



MD580-SI-ECAT1 EtherCAT Communication Expansion Card User Guide



Industrial
Automation



Intelligent
Elevator



New Energy
Vehicle



Industrial
Robot



Rail
Transit



Data code P500021579A00

Legal Information

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Proper transportation, storage, assembly, installation, commissioning, operation, and maintenance are required to ensure the safe operation of the product without any problems. The required ambient conditions must be met. All operations must follow the guidelines provided in this documentation.

Preface

Introduction

The MD580-SI-ECAT1 industrial Ethernet slave module conforms to the common EtherCAT industrial Ethernet standards. The module is mainly used together with the MD580 series AC drive. With the module, the MD580 can serve as the EtherCAT slave and controlled by the EtherCAT master. This effectively improves the communication efficiency and enriches the networking function of the MD580.

This guide describes the technical data, terminals, dimensions, installation, wiring, communication, and troubleshooting of the product.

Revision History

Date	Version	Revision
September 2025	A00	First release

Access to the guide

The selection guide is not delivered along with the product. You can download the PDF version in the following means:

- Inovance official website: Do keyword search under Support > Documentation download at <https://www.inovance.com/global>
- Scan the QR code on the product with your smart phone.
- My Inovance APP: Scan the QR code below to install the app, where you can search for and download user guides.



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Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is caused by proper operation of the user.

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- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

The maintenance is charged according to the latest Price List of Inovance. If otherwise agreed upon, the terms and conditions in the agreement shall prevail.

For details, see Product Warranty Card.

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1 Fundamental Safety Instructions

1.1 Fundamental Safety Instructions

Safety Disclaimer

- This chapter presents essential safety instructions for a proper use of the equipment. Before operating the equipment, read through the guide and comprehend all the safety instructions. Failure to comply with the safety precautions may result in death, serious injury, or equipment damage.
- "CAUTION", "WARNING", and "DANGER" items in the guide only indicate some of the precautions that need to be followed; they just supplement the safety precautions.
- Use this equipment according to the designated environment requirements; otherwise, a fault may occur. Malfunction or damage caused by improper use is not covered by warranty.
- Inovance shall take no responsibility for any personal injuries or property damage caused by improper use.

Safety Levels and Definitions



Indicates that failure to comply with the notice will result in severe personal injuries or even death.



Indicates that failure to comply with the notice may result in severe personal injuries or even death.



Indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage.

Fundamental Safety Instructions

- Drawings in the guide are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions.
- The drawings in the guide are shown for illustration only and may be different from the product you purchased.
- Operators must take mechanical precautions to protect personal safety and wear protective equipment, such as anti-smashing shoes, safety clothing, safety glasses, protective gloves, and protective sleeves.

Unpacking

 WARNING

- Do not install the equipment if you find damage, rust, or signs of use on the equipment or accessories upon unpacking.
- Do not install the equipment if you find water seepage or missing or damaged components upon unpacking.
- Do not install the equipment if you find the packing list does not conform to the equipment you received.

 CAUTION

- Check whether the packing is intact and whether there is damage, water seepage, dampness, and deformation before unpacking.
- Unpack the package in sequence. Do not hit the package violently.
- Check whether there is damage, rust, or injuries on the surface of the equipment and equipment accessories before unpacking.
- Check whether the package contents are consistent with the packing list before unpacking.

Storage and Transportation

- Large-scale or heavy equipment must be handled by qualified professionals using specialized hoisting equipment. Failure to comply may result in personal injury or equipment damage.
- Before hoisting the equipment, ensure the equipment components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in personal injuries or equipment damage.
- Never stand or stay below the equipment when the equipment is being hoisted by the hoisting equipment.
- When hoisting the equipment with a steel rope, ensure the equipment is hoisted at a constant speed without suffering from vibration or shock. Do not turn the equipment over or let the equipment stay hanging in the air. Failure to comply may result in personal injuries or equipment damage.



- Handle the equipment with care during transportation and mind your steps to prevent personal injuries or equipment damage.
- When carrying the equipment with bare hands, hold the equipment casing firmly with care to prevent parts from falling. Failure to comply may result in personal injuries.
- Store and transport the equipment based on the storage and transportation requirements. Failure to comply may result in equipment damage.
- Do not store or transport the drive in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing the drive for more than three months. Long-term storage requires stricter protection and necessary inspections.
- Pack the drive strictly before transportation. Use a sealed box for long-distance transportation.
- Never transport the equipment with other device or materials that may harm or have negative impacts on the equipment.

Installation



- The equipment must be operated only by professionals with electrical knowledge. Non-professionals are not allowed.



- Read through the guide and safety instructions before installation.
- Do not install the equipment in places with strong electric or magnetic fields.
- Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards.
- Do not wear loose clothes or accessories during installation. Failure to comply may result in electric shock.
- When installing the equipment in a closed environment (such as a cabinet or casing), use a cooling device (such as a fan or air conditioner) to cool the environment down to the required temperature. Failure to comply may result in equipment over-temperature or a fire.
- Do not retrofit the equipment.
- Do not fiddle with the bolts used to fix equipment components or the bolts marked in red.
- When the equipment is installed in a cabinet or final assembly, a fireproof enclosure providing both electrical and mechanical protections must be provided. The IP rating must meet IEC standards and local laws and regulations.
- Before installing devices with strong electromagnetic interference, such as a transformer, install a shielding device for the equipment to prevent malfunction.
- Install the equipment onto an incombustible object such as a metal. Keep the equipment away from combustible objects. Failure to comply will result in a fire.



- Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the equipment and causing faults. After installation, remove the cloth or paper on the top of the equipment to prevent over-temperature caused by poor ventilation due to blocked ventilation holes.
- Resonance may occur when the equipment operating at a constant speed switches to variable speed operations. In this case, install the vibration-proof rubber under the motor frame or use the vibration suppression function to reduce resonance.

Wiring**DANGER**

- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Before wiring, cut off all the power supplies of the equipment. and wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. After waiting for the designated time, measure the DC voltage in the main circuit to ensure the DC voltage is within the safe voltage range. Failure to comply can result in an electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with power on. Failure to comply can result in an electric shock.
- Check that the equipment is grounded properly. Failure to comply can result in electric shock.

**WARNING**

- Do not connect the input power supply to the output end of the equipment. Failure to comply will result in equipment damage or even a fire.
- When connecting a drive to the motor, check that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor rotation.
- Cables used for wiring must meet cross sectional area and shielding requirements. The shield of the cable must be reliably grounded at one end.
- Tighten the terminal screws with the tightening torque specified in the user guide. Improper tightening torque may result in overheat, damage to the connecting parts, or a fire.
- After wiring is done, check that all cables are connected properly and no screws, washers or exposed cables are left inside the equipment. Failure to comply may result in electric shock or equipment damage.

**CAUTION**

- During wiring, follow proper electrostatic discharge (ESD) procedures and wear an anti-static wrist strap. Failure to comply can result in damage to the equipment or internal product circuits.
- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment for grounding purpose. Failure to comply will result in equipment malfunction.

Power-on



- Before power-on, check that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Check that the power supply meets equipment requirements before power-on to prevent equipment damage or a fire.
- After power-on, do not open the cabinet door or protective cover of the equipment, touch any terminal, or disassemble any unit or component of the equipment. Failure to comply will result in an electric shock.



- Perform a trial run after wiring and parameter setting to ensure the equipment operates safely. Failure to comply may result in personal injuries or equipment damage.
- Before power-on, check that the rated voltage of the equipment is consistent with that of the power supply. Failure to comply may result in a fire.
- Before power-on, check that no one is near the equipment, motor, or machine. Failure to comply may result in death or personal injuries.

Operation



- The equipment must be operated only by professionals. Failure to comply will result in death or personal injury.
- Do not touch any connecting terminals or disassemble any unit or component of the equipment during operation. Failure to comply will result in an electric shock.



- Do not touch the equipment enclosure, fan, or resistor with bare hands. Failure to comply may result in personal injury.
- During operation, prevent metal or other objects from falling into the equipment. Failure to comply may result in a fire or equipment damage.

Maintenance**DANGER**

- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Do not maintain the equipment with power ON. Failure to comply will result in an electric shock.
- Before maintenance, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
- In case of a permanent magnet motor, do not touch the motor terminals immediately after power-off because the motor terminals will generate induced voltage during rotation even after the equipment power supply is off. Failure to comply will result in an electric shock.

**WARNING**


- Perform routine and periodic inspection and maintenance on the equipment according to maintenance requirements and keep a maintenance record.

Repair**DANGER**

- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Do not repair the equipment with power ON. Failure to comply can result in an electric shock.
- Before inspection and repair, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.





**WARNING**

- Submit the repair request according to the warranty agreement.
- When the fuse is blown or the circuit breaker or earth leakage current breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply may result in death, personal injuries or equipment damage.
- When the equipment is faulty or damaged, require professionals to perform troubleshooting and repair by following repair instructions and keep a repair record.
- Replace quick-wear parts of the equipment according to the replacement instructions.
- Do not use damaged equipment. Failure to comply may result in death, personal injuries, or severe equipment damage.
- After the equipment is replaced, check the wiring and set parameters again.

Disposal
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">  WARNING </div> <ul style="list-style-type: none"> • Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, personal injury, or even death. • Recycle retired equipment in accordance with industry waste disposal standards to avoid environmental pollution.

Safety Label

To ensure safe operation, comply with equipment-related safety labels. The following table describes the meaning of the safety labels.

Safety Label	Description
   	<ul style="list-style-type: none"> • Be cautious of the risk of electric shock. Hazardous voltage still exists within 10 minutes after power-off. • Read through the user guide before use.

1.2 Industrial Information Security

This product provides an interface to connect to the network and transmit data through the network interface. To protect factories, systems, machines, and networks from cyber attacks, appropriate industrial information security protection mechanisms need to be implemented to ensure the safe operation of factories, systems, machines, and networks.

The customer is responsible for providing and continuously ensuring a secure connection between the product and the customer's network or any other network, to prevent unauthorized access to their factory, systems, machines, and networks. The system or machine may only be connected to the corporate network or the Internet when a secure connection is established and proper security measures are in place (for example, using antivirus software and installing firewalls).

INOVANCE continuously develops and improves its products and solutions to enhance safety. It is strongly recommended that you update your products promptly and always use the latest product versions.



Malware (such as viruses, Trojans, and worms) can bring the device into an unsafe operating state, resulting in death, serious injury, and property damage. Observe the following precautions strictly:

- Always use the latest software version. If the product version is no longer supported or the latest program version is not applied, customers are at increased risk of cyberattacks.
 - Implement and maintain appropriate security measures (including but not limited to deploying anti-virus software, firewall, WAF, IPS/IDS, situational awareness system, ID verification, and data encryption) to prevent files in the removable storage device from being damaged by malware and to protect products, networks, systems, and interfaces from unauthorized access, disruption, intrusion, data leakage, or information theft.
 - Check all safety-related interfaces and settings after commissioning.
-

2 Product Information

2.1 Introduction

The MD580-SI-ECAT1 industrial Ethernet slave module conforms to the common EtherCAT industrial Ethernet standards. This module is mainly used together with the MD580 series AC drive. With this module, the MD580 can serve as the EtherCAT slave and controlled by the EtherCAT master. This effectively improves the communication efficiency and enriches the networking function of MD580.

Features:

- Passes the Conformance Test Tool (CTT) test.
- Supports up to 16 RXPDOs and 16 TXPDOs, as well as dynamic configuration of PDOs.
- Supports DC synchronous clock mode.
- Supports CoE protocol (PDO + SDO).
- Support a minimum of 125 μs communication cycle.
- Supports various topology structures, including chain, bus, tree, and star types.
- Installed in the slot of the communication expansion card (CN13) directly, without the need for an external power supply.



Figure 2-1 Appearance of MD580-SI-ECAT1 card

2.2 Applicable AC drives

Card model	Applicable AC drive
MD580-SI-ECAT1	MD580 and MD580S

Note

This document also applies to the MD580S series AC drive.

2.3 Technical Specifications

Table 2-1 Communication specifications

Item	Specifications
Communication protocol	EtherCAT protocol
Services available	CoE (CANopenover EtherCAT)
Network establishment time (Link)	Within 2s
Operation mode	DC mode (minimum synchronization time 500 μ s), SM mode
Physical layer	100BASE-TX
Duplex mode	Full duplex
Topology	Ring, linear, star, and tree types
Transmission rate	100 Mbps (100Base-TX)
Transmission medium	Shielded CaT 5e or higher network cable
Transmission distance	Shorter than 100 m between two nodes (with proper environment and cables)
Communication terminal	N/A
Communication type	Based on Ethernet protocol
EtherCAT frame length (bytes)	44 to 1498
Cyclical process data	Maximum of 16 PDOs per direction, each not exceeding 32 bytes in length
Acyclical mailbox data	SDO request SDO response
Min. synchronization cycle	500 μ s
Maximum cable length	100 m
Maximum number of connected slaves	65535

Table 2-2 Environment and installation specifications

Item	Description
Ambient temperature for operation	-10°C to +55°C
Ambient temperature for storage	-40°C to +70°C
Ambient humidity	5% RH to 95% RH (without condensation)
Operating environment	Free from corrosive gases
Installation method	Fixed by snap-fit joints and screws
IP rating	IP20
Ventilation method	Natural ventilation

2.4 Dimensions

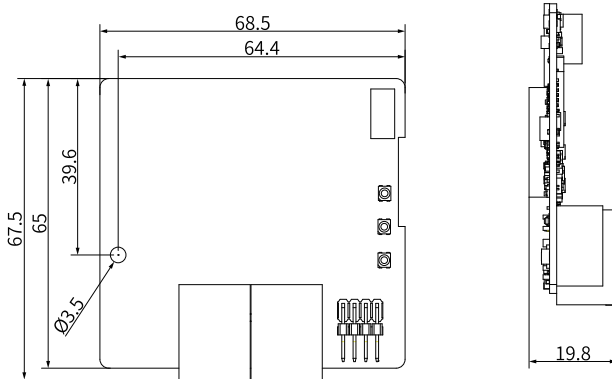


Figure 2-2 Dimensions of MD580-SI-ECAT1 card (mm)

2.5 Description of terminals

Terminal layout

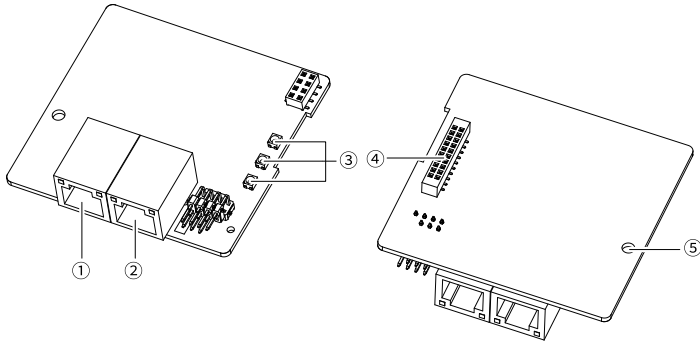


Figure 2-3 Product diagram

Description of terminals

No.	Name	Description
①	EtherCAT communication terminal X1	Communication terminal IN
②	EtherCAT communication terminal X2	Communication terminal OUT
③	Status indicator	Indicates the operating status of the module and bus. Bus communication faults can be tracked through three status indicators. For details on the indicator descriptions, see " Troubleshooting for Communication " on page 48
④	Slot terminal	Used for electrical connection with the MD580 drive.
⑤	Screw fixing hole	Used to secure the module to MD580 drive to ensure proper connection of the PE layer.

3 Installation Instructions

Installation precautions

- Before installation or removal, ensure that the module is powered off to avoid damage to the module.
- Do not drop or subject the MD580-SI-ECAT1 module to shock to avoid damage.
- Do not dismantle the MD580-SI-ECAT1 module to avoid damage.
- Tighten the screws according to the required tightening torque to avoid damage or improper fastening.

Tightening torque for screws and fasteners

The screws mentioned in this guide must be tightened according to the following tightening torque.

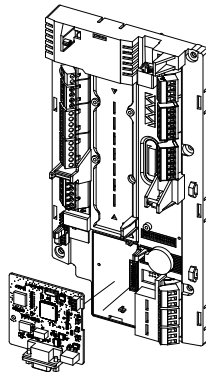
Table 3-1 Tightening torque of the grounding screw

Screw	Tightening torque
M3	0.55 N·m

Installation method

The MD580-SI-ECAT1 module can be installed in the expansion slot of the MD580.

1. Install the module to the expansion slot of the MD580.



2. Align the slot terminals of the module with the terminals on the control board and press firmly to ensure the snap-fit joints on both sides of the control board bracket securely fasten the module. Then, tighten the grounding screw of the module with a #1 Phillips screwdriver.

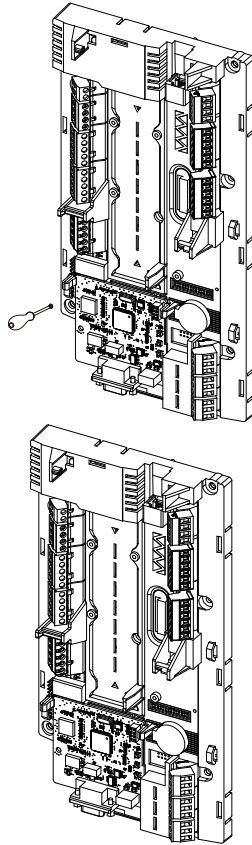


Figure 3-1

Removal procedure

1. Disconnect all power supplies and cables connected to the module.
2. Remove the grounding screw of the module with a Phillips screwdriver.
3. Loosen the snap-fit joints on both sides of the MD580-SI-ECA1 module, then pull the module outward.

4 Electrical Connection

EtherCAT supports various topology structures, including chain, bus, tree, and star types. This section describes the chain and star types.

Chain networking

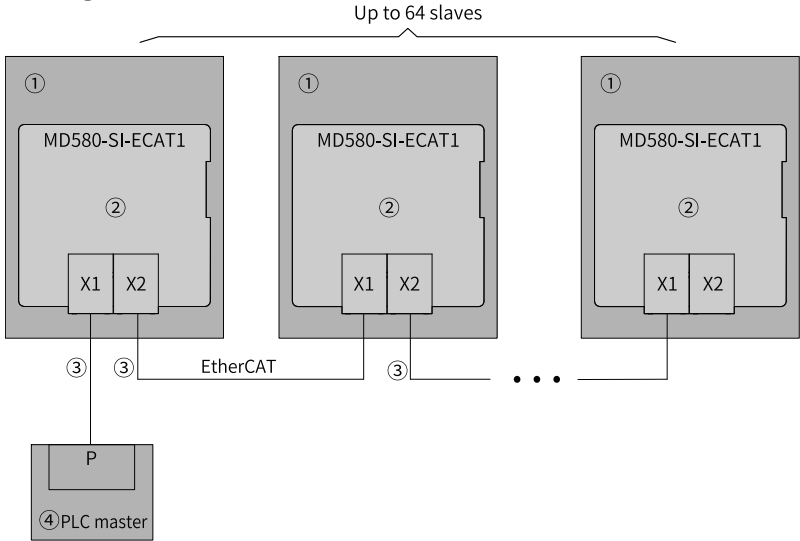


Figure 4-1 Chain networking topology

Table 4-1 Description of chain networking topology

No.	Name
①	MD580 AC drive
②	MD580-SI-ECAT1 industrial Ethernet module
③	Network cable (It is recommended to use shielded twisted pair Cat 5e Ethernet cable, and the registered jack used for crimping must have a metal shell for grounding shield protection.)
④	PLC master

Star networking

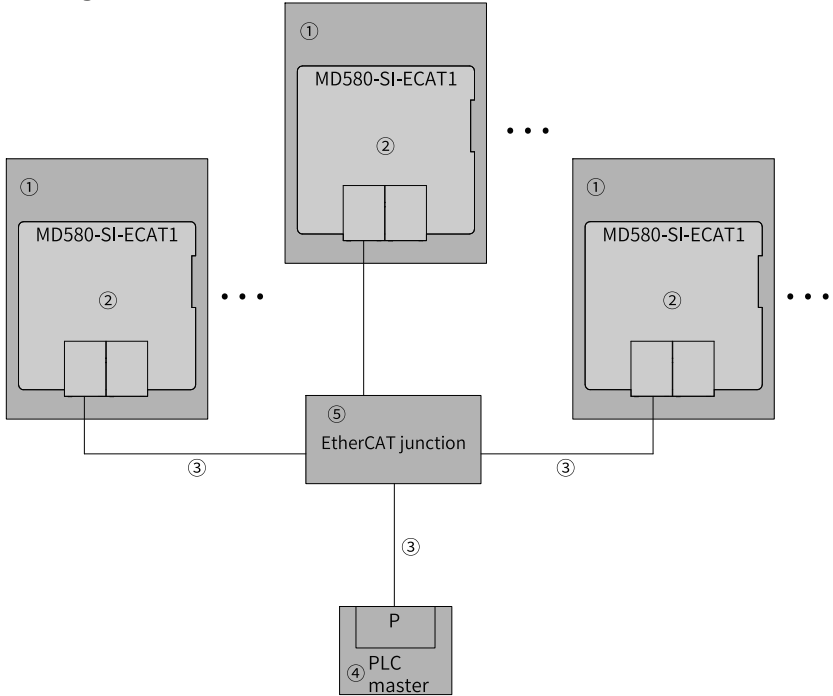


Figure 4-2 Star networking topology

Table 4-2 Description of star networking topology

No.	Name
①	MD580 AC drive
②	MD580-SI-ECAT1 industrial Ethernet module
③	Network cable (It is recommended to use shielded twisted pair Cat 5e Ethernet cable, and the registered jack used for crimping must have a metal shell for grounding shield protection.)
④	PLC master
⑤	EtherCAT junction

5 Description of Protocol

5.1 EtherCAT Protocol

EtherCAT, short for Ethernet Control Automation Technology, is a real-time Ethernet technology developed by Beckhoff. EtherCAT is based on standard Ethernet frame transmission, with a single frame capable of carrying up to 1486 bytes of data.

- EtherCAT supports almost all types of topologies, including star, linear, tree, and daisy-chain topologies, and accommodates various communication media such as cables and optical fiber.
- EtherCAT supports hot-swapping, ensuring flexibility in device connectivity.
- EtherCAT has virtually no device capacity limit, with up to 65,535 slaves supported to eliminate the need for switches in the network. Data can reach each slave directly through the topology structure.

5.2 PDO Data

The MD580 drive transmits data according to the selected transmission format of PZD with different length. The types of transmission formats supported depend on the xml file. The MD580 drive supports a maximum of 16 parameters to be written and read cyclically respectively. You can add or delete parameters to be written or read in the device configuration as required.

PDO data can be used to read and write process data of the MD580 drive, as shown in the following table.

Table 5–1 Bus adapter A

Writing parameters	Description
n2-68 to n2-83	Written via EtherCAT PDO communication cycle and updated to connector (U0-48 to U0-63, U15-18 to U15-33) after base value conversion (n2-36 to n2-51)
Reading parameters	Description
n2-52 to n2-67	Configured through n2-04...n2-19 and updated to n2-52...n2-67 to be read via EtherCAT PDO communication cycle after base value conversion (n2-20 to n2-35)

Table 5-2 Bus adapter B

Writing parameters	Description
n3-68 to n3-83	Written via EtherCAT PDO communication cycle and updated to connector (U0-64 to U0-79, U15-34 to U15-49) after base value conversion (n3-36 to n3-51)
Reading parameters	Description
n3-52 to n3-67	Configured through n3-04...n3-19 and updated to n3-52...n3-67 to be read via EtherCAT PDO communication cycle after base value conversion (n3-20 to n3-35)

5.3 SDO Data

EtherCAT service data object (SDO) is used to transfer acyclic data, such as communication parameter configurations and operation parameter configurations.

The CANopen over EtherCAT (CoE) service types include emergency messages, SDO requests, SDO responses, TxPDO, RxPDO, remote TxPDO transmission requests, remote RxPDO transmission request, and SDO information.

The SDO data can be used to read or write a single parameter of MD580.

6 Parameter Configuration

Parameter configuration flow

To set the MD580-SI-EtherCAT module, do as follows:

1. Select parameters to be set.
2. Check the slot of the module by parameters in A2 group.
3. Set the correct slot where the module is located through n14-00.
4. Select the fieldbus adapter A.
5. Select the bus type of the bus adapter (n2-00 = 5). If bus adapter B is selected, set n3-00 to 5.
6. Power on the control circuit of MD580 again.

Note

You can also select the fieldbus adapter B in step 4.

Table 6-1 Parameters of the MD580-SI-EtherCAT module

Param.	Name	Default value	Setpoint	Description
n2-00	Bus type for bus adapter A	0	5: EtherCAT module	Set either n2-00 or n3-00. Do not set n2-00 and n3-00 to the same value.
n3-00	Bus type for bus adapter B	0	5: EtherCAT module	
n14-00	Expansion slot selection	0	0: Disable 1: Expansion slot 1_1 2: Expansion slot 1_2 3: Expansion slot 1_3	Set this parameter according to the slot used.
n14-01	Online state	0	0: Offline 1: Online	-
n14-02	EtherCAT slave name	1	0 to 65535	-
n14-03	EtherCAT slave alias	1	0 to 65535	-
n14-04	Number of permissible EtherCAT synchronization interrupts	4	4 to 20	-
n14-06	Alias setting function switch	1	0: n14-03 1: Set by host controller	-
n14-11	Reception error count of port 1_0	0	0 to 65535	-

Param.	Name	Default value	Setpoint	Description
n14-12	Invalid frame count of port 1_0	0	0 to 65535	-
n14-13	Maximum number of forwarding errors of port 1_0	0	0 to 65535	-
n14-14	PDI and processing unit error count	0	0 to 65535	-
n14-15	Link loss count of port 1_0	0	0 to 65535	-
n14-16	Synchronization signal loss count	0	0 to 65535	-
n14-17	Application layer fault code	0	0 to 65535	-
n14-18	State machine and port link state	0	0 to 65535	-

7 Communication Example

7.1 Configuration for EtherCAT Communication with AM600

Networking description

The PLC used in this example is the AM600-CPU1608TN of Inovance. The programming software of the PLC is the InoProShop of Inovance. The commissioning software of the MD580 is the InoDriveStudio of Inovance. The software can be download from Inovance official website <https://www.inovance.com>.

Connect devices according to the following figure to complete networking. Set SOP-20-880 to the USB relay mode.

Note

AM600-CPU1608TN provides two Ethernet ports. CN4 is used for EtherCAT communication.

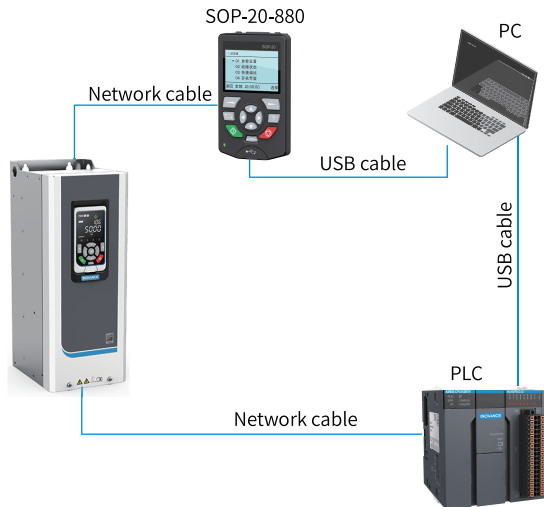
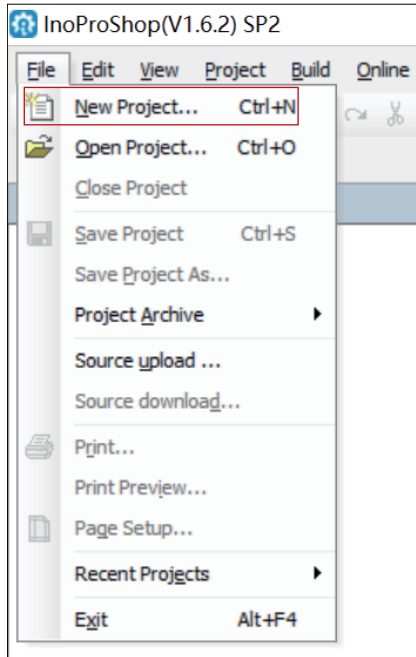


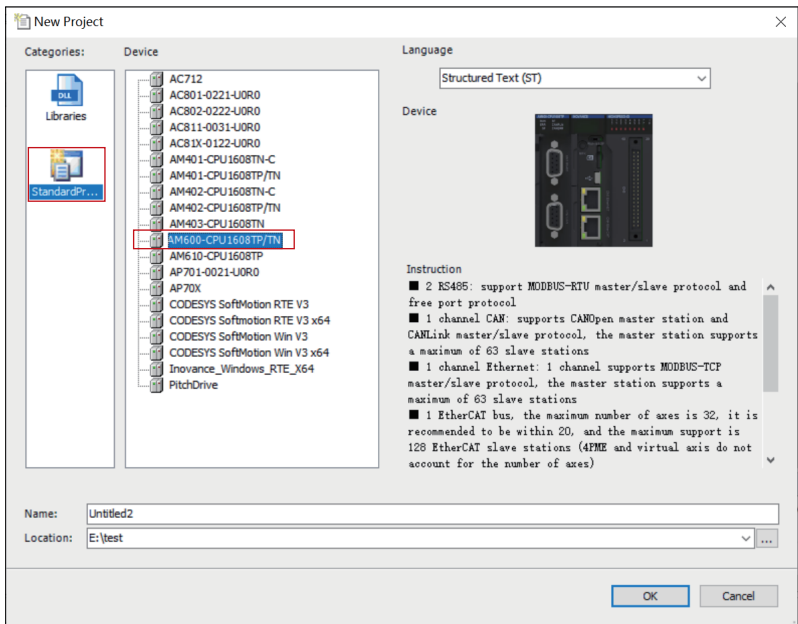
Figure 7-1 EtherCAT networking between MD580 and AM600

PLC configuration

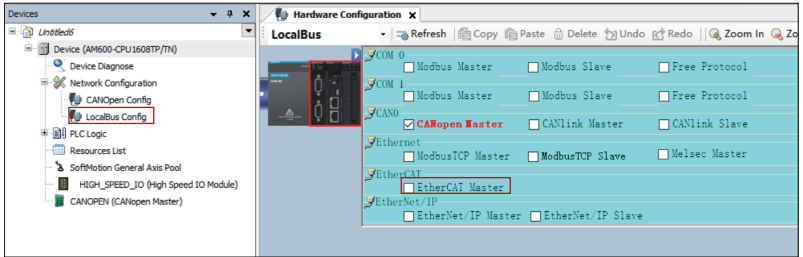
1. Create a project.



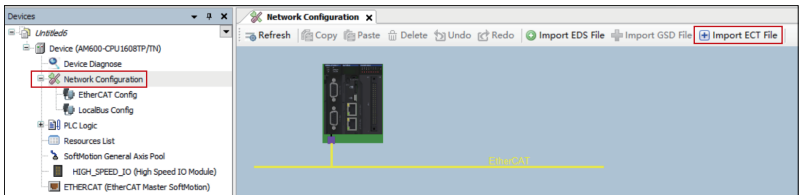
2. Select the PLC type.



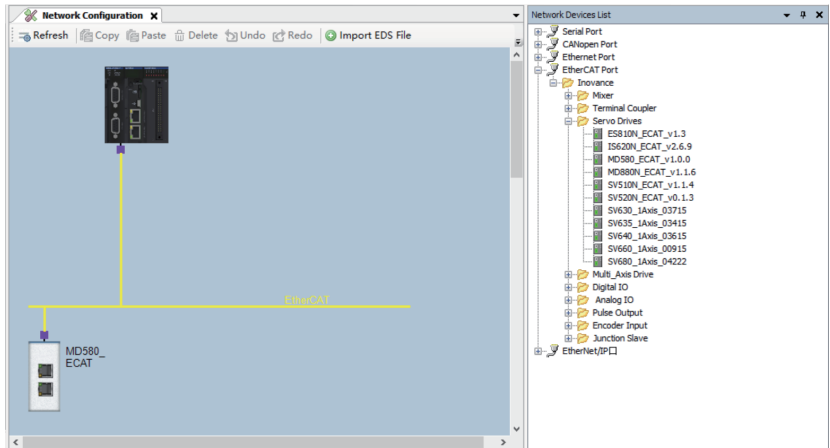
3. Set the AM600 to the EtherCAT master.



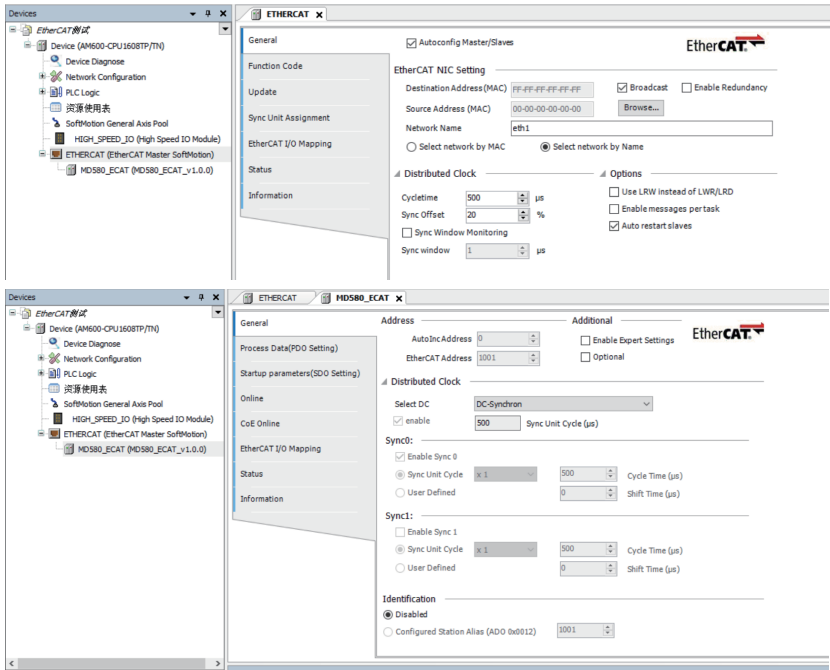
4. Install the XML file of MD580 to the EtherCAT master. You can obtain the XML file from Inovance agents or Inovance.



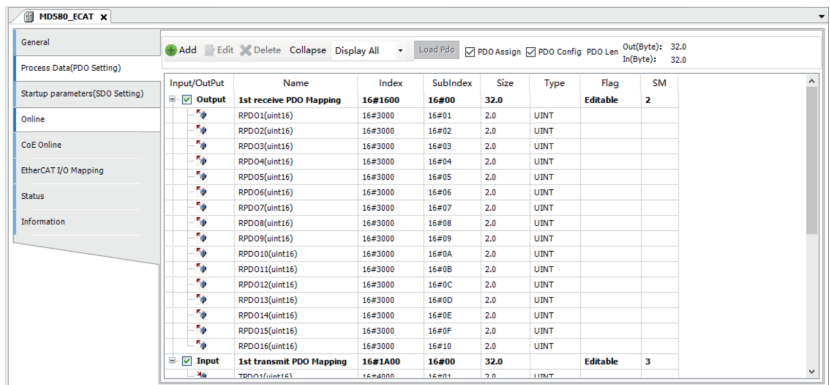
5. After installation, MD580_ECATOR is displayed in the "Network Device List". Drag MD580_ECATOR and drop it on the "Network Configuration" tab.



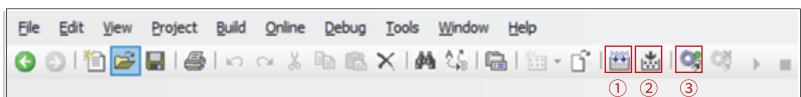
6. On the "General" tab, use default settings of parameters for the master and slave.



7. Configure the PDO. By default, 16 parameters are written and 16 parameters are read periodically. You can add or reduce parameters as required. The MD580 drive supports a maximum of 16 parameters to be read or written periodically.



8. After all settings are done, download the settings to the PLC.

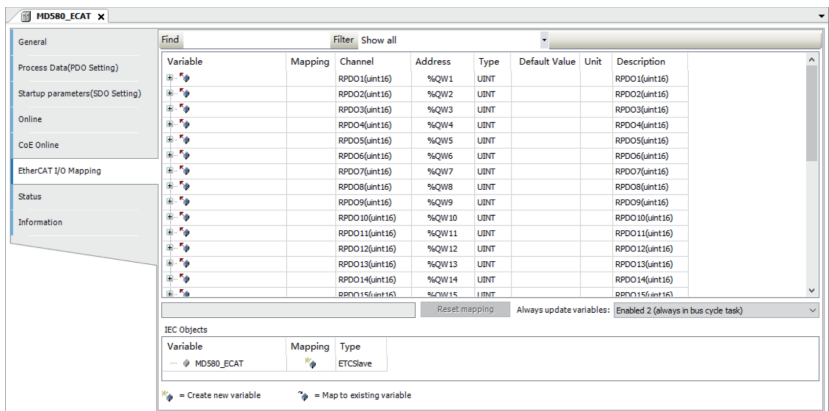


Note

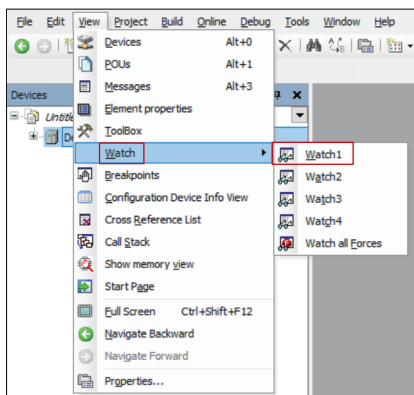
- ①: Compiling
- ②: Check programs.
- ③: Download

Process data configuration

1. After the PLC configuration is downloaded to the PLC, verify the transmission of process data, that is, check whether data can be sent and received between the MD580 and the PLC normally. Addresses IW1 to IW16 and QW1 to QW16 are monitored through the PLC. IW1 to IW16 and QW1 to QW16 are I/O address mapped by EtherCAT process data in the PLC.



2. Add addresses IW1 to IW16 and QW1 to QW16 to the monitoring table.



3. The PLC writes process data to the MD580 drive.

Expression	Application	Type	Value	Prepared value	Executionpoint	Address	Comm...
%QW1	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		
%QW2	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		
%QW3	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		
%QW4	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		
%QW5	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		
%QW6	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		
%QW7	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		
%QW8	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		
%QW9	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		
%QW10	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		
%QW11	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		
%QW12	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		
%QW13	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		
%QW14	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		
%QW15	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		
%QW16	Device.Application	WORD	<Not logged in>		Cyclic Monitoring		

- Copy
- Paste
- Cut
- Delete
- Select All
- Input Assistant...
- Write values
- Force values
- Unforce values
- Add All Forces To Watchlist
- Display Mode

功能码	名称		当前值
n2-57	[Process data output 6]	Data display	0x1000
n2-58	[Process data output 7]	Data display	0x1000
n2-59	[Process data output 8]	Data display	0x1000
n2-60	[Process data output 9]	Data display	0x1000
n2-61	[Process data output 10]	Data display	0x1000
n2-62	[Process data output 11]	Data display	0x1000
n2-63	[Process data output 12]	Data display	0x1000
n2-64	[Process data output 13]	Data display	0x1000
n2-65	[Process data output 14]	Data display	0x1000
n2-66	[Process data output 15]	Data display	0x1000
n2-67	[Process data output 16]	Data display	0x1000
n2-68	[Process data input 1]	Data display	0x0001
n2-69	[Process data input 2]	Data display	0x0002
n2-70	[Process data input 3]	Data display	0x0003
n2-71	[Process data input 4]	Data display	0x0004
n2-72	[Process data input 5]	Data display	0x0005
n2-73	[Process data input 6]	Data display	0x0006
n2-74	[Process data input 7]	Data display	0x0007
n2-75	[Process data input 8]	Data display	0x0008
n2-76	[Process data input 9]	Data display	0x0009
n2-77	[Process data input 10]	Data display	0x0011
n2-78	[Process data input 11]	Data display	0x0022
n2-79	[Process data input 12]	Data display	0x0033
n2-80	[Process data input 13]	Data display	0x0044
n2-81	[Process data input 14]	Data display	0x0055
n2-82	[Process data input 15]	Data display	0x0066
n2-83	[Process data input 16]	Data display	0x0077

4. The MD580 writes the process data to the PLC for configuration through n2-04 to n2-19. The constant setpoint 2 is 100%, corresponding to 16#1000.

MD580---[Parameter list]---->n2[FBA-A] X

Parameter group

- Custom parameter group
- Modified parameters
- All parameters
 - A[System]
 - b[Control command]
 - C[Setpoint]
 - d[Motor parameter]
 - E[Motor control]
 - F[I/O]
 - H[Diagnostic]
 - L[Application function]
 - n[Communication and Extension]
 - n0[InoLink]
 - n1[On board Modbus RTU]
 - n2[FBA-A]
 - n3[FBA-B]
 - n5[Encoder]
 - n6[reserved]
 - n10[Modbus RTU]
 - n12[CANOpen]
 - n14[EtherCat]
 - n16[Profibus-DP]
 - n17[ProfiNet IO]

功能码	名称	当前值
n2-00	[FBA-A] Bus type	1[Modbus RTU]
n2-01	[FBA-A] Comm. wire breakage meas. delay	0.10
n2-02	[FBA-A] Comm. mode selection	0[Standard]
n2-03	Continuous CRC error meas. setpoint	0
n2-04	Process data output 1	U6-01[FIX_WORD 2]
n2-05	Process data output 2	U6-01[FIX_WORD 2]
n2-06	Process data output 3	U6-01[FIX_WORD 2]
n2-07	Process data output 4	U6-01[FIX_WORD 2]
n2-08	Process data output 5	U6-01[FIX_WORD 2]
n2-09	Process data output 6	U6-01[FIX_WORD 2]
n2-10	Process data output 7	U6-01[FIX_WORD 2]
n2-11	Process data output 8	U6-01[FIX_WORD 2]
n2-12	Process data output 9	U6-01[FIX_WORD 2]
n2-13	Process data output 10	U6-01[FIX_WORD 2]
n2-14	Process data output 11	U6-01[FIX_WORD 2]
n2-15	Process data output 12	U6-01[FIX_WORD 2]
n2-16	Process data output 13	U6-01[FIX_WORD 2]
n2-17	Process data output 14	U6-01[FIX_WORD 2]
n2-18	Process data output 15	U6-01[FIX_WORD 2]
n2-19	Process data output 16	U6-01[FIX_WORD 2]
n2-20	[Process data output 1] Comm. base value	0
n2-21	[Process data output 2] Comm. base value	0

Watch1

Expression	Application	Type	Value	Prepared value	Executionpoint
%QW1	Device.Application	WORD	16#0000	16#0001	Cyclic Monitoring
%QW2	Device.Application	WORD	16#0000	16#0002	Cyclic Monitoring
%QW3	Device.Application	WORD	16#0000	16#0003	Cyclic Monitoring
%QW4	Device.Application	WORD	16#0000	16#0004	Cyclic Monitoring
%QW5	Device.Application	WORD	16#0000	16#0005	
%QW6	Device.Application	WORD	16#0000	16#0006	
%QW7	Device.Application	WORD	16#0000	16#0007	
%QW8	Device.Application	WORD	16#0000	16#0008	
%QW9	Device.Application	WORD	16#0000	16#0009	
%QW10	Device.Application	WORD	16#0000	16#000B	
%QW11	Device.Application	WORD	16#0000	16#0016	
%QW12	Device.Application	WORD	16#0000	16#0021	
%QW13	Device.Application	WORD	16#0000	16#002C	
%QW14	Device.Application	WORD	16#0000	16#0037	
%QW15	Device.Application	WORD	16#0000	16#0042	
%QW16	Device.Application	WORD	16#0000	16#004D	

MD580---[Parameter list]---->n2[FBA-A] X

Parameter group


- Custom parameter group
- Modified parameters
- All parameters
 - A[System]
 - b[Control command]
 - C[Setpoint]
 - d[Motor parameter]
 - E[Motor control]
 - F[I/O]
 - H[Diagnostic]
 - L[Application function]
 - n[Communication and Extension]
 - n0[InoLink]
 - n1[On board Modbus RTU]
 - n2[FBA-A]
 - n3[FBA-B]
 - n5[Encoder]
 - n6[reserved]
 - n10[Modbus RTU]
 - n12[CANOpen]
 - n14[EtherCat]
 - n16[Profibus-DP]
 - n17[ProfiNet IO]

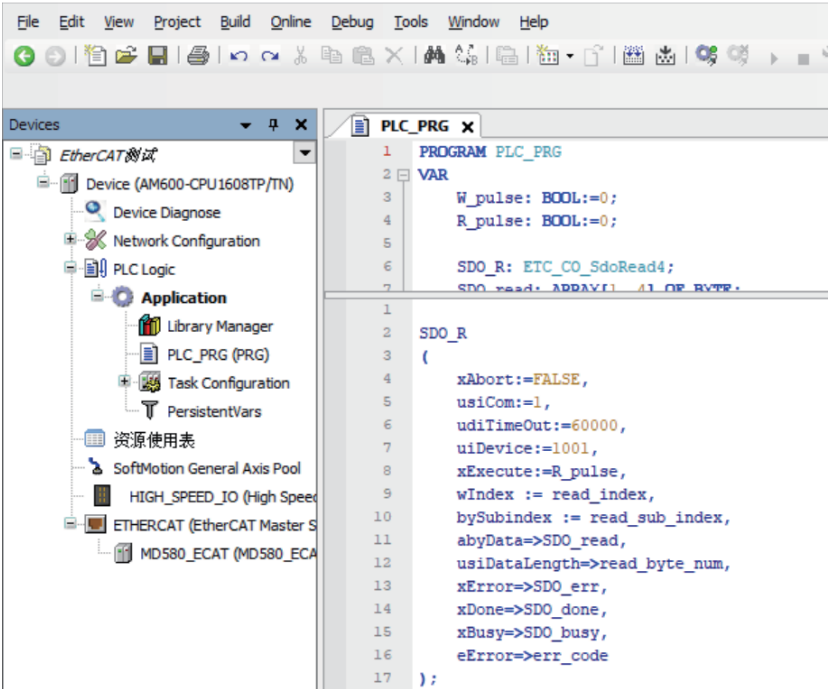
功能码	名称	当前值
n2-50	[Process data input 15] Comm. base value	0
n2-51	[Process data input 16] Comm. base value	0
n2-52	[Process data output 1] Data display	0x1000
n2-53	[Process data output 2] Data display	0x1000
n2-54	[Process data output 3] Data display	0x1000
n2-55	[Process data output 4] Data display	0x1000
n2-56	[Process data output 5] Data display	0x1000
n2-57	[Process data output 6] Data display	0x1000
n2-58	[Process data output 7] Data display	0x1000
n2-59	[Process data output 8] Data display	0x1000
n2-60	[Process data output 9] Data display	0x1000
n2-61	[Process data output 10] Data display	0x1000
n2-62	[Process data output 11] Data display	0x1000
n2-63	[Process data output 12] Data display	0x1000
n2-64	[Process data output 13] Data display	0x1000
n2-65	[Process data output 14] Data display	0x1000
n2-66	[Process data output 15] Data display	0x1000
n2-67	[Process data output 16] Data display	0x1000
n2-68	[Process data input 1] Data display	0x0001
n2-69	[Process data input 2] Data display	0x0002
n2-70	[Process data input 3] Data display	0x0003
n2-71	[Process data input 4] Data display	0x0004

Reading and writing parameters through SDO

This section takes reading C6-11 and writing C6-12 through SDO as an example. The addresses of the C6-11 and C6-12 are 1355 and 1356 respectively.

1. Perform programming in the PLC as shown below.

 EtherCAT测试.project - InoProShop(V1.6.2) SP2



```

1 PROGRAM PLC_PRG
2 VAR
3   W_pulse: BOOL:=0;
4   R_pulse: BOOL:=0;
5
6   SDO_R: ETC_CO_SdoRead4;
7   SDO_read: ARRAY[1..4] OF BYTE;
8 END_VAR
9
10 SDO_R
11 (
12   xAbort:=FALSE,
13   usiCom:=1,
14   udiTimeOut:=60000,
15   uiDevice:=1001,
16   xExecute:=R_pulse,
17   wIndex := read_index,
18   bySubindex := read_sub_index,
19   abyData=>SDO_read,
20   usiDataLength=>read_byte_num,
21   xError->SDO_err,
22   xDone->SDO_done,
23   xBusy->SDO_busy,
24   eError->err_code
25 );

```

2. Read C6-11 through SDO.

Variables related to the reading operation are defined as follows:

```

W_pulse: BOOL:=0;
R_pulse: BOOL:=0;

SDO_R: ETC_CO_SdoRead4;
SDO_read: ARRAY[1..4] OF BYTE;
read_byte_num: BYTE:=10#2;
SDO_err: BOOL;
SDO_done: BOOL;
SDO_busy: BOOL;
err_code: ETC_CO_ERROR;
read_index: WORD:=16#2000;
read_sub_index: BYTE:=10#192;

```

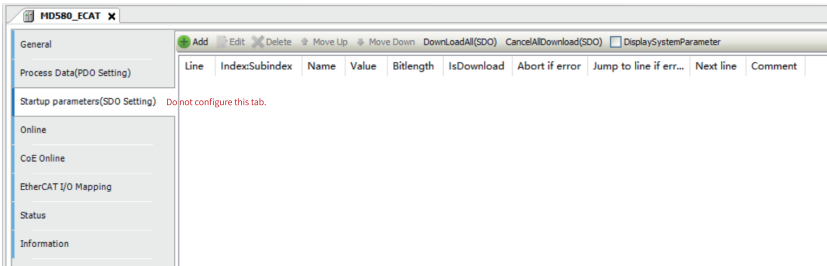
The indexes and subindexes of MD580 are read as follows: add 1 to the register address, the index is 0x20 + high bytes, and the subindex is low bytes. For example, to read the address 1355, add 1 to the address, that is 1355 + 1 = 1356 (0x054C), the index

is 0x2005, and the subindex is 0x4C. uiDevice is the EtherCAT address (for example, 1001) of the slave configured in the master.

```
SDO_R
(
    xAbort:=FALSE,
    usiCom:=1,
    udiTimeOut:=60000,
    uiDevice:=1001,
    xExecute:=R_pulse,
    wIndex := read_index,
    bySubindex := read_sub_index,
    abyData=>SDO_read,
    usiDataLength=>read_byte_num,
    xError=>SDO_err,
    xDone=>SDO_done,
    xBusy=>SDO_busy,
    eError=>err_code
);
```

Note

When the PLC writes and reads SDO through writing codes, do not configure the read/write addresses in the startup parameters (SDO setting) of the slave. Otherwise, the program cannot read from or write to the device.

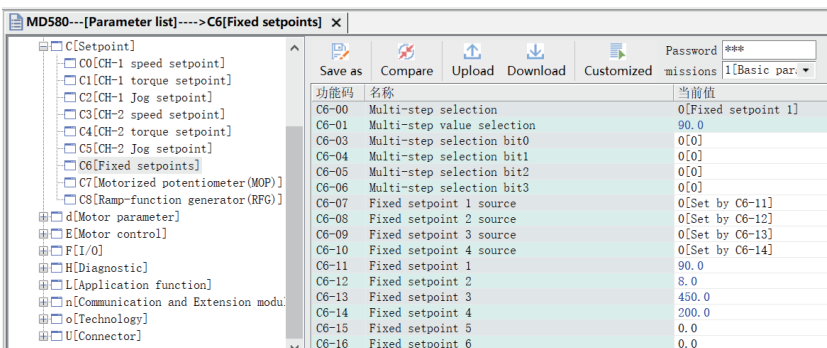


Perform operations in the monitoring table. When data is ready, trigger a read operation once, as shown in the following figure. The value of C6-11 being read is 16#0384, corresponding to 10#900. C6-11 is read successfully.

PLC_PRG_R_pulse	Device.Application	BOOL	TRUE	①
PLC_PRG.read_index	Device.Application	WORD	16#2005	
PLC_PRG.read_sub_index	Device.Application	BYTE	16#4C	
PLC_PRG.SDO_read	Device.Application	ARRAY [1..4] OF BYTE		
SDO_read[1]		BYTE	16#84	②
SDO_read[2]		BYTE	16#03	③
SDO_read[3]		BYTE	16#00	
SDO_read[4]		BYTE	16#00	④
PLC_PRG.read_byte_num	Device.Application	BYTE	16#02	

Note

- ①: When the data is ready, write the data to TRUE.
- ②: Read the low byte of the data
- ③: Read the high byte of the data
- ④: Read the number of data bytes



3. Write the C6-12 through SDO.

Variables related to the writing operation are defined as follows:

```

SDO_W: ETC_CO_SdoWrite4;
SDO_write_para: ARRAY[1..4] OF BYTE;
write_byte_num: BYTE:=2;
SDO_write_err: BOOL;
SDO_write_done: BOOL;
SDO_write_busy: BOOL;
SDO_write_err_code: ETC_CO_ERROR;
write_index: WORD:=16#2000;
write_sub_index: BYTE:=193;

wIndex: INT;
bySubindex: BYTE;
abyData: ARRAY [1..4] OF BYTE;
usiDataLength: BYTE;
xError: INT;
xDone: INT;
xBusy: INT;
eError: INT;
xExecute: INT;
    
```

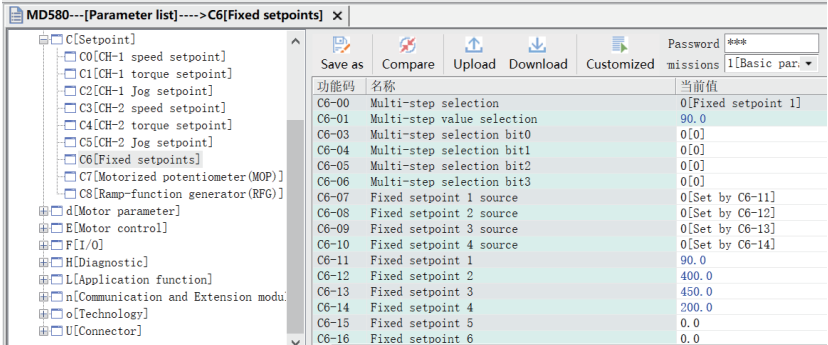
The indexes and subindexes of MD580 are written as follows: add 1 to the register address, the index is 0x20 + high bytes, and the subindex is low bytes. For example, to read the address 1356, add 1 to the address, that is 1356 + 1 = 1357 (0x054D), the index is 0x2005, and the subindex is 0x4C. uiDevice is the EtherCAT address (for example, 1001) of the slave configured in the master.

```

SDO_W
(
  xAbort:=FALSE,
  usiCom:=1,
  udiTimeOut:=60000,
  uiDevice:=1001,
  xExecute:=W_pulse,
  wIndex := write_index,
  bySubindex := write_sub_index,
  abyData:=SDO_write_para,
  usiDataLength:=write_byte_num,
  xError->SDO_write_err,
  xDone->SDO_write_done,
  xBusy->SDO_write_busy,
  eError->SDO_write_err_code
);
    
```

Perform operations in the monitoring table. When data is ready, trigger a write operation as shown in the following figure. The value of C6-12 being written is 16#0FA0, corresponding to 10#4000. C6-12 is written successfully.

Watch3					
Expression	Application	Type	Value	Prepared value	Executionpoint
PLC_PRG.R_pulse	Device.Application	BOOL	TRUE		Cyclic Monitoring
PLC_PRG.read_index	Device.Application	WORD	16#2005		Cyclic Monitoring
PLC_PRG.read_sub_index	Device.Application	BYTE	16#4D		Cyclic Monitoring
PLC_PRG.SDO_read	Device.Application	ARRAY [1..4] OF BYTE			Cyclic Monitoring
SDO_read[1]		BYTE	16#00		Cyclic Monitoring
SDO_read[2]		BYTE	16#00		Cyclic Monitoring
SDO_read[3]		BYTE	16#00		Cyclic Monitoring
SDO_read[4]		BYTE	16#00		Cyclic Monitoring
PLC_PRG.read_byte_num	Device.Application	BYTE	16#00		Cyclic Monitoring



7.2 Configuration for EtherCAT Communication with Beckhoff PLC

Networking description

The PLC model used in this example is the Beckhoff CX-8722AD. The programming software of the PLC is TwinCAT3 of Beckhoff. The commissioning software of the MD580 is the InoDriveStudio of Inovance. The InoDriveStudio software can be downloaded from the official website of Inovance (www.inovance.com).

Connect devices according to the following figure to complete networking. Set SOP-20-880 to the USB relay mode.

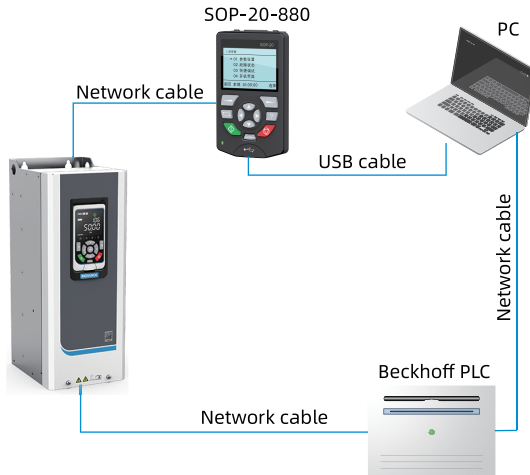
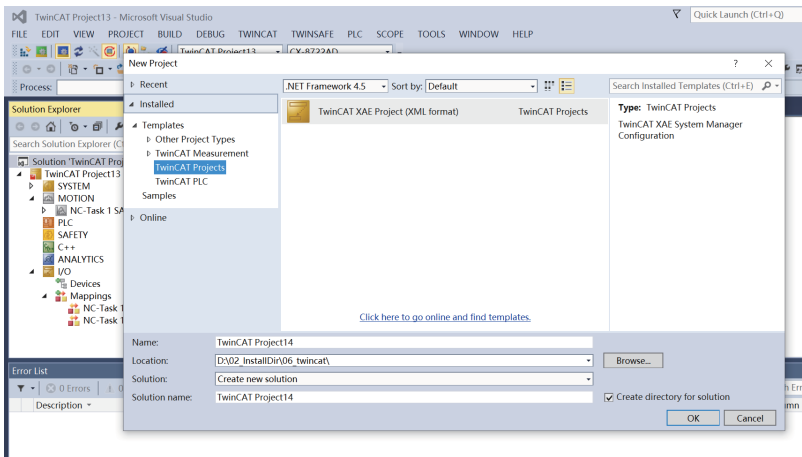
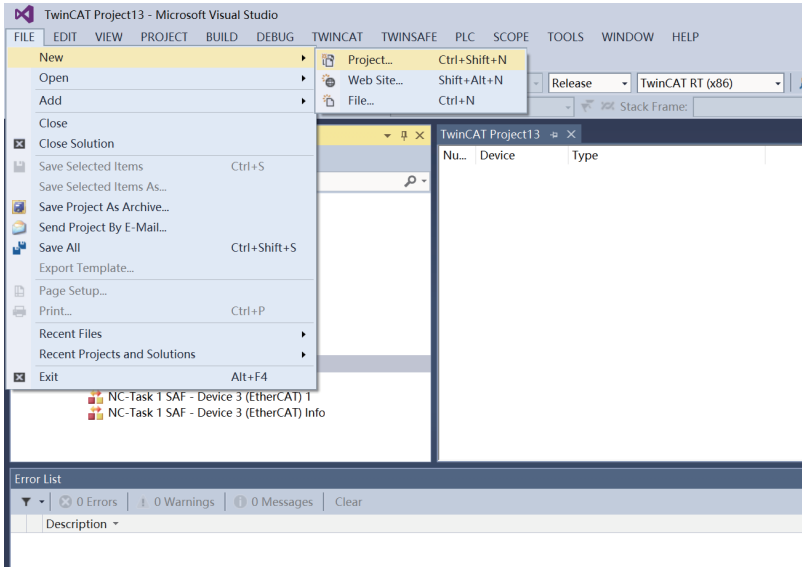


Figure 7-2 EtherCAT networking between the MD580 and Beckhoff CX-8722AD

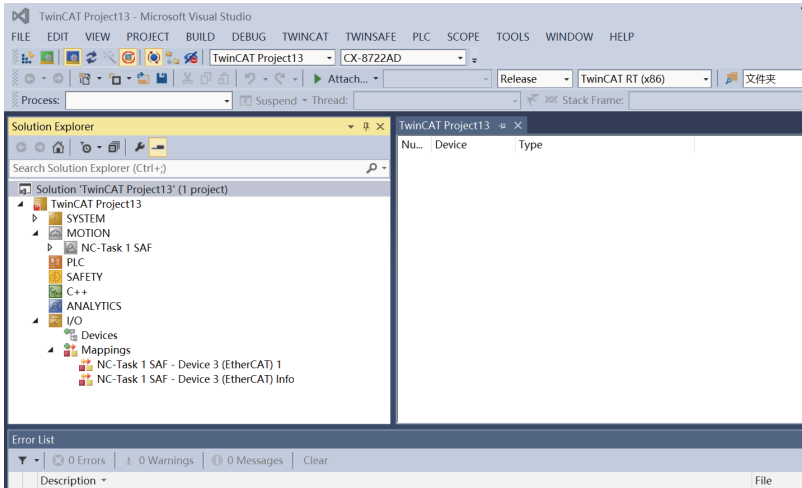
PLC configuration

1. Create a project.



2. Connect the PLC.

Connect the PC to CX-8722AD with an Ethernet cable, configure the PC network card to be in the same subnet as the PLC IP address, and after a successful connection, select the corresponding PLC device.



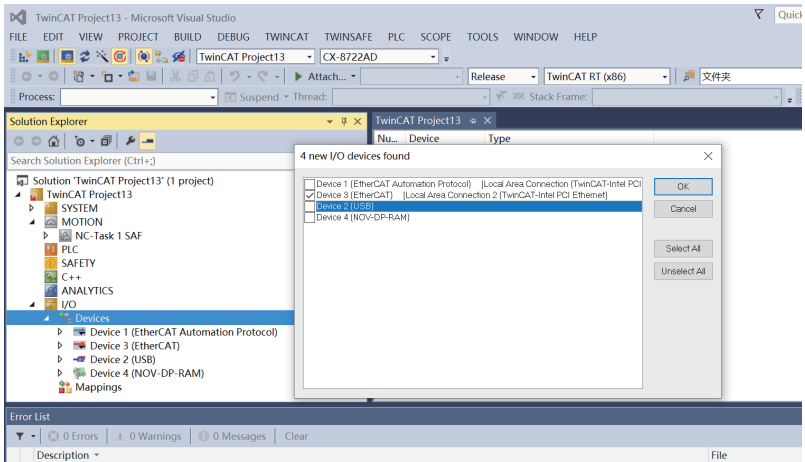
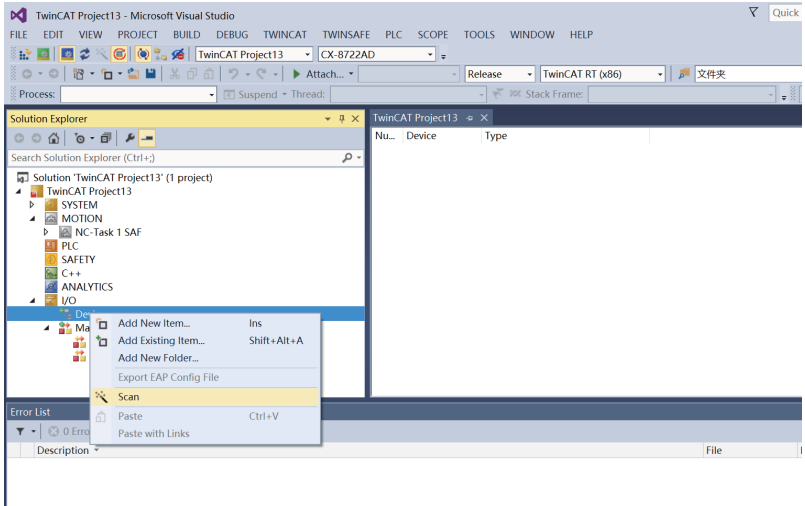
3. Install the XML file of MD580 to the EtherCAT master. You can obtain the XML file from Inovance agents or Inovance.

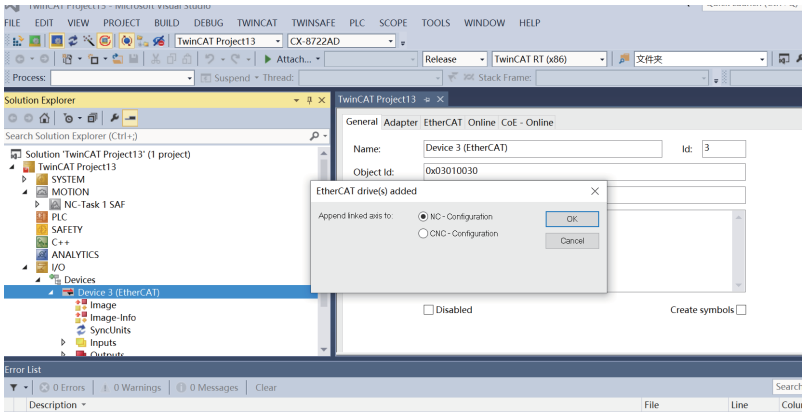
Copy the XML file to the default path "C:\TwinCAT\3.1\Config\Io\EtherCAT", where TwinCAT software scans for slaves matching the XML file. If a custom path is selected during installation, add the file to the custom path accordingly. After adding the file, restart the TwinCAT software.

本地磁盘 (C:) > TwinCAT > 3.1 > Config > Io > EtherCAT

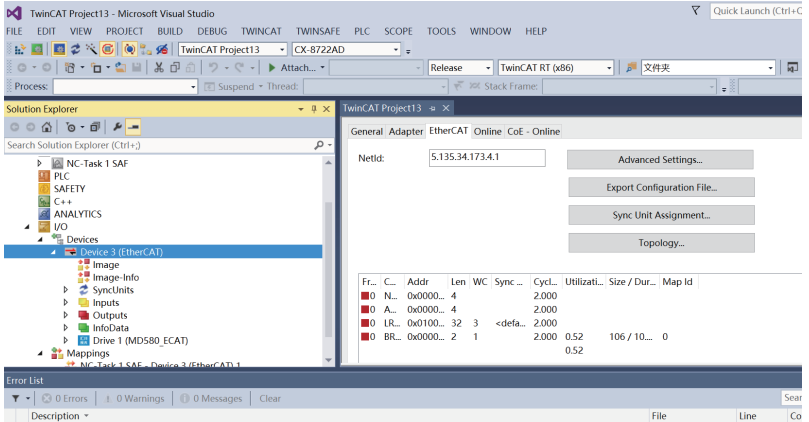
名称	修改日期	类型	大小
Beckhoff AX5xxx	2023/6/6 20:29	文件夹	
RES	2023/6/6 20:29	文件夹	
(0302B435)MD580N_ECANT_V1.0.1.xml	2023/10/10 17:05	XML 文档	185 KB
(0302B436)MD880N_ECANT_V1.1.7.xml	2023/10/10 17:28	XML 文档	185 KB
200KW_PCS_V1.12.xml	2024/5/21 15:44	XML 文档	1,004 KB
Beckhoff AP51xxx.xml	2019/9/9 9:24	XML 文档	218 KB
Beckhoff AT2xxx.xml	2020/4/6 8:28	XML 文档	6,401 KB
Beckhoff ATH2xxx.xml	2019/12/5 14:02	XML 文档	503 KB
Beckhoff AX2xxx.xml	2015/11/20 11:18	XML 文档	290 KB
Beckhoff AX5xxx.xml	2020/2/11 15:00	XML 文档	1,165 KB
Beckhoff AX8yxxx.xml	2019/12/16 14:54	XML 文档	15,897 KB
Beckhoff AX86xxx.xml	2019/6/27 12:15	XML 文档	4,841 KB
Beckhoff AX88xxx.xml	2019/6/27 12:15	XML 文档	386 KB
Beckhoff BK6xxx.xml	2016/7/15 13:24	XML 文档	1,912 KB
Beckhoff CUxxxx.xml	2019/10/11 11:52	XML 文档	283 KB
Beckhoff CXxxxx.xml	2019/5/3 15:41	XML 文档	111 KB
Beckhoff EJ1xxx.xml	2019/9/19 11:29	XML 文档	72 KB
Beckhoff EJ2xxx.xml	2020/1/16 17:16	XML 文档	255 KB
Beckhoff EJ3xxx.xml	2020/1/16 17:13	XML 文档	1,772 KB
Beckhoff EJ4xxx.xml	2020/1/29 12:53	XML 文档	512 KB

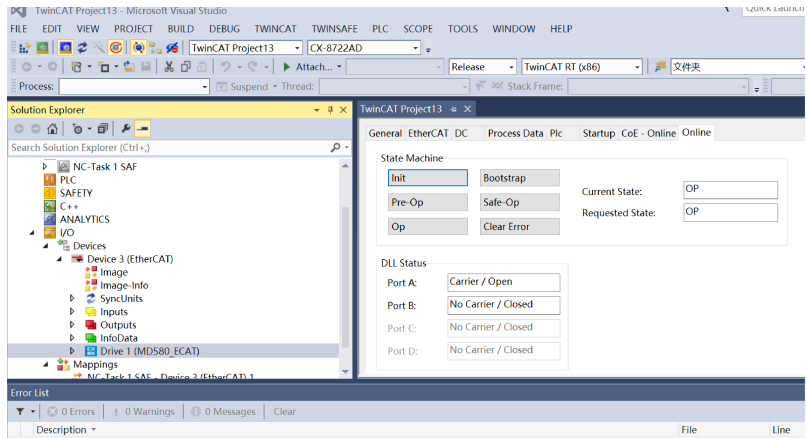
4. Scan the devices.





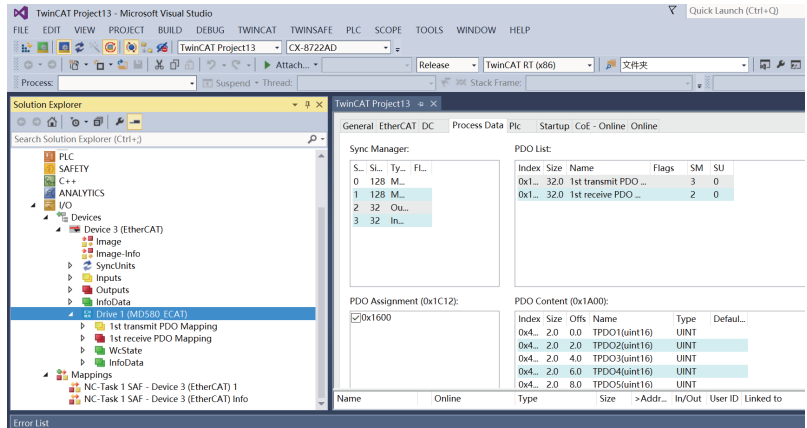
5. After successful scanning of the masters and slaves, the default configuration can be used to run the system. Modifications can be made if needed.





6. Configure the PDO data.

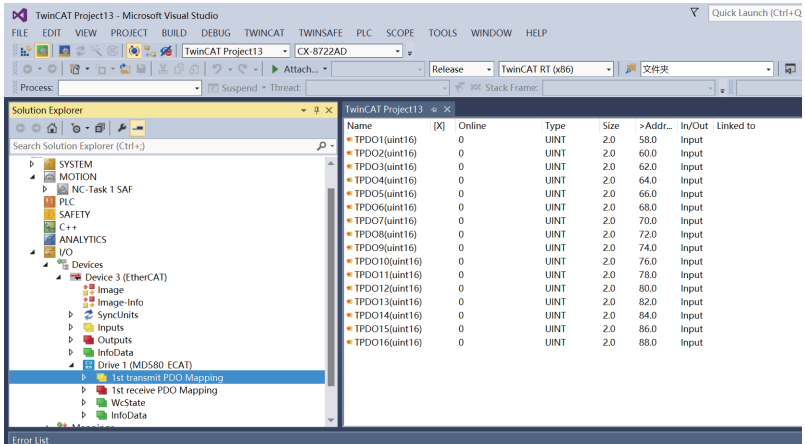
By default, 16 parameters are written and 16 parameters are read periodically. You can add or reduce parameters as required. The MD580 drive supports a maximum of 16 parameters to be read or written periodically.



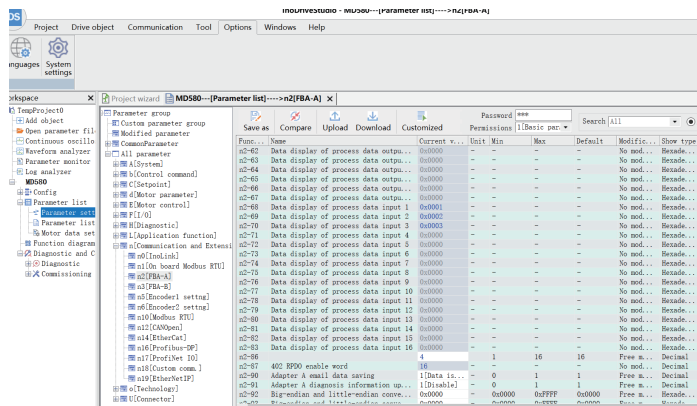
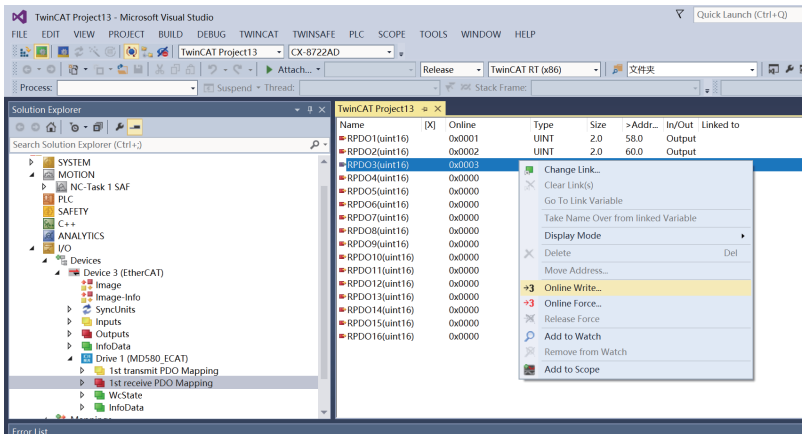
7. After completing the above settings, click to activate the configuration and download it to the PLC.

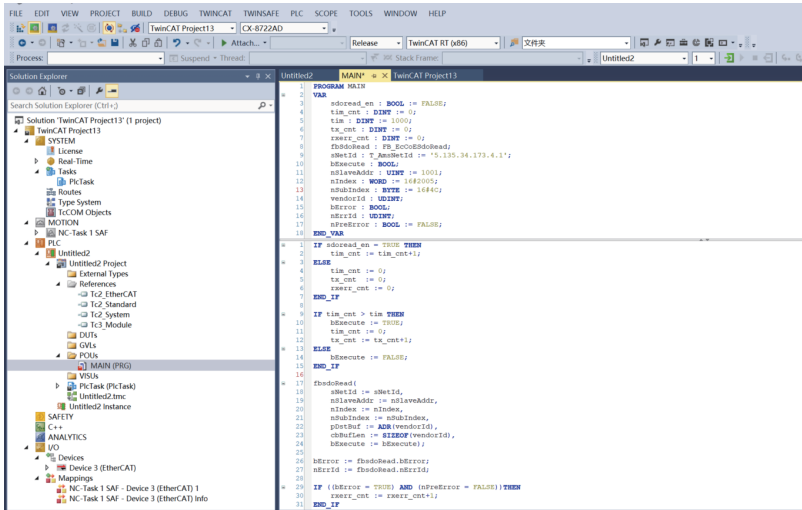
Process data communication

1. After the PLC configuration is downloaded to the PLC, verify the transmission of process data, that is, check whether data can be sent and received between the MD580 and the PLC normally.



2. The PLC writes process data to the MD580 drive.





2. Read C6-11 through SDO.

Variables related to the reading operation are defined as follows:

```

1 PROGRAM MAIN
2 VAR
3   sdoRead_en : BOOL := FALSE;
4   tim_cnt : DINT := 0;
5   tim : DINT := 1000;
6   tx_cnt : DINT := 0;
7   rxErr_cnt : DINT := 0;
8   fbSdoRead : FB_ECOESdoRead;
9   sNetId : STRING := '5.135.34.173.4.1';
10  bExecute : BOOL;
11  nSlaveAddr : UINT := 1001;
12  nIndex : WORD := 16#2000;
13  nSubIndex : BYTE := 10#192;
14  vendorId : UDINT;
15  bError : BOOL;
16  nErrId : UDINT;
17  nPreError : BOOL := FALSE;
18 END_VAR
19

```

The indexes and subindexes of MD580 are read as follows: the register address is added by 1, the index is $0x20 + \text{high byte}$, and the subindex is the low byte. For example, to read address 1355, then $1355 + 1 = 1356$ (0x054C), the index is 0x2005, and the subindex is 0x4C; nSlaveAddr is the configured slave address in the master, i. e., the EtherCAT address configured for the slave, such as 1001; sNetId is the master node address, which can be viewed in the master interface.

```

fbSdoRead(
  sNetId := sNetId,
  nSlaveAddr := nSlaveAddr,
  nIndex := nIndex,
  nSubIndex := nSubIndex,
  pDstBuf := ADR(vendorId),
  cbBufLen := sizeof(vendorId),
  bExecute := bExecute);

```

Compile and download the data written to the PLC. Perform the operation in the monitor table, and trigger a read operation once the data is ready, as shown in the figure below. The value of C6-11 being read is 16#0384, corresponding to 10#900. C6-11 is read successfully.

Expression	Type	Value	Prepared v...	Address	Comment
sdoread_en	BOOL	TRUE			
tim_cnt	DINT	201			
tim	DINT	1000			
tx_cnt	DINT	187			
rxerr_cnt	DINT	0			
fbSdoRead	FB_EcoCoESd...				
sNetId	T_AmsNetId	'5.135.34.173.4.1'			
bExecute	BOOL	FALSE			
nSlaveAddr	UINT	1001			
nIndex	WORD	8197			
nSubIndex	BYTE	76			
vendorId	UDINT	900			
bError	BOOL	FALSE			
nErrId	UDINT	0			
nPreError	BOOL	FALSE			

Func...	Name	Current v...	Unit	Min	Max	Default	Modific...	Show type	Address	Type	Des
C6-00	Multi-value selec...	0	Multi-v...	-	-	-	No mod...	Decimal	16635	UINT16	
C6-01	Multi-value selec...	0	Multi-v...	-	-	-	No mod...	Decimal	16636	INT16	
C6-03	Multi-value selec...	0[0]	%	-	-	-	Free m...	Decimal	1381	UINT16	
C6-04	Multi-value selec...	0[0]	%	-	1	0	Free m...	Decimal	1382	UINT16	
C6-05	Multi-value selec...	0[0]	%	-	1	0	Free m...	Decimal	1383	UINT16	
C6-06	Multi-value selec...	0[0]	%	-	1	0	Free m...	Decimal	1384	UINT16	
C6-07	Source of multi-v...	0	Set by ...	0	0	0	Free m...	Decimal	1399	UINT16	
C6-08	Source of multi-v...	0	Set by ...	0	0	0	Free m...	Decimal	1400	UINT16	
C6-09	Source of multi-v...	0	Set by ...	0	0	0	Free m...	Decimal	1401	UINT16	
C6-10	Source of multi-v...	0	Set by ...	0	0	0	Free m...	Decimal	1402	UINT16	
C6-11	Multi-value 1	90.0	%	-600.0	600.0	10.0	Free m...	Decimal	1355	INT16	
C6-12	Multi-value 2	10.0	%	-600.0	600.0	10.0	Free m...	Decimal	1356	INT16	
C6-13	Multi-value 3	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1357	INT16	
C6-14	Multi-value 4	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1358	INT16	
C6-15	Multi-value 5	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1359	INT16	
C6-16	Multi-value 6	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1360	INT16	
C6-17	Multi-value 7	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1361	INT16	
C6-18	Multi-value 8	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1362	INT16	
C6-19	Multi-value 9	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1363	INT16	
C6-20	Multi-value 10	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1364	INT16	
C6-21	Multi-value 11	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1365	INT16	
C6-22	Multi-value 12	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1366	INT16	
C6-23	Multi-value 13	0.00	%	-300.00	300.00	0.00	Free m...	Decimal	1367	INT16	
C6-24	Multi-value 14	0.00	%	-300.00	300.00	0.00	Free m...	Decimal	1368	INT16	
C6-25	Multi-value 15	0.00	%	-300.00	300.00	0.00	Free m...	Decimal	1369	INT16	
C6-26	Multi-value 16	0.00	%	-300.00	300.00	0.00	Free m...	Decimal	1370	INT16	

3. Write the C6-11 through SDO.

Variables related to the writing operation are defined as follows:

```

1 PROGRAM MAIN
2
3 VAR
4     sdowrite_en : BOOL := FALSE;
5     tim_cnt : DINT := 0;
6     tim : DINT := 1000;
7     tx_cnt : DINT := 0;
8     rxerr_cnt : DINT := 0;
9     fbSdoWrite : FB_EcoCoSdoWrite;
10    sNetId : T_AmsNetId := '5.135.34.173.4.1';
11    bExecute : BOOL;
12    nSlaveAddr : UINT := 1001;
13    nIndex : WORD := 16#2000;
14    nSubIndex : BYTE := 16#192;
15    valueMaxCurrent : UINT := 800;
16    vendorId : UDINT;
17    bError : BOOL;
18    nErrId : UDINT;
19    nPreError : BOOL := FALSE;
20 END_VAR

```

The indexes and subindexes of MD580 are written as follows: the register address is added by 1, the index is 0x20 + high byte, and the subindex is the low byte. For example, to write address 1355, then 1355 + 1 = 1356 (0x054C), the index is 0x2005,

and the subindex is 0x4C; nSlaveAddr is the configured slave address, i.e., the EtherCAT address configured for the slave, such as 1001; sNetId is the master node address, which can be viewed in the master interface.

```
fbSdoWrite (
    sNetId := sNetId,
    nSlaveAddr := nSlaveAddr,
    nIndex := nIndex,
    nSubIndex := nSubIndex,
    pSrcBuf := ADR(valueMaxCurrent),
    cbBufLen := SIZEOF(valueMaxCurrent),
    bExecute := bExecute);
```

Compile and download the data written to the PLC. Perform the operation in the monitor table, and trigger a write operation once the data is ready, as shown in the figure below. The value written for C6-11 is 10#800. C6-11 is written successfully.

Expression	Type	Value	Prepared v...	Address	Comment
◆ sdoRead_en	BOOL	TRUE			
◆ tim_crit	DINT	201			
◆ tim	DINT	1000			
◆ tx_cnt	DINT	187			
◆ rxerr_cnt	DINT	0			
◆ fbSdoRead	FB_EcCoESd...				
◆ sNetId	T_AmsNetId	'S.135.34.173.4.1'			
◆ bExecute	BOOL	FALSE			
◆ nSlaveAddr	UINT	1001			
◆ nIndex	WORD	8197			
◆ nSubIndex	BYTE	76			
◆ vendorId	UDINT	900			
◆ bError	BOOL	FALSE			
◆ nErrId	UDINT	0			
◆ nPreError	BOOL	FALSE			

Func...	Name	Current v...	Unit	Min	Max	Default	Modific...	Show type	Address	Type	Des
C6-00	Multi-value selec...	90.0	%	-	-	-	No mod...	Decimal	16635	UINT16	
C6-01	Multi-value selec...	0.0	%	-	-	-	No mod...	Decimal	16636	INT16	
C6-03	Multi-value selec...	0[0]		0	1	0	Free m...	Decimal	1351	UINT16	
C6-04	Multi-value selec...	0[0]		0	1	0	Free m...	Decimal	1352	UINT16	
C6-05	Multi-value selec...	0[0]		0	1	0	Free m...	Decimal	1353	UINT16	
C6-06	Multi-value selec...	0[0]		0	1	0	Free m...	Decimal	1354	UINT16	
C6-07	Source of multi-v...	0[Set by ...		0	0	0	Free m...	Decimal	1399	UINT16	
C6-08	Source of multi-v...	0[Set by ...		0	0	0	Free m...	Decimal	1400	UINT16	
C6-09	Source of multi-v...	0[Set by ...		0	0	0	Free m...	Decimal	1401	UINT16	
C6-10	Source of multi-v...	0[Set by ...		0	0	0	Free m...	Decimal	1402	UINT16	
C6-11	Multi-value 1	90.0	%	-600.0	600.0	10.0	Free m...	Decimal	1355	INT16	
C6-12	Multi-value 2	10.0	%	-600.0	600.0	10.0	Free m...	Decimal	1356	INT16	
C6-13	Multi-value 3	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1357	INT16	
C6-14	Multi-value 4	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1358	INT16	
C6-15	Multi-value 5	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1359	INT16	
C6-16	Multi-value 6	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1360	INT16	
C6-17	Multi-value 7	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1361	INT16	
C6-18	Multi-value 8	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1362	INT16	
C6-19	Multi-value 9	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1363	INT16	
C6-20	Multi-value 10	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1364	INT16	
C6-21	Multi-value 11	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1365	INT16	
C6-22	Multi-value 12	0.0	%	-600.0	600.0	0.0	Free m...	Decimal	1366	INT16	
C6-23	Multi-value 13	0.00	%	-300.00	300.00	0.00	Free m...	Decimal	1367	INT16	
C6-24	Multi-value 14	0.00	%	-300.00	300.00	0.00	Free m...	Decimal	1368	INT16	
C6-25	Multi-value 15	0.00	%	-300.00	300.00	0.00	Free m...	Decimal	1369	INT16	
C6-26	Multi-value 16	0.00	%	-300.00	300.00	0.00	Free m...	Decimal	1370	INT16	

8 Troubleshooting for Communication

The module provides three status indicators to indicate bus communication faults, as described below.

Indicator	Color	Status	Solution
INOBUS	Flashing green	Communication or internal communication timeout with MD580	Check whether MD580 is powered on, and check the connection between the expansion module and MD580.
MODULE	Steady orange	XML information of the EEPROM is checked and updated.	EEPROM initialization will be performed upon initial power-on.
	Flashing red every 100 ms	EEPROM loading error	Power off and on again. If the error persists, contact the technical support.
	Double flashing red	Hardware initialization error	Check whether the downloaded ESI file is correct or contact the technical support.
	Triple flashing red	Slave state switchover error	The state switchover is illegal, check the communication configuration parameters.
	Steady red	Bus disconnected	Check the communication cable. Make the master switch the slave to the OP state.
	Off	Expansion card not activated	<ul style="list-style-type: none"> • Check whether communication between the expansion module and MD580 is normal. • Check whether n14-00 is set correctly. • Check whether n1-00 (Bus adapter type) is set correctly.
FIELDBUS	Off	Expansion card not activated	<ul style="list-style-type: none"> • Check whether communication between the expansion module and MD580 is normal. • Check the communication cable. • Check whether the master network configuration is correct.
	Steady green	Communication with MD580 is normal.	-

9 Service and Support

9.1 Service and Support

Should you encounter a safety accident during the use or operation of the product, or face challenges in operating and maintaining the equipment, which remain unresolved after the relevant documentation is consulted, we provide multiple channels to ensure prompt resolution:

- Channel #1: Contact service@inovance.com.
- Channel #2: Visit <https://www.inovance.com/global> to access document downloads, after-sales support, spare parts ordering, repair applications, and authenticity verification services.
- Channel #3: Download My Inovance app (<https://zshc-eu.inovance.com/download-pc/>) where you can access products info and documentation, and query product parameters.

We are committed to providing you with quick and professional technical support, and we look forward to your satisfaction and trust.



PS00021579A00

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