

TX-201 series controller user manual



Foreword

Brief introduction of information

TX-201 series controller is high-performance multi-axis motion controllers based on X86 processor hardware platform and in line with PLCopen specification. With EtherCAT as the bus, multi-axis servo control can be realized, which is especially suitable for the control of high-load computing equipment and large equipment in advanced manufacturing industry.

This manual introduces the installation and wiring of the controller, including mechanical installation, electrical installation and operating instructions.

More information

Data name	brief Introduction of the content
Medium-sized PLC software user manual	This paper introduces the basic functions, network configuration and programming basis of medium-sized PLC software.
Medium-sized PLC programming manual (motion control)	This paper introduces the composition of medium-sized PLC motion control application system, motion control program mechanism, motion control related instructions, simulation and debugging related operations.
Medium-sized PLC instruction manual	Introduce the basic instructions of medium-sized PLC.

Version change record

Revision date	Release version	Change content
2023-6	1.0	First edition issue

Warranty statement

Under normal use, if the product breaks down or is damaged, we will provide warranty service within the warranty period (please refer to the purchase order for the product warranty period). After the warranty period expires, maintenance fees will be charged.

During the warranty period, if the product is damaged in the following circumstances, the maintenance fee will be charged.

- Failure to operate this product according to the provisions in the manual will cause product damage.
- Product damage caused by using this product for abnormal functions.
- Damage to the product caused by exceeding the specified scope of use of the product.
- Secondary damage of products caused by force (except natural disasters, earthquakes, lightning strikes, fires).

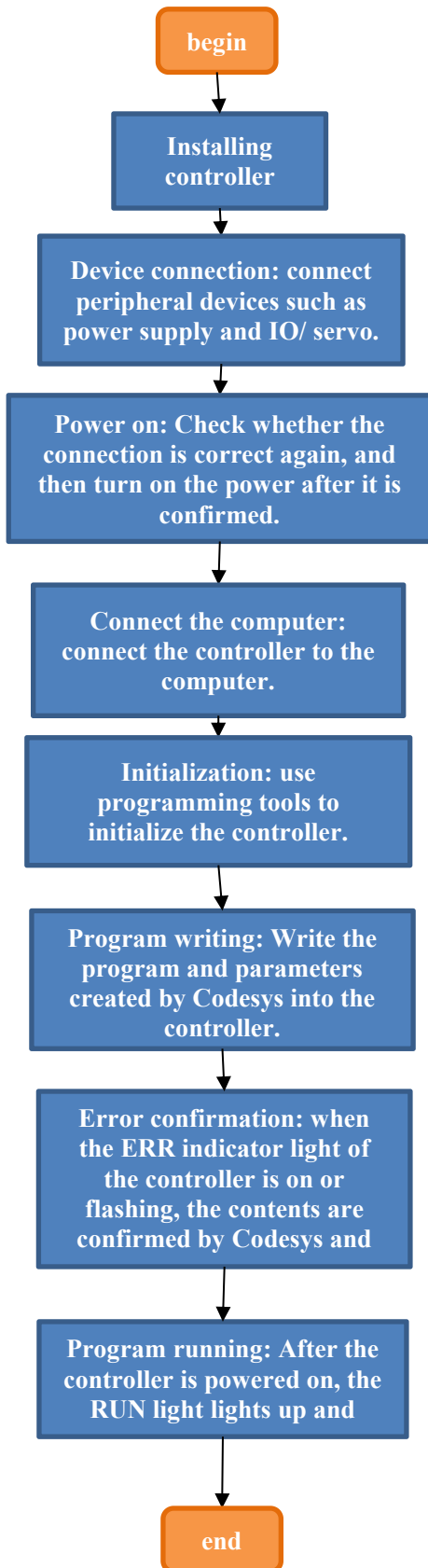
The relevant service fees shall be calculated according to the unified standards of the manufacturers. If there is a contract, the contract shall take precedence.

Please refer to the Product Warranty Card for detailed warranty instructions.

Manual description

Welcome to the User Manual of TX-201 Series Controller. Users who use this product for the first time should read this manual carefully first. If you are in doubt about some functions and performance, please consult our technical support personnel for help.

System startup flow chart



Preface




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Safety precautions

Security statement



- This chapter explains the safety precautions that should be paid attention to when using this product correctly. Before using this product, please read the relevant information in the product manual to ensure correct and safe use. Failure to observe the matters agreed in the safety precautions may lead to death, serious injury or equipment damage.
- The "Danger", "Warning" and "Caution" in the user's manual do not represent all safety matters that should be observed, but only serve as matters that need special attention when operating this product.
- This product should be used in an environment that meets the design requirements, otherwise it may cause product failures or casualties, and abnormal functions or parts damage caused by non-compliance with relevant regulations are not within the product quality assurance scope.
- Shenzhen Just Motion Electromechanical Co., Ltd. will not bear any legal responsibility for personal safety accidents and property losses caused by illegal operation of products.

Security level definition

 Danger	"Danger" means that if you don't follow the regulations, it will lead to death or serious injury.
 Warning	"Warning" means that if you don't follow the regulations, it may lead to death or serious injury.
 Note meaning	"Caution" If you don't follow the regulations, it may cause minor injury or equipment damage.

Safety precautions

- Before installing, operating, inspecting and maintaining this product, please read this instruction manual and other attached materials carefully and use it correctly. When using this product, please ensure the integrity of the product and operate according to the manual.

Unpack	
 Warning	<ul style="list-style-type: none"> ◆ Please check whether the outer packaging of the product is intact, damaged, damp and deformed before unpacking. ◆ When unpacking, please check whether the surface of product parts is damaged or rusted. If so, please do not install! ◆ After unpacking, please carefully check the order and check whether the product quantity and information are complete. If the product does not match the name of the packing list, please do not install it!
Transportation and storage	
 Note meaning	<ul style="list-style-type: none"> ◆ When handling the product, please handle it gently, pay attention to the machine body, and pay attention to the objects under your feet at any time to prevent tripping, otherwise there is a danger of injury or product damage! ◆ Please store and transport the products in strict accordance with the storage and transportation conditions required by the products, otherwise there is a risk of product damage. ◆ Avoid storing the product for more than 3 months. If the storage time is too long, please use a closed box and make necessary inspection. ◆ Avoid storage and transportation in places with high temperature, dew condensation, wind, rain and impact. ◆ It is strictly forbidden to transport this product together with equipment or articles that may affect or damage this product.
fix	



Warning

- ◆ Please read the product manual and safety precautions carefully before installation!
- ◆ It is strictly forbidden to disassemble or modify this product without authorization!
- ◆ Please do not install this product in rain, direct sunlight, strong electric field, strong magnetic field and strong vibration!
- ◆ Please don't wear loose clothes or accessories during installation, or you may be in danger of electric shock!
- ◆ When installing the product in a closed environment (such as a cabinet or a cabinet), please use a cooling device (such as a cooling fan or a cooling air conditioner) to fully cool it. At the same time, it is necessary to provide corresponding fire-proof enclosures, electrical enclosures and mechanical enclosures to meet the requirements of the installation environment, otherwise the product may overheat or fire.
- ◆ It is forbidden to twist the fixing bolts of product parts and components!
- ◆ When it is necessary to install transformers and other equipment with strong electromagnetic interference, please install shielding protection devices to avoid miss operation of this product.
- ◆ Do not tighten the machine with excessive torque to avoid damaging the machine.
- ◆ Please install the product on a flat surface. If the mounting surface is uneven, it may cause excessive external force to the circuit board, which may lead to failure.



Danger

- ◆ Only professionals who have been trained in electrical equipment and have electrical knowledge can operate it. Non-professionals are strictly prohibited to operate!



Note meaning

- ◆ Please cut off the power supply before installation. If the installation is carried out under the power-on state, it may cause damage to the controller and casualties.
- ◆ For a device operating at a constant speed, resonance may occur when it is operated at a variable speed. At this time, in order to reduce resonance, anti-vibration rubber can be installed under the motor frame or vibration suppression function can be used.

wiring



Danger

- ◆ Non-professionals are strictly forbidden to install and wire the equipment!
- ◆ During bolt processing and wiring operations, please cover the top of the product with cloth, etc. to prevent metal chips and wire ends from falling into the controller ventilation hole during drilling, otherwise it may lead to fire.
- ◆ Please conduct wiring operation when the power supply is cut off, and do not directly touch the conductive parts of the product, otherwise there will be danger of electric shock.
- ◆ Please make sure that the equipment is well grounded, otherwise there will be danger of electric shock.



Warning

- ◆ It is forbidden to connect the input power supply to the output end of equipment or products, otherwise it will cause equipment damage and even fire.
- ◆ When the driver is connected to the motor, please ensure that the phase sequence of the driver and the motor terminal is accurate and consistent, so as to avoid the reverse rotation of the motor.
- ◆ Cables used in wiring must meet the requirements of corresponding wire diameter and shielding, and the shielding layer of shielded cables needs to be reliably grounded at one end!
- ◆ Please tighten the terminal screws according to the tightening torque specified in the manual. Insufficient or excessive tightening torque may lead to overheating and damage of the connection part, which may lead to fire hazard.
- ◆ After the wiring is completed, please check that the cable is connected correctly, and there are no dropped screws, wire heads or gaskets inside the product, otherwise there may be electric shock danger, fire and misoperation.

electrify



Danger

- ◆ Before powering on, please confirm that the product is installed in good condition, the peripheral cables, input and output cables and other connections are firm, and the motor device is allowed to restart.
- ◆ Before powering on, please confirm that the output voltage of the power supply is consistent with the rated voltage of the programmable controller, and the positive and negative poles of the power supply are connected correctly, otherwise the product may be damaged.
- ◆ When the power is on, it is forbidden to open the product cover, touch any terminal of the product and disassemble the product, otherwise there is a danger of electric shock!



Warning

- ◆ After the wiring and parameter setting are completed, please make a trial run of the machine to confirm that the machine can operate safely, otherwise it may lead to misoperation, personal injury or equipment damage.
- ◆ Please ensure that the power supply voltage of the product is consistent with the power supply voltage before powering on. If the power supply voltage is used incorrectly, it may cause damage to the controller.
- ◆ Before electrifying, please pay attention to stay away from the range of mechanical movement, otherwise it may lead to personal injury or death.

start



Danger

- ◆ Non-professionals are strictly forbidden to operate the product, otherwise it may lead to misoperation, personal injury or death!
- ◆ Do not touch any conductive parts of the product or disassemble any devices or parts of the product during operation, otherwise there will be danger of electric shock and casualties!



Warning

- ◆ It is forbidden to directly touch the equipment shell or resistor to test the temperature, otherwise it may cause electric shock or burn!
- ◆ During operation, avoid other articles or metal objects falling into the vent of the product, otherwise it may cause product damage or fire!

maintain



Danger

- ◆ Non-professionals are strictly forbidden to carry out product maintenance, inspection or component replacement!
- ◆ It is forbidden to carry out equipment maintenance under the power-on state, otherwise there is danger of electric shock!
- ◆ Please use the battery correctly, and do not charge, heat, reverse connect or short circuit the battery.



Warning

- ◆ Please check and maintain the equipment and products regularly according to the requirements of equipment maintenance and maintenance, and make maintenance records.

repair



Danger

- ◆ Non-professionals are strictly forbidden to inspect, repair or replace the equipment!
- ◆ It is forbidden to carry out equipment maintenance under the power-on state, otherwise it may cause life danger!
- ◆ After cutting off the power supply of all equipment, please wait at least 10 minutes before carrying out equipment inspection and maintenance, otherwise there will be danger of electric shock!



Warning

- ◆ Please repair the equipment according to the product warranty card.
- ◆ When the equipment fails or is damaged, professional maintenance personnel will troubleshoot and repair the equipment, and make maintenance records.
- ◆ When replacing product parts, please standardize the operation.
- ◆ Please do not continue to use the damaged machine, otherwise it will cause greater damage and even cause accidents such as fire.
- ◆ After replacing the equipment, be sure to re-check the equipment and power supply wiring and set the parameters.

1 Product information

1.1 overview

TX-201 series controller is an EtherCAT bus motion controller based on X86 and Codesys motion control platform. It adopts all-metal body and provides rich network interfaces, which can meet the expansion requirements of various projects and has strong motion control performance. This product supports a variety of interfaces, including up to 4 Ethernet interfaces, 2 USB2.0 interfaces, 1 RS485 interface and 1 RS232 interface.

This series of products has a wide working temperature range (-5 ~ 55 C) and good EMC performance. Equipped with the highest Intel Core i7 CPU, it can provide excellent computing power; In addition, the product is also equipped with up to 8GB of DDR4 memory and 256GB of SSD hard disk, which is very suitable for high-load computing applications.

1.2 product composition and function

1.2.1 Appearance of controller

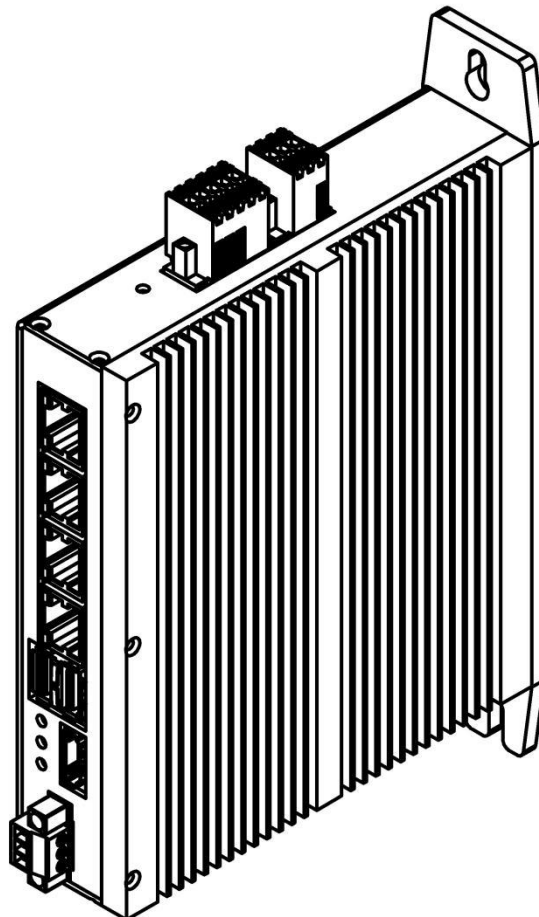
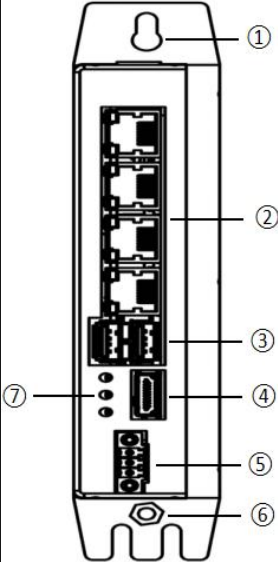
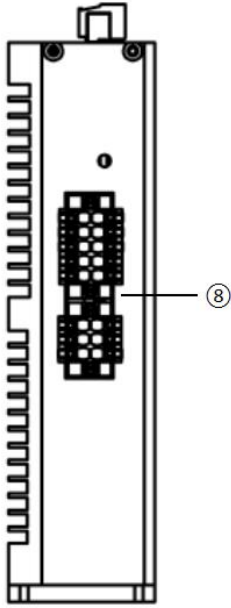


Figure 1-2 controller appearance

The external interfaces of TX-201 series box controllers are as follows::


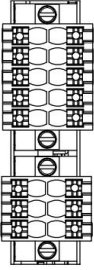
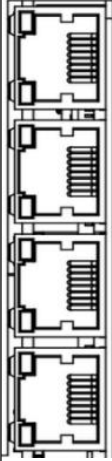
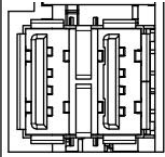
Product schematic diagram	number	Interface name	describe
	①	Back hanging ear	Standard component
	②	LAN port	4 Ethernet ports
	③	Usb interface	2 USB 2.0
	④	HDMI interface	HDMI high definition display interface
	⑤	power source	12V power input
	⑥	ground terminal	Controller grounding
	⑦	status indicator lamp	For a specific definition of indicator lights, see. 下表“1.3.2 LED 状态指示灯”
	⑧	IO/ communication interface	4 DI/4 DO, RS485/RS23 communication, detailed pin configuration and specifications, please refer to "4.3.2 RS485 bus wiring description" on page 19.

1.3.2 LED status indicator lamp
The definitions of indicator lamps are described in the following table:

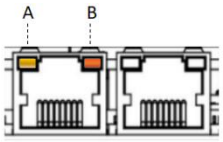






serial number	LED	name	functional description	condition	definition
one	PWR	power light	Controller power state	yellow	Normally off: abnormal power supply Always on: the power supply is running normally.
2	RUN	Running indicator lamp	running state	green	Always off: the system is not started. Blinking: User program is running. Always on: the system is started but the user program is not running.
three	ERR	Error indicator light	Running error	red	Constant extinction: normal Blinking: The system is restored to factory settings or the system is being updated. Always bright: 1. Overtemperature alarm or abnormal EtherCAT bus. 2, the user program running failure 3. System fault alarm

1.2.3 Controller interface

The following table summarizes the interfaces of TX-201 series controllers:

serial number	Interface name	functional description	Interface form	Terminal style
one	Input power supply	12VDC(-20%~+20%)	3P pluggable European terminal with 3.5mm spacing, spring crimping, with fixing screws, black.	
2	IO/ communication terminal	RS485 interface	2*3P pluggable European terminal with 3.5mm spacing, spring crimping, with fixing screws, black. Modbus master-slave and non-protocol communication are supported. The default parameters of serial port are baud rate 115201, no check, 8 bits of data and 1 stop bit.	
		RS232 interface	be the same as the above	
		4DI、4DO	2*5P pluggable European terminals with 3.5mm spacing, spring crimping, with fixing screws, black.	
three	Net mouth	Four LAN ports, from bottom to top, are LAN 0/LAN 1/LAN 2/LAN 3. The Ethernet port provides four standard RJ-45 jacks.		
four	USB2.0	This product provides two standard USB 2.0 interfaces, both of which support plug and play and hot plug functions. USB interface conforms to USB EHCI, Rev. 2.0 standard.		

The status of the LED indicator at the front of the network port is described as follows:

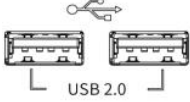
Indicator light	function	colour	condition	meaning
	A:Link/Act	yellow		Always off: not connected
				Blinking: connected and sending and receiving data.
				Always on: Connected
	B: Speed	Green/orange		Always off: 1. 100Mbps connection 2. Not connected
				Always on: 2500Mbps connection
				Always on: 1000Mbps and below connection

The following figure shows the indicator states of three transmission rates, from left to right: 1000Mbps connection, 100Mbps connection and 2500Mbps connection.



Figure 1-3 Controller Indicator State

USB 2.0 pins are defined as follows:

	stitch	Signal name	function
	one	VCC	Power Supply
	two	DATA-	USB 2.0 differential data signal
	three	DATA+	
four	GND	Power supply ground	

2 product specifications

2.1 basic specifications of controller

TX-201 series includes the following controllers, and their basic specifications are shown in the following table:

project	TX-201	
Power supply	12VDC(-20%~20%)	
CPU model	Celeron J4125	
internal storage capacity	4GB	
Memory form	DDR4 SO-DIMM	
hard disc capacity	64GB	
Hard disk form	M.2(M key) SSD	
Programming mode	61131-3 Programming Language (LD, ST, SFC, CFC)	
Program execution mode	Compilation execution	
User program storage space	128 M Byte	
User data storage capacity	128 M Byte	
EtherCAT communication	1 road (maximum 128 slave stations per road)	
Modbus TCP communication	4-way (maximum 63 slave stations per way)	
Modbus (serial port) communication	RS-485	1 road (31 slave stations at most per road)
	RS-232	1 road
number of axles	128	
Overall dimension (mm)	Height 150* width 35* depth 134	
Net weight of product (kg)	<1kg	
Heat dissipation mode	natural cooling	
battery life	3 years (25 °C, power-on time rate 0% (no power-on))	

2.2 Application environment specifications

The application environment specifications of TX-201 series controllers are shown in the following table:

project	Parameter type	work	transport	save
Environmental parameters (IEC60721 -3)	Environmental grade	IE33	IE22	IE12
	temperature	-10-55°C	-40-70°C	-25-70°C
	humidity	10-95%, no condensation		

3 Installation and fixation

3.1 Installation requirements

3.1.1 Installation environment

When installing the programmable controller, the environmental conditions should be fully considered. Please do not install this product in places with large temperature difference, water splash and rain, direct sunlight, strong electric field, strong magnetic field, strong vibration, corrosive gas, flammable gas and altitude above 2010m!

3.1.2 Installation space

In order to facilitate ventilation and easy replacement of the module, the distance between the upper and lower parts of the module and the installation environment and surrounding components should be as shown below.

Schematic diagram of installation method:

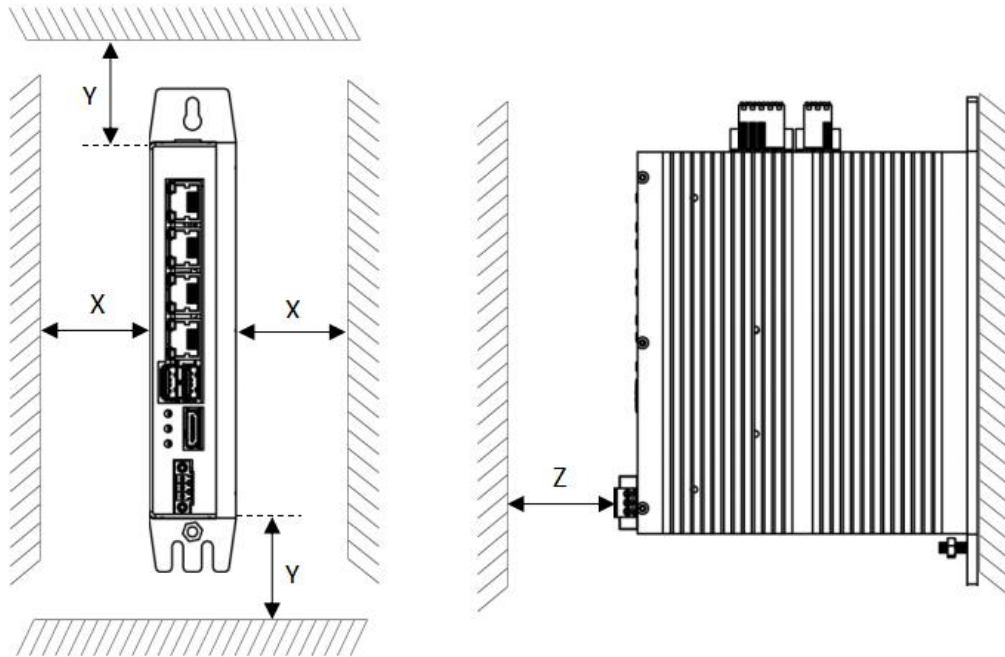


Figure 3-1 Installation Space Requirements of Box Controller

The installation interval dimensions in the drawing are shown in the following table:

direction	Minimum size requirement (mm)
X	50
Y	100
Z	50

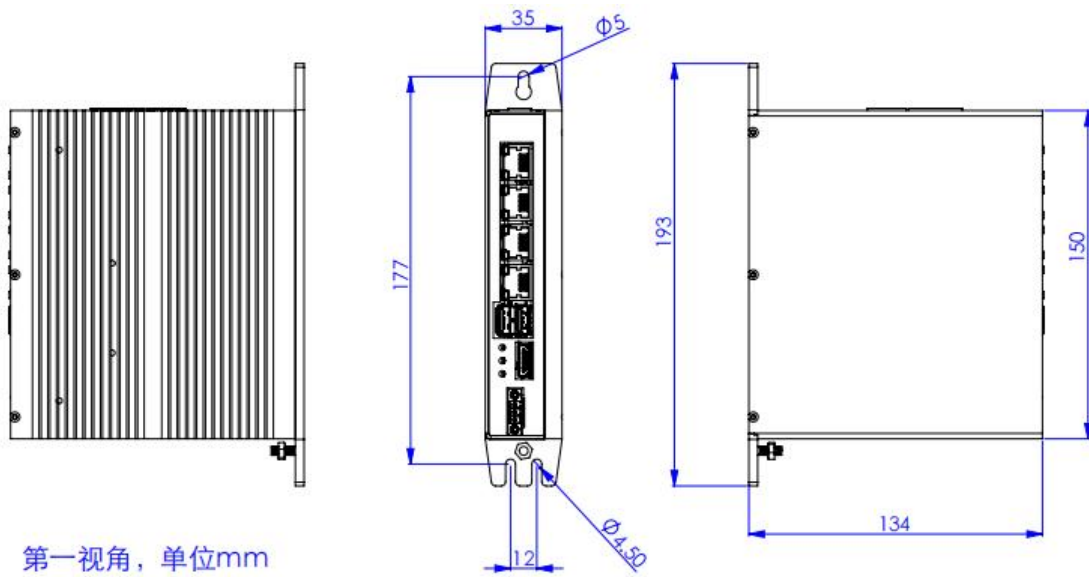
3.1.3 Installation precautions

Precautions when installing the controller:

- Before installation, please ensure that the product is in a power-off state;
- Please read the product manual and safety precautions carefully before installation.
- It is strictly forbidden to disassemble or modify this product without authorization, otherwise the controller may be damaged.
- Please don't install this product in places where water splashes and rains, direct sunlight, strong electric field, strong magnetic field and strong vibration occur.
- Do not tighten the machine with excessive torque to avoid damaging the controller.

3.2 Installation instruction

3.2.1 Installation dimensions



The installation dimensions of TX-201 series controllers are shown in the following figure:

Figure 3-2 Installation Dimensions of Controller-Rear Lug

4 wiring

4.1 Wiring suggestions

4.1.1 Grounding requirements

1. Power grounding requirements

The power terminal of that controller is provide with a grounding point. Please use the grounding wire as short as possible (the wire length is less than 30cm and the thickness is more than 0.5 of the national standard) to ground the controller. mm^2

If dedicated grounding is not available, please use "common grounding" (common grounding is strictly prohibited), as shown in Figure 4-1.

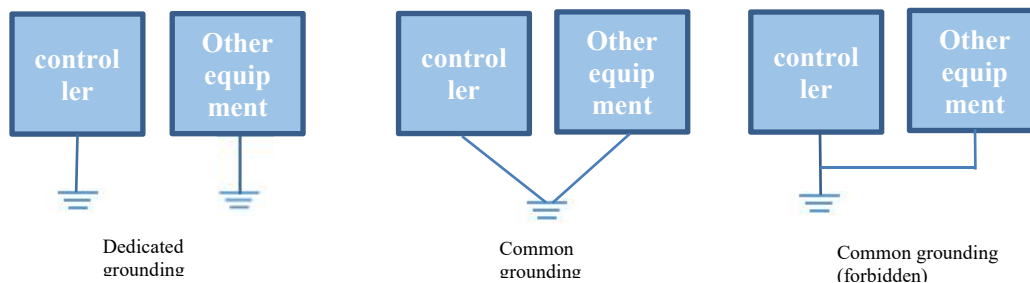


Figure 4-1 Power Grounding Requirements

2. Communication signal grounding requirements

Cables for communication signals must use shielded cables, and both ends of the shielded wires need to be grounded. The grounding point should be as close as possible to the communication port,

so that the grounded cable will not be affected by the electromagnetic induction of the cable before grounding.

For the shielded part exposed after peeling off part of the sheath of the shielded cable, it should be grounded with a larger area as far as possible to ensure good contact. Tu Tu 4 — 22

4.2 Power input terminal wiring

The power input terminal adopts screw-fixed, pluggable 3-3Pin terminals with a spacing of 3.5 mm.. The schematic diagram of the power plug connected to the power input interface is as follows:

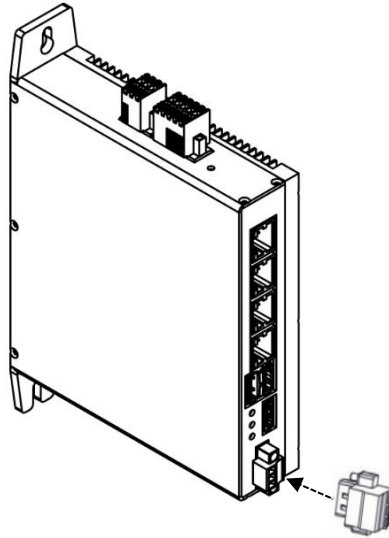


Figure 4-1 Schematic diagram of power input terminal wiring

1. Power terminal definition

post	serial number	Terminal name	type	function
	one	FG	landing	Enclosure protection ground
	2	EGND	input	Negative terminal of DC input
	three	E+12V	input	Direct input terminal current positive

2. Input power specification

serial number	project	specifications
one	input voltage	12VDC(-20%~+20%)
2	incoming current	5A
three	Anti-reverse connection	be
four	Short circuit protection	be

3. Manufacturing requirements of power cable

The power input cable adopts needle terminal.

4.3 IO/ communication interface wiring

4.3.1 IO/ communication interface specification

1. Interface introduction

IO/ communication interface adopts 6PIN (double row 3Pin) and 10PIN (double row 5Pin) terminals with a distance of 3.5mm, which includes RS-232 signal, RS-485 signal, startup signal, PLC program operation signal and program fault signal. The connection terminal adopts screw to fix the pluggable terminal, and adopts elastic sheet and crimping connection mode, which is convenient for on-site installation and wiring, and is conducive to on-site replacement and maintenance.

2. Definition of serial communication

stitch	name	function
one	A	RS485A
2	RXD	RS232 reception
three	G	Signal ground
four	B	RS485B
five	TXD	RS232 transmission
six	G	Signal ground

3. I/O interface communication definition

stitch	name	type	functional description	definition
one	X0	input	Boot signal	If it is currently turned off, turn it OFF→ON and turn it on; If it is currently turned off, off → on, and turned off after 4 seconds.
2	X1	input	RUN/STOP	User program RUN/STOP; ; STOP when it is ON (you can RUN when it is powered on again, or the upper computer can operate)
three	X2	input	brownout detector	When the ON→OFF edge changes, start power-off saving and actively shut down.
four	X3	input	reserve	Standby input
five	24	-	Input common terminal	Just short-circuit with the input port.
six	Y0	output	Power on output	Output after controller is powered on.
seven	Y1	output	running state	User program running, signal output; The user program stops and the signal is not output.
eight	Y2	output	Alarm status	User program running fault output
nine	Y3	output	reserve	Standby output
10	0V	-	Output common terminal	User external short circuit 0V is required.

4. State control signal specification

Detailed state control signal specifications of IO/ communication interface are described in the following table:

project	input signal	output signal
Input/output type	DC digital input	Transistor, high level output
Input/output mode	Leakage pattern	Leakage pattern
Input/output voltage level	OFF voltage: > 5V ON voltage: < 15V	Low level output
ON response time	Less than 10ms (hardware response time)	Less than 0.5ms (hardware response time)

OFF response time	Less than 10ms (hardware response time)	Less than 0.5ms (hardware response time)
Isolation mode	Optocoupler isolation	Optocoupler isolation
frequency	1kHz	1kHz
protect	Not involved	Over-current protection

5. RS-485 communication specification

RS485 communication supports MODBUS RTU protocol and free protocol, and the relevant specifications are as follows:

number	clauses and sub-clauses	specifications
one	Station number	1~247
2	Communication rate (bps)	4.8K,9.6K,19.2K,38.4K,57.6K,115.2K
three	Data length	8-bit
four	parity	Nothing, odd, even
five	Stop position	1,2
six	Maximum number of sites	32

6. RS-232 communication specification

The communication specifications supported by RS232 bus are as follows:

number	clauses and sub-clauses	specifications
one	Number of slave stations	one
2	Communication rate (bps)*	300,600,1.2K,2.4K,4.8K,9.6K,19.2K,38.4K,57.6K,115.2K

4.3.2 Description of RS485 bus connection

The topological structure of RS485 bus connection is shown in the following figure. It is recommended to use shielded twisted-pair connection for 485 bus, and twisted-pair connection for 485A and 485B. Connect 120Ω terminal matching resistors at both ends of the bus to prevent signal reflection; The reference ground of all nodes 485 signals are connected together; Connect up to 32 nodes; If branch line connection is needed, the shorter the distance of each node branch line, the better, and it is recommended to be less than 3m.

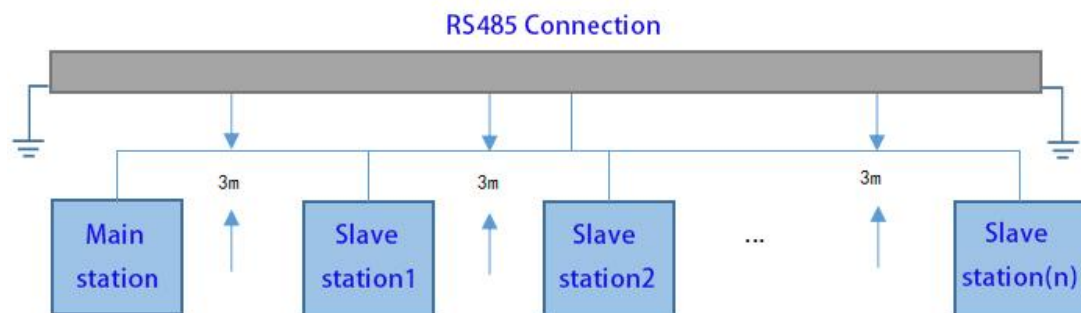


Figure 4-2 Schematic Diagram of RS485 Communication Connection

1. Multi-node connection

When there are many nodes, the RS485 bus must be daisy-chained (as shown in the figure below). Star connection is strictly prohibited.

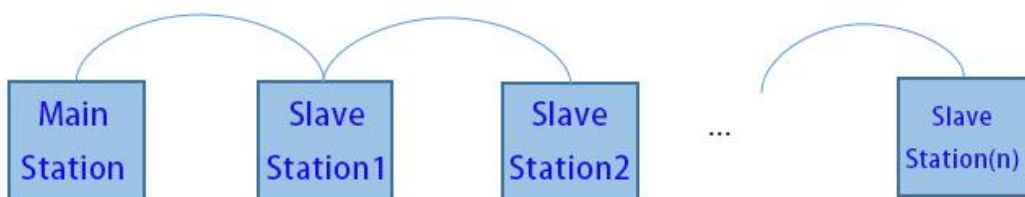


Figure 4-3 Daisy Chain Connection Structure

2. Terminal connection mode

TX-201 series controller has three terminals: A, B and G. After the wiring is completed, please check whether the field 485 bus contains three cables, and make sure that the wiring terminals are not wrongly connected. If a shielded cable is used, it is especially important to note that the shielding layer must also be connected to the G terminal. In any place, except G of the grounding node, the shielding layer is forbidden to be connected to any other place (including the equipment casing, equipment grounding terminal, etc.). Recommended cables are as follows:

- Recommended wiring cable 1: Multi-core cable with twisted-pair cable, in which one pair of twisted-pair cables is used as the connecting wire of A and B, and the other redundant cables are twisted together as the connecting wire of G..
- Recommended wiring cable 2: twisted-pair cable with shielding layer, twisted-pair cable is used as the connecting line of A and B, and shielding layer is used as the connecting line of G.

3. Precautions

In the case of using shielded wires as connecting cables, it is particularly important to note that the shielding layer can only be connected to G, but not to the site earth.

4.4 Network port communication wiring

4.4.1 Specifications of network port communication

TX-201 series intelligent mechanical programmable controller has four 2500 megabit network ports, and their definitions are described in the following table:

number	Net mouth	function
one	LAN 0	Description of network port configuration: 4 * 2500Mbps, modbusTCP, OPC UA, EtherCAT, etc. can be configured. Among them, LAN0 is a programming port (used for downloading and monitoring, etc.) and the IP address is 192.168.3.5, which cannot be modified.
2	LAN 1	
three	LAN 2	
four	LAN 3	

Support EtherCAT communication, specific specifications are as follows:

project	Specification description
protocol	EtherCAT protocol
Minimum synchronization period of 12-axis cam	500us (typical value, depending on the execution time of the program)
Maximum number of axes	128
Synchronization mode	Servo adopts DC- distributed clock, and IO adopts input-output synchronization.
physical layer	100BASE-TX
rate	100 Mbit/s (100Base-TX)
duplex mode	full duplex
topological structure	Ring topology
Transmission medium	Network cable, see cable specifications in the next section.
transmission distance	Less than 100M between two nodes
Number of slave stations	128
EtherCAT frame length	44 bytes ~1498 bytes
process data	A single Ethernet frame has a maximum of 1486 bytes.
refresh time	1000 switch inputs and outputs, about 30us. 32 servo shafts are about 100us.
Automatic scanning function	support

4.4.2 description through EtherCAT wiring.

Through the EtherCAT port, TX-201 series controllers can be connected with various stepping or servo drivers, slave modules or expansion module products supporting EtherCAT communication.

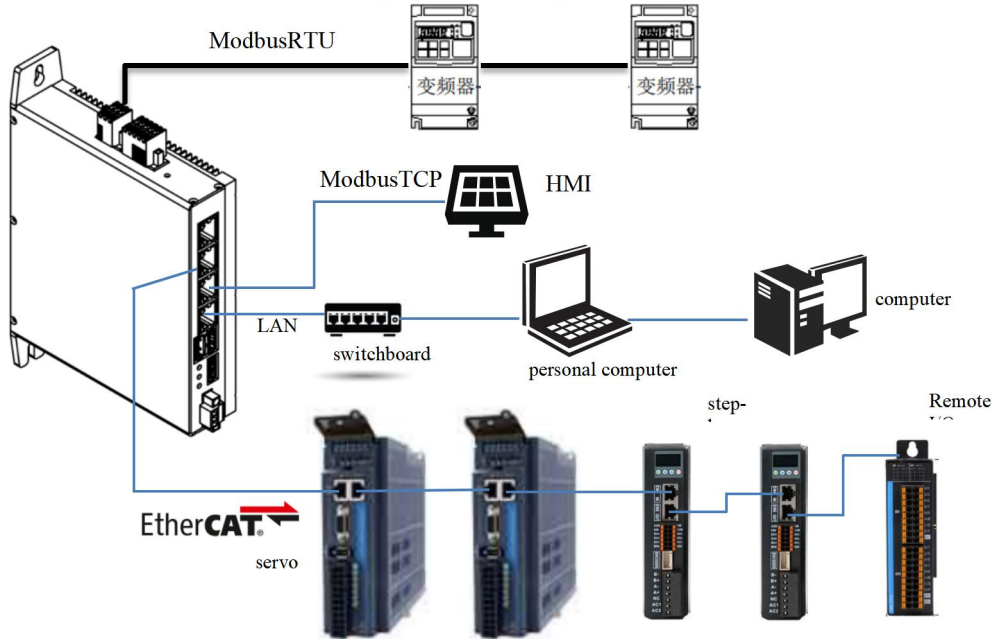


Figure 4-4 CPU module is connected with other devices through EtherCAT port.

4.4.3 Communication cable connection requirements

pin	Signal (Ethernet 1000 or 2500Mbps)	Signal direction	Signal description
one	TD+	output	Data transmission+
2	TD-	output	Data transmission-
three	RD+	input	Data reception+
four	-(DC+)	-(two-way)	Not used (data C+)
five	-(DC-)	-(two-way)	Not used (data C+)
six	RD-	input	Data reception-
seven	-(DD+)	-(two-way)	Not used (data D+)
eight	-(DD-)	-(two-way)	Not used (data D-)

Note: When Ethernet baud rate is 2500Mbps or 1000Mbps, the definitions of pins 4, 5, 7 and 8 are different from those of 100Mbps. Please pay attention to the contents in brackets.

Length requirement: When using EtherCAT bus, the length of cables between devices should not exceed 100 meters, which will attenuate signals and affect normal communication.

Technical requirements:

1. 100% continuity test, no short circuit, open circuit, dislocation and poor contact;
2. The cable length is within the allowable tolerance range;

EtherCAT bus uses shielded cable for network data transmission, and the specific specifications are shown in the following table:

project	specifications
Cable type	Elastic crossover cable, S-FTP, super category 6
Meet the standard	EIA/TIA568A, EN50173, ISO/IEC11801 EIA/TI Abulletin TSB, EIA/TIA SB40-A&TSB36
Conductor section	AWG26
Conductor type	unshielded twisted pair
wire pair	four

4.4 USB interface

The controller has two USB2.0 ports in total, and the port forms are as shown in the figure:

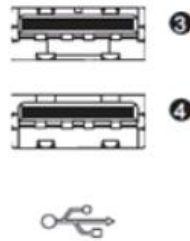


Figure 4-5 USB interface

USB interface specifications are described in the following table:

project	USB2.0
Maximum communication rate	480Mbps
5V maximum output current	500mA
Maximum communication distance	5m
Is it isolated?	no

4.4.1. Precautions

Please choose industrial-grade USB devices for industrial applications to ensure the reliability of use; USB devices should avoid long-term connection and pay attention to wiring specifications to prevent interference from affecting communication performance; When there is unavoidable interference, magnetic rings can be added at both ends of the communication cable to filter it out, so as to improve the anti-interference performance.

5 operating instructions

5.1 power on

5.1.1 Matters needing attention during power-on

There are the following precautions when powering on the controller:

- When turning on the power supply, please confirm whether the output voltage of the power supply matches the power supply voltage of the programmable controller, otherwise the hardware may be damaged.
- Please don't touch the terminal during power-on, otherwise there may be danger of electric shock.

5.1.2 PLC boot start-up.

After 15~25s from power-on, the PLC will be in an operational state. RUN LED will not light up before PLC enters the running state.

- The maximum waiting time (1~201s) can be set for some slave stations of EtherCAT, and the operational state of PLC is that the function module of EtherCAT master station works, regardless of the waiting time.
- The EtherCAT master function module regards the slave stations that are not started within the maximum waiting time as errors.

5.1.3 Action when PLC enters the operational state.

If there is a user PLC program when the PLC enters the operational state, the PLC will be in the operational state immediately.

5.2 Power down

5.2.1 Matters needing attention during power down

The controller has the following precautions when disconnecting the power supply:

- At the moment of power failure, the controller will run normally for a period of time, and the error signals of other devices affected by power failure may be received.

5.3 System upgrade

1. USB flash drive

The PLC system can be upgraded through USB. Select the upgrade package provided by the manufacturer and copy it to a USB flash drive, plug it into any USB interface of the controller, power off and restart the controller. When the RUN light is on, the upgrade is completed.

6 programming tools and downloads

6.1 programming tool acquisition

The user programming software Codesys, installation files and reference materials of TX-201 series medium-sized programmable controllers can be obtained through the following channels:

- Obtain software installation CDs from our distributors at all levels;
- Download the product reference materials for free on the page of "Technical Support" and "Download Center" of our official website (<https://www.szjmc.com/>);

Because our Company is constantly improving its products and materials, users are advised to update the software version in time when necessary and consult the latest published reference materials, which is beneficial to users' application design.

6.2 Programming Environment and Software Installation

6.2.1 Environmental requirements

Desktop PC or portable PC with the following conditions:

1. Operating systems above Windows 7 (excluding Windows 7); 64-bit operating system is recommended;
2. Memory: 4GB or higher;
3. Space: The available hard disk space is more than 5GB.

The connection between PC and TX-201 series controller is completed as follows:

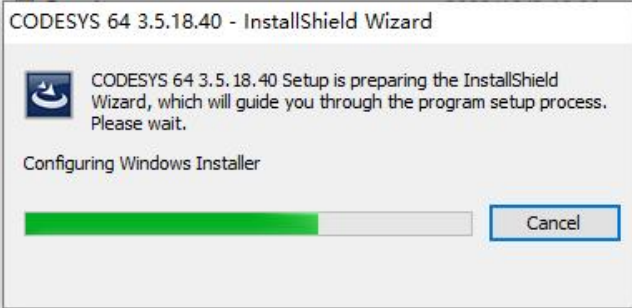
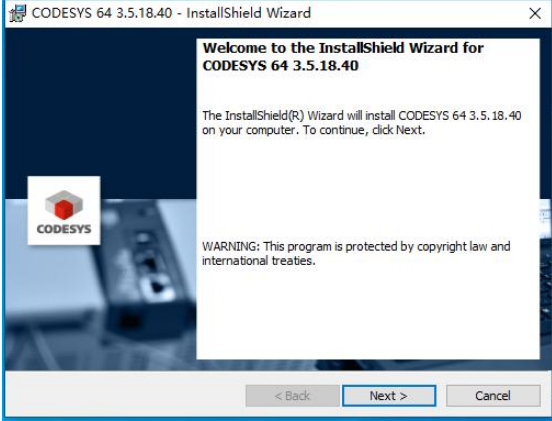
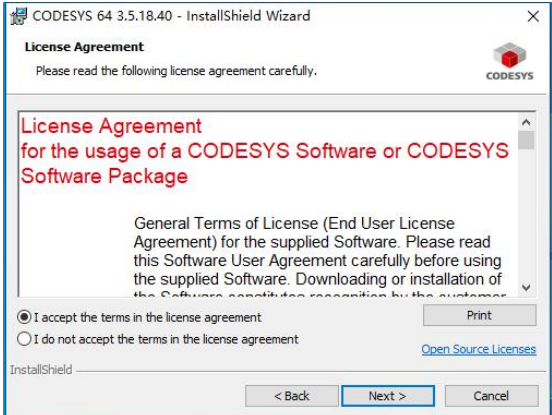
attended mode	Required cable	remarks
Connect with LAN network cable.	A free LAN port and a network cable are required in the local network.	Support the long-distance connection between PC and TX-201 series controller, such as programming TX-201 series controller in the workshop in the office and other application environments.

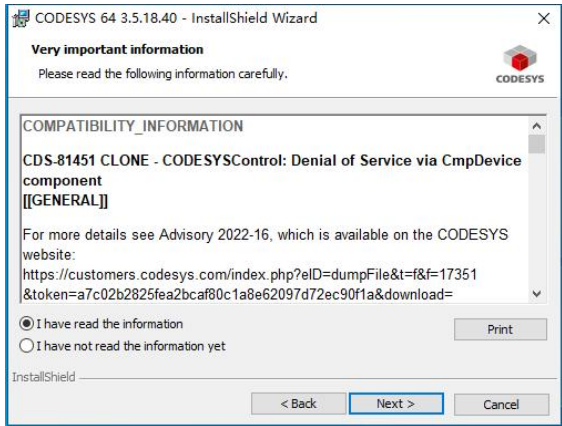
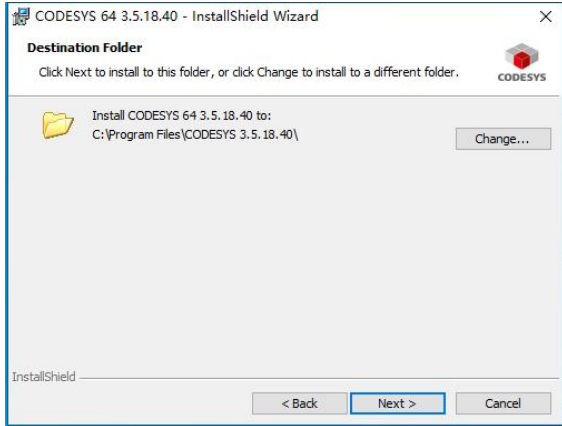
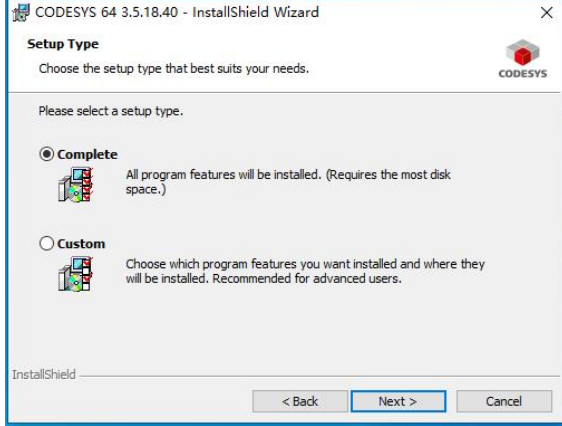
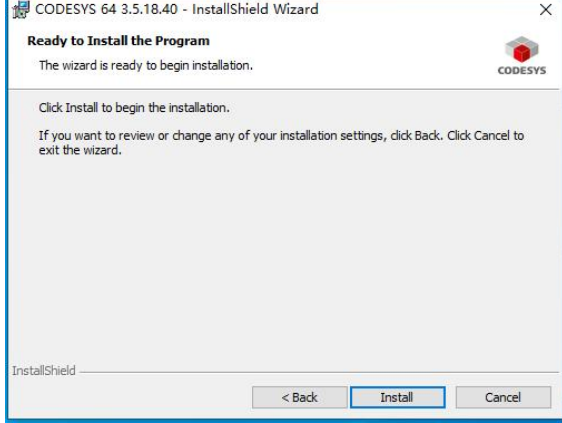
6.2.2 Installation steps

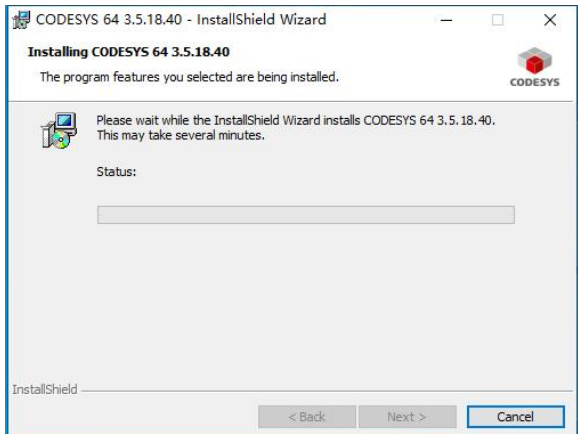
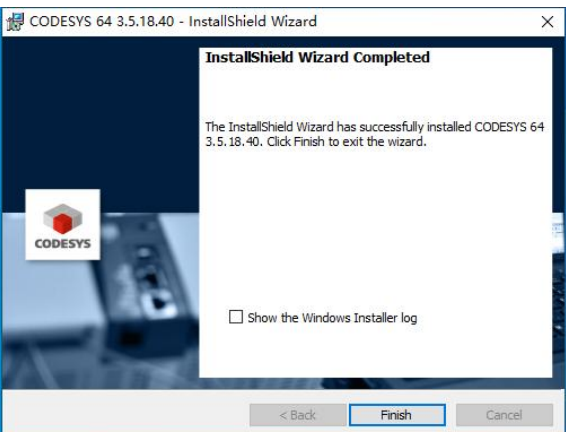
If it is the first time to install Codesys, please check the remaining space of the computer hard disk, confirm that the remaining space of the target disk to be installed is more than 2GB, and then install it directly.

If you are upgrading and installing Codesys, please first back up your existing working files, uninstall the old version of Codesys, restart your computer, and then start installing the new version of the software.

Through Windows Explorer, in the directory where the installation file is located, double-click to open the Codesys (64 *. *. *. *. *. exe file (64 *. *. *. *. *. is the software version of codesys).

step	describe	interface
one	Double-click to open and start the installation. You can see the following interface and enter the installation preparation stage.	
2	The following prompt interface appears, click "Next" to start the installation.	
three	Select receive, click "Next" and enter the next step.	

<p>four</p>	<p>Select read, click "Next" and go to the next step.</p>	
<p>five</p>	<p>Set the installation path, preferably on disk C, and click "Next" to enter the next step.</p>	
<p>six</p>	<p>Select Complete at the installation content option to completely install the content included in the software. Of course, you can also choose custom for selective installation, and you can check it individually. If there are no special requirements, just click Complete by default and click Next.</p>	
<p>seven</p>	<p>Click "Install".</p>	

<p>eight</p>	<p>It takes about 10 minutes to start the installation.</p>	
<p>nine</p>	<p>Click Finish to complete the installation.</p>	

Coding assistant

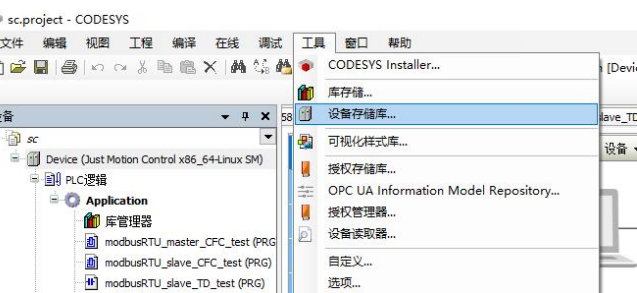
After installation, you can check all the options of Tools, Options and Coding Assistant to facilitate subsequent programming.

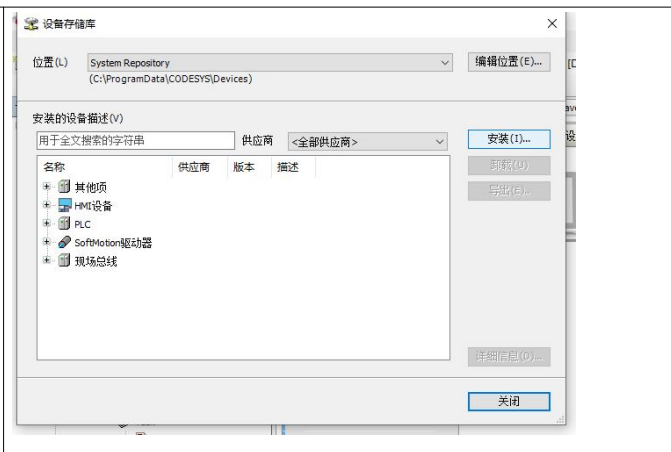
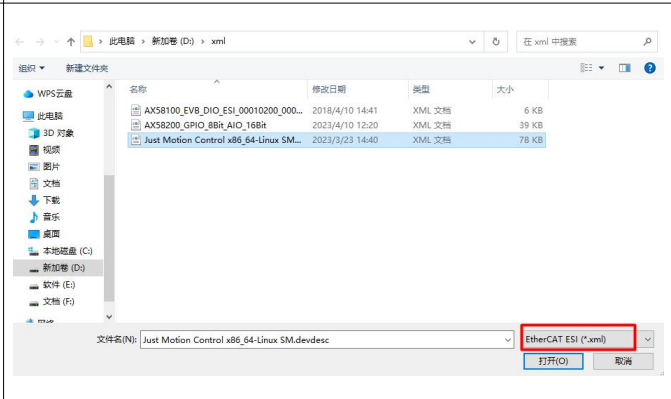
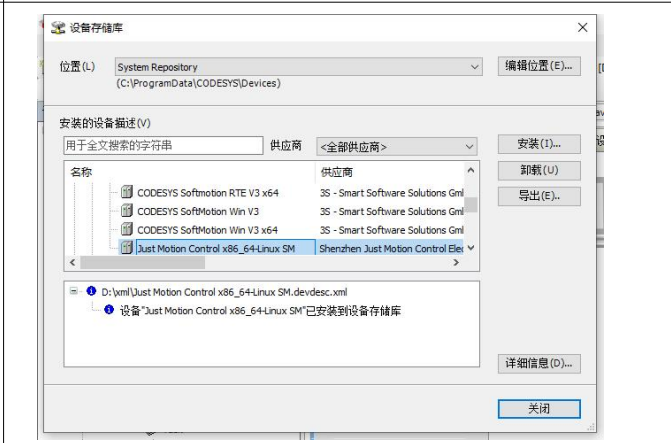
Language settings

After the installation, the operating language of Codesys interface is simplified Chinese by default. If you need to switch to other languages, you can click Tools Options Language Settings in the main interface of the software to make language selection settings.

Add device file

Using TX-201 series controllers requires adding special equipment files.

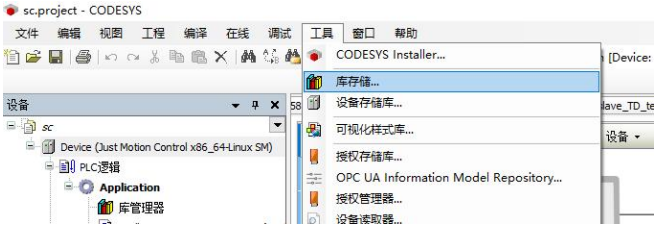
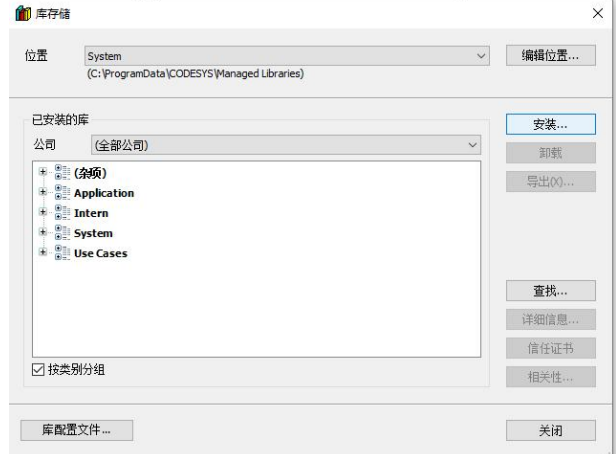
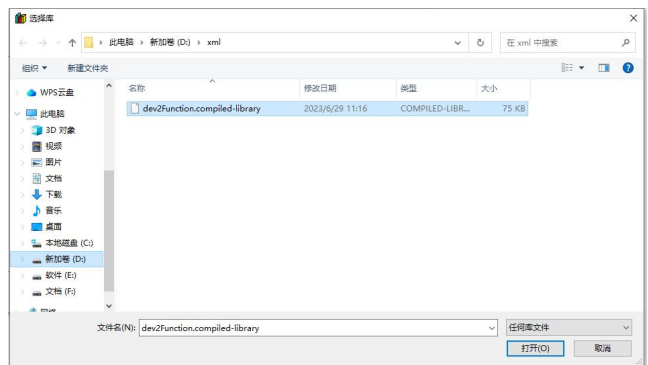
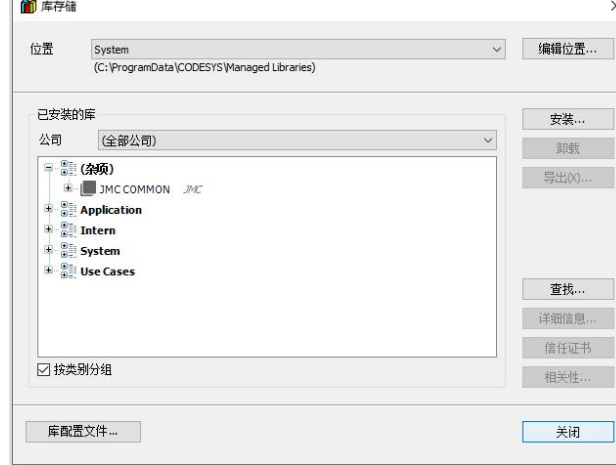
step	describe	interface
<p>one</p>	<p>Click "Tools" and "Device Storage" in the main interface of the software.</p>	

2	Click "install"	
three	Select "EtherCAT ESI(*.xml)" format, select the description file "Just Motion Control x86_64-Linux sm. devdesc" provided by Jiemeikang, and click "Open".	
four	Click "Close"	

Add library file

To use TX-201 series controllers, you need to add the library files provided by Jiemeikang.

step	describe	interface
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<p>one</p>	<p>Click "Library Storage" in "Tools" in the main interface of the software.</p>	
<p>2</p>	<p>Click "Install" in the popup window.</p>	
<p>three</p>	<p>Select the library file "dev2Function.compiled-library" provided by Jjemeikang, and click "Open".</p>	
<p>four</p>	<p>You can see that there is an additional library file in Miscellaneous. Click Close.</p>	

6.2.3 uninstall Codesys

Use the standard Windows system software uninstallation method to uninstall Codesys. The specific steps are as follows:

1. exit Codesys software and confirm that Gateway is closed. If there is a CodeSys icon in the operating system taskbar, you can right-click the icon and select Exit to close the Gateway.
2. select Start -> Settings -> Control Panel.
3. Click "Uninstall Programs".
4. Select the software item to be uninstalled and find "Codesys".
5. Right-click the "uninstall" button and confirm the deletion.

7 maintenance

7.1 Regular maintenance inspection

1. Check the project regularly.

serial number	project	Check content	criterion	deal with
1	Power supply	Measure through the power terminal to check whether the voltage change is within the range of standard voltage change.	DC 12V(+20%/-20%)	Please use a multimeter to detect and change the terminals, and control the power supply within the allowable voltage change range.
2	surroundings	Whether the ambient temperature is moderate (when used in the cabinet, the temperature in the cabinet is the ambient temperature)	-10~ 55 °C	Please use a thermometer to measure the ambient temperature, and control the ambient temperature within the range of -10 ~ 55°C.
		Whether the ambient humidity (humidity in the cabinet) is moderate (when used in the cabinet, the humidity in the cabinet is the ambient humidity)	10 ~ 90%RH, there should be no condensation.	Please use a hygrometer to measure the ambient humidity and rectify the surrounding environment, and control the ambient humidity within the range of 10 ~ 90%RH. The temperature changes sharply, so please confirm whether there is condensation.
		Is it exposed to direct sunlight?	Direct sunlight should be avoided	Please take shelter measures.
		Whether there is dust, oil fume, conductive dust and corrosive gas.	No allow	Please clear it and take shelter measures.
		Whether corrosive gas and flammable gas exist.	No allow	Please detect it by smell or gas sensor.
		Does it directly cause vibration or impact to the main body?	Is it within the specifications of vibration resistance and impact resistance?	Please set up cushioning materials for vibration resistance and impact resistance.
Are there any interference sources nearby?	No allow	Please stay away from interference sources or take shielding measures.		
3	Installation and wiring status	Is the connector connecting the cable fully inserted and locked?	There should be no looseness.	Please insert it completely and lock it with screws.
		Whether the screws of external wiring are loose.	There should be no looseness.	Please tighten with a Phillips screwdriver.
		Is the crimping terminal for external wiring too close?	Proper spacing should be ensured.	Please check it visually and correct it.
		Is the external connection cable about to break?	Appearance should be normal.	Please visually inspect and replace the cable.

2. Tools needed

- Phillips screwdriver
- Multimeter or digital instrument

