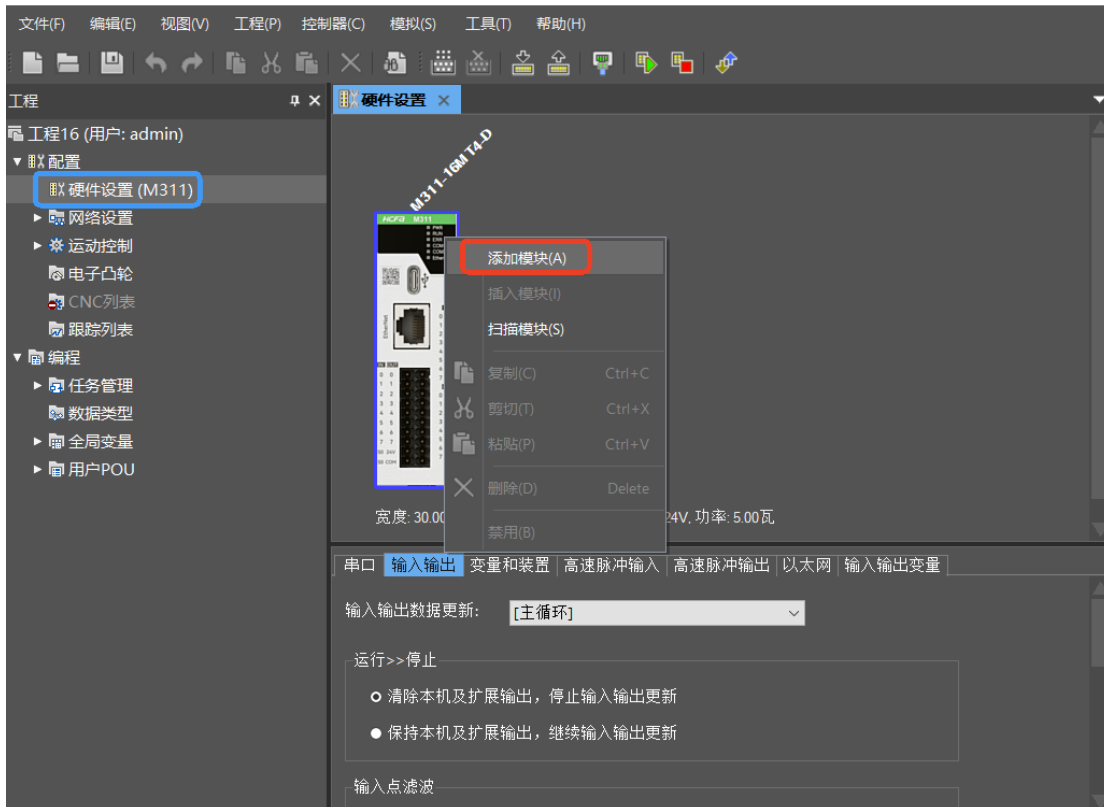


# M series Temperature Measurement modules Note

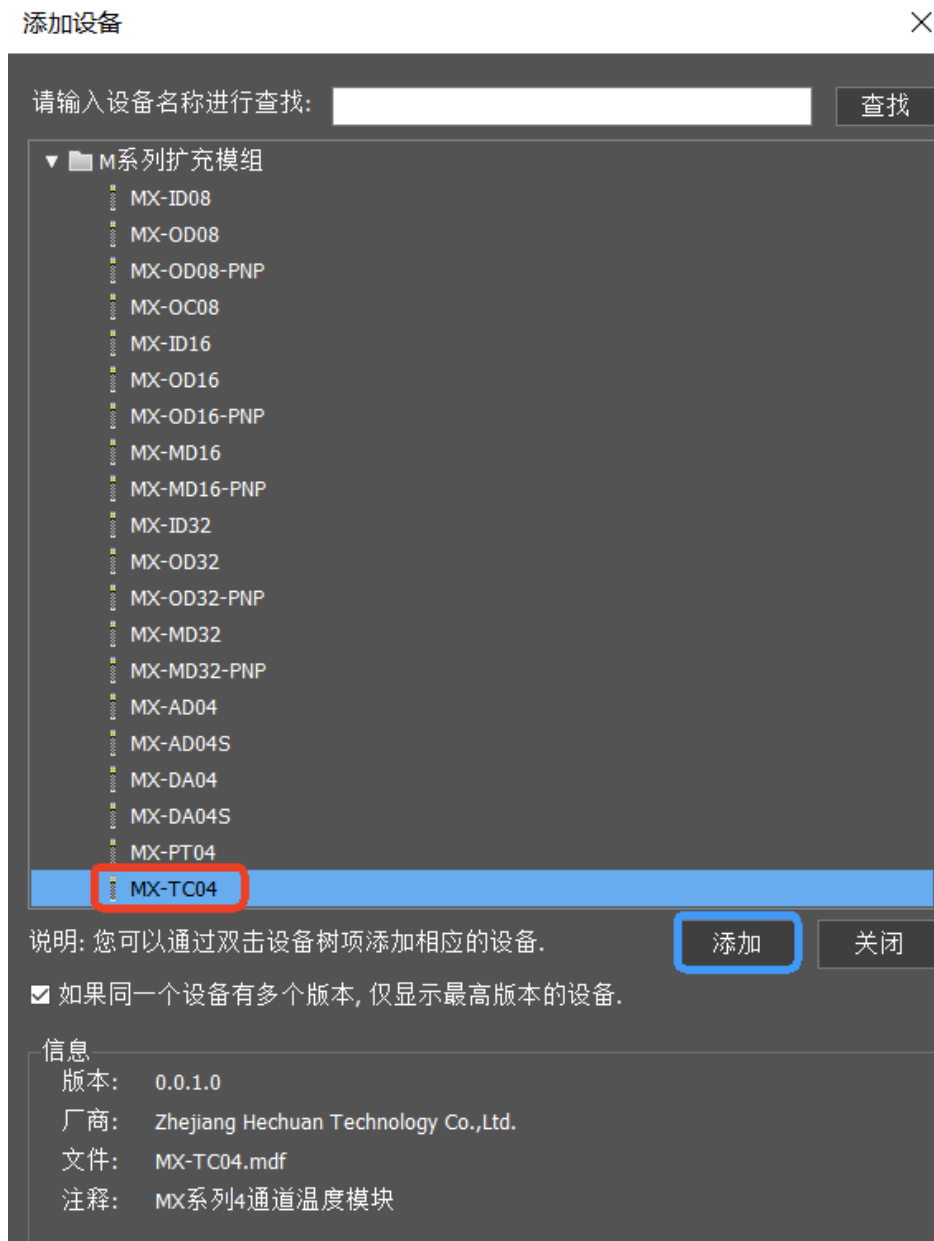
## Programming Example for HCMX-TC04 Module

This example is illustrated based on a system built with the **HCM311 Controller** and **HCMX-TC04-D Module**:

1. Double-click Hardware Settings in the blue box as shown below. Click the host icon on the right, then right-click it, and select the Add Module (A) option in the red box below to bring up the Add Device dialog box.



2. Double-click MX-TC04 in the red box as shown below to add the module. Alternatively, select MX-TC04 in the red box, then click the Add button in the blue box to add the module. After adding the module, click the Close button to exit the Add Device dialog box.



3. The interface after adding the module is shown below, which is divided into two tabs: **Exchange Area** and **Initialization**. The Exchange Area tab is displayed as follows. As indicated in the red box below, the software generates default variables for the current values of the module's 4 channels. Users can either modify the variable names or directly use the default ones. As shown in the green box below, the meanings of each parameter on the Exchange Area tab are described in the table below.

Parameters	Descriptions
Parameters	Parameter number and parameter name corresponding to the module. As shown in the figure below, P106: Channel 1 Current Value — P106 denotes the module parameter number, and Channel 1 Current Value denotes the module parameter name.
Variable	Variable names in the controller to which the current value parameters of the module's 4 channels are mapped
Assigned to	Device in the controller to which the module parameters are mapped. The device here is determined by the module's position on the right side of the controller and cannot be modified. It is not recommended to use this device to read or control module parameters.
Data type	Data type corresponding to the variable, which is determined by the module parameter type and cannot be modified.
Initial value	Initial value corresponding to the variable, which is written once when the controller is running. No setting is required for temperature modules.
Comment	Comment corresponding to the variable.

文件(F) 编辑(E) 视图(V) 工程(P) 控制器(C) 模拟(S) 工具(T) 帮助(H)

工程 硬件设置

工程161 (用户: admin)


配置

硬件设置 (M311)

- 网络设置
- 运动控制
- 电子凸轮
- CNC列表
- 跟踪列表

编程

- 任务管理
- 数据类型
- 全局变量
- 用户POU



宽度: 43.00毫米, 高度: 100.00毫米, 电压: DC24V, 功率: 6.00瓦

交换区 初始化

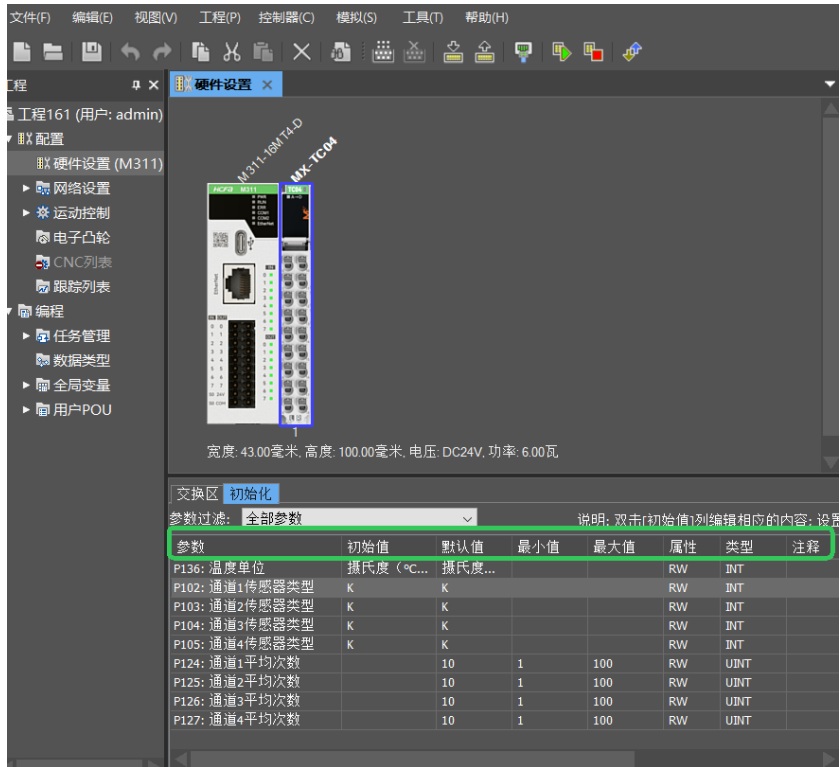
说明: 双击变量, 初始值, 注释单元格实施编辑操作.

参数	变量	分配到	数据类型	初始值	注释
P106: 通道1当前值	hwcVar27	%MW64000	REAL		
P107: 通道2当前值	hwcVar28	%MW64002	REAL		
P108: 通道3当前值	hwcVar29	%MW64004	REAL		
P109: 通道4当前值	hwcVar30	%MW64006	REAL		

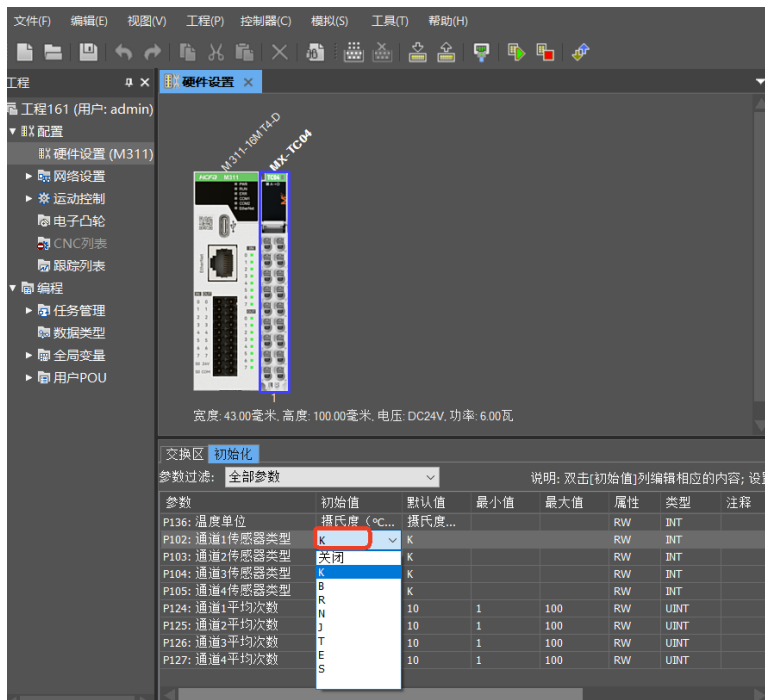
---

4. The interface after adding the module is shown below, which is divided into two tabs: Exchange Area and Initialization. As indicated in the green box below, the meanings of each parameter on the Initialization tab are described in the table below.

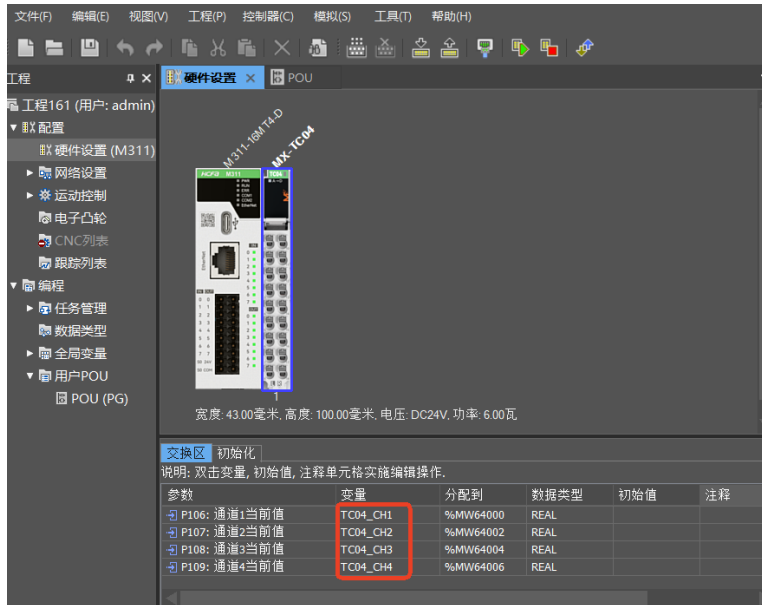
Parameters	Descriptions
Parameters	<p>Parameter number and parameter name corresponding to the module. As shown in the figure below, P102: Channel 1 Sensor Type — P102 denotes the module parameter number, and Channel 1 Sensor Type denotes the module parameter name.</p> <p>For detailed explanations of the module-related parameters, please refer to the detailed descriptions in the Parameter Description chapter.</p>
Initial value	The initial value of the module parameter is written to the module once in the following scenarios: when the controller operates after power-on, when the controller switches from stop to run mode, and when the controller runs after a download. The sensor type, averaging count, and other settings can be modified via the initial value of the parameter.
Default value	Default value of the module parameter
Minimum value	Minimum value of the module parameter
Maximum value	Maximum value of the module parameter
Property	Flag indicating whether the module parameter is readable and writable; <b>RW</b> means read-write capability.
Type	Data type corresponding to the module parameter
Comment	Comment corresponding to the module parameter



- On the Initialization tab, double-click the area in the red box as shown below to modify the sensor type of Channel 1.

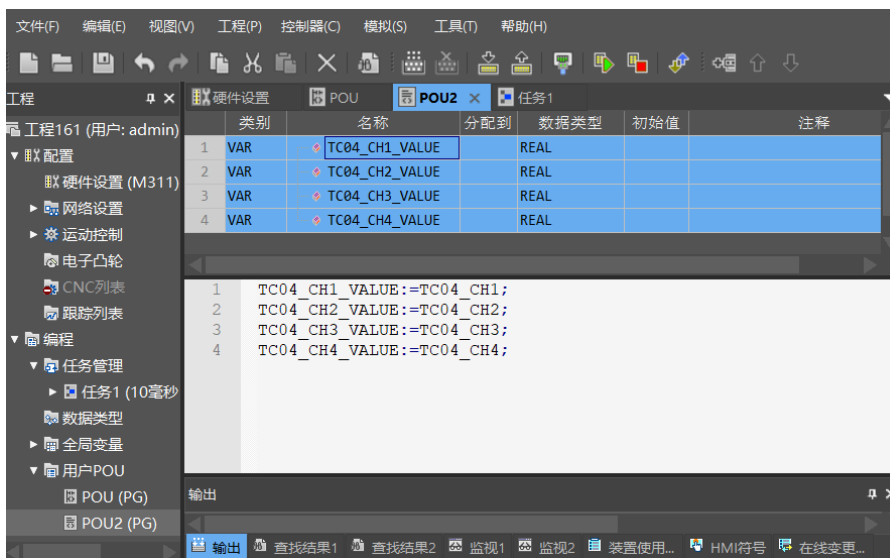


6. As indicated in the red box below, modify the variable names corresponding to the current values of the module's 4 channels.



## 7. Program Example

Add custom variables TC04\_CH1\_VALUE, TC04\_CH2\_VALUE, TC04\_CH3\_VALUE, and TC04\_CH4\_VALUE to the variable table, and assign the current values of the four channels of the temperature module to these custom variables respectively. LD as follow:







## 9. Download

Click on the red box in the image below to download the project data to the controller.

The screenshot shows a software interface with a menu bar at the top containing: 文件(F), 编辑(E), 视图(V), 工程(P), 控制器(C), 模拟(S), 工具(T), 帮助(H). Below the menu bar is a toolbar with various icons. A red box highlights the download icon (a downward arrow) in the toolbar. Below the toolbar is a tabbed interface with a tab labeled "POU" and a button labeled "下载 (Ctrl+F8)".

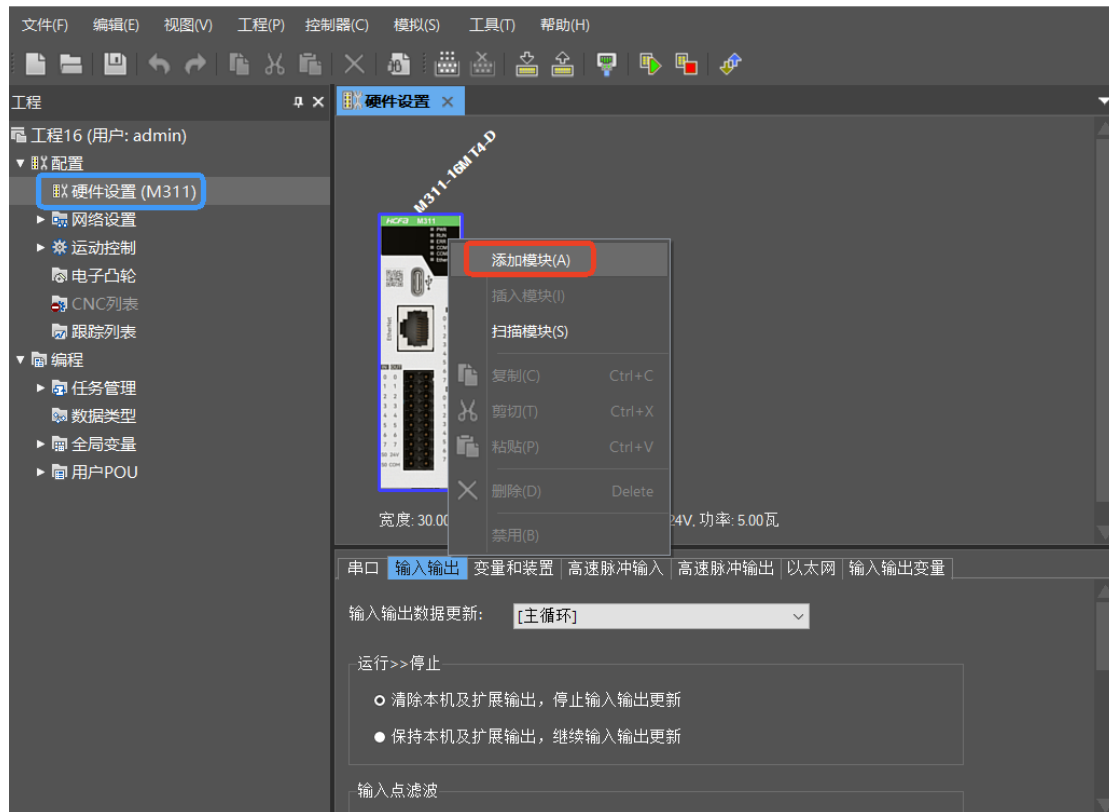
On the left side, there is a project tree with the following structure:

- 工程161 (用户: admin)
  - 配置
    - 硬件设置 (M311)
      - 网络设置
      - 运动控制
      - 电子凸轮
      - CNC列表
      - 跟踪列表
  - 编程
    - 任务管理
      - 任务1 (10毫秒)
    - 数据类型
    - 全局变量
    - 用户POU
      - POU (PG)
      - POU2 (PG)

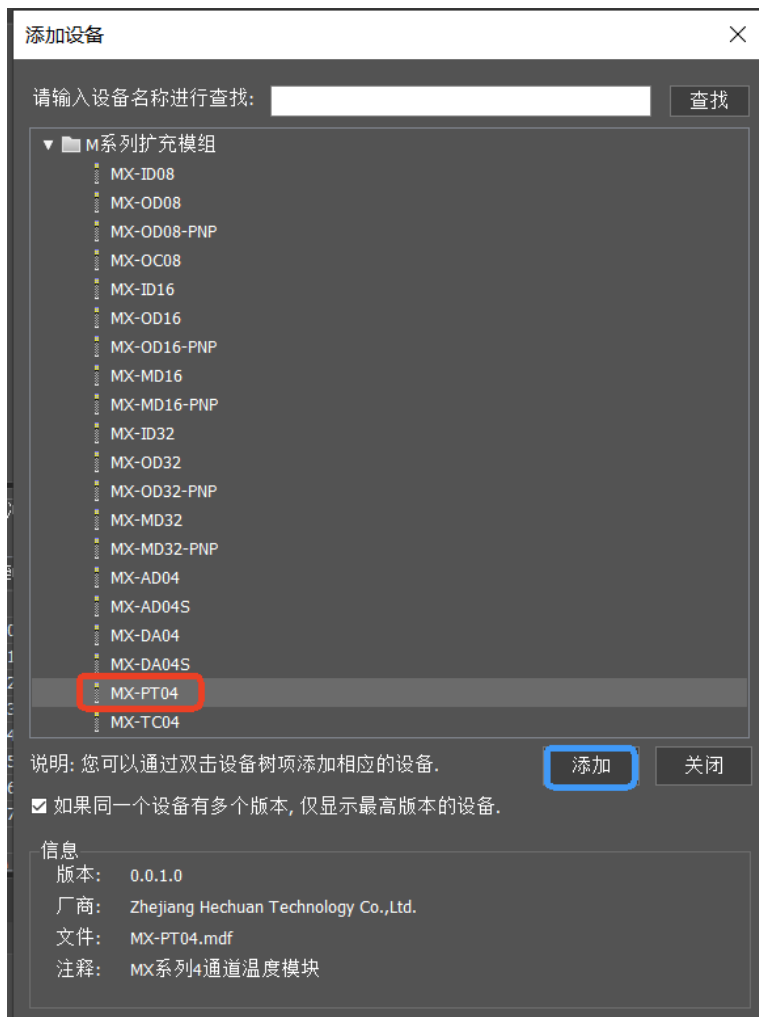
## Programming Example for HCMX-PT04 Module

This example uses a system built with the HCM311 controller and the HCMX-PT04-D module for explanation:

1. Double-click the "Hardware Settings" in the blue box in the image below, click on the host icon on the right, then right-click and select the "Add Module (A)" option in the red box in the image below. The "Add Device" dialog box will pop up.



2. Double-click "MX-PT04" in the red box of the image below to add the module, or click to select "MX-PT04" in the red box and then click the "Add" button in the blue box to add the module. After adding the module, click the "Close" button in the image below to close the "Add Device" dialog box.



3. The interface after adding the module is shown below, which is divided into two tabs: Exchange Area and Initialization. The Exchange Area tab is displayed as follows. As indicated in the red box below, the software generates default variables for the current values of the module's 4 channels. Users can either modify the variable names or directly use the default ones. As shown in the green box below, the meanings of each parameter on the Exchange Area tab are described in the table below.


Parameters	Descriptions
Parameters	Parameter number and parameter name corresponding to the module. As shown in the figure below, P106: Channel 1 Current Value — P106 denotes the module parameter number, and Channel 1 Current Value denotes the module parameter name.
Varibale	Variable names in the controller to which the current value parameters of the module's 4 channels are mapped
Assigned to	Device in the controller to which the module parameters are mapped. The device here is determined by the module's position on the right side of the controller and cannot be modified. It is not recommended to use this device to read or control module parameters.
Data type	Data type corresponding to the variable, which is determined by the module parameter type and cannot be modified.
Initial value	Initial value corresponding to the variable, which is written once when the controller is running. No setting is required for temperature modules.
Comment	Comment corresponding to the variable.

文件(F) 编辑(E) 视图(V) 工程(P) 控制器(C) 模拟(S) 工具(T) 帮助(H)

工程 硬件设置

工程16 (用户: admin)

- 配置
  - 硬件设置 (M311)
    - 网络设置
    - 运动控制
    - 电子凸轮
    - CNC列表
    - 跟踪列表
  - 编程
    - 任务管理
    - 数据类型
    - 全局变量
    - 用户POU
      - POU (PG)
      - POU2 (PG)



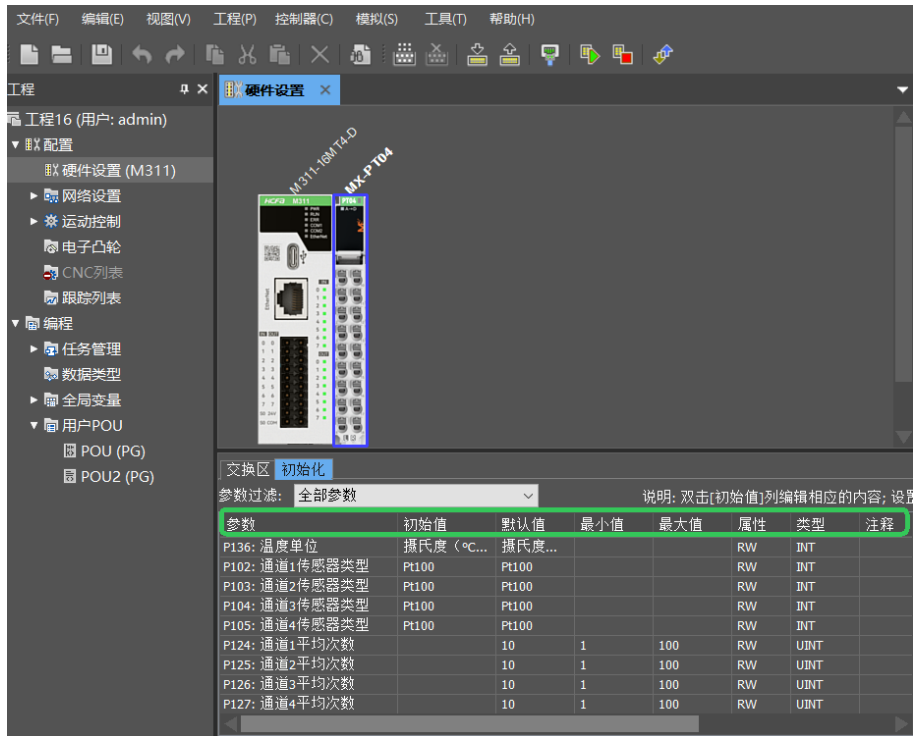
交换区 初始化

说明: 双击变量, 初始值, 注释单元格实施编辑操作.

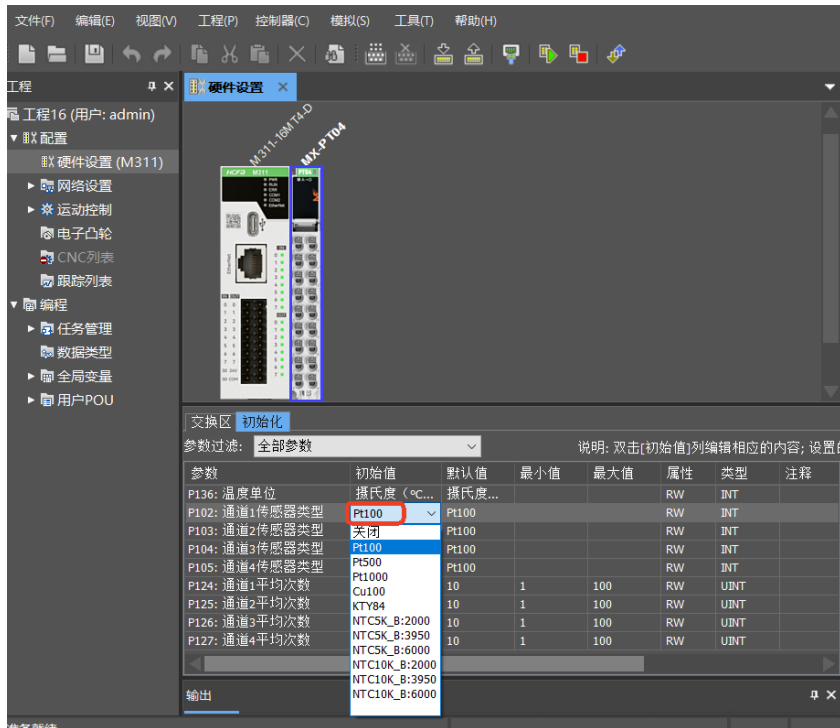
参数	变量	分配到	数据类型	初始值	注释
P106: 通道1当前值	hwcVar35	%MW64000	REAL		
P107: 通道2当前值	hwcVar36	%MW64002	REAL		
P108: 通道3当前值	hwcVar37	%MW64004	REAL		
P109: 通道4当前值	hwcVar38	%MW64006	REAL		

4. The interface after adding the module is shown below, which is divided into two tabs: Exchange Area and Initialization. As indicated in the green box below, the meanings of each parameter on the Initialization tab are described in the table below.

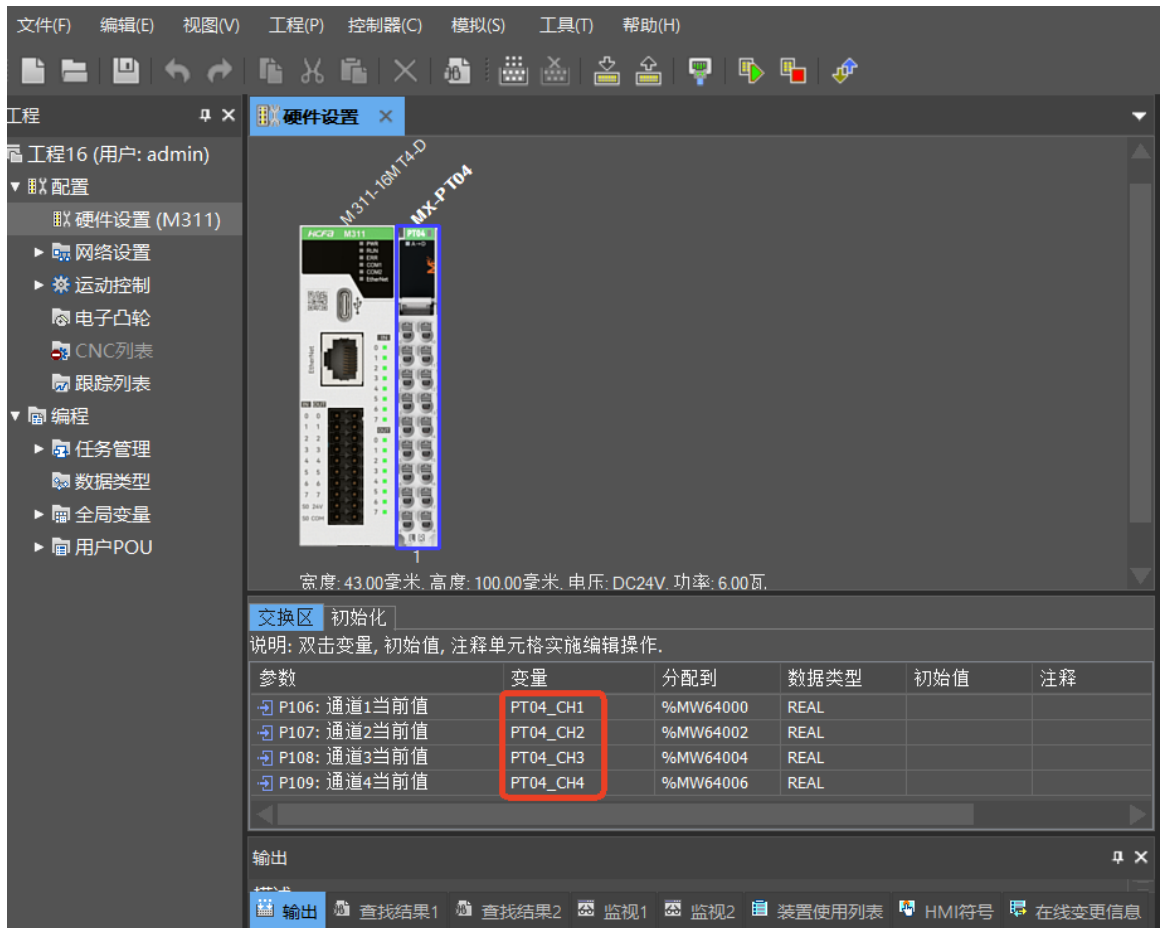
Parameters	Descriptions
Parameters	<p>Parameter number and parameter name corresponding to the module. As shown in the figure below, P102: Channel 1 Sensor Type — P102 denotes the module parameter number, and Channel 1 Sensor Type denotes the module parameter name.</p> <p>For detailed explanations of the module-related parameters, please refer to the detailed descriptions in the Parameter Description chapter.</p>
Initial value	The initial value of the module parameter is written to the module once in the following scenarios: when the controller operates after power-on, when the controller switches from stop to run mode, and when the controller runs after a download. The sensor type, averaging count, and other settings can be modified via the initial value of the parameter.
Default value	Default value of the module parameter
Minimum value	Minimum value of the module parameter
Maximum value	Maximum value of the module parameter
Property	Flag indicating whether the module parameter is readable and writable; <b>RW</b> means read-write capability.
Type	Data type corresponding to the module parameter
Comment	Comment corresponding to the module parameter



- On the "Initialization" page, double-click the area marked in red in the image below to change the sensor type for Channel 1.



6. As shown in the red box in the image below, modify the variable names corresponding to the current values of the module's four channels.



## 7. Program example

In the variable table, add custom variables PT04\_CH1\_VALUE, PT04\_CH2\_VALUE, PT04\_CH3\_VALUE, and PT04\_CH4\_VALUE. Then, assign the current values of the four channels of the temperature module to these custom variables, respectively.





## 8. Check Program and Configuration

Click the area marked in red in the image below to check the program and configuration. If the area marked in green shows 0 errors, it indicates that there are no issues with the program and configuration.

The screenshot displays the Siemens SIMATIC Manager interface. The top menu bar includes '文件(F)', '编辑(E)', '视图(V)', '工程(P)', '控制器(C)', '模拟(S)', '工具(T)', and '帮助(H)'. The toolbar contains various icons, with a red box highlighting the 'Check' icon (a grid of dots). The main workspace is divided into several panes:

- Left Pane:** Project tree for '工程16 (用户: admin)'. It shows a hierarchy: '配置' (Configuration) > '硬件设置 (M311)' (Hardware Settings) > '网络设置' (Network Settings) > '运动控制' (Motion Control) > '电子凸轮' (Electronic Cam) > 'CNC列表' (CNC Lists) > '跟踪列表' (Tracking Lists) > '编程' (Programming) > '任务管理' (Task Management) > '数据类型' (Data Types) > '全局变量' (Global Variables) > '用户POU' (User POU) > 'POU (PG)' (User POU) > 'POU2 (PG)' (User POU).
- Top Center Pane:** Variable Declaration Table for 'POU2'.

类别	名称	分配到	数据类型
1	VAR	PT04_CH1_VALUE	REAL
2	VAR	PT04_CH2_VALUE	REAL
3	VAR	PT04_CH3_VALUE	REAL
4	VAR	PT04_CH4_VALUE	REAL
- Center Pane:** Ladder Logic Network 1. It shows a normally open contact labeled 'TRUE' connected to two 'MOVE' blocks. The first 'MOVE' block has 'EN' connected to the 'TRUE' contact and 'ENO' connected to 'PT04\_CH1\_VALUE'. The second 'MOVE' block has 'EN' connected to 'PT04\_CH1' and 'ENO' connected to 'PT04\_CH2\_VALUE'.
- Bottom Pane:** Output window showing the following text:

```
检查配置数据...
程序容量使用率1.2939%
变量容量使用率1.5726%
断电保持容量使用率6.2500%
>>>>>>编译结束, 0 个错误, 0 个警告<<<<<<<<
```

## 9. Download

Click the area marked in red in the image below to download the project data to the controller.

The screenshot displays the SIMATIC Manager software interface. The top menu bar includes options like '文件(F)', '编辑(E)', '视图(V)', '工程(P)', '控制器(C)', '模拟(S)', '工具(T)', and '帮助(H)'. The main workspace is divided into several sections:

- Left Panel:** A tree view showing the project structure for '工程16 (用户: admin)'. It includes sections for '配置' (Configuration), '编程' (Programming), and '用户POU' (User POU). The '用户POU' section is expanded to show 'POU (PG)' and 'POU2 (PG)'. A red box highlights the '下载' (Download) icon in the toolbar above this panel.
- Table:** A table listing variables for POU2. The columns are '类别' (Category), '名称' (Name), '分配到' (Assigned to), and '数据类型' (Data Type).
- Diagram:** A ladder logic diagram for '网络1: ...'. It shows a network with a 'TRUE' input and two 'MOVE' instructions. The first 'MOVE' instruction has 'PT04\_CH1' as the input and 'PT04\_CH1\_VALUE' as the output. The second 'MOVE' instruction has 'PT04\_CH2' as the input and 'PT04\_CH2\_VALUE' as the output.
- Output Window:** A window at the bottom right showing the output of the compilation process. It includes a '描述' (Description) section with the following text:

```
检查配置数据...
程序容量使用率1.2939%
变量容量使用率1.5726%
断电保持容量使用率6.2500%
>>>>>>>编译结束, 0 个错误, 0 个警告<<<<<<<<
```

The status bar at the bottom left indicates '准备就绪' (Ready).

# Parameters Description

## HCMX-TC04-D

Parameters	Default	Min.	Max.	Porperty	Type	Description
Firmwre version	N/A			RO	UNIT	Sensor type
102: CH1 mode	1	0	65535	RW	UNIT	0: Disable
103: CH2 mode	1	0	65535	RW	UNIT	1: K
104: CH3 mode	1	0	65535	RW	UNIT	2: B
105: CH4 mode	1	0	65535	RW	UNIT	3: R
						4: N
						5: J
						6: T
						7: E
						8: S
106: CH1 Current temperature value	0			RO	INT	Temperature range corresponding to the sensor type, unit: °C / °F
107: CH2 Current temperature value	0			RO	INT	K: -270.0°C ~ 1370.0°C , -454.0° F~2498.0° F
108: CH3 Current temperature value	0			RO	INT	B: 200.0°C ~ 1800.0°C, 392.0° F ~ 3272.0° F
109: CH4 Current temperature value	0			RO	INT	R: -50.0°C ~ 1765.0°C , -58.0° F~3209.0° F
						N: -200.0°C ~ 1300.0°C , -328.0° F ~ 2372.0° F
						J: -210.0°C ~ 1200.0°C , -346.0° F~2192.0° F
						T: -270.0°C ~ 400.0°C, -454.0° F~752.0° F
						E: -270.0°C ~ 1000.0°C, -454.0° F ~ 1832.0° F
						S: -50.0°C ~ 1765.0°C , -58.0° F~3209.0° F

119 : Error code				RO	UNIT	<p>Error Codes Corresponding to the Module:</p> <p>BIT 0: Module power supply abnormal</p> <p>BIT 1: Cold junction resistance abnormal</p> <p>BIT 2: Internal hardware abnormal</p> <p>BIT 4: CH1 exceeds upper or lower limit</p> <p>BIT 5: CH2 exceeds upper or lower limit</p> <p>BIT 6: CH3 exceeds upper or lower limit</p> <p>BIT 7: CH4 exceeds upper or lower limit</p> <p>BIT 8: CH1 sensor open circuit</p> <p>BIT 9: CH2 sensor open circuit</p> <p>BIT 10: CH3 sensor open circuit</p> <p>BIT 11: CH4 sensor open circuit</p> <p>BIT 12: Failed factory production process</p>
124 : CH1 Averaging Count	10	1	100	RW	UINT	1-100
125 : CH2 Averaging Count	10	1	100	RW	UINT	1-100
126 : CH3 Averaging Count	10	1	100	RW	UINT	1-100
127 : CH4 Averaging Count	10	1	100	RW	UINT	1-100
128 : CH1 Upper limit setting Count				RW	INT	<p>The temperature range corresponding to the upper limit setpoint or lower limit</p> <p>units :0.1°C / 0.1°F.</p>
129 : CH2 Upper limit setting Count				RW	INT	<p>K: -270°C ~ 1370°C / -454°F ~ 2498°F</p> <p>B: 200°C ~ 1800°C /</p>

130 : CH3 Upper limit setting Count				RW	INT	392°F ~ 3272°F R: -50°C ~ 1765°C / -58°F ~ 3209°F N: -200°C ~ 1300°C / -328°F ~ 2372°F J: -210°C ~ 1200°C / -346°F ~ 2192°F T: -270°C ~ 400°C / -454°F ~ 752°F E: -270°C ~ 1000°C / -454°F ~ 1832°F S: -50°C ~ 1765°C / -58°F ~ 3209°F
131 : CH4 Upper limit setting Count				RW	INT	
132 : CH1 Lower limit setting Count				RW	INT	
133 : CH2 Lower limit setting Count				RW	INT	
134 : CH3 Lower limit setting Count				RW	INT	
135 : CH4 Lower limit setting Count				RW	INT	
136 : Temperature Units	0	0	1	RW	INT	

## HCMX-PT04-D

Parameters	Default	Min.	Max.	Porperty	Type	Description
Firmwre version	N/A			RO	UNIT	Sensor type 0: Disable
102: CH1 mode	1	0	65535	RW	UNIT	1: Pt100 2: Pt500 3: Pt1000
103: CH2 mode	1	0	65535	RW	UNIT	7: Cu100 8: KTY84
104: CH3 mode	1	0	65535	RW	UNIT	9: NTC5K_B:2000 10: NTC5K_B:3950
105: CH4 mode	1	0	65535	RW	UNIT	11: NTC5K_B:6000 12: NTC10K_B:2000 13: NTC10K_B:3950 14: NTC10K_B:6000
106: CH1 Current temperature value	0			RO	INT	Temperature range corresponding to the sensor type, unit: °C / °F Pt100: -200.0°C ~ 850.0°C, -328.0 °F ~ 1562.0 °F Pt500: -200.0°C ~ 850.0°C, -328.0 °F ~ 1562.0 °F
107: CH2 Current temperature value	0			RO	INT	Pt1000: -200.0°C ~ 850.0°C, -328.0 °F ~ 1562.0 °F Cu100: -50.0°C ~ 150.0°C, -58.0 °F ~ 302.0 °F KTY84: 0.0°C ~ 200.0°C, 32.0 °F ~ 392.0 °F
108: CH3 Current temperature value	0			RO	INT	NTC5K_B:2000: -30.0°C ~ 200.0°C, -22.0 °F ~ 392.0 °F NTC5K_B:3950: -15.0°C ~ 100.0°C, 5.0 °F ~ 212.0 °F NTC5K_B:6000: 0.0°C ~ 100.0°C, 32.0 °F ~ 212.0 °F
109: CH4 Current temperature value	0			RO	INT	NTC10K_B:2000: -25.0°C ~ 200.0°C, -13.0 °F ~ 392.0 °F NTC10K_B:3950: 0.0°C ~ 150.0°C, 32.0 °F ~ 302.0 °F

						NTC10K_B:6000: 6.0°C ~ 100.0°C, 42.8 °F ~ 212.0 °F
119 : Error code				RO	UNIT	Error Codes Corresponding to the Module: BIT 0: Module power supply abnormal BIT 2: Internal abnormal BIT 4: CH1 exceeds upper or lower limit BIT 5: CH2 exceeds upper or lower limit BIT 6: CH3 exceeds upper or lower limit BIT 7: CH4 exceeds upper or lower limit BIT 8: CH1 sensor open circuit BIT 9: CH2 sensor open circuit BIT 10: CH3 sensor open circuit BIT 11: CH4 sensor open circuit BIT 12: Failed factory production process
124 : CH1 Averaging Count	10	1	100	RW	UINT	1-100
125 : CH2 Averaging Count	10	1	100	RW	UINT	1-100
126 : CH3 Averaging Count	10	1	100	RW	UINT	1-100
127 : CH4 Averaging Count	10	1	100	RW	UINT	1-100
128 : CH1 Upper limit setting Count				RW	INT	The temperature range corresponding to the upper limit setpoint or lower limit units :0.1°C / 0.1°F.
129 : CH2 Upper limit setting Count				RW	INT	Pt100: -200°C ~ 850°C, -328 °F ~ 1562 °F Pt500: -200°C ~ 850°C,



130 : CH3 Upper limit setting Count				RW	INT	-328 °F ~ 1562 °F Pt1000: -200°C ~ 850°C, -328 °F ~ 1562 °F Cu100: -50°C ~ 150°C,
131 : CH4 Upper limit setting Count				RW	INT	-58 °F ~ 302 °F KTY84: 0°C ~ 200°C, 32 °F ~ 392 °F NTC5K_B:2000: -30°C ~ 200°C,
132 : CH1 Lower limit setting Count				RW	INT	-22 °F ~ 392 °F NTC5K_B:3950: -15°C ~ 100°C, 5 °F ~ 212 °F NTC5K_B:6000: 0°C ~ 100°C,
133 : CH2 Lower limit setting Count				RW	INT	32 °F ~ 212 °F NTC10K_B:2000: -25°C ~ 200°C, -13 °F ~ 392 °F NTC10K_B:3950: 0°C ~ 150°C,
134 : CH3 Lower limit setting Count				RW	INT	32 °F ~ 302 °F NTC10K_B:6000: 6°C ~ 100°C, 42.8 °F ~ 212 °F
135 : CH4 Lower limit setting Count				RW	INT	
136 : Temperature Units	0	0	1	RW	INT	Temperature Units for All Channels 0: Celsius (°C ) 1: Fahrenheit(°F)