# HMC S3 Series User Manual

Thank you very much for purchasing our controllers.

Please read this instruction manual carefully before installing, wiring, using, maintaining, and inspecting the product.

Please keep this manual in a safe place and deliver it to the end user.

# Statement

The contents of this user manual are subject to change without prior notice.

If you find any suspicion, error, or omission in the content of this user manual, please contact us to change it.

If there are any wrong or missing pages in this user manual, we will replace them for you.

HMC-S3 Series Controller User's Manual

Publisher     :   Guangzhou Auctech Automation Technology Limited

Headquarter:   Hongshi Business Building, SCI-TECH Industry Park, Baiyun District, Guangzhou city, PRC
Website: www.auctech.com.cn

Telephone   :   +86 020 8489 8493

# Change Log

| Revision | Description | Originator | Date |
|----------|-------------|------------|------|
| V1.0 | New Release | czm | 2022-08 |
| V1.1 | New HMC series controller related manual information sheet | czm | 2022-09 |
| V1.2 | New Product System Composition | czm | 2022-09 |
| V1.3 | Change image size | czm | 2022-10 |
| V1.4 | Add terminal cover schematic, change the definition of communication interface | czm | 2022-10 |
| V1.5 | Change data storage space value, replace HMC-S3-22N00 external dimensional drawing, change product nameplate description | czm | 2022-10 |
| V1.6 | Change the model's name and naming rules | czm | 2023-02 |
| V1.7 | Change the font of the entire manual | czm | 2023-03 |

HMC Series Controller Related Manuals

The following table shows the information, please select the manual according to your needs

| Number | Manual Name | Description |
|--------|-------------|-------------|
| 1 | HMC Series Controller and IO Unit Selection Manual | About the basic functions of controller products. |
| 2 | HMC Series Controller Software Getting Started Manual | Software acquisition, installation, getting started tutorial. |
| 3 | HMC S3 Series Controller User's Manual (This book) | Explanation on the basic use of S3 series controllers, etc. |
| 4 | HMC G300 Series Controller User Manual | About the basic use and functions of the G300 series controllers and other operating instructions. |
| 5 | HMC series controller programming basic instruction manual | Understanding of the concept and function of basic controller programming instructions. |
| 6 | HMC series controller motion control command manual | Understanding of basic concepts and functions of motion control commands. |

*Note: All the above information can be found on the official website: http://www.auctech.com.cn/下载.

# Table of Contents

# Section 1 Preface

Thank you for purchasing and using the HMC-S3-22N00 series industrial motion control PLC that developed and produced by Guangzhou Auctech Automation Technology Limited.

HMC-S3-22N00 controller complies with IEC61131-3 programming specification and supports 6 programming languages of PLCopen standard. Internal integration of USB, RS485, Ethernet, CAN, and other common industrial control interfaces. HMC-S3-22N00 unit supports EtherCAT, MODBUS-TCP, CANopen, RS485, etc. for remote rack expansion and more I/O points.

This manual mainly describes the specifications, parameters, and usage of this product, etc. Please read this manual carefully before use for safer use of this product.

# Section 2 Safety Precautions

## ■ Safety instructions

- Please read and follow these safety precautions when installing, operating, or maintaining the product.
- For personal and equipment safety, please follow all safety precautions described in the markings and manuals on the product when installing, operating, and maintaining the product.
- The "Caution", "Warning" and "Danger" items in the manual do not represent all safety precautions to be observed, but only in addition to all other safety precautions.
- This product should be used in an environment that meets design specifications, otherwise it may cause a malfunction due to failure to comply with the relevant safety precautions.
- The product quality warranty does not cover abnormal function or damage to parts caused by the regulations.
- We will not bear any legal responsibility for personal safety accidents and property damage caused by illegal operation of the product.

| Security Level Definition | |
|---|---|
| ⚠️ **Danger** | Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there maybe severe property damage. |
| ⚠️ **Caution** | If not used in accordance with the regulations, may cause fires, serious personal injury, or even death! |
| ⚠️ **Warning** | Failure to use in accordance with the regulations may result in moderate personal injury or minor injury, as well as the occurrence of equipment damage! |

| When products arrive and are stored | |
|---|---|
| ⚠️ **Warning** | • If the product and product accessories are damaged when opening the box, please do not install them and contact our company or your supplier immediately.<br>• Check carefully whether the arriving product and the ordered product model match, and whether the product and product accessories are included. |
| ⚠️ **Caution** | • Do not stack multiple of this product on top of each other as this may cause injury or malfunction.<br>• Do not store in places exposed to direct sunlight, places where the ambient temperature exceeds the temperature conditions for storage, places where the relative humidity exceeds the humidity condition for storage, places where there is a large temperature difference, places where there is high condensation, places near corrosive gases, places where there are flammable gases, places where there is a large amount of dust, dirt, salt or metal dust, places where water, oil or medicine drip, places where vibration or shock can affect the main body of product; otherwise it can lead to fire, Electric shock or machine damage. |

| | • Do not hold the cable or motor shaft for weight holding, as this may result in injury or malfunction. |
|---|---|

| **When designing the system** | |
|---|---|
| ⚠️ **Danger** | • If the rated load of current is exceeded or the load is short-circuited for a long period of time resulting in over-current, the product may start smoking or catch fire.<br>• Safety devices such as fuses, or circuit breakers should be set externally. |
| ⚠️ **Warning** | • Be sure to design safety circuits to ensure that the product system will still work safely if the external power supply is lost, or the product fails.<br>• For safe operation of the equipment, please design external protection circuits and safety mechanisms for output signals related to major accidents. |
| ⚠️ **Caution** | • Be sure to install emergency brake circuits, protection circuits, interlock circuits for forward and reverse operation, and position upper and lower limit interlock switches to prevent damage to the machine in the external circuit of the product.<br>• The product may shut down all outputs after detecting abnormalities in its own system; when part of the controller circuit fails, it may cause its output to be uncontrolled. To ensure normal operation, a suitable external control circuit needs to be designed.<br>• If the output unit such as relay or transistor of the product is damaged, the output will not be controlled to the ON or OFF state.<br>• The product is designed to be used in indoor, overvoltage class II electrical environments, and its power system level should have lightning protection devices to ensure that lightning overvoltage is not applied to the product's power input or signal input, control output and other ports to avoid damage to equipment. |

| **When the product is installed** | |
|---|---|
| ⚠️ **Danger** | • Only maintenance professionals with adequate electrical knowledge and training related to electrical equipment should install this product.<br>• For the product with open equipment, please install in the control cabinet with door lock (product cabinet shell protection > IP20), only operators with sufficient electrical knowledge and training related to electrical equipment can open the product cabinet. |
| ⚠️ **Warning** | • When disassembling the product, the external power supply used for the system must be completely disconnected before performing the operation. Failure to disconnect all power supplies may result in electric shock or product failure and malfunction.<br>• While dissembling the product, the power and the power indicator must be turned off for at least 5 minutes, before disassembling the driver. Otherwise, the residual voltage may cause electric shock.<br>• Do not use the product in the following places: places with dust, oil fumes, conductive dust, corrosive gases, combustible gases; places exposed to high temperature, condensation, wind, and rain; places with vibration and shock. Electric shock, fire, and misuse can also cause damage and deterioration of the product! |
| ⚠️ **Caution** | • Avoid metal shavings and wire tips falling into the ventilation holes of the product during installation, this may cause fire, malfunction, and misoperation. |

| | • After installation, ensure that there is no foreign matter on the ventilation surfaces, otherwise it may lead to poor heat dissipation and cause fire, malfunction and misoperation.<br>• When installing, make a tight connection to the respective connector and lock the product connection hook firmly. If the products are not installed properly, it may lead to misoperation, malfunction and dislodgement. |
|---|---|

| **When wiring products** ||
|---|---|
| ⚠️<br>**Danger** | • Only maintenance professionals with adequate electrical knowledge and training related to electrical equipment should perform the wiring of this product. |
| ⚠️<br>**Warning** | • During wiring operations, the external supply power used by the system must be completely disconnected before operation. Failure to disconnect all of them may result in electric shock or equipment malfunction or misoperation.<br>• When powering up and running after the wiring operation, the terminal cover that comes with the product must be installed. Failure to install the terminal cover may result in electric shock.<br>• Check the type of interface to be connected before connecting the cable correctly. If the wrong interface is connected or the wiring is incorrect, it may cause the product or external equipment to malfunction.<br>• The cable terminals should be well insulated to ensure that the insulation distance between the cables is not reduced after the cables are installed to the terminal block. Otherwise, it will lead to electric shock or equipment damage.<br>• Avoid metal shavings and wire tips falling into the ventilation holes of the controller when wiring, which may cause fire, malfunction, and misoperation!<br>• The bolts on the terminal blocks should be tightened within the specified torque range. Untightened terminal bolts may result in short circuit, fire, or malfunction. Over-tightening the bolts may damage the bolts and the product, resulting in dislodgement, short circuit, fire, or false operation. |
| ⚠️<br>**Caution** | • The specification and installation method of the external wiring of the equipment should meet the requirements of local power distribution regulations.<br>• To ensure the safety of the equipment and the operator, the equipment needs to be reliably grounded using cables of sufficient wire size.<br>• For connections using connectors and external devices, press fit, crimp, or properly solder using the tool specified by the manufacturer. A poor connection may result in a short circuit, fire, or malfunction.<br>• If the product is labeled to prevent foreign objects from entering the product during wiring, such as the wiring head. Do not remove this label during wiring operations. Before starting system operation, be sure to remove the label to facilitate heat dissipation.<br>• Please do not bundle the control and communication cables with the main circuit or power supply cables, etc. The alignment should be more than 100mm apart, otherwise the noise may lead to misoperation.<br>• For applications with serious interference, please use shielded cables for input or output of high frequency signals to improve the system's anti-interference capability. |

| **Before powering on the product** |
|---|
| |

| ⚠️ **Danger** | • Before powering on, please make sure the product is well installed, wired firmly and the motor unit is allowed to restart.<br>• Before powering on, please confirm that the power supply meets the product requirements to avoid causing damage to the product or starting a fire.<br>• It is strictly forbidden to open the product cabinet door or product protective cover, touch any terminals of the product, disassemble any device or parts of the product in the energized state, otherwise there is a risk of electric shock.<br>• Make sure that no one is around the product, the motor, or the machinery before powering it on, as this may result in injury or death! |
|---|---|
| ⚠️ **Warning** | • After the wiring operation and parameter setting are completed, please conduct a test run of the machine to confirm that it can operate safely, otherwise it may lead to injury or equipment damage!<br>• Before powering on, please make sure that the rated voltage of the product is the same as the power supply voltage. If the power supply voltage is used incorrectly, there is a risk of fire! |

| **When operating and maintaining** | |
|---|---|
| ⚠️ **Danger** | • Only maintenance professionals with adequate electrical knowledge and training on electrical equipment can perform the operation and maintenance of the products.<br>• Do not touch the terminals when the power is on, as this may cause electric shock or malfunction.<br>• When the motor or equipment is running, please never touch its rotating parts, otherwise it may lead to serious personal safety accidents. |
| ⚠️ **Warning** | • When cleaning the product or retightening the bolts on the terminal block or the connector mounting bolts, the external supply power used by the system must be completely disconnected. Failure to do so may result in electric shock.<br>• When disassembling the product or connecting or removing the communication cable, the external supply power used by the system must be completely disconnected first. Failure to disconnect all of them may result in electric shock or false operation.<br>• While dissembling the product, the power and the power indicator must be turned off for at least 5 minutes, before disassembling the driver. Otherwise, the residual voltage may cause electric shock. |
| ⚠️ **Caution** | • For online modification, forced output, RUN, STOP, etc., you must read the user's manual and confirm its safety before performing the relevant operations.<br>• Be sure to disconnect the power before loading and unloading expansion cards, modules, and other components! |

| **When the product is scrapped** | |
|---|---|
| ⚠️ **Caution** | • Please dispose of them as industrial waste; when disposing of batteries, do so separately according to the ordinances established by each region to avoid property damage or human injury!<br>• End-of-life products should be treated and recycled in accordance with industrial waste treatment standards to avoid polluting the environment. |

# Section 3 Product Information

HMC-S3 series is a medium-sized programmable controller with modular structure design. Each rack supports local expansion of 16 expansion units and remote expansion of the rack through various industrial fieldbuses such as EtherCAT and CANopen. The local expansion units can be expanded through internal bus protocols, and support digital input/output units, analog input/output units, temperature units and remote function units. Among them, the analog input/output unit adopts 16-bit resolution conversion chip to further improve the signal conversion accuracy. The motion control function is realized through EtherCAT bus, the 2ms execution cycle supports 16-axis motion control with single-axis acceleration/deceleration control function electronic gear function and electronic cam function.

## 3.1   Product System Composition

● **The following three accessories are required to form a properly functioning motion control system:**

1)   Power supply part: HMC-S3-22N00 power supply requires the use of internal mutually isolated dual 24V power supply or the use of two independent 24V power supplies and requires the power supply current to be greater than 2.7A/way.

2)   The HMC-S3-22N00 is the core component of the system and is the management and control center of the whole system. See subsection 3.1.1 for a description of the relevant functions.
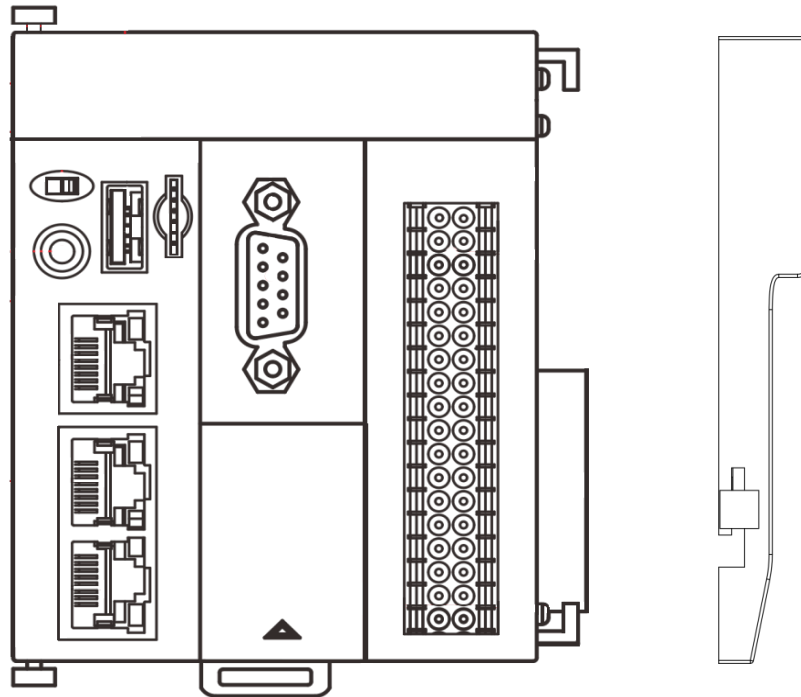


HMC-S3-22N00 diagram TK6-END terminal cover diagram

Note: This model controller 1:1 is equipped with terminal cover plate (TK6-END), please keep it properly. When there is only the controller at the application site, the terminal cover plate should be installed on the right side of the controller. If there is an expansion unit installed on the right side of the controller, the terminal cover plate should be installed on the right side of the last expansion unit, otherwise the expansion IO cannot be used normally.

3)   Rail: HMC-S3 series products are designed with modular structure, the controller and other expansion units are installed on the rail and then fixed to the corresponding fixed plane.

Note: Please use DIN35 standard guide, complete shape, no insulating paint, good conductivity, this accessory can be purchased by the user. (Please refer to subsection 4.2 for specific installation)

4) Based on the above products, users can continue to select the appropriate type of expansion units according to their needs to build a local control system or a remote-control system that meets their requirements. Please refer to section 3.1.2 for local expansion units and section 3.1.3 for remote expansion units. For the specific wiring of each unit before use, please refer to the user manual of the relevant product.

# 3.1.1 HMC-S3-22N00 Function Introduction

| Controller Model | HMC-S3-22N00 | |
|---|---|---|
| Number of local expansion units | 16 | |
| Program storage space | 4GB | |
| Data storage space | 2MB+512KB (power-down hold) | |
| Number of motion control axes | 16 axes (2ms execution cycle) | |
| Communication | RS485 | √ |
| | LAN | √ |
| | EtherCAT | √ |
| | CANopen | √ |
| | Modbus TCP | √ |

● **Description of each communication port of the controller**

| Controller communication port | Communication protocols | Connections | Application Notes | Matching Unit |
|---|---|---|---|---|
| LAN1/LAN2/ ECAT | Ethernet/EtherCAT | CAT5E Cable | 2-way independent 10/100 (LAN2/ECAT) 1 100M/1000Mbps (LAN1) adaptive Ethernet interface: LAN1:192.168.1.91, LAN2:192.168.2.92. Supports Ethernet (Modbus TCP) protocol. Support EtherCAT protocol. | TM6-ECT-32DM-N TM6-ECT-4HC TM6-ECT-2PM |

| DB9 | MODBUS-RTU/CANopen | DB9 | RS485 interface, support Modbus protocol CAN interface, support CANopen protocol Standard 3-channel RS485, 1-way CAN; | _ |
| USB | - | Mini USB | On-site maintenance and debugging (other functions can be customized according to user requirements, such as USB expansion | _ |

# 3.1.2 Local Expansion Unit

● **Dimensional drawing**
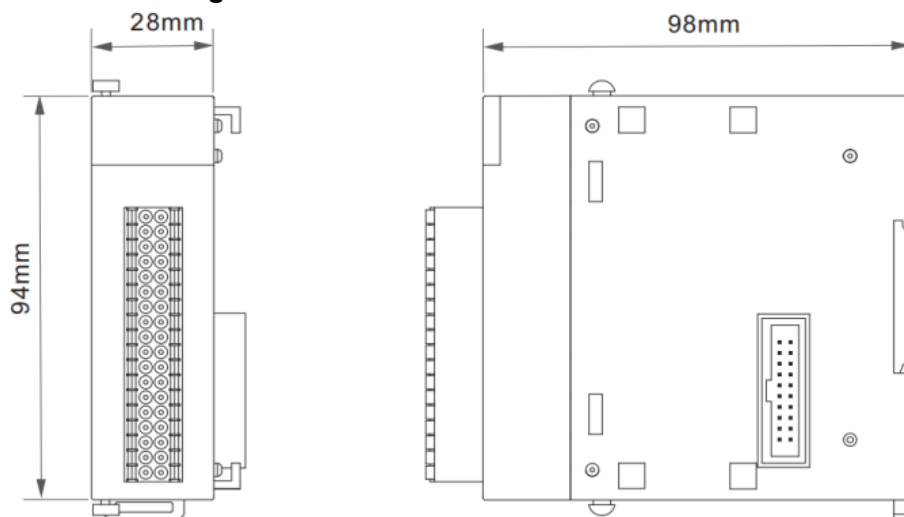
● **Function Introduction**

| Model | Type | Product description |
|---|---|---|
| TK6-16DI* | Digital Unit | TK6 series; 16-channel digital input unit. |
| TK6-8DO-R* | | TK6 series; 8-channel digital output unit, relay type. |
| TK6-16DO-N* | | TK6 series; 16-channel digital output unit, NPN transistor type. |
| TK6-16DO-P | | TK6 series; 16-channel digital output unit, PNP transistor type. |
| TK6-16DM-N* | | TK6 series; 8-way DI+8 way DO unit, NPN transistor type. |
| TK6-32DI | | TK6 series; 32-way digital input unit. |
| TK6-16DO-R | | TK6 series; 16-channel digital output unit; relay type. |
| TK6-32DO-N | | TK6 series; 32-channel digital output unit; NPN transistor type. |
| TK6-32DO-P | | TK6 series; 32-channel digital output unit; PNP transistor type. |
| TK6-32DM-N | | TK6 series; 16-way DI+16 way DO unit; NPN transistor type. |
| TK6-8HAI-C | Analog Unit | TK6 series; 8-way analog high precision input unit; 16-bit high precision; current input. |
| TK6-8HAI-V | | TK6 series; 8-way analog high precision input unit; 16-bit high precision; voltage input. |
| TK6-8HAO-V | | TK6 series; 8-way analog high-precision output unit; 16-bit precision; voltage input |
| TK6-4HAI-C | | TK6 series; 4-way analog high precision input unit; 16-bit high precision; current input. |
| TK6-4HAO-V | | TK6 series; 4-way analog high-precision output unit; 16-bit precision; voltage input |
| TK6-8HAI-B | | TK6 series; 8-way analog high-precision input unit; 16-bit precision; voltage or current, ±10V or 0~20mA; |
| TK6-4HAO-B* | | TK6 series; 4-way analog high-precision output unit; 16-bit precision; voltage or current, ±10V or 0~20mA; |
| TK6-8HAO-B | | TK6 series; 8-way analog high-precision output unit; 16-bit precision; voltage or current, ±10V or 0~20mA; |
| TK6-8HAO-C | | TK6 series; 8-channel analog high-precision output unit; 16-bit precision; current input; 4-20mA/0-20mA; |
| TK6-4HAI-B* | | TK6 series; 4-way analog high-precision input unit; 16-bit precision; voltage or current, 4-20mA/0-20mA/±10VDC; |
| TK6-4PT | Temperature measurement unit | TK6 series; 4-way analog RTD unit; 24-bit resolution; PT100, PT1000, etc; |
| TK6-8PT* | | TK6 series; 8-way analog RTD unit; 24-bit resolution; PT100, PT1000, etc; |
| TK6-4JK | | TK6 series; 4-way analog thermocouple unit; 24-bit resolution; J, K, etc; |

Note: *For products under planning, please contact AUCTECH for details.

● **Software Function Description**

| Number | Function | Description |
|---|---|---|
| 1 | Power-down hold function | Power-down hold function without calling the power-down hold library. |
| 2 | System time function | If there is no battery in the controller, the system time restores the initial time after power failure and restart. |

## 3.1.3 Remote expansion unit

- **External dimensional drawing**
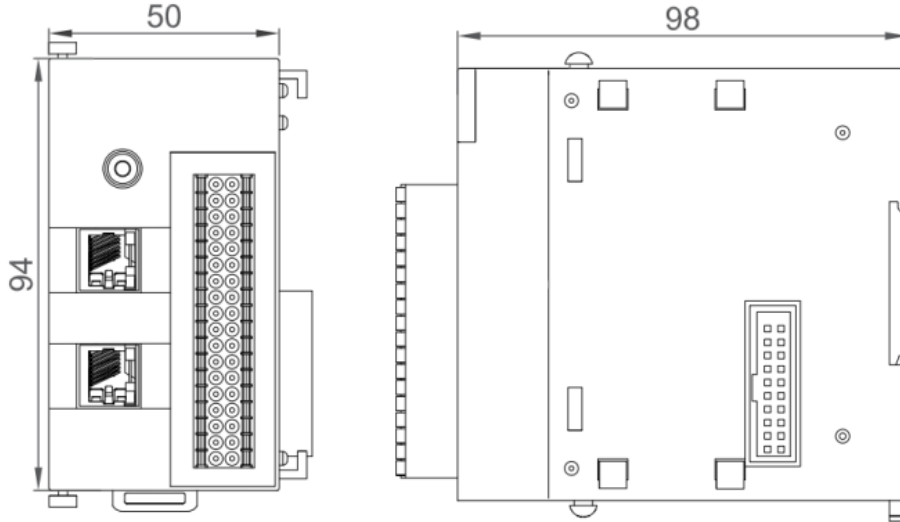


- **Function Introduction**

| Model | Type | Product description |
|---|---|---|
| TM6-ECT-32DM-N | Coupler Unit | TM6 series; 32 digital input/output unit; EtherCAT bus; 2 RJ45 communication ports; expandable by 32 units; 24VDC power supply; 16 digital inputs (source/drain inputs), 16 digital outputs (NPN transistors) |
| TM6-ECT-2PM* | | TM6 series; EtherCAT bus; 24VDC power supply; 2-axis pulse output, single-ended (NPN output up to 500KHZ) |
| TM6-ECT-4HC | | TM6 series; EtherCAT bus; 2 RJ45 communication ports; 24VDC power supply, rotary encoder (AB phase), pulse + direction (single-ended, max. 200KHZ) |
| TM6-ECT-4PM | | TM6 series; EtherCAT bus; 2 RJ45 communication ports; 24VDC power supply; 4-axis pulse output, single-ended (NPN output up to 500KHZ) or differential (output up to 500KHZ) |
| TM6-ECT-3COM* | | TM6 series; EtherCAT bus; 3 RJ45 communication ports; 24VDC power supply; 3 RS485 interfaces, support Modbus RTU and free port protocol |

Note: *For products under planning, please contact AUCTECH for details.

# 3.2    Naming Rules

HMC  -  S   3   -   2   2   n   00

**Servo Controller**

**Controller structure**

X x86 book-based controller

S ARM Template-based Controller

P Panel type controller

I Industrial control machine

**Controller Series**

3 3 Series

4 4 Series

5 5 Series

6 6 Series

**Specific models**

0 S3 model: Standard model with common IO input and output

1 S31 model: with 2-channel AI, 1-channel AO

**Software Features**

00 Standard functions

**Polarity**

N NPN

P PNP

**Number of DO**

0 0*8 way DO

1 1*8 way DO

2 2*8 way DO

**Number of DI**

0 0*8-way DI

1 1*8-way DI

2 2*8-way DI

Note: The naming rules are only for model number analysis, and cannot be

# 3.3    Product nameplate description
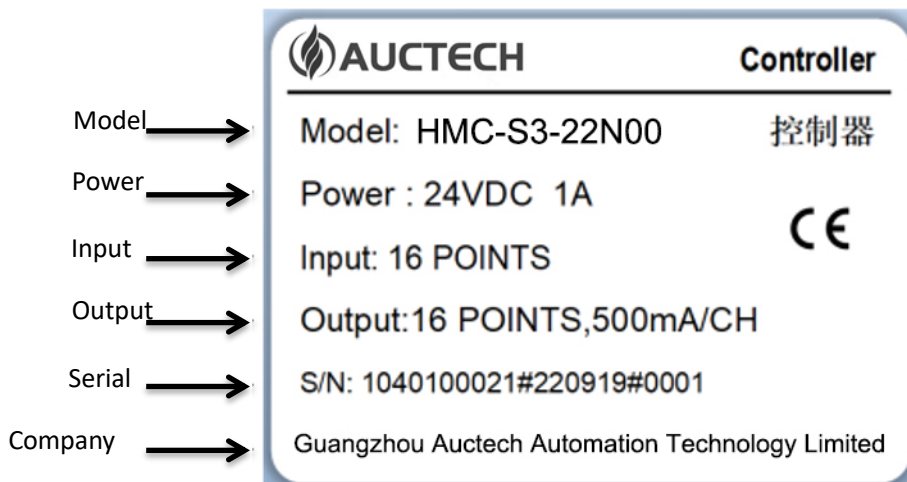
## 3.4   Specification parameters

| Model | | | HMC-S3-22N00 |
|---|---|---|---|
| **Processor main frequency** | | | 4 cores*1.2GHZ |
| **Memory** | For programs | | 4GByte |
| | For data | | 2MB+512K (2MB power down hold) |
| | Expandable memory | | 32G, pluggable SD card |
| **Storage** | Nand Flash permanent storage, no battery backup required | | |
| **Programming** | IEC61131-3 programming languages (LD, FBD, IL, ST, SFC, CFC) | | |
| **Program execution** | Compile and execute | | |
| **Instruction processing** | 4ns/basic instruction | | |
| **Maximum capacity of IO points** | Digital channels | | 131072 |
| | Analog channels | | 32768 |
| **Communication Interface** | Serial Interface | RS485 | 3-way RS485, 9-pins D-type connector (hole type), free port protocol support, Modbus RTU/ASCII master/slave protocol |
| | Network Interface | CAN | 1 way, 9-pins D-type connector (hole type), CANopen protocol support |
| | | Modbus TCP/EtherCAT | 1 CAN independent 10/100M, 1 100M/1000Mbps adaptive Ethernet interface, configurable as Modbus TCP/EtherCAT according to configuration |
| **Local IO parameters** | Number of channels | | 16-channels input 16-channels output |
| | Input | ON Current | 5mA |
| | | Input Impedance | 3.3kΩ |
| | | ON state voltage | 13-30V |
| | Output | Maximum load current | 0.5A/channel |
| | | Voltage output range | 12-32V |

| **EtherCAT Parameters** | Support Services | | CoE (PDO, SDO) | | |
|---|---|---|---|---|---|
| | Camshaft (contains both real and imaginary shafts) | | Execution cycle (ms) | Axes (pcs) | Description |
| | | | 2 | 16 | |
| | Synchronization method | | Servo with DC-distributed clock, IO with input-output synchronization | | |
| | Physical Layer | | 100BASE-TX | | |
| | Speed | | 100Mbit/s(100BASE-TX) | | |
| | Duplex method | | Full Duplex | | |
| | Number of slave stations | | Up to 125 units | | |
| | EtherCAT Frame Length | | 44 bytes~1498 bytes | | |

| Model | | HMC-S3-22N00 |
|---|---|---|
| | Process Data | Single Ethernet frame up to 1486 bytes |
| | Transmission distance | Less than 100M between two nodes |
| Parameter Configuration | Web-based configuration of network information | |
| Supply voltage | 24VDC (-15% to 20%) for both groups | |
| Current consumption | 500mA@24VDC | |

## 3.5  Product Structure
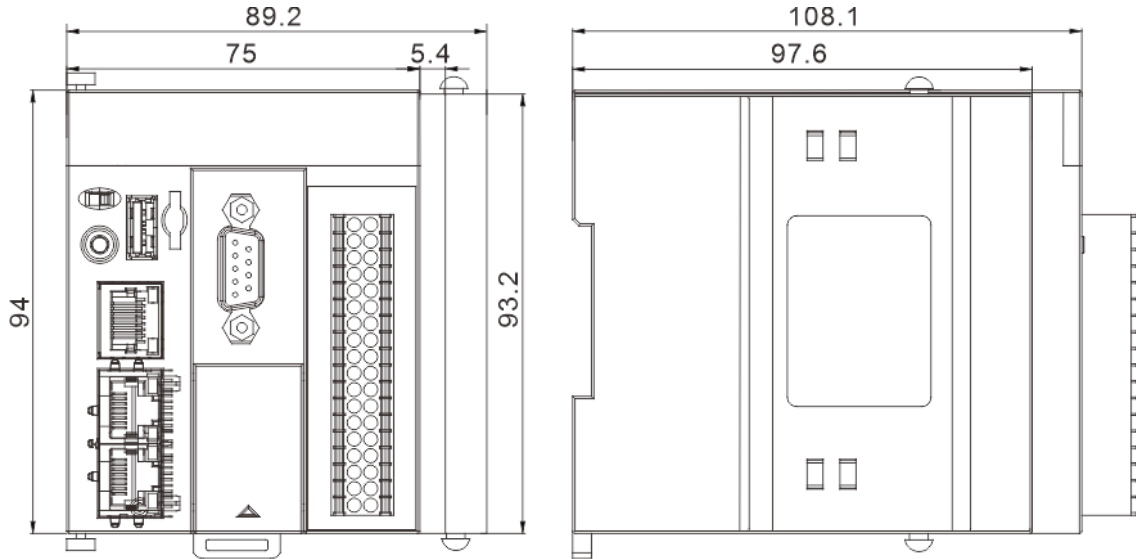


Figure 1 HMC-S3-22N00 external dimensional drawing

## 3.6  Interface Introduction and Definition

## 3.6.1 Interface Introduction

（1）USB interface
(2) Digital tube indication
(3) RUN/STOP switch
(4) Multi-functional keys
(5) SD card slot
(6) Ethernet/EtherCAT interface
(7) Ethernet/EtherCAT interface
(8) Ethernet/EtherCAT interface
(9) LED indicator
(10) DB9-RS485, CAN interface
(11) Local IO terminals
(12) Backplane bus interface
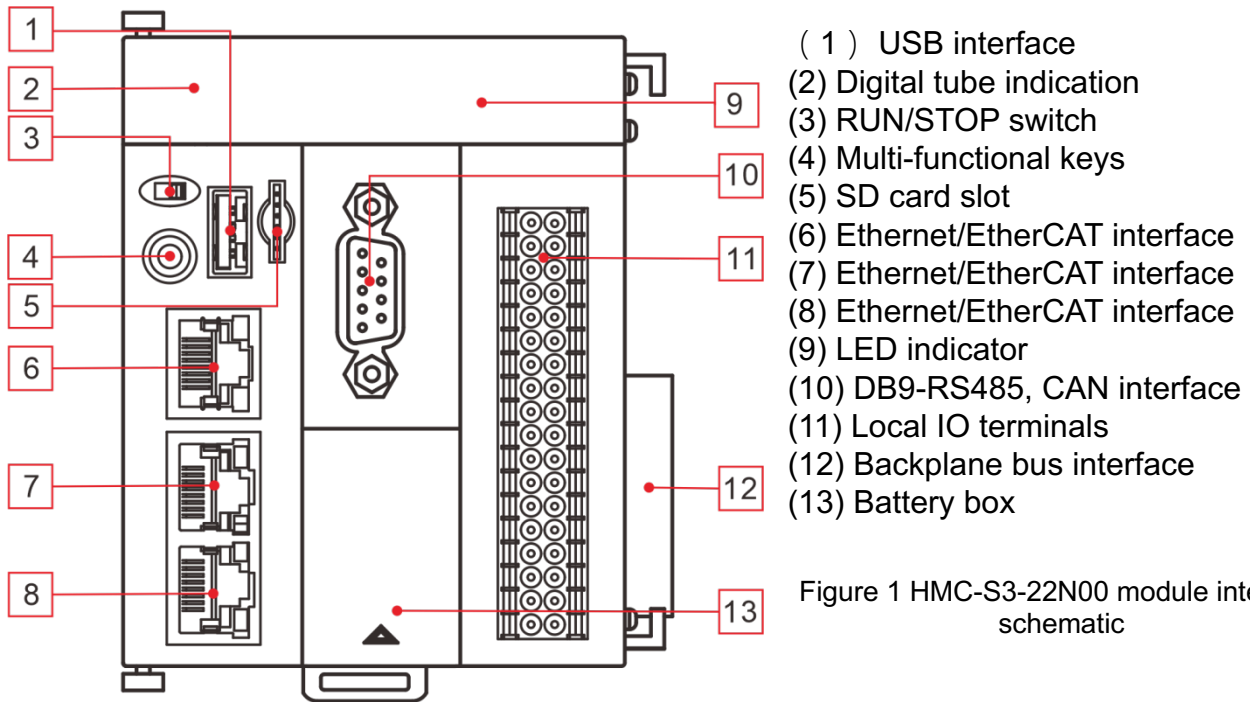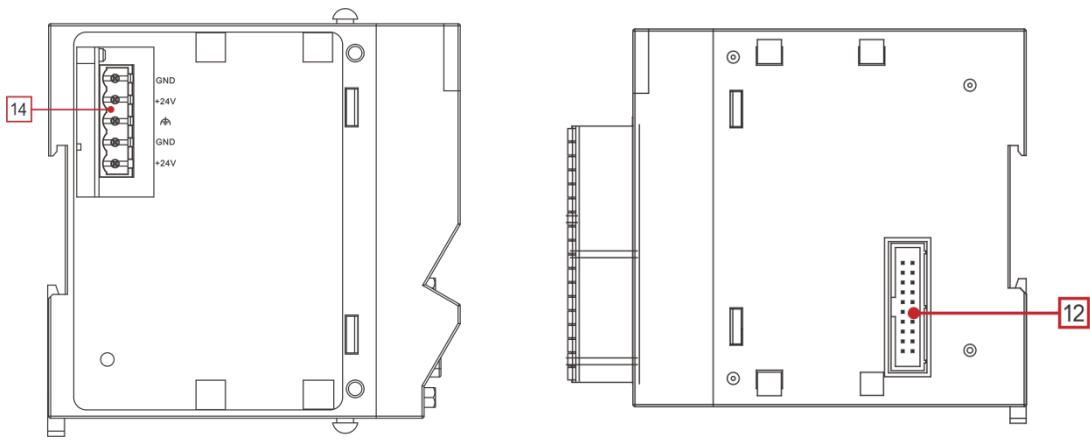(13) Battery box

Figure 1 HMC-S3-22N00 module interface schematic



(14) Power supply interface (12) Backplane bus interface
Figure 2    HMC-S3-22N00 module interface schematic

## 3.6.2 Interface Definition

| Number | Interface Name | Function Definition |
|---|---|---|
| 6~8 | Ethernet/EtherCAT interfaces (LAN1, LAN2, ECAT) | 2 independent 10/100 (LAN2/ECAT). 1 x 100M/1000Mbps (LAN1) adaptive Ethernet interface. LAN1:192.168.1.92, LAN2:192.168.2.92. Supports Ethernet (Modbus TCP) protocol. Support EtherCAT protocol. |
| 10 | DB9-RS485, CAN | RS485 interface, support Modbus protocol CAN interface, support CANopen protocol 3-channel RS485, 1-channel CAN as standard; |
| 1 | USB interface | On-site maintenance and debugging (other functions can be customized according to user requirements, such as USB expansion NIC, USB Wi-Fi module, USB authorization module, etc.) |
| 3 | Dipswitch | RUN/STOP switch |
| 5 | SD card slot | Expandable up to 32G SD card, SD card for firmware |

| | | update, application, and data storage |
|---|---|---|
| 4 | MFK Button | Multi-functional keys |
| 2 | Digital tube | Display of operating status and fault information (refer to Table 6 for details) |
| 12 | Backplane bus interface | Expandable with up to 16 IO modules when adapted to TK6 series IO |
| 11 | Local IO terminal block | Local IO input and output wiring (refer to Table 7 for detailed terminal definitions) |
| 14 | Power supply interface | Dual 24VDC power inputs |

● Description of the power supply interface

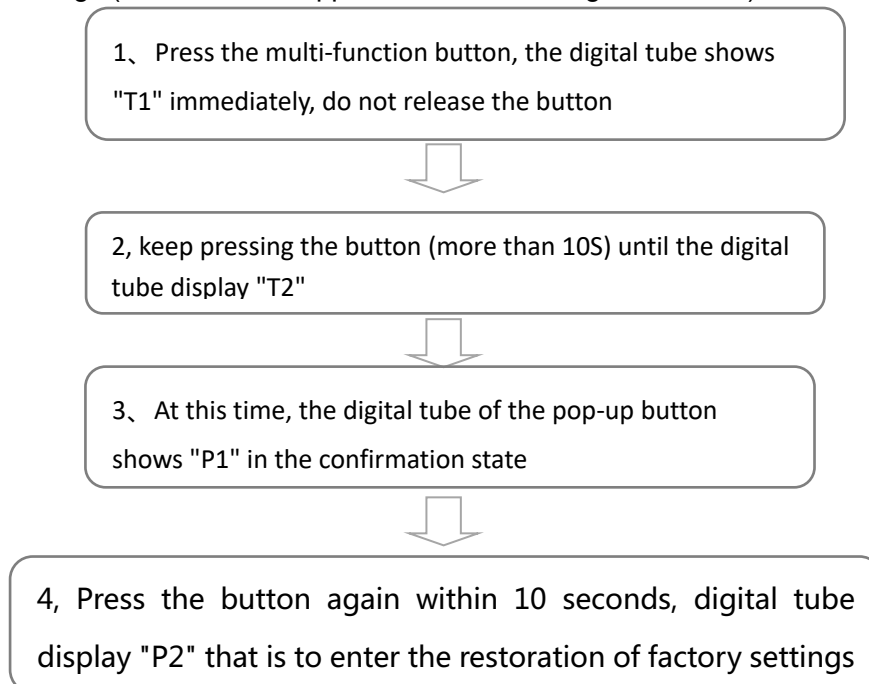| Number | Name | Type | Function | Remarks |
|---|---|---|---|---|
| 14 | GND | Input | DC input ground | Body output IO and expansion module power supply |
| | +24V | Input | 24V DC input | |
| | ⏚ | - | Functional ground (connection system housing) | - |
| | GND | Input | DC input ground | Controller body power supply |
| | +24V | Input | 24V DC input | |

# 3.6.3 Interface Function Introduction

● RUN/STOP switch

Run or stop runtime by switch to facilitate the operation of individual IO points on site via web page to judge whether IO points are normal or not.

● MFK Button

Restore factory settings (IP reset, clear applications, user configuration, etc.)

```
┌─────────────────────────────────────────────────────┐
│ 1、Press the multi-function button, the digital tube shows │
│ "T1" immediately, do not release the button          │
└─────────────────────────────────────────────────────┘
                         ⇩
┌─────────────────────────────────────────────────────┐
│ 2, keep pressing the button (more than 10S) until the digital │
│ tube display "T2"                                    │
└─────────────────────────────────────────────────────┘
                         ⇩
┌─────────────────────────────────────────────────────┐
│ 3、At this time, the digital tube of the pop-up button │
│ shows "P1" in the confirmation state                 │
└─────────────────────────────────────────────────────┘
                         ⇩
┌─────────────────────────────────────────────────────┐
│ 4, Press the button again within 10 seconds, digital tube │
│ display "P2" that is to enter the restoration of factory settings │
└─────────────────────────────────────────────────────┘
                         ⇩
```

> 5、Power off and reboot the system

After restoring the factory settings, the network information is: LAN1: IP 192.168.1.92, mask 255.255.255.0 gateway 192.168.1.1, LAN2: IP 192.168.2.92, mask 255.255.255.0 gateway 192.168.2.1, ECAT: no IP, the system will automatically reboot).

● LAN1, LAN2, ECAT function description
It can be configured as Ethernet or EtherCAT according to the configuration; in Ethernet mode, it supports Modbus TCP/IP master/slave protocol for program download and debugging, extending remote racks, and connecting to other industrial configuration systems, etc.; in EtherCAT mode, it is used to extend racks or remote EtherCAT IO modules and third-party EtherCAT operating mode is used to extend racks or remote EtherCAT IO modules and third-party EtherCAT slave devices.

● LED indicator function description

| Indicator light | Function | Status | Meaning |
|---|---|---|---|
| PWR | Power supply indication | Always bright | Normal power supply |
| | | extinguish | No power supply |
| RUN | Program operation instructions | Always bright | The program is running properly |
| | | extinguish | Program stops running |
| ERR | Error indication | Always bright | Error |
| | | extinguish | Normal |
| 0...F | The previous group 0...F identifies 0...15DI inputs; the next group 0...F identifies 0...15DO outputs; | Always bright | Channel has input/output |
| | | extinguish | Channel has not input/output |

● (RS485, CAN) port definition description
DB9 adopts standard DB9 female connector, supports 1 CAN interface and 3 RS485 interfaces, refer to Figure 4 for interface pin definition.
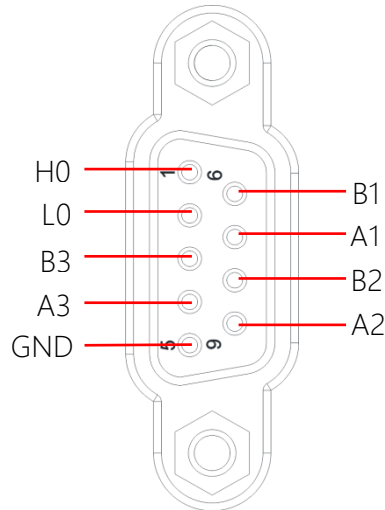
Figure 3    DB9 Port Definition

| Name | Corresponding CPU hardware ports | Name | Corresponding CPU hardware ports |
|---|---|---|---|
| H0, L0 | CAN1 | A1, B1 | Serial port 1 |
| B3, A3 | Serial port 3 | A2, B2 | Serial port 2 |

## 3.7    Digital tube indication definition

| Digital tube display | Meaning | Countermeasures |
|---|---|---|
| 01 .. 80 | Rack error, 01 means local rack error, extended rack by configuration and so on | Find the corresponding error rack, you can check the subsequent error code to find the error type of the rack. For specific errors, further check the information on the digital tube of the error rack |
| 81 | Initialization rack error | Check whether the hardware connection of the rack is normal, whether the relevant configuration of the rack is correct, specific errors need to further check the information on the digital tube of the wrong rack |
| 82 | Rack internal error | Check whether the rack is working properly, specific errors need to further check the information on the digital tube of the error rack |
| 83 | Configuration mismatch | Check that the configuration of the rack and the modules on the rack are consistent with the background configuration |
| 84 | Setting module parameter error | Check whether the rack is working properly, confirm whether the module connection is normal and whether the module is damaged |
| 85 | Error getting hardware configuration information | Check whether the rack is working properly and whether the module is broken |
| 86 | Update module output data error | Check whether the rack is working properly and whether the module is broken |

| | | |
|---|---|---|
| 87 | Update module input data error | Check whether the rack is working properly and whether the module is connected properly |
| 88 | Sending rack command data error | Check if the rack is working properly and check if the rack configuration is correct |
| 89 | Remote rack disconnection | Check if the rack is working properly and check if the network connection is normal |
| 8A | Remote rack with IP duplication | Check whether the rack configuration is correct, you can further view the information on the error rack digital tube |
| C1 | EtherCAT Slave Error | Check whether the hardware link of the slave is properly connected, and after locking the wrong slave, you can check the digital tube error message on the slave to analyze the specific error |
| C2 | EtherCAT slave stops running | Check whether the hardware link of the slave is properly connected, and after locking the wrong slave, you can check the digital tube error message on the slave to analyze the specific error |
| 3C | EtherCAT slaves have valid diagnostic information | Check whether the hardware link of the slave is properly connected, and after locking the wrong slave, you can check the digital tube error message |
| 5A | PLC programs stop | PLC program is in stop state, pending start |
| 5B | PLC program exception | Check the program for exceptions such as divide by zero or null pointer |

Note: The word code displayed by the digital tube indicates the hexadecimal error code.

# 3.8   Local IO terminal definition and wiring

## 3.8.1 Local IO Interface Definition

| Terminal number | Function | Terminal number | Function | Remarks |
|---|---|---|---|---|
| I0 | Input (IN0) | I1 | Input (IN1) | |
| I2 | Input (IN2) | I3 | Input (IN3) | |
| I4 | Input (IN4) | I5 | Input (IN5) | |
| I6 | Input (IN6) | I7 | Input (IN7) | |
| I8 | Input (IN8) | I9 | Input (IN9) | |
| IA | Input (IN10) | IB | Input (IN11) | |
| IC | Input (IN12) | ID | Input (IN13) | |
| IE | Input (IN14) | IF | Input (IN15) | |
| C0 | Input Common | C0 | Input Common | |
| Q0 | 0V output (OUT0) | Q1 | 0V output (OUT1) | |
| Q2 | 0V output (OUT2) | Q3 | 0V output (OUT3) | |
| Q4 | 0V output (OUT4) | Q5 | 0V output (OUT5) | |

| Q6 | 0V output (OUT6) | Q7 | 0V output (OUT7) | |
| Q 8 | 0V output (OUT8) | Q9 | 0V output (OUT9) | |
| QA | 0V output (OUT10) | QB | 0V output (OUT11) | |
| QC | 0V output (OUT12) | QD | 0V output (OUT13) | |
| QE | 0V output (OUT14) | QF | 0V output (OUT15) | |
| C1 | Output common (connected to 0V) | C1 | Output common (connected to 0V) | |

## 3.8.2 Wiring Diagram
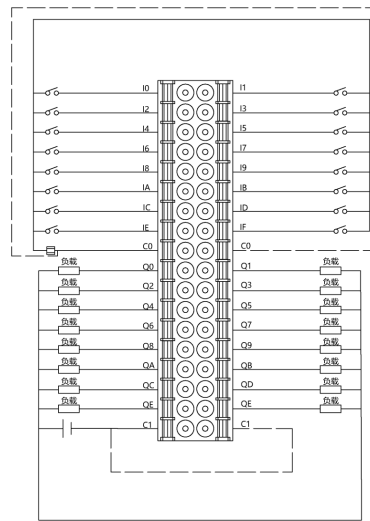


## 3.8.3 Input IO wiring diagram
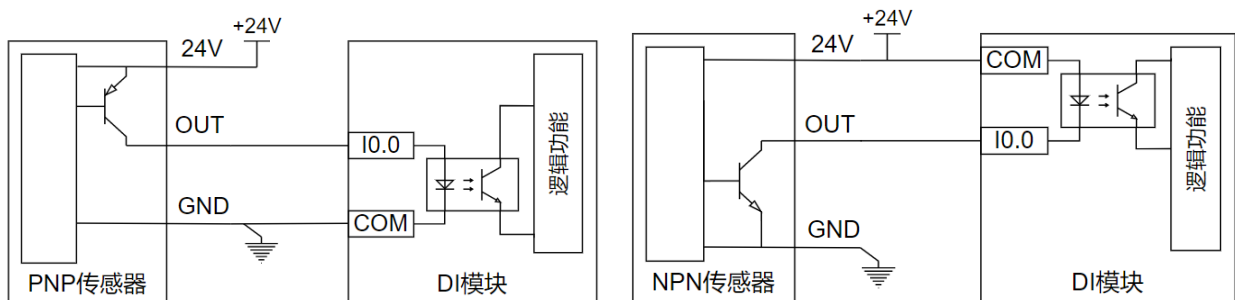


Note: The body IO is NPN drain type output, and the controller field bus power terminal needs to be connected to 24V power supply. Output IO can be set to hold and non-hold switching

● If "Update when stop" is checked, the output behavior is "Keep current value", the output IO signal will remain true when the program stops; the output behavior is "Set all outputs to default ", when the program stops, the output IO signal will be reset back to false.
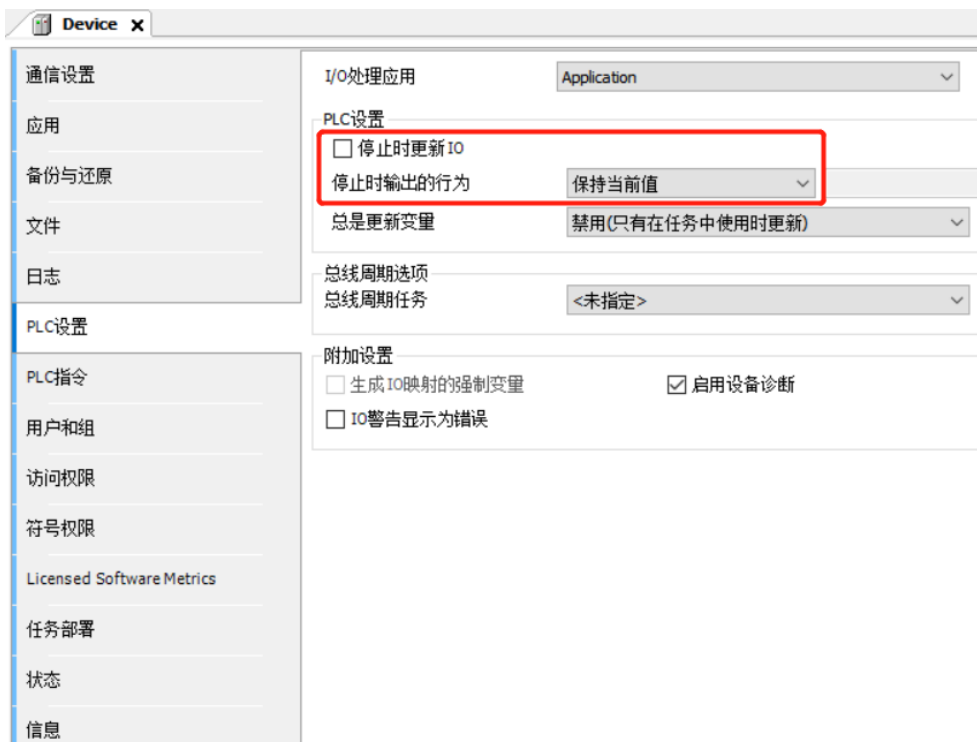
# Section 4 Unit Connection

The S3 series provides a complete range of product units and series, and each unit can be seamlessly connected to each other, simplifying the process of project implementation and use.

## 4.1    Power, controller, and local I/O expansion unit connections

The HMC-S3-22N00 can be used seamlessly with our TM6/TK6 series products, and the controller, power supply, and units are tightly connected by internal clips.

## 4.2    Guide rail installation

1)    Pull all the snaps on the back of all modules in the unit (as shown in Figure 7) all the way down. It should be pulled until it clicks.
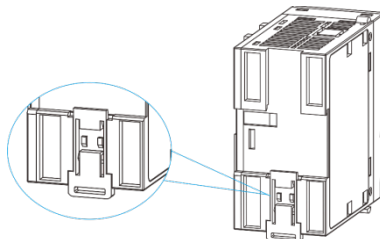


Figure 4    Pull down snap

2)    Hang the fixing claws on the upper side of the unit to the upper side of the rail as shown in the direction of Figure 8 A. Press the unit set firmly until it is completely embedded in the rail as shown in Figure 8 B.
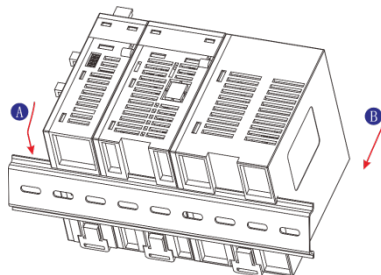


Figure 5    Installation units 1

3)    Lock the snap of the unit and embed it into the rail. Press upward until it clicks, as in Figure 9. If your fingers cannot reach the snap, you should use a tool such as a screwdriver and remember don't apply too much torque.
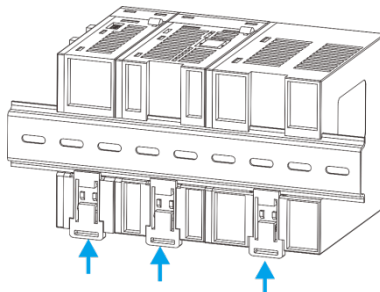


Figure 6    Installation units 2

# Section 5 Communication connection

## 5.1     EtherCAT/ModbusTCP bus connection

The HMC-S3-22N00 network interface supports both EtherCAT and ModbusTCP network communication modes. EtherCAT mode supports regular EtherCAT device connection communication. Modbus TCP mode supports Modbus-TCP server/client protocol, generally by calling function blocks to achieve communication. Also, the working mode of the network interface can be configured by configuration programming software. The configuration mode is generally used as a client and the M-zone accesses data, and the former is recommended.

## 5.2    RS485 communication connection

The RS485 communication interface uses the standard DB9 interface, and the interface is defined in Figure 4, which is connected according to the requirements.

## 5.3    Monitoring connection via Ethernet

HMC-S3-22N00 integrates MQTT client, MODBUS-TCP Client function to provide data access interface for upper layer communication.

1. Point-to-point connection with PC, HMI, etc. via Ethernet cable
2. Connect to hub or switch through Ethernet cable, and then connect to PC, HMI, and other network devices to realize multi-point connection.
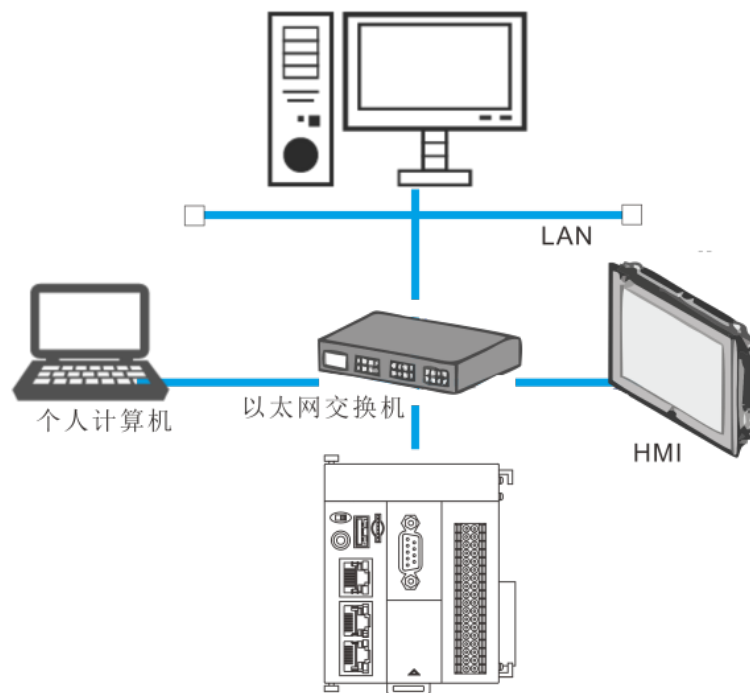


Figure 7    HMC-S3-22N00 connects to other devices through the switch

# Section 6 Web operation

Debug the computer and controller LAN1 network port with a network cable connection, open the browser page, enter the network port IP, and port number, the web default login account password for admin and admin, you can enter the web operation interface, as follows

1)  Web page directly hit the IP: 192.168.1.92:8090; login account password is admin and admin
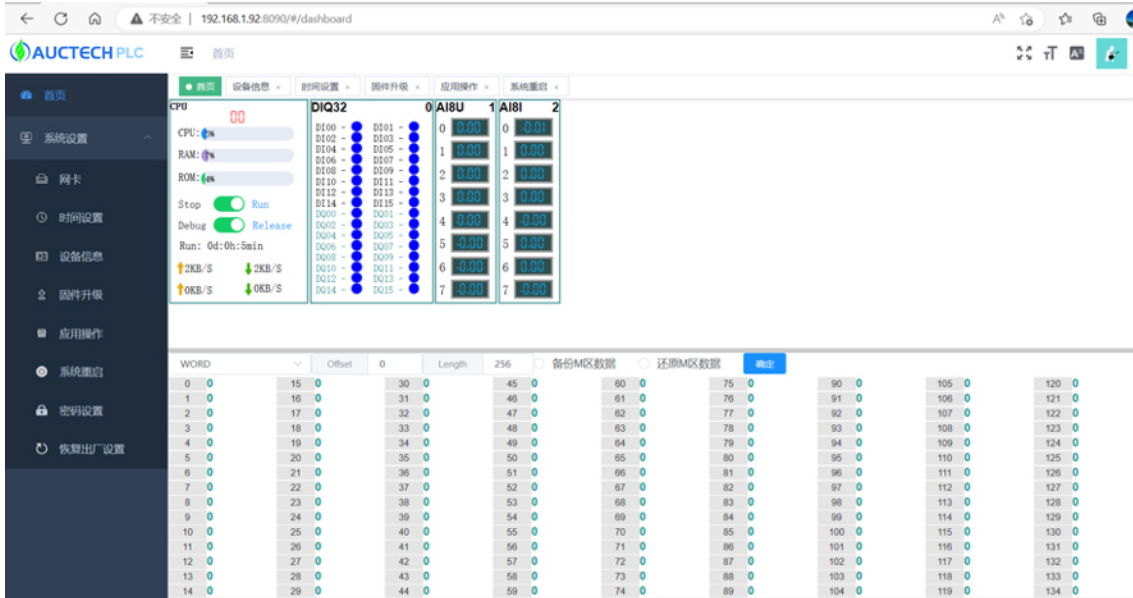


2)  Click on the network card to change the IP address
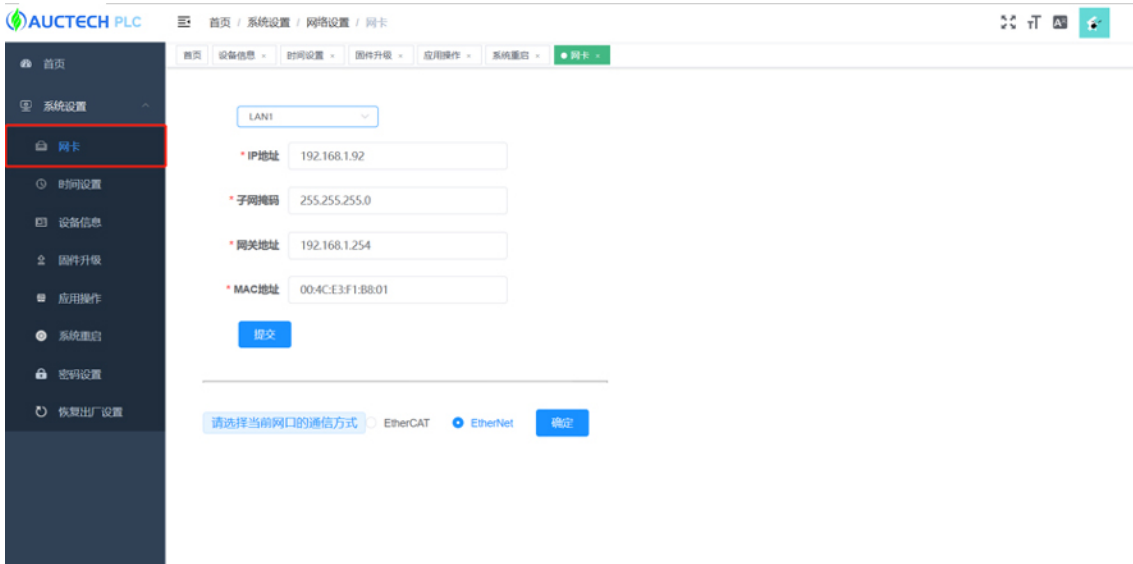
# Section 7 Programming Examples

HMC-S3-22N00, two TK6 series IO units programming example, realize controller local IO input and output, control two TK6 series IO units data interaction.

## 7.1    Preparation before programming

- Software
1) Installation of the programming software CODESYS on a PC that meets the installation environment.
2) Start the CODESYS software and install the device description file and function library.
- Hardware

According to the actual application scenario, the hardware is connected to the controller (HMC-S3-22N00), the CODESYS TK6 series IO modules, etc., and the power is supplied as required. Connect the controller Ethernet interface via network to a PC with CODESYS software installed.
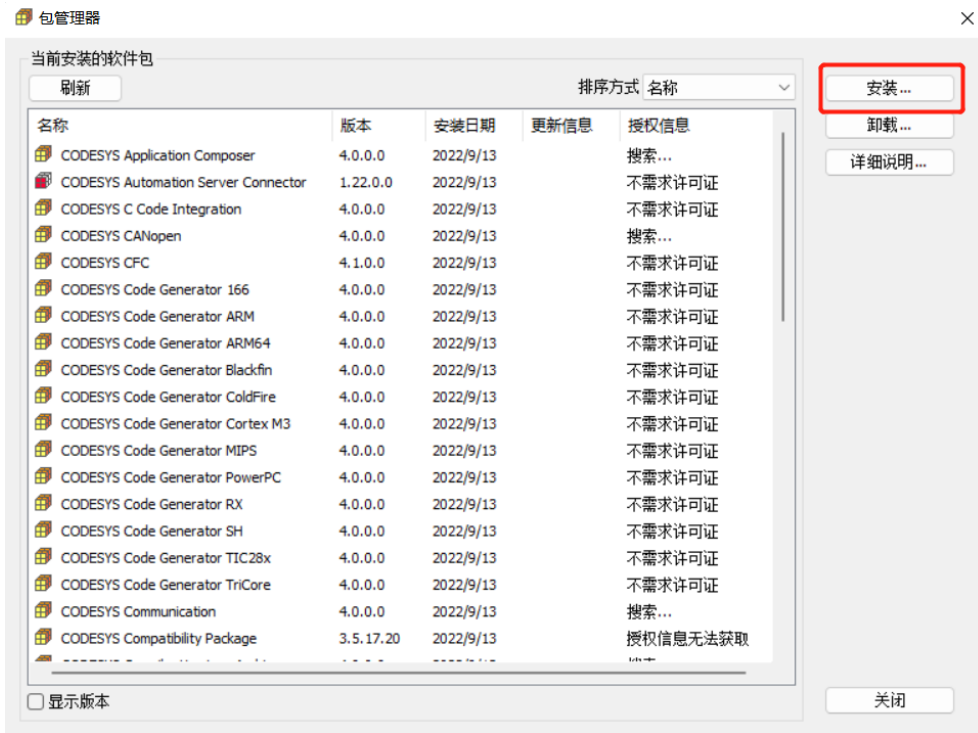
## 7.2    Communication and Configuration
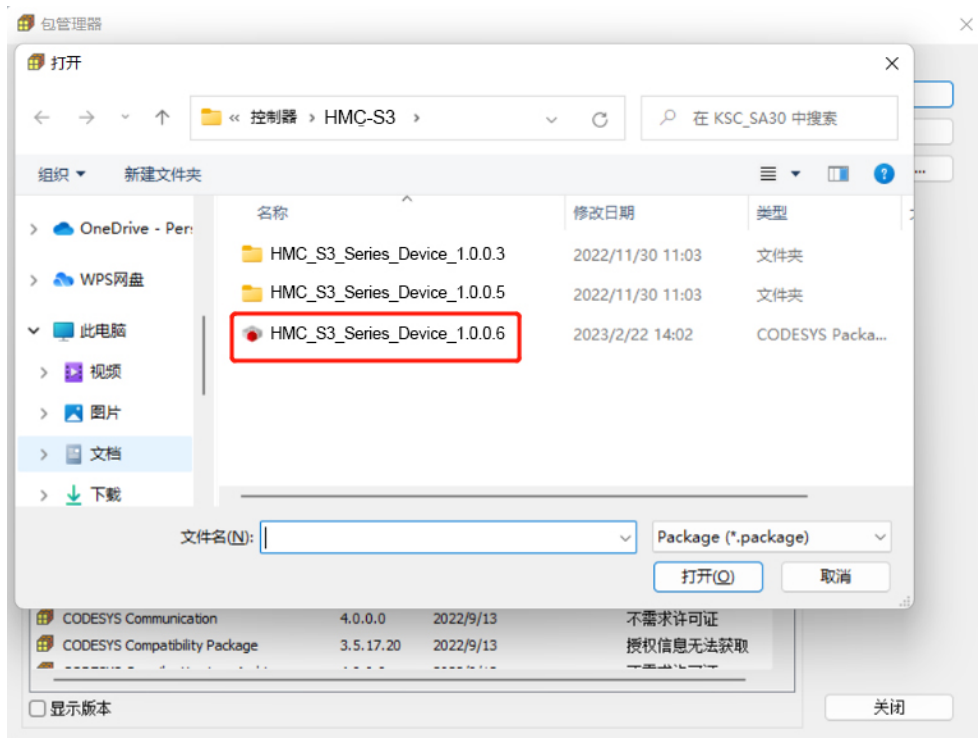
### 7.2.1 Installation description file

1) Add the Package file of controller HMC-S3-22N00
2) Click on "Tools" on the CODESYS software toolbar and select CODESYS Installer.
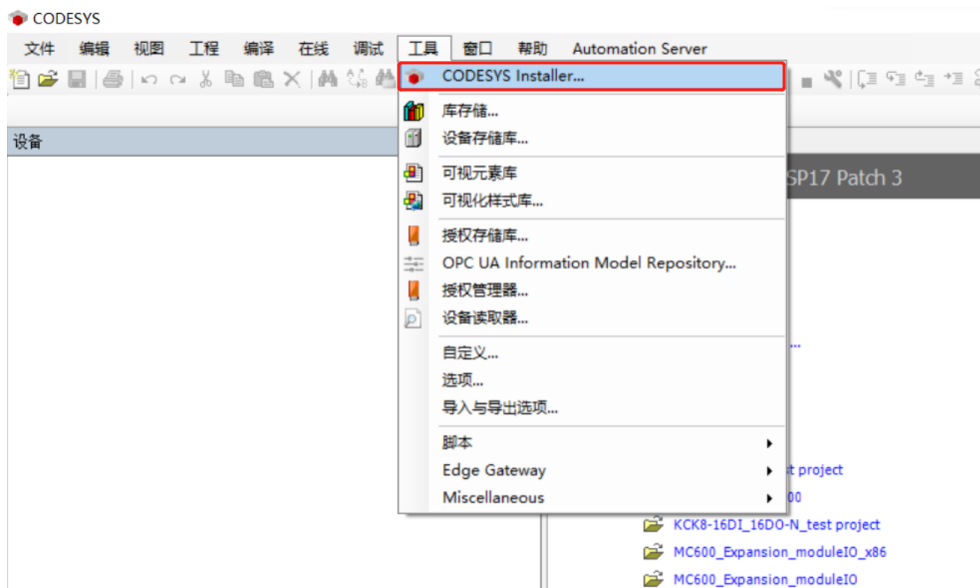


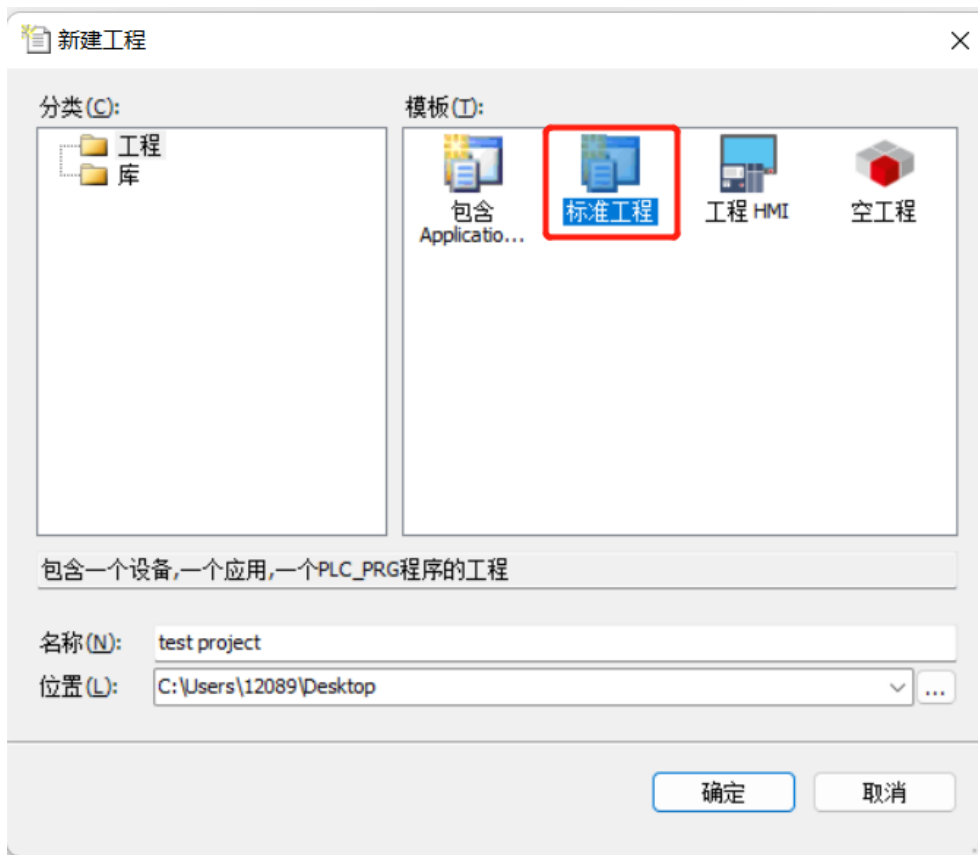3) Once in the package manager, click Install

4) Select the corresponding Package file to install
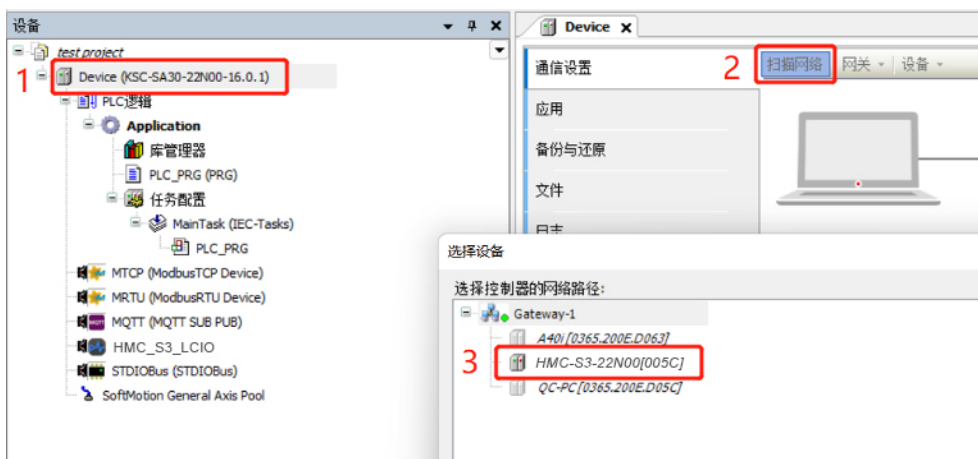


# 7.2.2 New project and configuration
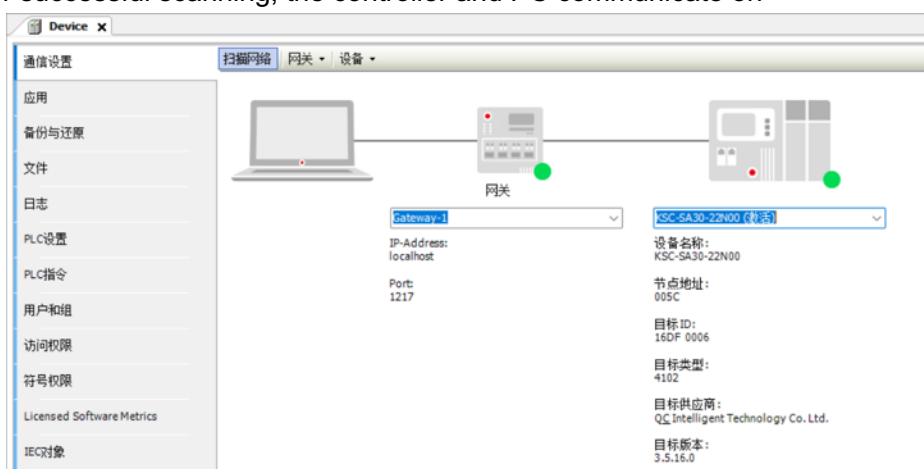
1) New project, select standard project

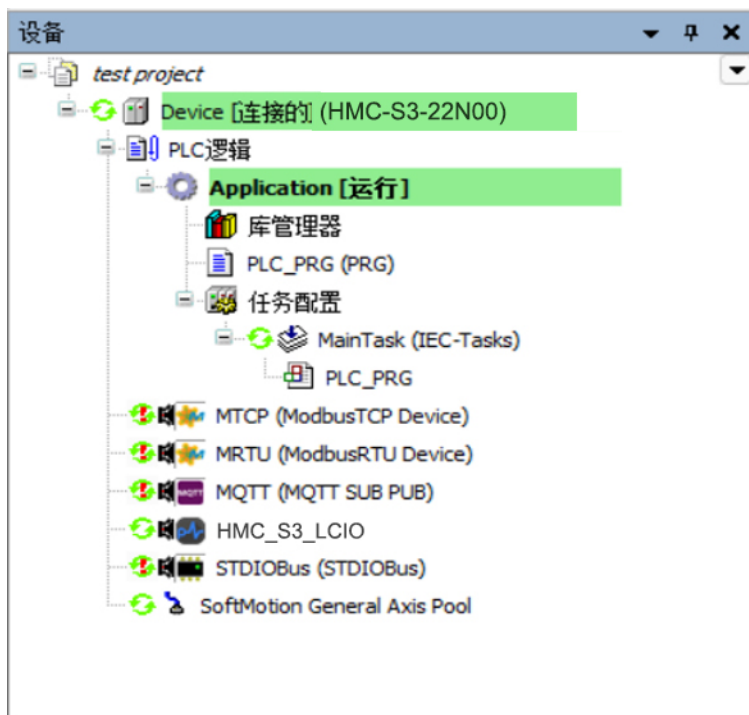2)  Controller device selection, this controller is HMC-S3-22N00



3)  Scan the device, the controller IP address is 192.168.1.92 or 192.168.1.93 by default, double click to select the controller
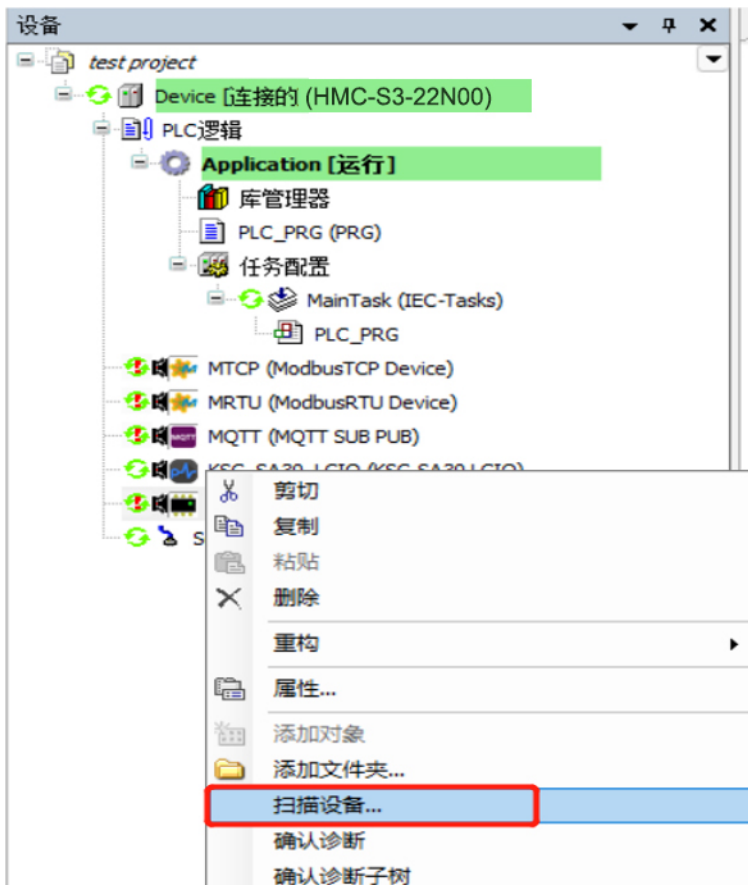
4) After successful scanning, the controller and PC communicate on
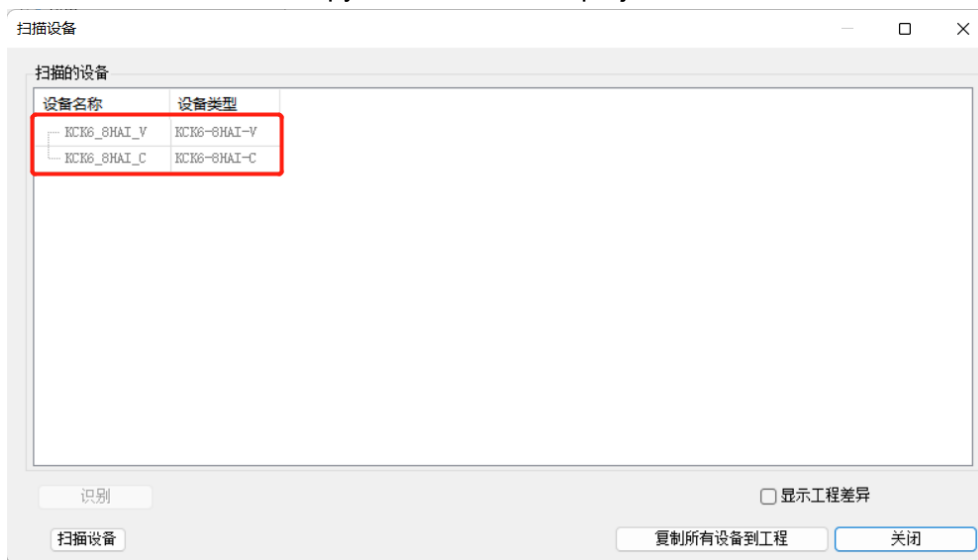


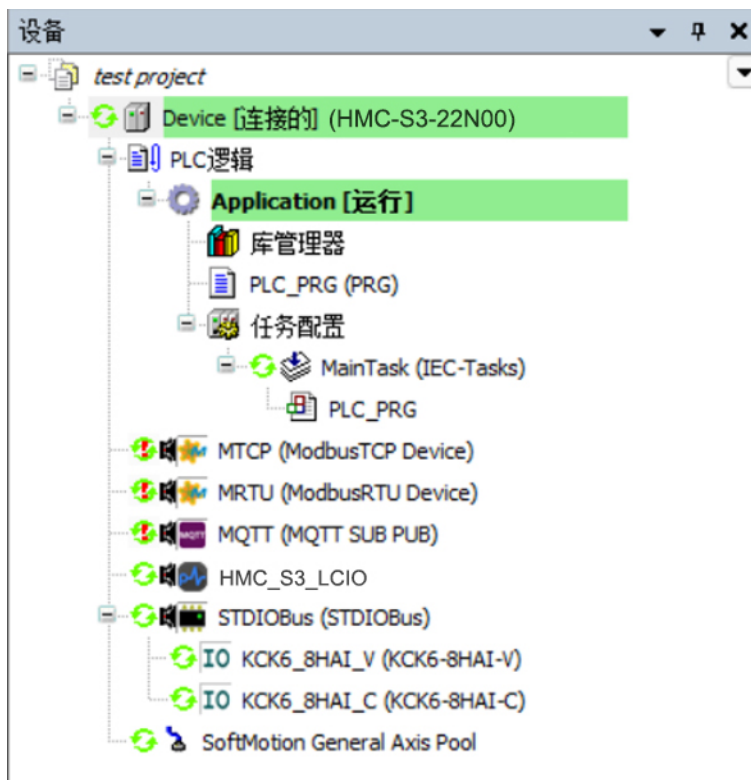5) Click Login and Run to view communication status

6)  Right-click STDIOBus (STDIOBus) and click Scan Device



7)  Scan out the results and copy all devices to the project



8)  Re-login to check communication status

设备

test project
- Device [连接的] (HMC-S3-22N00)
  - PLC逻辑
    - Application [运行]
      - 库管理器
      - PLC_PRG (PRG)
      - 任务配置
        - MainTask (IEC-Tasks)
          - PLC_PRG
  - MTCP (ModbusTCP Device)
  - MRTU (ModbusRTU Device)
  - MQTT (MQTT SUB PUB)
  - HMC_S3_LCIO
  - STDIOBus (STDIOBus)
    - IO KCK6_8HAI_V (KCK6-8HAI-V)
    - IO KCK6_8HAI_C (KCK6-8HAI-C)
  - SoftMotion General Axis Pool

Reversion: V1.7

# HMC

## AUCTECH AUTOMATION

GUANGZHOU AUCTECH AUTOMATION TECHNOLOGY LIMITED

Hongshi Business Building, SCI-TECH Industry
Park, Baiyun District, Guangzhou city, PRC

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| Fax | Web | Mail |
|-----|-----|------|
| +86 020 8489 8493 | www.auctech.com.cn | info@auctech.com.cn |

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