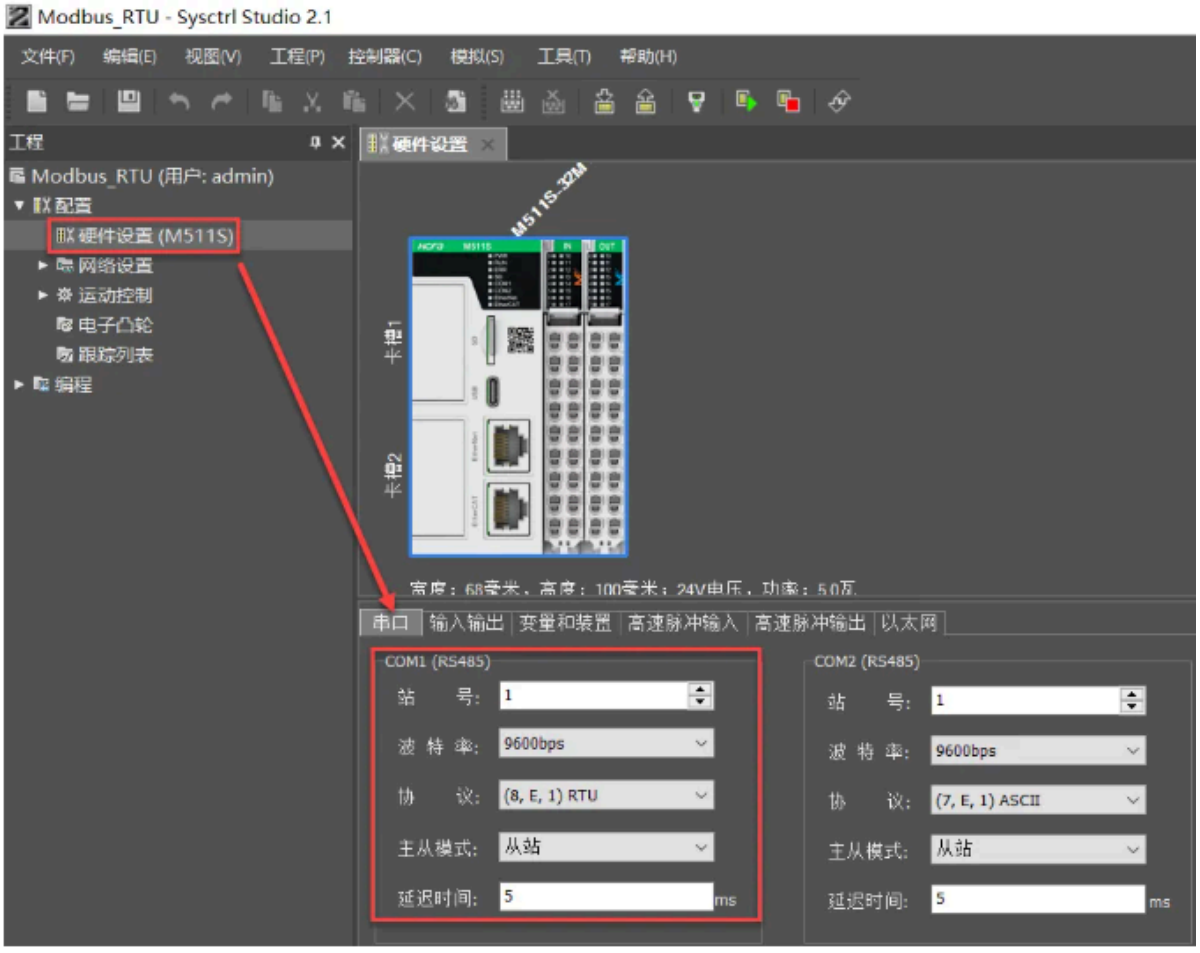
Modbus RTU

Sysctrl Studio project configuration

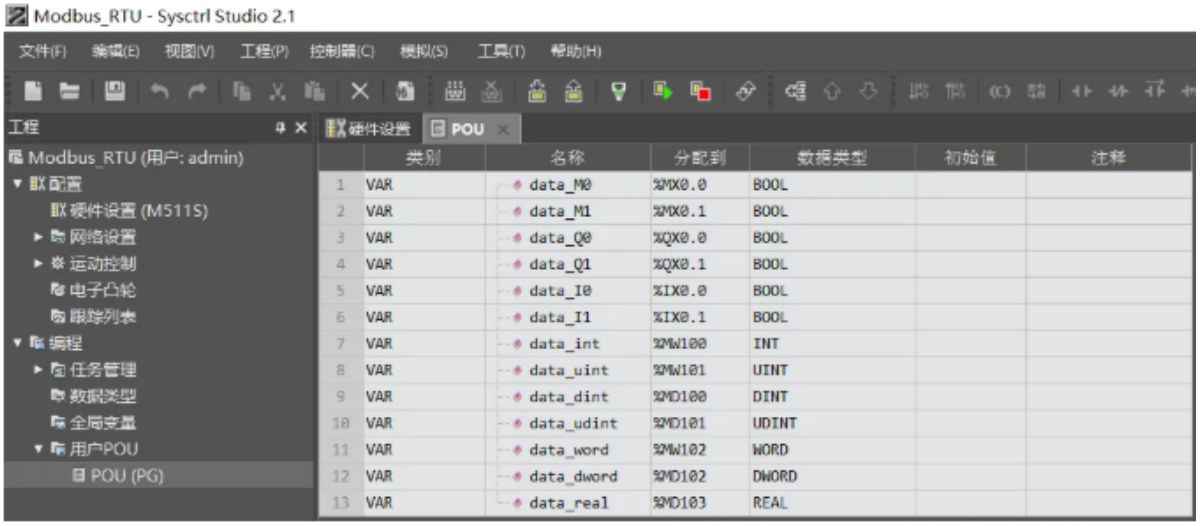
Step 1: Create a new project

Double-click to open Sysctrl Studio and create a new project. Click [Hardware Settings] and make the following settings on the serial port interface. Set the default station number to 1, the baud rate to 9600bps, the protocol to (8,E,1) RTU, and the master-slave mode to slave (with the touch screen as the master).



Step 2: Create a new variable

Open the default POU, right-click in the variable declaration area and select "Add Variable", create a new variable and assign it to the corresponding address. When assigning addresses, pay attention to the device range.



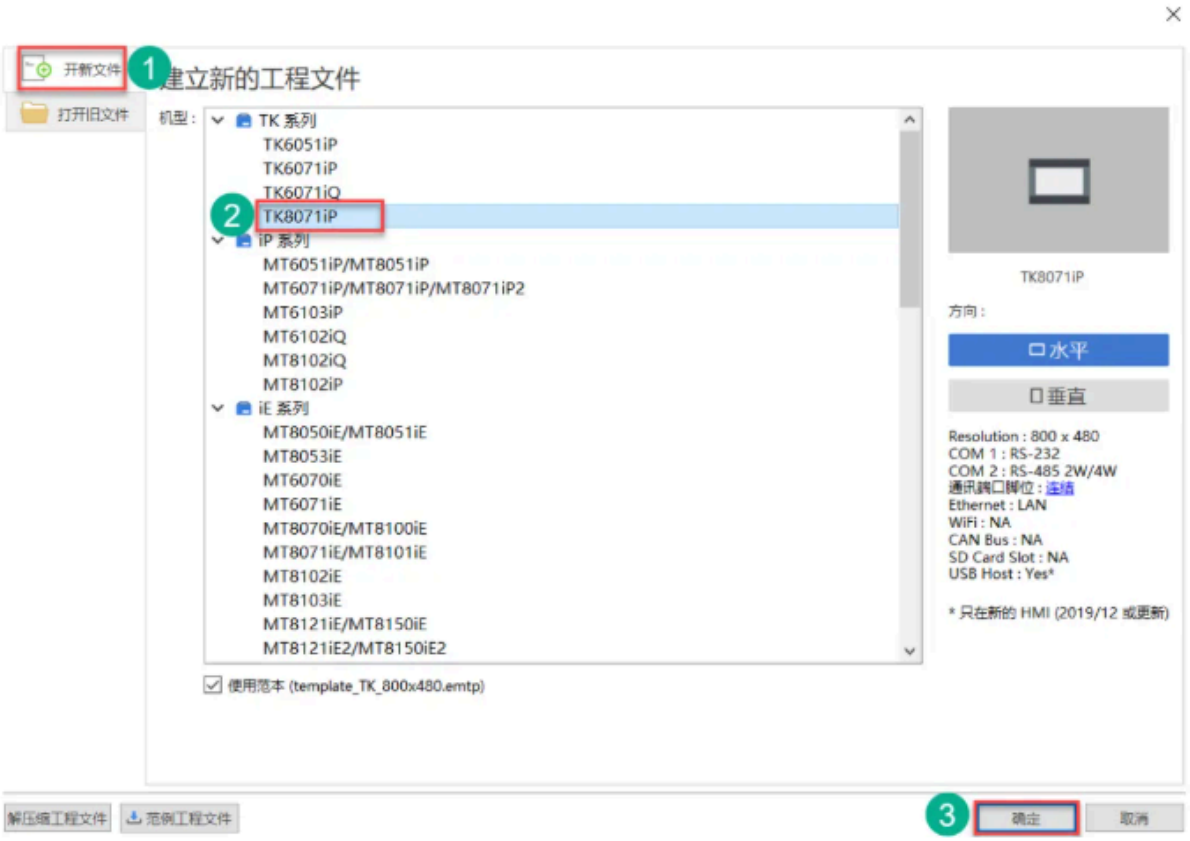
Step 3: After compilation, download the project to the controller.

Utility Manager Project Configuration

Step 1: Create a new project

(1) Open the Utility Manager software, select [Select Model] in the upper left corner, select the model series corresponding to the touch screen, and click [EasyBuilder Pro].

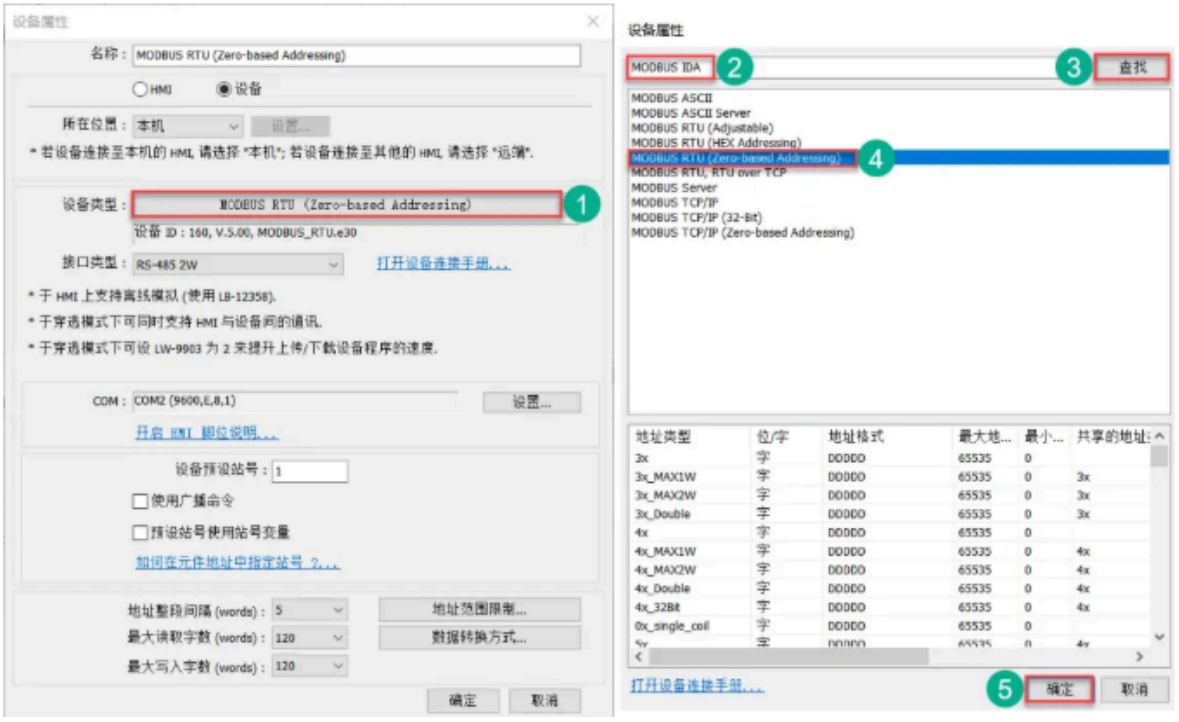
(2) Click [Open New File] and select the corresponding model [TK8071iP].



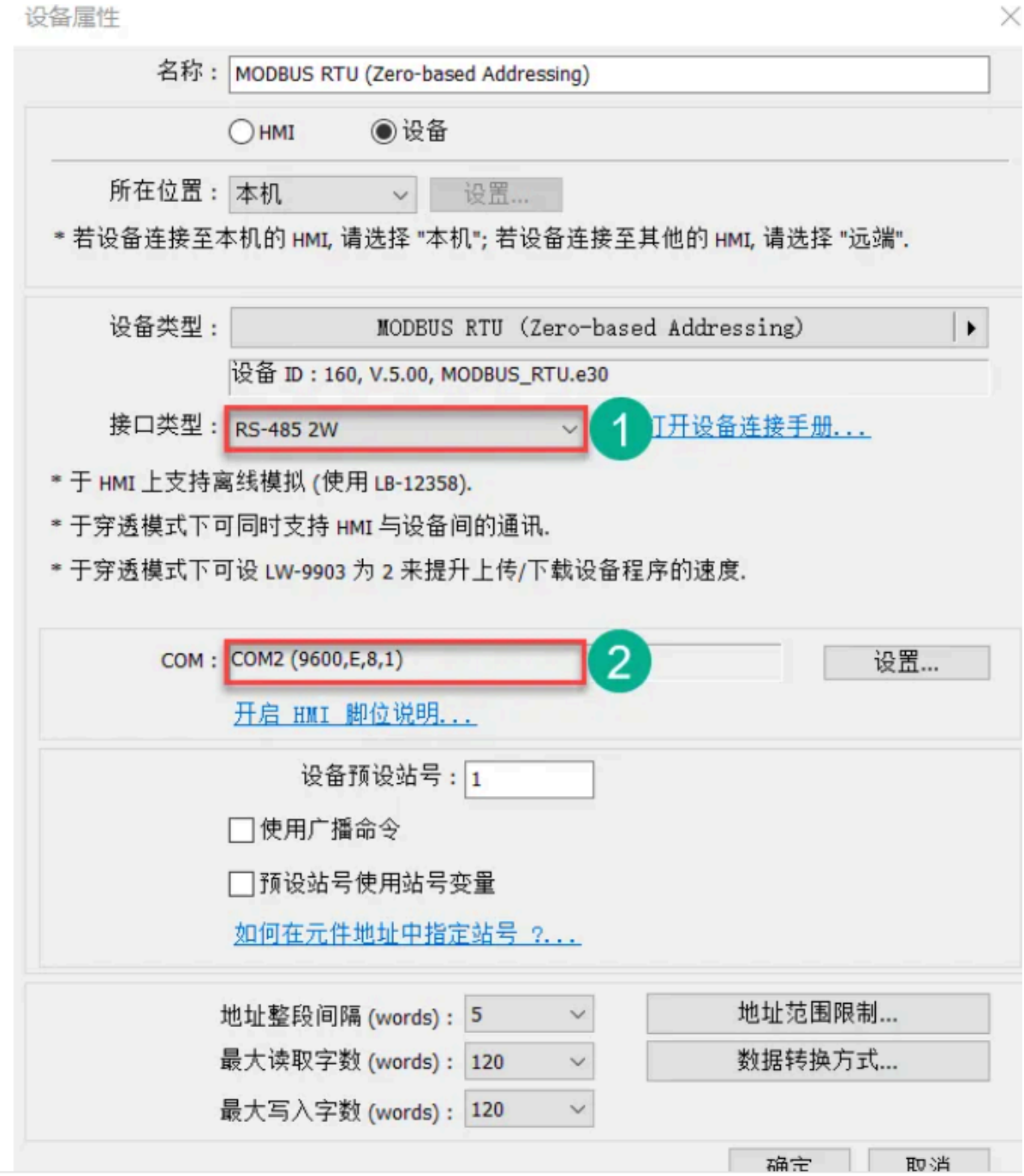
Step 2: Basic Configuration

(1) In the pop-up window, select [Add device/server...]

(2) Select [MODBUS RTU (Zero-based Addressing)] from [Device Type].



(3) At No. 1, select the interface type corresponding to the COM port. At No. 2, the baud rate, data bits, and stop bits must be consistent with the Sysctrl project settings.



The Modbus addresses of the project variables and touch screen components must correspond one to one for successful communication.

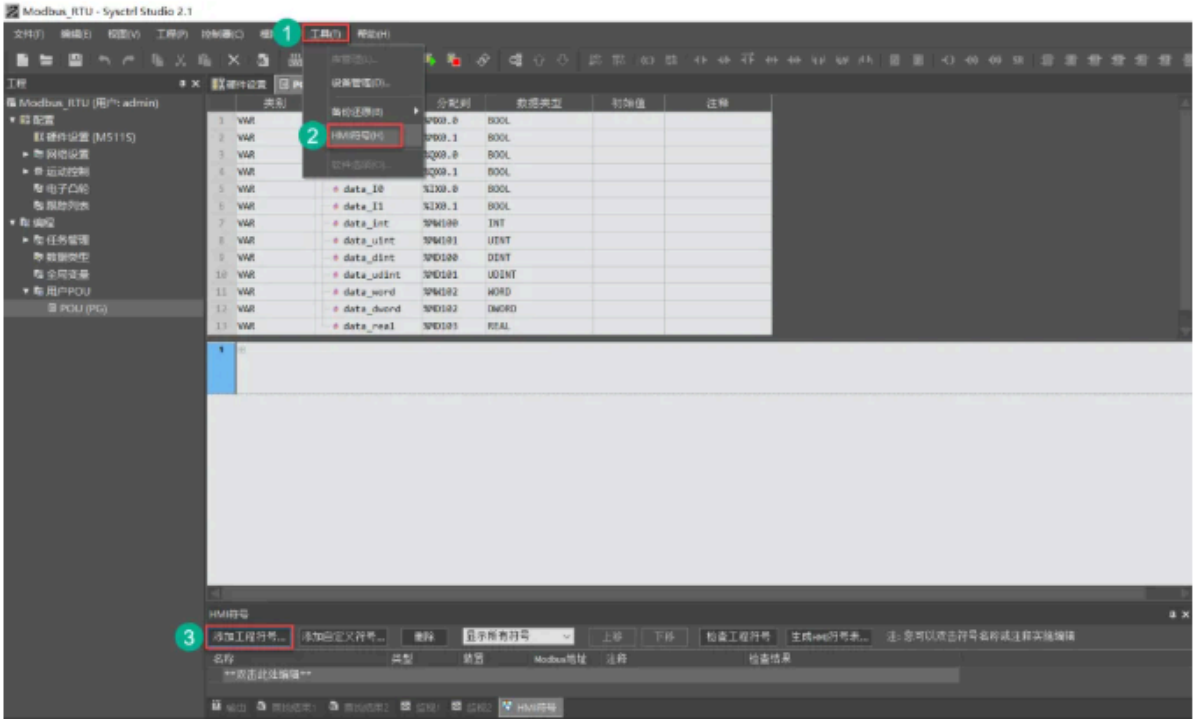
There are two ways to map addresses: **the HMI symbol table** and **the standard Modbus address calculation** .

You can choose any method to perform address mapping.

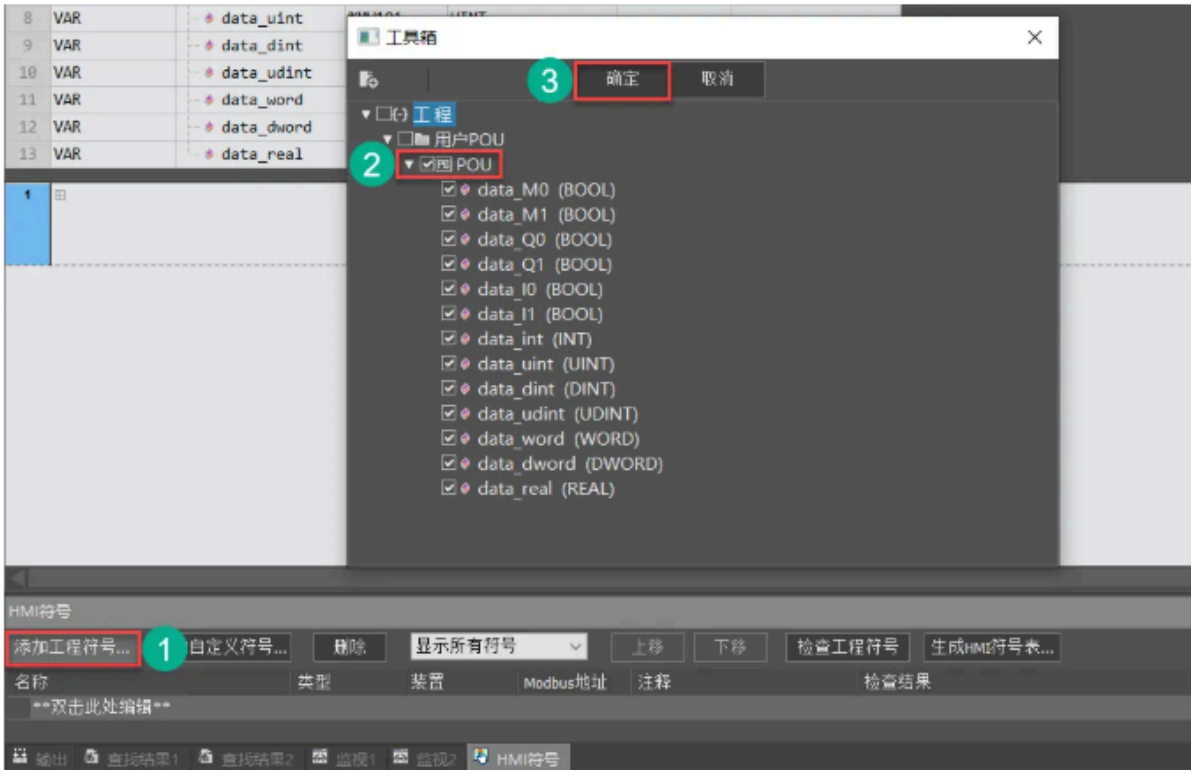
HMI symbol table

Step 1: Generate HMI symbol table (Sysctrl Studio project)

(1) Click [Tools] >> [HMI Symbols] in the upper menu bar

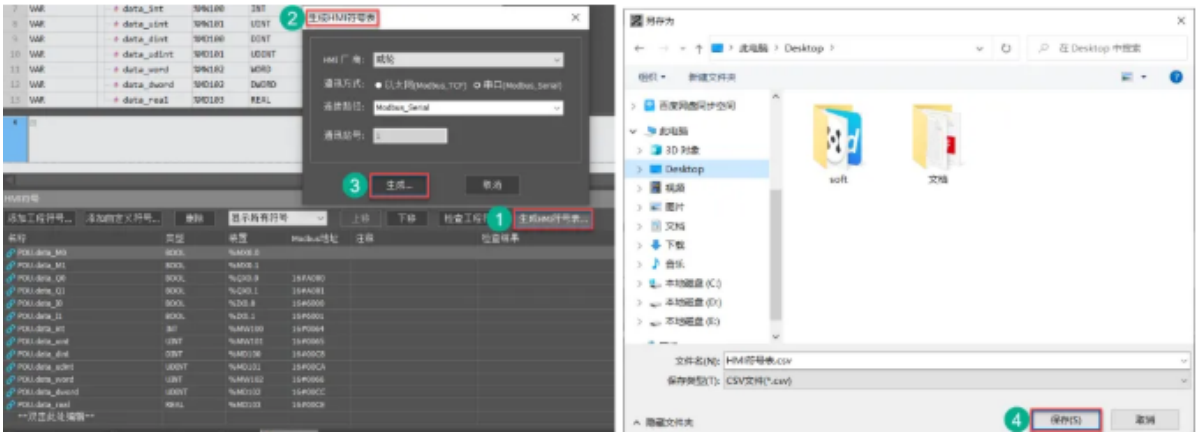


(2) The HMI symbol interface appears at the bottom. Click [Add Engineering Symbol...], select the variable to be added in the pop-up window, and click [OK].



(3) Click [Check Project Symbols] and the variables will be automatically assigned Modbus addresses.

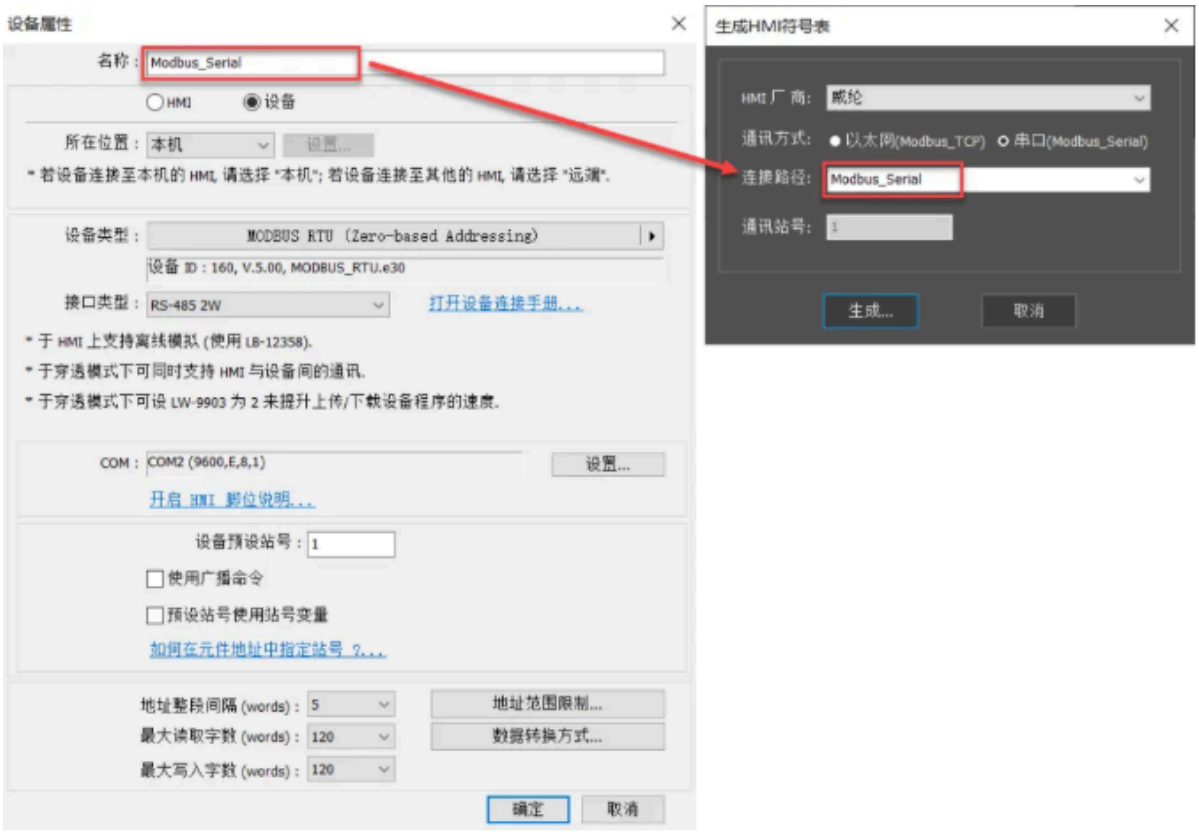
(4) Click [Generate HMI Symbol Table...]. On the [Generate HMI Symbol Table] interface, select WEINVIEW for [HMI Manufacturer], select Serial Port for [Communication Method], and select Modbus_Serial for [Connection Path]. Click [Generate...] and save the CSV file to your computer. It will be used in subsequent touch screen projects.



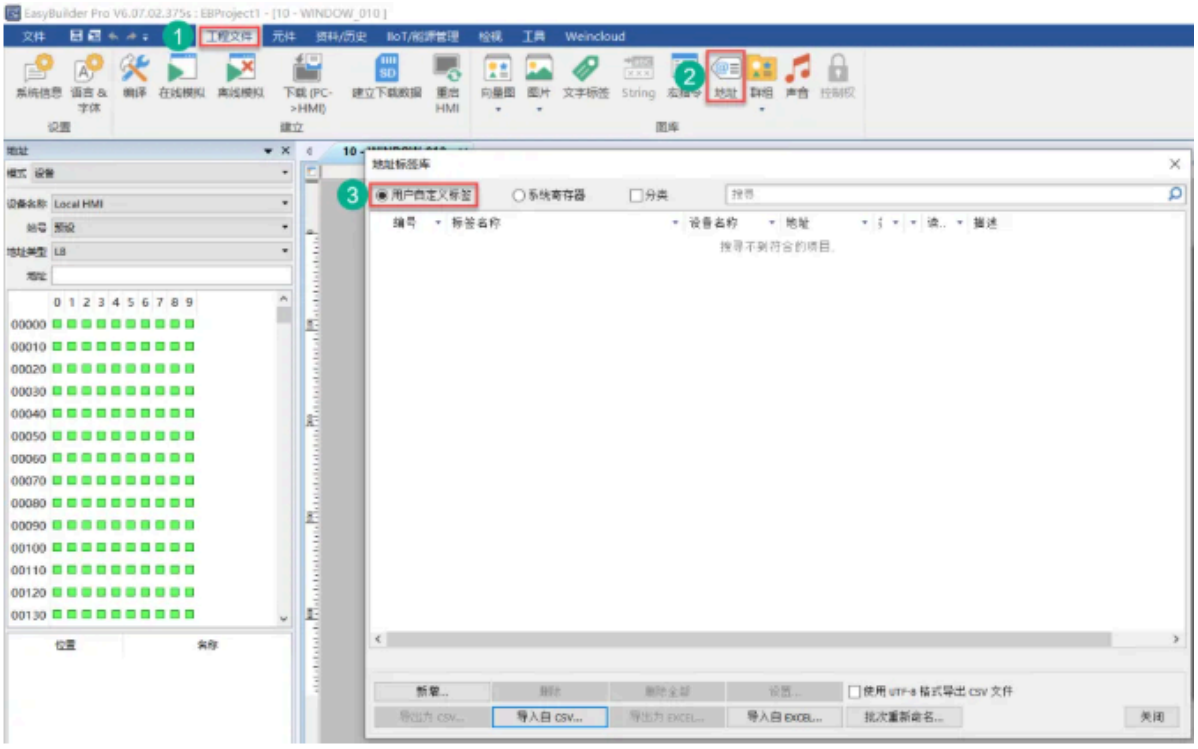
```
After the configuration is complete, download the project to the controller.
```

Step 2: Import the HMI symbol table (Utility Manager project)

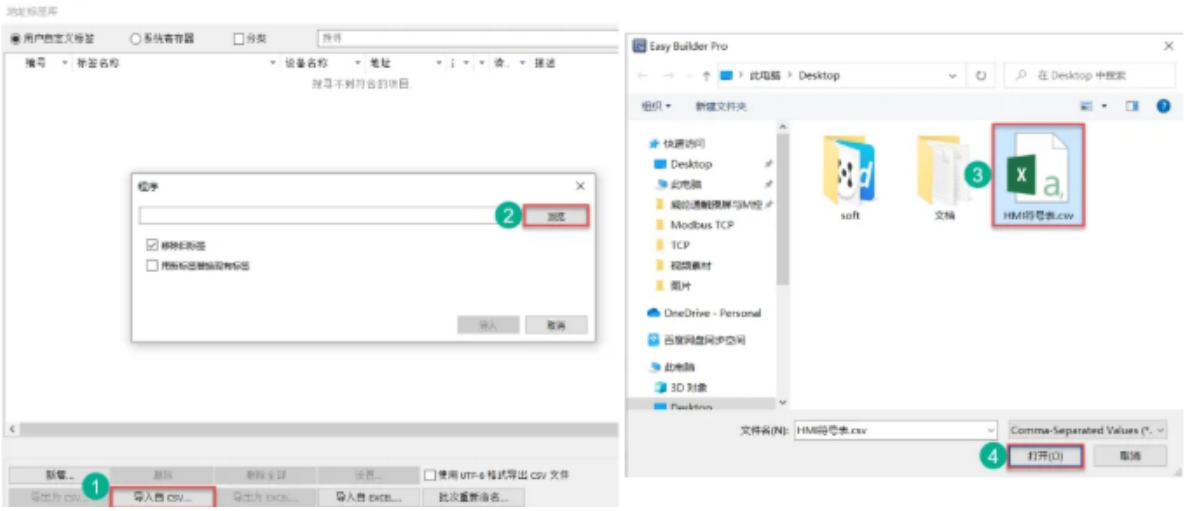
(1) The name must be consistent with the name in [Generate HMI Symbol Table] - [Connection Path]



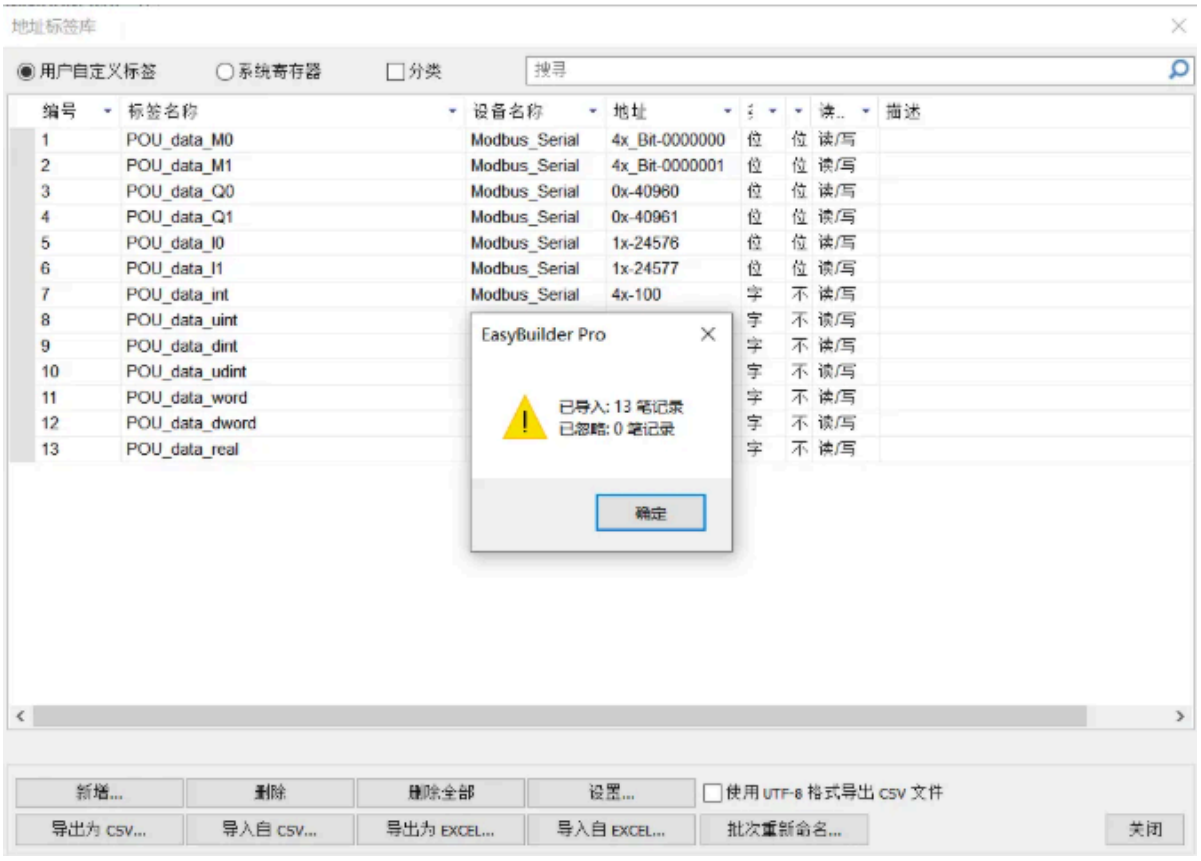
(2) Click [Project File] >> [Address] >> [User Defined Label]



(3) Import CSV file

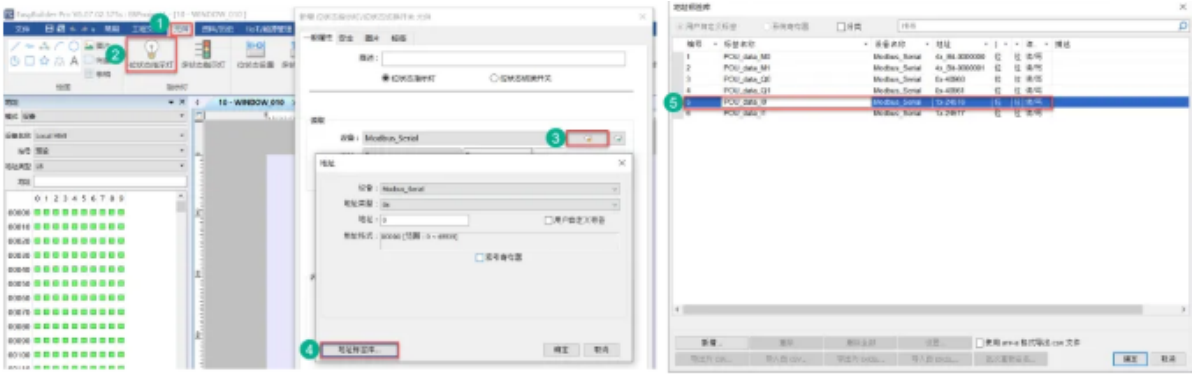


(4) A pop-up window indicates that the import was successful

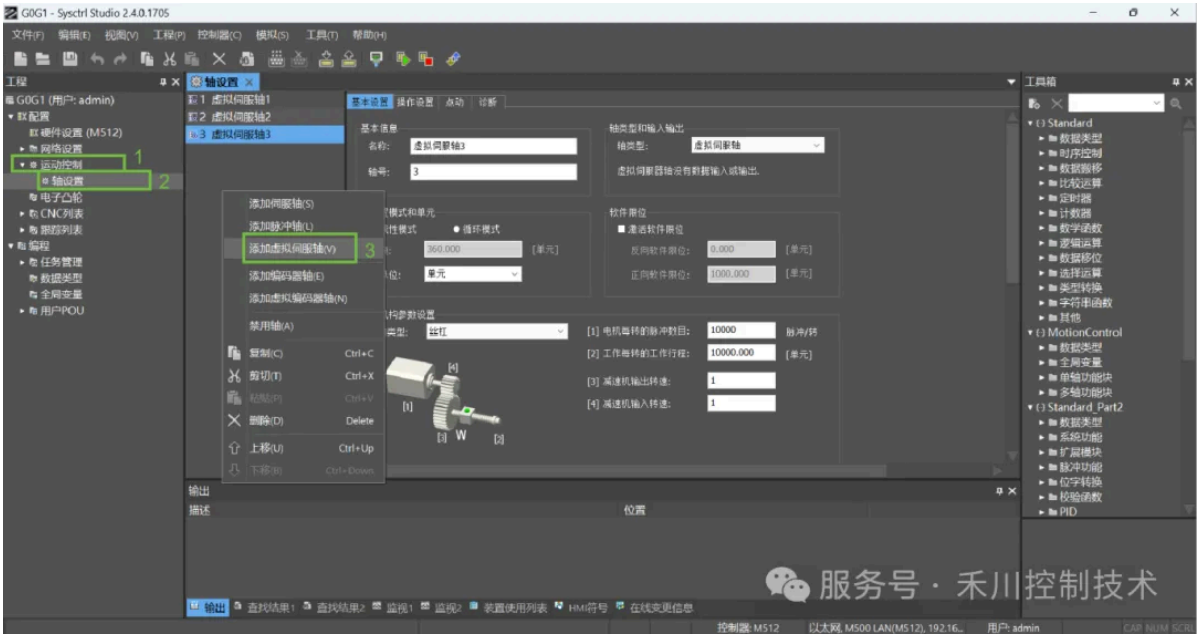


Step 3: Create a new component

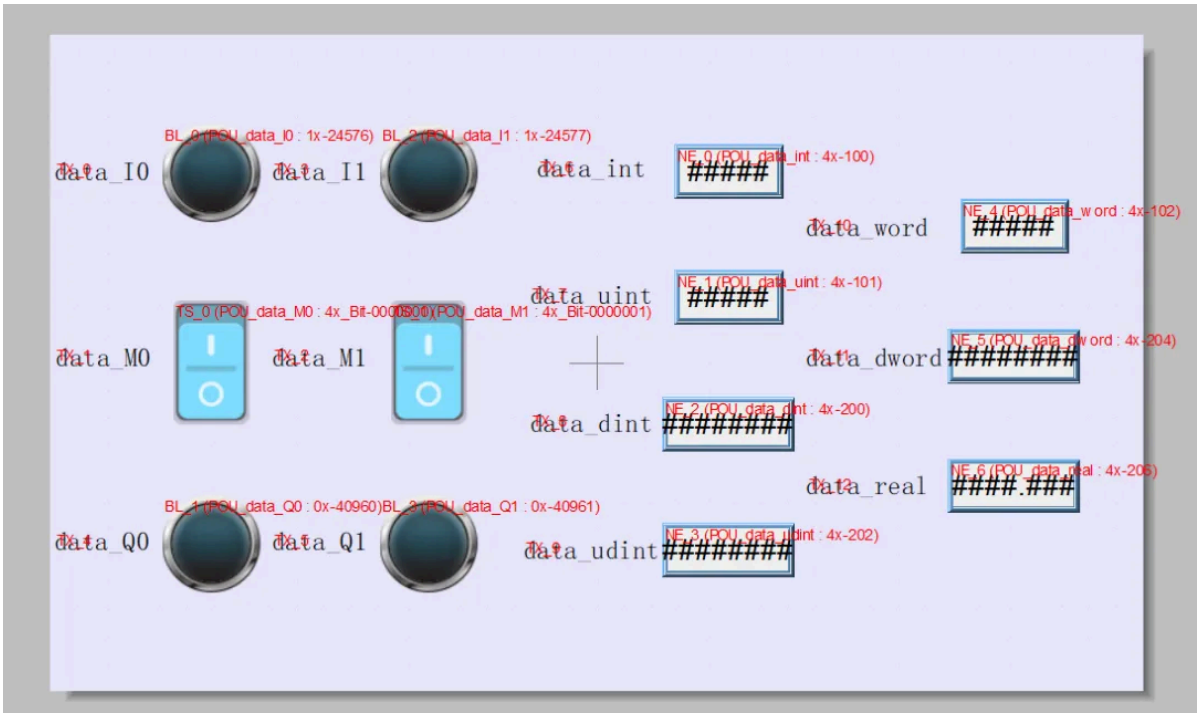
(1) Create a new indicator light component and bind it to the bool variable data_I0.



(2) Create a new bit state switching switch element and bind it to the bool variable data_M0.

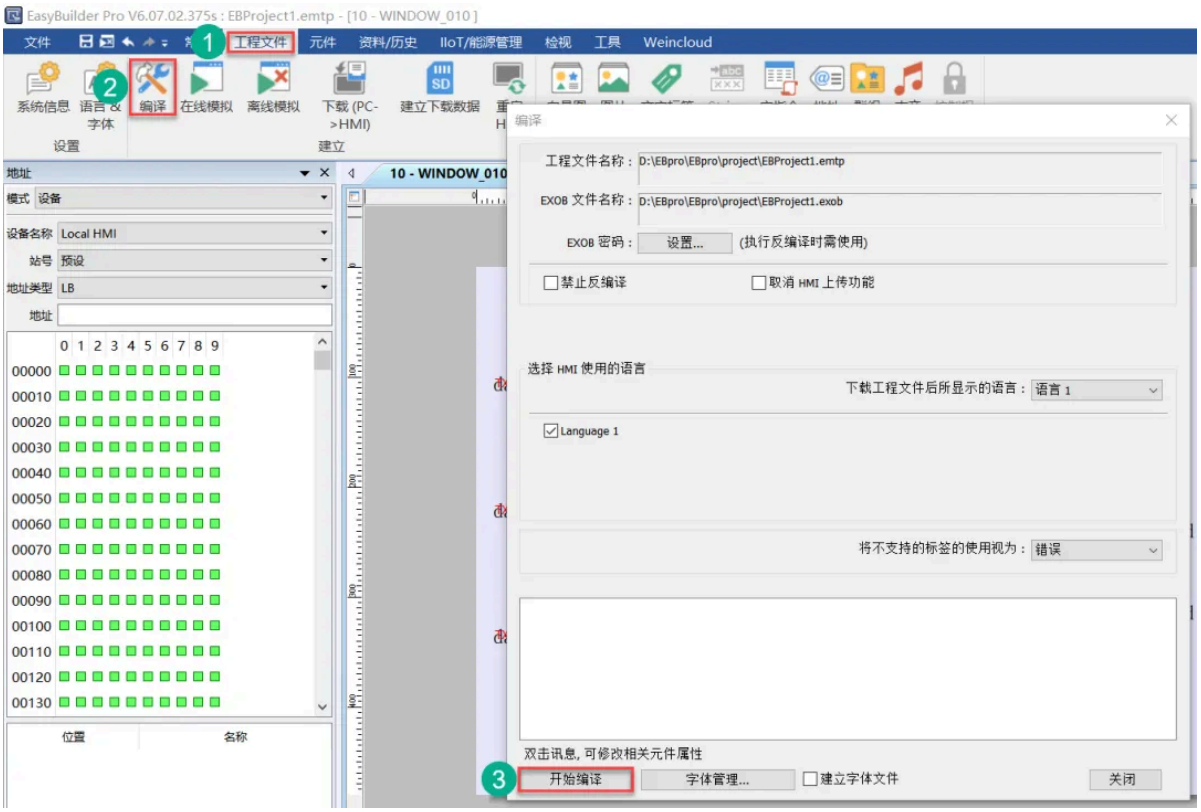


(3) Similarly, create other components and bind the corresponding variables. For easy distinction, add text here.

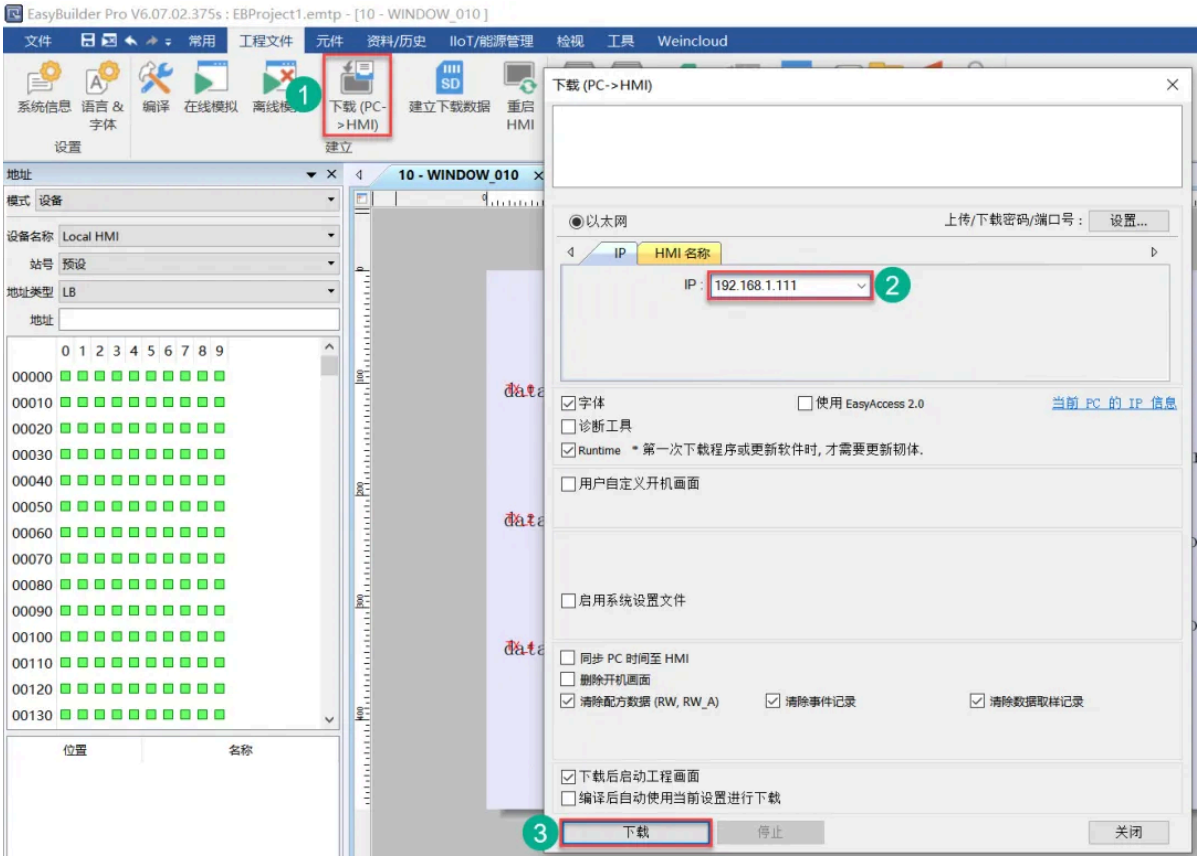


Step 4: Download the project

(1) Click [Project File] >> [Compile] >> [Start Compiling].



(2) Click [Download (PC->HMI)], enter the touch screen IP address 192.168.1.111 in the IP field, and click [Download].



(3) The window displays "All completed", indicating that the download is successful

Standard Modbus address calculation

Address calculation relationship description

The following table applies to the Modbus address correspondence between the M series controller and the WEINIVIEW HMI.

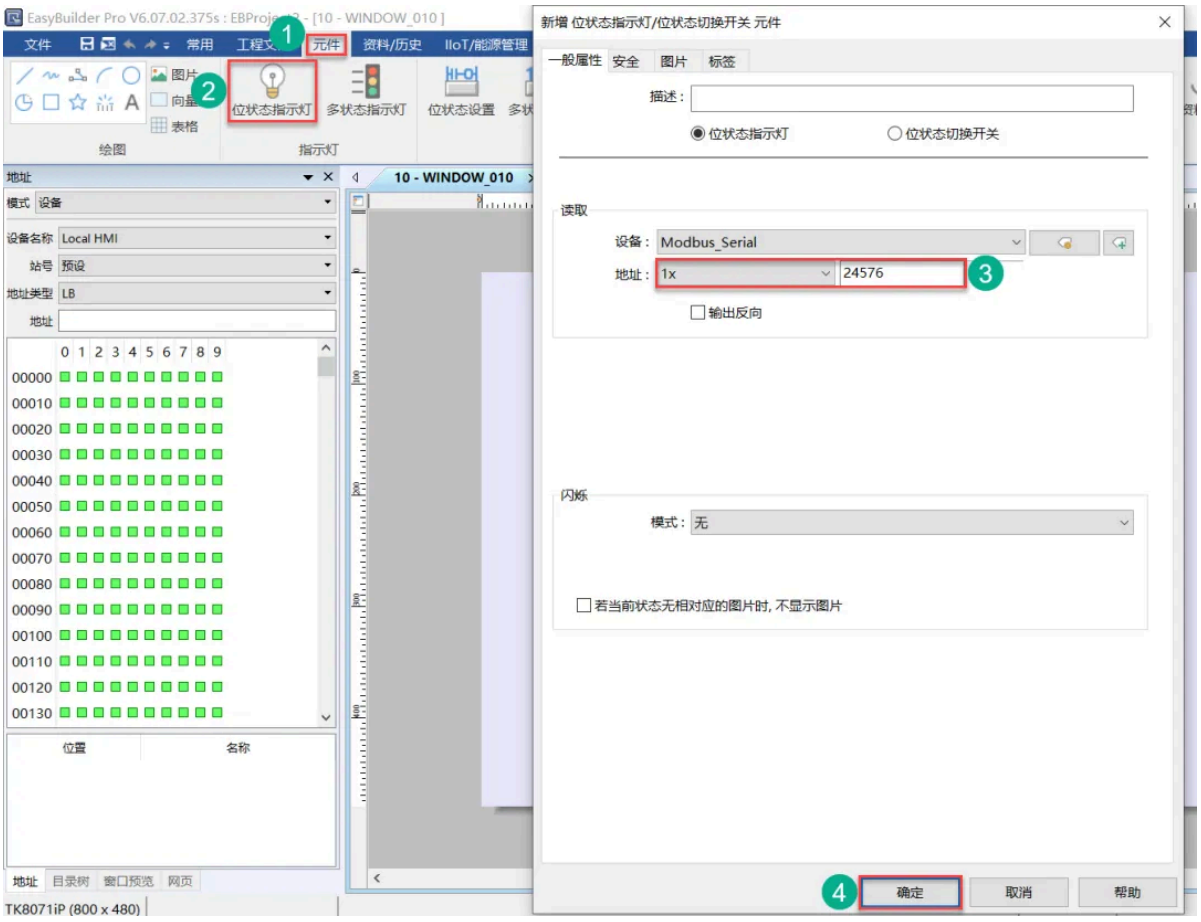
Name	Type	Number	Address	Property
I (Input device)	Bit device	%IX0.0~%IX0.7	6000 ~ 6007	Read-only
		%IX1.0~%IX1.7	6008 ~ 600F	Read-only
		.....	.....	Read-only
		%IX127.0~%IX127.7	63F8 ~ 63FF	Read-only
	Word device	%IW0~%IW63	8000 ~ 803F	Read-only
Q (Output device)	Bit device	%QX0.0~%QX0.7	A000 ~ A007	Read/Write
		%QX1.0~%QX1.7	A008 ~ A00F	Read/Write
		.....	.....	Read/Write
		%QX127.0~%QX127.7	A3F8 ~ A3FF	Read/Write
	Word device	%QW0~%QW63	A000 ~ A03F	Read/Write
M (Middle device)	Word device	%MW0~%MW32767	0000 ~ 7FFF	Read/Write

The corresponding address conversion method is as follows:

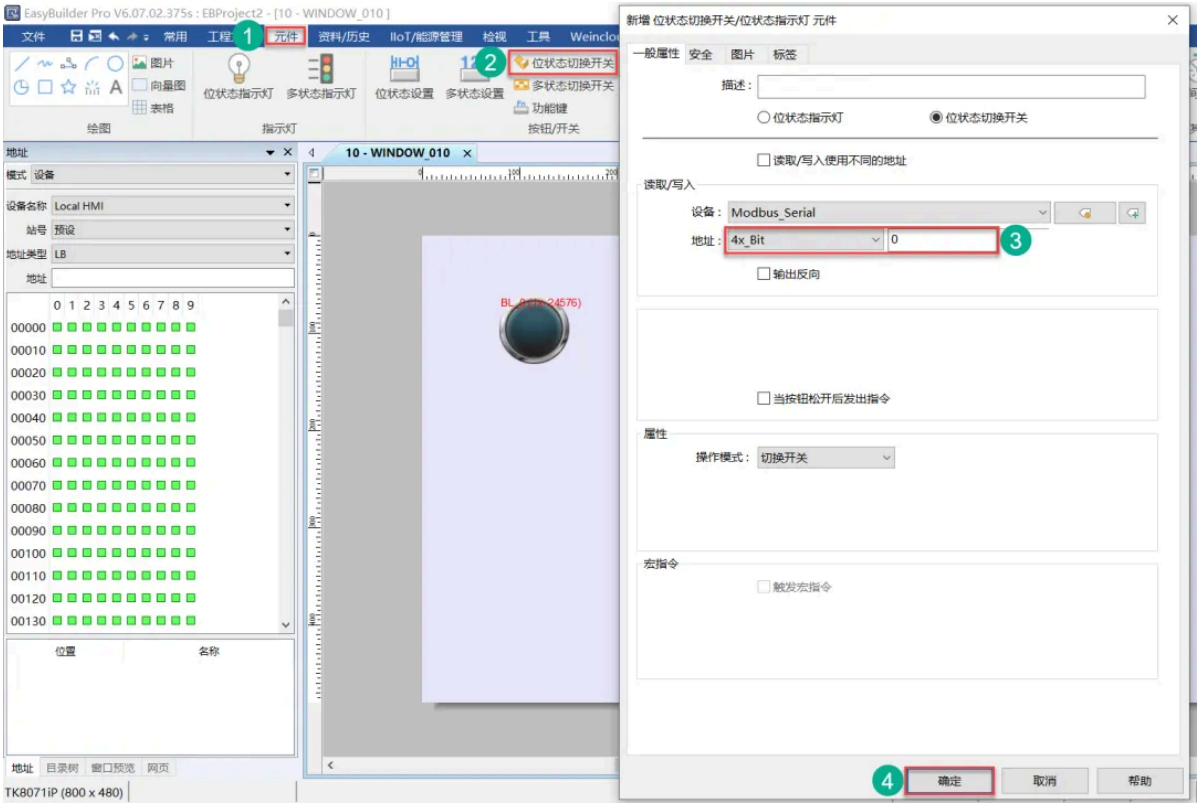
Address	Type	Algorithm	HMI Address
%IXA.B	1X	24576+ A*8 + B	%IX1.1 → 24576 + 1*8 + 1 = 24585
%IBA	3X_bit	24576 + A/2 (A/2 Divisible) [24576 + A/2(Round)].8 (A/2 Not divisible)	%IB20 → 24576 + 20/2 = 24586 %IB21 → [24576 + 21/2(Round)].8=24586.8
%IWA	3X	32768 + A	%IW10 → 32768 + 10 = 32778
%QXA.B	0X	40960+ A*8 + B	%QX1.1 → 40960 + 1*8 + 1 = 40969
%QBA	4X_bit	40960 + A/2 (A/2 Divisible) [40960 + A/2(Round)].8 (A/2 Not divisible)	%QB10 → 40960 + 10/2 = 40965 %QB11 → [40960 + 11/2(Round)].8=40965.8
%QWA	4X	40960 + A	%QW10 → 40960 + 10 = 40970
%MXA.B	4X_bit	A/2.B (A/2 Divisible) A/2(Round).(B+8) (A/2 Not divisible)	%MX500.3 → 500/2 = 250.3 %MX501.3 → [501/2(Round)].(3+8) = 250.11
%MBA	4X_bit	A/2 (A/2 Divisible) A/2(Round).8 (A/2 Not divisible)	%MB100 → 100/2 = 50 %MB101 → 101/2(Round).8 = 50.8
%MWA	4X	A	%MW100→ 100

Step 1: Create a new component

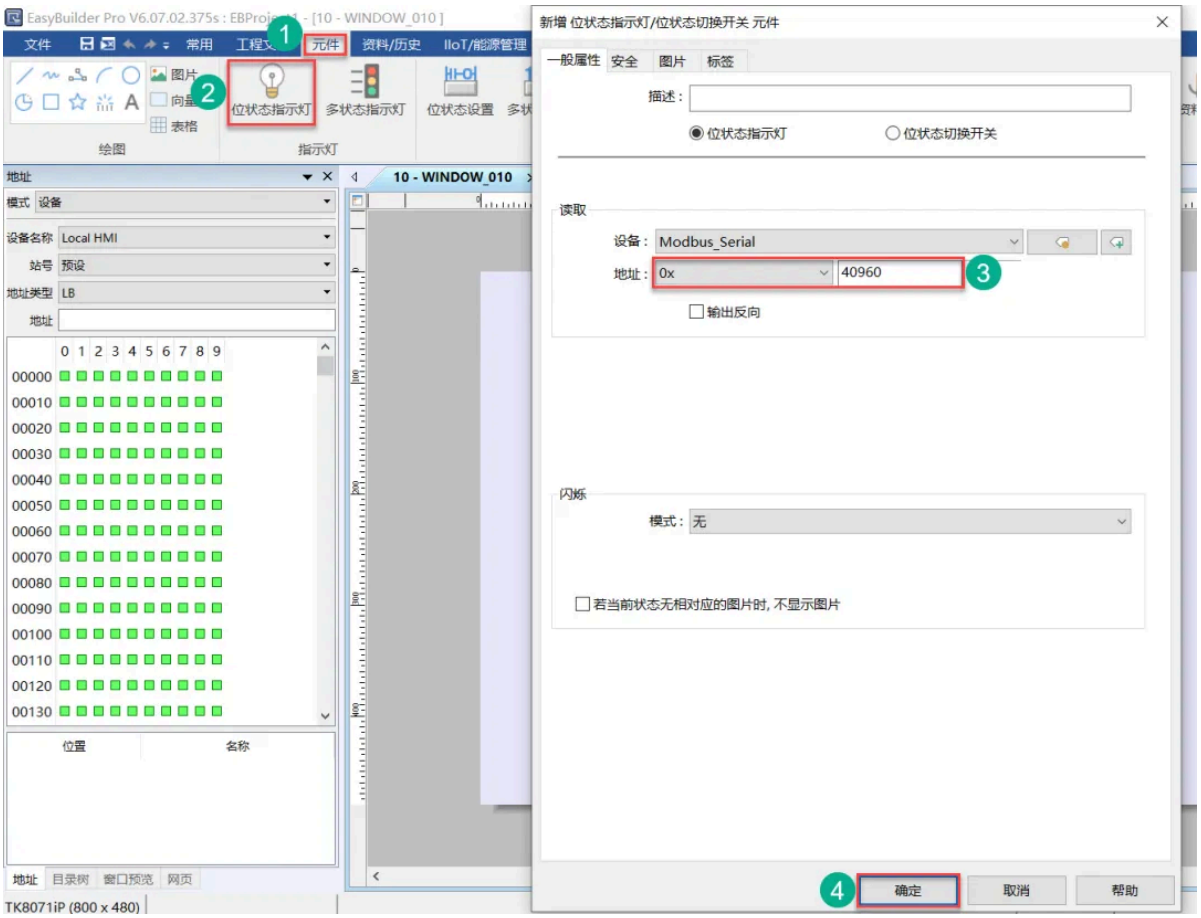
(1) Create a new indicator light component and bind the bool variable data_I0. Click [Bit Status Indicator] in the upper menu bar, select 1x for the corresponding address, and enter 24576.



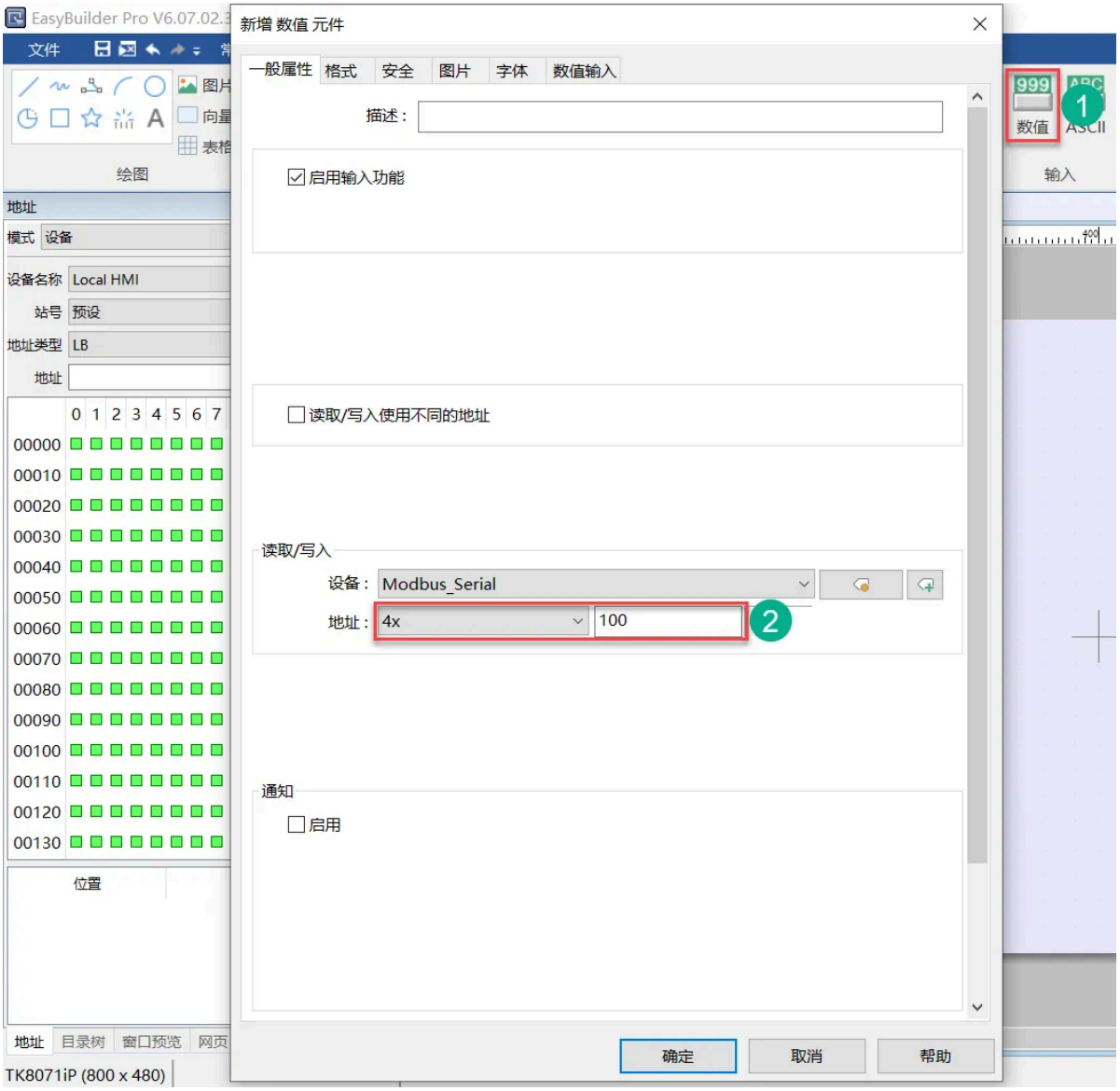
(2) Create a new Bit State Switch component and bind it to the Bool variable data_M0. Click [Bit State Switch] in the upper menu bar, select 4x_Bit for the corresponding address, and fill in 0.



(3) Create a new indicator light component and bind it to the bool variable data_Q0. Click [Bit Status Indicator] in the upper menu bar, select 0x for the corresponding address, and enter 40960.

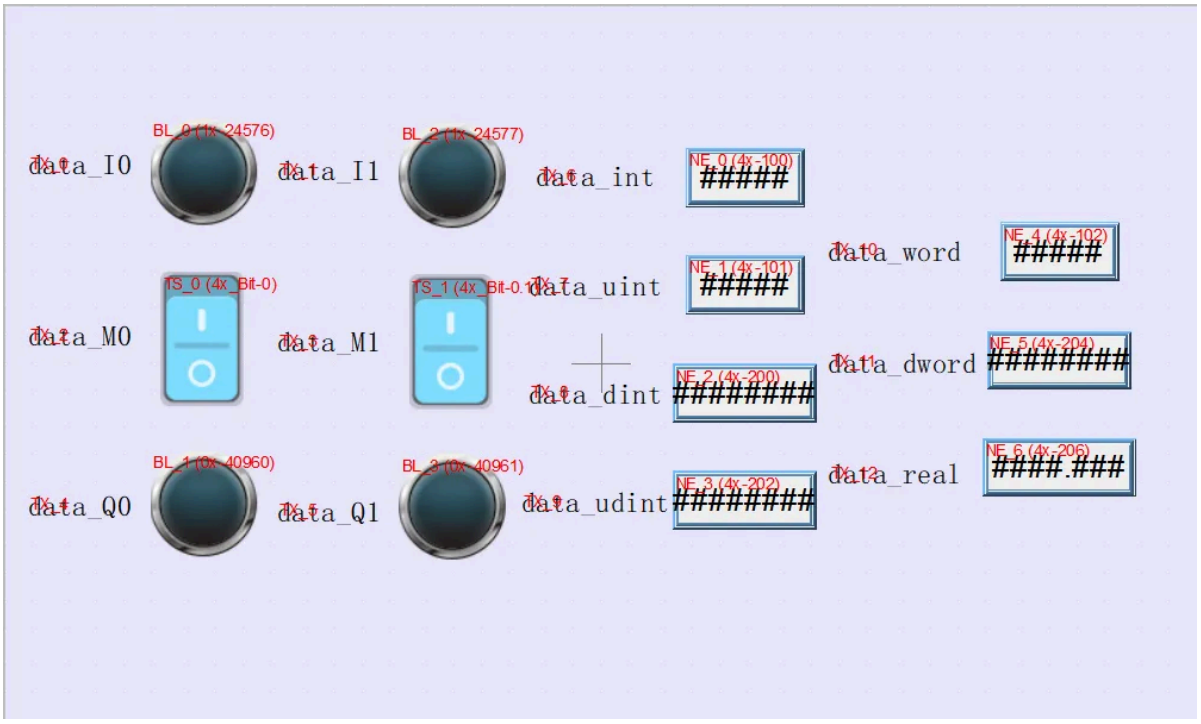


(4) Create a new value component and bind it to the int variable data_int. Click [Value] in the upper menu bar, select 4x for the corresponding address, and enter 100.



The data type of data_int is int. Select 16-bit Signed for [Data Format]. In the [Display Format] section, enter 5 for [Number of digits above the decimal point] to indicate the number of digits that can be displayed on the touch screen.

(5) Similarly, create other components and bind the corresponding variables. For easy distinction, add text here.

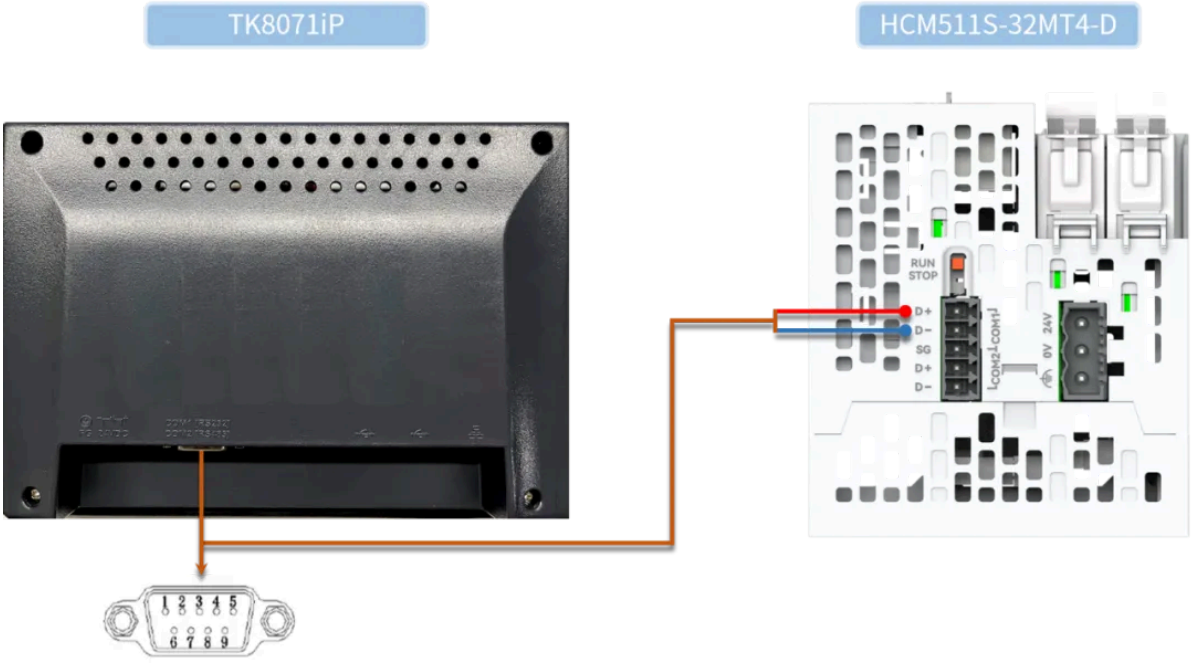


Step 2: After the component is created, download the project to the touch screen.

Communication test

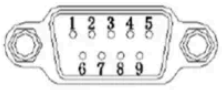
Step 1: Device connection

This tutorial uses the HCM511S-32MT4-D controller and the TK8071iP touch screen. The Modbus RTU communication connection method is shown in the figure below.



The touch screen COM interface DB9 male pin definition is as follows.

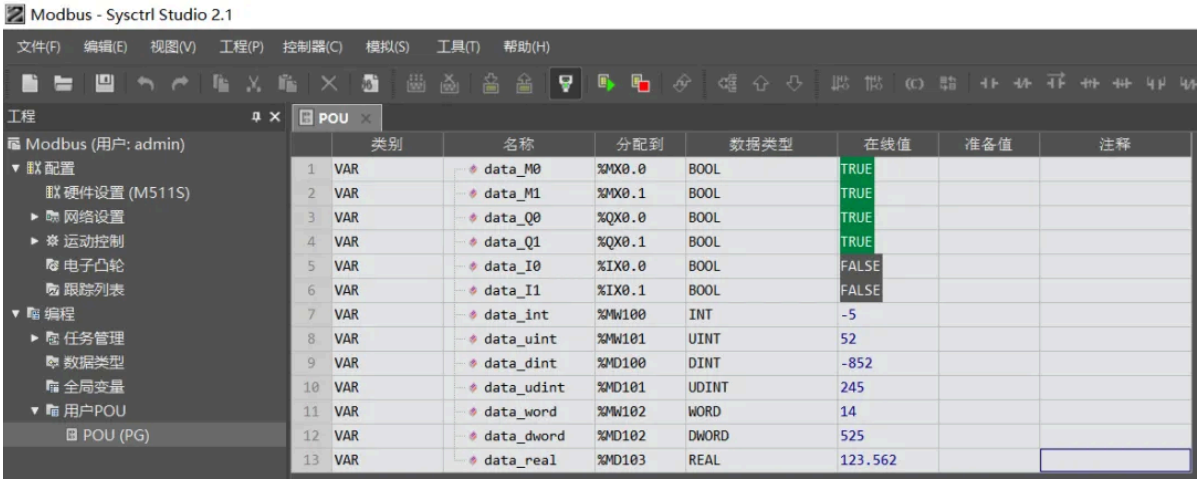
DB9接口公头



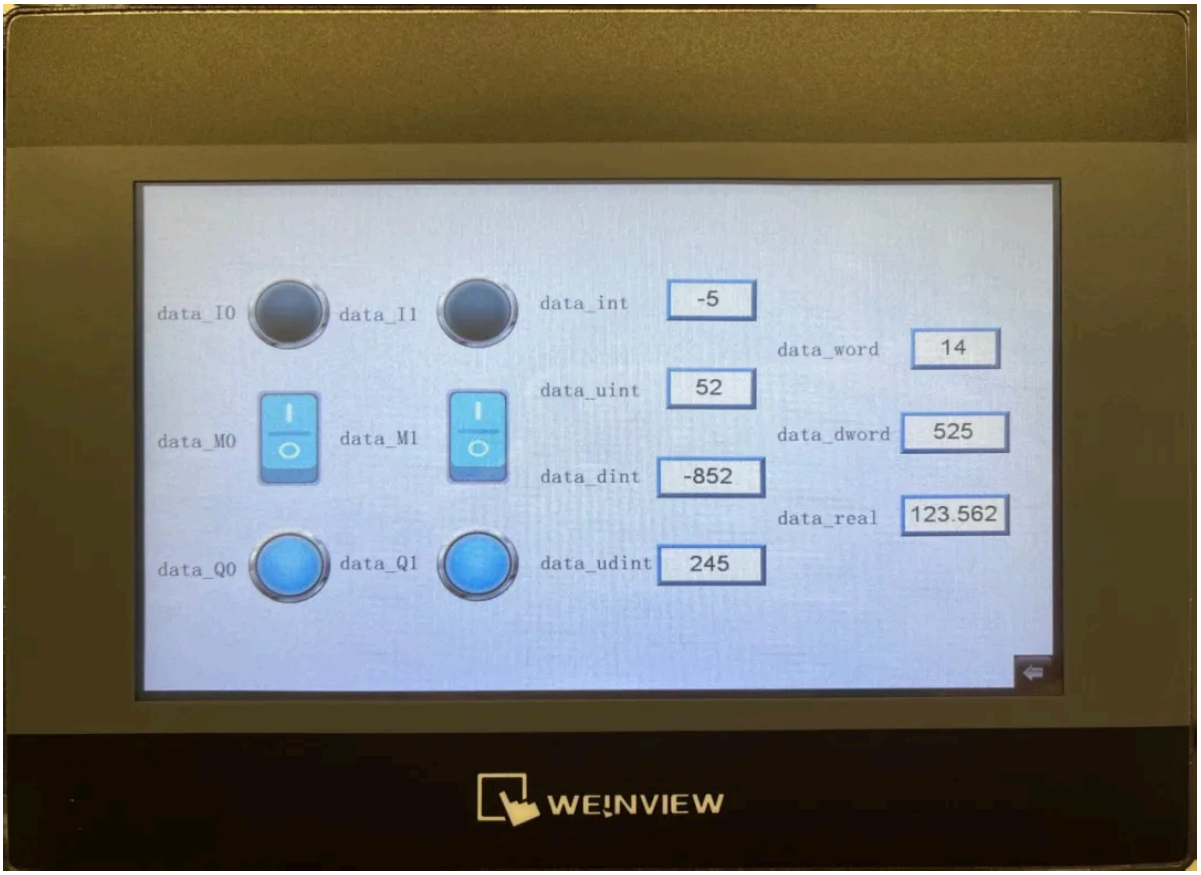
接口	引脚	定义
COM2 [RS-485]2W	1	Data-
	2	Data+
COM2 [RS-485]4W	1	Rx-
	2	Rx+
	3	Tx-
	4	Tx+
COM3 [RS-485]2W	6	Data-
	9	Data+

Step 2: project Testing

The Sysctrl project enters the monitoring state and assigns values to variables.



At the same time, the touch screen component displays the corresponding value.

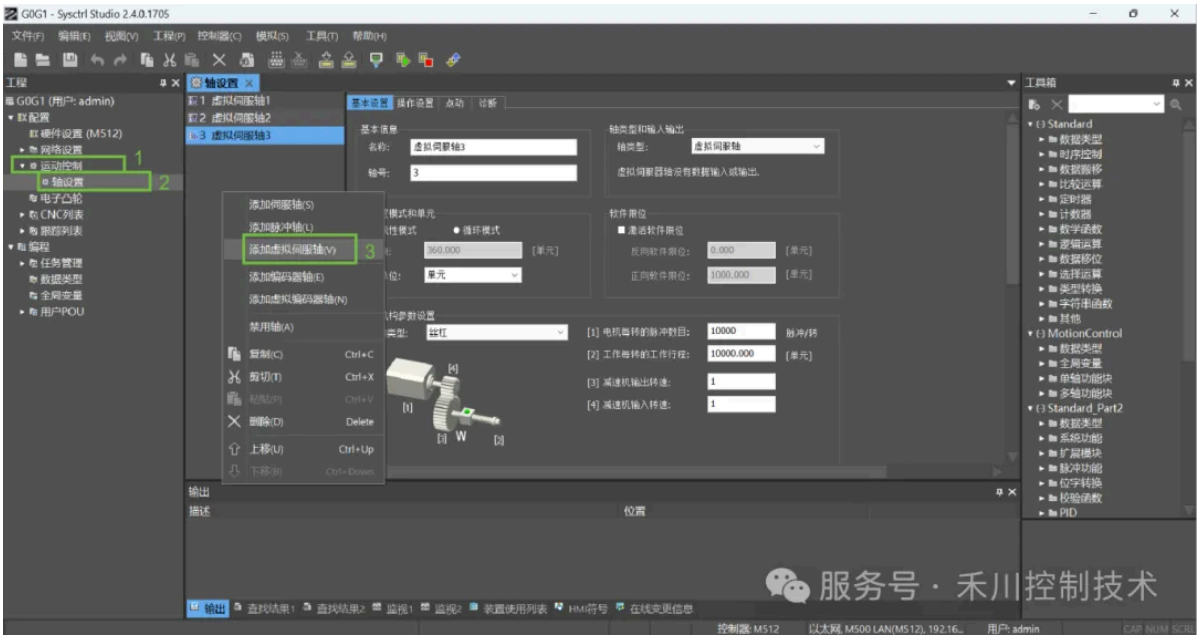


Modbus TCP

Sysctrl Studio project configuration

Step 1: Create a new project

Double-click to open the Sysctrl Studio software and create a new project. In the default POU, create new variables and assign them to corresponding addresses.



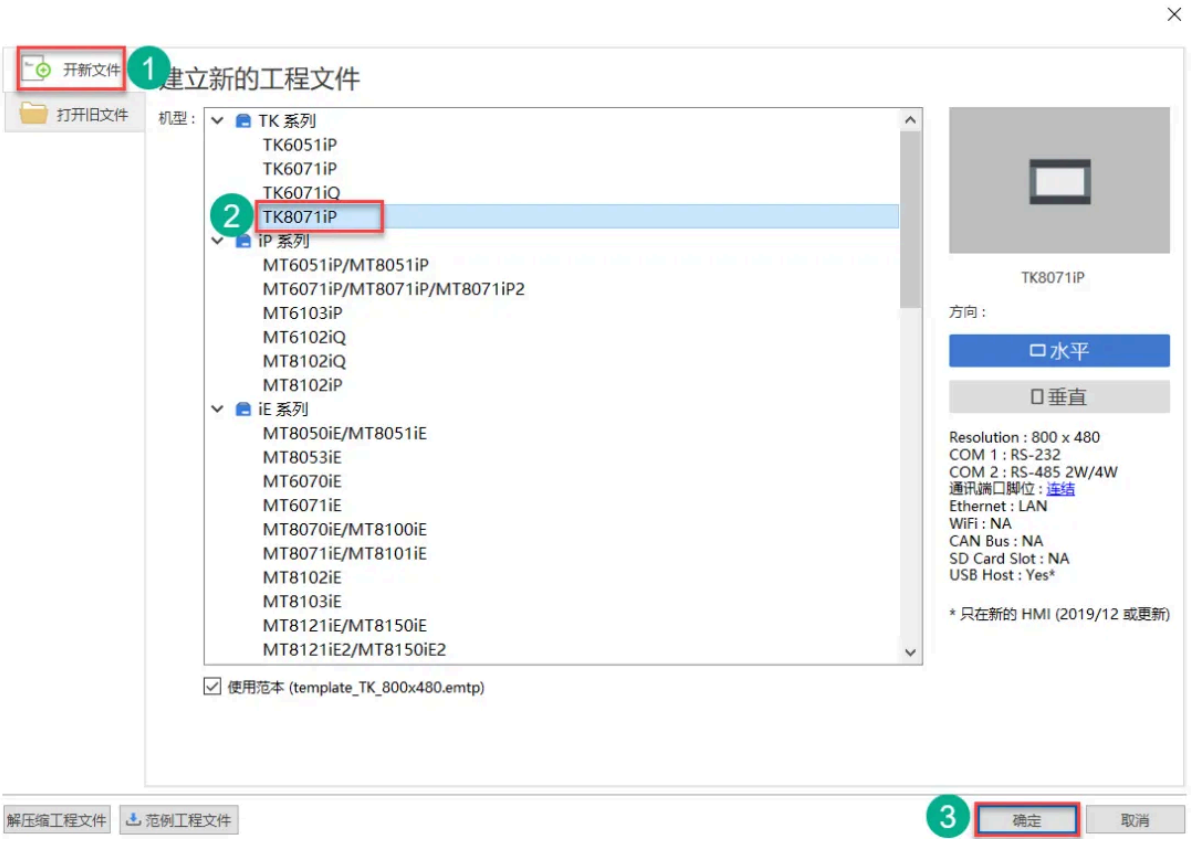
Step 2: After compilation, download the project to the controller.

Utility Manager Project Configuration

Step 1: Create a new project

(1) Open the Utility Manager software, select [Select Model] in the upper left corner, select the model series corresponding to the touch screen, and click [EasyBuilder Pro].

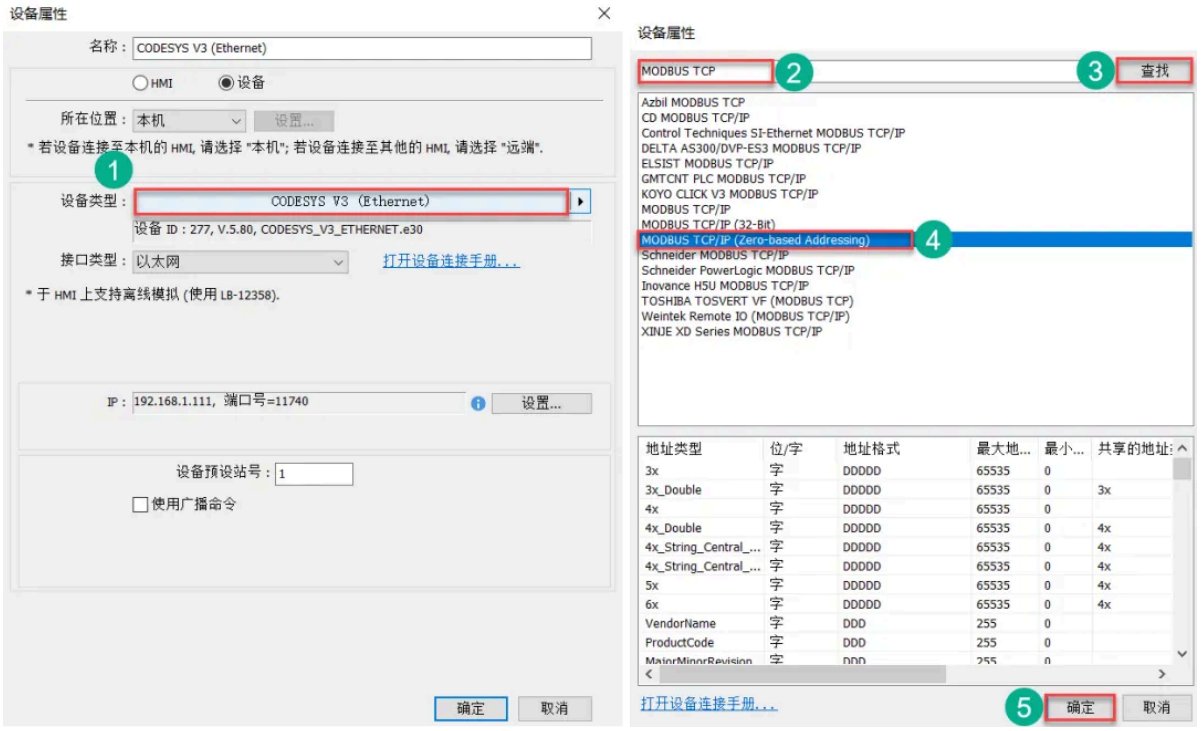
(2) Click [Open New File] and select the corresponding model [TK8071iP].



Step 2: Basic Configuration

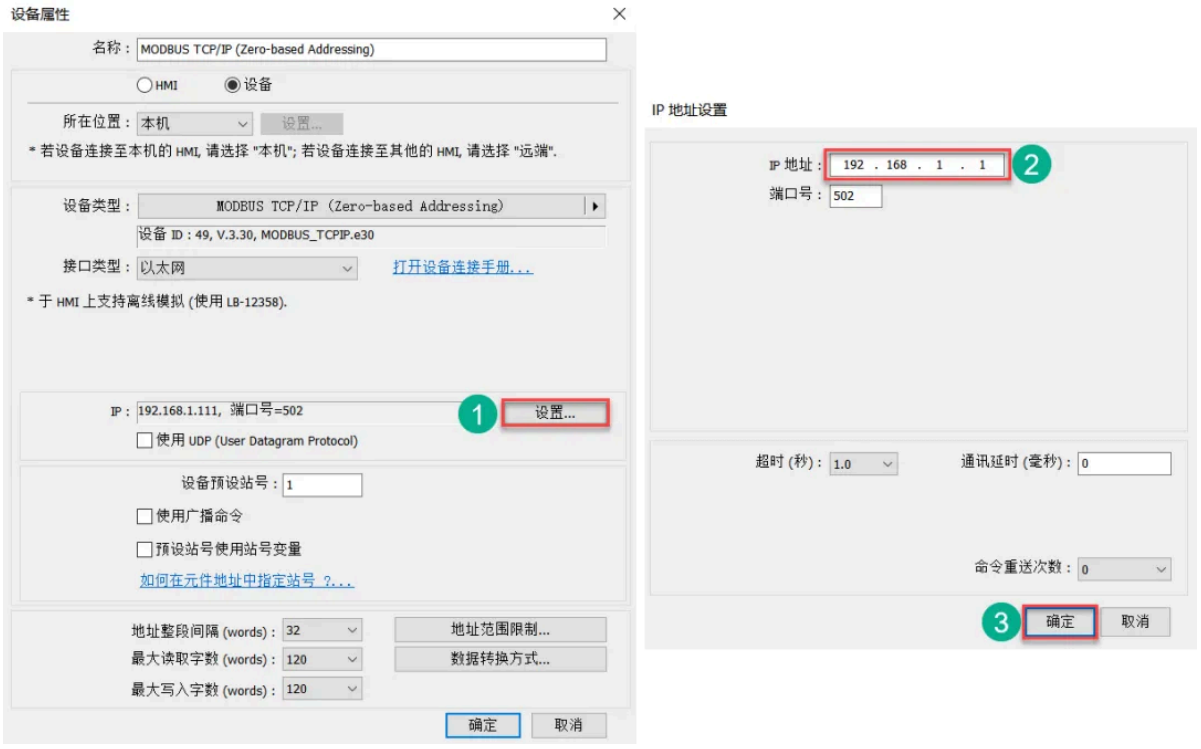
(1) In the pop-up window, select [Add device/server...]

(2) Select [MODBUS TCP/IP (Zero-based Addressing)] from [Device Type].



(3) Click [Set...] at the IP address, and change the IP address to the controller IP address.

Note: For Modbus TCP communication, the controller IP and touch screen IP must be in the same network segment.



The Modbus addresses of the project variables and touch screen components must correspond one to one for successful communication.

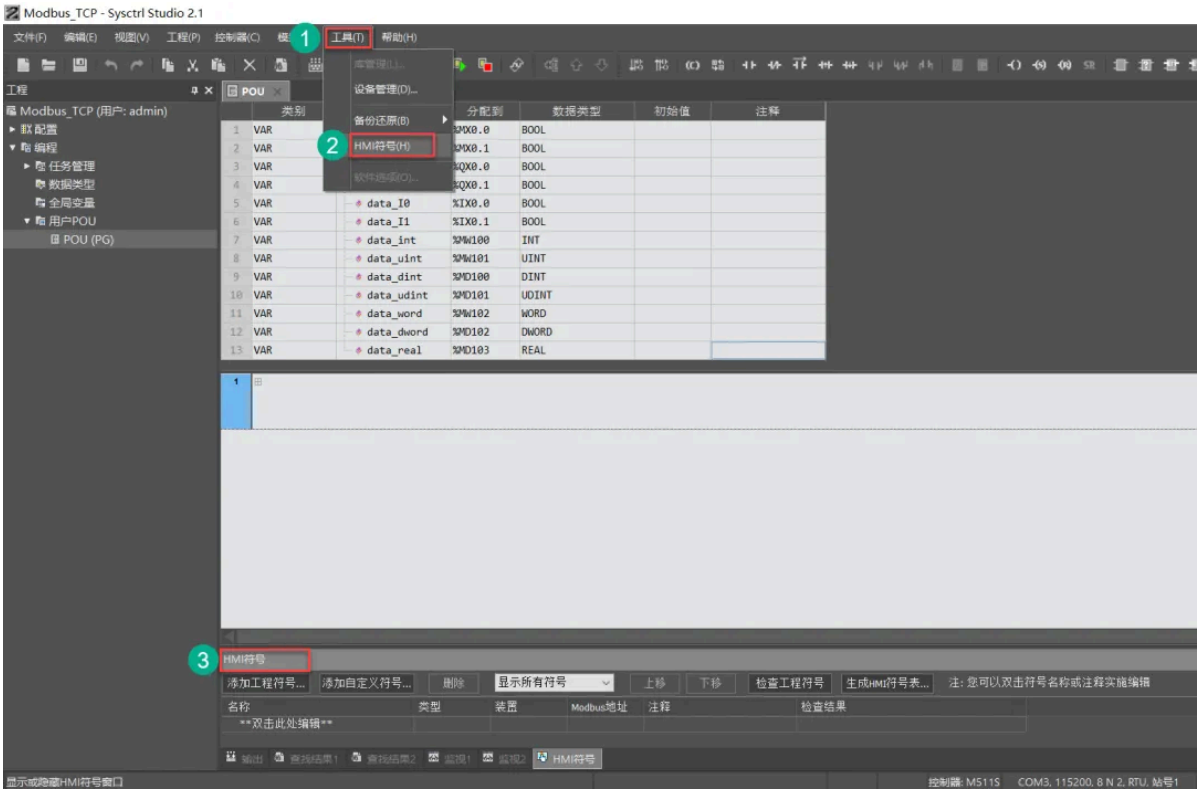
There are two ways to map addresses: **the HMI symbol table** and **the standard Modbus address calculation.**

You can choose any method to perform address mapping.

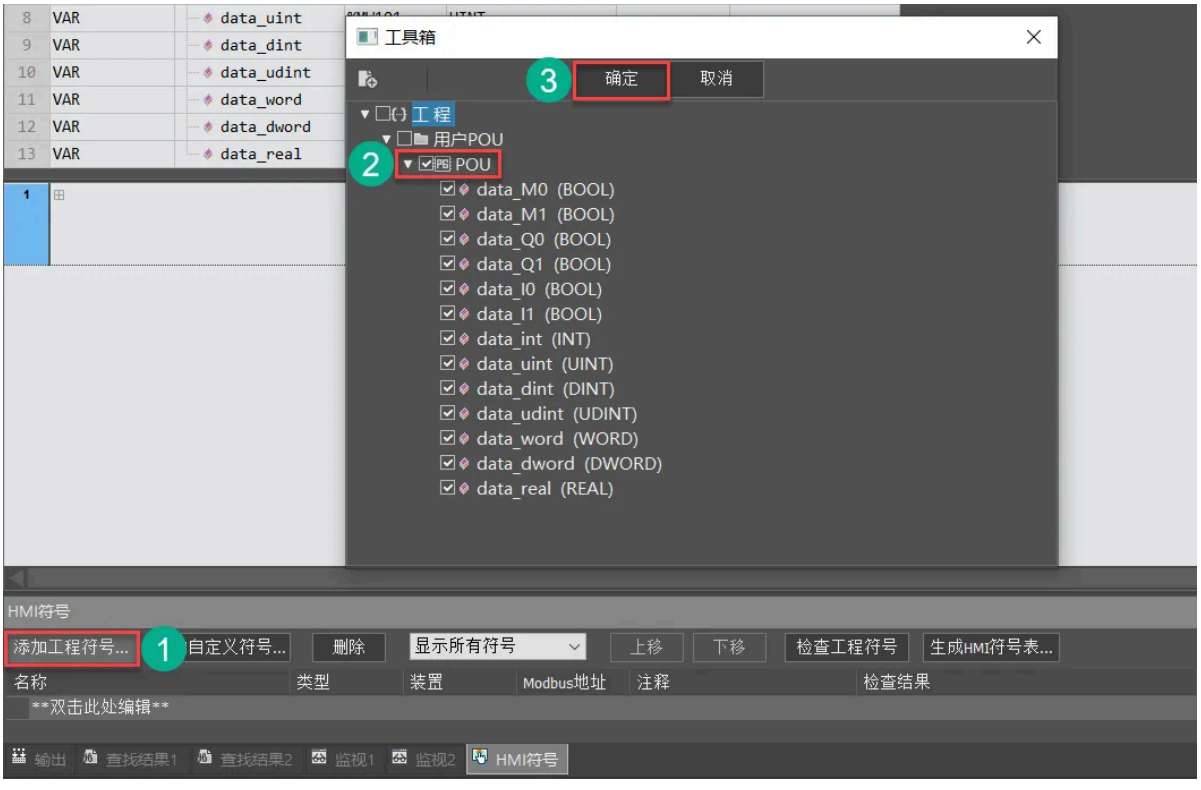
HMI symbol table

Step 1: Generate HMI symbol table (Sysctrl Studio project)

(1) Click [Tools] >> [HMI Symbols] in the upper menu bar

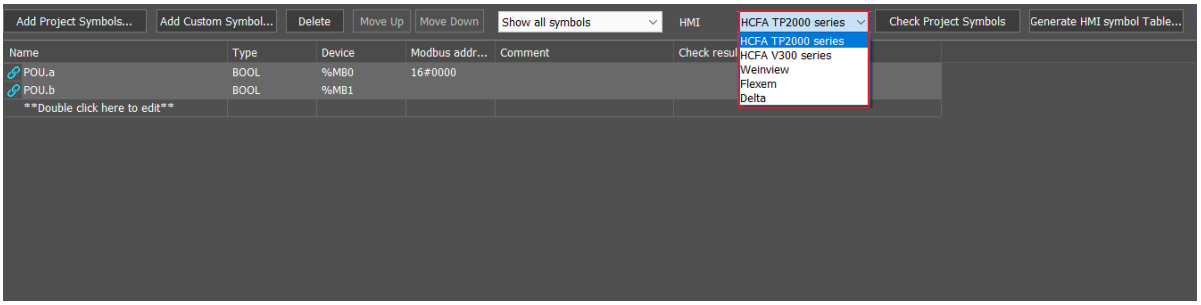


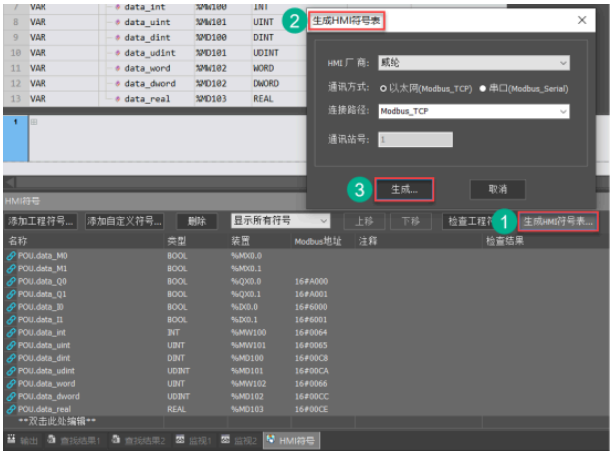
(2) The HMI symbol interface appears at the bottom. Click [Add Engineering Symbol...] and select the variable to be added in the pop-up window.

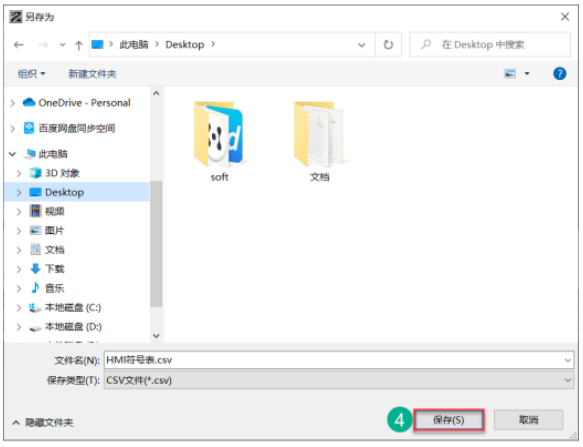


(3) Click [Check Project Symbols] and the variables will be automatically assigned Modbus addresses.

(4) Click [Generate HMI Symbol Table...]. On the [Generate HMI Symbol Table] screen, select WEINIEW for [HMI Manufacturer], Ethernet for [Communication Method], and Modbus_TCP for [Connection Path]. Click [Generate...] and save the CSV file to your computer. It will be used in subsequent touch screen projects.



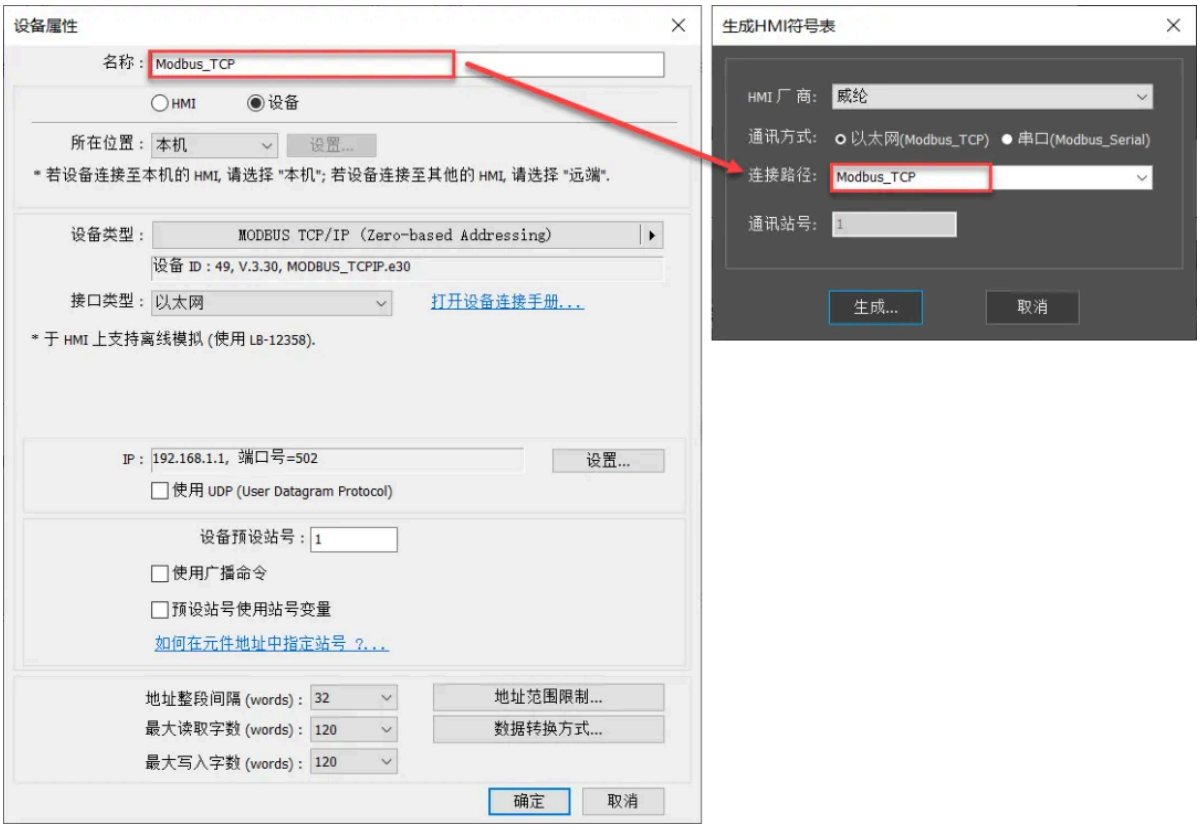




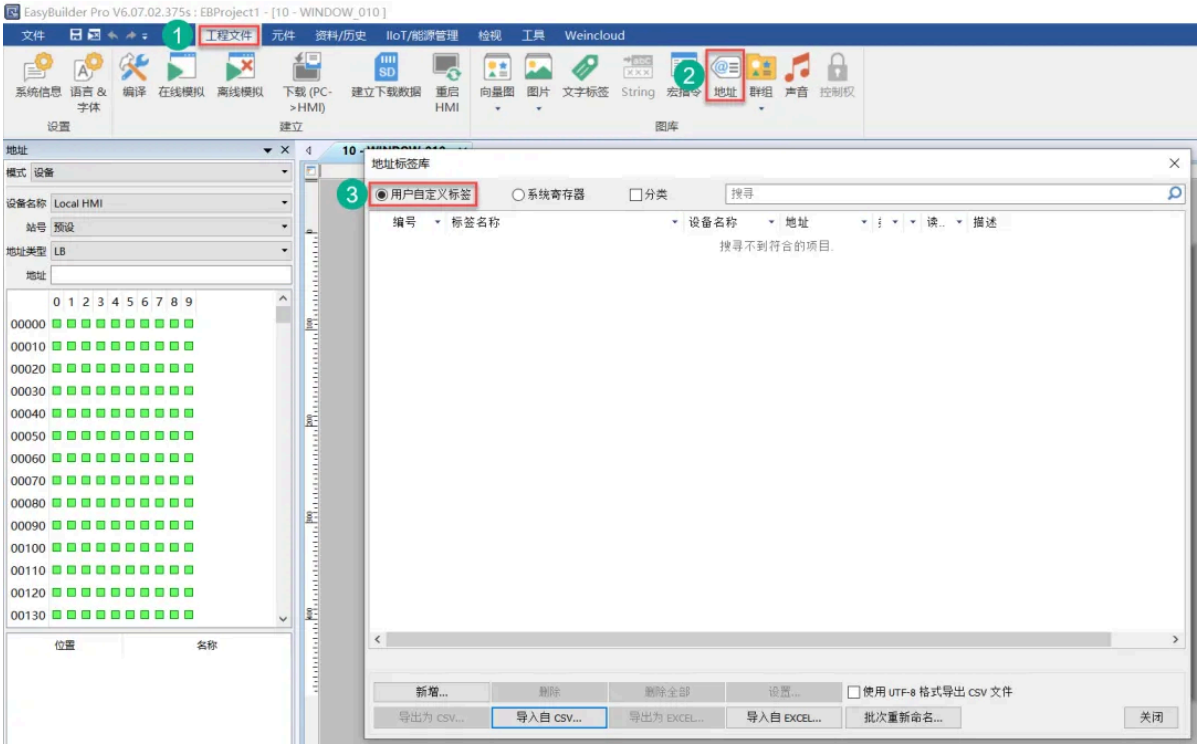
After the configuration is complete, download the project to the controller.

Step 2: Import the HMI symbol table (Utility Manager project)

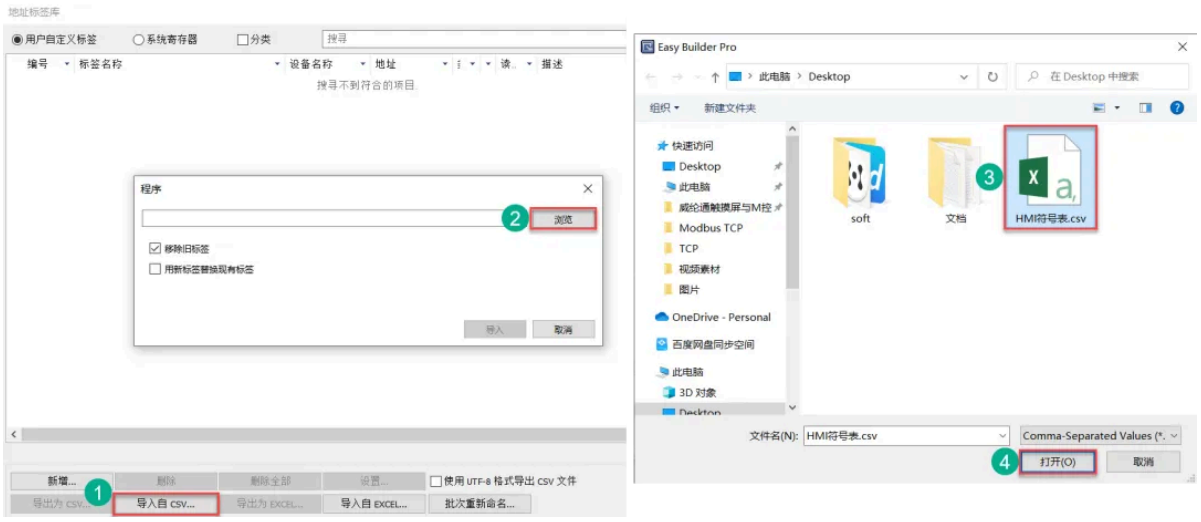
(1) The name must be consistent with the name in [Generate HMI Symbol Table] - [Connection Path].



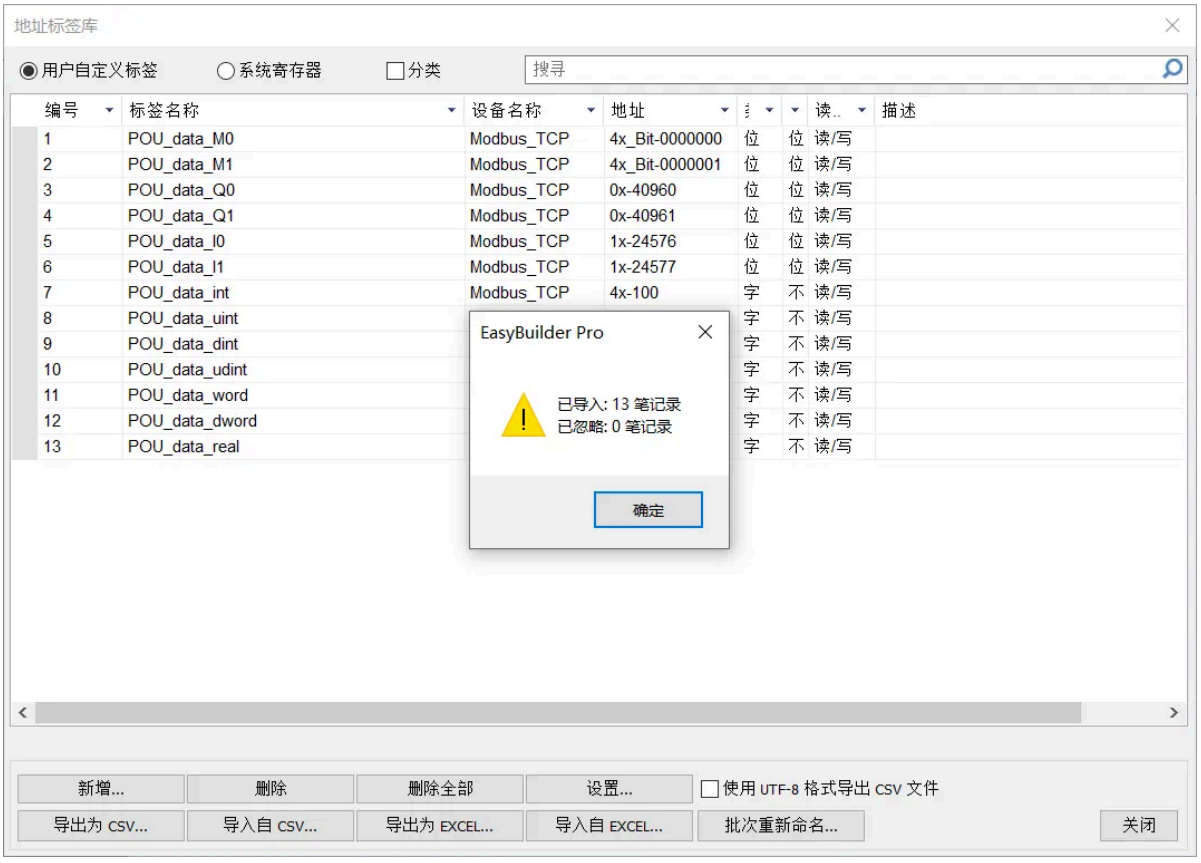
(2) Click [Project File] >> [Address] >> [User Defined Label]



(3) Import CSV file

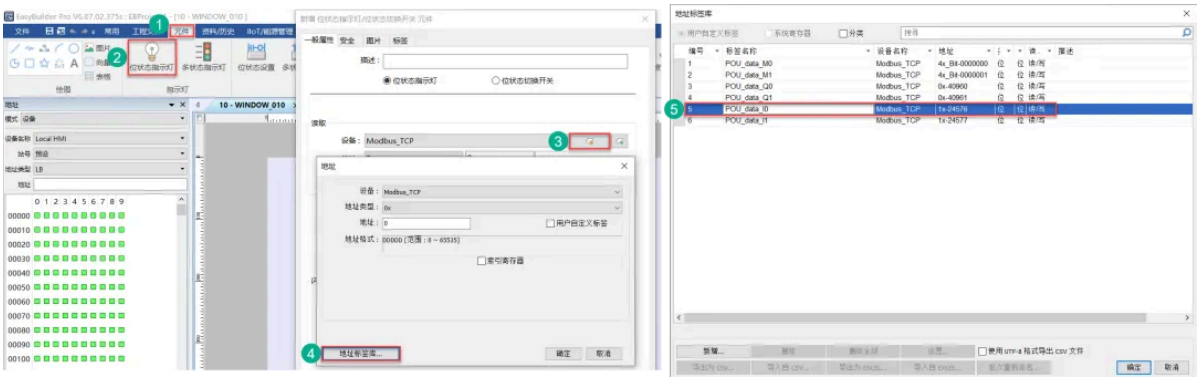


(4) A pop-up window indicates that the import was successful

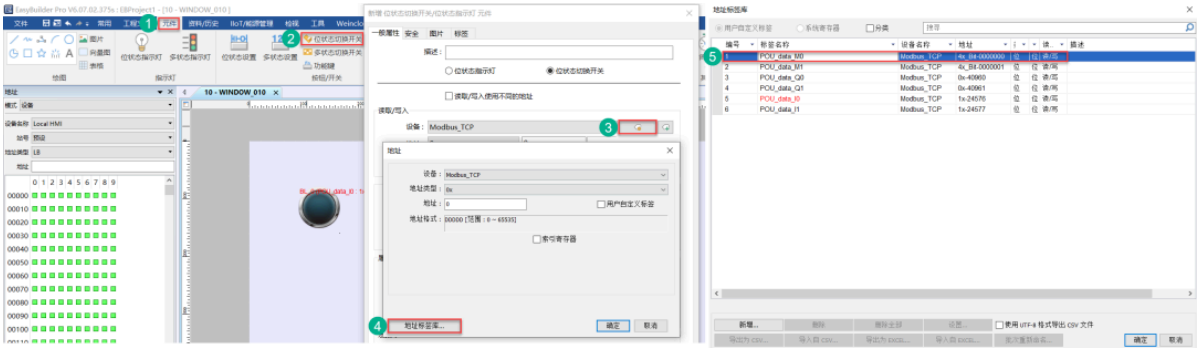


Step 3: Create a new component

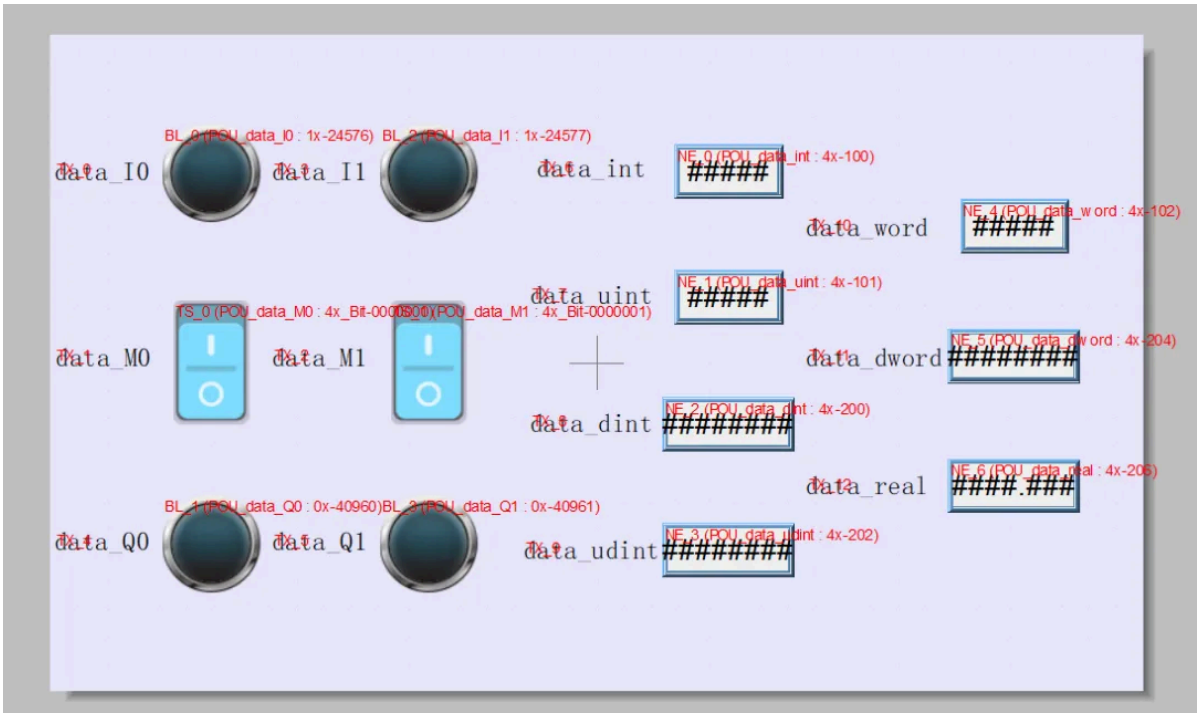
(1) Create a new indicator light component and bind it to the bool variable data_I0.



(2) Create a new bit state switching switch element and bind it to the bool variable data_M0.

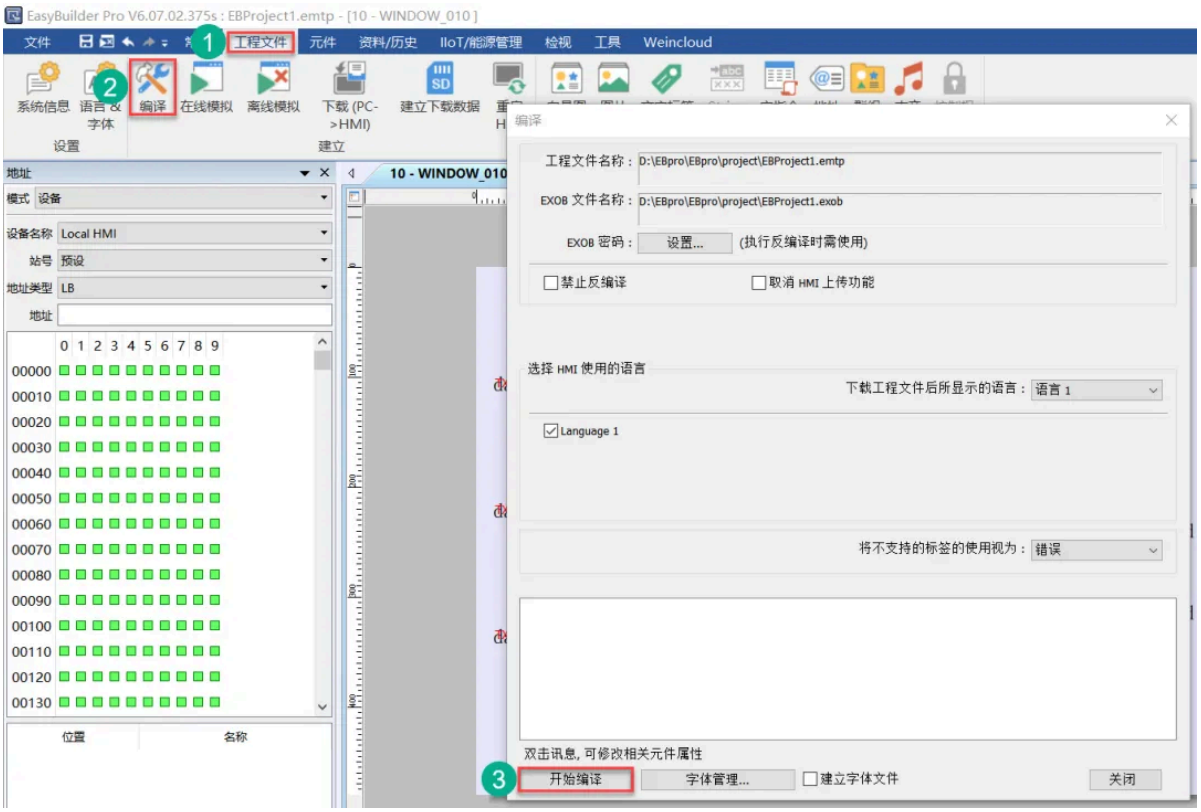


(3) Similarly, create other components and bind the corresponding variables. For easy distinction, add text here.

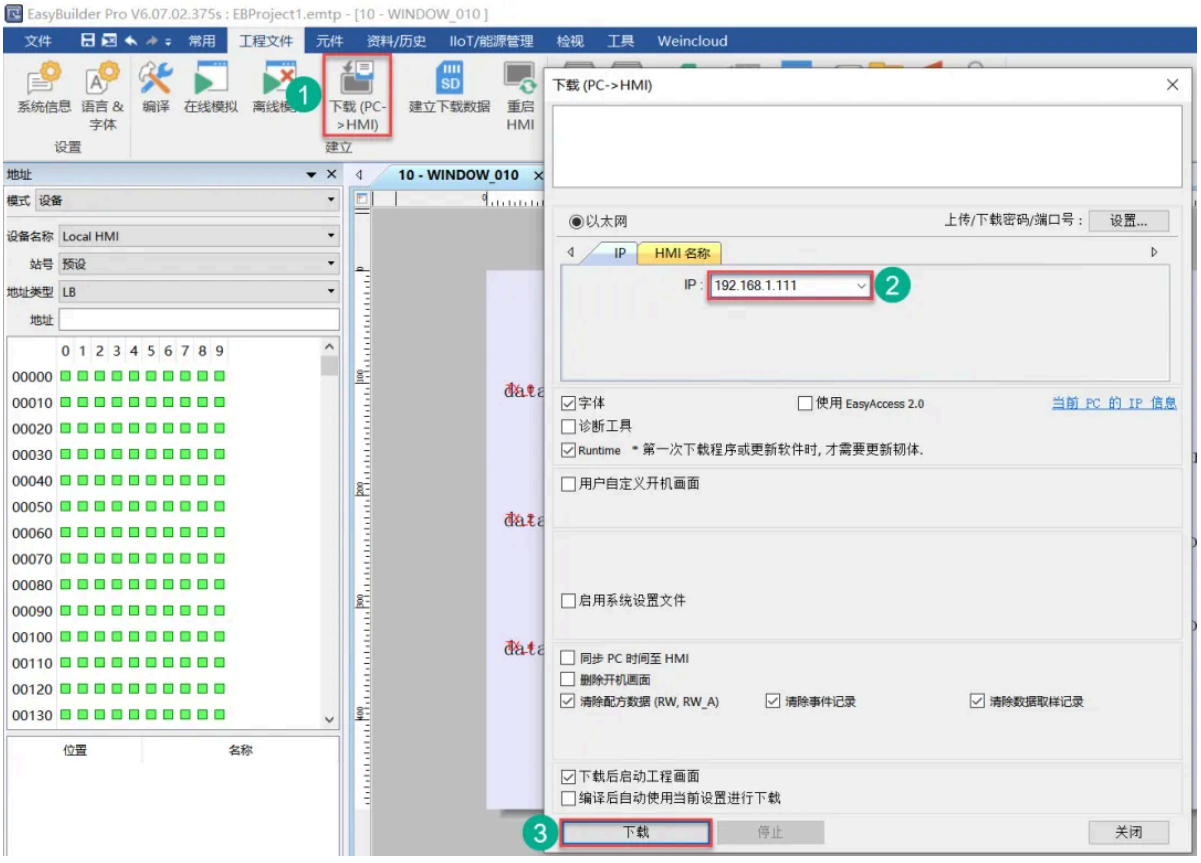


Step 4: Download the project

(1) Click [Project File] >> [Compile] >> [Start Compiling].



(2) Click [Download (PC->HMI)], enter the touch screen IP address 192.168.1.111 in the IP field, and click [Download].



(3) The window displays "All completed", indicating that the download is successful

Standard Modbus address calculation

Address calculation relationship description

The following table applies to the Modbus address correspondence between the M series controller and the WEINIVIEW HMI.

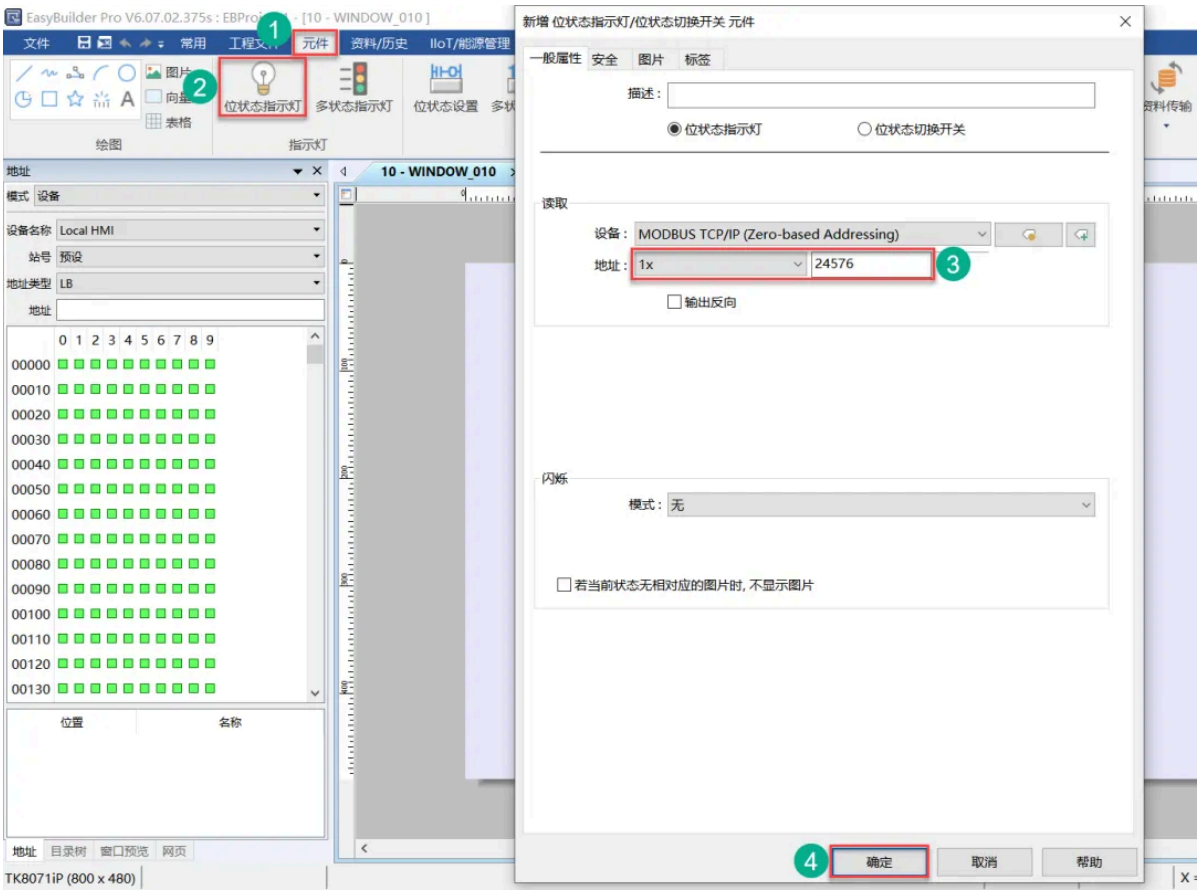
Name	Type	Number	Address	Property
I (Input device)	Bit device	%IX0.0~%IX0.7	6000 ~ 6007	Read-only
		%IX1.0~%IX1.7	6008 ~ 600F	Read-only
		.....	.....	Read-only
		%IX127.0~%IX127.7	63F8 ~ 63FF	Read-only
	Word device	%IW0~%IW63	8000 ~ 803F	Read-only
Q (Output device)	Bit device	%QX0.0~%QX0.7	A000 ~ A007	Read/Write
		%QX1.0~%QX1.7	A008 ~ A00F	Read/Write
		.....	.....	Read/Write
		%QX127.0~%QX127.7	A3F8 ~ A3FF	Read/Write
	Word device	%QW0~%QW63	A000 ~ A03F	Read/Write
M (Middle device)	Word device	%MW0~%MW32767	0000 ~ 7FFF	Read/Write

The corresponding address conversion method is as follows:

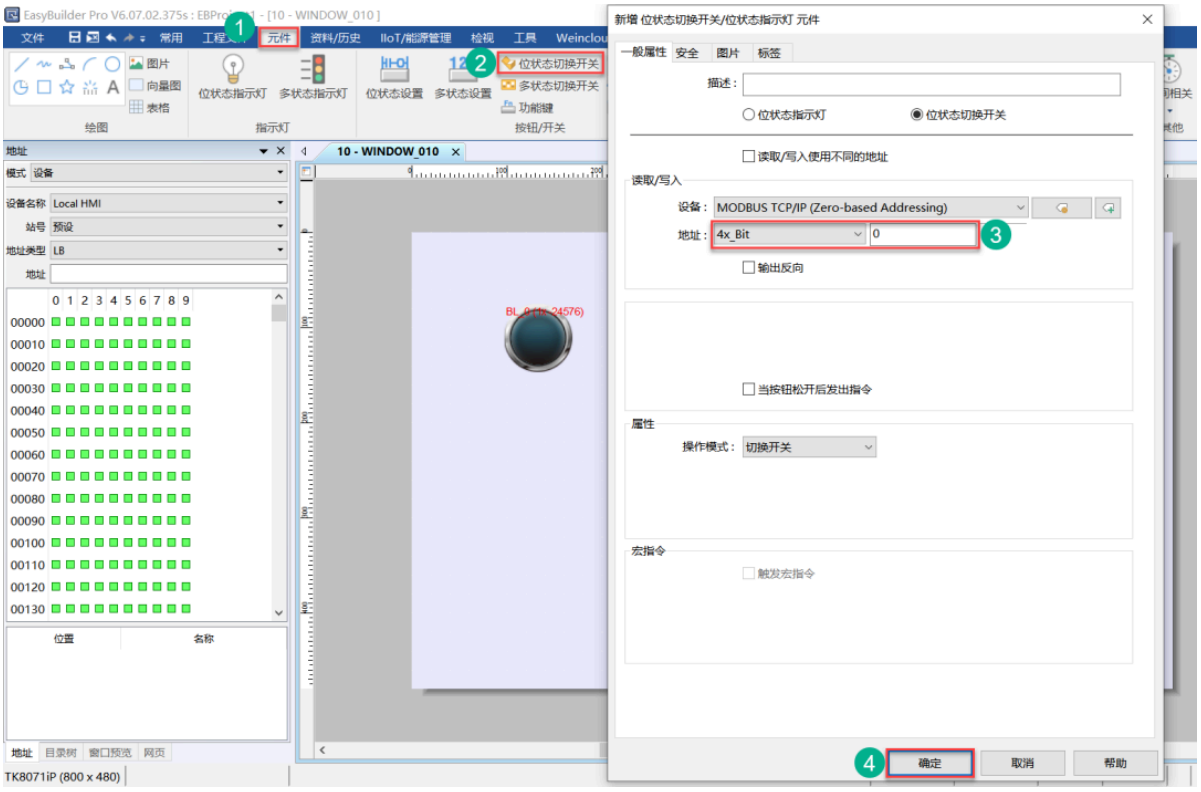
Address	Type	Algorithm	HMI Address
%IXA.B	1X	24576+ A*8 + B	%IX1.1 → 24576 + 1*8 + 1 = 24585
%IBA	3X_bit	24576 + A/2 (A/2 Divisible) [24576 + A/2(Round)].8 (A/2 Not divisible)	%IB20 → 24576 + 20/2 = 24586 %IB21 → [24576 + 21/2(Round)].8=24586.8
%IWA	3X	32768 + A	%IW10 → 32768 + 10 = 32778
%QXA.B	0X	40960+ A*8 + B	%QX1.1 → 40960 + 1*8 + 1 = 40969
%QBA	4X_bit	40960 + A/2 (A/2 Divisible) [40960 + A/2(Round)].8 (A/2 Not divisible)	%QB10 → 40960 + 10/2 = 40965 %QB11 → [40960 + 11/2(Round)].8=40965.8
%QWA	4X	40960 + A	%QW10 → 40960 + 10 = 40970
%MXA.B	4X_bit	A/2.B (A/2 Divisible) A/2(Round).(B+8) (A/2 Not divisible)	%MX500.3 → 500/2 = 250.3 %MX501.3 → [501/2(Round)].(3+8) = 250.11
%MBA	4X_bit	A/2 (A/2 Divisible) A/2(Round).8 (A/2 Not divisible)	%MB100 → 100/2 = 50 %MB101 → 101/2(Round).8 = 50.8
%MWA	4X	A	%MW100→ 100

Step 1: Create a new component

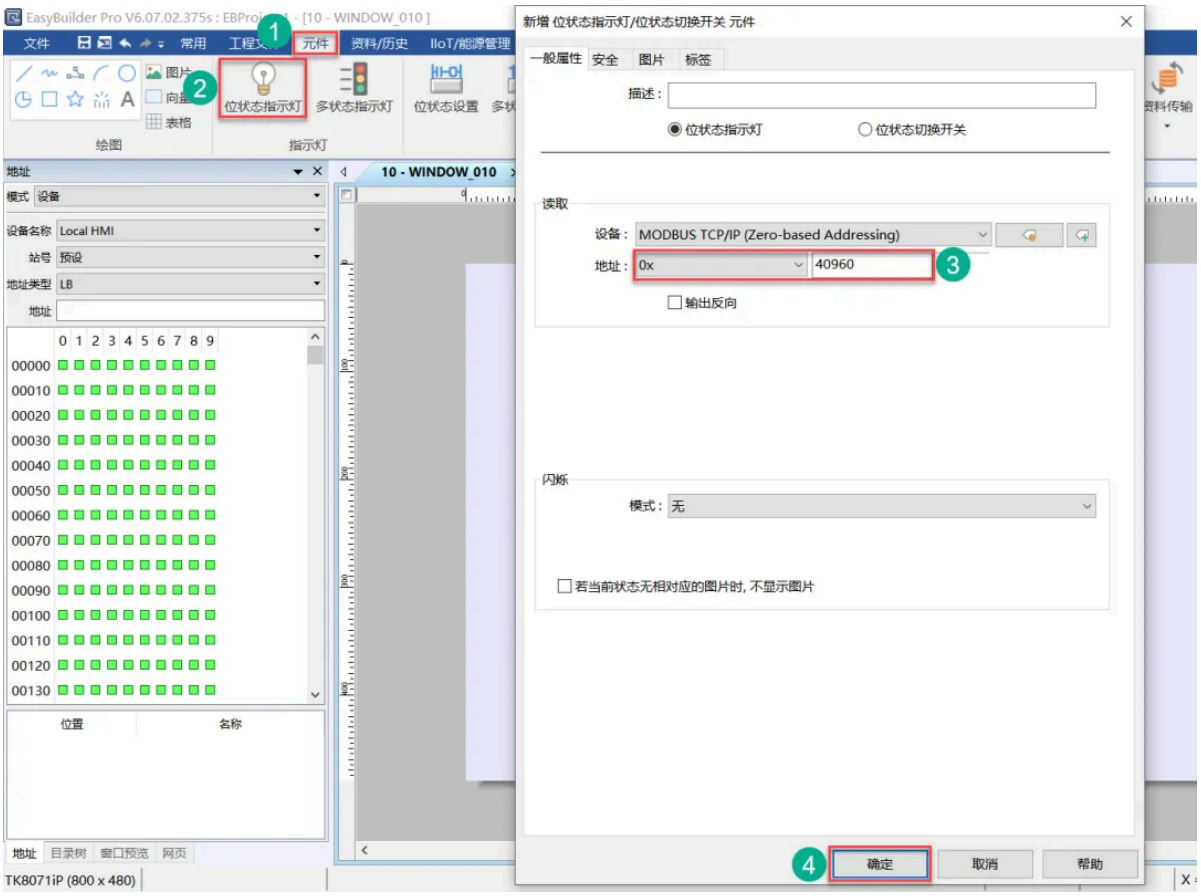
(1) Create a new indicator light component and bind the bool variable data_I0. Click [Bit Status Indicator] in the upper menu bar, select 1x for the corresponding address, and enter 24576.



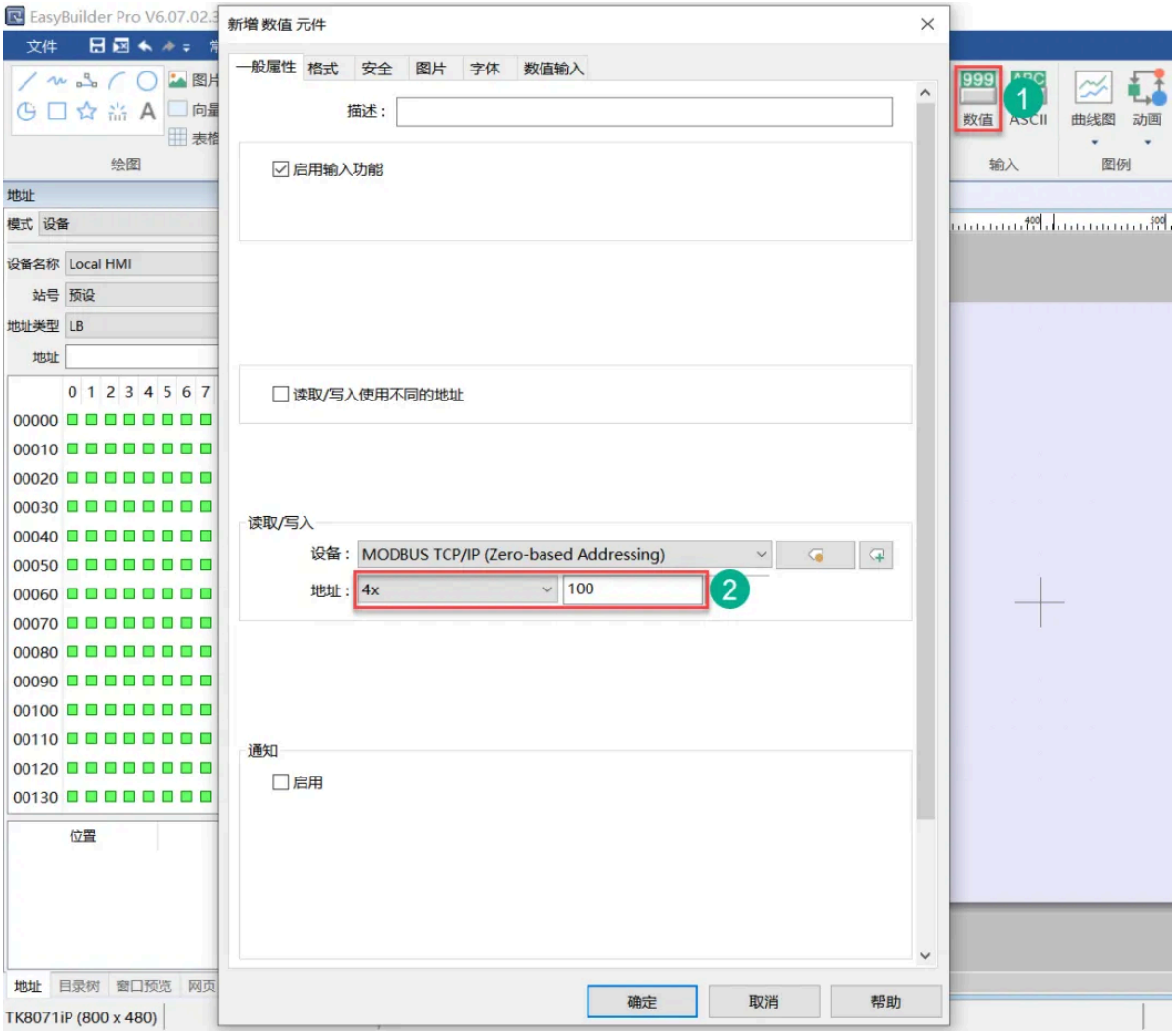
(2) Create a new Bit State Switch component and bind it to the Bool variable data_M0. Click [Bit State Switch] in the upper menu bar, select 4x_Bit for the corresponding address, and enter 0.



(3) Create a new indicator light component and bind it to the bool variable data_Q0. Click [Bit Status Indicator] in the upper menu bar, select 0x for the corresponding address, and enter 40960.

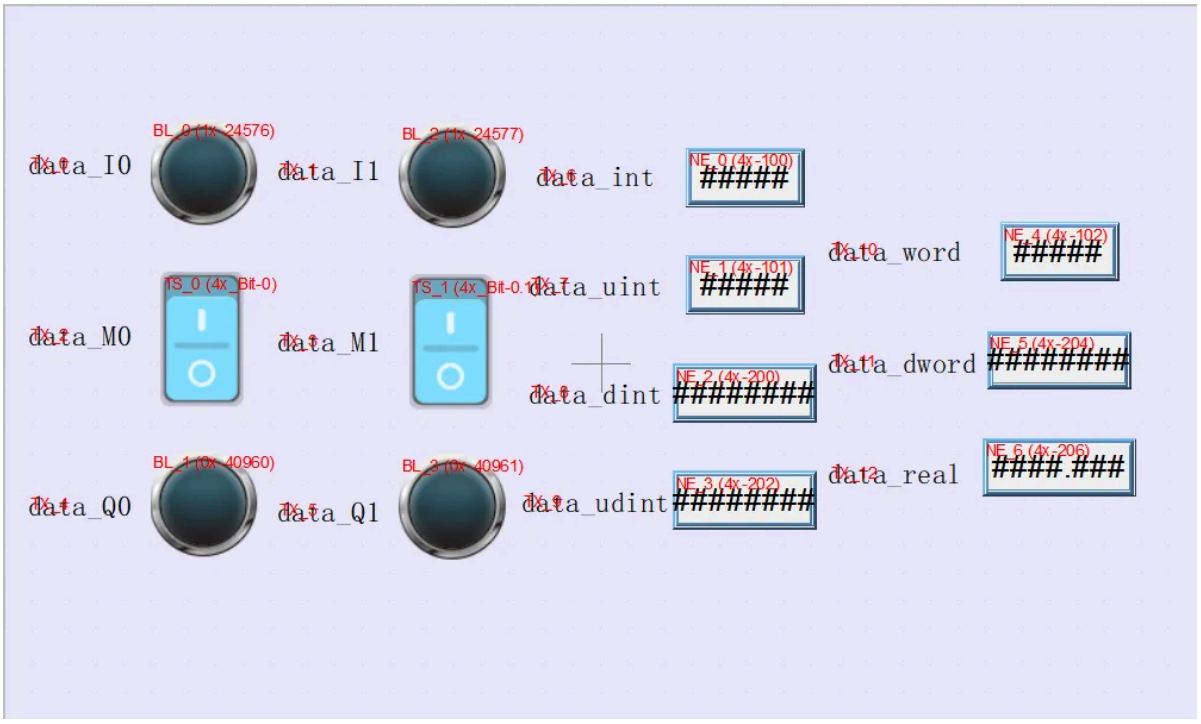


(4) Create a new value component and bind it to the int variable data_int. Click [Value] in the upper menu bar, select 4x for the corresponding address, and enter 100.



The data type of data_int is int. Select 16-bit Signed for [Data Format]. In the [Display Format] section, enter 5 for [Number of digits above the decimal point] to indicate the number of digits that can be displayed on the touch screen.

(5) Similarly, create other components and bind the corresponding variables. For easy distinction, add text here.

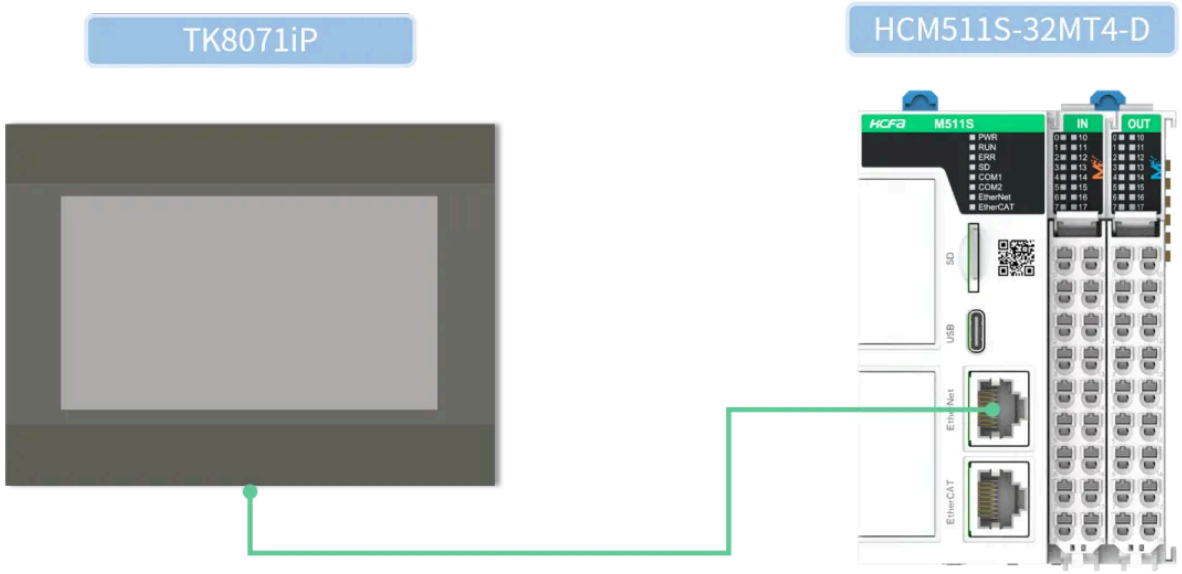


Step 2: After the component is created, download the project to the touch screen.

Communication test

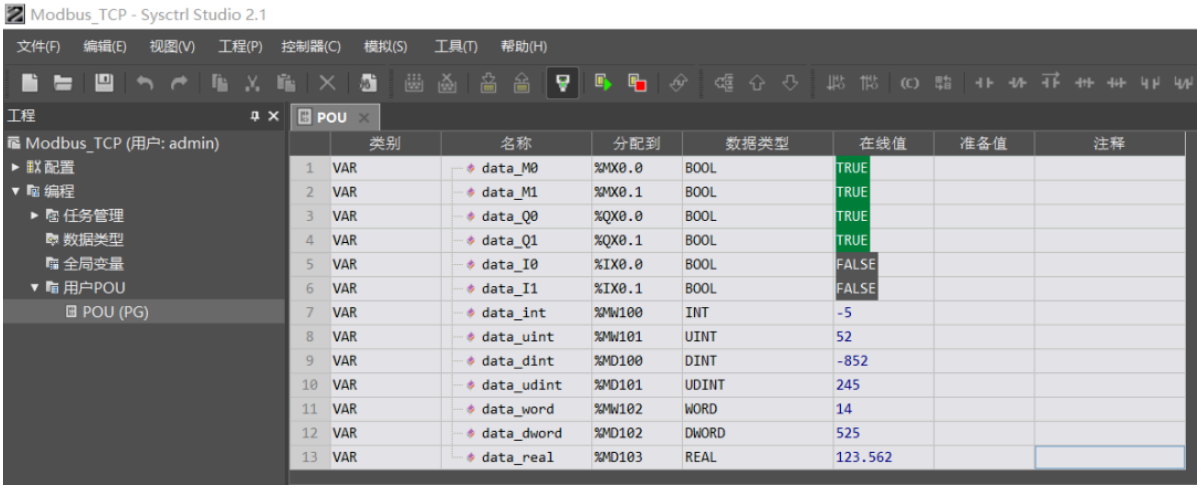
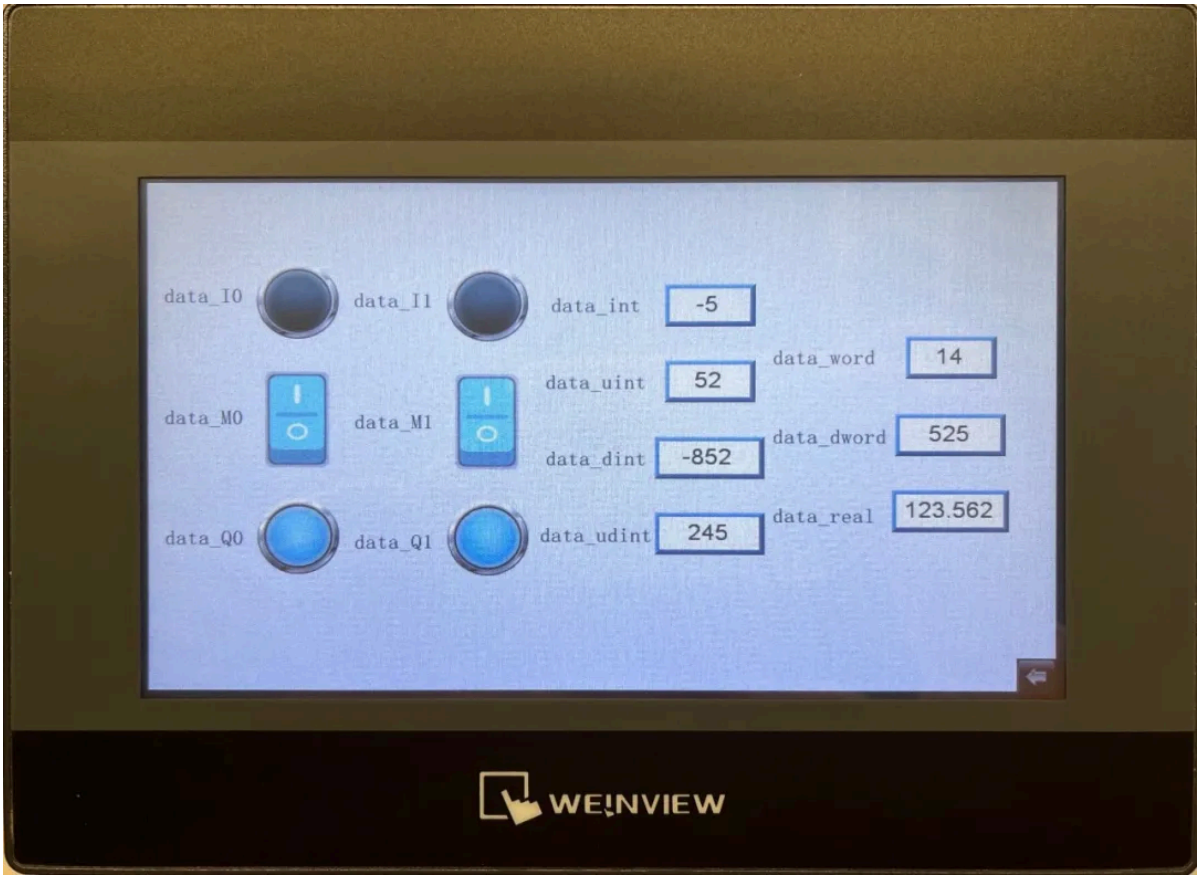
Step 1: Device connection

This tutorial uses the HCM511S-32MT4-D controller and the TK8071iP touch screen. The Modbus TCP communication connection method is shown in the figure below.



Step 2: Engineering Testing

The Sysctrl project enters the monitoring state and assigns values to variables.



At the same time, the touch screen component displays the corresponding value.