INOVANCE

MD500 EtherCAT Expansion Card User Guide

Option for the MD Series AC Drive

19011425 A00

1. Overview

Thank you for using Inovance's MD series AC drives and MD500-EtherCAT expansion card (hereinafter referred to as the MD500-ECAT card).

The MD500-ECAT card is an EtherCAT fieldbus adapter card, which can be used in the ultra-high speed I/O network. The protocol is applicable on the I/O layer. This card features high efficiency, flexible topology, and easy operation. It is installed in the MD series AC drive to increase the communication efficiency and implement the AC drive networking function, which enables the AC drive to be a slave controlled by the field bus master station.

The MD500-ECAT card can be used on the MD series AC drives, such as MD500 and MD290.

The MD500-ECAT card software version required in this user guide is 1.00 or above (checked by the parameter on the AC drive after the card is installed and powered on). The corresponding XML file is **MD500_1Axis_V1.03.xml**. This user guide is applicable only for the MD500 and MD290 series AC drive. If you need to use the MD500-ECAT card on other AC drives, contact our technical engineers to check whether available and obtain corresponding information.

Before using the product, read this user guide thoroughly.

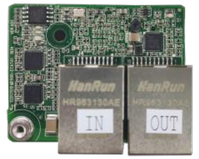


Figure 1-1 Appearance of the MD500-ECAT card

2. Installation and Settings

2.1 Installing the MD500-ECAT card

The MD500-ECAT card is installed inside the MD500 series AC drive. Before installation, de-energize the AC drive and wait about 10 minutes until the charging indicator on the AC drive becomes off. Then, insert the MD500-ECAT card into the AC drive and fasten the screws to avoid damage caused by external signal cable tension on the signal socket between boards. Figure 2-1 shows the installation.

Note that the ground terminals of both the MD500-ECAT card and AC drive must be connected properly, as shown in Figure 2-2.

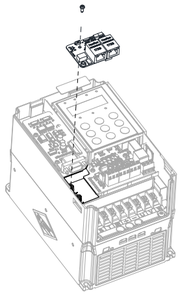


Figure 2-1 Installation of the MD500-ECAT card

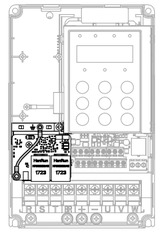


Figure 2-2 Ground terminal connection between the MD500-ECAT card and AC drive

2.2 Hardware Layout

Figure 2-3 shows the hardware layout of the MD500-ECAT card. The pin header J7 on the back of the MD500-ECAT card is used to connect the AC drive. The MD500-ECAT card provides two network ports J4 and J6 for communication with the master station (or the previous slave station) and next slave station (if existing). For details about the hardware, see table 2-1.

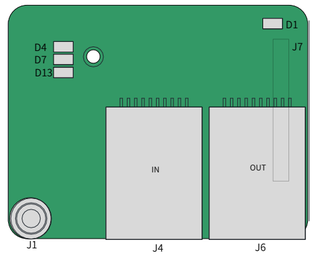


Figure 2-3 MD500-ECAT card (hardware)

Table 2-1 Hardware description of the MD500-ECAT card

Symbol	Hardware Name	Function Description
J7	Pin header	Used to connect the AC drive.
J4	Network port	Used for communication with the master station (or the previous slave station) and next slave station (if existing). The left one is used for input and the right one is for output.
J6		
J1	EMC ground terminal	Used to connect the EMC ground terminal of the AC drive.
D13	Power indicator (green)	Used to indicate the power status. On: power-on normal Off: power-on abnormal (Check whether the installation is correct.)
D1	AC drive communication status indicator (green)	See Table 2-2 Indicator description of the MD500-ECAT card.
D4	EtherCAT interaction indicator (green)	
D7	ESC fault indicator (red)	

Table 2-2 Indicator description of the MD500-ECAT card

Indicator		State Description	Solution
D1	Steady green	Normal	N/A
	Steady off	Abnormal communication with the AC drive	Set F0-28 to 1 and check whether the AC drive supports the MD500-ECAT card.

Indicator		State Description	Solution
D4	Steady green	Working at OP state	N/A
	Flashing green	Working in PREOP/ SAFEOP mode	Check the configuration. Check whether the AC drive supports the MD500-ECAT card and whether F0-28 is set to 1. Check whether the network port is connected correctly.
	Steady OFF	Master station disconnected or working in Initial mode	Check whether the master station and network port are connected correctly.
D7	Steady OFF	Normal	N/A
	Steady on in red	ESC internal fault	Contact Inovance or the agent for technical support.

2.3 EtherCAT RJ45 Interfaces

The MD500-ECAT card is connected to the EtherCAT master station using the standard Ethernet RJ45 socket. Its pin signal definitions are the same as those of the standard Ethernet pins. They can be connected using crossover cables or straight-through cables.

Table 2-3 Description of EtherCAT communication interfaces

Terminal Symbol	Terminal Name	Description
J4	ECAT IN	Wiring terminals. The left one is for input and the right one is for output.
J6	ECAT OUT	

NOTE

- After the MD500-ECAT card is installed, ECAT IN is on the left and ECAT OUT is on the right when facing to the RJ45 interface. The two interfaces must be connected correctly.
- The Cat5e shielded twisted pair (STP) network cable must be used for ensuring stability.

3. Communication Configuration

3.1 Communication Configuration for the MD500-ECAT Card and MD500 AC Drive

After installing the MD500-ECAT card on the MD500 series AC drive, complete communication configuration to enable the communication between them.

■ Communication card setting for the AC drive

AC drive software version:

MD500: U76.62_U77.62 and above (checked by parameters: F7-10 = U76.62; F7-11 = U77.62)

MD290: U29.12_U29.21 and above (checked by parameters: F7-10 = U29.12; F7-11 = U29.21)

The following parameters must be set to enable normal communication between the MD500-ECAT card and MD500/MD290 series AC drive and connect the MD500-ECAT card to the EtherCAT fieldbus nerwork.

Parameter No.	Parameter Name	Setting Range	Value	Description
F0-02	RUN command selection	0: Operating panel 1: Terminal 2: Serial communication	2	Running command given through communication
F0-03	Main frequency reference input selection	0: Digital setting (non-retentive at power failure) 1: Digital setting (retentive at power failure) 2: AI1 3: AI2 4: AI3 5: Pulse setting (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication setting	9	Target frequency given through communication

Parameter No.	Parameter Name	Setting Range	Value	Description
F0-28	Serial port communication protocol	0: Modbus protocol 1: Communication card network bridge protocol	1	Select the special communication card network bridge for the serial communication protocol.
FD-02	Slave station alias	1 to 247	Undetermined	Alias of the EtherCAT slave station. Its default value is 1. (If the formal name of the slave station is used for communication, the setting of this parameter is not required.)

■ Parameters related to communication control

Parameter No.	Name	Setting Range	Index	Sub-index
Communication control word parameters				
U3-16	Frequency setting	-Maximum frequency to +Maximum frequency 0.01 Hz	16#2073	16#11
U3-17	Control command	0001: Forward running 0002: Reverse running 0003: Forward jogging 0004: Reverse jogging 0005: Coast to stop 0006: Decelerate to stop 0007: Fault reset	16#2073	16#12
U3-18	DO control	BIT0: DO1 control BIT1: DO2 control BIT2: RELAY1 control BIT3: RELAY2 control BIT4: FMR output control BIT5: VDO1 BIT6: VDO2 BIT7: VDO3 BIT8: VDO4 BIT9: VDO5	16#2073	16#13
U3-19	AO1 control	0 to 7FFF corresponds to 0% to 100%.	16#2073	16#14
U3-20	AO2 control	0 to 7FFF corresponds to 0% to 100%.	16#2073	16#15
U3-21	FMP control	0 to 7FFF corresponds to 0% to 100%.	16#2073	16#16
U3-22	Reserved	Reserved	16#2073	16#17
U3-23	Speed control	-15000 rpm to +15000 rpm (The setting range is determined by the number of motor pole pairs and frequency setting range.)	16#2073	16#18
AC drive parameters (commonly-used)				
F0-10	Maximum frequency	50.00 Hz to 500.00 Hz	16#20F0	16#0B
F0-17	Acceleration time	0.00s to 650.00s (F0-19 = 2) 0.0s to 6500.0s (F0-19 = 1) 0s to 65000s (F0-19 = 0)	16#20F0	16#12
F0-18	Deceleration time	0.00s to 650.00s (F0-19 = 2) 0.0s to 6500.0s (F0-19 = 1) 0s to 65000s (F0-19 = 0)	16#20F0	16#13

Parameter No.	Name	Setting Range	Index	Sub-index
F0-19	Acceleration/Deceleration time unit	0: 1s 1: 0.1s 2: 0.01s	16#20F0	16#14
F8-00	Jog running frequency	0.00 Hz to the maximum frequency	16#20F8	16#01
F8-01	Jog acceleration time	0.0s to 6500.0s	16#20F8	16#02
F8-02	Jog deceleration time	0.0s to 6500.0s	16#20F8	16#03
A0-03	Torque digital setting in torque control	-200.0% to +200.0%	16#20A0	16#04
A0-05	Forward maximum frequency in torque control	0.00 Hz to the maximum frequency	16#20A0	16#06
A0-06	Reverse maximum frequency in torque control	0.00 Hz to the maximum frequency	16#20A0	16#07
U0-06	Output torque (%)	-	16#2070	16#07
U0-07	DI state	-	16#2070	16#08
U0-08	DO state	-	16#2070	16#09
U0-24	Current speed	-	16#2070	16#19
U0-38	Encoder position	-	16#2070	16#27
2001H	DO control	-	16#2020	16#02
8000H	Current fault	-	16#2080	16#01

The AC drive parameter indices are described as below:

Each object within the dictionary shall be addressed uniquely by using an index and sub-index.

"Index": This field (hexadecimal) specifies the position of the same type of objects in the dictionary.

"Sub-index": This field specifies the offset of each object in the same index in hexadecimal format.

The mapping between AC drive parameters and the object dictionary is as follows:

Object dictionary index = 0x2000 + Parameter group number

Object dictionary sub-index = Hexadecimal of offset in parameter group + 1

By default, when the MD500-ECAT card is used, the written PDO1 and PDO2 are mapped to U3-17 and U3-16, respectively. Therefore, the first item of RPDO must be U3-17; otherwise, the running will be abnormal. Besides, if the eight higher bits of U3-17 are written with any non-zero value, the AC drive will report a communication fault (Err16).

■ Parameters related to communication monitoring

Parameter No.	Name	Unit	Decimal Address
U0-00	Running frequency (Hz)	0.01 Hz	28672
U0-01	Frequency reference (Hz)	0.01 Hz	28673
U0-02	Bus voltage (V)	0.1 V	28674
U0-03	Output voltage (V)	1 V	28675
U0-04	Output current (A)	0.01 A	28676
U0-05	Output power (kW)	0.1 kW	28677
U0-06	Output torque (%)	0.1%	28678
U0-07	DI state	1	28679
U0-08	DO state	1	28680
U0-09	AI1 voltage (V)	0.01 V	28681
U0-10	AI2 voltage (V)	0.01 V	28682
U0-11	AI3 voltage (V)	0.01 V	28683
U0-12	Count value	1	28684
U0-13	Length value	1	28685
U0-14	Load speed display	1	28686
U0-15	PID reference	1	28687

Parameter No.	Name	Unit	Decimal Address
U0-16	PID feedback	1	28688
U0-17	PLC stage	1	28689
U0-18	Pulse input reference (Hz)	0.01 kHz	28690
U0-19	Feedback speed (Hz)	0.01 Hz	28691
U0-20	Remaining running time	0.1 min	28692
U0-21	AI1 voltage before correction	0.001 V	28693
U0-22	AI2 voltage before correction	0.001 V	28694
U0-23	AI3 voltage before correction	0.001 V	28695
U0-24	Linear speed	1 m/min	28696
U0-25	Current power-on time	1 min	28697
U0-26	Current running time	0.1 min	28698
U0-27	Pulse input frequency	1 Hz	28699
U0-28	Communication reference	0.01%	28700
U0-29	Encoder feedback speed	0.01 Hz	28701
U0-30	Main frequency X display	0.01 Hz	28702
U0-31	Auxiliary frequency Y display	0.01 Hz	28703
U0-32	Any memory address	1	28704
U0-33	Synchronous motor rotor position	0.1°	28705
U0-34	Motor temperature	1°C	28706
U0-35	Target torque (%)	0.1%	28707
U0-36	Resolver position	1	28708
U0-37	Power factor angle	0.1°	28709
U0-38	ABZ position	1	28710
U0-39	Target voltage upon V/f separation	1 V	28711
U0-40	Output voltage upon V/f separation	1 V	28712
U0-41	DI state display	1	28713
U0-42	DO state display	1	28714
U0-43	DI state display 1	1	28715
U0-44	DI state display 2	1	28716
U0-45	Fault information	1	28717
U0-58	Z signal counting	1	28730
U0-59	Rated frequency (%)	0.01%	28731
U0-60	Running frequency (%)	0.01%	28732
U0-61	AC drive state	1	28733
U0-62	Current fault code	1	28734
U0-63	Data sent by master during point-point communication	0.01%	28735
U0-64	Data sent by slave during point-point communication	0.01%	28736
U0-65	Torque upper limit	0.1%	28737
U0-66	Expansion card model	100: CANopen 200: PROFIBUS-DP 300: CANlink 400: PROFINET 500: EtherCAT	28738
U0-67	Expansion card version	0.01	28739
U0-68	AC drive state	1	28740
U0-69	Running frequency (Hz)	0.01 Hz	28741
U0-70	Motor speed	1 rpm	28742

Parameter No.	Name	Unit	Decimal Address
U0-71	Output current	0.1 A	28743
U0-80	EtherCAT slave station name	1	28752
U0-81	EtherCAT slave site alias	1	28753
U0-82	EtherCAT ESM transmission error code	1	28754
U0-83	EtherCAT XML file version	0.01	28755
U0-84	EtherCAT synchronization loss times	1	28756
U0-85	Maximum EtherCAT port 0 invalid frames and errors per unit time	1	28757
U0-86	Maximum EtherCAT port 1 invalid frames and errors per unit time	1	28758
U0-87	Maximum EtherCAT port forwarding errors per unit time	1	28759
U0-88	Maximum EtherCAT data frame processing unit errors per unit time	1	28760
U0-89	Maximum EtherCAT port link losses per unit time	1	28761

By default, when the MD500-ECAT card is used, the read PDO1 and PDO2 are mapped to U0-68 and U0-69, respectively. Therefore, the first item of TPDO must be U0-68; otherwise, the running will be abnormal.

3.2 Communication Settings for the MD500-ECAT Card and EtherCAT Master Station

After enabling the communication between the MD500-ECAT card and MD500 AC drive, connect the EtherCAT master station correctly to enable the communication between the MD500-ECAT card and EtherCAT master station and networking function of the AC drives.

3.2.1 EtherCAT Topology

EtherCAT supports various topological structures including star, bus, and tree topologies and their combination. This enables flexible and convenient equipment connection and wiring. The following figure shows the bus topology.

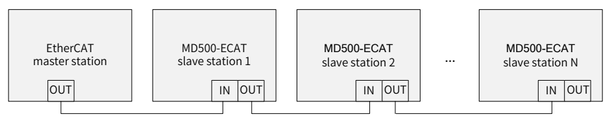


Figure 3-1 Bus topology

3.2.2 EtherCAT Communication Protocol

In the DC mode, the DC synchronous mode period must be at least 1 ms but shorter then 100 ms. Otherwise, an EtherCAT communication fault will occur.

■ PDO data description

The PDO data is used for the master station to modify and read AC drive data in real time and perform periodic data exchange. Data communication addresses are directly configured by the AC drive. It mainly includes:

a) Real-time setting of AC drive control command and target frequency

b) Real-time reading of AC drive current state and running frequency

c) Function parameter and monitor data real-time exchange between AC drive and EtherCAT master station

The PDO process data is used for periodic data exchange between the master station and AC drive, as described in the following table.

Master sending PDO (0x1600)		
Fixed RPDO		Variable RPDO
AC drive command	AC drive target frequency	Modifying function parameters of AC drive in real time
RPDO1	RPDO2	RPDO3 to RPDO10

Corresponding AC drive data PDO (0x1A00)		
AC drive state	AC drive running frequency	Reading function parameters of AC drive in real time
TPDO1	TPDO2	TPDO3 to TPDO10

Note: A maximum of 10 RPDOs and 10 TPDOs can be configured.

■ Data sent by the master station

Master sending data RPDO	
RPDO1	AC drive command word (command source set to "communication") 01: Forward running 02: Reverse running 03: Forward jogging 04: Reverse jogging 05: Coast to stop 06: Stop according to F6-10 (Stop mode) 07: Fault reset
RPDO2	AC drive target frequency (frequency source set to "communication") in the range of reverse frequency upper limit (negative value) to forward frequency upper limit (decimal places included, for example, 2000 corresponds to 20.00 Hz on the AC drive) When the given target frequency exceeds this range, the AC drive runs at the frequency upper limit. For example, if the frequency upper limit is set to 50.00 Hz and the communication setting is 6000, the AC drive will run at 50.00 Hz in the forward direction. If the frequency upper limit is set to 50.00 Hz and the communication setting is -6000, the AC drive will run at 50.00 Hz in the reverse direction.
RPDO3 to RPDO10	Modifying the function parameter values (groups F and A) in real time, not written into EEPROM FE-02 to FE-09 correspond to RPDO3 to RPDO10 respectively. For the configuration method, see PDO data configuration.

■ AC drive response data

AC drive response data TPDO	
TPDO1	AC drive running state AC drive running state determined by the bits as follows: Bit0: 0: AC drive stop; 1: AC drive running Bit1: 0: Forward running; 1: Reverse running Bit2: 0: No fault; 1: AC drive fault Bit3: 0: Running frequency not reached; 1: Running frequency reached Bit4 to Bit7: Reserved Bit8 to Bit15: AC drive fault code
TPDO2	AC drive running frequency (unit: 0.01 Hz) The current AC drive running frequency is returned. The returned data is 16-bit signed data and the received data is 16-bit unsigned data. Variables must be mapped to the 16-bit signed data.
TPDO3 to TPDO10	Reading function parameter values (groups F and A) and monitor parameter values (group U): FE-22 to FE-29 correspond to TPDO3 to TPDO10 respectively. For the configuration method, see PDO data configuration.

For details about the PDO definitions of other AC drives, see the corresponding AC drive user guides.

■ Service data object (SDO)

EtherCAT SDO is used to transfer non-cyclic data, such as communication parameter configuration and servo drive running parameter configuration. The EtherCAT CoE service types include:

1) Critical event message
2) SDO request
3) SDO response
4) TxPDO
5) RxPDO
6) Remote TxPDO sending request

7) Remote RxPDO sending request

8) SDO information

Currently, the AC drive supports SDO requests and responses. For details about SDO-related parameters, see the MD500 and MD290 user guides.

3.3 Using the MD500-ECAT Card with Beckhoff's Controller

Beckhoff's TwinCAT master station is used as an example to describe the configuration of the MD500-ECAT card.

NOTE:

The 100M Ethernet network adapter with Intel chip must be used. Other network adapters may not support EtherCAT.

1) Install TwinCAT.

Windows XP system: **tcat_2110_2230** is recommended.

Windows 7 32-bit system: **tcat_2110_2248** is recommended.

2) Copy the EtherCAT configuration file (MD500_1Axis_V1.03.xml.XML) of MD500 to the TwinCAT installation directory.

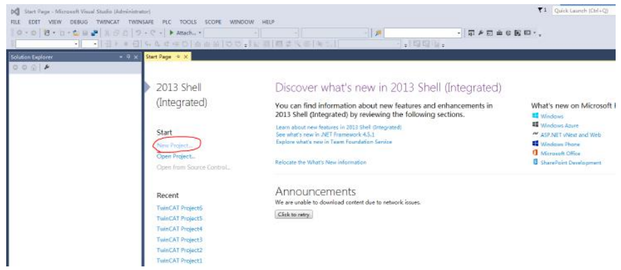
TwinCAT2 directory: **TwinCAT\IO\EtherCAT**

TwinCAT3 directory: **TwinCAT\3.1\config\IO\EtherCAT**

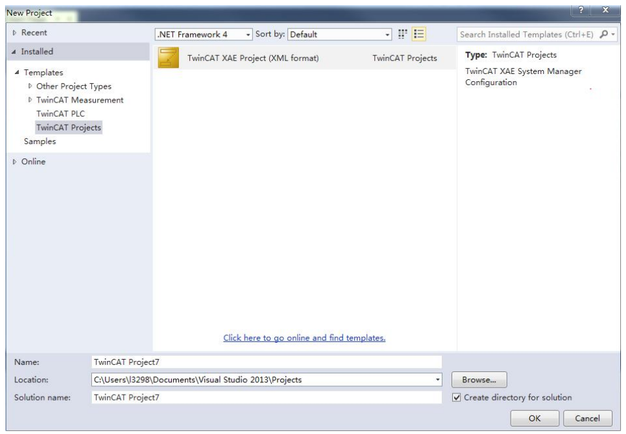
TwinCAT3 is used as an example in the following section. The operation steps for TwinCAT2 are similar.

3) Start TwinCAT.

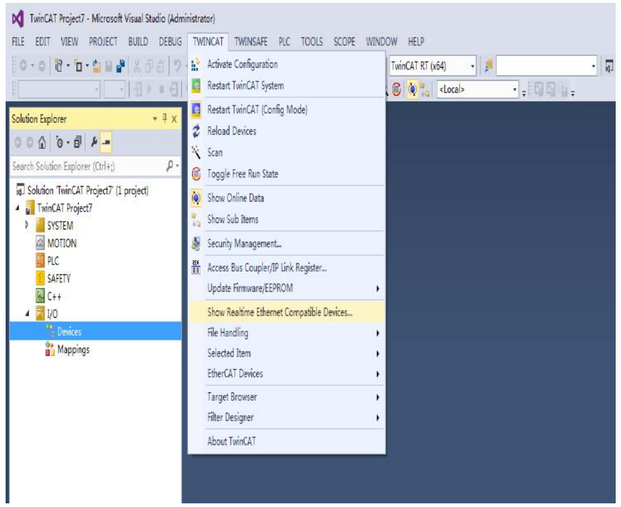
Click **New Project** to create a project.



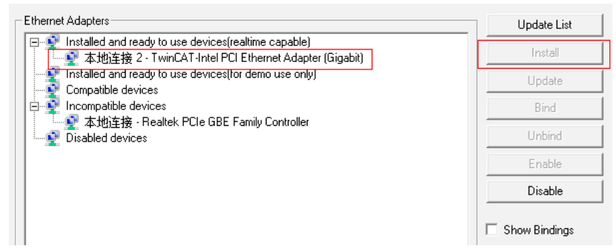
Click **OK**.



4) Install the TwinCAT network adapter driver.

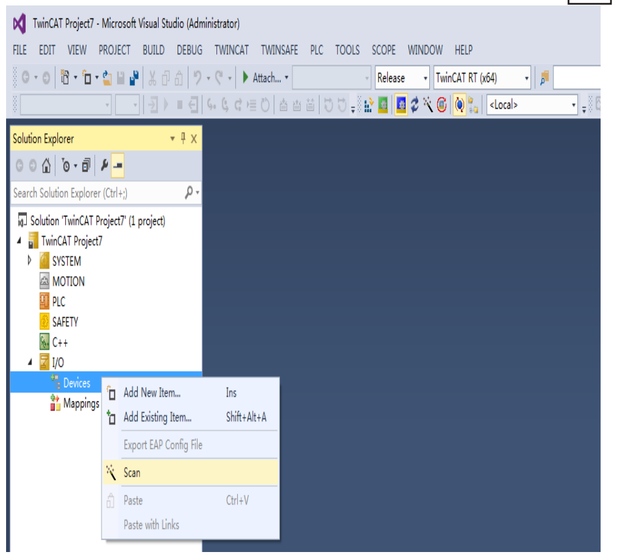


Choose **TWINCAT** > **Show Real Time Ethernet Compatible Devices...**. In the displayed dialog box, select the local network adapter in **Incompatible devices**, and click **Install**. After installation, the installed network adapter is displayed in **Installed and ready to use devices**.

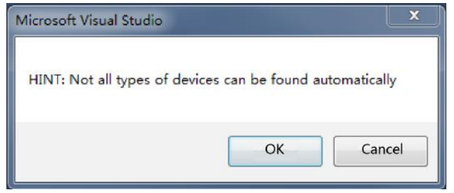


5) Search for devices.

Create a project, right-click **Device**, and then click **Scan** to search for devices, as shown in the following figure.



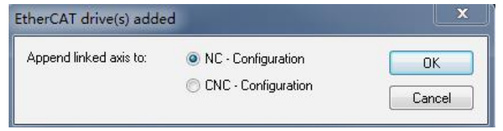
Click **OK**.



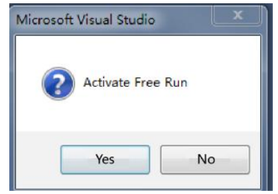
Click **OK.**

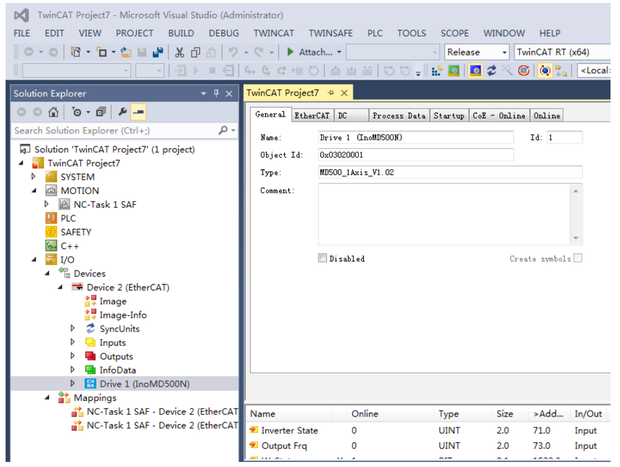
Click **Yes**.

Click **OK.**



Click **No**. Now the equipment search is complete, as shown in the following figure:

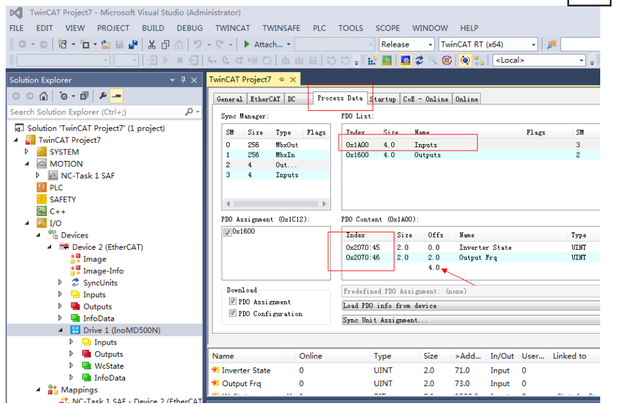




6) Configure PDO parameters.

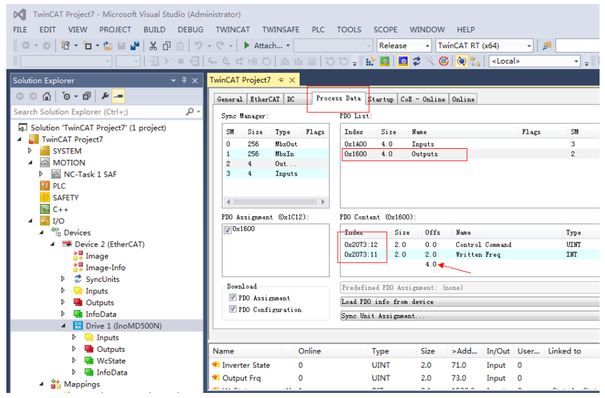
1. Configure TPDO.

Select 0x1A00 when configuring TPDO. The first two items are set to TPDO by default and cannot be changed. Right click at the position indicated by the red arrow in the following figure to add the TPDO mapping as required.



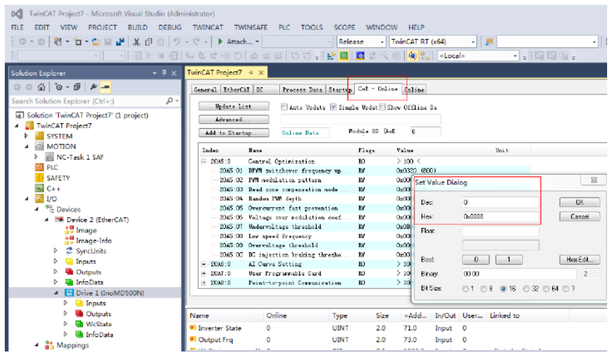
2. Configure RPDO.

Select 0x1600 when configuring RPDO. The first two items are set to RPDO by default and cannot be changed. Right click at the position indicated by the red arrow in the following figure to add the RPDO mapping as required.



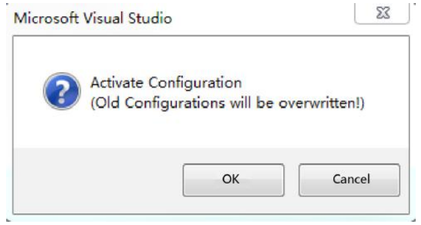
3. View the SDO data list.

After the OP state is activated, you can view real-time data in the SDO data list or double-click the object dictionary to modify the SDO data.

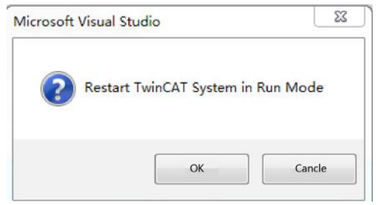


4. Activate the configuration and switch over to the running mode.

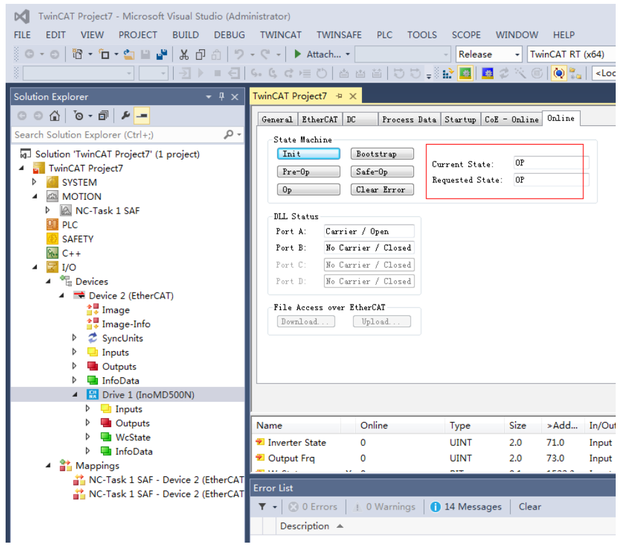
Click  . The following dialog box is displayed.



Click **OK**.

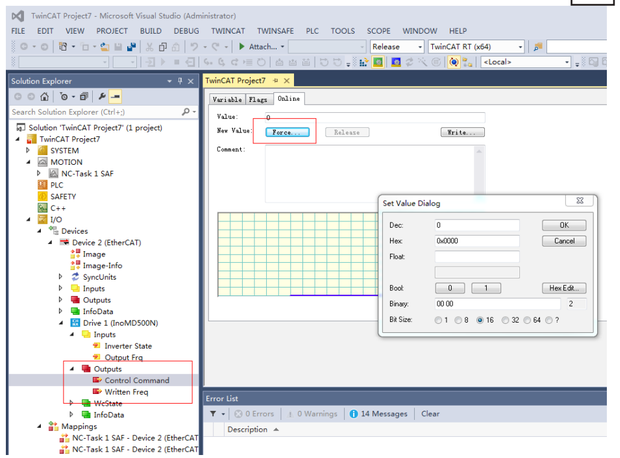


Click **OK** to enter the OP state.



5. Control the AC drive through PDO.

Write corresponding values through the configured RPDO to control the AC drive.

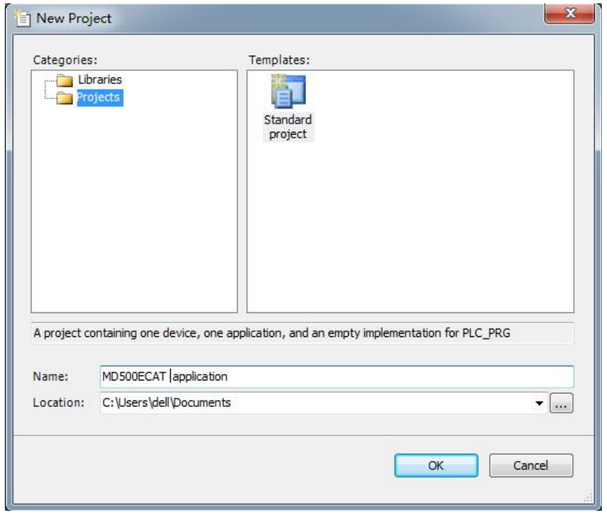


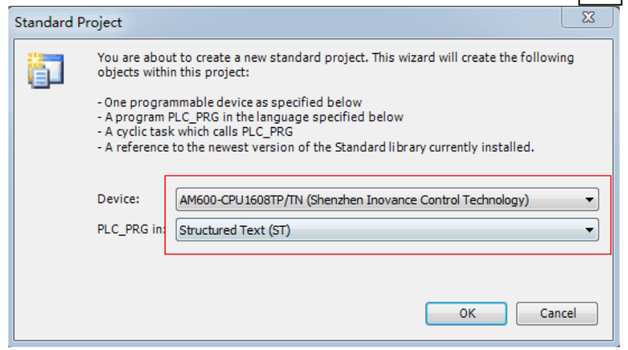
3.4 Using the MD500-ECAT Card with the AM600 Master Station

The AM600 master station is used as an example to describe how to use the MD500-ECAT card with the master station.

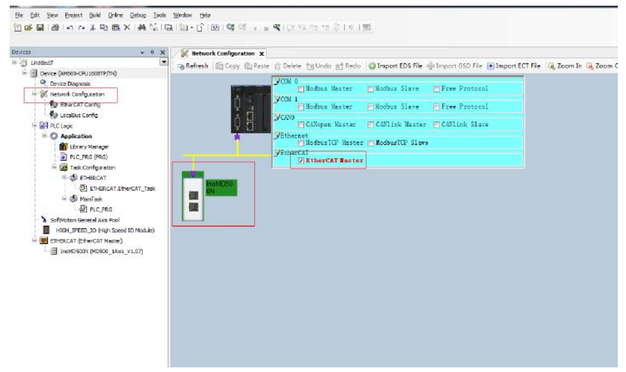
1) Start the software, and create an AM600 project.

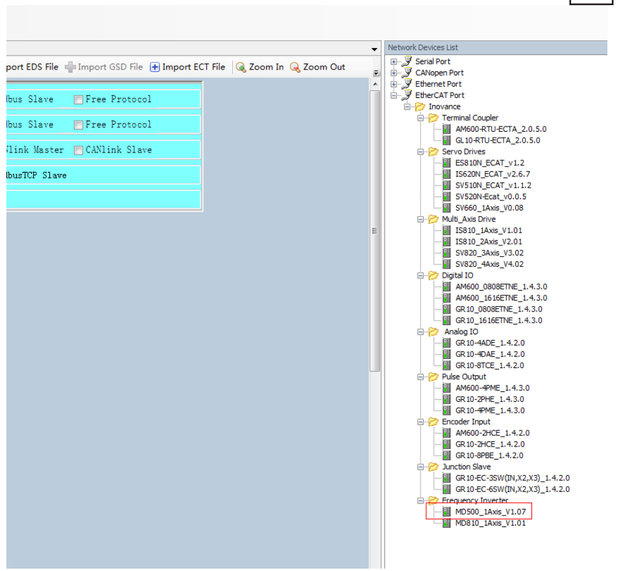
Select **AM600-CPU1608TP**, as shown in the following figure.





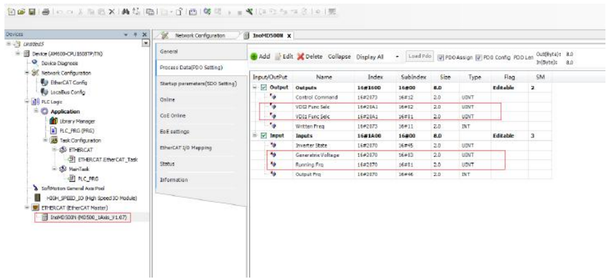
2) Add the MD500 AC drive slave station. Open the network configuration, import the EtherCAT configuration file of MD500. If any configuration file of other version exists, delete the existing configuration file before importing a new one. Drag the device in the network device list to add the AC drive slave station, as shown in the following figure.



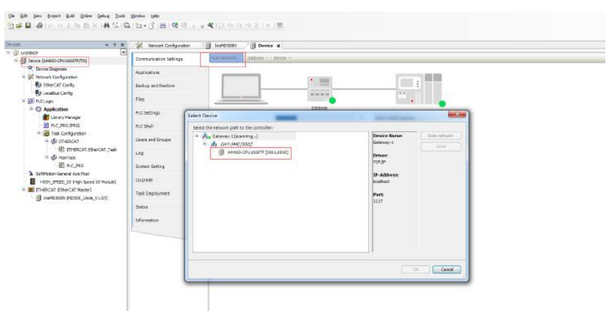


3) Configure PDO parameters.

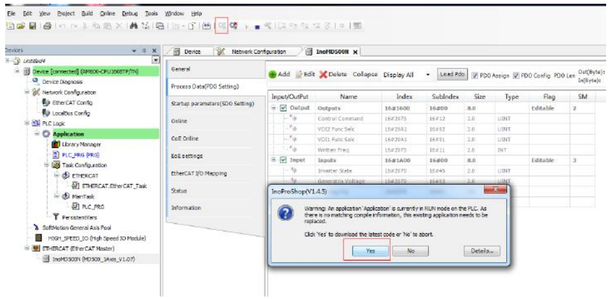
Right click at the position indicated by the red arrow in the following figure to add the TPDO mapping as required. **Control Command** and **Inverter State** of the RPDO cannot be changed and they must be set as the first items. Otherwise, the running will be abnormal.



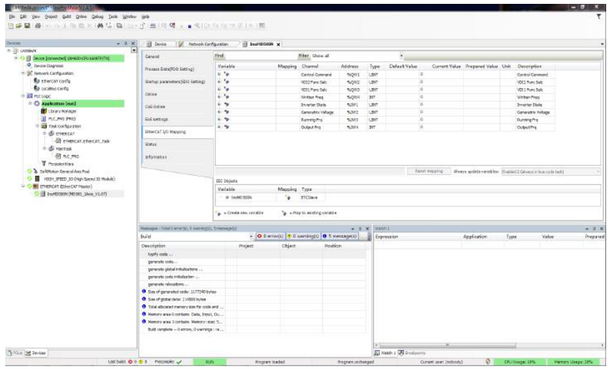
Scan the devices.



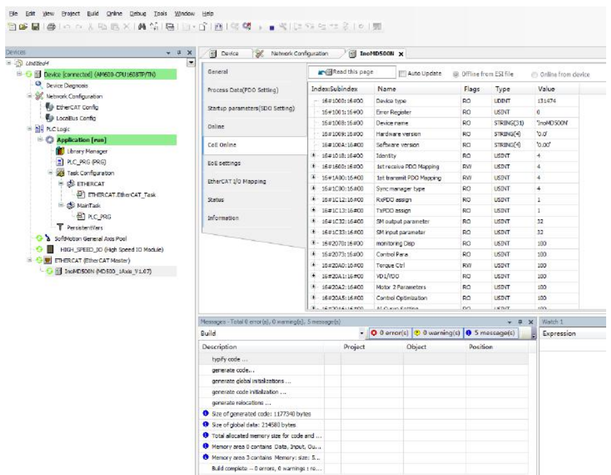
Download the project to the PLC.



View TPDO data and write RPDO data in real time through EtherCAT I/O mapping.



Parameter values can be viewed and directly written in through the online CoE.



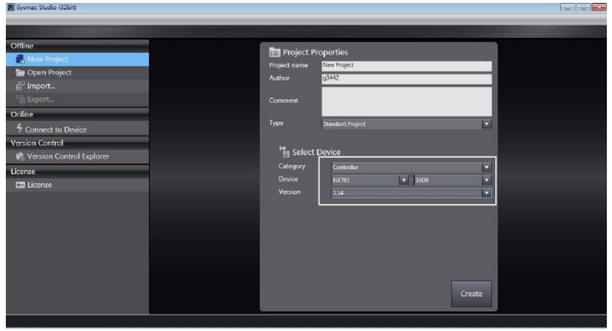
3.5 Using the MD500-ECAT Card with Omron's Master Station

Omron's NX701 master station is used as an example to describe how to use the MD500-ECAT card with the MD500 AC drive.

1) Create a project.

Device: Set it according to the actual controller model.

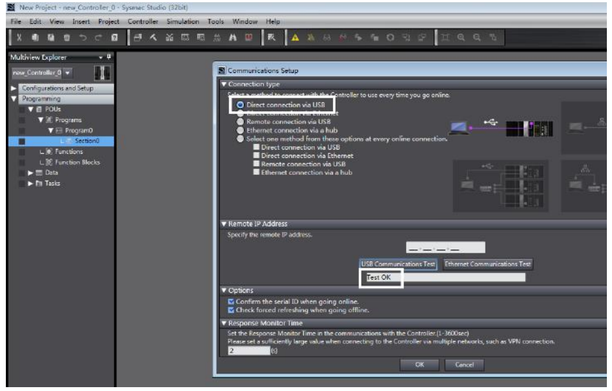
Version: 1.09 or later version. NX701-1600 only supports 1.10 or later version.



2) Perform communication settings.

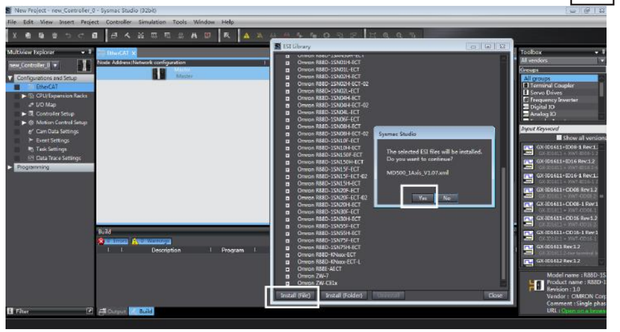
Enter the main interface and choose **Controller** > **Communications Setup** to set the control mode for the computer and controller.

Select **Direct connection via USB**. Go to next step if the test is successful.



3) Import the XML configuration file.

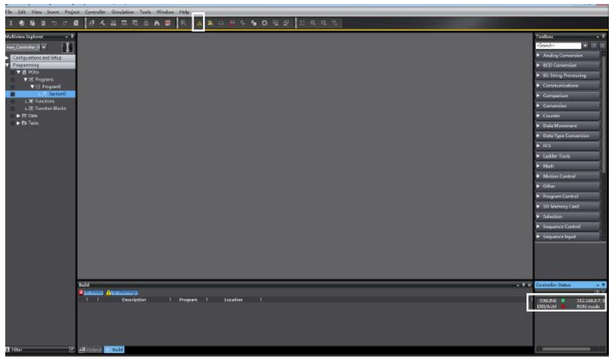
Double-click **EtherCAT** on the left nevigation pane, and then select and right-click on the master device. In the displayed **ESI Library** dialog box, click **Install (File)**, and select the XML configuration file of the MD500_ECAT card to import the XML file.



4) Scan the devices.

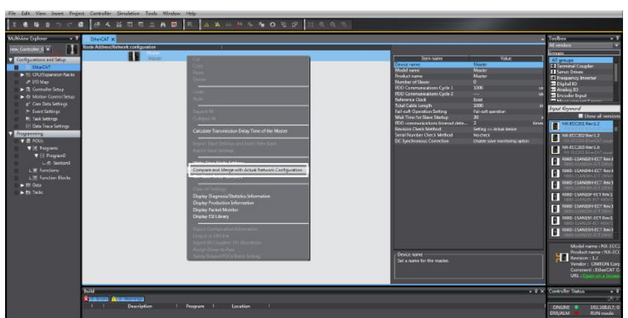
Switch the controller to the online running mode.

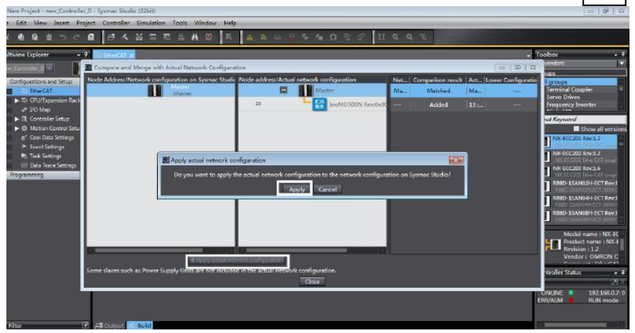
Observe the controller status in the lower right corner: online, running mode.

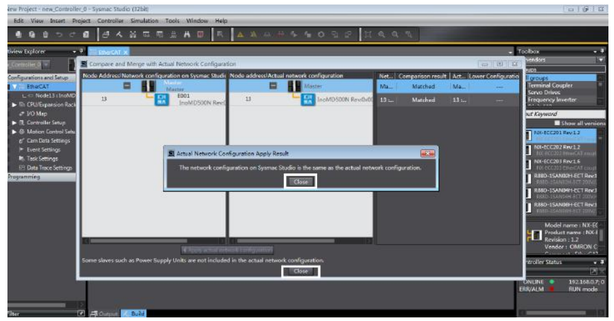


Scan the device and add the slave station. Choose **Configurations and Setup** > **EtherCAT** on the left nevigation pane. Right click on the master device, and then select **Compare and merge with Actual Network Configuration** to have the controller automatically scan all slave stations in the network (a fault will be reported if any station number is 0). After the scanning is complete, click **Apply actual network configuration** in the displayed dialog box. Now, the added slave can be viewed on the main interface.

Note: For the MD500-ECAT card, the station alias can be modified through the parameter Fd-02 or the software tool of the master station (the AC drive software must be updated to the version required in "3.1 Communication Configuration for the MD500-ECAT Card and MD500 AC Drive"). The modified station alias takes effect upon next power-on.

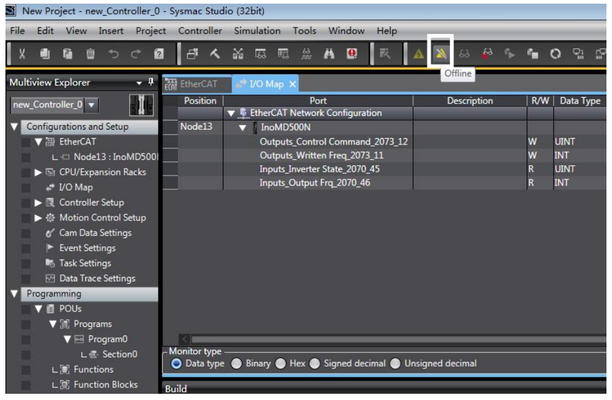




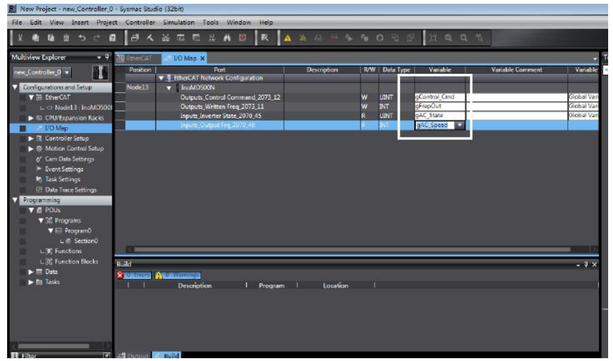


5) Set the parameters.

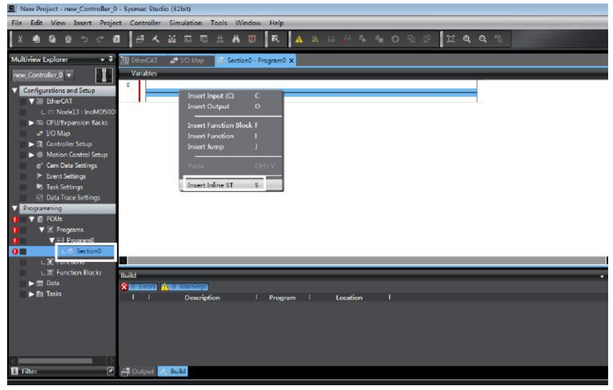
Switch the controller to the offline mode.

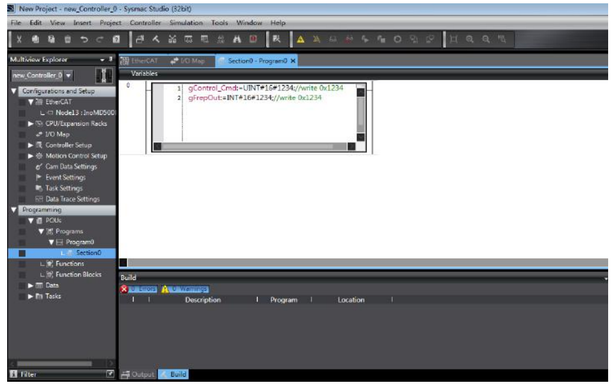


Set the PDO mapping (I/O mapping distribution).



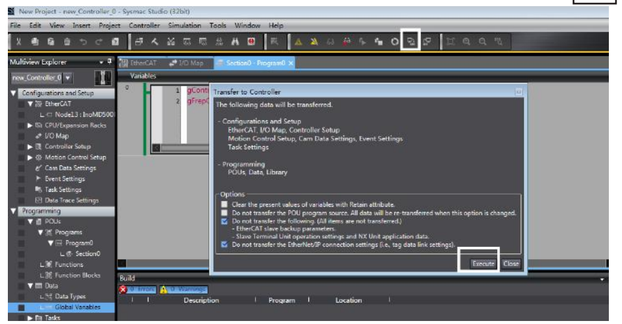
6) Edit the PLC program.





7) Download the program to the controller.

After all the setting and programming are complete, switch over to the online state, and download the program to the controller.



4. Troubleshooting

The following table describes the faults that may occur during the usage of the MD500-ECAT card and AC drive.

Table 4-1 Fault causes and solutions

Symptom	Possible Cause	Solution
Communication failure between the MD500-ECAT card and AC drive	1. The AC drive does not support EtherCAT communication. 2. The communication configuration of the MD500-ECAT card is incorrect. 3. The MD500-ECAT card hardware is faulty.	1. Check whether the AC drive supports EtherCAT communication. 2. Set the EtherCAT communication parameters correctly. 3. Replace the MD500-ECAT card.
Err16 communication error reported by the AC drive during running	1. The communication data is abnormal. 2. The network cable is damaged or connected incorrectly. 3. The AC drive suffers external interference.	1. Check whether the EtherCAT master station program is normal. 2. Check whether the network cable is connected correctly. Replace the network cable if required. 3. Use the Cat5e shielded twisted pair (STP) network cable as required. Check that the MD500-ECAT card is grounded correctly. Eliminate the external interference. Contact the agent or Inovance for technical support if necessary.

The MD500-ECAT card can be replaced directly when a slave node is faulty (only the MD500-ECAT card is faulty) without performing device configuration again.

Prerequisites for directly replacing the MD500-ECAT card:

1. Ensure that the wiring sequence is consistent before and after replacing the MD500-ECAT card.

2. The internal XML file versions of the original MD500-ECAT card and new MD500-ECAT card must be consistent.

3. If a station alias has been configured for the original MD500-ECAT card, the alias of the new device must be consistent with that of the original device.

INOVANCE Warranty Agreement

1) Inovance provides an 18-month free warranty to the equipment itself from the date of manufacturing (subject to the information indicated by the barcode on the product) for the failure or damage under normal use conditions.

2) Within the warranty period, maintenance will be charged for the damage caused by the following reasons:

   a. Improper use or disassembly/repair/modification without prior permission

   b. Fire, flood, abnormal voltage, natural disasters, and secondary disasters

   c. Hardware damage caused by dropping or transportation after procurement

   d. Operations not following the user instructions

   e. Damage out of the equipment (for example, external device factors)

3) The maintenance fee is charged according to the latest Maintenance Price List of Inovance.

4) If there is any problem during the service, contact Inovance's agent or Inovance directly.

5) You are assumed to agree on terms and conditions of this warranty agreement by purchase of the product. Inovance reserves the rights for explanation of this agreement.

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