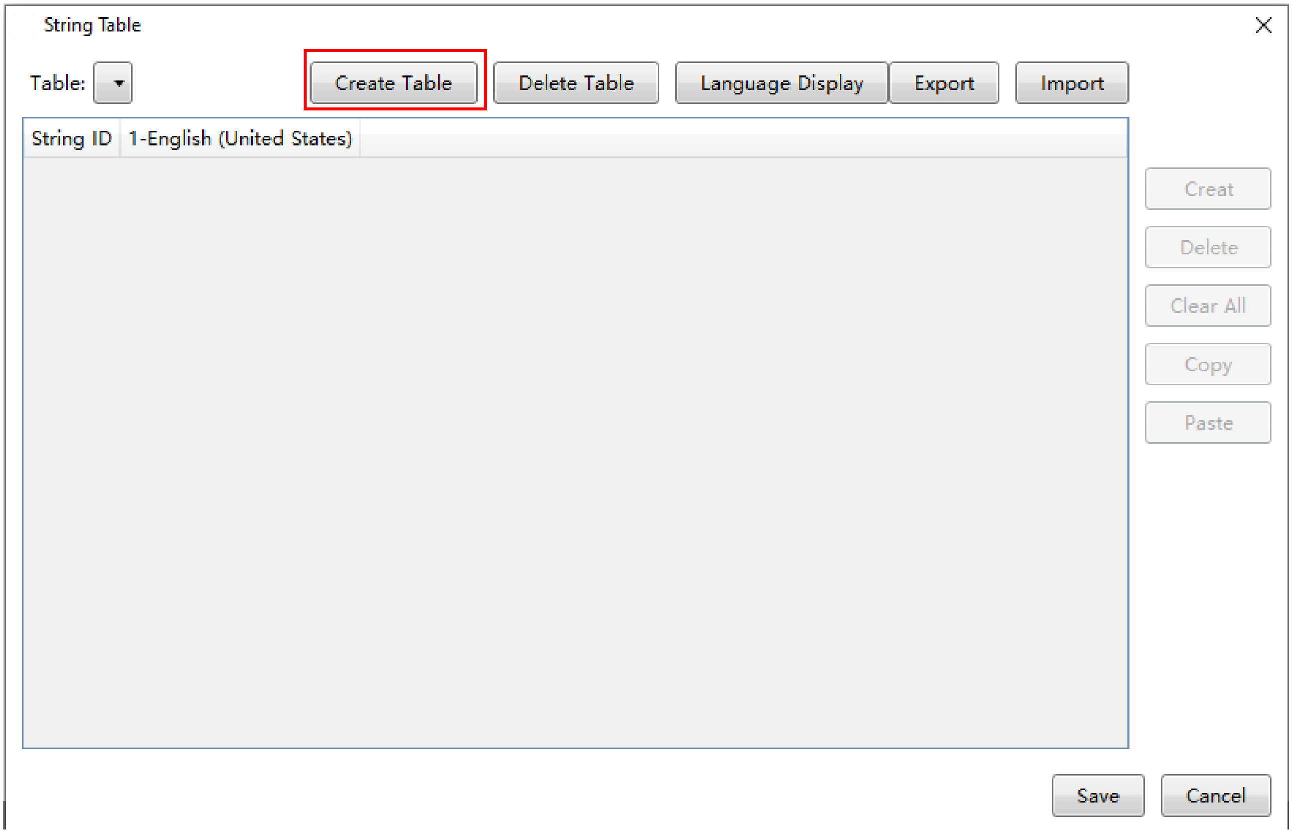
Only VI20Studio V3.0 supports the **String Table** feature.

For scenarios with multiple text states, the string tables feature can be used to dynamically adjust the text using pre-defined identifiers (string IDs). The steps to add a string table are as follows:

Step 1. Double click **String Table** in the **Project** control.

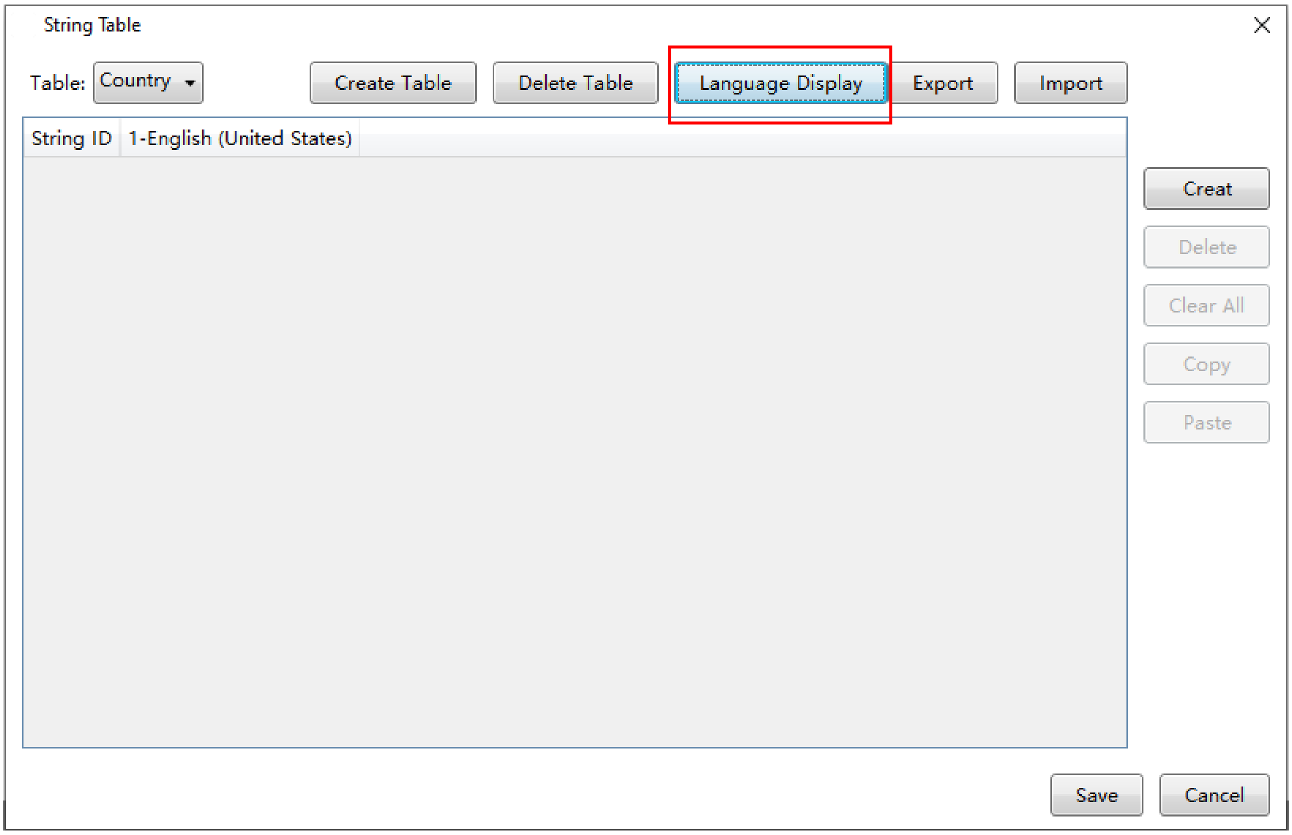


Step 2. Click **Create Table** in the pop-up dialog box.

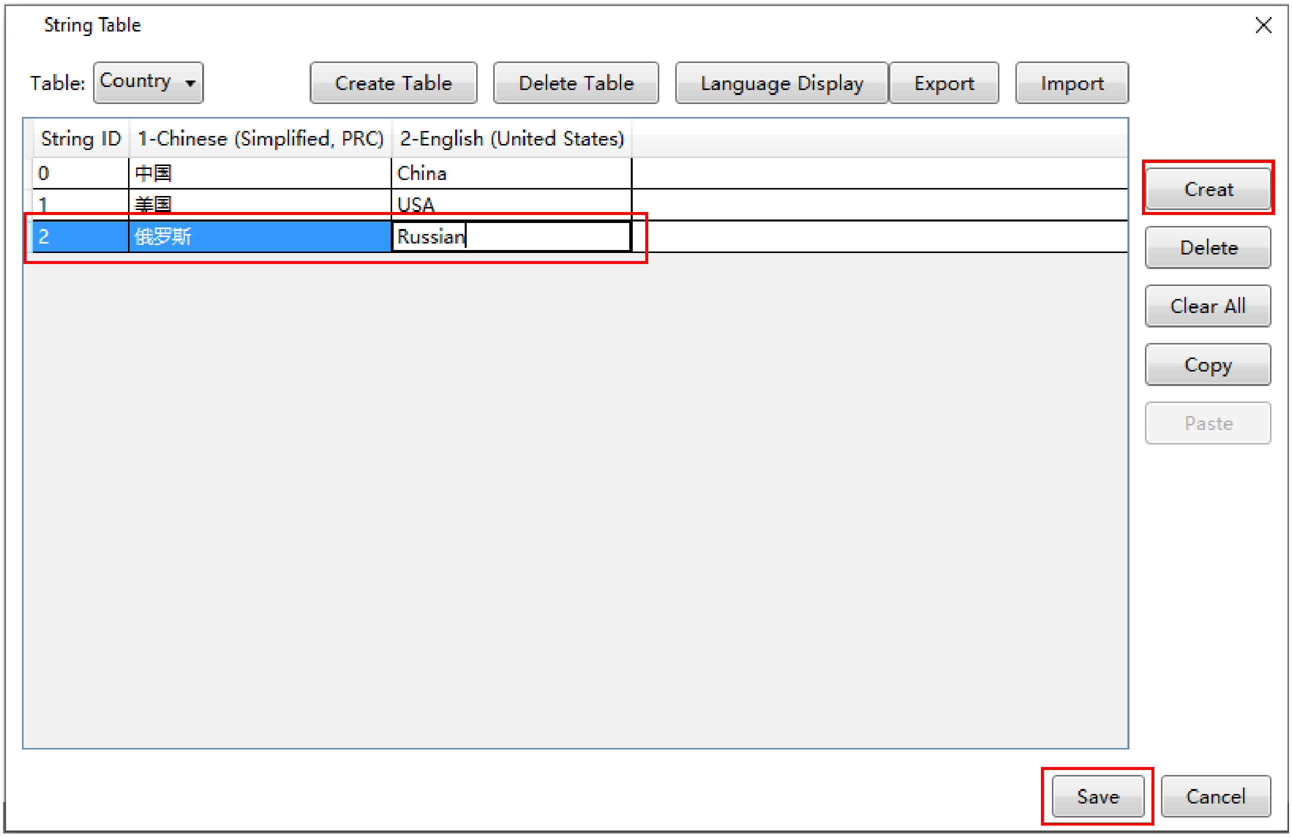


Step 3. Edit string table name in the pop-up dialog box, click **OK**.

Step 4. Click **Language Display** to set language information that needs to be displayed.



Step 5. Click **Create**, edit the string content of different string IDs and different languages, click **Save**.


String Table
Table: Country
Create Table
Delete Table
Language Display
Export
Import
String ID
1-Chinese (Simplified, PRC)
2-English (United States)
0 中国 China
1 美国 USA
2 俄罗斯 Russian
Creat
Delete
Clear All
Copy
Paste
Save
Cancel

12 Macro

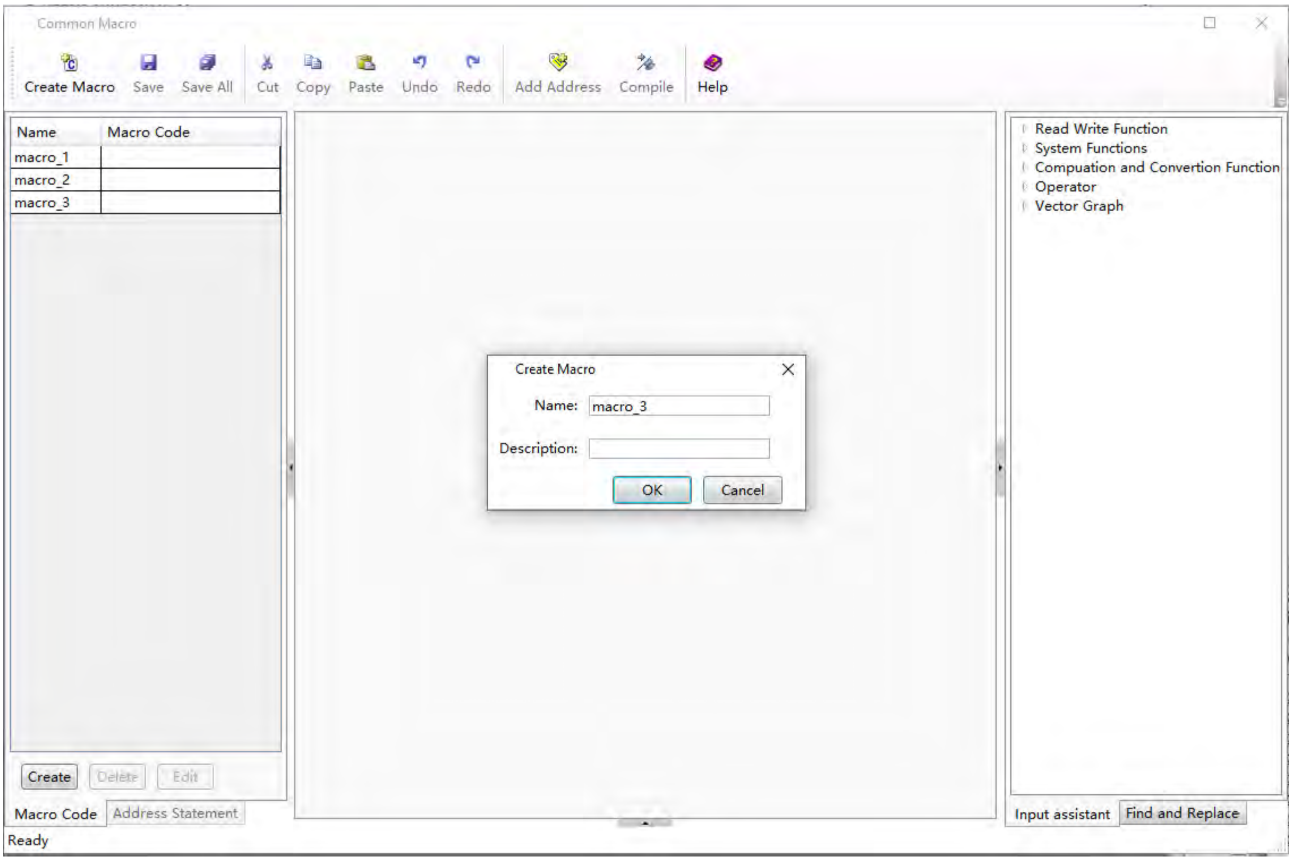
A macro is a piece of source code (in C language) that implements specific functionality. There are two types of macros: common macro and sub macro.

12.1 Common Macro

A common macro refers to a macro that can be called from anywhere and is typically designed to have broad applicability and can be used in multiple different programs.

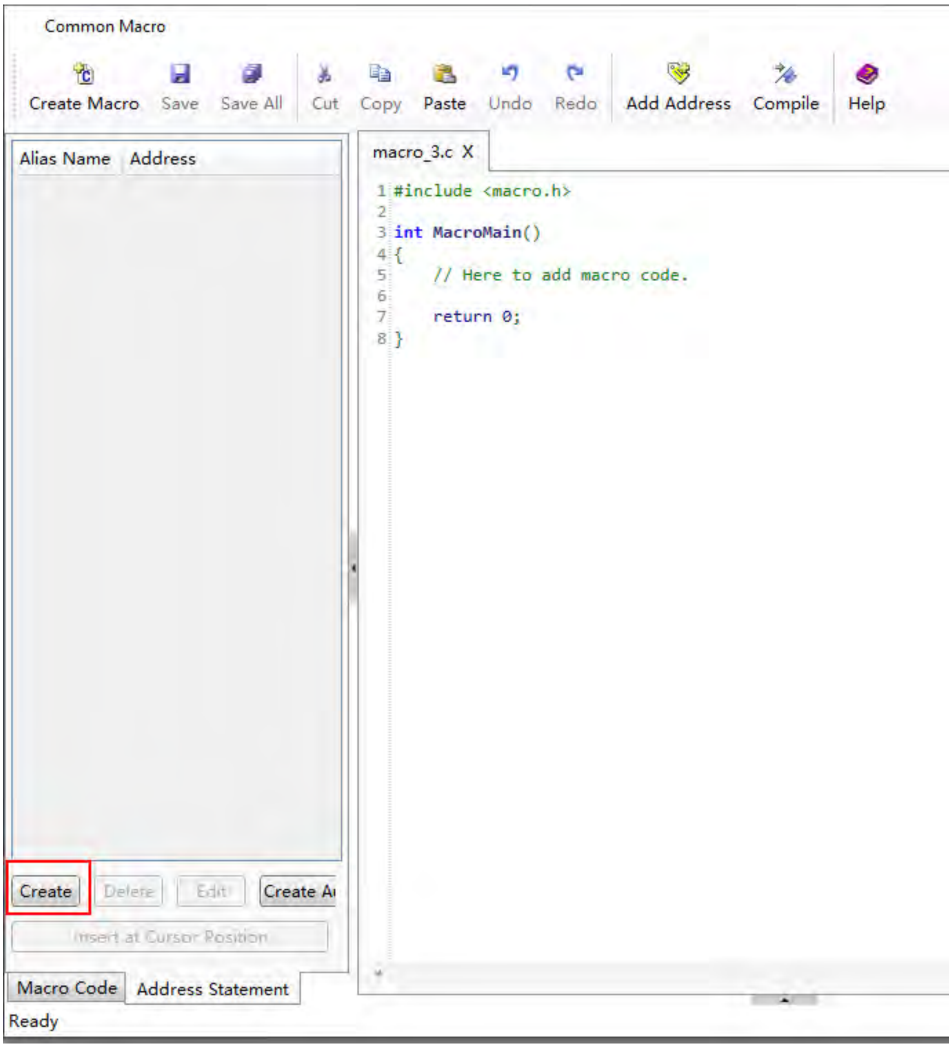
Steps to create a common macro are as follows:

Step 1. Select **Macro/Common Macro/Create Macro** from the menu bar to enter the following interface. Edit the macro name and click **OK**.

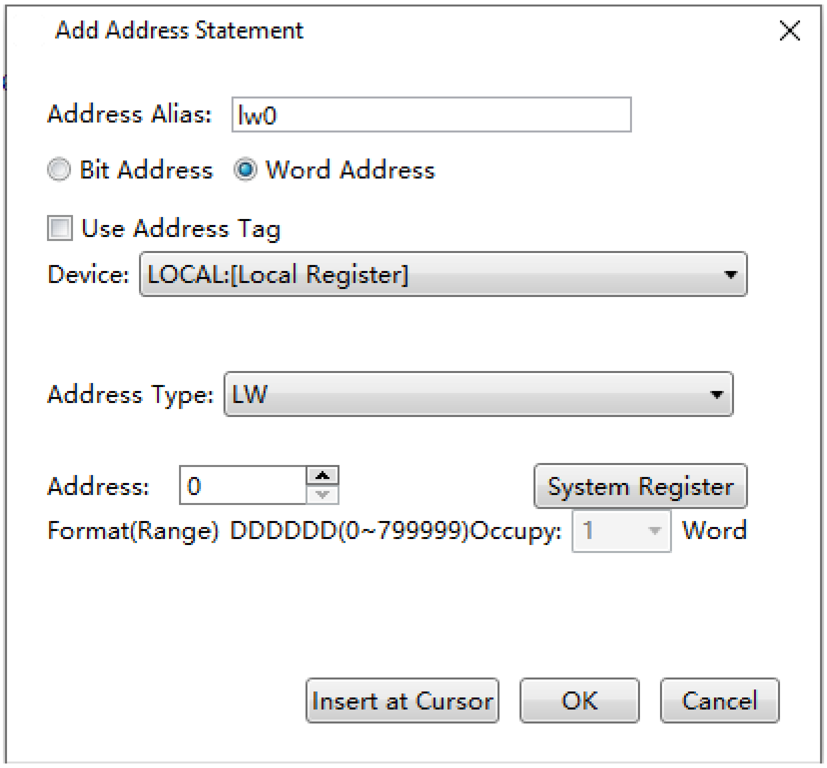


Step 2. Create a new address statement.

1) Click **Create** in the **Address Statement** area.



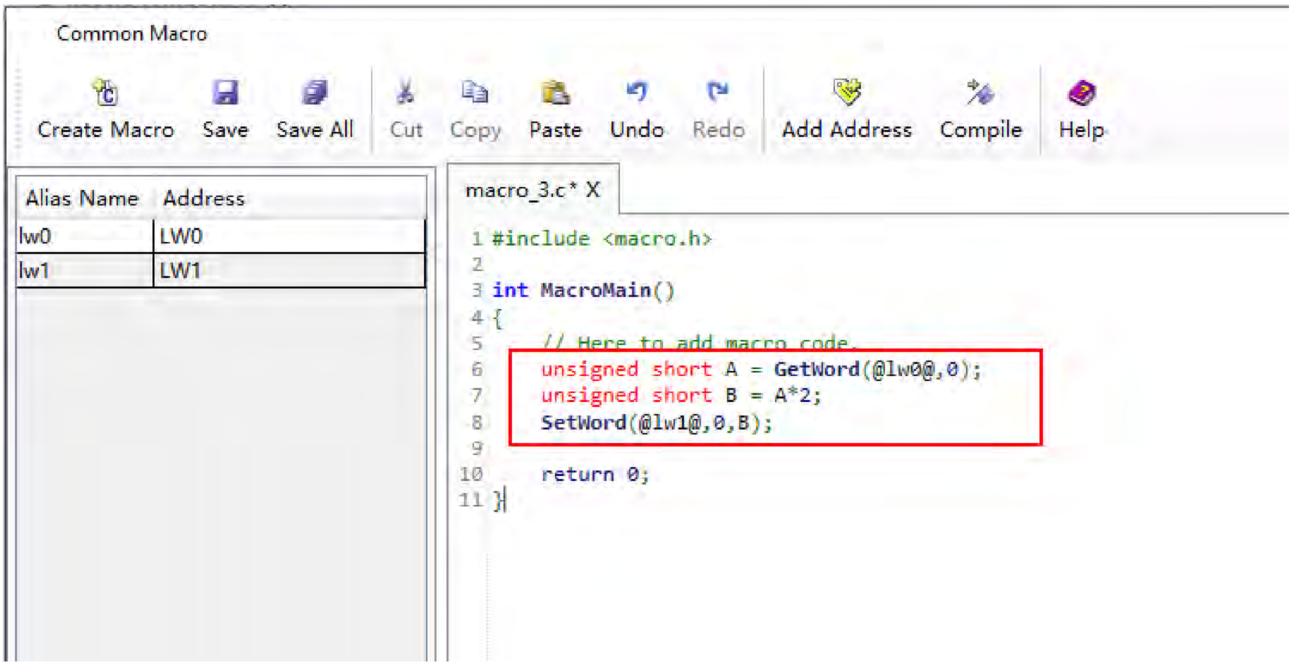
2) Edit the relevant parameters in the pop-up dialog box and click **OK**.



Please refer to the table below for detailed configuration methods.

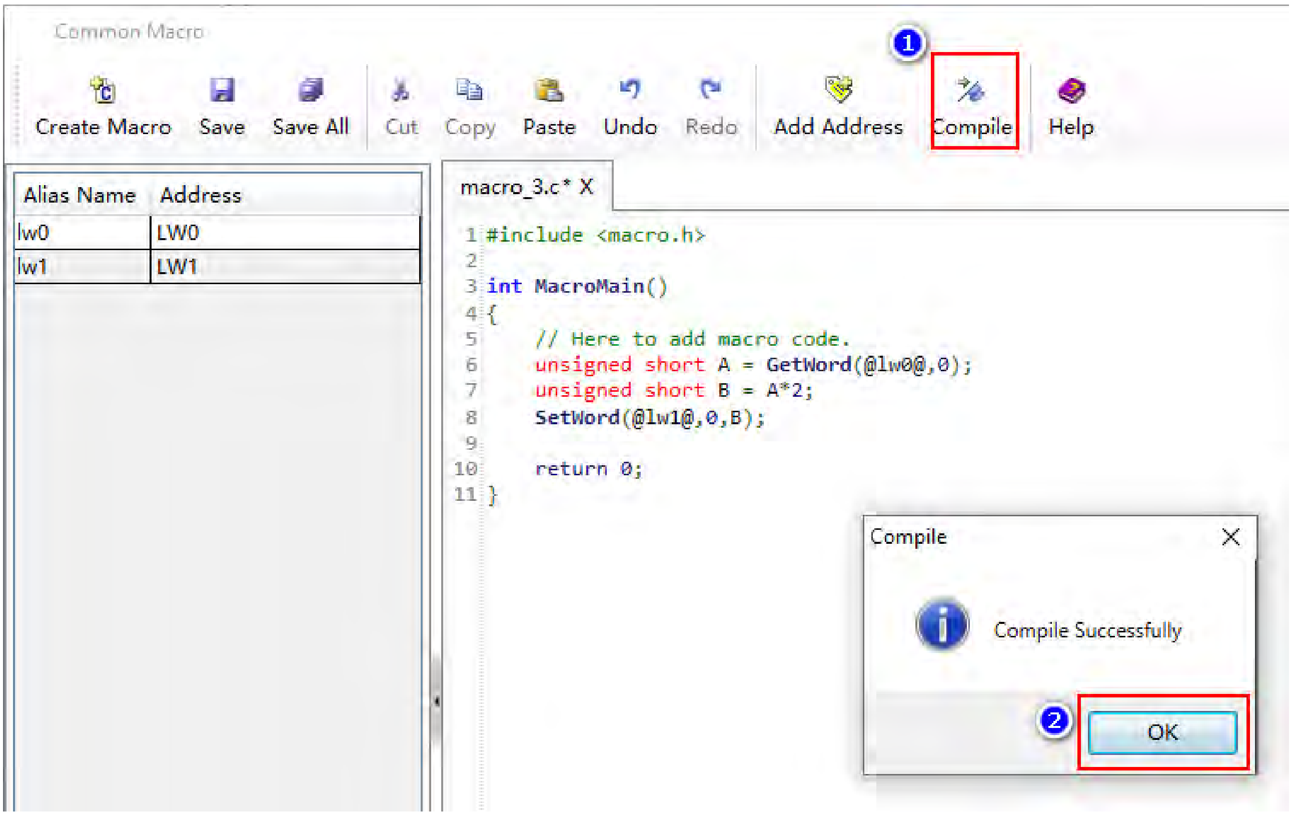
Parameters	Description
Address Alias	Used to identify the address.
Use Address Tag	Use a tag to refer to the corresponding address. For more information about address tags, please refer to the Address Tag Library.
Device	HMI local register, recipe register, PLC register.
Address Type	Please refer to the actual address type used.
Address	Address numbering.

Step 3. Edit macro code.

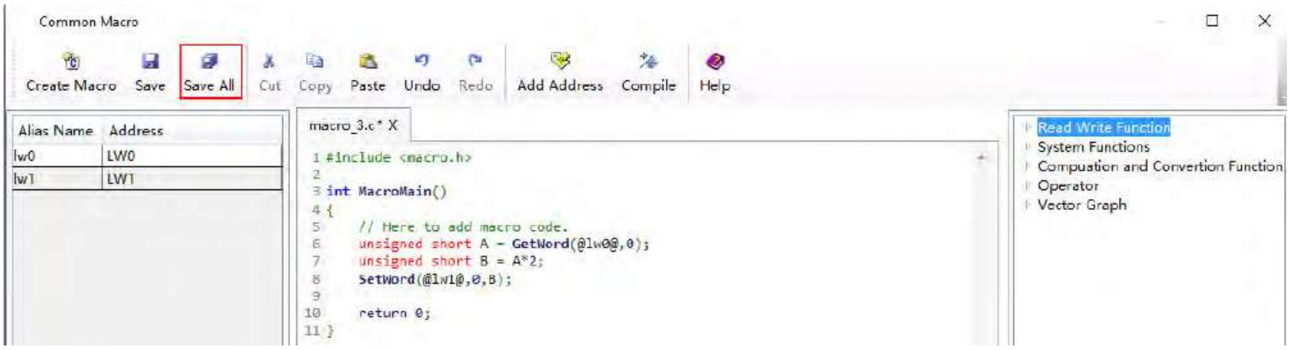


Step 4. Click **Compile**, if successfully compiled, click **OK** in the pop-up dialog box.

If compilation fails, please check the error message.



Step 5. Click **Save All**.

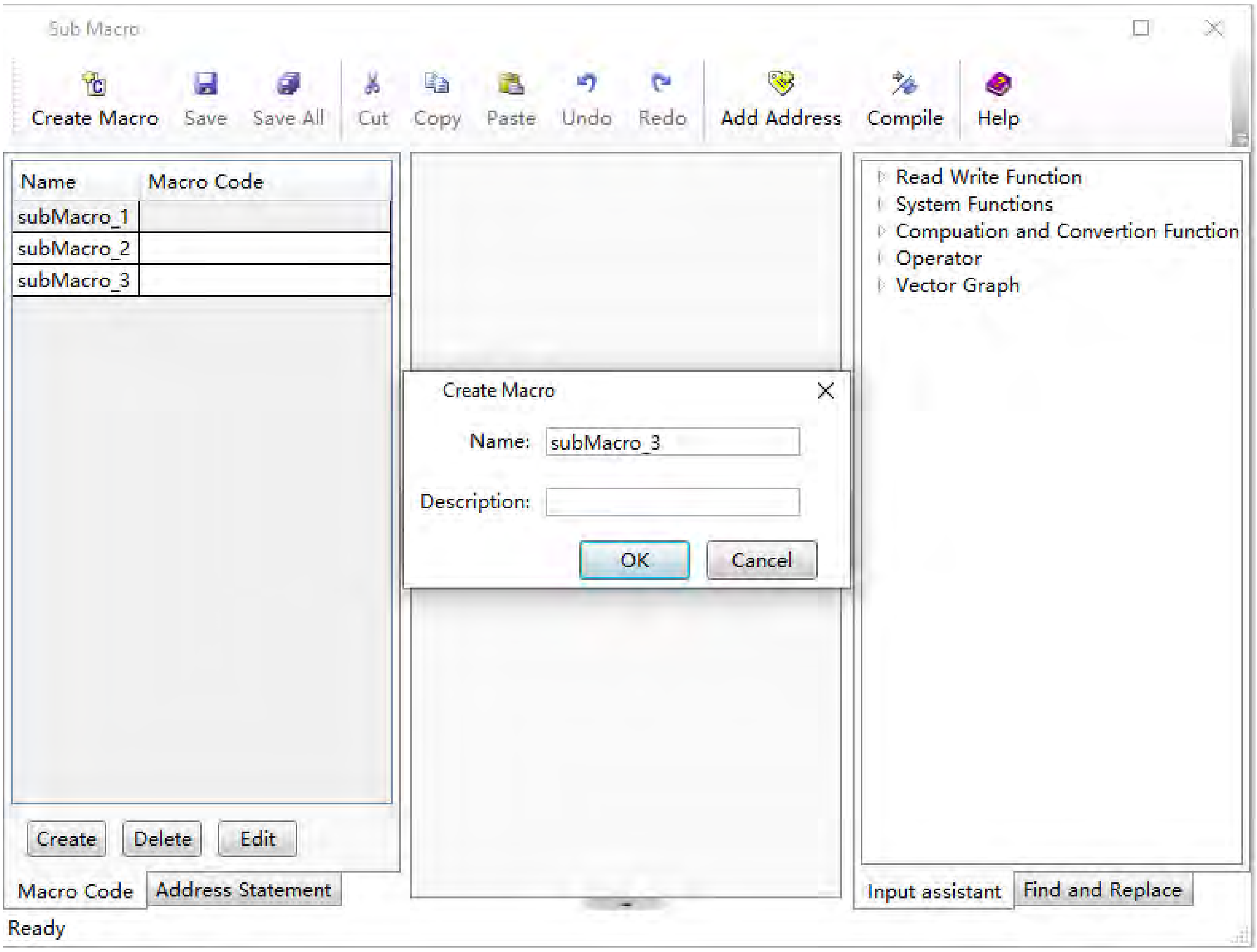


12.2 Sub Macro

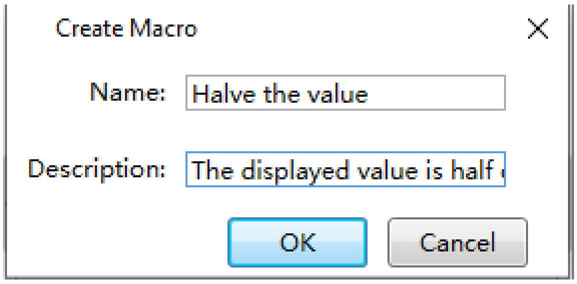
A sub macro refers to a macro that exists as part of the main macro. Typically, sub-macros are designed as auxiliary functions to assist the main macro in accomplishing more complex tasks

The steps to create a new sub macro are as follows:

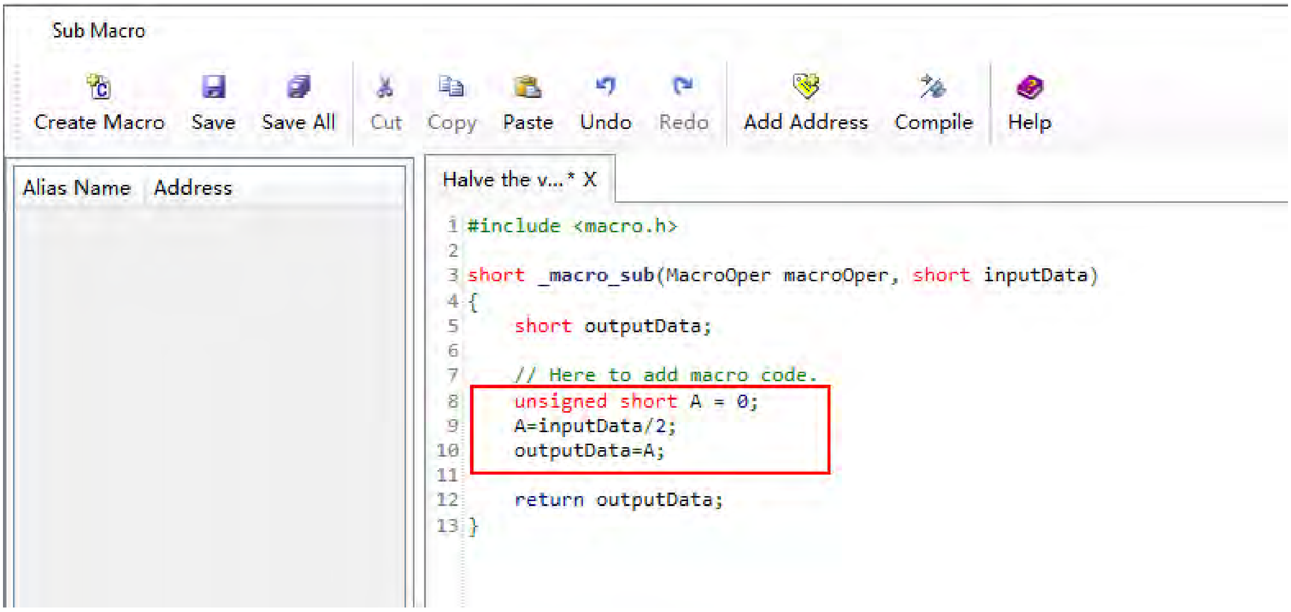
Step 1. Select **Macro/Sub Macro/Create Macro** from the menu bar to enter the following interface.



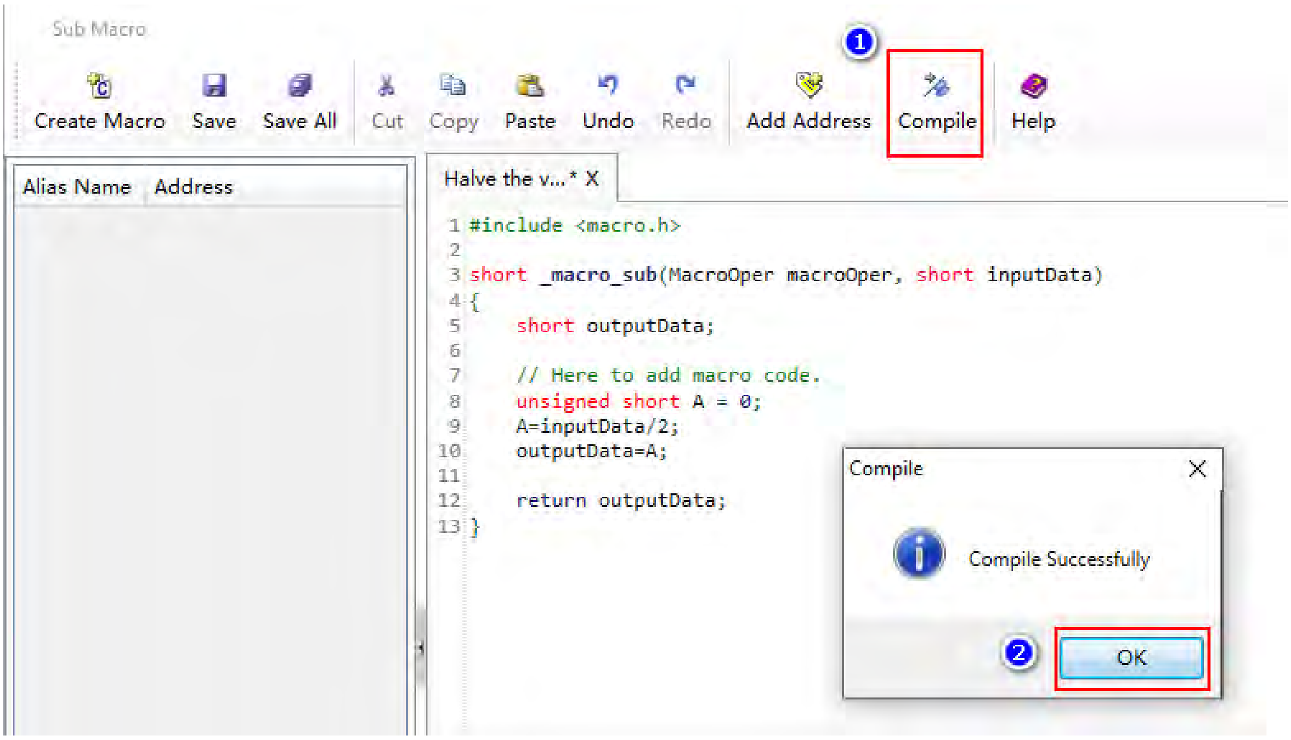
Step 2. Edit marco Name and Description, click **OK**.



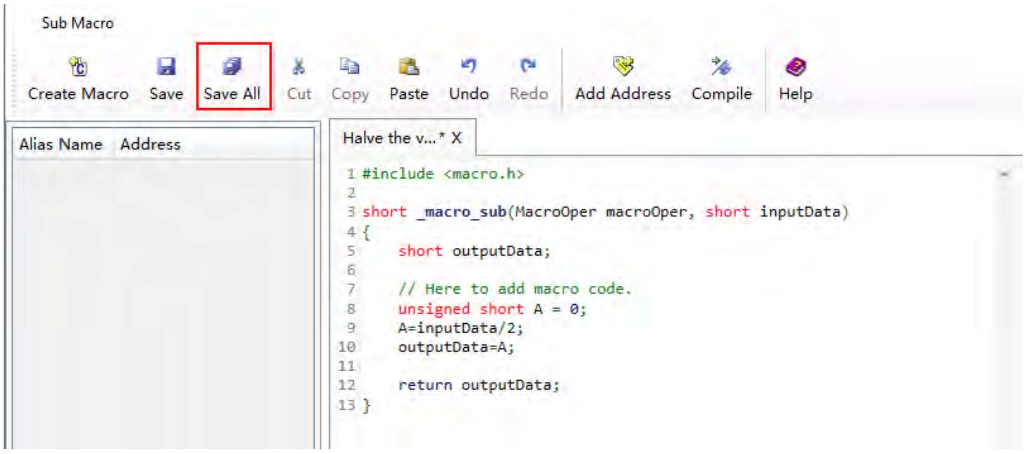
Step 3. Write code.



Step 4. Click **Compile**, if successfully compilied, click **OK** in the pop-up dialog box. If failed, view the error message and modify codes.



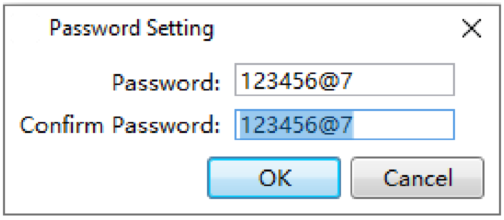
Step 5. Click **Save All**.



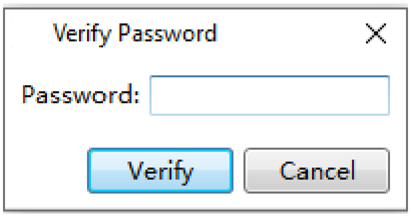
12.3 Common Macro Password Setting

To protect the confidentiality and safety of macro code and prevent unauthorized users or malicious software from tampering, cracking, or abusing the macro code, you can set passwords for common macros. Users will be required to enter a password for authentication when creating or editing common macros.

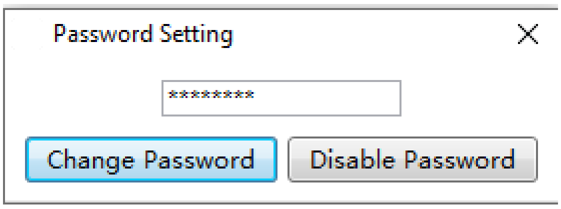
Step 1. Select **Macro/Common Macro Password Settings** from the menu bar, set and confirm the password (at least 6 characters) in the pop-up **Password Setting** dialog box, click **OK**.



Step 2. In the subsquent operations to create new common macros or edit common macros, a password is required to vertify.



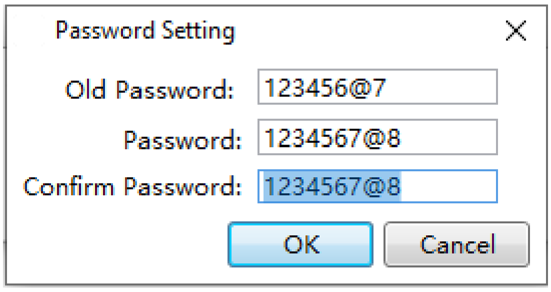
Step 3. Select **Macro/Common Macro Password Settings** from the menu bar, you can Change Password or Disable Password in the pop-up dialog box.



- Change Password

1) Click **Change Password.**

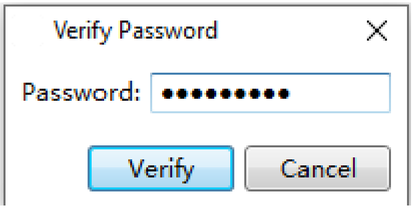
2) Enter the old password, set a new password and confirm, click **OK**.



- Disable Password

1) Click **Disable Password.**

2) Enter the password and click **Verify**.



12.4 Sub Macro Password Setting

Select **Macro/Sub Macro Password Setting** to set sub marco password. The method to set sub macro password is the same as setting the common macro password. Please refer to Common Macro Password Setting.

13 Recipe

A recipe refers to the data stored in the internal registers of the HMI, and the data in this area can be saved even when power is lost. When used, different groups of recipe index can be selected to quickly download the data of that group to the PLC for use. Recipes are typically used in scenarios where the required ingredient ratios vary for producing different types of products.

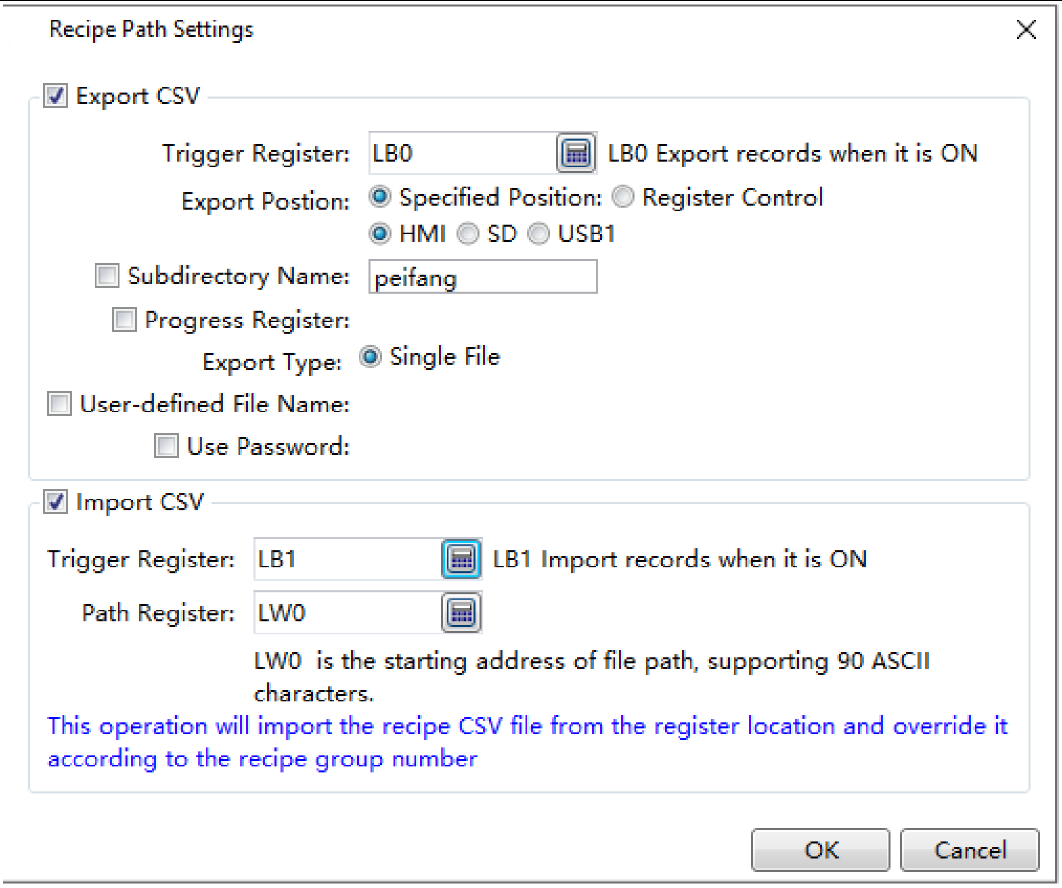
The steps to create a new recipe are as follows:

Step 1. Select **Recipe/Create Recipe** from the menu bar. In the pop-up **Recipe** dialog box, set general properties.

Please refer to the table below for detailed configuration methods.

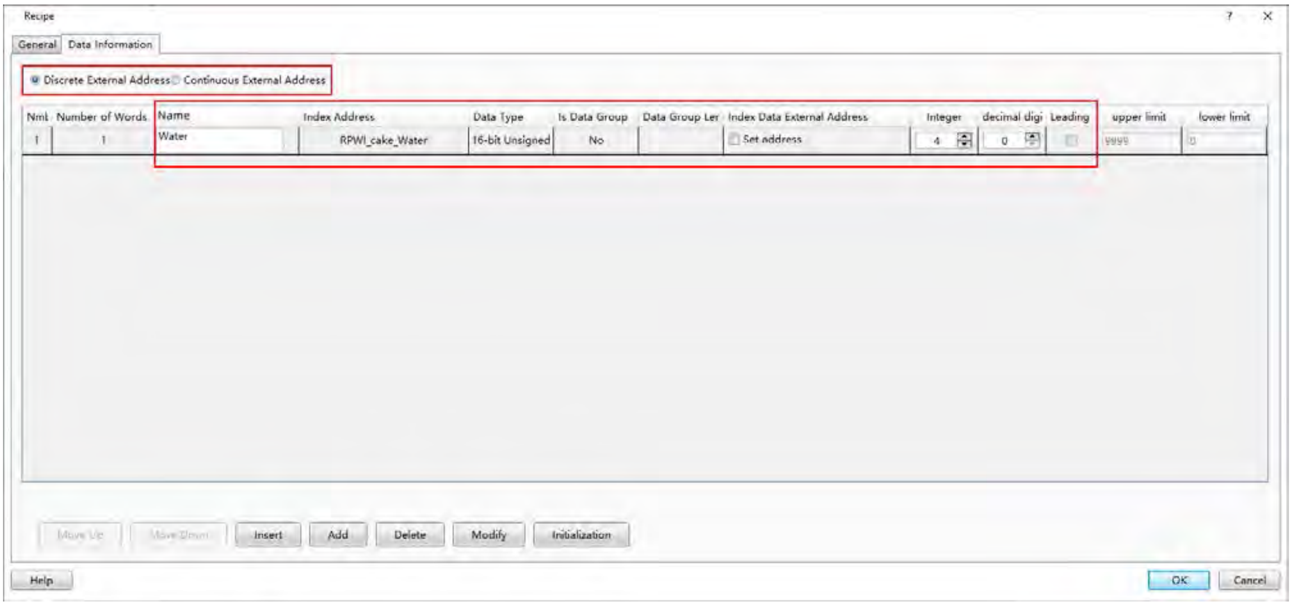
Parameters	Description
Name	Used to identify the recipe. The length should not exceed 16 bytes, and each Chinese character occupies 2 bytes.
Max number of recipe groups	The value range is 1 to 65535.
Use External Address as Recipe Index	Non-recipe storage area addresses can be used as recipe indexes.
Clear current recipe	The value of the specified bit address is set to ON, and the value of the current numbered recipe group is cleared (set to 0). After the clear is completed, the value of the bit address is set to OFF.

Parameters	Description
Clear all recipe	The value of the specified bit address is set to ON, and all recipe group data under the current recipe name is cleared (set to 0). After the clear is completed, the value of the bit address is set to OFF.”
Use the operation register	The bit address that triggers the recipe operation is 21 bits long. When set to ON, the relevant operation is executed, and when the operation is completed, it is set to OFF. For example, if the starting bit is set to LB0: ◆ Insert Above: When LB0 is set to ON, a new group is inserted above the current recipe group pointed to by RPI. ◆ Insert Below: When LB1 is set to ON, a new group is inserted below the current recipe group pointed to by RPI. ◆ Copy: When LB2 is set to ON, the current recipe group pointed to by RPI is copied. ◆ Cut: When LB3 is set to ON, the current recipe group pointed to by RPI is cut. ◆ Paste (Replace): When LB4 is set to ON, the content of the copied or cut recipe group is switched to the current recipe group pointed to by RPI. ◆ Copy to Next Row: When LB5 is set to ON, copy the current recipe group pointed to by RPI to the next row, shift the next row number, and do not overwrite existing data. ◆ Save Snapshot: When LB6 is set to ON, save the current recipe group as a snapshot. ◆ Restore to Initial Values: When LB7 is set to ON, restore the recipe data to the initial values set in edit mode. ◆ Restore Snapshot: When LB8 is set to ON, restore the snapshot saved by LB6. ◆ Upload: When LB9 is set to ON, upload data from an external address to the current recipe group data. ◆ Download: When LB10 is set to ON, download the current recipe group data to an external address. ◆ Delete Row: When LB11 is set to ON, delete the currently selected row or the checked row during a query. ◆ Delete All: When LB12 is set to ON, delete all recipe groups in the recipe. ◆ Reserved Operation Bits: LB13 to LB20.
Use Status Register	There are a total of 9 state values to display recipe operation state in the word address register: ◆ A value of 1 indicates a successful operation. ◆ 2 indicates that the selected record does not exist. ◆ 3 indicates an unknown operation. ◆ 4 indicates that the maximum number of records has been reached and a new record cannot be added. ◆ 5 indicates that another operation is in progress. ◆ 6 indicates a download failure. ◆ 7 indicates an upload failure. ◆ 8 indicates an operation that was not successfully executed. ◆ 9 indicates unsaved data.
Enable all recipe CSV import export	Click **Path Settings** to configure the import and export paths for the recipe data CSV file.

Parameters	Description
	

Step 2. Configure data entry.

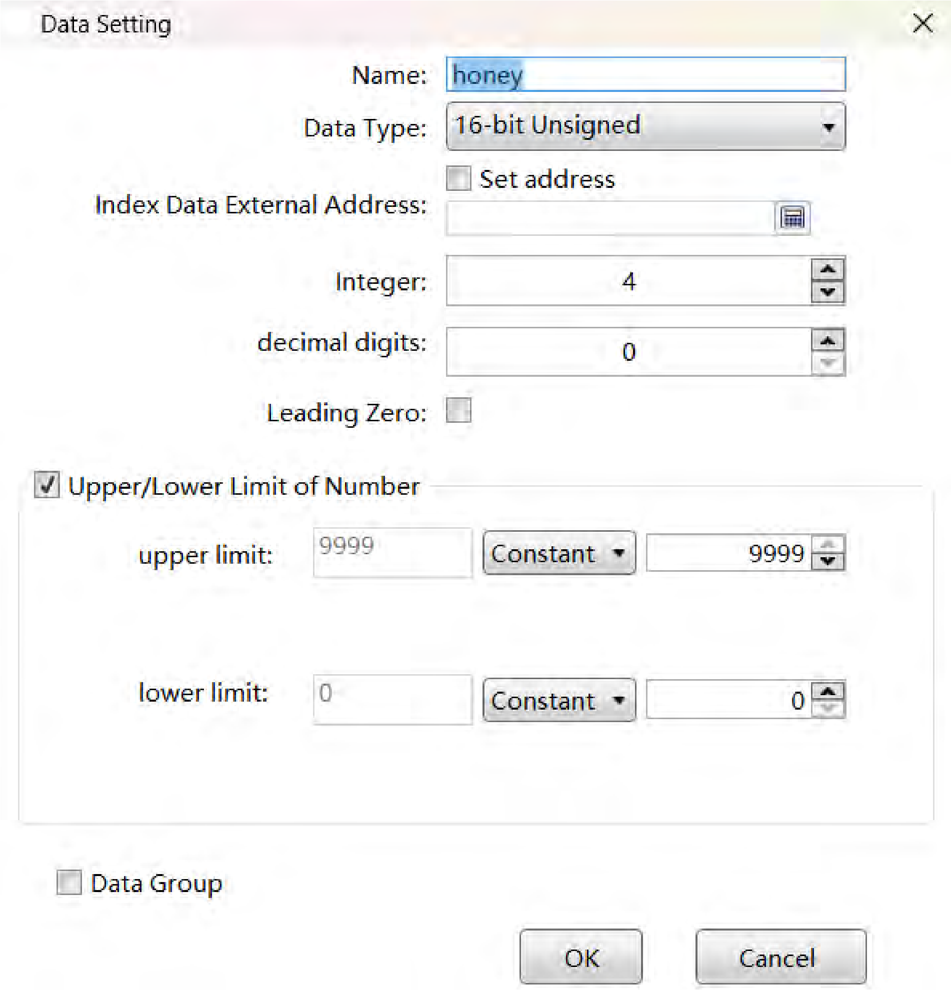
1) Choose the external address format (discrete address or continuous address) and set the current data entry (at least one data entry is required).



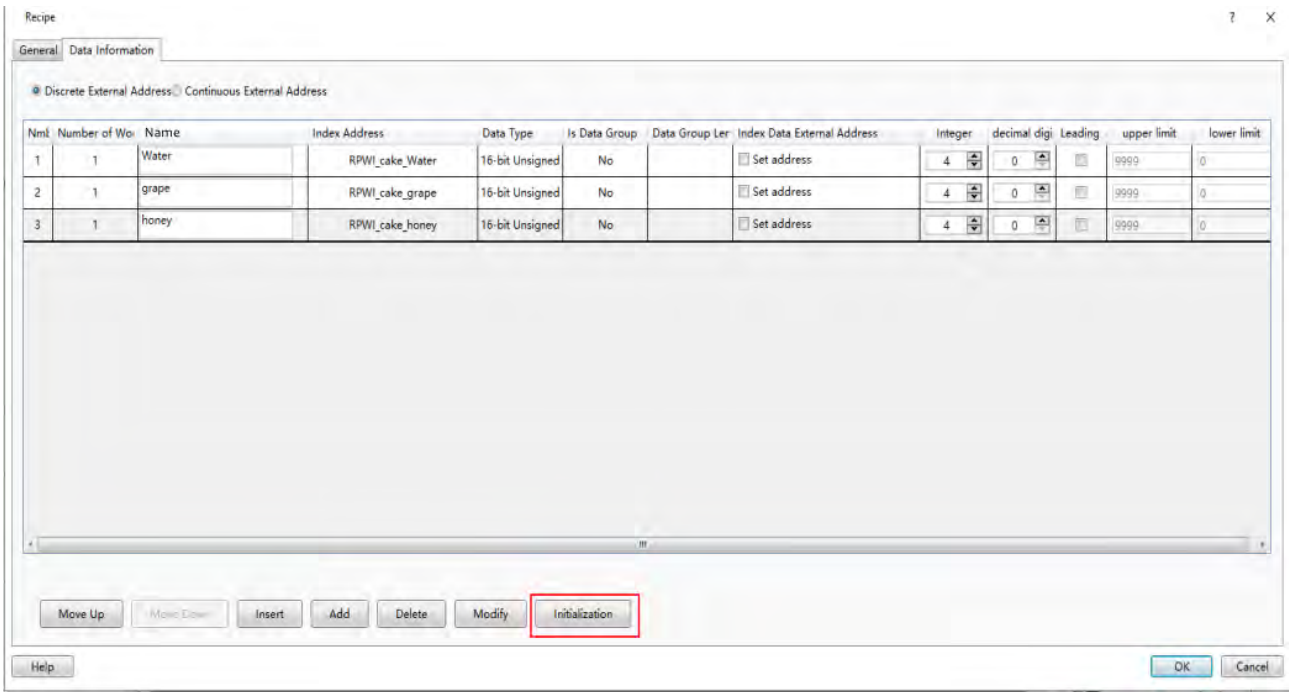
Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Discrete External Address	The address associated with recipe data in an external device is not continuous. For example, an external device uses a Siemens S7-1500 PLC to store recipe data for making cakes, where the address for butter is DB1.DBD0, and the address for eggs is MW2. In this case, the storage registers are different, so it can be referred to as a discrete external address.
Continuous External Address	The address associated with recipe data in an external device is continuous. For example, an external device uses a Siemens S7-1500 PLC to store recipe data for making cakes, where the address for butter is DB1.DBD0, the address for eggs is DB1.DBD4, and the address for sugar is DB1.DBD8, and so on. This can be referred to as a continuous external address.
Name	Name of the data item.
Index Address	Similar to a variable tag for the recipe data item, it can store the data for the data item.
Data Type	Please refer to the actual data type used.
Is Data Group	When selecting array data, the array length needs to be set.
External Address	Indicates whether an external address is used to associate the recipe data.
Integer	The number of integer digits in the data.
Decimal	The number of decimal digits in the data. For example, when the actual data is 55 and the decimal digits are set to 2, the displayed data is 0.55.
Leading Zero	When the high bits of the data are empty, they are filled with zeros. For example, 55 is displayed as 0055.

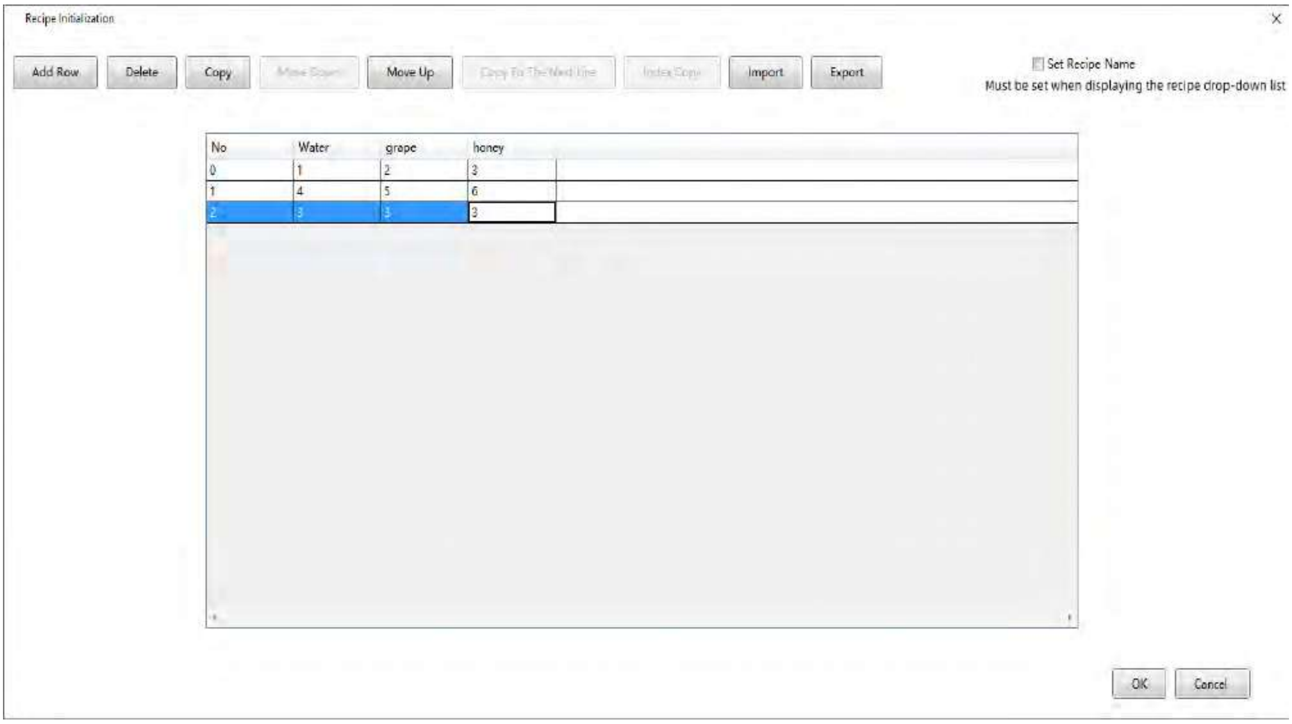
2) Click **Add**, edit the relevant parameters in the pop-up dialog box, and click OK to add a new data entry.



3) Click **Initialization**.



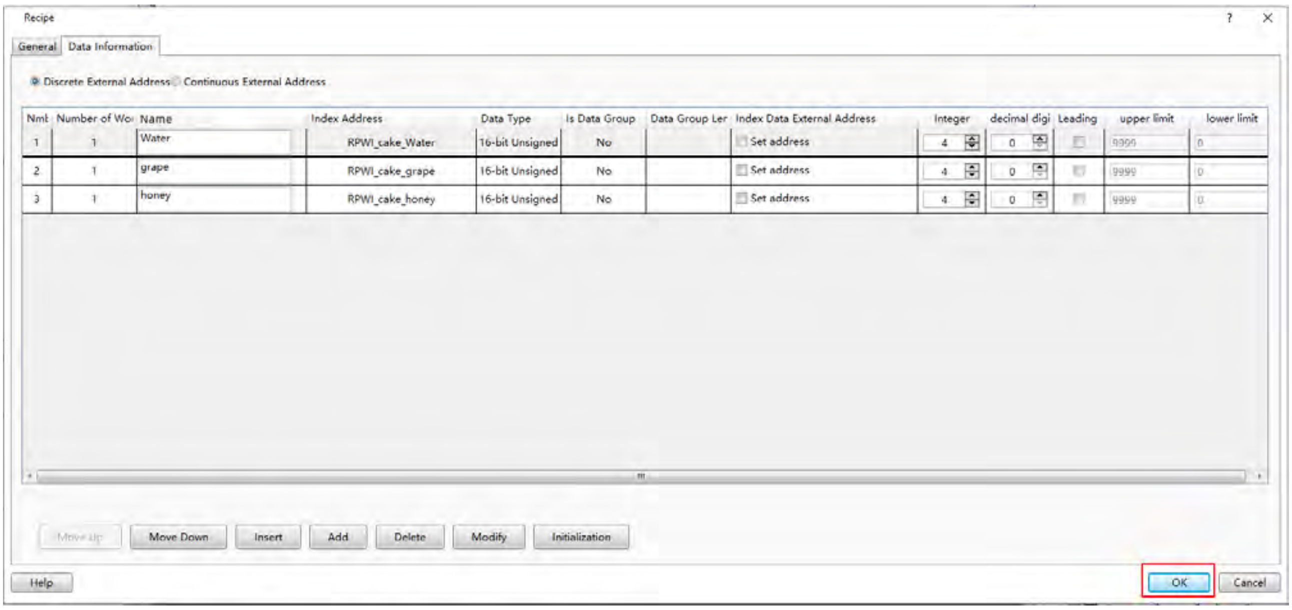
4) Set the initial data for the recipe and click **OK**.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Add Row	Click **Add Row** to set the data for the recipe group.
Set Recipe Name	When the recipe is displayed as a drop-down list, the recipe group name must be set to distinguish different recipe groups.
Export	Click **Export** to export initial data of recipe (Excel file).
Import	Click **Import**, select the edited initial data file (Excel file) to batch set the data of different recipe groups.

Step 3. Click **OK**.


Recipe
General
Data Information
Discrete External Address
Continuous External Address
Name
Index Address
Data Type
Is Data Group
Index Data External Address
Integer
Leading
upper limit
lower limit
Water
RPWI_cake_Water
16-bit Unsigned
No
Set address
grape
RPWI_cake_grape
honey
RPWI_cake_honey
Move Up
Move Down
Insert
Add
Delete
Modify
Initialization
Help
OK
Cancel

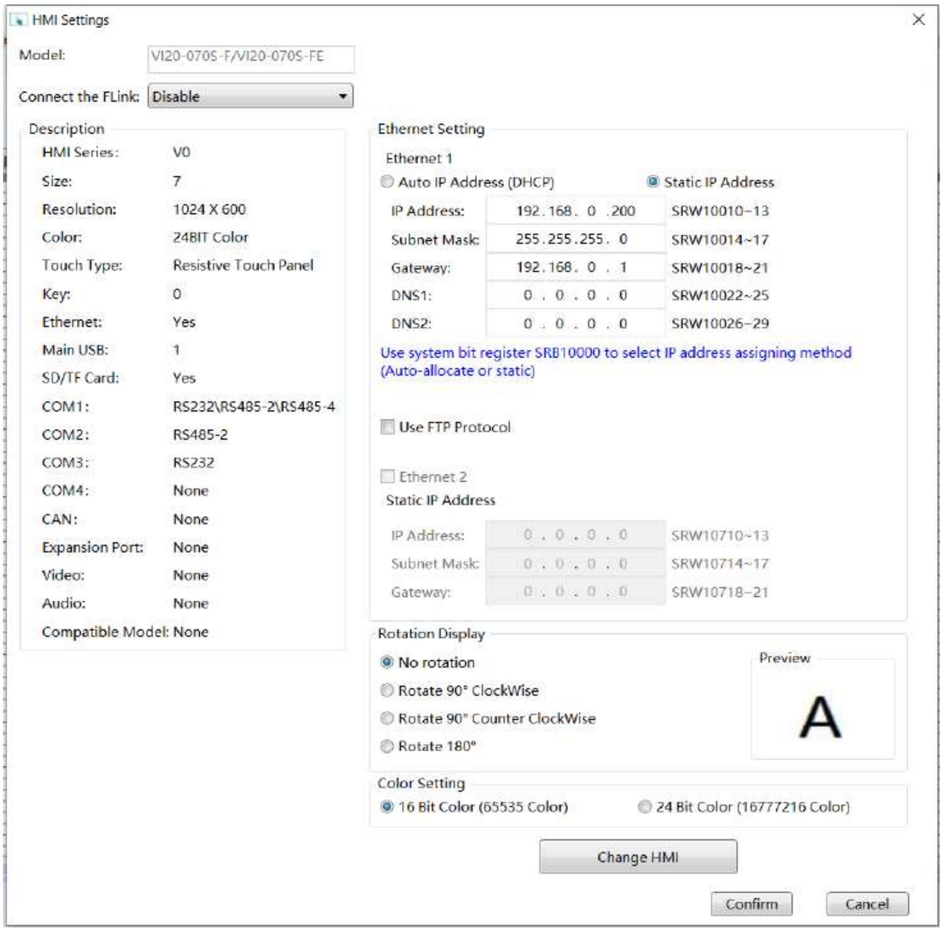
14 Settings

Settings refers to setting up the system resources and operational parameters of VI20Studio to make it suitable for actual application scenarios. This includes HMI settings, communication settings, system settings, and options.

14.1 HMI Settings

HMI Settings irefers to setting the parameters of the HMI, in order to adapt to actual application scenarios.

Select **Settings/HMI Settings** from the menu bar, edit relevant paramaters, and click **OK**.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Auto IP Address (DHCP)	IP address assigned by DHCP server. Please make sure HMI and DHCP are accessible to ethernet.
Static IP Address	IP address manually assigned.
IP Address	IP address of the ethernet card corresponding to HMI.

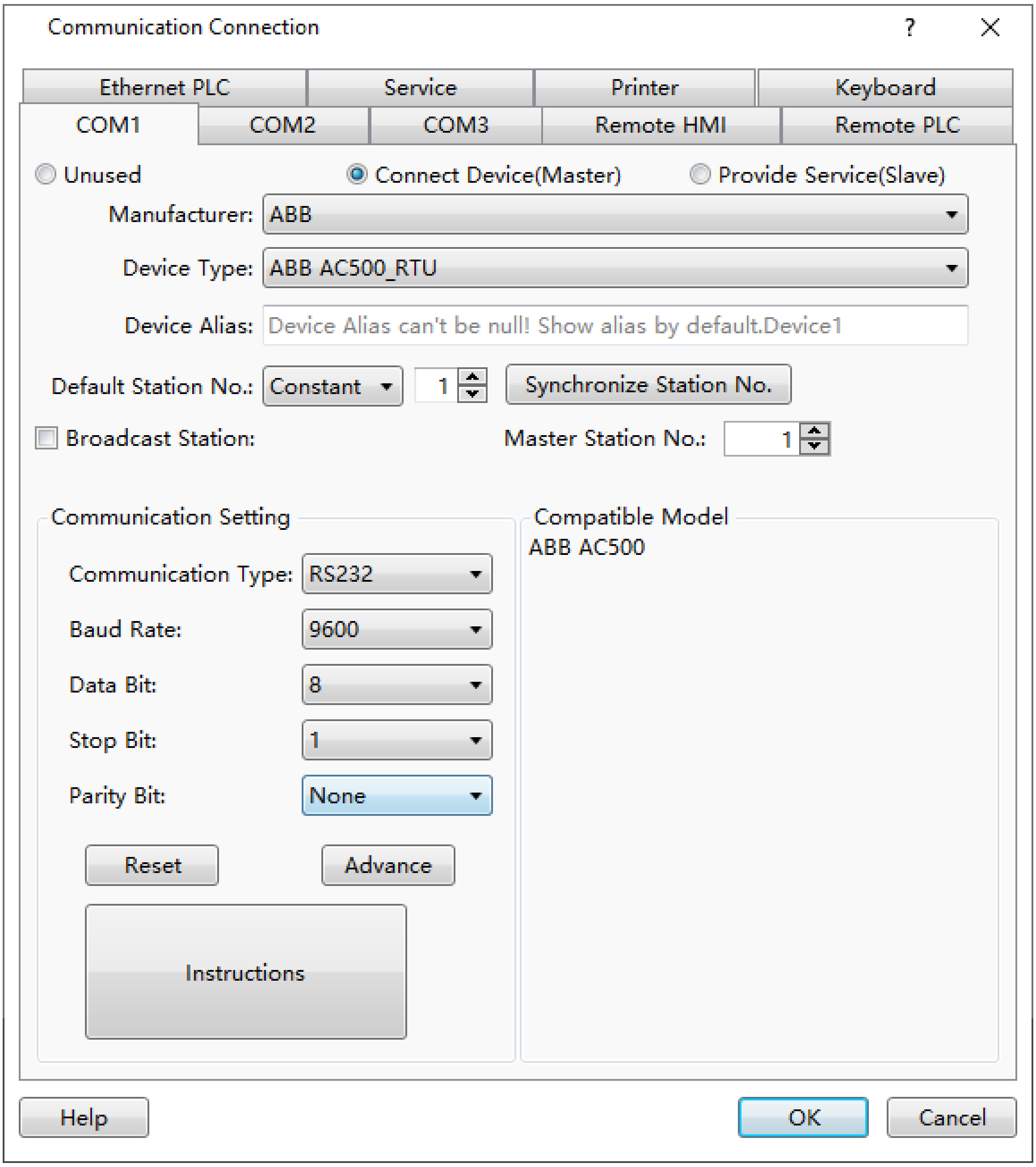
Subnet Mask	Subnet mask of the ethernet card corresponding to HMI.
Gateway	Gateway of the ethernet card corresponding to HMI.
DNS1	Main DNS server.
DNS2	Backup DNS server.
Use FTP Protocol	HMI transmits system data (such as project, system log data) through FTP protocol. Restart HMI is required after downloading the project to bring it into effect. Only applicable to Ethernet1 interface.
FTP Password	Password of FTP service, the length should not exceed 6 characters.
Rotation Display	Rotate a certain angle to display the screen. It supports no rotation, rotate 90°clockwise, rotate 90°counter clockwise, rotate 180°.
16 Bit Color	The color of HMI screen pixels is represented by 16-bit binary data, where the allocation of bits specifies the number of bits for each of the three primary colors in a pixel. In typical cases, the red and blue elements each occupy 5 bits, while the green element occupies 6 bits.
24 Bit Color	In each pixel, the intensity or depth of each primary color (red, green, and blue) is represented by 8-bit binary data.
Exchange HMI	Click **Exchange HMI**, select HMI Model in the pop-up dialog box, click **Exchange** to exchange the HMI mode.

14.2 Communication Setting

Communication Settings refer to setting the devices connected to HMI, including HMI, PLC, server, printer, etc.

14.2.1 Local Connection

Step 1. Select **Settings/Communication Settings/Local Connection** from the menu bar, set the devices (such as PLC) connected to serial ports in the pop-up dialog box (the number of serial ports is related to the HMI model, please refer to the actual situation), configure relevant parameters and click **OK**.



Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Connect Device (Master)	HMI works as the control center, analyses data collected from the devices and assign tasks to slave devices.
Provide Service (Slave)	HMI works as the slave station, providing corresponding services as the server-side. The following parameters should be configured: ◆ Device type: please refer to the actual situation. ◆ Server station No.: In a communication link, there may be multiple slave devices, and they are identified by these IDs.
Manufacturer	PLC manufacturer.

Parameters	Description
Device Type	PLC type.
Device Alias	If no specific alias is set, the default alias is Device *n*.
Default Station No.	This parameter sets the default station number used for device addressing. When the address does not include station number information, this setting value will be used as the station number for the device.
Synchronize Station No.	Synchronize the station numbers from the components.
Communication Type	Serial port communication protocol, please refer to the actual situation.
Baud Rate	Data transmission rate, please refer to the actual situation.
Data Bit	The number of bits that carry valid information in communication, including 7 bits and 8 bits.
Stop Bit	Logic 1, which signifies the end of a character, can be represented by either 1 bit or 2 bits.
Parity Bit	The data parity bit, including no parity, odd parity, and even parity.
Advance	Click **Advance** to set the Timeout and Group Packaging Parameters, high and low byte, Byte Order.

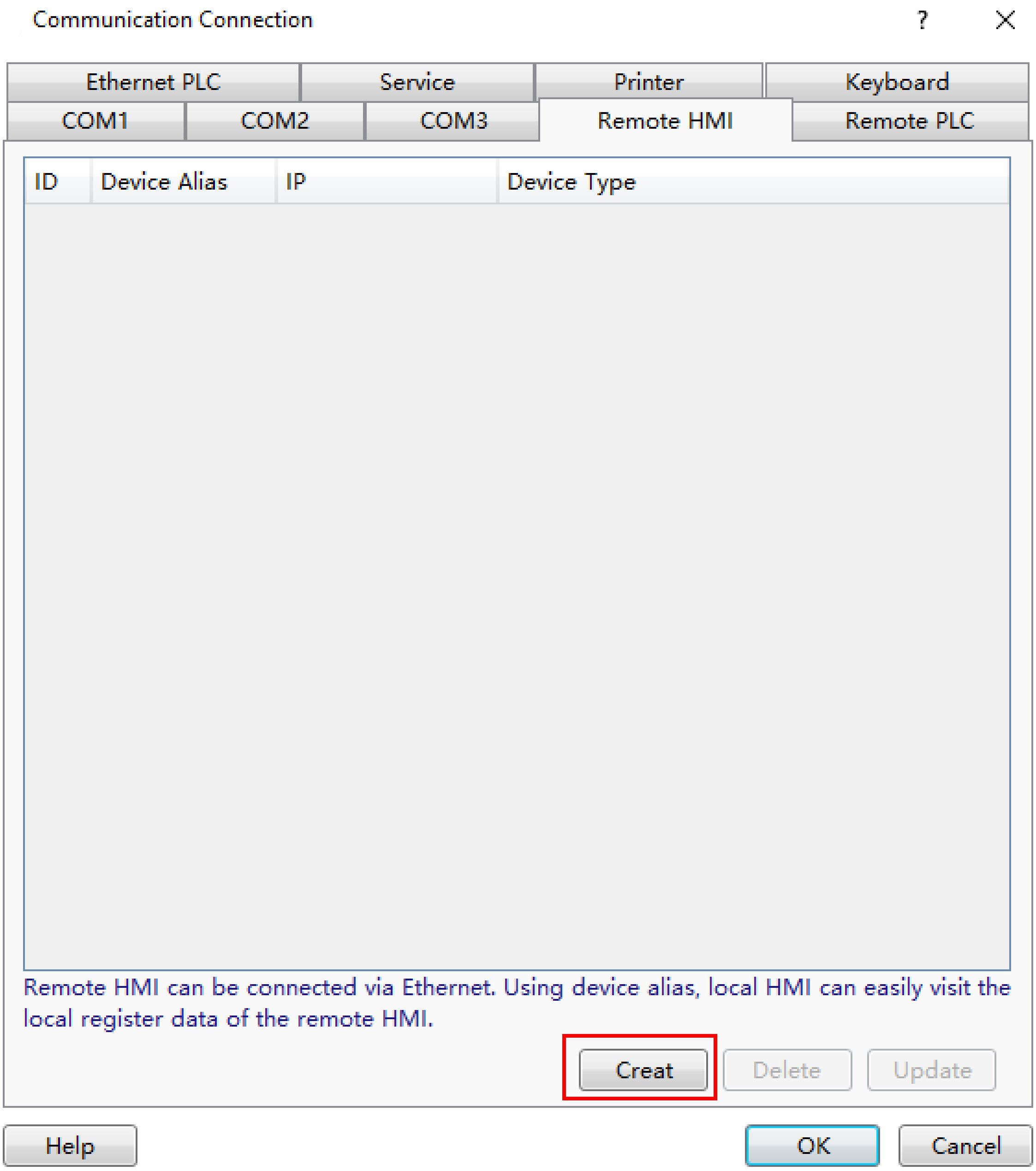
14.2.2 Remote Connection

Remote connection refers to HMI connection remote devices (such as remote HMI, remote PLC, ethernet PLC) by specified protocols.

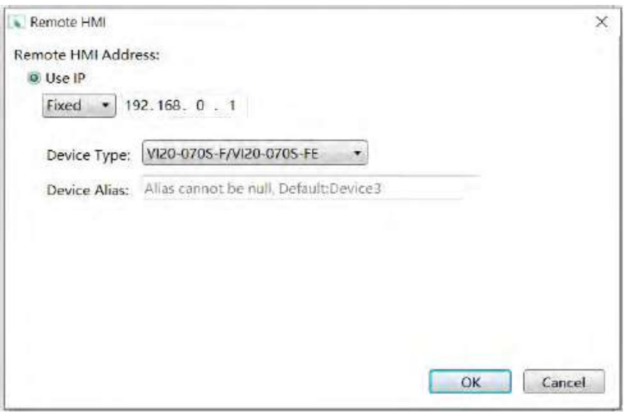
14.2.2.1 Remote HMI

Remote HMI connects local HMI through Ethernet. Using device alias of remote HMI, local HMI can visit the register data of the remote HMI. The steps to configure remote HMI are as follows:

Select **Settings/Communication Settings/Remote Connection**, click **Create** in the pop-up dialog box.



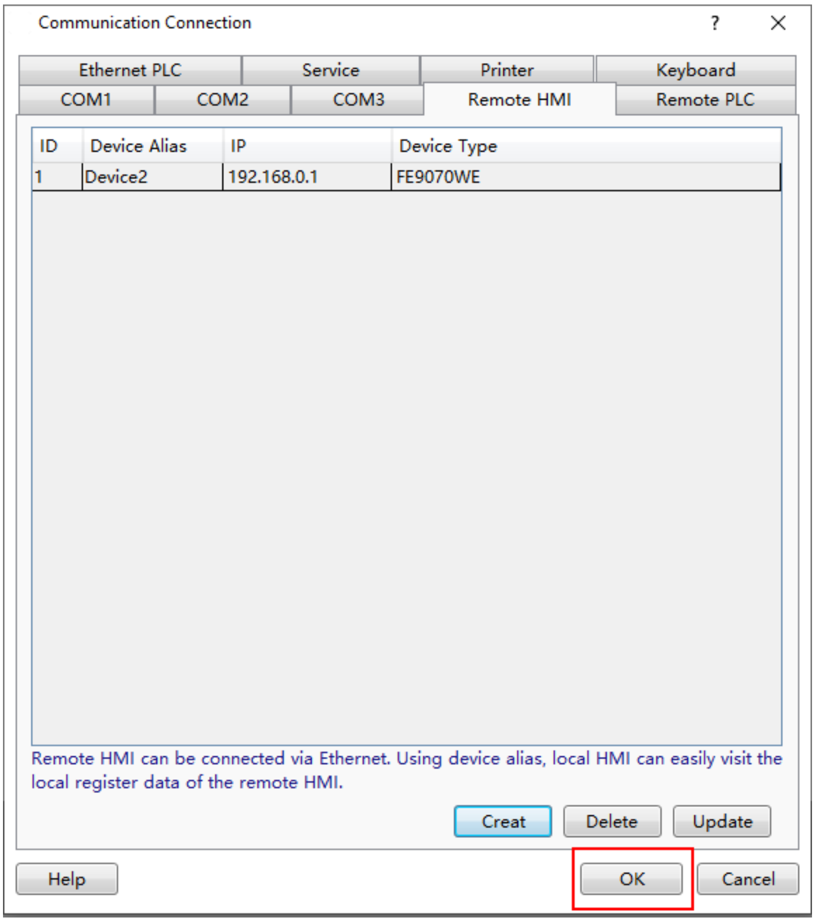
Step 2. Configure relevant parameters in the pop-up **Remote HMI** dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Use IP	IP address of remote HMI. It can be a fixed value, it can also be determined by the value of the specified word address register.
Device Type	It supports HMI and FBox of VEICHI, please see the drop-down list for detailed models.
Device Alias	If no alias is set, the default value is Device *n* (n is a specific number, please refer to the actual situation).

Step 3. Click **OK**.

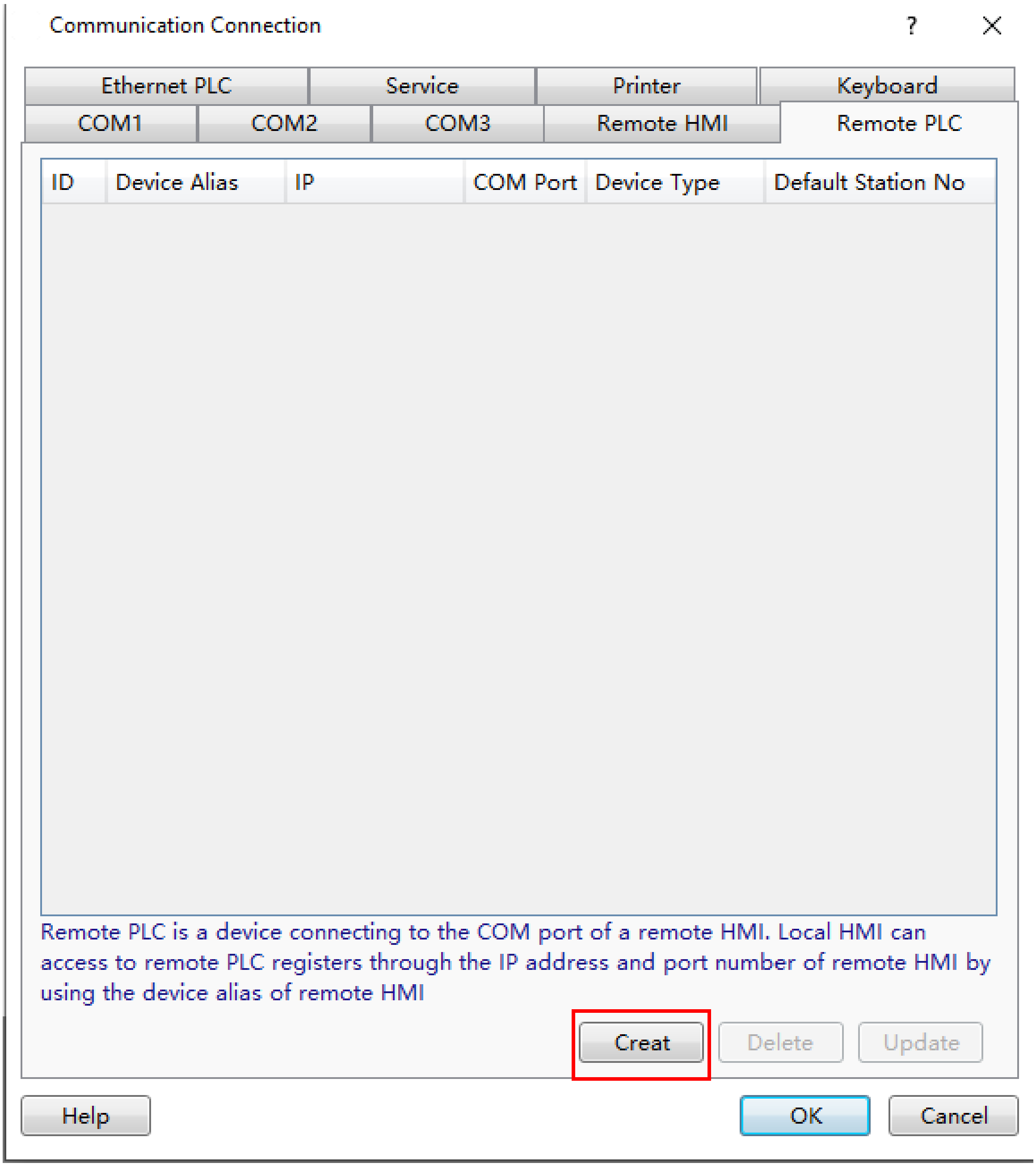


14.2.2.2 Remote PLC

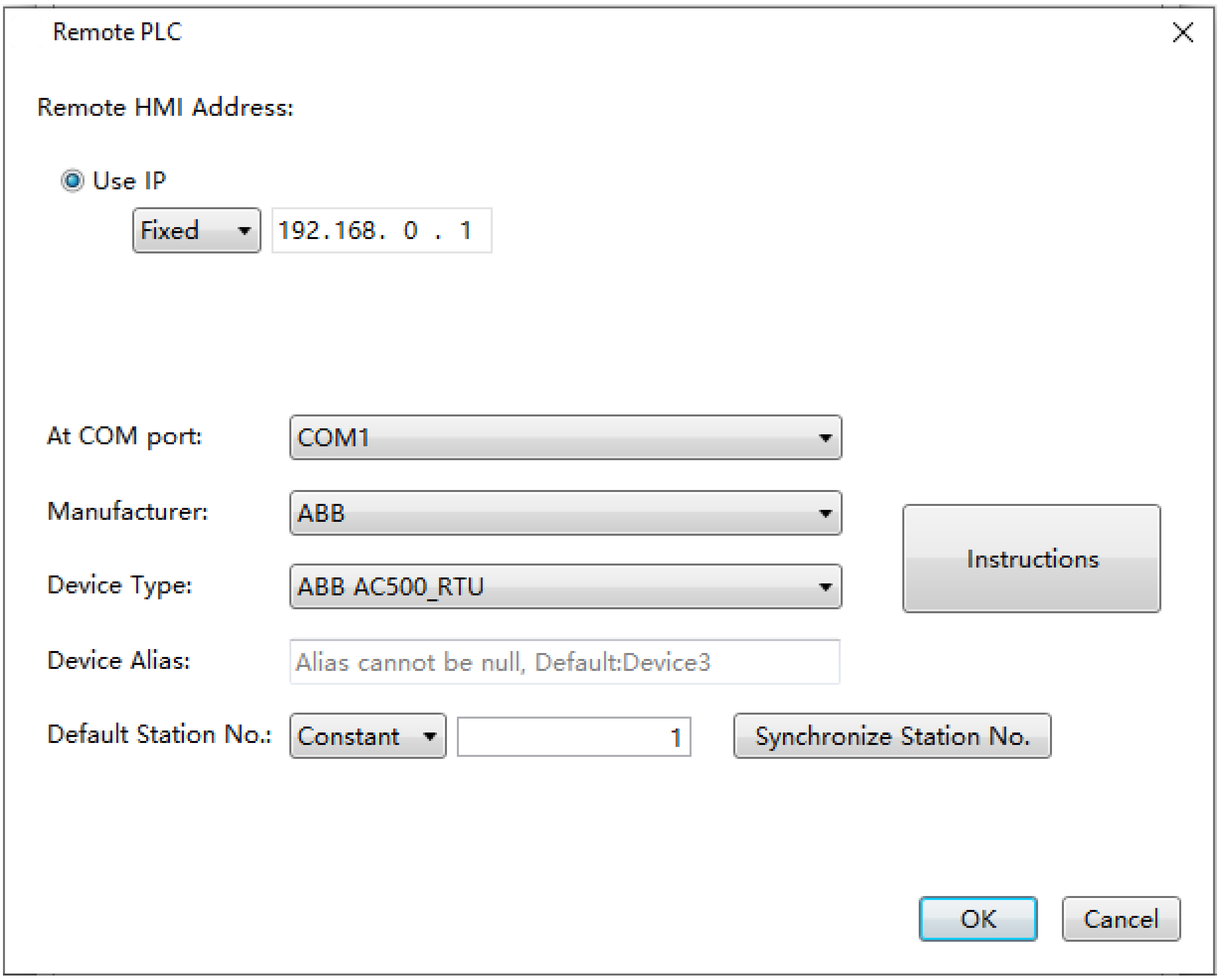
Remote PLC is a device connecting to the COM port of a remote HMI. Local HMI can access remote PLC through remtoe HMI (identify remote PLC through device alias).

The steps to add a new remote PLC are as follows:

Step 1. Select **Settings/Communication Settings/Remote Connection**, select the **Remote PLC** tab in the pop-up dialog box, click **Create**.



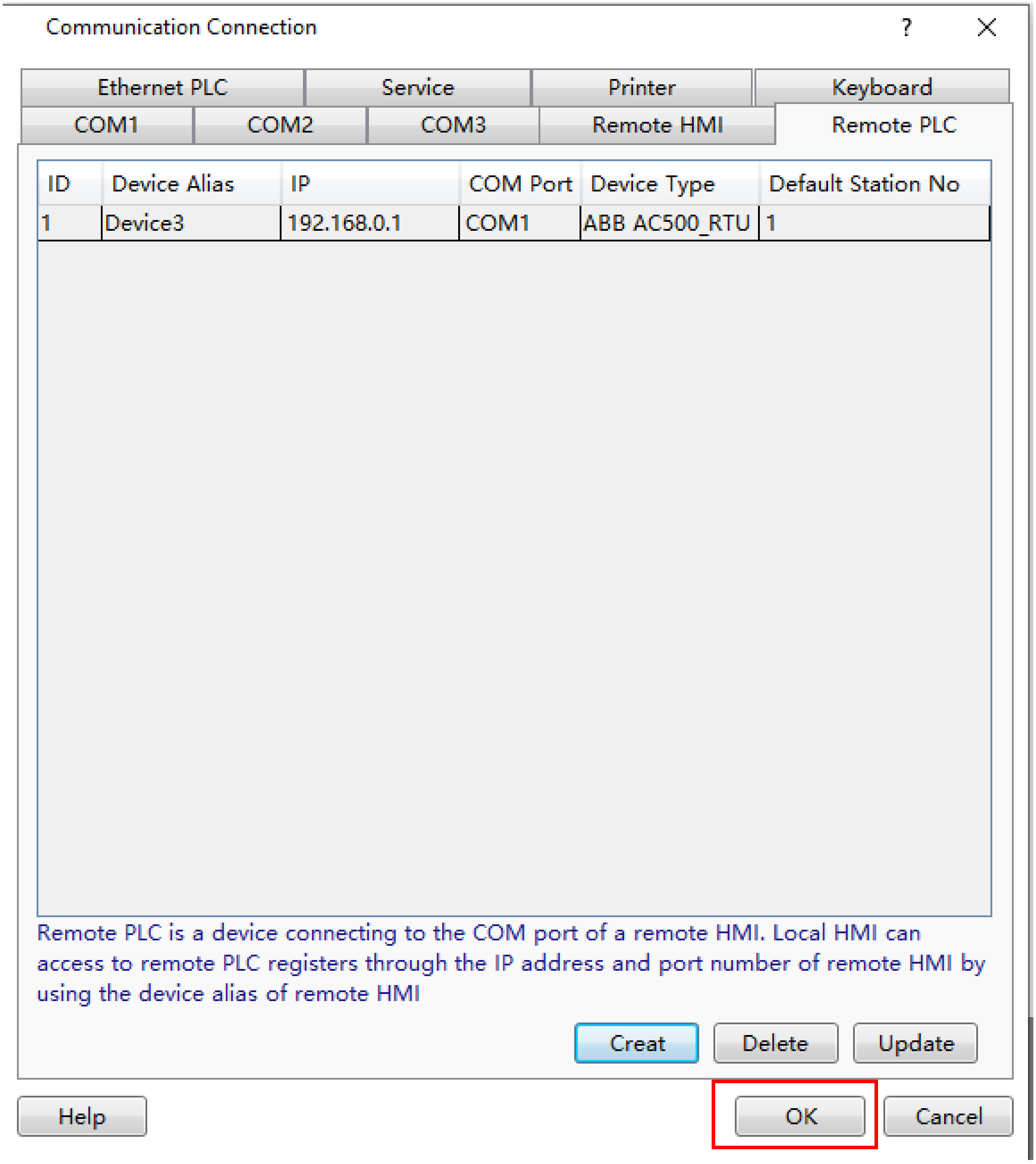
Step 2. Configure relevant parameters in the pop-up **Remote PLC** dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Remote HMI Address	IP address of the remote HMI connected to remote PLC. It can be a fixed value or determined by variables.
At COM port	COM port of the remote HMI connected to remote PLC.
Manufacturer	Remote PLC manufacturer.
Device Type	Remote PLC type.
Device Alias	Used to identify remote PLC, default value is Device *n* (*n* is a specific number).
Default Station No.	Set the default station number used by device address. When the address content does not include station number information, the set value of this item will be used as the device station number.

Step 3. Click **OK**.

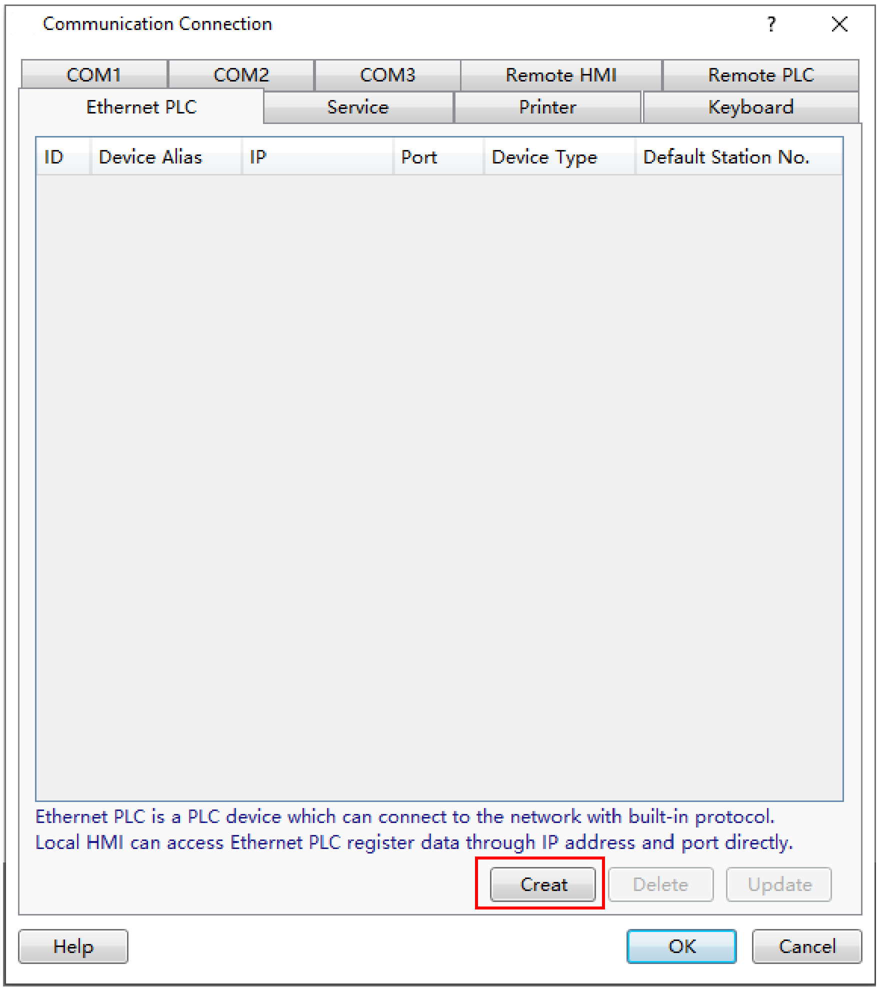


14.2.2.3 Ethernet PLC

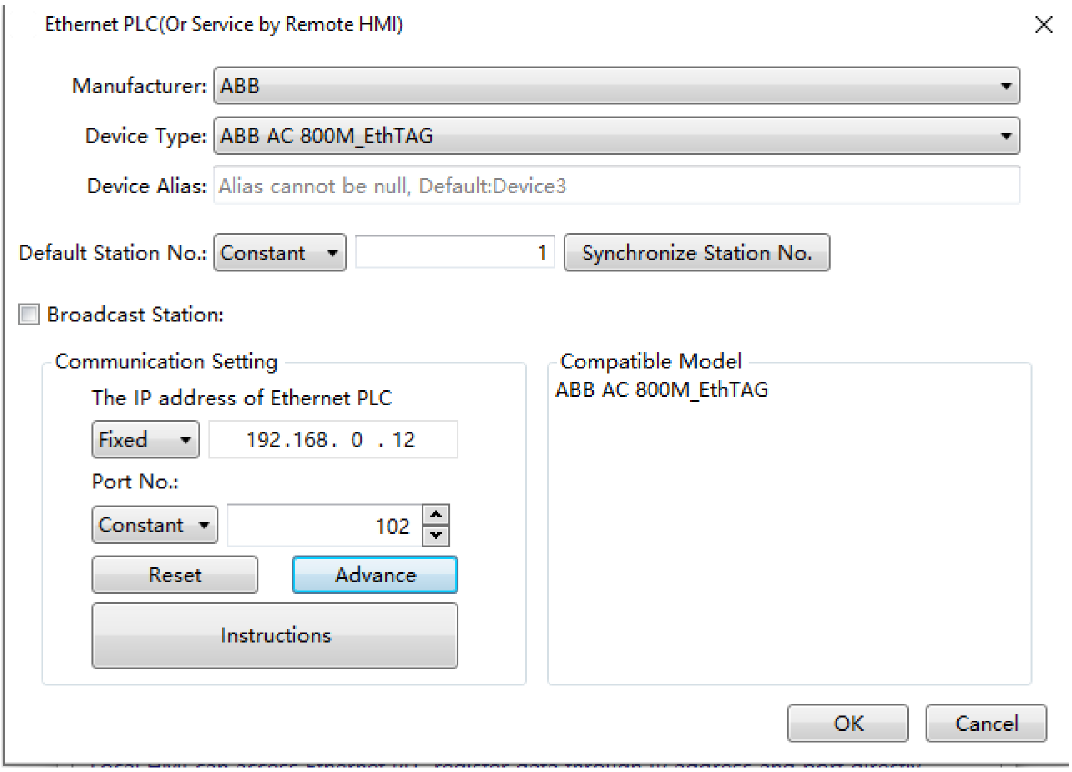
Ethernet PLC is a PLC device that connects to HMI by ethernet protocol. Local HMI can access Ethernet PLC register data through the IP address and port (port that communication service uses) of Etehrnet PLC.

The steps to add an Ethernet PLC are as follows:

Step 1. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select the **Ethernet PLC** tab in the pop-up dialog box, click **Create**.



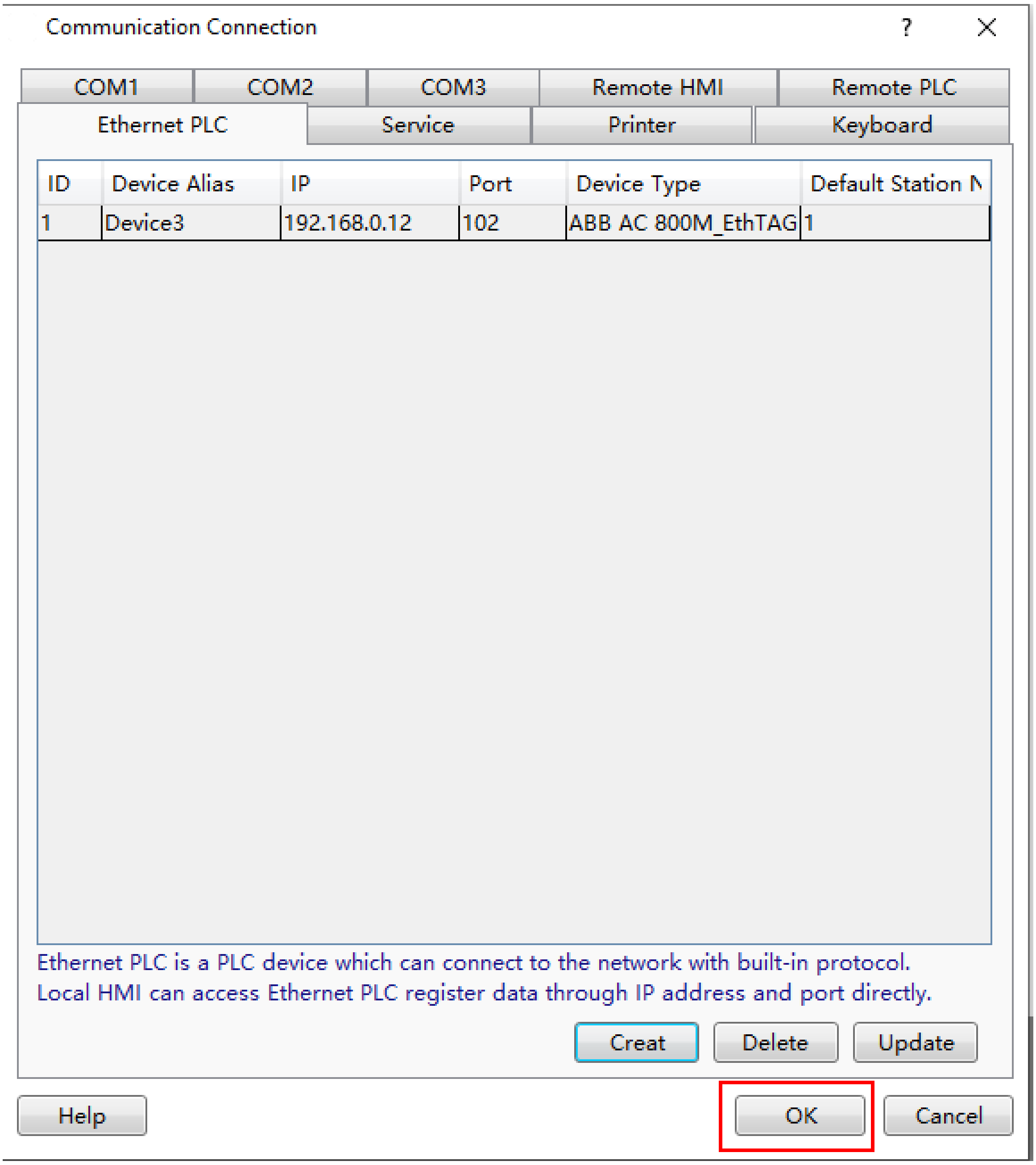
Step 2. Edit relevant information in the pop-up dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameters	Description
Manufacturer	Manufacturer of remote PLC.
Device Type	PLC type.
Device Alias	Used to identify remote PLC. Default value is Device *n* (n is a specific digit).
Default Station No.	Set the default station number used by device address. When the address content does not include station number information, the set value of this item will be used as the device station number.
Synchronize Station No.	Synchronize the station number of the component.
Broadcast Station	When enabling the Broadcast Station, such as in Modbus communication, 255 is the broadcast station number. Any data frame sent by a Modbus device with the station number 255 will be received by all connected Modbus devices (which need to support the broadcast station number feature), but they will not reply. The Broadcast Station is only effective for devices that support the Broadcast Station feature.
The IP address of Ethernet PLC	IP address of ethernet PLC. It can be set as a fixed value or determined by the value of the specified word address register.
Port No.	Port number of the service that ethernet PLC and HMI communication use.
Reset	Click **Reset** to reset the default IP and port number of ethernet PLC.
Advance	Click **Advance** to set the timeout and group packaging parameters, communication abnormal tip display time, word and byte port order.

Step 3. Click **OK**.

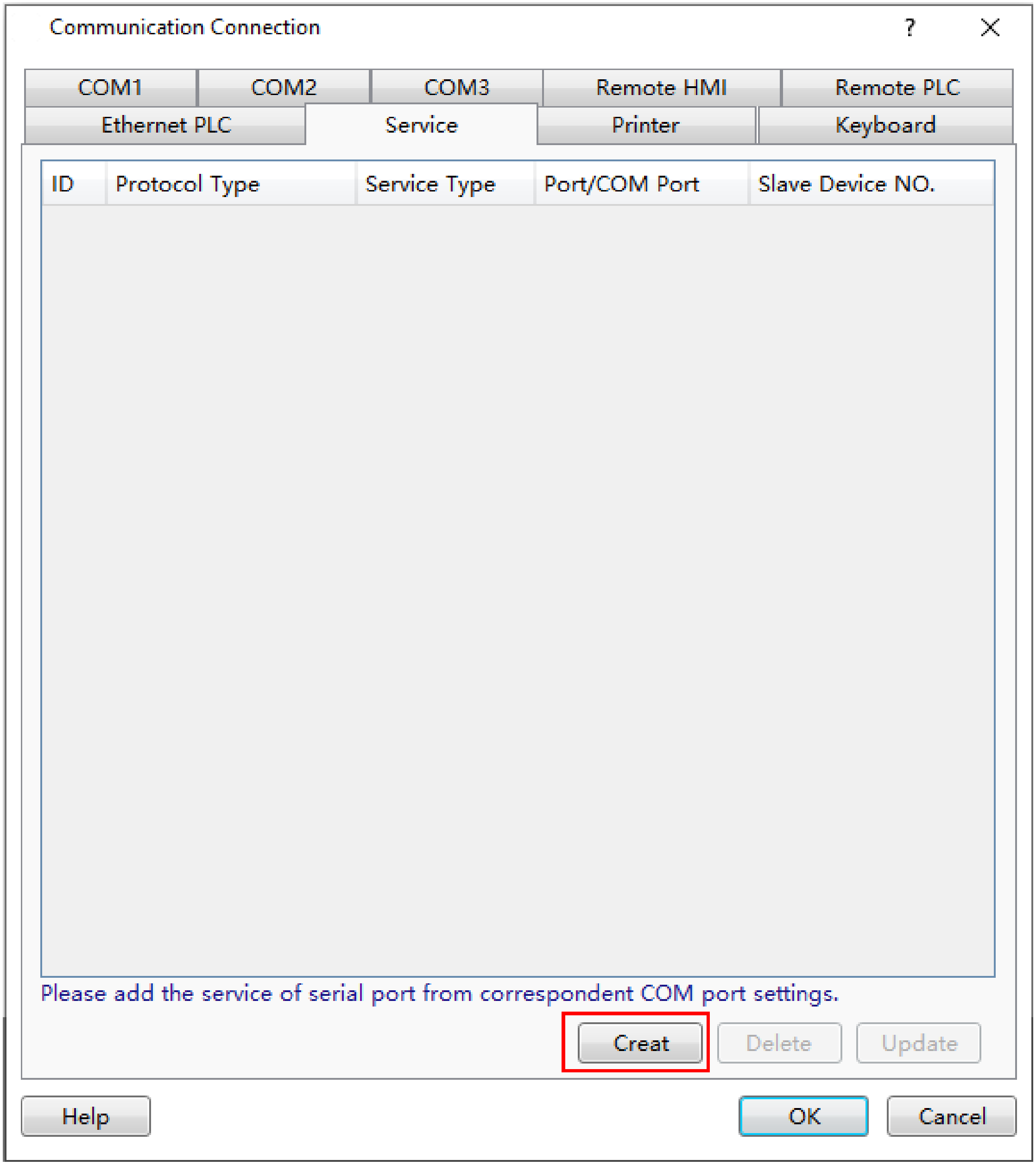


14.2.3 Service

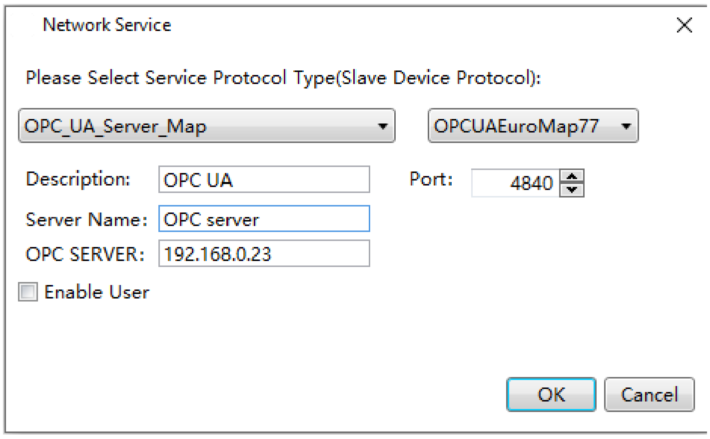
Services refer to the network services provided by the HMI, where data is offered to relevant network servers through protocols (such as OPC UA, etc.). It is essential to ensure that the HMI is accessible to the network server in terms of routing and the required ports.

The steps to add new network services are as follows:

Step 1. Select **Settings/Communication Settings/Service**, select the **Service** tab in the pop-up dialog box, click **Create**.



Step 2. Configure relevant parameters in the pop-up **Network Service** diolog box, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameters	Description
Please Select Service Protocol Type	◆ BACnet_IP_Server: BACnet_IP_Server is a server-side program, it receives the BACnet/IP messages from other devices and analyse, deal with and respond to these messages. The following parameters should be configured: ● Port No.: Port number the service occupies, please refer to the actual situation. ● Server Station No.: server station number is a number that identifies a specific device. In the BACnet/IP protocol, server station number is usually called Device Instance, which is a unique integer that is larger than 0, used to identify devices in the BACnet network. ● Enable Address Mapping: Map the addresses in HMI to the BACnet_IP_Server addresses, used to record BACnet_IP_Server address information. ◆ FBox-2AD2DA: An IoT gateway (model: FBox-4G) of Veichi that features 2 analog inputs and 2 analog outputs. The following parameters should be configured: ● Port No.: the port occupied by the service, default is 502. ● Server Station No.: a number to identify the device. ◆ HIK_sever: HIKVISION server. The following parameters should be configured: ● Port No.: the port occupied by the service, default is 10008. ● Server Station No.: a number to identify the device. ◆ Modbus RTU_Over_TCP_Server: A server that transmits Modbus RTU messages over TCP. The following parameters should be configured: ● Port No.: the port occupied by the service, default is 502. ● Server Station No.: a number to identify the device. ◆ Modbus RTU_Over_TCP_Server_freeLW: A server that transmits Modbus RTU messages over TCP. LW address can be modified based on the slave station. The following parameters should be configured: ● Port No.: the port occupied by the service, default is 502. ● Server Station No.: a number to identify the device. ◆ Modbus_TCP_Extend_Server: A server that transmits Modbus RTU Extend protocol messages using TCP. The following parameters should be configured: ● Port No.: the port occupied by the service, default is 502. ● Server Station No.: a number to identify the device. ◆ Modbus_TCP_Server: A server that transmits Modbus protocol messages using TCP.

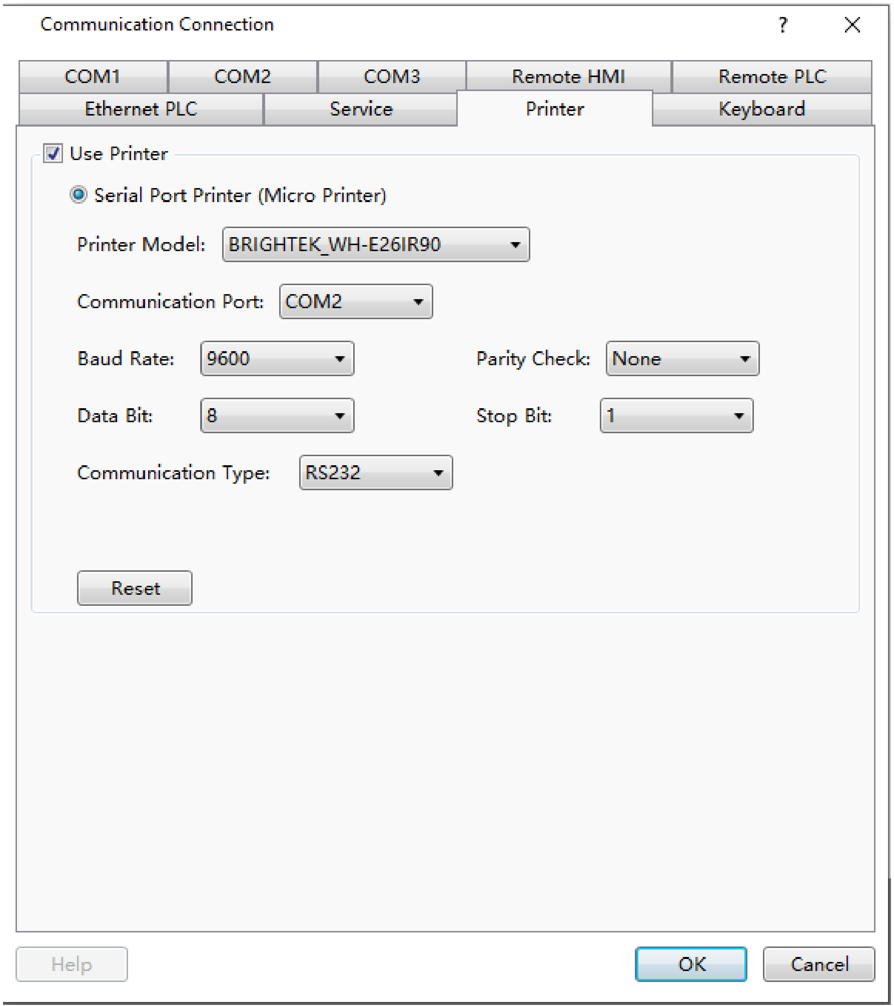
Parameters	Description
	The following parameters should be configured: ● Port No.: the port occupied by the service, default is 502. ● Server Station No.: a number to identify the device. ● Enable Address Mapping: The addresses within the HMI are mapped to the Modbus TCP server addresses, enabling the recording of the Modbus TCP server's address information. ◆ OPC_UA_Server_Map: OPC UA server. The following parameters should be configured: ● Description: description information of the server. ● Server Name: used to identify server. ● OPC SEVER: IP of OPC UA. ● Port : the port occupied by the service, default is 4080. ● Enable User: Authentication of the user is required during communication, including the username and password.

14.2.4 Printer

The HMI can be connected to a serial printer (a micro-printer) to print the screens or alarm messages or other content from the HMI.

The steps to create a new printer are as follows:

Select **Settings/Communication Settings/Printer** from the menu bar, configure relevant parameters in the pop-up dialog box, click **OK.**



Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Use Printer	Check **Use Printer** to connect the printer (through serial port).
Printer Model	Please refer to the actual situation.
Communication Port	The port used when HMI communicates with the printer.
Baud Rate	Data transmission speed, please refer to the actual situation.
Parity Check	Data check method, including odd check, even check and none.
Data Bit	The actual data bit during communication.
Stop Bit	The last bit of a single data package.
Communication	◆ RS232: The RS-232 standard interface, also known as EIA RS-232, is one of the commonly used serial communication interface standards. It was jointly established by

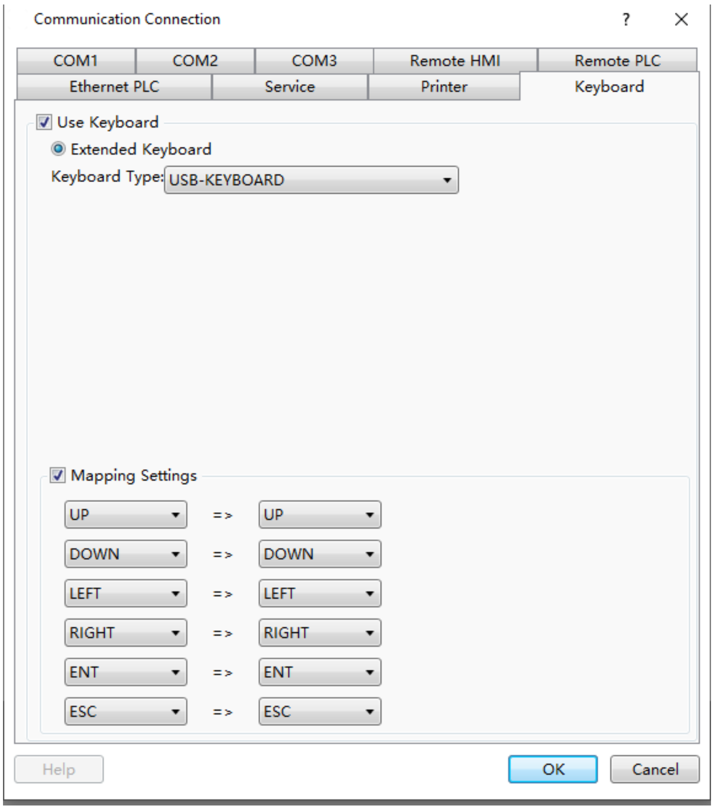
Parameter	Description
Type	the Electronic Industry Association (EIA), Bell System, modem manufacturers, and computer terminal manufacturers in 1970. Its full name is “Standard Interface Between Data Terminal Equipment (DTE) and Data Communication Equipment (DCE) for Serial Binary Data Exchange. In industrial control devices, the RS-232 port typically only uses three lines: RXD, TXD, and GND. ◆ RS485-2: The RS-485 bus standard defines the electrical characteristics of the bus interface and the definition of two logic state. A positive voltage level between 2V and +6V represents one logic state, while a negative voltage level between -2V and -6V represents the other logic state. The digital signals are transmitted using a differential transmission method, which effectively reduces the interference from noise signals. RS-485-2 uses two wires to transmit signals: Data+ and Data-. ◆ RS485-4: RS485-4 uses four wires to transmit signals (TXD+, TXD-, RXD+, RXD-).

14.2.5 Keyboard

HMI can use an external keyboard.

The steps to add an external keyboard are as follows:

Select **Settings/Communication Settings/Keyboard** from the menu bar, configure relevant parameters in the pop-up dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Use Keyboard	Check **Use Keyboard** to use and external keyboard.
Keyboard Type	◆ USB-KEYBOARD: USB external keyboard. ◆ davo_D8210: to connect a davo keyboard via the COM port, you will need to set the communication port, communication protocol, baud rate, data bits, stop bits, and parity settings. ◆ FR7-KEYBOARD: The HMI is used in conjunction with the FR7 keyboard for the Leadshine mainboard. You will need to set the communication port, communication protocol, baud rate, data bits, stop bits, and parity settings. ◆ MEGEET-KEBOARD: connect MEGEET keyboard via COM port. You will need to set the communication port, communication protocol, baud rate, data bits, stop bits, and parity settings.
Mapping Setting	Map the specified keyboard to corresponding keyboard (up, down, left, right, enter, cancel).

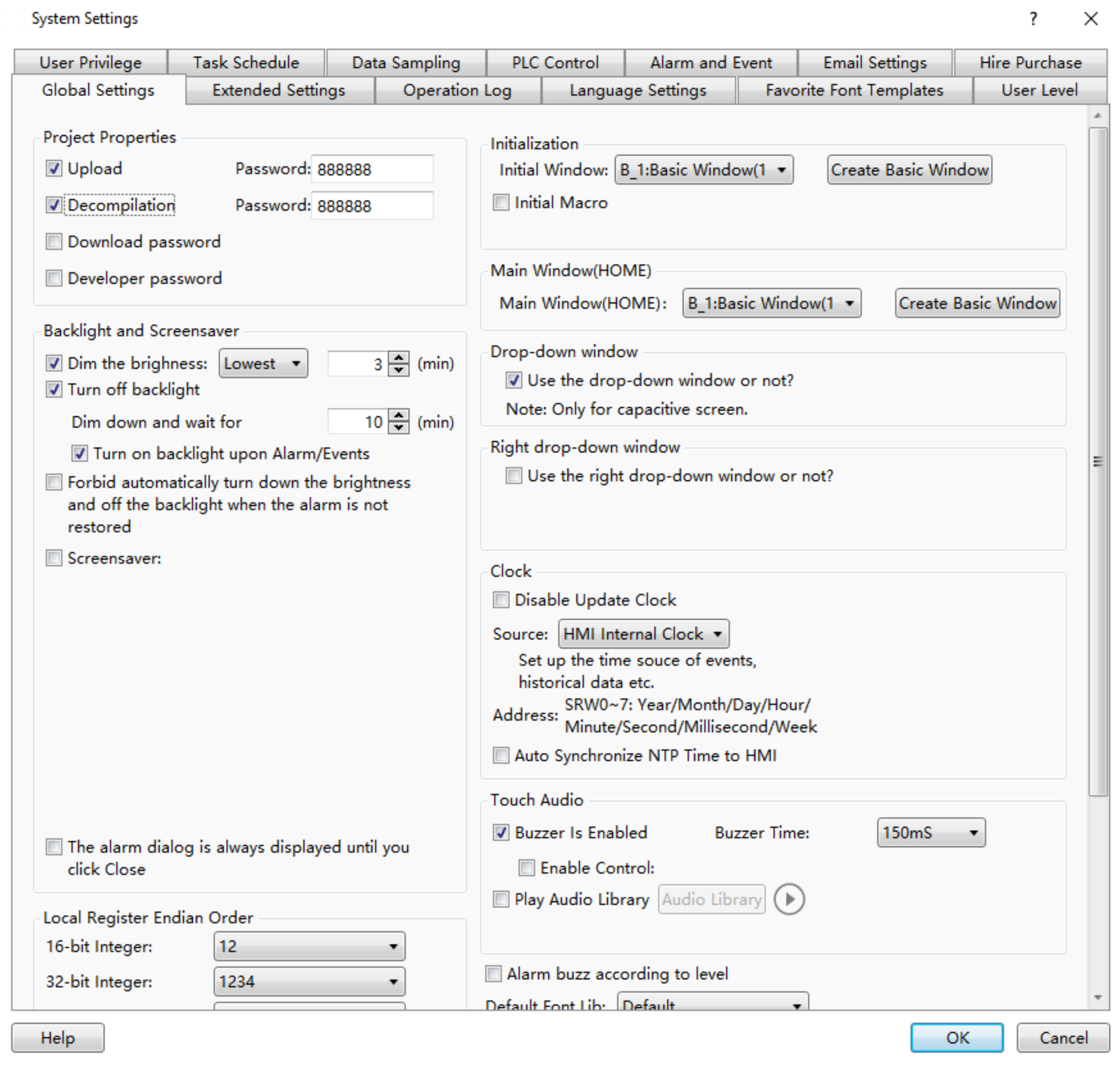
14.3 System Settings

System Settings refer to the configuration and management of system operating parameters and resources to ensure the system operates in an optimal state. This includes global settings, extended properties, operation logs, etc.

14.3.1 Global Settings

Global Settings take effect to all windows and components of the current project.

Select **Settings/System Settings/Global Settings** from the menu bar, configure relevant parameters in the pop-up dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Upload	Allowing project uploads from the HMI to VI20Studio requires setting an upload password (an 8-digit decimal number), with the default password being 888888.
Decompilation	Allowing decompilation of uploaded project files from the HMI requires setting a decompilation password (an 8-digit decimal number), with the default password being 888888.
Download Password	When downloading project files from VI20Studio to the HMI, password verification is required. The password is an 8-digit decimal number, with the default password being 888888.
Developer Password	If the project currently running on the HMI does not have a download password, but the target FPG file to be downloaded has a developer password, you will need to enter the developer password to proceed with the download.

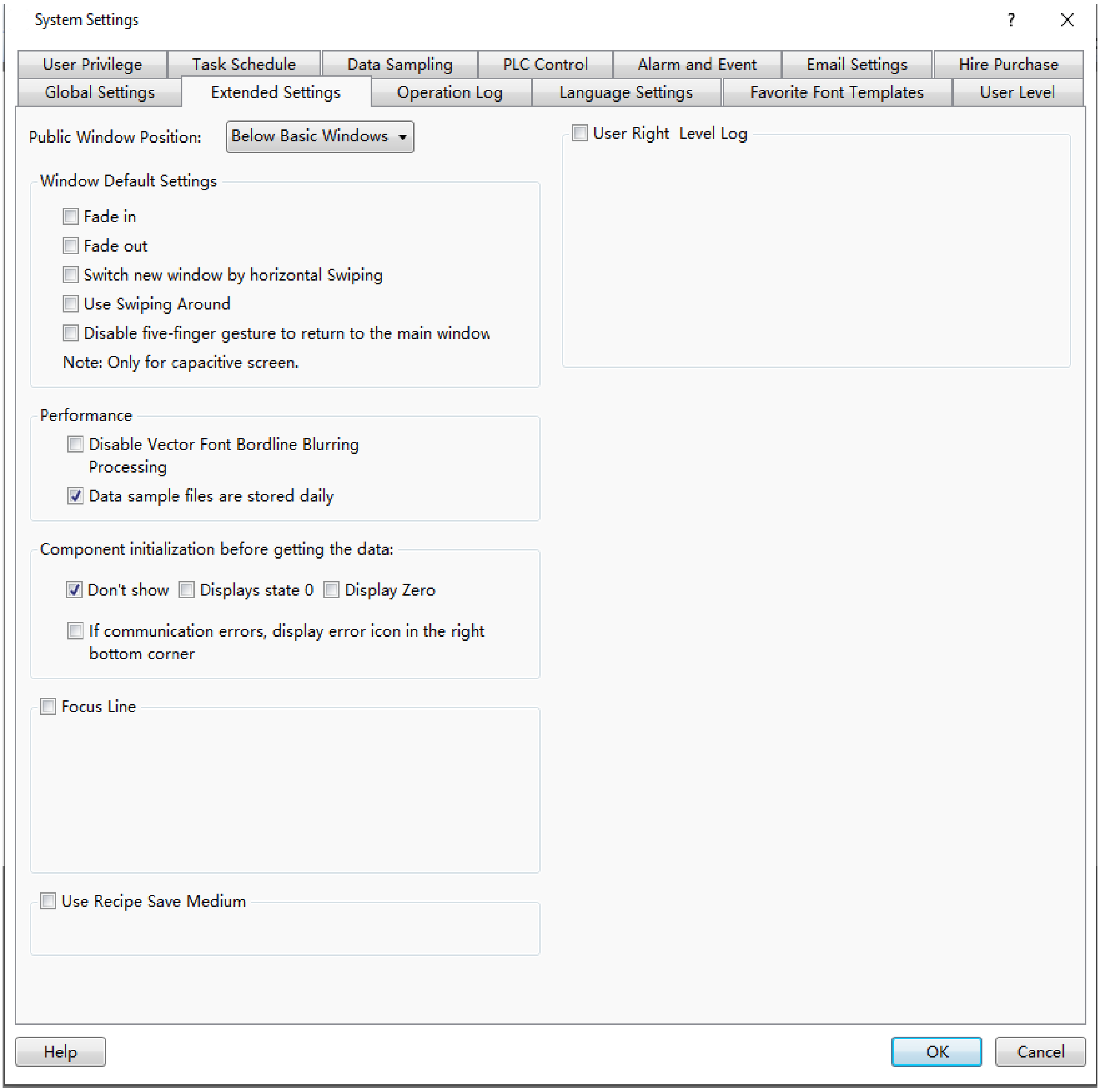
Parameters	Description
Initial Window	The window that the project initializes with.
Initial Macro	The macro executed during project initialization. Check the **Initial Macro** option and select a macro. For detailed information about macro instructions, please refer to Macro.
Main Window (HOME)	Set the main window of the project, and use a Return to Main Window switch component to return to the main window.
Dim the Brightness	When there is no operation on the HMI screen for a specified duration (default is 3 minutes), the screen brightness can be automatically lowered to a specified value (including the lowest, 10%, 20%, 30%, 50%, and 80%).
Turn off Backlight	After lowering the brightness, if a specified duration (default is 10 minutes) elapses, the backlight will be turned off. If the option **Turn on backlight upon Alarm/Events** is checked, the backlight will be turned on when an alarm or event occurs.
Forbid automatically turn donw brightness and turn off the backlight when the alarm is not restored	By checking this parameter, automatic lowering of brightness and turning off backlight will be disabled when an alarm is not cleared or recovered.
Screensaver	By checking the **Screensaver** option, when there is no operation on the HMI screen for a specified duration (default is 10 minutes), the screensaver program will be activated.
Screensaver Window	The window used by the screensaver program.
Require Password to Exit Screensaver	To exit the screensaver program, a password is required. You can set the password level (user level) for this purpose. For detailed information about user levels, please refer to User Level.
Return to original screen when screensaver is over	After exiting the screensaver program, return to the previous window.
Do not enter the screen when the alarm is not recovered	By checking this option, entering the screensaver program will be disabled when an alarm is not cleared or recovered.
Automatically exit the screensaver when an alarm	By checking this option, it will automatically exit the screensaver program when an alarm occurs.

Parameters	Description
occurs	
The alarm dialog is always displayed until you click Close	By checking this option, if an alarm occurs, the alarm popup window will remain displayed until it is manually closed.
Local Register Endian Order	◆ 16-bit integer ● 12: Low byte data stored at low address and high byte data stored at high address. ● 21: High byte data stored at low address and low byte data stored at high address. ◆ 32-bit integer: ● 4321: High byte data stored at low address and low byte data stored at high address. ● 3412: High byte data stored at low address and low byte data stored at high address. The positions of the 2 bytes of data in the high byte are exchanged, and the positions of the 2 bytes of data in the low byte are exchanged. ● 2143: High byte data stored at high address and low byte data stored at low address. The positions of the 2 bytes of data in the high byte are exchanged, and the positions of the 2 bytes of data in the low byte are exchanged. ● 1234: High byte data stored at high address and low byte data stored at low address. ◆ 32-bit float: ● 4321: High byte data stored at low address and low byte data stored at high address. ● 3412: High byte data stored at low address and low byte data stored at high address. The positions of the 2 bytes of data in the high byte are exchanged, and the positions of the 2 bytes of data in the low byte are exchanged. ● 2143: High byte data stored at high address and low byte data stored at low address. The positions of the 2 bytes of data in the high byte are exchanged, and the positions of the 2 bytes of data in the low byte are exchanged. ● 1234: High byte data stored at high address and low byte data stored at low address.
Scrollbar Width	In pixels with default value of 20 pixels.
Use Drop-down Window	Check this option to use the drop-down window. Only applicable for capacitive HMIs.
Use Right Drop-down Window	Check this option to use the right drop-down window. Only applicable for 6300 series of HMIs.
Disable Update Clock	Check this option to disable update of clocks (i.e. system time).
Source	◆ HMI Internal Clock: HMI built-in clock, word address SRW0~SRW7 represent year, month, day, hour, minute, second, millisecond, and week respectively. ◆ External Device: Specify the value of the word address, occupying 7 words.
Touch Audio	The sound of touching HMI screen: ◆ Enable Buzzer: Check this option to enable buzzer, you can set the buzzer time and enable control conditions.

Parameters	Description
	◆ Use Audio Library: Check this option to select audio files in the Audio Library and set the enable conditions. For detailed information about the audio library, please refer to Audio Library.
Alarm buzz according to level	The alarm level is divided into high, medium and low. The buzzer is enabled for different levels of alarm, and the sound frequency of the buzzer is different.
Default Font Library	◆ Default: Two fonts, Microsoft YaHei and Alibaba PuHuiTi. ◆ Haansoft Batang: Three fonts, Microsoft YaHei and Alibaba PuHuiTi and Haansoft Batang, among which the Haansoft Batang is a Chinese font library. When character input is made and there is no corresponding font format available in the font library, the font will not be displayed correctly.
Display Focus when clicking or touching	When using a mouse or performing a touch operation to select a component, a selection box will appear around the component.

14.3.2 Extended Settings

Select **Settings/System Settings/Extended Settings** from the menu bar, configure relevant parameters in the pop-up dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Public Window Position	Displayed above basic window or below basic window.
Fade In	Use fade in animation effect when the window appears.
Fade Out	Use fade out animation effect when the window disappears.
Switch new window	You can switch newly created windows by sliding left and right. Applies only to HMIs

Parameters	Description
by horizontal Swiping	with capacitive screens.
Use Swiping Around	Swipe around to switch the window. Applies only to HMIs with capacitive screens.
Disable five-finger gesture to return to the main window	Check this option to disable five-finger gesture to return to the main window.
Disable Vector Font Bordline Blurring Processing	Check this option to disable vector font bordline blurring processing.
Data sample files are stored daily	Check this option to disable to store the data sampling files for each day separately.
Component initialization before getting the data	Display state of component initialization before getting the data: ◆ Don’t show: do not show the value. ◆ Display state 0: display the value under state 0. ◆ Display value 0: display 0.
Focus Line	When an external keyboard is connected to the HMI, pressing the direction keys will navigate to the specified input component, and a focus outline will be displayed around the input component. You can configure the color, width, and style of the focus outline.
Recipe Storage Media	◆ None: do not store recipe data, default is to not store. ◆ HMI:Store recipe data to HMI. ◆ SD 卡:Store recipe data to SD card. ◆ USB1: Store recipe data to USB storage medium connected to USB1 interface.
User Right and Level Log	Whether to record the log information of user login success (failure), user level switching success, user logout and other operations.
Language	Set the logs of events related to user rights and levels in different languages.
Use Text Library	Use the text library to display log information for events related to user previleges and levels. For detailed information about the text library, please refer to the Text Library.

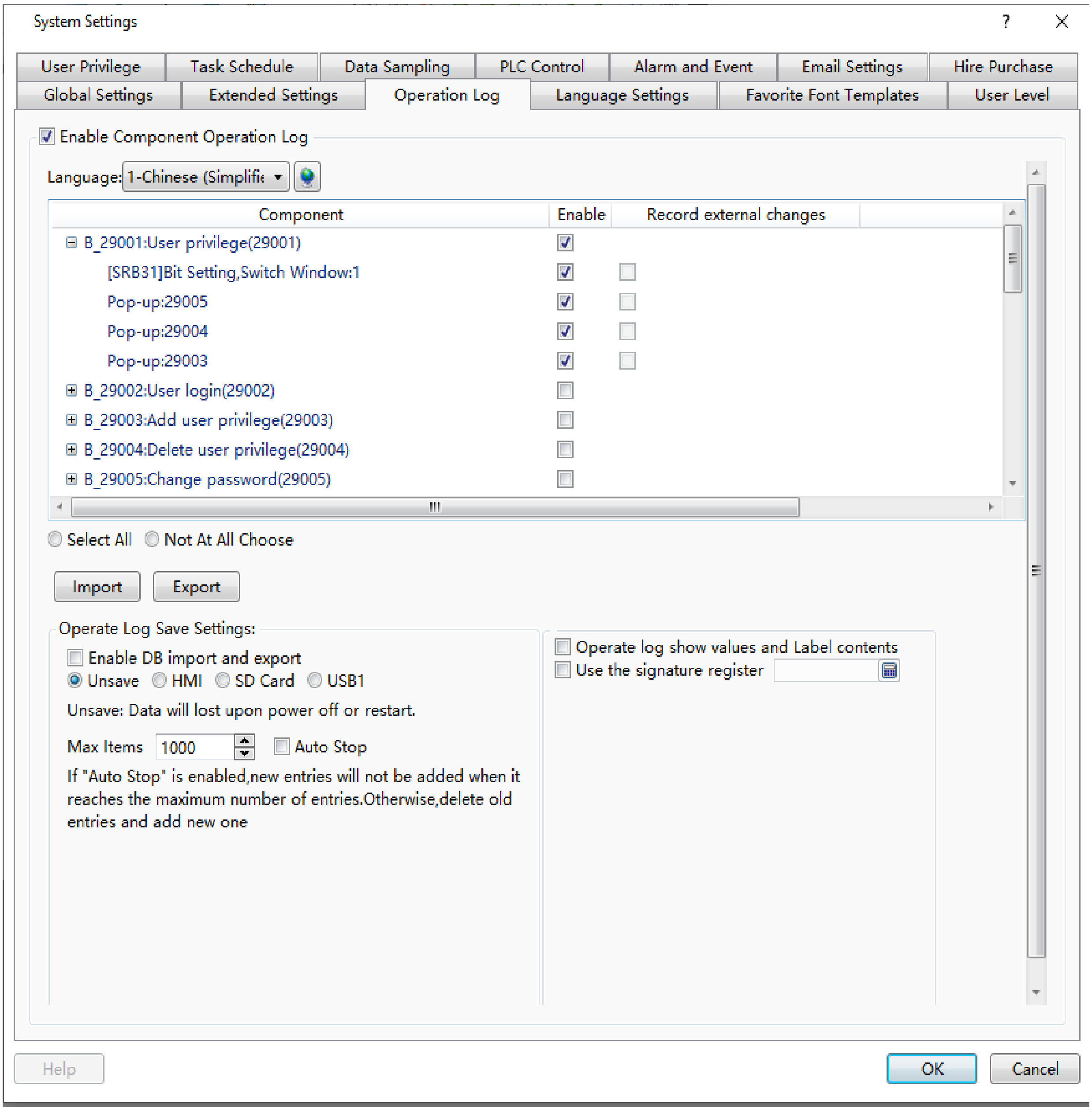
Parameters	**Description**
Level Success	By checking this option, successful user level switches will be logged, and you will have the ability to customize the log information.
Login Success	By checking this option, successful user logins will be logged, and you will have the ability to customize the log information.
Login Failed	By checking this option, failed user logins will be logged, and you will have the ability to customize the log information.
Logout	By checking this option, user logouts will be logged, and you will have the ability to customize the log information.

14.3.3 Operation Log

The operation log is used to record the operation records of the components other than the Startup screen window.

The steps to set operation logs are as follows:

Select **Settings/System Settings/Operation Log** from the menu bar, configure relevant parameters in the pop-up dialog box, click **OK**.

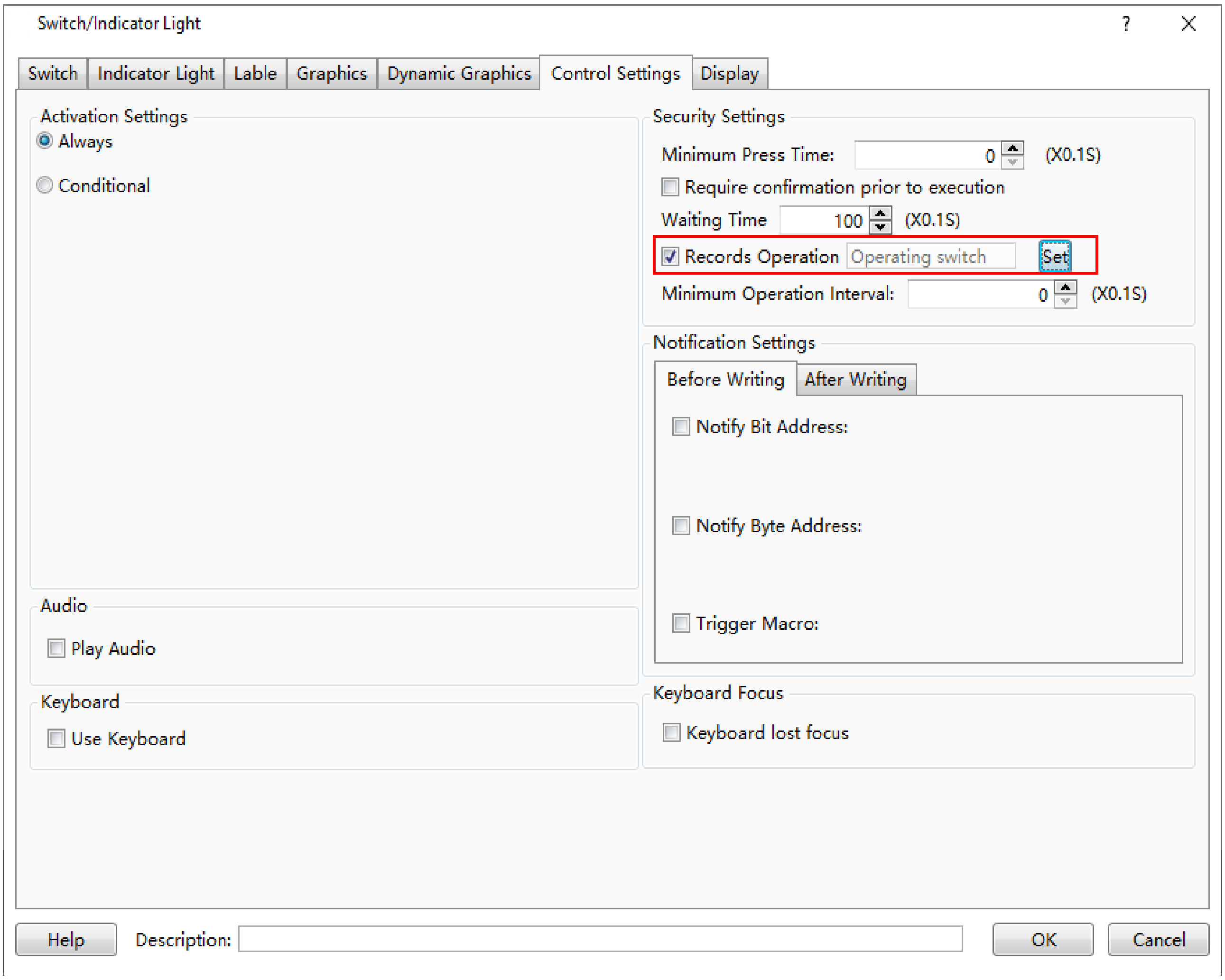


Please refer to the table below for detailed configuration methods.

Parameters	Description
Enable Component Operation Log	Check this option to enable the component operation log function.
Component	Display all the componet in the non-startup screen windows.
Enable	Check the box to enable operation log function of the corresponding component.
Record External Changes	After selecting the option, operating other components or PLC will cause the value of the relevant address of the component to change, and an operation record will also be generated.
Select All	Enable operation log function of all components.

Parameters	Description
Not At All Choose	Disable operation log function of all components.
Export	Click **Export** to export the operation log activation information of the component as an Excel file.
Import	Click **Import**, select the edited component operation log activation file, and set the operation log activation state of the component.
Enable DB Import and Export	Import/export operation log files stored during HMI runtime, in the format of db files.
Unsave	Do not save component operation log information.
HMI	Save the component operation log information in HMI.
SD Card	Save the component operation log information in SD card.
USB1	Save the component operation log information to USB storage device connected HMI..
Subdirectory Name	Subdirectory where component operation log files are located.
Save CSV file	Save component operation log information in a CSV format file.
Number of Entries	The maximum number of stored component operation log entries, value range: 1~9999.
Reach Maximum Entry	Actions to take when the stored component operation log reaches the maximum number of entries: ◆ Delete old records. ◆ Do not add new records.
Notify Register	When the remaining memory is less than the specified value (128KB by default), set the value of the specified bit address register to 1.
Clear History Record Register	When the specified bit address register is set to 1, the action of clearing the history record of the component operation log is executed. After successful execution, the bit address is automatically reset.
Operation logs show value and label contents	The operation log shows the value and label content of the component.
Use Signature Register	Use the designated word address register to store signature information.

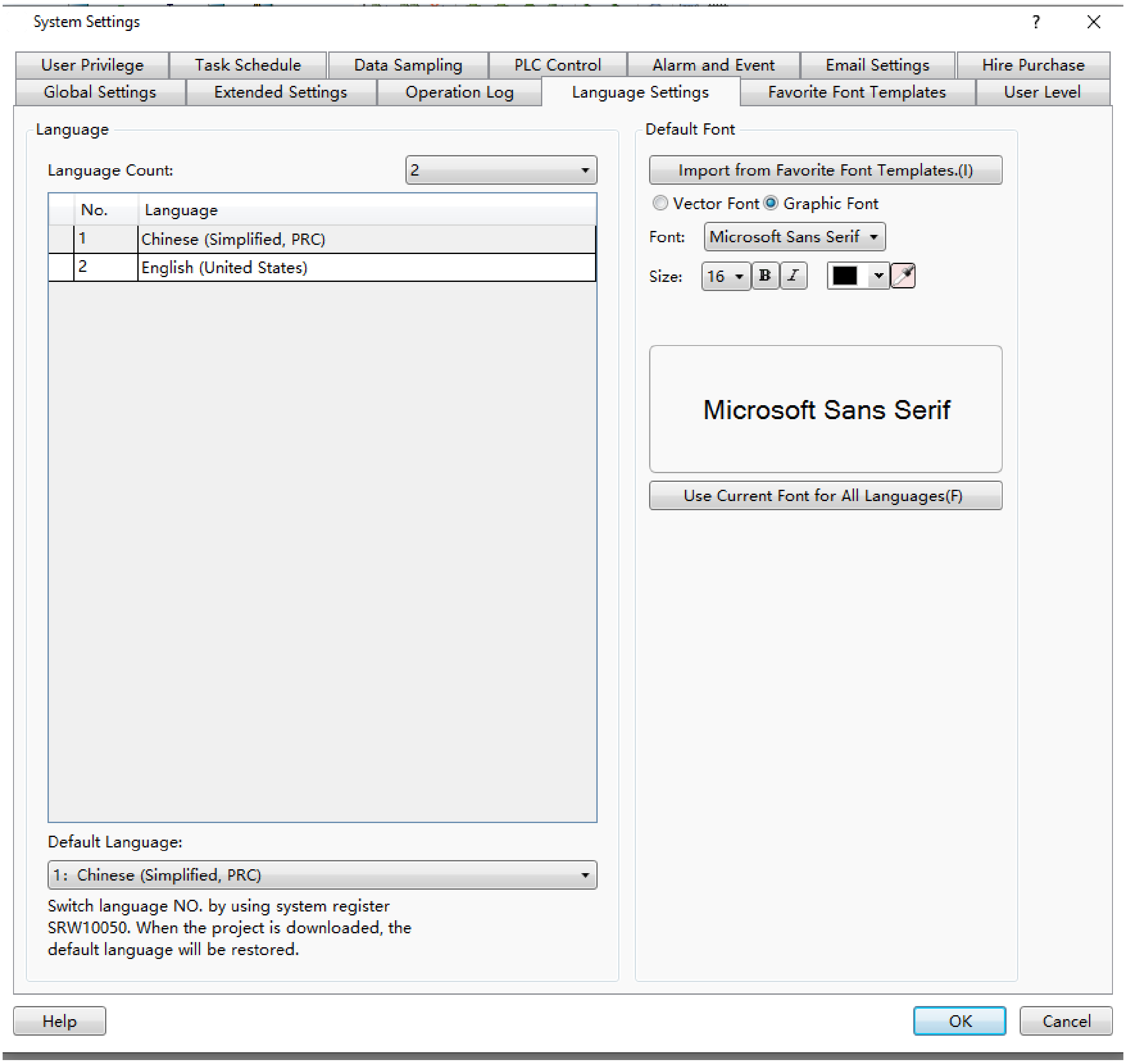
The operation log function of VI20Studio V2.8 needs to be set in the **Control Settings** of the component. Check **Record Operator Operations**, click **Settings**, and set operation log information.



14.3.4 Language Setting

You can set different language display values for component text content (such as tags). Language Settings are used to determine the language information displayed by the components. This feature is suitable for scenarios where the HMI needs to be configured by operators of different languages.

Select **Settings/System Settings/Language Settings** from the menu bar, configure relevant parameters in the pop-up dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameters	Description
Language Count	Number of languages used in the window.
Language	Click the drop-down box in the cell to select language.
Vector Font	The fonts in the font library are vector graphs. When the character encoding is Unicode, Vector Font must be selected.
Graphic Font	The entire string is treated as a single entity and extracted as a bitmap, which is then saved within the project.

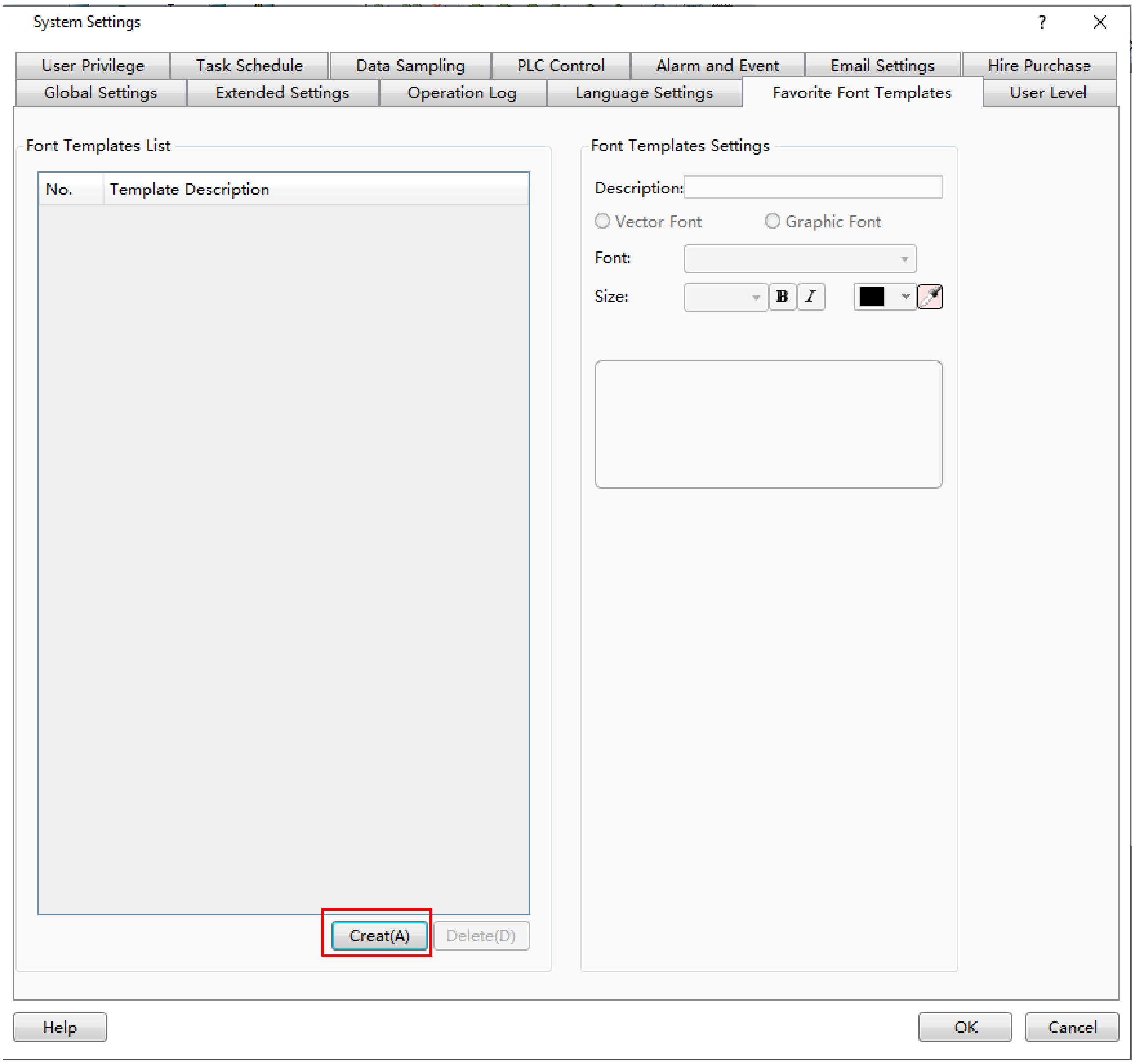
Parameters	Description
Font	Select a language in the list on the left to set the font of the corresponding language.
Size	Font size.
B	Bold.
I	Italic
Import from Favorite Font Templates	Click Import from Favorite Font Templates to select fonts from the Favorite Font Templates. For more information about Favorite Font Templates, please refer to Favorite Font Template.
Use Current Font for All Languages	Apply the properties of the current font (such as size, font, bold, color, etc.) to all languages.
Default Language	Default display language of the window screen after downloading the configuration project to the HMI.

14.3.5 Favorite Font Template

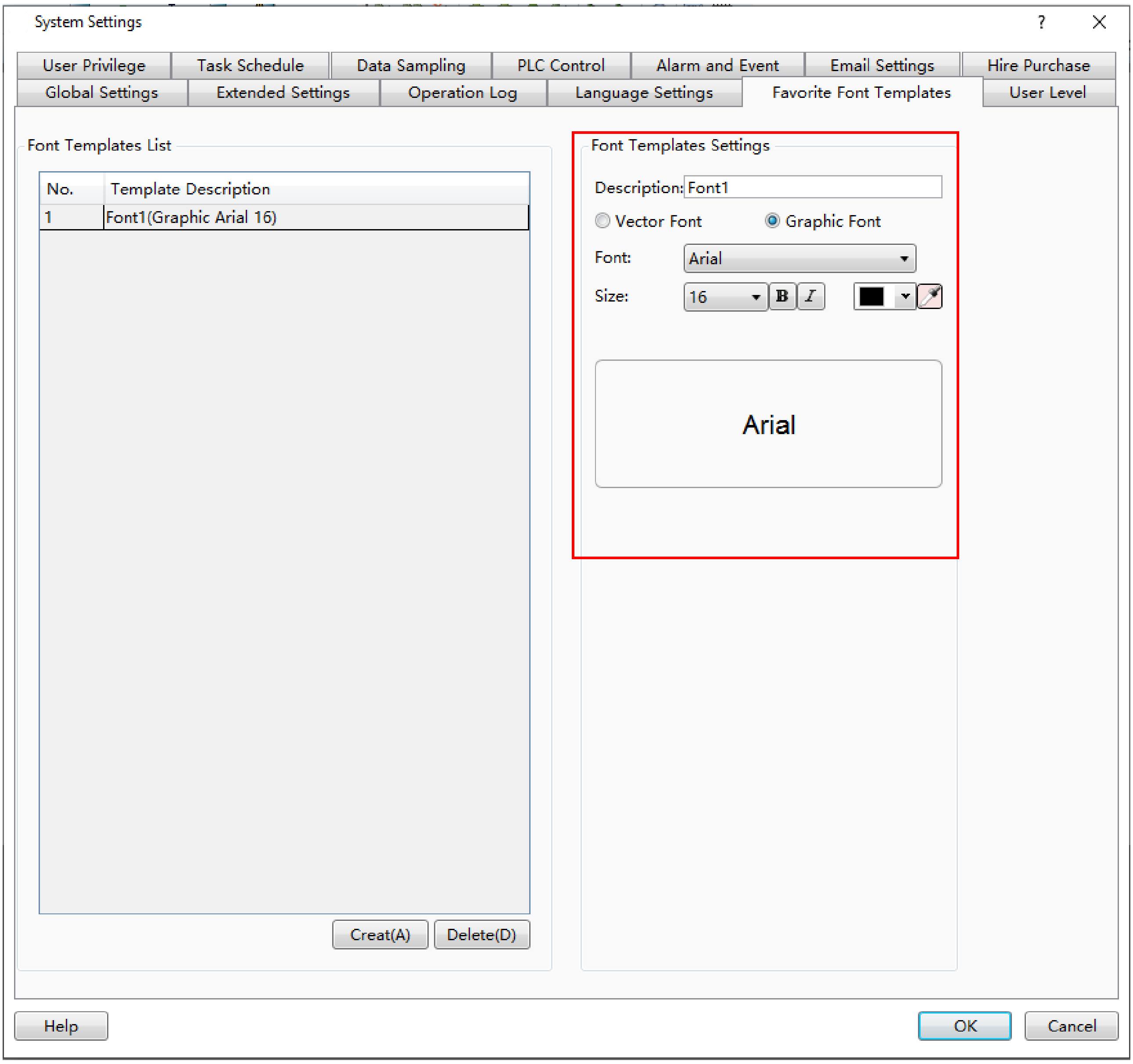
Favorite Font Templates are used to add favorite fonts, which is convenient for users to quickly reference font properties when setting text content (such as tag content and static text).

The steps to add favorite font template are as follows:

Step 1. Select **Settings/System Settings/Favorite Font Templates** from the menu bar, click **Create** in the pop-up dialog box..

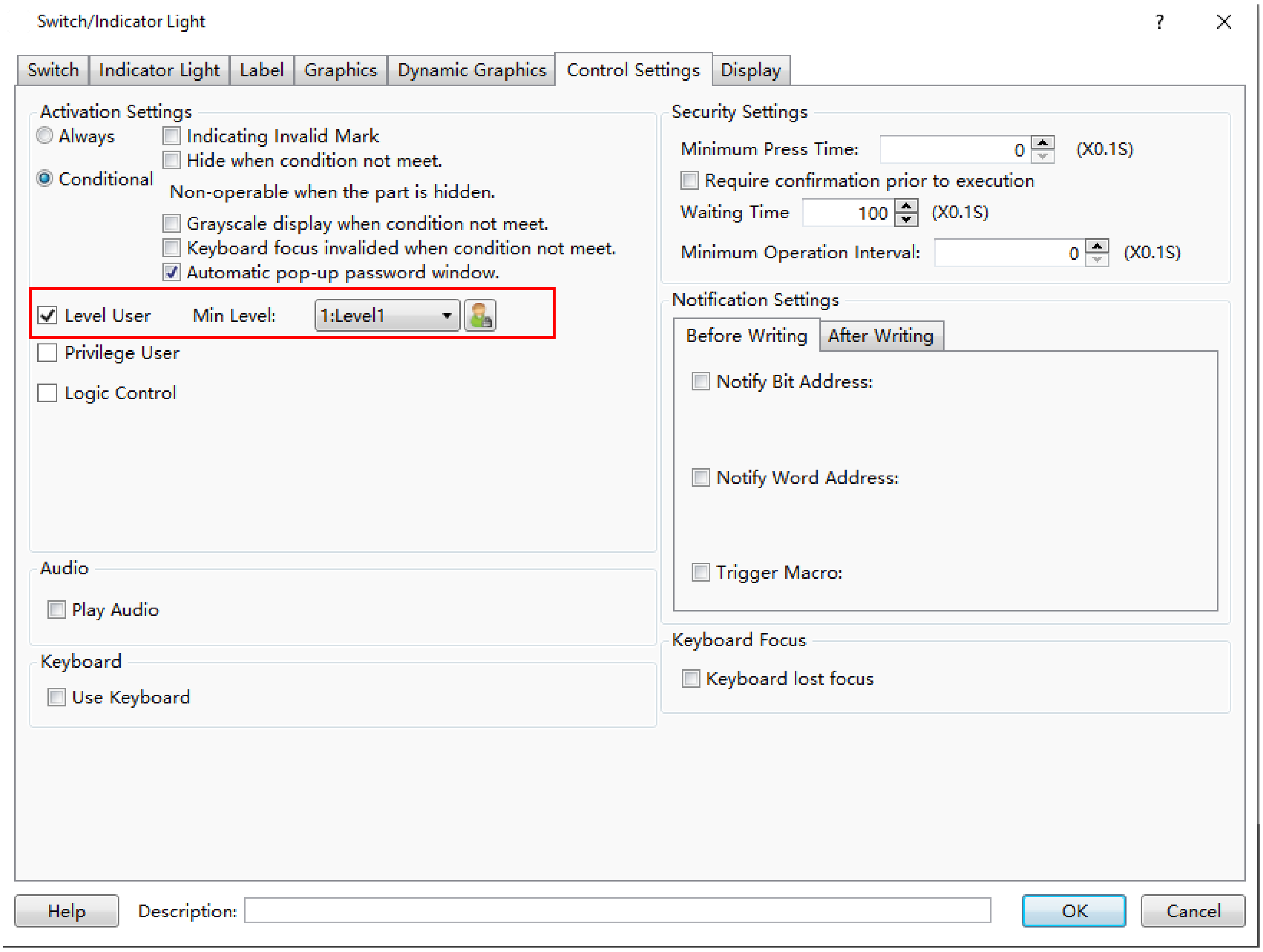


Step 2. Configure relevant parameters in the **Font Template Settings** area, click **OK**.



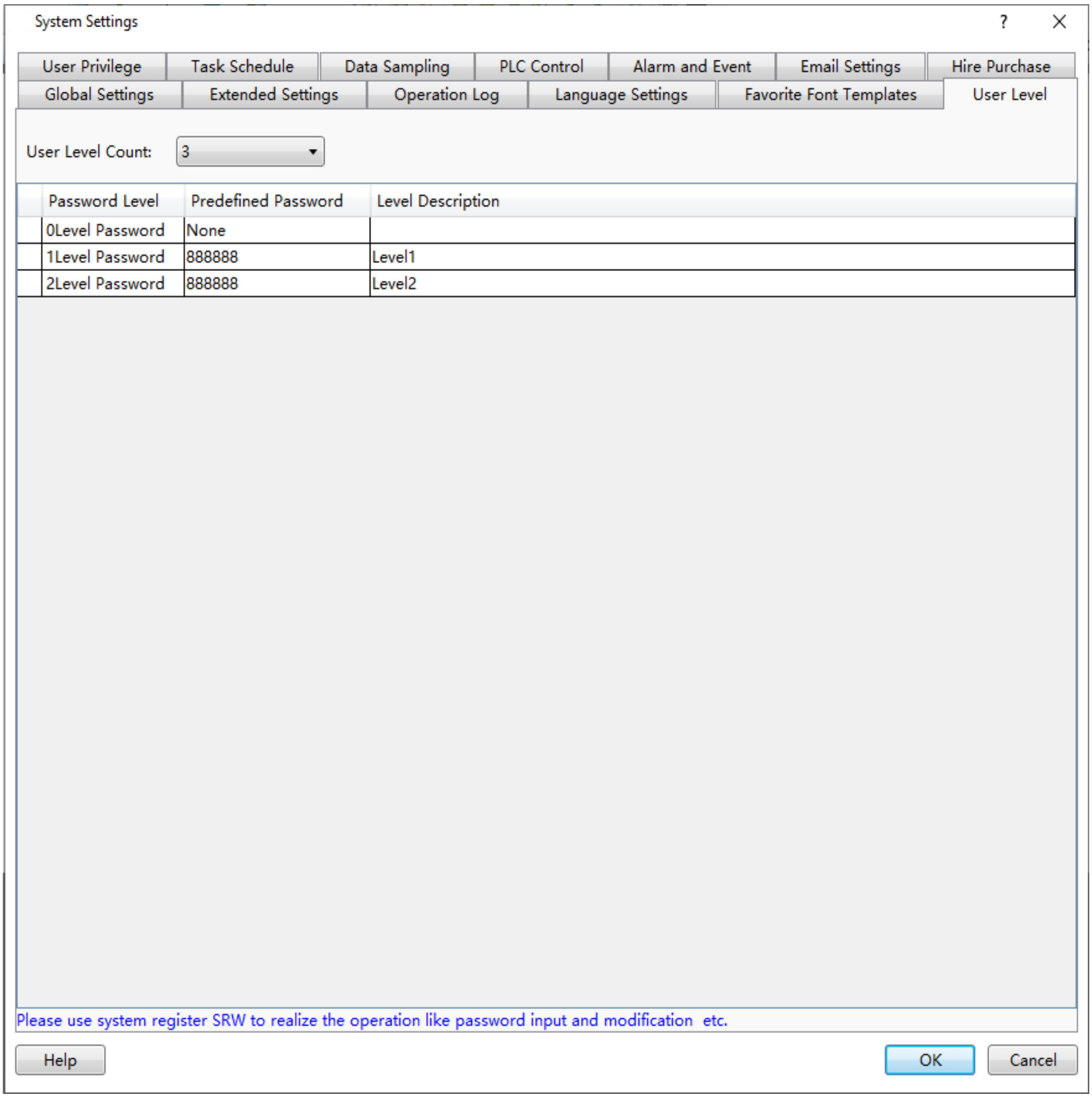
14.3.6 User Level

By dividing users into different user levels, it is possible to restrict user operation privilege and prevent potential losses caused by inappropriate user privilege settings. User levels can be implemented through password levels, where users with different levels correspond to different passwords. When setting the operation control properties of a component, user levels can be limited, allowing only users with the minimum enable level to operate that component.



The steps to set user levels are as follows:

Select **Settings/System Settings/User Level** from the menu bar, configure relevant parameters in the pop-up dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

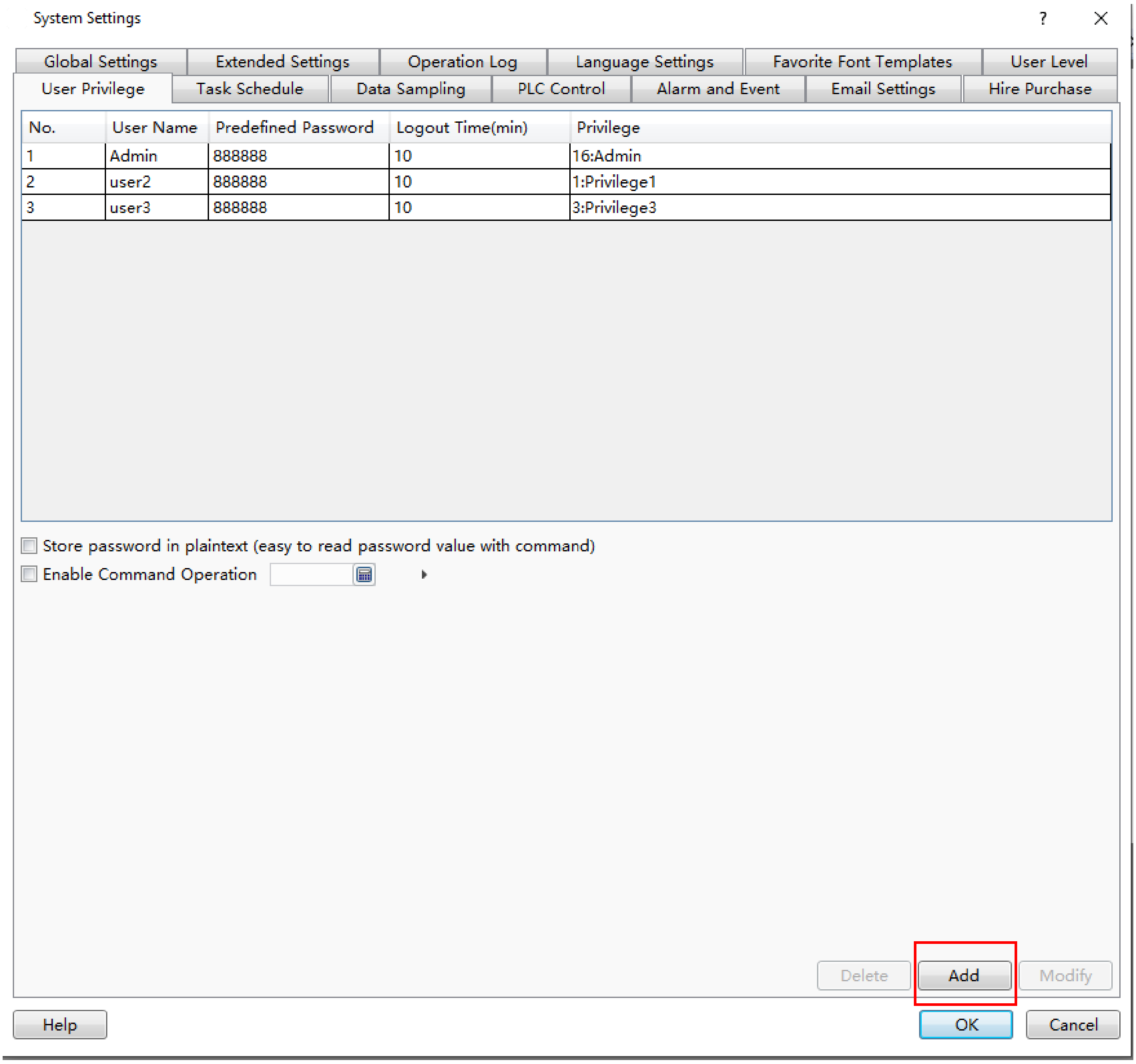
Parameters	**Description**
User Level Count	Value range 1~16.
Password Level	Support passwords from level 0 to level 16. The higher the level, the higher the privilege. For example, a level 2 user has all the privilege of a level 0 user and a level 1 user.
Predefined Password	Configure passwords for different password levels, with a maximum length of 8 digits and only supporting numerical values. The password for level 0 is set to be empty (no password). Passwords for users with different levels should be set to different values.
Level Description	Information describing the user level.

14.3.7 User Privilege

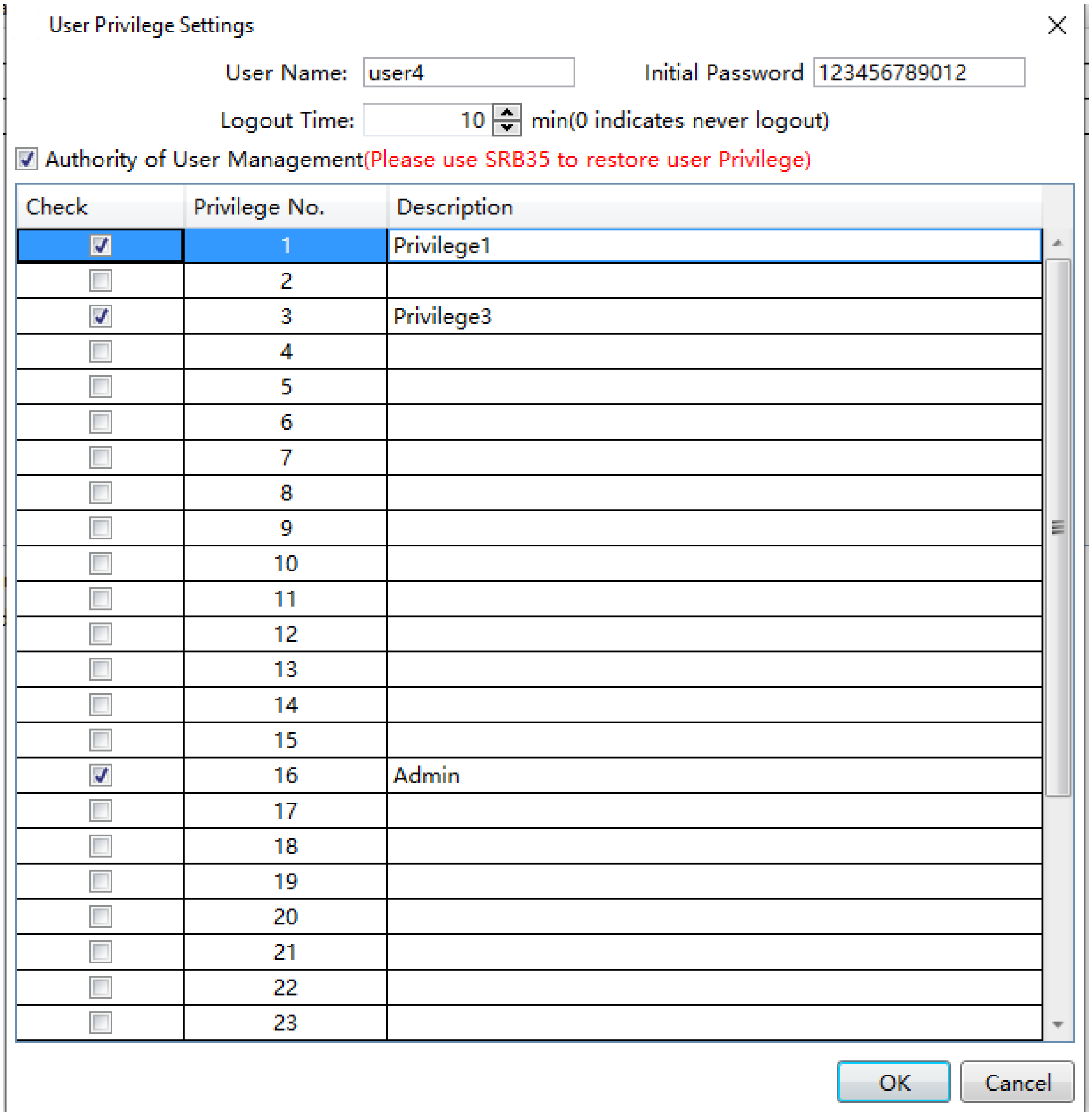
User Privilege refer to the authorization management of different types of users in order to ensure the security and reliability of an information system. It involves defining the scope of operations and privilege levels that users can perform within the HMI system. Typically, user privilege are divided into multiple levels, such as regular users, administrators, super administrators, etc. The definition of user privilege should be tailored to specific business requirements and consider aspects such as data security and privacy protection. Additionally, the management of user privilege should involve regular auditing and updates to ensure the security and stability of the system.

The steps to set user privilege are as follows:

Step 1. Select **Settings/System Settings/User Privilege** from the menu bar, click **Add** in the pop-up dialog box.



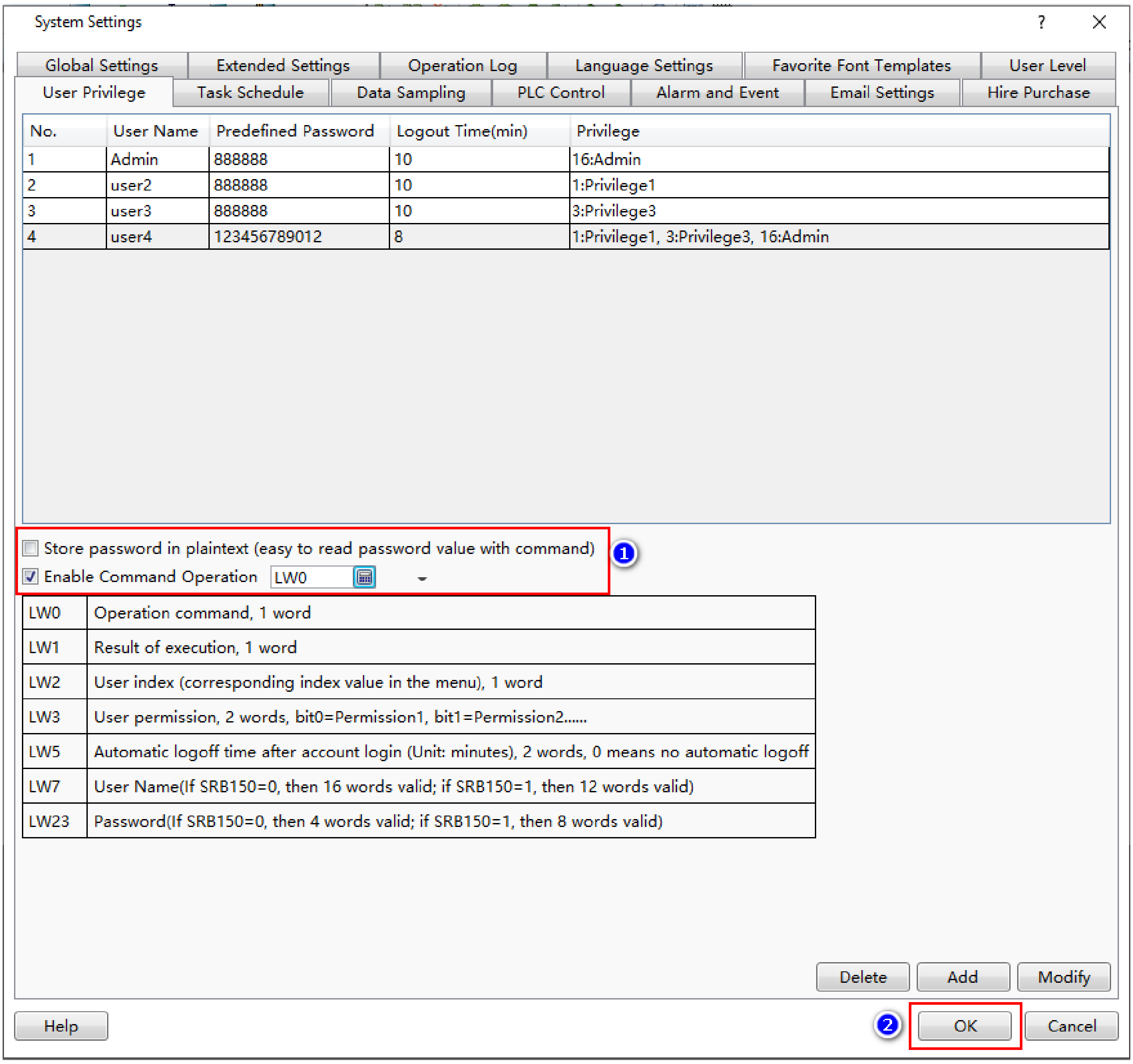
Step 2. Configure relevant parameters in the pop-up dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameters	Description
User Name	The maximum length does not exceed 32 bytes.
Initial Password	Only numbers can be entered, and the maximum length is 12 digits.
Logout Time	After reaching the logout time, the user will need to log in again to their account.
Check	Check the box to have this priviledge.
Priviledge No.	The number of the priviledge, the value range is 1~32.
Description	Description of priviledge.

Step 3. Set whether to store password in plaintext and whether to enable command operation, click **OK**.



Please refer to the table below for detailed configuration methods.

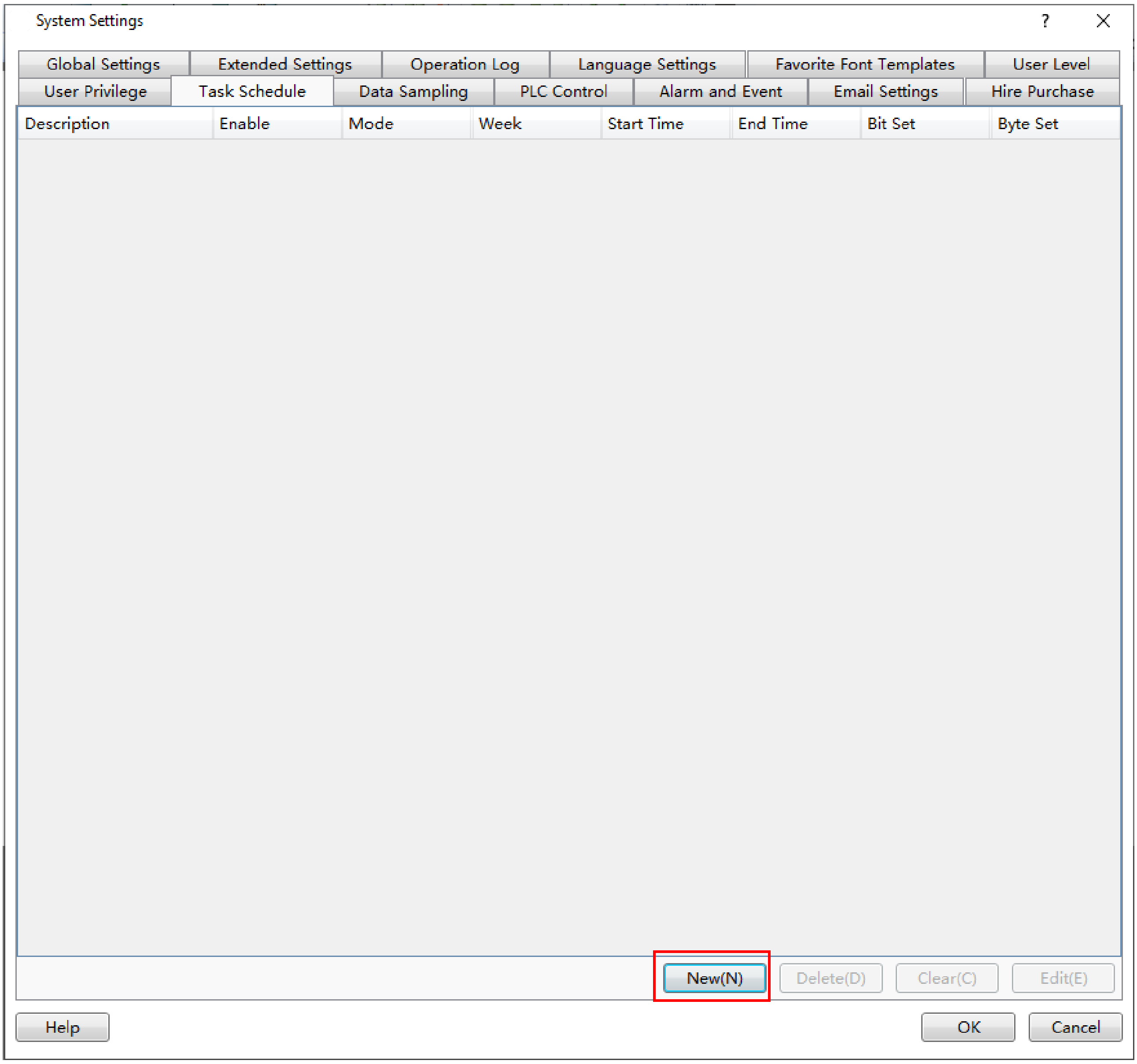
Parameters	**Description**
Store password in plaintext	The password is stored in plain text so that the password value can be read out using commands.
Enable Command Operation	Check this option to enable command operation and set the word address register. For the meaning of the value of the word address register, please refer to the interface information.

14.3.8 Task Schedule

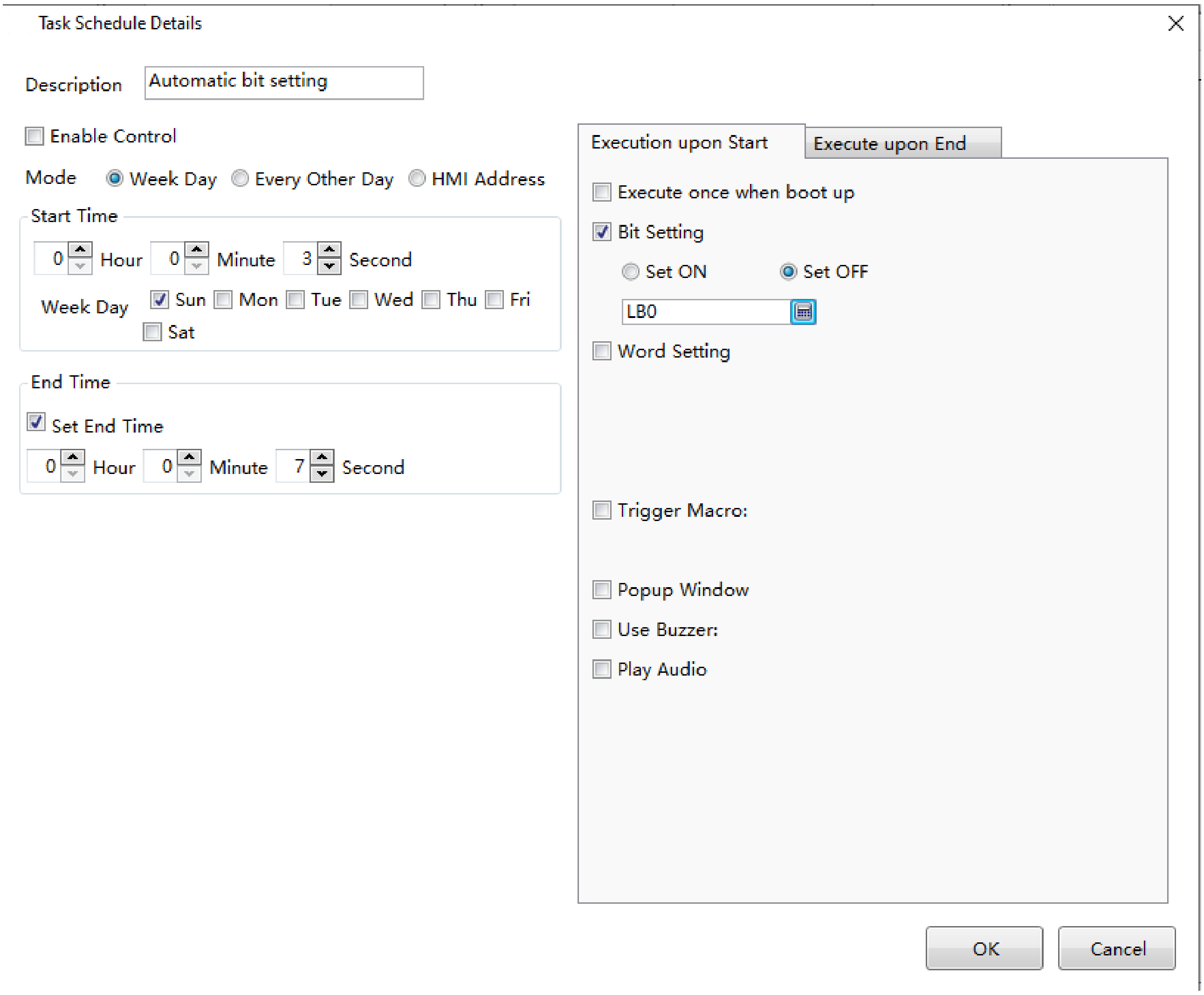
Task schedule refers to the process of creating periodic or non-periodic automated tasks that are executed by the system at specified time (such as execute Macro).

The steps to create a task schedule are as follows:

Step 1. Select **Settings/System Settings/Task Schedule** from the menu bar, click **New** in the pop-up dialog box.



Step 2. Configure relevant parameters in the pop-up dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameters	Description
Description	Description of task schedule.
Enable Control	Check **Enable Control**, set the bit address. When the value of specified bit address is set to ON, execution of the task plan is prohibited.
Mode	◆ Week Day: On a weekly basis, for example, every Sunday from 0:00 to 1:00. ◆ Every Other Day: On a weekly basis. After each execution, it will not exceed 24:00 of the day, and then it will be executed after an interval of 24 hours until the end time of the task. ◆ The value of a specified bit address register determines the execution time of a task. Please refer to the interface information for more details.
Execute once when boot up	Execute only when HMI is powered on.
Bit Setting	Set the value of specified bit address register to ON or OFF.
Word Setting	Set the value of specified word address register to a specified value (a constant or variable).

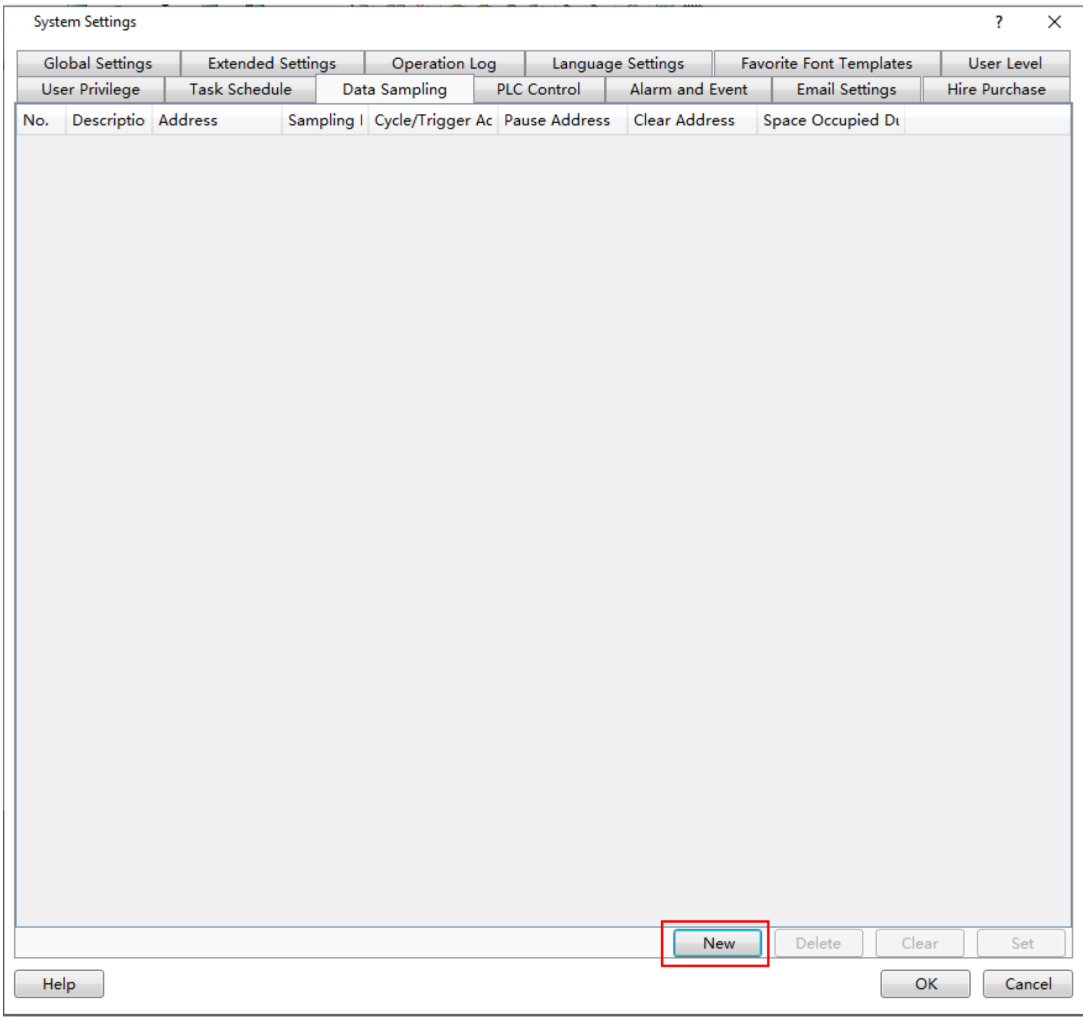
Parameters	Description
Trigger Macro	Execute the specified macro. For more detailed information about macro, please refer to Macro.
Popup Window	Pop up the specified window.
Use Buzzer	Use buzzer and set the buzzer time.
Play Audio	Play specified audio in the Audio Library. For detailed information about the Audio Library, please refer to Audio Library.

14.3.9 Data Sampling

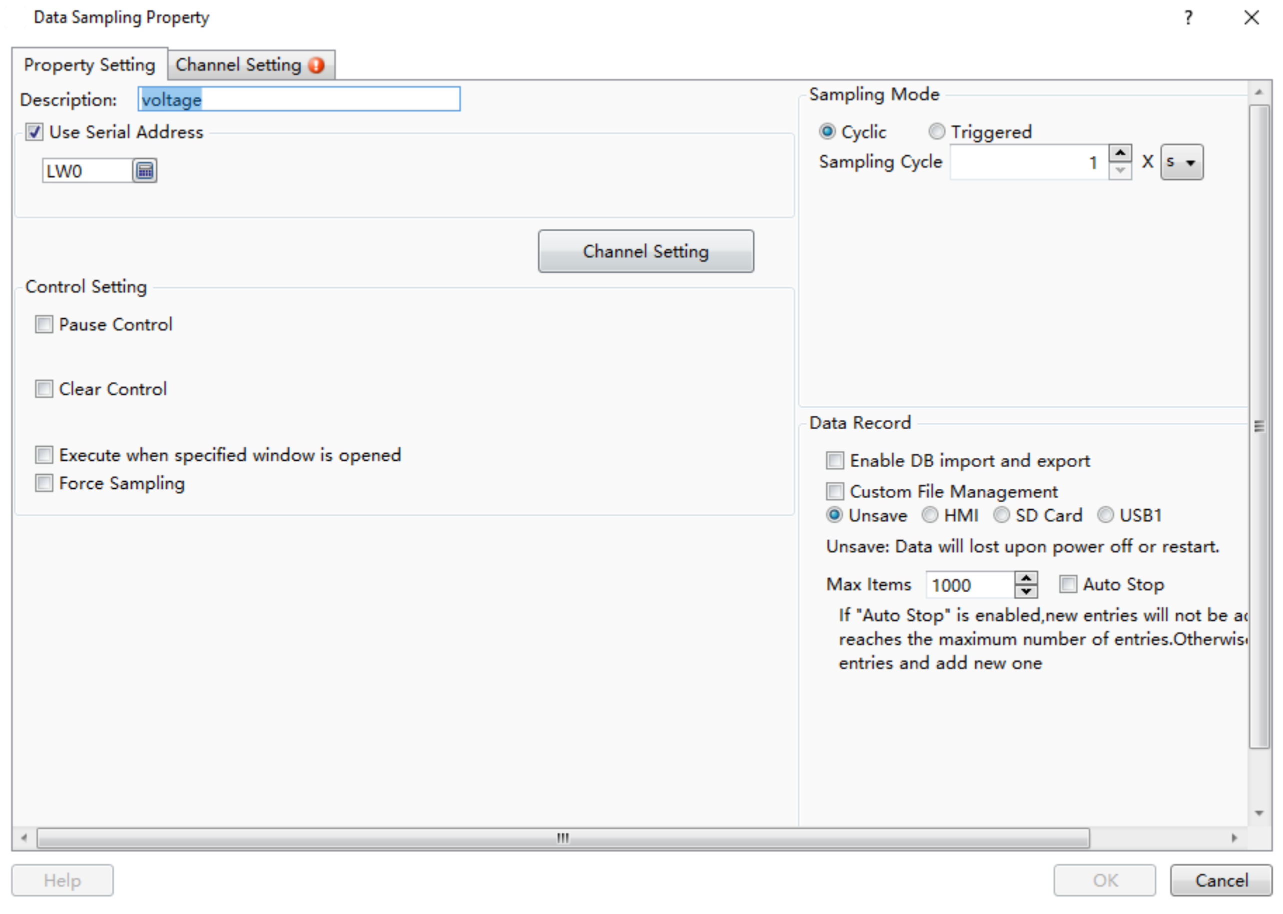
Data sampling refers to the process of collecting data from specified address registers, which can be done through periodic sampling or triggered sampling.

The steps to add new data sampling are as follows:

Step 1. Select **Settings/System Settings/Data Sampling** from the menu bar, click **New** in the pop-up dialog box.



Step 2. Configure relevant parameters in the pop-up **Data Sampling Property** dialog box.



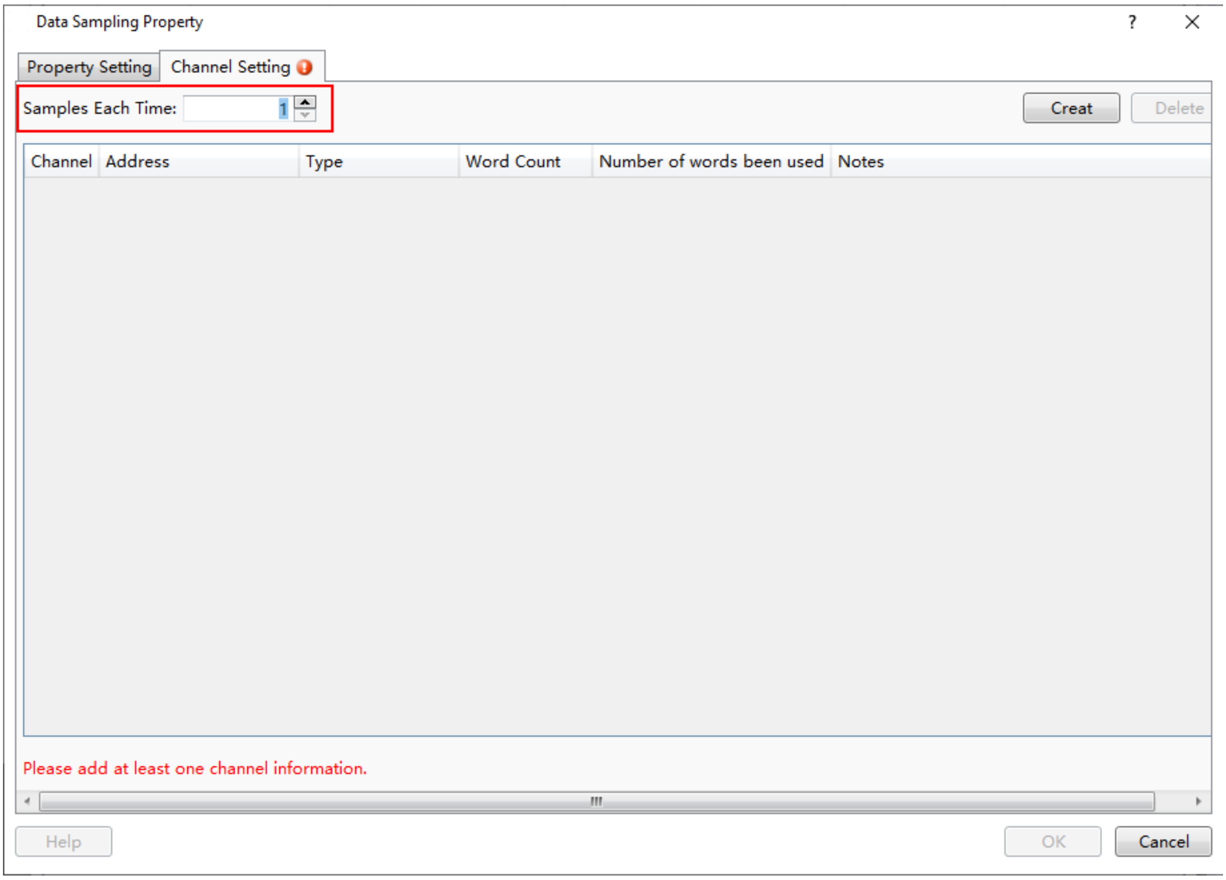
Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Description	Description of data sampling.
Use Serial Address	Check this option to collect data from a serial of address registers, start address is required to be set.
Pause Control	If the value of specified bit address register is 0, keep collect data; if it is 1, pause collecting.
Clear Control	If the value of specified bit address register is 1, clear all sampled data.
Execute when specified window is opened	Execute data sampling only when the specified window is opened.
Sampling Cycle	Data sampling cycle, for example, collect data once per second.
Triggered	Trigger data sampling when the value of specified word address or bit address meet certain conditions.
Enable DB import and export	Enable the sampling data import and export function.

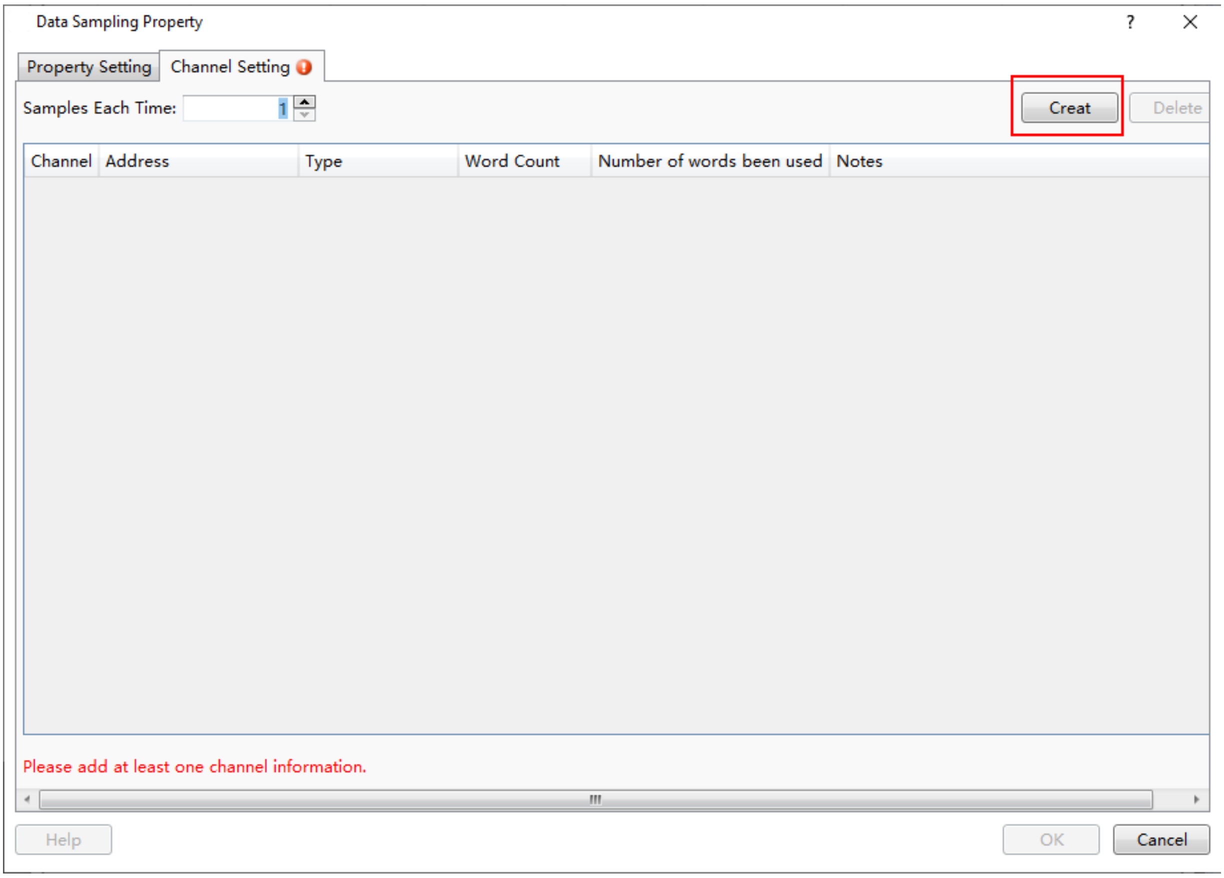
Parameter	Description
	◆ Import: import sampling data from specified path. You need to set the trigger condition(import data when the value of specified bit address is 1), path register (specify the value of specified word address register as import file path). ◆ Export: export to HMI, SD or USB storage device.
Custom File Management	Set the name of the sampling file and the trigger method of generating a new sampling file.
Unsave	Not save sampling data record.
HMI	Save sampling data records to HMI.
SD	Save sampling data records to SD card.
USB	Save sampling data records to the USB storage device connected to HMI.
Subdirectory Name	The subdirectory where data sampling record files are located.
save CSV file meanwhile	Save data sampling record in the form of CSV file.
Maximum Saving Limit	When the maximum number of days is reached, delete old records or stop adding new records.
Notify Register	When the remaining memory is less than the specified value (128KB by default), set the value of the specified bit address register to ON.
Clear Record Register	When the specified bit address register is set to ON, execute the action of clearing data sampling history record. After successful execution, the bit address is automatically reset (to OFF).

Step 2. Set the Channel Setting.

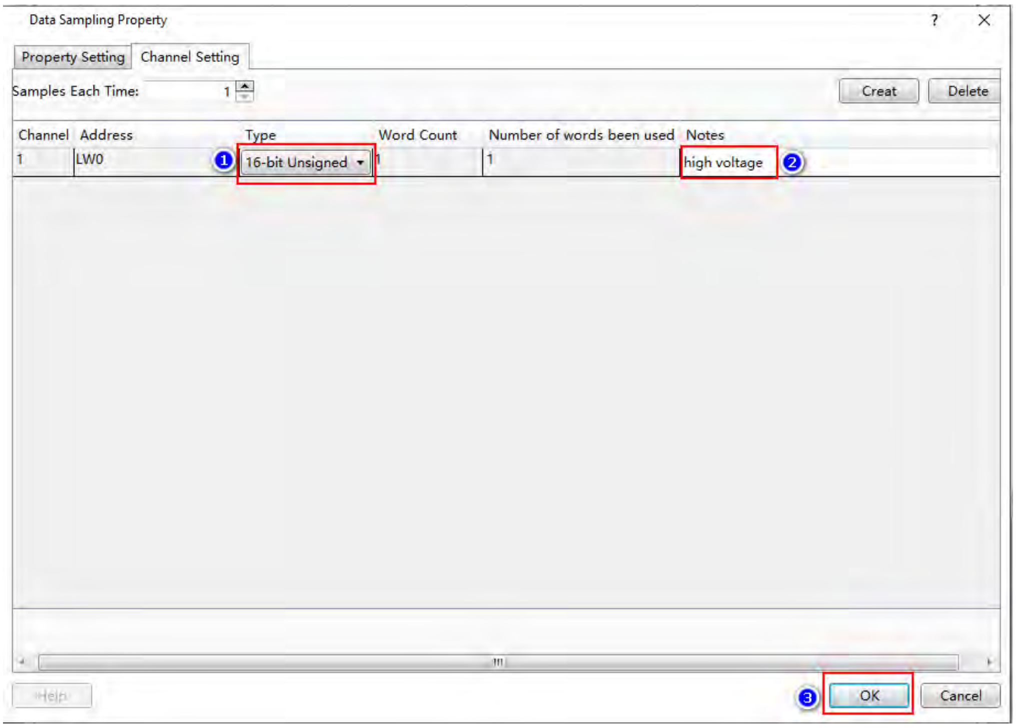
1) Set the sampling points for each channel each time.



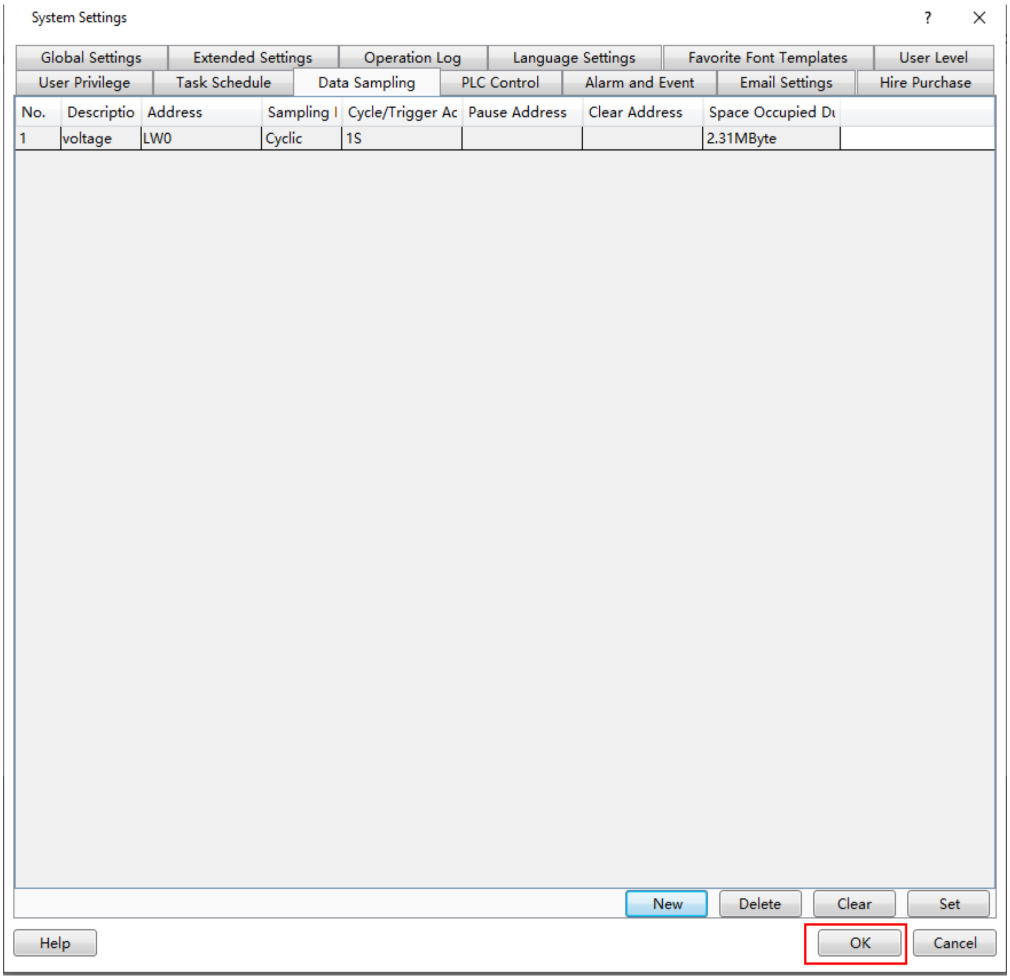
2) Click **Create**.



3) Set the data type, notes, click **OK**.



Step 4. Click **OK**.



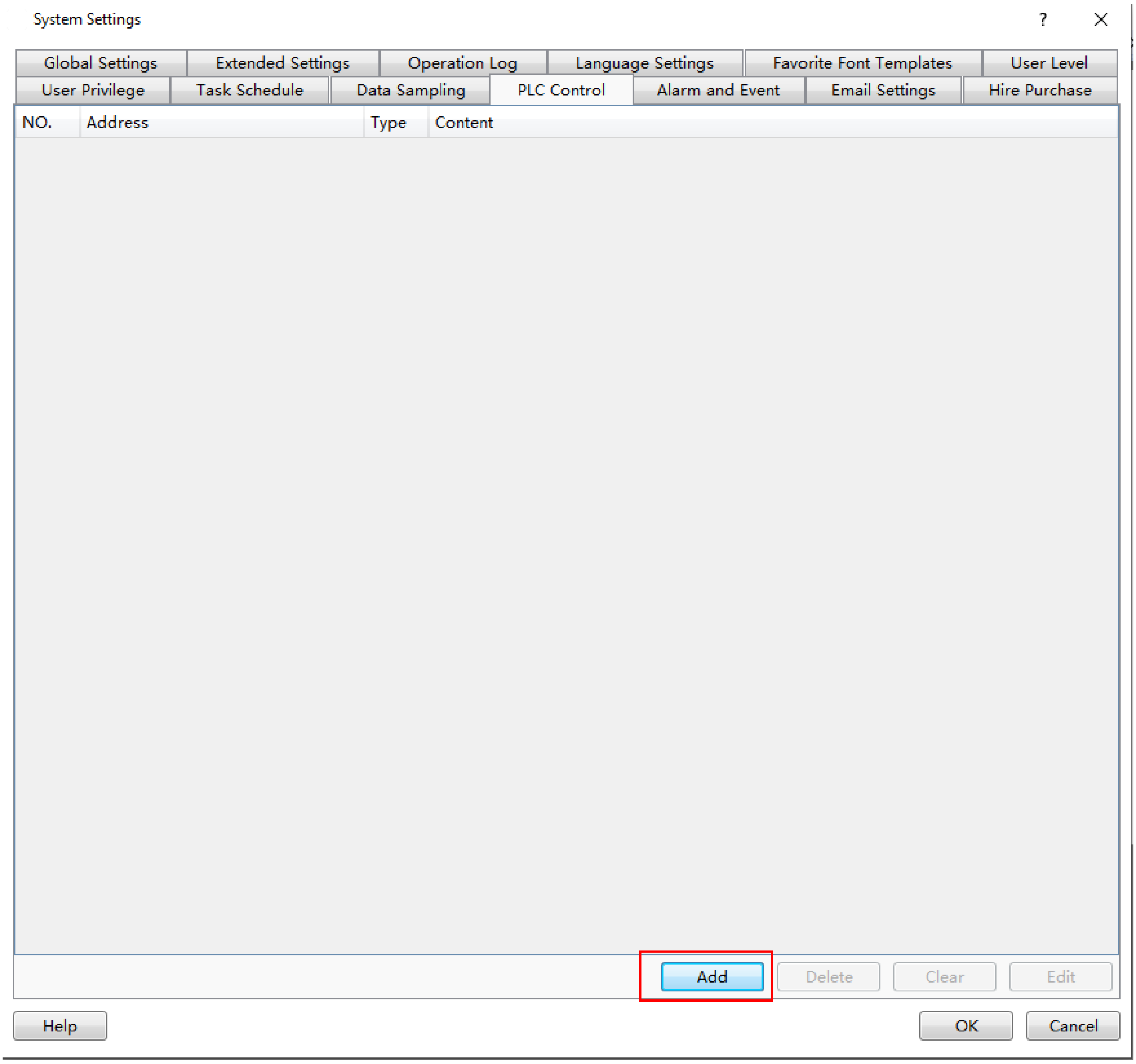
14.3.10 PLC Control

PLC control refers to the operation of executing corresponding control actions on an HMI or PLC connected to the HMI when there are changes in the state or values of the PLC's registers. The control types include switching basic window, reporting the current window number, controlling the backlight, executing macros, audio control, printing reports, forcibly terminating the buzzer, and capturing screenshots.

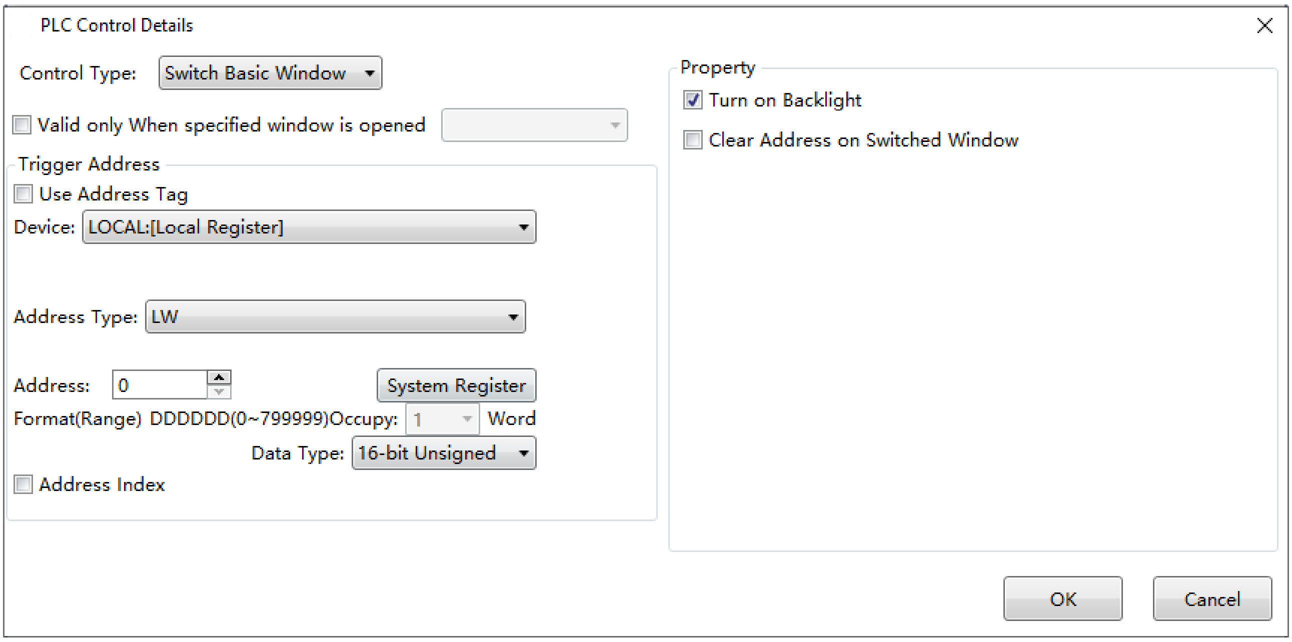
14.3.10.1 Switch Basic Window

When the value of trigger address changes, switch the corresponding basic window (the number of this window is the value of trigger address).

Step 1. Select **Settings/System Settings/PLC Control** from the menu bar, click **Add** in the pop-up dialog box.



Step 2. Edit relevant information in the pop-up **PLC Control Details** dialog box, click **OK**.



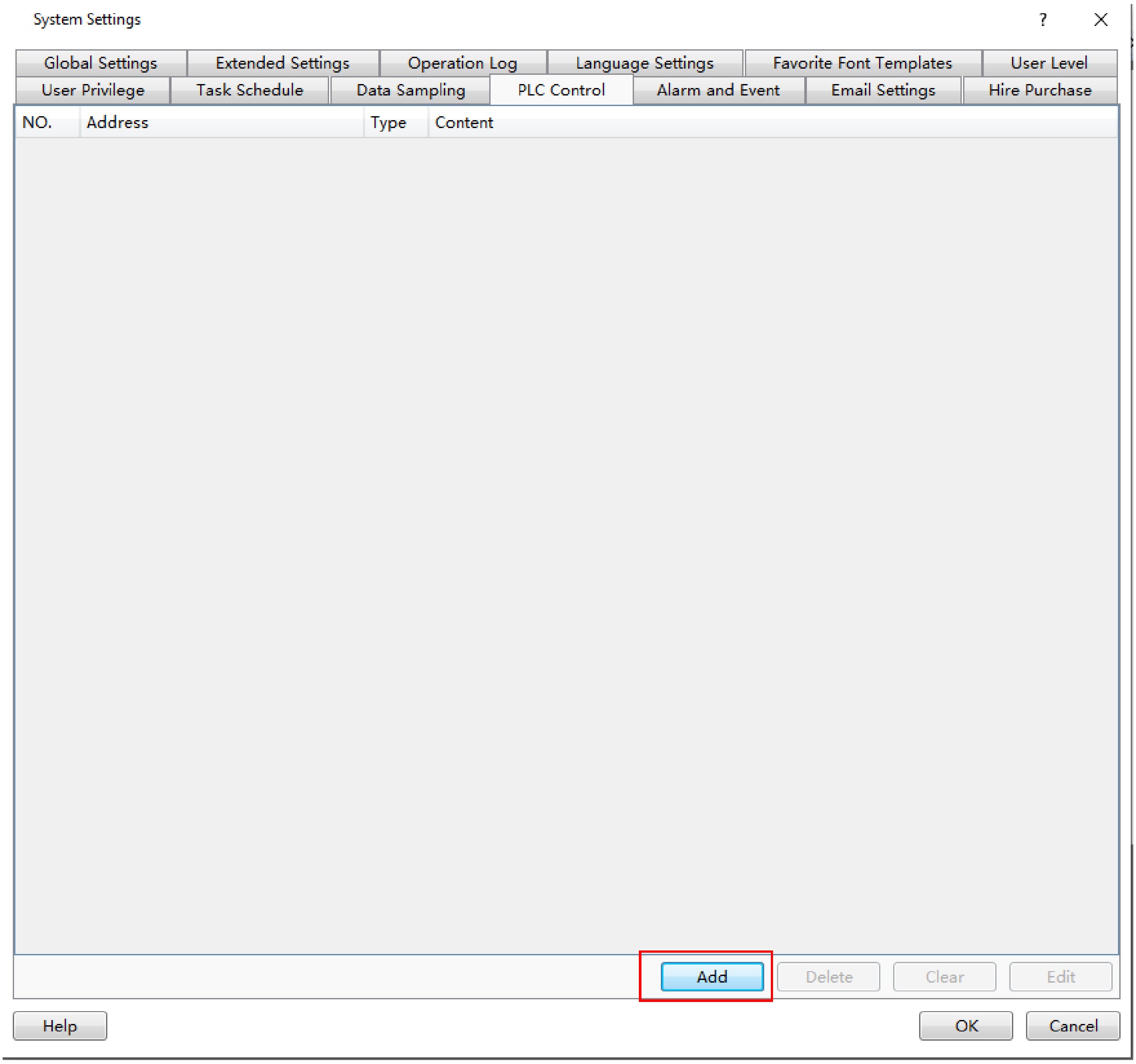
Please refer to the table below for detailed configuration methods.

Parameters	Description
Control Type	Select “Switch Basic Window”.
Valid only when specified window is opened	When the specified window is opened, it can switch to the basic window according to the value of the trigger address.
Trigger Address	The value of the trigger address determines the number of the basic window to switch to. If the trigger address is LW0, when the value of LW0 becomes 1, switch to basic window 1; when the value of LW0 becomes 2, switch to basic window 2, and so on.
Turn on Backlight	Turn on backlight when switching basic window.
Clear Address on Switched Window	When switched to basic window, the value of trigger address becomes 0.

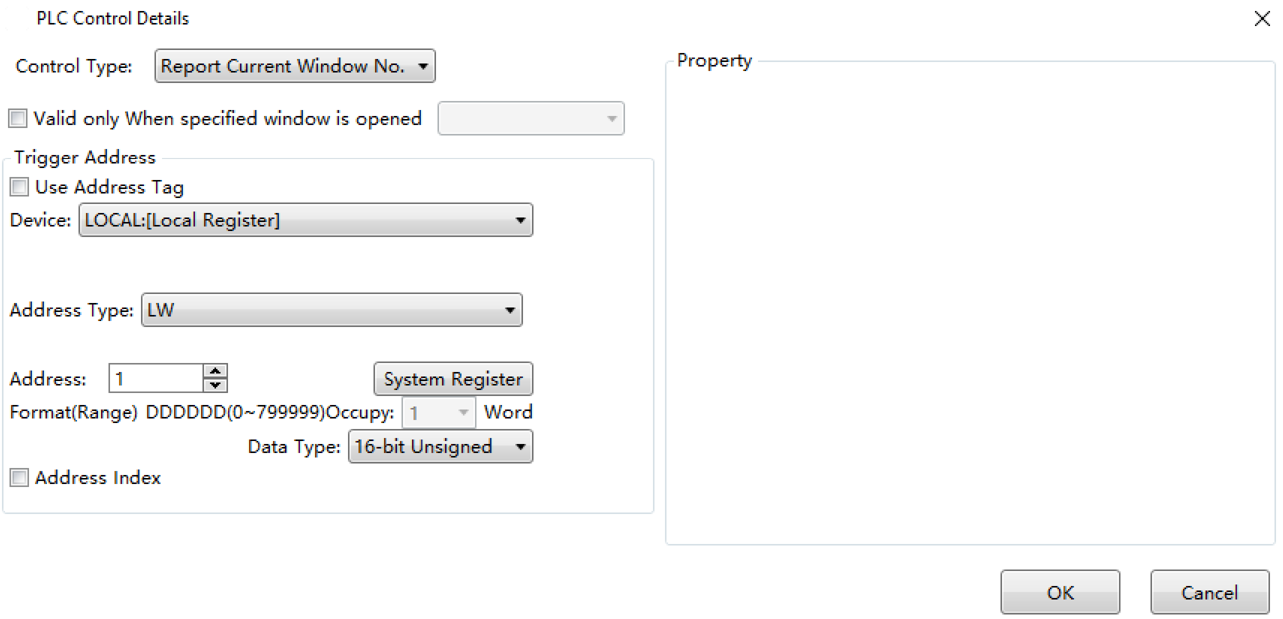
14.3.10.2 Report Current Window Number

The value of trigger address is the number of current window.

Step 1. Select **Settings/System Settings/PLC Control** from the menu bar, click **Add** in the pop-up dialog box.



Step 2. Configure relevant parameters in the pop-up **PLC Control Details** dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

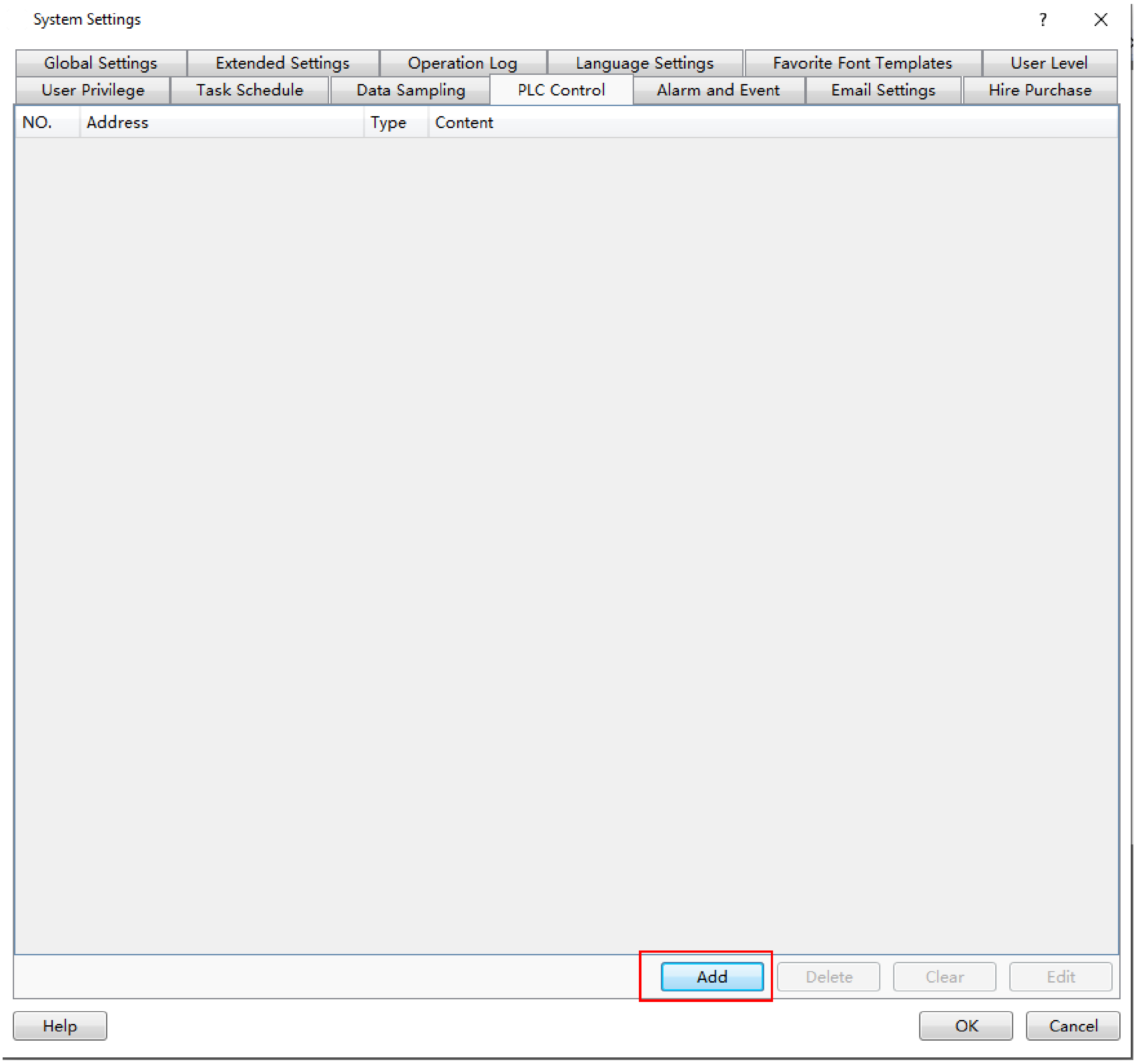
Parameters	**Description**
Control Type	Select “Report Current Window No.”.
Valid only when specified window is opened	This control operation can only be performed when the specified window is opened.
Trigger Address	Specify the word address. The value of this word address is the number of the current window. If the current window number is 1, the value of this word address is 1.

14.3.10.3 Backlight Control

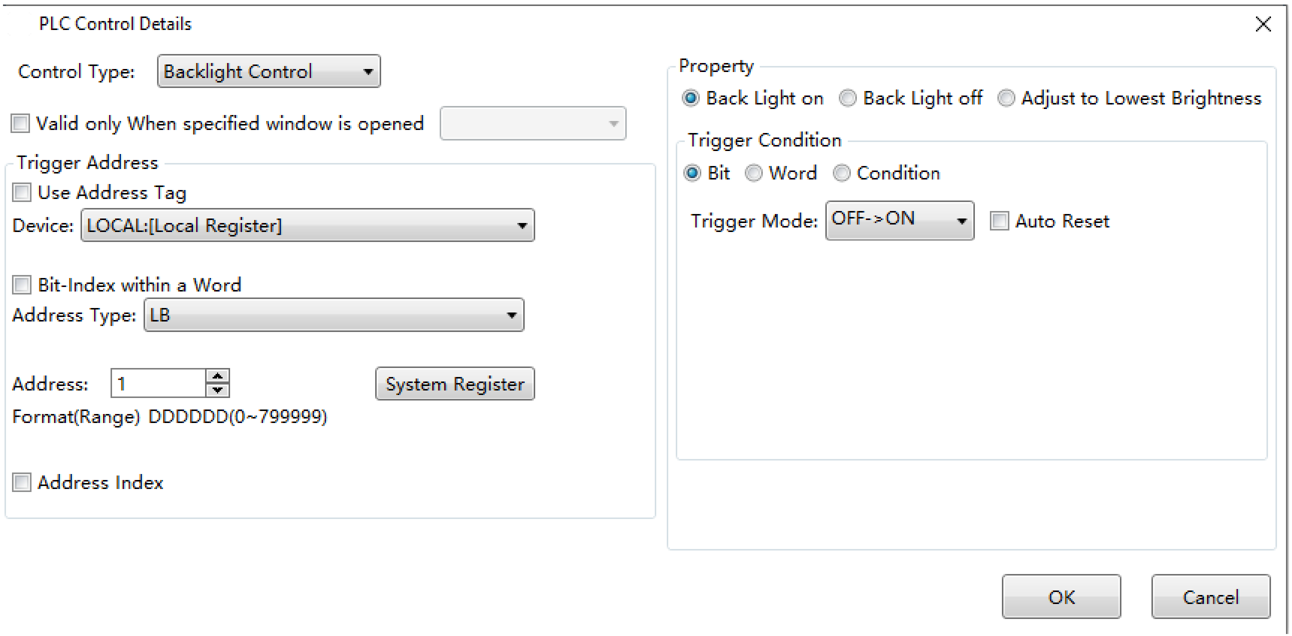
When the value of the trigger address meets the trigger condition, the backlight can be controlled (such as turning on the backlight).

The steps to add backlight control rules are as follows:

Step 1. Select **Settings/System Settings/PLC Control** from the menu bar, click **Add** in the pop-up dialog box.



Step 2. Configure relevant parameters in the pop-up **PLC Control Details** dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

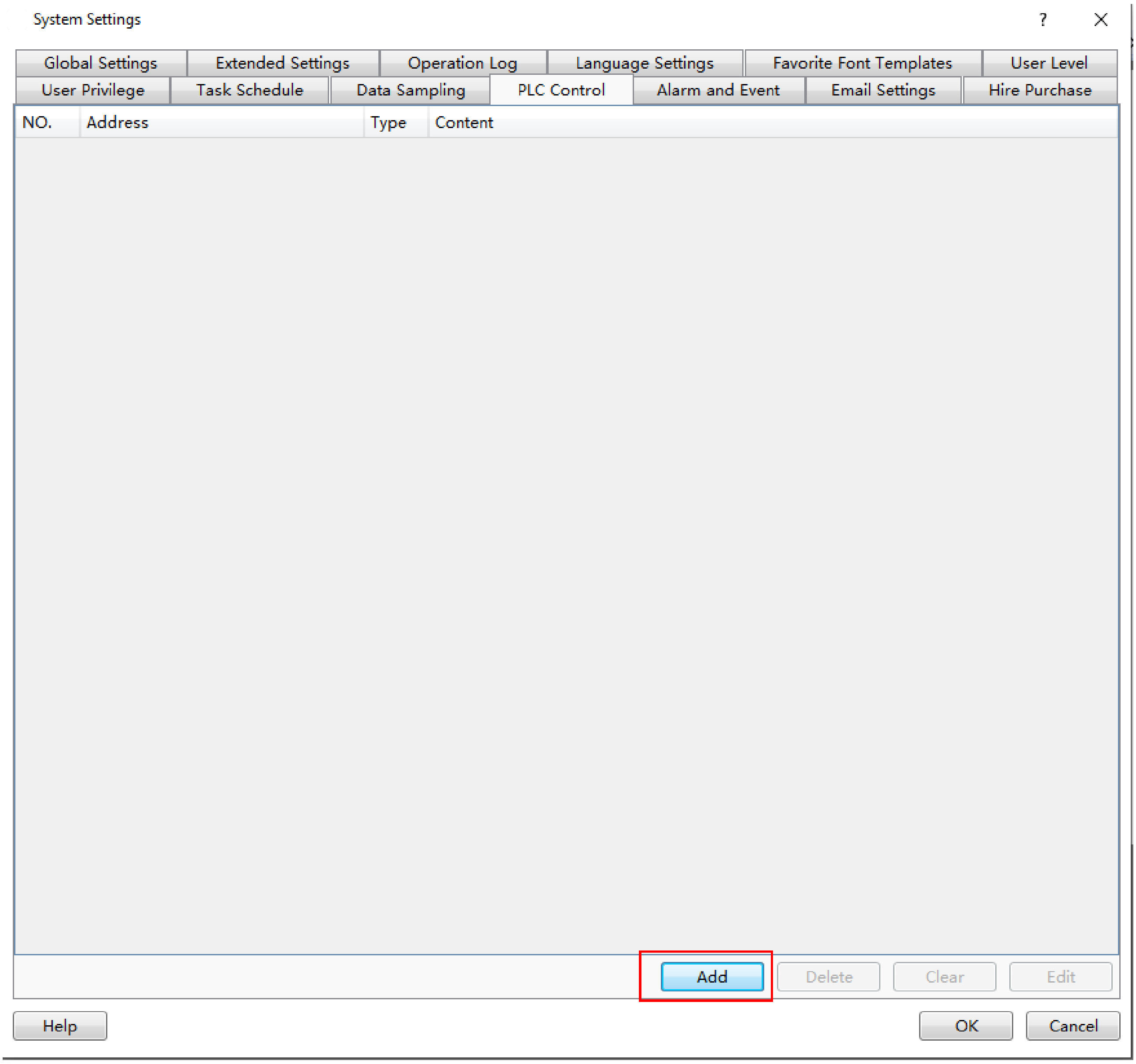
Parameter	Description
Control Type	Select “Backlight Control”.
Valid only when specified window is opened	This control is available only when the specified window is opened.
Trigger Address	Select specified bit address or word address.
Trigger Condition	◆ Bit: refers to the change in bit state of trigger address (such as transitioning from ON to OFF). ◆ Word: refers to the change of trigger address value. ◆ Condition: meets certain logic conditions (for example, the state of LB0 is ON and the state of LB1 is OFF).

14.3.10.4 Execute Macro Instruction

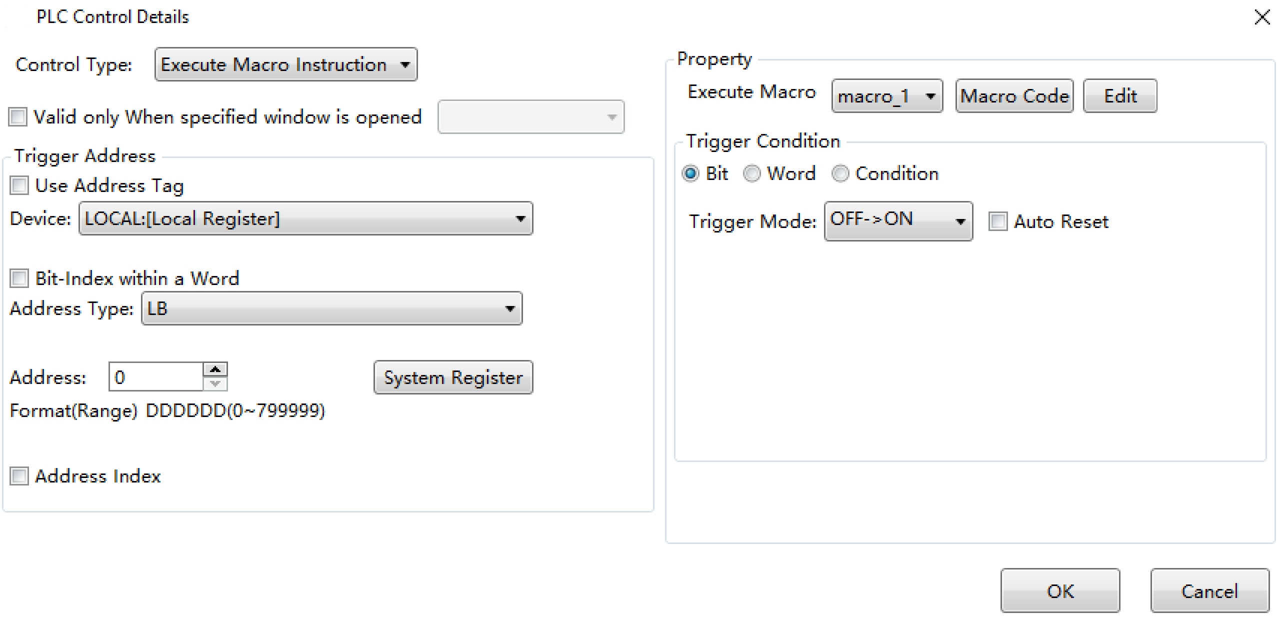
When the trigger condition is met (for example, when the state of specified bit address is ON), execute macro instruction.

The steps to add macro control rules are as follows:

Step 1. Select **Settings/System Settings/PLC Control** from the menu bar, click **Add** in the pop-up dialog box.



Step 2. Configure relevant parameters in the pop-up **PLC Control Details** dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

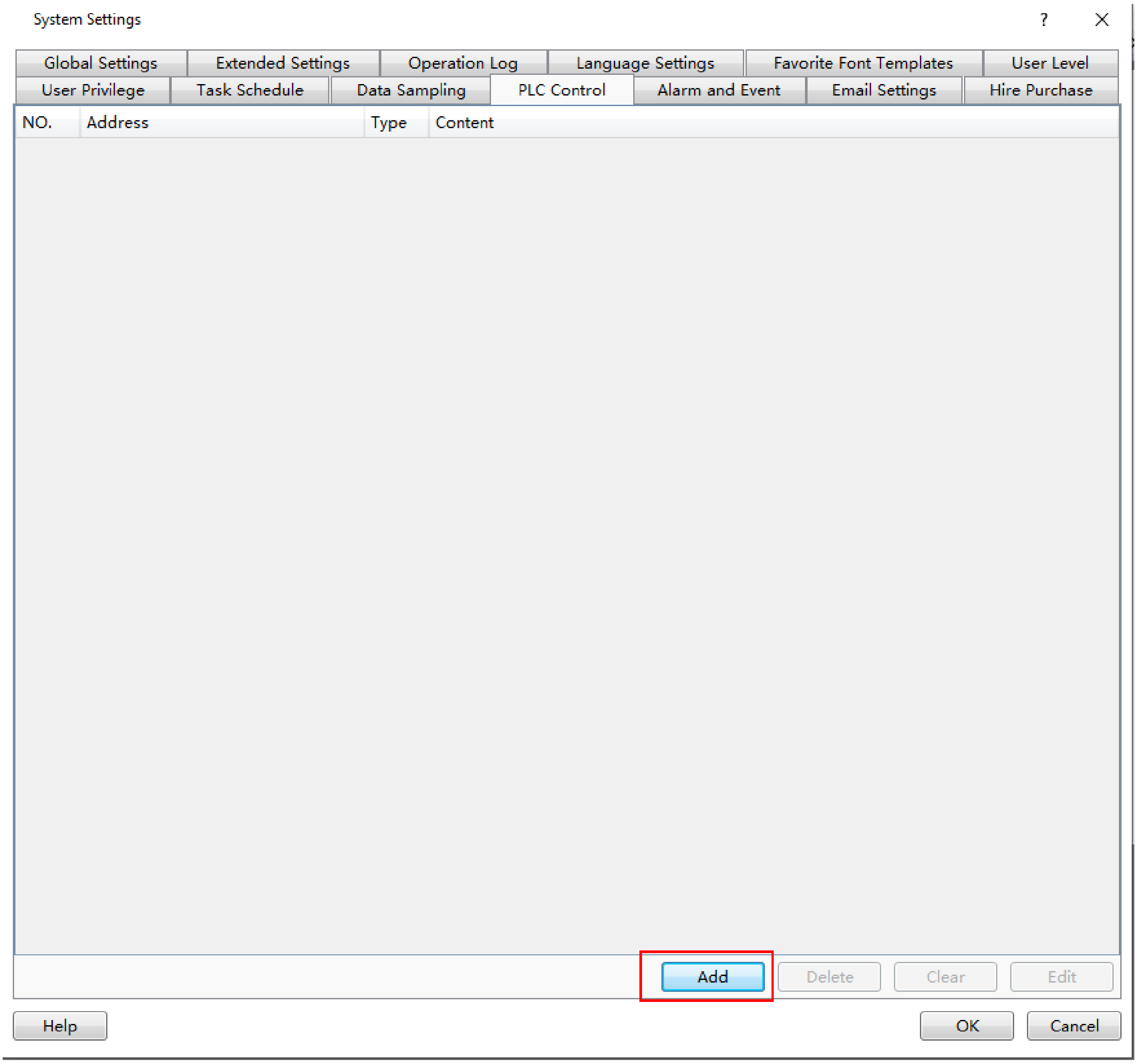
Parameters	**Description**
Control Type	Select “Execute Macro Instruction”.
Valid only when specified window is opened	This control rule is available only when the specified window is opened.
Trigger Address	Select specified bit address or word address.
Trigger Condition	◆ Bit: refers to the change in bit state of trigger address (such as transitioning from ON to OFF). ◆ Word: refers to the change of trigger address value. ◆ Condition: meets certain logic conditions (for example, the state of LB0 is ON and the state of LB1 is OFF).
Execute Macro	Execute specified macro instruction. For detailed information about macro instruction, please refer to Macro. Click **Macro Code** to add macro instruction; click **Edit** to modify macro instruction.

14.3.10.5 Audio Control

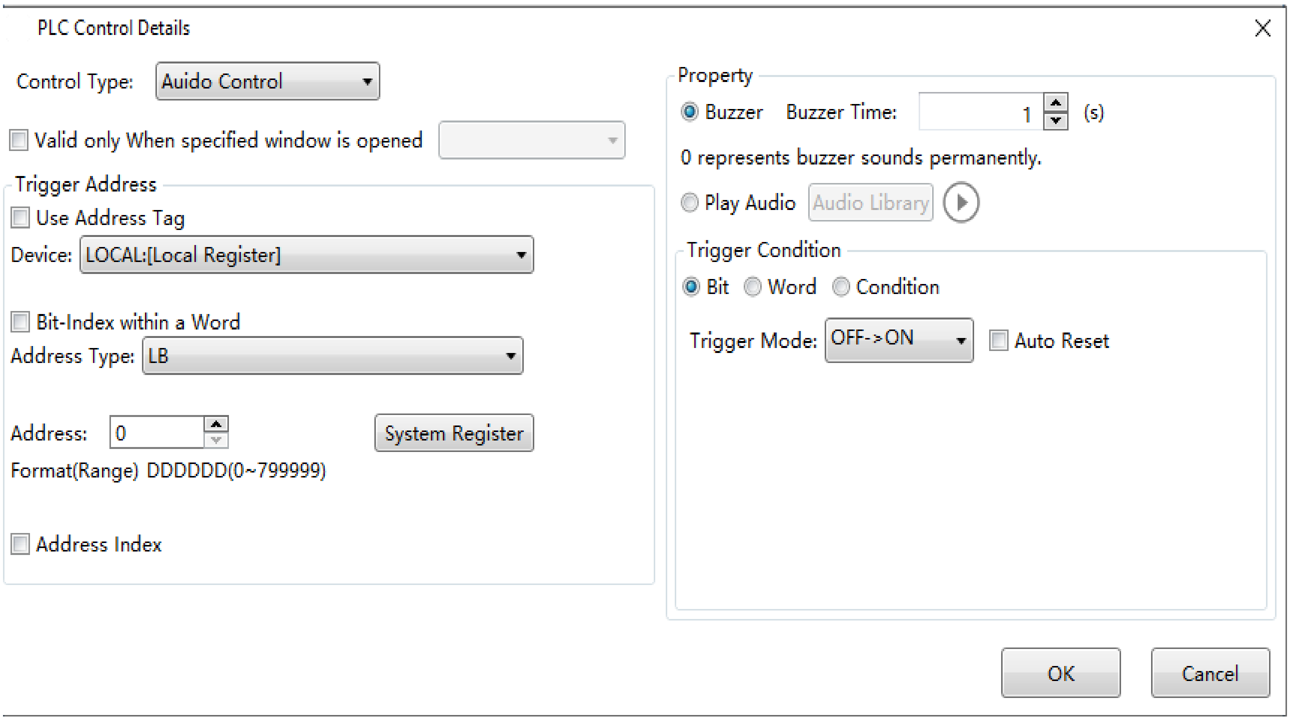
Play a sound (either using a buzzer or playing a sound from the audio library) when a trigger condition is met.

The steps to add audio control rules are as follows:

Step 1. Select **Settings/System Settings/PLC Control** from the menu bar, click **Add** in the pop-up dialog box.



Step 2. Configure relevant parameters in the pop-up **PLC Control Details** dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

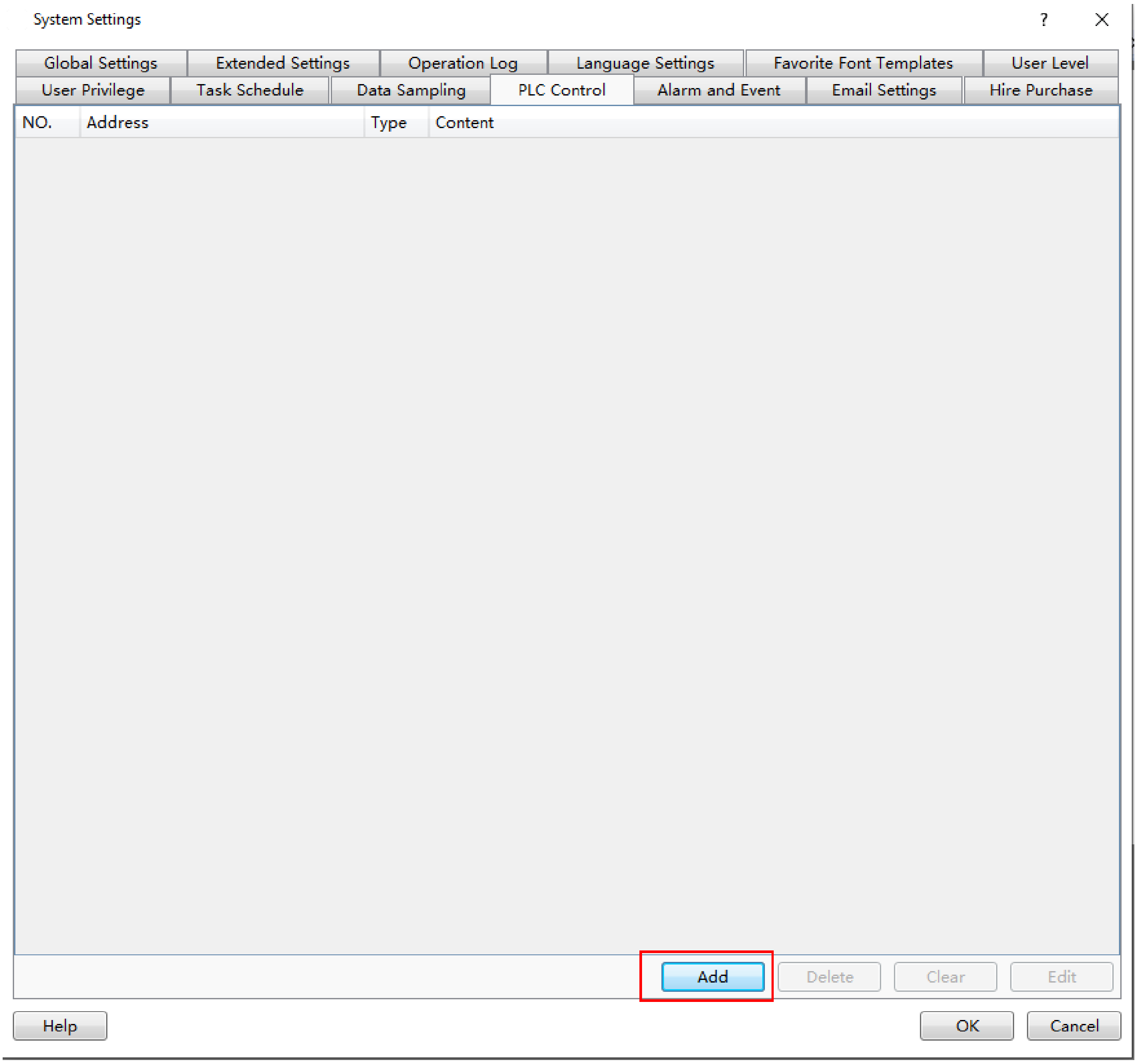
Parameter	Description
Control Type	Select “Audio Control”.
Valid only when specified window is opened	This control is available only when the specified window is opened.
Trigger Address	Select specified bit address or word address.
Trigger Condition	◆ Bit: refers to the change in bit state of trigger address (such as transitioning from ON to OFF). ◆ Word: refers to the change of trigger address value. ◆ Condition: meets certain logic conditions (for example, the state of LB0 is ON and the state of LB1 is OFF).
Buzzer	Use buzzer and set the buzzer time. A buzzer time of 0 indicates continuous buzzing.
Play Audio	Play audio in the Audio Library. For detailed information about the Audio Library, please refer to Audio Library.

14.3.10.6 Print Report

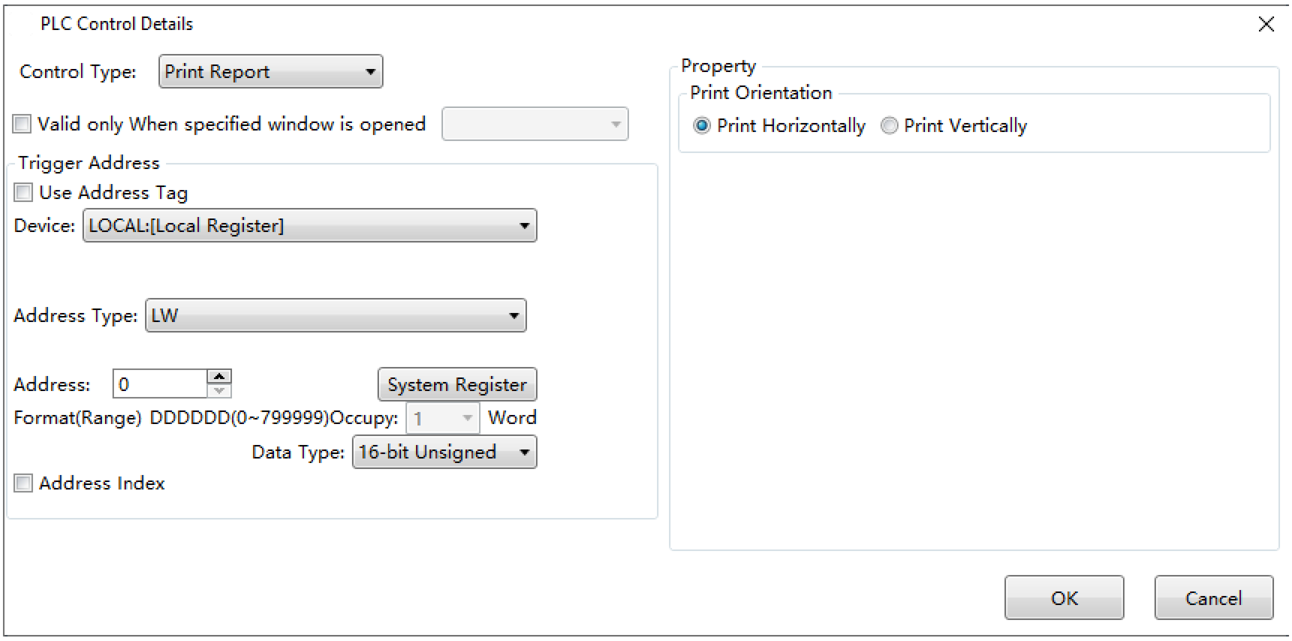
When the value of the triggered address corresponds to a valid window number, print the screen of the corresponding window with that number.

The steps to add print report control rules are as follows:

Step 1. Select **Settings/System Settings/PLC Control** from the menu bar, click **Add** in the pop-up dialog box.



Step 2. Configure relevant parameters in the pop-up **PLC Control Details** dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

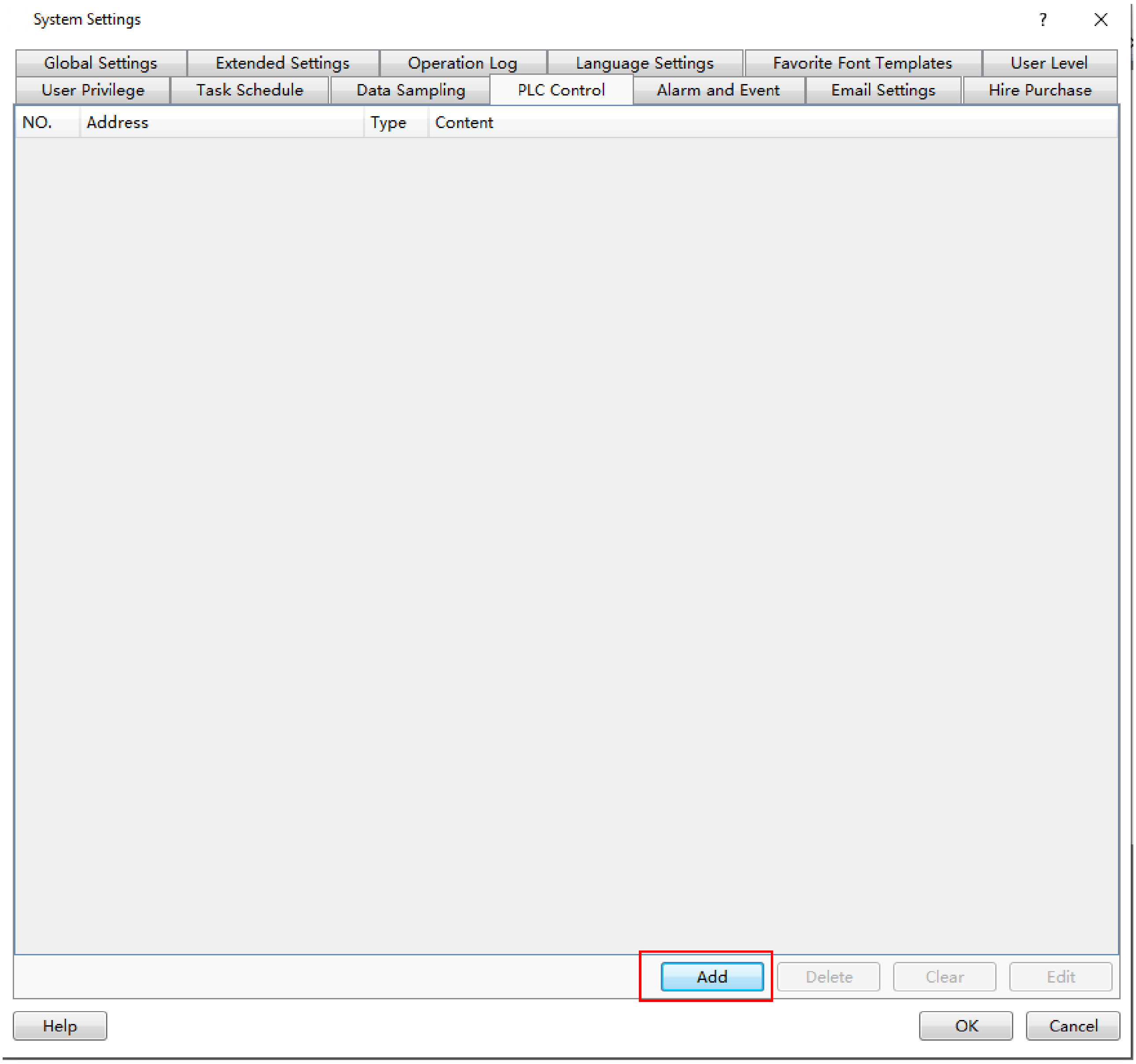
Parameters	**Description**
Control Type	Select "Report Print".
Valid only when specified window is opened	This control is effective only when the specified window is opened.
Trigger Address	Select specified word address.
Print Orientation	◆ print horizontally ◆ print vertically

14.3.10.7 Force Buzzer Off

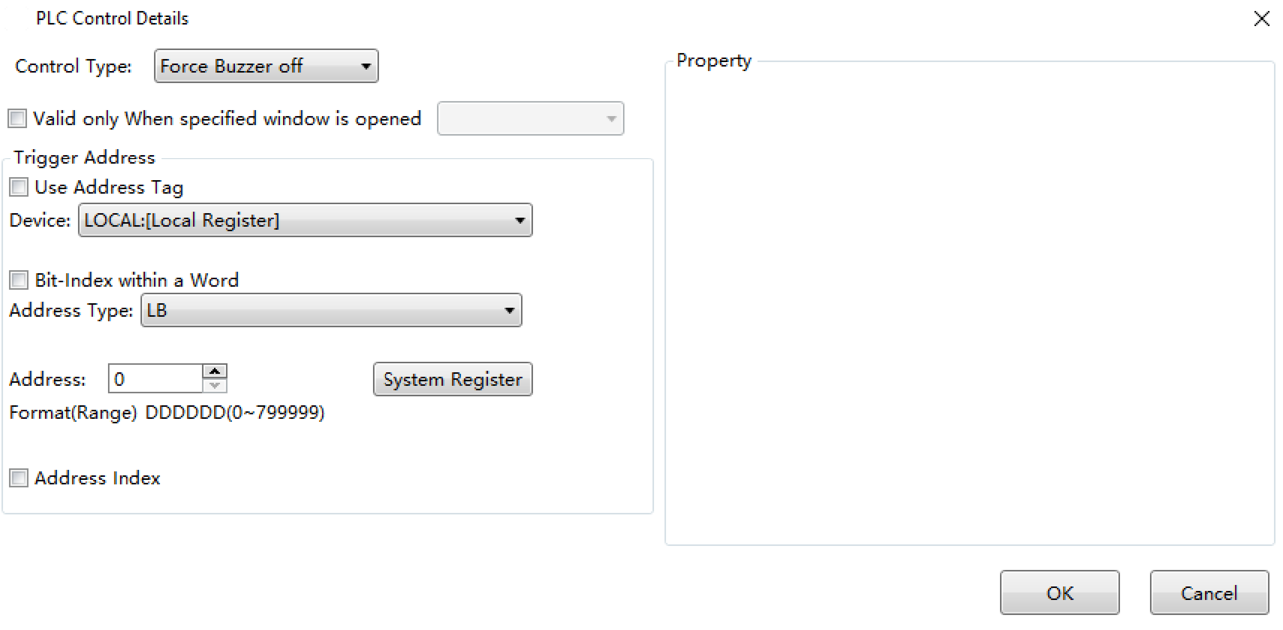
To stop the continuous buzzing of the HMI, you can set a bit address register for forced termination of the buzzer. When the value of the bit address register is set to ON, it will forcefully terminate the buzzer sound.

The steps to add force buzzer off control rules are as follows:

Step 1. Select **Settings/System Settings/PLC Control** from the menu bar, click **Add** in the pop-up dialog box.



Step 2. Configure relevant parameters in the pop-up **PLC Control Details** dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

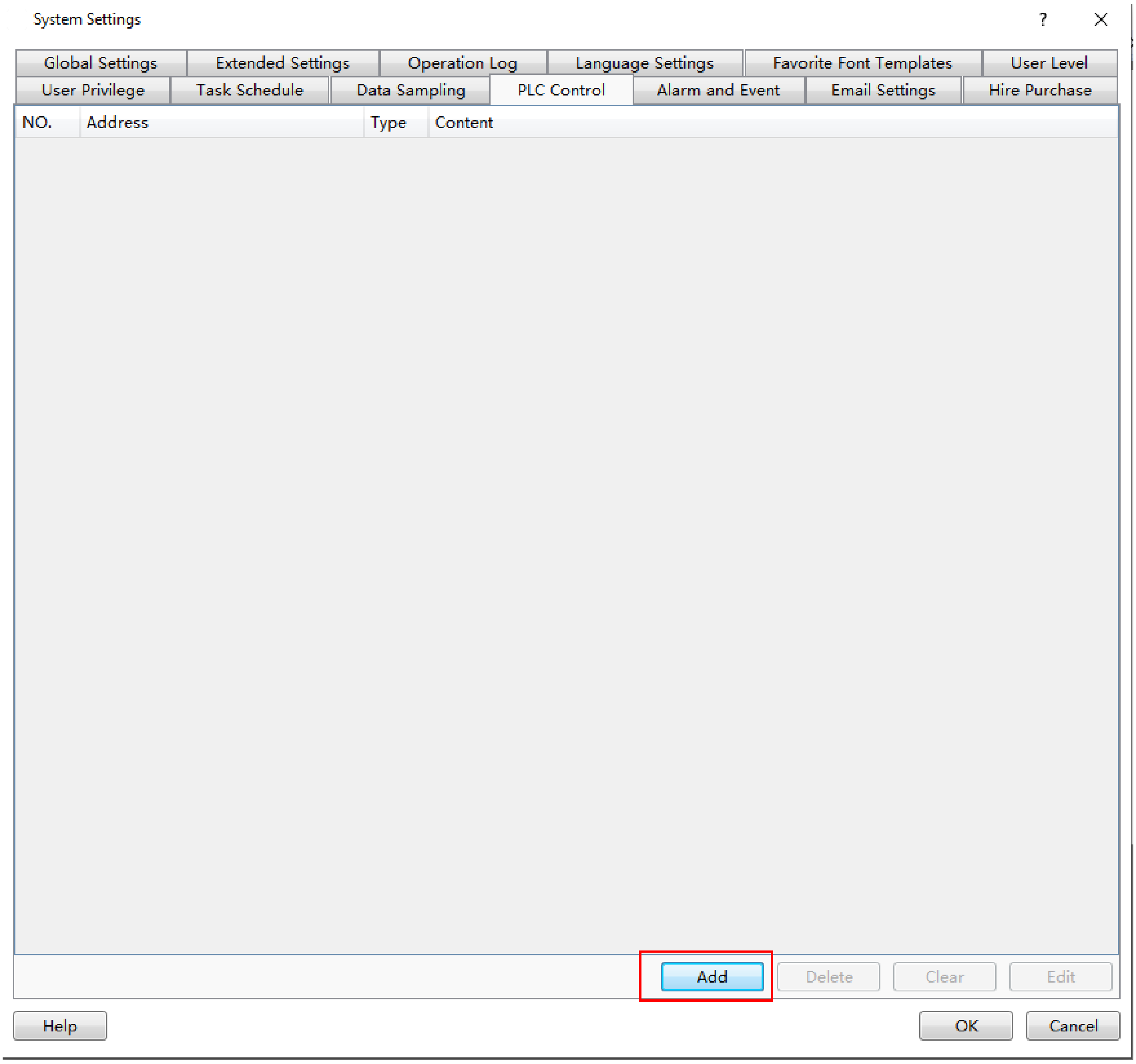
Parameter	Description
Control Type	Select “Force Buzzer Off”.
Valid only when specified window is opened	This control is effective only when the specified window is opened.
Trigger Address	Select specified bit address.

14.3.10.8 Capture Screen

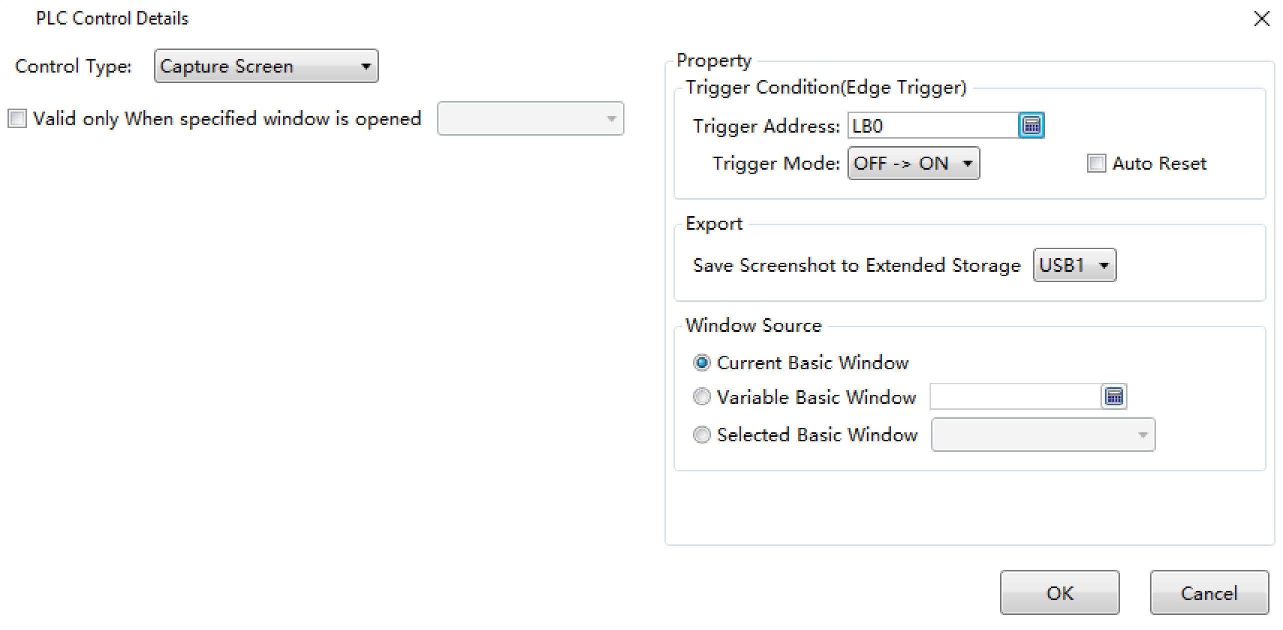
When the trigger condition is met, the HMI captures a screenshot of the window screen and saves it to an SD card or USB storage device.

The steps to add capture screen rules are as follows:

Step 1. Select **Settings/System Settings/PLC Control** from the menu bar, click **Add** in the pop-up dialog box.



Step 2. Configure relevant parameters in the pop-up **PLC Control Details** dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

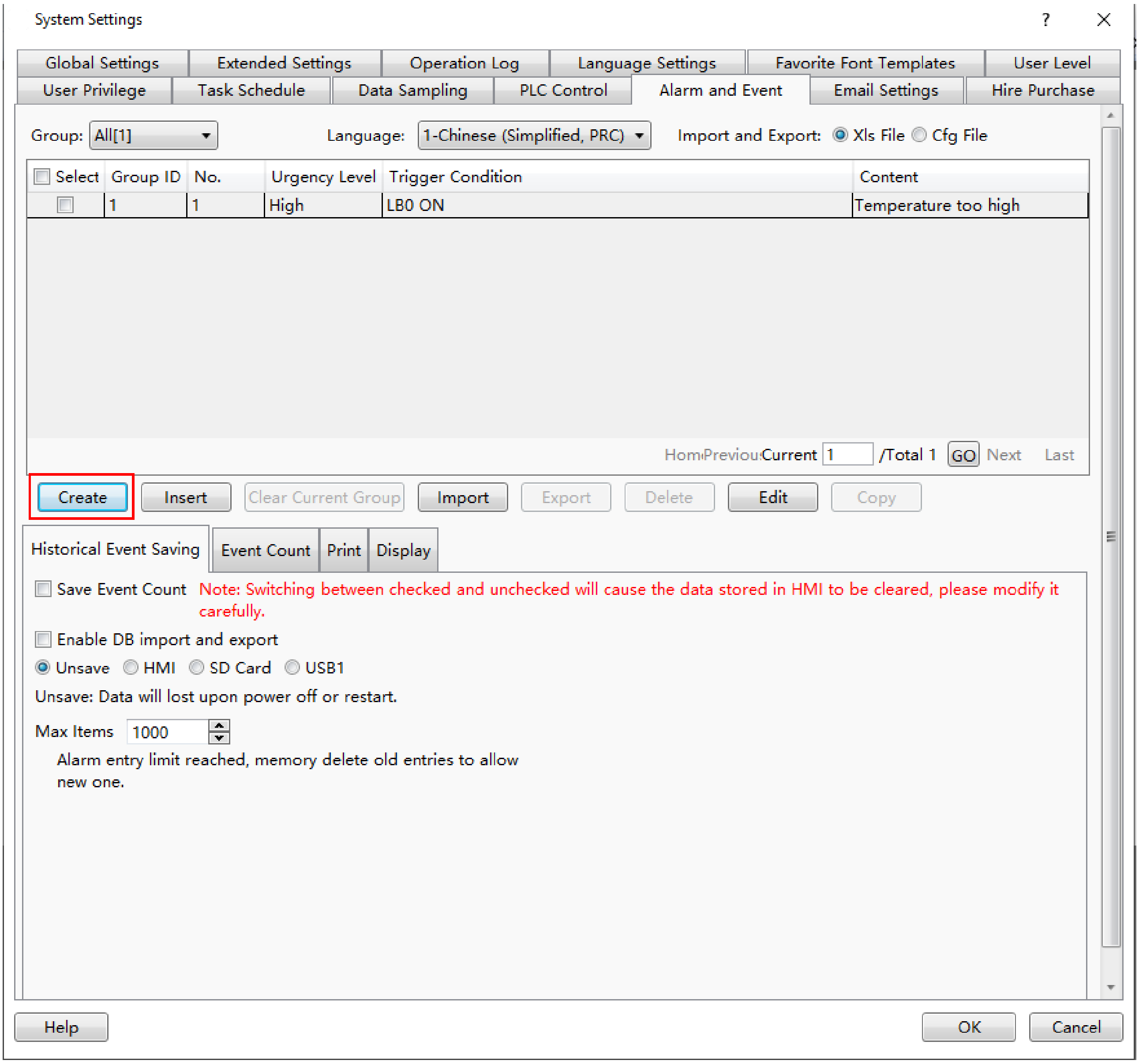
Parameters	**Description**
Control Type	Select “Capture Screen”.
Valid only when specified window is opened	This control is effective only when the specified window is opened.
Trigger Address	Select specified bit address.
Trigger Mode	Including from ON to OFF, from OFF to ON, and state change (from ON to OFF or from OFF to ON).
Auto Reset	Automatically set to OFF when the trigger address is triggered.
Export	Select the location to export screenshots, including USB and SD card.
Window Source	Select to capture the screen of specified window: ◆ Current basic window. ◆ Variable basice window: the value of specified word address register determine the number of window. ◆ Select basic window: select window.

14.3.11 Alarm and Event

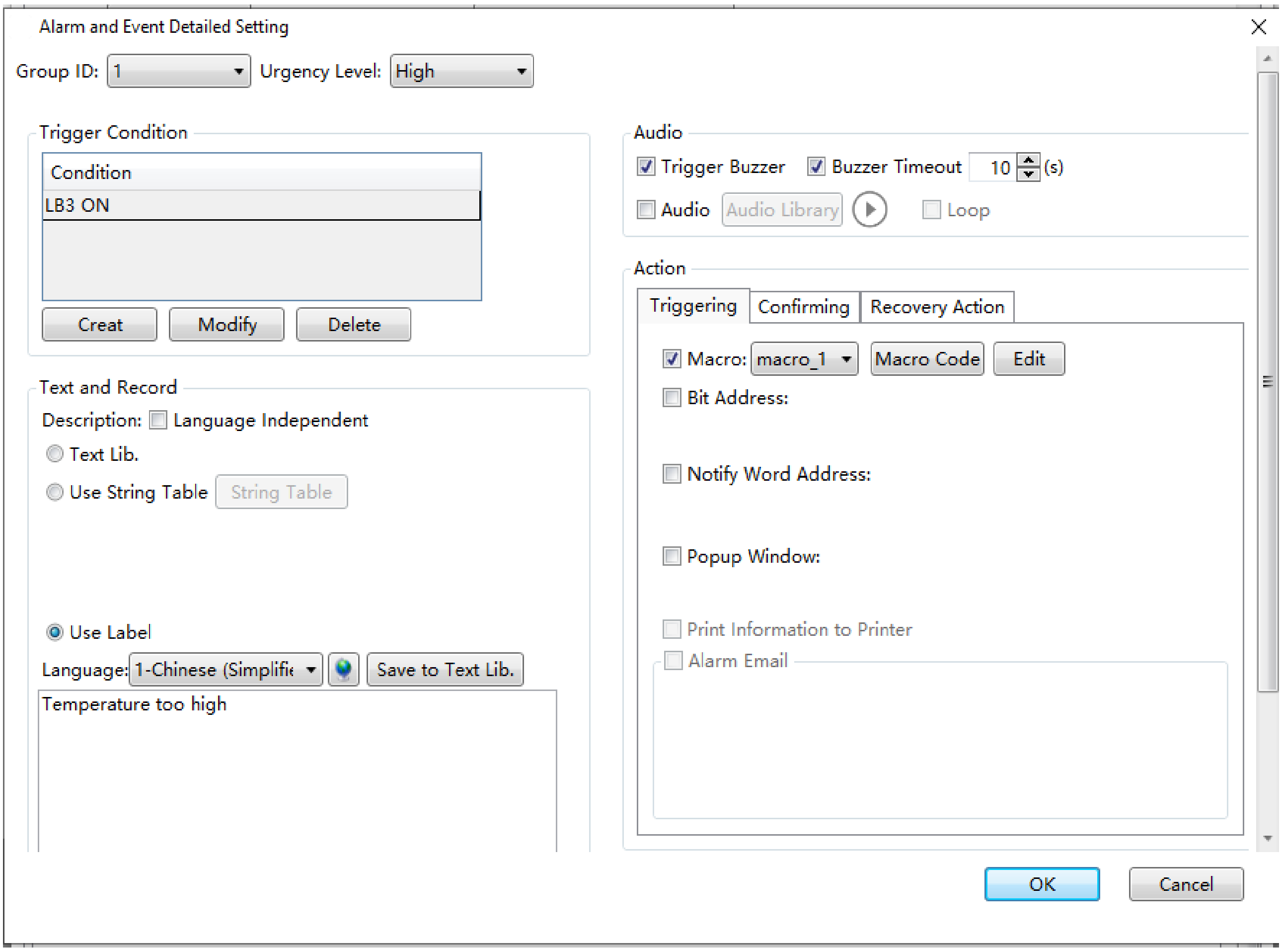
Alarm and Event refers to alarm certain events.

14.3.11.1 Create Alarm and Event

Step 1. Select **Settings/System Settings/Alarm and Event** from the menu bar, click **Create** in the pop-up dialog box.

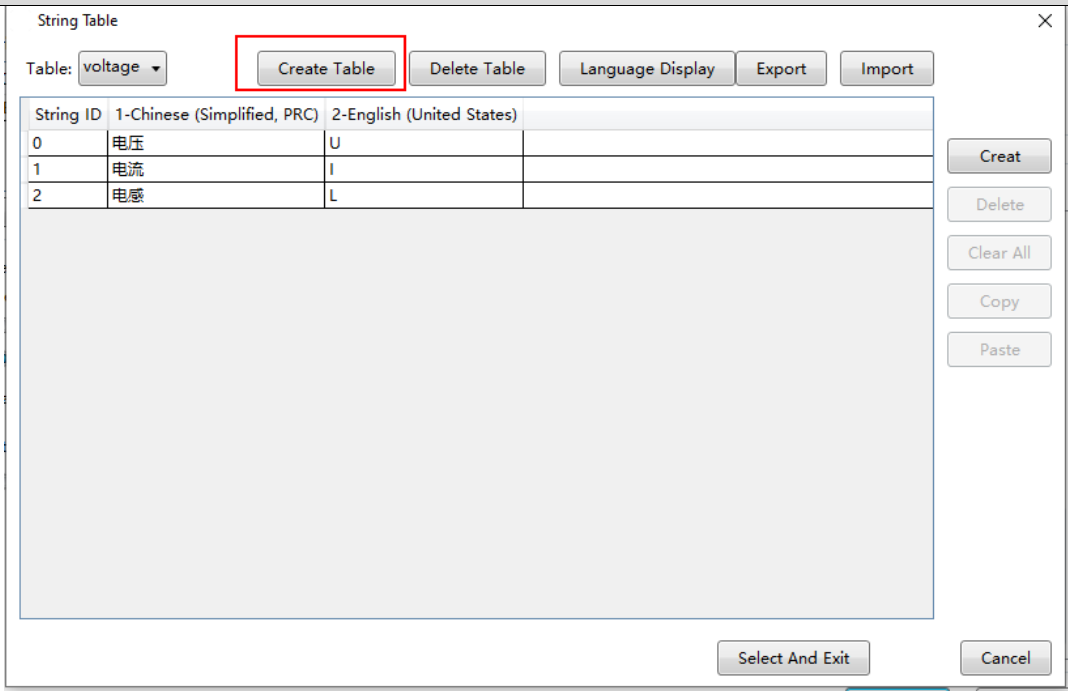


Step 2. Configure relevant parameters in the pop-up **Alarm and Event Detailed Setting** dialog box, click **OK**.

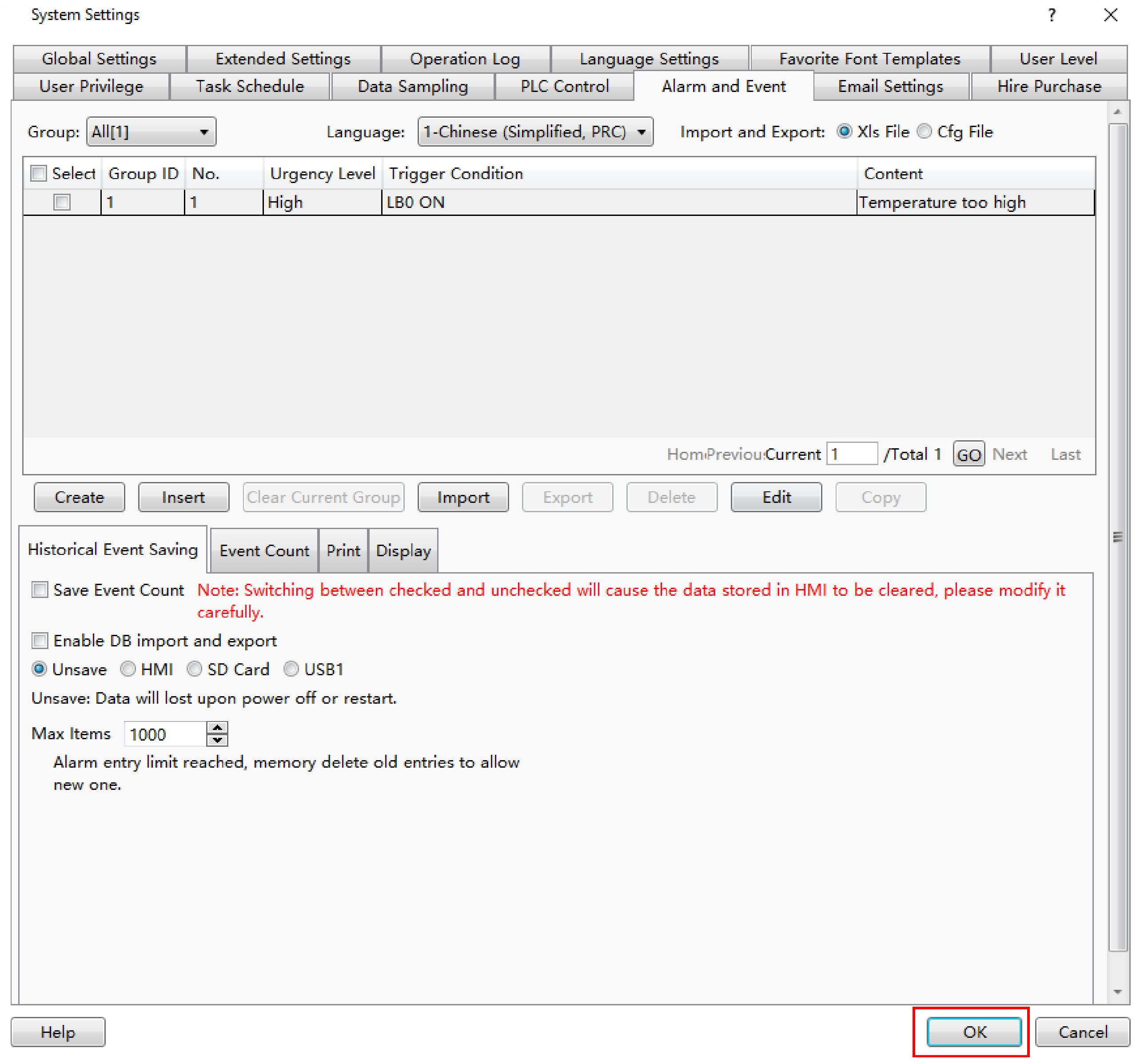


Please refer to the table below for detailed configuration methods.

Parameter	Description
Group	Group of alarm and event, there are 64 groups in total.
Urgency Level	Including high, middle and low.
Trigger Condition	Click **Create** to add new logic condition. Where there multiple logic conditions, you need to set the AND/OR relationship between logic conditions.
Language Independent	Text and record content is independent to language.
Text Lib.	Use text in the text library. For detailed information about the text library, please refer to the Text Library.
Use String Table	Use the text content from a specified string table. Click **String Table**, in the popup dialog box, click **Create Table** to create a new table and set the content of the strings.

Parameter	Description
	
Use Label	To use labels, you need to set the label content, and you can set the label content in different languages.
Trigger Buzzer	When the trigger condition is met, the buzzer will be triggered to alarm. The following parameters can be set: Buzzer Timeout: Stop buzzer when the set time is reached.
Action	Set the actions of triggering, confirming and restoring the alarm. The actions include: ◆ Trigger macro: execute specified macro instruction. For detailed information about macro, please refer to Macro. ◆ Bit address: set the value of specified bit address to ON or OFF. ◆ Word address: set the value of specified word address to a specified constant. ◆ Popup window: pop up specified window.

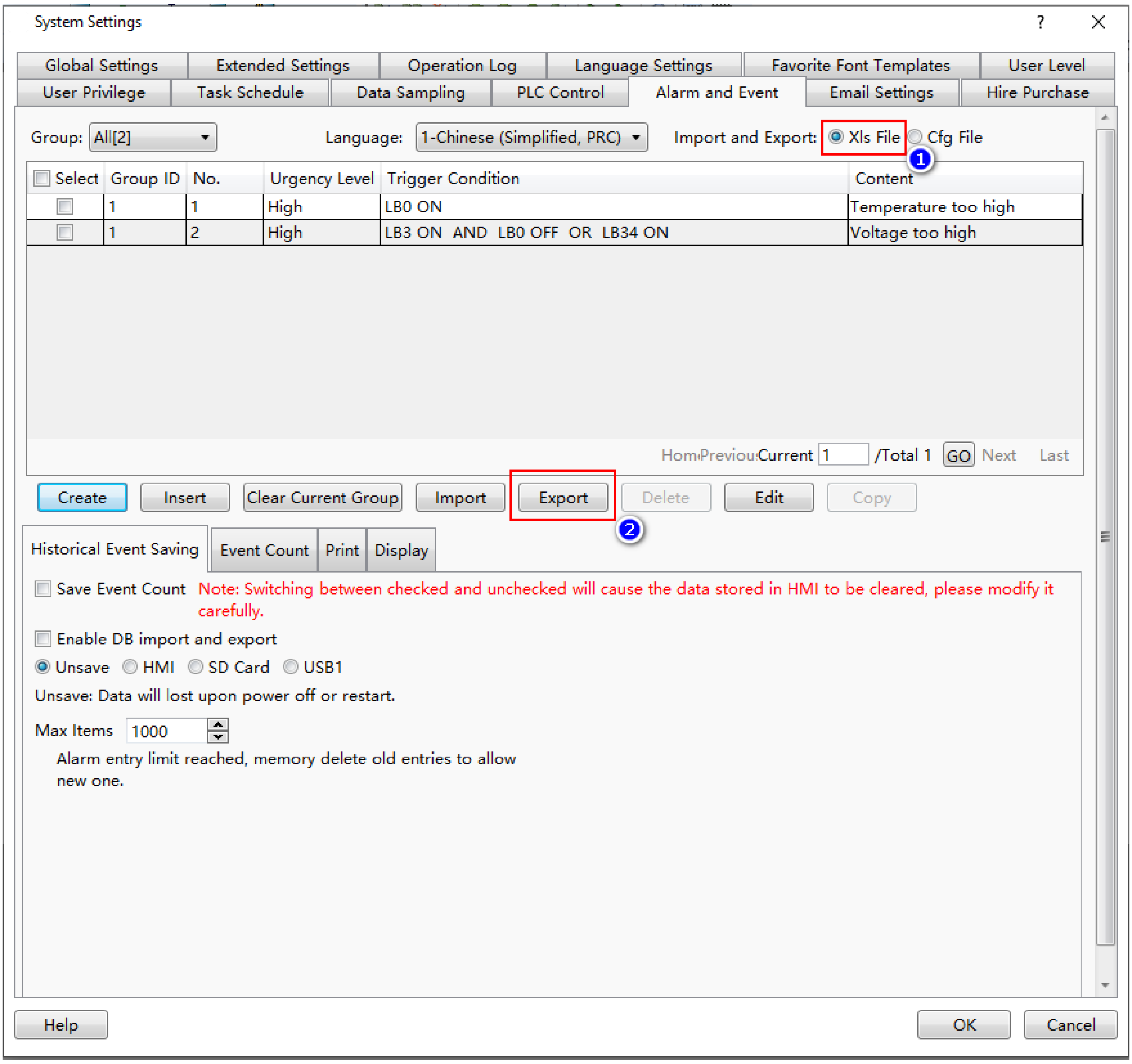
Step 3. Click **OK**.



14.3.11.2 Export Alarm and Event

You can export the added alarm and event, the steps are as follows:

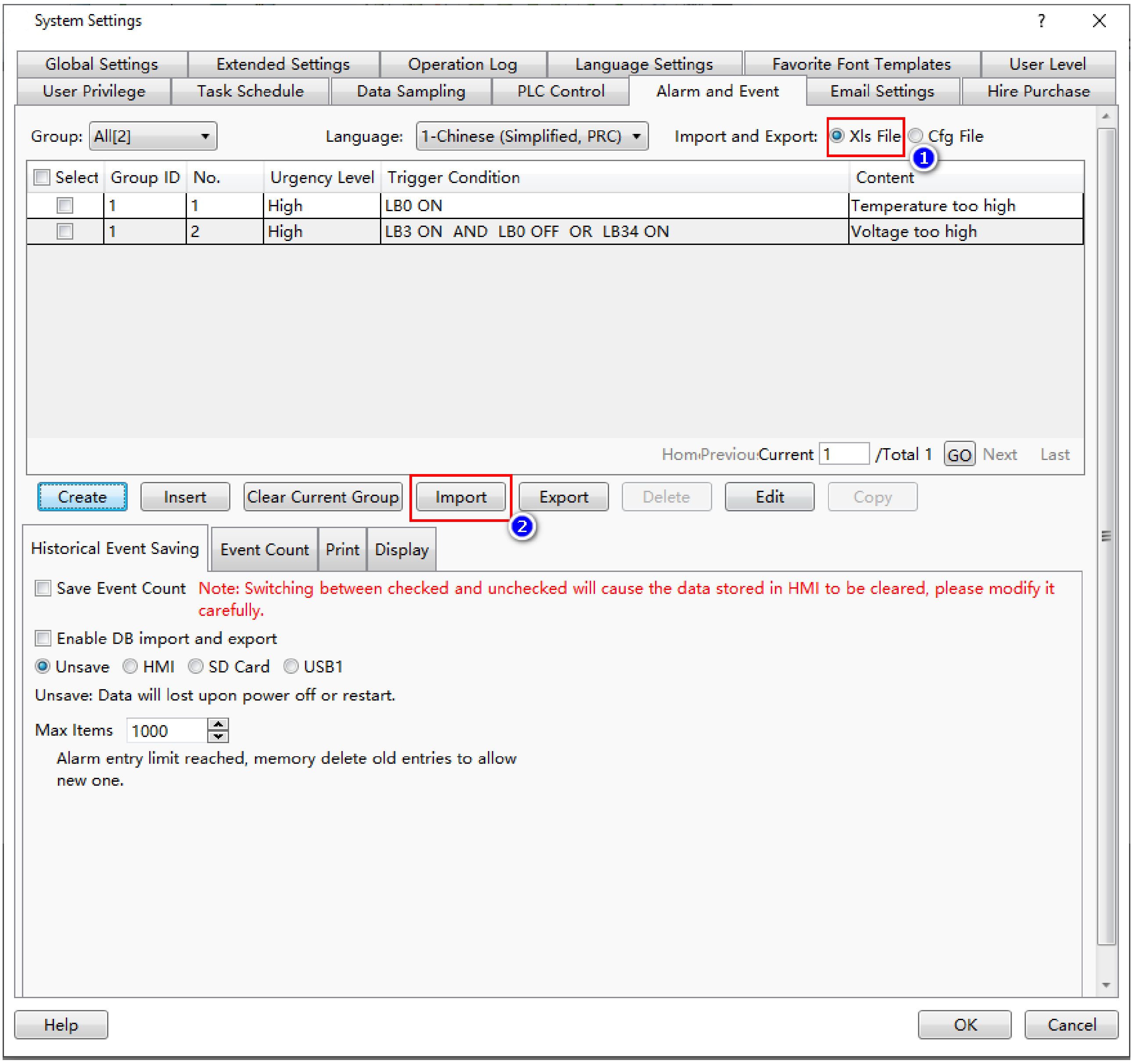
Select import and export file format, click **Export**.



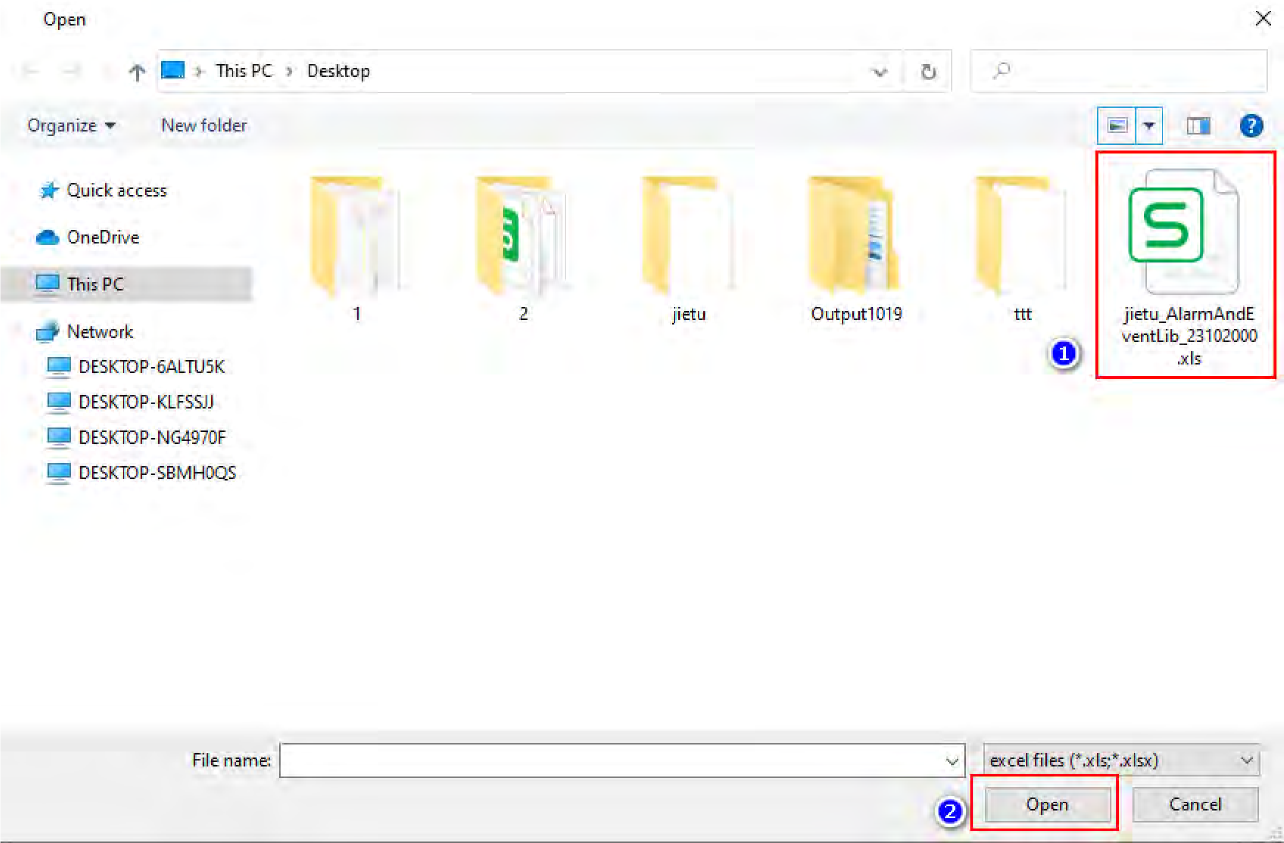
14.3.11.3 Import Alarm and Event

Importing alarm and event can improve the efficiency of creating alarm and event. The steps are as follows:

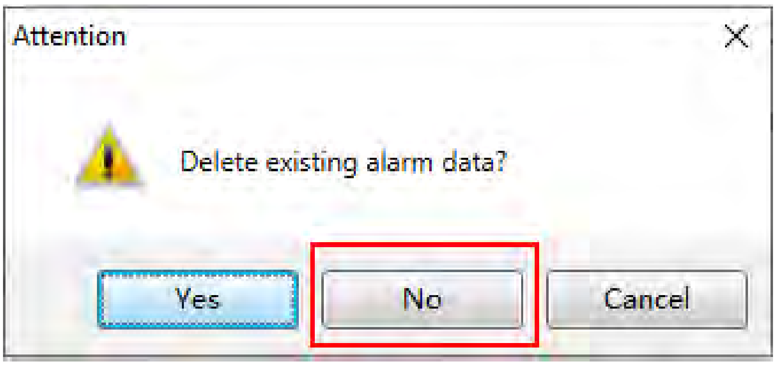
Step 1. Select import and export file format, click **Import**.



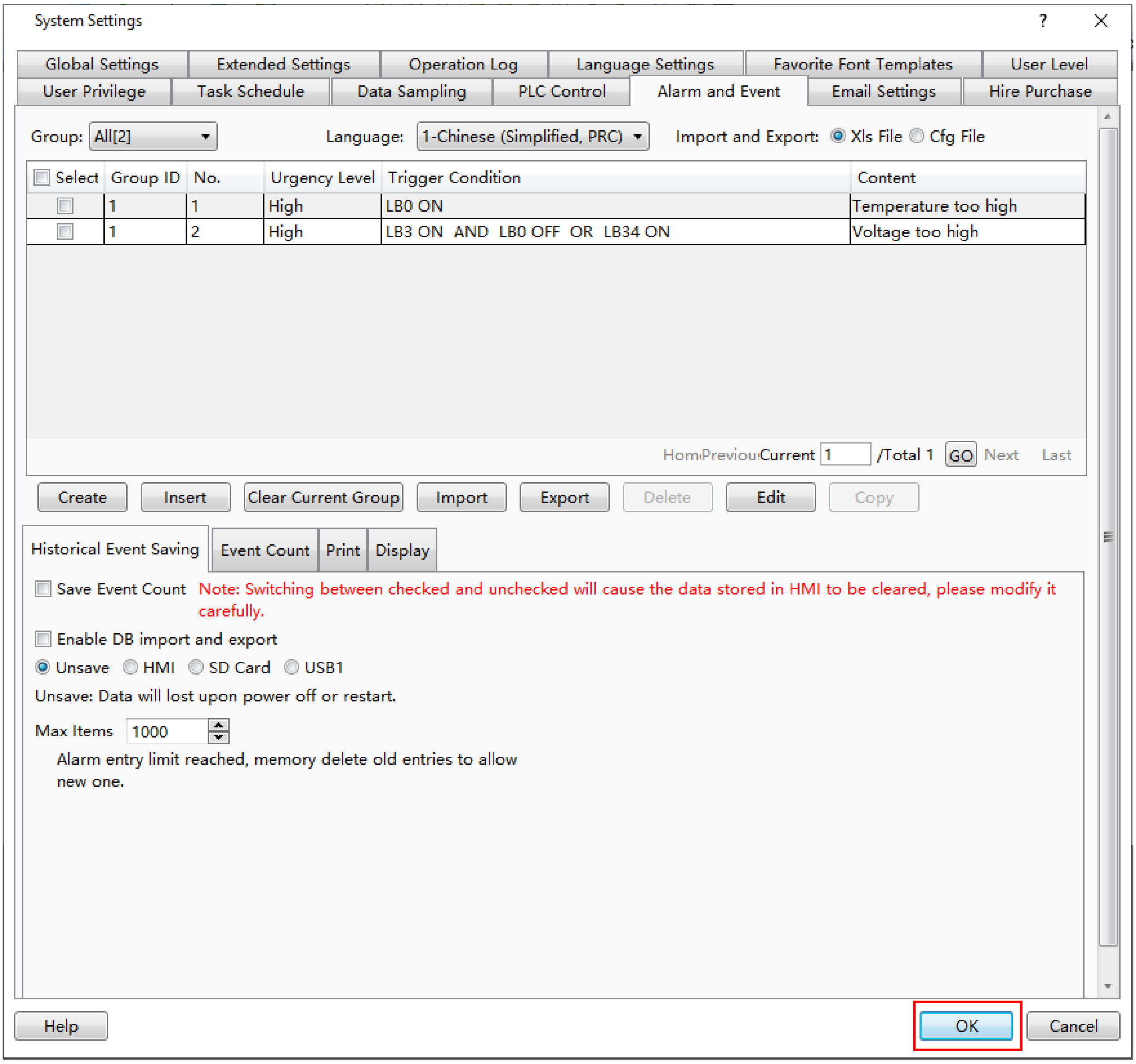
Step 2. Select the edited file (modify based on the exported file) in the pop-up dialog box, click **Open**.



Step 3. Select whether to delete current alarm data in the pop-up dialog box, and you can import the alarm and event.

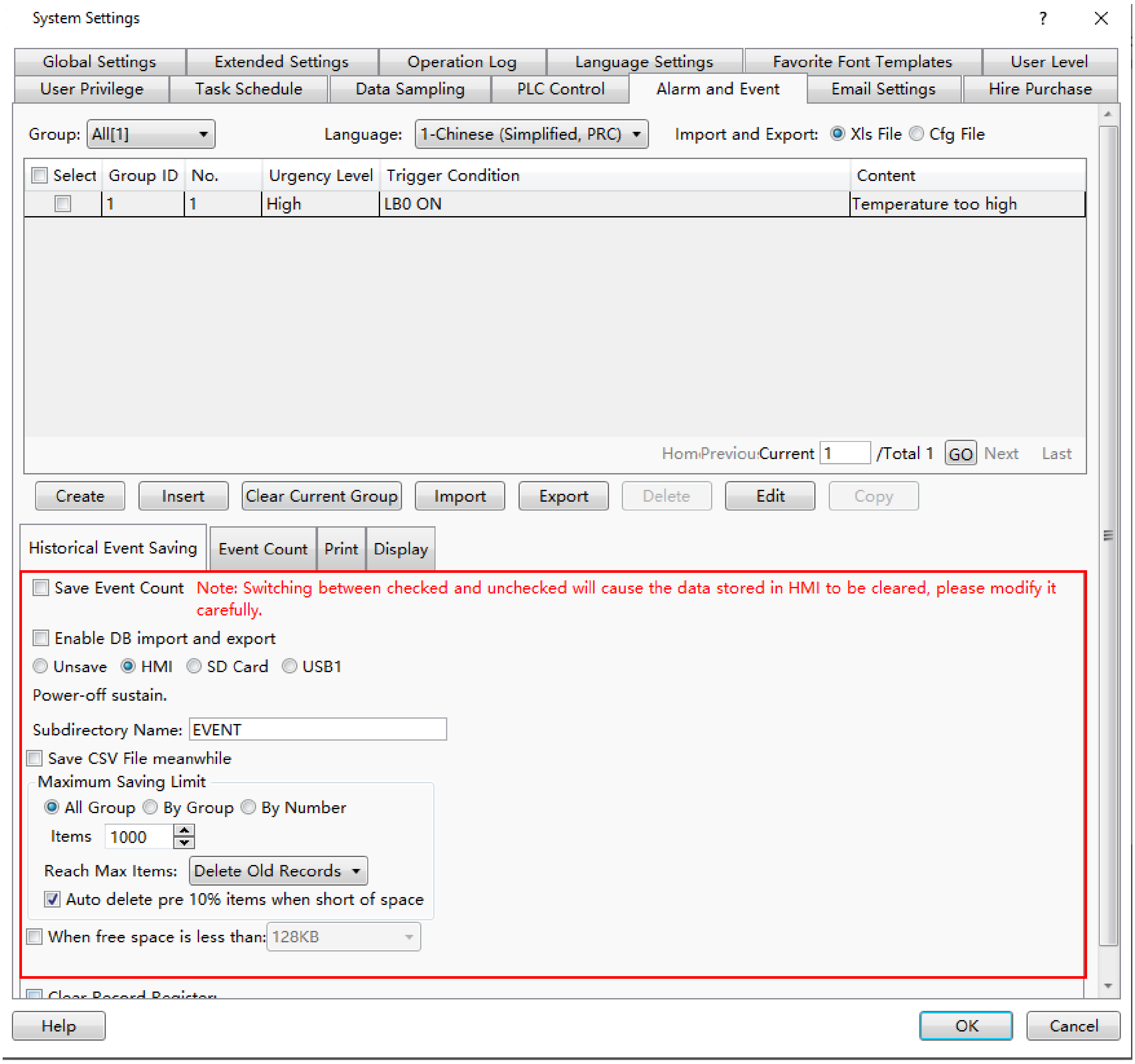


Step 4. Click **OK**.



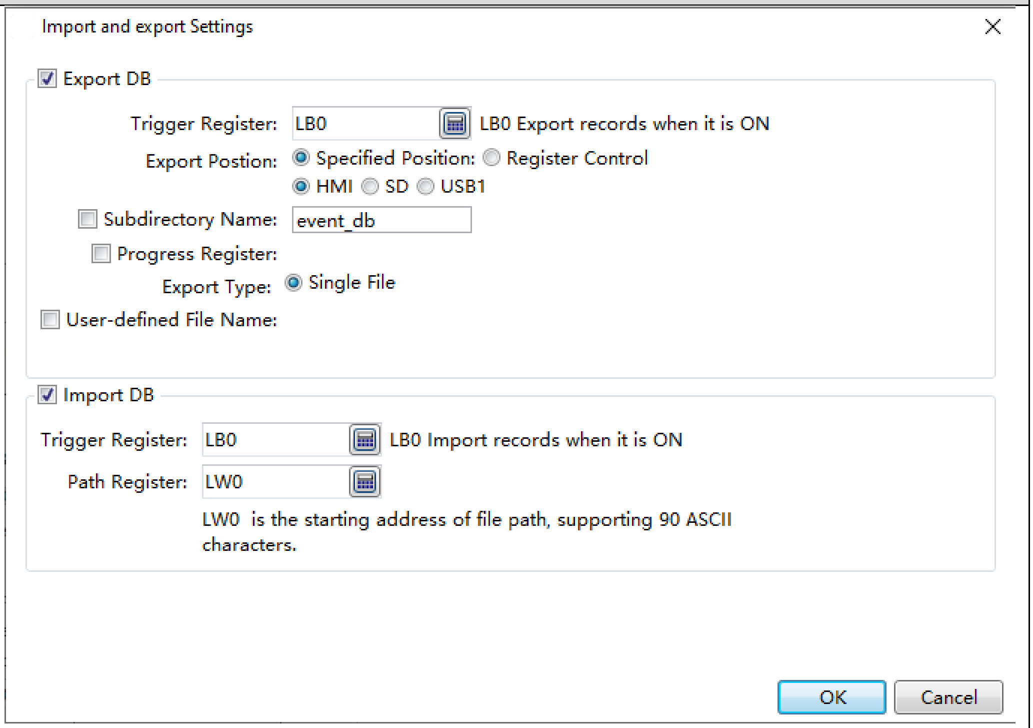
14.3.11.4 Set Alarm and Event Property

Step 1. Select **Settings/System Settings/Alarm and Event** from the menu bar, set **Historical Event Saving** in the pop-up dialog box.



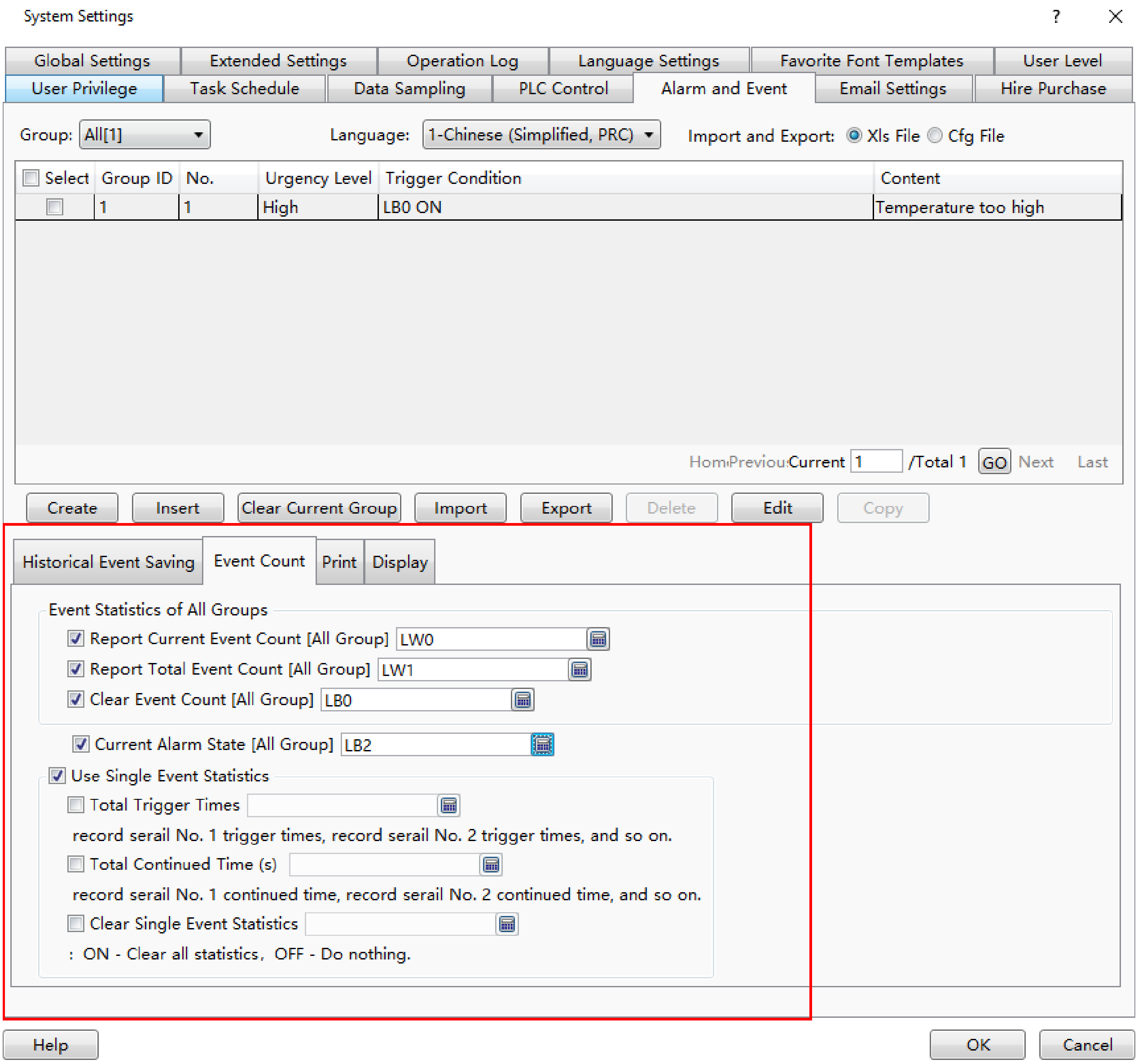
Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Save Event Count	Store the number of times event occur.
Enable DB import and export	By checking the **Enable DB import and export** option and clicking **Setting**, you can configure the import of alarms and events from a specified path or export alarms and events to a designated storage device such as HMI, SD card, or USB storage device.

Parameter	Description
	
Unsave	Stored in memory, lost when power off, the maximum number of entries stored in memory can be set.
HMI	Save to HMI storage device.
SD	Save to SD card.
USB	Save to USB storage device connected to HMI.
Subdirectory Name	Export alarm and event historical data to designated subdirectory.
Save CSV file	Save alarm and event historical data in a CSV format file.
Maximum Storage Limit	The maximum number of entries stored. Methods for calculating the number of entries include: ◆ All groups: entries of all groups. ◆ By Group: entries of specified group. ◆ By Number: single alarm and event. When it reaches the maximum limit: ◆ Delete old records: delete the old records. ◆ Didcard new record: stop adding new data.

Parameter	Description
Notify Register	When the remaining memory is less than the specified value (128KB by default), set the value of the specified bit address register to ON.
Clear Record Register	When the specified bit address register is set to ON, the action of clearing the history record of the alarm and event is executed. After successful execution, the bit address is automatically reset (to OFF).

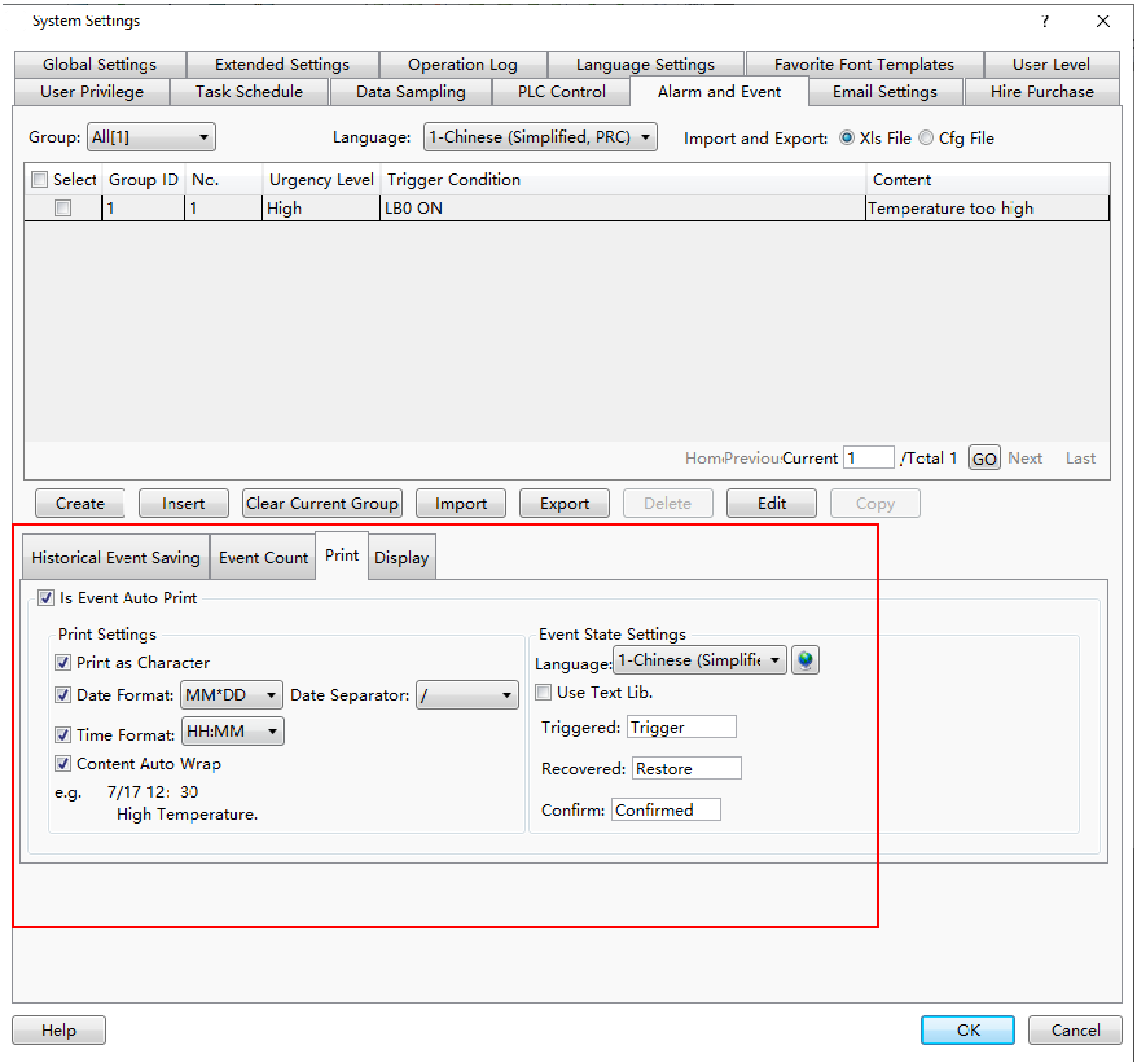
Step 2. Set the Event Count.



Please refer to the table below for detailed configuration methods.

Parameters	Description
Report Current Event Count	Write the current event count to specified word address register.
Report Total Event Count	Write the total event count to specified word address register.
Clear Event Count	When the value of the specified bit address register is set to ON, the accumulated event count is cleared, resetting it to 0. After the clearing operation, the bit address register is automatically reset to OFF.
Current Alarm State	If an alarm occurs, the bit register is set to ON. If no alarm occurs, the bit register is set to OFF.
Total Trigger Times	Using the specified word address register to record the cumulative occurrence count of individual events. For example, if you set the starting address as LW0, LW0 will record the cumulative occurrence count of Event 1, LW2 will record the cumulative occurrence count of Event 2, and so on.
Total Continued Time	Using the specified word address register to record the cumulative occurrence time of individual events. For example, if you set the starting address as LW0, LW0 will record the cumulative occurrence time of Event 1, LW2 will record the cumulative occurrence time of Event 2, and so on.
Clear Single Event Statistics	When the value of the specified bit address register is set to ON, it clears all statistical data for individual events.

Step 3. Print Event.

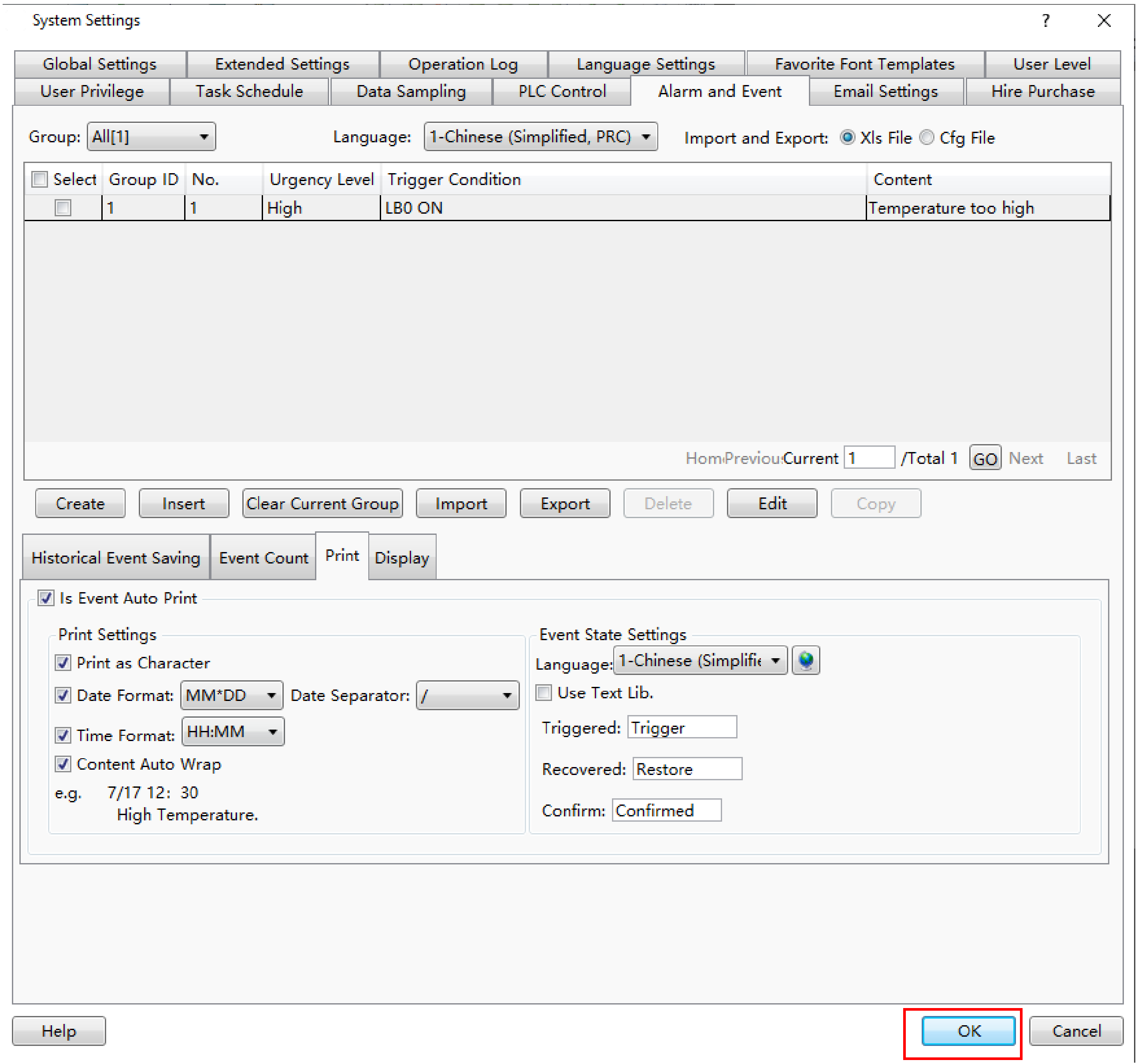


Please refer to the table below for detailed configuration methods.

Parameters	Description
Is Event Auto Print	Automatically print event information when event occurs.
Print as Character	This parameter must be selected in order to print successfully.
Date Format	Format of the event date. ◆ MM*DD: For example, 12/01 represents December 1st. ◆ DD*MM: For example, 12/01 represents January 12th. ◆ DD: For example, 12 represents date 12. ◆ DD*MM*YY: For example, 01/10/22 represents October 1st, 2022. ◆ MM*DD*YY: For example, 01/10/22 represents January 10th, 2022. ◆ YY*MM*DD: For example, 22/10/01 represents October 1st, 2022.
Date Separator	Used to separate year, month and date. Including “/”, “.”, “-”.

Parameters	Description
Time Format	Format of the event time. ◆ HH:MM: For example, 01:23 represent 1 o'clock and 23 minutes. ◆ HH:MM:SS: For example, 03:04:12 represent 3 o'clock, 4 minutes and 12 seconds. ◆ HH:MM:SS:mS: For example, 01:03:22:13 represent 1 o'clock, 3 minutes, 22 seconds and 13 milliseconds.
Event State Setting	Set the text information for the alarm event state. You can set different texts for different languages and different states (triggered, restored, confirmed).

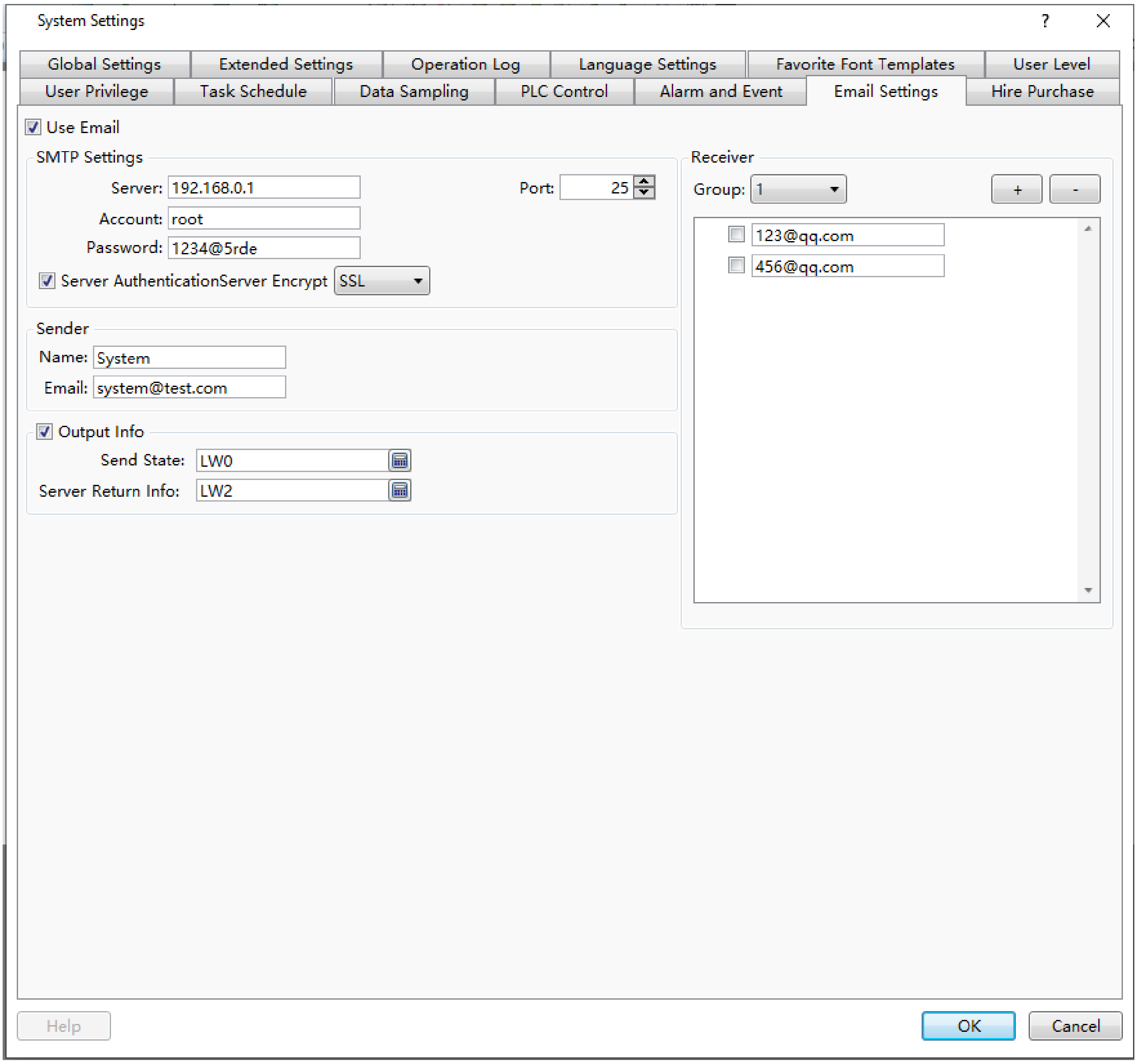
Step 4. Click **OK**.



14.3.12 Email Setting

You can configure the email server to send alarm messages of the HMI to the recipients. Only SMTP email servers are supported, and the email server must be reachable from the HMI's network, including routing and relevant ports.

Select **Settings/System Settings/Email Settings**, edit relevant information in the pop-up dialog box, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameter	Description
Server	IP or domain name of the email server.
Port	Port occupied by SMTP service.
Account	Account of SMTP server.
Password	Password of SMTP server.

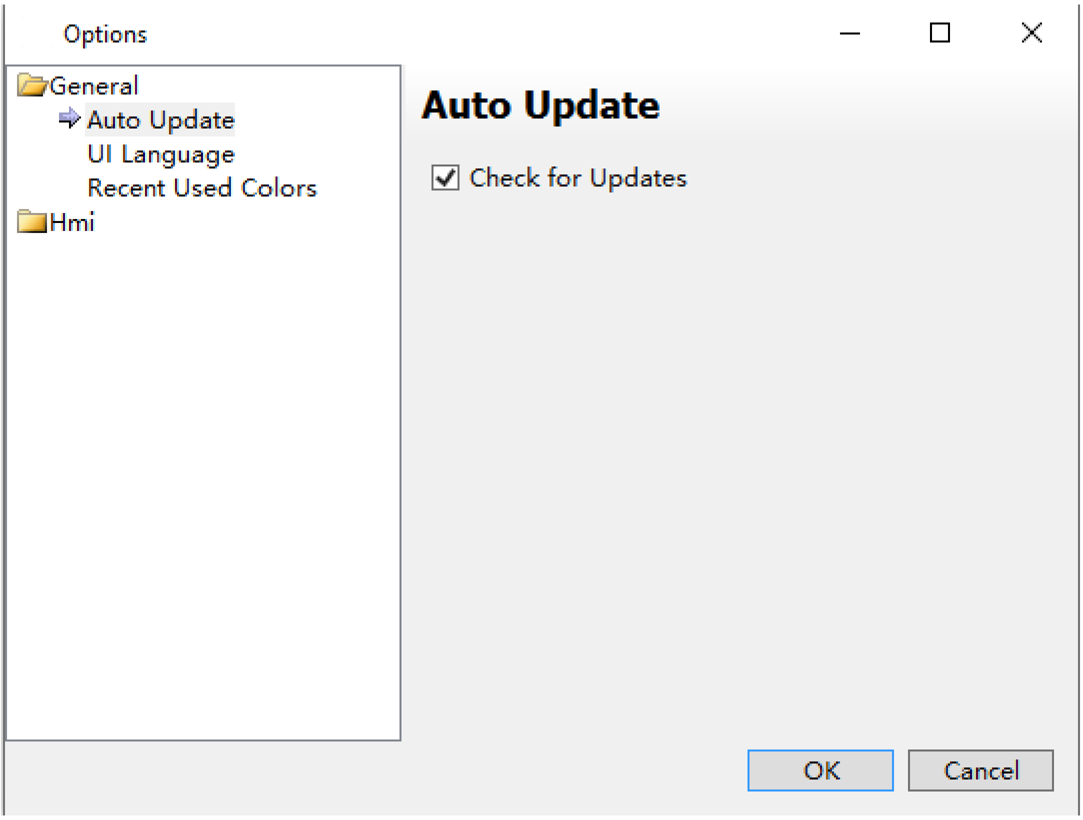
Parameter	Description
Server Authentication	Set the encryption method for emails sent by the email server: ◆ None: No encryption. ◆ TLS: Encrypted using the TLS protocol. ◆ SSL: Encrypted using the SSL protocol.
Name	Sender's name.
Email	Sender's email.
Group	The group the recipient. Click the  icon to add recipient email.

14.4 Options

You can personalize the interface and settings of VI20Studio, including options such as auto update, UI language, recent used colors, automatically load the previously closed project, auto-recovery, windows layout, and tool sets.

14.4.1 Auto Update

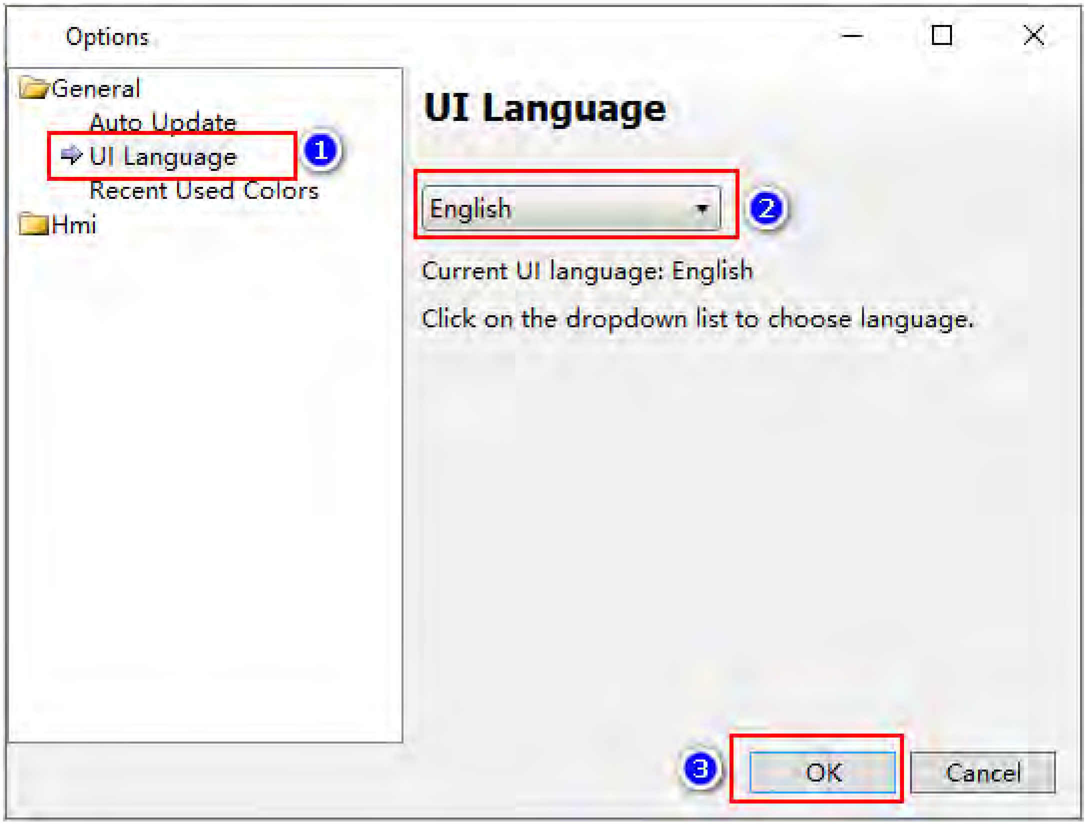
Select **Settings/Options** from the menu bar, select **General/Auto Update** in the pop-up dialog box, check **Check for Updates**, click **OK**. When running VI20Studio software again, it automatically checks the cloud server for any new software versions. If a new version is detected, click **Update now**，VI20Studio will initiate an automatic software upgrade to the latest version.



14.4.2 UI Language

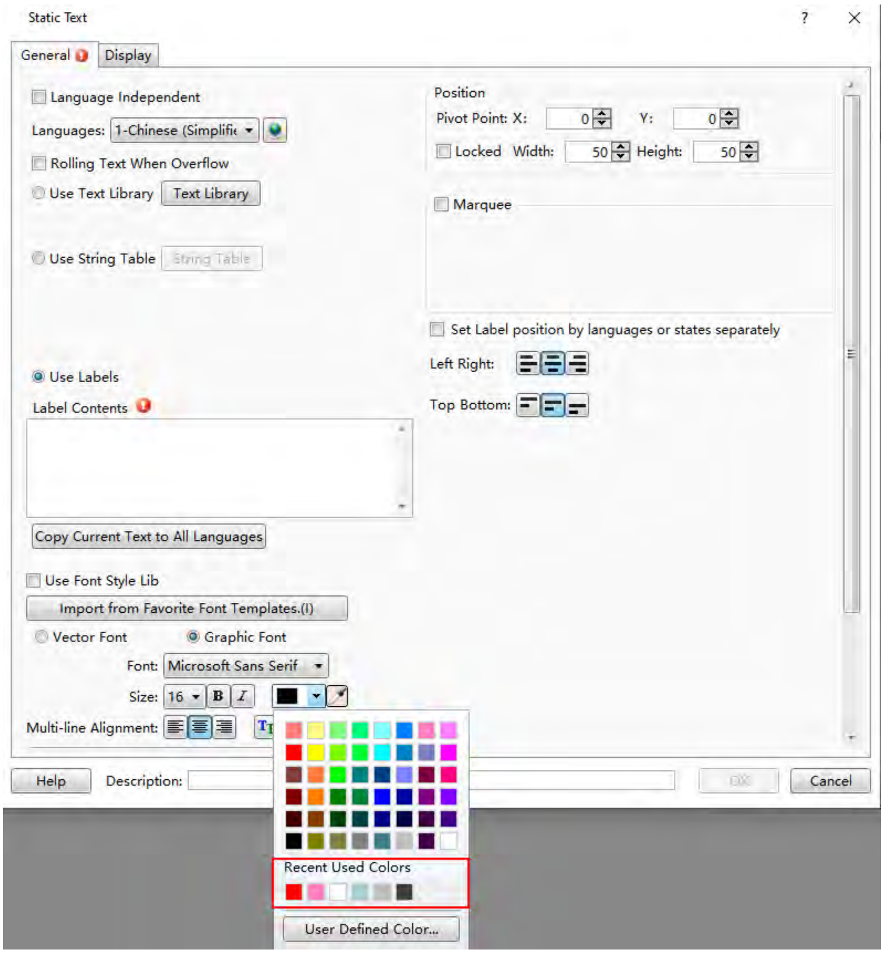
UI language can be set, supporting Chinese, English, Russian, Turkish, Persian, Korean and Spanish.

Select **Settings/Options** from the menu bar, select **General/UI Language** in the pop-up dialog box, select the language to be set, and click **OK** to switch the UI language.



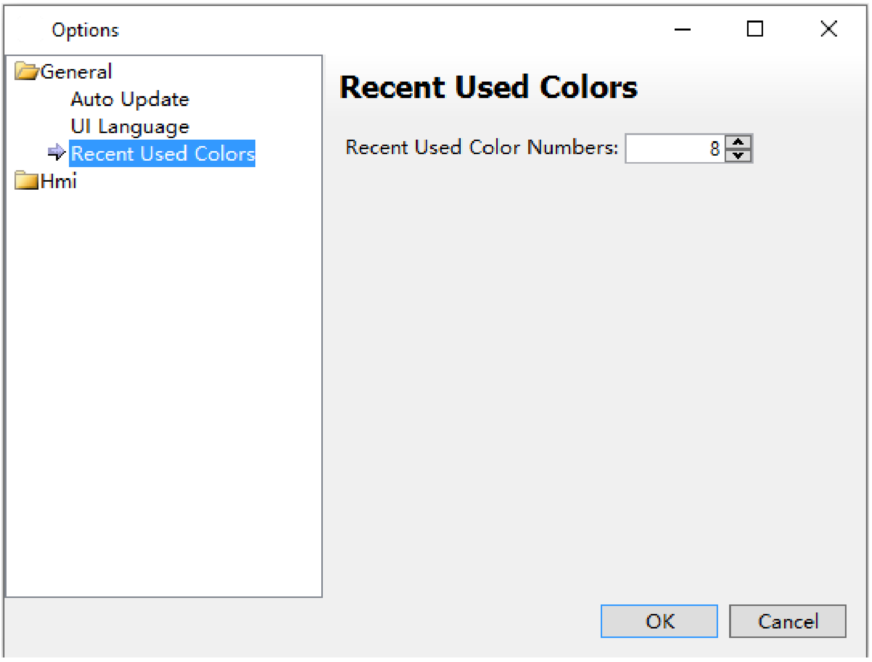
14.4.3 Recent Colors

When setting the color property of a component, the “Recent Used Color” will be displayed when selecting a color. The number of recently used colors can be customized.



The steps to set the number of recently used colors are as follows:

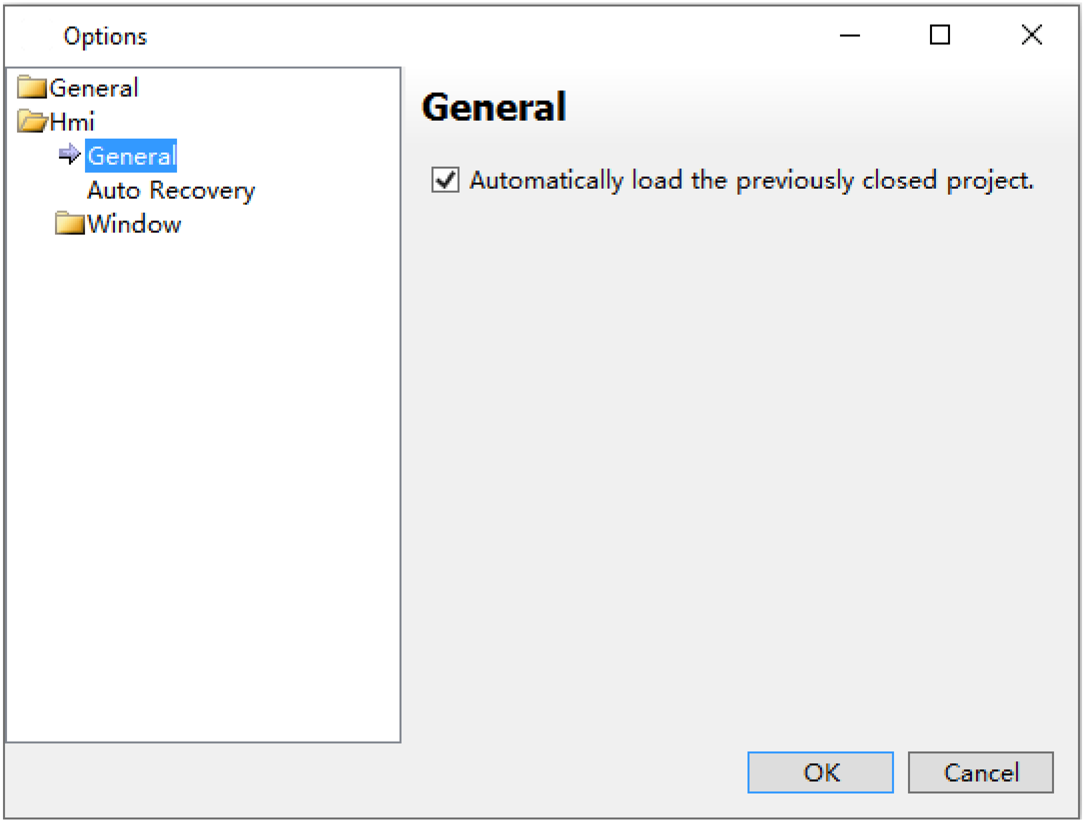
Select **Settings/Options** from the menu bar, select **General/Recent Used Colors** in the pop-up dialog box, set the number of colors, and click **OK**.



14.4.4 Automatically load the previously closed project

After setting to automatically load the previously closed project, running the VI20Studio software will automatically load the last closed project. The steps are as follows:

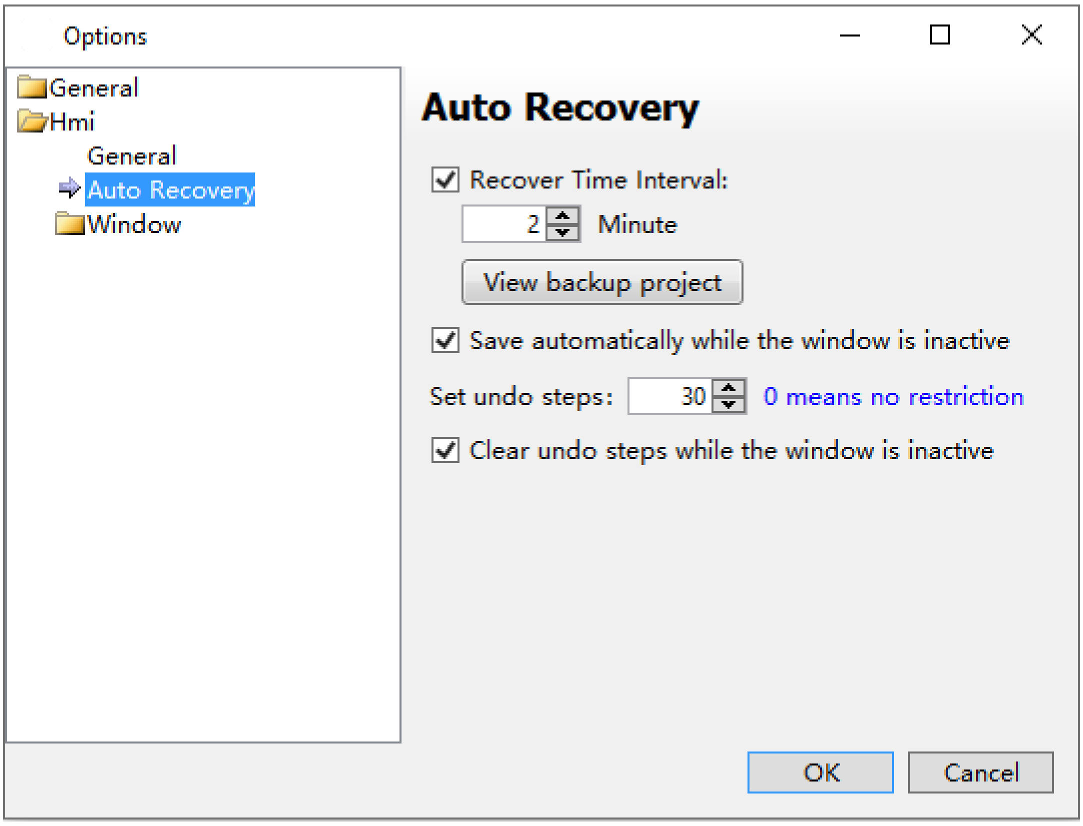
Select **Settings/Options** from the menu bar, select **HMI/General** in the pop-up dialog box, check **Automatically load the previously closed project**, and click **OK**.



14.4.5 Auto Recovery

The automatic recovery function can automatically save the project file, preventing the work waste caused by the user's unsaved configuration design operation.

Select **Settings/Options** from the menu bar, select **HMI/Auto Recovery** in the pop-up dialog box, edit the relevant parameters, and click **OK**.

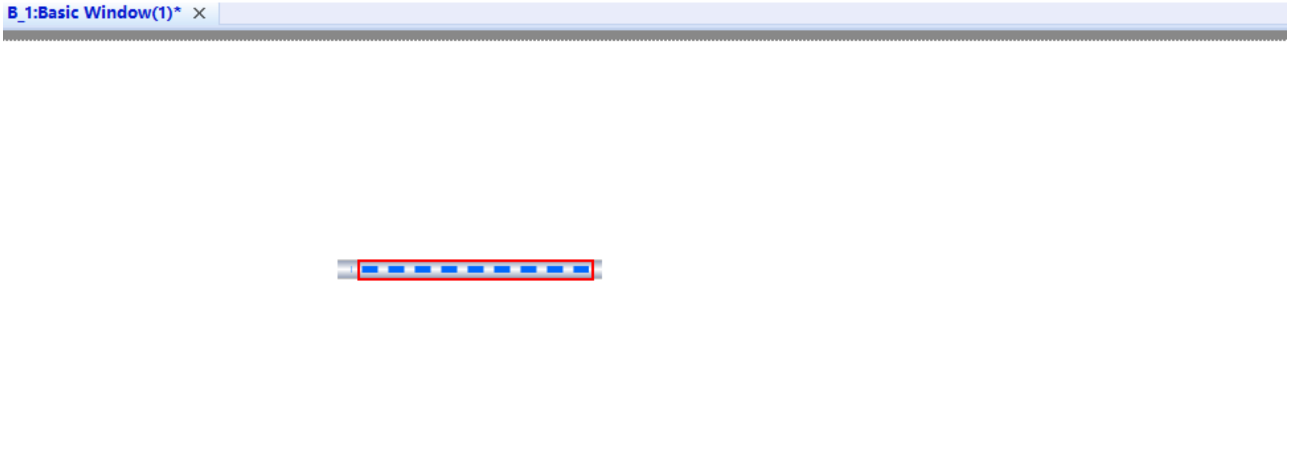


Please refer to the table below for detailed configuration methods.

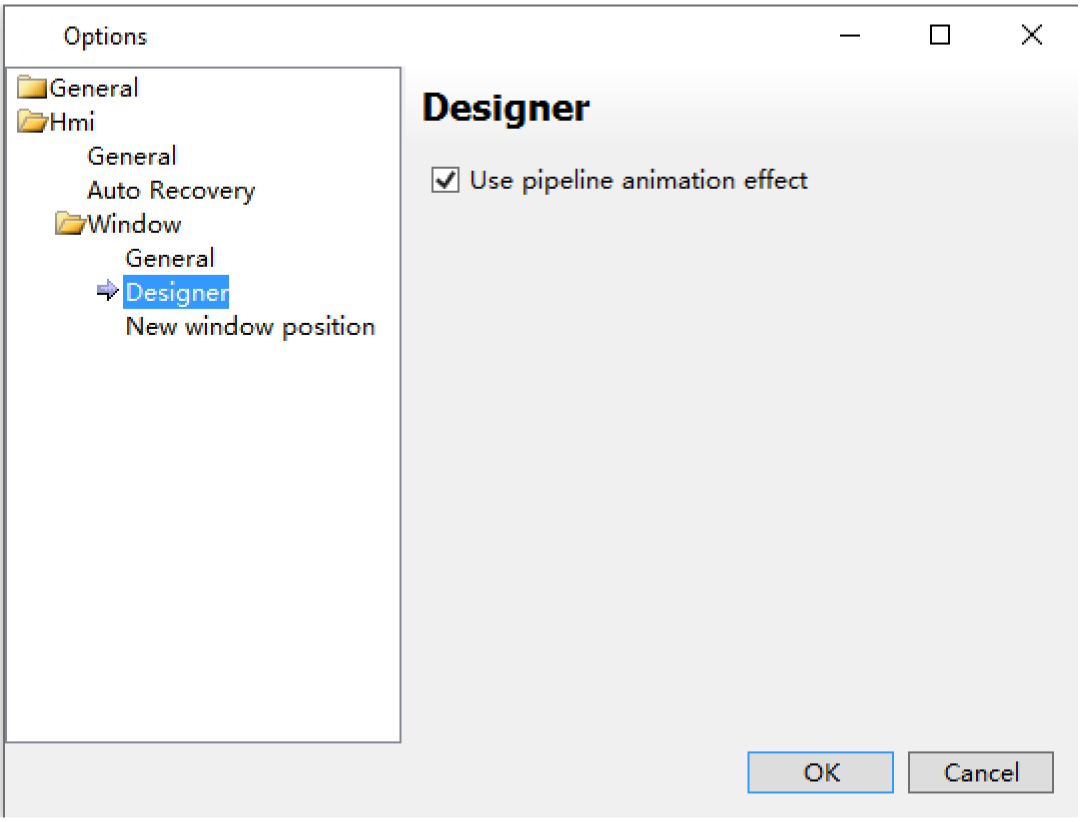
Parameters	Description
Recover Time Interval	Save Auto Recovered information at specified intervals.
View backup project	Click **View backup project** to view the automatically recovered project file.
Save automatically while the window is inactive	The project file is automatically saved when the window is turned into the background operation.
Set undo steps	The number of steps that can be undone, set to 0 means no limit.
Clear undo steps while the window is inactive	When the window is transferred to the background, the number of undo steps becomes 0 (unlimited).

14.4.6 Pipeline Animation Effect

After applying the pipeline animation effect, you can add pipeline components to the window, and the flowing blocks will simulate the flow animation effect.



Select **Settings/Options** from the menu bar, select **HMI/Window/Designer** in the pop-up dialog box, check **Use pipeline animation effect**, and click **OK**.

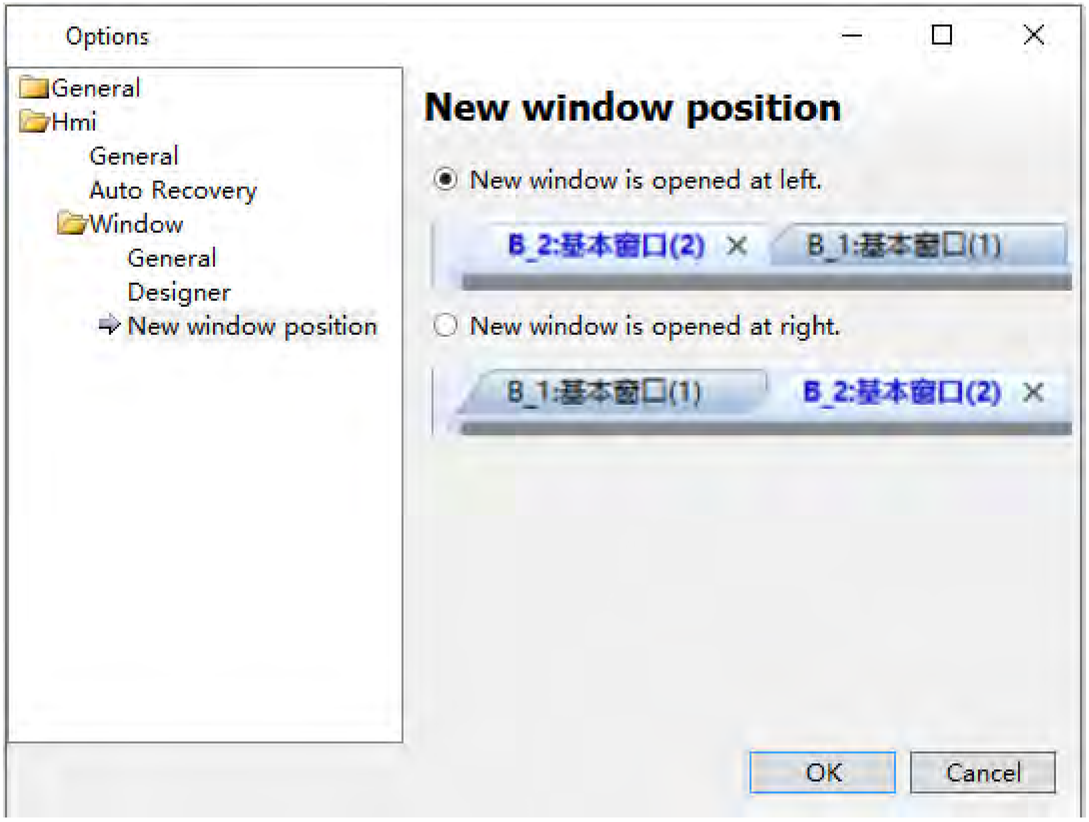


14.4.8 New Window Position

Only VI20Studio V3.0 supports the **New Window Position** feature.

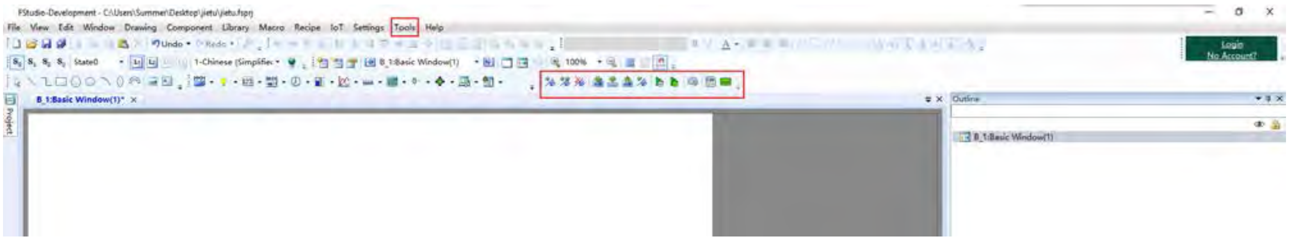
The position of the most recently opened window can be set (leftmost or rightmost). The steps are as follows:

Select **Settings/Options** from the menu bar, select **HMI/Window/New Window Position** in the pop-up dialog box, select the position of the new window, and click **OK**.



15 Tools

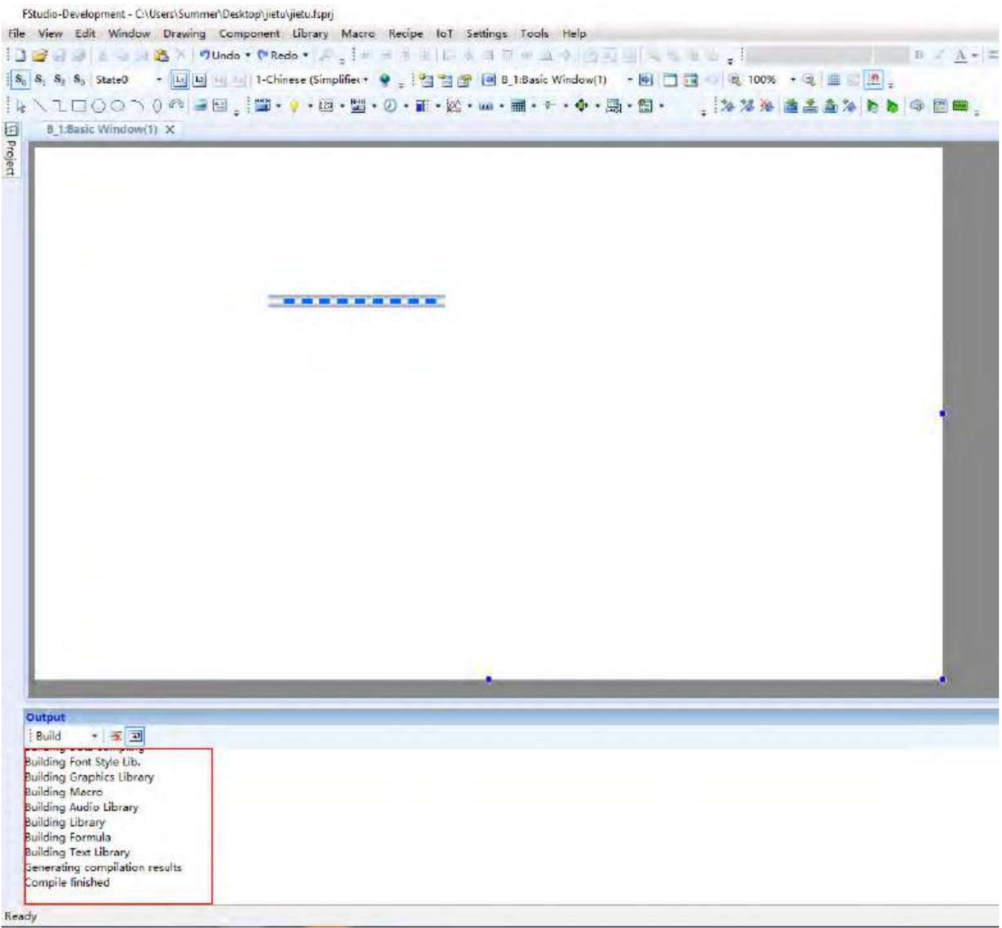
VI20Studio provides a range of tools that facilitate debugging of project files and manipulation of data, such as repairing and cleaning. These tools include compile, compile all, download, etc. You can access these tools both in the menu bar and the toolbar.



15.1 Compile

When compiling a project, first Automatically save and check whether errors exist. If no errors are found, VI20Studio creates a bin directory with related files required for simulation or downloading in the project folder. The steps are as follows:

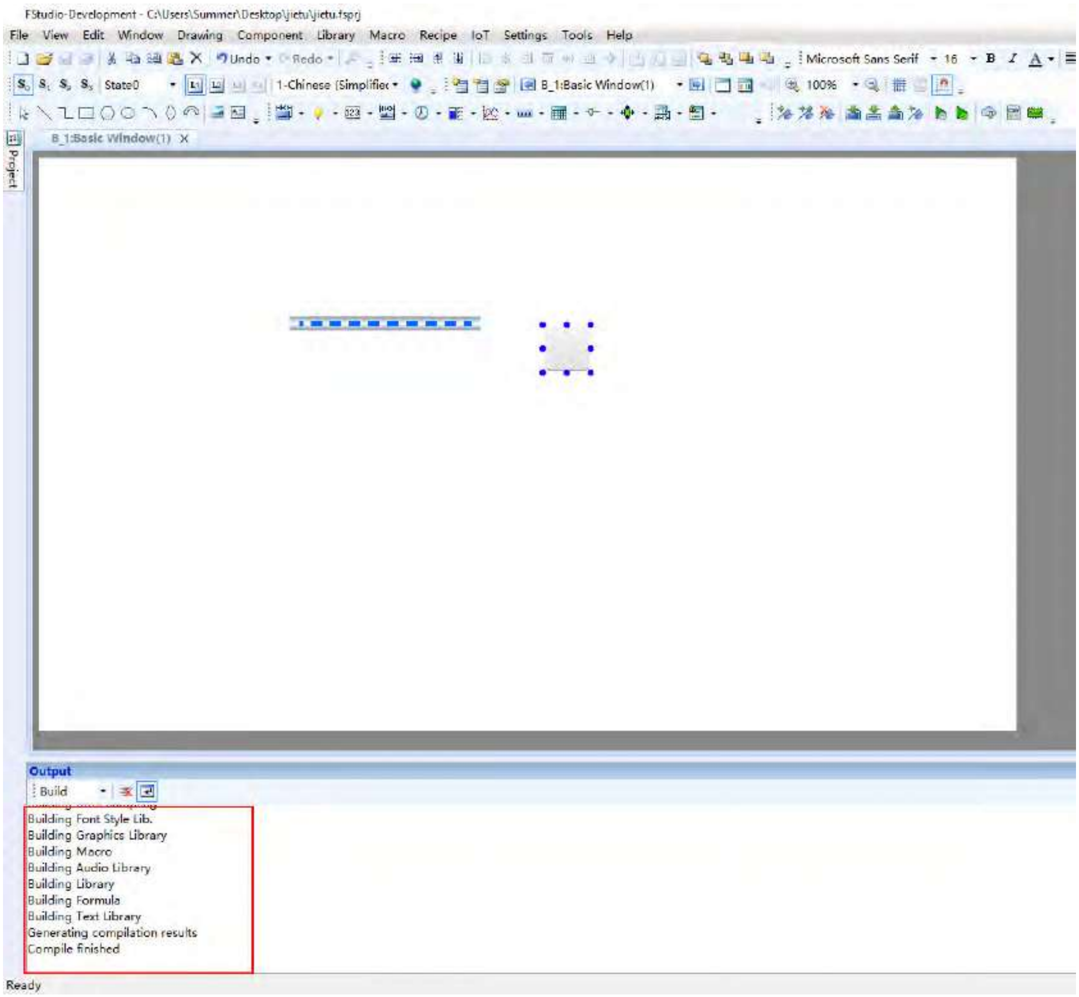
After editing the project, select **Tools/Compile** from the menu bar (shortcut key F6), VI20Studio will compile the project file and output compilation information.



15.2 Compile All

Compile all refers to automatically save the current project changes and force recompile all (no matter whether the file is modified or not).

After editing the project, select **Tools/Compile All** from the menu bar, VI20Studio will compile the project file and output compilation information.



15.3 Clear Compile Results

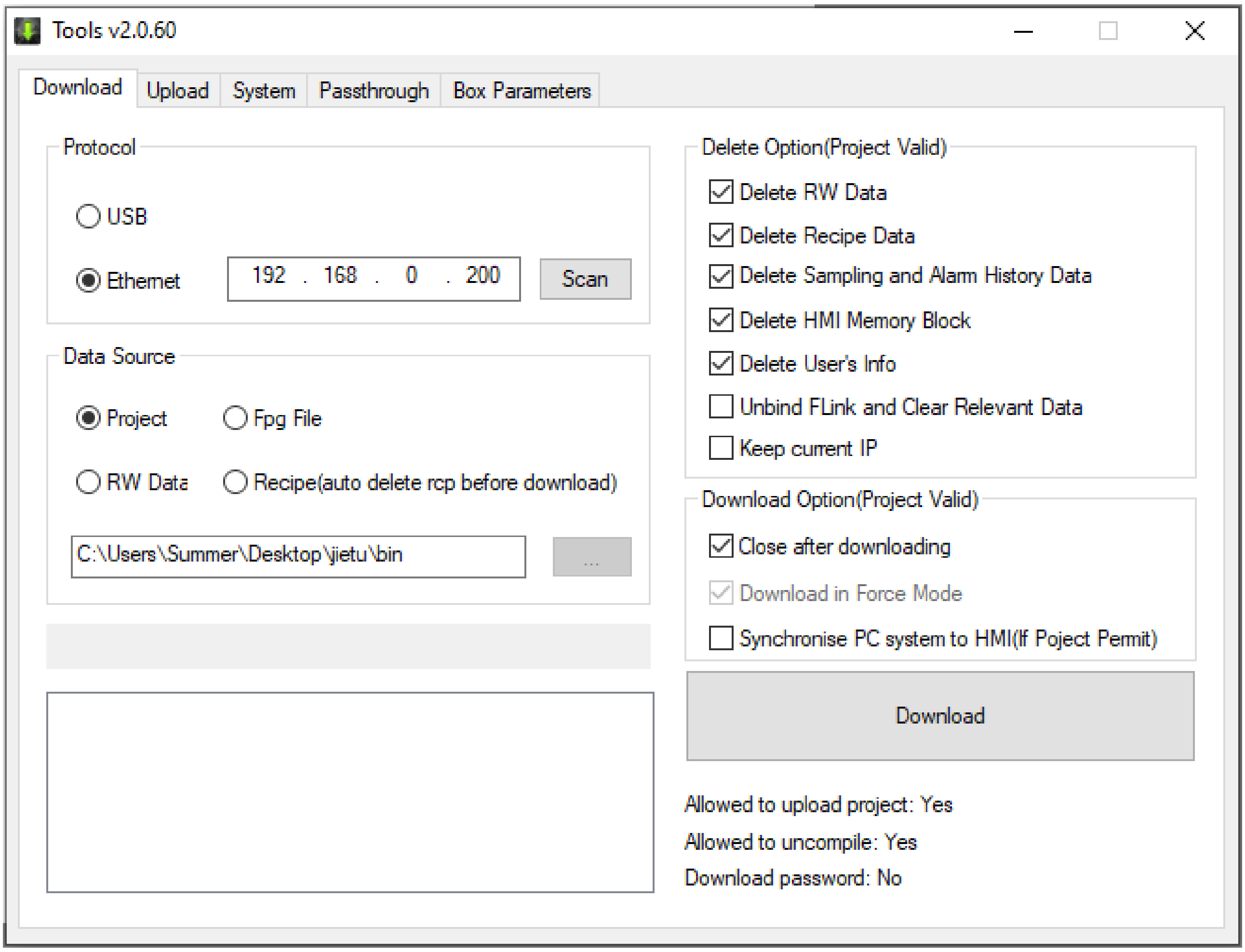
Clearing the compilation results will remove all compiled outputs as well as user data, recipe data, and any other data generated during the simulation process. The steps are as follows:

Select **Tools/Clear Compile Result** from the menu bar, click **Yes** in the pop-up dialog box to clear compile results.

15.4 Download

Download refers to downloading project files to HMI, and supports downloading via Ethernet or USB.

After editing the project, select **Tools/Download** from the menu bar to enter the following interface.



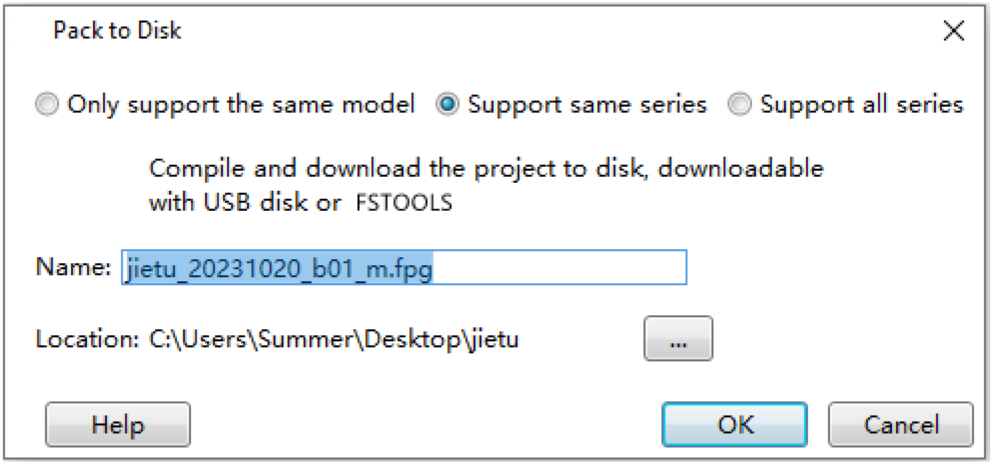
For the detailed operation of downloading, please refer to Download Project to HMI.

15.5 Pack to Disk

Pack the project compilation file to the disk, and use the USB disk or the download tool provided by VI20Studio to download the project compilation file to the HMI.

The steps to pack to disk are as follows:

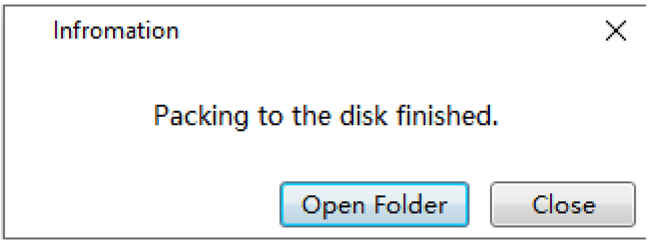
Step 1. Select **Tools/Pack to Disk** from the menu bar, edit the relevant parameters, and click **OK**.



Please refer to the table below for detailed configuration methods.

Parameters	Description
Only support the same model	The packaged project files can only be downloaded to HMIs of the same model.
Support same series	The packaged project files can only be downloaded to HMIs of the same series.
Support all series	The packaged project files can only be downloaded to all series of HMIs.
Name	File name of the packaged project file with suffix .fpg.
Location	Click the  icon to set the packaged project file location.

Step 2. Click **Open Folder** in the pop-up dialog box to view the packaged project files.



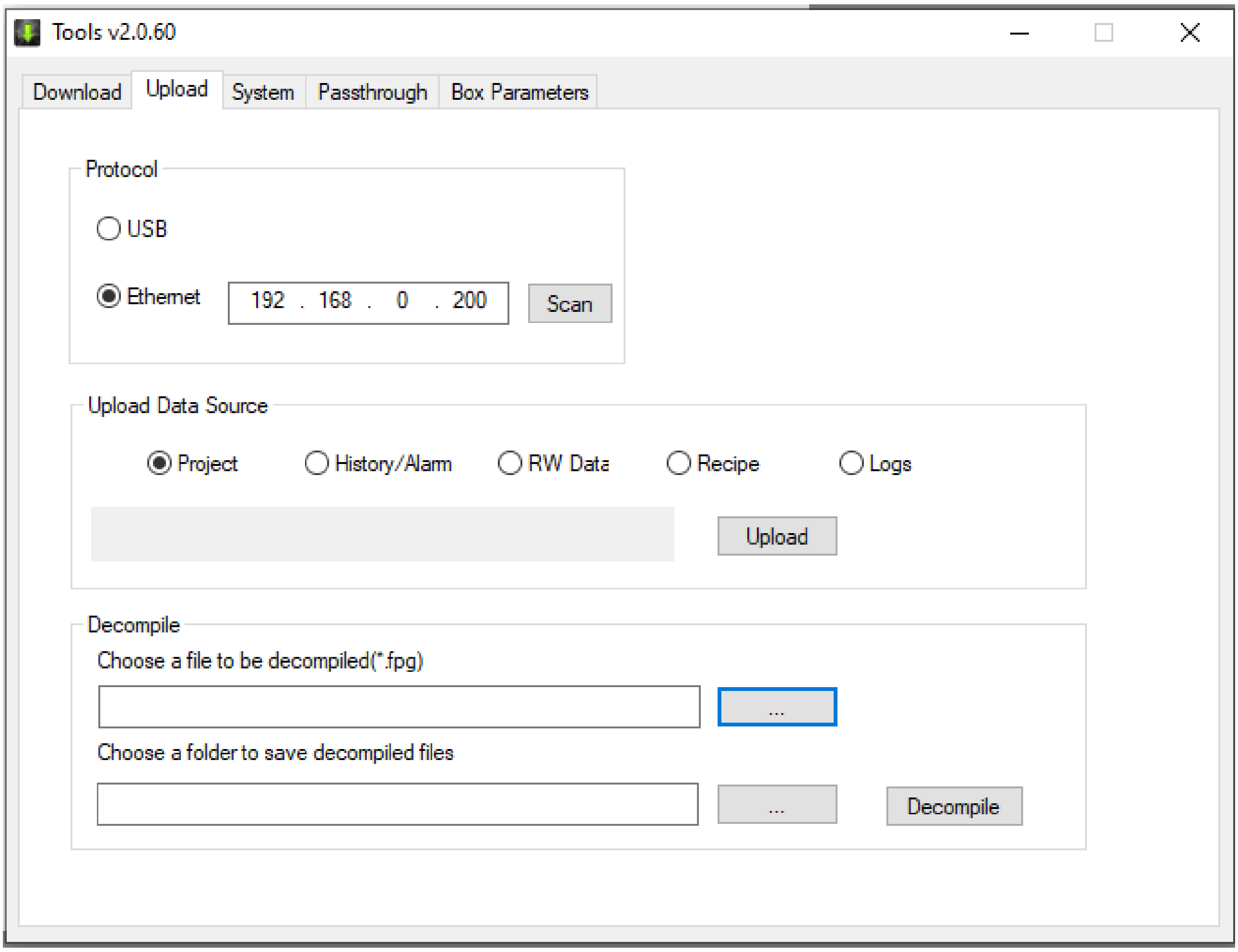
15.6 Upload

To perform an upload operation, you need to configure the project properties in the **Global Settings** to **Allow Upload** and set an upload password. For detailed information on global settings, please refer to Global Settings.

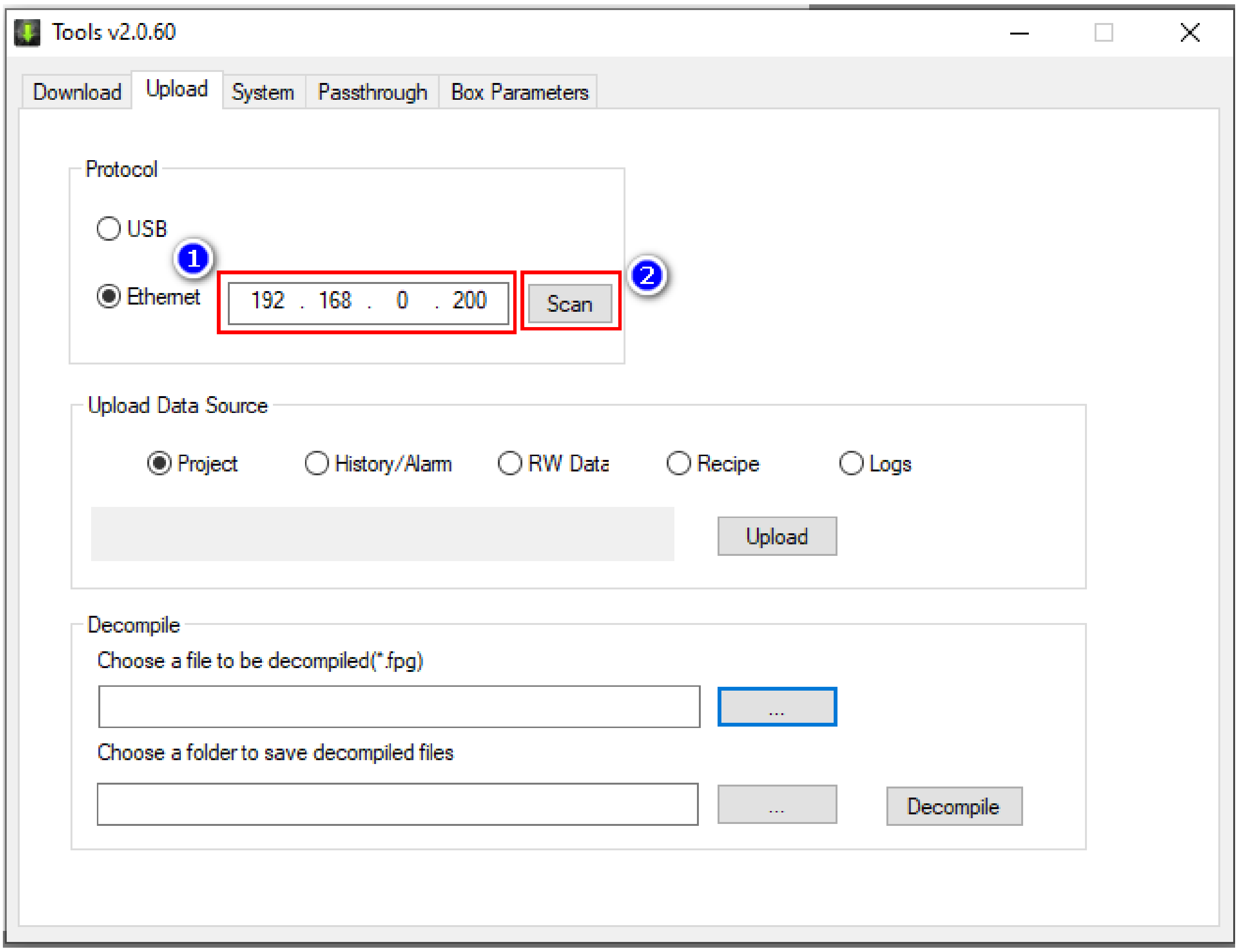
To upload data from the HMI (such as project files, historical data/alarms, RW data, recipes, and logs) to a PC using Ethernet or USB, follow these steps:

Step 1. Connect the HMI and PC using an Ethernet cable or USB cable.

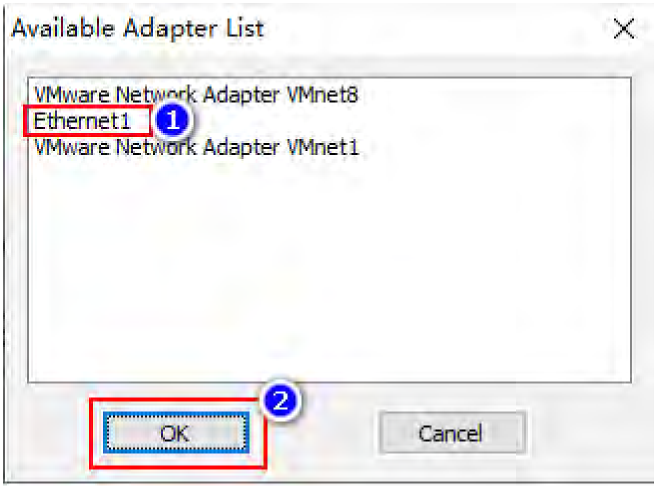
Step 2. Select **Tools/Upload** from the menu bar. In the popup dialog box, choose the communication method (Ethernet or USB, this example assumes Ethernet).



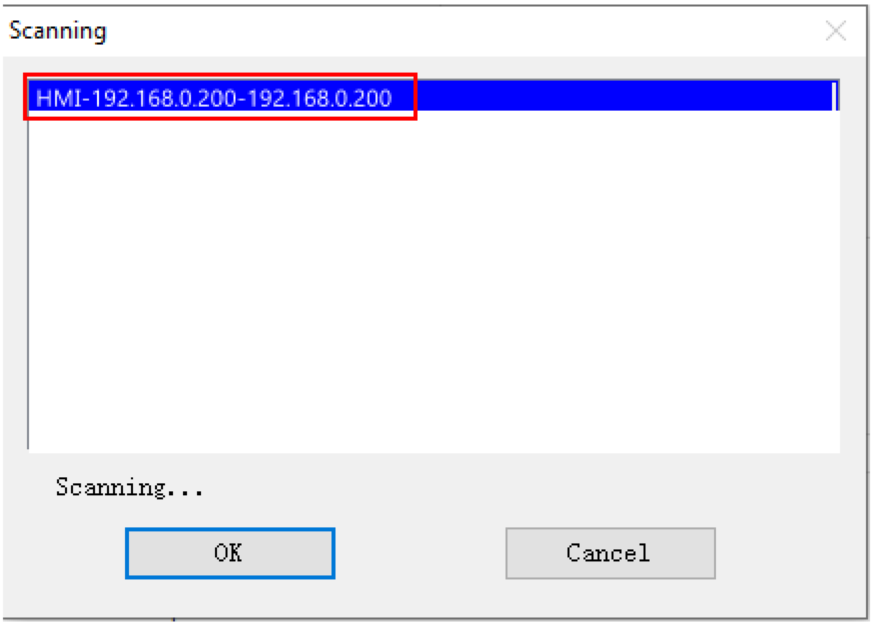
Step 3. Set IP address (IP address or segment of HMI), click **Scan**.



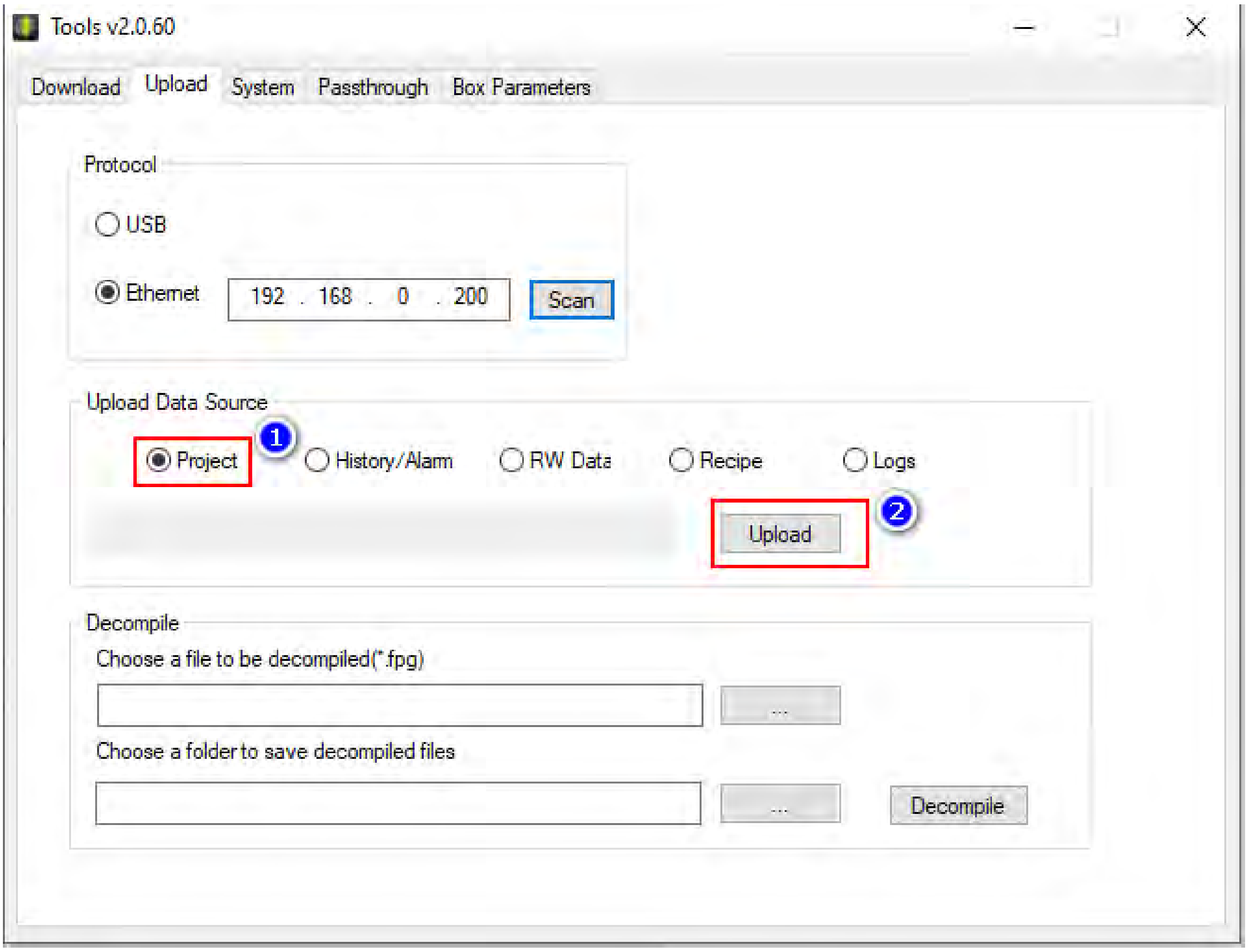
Step 4. Select the network adapter (PC adapter, used to connect HMI) in the pop-up dialog box, click **OK**.



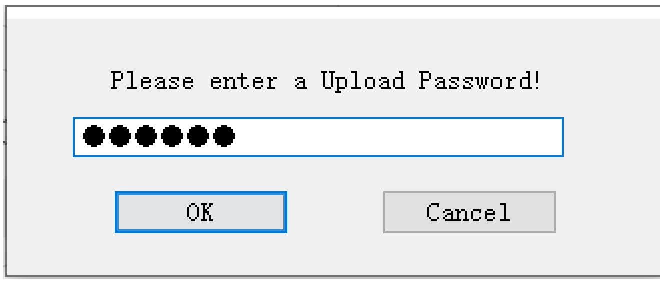
Step 5. Select the scanned HMI, click **OK**.



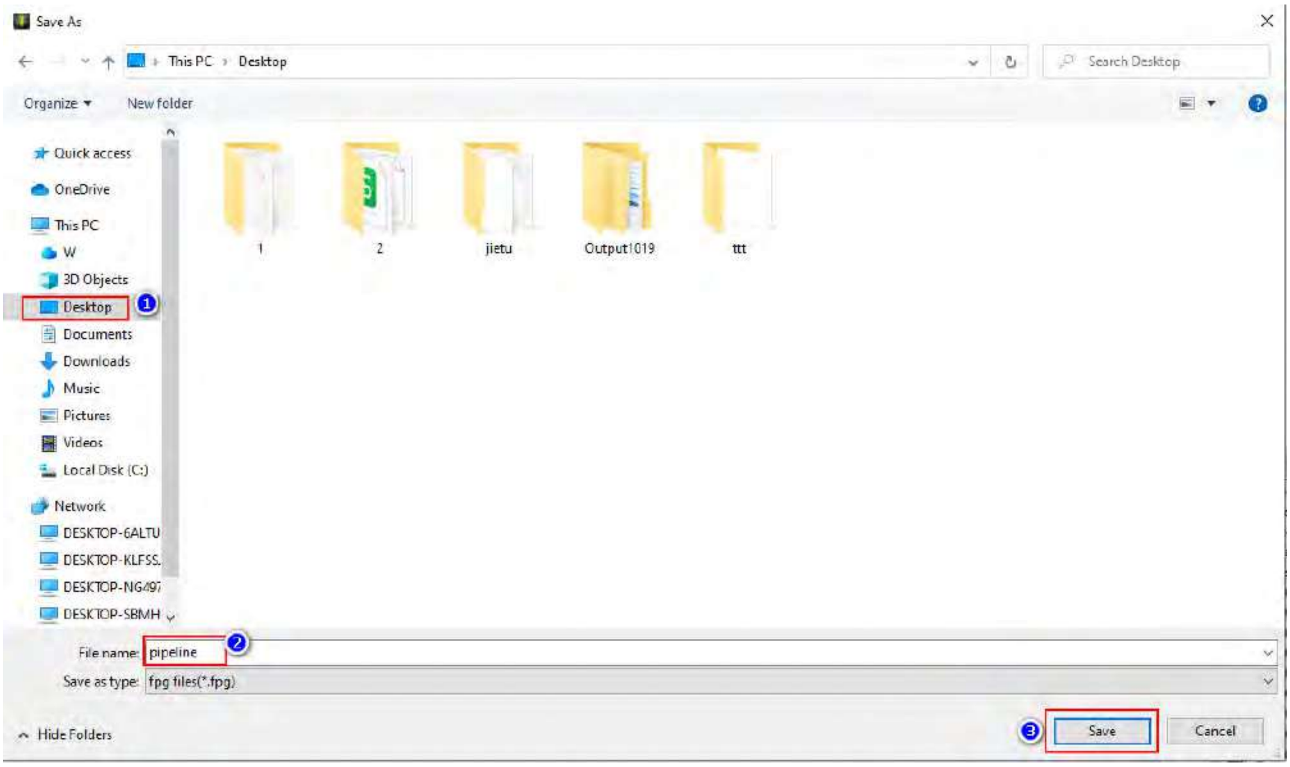
Step 6. Select the data to be uploaded (such as “project”), click **Upload**.



Step 7. Enter the password in the pop-up dialog box, click **OK**.



Step 8. Select the save path in the pop-up dialog box, set file name, click **Save**.



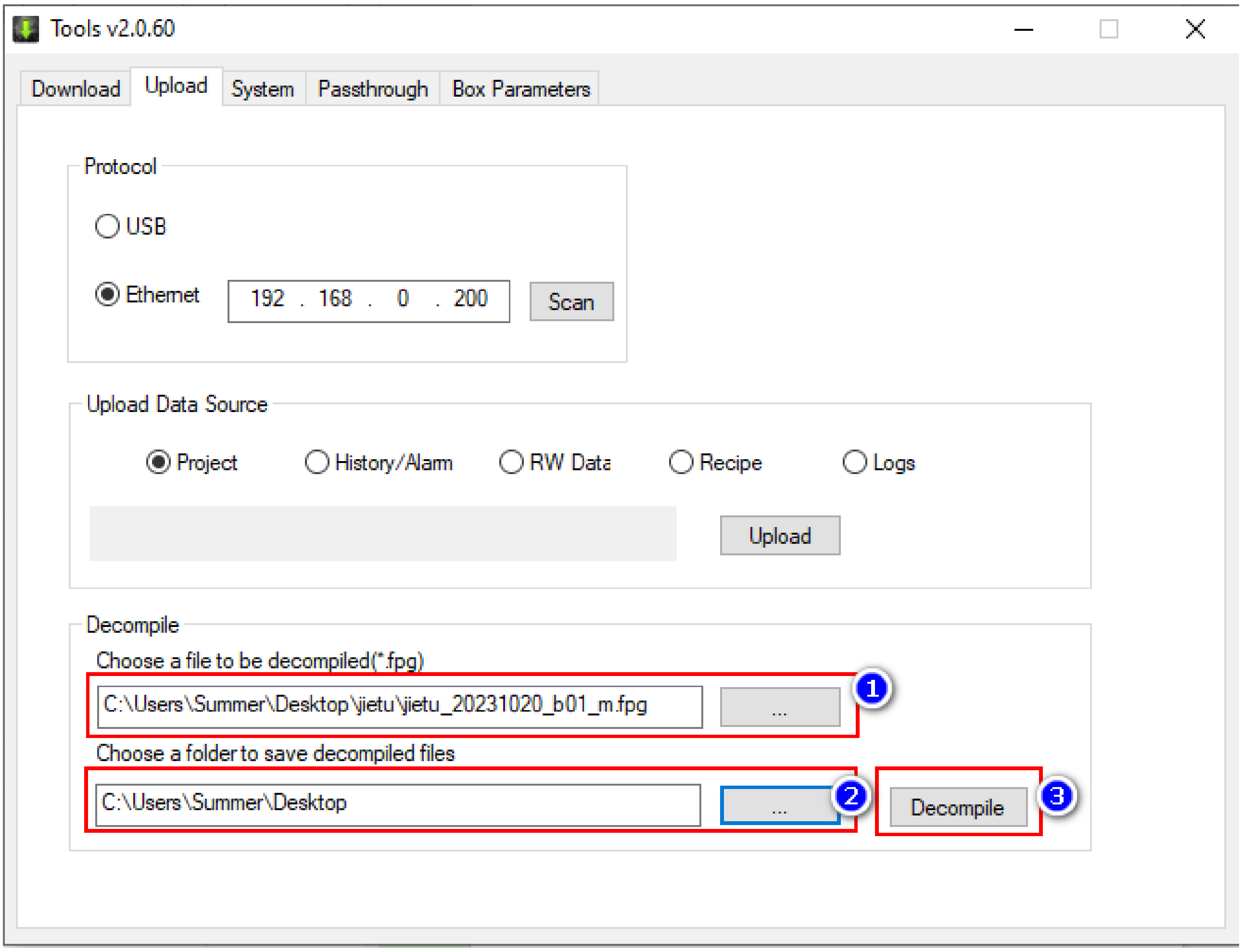
Step 9. Wait for the file to be uploaded automatically, and the HMI will automatically restart after the upload is complete.

15.7 Decompile

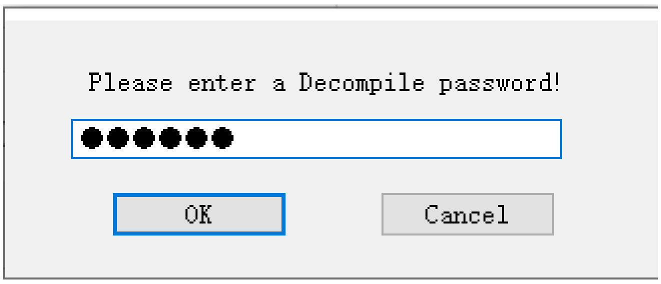
To perform a decompile operation, you need to configure the project properties in the **Global Settings** to **Allow Decompile** and set a decompile password. For detailed information on global settings, please refer to Global Settings.

The project compilation file (fpg file) can be decompiled. The steps are as follows:

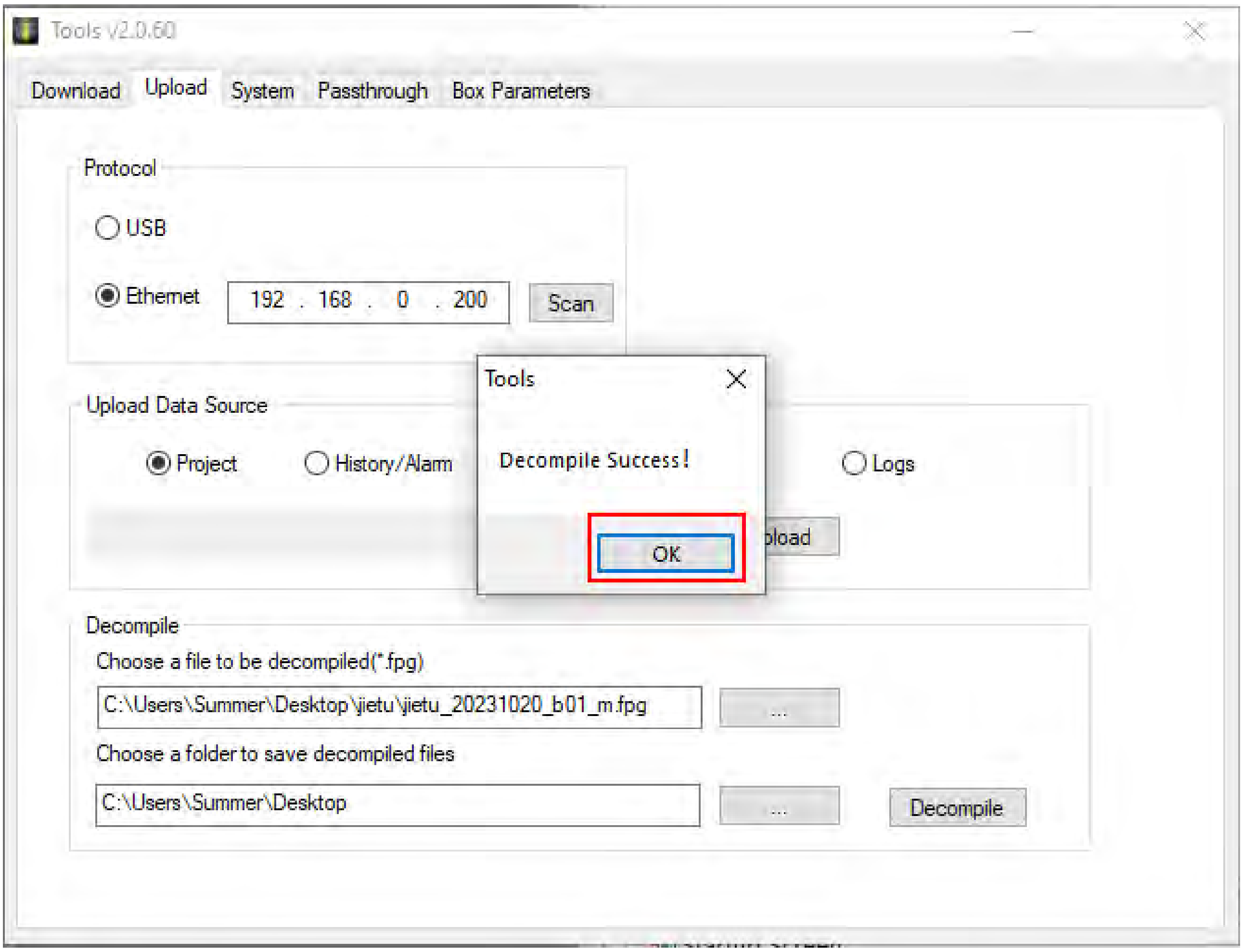
Step 1. Select **Tools/Decompile** from the menu bar, select the decompile file and target folder in the pop-up dialog box, and click **Decompile**.



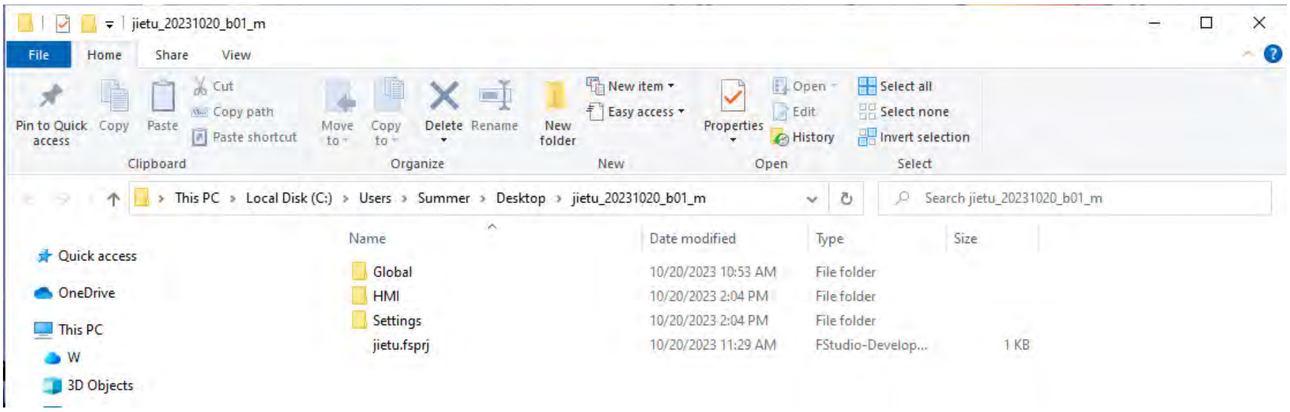
Step 2. Enter the decompilation password in the pop-up dialog box, and click **OK**.



Step 3. The system prompts “Decompiled successfully”, click **OK**.



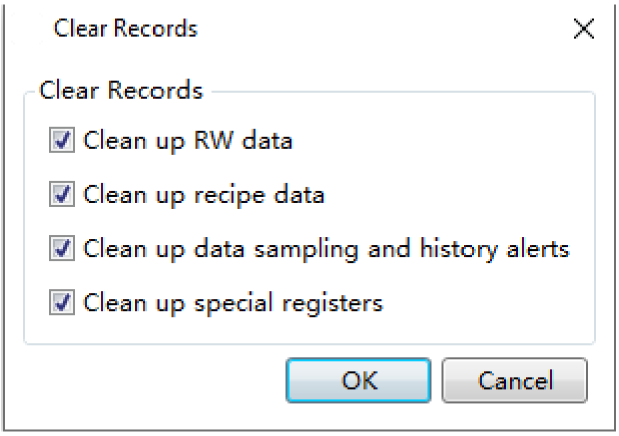
Step 4. The decompiled files can be viewed in the target folder.



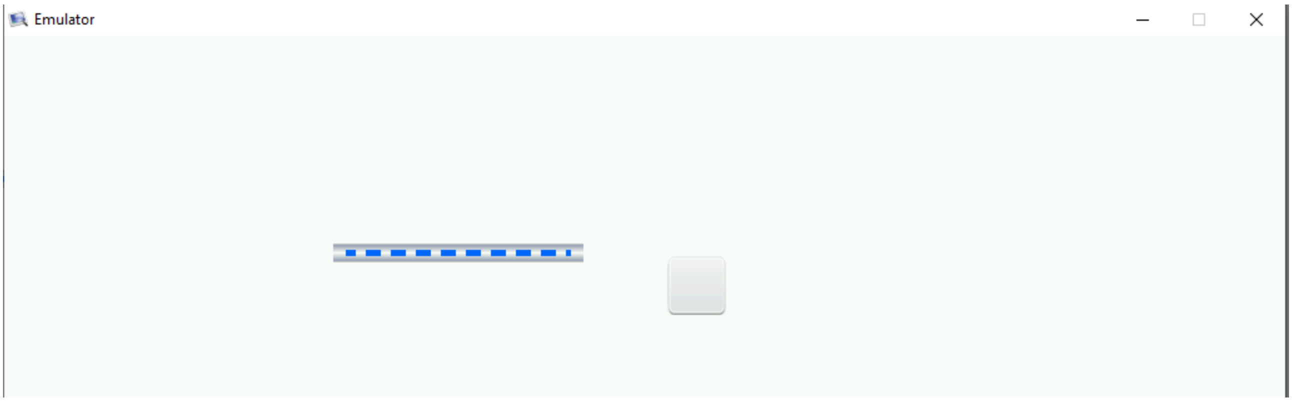
15.8 Offline Simulation

Offline simulation refers to the situation where a simulated project runs offline in the HMI(without being connected to other devices). During offline simulation, the current project is automatically saved, and the FSGui simulator is launched. Additionally, a bin directory is generated to store files such as recipes and data records. The steps are as follows:

Step 1.Select **Tools/Offline Simulation** from the menu bar (shortcut key is “F5”), check the data you need to clear in the pop-up dialogue box and click **OK**.



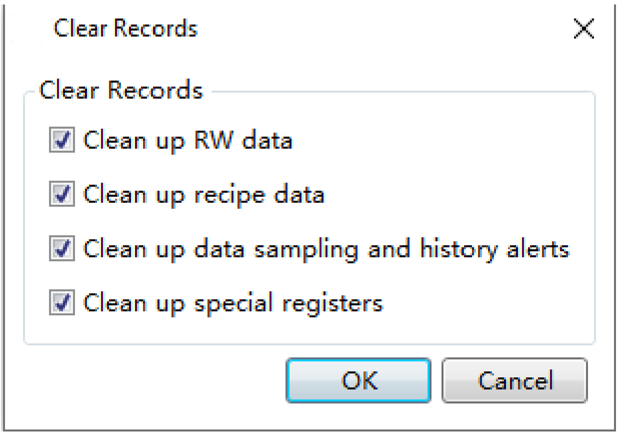
Step 2. Enter the **Emulator** interface, you can simulate the corresponding operation of the HMI (using the mouse to click the corresponding components is equivalent to touching the components in the HMI screen), in order to verify the effect of configuration.



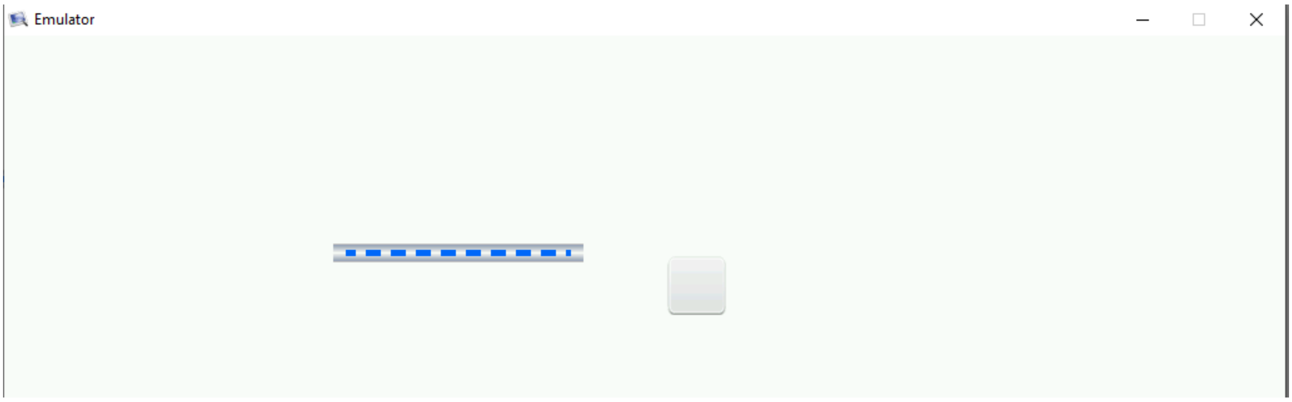
15.9 Online Simulation

Online simulation refers to simulating the operation of an HMI project in an online state, where it communicates with external devices such as PLCs.

Step 1.Select **Tools/Online Simulation** from the menu bar (shortcut key is “F4”), check the data you need to clear in the pop-up dialogue box and click **OK**.



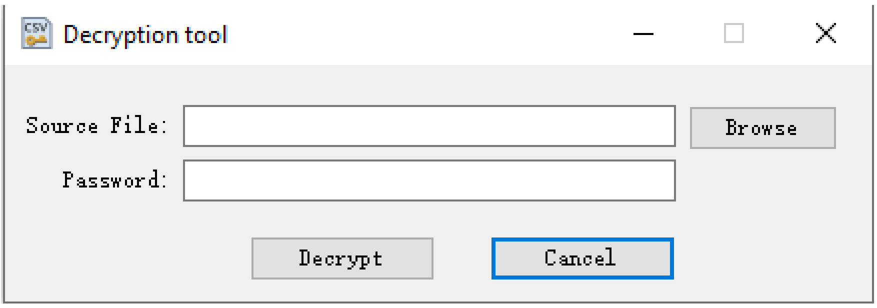
Step 2. Enter the **Emulator** interface, you can simulate the corresponding operation of the HMI (using the mouse to click the corresponding components is equivalent to touching the components in the HMI screen), in order to verify the effect of configuration design.



15.10 Decryption Tool

The decryption tool is used to decrypt encrypted CSV files (such as historical data files) exported from the HMI. Here are the steps to perform the decryption:

Select **Tools/Decrypt** from the menu bar. In the popup dialog box, click **Browse** to select the source file (the encrypted CSV file exported from the HMI). Enter the password that was set when exporting the CSV file. Click **Decrypt** to decrypt the CSV file.

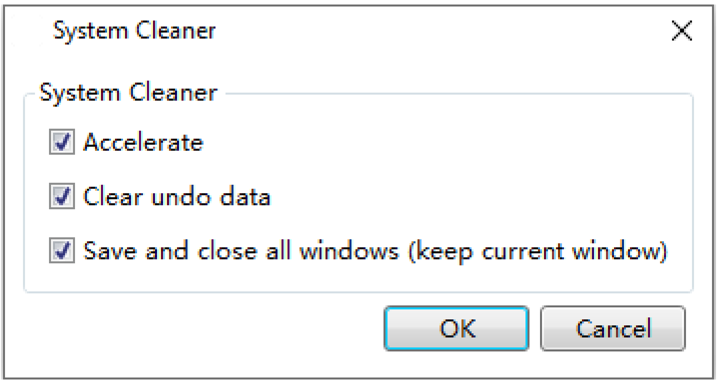


15.12 System Cleaner

You can clean up the data in the system using the following steps:

Select **Tools/System Cleaner** from the menu bar. In the popup dialog box, check the corresponding parameters.

Click **OK**.



Please refer to the table below for detailed configuration methods.

Parameter	Configuration
Accelerate	Clear the compiled cache.
Clear undo data	Clear the data involved in the undo operation.
Save and close all windows (keep current window)	Close all windows (except the current window) and save the data of all windows.

15.13 Database WindowInfo Fix

Only VI20Studio V3.0 supports the **Database WindowInfo Fix** feature.

Select **Tools/Fix Tools/Database WindowInfo Fix** to fix the windows information data.

15.14 Variable Tag Address Index Fix

Only VI20Studio V3.0 supports the **Variable Tag Index Fix** feature.

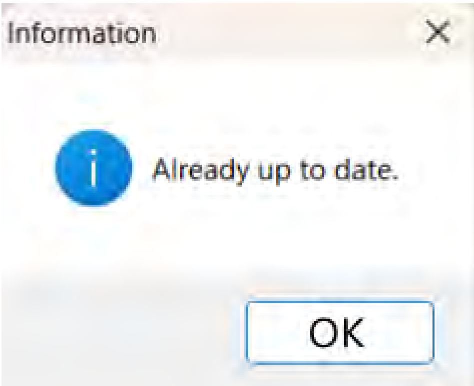
Select **Tools/Fix Tools/Variable Tag Index Fix**, click **Yes** in the pop-up dialog box to fix the variable tag address index.

16 Help

VI20Studio provides assistance and guidance for users to configuring screens. It offers various forms of help, including online help and interactive help.

16.1 Check for Update

Select **Help/Check for Updates** from the menu bar. The system will log in to the cloud server to check for the latest version of the software. If a new version is detected, you can proceed with an online upgrade. If no new version is detected, a message will be displayed indicating that “Alreay up to date”.



16.2 Interactive Help

Select **Help/Help** from the menu bar to view the help document (PDF file) and get the configuration method of VI20Studio.

16.3 Check System Version

Select **Help/About** from the menu bar, and you can check VI20Studio version information in the pop-up dialog box.

17 Appendix A -Communicaiton Between HMI and PLC

Veichi HMI supports communication with mainstream PLCs to realize PLC control.

17.1 Veichi PLC

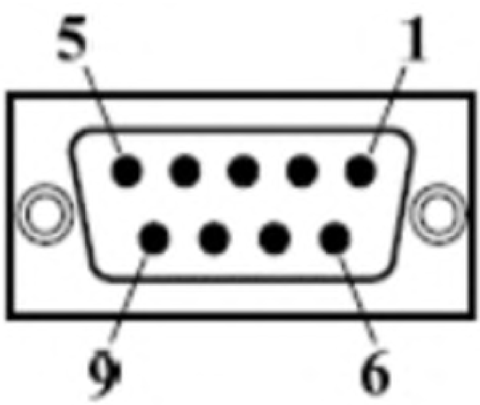
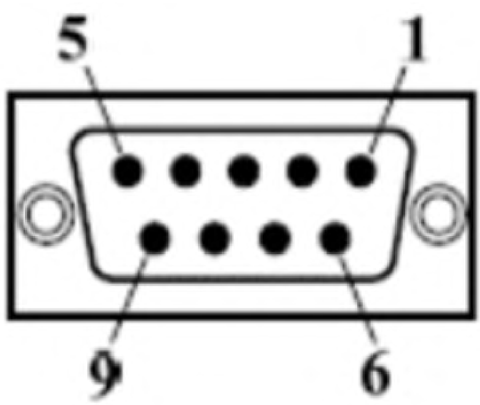
17.1.1 Serial Communication Between HMI and Veichi FL2N PLC

17.1.1.1 Connection Method

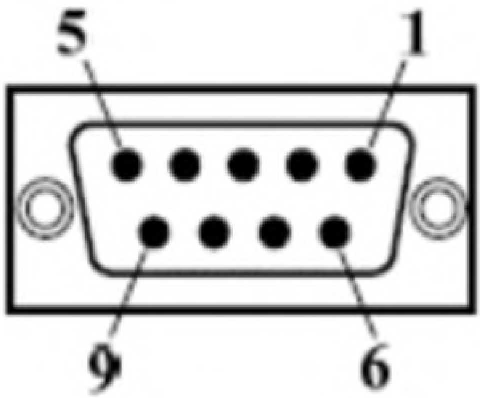
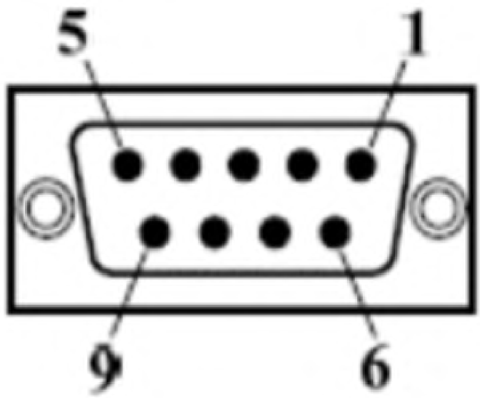
HMI and Veichi FL2N PLC use serial cable for communication, and the connection method supports RS232 and RS485-2 (two-wire mode).

- When using the RS232 cable to connect the COM1/COM2 interface of the HMI and the serial port 1 of the PLC, the connection method is shown in the table below.

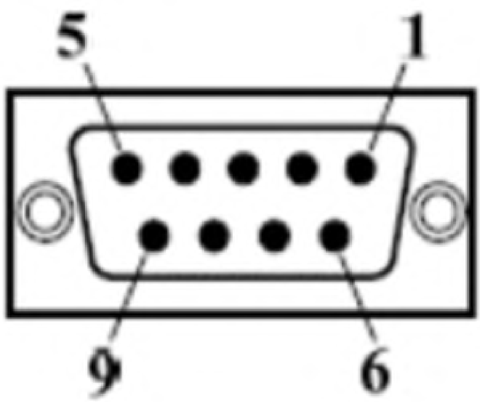
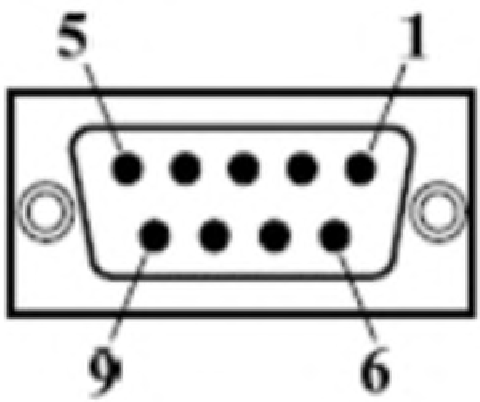
The same row in the table indicates the corresponding pins at both ends of the connection. This instruction will not be repeated in the subsequent tables.

HMI COM1/COM2 Ports(RS232 9P Female)	PLC Port1(RS232 9P Male)
2-RX	3-TX
3-TX	2-RX
5-GND	5-GND
	

- When using the RS232 cable to connect the COM3/COM4 interface of the HMI and the serial port 1 of the PLC, the connection method is shown in the table below.

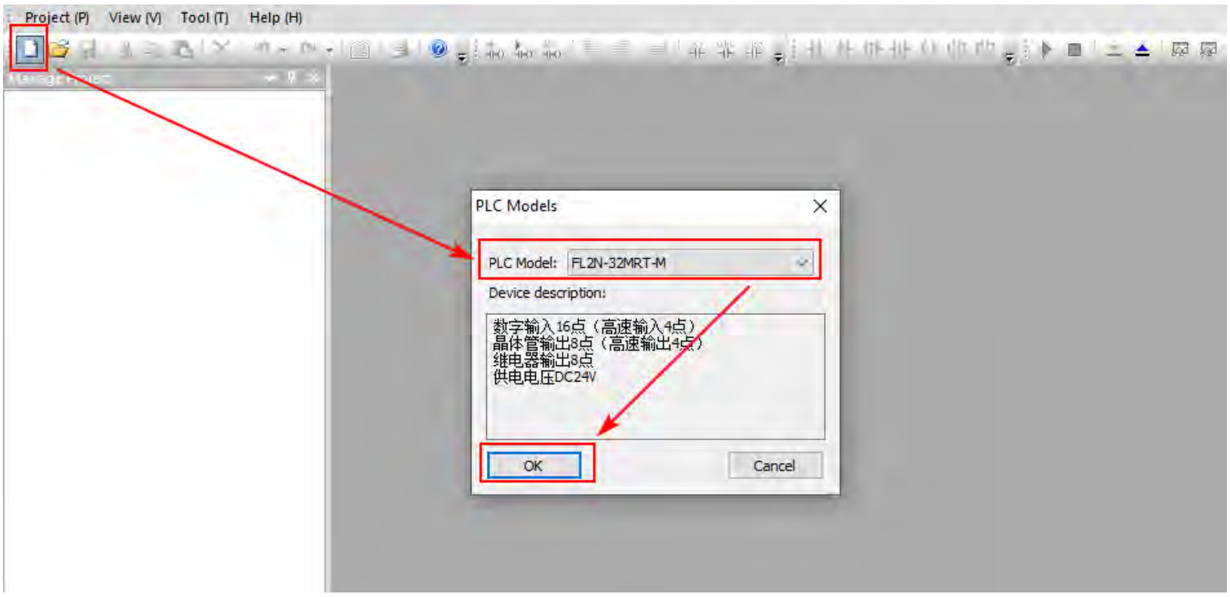
HMI COM3/COM4 Ports(RS232 9P Female)	**PLC Port1(RS232 9P Male)**
7-RX	3-TX
8-TX	2-RX
5-GND	5-GND
	

◆ When using the RS485-2 cable to connect the COM1/COM2 interface of the HMI and the serial port 2 of the PLC, the connection method is shown in the table below.

HMI COM1/COM2 Ports(RS485 9P Female)	**PLC Port2(RS485 9P Male)**
1-RX-	1-B-
6-RX+	6-A+
5-GND	5-GND
	

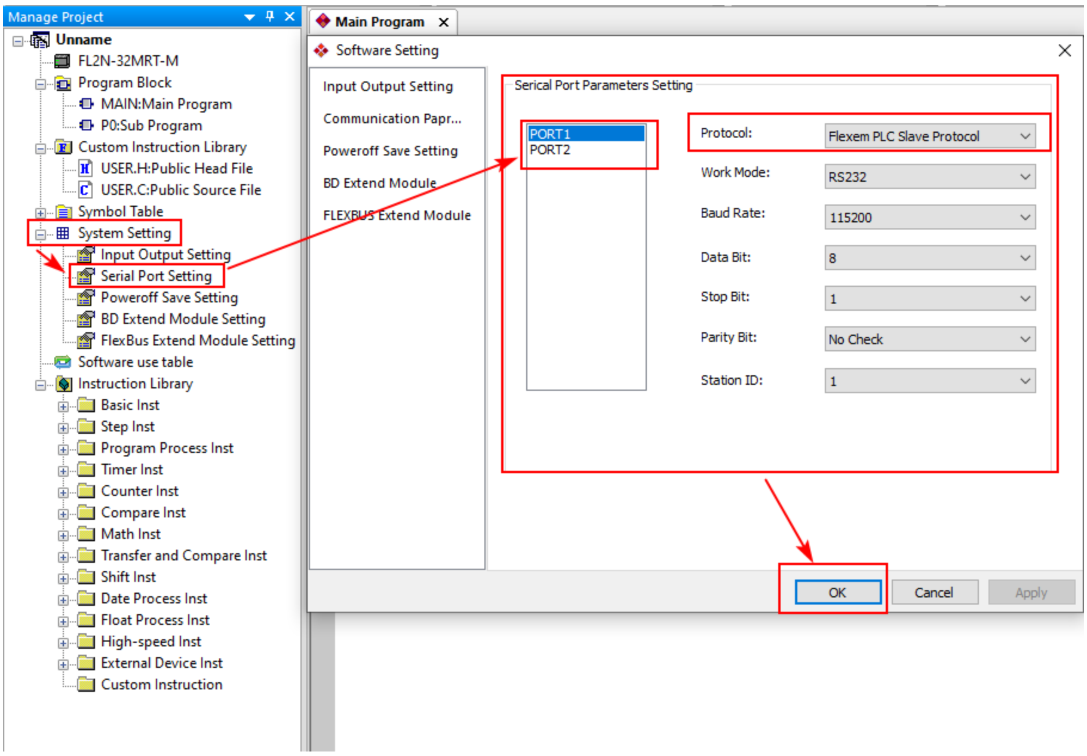
17.1.1.2 Configure PLC

Step 1. Run the PLC configuration software FlexLogic, create a new project. Please refer to the figure below for detailed operations.

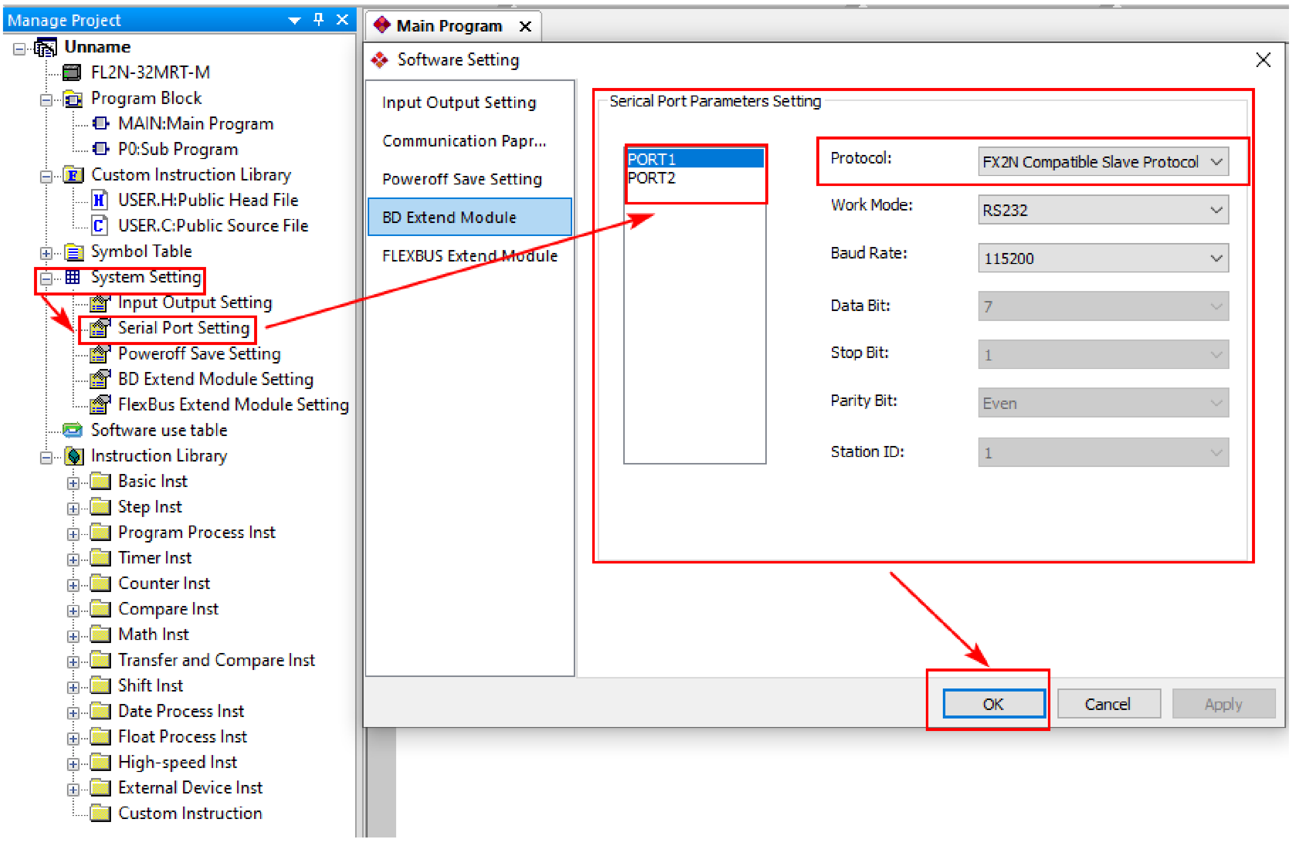


Step 2. Set communication parameters.

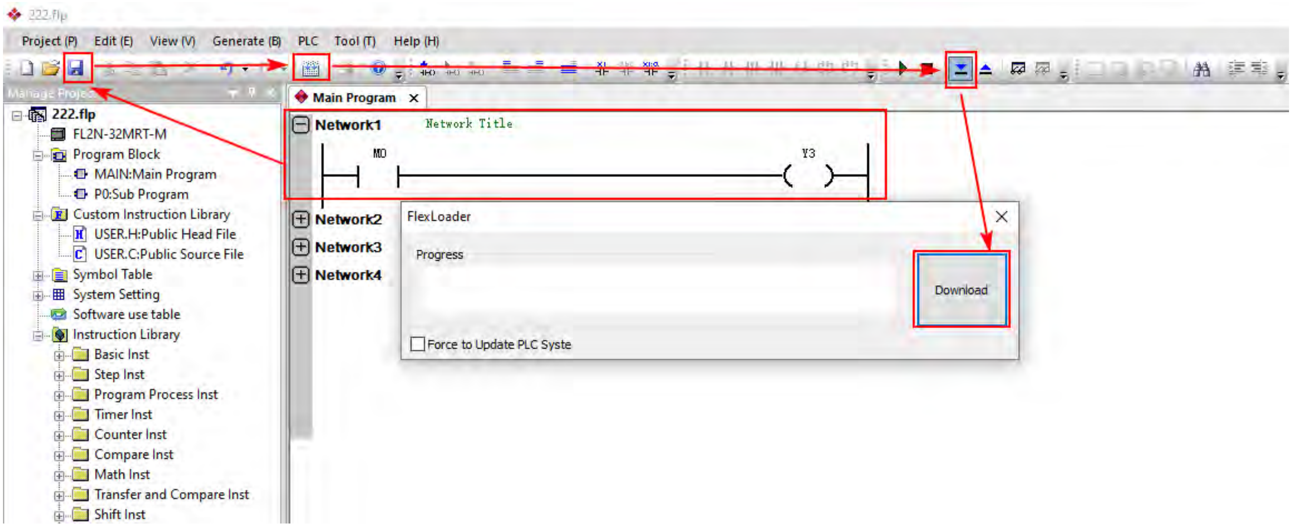
- When selecting the “Veichi Modbus protocol” for communication, if PORT1 is selected, the default working mode is RS232; if PORT2 is selected, the default working mode is RS485 (RS485-2). You can customize the settings for baud rate, data bits, stop bits, parity, and device station number.



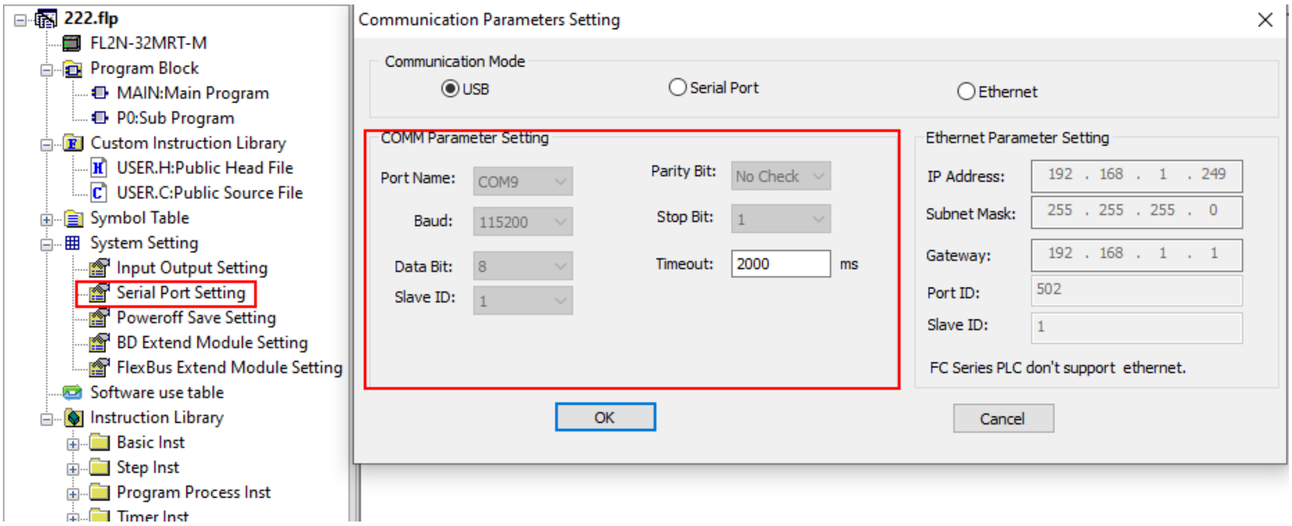
- When selecting the "Compatible with FX2N slave protocol" for communication, if PORT1 is selected, the default working mode is RS232; if PORT2 is selected, the default working mode is RS485 (RS485-2). The baud rate can be customized, with the default data bits set to 7, stop bits set to 1, parity set to even parity, and device station number set to 1.



Step 3. Set the ladder diagram, save project and compile, download project to PLC.



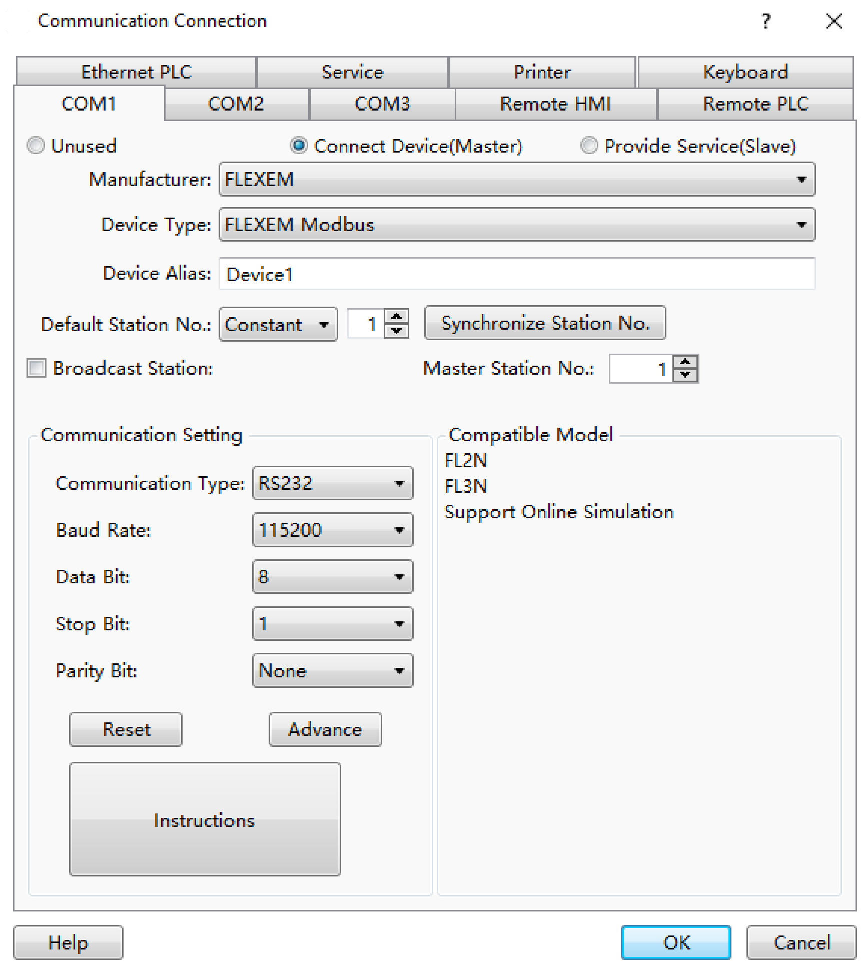
Select **Tools/Communication Settings** from the menu bar, and you can see the three methods to download a project as shown in the picture below.



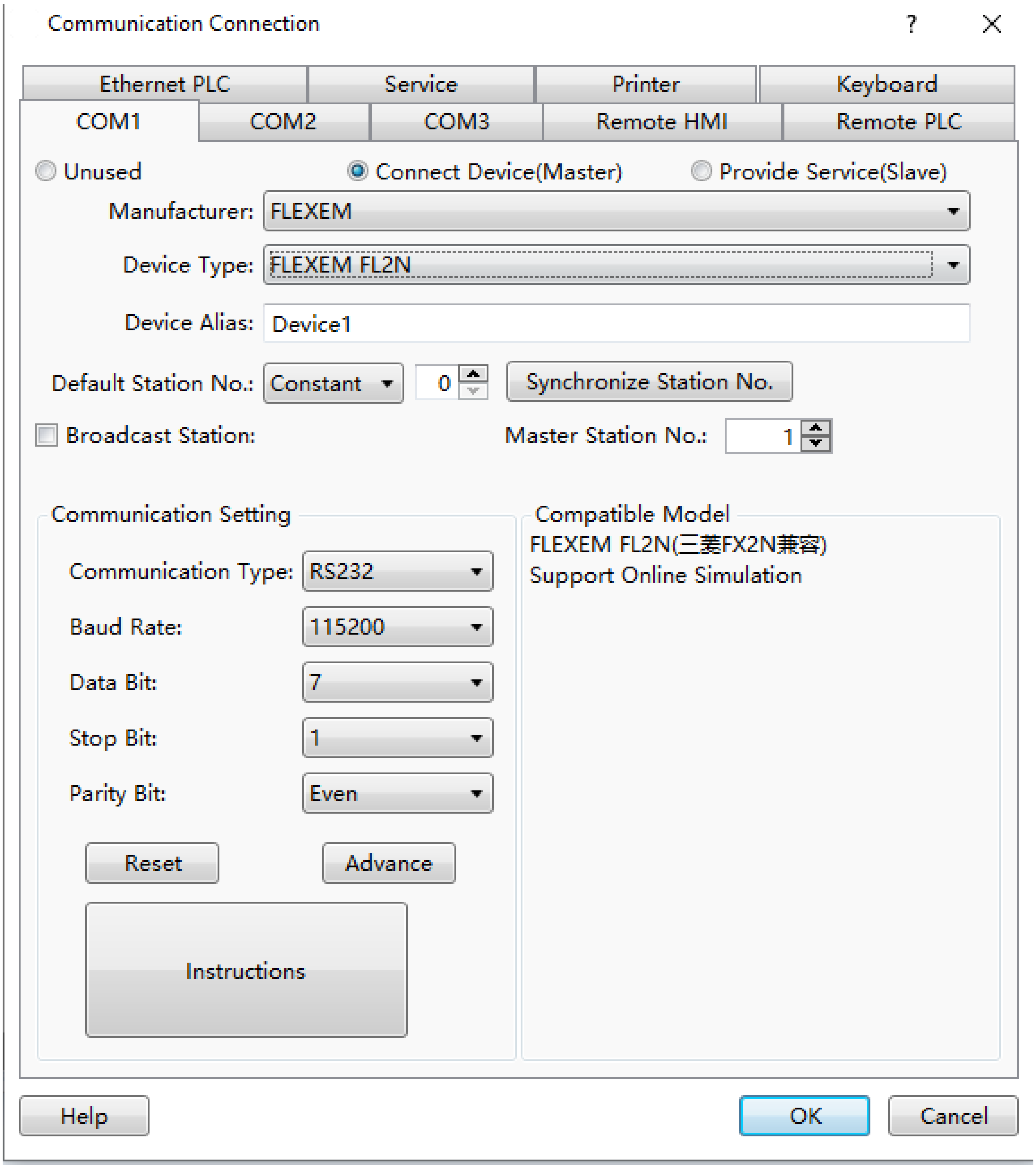
17.1.1.3 Configure HMI

Step 1. Run the VI20Studio software, select **Settings/Communication Settings/Local Connection** from the menu bar, configure relevant parameters in the pop-up dialog box, click **OK**.

- When you select VEICHI Modbus for the device type, the **Pre-set Station No.**(i.e. station device number of PLC) and the parameters of **Communication Settings** should be consistent.

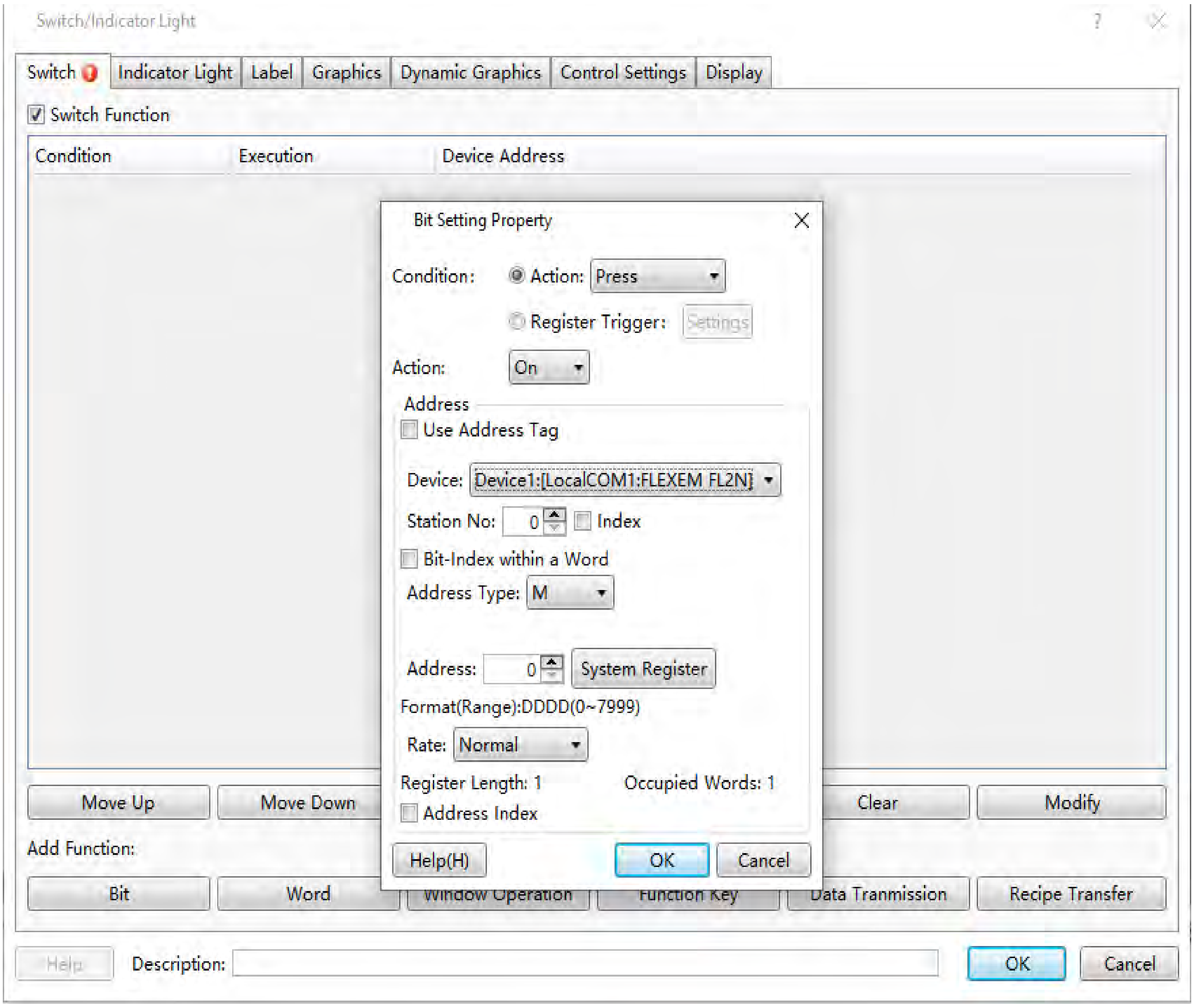


- When selecting the device type as VEICHI FL2N, you should set the predefined station number (PLC device station number) to 1. Set the data bits to 7, stop bits to 1, and parity bit to “Even”. The communication type and baud rate should be consistent with the settings of the PLC.



The **communication type** should be consistent with the actual wiring. You can choose either RS232 or RS485-2.

Step 2. Select **Component/Switch/Bit Set** to create a bit switch component, as shown in the figure below.



Step 3. Download project to HMI and observe whether the switch component can read the data normally. If the data can be read normally, it means communication is normal.

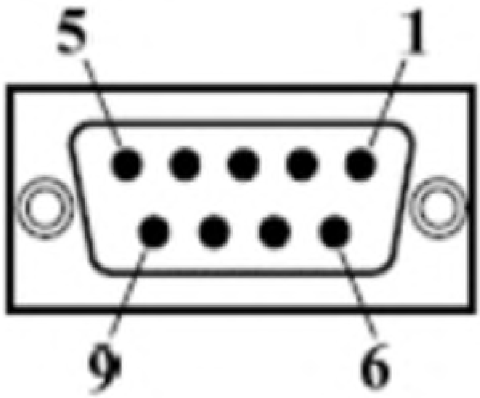
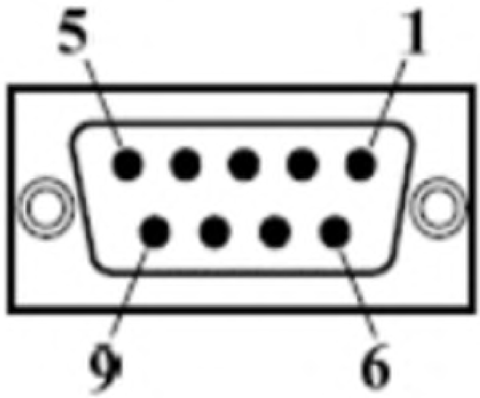
17.1.2 Serial Communication Between HMI and Veichi FL3 PLC

HMI and Veichi FL3 PLC use serial cable for communication, and the connection method supports RS232 and RS485-2 (two-wire mode).

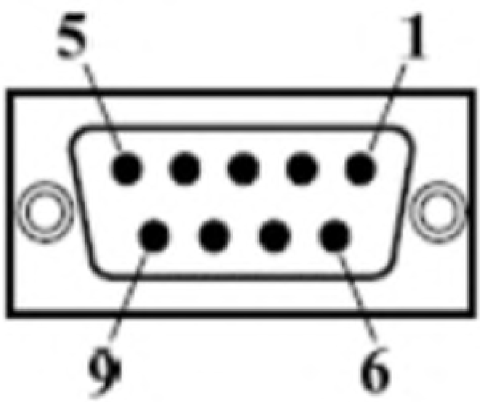
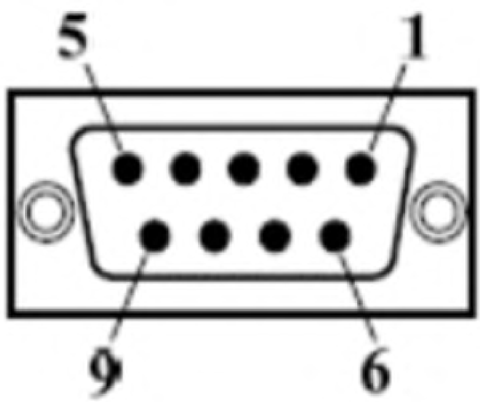
17.1.2.1 Connection Method

- Use RS232 cable to connect the COM1/COM2 port of the HMI and the serial port 1 of the PLC, the connection method is shown in the table below.

HMI COM1/COM2 Ports(RS232 9P Female)	PLC Port1(RS232 9P Male)
2-RX	3-TX

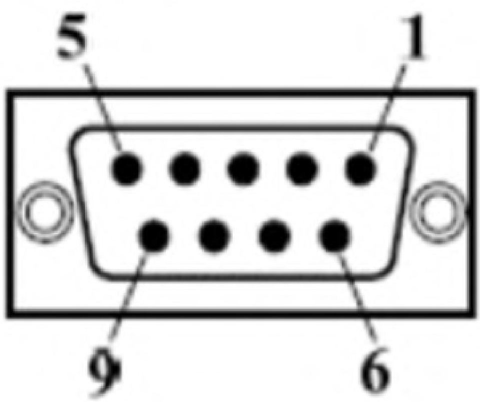
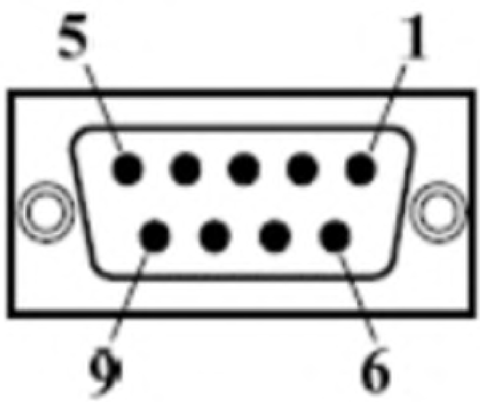
HMI COM1/COM2 Ports(RS232 9P Female)	PLC Port1(RS232 9P Male)
3-TX	2-RX
5-GND	5-GND
	

◆ Use RS232 cable to connect the COM3/COM4 port of the HMI and the serial port 1 of the PLC, the connection method is shown in the table below.

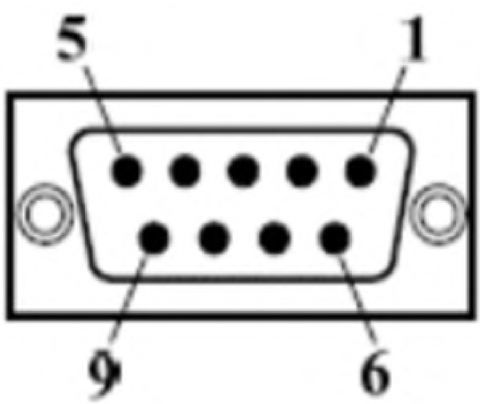
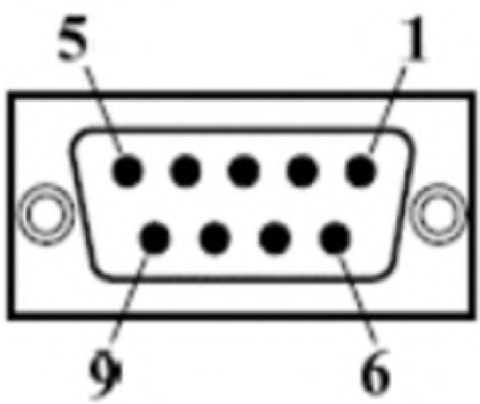
HMI COM3/COM4 Ports(RS232 9P Female)	PLC Port1(RS232 9P Male)
7-RX	3-TX
8-TX	2-RX
5-GND	5-GND
	

◆ Use RS232 cable to connect the COM1/COM2 port of the HMI and the serial port 2 of the PLC, the connection method is shown in the table below.

HMI COM1/COM2 Ports(RS232 9P Female)	PLC Port2(RS232 9P Male)
2-RX	8-TX

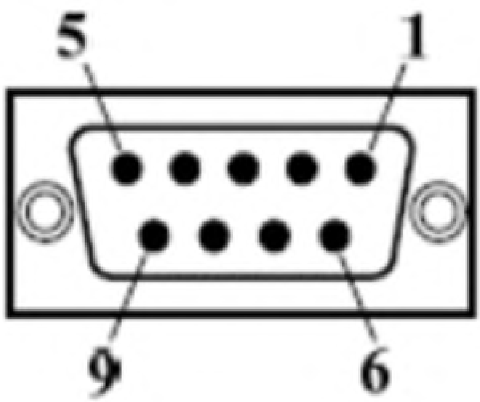
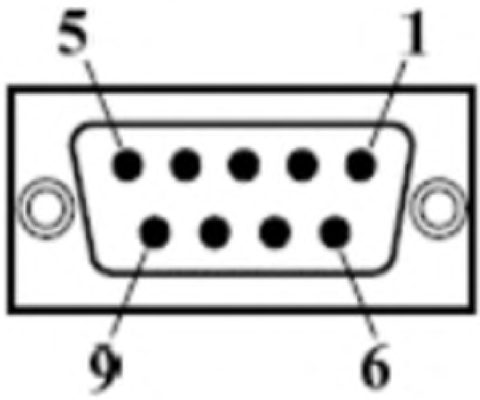
HMI COM1/COM2 Ports(RS232 9P Female)	**PLC Port2(RS232 9P Male)**
3-TX	7-RX
5-GND	5-GND
	

◆ Use RS232 cable to connect the COM3/COM4 port of the HMI and the serial port 2 of the PLC, the connection method is shown in the table below.

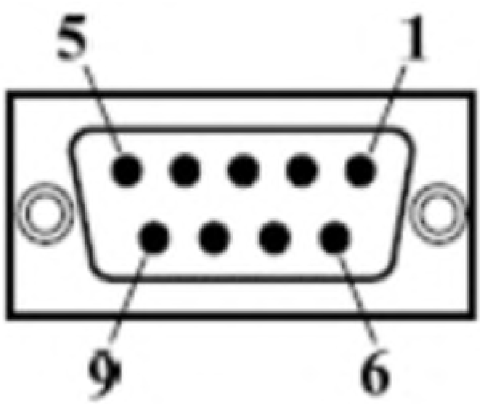
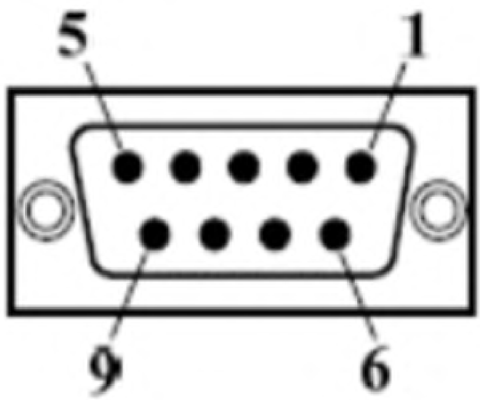
HMI COM3/COM4 Ports(RS232 9P Female)	**PLC Port2(RS232 9P Male)**
7-RX	8-TX
8-TX	7-RX
5-GND	5-GND
	

◆ Use RS485 cable to connect the COM1/COM2 port of the HMI and the serial port 1 of the PLC, the connection method is shown in the table below.

HMI COM1/COM2 Ports(RS485 9P Female)	**PLC Port1(RS485 9P Male)**
1-RX-	1-B-
6-RX+	6-A+

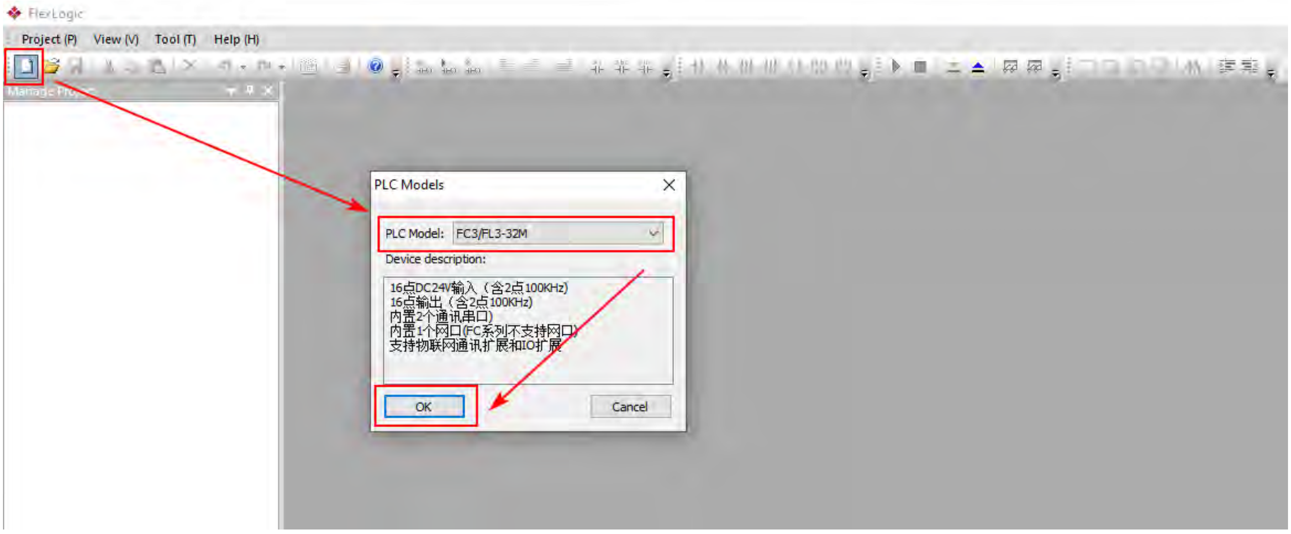
HMI COM1/COM2 Ports(RS485 9P Female)	PLC Port1(RS485 9P Male)
5-GND	5-GND
	 s

- ◆ Use RS485 cable to connect the COM1/COM2 port of the HMI and the serial port 2 of the PLC, the connection method is shown in the table below.

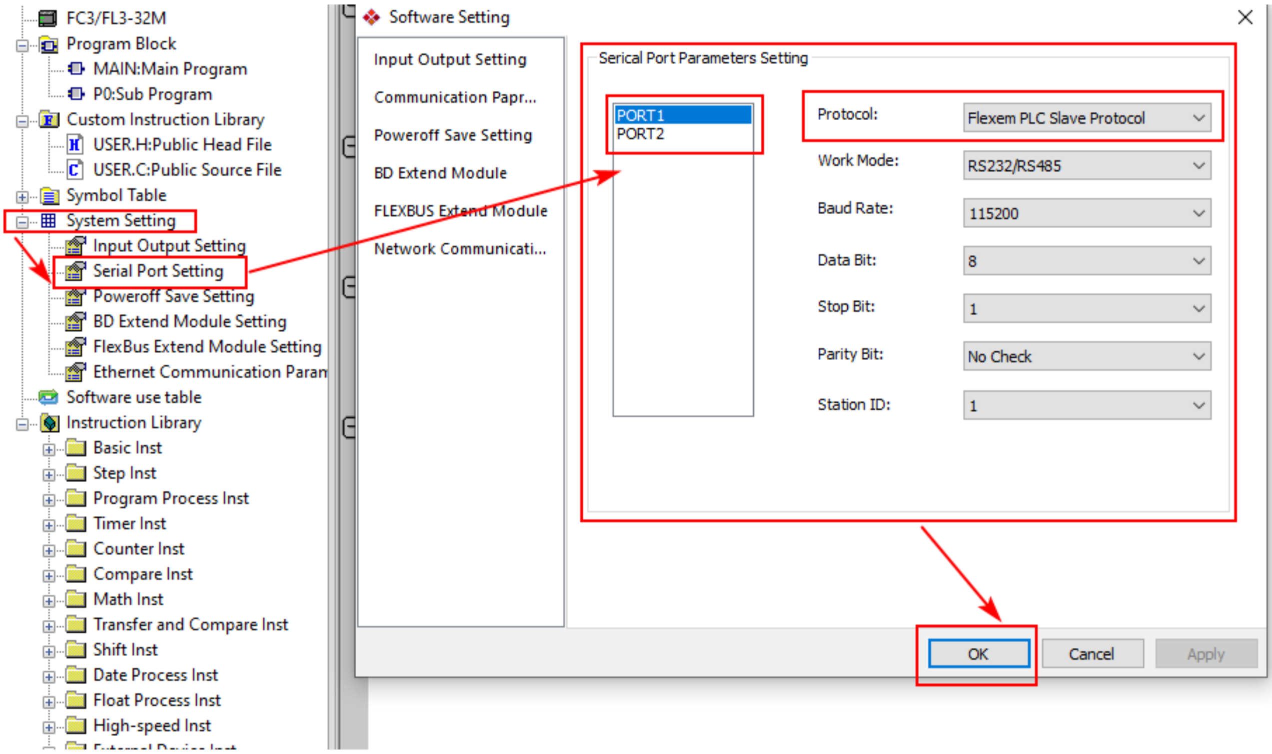
HMI COM1/COM2 Ports(RS485 9P Female)	PLC Port2(RS485 9P Male)
1-RX-	4-B-
6-RX+	9-A+
5-GND	5-GND
	 s

17.1.2.2 Configure PLC

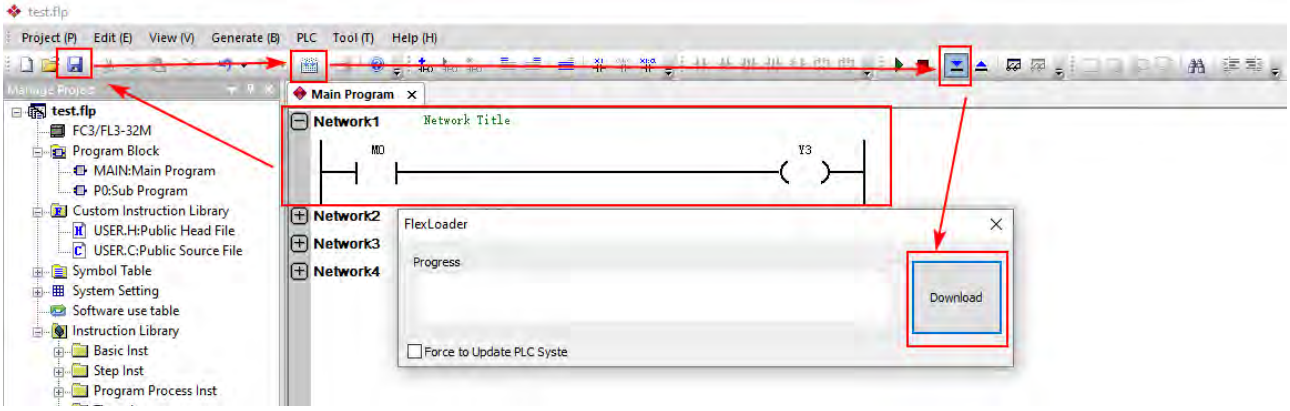
Step 1. Run the PLC configuration software FlexLogic, create a new project. Please refer to the figure below for detailed operations.



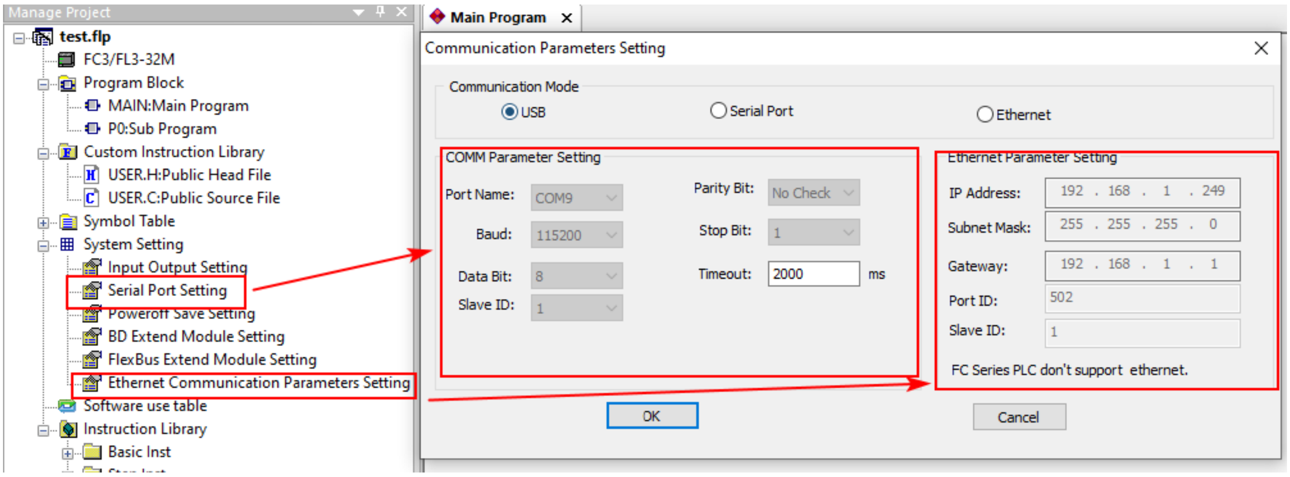
Step 2. Set the communication parameters as shown in the picture below.



Step 3. Complete the ladder diagram, save project and compile, download project to PLC.



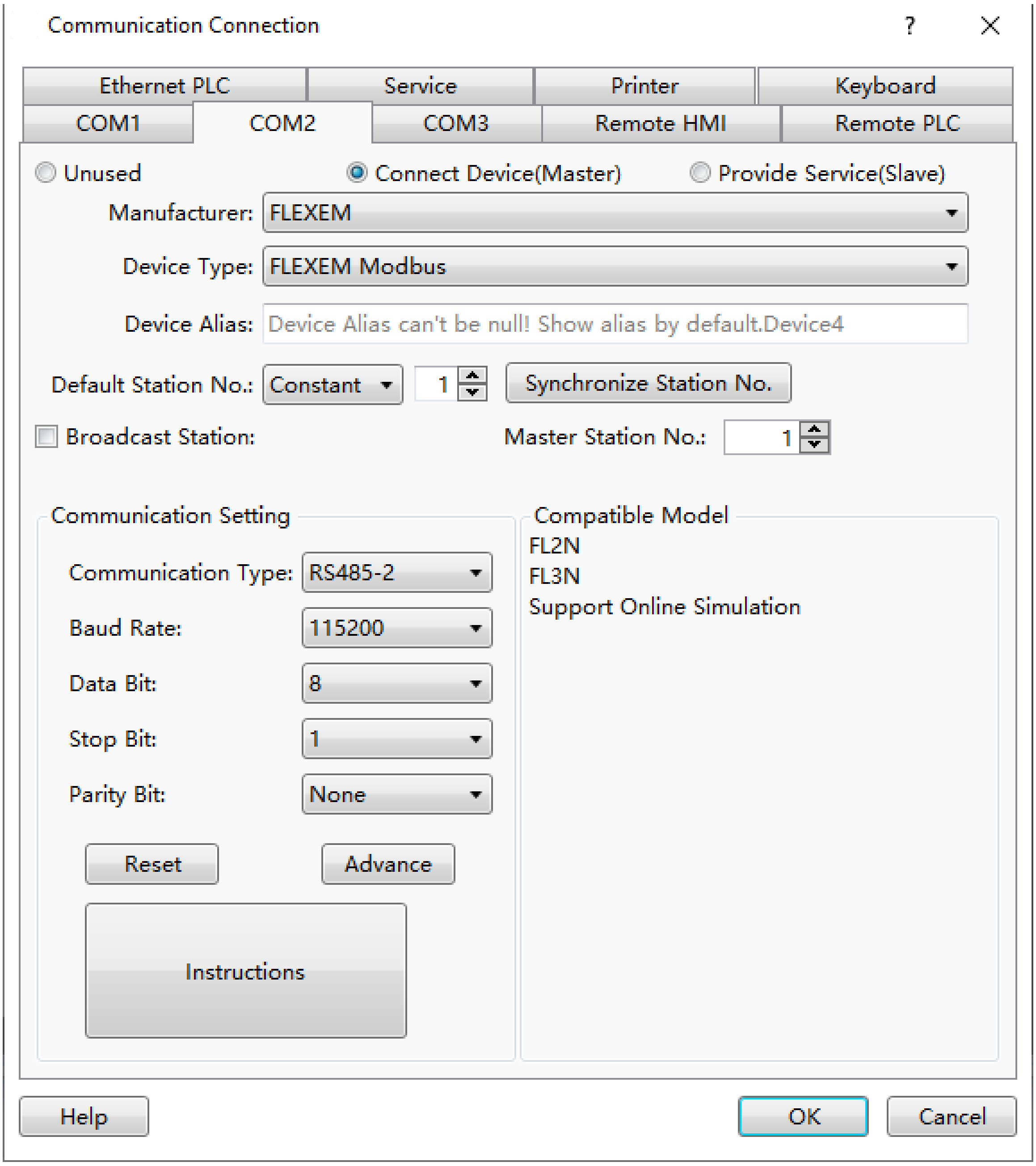
Select **Tools/Communication Parameter Settings** from the menu bar. There are three methods to download a project.



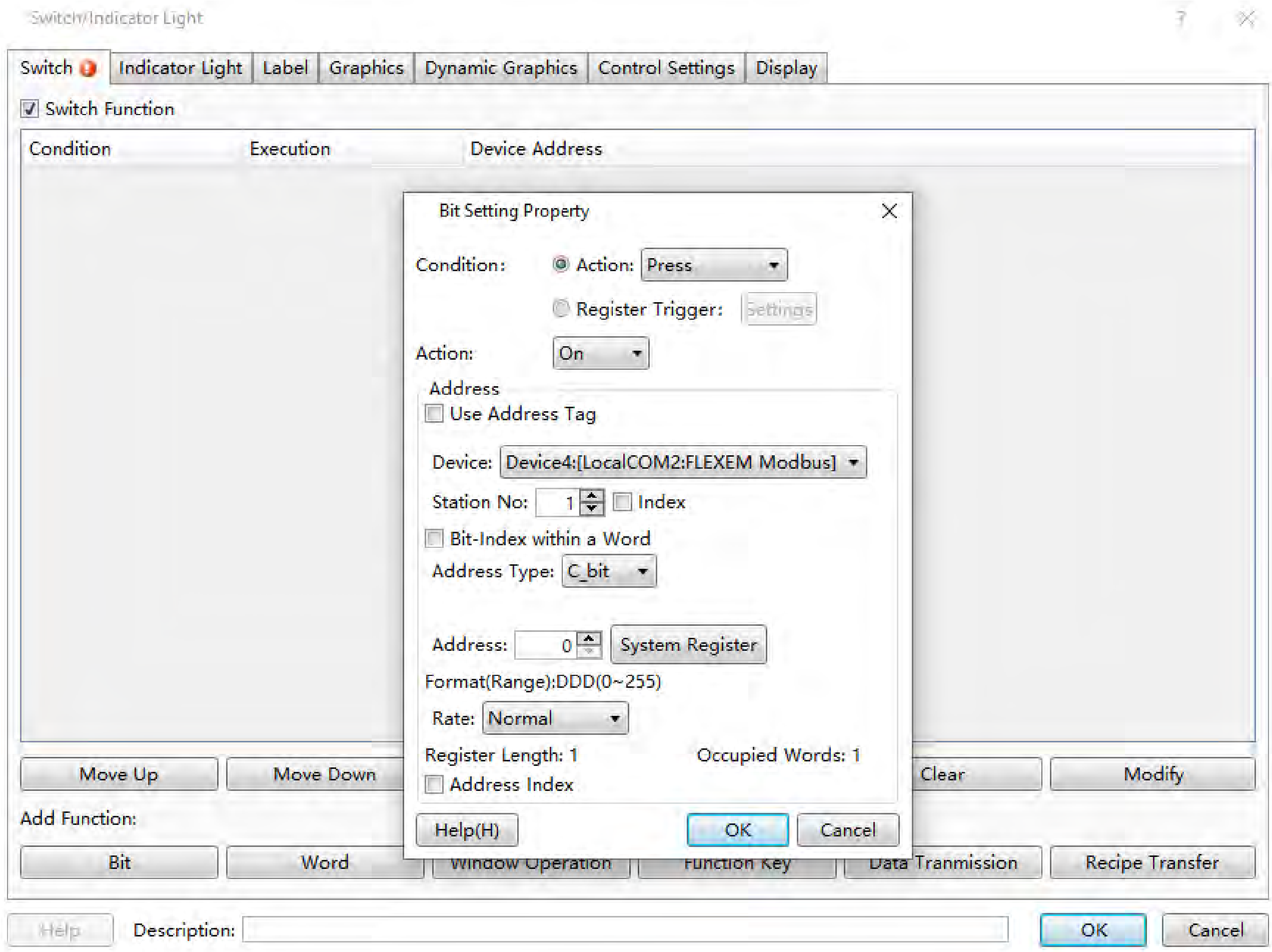
17.1.2.3 Configure HMI

Step 1. Run the VI20Studio software, select **Settings/Communication Settings/Local Connection** from the menu bar, select the COM port to be connected, configure relevant parameters, click **OK**.

Select **Connect Device (Master)**, select “VEICHI” for the manufacturer, select “VEICHI Modbus” for device type. The Pre-set Station No.(i.e. station device number of PLC) and the parameters of **Communication Settings** should be consistent with PLC settings.



Step 2. Select **Component/Switch/Bit Set** to configure in the pop-up dialog box, as shown in the picture below.



Step 3. Download project to HMI and observe whether the component can display the data normally.

17.1.3 Ethernet Communication Between HMI and FL3 PLC

HMI and Veichi FL3 PLC use Ethernet port for communication,

17.1.3.1 Connection Method

◆ The connection method using the crossover network cable is shown in the table below.

Connection Method of HMI Ports	Connection Method of PLC Ports	Cable
1TX+(orange white)	3RX+(green white)	
2TX-(orange)	6RX-(green)	
3RX+(green white)	1TX+(orange white)	
4BD4+(blue)	4BD4+(blue)	
5BD4-(blue white)	5BD4-(blue white)	

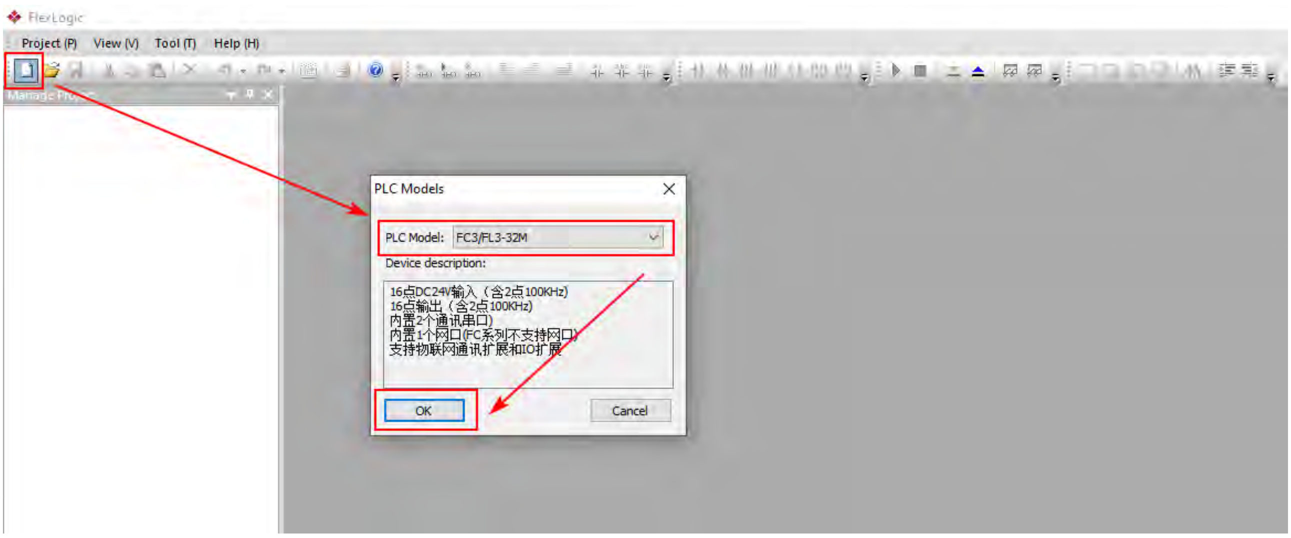
Connection Method of HMI Ports	Connection Method of PLC Ports	Cable
6RX-(green)	2TX-(orange)	
7BD3+(brownwhite)	7BD3+(brownwhite)	
8BD3-(brown)	8BD3-(brown)	

◆ The connection method using a straight-through network cable is shown in the table below.

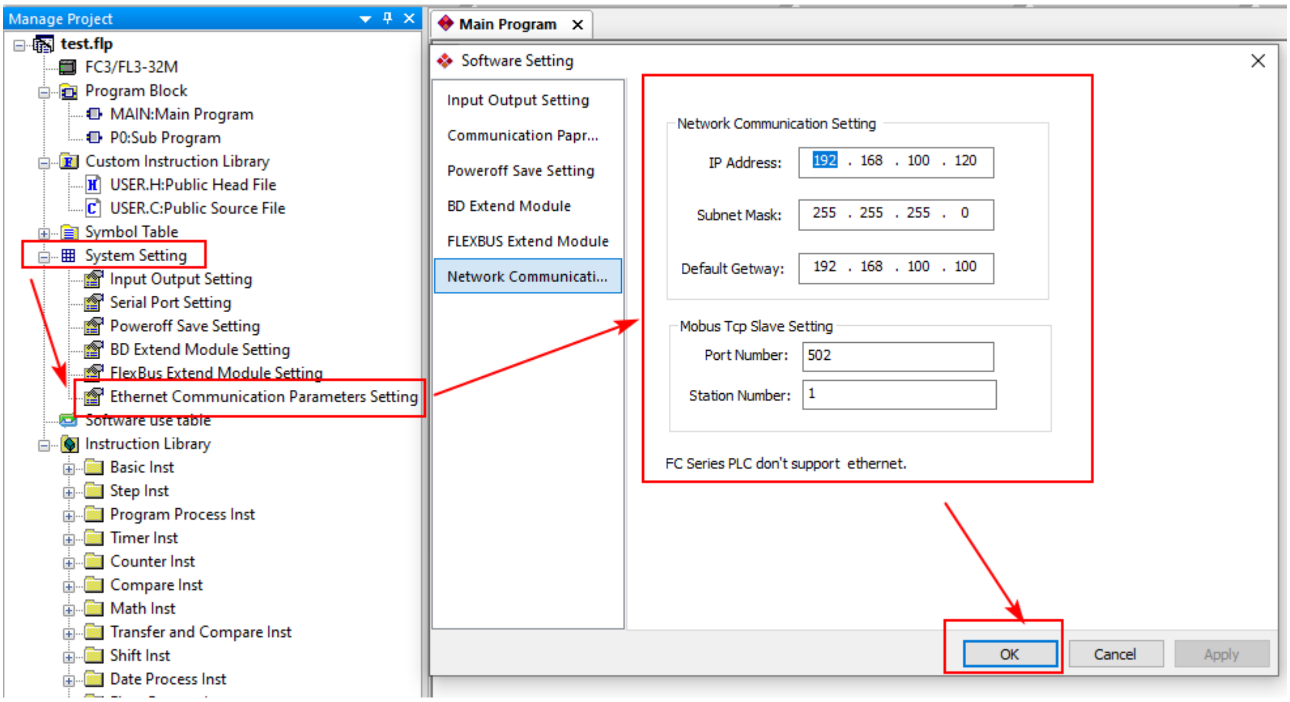
Connection Method of HMI Ports	Connection Method of PLC Ports	Cable
1TX+(orange white)	1TX+(orange white)	
2TX-(orange)	2TX-(orange)	
3RX+(green white)	3RX+(green white)	
4BD4+(blue)	4BD4+(blue)	
5BD4-(blue white)	5BD4-(blue white)	
6RX-(green)	6RX-(green)	
7BD3+(brown white)	7BD3+(brown white)	
8BD3-(brown)	8BD3-(brown)	

17.1.3.2 Configure PLC

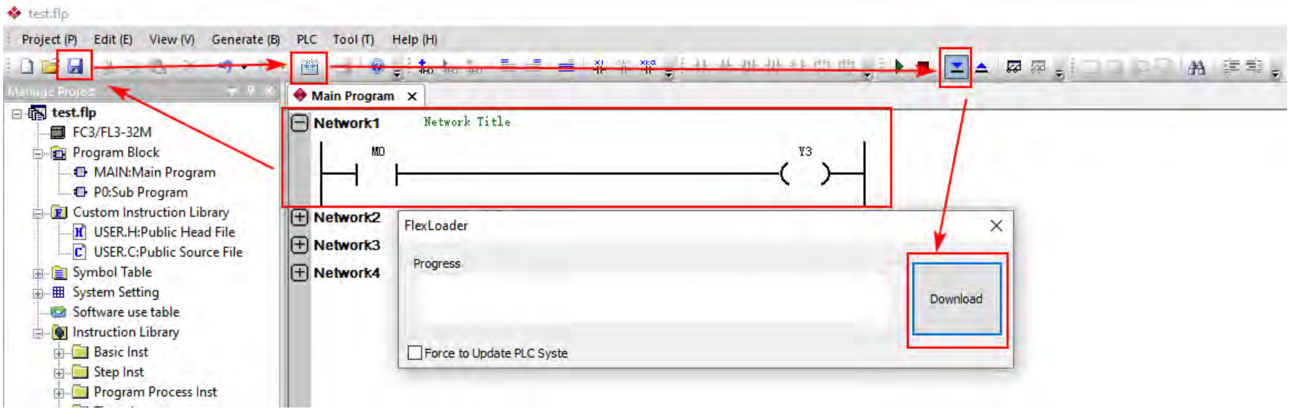
Step 1. Run the PLC configuration software FlexLogic, create a new project. Please refer to the figure below for detailed configuration.



Step 2. Refer to the figure below to configure Ethernet communication parameters



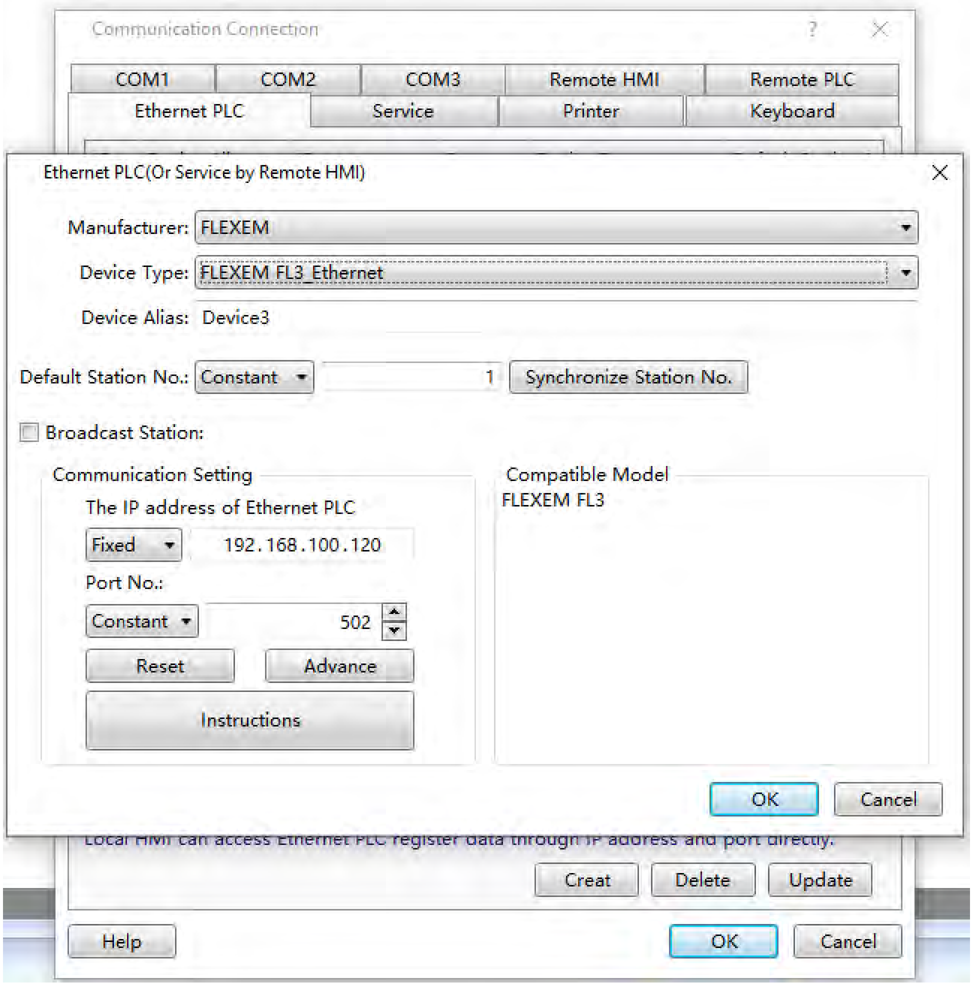
Step 3. Complete the ladder diagram, save project and compile, download project to PLC.



17.1.3.3 Configure HMI

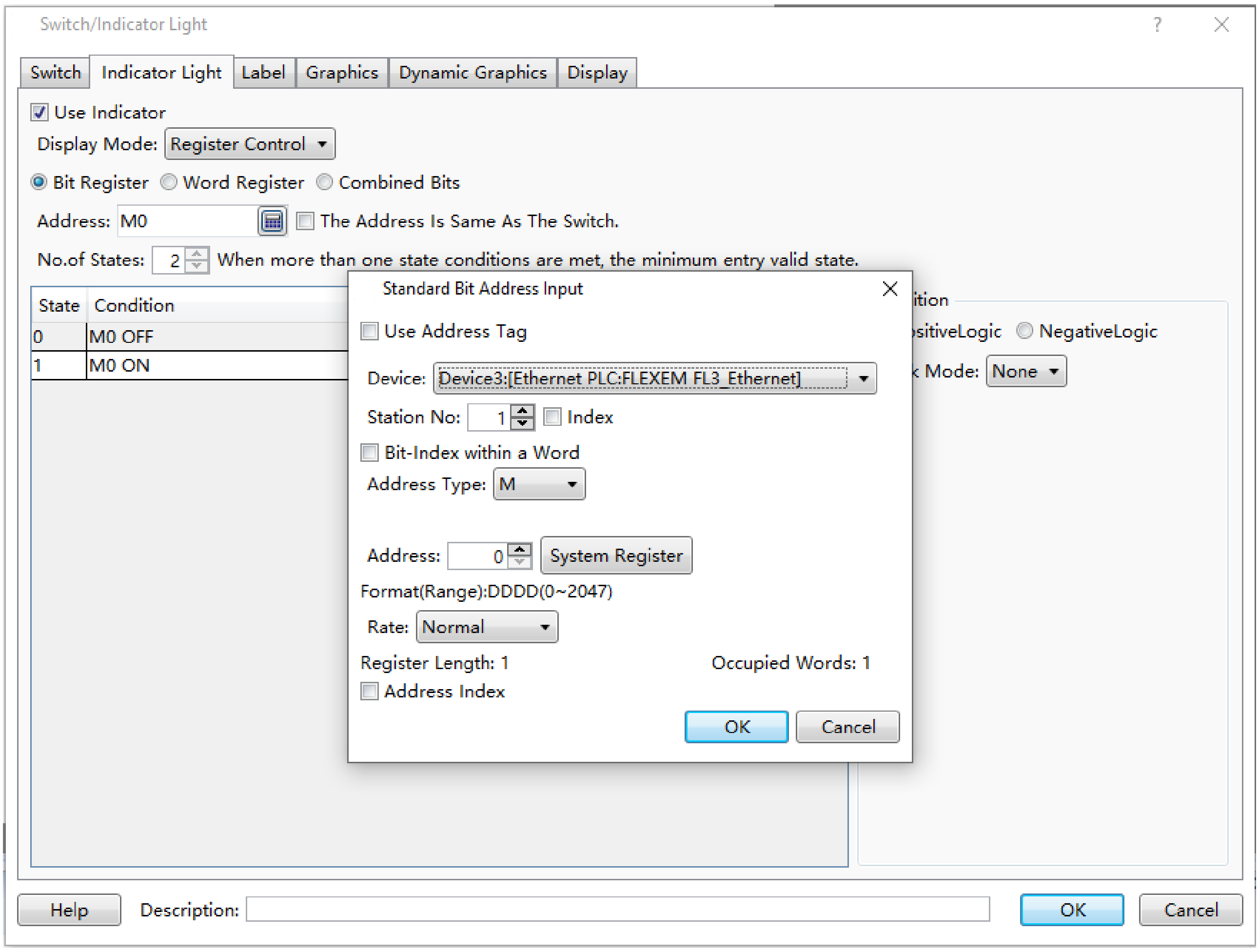
Step 1. Run the VI20Studio software, select **Settings/Communication Settings/Remote Connection** from the menu bar, select the **Ethernet PLC** tab, click **Add**, configure relevant parameters in the pop-up dialog box, click **OK**.

Select “VEICHI” for the manufacturer, select “VEICHI FL3_Ethernet” for device type. The IP address, station number and port number of remote PLC should be consistent with the PLC settings.

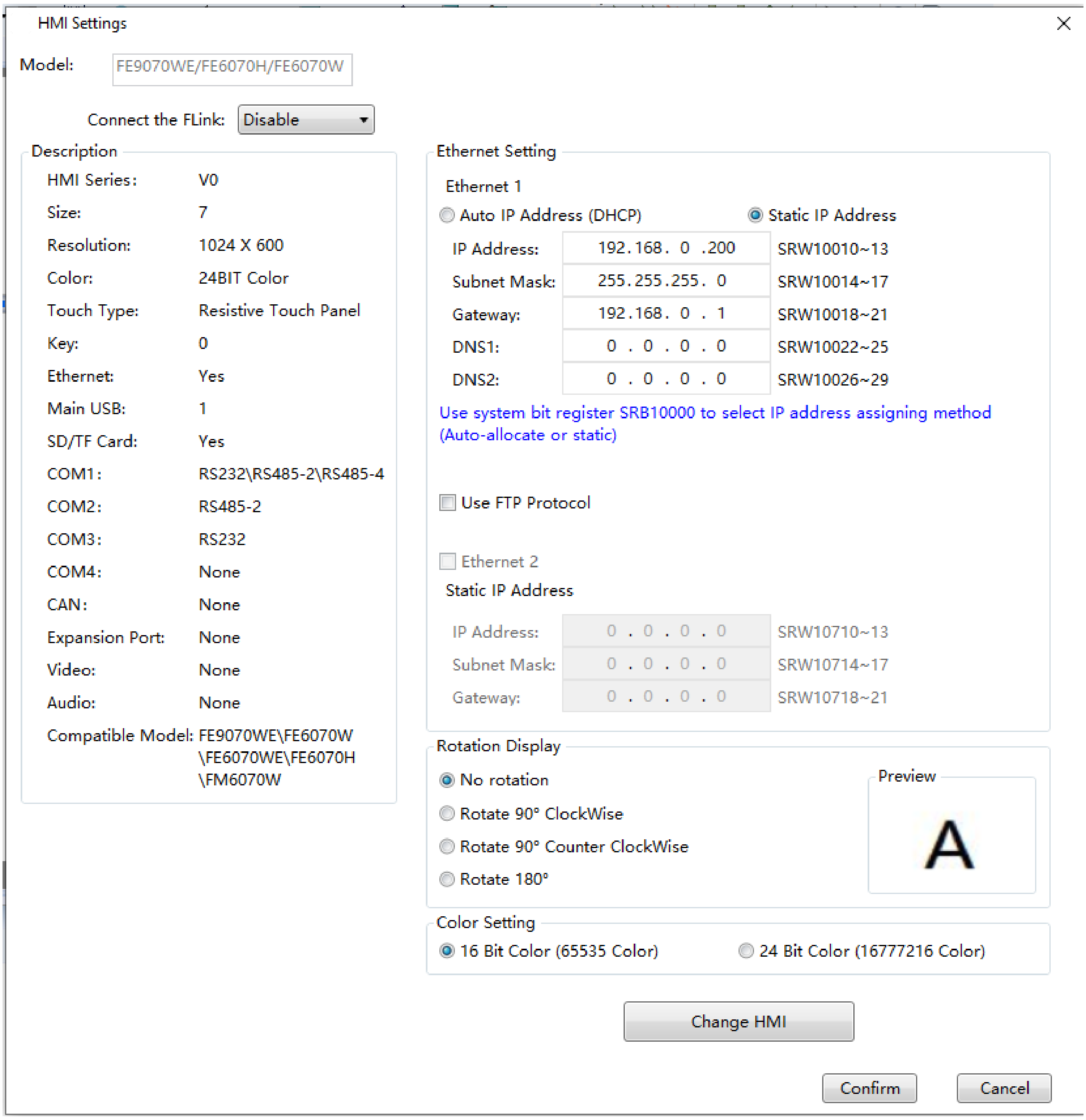


Step 2. Click **OK**.

Step 3. Select **Component/Indicator Light/Bit Indicator Light** from the menu bar, add the PLC address.



Step 4. Select **Settings/HMI Settings** from the menu bar, set the IP address of HMI to be in the same network segment as the IP address of PLC.



Step 5. Download project to HMI and observe whether the component operates normally.

17.2 Inovance PLC

17.2.1 Serial Communication Between HMI and Inovance H2u PLC

17.2.1.1 Connection Method

The HMI can communicate with the Inovance H2u PLC through the COM0 (8-pin round port) interface, which supports RS232, RS485-4 (RS422), and 485-2 (RS485) communications.

- Use the special serial programming cable of Inovance to connect the COM port of HMI and the COM0 port of Inovance H2u PLC.
- Use the RS485-4 (RS442) cable to connect the COM port of the HMI to the COM0 port of the Inovance H2u PLC. Please refer to the table below for the connection method.

HMI COM Port	**PLC COM0 Port**
1 RX-	4 TX-
6 RX+	7 TX+
5 GND	3 GND
4 TX-	1 RX-
9 TX+	2 RX+
	

- Use RS485-2(RS485) cable to connect the COM port of the HMI and COM0 port of Inovance H2u PLC, the connection method is shown in the table below.

When using the RS485 communication method, you need to unplug the JP0 short circuit block.

HMI COM Port	**PLC COM0 Port**
1 RX-	4 TX-
6 RX+	7 TX+
5 GND	3 GND

HMI COM Port	PLC COM0 Port
	

The HMI can communicate with Inovance H2u PLC through the COM1 port, supporting RS485-2 (RS485) protocol communication.

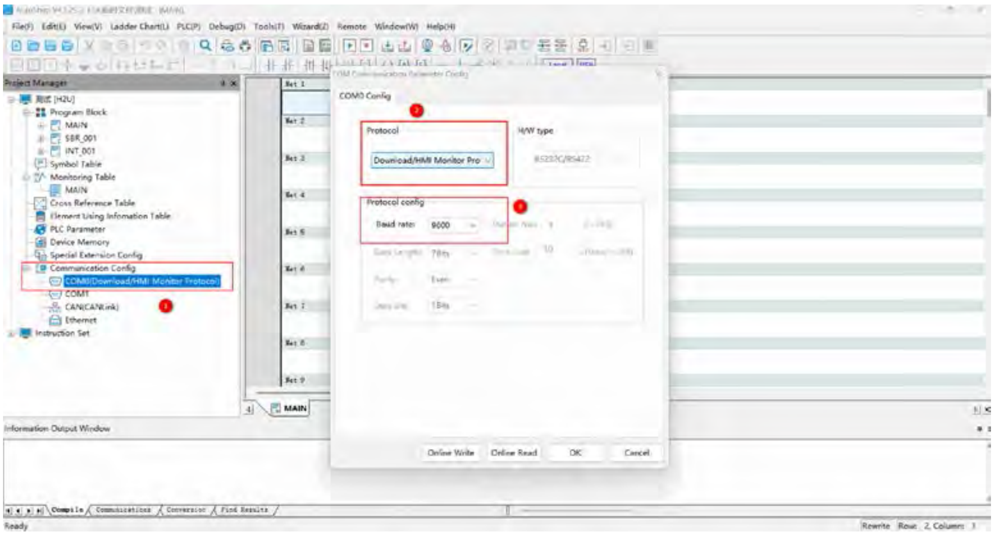
Use RS485 cable to connect the COM port of the HMI and COM1 port of Inovance PLC, the connection method is shown in the table below.

HMI COM1/COM2 Port	PLC COM1 Port
1 RX-	485-
6 RX+	485+
5 GND	GND
	

17.2.1.2 Configure PLC

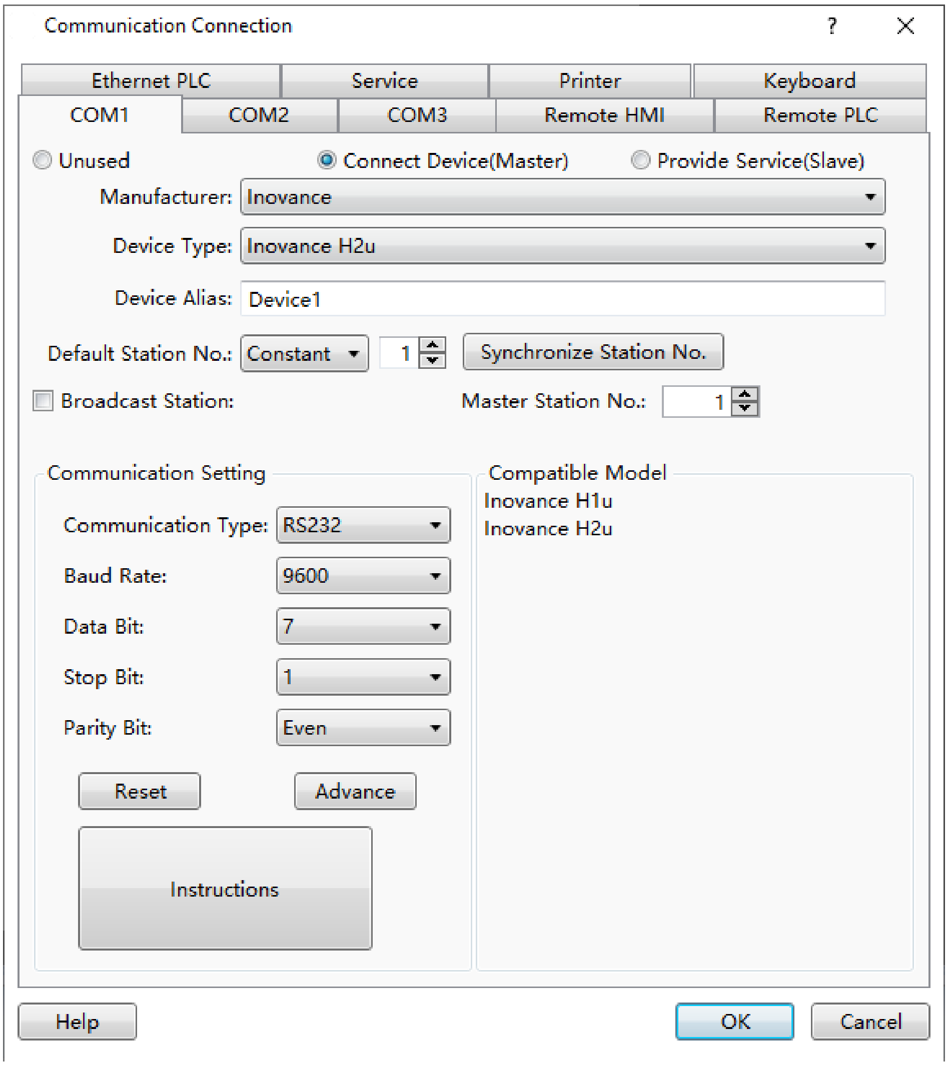
Run the Inovance H2u PLC configuration software. Go to the **Project Management** section and navigate to the **Communication Settings** (COM0 or COM1). Choose the **Download/HMI Monitoring Protocol** for the protocol option. In the protocol configuration area, you can set the baud rate. Other settings may not be modifiable.

- If using the RS485-2 (RS485) communication of the COM0 port, the short circuit block of JP0 must be unplugged, and D8116 must be set to 1.
- If COM1 port is used for communication, and the communication type is RS485-2, then D8126 needs to be set to 1.

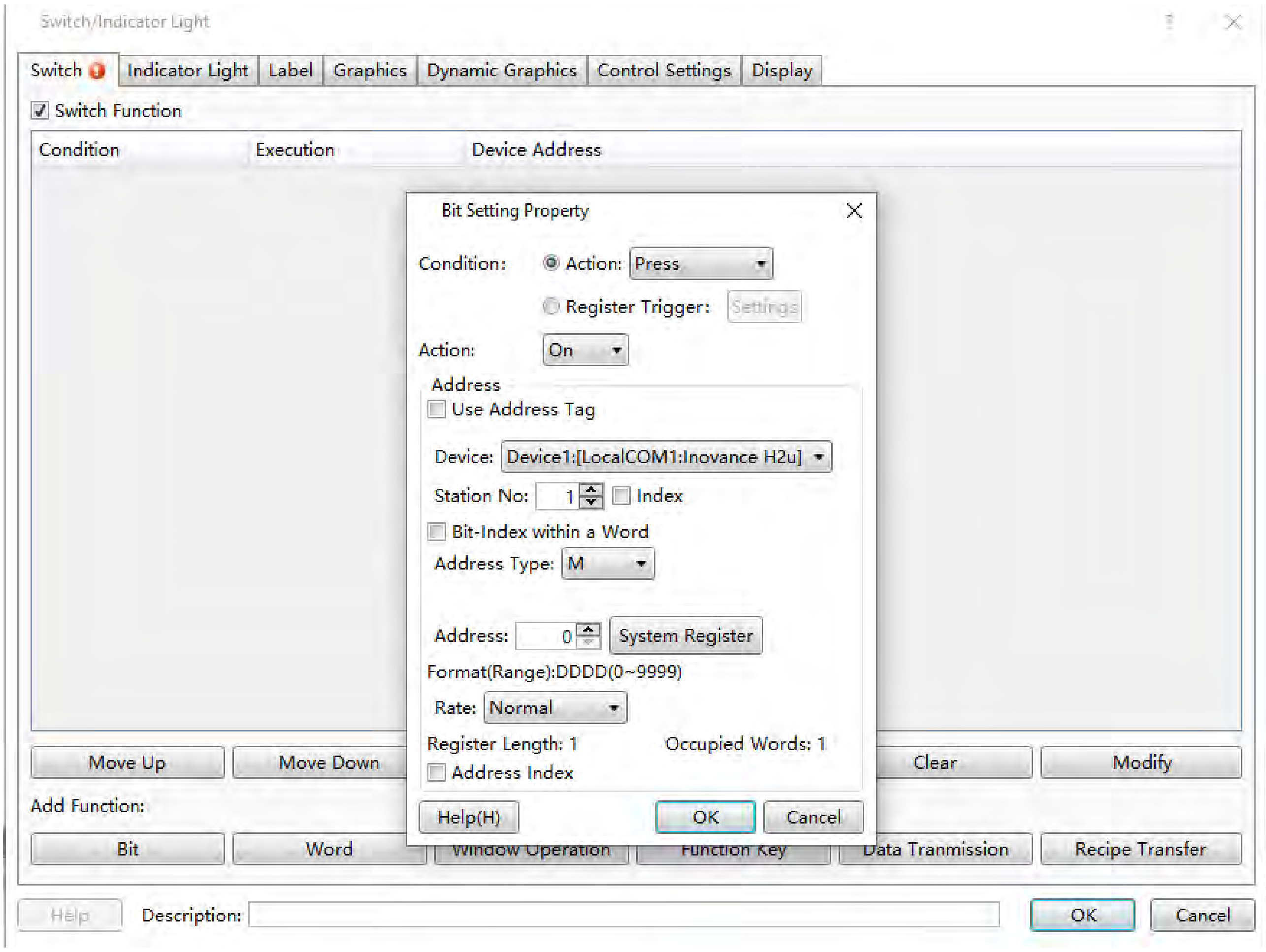


17.2.1.3 Configure HMI

Step 1. Run the VI20Studio software, select **Settings/Communication Settings/Local Connection** from the menu bar, select the corresponding COM port, configure relevant parameters, click **OK**.



Step 2. Select **Component/Switch/Bit Setting** from the menu bar, add PLC bit address information in the pop-up dialog box.



Step 3. After confiuring the project, download project to HMI. If the bit switch component is able to read PLC data, it means the communication is normal.

17.2.2 Serial Communication Between HMI and Inovance H3u PLC

17.2.2.1 Connection Method

The HMI can communicate with the Inovance H3u PLC through the COM0 port, which supports RS232, RS422, and RS485 communications.

- Use the special serial programming cable of Inovance to connect the COM port of HMI and the COM0 port of Inovance H3u PLC.
- Use the RS442 cable to connect the COM port of the HMI to the COM0 port of PLC. Please refer to the table below for the connection method.

HMI COM Port	PLC COM0 Port
1 RX-	4 TX-

HMI COM Port	PLC COM0 Port
6 RX+	7 TX+
5 GND	3 GND
4 TX-	1 RX-
9 TX+	2 RX+
	

◆ Use RS485 cable to connect the COM port of the HMI and COM0 port of Inovance H3u PLC, the connection method is shown in the table below.

When using the RS485 communication method, you need to unplug the JP0 short circuit block.

HMI COM1/COM2 Port	PLC COM0 Port
1 RX-	4 TX-
6 RX+	7 TX+
5 GND	3 GND
	

HMI can communicate with Inovance H3u PLC through the COM1 port, supporting RS485 protocol.

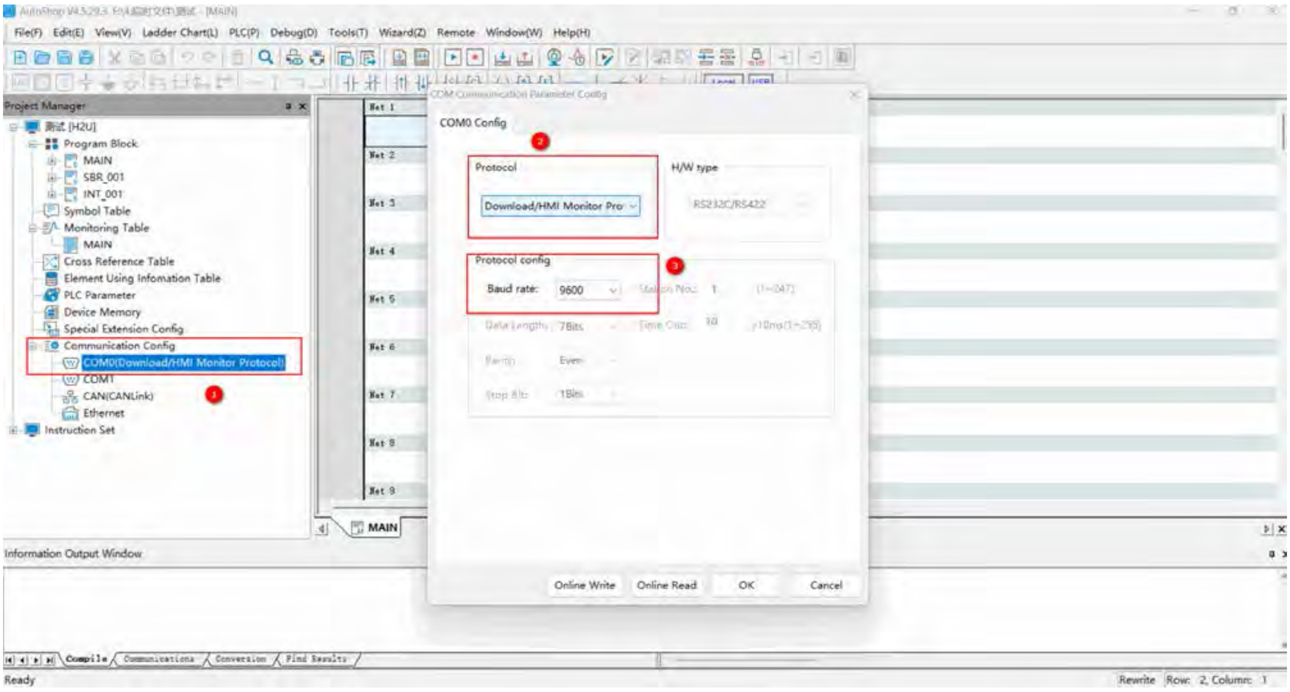
Use RS485 cable to connect the COM port of HMI and COM1 port of Inovance H3u PLC, the connection method is shown in the table below.

HMI COM1/COM2 Port	PLC COM1 Port
1 RX-	485-
6 RX+	485+
5 GND	GND
	

17.2.2.2 Configure PLC

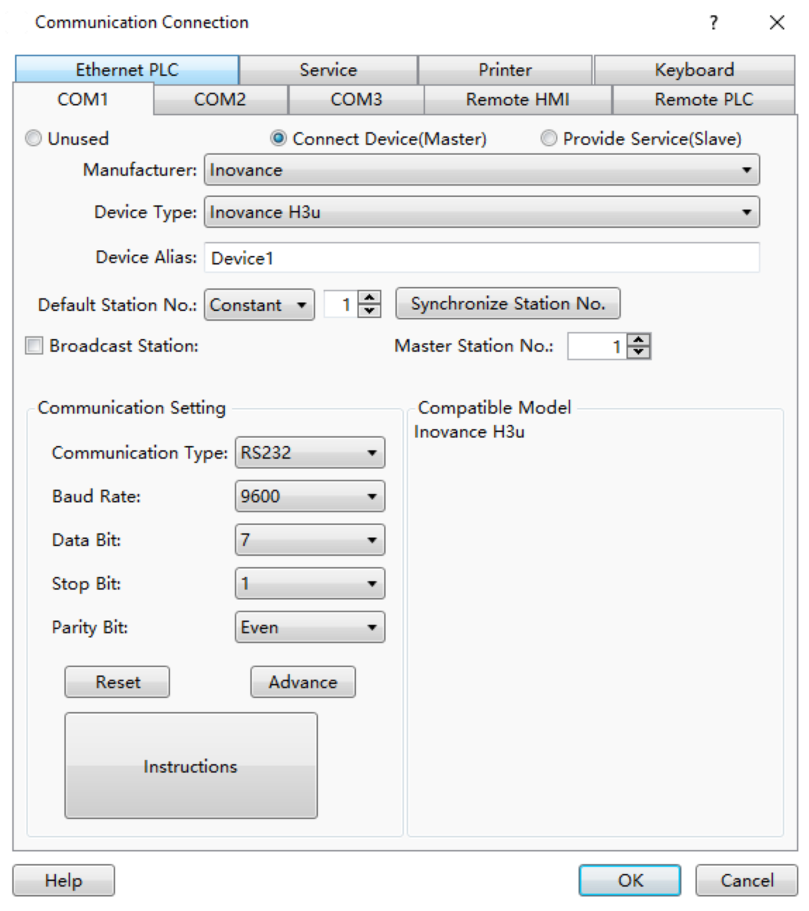
Run the Inovance H3u PLC configuration software. Go to **Project Management** and navigate to the **Communication Settings** (com0 or com1). Choose the Download/HMI Monitoring Protocol for the protocol option. In the **protocol configuration** area, you can set the baud rate. Other settings may not be modifiable.

- If using the RS485-2 (RS485) communication of the COM0 port, the short circuit block of JP0 must be unplugged, and D8116 must be set to 1.
- If COM1 port is used for communication, and the communication type is RS485-2, then D8126 needs to be set to 1.

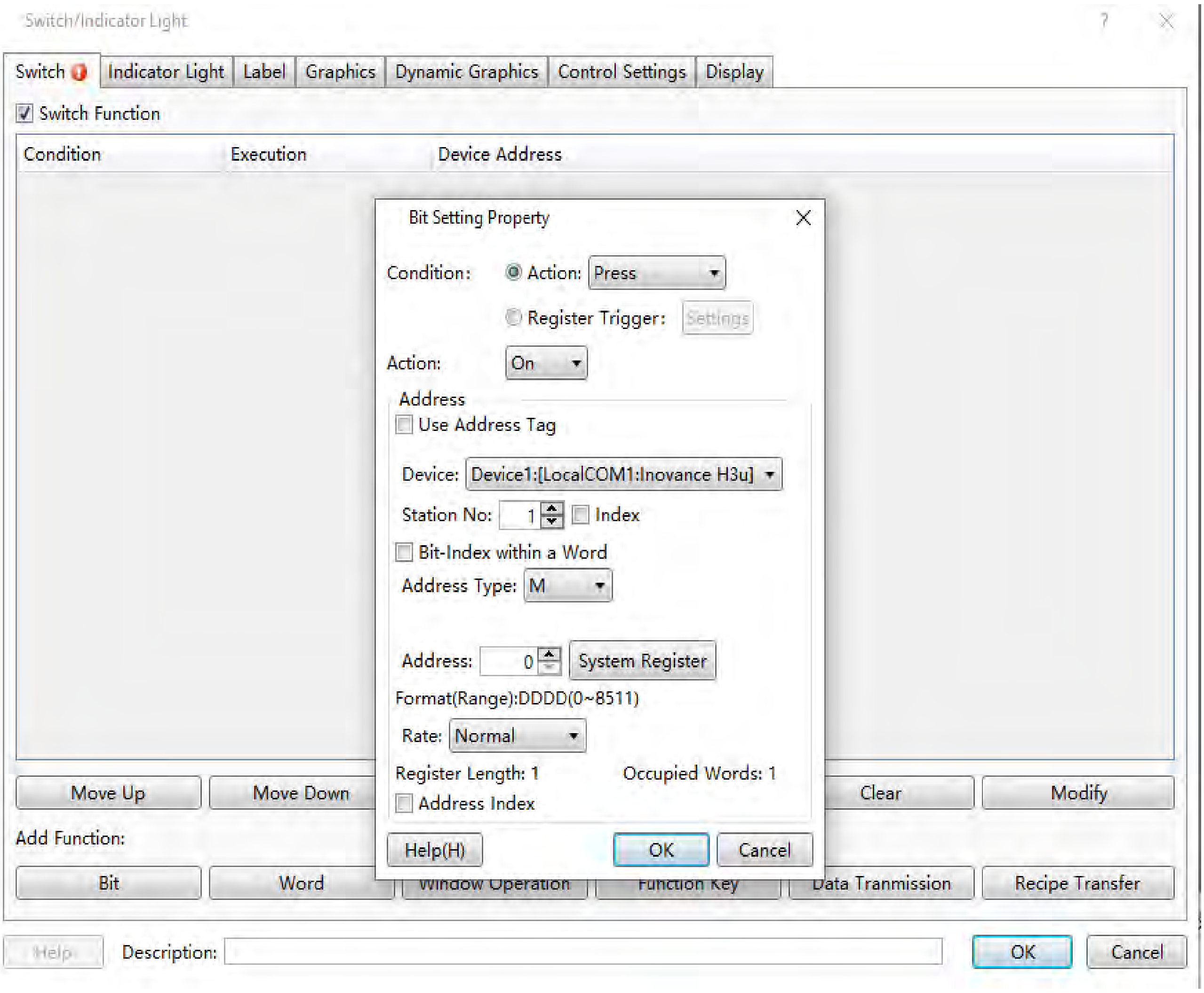


17.2.2.3 Configure HMI

Step 1. Run the VI20Studio software, select **Settings/Communication Settings/Local Connection** from the menu bar, select the corresponding COM port, configure relevant parameters, click **OK**.



Step 2. Select **Component/Switch/Bit Set** from the menu bar, add PLC bit address information in the pop-up dialog box.



Step 3. After configuring the project, download project to HMI. If the bit switch component is able to read PLC data, it means the communication is normal.

17.2.3 Ethernet Communication Between HMI and Inovance H3u PLC

HMI has an Ethernet port, and a cable is used to connect the the HMI Ethernet port and the Ethernet port of Inovance H3u PLC, or communicate through the switch.

17.2.3.1 Connection Method

- ◆ The connection method using the crossover network cable is shown in the table below.

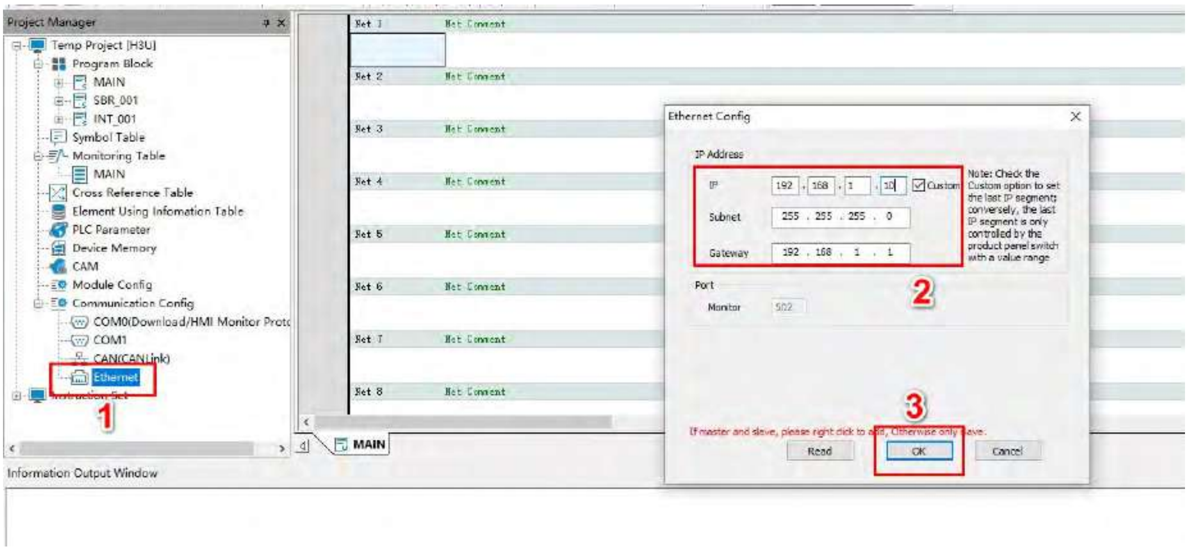
Connection Method of HMI Ports	Connection Method of PLC Ports	Cable
1TX+(orange white)	3RX+(green white)	
2TX-(orange)	6RX-(green)	
3RX+(green white)	1TX+(orange white)	
4BD4+(blue)	4BD4+(blue)	
5BD4-(blue white)	5BD4-(blue white)	
6RX-(green)	2TX-(orange)	
7BD3+(brown white)	7BD3+(brown white)	
8BD3-(brown)	8BD3-(brown)	

- The connection method using a straight-through network cable is shown in the table below.

Connection Method of HMI Ports	Connection Method of PLC Ports	Cable
1TX+(orange white)	1TX+(orange white)	
2TX-(orange)	2TX-(orange)	
3RX+(green white)	3RX+(green white)	
4BD4+(blue)	4BD4+(blue)	
5BD4-(blue white)	5BD4-(blue white)	
6RX-(green)	6RX-(green)	
7BD3+(brown white)	7BD3+(brown white)	
8BD3-(brown)	8BD3-(brown)	

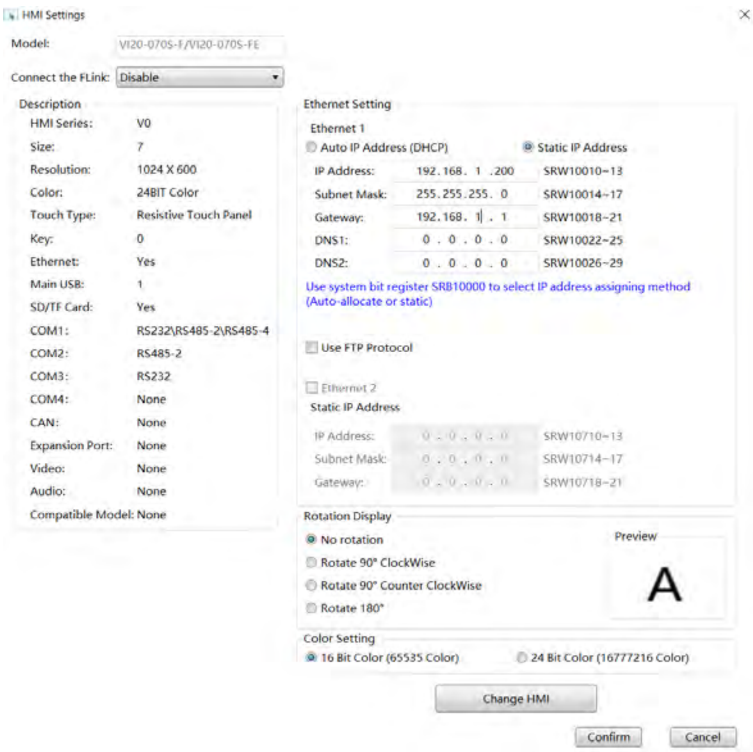
17.2.3.2 Configure PLC

Run the PLC configuration software, click **Communication Configuration/Ethernet**, set the IP address, subnet mask and gateway, click **OK**.

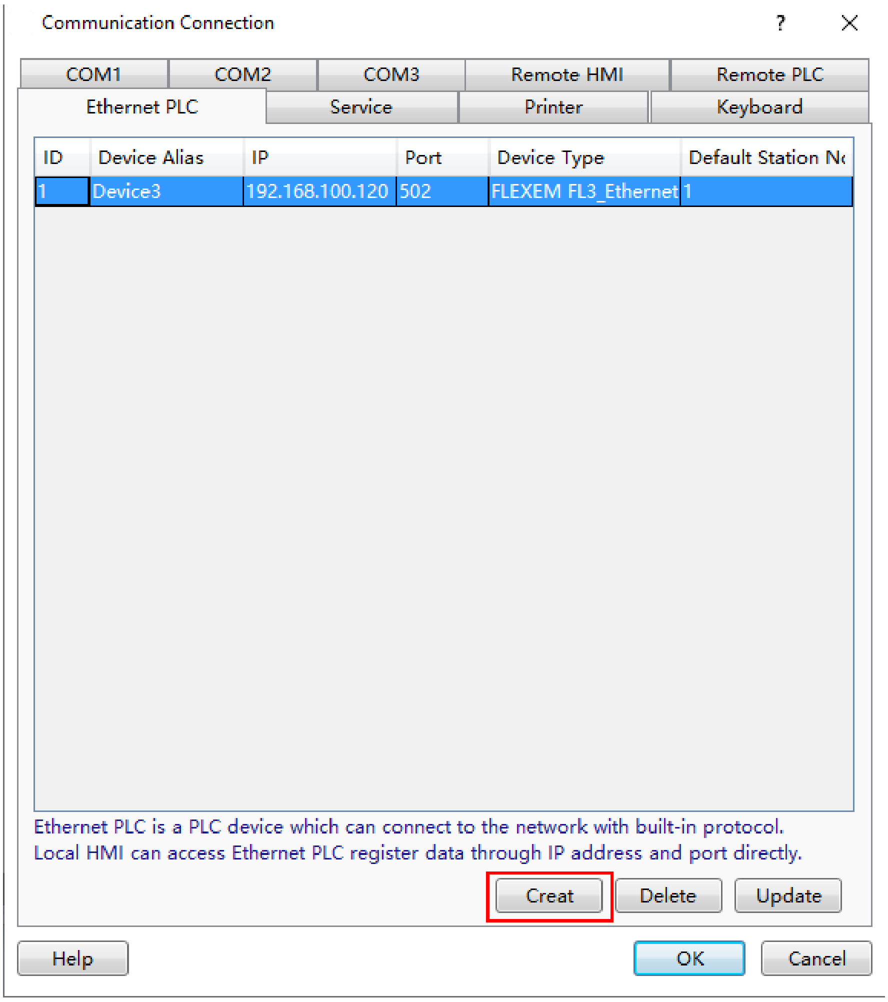


17.2.3.3 Configure HMI

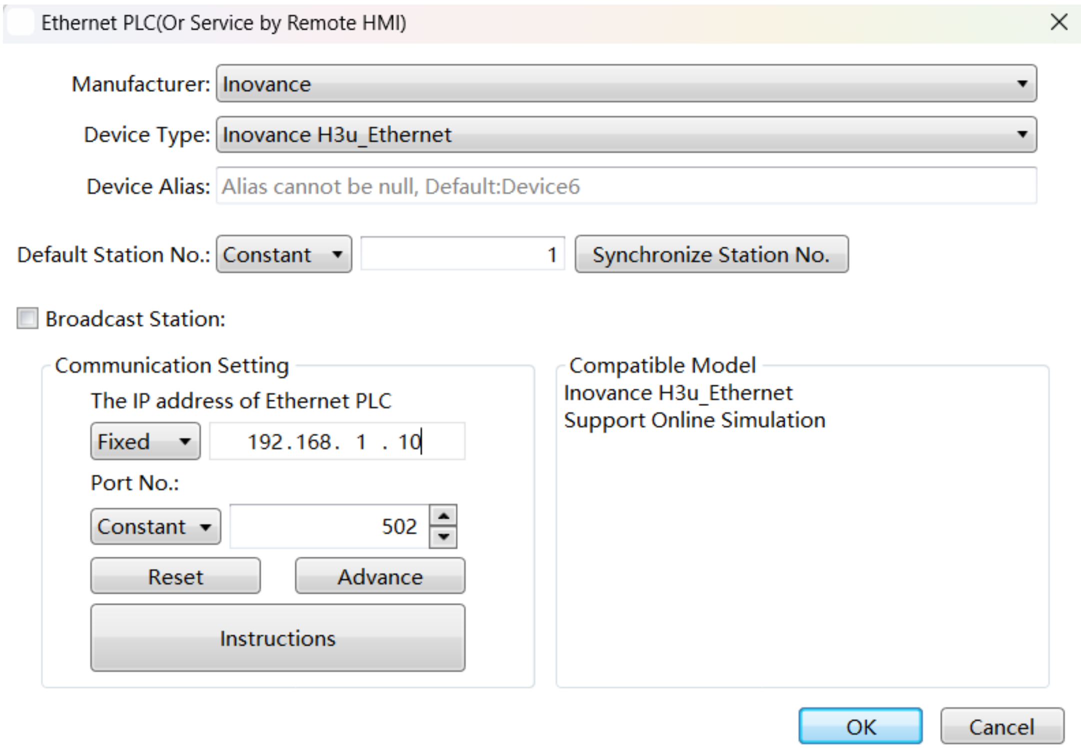
Step 1. Run the VI20Studio software, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI to be in the same network segment as the IP address of PLC, click **Confirm**.



Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select the **Ethernet PLC** tab in the pop-up dialog box, click **Create**.

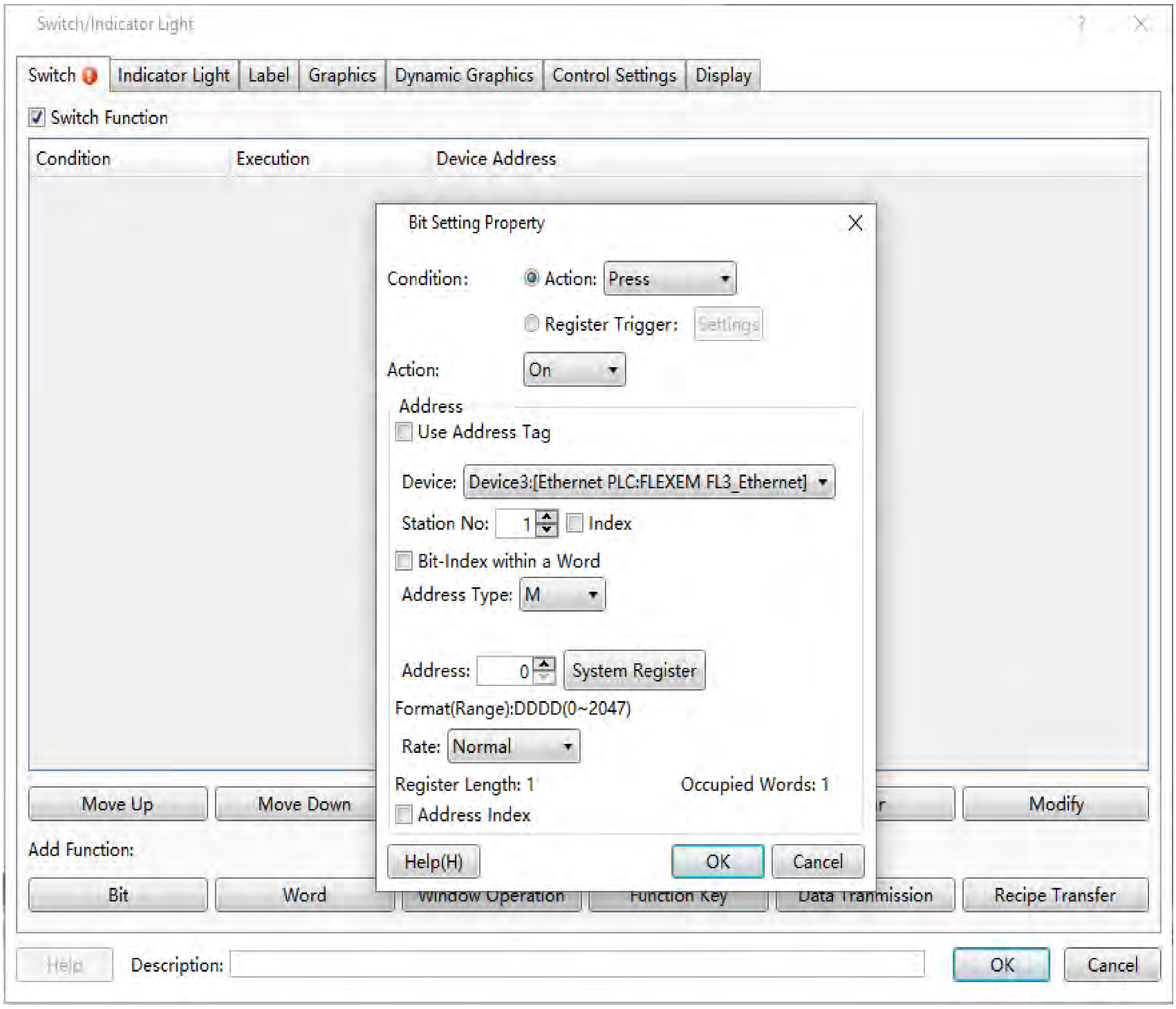


Step 3. Configure in the pop-up dialog box as shown in the picture below, click **OK**.



Step 4. Click **OK**.

Step 5. Select **Component/Switch/Bit Set** from the menu bar, set the address to PLC address in the pop-up dialog box.



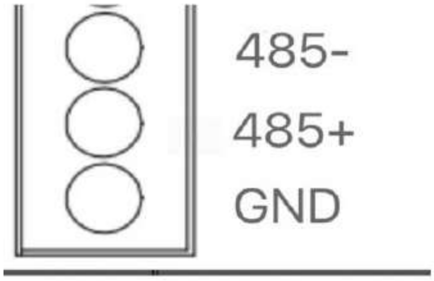
Step 6. After adding the switch component, download project to HMI. If it is able to read the data of the switch component, it means the communication is working.

17.2.4 Serial Communication Between HMI and Inovance H5u PLC

17.2.4.1 Connection Method

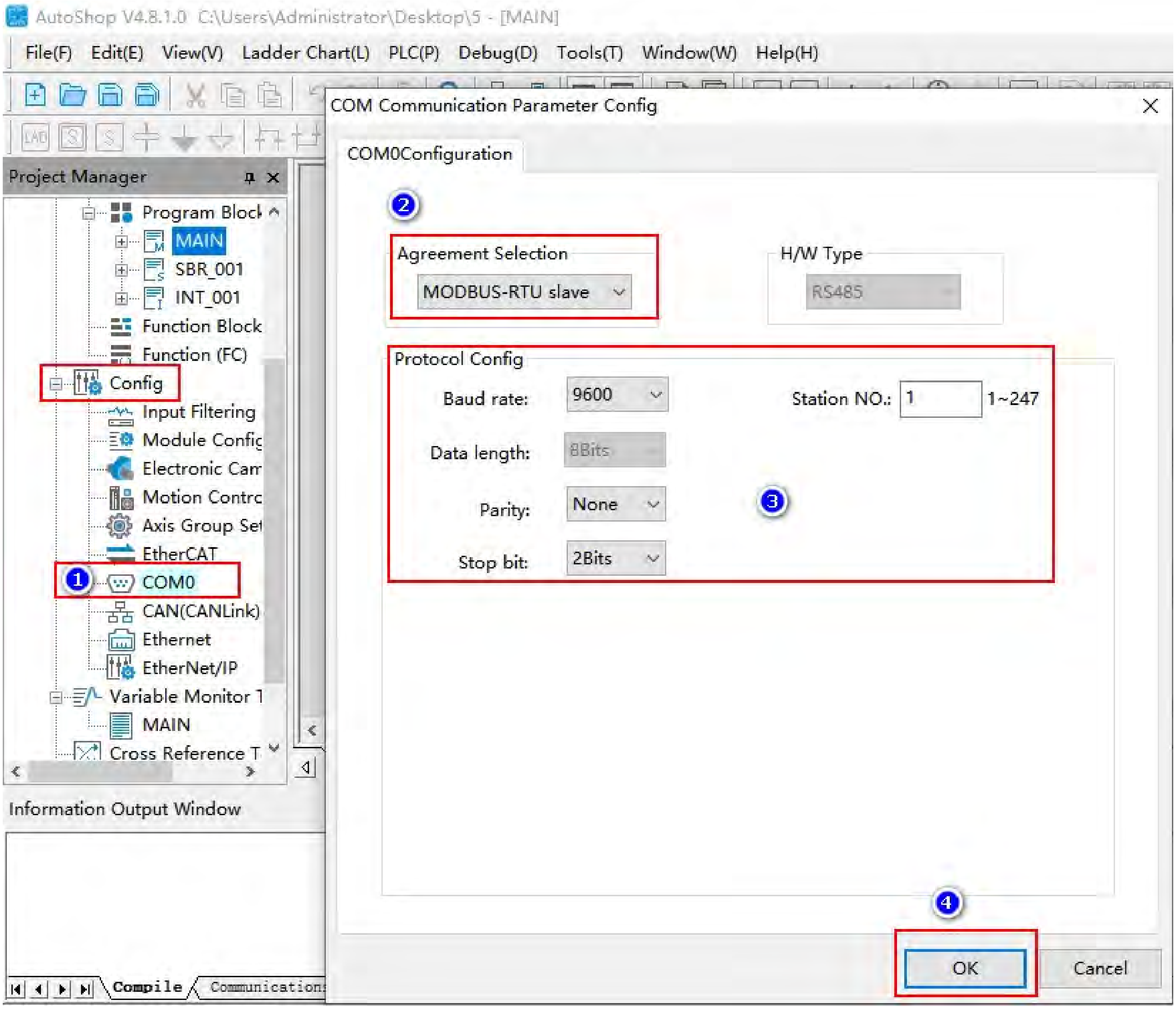
HMI can communicate with the Inovance H5u PLC through the COM port, which supports RS485 protocol.

Use RS485 cable to connect the COM port of the HMI and COM port of PLC, the connection method is shown in the table below.

HMI COM1 Port	**PLC COM Port**
1 RX-	485-
6 RX+	485+
5 GND	GND
	

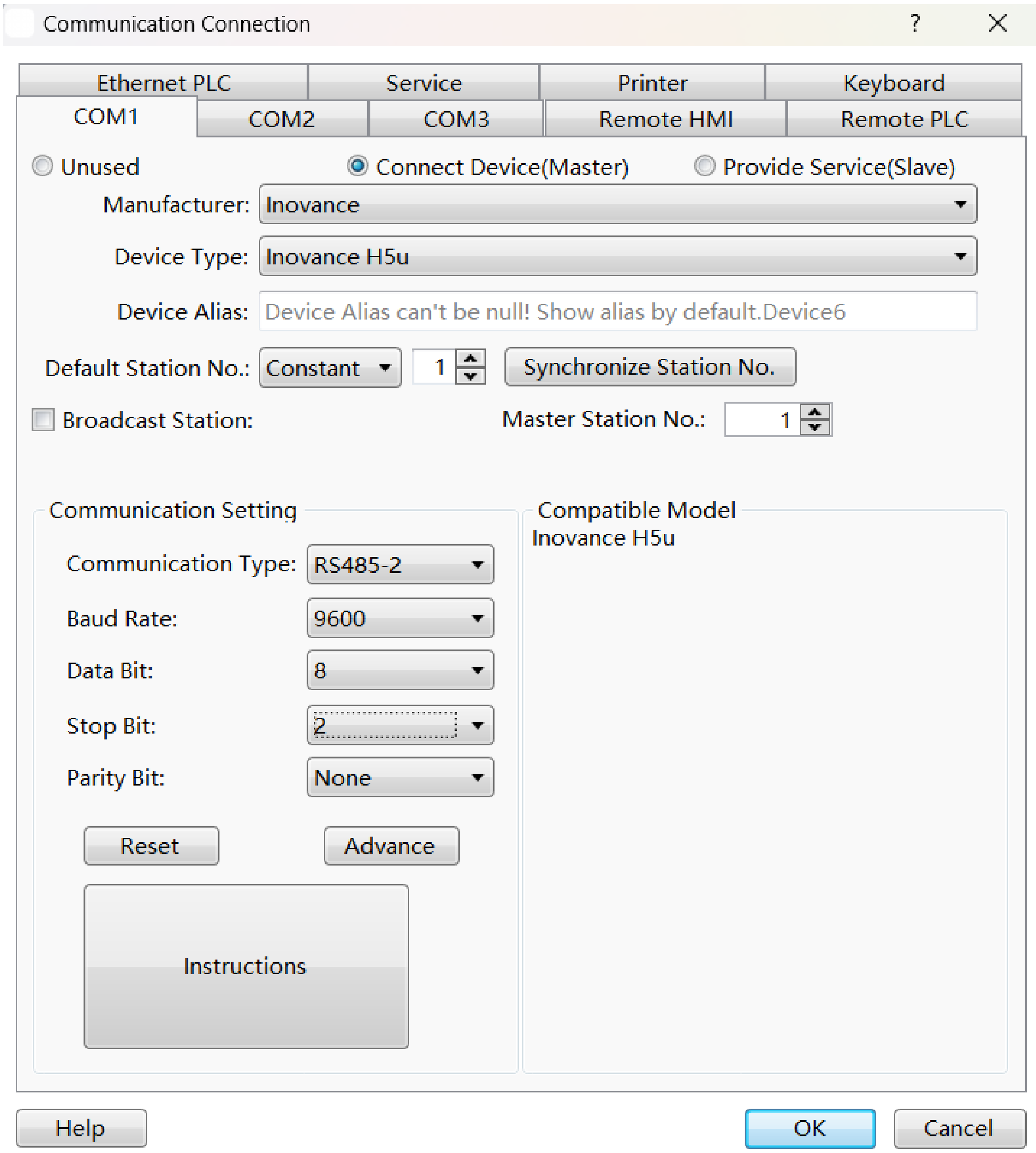
17.2.4.2 Configure PLC

Run the Inovance PLC configuration software, select **Configuration/COM** in the **project management** area, and set the protocol as "MODBUS-RTU slave". In the **protocol configuration**, you can set the baud rate, parity bit, stop bit, and station number.

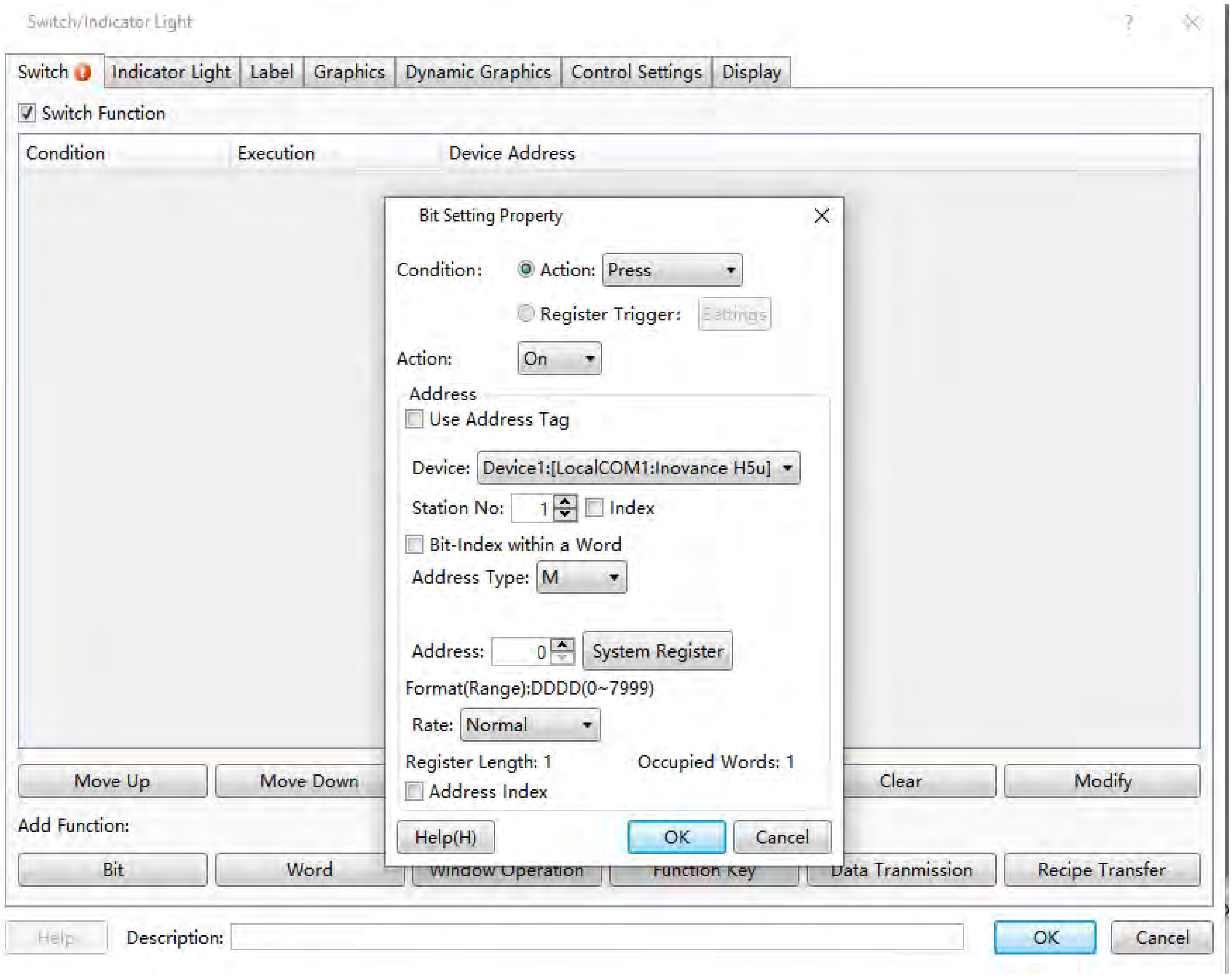


17.2.4.3 Configure HMI

Step 1. Run the VI20Studio software, select **Settings/Communication Settings/Local Connection** from the menu bar, select the **COM1** tab in the pop-up dialog box, refer to the figure below for configuration, click **OK**.



Step 2. Select **Component/Switch/Bit Set** from the menu bar, configure parameters such as PLC address as shown in the figure below.



Step 3. After editing the project, download project to HMI. If it is able to read data of the specified PLC bit address, it means the communication is working.

17.2.5 Ethernet Communication Between HMI and Inovance H5u PLC

For HMI models with Ethernet ports, the HMI and Inovance H5u PLC can be directly connected through a network cable or communicate through a switch.

17.2.5.1 Connection Method

- ◆ The connection method using the crossover network cable is shown in the table below.

Connection Method of HMI Ports	Connection Method of PLC Ports	Cable
1TX+(orange white)	3RX+(green white)	
2TX-(orange)	6RX-(green)	

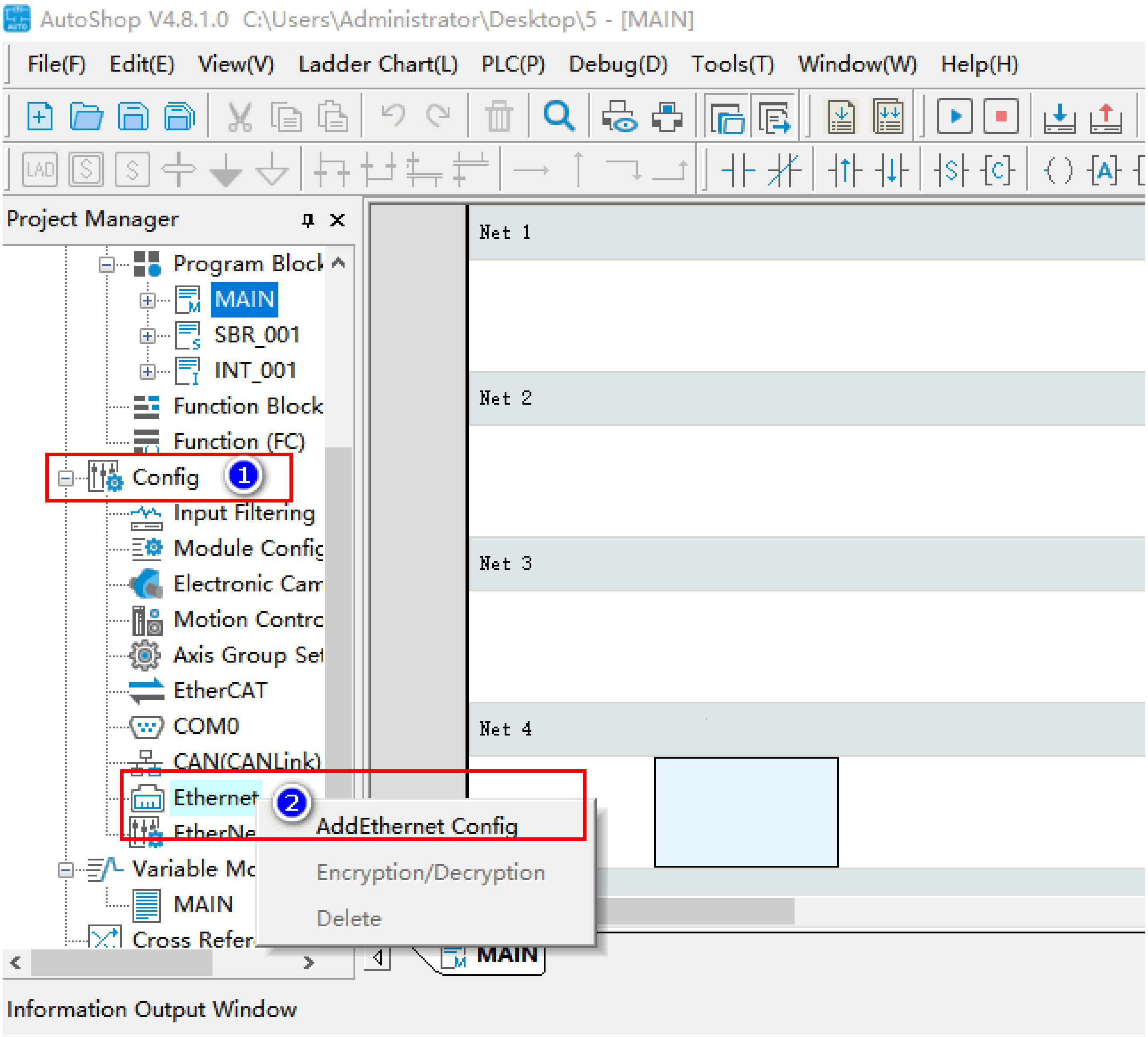
Connection Method of HMI Ports	Connection Method of PLC Ports	Cable
3RX+(green white)	1TX+(orange white)	
4BD4+(blue)	4BD4+(blue)	
5BD4-(blue white)	5BD4-(blue white)	
6RX-(green)	2TX-(orange)	
7BD3+(brown white)	7BD3+(brown white)	
8BD3-(brown)	8BD3-(brown)	

- The connection method using a straight-through network cable is shown in the table below.

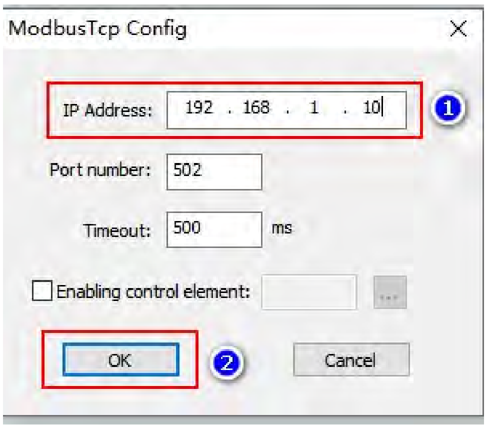
Connection Method of HMI Ports	Connection Method of PLC Ports	Cable
1TX+(orange white)	1TX+(orange white)	
2TX-(orange)	2TX-(orange)	
3RX+(green white)	3RX+(green white)	
4BD4+(blue)	4BD4+(blue)	
5BD4-(blue white)	5BD4-(blue white)	
6RX-(green)	6RX-(green)	
7BD3+(brown white)	7BD3+(brown white)	
8BD3-(brown)	8BD3-(brown)	

17.2.5.2 Configure PLC

Step 1. Run the PLC configuration software. Select **Project Management/Configuration**, and right click **Ethernet**, select **Add Ethernet Configuration**.

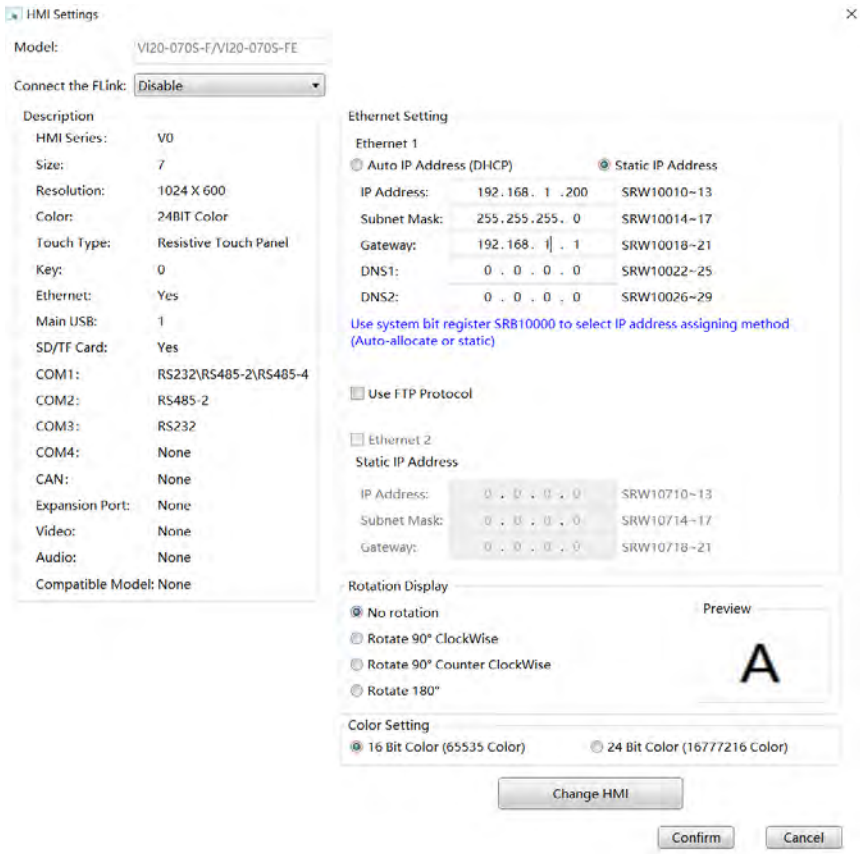


Step 2. Set PLC IP address in the pop-up dialog box, click **OK**.

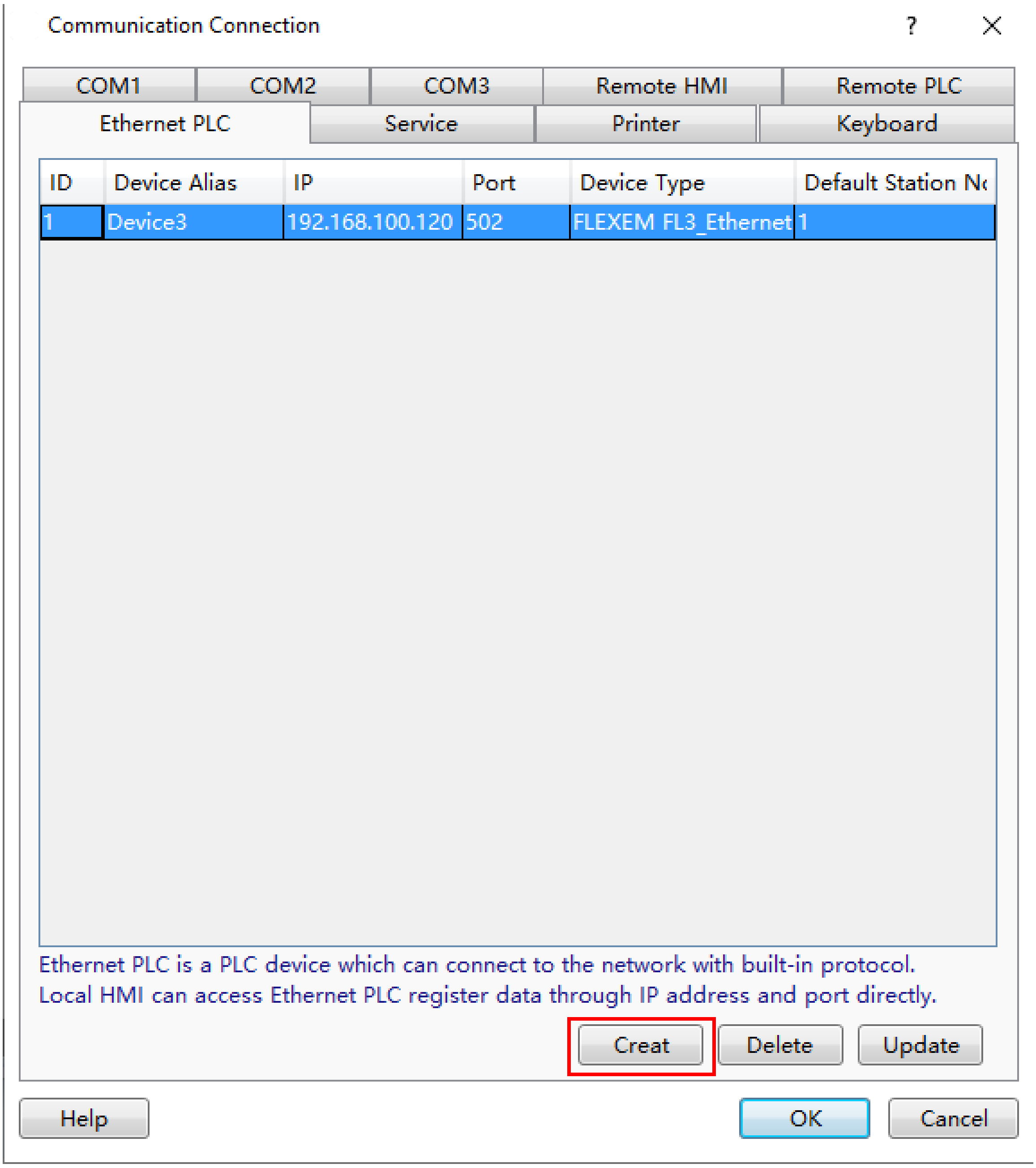


17.2.5.3 Configure HMI

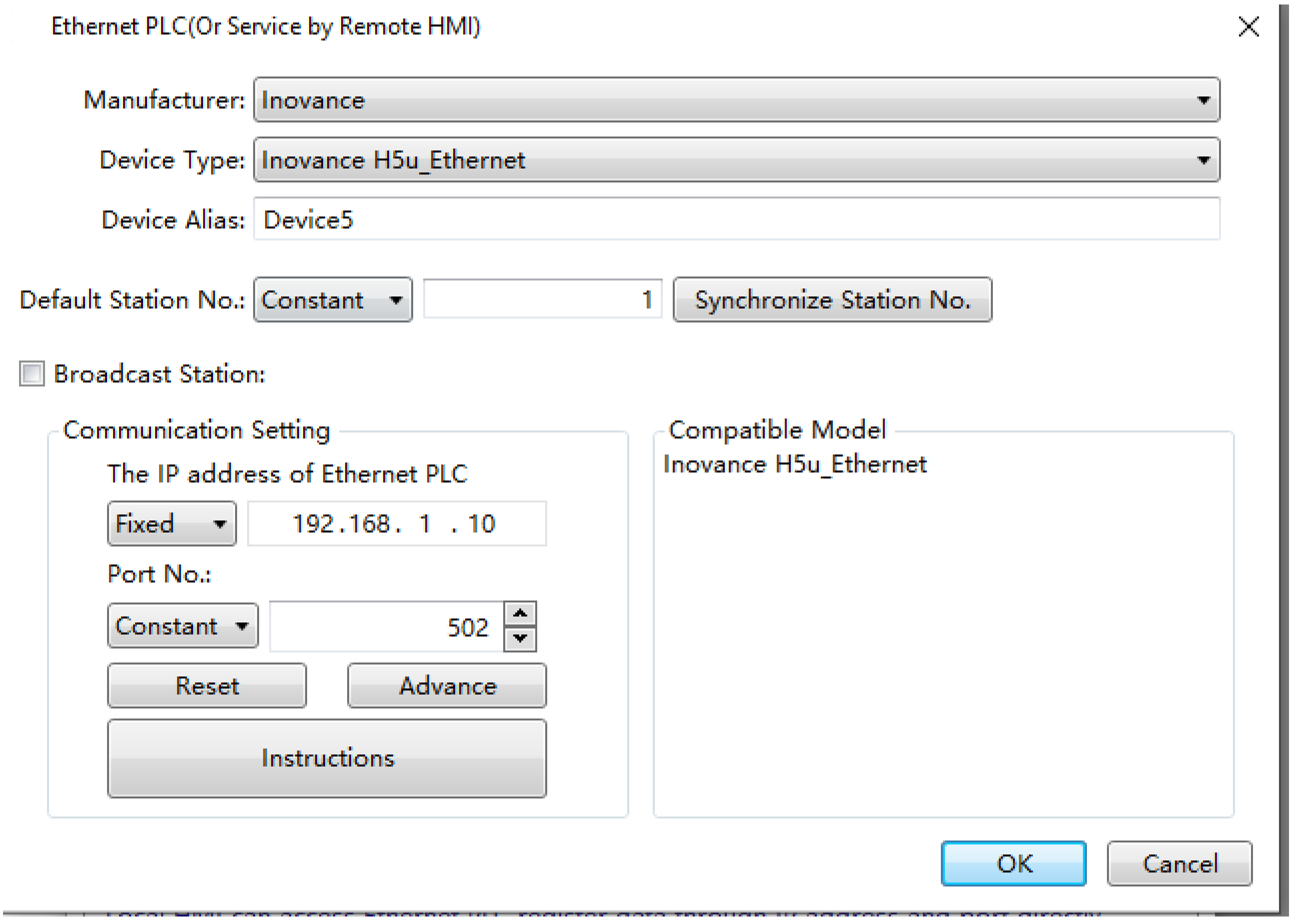
Step 1. Run the VI20Studio software, select **Settings/HMI Settings** from the menu bar, set the IP address of the HMI to 192.168.1.200/24 (in the same network segment as the IP address of the PLC), and click **Confirm**.



Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select the **Network PLC** tab, and click **Create**.

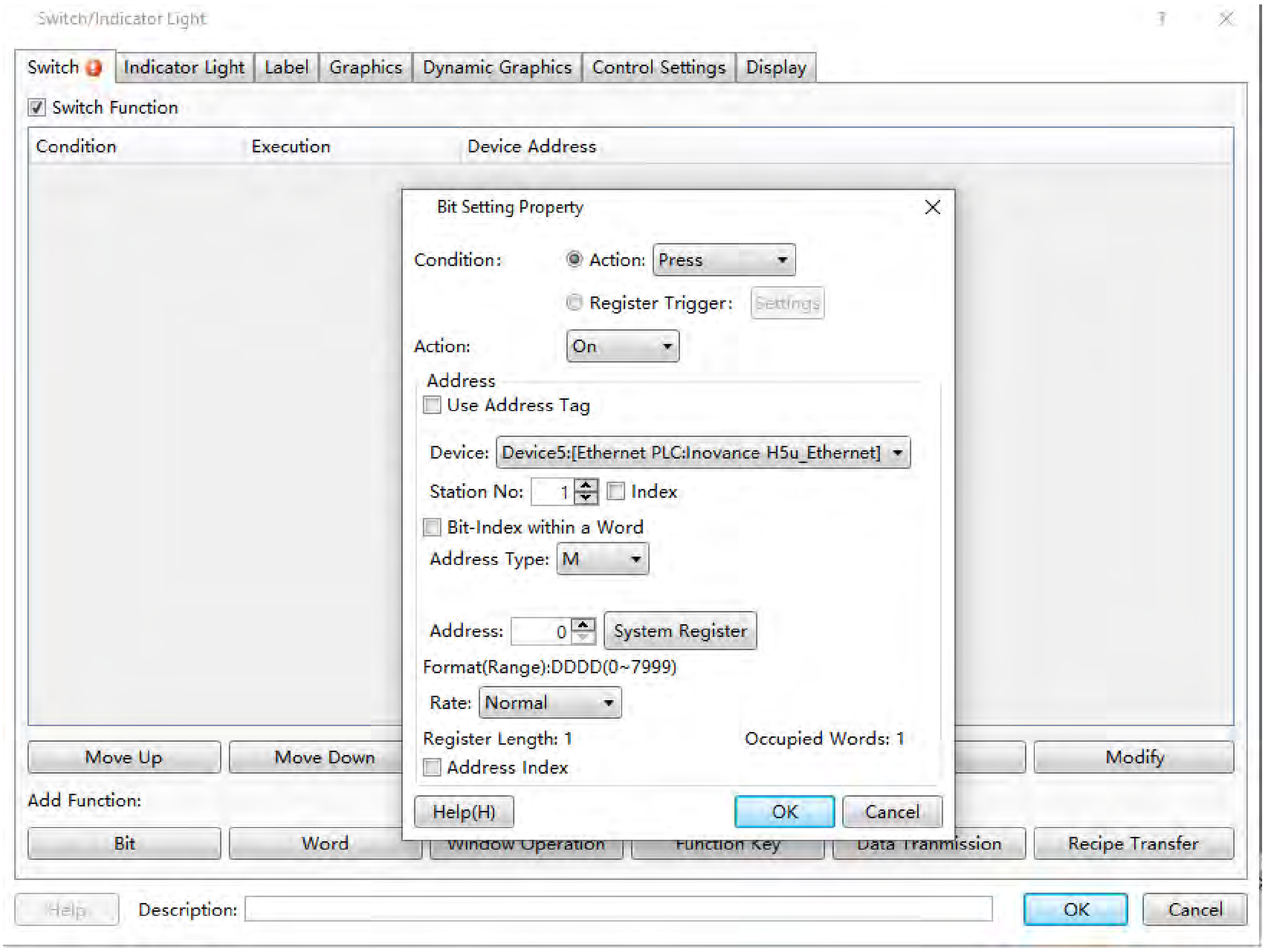


Step 3. Edit the relevant Parameters in the pop-up dialog box, and click **OK**.



Step 4. Click **OK**.

Step 5. Select **Component/Switch/Bit Set** from the menu bar, configure relevant parameters in the pop-up dialog box (select the actual bit address of PLC), click **OK**.



Step 6. After designing the project, download project to HMI. If the data of the switch component can be read, it means the communication is working.

17.3 Beckhoff PLC

Beckhoff PLC is based on the PC platform, which can be understood as a small industrial computer. The model of Beckhoff PLC only corresponds to the hardware of the controller. For example, Cx9020 adopts ARM A8 processor, 1GB memory; CX5130 adopts Intel Atom E3827 processor (dual core, 1.75Ghz), 4GB memory; CX2040 adopts Intel Core i7 processor (quad core, 2.1GHz), 4GB memory.

The operating systems of Beckhoff PLCs can be categorized as Windows CE and Windows 7, which are available to customers as an option (some PLC models have a fixed operating system).

The configuration software for Beckhoff PLC is divided into TwinCAT 2 and TwinCAT 3 (abbreviated as TC2 and TC3). Customers have the option to purchase either one, as they have different prices(some controllers come with a fixed configuration software).

17.3.1 Ethernet Communication(Address Tag) Between HMI and Beckhoff PLC(Windows CE+TwinCAT 3)

The PLC in this case is a C6015 with a Windows CE operating system and TC3 configuration software.

17.3.1.1 Connection Method

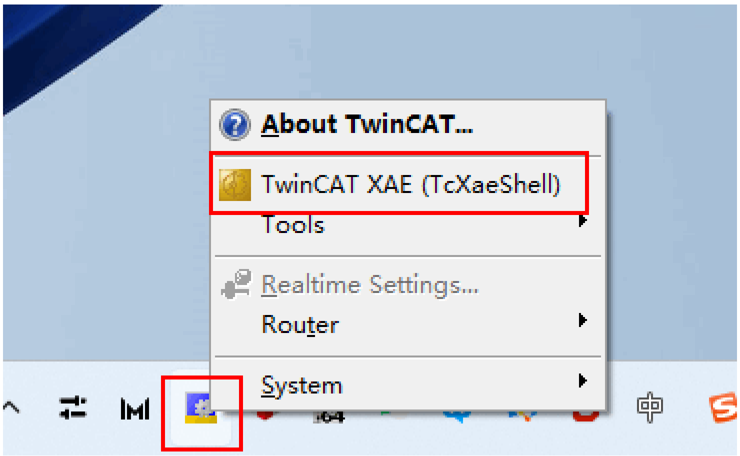
Use a network cable to connect the PC's Ethernet port to the HMI Ethernet port, or PC and HMI can be connected through a switch.

17.3.1.2 Configure PLC

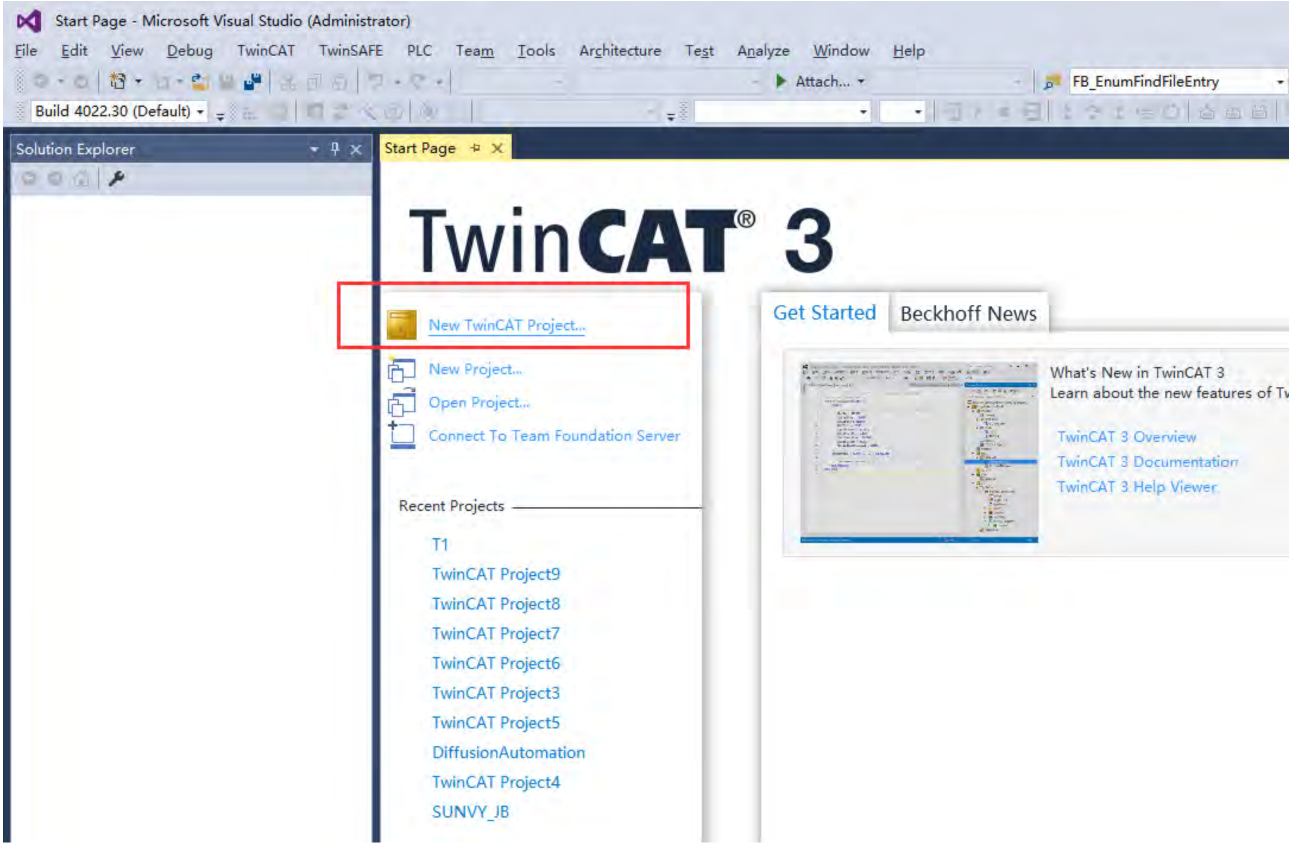
17.3.1.2.1 Connect to PLC's Remote Desktop

Step 1. Create TwinCAT project.

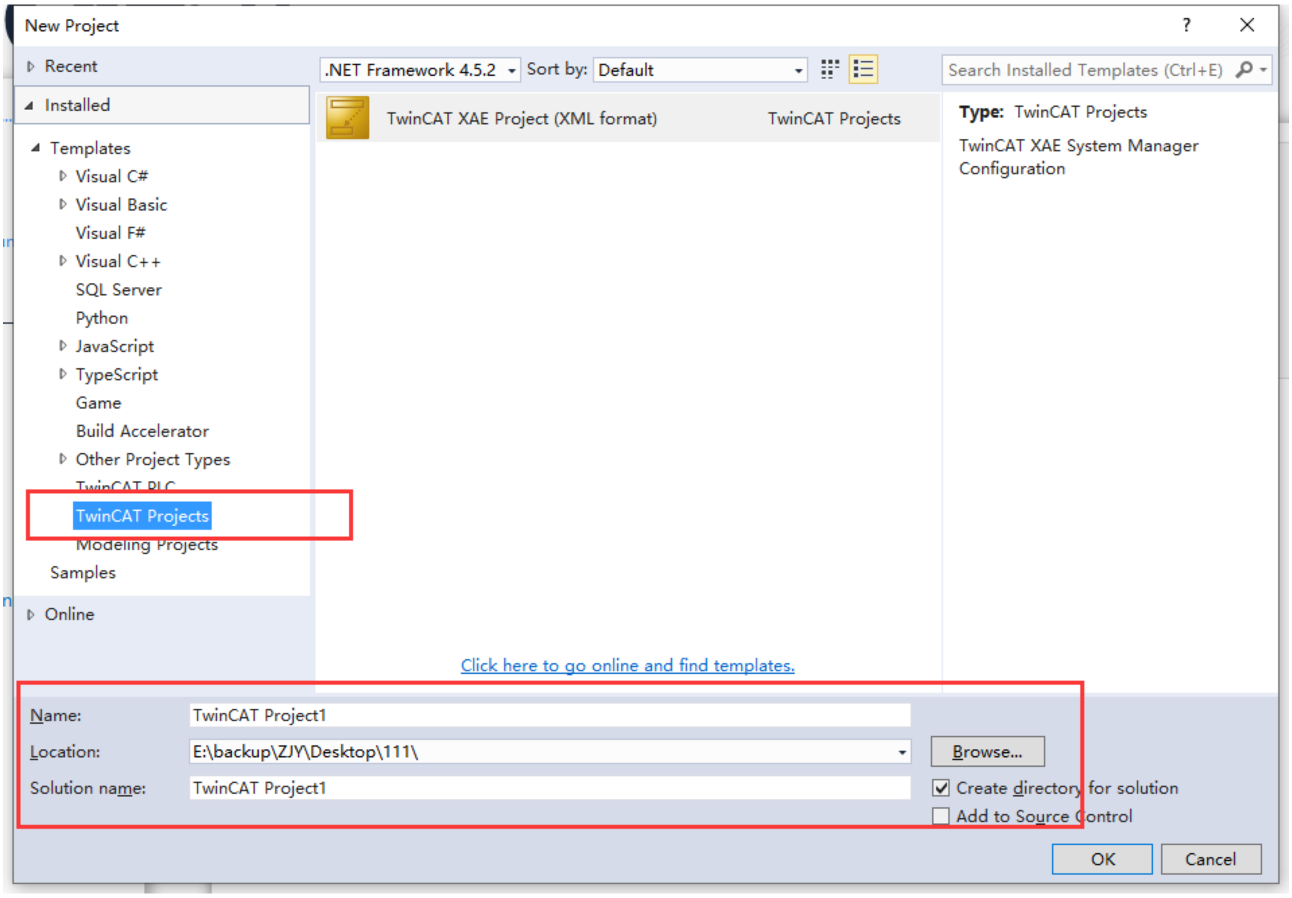
1) PC and PLC are directly connected using a network cable, right-click the TwinCAT icon in the PC's taskbar and select **TwinCAT XAE**.



2) Click **New Twincat Project**.

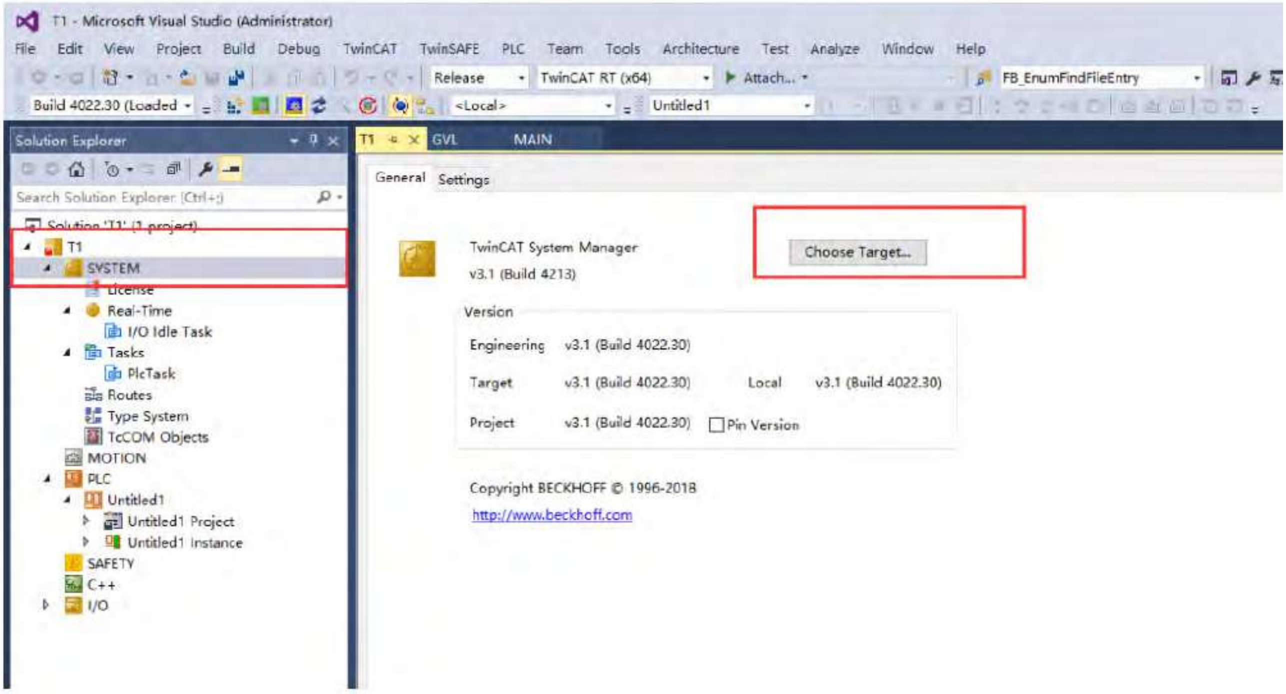


3) Select the project type in the pop-up dialog box, set the project name and save path, and click **OK**.

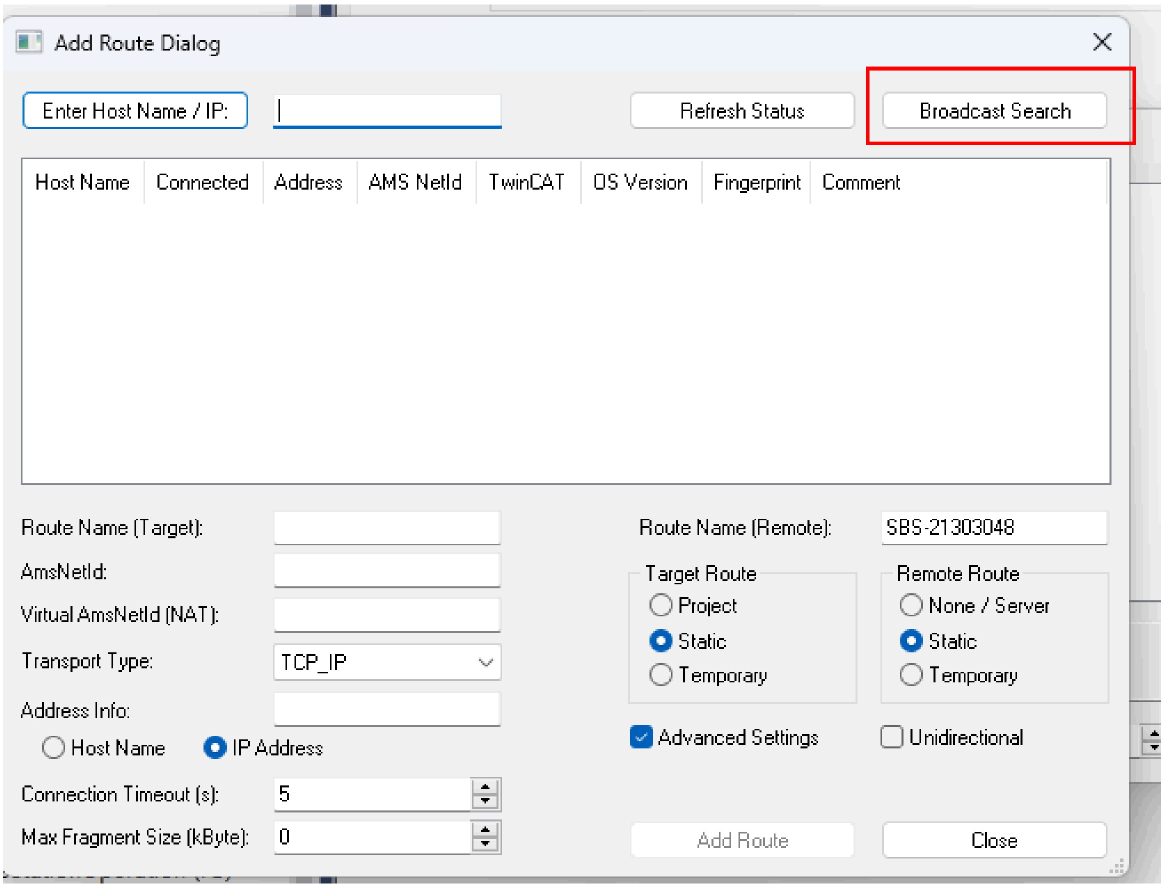


Step 2. Connect PLC.

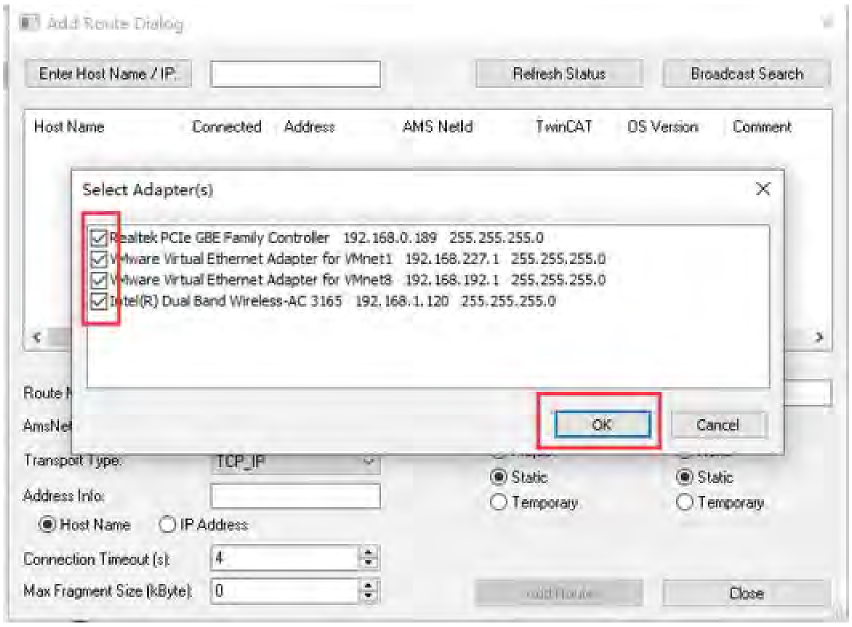
1) After creating a project, select **System** from the left side navigation bar, select **General** tab, click **Choose Target**.



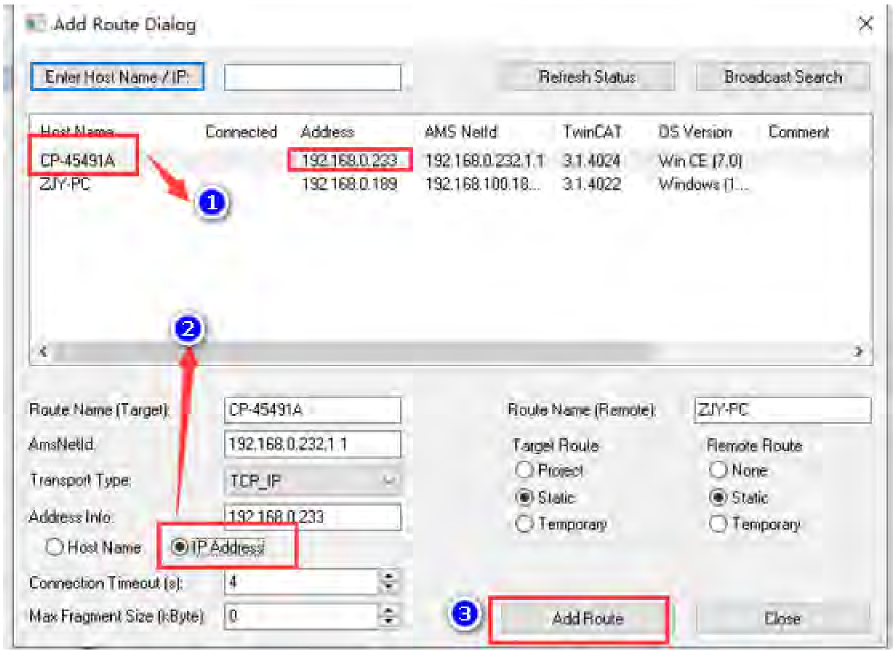
2) Click **Broadcast** Search in the pop-up dialog box.



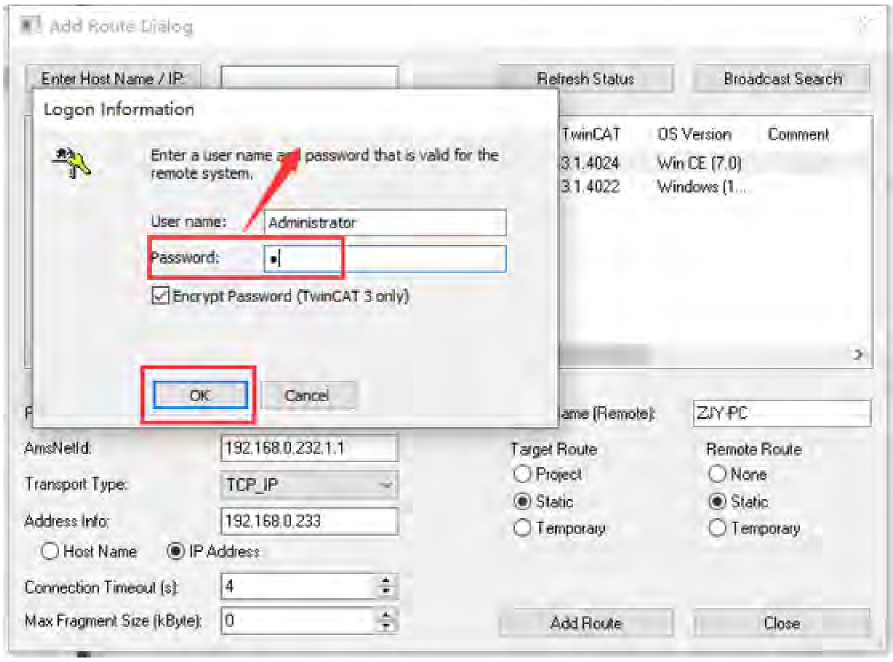
3) Check all the **Adapters**, click OK.



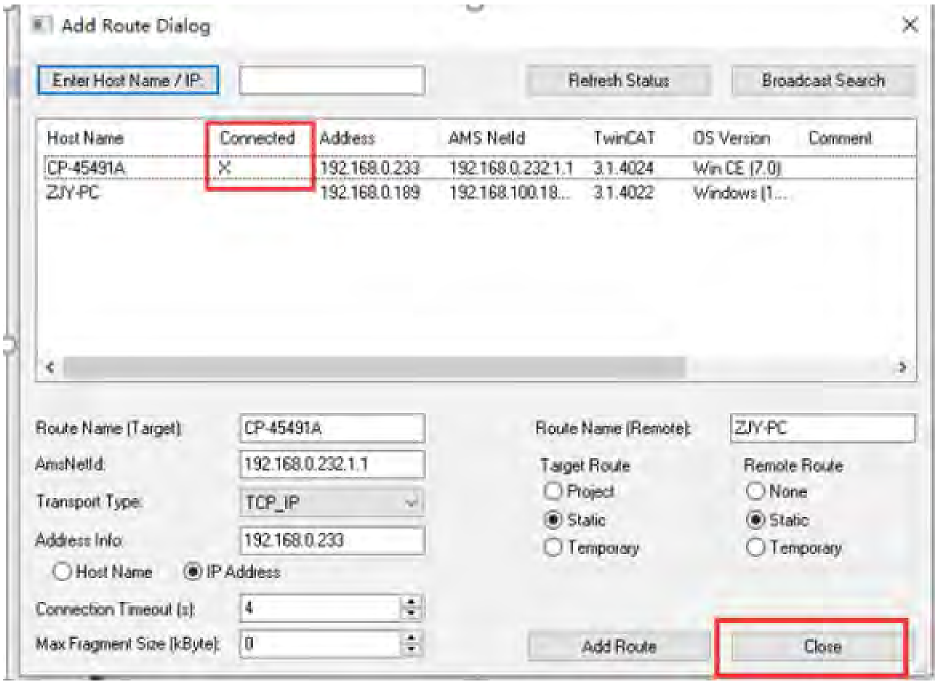
4) Find the device whose **Host Name** starts with “C” in the list, you can view the relevant information of the controller, including IP address, AMS ID, OS version, Twincat version. Select **IP Address** for the following routing method, select **Static** for the routing method, and click **Add Route**.



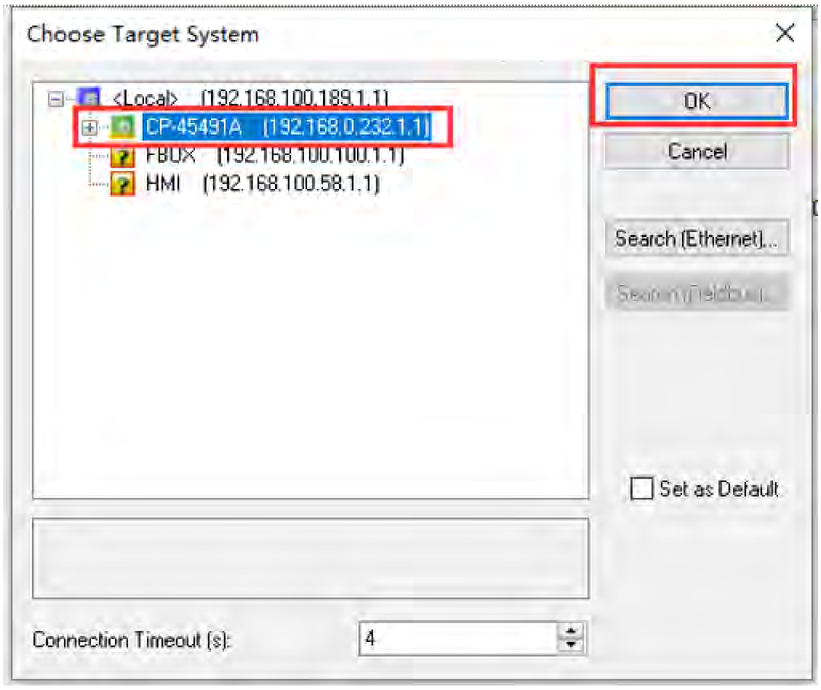
5) In the pop-up dialog box, enter your user name and password (the default user name is Administrator and the default password is 1) and click **OK**.



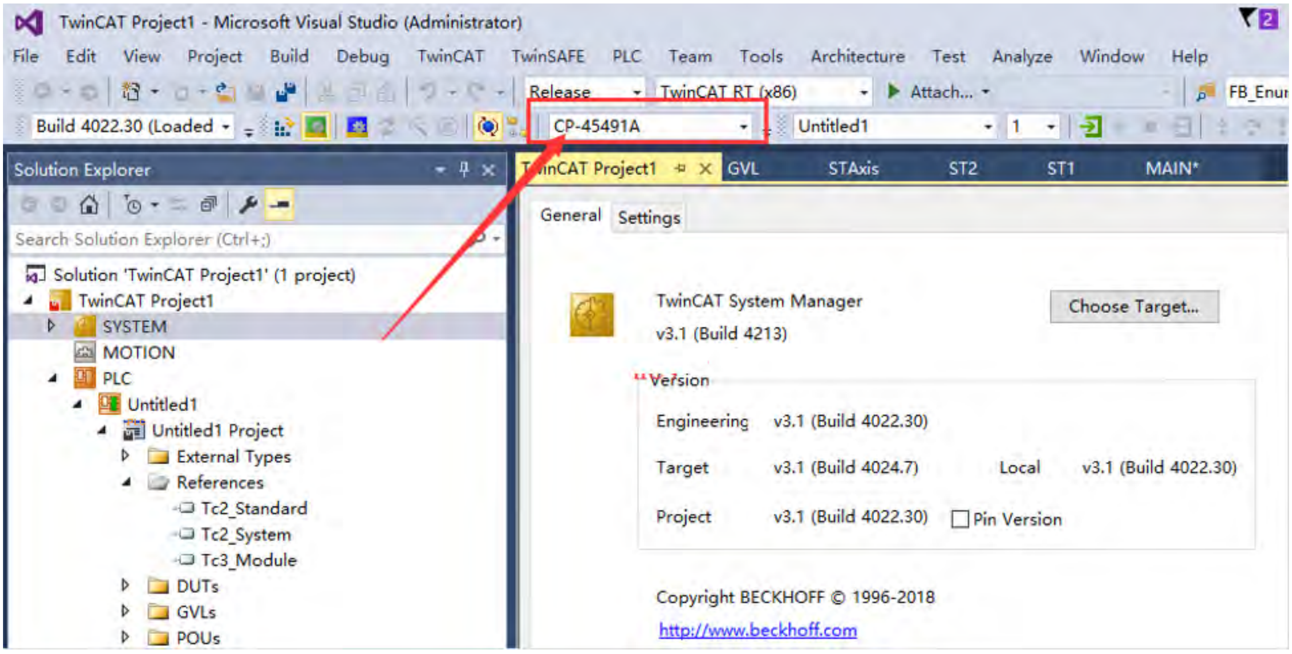
6) When **Connected** is X, it means the PLC is connected, click **Close**.



7) Select the PLC you just added and click **OK**.

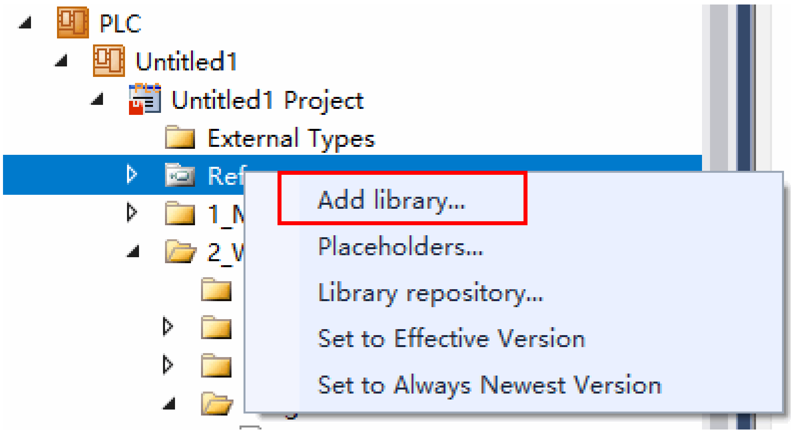


8) If the Host Name of the PLC is displayed at the red box mark in the project as shown below and there is no Error, it means that the PLC has been connected, and operations such as downloading programs and online monitoring can be performed.

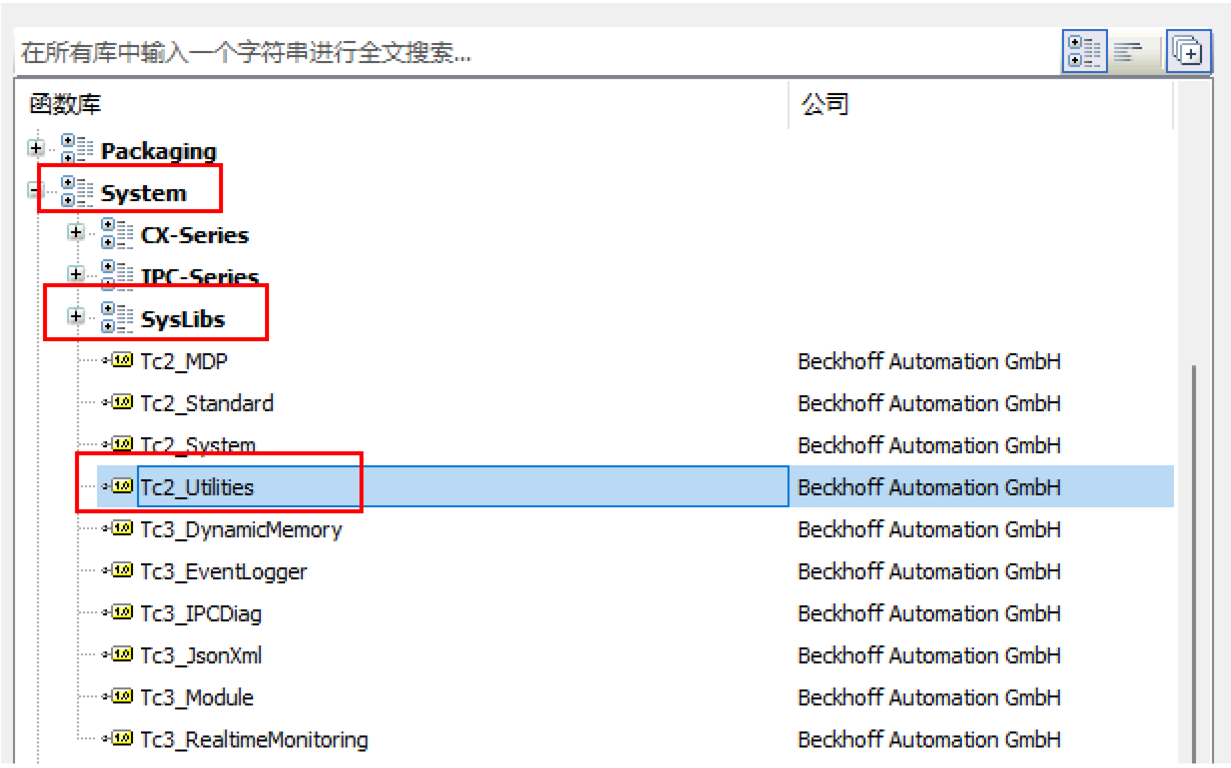


Step 3. Add library.

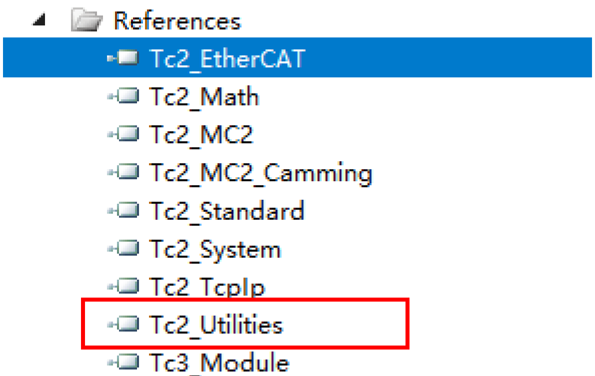
1) When the controller is connected to a monitor, you can directly use the monitor to modify the parameters of the controller; when no monitor is connected, you need to cooperate with a small program to open the remote desktop of the CE system. To add library files to the project, right-click **Reference**, and select **Add library**.



2) Expand **System**, select TC2-Utilities library file, click **OK**.



3) After the previous step, you can see a TC2-Utilities library file under References.



Step 4. Write the control program.

1) Open the MAIN program, and the function block definition is shown in the figure below.

OpenRemoteDesktop: NT_StartProcess;

Instantiation:

OpenRemoteDesktop(

NETID:='' ,

PATHSTR:='\windows\CerDisp.exe' ,

DIRNAME:='\windows' ,

COMNDLINE:= ,

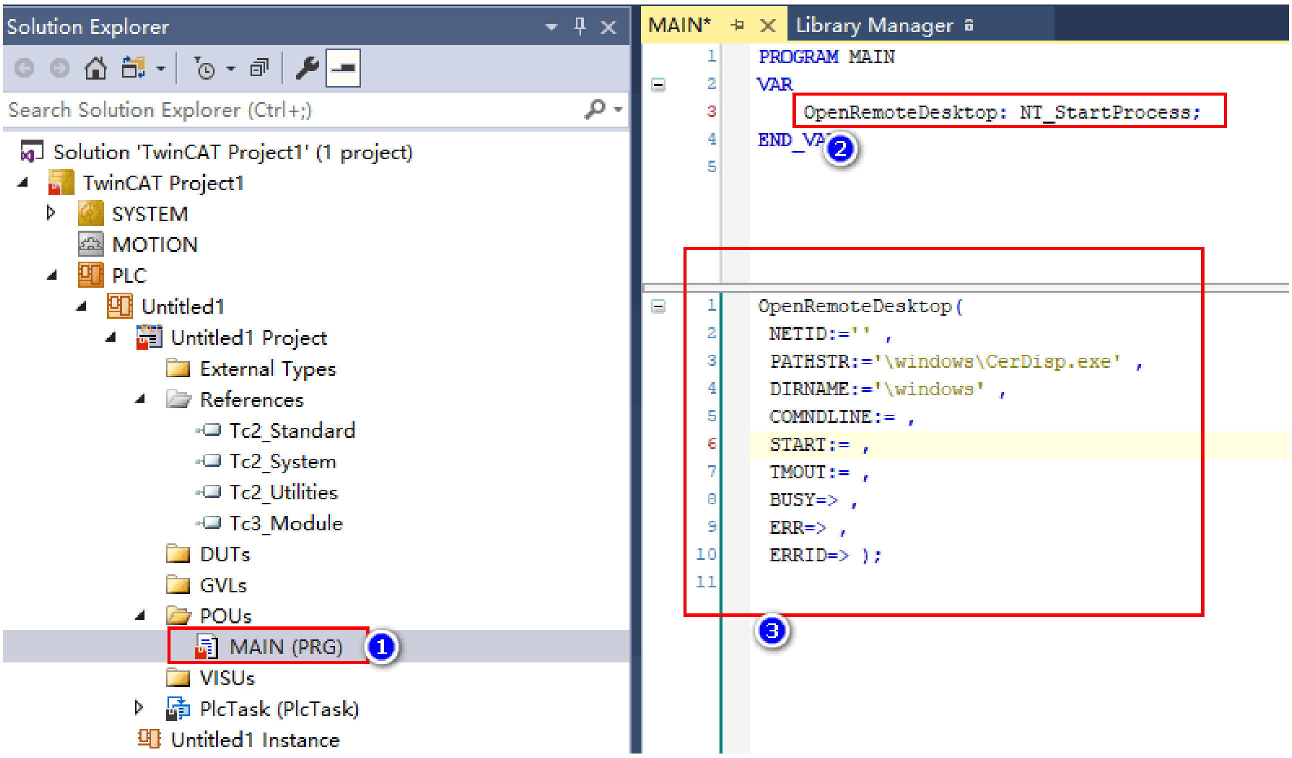
*START:= ,(*start remote desktop connection*)*

TMOUT:= ,

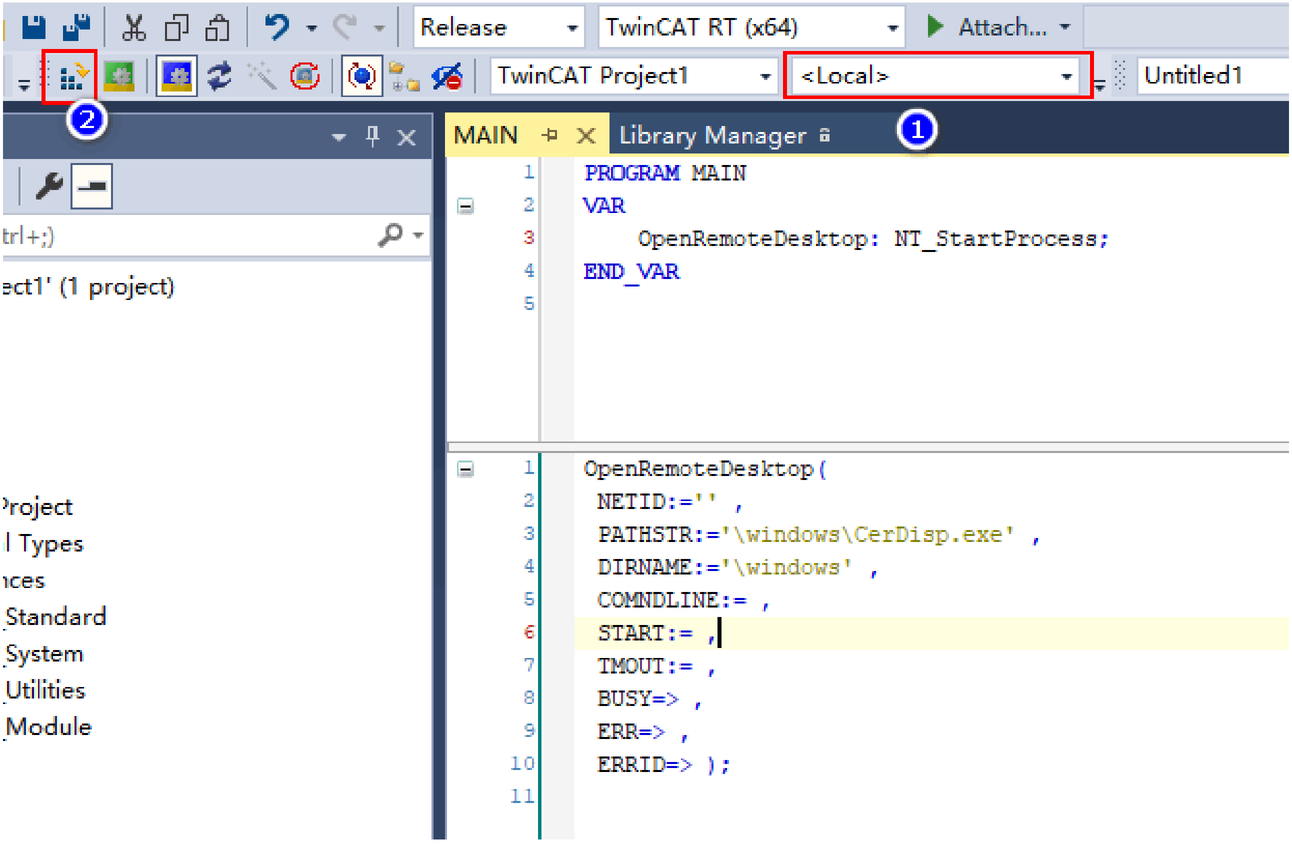
BUSY=> ,

ERR=> ,

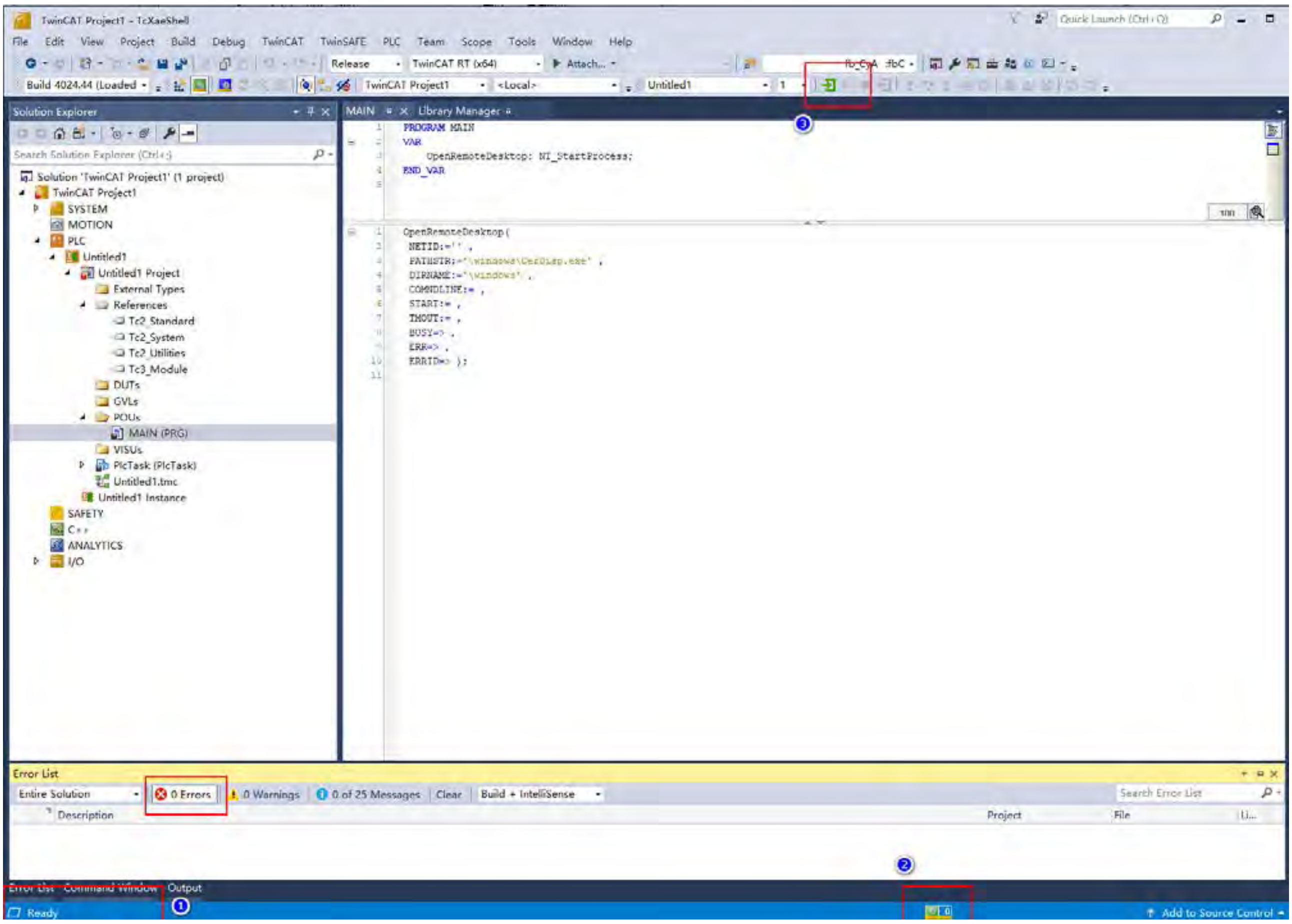
ERRID=>);



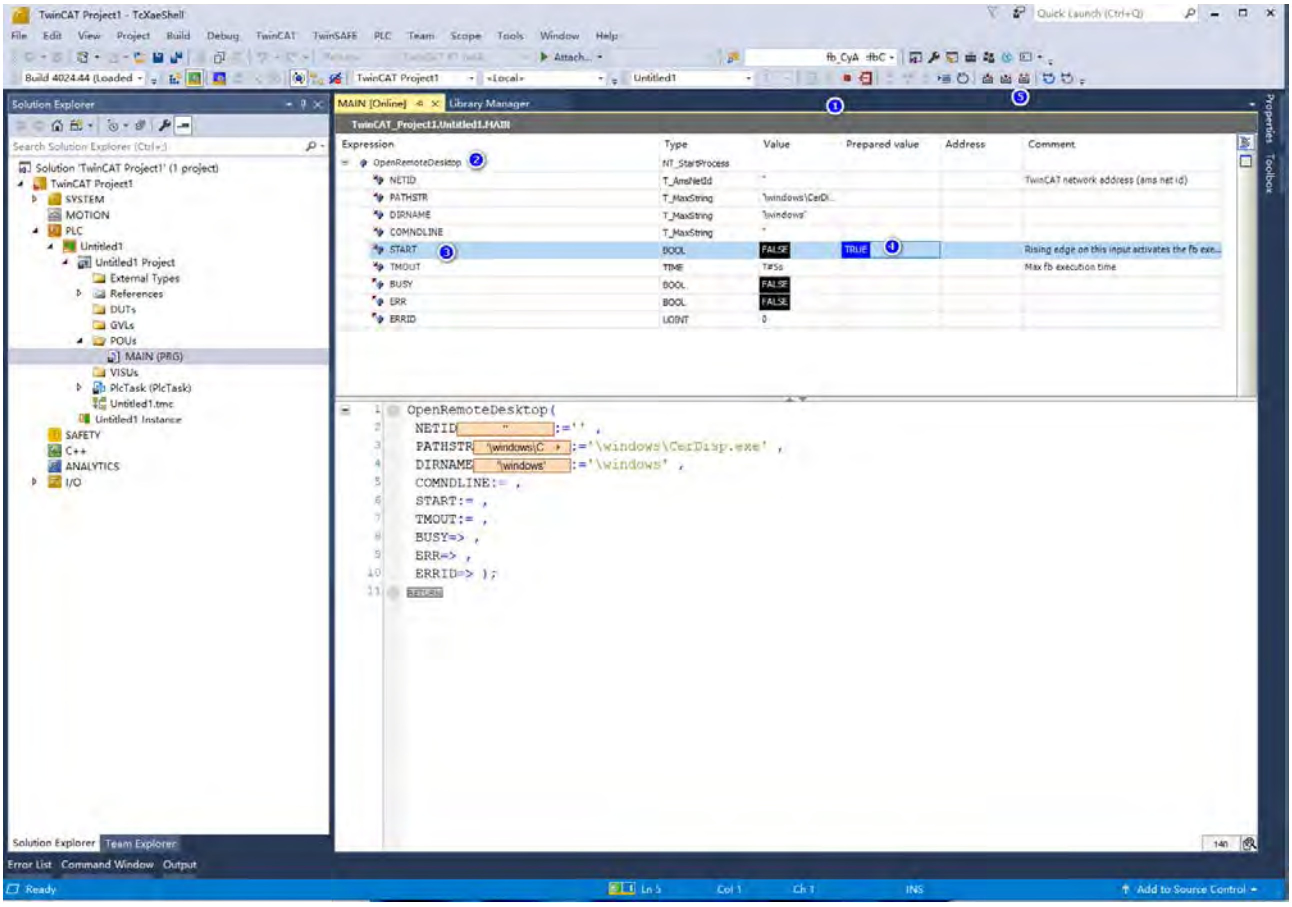
2) Activate the configuration when connected to the PLC, and click **OK** in the pop-up dialog box.

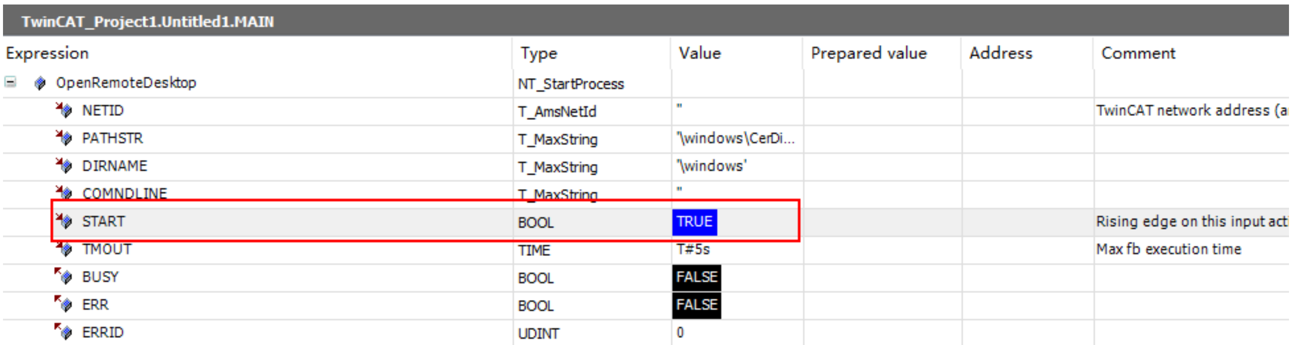


3) Wait for the prompt “Ready”, and after the controller is running, click the icon.



4) Find the functional block, write the START pin to TRUE.



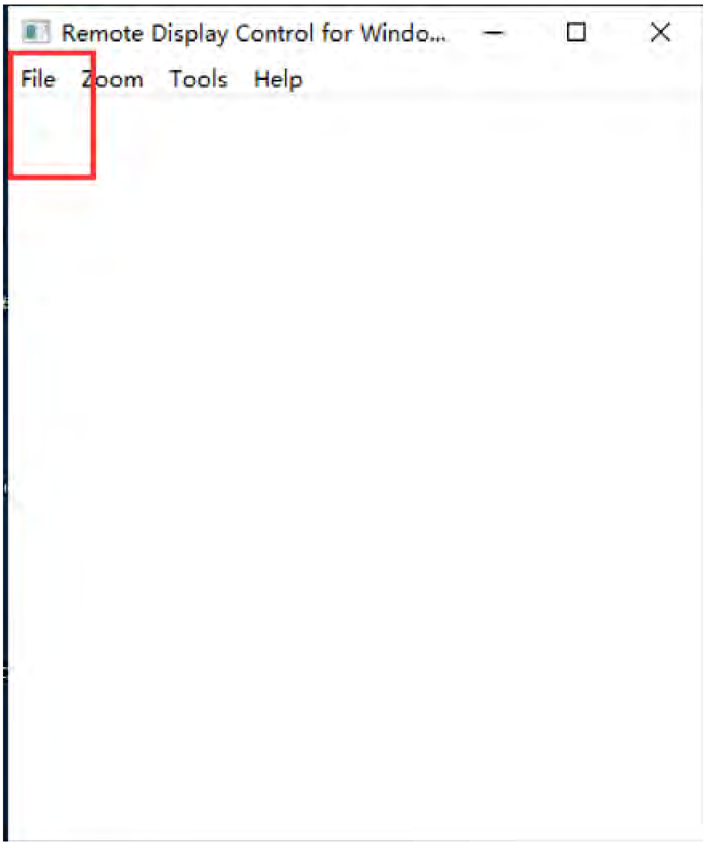


TwinCAT_Project1.Untitled1.MAIN					
Expression	Type	Value	Prepared value	Address	Comment
OpenRemoteDesktop	NT_StartProcess				
NETID	T_AmsNetId	''			TwinCAT network address (a
PATHSTR	T_MaxString	'\windows\CerDi...			
DIRNAME	T_MaxString	'\windows'			
COMNDLINE	T_MaxString	''			
START	BOOL	TRUE			Rising edge on this input act
TMOUT	TIME	T#5s			Max fb execution time
BUSY	BOOL	FALSE			
ERR	BOOL	FALSE			
ERRID	UDINT	0			

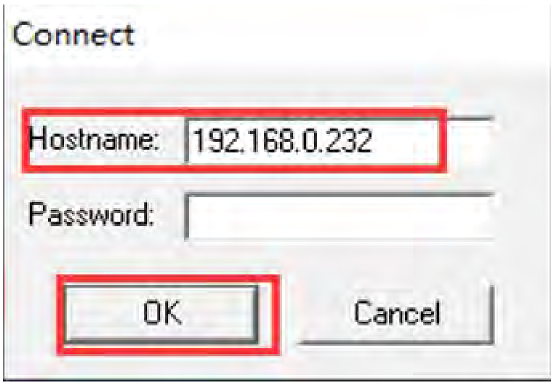
Step 5. Configure RemoteHost.

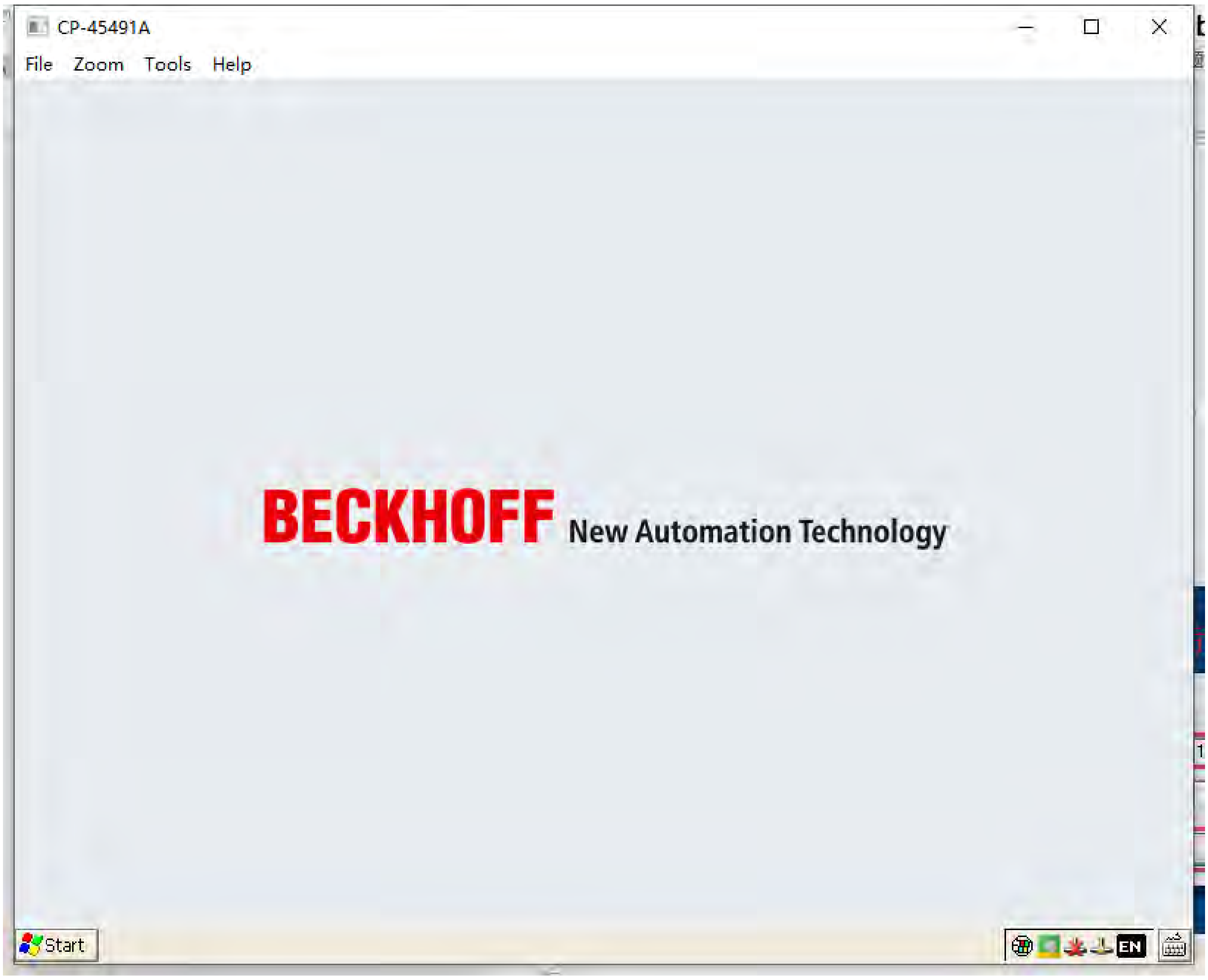
1) Run RemoteHost.

2) Select **File /Connect** from the menu bar.



3) Enter the IP address of controller, click **OK** to enter the remote desktop.





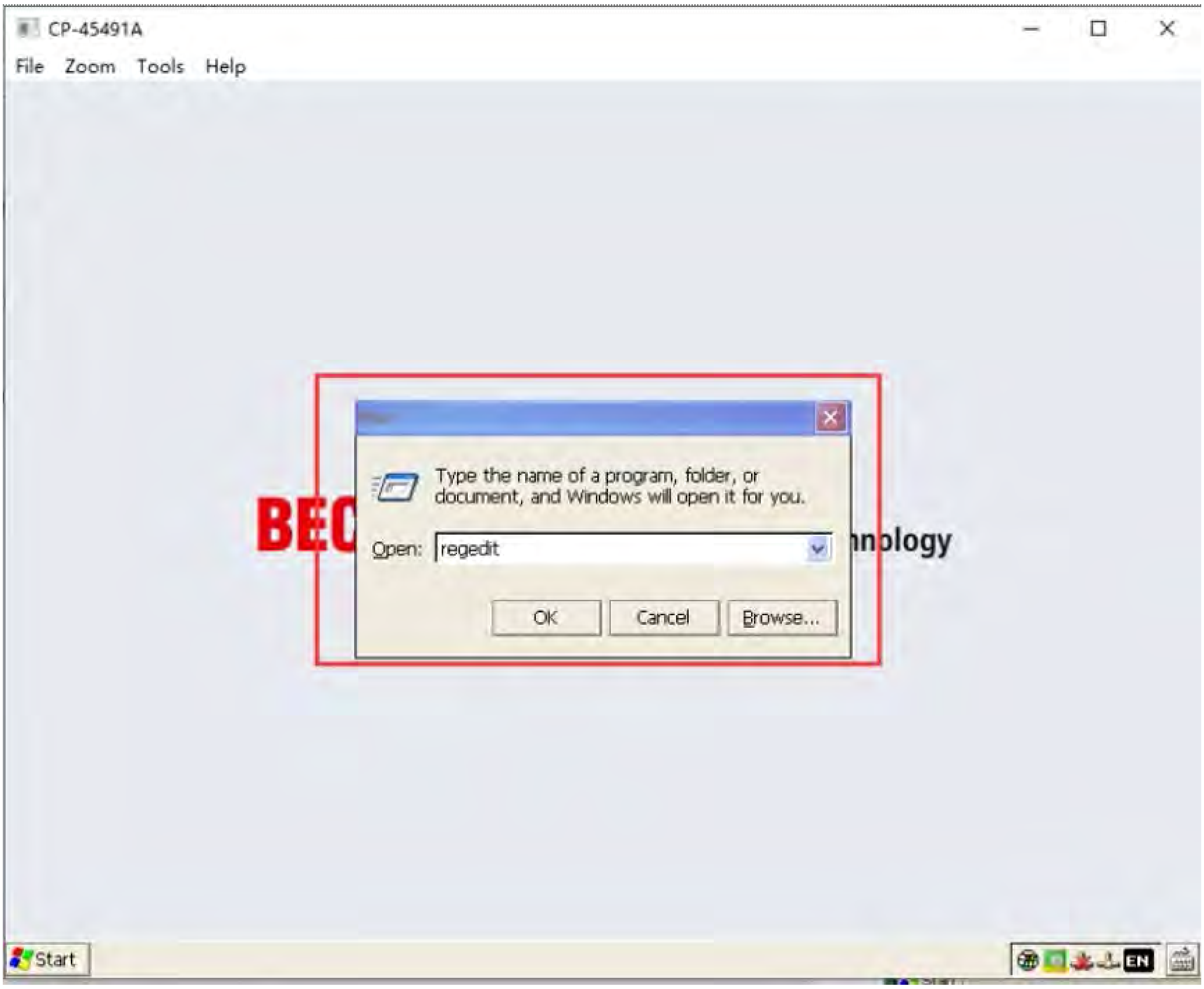
17.3.1.2.2 Set the IP Address of PLC

It is necessary to set the IP address of the PLC to be in the same network segment as the IP address of the HMI.

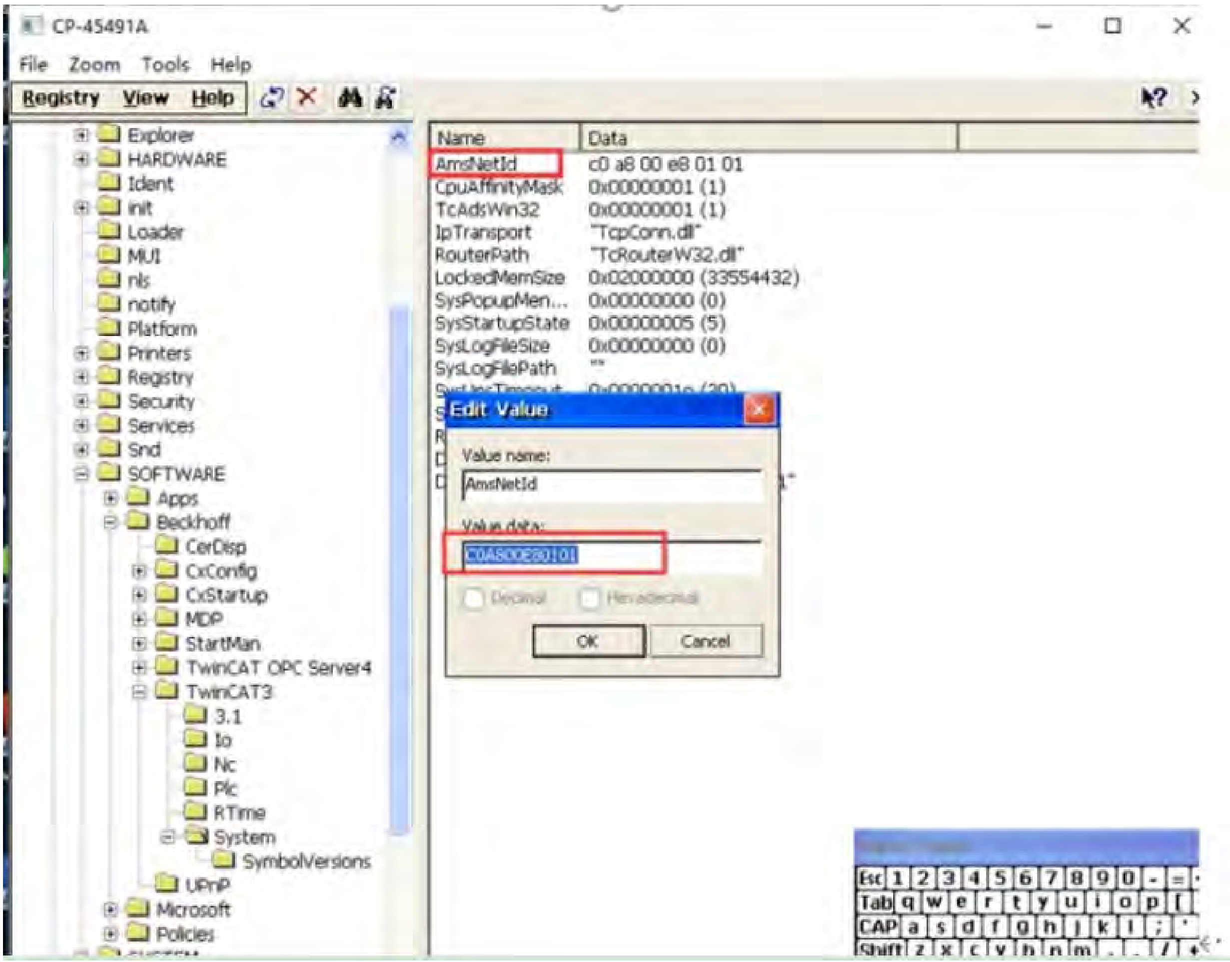
Select **Start/Control Panel/Network and Dial-up Connections/FEC1** in the taskbar, select the **IP Adress** tab in the pop-up dialog box, select **Specify an IP address**, set IP Address to 192.168.0.232; set Subnet Mark to 255.255.255.0. The third line is not required. Click **OK** in the top right corner.

17.3.1.2.3 Set the AMS Net ID of PLC

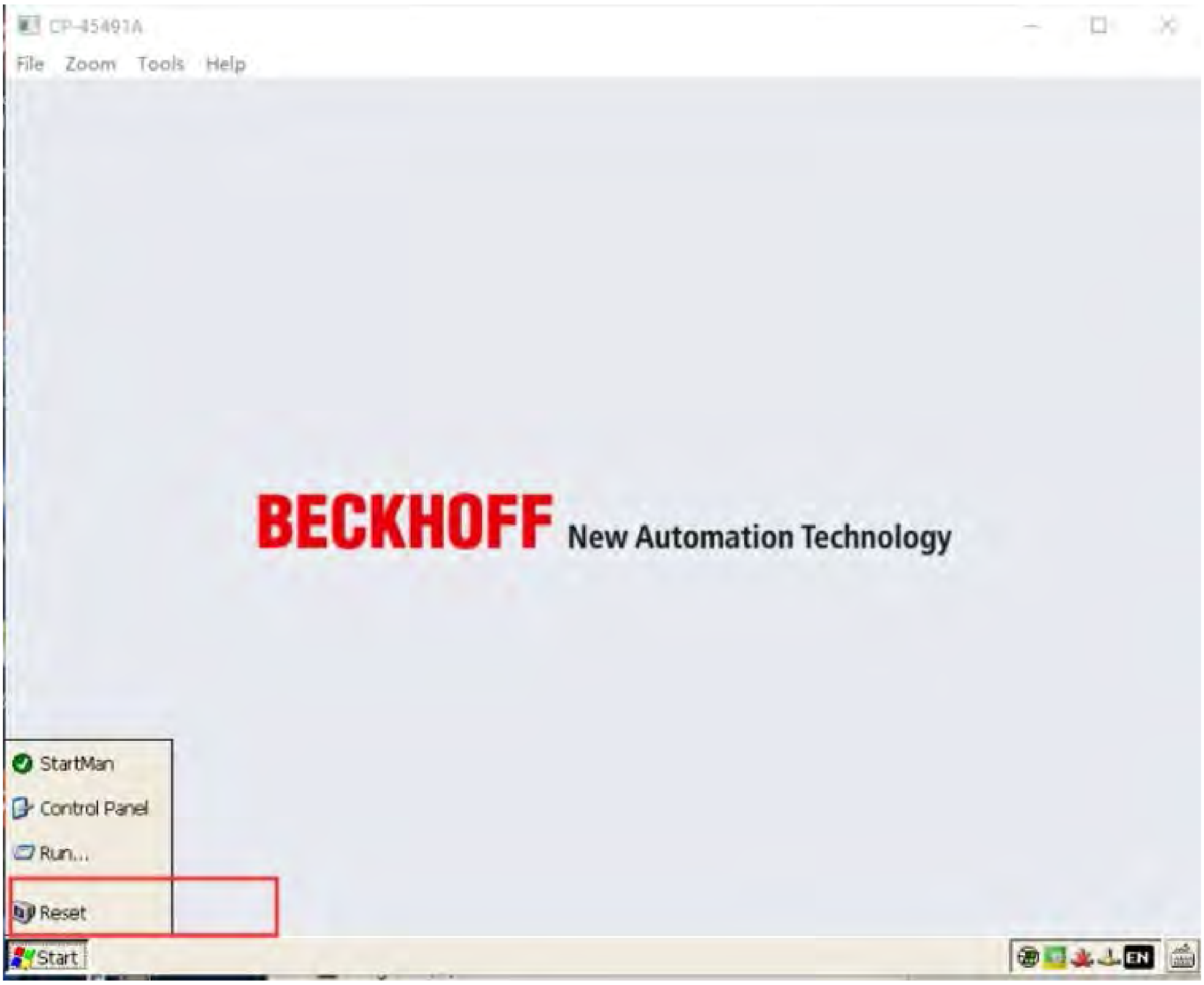
Step 1. Select **Start/Run** in the taskbar of remote desktop, enter “regedit” and press Enter.



Step 2. Select **HKEY_LOCAL_MACHINE/SOFTWARE/BECKHOFF/SYSTEM** in the pop-up dialog box, find AMSNetID, right-click, and select Edit Value. For example, if the IP address of the PLC is 192.168.0.232, modify it to 192.168.0.232.1.1 format. The input value is in hexadecimal format.



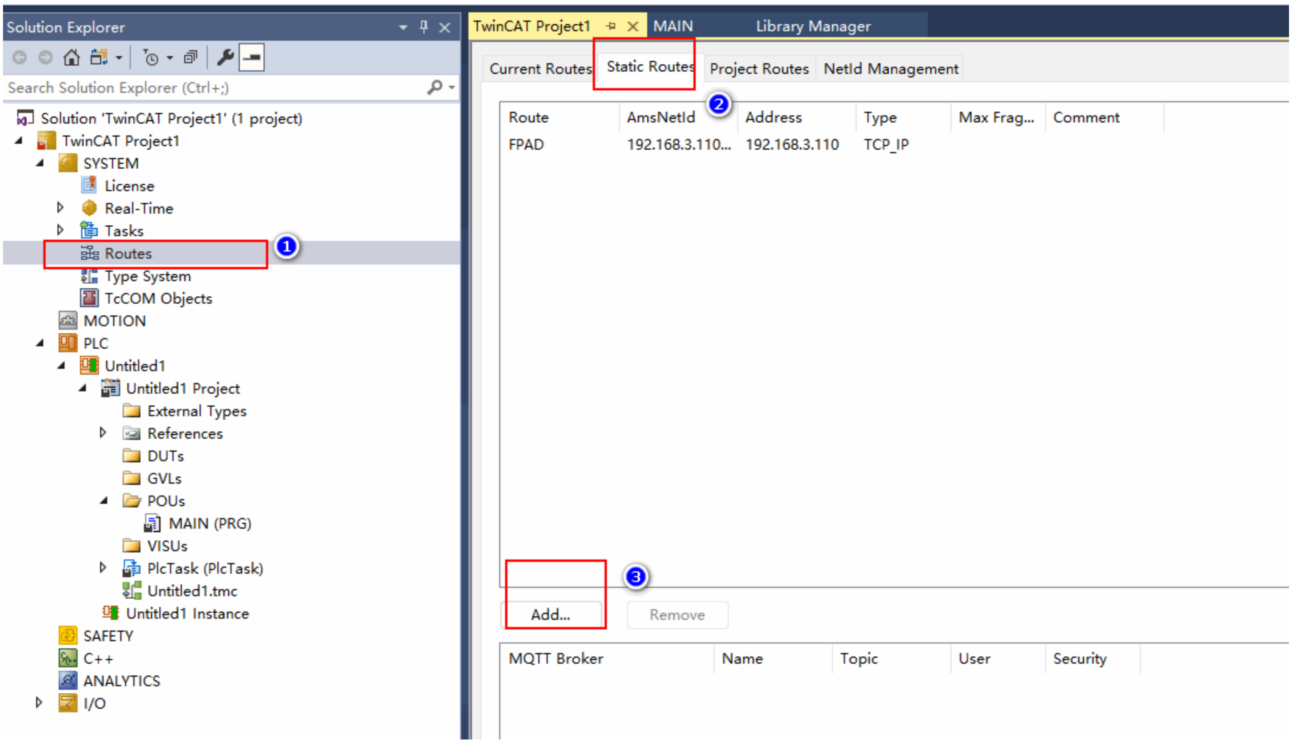
Step 3. After the setting is completed, select **Start/Reset** on the task bar, and restart the PLC to take effect.



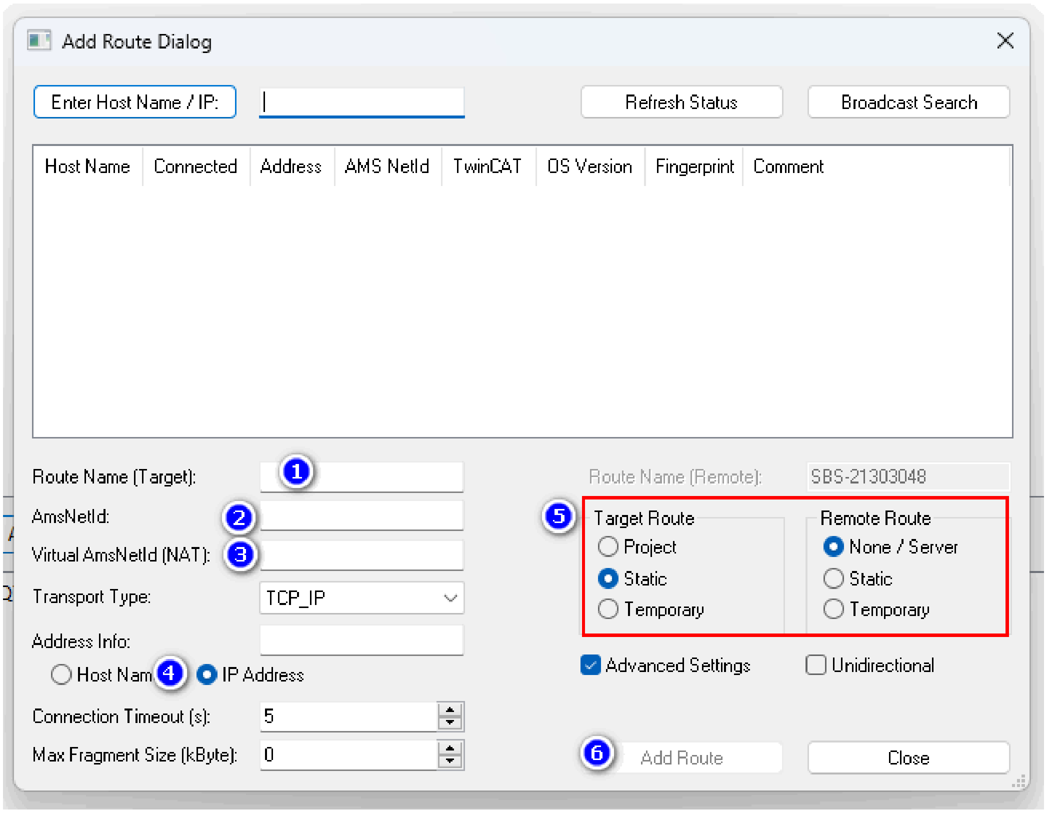
17.3.1.2.4 Add HMI Route in PLC

When the PC is connected to the PLC, add HMI route to the PLC

Step 1. Click **Route**, select the **Static Routes** tab, click **Add**.



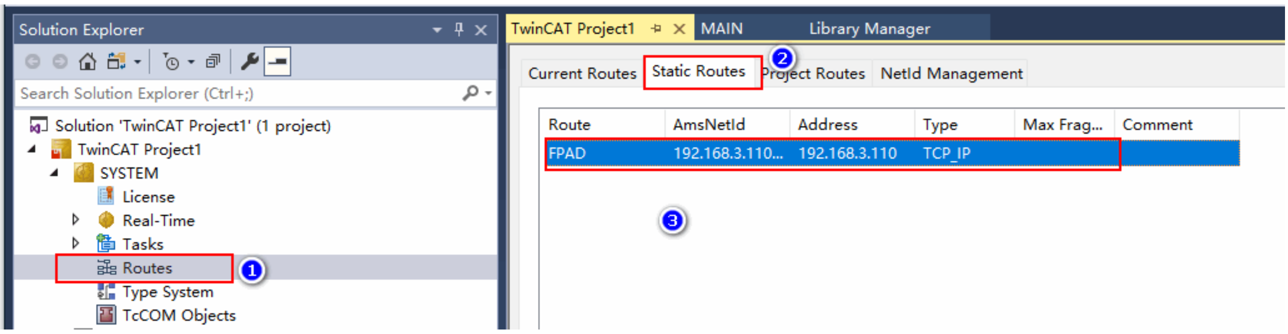
Step 2. Configure relevant parameters in the pop-up dialog box, click **Add Route** and then click **Close**.



Please refer to the table below for detailed configuration methods.

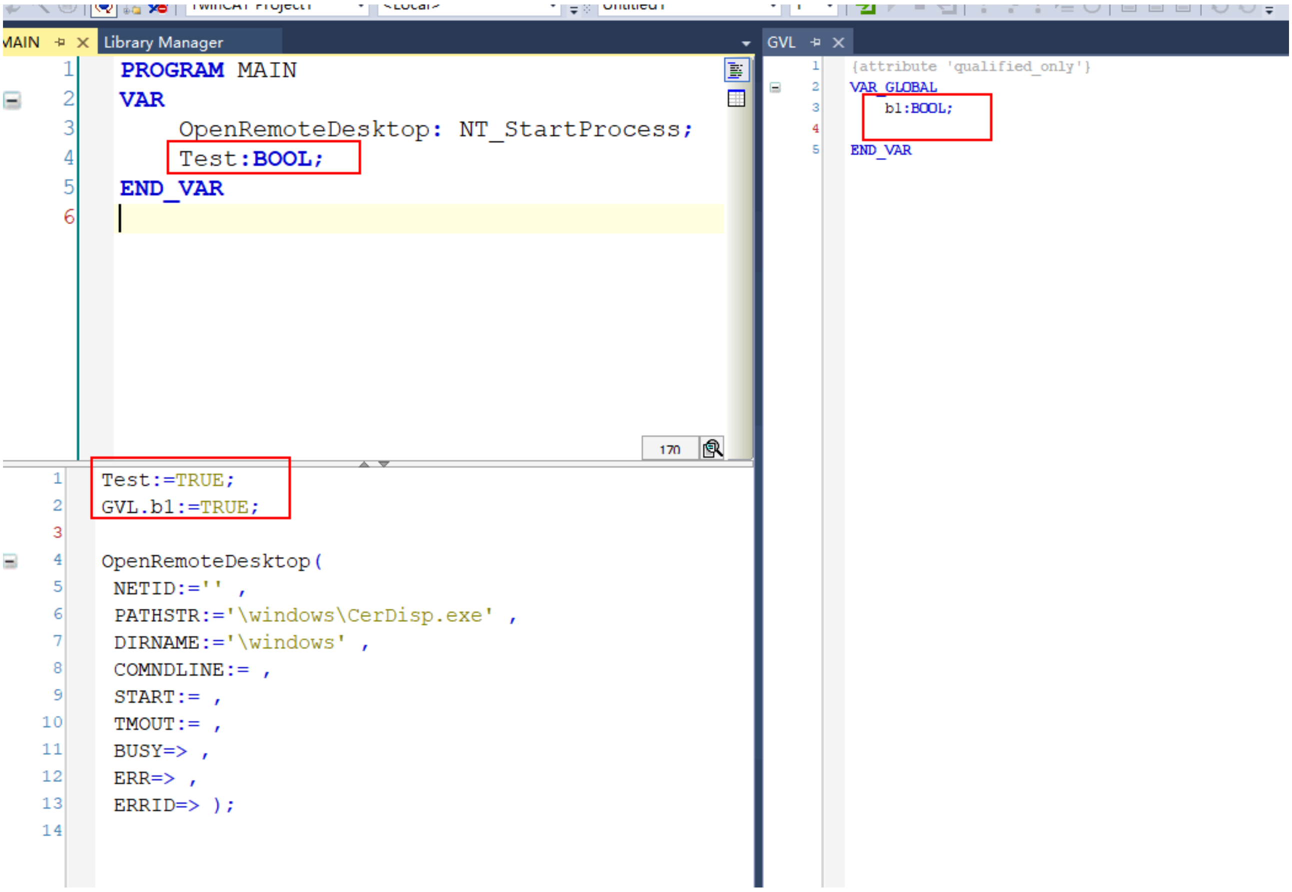
Parameters	Description
Route Name	Name of route, it is recommended to enter the HMI name.
AMS Net ID	When the IP address of HMI is 192.168.0.200, AMS Net ID is 192.168.0.200.1.1.
Adress Info	IP address of HMI.
Target Route	Select “Static”.
Remote Route	Select “None”.

If the newly added route can be found in the Current Routes list, it means that the route is added successfully.

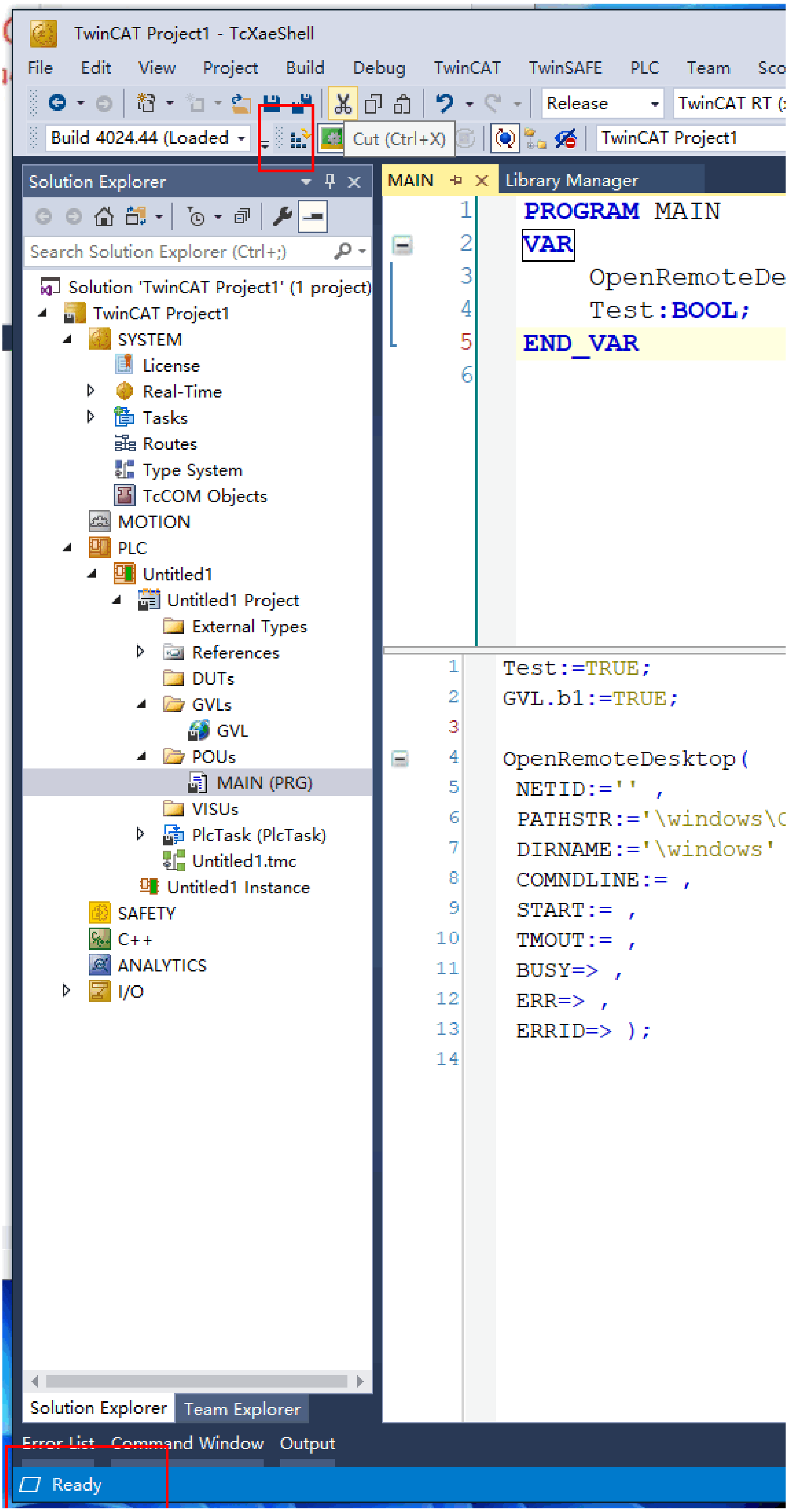


17.3.1.2.5 Add Variable in the PLC

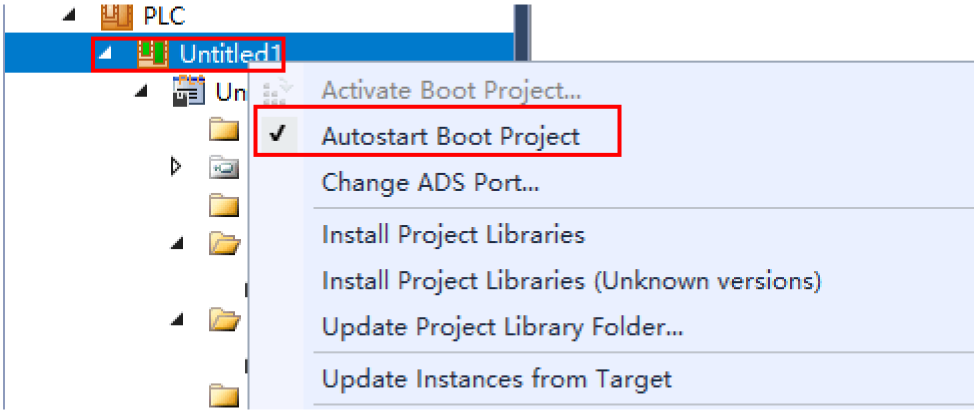
Step 1. As shown in the figure below, create Test and b1 variables in MAIN and GVL respectively, and a structure Axis1 of type STAxis, and call and write values to it in the program (for adding monitoring in HMI to see whether the communication is successful).



Step 2. Activate the configuration, wait for the Twincat state to become “Ready”.


TwinCAT Project1 - TcXaeShell
File Edit View Project Build Debug TwinCAT TwinSAFE PLC Team Sco
Release
TwinCAT RT (
Build 4024.44 (Loaded
Cut (Ctrl+X)
TwinCAT Project1
Solution Explorer
Search Solution Explorer (Ctrl+;)
Solution 'TwinCAT Project1' (1 project)
TwinCAT Project1
SYSTEM
License
Real-Time
Tasks
Routes
Type System
TcCOM Objects
MOTION
PLC
Untitled1
Untitled1 Project
External Types
References
DUTs
GVLs
GVL
POUs
MAIN (PRG)
VISUs
PlcTask (PlcTask)
Untitled1.tmc
Untitled1 Instance
SAFETY
C++
ANALYTICS
I/O
Solution Explorer
Team Explorer
MAIN
Library Manager
PROGRAM MAIN
VAR
OpenRemoteDe
Test:BOOL;
END_VAR
Test:=TRUE;
GVL.b1:=TRUE;
OpenRemoteDesktop(
NETID:='' ,
PATHSTR:='\windows\C
DIRNAME:='\windows'
COMNDLINE:= ,
START:= ,
TMOUT:= ,
BUSY=> ,
ERR=> ,
ERRID=>);
Error List
Command Window
Output
Ready

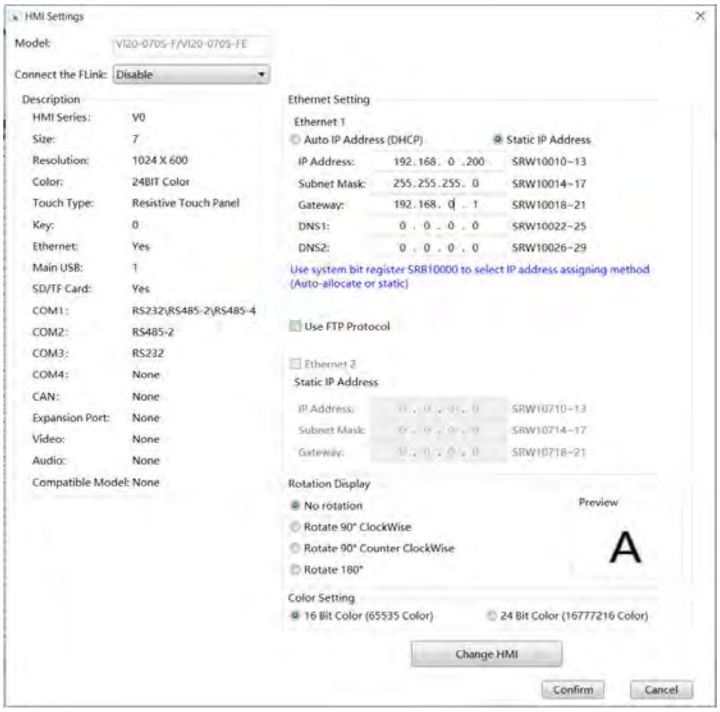
Step 3. Right-click the lower level of PLC (PLC project), and check **Autostart Boot Project**.



17.3.1.3 Configure HMI

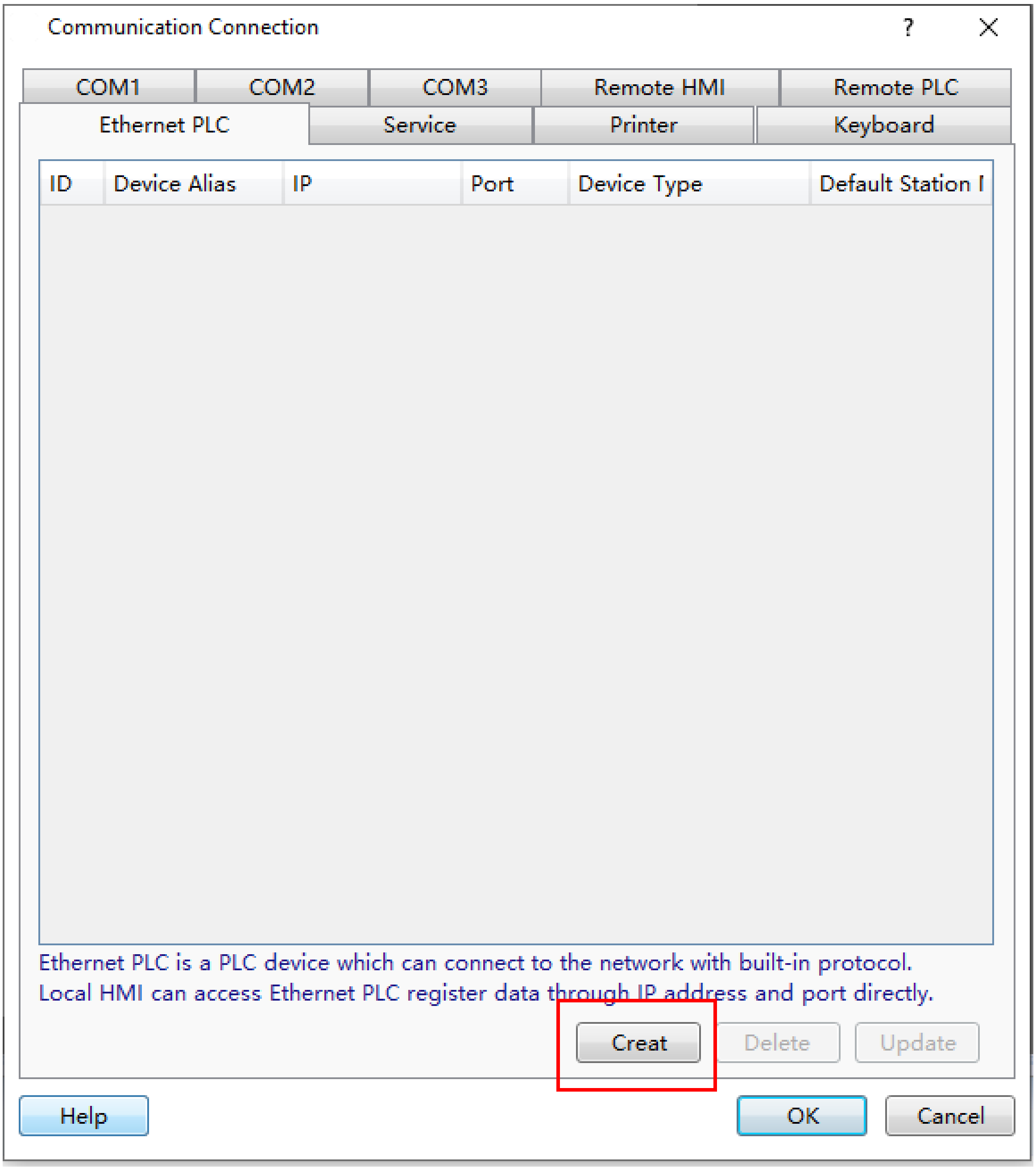
Step 1. Configure the IP address of HMI.

Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI in the pop-up dialog box (to be in the network segment as the IP address of PLC), click **Confirm**.

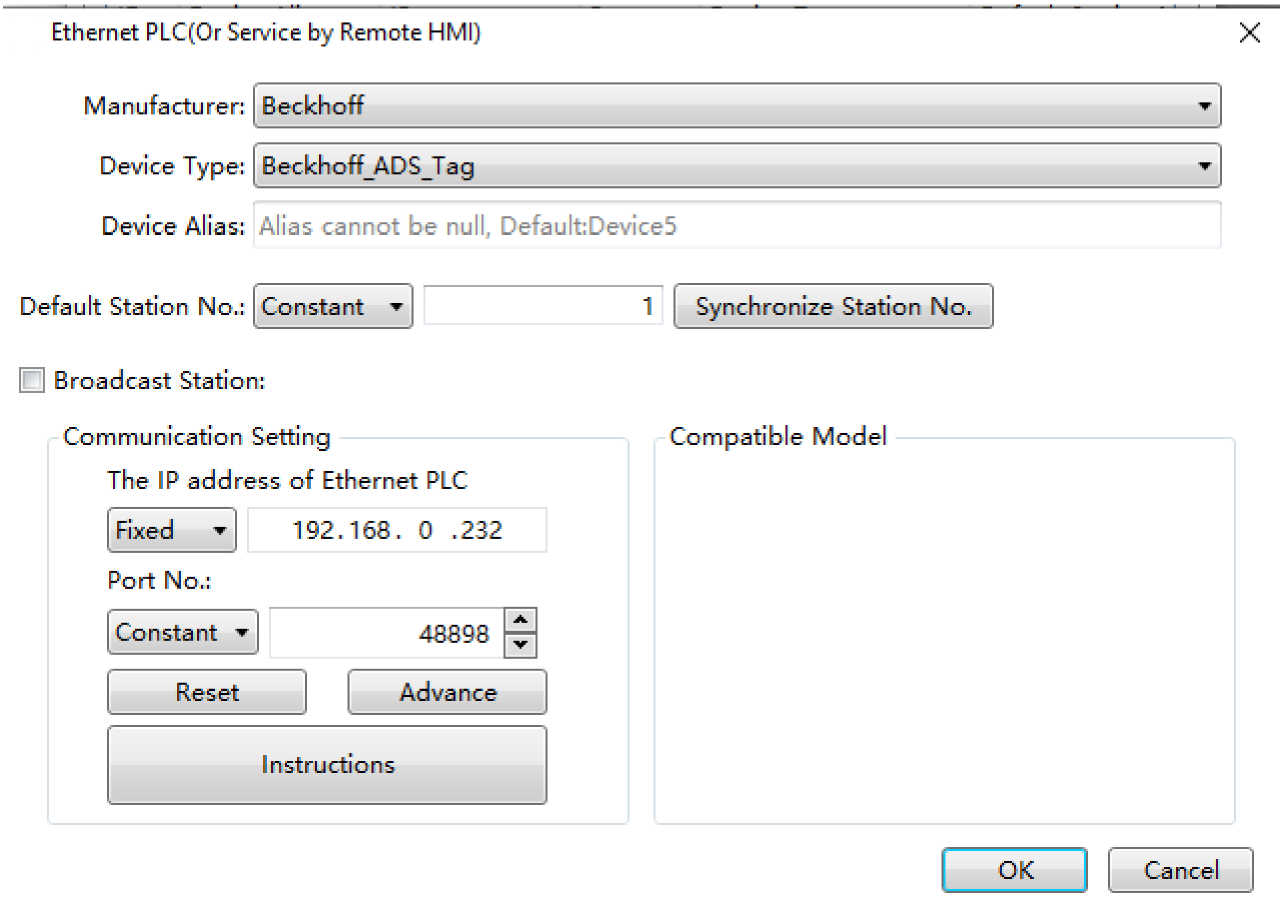


Step 2. Add Network PLC.

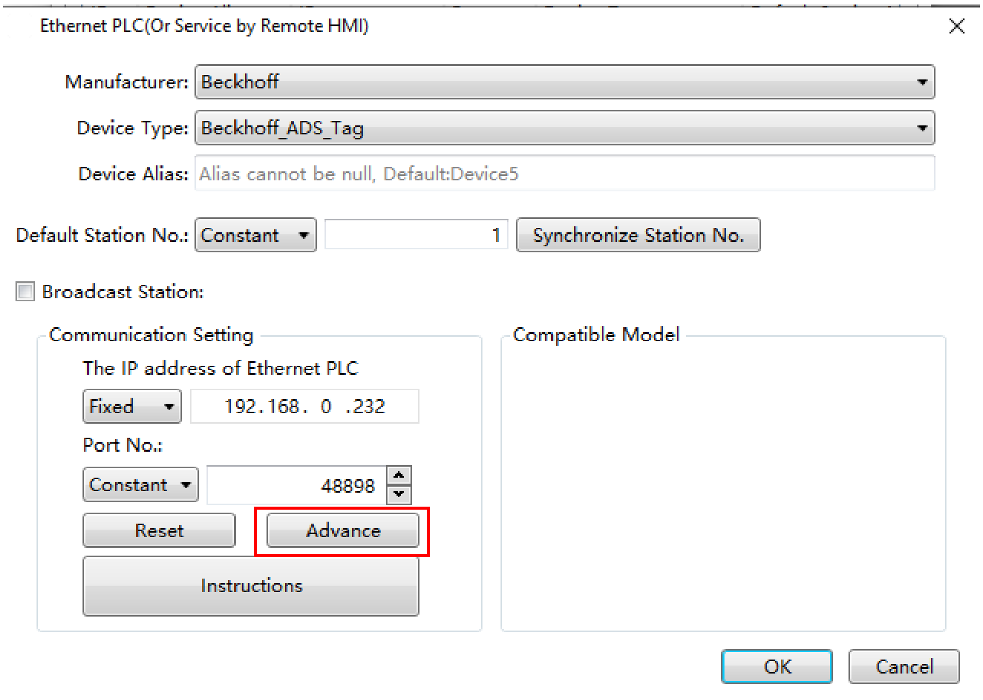
1) Select **Settings/Communication Settings/Remote Connection** from the menu bar, select the **Ethernet PLC** tab in the pop-up dialog box, click **Create**.



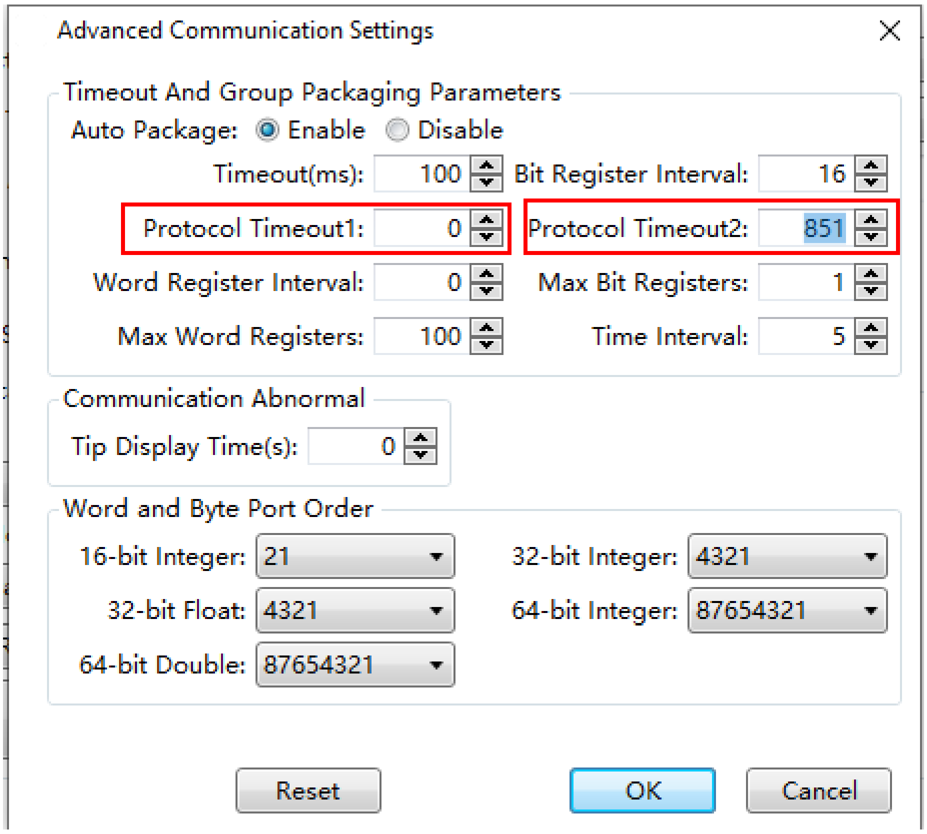
2) In the pop-up dialog box, configure as shown in the figure below.



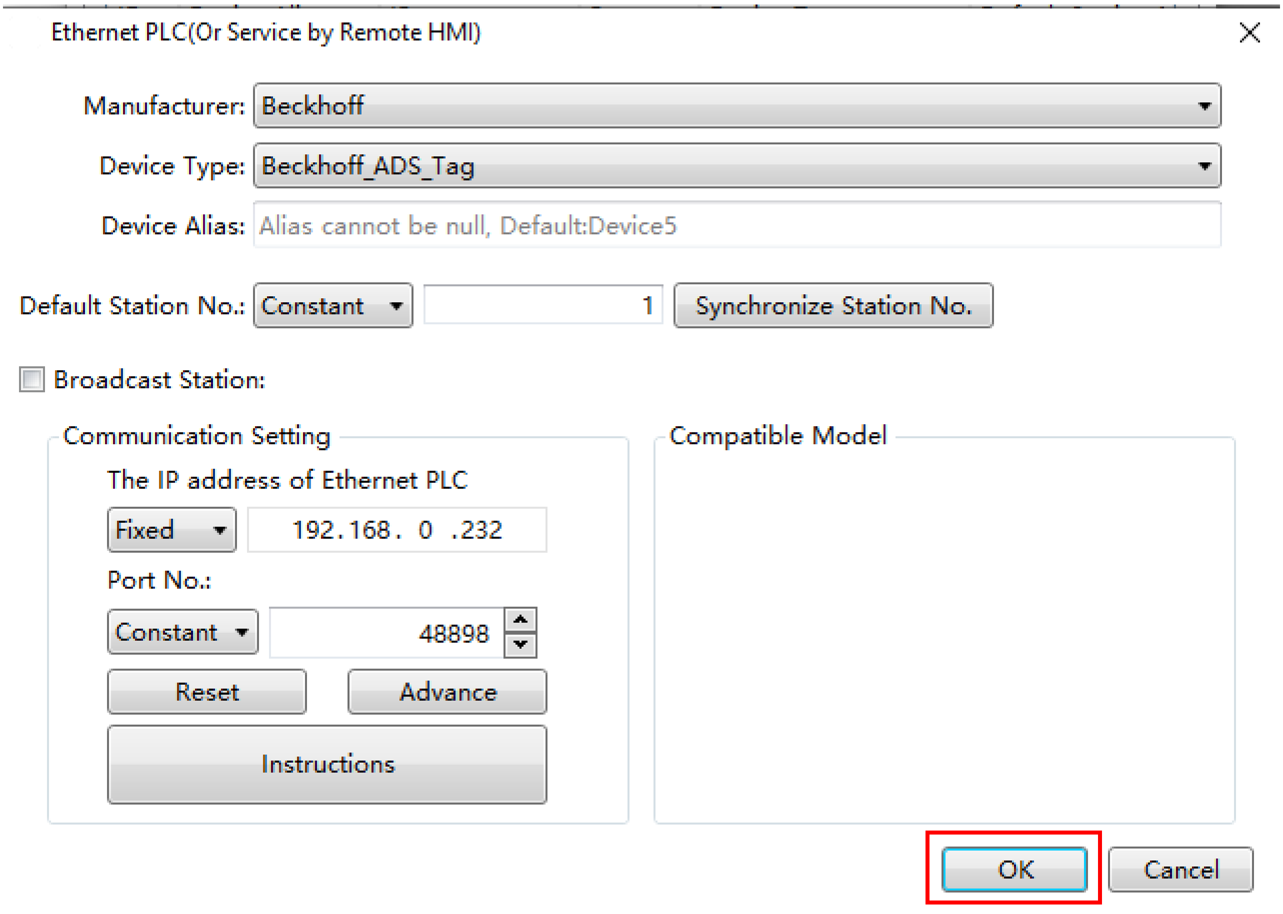
3) Click **Advance**.



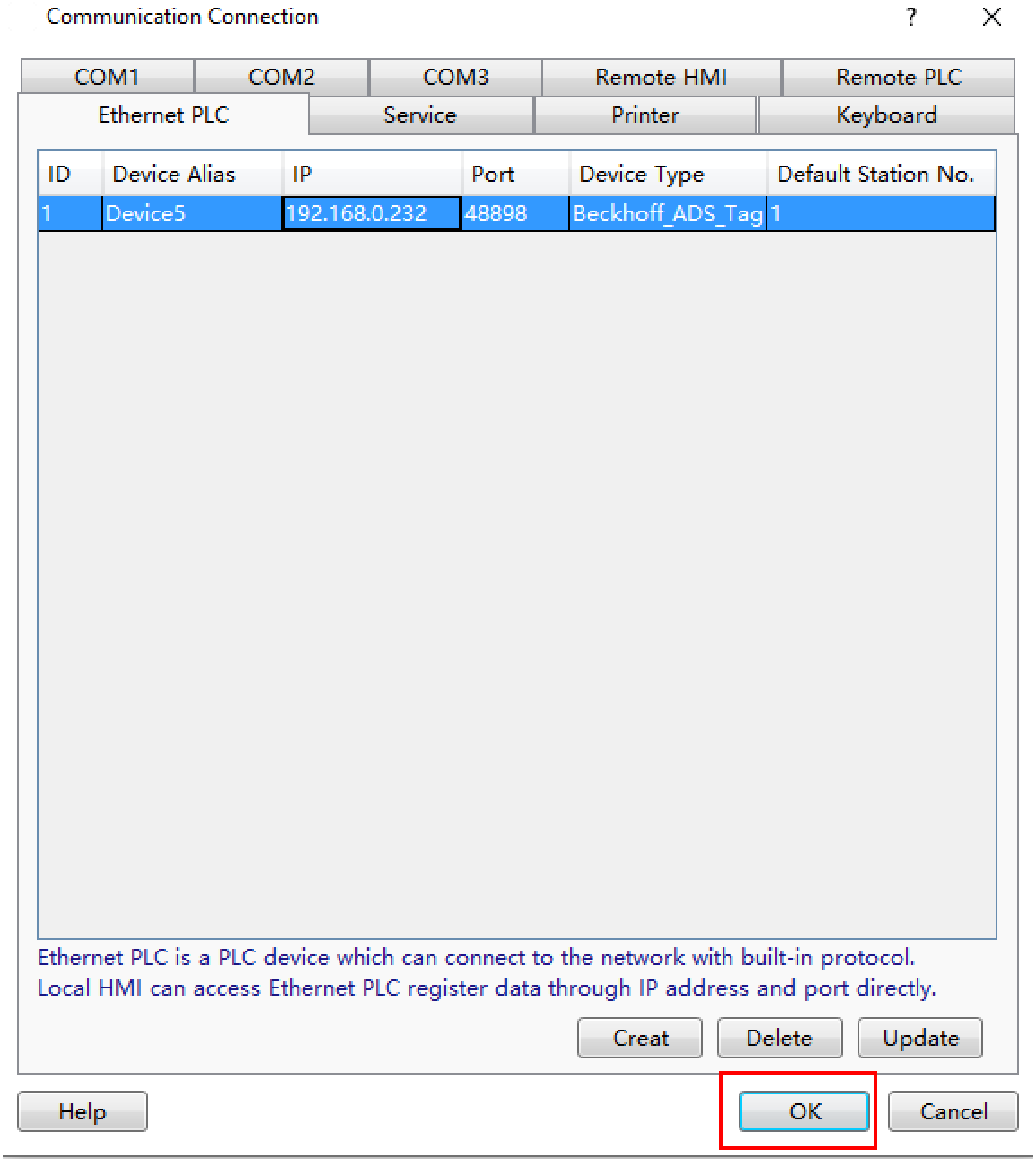
4) In the pop-up **Advanced Communication Settings**, set the **Protocol Timeout 1** to 0, **Protocol Timeout 2** to 851.


Advanced Communication Settings
Timeout And Group Packaging Parameters
Auto Package: Enable Disable
Timeout(ms): 100
Bit Register Interval: 16
Protocol Timeout1: 0
Protocol Timeout2: 851
Word Register Interval: 0
Max Bit Registers: 1
Max Word Registers: 100
Time Interval: 5
Communication Abnormal
Tip Display Time(s): 0
Word and Byte Port Order
16-bit Integer: 21
32-bit Integer: 4321
32-bit Float: 4321
64-bit Integer: 87654321
64-bit Double: 87654321
Reset
OK
Cancel

5) Click **OK**.

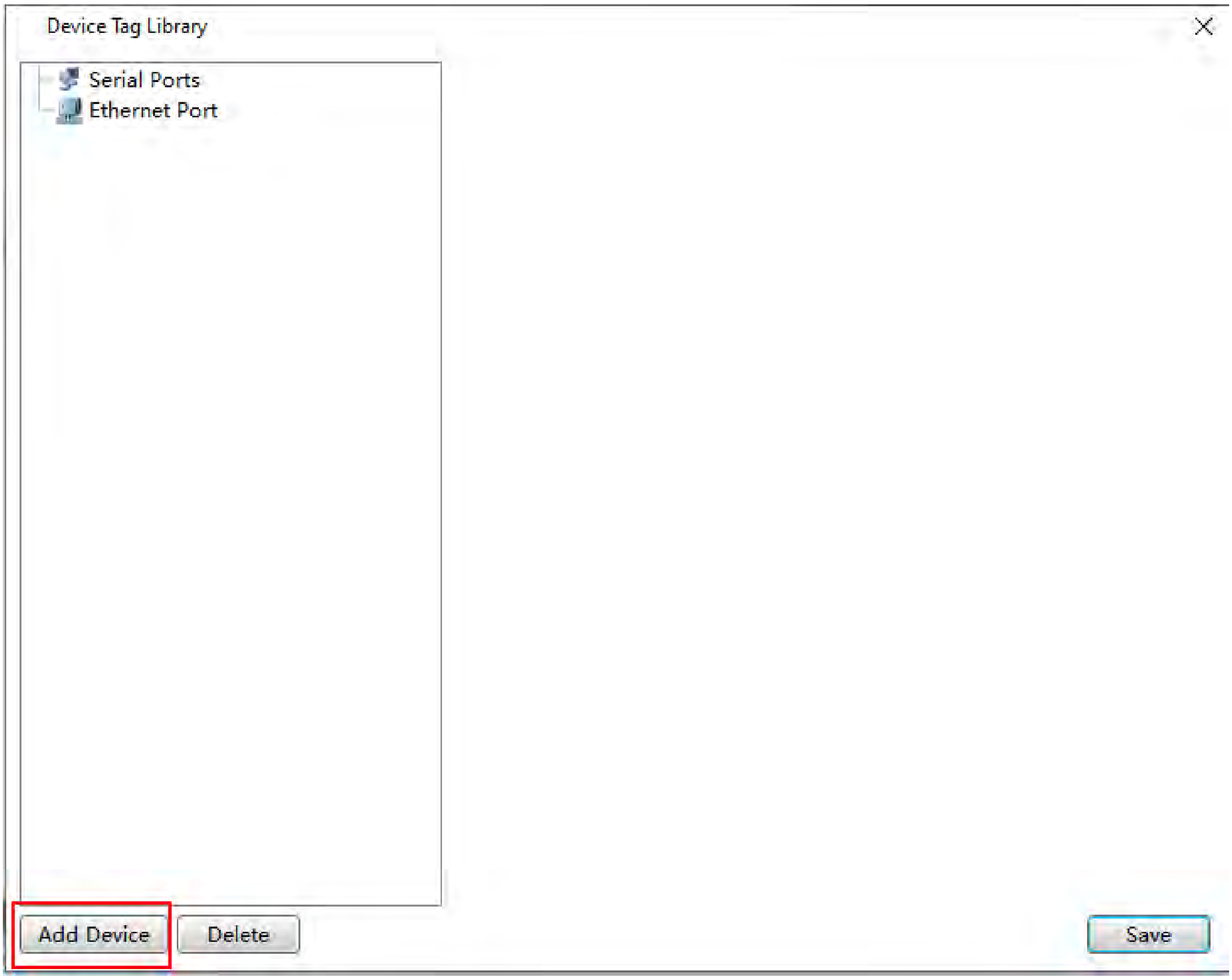

Ethernet PLC(Or Service by Remote HMI)
Manufacturer: Beckhoff
Device Type: Beckhoff_ADS_Tag
Device Alias: Alias cannot be null, Default:Device5
Default Station No.: Constant 1
Synchronize Station No.
Broadcast Station:
Communication Setting
The IP address of Ethernet PLC
Fixed 192.168. 0 .232
Port No.:
Constant 48898
Reset
Advance
Instructions
Compatible Model
OK
Cancel

6) Click **OK**.

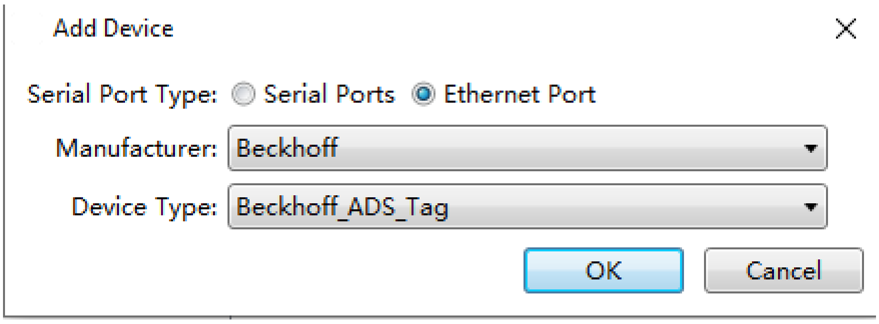


Step 3. Add device tag.

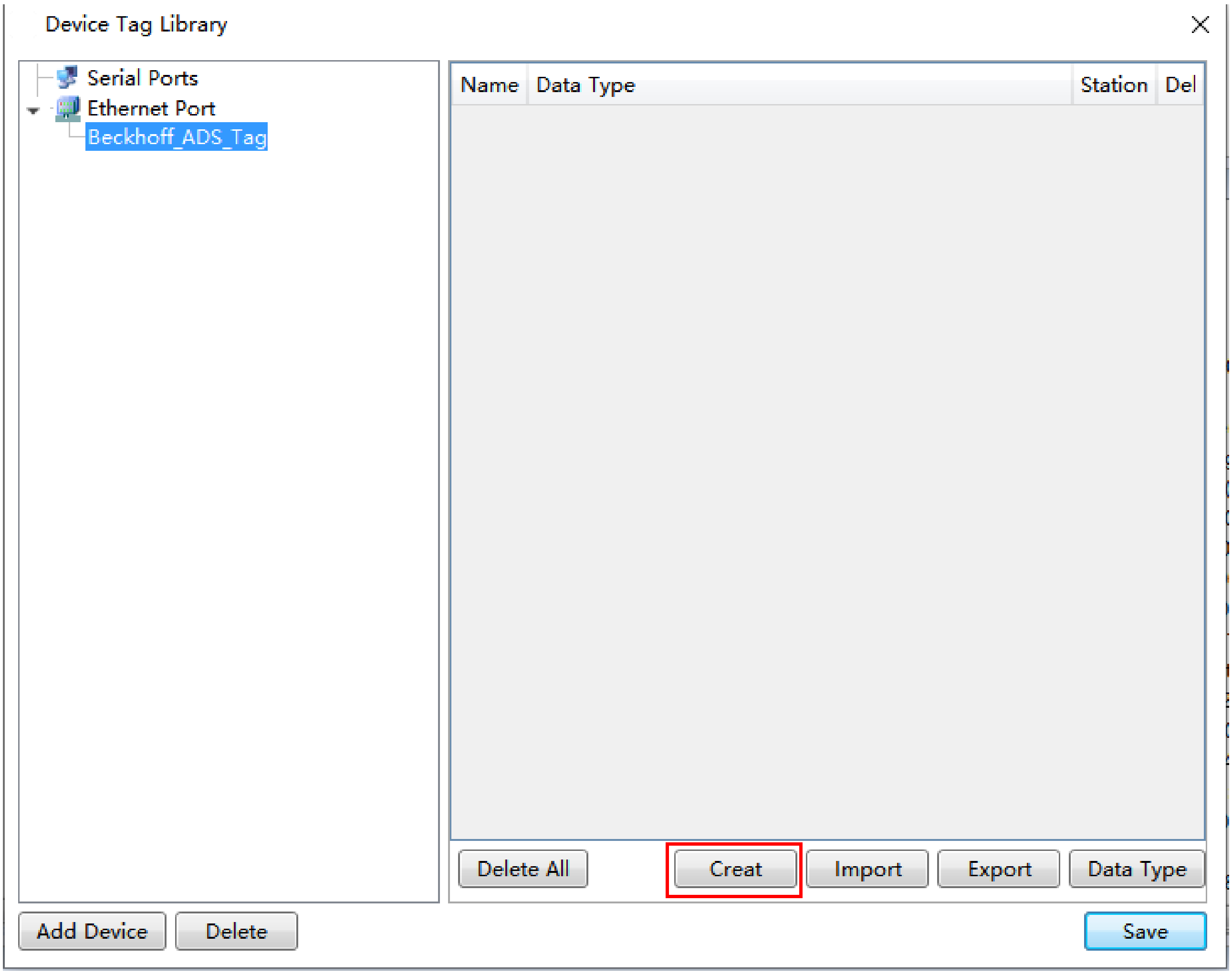
1) Select **Library/Device Tag Library** from the menu bar, click **Add Device** in the pop-up dialog box.



2) In the pop-up dialog box, configure as shown in the figure below, click **OK.**



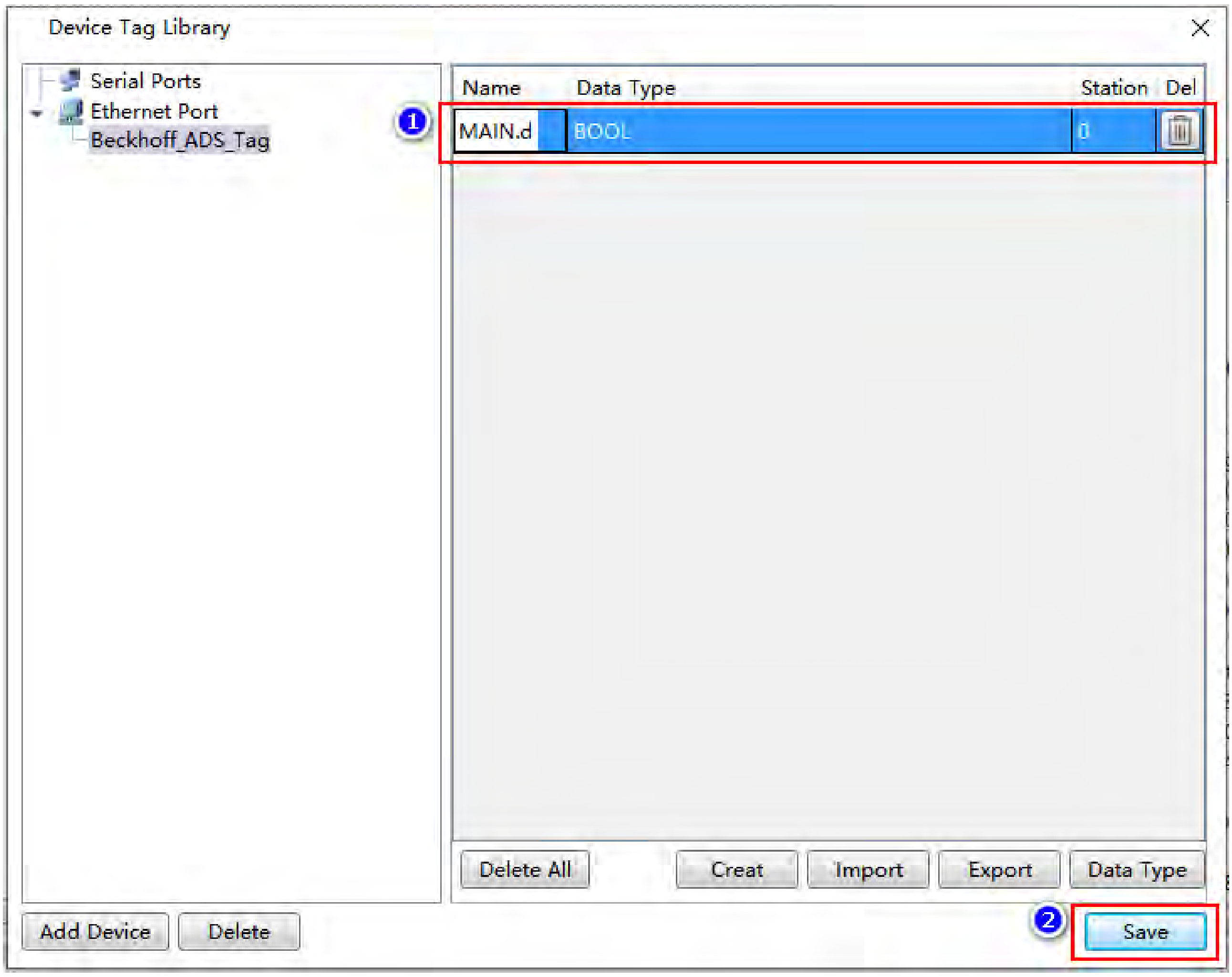
3) Select Beckhoff PLC, click **Create**.



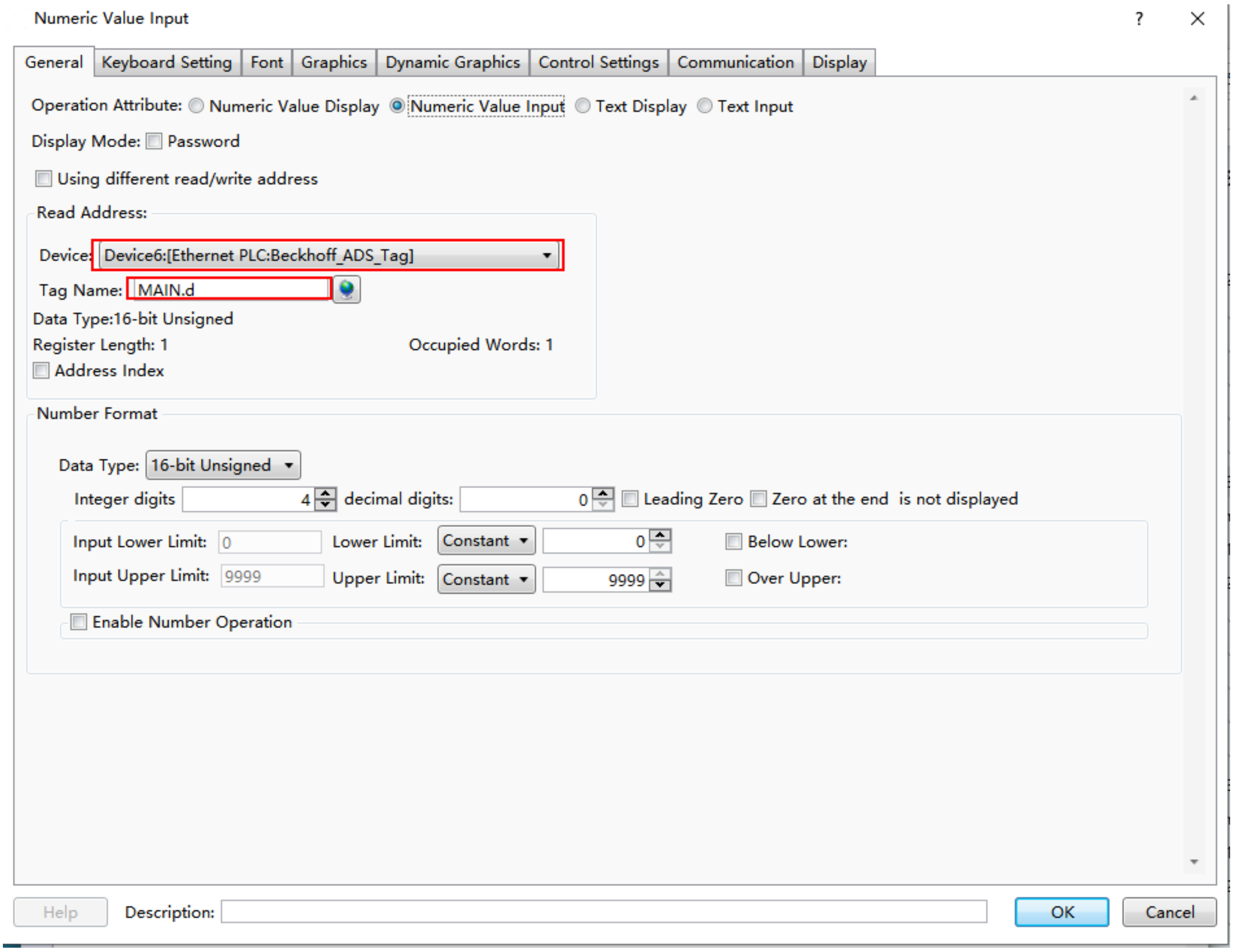
4) Edit variable tag, click **Save**.

For example, there is a variable d in the MAIN of the PLC, and the type is String, and the String type tag of MAIN.d needs to be added in the device tag library.

- ◆ The variable tag case and variable name must match the PLC program.
- ◆ If the variable is created in GVL, the format of the tag is *GVL name.variable name*. For example, the name of GVL is HmiTag, the variable name is a, and the tag name is *HmiTag.a*.



Step 4. Select **Component/Numerical Value and Text Display/Numerical Value Input** from the menu bar, and set the **Read Address** to the address tag of Beckhoff PLC in the pop-up dialog box.



Step 5. Complete the configuration of the numerical value input component, download the project to the HMI, if the numerical value can be written to the corresponding address tag of the PLC, it means that the communication is working.

17.3.2 Ethernet Communication (Address Tag) Between HMI and Beckhoff PLC(Windows 7+TwinCAT3)

The PLC in this case is a Cx5130 with a Windows 7 operating system and TC3 programme running system.

17.3.2.1 Connection Method

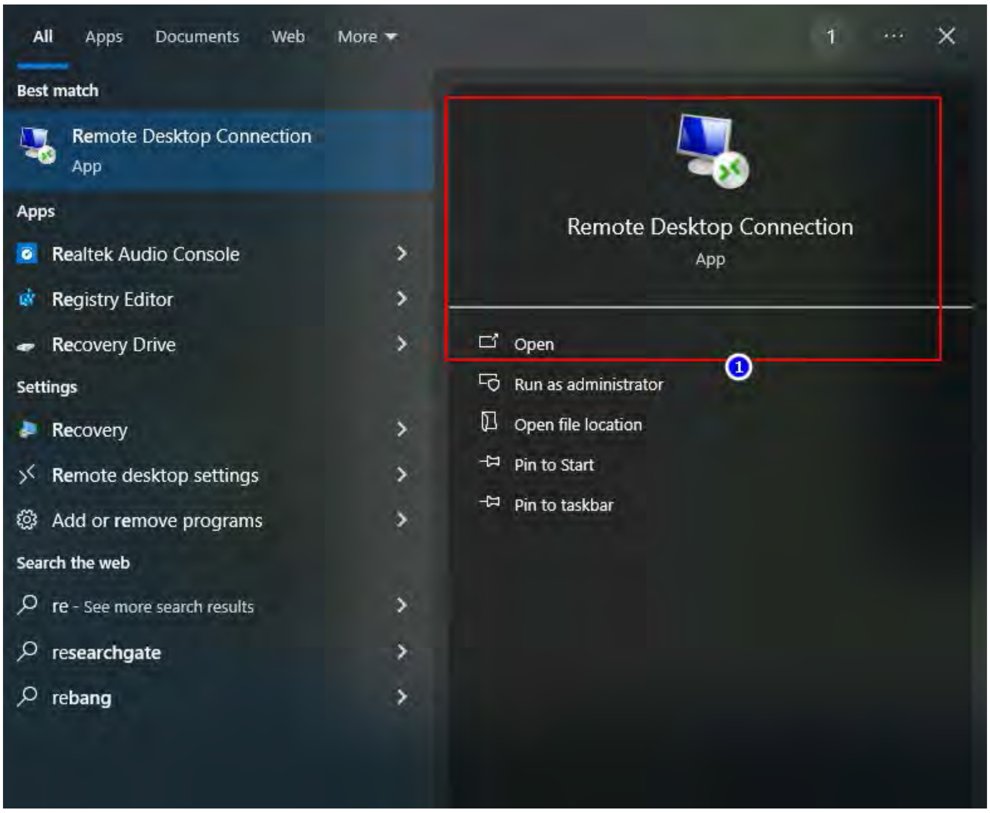
Use a network cable to connect the PC port to the HMI port, or PC and HMI can be connected through a switch.

17.3.2.2 Configure PLC

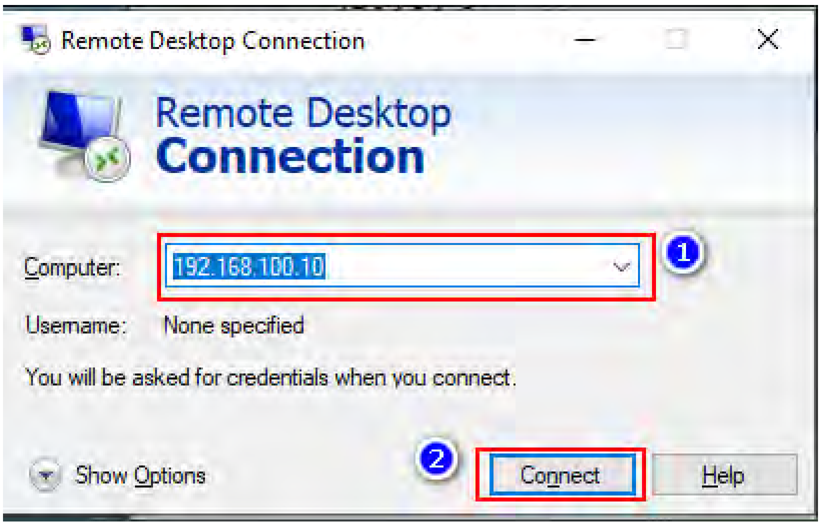
17.3.2.2.1 Connect to PLC’s Remote Desktop

Since Cx5130 uses the Windows7 operating system, when the IP address of the CX5130 is known, you can use the remote desktop connection to connect to the controller.

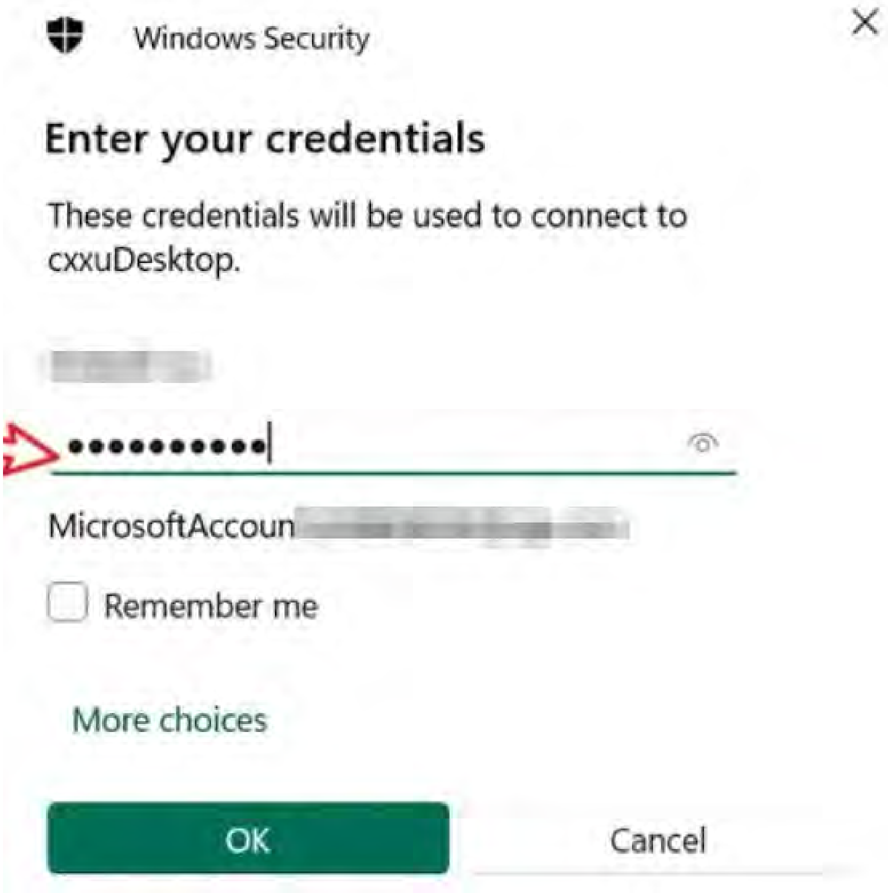
Step 1. Search for the remote desktop connection program on the taskbar of the local PC, and double-click the remote desktop connection preogram.



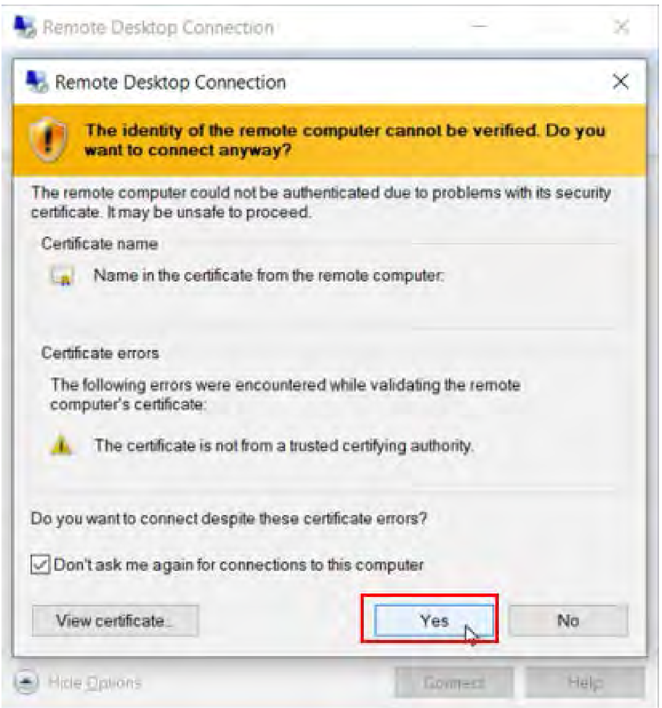
Step 2. Fill in the IP address of the PLC in the pop-up dialog box, and click **Connect**.



Step 3. Enter the user name and password of the PLC operating system in the pop-up dialog box (the default user name is Administrator, and the default password is 1), and click **OK**.



Step 4. Click Yes in the pop-up dialog box.

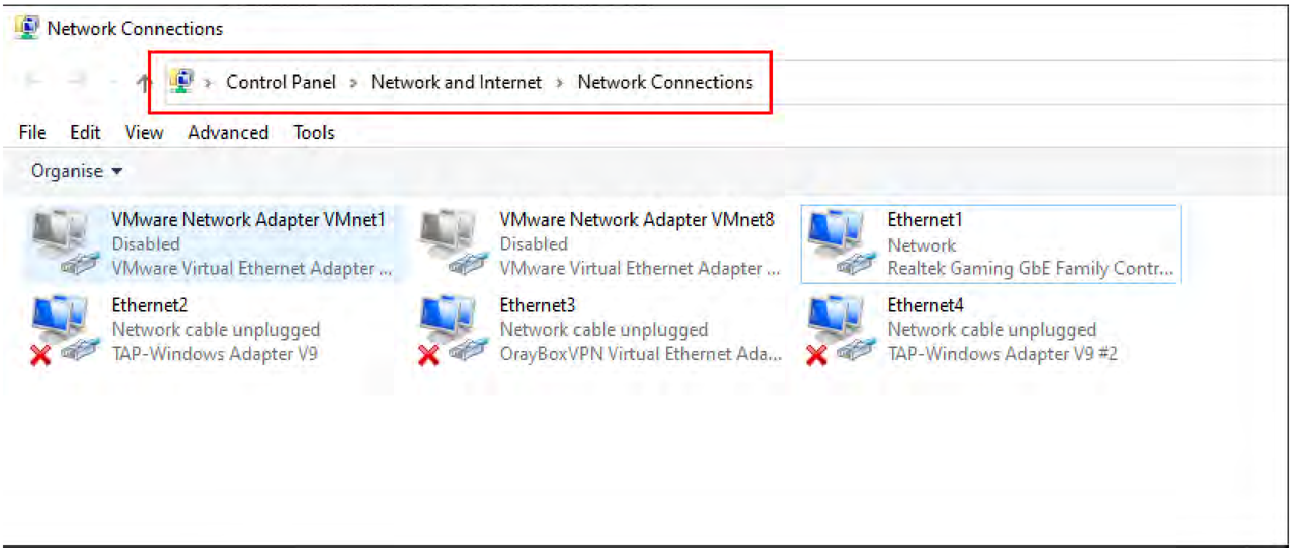


Step 5. Enter the following interface after connecting to the remote desktop.

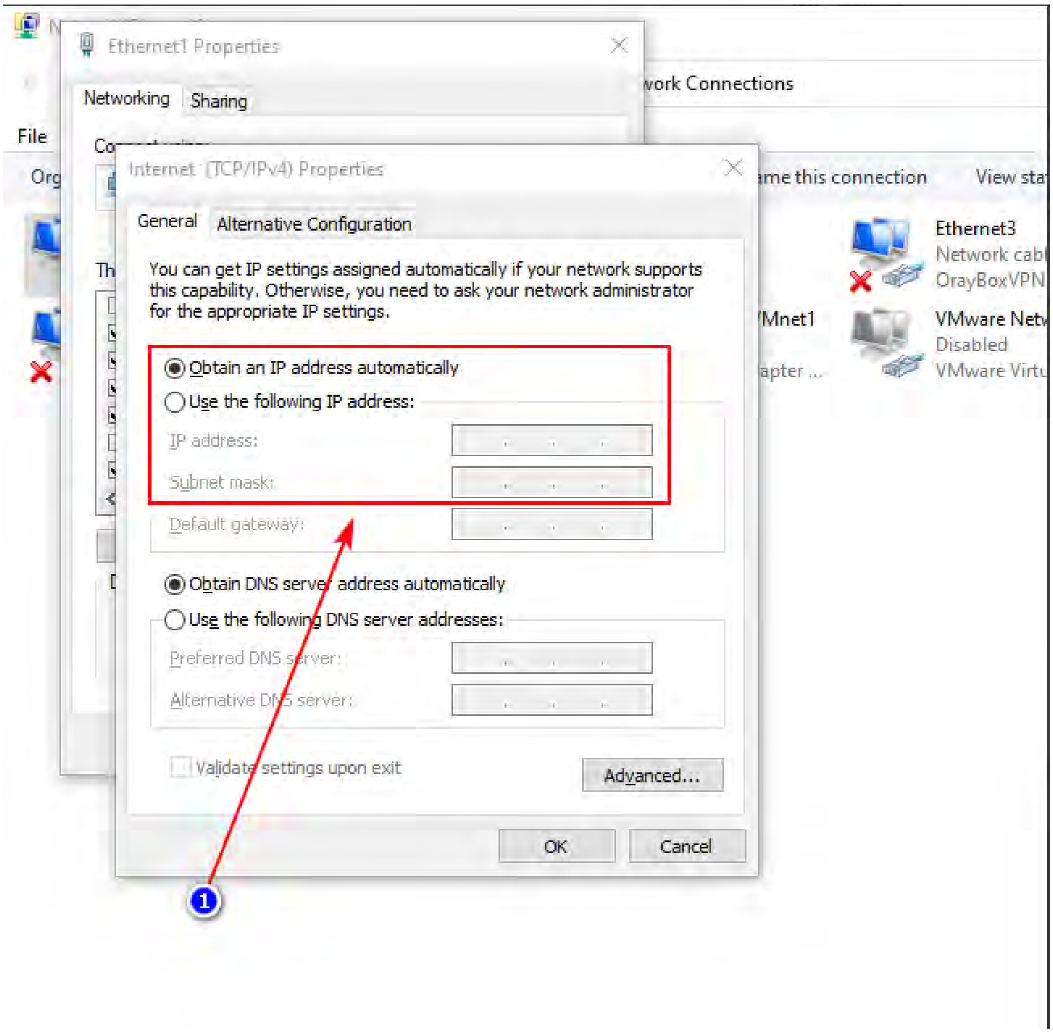
17.3.2.2.2 Modify the IP Address of PLC

Step 1. Open the **Network Connections** in the **Control Panel** of the PLC, you can see that there are two network cards (Local Area Connection). Cx5130 is a dual network card with two independent IP addresses, and may not be in the same network segment.

Pay attention to distinguish the adapter corresponding to the port connected to the HMI (you can see which network card corresponds to by plugging and unplugging the network cable, that is, after unplugging the network cable, it will display “network cable is pulled out”).



Step 2. Right-click the corresponding adapter, select Properties, and double-click **Internet Protocol Version 4 (TCP/IPv4)** in the pop-up dialog box to modify the IP address.



17.3.2.2.3 Modify AMS Net ID of PLC

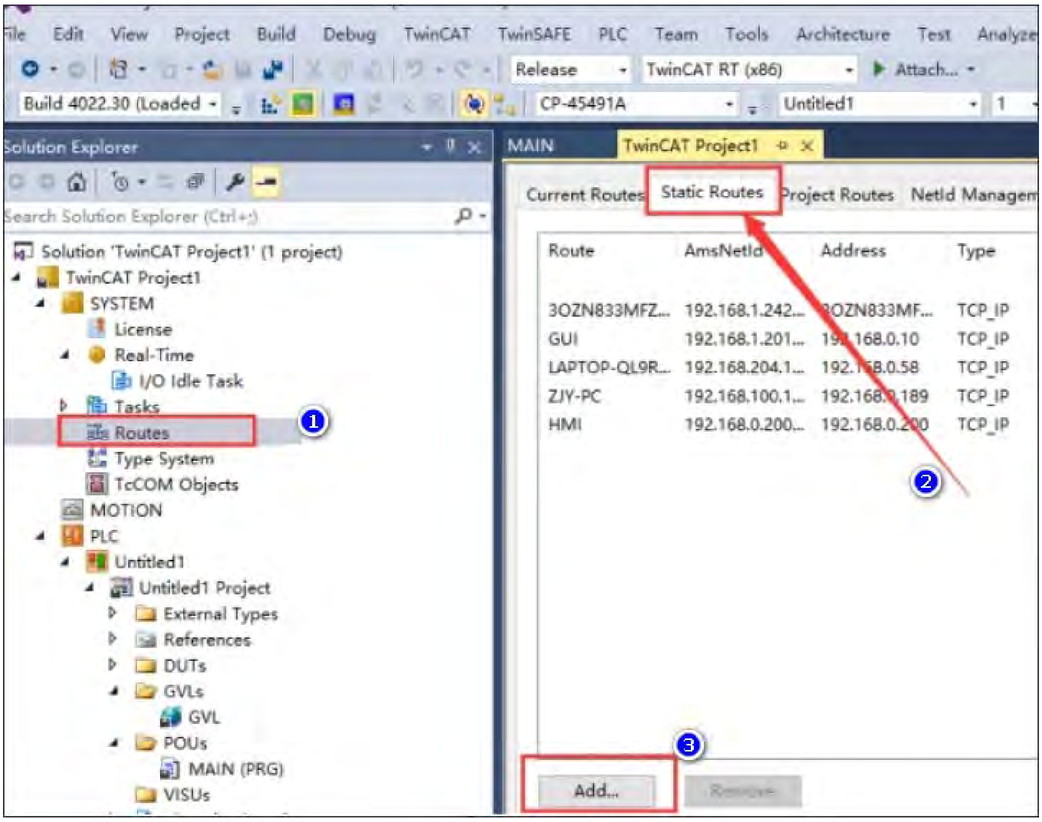
Step 1. Right-click the TwinCAT program, select **Router/Change AMS NET ID**, and modify the AMS NET ID in the pop-up dialog box (the form is *the IP address of the PLC*.1.1, for example, if the IP address of the PLC is 192.168.100.10, then the AMS NET ID 192.168.100.10.1.1), click **OK**.

Step 2. Restart the operation system.

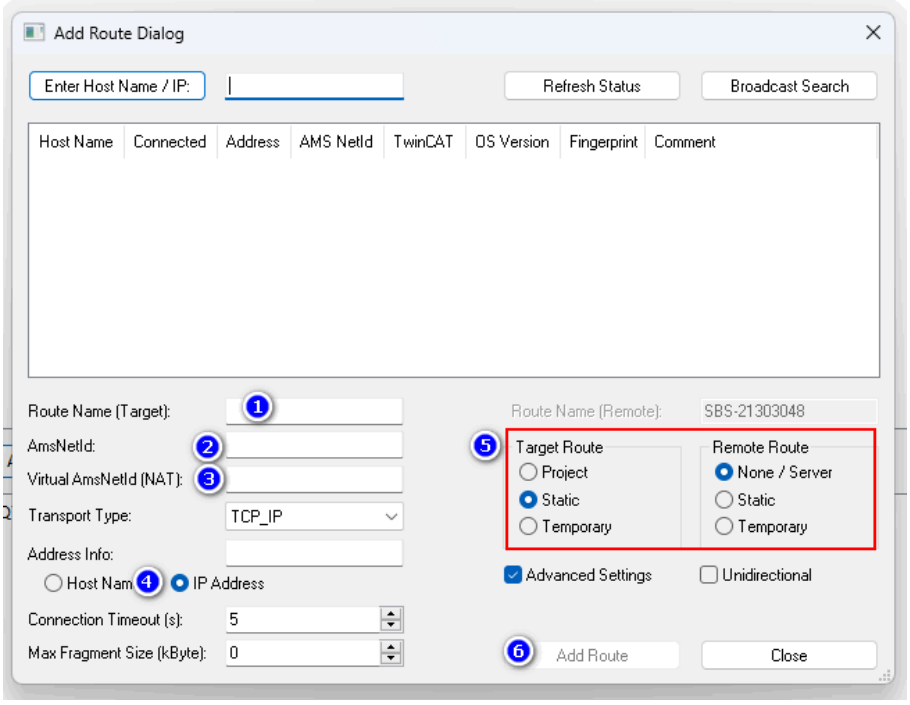
17.3.2.2.4 Add HMI Route in PLC

When the PC is connected to the PLC, add HMI route to the PLC

Step 1. Click **Routes**, select the **Static Routes** tab, click **Add**.



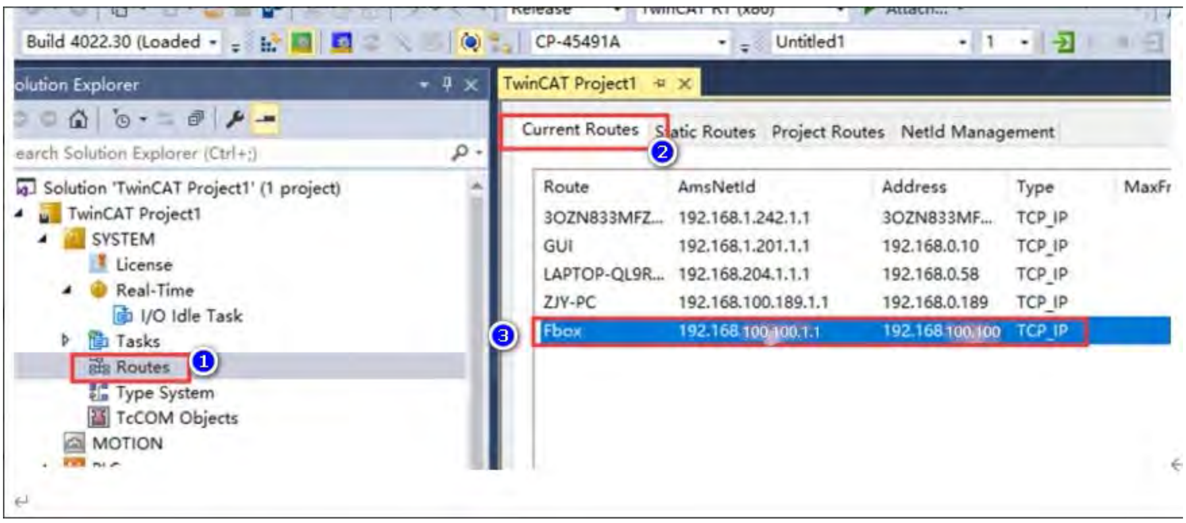
Step 2. Configure relevant parameters in the pop-up dialog box, click **Add Route** and then click **Close**.



Please refer to the table below for detailed configuration methods.

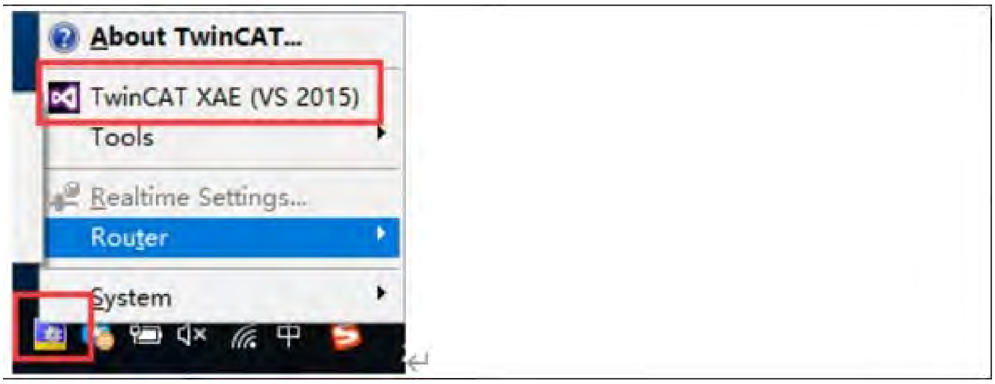
Parameter	**Description**
Route Name	Name of route, it is recommended to enter the HMI name.
AMS Net ID	When the IP address of HMI is 192.168.0.200, AMS Net ID is 192.168.0.200.1.1.
Address Info	IP address of HMI.
Target Route	Select “Static”.
Remote Route	Select “None”.

If the newly added route can be found in the Routes list, it means that the route is added successfully.

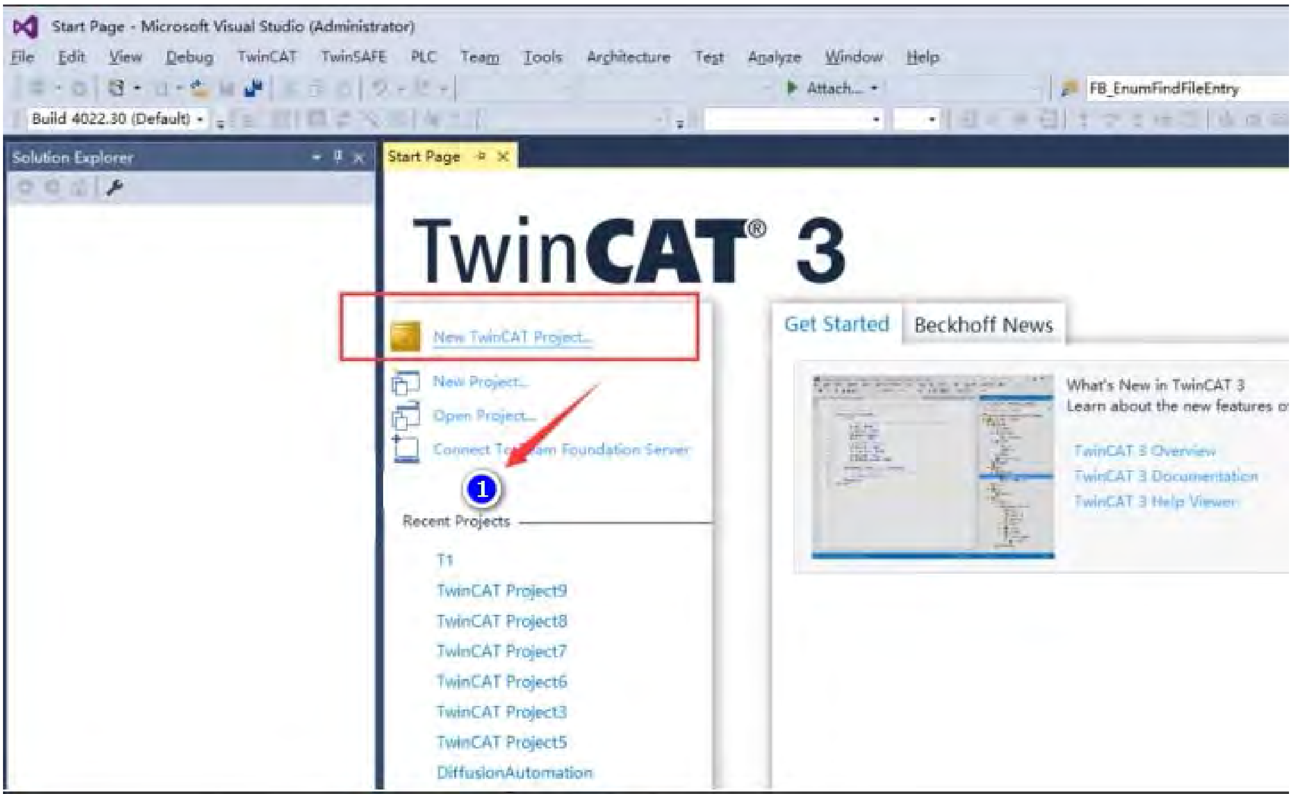


17.3.2.2.5 Add Variable in the PLC

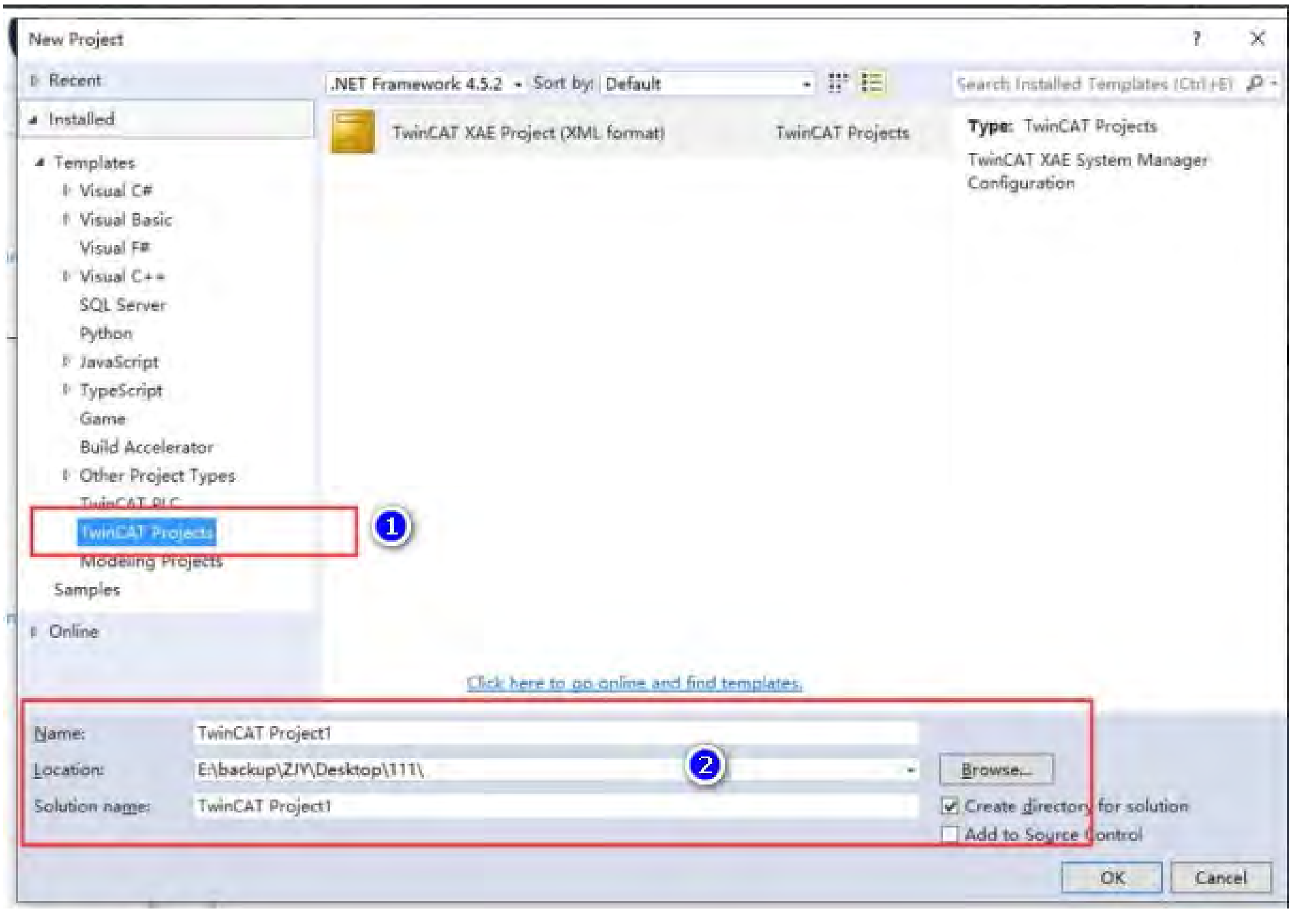
Step 1. Right click the TwinCAT icon in the taskbar, click **winCat XAE**.



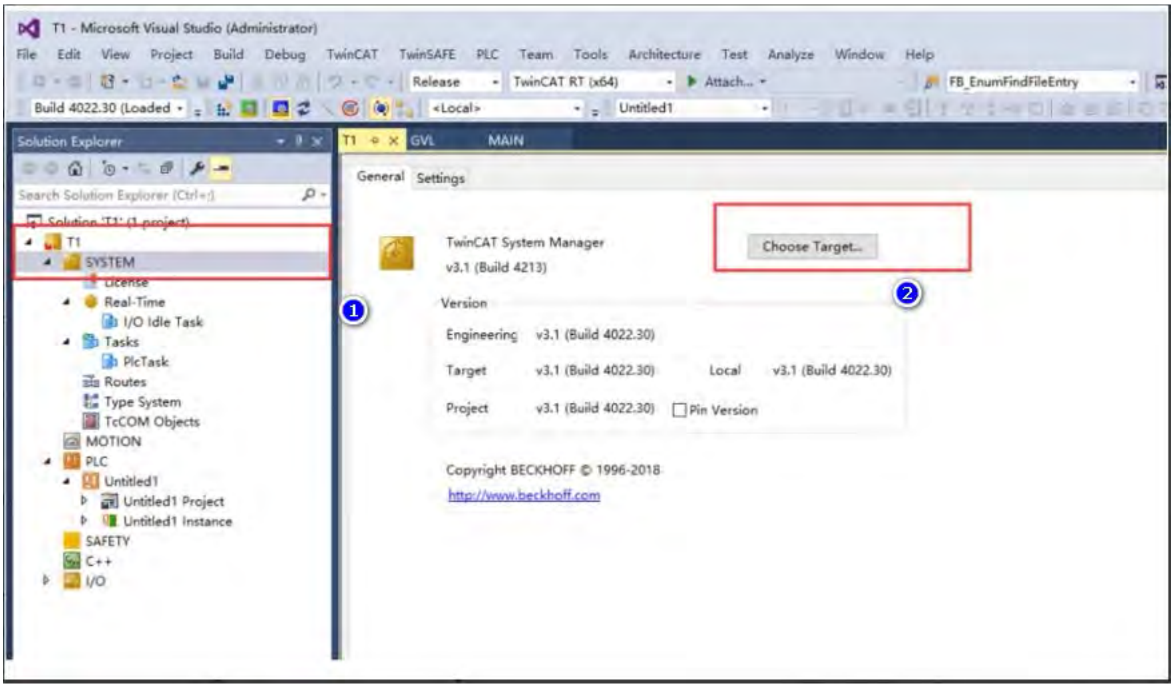
Step 2. Click **New Twincat Project**.



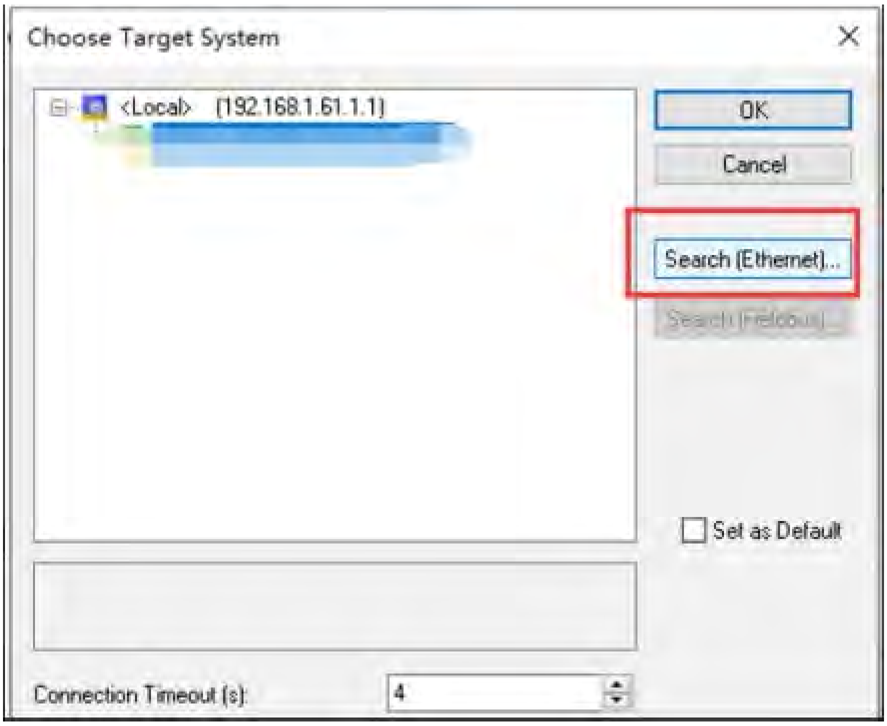
Step 3. Select project type in the pop-up dialog box, enter project name and save path, click **OK**.



Step 4. After creating project, select **System**, select the **General** tab, click **Choose Target**.

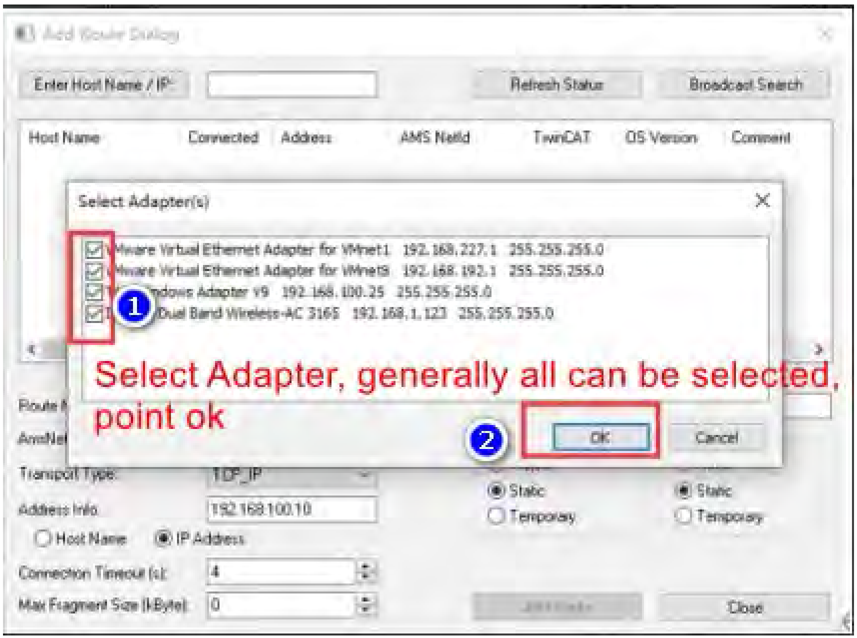


Step 5. Click **Search[Ethernet]** in the pop-up dialog box.

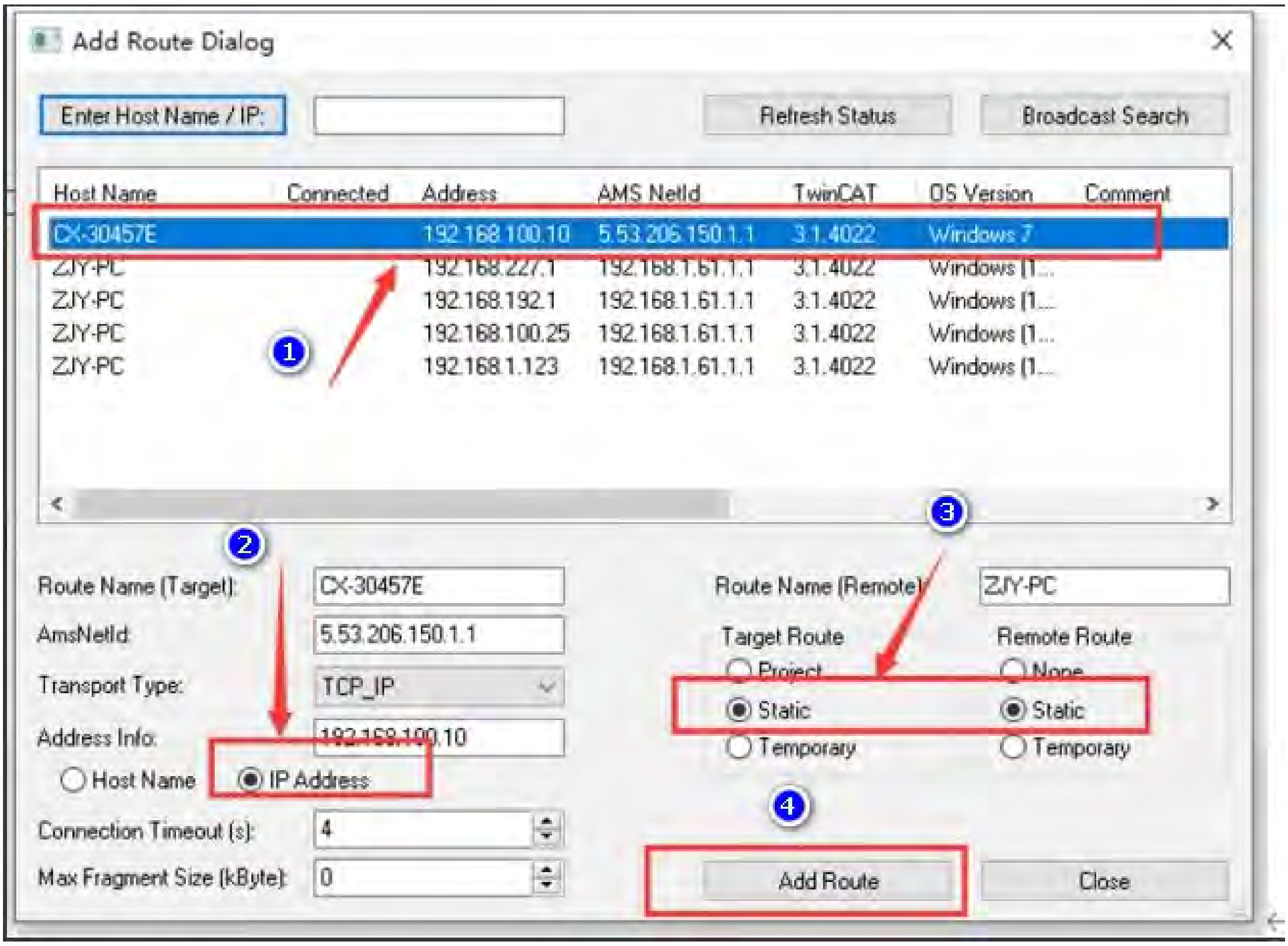


Step 6. Click **Broadcast Search** in the pop-up **Add Route Dialog** dialog box.

Step 7. Check all Adapters in the pop-up **Select Adapter** dialog box, click **OK**.



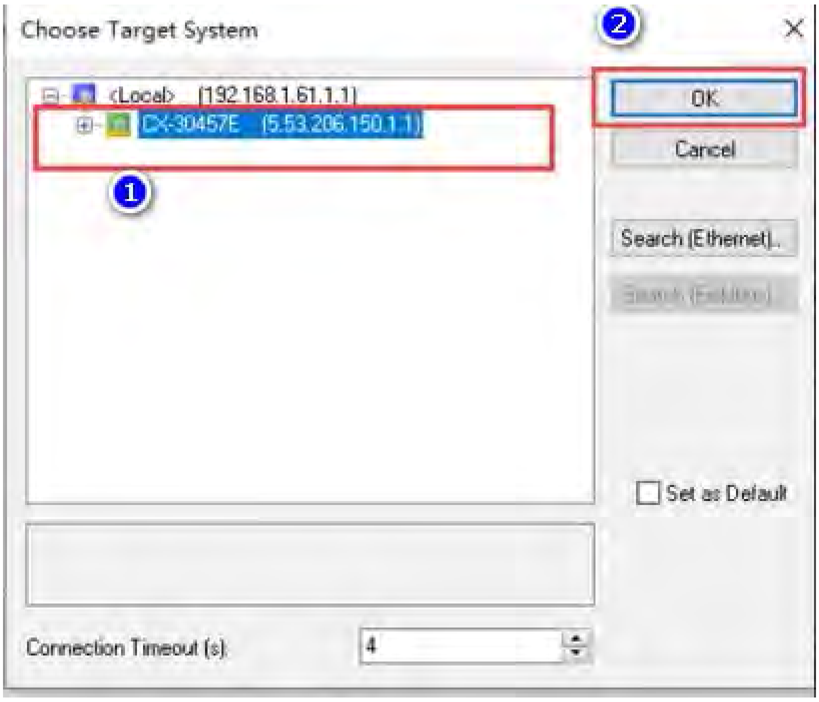
Step 8. Select the device whose Host Name starts with “CX” in the list, select **IP Address**, set Target Route and Remote Route to “Static”, and click **Add Route**.



Step 9. A pop-up window appears to fill in the user name and password of the PLC (the default user name is Administrator, and the default password is 1), and click **OK**.

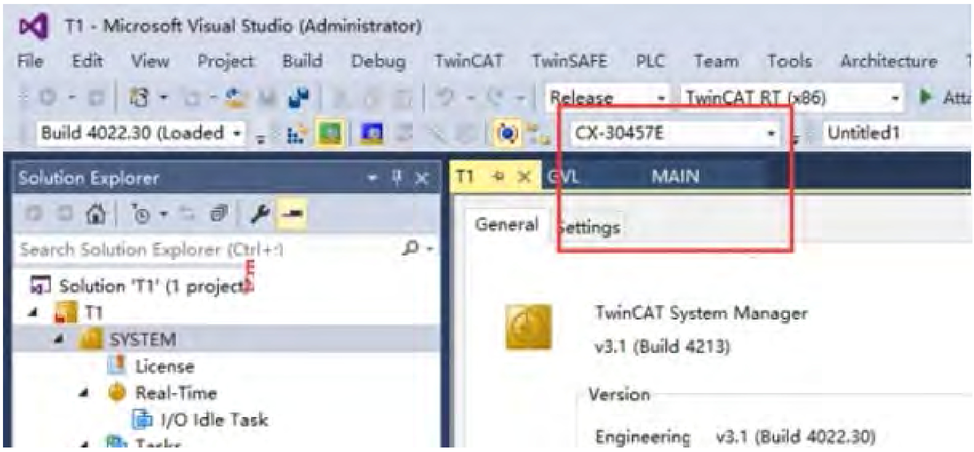
Step 10. When the **Connected** column shows “X”, it means the PLC has been connected.

Step 11. The controller to be connected appears in the **Choose Target System** dialog box, select the controller, and click **OK**.

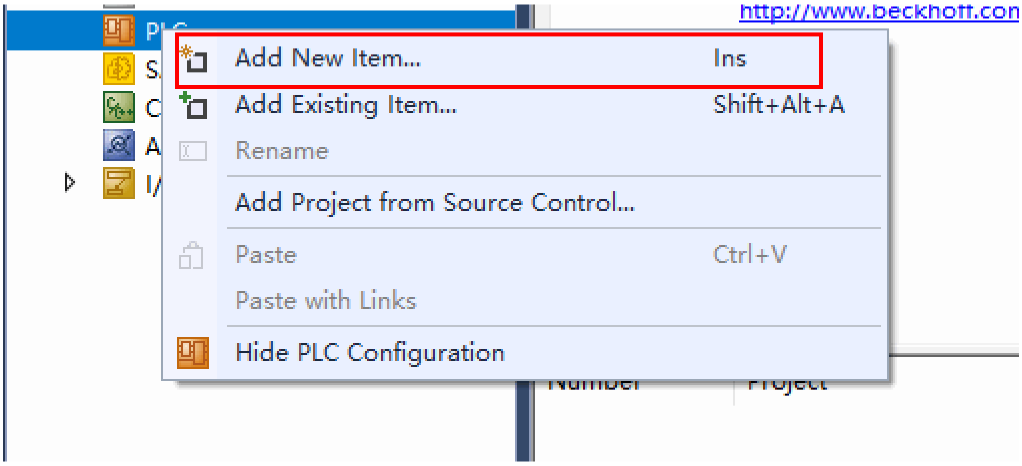


Step 12. Click **Yes** in the pop-up dialog box.

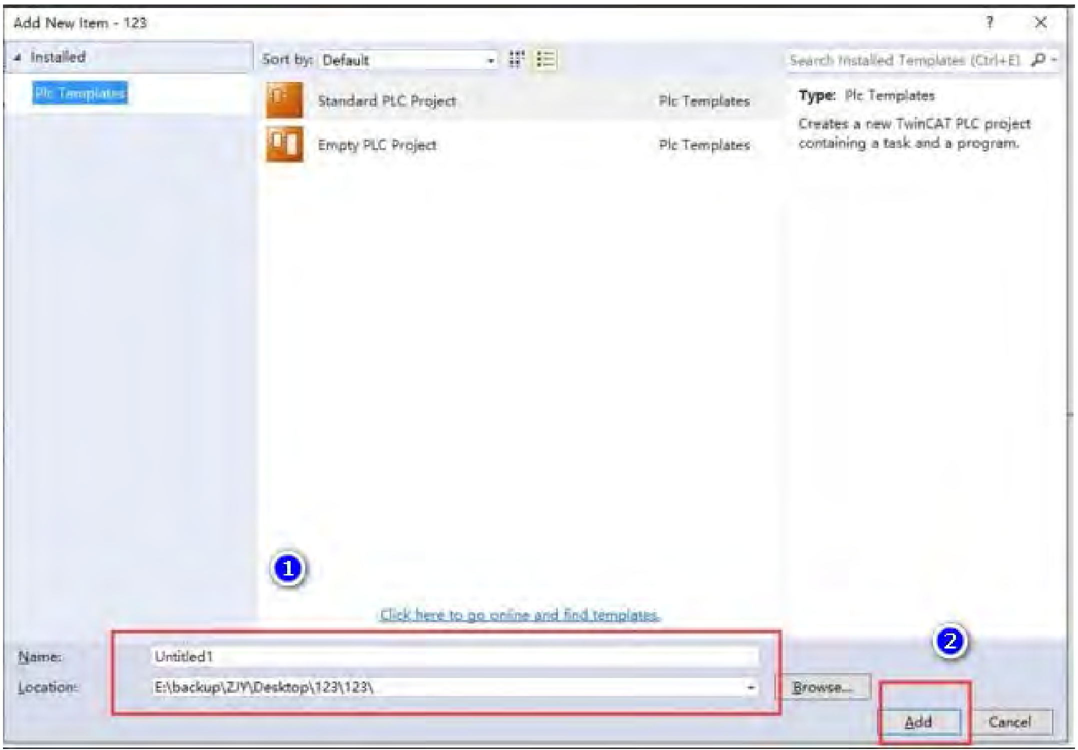
Step 13. If the red box as shown in the picture below displays the Host Name of PLC, and there is no Error, it means PLC is connected.



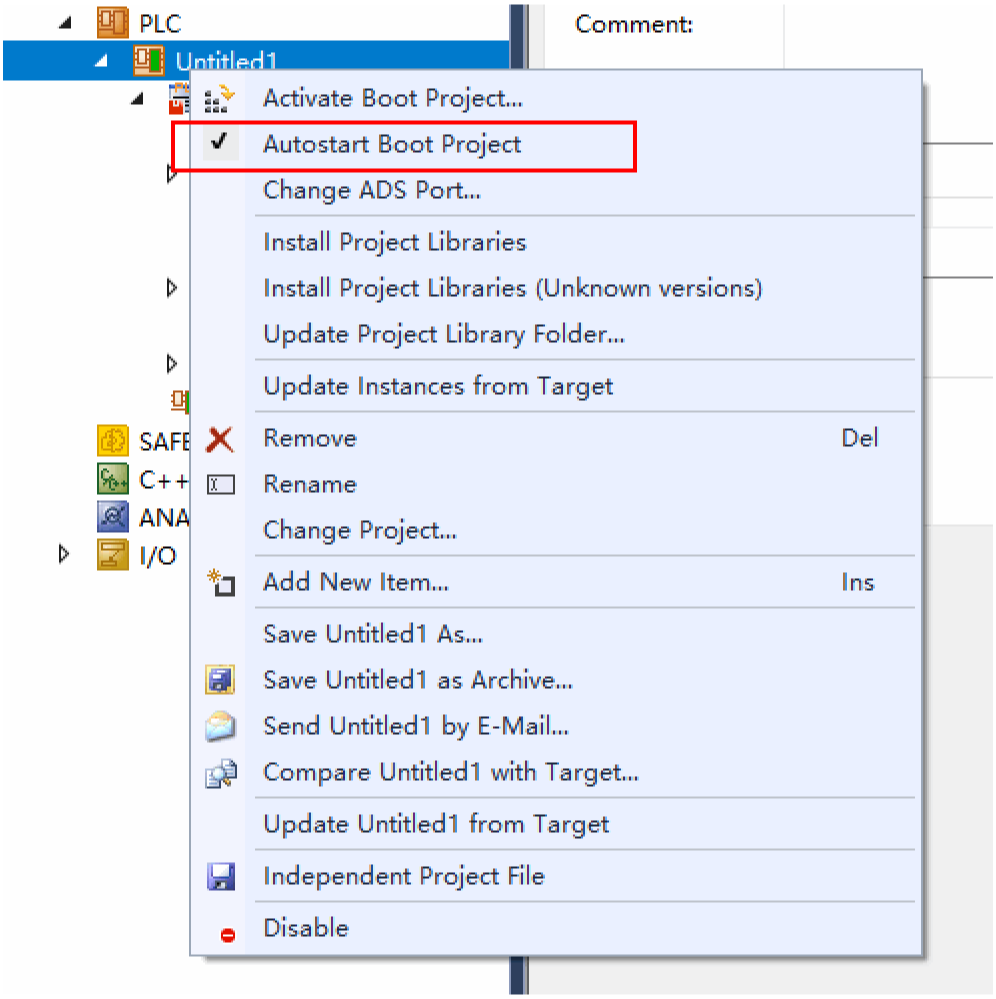
Step 14. Right click PLC, click **Add New Item**.



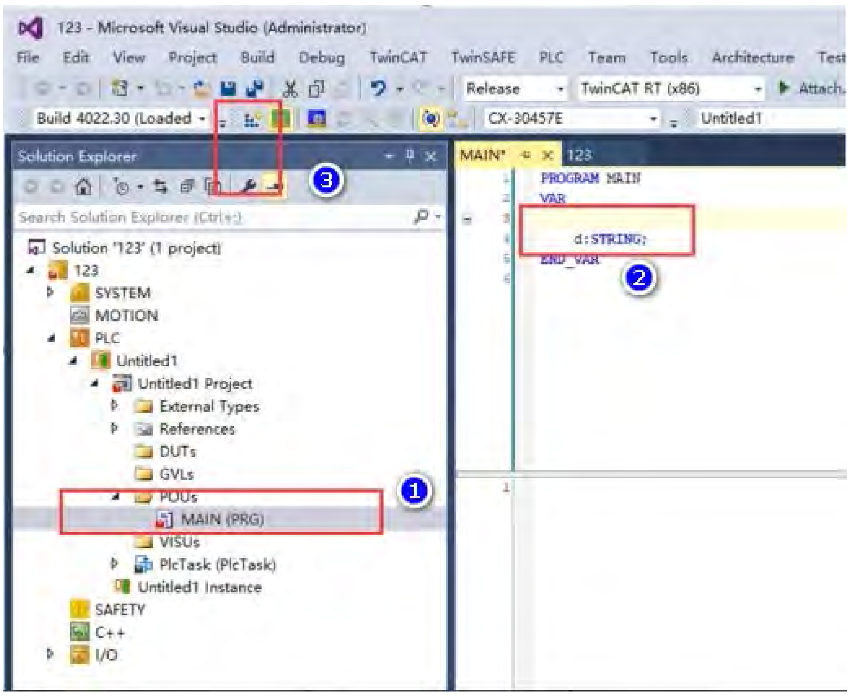
Step 15. Enter the PLC project name and save path in the pop-up dialog box, and click **Add**.



Step 16. Right click the newly added PLC project, check **AutoStart Boot Project**.



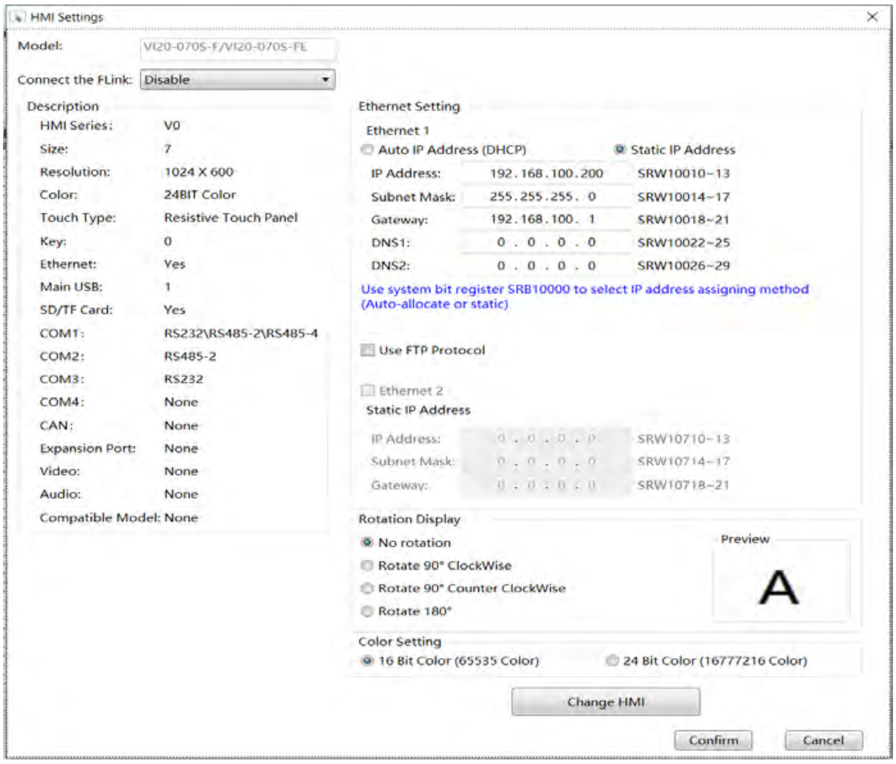
Step 17. Double-click the MAIN program to add a local variable in the MAIN program, the variable name is d, and the type is STRING. Click the icon to activate the configuration and put the PLC in the running state.



17.3.2.3 Configure HMI

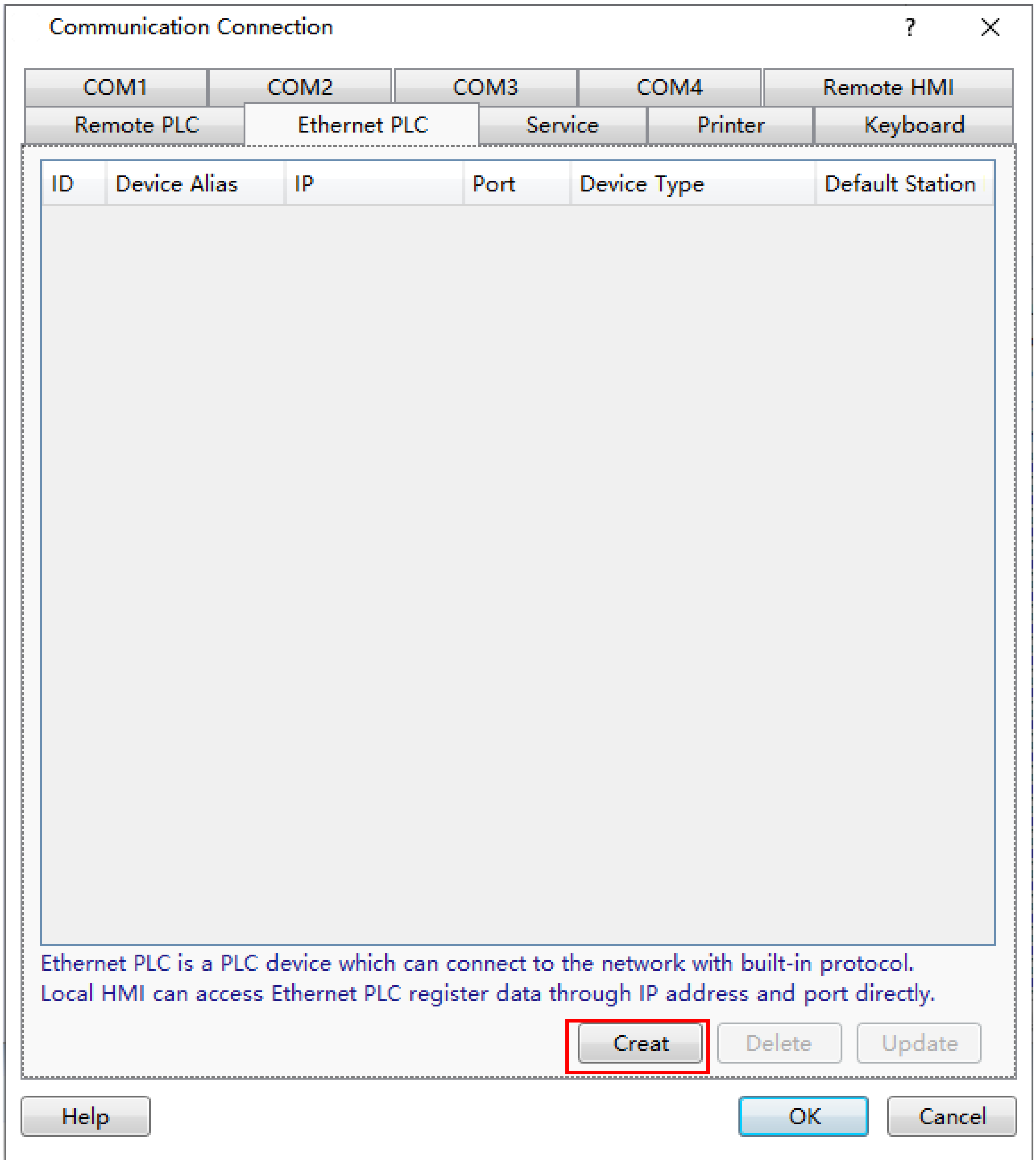
Step 1. Configure the IP address of HMI.

Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI (in the same segment as PLC) in the pop-up dialog box, click **OK**.

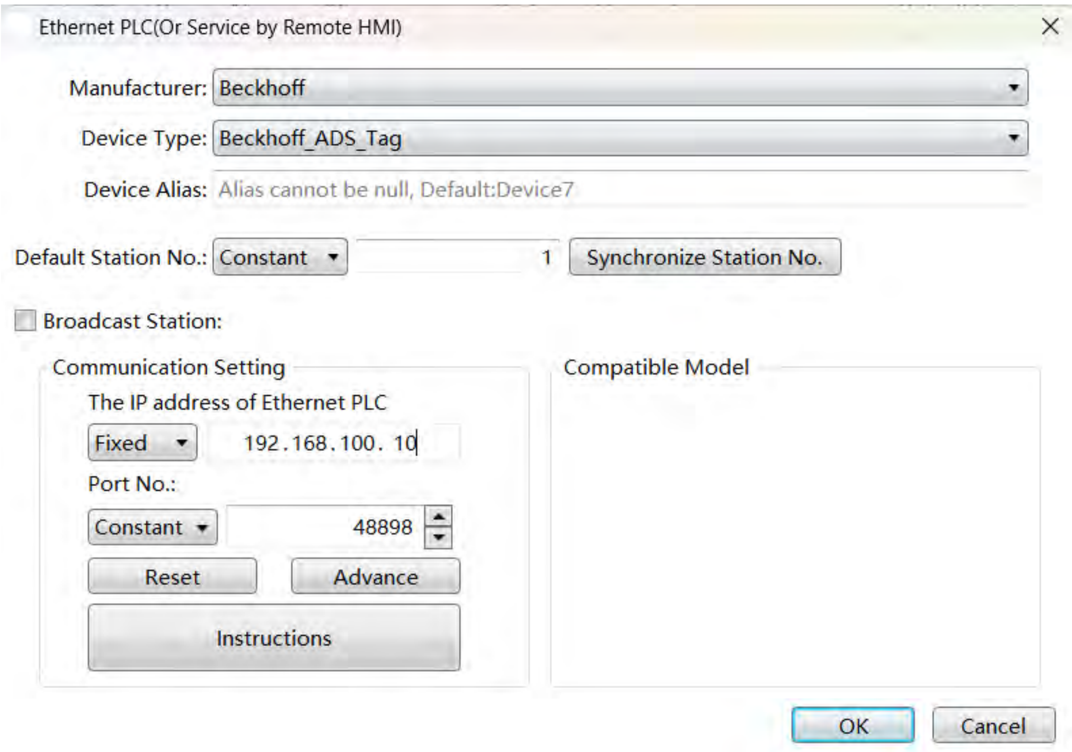


Step 2. Add Ethernet PLC.

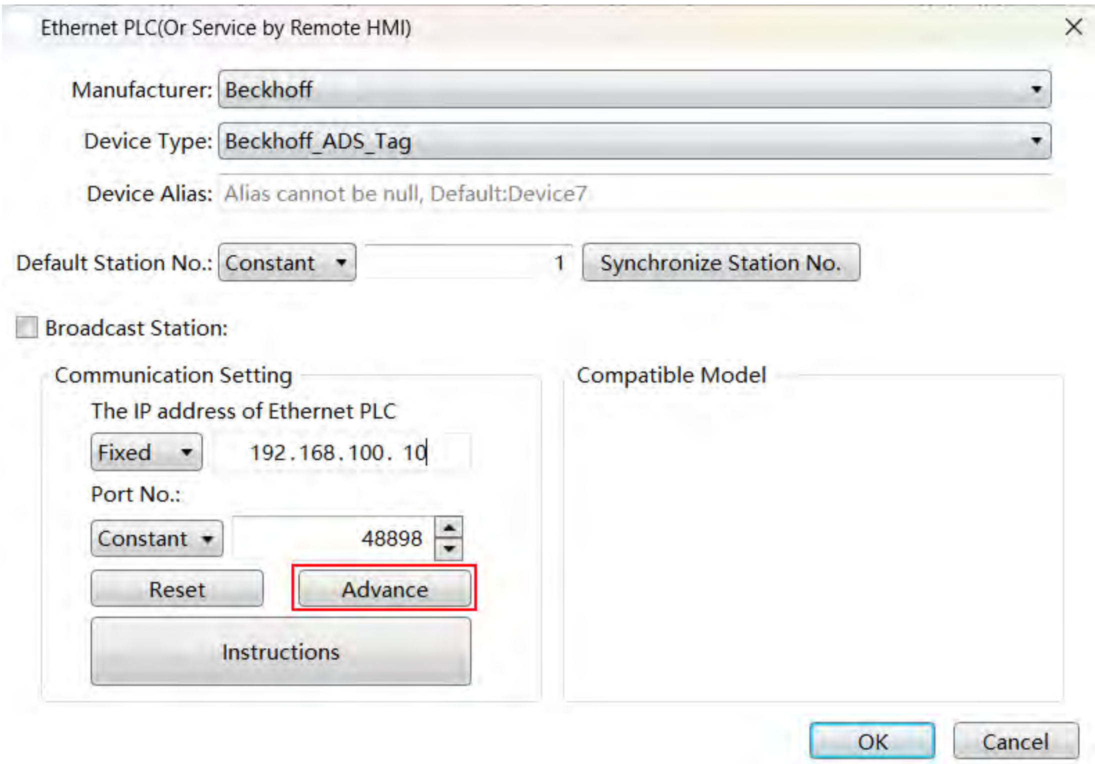
1) Select **Settings/Communication Settings/Remote Connection** from the menu bar, select the **Ethernet PLC** tab in the pop-up dialog box, click **Create**.



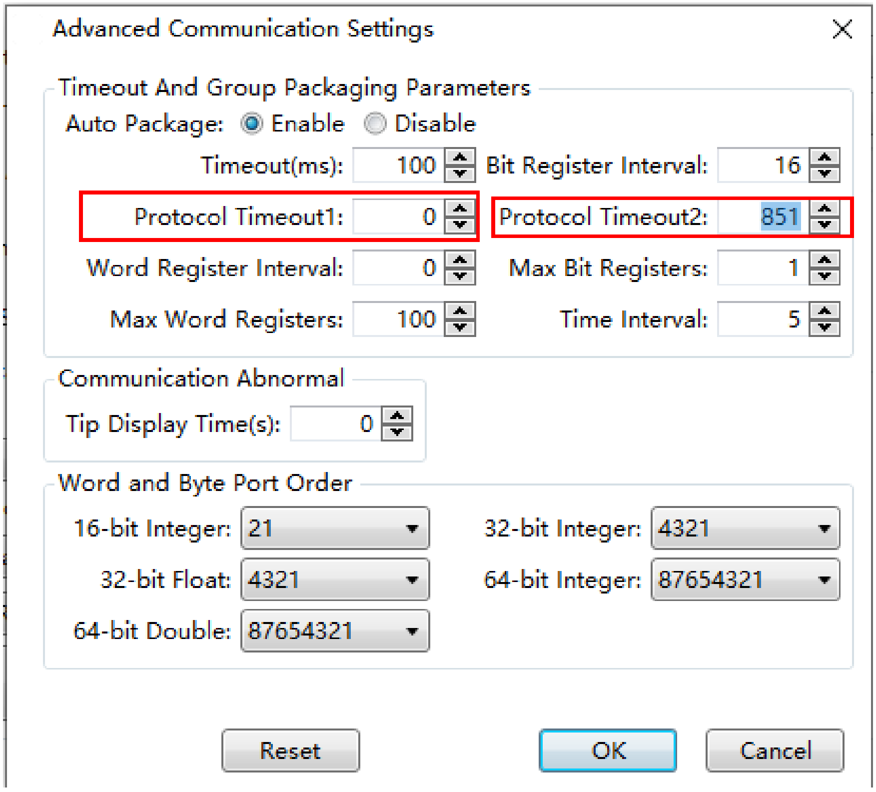
2) In the pop-up dialog box, configure as shown in the figure below.



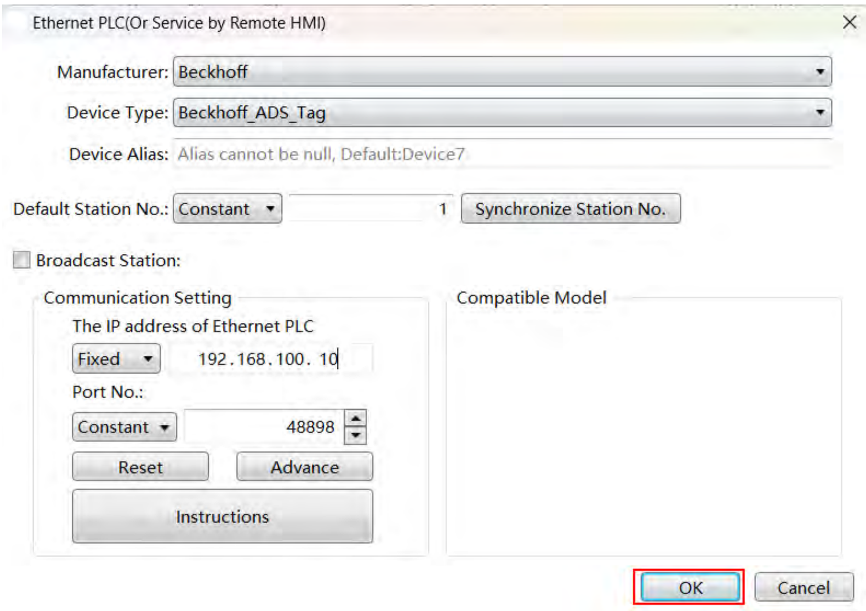
3) Click **Advance**.



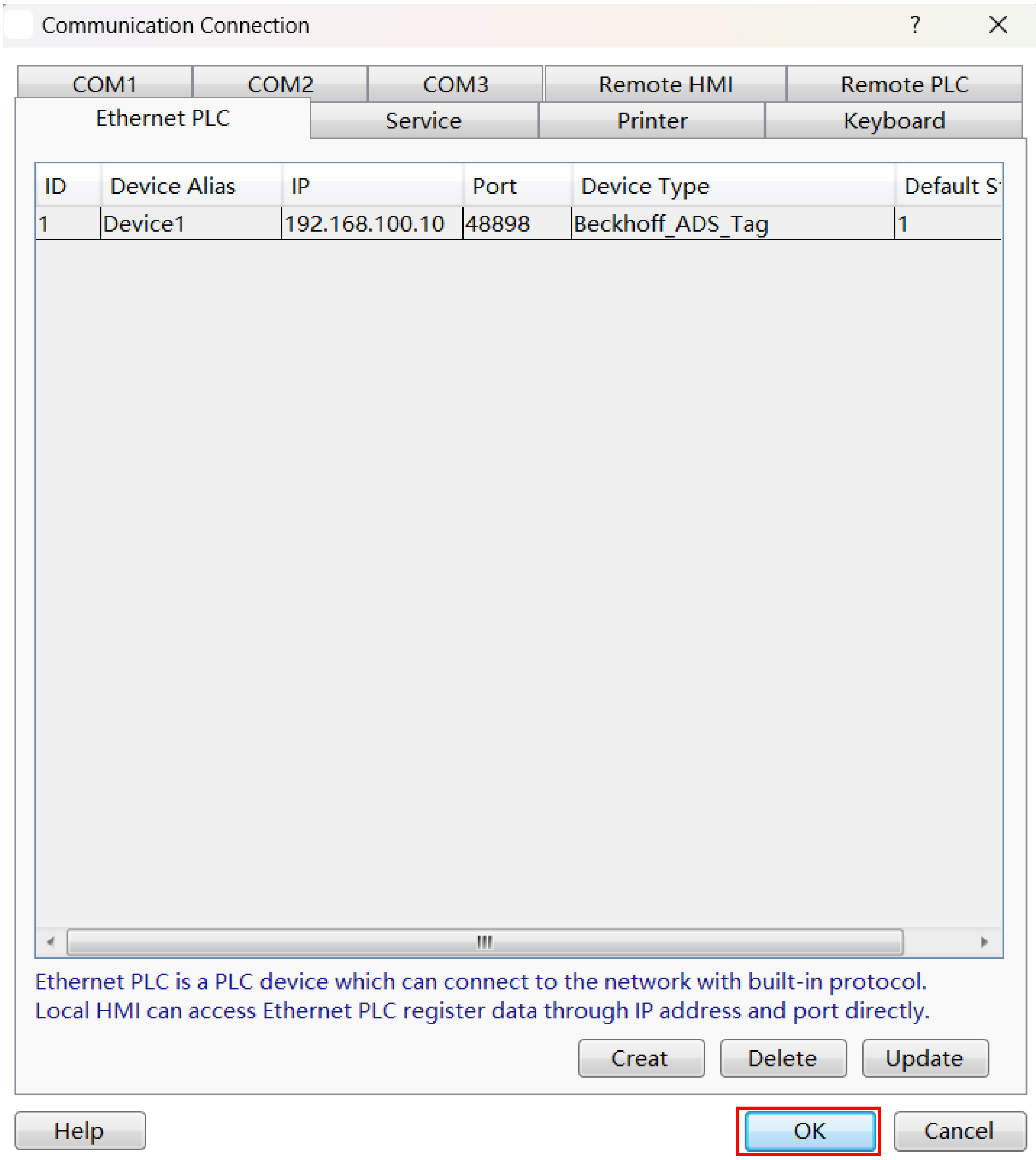
4) In the pop-up **Advanced Communication Settings** dialog box, set the **Protocol Timeout 1** to 0, **Protocol Timeout 2** to 851.



5) Click **OK**.

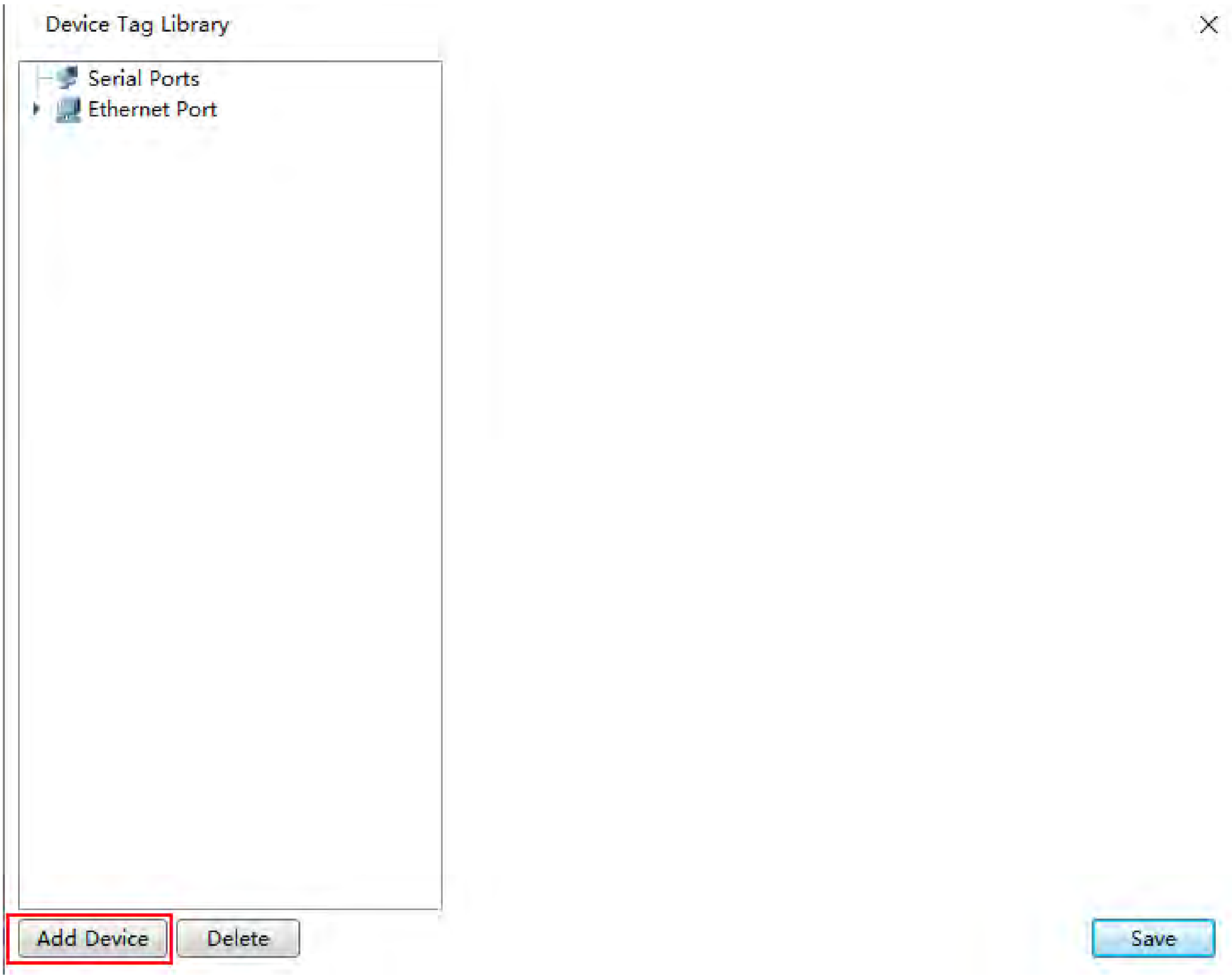


6) Click **OK**.

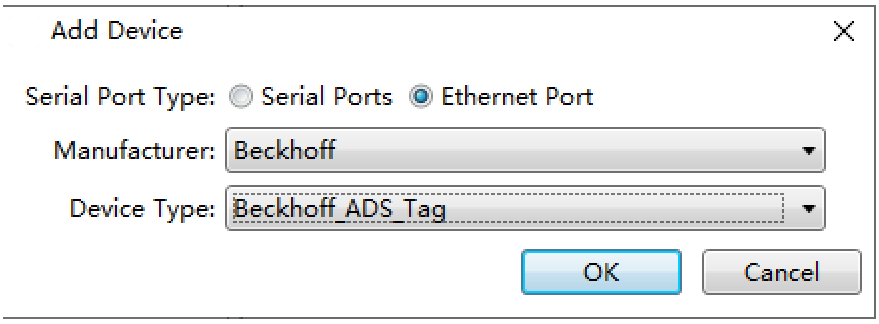


Step 3. Add device tag.

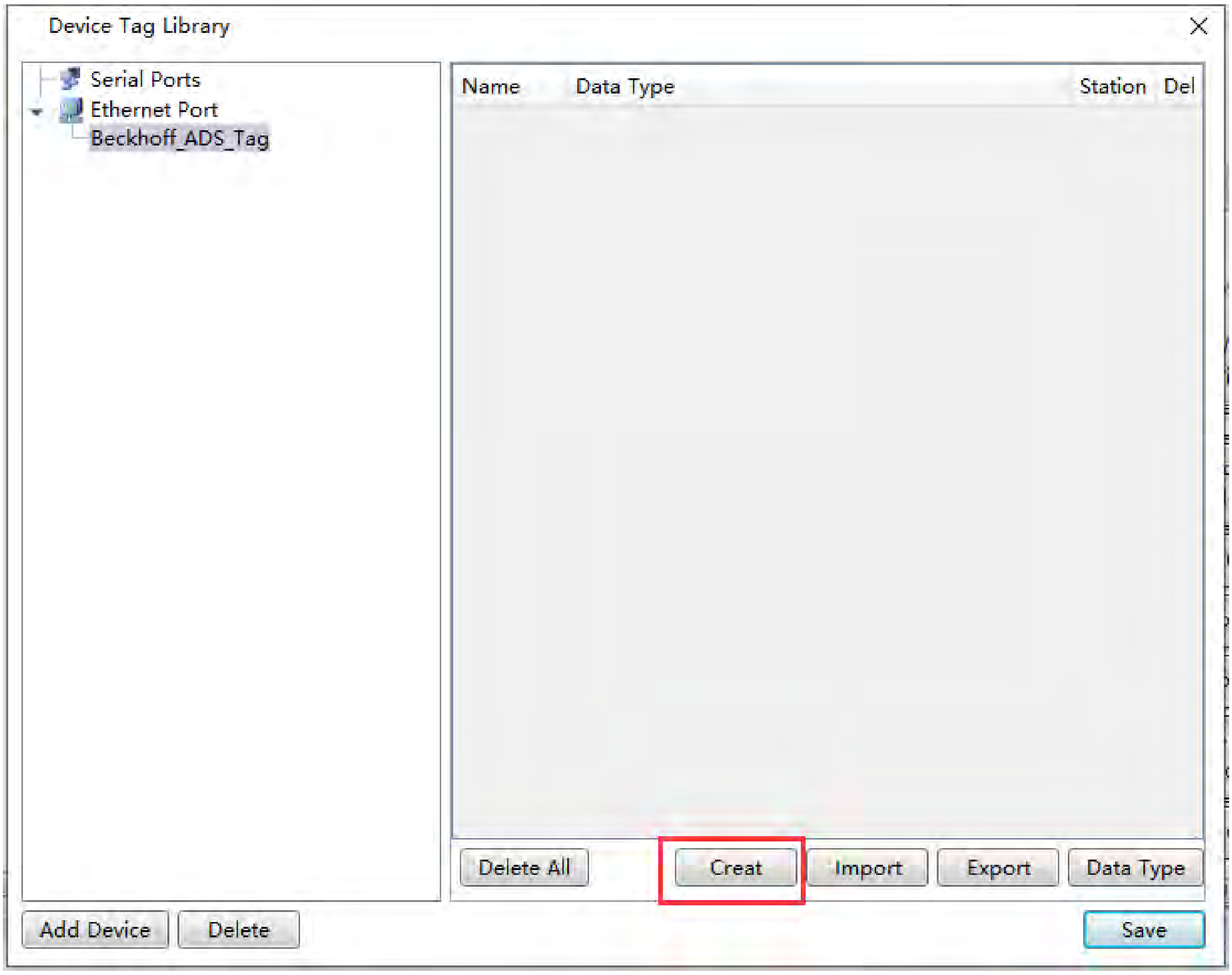
1) Select **Library/Device Tag Library** from the menu bar, click **Add Device** in the pop-up dialog box.



2) In the pop-up dialog box, configure as shown in the figure below, click **OK**.



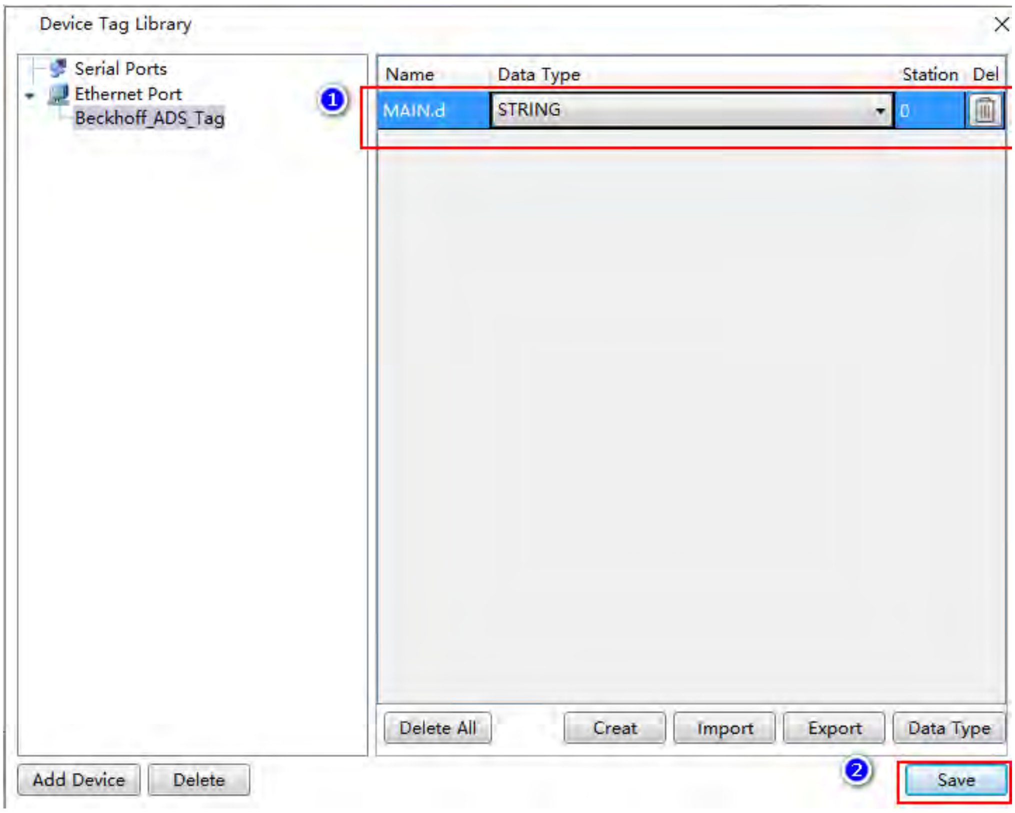
3) Select Beckhoff PLC, click **Create**.



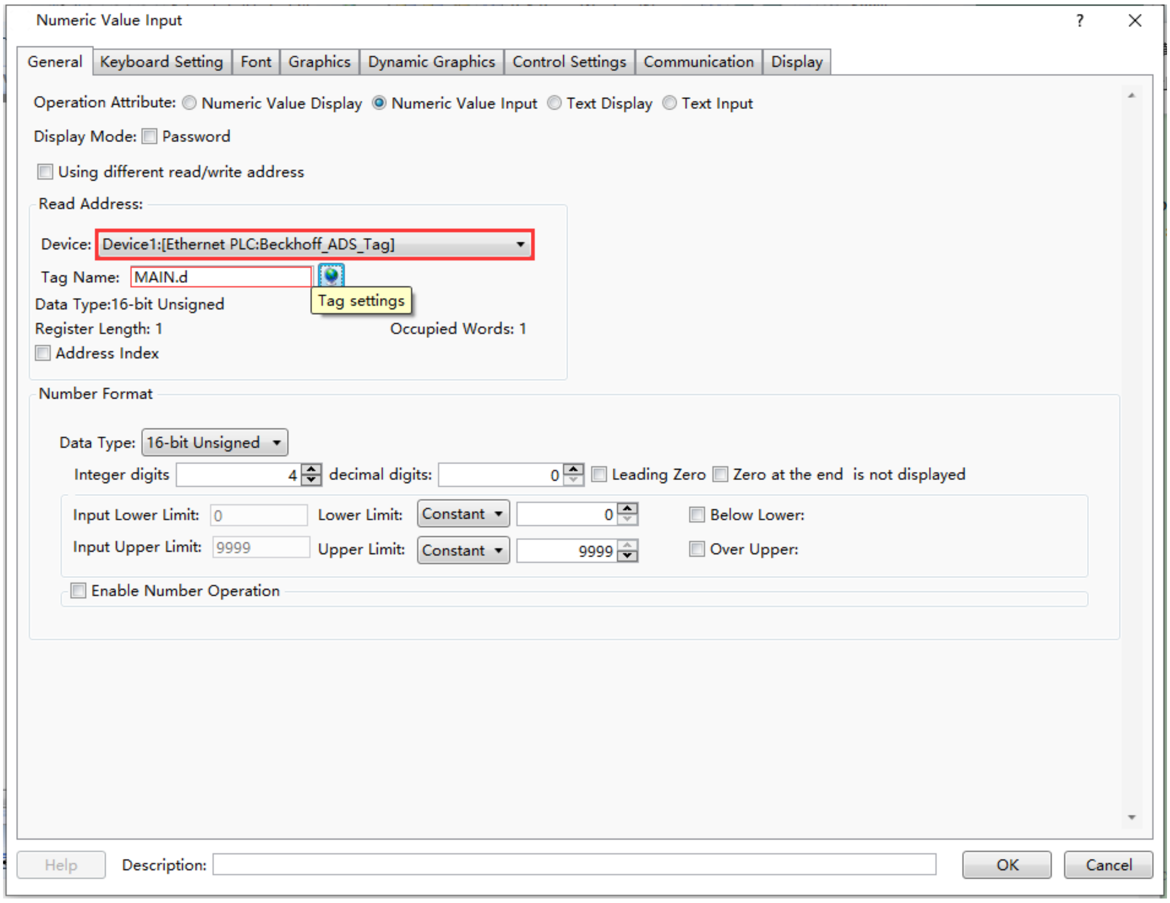
4) Edit variable tag, click **Save**.

For example, there is a variable d in the MAIN of the PLC, and the type is String, and the String type tag of MAIN.d needs to be added in the device tag library.

- ◆ The variable tag case and variable name must match the PLC program.
- ◆ If the variable is created in GVL, the format of the tag is *GVL name.variable name*. For example, the name of GVL is HmiTag, the variable name is a, and the tag name is HmiTag.a.



Step 4. Select **Component/Numerical Value and Text Display/Numerical Value Input** from the menu bar, and set the **Read Address** to the address tag of Beckhoff PLC in the pop-up dialog box.



Step 5. Complete the configuration of the numerical value input component, download the project to the HMI, if the numerical value can be written to the corresponding address tag of the PLC, it means that the communication is working.

17.3.3 Ethernet Communication (Address Tag) Between HMI and Beckhoff PLC(Windows CE+TwinCAT 2)

The PLC in this case is a Cx5130 with a Windows CE operating system and TC2 programme running system.

17.3.3.1 Connection Method

Use a network cable to connect the PC port to the HMI port, or PC and HMI can be connected through a switch.

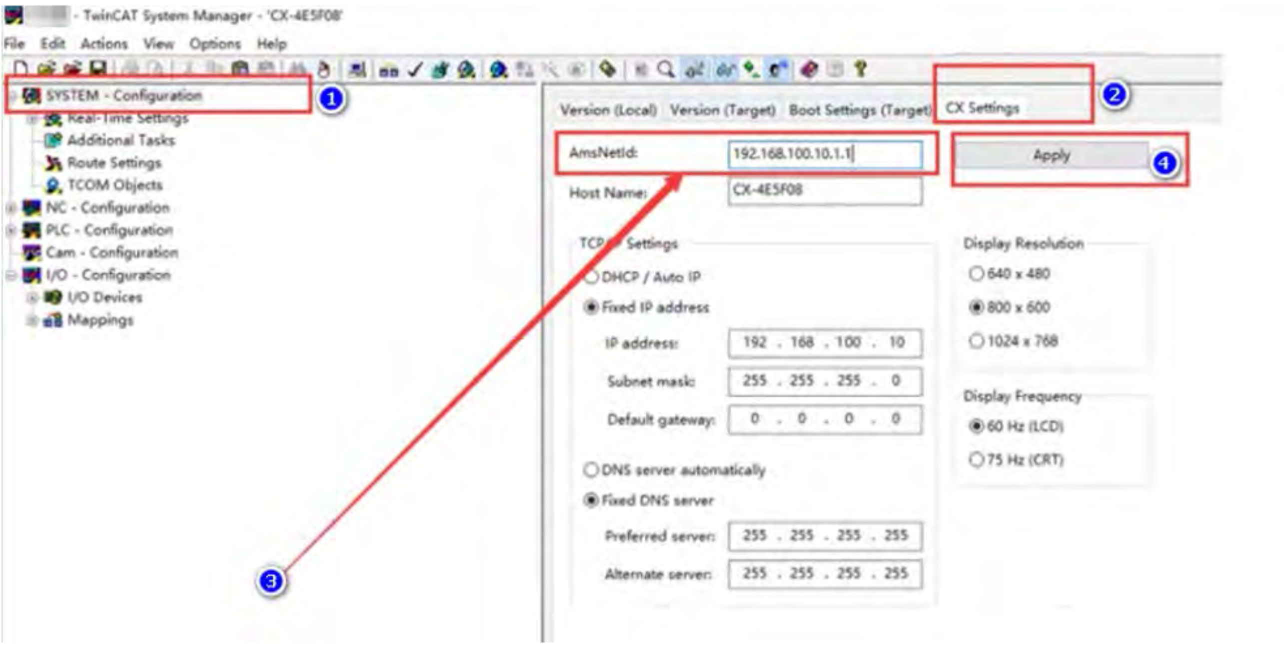
17.3.3.2 Configure PLC

17.3.3.2.1 Modify the IP Address of PLC

Select **Start/Control Panel/Network and Dial-up Connections/FEC1** on the task bar, select the **IP Address** tab in the pop-up dialog box, select **Specify an IP address**, set the IP Address to 192.168.100.10; set the Subnet Mask to 255.255. 255.0. There is no need to fill in the third line, click **OK** in the upper right corner.

17.3.3.2.2 Modify AMS Net ID of PLC

Step 1. Run TwinCAT 2, select **SYSTEM-Configuration** in the left side navigation bar, select the **CX Settings** tab, set AMS NET ID to 192.168.100.10.1.1 (the format is *the IP address of PLC*.1.1), click **Apply**.

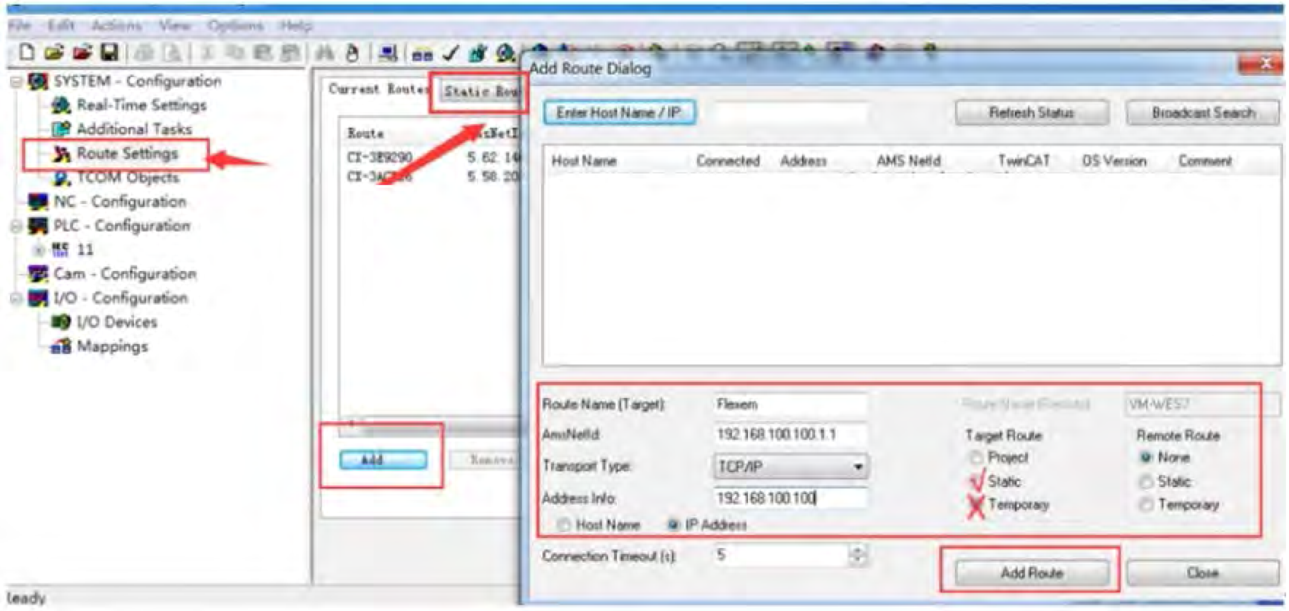


Step 2. Restart PLC.

17.3.3.2.3 Add HMI Route in PLC

Step 1. Run TwinCAT 2, select **SYSTEM-Configuration/Route Setting** in the left side navigation bar, select the **Static Routes** tab, click **Add**.

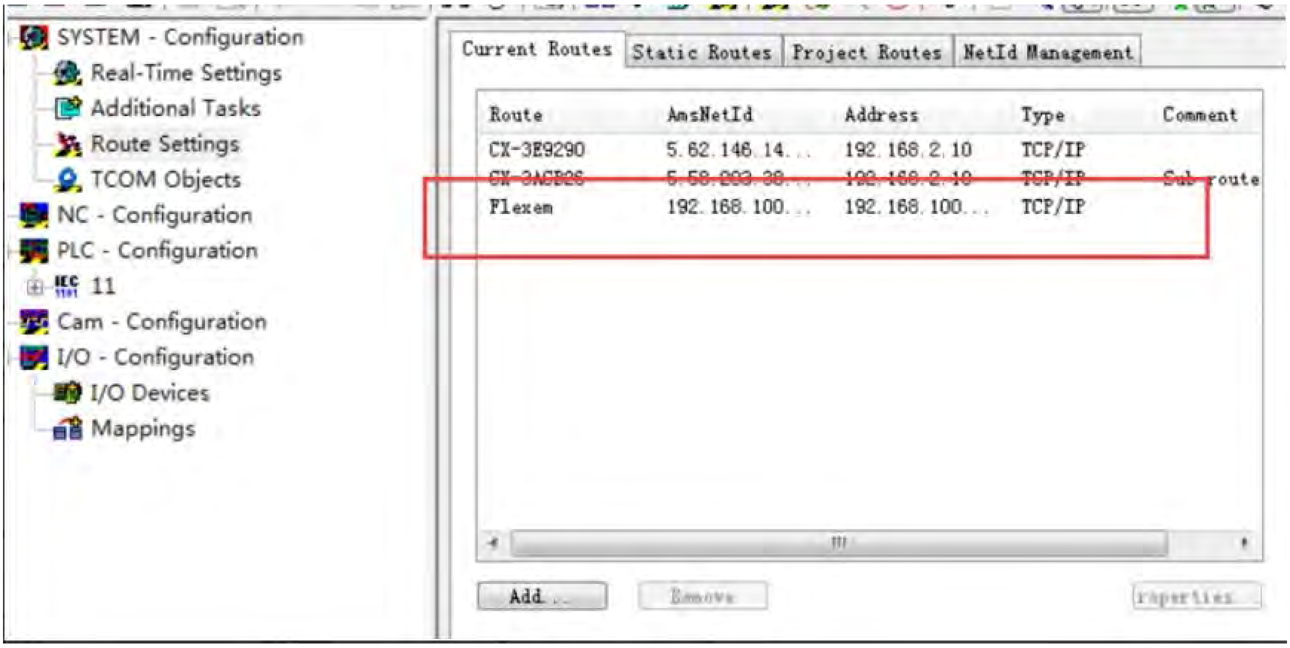
Step 2. Configure relevant parameters in the pop-up dialog box, click **Add Route**, then click **Close**.



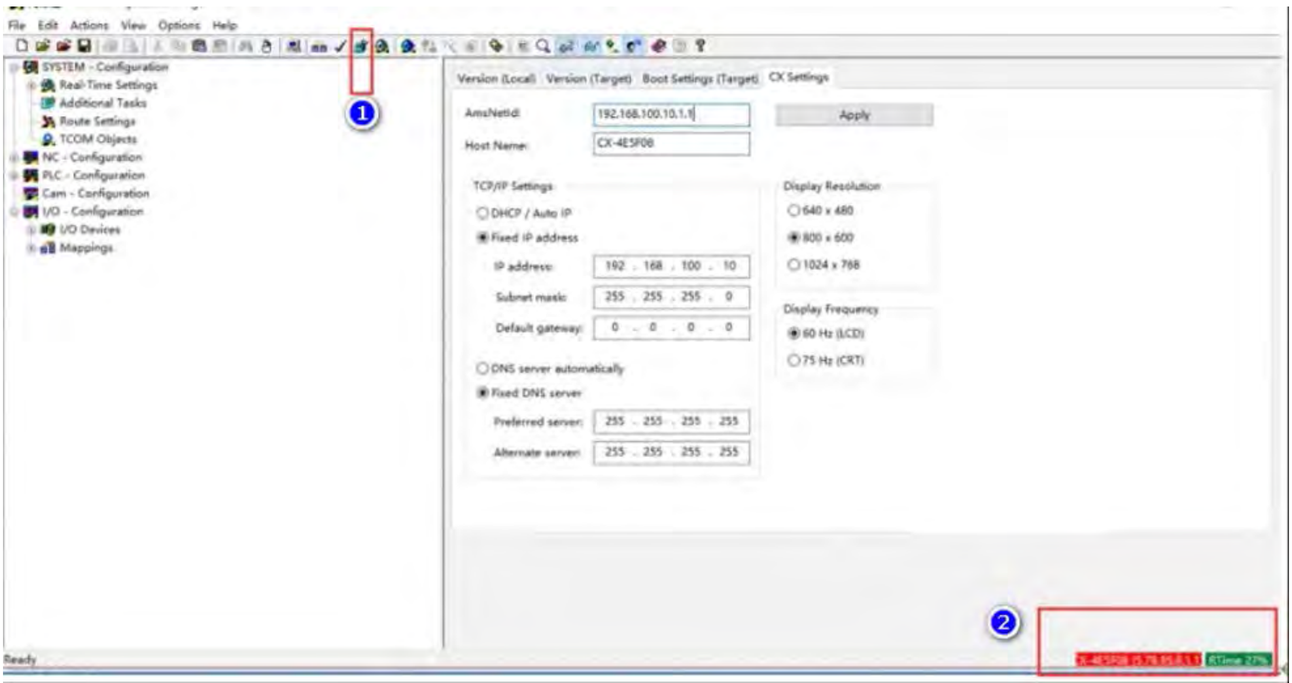
Please refer to the table below for detailed configuration methods.

Parameter	Configuration
Route Name(Target)	Name of route, it is recommended to enter the HMI name.
AMS NET ID	The format is *IP address of HMI*.1.1. For example, if the IP address of HMI is 192.168.100.100, AMS Net ID is 192.168.100.100.1.1.
Address Info	Select **IP Address**, set to the IP address of HMI.
Target Route	Select **Static**.
Remote Route	Select **None**.

If the newly added static route can be found in the **Current Routes** list, and after the PLC is powered off and on again, the routing table entry still exists, it means that the HMI static route is successful added.



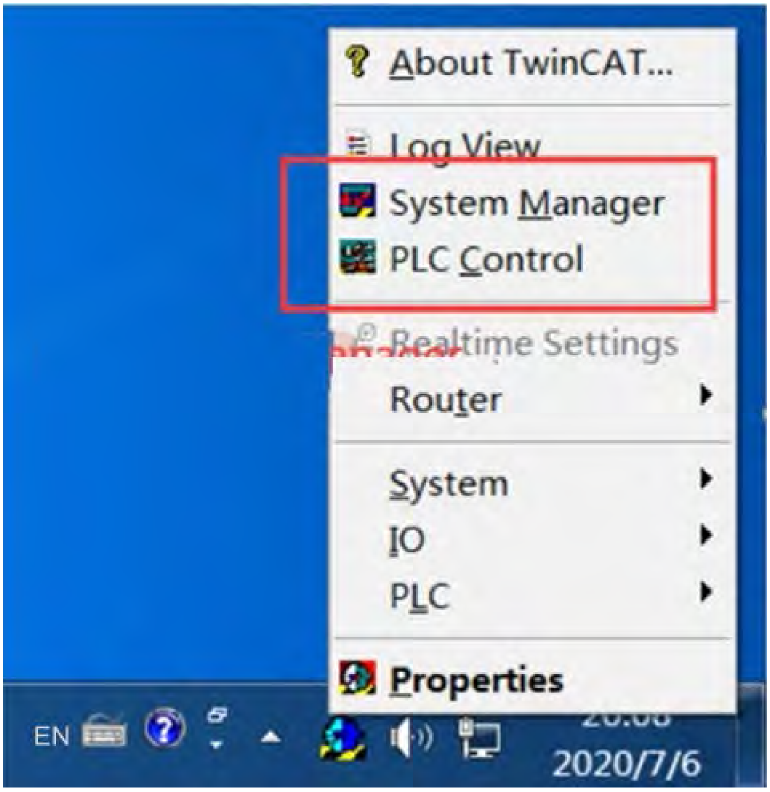
Step 3. After configuration, click the icon. After the download is complete, the icon in the lower right corner will be green, displaying the real-time R Time of the connected PLC.



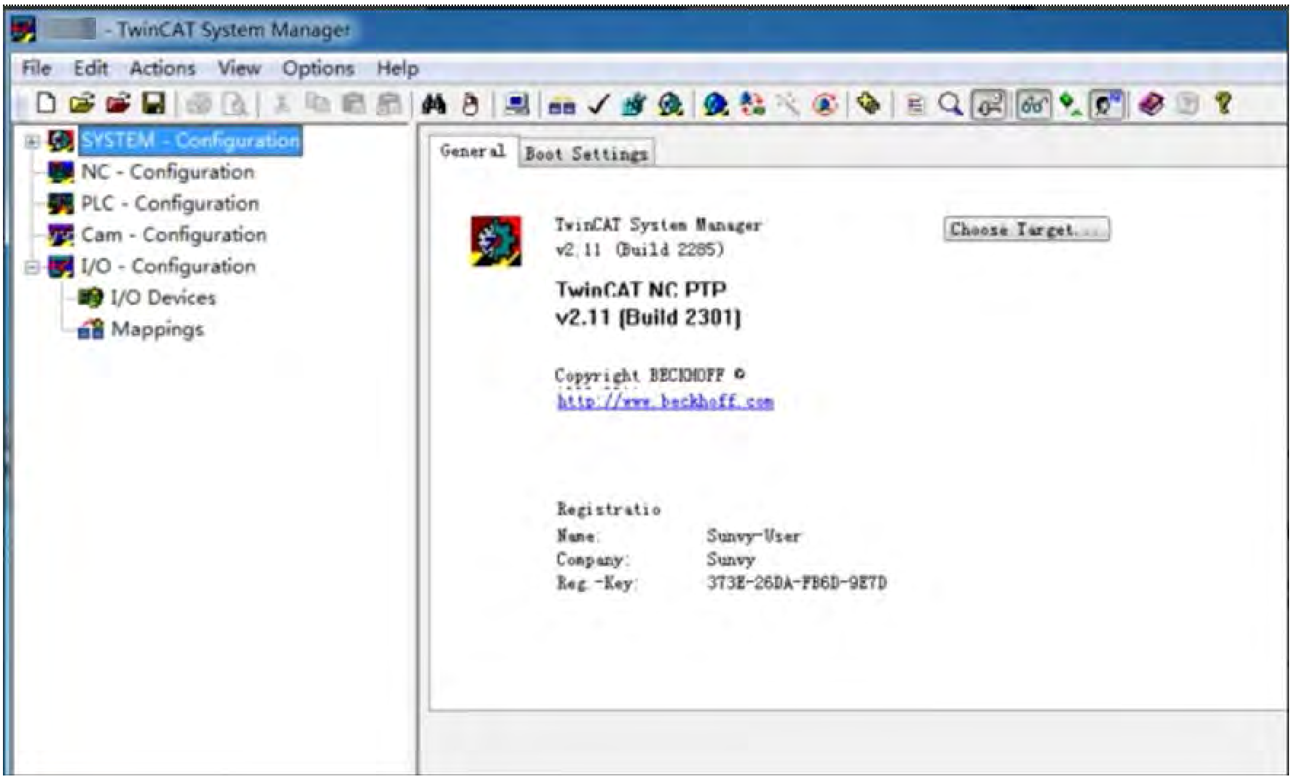
17.3.3.2.4 Add Variable in the PLC

Step 1. Create project.

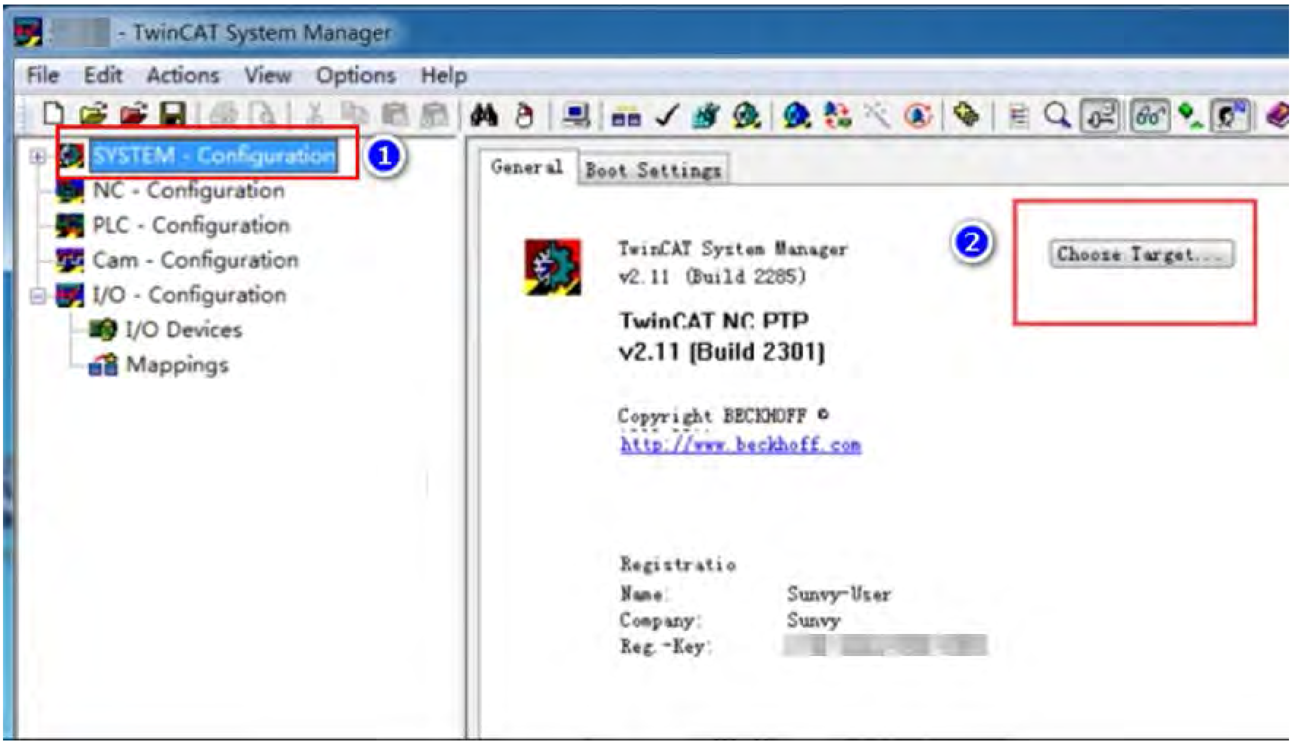
1) Right-click the TwinCAT icon on the taskbar, and select the corresponding option in the pop-up menu. System Manager is used to configure hardware; PLC Control is used to write PLC program logic, HMI screen program, etc. First create a new System Manager, and then write the control program.



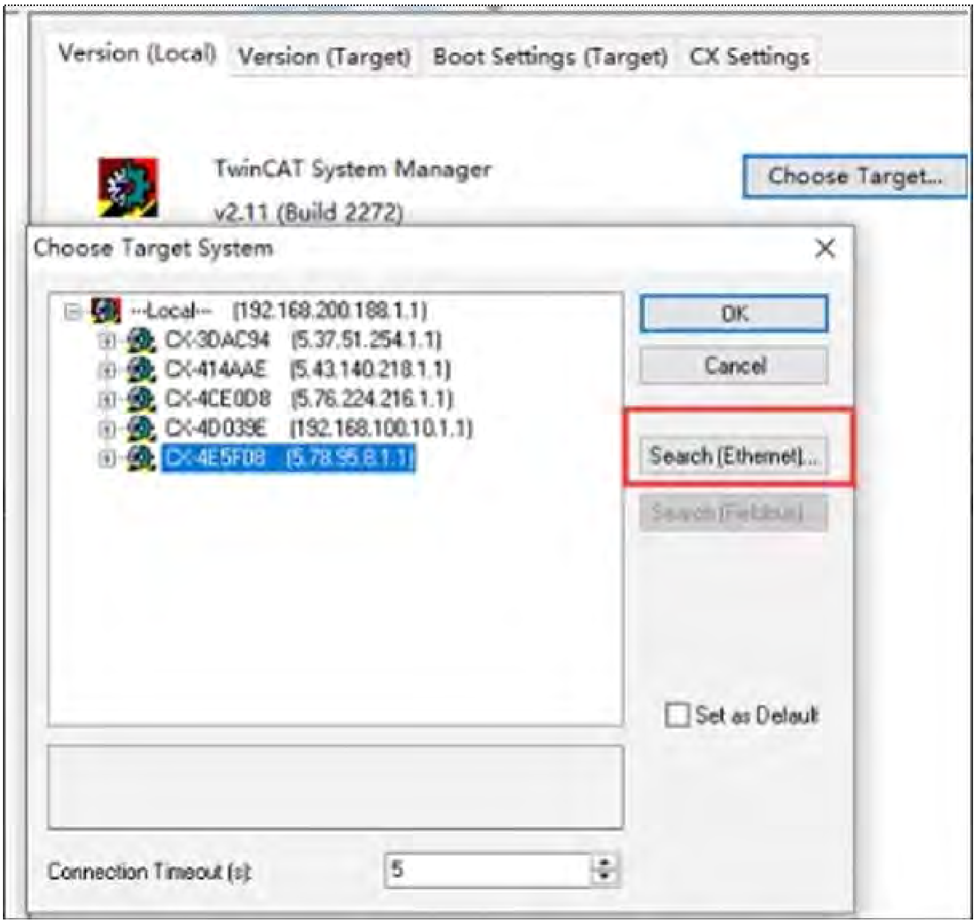
2) The interface after the new project is created is shown in the figure below.



Step 2. Select **SYSTEM-Configuration,** click **Choose Target** to connect PLC.

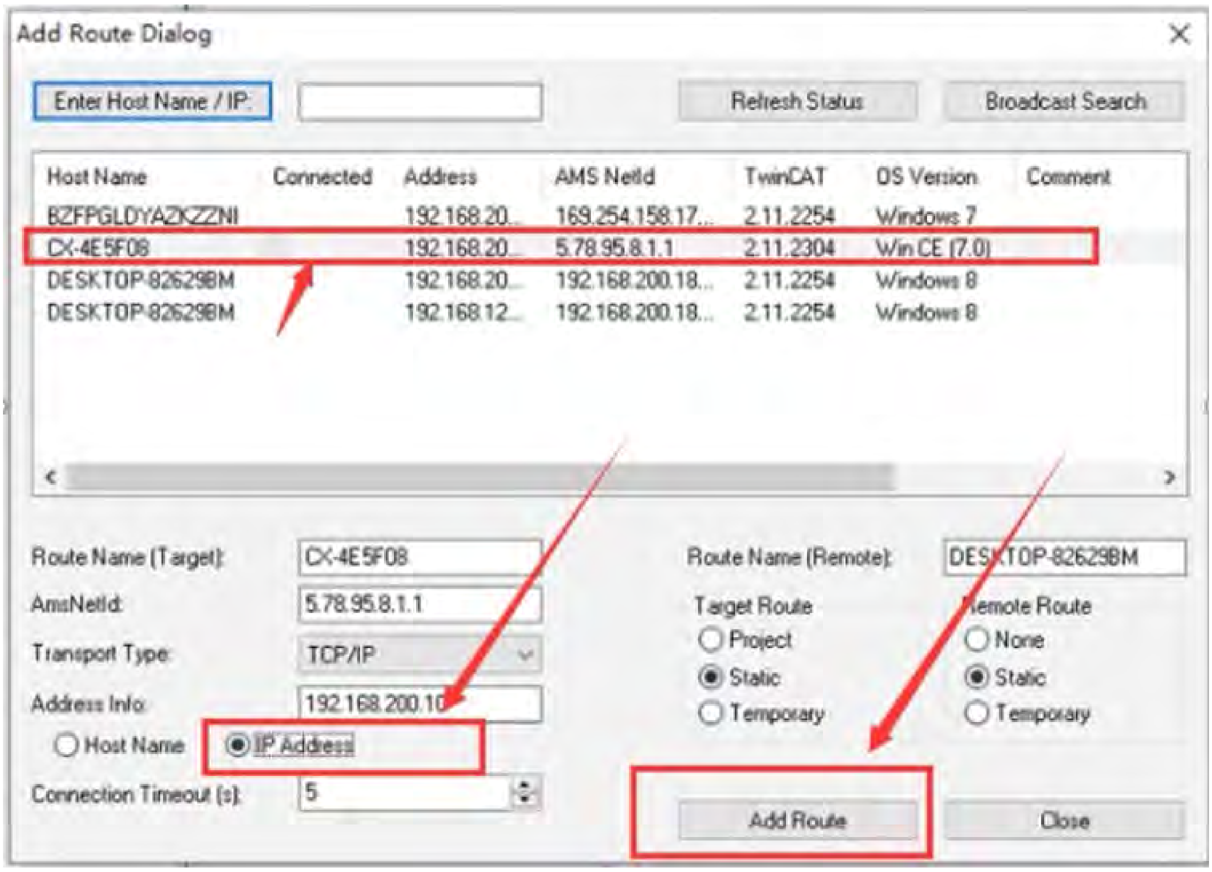


Step 3. Click **Search[Ethernet]** in the pop-up dialog box.

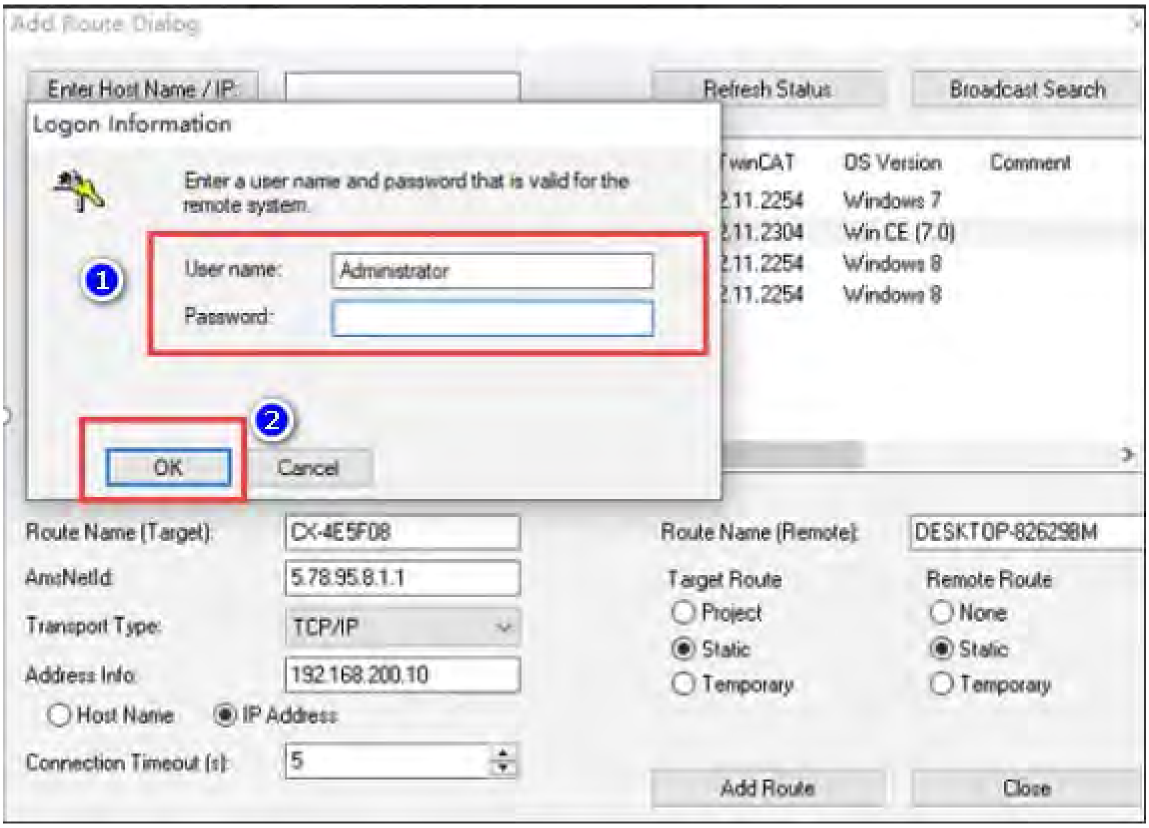


Step 4. Click **Boardcast Search**, a pop-up window will remind you which networks to search for the controller, select all networks.

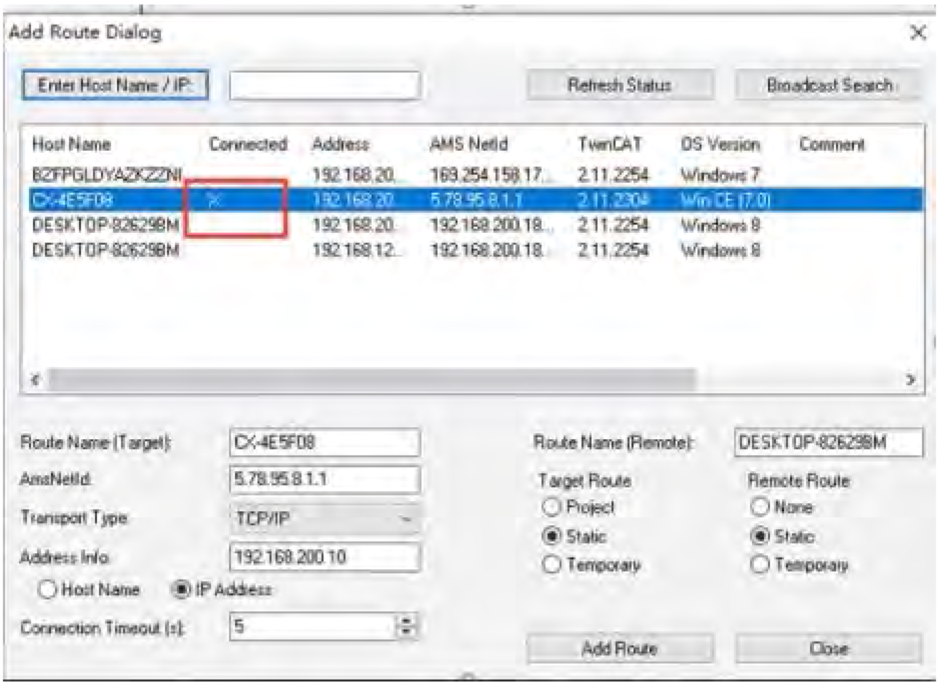
Step 5. Select the device whose Host Name starts with “CX” in the list, select **IP Address**, configure relevant parameters, and click **Add Route**.



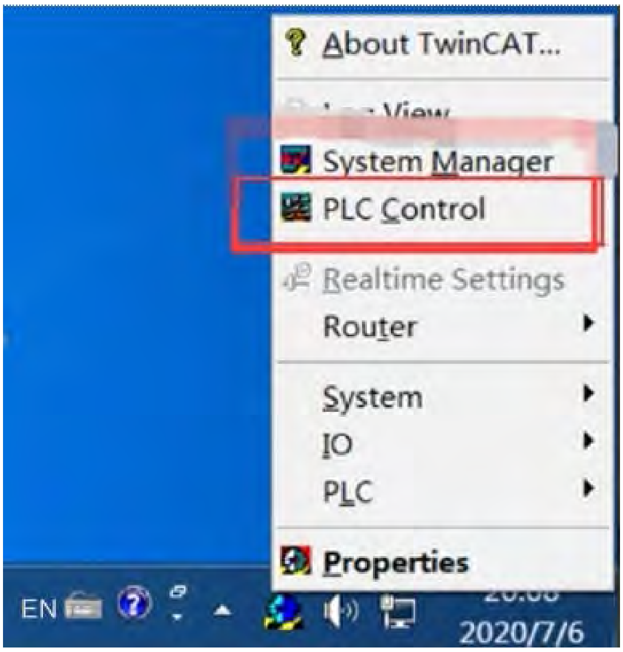
Step 6. Enter the PLC user name and password in the pop-up dialog box (the default user name is Administrator, and the default password is blank), and click **OK**.



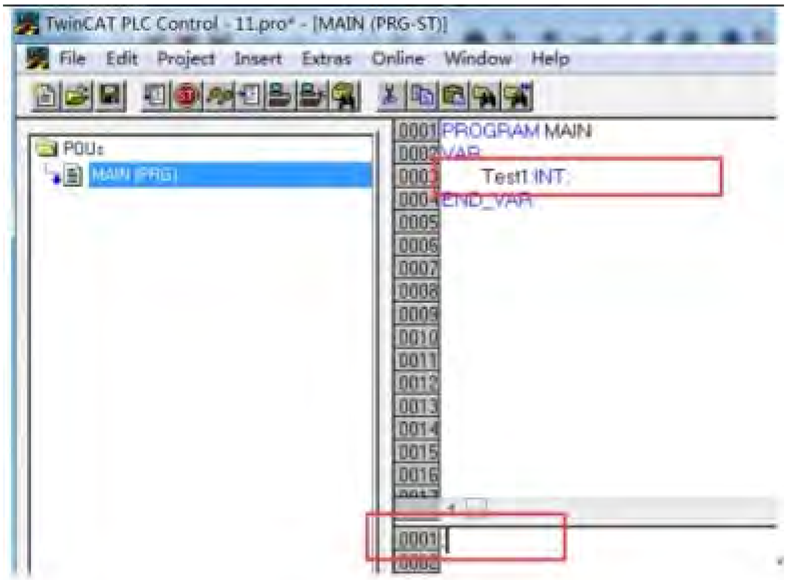
Step 7. When the **Connected** column shows “X”, it means the PLC has been connected.



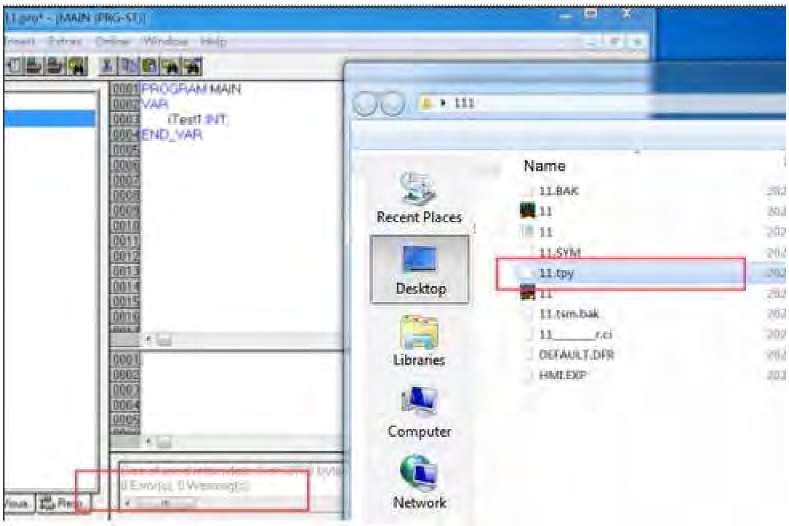
Step 8. Right click the TwinCAT icon, select **PLC Control**.



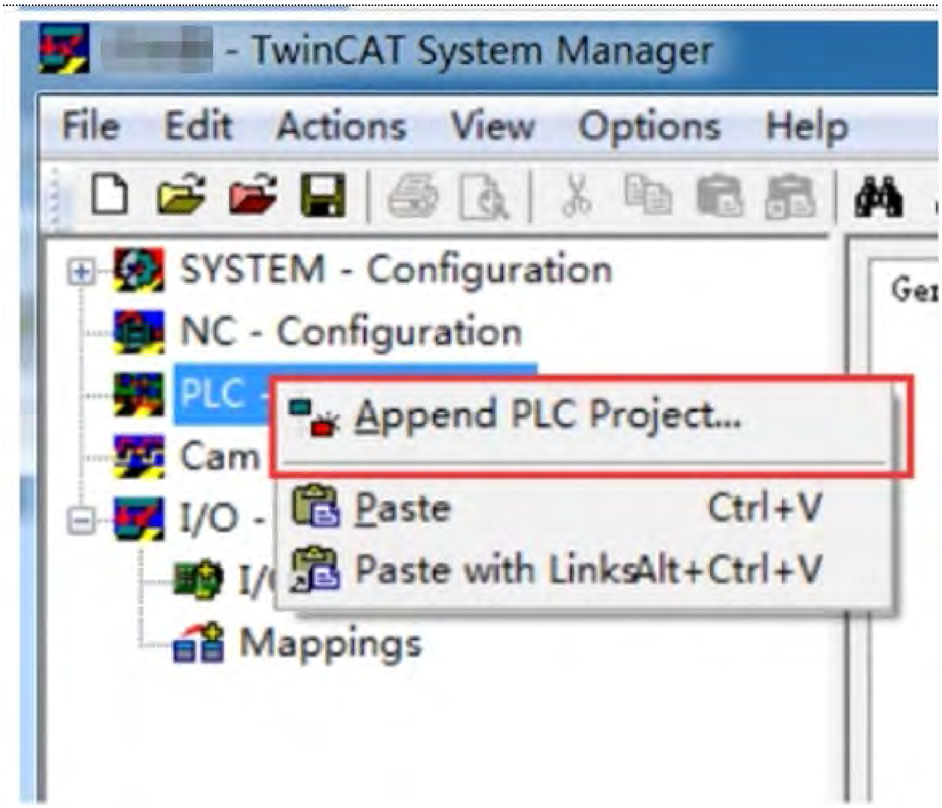
Step 9. Add local variable in the MAIN program with the variable name as Test1, data type INT.



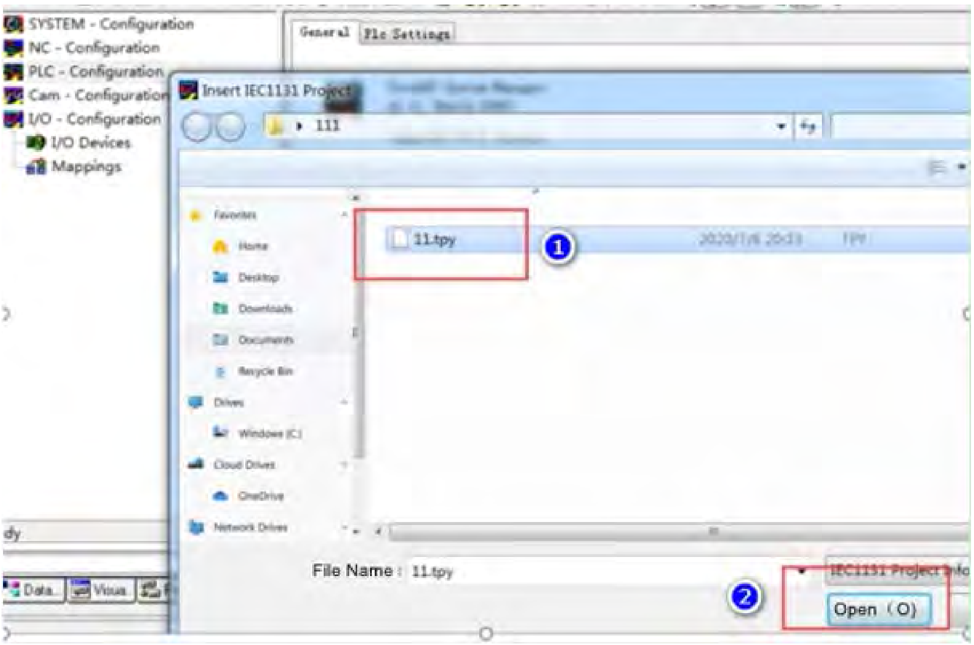
Step 10. After compiling, generate a .tpy file under the save path.



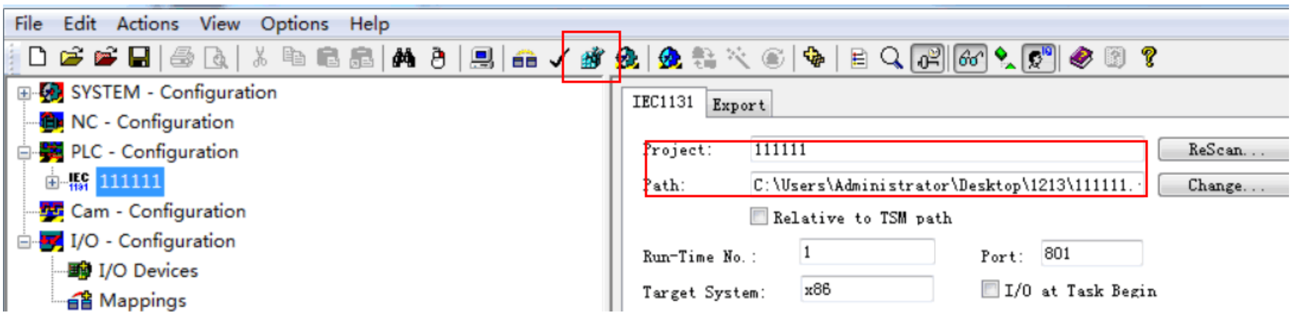
Step 11. Right click **PLC-Configuration** under **System Manager**, select **Append PLC Project**.



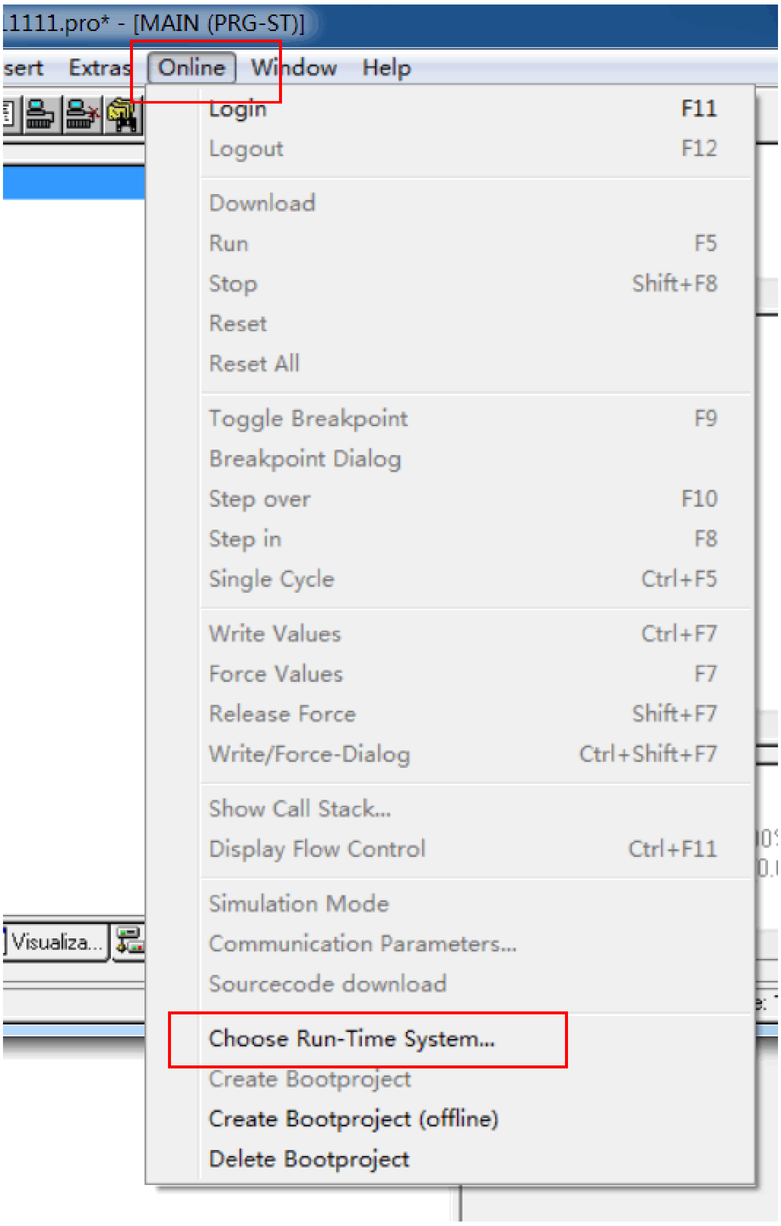
Step 12. Select the generated .tpy file in the pop-up dialog box, click **Open** to link the file.



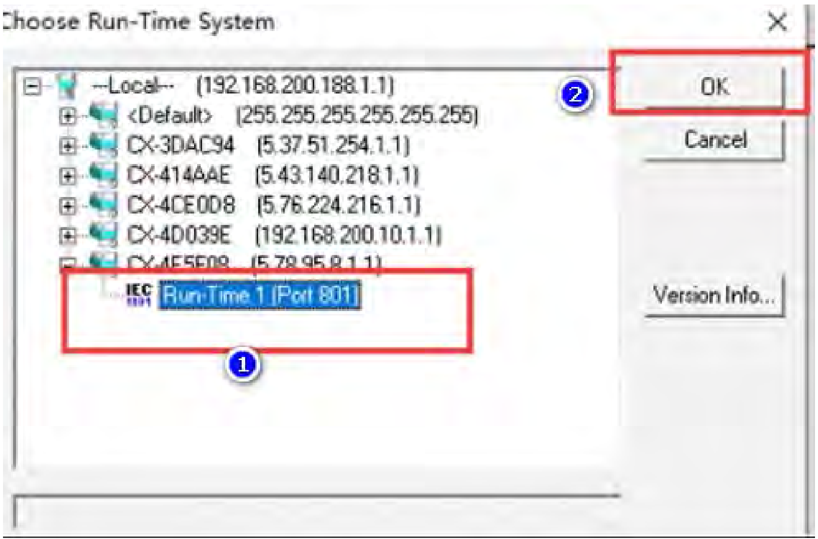
Step 13. Click the icon to activate configuration.



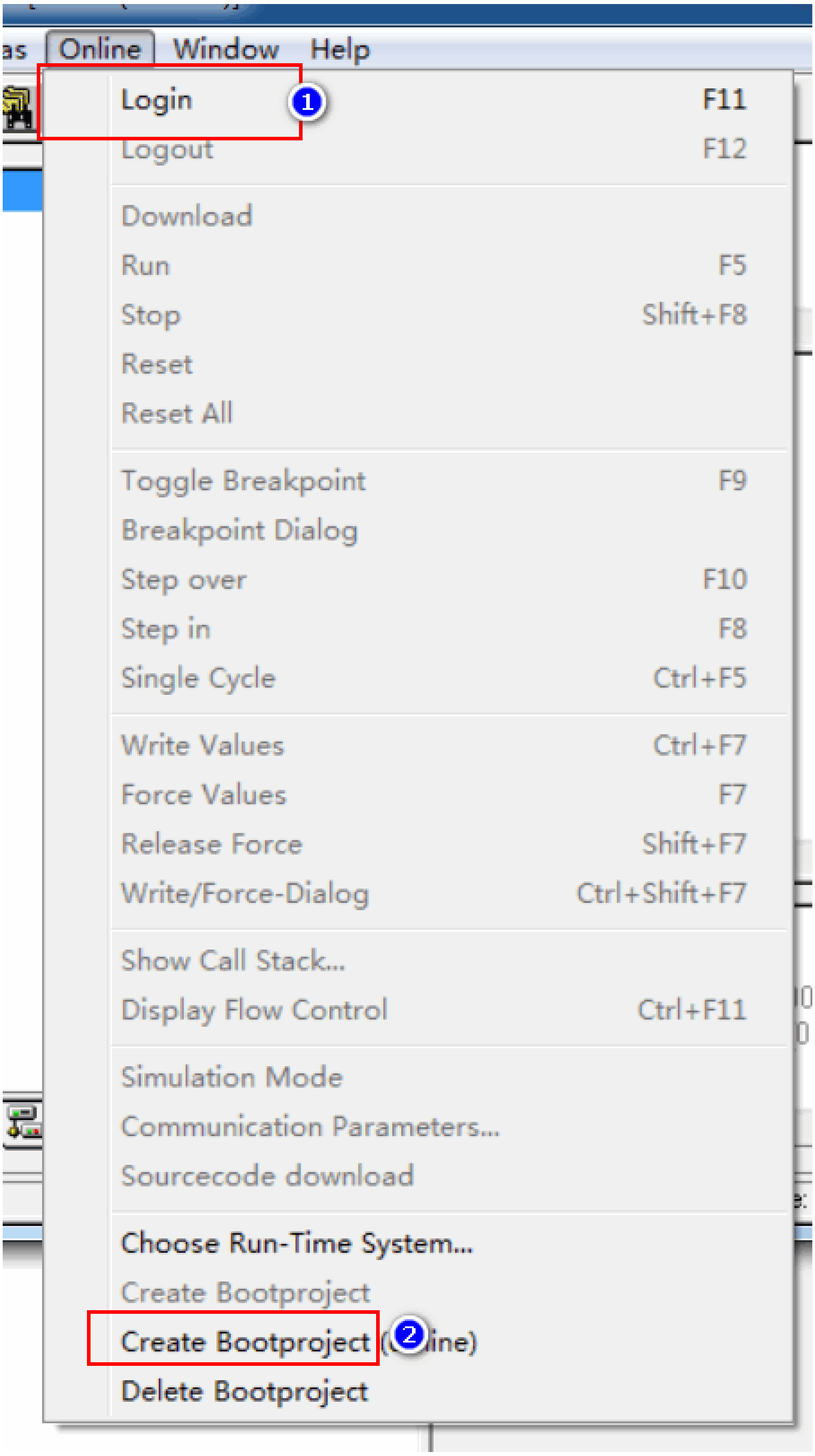
Step 14. Select **Online/Choose Run-Time** from the TwinCAT menu bar.



Step 15. In the pop-up dialog box, select the Run-Time corresponding to the PLC, click **OK**, and run PLC.

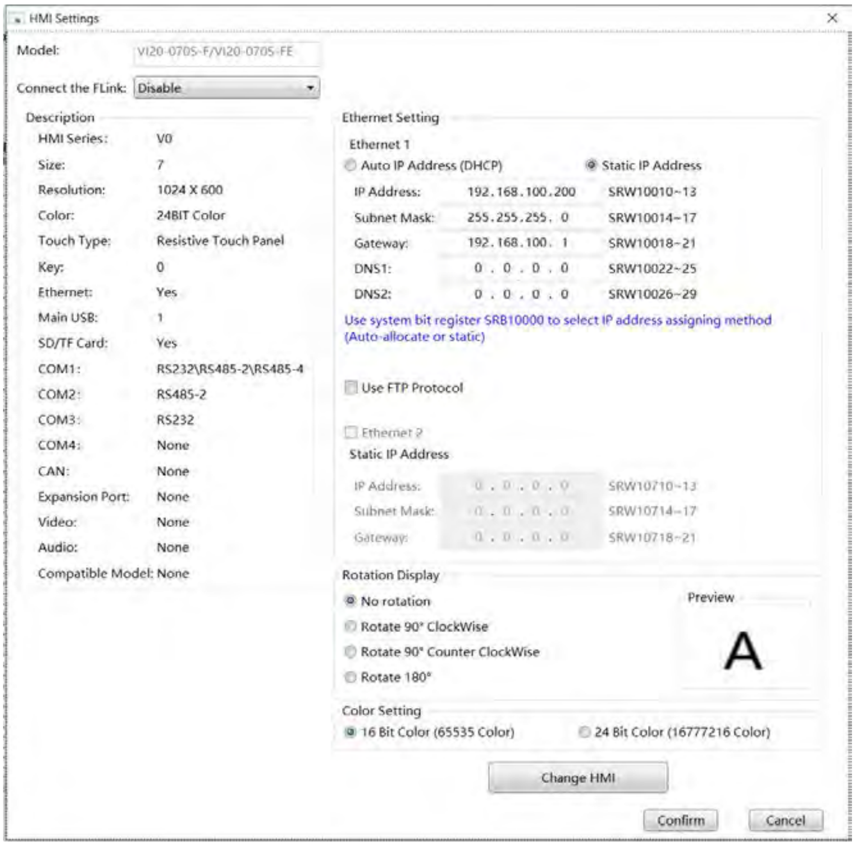


Step 16. After connecting to the PLC, select **Online/Login** from the menu bar to download the PLC program to the PLC. Select **Online/Create Bootproject** from the menu bar to create a Boot file.

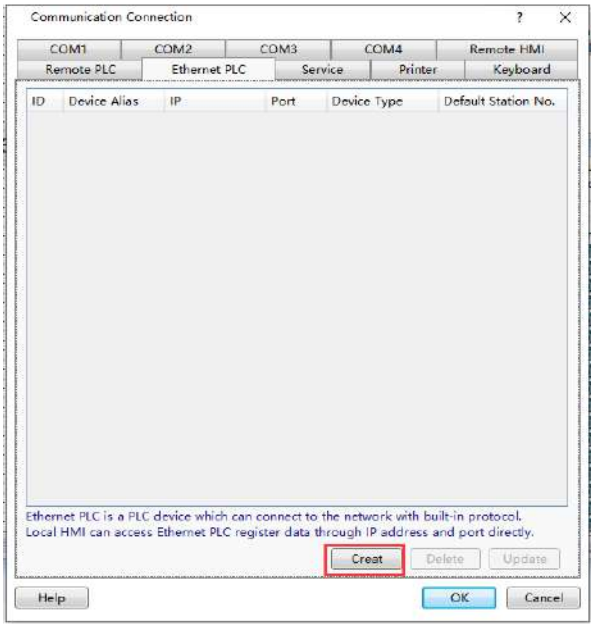


17.3.3.3 Configure HMI

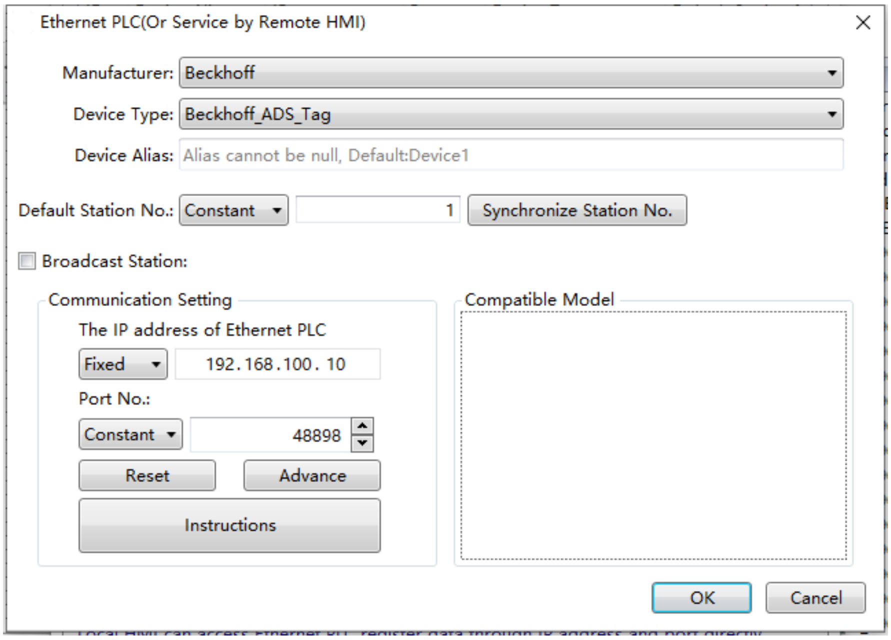
Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI (to be in the same network segment as the IP address of PLC), click **Confirm**.



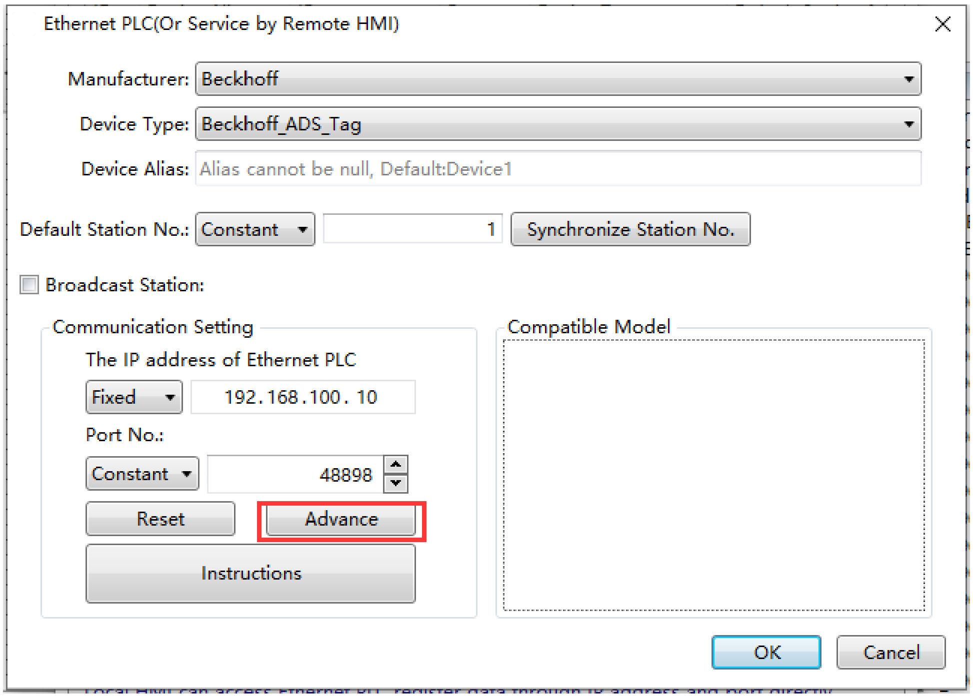
Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select the **Ethernet PLC** tab in the pop-up dialog box, click **Create**.



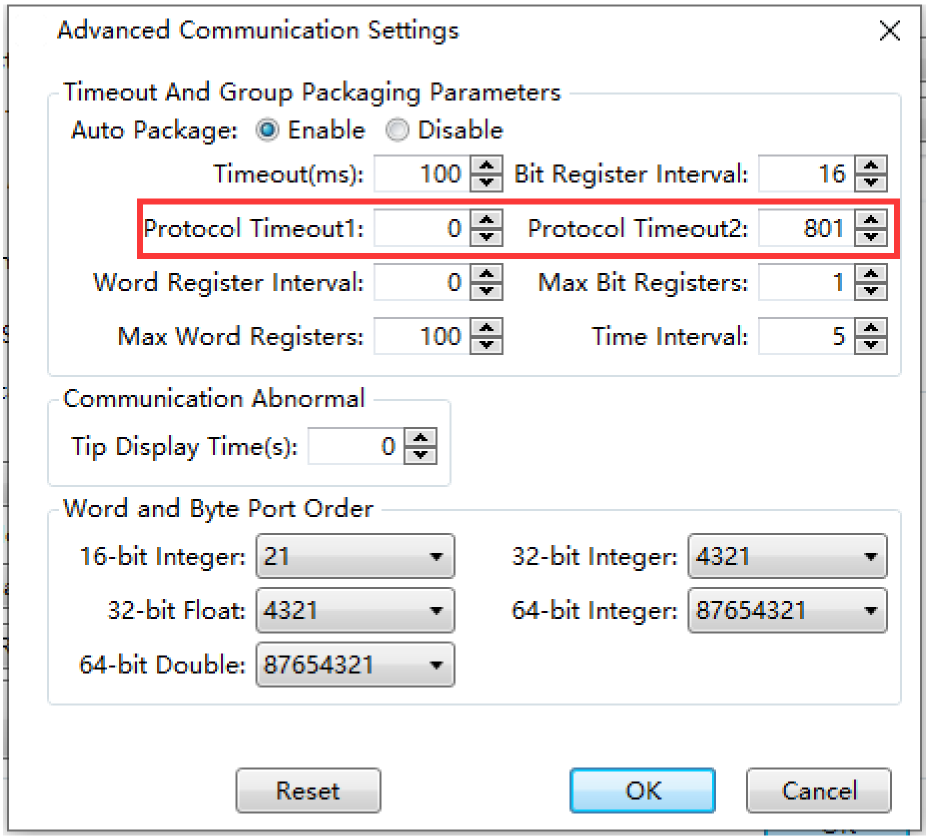
Step 3. Configure relevant parameters in the pop-up dialog box(select Beckhoff for manufacturer, Beckhoff_ADS_Tag for device type, fill in the IP address of PLC).



Step 4. Click **Advance**.



Step 5. In the pop-up **Advanced Communication Settings**, edit Protocol Timeout 1 and Protocol Timeout 2, click **OK.**

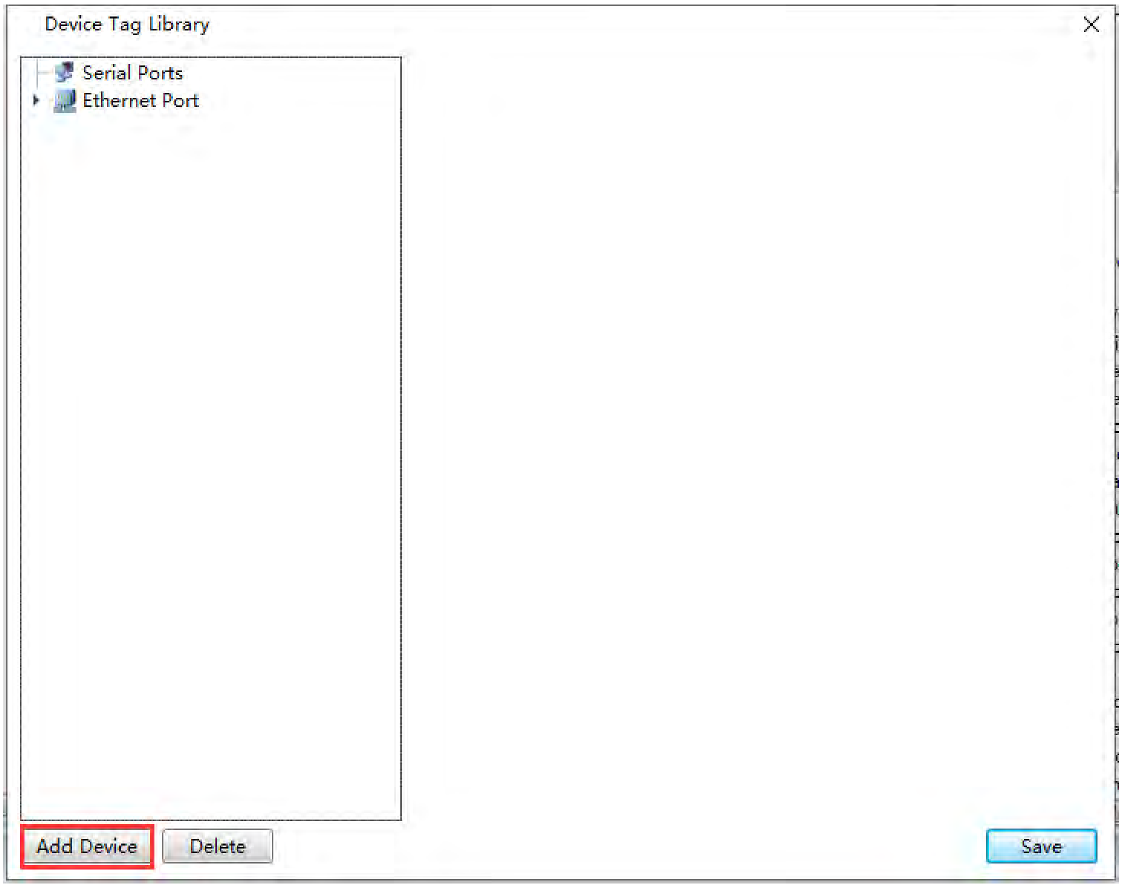


Please refer to the table below for detailed configuration methods.

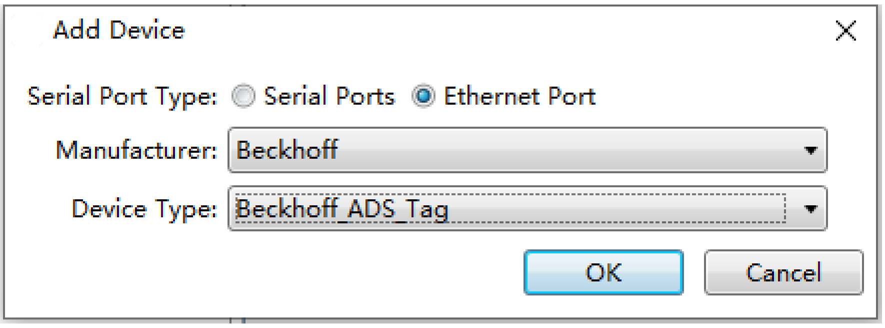
Parameters	Description
Protocol Timeout 1	If the last two digits of the PLC's AMS NET ID are 1.1, set protocol timeout 1 to 0. If the last two digits of the PLC's AMS NET ID are 8.9, set the protocol timeout 1 to 8009.
Protocol Timeout 2	Set to 801.

Step 6. Add device tag.

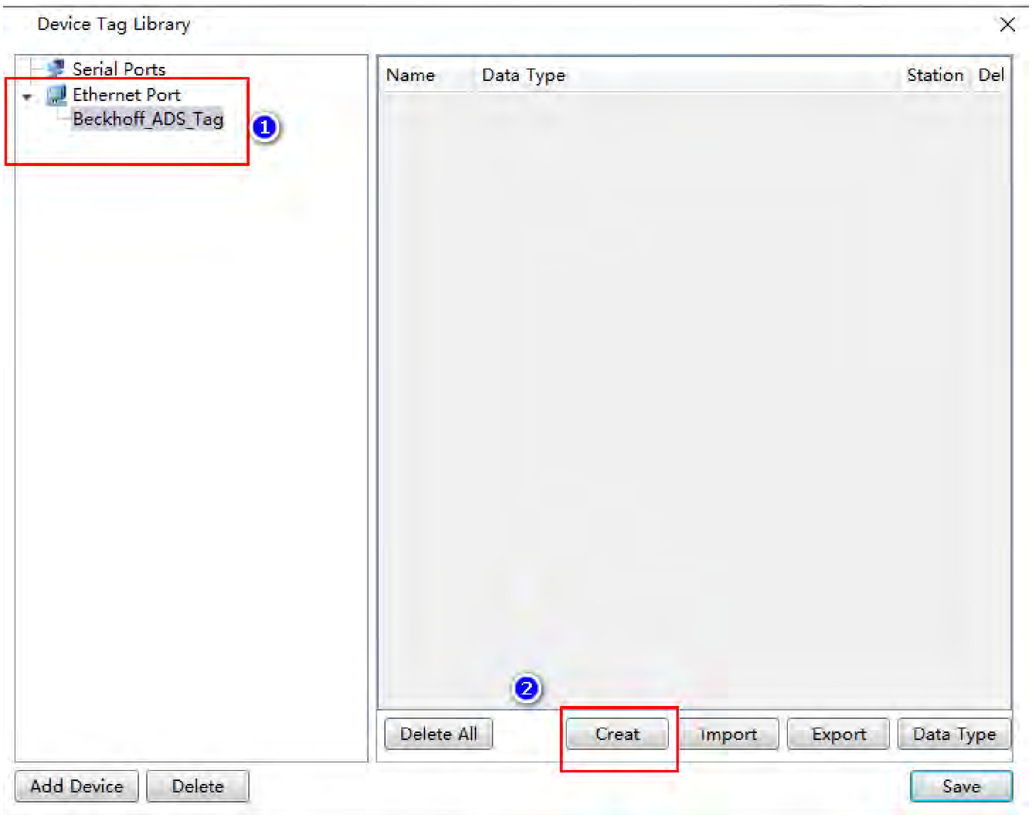
1) Select **Library/Device Tag Library** from the menu bar, click **Add Device** in the pop-up dialog box.



2) In the pop-up dialog box, edit parameters as shown in the figure below, click **OK**.

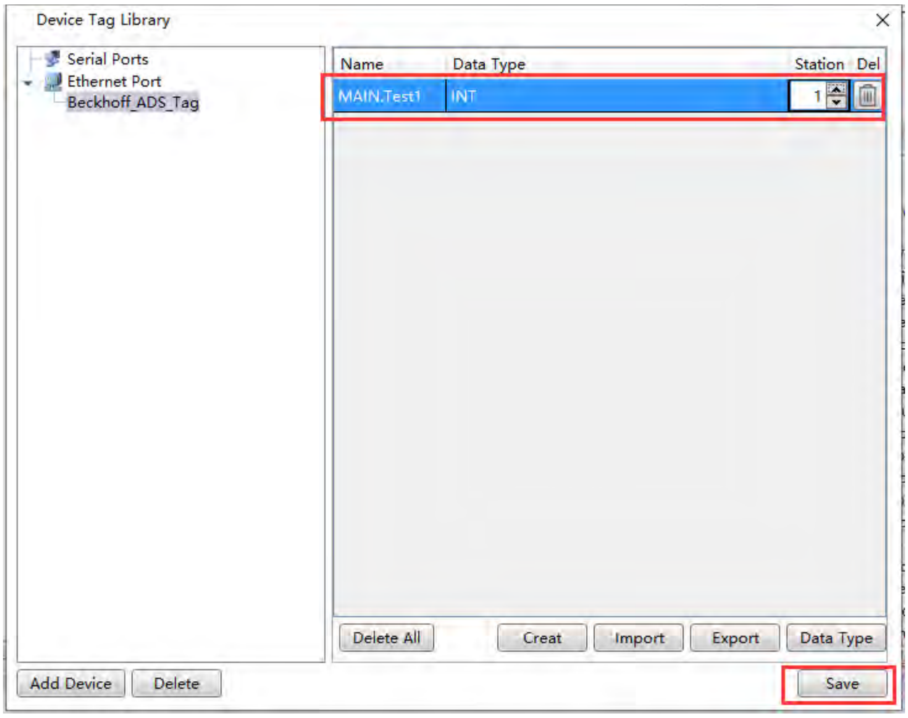


3) Select the added device, click **Create**.

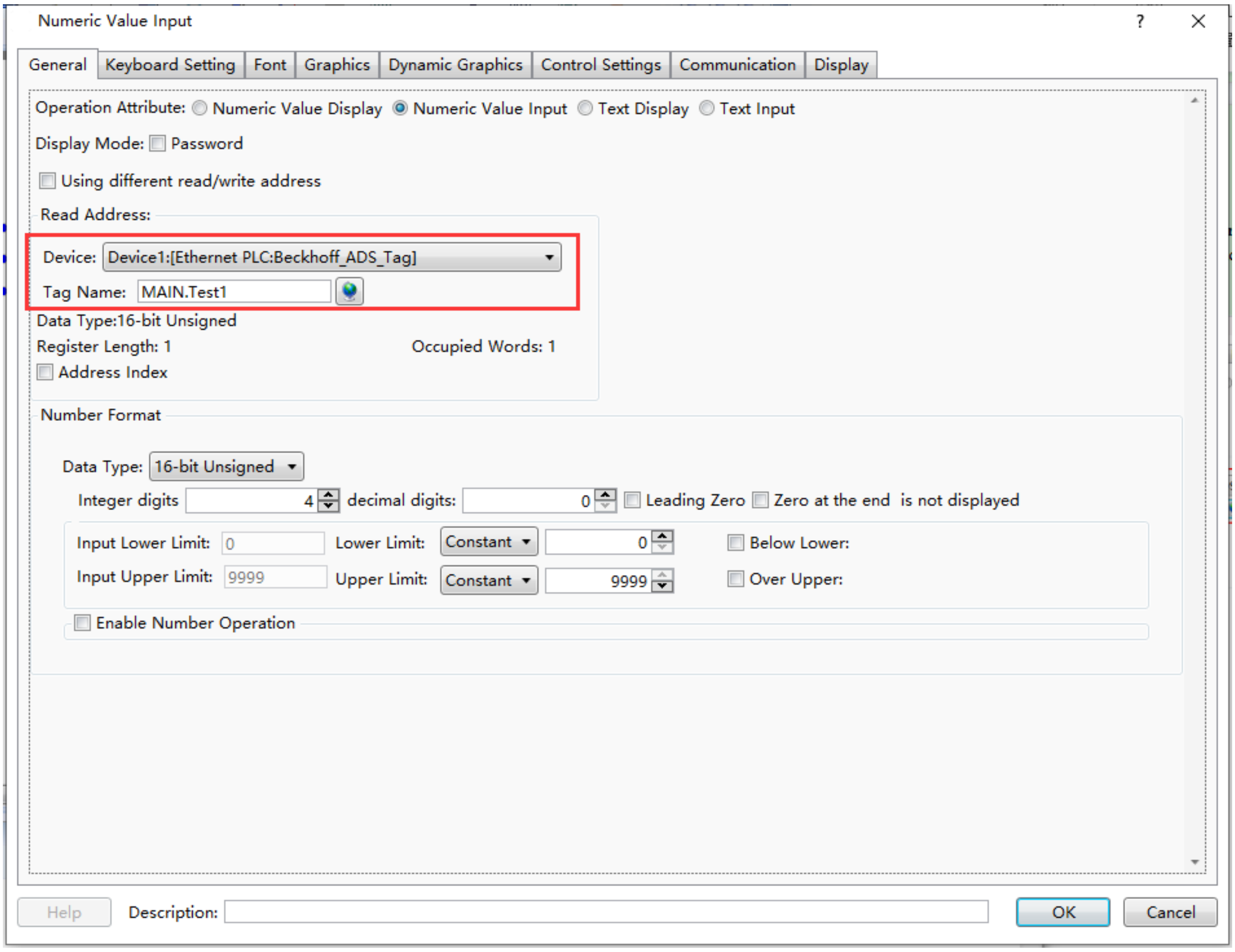


4) Add tag. For example, if there is a variable Test1 in the MAIN function of PLC, the tag name will be MAIN.Test1.

◆ The variable tag case and variable name must match the PLC program.
◆ If the variable is created in GVL, the format of the tag is *GVL name.variable name*. For example, if the name of GVL is HmiTag, the variable name is a, and the tag name is *HmiTag.a*.



Step 7. Select **Component/Numerical Value and Text Display/Numerical Value Input** from the menu bar, and set the **Read Address** to the address tag of Beckhoff PLC in the pop-up dialog box.



Step 8. Complete the configuration of the numerical value input component, download the project to the HMI, if the numerical value can be written to the corresponding address of the PLC, it means that the communication is working.

17.3.4 Ethernet Communication (Variable Tag) Between HMI and Beckhoff CX9020 PLC

HMI supports Ethernet communication with the Beckhoff CX9020 PLC and can recognize the variable tags of the Beckhoff CX9020 PLC.

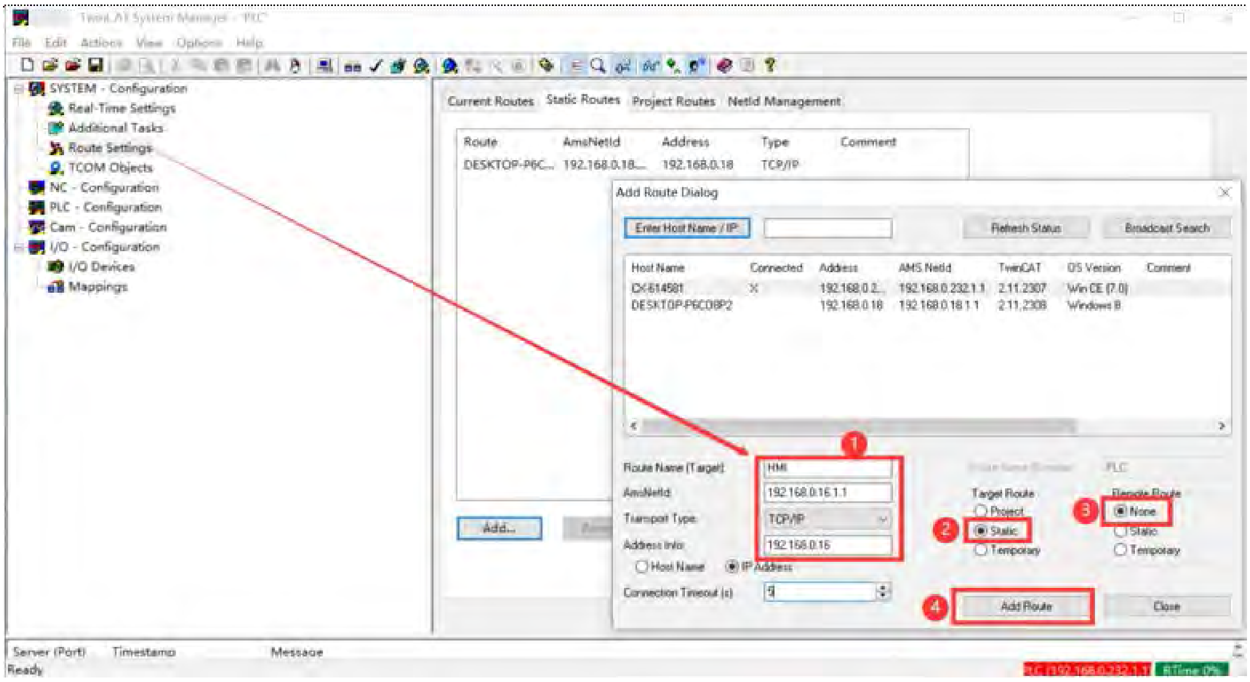
17.3.4.1 Connection Method

Connect the Ethernet port of the HMI to the Ethernet port of the Beckhoff CX9020 PLC using an Ethernet cable, or establish a connection through a switch. For specific connection methods, please refer to the Connection Method.

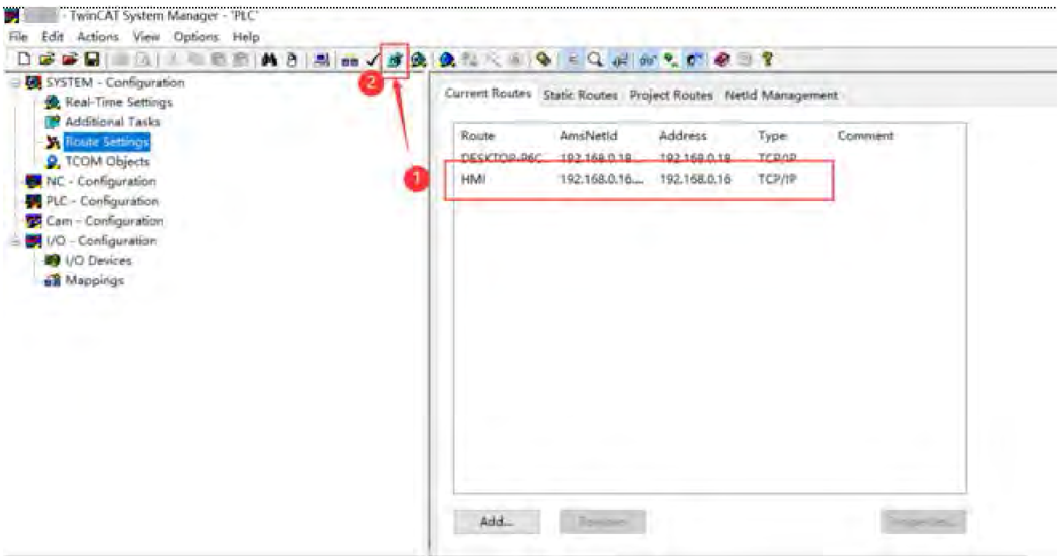
17.3.4.2 Configure PLC

◆ Configuration steps for TwinCAT2 are as follows:

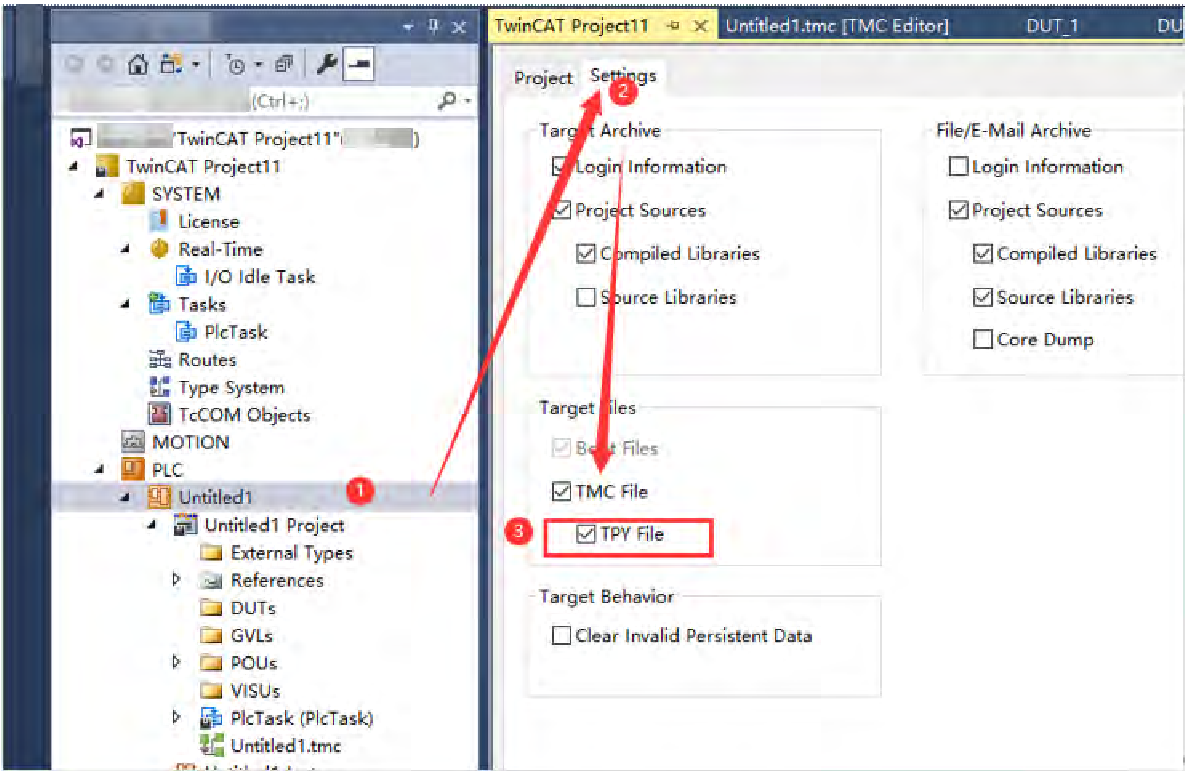
Step 1. Run the PLC configuration software TwinCAT2 and select **Route Settings** from the left navigation pane. In the pop-up dialog box, configure a static route to the HMI.



Step 2. When the route to the HMI appears in the **Current Routes** list, click the  icon to activate the configuration.



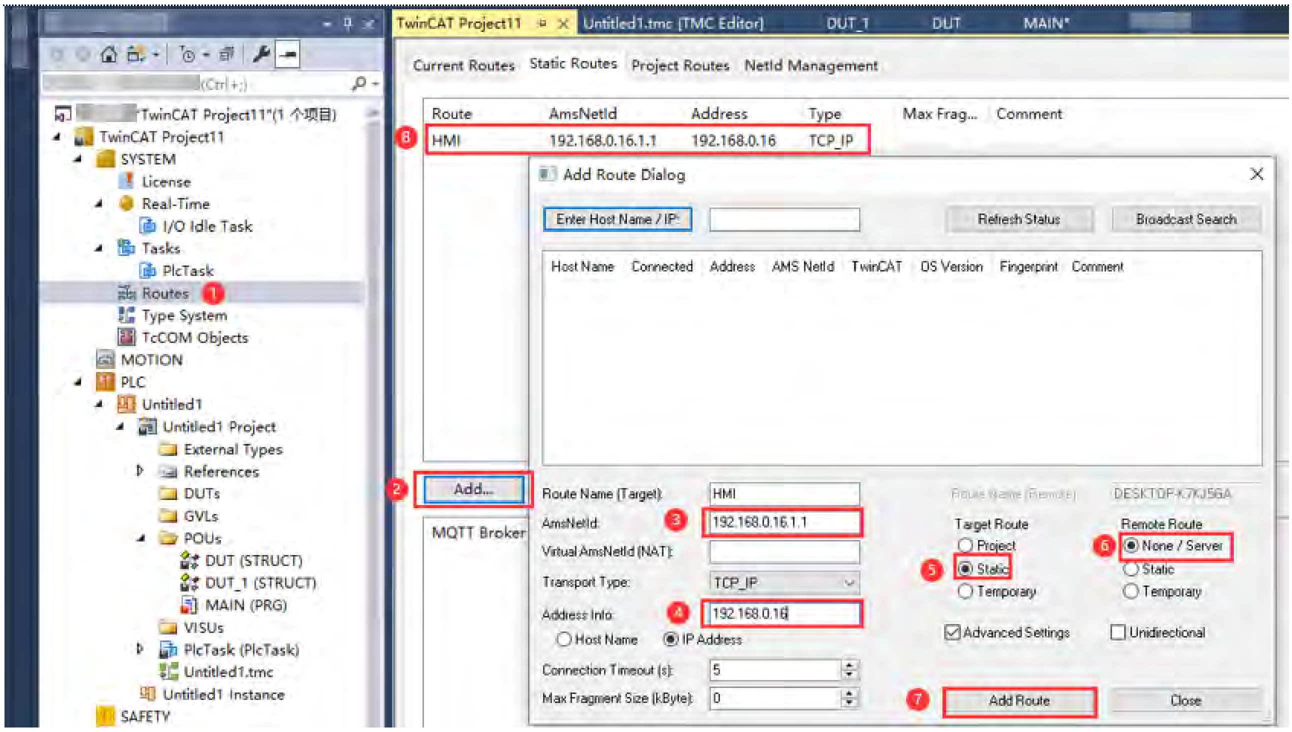
Step 3. Select PLC project, select **Settings** tab, check **TPY File.**



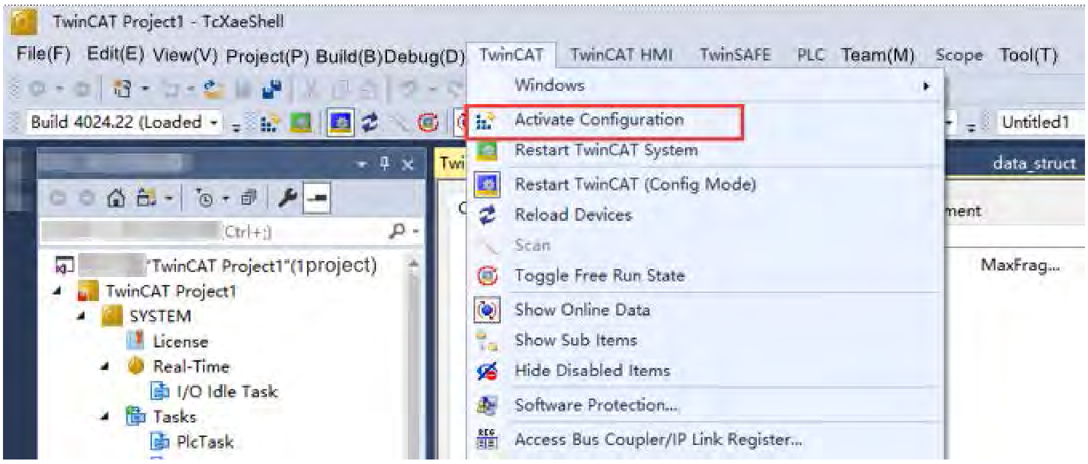
Step 4. Click the  icon to find the corresponding TPY file (variable tag file) under the project directory.

◆ Configuration steps for TwinCAT3 are as follows:

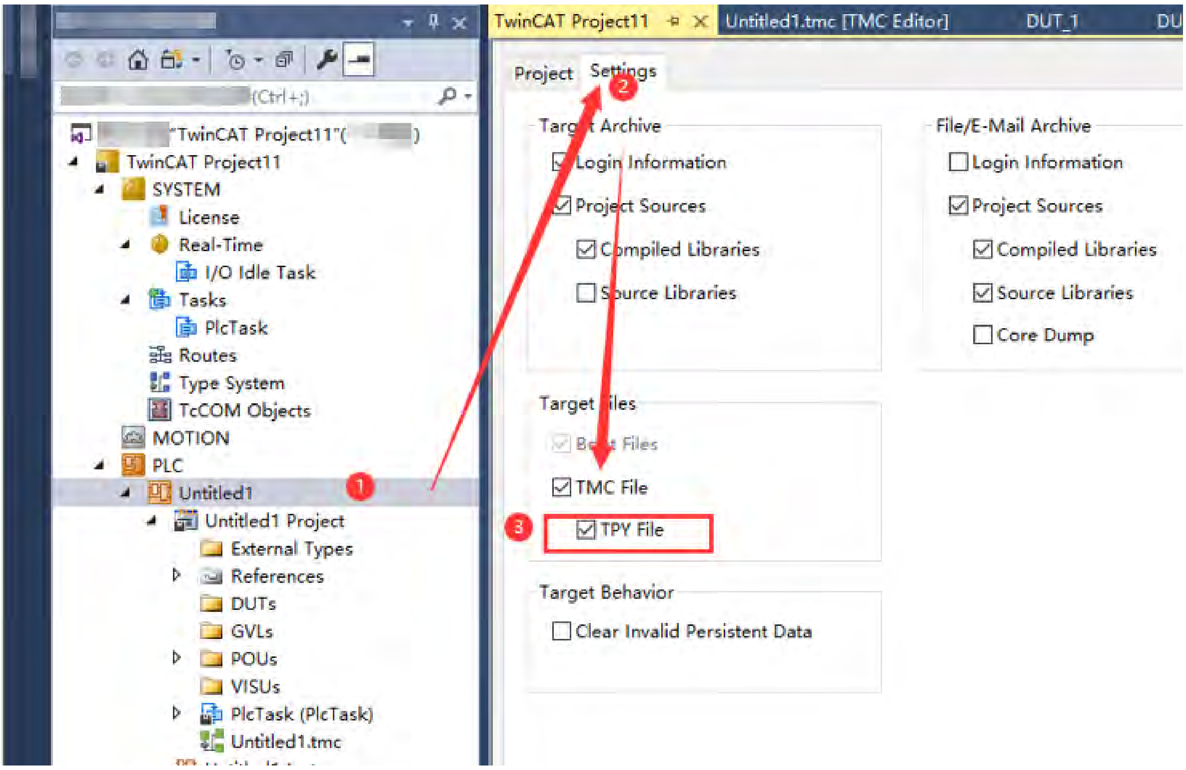
Step 1. Run the PLC configuration software TwinCAT3 and select **Routes** from the left navigation pane. Click **Add,** edit the relevant parameters in the pop-up dialog box. Then click **Add Route** to add a static route to the HMI.



Step 2. Select **TwinCAT/Activate Configuration** from the menu bar to activate the configuration.



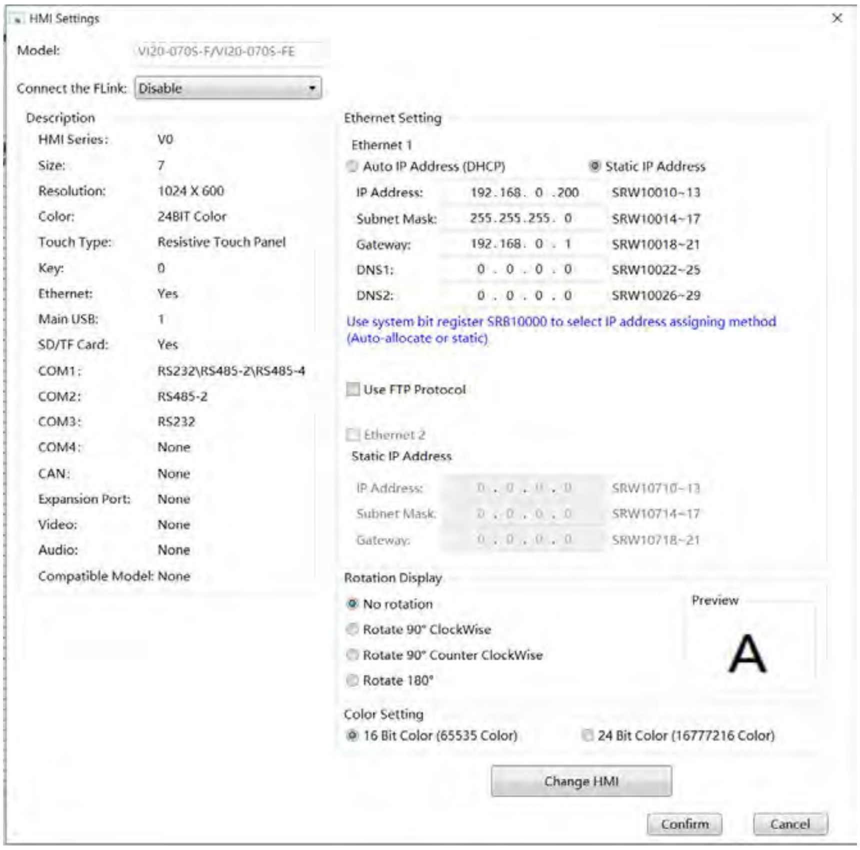
Step 3. Select PLC project, select **Settings** tab, check **TPY File.**



Step 4. After selecting **Build/Build Solution** from the menu bar, you can find the corresponding TPY file (variable tag file) in the project directory.

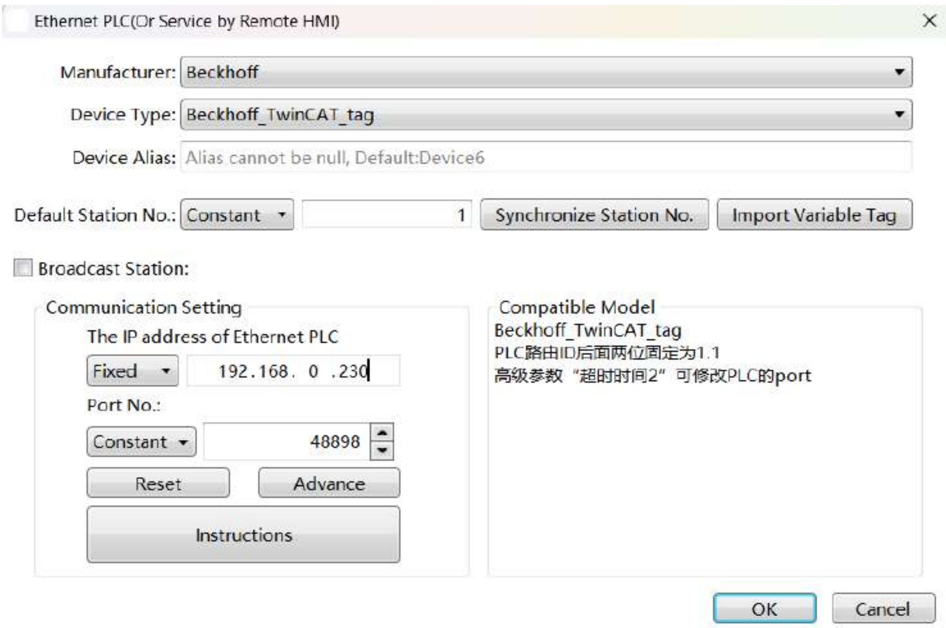
17.3.4.3 Configure HMI

Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI (to be in the same network segment as the IP address of PLC) in the pop-up dialog box, click **Confirm**.



Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select the **Ethernet PLC** tab in the pop-up dialog box, click **Create**.

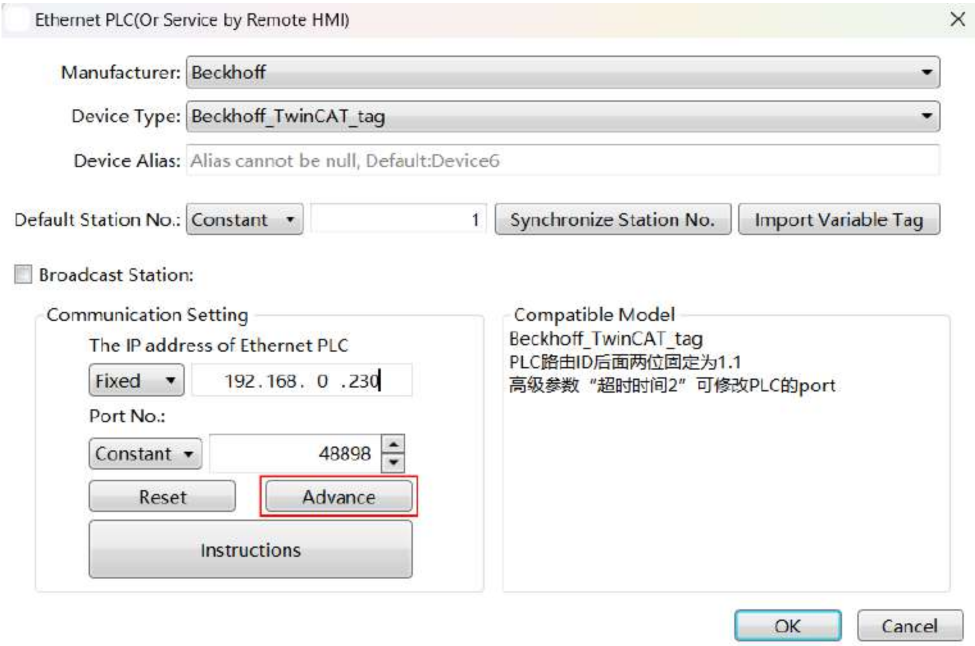
Step 3. Configure relevant parameters in the pop-up dialog box.



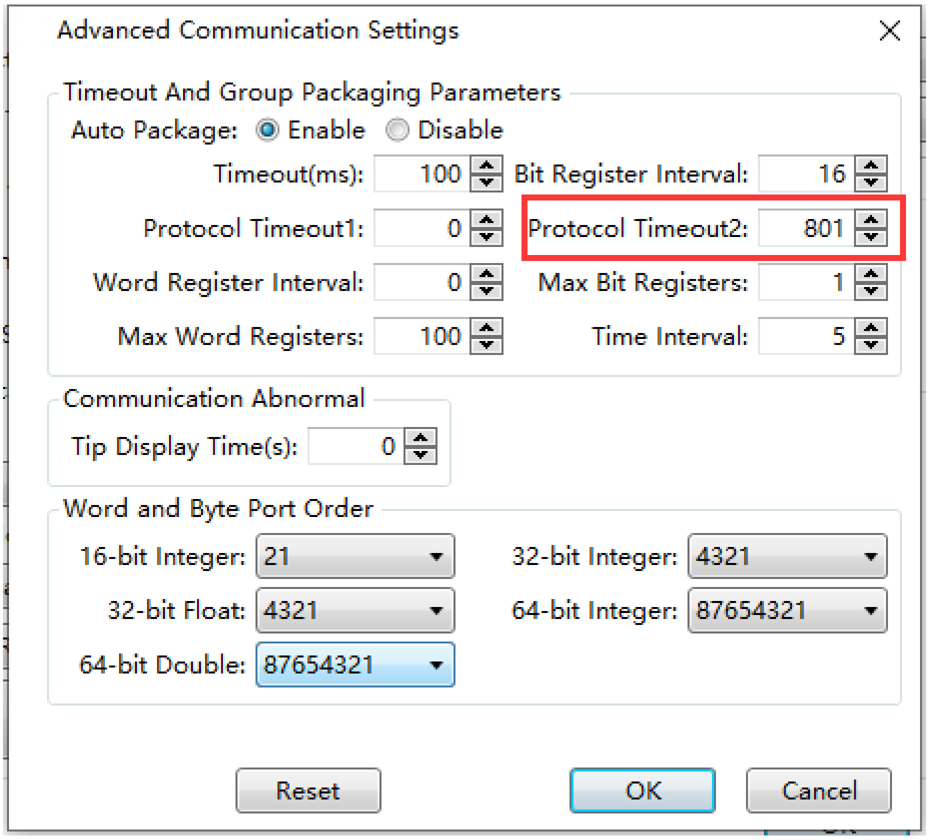
Please refer to the table below for detailed configuration methods.

Parameters	Description
Manufacturer	Select “Beckhoff-Beckhoff”.
Device Type	Select “Beckhoff_TwinCAT_Tag”.
IP Address of Network PLC	Please refer to the actual situation.
Port No.	Use default value 48898.

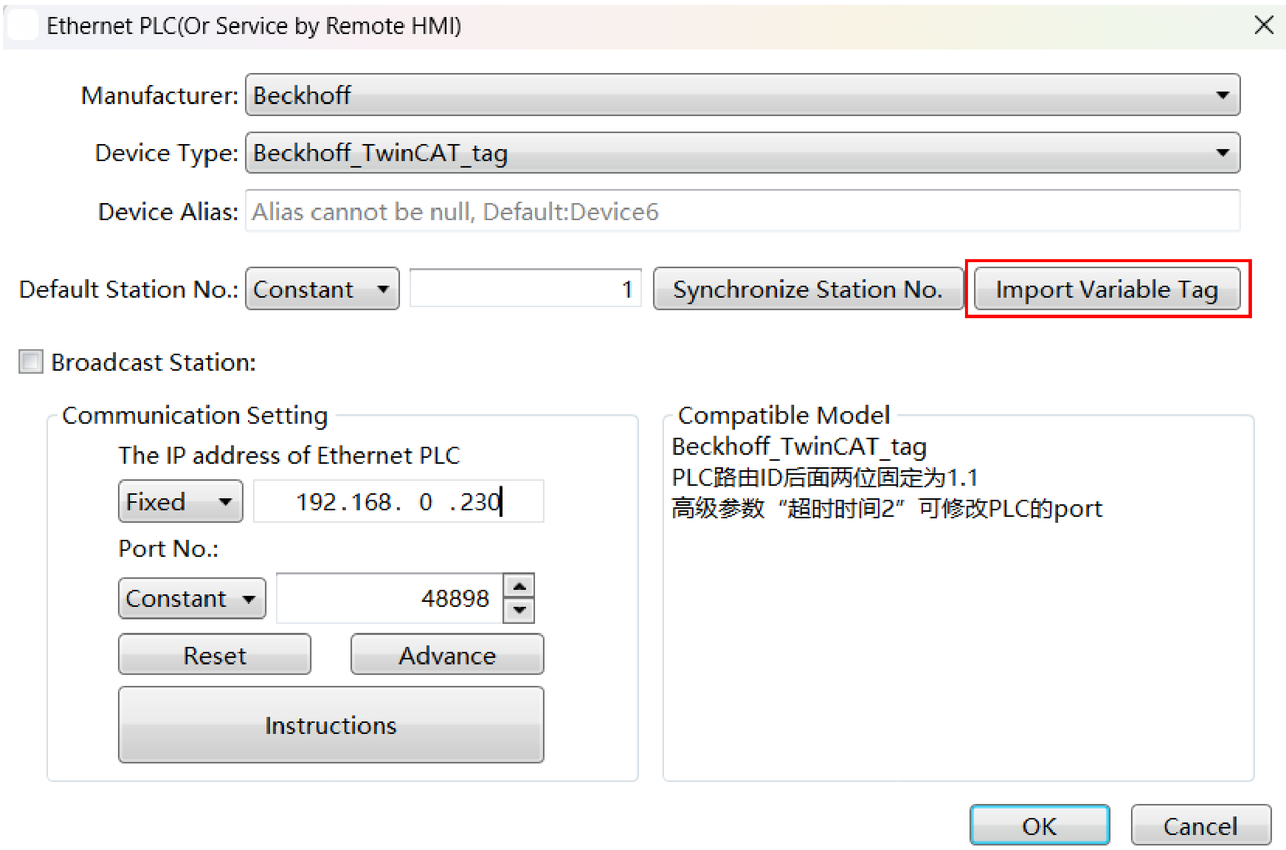
Step 4. Click **Advance**.



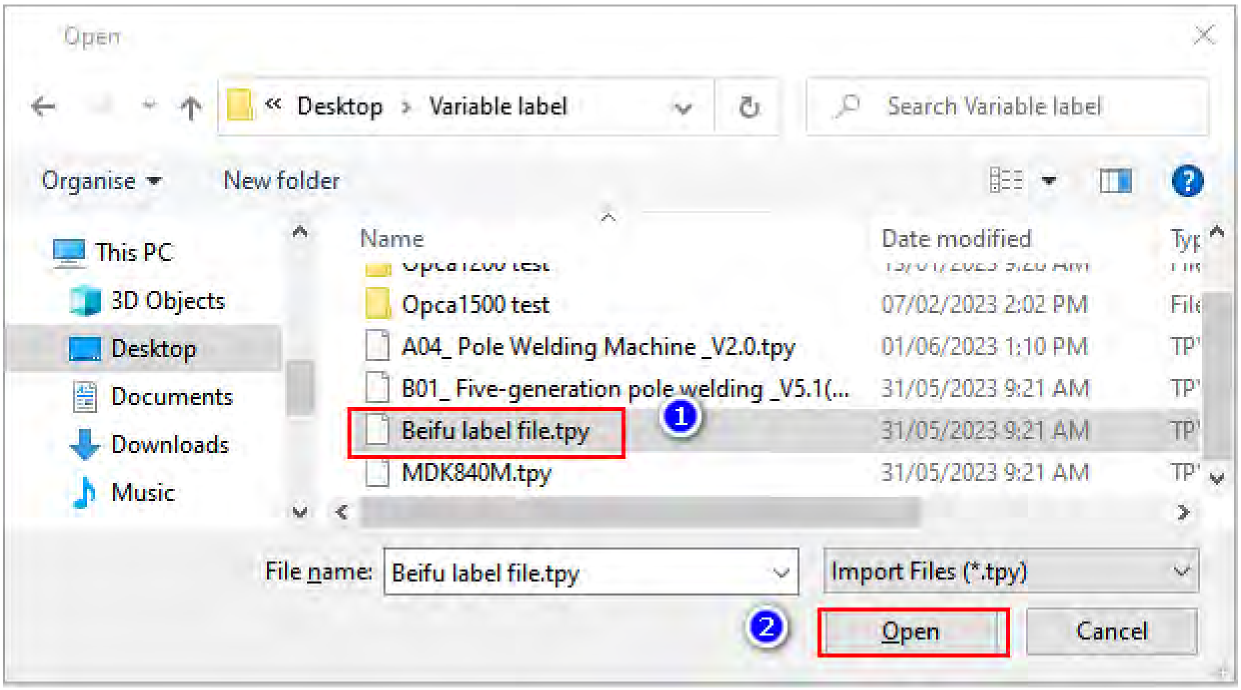
Step 5. Set **Protocol Timeout 2** in the pop-up dialog box (801 for TwinCAT2, 851 for TwinCAT3), click **OK**.



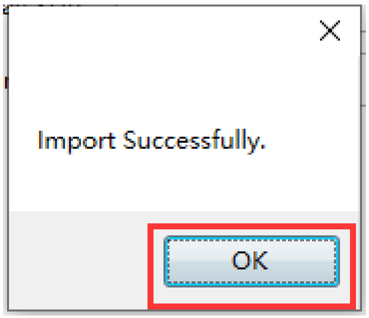
Step 6. Click **Import Variable Tag**.



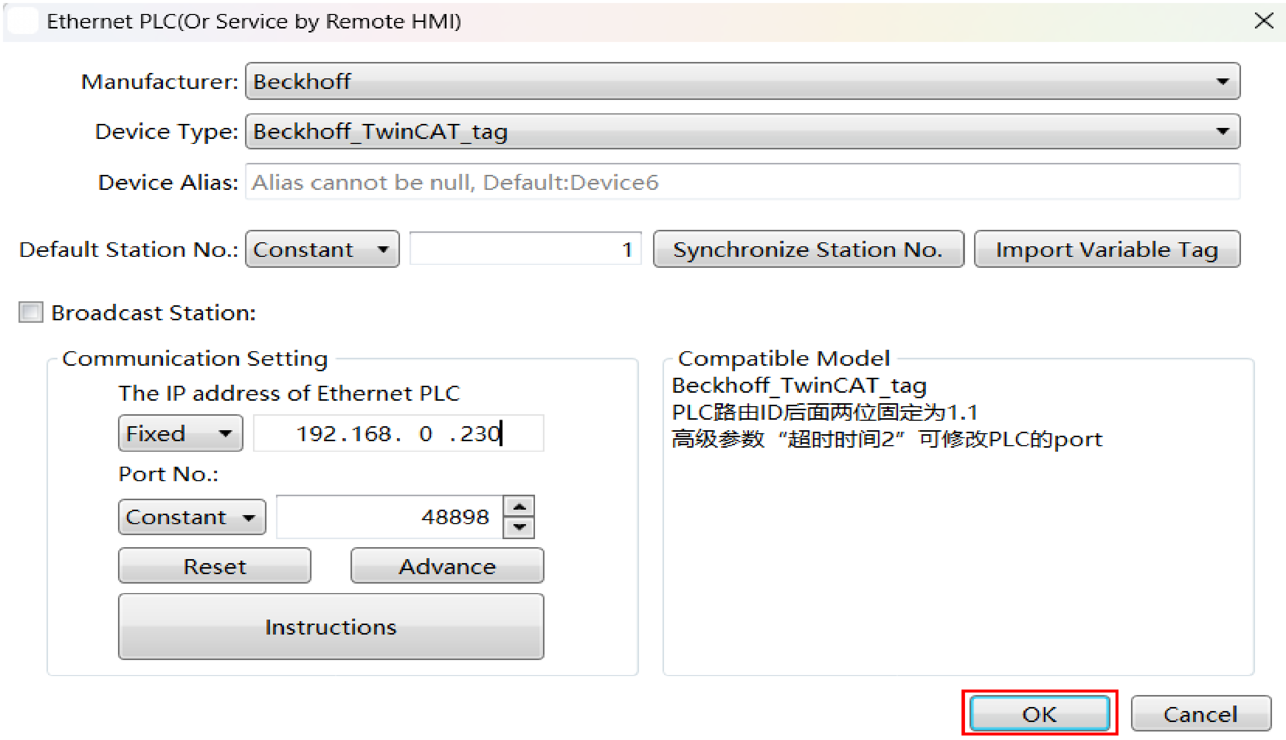
Step 7. Select Beckhoff variable tag file in the pop-up dialog box, click **Open**.



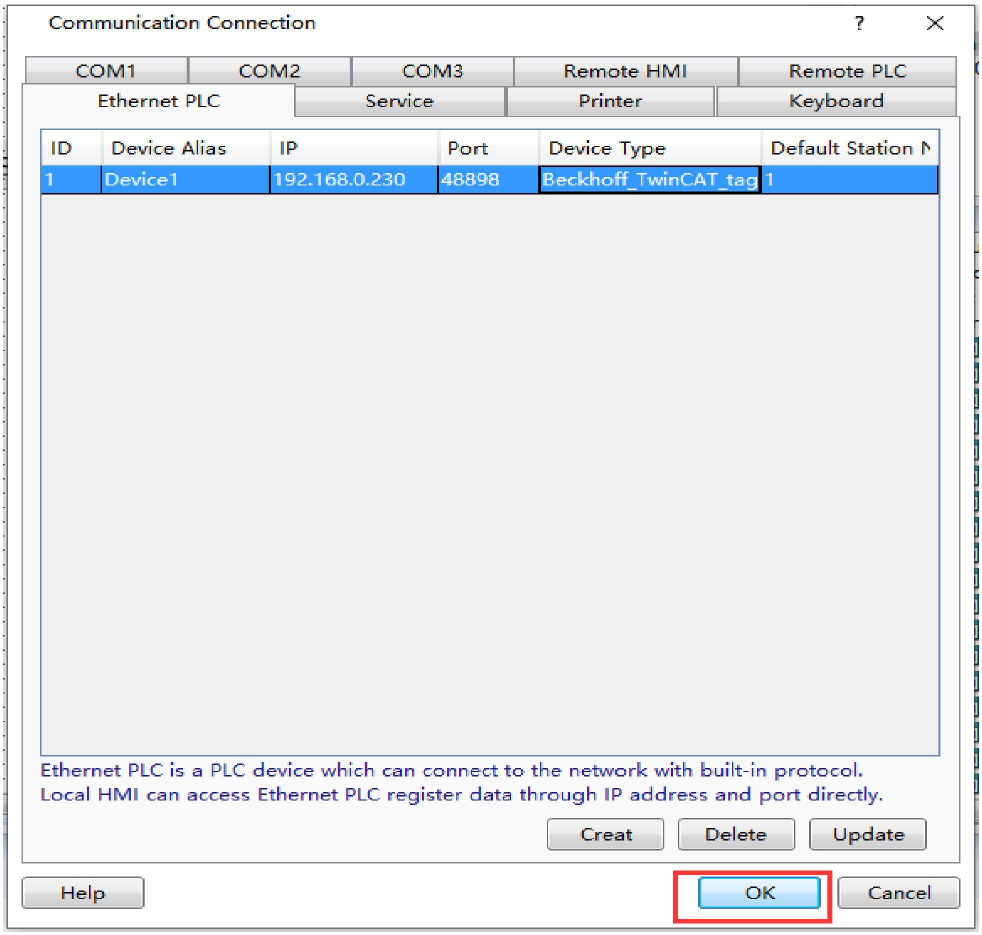
Step 8. After importing tag, click **OK** in the pop-up dialog box.



Step 9. Click **OK**.

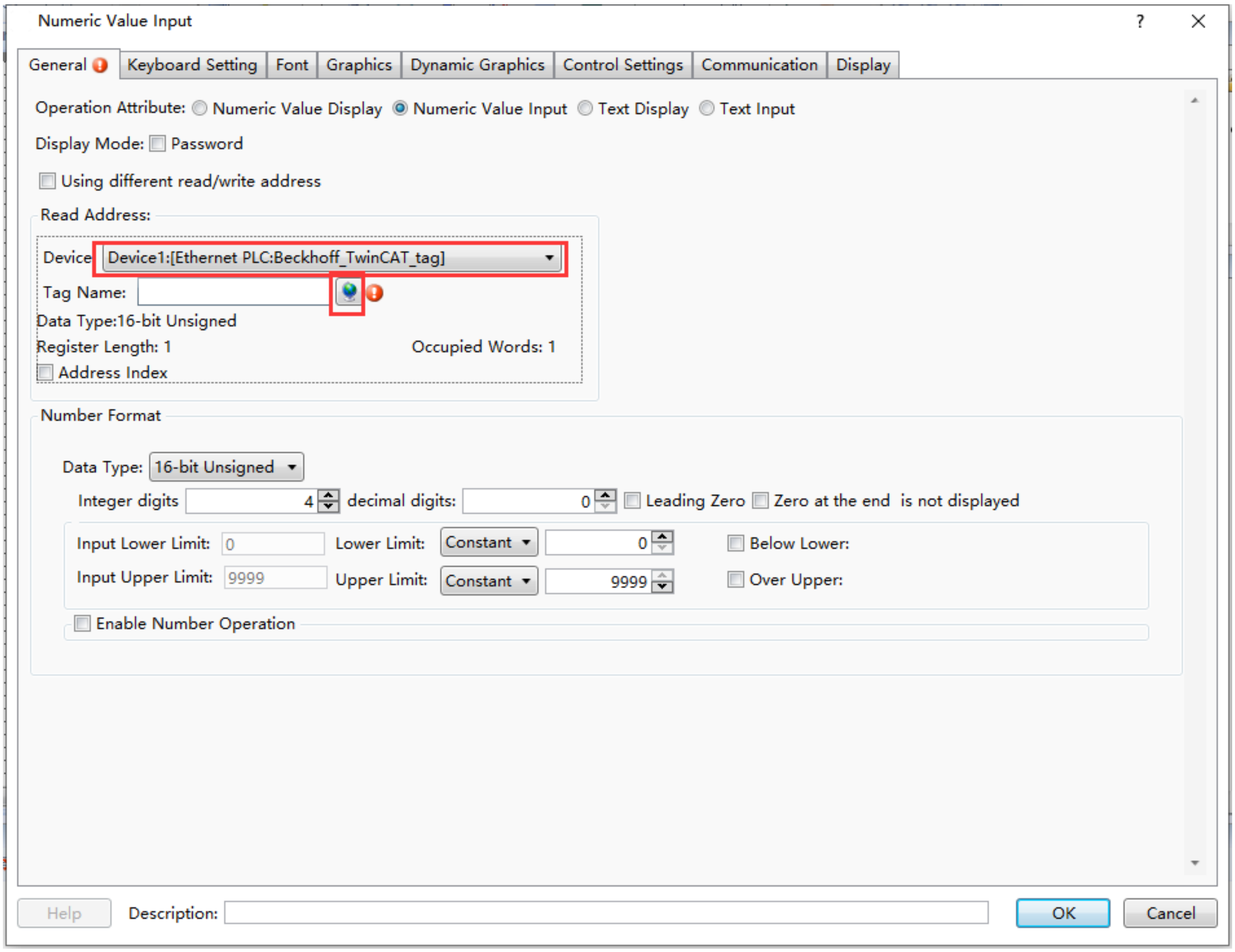


Step 10. Click **OK**.

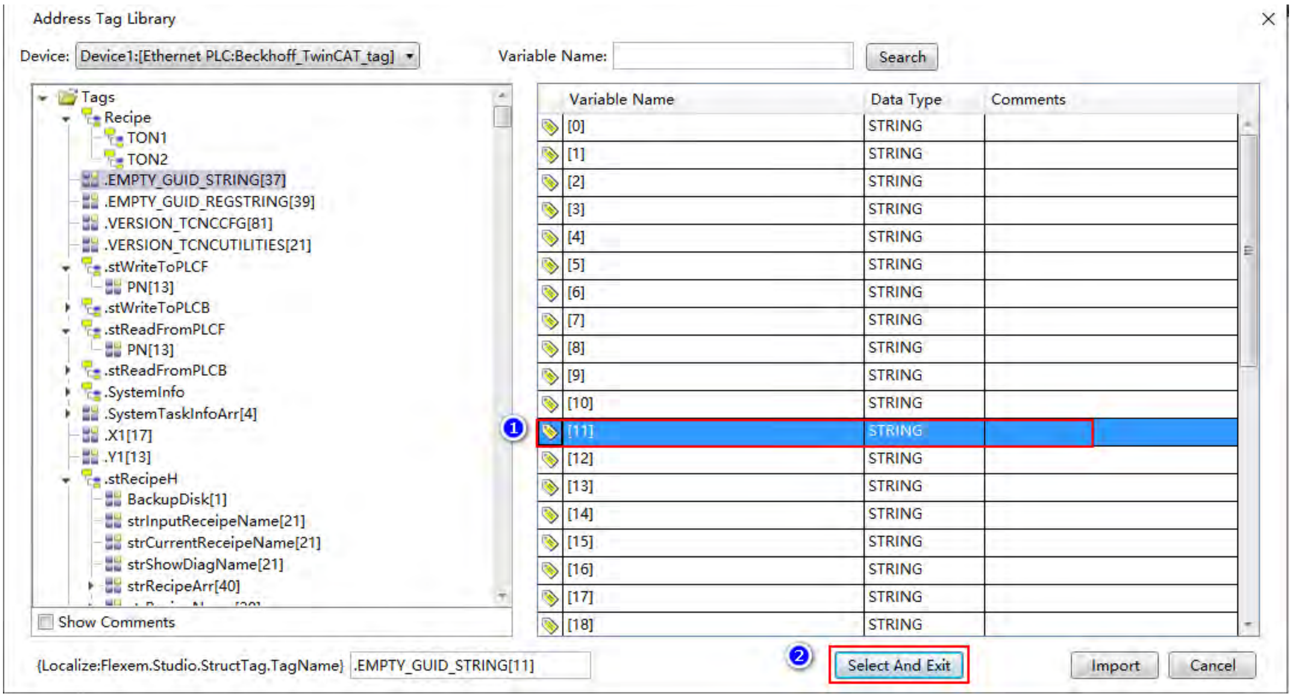


Step 11. Add numeric value input component.

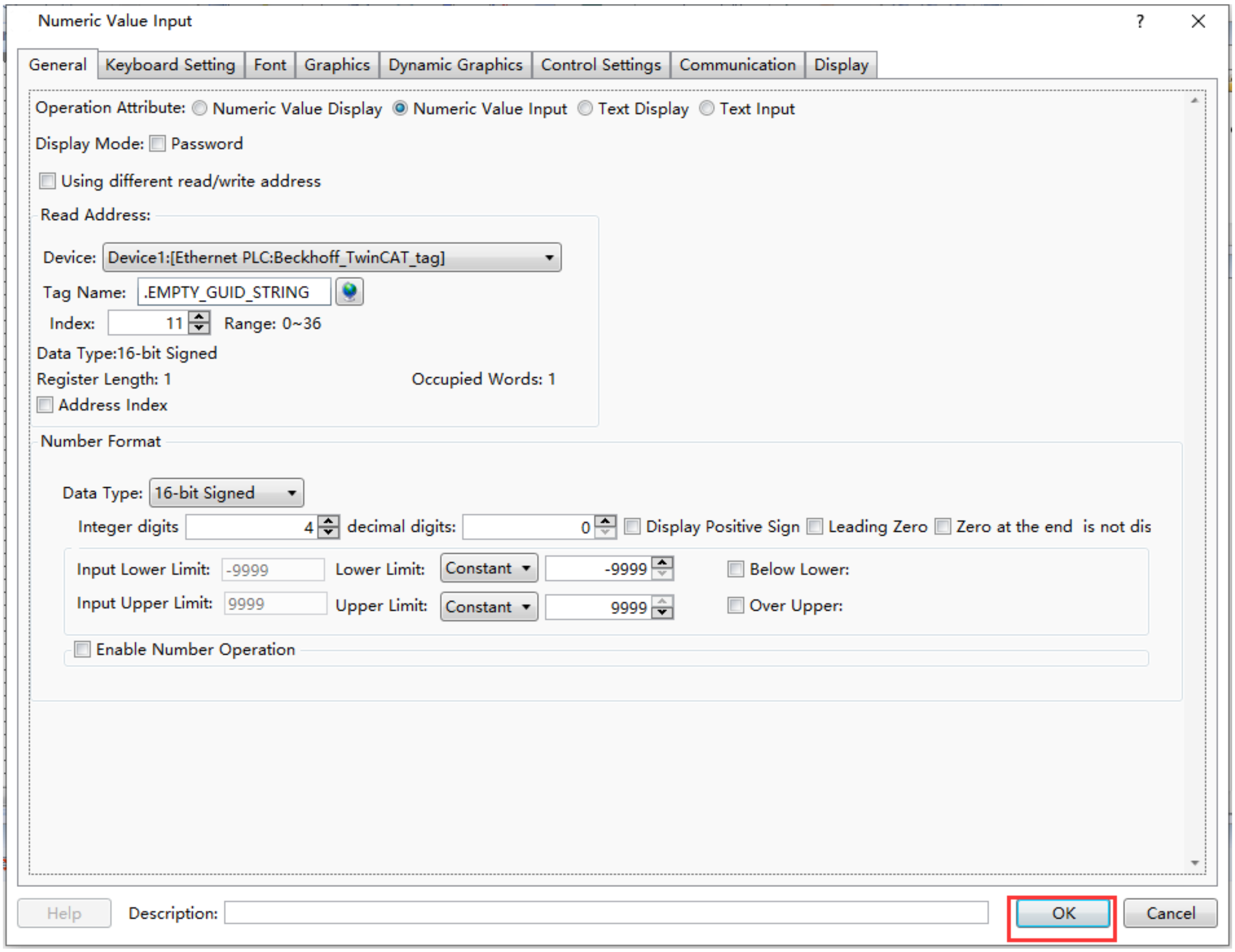
1) Select **Component/Numerical Value and Text Display/Numerical Value Input** from the menu bar, and set the Read Address in the pop-up dialog box (select Beckhoff PLC for device), click the  icon.



2) Select variable tag in the pop-up dialog box, click **Select and Exit**.



3) Click **OK**.



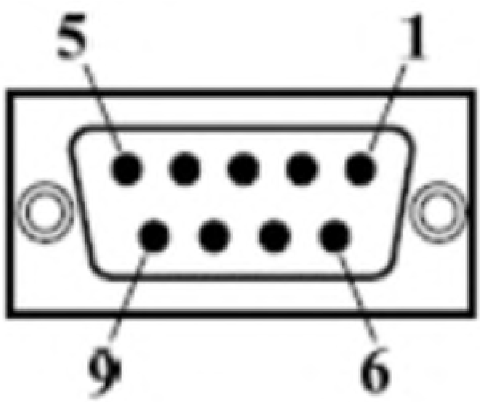
Step 12. After configuring the project, download project to HMI. If the data of the numeric value input component can be read and written, it means the communication is working.

17.4 Keyence PLC

17.4.1 Serial Communication Between HMI and KeyenceKV-N60AT PLC

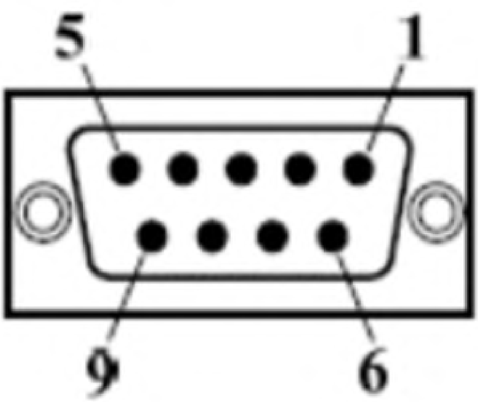
17.4.1.1 Connection Method

◆ Use RS232 cable to connect the COM1/COM2 port of HMI and serial port of PLC, the connection method is shown in the table below.

HMI COM1/COM2 Port (RS232 9P Female)	PLC Serial Port (RJ12 9P Male)
2-RX	2-SD
3-TX	4-RD
5-GND	3-SG
6	6
8	5
	

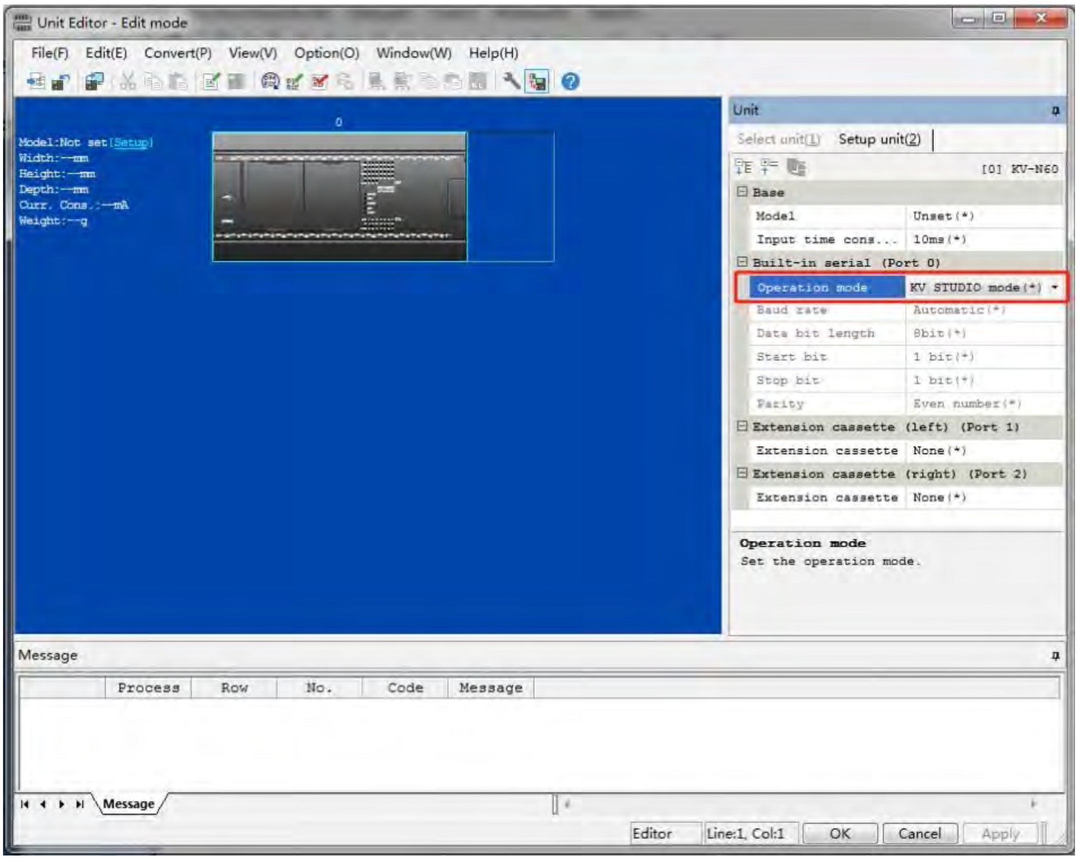
◆ Use RS232 cable to connect the COM3/COM4 port of HMI and serial port of PLC, the connection method is shown in the table below.

HMI COM3/COM4 Ports (RS232 9P Female)	PLC Serial Port(RJ12 9P Male)
7-RX	2-SD
8-TX	4-RD

HMI COM3/COM4 Ports (RS232 9P Female)	PLC Serial Port(RJ12 9P Male)
5-GND	3-SG
	

17.4.1.2 Configure PLC

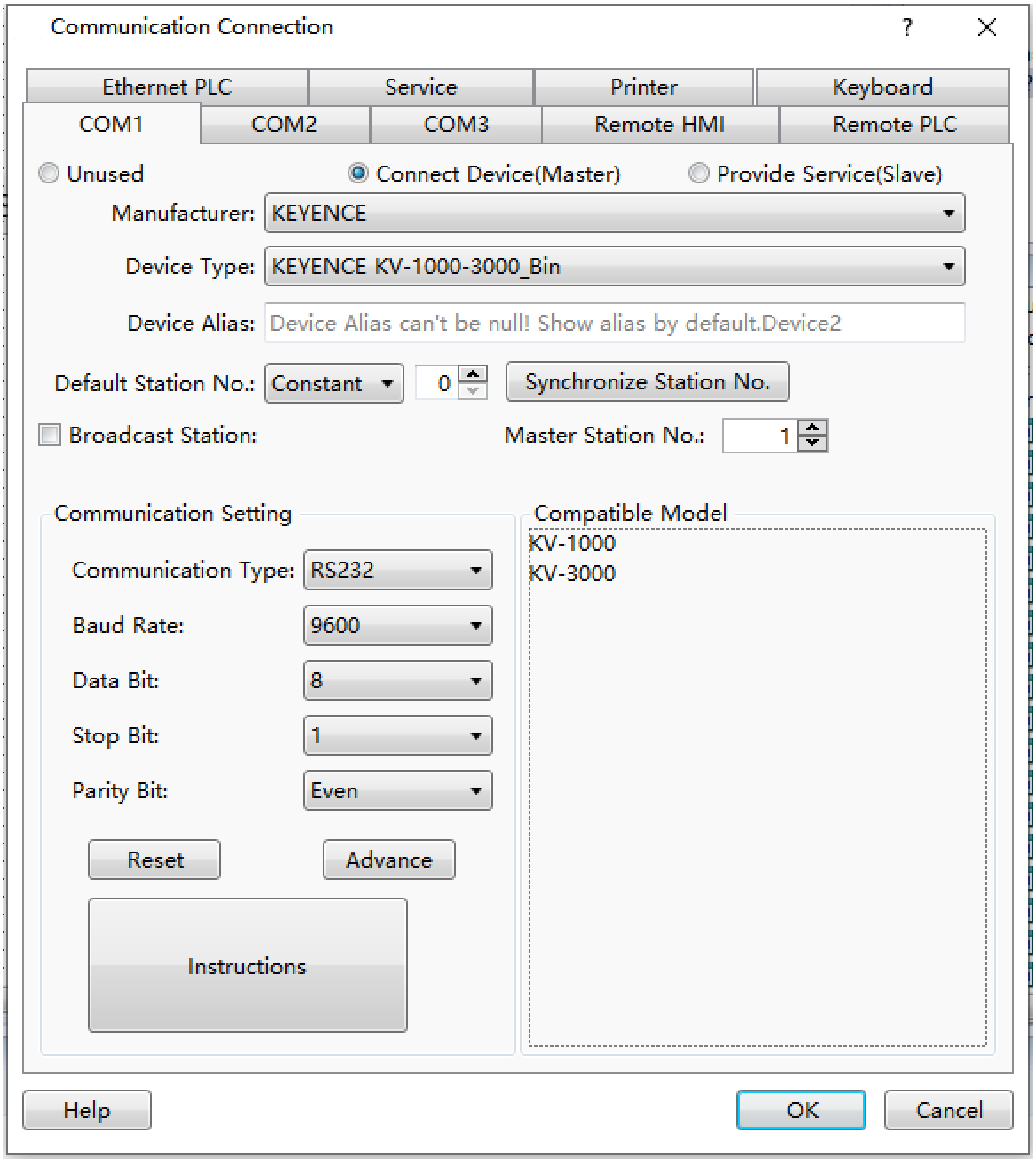
Run the Keyence PLC configuration software, set the communication parameters of Serial Port 0 referring to the figure below. Please note that the Action Mode should be set to KV STUDIO Mode.



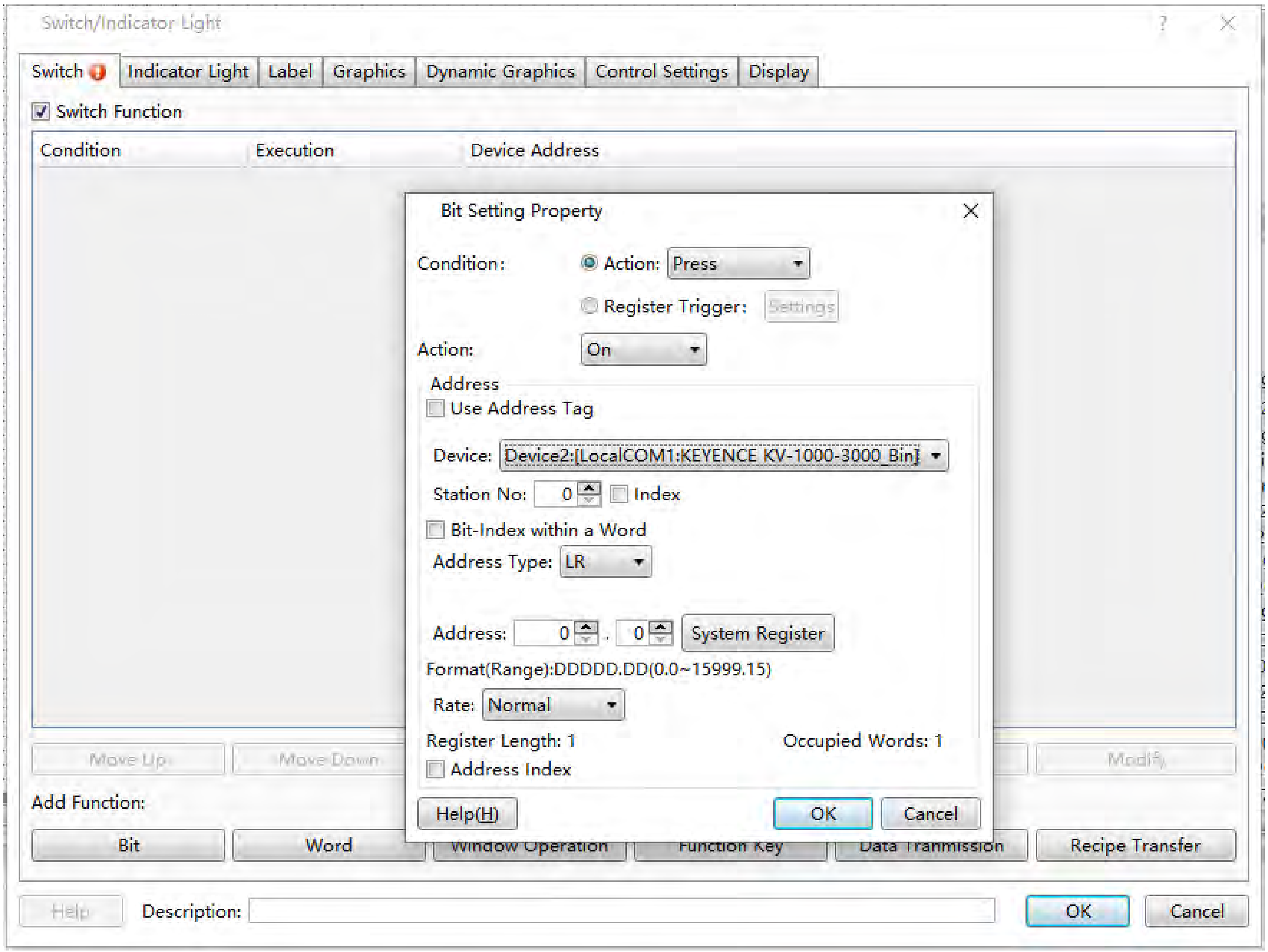
17.4.1.3 Configure HMI

Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select the corresponding COM port in the pop-up dialog box, configure relevant parameters as shown in the picture below, click **OK**.

The baud rate can be adjusted according to the actual requirements. The data bits, stop bits, and parity bits should be consistent with the settings on the PLC.



Step 2. Select **Component/Switch/Bit Set** from the menu bar, add a bit switch as shown in the picture below.



Step 3. Download project to HMI, observe if the switch component can read data normally.

17.4.2 Ethernet Communication Between HMI and Keyence KV8000 PLC (Variable tag)

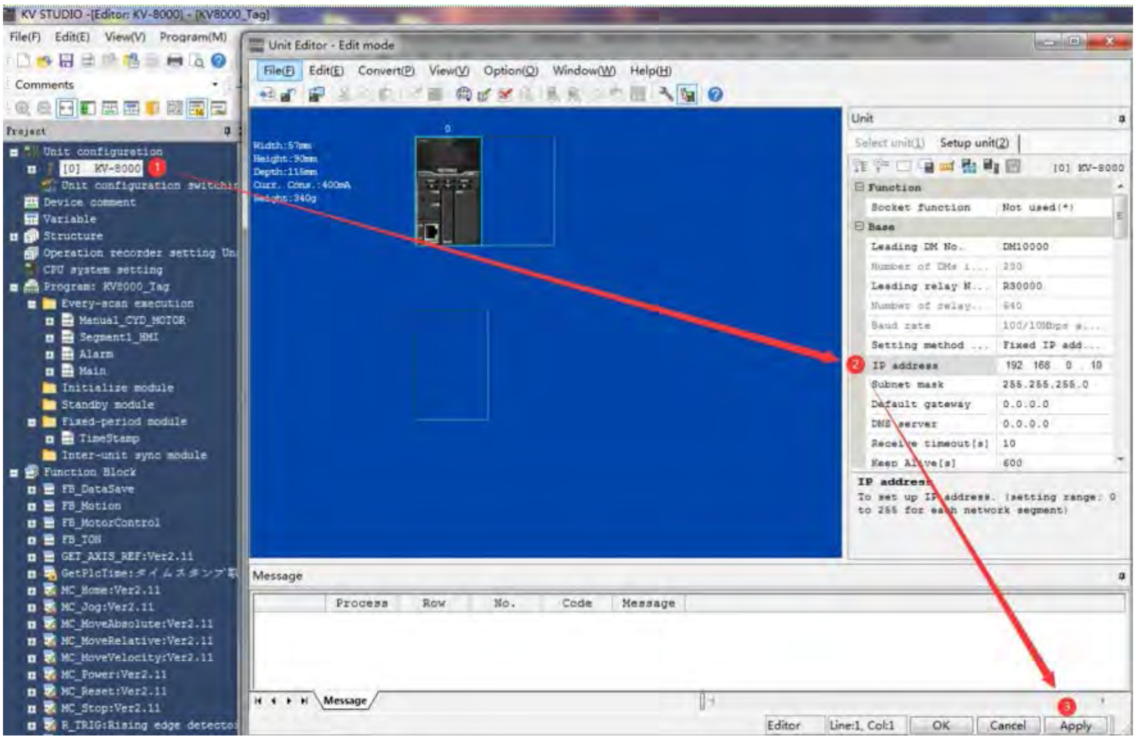
The FE9000 series HMI supports Ethernet communication with the Keyence KV8000 PLC and is capable of recognizing the variable tags of the Keyence KV8000 PLC.

17.4.2.1 Connection Method

Connect the Ethernet port of the FE9000 series HMI to the Ethernet port of the Keyence KV8000 PLC using an Ethernet cable, or establish a connection between them through a switch. For specific connection methods, please refer to the Connection Method.

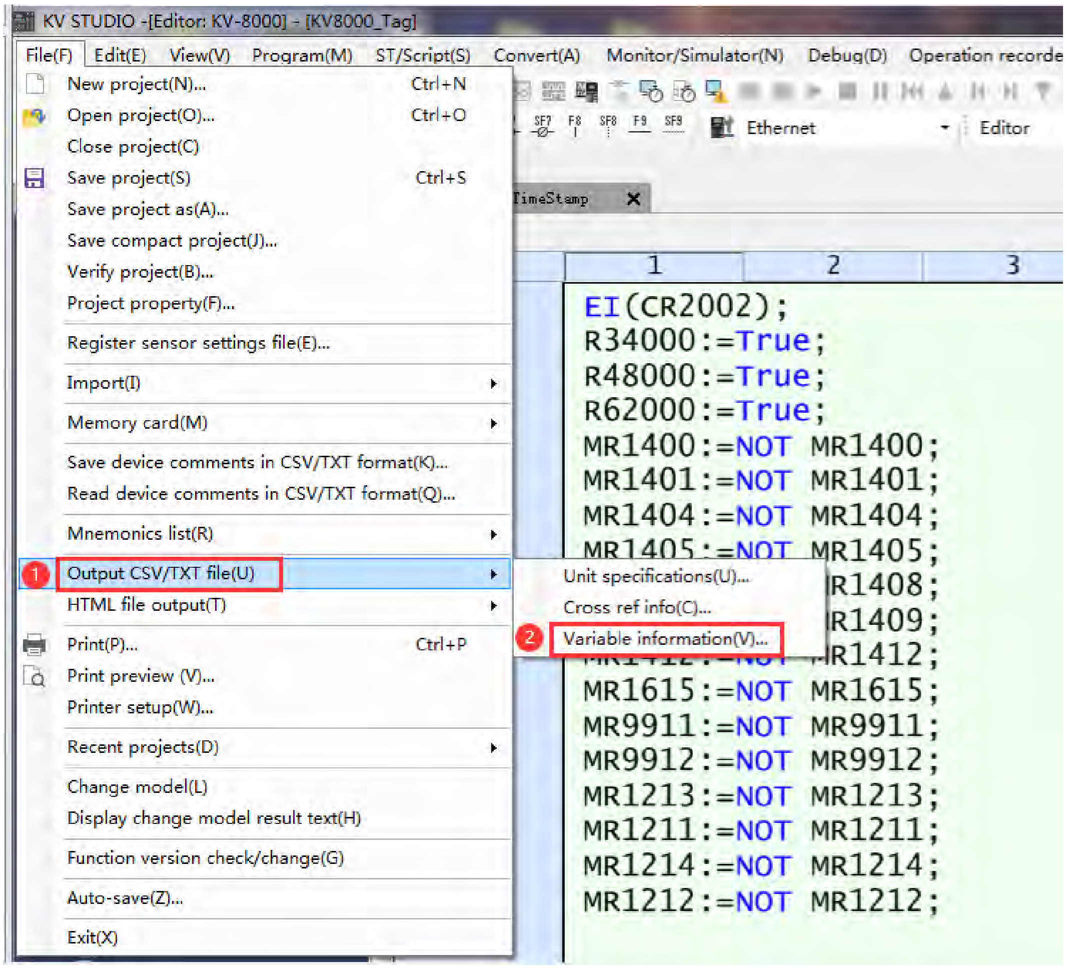
17.4.2.2 Configure PLC

Step 1. Run the configuration software of Keyence PLC, set the IP address of PLC as shown in the figure below.

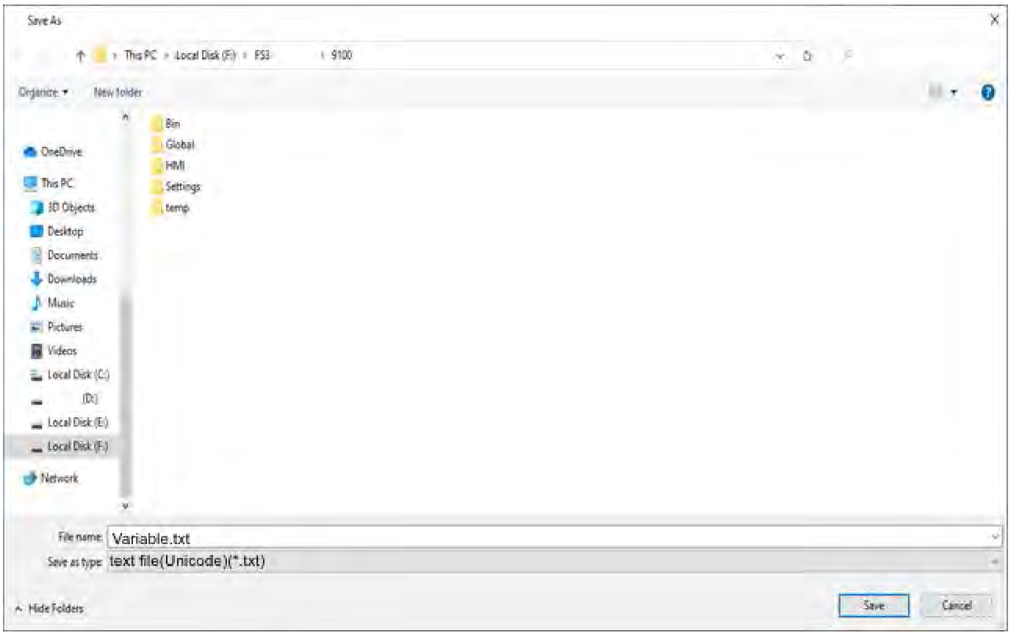


Step 2. Export tag file of PLC.

1) Select File/**CSV/TXT File Export/Variable** from the menu bar.

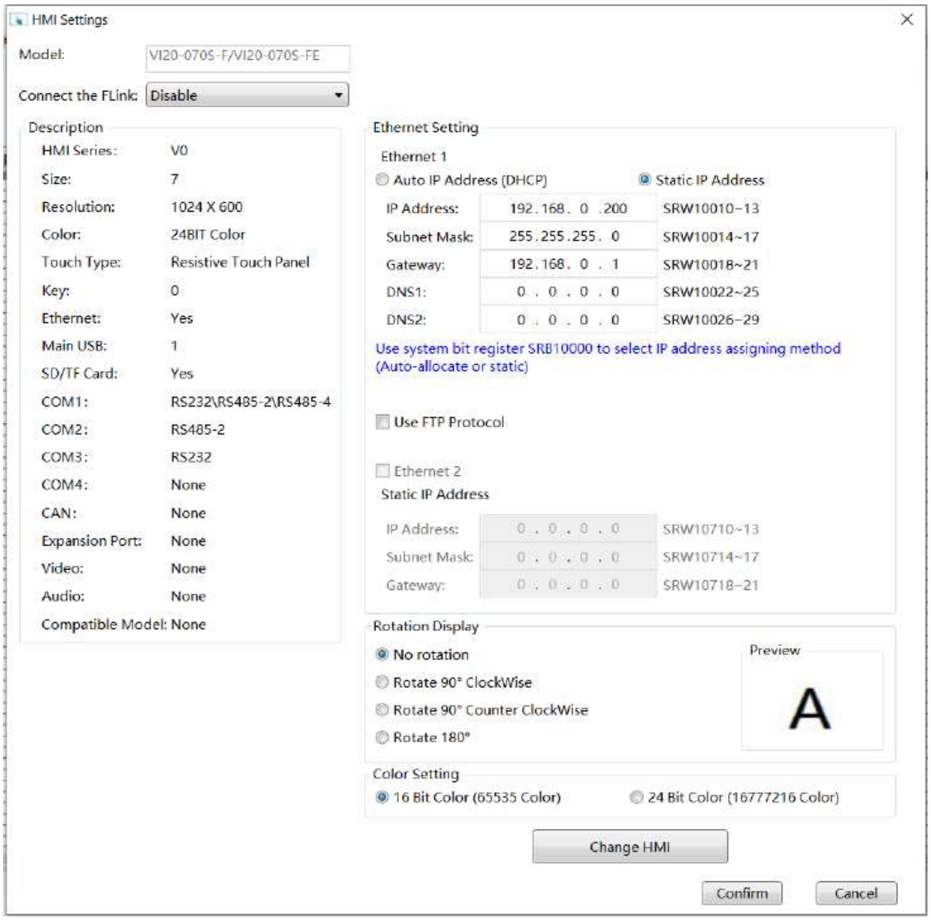


2) Set the save path, file name and file type of variable tag files in the pop-up dialog box, click **Save**.

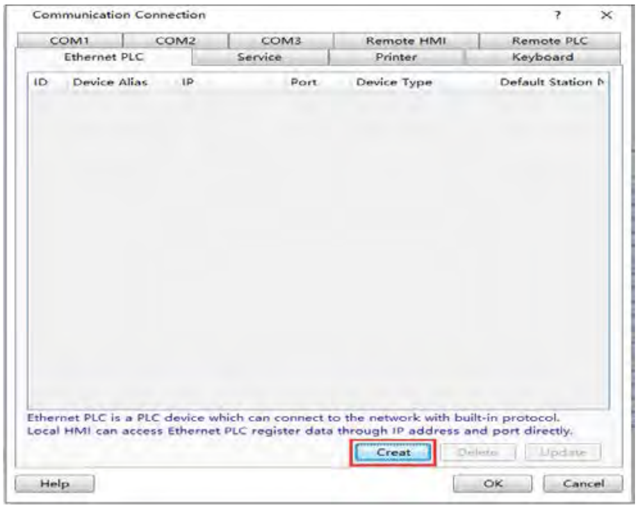


17.4.2.3 Configure HMI

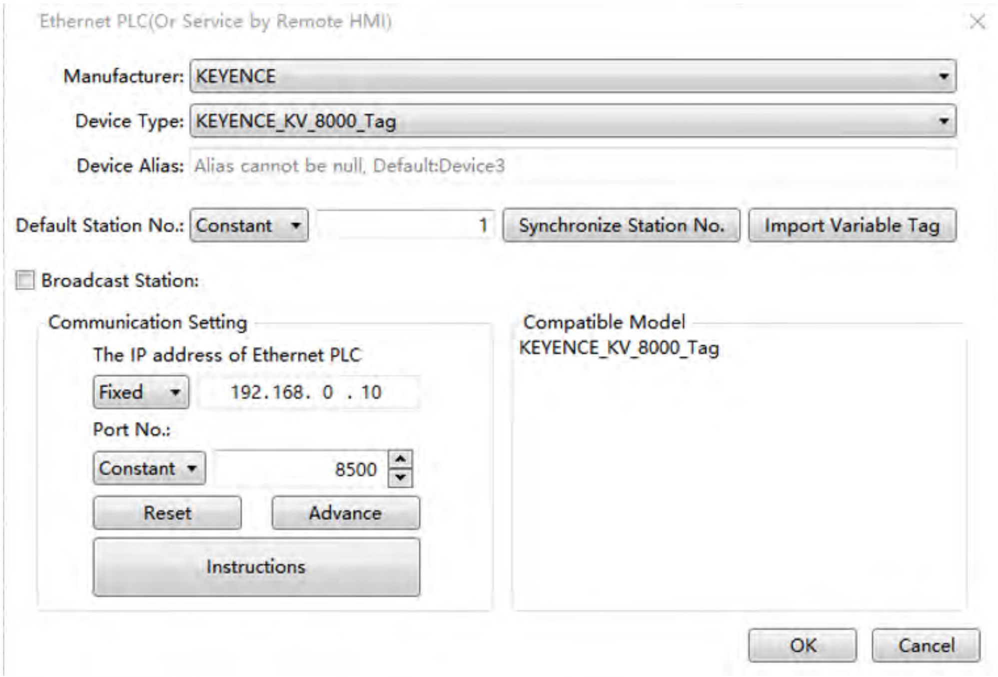
Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI (to be in the same network segment as the IP address of PLC) in the pop-up dialog box, click **Confirm**.



Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select the **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.



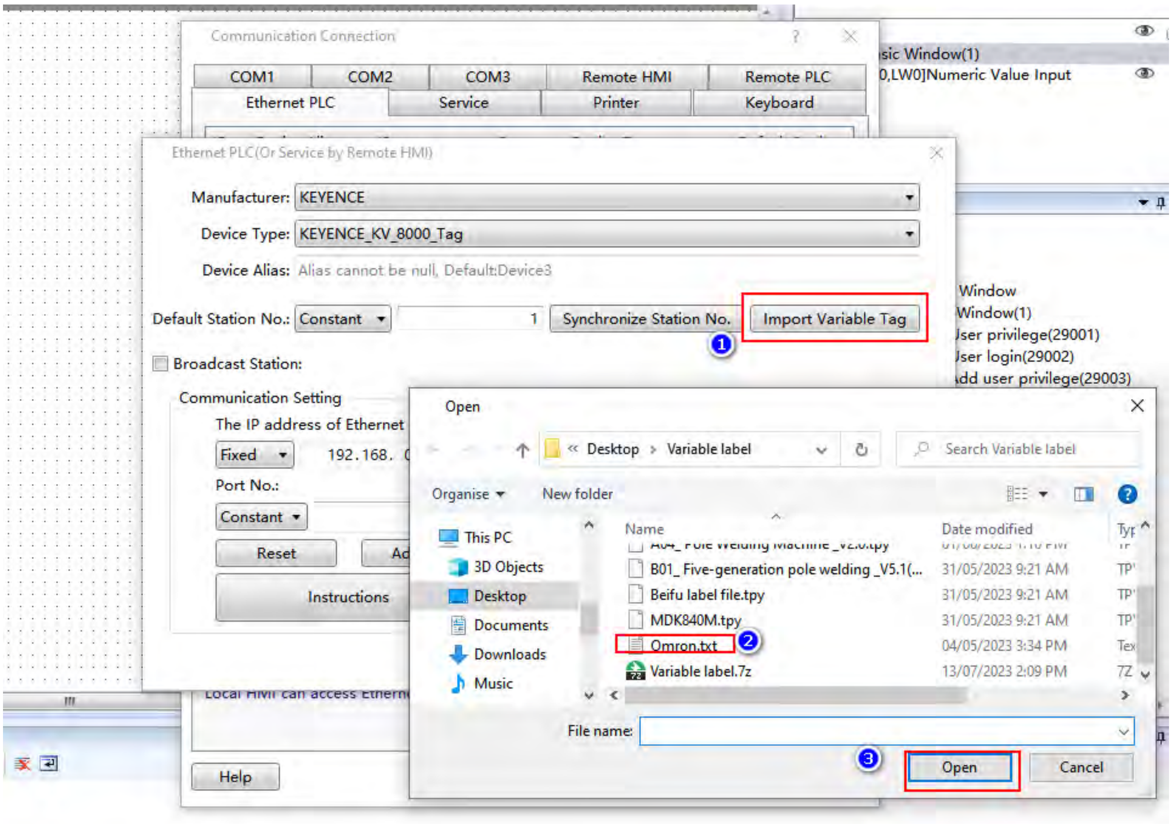
Step 3. Configure relevant parameters in the pop-up dialog box.



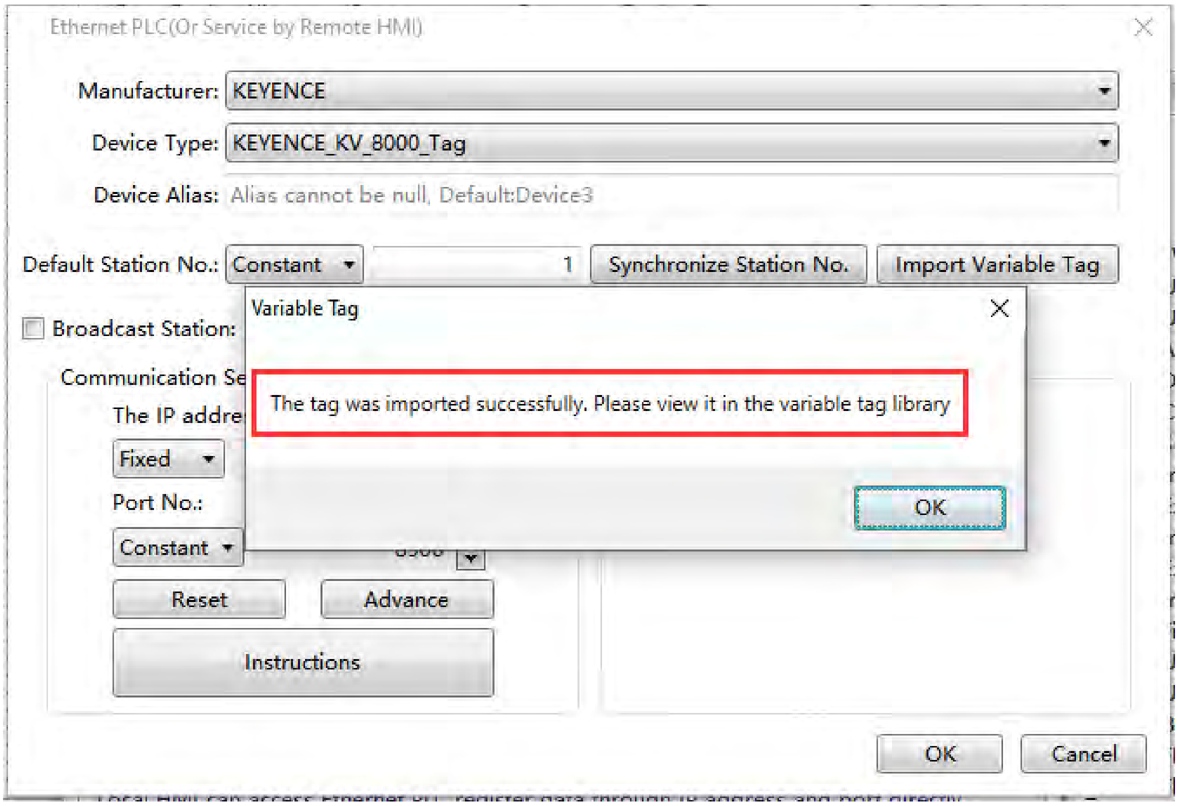
Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Manufacturer	Select “KEYENCE-Keyence”.
Device Type	Select “KEYENCE_KV_8000_Tag”.
IP Address of Network PLC	Please refer to the actual situation.
Port No.	Use default value 8500.

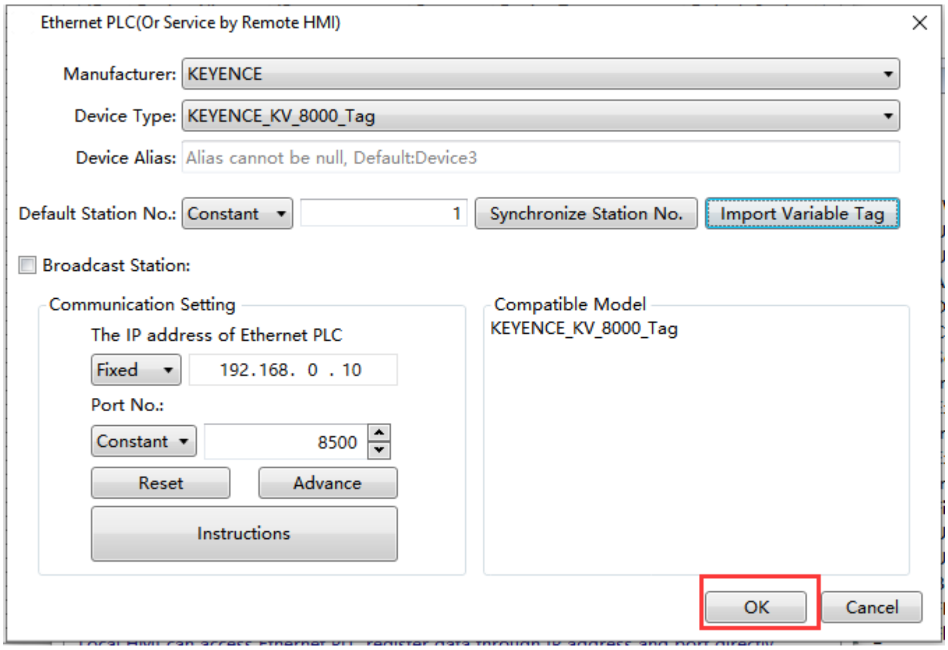
Step 4. Click **Import Variable Tag**, select PLC variable tag file in the pop-up **Open** dialog box, click **Open**.



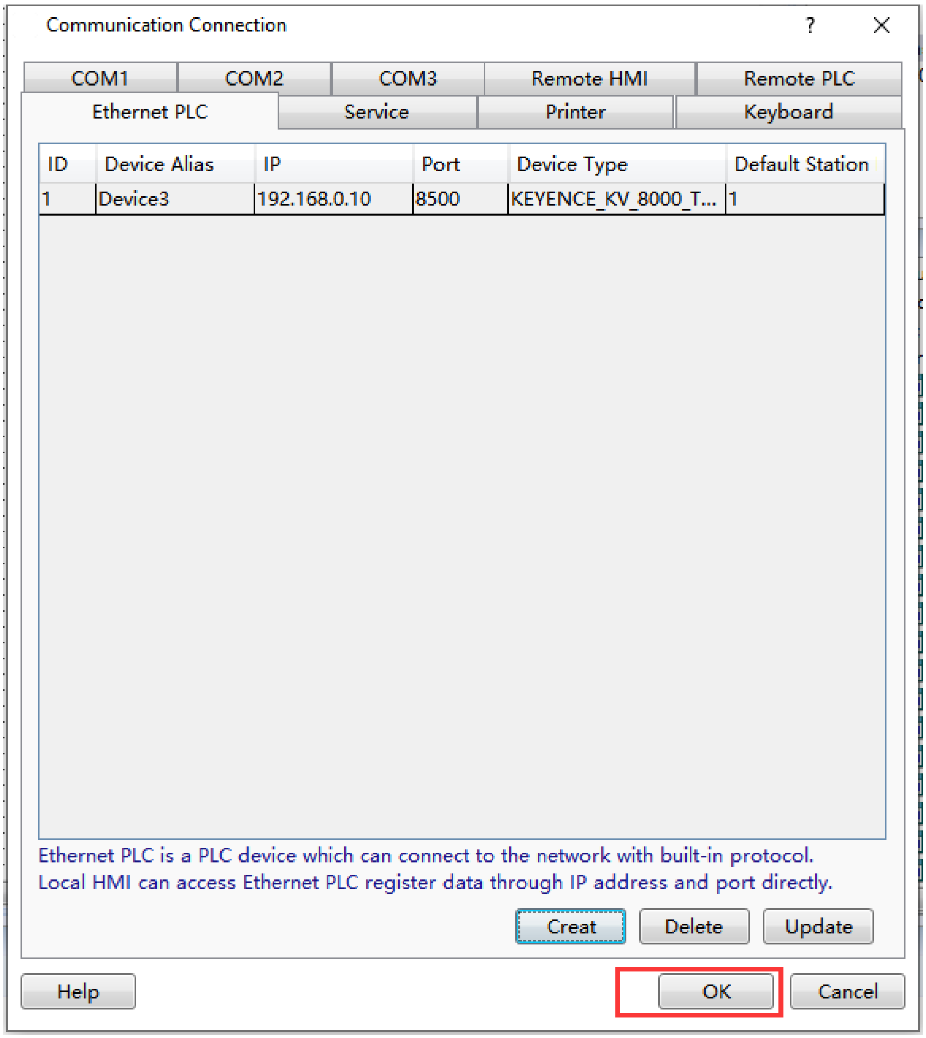
Step 5. Afte importing tags, click **OK** in the pop-up dialog box.



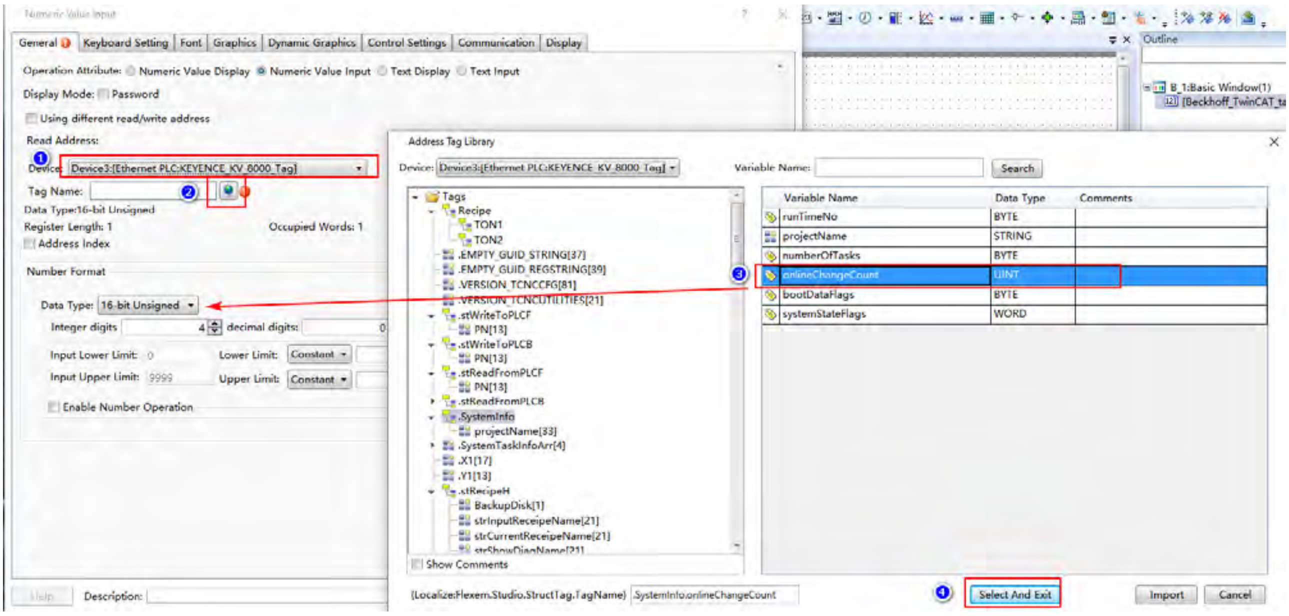
Step 6. Click **OK**.



Step 7. Click **OK** in the **Communication Connection** dialog box.



Step 8. Select **Component/Numeric Value and Text Display/Numeric Value Input** from the menu bar, and select "KEYENCE_KV_8000_Tag" for device in the pop-up dialog box, click the  icon, select tag in the pop-up **Variable Tag Library** dialog box, click **Select and Exit**.



Step 9. Complete the configuration of the numeric value input component, download the project to the HMI, if the value of tag can be read, it means that the communication is working.

17.5 OMRON PLC

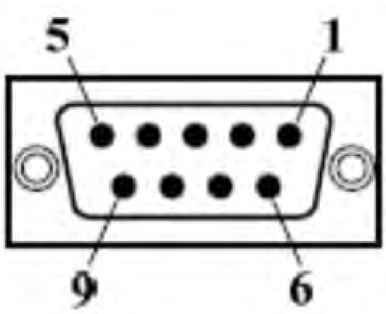
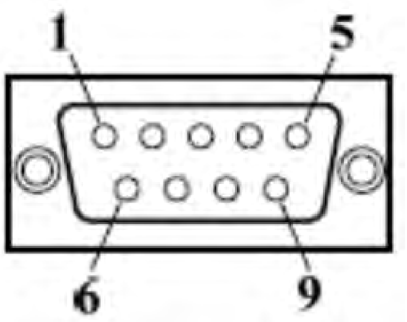
17.5.1 Serial Communication Between HMI and OMRON CJ/CS/CP Series PLC

17.5.1.1 Connection Method

◆ Use RS232 cable to connect the COM1/COM2 port of HMI and serial port of PLC, the connection method is shown in the table below.

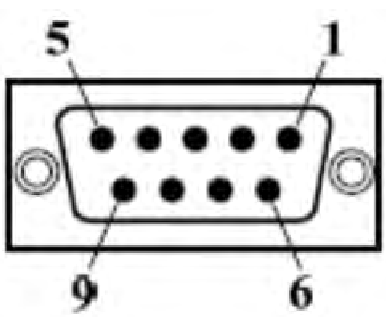
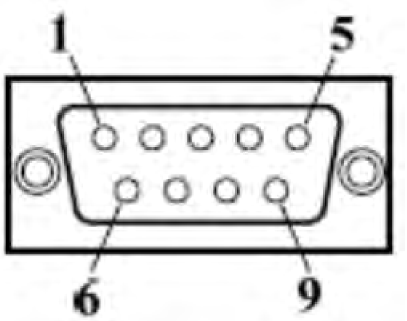
The pins 4 and 5 of the PLC need to be shorted.

HMI COM1/COM2 Port	PLC Serial Port
2 RX	2 TX
3 TX	3 RX

HMI COM1/COM2 Port	PLC Serial Port
5 GND	9 GND
	

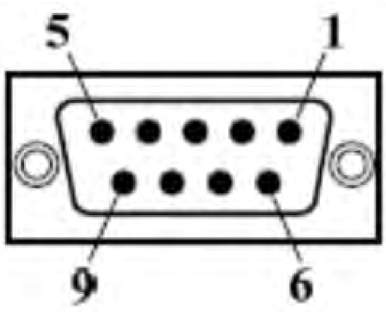
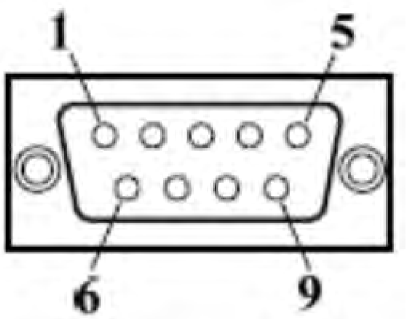
- Use RS232 cable to connect the COM3/COM4 port of HMI and serial port of PLC, the connection method is shown in the table below.

The pins 4 and 5 of the PLC need to be shorted.

HMI COM3/COM4 Port	PLC Serial Port
7 RX	2 TX
8 TX	3 RX
5 GND	9 GND
	

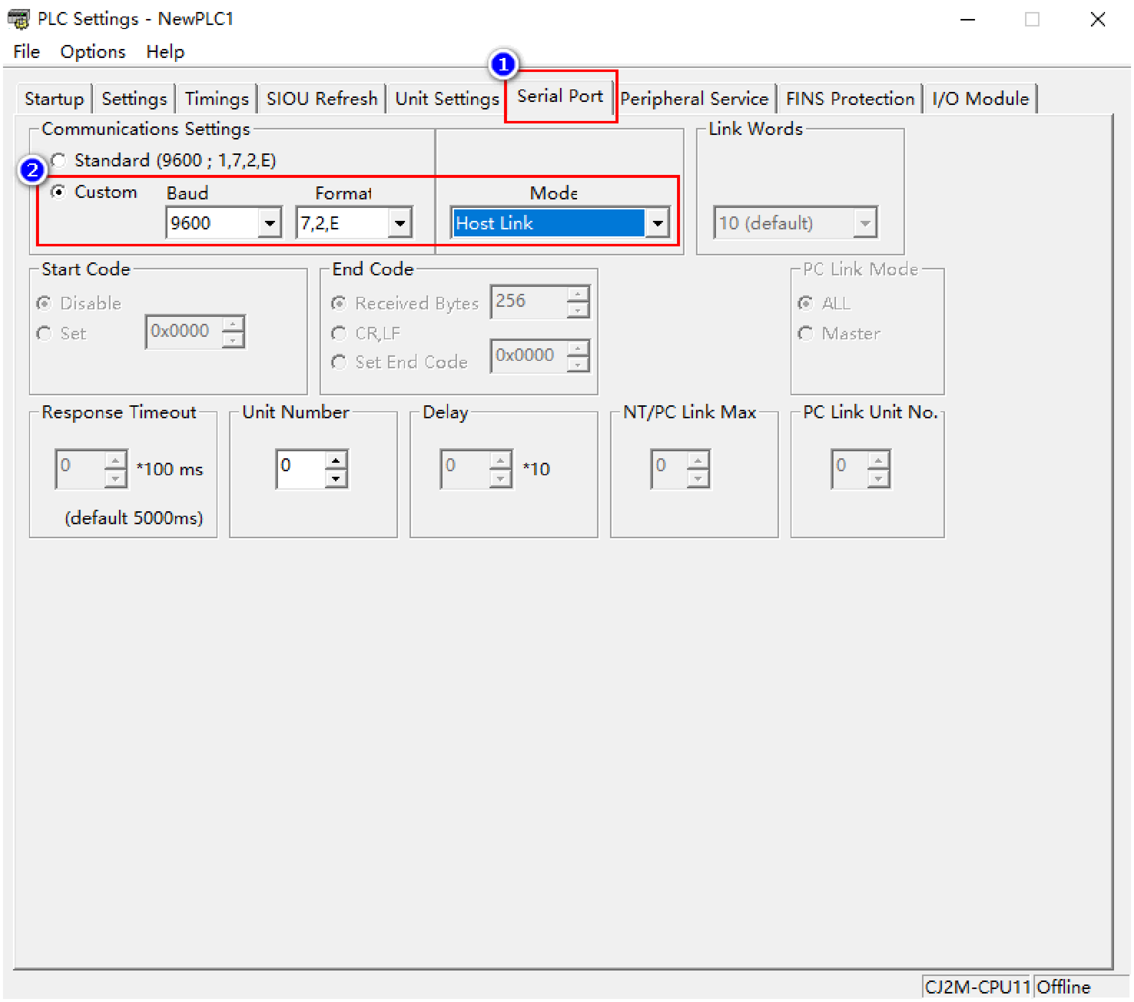
- Use RS485-4(RS422) cable to connect the COM1/COM2 port of HMI and serial port of PLC, the connection method is shown in the table below.

HMI COM1/COM2 Port	PLC Serial Port
1 RX-	1 SDA-
6 RX+	2 SDB+

HMI COM1/COM2 Port	PLC Serial Port
4 TX-	6 RDA-
9 TX+	8 RDB+
	

17.5.1.2 Configure PLC

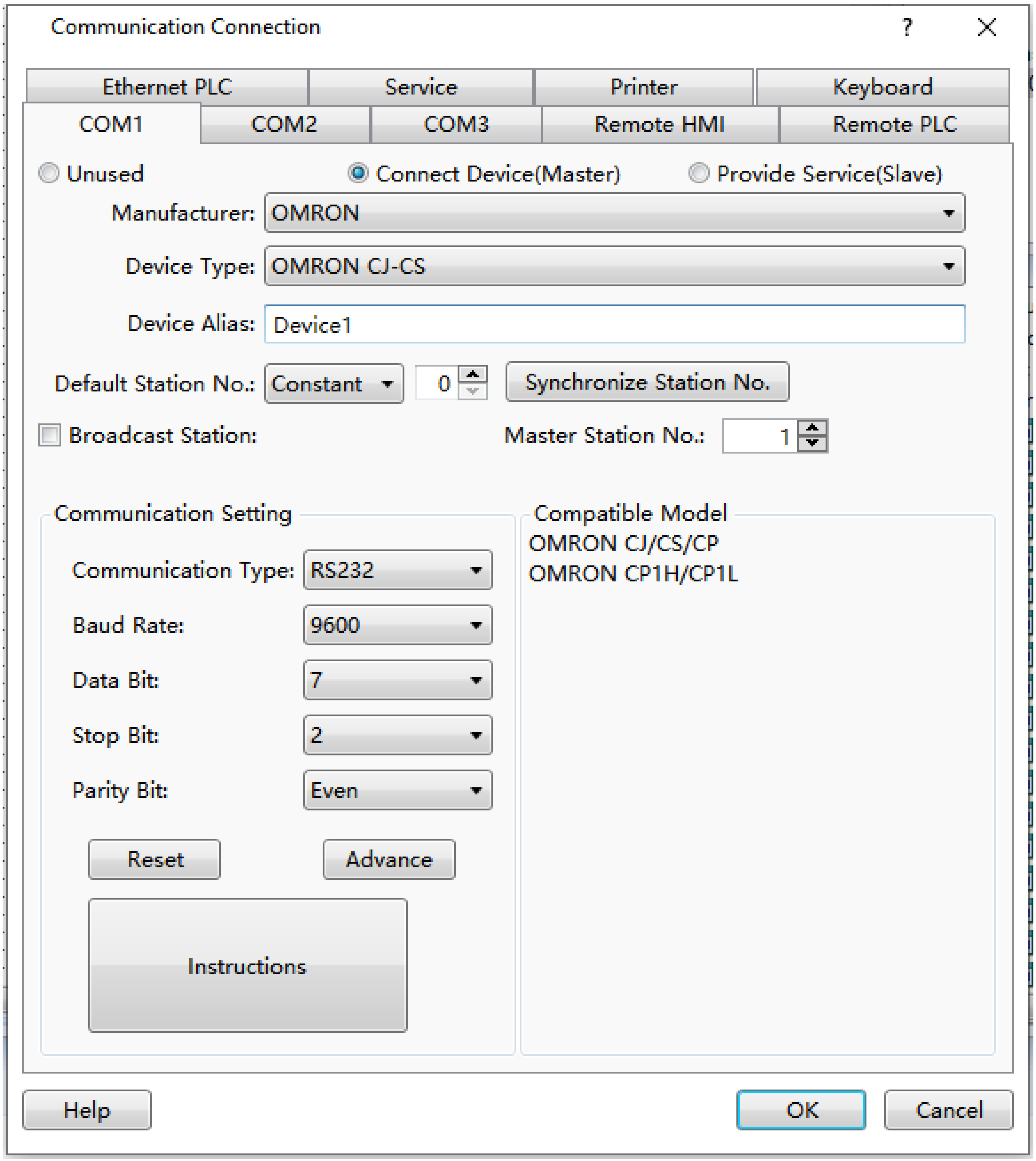
Run the OMRON PLC configuration software, selecy **Customize** in the **Communication Settings** area, set baud rate, select “7,2,E” for **Format**, select Host Link for **Mode.**



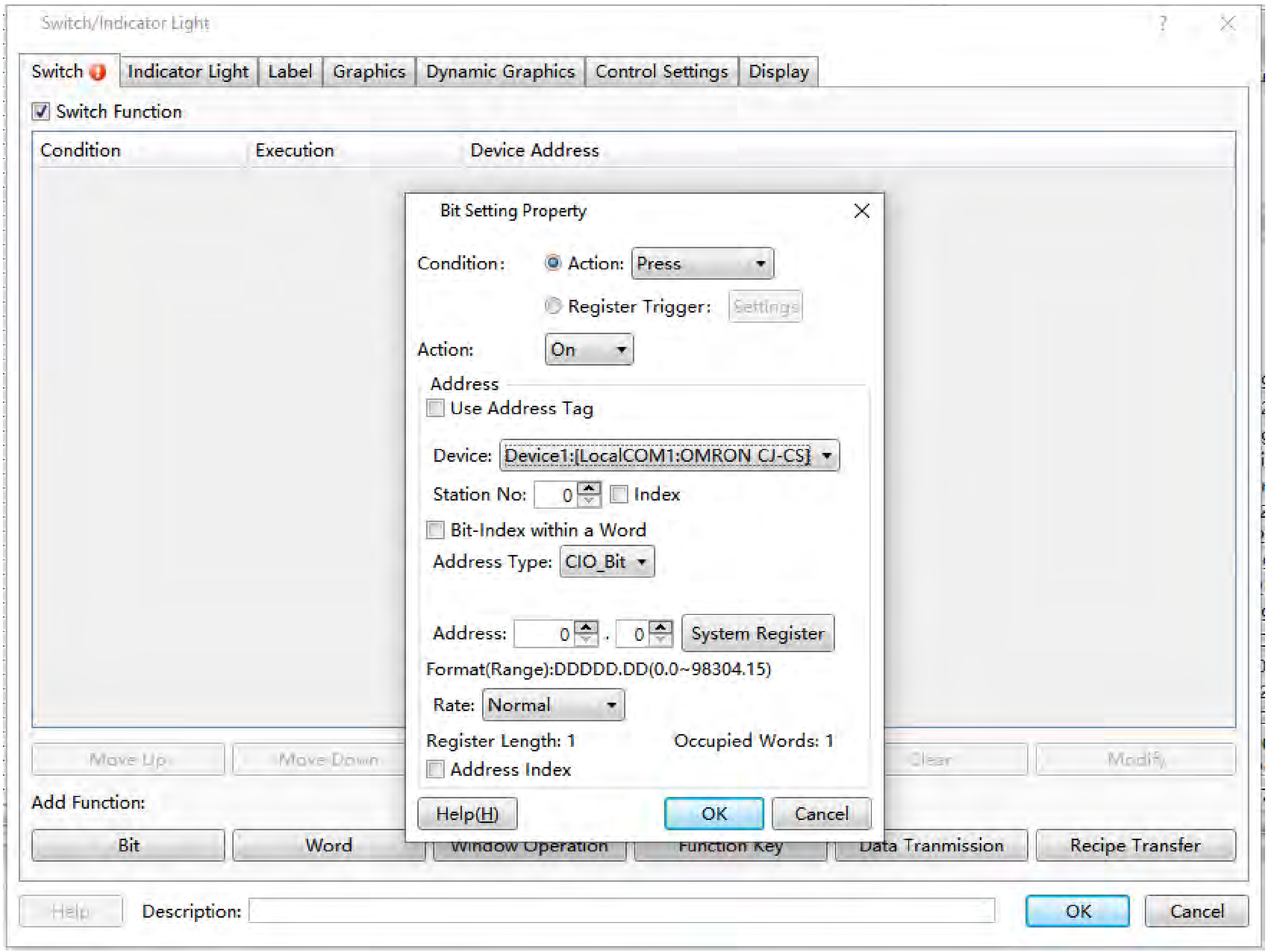
17.5.1.3 Configure HMI

Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select the corresponding COM port in the pop-up dialog box, configrue as shown in the figure below, click **OK**.

The **Communication Settings** can be configured according to the actual communication method. Communication Type can be set as RS232 or RS485-4. The baud rate, data bits, stop bits, and parity bits should be consistent with the settings on the PLC.



Step 2. Select **Component/Switch/Bit Set** from the menu bar, add PLC address in the pop-up dialog box.



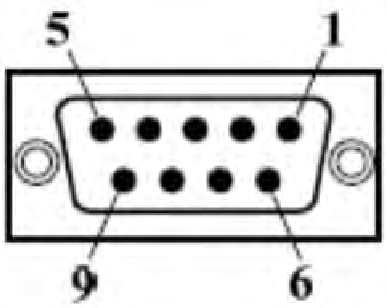
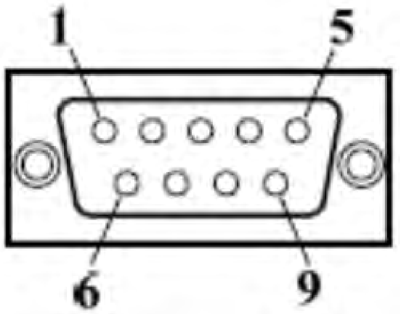
Step 3. After configuring the project, download project to HMI. If the data of PLC address can be read, it means that the communication is working.

17.5.2 Serial Communication Between HMI and OMRON CP1H/CP1L Series PLC

17.5.2.1 Connection Method

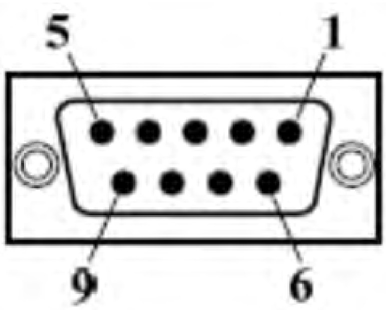
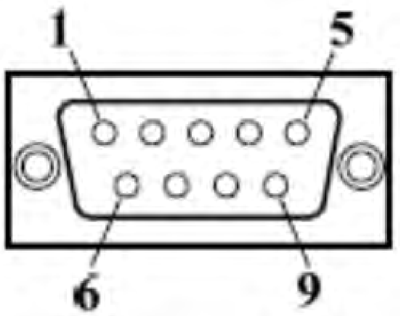
◆ Use RS232 cable to connect the COM1/COM2 port of HMI and serial port of PLC, the connection method is shown in the table below.

The pins 4 and 5 of the PLC need to be shorted.

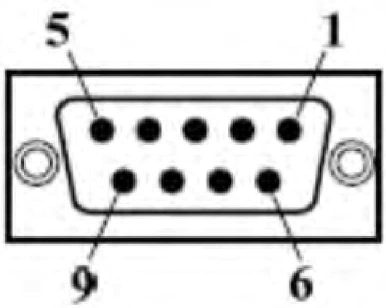
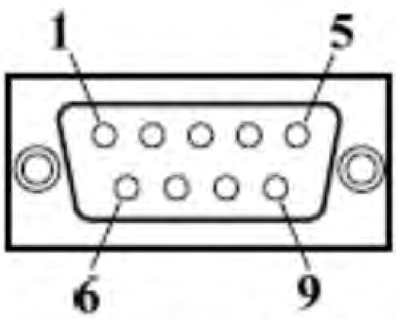
HMI COM1/COM2 Port	**PLC Serial Port**
2 RX	2 TX
3 TX	3 RX
5 GND	9 GND
	

◆ Use RS232 cable to connect the COM3/COM4 port of HMI and serial port of PLC, the connection method is shown in the table below.

The pins 4 and 5 of the PLC need to be shorted.

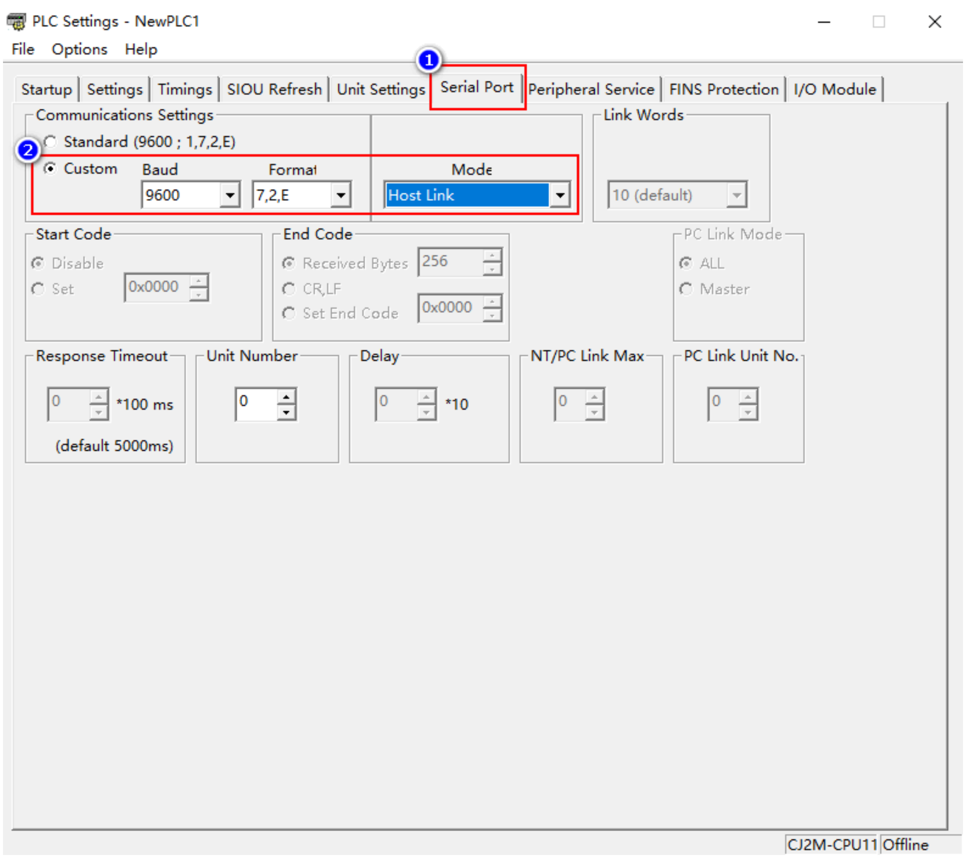
HMI COM3/COM4 Port	**PLC Serial Port**
7 RX	2 TX
8 TX	3 RX
5 GND	9 GND
	

◆ Use RS485-4(RS422) cable to connect the COM1/COM2 port of HMI and serial port of PLC, the connection method is shown in the table below.

HMI COM1/COM2 Port	PLC Serial Port
1 RX-	1 SDA-
6 RX+	2 SDB+
4 TX-	6 RDA-
9 TX+	8 RDB+
	

17.5.2.2 Configure PLC

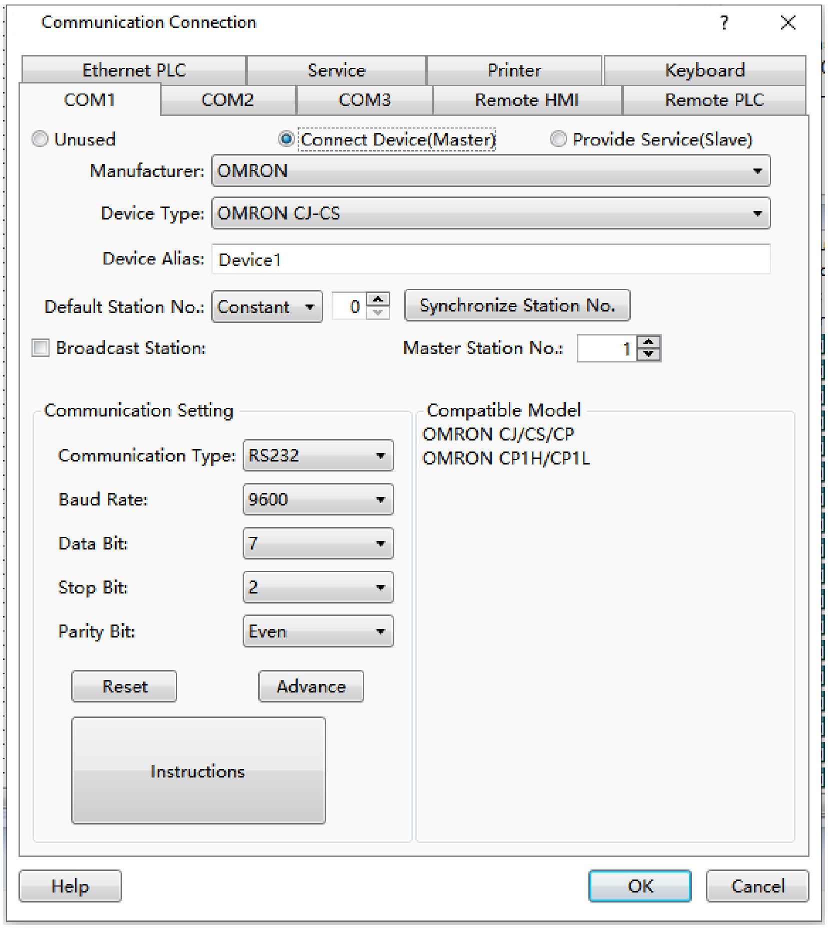
Run the OMRON PLC configuration software, select Customize in the Communication Settings area, set baud rate, select “7,2,E” for **Format**, select Host Link for **Mode.**



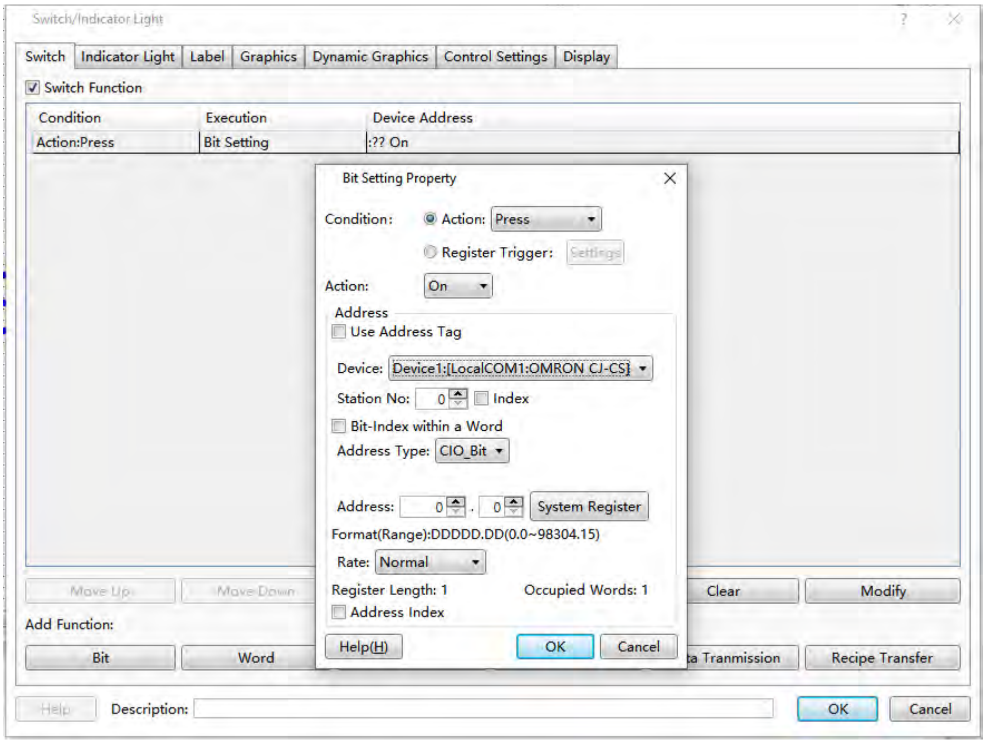
17.5.2.3 Configure HMI

Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select the corresponding COM port in the pop-up dialog box, configrue as shown in the picture below, click **OK**.

The **Communication Settings** can be configured according to the actual communication method. Communication Type can be set as RS232 or RS485-4. The baud rate, data bits, stop bits, and parity bits should be consistent with the settings on the PLC.



Step 2. Select **Component/Switch/Bit Set** from the menu bar, add PLC address in the pop-up dialog box..



Step 3. After configuring the project, download project to HMI. If the data of PLC address can be read, it means that the communication is working.

17.5.3 Ethernet Communication Between HMI and OMRON NX1P2 PLC (Absolute Address)

Connect the Ethernet port of the HMI and the Ethernet port of the OMRON NX1P2 PLC using an Ethernet cable. Alternatively, establish communication between the two devices through a switch.

17.5.3.1 Connection Method

◆ The connection method using the crossover network cable is shown in the table below.

Connection Method of HMI Ports	Connection Method of PLC Ports	Cable
1TX+(orange white)	3RX+(green white)	
2TX-(orange)	6RX-(green)	
3RX+(green white)	1TX+(orange white)	
4BD4+(blue)	4BD4+(blue)	
5BD4-(blue white)	5BD4-(blue white)	
6RX-(green)	2TX-(orange)	

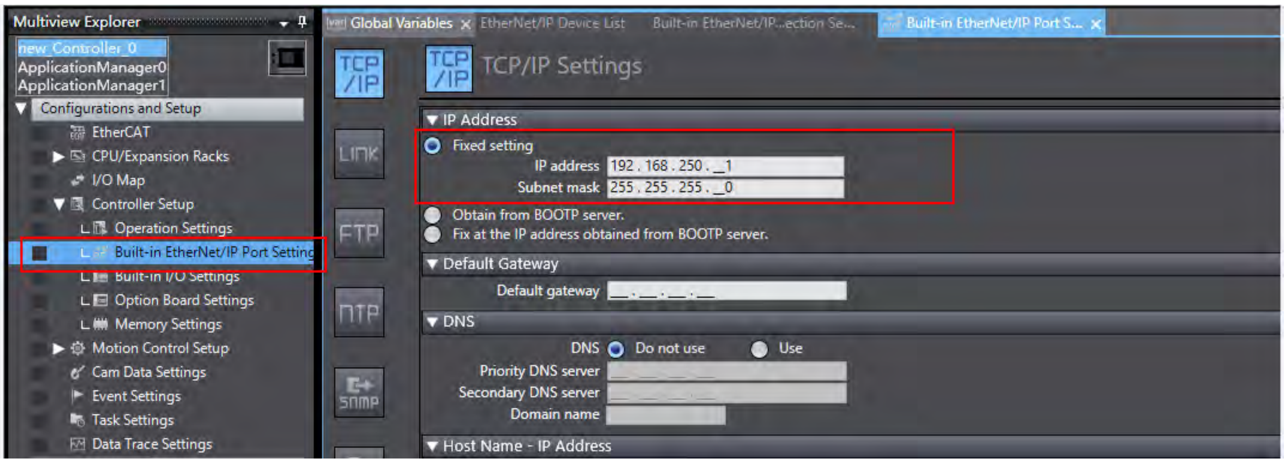
Connection Method of HMI Ports	Connection Method of PLC Ports	Cable
7BD3+(brown white)	7BD3+(brown white)	
8BD3-(brown)	8BD3-(brown)	

◆ The connection method using a straight-through network cable is shown in the table below.

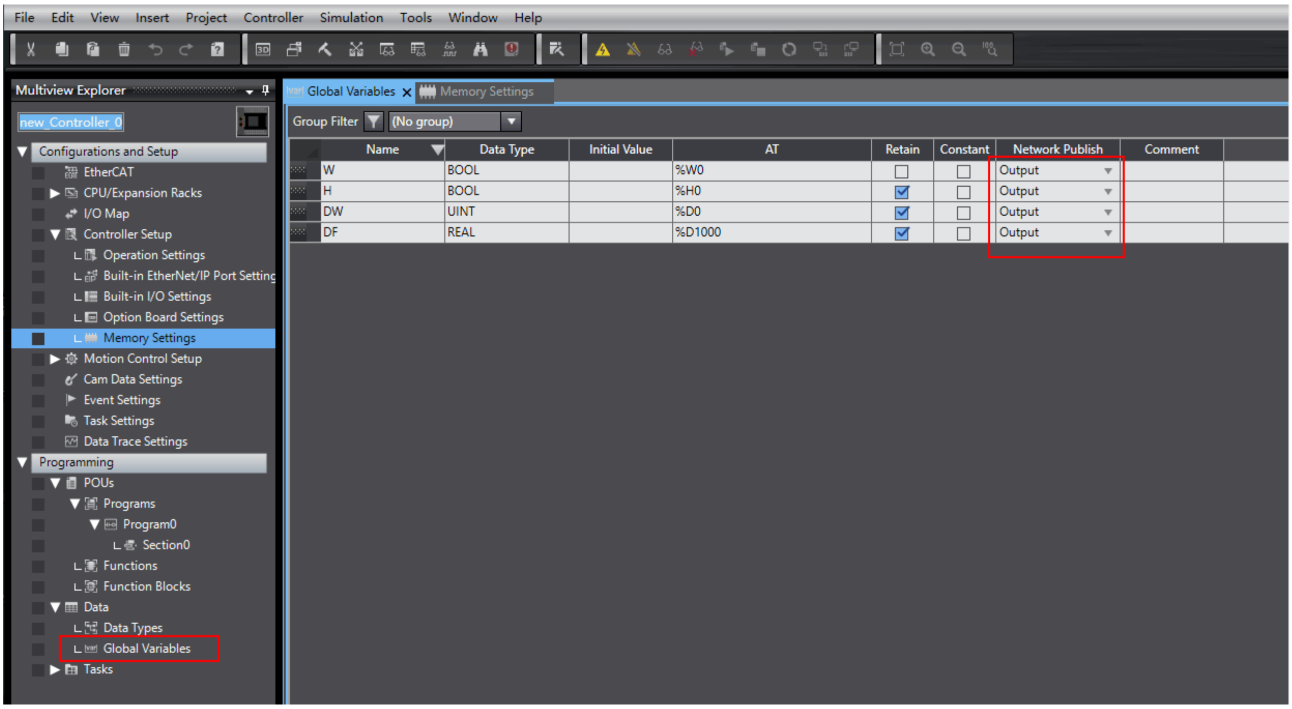
Connection Method of HMI Ports	Connection Method of PLC Ports	Cable
1TX+(orange white)	1TX+(orange white)	
2TX-(orange)	2TX-(orange)	
3RX+(green white)	3RX+(green white)	
4BD4+(blue)	4BD4+(blue)	
5BD4-(blue white)	5BD4-(blue white)	
6RX-(green)	6RX-(green)	
7BD3+(brown white)	7BD3+(brown white)	
8BD3-(brown)	8BD3-(brown)	

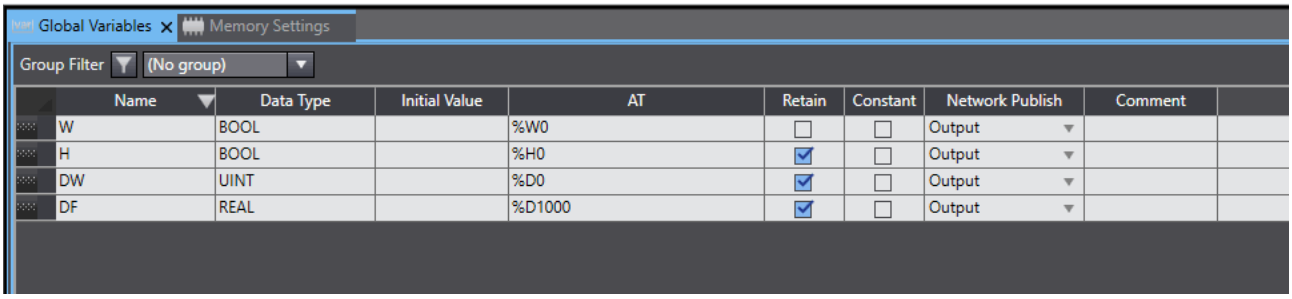
17.5.3.2 Configure PLC

Step 1. Run the PLC configuration software. Configure the IP address of PLC as shown in the picture below.



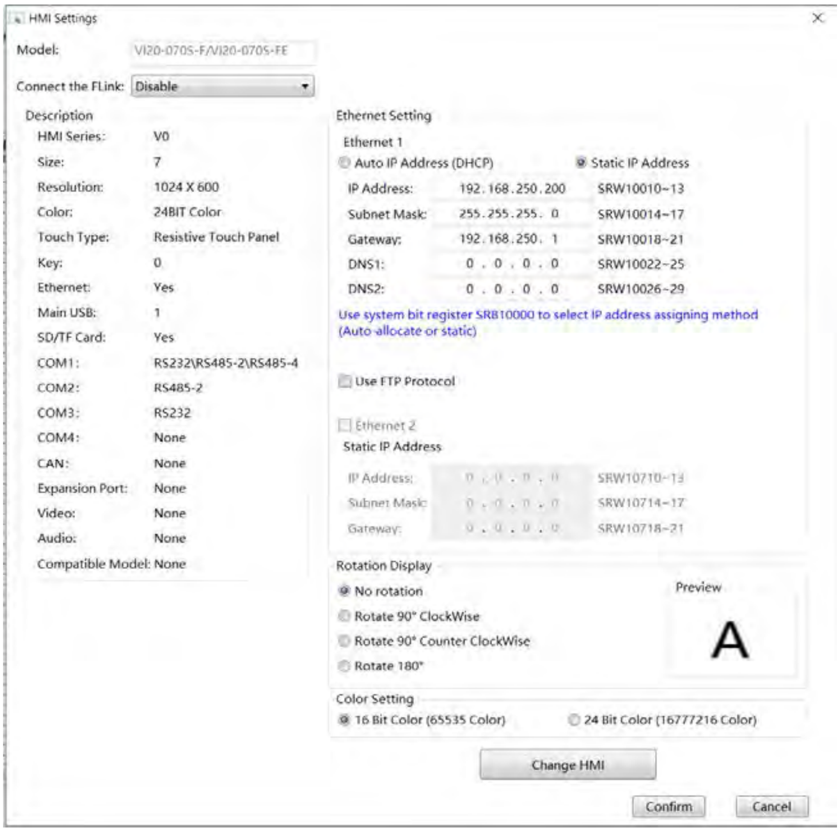
Step 2. Open the Address Allocation in the **Global Variable** interface. Select **Public** for the **Network Publish** column. This will enable reading and writing data through Ethernet communication.



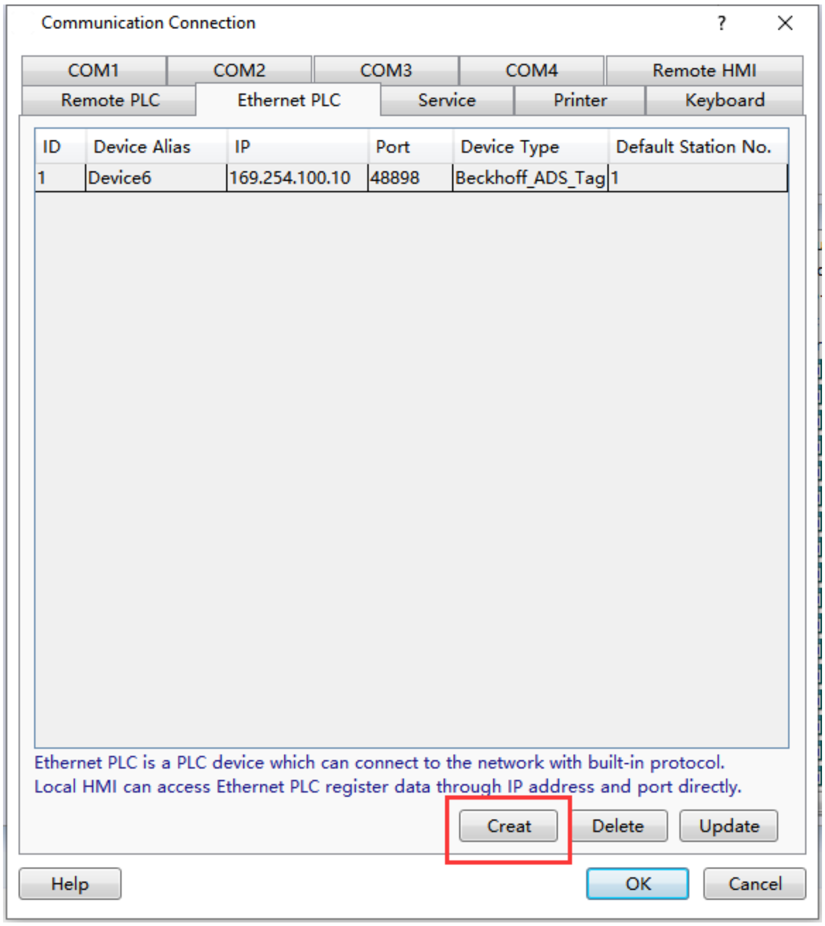


17.5.3.3 Configure HMI

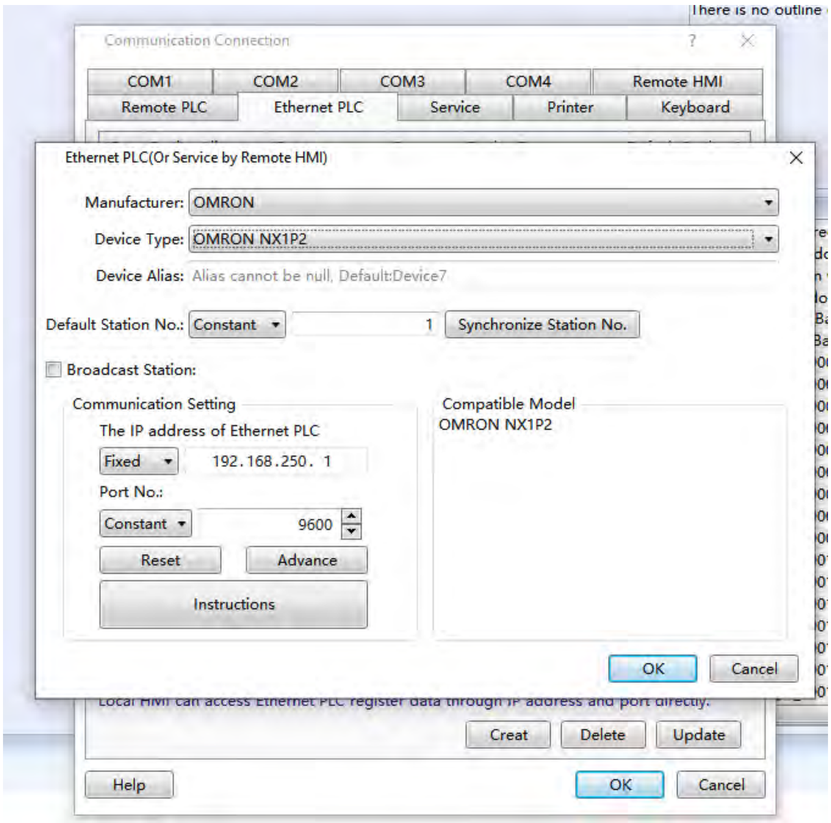
Step 1. Select **Settings/HMI Settings** from the menu bar, set the HMI IP address (to be in the same network segment as the IP address of PLC).



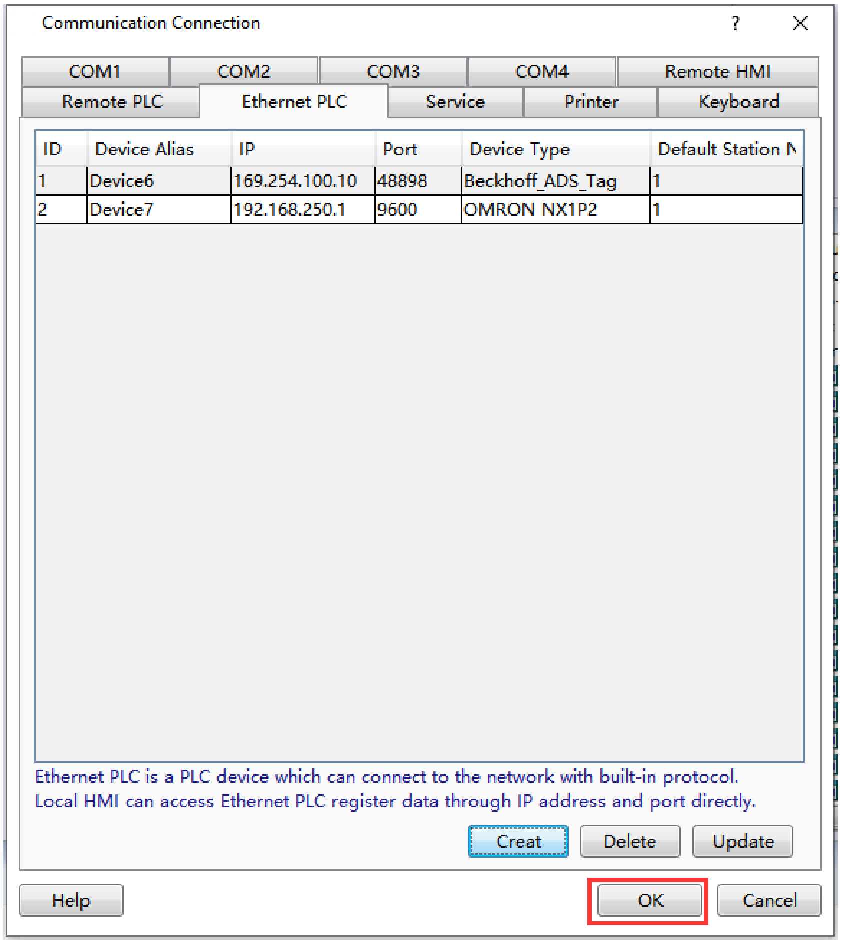
Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select the **Ethernet PLC** tab in the pop-up dialog box, click **Create**.



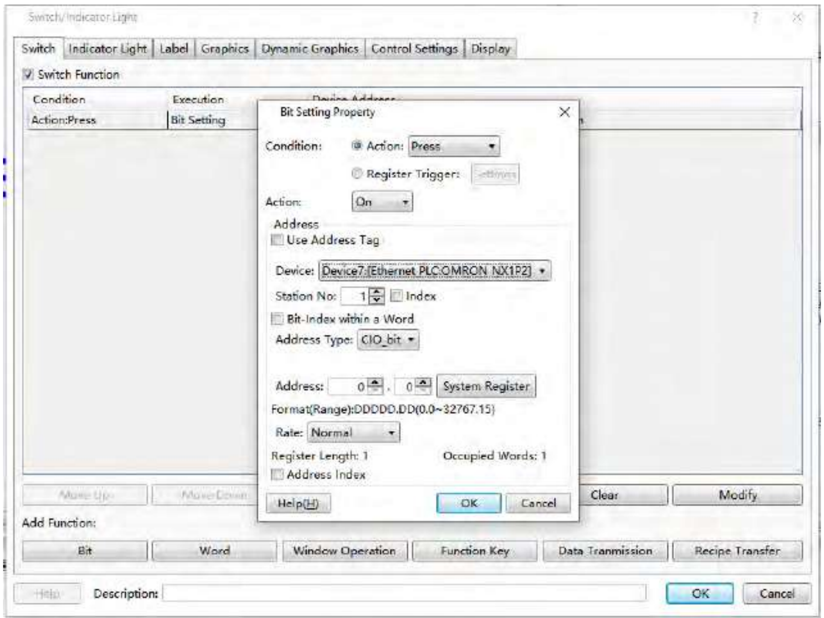
Step 3. Configure relevant parameters in the pop-up dialog box, click **OK**.



Step 4. Click **OK**.



Step 5. Select **Component/Switch/Bit Set** from the menu bar, add the PLC address.



Step 6. After configuring the project, download project to HMI. If the data of switch component can be read, it means that the communication is working.

17.5.4 Ethernet Communication Between HMI and OMRON NX1P2 PLC (Address Tag)

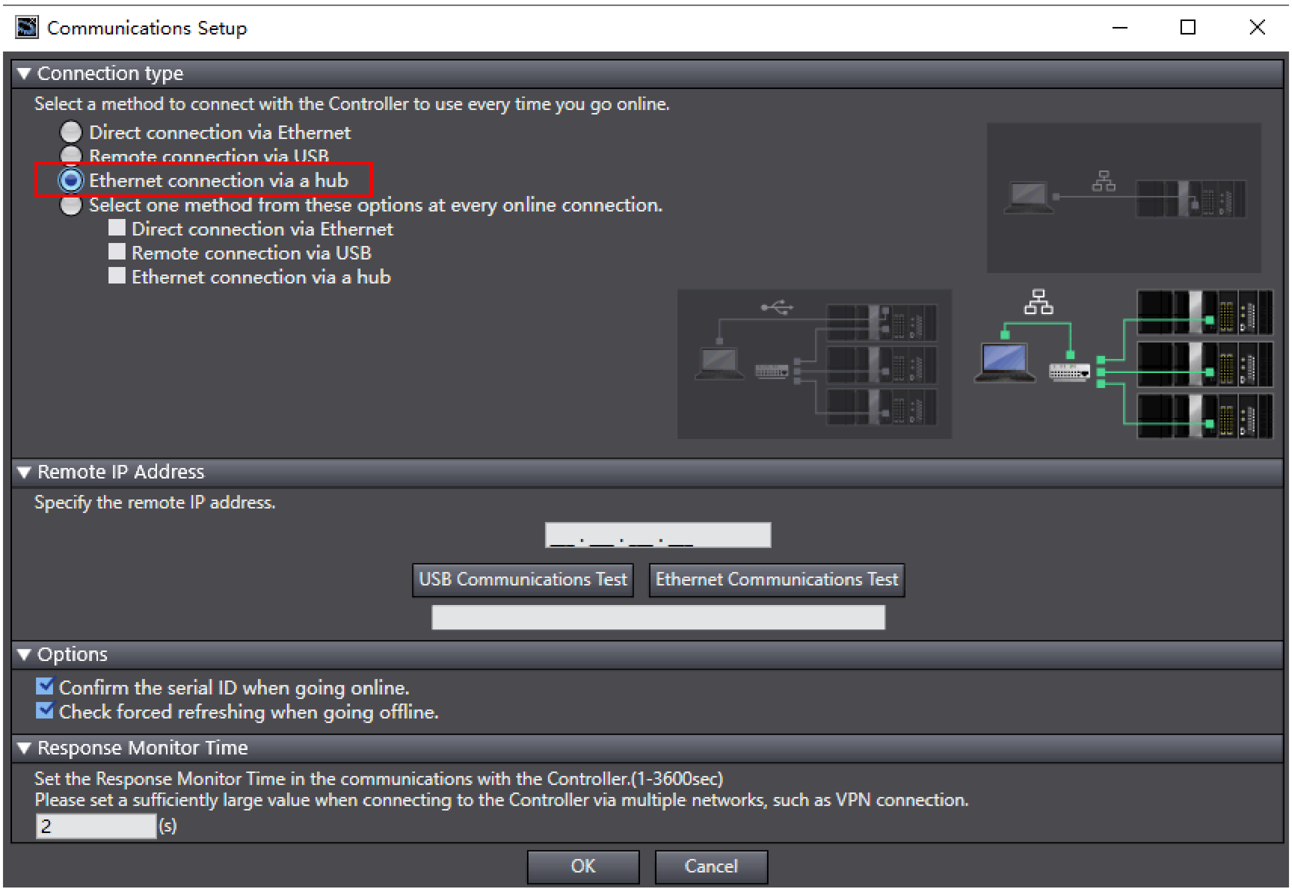
The HMI communicates with the OMRON NX1P2 PLC through Ethernet. The HMI reads data from the PLC using the PLC's address tags.

17.5.4.1 Connection Method

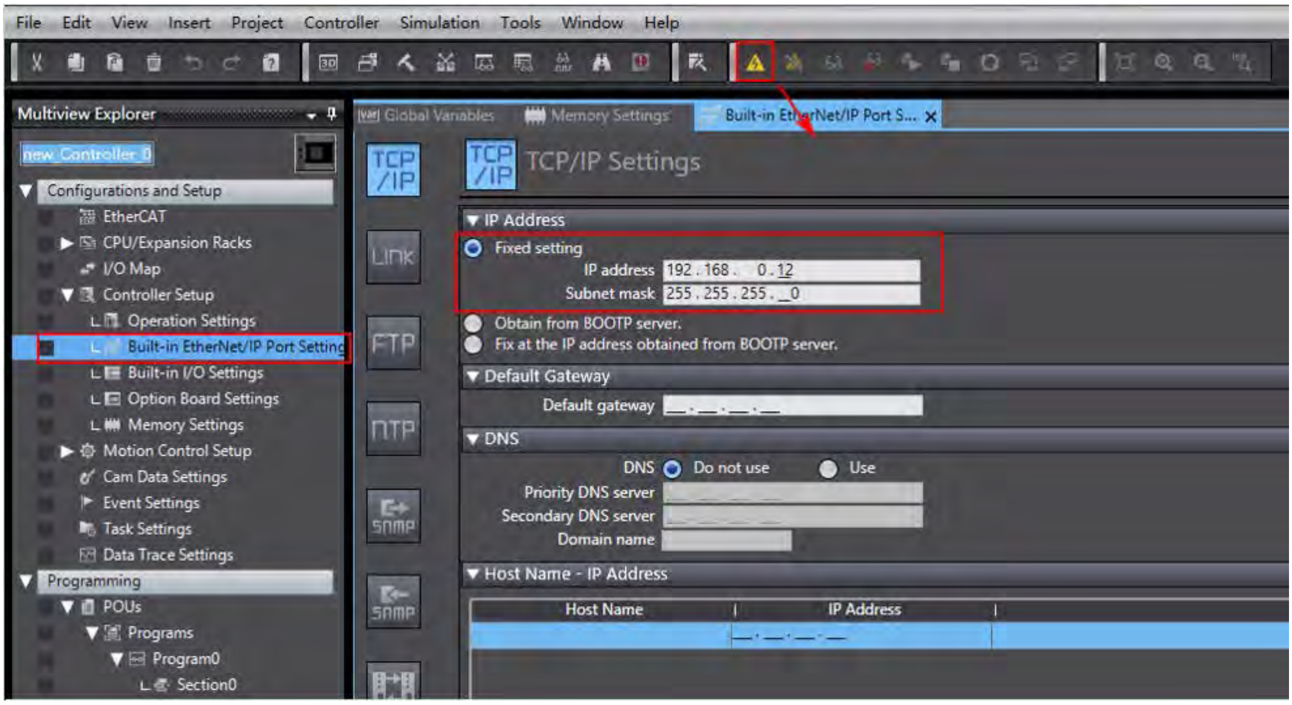
Please refer to Connection Method.

17.5.4.2 Configure PLC

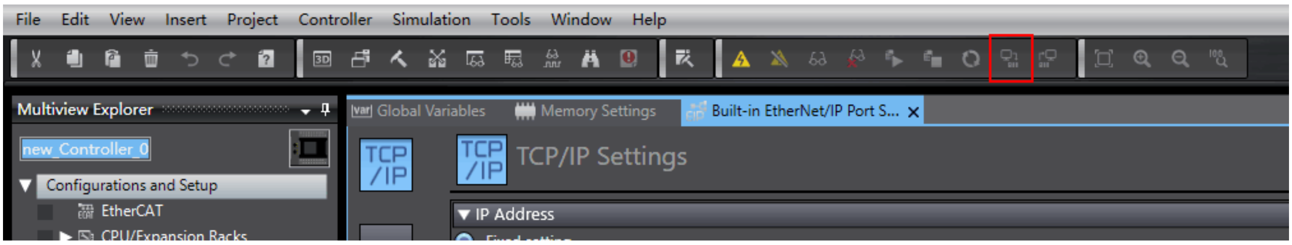
Step 1. Connect your PC to the PLC via a switch for network connectivity. Run the PLC configuration software and navigate to the **communication setup** interface. Select **Ethernet connection via a hub** connection type and enter the PLC's IP address. This will enable the PLC to be online.



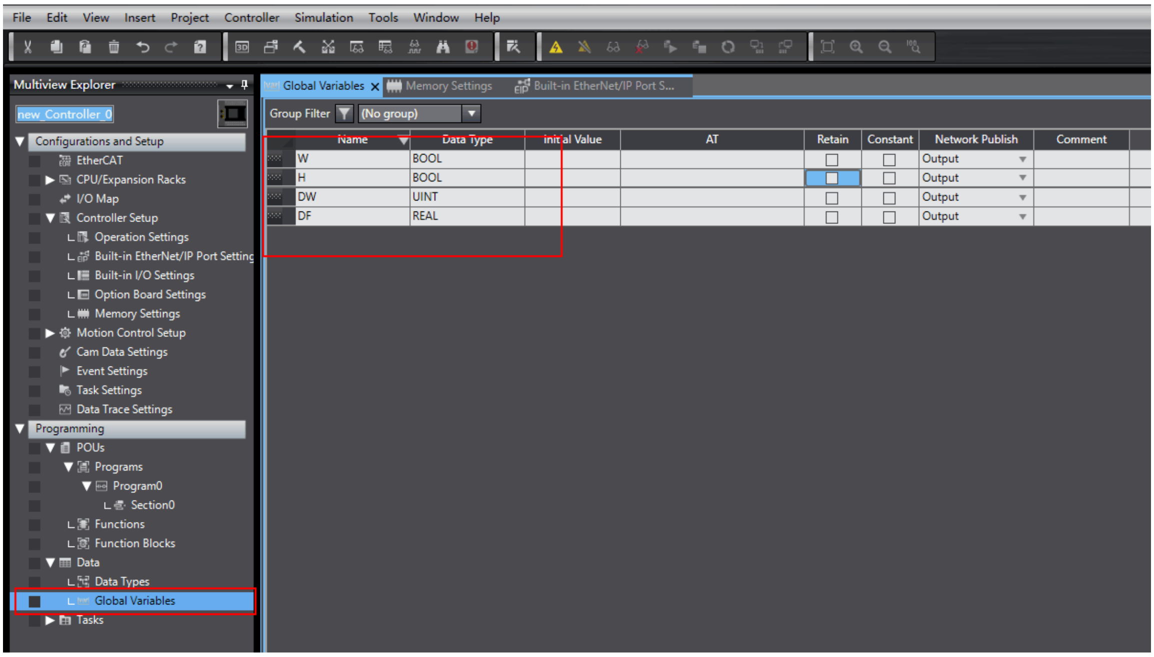
Step 2. Run PLC configuration software SYSMAC Studio, set the IP address of the PLC in the **Configurations and Setup** interface, and click the  icon to connect the PLC.



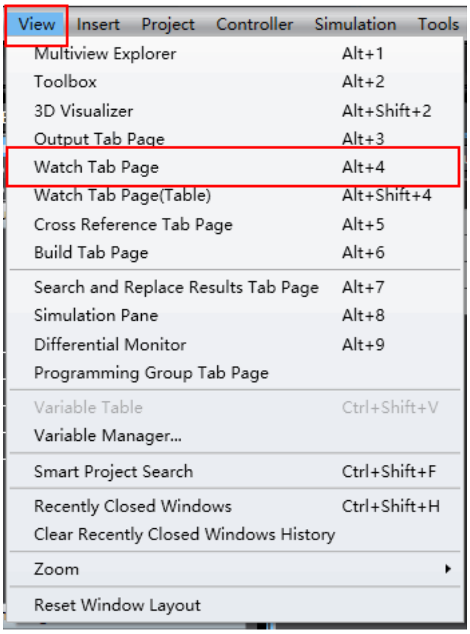
Step 3. Click the  icon to download the settings to PLC.



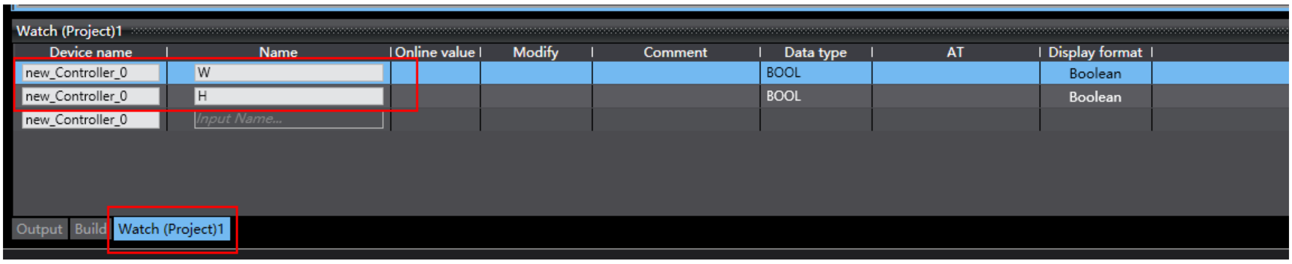
Step 4. Select **Programming/Global Variables** in the left navigation pane, add global variable (add in PLC offline mode).



Step 5. When PLC is online, select **View/Watch Tab Page** from the menu bar.

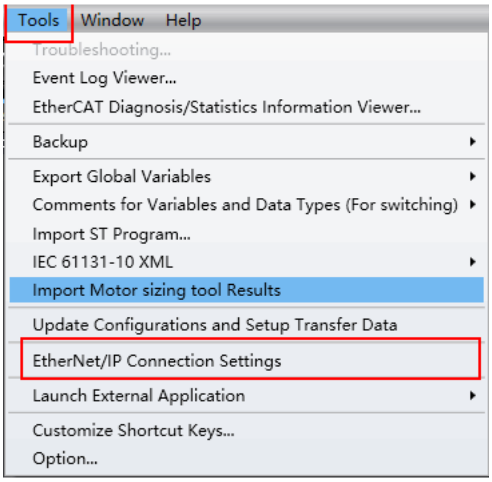


Step 6. Select **Watch(Project)**, enter the variable to be monitored.

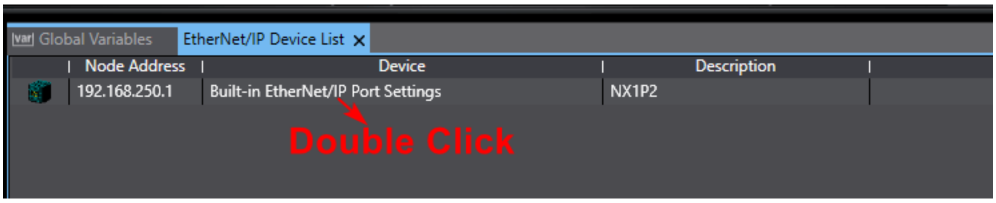


Step 7. Add tag in PLC offline state.

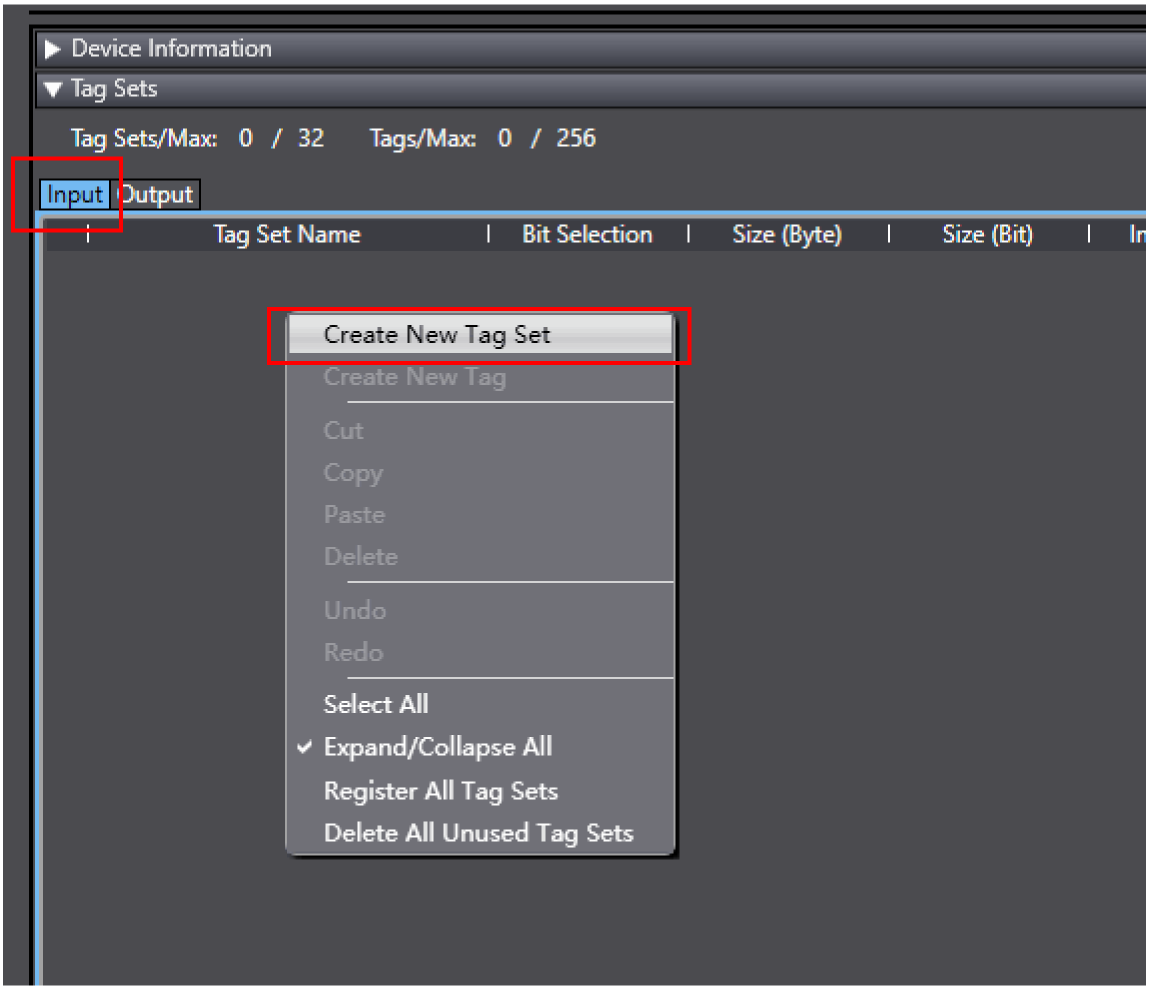
1) Select **Tools/EtherNet/IP Connection Settings** from the menu bar.



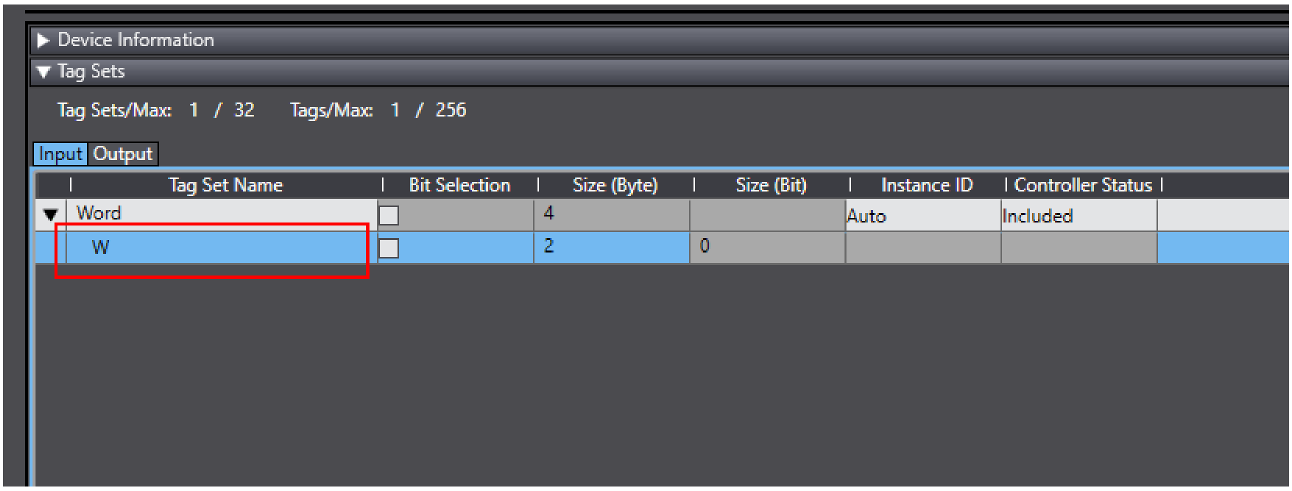
2) Dould click the entry.



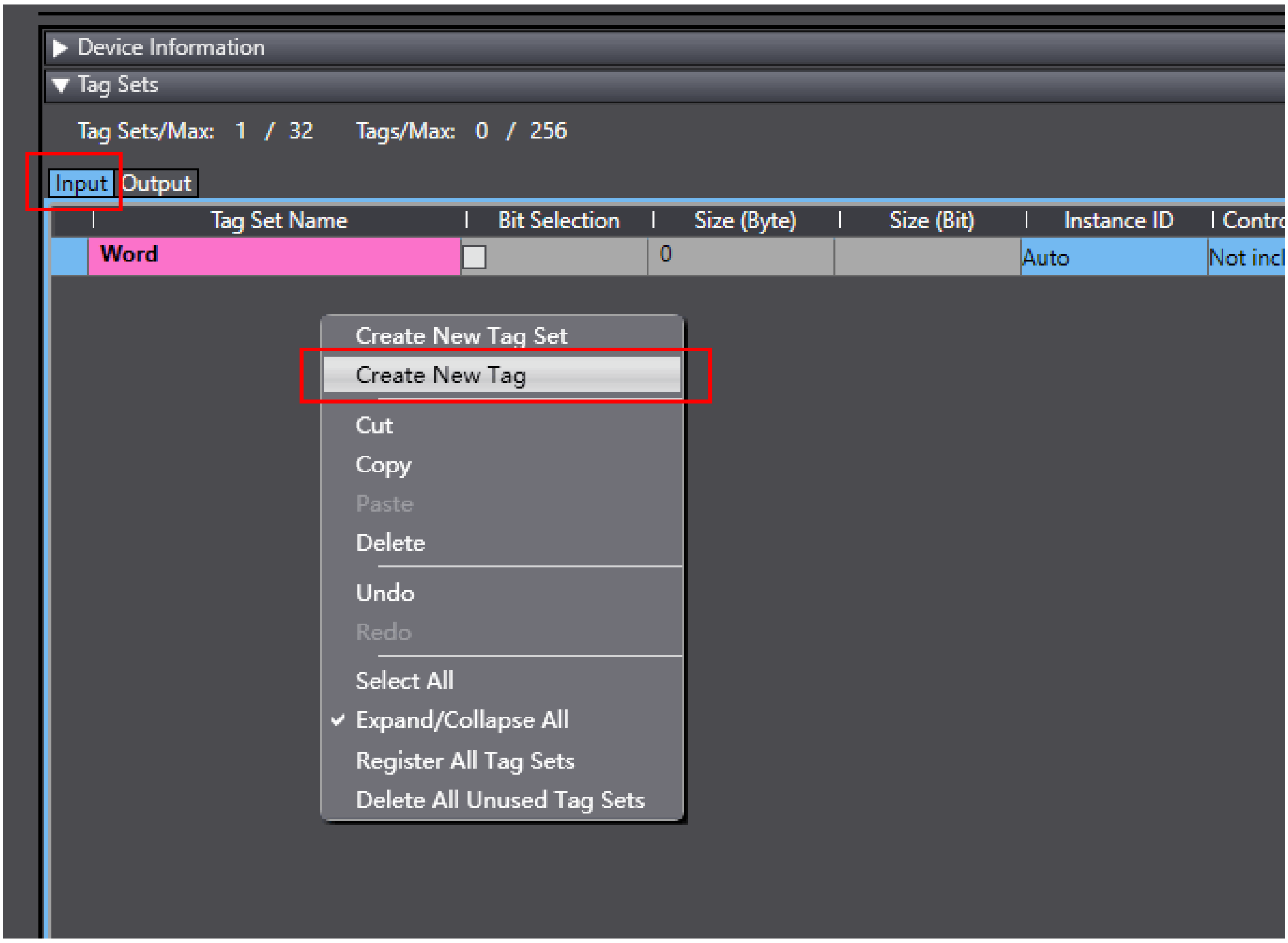
3) Select **Input** in the pop-up dialog box, right click the list box, select **Create New Tag Set**.



4) Create tag set.



5) Right click the list, select **Create New Tag** to add tag.

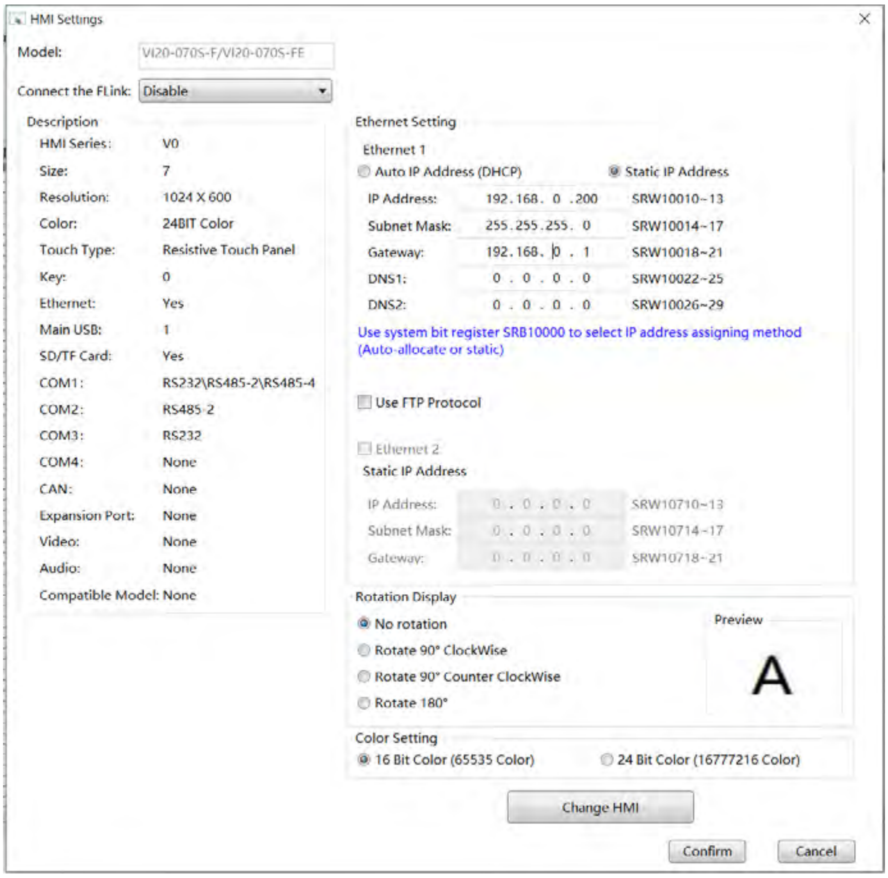


- The tag names should be the variable names in the global variables. Additionally, the input and output types should match the settings in the global variables.
- Only input and output variables can be used to create tags. Global variables that are marked as public or private cannot be used to create tags.

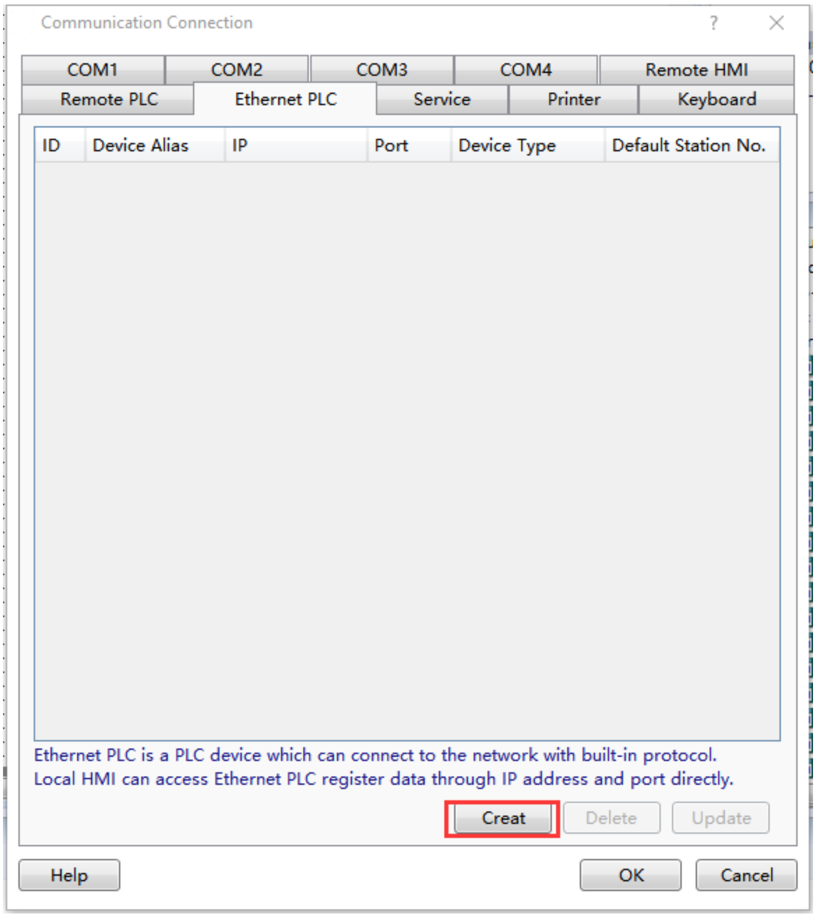
Step 8. After adding the tags, download the program to the PLC and run it.

17.5.4.3 Configure HMI

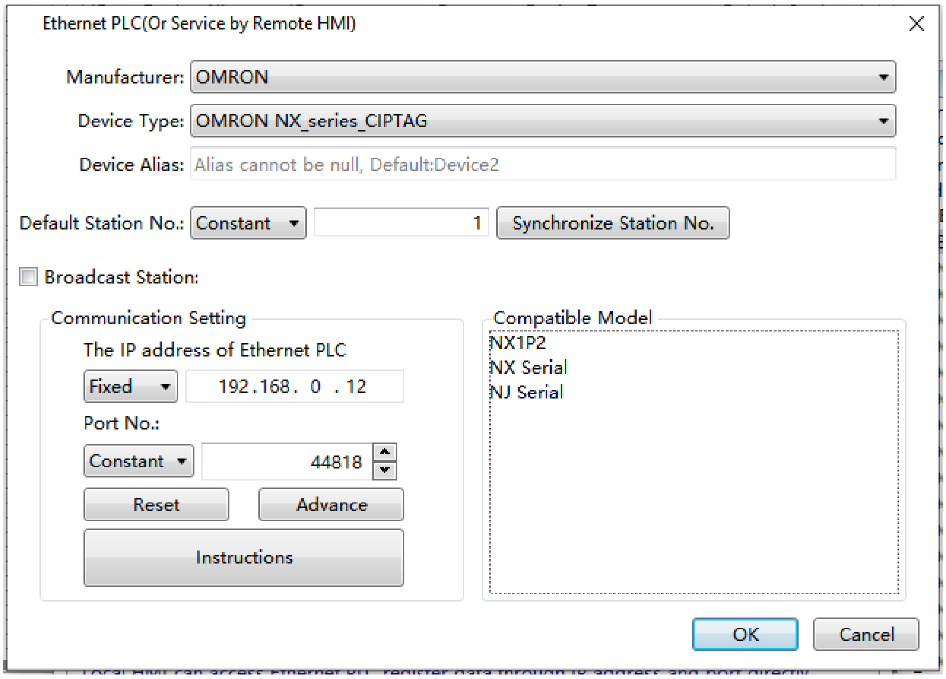
Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI (to be in the same network segment as the IP address of PLC) in the pop-up dialog box, click **Confirm**.



Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select the **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.



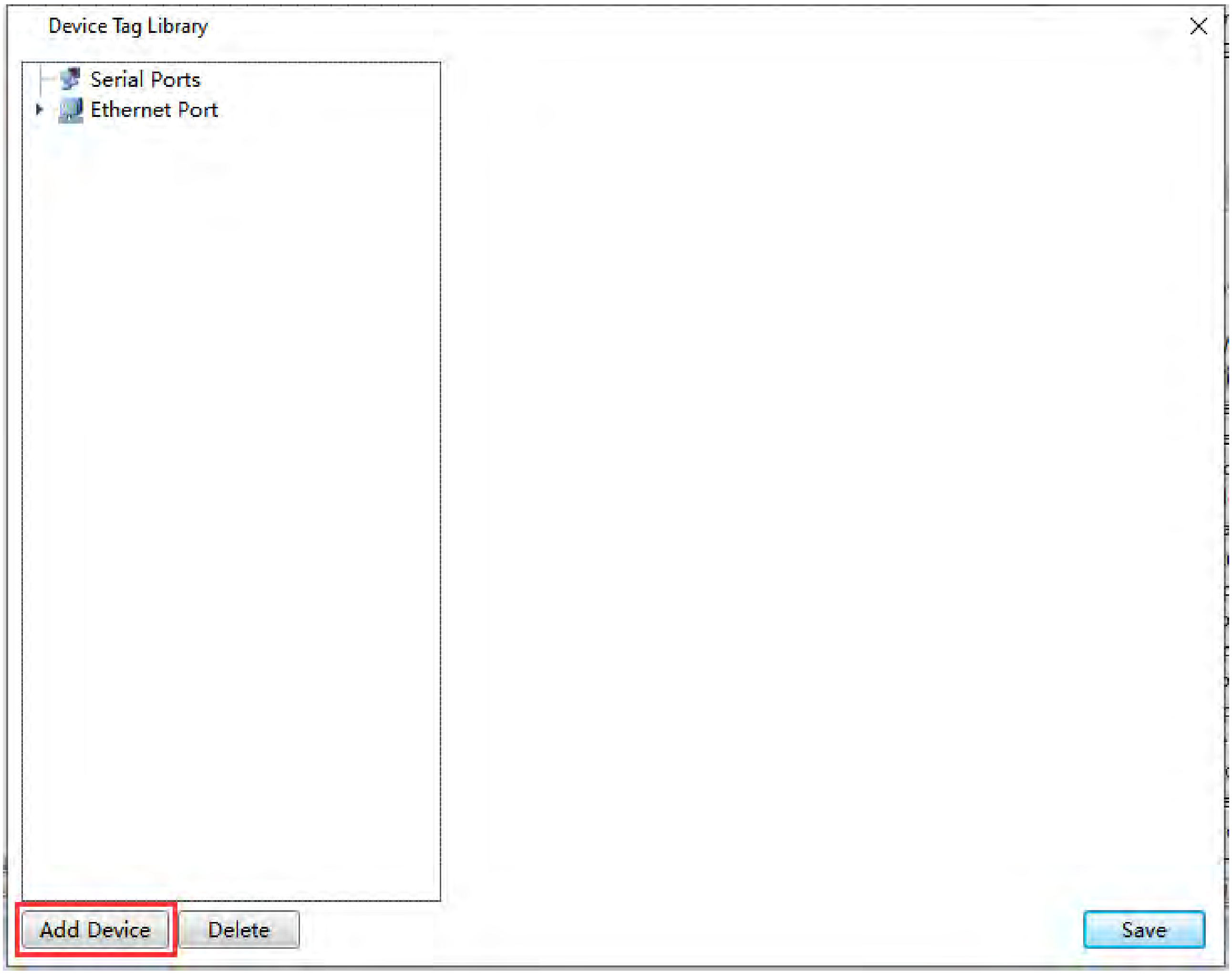
Step 3. Configure relevant parameters in the pop-up dialog box, click **OK**.



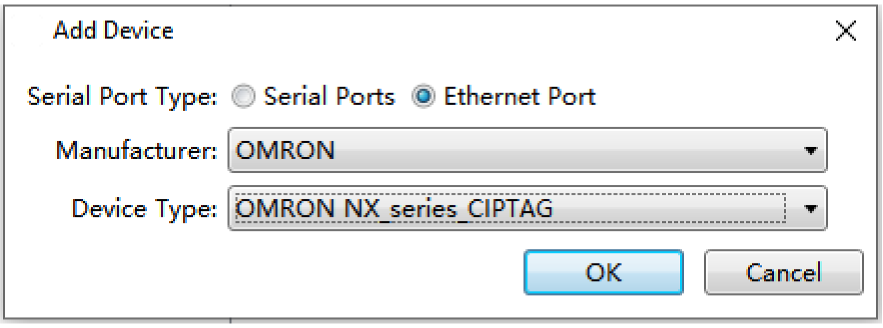
Step 4. Click **OK** in the **Communication Connection** dialog box.

Step 5. Add device tag.

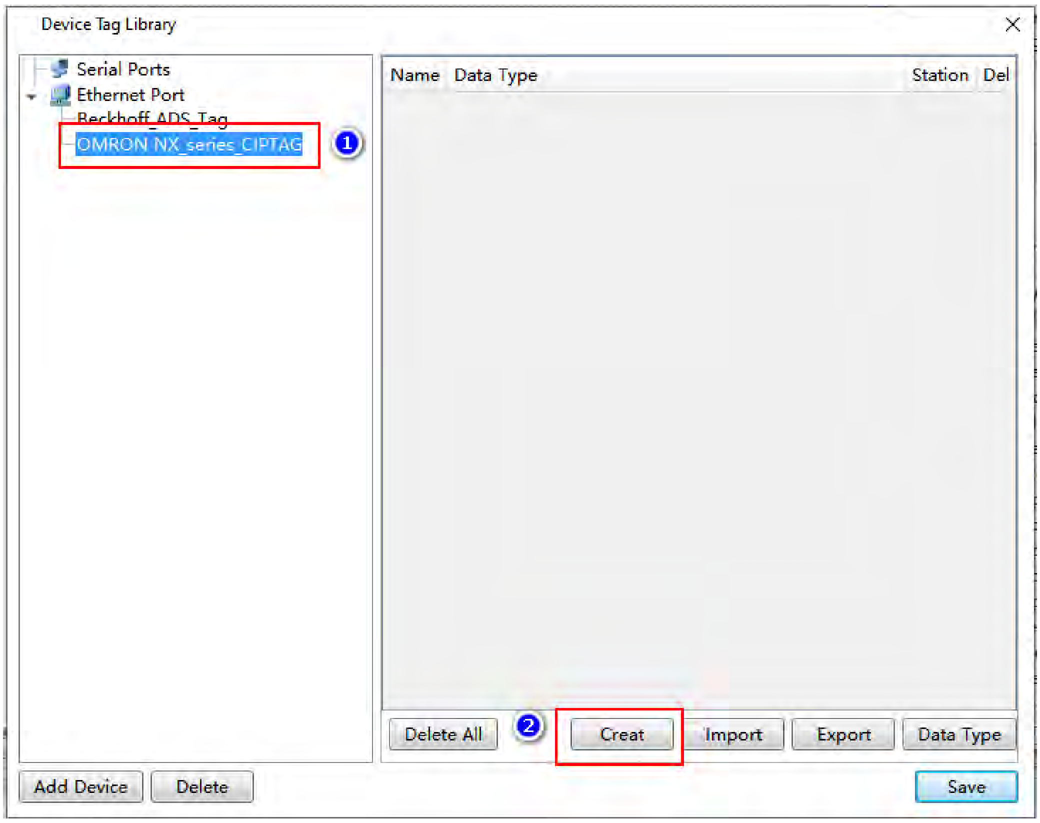
1) Select **Library/Device Tag Library** from the menu bar, click **Add Device** in the pop-up dialog box.



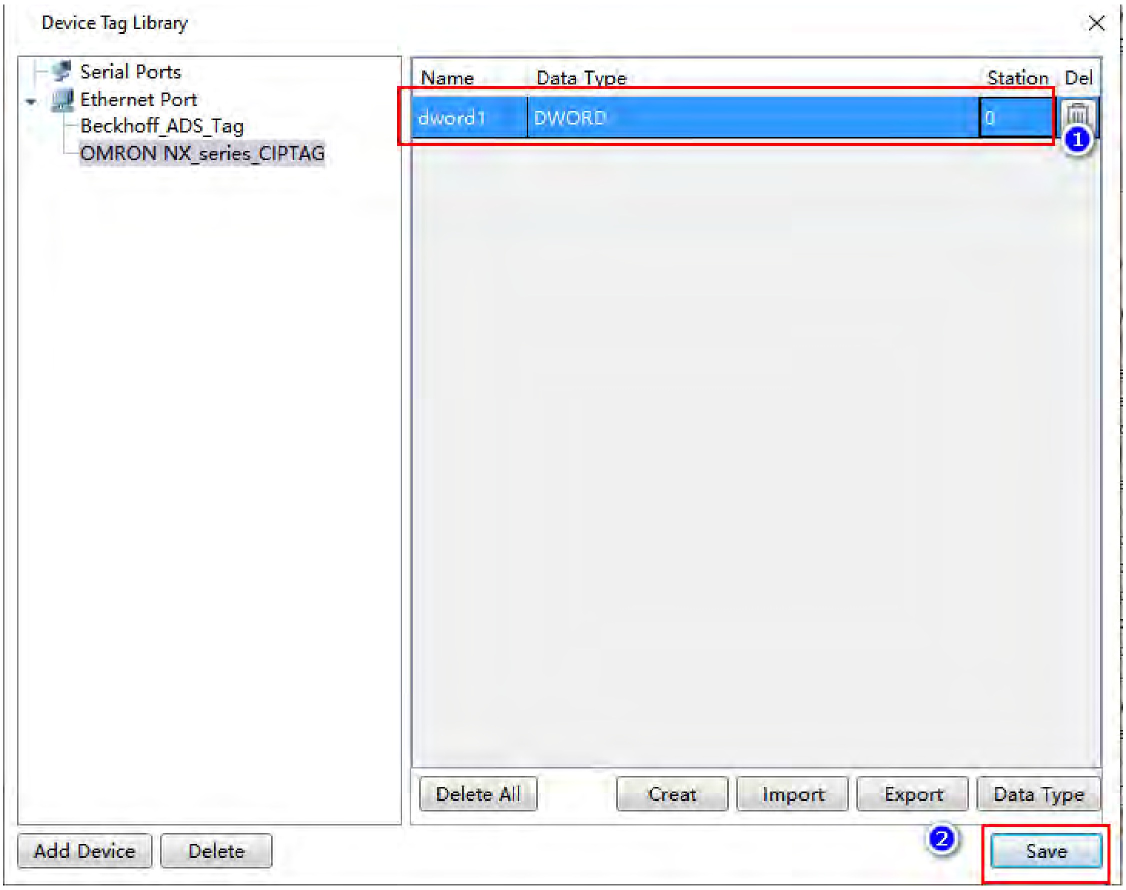
2) Configure relevant parameters in the pop-up dialog box, click **OK**.



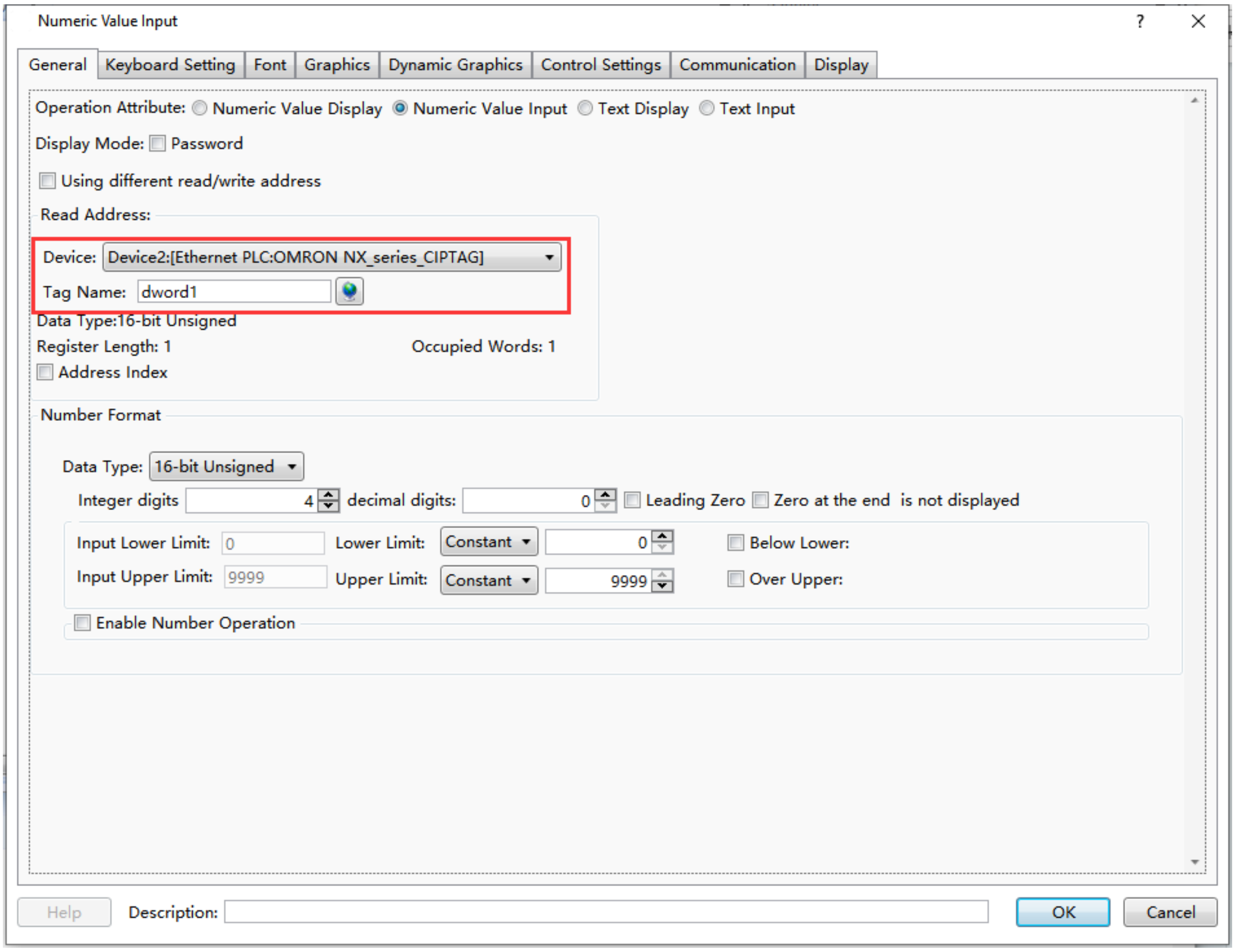
3) Select the added device, click **Create**.



4) In the pop-up dialog box, set the tag parameters and click **Save** (make sure to keep the tag name consistent with the one used in the PLC).



Step 6. Select **Component/Numeric Value and Text Diaply/Numeric Value Display** from the menu bar, set address to PLC tag in the pop-up dialog box.



Step 7. After designing the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

17.5.5 Ethernet Communication Between HMI and OMRON CJ2M PLC

Connect the Ethernet port of the HMI and the Ethernet port of the OMRON CJ2M PLC using an Ethernet cable. Alternatively, establish communication between the two devices through a switch.

17.5.5.1 Connection Method

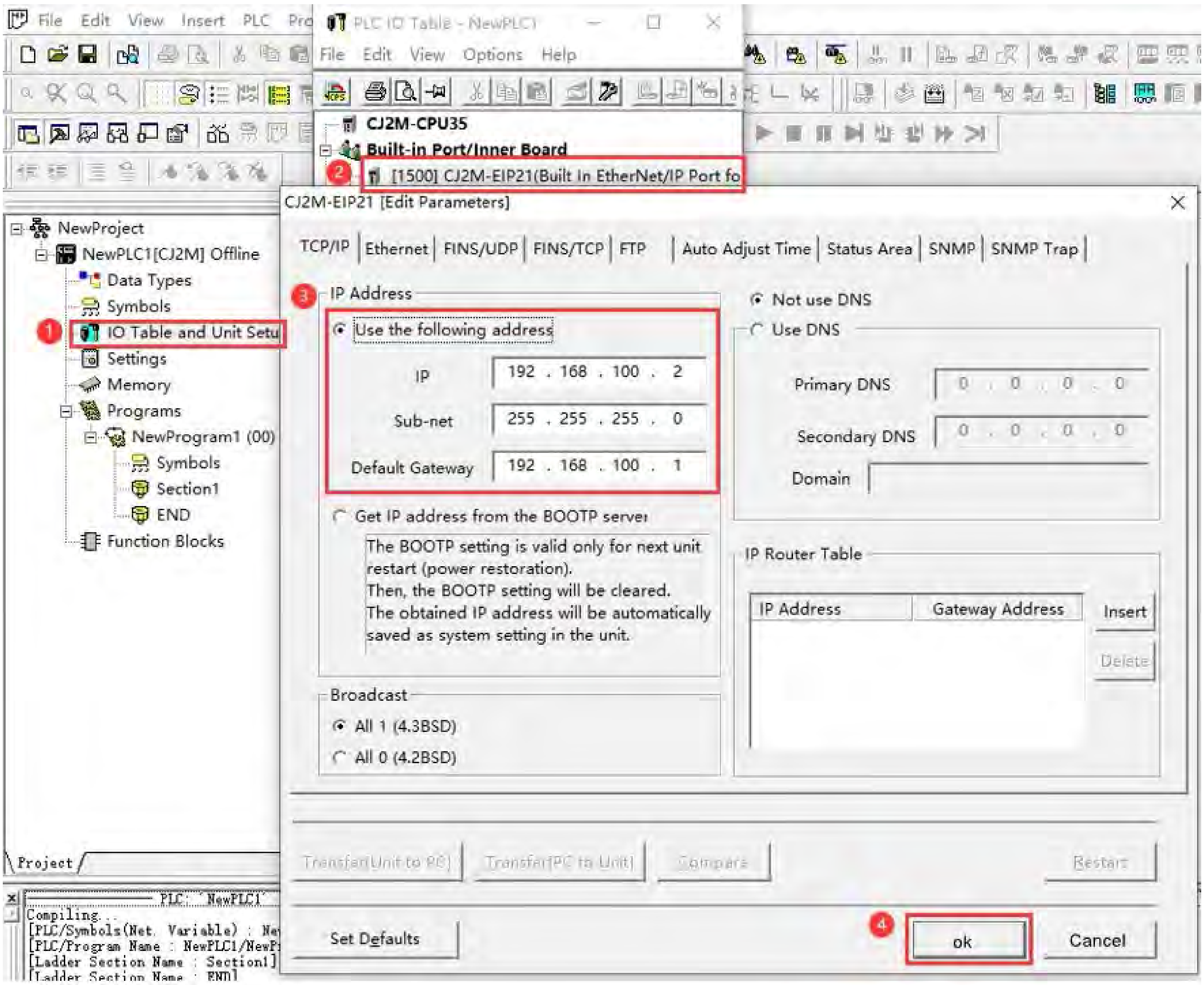
Please refer to Connection Method.

17.5.5.2 Configure PLC

Step 1. Run PLC configuration software, click **IP Table and Unit Setting** in the **Project** area.

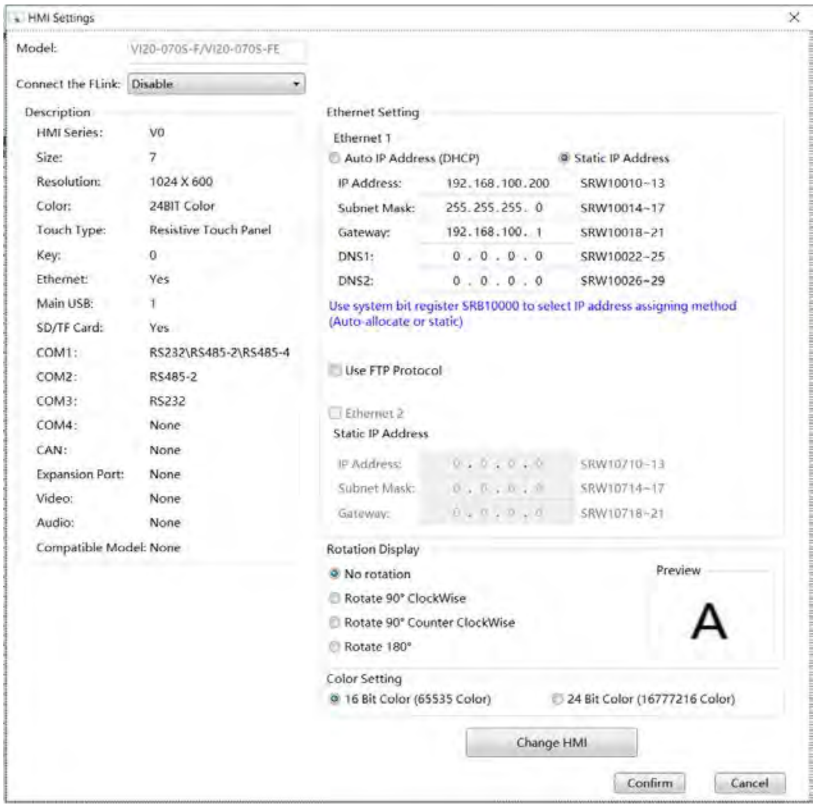
Step 2. Select **Built-in Port/Inner Board** in the pop-up **PLC IO Table** dialog box, double click **(Built In EtherNet/IP for CJ2M)**.

Step 3. Set the IP address, subnet mask, gateway in the pop-up **Edit Parameter** dialog box, click **OK**.

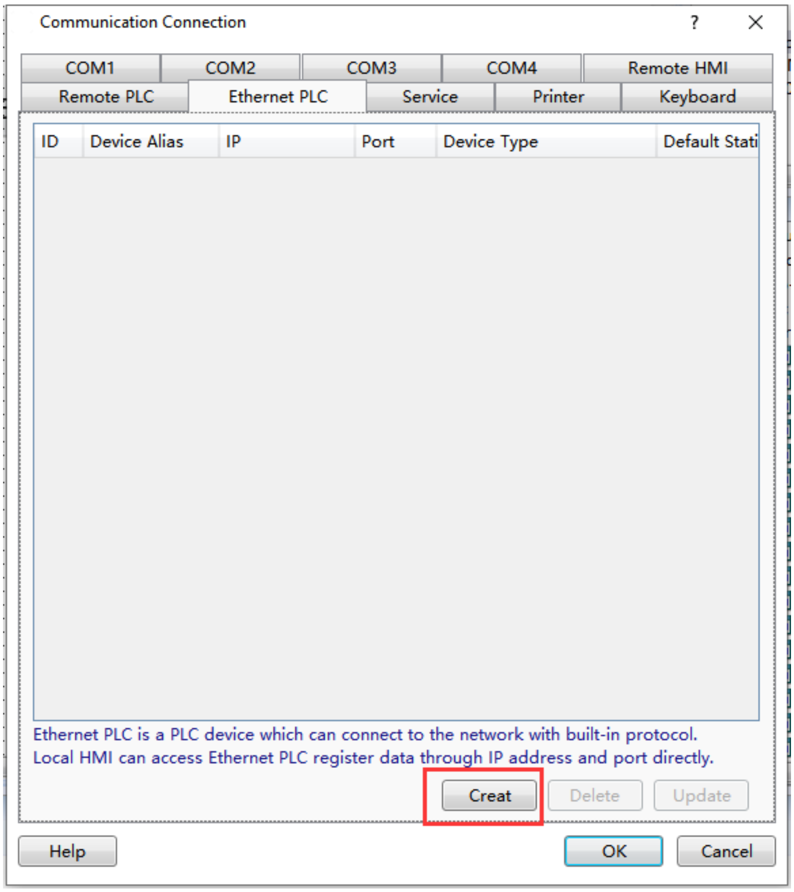


17.5.5.3 Configure HMI

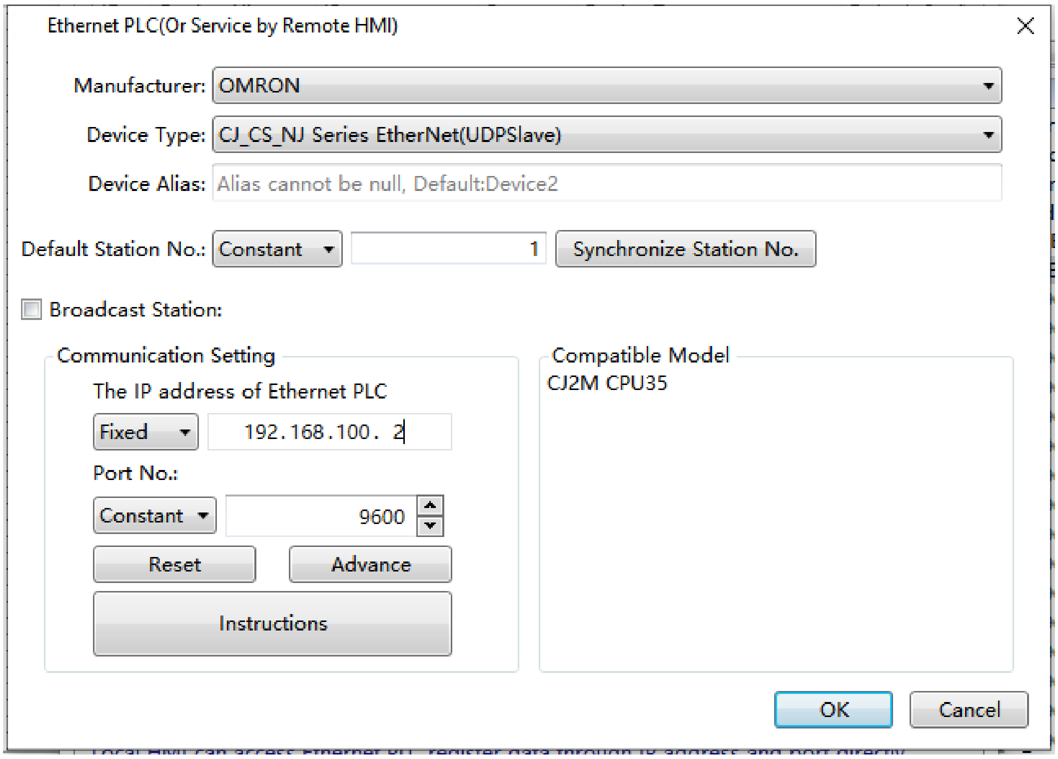
Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI (to be in the same network segment as the IP adress of PLC) in the pop-up dialog box, click **Confirm**.



Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select the **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.

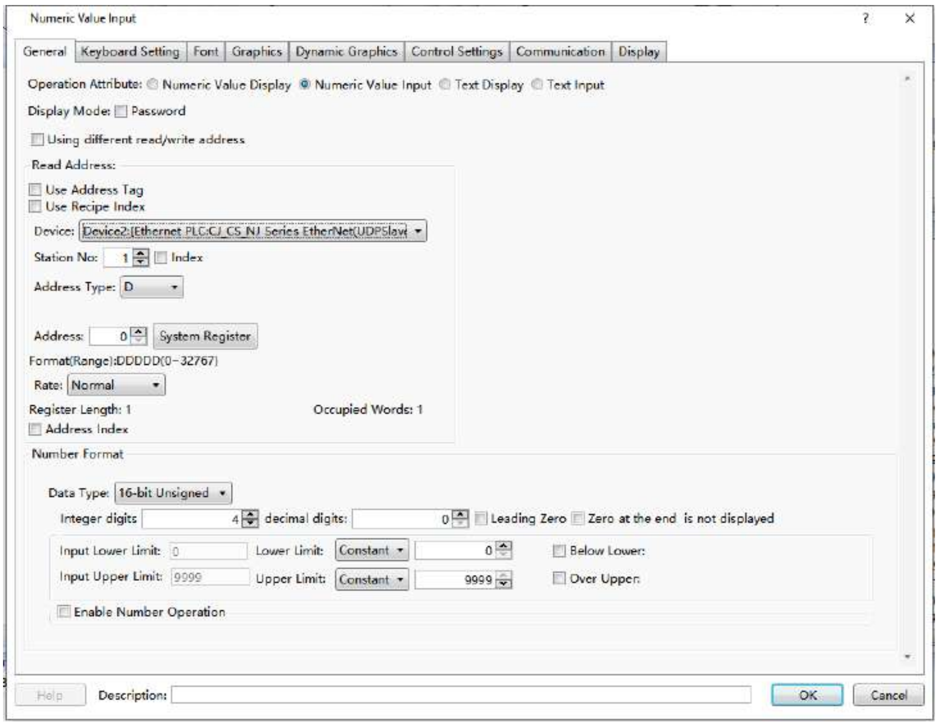


Step 3. Configure relevant parameters in the pop-up dialog box, click **OK**.



Step 4. Click **OK** in the **Communication Connection** dialog box.

Step 5. Select **Component/Numeric Value and Text Diaply/Numeric Value Input** from the menu bar, set address to PLC address in the pop-up dialog box (keep consistent with actual situation).



Step 6. After configuring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

17.5.6 Communication Between HMI and OMRON CP1W-CIF41 Ethernet Module

The OMRON CP1W-CIF41 Ethernet module needs to be installed on the corresponding PLC. For HMI models that have an Ethernet port, you can use an Ethernet cable to connect the HMI's Ethernet port to the CP1W-CIF41 module.

17.5.6.1 Connection Method

Please refer to Connection Method.

17.5.6.2 Configure PLC

The default IP address of the CP1W-CIF41 module is 192.168.250.1/24. To adapt to the actual network environment, the IP address of the PLC is usually required to change. This article takes the CP1H model PLC as an example.

Step 1. Put the CP1W-CIF41 module in the CP1H slot 1, set the dial switch 4 to ON, and other dial switches to OFF.

If the CP1W-CIF41 module is located in the CP1H slot 2, you need to set the dial switch 5 to ON and other dial switches to OFF.

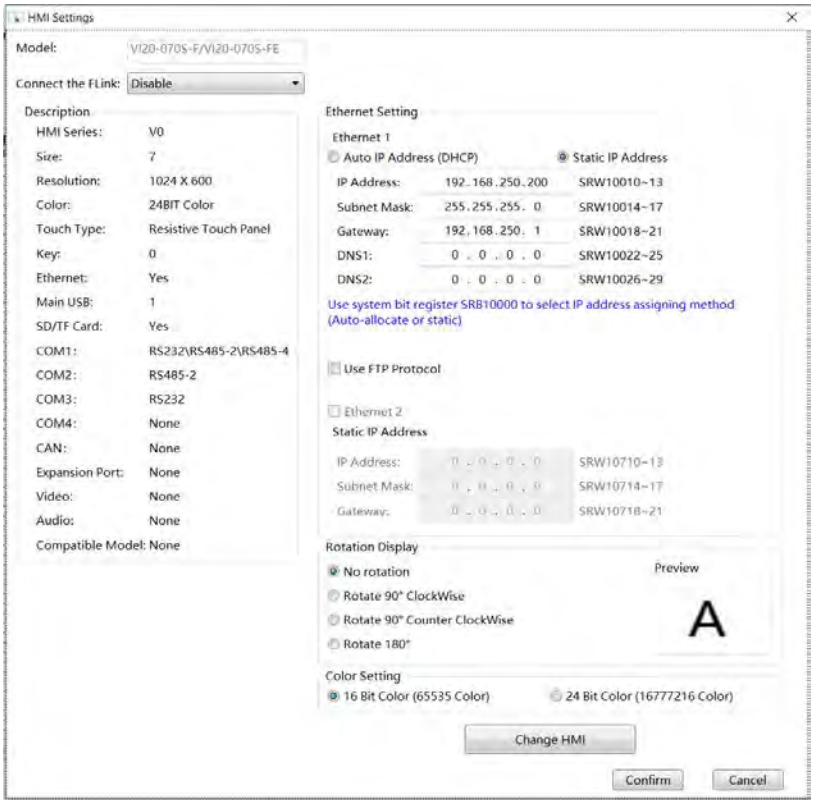
Step 2. Set the IP address of the PC to 192.168.250.1/24 to other IPs in the same network segment. Use cable to connect the port of the PC and the CP1H-CIF41 module.

Step 3. Enter http://192.168.250.1/c01.htm in the browser address bar and press Enter to enter the following page, modify the IP address, click **Transmission**.

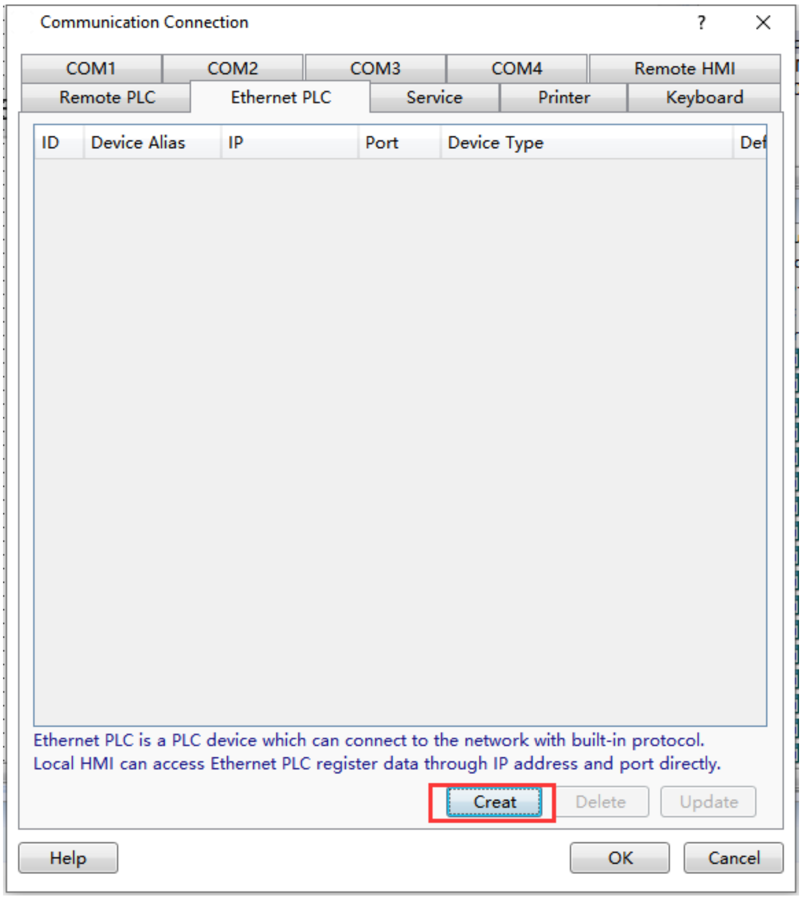
Step 4. Restart PLC.

17.5.6.3 Configure HMI

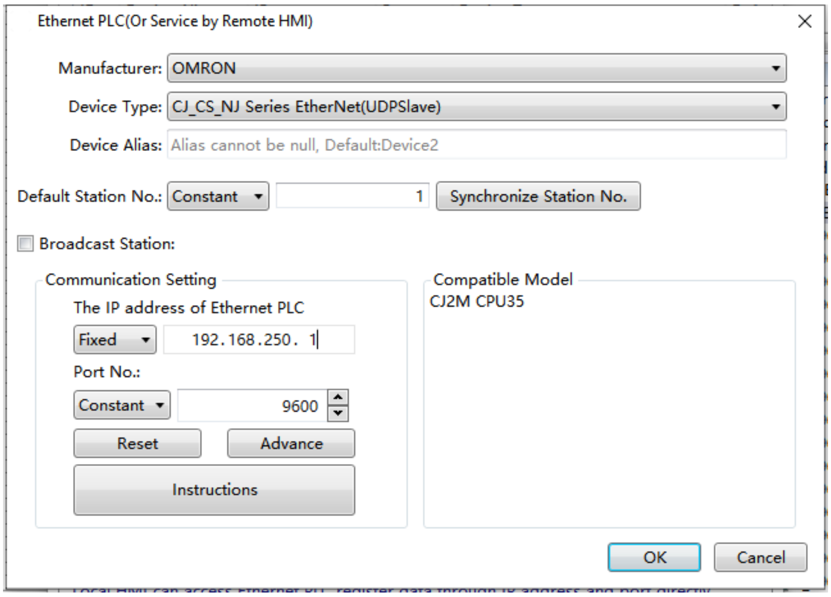
Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI (to be in the same network segment as the IP address of PLC) in the pop-up dialog box, click **Confirm**.



Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select the **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.

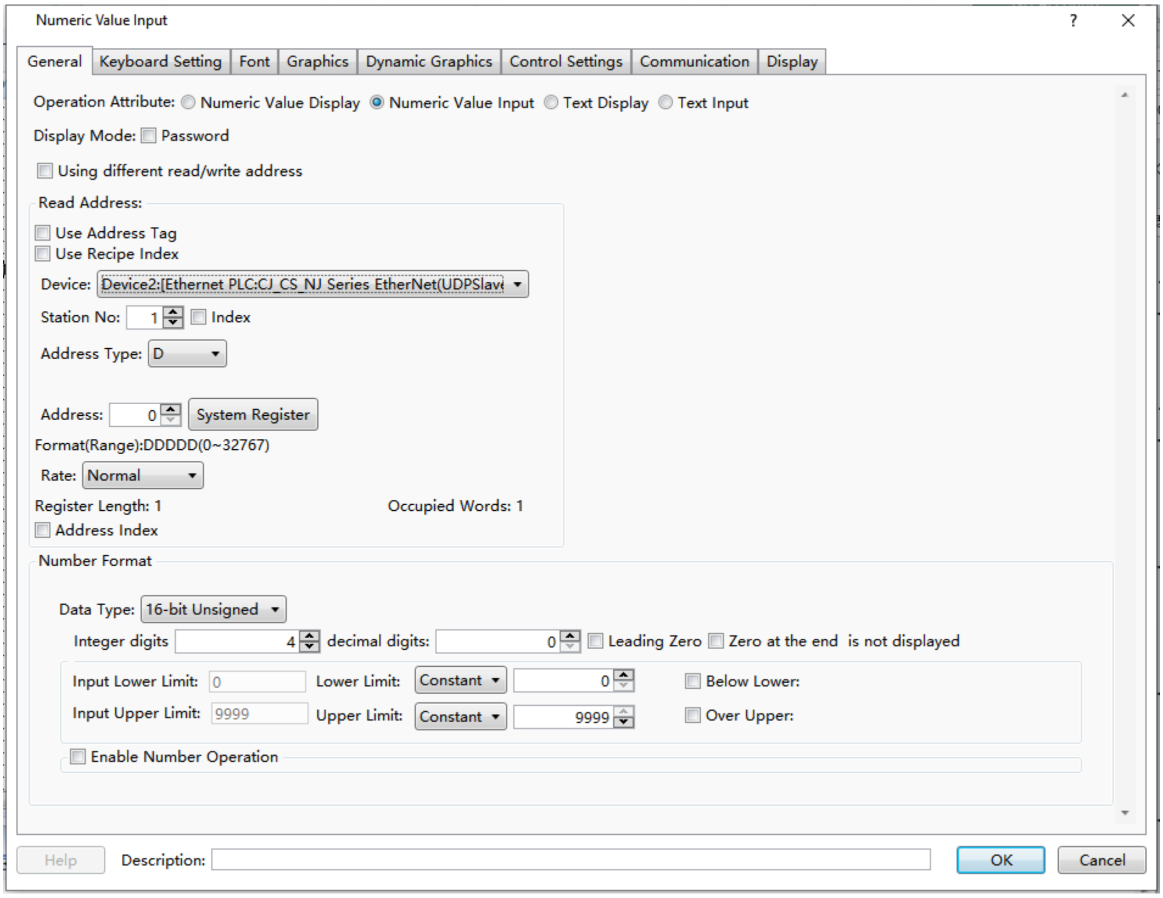


Step 3. Configure relevant parameters in the pop-up dialog box as shown in the figure below, click **OK**.



Step 4. Click **OK** in the **Communication Connection** dialog box.

Step 5. Select **Component/Numeric Value and Text Diaply/Numeric Value Input** from the menu bar, set address to PLC address in the pop-up dialog box (keep consistent with actual situation).



Step 6. After configuring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

17.5.7 Ethernet Communication(Variable Tag) Between HMI and OMRON NJ1500 PLC

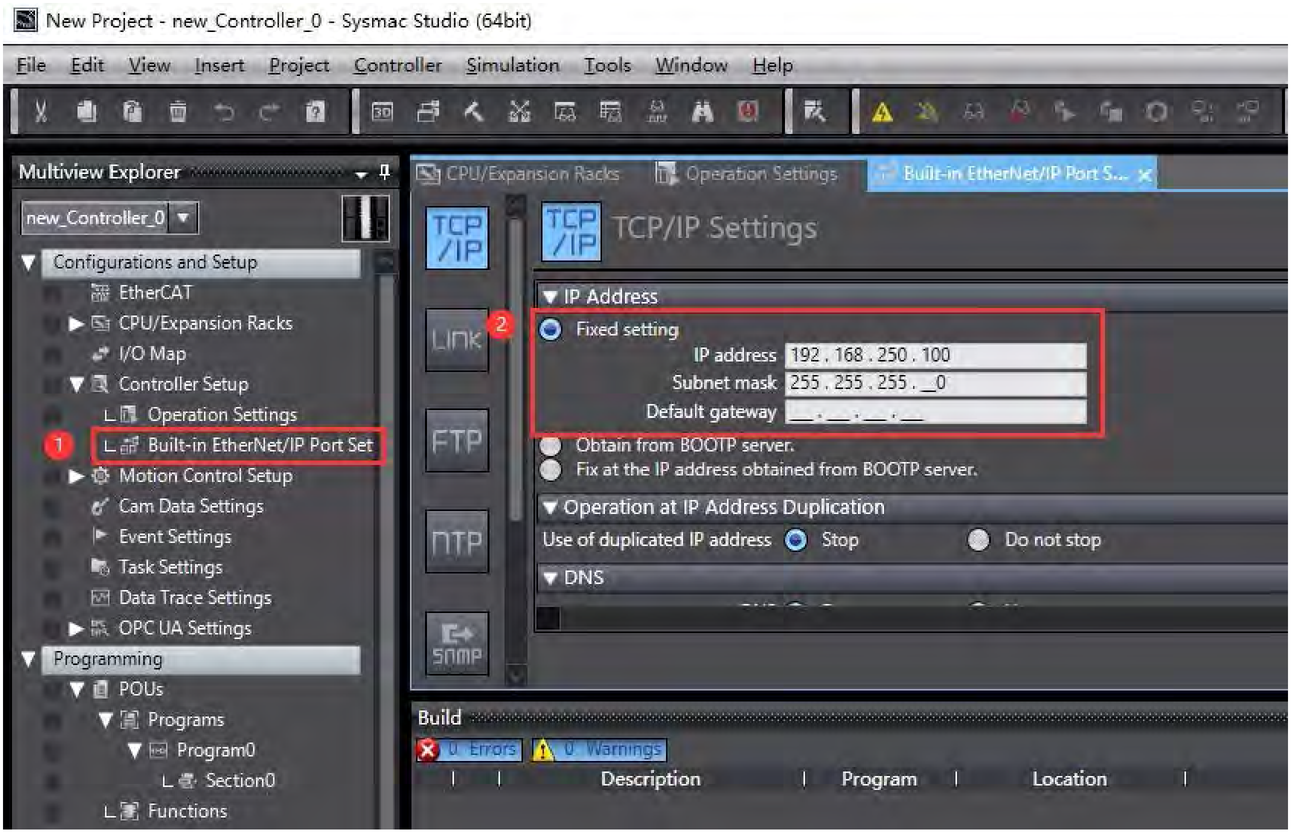
HMI supports Ethernet communication with the OMRON NJ1500 PLC and is capable of recognize the variable tags of the OMRON NJ1500 PLC.

17.5.7.1 Connection Method

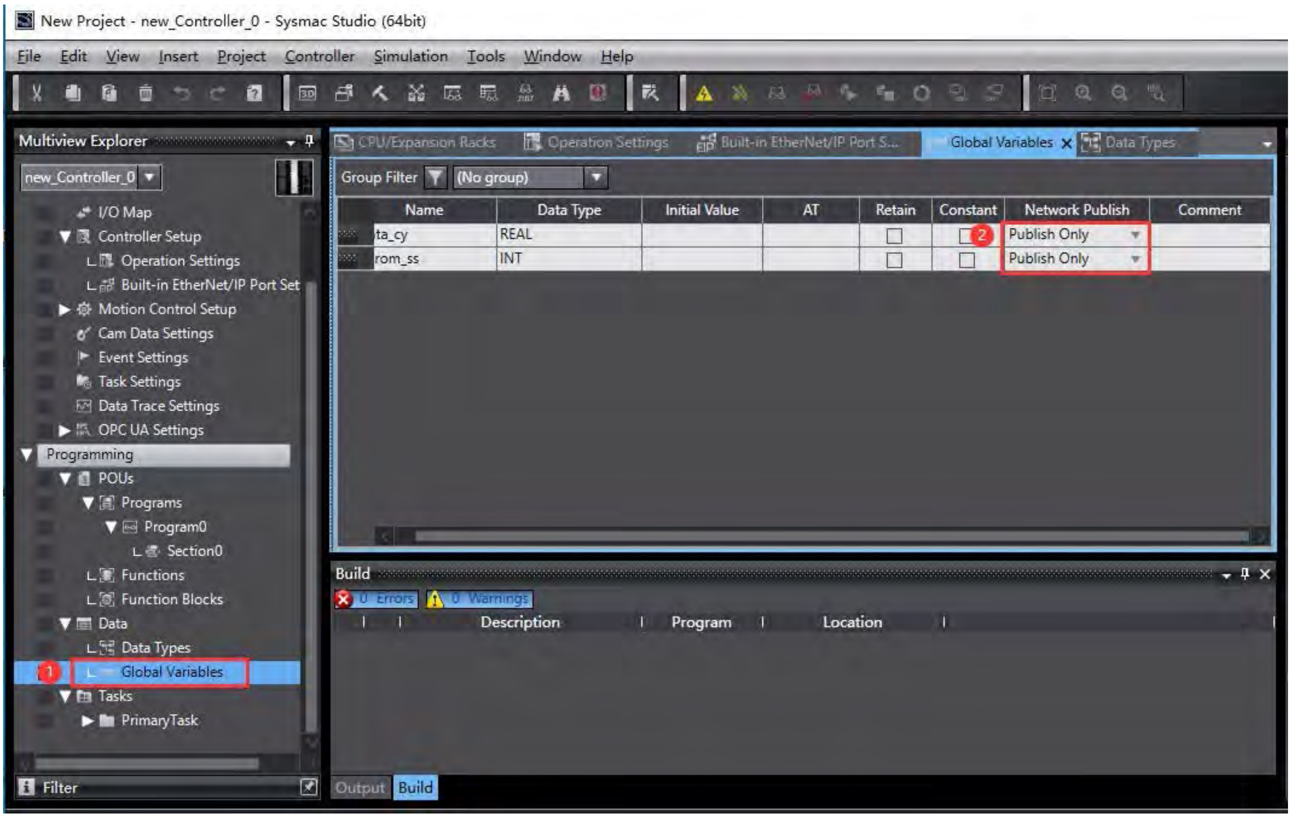
Connect the Ethernet port of the HMI to the Ethernet port of the OMRON NJ1500 PLC using an Ethernet cable. For specific connection methods, please refer to Connection Method.

17.5.7.2 Configure PLC

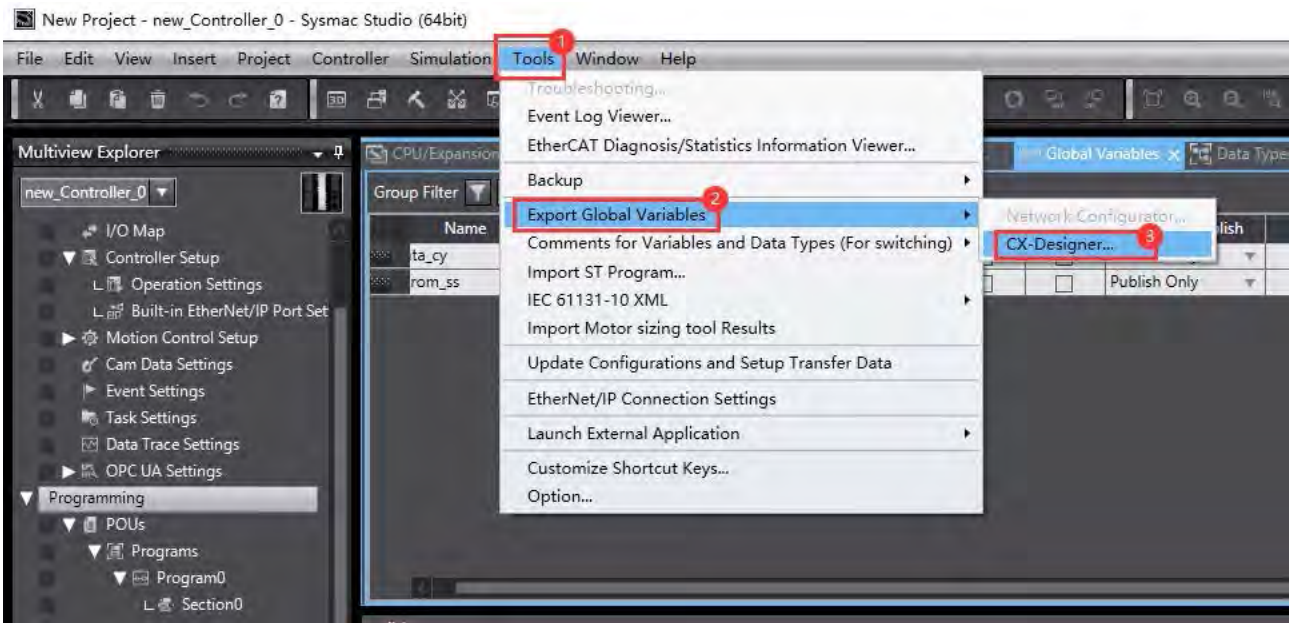
Step 1. Run OMRON PLC configuration software, set the IP address of PLC as shown in the figure below.



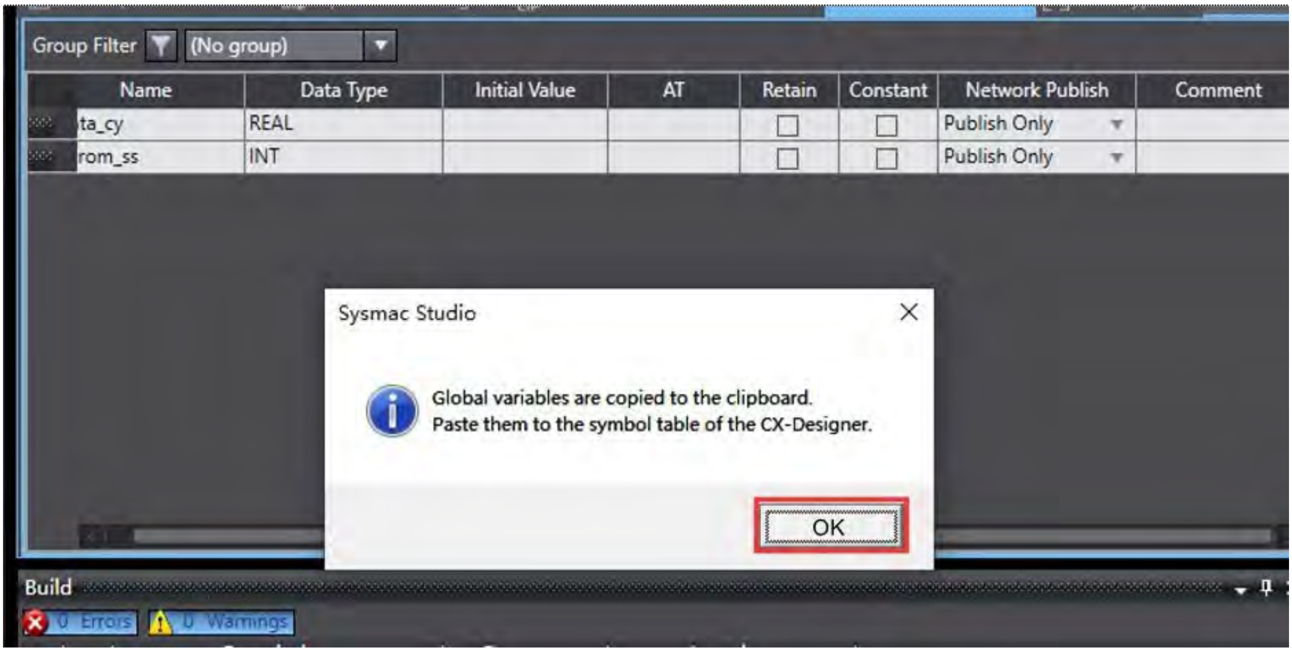
Step 2. Set the Global variable properties as “Publish only” in **Network Publish**.



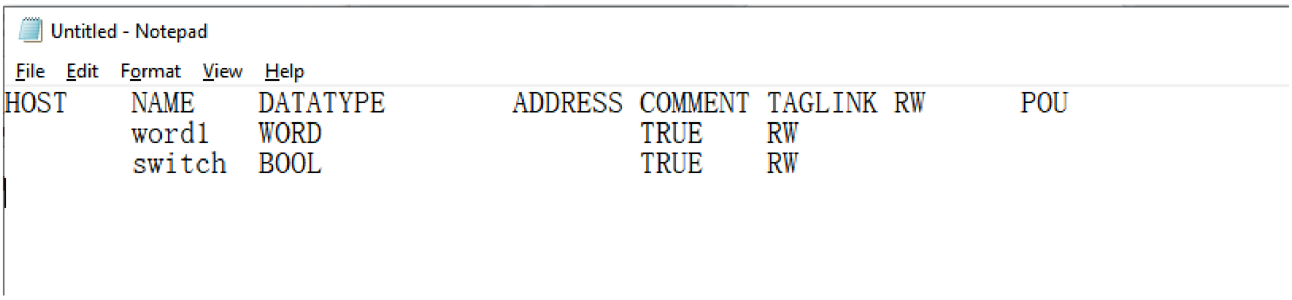
Step 3. Select **Tools/Export Global Variables/CX-Designer**.



Step 4. Click **OK** in the pop-up dialog box, copy the variable tag to clipboard.

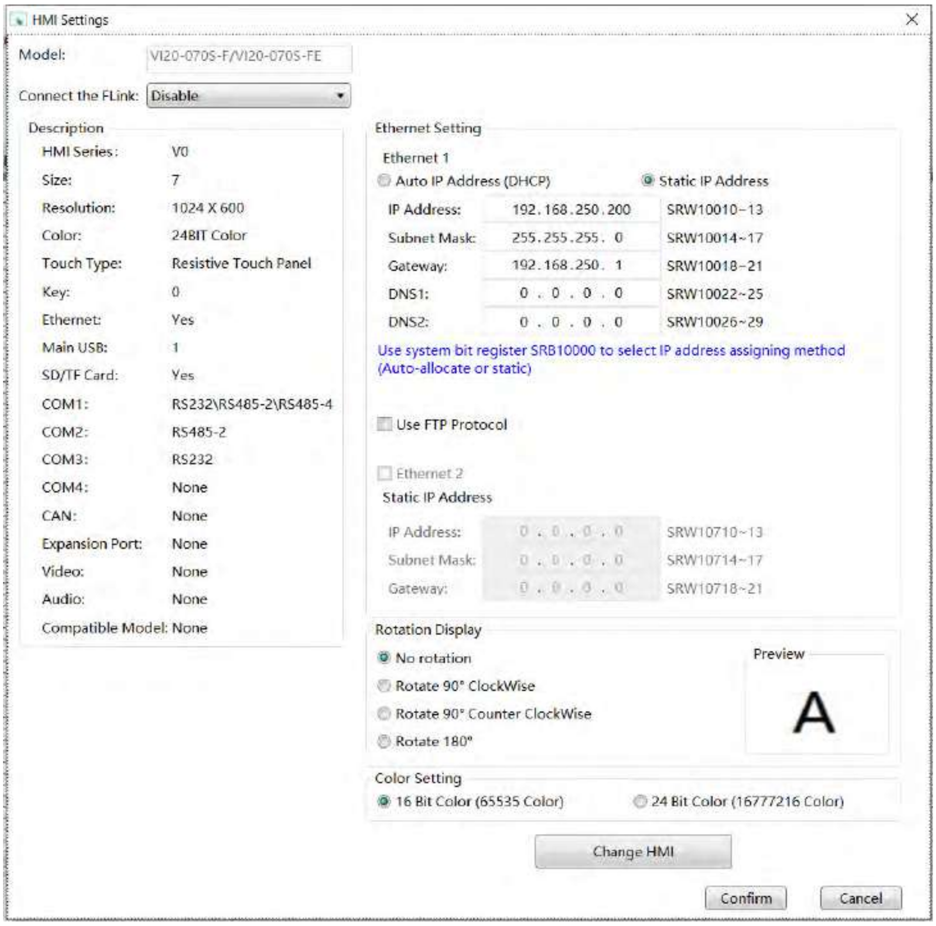


Step 5. Create text file (.txt format), paste the variable tag, save file.

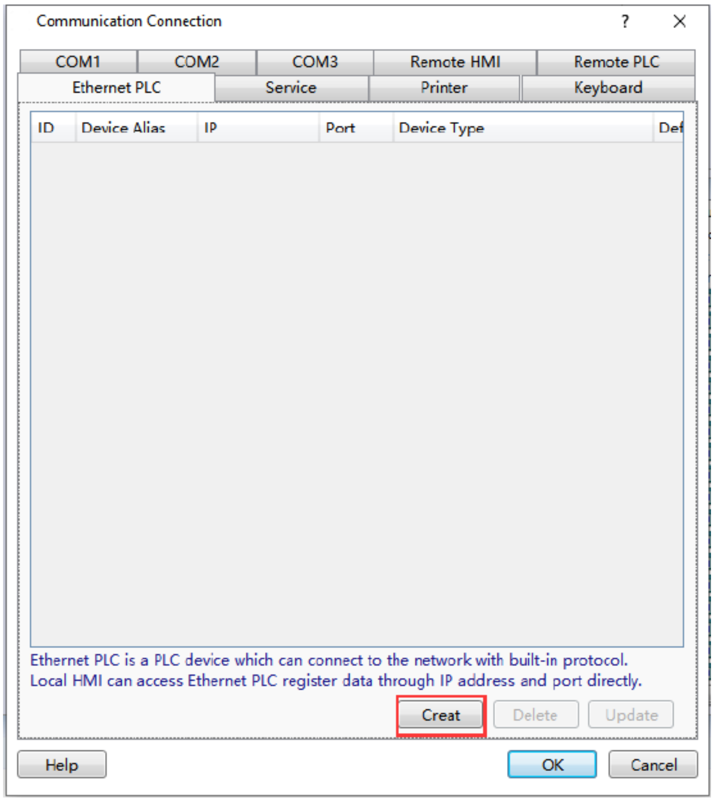


17.5.7.3 Configure HMI

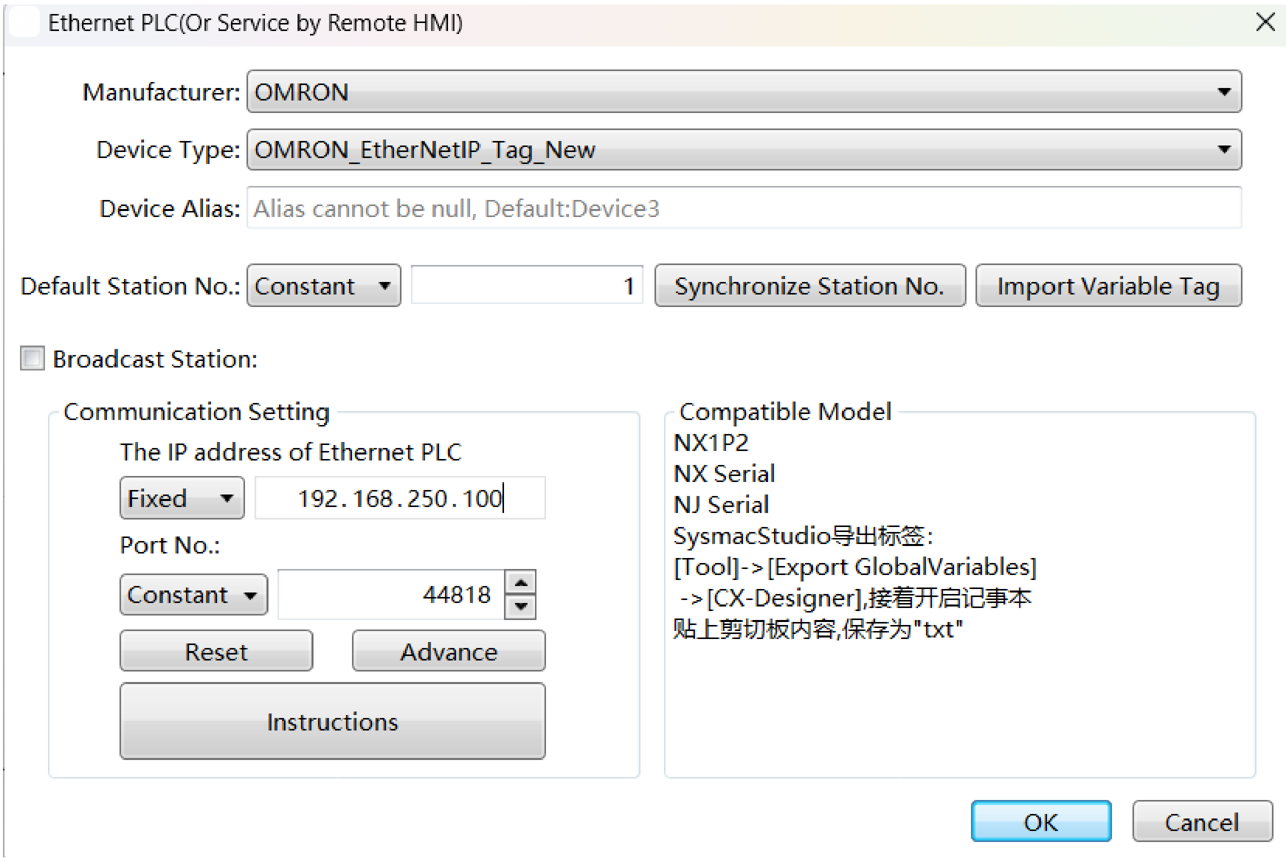
Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI (to be in the same network segment as the IP address of PLC), click **Confirm**.



Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select the **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.



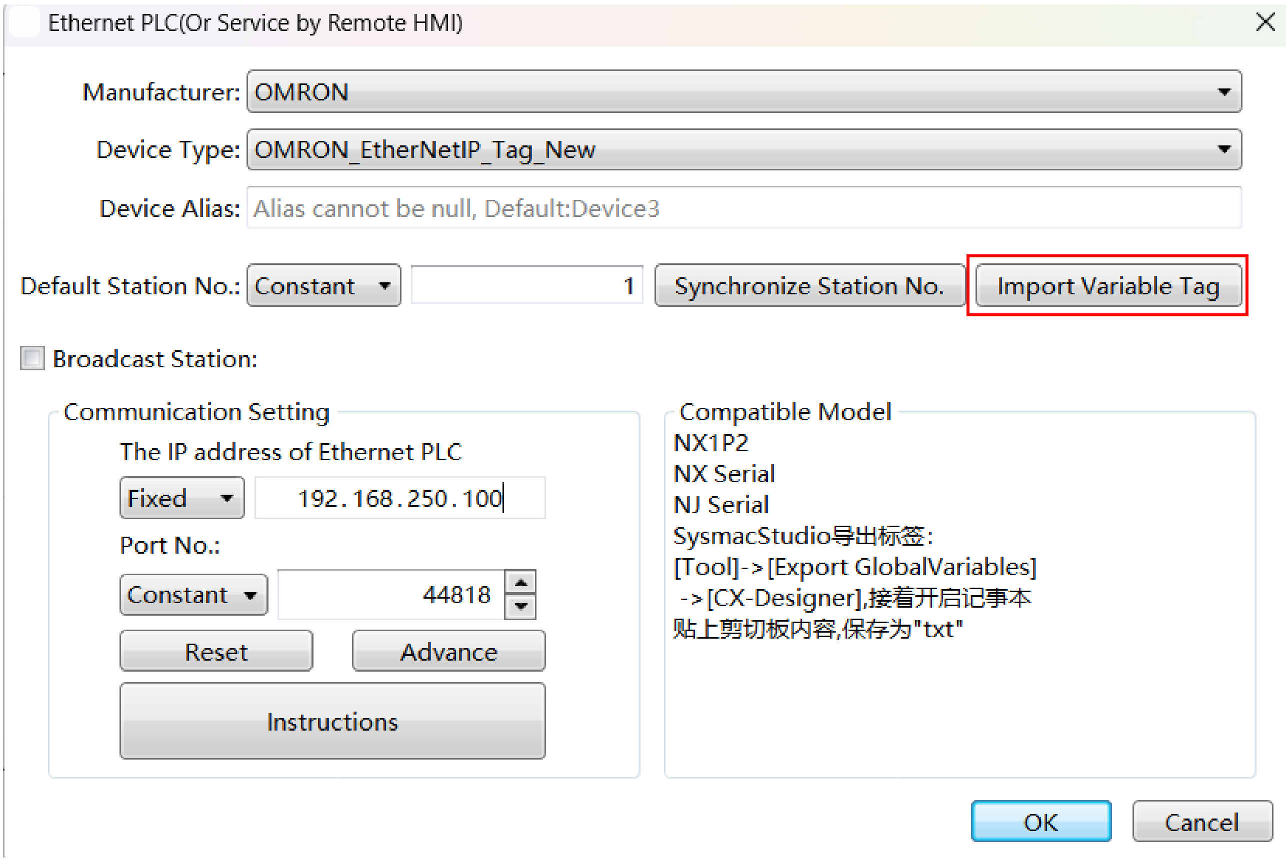
Step 3. Configure relevant parameters in the pop-up dialog box, click **OK**.



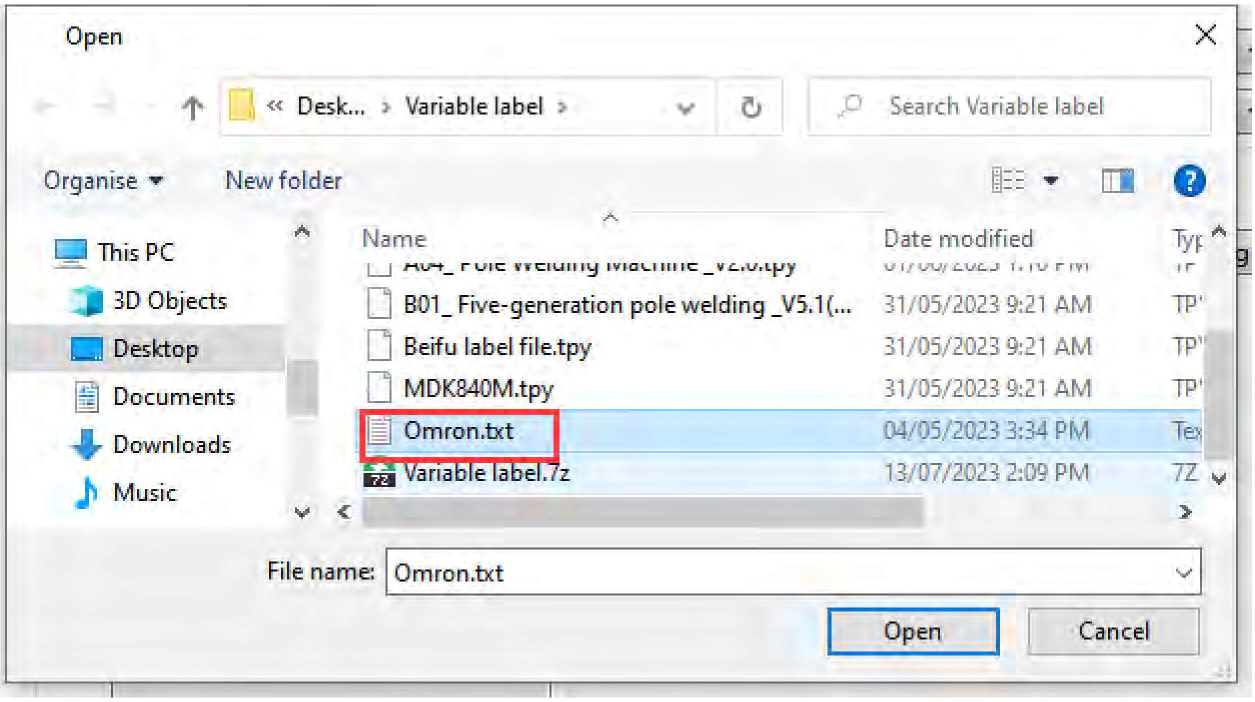
Please refer to the table below for detailed configuration methods.

Parameter	Description
Manufacturer	Select “OMRON “.
Device Type	Select “OMRON_EthernetIP_Tag_New”.
IP Address of Network PLC	Please refer to the actual situation.
Port No.	Use default value 44818.

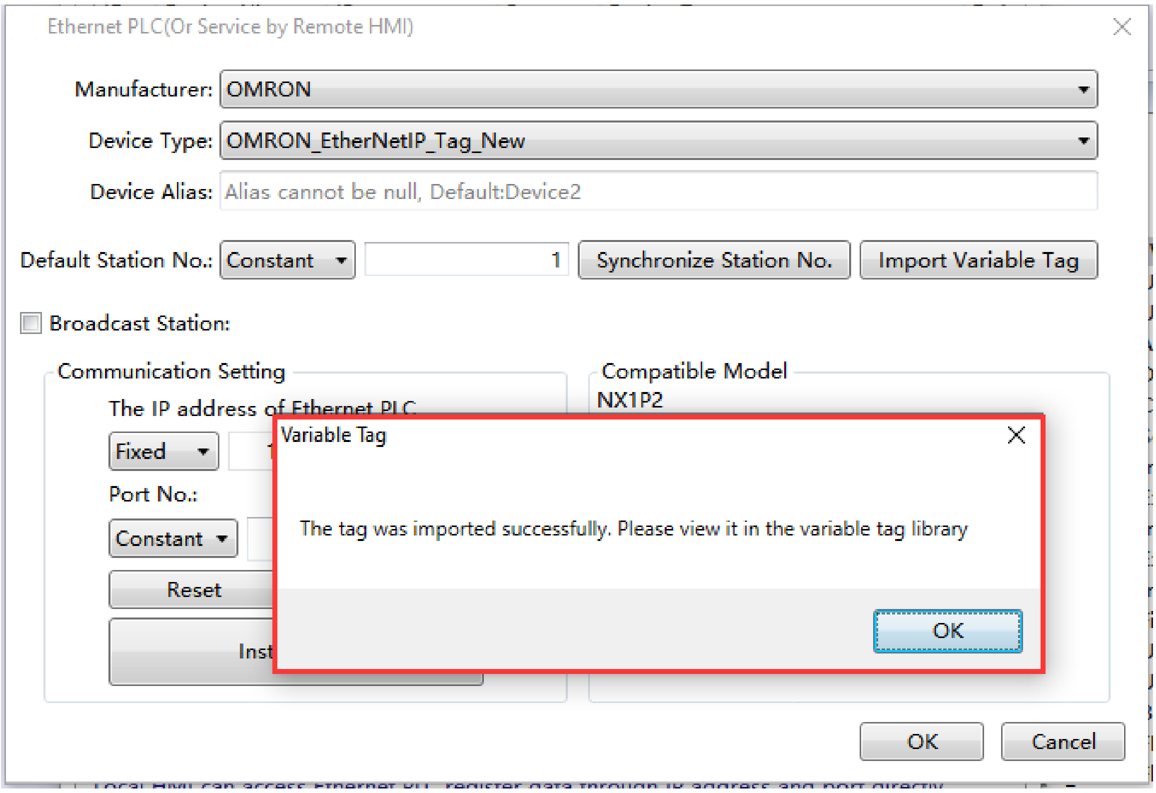
Step 4. Click **Import Variable Tag**.



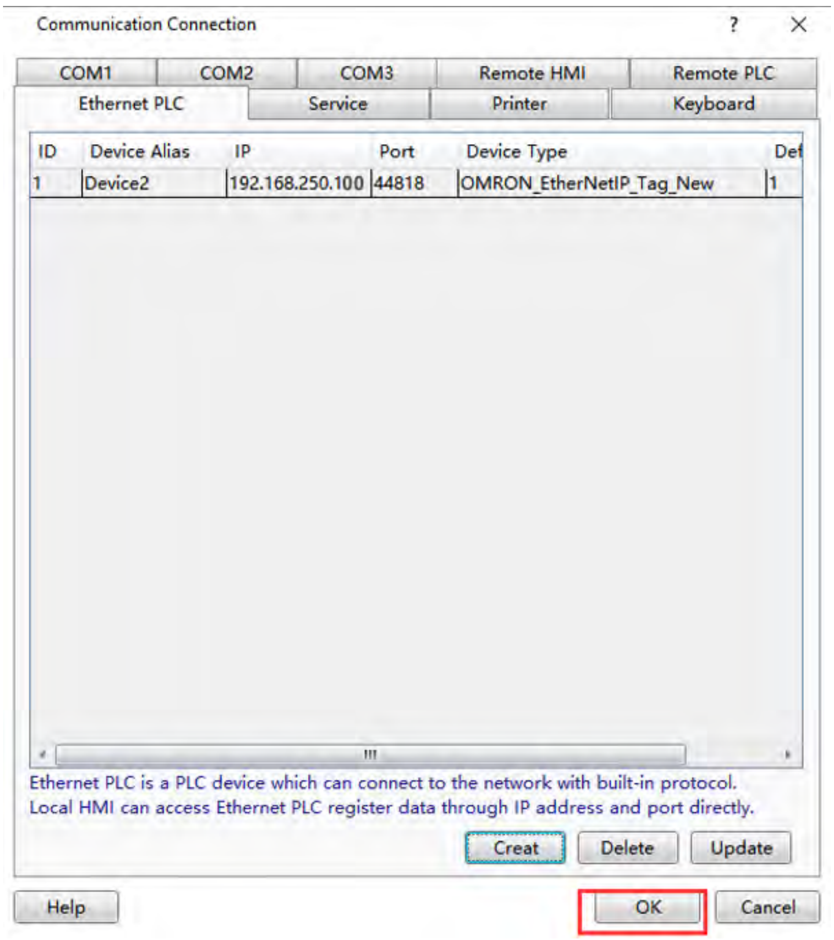
Step 5. Select OMRON PLC variabel tag file (.txt format) in the pop-up dialog box, click **Open**.



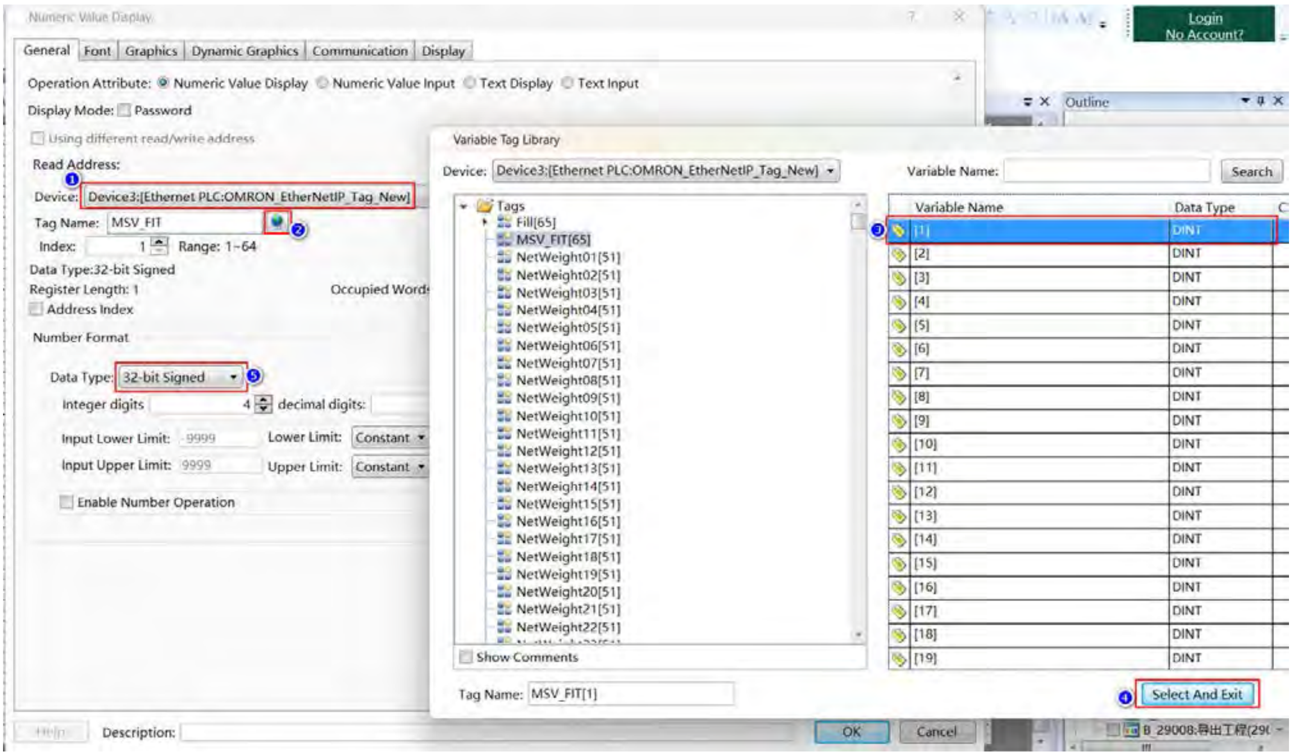
Step 6. After importing variable tag, click **OK** in the pop-up dialog box.



Step 7. Click **OK**.



Step 8. Select **Component/Numeric Value and Text Display/Numeric Value Display** from the menu bar. Set the read address in the pop-up **Numeric Display** dialog box (select OMRON PLC for device, click the icon, select the variable tag in the pop-up **Variable Tag Library** dialog box, click **Select and Exit**. Set the data type (consistent with the data type of variable tags) in the **Numeric Value Display** dialog box.



Step 9. After the numeric value display component is completed, download project to HMI. If the value of PLC variable tag can be read, it means the communication is working.

17.6 Mitsubishi PLC

17.6.1 Serial Communication Between HMI and Mitsubishi F2XN PLC

HMI can communicate with Mitsubishi F2XN PLC through serial port, support the RS232 protocol and RS485-4 (RS422) protocol.

17.6.1.1 Connection Method

- When using RS232 protocol for communication, connect the COM1 port of the HMI to the serial port of the Mitsubishi F2XN PLC using a dedicated Mitsubishi serial cable.
- When using RS485-4 protocol for communication, connect the COM1 port of the HMI to the serial port of the Mitsubishi F2XN PLC using RS485-4 cable. Please refer to the table below for connection method.

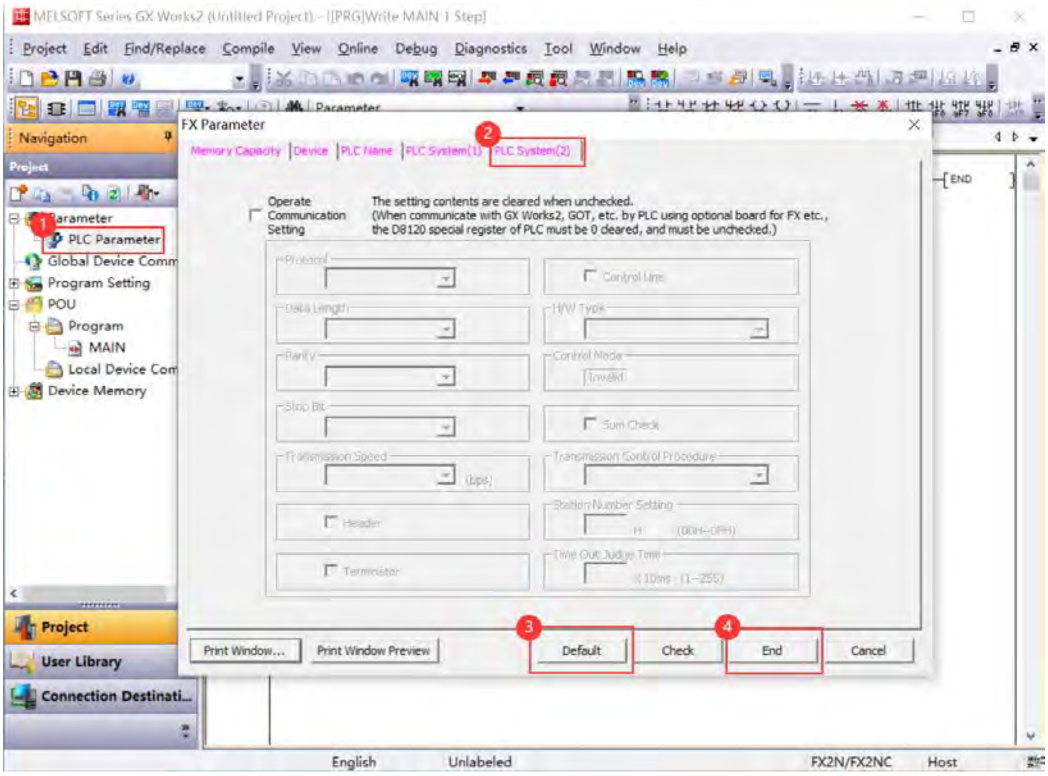
HMI COM1 Port	**PLC Serial Port**
1 RX-	4 TX-
6 RX+	7 TX+
5 GND	3 GND
4 TX-	1 RX-
9 TX+	2RX+
	

17.6.1.2 Configure PLC

Step 1. Run PLC configuration software, Select **Project/Parameters/PLC Parameters** in the left navigation pane.

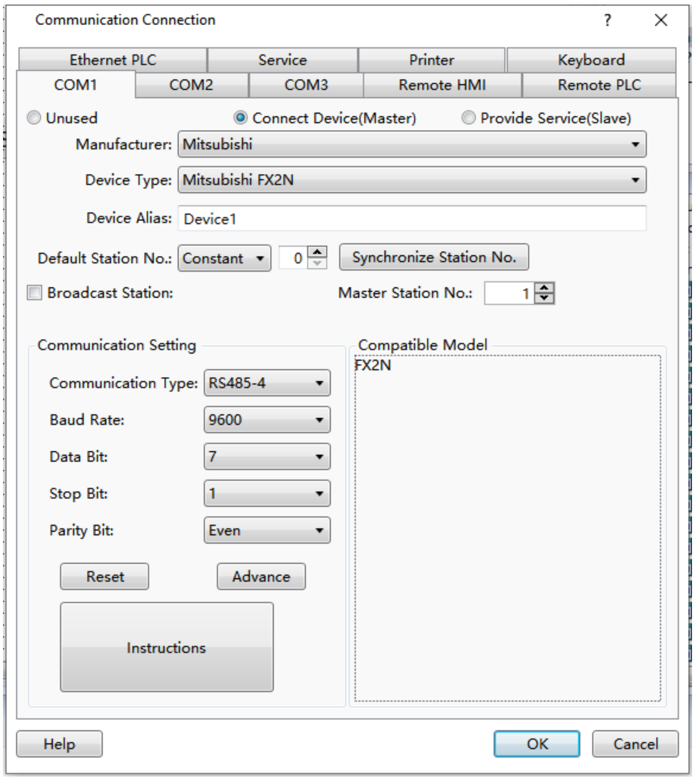
Step 2. Select the **PLC System Settings (2)** tab in the pop-up dialog box, click **Deful**t, click **End**.

Step 3. Restart PLC after power off.

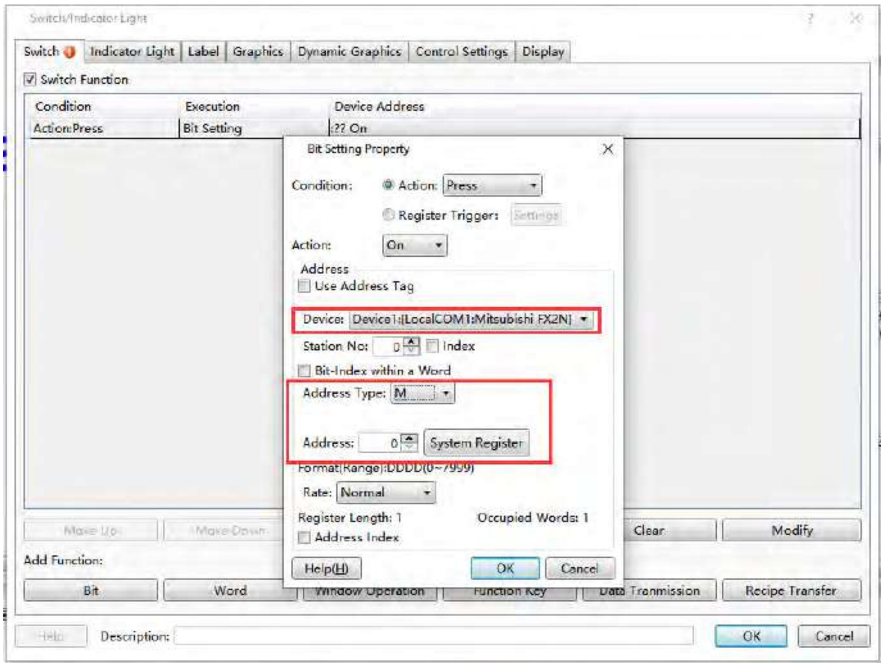


17.6.1.3 Configure HMI

Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select **COM1** tab in the pop-up dialog box, configure relevant parameters (you can choose RS232 or RS485-4 for **Communication Type**, other parameters please refer to the figure below), click **OK**.



Step 2. Select **Component/Switch/Bit Set** from the menu bar, set the PLC address in the pop-up dialog box (to be consistent with the actual situation).



Step 3. After configuring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

17.6.2 Serial Communication Between HMI and Mitsubishi FX3U/FX3G PLC

Mitsubishi FX3U/FX3G PLC serial port is an 8-pin serial port, it supports RS232 and RS485-4(RS422) communication protocol.

17.6.2.1 Connection Method

- When using RS232 protocol for communication, connect the COM1 port of the HMI to the serial port of the Mitsubishi FX3U/FX3G PLC using a dedicated Mitsubishi serial cable.
- When using RS485-4 protocol for communication, connect the COM1 port of the HMI to the serial port of the Mitsubishi FX3U/FX3G PLC using RS485-4 cable. Please refer to the table below for connection method.

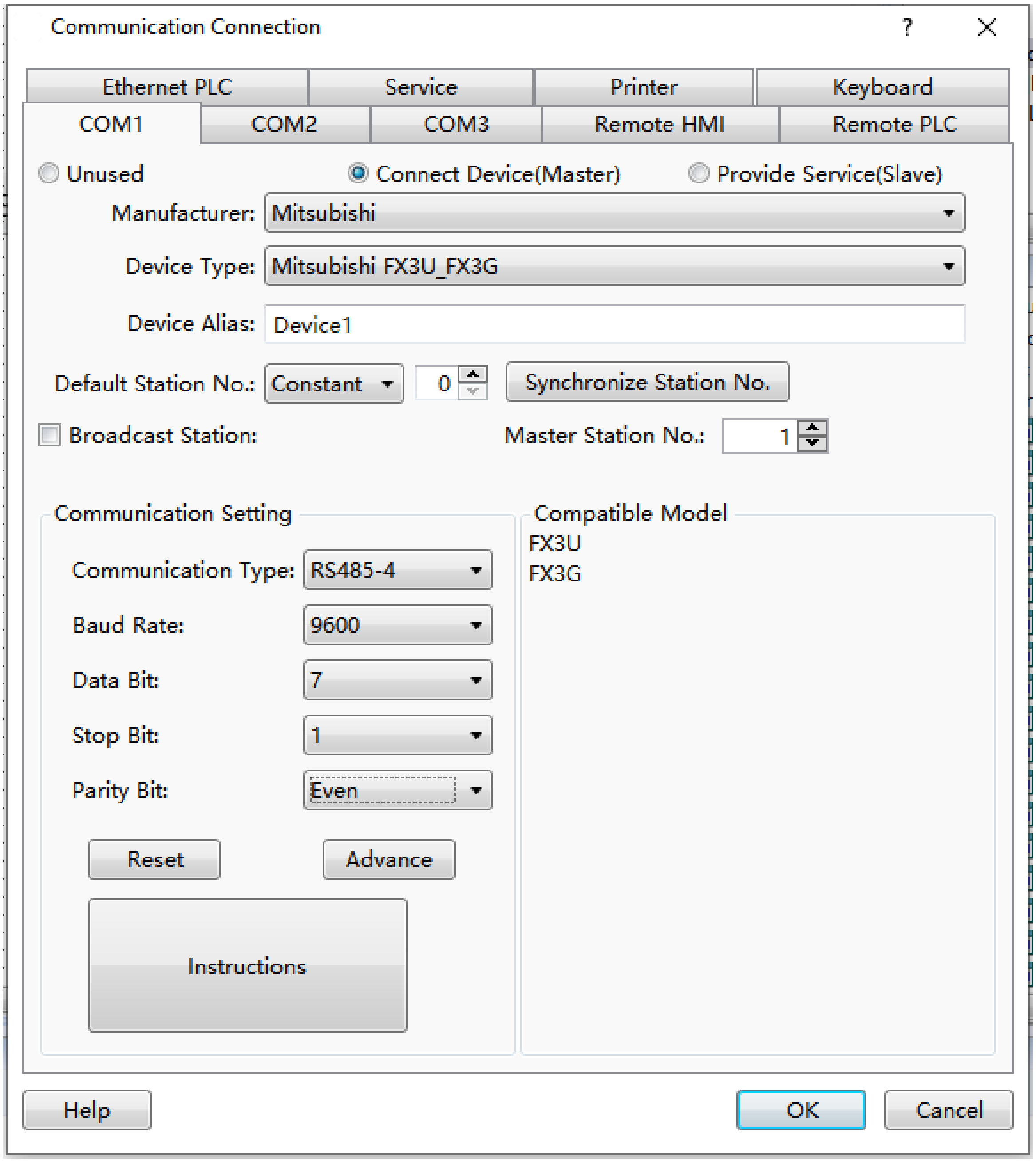
HMI COM1 Port	**PLC Serial Port**
1 RX-	4 TX-
6 RX+	7 TX+
5 GND	3 GND
4 TX-	1 RX-
9 TX+	2RX+
	

17.6.2.2 Configure PLC

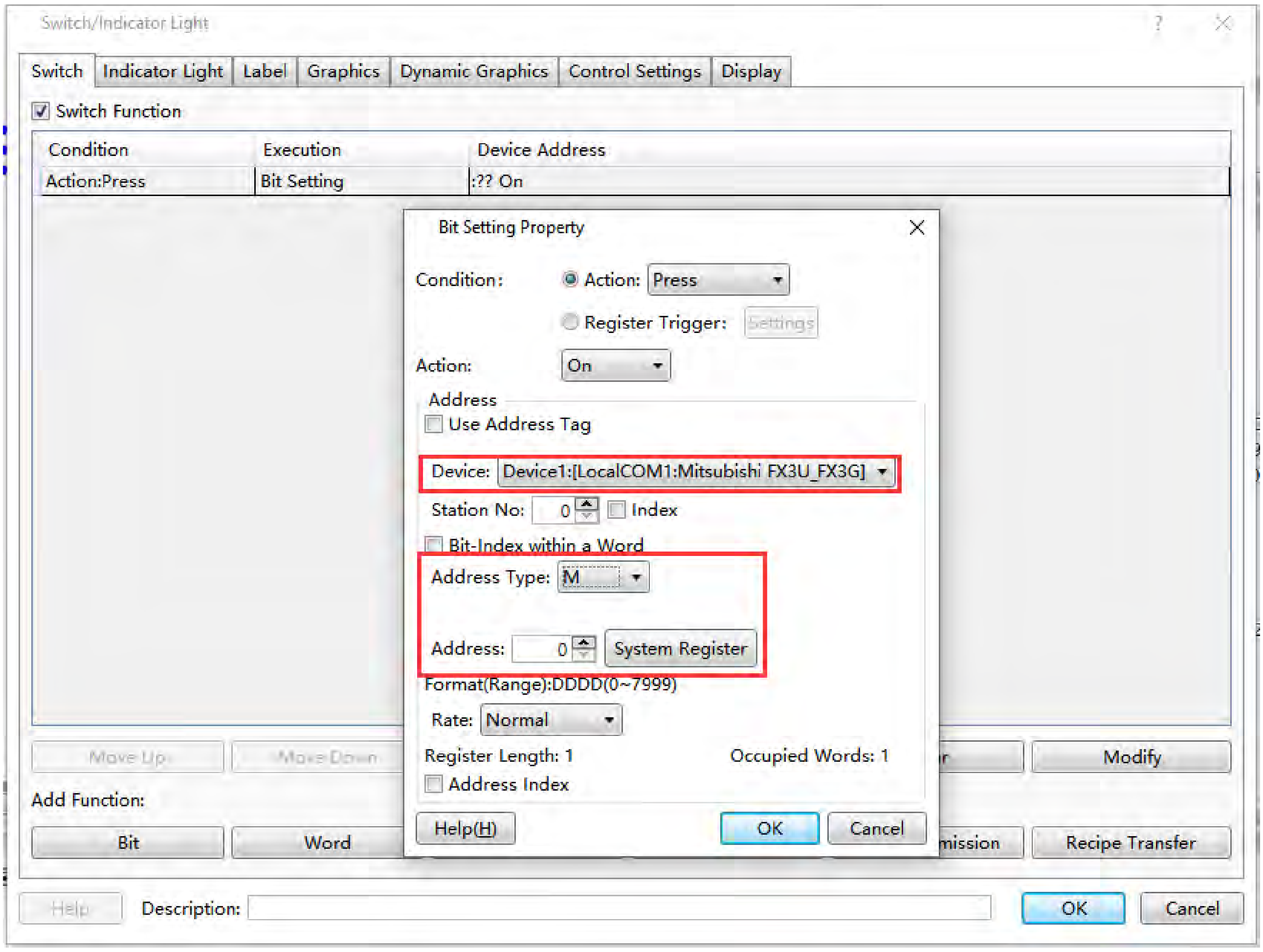
Please refer to Configure PLC.

17.6.2.3 Configure HMI

Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select **COM1** tab in the pop-up dialog box, configure relevant parameters (you can choose RS232 or RS485-4 for **Communication Type**, other parameters please refer to the picture below), click OK.



Step 2. Select **Component/Switch/Bit Set** from the menu bar, set the PLC address in the pop-up dialog box (to be consistent with the actual situation).



Step 3. After configuring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

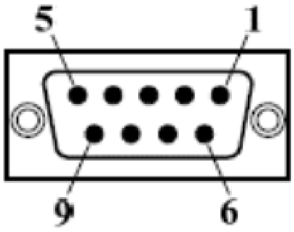
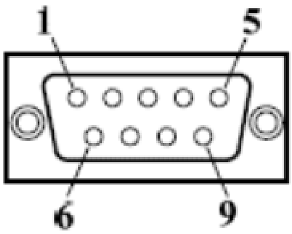
17.6.3 Serial Communication Between HMI and Mitsubishi FX3U-232BD Module

Mitsubishi FX3U-232BD module supports RS232 protocol for communication.

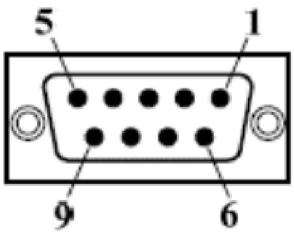
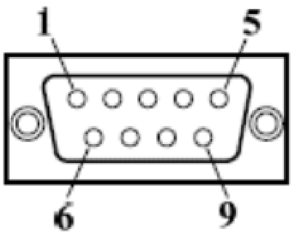
17.6.3.1 Connection Method

- Use RS232 cable to connect the COM1/COM2 port of the HMI to the serial port of the Mitsubishi FX3U-232BD module. Please refer to the table below for the connection method.

HMI COM1/COM2 Ports	PLC Serial Port
2 RX	3 TX
3 TX	2 RX
5 GND	5 GND

<table>
<tr><th>HMI COM1/COM2 Ports</th><th>PLC Serial Port</th></tr>
<tr><td>
</td><td>
</td></tr>
</table>

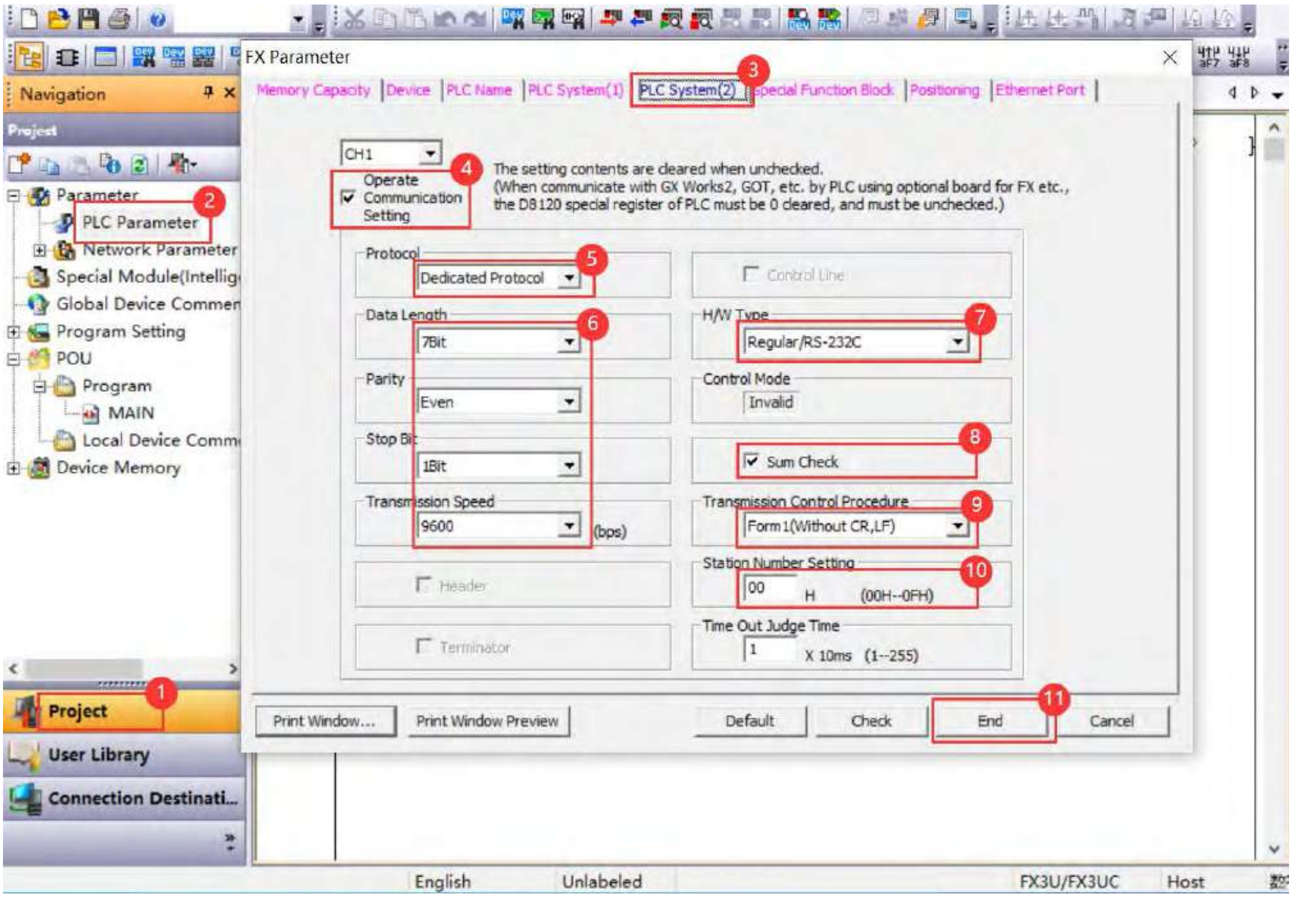
◆ Use RS232 cable to connect the COM3/COM4 port of the HMI to the serial port of the Mitsubishi FX3U-232BD module. Please refer to the table below for the connection method.

<table>
<tr><th>HMI COM3/COM4 Ports</th><th>PLC Serial Port</th></tr>
<tr><td>7 RX</td><td>3 TX</td></tr>
<tr><td>8 TX</td><td>2 RX</td></tr>
<tr><td>5 GND</td><td>5 GND</td></tr>
<tr><td>
</td><td>
</td></tr>
</table>

17.6.3.2 Configure PLC

Step 1. Run PLC configuration software, Select **Project/Parameter/PLC Parameter** in the left navigation pane.

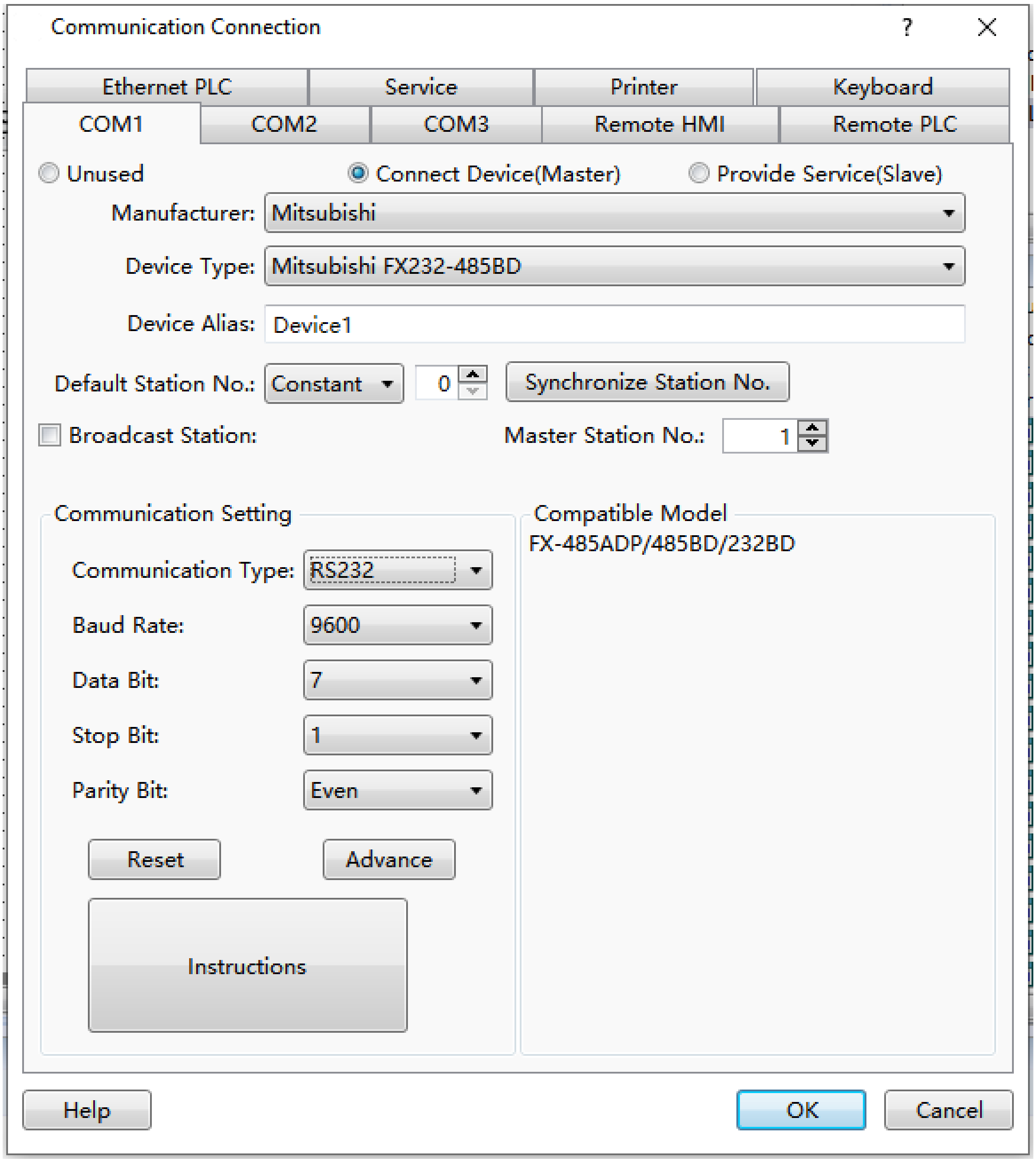
Step 2. Select the **PLC System Settings (2)** tab in the pop-up dialog box, configure as shown in the picture below.



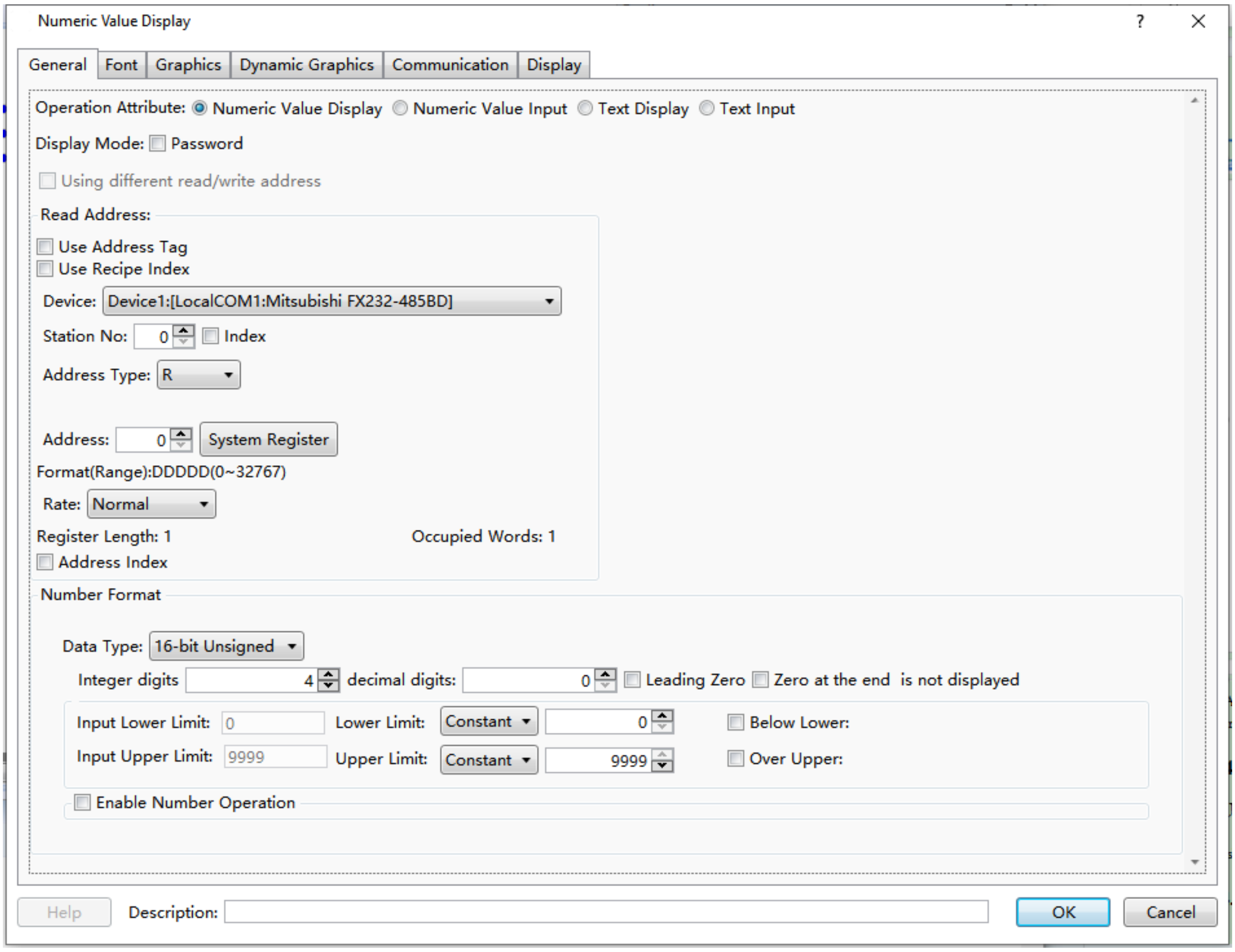
Step 3. After downloading configuration to PLC, turn off power and restart PLC to take effect.

17.6.3.3 Configure HMI

Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select **COM port** in the pop-up dialog box (this article uses COM1 as an example), configure relevant parameters as shown in the figure below, click **OK**.



Step 2. Select **Component/Numeric Value and Text Display/Numeric Value Display** from the menu bar, set the PLC address in the pop-up dialog box.



Step 3. After configuring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

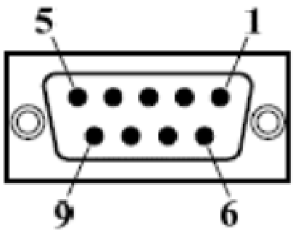
17.6.4 Serial Communication Between HMI and Mitsubishi FX3U-485BD Module

Mitsubishi FX3U-485BD module supports RS485-2 and RS485-4 protocol for communication.

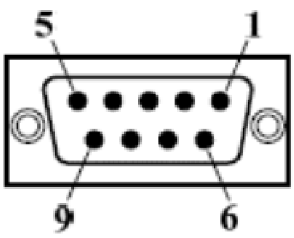
17.6.4.1 Connection Method

◆ Use RS485-2 cable to connect the COM1/COM2 port of the HMI to the serial port of the Mitsubishi FX-3U-485BD module. Please refer to the table below for the connection method.

HMI COM1/COM2 Ports	PLC Searial Ports
1 RX-	SDB
1RX-	RDB

HMI COM1/COM2 Ports	PLC Searial Ports
5 GND	SG
6 RX+	SDA
6 RX+	RDA
	

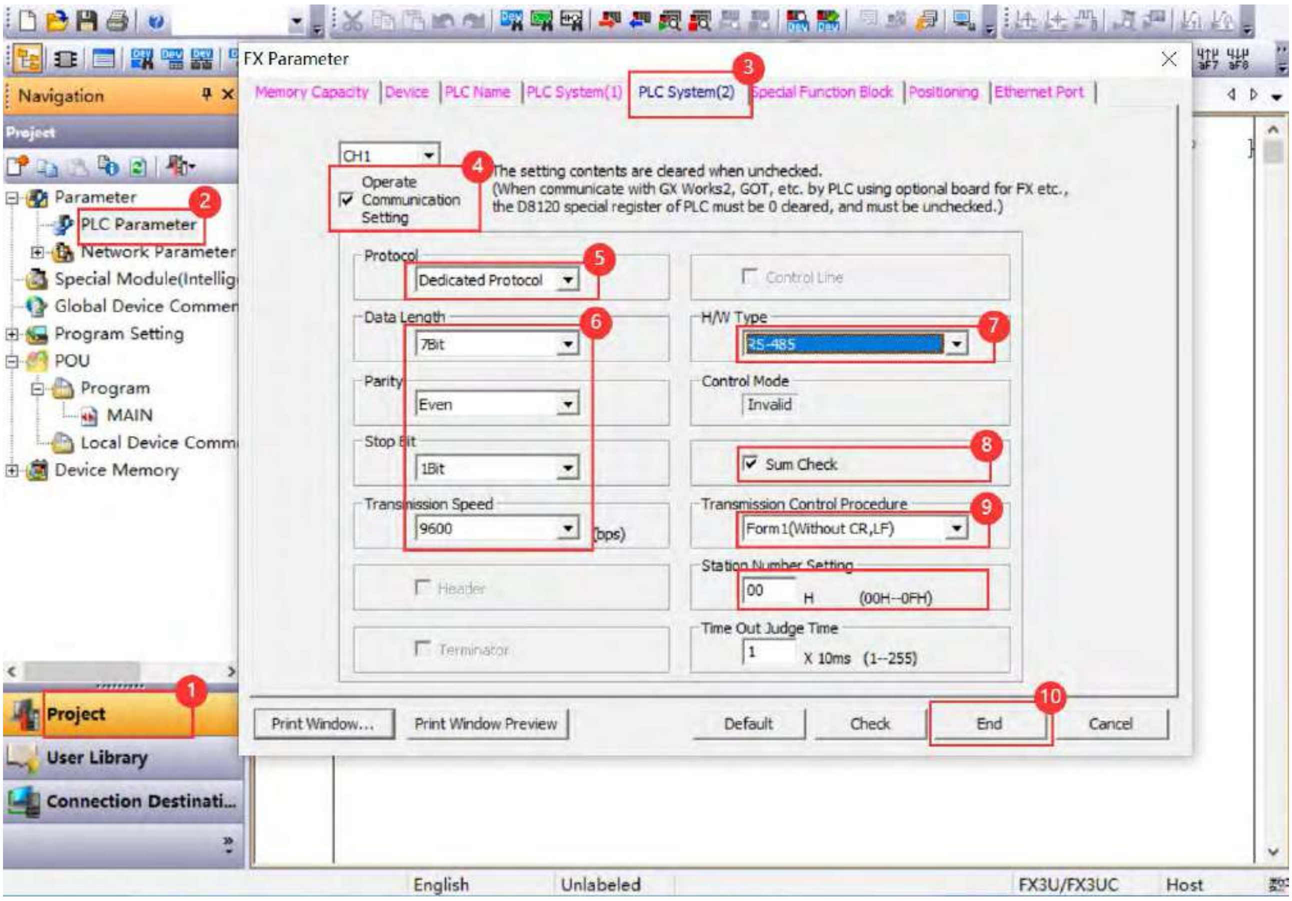
◆ Use S485-4 cable to connect the COM1/COM2 port of the HMI to the serial port of the PLC. Please refer to the table below for the connection method.

HMI COM1/COM2 Ports	PLC Searial Ports
1 RX-	SDB
6 RX+	SDA
5 GND	SG
4 TX-	RDB
9 TX+	RDA
	

17.6.4.2 Configure PLC

Step 1. Run PLC configuration software, Select **Project/Parameter/PLC Parameter** in the left navigation pane.

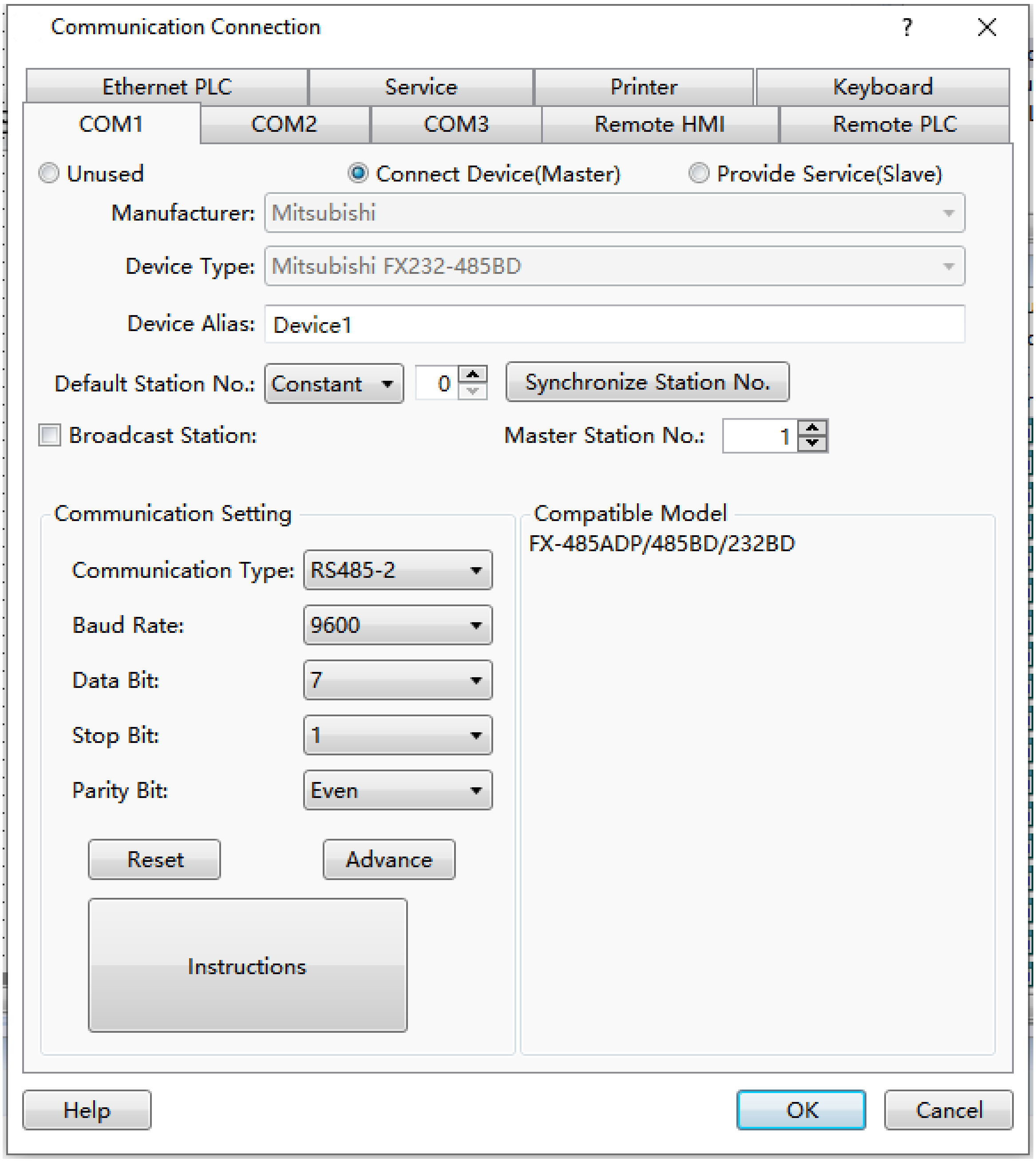
Step 2. Select the **PLC System Settings 2** tab in the pop-up dialog box, configure as shown in the picture below.



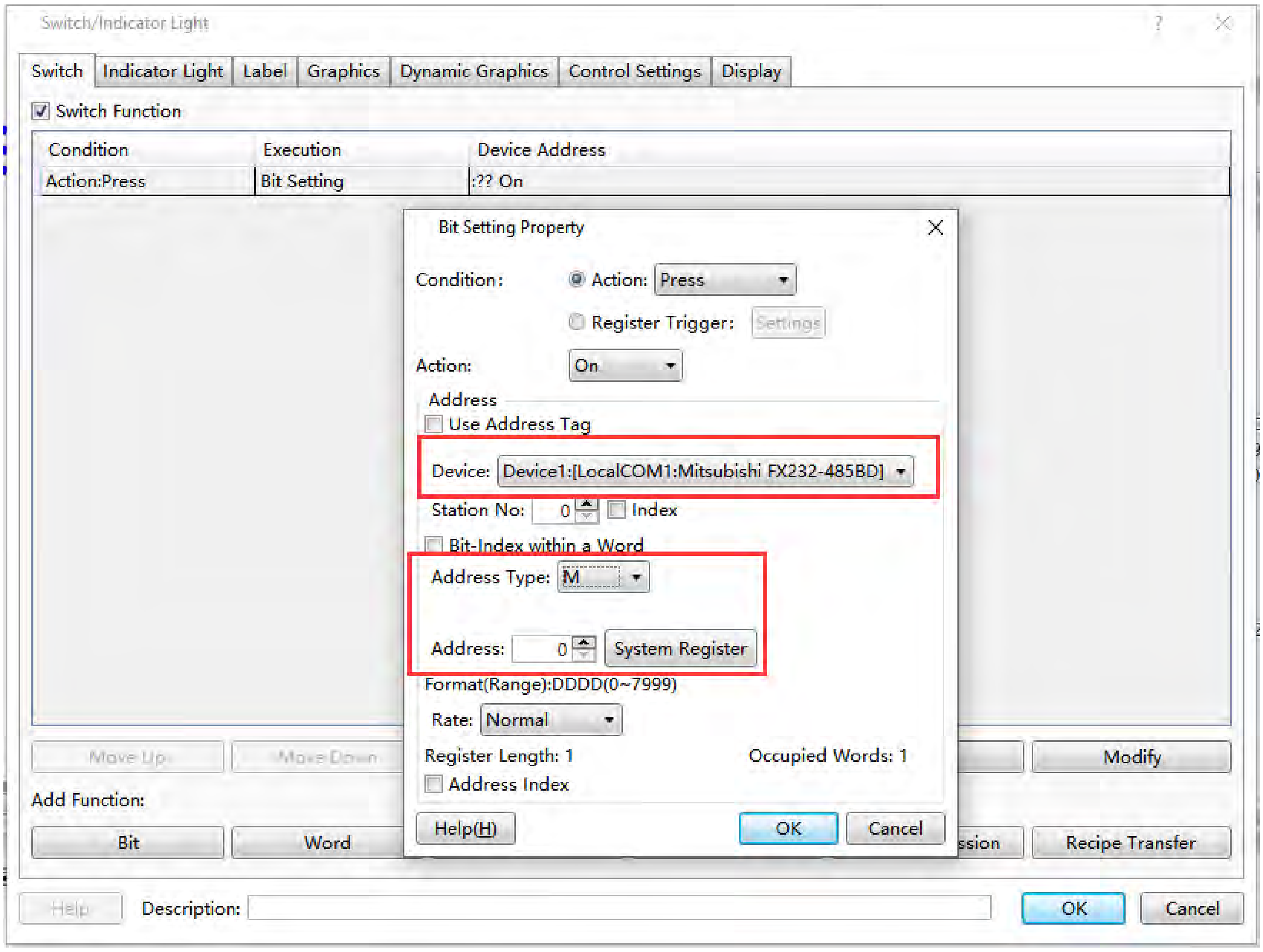
Step 3. After downloading configuration to PLC, turn off power and restart PLC to take effect.

17.6.4.3 Configure HMI

Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select COM port in the pop-up dialog box as shown in the figure below, click **OK**.



Step 2. Select **Component/Switch/Bit Set** from the menu bar, set the PLC address in the pop-up dialog box (to be consistent with the actual situation).



Step 3. After cofiguring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

17.6.5 Ethernet Communication Between HMI and Mitsubishi Q/L Series PLC

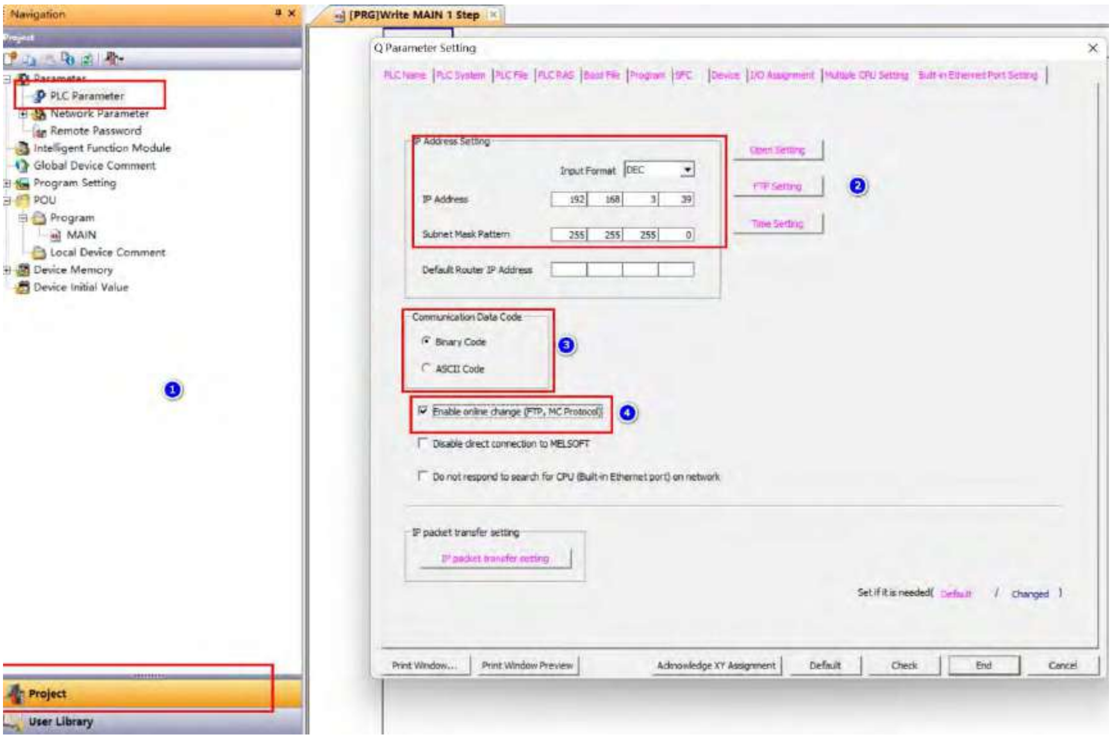
For an HMI with an Ethernet port, you can directly connect it to the Ethernet port of the Mitsubishi Q/L Series PLC using an Ethernet cable. Alternatively, you can establish a network connection between them by connecting both devices to a switch using Ethernet cables.

17.6.5.1 Connection Method

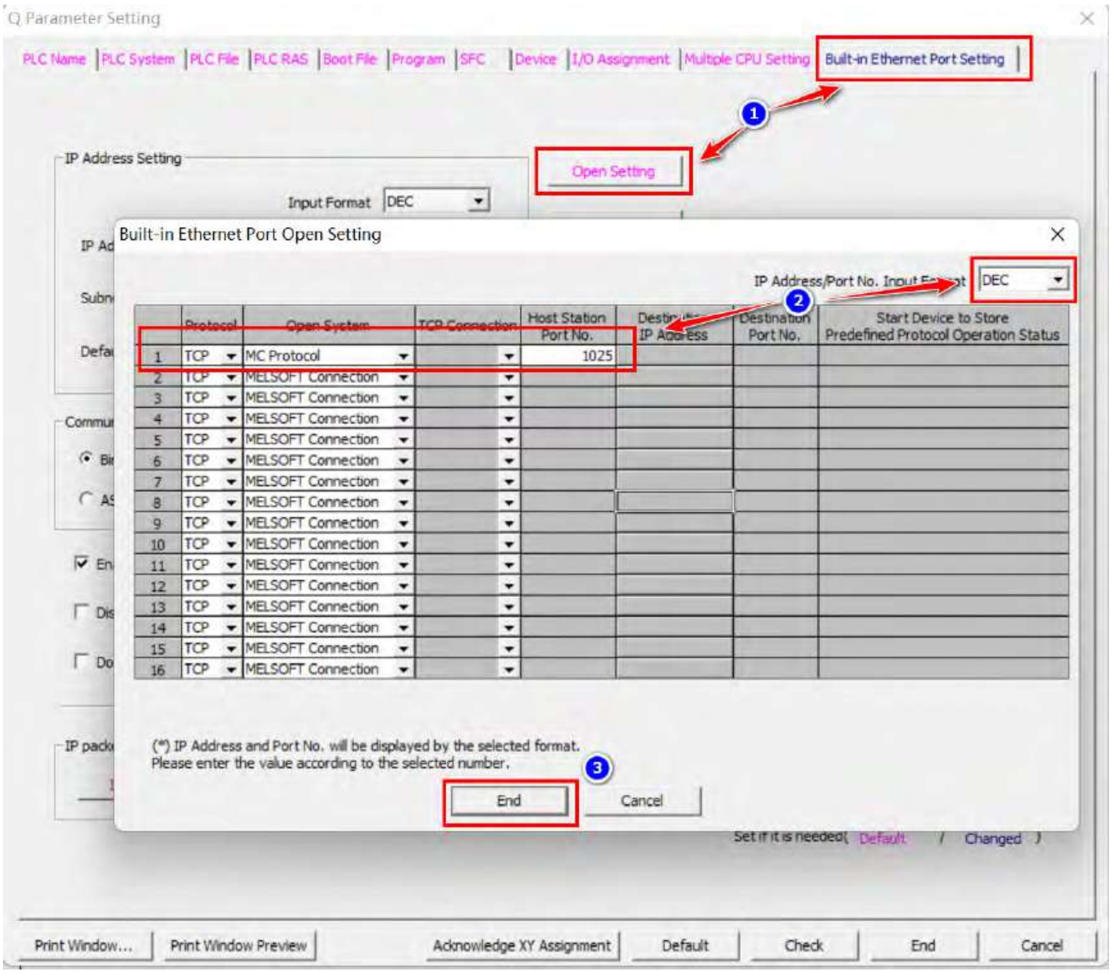
Please refer to Connection Method.

17.6.5.2 Configure PLC

Step 1. Run PLC configuration software, Select **Project/Parameter/PLC Parameter** in the left navigation pane. Select **Built-in Ethernet Port Setting** tab, set IP address and subnet mask, select Binary Code Communication or ASCII Code Communication for **Communication Data Code**. Check **Enable online change (FTP,MC protocol)**.



Step 2. Click **Built-in Ethernet Port Setting/ Open Setting**, configure relevant parameters in the pop-up dialog box, click **End**.



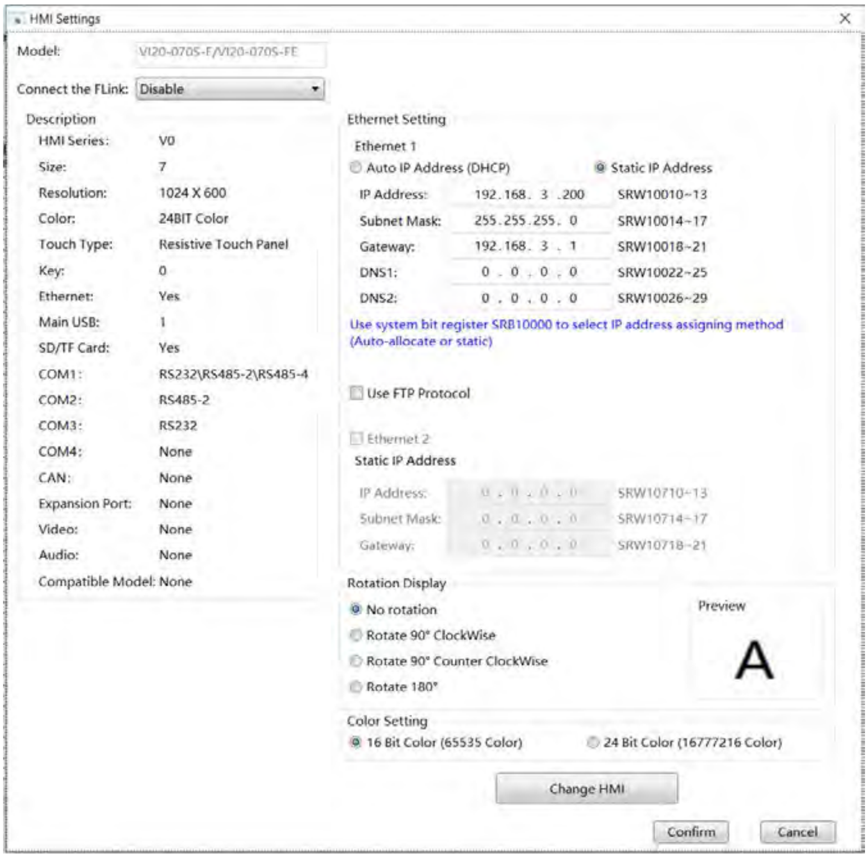
Please refer to the table below for detailed configuration methods.

Parameter	Description
IP Address/Port No. Format	Select “decimal number”.
Protocol	Select “TCP”.
Open Method	Select “MC protocol”.
Port No. of this Station	Set to “1025”.

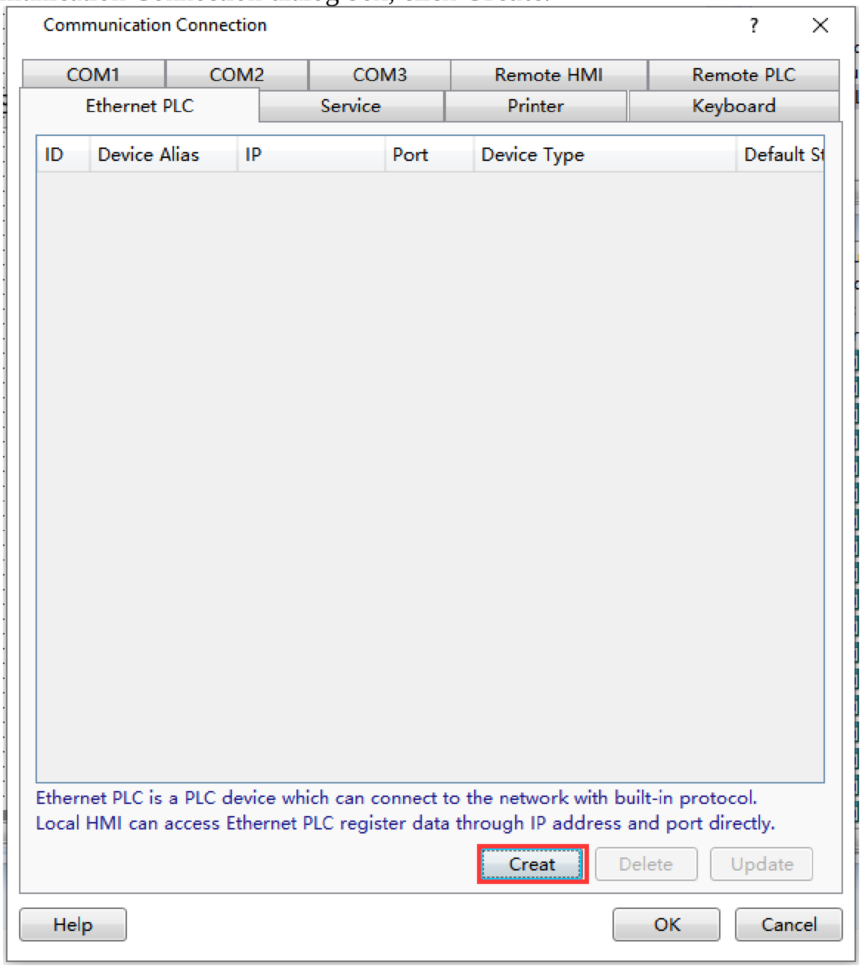
Step 3. After downloding program to PLC, turn off power and restart PLC.

17.6.5.3 Configure HMI

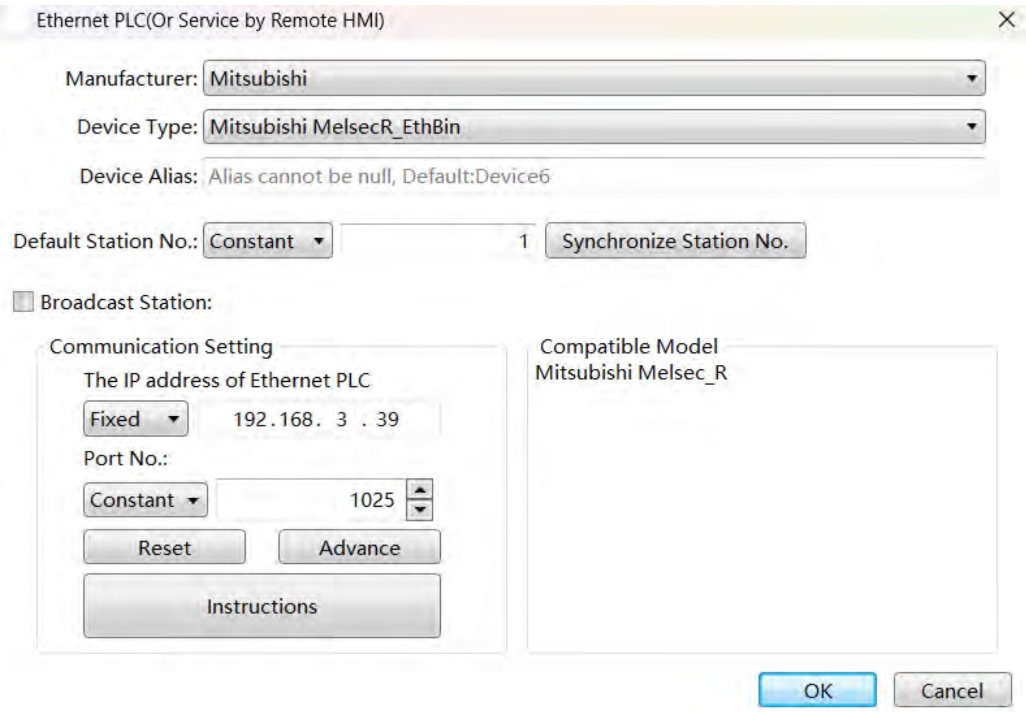
Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI in the pop-up dialog box (to be in the same network segment as the IP address of PLC), click **Confirm**.



Step 2. Select **Settings/Communication Settings/Local Connection** from the menu bar, select **Ethernet PLC** tab in the pop-up Communication Connection dialog box, click **Create**.



Step 3. Configure relevant parameters in the pop-up dialog box, click **OK**.

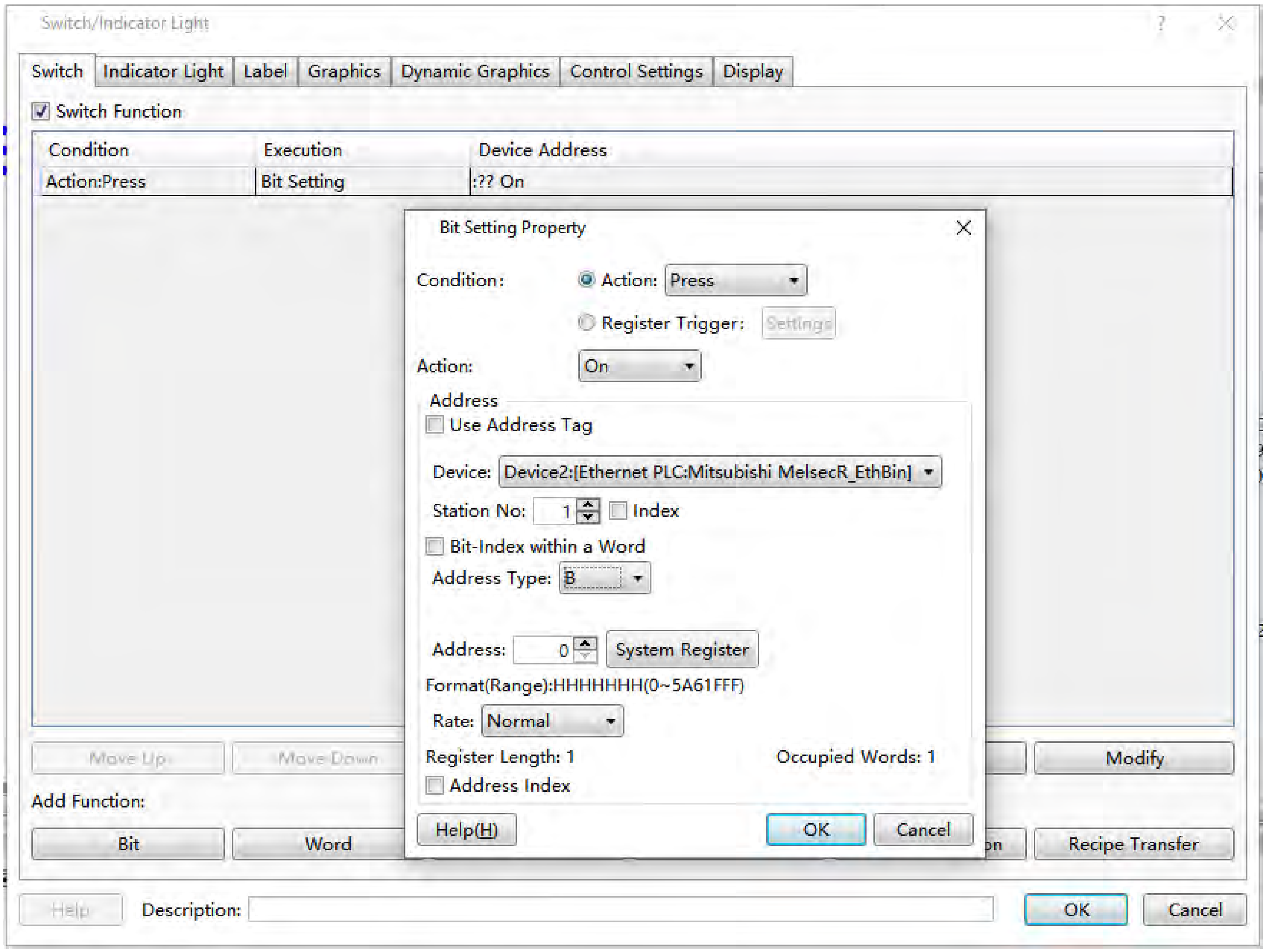


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Manufacturer	Select “Mitsubishi-Mitsubishi “.
Device Type	Select “Mitsubishi MelseR_EthBin (when PLC's communication data code is set to binary code communication) or “Mitsubishi MelseR_EthASCII” (when PLC's communication data code is set to ASCII code communication)
IP Address of Network PLC	Please refer to the actual situation.
Port No.	Set to 1025.

Step 4. Click **OK** in the **Communication Connection** dialog box.

Step 5. Select **Component/Switch/Bit Set** from the menu bar, edit address as PLC address in the pop-up dialog box.



Step 6. After configuring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

17.6.6 Ethernet Communication Between HMI and Mitsubishi FX5U PLC

HMI with Ethernet port directly connects to Mitsubishi FX5U PLC Ethernet port via Ethernet cable, or connect to Mitsubishi FX5U PLC via switch.

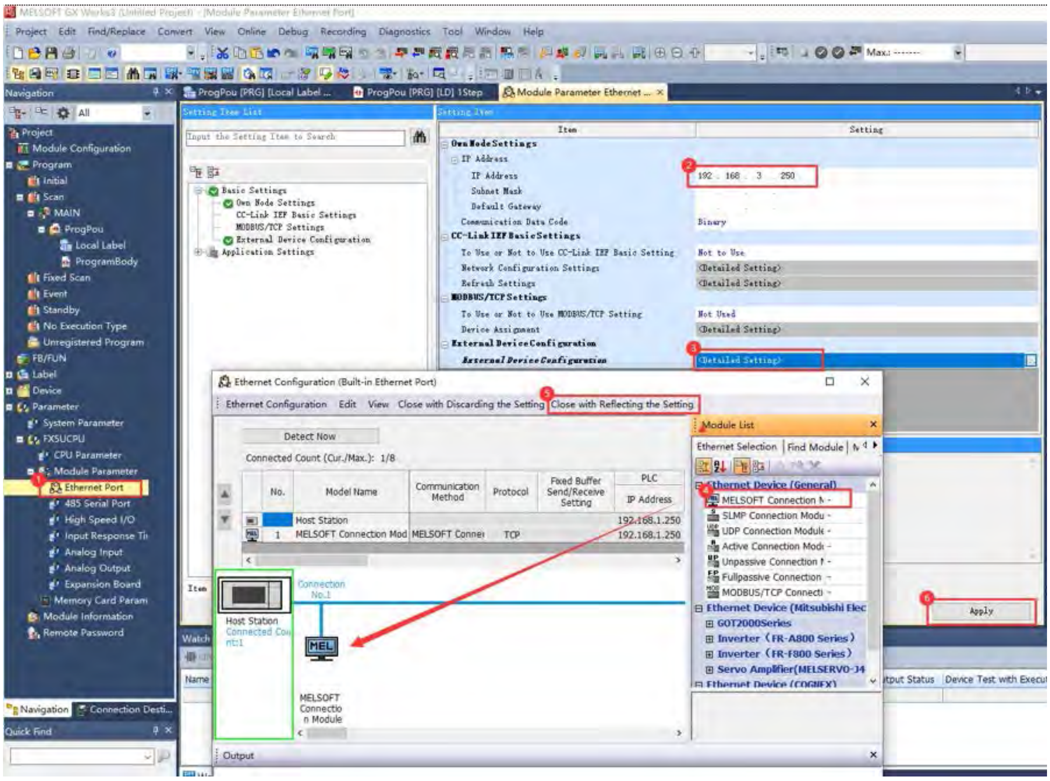
17.6.6.1 Connection Method

Please refer to Connection Method.

17.6.6.2 Configure PLC

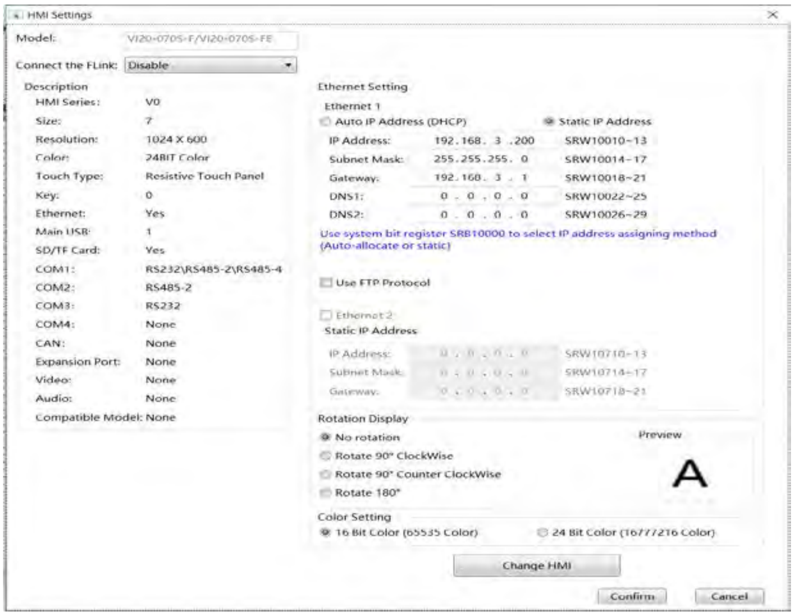
Step 1. Run PLC configuration software, Select **Parameter/Module Parameter/Ethernet Port** in the left navigation pane. set the IP address of the PLC. Double-click **detailed settings**.

Step 2. Drag and drop MELSOFT Connection Module from the right side to establish a connection with the local station. If there are two master stations accessing the PLC, configure it as shown in the screenshot by adding one MELSOFT connection device. If there are three master stations, add two MELSOFT connection devices.

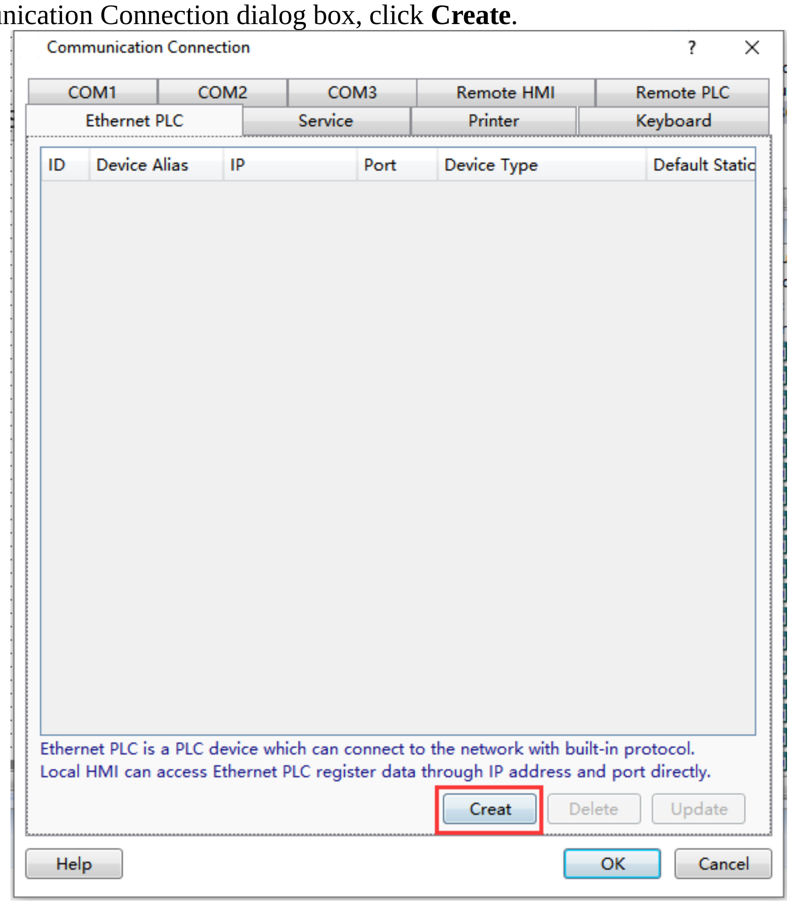


17.6.6.3 Configure HMI

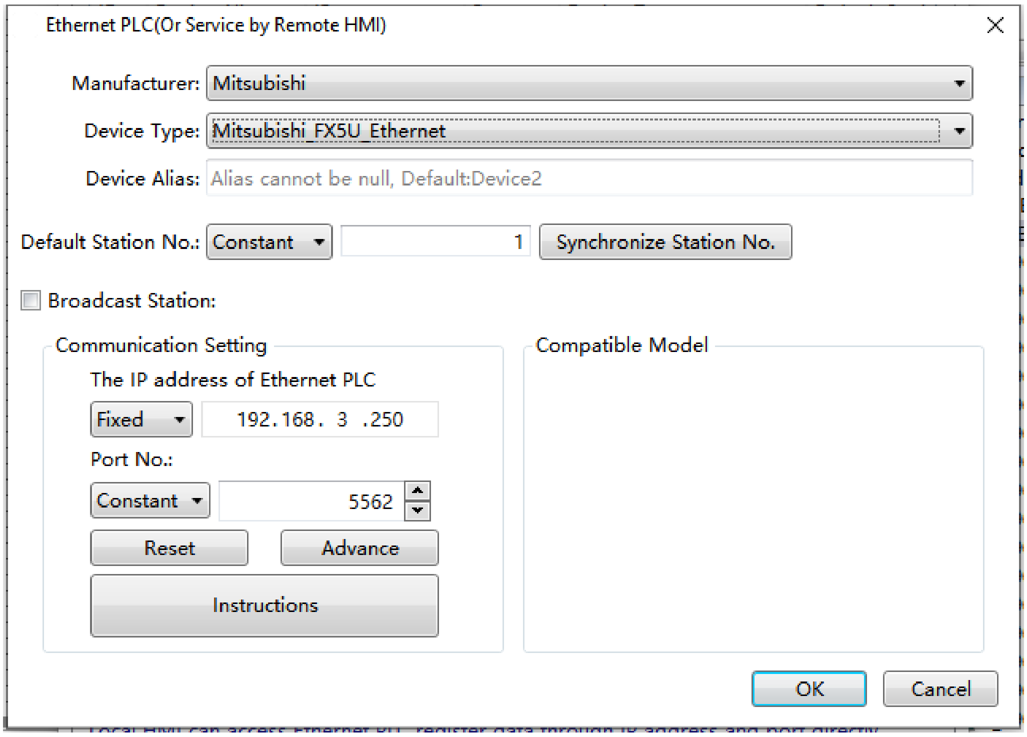
Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI in the pop-up dialog box (to be in the same network segment as the IP address of PLC), click **OK**.



Step 2. Select **Settings/Communication Settings/Local Connection** from the menu bar, select **Ethernet PLC** tab in the pop-up Communication Connection dialog box, click **Create**.

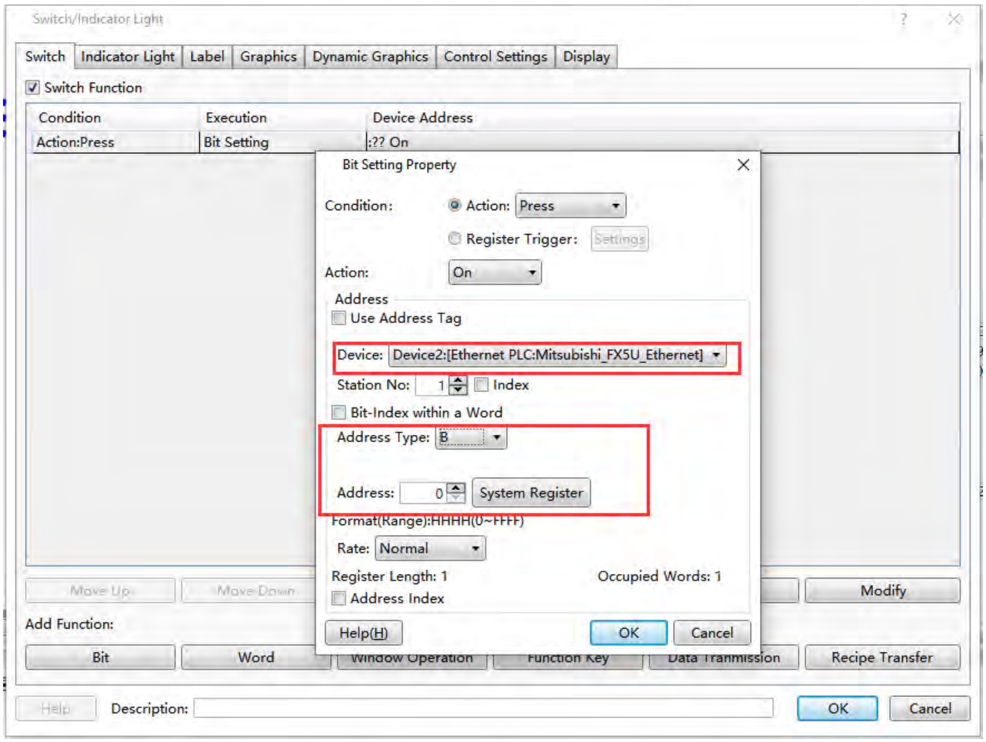


Step 3. Configure relevant parameters in the pop-up dialog box (refer to the picture below), click **OK**.



Step 4. Click **OK** in the **Communication Connection** dialog box.

Step 5. Select **Component/Switch/Bit Set** from the menu bar, edit address as PLC address in the pop-up dialog box (refer to the actual situation).



Step 6. After configuring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

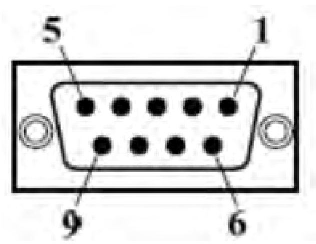
17.6.7 Serial Communication Between HMI and Mitsubishi FX5U PLC

HMI supports communication with the Mitsubishi FX5U PLC using both the RS485-2 protocol and the RS485-4 protocol.

17.6.7.1 Connection Method

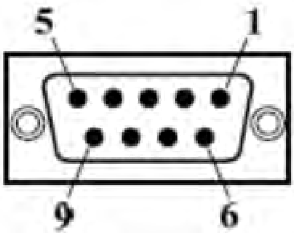
- Use RS485-2 cable to connect the COM1/COM2 port of the HMI to the serial port of the PLC. Please refer to the table below for the connection method.

The RDA and SDR pins of the PLC serial port need to be shortened, and the RDB and SDB pin need to be shorted.

HMI COM1/COM2 Ports	PLC Serial Port
1 B-	RDB
6 A+	RDA
	

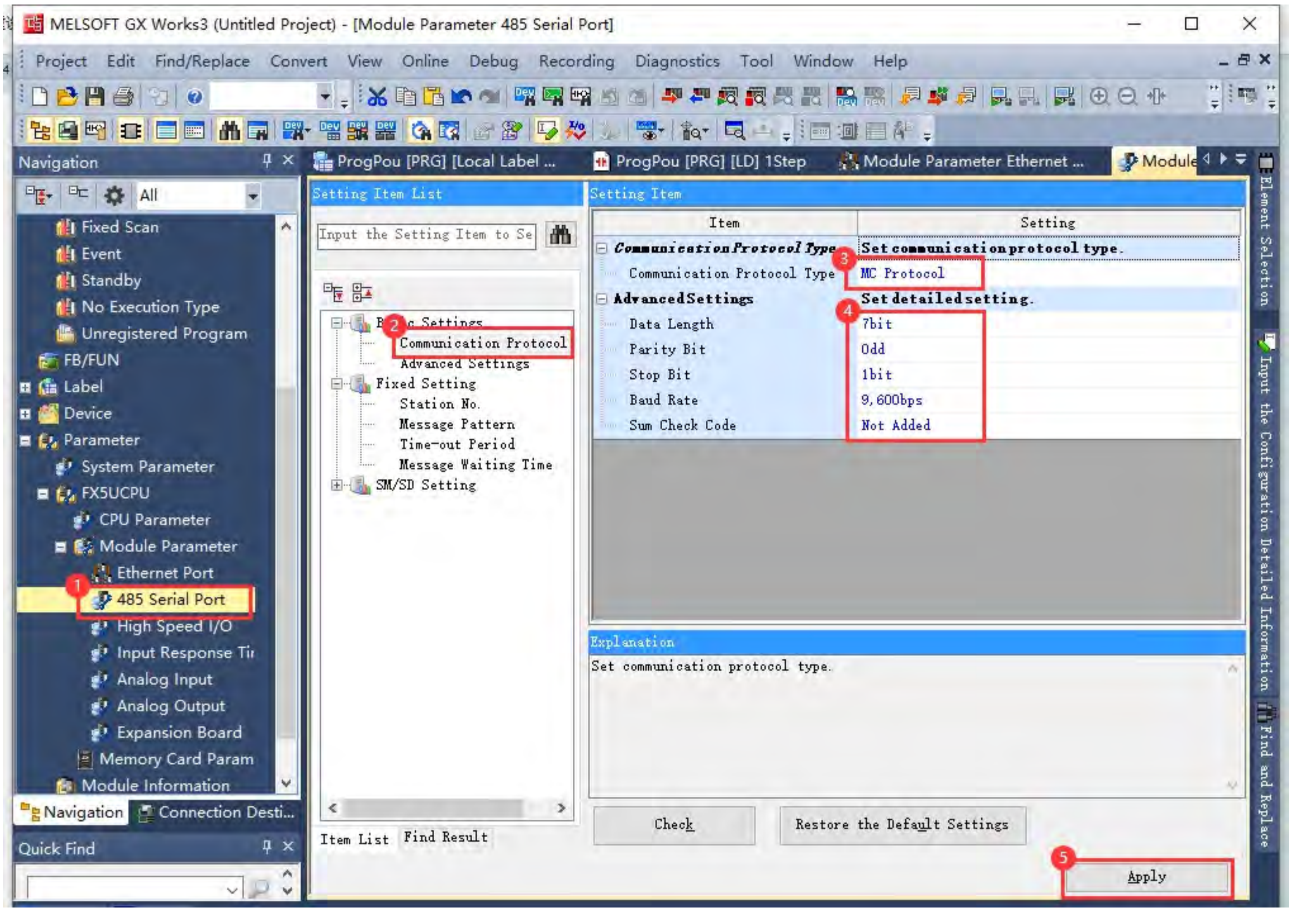
- Use RS485-4 cable to connect the COM1/COM2 port of the HMI to the serial port of the PLC. Please refer to the table below for the connection method.

HMI COM1/COM2 Ports	PLC Serial Port
1 RX-	SDB
6 RX+	SDA
5 GND	SG
4 TX-	RDB
9 TX+	RDA

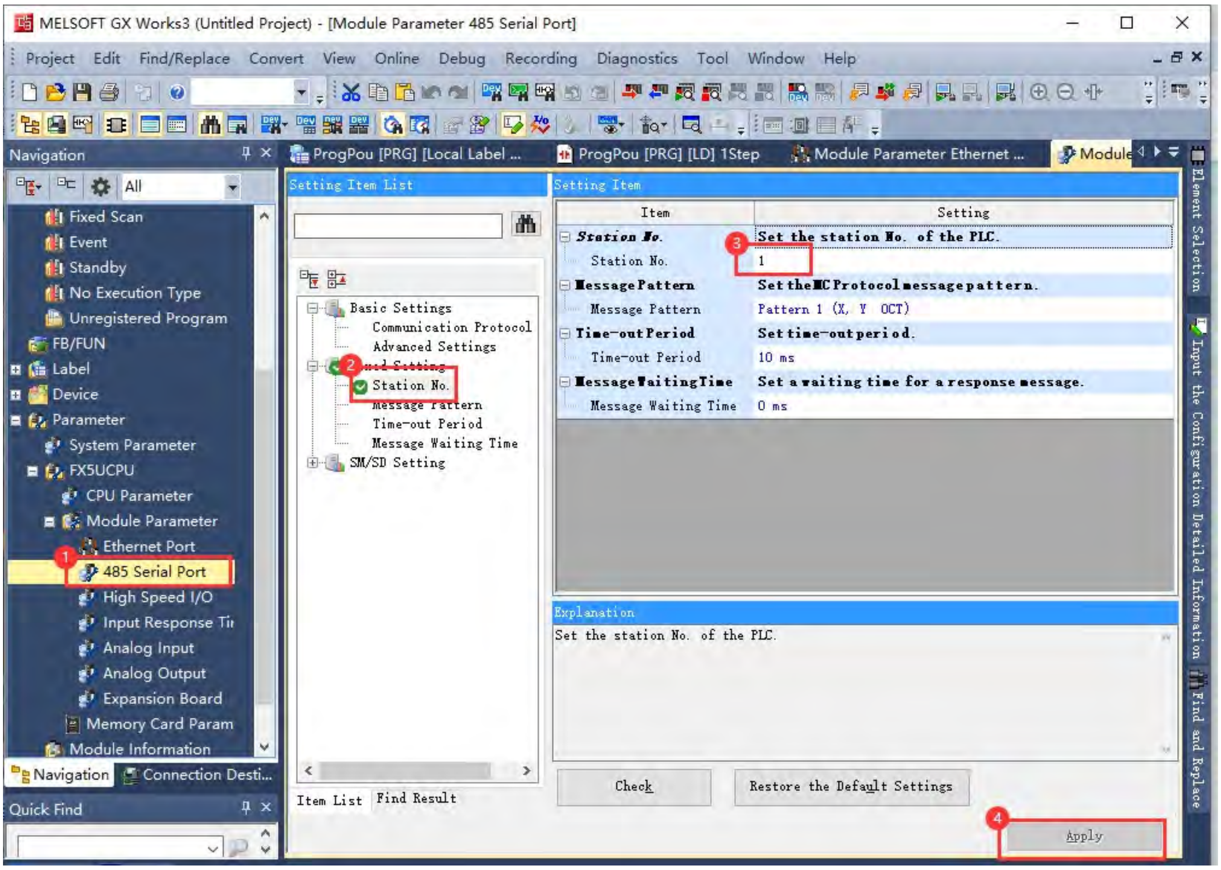
HMI COM1/COM2 Ports	PLC Serial Port
	

17.6.7.2 Configure PLC

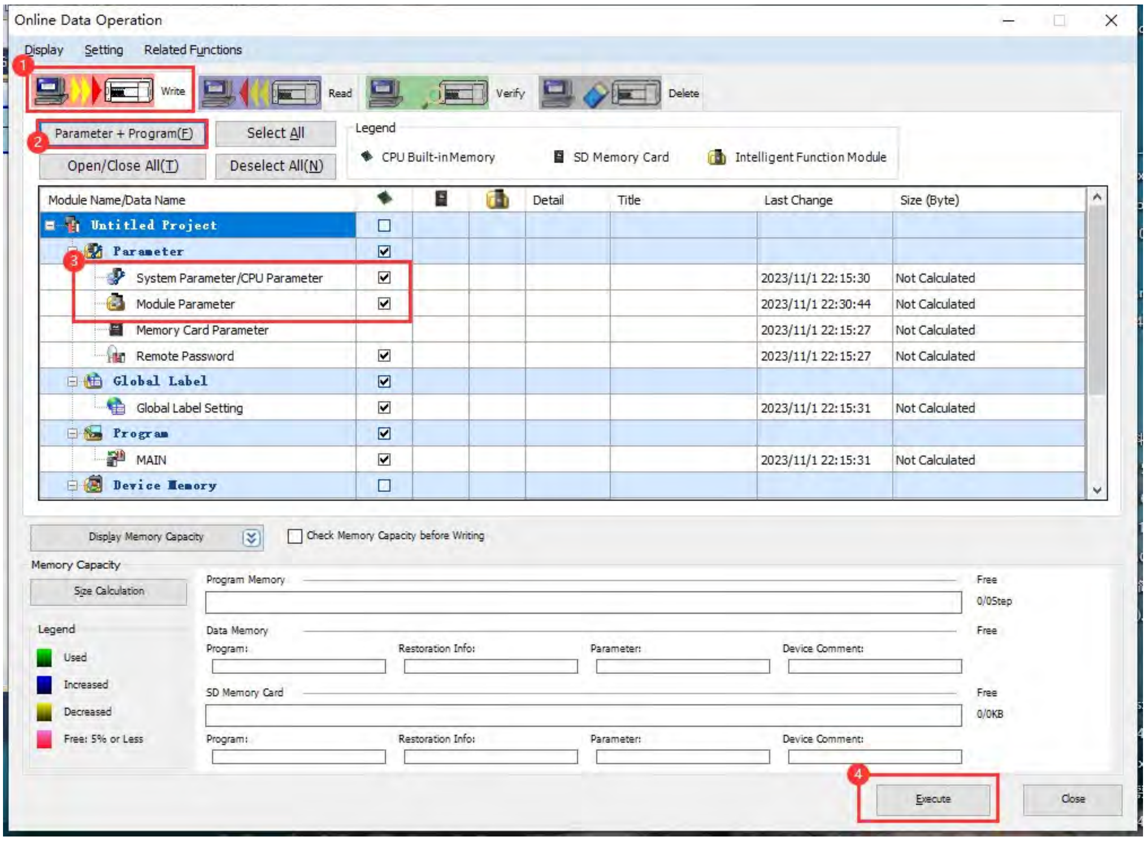
Step 1. Run PLC configuration software, Select **Parameter/Module Parameter/485 Serial Port** in the left navigation pane. Click **Basic Settings/Communication Protocol**, select “MC Protocol”. Set the parameters such as baud rate, data length, stop bits, parity bits, etc.



Step 2. Select **Fixed Setting/Station No.**, set the station number of PLC, click **Apply**.

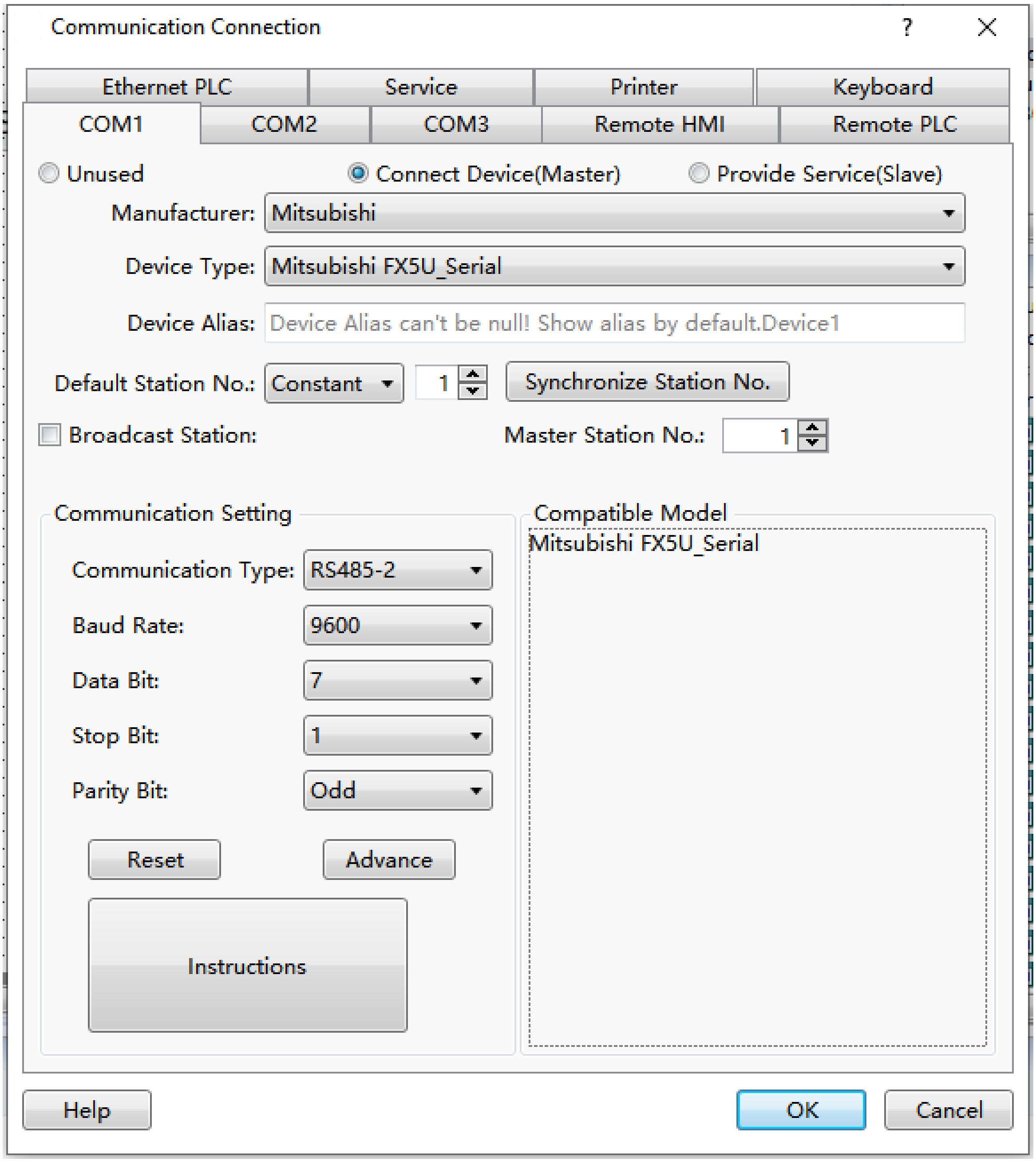


Step 3. Click **Write**, Click **Prameter+Program(F)**,check **System Parameters/CPU Parameter** and **Module Parameters**, click **Execute**, download program to PLC.



17.6.7.3 Configure HMI

Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select COM port in the pop-up **Communication Connection** dialog box, configure relevant parameters, click **OK**.

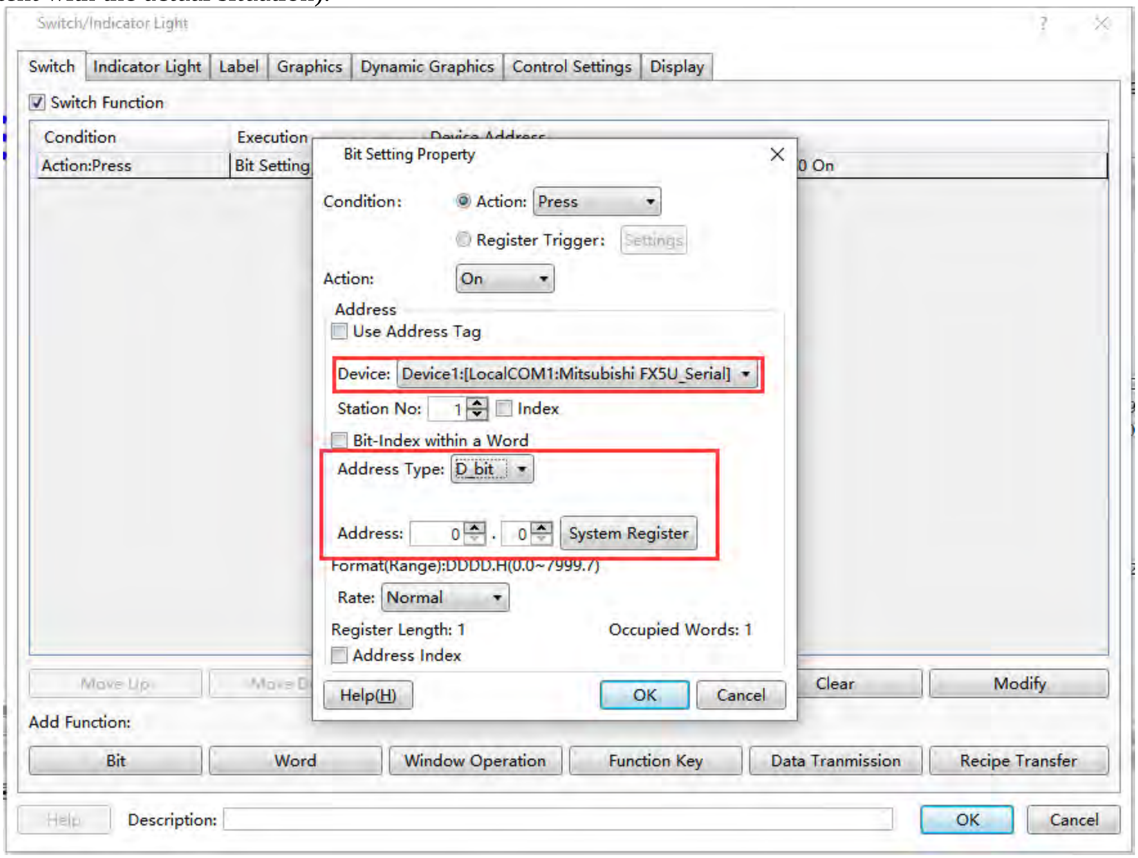


Please refer to the table below for detailed configuration.

Parameter	**Description**
Connection Device (HMI as Master)	As a control center, HMI analyzes the data collected from the device and issued the task to the device.

Parameter	Description
Manufacturer	Select “Mitsubishi-Mitsubishi “.
Device Type	Select “Mitsubishi FX5U_Serial”.
Pre-set Station No.	Keep consistent with PLC settings.
Communication Type	Select “RS485-2 or “RS485-4”.
Baud Rate	Keep consistent with the actual PLC setting.
Data Bit	Keep consistent with the actual PLC setting.
Stop Bit	Keep consistent with the actual PLC setting.
Parity Bit	Keep consistent with the actual PLC setting.

Step 2. Select **Component/Switch/Bit Set** from the menu bar, set the PLC address in the pop-up dialog box (to be consistent with the actual situation).



Step 3. After configuring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

17.6.8 Ethernet Communication Between HMI and Mitsubishi FX3U-ENET-ADP Module

The FX3U-ENET-ADP is an Ethernet extension module for the Mitsubishi FX3U PLC. HMI with an Ethernet port can communicate with the Mitsubishi FX3U-ENET-ADP module through Ethernet.

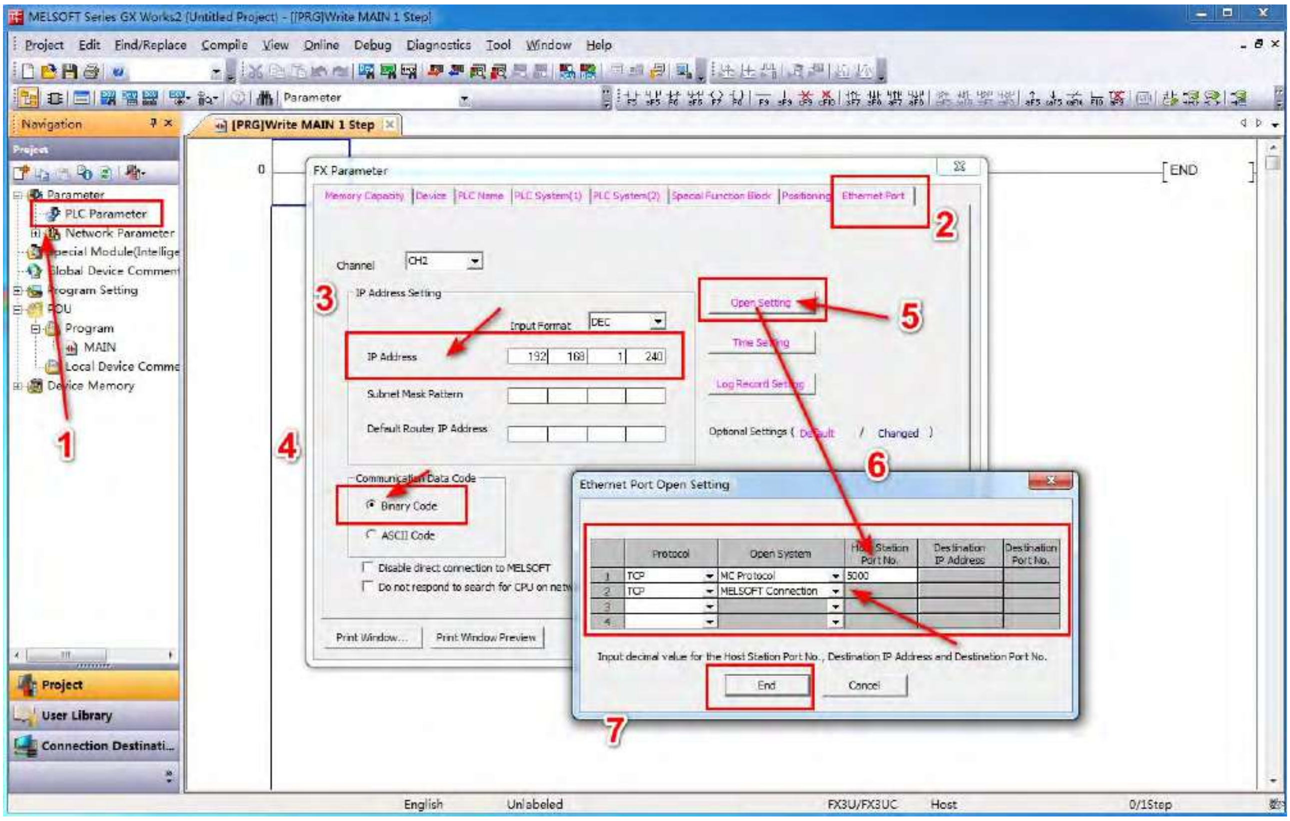
17.6.8.1 Connection Method

Please refer to Connection Method.

17.6.8.2 Configure PLC

Step 1. Run PLC configuration software, Select **Project/Parameter/PLC Parameter** in the left navigation pane. Select the **Ethernet Port** tab, set PLC IP address, select "Binary Code " for **Communication Data Code**. Click **Open Settings**.

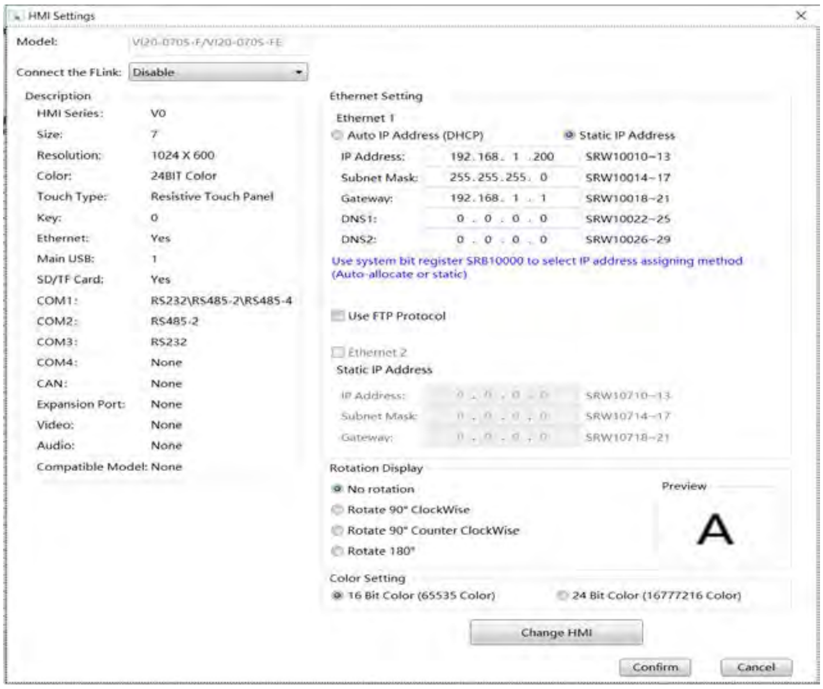
Step 2. In the pop-up dialog box, select TCP for Protocol in the first line, select MC Protocol for Open System, set the Host Station Port No. To 5000; in the second line, select TCP for Protocol , select MELSOFT Connection for Open System. Click **End**.



Step 3. Download program to PLC.

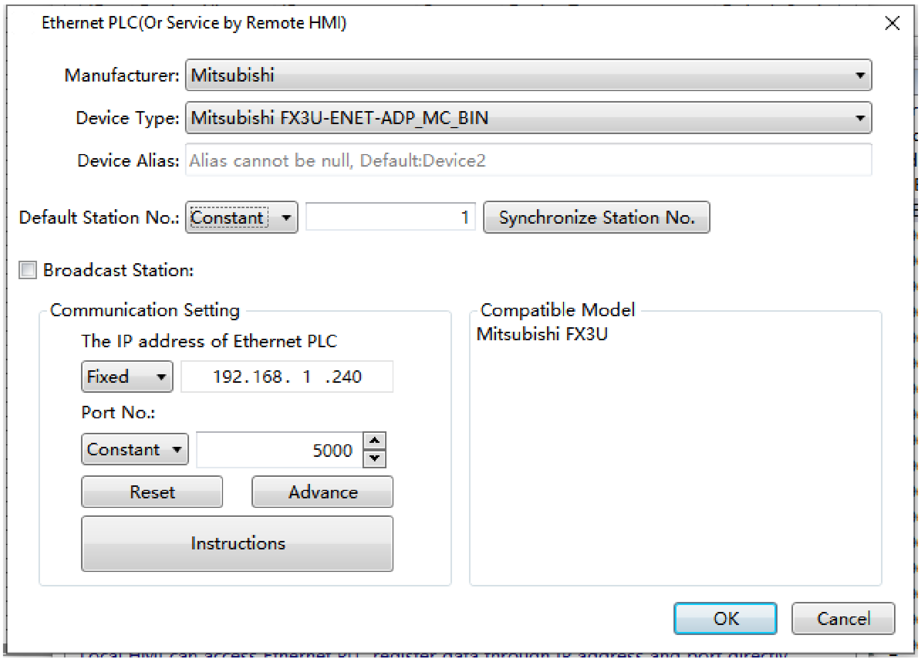
17.6.8.3 Configure HMI

Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI in the pop-up dialog box (to be in the same network segment as the IP address of PLC), click **Confirm**.



Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.

Step 3. Configure relevant parameters in the pop-up dialog box , click **OK**.

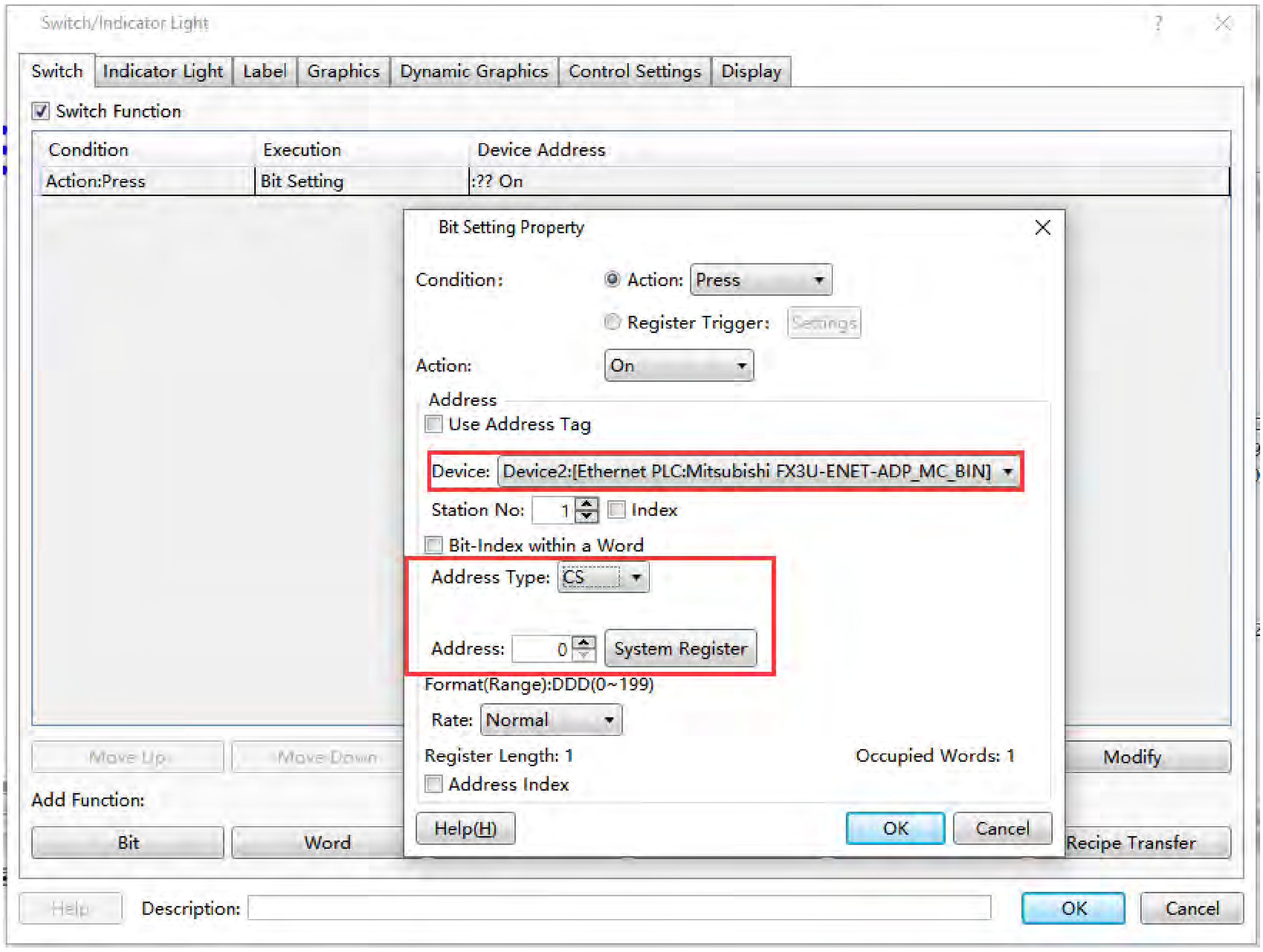


Please refer to the table below for detailed configuration.

Parameter	Description
Manufacturer	Select “Mitsubishi-Mitsubishi “.
Device Type	Select “Mitsubishi FX3U-ENET-ADP_MC_BIN”.
IP Address of Network PLC	Please refer to the actual situation.
Port No.	Default value 5000.

Step 4. Click **OK** in the **Communication Connection** dialog box.

Step 5. Select **Component/Switch/Bit Set** from the menu bar, edit address as PLC address in the pop-up dialog box (refer to the actual situation).



Step 6. After configuring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

17.6.9 Serial Communication Between HMI and Mitsubishi Q02-QJ71C42 Module

HMI can use the RS232 protocol to communicate with Mitsubishi Q02-QJ71C42 module.

17.6.9.1 Connection Method

◆ Use RS232 cable to connect the COM1 port of the HMI to the serial port of Mitsubishi Q02-ENET-ADP module. Please refer to the table below for the connection method.

The three pins of 1, 4, and 6 of the PLC serial port need to be shorted, and the two pins of 7 and 8 need to be shorted.

HMI COM1 Port	**PLC Serial Port**
2 RX	3 TXD
3 TX	2 RXD
5 GND	5 GND
	

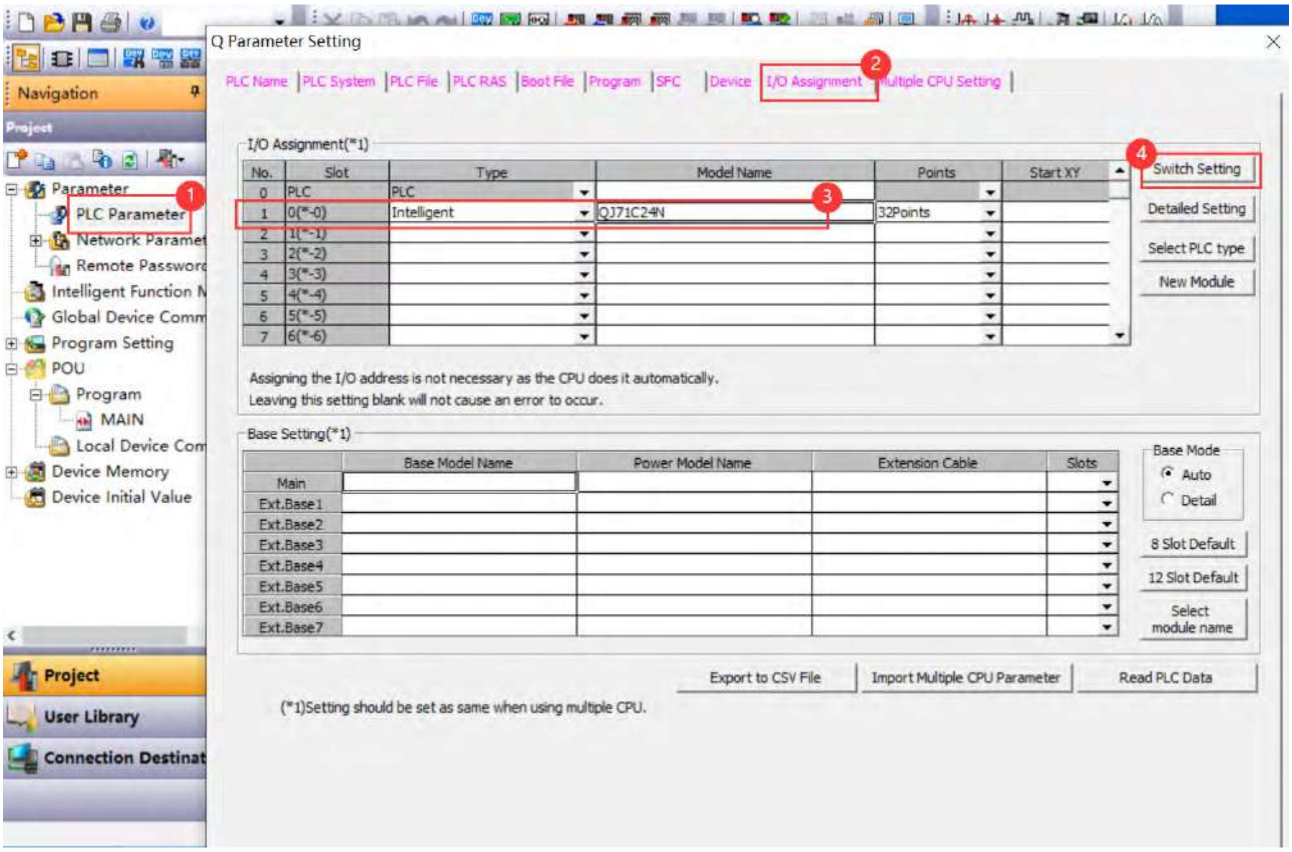
◆ Use RS232 cable to connect the COM3 port of the HMI to the serial port of Mitsubishi Q02-ENET-ADP module. Please refer to the table below for the connection method.

The three pins of 1, 4, and 6 of the PLC serial port need to be shorted, and the two pins of 7 and 8 need to be shorted.

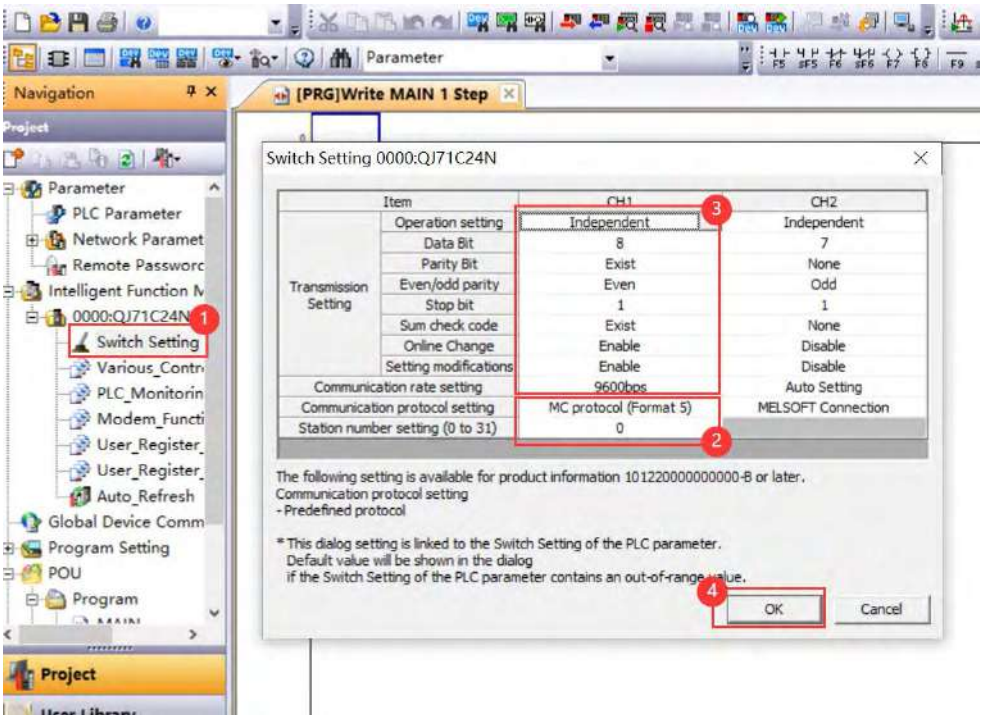
HMI COM3 Port	**PLC Serial Port**
7 RX	3 TXD
8 TX	2 RXD
5 GND	5 GND
	

17.6.9.2 Configure PLC

Step 1. Run PLC configuration software, Select **Project/Parameter/PLC Parameter** in the left navigation pane. Select the **I/O Assignment** tab, set the type in Channel 1 as “Intelligent”, select “QJ71C42” for Model Name.



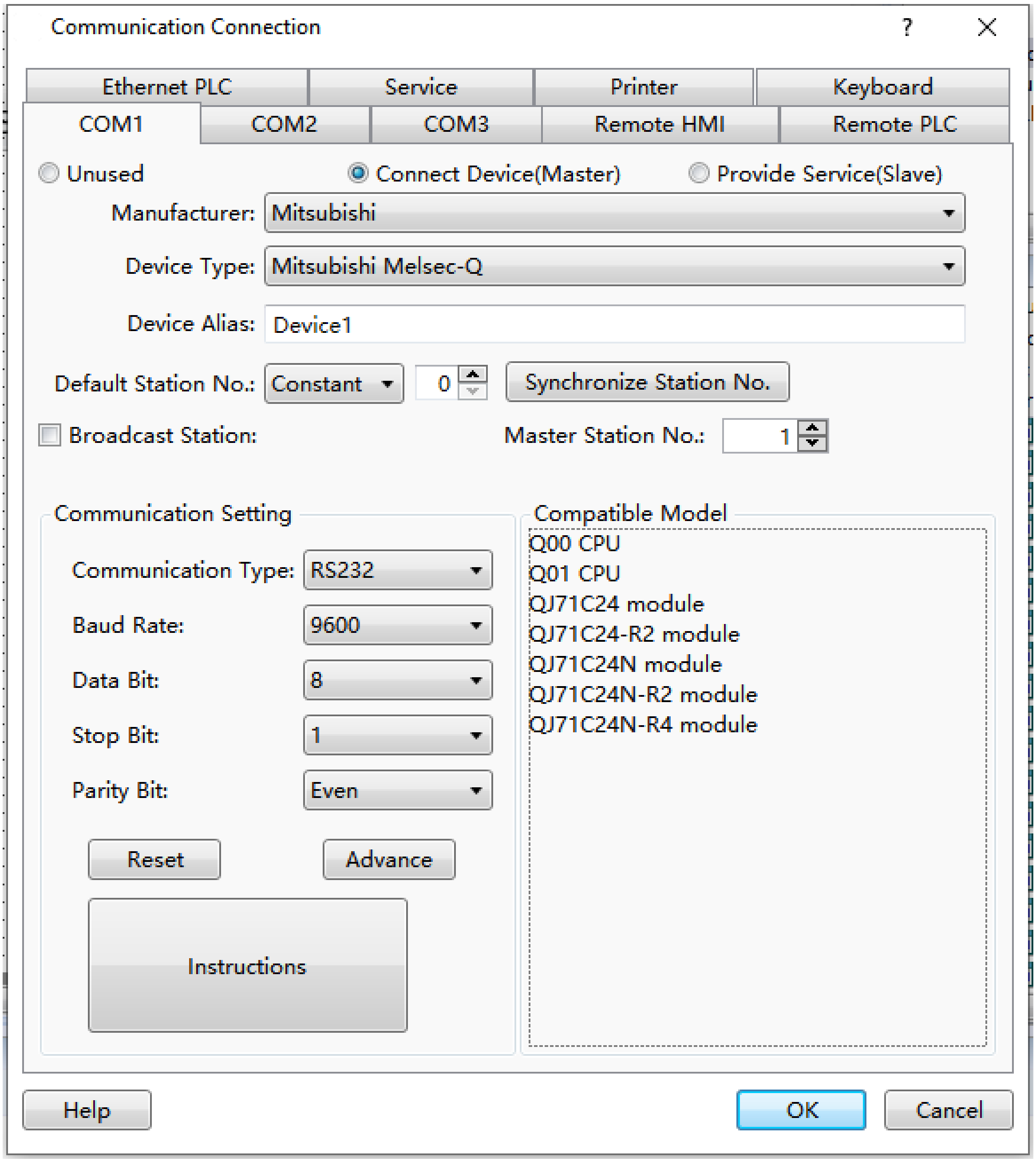
Step 2. Click **Switch Setting**, set the baud rate, data bit, stop bit, parity bit of Channel 1 in the pop-up dialog box, select MC protocol, set station number to 0. Click **OK**.



Step 3. Download configuration to PLC.

17.6.9.3 Configure HMI

Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select COM port (COM1 or COM3) in the pop-up **Communication Connection** dialog box, configure relevant parameters, click **OK**.

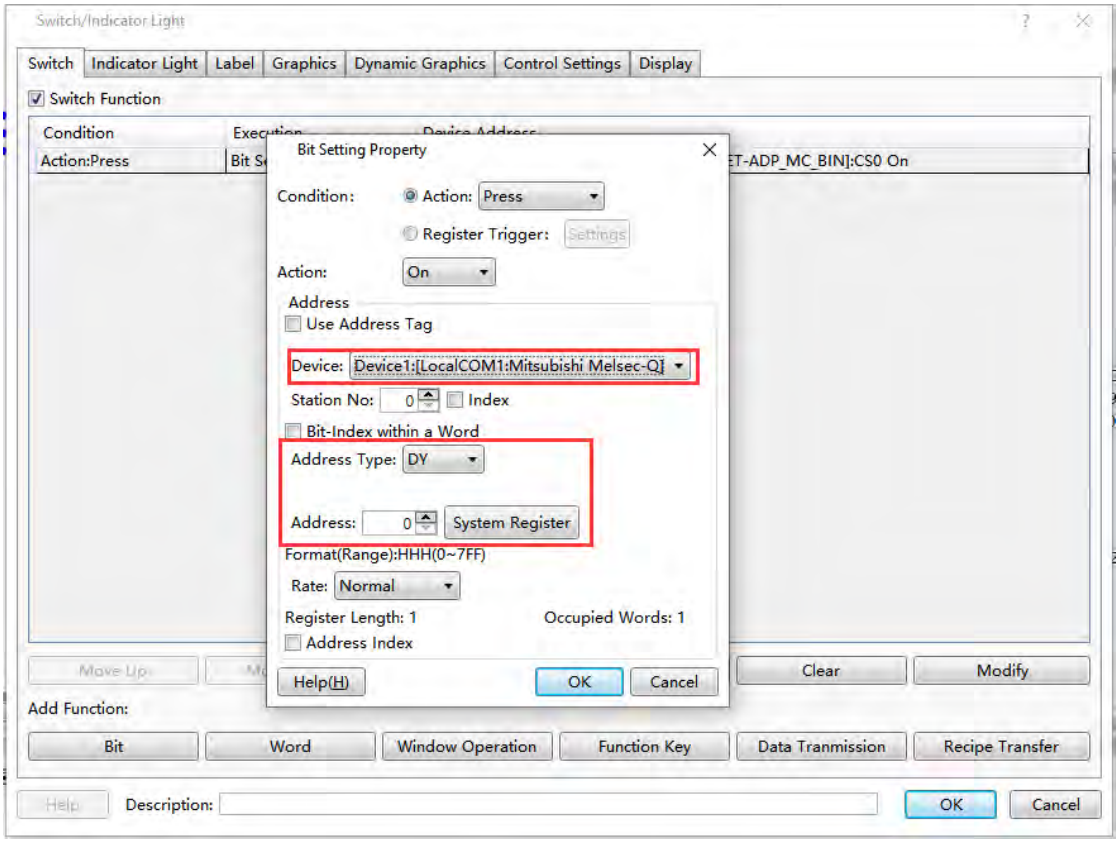


Please refer to the table below for detailed configuration.

Parameter	Description
Connection Device (HMI as Master)	As a control center, HMI analyzes the data collected from the device and issued the task to the device.

Parameter	Description
Manufacturer	Select “Mitsubishi”.
Device Type	Select “Mitsubishi Melsec-Q”.
Pre-set Station No.	Keep consistent with PLC settings.
Communication Type	Select “RS232”.
Baud Rate	Keep consistent with the actual PLC setting.
Data Bit	Keep consistent with the actual PLC setting.
Stop Bit	Keep consistent with the actual PLC setting.
Parity Bit	Keep consistent with the actual PLC setting.

Step 2. Select **Component/Switch/Bit Set** from the menu bar, set address as PLC address in the pop-up dialog box (refer to the actual situation).



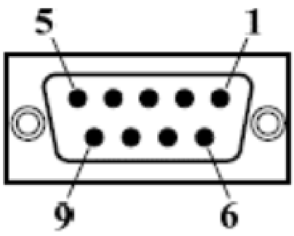
Step 3. After configuring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

17.8 Panasonic PLC

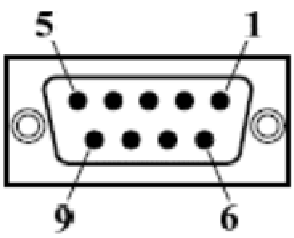
17.8.1 Serial Communication Between HMI and Panasonic FP0 PLC

17.8.1.1 Connection Method

- Use RS232 cable to connect the COM1/COM2 port of the HMI to the serial port of the Panasonic FP0 PLC. Please refer to the table below for the connection method.

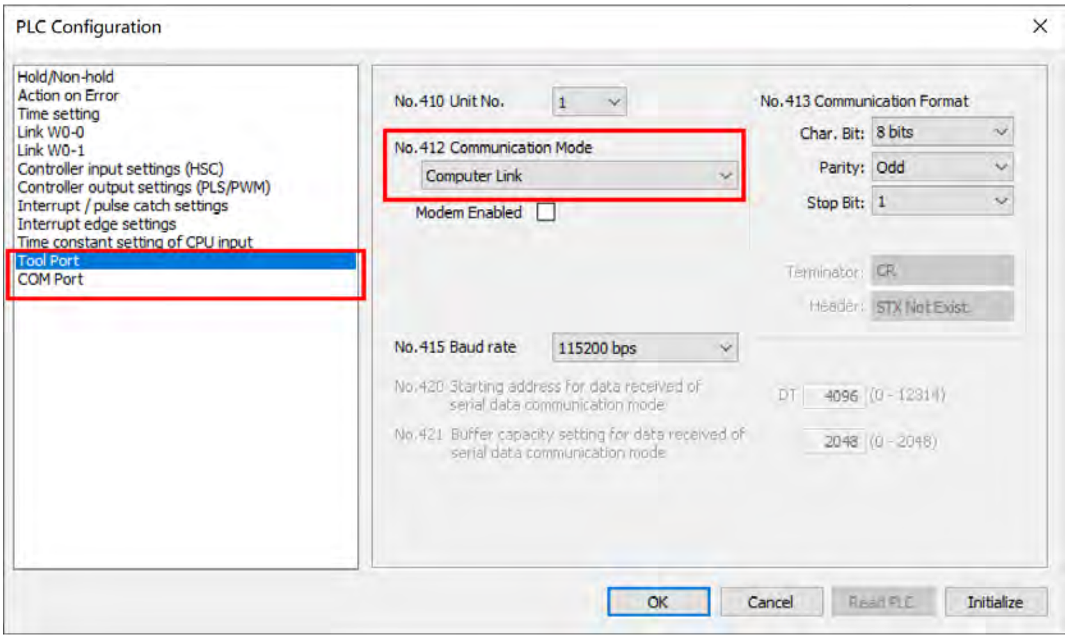
HMI COM1/COM2 Ports	PLC Serial Port
2 RX	3 TXD
3 TX	2 RXD
5 GND	1 GND
	

- Use RS232 cable to connect the COM3/COM4 port of the HMI to the serial port of the Panasonic FP0 PLC. Please refer to the table below for the connection method.

HMI COM3/COM4 Ports	PLC Serial Port
7 RX	3 TXD
8 TX	2 RXD
5 GND	1 GND
	

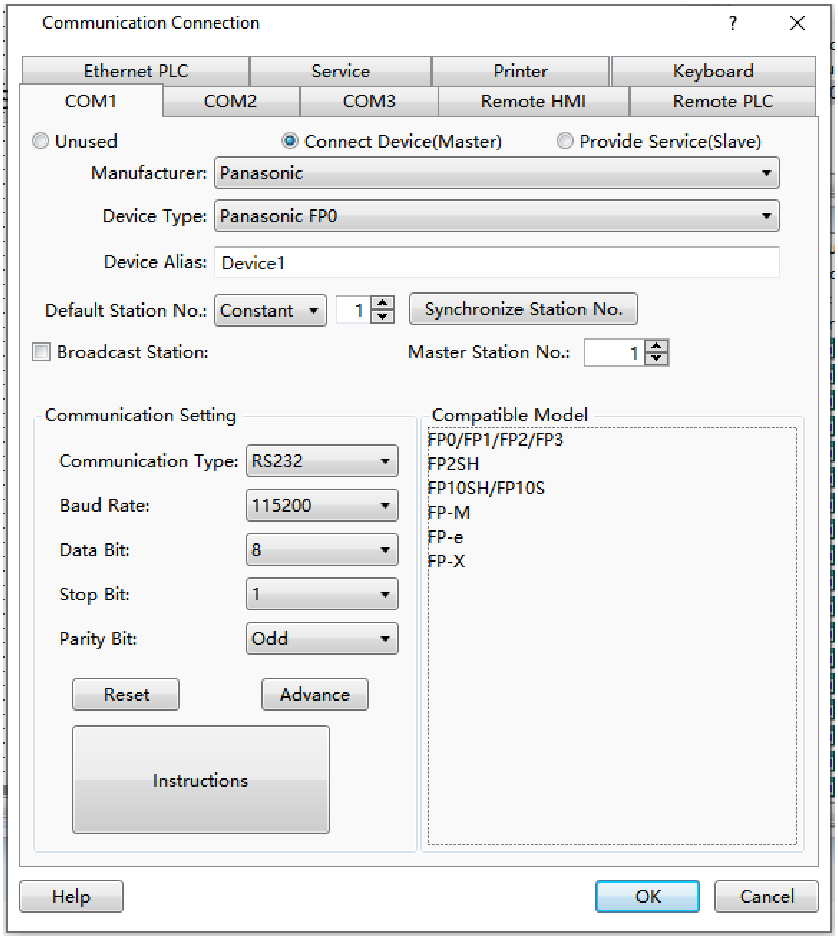
17.8.1.2 Configure PLC

Run PLC configuration sofrware, select **COM Port** , configure as shown in the figure below, click **OK**.



17.8.1.3 Configure HMI

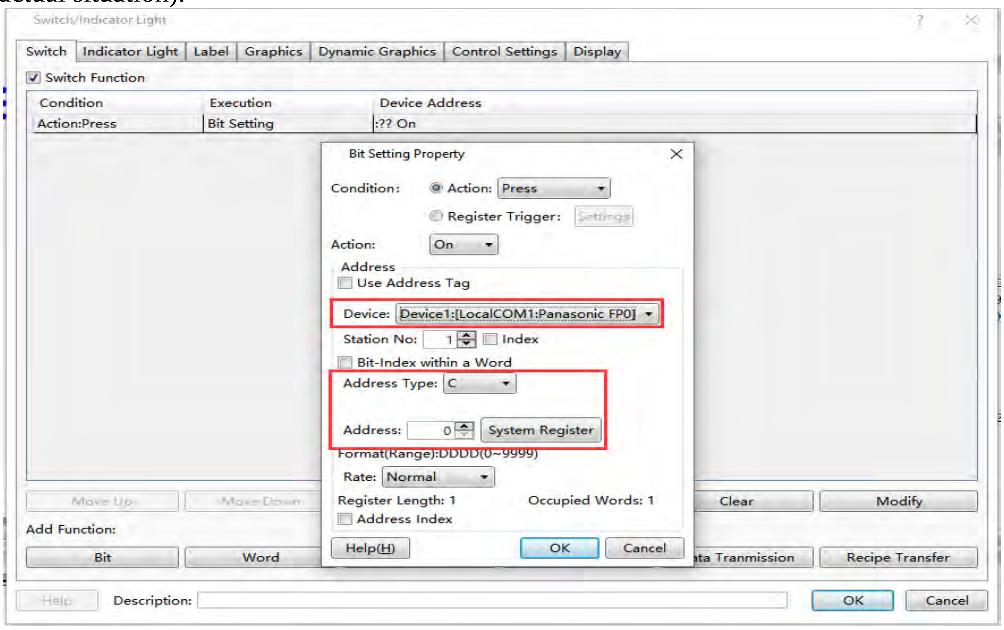
Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select **COM** port in the pop-up dialog box, configure relevant parameters, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Connection Device (HMI as Master)	As a control center, HMI analyzes the data collected from the device and issued the task to the device.
Manufacturer	Select “Panasonic “.
Device Type	Select “Panasonic FP0”.
Pre-set Station No.	Keep consistent with the PLC setting.
Communication Type	Select “RS232”.
Baud Rate	Please refer to the actual situation.
Data Bit	Please refer to the actual situation.
Stop Bit	Please refer to the actual situation.
Parity Bit	Please refer to the actual situation.

Step 2. Select **Component/Switch/Bit Setting** from the menu bar, set the PLC address in the pop-up dialog box (refer to the actual situation).

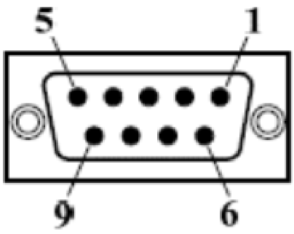


Step 3. After designing the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

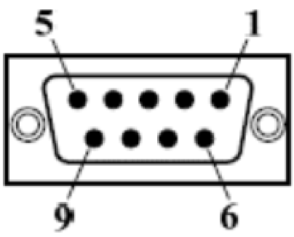
17.8.2 Serial Communication Between HMI and Panasonic FPX PLC

17.8.2.1 Connection Method

- Use RS232 cable to connect the COM1/COM2 port of the HMI to the serial port of the Panasonic FP0X PLC. Please refer to the table below for the connection method.

HMI COM1/COM2 Ports	PLC Serial Ports
2 RX	3 TXD
3 TX	2 RXD
5 GND	1 GND
	

- Use RS232 cable to connect the COM3/COM4 port of the HMI to the serial port of the Panasonic FP0 PLC. Please refer to the table below for the connection method.

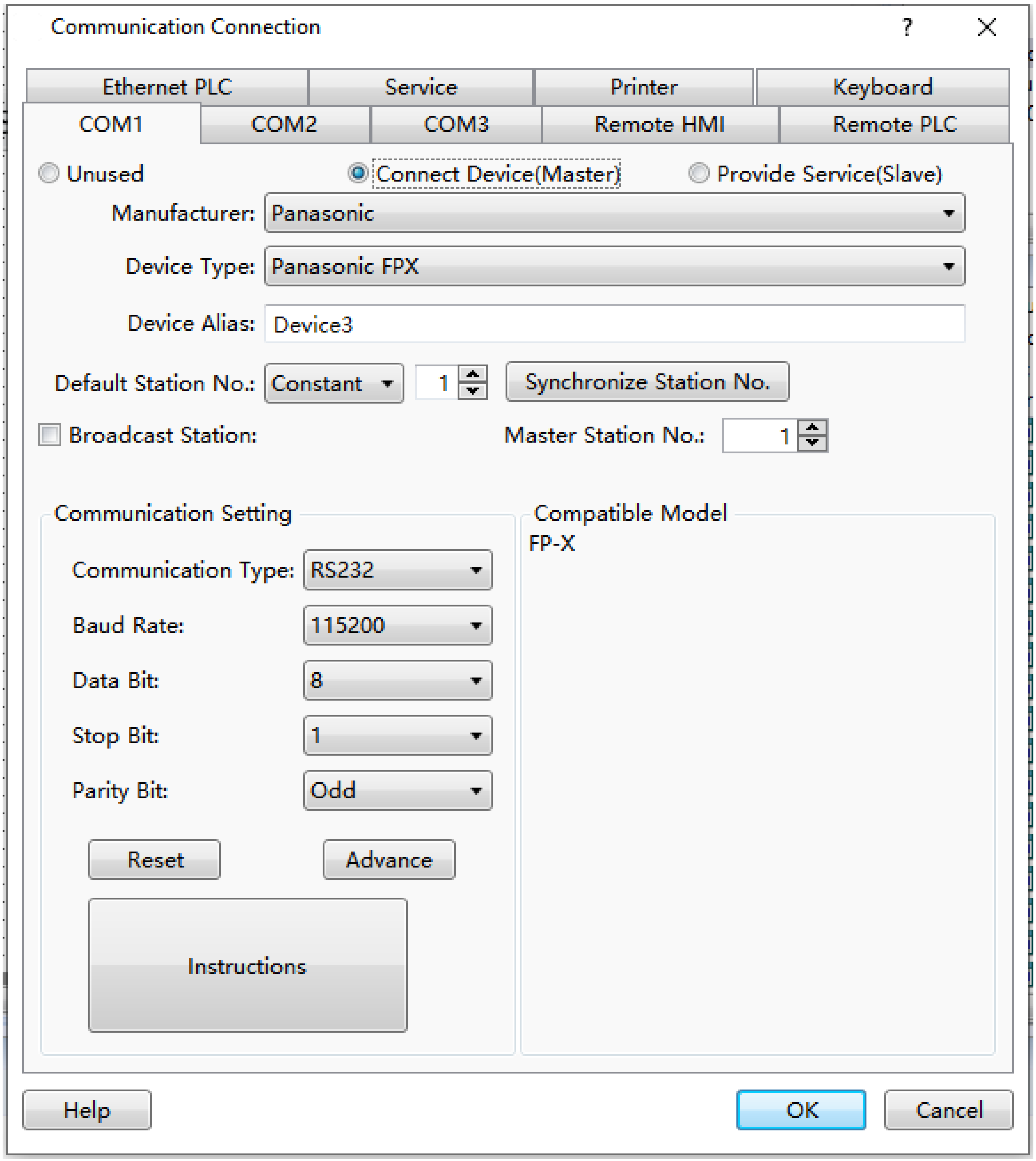
HMI COM3/COM4 Ports	PLC Serial Ports
7 RX	3 TXD
8 TX	2 RXD
5 GND	1 GND
	

17.8.2.2 Configure PLC

Please refer to Configure PLC.

17.8.2.3 Configure HMI

Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select COM port in the pop-up dialog box, configure relevant parameters, click **OK**.

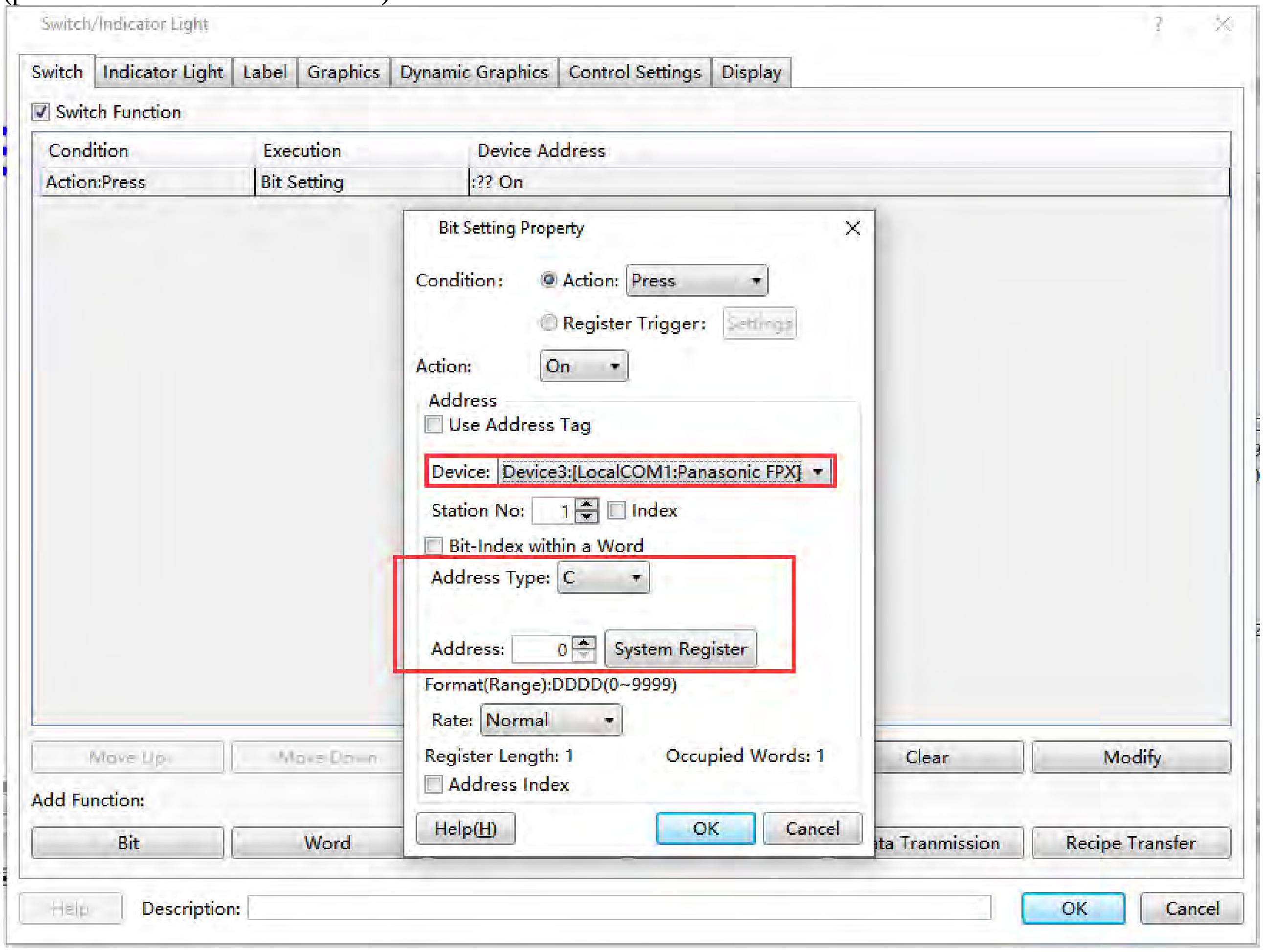


Please refer to the table below for detailed configuration methods.

Parameter	**Description**
Connection Device (HMI as Master)	As a control center, HMI analyzes the data collected from the device and issued the task to the device.
Manufacturer	Select “Panasonic “.

Parameter	Description
Device Type	Select “Panasonic FPX”.
Device Type	Keep consistent with PLC settings.
Device Type	Select “RS232”.
Baud Rate	Please refer to the actual situation.
Data Bit	Please refer to the actual situation.
Stop Bit	Please refer to the actual situation.
Parity Bit	Please refer to the actual situation.

Step 2. Select **Component/Switch/Bit Set** from the menu bar, set the PLC address in the pop-up dialog box (please refer to the actual situation).



Step 3. After configuring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

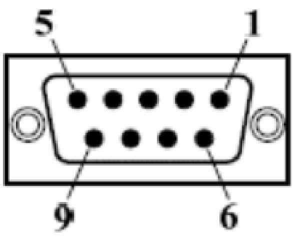
17.9 Delta PLC

17.9.1 RS232 Communication Between HMI and Delta DVP PLC

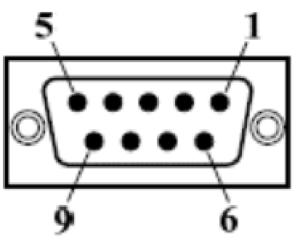
HMI supports the RS232 protocol communication with Delta DVP PLC.

17.9.1.1 Connection Method

◆ Use RS232 cable to connect the COM1/COM2 port of the HMI to the serial port of Delta DVP PLC. Please refer to the table below for the connection method.

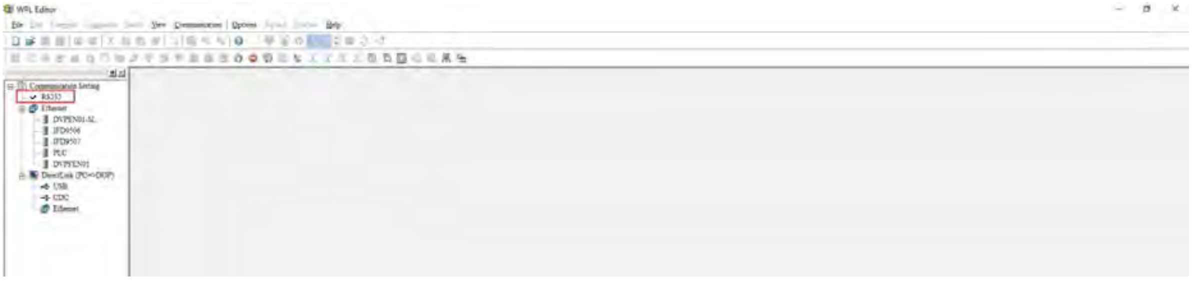
HMI COM1/COM2 Ports	PLC Serial Port
2 RX	5 TXD
3 TX	4 RXD
5 GND	8 GND
	

◆ Use RS232 cable to connect the COM3/COM4 port of the HMI to the serial port of Delta DVP PLC. Please refer to the table below for the connection method.

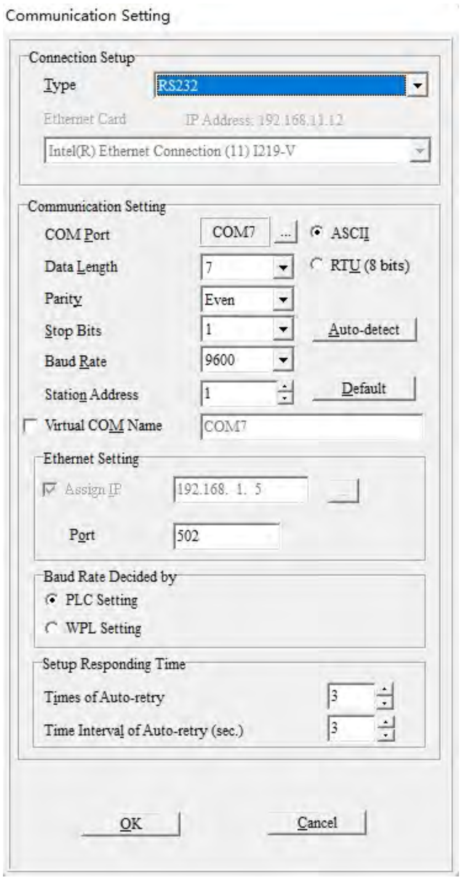
HMI COM3/COM4 Ports	PLC Serial Port
7 RX	5 TXD
8 TX	4 RXD
5 GND	8 GND
	

17.9.1.2 Configure PLC

Step 1. Run WPLSoft, the configuration software of Delta DVP PLC, double click **RS232**.



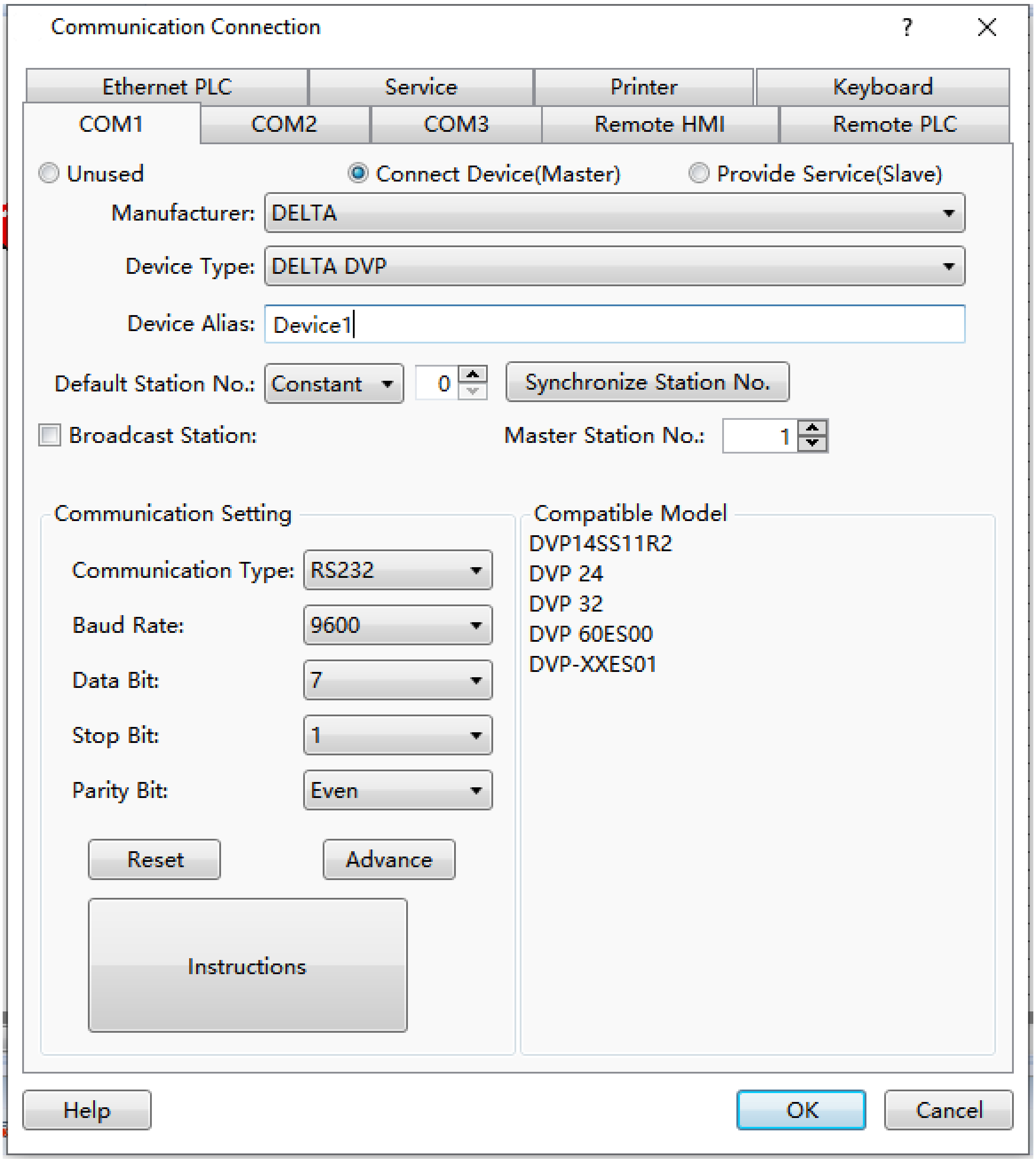
Step 2. Configure relevant parameters in the pop-up dialog box, (select RS232 as transmission method, for data length, patiry bit, stop bit, baud rate, please refer to the actual situation of PLC), click **OK**.



Step 3. Click the  icon, download the configuration information to PLC.

17.9.1.3 Configure HMI

Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select COM port in the pop-up dialog box, configure relevant parameters, click **OK**.

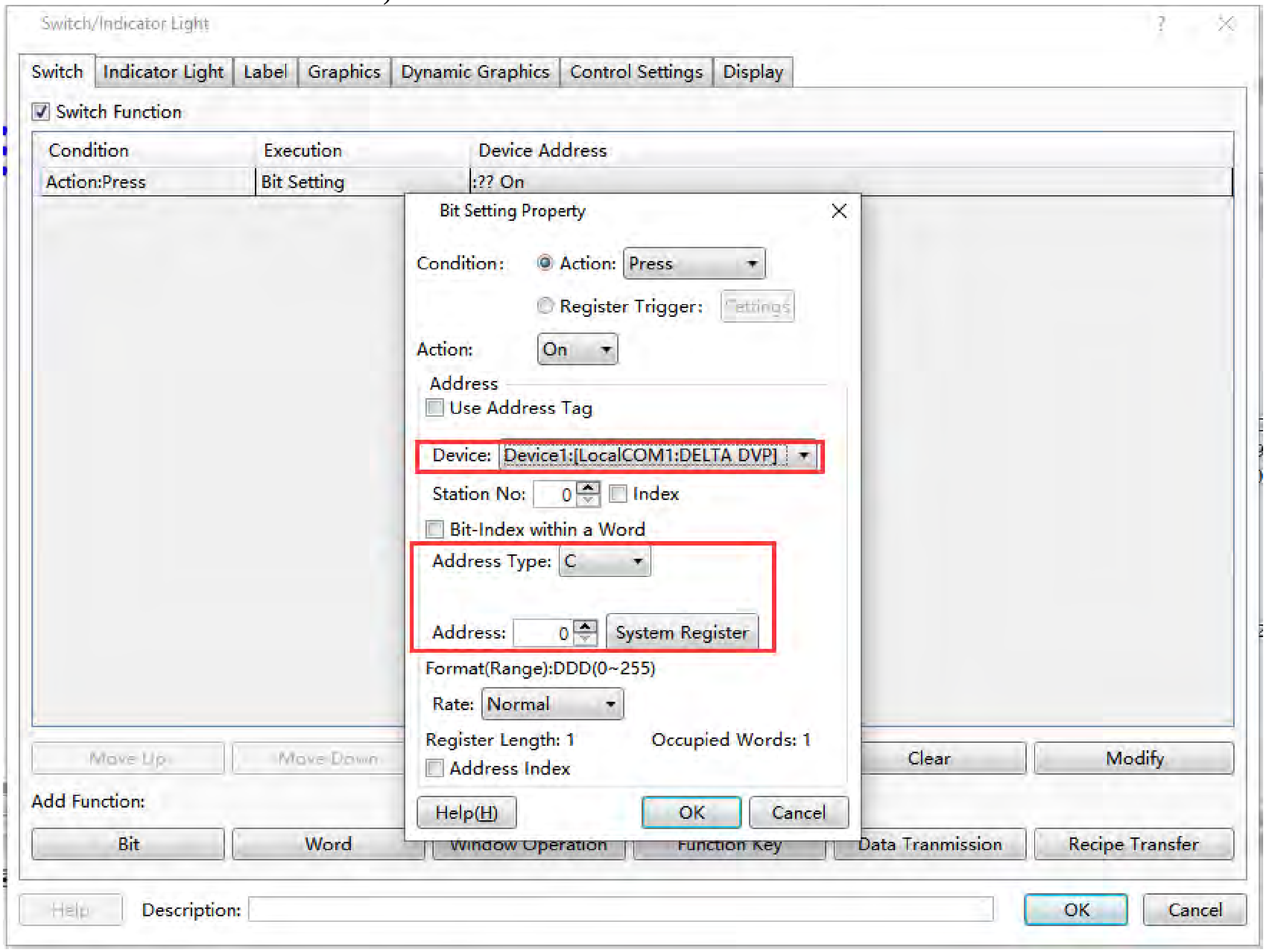


Please refer to the table below for detailed configuration.

Parameter	**Description**
Connection Device (HMI as Master)	As a control center, HMI analyzes the data collected from the device and issued the task to the device.
Manufacturer	Select “DELTA”.
Device Type	Select “DELTA DVP”.
Communication Type	Select “RS232”.
Baud Rate	Keep consistent with the actual PLC setting.
Data Bit	Keep consistent with the actual PLC setting.

Parameter	Description
Stop Bit	Keep consistent with the actual PLC setting.
Parity Bit	Keep consistent with the actual PLC setting.

Step 2. Select **Component/Switch/Bit Set** from the menu bar, set the PLC address in the pop-up dialog box (to be consistent with the actual situation).



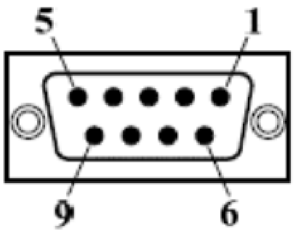
Step 3. After configuring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

17.9.2 RS485 Communication Between HMI and Delta DVP PLC

HMI supports the RS485 protocol communication with Delta DVP PLC.

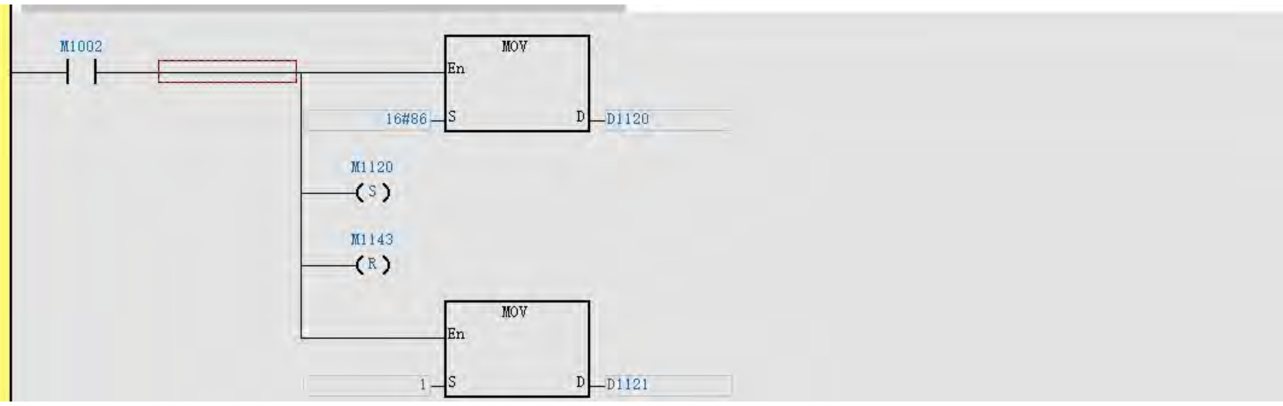
17.9.2.1 Connection Method

Use RS485-2 cable to connect the COM port of the HMI to the serial port of Delta DVP PLC. Please refer to the table below for the connection method.

HMI COM1/COM2 Ports	PLC Serial Port
1 RX	D-
6 TX	D+
5 GND	GND
	

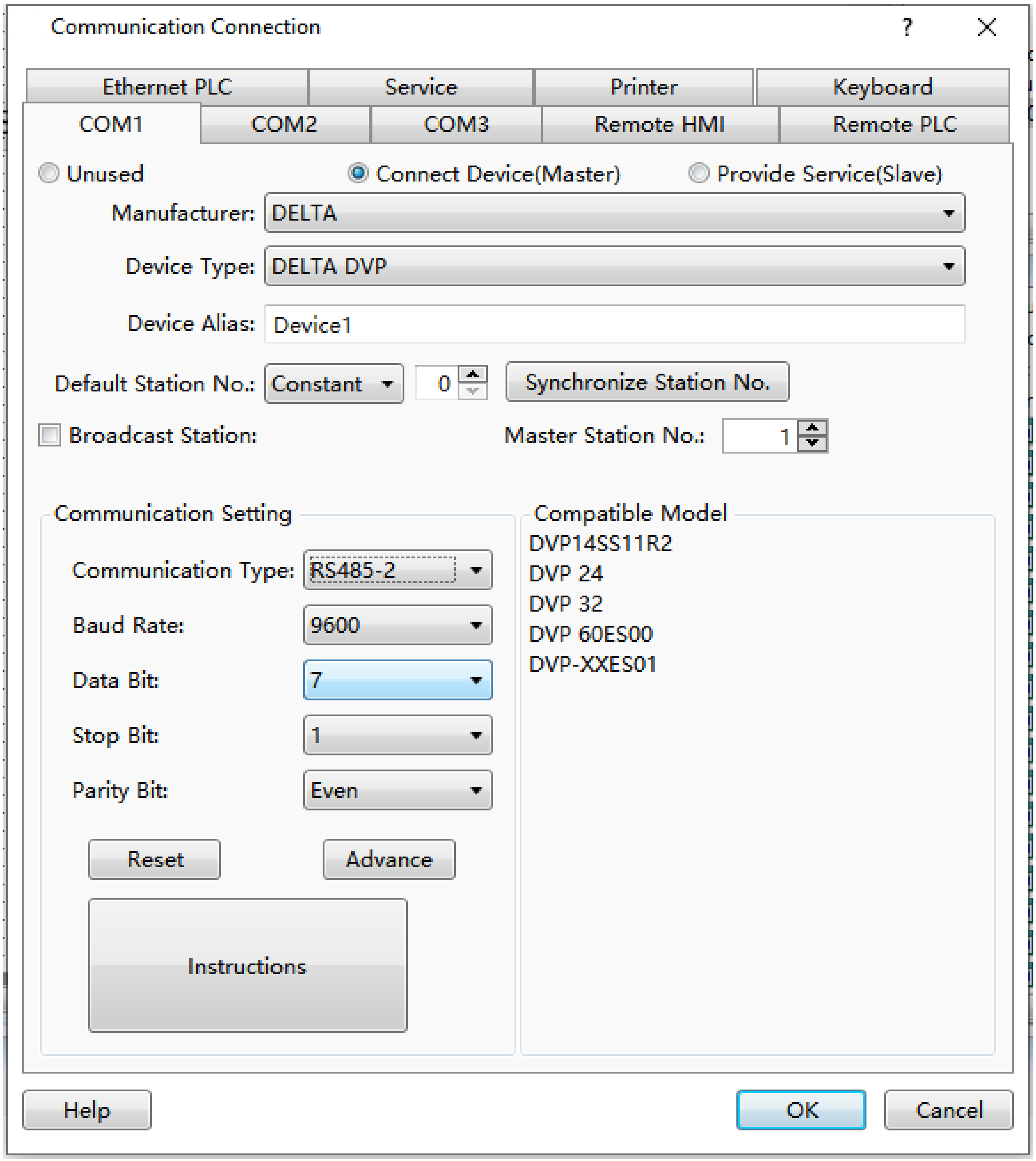
17.9.2.2 Configure PLC

Delta DVP requires adding a communication program within the PLC for RS485 communication. Please refer to the diagram below. It is recommended to set M1143 as 0 (0 corresponds to Modbus ASCII communication mode, while 1 corresponds to Modbus RTU communication mode). For other parameters, please refer to the programming manual of Delta DVP PLC.



17.9.2.3 Configure HMI

Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select COM port that supports RS485-2 protocol in the pop-up dialog box, configure relevant parameters, click **OK**.

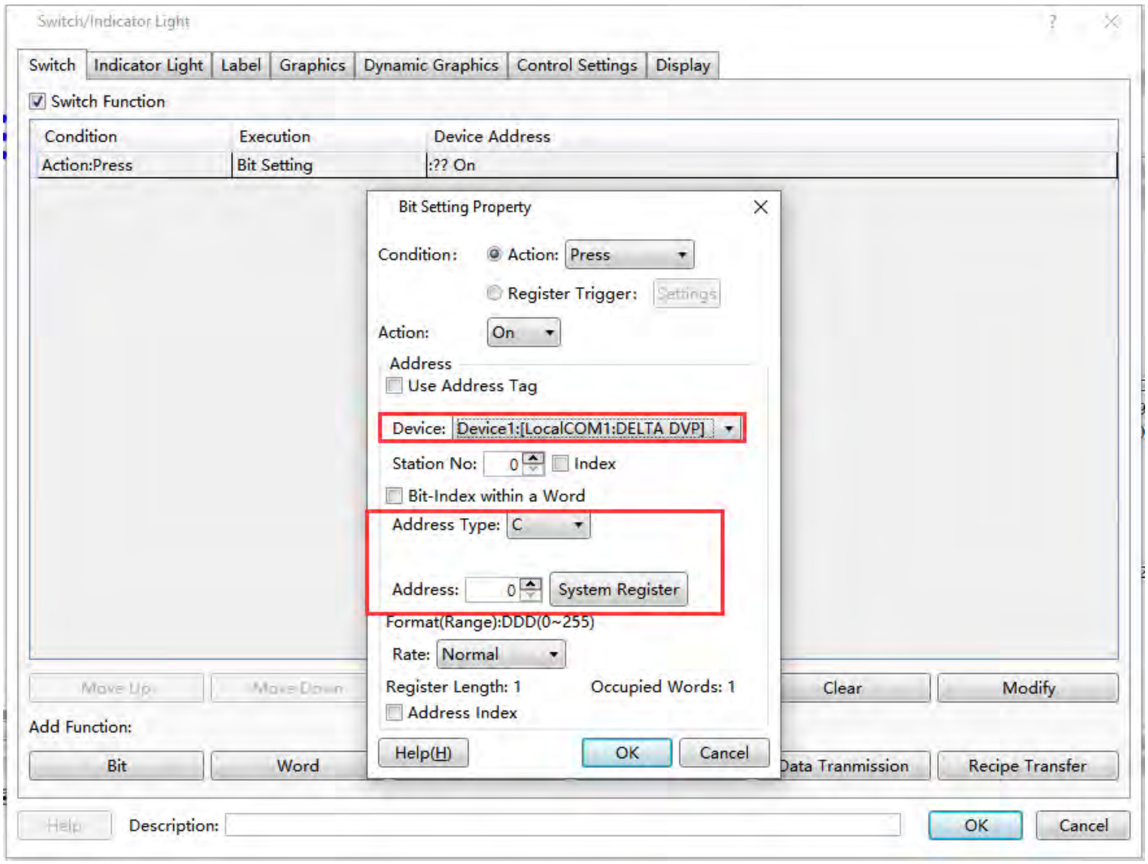


Please refer to the table below for detailed configuration methods.

Parameters	Description
Connection Device (HMI as Master)	As a control center, HMI analyzes the data collected from the device and issued the task to the device.
Manufacturer	Select “DELTA”.
Device Type	Select “DELTA DVP”.
Communication Type	Select “RS485-2”.

Parameters	Description
Baud Rate	Keep consistent with PLC settings.
Data Bit	Keep consistent with PLC settings.
Stop Bit	Keep consistent with PLC settings.
Parity Bit	Keep consistent with PLC settings.

Step 2. Select **Component/Switch/Bit Setting** from the menu bar, set the PLC address in the pop-up dialog box (to be consistent with the actual situation).



Step 3. After configuring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

17.9.3 Serial Communication Between HMI and Delta AS Series

HMI supports the RS485-2 protocol communication with Delta AS series PLC.

17.9.3.1 Connection Method

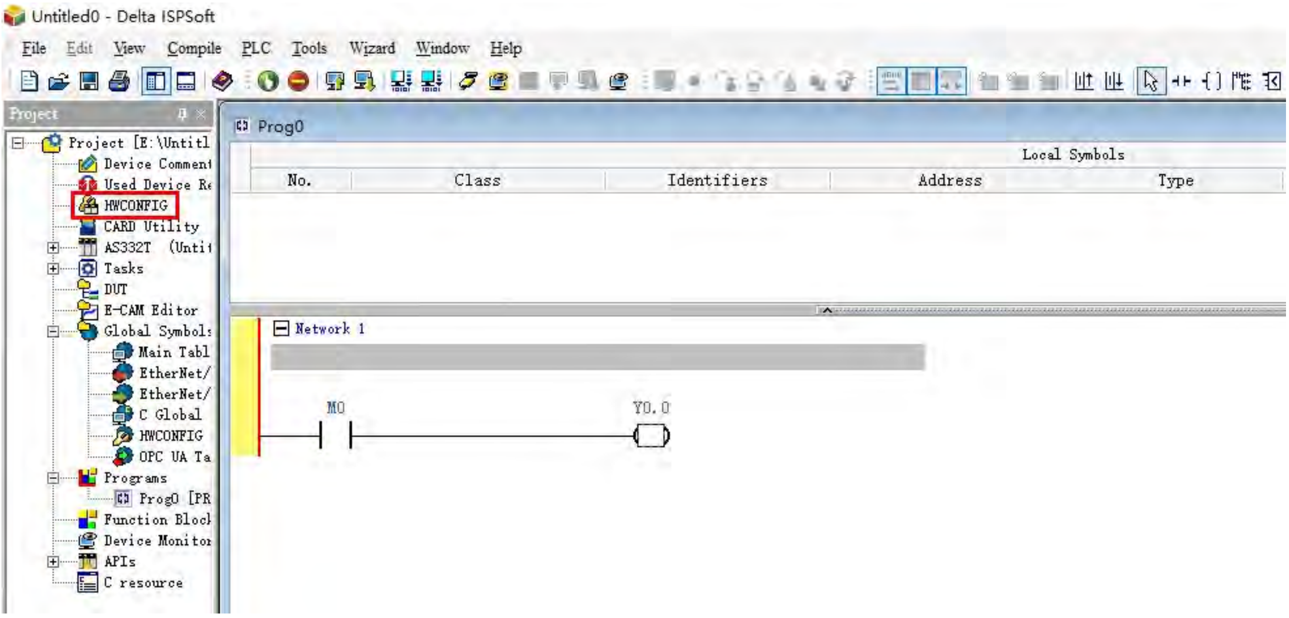
Use RS485-2 cable to connect the COM port of the HMI to the serial port of Delta AS series PLC. Please refer to the table below for the connection method.

HMI COM Port (support RS458-2 protocol)	PLC Serial Port
A+	A
B-	B
GND	GND

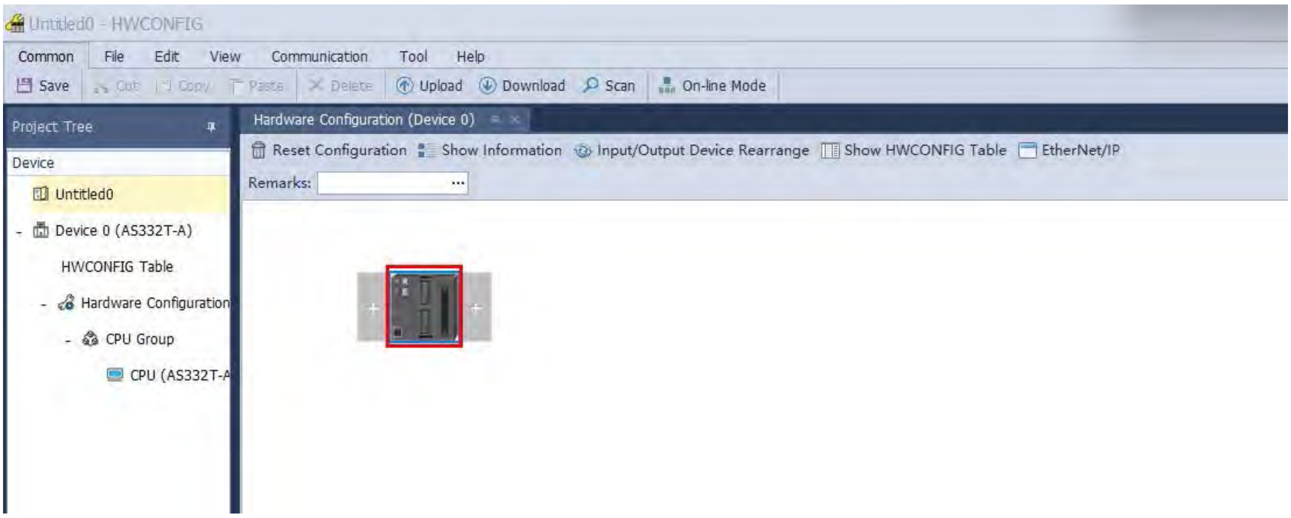
17.9.3.2 Configure PLC

Step 1. Configure serial communication parameters.

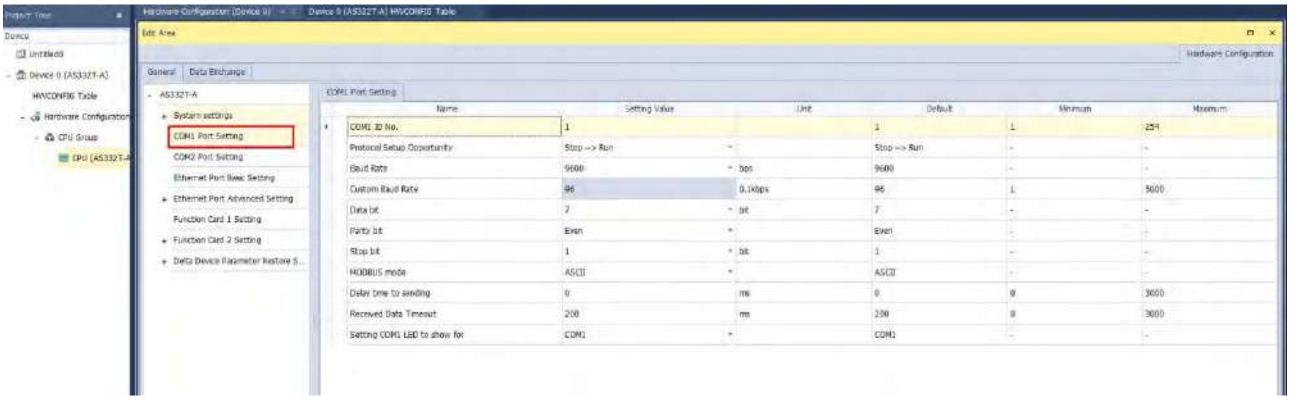
1) Run ISPSoft, the configuration software of PLC, double click **HWCONFIG**.



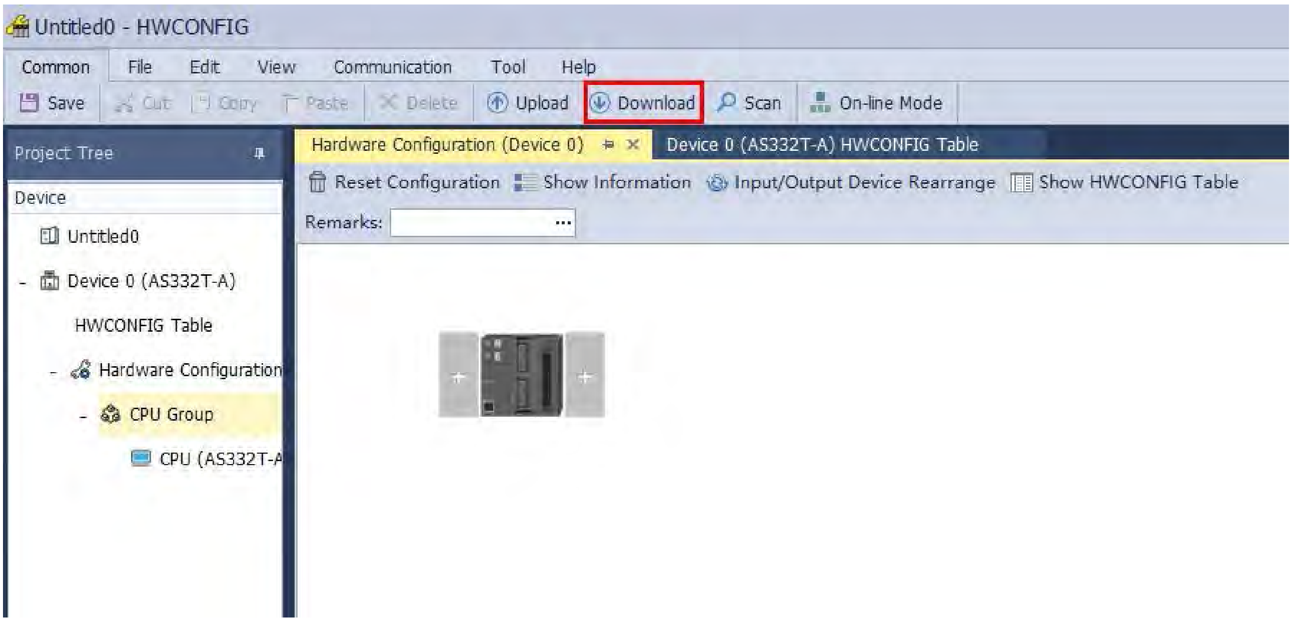
2) Double click the master icon.



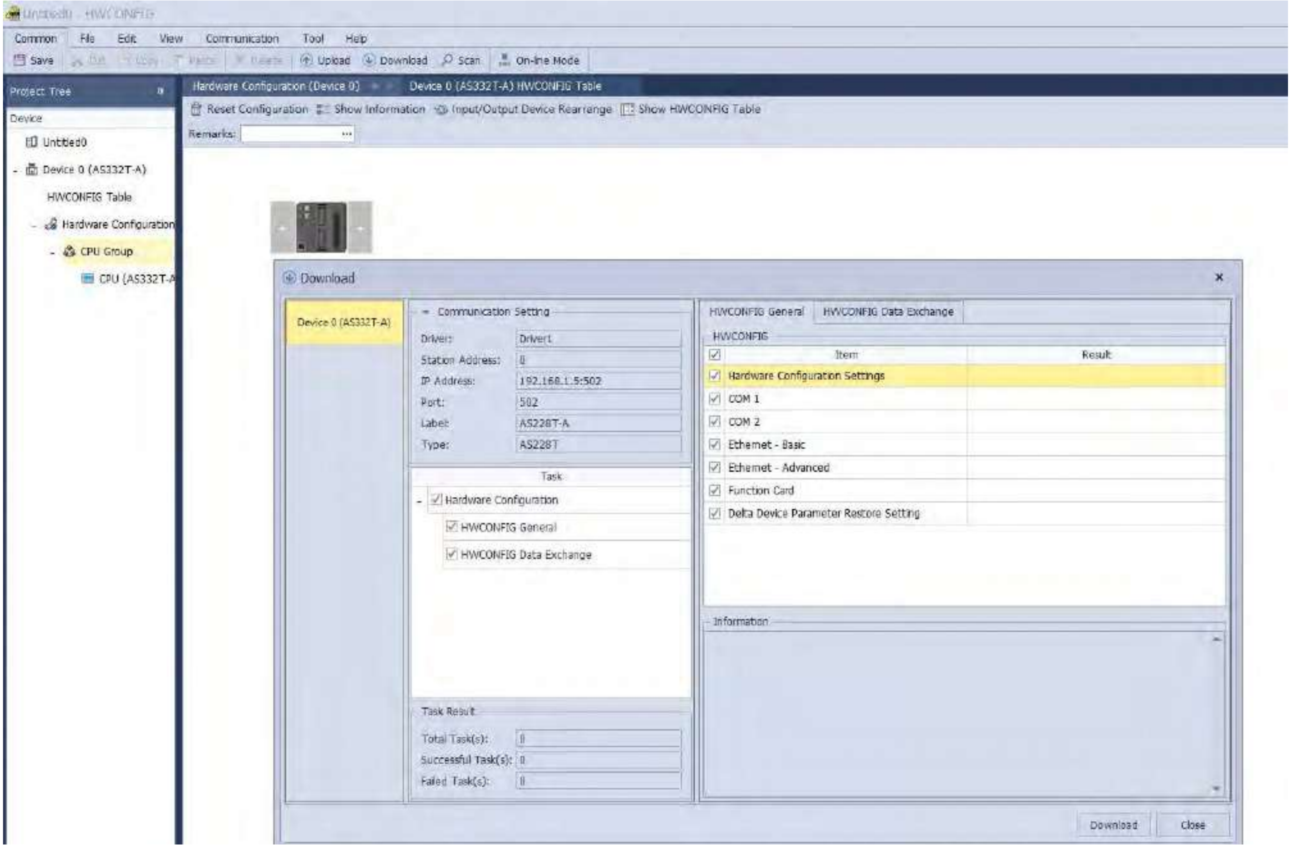
3) Set communication parameters of the corresponding COM port, click **OK**.



4) Click **Download**.



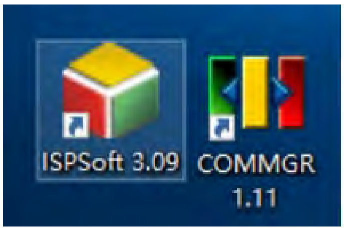
5) Click **Download** in the pop-up dialog box, download configuration to PLC.



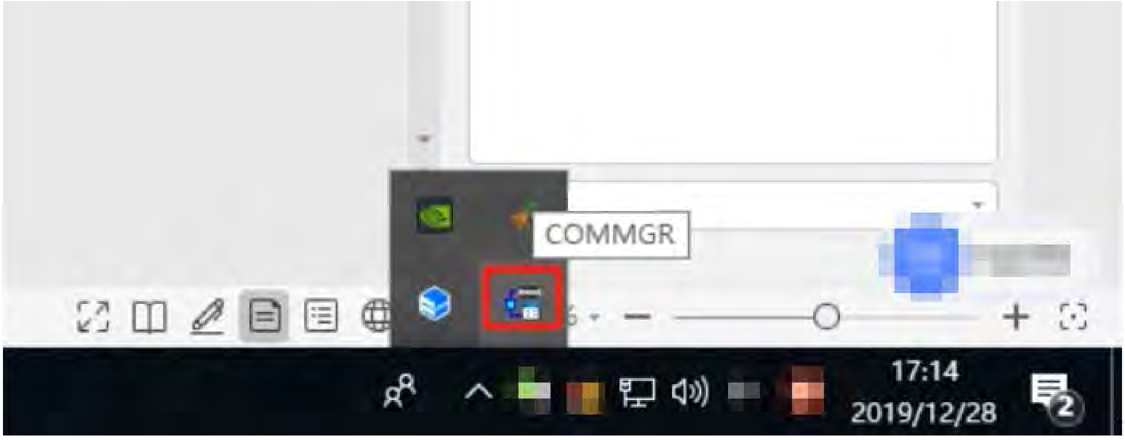
Step 2. (Optional) Download program to PLC.

1) Install COMMGR plug-in.

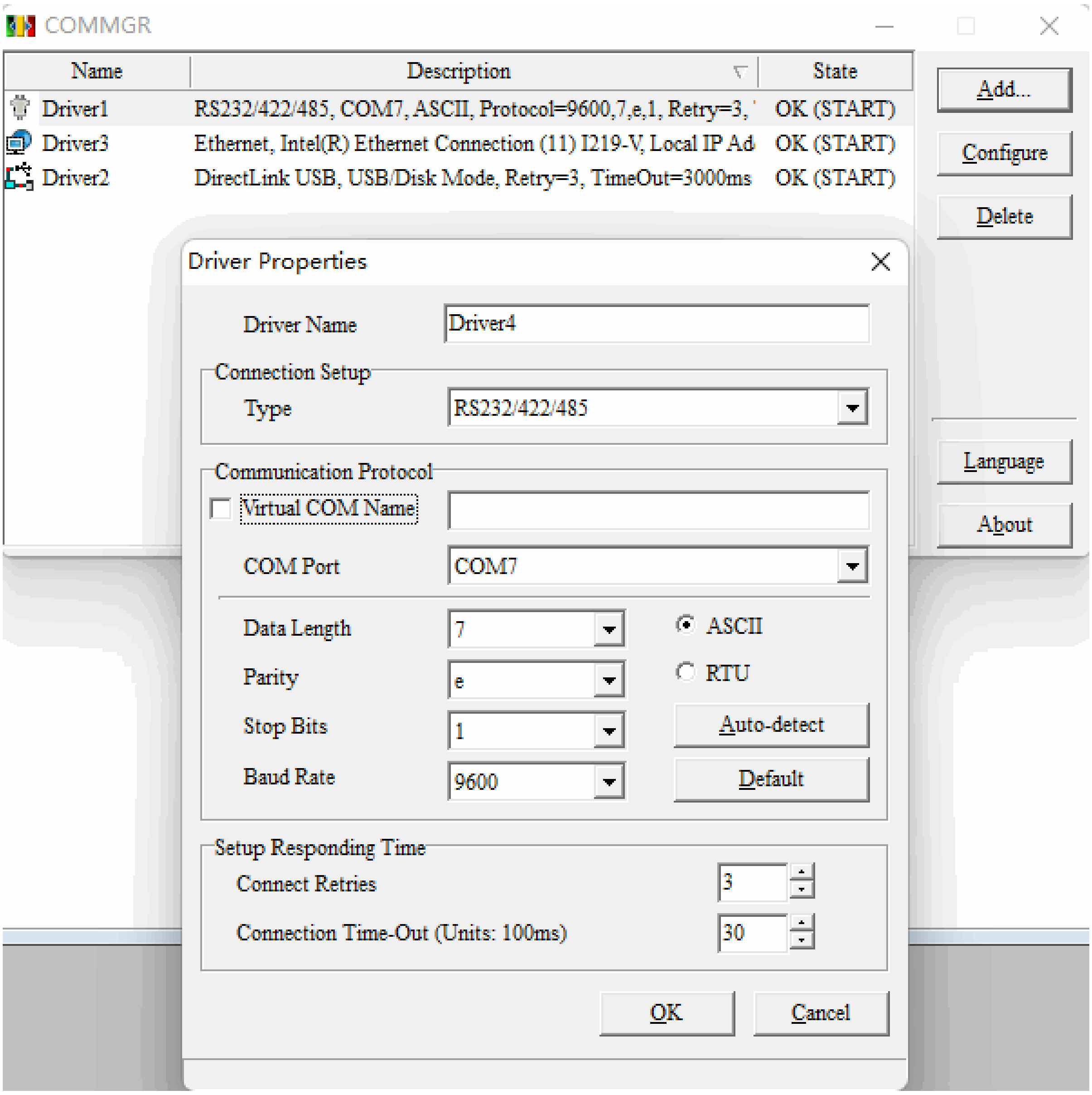
- ◆ The configuration software of the Delta AS series PLC is ISPSOFT. The download program needs to be supported using the COMMGR plug-in.
- ◆ ISPSOFT software is compatible with DVP series PLC configuration software WLPSoft's program.



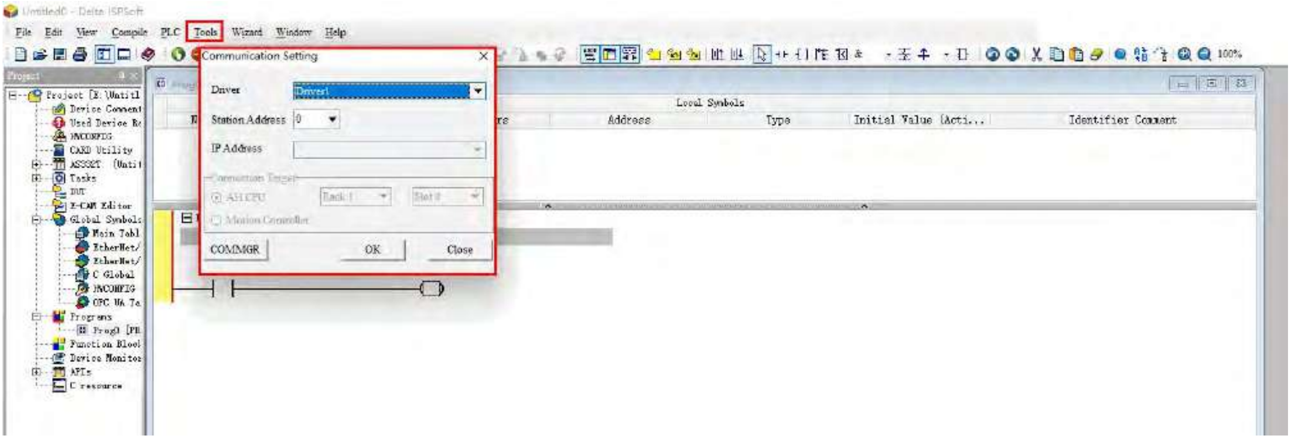
2) After installing the COMMGR plug-in, the COMMGR is staying in the system tray on the right side of the taskbar.



3) Add download channels in COMMGR, including USB, network port, serial port.

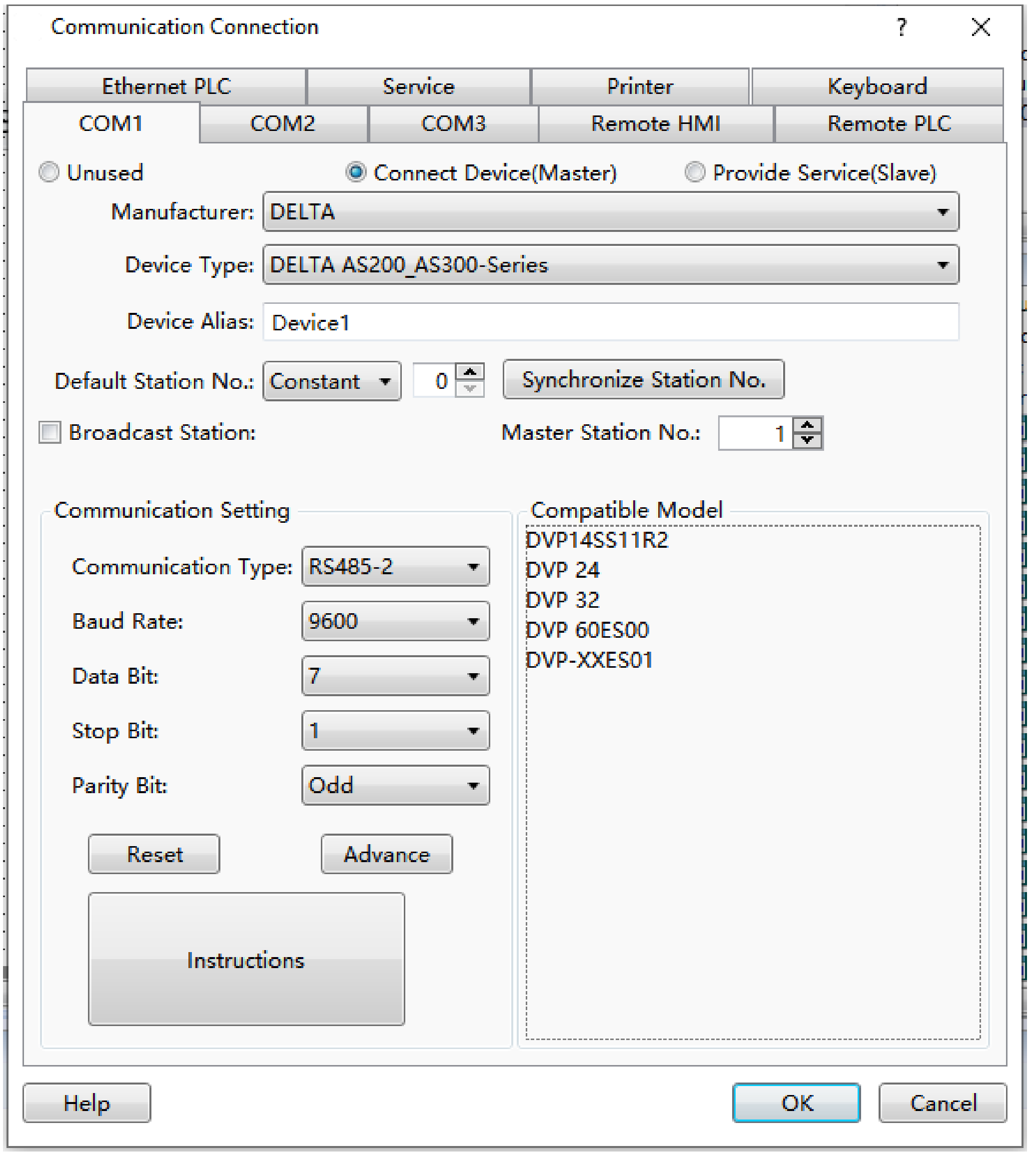


4) Select **Tools/communication settings** from the menu bar of ISPSOFT software. Select the newly added download channel to download the PLC program.



17.9.3.3 Configure HMI

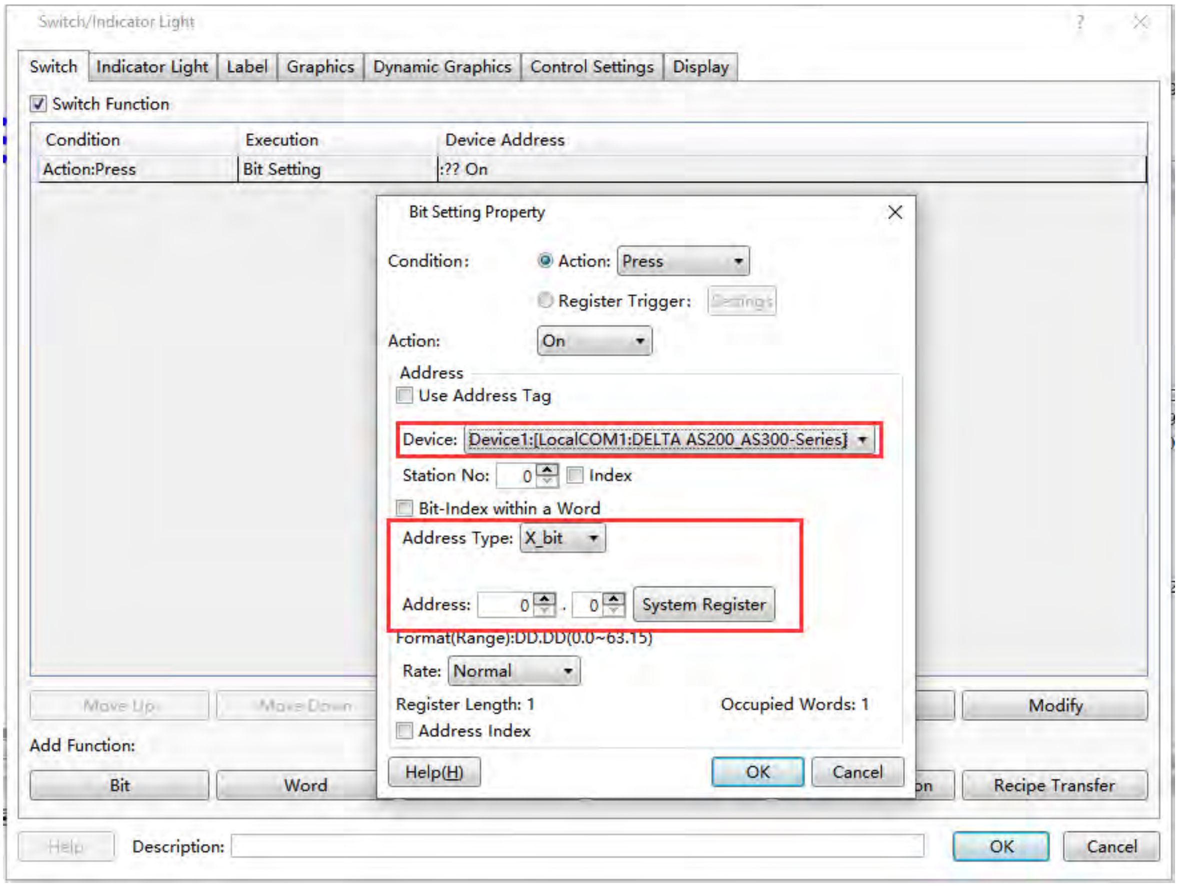
Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select COM port in the pop-up dialog box, configure relevant parameters, click **OK**.



Please refer to the table below for detailed configuration methods.

Parameters	**Description**
Connection Device (HMI as Master)	As a control center, HMI analyzes the data collected from the device and issued the task to the device.
Manufacturer	Select “DELTA”.
Device Type	Select “DELTA AS200_AS300-Series”.
Communication Protocol	Select “RS485-2”.
Baud Rate	Keep consistent with the actual PLC setting.
Data Bit	Keep consistent with the actual PLC setting.
Stop Bit	Keep consistent with the actual PLC setting.
Parity Bit	Keep consistent with the actual PLC setting.

Step 2. Select **Component/Switch/Bit Set** from the menu bar, set the PLC address in the pop-up dialog box (to be consistent with the actual situation).



Step 3. After configuring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

17.9.4 Ethernet Communication Between HMI and Delta AS Series PLC

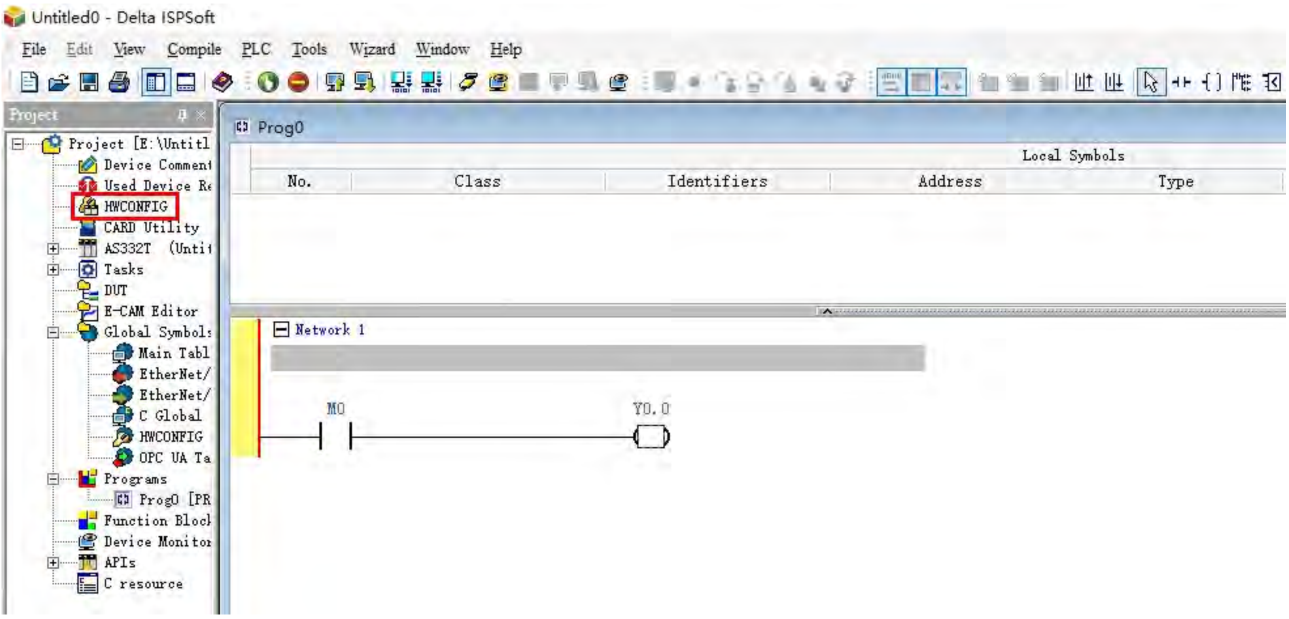
HMI with Ethernet port support Ethernet communication with the Delta AS series PLC. HMI can be directly connected to the Delta PLC using an Ethernet cable, or via switch connection.

17.9.4.1 Connection Method

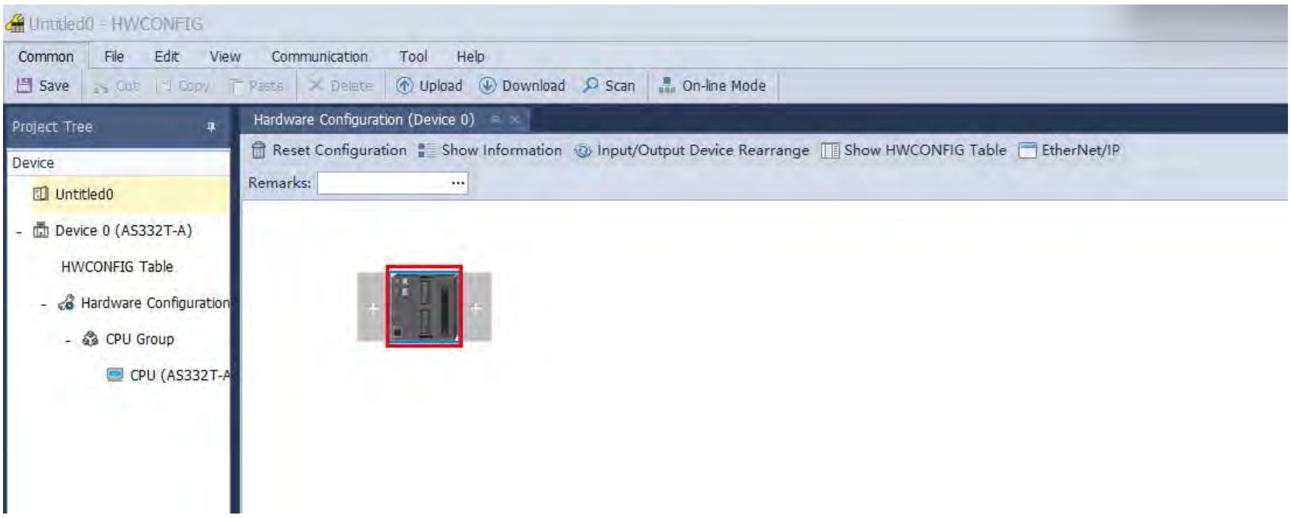
Please refer to Connection Method.

17.9.4.2 Configure PLC

Step 1. Run PLC configuration software, double click **HWCONFIG**.

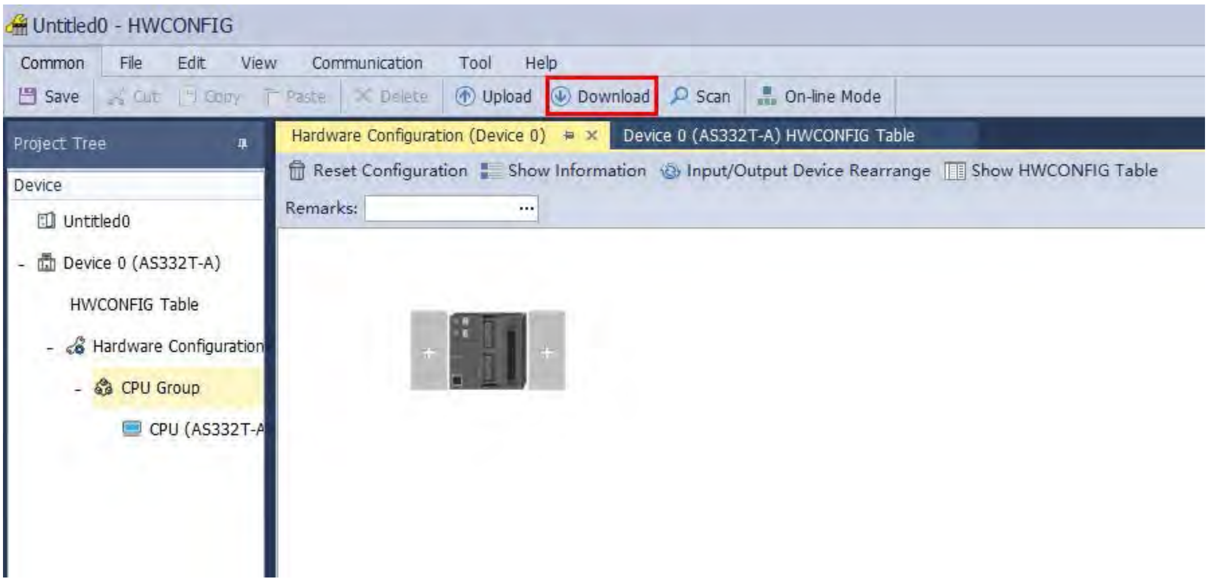


Step 2. Double click Host icon.

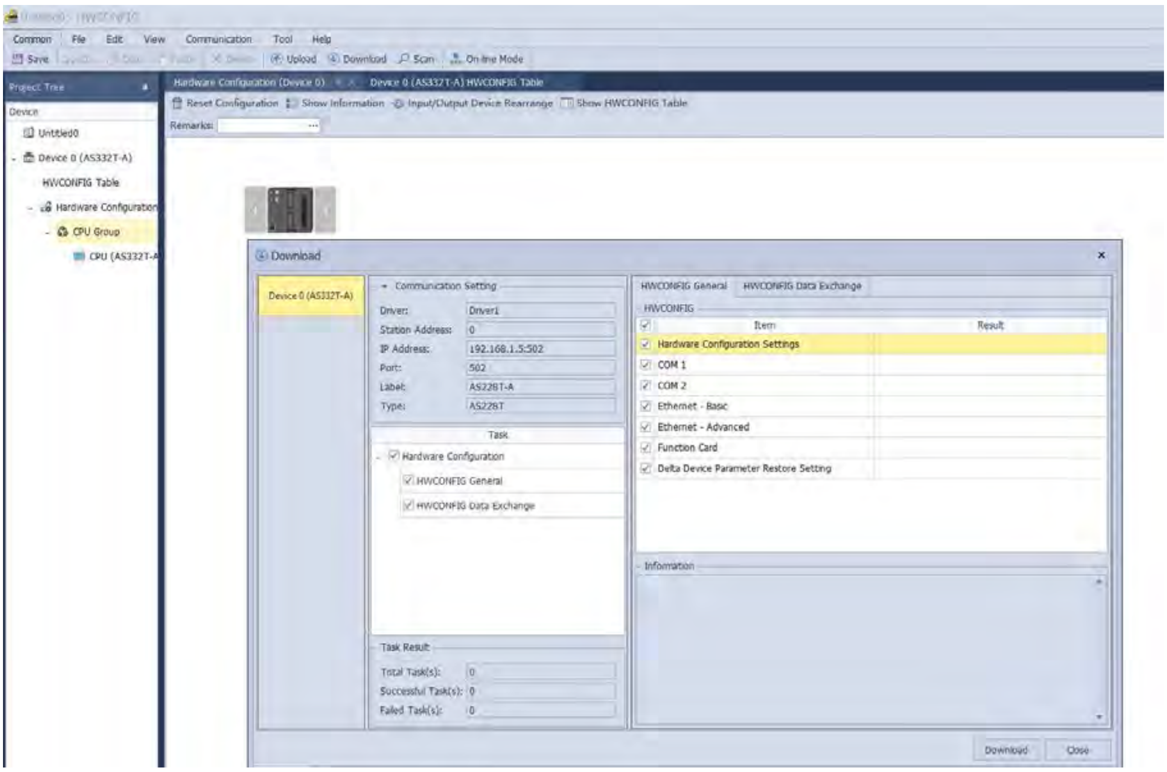


Step 3. Select **Ethernet Port Basic Settings**, set the corresponding master IP, click **OK**.

Step 4. Click **Download**.

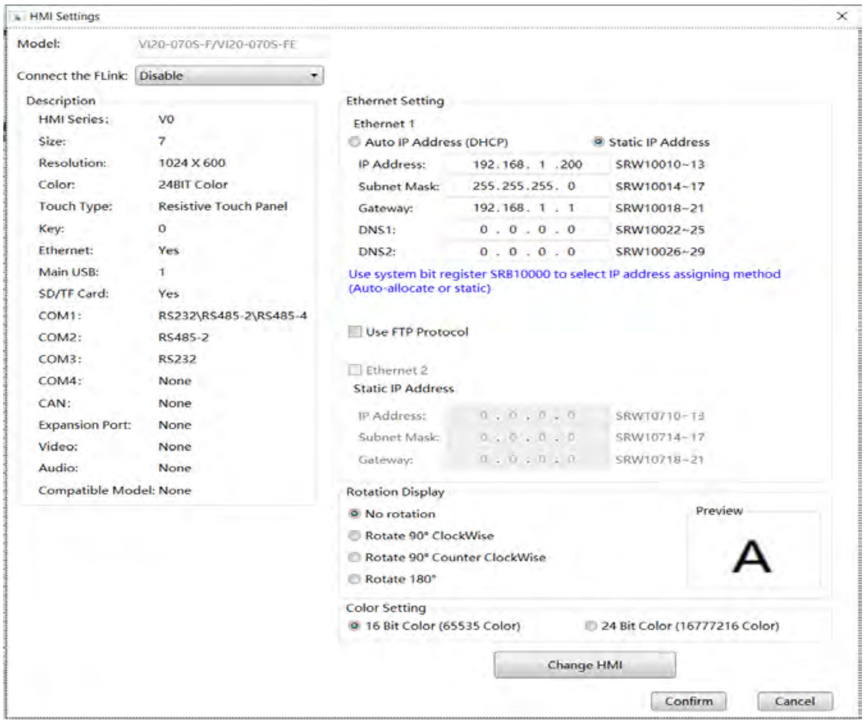


Step 5. Select the download project in the pop-up dialog box, click **Download**.

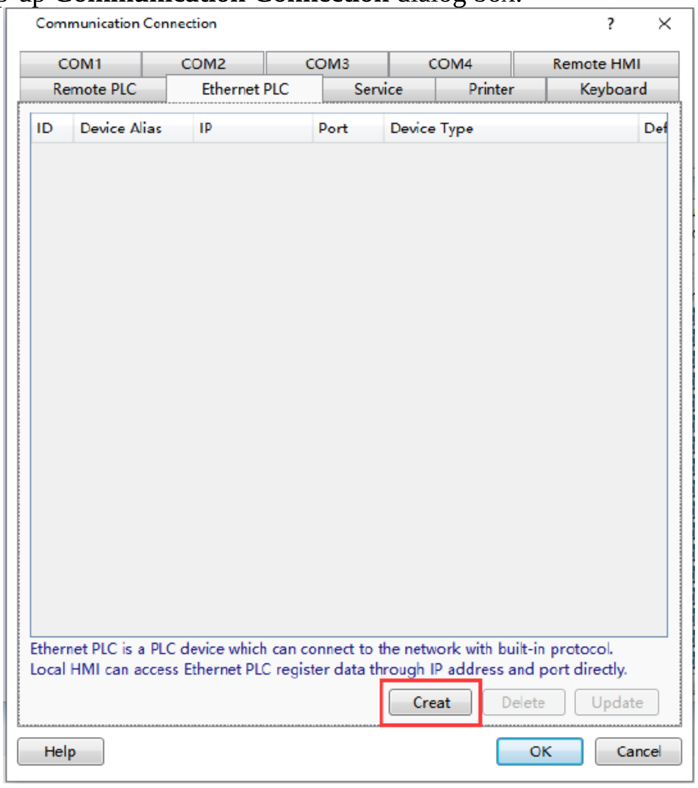


17.9.4.3 Configure HMI

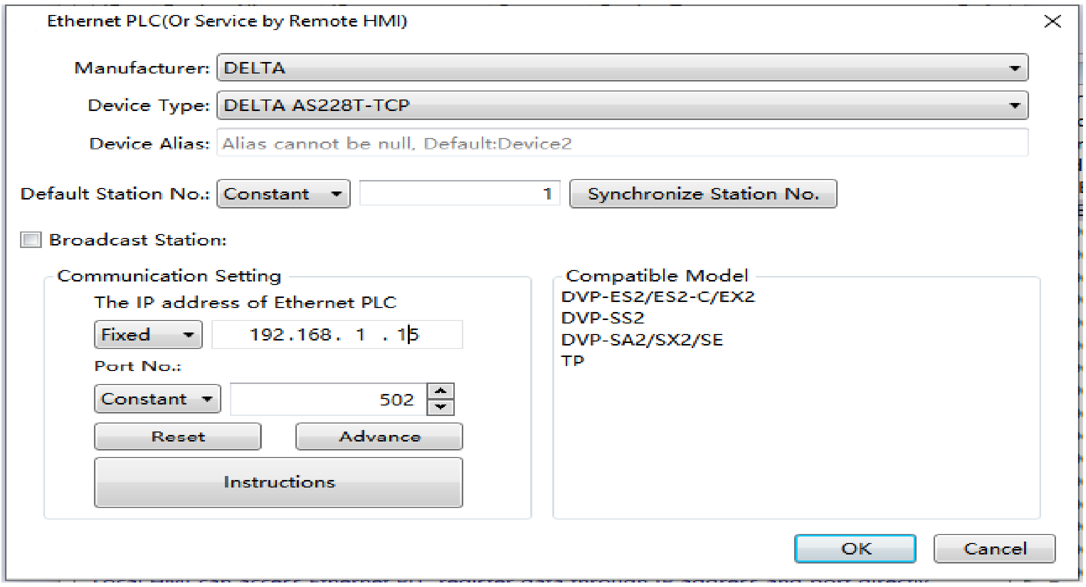
Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI in the pop-up dialog box (to be in the same network segment as the IP address of PLC), click **Confirm**.



Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, selcet **Ethernet PLC** tab,click **Create** in the pop-up **Communication Connection** dialog box.

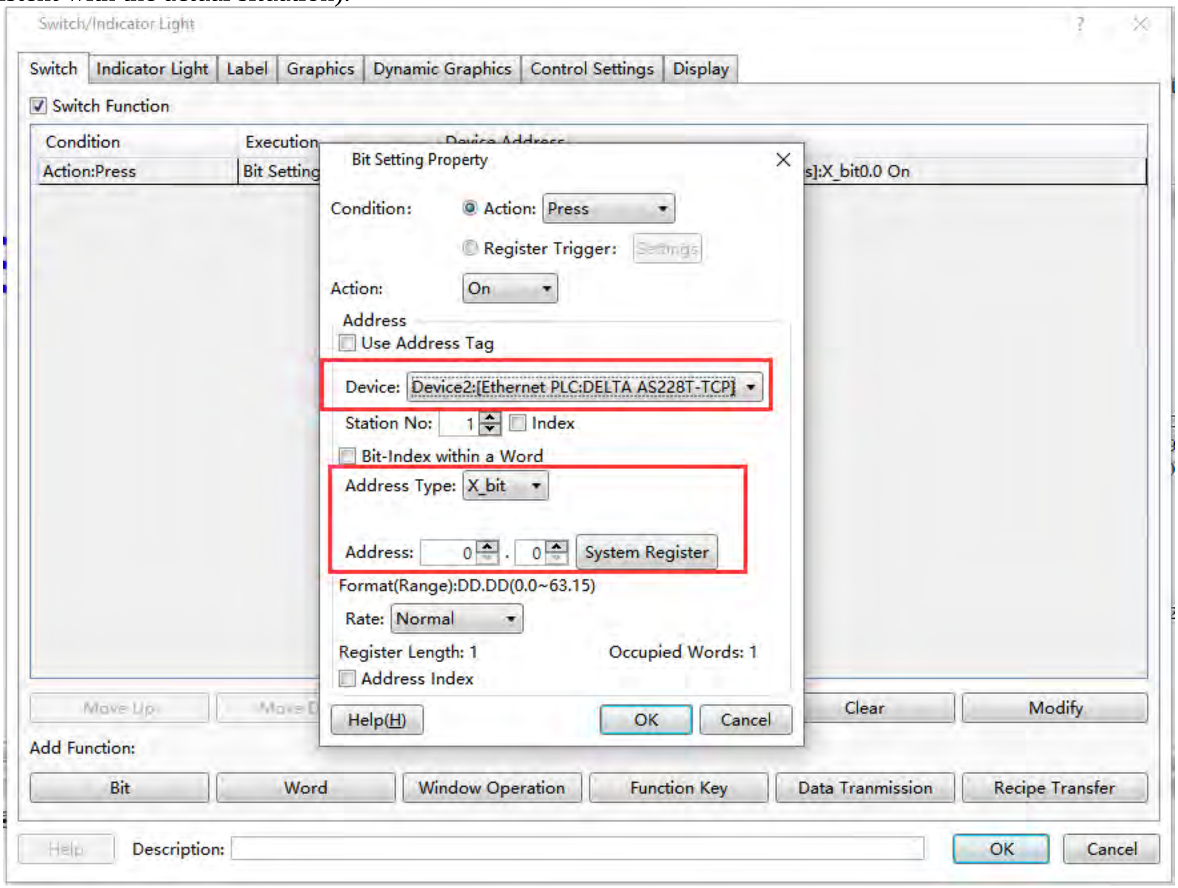


Step 3. Configure relevant parameters in the pop-up dialog box, click **OK**.



Step 4. Click **OK** in the **Communication Connection** dialog box.

Step 5. Select **Component/Switch/Bit Set** from the menu bar, set the PLC address in the pop-up dialog box (to be consistent with the actual situation).



Step 3. After configuring the project, download project to HMI. If the value of PLC address can be read, it means the communication is working.

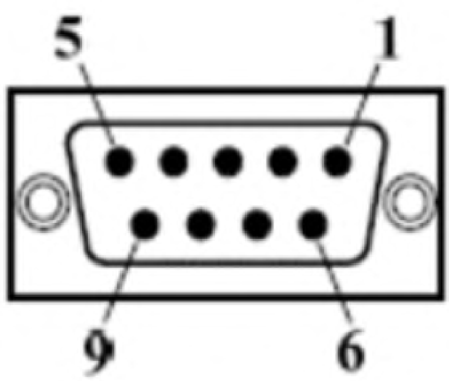
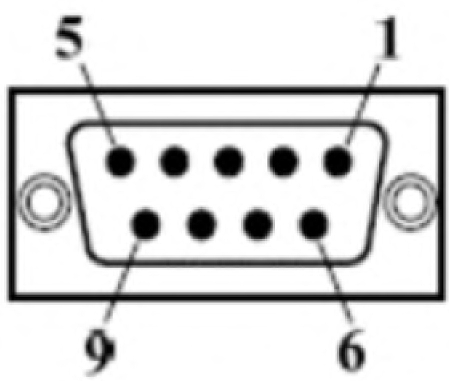
17.10 Siemens PLC

17.10.1 Serial Communication Between HMI and Siemens S7-200 PLC

HMI supports RS232, RS485-2 protocol communication with Siemens S7-200 PLC.

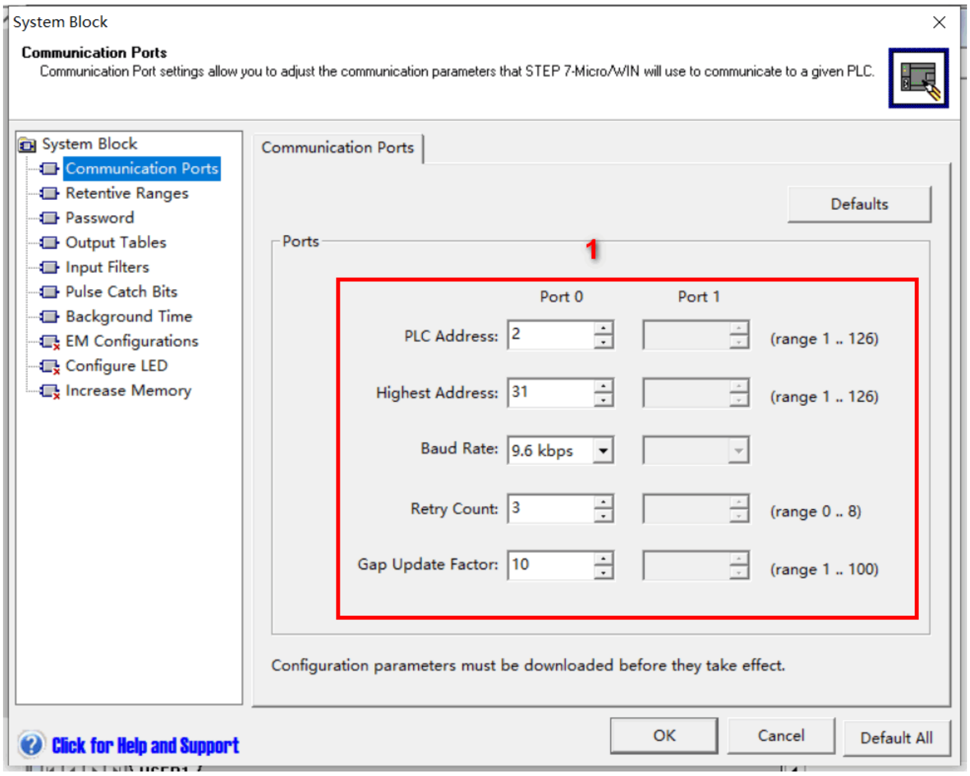
17.10.1.1 Connection Method

- ◆ If you use RS232 communication protocol, a Siemens special serial cable is required to connect the COM port of HMI and serial port of Siemens S7-200 PLC.
- ◆ If use RS485-2 communication protocol, please refer to the table below for connection method.

HMI COM Ports (support RS458-2 protocol)	PLC POTR1
1 RX	8 D-
6 TX	3 D+
5 GND	5 GND
	

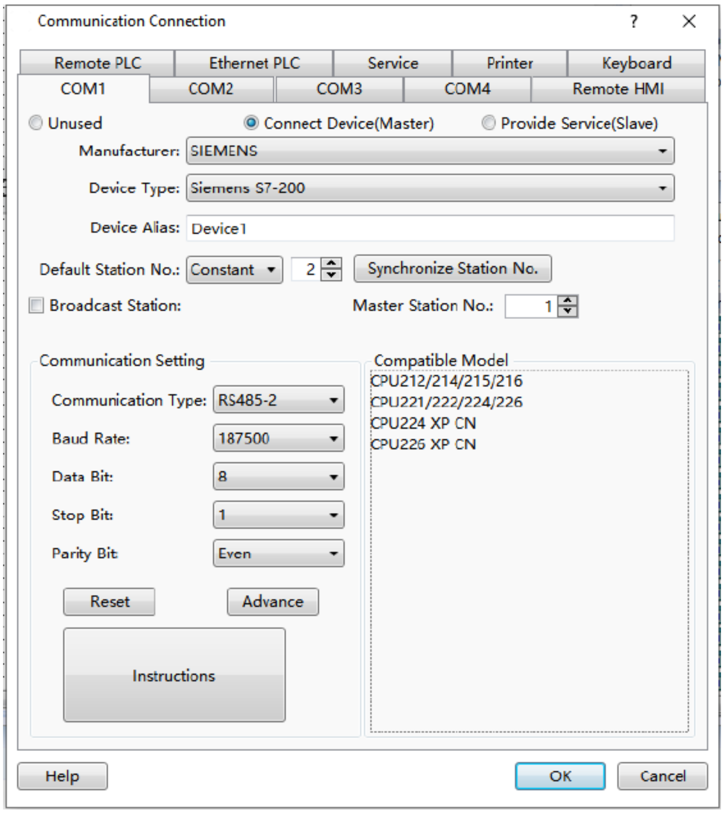
17.10.1.2 Configure PLC

Run the configuration software of Siemens S7-200 PLC. Set the serial communication parameters as shown in the picture below. Click **OK**. **PLC Address** is the pre-set station number.



17.10.1.3 Configure HMI

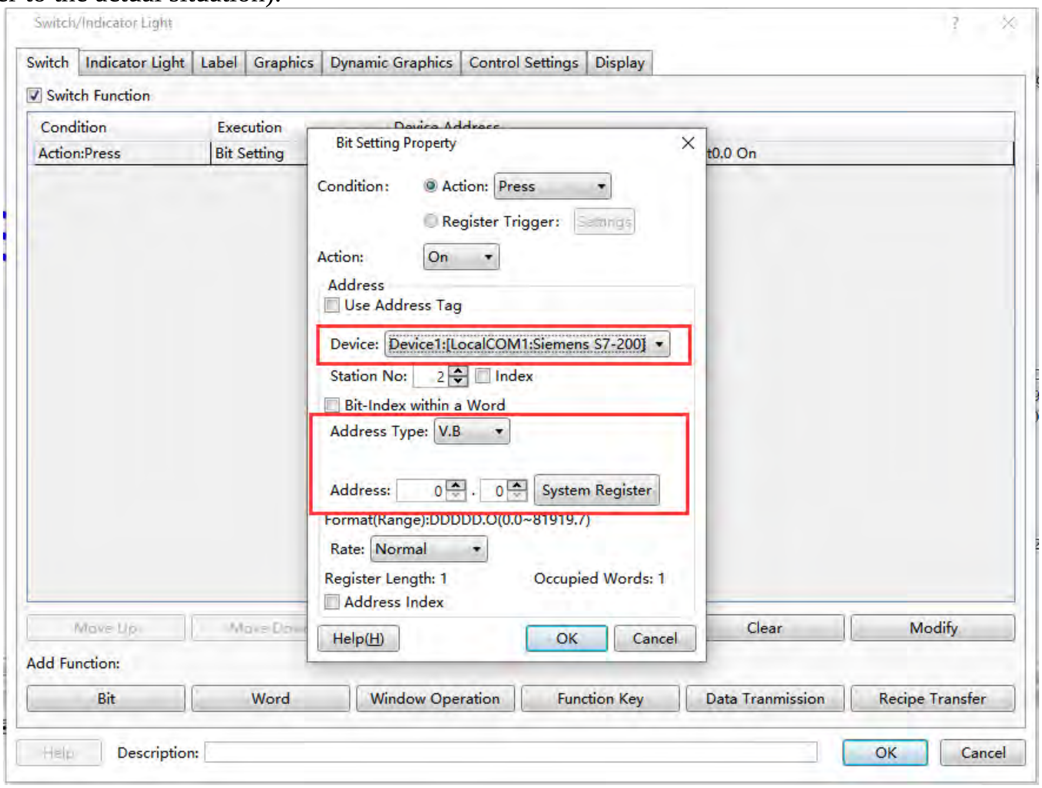
Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select COM port in the pop-up dialog box, configure relevant parameters, click **OK**.



Please refer to the table below for detailed configuration.

Parameter	Description
Connection Device (HMI as Master)	As a control center, HMI analyzes the data collected from the device and issued the task to the device.
Manufacturer	Select “Siemens”.
Device Type	Select “Siemens S7-200”.
Default Station No.	Same as **PLC Address**.
Communication Type	Select “RS232” or “RS485-2”.
Baud Rate	Keep consistent with PLC settings.
Data Bit	Set to 8.
Stop Bit	Set to 1.
Parity Bit	Set to “Even”.

Step 2. Select **Component/Switch/Bit Set** from the menu bar, set the PLC address in the pop-up dialog box (please refer to the actual situation).



Step 3. After configuring the project, download project to HMI. If the value of PLC address can be read and written, it means the communication is working.

17.10.2 Ethernet Communication Between HMI and Siemens S7-200 SMART PLC

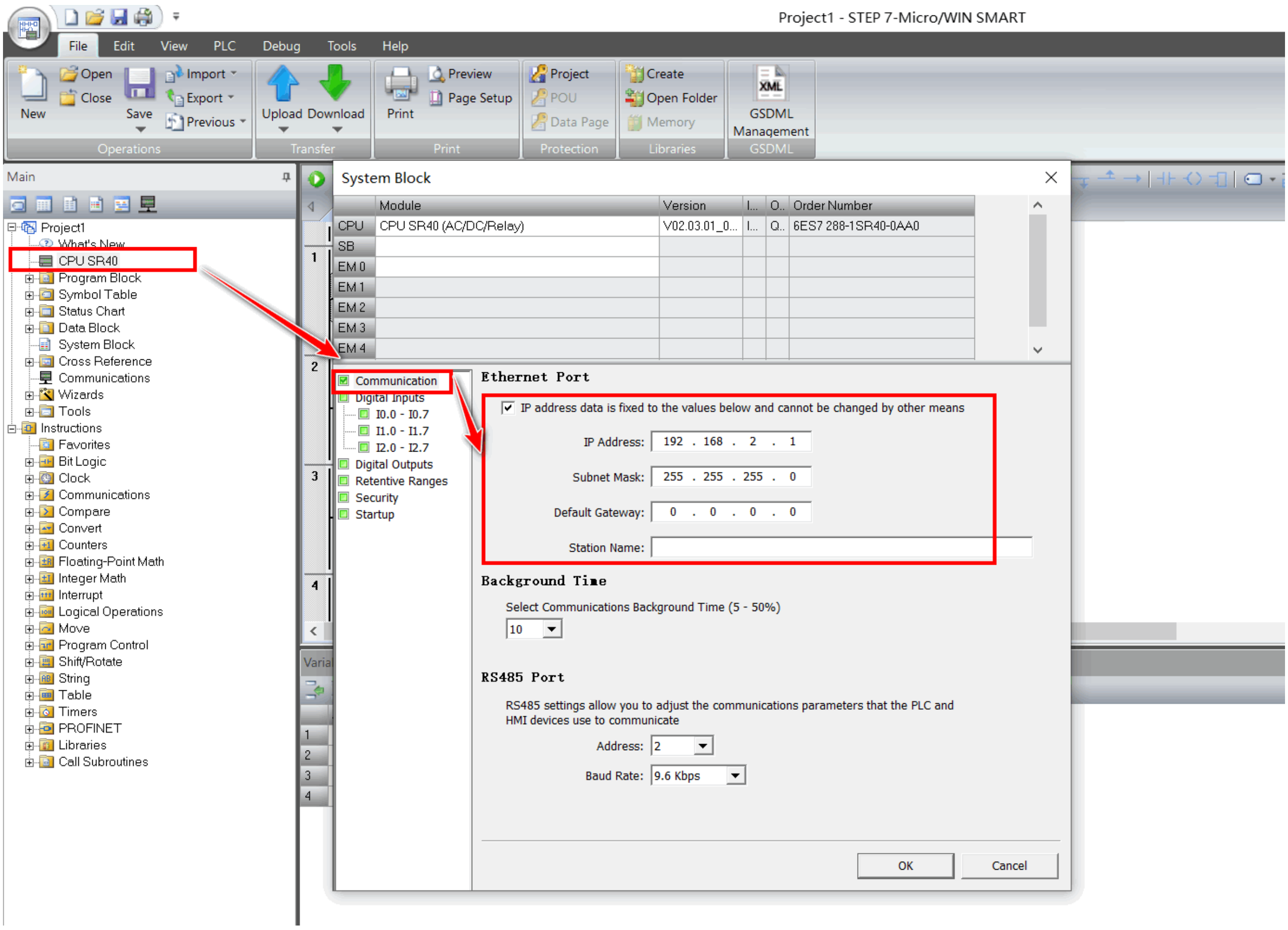
HMI with Ethernet port can be directly connecte to the Ethernet port of Siemens S7-200 SMART PLC using cables, or via network switch.

17.10.2.1 Connection Method

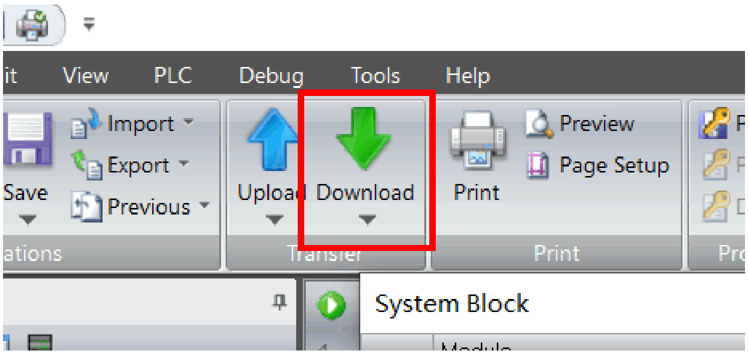
Please refer to Connection Method.

17.10.2.2 Configure PLC

Step 1. Run STEP 7-Micro/WIN SMART, the configuration software of Siemens S7-200 SMART PLC. Double click the corresponding PLC model in the tree, set the corresponding IP address in the **Communication** area, click **OK**.

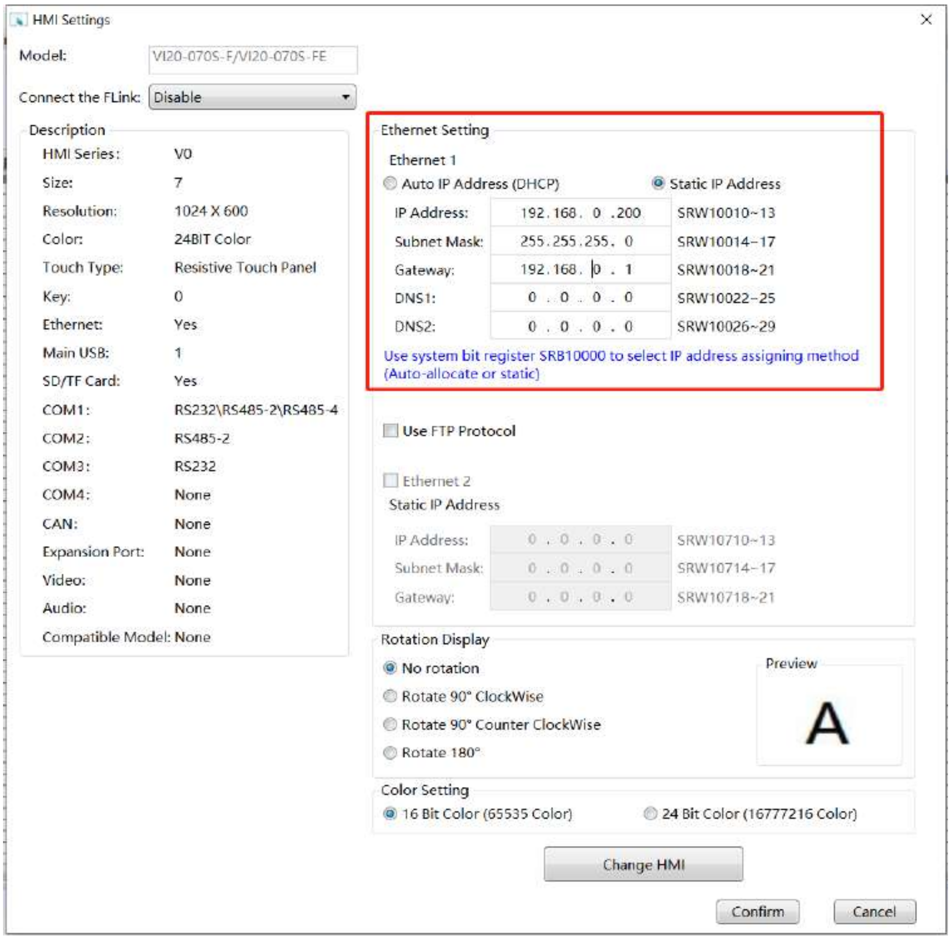


Step 2. Click **Download** to download Ethernet configuration information to PLC.

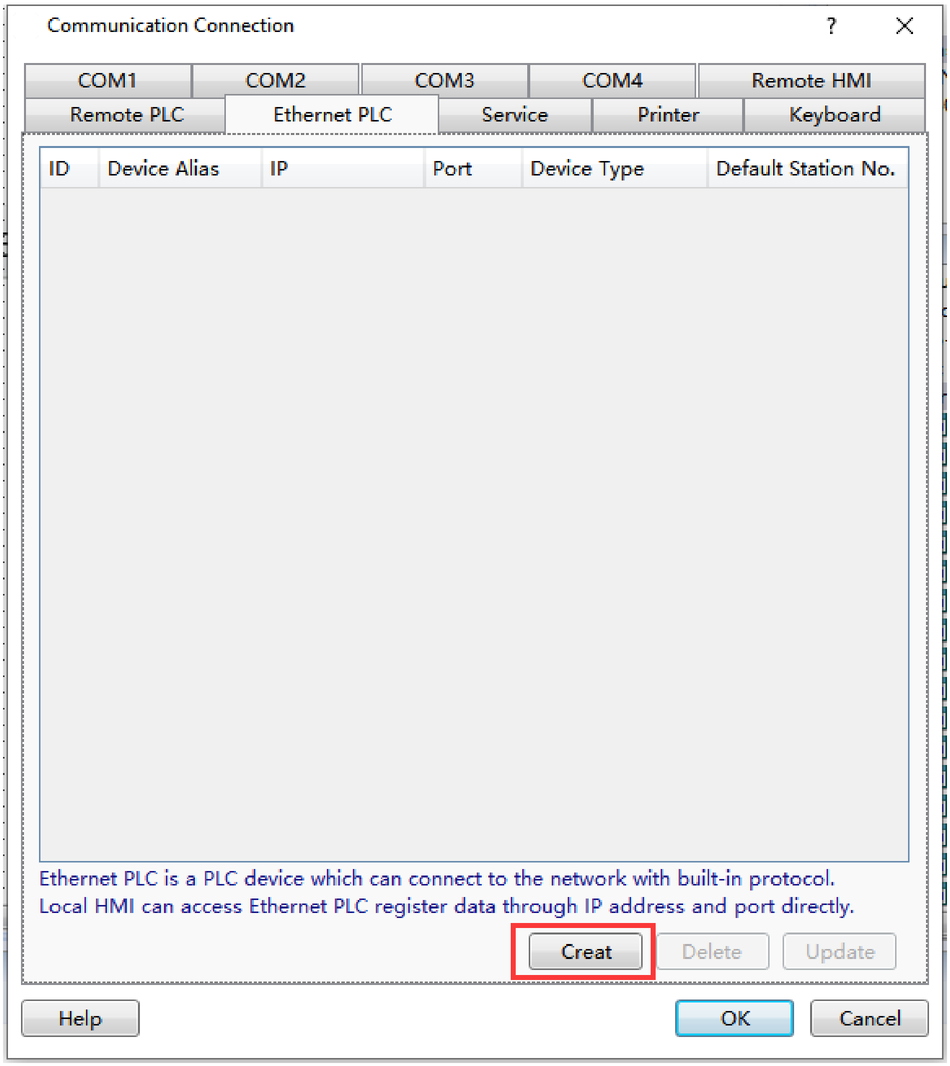


17.10.2.3 Configure HMI

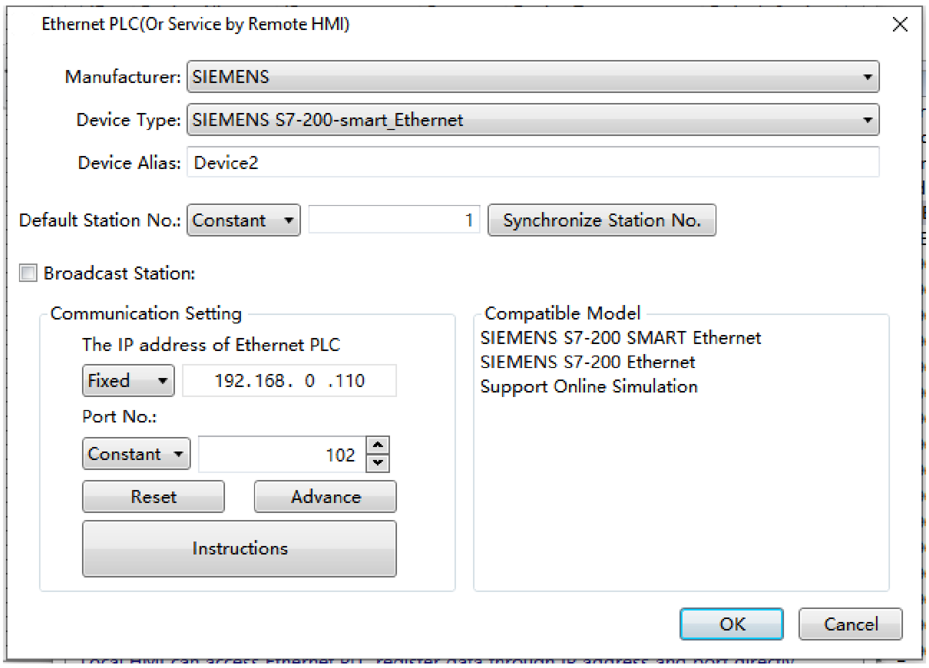
Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI in the dialog box (to be in the same network segment as the IP address of PLC), click **Confirm**.



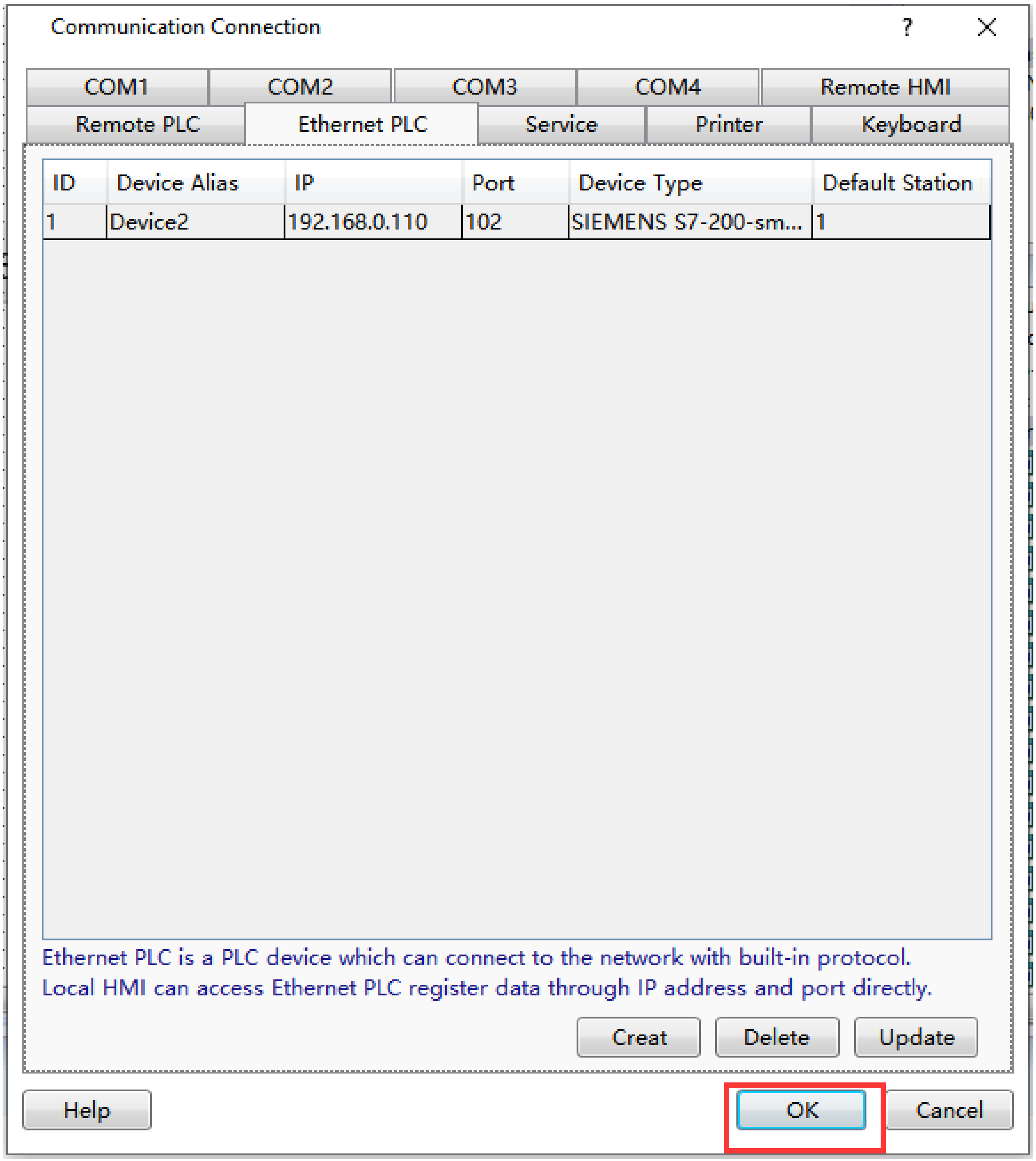
Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select the **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.



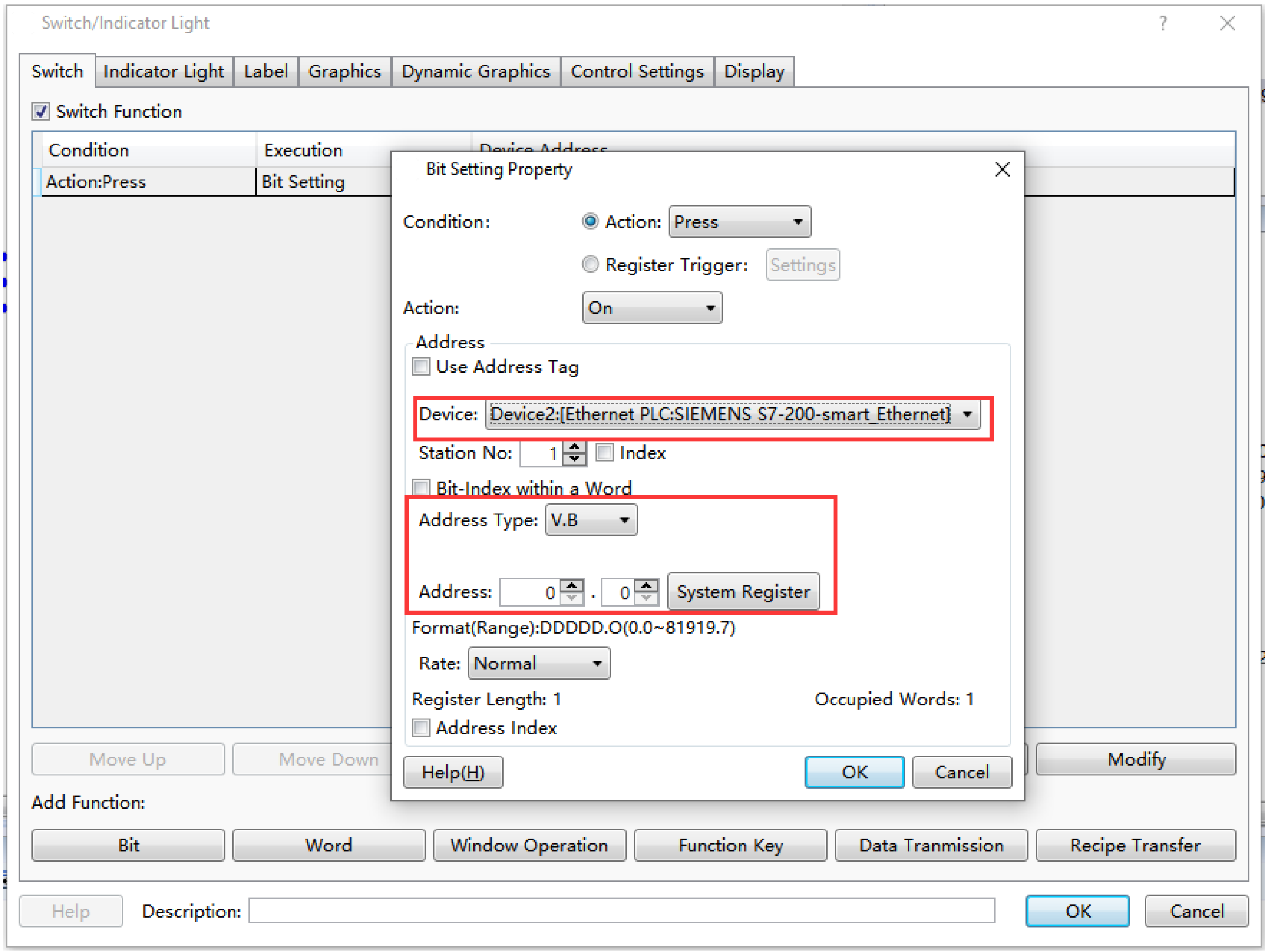
Step 3. Configure relevant parameters in the pop-up dialog box, click **OK**.



Step 4. Click **OK** in the **Communication Connection** dialog box.



Step 5. Select **Component/Switch/Bit Set** from the menu bar, set the PLC address in the pop-up dialog box (to be consistent with the actual situation).



Step 6. After adding the switch component, download project to HMI. If the value of PLC address can be read and written, it means the communication is working.

17.10.3 Ethernet Communication Between HMI and Siemens S7-200 CP-243-1 Module

Siemens CP-243-1 module is adapted to Siemens S7-200 PLC, proving Ethernet access for S7-200 PLC.

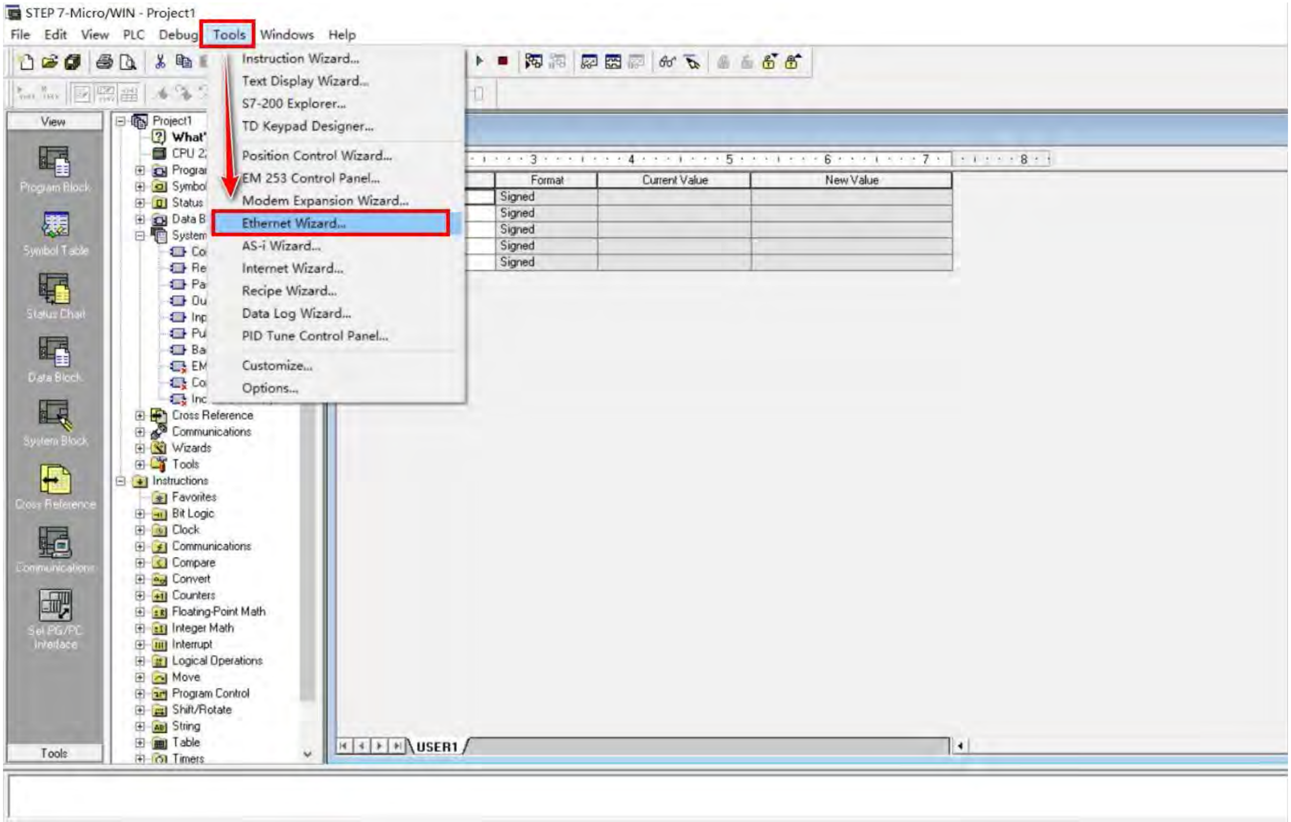
HMIs with network port support Ethernet communication with the Siemens S7-200 CP-243-1 Ethernet module. Use a cable to connect the HMI's Ethernet port to the Siemens S7-200 CP-243-1 Ethernet module's Ethernet port.

17.10.3.1 Connection Method

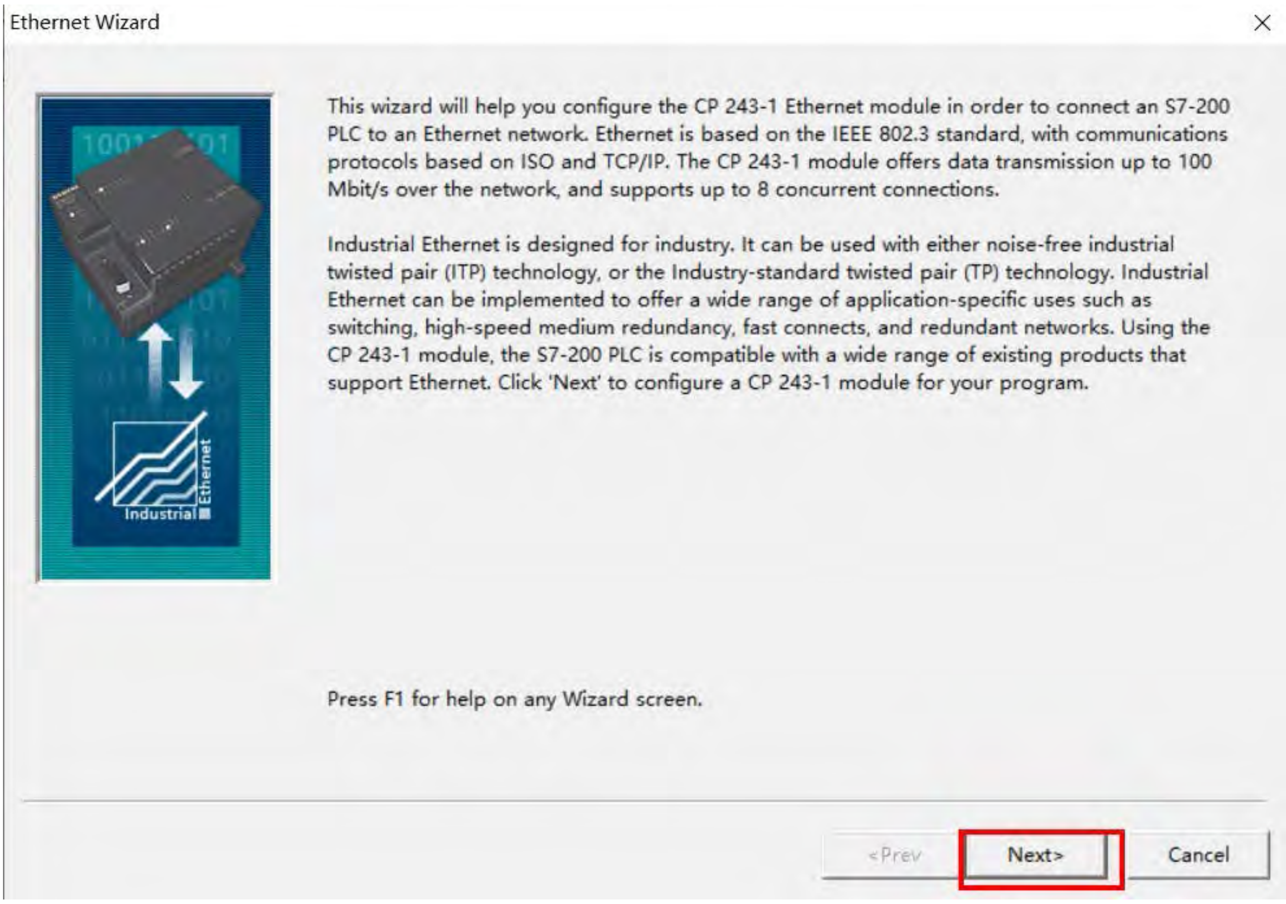
Please refer to Connection Method.

17.10.3.2 Configure PLC

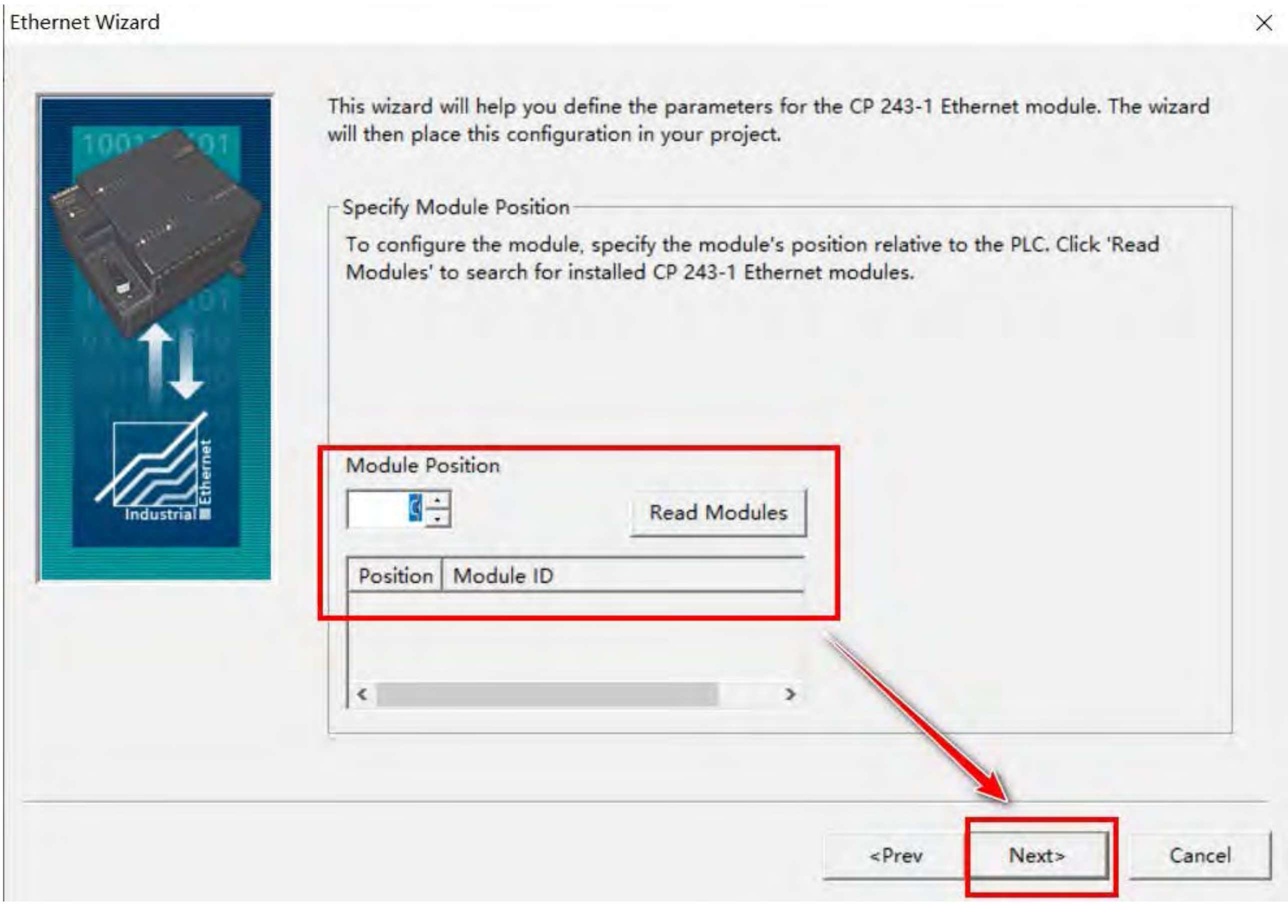
Step 1. Run the configuration software of Siemens PLC, select **Tools/Ethernt Wizard** from the menu bar.



Step 2. Click **Next** in the pop-up dialog box.

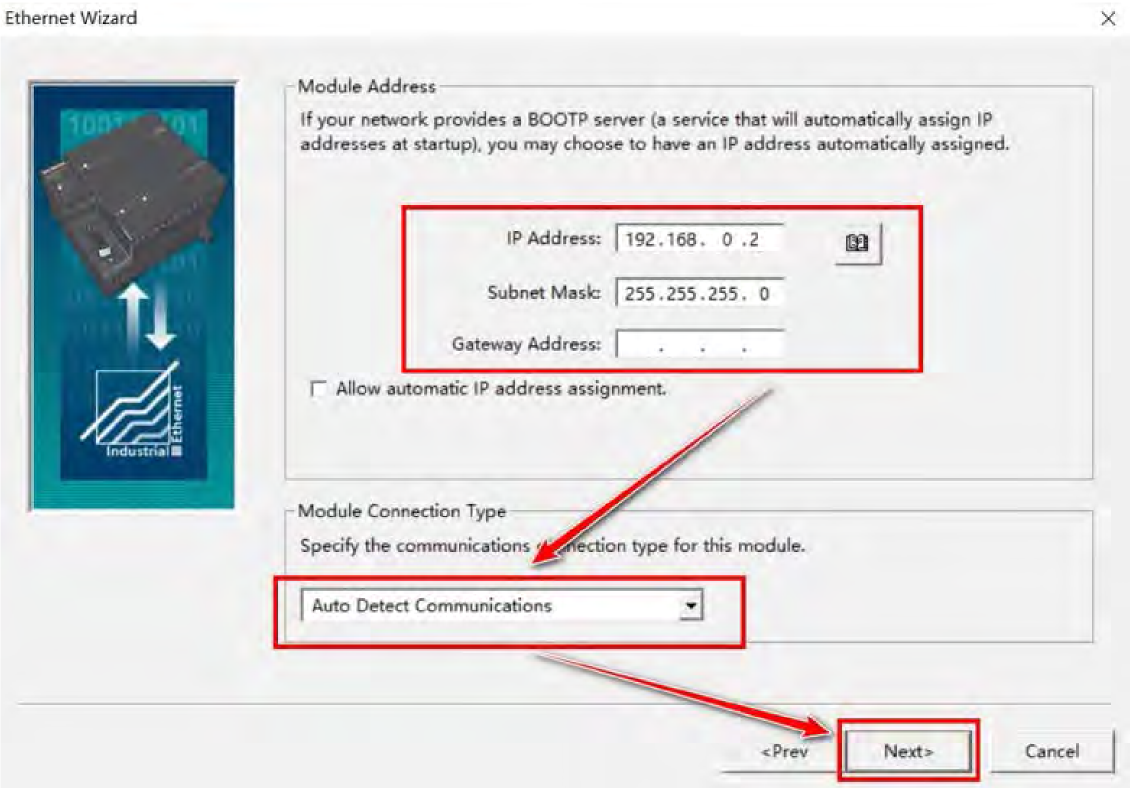


Step 3. Set the module position (you can manually point the module position, or click Read Module, search for the installed CP243-1 module), click **Next**.

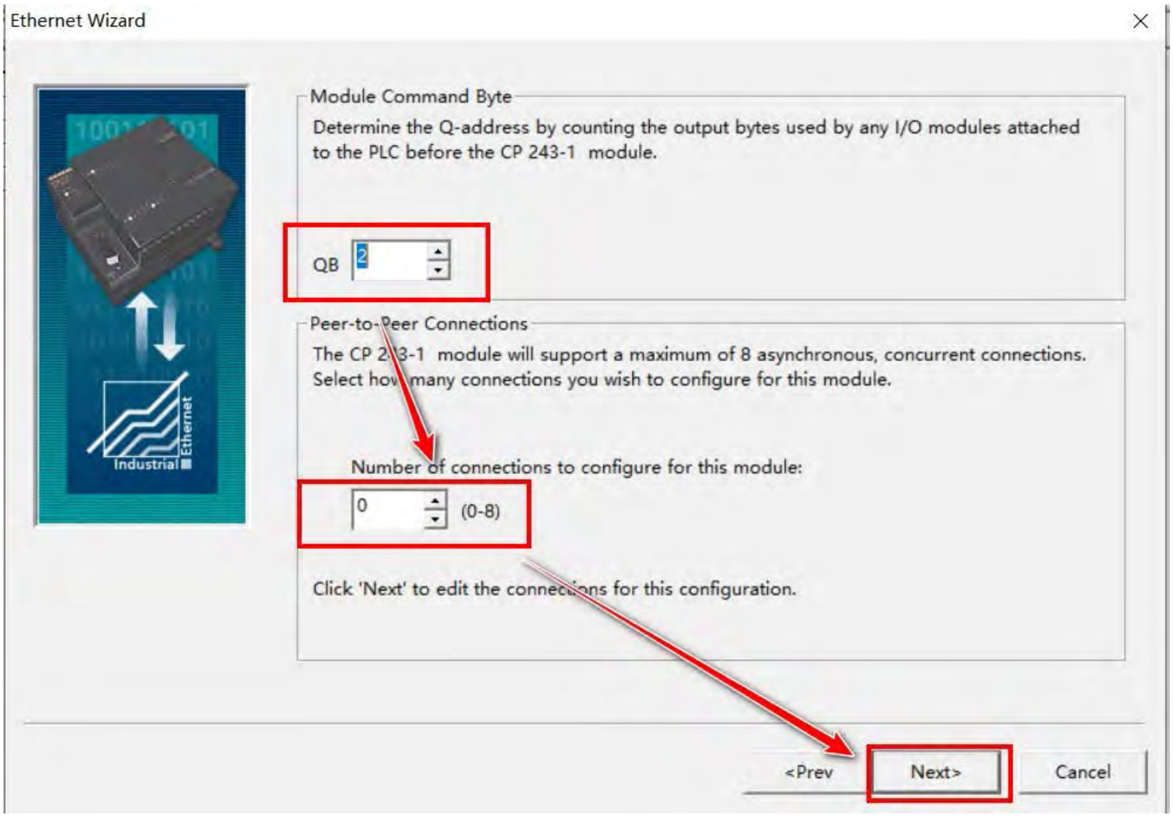


Step 4. Select Ethernet module model, click **Next**.

Step 5. Set the IP address and subnet mask of PLC, select module connection type, click **Next**.



Step 6. Set QB, configure the connection count of module (this Ethernet module supports communication with up to 8 devices), click **Next**.



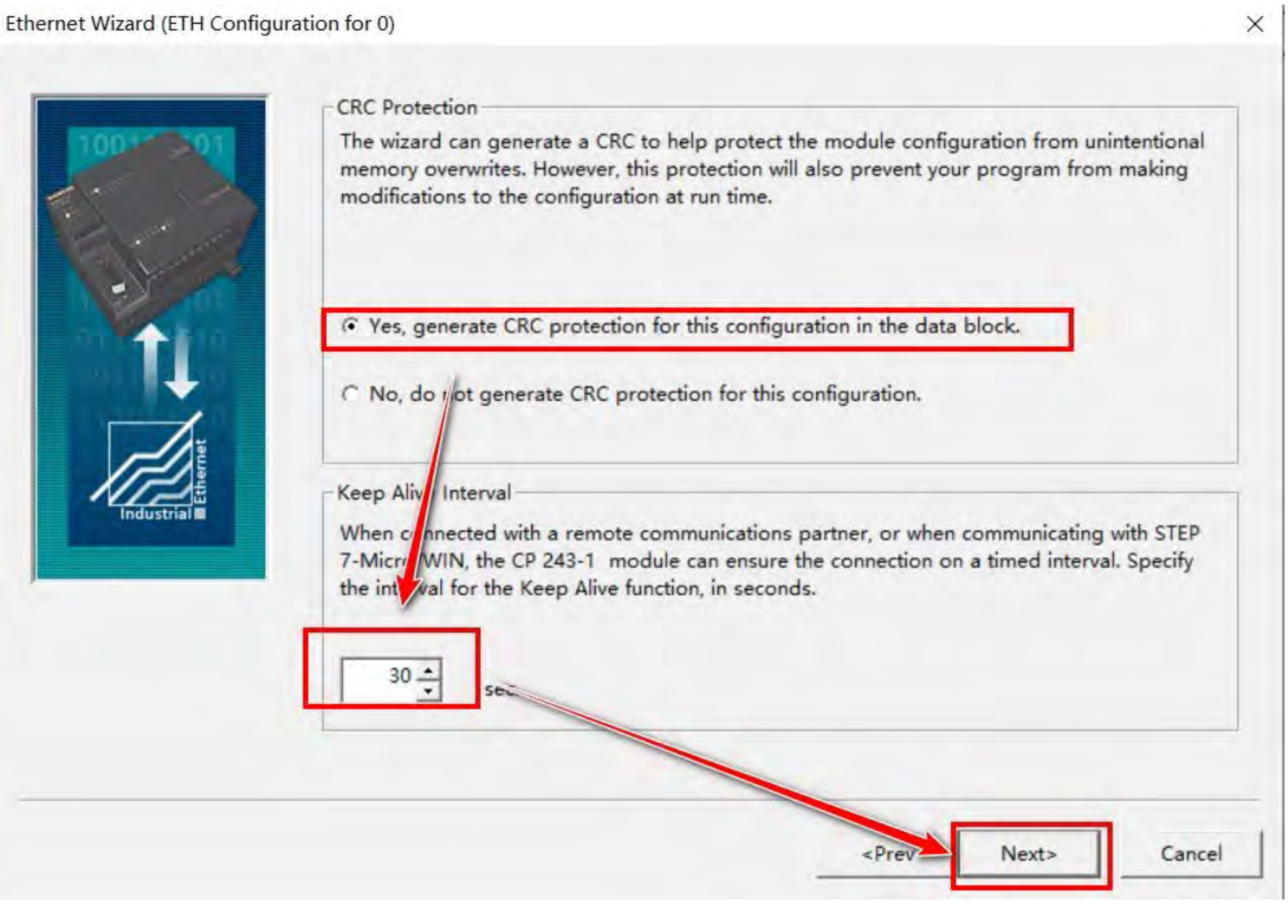
Step 7. Configure the connection of the first device, finish and click **Next Connection**.

Here we take connecting two devices as an example, select **This is server connection**, and check **Accept all connection requests**, and assign a group of local TSAP and remote TSAP to each connected device, the value of each group should be different. The local TSAP and remote TSAP in the same group can be the same, and the following figure shows the related settings of the first connected device.

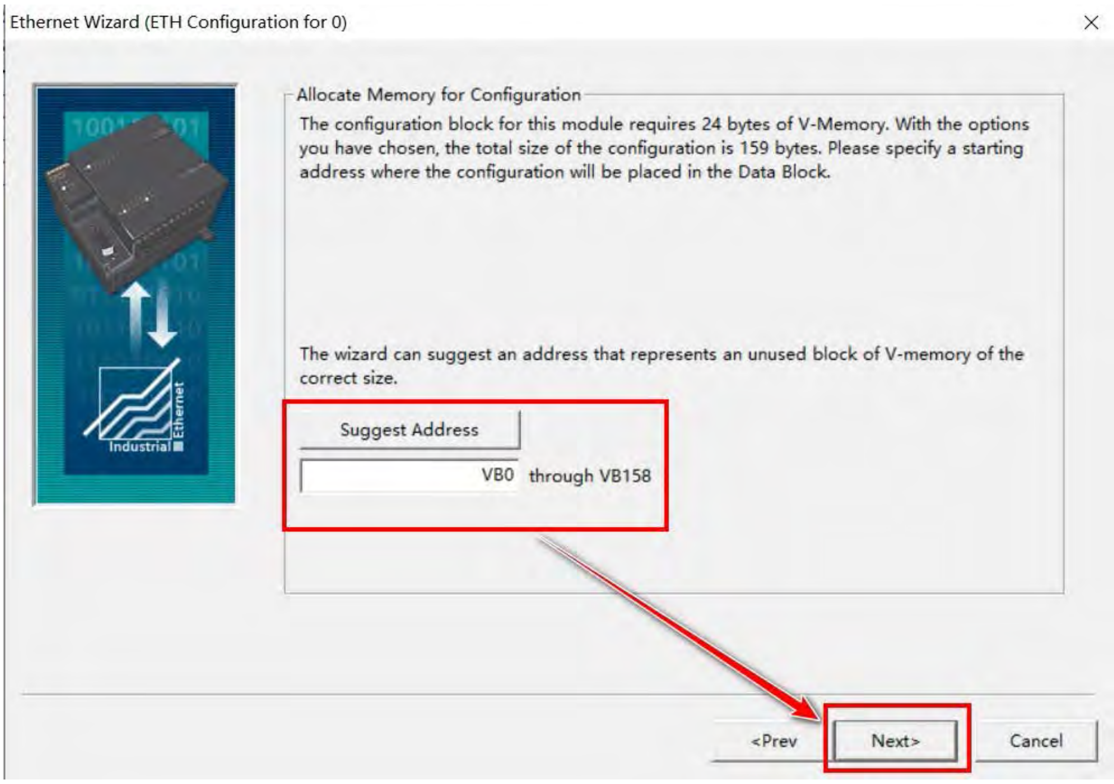
Step 8. Configure the connection of the second device, click **OK**.

- When PLC is connected with device, do not write new value to the 159 bytes (address configured in VW, VN, VD area) involved in the Ethernet module configuration information. Otherwise, it will cause failure of previously configured module information. The module cannot be connected even if powered off and restarted, you can only re-download PLC program.
- A group of local TSAP and remote TSAP can only be used by one device, it cannot be used by multiple devices at the same time.

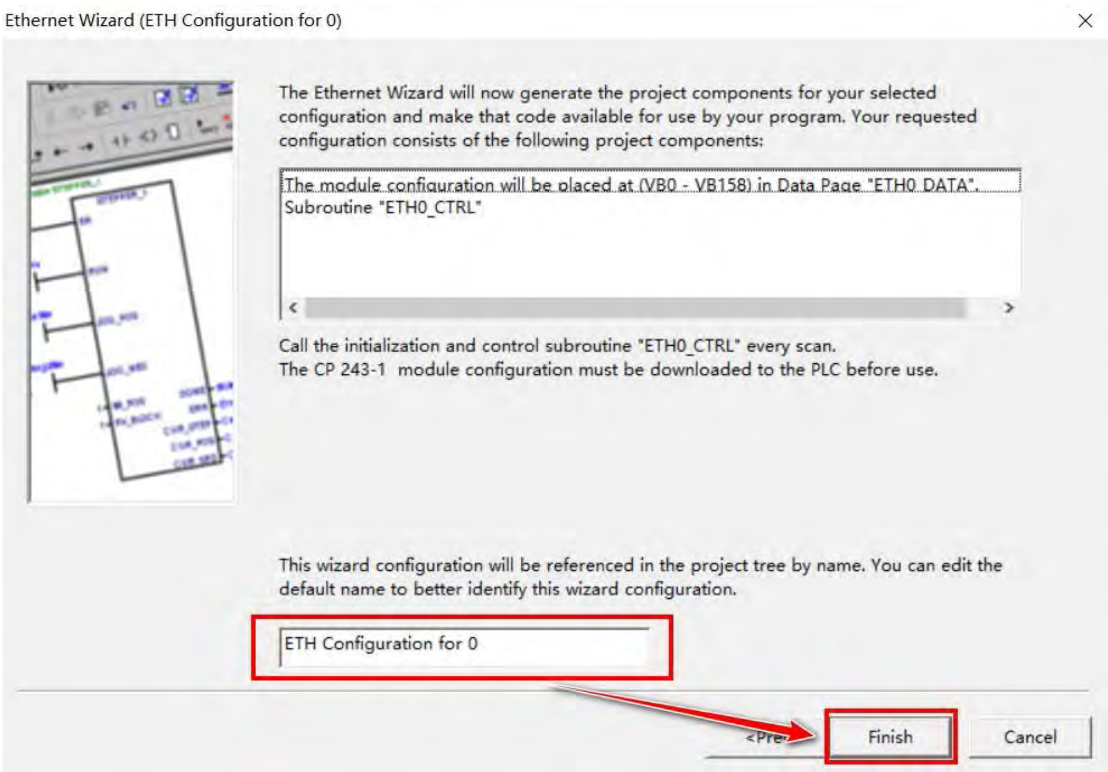
Step 9. Selct “Yes，generate CRC protection for this configuration in the data block”,set **Keep Alive Interval**(you can select default value), click **Next**.



Step 10. Set starting address where the configuration will be placed in the Data Block, click **Next**.



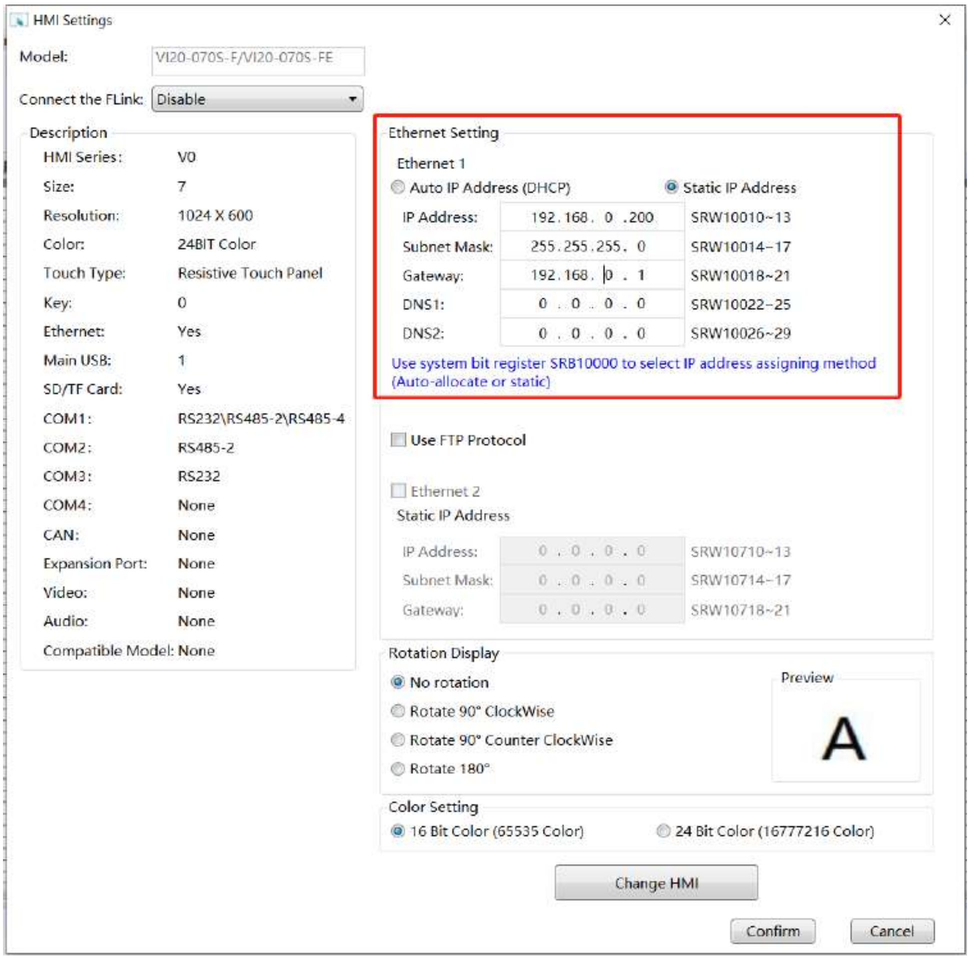
Step 11.Edit wizard configuration name,click **Finish**.



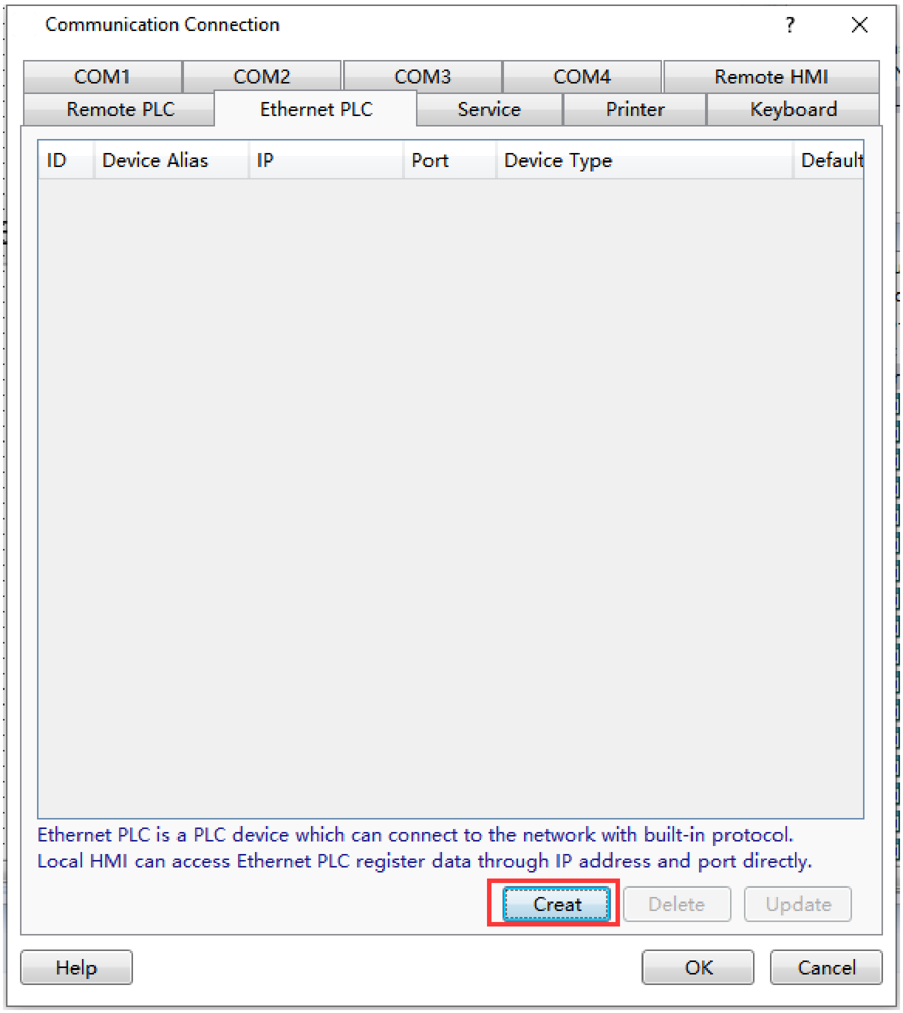
Step 12. Download configuration to PLC, after downloaded, power off and restart Ethernet module, the corresponding configuration will then take effect.

17.10.3.3 Configure HMI

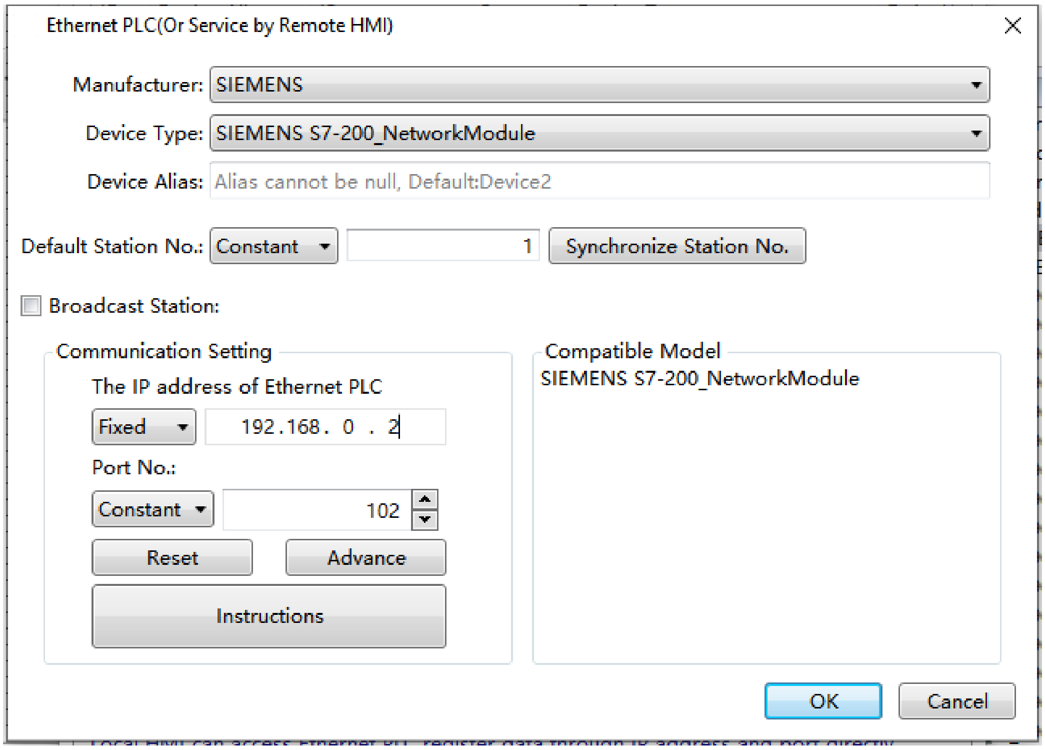
Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI in the pop-up dialog box (to be in the same network segment as the IP address of PLC), click **Confirm**.



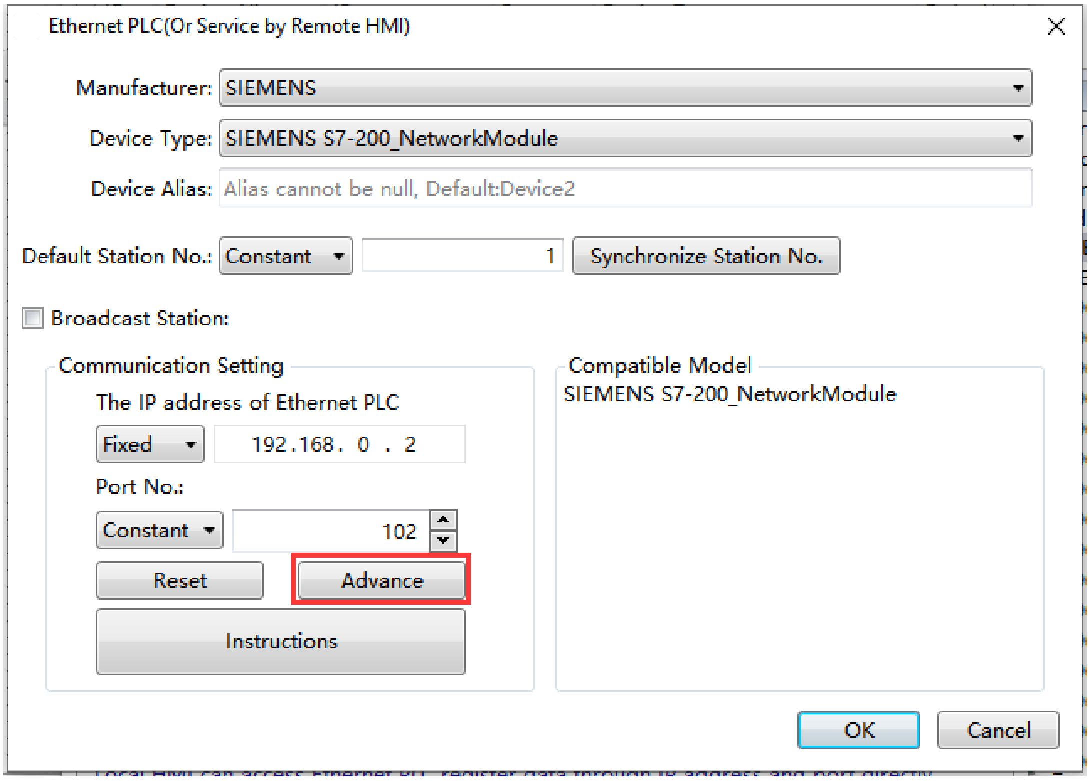
Step 2. Select **Settings/Communication Settings/Remote Connection**, select the **Ethernet PLC** tab in the pop-up dialog box, click **Create**.



Step 3. Configure relevant parameters in the pop-up dialog box.



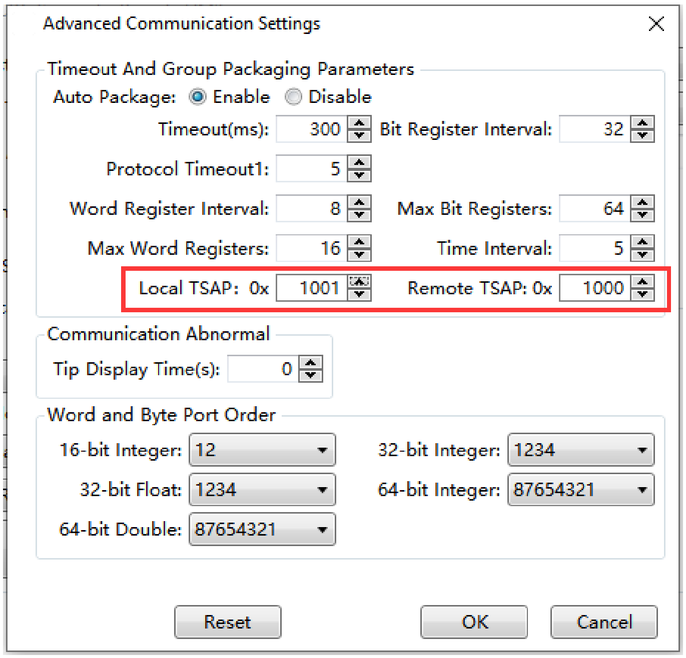
Step 4. Click **Advance**.



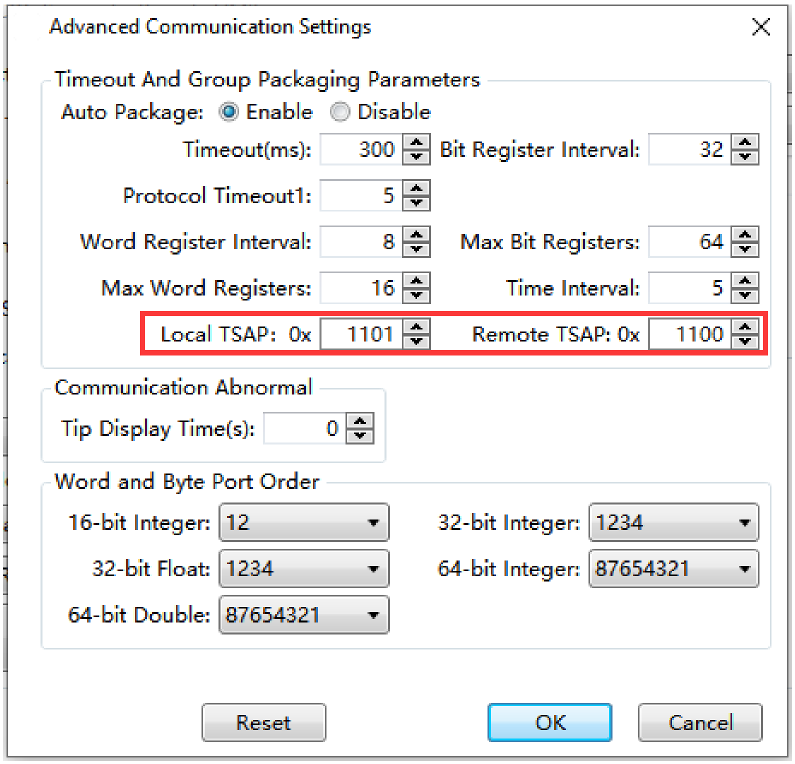
Step 5. Set local TSAP and remote TSAP in the pop-up dialog box, click **OK**.

Suppose in the Siemens S7-200 Ethernet module configuration, the first connect device sets local TSAP to 1000, remote TSAP to 1001; the second connected device sets local TSAP to 1100, remote TSAP to 1101.

- If HMI is the first connected device, local TSAP is set to 1001, remote TSAP is set to 1000 (TSAP settings are opposite to PLC settings).



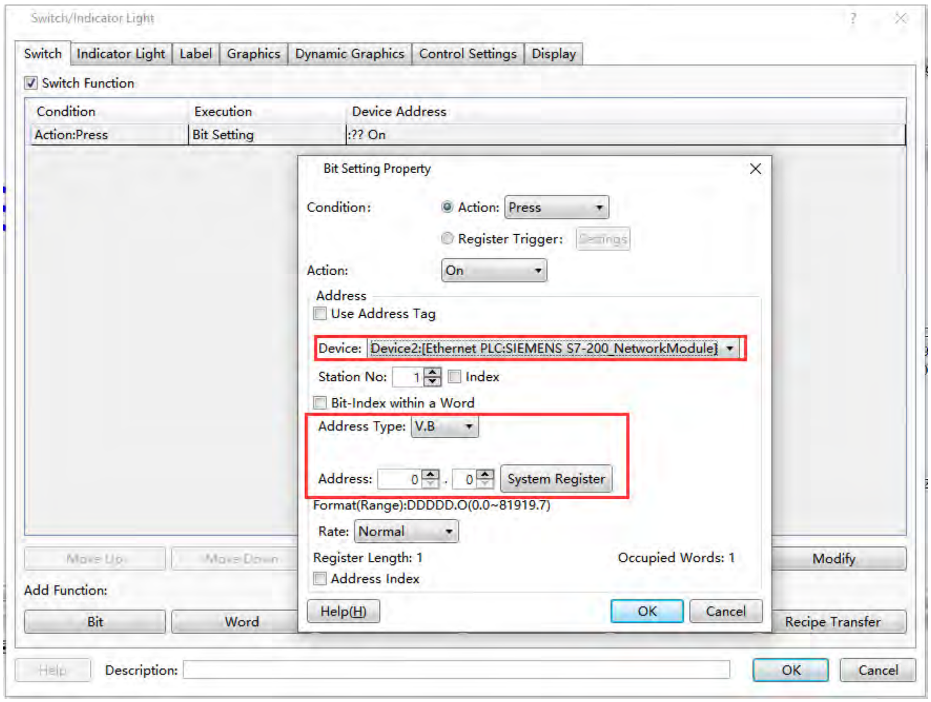
- If HMI is the second connected device, local TSAP set to 1101, remote TSAP set to 1100 (TSAP settings are opposite to PLC settings).



Step 6. Click **OK** in the **Ethernet PLC (or services provided by remote HMI)** dialog box.

Step 7. Click **OK** in the **Communication Connection** dialog box.

Step 8. Select **Component/Switch/Bit Set** from the menu bar, set address to PLC address in the pop-up dialog box (refer to the actual situation).



Step 9. After configuring the project, download project to HMI. If the data of PLC address can be read and written, it means the communication is working.

17.10.4 Communication Between HMI and Siemens S7-300 Ethernet Module

Siemens S7-300 PLC adapts to specific Ethernet module to provide Ethernet access ability. This article uses PLC order number (312-1AE14-0AB0) Ethernet module as an example.

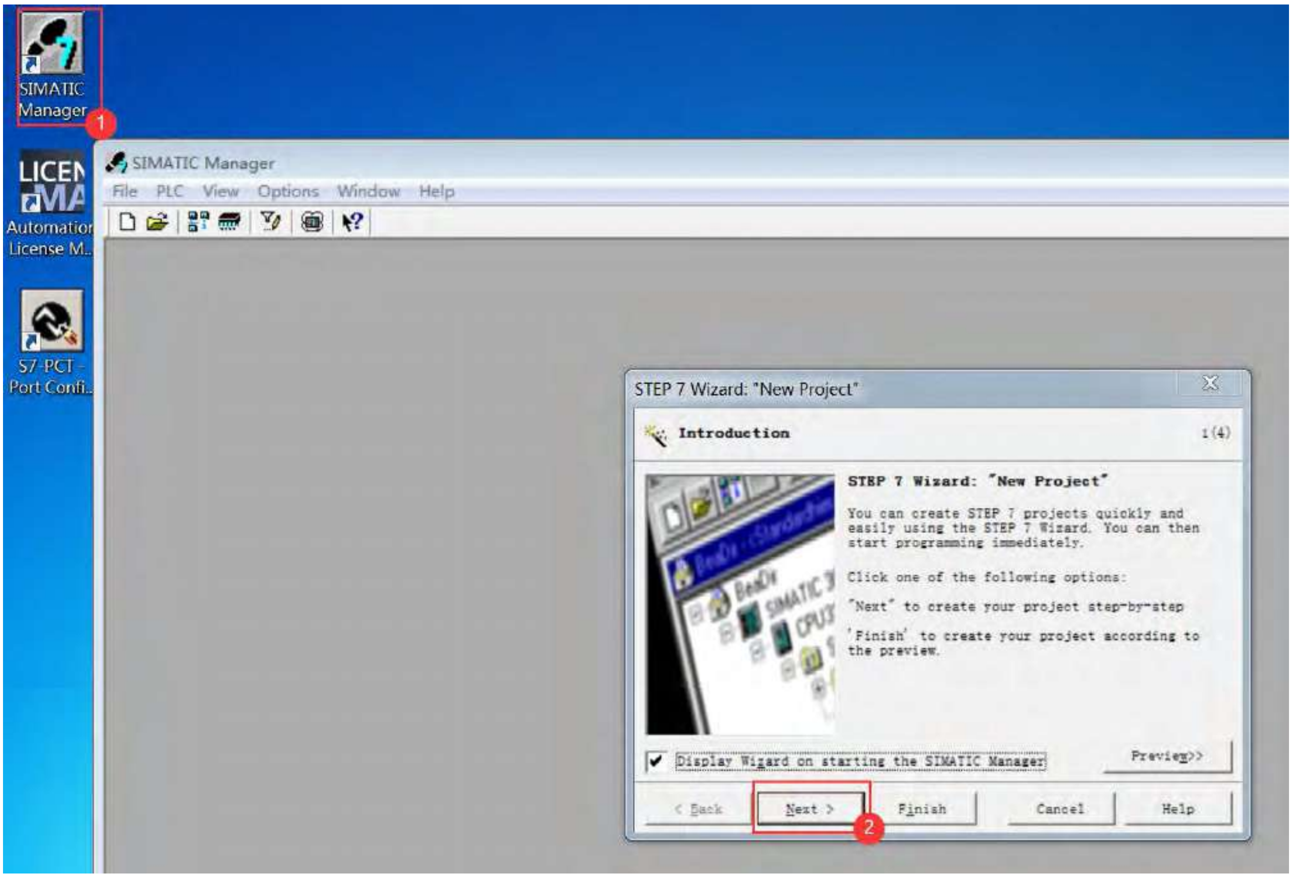
17.10.4.1 Connection Method

Use Ethernet cable to connect HMI Ethernet port and Siemens S7-300 Ethernet module 343-CX10-0XE0 port. Please refer to Connection Method.

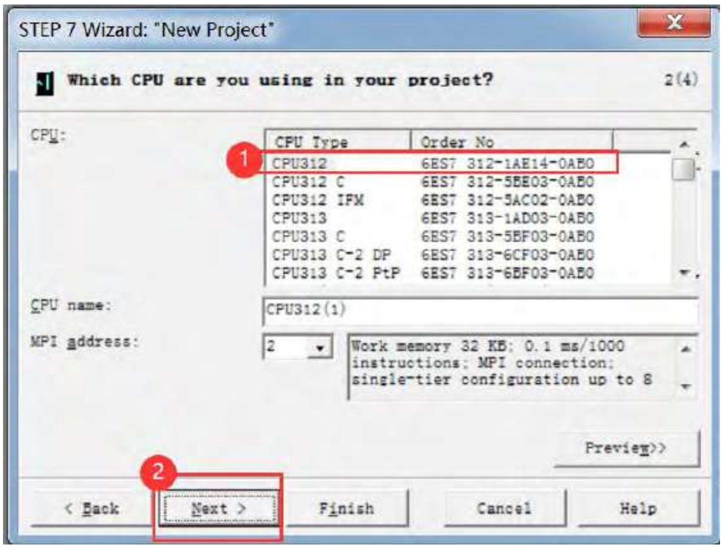
17.10.4.2 Configure PLC

Step 1. Ensure PC and Siemens S7-300 Ethernet module haven been connected by cable.

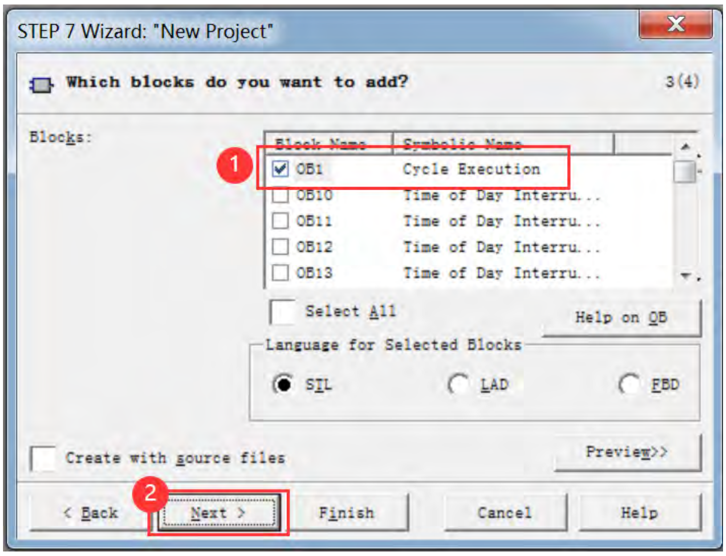
Step 2. Run SIMATIC Manager, the configuration software of PLC, click **Next** in the pop-up Wizard.



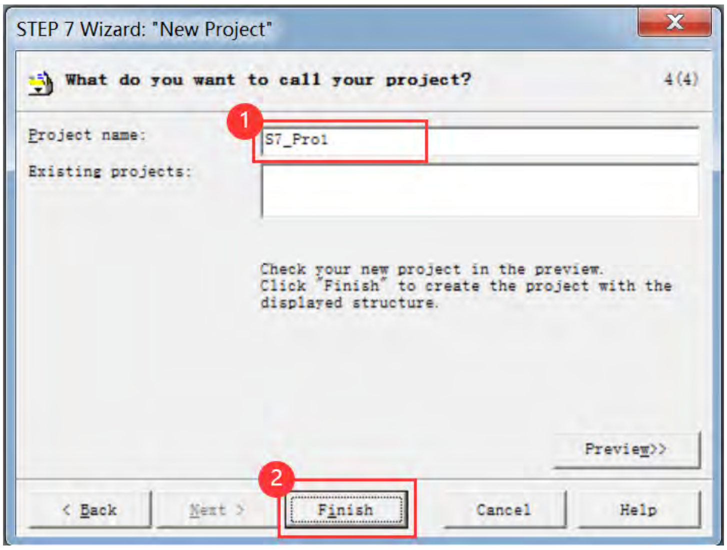
Step 3. Select PLC with the corresponding Order No., click **Next**.



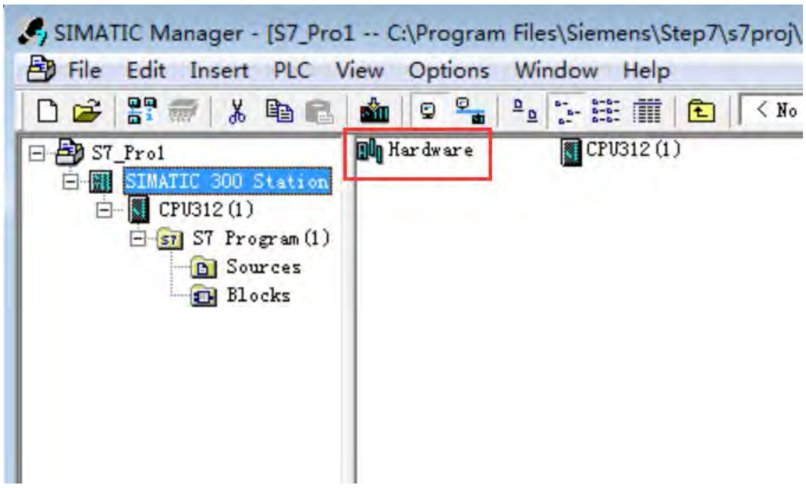
Step 4. Check the OB block to be programmed, click **Next**.



Step 5. Set the project name, click **Finish** to complete creating the project.

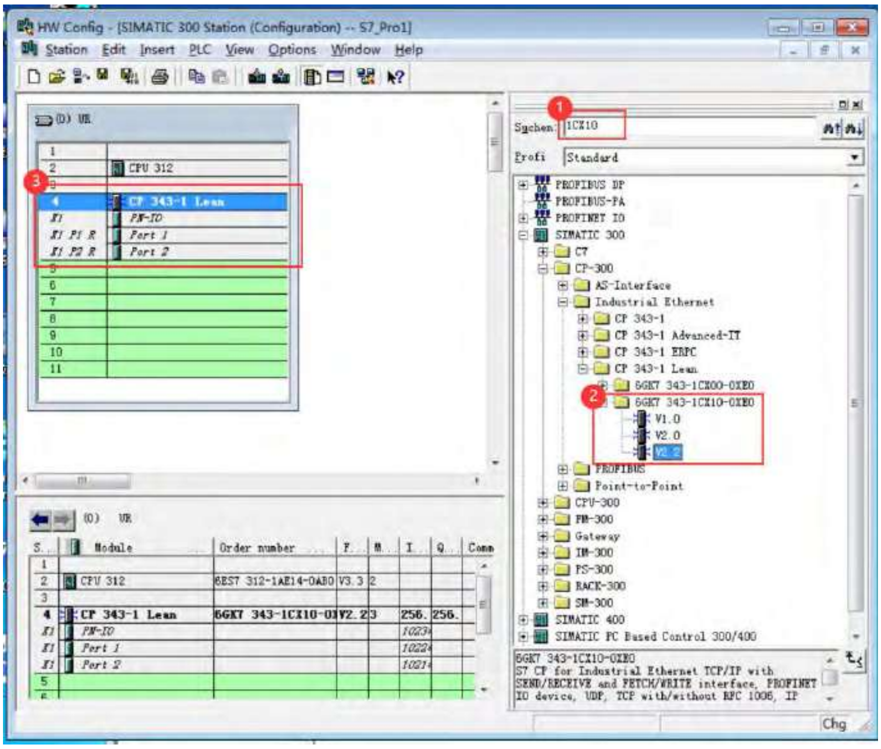


Step 6. Enter the project interface, double click **Hardware**, configure hardware information.

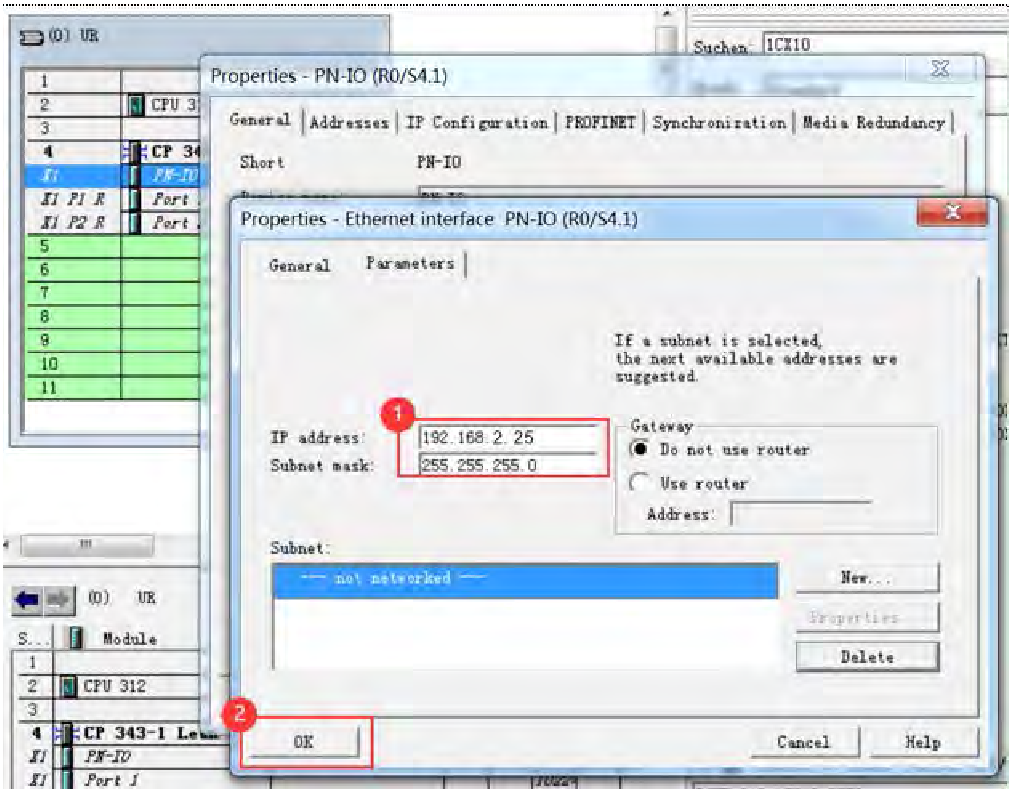


Step 7. Configure Ethernet module in Hardware.

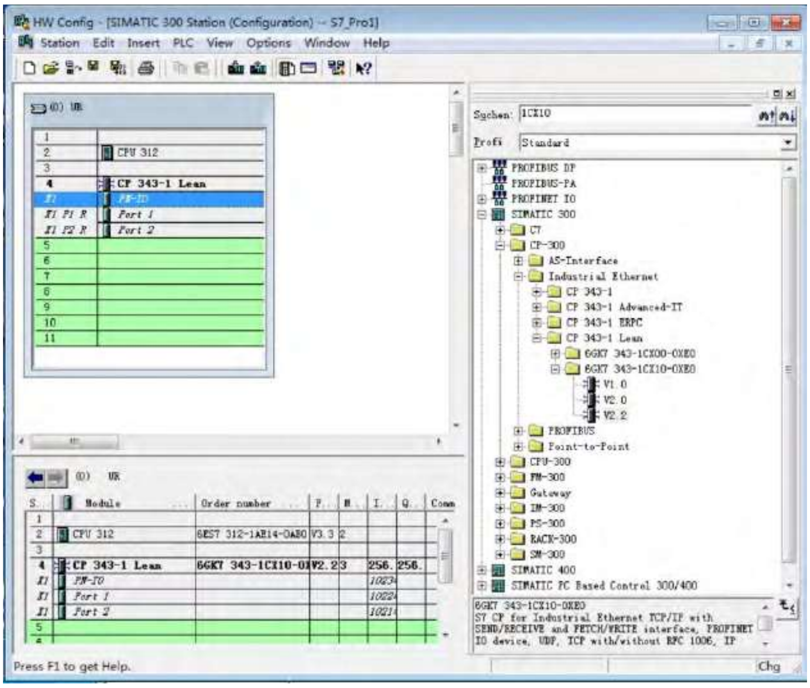
1) Enter the Order No. corresponding to Ethernet module, press Enter to search. After finding the Ethernet module, select the proper version number, double click version number to add to No.4 slot.



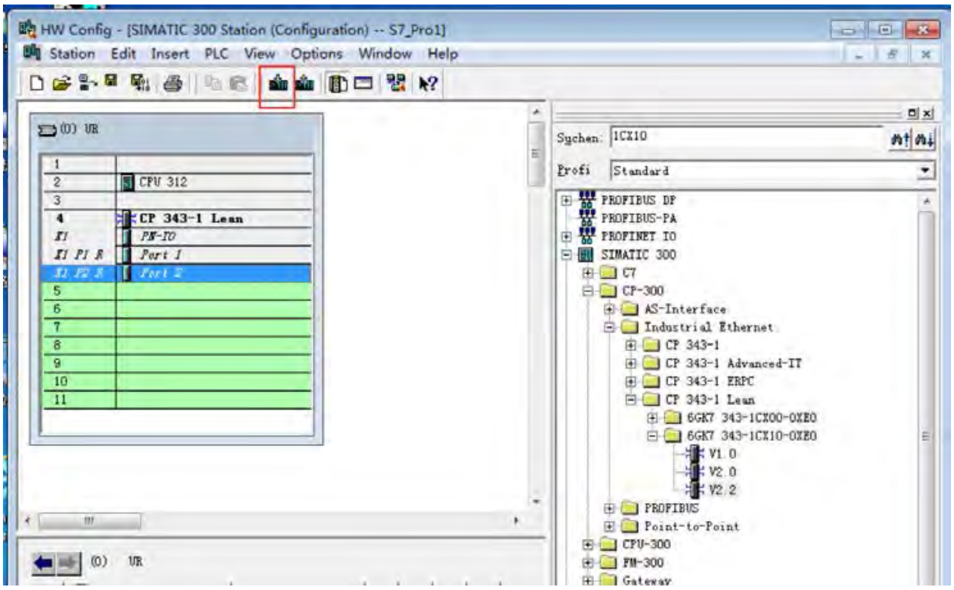
Step 8. Set the IP address and subnet mask of the corresponding Ethernet module, click **OK**.



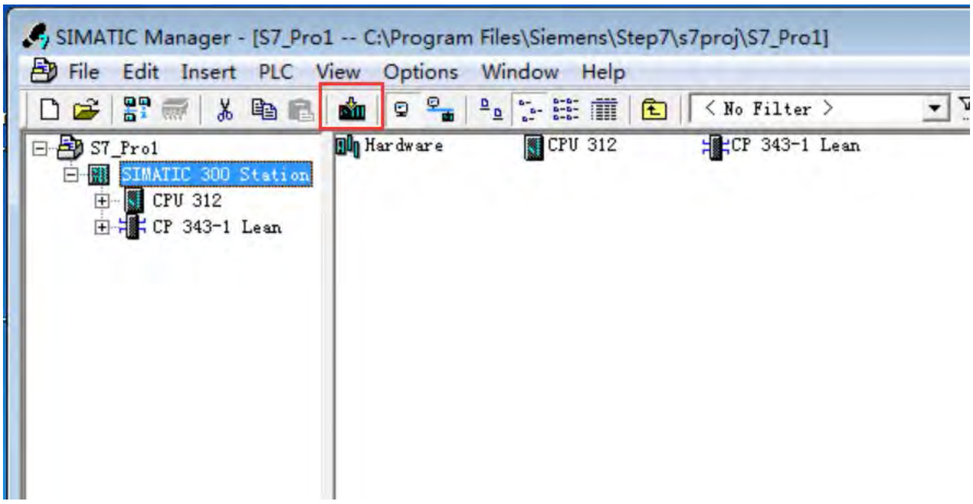
Step 9. After configuration, it is shown as the figure below.



Step 10. Click the  icon, download hardware configuration method to PLC.



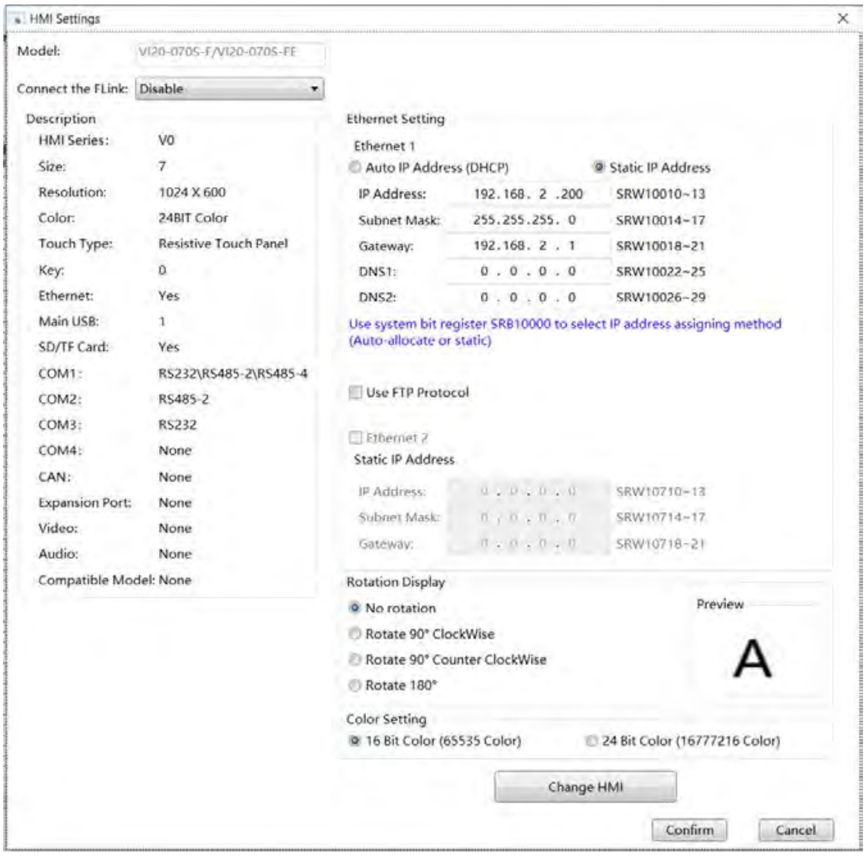
Step 11. Click the  icon, download project to PLC.



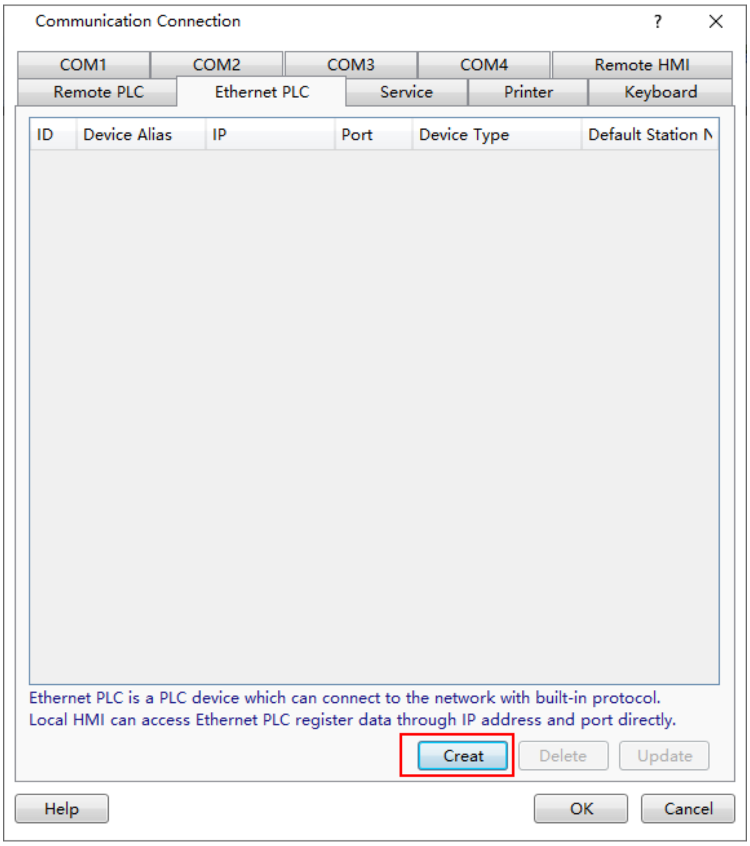
Step 12. Power off the PLC, then power on and restart.

17.10.4.3 Configure HMI

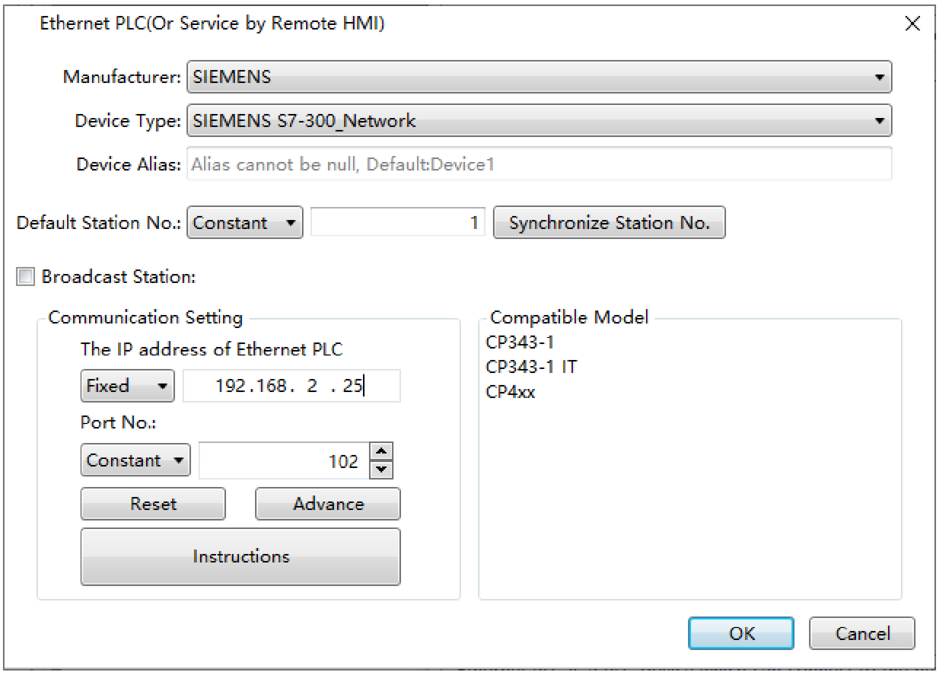
Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI in the pop-up dialog box (to be in the same segment as the PLC IP address), click **Confirm**.



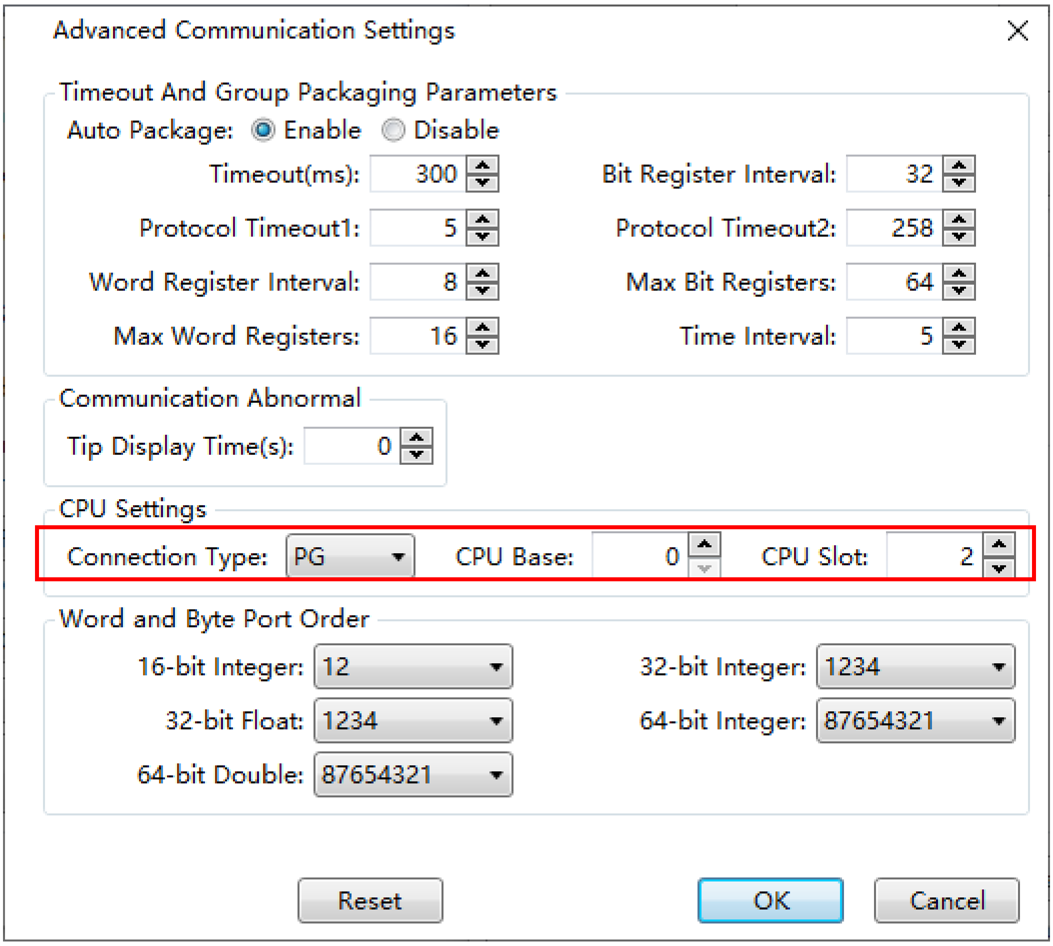
Step 2. Select **Settings/Communication Settings/Remote Connection**, select the **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.



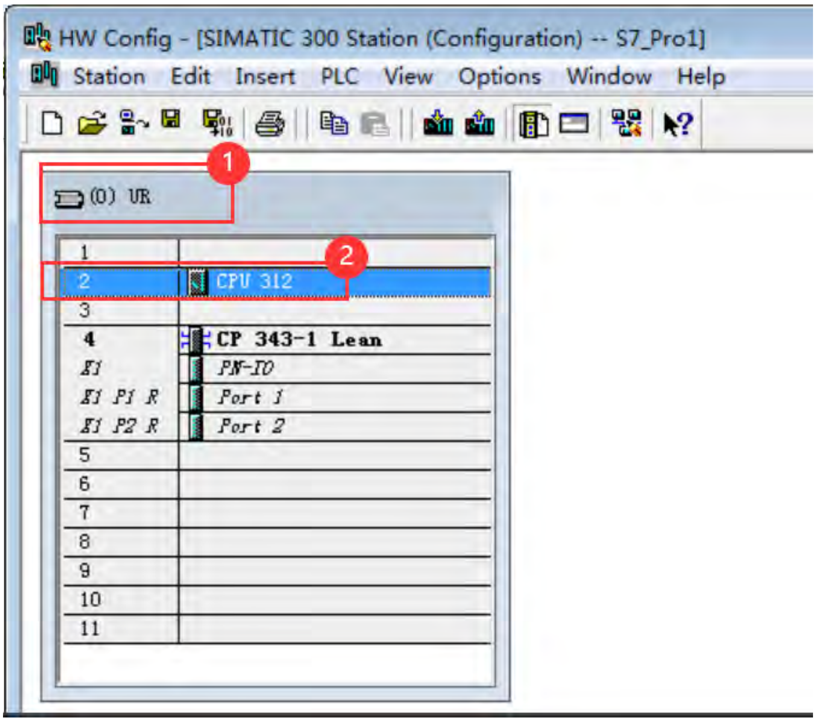
Step 3. Configure relevant parameters in the pop-up dialog box.



Step 4. Click **Advance**. Set the CPU base and slot number in the pop-up dialog box, click **OK**.

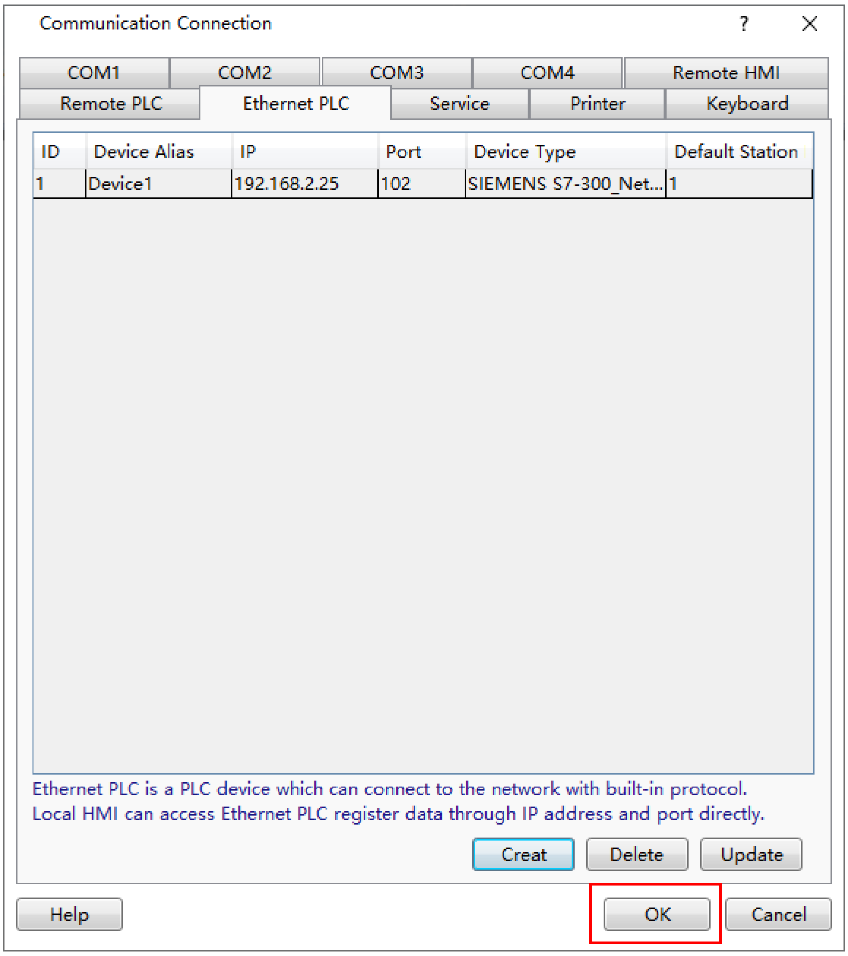


CPU base and slot number should be same as PLC configuration.

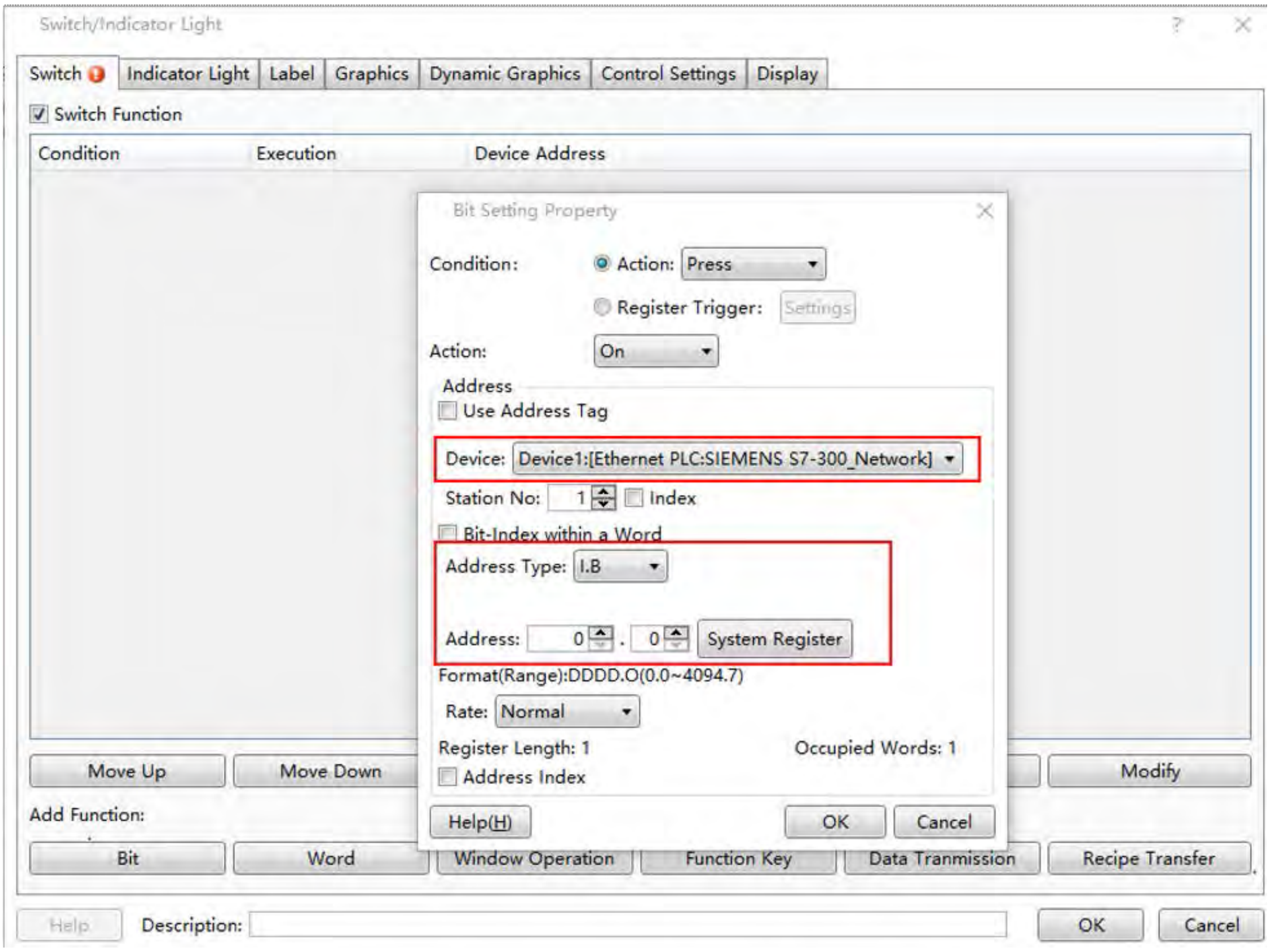


Step 5. Click **OK** in the **Ethernet PLC (or service provided by remote HMI)** dialog box.

Step 6. Click **OK** in the **Communication Connection** dialog box.



Step 7. Select **Component/Switch/Bit Set** from the menu bar, set address to PLC address in the pop-up dialog box (refer to the actual situation).



Step 8. After configuring the project, download project to HMI. If the data of PLC address can be read and written, it means the communication is working.

17.10.5 Serial Communication Between HMI and Siemens S7-300 PLC

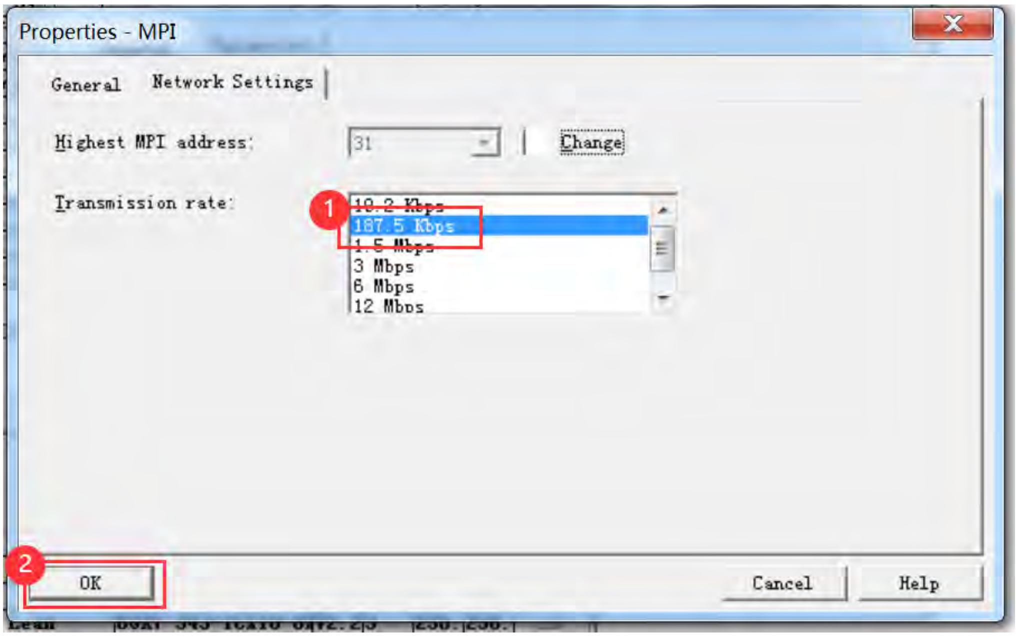
Serial communication between HMI and Siemens S7-300 PLC needs to use Siemens special adapter communication cable. HMI uses RS232 protocol, Siemens S7-300 PLC uses RS485 protocol, protocol data conversion can be done via Siemens special adapter.

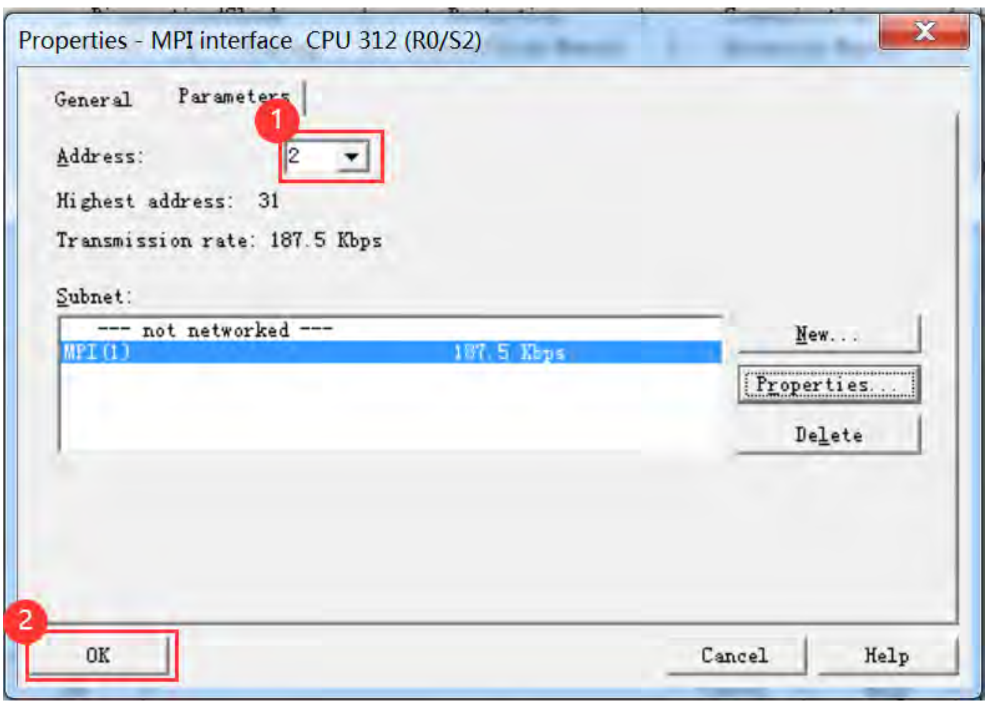
17.10.5.1 Connection Method

Use Siemens special adapter cable to connect HMI and PLC. RS232 connector connected to HMI COM port, RS485 connector connected to Siemens S7-300 serial port.

17.10.5.2 Configure PLC

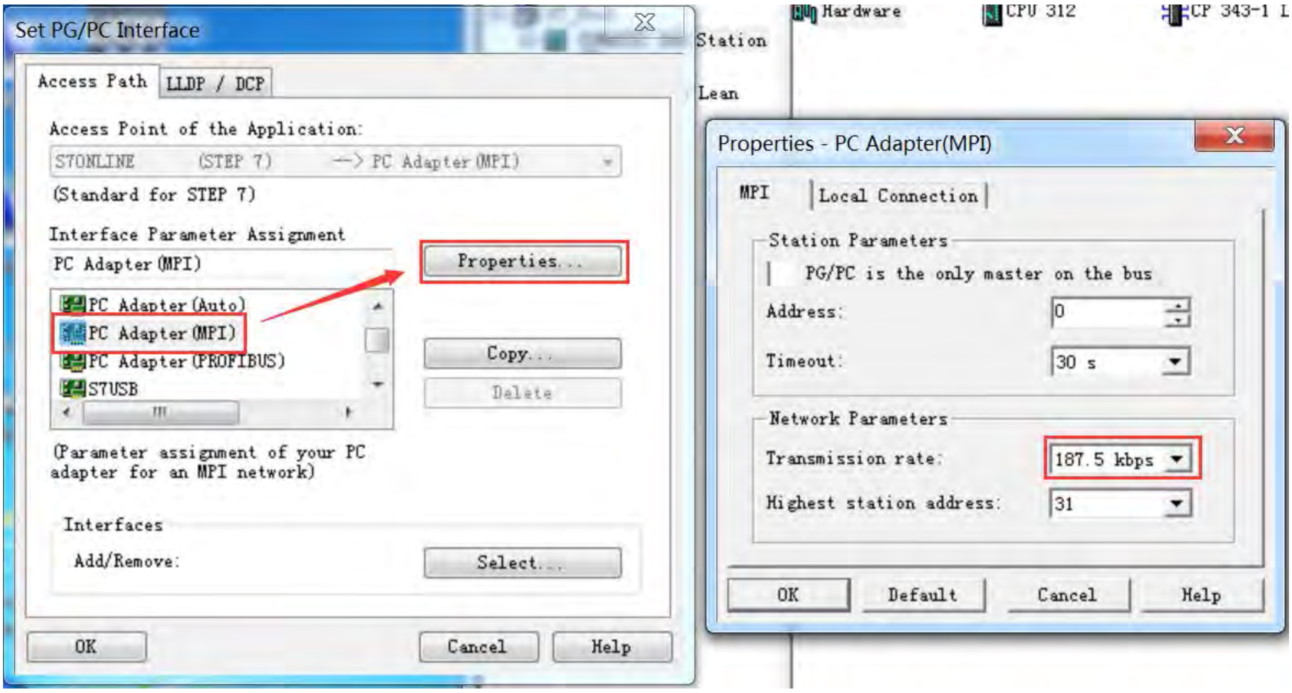
Step 1. Run SIMATIC Manager, the configuration software of PLC, set baud rate to 187500, address (corresponding to the “station number” in HMI) to 2.





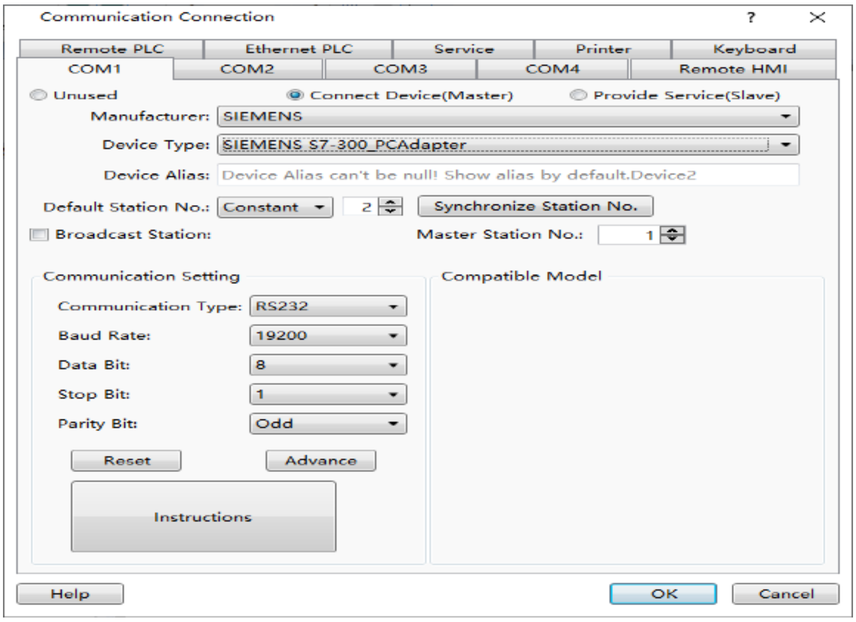
Step 2. Download configuration to PLC.

Step 3. Select **Options/[Set PG/PC Interface]** from the menu bar, select **PC Adapter(MPI)**, click **Property**, revise the transmission rate of MPI port to 187.5kbps, click **OK**.



17.10.5.3 Configure HMI

Step 1. Run VI20Studio, select **Settings/Communication Settings/Remote Connection** from the menu bar, select COM port (support RS232 protocol), configure relevant parameters, click **OK**.

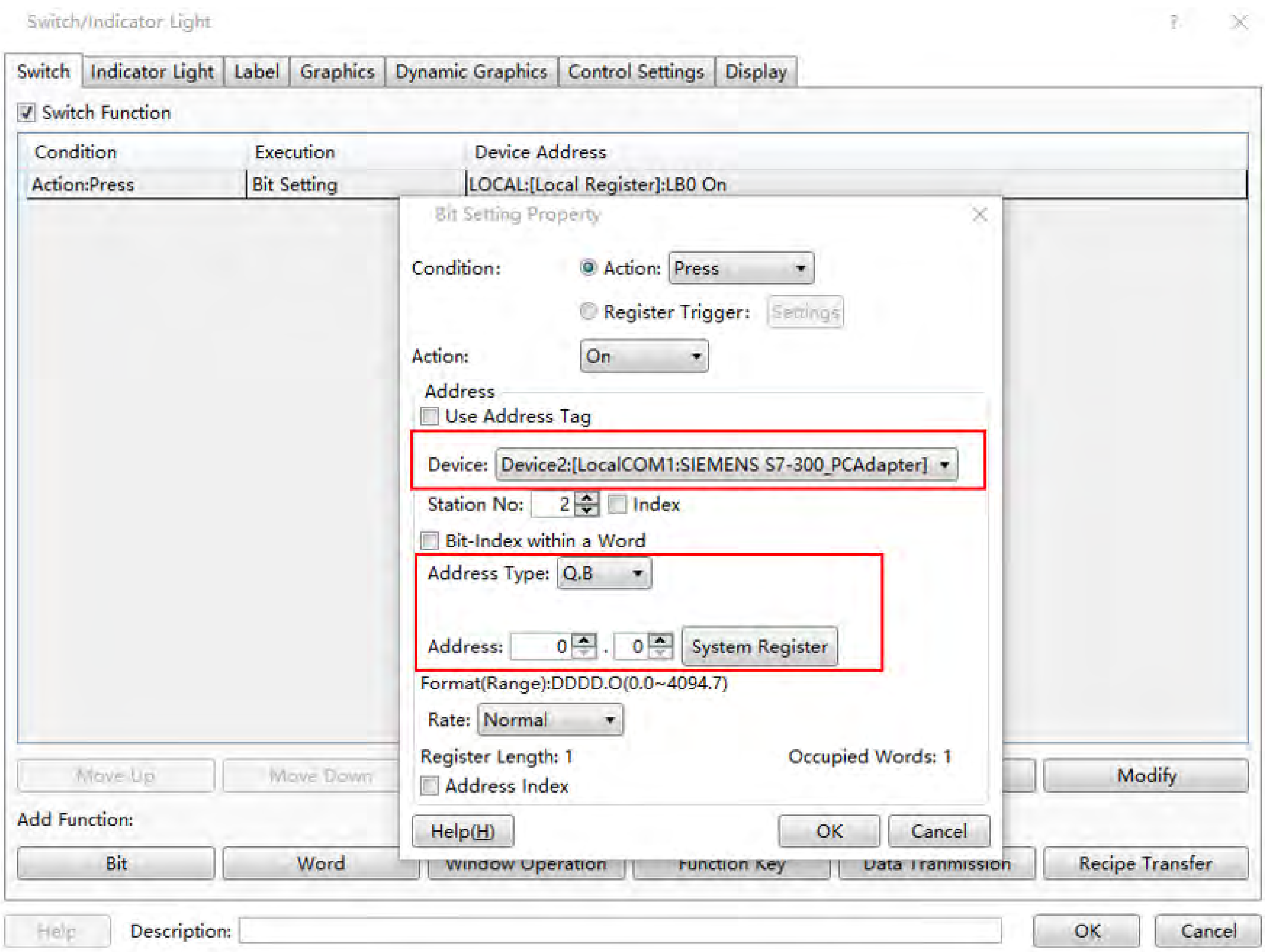


Please refer to the table below for detailed configuration.

Parameter	Description
Connection Device (HMI as Master)	As a control center, HMI analyzes the data collected from the device and issued the task to the device.
Manufacturer	Select “Siemens “.

Parameter	Description
Device Type	Select “Siemens S7-300_PCAdapter”.
Default Station No.	Set to “2”.
Communication Type	Select “RS232”.
Baud Rate	Set to 19200 or 38400.
Data Bit	Set to 8.
Stop Bit	Set to 1.
Parity Bit	Select “odd”.

Step 2. Select **Component/Switch/Bit Set** from the menu bar, set address to PLC address in the pop-up dialog box (refer to the actual situation).



Step 3. After adding the switch component, download project to HMI. If the data of PLC address can be read and written, it means the communication is working.

17.10.6 Ethernet Communication Between HMI and Siemens S7-1200/S7-1500 PLC

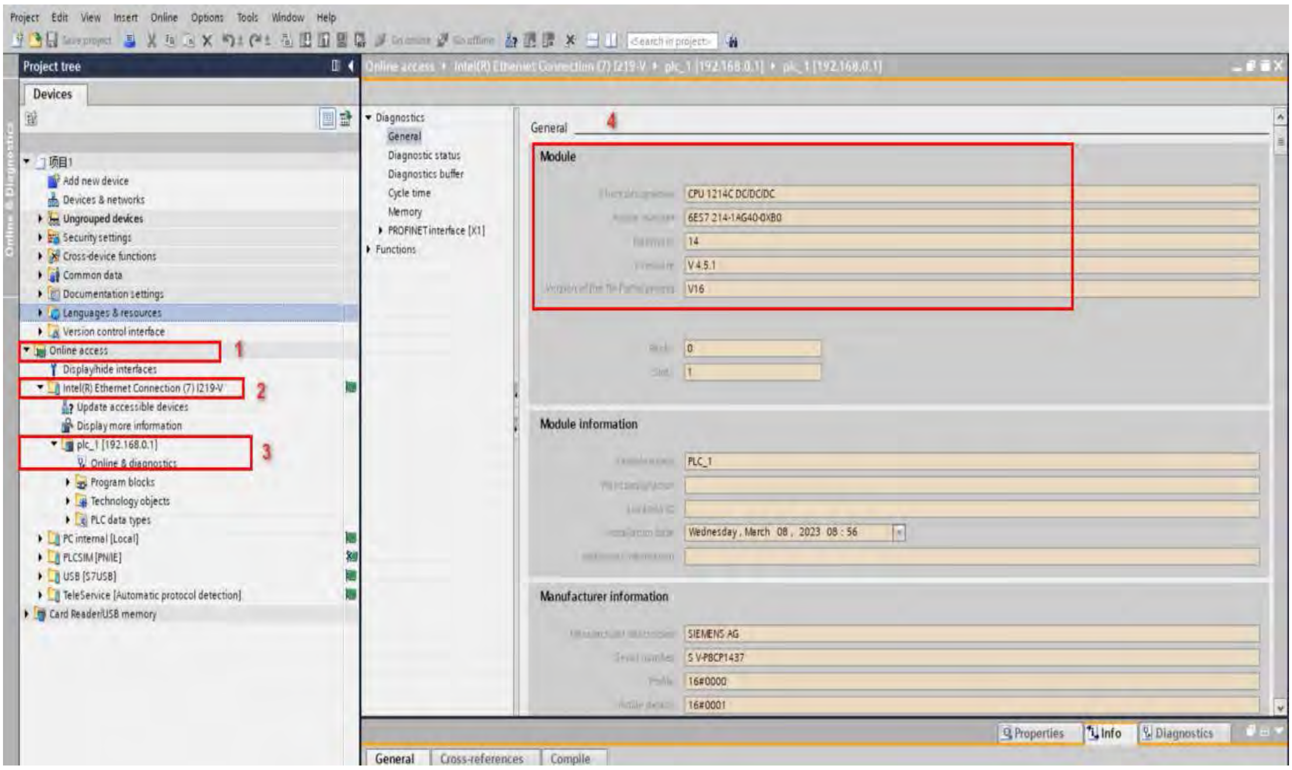
HMI with Ethernet port supports Ethernet communication with Siemens S7-S1200/S7-1500 PLC. You can use Ethernet cable to directly connect HMI Ethernet port and PLC Ethernet port, or via switch.

17.10.6.1 Connection Method

Please refer to Connection Method.

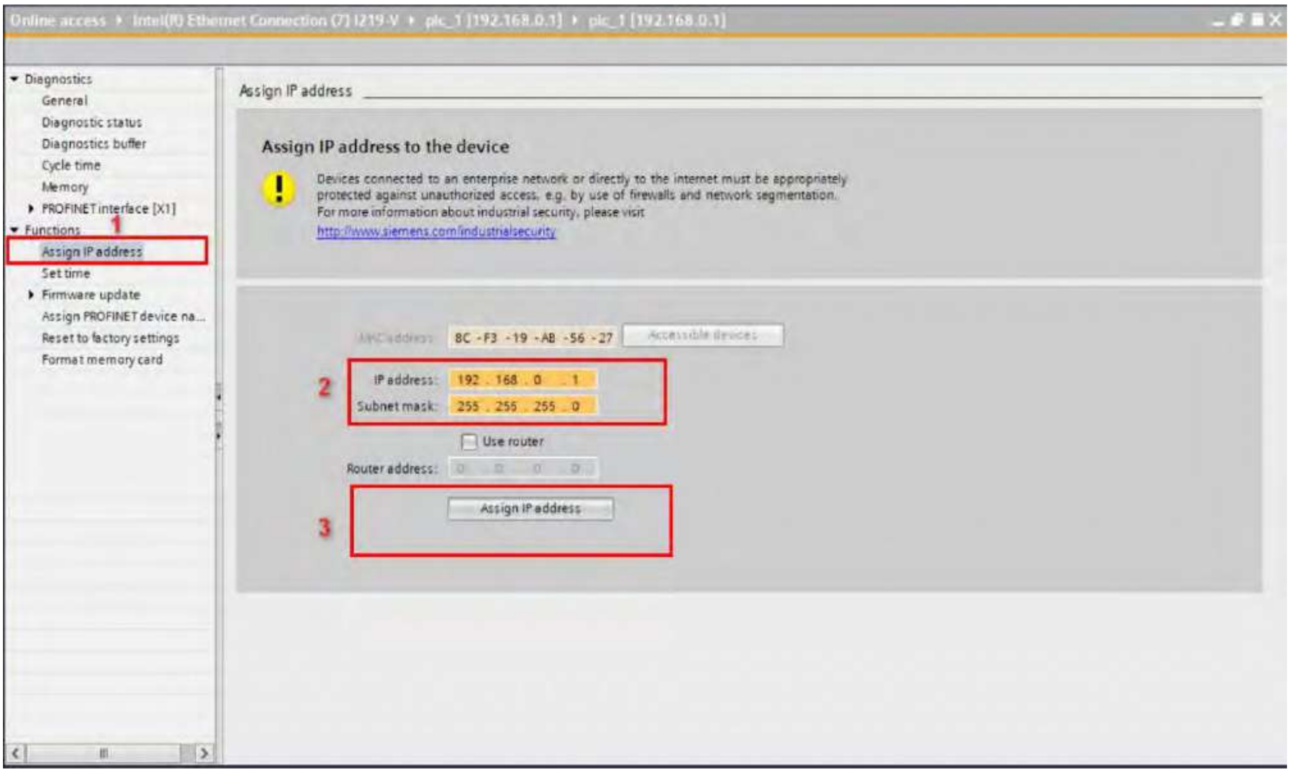
17.10.6.2 Configure PLC

Step 1. Connect PC and PLC via Ethernet cable. Run Siemens PLC configuration software, select PC adapter under **Online Access**, update accessible devices to view IP address, order number and firmware number of the current PLC.

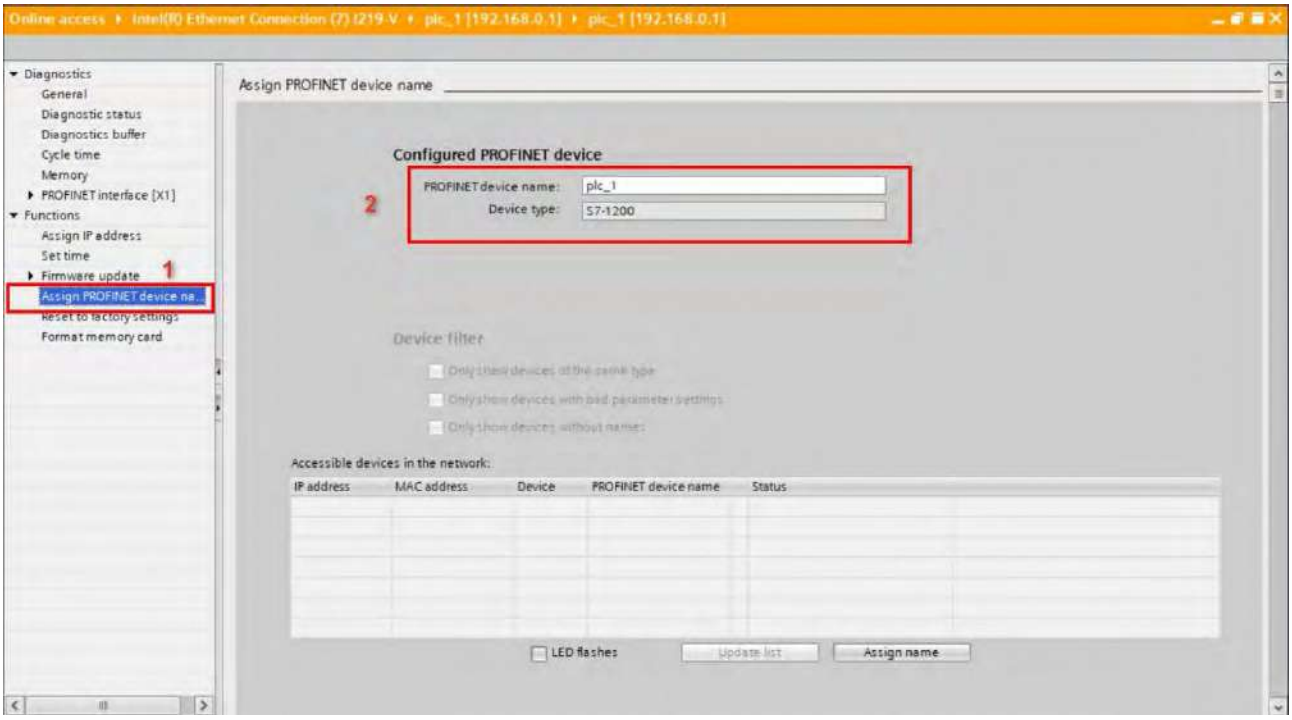


If the PLC is used for the first time, update information is MAC address of PLC. You need to assign IP address and name for PLC (IP address should be in the same network segment as the IP address of HMI).

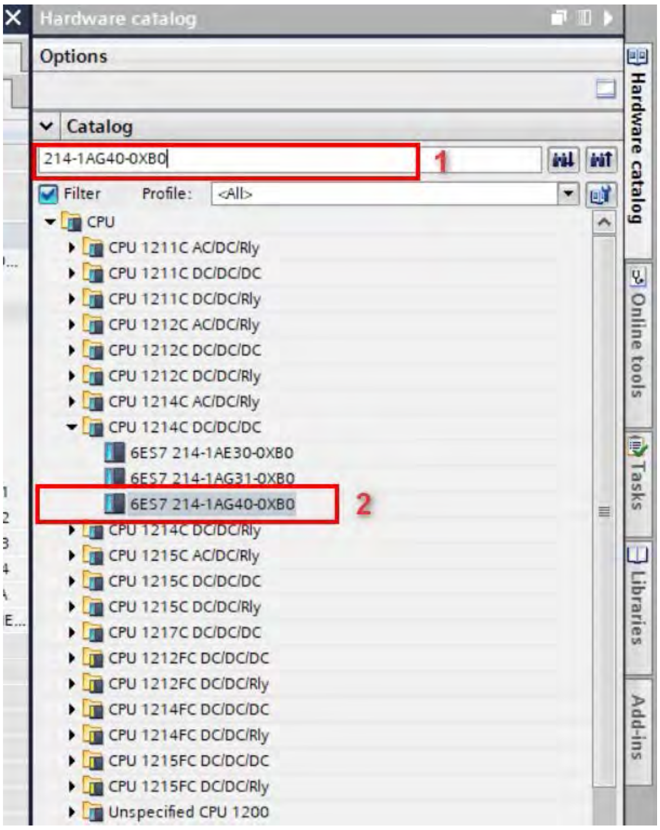
1) Selection **Function/Assign IP Address**.
2) Enter the IP address and subnet mask of PLC.
3) Click **Assign IP Address**.



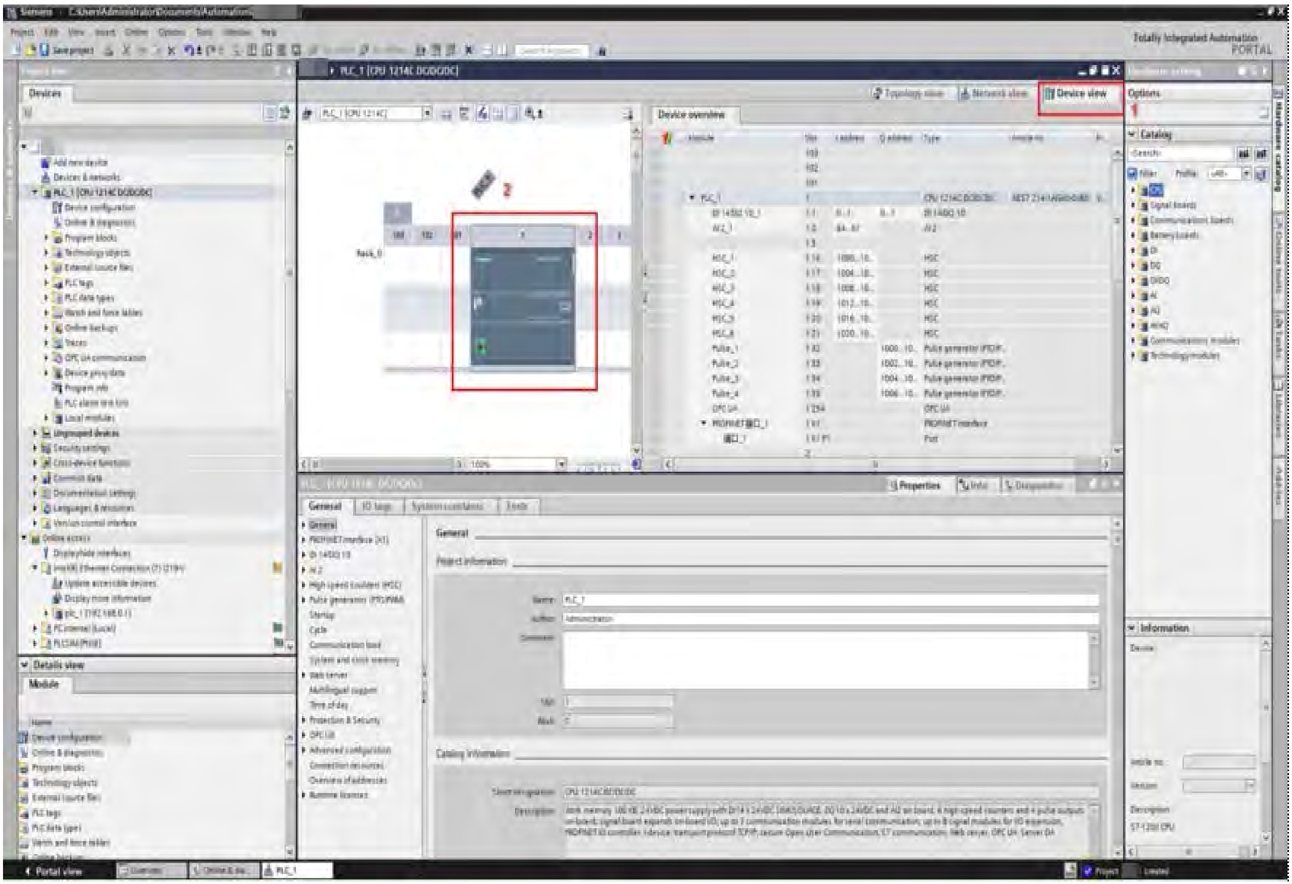
4) Select **Function/Assign PROFINET Device Name**, set PROFINET device name and type.



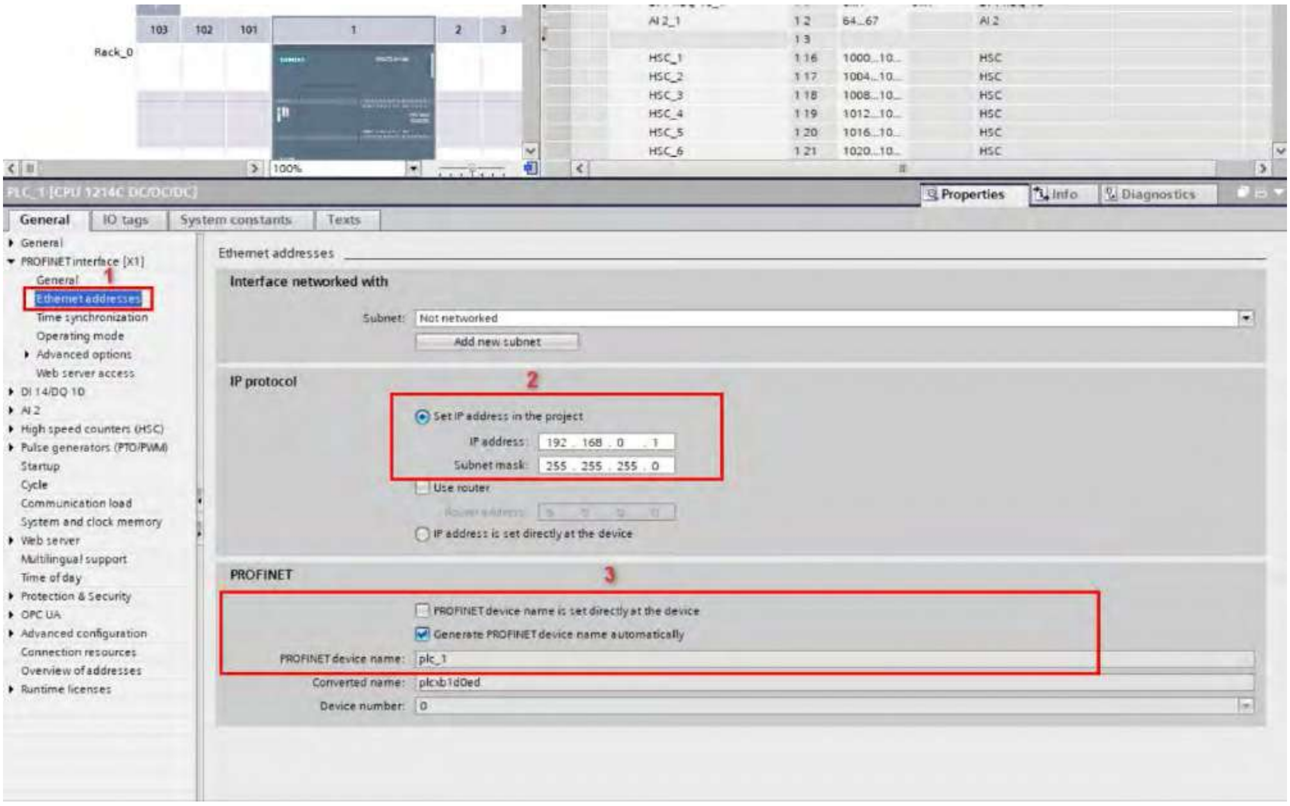
Step 2. Search for PLC in the directory based on order number, find the corresponding PLC and double click to add it to project.



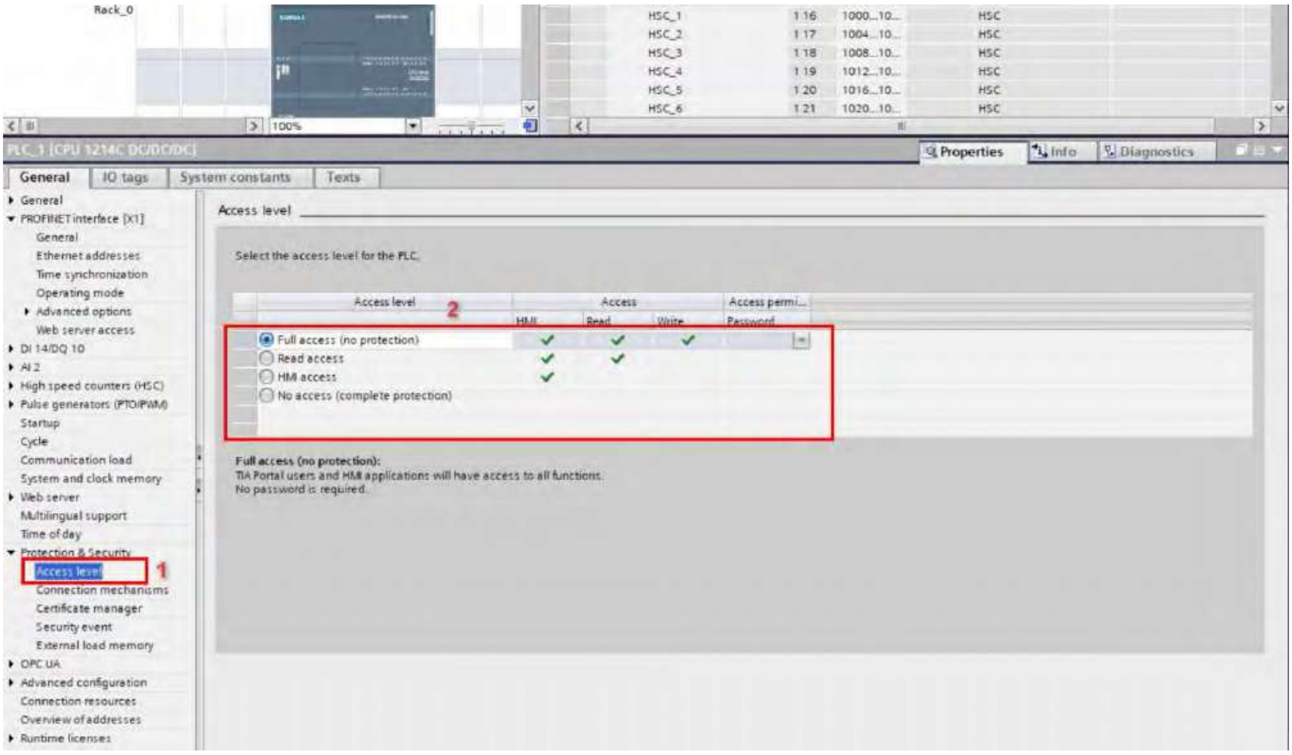
Step 3. After adding PLC, you can see this PLC under **Device View**.



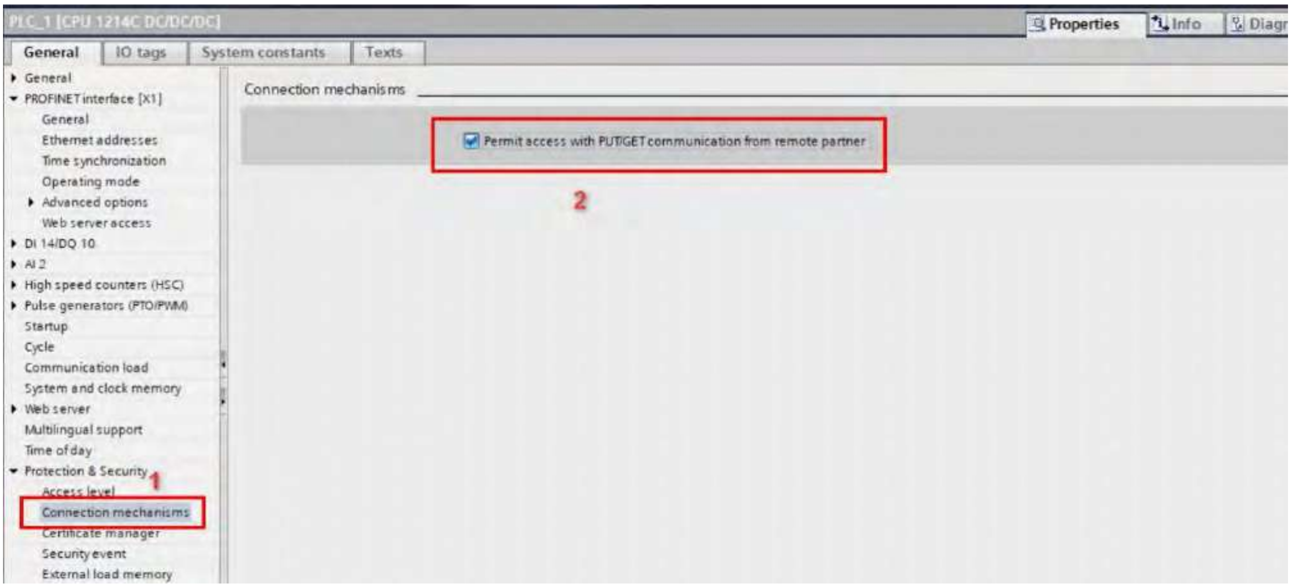
Step 4. Modify IP address and device name (keep consistent with settings in step1).



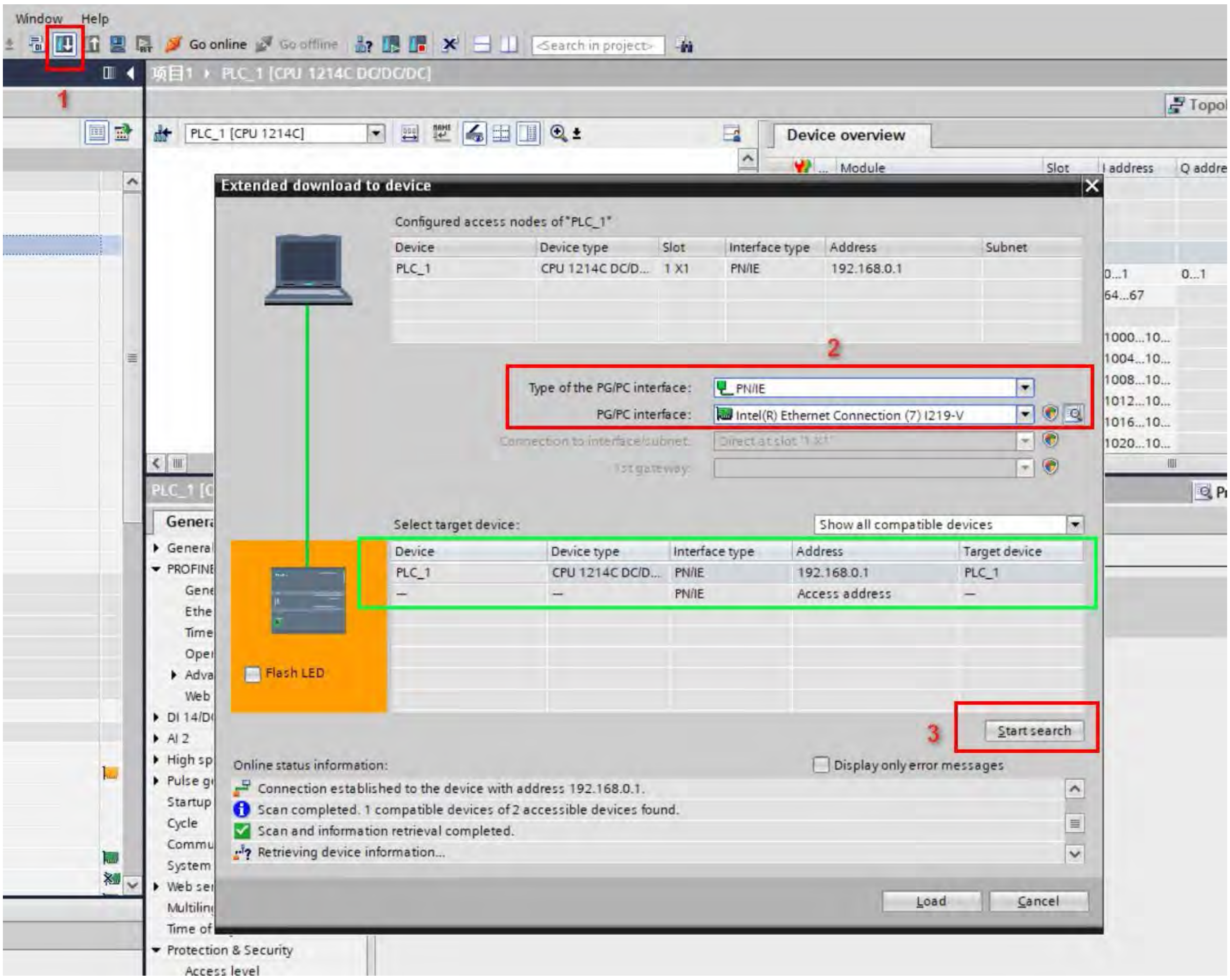
Step 5. Select **Protection & Security/Access Level**, set it to **Full Access**.



Step 6. Select **Protection & Security/Connection Mechanism**, check **Permit access with PUT/GET communication from remote partner**.



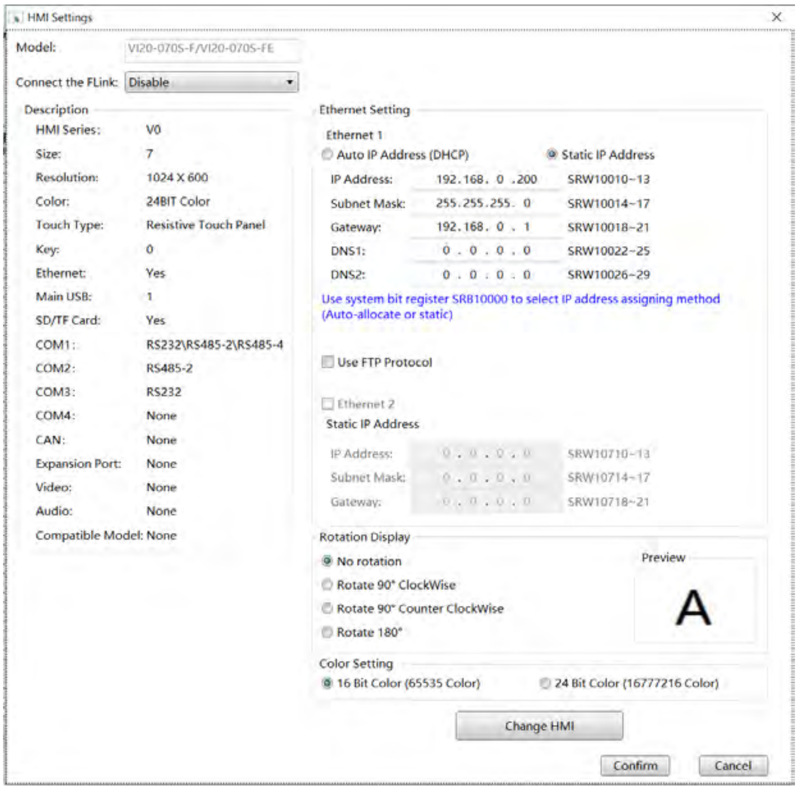
Step 7. Click the icon, select the PG/PC interface in the pop-up dialog box, click **Start search**, select the target PLC, download configuration information to target PLC.



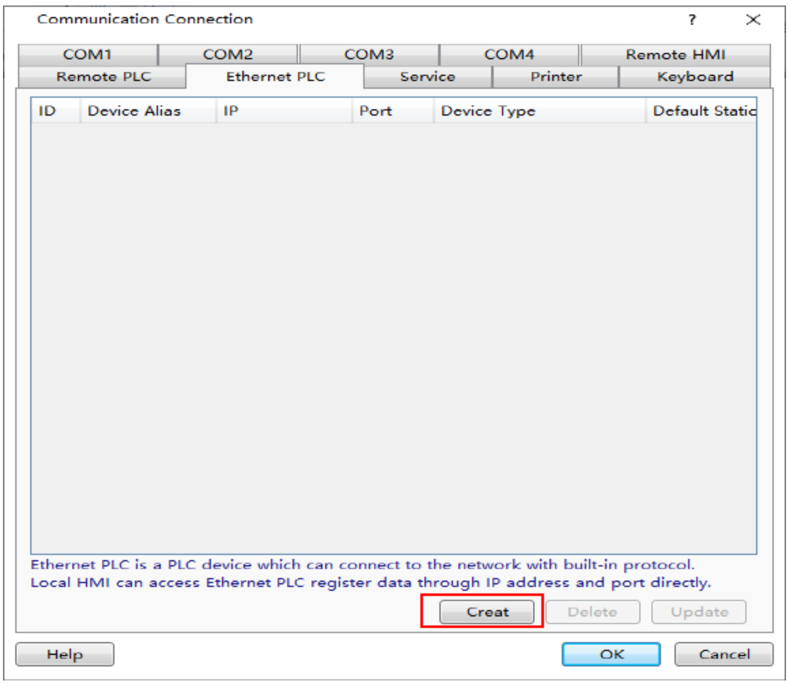
Step 8. Power off, then power on and restart again.

17.10.6.3 Configure HMI

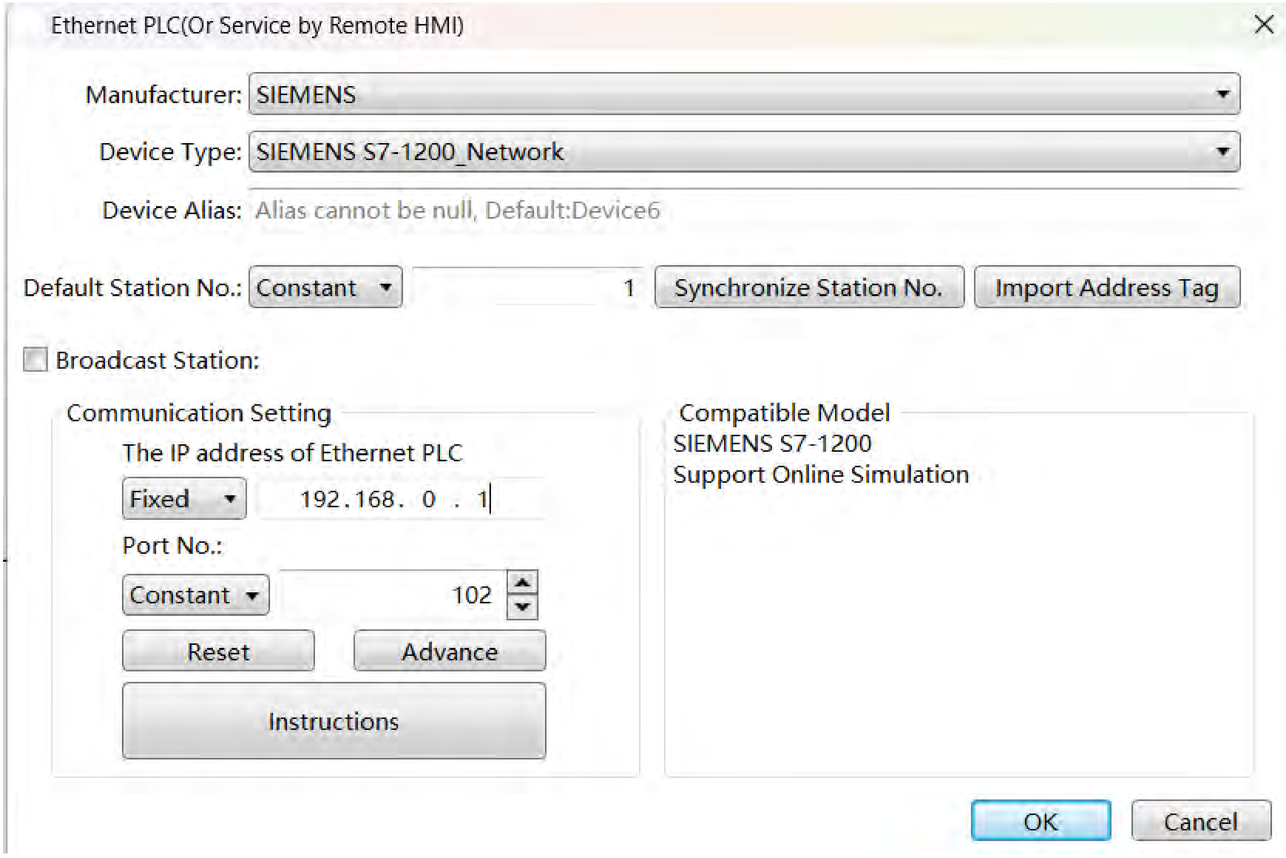
Step 1. Run VI20Studio, select **Setting/HMI Setting**, set the IP address of HMI (to be in the same network segment as the IP address of PLC) in the pop-up dialog, click **Confirm**.



Step 2. Select **Setting/Communication Setting/Remote Connection** from the menu bar, select **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.



Step 3. Configure relevant parameters in the pop-up dialog box, click **OK**.

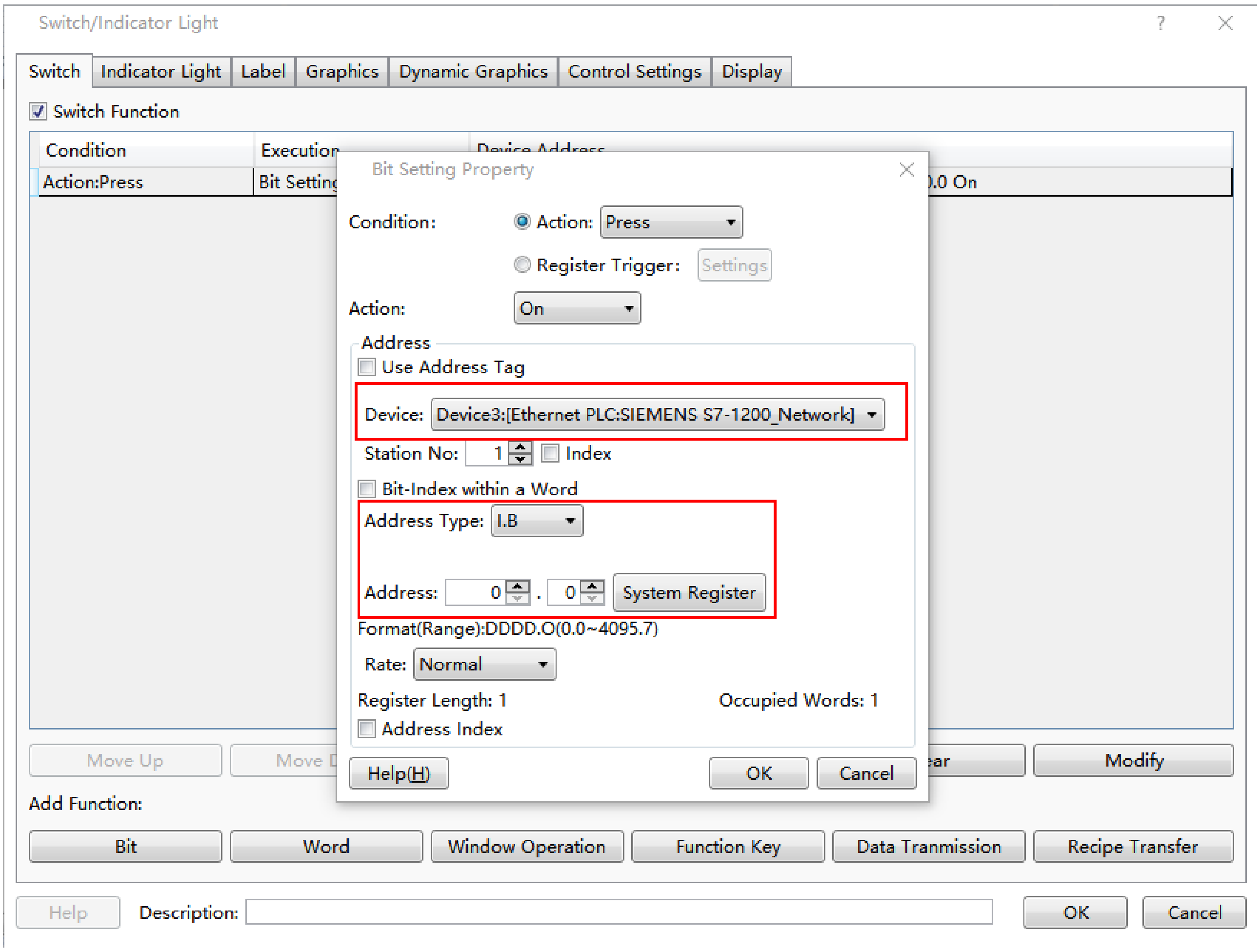


Please refer to the table below for detailed configuration.

Parameter	**Description**
Manufacturer	Select "Siemens ".
Device Type	When PLC is Siemens S7-1200, select "Siemens S7-1200_Network"; when PLC is Siemens S7-1500, select "Siemens S7-1500_Network".
IP Address of Network PLC	Please refer to the actual situation.
Port No.	Use default value 102.

Step 4. Click **OK** in the pop-up **Communication Connection** dialog box.

Step 5. Select **Component/Switch/Bit Set** from the menu bar, set address to PLC address(please refer to the actual situation) in the pop-up dialog box.



Step 6. After adding the switch component, download project to PLC. If PLC address data can be read and written, it means the communication is working.

17.10.6.4 PLC Register Address Format

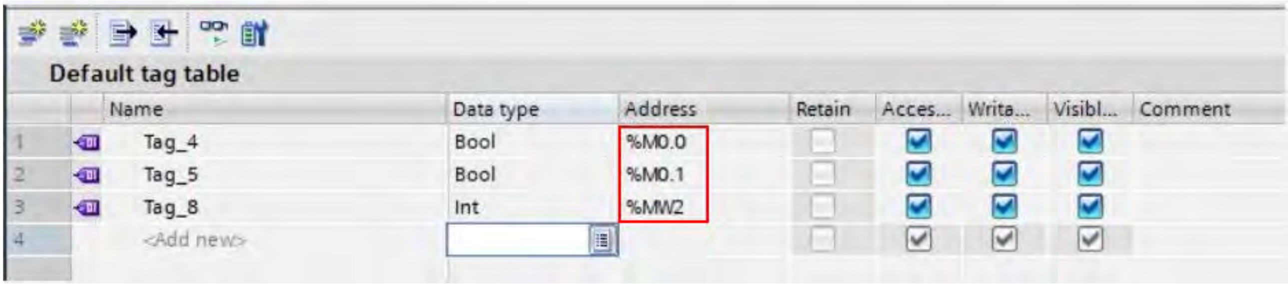
Please refer to the table below for register address formats supported by Siemens S7-1200/S7-1500 PLC.

Drive	Charcter/Bit	Device Type	Format	Range
SIEMENS S7-1200_Network	B	I.B	DDDD.0	0.0~4095.7
	B	Q.B	DDDD.0	0.0~4095.7
	B	M.B	DDDD.0	0.0~8192.7
	B	DBn_DBX	DDDDD.0	0.0~65535.7
	B	n represents block address		
	W	IW	DDDD	0~4095

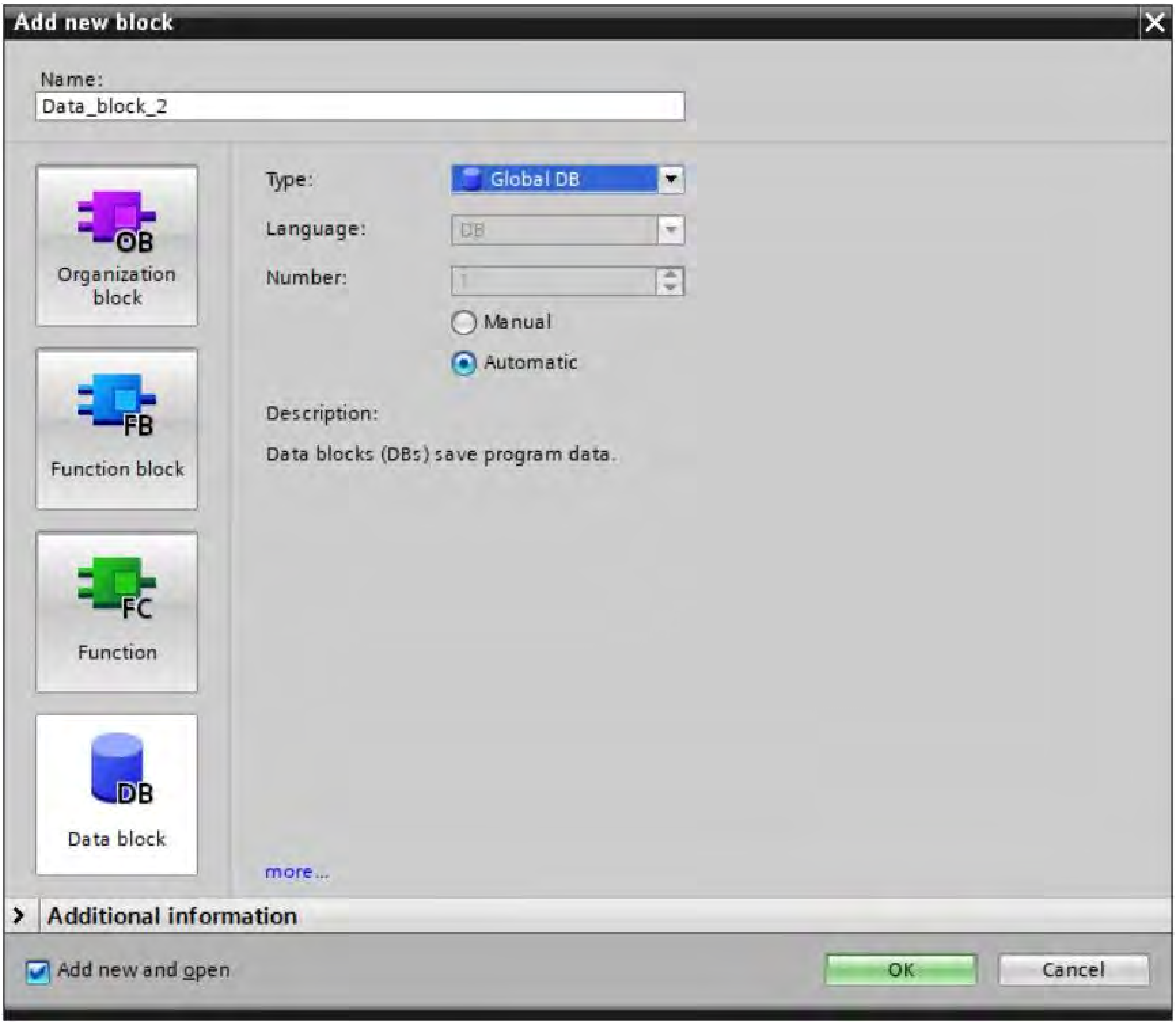
Drive	Charcter/Bit	Device Type	Format	Range
	W	QW	DDDD	0~4095
	W	MW	DDDDD	0~65530
	W	ID	DDDD	0~4095
	W	QD	DDDD	0~4095
	W	MD	DDDDD	0~65530
	W	DBn_DBD	DDDDD	0~65532
	W	n represents block address		
	W	DBn_DBW		0~65534
	W	n represents block address		

As shown in the picture, if "%" is removed from the address of tag name, its corresponding address in HMI means:

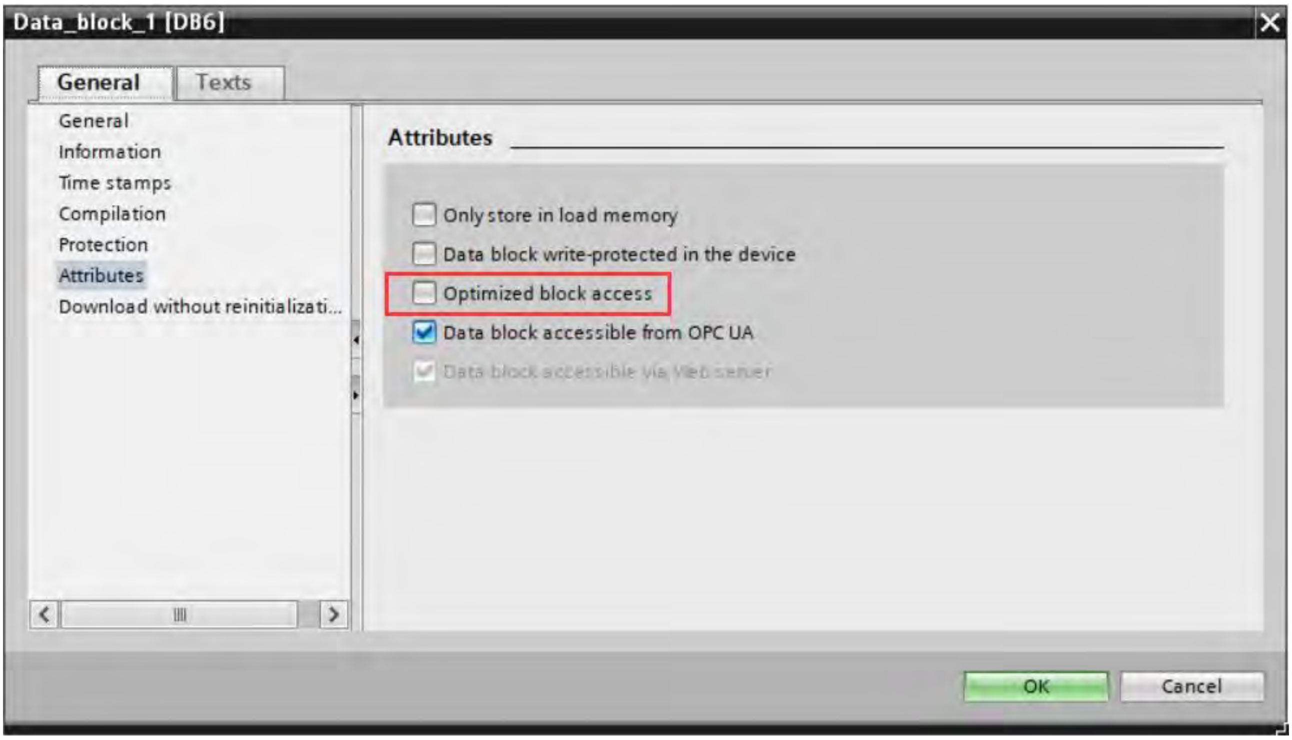
- %M0.0 corresponds to M0.0 on HMI
- %M0.1 corresponds to M0.1 on HMI
- %MW2 corresponds to MW2 on HMI



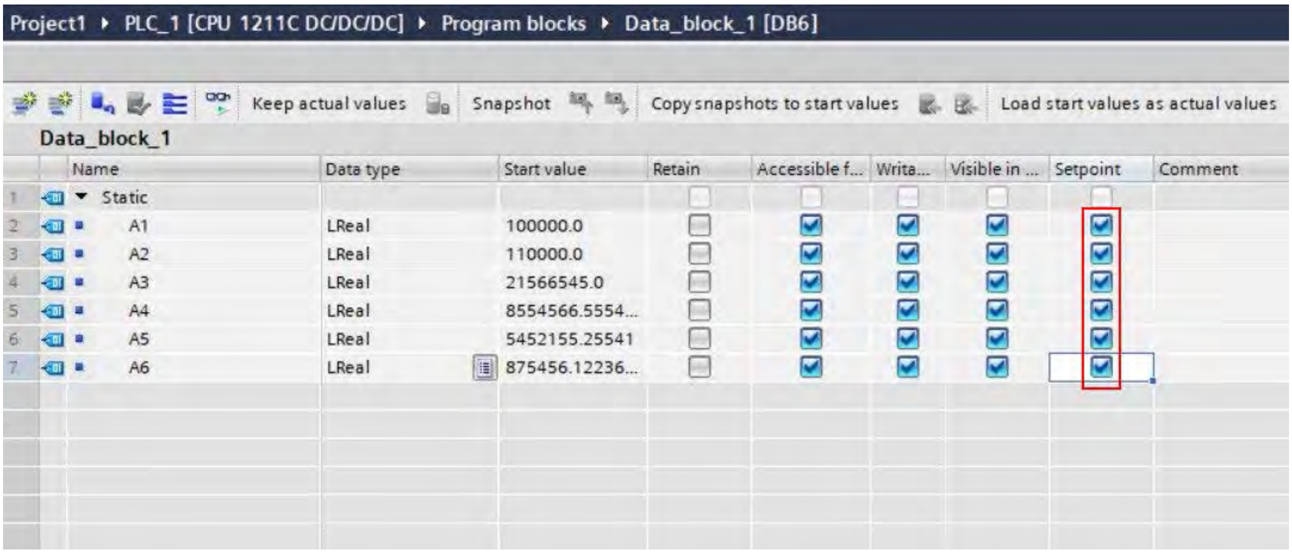
Configuration of DB block is as shown in the picture below.



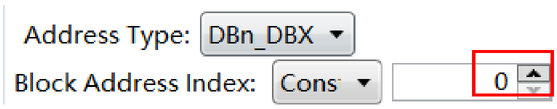
After adding data block, uncheck **Optimized block access** in the corresponding data block property. Compile data block. Then there will be an offset address for each data in the data block. Adding corresponding address in HMI can read value in data blocks, otherwise the block data cannot be read.

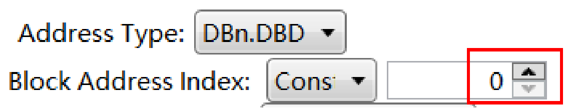


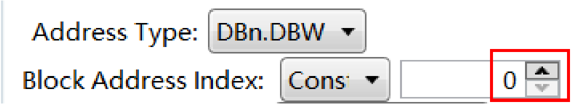
Checking **Setpoint** is required for data in DB.



When setting PLC address in HMI, when address type is DBn_DBX, DBn.DBD and DBn.DBW, block address index can be set to 0.







17.10.7 Ethernet Communication Between HMI and Siemens S7-400 PLC

HMI with Ethernet port supports Ethernet communication with Siemens S7-400 PLC. You can use cable to directly connect HMI Ethernet port and Siemens S7-400 PLC Ethernet port, or via a switch.

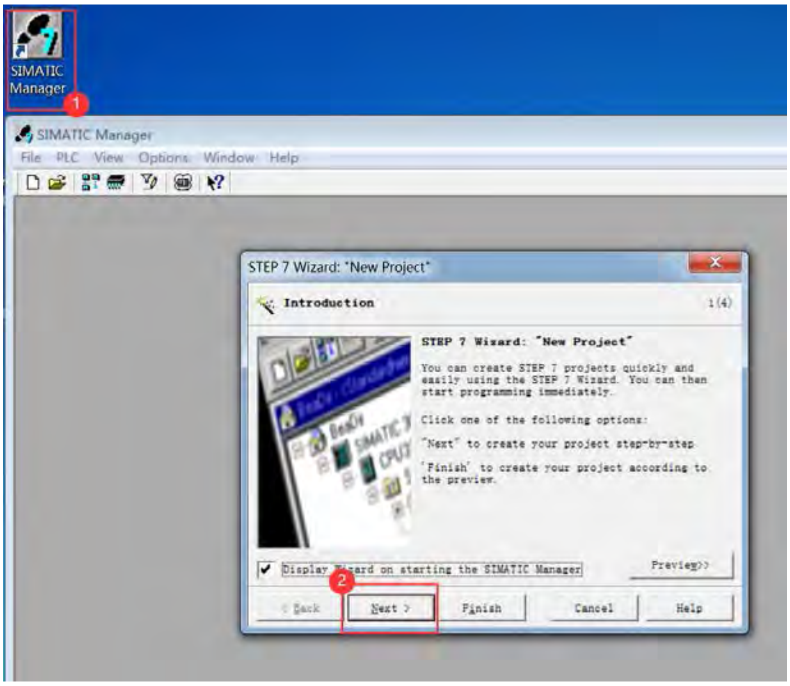
17.10.7.1 Connection Method

Please refer to Connection Method.

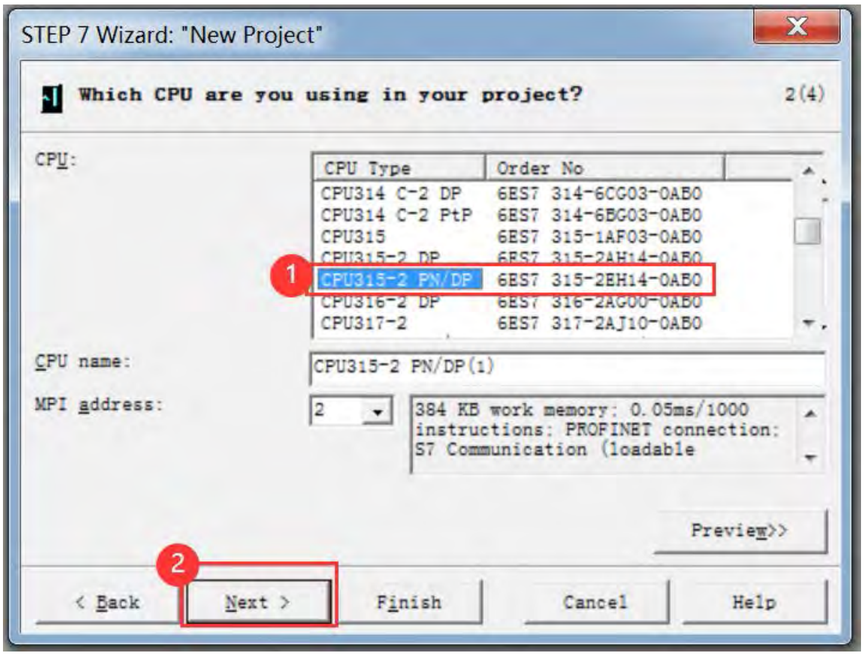
17.10.7.2 Configure PLC

Step 1. Ensure that PC is connected to Siemens S7-400 via Ethernet cable.

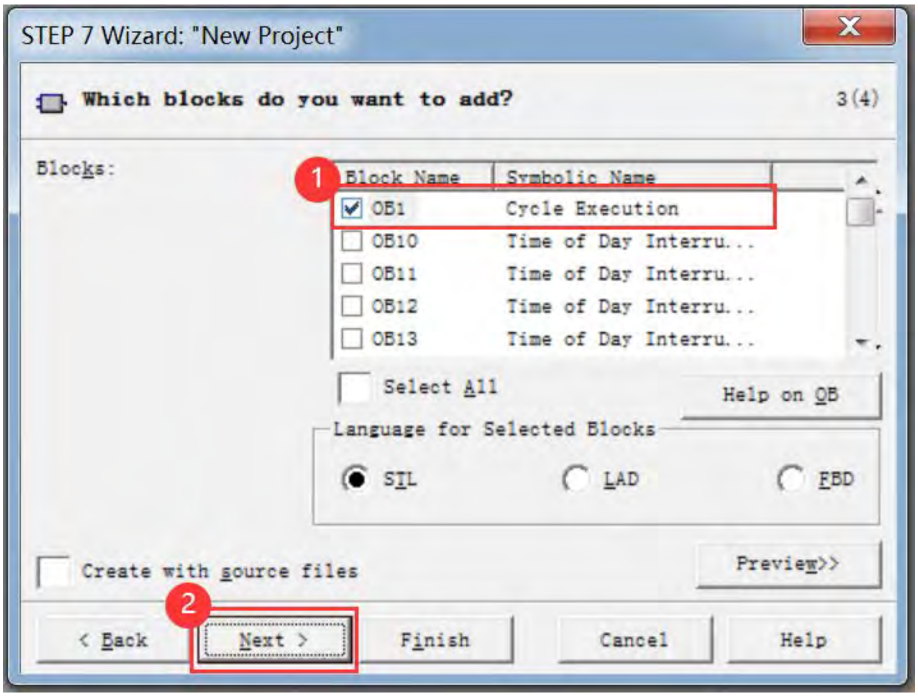
Step 2. Run SIMATIC Manager, the PLC configuration software, click **Next** in the pop-up configuration guide.



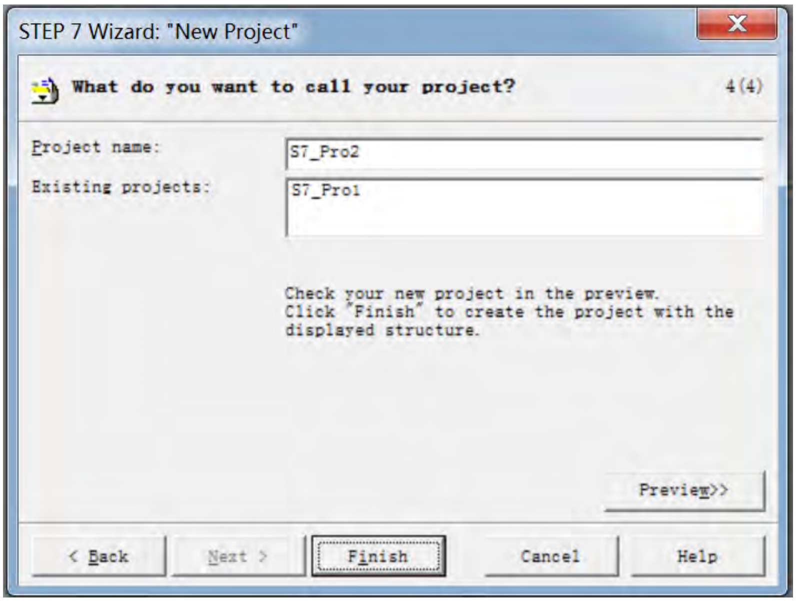
Step 3. Select PLC of the corresponding order number, click **Next.**



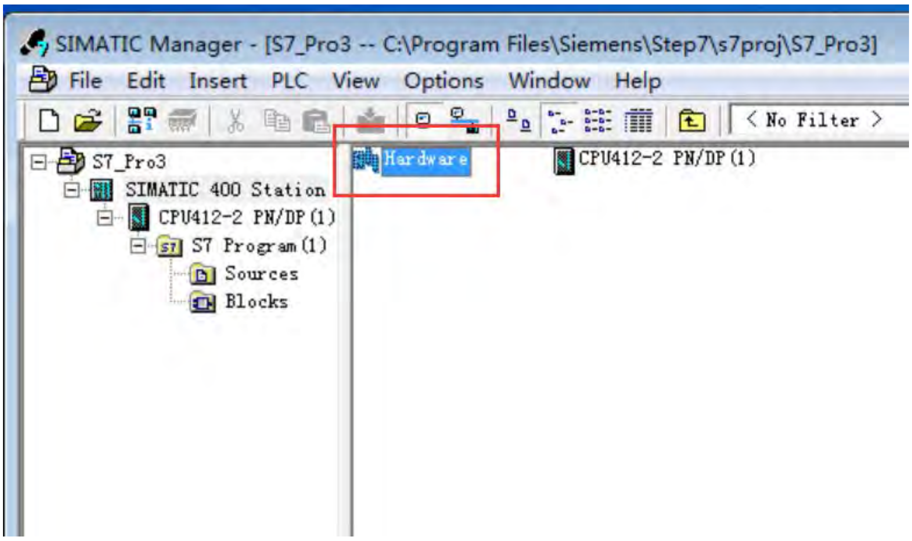
Step 4. Check OB block to be programmed, click **Next**.



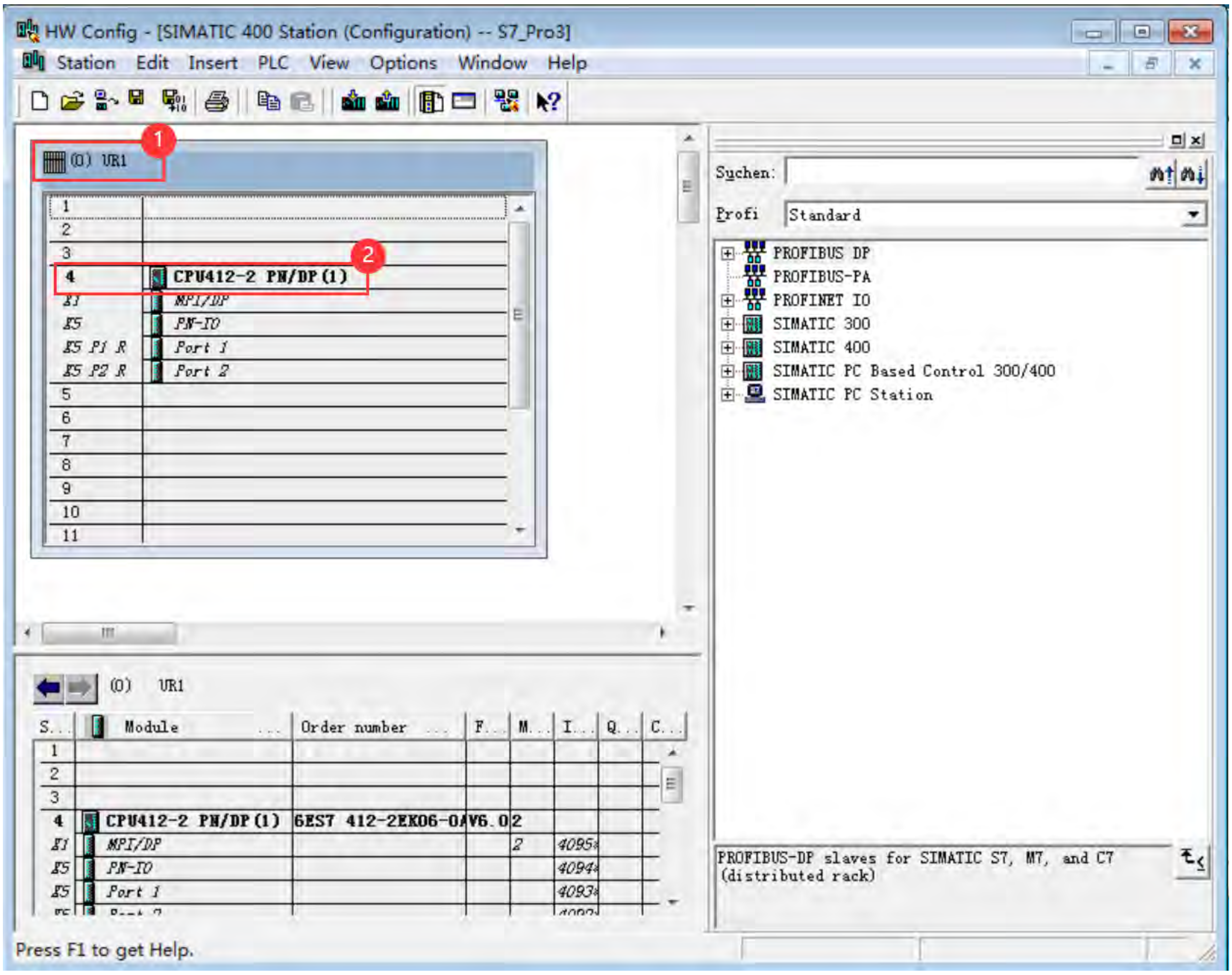
Step 5. Set project name, click **Finish** to finish creating the project.



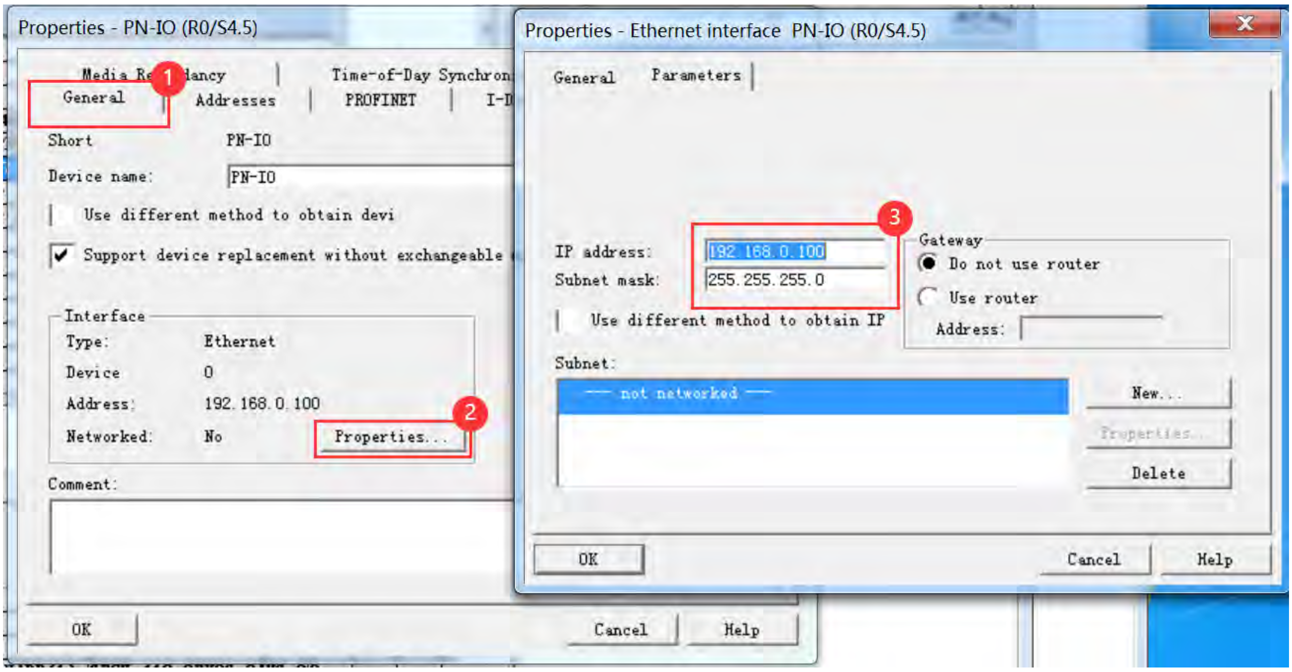
Step 6. Enter the project interface, double click **Hardware** to configure hardware information.



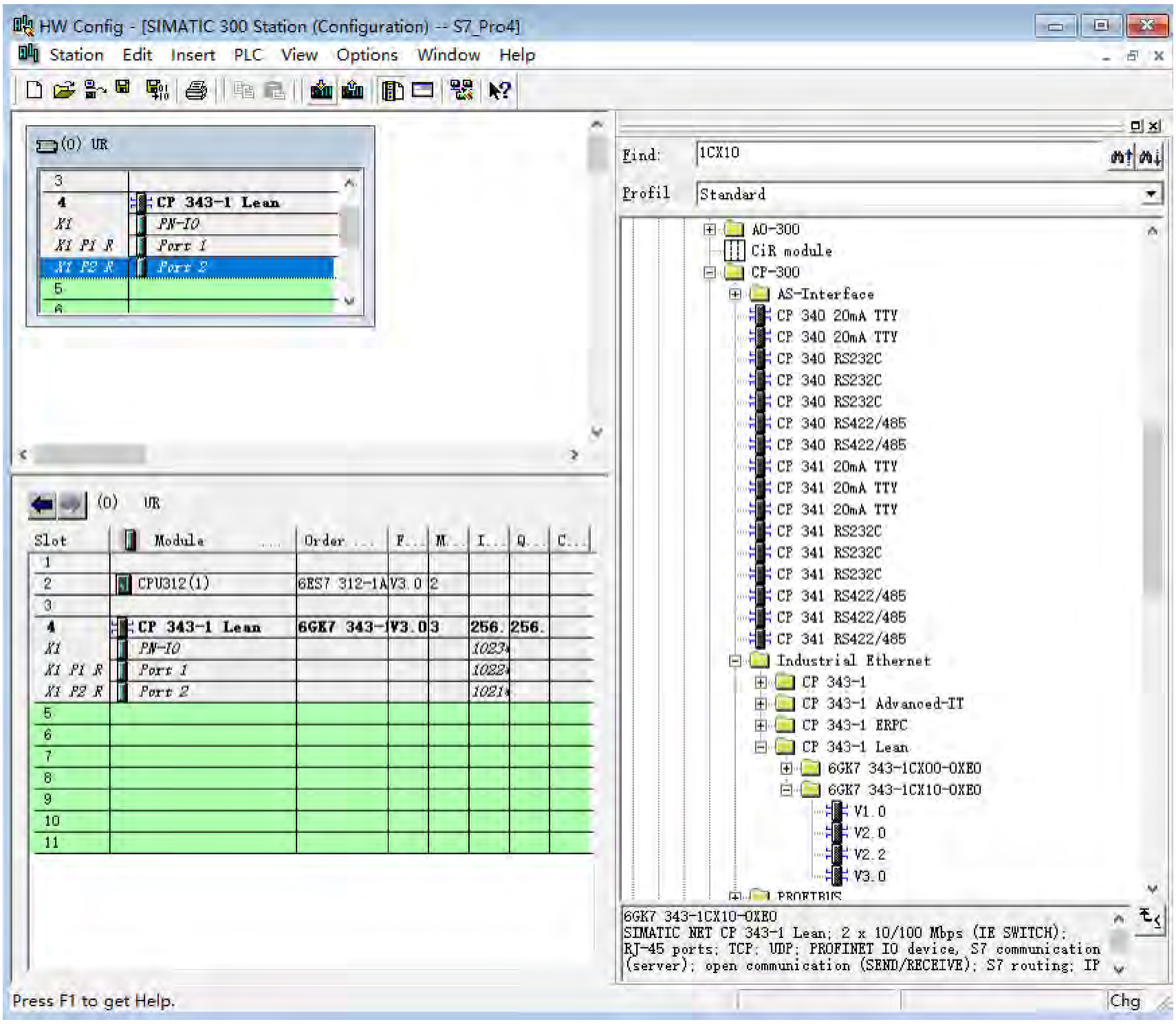
Step 7. Confirm PLC base number and slot number in Hardware.



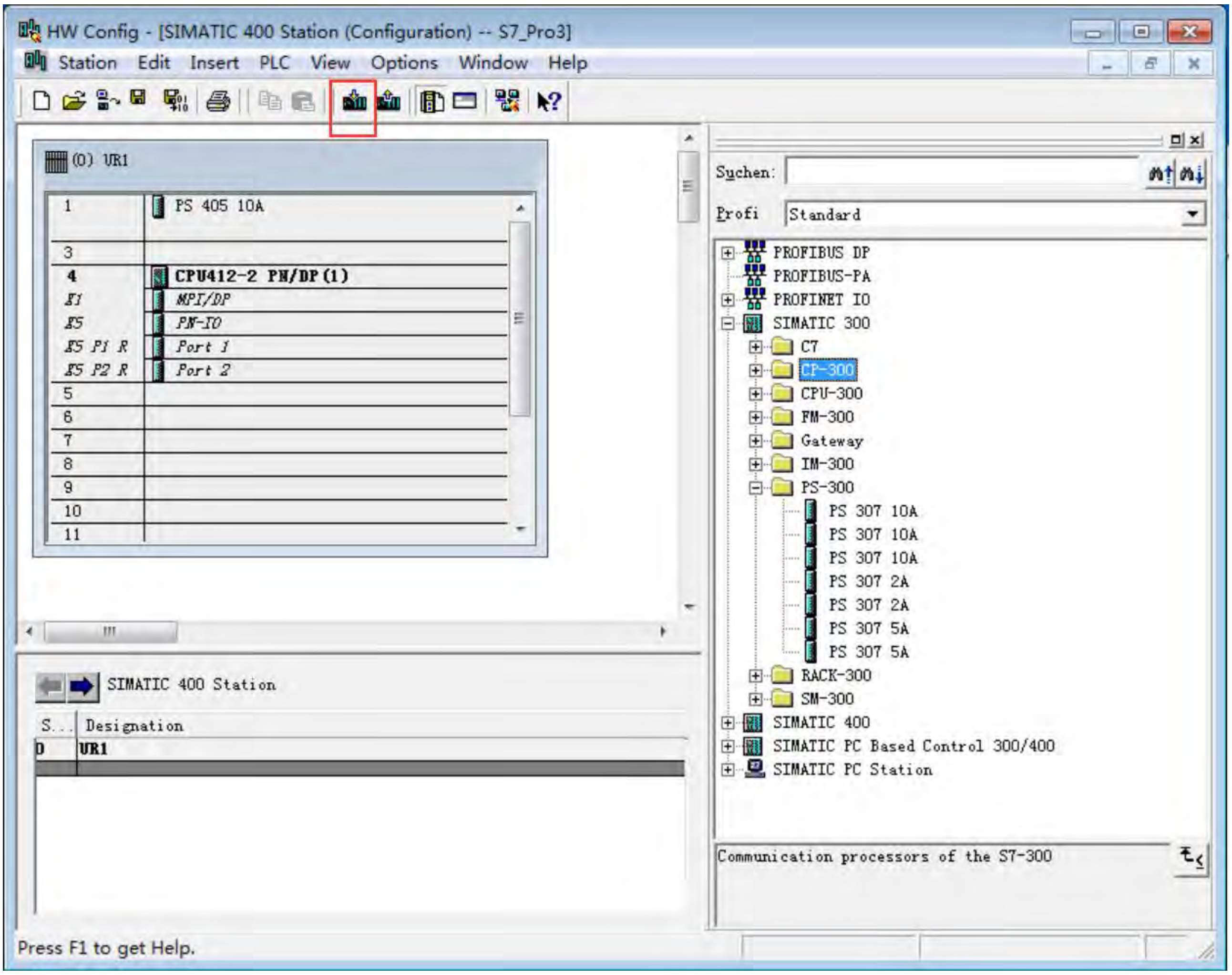
Step 8. Select the **General** tab, click **Properties**, set the IP address and subnet mask of PLC in the pop-up dialog box, click **OK**.



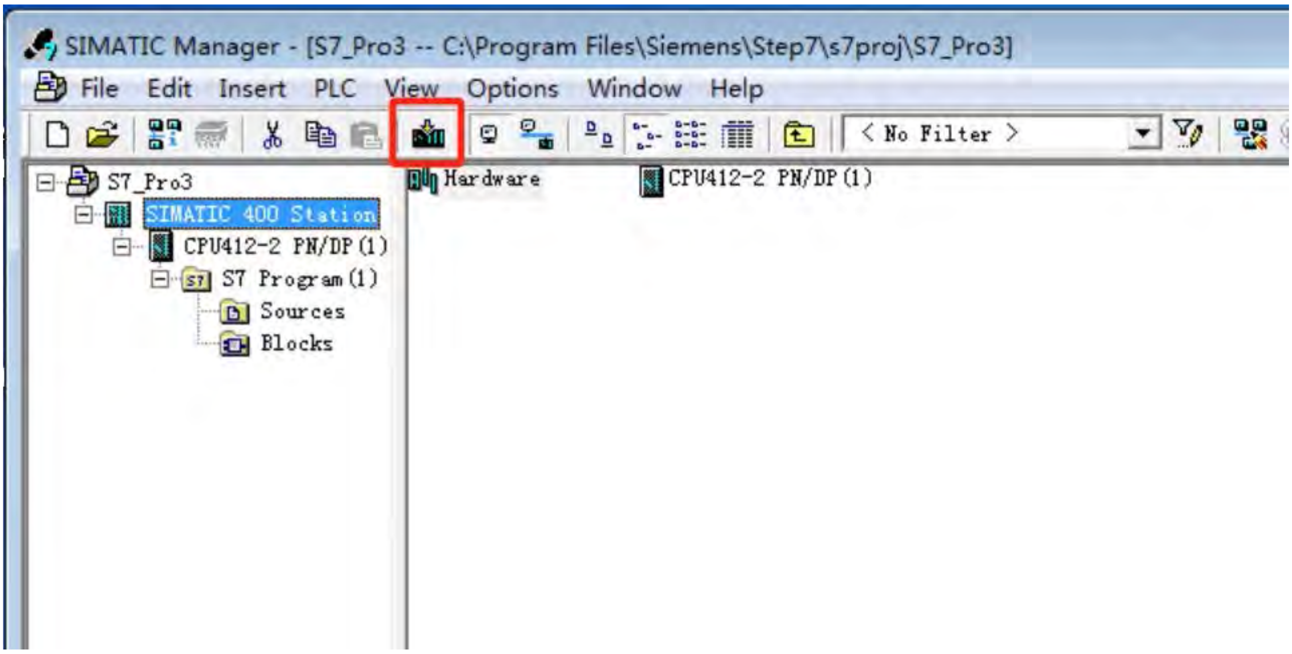
Step 9. After the setup is completed, it is as shown in the figure below.



Step 10. Click the  icon, download hardware configuration information to PLC.



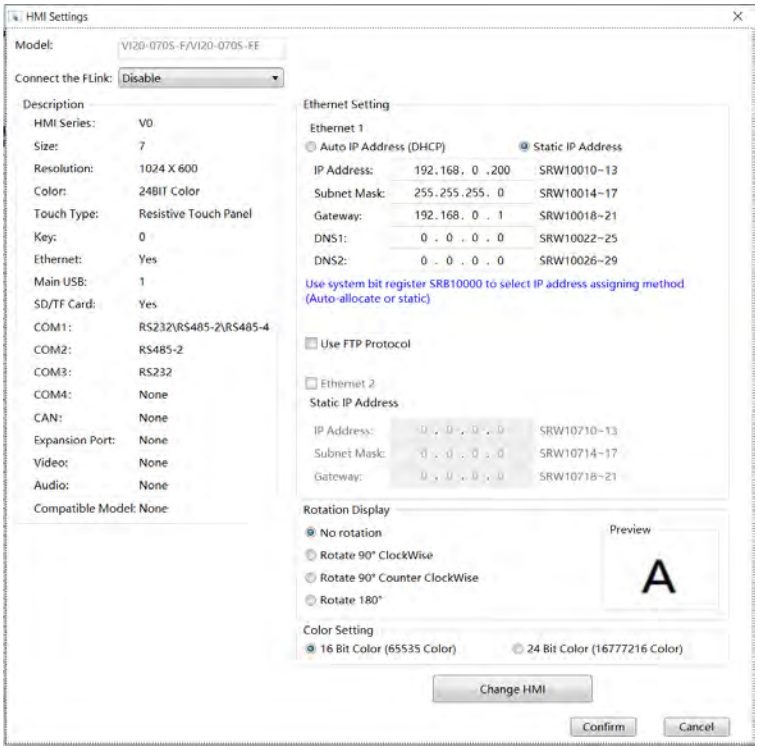
Step 11. Click the  icon, download project to PLC.



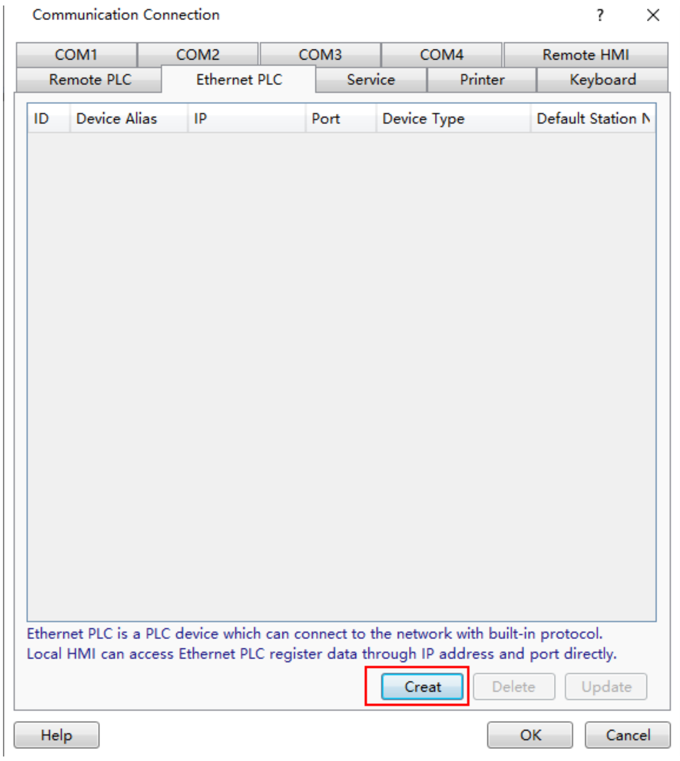
Step 12. Power off , then power on and restart again.

17.10.7.3 Configure HMI

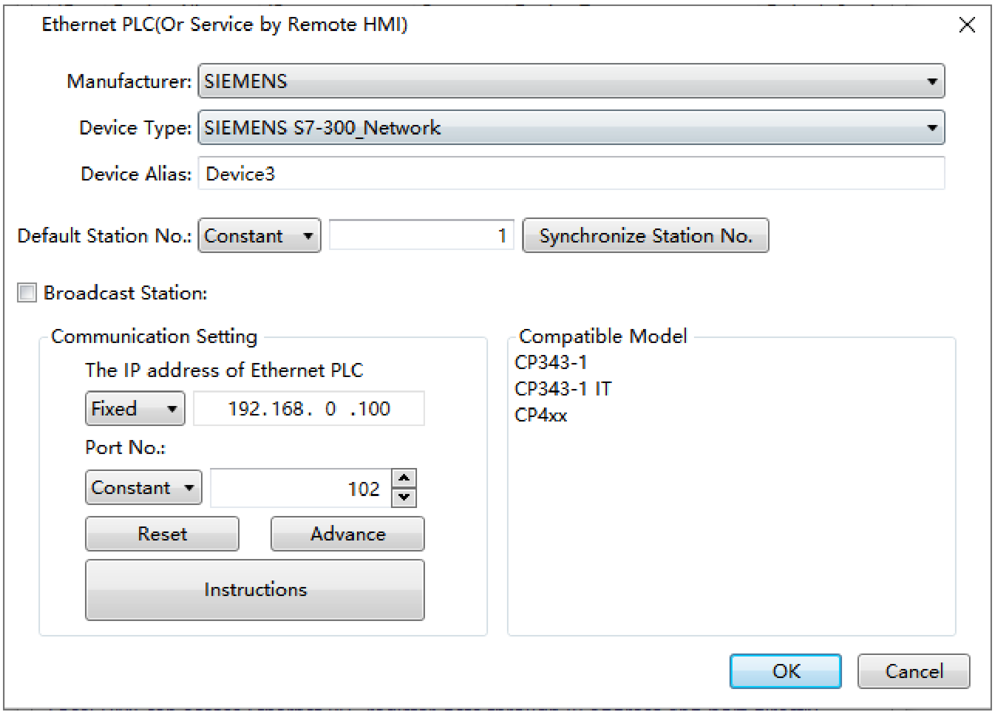
Step 1. Run VI20Studio, select **Setting/HMI Setting** from the menu bar, set the IP address of HMI (to be in the same network segment as the IP address of PLC) in the pop-up dialog box, click **Confirm**.



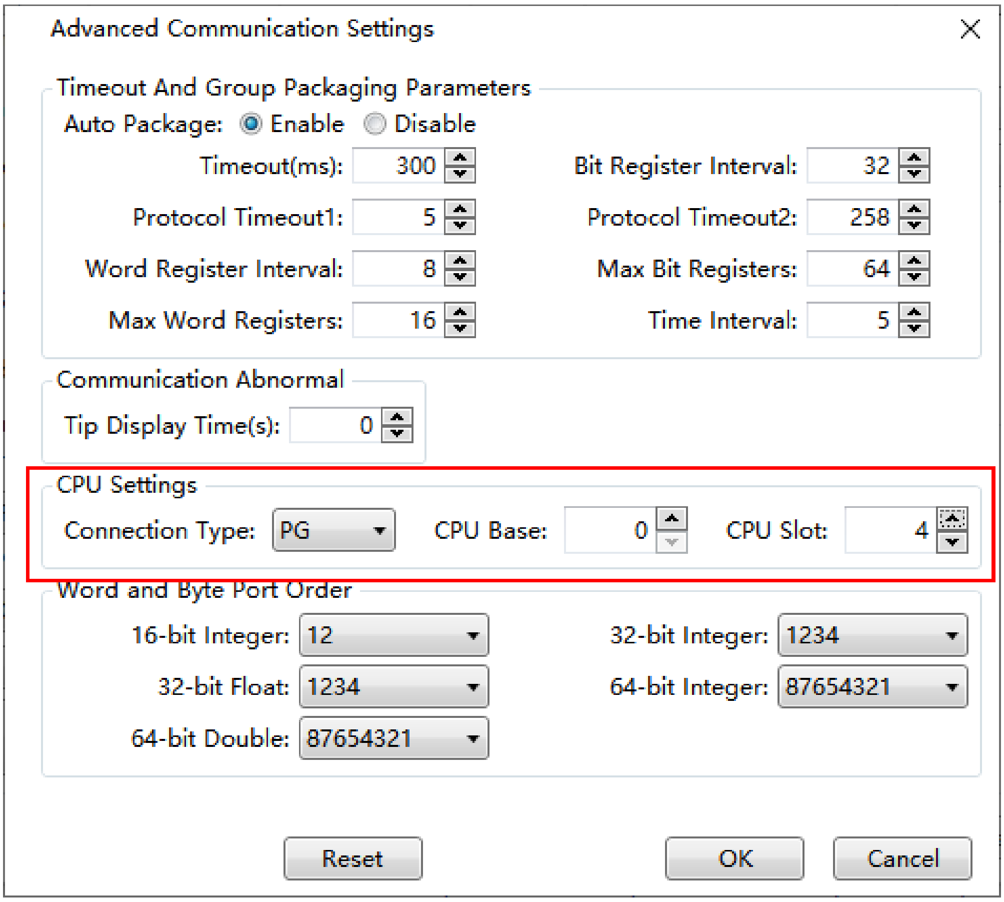
Step 2. Select **Setting/Communication Setting/Remote Connection** from the menu bar, select **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.



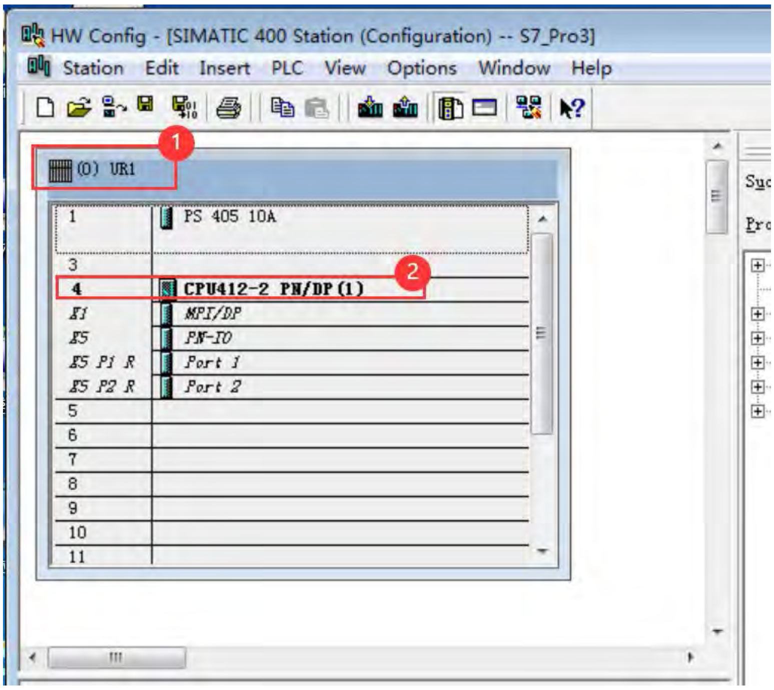
Step 3. Configure relevant parameters in the pop-up dialog box (select “Siemens S7-300_Network” for **Device Type**).



Step 4. Click **Advance**, set CPU base and slot number in the pop-up dialog box, click **OK**.

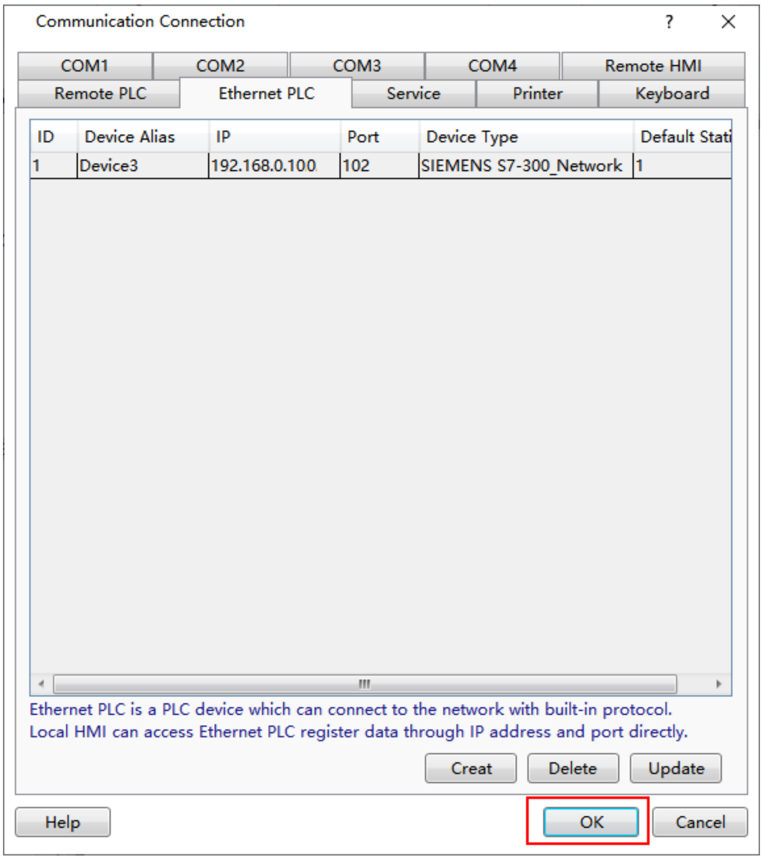


CPU base and slot number should be consistent with PLC settings.

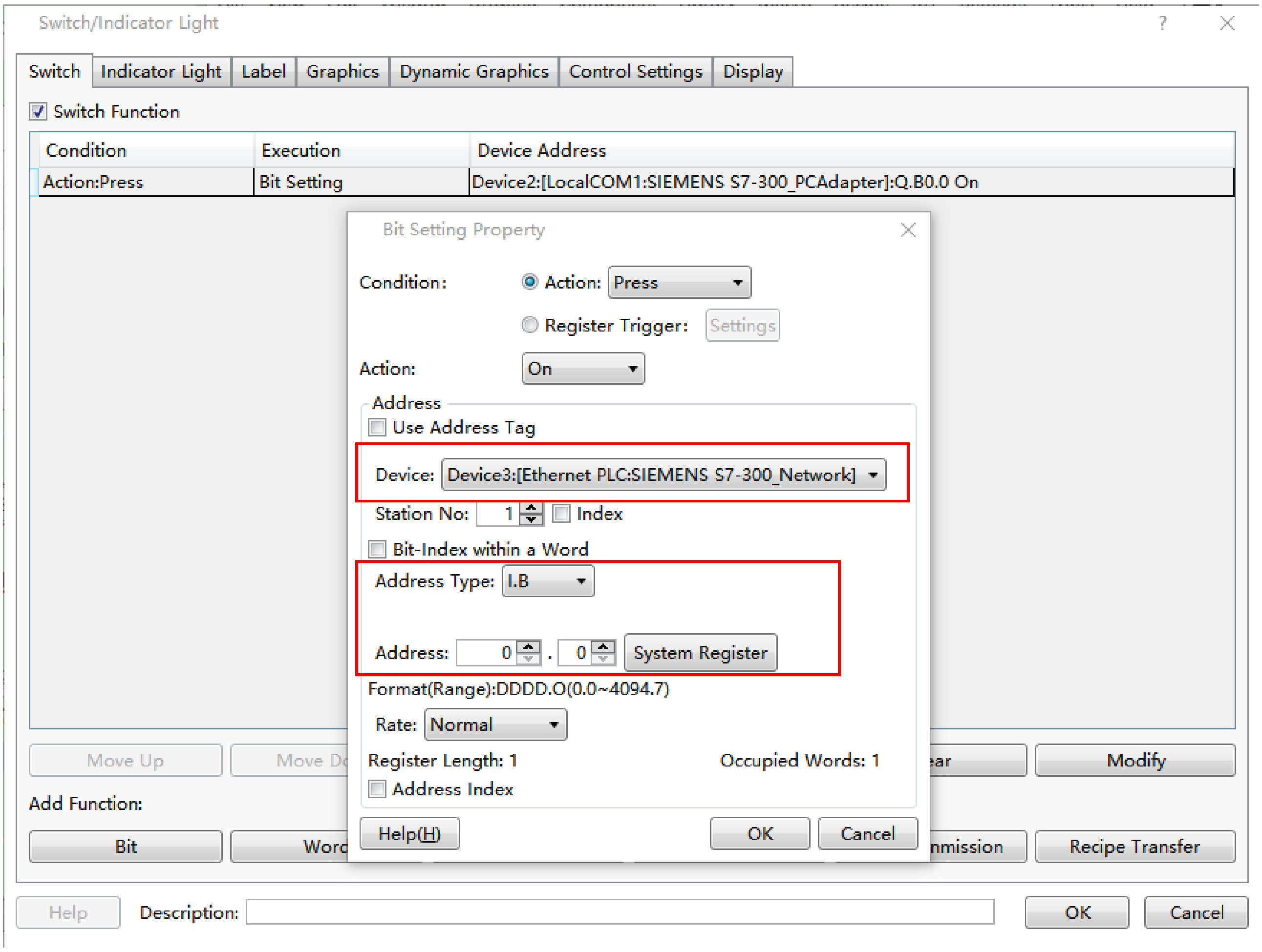


Step 5. Click **OK** in the **Ethernet PLC (or service provided by remote HMI)** dialog box.

Step 6. Click OK in the **Communication Connection** dialog box.



Step 7. Select **Component/Switch/Bit Set** from the menu bar, set address to PLC address(please refer to the actual situation) in the pop-up dialog box.



Step 8. After adding the switch component, download project to HMI. If PLC address data can be read and written, it means the communication is working.

17.10.8 Ethernet Communication (S7-Plus Tag) Between HMI and Siemens S7-1200/S7-1500 PLC

FE9000 series HMI supports Ethernet communication with Siemens S71200/S7-1500 PLC. FE9000 series HMI can recognize S7-Plus tag of Siemens S7-1200/S7-1500 PLC.

17.10.8.1 Connection Method

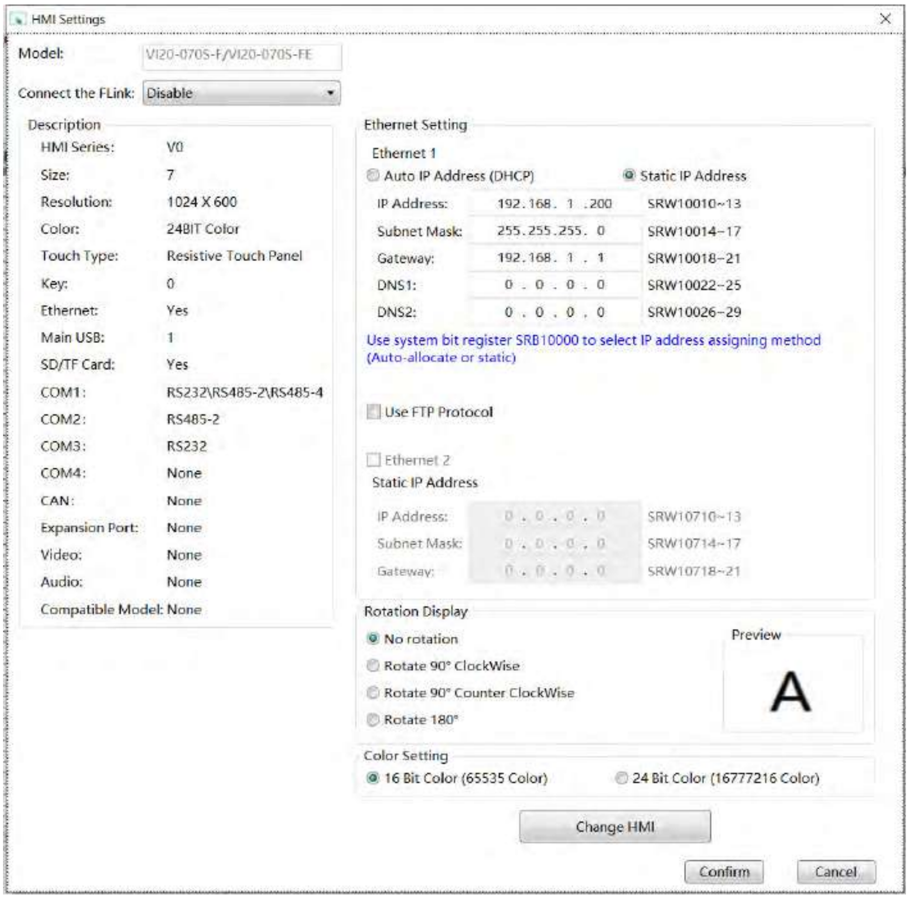
Use Ethernet cable to connect HMI port of FE9000 series and Siemens S7-1200/S7-1500 PLC port, or connect the two via switch. Please refer to Connection Method for detailed method.

17.10.8.2 Configure PLC

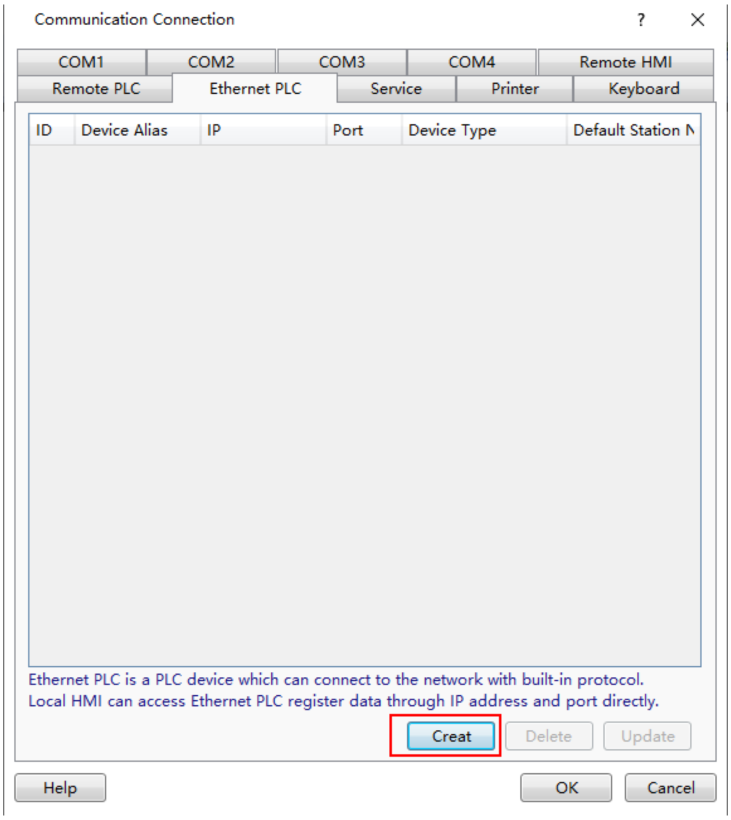
Run Siemens PLC configuration software, set PLC IP address, download to PLC, confirm the set IP has been updated to PLC.

17.10.8.3 Configure HMI

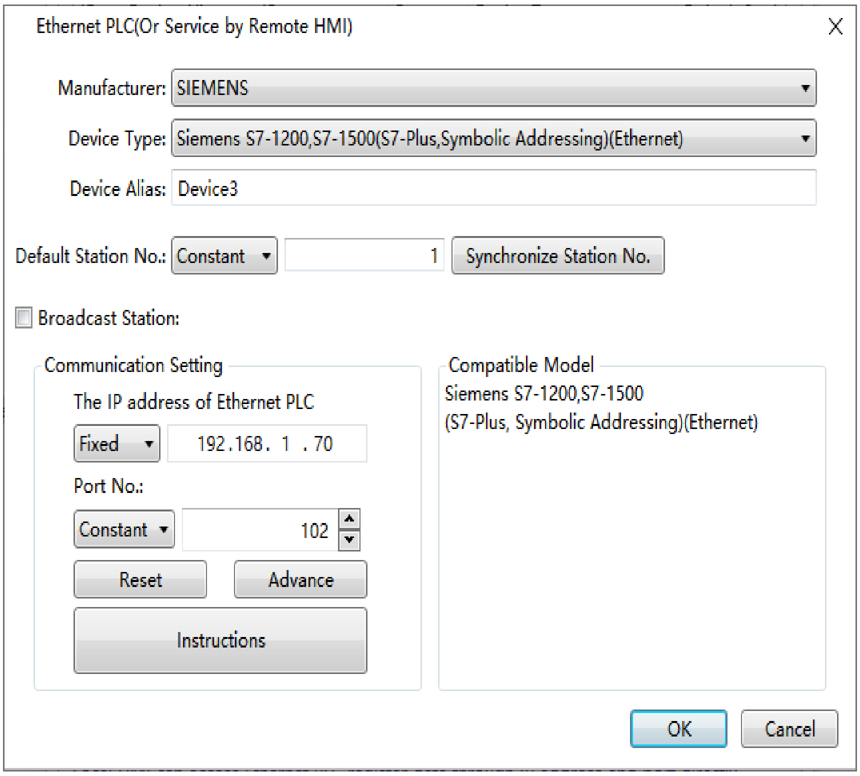
Step 1. Run VI20Studio, select **Setting/HMI Setting** from the menu bar, set the IP address of HMI (to be in the same network segment as the IP address of PLC) in the pop-up dialog, click **OK**.



Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.



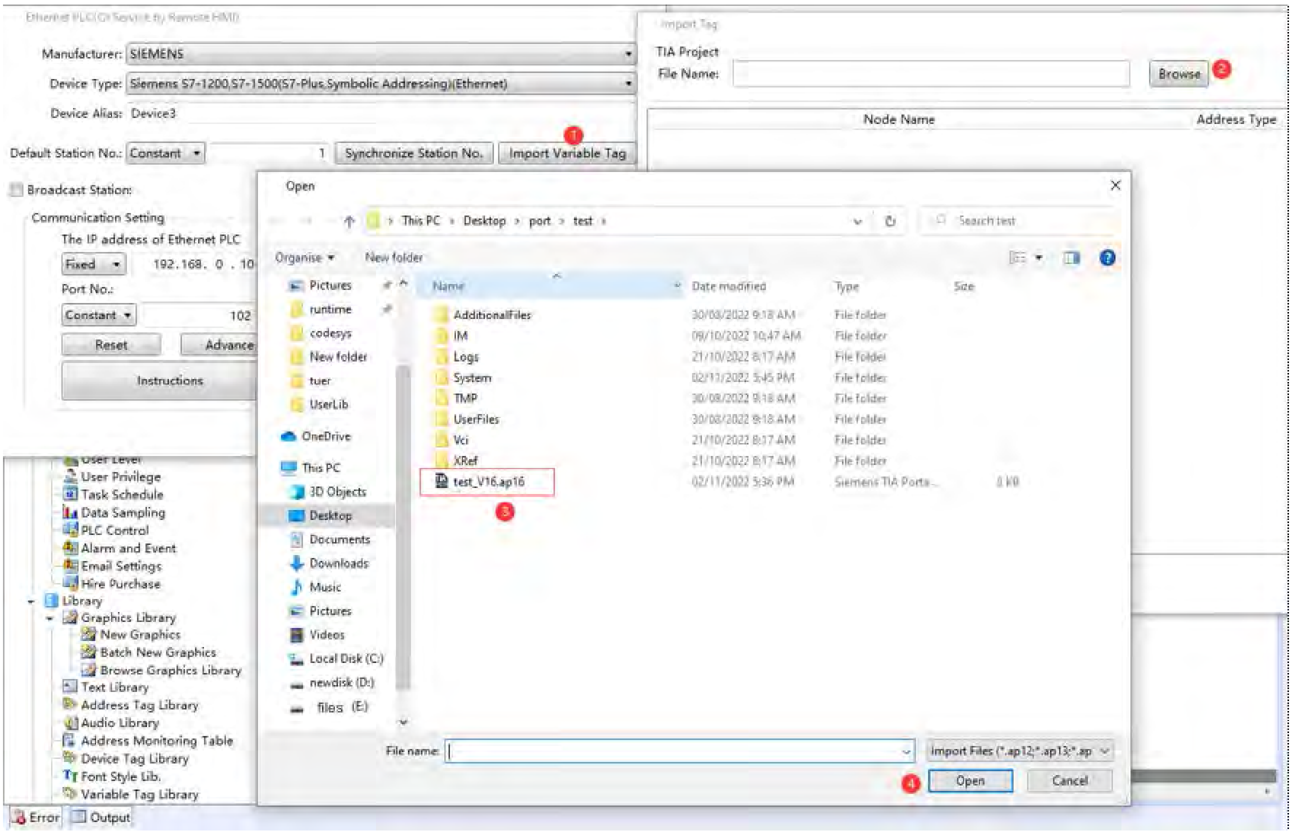
Step 3. Configure relevant parameters in the pop-up dialog box.



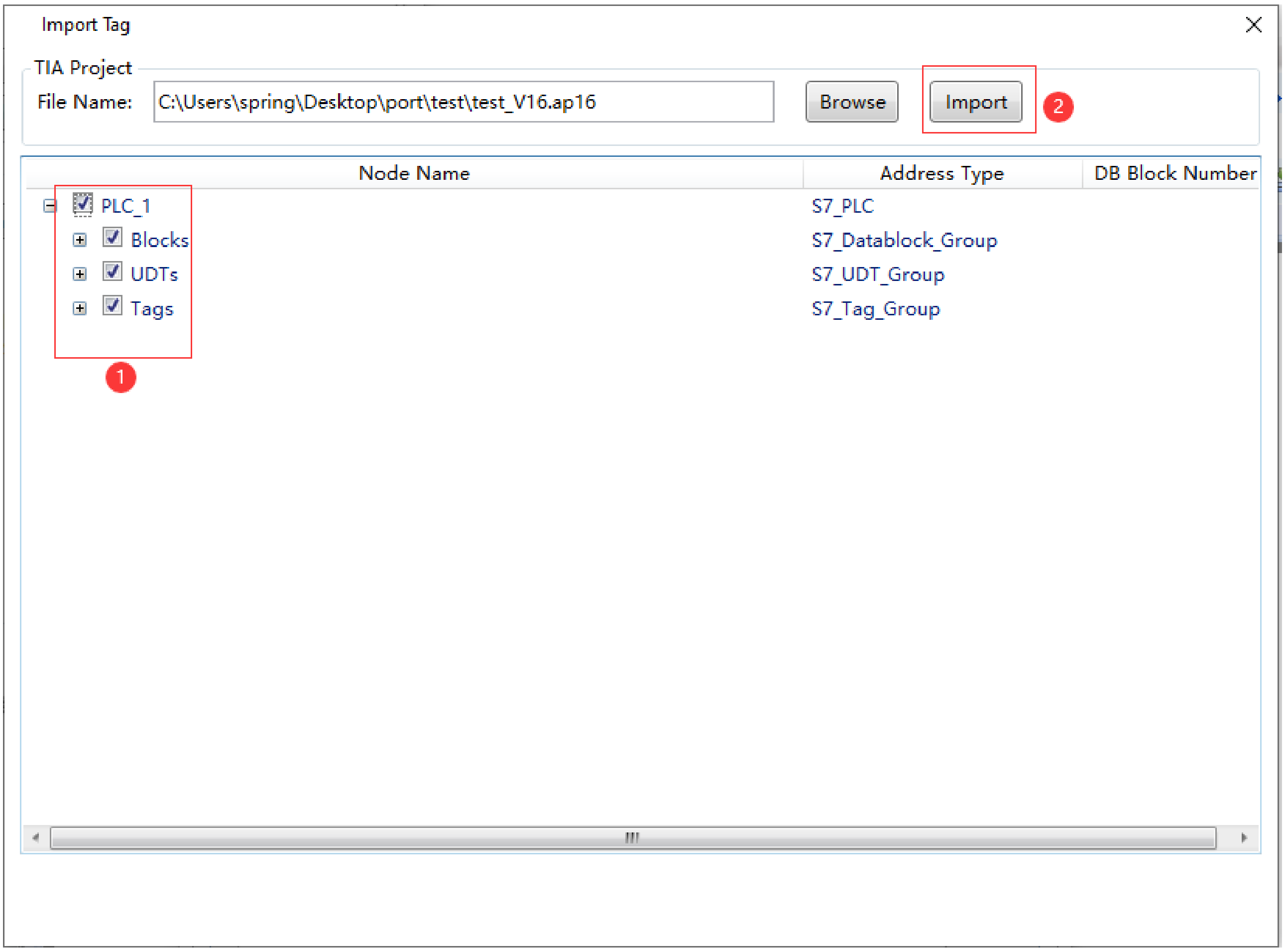
Please refer to the table below for detailed configuration.

Parameter	Description
Manufacturer	Select “Siemens”.
Device Type	Select “Siemens S7-1200,S7-1500(S7-Plus,Symbolic Addressing(Ethernet)”.
IP Address of Network PLC	Please refer to the actual situation.
Port No.	Use default value 102.

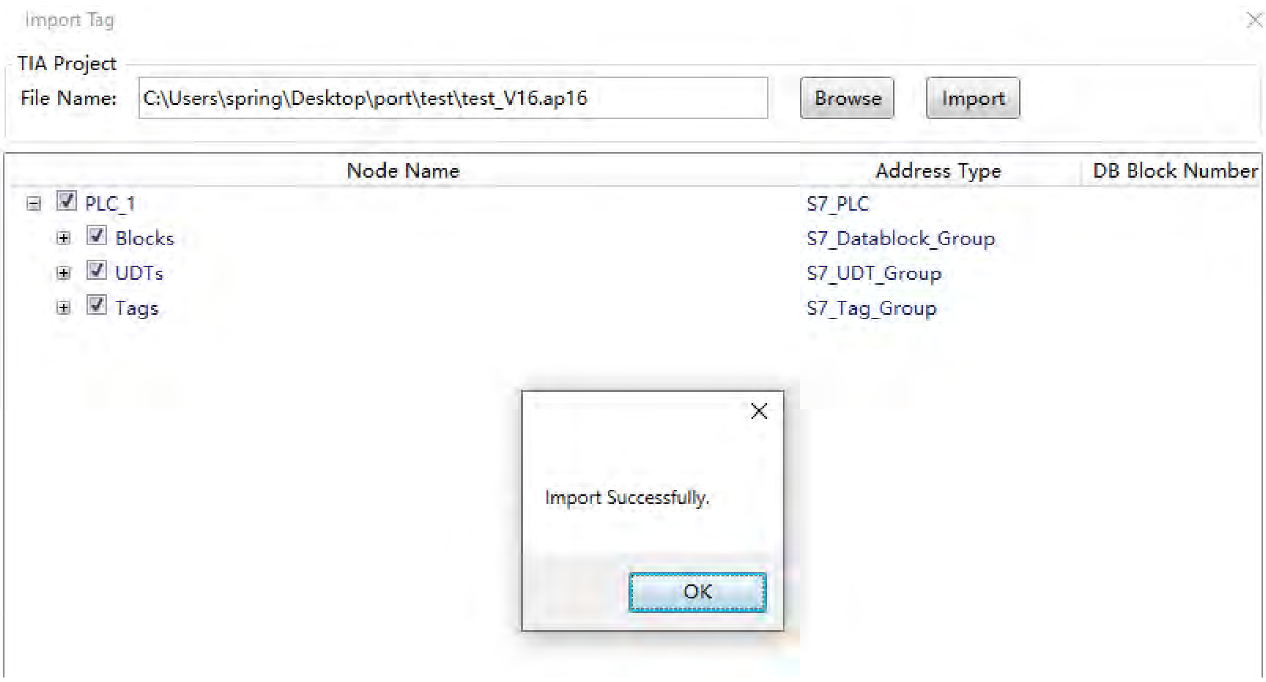
Step 4. Click **Import Variable Tag**, select PLC project file with .ap suffix in the pop-up dialog box, click **Open**.



Step 5. Select the tag to be imported in the pop-up **Import Tag** dialog box, click **Import**.



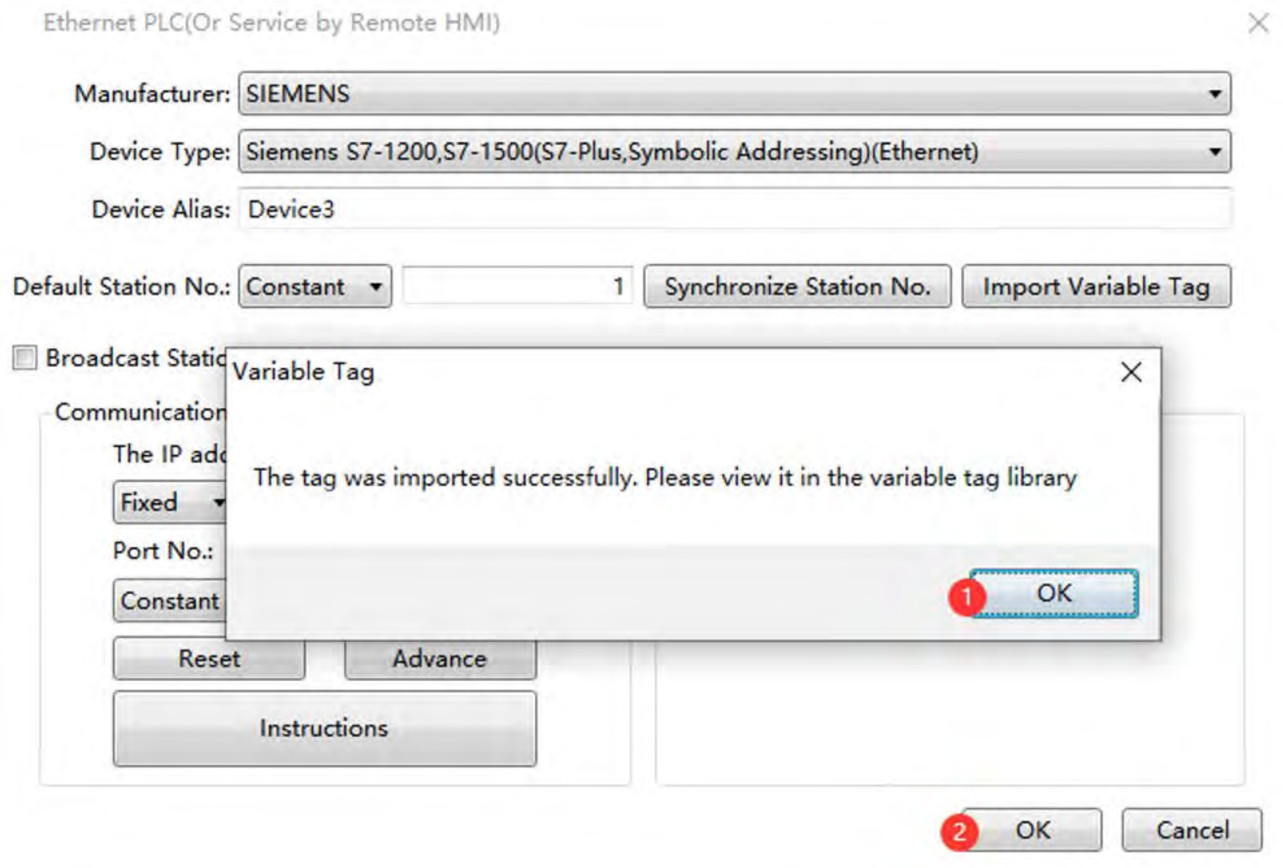
Step 6. System prompts “Import Successfully”, click **OK**.



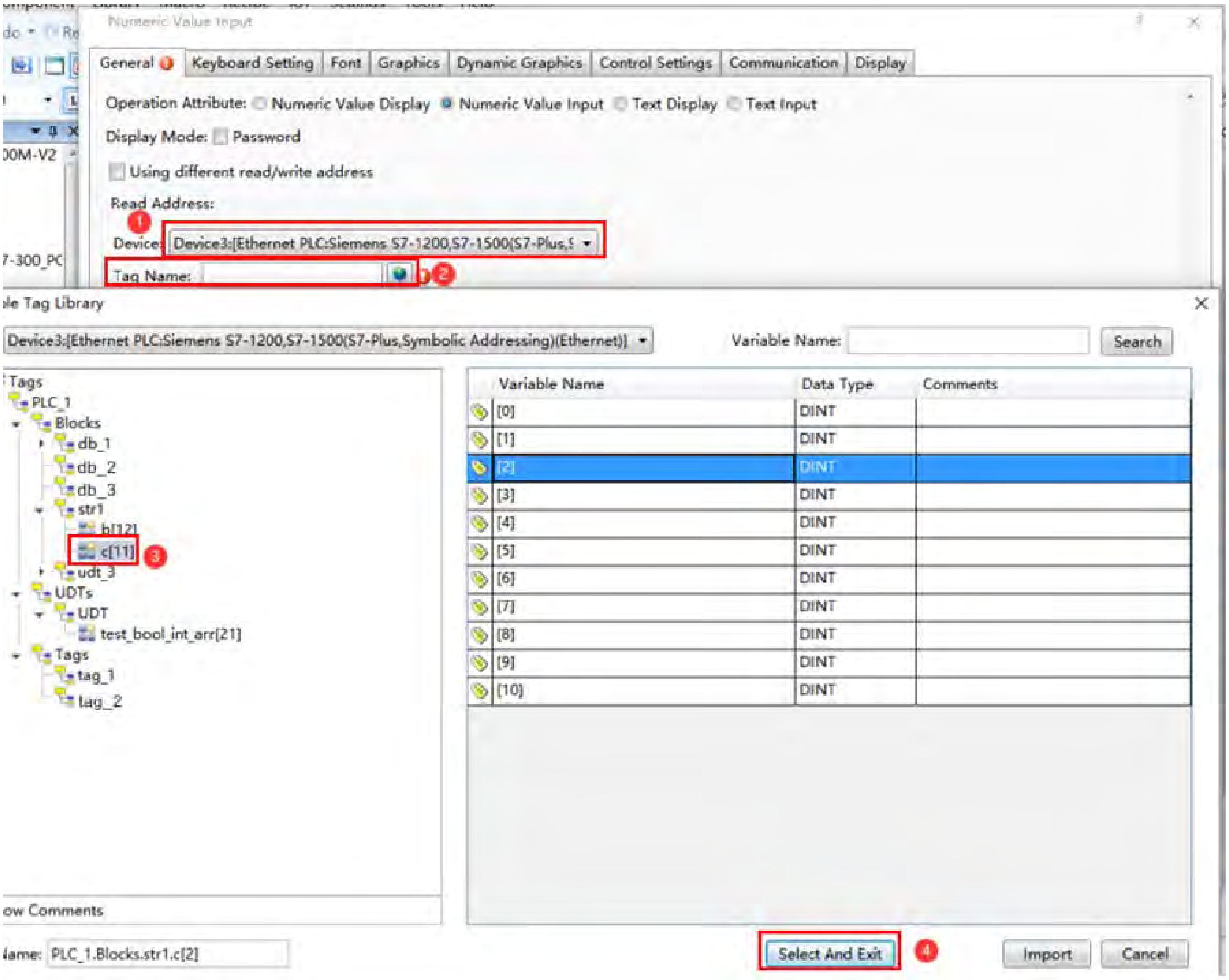
Step 7. Click **OK** in the pop-up **Variable Tag** dialog box.

Step 8. Click **OK** in the **Ethernet PLC (or service provided by remote HMI)** dialog box.

Step 9. Click **OK** in the **Communication Connection** dialog box.



Step 10. Select **Component/Numeric Value and Text Display/Numeric Value Input** from the menu bar, set the read address in the pop-up **Numeric Value Input** dialog box (select Siemens S7-1200PLC for **Device**), lick the  icon, select tag in the pop-up **Variable Tag Library** dialog box, click **Select and Exit**.



Step 11. After adding the numeric value input component, download project to the HMI, if the value of tag can be read and written, it means that the communication is working.

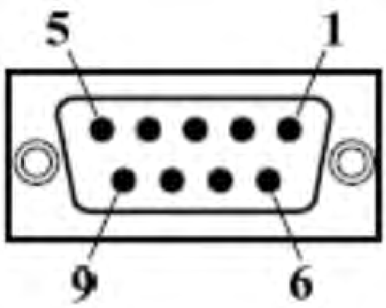
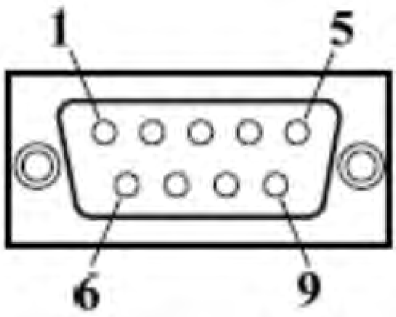
17.11 AB PLC

17.11.1 Serial Communication(Address Tag) Between HMI and AB Micro 850 PLC

HMI supports RS232 protocol communication with AB Micro 850 PLC. HMI can recognize address tag of AB Micro 850 PLC.

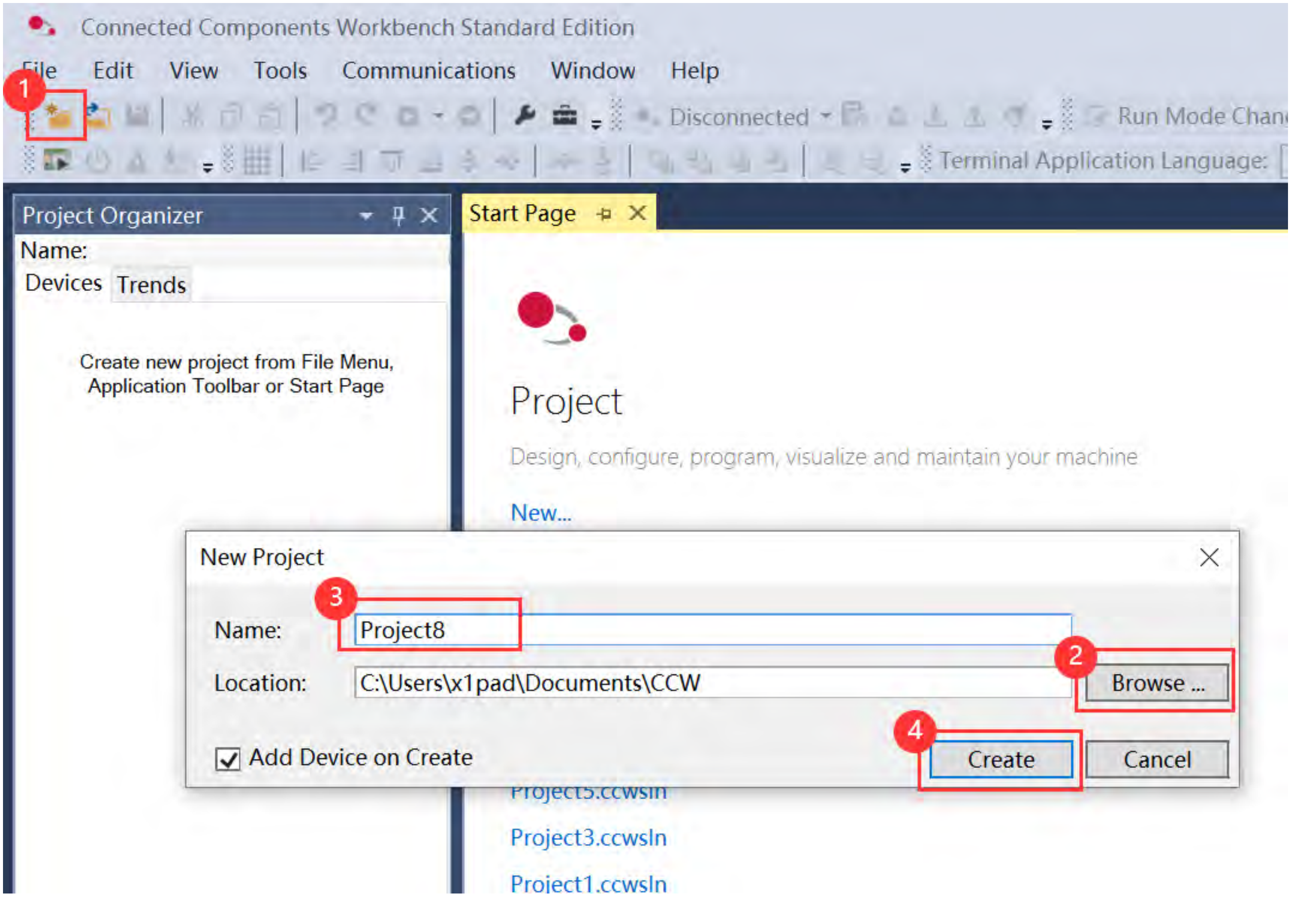
17.11.1.1 Connection Method

◆ Use RS232 cable to connect the COM1/COM2 port of the HMI to the serial port of AB Micro 850 PLC. Please refer to the table below for the connection method.

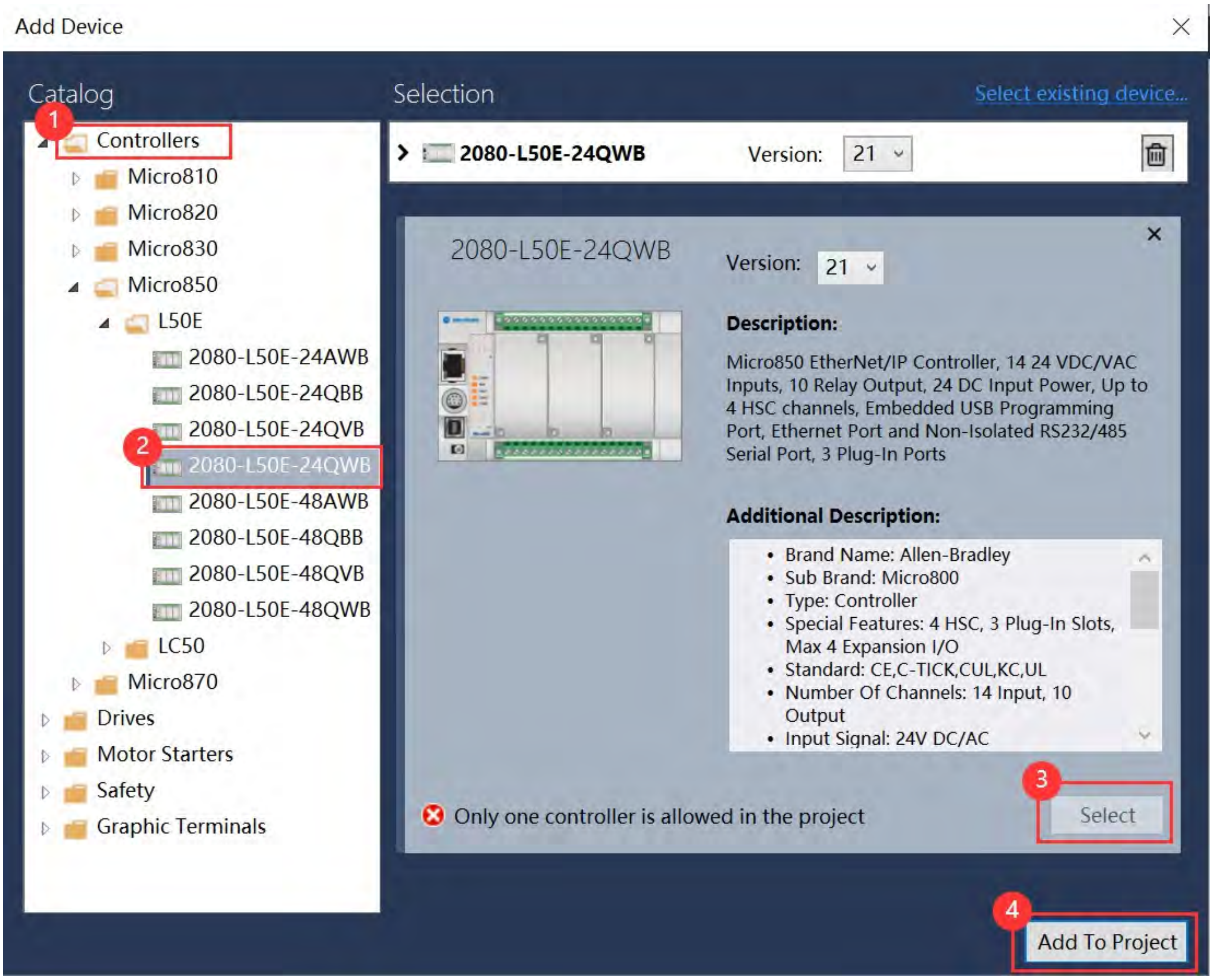
HMI COM1/COM2 Ports	PLC Serial Port
2 RX	3 TXD
3 TX	2 RXD
5 GND	5 GND
	

17.11.1.2 Configure PLC

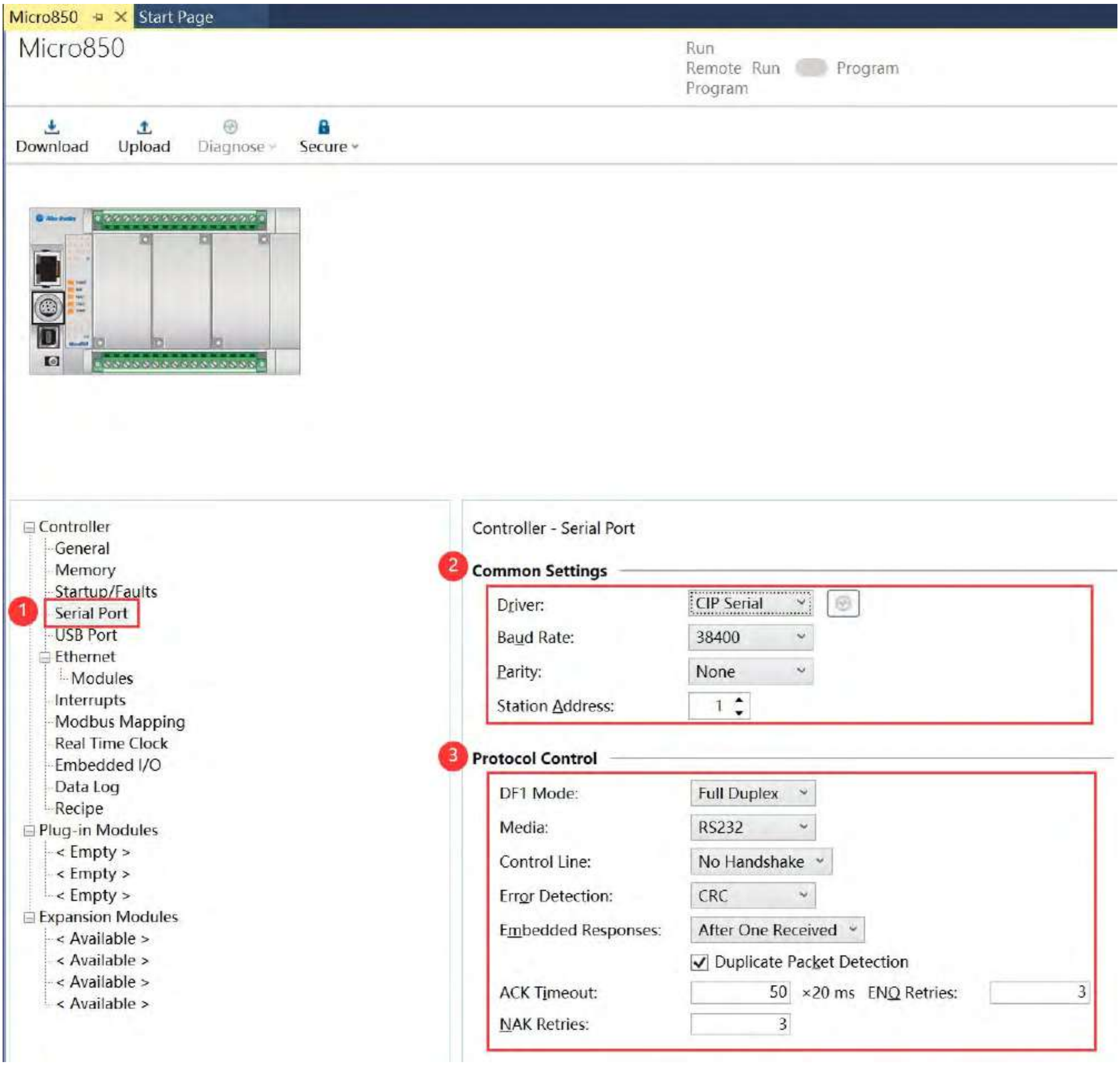
Step 1. Run PLC configuration software, click the icon, set the name and save path of the new project in the pop-up window, click **Create**.



Step 2. Select the controller model (same as actual model), click **Select**, click **Add to Project**.



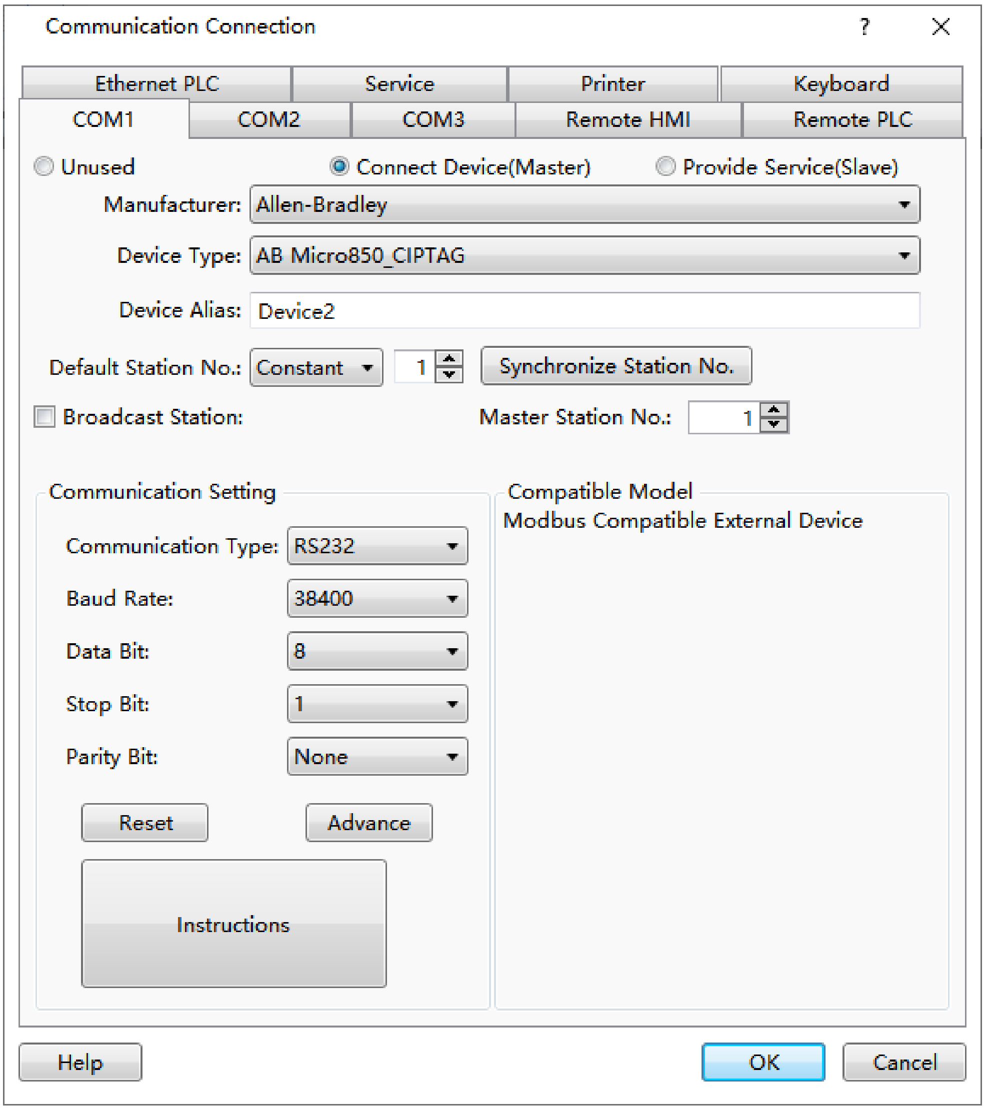
Step 3. Set communication parameters as shown in the figure below.



Step 4. Download project to PLC, wait for the PLC to complete restart.

17.11.1.3 Configure HMI

Step 1. Run VI20Studio, select **Setting/Communication Setting/Local Connection** from the menu bar, select COM port, configure relevant parameters, click **OK**.



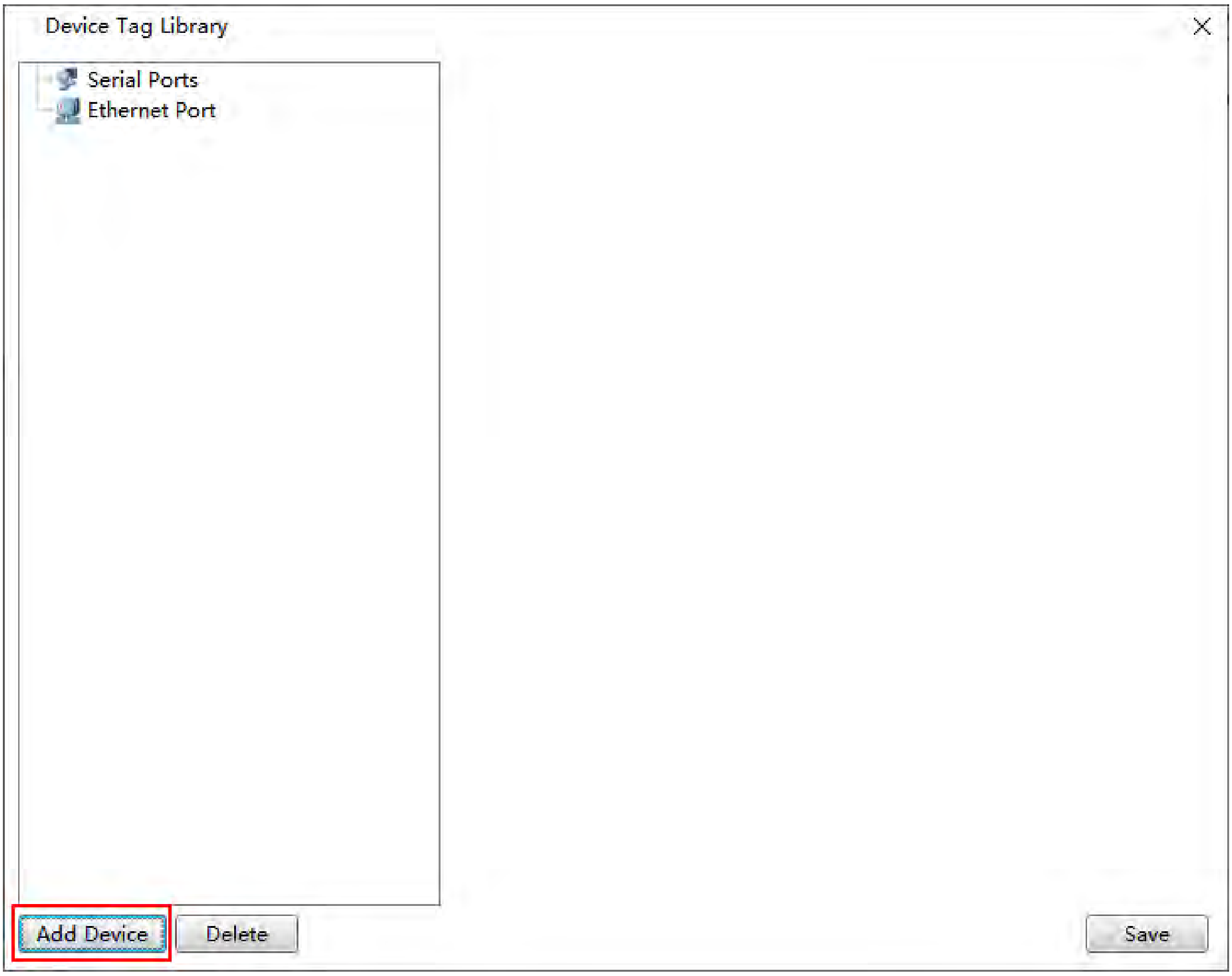
Please refer to the table below for detailed configuration.

Parameter	**Description**
Connection Device (HMI as Master)	As a control center, HMI analyzes the data collected from the device and issued the task to slave device.
Manufacturer	Select “Allen-Bradly”.
Device Type	Select “AB Micro850_CIPTAG”.
Pre-set Station No.	Keep consistent with the actual PLC setting.
Communication Type	Keep consistent with the actual PLC setting.
Baud Rate	Keep consistent with the actual PLC setting.
Data Bit	Keep consistent with the actual PLC setting.

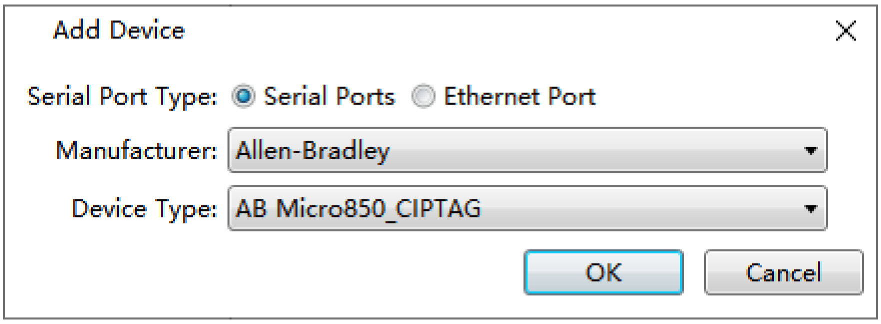
Parameter	Description
Stop Bit	Keep consistent with the actual PLC setting.
Parity Bit	Keep consistent with the actual PLC setting.

Step 2. Add device tag.

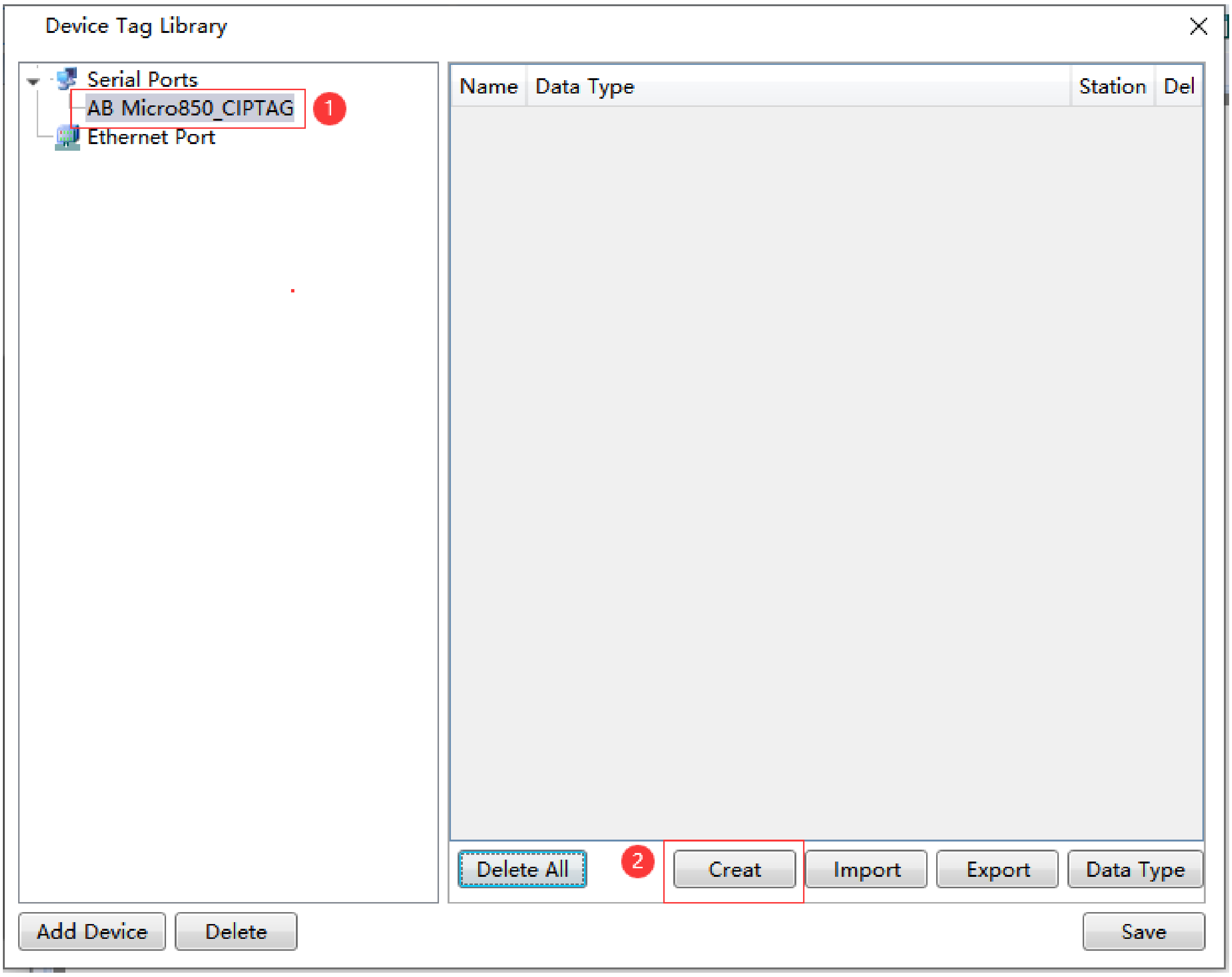
1) Select **Library/Device Tag Library** from the menu bar, click **Add Device** in the pop-up dialog box.



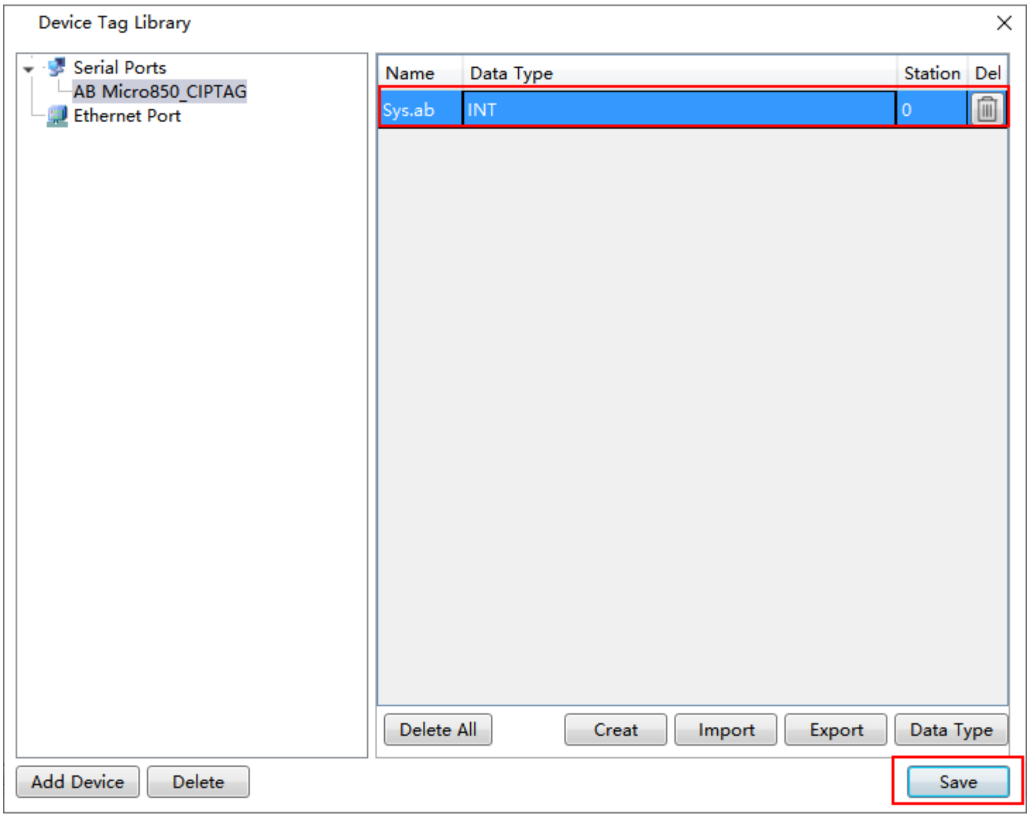
2) Configure in the pop-up dialog box as shown in the figure below, click **OK**.



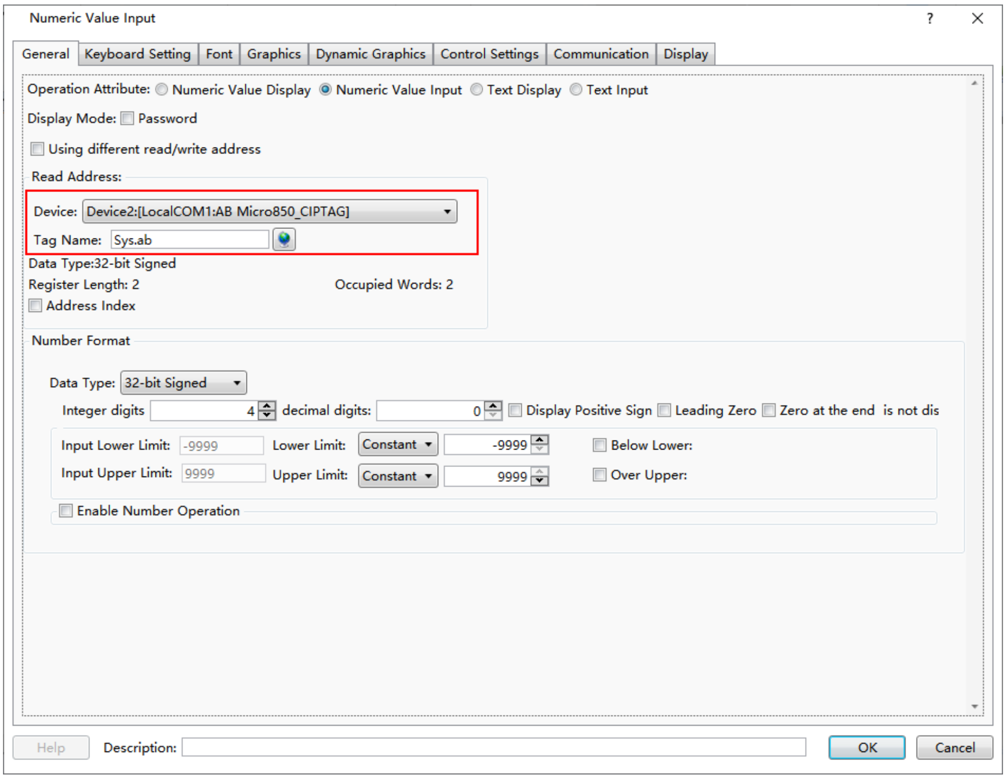
3) Select the device just added, click **Create**.



4) Set variable tag (same name as PLC actual tag), click **Save**.



Step 3. Select **Component/Numeric Value and Text Display/Numeric Value Input** from the menu bar, set **Read Address** to PLC tag in the pop-up dialog box, click **OK**.



Step 4. After adding the numeric input component, download project to HMI. If PLC address data can be read and written, it means the communication is working.

17.11.2 Ethernet Communication(Address Tag) Between HMI and AB Micro 850 PLC

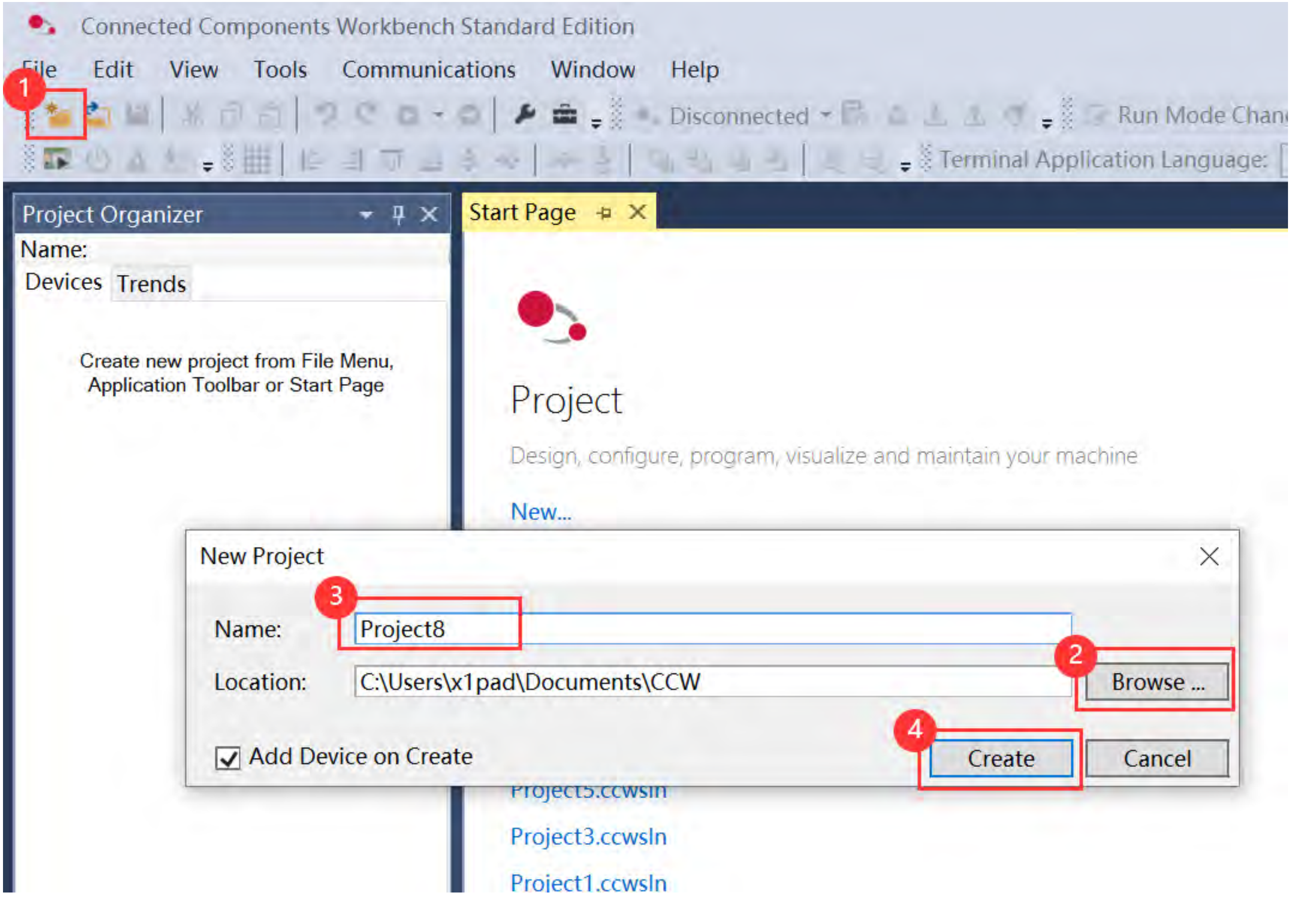
HMI with Ethernet port supports Ethernet communication with AB Micro 850 PLC. You can use Ethernet cable to directly connect HMI Ethernet port and AB Micro 850 PLC Ethernet port, or connect the two via a switch. HMI can recognize AB Micro 850 PLC address tag.

17.11.2.1 Connection Method

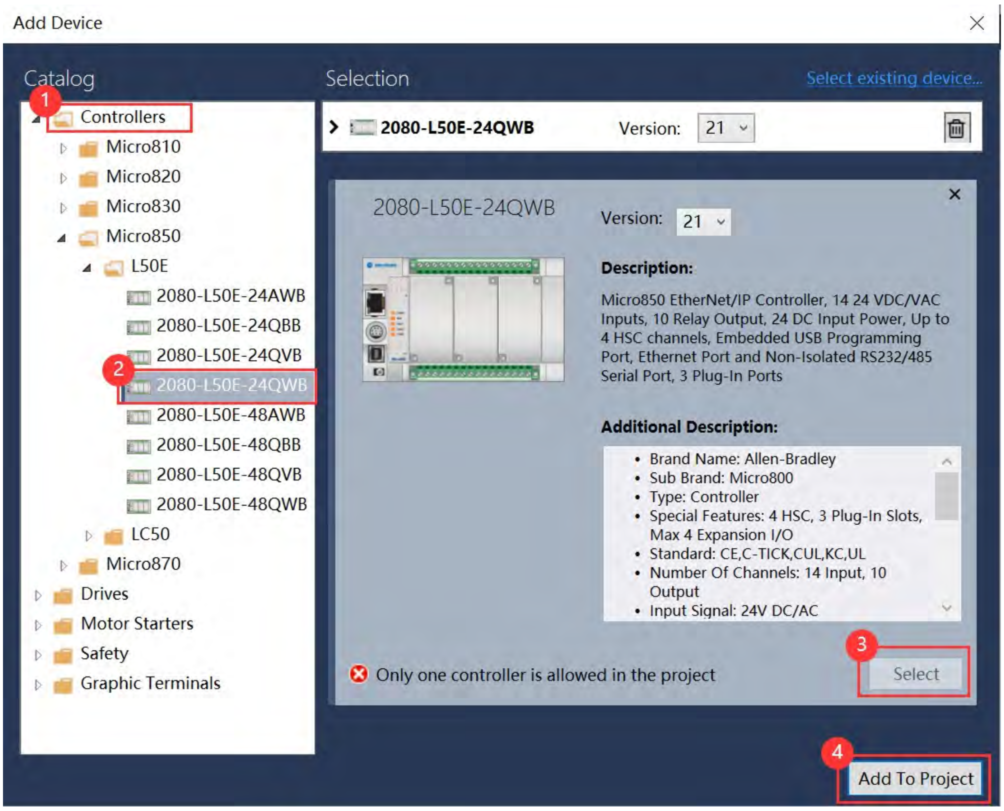
Please refer to Connection Method.

17.11.2.2 Configure PLC

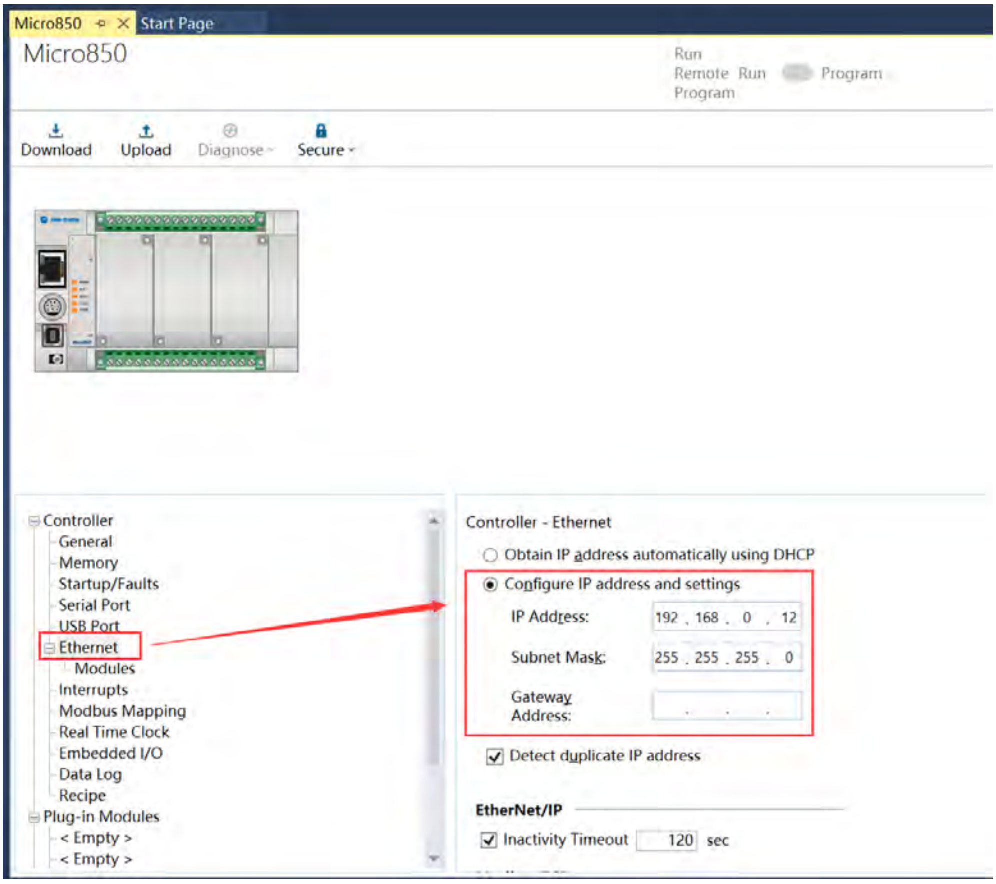
Step 1. Run PLC configuration software, click the icon, set the name and save path of the new project in the pop-up window, click **Create**.



Step 2. Select the controller model (same as actual model), click **Select**, click **Add to Project**.



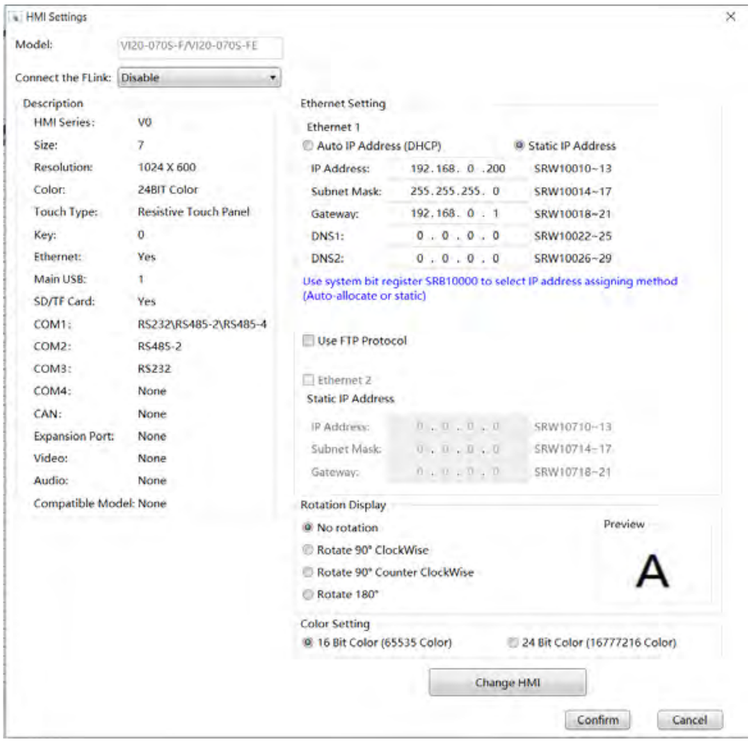
Step 3. Set the IP address of PLC.



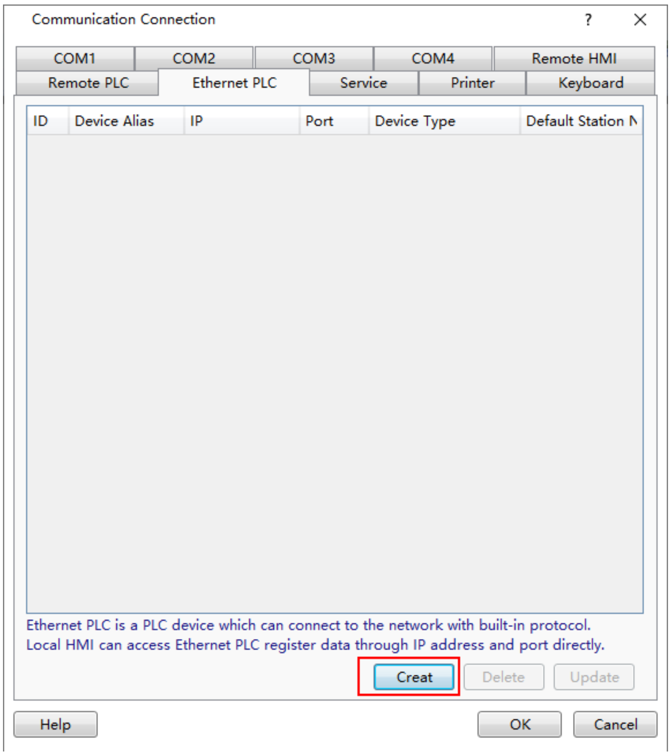
Step 4. Download project to PLC, wait for the PLC to complete restart.

17.11.2.3 Configure HMI

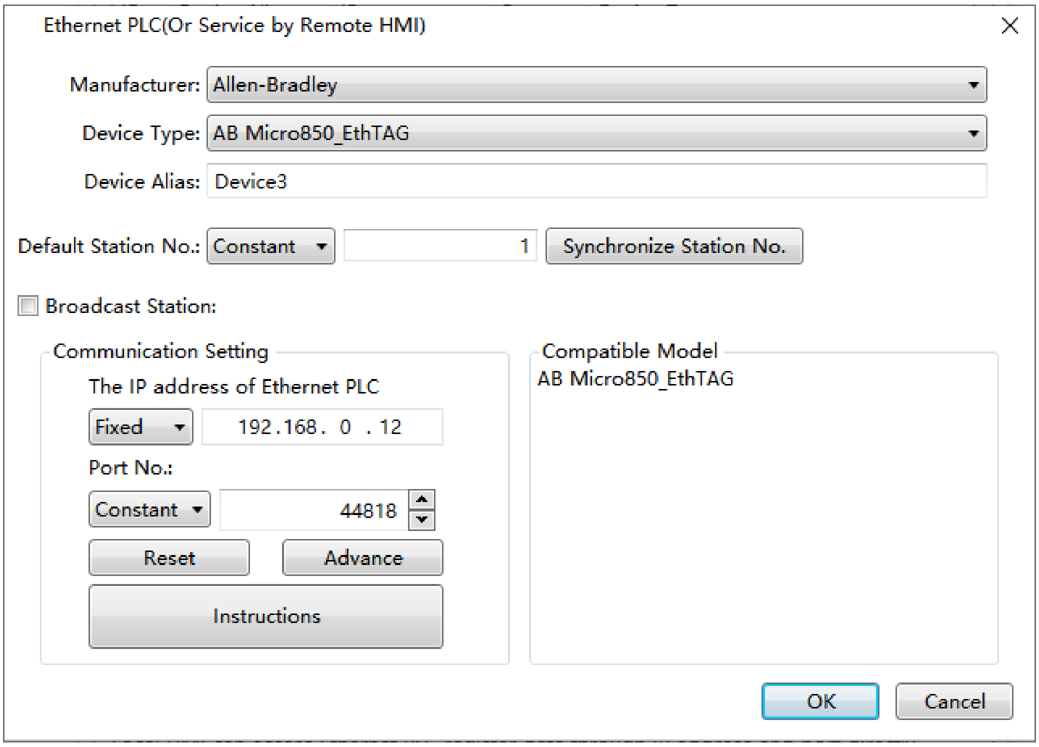
Step 1. Run VI20Studio, select **Setting/HMI Setting** from the menu bar, set the IP address of HMI (to be in the same network segment as the IP address of PLC) in the pop-up dialog, click **OK**.



Step 2. Select **Setting/Communication Setting/Remote Connection** from the menu bar, select **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.



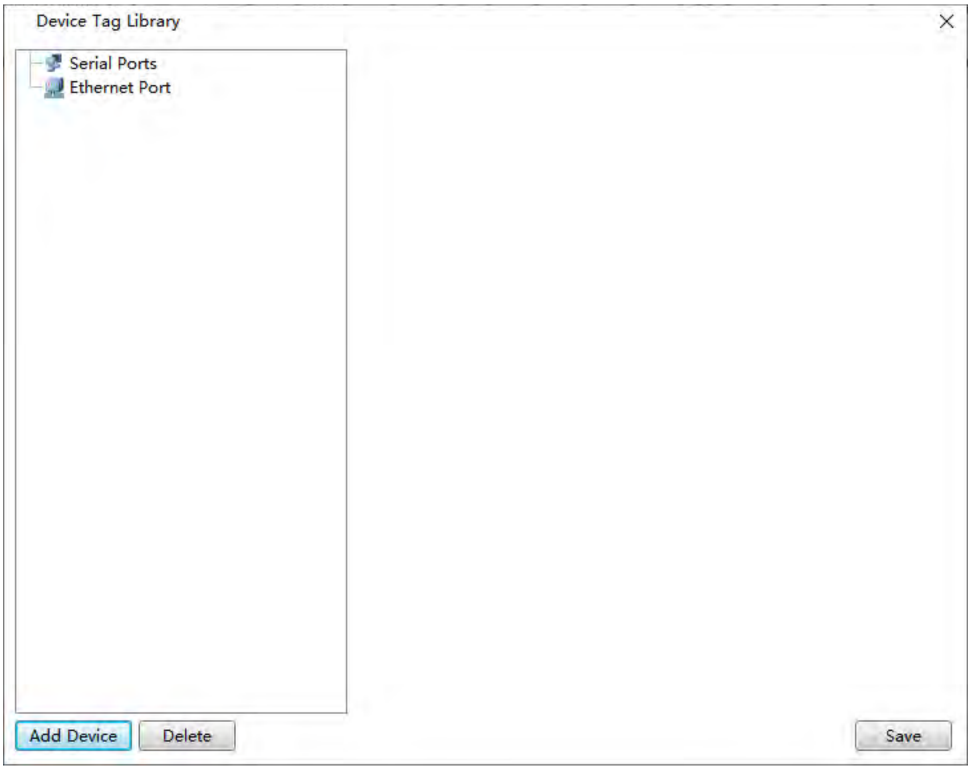
Step 3. Configure relevant parameters in the pop-up dialog box, click **OK**.



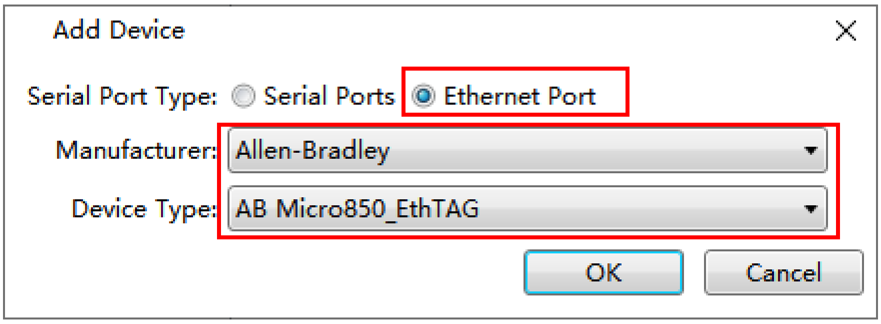
Step 4. Click **OK** in the **Communication Connection** dialog box.

Step 5. Add device tag.

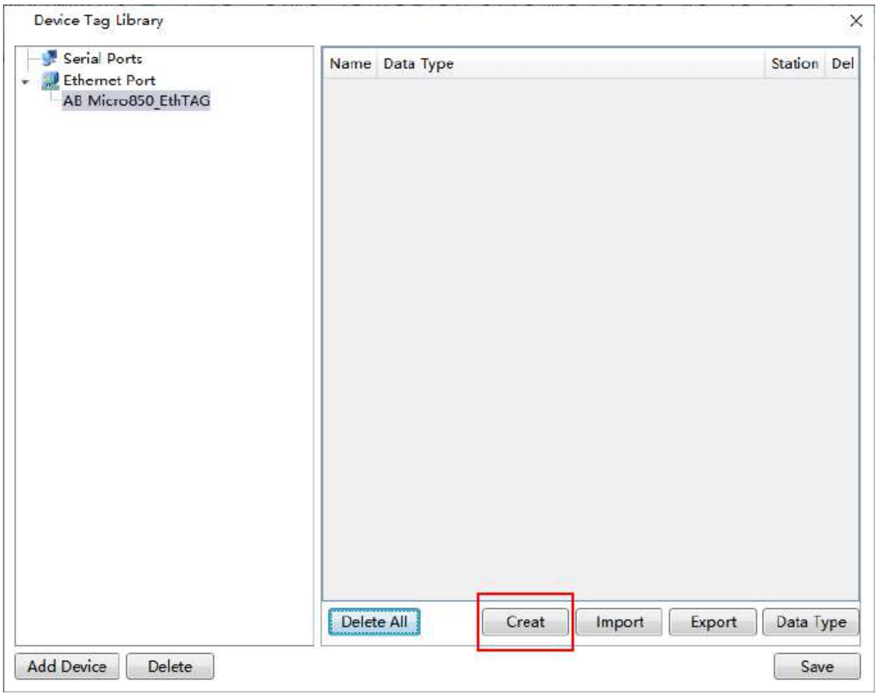
1) Select **Library/Device Tag Library** from the menu bar, click **Add Device** in the pop-up dialog box.



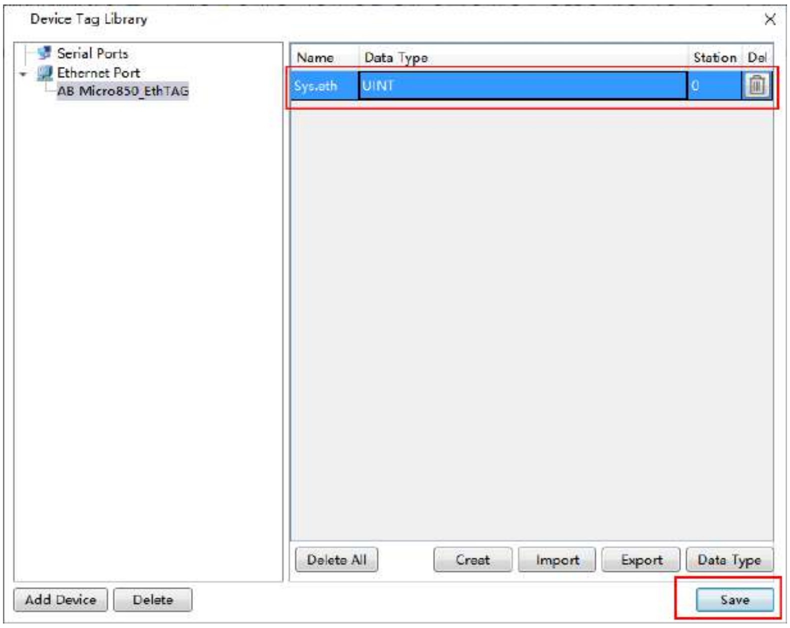
2) Configure in the pop-up dialog box as shown in the figure below, click **OK**.



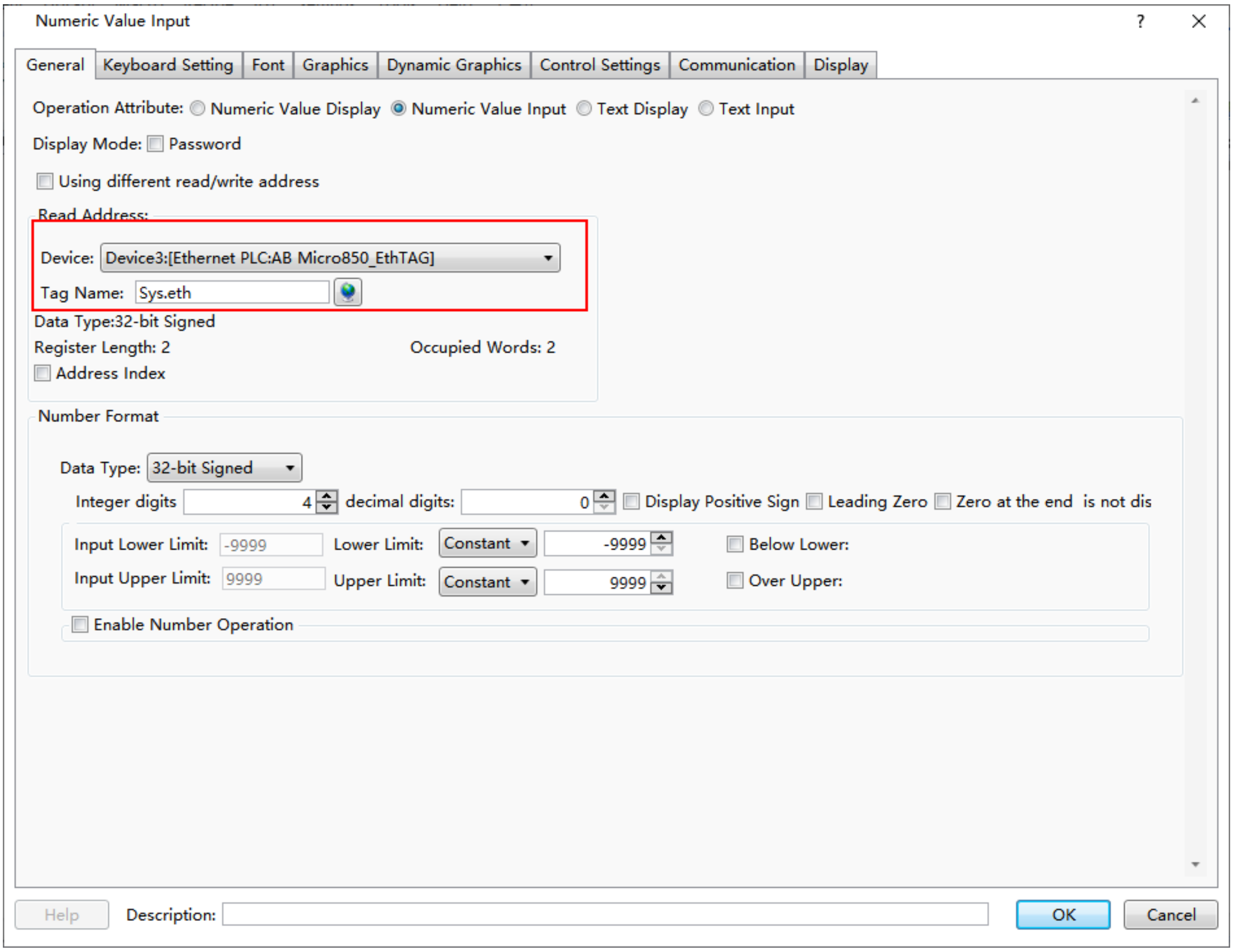
3) Select the device just added, click **Create**.



4) Set variable tag (same name as PLC actual tag), click **Save**.



Step 6. Select C**omponent/Numeric Value and Text Display/Numeric Display** from the menu bar, set Read Address to PLC tag in the pop-up dialog box, click **OK**.



Step 7. After adding the numeric value input component, download project to HMI. If PLC address data can be read and written, it means the communication is working.

17.11.3 Ethernet Communication Between HMI and AB ControlLogix PLC

HMI with Ethernet port supports Ethernet communication with AB ControlLogix PLC. You can use Ethernet cable to directly connect HMI Ethernet port and AB ControlLogix PLC, or connect the two via a switch.

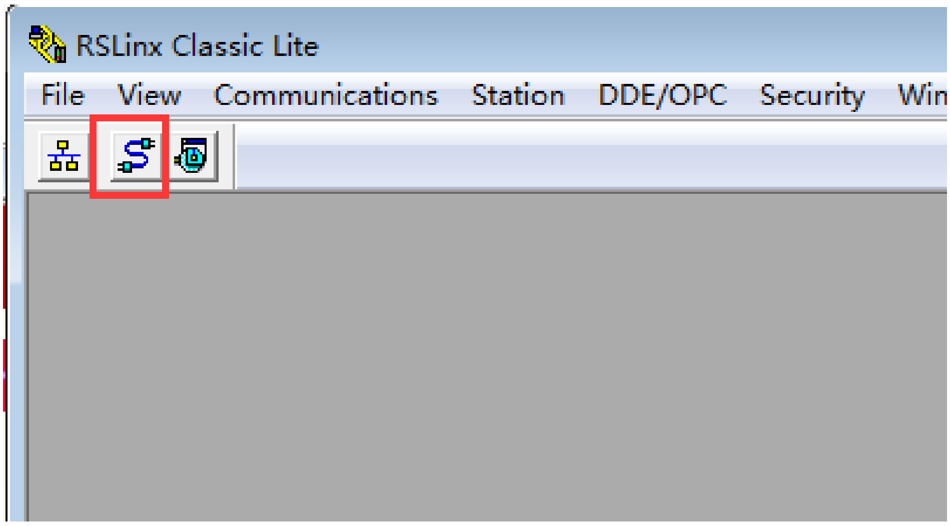
17.11.3.1 Connection Method

Please refer to Connection Method.

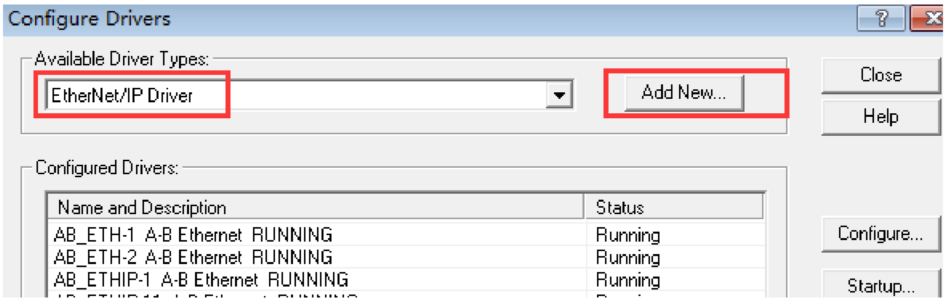
17.11.3.2 Configure PLC

17.11.3.2.1 Search for Connectable PLC

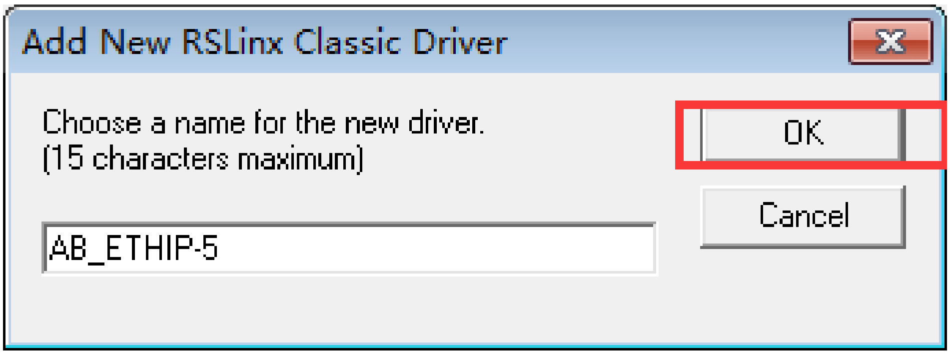
Step 1. Run RSLinx Classi, the PLC configuration software, click the icon.



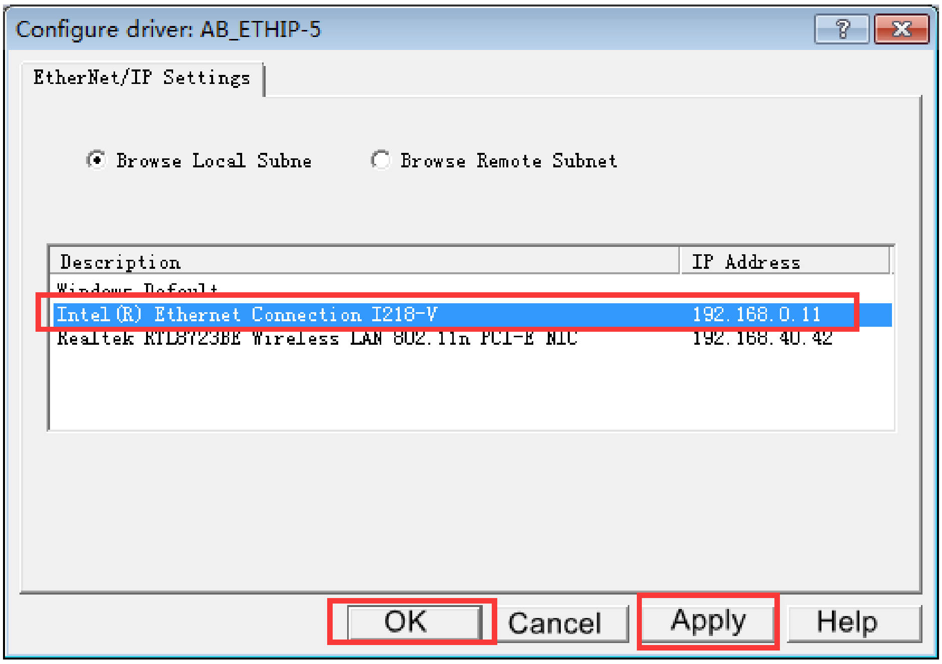
Step 2. Select Available Drive Type as “Ethernet/IP Driver” in the pop-up dialog box, click **Add New**.



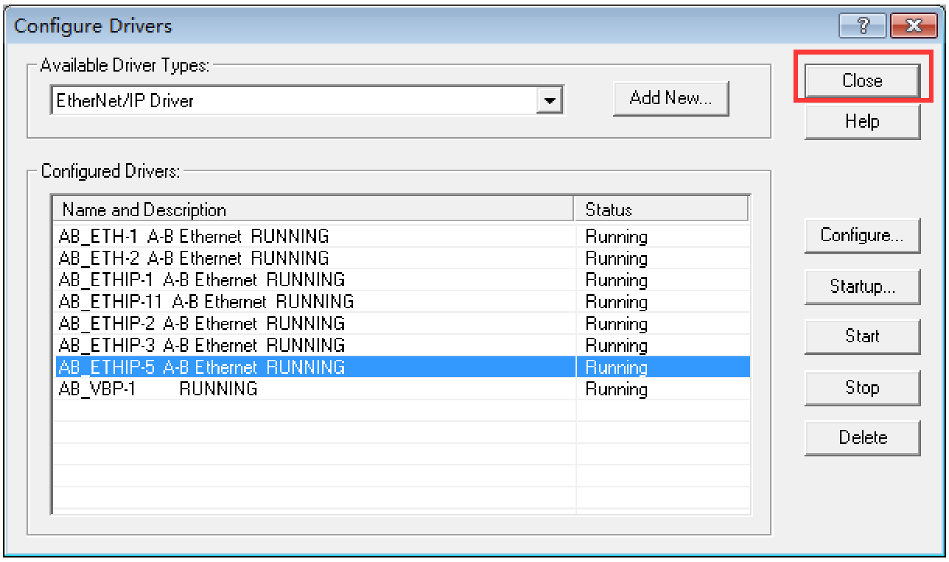
Step 3. Edit drive name in the pop-up dialog box, click **OK**.



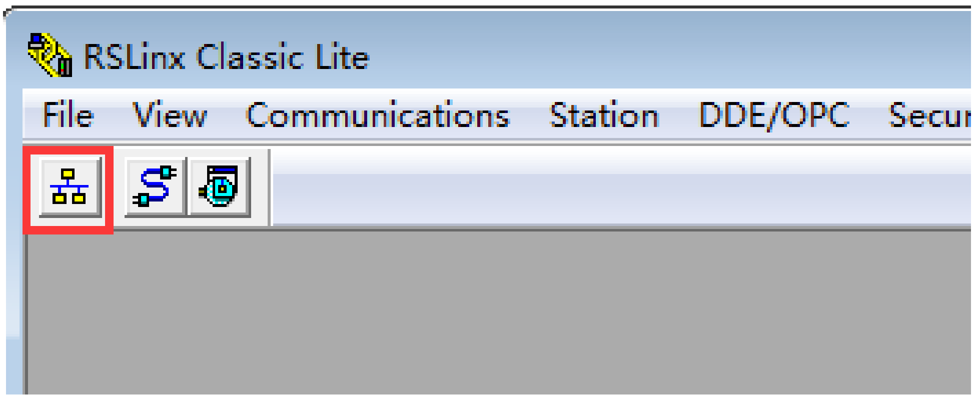
Step 4. Select the adapter (the IP address should be in the same network segment as the IP address of PLC) used to connect PLC in the pop-up dialog box, click **Apply**, click **OK**.



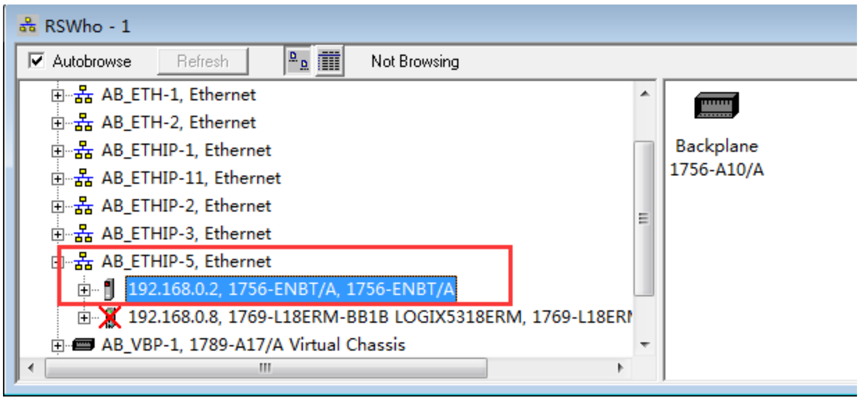
Step 5. Find the available PLC, click **Close**.



Step 6. Click the icon, open connection view, you can view the just added connection, check if the PLC can be scanned.

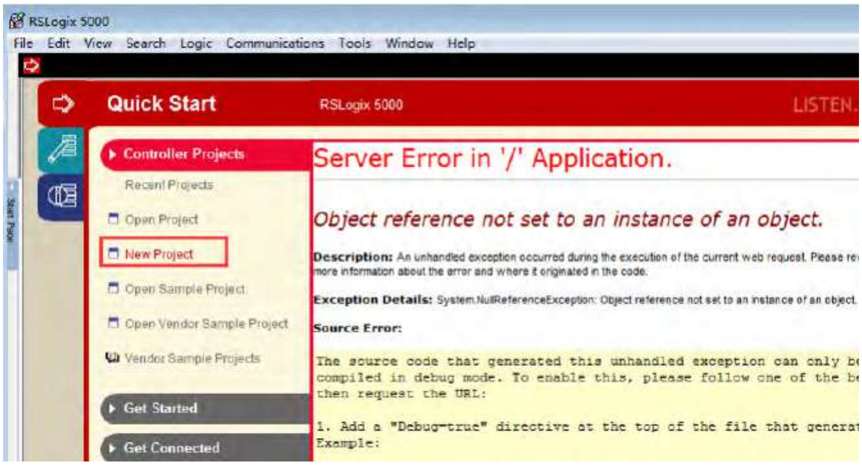


Step 7. If PLC connected to port can be found, it means the communication is working.

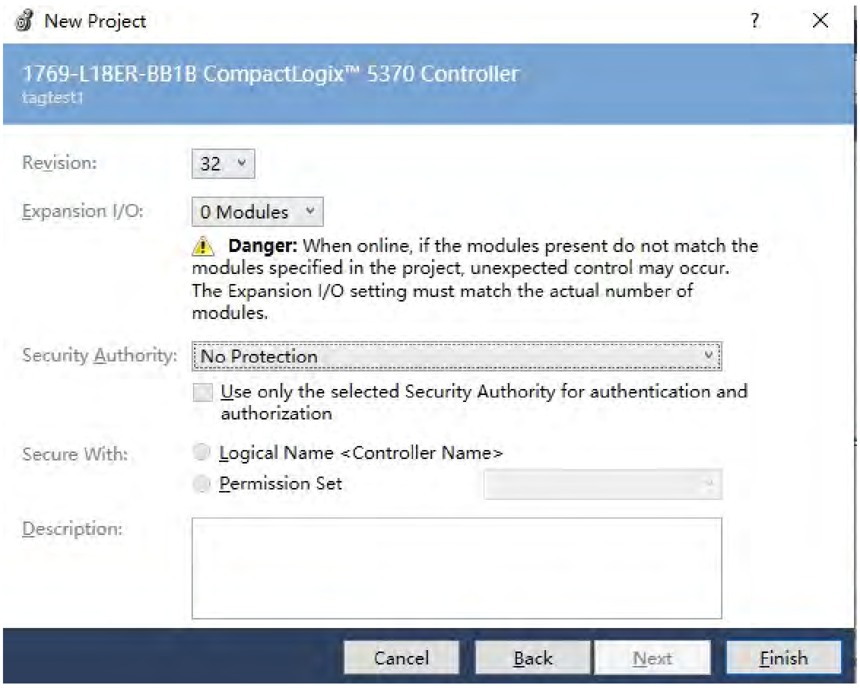


17.11.3.2.2 New Project

Step 1. Click **New Project**.

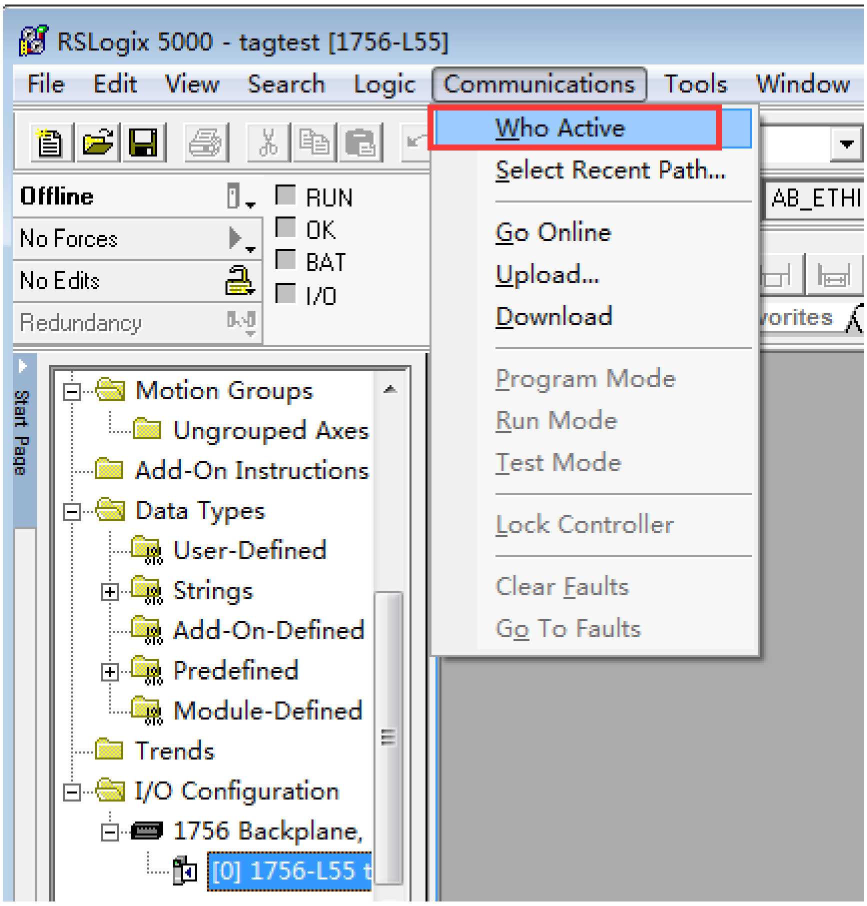


Step 2. Configure relevant parameters in the pop-up dialog box, click **OK**.

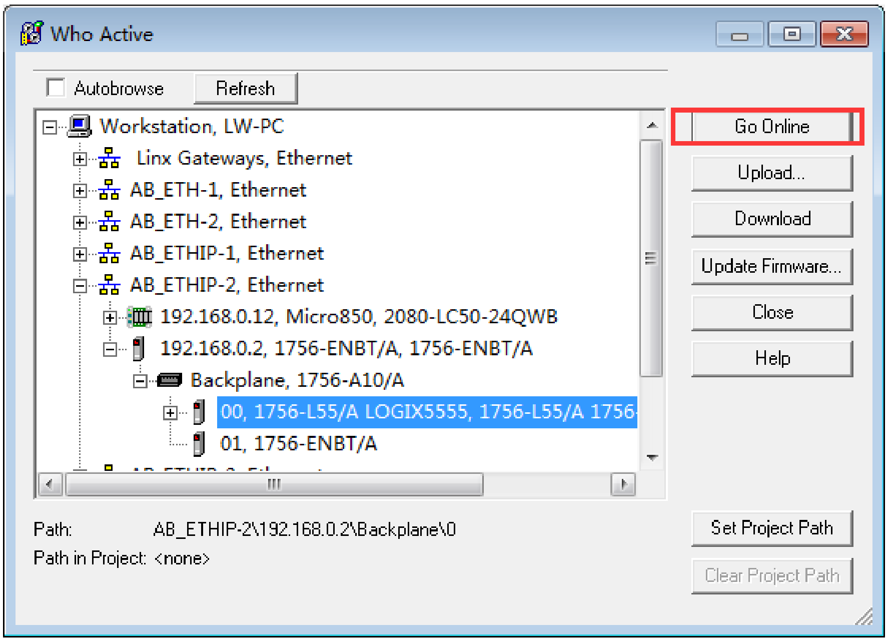


17.11.3.2.3 Search for PLC

Step 1. Select **Communications/Who Active** from the menu bar.

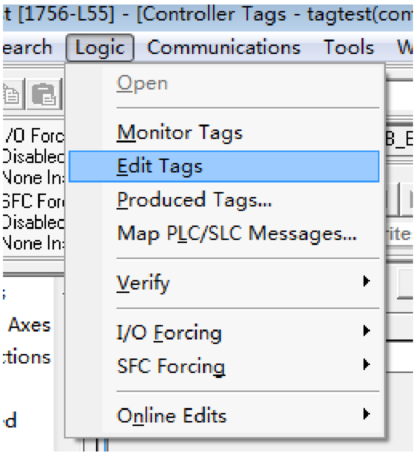


Step 2. Select PLC, click **Go Online**.

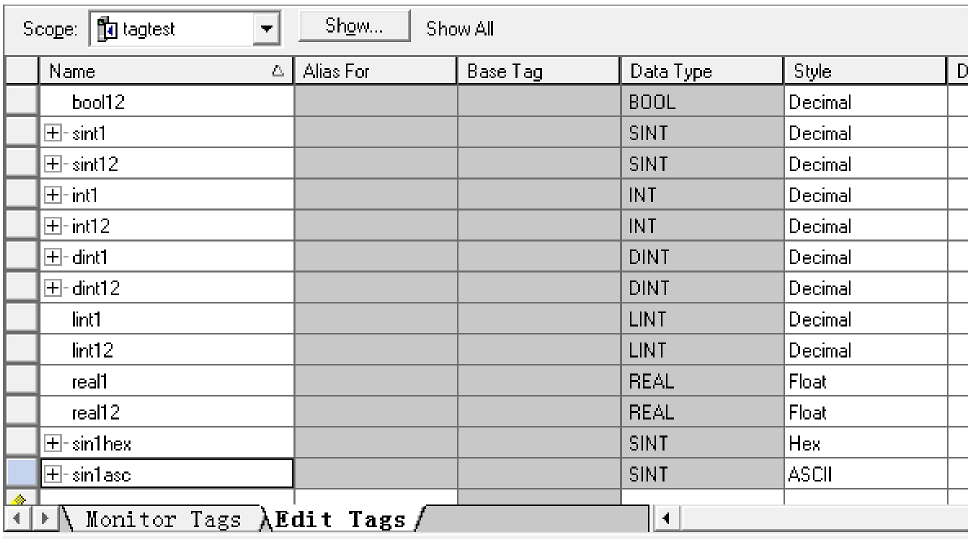


17.11.3.2.4 New Tag

Step 1. Select **Logic/Edit Tags** from the menu bar.

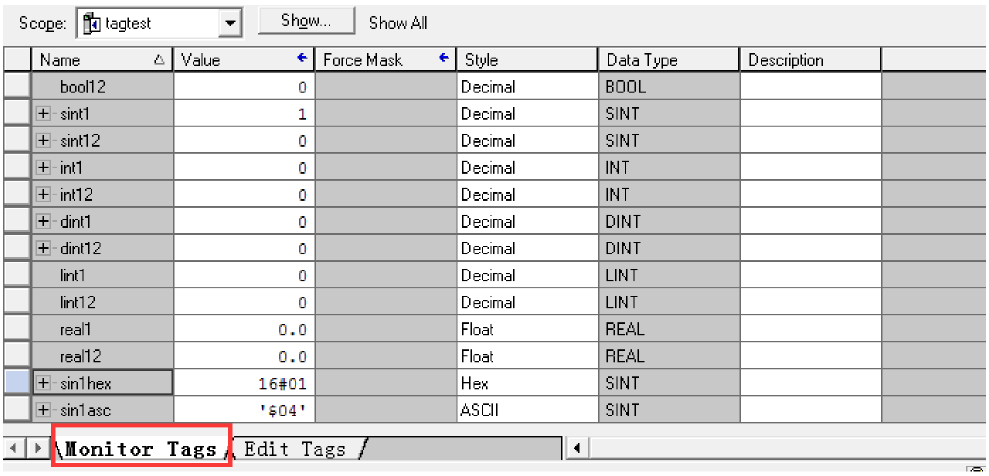


Step 2. Add tag in the pop-up dialog box.



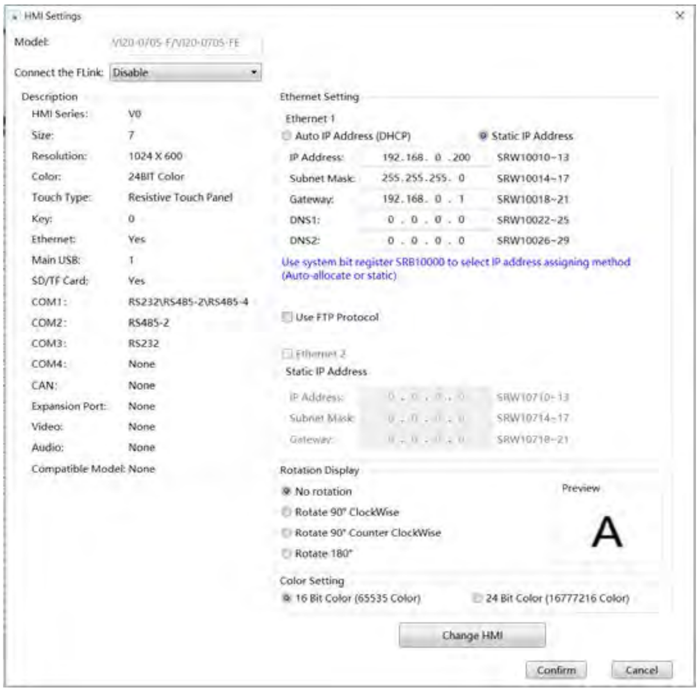
17.11.3.2.5 Monitor Tag Data

When PLC is in Online state, data of tags can be monitored.

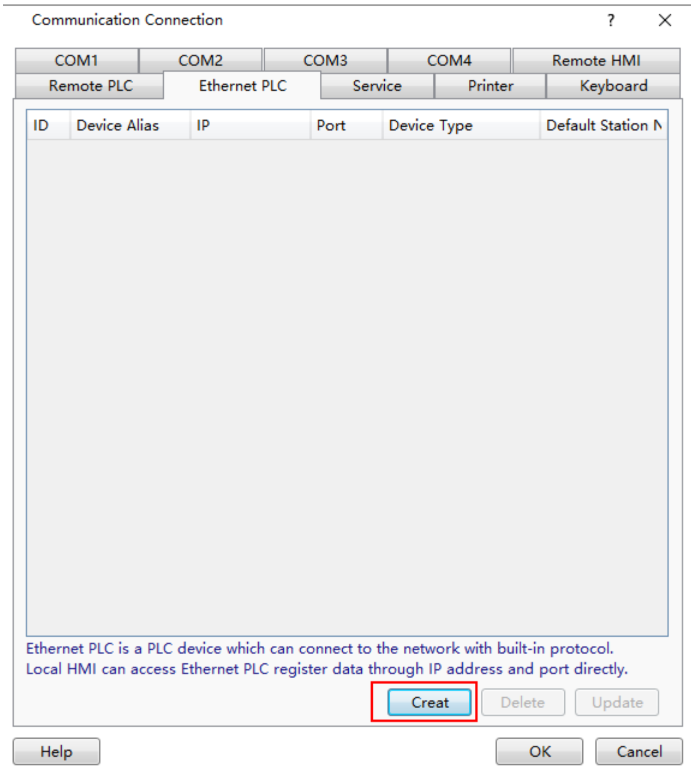


17.11.3.3 Configure HMI

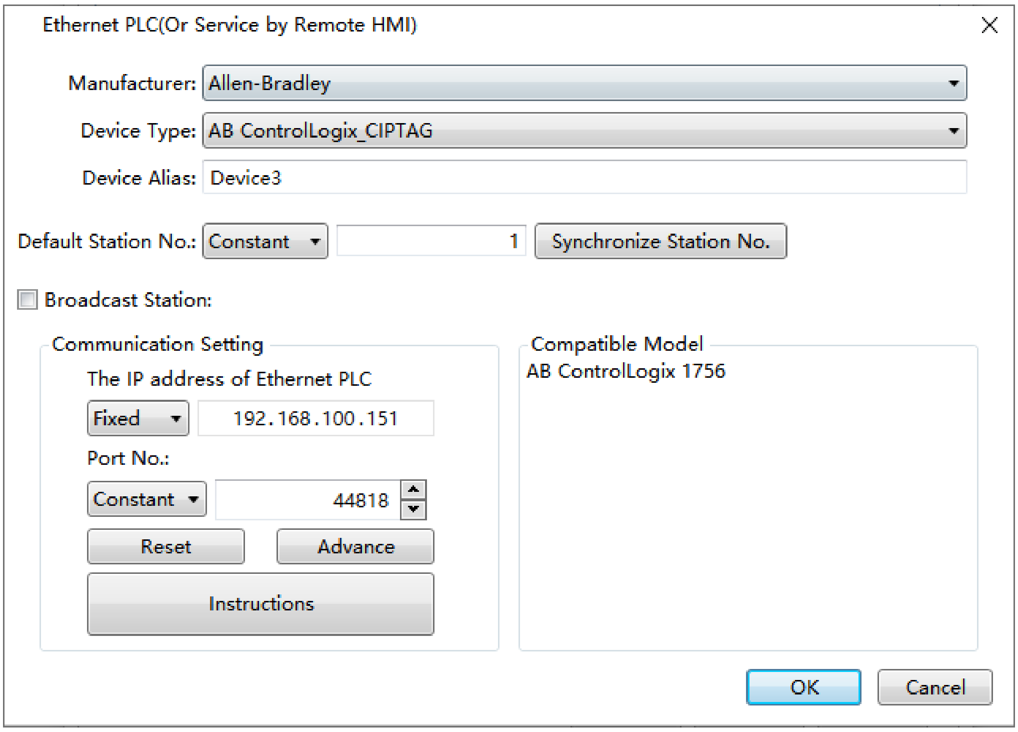
Step 1. Run VI20Studio, select **Setting/HMI Setting** from the menu bar, set the IP address of HMI (to be in the same network segment as IP address of PLC) in the pop-up dialog box, click **OK**.



Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.



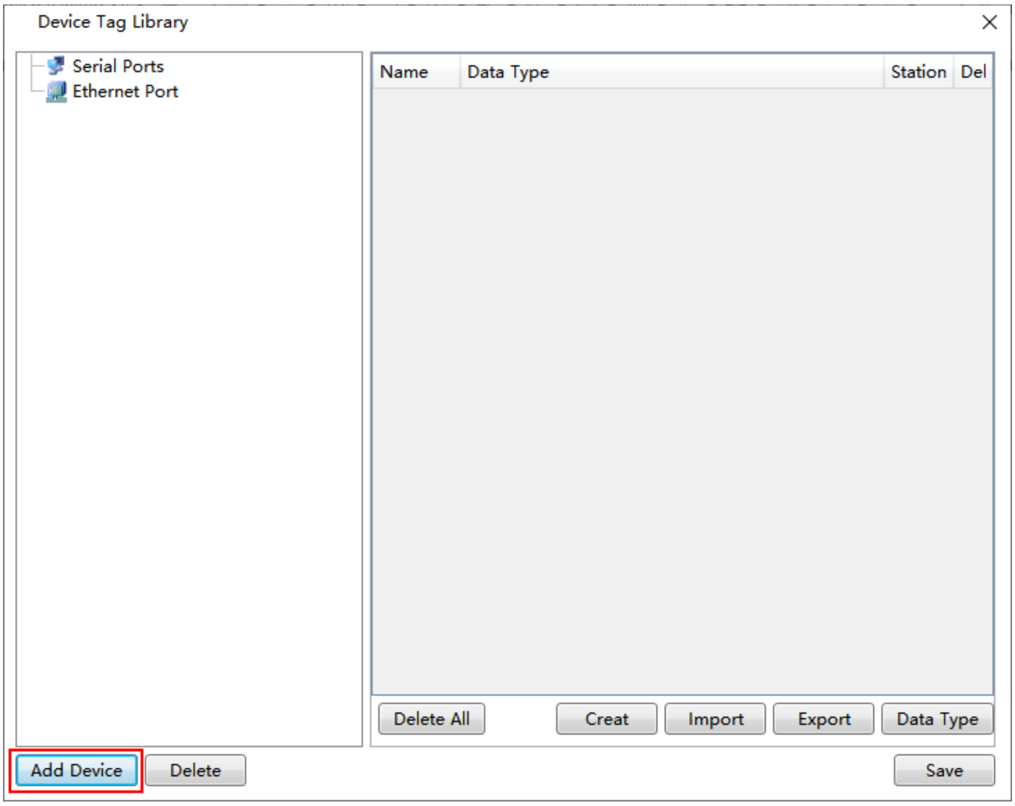
Step 3. Configure relevant parameters in the pop-up dialog box, click **OK**.



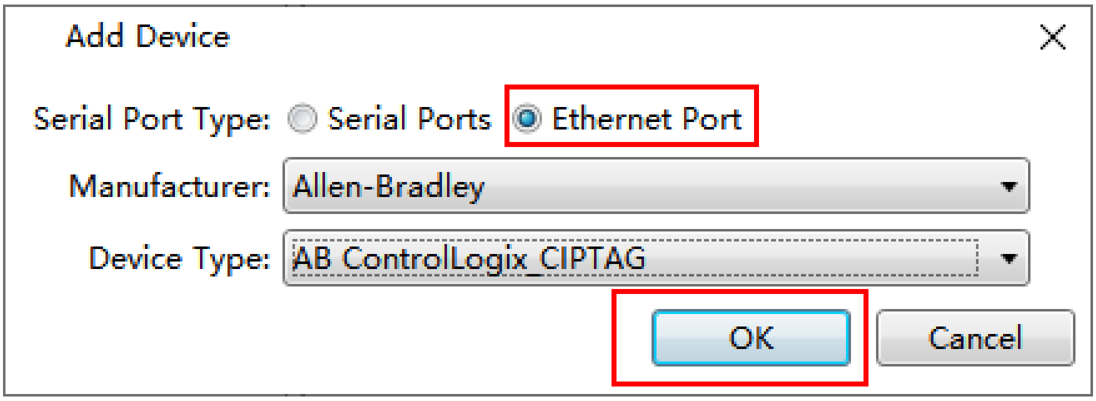
Step 4. Click **OK** in the **Communication Connection** dialog box.

Step 5. Add device tag.

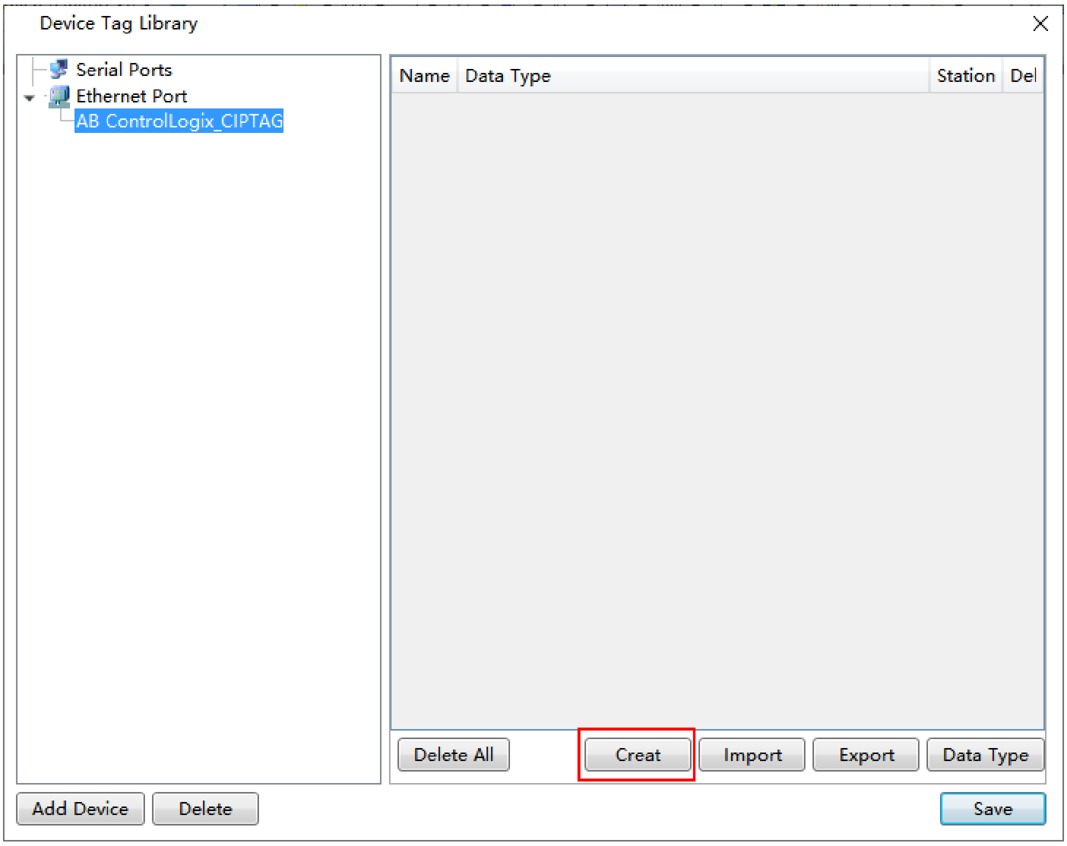
1) Select **Library/Device Tag Library** from the menu bar, click **Add Device** in the pop-up dialog box.



2) Configure relevant parameters in the pop-up dialog box, click **OK**.

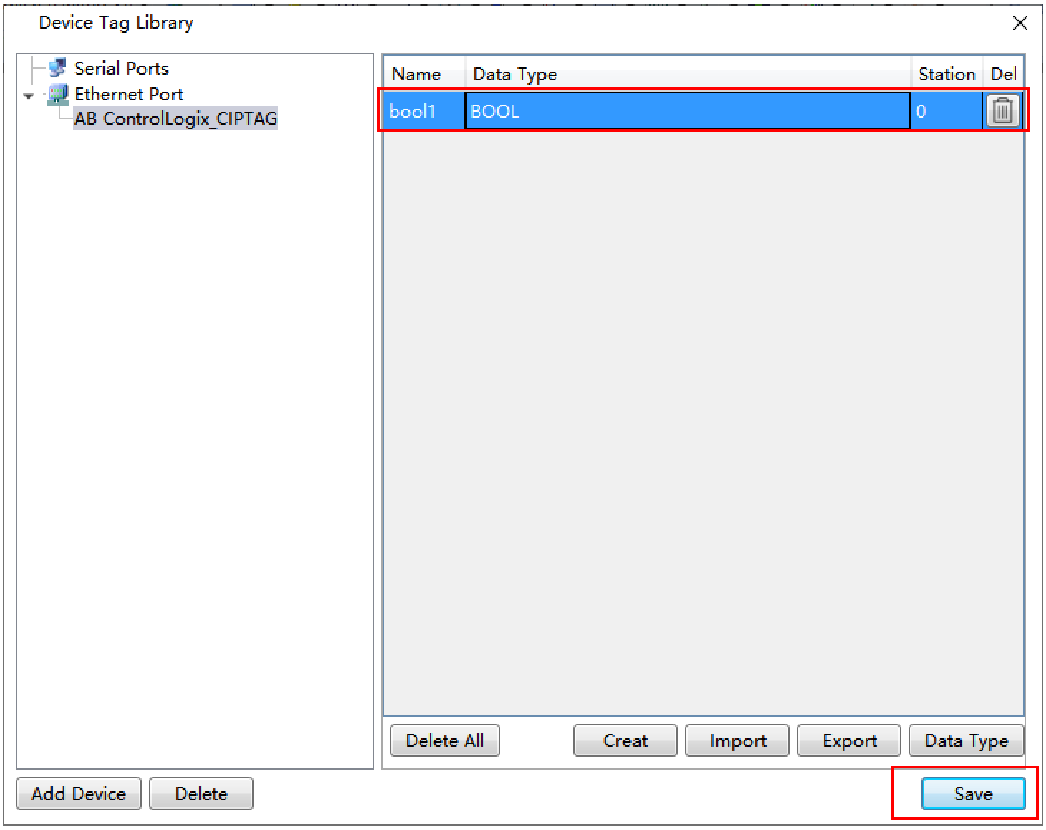


3) Select the device just added, click **Create**.

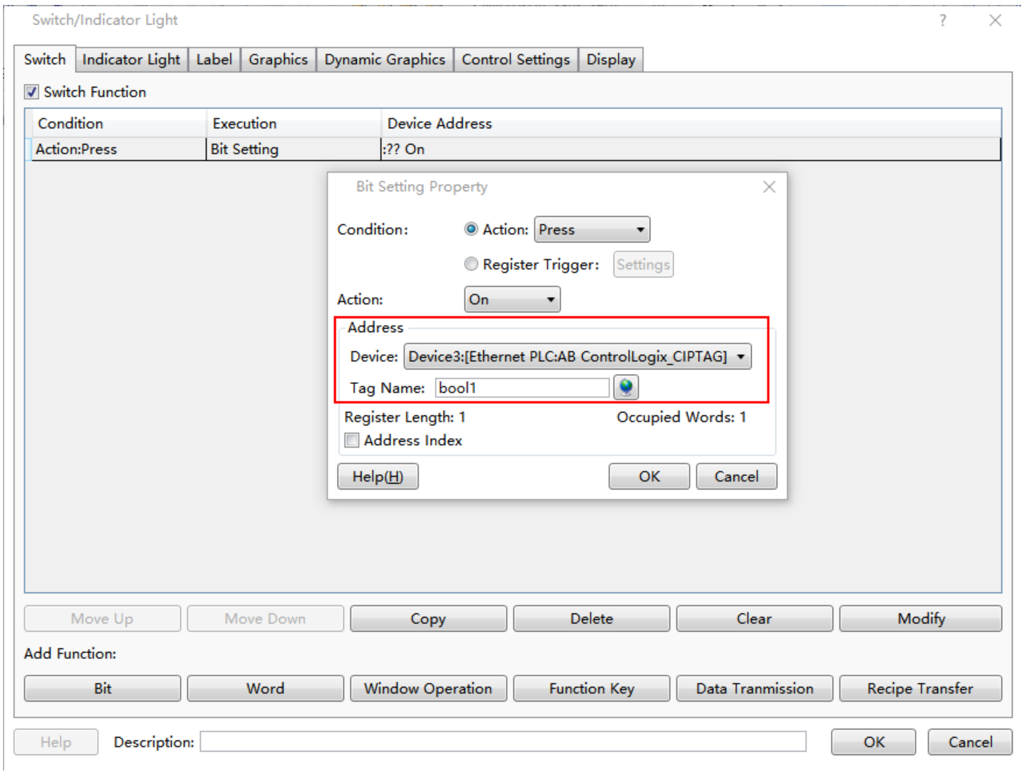


4) Edit tag name, click **Save**.

AB ControlLogix PLC doesn't have the station number property, it can be set to any value. For detailed information about tag please refer to Tag Format.



Step 6. Select **Component/Switch/Bit Set** from the menu bar, set address to PLC address in the pop-up dialog box.



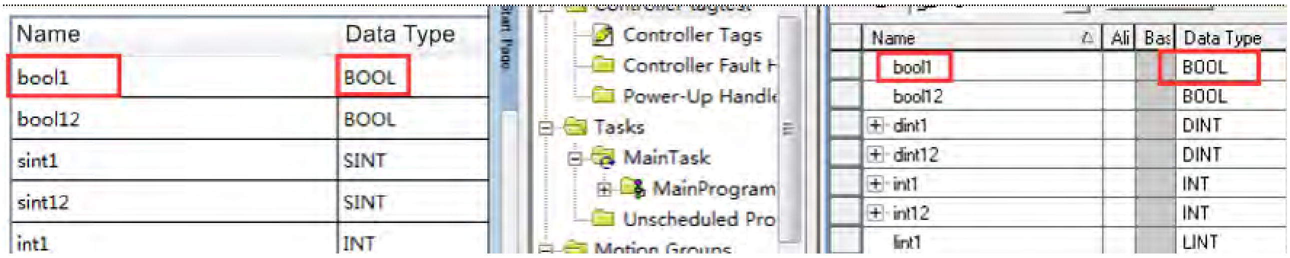
Step 7. After adding the switch component, download project to HMI. If PLC address data can be read and written, it means the communication is working.

17.11.3.4 Tag Format

17.11.3.4.1 Tag of Basic Data Type

The name and data type of the device tag added to HMI must be identical to the name and data type of the tag downloaded to the PLC. In the figure below, the left side is the device tag of the HMI, and the right side is the tag that has been downloaded to the PLC.

Basic data type tags cannot have sub-tags.



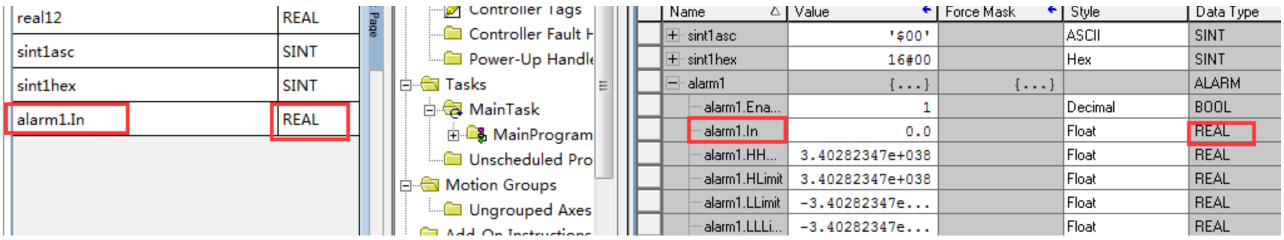
17.11.3.4.2 Tag of Non Basic Data Type

Tags of non-basic data types support sub-tags (e.g. parent tag is A, child tag is A.B).

In the figure below, the left side is the device tag of the HMI, and the right side is the tag that has been downloaded to the PLC.

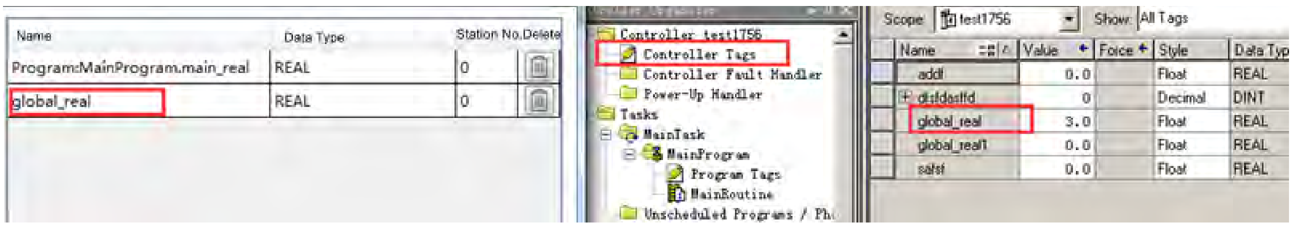
Tag “alarm1” data type is ALARM (non-basic data type). You can open the tree structure, and see that this type is in fact a collection of basic data type variables (sub-tags) . When monitoring the tag data, it is actually monitoring the value of these sub-tags.

The device tag in HMI only supports the basic data type tag, so when adding a tag you need to fill in the name and data type of the sub-tag.

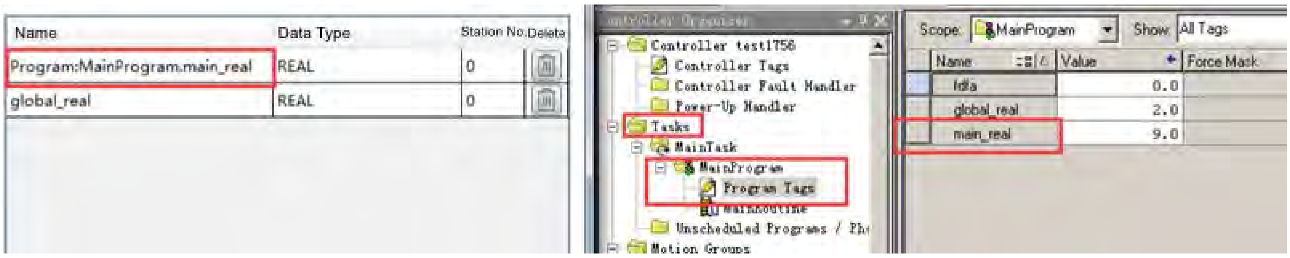


17.11.3.4.3 Global Variable Tag and Local Variable Tag

Variables in “Controller Tags” are global variables, the tag settings are shown below.



Variables in sub-programs of “Tasks” are local variables, the tag settings are shown below.



Format of variable tag: Program: *program name.variable name*

17.11.4 Ethernet Communication (Variable Tag) Between HMI and AB 5069-L350ERM PLC

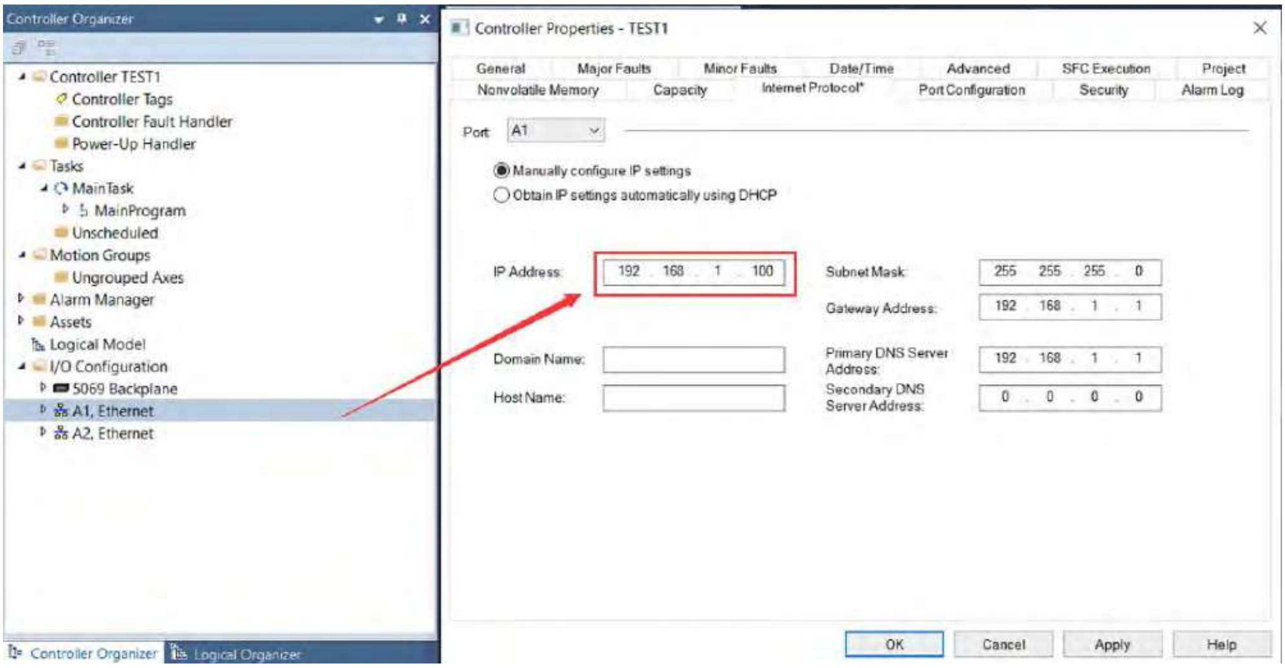
FE9000 series HMI supports Ethernet communication with AB PLC (supports variable tag). FE9000 series HMI can recognize variable tag of AB PLC. In this case, HMI is FE9156M, PLC is AB 5069-L350ERM.

17.11.4.1 Connection Method

Use Ethernet cable to connect HMI port and PLC port directly, or connect the two via a switch. Please refer to Connection Method for details.

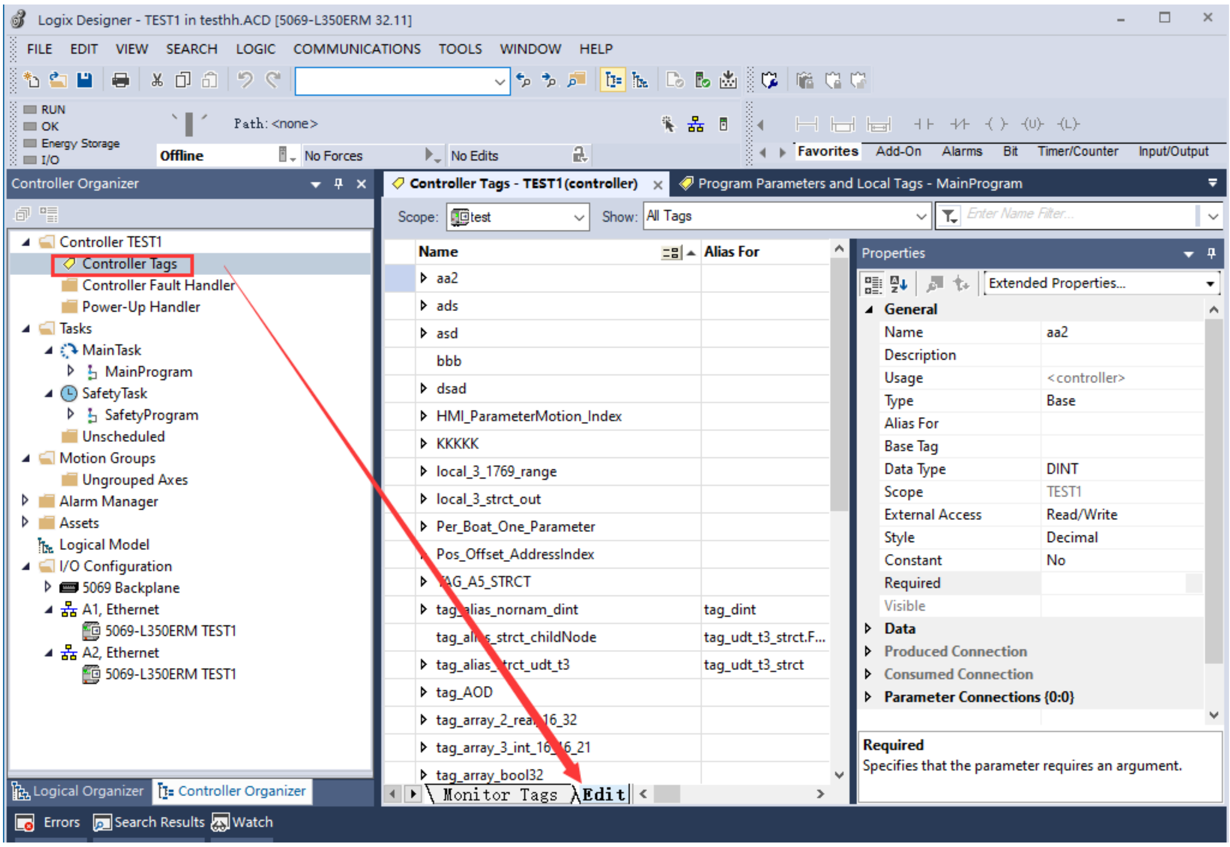
17.11.4.2 Configure PLC

Step 1. Run PLC configuration software, set the IP address of PLC.

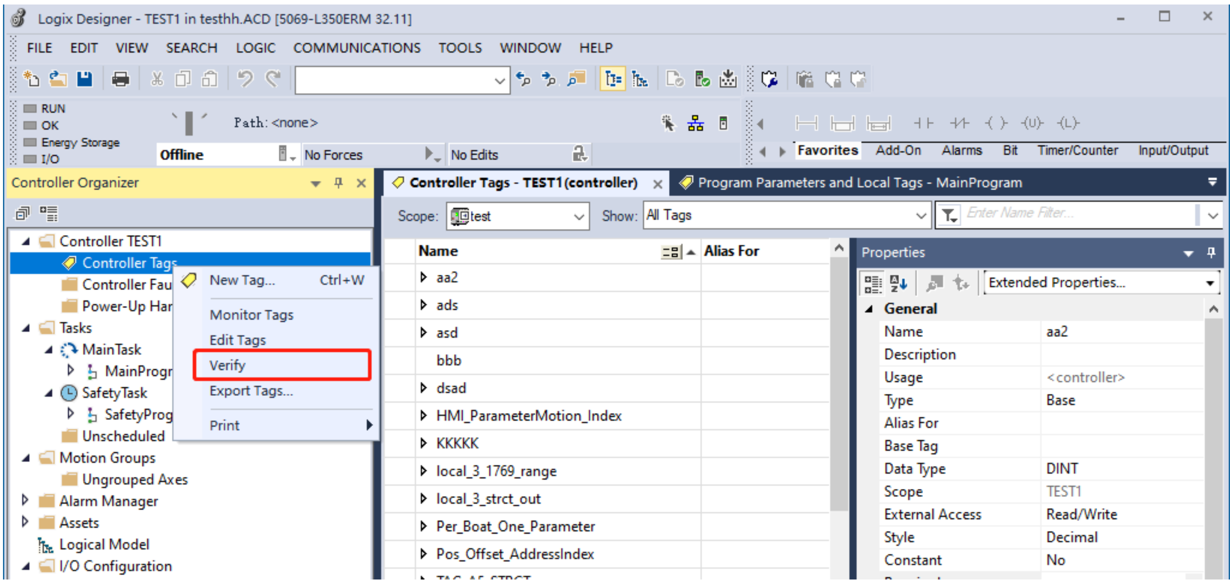


Step 2. Generate variable tag file.

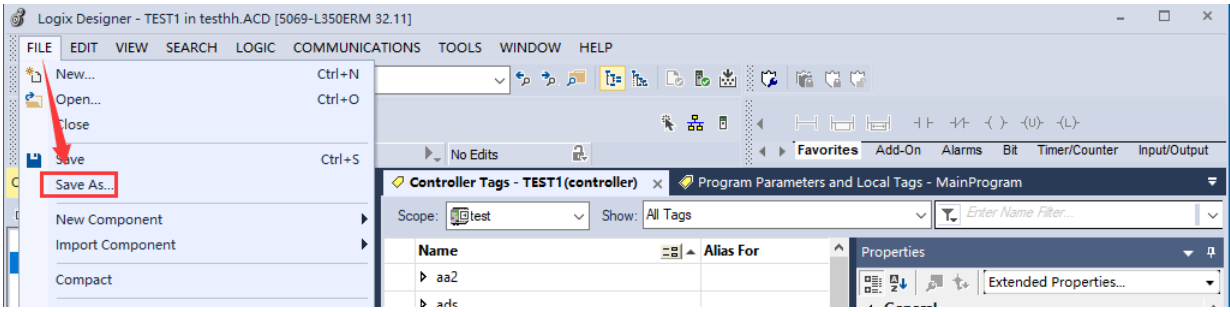
1) Select **Controller Tags**, click **Edit**, edit variable tag.



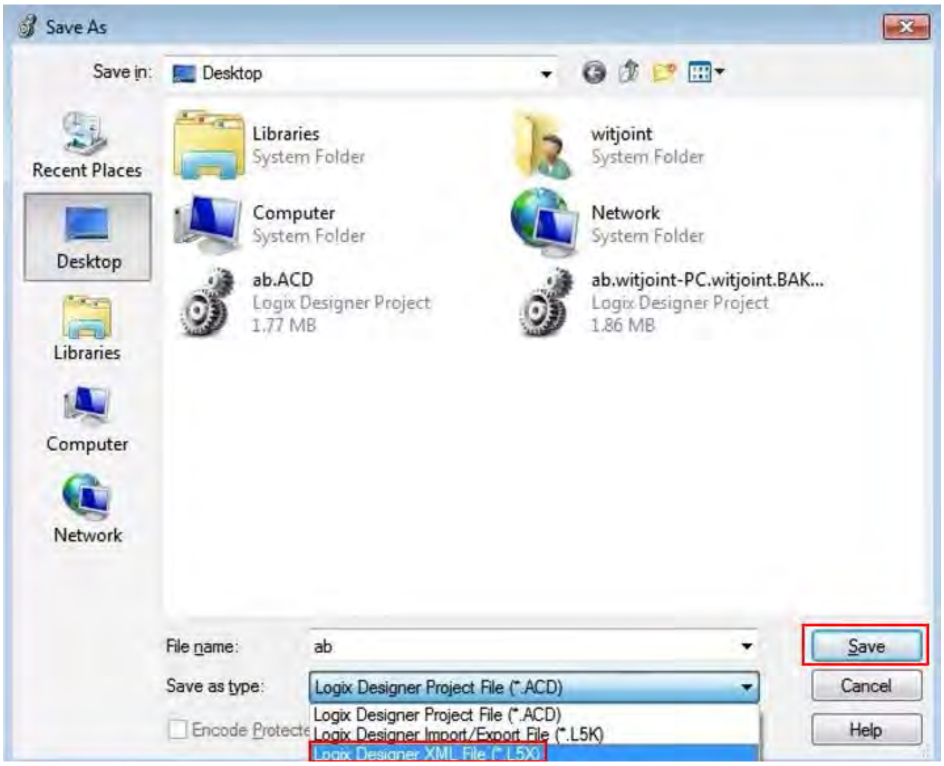
2) Right click **Controller Tags**, select **Verify** in the pop-up menu.



3) Select **File/Save As** in the menu.

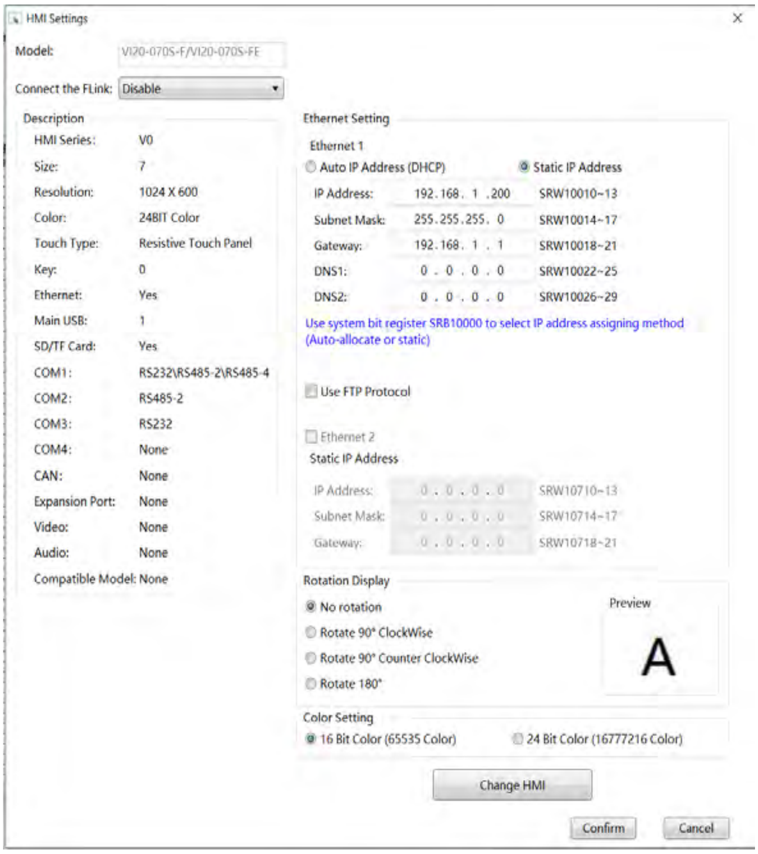


4) Set file name and type (.L5X) in the pop-up dialog box, click **Save.**

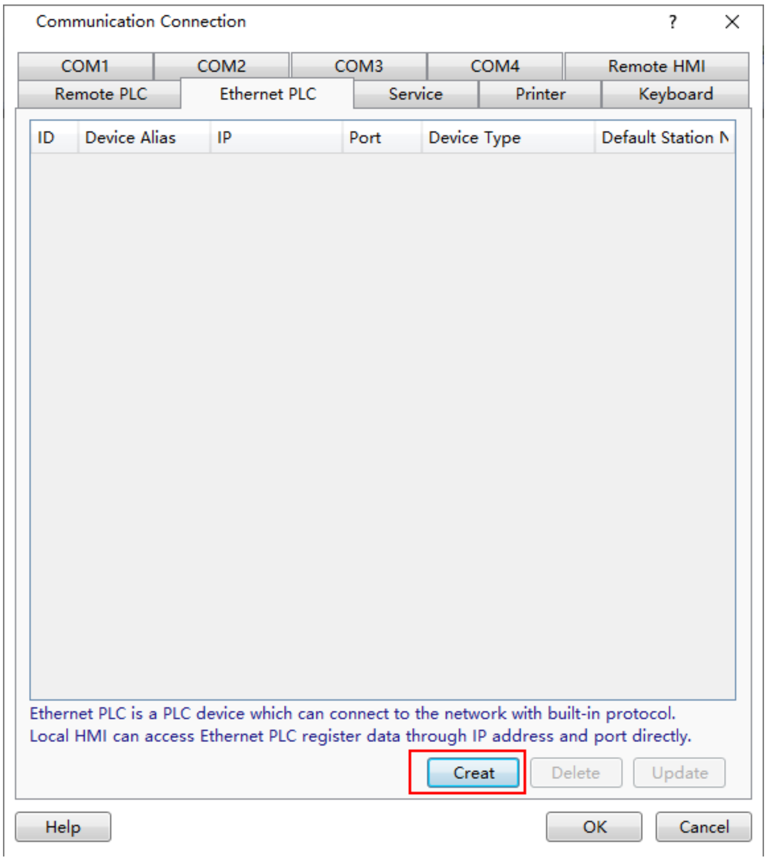


17.11.4.3 Configure HMI

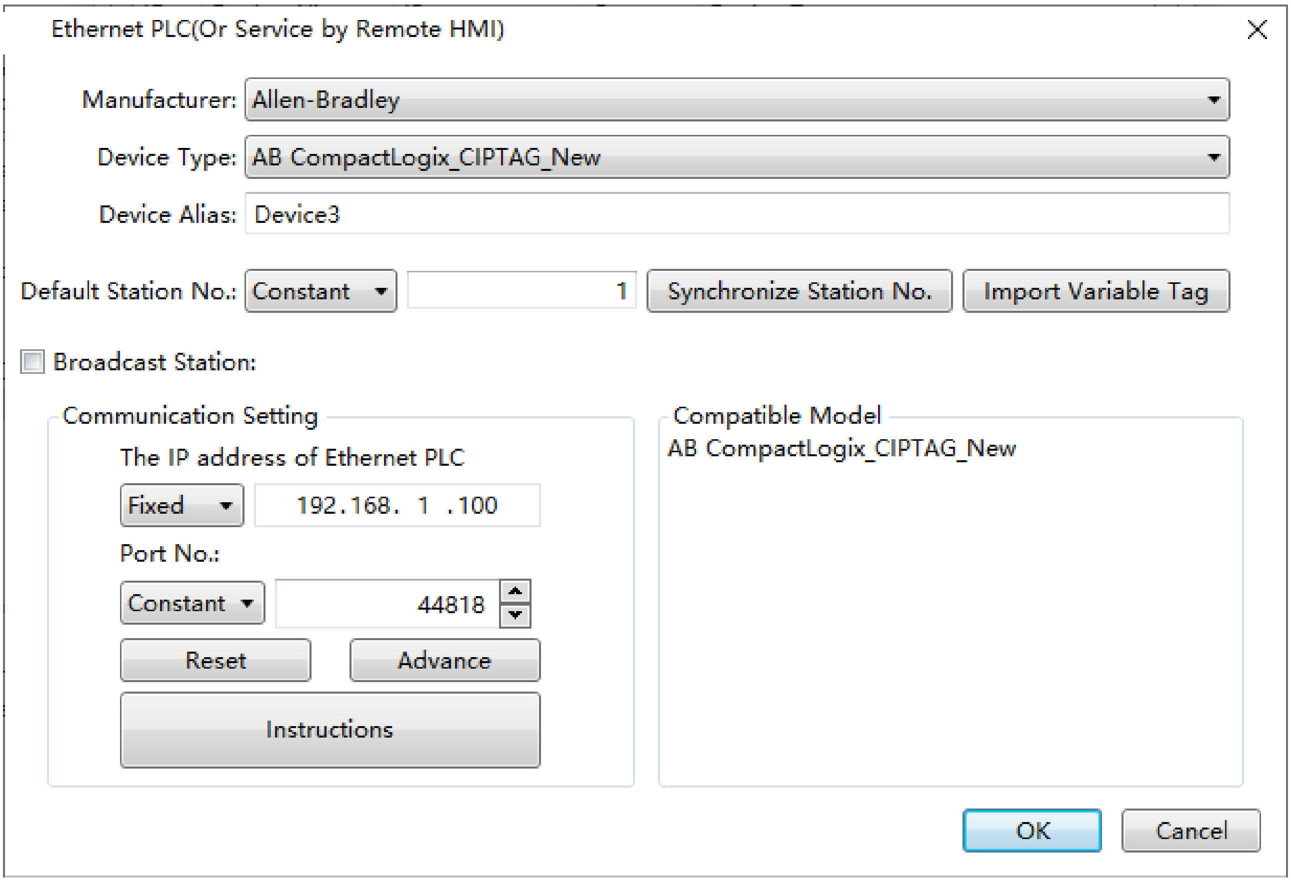
Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI (to be in the same network segment as the IP address of PLC) in the pop-up dialog box, click **Confirm**.



Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.



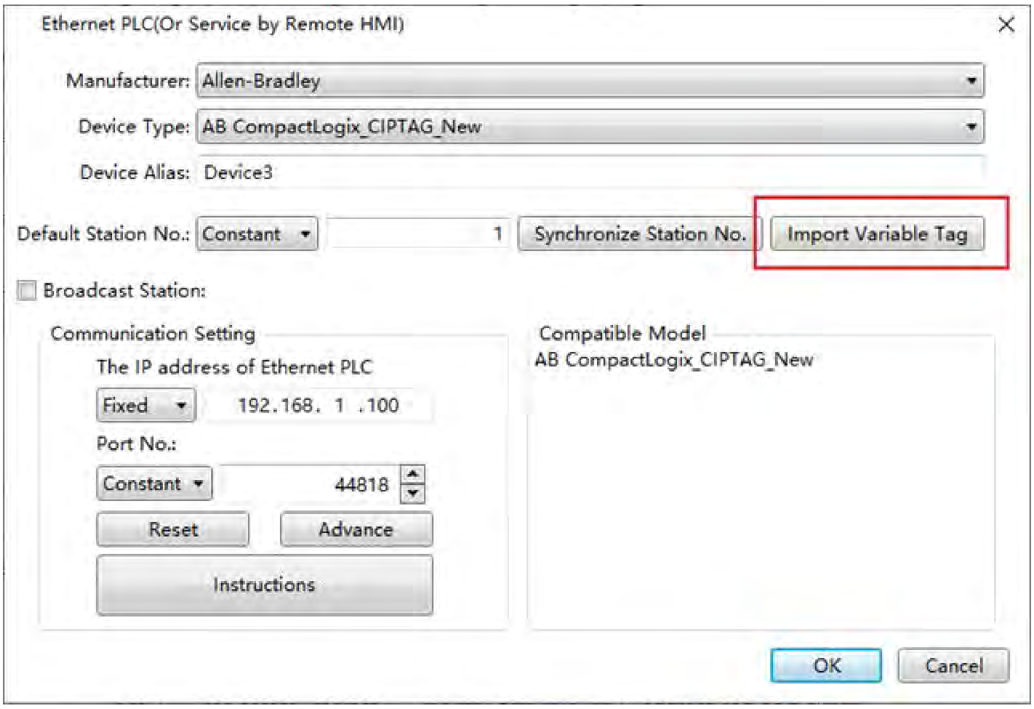
Step 3. Configure relevant parameters in the pop-up dialog box.



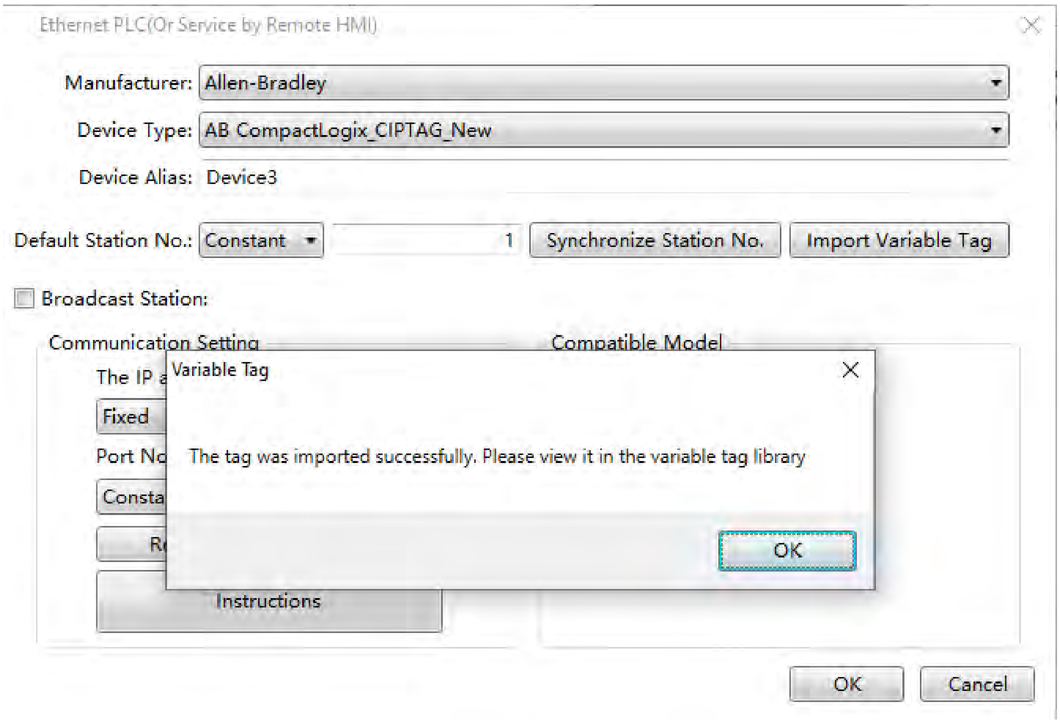
Please refer to the table below for detailed configuration.

Parameter	**Description**
Manufacturer	Select “Allen-Bradley”.
Device Type	Select “AB CompactLogix_CIPTAG_New”.
IP Address of Network PLC	Please refer to the actual situation.
Port No.	Default value 44818.

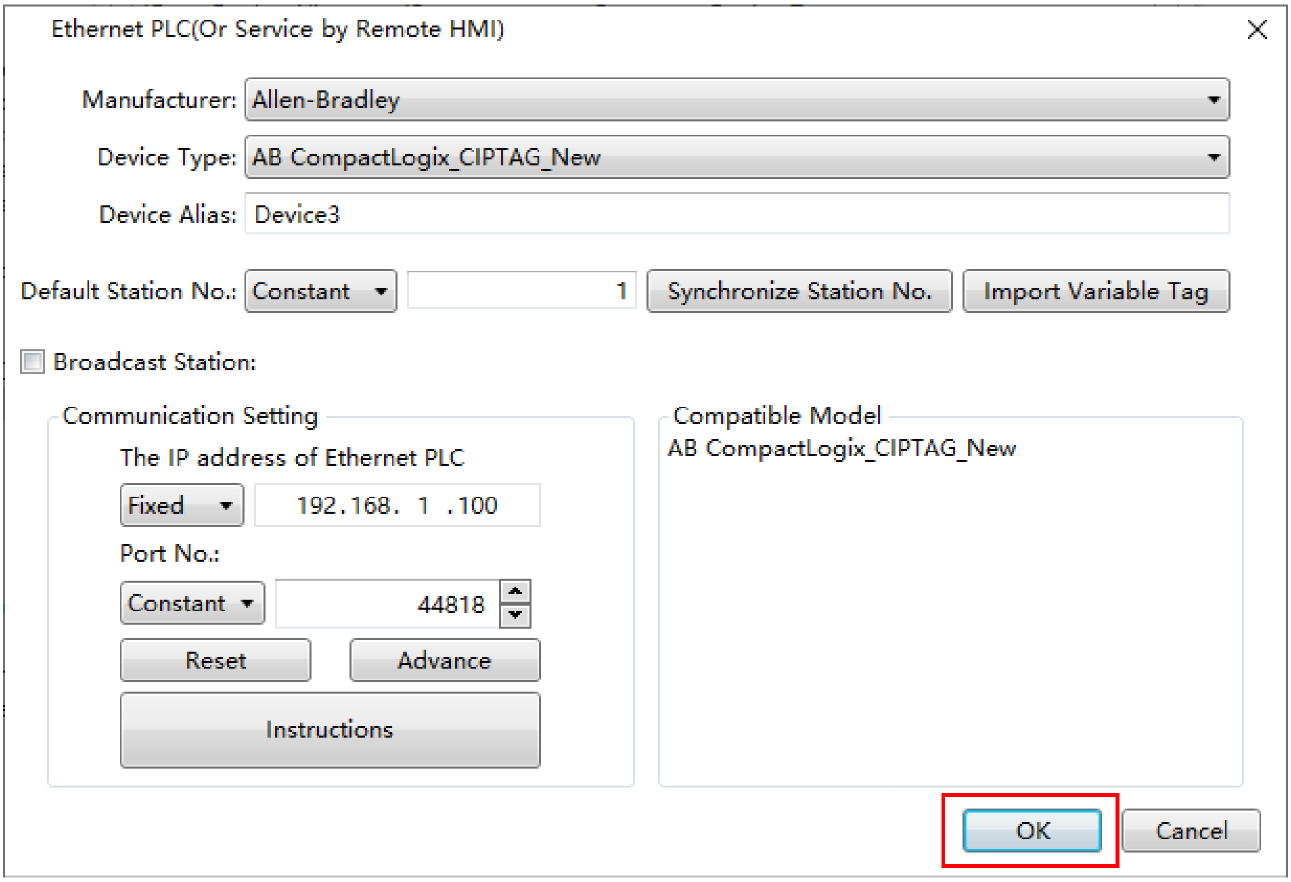
Step 4. Click **Import Variable Tag**, select the variable tag file that has been generated (.L5X format).



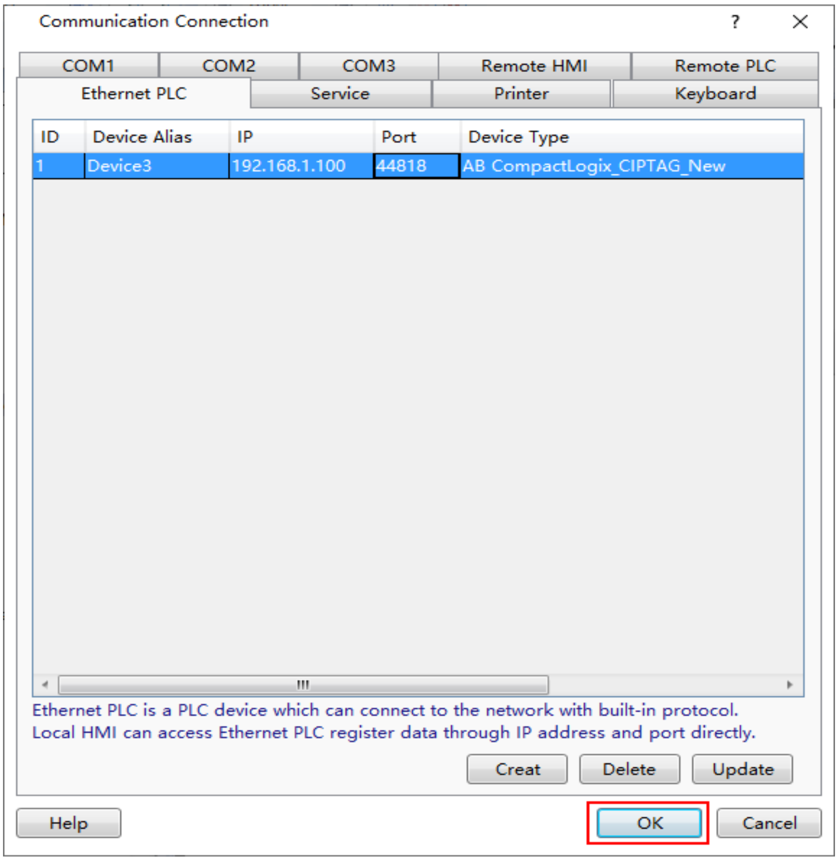
Step 5. Click **OK** when system prompts “The tag was imported successfully”.



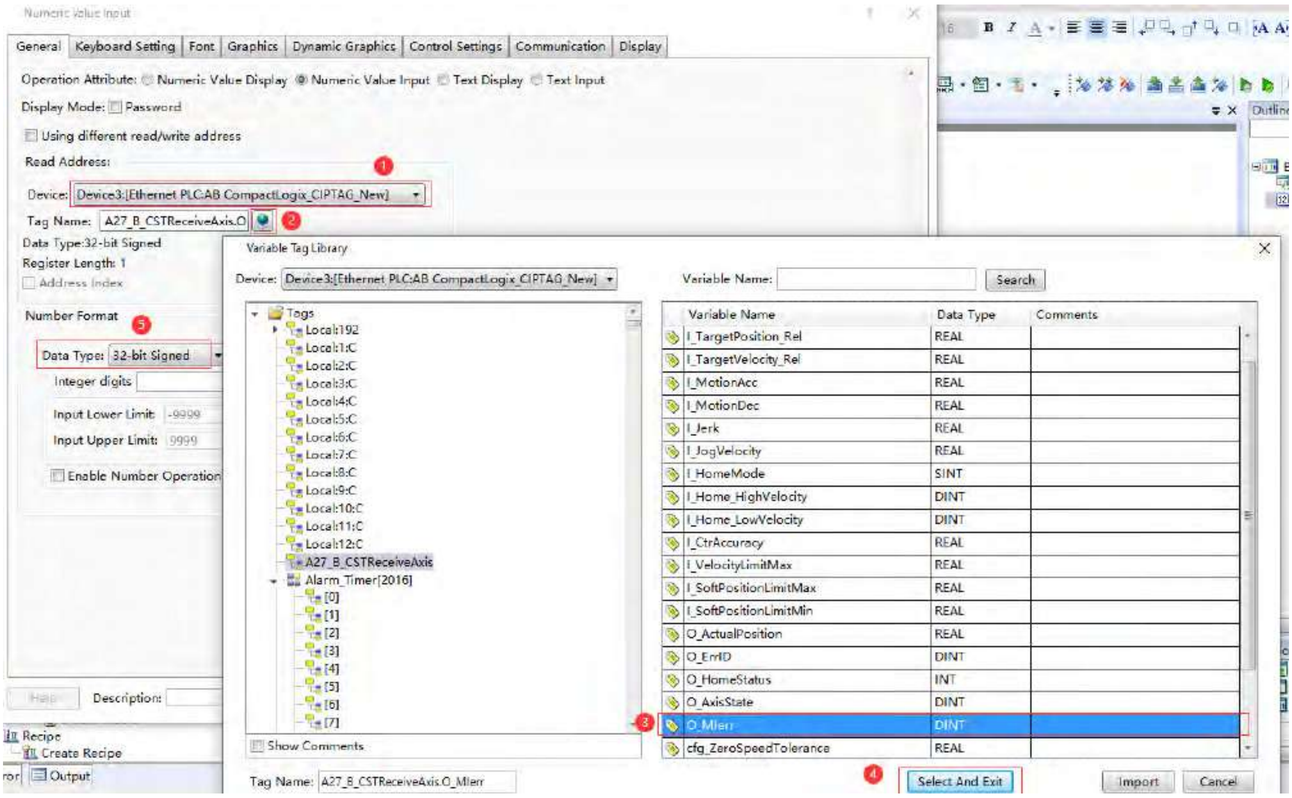
Step 6. Click **OK**.



Step 7. Click **OK**.



Step 8. Select **Component/Numeric Value and Text Display/Numeric Value Display** from the menu bar, select AB PLC, click the  icon, select variable tag, click **Select and Exit**.



Step 9. After creating the numeric value display component, download project to HMI. If the component can read tag value, it means the communication is working.

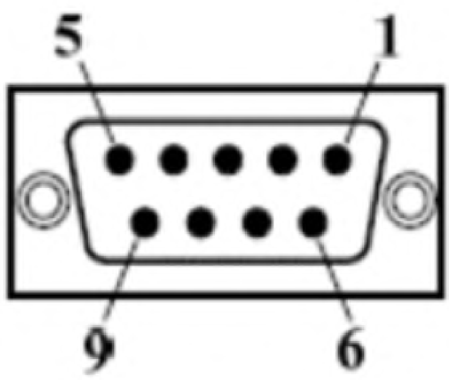
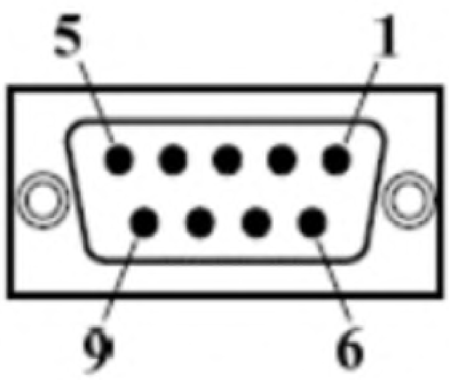
17.12 Serial Communication Between HMI and Devices that Support Modbus RTU Protocol

HMI communicates with devices (such as PLC) that support Modbus RTU protocol via serial ports.

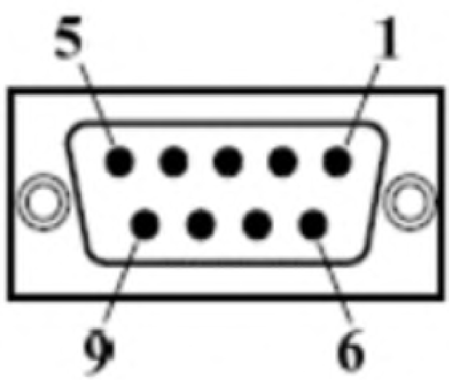
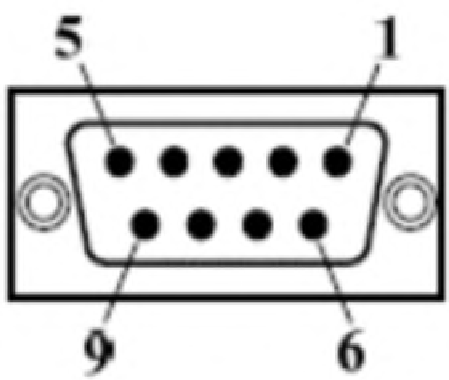
17.12.1 Connection Method

- Use RS232 cable to connect the COM1/COM2 port of the HMI to the serial port of devices that support Modbus RTU protocol. Please refer to the table below for the connection method.

HMI COM1/COM2 Ports	Serial Port of Devices that Support Modbus RTU Protocol
2 RX	3 TX
3 TX	2 RX
5 GND	5 GND

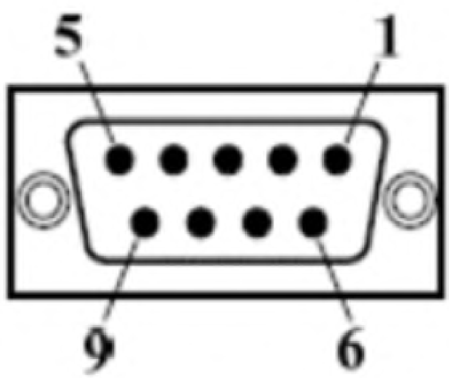
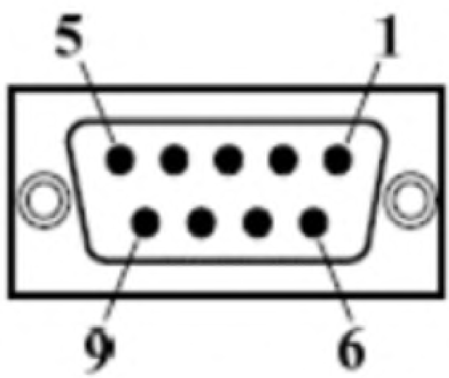
HMI COM1/COM2 Ports	**Serial Port of Devices that Support Modbus RTU Protocol**
	

- ◆ Use RS232 cable to connect the COM3/COM4 port of the HMI to the serial port of devices that support Modbus RTU protocol. Please refer to the table below for the connection method.

HMI COM3/COM4 Ports	**Serial Port of Devices that Support Modbus RTU Protocol**
7 RX	3 TX
8 TX	2 RX
5 GND	5 GND
	

- ◆ Use RS485-2 cable to connect the COM port (support RS485-2 protocol) of the HMI to the serial port of devices that support Modbus RTU protocol. Please refer to the table below for the connection method.

HMI COM3/COM4 Ports	**Serial Port of Devices that Support Modbus RTU Protocol**
1 RX-	TX-
6 RX+	TX+
5 GND	GND

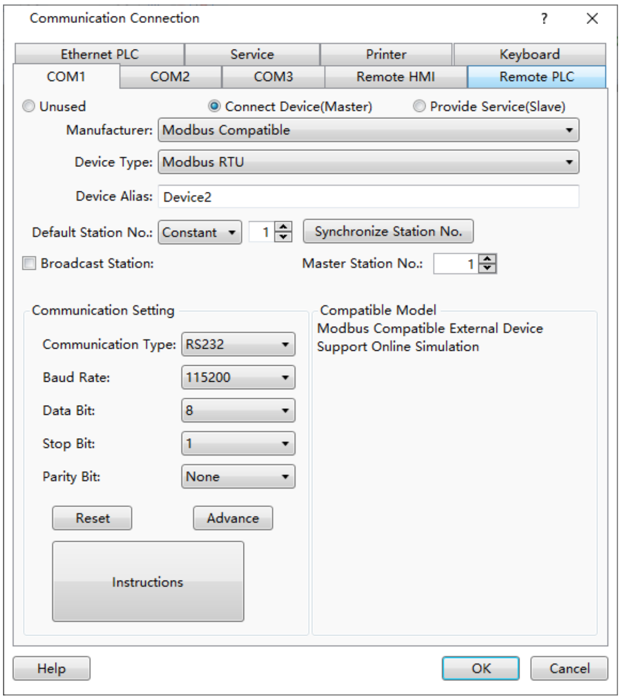
HMI COM3/COM4 Ports	Serial Port of Devices that Support Modbus RTU Protocol
	

17.12.2 Configure Devices that Support Modbus RTU Protocol

You need to configure serial communication method (including communication type, baud rate, data bit, stop bit, parity bit) of devices that support Modbus RTU protocol. Configuration steps of devices of difference manufacturers are different, please refer the user manual provided by the manufacturer.

17.12.3 Configure HMI

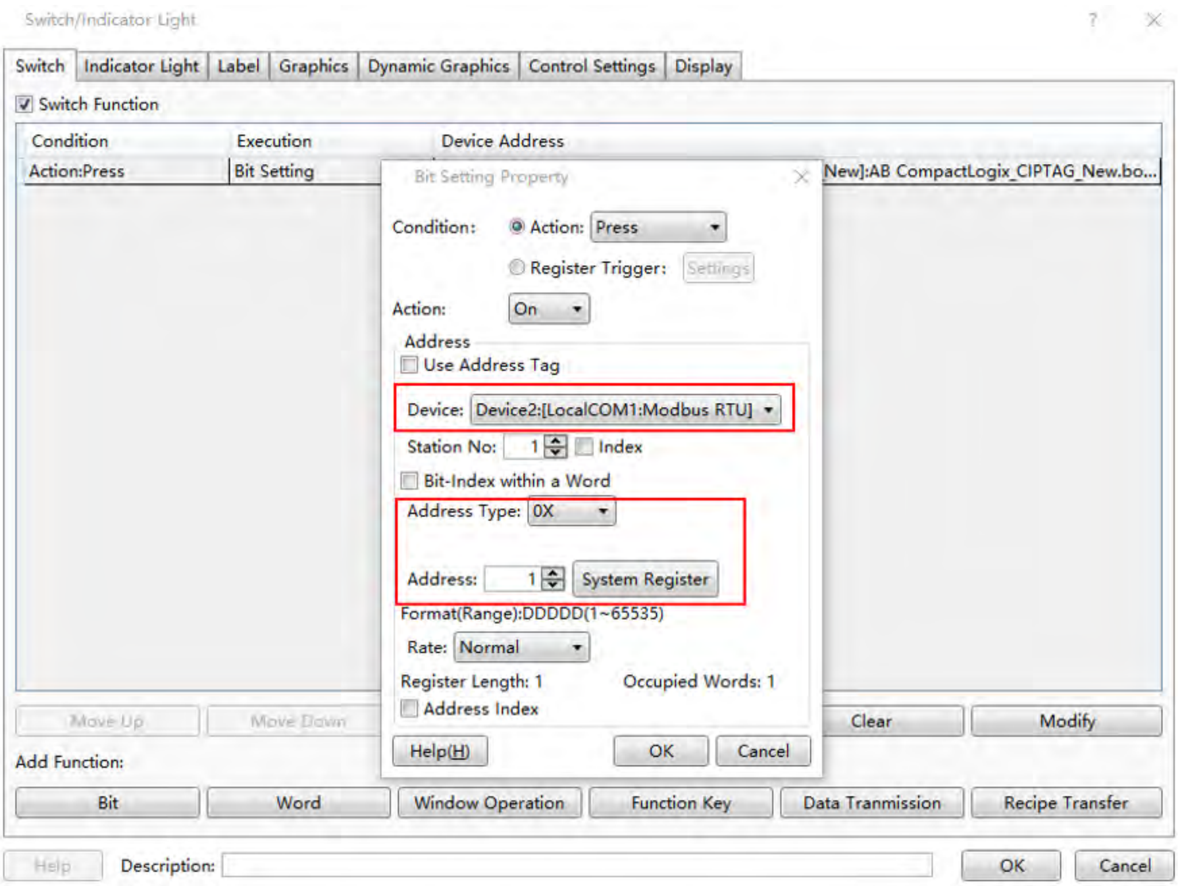
Step 1. Run VI20Studio, select **Settings/Communication Settings/Local Connection** from the menu bar, select COM port, configure relevant parameters, and click **OK**.



Please refer to the table below for detailed configuration.

Parameter	**Description**
Connection Device (HMI as Master)	As a control center, HMI analyzes the data collected from the device and issued the task to slave device.
Manufacturer	Select “Modbus compatible”.
Device Type	Select “Modbus RTU”.
Default Station No.	Keep consistent with the setting of devices that support Modbus protocol.
Communication Type	Select “RS232” or “RS485-2”.
Baud Rate	Keep consistent with the setting of devices that support Modbus protocol.
Data Bit	Keep consistent with the setting of devices that support Modbus protocol.
Stop Bit	Keep consistent with the setting of devices that support Modbus protocol.
Parity Bit	Keep consistent with the setting of devices that support Modbus protocol.

Step 2. Select **Component/Switch/Bit Set** from the menu bar, set the address as address of the device that supports Modbus RTU protocol in the pop-up dialog box (refer to the actual situation).



Step 3. After adding the switch component, download project to HMI. If the data of devices that support Modbus RTU protocol can be read and written, it means the communication is working.

17.12.4 Address Format

17.12.4.1 Address Type

Address type in HMI is 0X, 1X, 3X, 4X. Address base setting affects the initial address, which starts from 0 or 1, and available address range. The details are as follows.

◆ When address base set to 1 (this is default value)

Driver	Address Base Setting	Character/But	Address Type	Address Range
Modbus RTU	1	B(bit)	0X	1~65535
		B(bit)	1X	1~65535
		B(bit)	4X_bit	1.0~65535.15
		W(character)	3X	1~65535
		W(character)	4X	1~65535

◆ When address base set to 0

Driver	Address Base Setting	Character/But	Address Type	Address Range
Modbus RTU	0	B(bit)	0X	0~65534
		B(bit)	1X	0~65534
		B(bit)	4X_bit	0.0~65534.15
		W(character)	3X	0~65534
		W(character)	4X	0~65534

17.12.4.2 Function Code

Please refer to the table below for the detailed information of function codes of different address types.

Address Type	Read/Write Property	Read Function Code	Write Function Code	
			Write Single Address	Write Multiple Addresses
0X	Read and write	01	05	0F
1X	Read only	02	Not supported	Not supported
3X	Read only	04	Not supported	Not supported
4X	Read and write	03	06	10

17.12.4.3 Address Correspondence Between HMI and Devices that Support Modbus RTU Protocol

- If the devices supporting the Modbus RTU protocol have an initial address starting from 1, and the address base in the HMI is set to the default value of 1, then the conversion of addresses to the HMI will be one-to-one correspondence.
- If the devices supporting the Modbus RTU protocol have an initial address starting from 0, and the address base in the HMI is set to the default value of 1, then the conversion of addresses to the HMI will require adding 1.
- If the devices supporting the Modbus RTU protocol have an initial address starting from 0, and the address base in the HMI is set to 0, then the conversion of addresses to the HMI will be one-to-one correspondence.

Example: If HMI is reading from devices that support the Modbus RTU protocol with addresses 40001 and 30010.

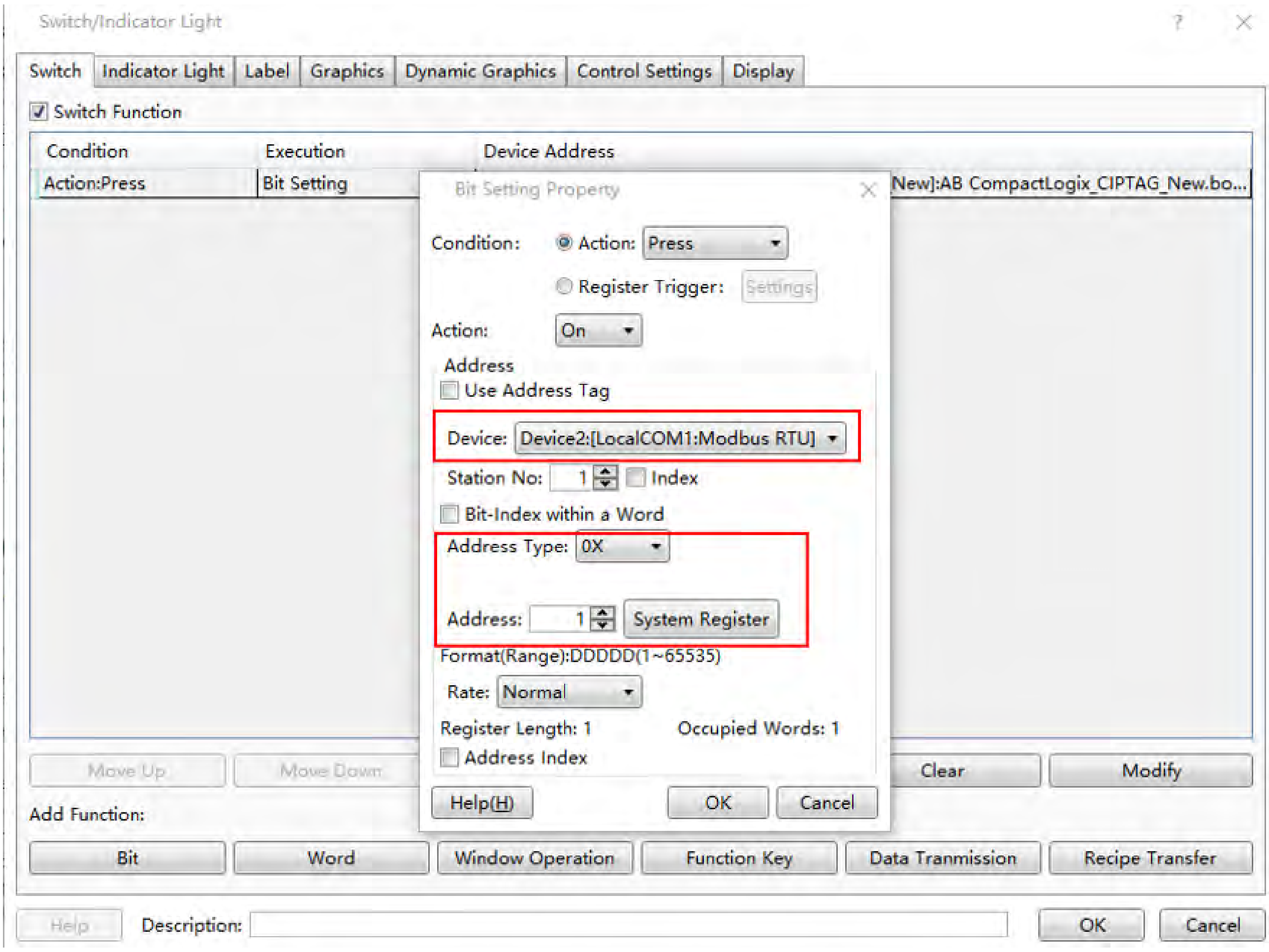
The “4” in 40001 corresponds to the HMI address type 4, supporting Modbus RTU protocol X. The “3” in 30010 corresponds to the HMI address type 3X.

If the devices supporting the Modbus RTU protocol have an initial address starting from 0, and the address base in the HMI is set to 0, 40001 corresponds to 4X1 in HMI, 30010 corresponds to 3X10 in HMI.

If the devices supporting the Modbus RTU protocol have an initial address starting from 0, and the address base in the HMI is set to 1, 40001 corresponds to 4X2 in HMI, 30010 corresponds to 3X11 in HMI.

If the devices supporting the Modbus RTU protocol have an initial address starting from 1, and the address base in the HMI is set to 1, 40001 corresponds to 4X1 in HMI, 30010 corresponds to 3X10 in HMI.

Add Numeric Vlaue Display component in VI20Studio, read the data of device address 40001. The configuration steps of the address are as shown below.



17.13 Ethernet Communication Between HMI and Devices that Support Modbus TCP Protocol

HMI with Ethernet port supports Ethernet communication with devices that support Mobus TCP protocol (such as PLC). You can use Ethernet cable to directly connect HMI Ethernet port and Ethernet port of devices that support Mobus TCP protocol, or connect the two via a switch.

17.13.1 Connection Method

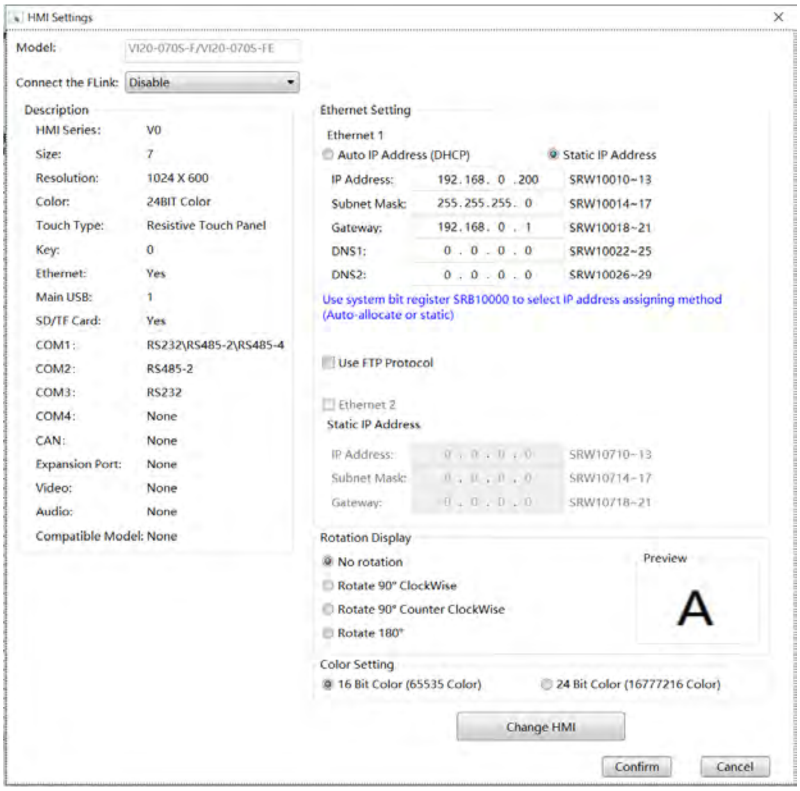
Please refer to Connection Method.

17.13.2 Configure Devices that Support Modbus TCP Protocol

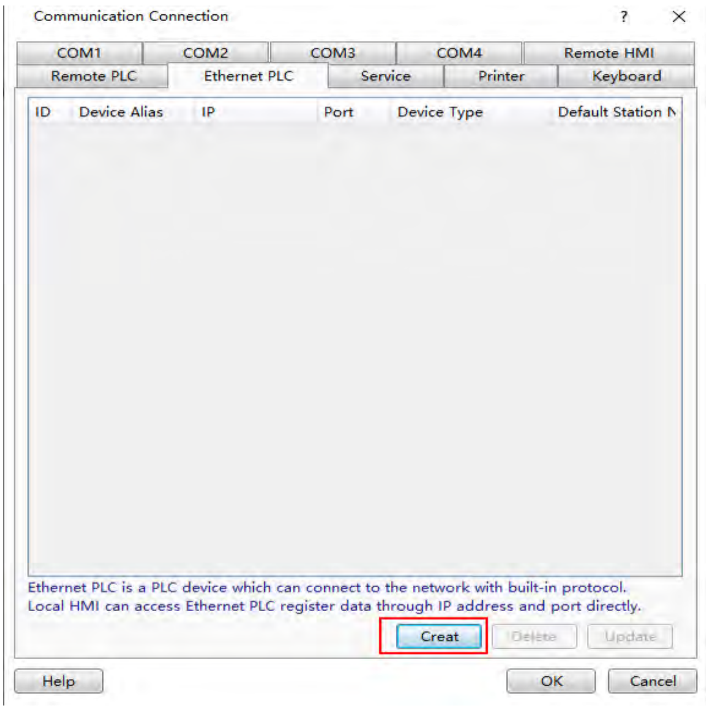
Configure the Ethernet parameters of devices that support Modbus TCP protocol. Configuration steps of devices of difference manufacturers are different, please refer the user manual provided by the manufacturer.

17.13.3 Configure HMI

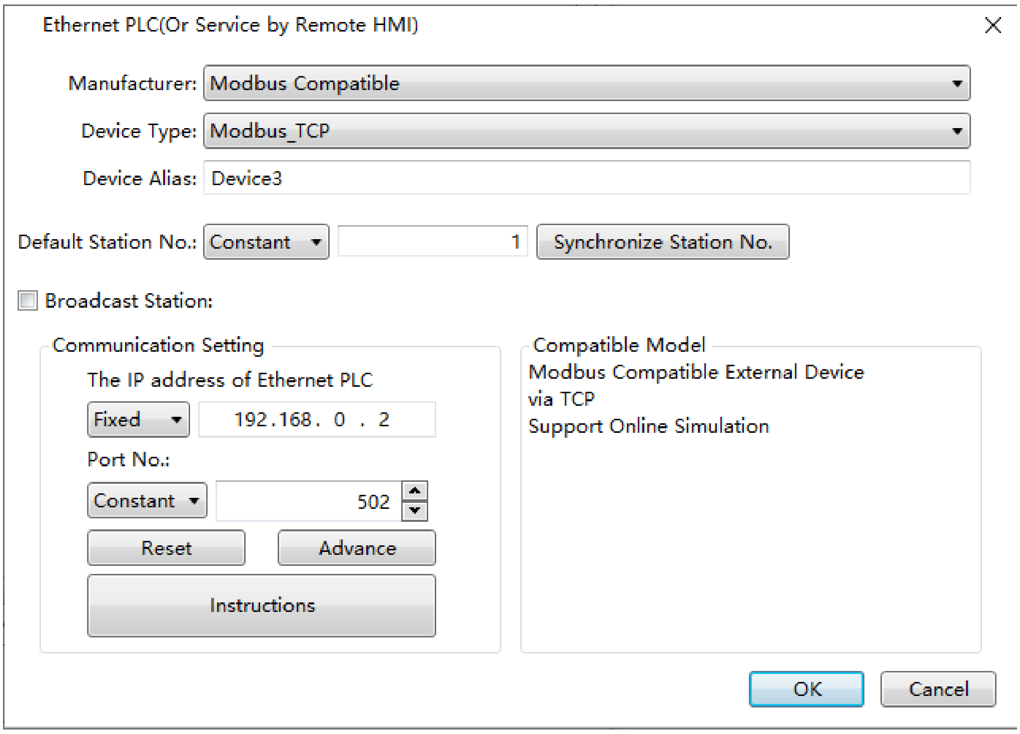
Step 1. Run VI20Studio, select **Setting/HMI Setting** from the menu bar, set the IP address of HMI in the pop-up dialog box, and click **Confirm**.



Step 2. Select **Setting/Communication Setting/Remote Connection** from the menu bar, select **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.



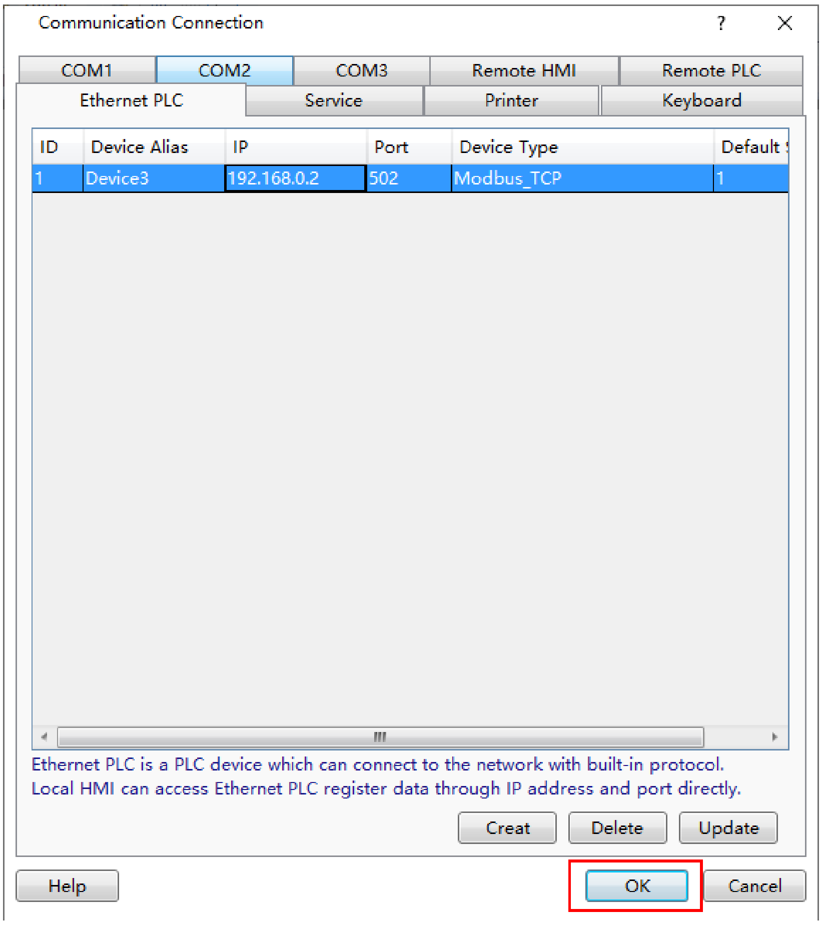
Step 3. Configure relevant parameters in the pop-up dialog box, click **OK**.



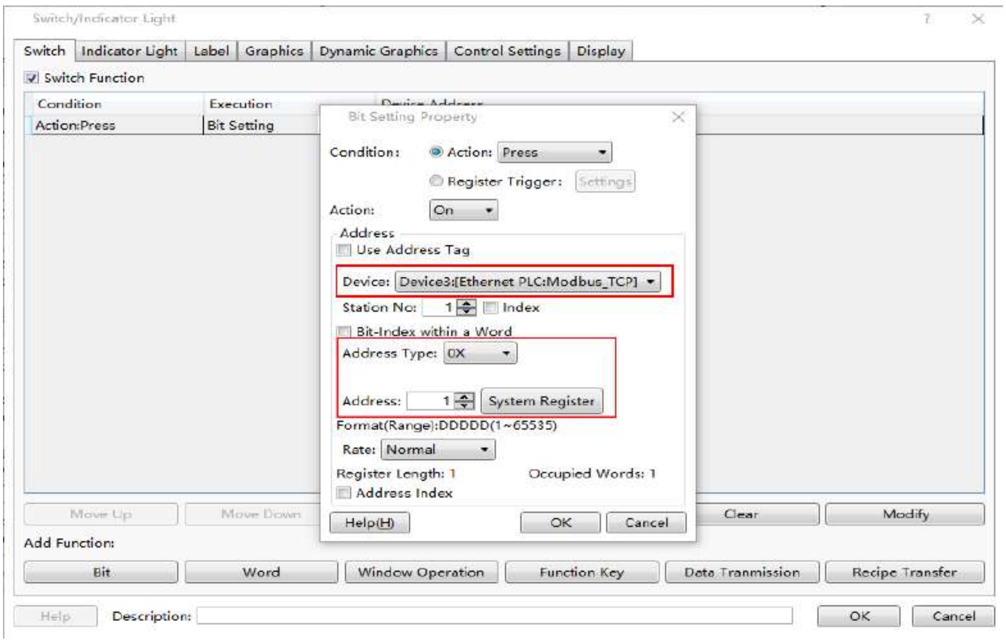
Please refer to the table below for detailed configuration.

Parameter	**Description**
Manufacturer	Select “Modbus Network Compatible”.
Device Type	Select “Modbus_TCP”.
Pre-set Station No.	Keep consistent with the setting of devices that support Modbus TCP protocol.
IP Address of Network PLC	Please refer to the actual situation.
Port No.	Use default value 502.

Step 4. Click **OK** in the **Communication Connection** dialog box.



Step 5. Select **Component/Switch/Bit Set** from the menu bar, set the address as address of the device that supports Modbus TCP protocol in the pop-up dialog box (refer to the actual situation). For detailed information about address format, please refer to Address Format.



Step 6. After adding the switch component, download project to HMI. If the address data of devices that support Modbus TCP protocol can be read and written, it means the communication is working.

17.14 Ethernet Communication(Variable Tag) Between HMI and Devices that Support CODESYS_V3_TCP Protocol

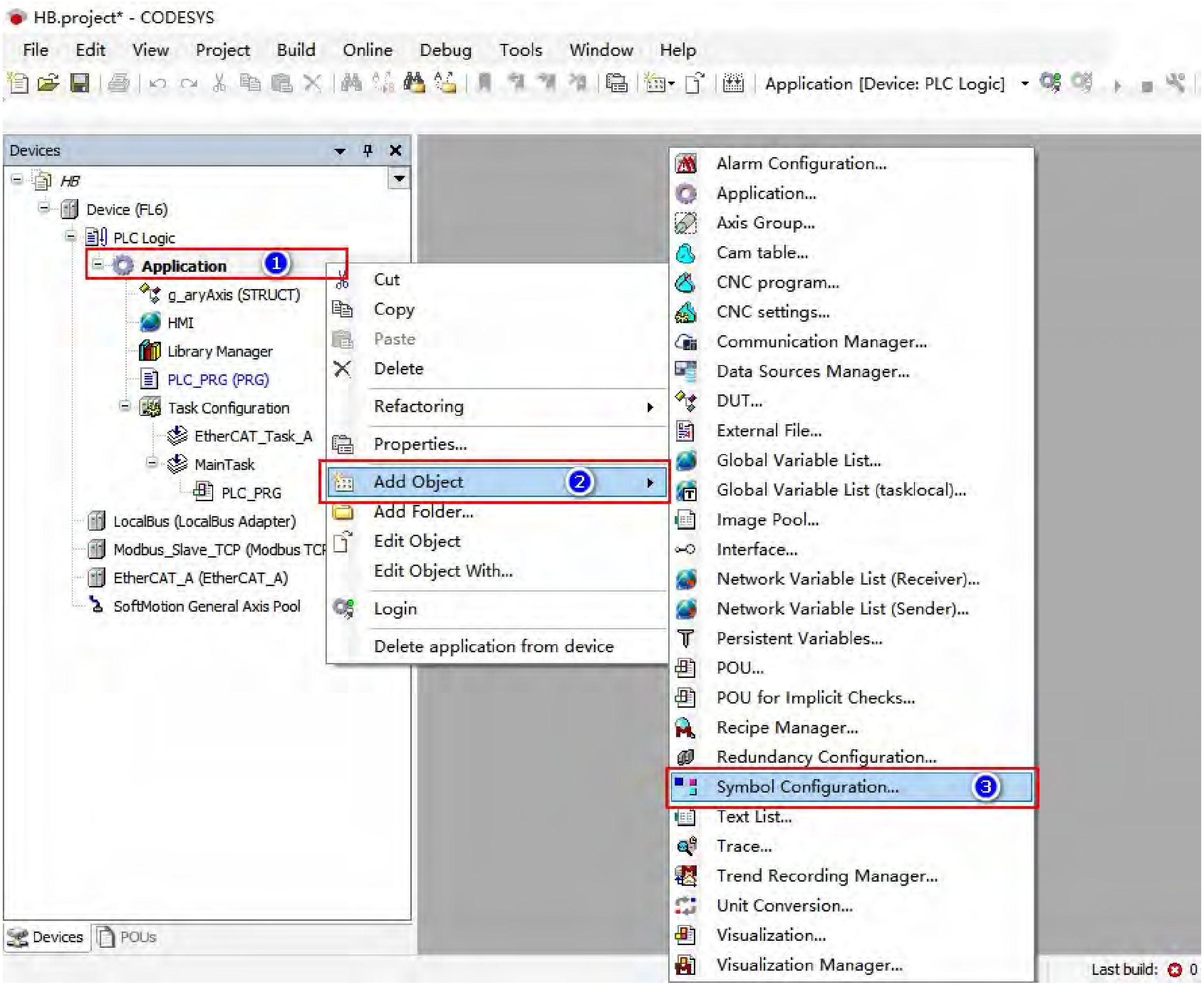
HMI supports Ethernet communication with PLCs that support CODESYS_V3_TCP protocol (such as CODESYS PLC, Inovance PLC, HCFA PLC). HMI can recognize variable tag of PLC. In this configuration case, HMI model is FE9156.

17.14.1 Connection Method

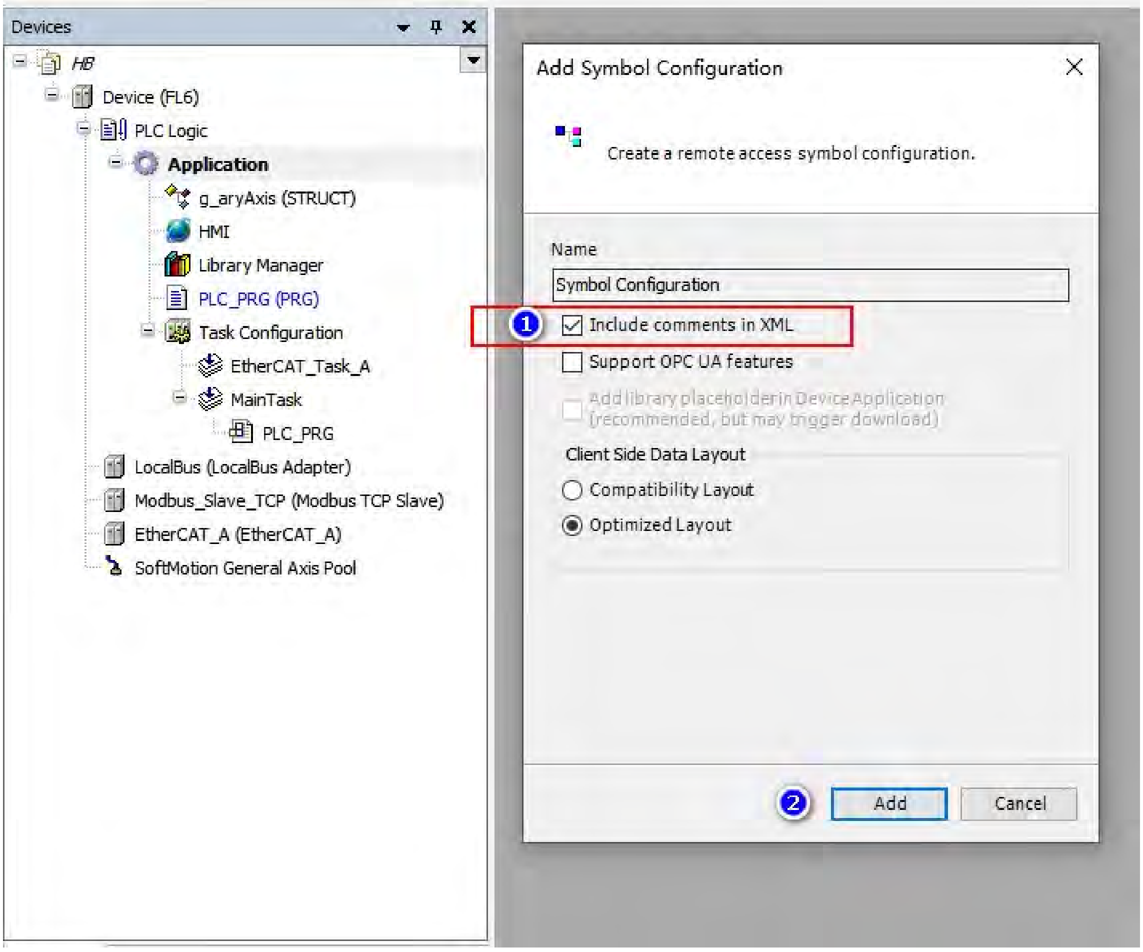
Use cable to connect ports of FE9156 and ports of PLC. Please refer to Connection Method for details.

17.14.2 Configure PLC

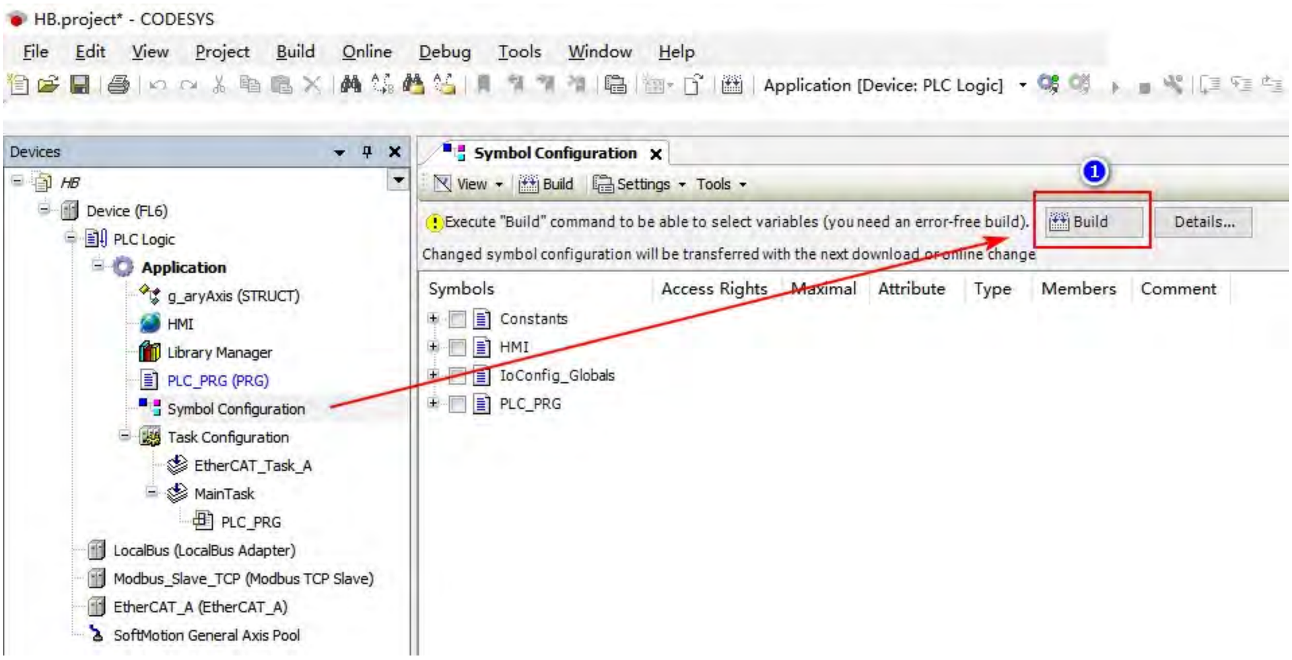
Step 1. Run CODESYS, the PLC configuration software, right click **Application**, select **Add Object/Symbol Configuration**.



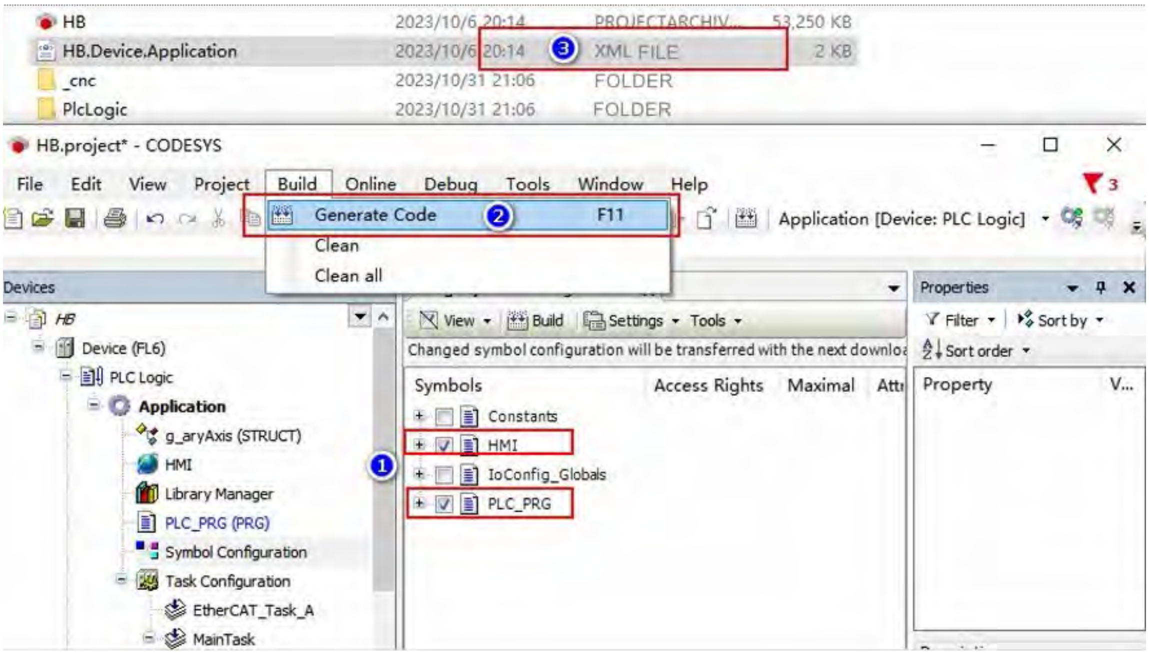
Step 2. Check **Include comments in XML** in the pop-up dialog box, click **Add**.



Step 3. Click **Build**.



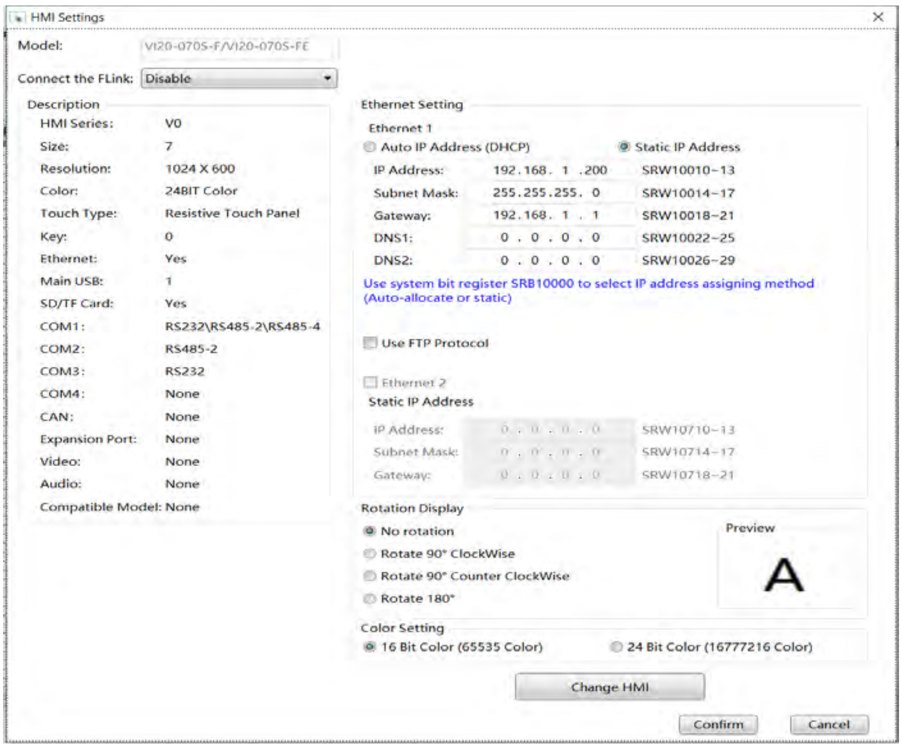
Step 4. Check the variable tag which will communicate with HMI, click **Build/Generate Code**. In the PLC project directory, you can see the new XML file generated.



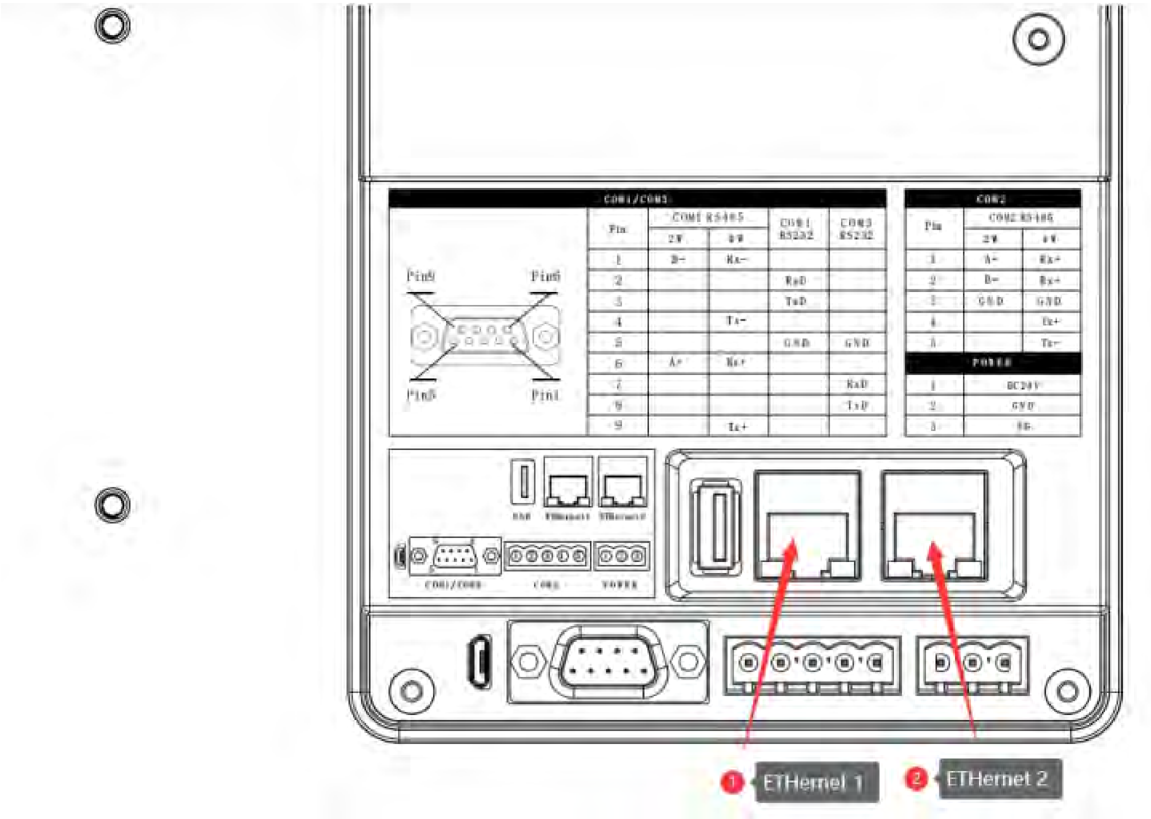
Need to confirm that the XML file is generated with the current system time of the PC. If it is not the case, recompilation is required. Make sure that the selected variable tags are generating the XML file.

17.14.3 Configure HMI

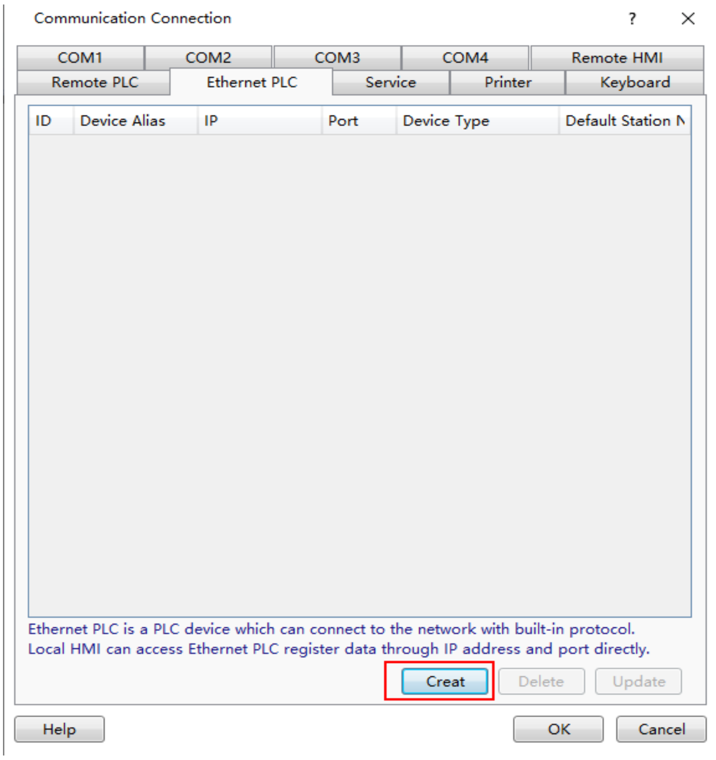
Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI in the pop-up dialog box (to be in the same network segment as the IP address of PLC), and click **Confirm**.



When the model is FE9156M, the two ports as shown in the picture below corresponds to **Ethernet1** and **Ethernet2** in VI20Studio, respectively.

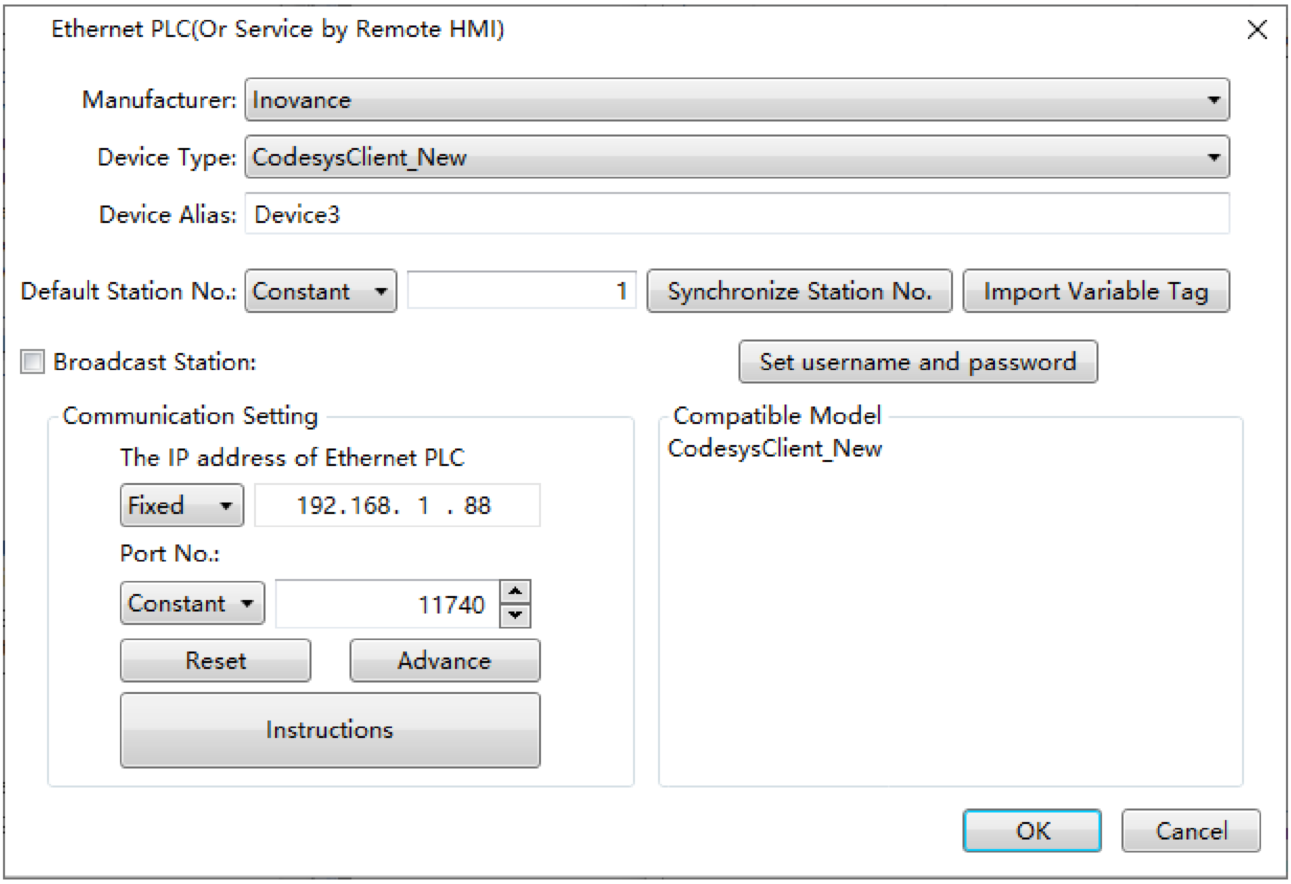


Step 2. Select **Settings/Communication Settings/Remote Connection** from the menu bar, select **Ethernet PLC** tab in the pop-up **Communication Connection** dialog box, click **Create**.



Step 3. Configure relevant parameters in the pop-up dialog box.

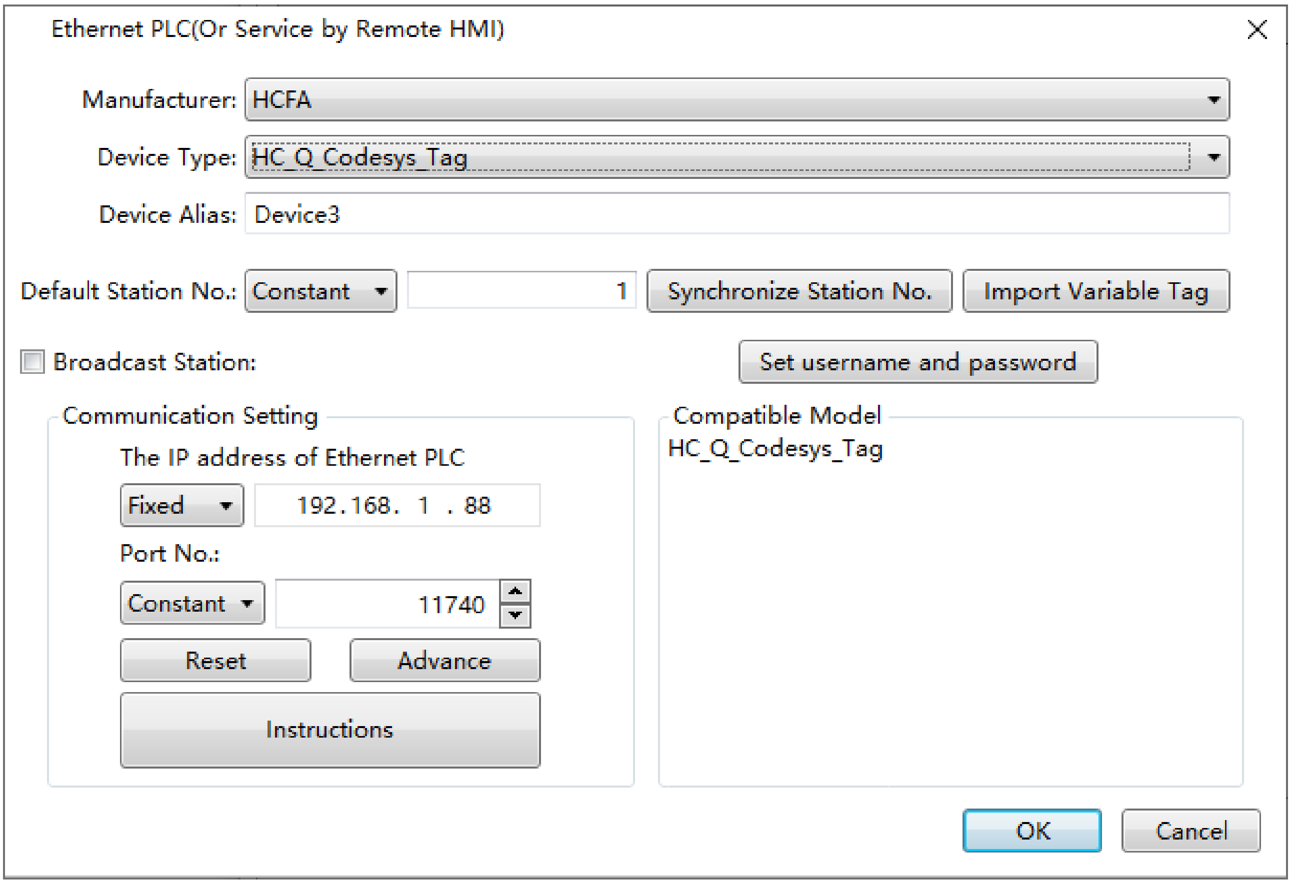
- When PLC is Inovance PLC, configure as shown in the figure below.



Please refer to the table below for detailed configuration.

Parameter	Description
Manufacturer	Select “Inovance”.
Device Type	Select “CodesysClient_New”.
IP Address of Network PLC	Please refer to the actual situation.
Port No.	Use default value 11740.

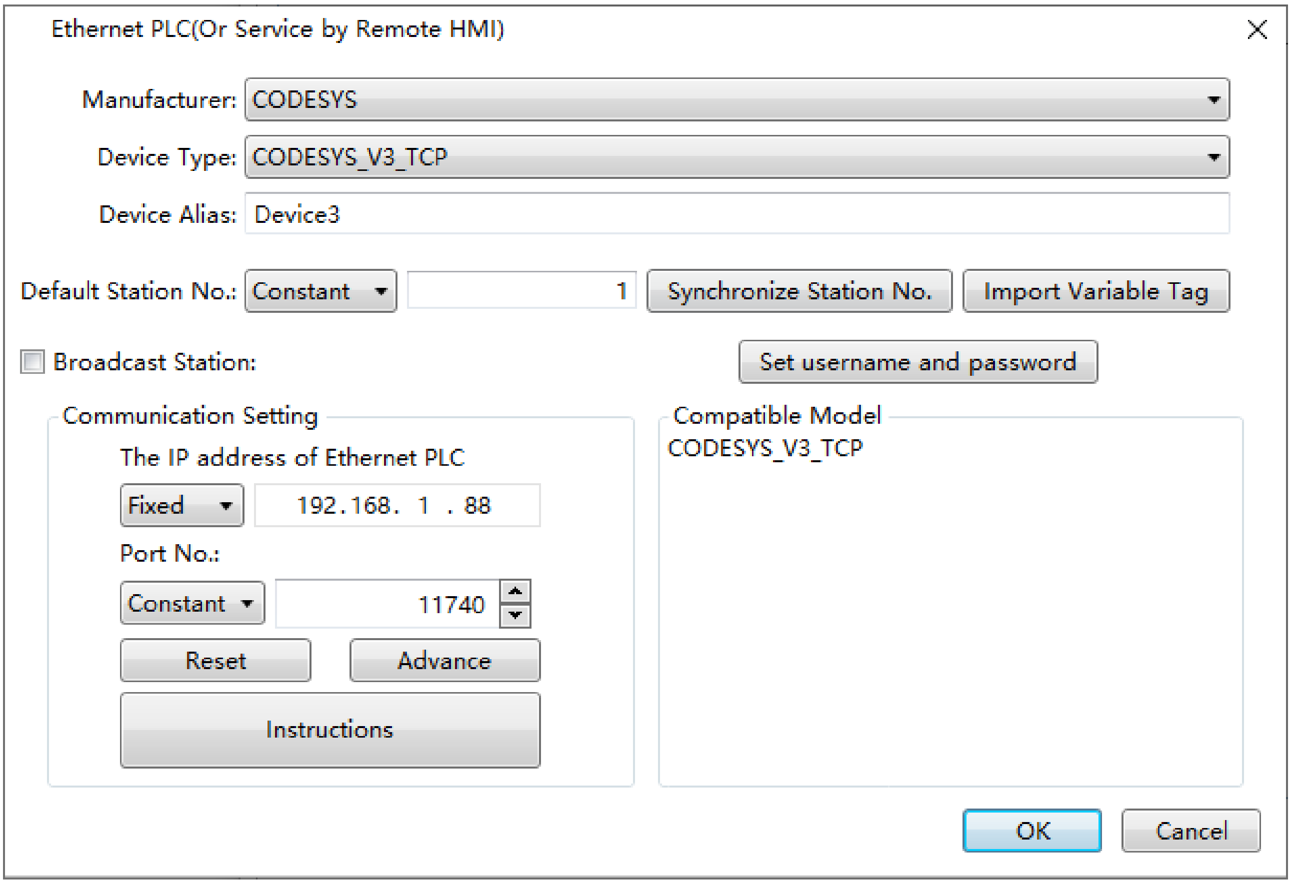
- When PLC is HCFA PLC, configure as shown in the figure below.



Please refer to the table below for detailed configuration.

Parameters	Description
Manufacturer	Select “HCFA”.
Device Type	Select “HC_Q_Codesys_Tag”.
IP Address of Network PLC	Please refer to the actual situation.
Port No.	Use default value 11740.

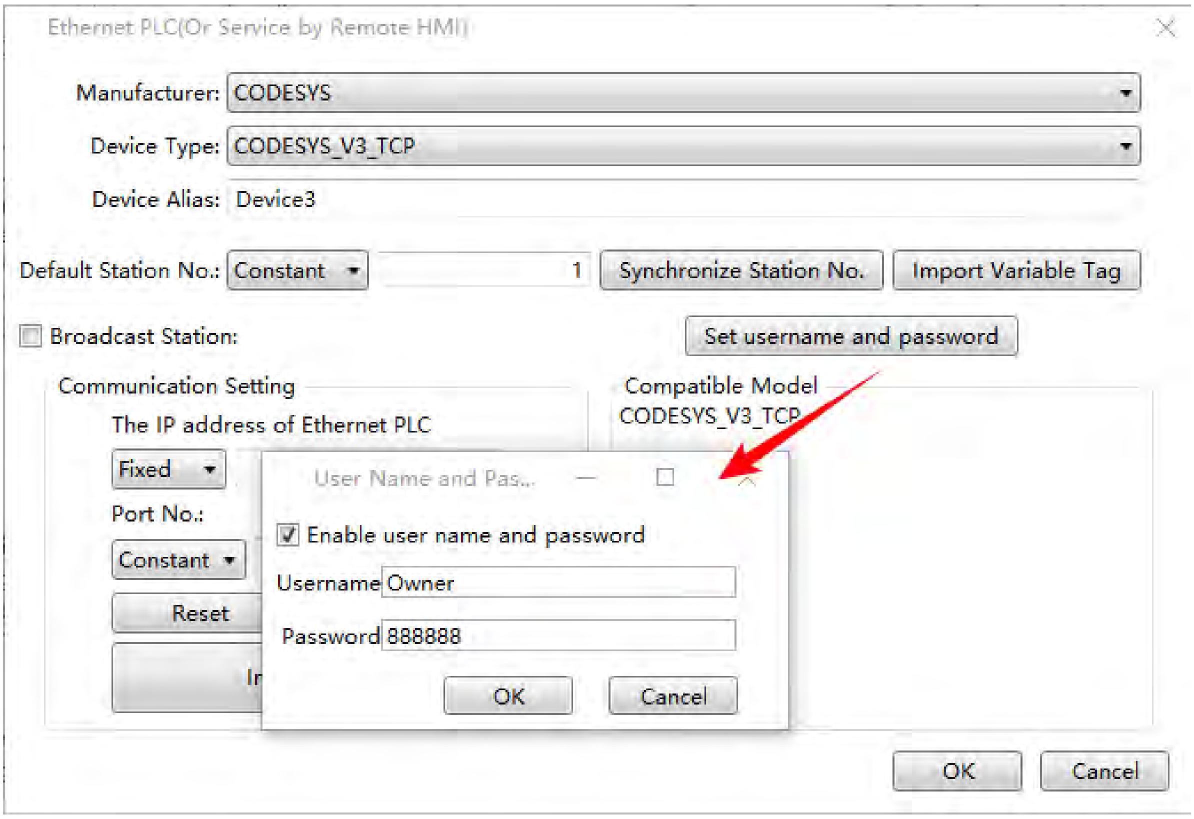
- When PLC is PLC of other brands, configure as shown in the figure below.



Please refer to the table below for detailed configuration.

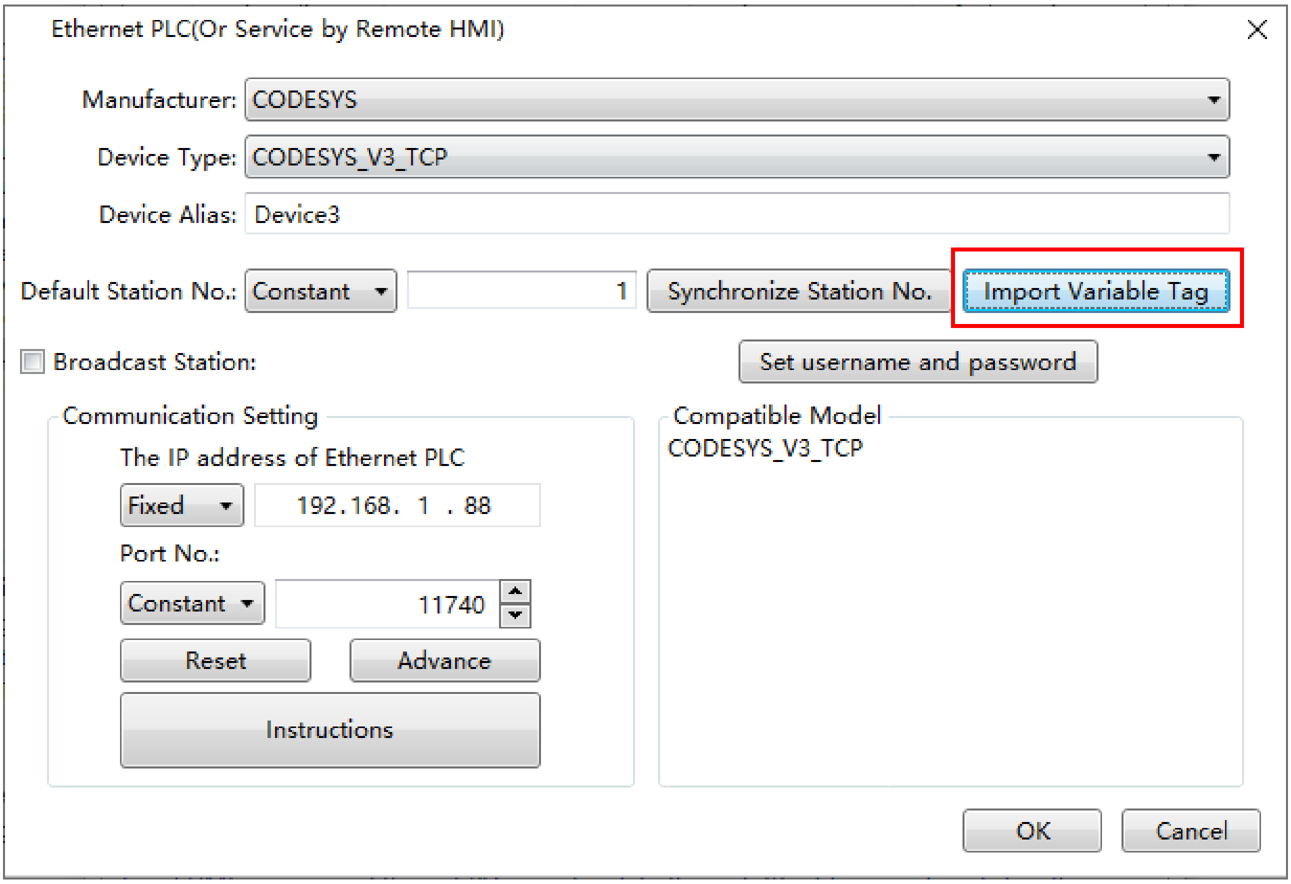
Parameter	Description
Manufacturer	Select "CODESYS".
Device Type	Select "CODESYS_V3_TCP".
IP Address of Network PLC	Please refer to the actual situation.
Port No.	Use default value 11740.

Step 4. (optional) If username and password is set in PLC (using PLC configuration software to monitor PLC requires to verify username and password), click **Set username and password**, check **Enable username and password** in the pop-up dialog box, set username and password, click **OK**.

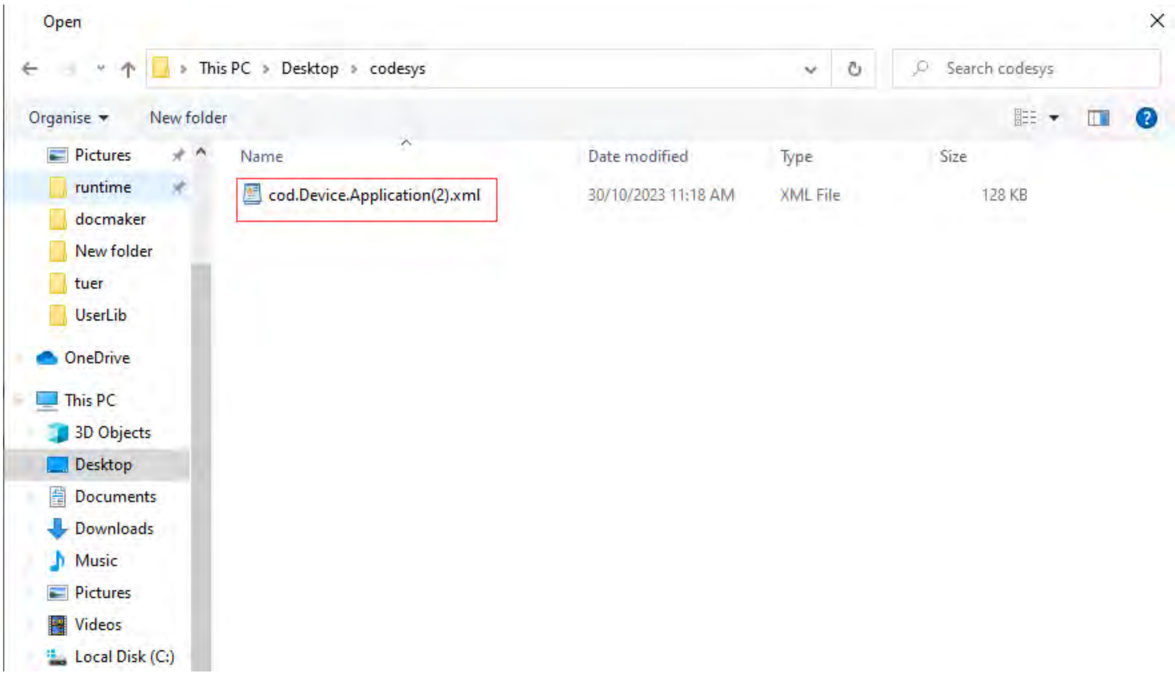


Step 5. Import variable tag.

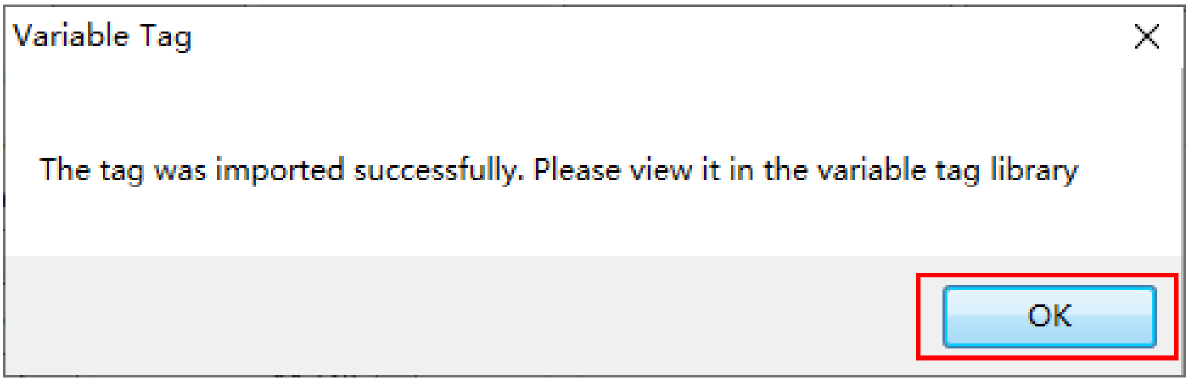
1) Click **Import Variable Tag.**



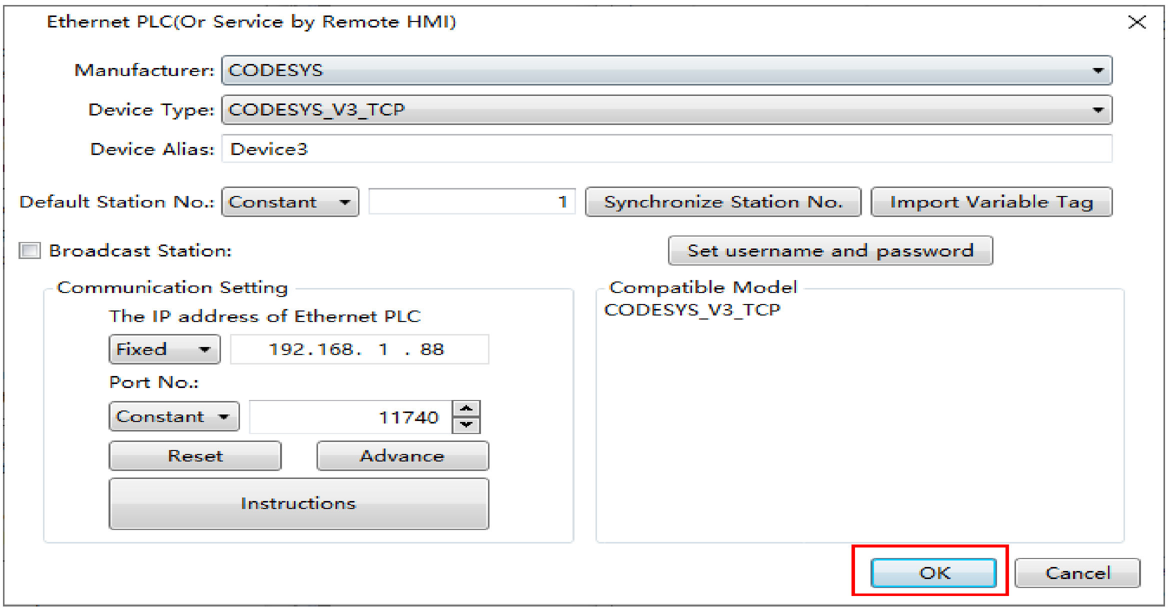
2) Select CODESYS variable tag file in the pop-up dialog box, click **Open**.



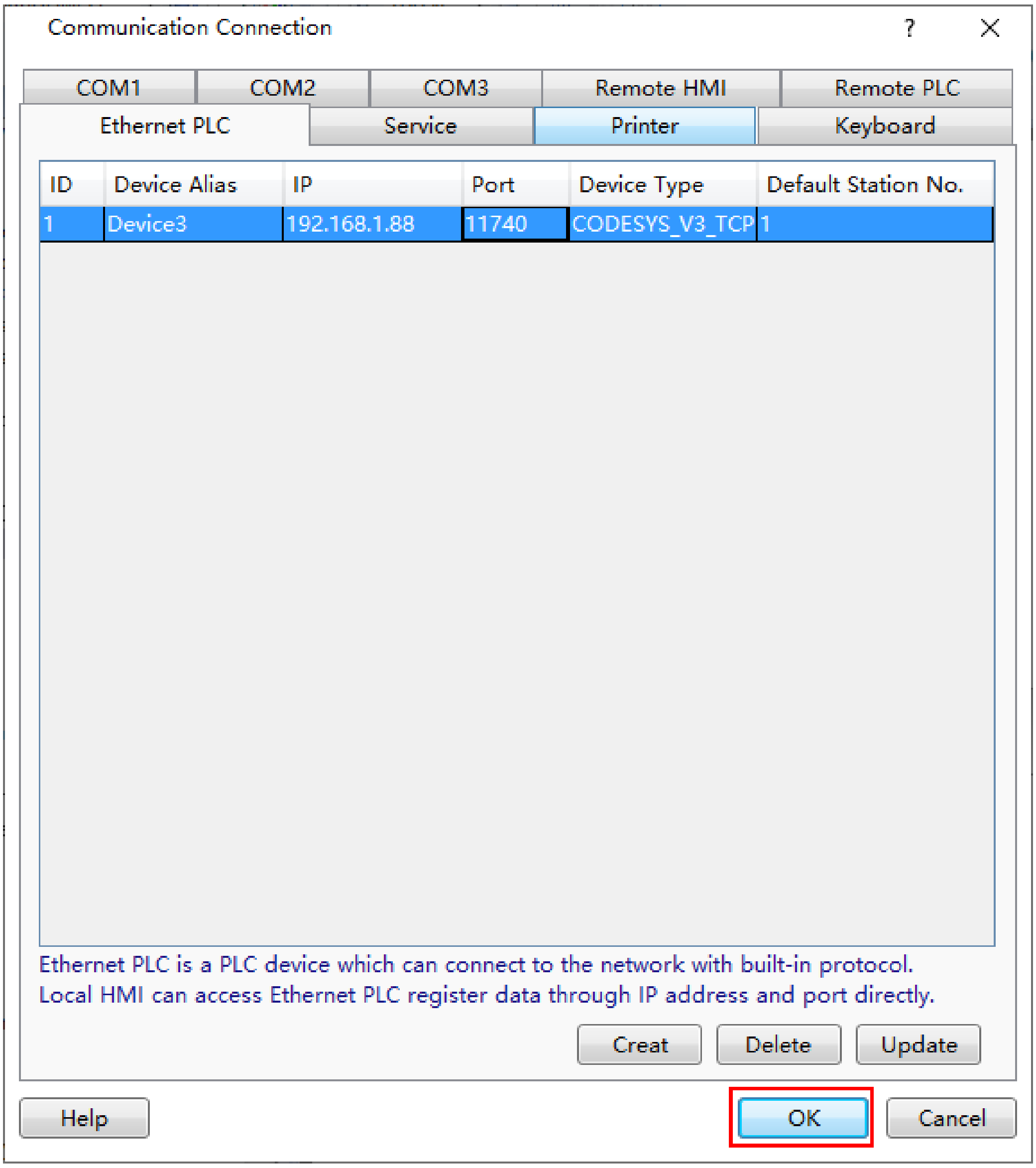
3) Click **OK** in the pop-up dialog box.



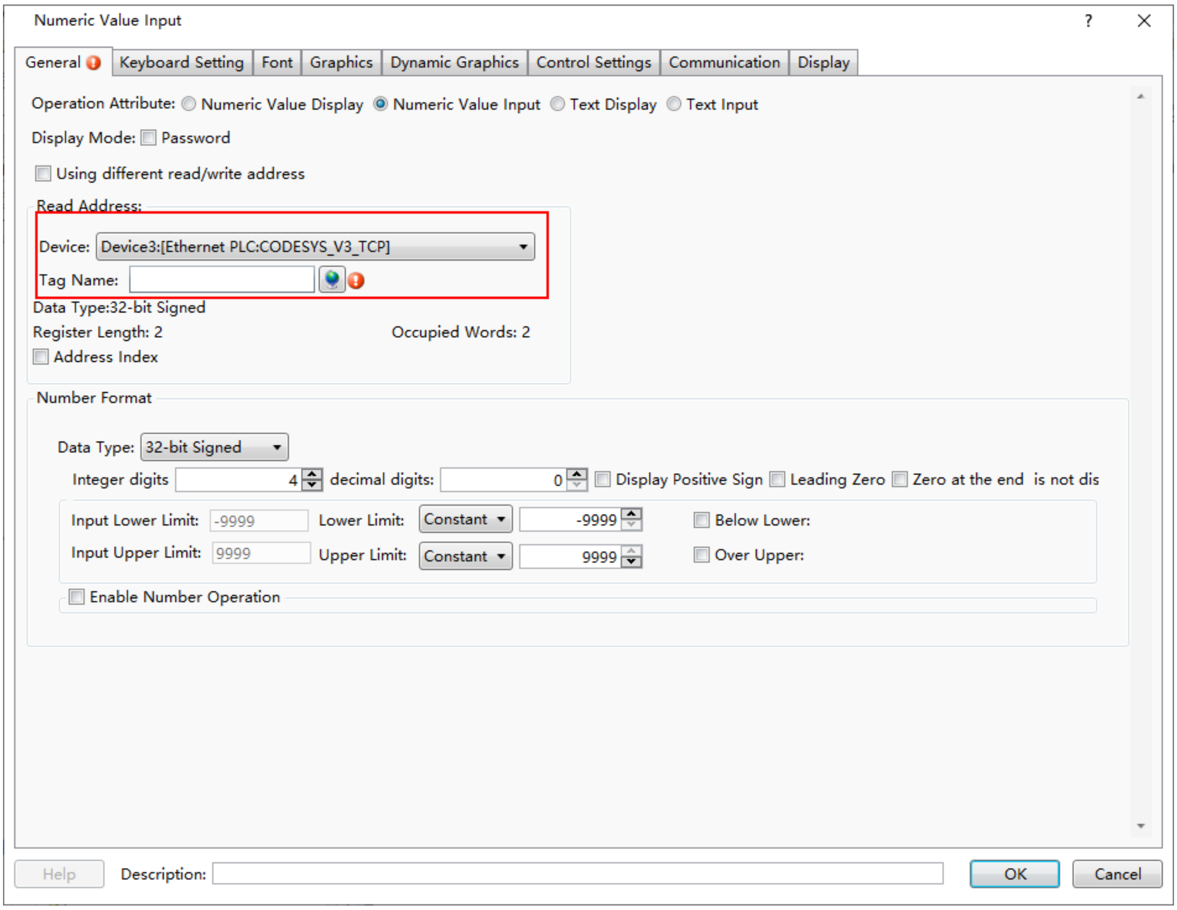
Step 6. Click **OK.**



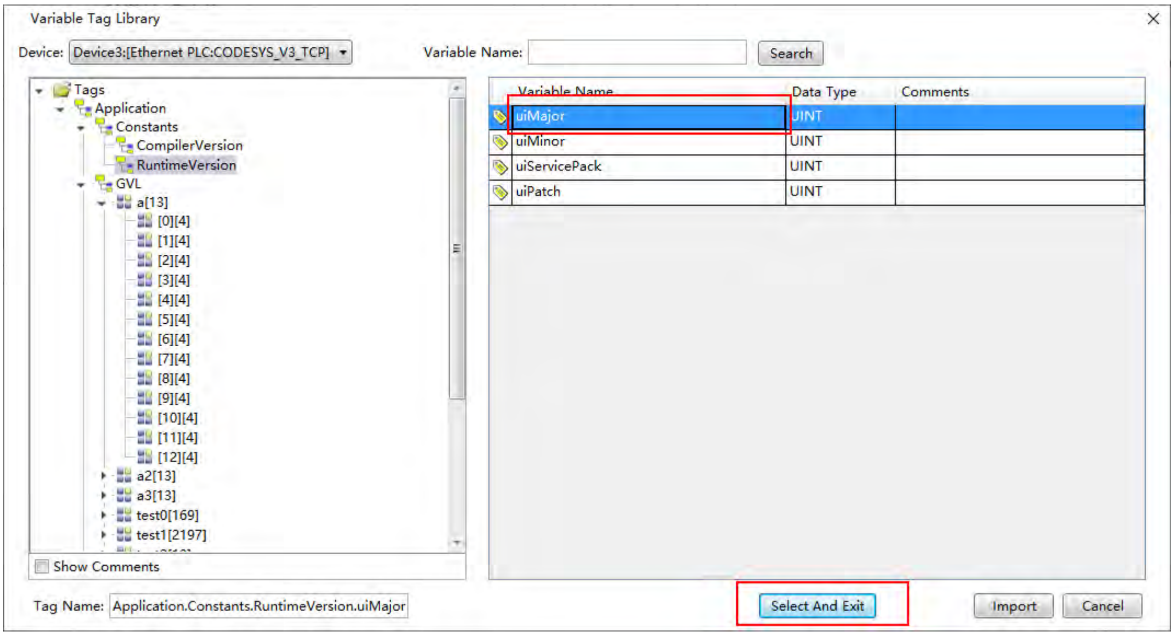
Step 7. Click **OK**.



Step 8. Select **Component/Numeric Value and Text Display/Numeric Value Display** from the menu bar, select device as PLC that support CODESYS_V3_TCP protocol, click the  icon.



Step 9. Select variable tag in the pop-up dialog box, click **Select and Exit**.



Step 10. After adding the numeric value display component, download project to HMI. If the component can display the value of PLC tag normally, it means that the communication is working.

18 Appendix B-Typical Configuration Cases

18.1 User Level

18.1.1 Usage Scenario

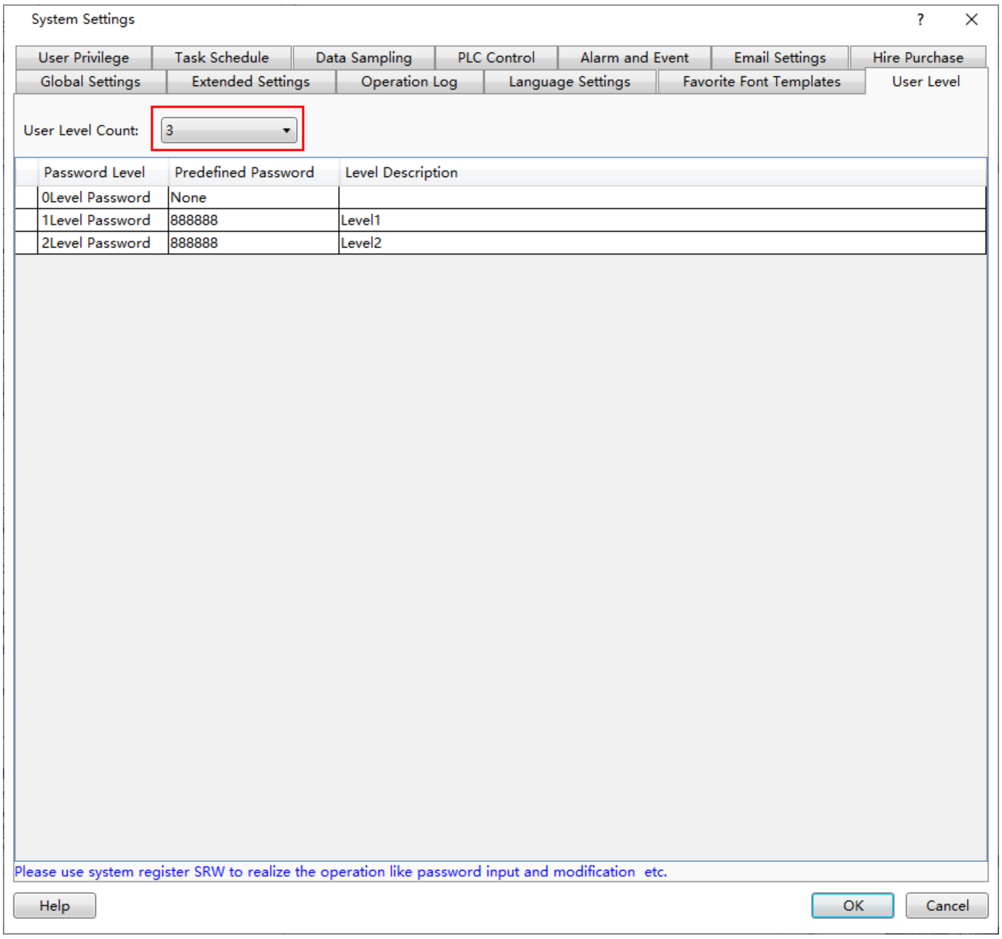
- HMI user system requires to use three user levels (level 0 to level 2, the higher the level, the higher the privilege).
- Only level 2 users can perform operations on numeric input components.

18.1.2 Configuration Steps

Step 1: Create a new project. The specific steps are omitted here.

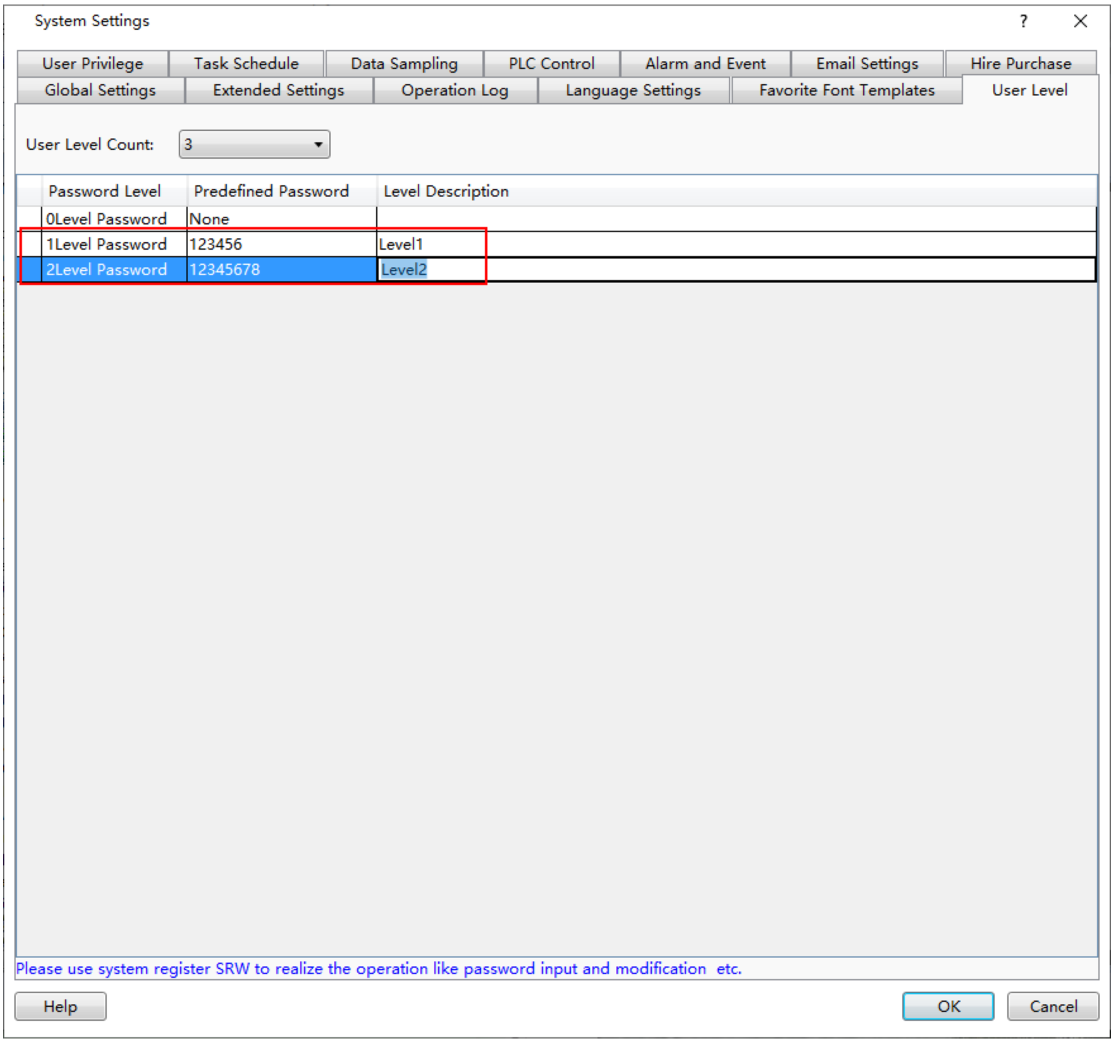
Step 2. Set user levels.

1) Select **Settings/System Settings/User Level** from the menu bar, set the User Level Count to 3 in the pop-up dialog box.



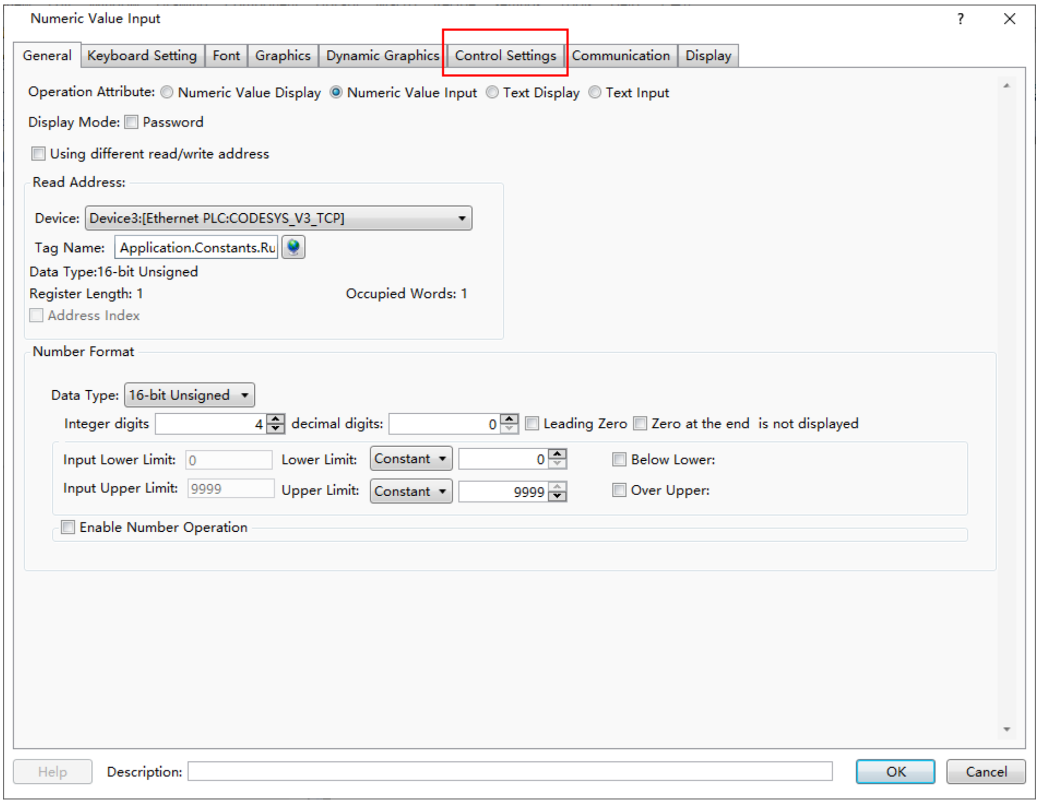
2) In the user level list, set the password for level 1 user to 123456, set the password of level 2 user to 12345678.

3) Click **OK**.



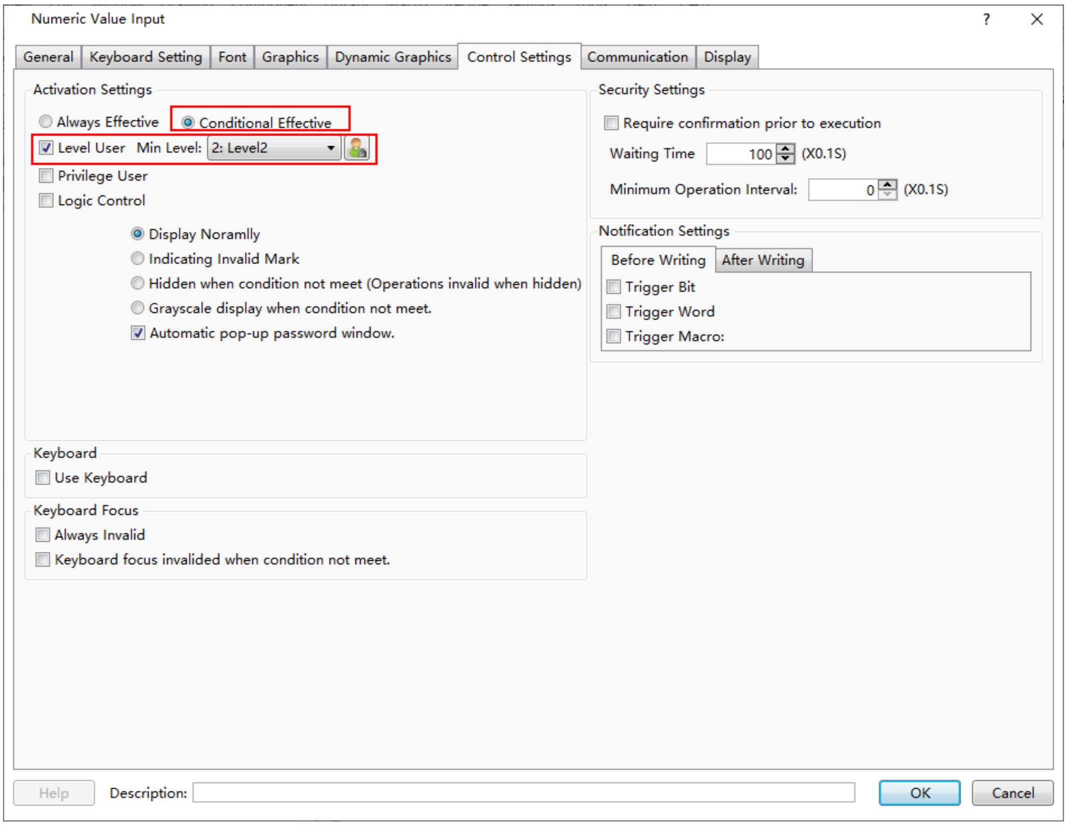
Step 3. Create new numeric value input component.

1) Select **Component/Numeric Value and Text Display/Numeric Value Input**, set the General properties in the pop-up dialog box.



2) Set number format, keyboard setting, font and graphic properties.

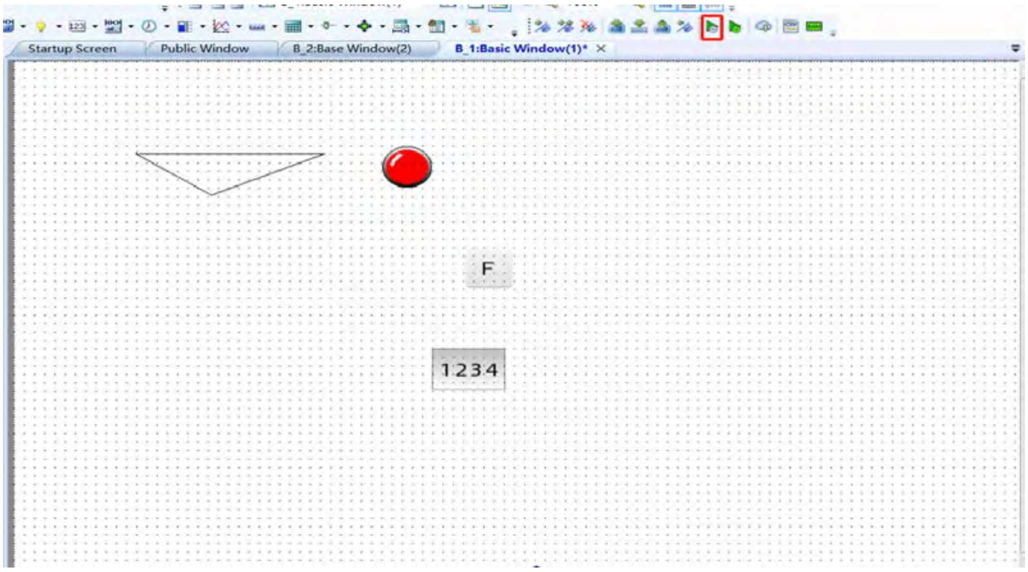
3) Refer to the figure below to set the **Control Settings** properties.



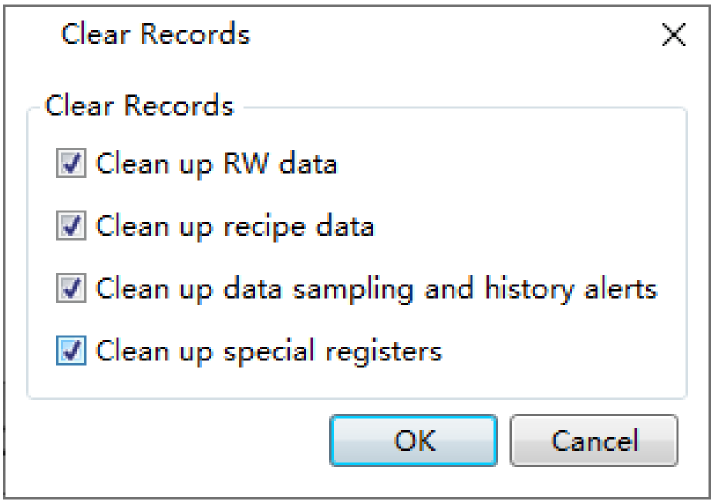
4) Click OK.

18.1.3 Verification Method

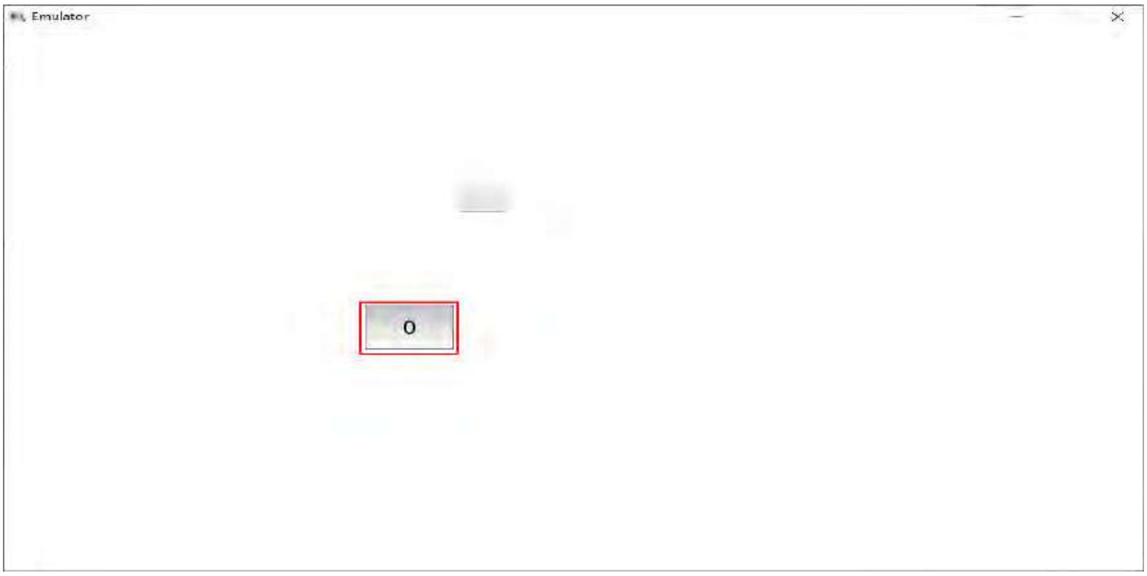
Step 1. Click the  icon in the toolbar.



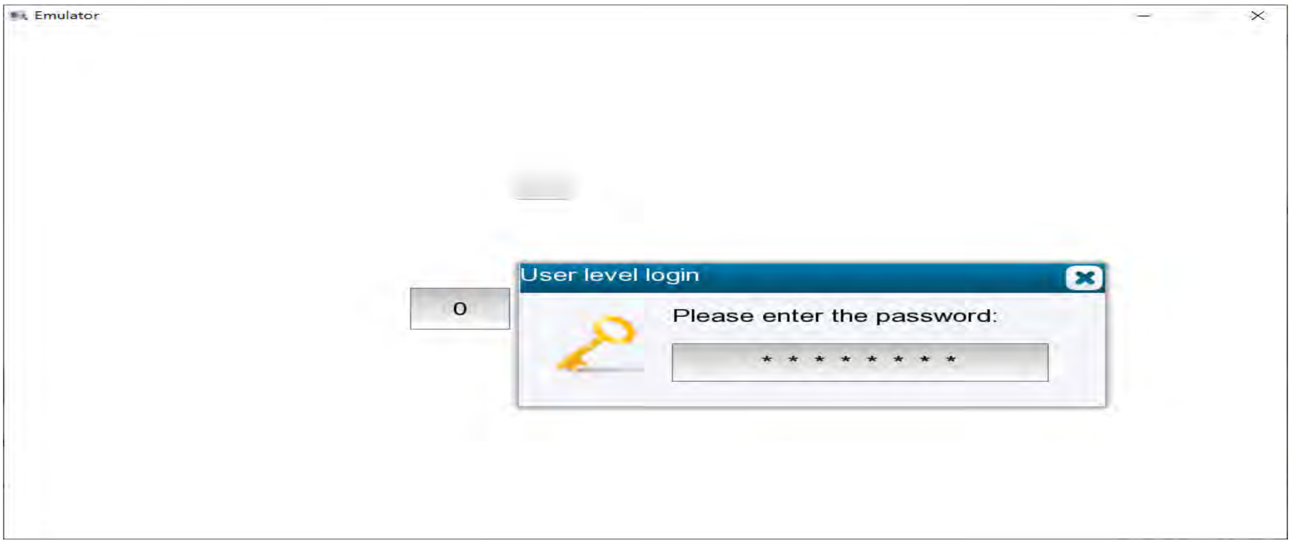
Step 2. Click **OK** in the pop-up dialog box.



Step 3. Enter the **Emulator** interface, click the numeric input component.



Step 4. Click the password input box.

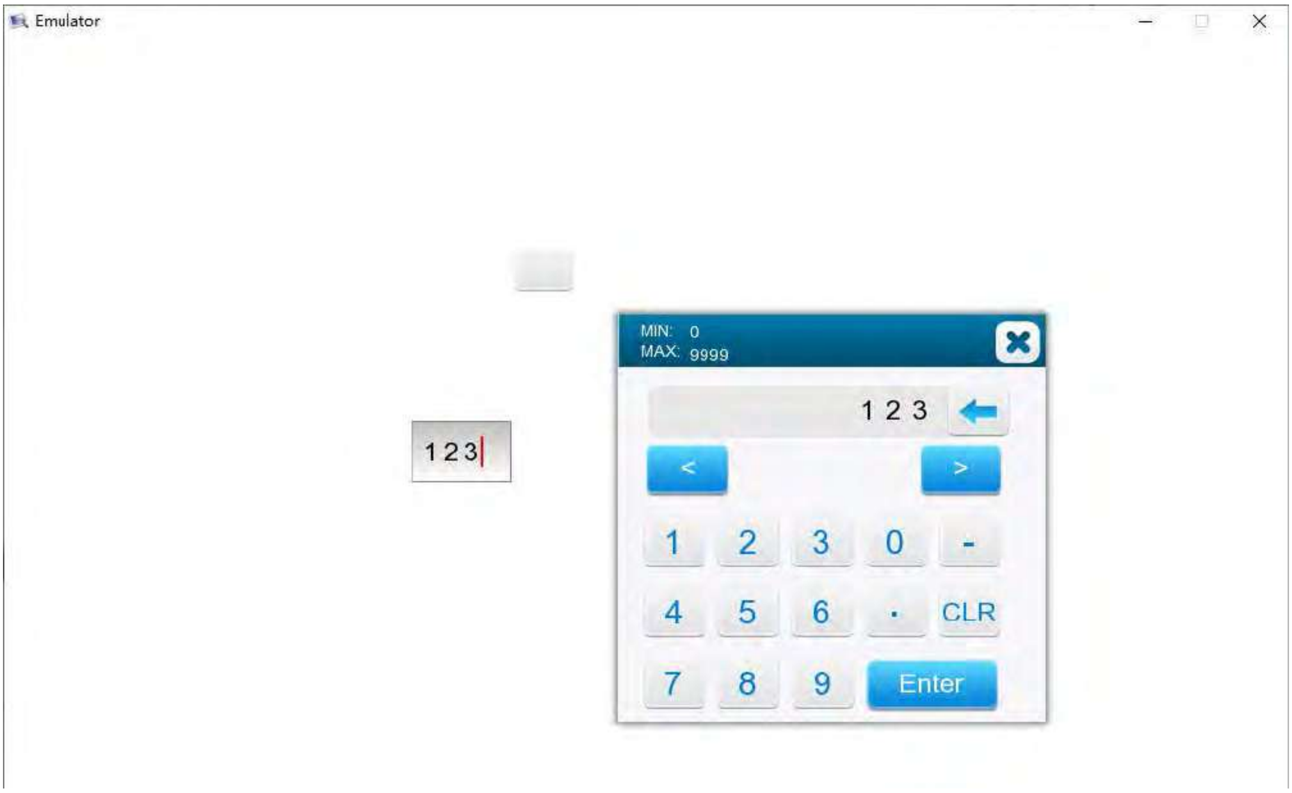


Step 5. Enter “123456” in the pop-up keyboard, click **Enter**.

Step 6. System prompts “Wrong Password”.

Step 7. Click the password input box, enter “12345678” in the pop-up keyboard, click **Enter**.

Step 8. Numeric can be input.



18.2 User Privilege

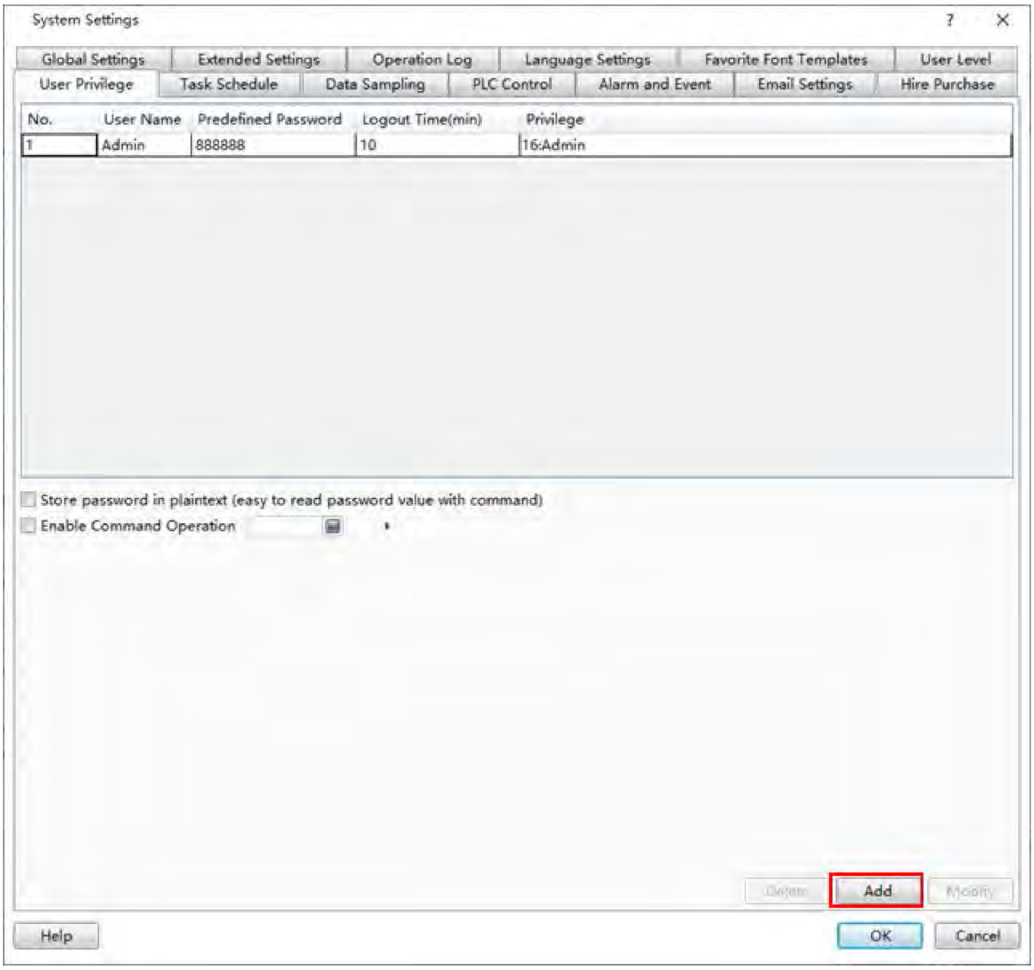
18.2.1 Usage Scenario

Only users with privilege 3 can operate the numeric input component.

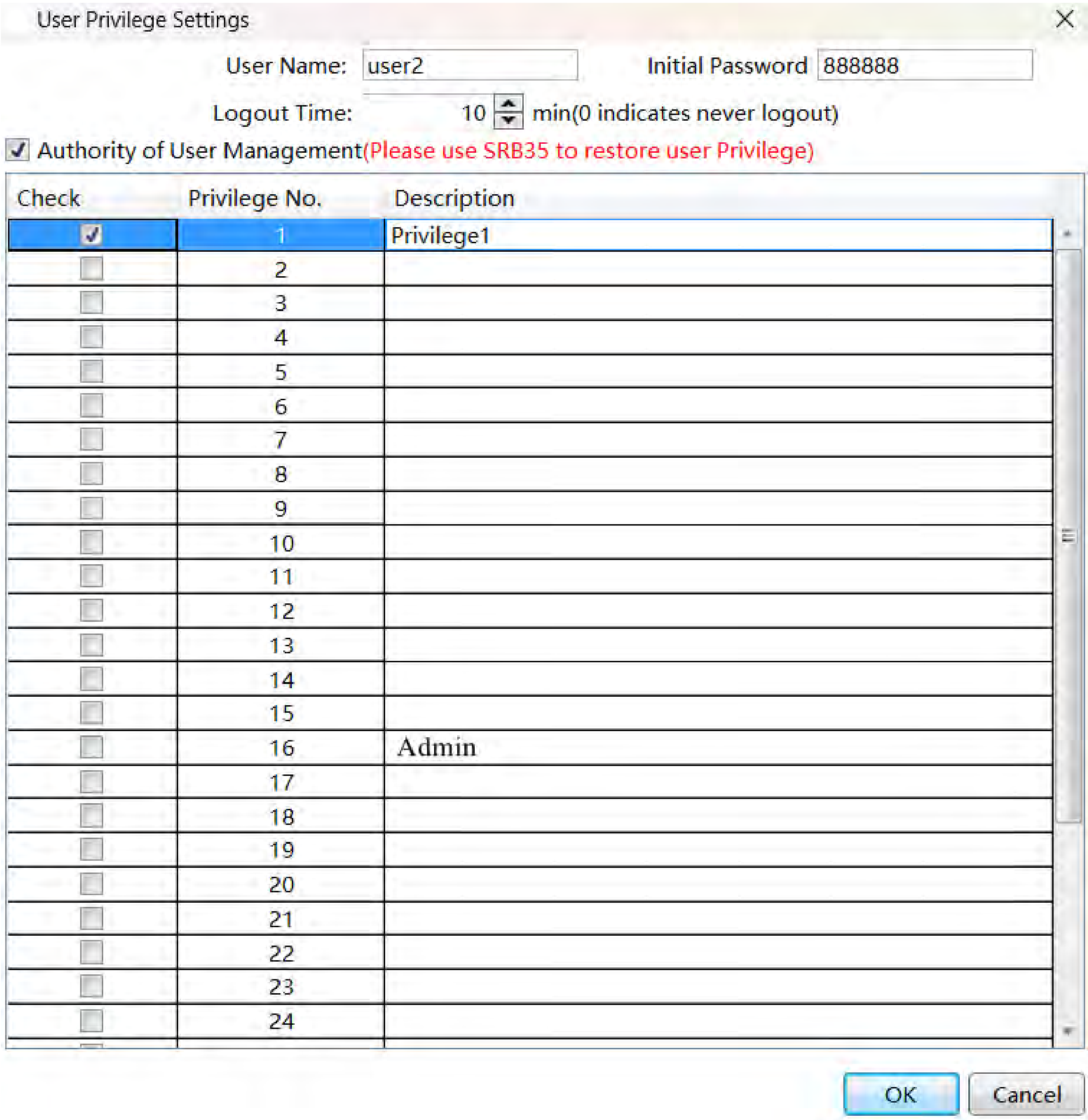
18.2.2 Configuration Steps

Step 1. Configure user privilege.

1) Select **Settings/System Settings/User Privilege** from the menu bar, click **Add** in the pop-up dialog box.

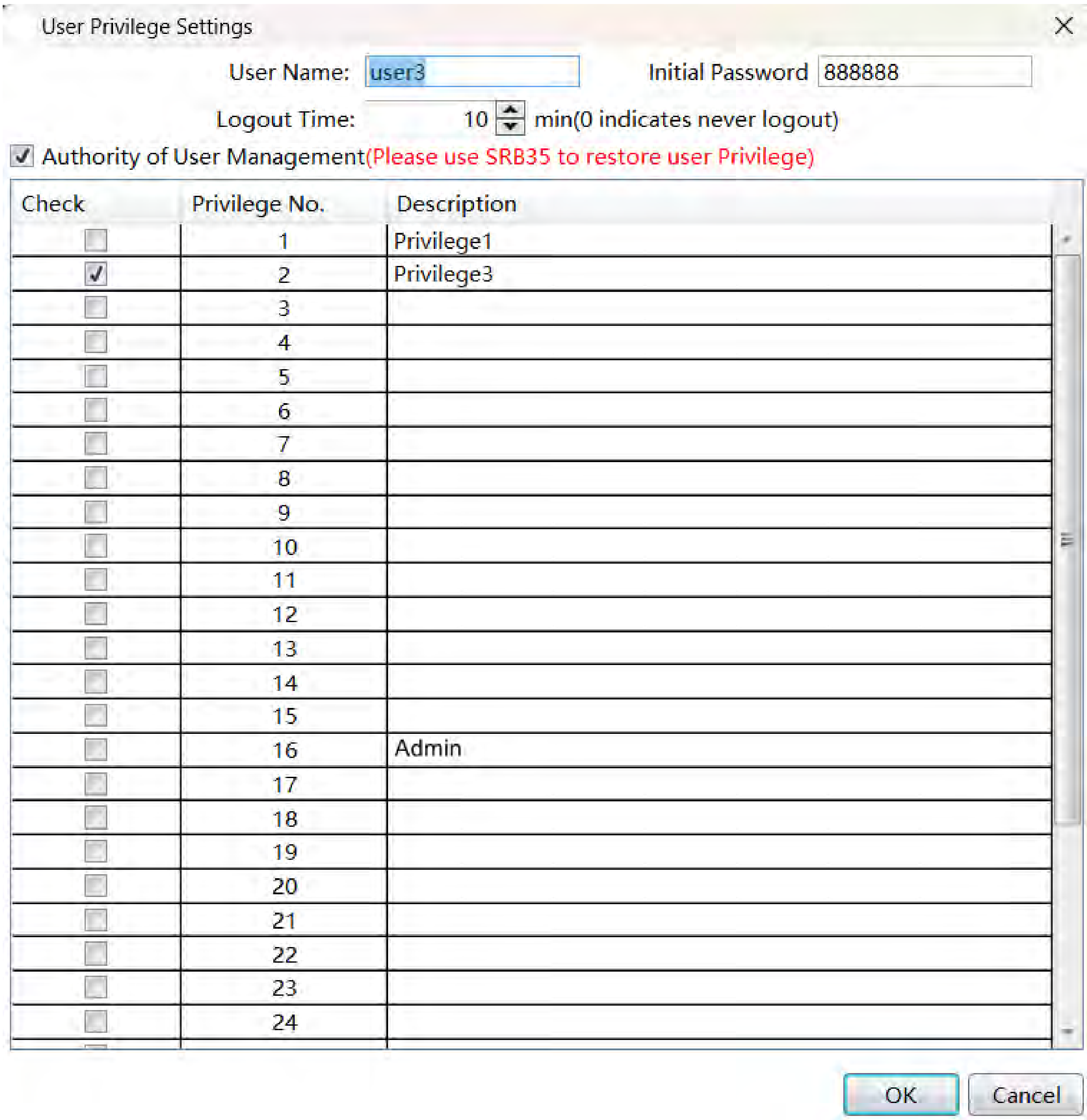


2) Add user with the username user 2, password is 888888, check privilege 1, click **OK**.



3) Use the similar method to add user3, password 888888, with privilege 3.

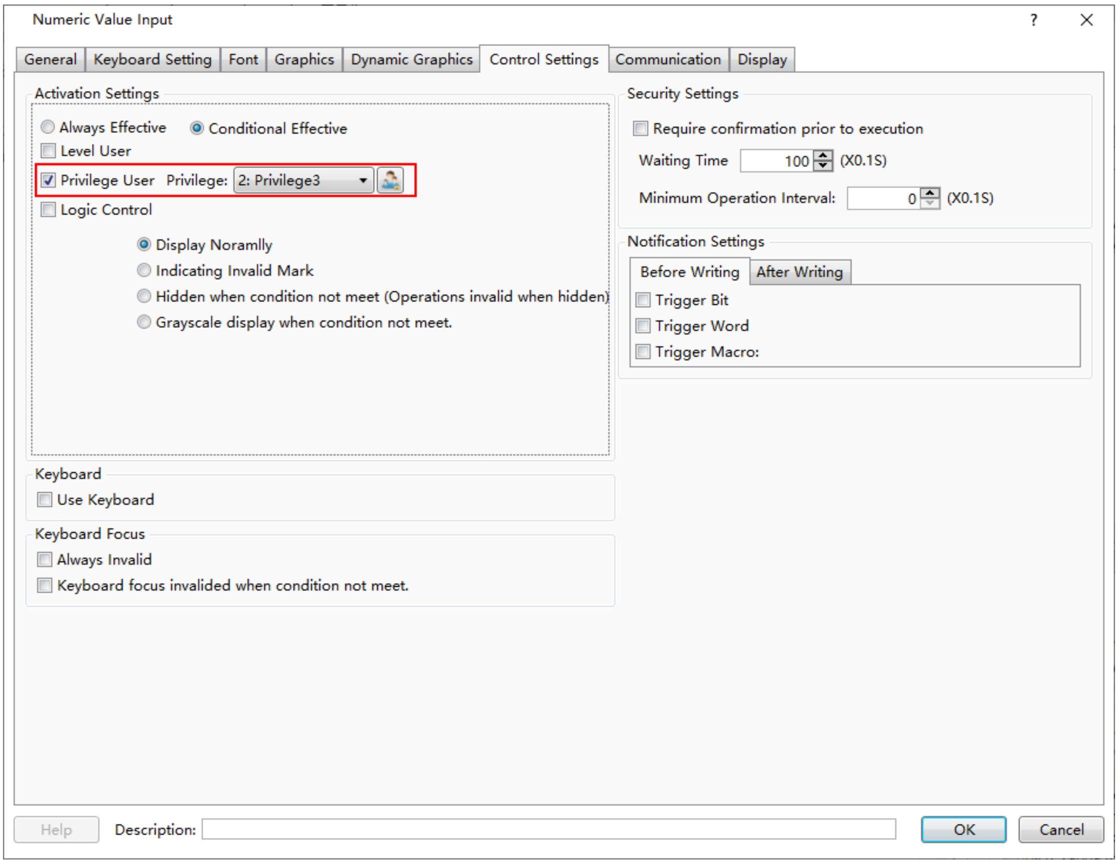
4) Click **OK**.



Step 2. Add numeric input component in basic window 1.

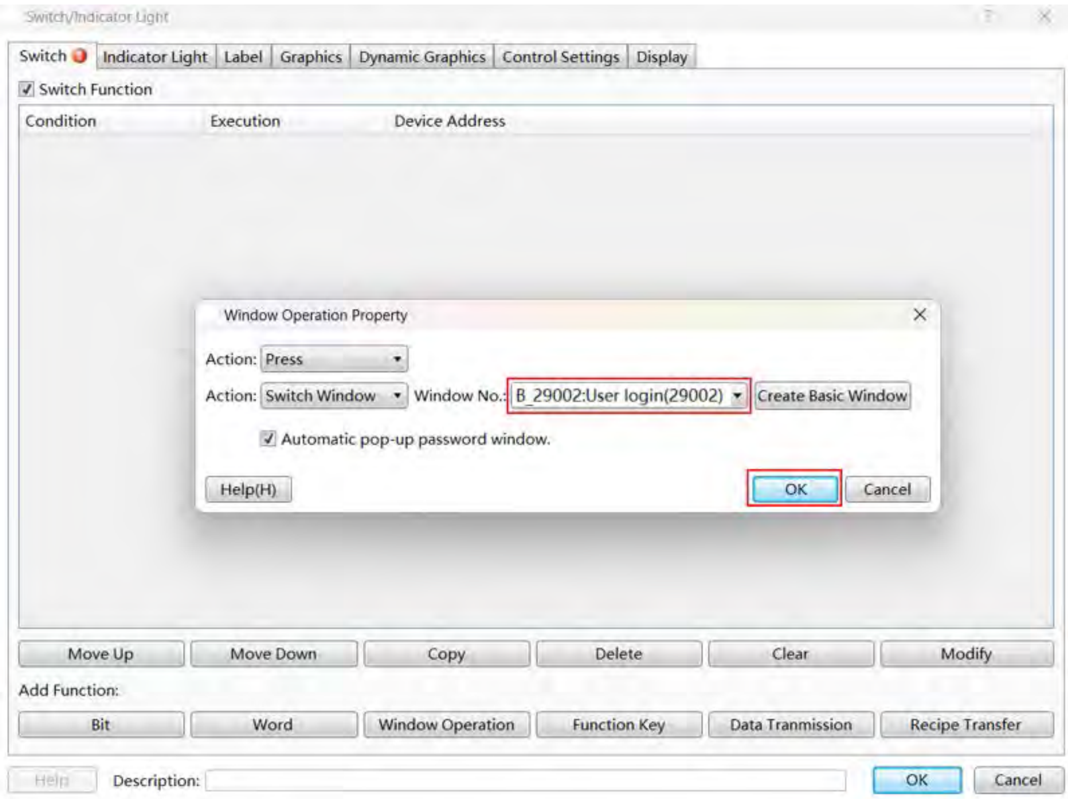
1) Select **Component/Numeric Value and Text Display/Numeric Value Input** from the menu bar, set the General properties and number format, etc.

2) Select the **Control Settings** tab, as shown in the figure below.

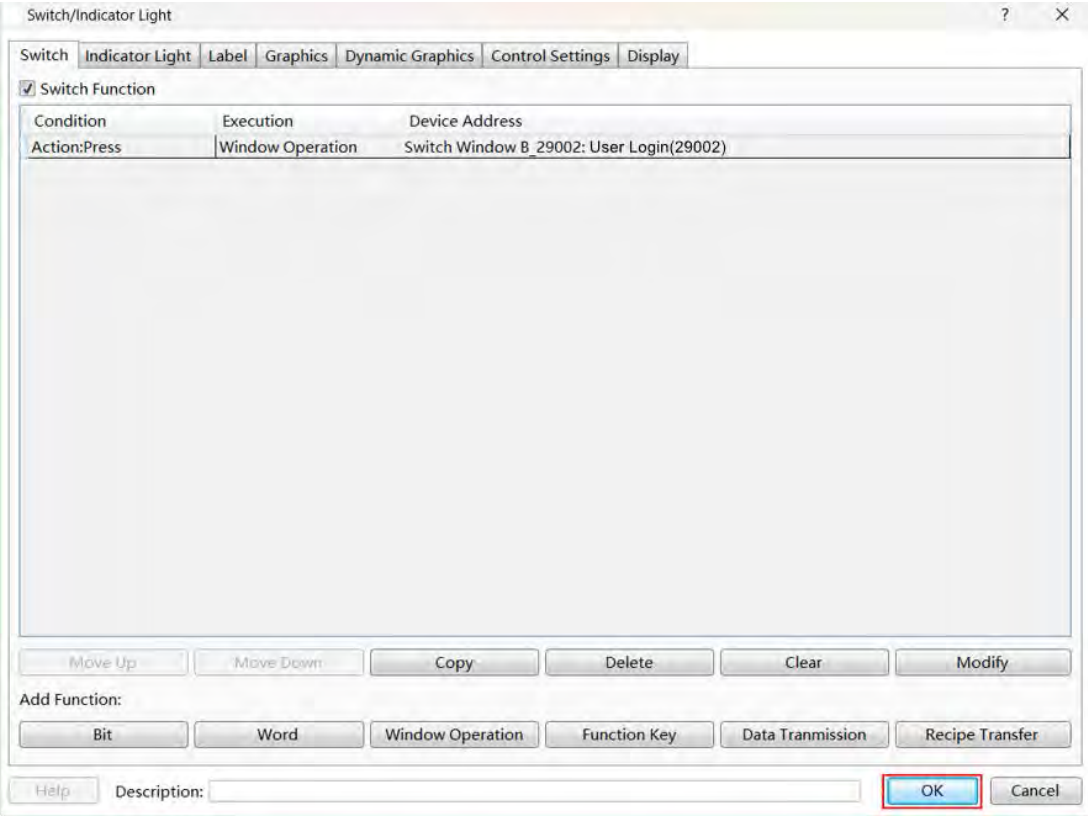


Step 3. Add the switch component to switch to specified window.

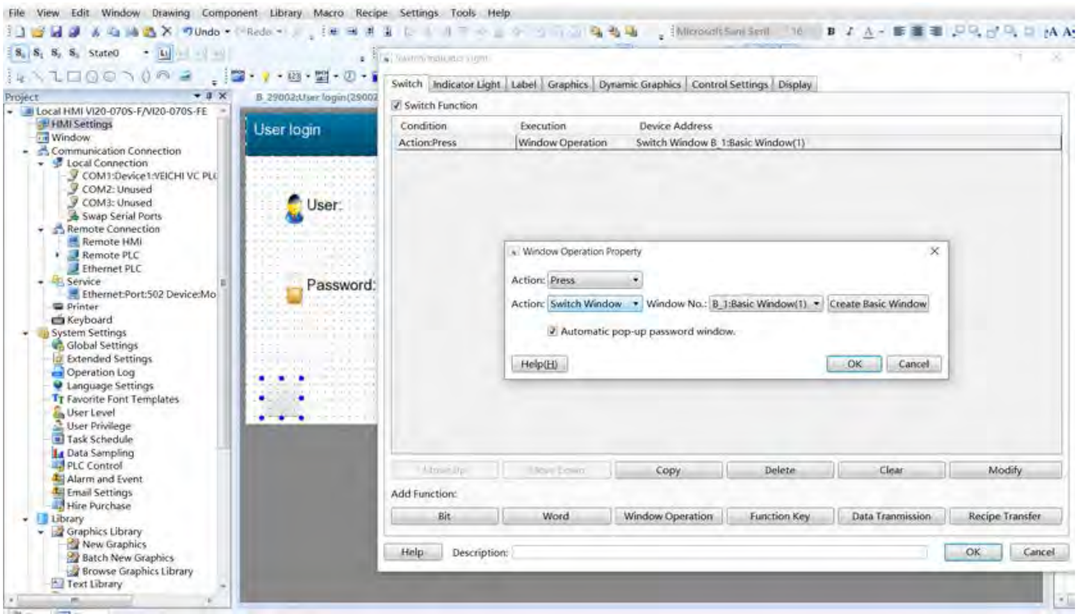
1) Select **Component/Switch/Window operation** from the menu bar, and configure in the pop-up dialog box as shown in the picture below.



2) Click **OK**.

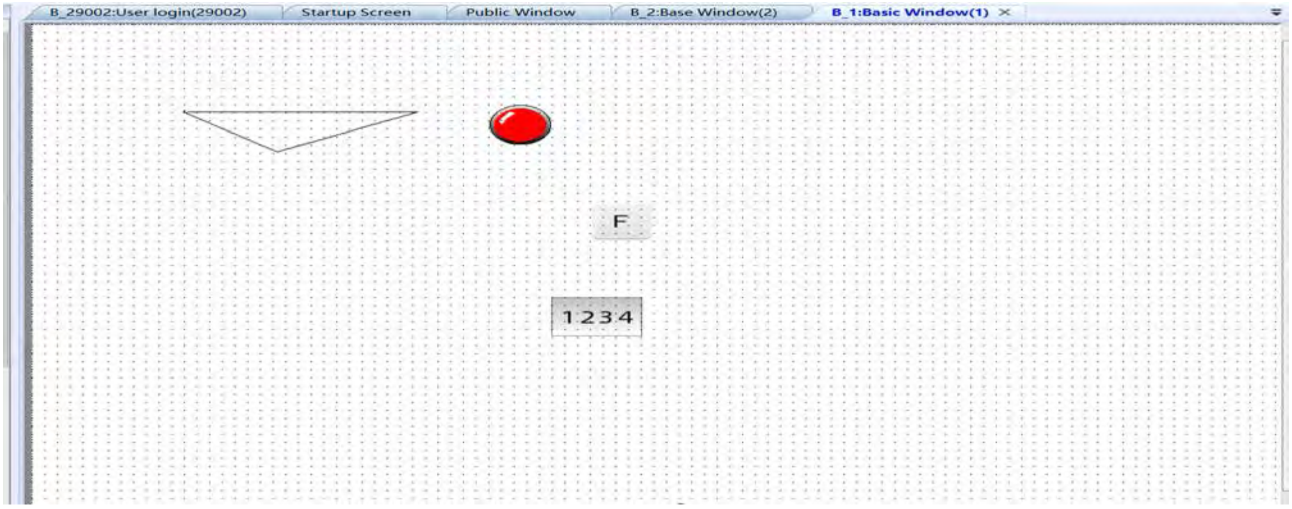


Step 4. Add window switch (switch to basic window 1) in the **User Login** window.

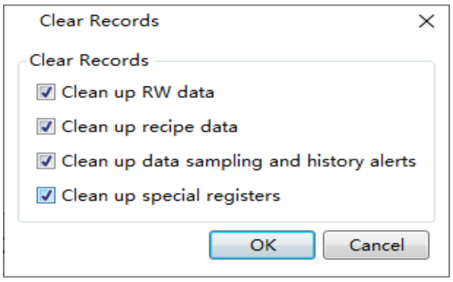


18.2.3 Verification Method

Step 1. Click the  icon in the toolbar,

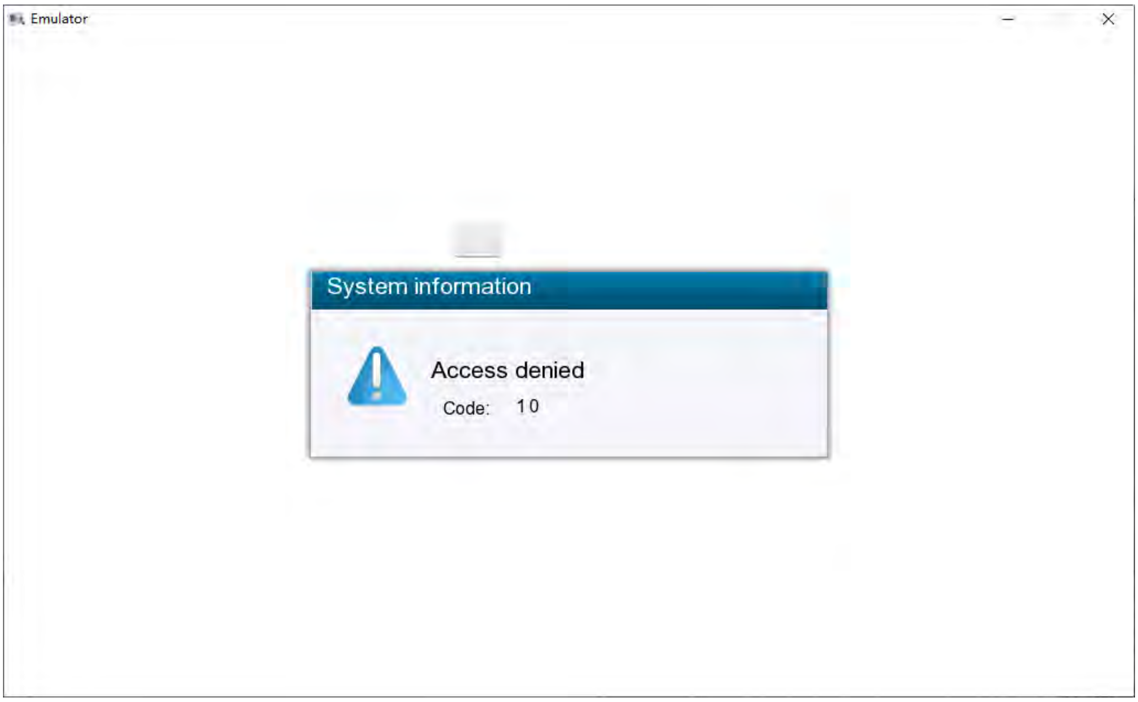


Step 2. Click **OK** in the pop-up dialog box.

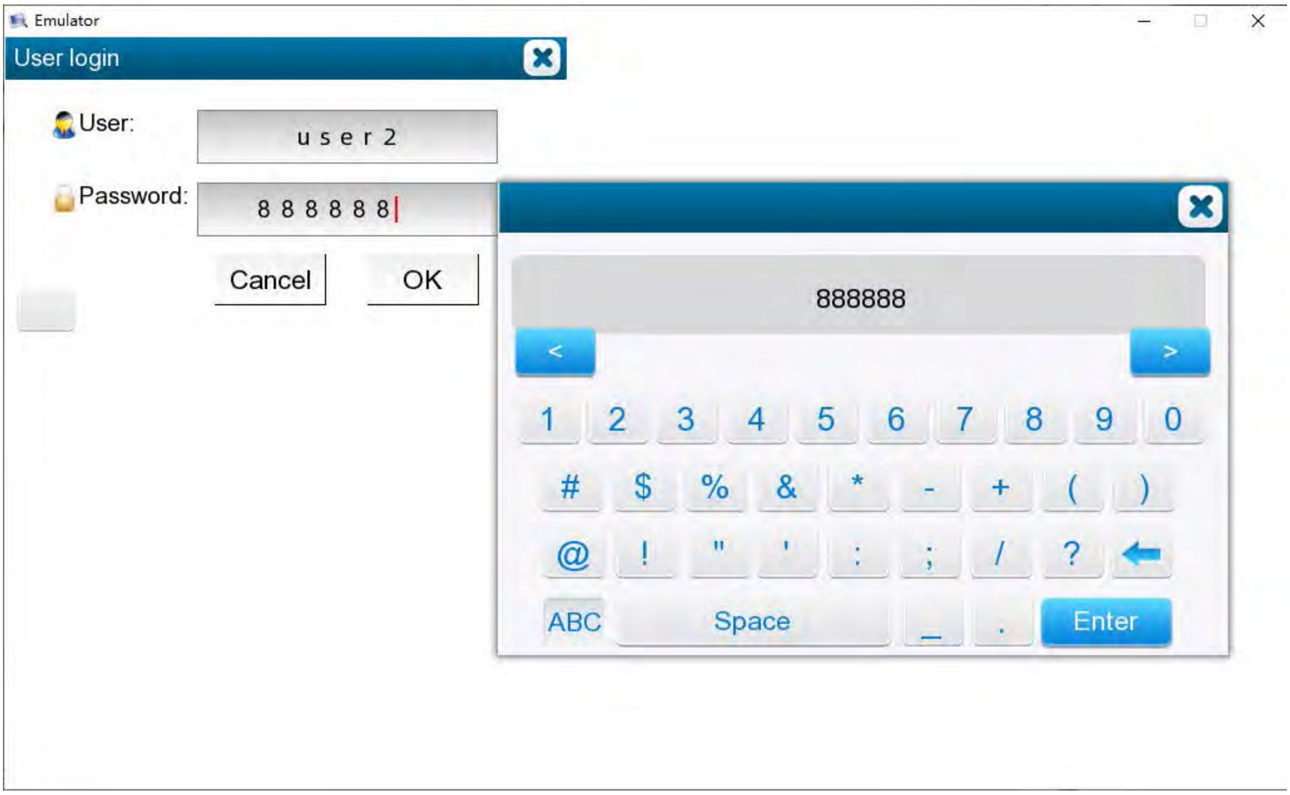


Step 3. Enter the **Emulator** window, click the numeric input component, system prompts "Access denied".

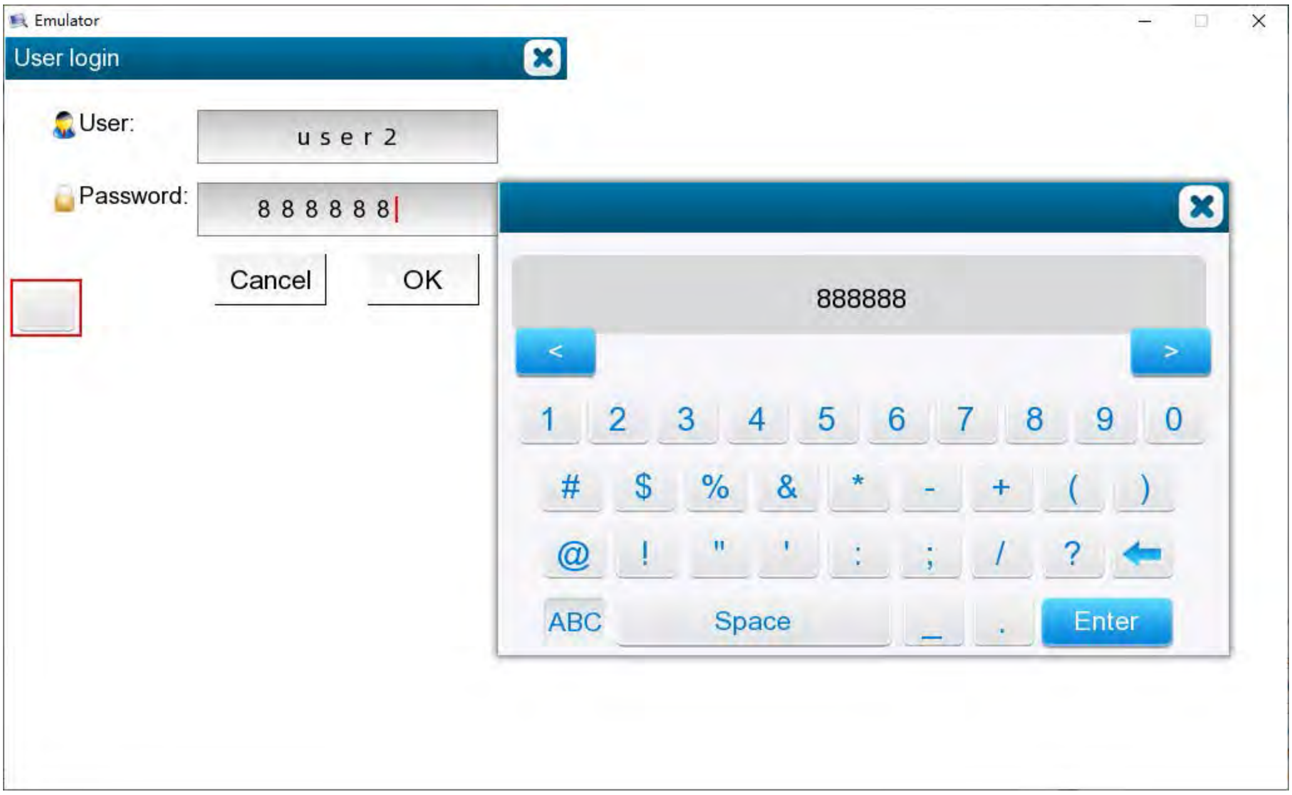
Current user is "administrator", it only has privilege 16, thus it can not operate this numeric value input component.



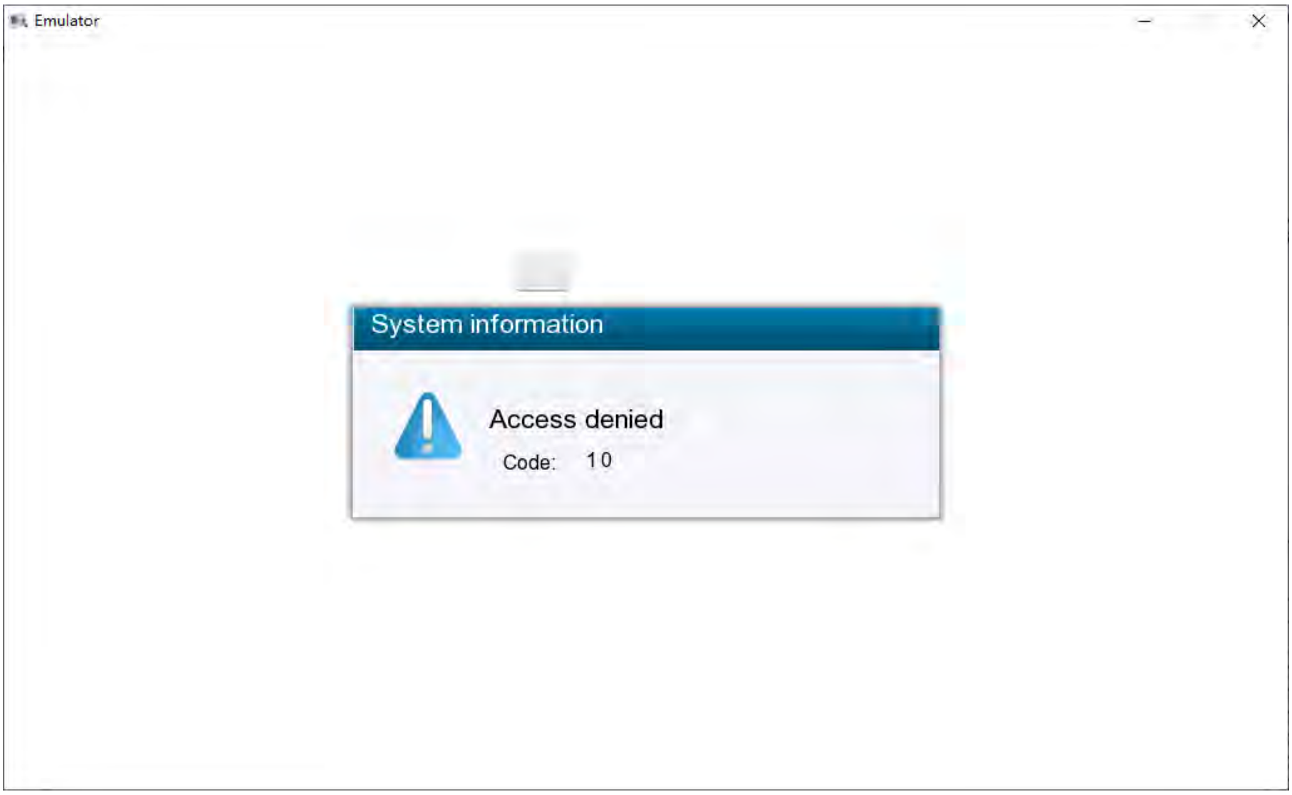
Step 4. Click to switch to the **user login** window, and log in with user2.



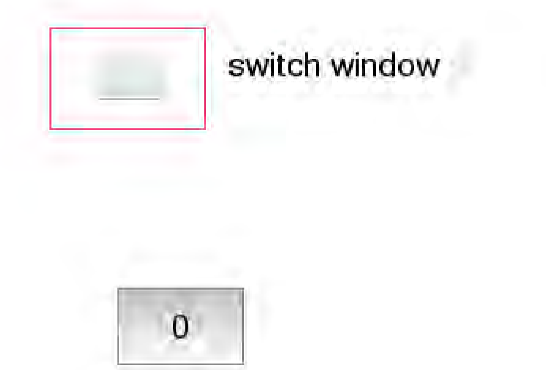
Step 5. Click switch to basic window 1.



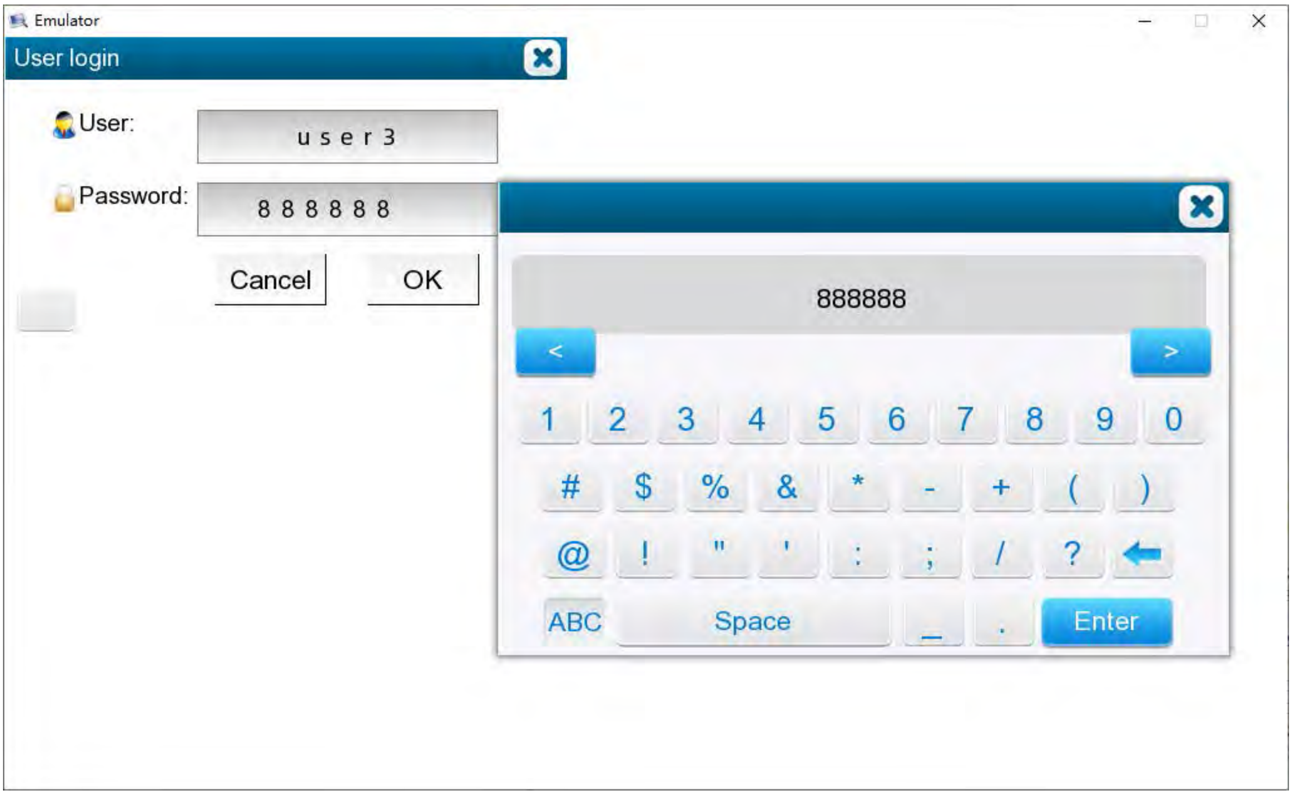
Step 6. Return to basic window 1, click the numeric value input component, system prompts “Access denied”.



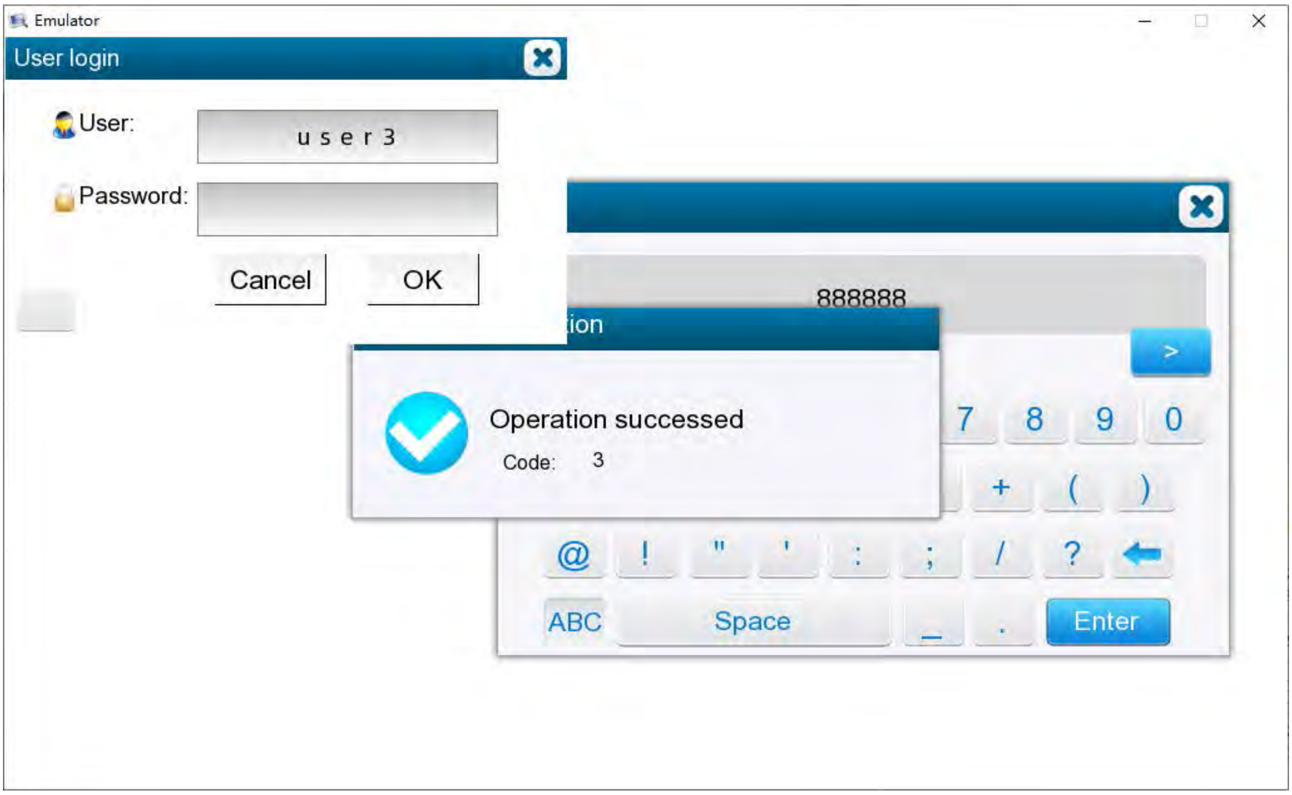
Step 7. Click switch to **user login** window.



Step 8. Log in with user3.



Step 9. Click switch to basic window 1.



Step 10. Return to basic window 1, click the numeric value input component to enter the number.

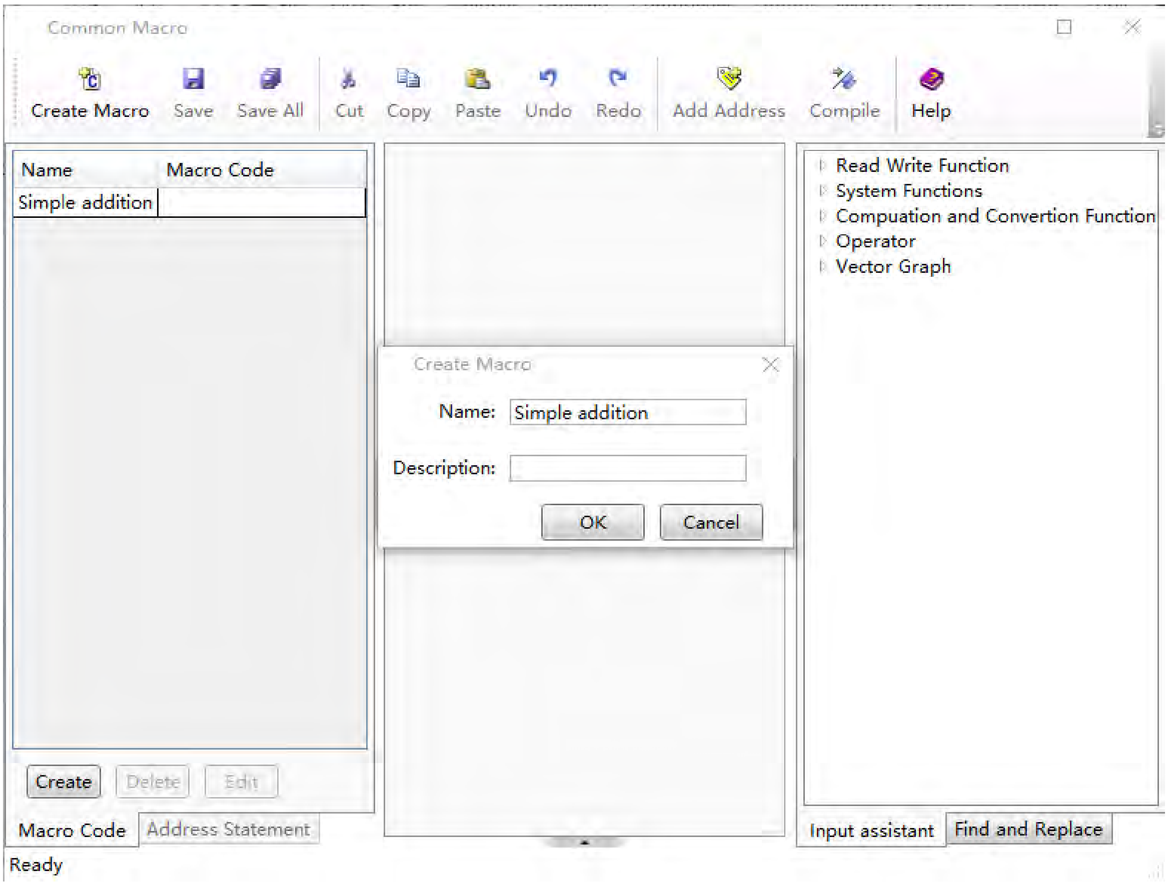
18.3 Macro

18.3.1 Usage Scenario

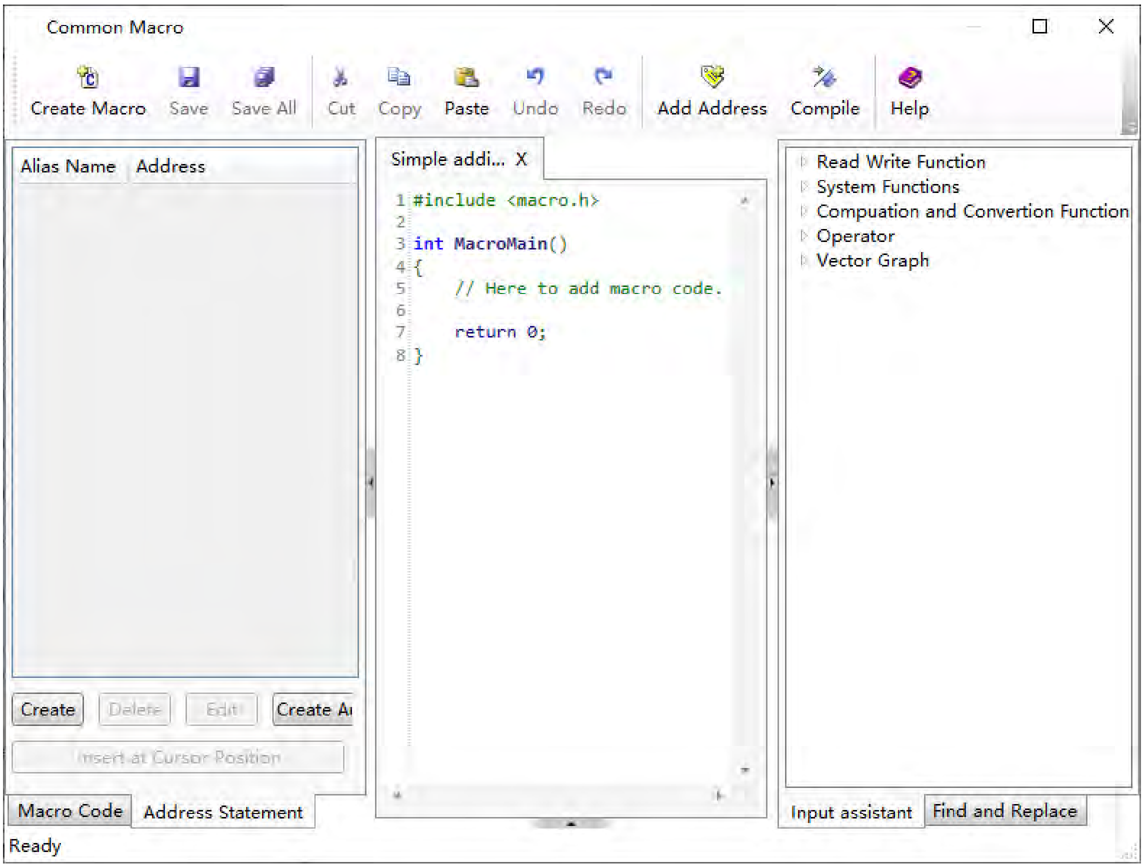
Use macro instructions to perform a simple addition operation, making the value of word address LW0 equal to the sum of the values of word address LW2 and word address LW4.

18.3.2 Configuration Steps

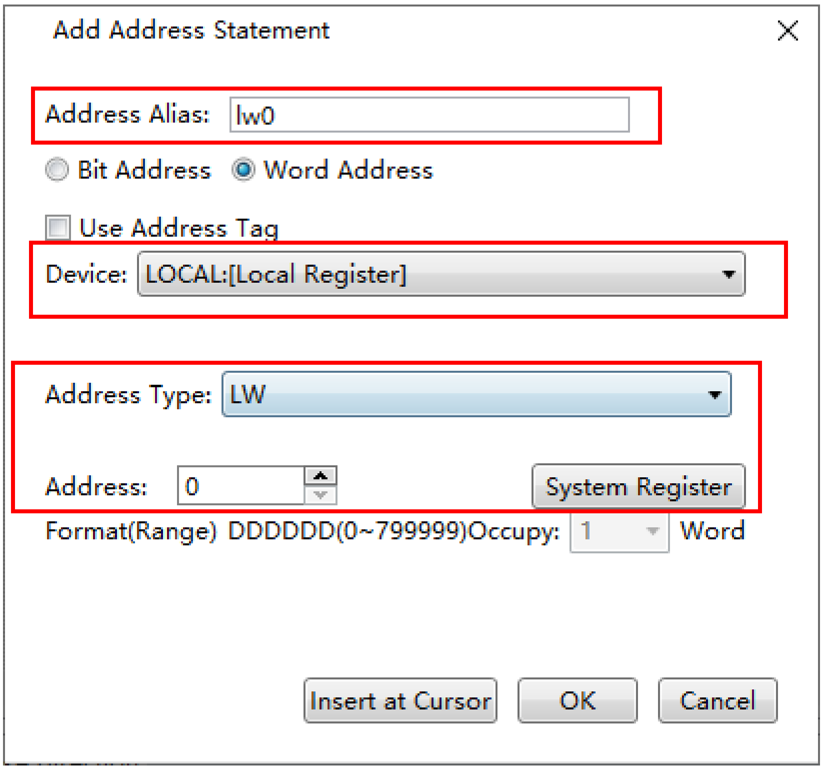
Step 1. Select **Macro/Common Macro/Create Macro**, edit the macro name in the pop-up dialog box, click **OK**.



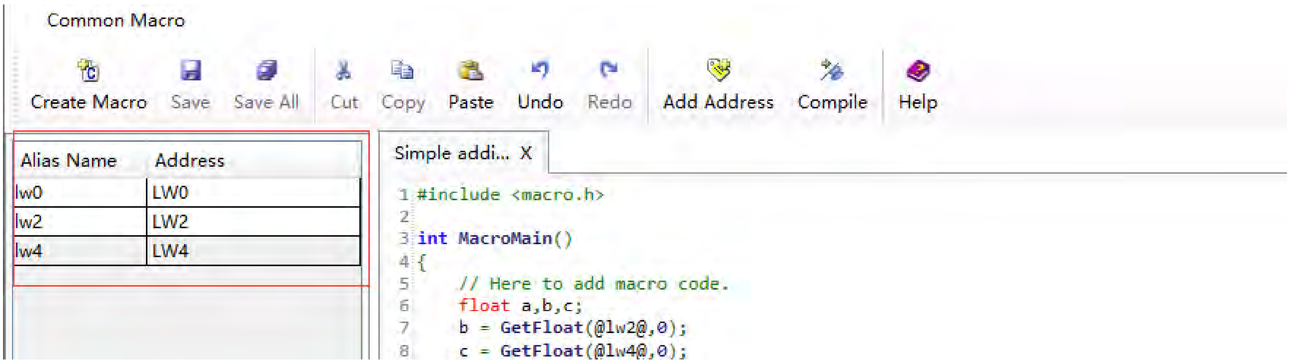
Step 2. Click **Create** in the **Address Statement** area.



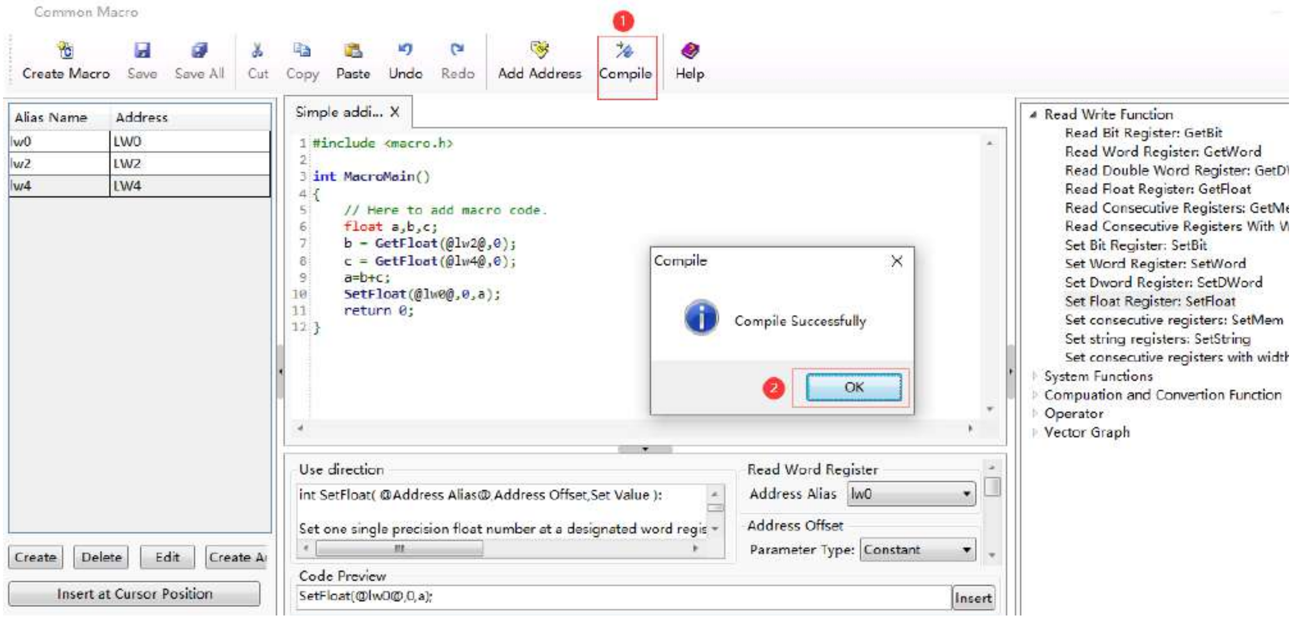
Step 3. In the pop-up window, Set the address alias to lw0, set the address to LW0, click **OK**.



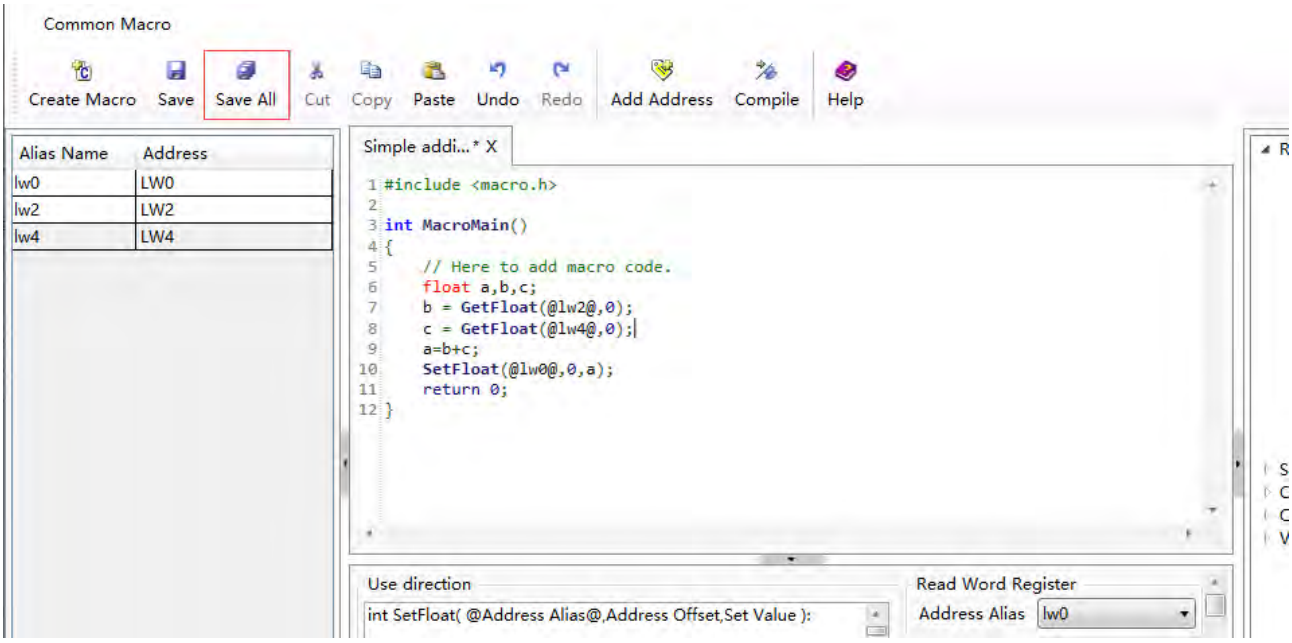
Step 4. Follow the 2 steps above to create Address Statement lw2 and lw4.



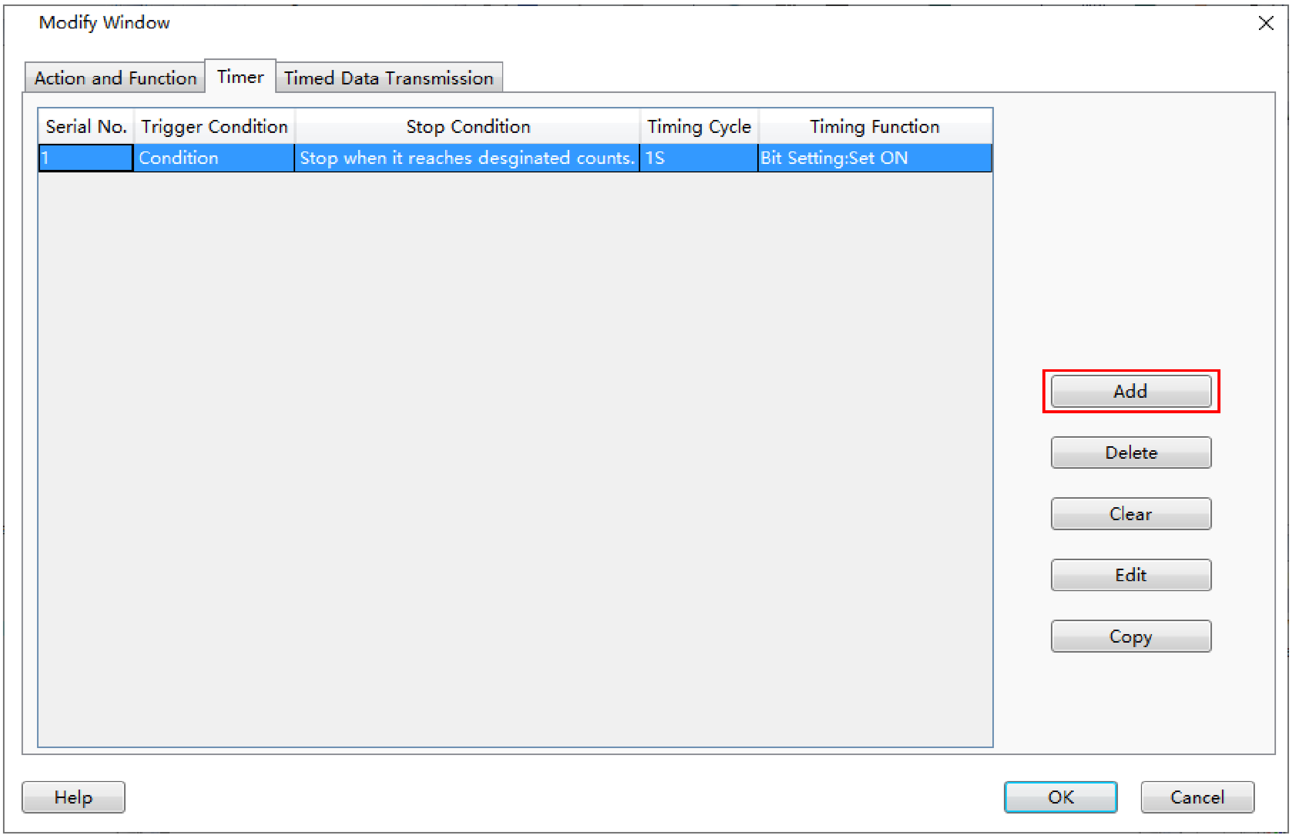
Step 5. Edit the macro code in reference to the figure below, click **Compile**, ensure the compilation is successful.



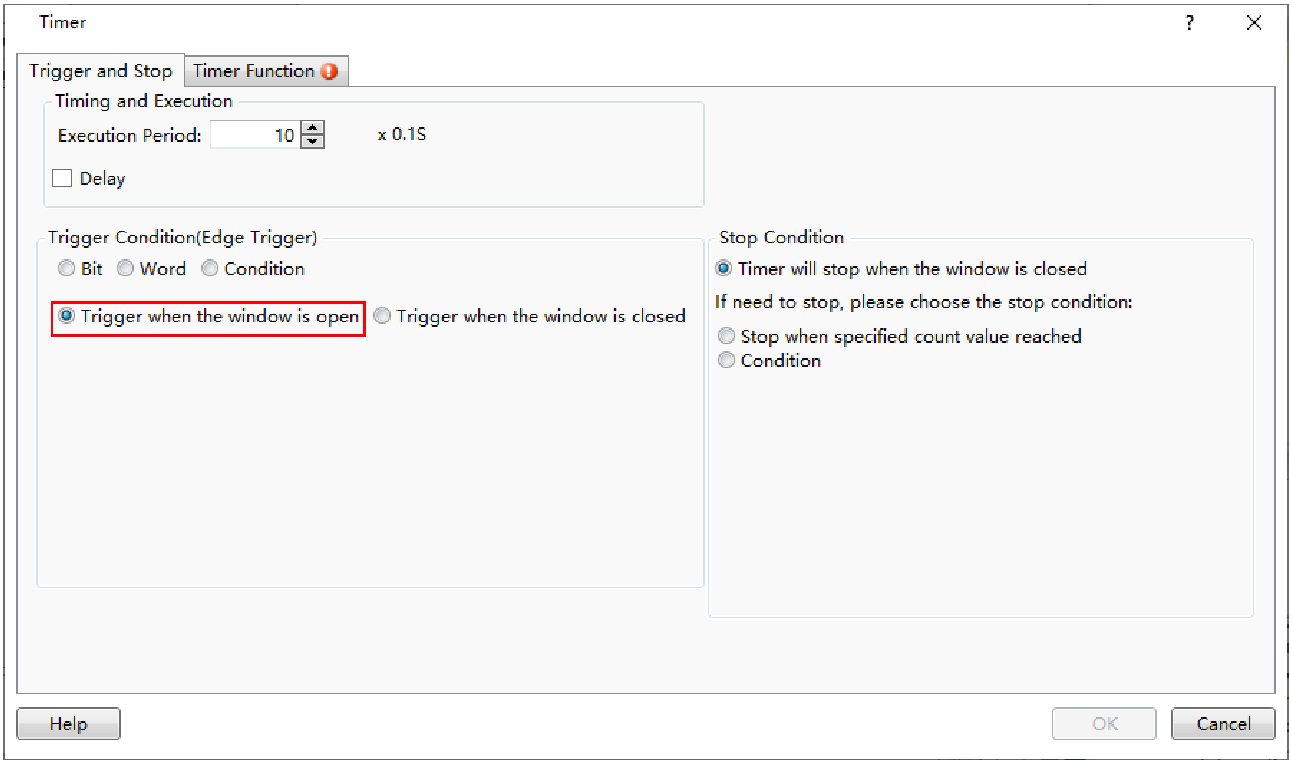
Step 6. Click **Save All**.



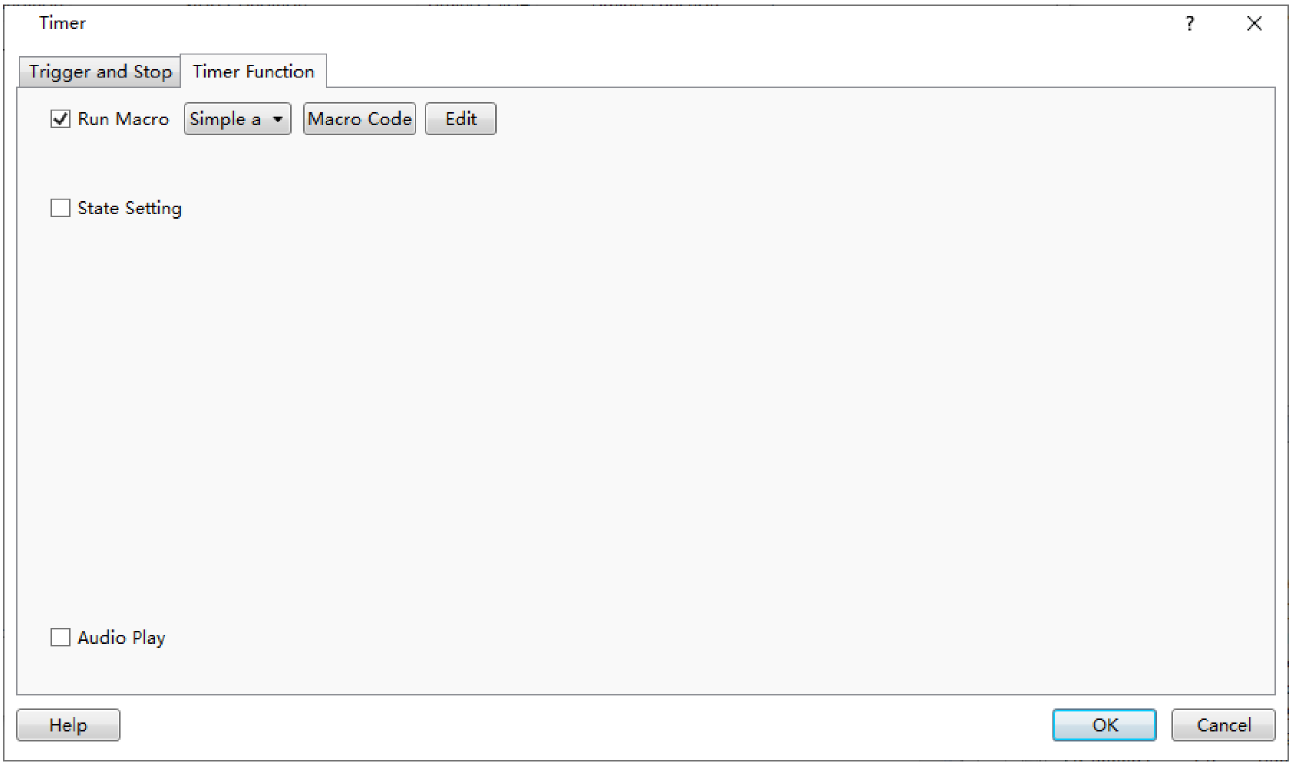
Step 7. Double click **Pubic Window** in the **Window** control at the right bottom corner of the software interface, select **Window/Current Window Properties** from the menu bar, select the **Timer** tab in the pop-up dialog box, click **Add**.



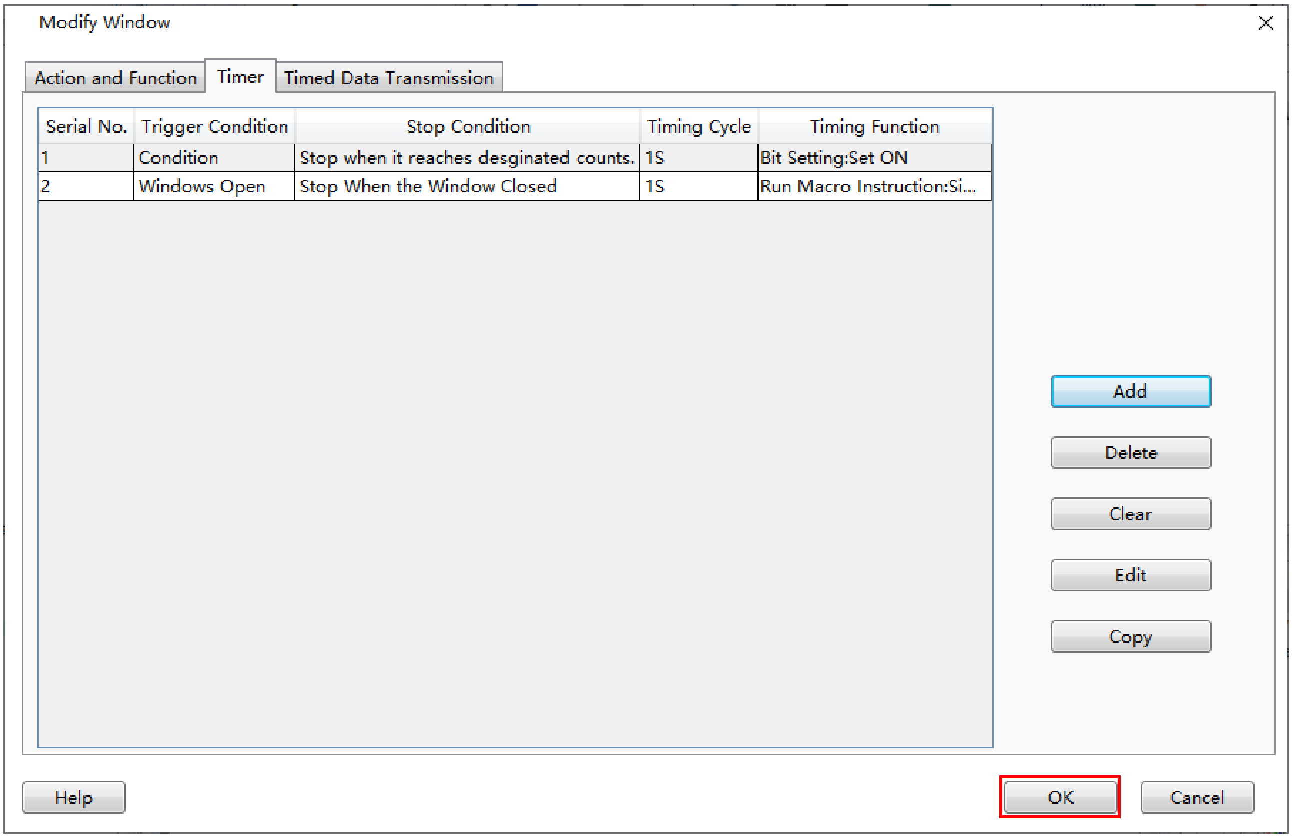
Step 8. Set the trigger condition to “trigger when window is open” in the pop-up **Timer** dialog box.



Step 9. Select the **Timer Function** tab, check **Run Macro**, select the “simple addition” macro, click **OK**.

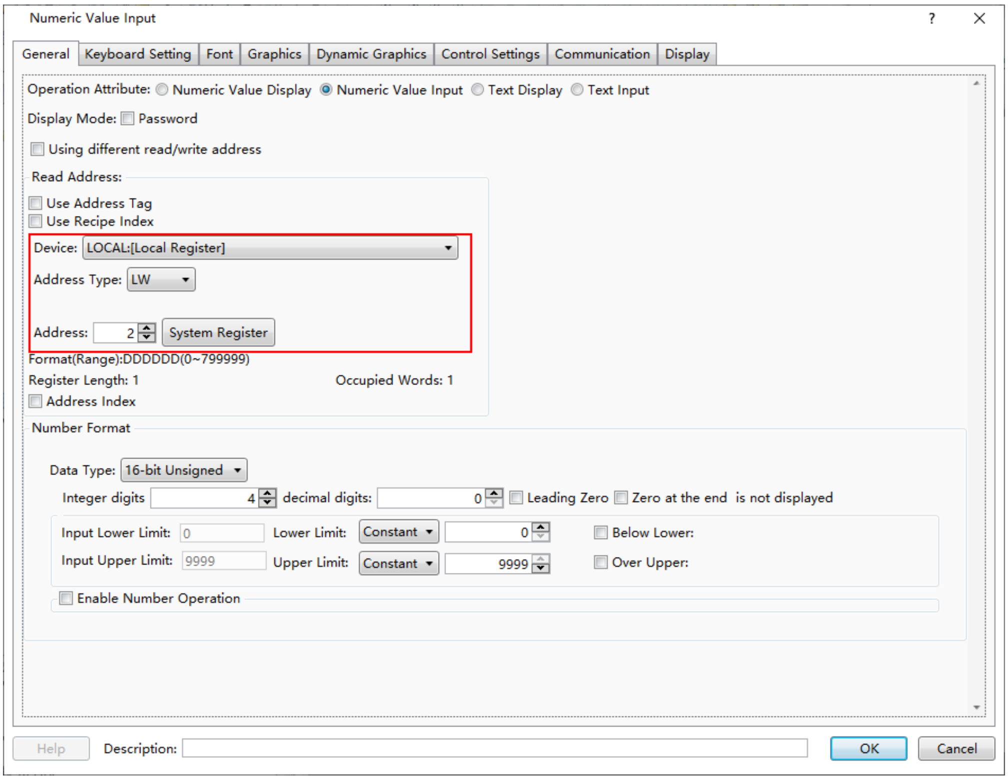


Step 10. Click **OK**.

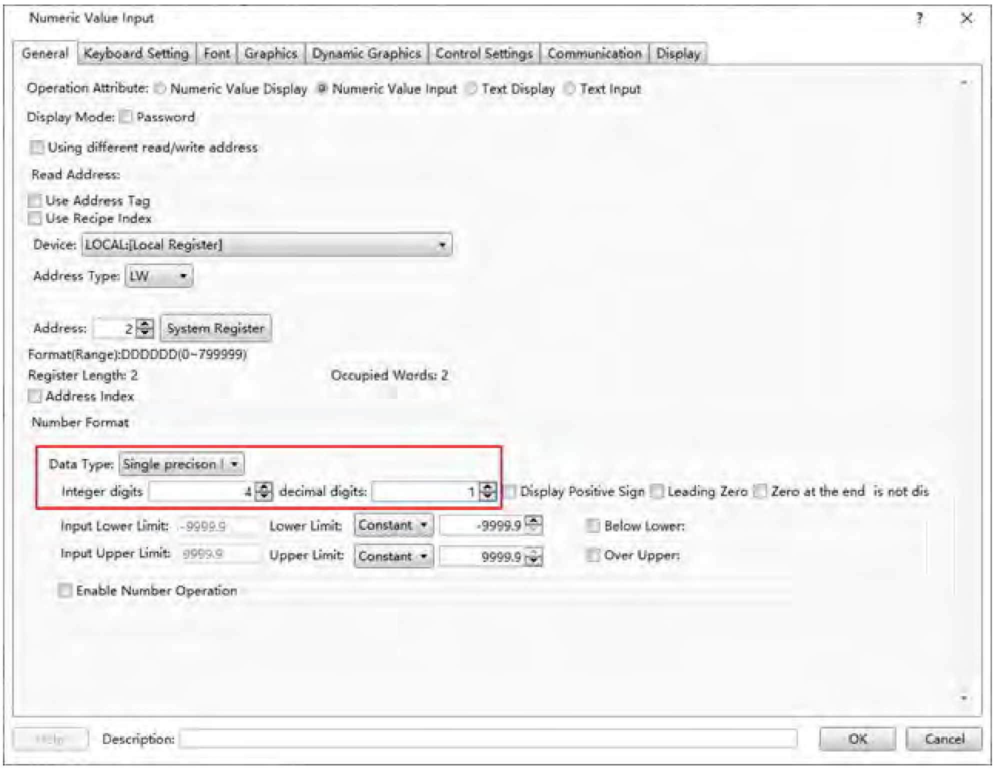


18.3.3 Verification Method

Step 1. Double click Basic Window**(1)**, click **Component/Numeric Value and Text Display/Numeric Value Input** from the menu bar, set the address to LW2 in the pop-up dialog box.

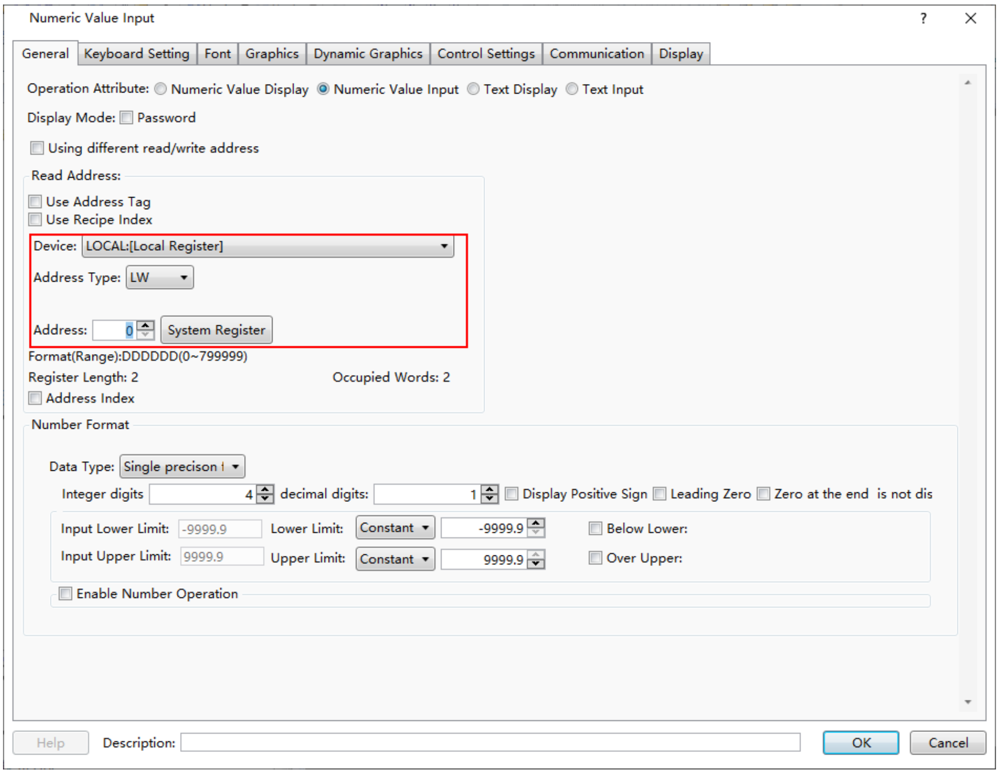


Step 2. Set the number format, click **OK**.

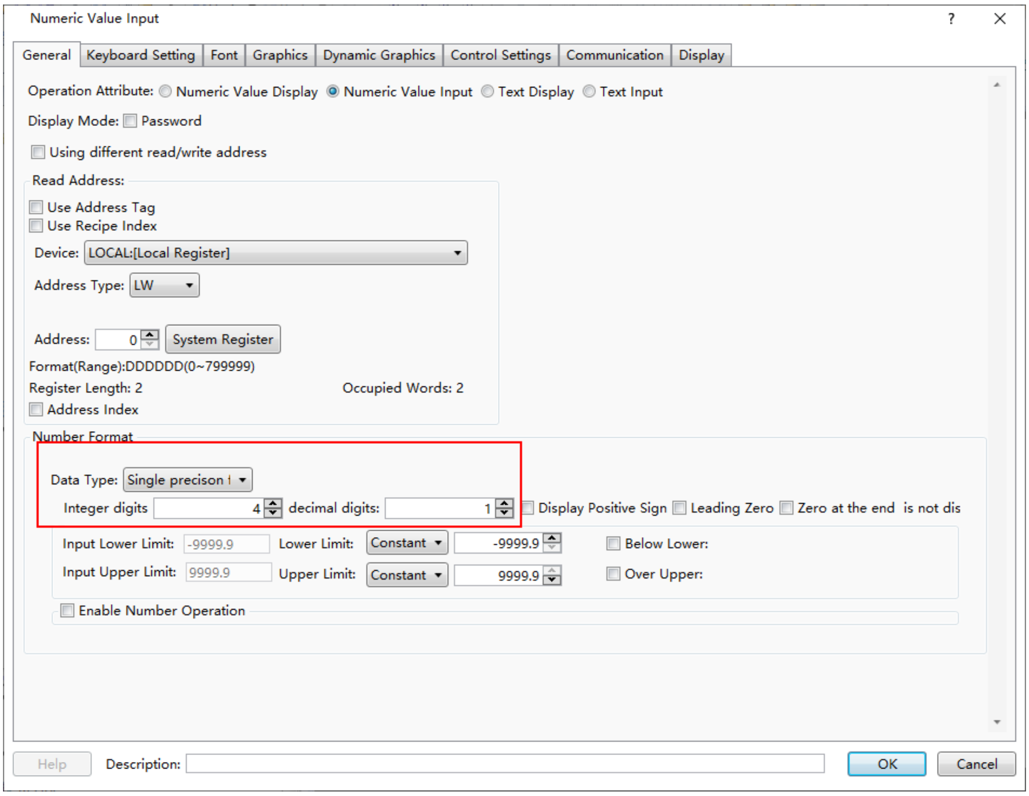


Step 3. Follow the steps above to add another numeric input component, set the address to LW4.

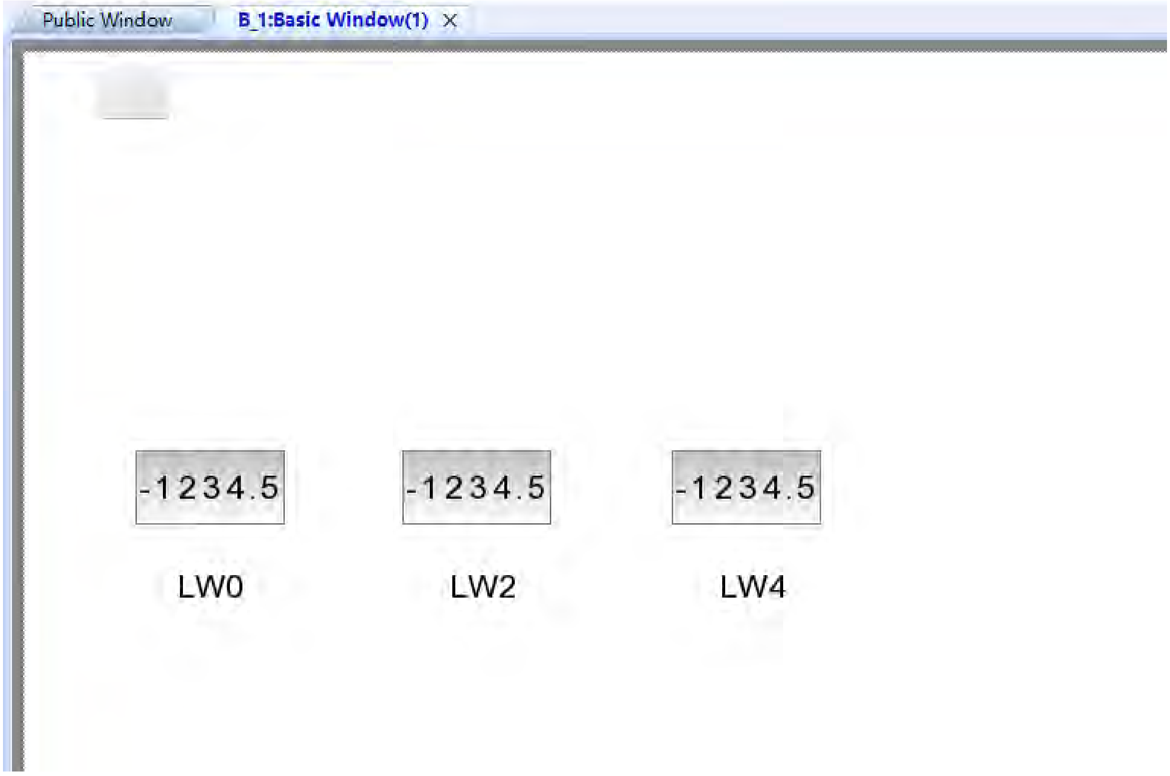
Step 4. Select **Component/Numeric Value and Text Display/Numeric Value Display**, set the address to LW0 in the pop-up dialog box.



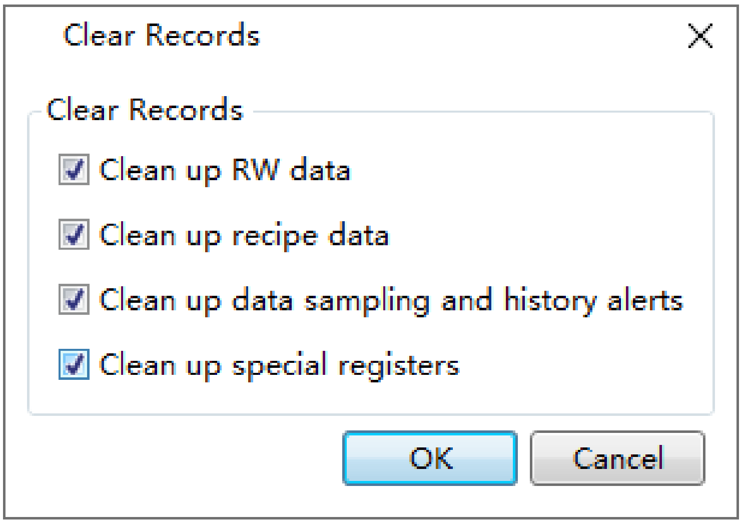
Step 5. Set the number format, click **OK.**



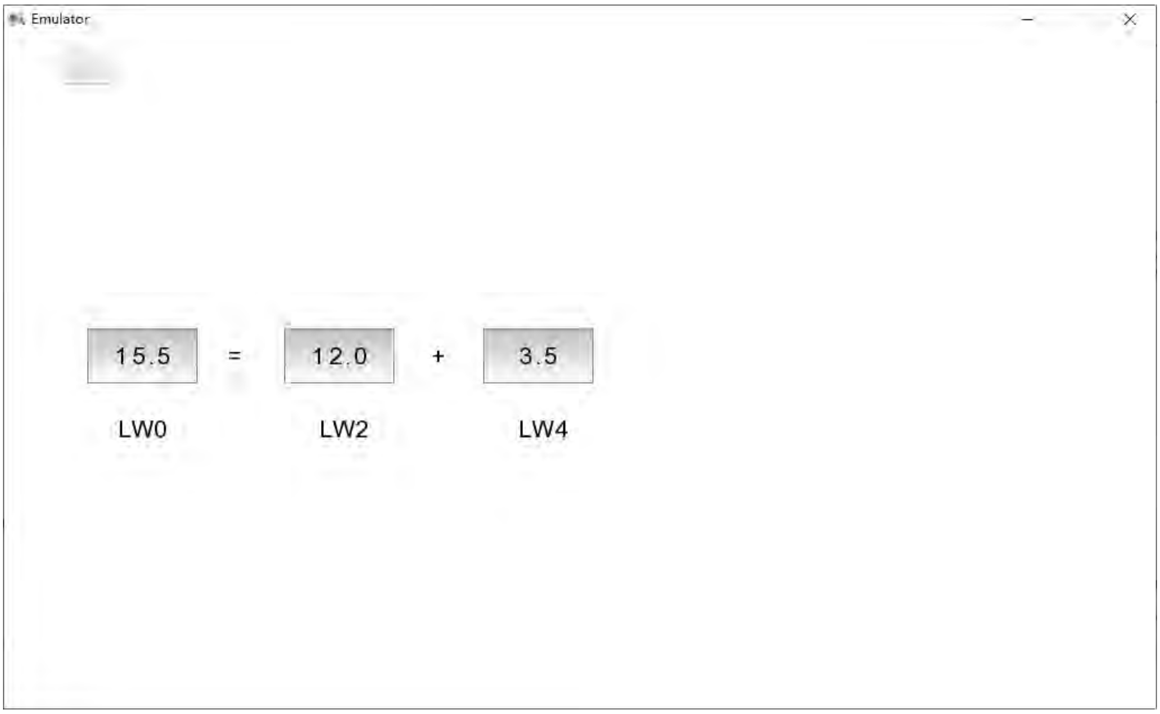
Step 6. To make it easy to understand, select **Drawing/Static Text** from the menu bar to insert multiple static texts.



Step 7. Select **Tools/Offline Simulation** from the menu bar, click **OK** in the pop-up dialog box.



Step 8. Enter the **Emulator** interface, click the numeric input component, enter the number, you will find that the value of the display component is the sum of the two input components. It means successfully configured.

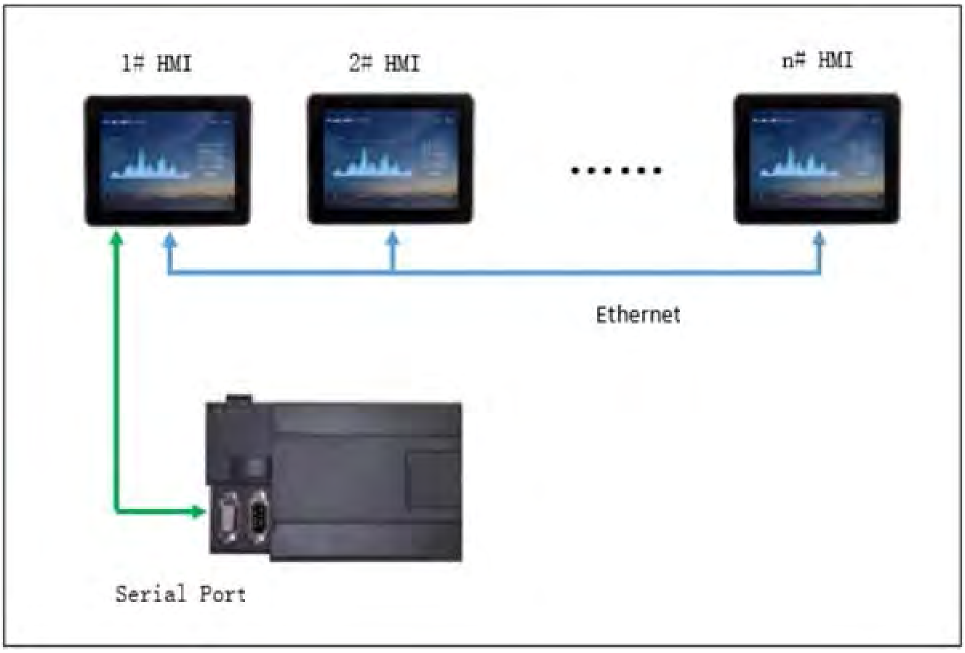


18.4 Use Multiple HMIs to Simultaneously Monitor PLC Data

18.4.1 Usage Scenario

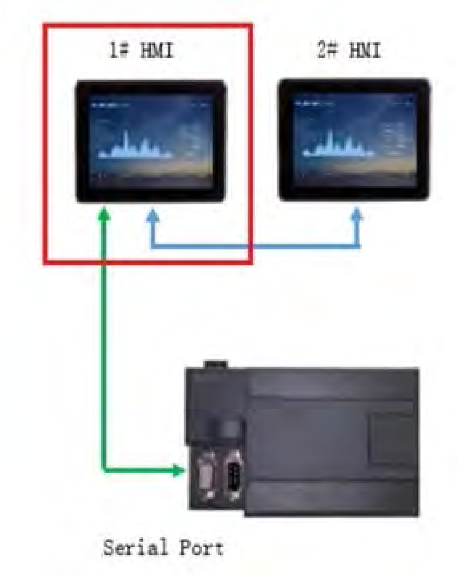
The user needs to use HMI to monitor PLC data from different locations(such as offices and meeting rooms). Multiple HMIs can be used to connect to the PLC. The network topology is illustrated in the figure below.

HMI 1 is connected to the PLC via a serial cable, while the other HMIs are connected to HMI 1 through an Ethernet connection (If HMI 1 has only one port, you can use a switch to connect different HMIs).



18.4.2 Configuration Steps

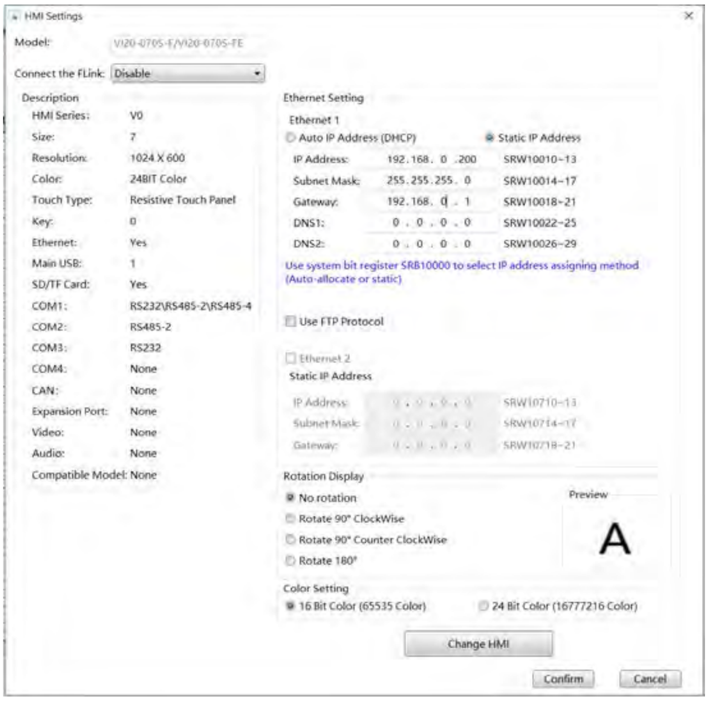
This article uses two HMIs as an example.



18.4.2.1 Configure HMI 1

Step 1. Use a serial cable to connect the COM port of the HMI to the COM port of the PLC, and configure the serial communication parameters of the PLC and HMI respectively. For detailed configuration steps, please refer to Appendix A -Communicaiton Between HMI and PLC.

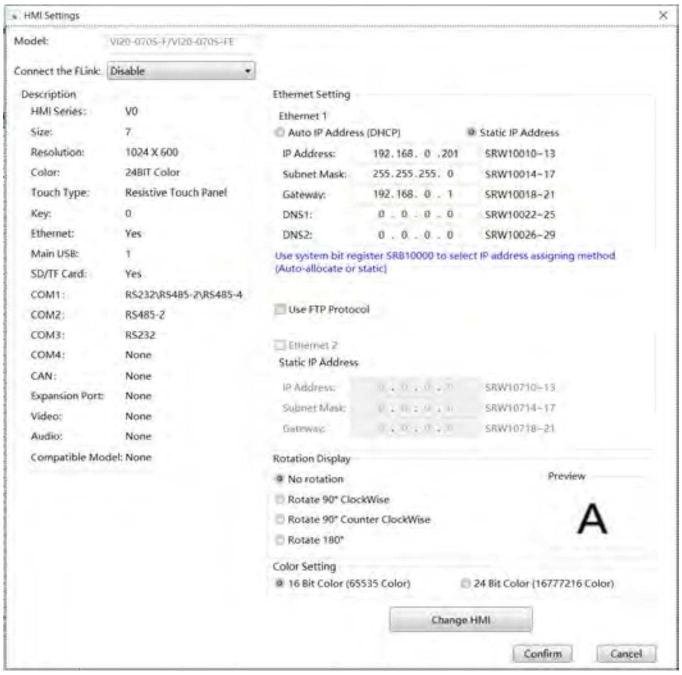
Step 2. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI in the pop-up dialog box, click **OK**.



18.4.2.2 Configure HMI 2

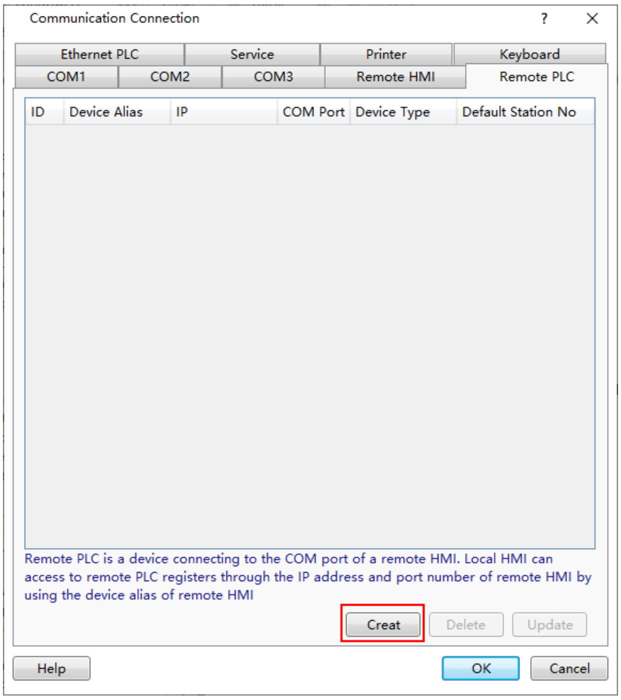
Step 1. Set the IP address of HMI 2.

Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set the IP address of HMI in the pop-up dialog box (to be in the same network segment as the IP address of HMI 1), click **OK**.

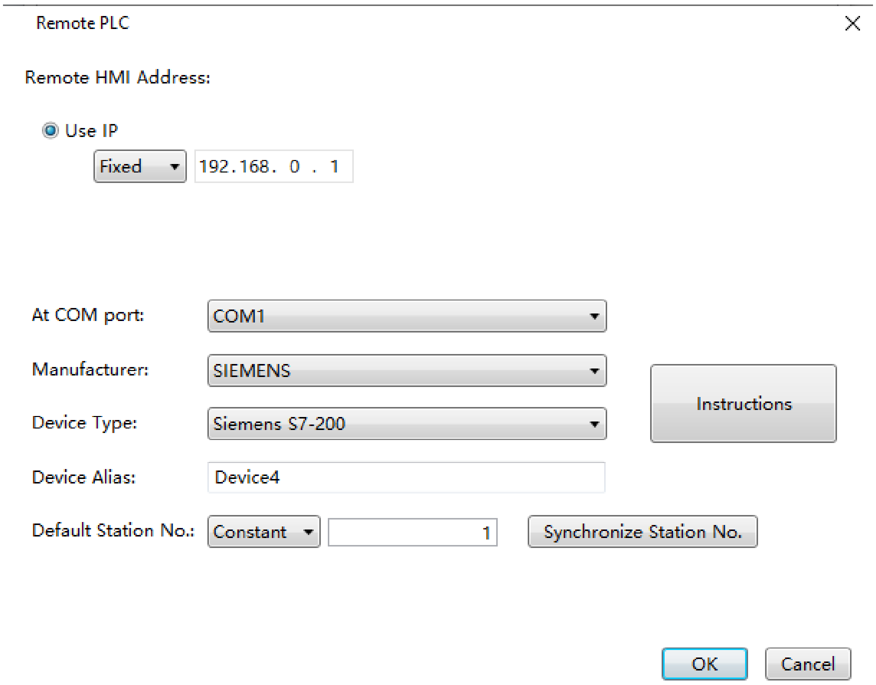


Step 2. Add Remote PLC.

1) Select **Settings/Communication Settings/Remote Connection** from the menu bar, select **Remote PLC** tab in the pop-up **Communication Connection** dialog box, click **Add**.



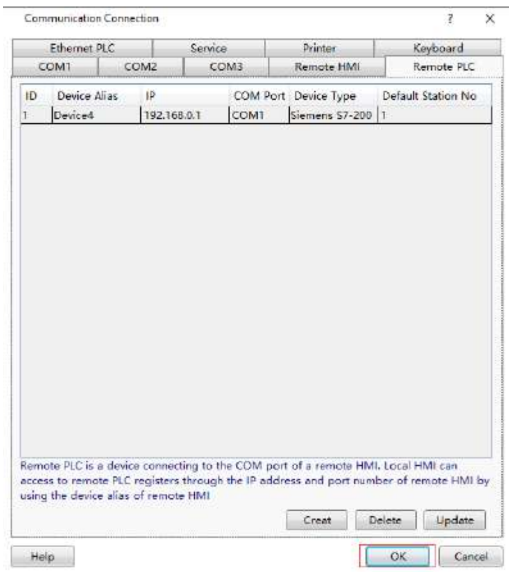
2) Configure relevant parameters in the pop-up dialog box, click **OK**.



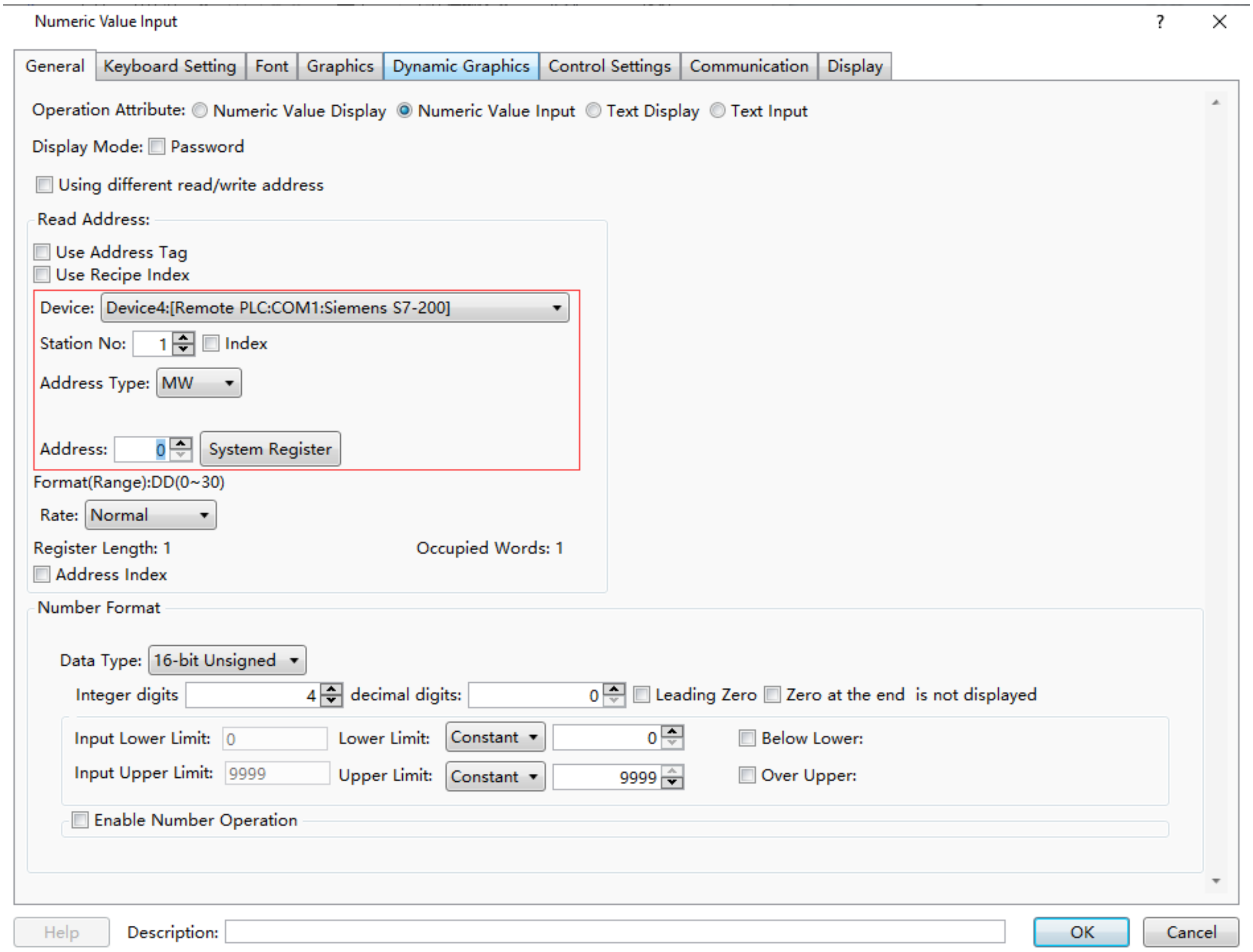
Please refer to the table below for detailed configuration.

Parameter	Description
Use IP	Select **Fixed**, set the IP address of HMI 1.
At COM Port	The COM port used by HMI 1 to connect to PLC.
Manufacturer	Please refer to the actual situation.
Device Type	Please refer to the actual situation.
Default Station No.	Please refer to the actual situation.

3) Click **OK**.



Step 3. configure screen to monitor the register data of the PLC.



18.4.2.3 Verification Method

Download the project to the two HMIs. If the register data of the PLC can be read and written, it means the configuration is successful.

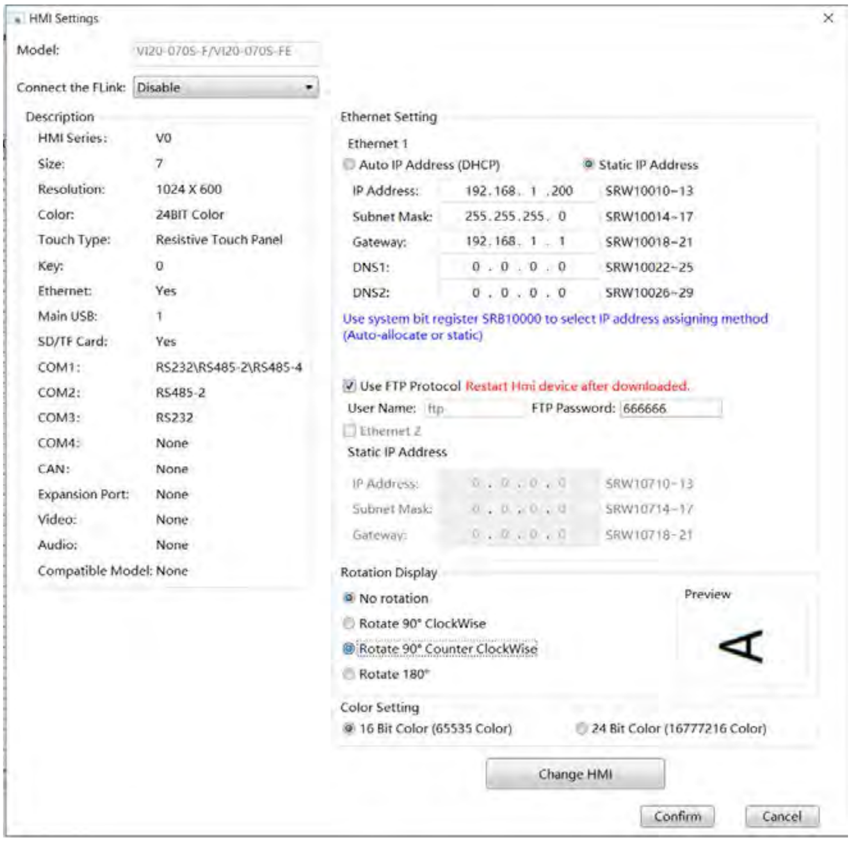
18.5 Use FTP to Access HMI File Remotely

18.5.1 Usage Scenario

Use the PC to remotely access the files of the HMI (including the external USB disk and SD card connected to the HMI) through the FTP protocol. It is only necessary to ensure that the PC and HMI routing and FTP service ports are reachable.

18.5.2 Configuration Steps

Step 1. Run VI20Studio, select **Settings/HMI Settings** from the menu bar, set IP address of HMI ,check **Uuse FTP Protocol**, and set **FTP Password** in the pop-up dialog box, click **Confirm**.



Please refer to the table below for detailed configuration.

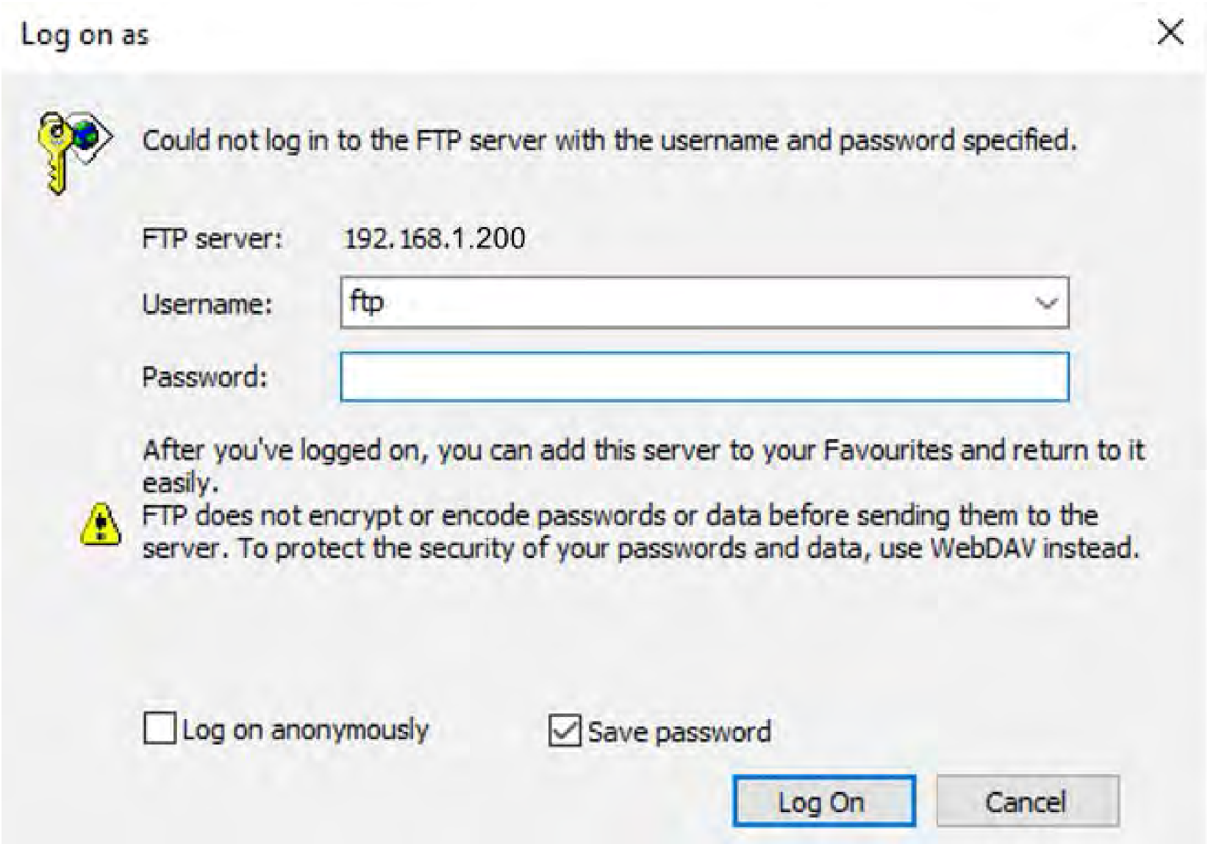
Parameters	**Description**
Connect FLink	Select the FLink module to connect, please refer to the actual situation.
Use GRPS/3G/4G/WiFi iRemote Connection	Check this parameter.
Static IP	Select **Static IP**, set IP address, subnet mask and gateway.
LAN IP	If HMI has two or more ethernet ports, LAN IP is the IP address of LAN port(Ethernet 1). If HMI is single adapter, LAN IP is the second IP of this port (sub IP).
Enable FTP	Check this option to enable HMI FTP function, and set FTP service password.

Step 2. After configuring the project,download the project to HMI.

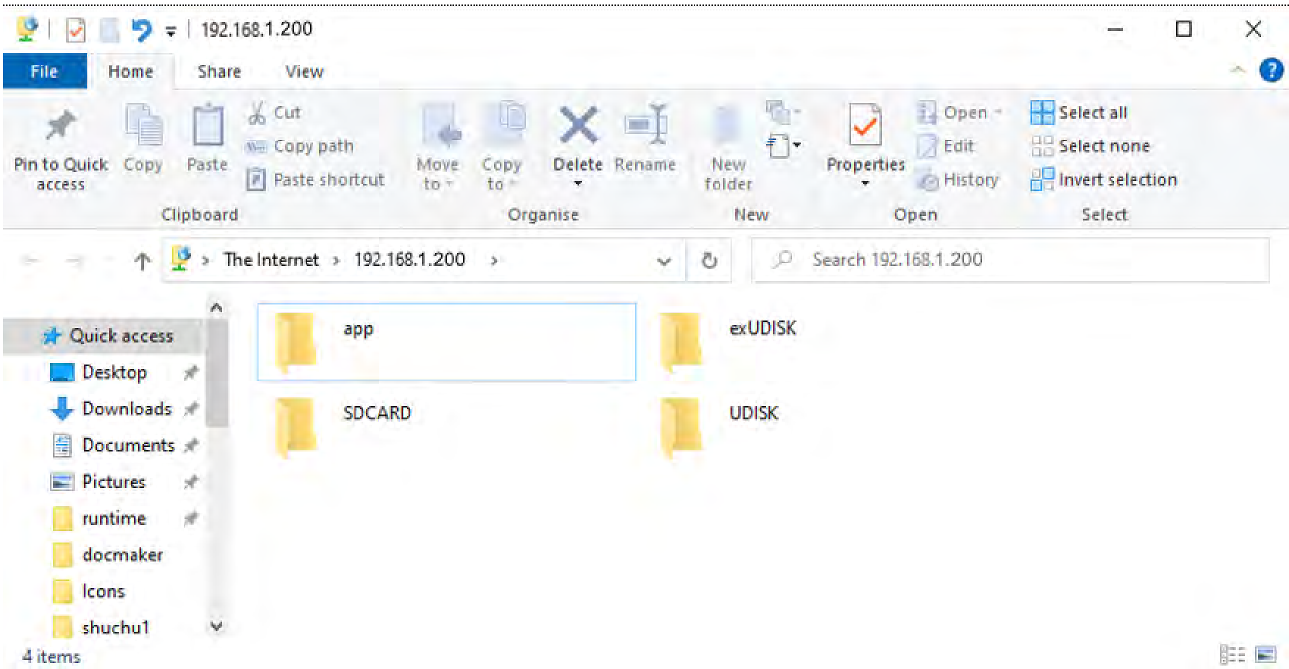
Step 3. Restart HMI.

18.5.3 Verification Method

Step 1. Enter "ftp://192.168.1.200" in the address bar of file explorer or browser, and press Enter. Enter the user name ftp in the pop-up dialog box, password is 666666, click **Log on**.



Step 2. You can access the HMI file directory.



18.6 User-defined Library File

18.6.1 Usage Scenario

By using user-defined library files, you can generate user-defined functions that can be called within macros. This approach allows you to encapsulate macro scripts as functions, which can be called in the form of functions. Users will not have visibility of the underlying source code.

18.6.2 Configuration Steps

Step 1. Write source code of the library file.

When writing the source code for a user-defined library file, please avoid using the header file name "macro.h" as it is already used by VI20Studio.

The source code example is as follows:

- add.c

```
nclude "usermacro.h"
nclude <stdio.h>

t add(int a, int b)

  return a+b;
```

- sub.c

```
#include "usermacro.h"
#include <stdio.h>

int sub(int minuend, int subtractor)
{
    return minuend - subtractor;
}
```

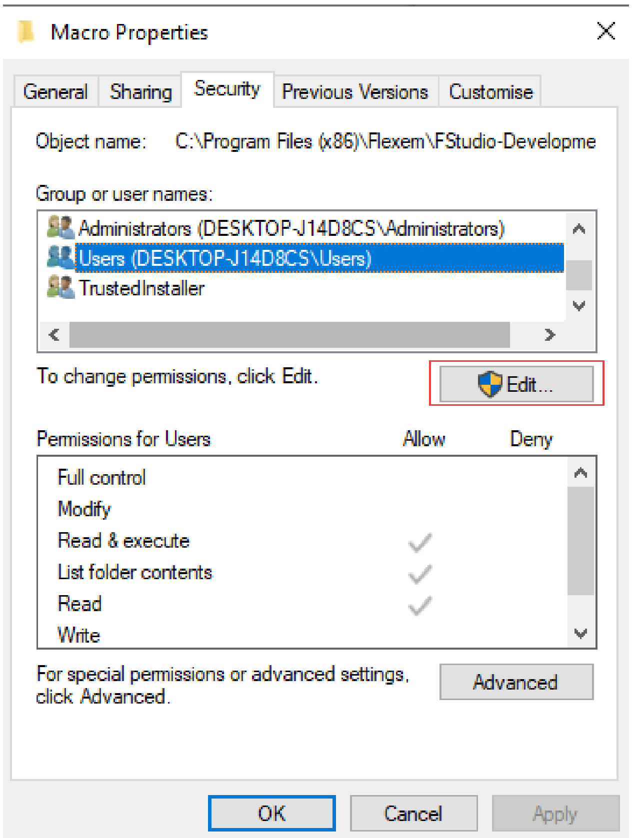
- usermacro.h

```
#ifndef _USERMACRO_H
#define _USERMACRO_H

int add(int a, int b);
int sub(int minuend, int subtractor);

#endif
```

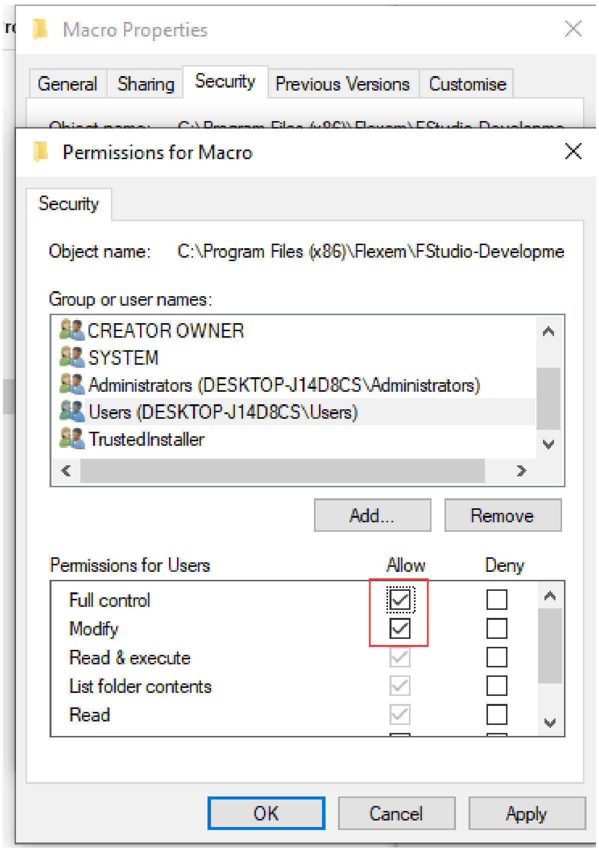
Step 2. Copy the source code file to the directory \Macro\UserLib under VI20Studio installation pathway (For example F:\Program Files (x86)\Veichi\VI20Studio 3.x\Macro\UserLib).

Step 3. Modify the permission properties of Macro folder.

1) Right click the Macro folder, select **Property**, select **Safety** tab in the pop-up **Macro Property** dialog box, click **Edit**.

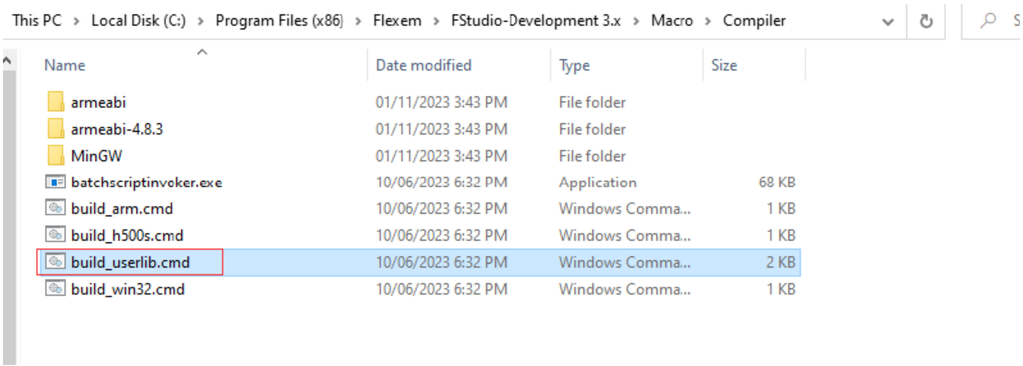


2) Select Users, set the user privilege as “Allow Complete Control”, “Allow Modification”, click **OK**.

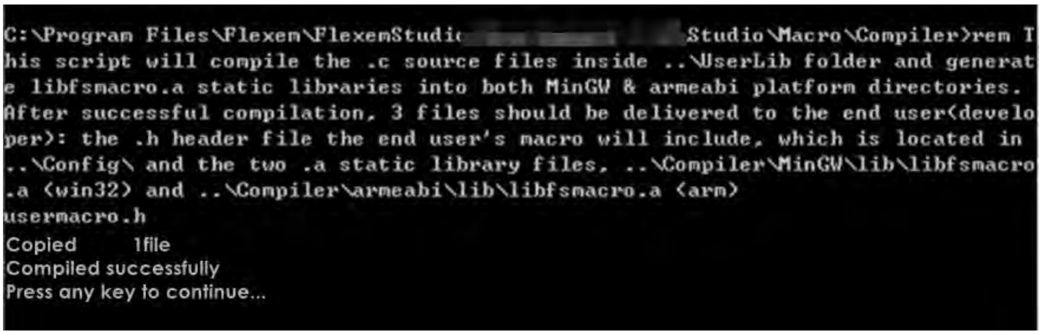


3) Click **OK** in the **Macro Property** dialog box.

Step 4. Go to the VI20Studio installation directory and navigate to the “\Macro\Compiler” folder. Double-click the build_userlib.cmd file to compile the source code located in the UserLib folder.

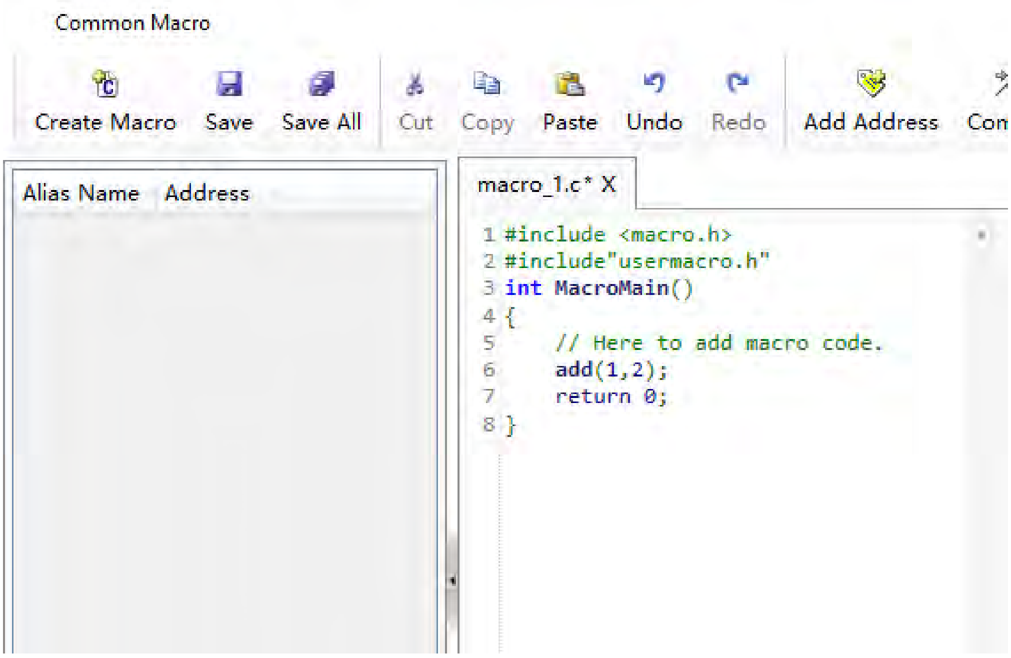


Step 5. If there are compilation errors, please review the source code until the compilation process completes without errors.



18.6.3 Verification Method

Run VI20Studio. Select **Macro/Common Macro/Edit Macro Command** from the menu bar. Add the header file and call the function as shown in the following figure. Ensure successful compilation of the program.



18.6.4 Notes

If other users need to use the user-defined library file, please provide the following 3 files. Other users obtain the compiled files and do not understand the original file of the macro. Place the following 3 files on the corresponding path.

- File 1(libfsmacro.a):

  C:\Program Files (x86)\Veichi\VI20Studio3.x\Macro\Compiler\MinGW\lib

- File 2(libfsmacro.a):

  C:\Program Files (x86)\ \Veichi\VI20Studio3.x \Macro\Compiler\armeabi\lib

- File 3(usermacro.h):

  C:\Program Files (x86)\ \Veichi\VI20Studio3.x \Macro\Config

19 Appendix C-System Information

19.1 HMI Register Description

HMI register includes word register and bit register.

19.1.1 Word Register

Word register includes the following three types:

- LW: HMI internal word register, not save data when power-off, address range 0~799999.
- RW: HMI internal word register, save data when power-off, address range 0~524288.
- SRW: Special HMI internal word register, address range 0~11023.

Please refer to the following table for the word register of the system with special function.

Category	Register Address (start Address)	Register Function
System Time	SRW0	Year, such as 2023.
	SRW1	Month, such as December.
	SRW2	Date, such as 30th.
	SRW3	Time, such as 8 o’clock, supports 12-hour system and 24-hour system.
	SRW4	Minute, such as 31 minutes.
	SRW5	Second, such as 29 seconds.
	SRW6	Millisecond, such as 123 milliseconds.
	SRW7	Days of a week, such as Friday.
	SRW10055	Time zone setting. Value range: 1~82, with each value corresponding to different time zones. Other value (including 0) represents GMT +8 time zone (China), the default value is 0. The meaning of different values are as follows: 0:(UTC+08:00)Asia/Shanghai 1:(UTC-11:00)Pacific/Midway 2:(UTC-10:00)Pacific/Honolulu 3:(UTC-09:00)America/Anchorage 4:(UTC-08:00)America/Los_Angeles 5:(UTC-08:00)America/Tijuana 6:(UTC-07:00)America/Phoenix 7:(UTC-07:00)America/Denver

Category	Register Address (start Address)	Register Function
		8:(UTC-06:00)America/Costa_Rica 9:(UTC-06:00)America/Regina 10:(UTC-07:00)America/Chihuahua 11:(UTC-05:00)America/Bogota 12:(UTC-06:00)America/Chicago 13:(UTC-06:00)America/Mexico_City 14:(UTC-04:30)America/Caracas 15:(UTC-05:00)America/New_York 16=(UTC-04:00)America/Barbados 17:(UTC-04:00)America/Manaus 18:(UTC-03:00)America/Santiago 19:(UTC-02:00)America/Sao_Paulo 20:(UTC-03:00)America/Argentina/Buenos_Aires 21:(UTC-02:00)America/Montevideo 22:(UTC-03:00)America/Godthab 23:(UTC-03:30)America/St_Johns 24:(UTC-02:00)Atlantic/South_Georgia 25:(UTC-01:00)Atlantic/Cape_Verde 26:(UTC-01:00)Atlantic/Azores 27:(UTC+00:00)Europe/London 28:(UTC+00:00)Africa/Casablanca 29:(UTC+01:00)Africa/Brazzaville 30:(UTC+01:00)Europe/Brussels 31:(UTC+01:00)Europe/Sarajevo 32:(UTC+01:00)Europe/Belgrade 33:(UTC+01:00)Europe/Amsterdam 34:(UTC+02:00)Africa/Cairo 35:(UTC+02:00)Africa/Harare 36:(UTC+02:00)Europe/Helsinki 37:(UTC+02:00)Asia/Jerusalem 38:(UTC+03:00)Asia/Amman 39:(UTC+02:00)Europe/Athens 40:(UTC+02:00)Asia/Beirut

Category	Register Address (start Address)	Register Function
		41:(UTC+03:00)Europe/Minsk 42:(UTC+03:00)Asia/Baghdad 43:(UTC+03:00)Asia/Kuwait 44:(UTC+03:00)Africa/Nairobi 45:(UTC+04:00)Europe/Moscow 46:(UTC+04:00)Asia/Tbilisi 47:(UTC+04:00)Asia/Yerevan 48:(UTC+04:00)Asia/Dubai 49:(UTC+03:30)Asia/Tehran 50:(UTC+04:30)Asia/Kabul 51:(UTC+04:00)Asia/Baku 52:(UTC+05:00)Asia/Karachi 53:(UTC+05:00)Asia/Oral 54:(UTC+05:30)Asia/Calcutta 55:(UTC+05:30)Asia/Colombo 56:(UTC+05:45)Asia/Katmandu 57:(UTC+06:00)Asia/Yekaterinburg 58:(UTC+06:00)Asia/Almaty 59:(UTC+06:30)Asia/Rangoon 60:(UTC+07:00)Asia/Bangkok 61:(UTC+08:00)Asia/Krasnoyarsk 62:(UTC+08:00)Asia/Kuala_Lumpur 63:(UTC+08:00)Australia/Perth 64:(UTC+08:00)Asia/Shanghai 65:(UTC+08:00)Asia/Hong_Kong 66:(UTC+08:00)Asia/Taipei 67:(UTC+09:00)Asia/Irkutsk 68:(UTC+09:00)Asia/Seoul 69:(UTC+09:00)Asia/Tokyo 70:(UTC+10:30)Australia/Adelaide 71:(UTC+09:30)Australia/Darwin 72:(UTC+10:00)Asia/Yakutsk 73:(UTC+10:00)Australia/Brisbane

Category	Register Address (start Address)	Register Function
		74:(UTC+11:00)Australia/Hobart 75:(UTC+11:00)Australia/Sydney 76:(UTC+10:00)Pacific/Guam 77:(UTC+11:00)Asia/Vladivostok 78:(UTC+12:00)Asia/Magadan 79:(UTC+13:00)Pacific/Auckland 80:(UTC+13:00)Pacific/Fiji 81:(UTC+12:00)Pacific/Majuro 82:(UTC+13:00)Pacific/Tongatapu
	SRW10056	Enable/Disable synchronization of time from an NTP server. Here is the meaning of different values: 1: Allow synchronization of time from an NTP server. 2: Prohibit synchronization of time from an NTP server. Other values (including 0): Undefined.
Network Setting	SRW10	The MAC address of ETH1, from SRW10 to SRW15, where the lower 8 bits of each word represents a MAC segment. Read only and cannot be modified.
	SRW10010	The IP address of ETH1, retained during power loss, SRW10010~SRW10013. Each word represents an IP segment. When statically assigning an IP address, it can be read and written; when dynamically obtaining an IP address, it is read only.
	SRW10014	The subnet mask of ETH1, retained during power loss, SRW10014~SRW10017. Each word represents an IP segment. When statically assigning an IP address, it can be read and written; when dynamically obtaining an IP address, it is read only.
	SRW10018	The gateway of ETH1, retained during power loss, SRW10018~SRW10021. Each word represents an IP segment. When statically assigning an IP address, it can be read and written; when dynamically obtaining an IP address, it is read only.
	SRW10022	DNS1 of ETH1 (main DNS server), retained during power loss, SRW10022~SRW10025. Each word represents an IP segment. When statically assigning an IP address, it can be read and written; when dynamically obtaining an IP address, it is read only.

Category	Register Address (start Address)	Register Function
	SRW10026	DNS2 of ETH1 (backup DNS server), retained during power loss, SRW10022~SRW10025. Each word represents an IP segment. When statically assigning an IP address, it can be read and written; when dynamically obtaining an IP address, it is read only.
	SRW10030	LAN IP address of ETH1, retained during power loss, SRW10022~SRW10025. Each word represents an IP segment. When statically assigning an IP address, it can be read and written.
	SRW900	MAC address of ETH2, SRW900~SRW905. Each lower address represents a MAC segment. Read only, cannot be modified.
	SRW10710	IP address of ETH2, retained during power loss, SRW10710~SRW10713. Each word represents an IP segment. Can be read and written when statically assigning an IP address.
	SRW10714	Subnet mask of ETH2, retained during power loss, SRW10714~SRW10717. Each word represents an IP segment. Can be read and written when statically assigning an IP address.
	SRW10718	Gateway of ETH2, retained during power loss, SRW10718~SRW10721. Each word represents an IP segment. Can be read and written when statically assigning an IP address.
System	SRW20	Product model ID, SRW20~SRW21, product model numbering (numerical form).
	SRW24	The product's date of production, SRW24~SRW26, corresponds to the year, month, and date in order.
	SRW27	The current colour depth of the HMI, a value of 16 means 16-bit colour; a value of 24 means 24-bit colour. Read-only Memory.
	SRW30	The software version number, SRW30~RW36, it is Boot, Kernel, Rootfs, Floader, Fgui, Fcs, and Fds in order.
	SRW40	Product hardware serial number, SRW40~SRW45, total 128 bits, may occupy 48 bits/64 bits depending on hardware. It is unique in the world.
	SRW50	Used for confirmation in security settings, 1 means confirming the execution; 2 means canceling the operation.
	SRW65	The hold time of the system prompt popup in seconds (0 means the default value is 3 seconds).
	SRW76	SRW76~SRW77, the upper limit of the amount of Flash memory currently

Category	Register Address (start Address)	Register Function
		occupied by the system in bytes.
	SRW78	SRW78~SRW79, the amount of Flash memory currently occupied by the system in bytes.
	SRW80	SRW80~SRW81, the RAM memory currently occupies by the system.
	SRW84	SRW84~SRW85, the upper limit of the RAM memory available.
	SRW88	The time interval between system scan loops in milliseconds.
	SRW96	Enter develper password to verify. SRW96~SRW99, 4 words in total. Please use ASCII character component to enter, supports numbers only, maximum length is 8 bits.
	SRW450	When touch control is pressed, set SRB16 to ON, SRW450 is the X coordinate of the current touch control.
	SRW451	When touch control is pressed, set SRB16 to ON, SRW451 is the Y coordinate of the current touch control.
	SRW460	HMI serial number, occupies 12 characters, 6 words in total (SRW460~SRW465).
	SRW466	HMI password, occupies 4 characters, 2 words(SRW466~SRW467).
	SRW1000	SRW1000~SRW1001, GUI heartbeat, measured in hundred milliseconds. The GUI incrementally increases by 1 every hundred milliseconds during normal operation, and resets to zero upon GUI restart.
	SRW10040	Screensaver time. When there is no user interaction for a specified period, the HMI will enter the screensaver mode, and the current screen will be saved even in the event of a power loss.
	SRW10041	Time to turn off backlight. When there is no user interaction for a specified period, backlight will be turned off automatically. Save when power is off.
	SRW10042	Time to lower brightness. When there is no user interaction for a specified period, lower brightness. Save when power is off.
	SRW10050	Revise current language number. Saved when power is off. 0 indicates using language 1, 1 indicates using language 2, and so on.
	SRW10051	Display after rotating for a certain angle. Save when power off. Meaning of different values are as follows: 0: Normal (no rotation) 1: 90-degree vertical rotation

Category	Register Address (start Address)	Register Function
		2: 270-degree vertical rotation 3: Reverse Not self-adaptive, need to adjust the width and height of the window before rotating it.
	SRW10052	HMI current brightness percentage, value range 1~100, save when power off.
	SRW10053	HMI current volume percentage, value range 1~100, save when power off.
	SRW10080	Maximum execution time of macro in hundred milliseconds. 0: No restriction 1: Macro execution time (not including communication time read and write register) exceeds 100ms, force stop macro. Default value 10, i.e. 1 second, save when power off.
Communication	SRW60	Communication information code (timeout, error etc.) occupies a word register.
	SRW61	Numbering of device which is in abnormal communication state(such as timeout,error,etc.).
	SRW62	Numbering of port which is in abnormal communication state(such as timeout,error,etc.).
	SRW63	Station number of PLC which is in abnormal communication state (such as timeout,error,etc.).
	SRW64	Set pop-up time of prompt (such as communication timeout,error,etc.) in seconds (0 indicates default value 3 seconds)
	SRW70	System prompt message code: 1: "input overflow" 2: "processing" 3: "operation success" 4: "data transfer overflow" 5: "run out of memory" 6: "runtime errors on macros" 7: "invalid password" 8: "failed connection to server" 9: "operation failed"

Category	Register Address (start Address)	Register Function
		10: “Permission denied” 11: “log out success” 12: “conflicted user” 13: “no sd card detected” 14: “no U-disc 1 detected” 15: “no U-disc 2 detected” 16: “database updating” 17: “querying” 18: “print failed” 19: “printer busy” 20: “prepare for printing” 21: “address index override” 22: “image side exceeds 2048*2048” 23: “user has been disabled” 24: “insufficient HMI memory” 25: “insufficient SD card memory” 26: “insufficient USB drive 1 memory” 27: “insufficient USB drive 2 memory” 28: “recipe operation failed” 29: “password level unmatch” 30: “wrong media file format” 31: “failed to play media file” 32: “password too short” 33: “not support playing 16-bit color” 34: “non-supported video encoding format” 128: “operation success” 132: “wrong USB drive system format” 137: “file not exist” 138: “invalid file” 139: “operation failed” 140: “file exist” 141: “invalid password” 142: “run out of memory”

Category	Register Address (start Address)	Register Function
		143: "run out of memory on sd/U-disc" 144: "wrong developer password" 145: "limited target model, please change correct HMI"
	SRW480	The system prompt message blocking bit ,16 words in total. When SRW480.x is set to ON, it blocks the system prompt message corresponding to SRW70=x. For example, if SRW480.1 is set to ON, it blocks the system prompt message for "Input Exceeds Limit" ; if SRW480.F is set to ON, it blocks the system prompt message for "No USB 2 Detected". If SRW481.0 is set to ON, it blocks the system prompt message for "Database Upgrading, Please Wait".
	SRW496	The communication prompt blocking bits (SRW496.1 set to ON blocks the "Communication Timeout" prompt, SRW496.2 set to ON blocks the "Communication Error" prompt) are reserved within a 4-word space, allowing for a total of 64 error statees.
	SRW1020	The FLink online state is indicated by the value of SRW1020. If the value is 0, it represents online state, while a value of 1 indicates offline state.
	SRW1021	FLink network type: 1: Ethernet 2: GPRS 4: WIFI 5: 4G
	SRW1022	The FLink signal strength: ranges from 0 (minimum) to 8 (maximum).
	SRW1024	The single word represents the error types for FLink: 0: Normal 2: Unable to resolve the domain name 3: Dial-up failure 4: Unable to connect to port 80 5: Unable to connect to port 800 6: Failed to log in to the server
	SRW10199	The communication startup delay is represented by one word (16-bit unsigned integer) and is used to set the delay time in seconds between

Category	Register Address (start Address)	Register Function
		starting from the HMI and initiating external communication. It can be set within the range of 0 to 300 seconds.
	SRW10200	SRW10200~SRW10201 represent the communication baud rate for COM1. It occupies a double words (32-bit unsigned integer). Value range: 110 ~187500. The configuration is saved even after a power loss, and will take effect upon restarting.
	SRW10202	The communication data bit for COM1 is represented by one word (16-bit unsigned integer). The meanings for different values are as follows: 8: 8 data bits 7: 7 data bits Saved even after a power loss, and will take effect upon restarting.
	SRW10203	The communication stop bit for COM1 is represented by one word (16-bit unsigned integer). The meanings for different values are as follows: 1: 1 stop bit 2: 2 stop bits Saved even after a power loss, and will take effect upon restarting.
	SRW10204	The communication parity bit for COM1 is represented by one word (16-bit unsigned integer). The meanings for different values are as follows: 0: no parity 1: odd 2: even Saved even after a power loss, and will take effect upon restarting.
	SRW10205	The communication mode for COM1 is represented by one word (16-bit unsigned integer), and the meanings for different values are as follows: 0: RS232 1: RS485-4 2: RS485-2 The configuration is saved even after a power loss, and it will take effect upon restarting (when SRB20 is set to 1, it takes effect immediately).
	SRW10210	SRW10210~SRW10225 represent the communication blocking of devices connected to COM1 based on station numbers. It occupies 16 words, with each word representing 16 bits. Each bit corresponds to a

Category	Register Address (start Address)	Register Function
		station number, ranging from 0 to 255. For example, if Bit3 of SRW10211 is set to 1, it indicates that the device connected to station number 19 via the serial port is blocked from communication. The related component data will no longer be refreshed. The configuration is saved during power loss and takes effect immediately.
	SRW10230	It occupies one word (16-bit unsigned integer), and the meanings for different values are as follows: 10 and greater than 10: Allow automatic blocking of communication based on station numbers when communication fails. 0~9: Disable automatic blocking. The station numbers that are automatically blocked can be viewed through SRW800~SRW815. The retry period after automatic blocking is set through SRW10231.
	SRW10231	The cycle time for probe testing after entering the automatic blocking state is set in seconds. It occupies one word (16-bit unsigned integer), with a default value of 0 representing 10 seconds. The maximum value can be set to 65535 seconds. This register is effective when SRW10230 is set to "Allow Automatic Blocking."
	SRW120	SRW120~SRW135 represent the communication state of devices connected to COM1 based on station numbers. It occupies 16 words, with each word representing 16 bits. Each bit corresponds to a station number, ranging from 0 to 255. For example, if Bit3 of SRW120 is set to 1, it indicates a communication error for the device connected to station number 3 via the serial port. Similarly, if Bit0 of SRW121 is set to 1, it represents a communication error for the device connected to station number 16.
	SRW800	SRW800~SRW815 occupy 16 words, each word has 16 bits, 1 bit corresponds to 1 station number, indicating station number 0~255. A value of 1 for each bit indicates that the corresponding station number has been automatically blocked for communication; a value of 0 indicates that the corresponding station number is in normal communication.

Category	Register Address (start Address)	Register Function
		For example, if Bit3 of SRW800 is 1, it means that the communication of the station number 3 connected to COM1 is abnormal and has been blocked automatically. This register is effective when SRW10230 is set to “Allow Automatic Blocking”.
	SRW10250	SRW10250~SRW10251, COM2 communication baud rate, occupies a double word (32-bit unsigned number). Value range: 110~187500. Saved even after a power loss, and will take effect upon restarting.
	SRW10252	The communication data bit for COM2 is represented by one word (16-bit unsigned integer). The meanings for different values are as follows: 8: 8 data bits 7: 7 data bits Saved even after a power loss, and will take effect upon restarting.
	SRW10253	The communication stop bit for COM2 is represented by one word (16-bit unsigned integer). The meanings for different values are as follows: 1: 1 stop bit 2: 2 stop bit Saved even after a power loss, and will take effect upon restarting.
	SRW10254	The communication parity bit for COM2 is represented by one word (16-bit unsigned integer). The meanings for different values are as follows: 0: none 1: odd 2: even Saved even after a power loss, and will take effect upon restarting.
	SRW10255	The communication mode for COM2 is represented by one word (16-bit unsigned integer). The meanings for different values are as follows: 0: RS232 1: RS485-4 2: RS485-2 Saved even after a power loss, and will take effect upon restarting （when SRB21 is set to 1, it takes effect immediately).
	SRW10260	SRW10260~SRW10275, the devices connected to COM2 are blocked by

Category	Register Address (start Address)	Register Function
		station number, occupying 16 words, each word has 16 bits, corresponding to station number 0~255. For example, if Bit3 of SRW10261 is set to 1, it means that the device with station number 19 connected to the serial port is blocked and no longer communicates. The related component data will not be refreshed. The configuration is saved after power down and takes effect immediately.
	SRW10280	Automatic retry period for COM2, it occupies one word (16-bit unsigned integer), and the meanings for different values are as follows: 10 and greater than 10: Allow automatic blocking of communication based on station numbers when communication fails. 0~9: Disable automatic blocking. The station numbers that are automatically blocked can be viewed through SRW820~SRW835. The retry period after automatic blocking is set through SRW10281.
	SRW10281	For COM2, after entering the auto-mask state, starts the cycle time of communication detection, the unit is second. Occupying one word (16-bit unsigned number), the default value is 0, which means 10 seconds, and the maximum value is 65535 seconds. This register is valid when SRW10280 is set to allow auto blocking.
	SRW140	SRW140~SRW155, communication state of devices connected to COM2 according to the station number , occupies 16 words, each word has 16 bits, corresponding to the station number 0~255. For example, if Bit3 of SRW140 is 1, it means that the device connected to the serial port with station number 3 has communication error.
	SRW820	COM2 blocked station number. SRW820~SRW835, occupies 16 words, each word has 16 bits, 1 bit corresponds to 1 station number, indicating station number 0~255. 1: corresponding station number has been automatically blocked communication; 0: corresponding station number is communicating normally. For example, if Bit3 of SRW820 is 1, it means that the communication of the station number 3 connected to COM2 is abnormal and has been

Category	Register Address (start Address)	Register Function
		blocked automatically. This register is valid when SRW10280 is set to allow auto blocking.
	SRW10300	SRW10300~SRW10301 represent the communication baud rate for COM3. It occupies a double word (32-bit unsigned integer). Value range: 110~187500. Saved even after a power loss, and will take effect upon restarting.
	SRW10302	The communication data bit for COM3 is represented by one word (16-bit unsigned integer). The meanings for different values are as follows: 8: 8 data bits 7: 7 data bits Saved even after a power loss, and will take effect upon restarting.
	SRW10303	The communication stop bit for COM3 is represented by one word (16-bit unsigned integer). The meanings for different values are as follows: 1: 1 stop bit 2: 2 stop bit Saved even after a power loss, and will take effect upon restarting.
	SRW10304	The communication parity bit for COM3 is represented by one word (16-bit unsigned integer). The meanings for different values are as follows: 0: none 1: odd 2: even Saved even after a power loss, and will take effect upon restarting.
	SRW10305	The communication mode for COM3 is represented by one word (16-bit unsigned integer). The meanings for different values are as follows: 0: RS232 1: RS485-4 2: RS485-2 Saved even after a power loss, and will take effect upon restarting (when SRB22 is set to 1, it takes effect immediately).
	SRW10310	SRW10310~SRW10325 represent the communication blocking of devices connected to COM3 based on station numbers. It occupies 16 words, with each word representing 16 bits. Each bit corresponds to a station number, ranging from 0 to 255.

Category	Register Address (start Address)	Register Function
		For example, if Bit3 of SRW10311 is set to 1, it indicates that the device connected to station number 19 via the serial port is blocked from communication. The related component data will no longer be refreshed. The configuration is saved even during power loss and takes effect immediately.
	SRW10330	It occupies one word (16-bit unsigned integer), and the meanings for different values are as follows: 10 and greater than 10: Allow automatic blocking of communication based on station numbers when communication fails. 0~9: Disable automatic blocking. The station numbers that are automatically blocked can be viewed through SRW840~SRW855. The retry period after automatic blocking is set through SRW10331.
	SRW10331	The cycle time for communication detection after entering the automatic blocking state is set in seconds. It occupies one word (16-bit unsigned integer), with a default value of 0 representing 10 seconds. The maximum value can be set to 65535 seconds. This register is effective when SRW10330 is set to “Allow Automatic Blocking.”
	SRW160	SRW160~175 represent the communication state of devices connected to COM3 based on station numbers. It occupies 16 words, with each character representing 16 bits. Each bit corresponds to a station number, ranging from 0 to 255. For example, if Bit3 of SRW160 is set to 1, it indicates a communication error for the device connected to station number 3 via the serial port.
	SRW840	SRW840~SRW855 occupies 16 words, with each word representing 16 bits. Each bit corresponds to a station number, ranging from 0 to 255. If a bit is set to 1, it indicates that the corresponding station number has been automatically blocked from communication. If the bit is set to 0, it means that the corresponding station number is communicating normally. For example, if Bi 3 of SRW840 is set to 1, it represents that the device connected to station number 3 via COM3 is experiencing communication issues and has been automatically blocked. This register is effective when SRW10330 is set to “Allow Automatic

Category	Register Address (start Address)	Register Function
		Blocking.”
	SRW10350	SRW10350 ~SRW10351 represent the communication baud rate for COM4. It occupies a double word (32-bit unsigned integer). Value range: 110~187500. Saved even after a power loss, and will take effect upon restarting.
	SRW10352	The communication data bit for COM4 is represented by one word (16-bit unsigned integer). The meanings for different values are as follows: 8: 8 data bits 7: 7 data bits Saved even after a power loss, and will take effect upon restarting.
	SRW10353	The communication stop bit for COM4 is represented by one word (16-bit unsigned integer). The meanings for different values are as follows: 1: 1 stop bit 2: 2 stop bit Saved even after a power loss, and will take effect upon restarting.
	SRW10354	The communication parity bit for COM4 is represented by one word (16-bit unsigned integer). The meanings for different values are as follows: 0: none 1: odd 2: even Saved even after a power loss, and will take effect upon restarting.
	SRW10355	The communication mode for COM4 is represented by one word (16-bit unsigned integer), and the meanings for different values are as follows: 0: RS232 1: RS485-4 2: RS485-2 The configuration is saved even after a power loss, and it will take effect upon restarting (when SRB23 is set to 1, it takes effect immediately).
	SRW10360	SRW10360~SRW10375 represents the communication blocking of devices connected to COM4 based on station numbers. It occupies 16 words, with each word representing 16 bits. Each bit corresponds to a station number, ranging from 0 to 255. For example, if Bit3 of SRW10361 is set to 1, it indicates that the device

Category	Register Address (start Address)	Register Function
		connected to station number 19 via the serial port is blocked from communication. The related component data will no longer be refreshed. The configuration is saved even during power loss and takes effect immediately.
	SRW10380	It occupies one word (16-bit unsigned integer), and the meanings for different values are as follows: 10 and greater than 10: Allow automatic blocking of communication based on station numbers when communication fails. 0~9: Disable automatic blocking. The station numbers that are automatically blocked can be viewed through SRW860 ~ SRW875. The retry period after automatic blocking is set through SRW10381.
	SRW10381	When entering the automatic blocking state, the cycle time for communication detection is set in seconds. It occupies one word (16-bit unsigned integer) with a default value of 0, representing 10 seconds. The maximum value is 65535 seconds. This register is effective when SRW10380 is set to 'Allow Automatic Blocking'.
	SRW180	SRW180~SRW195 represents the communication state of devices connected to COM4 based on station numbers. It occupies 16 words, with each word representing 16 bits. Each bit corresponds to a station number, ranging from 0 to 255. For example, if Bit3 of SRW180 is set to 1, it indicates a communication error for the device connected to station number 3 via the serial port.
	SRW860	SRW860~SRW875, occupies 16 words, with each word representing 16 bits. Each bit corresponds to a station number, ranging from 0 to 255. A bit value of 1 indicates that the corresponding station number has been automatically blocked for communication, while a bit value of 0 indicates normal communication for the corresponding station number. For example, if Bit3 of SRW860 is set to 1, it represents communication abnormality for the device connected to station number 3 via COM4, and it has been automatically blocked. This register is effective when SRW10380 is set to 'Allow Automatic

Category	Register Address (start Address)	Register Function
		Blocking'.
	SRW10500	SRW10500~10515 represents the network PLC communication blocking bits. These blocking bits are IP-based. If multiple PLCs are connected to the same IP, the communication of all these PLCs will be blocked. For example, if SRW10500.0 is set to 1, it blocks the communication of the first network PLC corresponding to the IP. If SRW10500.1 is set to 1, it blocks the communication of the second network PLC corresponding to the IP.
	SRW10518	It occupies one word (16-bit unsigned integer), and the meanings for different values are as follows: 10 and greater than 10: Allow automatic blocking of communication based on IP when communication fails. 0~9: Disable automatic blocking. The Ethernet devices that are automatically blocked can be viewed through SRW880~SRW895. The retry period after communication automatic blocking is set through SRW10519.
	SRW10519	When entering the automatic blocking state, the cycle time for communication detection is set in seconds. It occupies one word (16-bit unsigned integer) with a default value of 0, representing 10 seconds. The maximum value is 65535 seconds This register is effective when SRW10518 is set to “Allow Automatic Blocking”.
	SRW10520	SRW10520~SRW10579 represents the 15-level passwords in Setup mode, corresponding to SRW10110~SRW10169. It occupies 60 words.
	SRW10590	SRW10590~SRW10593 represents the remote PLC communication blocking bits. It is used to set whether the communication with remote PLCs is blocked. With 4 words, it can block up to 63 remote PLCs (SRW10590.0 is invalid). Setting a bit to 1 indicates blocking the corresponding remote PLC. For example, if SRW10590.1 is set to 1, it blocks the communication with the first added remote PLC. If SRW10590.2 is set to 1, it blocks the communication with the second added remote PLC.

Category	Register Address (start Address)	Register Function
	SRW630	SRW630~633, remote PLC communication state bit, 4 words represent up to 63 states of remote PLC (SRW630.0 invalid). A value of 1 indicates that the corresponding remote PLC is communicating abnormally, and a value of 0 indicates that the corresponding remote PLC is communicating normally or is not in use. For example: SRW630.1 is 1, indicates the first remote PLC is communicating abnormally; SRW630.2 is 1, indicates the second remote PLC is communicating abnormally.
	SRW640	SRW640~SRW655, each bit corresponds to a Ethernet PLC. Setting a bit to 1 indicates communication abnormality for the corresponding Ethernet PLC, while setting it to 0 indicates normal communication or unused state for the corresponding Ethernet PLC. For example, if SRW640.0 is set to 1, it represents communication abnormality for the first Ethernet PLC, and if SRW640.1 is set to 1, it represents communication abnormality for the second Ethernet PLC.
	SRW880	SRW880~SRW895, occupying a total of 16 words, with each word representing 16 bits. Each bit corresponds to an Ethernet device in the **Ethernet PLC** settings, ranging from device 0 to 255. Masking communication by closing the channel is done based on IP. The meanings of each bit value are as follows: 1: the IP assigned to the corresponding device has been automatically blocked for communication. 0: the corresponding device is communicating normally. For example, if Bit3 of SRW880 is 1, it indicates that the communication of the third Ethernet device is abnormal, and the assigned IP has been automatically blocked. This register is effective when SRW10518 is set to Allow Automatic Blocking.
User Level Password	SRW100	Enter the user login password for verification, occupying SRW100 to SRW103, a total of 4 words. Please use the text input component to read or display the password value.
	SRW104	Occupying 1 word, read-only register to display the current authenticated password level.

Category	Register Address (start Address)	Register Function
	SRW105	Occupying 1 word, write-only register to forcibly lower the current password level. When the value changes from a higher level to a lower level, it triggers the downgrade action. When the value of SRW104 changes, SRW105 will also change simultaneously.
	SRW10110	User level 1 password, can be any combination of digits from 0 to 9, with a maximum length of 8 digits. Passwords with different number of leading zeros are considered as different passwords. For example, 0123 and 00123 are considered different passwords. It occupies 4 words from SRW10110 to SRW10113. To read or display the password values, please use ASCII component.
	SRW10114	User level 2 password, can be any combination of digits from 0 to 9, with a maximum length of 8 digits. Passwords with different number of leading zeros are considered as different passwords. For example, 0123 and 00123 are considered different passwords. It occupies 4 words from SRW10114~SRW10117. To read or display the password values, please use ASCII component.
	SRW10118	User level 3 password, can be any combination of digits from 0 to 9, with a maximum length of 8 digits. Passwords with different number of leading zeros are considered as different passwords. For example, 0123 and 00123 are considered different passwords. It occupies 4 words from SRW10118~RSW10121. To read or display the password values, please use ASCII component.
	SRW10122	User level 4 password, can be any combination of digits from 0 to 9, with a maximum length of 8 digits. Passwords with different number of leading zeros are considered as different passwords. For example, 0123 and 00123 are considered different passwords. It occupies 4 words from SRW10122~SRW10125. To read or display the password values, please use ASCII component.
	SRW10126	User level 5 password, can be any combination of digits from 0 to 9, with a maximum length of 8 digits. Passwords with different number of leading zeros are considered as different passwords. For example, 0123 and 00123 are considered different passwords. It occupies 4 words from SRW10126~SRW10129. To read or display the password values, please use ASCII component.

Category	Register Address (start Address)	Register Function
	SRW10130	User level 6 password, can be any combination of digits from 0 to 9, with a maximum length of 8 digits. Passwords with different number of leading zeros are considered as different passwords. For example, 0123 and 00123 are considered different passwords. It occupies 4 words from SRW10130~SRW10133. To read or display the password values, please use ASCII component.
	SRW10134	User level 7 password, can be any combination of digits from 0 to 9, with a maximum length of 8 digits. Passwords with different number of leading zeros are considered as different passwords. For example, 0123 and 00123 are considered different passwords. It occupies 4 words from SRW10134~SRW10137. To read or display the password values, please use ASCII component.
	SRW10138	User level 8 password, can be any combination of digits from 0 to 9, with a maximum length of 8 digits. Passwords with different number of leading zeros are considered as different passwords. For example, 0123 and 00123 are considered different passwords. It occupies 4 words from SRW10138~SRW10141. To read or display the password values, please use ASCII component.
	SRW10142	User level 9 password, can be any combination of digits from 0 to 9, with a maximum length of 8 digits. Passwords with different number of leading zeros are considered as different passwords. For example, 0123 and 00123 are considered different passwords. It occupies 4 words from SRW10142~SRW10145. To read or display the password values, please use ASCII component.
	SRW10146	User level 10 password, can be any combination of digits from 0 to 9, with a maximum length of 8 digits. Passwords with different number of leading zeros are considered as different passwords. For example, 0123 and 00123 are considered different passwords. It occupies 4 words from SRW10146~SRW10149. To read or display the password values, please use ASCII component.
	SRW10150	User level 11 password, can be any combination of digits from 0 to 9, with a maximum length of 8 digits. Passwords with different number of leading zeros are considered as different passwords. For example, 0123 and 00123 are considered different passwords. It occupies 4 words from

Category	Register Address (start Address)	Register Function
		SRW10150~SRW10153. To read or display the password values, please use ASCII component.
	SRW10154	User level 12 password, can be any combination of digits from 0 to 9, with a maximum length of 8 digits. Passwords with different number of leading zeros are considered as different passwords. For example, 0123 and 00123 are considered different passwords. It occupies 4 words from SRW10154~SRW10157. To read or display the password values, please use ASCII component.
	SRW10158	User level 13 password, can be any combination of digits from 0 to 9, with a maximum length of 8 digits. Passwords with different number of leading zeros are considered as different passwords. For example, 0123 and 00123 are considered different passwords. It occupies 4 words from SRW10158~SRW10161. To read or display the password values, please use ASCII component.
	SRW10162	User level 14 password, can be any combination of digits from 0 to 9, with a maximum length of 8 digits. Passwords with different number of leading zeros are considered as different passwords. For example, 0123 and 00123 are considered different passwords. It occupies 4 words from SRW10162~SRW10165. To read or display the password values, please use ASCII component.
	SRW10166	User level 15 password, can be any combination of digits from 0 to 9, with a maximum length of 8 digits. Passwords with different number of leading zeros are considered as different passwords. For example, 0123 and 00123 are considered different passwords. It occupies 4 words from SRW10166~SRW10169. To read or display the password values, please use ASCII component.
User Privilege	SRW399	The user ID for login with user privileges (used in conjunction with Check List and Selection Boxes, and the Drop-down List components).
	SRW400	The username for user privileges, occupying 16 words. It can accommodate 16 Chinese words or 32 English or numeric words.
	SRW416	The password for user privilege settings, occupying 4 words. The password can consist of any combination of digits from 0 to 9, with a maximum support of 8 digits. Different leading zeros make different passwords. For example, 0123 and 00123 are different passwords. Please

Category	Register Address (start Address)	Register Function
		use the text input component to enter the password using ASCII code.
	SRW420	SRW420~SRW421, display the current user privileges. Each bit corresponds to a specific permission, where BIT0 corresponds to privilege 1, BIT1 corresponds to privilege 2, and so on.
	SRW422	SRW422~SRW423, add new user privileges. Each bit corresponds to a specific permission, where BIT0 corresponds to privilege 1, BIT1 corresponds to privilege 2, and so on.
	SRW424	SRW424~SRW425 represents the automatic logout time for new users, measured in minutes.
	SRW426	SRW426~SRW429 is used to set the password for new users or update the password for existing users. It occupies 4 words and allows passwords to be any combination of digits from 0 to 9, with a maximum of 8 digits. Different leading zeros make different passwords. For example, 0123 and 00123 are considered different passwords. Please use the text input component to enter the password using ASCII code.
	SRW430	SRW430~SRW433 is used to set the confirmation password for new users or confirm the password change. It occupies 4 words and allows passwords to be any combination of digits from 0 to 9, with a maximum of 8 digits. Different leading zeros make different passwords. For example, 0123 and 00123 are considered different passwords. Please use the text input component to enter the password using ASCII code.
	SRW434	SRW434~SRW449, the current logged-in username, occupying 16 words.
	SRW10600	SRW10600~SRW10601 is used to set whether to disable user accounts. It occupies 2 words, allowing the disabling of up to the first 32 user accounts. Setting a bit to 1 indicates that the corresponding account is disabled. For example, setting SRW10600.0 to 1 disables account 1, while setting SRW10600.1 to 0 indicates that account 2 is not disabled.
	SRW10610	SRW10610~SRW10641 represents the user login failure count, with a total of 32 words. Each word corresponds to the login failure count for one account. For example, SRW10610 represents the login failure count for account 1, and SRW10641 represents the login failure count for account 32.

Category	Register Address (start Address)	Register Function
VNC Permission Password	SRW10180	The VNC control password grants control privileges after password authentication, allowing remote control. If no password is used, it is set as empty.
	SRW10184	The VNC monitoring password grants monitoring privileges after password authentication. It allows for monitoring only and does not provide control capabilities. If no password is used, it is set as empty.
Input Keyboard	SRW200	SRW200~SRW215, a total of 16 words, usually use word display component. When keyboard pops up, display the input process of keyboard.
	SRW220	SRW220~SRW235, a total of 16 words, usually use word display component. Display the maximum value of the current numeric input component.
	SRW240	SRW240~SRW255, a total of 16 words, usually use word display component. Display the minimum value of the current numeric input component.
	SRW260	SRW260~SRW275, a total of 16 words, usually use word display component. Display the history value of the current numeric input component before entering the input state.
	SRW280	SRW280: only SRW280.0 is valid, SRW280.0 being ON indicates that the candidate word window coordinates(SRW281,SRW282) take effect. SRW280.0 being OFF indicates that the candidate word window coordinates are fixed at page coordinates (0,0).
	SRW281	The X-coordinate of the candidate word window for the input method, relative to the keyboard window.
	SRW282	The Y-coordinate of the candidate word window for the input method, relative to the keyboard window.
	SRW456	SRW456 to SRW457, occupy 2 words, represent the current keycode value of the pressed key.
	SRW10082	Font size setting for Pinyin input method, ranges from 12 to 32. It is saved even after power loss.
File Browsing	SRW300	SRW300~SRW349, a total of 50 words, usually use word components, display absolute path string currently selected by the file browsing component.

Category	Register Address (start Address)	Register Function
	SRW350	SRW350~389, a total of 40 words, usually use word components, display or input the file names of file browsing component, excluding the path.
	SRW390	The operation performed after the file browsing component is confirmed. The meanings of different values are as follows: 0: cancel or no operation 1: HMI import project to HMI 2: export from HMI to SD card or USB drive 3: HMI import recipe to HMI 4: export recipe to SD card or USB drive 5: other file operation
	SRW391	The cleaning operation done before importing the project to the HMI, after setting the relevant bit to 1, the corresponding cleaning operation will be performed before importing the project BIT0: set to 1, remove RW BIT1: set to 1, remove recipe BIT2: set to 1, remove data sampling record and historical alarm and event record BIT3: set to 1, remove special register value
	SRW392	Meanings for different values of import and export results are as follows: 9: file doesn’t exist 10: wrong file type 11: operation failed 12: file already exists 13: wrong user password 14: insufficient HMI storage 15: insufficient external storage
	SRW394	User uploads password input, occupying 4 words. The password can consist of any combination of digits from 0 to 9, with a maximum of 8 digits. Different leading zeros make different passwords. For example, 0123 and 00123 are different passwords. Occupying SRW394 to SRW397, a total of 4 words, please use ASCII code component to read or display the password value.
External Input	SRW458	Set the release detection time for USB keyboard keys. The time value =

Category	Register Address (start Address)	Register Function
		the set value * 200 milliseconds. The default value for SRW458 is 0, which represents 200 milliseconds.
	SRW699	Display the length of characters input by the barcode scanner (in bytes). After the user reads the content of SRW700, the length value needs to be reset to zero.
	SRW700	SRW700~SRW799, display the scanned character content.
	SRW10084	Set the mouse pointer movement distance (in pixels) when the direction key is pressed.

19.1.2 Bit Register

Bit register includes the following two types:

- LB: The internal bit register of HMI, the data is not saved when power off, the address range is 0~799999.
- SRB: Internal special bit register of HMI. The address range is 0~11023.

Refer to the table below for the details of the system special bit registers.

Category	Register Address (start address)	Register Function
network	SRB0	ETH1 network connection state: SRB0=0: No connection SRB0=1: Connected
	SRB1	SRB1=1: immediately reset the IP address of ETH1/immediately re-obtain the dynamic IP address of ETH1
	SRB10000	Power loss retaining register, method to obtain HMI IP address: SRB10000=0: automatically obtain IP address (DHCP) SRB10000=1: statically assign IP address
	SRB120	ETH2 network connection state: SRB120=0: No connection SRB120=1: Connected
System	SRB101	SRB101=1: execute sub macro of all components
	SRB10013	SRB10013=0: Enable changing system time SRB10013=1: Disable changing system time
	SRB10015	SRB10015=1: Forbidden to turn off backlight or lower the brightness

Category	Register Address (start address)	Register Function
		when alarm is not restored
Hardware	SRB3	SRB3=1: restart system
	SRB4	SRB4=1: restart and enter BOOT state
	SRB5	SRB5=0: Turn on backlight SRB5=1: Turn off backlight
	SRB6	SRB6=0: No SD card inserted SRB6=1: SD card inserted
	SRB7	SRB7~SRB9=0: No USB disk inserted SRB7~SR9=1: USB disk inserted (SRB7~SRB9 correspond to USB drives inserted into USB ports 1~3 respectively)
	SRB11	SRB11=0: USB download cable unconnected SRB11=1: USB download cable connected
	SRB15	SRB15=1: force stop alarm buzzer
	SRB16	When a touch screen is pressed, SRB16 is set to ON, and the X and Y coordinates of the touch position are stored in SRW450 and SRW451, respectively.
	SRB17	When SRB17 is set to ON, the non-volatile data such as RW and recipes will be immediately written. By default, it is set to OFF, which means buffered writing is used. In the event of a sudden power loss, data from the recent few seconds to a minute may be lost.
	SRB18	When SRB18 is set to 1, the system will safely eject the SD card. To use the SD card again, please reinsert SD card or restart HMI. You can check if the SD card has been ejected by examining the value of SRB6.
	SRB19	When SRB19 is set to 1, the system will safely eject the USB drive. To use the USB drive again, please reinsert USB drive or restart HMI. You can check if the USB drive has been ejected by examining the value of SRB7.
	SRB10010	SRB10010=0: Enable buzzer SRB10010=1: Disable buzzer
	SRB10011	SRB10011=0: Play audio SRB10011=1: Mute

Category	Register Address (start address)	Register Function
	SRB10012	SRB10012=0: Enable five-finger gesture to return to the main window function SRB10012=1: Disable five-finger gesture to return to the main window function
	SRB10031	SRB10031=0: Display the string “Loading” when start up SRB10031=1: Not display the string “Loading” when start up
Keyboard	SRB10	SRB10=0: Function keys input lowercase characters SRB10=1: Function keys input the corresponding uppercase characters
	SRB12	SRB12=1: Enable mouse SRB12=0: Disable mouse
	SRB13	SRB13=0: Characters keyboard shows letters SRB13=1: Characters keyboard shows numbers and characters
	SRB14	SRB14=0: Use English input SRB14=1: Use Pinyin input
	SRB102	SRB102=1: Customized uppercase characters for Korean input
	SRB10014	SRB10014=0: Keyboard focus moves left and right by pixels SRB10014=1: Keyboard focus moves left and right by component creation order
VNC	SRB10020	SRB10020=0: Disable VNC function SRB10020=1: Enable VNC function, save during power loss.
	SRB10021	SRB10021=0: Remote VNC client can control HMI interface SRB10021=1: Remote VNC client can only display HMI interface, cannot control; save during power loss.
Communication	SRB20	After changing the communication settings for COM1, setting SRB20 to 1 will immediately apply the changes. Otherwise, a restart is required for the changes to take effect.
	SRB21	After changing the communication settings for COM2, setting SRB21 to 1 will immediately apply the changes. Otherwise, a restart is required for the changes to take effect.
	SRB22	After changing the communication settings for COM3, setting SRB22 to 1 will immediately apply the changes. Otherwise, a restart is required for the changes to take effect.

Category	Register Address (start address)	Register Function
	SRB23	After changing the communication settings for COM4, setting SRB23 to 1 will immediately apply the changes. Otherwise, a restart is required for the changes to take effect.
User Privilege	SRB30	Set SRB30 to 1, Enable user authority login.
	SRB31	Set SRB31 to 1, log out user privileges.
	SRB32	Set SRB32 to 1, add user privileges.
	SRB33	Set SRB33 to 1, delete user privileges.
	SRB34	Set SRB34 to 1, modify current user privilege password.
	SRB35	Set SRB35to 1, restore user privileges to default value.
Alarm Events	SRB70	SRB70=1: Confirm all current events
	SRB71	SRB71=1: Confirm all history events
	SRB72	SRB72=1: Clear current confirmed events, only supports the current alarm component.
	SRB73	SRB73=1: Clear recovered history events
File Browsing	SRB103	SRB103=1: The file browsing path set by SRW300 takes effect
External Input	SRB10016	SRB10016=1: Enable keyboard arrow keys to control mouse movement and enter key to control left clicking

19.2 Built-in Function

Functions are built into the macro module and can be called directly by the user when writing macro codes.

19.2.1 Read and Write Function

19.2.1.1 Read Bit Address

Function format: bool GetBit (@address alias@,address offset)

Function: read a bit from specified register .

If the word address to be read is a variable external to the PLC, be sure to use the GetError function to ensure that this function is executed successfully, otherwise it may cause the macro to exit or read or write to an unanticipated value, resulting in an error.

Parameter Description:

- @address alias@: select a bit address type

- Address offset: positive integer (unsigned int), read address=@address alias@stated address+address offset
- Return value: Boolean, value of the read bit address

Error Message:

Use GetError function to get the error code.

int error=GetError();

Example:

bool power=GetBit(@power_on@,2)

Address of power_on is set to LB0, then this example means read bit state from LB2, return to bool variable power

19.2.1.2 Read Word Address

Function format: unsigned short GetWord(@address alias@, address offset)

Function: read a word from specified register.

> If the word address to be read is a variable external to the PLC, be sure to use the GetError function to ensure that this function is executed successfully, otherwise it may cause the macro to exit or read or write to an unanticipated value, resulting in an error.

Parameter Description:

- @address alias@: select a word address type
- Address offset: positive integer(unsigned int), read address=@address alias@stated address+address offset
- Return value: unsigned short, value of the read word address

Error Message:

Use GetError function to get the error code.

int error=GetError();

Example:

unsigned short speed=GetWord(@speed@,3)

@speed@address is set to LW0, then this example means read value from LW3, return to unsigned short variable speed.

If use signed number, force conversion can be used:

short speed = (short)GetWord(@speed@,3)

19.2.1.3 Read Double-word Address

Function format: unsigned int GetDWord(@address alias@, address offset)

Function: read a double-word from specified register.

Parameter Description:

- @address alias@: Select a word or double-word address type
- Address offset: positive integer(unsigned int), read address=@address alias@stated address+address offset
- Return value: unsigned int, value of the double-word address that is read. If it is word type, read two words consecutively in little-endian order, with the lower word first.

Error Message:

Use GetError function to get the error code.

int error=GetError();

Example:

unsigned int speed=GetDWord(@speed@,3):

@speed@address is set to LW0, then this example means to read the value of double-word from LW3 and LW4, return to unsigned int variable speed

If use other type of number, force conversion can be used:

int speed = (int)GetDWord(@speed@,3)

19.2.1.4 Read Float Point

Function format: float GetFloat(@address alias@, address offset)

Function: read a single-precision floating-point from specified register address.

Parameter Description:

- @address alias@: select a word or double-word address type
- address offset: positive integer(unsigned int), read address=@address alias@stated address+address offset
- Return value: floating point, read the floating point value stored at the double-word address or two consecutive words addresses.

Error Message:

Use GetError function to get the error code.

int error=GetError();

Example:

float speed=GetFloat(@speed@,3)

@speed@address is set to LW0, then this example means to read double-word from LW3 and LW4, return to float variable speed

19.2.1.5 Read Consecutive Addresses by Data Type

Function format: int GetMem (array pointer,@address alias@,address offset, number of bytes)

Function: read consecutive words from specified register address.

Parameter Description:

- Array pointer: pointer type, pre-stated array.
- @address alias@: select the start address for a register type, it can be a bit register or word register
- address offset: positive integer(unsigned int), read start address=@address alias@stated address+address offset
- Number of bytes: positive integer(unsigned int), number of bytes to read. Pay special attention to data type conversion. Number of bytes should be sizeof(data type staed by array)*number of arrays to read, maximum value of byte number is 20480.
- Return value: int, return value1 indicates success, 0 indicates read failure, -4 indicates call failure.

Example:

unsigned short data[10];

int error = GetMem(data,@array data@,2,10*sizeof(unsigned short))

@array data@address is set to LW0, then this example means read 10 words strat from LW2.

char data[5];

int error = GetMem(data,@array data@,2,5)

@array data@address is set to LW0, then this example means read 3 words strat from LW2(each word contains two char data, high bit of the last word is invalid), copy to array data.

19.2.1.6 Set Value of Bit Address

Function format: int SetBit(@address alias@,address offset, set value)

Function: set bit of the specified regitser .

Parameter Description:

- @address alias@: select a bit address type
- Address offset: positive integer(unsigned int), read address=@address alias@stated address+address offset
- Set value: bool, set bit state, 0 or 1
- Return value: int, return value 0 indicates failure,1 indicates success

Example:

int error=SetBit(@power@,2,1)

Poweraddress set to LB0, then this example means set the state of LB2 to 1.

19.2.1.7 Set Value of Word Address

Function format: int SetWord(@address alias@,address offset, set value)

Function: set a 16-bit number to specified word address register.

Parameter Description:

- @address alias@: select a word address type
- address offset: positive integer(unsigned int), read address=@address alias@stated address+address offset
- Set value: short type, the to the value of specified register.

- Return value: int, return value 0 indicates failure,1 indicates success

Example:

short speed;

int error=SetWord(@speed@,3,speed):

@speed@address set to LW0, this example means set the value of speed to LW3.

19.2.1.8 Set Value of Dual-word Address

Function format: bool SetDWord (@address alias@,address offset, set value)

Function: set a 32-bit number to specified register address, the address can be a dual-word register or two consecutive single-word resgiter.

Parameter Description:

- @address alias@: select a single-word or dual-word address type
- Address offset: positive integer(unsigned int), read address=@address alias@stated address+address offset
- Set value: int, set to value of specified register
- Return value: int, Return value 0 indicates failure,1 indicates success

Example:

unsigned int speed

int error=SetDWord(@speed@,3,speed):

@speed@address is set to LW0, this example means to set the value of speed to a dual-word address combined by LW3 and LW4.

19.2.1.9 Set Float Point to Specified Address

Function format: int SetFloat(@address alias@,address offset, set value):

Function: set a single-precision floating-point to specified address.

Parameter Description:

- @address alias@: select a single-word or dual-word address type
- address offset: positive integer(unsigned int), read address=@address alias@stated address+address offset
- set value: float, set to register float
- Return value: int, return value 0 indicates failure,1 indicates success

Example:

float speed=3.14;

int error=SetFloat(@speed@,3,speed):

@speed@address is set to LW0, this example means to set the value of speed to a dual-word combined by LW3 and LW4.

19.2.1.10 Set Value of Continuous Addresses

Function format: int SetMem(array pointer, @address alias@, address offset, number of bytes)

Function: set array data to the continuous register of specified start address.

Parameter Description:

- Array pointer: pointer type, point to pre-stated array.
- @address alias@: select the start address of a register type, can be bit register or word register.
- address offset: positive integer(unsigned int) start address read=@address alias@stated address+address offset
- Number of bytes: positive integer(unsigned int), number of bytes to read. Pay special attention to data type conversion.
- Number of bytes should be sizeof(data type stated by array)*number of array to read. Maximum number of bytes is 20480.
- Return value: int, return value 1 indicates success, 0 indicates read failure, -4 indicates call failure

Example:

unsigned short data[10];

int error = SetMem(data,@array data@,2,10*sizeof(unsigned short));

@array data@address set to LW0, this example copy the data of array to 10 word registers starting from LW2.

char data[5];

int error = SetMem(data,@array data@,2,5):

@array data@address is set to LW0, this example will copy 5-byte data to 3 words starting from LW2 (each word contains two char data, high bit of the last word is invalid).

19.2.1.11 Set String to Continuous Addresses

Function format: int SetString(@address alias@, address offset, encoding format, array pointer,...)

Function: set string array to the continuous register of specified start address.

Parameter Description:

- @address alias@: select the start address of a register type, word register only.
- Address offset: positive integer(unsigned int),write in start address=@address alias@stated address+address offset
- Encoding format: select the encoding format that HMI display component uses, directly enter UTF8, UNICODE, GB2312
- Array pointer: pointer type, point to pre-stated array or a set of string. Format effector can be used.
- ...: Un-fixed number of parameters, must be one-to-one correspond to format effector.

The format effector of this function only supports %d (signed decimal integer), %x (signed hexadecimal integer), %f (signed 2-digit decimal single-precision floating-point number), %c (character type), %s (string), if you need to use the regular ‘%’, you can use ‘%%’.

- Return value: int, return value 1 indicates success, 0 indicates encoding format error, -4 indicates call error

Example:

unsigned short usStation=GetWord(@information value_level@,0); // store information value_level；

unsigned short usVal=GetWord(@information value_value@,0);// store information value_value；

int error1 = SetString(@information@, 0, UNICODE, “level %d, revise from value %d to 0”, usStation, usVal);

Execution Result:

In @information@string register, display “level 5, revise from value 230 to 0”

19.2.1.12 Set the Value of Continuous Addresses Based on Data Type

Function format: int SetMemEx (array pointer,@address alias@,address offset,number of bytes, data type)

Function: set the array data to the continuous register of specific start address based on specific data type.

Parameter Description:

- Array pointer: pointer type, point to pre-stated array.
- @address alias@: select the start address of a register type, can be bit register or word register.
- Address offset: positive integer(unsigned int), start address read=@address alias@stated address+address offset.
- Number of bytes: positive integer(unsigned int), number of bytes to read. Pay special attention convert based on data type. Number of bytes is sizeof (data type stated by array)*number of arrays to read, maximum number of bytes is 20480.
- Data Type: DATA_INT16(16-bit integer), DATA_INT32 (32-bit integer), DATA_FLOAT(32-bit float point)
- Return value: int, return value 1 indicates success, 0 indicates read failure, -4 indicates call failure.

Example:

unsigned short data[10];

int error = SetMemEx(data,@array data@,2,10*sizeof(unsigned short),DATA_INT16):

@array data@set address to LW0, then this example indicates copy array data to 10 word registers starting from LW2, based on 16-bit integer.

char data[5];

int error = SetMemEx(data,@array data@,2,5,DATA_INT16):

@array data@set address to LW0, this example means to copy 5 bytes of data to 3 words starting from LW2 based on 16-bit integer type.

19.2.2 System Function

19.2.2.1 Call Macro

Function format: int CallMacro(“macro name”)

Function: call specific macro.

Parameter Description:

- Macro name: content in the quotation marks is the name of macro to quote
- Return value: int, return the return value of macro

Example:

int error = CallMacro(“Macro_1”):

Assign the return value of macro(Macro_1) to integer error

19.2.2.2 Get Error Code

Function format: int GetError( ):

Function: Get error code.

Parameter Description:

- No input parameter.
- Return value: int, returned error code: 0 represents not executed; 1 represents success; 2 represents timeout; 3 represents error; 4 represents socket error; 16 represents unfinished communication.

Example:

int error =GetError()

Assign error code to error (integer).

19.2.2.3 Delay Function

Function format: Delay(Time)

Function: delay specified time.

Parameter Description:

- Time: delay time, unsigned int in milliseconds.
- Return value: no return value.

Example:

Delay(1000)

Wait for 1000 milliseconds when delayed.

19.2.2.4 Set COM Port Communication Parameters

Function format: int SetComParam(port no., baud rate, data bit, stop bit, parity bit, communication mode)

Parameter Description:

- Port No.: number of communication port, unsigned int. 0 represents COM1, 1 represents COM2, 2 represents COM3, and so on.

- Baud rate: communication baud rate, int, such as 9600, 115200l.
- Data bit: communication data bit, int, including 7, 8.
- Stop bit: communication stop bit, int, including 1, 2.
- Parity bit: communication parity bit,int, 'n' or value 110: no parity, 'o' or value 111: odd parity, 'e' or value 101: even parity.
- Communication mode: communication mode setting ,int, 0 represents RS232, 1 represents RS485-4, 2 represents RS485-2.
- Return value: return value 0 represents failure, 1 represents success.

Example:

int error=SetComParam(0,115200,8,1,'n',2)

Set the communication mode of COM1port to RS485-2, baud rate is 115200, 8 data bits, 1 stop bit, no parity bit.

19.2.2.5 COM Port Communication Data Output

Function format: int Outport (port no., buffer pointer, number of data)

Before using this function, call the Set COM Port Communication Parameters function to initialize the HMI COM port. Please refer to Set COM Port Communication Parameters.

Function: COM port outputs specific data.

Parameter Description:

- Port No.: communication COM port number, unsigned int. 0 represents COM1, 1 represents COM2, 2 represents COM3,and so on.
- Buffer pointer: read array pointer of the buffer area.
- Number of data: unsigned int, number of data to be sent.
- Return value: return the output number of data bytes number of bytes

Example:

unsigned char send_buff[]=“Hello world!”;

int error=Outport(1,send_buff,12);

19.2.2.6 COM Port Communication Data Input

Function format: int Inport(port no., buffer pointer, buffer length, timeout period)

- Before using this function, call the Set COM Port Communication Parameters function to initialize HMI COM port.
- Please replace this function with the InportAuto function. The InportAuto function addresses the inconvenience and unfriendly data reception issues present in the Inport function. It incorporates features such as timeout and packet disconnection time, which allow for more efficient reception of data sent over the serial port. However, for compatibility reasons, the Inport function is still retained. For detailed information about the InportAuto function, please refer to COM Port Communication Data Auto Input.

Function: COM port receives data.

Parameter Description:

- Port No.: COM port number,unsigned int. 0 represents COM1, 1 represents COM2, 2 represents COM3, and so on.
- Buffer pointer: read array pointer of the buffer area.
- Buffer Length: This function reads and returns the length of the buffer. It does not necessarily wait until the buffer is full. The maximum size of the buffer is 4096.
- Timeout period: Measured in milliseconds, if no data is received within n milliseconds, or if no additional data is received within n milliseconds after receiving data, or if the buffer becomes full, the function will return.
- Return value: The actual number of data read. If the function returns “-1”, it indicates an error.

Example:

unsigned char recv_buff[];

int data_count=Inport(1,recv_buff,16,10);

19.2.2.7 COM Port Communication Data Auto Input

Function format: int InportAuto(port no., buffer pointer, buffer length, wait time, packet disconnection time)

Before using this function, call the Set COM Port Communication Parameters function to initialize HMI COM port. Please refer to Set COM Port Communication Parameters.

Parameter Description:

- Port No.: Communication COM port No., unsigned int. 0 indicates COM1, 1 indicates COM2, 2 indicates COM3, and so on.
- Buffer pointer: read buffer array pointer.
- Buffer length: refers to the number of bytes to be read currently. The actual value read will be less than or equal to the actual length. If it is set to 100, when 120 bytes are sent, a maximum of 100 bytes can be read. There are 20 bytes left in the serial port for buffering. System can read the 20 bytes data next time.
- Waiting time: When calling this function, if there is data on the serial port within the waiting time, then it will be received. If there is no data on the serial port during the waiting time, the function will be exited. The unit is millisecond.
- Packet disconnection time: in milliseconds. After starting to receive data, wait for a short time, usually 1ms to 30ms, to check whether there is still data on the serial port. If there is no data, it is considered that the serial data has been received. If this value is 0, then use the default value (less than 9600 for 40ms; greater than or equal to 9600 and less than or equal to 19200 for 30ms; greater than 19200 and less than 115200 for 20ms; greater than or equal to 115200 for 10ms). This value can be adjusted according to different baud rates, the recommended values for common baud rates are as follows.
    - 9600: 10ms to 50ms
    - 19200: 10ms to 40ms
    - 38400: 10ms to 30ms
    - 115200: 5ms to 20ms
- Return value: the number of data actually read. If the return value is -1, it means there is an error; if the return value is 0, it means timeout, and there is no data.

Example:

unsigned char recv_buff[256]={0};

int data_count=InportAuto(1,recv_buff,16,1000,0);

19.2.2.8 Create Ethernet Connection

Function format: int OpenSocket(IP address, port no., communication mode sign)

Function: create Ethernet connection

Parameters Description:

- IP address: IP address of server, in string, such as “192.168.1.1”.
- Port No.: port No. of server, such as 5000.
- Communication mode sign: 0 indicates UDP, 1 indicates TCP.
- Return value: valid when greater than 0.

Example:

unsigned int sockNo=OpenSocket(“192.168.1.1”,5000,1);

19.2.2.9 Send Data Via Ethernet Interface

Function format: int SendSocket(sockNo, Sendbuff, data_count)

Function: Send data via Ethernet interface.

Parameter Description:

sockNo: Create a handle that is returned when monitoring a successful connection.

Sendbuff: send buffer area.

data_count: send number of bytes.

Return value: number of bytes sent.

Example:

```
unsigned int sockNo=OpenSocket("192.168.1.1",5000,1);
            unsigned char sendBuff[1500];
                GetMem(sendBuff,@sendBuff@,0,1500);
                SendSocket(sockNo,sendBuff,10);
```

19.2.2.10 Receive Data Via Ethernet Interface

Function format: int RecvSocket(sockNo,Recvbuff, data_count,waitMs)

Function: Receive data via Ethernet interface

Parameter Description:

- sockNo: create a handle that is returned when monitoring a successful connection.

- Recvbuff: receive data buffer area.
- data_count: receive number of bytes.
- waitMs: receive timeout in milliseconds, after this time, receive function will exit. System determine whether the data is received or not based on whether return value is greater than 0.
- Return value: greater than 0 indicates the number of bytes received.

Example:

```
unsigned int sockNo=OpenSocket("192.168.1.1",5000,1);
            unsigned char recvbuff[1500];
                GetMem(recvbuff,@recvbuff@,0,1500);
                RecvSocket(sockNo,recvbuff,10,10);
```

19.2.2.11 Close Ethernet Connection

Function format: int CloseSocket(sockNo)

Function: close Ethernet Connection

Parameter Description:

- sockNo: create a handle that is returned when monitoring a successful connection.
- Return value: 1 indicates success, 0 indicates failure.

Example:

```
unsigned int sockNo=OpenSocket("192.168.1.1",5000,1);
                 CloseSocket(sockNo);
```

19.2.2.12 TCP Slave Connection

Function format: int Listen_TCP(dstPort)

Function: HMI acts as a TCP server and creates a monitoring port.

Parameter Description:

- dstPort: server port No.(i.e. the port number of HMI as server).
- Return value: Handle opened as a service, valid if greater than 0.

Example:

```
unsigned int listenRet=Listen_TCP(5000);
```

19.2.2.13 UDP Slave Connection

Function format: int Listen_UDP(dstPort)

Function: HMI acts as a UDP server and creates a monitoring port.

Parameter Description:

- dstPort: server port No.(i.e. the port number of HMI as server).
- Return value: Handle opened as a service, valid if greater than 0.

Example:

unsigned int listenRet=Listen_UDP(5000);

19.2.2.14 TCP Socket

Function format: int AcceptSocket(listenRet)

Function: HMI acts as a server, monitor the port and waits for connection.

Parameter Description:

- listenRet: return handle of the Listen_TCP function.
- Return value: correctly monitored handle, valid when greater than 0.

Example:

unsigned int listenRet=Listen_TCP(5000);

unsigned int sockNo=AcceptSocket(listenRet);

19.2.2.15 Set CAN Communication Parameters

Function format: SetCanParam(baud rate, communication mode)

Function: set CAN(Controller Area Network, controller LAN) communication parameters.

Parameter Description:

- baud rate: communication baud rate, int, such as 125000
- Communication Mode: Communication Mode Setting, unsigned int type, down when value is 0, up when value is greater than or equal to 1.

Example:

SetCanParam(125000,1);

19.2.2.16 CAN Communication Data Output

Function format: CanSend(ID, buffer pointer, number of data, standard extension)

Before using this function, call the Set CAN Communication Parameters function to initialize CAN communication of HMI. Please refer to Set CAN Communication Parameters.

Function: HMI outputs data using CAN protocol.

Parameters Description:

- ID: communication ID, unsigned int type, such as 1, 2, 3……
- Buffer pointer: read buffer array pointer,char * type.
- Number of data: number of bytes of the data to be sent, unsigned int type, a maximum of 8 bytes is recommended.
- Standard extension: sending mode is standard or extension, unsigned int type, 0 indicates standard; 1indicates extension.

Example:

char send_buff[]="1234567";

CanSend(1,send_buff,7,0);

19.2.2.17 Communication Data Input

Function format: unsigned int CanDump(ID No., buffer pointer, standard extension)

Before using this function, call the Set CAN Communication Parameters function to initialize CAN communication of HMI. Please refer to Set CAN Communication Parameters.

Function: HMI receives data using CAN protocol.

Parameter Description:

- ID: communication ID, unsigned int, such as 1,2,3……
- Buffer pointer: read buffer array pointer,char * type.
- Standard extension: sending mode is standard or extension, unsigned int type, 0 indicates standard; 1 indicates extension.
- Return value: number of bytes received, unsigned int type.

Example:

char dump_buff[16];

unsigned int recvlen = 0;

recvlen = CanDump(1,dump_buff,0);

19.2.2.18 Trigger Buzzer

Function format: int BeepOut(time count of buzz, time period of each buzz)

Function: trigger a buzzer to buzz,

Parameter Description:

- Time count of buzz: unsigned int, set the time count of buzz, range 1~100.
- Time period of each buzz: unsigned int, time period of a single buzz, in millisecond, range 20~5000.
- Return value: int, 0indicates input value out of range; 1 indicates successful beep; -1 indicates failed to trigger buzzer.

Example:

int res=0;

res=BeepOut(5,500);

Beep 5 times, last for 500 milliseconds each time, with interval of 500 milliseconds.

int res=0;

res=BeepOut(120,10000);

At this point, res returns 0, buzzer does not beep.

19.2.2.19 Access Database

Function format: int SqlCmd(database file No., SQL commend string pointer)

Function: Access database.

Parameter Description:

- Database file No.: int, value 0 indicates access history alarm and event database; non-zero value indicates the database file corresponds to data sampling number.
- SQL command string pointer: char array pointer, directly input SQL command string pointer.
- Return value: int, 1 indicates success, 0 indicates failure.

19.2.2.20 Search Database

Function format: int SqlSelect(database file number, SQL command string pointer, return query result buffer area, returned number of rows, returned number of columns)

Function: search the data in database

Parameter Description:

- Database file No.: int, value 0 indicates access history alarm and event database; non-zero value indicates the database file corresponds to data sampling number.
- SQL command string pointer: char array pointer, directly input SQL command string pointer.
- Return search result buffer: char array pointer input.
- Return number of rows for search result: int value, returns the number of rows in the query result.
- Return number of columns for search result: int value, returns the number of columns in the query result.
- Return value: int, 1 indicates success, 0 indicates failure.

Example:

char **pResult;

int Row,Col;

int err=SqlSelect(2,”xxx”,pResult,Row,Col);

SqlFree(pResult);

19.2.2.21 Release Data Query Buffer

Function format: int SqlFree(database query buffer pointer)

Function: Release the buffer data of the query database data operation.

Parameter Description:

- Database query buffer pointer: string array pointer.
- Return value: int, 1 indicate success, 0 indicates failure.

Example:

char **pResult;

int Row,Col;

int err=SqlSelect(2,"xxx",pResult,Row,Col);

SqlFree(pResult);

19.2.2.22 COM Port Debug

Function format: void Debug(port no., format string, variable 1, variable 2...)

- Before using this function, call the Set COM Port Communication Parameters function to initialize HMI COM port. Please refer to Set COM Port Communication Parameters.
- If only debugging in the simulator interface, it's not necessary to call the Set COM Port Communication Parameters function to initialize HMI COM port.

Function: debug COM port communication.

Parameter Description:

- Port No.: communication COM port number, unsigned int. 0 indicates COM1, 1 indicates COM2, 2 indicates COM3, and so on.
- Format string: output format string, usage is same as C language printf function.
- Variable: variable name corresponding to the output format string, same usage as the printf function of C language. The format rules are as follows. The part in [] is optional. %[Specify parameters][Identifier][Width][.Precision] indicator, if you want to output '%' itself, please use '%%' to process.
- Specified parameters: process character direction, negative sign means that it is processed from the back to the front.
- Identifier: filling element. If the element is 0, it means use 0 to fill in the blank. The filling element may be omitted.
- Width: total width of character, it is minimum width.
- Precision: refers to number of float point bits after the decimal point.

Conversion Character

- %%: Print the percentage symbol without conversion.
- %c: Convert an integer to the corresponding ASCII character.
- %d: Convert an integer to decimal.
- %f: Convert a double-precision number to a floating-point number.
- %o: Convert an integer to octal.
- %s: Convert an integer to a string.
- %x: Convert an integer to lowercase hexadecimal.
- %X: Convert an integer to uppercase hexadecimal.

Example:

int itest=12;

float ftest=65.4321;

Debug(0,"itest=%d\n ftest=%2.3f\n",itest,ftest);

Output result:

itest=12

ftest=65.432

19.2.3 CRC Check

Function format: unsigned short CRC16(array pointer, operation length)

Function: perform CRC check to received data

Parameter Description:

- array pointer: array pointer, point to the array to operate.
- Operation length: data byte length to be operated
- Return value: 16-bit CRC check value.

Example:

unsigned char data[]={5,6,3,2,18};

unsigned short crc16=CRC16(data,5);

19.2.4 Vector Graph

19.2.4.1 Define Angle

Function format: FArc arc = { angle1, angle2}

Function: set start angle and end angle (clockwise) of graphics such as arc.

Parameter Description:

- angle1: start angle
- angle2: end angle
- Return value: value of angle

Example:

FArc arc = { 0,180}

19.2.4.2 Coordinate of Defined Point

Function format: FPoint point = { x, y}

Function: create point.

Parameter Description:

- x: x coordinate
- y: y coordinate
- Return value: point

Example:

FPoint point = { 3, 4}

Create new point, coordinate is {3,4}.

19.2.4.3 Define Rectangle

Function format: FRect rect = { x1, y1, x2, y2}

Function: create a rectangle.

Parameter Description:

- x1: X coordinate of the upper left vertex of the rectangle.
- y1: Y coordinate of the upper left vertex of the rectangle.
- x2: X coordinate of the lower right vertex of the rectangle.
- y2: Y coordinate of the lower right vertex of the rectangle.
- Return value: rectangle.

Example:

FRect rect = { 1, 1, 5, 5}

19.2.4.4 Define Color

Function format: int rgb = FRgb(red, green, blue)

Function: define color based on the RGB value

Parameter Description:

- red: value of read, value range 0~255
- green: value of green, value range 0~255
- blue: value of blue, value range 0~255
- Return value: color

Example:

int rgb = FRgb(204, 232, 207)

19.2.4.5 Define Pen

Function format: FPen pen = { flag, width, color}

Function: create pen.

Parameter Description:

- flag: bit0~7(type)-(0-none, 1-solid line, 2-dash line,...)

- width: pen width.
- color: pen color.
- Return value: single-color pen.

Example:

FPen pen = { flag, width, color}

19.2.4.6 Define Brush

Function format: FBrush brush = { flag, color1, color2}

Function: create brush.

Parameter Description:

- flag: bit0~3(main type),(0 indicates no filling, 1 represents pattern fill, 2 represents gradient fill, 3 indicates user-defined pattern)
- flag: bit8~15(sub type),(0 indicates none,1 indicates solid color filling for brush...)
- color1: color 1, foreground color.
- color2: color 2, background color.
- Return value: brush

Example:

FBrush brush = { flag, color1, color2}

19.2.4.7 Create Canvas

Function format: int CreateCanvas(w, h)

Function: create canvas.

Parameter Description:

- w: canvas width
- h: canvas height
- Return value: canvas handle

Example:

int canvas = CreateCanvas(w, h)

19.2.4.8 Render Canvas

Function format: int RenderCanvas(canvasNo, winNo, x, y)

Function: export canvasNo to specified window number, dispaly position is (x,y)

Parameter Description:

- canvasNo: canvas
- winNo: window number
- x: X coordinate of canvas

- y: Y coordinate of canvas

Example:

int render = RenderCanvas(canvasNo, winNo, x, y)

19.2.4.9 Free Vanvas

Function format: FreeCanvas(canvasNo)

Function: free canvas.

Parameter Description:

cansvasNo: canvas number

Example:

FreeCanvas(canvasNo)

19.2.4.10 Draw Polyline

Function format: int DrawLines(pts, n, pen, canvasNo)

Function: draw Polyline.

Parameter Description:

- pts: point
- n: number of points
- pen: pen
- canvas: canvas
- Return value: Polyline

Example:

int line = DrawLines(pts, n, pen, canvasNo)

/////////////////////////////////Project Example/////////////////////////////////

```
//create canvas, canvasNo is canvas handle

int canvasNo = CreateCanvas(100, 100);

FRect rt = {20, 20, 80, 80};

FPoint pts[] = {{10, 10}, {10, 90}, {90, 90}};

FPen pen = {1, 5, FRgb(0, 255, 0)};        //pen

FBrush brh = {1, FRgb(255, 0, 0), FRgb(255, 0, 0)};        //brush

//draw line on canvas, pts store points

DrawLines(pts, 3, pen, canvasNo);
```

```
// export canvas to window 1 (20,20) to display

RenderCanvas(canvasNo, 1, 20, 20);

//free canvas at last

FreeCanvas(canvasNo);
```

19.2.4.11 Fill Polygon

Function format: int DrawPolygon(pts, n, brush, canvasNo)

Function: draw polygon

Parameter Description:

- pts: point
- n: number of points
- brush: pen
- canvasNo: canvas
- Return value: draw polygon

Example:

int polygon = DrawPolygon(pts, n, brush, canvasNo)

////////////////////////////////Project Example////////////////////////////////

```
//create canvas, canvasNo is canvas handle

int canvasNo = CreateCanvas(100, 100);

FRect rt = {20, 20, 80, 80};

FPoint pts[] = {{10, 10}, {10, 90}, {90, 90}};

FPen pen = {1, 5, FRgb(0, 255, 0)};       //pen

FBrush brh = {1, FRgb(255, 0, 0), FRgb(255, 0, 0)};       //brush


//draw polygon to canvas, pts, store points

DrawPolygon(pts, 3, brh, canvasNo);

//export canvas to window 1 (20,20) to display

RenderCanvas(canvasNo, 1, 20, 20);

//free canvas at last

FreeCanvas(canvasNo);
```

19.2.4.12 Draw Circle

Function format: int DrawCycle(rt, pPen, pBrush, canvasNo)

Function: draw circle

Parameter Description:

- rt: enclosing rectangle of the circle
- pPen: single-color pen pointer (NULL represents no border)
- pBrush: multi-color pen pointer (NULL represents no filling)
- canvasNo: canvas
- Return value: draw circle

Example:

int cycle = DrawCycle(rt, pPen, pBrush, canvasNo)

////////////////////////////////Project Example////////////////////////////////

```
//create canvas, canvasNo is canvas handle

int canvasNo = CreateCanvas(100, 100);

FRect rt = {20, 20, 80, 80};

FPoint pts[] = {{10, 10}, {10, 90}, {90, 90}};

FPen pen = {1, 5, FRgb(0, 255, 0)};        //pen

FBrush brh = {1, FRgb(255, 0, 0), FRgb(255, 0, 0)};        //brush

//draw circle with rt as enclosing rectangle to canvas, &pen draws the circle outline, &brh fills the circle inside

DrawCycle(rt, &pen, &brh, canvasNo);

//export canvas to window 1 (20,20) to display

RenderCanvas(canvasNo, 1, 20, 20);

//free canvas at last

FreeCanvas(canvasNo);
```

19.2.4.13 Draw Sector Ring

Function format: int DrawPie(rt, arc, scale, pPen, pBrush, canvasNo)

Function: draw sector ring

Parameter Description:

- rt: rectangle enclosing rectangle of the sector ring

- arc: angle of sector ring
- scale: the ratio of the inner and outer diameters of the sector ring, the value range is 0~99, 0 means sector
- pPen: pen
- pBrush: brush pointer (NULL indicates no filling)
- canvasNo: canvas
- Return value: sector ring

Example:

int pie = DrawPie(rt, arc, scale, pPen, pBrush, canvasNo)

////////////////////////////////Project Example////////////////////////////////

```
//create canvas, canvasNo is canvas handle

int canvasNo = CreateCanvas(100, 100);

FRect rt = {20, 20, 80, 80};

FArc arc ={0,180}

FPoint pts[] = {{10, 10}, {10, 90}, {90, 90}};

FPen pen = {1, 5, FRgb(0, 255, 0)};        //pen

FBrush brh = {1, FRgb(255, 0, 0), FRgb(255, 0, 0)};        //brush

//&pen draws border, &brh fills the inside

DrawPie(rt,arc,50,&pen,&brh,canvasNo);

//export canvas to window 1 (20,20) to display

RenderCanvas(canvasNo, 1, 20, 20);

//free canvas

FreeCanvas(canvasNo);
```

19.2.4.14 Draw Arc

Function format: int DrawArc(rt, arc, pen, canvasNo)

Function: draw arc

Parameter Description:

- rt: enclosing rectangle of arc
- arc: angle
- pen: pen
- canvasNo: canvas
- Return value: arc

Example:

int arc = DrawArc(rt, arc, pen, canvasNo)

////////////////////////////////Project Example////////////////////////////////

```
//create canvas, canvasNo is canvas handle
int canvasNo = CreateCanvas(100, 100);
FRect rt = {20, 20, 80, 80};
FArc arc ={0,180}
FPoint pts[] = {{10, 10}, {10, 90}, {90, 90}};
FPen pen = {1, 5, FRgb(0, 255, 0)};        //pen
DrawArc(rt, arc, pen, canvasNo);
//export canvas to window 1 (20,20) to display
RenderCanvas(canvasNo, 1, 20, 20);
//free canvas at last
FreeCanvas(canvasNo);
```

20 Appendix D-Terminology

Term	Description
CRC	CRC (Cyclic Redundancy Check) is a fast algorithm used to generate a short, fixed-length verification code based on network data packets, files, or other data. It is primarily used for detecting and verifying errors that may occur during data transmission or storage. The CRC algorithm utilizes division and remainder principles to achieve error detection functionality. It has advantages such as clear principles and simple implementation.
DCS	DCS (Distributed Control System) is a new generation meter control system based on microprocessors. It is designed with the principles of decentralized control functionality, centralized display and operation, and a balance between autonomy and comprehensive coordination. DCS adopts the fundamental design concept of decentralized control and centralized operation and management. It utilizes a multi-level hierarchical and cooperative autonomous structure. Its main characteristic is the combination of centralized management and decentralized control. DCS has been widely applied in various industries such as power, metallurgy, petrochemical, and many others.
FTP	FTP (File Transfer Protocol) is a set of standard protocols used for file transfer over a network. It operates at the application layer, which is the seventh layer of the OSI model or the fourth layer of the TCP model. FTP utilizes TCP for transmission instead of UDP. Before establishing a connection between the client and server, a “three-handshake” process is performed to ensure a reliable and connection-oriented communication. This guarantees the reliability and integrity of the connection between the client and server, providing a reliable assurance for data transmission. FTP is the most longstanding network tool on the Internet. It has been an essential and widely used service in the Internet for the past half-century since its inception. The first FTP was proposed by A KBHUSHAN in 1971 in RFC (Request for Comments 114). Throughout its history, FTP has maintained its significance and widespread usage due to its unique advantages. The goal of FTP is to enhance file sharing and provide a means for users to access remote computers indirectly, enabling transparent and reliable data transmission across storage media. FTP can operate with any type of file without requiring further processing, much like MIME or Unicode. However, FTP is known for its high latency, meaning that the time between initiating a request and receiving the first set of requested data can be quite long. Additionally, FTP often involves lengthy login processes that need to be repeated periodically.
HMI	HMI is short for Human Machine Interface. The human-machine interface (also called a user

Term	Description
	interface) serves as a medium for interaction and information exchange between a system and its users. It facilitates the conversion of information from its internal form to a format that can be easily understood by humans. The field of human-machine interaction exists in various domains where communication between humans and machines takes place. Veichi HMI is an HMI for industrial control scenarios, used to connect programmable logic controllers, frequency converters, DC speed controllers, meters, and other industrial control device. It is a digital device using the display screen to show, writing the work parameters or entering the operating command through the input unit (such as touch screen, keyboard, mouse, etc.) to achieve the human-machine information interaction. It consists of two parts: hardware and software.
Modbus	Modbus is a serial communication protocol that was introduced by Modicon (now Schneider Electric) in 1979 for communication with programmable logic controllers (PLC). Modbus has become an industry-standard communication protocol in the industrial field (De facto) and is widely used as a common connectivity method between industrial electronic devices. The main reasons why Modbus is more widely used compared to other communication protocols are: ◆ It was publicly released and has no copyright restrictions. ◆ It is easy to deploy and maintain. ◆ For vendors, there are fewer limitations when it comes to modifying or moving bits or bytes locally. Modbus allows multiple devices (approximately 240) to be connected on the same network for communication. For example, a device that measures temperature and humidity can send the results to a computer. In Data Acquisition and Supervisory Control and Data Acquisition (SCADA) systems, Modbus is commonly used to connect the monitoring computer with remote terminal units (RTUs).
Modbus RTU	Modbus RTU protocol is an open communication protocol primarily based on serial links such as RS232C or RS485. The “RTU” in its name stands for “Remote Terminal Unit,” which refers to remote terminal devices. It supports various electrical interfaces such as RS-232, RS-485, and can be transmitted over different media such as twisted pair cables, fiber optics, wireless, and more. In the Modbus RTU protocol, the communicating entities are referred to as “master” and “slave.” The master station initiates communication by sending queries or write commands to the slave station. The slave station passively receives these commands and responds with the corresponding data based on the function code and register number or executes the write command. In an RS485 network, theoretically, a maximum of 254 slave stations can be connected. However, in practical applications, factors such as line loss and interference are

Term	Description
	considered, and the number of slave stations is generally limited to around 100. Beyond that, it is recommended to use Ethernet communication.
Modbus TCP	Modbus TCP is a derived protocol from the Modbus series of communication protocols, designed for managing and controlling automation devices. It is a simple, vendor-neutral protocol that utilizes the TCP/IP protocol and is suitable for use in both Intranet and Internet environments for Modbus message transmission. The most common application of the Modbus TCP protocol is in serving devices such as PLCs, I/O modules, and gateways that connect to other simple field buses or I/O modules.
OPC UA	OPC stands for OLE (Object Linking and Embedding) for Process Control. It is a standardized protocol specification that was developed to facilitate data exchange between devices and applications from different vendors in the automation industry. OPC is based on Windows COM/DOM technologies and provides a unified interface for accessing data from products of various device vendors. In simple terms, OPC enables the exchange of data between devices and software applications in a standardized manner. UA stands for Unified Architecture. In response to the trends of standardization and cross-platform compatibility, the OPC Foundation has introduced a new OPC standard called OPC UA to better promote OPC. OPC UA is built upon the success of previous OPC applications. The OPC UA protocol includes the functionality of previous OPC specifications such as A&E, DA, OPC XML DA, or HDA. It allows accessing all objects using a single address space and is not limited to the Windows platform. OPC UA is defined above the transport layer, which results in increased flexibility and security compared to previous versions of OPC.
PLC	A PLC (Programmable Logic Controller) is a digital computing operation electronic system specifically designed for application in industrial environments. It utilizes a programmable memory to store instructions for executing logical operations, sequential control, timing, counting, arithmetic operations, etc. It controls various types of machinery or production processes through digital or analog inputs and outputs.
RS232	In serial communication, it is required that both communicating parties use a standardized interface, allowing different devices to be easily connected for communication. The RS-232-C interface (also known as EIA RS-232-C) is the most commonly used serial communication interface. The “-C” in “RS-232-C” simply denotes the version of RS-232, so it is essentially the same as “RS-232” in abbreviation. It was developed as a standard for serial communication in 1970 by the Electronic Industries Association (EIA) in collaboration with Bell System, modem manufacturers, and computer terminal manufacturers. Its full name is “Standard for Serial Binary Data Exchange Between Data Terminal Equipment (DTE) and Data Communication Equipment (DCE).” The standard

Term	Description
	specifies the use of a 25-pin DB-25 connector and defines the signal content for each pin of the connector, as well as the electrical levels for various signals. Later, IBM's PC simplified RS-232 to use a DB-9 connector, which became the de facto standard. In industrial control, the RS-232 port typically only uses three lines: RXD, TXD, and GND.
RS485	RS-485 is a typical serial communication standard. The RS-485 bus standard specifies the electrical characteristics of the bus interface, specifically defining two logic states: a positive voltage level between +2V and +6V represents one logic state, while a negative voltage level between -2V and -6V represents another logic state. The digital signal is transmitted differentially, which effectively reduces interference from noise signals.
RS422	EIA-422 (formerly known as RS-422) is a series of specifications for data transmission protocols that utilize 4-wire, full-duplex, differential transmission, and multi-point communication. It employs balanced transmission using unidirectional/irreversible transmission lines with or without an enable terminal. Unlike RS-485, EIA-422 does not allow multiple transmitters but can have multiple receivers. In terms of hardware configuration, EIA-422 (RS-422) is equivalent to two sets of EIA-485 (RS-485), meaning that two half-duplex EIA-485 (RS-485) connections form a full-duplex EIA-422 (RS-422) connection. The RS-422 four-wire interface does not require data direction control due to the separate transmit and receive channels. Any necessary signal exchange between devices can be done through software means (XON/XOFF handshake) or hardware means (a pair of dedicated twisted pairs). The maximum transmission distance of RS-422 is 4000 feet (approximately 1219 meters), and the maximum transmission rate is 10 Mbit/s. The length of balanced twisted pair is inversely proportional to the transmission rate, and the maximum transmission distance can be achieved only at rates below 100 kbit/s. The highest transmission rate can only be achieved over very short distances. Typically, the maximum achievable transmission rate on a 100-meter twisted pair is only 1 Mbit/s. RS-422 requires a terminating resistor, with its resistance value approximately equal to the characteristic impedance of the transmission cable. In short-distance transmissions, terminating resistors may not be necessary, meaning that they are generally not required for distances below 300 meters. The terminating resistor is connected at the farthest end of the transmission cable.
VNC	VNC is an abbreviation for Virtual Network Console. It is an excellent remote control tool software developed by the renowned AT&T European Research Laboratory. VNC is a free and open-source software based on UNIX and Linux operating systems. It offers powerful and efficient remote control capabilities, and its performance can rival any remote control software

Term	Description
	in Windows/Mac.
Address Index	Use the address index to change the current address. For example, the current address is LW0, the address index is LW2, and the offset is 3, then the target address pointed to is LW (0+*LW2 value*+3).
Address Monitoring Table	The value of the specified address needs to be monitored, and the collection of these addresses is the “address monitoring table”.
Address Tag	Use tag names to mark device (such as a PLC)register addresses. For example, if the register address of a PLC is M0.0 and its value is used to control the start of a fan, the address can be tagged as "XX_START" for easy identification. When communicating between the HMI and the PLC, the absolute address is used as the reference, the address tags are used to map to the absolute addresses. In FlexManager, when adding data monitoring points, you can directly reference the tag names. In VI20Studio, when setting the addresses for the PLC, you can also directly reference the tag names.
Alarm	Alarms are used to indicate events or operational states that occur in the industrial production process and its control system. Alarm record is used to record alarm events. Alarm records can be displayed on the HMI and can be printed and output in the form of reports.
Compilation	Compilation has two meanings: 1. the process of using a compiler program to generate an object program from a source program written in a source language; 2. the action of generating an object program using a compiler program. Compilation refers to the transformation of high-level languages into binary language that computers can recognize. Computers only understand 1s and 0s, so a compiler program translates human languages into binary code. The process of translating a source program into an object program involves five stages: lexical analysis, syntax analysis, semantic checking and intermediate code generation, code optimization, and target code generation. The main focus is on lexical analysis and syntax analysis, also known as source program analysis. During the analysis, if any syntax errors are detected, appropriate error messages are provided.
Component	The components in configuration software integrate specific computational functions to facilitate users in configuration.
Configuration	Configuration can be understood as “setting”. It refers to the process where users can achieve the desired software functionality by using a simple “building block” approach, without the need for writing computer programs.
Device Tag	By manually creating PLC variable tags in VI20Studio, you can enable tag communication between the HMI and the PLC. The device tag library is a collection of manually created

Term	Description
	variable tags.
Historical Data	Historical data refers to non-real-time data obtained from industrial field controllers stored in HMI or PLC systems. History data can be classified into two types: data records(archiving process values) and alarm records(archiving messages). Analyzing history data helps users understand the operational state and failure information of industrial production. By making changes to the control system based on this analysis, industrial production processes can be optimized, leading to improved production quality.
Macro	In computer science, a macro is a form of Abstraction that involves substituting a specified pattern of text with a series of predefined rules. When encountered by an interpreter or compiler, macros are automatically expanded or replaced according to this pattern. In compiled languages, macro expansion occurs during the compilation process, and the tools responsible for macro expansion are often referred to as macro expanders. The term “macro” is also commonly used in various similar contexts that derive from the concept of macro expansion. This includes keyboard macros and macro languages. In most cases, the use of the term “macro” implies the transformation of small commands or actions into a series of instructions.
Master/Slave	In industrial automation systems, the master station is typically the control center, while the slave stations are individual executing devices. The master station is responsible for monitoring the overall system state, controlling and scheduling the system to achieve automation control of the production process. The slave stations perform respective operations based on instructions from the master station, completing various tasks during the production process. For instance, in an assembly line production system, the master station is responsible for controlling parameters such as the start, stop, and speed of the entire production process. The slave stations are responsible for executing specific production operations, such as processing, inspection, and packaging. The master station communicates and controls the slave stations to achieve automation control of the production process, thereby improving production efficiency and quality.
Recipe	Recipe is a collection of related data, such as machine parameters or production data. Recipes are stored on HMI devices or external storage media. Recipe data is recorded on both the HMI device and PLC and is always transmitted as a whole through a single transfer.
Register	Registers are small storage areas within the CPU that are used to temporarily store data involved in calculations and their results. In fact, registers are a type of commonly used sequential logic circuit that only includes storage circuits. The storage circuits of registers are composed of flip-flops or latches, as one flip-flop or latch can store a 1-bit binary number.

Term	Description
	Therefore, an N-bit register can be constructed using N flip-flops or latches. Registers are integral components of the central processing unit. They are high-speed storage components with limited storage capacity, and they can be used to temporarily store instructions, data, and addresses. In the field of computer science, registers are internal components of the CPU and include common registers, special registers, and control registers. Registers have very high read and write speeds, making data transmission between registers extremely fast. Registers typically have at least four functions: ◆ Clearing: Clear the previously stored data in the register. ◆ Receiving: Under the influence of receiving pulses, external input data is stored in the register. ◆ Storing: Registers can retain the stored data without changes until new write pulses are received. ◆ Outputting: Only when output pulses are applied, the register circuit outputs the stored data. Registers that possess only these functions are known as digital registers, while some registers also have shift functionality and are referred to as shift registers.
Register Bit Index	It is used to present the specified bit register in a word register. The format is DDDDD.DD, such as 799999.15.
Variable Tag	For PLCs that support variable tag feature, preset rules are used to generate tag names for variables, and it is supported to export variable tags in a specific file format. The HMI imports the variable tag file from the PLC and communicates with the PLC using the variable tags, without needing to know the absolute addresses of the variables in the PLC. PLC brands that currently support variable tag functionality include Siemens, Allen Bradley, Schneider, OMRON, CODESYS, Beckhoff, and Keyence.

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