Leadshine

MC500 Series PLC

Programming Manual

CODESYS

Modbus

OPC UA

CANopen

EtherNet/IP

EtherCAT

www. leadshine.com

202310 V1. 15

Contents

Record of revisions

Manual version	Date	Update contents
V1.10	2023/10/07	Add high speed counter configuration
V1.11	2023/10/12	Modify high speed counter configuration
V1.12	2023/10/18	Add standard wiring diagram
V1.13	2023/10/20	Add project environment configuration
V1.14	2023/10/20	Add software environment configuration, and E-CAM function
V1.15	2023/11/17	Add the G-code function

1.Introduction

MC500 is Leadshine self-developed new generation basic medium-sized PLC product that supports EtherCAT bus control. It can encapsulate and reuse processes through ST.LD, FB/FC functions, and achieve multi-level network communication through RS485, RS232, CAN, Ethernet, and EtherCAT interfaces.

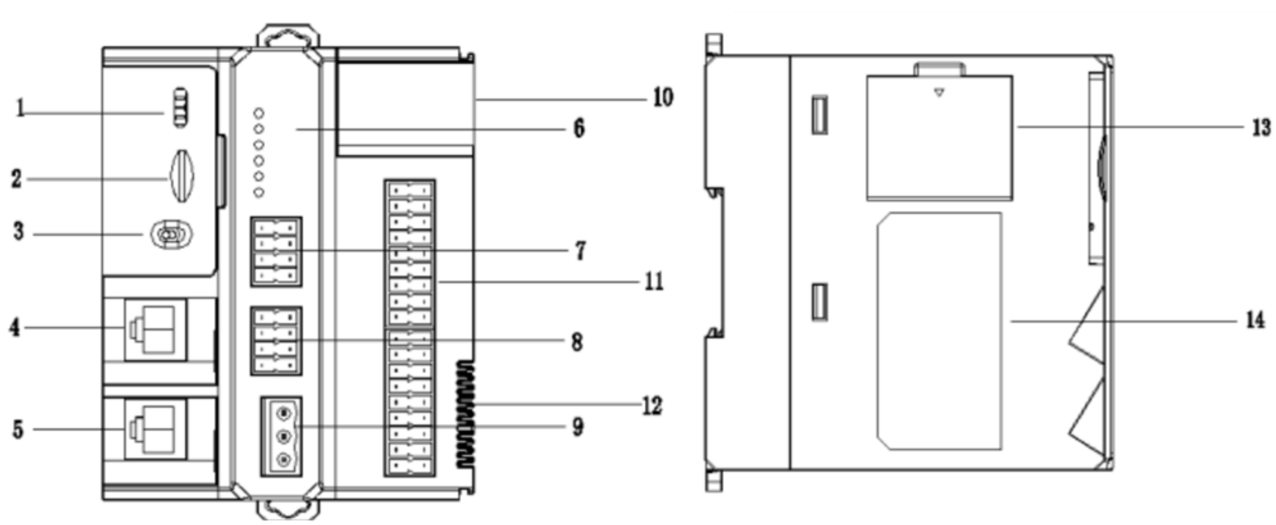
The MC500 series functions:
1) Interpolation, Multidimensional linear interpolation, circular interpolation, and continuous interpolation
2) E-CAM: By digitizing cam movements, the problems of low precision, easy wear and noise in mechanical cams can be solved.
3) Flying Shear: By setting motion values, a rotary cutting cam table can be established within the synchronization zone, with the spindle and slave shafts operating at a certain speed ratio.
4) Chasing Shear: By setting motion values a chasing cam table can be established, which is suitable for application scenarios such as cutting and filling

MC500 series PLC specification

Model Specifications	MC508CS	MC516CS	MC532CS
	EtherCAT 8 axes + pulse+dir 6 axes	EtherCAT 16 axes + pulse+dir 6 axes	EtherCAT 32 axes + pulse+dir 6 axes
Axes of Pulse +dir	Local 6 axes 200K pulse output		
Extention Capacity	Maximum extend 32 R2 series extension modules		
EtherNET	1* EtherNET port, Modbus,Socket,program upload or download ,debugging		
EtherCAT	EtherCAT master , up to 128 slaves		
Serial port communication	RS232*1,RS485*2,free communication protocol, modbus rtu master and slave		
CAN	Maximum 31 slave		
Capacity of Program file	20 M Byte		
Capacity of data	40 M Byte		
Power-Failure RetentionArea	512K Byte		
USB port	Type-C port, program upload or download,debugging		
SD card slot	User download program, standard micro SD card,FAT32 type, Maximum capacity 32G		
Function	Point to point , E-CAM, Interpolation		
High-speed counter	6 inputs ,200K		
IO Quantity	High-speed input/ normal input: 12 inputs 200K/4 inputs 1K(NPN/PNP) High-speed output/ normal output: 12 outputs 200K/4 outputs 10K(NPN)		

RTC clock	RTC
Program software	Leadsys Studio ,CODESYS V3.5(SP15) or higher
Program Language	ST,LD,CFC,SFC FBD,IL
Power input	DC 24V
Power rating	3.6W
Dimension	L 98.50mm*W 81.75mm*H100.00mm

MC500 series port description



1. **USB port**
2. **SD card slot**
3. **RUN/STOP/RESET Switch**
4. **Internet port**
5. **EtherCAT port**
6. **Running status indicator light**
7. **RS485 port**
8. **RS232 port, CAN port**
9. **Power port**
10. **I/O status indicator light**
11. **I/O port**
12. **Extension module port**
13. **Battery slot**
14. **Label**

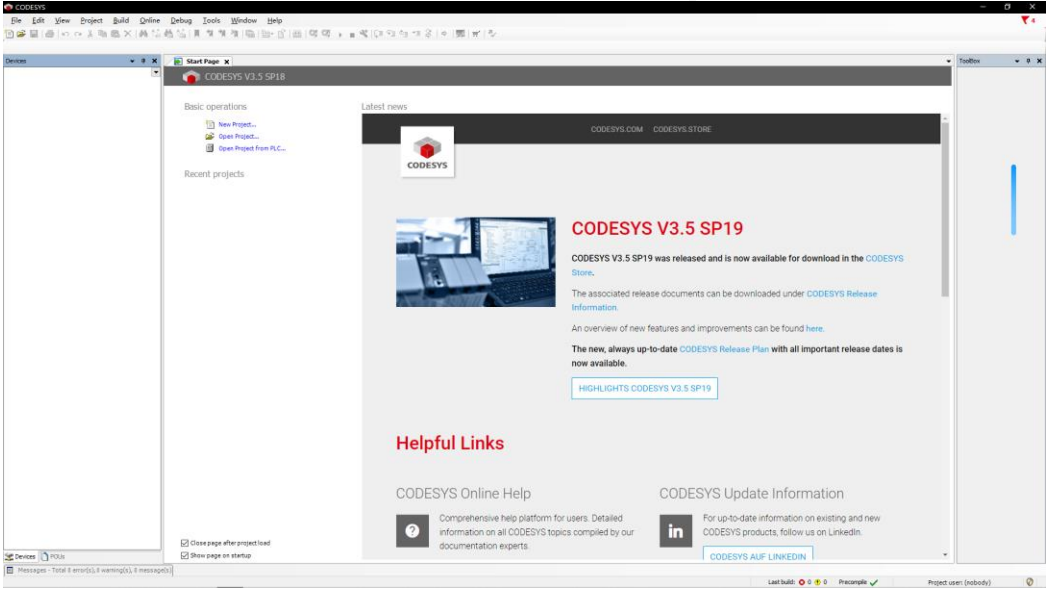
2.Quick Start

Below contents introduced the basic steps before using CODSYS software to program.When user need to program in another new upper computer, please follow these contents set configuration.

2.1.Programing Environment Launching

2.1.1.MC500 Series PLC Package Install

1)Double-click the CODESYS icon , the launch interface as below picture



CODESYS V3.5 SP19

CODESYS V3.5 SP19 was released and is now available for download in the CODESYS Store.

The associated release documents can be downloaded under CODESYS Release Information.

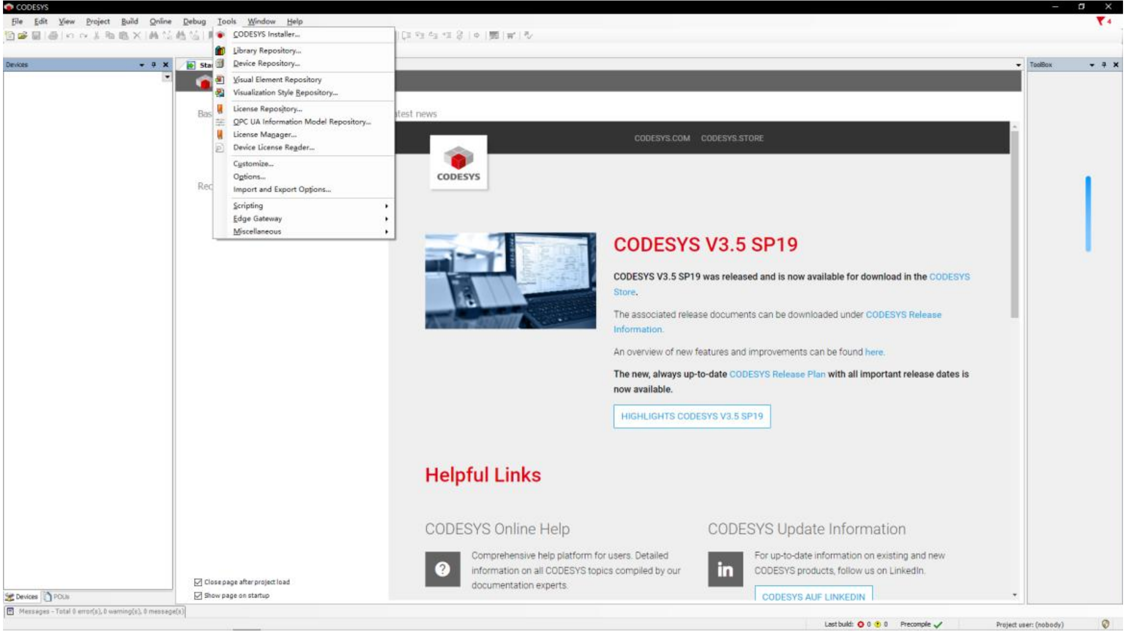
An overview of new features and improvements can be found here.

The new, always up-to-date CODESYS Release Plan with all important release dates is now available.

Comprehensive help platform for users. Detailed information on all CODESYS topics compiled by our documentation experts.

For up-to-date information on existing and new CODESYS products, follow us on LinkedIn.

2)Then click the “tool” option ,select the CODESYS installer


CODESYS
File Edit View Project Build Online Debug Tools Window Help
CODESYS Installer...
Library Repository...
Device Repository...
Visual Element Repository
Visualization Style Repository...
License Repository...
OPC UA Information Model Repository...
License Manager...
Device License Reader...
Customize...
Options...
Import and Export Options...
Scripting
Edge Gateway
Miscellaneous
Devices
ToolBox
CODESYS.COM CODESYS.STORE
CODESYS
HIGHLIGHTS CODESYS V3.5 SP19
Helpful Links
CODESYS Online Help
CODESYS Update Information
CODESYS AUF LINKEDIN
Close page after project load
Show page on startup
Devices POUs
Messages - Total 0 error(s), 0 warning(s), 0 message(s)
Last build: 0 0 Precompile
Project user: (nobody)

CODESYS V3.5 SP19

CODESYS V3.5 SP19 was released and is now available for download in the CODESYS Store.

The associated release documents can be downloaded under CODESYS Release Information.

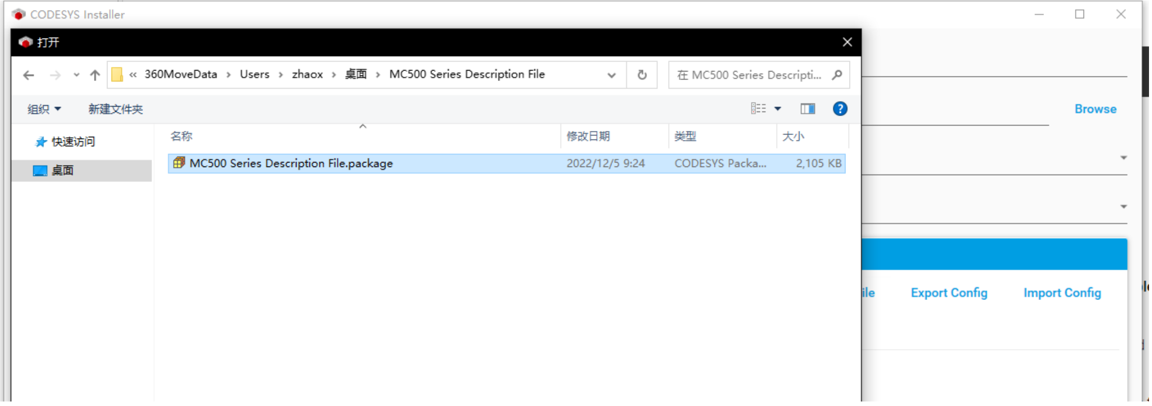
An overview of new features and improvements can be found here.

The new, always up-to-date CODESYS Release Plan with all important release dates is now available.

Comprehensive help platform for users. Detailed information on all CODESYS topics compiled by our documentation experts.

For up-to-date information on existing and new CODESYS products, follow us on LinkedIn.

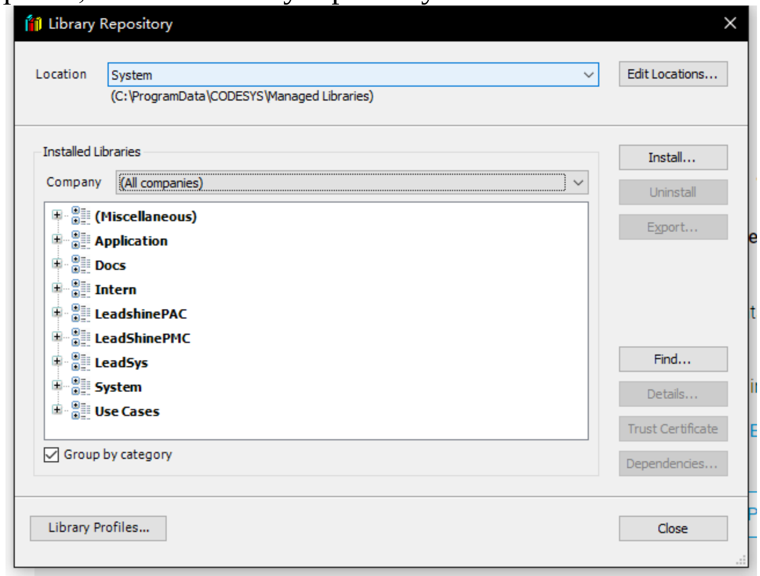
3)Click the “install file”, find the “MC500 series description file .package” to install.


CODESYS Installer
打开
« 360MoveData › Users › zhaox › 桌面 › MC500 Series Description File
MC500 Series Descripti...
组织
新建文件夹
快速访问
桌面
Browse
ile
Export Config
Import Config

名称	修改日期	类型	大小
MC500 Series Description File.package	2022/12/5 9:24	CODESYS Packa...	2,105 KB

2.1.2.Basic Function Libraries Install

1)Then click the “tool” option ,select the library repository to install the function library



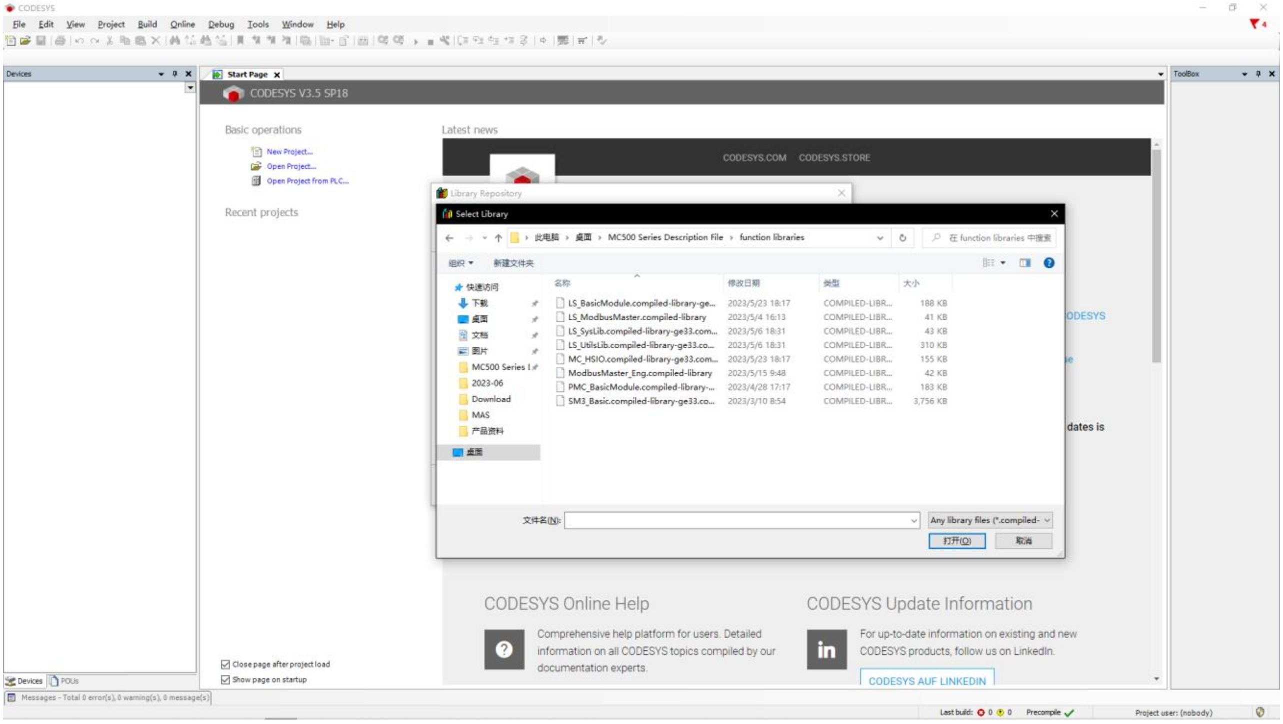
Location: System (C:\ProgramData\CODESYS\Managed Libraries)

Company: (All companies)

- (Miscellaneous)
- Application
- Docs
- Intern
- LeadshinePAC
- LeadShinePMC
- LeadSys
- System
- Use Cases

☑ Group by category

2) Install all the function libraries which provide by us.



名称	修改日期	类型	大小
LS_BasicModule.compiled-library-ge...	2023/5/23 18:17	COMPILED-LIBR...	188 KB
LS_ModbusMaster.compiled-library	2023/5/4 16:13	COMPILED-LIBR...	41 KB
LS_SysLib.compiled-library-ge33.com...	2023/5/6 18:31	COMPILED-LIBR...	43 KB
LS_UtilsLib.compiled-library-ge33.co...	2023/5/6 18:31	COMPILED-LIBR...	310 KB
MC_HSIO.compiled-library-ge33.com...	2023/5/23 18:17	COMPILED-LIBR...	155 KB
ModbusMaster_Eng.compiled-library	2023/5/15 9:48	COMPILED-LIBR...	42 KB
PMC_BasicModule.compiled-library-...	2023/4/28 17:17	COMPILED-LIBR...	183 KB
SM3_Basic.compiled-library-ge33.co...	2023/3/10 8:54	COMPILED-LIBR...	3,756 KB

Comprehensive help platform for users. Detailed information on all CODESYS topics compiled by our documentation experts.

For up-to-date information on existing and new CODESYS products, follow us on LinkedIn.

☑ Close page after project load

☑ Show page on startup

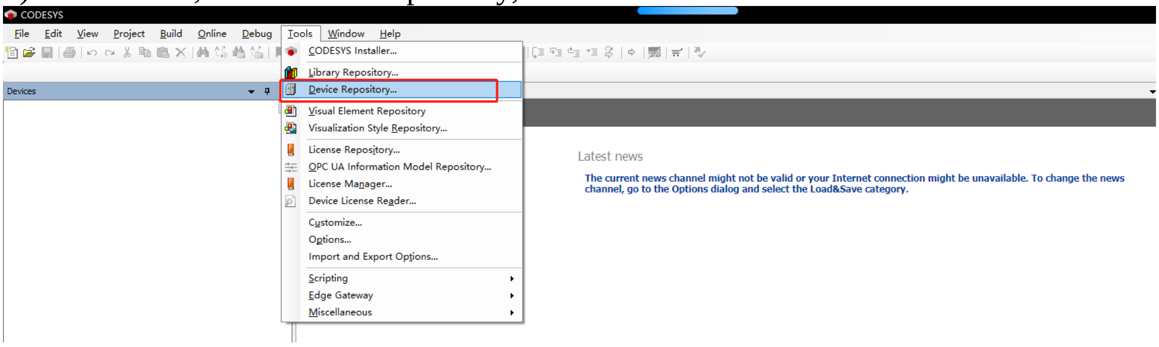
Messages - Total 0 error(s), 0 warning(s), 0 message(s)

Last build: 0 0

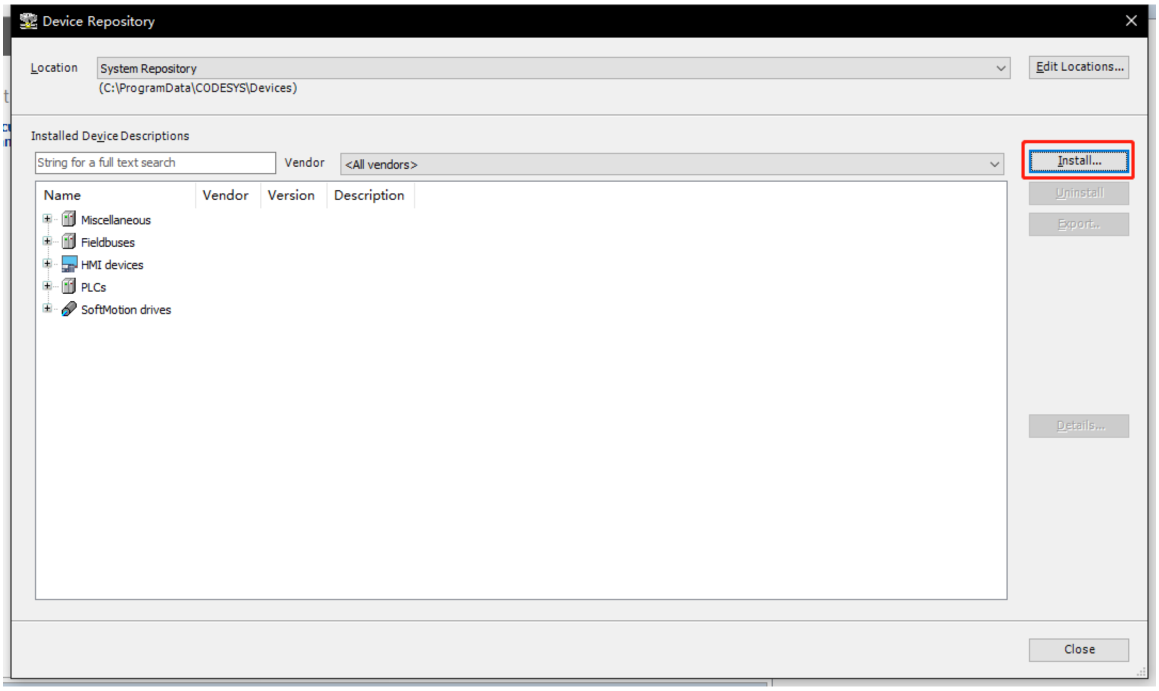
2.1.3.Install basic device .XML file

The basic devices include the high speed IO device and local bus device, please refer to follow contents to install the XML files.

1) Click “tool”, select device repository, then click install.



The current news channel might not be valid or your Internet connection might be unavailable. To change the news channel, go to the Options dialog and select the Load&Save category.



Device Repository

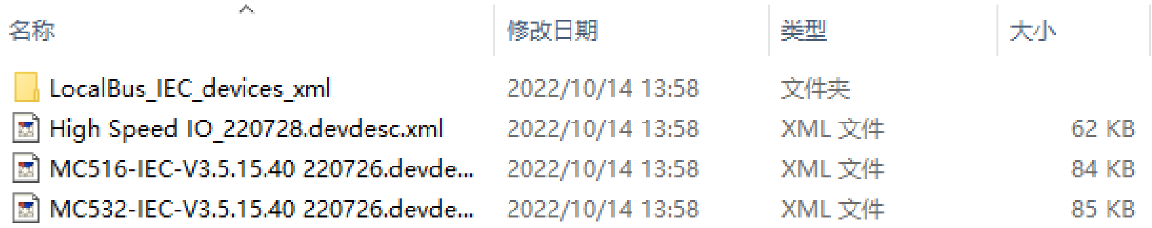
Location System Repository
(C:\ProgramData\CODESYS\Devices)

Installed Device Descriptions

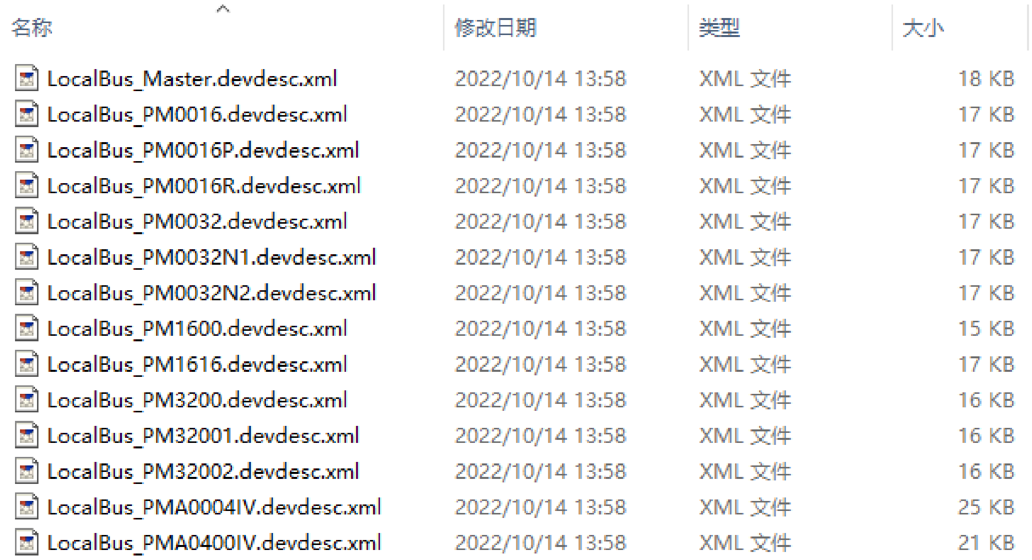
Vendor <All vendors>

Name	Vendor	Version	Description
Miscellaneous			
Fieldbuses			
HMI devices			
PLCs			
SoftMotion drives			

2) Select the devices XML files to install



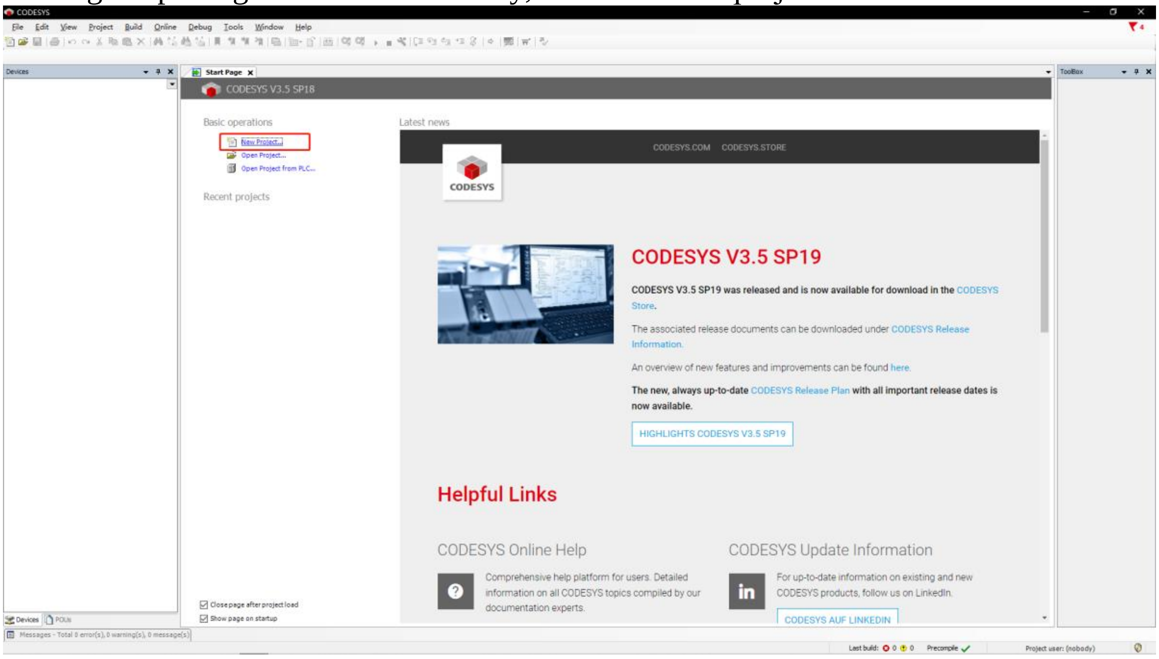
名称	修改日期	类型	大小
LocalBus_IEC_devices_xml	2022/10/14 13:58	文件夹	
High Speed IO_220728.devdesc.xml	2022/10/14 13:58	XML 文件	62 KB
MC516-IEC-V3.5.15.40 220726.devde...	2022/10/14 13:58	XML 文件	84 KB
MC532-IEC-V3.5.15.40 220726.devde...	2022/10/14 13:58	XML 文件	85 KB



名称	修改日期	类型	大小
LocalBus_Master.devdesc.xml	2022/10/14 13:58	XML 文件	18 KB
LocalBus_PM0016.devdesc.xml	2022/10/14 13:58	XML 文件	17 KB
LocalBus_PM0016P.devdesc.xml	2022/10/14 13:58	XML 文件	17 KB
LocalBus_PM0016R.devdesc.xml	2022/10/14 13:58	XML 文件	17 KB
LocalBus_PM0032.devdesc.xml	2022/10/14 13:58	XML 文件	17 KB
LocalBus_PM0032N1.devdesc.xml	2022/10/14 13:58	XML 文件	17 KB
LocalBus_PM0032N2.devdesc.xml	2022/10/14 13:58	XML 文件	17 KB
LocalBus_PM1600.devdesc.xml	2022/10/14 13:58	XML 文件	15 KB
LocalBus_PM1616.devdesc.xml	2022/10/14 13:58	XML 文件	17 KB
LocalBus_PM3200.devdesc.xml	2022/10/14 13:58	XML 文件	16 KB
LocalBus_PM32001.devdesc.xml	2022/10/14 13:58	XML 文件	16 KB
LocalBus_PM32002.devdesc.xml	2022/10/14 13:58	XML 文件	16 KB
LocalBus_PMA0004IV.devdesc.xml	2022/10/14 13:58	XML 文件	25 KB
LocalBus_PMA0400IV.devdesc.xml	2022/10/14 13:58	XML 文件	21 KB

2.2.Create New Project

1)After installing the package and function library, click the “new project”



CODESYS V3.5 SP19

CODESYS V3.5 SP19 was released and is now available for download in the CODESYS Store.

The associated release documents can be downloaded under CODESYS Release Information.

An overview of new features and improvements can be found here.

The new, always up-to-date CODESYS Release Plan with all important release dates is now available.

CODESYS Online Help

Comprehensive help platform for users. Detailed information on all CODESYS topics compiled by our documentation experts.

CODESYS Update Information

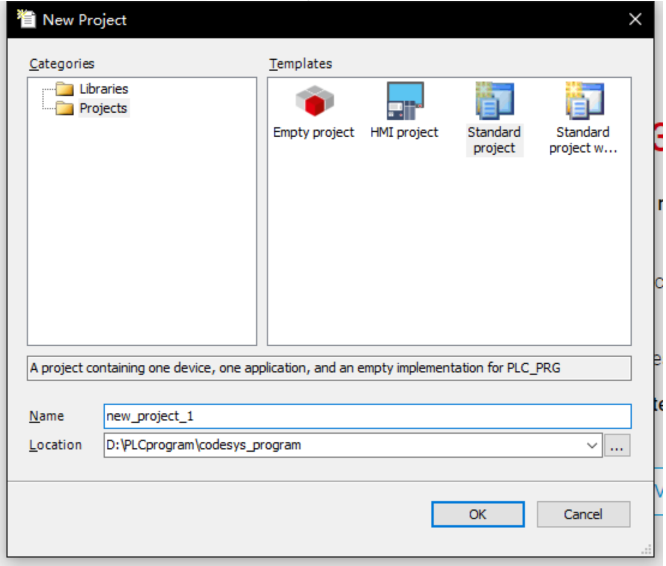
For up-to-date information on existing and new CODESYS products, follow us on LinkedIn.

☑ Close page after project load

☑ Show page on startup

Messages - Total 0 error(s), 0 warning(s), 0 message(s)

2)Then enter the project location, name and project type, click “OK”.



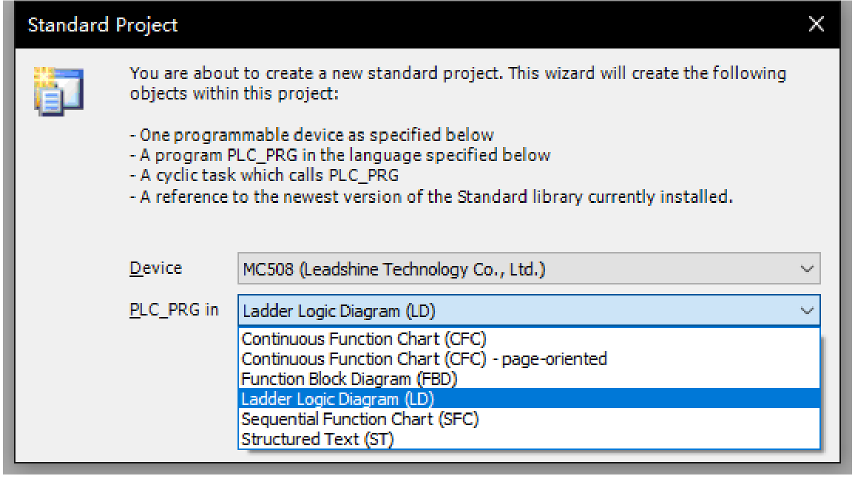
A project containing one device, one application, and an empty implementation for PLC_PRG

Name: new_project_1

Location: D:\PLCprogram\codesys_program

3)Selecting the device and programing language,

MC500 series PLC supports ST, LD, CFC, SFC, FBD, IL programing language.


Standard Project
Continuous Function Chart (CFC)
Continuous Function Chart (CFC) - page-oriented
Function Block Diagram (FBD)
Ladder Logic Diagram (LD)
Sequential Function Chart (SFC)
Structured Text (ST)

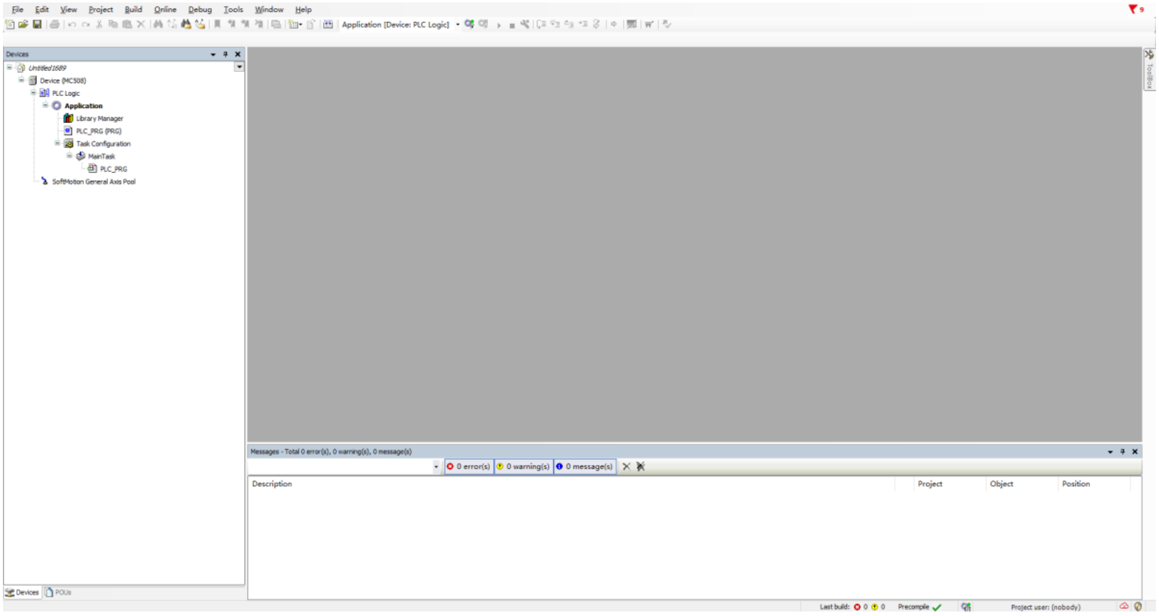
You are about to create a new standard project. This wizard will create the following objects within this project:

- One programmable device as specified below
- A program PLC_PRG in the language specified below
- A cyclic task which calls PLC_PRG
- A reference to the newest version of the Standard library currently installed.

Device: MC508 (Leadshine Technology Co., Ltd.)

PLC_PRG in: Ladder Logic Diagram (LD)

4)After finish above steps, window shows as below



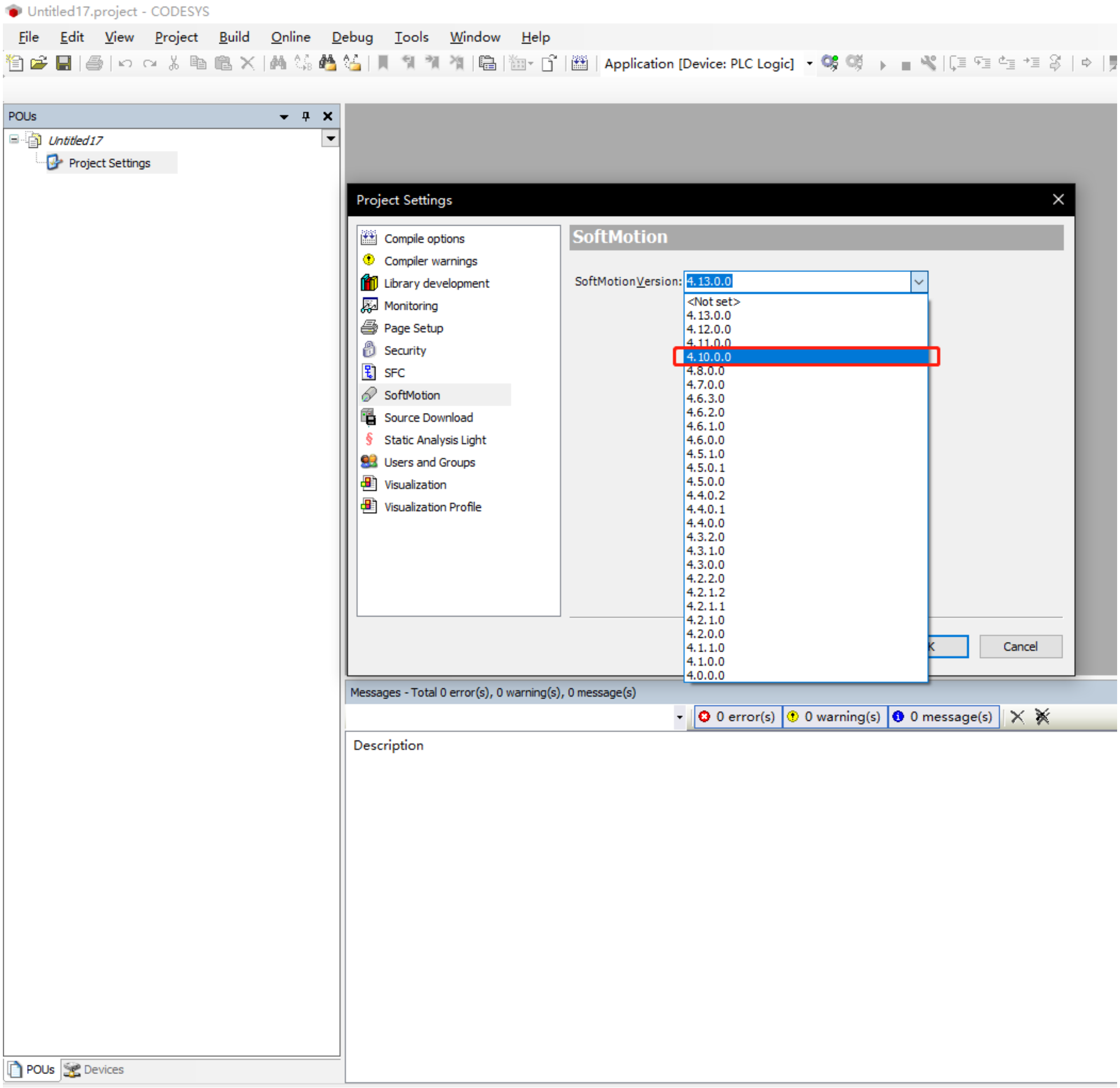
Messages - Total 0 error(s), 0 warning(s), 0 message(s)

0 error(s) 0 warning(s) 0 message(s)

Last build: 0 0 Precompile ✓ Project user: (nobody)

5) Change the SoftMotion version

The function libraries which developed by Leadshine are basic on the version 4.10.0.0, so after creating the new project, user have to change the SoftMotion version.



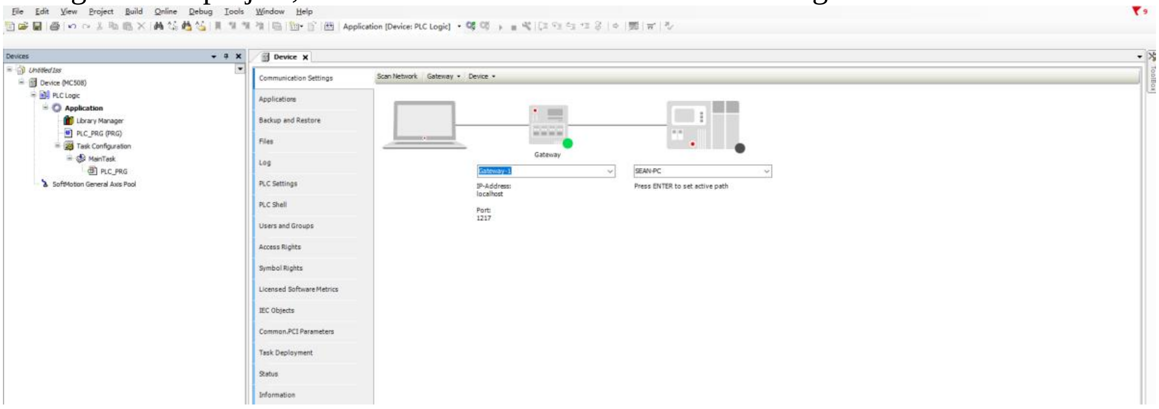
SoftMotionVersion: 4.13.0.0

Messages - Total 0 error(s), 0 warning(s), 0 message(s)

0 error(s) 0 warning(s) 0 message(s)

2.3.Login And Running PLC

1)After creating the new project, click the device to check the PLC configuration.



Gateway-1

IP-Address:
localhost

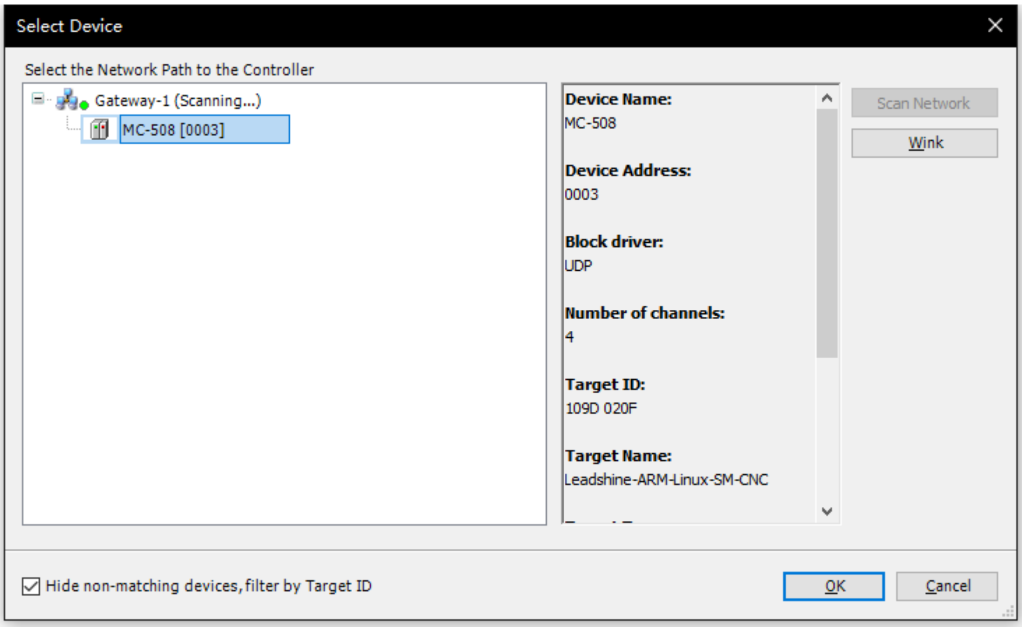
Port:
1217

SEAN-PC

Press ENTER to set active path

2)Click "Scan Network" to find the PLC, Click "OK" check the information of the device.

The default IP address is **192.168.1.3**



Select the Network Path to the Controller

Gateway-1 (Scanning...)

MC-508 [0003]

Device Name:
MC-508

Device Address:
0003

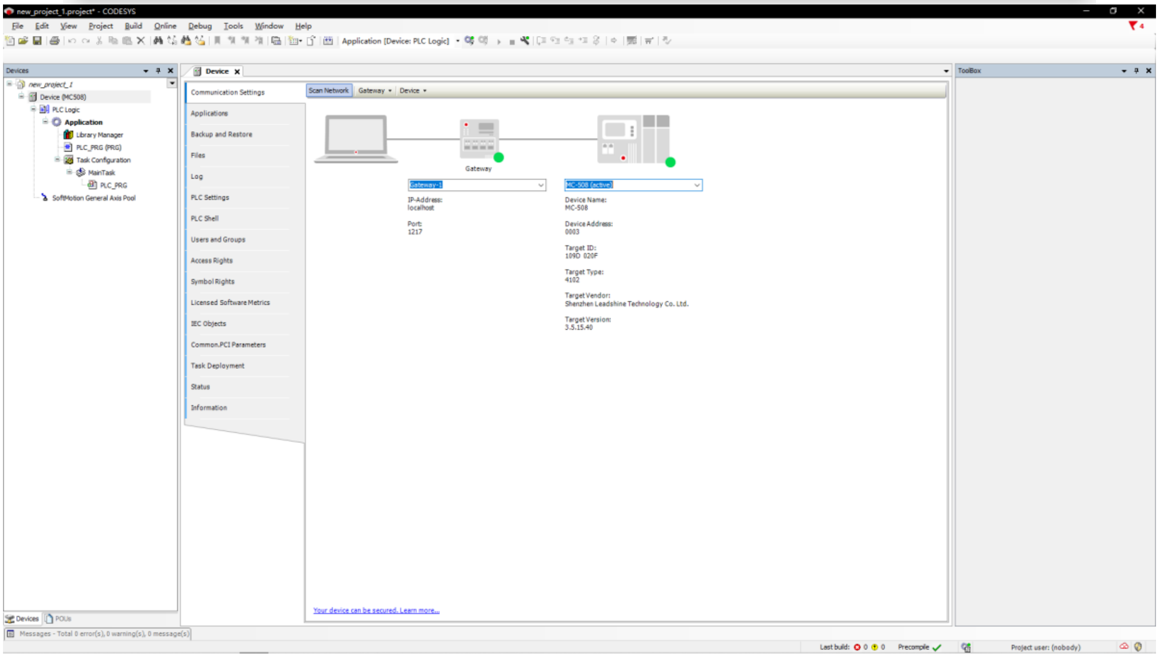
Block driver:
UDP

Number of channels:
4

Target ID:
109D 020F

Target Name:
Leadshine-ARM-Linux-SM-CNC

☑ Hide non-matching devices, filter by Target ID



Gateway-1

IP-Address:
localhost

Port:
1217

MC-508 (active)

Device Name:
MC-508

Device Address:
0003

Target ID:
109D 020F

Target Type:
4102

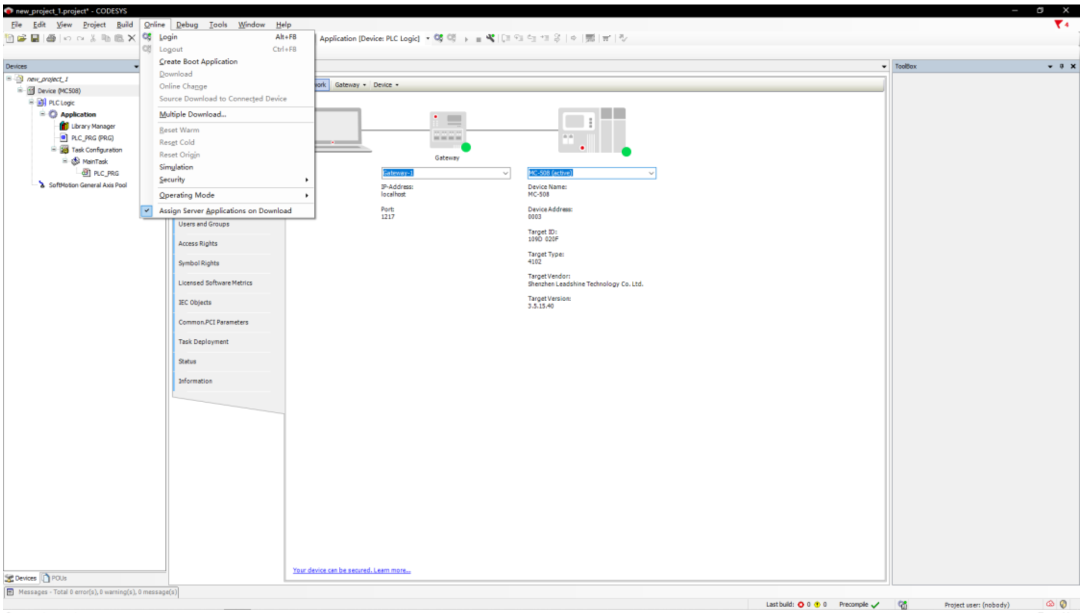
Target Vendor:
Shenzhen Leadshine Technology Co. Ltd.

Target Version:
3.5.15.40

Your device can be secured. Learn more...

Messages - Total 0 error(s), 0 warning(s), 0 message(s)

3)Then download the project to PLC, click "online" to select login option

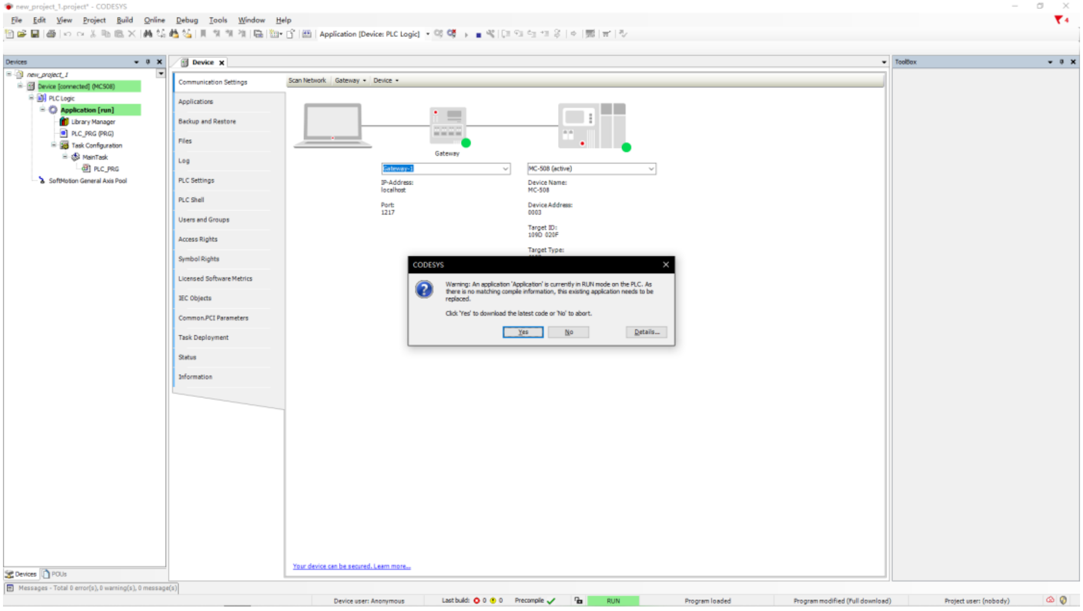


Gateway-1
IP-Address:
localhost
Port:
1217

MC-508 (active)
Device Name:
MC-508
Device Address:
0003
Target ID:
109D 020F
Target Type:
4102
Target Vendor:
Shenzhen Leadshine Technology Co. Ltd.
Target Version:
3.5.15.40

Messages - Total 0 error(s), 0 warning(s), 0 message(s)

Last build: 0 0 Precompile ✓ Project user: (nobody)



Gateway-1
IP-Address:
localhost
Port:
1217

MC-508 (active)
Device Name:
MC-508
Device Address:
0003
Target ID:
109D 020F
Target Type:

CODESYS

Warning: An application 'Application' is currently in RUN mode on the PLC. As there is no matching compile information, this existing application needs to be replaced.

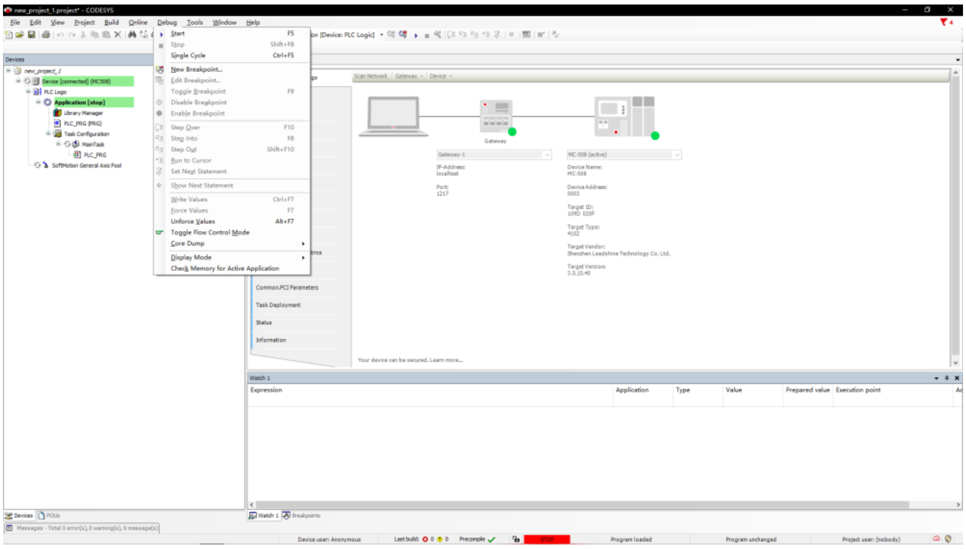
Click 'Yes' to download the latest code or 'No' to abort.

Yes No Details...

Messages - Total 0 error(s), 0 warning(s), 0 message(s)

Device user: Anonymous Last build: 0 0 Precompile ✓ RUN Program loaded Program modified (Full download) Project user: (nobody)

4)After downloading the program, PLC will turn to the stop status, click “Debug” to modify the PLC to start status.



Gateway-1
IP-Address:
localhost
Port:
1217

MC-508 (active)
Device Name:
MC-508
Device Address:
0003
Target ID:
109D 020F
Target Type:
4102
Target Vendor:
Shenzhen Leadshine Technology Co. Ltd.
Target Version:
3.5.15.40

Messages - Total 0 error(s), 0 warning(s), 0 message(s)

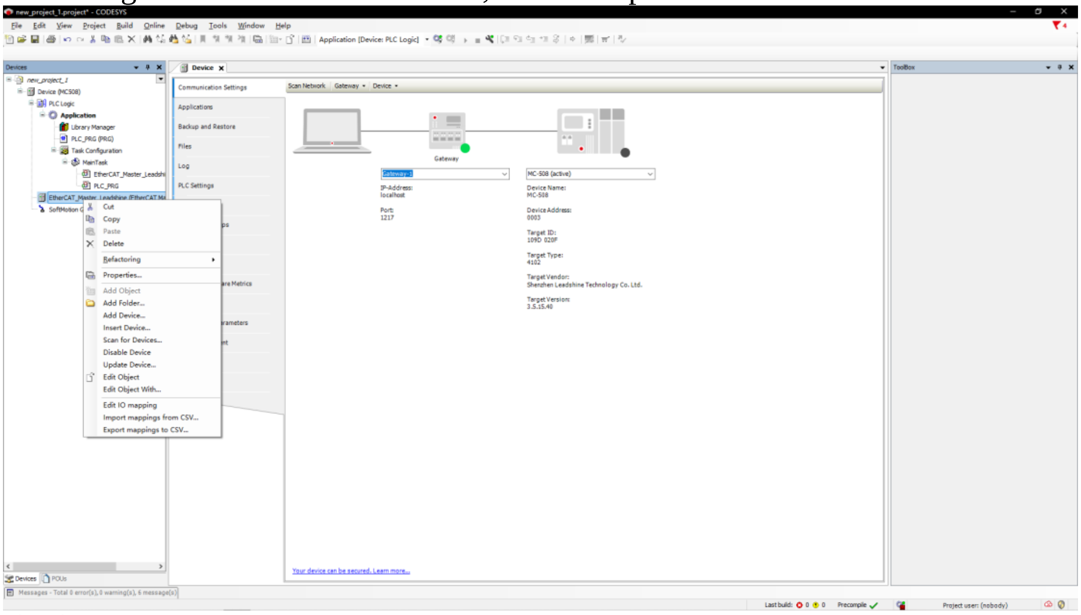
Device user: Anonymous Last build: 0 0 Precompile ✓ STOP Program loaded Program unchanged Project user: (nobody)

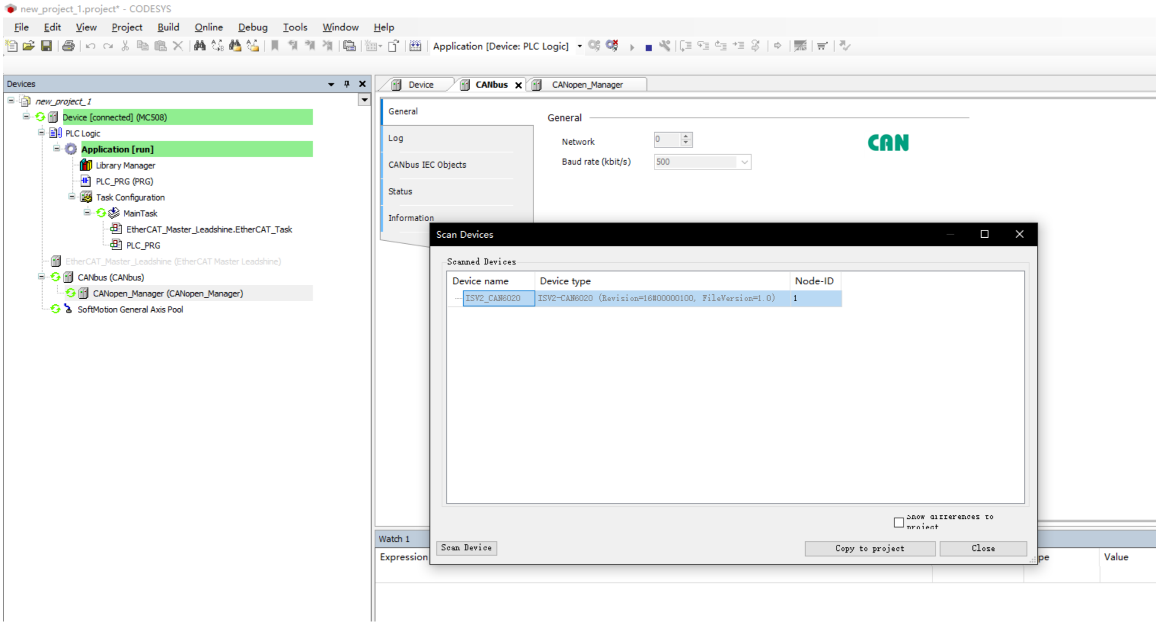
2.4.Device Configuration

Normally, there are two different methods to configure the drive or other device. If drive or device has connected to the PLC, user can use the auto-scanning function to help user to configure

2.4.1.Auto-Scanning Device

When the device have connected to PLC via EtherCAT, Ethernet/IP, or CANopen communication, using the scanning function to find the device, as bellow pictures show.




new_project_1.project* - CODESYS
Device [connected] (MC508)
Application [run]
CANbus (CANbus)
CANopen_Manager (CANopen_Manager)
CAN
Network
Baud rate (kbit/s)
500
Scan Devices
Show differences to project
Scan Device
Copy to project
Close

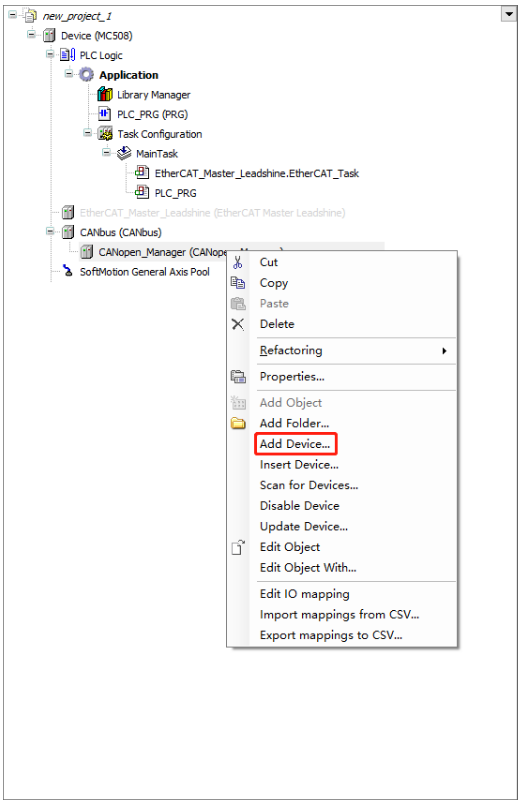
Scanned Devices

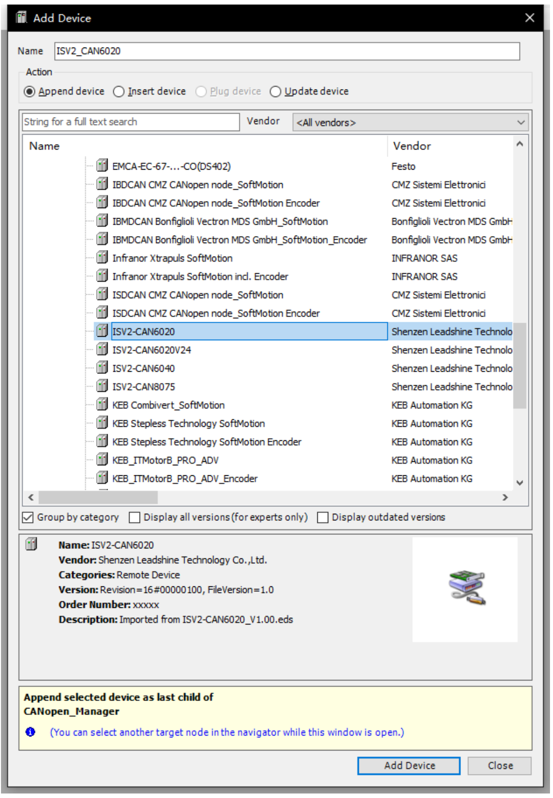
Device name	Device type	Node-ID
ISV2_CAN6020	ISV2-CAN6020 (Revision=16#00000100, FileVersion=1.0)	1

2.4.2.Off-Line Device Configuration

When the device is off line, user can add the device to project manually. (After install the device description file, the device can be found in the list)

1) Click “add device”, the device will be added into the project automatically.





Name: ISV2_CAN6020

Action: ● Append device ○ Insert device ○ Plug device ○ Update device

String for a full text search Vendor <All vendors>

Name	Vendor
EMCA-EC-67-...-CO(DS402)	Festo
IBDCAN CMZ CANopen node_SoftMotion	CMZ Sistemi Elettronici
IBDCAN CMZ CANopen node_SoftMotion Encoder	CMZ Sistemi Elettronici
IBMDCAN Bonfiglioli Vectron MDS GmbH_SoftMotion	Bonfiglioli Vectron MDS GmbH
IBMDCAN Bonfiglioli Vectron MDS GmbH_SoftMotion_Encoder	Bonfiglioli Vectron MDS GmbH
Infranor Xtrapuls SoftMotion	INFRANOR SAS
Infranor Xtrapuls SoftMotion incl. Encoder	INFRANOR SAS
ISDCAN CMZ CANopen node_SoftMotion	CMZ Sistemi Elettronici
ISDCAN CMZ CANopen node_SoftMotion Encoder	CMZ Sistemi Elettronici
ISV2-CAN6020	Shenzen Leadshine Technolo
ISV2-CAN6020V24	Shenzen Leadshine Technolo
ISV2-CAN6040	Shenzen Leadshine Technolo
ISV2-CAN8075	Shenzen Leadshine Technolo
KEB Combivert_SoftMotion	KEB Automation KG
KEB Stepless Technology SoftMotion	KEB Automation KG
KEB Stepless Technology SoftMotion Encoder	KEB Automation KG
KEB_ITMotorB_PRO_ADV	KEB Automation KG
KEB_ITMotorB_PRO_ADV_Encoder	KEB Automation KG

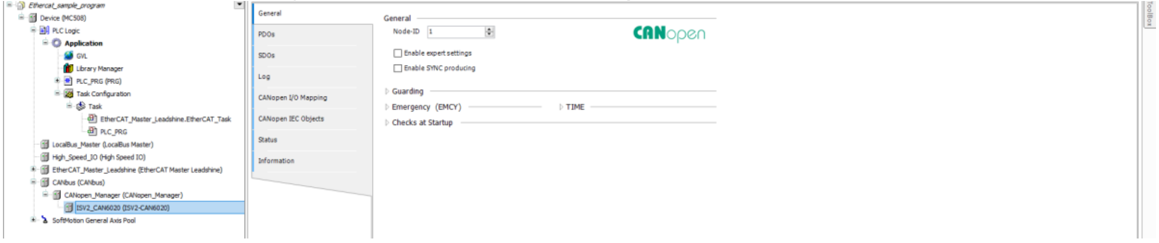
☑ Group by category ☐ Display all versions (for experts only) ☐ Display outdated versions

Name: ISV2-CAN6020
Vendor: Shenzen Leadshine Technology Co.,Ltd.
Categories: Remote Device
Version: Revision=16#00000100, FileVersion=1.0
Order Number: xxxxx
Description: Imported from ISV2-CAN6020_V1.00.eds

Append selected device as last child of CANopen_Manager

(You can select another target node in the navigator while this window is open.)

2) And user can modify the device off line configuration



General

Node-ID: 1

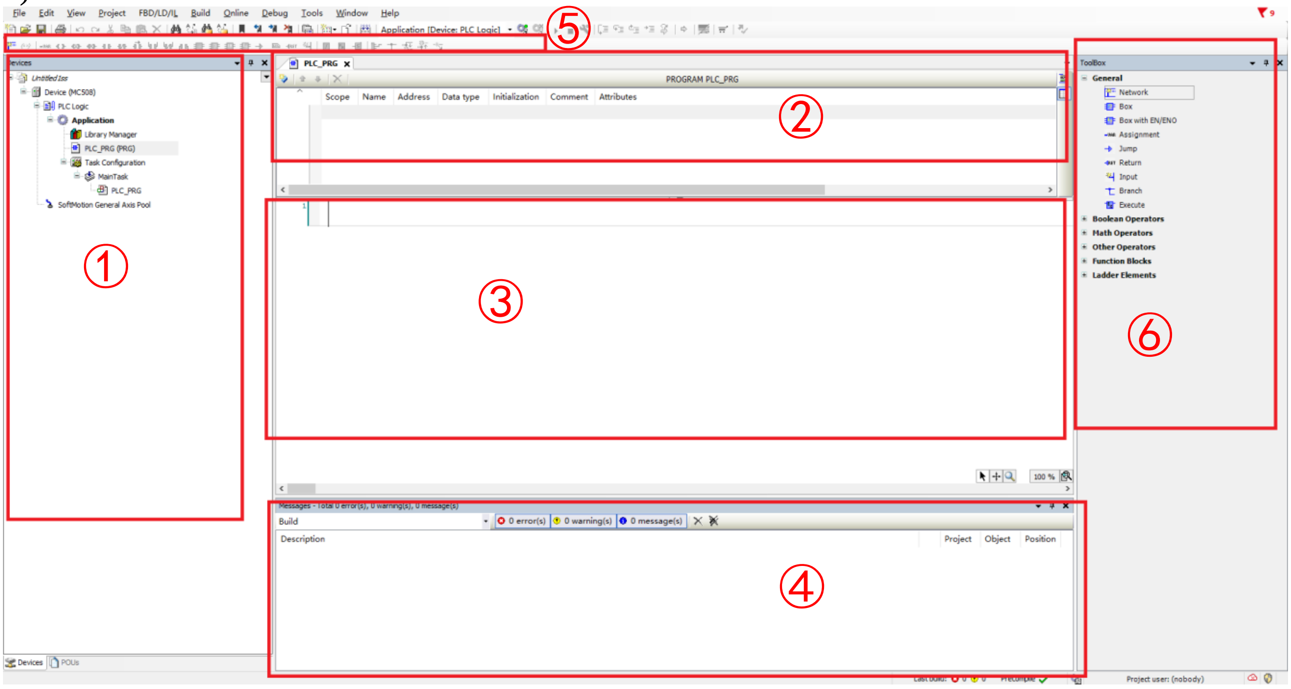
☐ Enable expert settings

☐ Enable SYNC producing

2.5.PLC Sample Program Writing

2.5.1.Create Main Program

1) Interface introduction

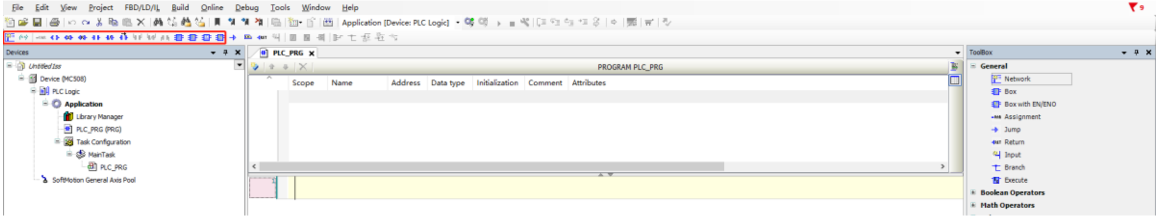


① device configuration area ④ project information area

② local variable definition area ⑤ LD quick command bar

③ programing area ⑥toolbox

2) Click the “PLC_PLG”, to open programming interface, click the LD command icon to create program.



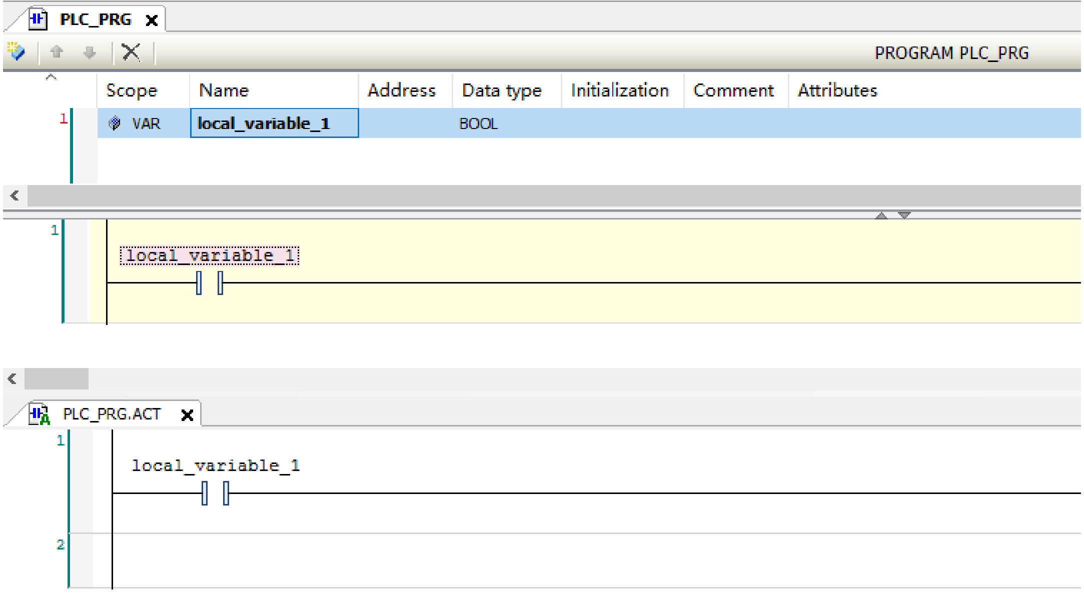
3) Typical procedure for writing user program

- Configure the hardware system based on the hardware connection structure of the medium-sized PLC application system.
- Write the user program according to the control procedure of the application system. During programming, the variables are customized based on the data storage width and use scope, which may be independent of hardware configuration.
- Link the input port variable (I), output status (Q), or value (M) of each hardware port in the system structure with the variables in the user program.
- Configure the synchronization period of network communication (for example, the EtherCAT bus). Configure the execution periods of user program units according to the instantaneity requirements of tasks.
- Login PLC and download the user program, carry out simulated commissioning, and rectify faults until the program runs normally.

2.5.2.Variable Definition

1) Local variable

The variable which be defined in the variable window of PLC_PRG is the local variable, it can be called within the PLC_PRG program main body or subroutine.



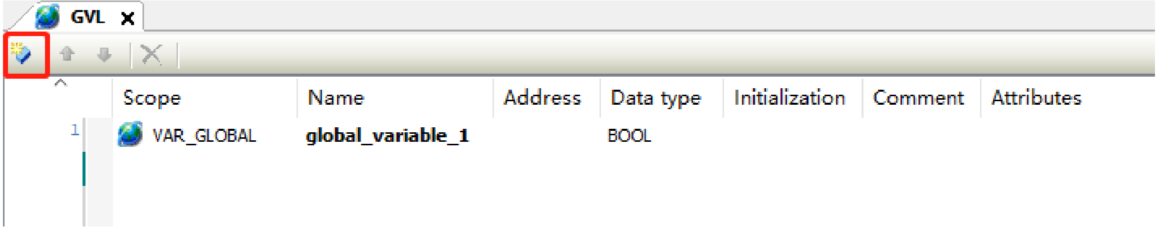
Scope	Name	Address	Data type	Initialization	Comment	Attributes
VAR	local_variable_1		BOOL			

local_variable_1

local_variable_1

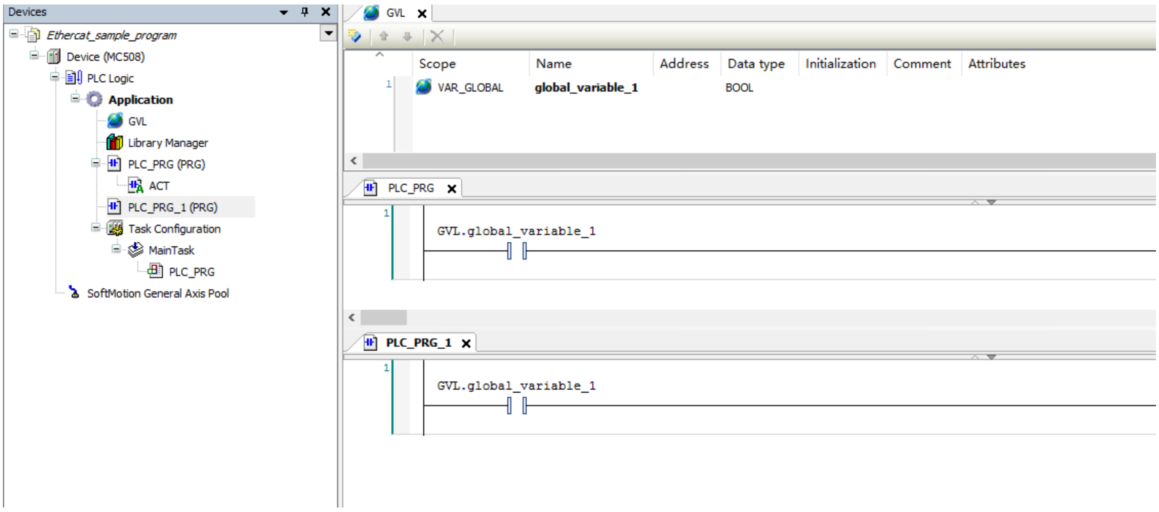
2) Global variable

The variable which be defined in the global variable list is the global variable.right-click “application”, create the “GVL” (global variable list), click “add”icon to create a global variable



Scope	Name	Address	Data type	Initialization	Comment	Attributes
VAR_GLOBAL	global_variable_1		BOOL			

Global variable can be called within all program body



Scope	Name	Address	Data type	Initialization	Comment	Attributes
VAR_GLOBAL	**global_variable_1**		BOOL			

2.5.3.Variable address definition

Definition format **: <%address area> <prefix symbol> <number>. <number>**

For example: %MX0.0, %IX0.0

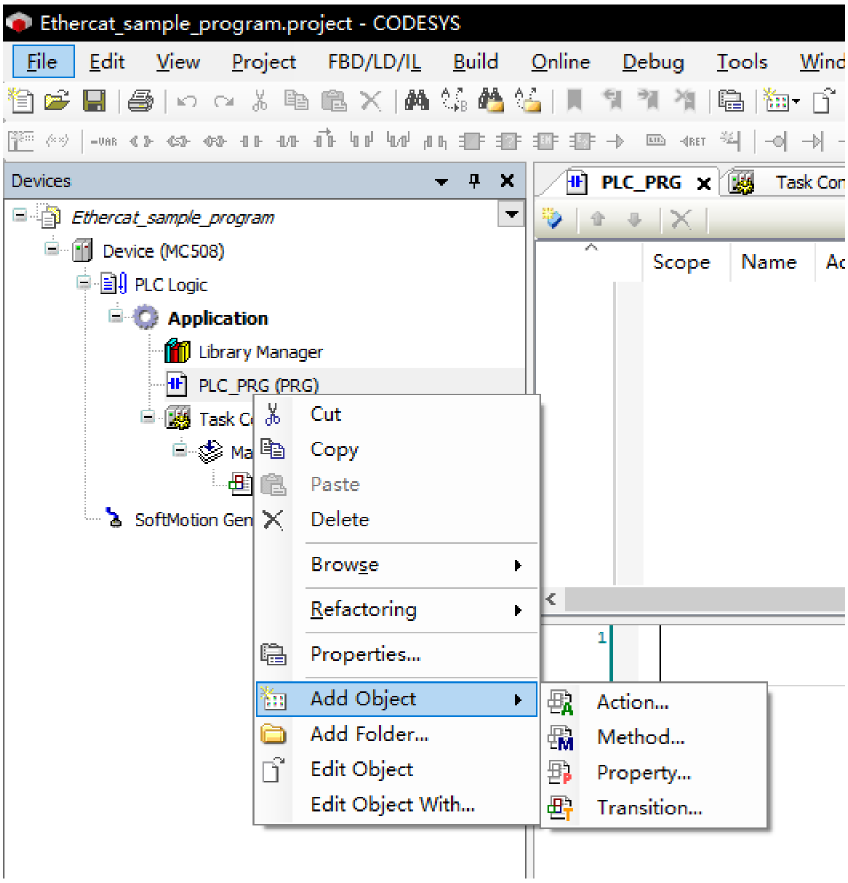
Prefix symbol	**Definition**	**Data type**
X	BIT	BOOL
B	BYTE	BYTE
W	WORD	WORD
D	DWORD	DWORD

2.5.4.Variable type

Data type	**Data size**	**Range**
BIT	1 bit	0 or1
BOOL	1Byte	FALSE(0) or TRUE(1)
BYTE	8bit	0~255
WORD	16bit	0~65535
DWORD	32bit	0~4294967295
LWORD	64bit	0~(2^{64} -1)
SINT	8bit	-128~127
USINT	8bit	0~255
INT	16bit	-32768~32767
UINT	16bit	0~65535
DINT	32bit	-2147483648~2147483647
UDINT	32bit	0~4294967295
LINT	64bit	-263~(2^{63} -1)
REAL	32bit	1.175494351e^{-38}~3.402823466e^{+38}
LREAL	64bit	2.2250738585072014e^{-308}~1.7976931348623158e^{+308}
STRING	8×N bit	
WSRING	16×N bit	
TIME	32bit	T#0ms~T#71582m47s295ms
TIME_OF_DAY		TOD#0:0:0~TOD#1193:02:47.295
DATE		D#1970-1-1~D#2106-02-06
DATE_AND_TIME		DT#1970-1-1-0:0:0~DT#2106-02-06-06: 28:15

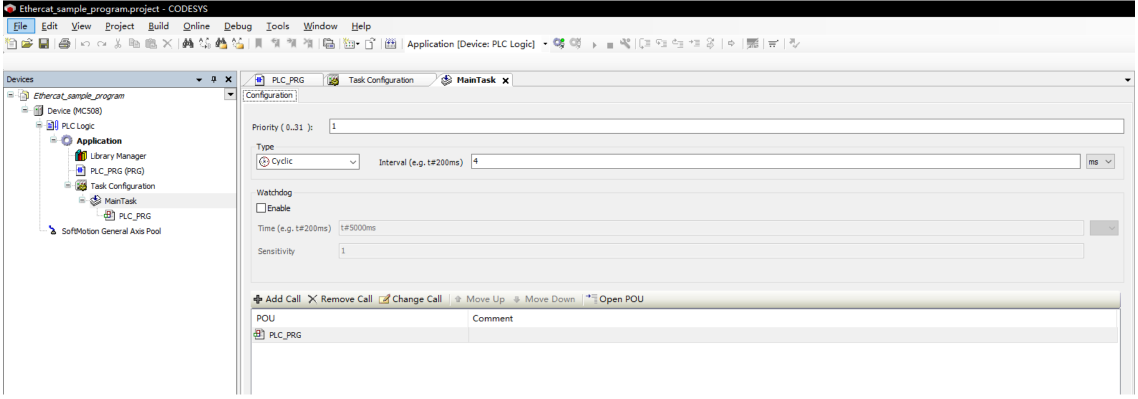
2.5.5.Create Action Program

Right-click the “PLC_PRG” to add the action program, it’s as the subroutine of the PLC_PRG program



2.5.6.Task Configuration

Double click “MainTask” user can configure the priority, task type, interval, watch dog, and the task item.as the follow picture show



Priority (0..31): 1

Type: Cyclic   Interval (e.g. t#200ms): 4 ms

Watchdog

□ Enable

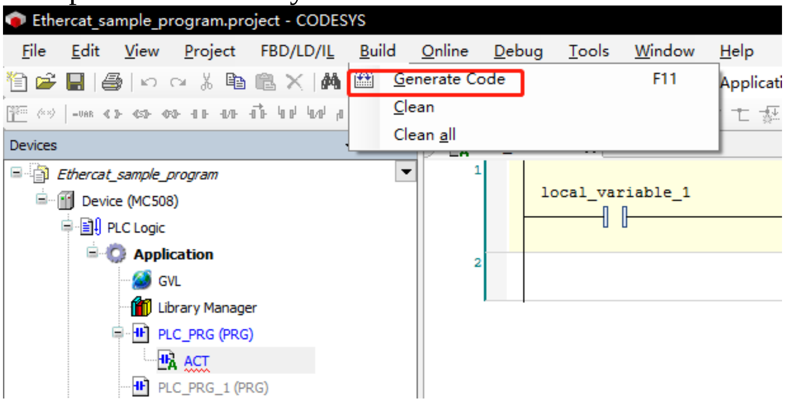
Time (e.g. t#200ms): t#5000ms

Sensitivity: 1

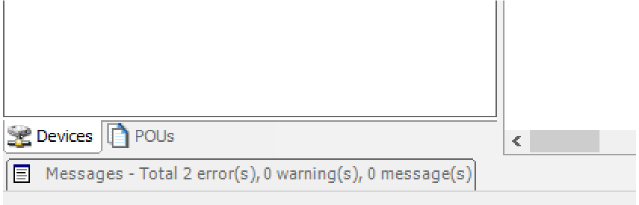
POU	Comment
PLC_PRG	

2.5.7.Locate Program Compiling Error

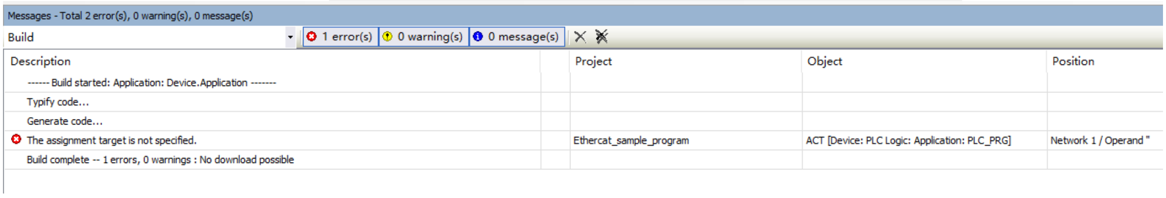
After complete all the program , need to compile the program to check the error,click “build” then click “generate code” or press Shortcut key F11.



Then message window will note whether there are any errors in the program



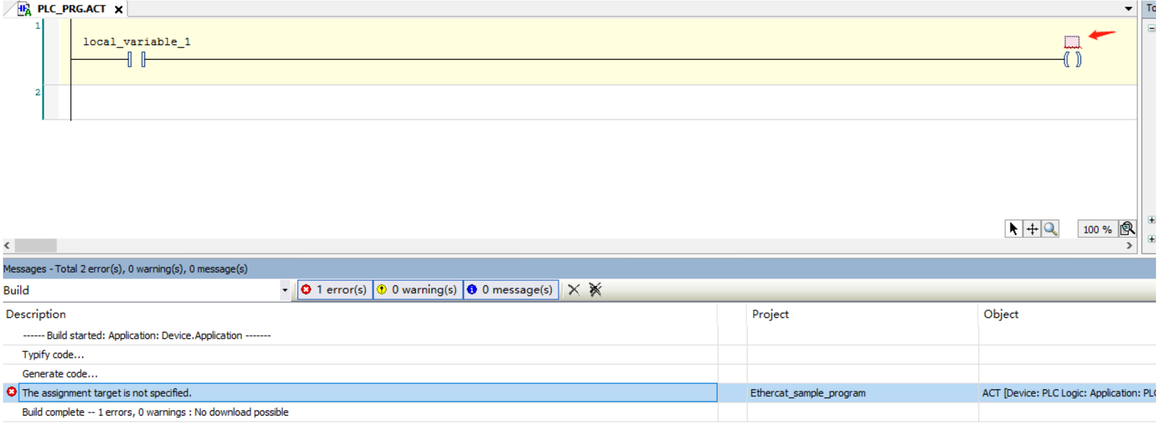
Messages - Total 2 error(s), 0 warning(s), 0 message(s)



Messages - Total 2 error(s), 0 warning(s), 0 message(s)

Description	Project	Object	Position
------ Build started: Application: Device.Application -------			
Typify code...			
Generate code...			
The assignment target is not specified.	Ethercat_sample_program	ACT [Device: PLC Logic: Application: PLC_PRG]	Network 1 / Operand ''
Build complete -- 1 errors, 0 warnings : No download possible			

Then double click the error item, program window will show the error location automatically



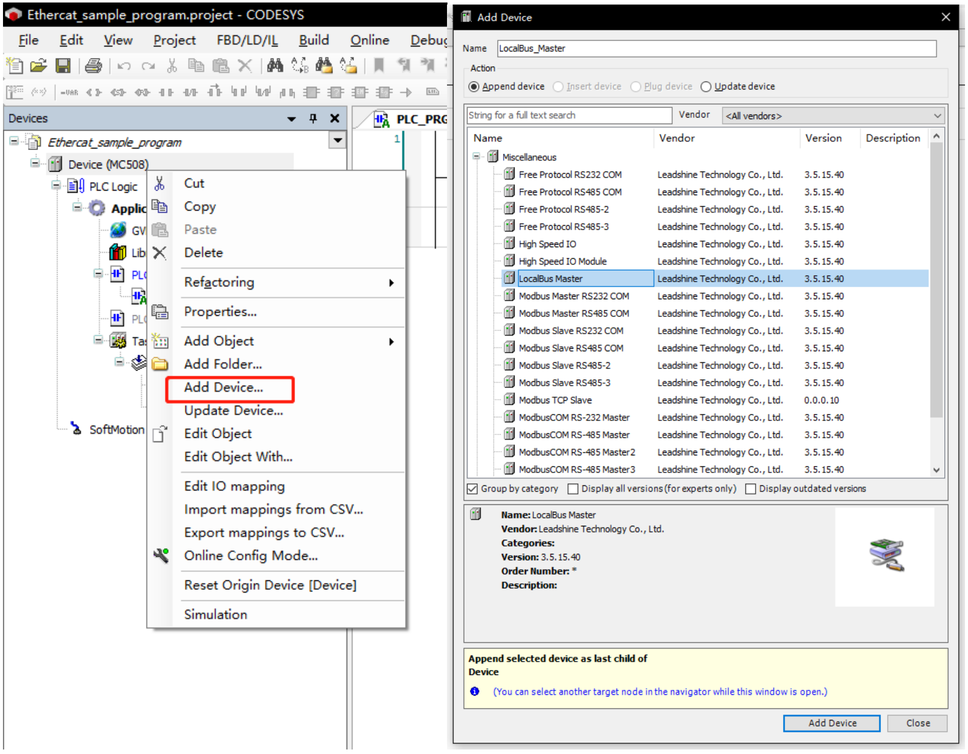
Messages - Total 2 error(s), 0 warning(s), 0 message(s)

Description	Project	Object
------ Build started: Application: Device.Application -------		
Typify code...		
Generate code...		
The assignment target is not specified.	Ethercat_sample_program	ACT [Device: PLC Logic: Application: PL
Build complete -- 1 errors, 0 warnings : No download possible		

3.Local Module

MC500 series PLC right side can extend maximum 32 IO modules (specific model please refer to the IO module catalog), after create the new project, have to add the local bus device before add the module.

1) Right-click the "Device", click "add device", then select the "local bus master", click add device.



Name: LocalBus_Master

Action: ● Append device ○ Insert device ○ Plug device ○ Update device

String for a full text search Vendor <All vendors>

Name	Vendor	Version	Description
Miscellaneous			
Free Protocol RS232 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Free Protocol RS485 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Free Protocol RS485-2	Leadshine Technology Co., Ltd.	3.5.15.40	
Free Protocol RS485-3	Leadshine Technology Co., Ltd.	3.5.15.40	
High Speed IO	Leadshine Technology Co., Ltd.	3.5.15.40	
High Speed IO Module	Leadshine Technology Co., Ltd.	3.5.15.40	
LocalBus Master	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Master RS232 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Master RS485 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS232 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS485 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS485-2	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS485-3	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus TCP Slave	Leadshine Technology Co., Ltd.	0.0.0.10	
ModbusCOM RS-232 Master	Leadshine Technology Co., Ltd.	3.5.15.40	
ModbusCOM RS-485 Master	Leadshine Technology Co., Ltd.	3.5.15.40	
ModbusCOM RS-485 Master2	Leadshine Technology Co., Ltd.	3.5.15.40	
ModbusCOM RS-485 Master3	Leadshine Technology Co., Ltd.	3.5.15.40	

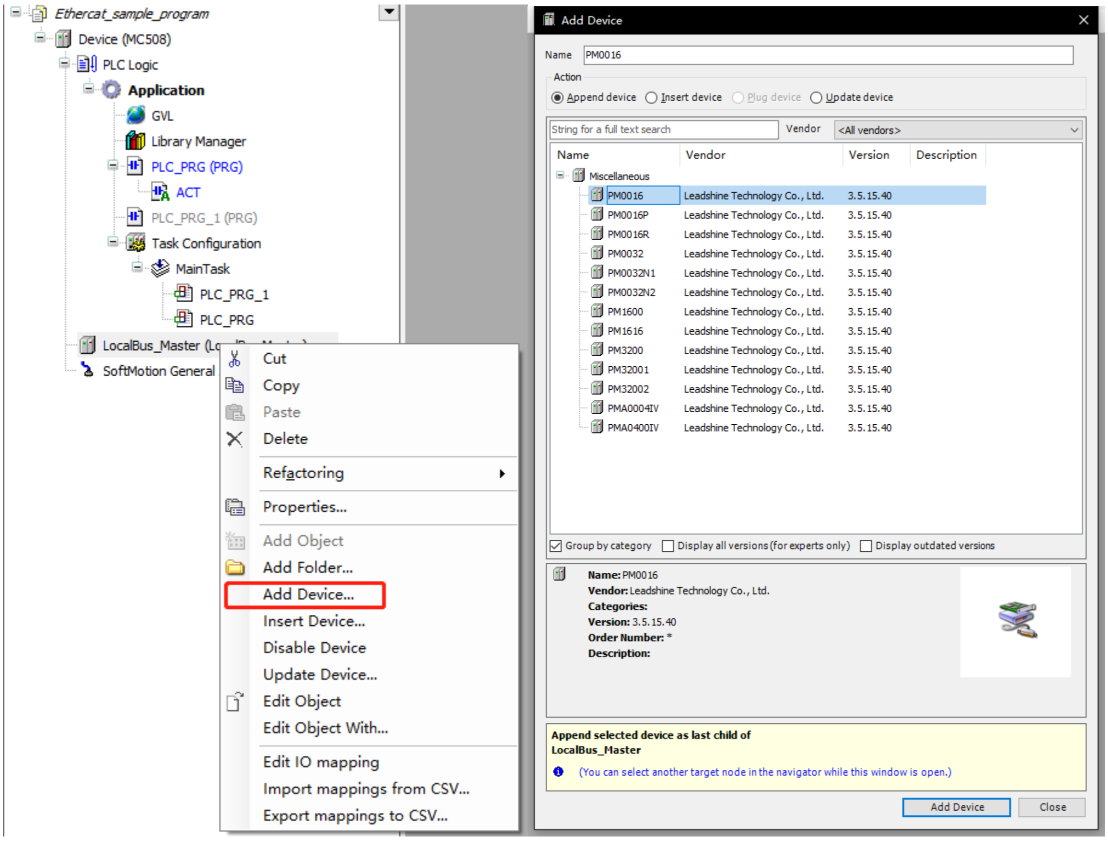
☑ Group by category ☐ Display all versions (for experts only) ☐ Display outdated versions

Name: LocalBus Master
Vendor: Leadshine Technology Co., Ltd.
Categories:
Version: 3.5.15.40
Order Number: *
Description:

Append selected device as last child of
Device

(You can select another target node in the navigator while this window is open.)

2) Then the device configuration area will show the local bus master, right-click it then select "add device". Select the IO module which connected.



Name: PM0016

Action: ● Append device ○ Insert device ○ Plug device ○ Update device

String for a full text search Vendor <All vendors>

Name	Vendor	Version	Description
Miscellaneous			
PM0016	Leadshine Technology Co., Ltd.	3.5.15.40	
PM0016P	Leadshine Technology Co., Ltd.	3.5.15.40	
PM0016R	Leadshine Technology Co., Ltd.	3.5.15.40	
PM0032	Leadshine Technology Co., Ltd.	3.5.15.40	
PM0032N1	Leadshine Technology Co., Ltd.	3.5.15.40	
PM0032N2	Leadshine Technology Co., Ltd.	3.5.15.40	
PM1600	Leadshine Technology Co., Ltd.	3.5.15.40	
PM1616	Leadshine Technology Co., Ltd.	3.5.15.40	
PM3200	Leadshine Technology Co., Ltd.	3.5.15.40	
PM32001	Leadshine Technology Co., Ltd.	3.5.15.40	
PM32002	Leadshine Technology Co., Ltd.	3.5.15.40	
PMA0004IV	Leadshine Technology Co., Ltd.	3.5.15.40	
PMA0400IV	Leadshine Technology Co., Ltd.	3.5.15.40	

☑ Group by category ☐ Display all versions (for experts only) ☐ Display outdated versions

Name: PM0016
Vendor: Leadshine Technology Co., Ltd.
Categories:
Version: 3.5.15.40
Order Number: *
Description:

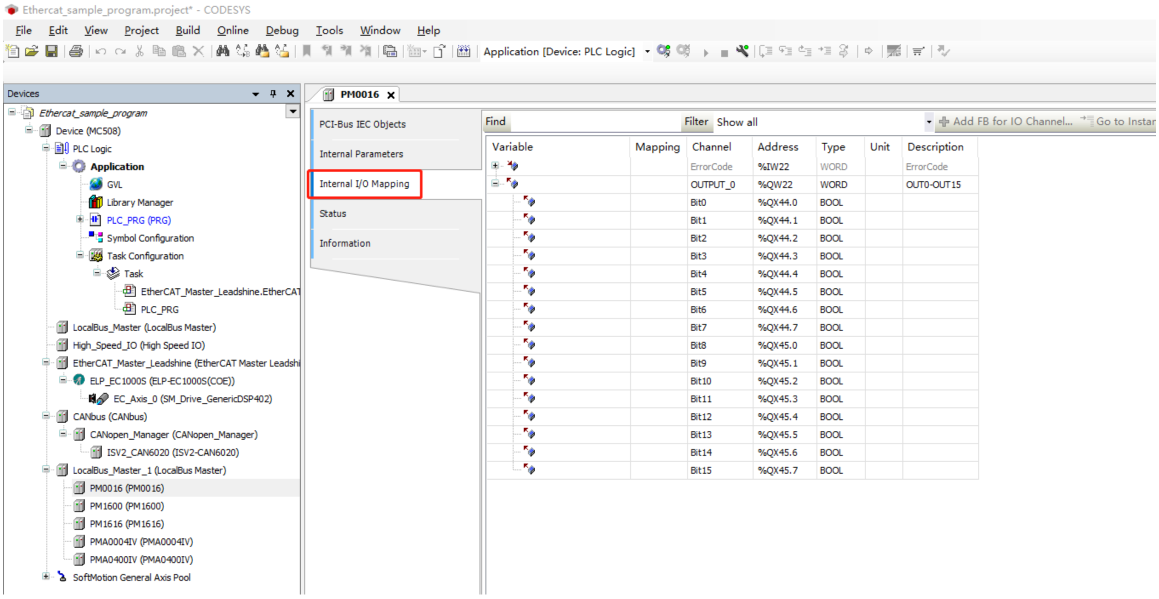
Append selected device as last child of
LocalBus_Master

(You can select another target node in the navigator while this window is open.)

3.1.Local Module Configuration

3.1.1. Digital module configuration

After add the digital modules, mapping the inputs or outputs. Select “internal I/O mapping”, click mapping icon to select the variable.


Ethercat_sample_program.project* - CODESYS
File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
Ethercat_sample_program
Device (MC508)
PLC Logic
Application
GVL
Library Manager
PLC_PRG (PRG)
Symbol Configuration
Task Configuration
Task
EtherCAT_Master_Leadshine.EtherCAT
PLC_PRG
LocalBus_Master (LocalBus Master)
High_Speed_IO (High Speed IO)
EtherCAT_Master_Leadshine (EtherCAT Master Leadshi
ELP_EC1000S (ELP-EC1000S(COE))
EC_Axis_0 (SM_Drive_GenericDSP402)
CANbus (CANbus)
CANopen_Manager (CANopen_Manager)
ISV2_CAN6020 (ISV2-CAN6020)
LocalBus_Master_1 (LocalBus Master)
PM0016 (PM0016)
PM1600 (PM1600)
PM1616 (PM1616)
PMA0004IV (PMA0004IV)
PMA0400IV (PMA0400IV)
SoftMotion General Axis Pool
PM0016
PCI-Bus IEC Objects
Internal Parameters
Internal I/O Mapping
Status
Information
Find
Filter Show all
Add FB for IO Channel...
Go to Instar

Variable	Mapping	Channel	Address	Type	Unit	Description
		ErrorCode	%IW22	WORD		ErrorCode
		OUTPUT_0	%QW22	WORD		OUT0-OUT15
		Bit0	%QX44.0	BOOL		
		Bit1	%QX44.1	BOOL		
		Bit2	%QX44.2	BOOL		
		Bit3	%QX44.3	BOOL		
		Bit4	%QX44.4	BOOL		
		Bit5	%QX44.5	BOOL		
		Bit6	%QX44.6	BOOL		
		Bit7	%QX44.7	BOOL		
		Bit8	%QX45.0	BOOL		
		Bit9	%QX45.1	BOOL		
		Bit10	%QX45.2	BOOL		
		Bit11	%QX45.3	BOOL		
		Bit12	%QX45.4	BOOL		
		Bit13	%QX45.5	BOOL		
		Bit14	%QX45.6	BOOL		
		Bit15	%QX45.7	BOOL		

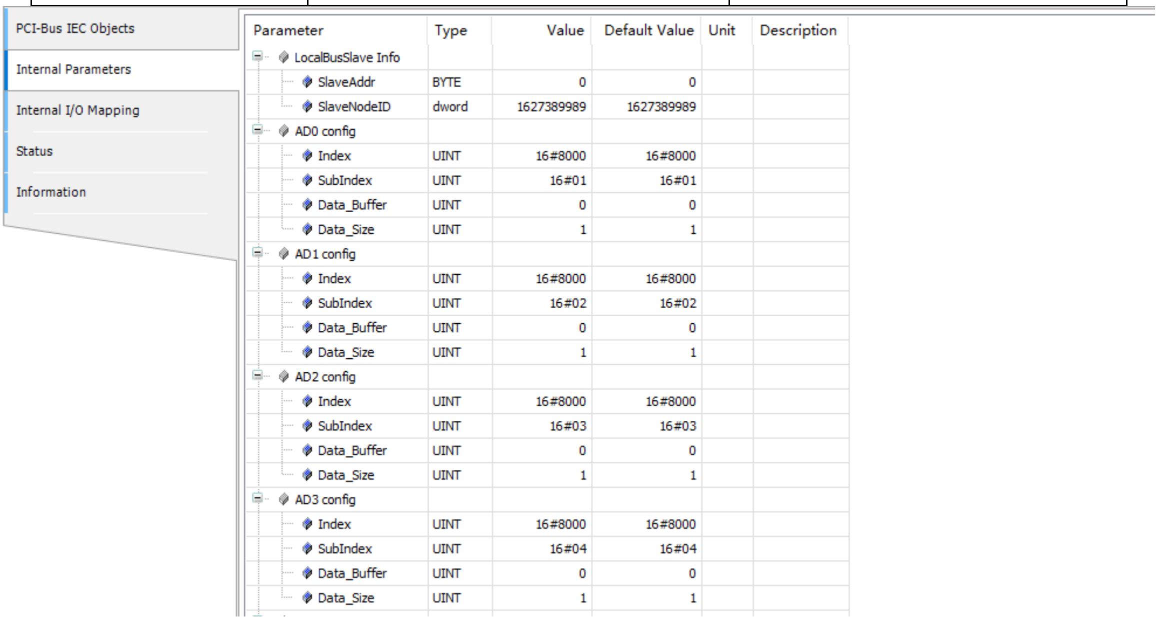
3.1.2.Analog module configuration

After add the modules, user need to configure the outputs or inputs type, click the module, select the internal parameters

1) Analog input module

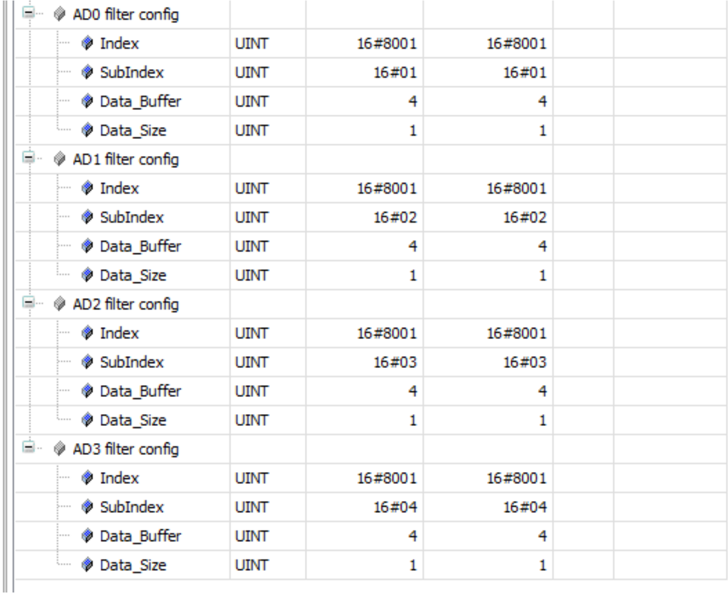
Modify the “AD*config”, “Data_Buffer” to select the different input type, the value details please refer to the below table.

Data_Buffer value	Analog input type	Internal variable range
0	-5~5V,	-32000~32000
1	1~5V,	0~32000
2	-10~+10V	-32000~32000
3	0~10V	0~32000
4	0~20mA	0~32000
5	4~20mA	0~32000
6	0~5V	0~32000
7	-20mA~20mA	-32000~32000



Parameter	Type	Value	Default Value	Unit	Description
LocalBusSlave Info					
SlaveAddr	BYTE	0	0		
SlaveNodeID	dword	1627389989	1627389989		
AD0 config					
Index	UINT	16#8000	16#8000		
SubIndex	UINT	16#01	16#01		
Data_Buffer	UINT	0	0		
Data_Size	UINT	1	1		
AD1 config					
Index	UINT	16#8000	16#8000		
SubIndex	UINT	16#02	16#02		
Data_Buffer	UINT	0	0		
Data_Size	UINT	1	1		
AD2 config					
Index	UINT	16#8000	16#8000		
SubIndex	UINT	16#03	16#03		
Data_Buffer	UINT	0	0		
Data_Size	UINT	1	1		
AD3 config					
Index	UINT	16#8000	16#8000		
SubIndex	UINT	16#04	16#04		
Data_Buffer	UINT	0	0		
Data_Size	UINT	1	1		

Modify the “AD*filter config”, “Data_Buffer” to set the value of the filtering parameter

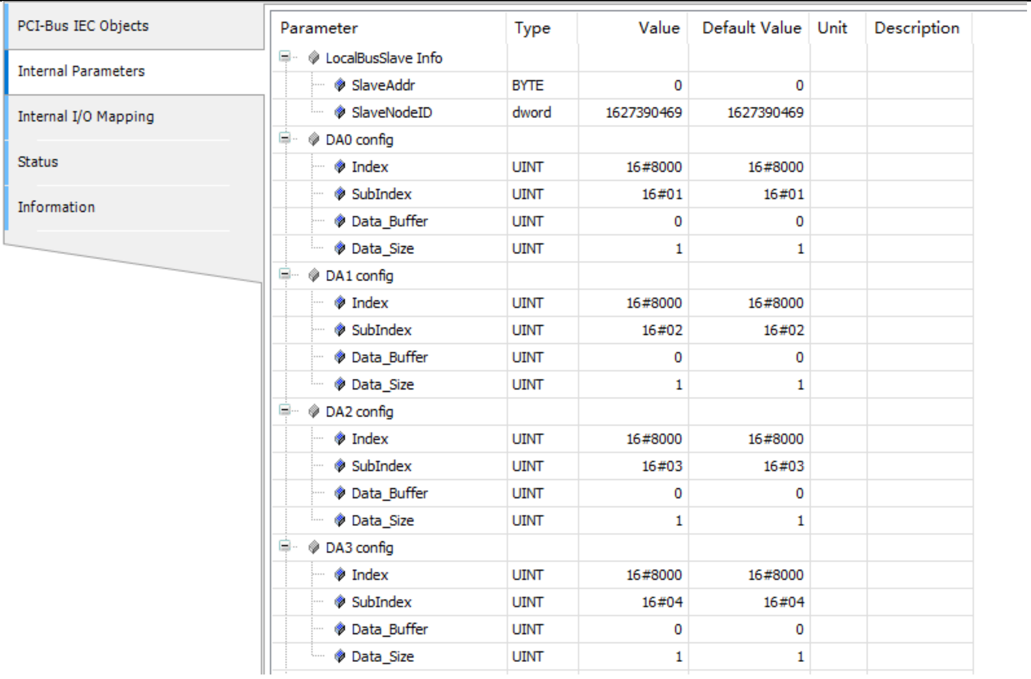


AD0 filter config			
Index	UINT	16#8001	16#8001
SubIndex	UINT	16#01	16#01
Data_Buffer	UINT	4	4
Data_Size	UINT	1	1
AD1 filter config			
Index	UINT	16#8001	16#8001
SubIndex	UINT	16#02	16#02
Data_Buffer	UINT	4	4
Data_Size	UINT	1	1
AD2 filter config			
Index	UINT	16#8001	16#8001
SubIndex	UINT	16#03	16#03
Data_Buffer	UINT	4	4
Data_Size	UINT	1	1
AD3 filter config			
Index	UINT	16#8001	16#8001
SubIndex	UINT	16#04	16#04
Data_Buffer	UINT	4	4
Data_Size	UINT	1	1

1) Analog output module

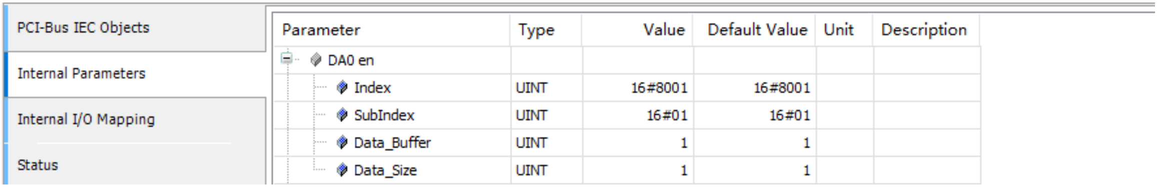
Modify the “DA*config”, “Data_Buffer” to select the different output type, the value details please refer to the below table.

Data_Buffer value	Analog output type	Internal variable range
0	0~5V	0~32000
1	1~5V,	0~32000
2	-5~5V,	-32000~32000
3	0~10V	0~32000
4	-10~+10V	-32000~32000
5	0~20mA	0~32000
6	4~20mA	0~32000



Parameter	Type	Value	Default Value	Unit	Description
LocalBusSlave Info					
SlaveAddr	BYTE	0	0		
SlaveNodeID	dword	1627390469	1627390469		
DA0 config					
Index	UINT	16#8000	16#8000		
SubIndex	UINT	16#01	16#01		
Data_Buffer	UINT	0	0		
Data_Size	UINT	1	1		
DA1 config					
Index	UINT	16#8000	16#8000		
SubIndex	UINT	16#02	16#02		
Data_Buffer	UINT	0	0		
Data_Size	UINT	1	1		
DA2 config					
Index	UINT	16#8000	16#8000		
SubIndex	UINT	16#03	16#03		
Data_Buffer	UINT	0	0		
Data_Size	UINT	1	1		
DA3 config					
Index	UINT	16#8000	16#8000		
SubIndex	UINT	16#04	16#04		
Data_Buffer	UINT	0	0		
Data_Size	UINT	1	1		

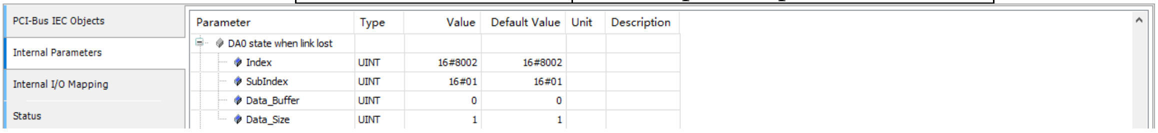
And modify the “DA*en”, “Data_Buffer” to select whether enable the output channel. Data_Buffer=1 enable the channel, Data_Buffer=0 disable the channel.



Parameter	Type	Value	Default Value	Unit	Description
DA0 en					
Index	UINT	16#8001	16#8001		
SubIndex	UINT	16#01	16#01		
Data_Buffer	UINT	1	1		
Data_Size	UINT	1	1		

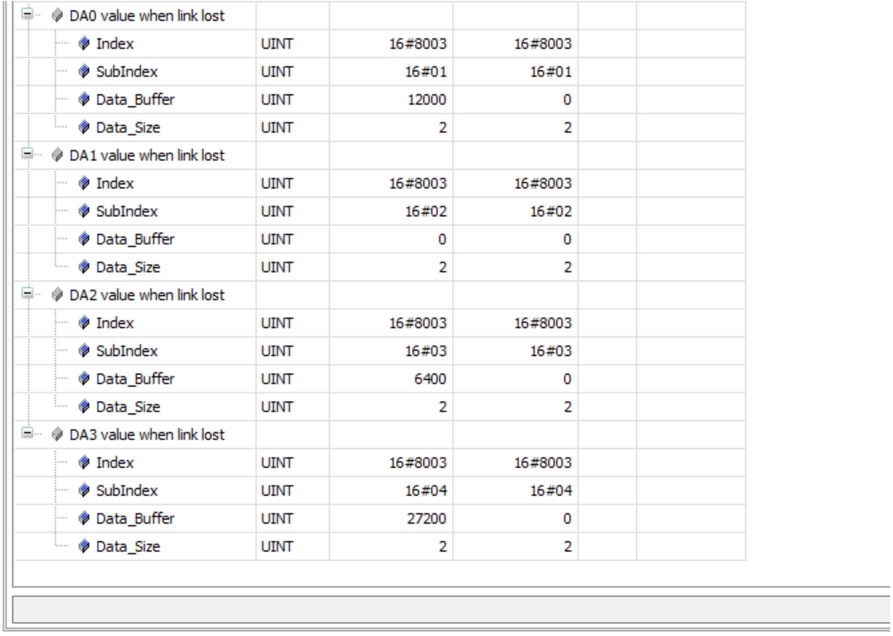
And modify the “DA*state when link lost”, “Data_Buffer” to select the output state when the module lose link. The details please refer to the below table.

Data_Buffer value	Channel state
0	Keep previous status
1	Reset status
2	Output the preset value



Parameter	Type	Value	Default Value	Unit	Description
DA0 state when link lost					
Index	UINT	16#8002	16#8002		
SubIndex	UINT	16#01	16#01		
Data_Buffer	UINT	0	0		
Data_Size	UINT	1	1		

The “Output the preset value” can be modified on the “DA*value when link lost”, “Data_Buffer”. For example: output type is “0~10V” the voltage output, set the Data_Buffer value = 27200, when the module lost link, the channel will keep 8.50V voltage output.



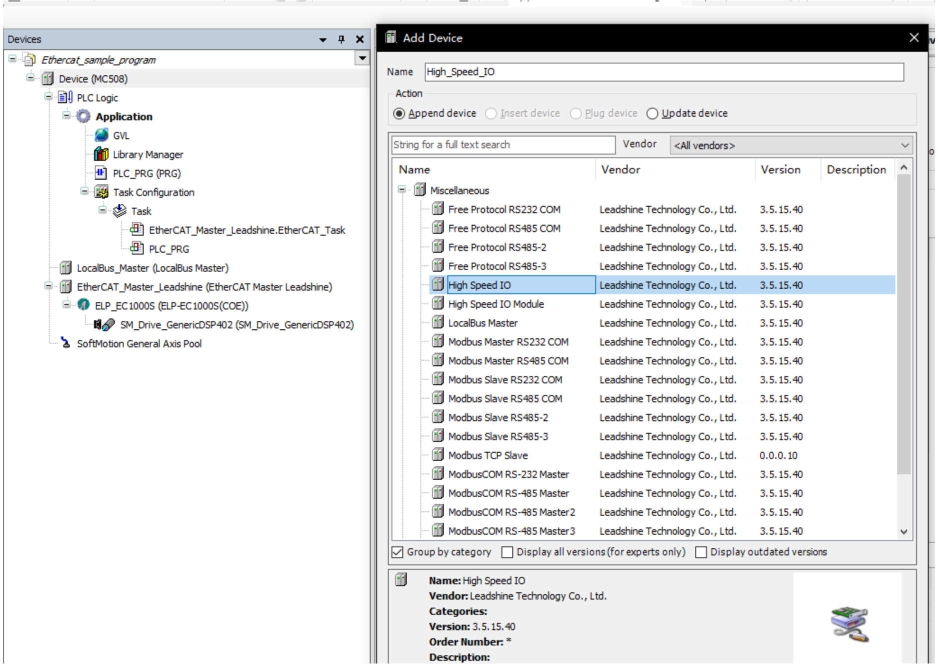
DA0 value when link lost					
Index	UINT	16#8003	16#8003		
SubIndex	UINT	16#01	16#01		
Data_Buffer	UINT	12000	0		
Data_Size	UINT	2	2		
DA1 value when link lost					
Index	UINT	16#8003	16#8003		
SubIndex	UINT	16#02	16#02		
Data_Buffer	UINT	0	0		
Data_Size	UINT	2	2		
DA2 value when link lost					
Index	UINT	16#8003	16#8003		
SubIndex	UINT	16#03	16#03		
Data_Buffer	UINT	6400	0		
Data_Size	UINT	2	2		
DA3 value when link lost					
Index	UINT	16#8003	16#8003		
SubIndex	UINT	16#04	16#04		
Data_Buffer	UINT	27200	0		
Data_Size	UINT	2	2		

4.High Speed Counter Configuration

MC500 series PLC support 6 channels high speed counter inputs, please refer to the follow contents to configure the parameters.

4.1.Add high speed device

Right-click the “Device”, click “add device”, then select the “High Speed IO”, click add device.



Devices

```
Ethercat_sample_program
  Device (MC508)
    PLC Logic
      Application
        GVL
        Library Manager
        PLC_PRG (PRG)
        Task Configuration
          Task
            EtherCAT_Master_Leadshine.EtherCAT_Task
            PLC_PRG
    LocalBus_Master (LocalBus Master)
    EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
      ELP_EC1000S (ELP-EC1000S(COE))
        SM_Drive_GenericDSP402 (SM_Drive_GenericDSP402)
    SoftMotion General Axis Pool
```

Add Device

Name: High_Speed_IO

Action: ● Append device ○ Insert device ○ Plug device ○ Update device

String for a full text search | Vendor: <All vendors>

Name	Vendor	Version	Description
Miscellaneous			
Free Protocol RS232 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Free Protocol RS485 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Free Protocol RS485-2	Leadshine Technology Co., Ltd.	3.5.15.40	
Free Protocol RS485-3	Leadshine Technology Co., Ltd.	3.5.15.40	
High Speed IO	Leadshine Technology Co., Ltd.	3.5.15.40	
High Speed IO Module	Leadshine Technology Co., Ltd.	3.5.15.40	
LocalBus Master	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Master RS232 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Master RS485 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS232 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS485 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS485-2	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS485-3	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus TCP Slave	Leadshine Technology Co., Ltd.	0.0.0.10	
ModbusCOM RS-232 Master	Leadshine Technology Co., Ltd.	3.5.15.40	
ModbusCOM RS-485 Master	Leadshine Technology Co., Ltd.	3.5.15.40	
ModbusCOM RS-485 Master2	Leadshine Technology Co., Ltd.	3.5.15.40	
ModbusCOM RS-485 Master3	Leadshine Technology Co., Ltd.	3.5.15.40	

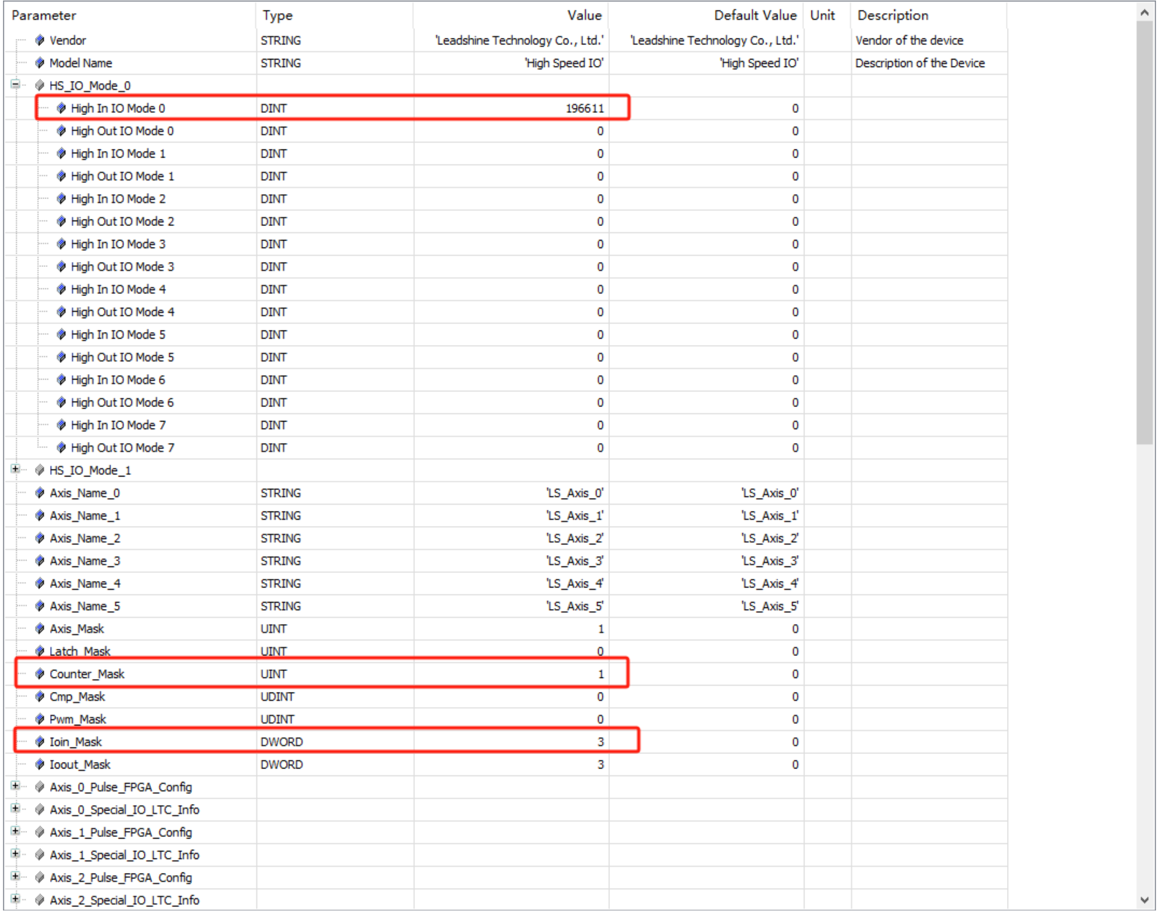
☑ Group by category ☐ Display all versions (for experts only) ☐ Display outdated versions

Name: High Speed IO
Vendor: Leadshine Technology Co., Ltd.
Categories:
Version: 3.5.15.40
Order Number: *
Description:

4.2.Configure the high speed counter parameters

Double-click “High Speed IO”, into the “internal parameters” interface

1) Enable the high speed counter, modify “High In IO Mode 0”=196611 to enable the counter0, when need user need to enable other counters, please modify the value of “High In IO Mode”.



Parameter	Type	Value	Default Value	Unit	Description
Vendor	STRING	'Leadshine Technology Co., Ltd.'	'Leadshine Technology Co., Ltd.'		Vendor of the device
Model Name	STRING	'High Speed IO'	'High Speed IO'		Description of the Device
HS_IO_Mode_0					
High In IO Mode 0	DINT	196611	0		
High Out IO Mode 0	DINT	0	0		
High In IO Mode 1	DINT	0	0		
High Out IO Mode 1	DINT	0	0		
High In IO Mode 2	DINT	0	0		
High Out IO Mode 2	DINT	0	0		
High In IO Mode 3	DINT	0	0		
High Out IO Mode 3	DINT	0	0		
High In IO Mode 4	DINT	0	0		
High Out IO Mode 4	DINT	0	0		
High In IO Mode 5	DINT	0	0		
High Out IO Mode 5	DINT	0	0		
High In IO Mode 6	DINT	0	0		
High Out IO Mode 6	DINT	0	0		
High In IO Mode 7	DINT	0	0		
High Out IO Mode 7	DINT	0	0		
HS_IO_Mode_1					
Axis_Name_0	STRING	'LS_Axis_0'	'LS_Axis_0'		
Axis_Name_1	STRING	'LS_Axis_1'	'LS_Axis_1'		
Axis_Name_2	STRING	'LS_Axis_2'	'LS_Axis_2'		
Axis_Name_3	STRING	'LS_Axis_3'	'LS_Axis_3'		
Axis_Name_4	STRING	'LS_Axis_4'	'LS_Axis_4'		
Axis_Name_5	STRING	'LS_Axis_5'	'LS_Axis_5'		
Axis_Mask	UINT	1	0		
Latch_Mask	UINT	0	0		
Counter_Mask	UINT	1	0		
Cmp_Mask	UDINT	0	0		
Pwm_Mask	UDINT	0	0		
Ioin_Mask	DWORD	3	0		
Ioout_Mask	DWORD	3	0		
Axis_0_Pulse_FPGA_Config					
Axis_0_Special_IO_LTC_Info					
Axis_1_Pulse_FPGA_Config					
Axis_1_Special_IO_LTC_Info					
Axis_2_Pulse_FPGA_Config					
Axis_2_Special_IO_LTC_Info					

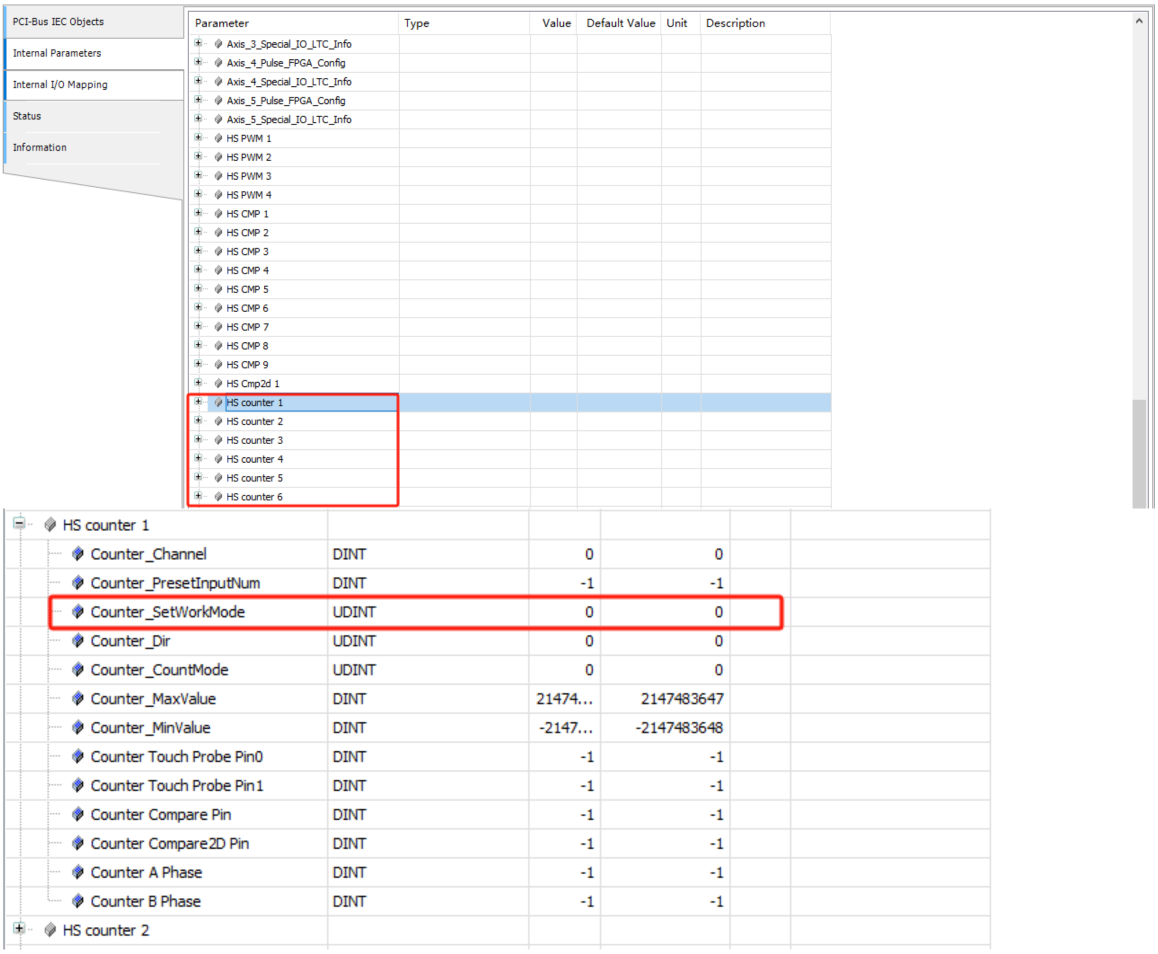
Then setting “Counter_Mask”=1 and “Ioin_Mask” =3, (for example: if counter 0 and counter 3 have be enabled, “Counter_Mask”=1+8=9, and “Ioin_Mask”=3+192=195)

Please refer to the mask value table

Axis	“Counter_Mask” value	“Ioin_Mask” value
Counter0	2^0=1	$2^{0+}2^1$=3
Counter 1	2^1=2	$2^{2+}2^3$=12
Counter 2	2^2=4	$2^{4+}2^5$=48
Counter 3	2^3=8	$2^{6+}2^7$=192
Counter 4	2^4=16	$2^{8+}2^9$=768
Counter 5	2^5=32	$2^{10+}2^{11}$=3072

2) Setting the counter working mode, please find the “HS counter 1” option in the internal parameters interface, modify the “Counter_SetWorkMode” value to set the count mode, please refer to the follow table.

Count Mode	Value
A/B phase (quadruple)	0
Pulse+direction	1
Single phase	2
CW/CCW	3
A/B phase	4
A/B phase(double)	5

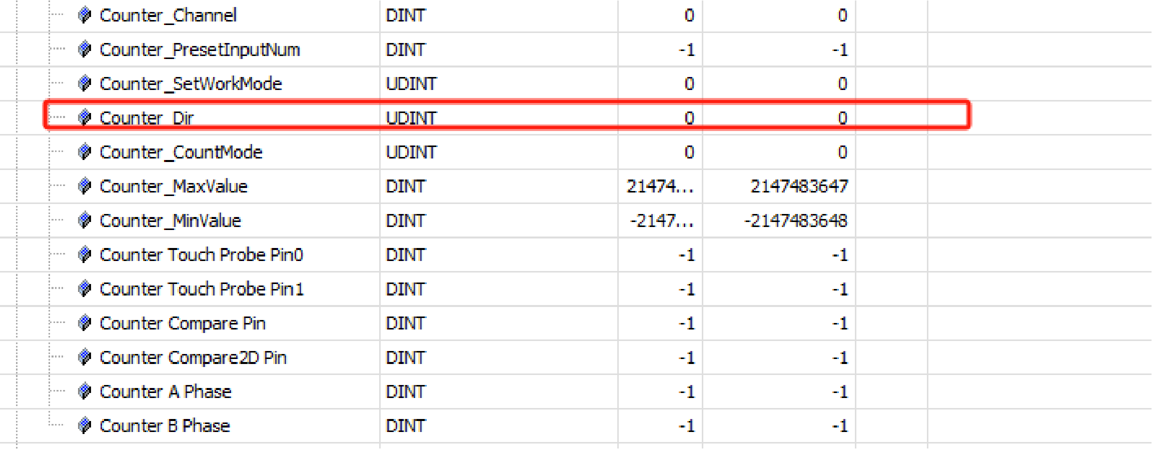


Parameter	Type	Value	Default Value	Unit	Description
Axis_3_Special_IO_LTC_Info					
Axis_4_Pulse_FPGA_Config					
Axis_4_Special_IO_LTC_Info					
Axis_5_Pulse_FPGA_Config					
Axis_5_Special_IO_LTC_Info					
HS PWM 1					
HS PWM 2					
HS PWM 3					
HS PWM 4					
HS CMP 1					
HS CMP 2					
HS CMP 3					
HS CMP 4					
HS CMP 5					
HS CMP 6					
HS CMP 7					
HS CMP 8					
HS CMP 9					
HS Cmp2d 1					
HS counter 1					
HS counter 2					
HS counter 3					
HS counter 4					
HS counter 5					
HS counter 6					

HS counter 1				
Counter_Channel	DINT	0	0	
Counter_PresetInputNum	DINT	-1	-1	
Counter_SetWorkMode	UDINT	0	0	
Counter_Dir	UDINT	0	0	
Counter_CountMode	UDINT	0	0	
Counter_MaxValue	DINT	21474...	2147483647	
Counter_MinValue	DINT	-2147...	-2147483648	
Counter Touch Probe Pin0	DINT	-1	-1	
Counter Touch Probe Pin1	DINT	-1	-1	
Counter Compare Pin	DINT	-1	-1	
Counter Compare2D Pin	DINT	-1	-1	
Counter A Phase	DINT	-1	-1	
Counter B Phase	DINT	-1	-1	
HS counter 2				

3) Setting the counting direction

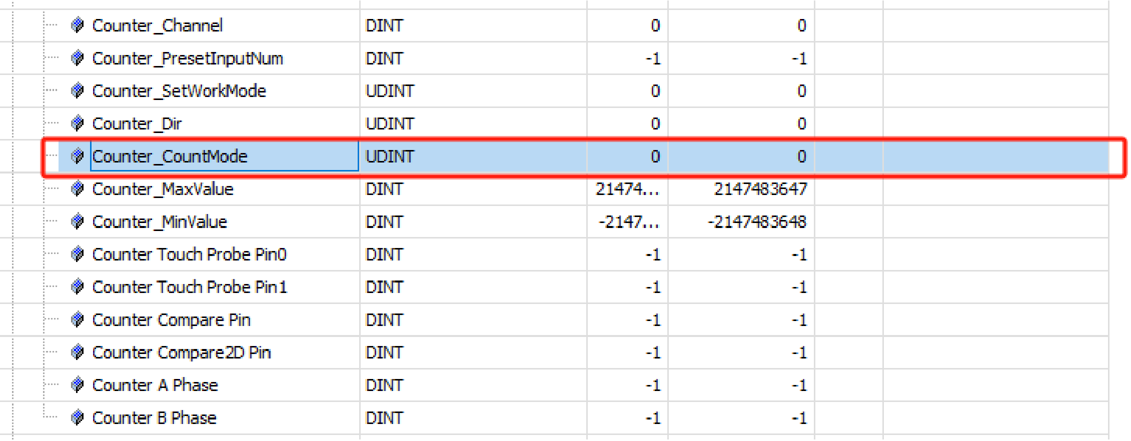
Value =0 is Positive, -1 is negative



Counter_Channel	DINT	0	0
Counter_PresetInputNum	DINT	-1	-1
Counter_SetWorkMode	UDINT	0	0
Counter_Dir	UDINT	0	0
Counter_CountMode	UDINT	0	0
Counter_MaxValue	DINT	21474...	2147483647
Counter_MinValue	DINT	-2147...	-2147483648
Counter Touch Probe Pin0	DINT	-1	-1
Counter Touch Probe Pin1	DINT	-1	-1
Counter Compare Pin	DINT	-1	-1
Counter Compare2D Pin	DINT	-1	-1
Counter A Phase	DINT	-1	-1
Counter B Phase	DINT	-1	-1

4) Setting counting mode

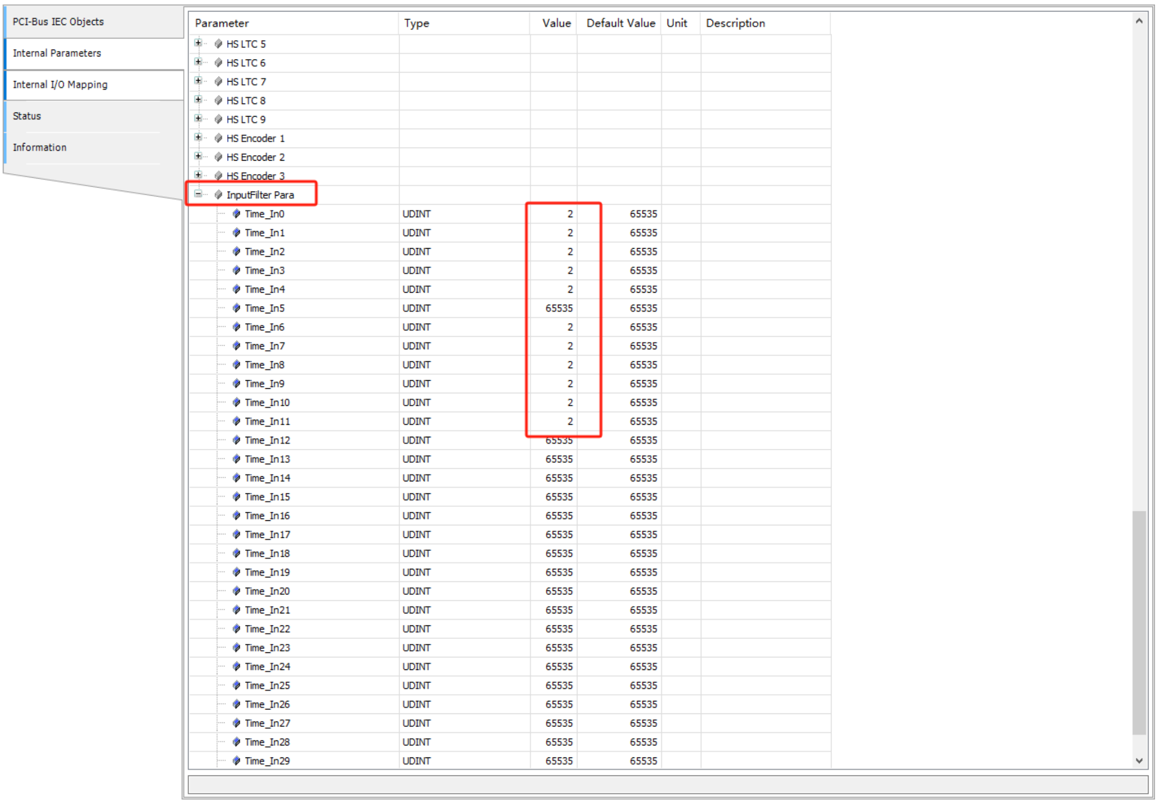
Value=0 is linear counting, -1 is circular counting



Counter_Channel	DINT	0	0
Counter_PresetInputNum	DINT	-1	-1
Counter_SetWorkMode	UDINT	0	0
Counter_Dir	UDINT	0	0
Counter_CountMode	UDINT	0	0
Counter_MaxValue	DINT	21474...	2147483647
Counter_MinValue	DINT	-2147...	-2147483648
Counter Touch Probe Pin0	DINT	-1	-1
Counter Touch Probe Pin1	DINT	-1	-1
Counter Compare Pin	DINT	-1	-1
Counter Compare2D Pin	DINT	-1	-1
Counter A Phase	DINT	-1	-1
Counter B Phase	DINT	-1	-1

4.3.Setting input filter parameters

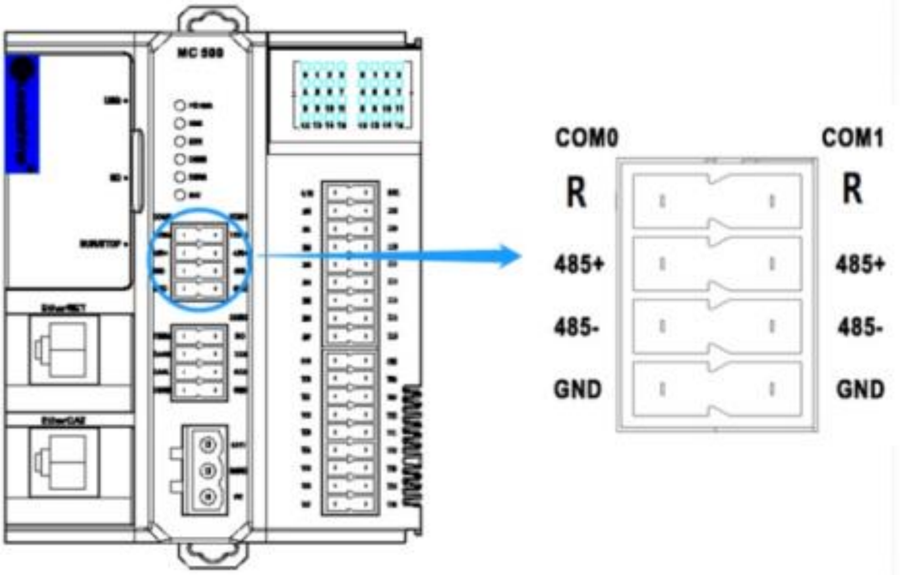
Please find the “InputFilter Para” option in the internal parameters interface, modify the “time_In” value to set the filter value.

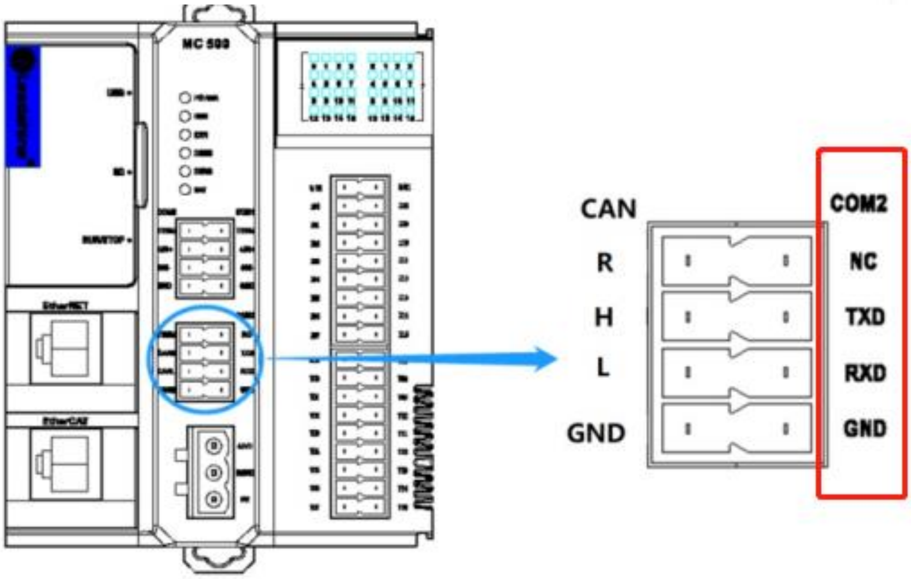


Parameter	Type	Value	Default Value	Unit	Description
HS LTC 5					
HS LTC 6					
HS LTC 7					
HS LTC 8					
HS LTC 9					
HS Encoder 1					
HS Encoder 2					
HS Encoder 3					
InputFilter Para					
Time_In0	UDINT	2	65535		
Time_In1	UDINT	2	65535		
Time_In2	UDINT	2	65535		
Time_In3	UDINT	2	65535		
Time_In4	UDINT	2	65535		
Time_In5	UDINT	65535	65535		
Time_In6	UDINT	2	65535		
Time_In7	UDINT	2	65535		
Time_In8	UDINT	2	65535		
Time_In9	UDINT	2	65535		
Time_In10	UDINT	2	65535		
Time_In11	UDINT	2	65535		
Time_In12	UDINT	65535	65535		
Time_In13	UDINT	65535	65535		
Time_In14	UDINT	65535	65535		
Time_In15	UDINT	65535	65535		
Time_In16	UDINT	65535	65535		
Time_In17	UDINT	65535	65535		
Time_In18	UDINT	65535	65535		
Time_In19	UDINT	65535	65535		
Time_In20	UDINT	65535	65535		
Time_In21	UDINT	65535	65535		
Time_In22	UDINT	65535	65535		
Time_In23	UDINT	65535	65535		
Time_In24	UDINT	65535	65535		
Time_In25	UDINT	65535	65535		
Time_In26	UDINT	65535	65535		
Time_In27	UDINT	65535	65535		
Time_In28	UDINT	65535	65535		
Time_In29	UDINT	65535	65535		

5.Serial Port Communication

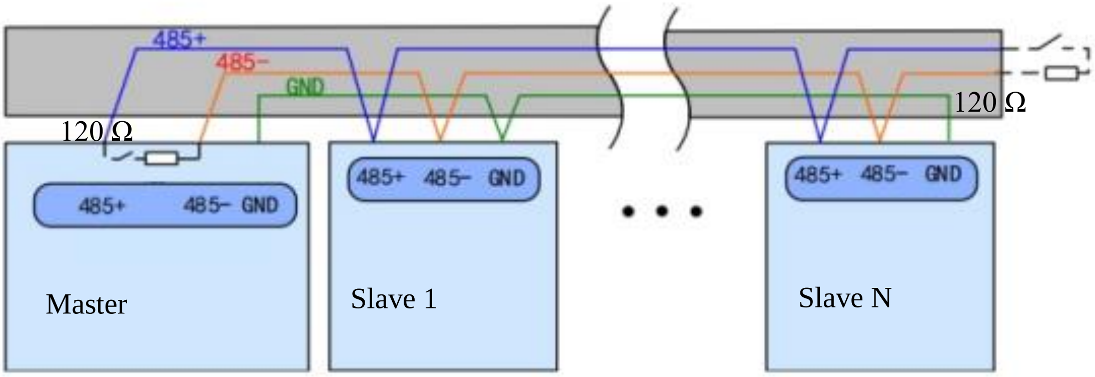
MC500 series PLC configured 2* RS485 port and 1*RS232 port, as the follow picture show





5.1.RS485 Communication wiring

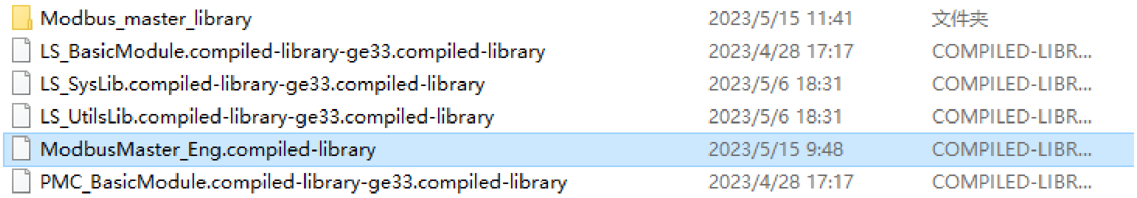
MC500 series PLC COM0 and COM1 are the RS485 serial port, it can be connected to HMI, frequency converter, or other Modbus-RTU master station device or slave station device. The communication wiring please refer to the follow picture.



5.2.Modbus-RTU Communication configuration

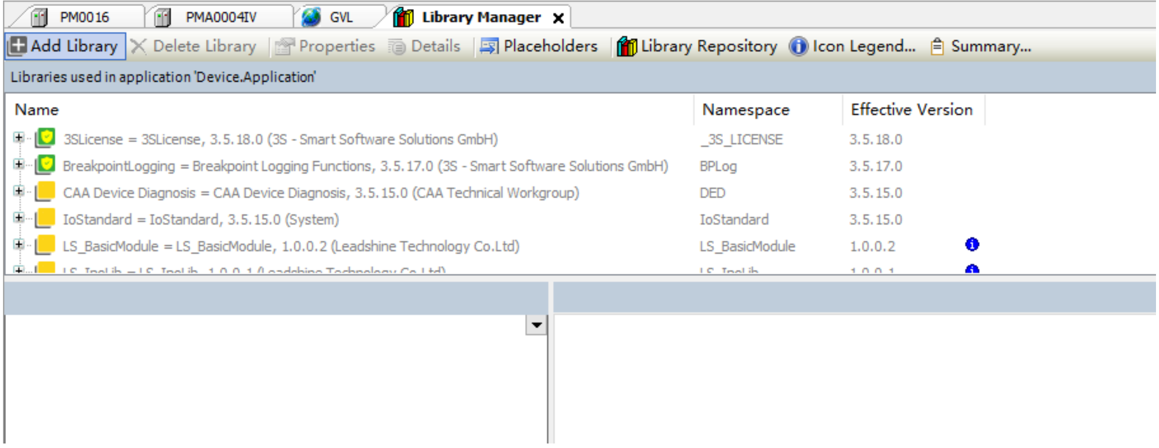
5.2.1.Modbus Master Station Configuration

1) Using CODESYS software configure the Modbus-RTU master function will use the special function libraries “ModbusMaster_Eng.compiled-library”



Modbus_master_library	2023/5/15 11:41	文件夹
LS_BasicModule.compiled-library-ge33.compiled-library	2023/4/28 17:17	COMPILED-LIBR...
LS_SysLib.compiled-library-ge33.compiled-library	2023/5/6 18:31	COMPILED-LIBR...
LS_UtilsLib.compiled-library-ge33.compiled-library	2023/5/6 18:31	COMPILED-LIBR...
ModbusMaster_Eng.compiled-library	2023/5/15 9:48	COMPILED-LIBR...
PMC_BasicModule.compiled-library-ge33.compiled-library	2023/4/28 17:17	COMPILED-LIBR...

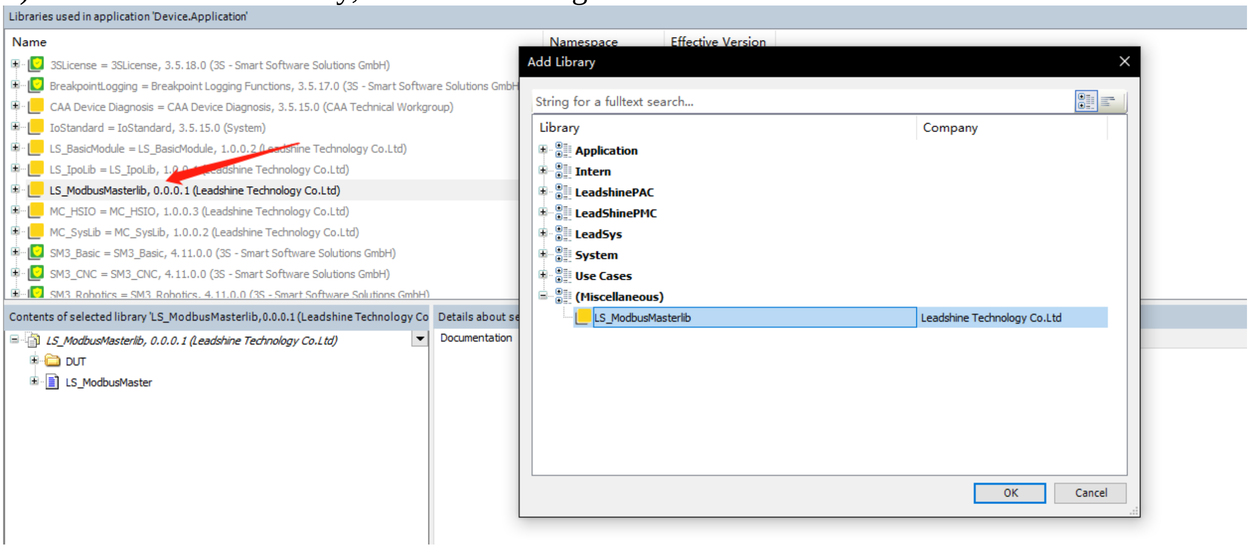
2) After installing the function libraries at the library repository, add it to the library manager, double click the “library manager”, click add library.



Libraries used in application 'Device.Application'

Name	Namespace	Effective Version
3SLicense = 3SLicense, 3.5.18.0 (3S - Smart Software Solutions GmbH)	_3S_LICENSE	3.5.18.0
BreakpointLogging = Breakpoint Logging Functions, 3.5.17.0 (3S - Smart Software Solutions GmbH)	BPLog	3.5.17.0
CAA Device Diagnosis = CAA Device Diagnosis, 3.5.15.0 (CAA Technical Workgroup)	DED	3.5.15.0
IoStandard = IoStandard, 3.5.15.0 (System)	IoStandard	3.5.15.0
LS_BasicModule = LS_BasicModule, 1.0.0.2 (Leadshine Technology Co.Ltd)	LS_BasicModule	1.0.0.2
LS_IpoLib = LS_IpoLib, 1.0.0.1 (Leadshine Technology Co.Ltd)	LS_IpoLib	1.0.0.1

3) Find the function library, add to the manager.



Libraries used in application 'Device.Application'

Name
3SLicense = 3SLicense, 3.5.18.0 (3S - Smart Software Solutions GmbH)
BreakpointLogging = Breakpoint Logging Functions, 3.5.17.0 (3S - Smart Software Solutions GmbH
CAA Device Diagnosis = CAA Device Diagnosis, 3.5.15.0 (CAA Technical Workgroup)
IoStandard = IoStandard, 3.5.15.0 (System)
LS_BasicModule = LS_BasicModule, 1.0.0.2 (Leadshine Technology Co.Ltd)
LS_IpoLib = LS_IpoLib, 1.0.0.1 (Leadshine Technology Co.Ltd)
LS_ModbusMasterlib, 0.0.0.1 (Leadshine Technology Co.Ltd)
MC_HSIO = MC_HSIO, 1.0.0.3 (Leadshine Technology Co.Ltd)
MC_SysLib = MC_SysLib, 1.0.0.2 (Leadshine Technology Co.Ltd)
SM3_Basic = SM3_Basic, 4.11.0.0 (3S - Smart Software Solutions GmbH)
SM3_CNC = SM3_CNC, 4.11.0.0 (3S - Smart Software Solutions GmbH)
SM3_Robotics = SM3_Robotics, 4.11.0.0 (3S - Smart Software Solutions GmbH)

Contents of selected library 'LS_ModbusMasterlib,0.0.0.1 (Leadshine Technology Co

- *LS_ModbusMasterlib, 0.0.0.1 (Leadshine Technology Co.Ltd)*
  - DUT
  - LS_ModbusMaster

Details about se

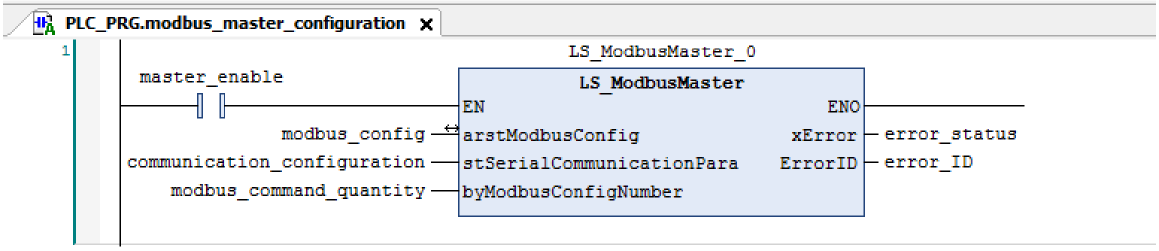
Documentation

Add Library

String for a fulltext search...

Library	Company
Application	
Intern	
LeadshinePAC	
LeadShinePMC	
LeadSys	
System	
Use Cases	
(Miscellaneous)	
LS_ModbusMasterlib	Leadshine Technology Co.Ltd

4) Create a new subroutine, insert the “LS_ModbusMaster”function box, then define the box input and output variable name.



PLC_PRG.modbus_master_configuration

LS_ModbusMaster_0

LS_ModbusMaster

Input variable	Input	Output	Output variable
master_enable	EN	ENO	
modbus_config	arstModbusConfig	xError	error_status
communication_configuration	stSerialCommunicationPara	ErrorID	error_ID
modbus_command_quantity	byModbusConfigNumber		

About the function box description please refer to the follow contents.

Name	Description	Data type	Range	Initialization
arstModbus Config	Moebus communication config	ARRAY[0..127] OF ModbusConfig	-	-
stSerialCommunicationPara	Serial port communication parameters	SerialCommunicationPara	-	-
byModbusConfigNumber	Modbus command quantity,maximum 128 configurations	BYTE	0-128	0
xError	Error	BOOL	TRUE/FALSE	FALSE
ErrorID	Error code	ModbusMasterErrorCode	-	0

arstModbus Config (modbus communication configuration structure)

```
usiAddress : USINT :=1 ; //Slave ID
usiFunctionCode : ModbusFuntionCode :=Read_Coils; //Function code
wOffset : WORD :=0; //Address offset
wLength : WORD :=1; //Data length, 01/02/03/04/15/16 function code
xCycle : BOOL :=TRUE; // True:cycle mode，False: trigger mode
uiCycleTime : UINT :=100; //Cycletime，Unit：ms
xTrigger : BOOL ; //Trigger signal, used for trigger mode
sbyRetransmissionNumber : BYTE := 3; //Retransmissions numbers
xError : BOOL := FALSE;
ErrorCode : ModbusMasterErrorCode;
xDone : BOOL := FALSE; //Processing completion signal
arwReadData : ARRAY[0..126] OF WORD;//Read Data Cache,01/02/03/04 function code
arwWriteData : ARRAY[0..126] OF WORD;//Write Data Cache,05/06/15/16 function code
```

stSerialCommunicationPara(Serial port communication parameters structure)

```
udiPort : UDINT :=3;// Serial port.3:COM0;   4:COM1
udiBaudrate : UDINT :=115200;//Baud rate
udiPARITY : COM.PARITY :=COM.PARITY.EVEN;//Parity
udiStopBits : COM.STOPBIT :=COM.STOPBIT.ONESTOPBIT;//Stop bit
udiTimeout : UDINT :=1000;//Time out, Unit: ms
udiByteSize : UDINT :=8;//Data bit
```

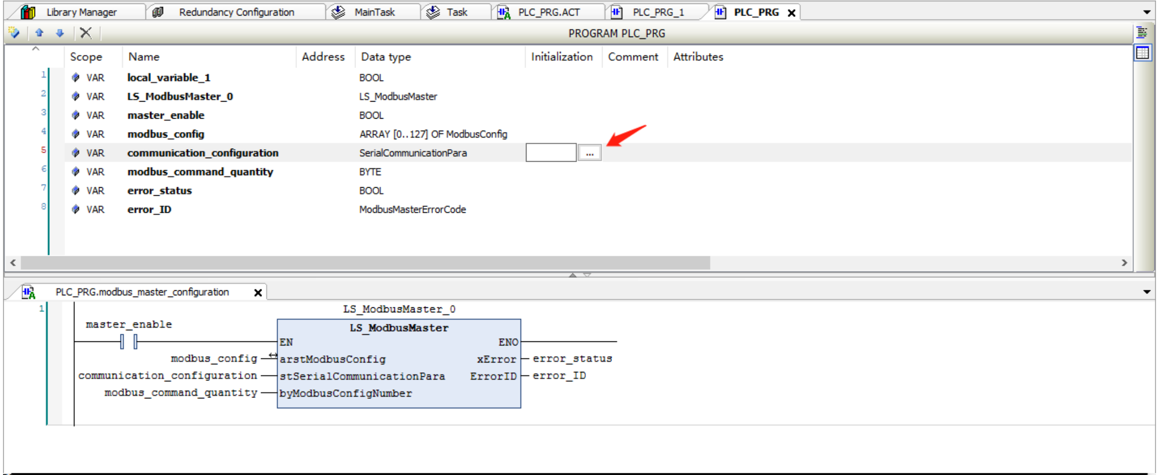
usiFunctionCode : ModbusFuntionCode :=(modbus function code)

```
Read_Coils := 16#01 , //Read coil
Read_DisCrete_Inputs := 16#02 , // Read discrete inputs
Read_Holding_Registers := 16#03 ,//Read holding registers
Read_Input_Registers := 16#04 , // Read input registers
Write_Single_Coil := 16#05 , // Write single coil
Write_Single_Register := 16#06 ,// Write single register
Write_Muluiple_Coil := 15 ,//Write multiple coils
Write_Muluiple_Register := 16, // Write multiple registers
```

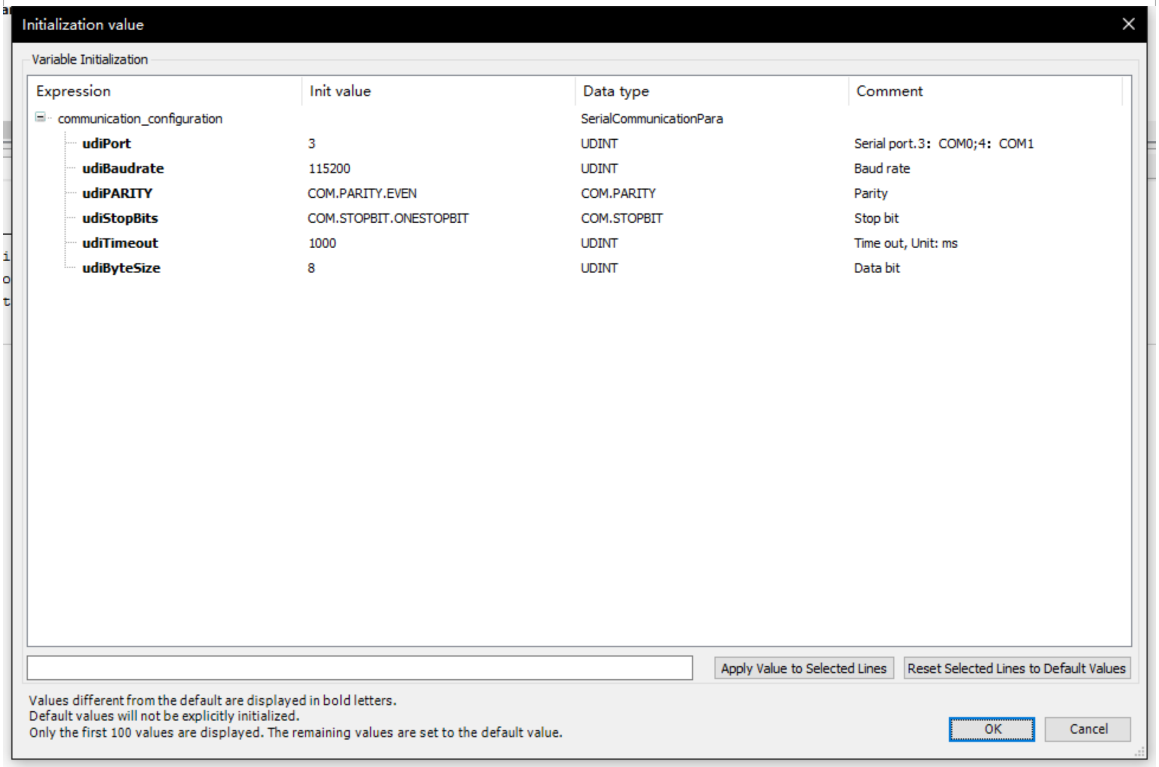
ErrorCode : ModbusMasterErrorCode (modbus master error code)

```
NO_ERROR := 0,
OPEN_SERIAL_ERROR := 100,
NOT_SUPPORT_FUNCTIONCODE := 200,
INVAILD_DATA_ADDRESS := 300,
INVAILD_DATA_VALUE := 400,
SLAVE_ERROR :=500,
CRC_ERROR :=600,
INVAILD_DATA_LENGTH := 700,
TIME_OUT := 800,
INVAILD_DEVICE := 16#FFFF
```

5) Configure the communication parameters initialization.



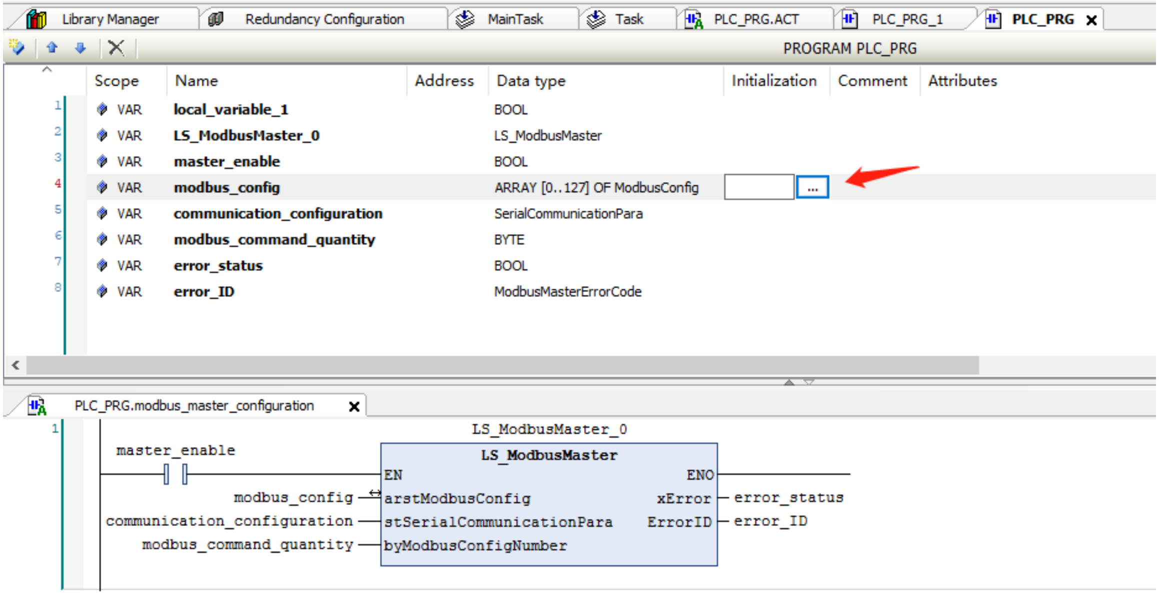
Scope	Name	Address	Data type	Initialization	Comment	Attributes
VAR	local_variable_1		BOOL			
VAR	LS_ModbusMaster_0		LS_ModbusMaster			
VAR	master_enable		BOOL			
VAR	modbus_config		ARRAY [0..127] OF ModbusConfig			
VAR	communication_configuration		SerialCommunicationPara	...		
VAR	modbus_command_quantity		BYTE			
VAR	error_status		BOOL			
VAR	error_ID		ModbusMasterErrorCode			


Initialization value
Variable Initialization
Apply Value to Selected Lines
Reset Selected Lines to Default Values
OK
Cancel

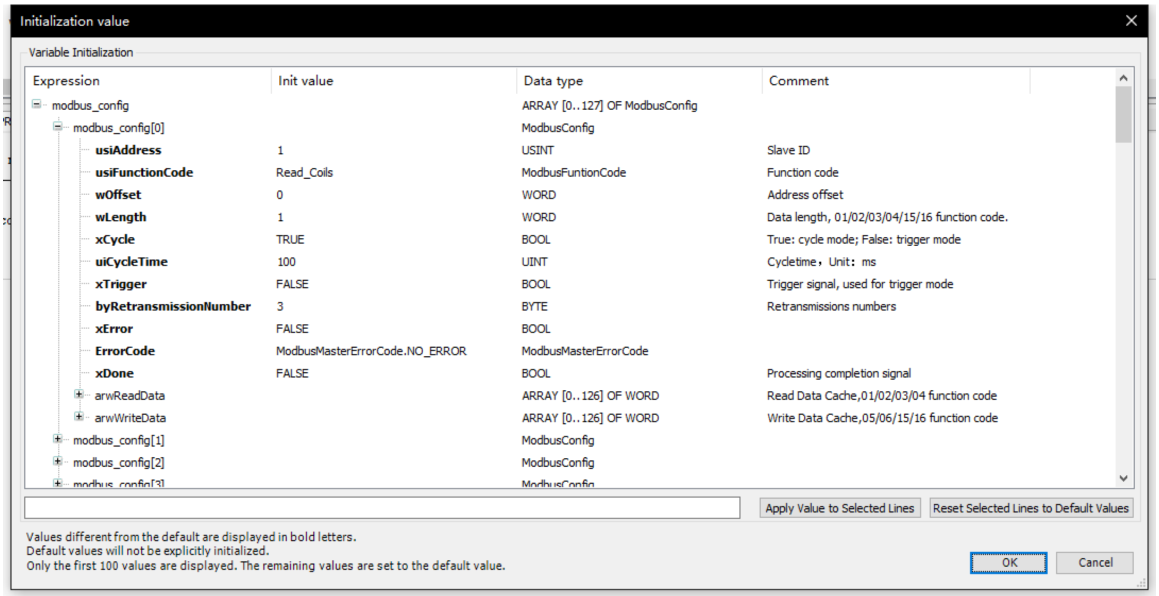
Expression	Init value	Data type	Comment
communication_configuration		SerialCommunicationPara	
udiPort	3	UDINT	Serial port.3：COM0;4：COM1
udiBaudrate	115200	UDINT	Baud rate
udiPARITY	COM.PARITY.EVEN	COM.PARITY	Parity
udiStopBits	COM.STOPBIT.ONESTOPBIT	COM.STOPBIT	Stop bit
udiTimeout	1000	UDINT	Time out, Unit: ms
udiByteSize	8	UDINT	Data bit

Values different from the default are displayed in bold letters.
Default values will not be explicitly initialized.
Only the first 100 values are displayed. The remaining values are set to the default value.

6) Configure the communication command items.



Scope	Name	Address	Data type	Initialization	Comment	Attributes
VAR	local_variable_1		BOOL			
VAR	LS_ModbusMaster_0		LS_ModbusMaster			
VAR	master_enable		BOOL			
VAR	modbus_config		ARRAY [0..127] OF ModbusConfig	...		
VAR	communication_configuration		SerialCommunicationPara			
VAR	modbus_command_quantity		BYTE			
VAR	error_status		BOOL			
VAR	error_ID		ModbusMasterErrorCode			

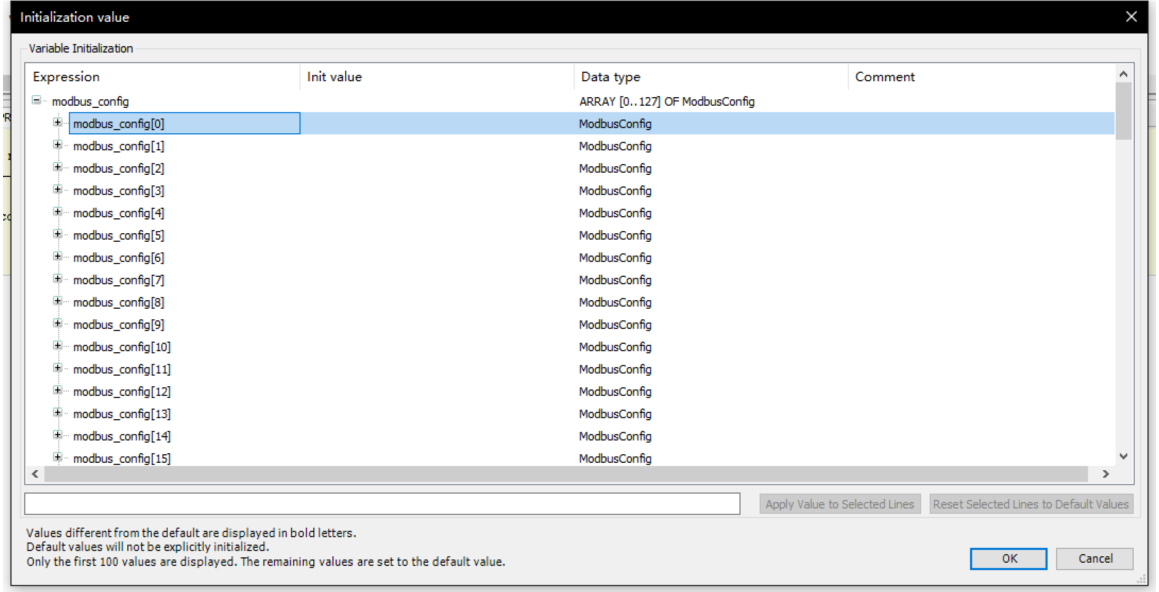

Initialization value
Variable Initialization
Apply Value to Selected Lines
Reset Selected Lines to Default Values
OK
Cancel

Expression	Init value	Data type	Comment
modbus_config		ARRAY [0..127] OF ModbusConfig	
modbus_config[0]		ModbusConfig	
usiAddress	1	USINT	Slave ID
usiFunctionCode	Read_Coils	ModbusFuntionCode	Function code
wOffset	0	WORD	Address offset
wLength	1	WORD	Data length, 01/02/03/04/15/16 function code.
xCycle	TRUE	BOOL	True: cycle mode; False: trigger mode
uiCycleTime	100	UINT	Cycletime，Unit：ms
xTrigger	FALSE	BOOL	Trigger signal, used for trigger mode
byRetransmissionNumber	3	BYTE	Retransmissions numbers
xError	FALSE	BOOL	
ErrorCode	ModbusMasterErrorCode.NO_ERROR	ModbusMasterErrorCode	
xDone	FALSE	BOOL	Processing completion signal
arwReadData		ARRAY [0..126] OF WORD	Read Data Cache,01/02/03/04 function code
arwWriteData		ARRAY [0..126] OF WORD	Write Data Cache,05/06/15/16 function code
modbus_config[1]		ModbusConfig	
modbus_config[2]		ModbusConfig	
modbus_config[3]		ModbusConfig	

Values different from the default are displayed in bold letters.
Default values will not be explicitly initialized.
Only the first 100 values are displayed. The remaining values are set to the default value.

7) Select the command quantity

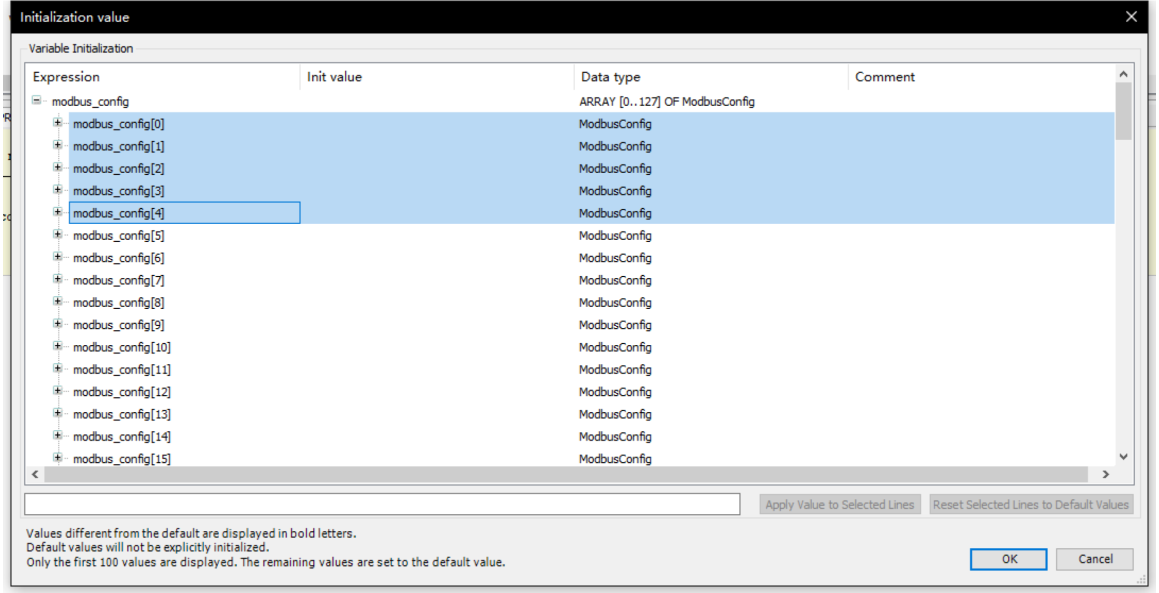
For example: stSerialCommunicationPara =1, it’s means enable Modbus_config[0] command


Initialization value
Variable Initialization
Apply Value to Selected Lines
Reset Selected Lines to Default Values
OK
Cancel

Expression	Init value	Data type	Comment
modbus_config		ARRAY [0..127] OF ModbusConfig	
modbus_config[0]		ModbusConfig	
modbus_config[1]		ModbusConfig	
modbus_config[2]		ModbusConfig	
modbus_config[3]		ModbusConfig	
modbus_config[4]		ModbusConfig	
modbus_config[5]		ModbusConfig	
modbus_config[6]		ModbusConfig	
modbus_config[7]		ModbusConfig	
modbus_config[8]		ModbusConfig	
modbus_config[9]		ModbusConfig	
modbus_config[10]		ModbusConfig	
modbus_config[11]		ModbusConfig	
modbus_config[12]		ModbusConfig	
modbus_config[13]		ModbusConfig	
modbus_config[14]		ModbusConfig	
modbus_config[15]		ModbusConfig	

Values different from the default are displayed in bold letters.
Default values will not be explicitly initialized.
Only the first 100 values are displayed. The remaining values are set to the default value.

stSerialCommunicationPara =5 , it’s means enable Modbus_config[0] ~[4] command

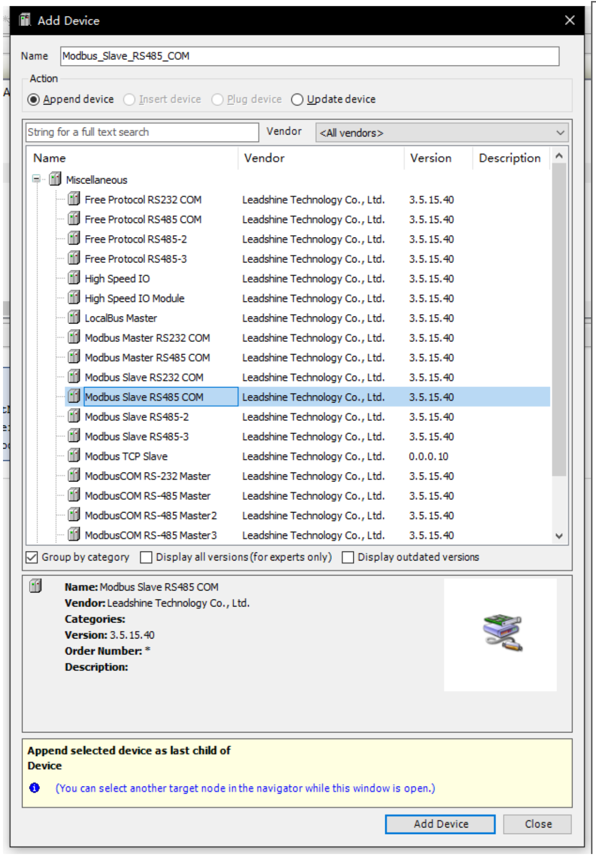

Initialization value
Variable Initialization
Apply Value to Selected Lines
Reset Selected Lines to Default Values
OK
Cancel

Expression	Init value	Data type	Comment
modbus_config		ARRAY [0..127] OF ModbusConfig	
modbus_config[0]		ModbusConfig	
modbus_config[1]		ModbusConfig	
modbus_config[2]		ModbusConfig	
modbus_config[3]		ModbusConfig	
modbus_config[4]		ModbusConfig	
modbus_config[5]		ModbusConfig	
modbus_config[6]		ModbusConfig	
modbus_config[7]		ModbusConfig	
modbus_config[8]		ModbusConfig	
modbus_config[9]		ModbusConfig	
modbus_config[10]		ModbusConfig	
modbus_config[11]		ModbusConfig	
modbus_config[12]		ModbusConfig	
modbus_config[13]		ModbusConfig	
modbus_config[14]		ModbusConfig	
modbus_config[15]		ModbusConfig	

Values different from the default are displayed in bold letters.
Default values will not be explicitly initialized.
Only the first 100 values are displayed. The remaining values are set to the default value.

5.2.2.Modbus Slave Station Configuration

1) Add the slave device to configure MC500 series PLC as slave station.



Add Device

Name: Modbus_Slave_RS485_COM

Action: ● Append device ○ Insert device ○ Plug device ○ Update device

String for a full text search Vendor <All vendors>

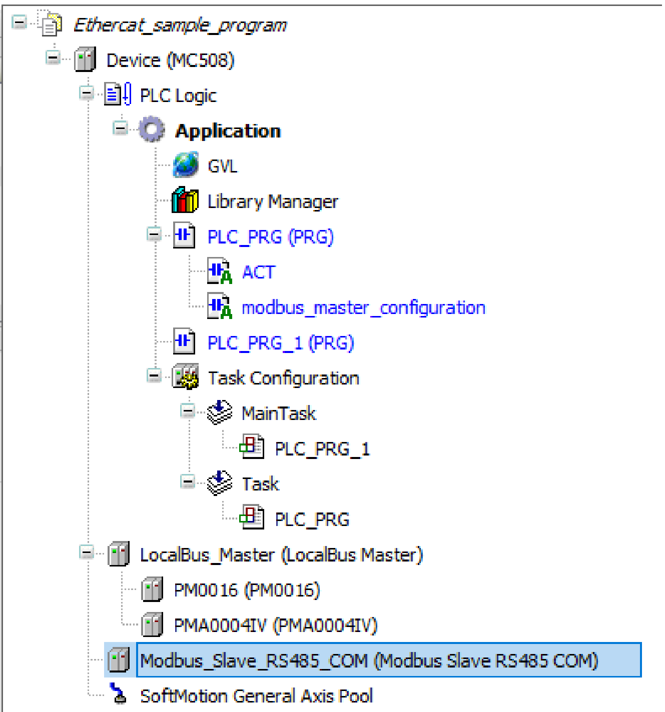
Name	Vendor	Version	Description
Miscellaneous			
Free Protocol RS232 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Free Protocol RS485 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Free Protocol RS485-2	Leadshine Technology Co., Ltd.	3.5.15.40	
Free Protocol RS485-3	Leadshine Technology Co., Ltd.	3.5.15.40	
High Speed IO	Leadshine Technology Co., Ltd.	3.5.15.40	
High Speed IO Module	Leadshine Technology Co., Ltd.	3.5.15.40	
LocalBus Master	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Master RS232 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Master RS485 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS232 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS485 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS485-2	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS485-3	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus TCP Slave	Leadshine Technology Co., Ltd.	0.0.0.10	
ModbusCOM RS-232 Master	Leadshine Technology Co., Ltd.	3.5.15.40	
ModbusCOM RS-485 Master	Leadshine Technology Co., Ltd.	3.5.15.40	
ModbusCOM RS-485 Master2	Leadshine Technology Co., Ltd.	3.5.15.40	
ModbusCOM RS-485 Master3	Leadshine Technology Co., Ltd.	3.5.15.40	

☑ Group by category ☐ Display all versions (for experts only) ☐ Display outdated versions

Name: Modbus Slave RS485 COM
Vendor: Leadshine Technology Co., Ltd.
Categories:
Version: 3.5.15.40
Order Number: *
Description:

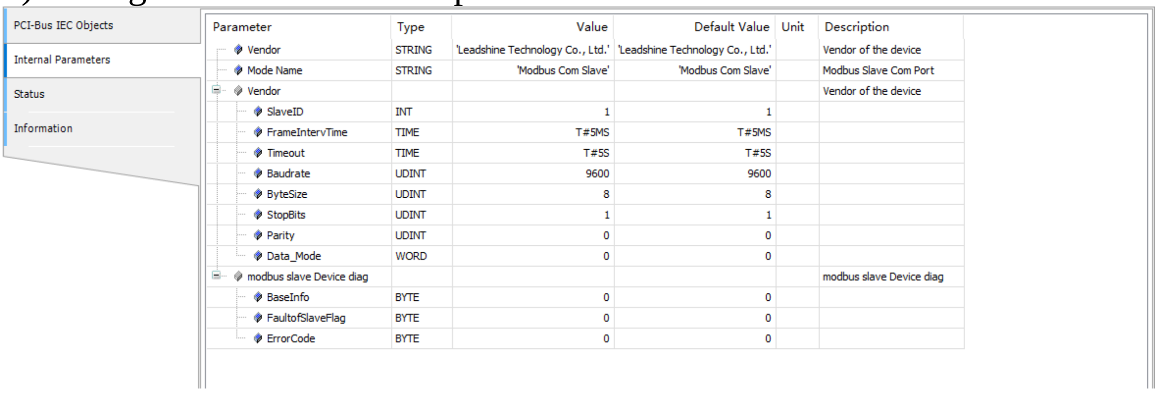
Append selected device as last child of
Device

(You can select another target node in the navigator while this window is open.)



```
Ethercat_sample_program
  Device (MC508)
    PLC Logic
      Application
        GVL
        Library Manager
        PLC_PRG (PRG)
          ACT
          modbus_master_configuration
        PLC_PRG_1 (PRG)
        Task Configuration
          MainTask
            PLC_PRG_1
          Task
            PLC_PRG
    LocalBus_Master (LocalBus Master)
      PM0016 (PM0016)
      PMA0004IV (PMA0004IV)
    Modbus_Slave_RS485_COM (Modbus Slave RS485 COM)
    SoftMotion General Axis Pool
```

2) Configure the slave station parameters.



Parameter	Type	Value	Default Value	Unit	Description
Vendor	STRING	'Leadshine Technology Co., Ltd.'	'Leadshine Technology Co., Ltd.'		Vendor of the device
Mode Name	STRING	'Modbus Com Slave'	'Modbus Com Slave'		Modbus Slave Com Port
Vendor					Vendor of the device
SlaveID	INT	1	1		
FrameIntervTime	TIME	T#5MS	T#5MS		
Timeout	TIME	T#5S	T#5S		
Baudrate	UDINT	9600	9600		
ByteSize	UDINT	8	8		
StopBits	UDINT	1	1		
Parity	UDINT	0	0		
Data_Mode	WORD	0	0		
modbus slave Device diag					modbus slave Device diag
BaseInfo	BYTE	0	0		
FaultofSlaveFlag	BYTE	0	0		
ErrorCode	BYTE	0	0		

5.2.3.Modbus Variable Address

MC 500 series PLC include Q type ,I type and M type variable areas which can be accessed by bit, byte word, and dual-word.

For example, %QX, %QB, %QW, and %QD are converted as follows:

QB0 = (QX0.0-QX0.7)
QW0 = (QB0-QB1) = ((QX0.0-QX0.7) + (QX1.0-QX1.7));
QD0 = (QW0-QW1) = (QB0-QB4) = ((QX0.0-QX0.7) + (QX1.0-QX1.7)+(QX2.0-QX2.7)+(QX3.0-QX3.7))\

3) Variables addressing table

Bitwise addressing	Bytewise addressing	Wordwise addressing	DWordwise addressing		Bitwise addressing	Bytewise addressing	Wordwise addressing	DWordwise addressing
QX0.0	QB0	QW0	QD0		MX0.0	MB0	MW0	MD0
QX0.1					MX0.1			
QX0.2					MX0.2			
QX0.3					MX0.3			
QX0.4					MX0.4			
QX0.5					MX0.5			

QX0.6					MX0.6			
QX0.7					MX0.7			
QX1.0	QB1				MX1.0	MB1		
QX1.1					MX1.1			
QX1.2					MX1.2			
QX1.3					MX1.3			
QX1.4					MX1.4			
QX1.5					MX1.5			
QX1.6					MX1.6			
QX1.7					MX1.7			
QX2.0	QB2	QW1			MX2.0	MB2	MW1	
QX2.1					MX2.1			
QX2.2					MX2.2			
QX2.3					MX2.3			
QX2.4					MX2.4			
QX2.5					MX2.5			
QX2.6					MX2.6			
QX2.7					MX2.7			
QX3.0	QB3				MX3.0	MB3		
QX3.1					MX3.1			
QX3.2					MX3.2			
QX3.3					MX3.3			
QX3.4					MX3.4			
QX3.5					MX3.5			
QX3.6					MX3.6			
QX3.7					MX3.7			

4) Variables access range

Areas	Range	Function code	Initial address	Quantity
Q type	%QW0~%QW4095 (QX0.0 ~ QX8191.7)	0x01,0x05,0x0f	0	65536
I type	%IW0~%IW4095 (IX0.0 ~ IX8191.7)	0x02	0	65536
M type	%MW0~%MW65535	0x03,0x06,0x10	0	65536

5.3.Ethernet Communication

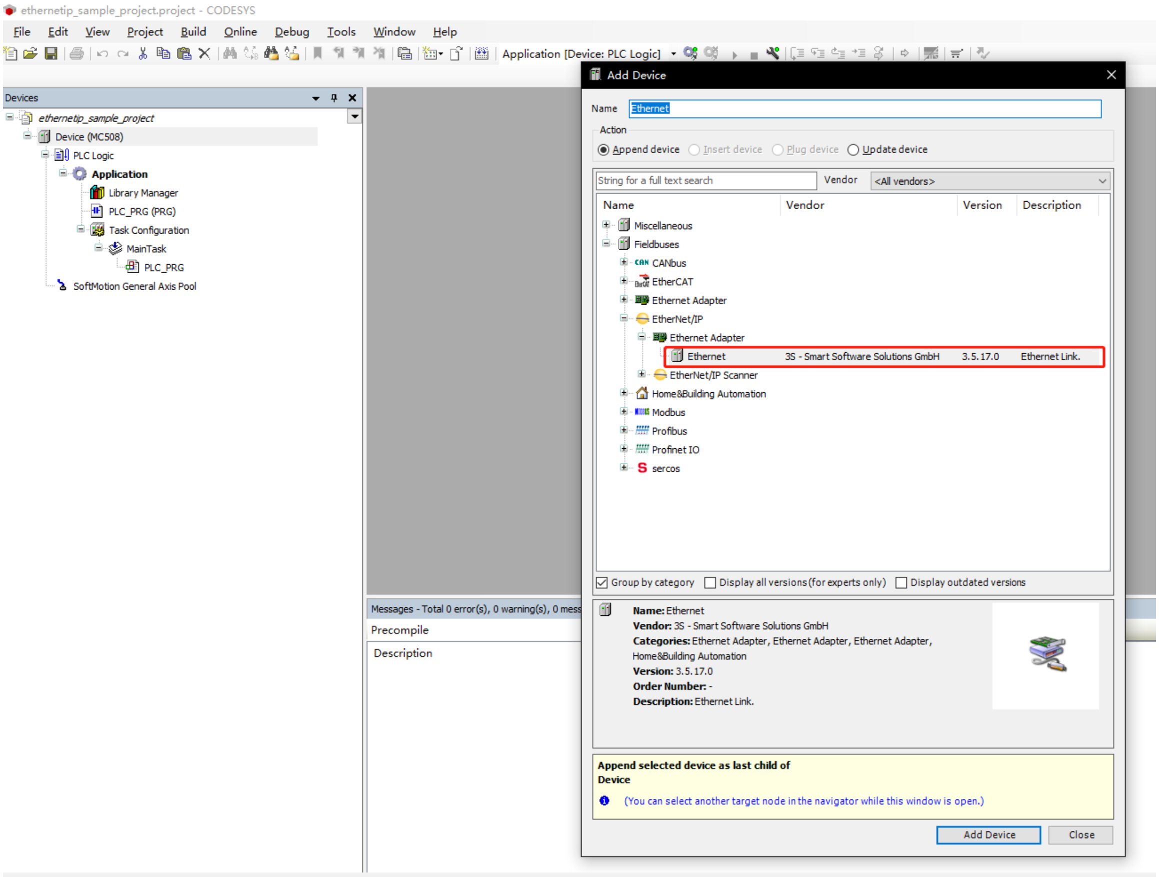
Ethernet/IP is an industrial application layer protocol for industrial automation applications. It is based on the Industrial Ethernet standard, which is introduced by ODVA (OpenDeviceNet Vendors Association) and ControlNet International and is combined with TCP/IP Ethernet.

5.4.Ethernet/IP Communicating

5.4.1.Configuring PLC As Master Station

5.4.1.1.Add The Drive As Slave Station

1) right-click the "device" click "Ethernet/IP", then select the Ethernet port.


ethernetip_sample_project.project - CODESYS
File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
ethernetip_sample_project
Device (MC508)
PLC Logic
Application
Library Manager
PLC_PRG (PRG)
Task Configuration
MainTask
PLC_PRG
SoftMotion General Axis Pool
Messages - Total 0 error(s), 0 warning(s), 0 mess
Precompile
Description

Add Device

Name: Ethernet

Action: ● Append device ○ Insert device ○ Plug device ○ Update device

String for a full text search | Vendor: <All vendors>

Name	Vendor	Version	Description
Miscellaneous			
Fieldbuses			
CANbus			
EtherCAT			
Ethernet Adapter			
EtherNet/IP			
Ethernet Adapter			
Ethernet	3S - Smart Software Solutions GmbH	3.5.17.0	Ethernet Link.
EtherNet/IP Scanner			
Home&Building Automation			
Modbus			
Profibus			
Profinet IO			
sercos			

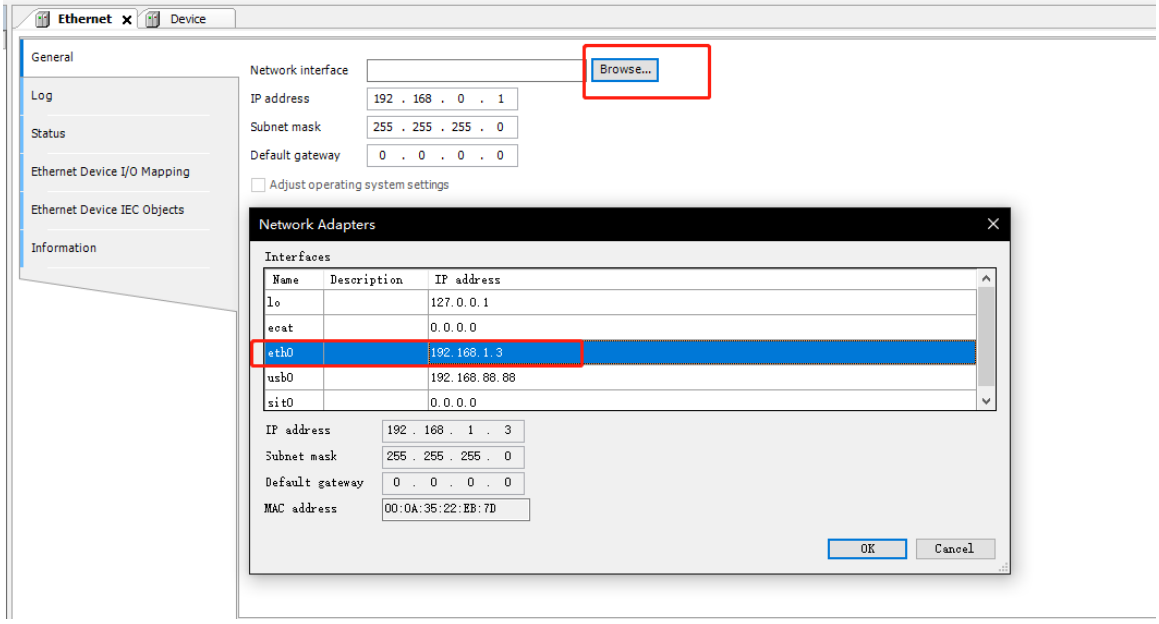
☑ Group by category ☐ Display all versions (for experts only) ☐ Display outdated versions

Name: Ethernet
Vendor: 3S - Smart Software Solutions GmbH
Categories: Ethernet Adapter, Ethernet Adapter, Ethernet Adapter, Home&Building Automation
Version: 3.5.17.0
Order Number: -
Description: Ethernet Link.

Append selected device as last child of Device

(You can select another target node in the navigator while this window is open.)

Add Device | Close



Network interface: Browse...

IP address: 192 . 168 . 0 . 1

Subnet mask: 255 . 255 . 255 . 0

Default gateway: 0 . 0 . 0 . 0

☐ Adjust operating system settings

Network Adapters

Interfaces

Name	Description	IP address
lo		127.0.0.1
ecat		0.0.0.0
eth0		192.168.1.3
usb0		192.168.88.88
sit0		0.0.0.0

IP address: 192 . 168 . 1 . 3

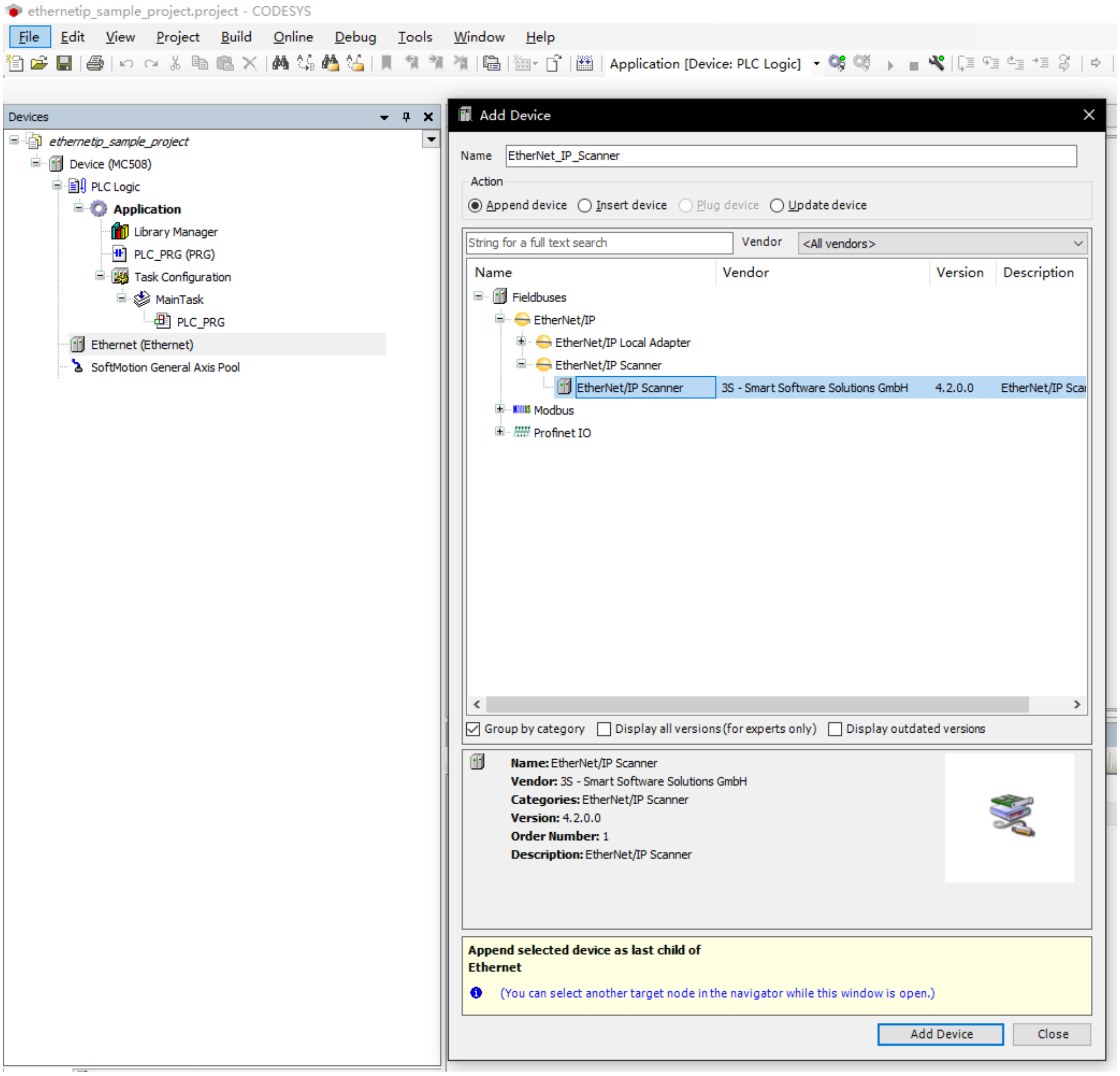
Subnet mask: 255 . 255 . 255 . 0

Default gateway: 0 . 0 . 0 . 0

MAC address: 00:0A:35:22:EB:7D

OK | Cancel

2) Add the Ethernet/IP scanner



Name: EtherNet_IP_Scanner

Action: ● Append device ○ Insert device ○ Plug device ○ Update device

Name	Vendor	Version	Description
EtherNet/IP Scanner	3S - Smart Software Solutions GmbH	4.2.0.0	EtherNet/IP Scai

☑ Group by category ☐ Display all versions (for experts only) ☐ Display outdated versions

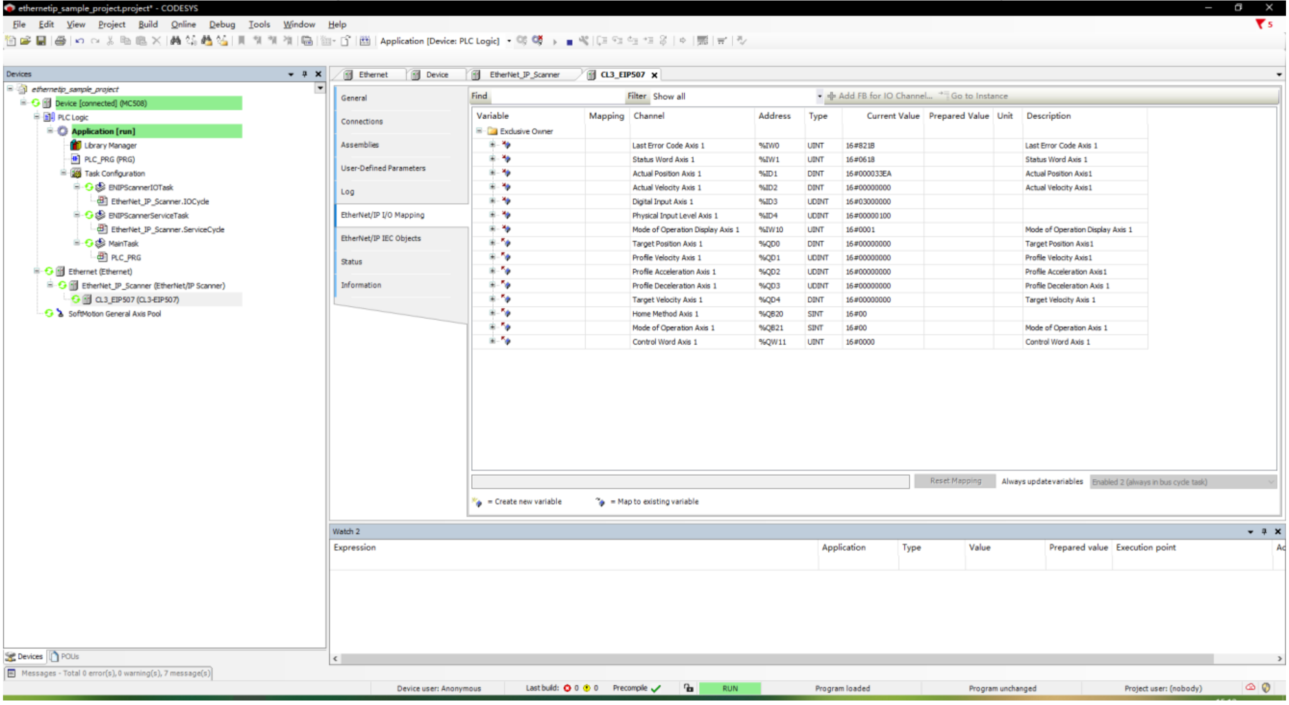
Name: EtherNet/IP Scanner
Vendor: 3S - Smart Software Solutions GmbH
Categories: EtherNet/IP Scanner
Version: 4.2.0.0
Order Number: 1
Description: EtherNet/IP Scanner

Append selected device as last child of Ethernet

(You can select another target node in the navigator while this window is open.)

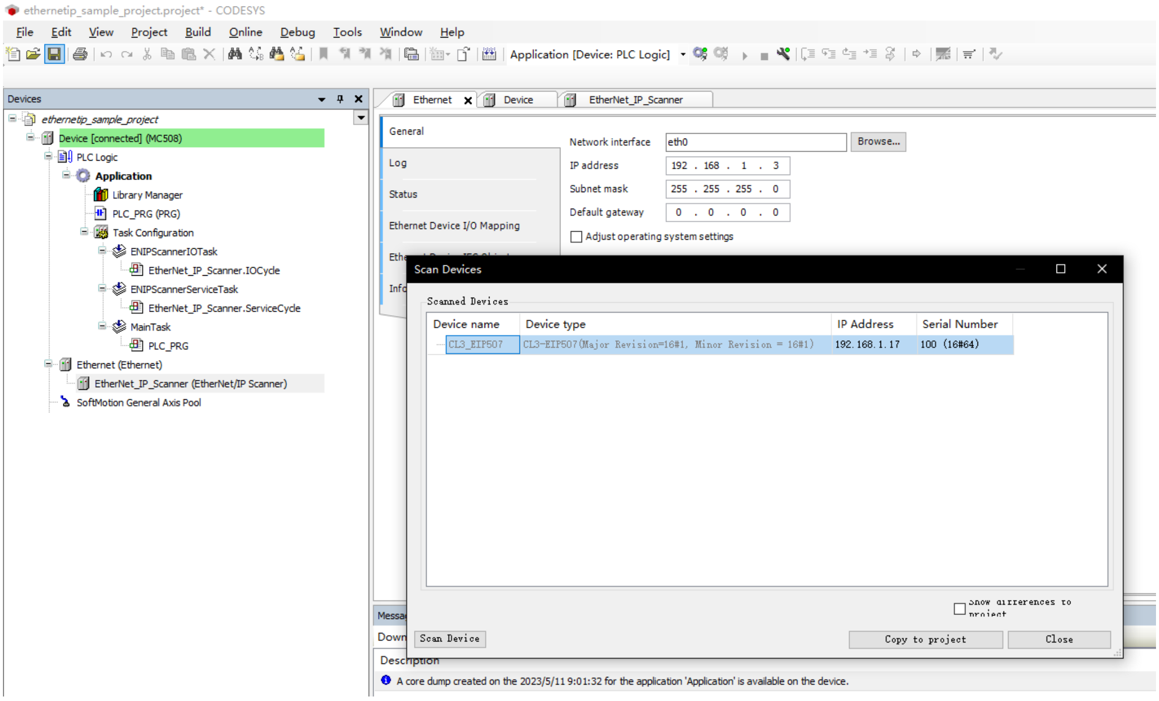
ethernetip_sample_project.project - CODESYS
File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
ethernetip_sample_project
Device (MC508)
PLC Logic
Application
Library Manager
PLC_PRG (PRG)
Task Configuration
MainTask
PLC_PRG
Ethernet (Ethernet)
SoftMotion General Axis Pool
Add Device
String for a full text search
Vendor
<All vendors>
Fieldbuses
EtherNet/IP
EtherNet/IP Local Adapter
EtherNet/IP Scanner
Modbus
Profinet IO
Add Device
Close

3) Using the auto scanning function find the device or add the device manually to the project



Variable	Mapping	Channel	Address	Type	Current Value	Prepared Value	Unit	Description
Exclusive Owner								
		Last Error Code Axis 1	%IW0	UINT	16#821B			Last Error Code Axis 1
		Status Word Axis 1	%IW1	UINT	16#0618			Status Word Axis 1
		Actual Position Axis 1	%ID1	DINT	16#000033EA			Actual Position Axis1
		Actual Velocity Axis 1	%ID2	DINT	16#00000000			Actual Velocity Axis1
		Digital Input Axis 1	%ID3	UDINT	16#03000000			
		Physical Input Level Axis 1	%ID4	UDINT	16#00000100			
		Mode of Operation Display Axis 1	%IW10	UINT	16#0001			Mode of Operation Display Axis 1
		Target Position Axis 1	%QD0	DINT	16#00000000			Target Position Axis1
		Profile Velocity Axis 1	%QD1	UDINT	16#00000000			Profile Velocity Axis1
		Profile Acceleration Axis 1	%QD2	UDINT	16#00000000			Profile Acceleration Axis1
		Profile Deceleration Axis 1	%QD3	UDINT	16#00000000			Profile Deceleration Axis 1
		Target Velocity Axis 1	%QD4	DINT	16#00000000			Target Velocity Axis 1
		Home Method Axis 1	%QB20	SINT	16#00			
		Mode of Operation Axis 1	%QB21	SINT	16#00			Mode of Operation Axis 1
		Control Word Axis 1	%QW11	UINT	16#0000			Control Word Axis 1

4) Download to PLC then create the control program.


ethernetip_sample_project.project* - CODESYS
File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
ethernetip_sample_project
Device [connected] (MC508)
PLC Logic
Application
Library Manager
PLC_PRG (PRG)
Task Configuration
ENIPScannerIOTask
EtherNet_IP_Scanner.IOCycle
ENIPScannerServiceTask
EtherNet_IP_Scanner.ServiceCycle
MainTask
PLC_PRG
Ethernet (Ethernet)
EtherNet_IP_Scanner (EtherNet/IP Scanner)
SoftMotion General Axis Pool
Ethernet
Device
EtherNet_IP_Scanner
General
Log
Status
Ethernet Device I/O Mapping
Browse...
Scan Devices
Scan Device
Copy to project
Close

Network interface: eth0

IP address: 192 . 168 . 1 . 3

Subnet mask: 255 . 255 . 255 . 0

Default gateway: 0 . 0 . 0 . 0

□ Adjust operating system settings

Scanned Devices

Device name	Device type	IP Address	Serial Number
CL3_EIP507	CL3-EIP507(Major Revision=16#1, Minor Revision = 16#1)	192.168.1.17	100 (16#64)

□ Show differences to project

Description

A core dump created on the 2023/5/11 9:01:32 for the application 'Application' is available on the device.

6.EtherCAT Configuration

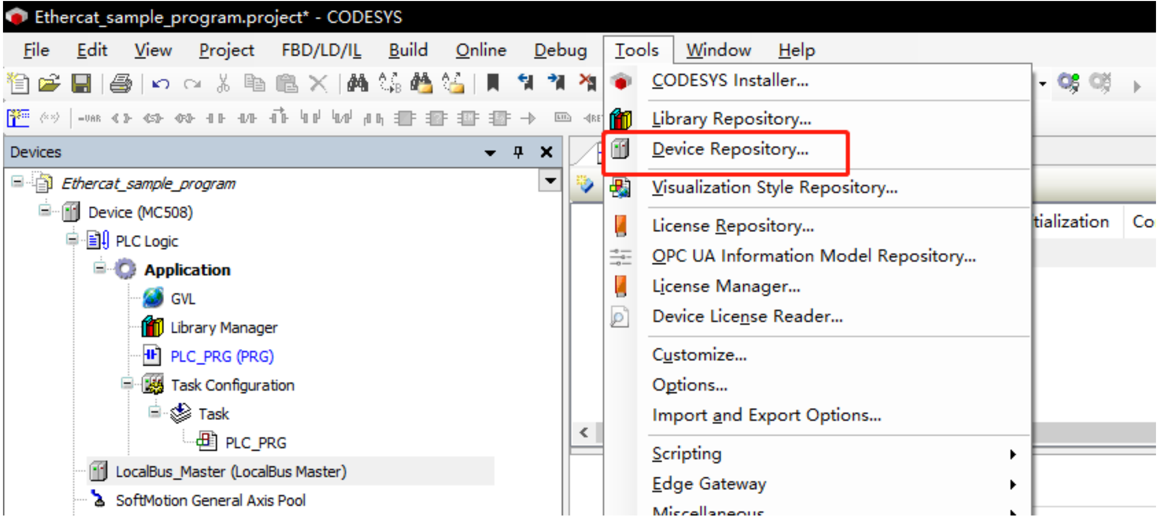
6.1.Overview

EtherCAT is an open industrial field technology over the Ethernet. It features short communication update interval, low synchronization jitter, and low hardware cost. EtherCAT supports the linear, tree, start, and hybrid topologies. EtherCAT slave stations must use dedicated communication chipset ESC, and EtherCAT master stations can use a standard Ethernet controller.

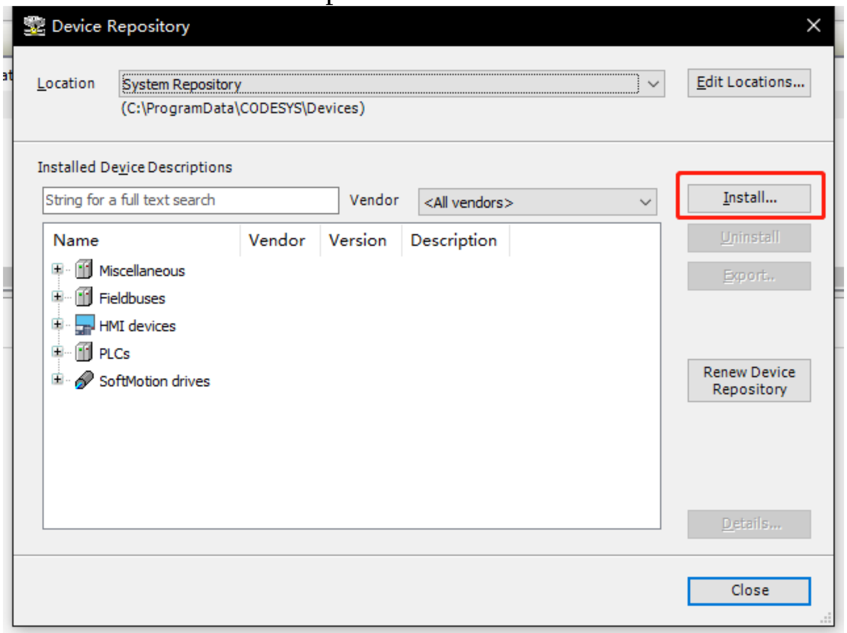
6.2.Add “.Xml” File

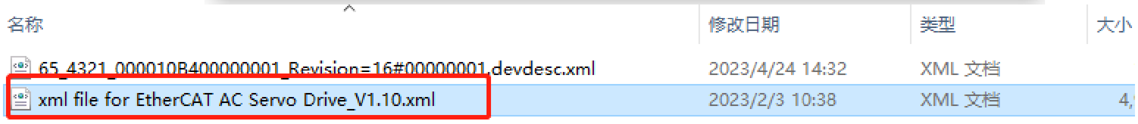
EtherCAT device installation is to import the device description file (with file name extension .XML) in compliance with ETG (EtherCAT Technical Committee) standards into the programming software CODESYS. After the software parses and processes the file, it generates the EtherCAT configure devices that can be added and deleted by users. User need to use third-party the EtherCAT devices, install the device description files provided by the third-party vendors.

1) Click “tool” then open the device repository window

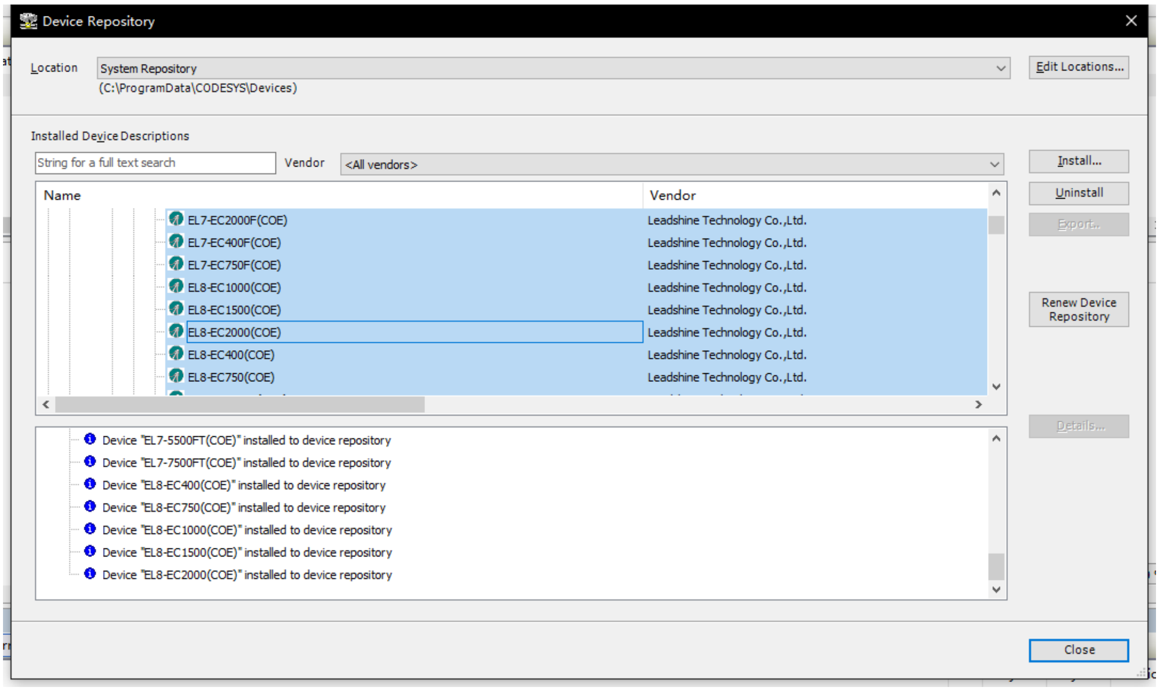


2) Click install ,then find the device description file to install





名称	修改日期	类型	大小
65_4321_000010B400000001_Revision=16#00000001.devdesc.xml	2023/4/24 14:32	XML 文档	
xml file for EtherCAT AC Servo Drive_V1.10.xml	2023/2/3 10:38	XML 文档	4,



Location: System Repository (C:\ProgramData\CODESYS\Devices)

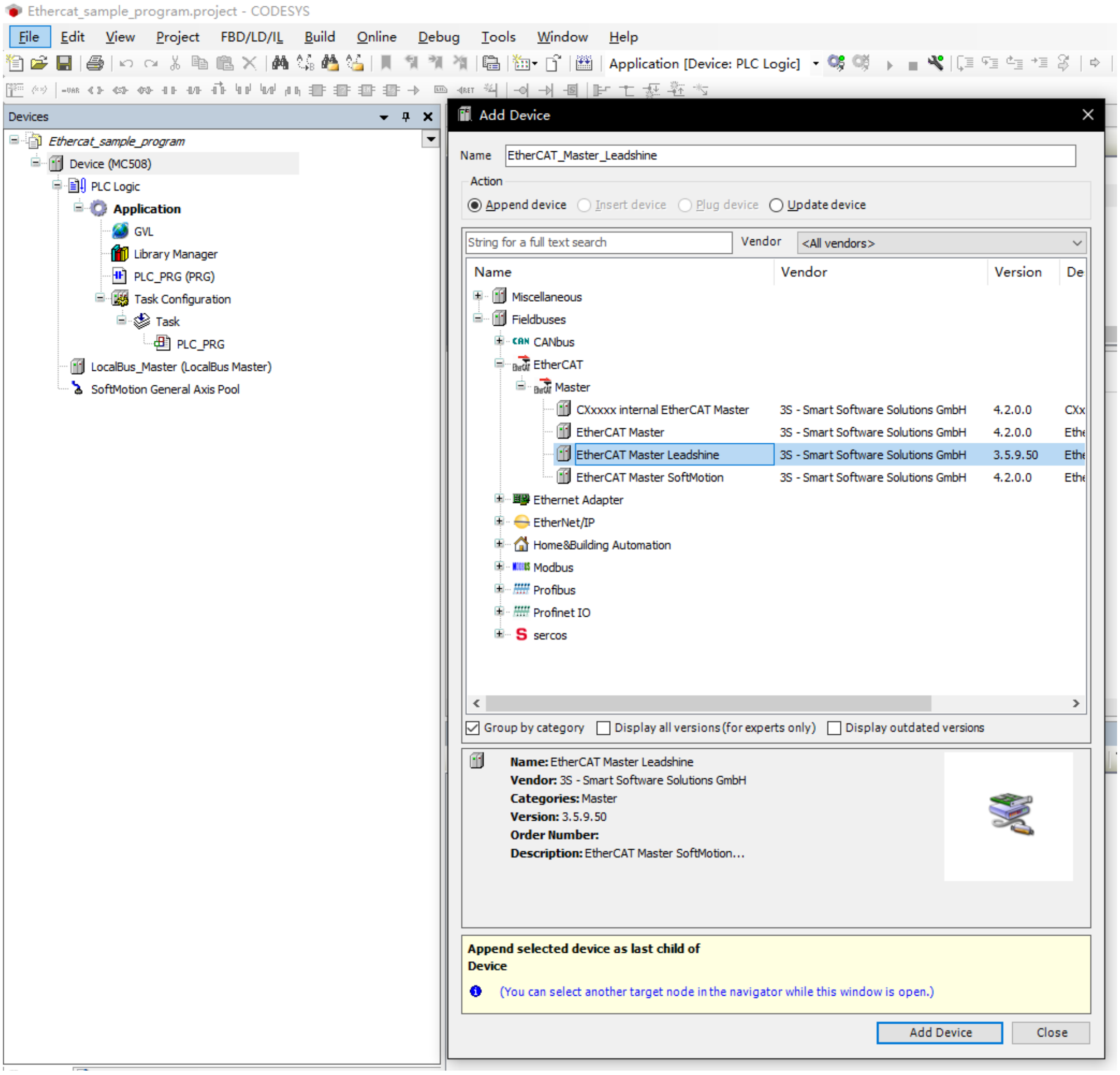
String for a full text search
Vendor <All vendors>

Name	Vendor
EL7-EC2000F(COE)	Leadshine Technology Co.,Ltd.
EL7-EC400F(COE)	Leadshine Technology Co.,Ltd.
EL7-EC750F(COE)	Leadshine Technology Co.,Ltd.
EL8-EC1000(COE)	Leadshine Technology Co.,Ltd.
EL8-EC1500(COE)	Leadshine Technology Co.,Ltd.
EL8-EC2000(COE)	Leadshine Technology Co.,Ltd.
EL8-EC400(COE)	Leadshine Technology Co.,Ltd.
EL8-EC750(COE)	Leadshine Technology Co.,Ltd.

Device "EL7-5500FT(COE)" installed to device repository
Device "EL7-7500FT(COE)" installed to device repository
Device "EL8-EC400(COE)" installed to device repository
Device "EL8-EC750(COE)" installed to device repository
Device "EL8-EC1000(COE)" installed to device repository
Device "EL8-EC1500(COE)" installed to device repository
Device "EL8-EC2000(COE)" installed to device repository

6.3.EtherCAT Master Station Configuration

1) After install the .xml file, add the EtherCAT device, right click “Device” to add the EtherCAT master “EtherCAT Master Leadshine”


Ethercat_sample_program.project - CODESYS
File Edit View Project FBD/LD/IL Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
Ethercat_sample_program
Device (MC508)
PLC Logic
Application
GVL
Library Manager
PLC_PRG (PRG)
Task Configuration
Task
PLC_PRG
LocalBus_Master (LocalBus Master)
SoftMotion General Axis Pool
Add Device
Add Device
Close

Name: EtherCAT_Master_Leadshine

Action: ● Append device ○ Insert device ○ Plug device ○ Update device

String for a full text search
Vendor <All vendors>

Name	Vendor	Version	De
Miscellaneous			
Fieldbuses			
CANbus			
EtherCAT			
Master			
CXxxxx internal EtherCAT Master	3S - Smart Software Solutions GmbH	4.2.0.0	CXx
EtherCAT Master	3S - Smart Software Solutions GmbH	4.2.0.0	Ethe
EtherCAT Master Leadshine	3S - Smart Software Solutions GmbH	3.5.9.50	Ethe
EtherCAT Master SoftMotion	3S - Smart Software Solutions GmbH	4.2.0.0	Ethe
Ethernet Adapter			
EtherNet/IP			
Home&Building Automation			
Modbus			
Profibus			
Profinet IO			
sercos			

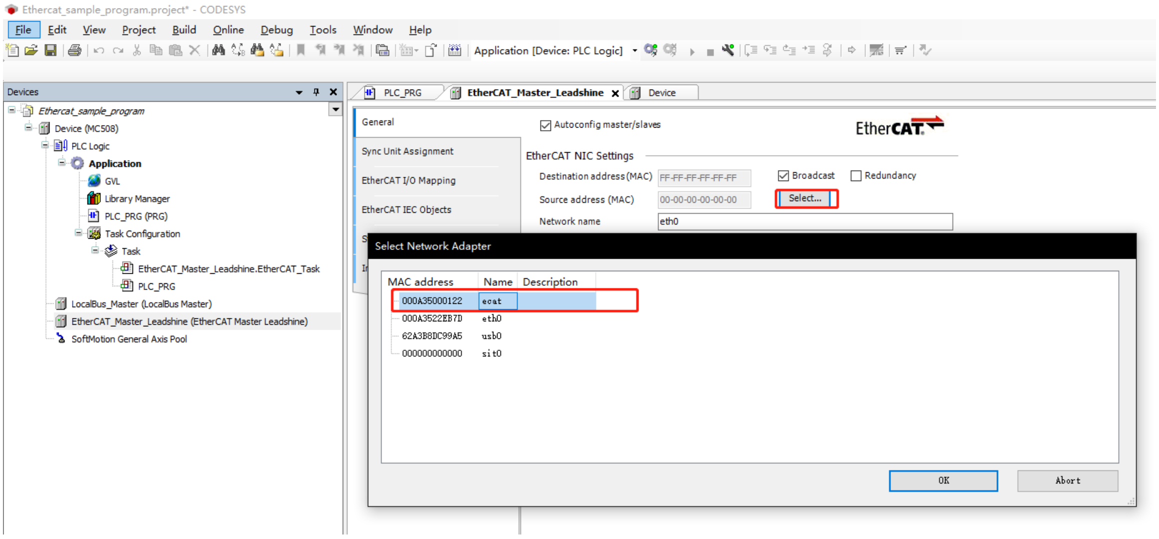
☑ Group by category □ Display all versions (for experts only) □ Display outdated versions

Name: EtherCAT Master Leadshine
Vendor: 3S - Smart Software Solutions GmbH
Categories: Master
Version: 3.5.9.50
Order Number:
Description: EtherCAT Master SoftMotion...

Append selected device as last child of Device

(You can select another target node in the navigator while this window is open.)

2) Select the EtherCAT source address


Ethercat_sample_program.project* - CODESYS
File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
Ethercat_sample_program
Device (MC508)
PLC Logic
Application
GVL
Library Manager
PLC_PRG (PRG)
Task Configuration
Task
EtherCAT_Master_Leadshine.EtherCAT_Task
PLC_PRG
LocalBus_Master (LocalBus Master)
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
SoftMotion General Axis Pool
PLC_PRG
EtherCAT_Master_Leadshine
Device
General
Sync Unit Assignment
EtherCAT I/O Mapping
EtherCAT IEC Objects
EtherCAT.
Select...
OK
Abort

☑ Autoconfig master/slaves

EtherCAT NIC Settings

Destination address (MAC): FF-FF-FF-FF-FF-FF ☑ Broadcast □ Redundancy

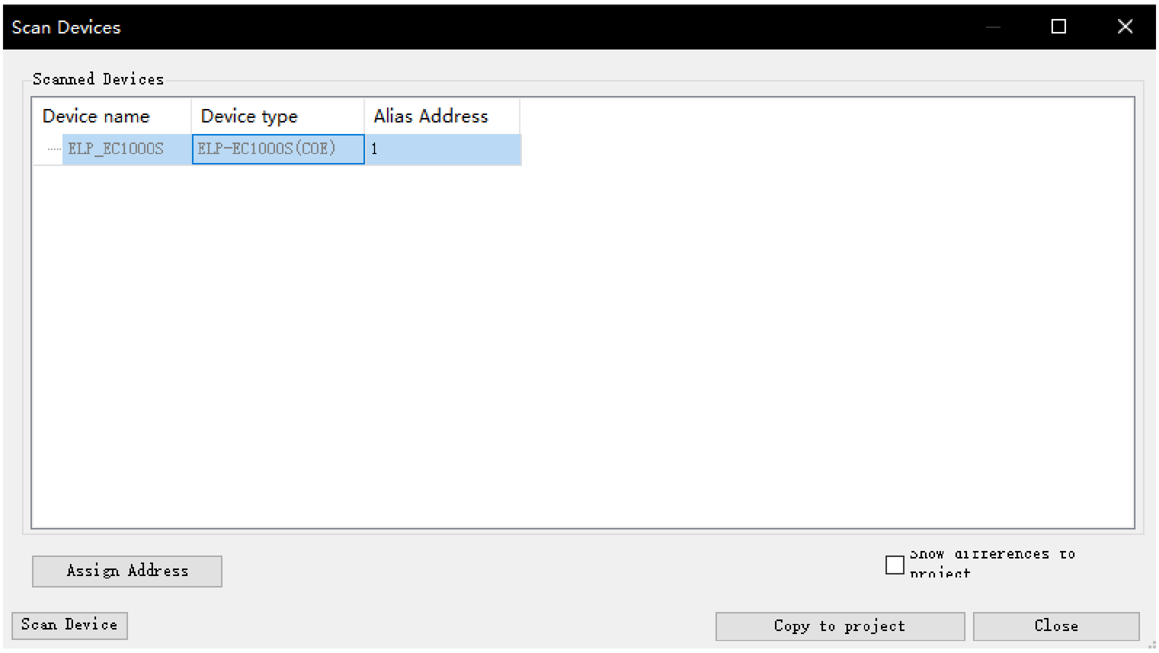
Source address (MAC): 00-00-00-00-00-00

Network name: eth0

Select Network Adapter

MAC address	Name	Description
000A35000122	ecat	
000A3522EB7D	eth0	
62A3B8DC99A5	usb0	
000000000000	sit0	

3) When the PLC connected the device via EtherCAT port, use the auto-scanning function to find the slave station.

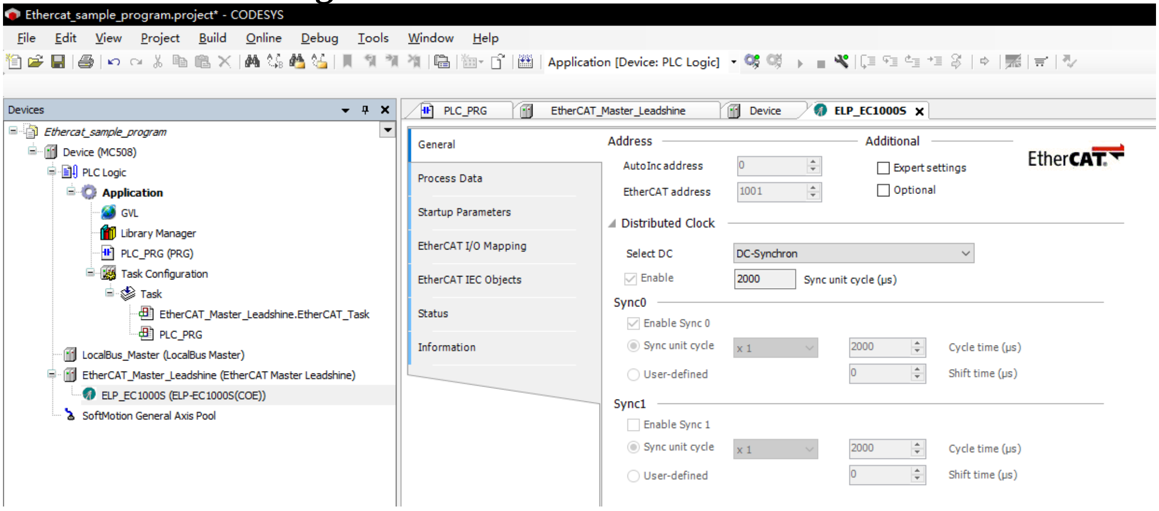


Device name	Device type	Alias Address
ELP_EC1000S	ELP-EC1000S(COE)	1

6.4.EtherCAT Slave Station Configuration

After add the device to project, user can modify the general configuration, SDO, PDO, and EtherCAT I/O mapping.

6.4.1.General Configuration


Ethercat_sample_program.project* - CODESYS
File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
Ethercat_sample_program
Device (MC508)
PLC Logic
Application
GVL
Library Manager
PLC_PRG (PRG)
Task Configuration
Task
EtherCAT_Master_Leadshine.EtherCAT_Task
PLC_PRG
LocalBus_Master (LocalBus Master)
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
ELP_EC1000S (ELP-EC1000S(COE))
SoftMotion General Axis Pool
PLC_PRG
EtherCAT_Master_Leadshine
Device
ELP_EC1000S
General
Process Data
Startup Parameters
EtherCAT I/O Mapping
EtherCAT IEC Objects
Status
Information
EtherCAT.

Address

AutoInc address: 0

EtherCAT address: 1001

Additional

□ Expert settings

□ Optional

Distributed Clock

Select DC: DC-Synchron

☑ Enable 2000 Sync unit cycle (µs)

Sync0

☑ Enable Sync 0

● Sync unit cycle x 1 2000 Cycle time (µs)

○ User-defined 0 Shift time (µs)

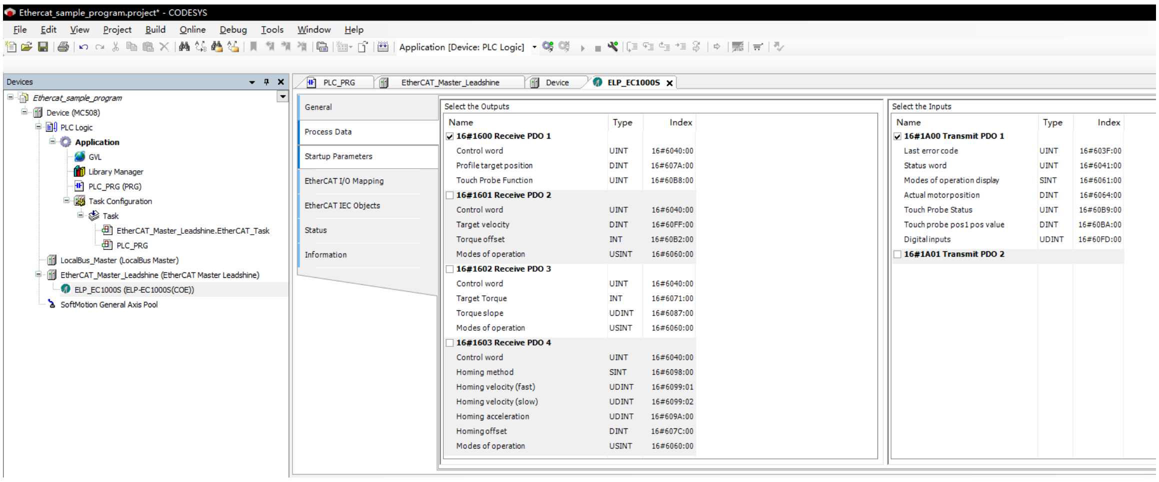
Sync1

□ Enable Sync 1

● Sync unit cycle x 1 2000 Cycle time (µs)

○ User-defined 0 Shift time (µs)

6.5.Process Data Object（PDO）


Ethercat_sample_program.project* - CODESYS
File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
Ethercat_sample_program
Device (MC508)
PLC Logic
Application
GVL
Library Manager
PLC_PRG (PRG)
Task Configuration
Task
EtherCAT_Master_Leadshine.EtherCAT_Task
PLC_PRG
LocalBus_Master (LocalBus Master)
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
ELP_EC1000S (ELP-EC1000S(COE))
SoftMotion General Axis Pool
PLC_PRG
EtherCAT_Master_Leadshine
Device
ELP_EC1000S
General
Process Data
Startup Parameters
EtherCAT I/O Mapping
EtherCAT IEC Objects
Status
Information

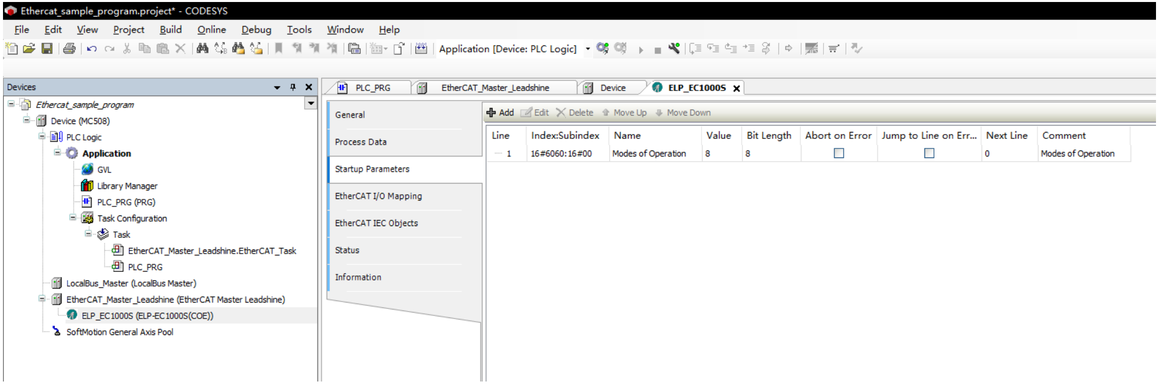
Select the Outputs

Name	Type	Index
☑ 16#1600 Receive PDO 1		
Control word	UINT	16#6040:00
Profile target position	DINT	16#607A:00
Touch Probe Function	UINT	16#60B8:00
□ 16#1601 Receive PDO 2		
Control word	UINT	16#6040:00
Target velocity	DINT	16#60FF:00
Torque offset	INT	16#60B2:00
Modes of operation	USINT	16#6060:00
□ 16#1602 Receive PDO 3		
Control word	UINT	16#6040:00
Target Torque	INT	16#6071:00
Torque slope	UDINT	16#6087:00
Modes of operation	USINT	16#6060:00
□ 16#1603 Receive PDO 4		
Control word	UINT	16#6040:00
Homing method	SINT	16#6098:00
Homing velocity (fast)	UDINT	16#6099:01
Homing velocity (slow)	UDINT	16#6099:02
Homing acceleration	UDINT	16#609A:00
Homing offset	DINT	16#607C:00
Modes of operation	USINT	16#6060:00

Select the Inputs

Name	Type	Index
☑ 16#1A00 Transmit PDO 1		
Last error code	UINT	16#603F:00
Status word	UINT	16#6041:00
Modes of operation display	SINT	16#6061:00
Actual motorposition	DINT	16#6064:00
Touch Probe Status	UINT	16#60B9:00
Touch probe pos1 pos value	DINT	16#60BA:00
Digital inputs	UDINT	16#60FD:00
□ 16#1A01 Transmit PDO 2		

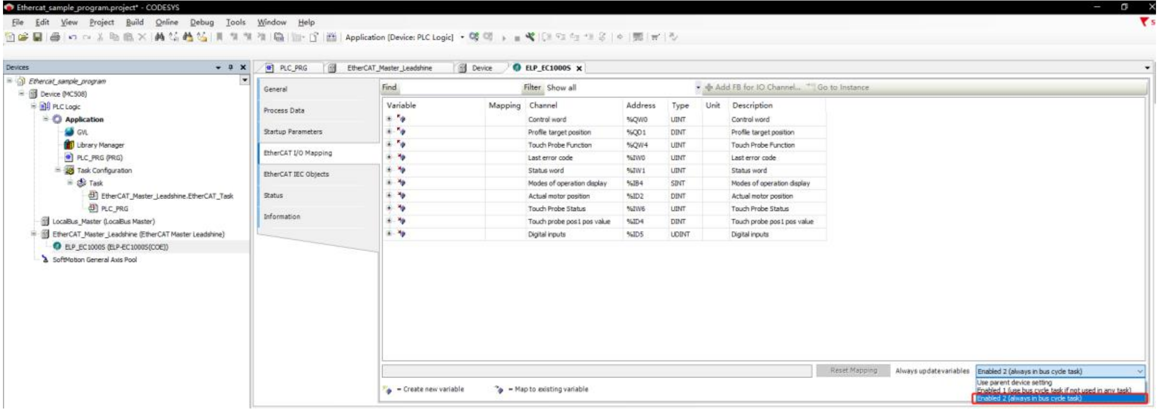
6.5.1.Starting Data Object（SDO）


Ethercat_sample_program.project* - CODESYS
File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
Ethercat_sample_program
Device (MC508)
PLC Logic
Application
GVL
Library Manager
PLC_PRG (PRG)
Task Configuration
Task
EtherCAT_Master_Leadshine.EtherCAT_Task
PLC_PRG
LocalBus_Master (LocalBus Master)
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
ELP_EC1000S (ELP-EC1000S(COE))
SoftMotion General Axis Pool
PLC_PRG
EtherCAT_Master_Leadshine
Device
ELP_EC1000S
General
Process Data
Startup Parameters
EtherCAT I/O Mapping
EtherCAT IEC Objects
Status
Information
Add
Edit
Delete
Move Up
Move Down

Line	Index:Subindex	Name	Value	Bit Length	Abort on Error	Jump to Line on Err...	Next Line	Comment
1	16#6060:16#00	Modes of Operation	8	8	□	□	0	Modes of Operation

6.5.2.EtherCAT I/O mapping

And the EtherCAT I/O mapping have to select the Enabled 2 (always in bus cycle task),please refer to the follow picture.


Ethercat_sample_program.project* - CODESYS
File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
Ethercat_sample_program
Device (MC508)
PLC Logic
Application
GVL
Library Manager
PLC_PRG (PRG)
Task Configuration
Task
EtherCAT_Master_Leadshine.EtherCAT_Task
PLC_PRG
LocalBus_Master (LocalBus Master)
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
ELP_EC1000S (ELP-EC1000S(COE))
SoftMotion General Axis Pool
PLC_PRG
EtherCAT_Master_Leadshine
Device
ELP_EC1000S
General
Process Data
Startup Parameters
EtherCAT I/O Mapping
EtherCAT IEC Objects
Status
Information
Find
Filter Show all
Add FB for IO Channel...
Go to Instance
Reset Mapping
= Create new variable
= Map to existing variable

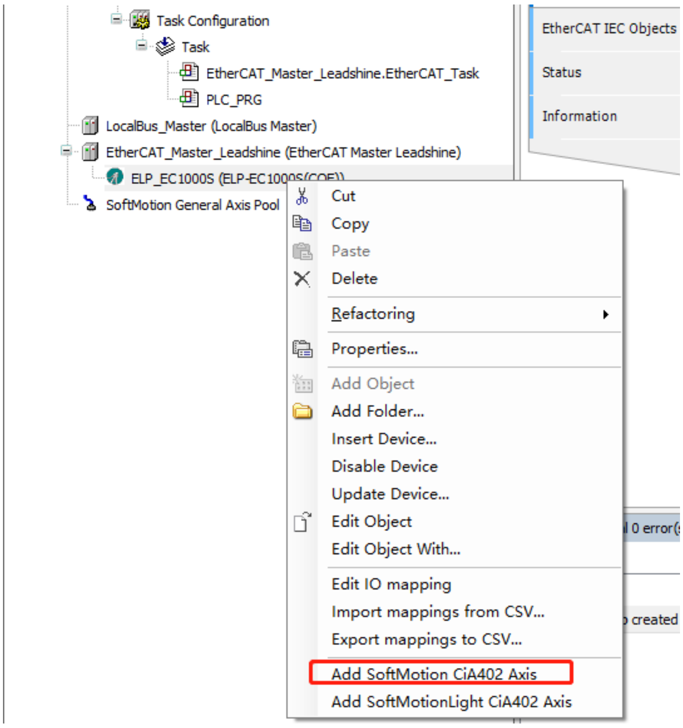
Variable	Mapping	Channel	Address	Type	Unit	Description
		Control word	%QW0	UINT		Control word
		Profile target position	%QD1	DINT		Profile target position
		Touch Probe Function	%QW4	UINT		Touch Probe Function
		Last error code	%IW0	UINT		Last error code
		Status word	%IW1	UINT		Status word
		Modes of operation display	%IB4	SINT		Modes of operation display
		Actual motor position	%ID2	DINT		Actual motor position
		Touch Probe Status	%IW6	UINT		Touch Probe Status
		Touch probe pos1 pos value	%ID4	DINT		Touch probe pos1 pos value
		Digital inputs	%ID5	UDINT		Digital inputs

Always updatevariables: Enabled 2 (always in bus cycle task)

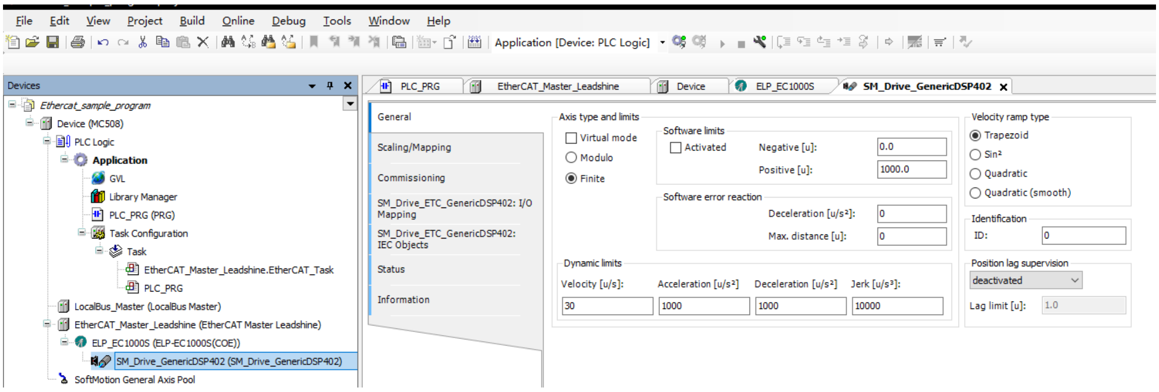
- Use parent device setting
- Enabled 1 (use bus cycle task if not used in any task)
- Enabled 2 (always in bus cycle task)

6.6.Add 402 Axis To Servo Slave Station

1) Right click the slave drive to Add the SoftMotion CIA402 Axis.


Task Configuration
Task
EtherCAT_Master_Leadshine.EtherCAT_Task
PLC_PRG
LocalBus_Master (LocalBus Master)
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
ELP_EC1000S (ELP-EC1000S(COE))
SoftMotion General Axis Pool
EtherCAT IEC Objects
Status
Information
Cut
Copy
Paste
Delete
Refactoring
Properties...
Add Object
Add Folder...
Insert Device...
Disable Device
Update Device...
Edit Object
Edit Object With...
Edit IO mapping
Import mappings from CSV...
Export mappings to CSV...
Add SoftMotion CiA402 Axis
Add SoftMotionLight CiA402 Axis
0 error(
created

2) Axis general configuration


File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
Ethercat_sample_program
Device (MC508)
PLC Logic
Application
GVL
Library Manager
PLC_PRG (PRG)
Task Configuration
Task
EtherCAT_Master_Leadshine.EtherCAT_Task
PLC_PRG
LocalBus_Master (LocalBus Master)
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
ELP_EC1000S (ELP-EC1000S(COE))
SM_Drive_GenericDSP402 (SM_Drive_GenericDSP402)
SoftMotion General Axis Pool
PLC_PRG
EtherCAT_Master_Leadshine
Device
ELP_EC1000S
SM_Drive_GenericDSP402
General
Scaling/Mapping
Commissioning
SM_Drive_ETC_GenericDSP402: I/O Mapping
SM_Drive_ETC_GenericDSP402: IEC Objects
Status
Information

Axis type and limits
☐ Virtual mode
○ Modulo
● Finite

Software limits
☐ Activated
Negative [u]: 0.0
Positive [u]: 1000.0

Software error reaction
Deceleration [u/s²]: 0
Max. distance [u]: 0

Dynamic limits

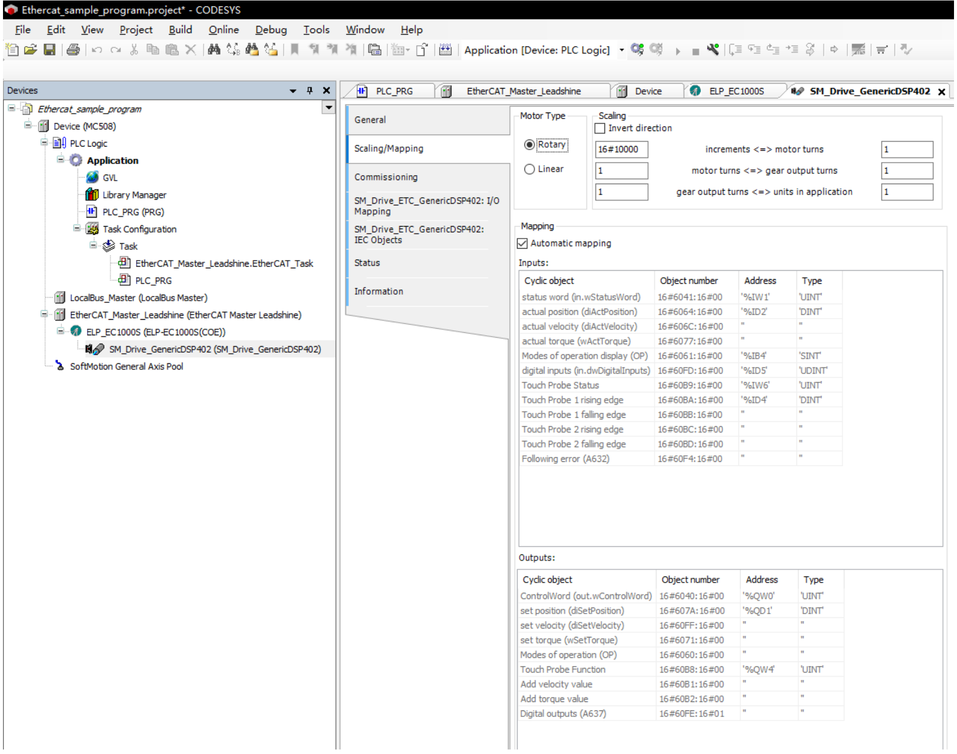
Velocity [u/s]:	Acceleration [u/s²]	Deceleration [u/s²]	Jerk [u/s³]:
30	1000	1000	10000

Velocity ramp type
● Trapezoid
○ Sin²
○ Quadratic
○ Quadratic (smooth)

Identification
ID: 0

Position lag supervision
deactivated
Lag limit [u]: 1.0

3) Scaling, Motor Type, and I/O Mapping


Ethercat_sample_program.project* - CODESYS
File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
Ethercat_sample_program
Device (MC508)
PLC Logic
Application
GVL
Library Manager
PLC_PRG (PRG)
Task Configuration
Task
EtherCAT_Master_Leadshine.EtherCAT_Task
PLC_PRG
LocalBus_Master (LocalBus Master)
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
ELP_EC1000S (ELP-EC1000S(COE))
SM_Drive_GenericDSP402 (SM_Drive_GenericDSP402)
SoftMotion General Axis Pool
PLC_PRG
EtherCAT_Master_Leadshine
Device
ELP_EC1000S
SM_Drive_GenericDSP402
General
Scaling/Mapping
Commissioning
SM_Drive_ETC_GenericDSP402: I/O Mapping
SM_Drive_ETC_GenericDSP402: IEC Objects
Status
Information

Motor Type
● Rotary
○ Linear

Scaling
☐ Invert direction

16#10000	increments <=> motor turns	1
1	motor turns <=> gear output turns	1
1	gear output turns <=> units in application	1

Mapping
☑ Automatic mapping

Inputs:

Cyclic object	Object number	Address	Type
status word (in.wStatusWord)	16#6041:16#00	'%IW1'	'UINT'
actual position (diActPosition)	16#6064:16#00	'%ID2'	'DINT'
actual velocity (diActVelocity)	16#606C:16#00	''	''
actual torque (wActTorque)	16#6077:16#00	''	''
Modes of operation display (OP)	16#6061:16#00	'%IB4'	'SINT'
digital inputs (in.dwDigitalInputs)	16#60FD:16#00	'%ID5'	'UDINT'
Touch Probe Status	16#60B9:16#00	'%IW6'	'UINT'
Touch Probe 1 rising edge	16#60BA:16#00	'%ID4'	'DINT'
Touch Probe 1 falling edge	16#60BB:16#00	''	''
Touch Probe 2 rising edge	16#60BC:16#00	''	''
Touch Probe 2 falling edge	16#60BD:16#00	''	''
Following error (A632)	16#60F4:16#00	''	''

Outputs:

Cyclic object	Object number	Address	Type
ControlWord (out.wControlWord)	16#6040:16#00	'%QW0'	'UINT'
set position (diSetPosition)	16#607A:16#00	'%QD1'	'DINT'
set velocity (diSetVelocity)	16#60FF:16#00	''	''
set torque (wSetTorque)	16#6071:16#00	''	''
Modes of operation (OP)	16#6060:16#00	''	''
Touch Probe Function	16#60B8:16#00	'%QW4'	'UINT'
Add velocity value	16#60B1:16#00	''	''
Add torque value	16#60B2:16#00	''	''
Digital outputs (A637)	16#60FE:16#01	''	''

7.Motion Control Configuration

MC500 series PLC axes capacity is 6 high speed pulse axis and 32 maximum EtherCAT axes.

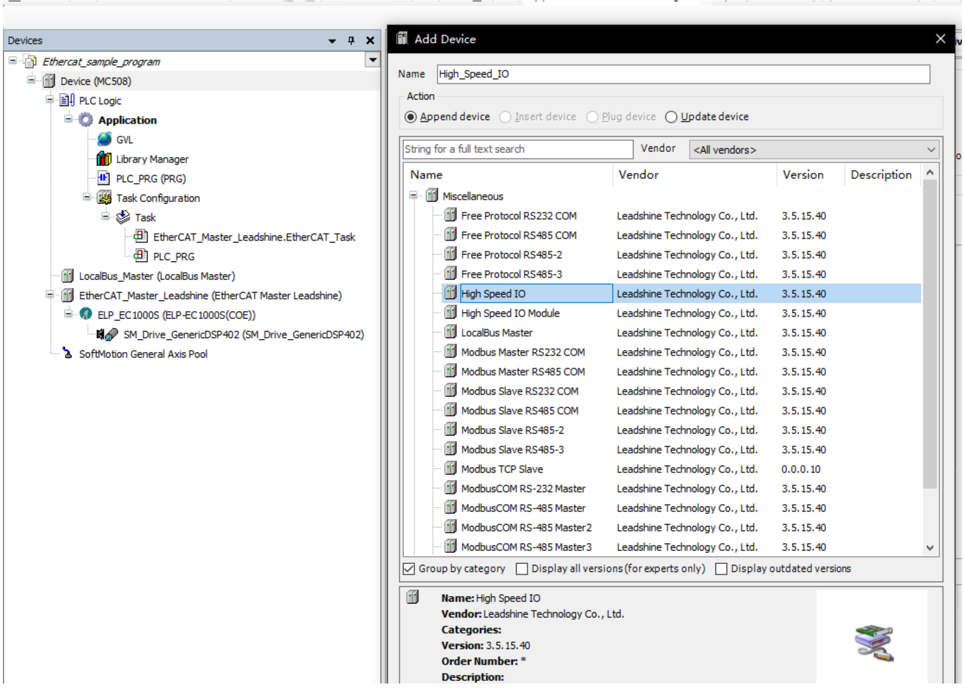
7.1.Local High Speed Pulse Axis Configuration

Please refer to the follow table, 6 high speed pulse axis are configured at the output 0~11, output maximum frequency is 200KHz.

Definition	Label	Pulse No	Pulse No	Label	Definition
Input common terminal	SS0			SS1	Input common terminal
High speed input	0			8	High speed input
High speed input	1			9	High speed input
High speed input	2			10	High speed input
High speed input	3			11	High speed input
High speed input	4			12	Normal input
High speed input	5			13	Normal input
High speed input	6			14	Normal input
High speed input	7			15	Normal input
Output common terminal	COM			COM	Output common terminal
High speed output	0	PULSE AXIS 0 PUL	PULSE AXIS 4 PUL	8	High speed output
High speed output	1	PULSE AXIS 0 DIR	PULSE AXIS 4 DIR	9	High speed output
High speed output	2	PULSE AXIS 1 PUL	PULSE AXIS 5 PUL	10	High speed output
High speed output	3	PULSE AXIS 1 DIR	PULSE AXIS 5 DIR	11	High speed output
High speed output	4	PULSE AXIS 2 PUL		12	Normal output
High speed output	5	PULSE AXIS 2 DIR		13	Normal output
High speed output	6	PULSE AXIS 3 PUL		14	Normal output
High speed output	7	PULSE AXIS 3 DIR		15	Normal output

7.1.1.Axis Configuration Interface

1) Right click the “device” to add the high speed IO



Devices

- Ethercat_sample_program
  - Device (MC508)
    - PLC Logic
      - Application
        - GVL
        - Library Manager
        - PLC_PRG (PRG)
        - Task Configuration
          - Task
            - EtherCAT_Master_Leadshine.EtherCAT_Task
            - PLC_PRG
    - LocalBus_Master (LocalBus Master)
    - EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
      - ELP_EC1000S (ELP-EC1000S(COE))
        - SM_Drive_GenericDSP402 (SM_Drive_GenericDSP402)
    - SoftMotion General Axis Pool

Add Device

Name: High_Speed_IO

Action: ● Append device ○ Insert device ○ Plug device ○ Update device

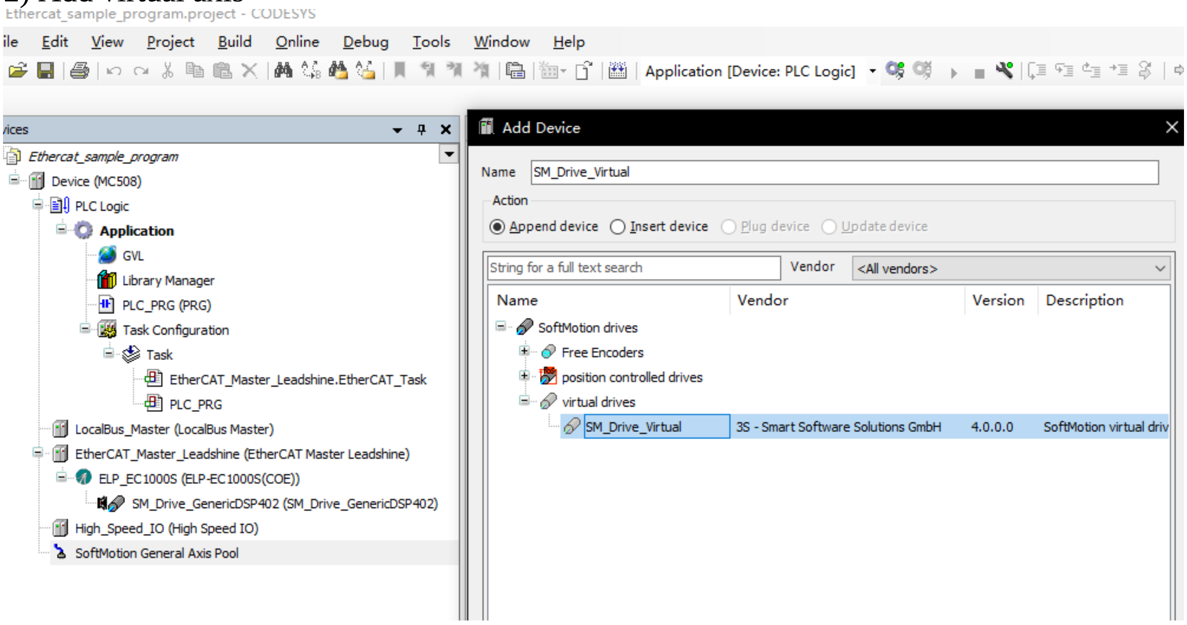
String for a full text search Vendor <All vendors>

Name	Vendor	Version	Description
Miscellaneous			
Free Protocol RS232 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Free Protocol RS485 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Free Protocol RS485-2	Leadshine Technology Co., Ltd.	3.5.15.40	
Free Protocol RS485-3	Leadshine Technology Co., Ltd.	3.5.15.40	
High Speed IO	Leadshine Technology Co., Ltd.	3.5.15.40	
High Speed IO Module	Leadshine Technology Co., Ltd.	3.5.15.40	
LocalBus Master	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Master RS232 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Master RS485 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS232 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS485 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS485-2	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus Slave RS485-3	Leadshine Technology Co., Ltd.	3.5.15.40	
Modbus TCP Slave	Leadshine Technology Co., Ltd.	0.0.0.10	
ModbusCOM RS-232 Master	Leadshine Technology Co., Ltd.	3.5.15.40	
ModbusCOM RS-485 Master	Leadshine Technology Co., Ltd.	3.5.15.40	
ModbusCOM RS-485 Master2	Leadshine Technology Co., Ltd.	3.5.15.40	
ModbusCOM RS-485 Master3	Leadshine Technology Co., Ltd.	3.5.15.40	

☑ Group by category ☐ Display all versions (for experts only) ☐ Display outdated versions

Name: High Speed IO
Vendor: Leadshine Technology Co., Ltd.
Categories:
Version: 3.5.15.40
Order Number: *
Description:

2) Add virtual axis


Ethercat_sample_program.project - CODESYS
ile Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
vices
Ethercat_sample_program
Device (MC508)
PLC Logic
Application
GVL
Library Manager
PLC_PRG (PRG)
Task Configuration
Task
EtherCAT_Master_Leadshine.EtherCAT_Task
PLC_PRG
LocalBus_Master (LocalBus Master)
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
ELP_EC1000S (ELP-EC1000S(COE))
SM_Drive_GenericDSP402 (SM_Drive_GenericDSP402)
High_Speed_IO (High Speed IO)
SoftMotion General Axis Pool
Add Device

Name: SM_Drive_Virtual

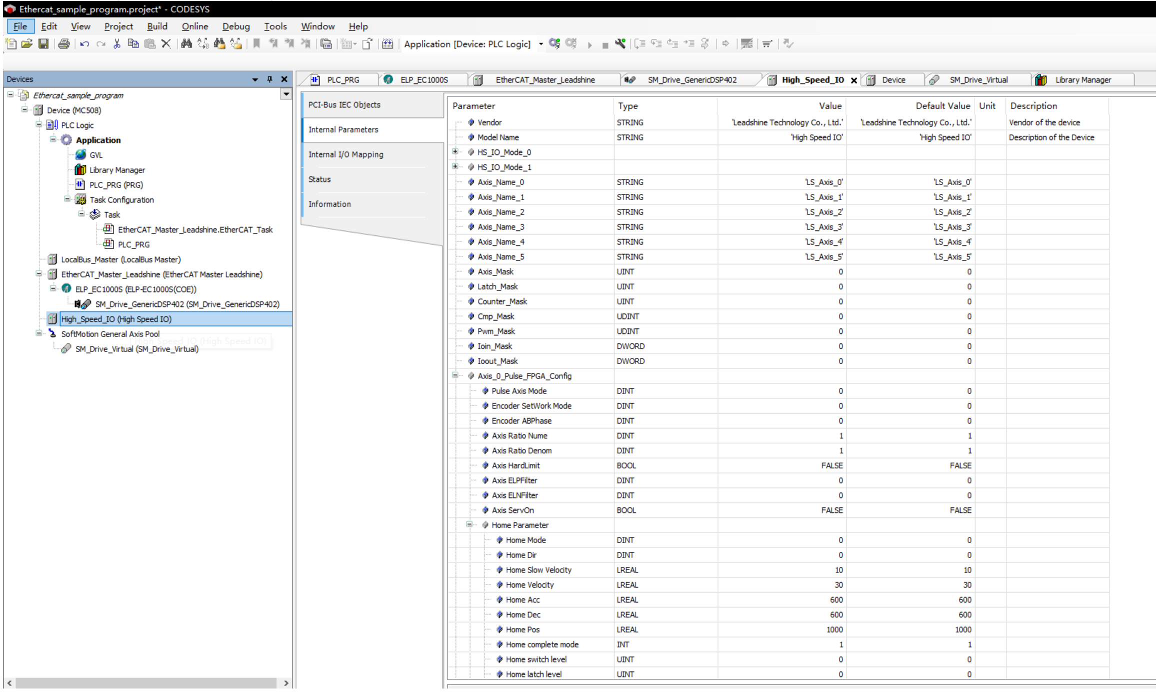
Action: ● Append device ○ Insert device ○ Plug device ○ Update device

String for a full text search

Vendor <All vendors>

Name	Vendor	Version	Description
SoftMotion drives			
Free Encoders			
position controlled drives			
virtual drives			
SM_Drive_Virtual	3S - Smart Software Solutions GmbH	4.0.0.0	SoftMotion virtual driv

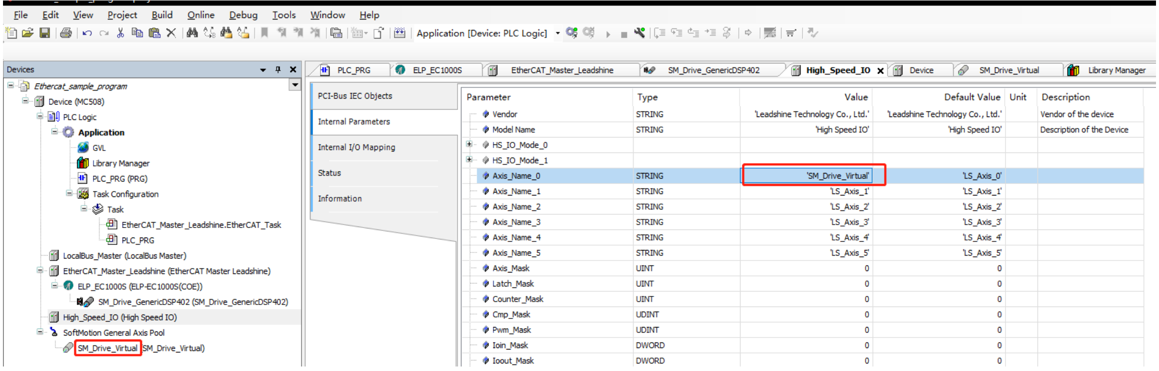
3) Configured the high speed outputs parameters


Ethercat_sample_program.project* - CODESYS
File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
Ethercat_sample_program
Device (MC508)
PLC Logic
Application
GVL
Library Manager
PLC_PRG (PRG)
Task Configuration
Task
EtherCAT_Master_Leadshine.EtherCAT_Task
PLC_PRG
LocalBus_Master (LocalBus Master)
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
ELP_EC1000S (ELP-EC1000S(COE))
SM_Drive_GenericDSP402 (SM_Drive_GenericDSP402)
High_Speed_IO (High Speed IO)
SoftMotion General Axis Pool
SM_Drive_Virtual (SM_Drive_Virtual)
PLC_PRG
ELP_EC1000S
EtherCAT_Master_Leadshine
SM_Drive_GenericDSP402
High_Speed_IO
Device
SM_Drive_Virtual
Library Manager
PCI-Bus IEC Objects
Internal Parameters
Internal I/O Mapping
Status
Information

Parameter	Type	Value	Default Value	Unit	Description
Vendor	STRING	'Leadshine Technology Co., Ltd.'	'Leadshine Technology Co., Ltd.'		Vendor of the device
Model Name	STRING	'High Speed IO'	'High Speed IO'		Description of the Device
HS_IO_Mode_0					
HS_IO_Mode_1					
Axis_Name_0	STRING	'LS_Axis_0'	'LS_Axis_0'		
Axis_Name_1	STRING	'LS_Axis_1'	'LS_Axis_1'		
Axis_Name_2	STRING	'LS_Axis_2'	'LS_Axis_2'		
Axis_Name_3	STRING	'LS_Axis_3'	'LS_Axis_3'		
Axis_Name_4	STRING	'LS_Axis_4'	'LS_Axis_4'		
Axis_Name_5	STRING	'LS_Axis_5'	'LS_Axis_5'		
Axis_Mask	UINT	0	0		
Latch_Mask	UINT	0	0		
Counter_Mask	UINT	0	0		
Cmp_Mask	UDINT	0	0		
Pwm_Mask	UDINT	0	0		
Ioin_Mask	DWORD	0	0		
Ioout_Mask	DWORD	0	0		
Axis_0_Pulse_FPGA_Config					
Pulse Axis Mode	DINT	0	0		
Encoder SetWork Mode	DINT	0	0		
Encoder ABPhase	DINT	0	0		
Axis Ratio Nume	DINT	1	1		
Axis Ratio Denom	DINT	1	1		
Axis HardLimit	BOOL	FALSE	FALSE		
Axis ELPFilter	DINT	0	0		
Axis ELNFilter	DINT	0	0		
Axis ServOn	BOOL	FALSE	FALSE		
Home Parameter					
Home Mode	DINT	0	0		
Home Dir	DINT	0	0		
Home Slow Velocity	LREAL	10	10		
Home Velocity	LREAL	30	30		
Home Acc	LREAL	600	600		
Home Dec	LREAL	600	600		
Home Pos	LREAL	1000	1000		
Home complete mode	INT	1	1		
Home switch level	UINT	0	0		
Home latch level	UINT	0	0		

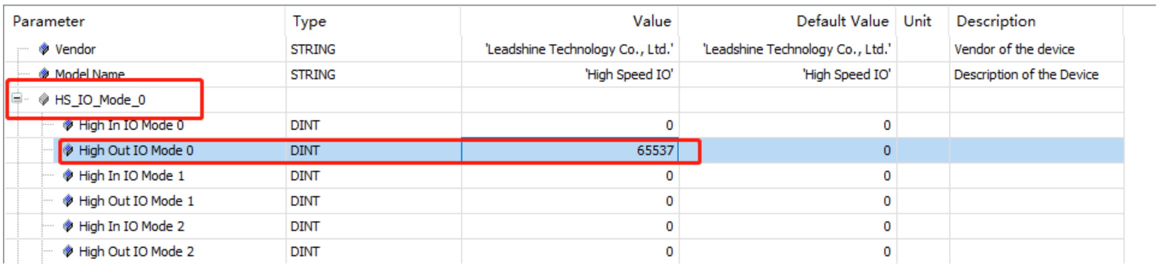
For example: enable axis 0 to control the stepper motor.

3.1) modify the axis 0 name


File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
Ethercat_sample_program
Device (MC508)
PLC Logic
Application
GVL
Library Manager
PLC_PRG (PRG)
Task Configuration
Task
EtherCAT_Master_Leadshine.EtherCAT_Task
PLC_PRG
LocalBus_Master (LocalBus Master)
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
ELP_EC1000S (ELP-EC1000S(COE))
SM_Drive_GenericDSP402 (SM_Drive_GenericDSP402)
High_Speed_IO (High Speed IO)
SoftMotion General Axis Pool
SM_Drive_Virtual (SM_Drive_Virtual)
PLC_PRG
ELP_EC1000S
EtherCAT_Master_Leadshine
SM_Drive_GenericDSP402
High_Speed_IO
Device
SM_Drive_Virtual
Library Manager
PCI-Bus IEC Objects
Internal Parameters
Internal I/O Mapping
Status
Information

Parameter	Type	Value	Default Value	Unit	Description
Vendor	STRING	'Leadshine Technology Co., Ltd.'	'Leadshine Technology Co., Ltd.'		Vendor of the device
Model Name	STRING	'High Speed IO'	'High Speed IO'		Description of the Device
HS_IO_Mode_0					
HS_IO_Mode_1					
Axis_Name_0	STRING	'SM_Drive_Virtual'	'LS_Axis_0'		
Axis_Name_1	STRING	'LS_Axis_1'	'LS_Axis_1'		
Axis_Name_2	STRING	'LS_Axis_2'	'LS_Axis_2'		
Axis_Name_3	STRING	'LS_Axis_3'	'LS_Axis_3'		
Axis_Name_4	STRING	'LS_Axis_4'	'LS_Axis_4'		
Axis_Name_5	STRING	'LS_Axis_5'	'LS_Axis_5'		
Axis_Mask	UINT	0	0		
Latch_Mask	UINT	0	0		
Counter_Mask	UINT	0	0		
Cmp_Mask	UDINT	0	0		
Pwm_Mask	UDINT	0	0		
Ioin_Mask	DWORD	0	0		
Ioout_Mask	DWORD	0	0		

3.2) modify “High Out IO Mode 0”=65537, it’s means enable axis configuration. Pulse axis0~5 enable switch is “High Out IO Mode 0”~“High Out IO Mode 5”



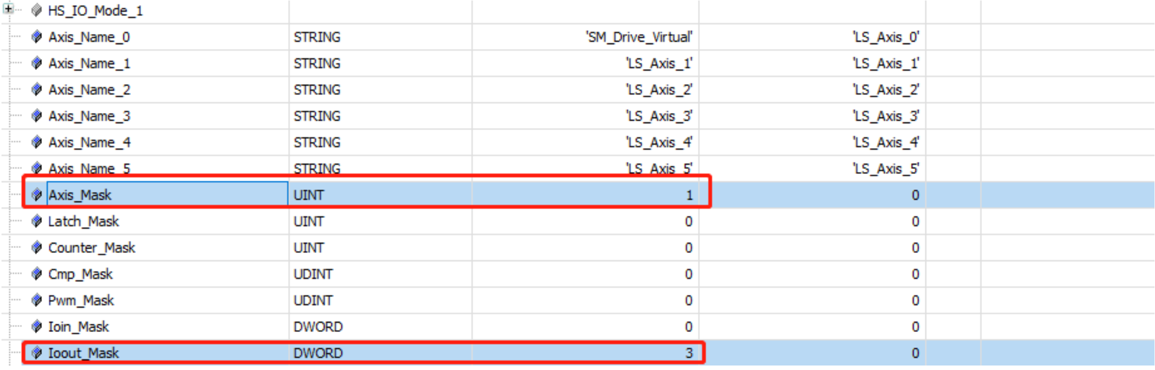
Parameter	Type	Value	Default Value	Unit	Description
Vendor	STRING	'Leadshine Technology Co., Ltd.'	'Leadshine Technology Co., Ltd.'		Vendor of the device
Model Name	STRING	'High Speed IO'	'High Speed IO'		Description of the Device
HS_IO_Mode_0					
High In IO Mode 0	DINT	0	0		
High Out IO Mode 0	DINT	65537	0		
High In IO Mode 1	DINT	0	0		
High Out IO Mode 1	DINT	0	0		
High In IO Mode 2	DINT	0	0		
High Out IO Mode 2	DINT	0	0		

Then setting “Axis_Mask”=1 and “Ioout_Mask” =3, (for example: if axis 0 and axis 3 have be enabled, “Axis_Mask”=1+8=9, and “Ioout_Mask”=3+192=195)

Please refer to the mask value table

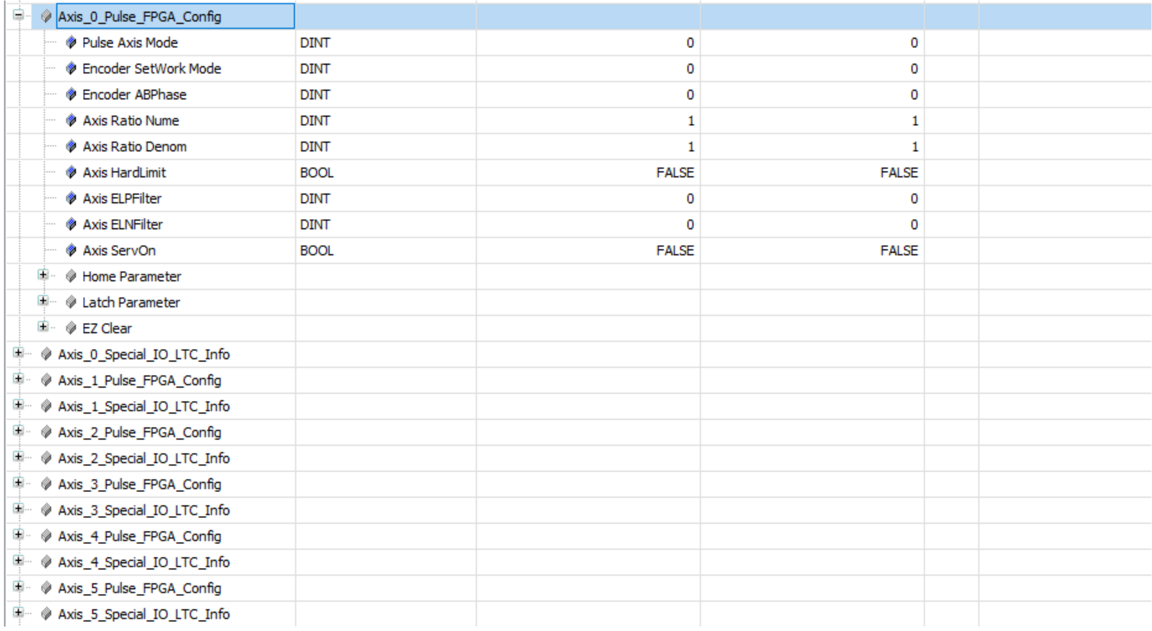
Axis	“Axis_Mask” value	“Ioout_Mask” value
Axis_0	$2^{0}=1$	$2^{0+}2^{1}=3$
Axis_1	$2^{1}=2$	$2^{2+}2^{3}=12$
Axis_2	$2^{2}=4$	$2^{4+}2^{5}=48$
Axis_3	$2^{3}=8$	$2^{6+}2^{7}=192$
Axis_4	$2^{4}=16$	$2^{8+}2^{9}=768$
Axis_5	$2^{5}=32$	$2^{10+}2^{11}=3072$

Parameter Axis_Mask bit 0~5 match axis 0~5, and Ioout_Mask bit 0~11 match MC500 series PLC output 0~11.



HS_IO_Mode_1			
Axis_Name_0	STRING	'SM_Drive_Virtual'	'LS_Axis_0'
Axis_Name_1	STRING	'LS_Axis_1'	'LS_Axis_1'
Axis_Name_2	STRING	'LS_Axis_2'	'LS_Axis_2'
Axis_Name_3	STRING	'LS_Axis_3'	'LS_Axis_3'
Axis_Name_4	STRING	'LS_Axis_4'	'LS_Axis_4'
Axis_Name_5	STRING	'LS_Axis_5'	'LS_Axis_5'
Axis_Mask	UINT	1	0
Latch_Mask	UINT	0	0
Counter_Mask	UINT	0	0
Cmp_Mask	UDINT	0	0
Pwm_Mask	UDINT	0	0
Ioin_Mask	DWORD	0	0
Ioout_Mask	DWORD	3	0

3.3) modify axis main parameters, “Axis_0_Pluse_FPGA_Config”~ “Axis_5_Pluse_FPGA_Config” include axis 0~5 main motion parameters.

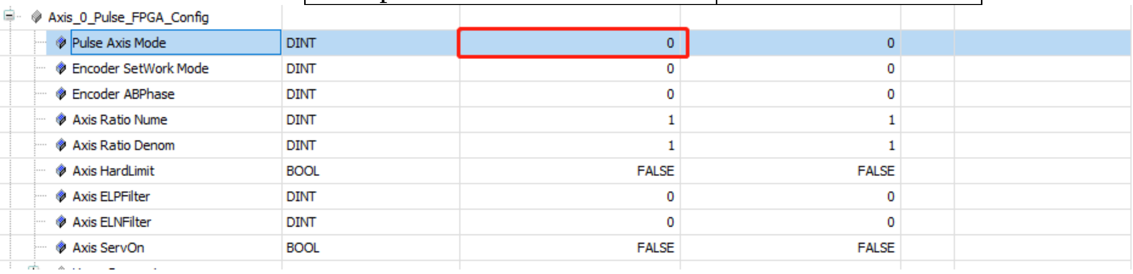


Axis_0_Pulse_FPGA_Config			
Pulse Axis Mode	DINT	0	0
Encoder SetWork Mode	DINT	0	0
Encoder ABPhase	DINT	0	0
Axis Ratio Nume	DINT	1	1
Axis Ratio Denom	DINT	1	1
Axis HardLimit	BOOL	FALSE	FALSE
Axis ELPFilter	DINT	0	0
Axis ELNFilter	DINT	0	0
Axis ServOn	BOOL	FALSE	FALSE
Home Parameter			
Latch Parameter			
EZ Clear			
Axis_0_Special_IO_LTC_Info			
Axis_1_Pulse_FPGA_Config			
Axis_1_Special_IO_LTC_Info			
Axis_2_Pulse_FPGA_Config			
Axis_2_Special_IO_LTC_Info			
Axis_3_Pulse_FPGA_Config			
Axis_3_Special_IO_LTC_Info			
Axis_4_Pulse_FPGA_Config			
Axis_4_Special_IO_LTC_Info			
Axis_5_Pulse_FPGA_Config			
Axis_5_Special_IO_LTC_Info			

3.3.1) “Pulse Axis Mode”, please refer to the follow table to select the mode

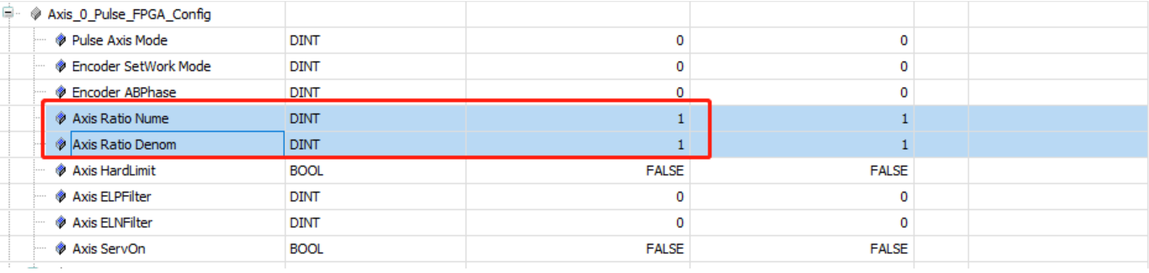
Output mode	Value
Pulse high + Direction high	0
Pulse low + Direction high	1
Pulse high + Direction low	2
Pulse low + Direction low	3

Dual pulse high	4
Dual pulse low	5
A B phase	6



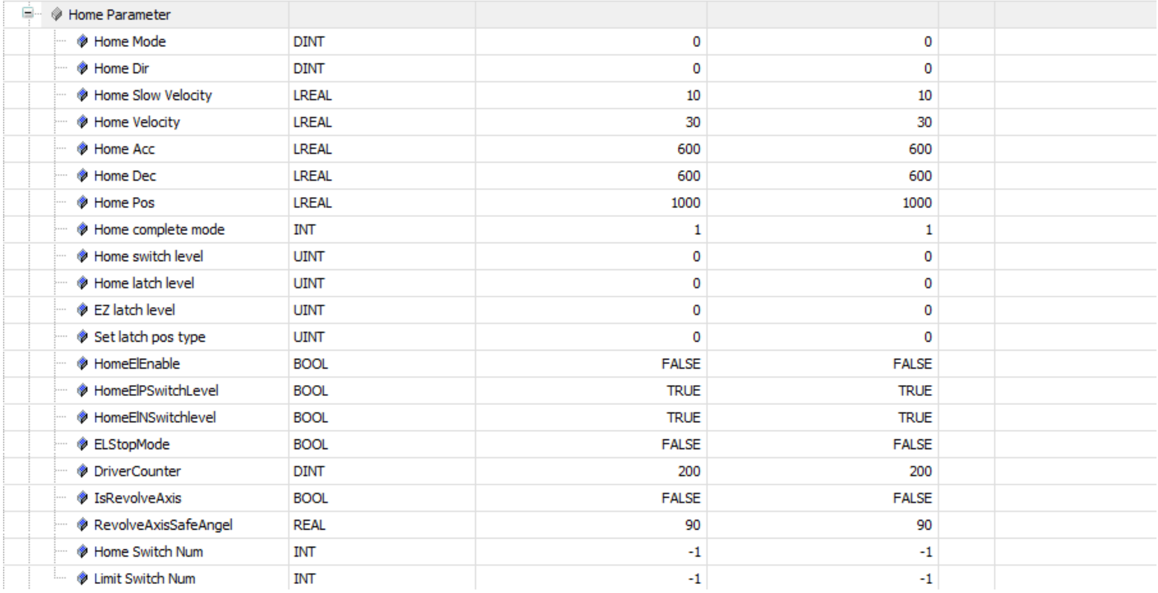
Axis_0_Pulse_FPGA_Config			
Pulse Axis Mode	DINT	0	0
Encoder SetWork Mode	DINT	0	0
Encoder ABPhase	DINT	0	0
Axis Ratio Nume	DINT	1	1
Axis Ratio Denom	DINT	1	1
Axis HardLimit	BOOL	FALSE	FALSE
Axis ELPFilter	DINT	0	0
Axis ELNFilter	DINT	0	0
Axis ServOn	BOOL	FALSE	FALSE

3.3.2) pulse equivalent, modify parameter Axis Ratio Nume and Axis Ratio Denom to change the pulse equivalent.



Axis_0_Pulse_FPGA_Config			
Pulse Axis Mode	DINT	0	0
Encoder SetWork Mode	DINT	0	0
Encoder ABPhase	DINT	0	0
Axis Ratio Nume	DINT	1	1
Axis Ratio Denom	DINT	1	1
Axis HardLimit	BOOL	FALSE	FALSE
Axis ELPFilter	DINT	0	0
Axis ELNFilter	DINT	0	0
Axis ServOn	BOOL	FALSE	FALSE

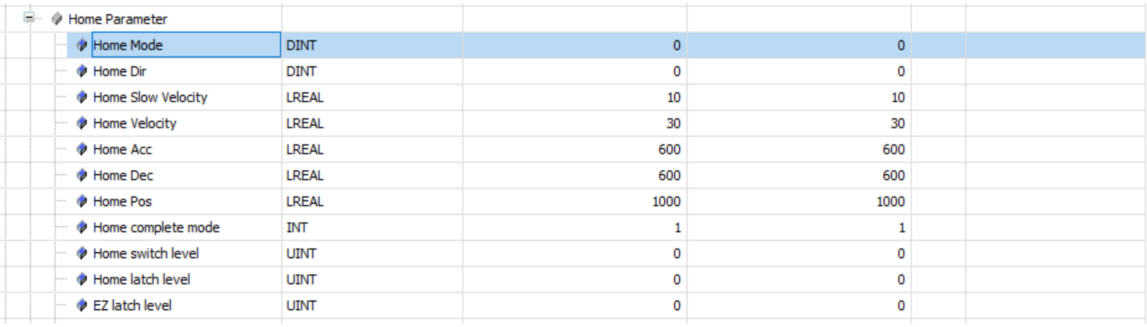
3.3.3) homing parameters



Home Parameter			
Home Mode	DINT	0	0
Home Dir	DINT	0	0
Home Slow Velocity	LREAL	10	10
Home Velocity	LREAL	30	30
Home Acc	LREAL	600	600
Home Dec	LREAL	600	600
Home Pos	LREAL	1000	1000
Home complete mode	INT	1	1
Home switch level	UINT	0	0
Home latch level	UINT	0	0
EZ latch level	UINT	0	0
Set latch pos type	UINT	0	0
HomeElEnable	BOOL	FALSE	FALSE
HomeElPSwitchLevel	BOOL	TRUE	TRUE
HomeElNSwitchlevel	BOOL	TRUE	TRUE
ELStopMode	BOOL	FALSE	FALSE
DriverCounter	DINT	200	200
IsRevolveAxis	BOOL	FALSE	FALSE
RevolveAxisSafeAngel	REAL	90	90
Home Switch Num	INT	-1	-1
Limit Switch Num	INT	-1	-1

① Home mode ,the homing method please refer to the follow table

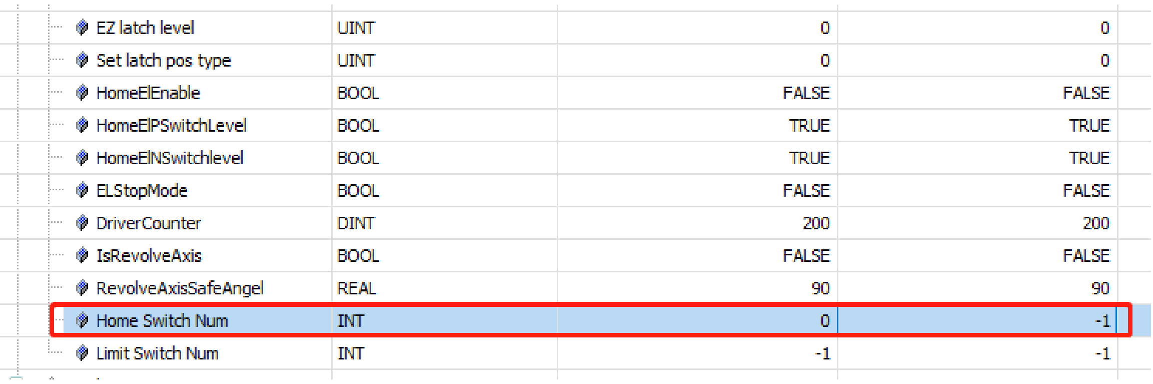
Home mode	Value
One homing processing	0
One homing processing + reverse find homing signal	1
Two homing processing	2
Mark homing position	3



Home Parameter			
Home Mode	DINT	0	0
Home Dir	DINT	0	0
Home Slow Velocity	LREAL	10	10
Home Velocity	LREAL	30	30
Home Acc	LREAL	600	600
Home Dec	LREAL	600	600
Home Pos	LREAL	1000	1000
Home complete mode	INT	1	1
Home switch level	UINT	0	0
Home latch level	UINT	0	0
EZ latch level	UINT	0	0

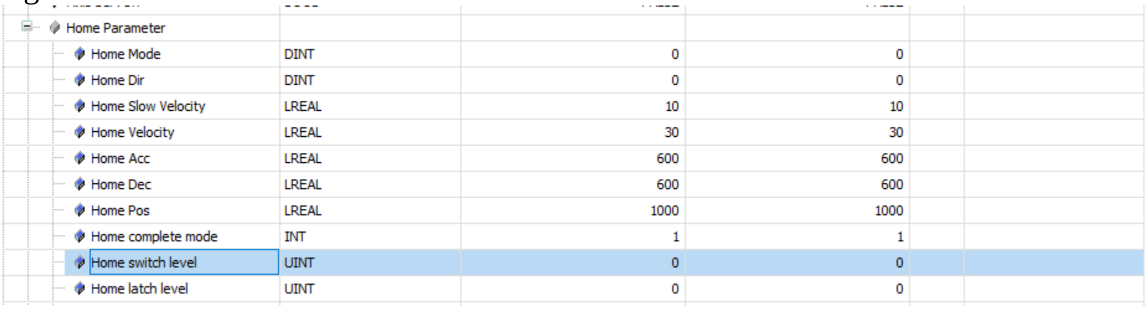
② Homing signal configuration, MC500 series PLC input 0~5 can be configured as homing detection signal, please refer to the follow table setting the parameter “Home Switch Num” value.

Select input as homing switch	Home Switch Num value
Invalid	-1
IN0	0
IN1	1
IN2	2
IN3	3
IN4	4
IN5	5



EZ latch level	UINT	0	0
Set latch pos type	UINT	0	0
HomeElEnable	BOOL	FALSE	FALSE
HomeElPSwitchLevel	BOOL	TRUE	TRUE
HomeElNSwitchlevel	BOOL	TRUE	TRUE
ELStopMode	BOOL	FALSE	FALSE
DriverCounter	DINT	200	200
IsRevolveAxis	BOOL	FALSE	FALSE
RevolveAxisSafeAngel	REAL	90	90
Home Switch Num	INT	0	-1
Limit Switch Num	INT	-1	-1

③Home switch level, if it’s a normally closed signal, set the value to 1 and the normally open signal to 0.

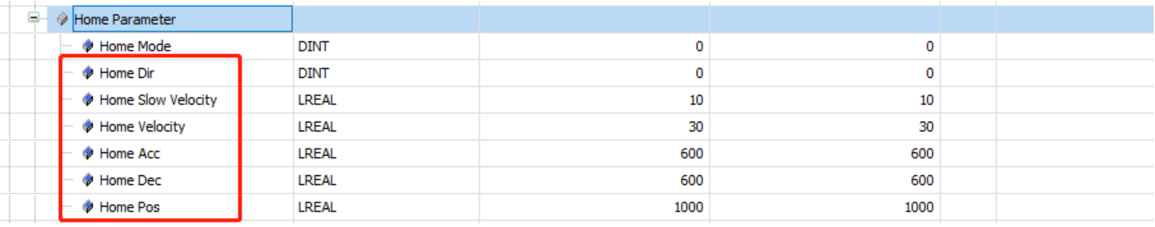


Home Parameter			
Home Mode	DINT	0	0
Home Dir	DINT	0	0
Home Slow Velocity	LREAL	10	10
Home Velocity	LREAL	30	30
Home Acc	LREAL	600	600
Home Dec	LREAL	600	600
Home Pos	LREAL	1000	1000
Home complete mode	INT	1	1
Home switch level	UINT	0	0
Home latch level	UINT	0	0

④ Limit Switch Num

Select input as limit switch	Value
Invalid	-1
IN10	10
IN11	11
IN12	12
IN13	13
IN14	14
IN15	15

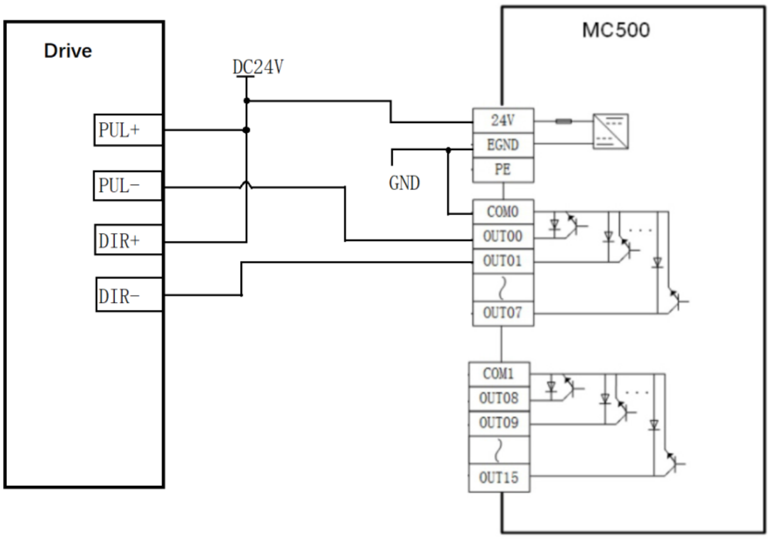
⑤Homing running parameter



Home Parameter			
Home Mode	DINT	0	0
Home Dir	DINT	0	0
Home Slow Velocity	LREAL	10	10
Home Velocity	LREAL	30	30
Home Acc	LREAL	600	600
Home Dec	LREAL	600	600
Home Pos	LREAL	1000	1000

7.1.2.High Speed Output Wiring

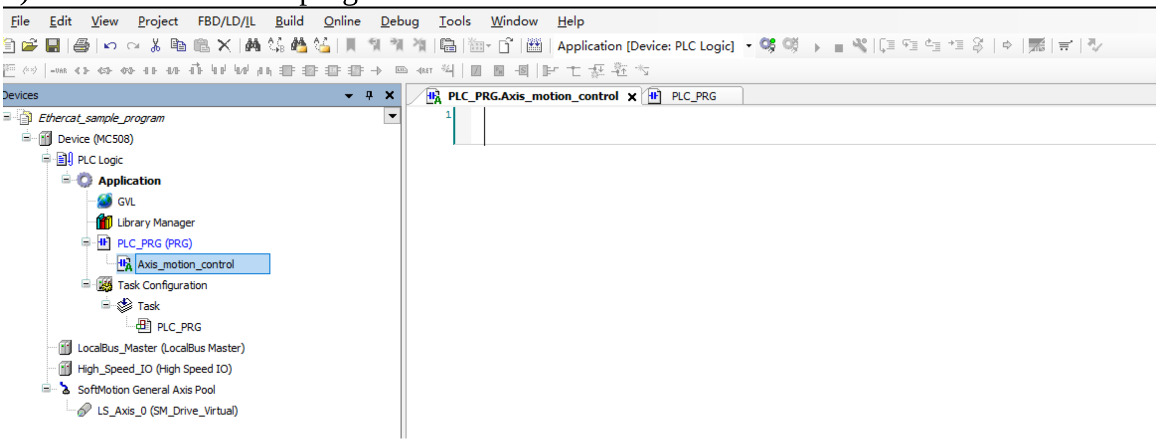
MC500 series PLC only support NPN type output, and the maximum output frequency is 200KHz, please refer to the follow picture to connect the drive.



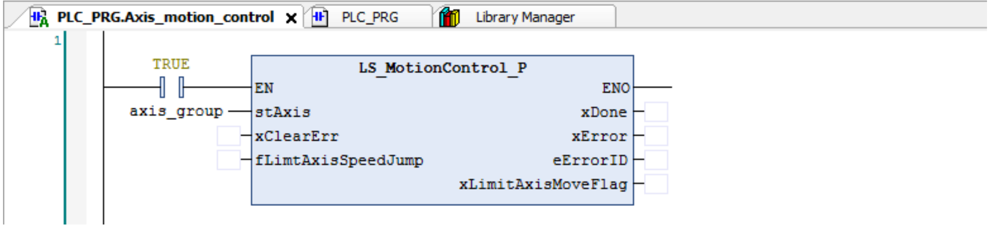
7.1.3.High Speed Pulse Axis Control Program

Finish high speed pulse axis basic configuration, user can add some function blocks to control motor.

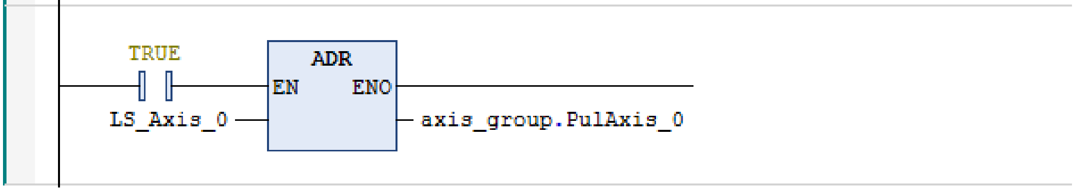
1) Create a new action program.


File Edit View Project FBD/LD/IL Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
PLC_PRG.Axis_motion_control
PLC_PRG
Ethercat_sample_program
Device (MC508)
PLC Logic
Application
GVL
Library Manager
PLC_PRG (PRG)
Axis_motion_control
Task Configuration
Task
PLC_PRG
LocalBus_Master (LocalBus Master)
High_Speed_IO (High Speed IO)
SoftMotion General Axis Pool
LS_Axis_0 (SM_Drive_Virtual)

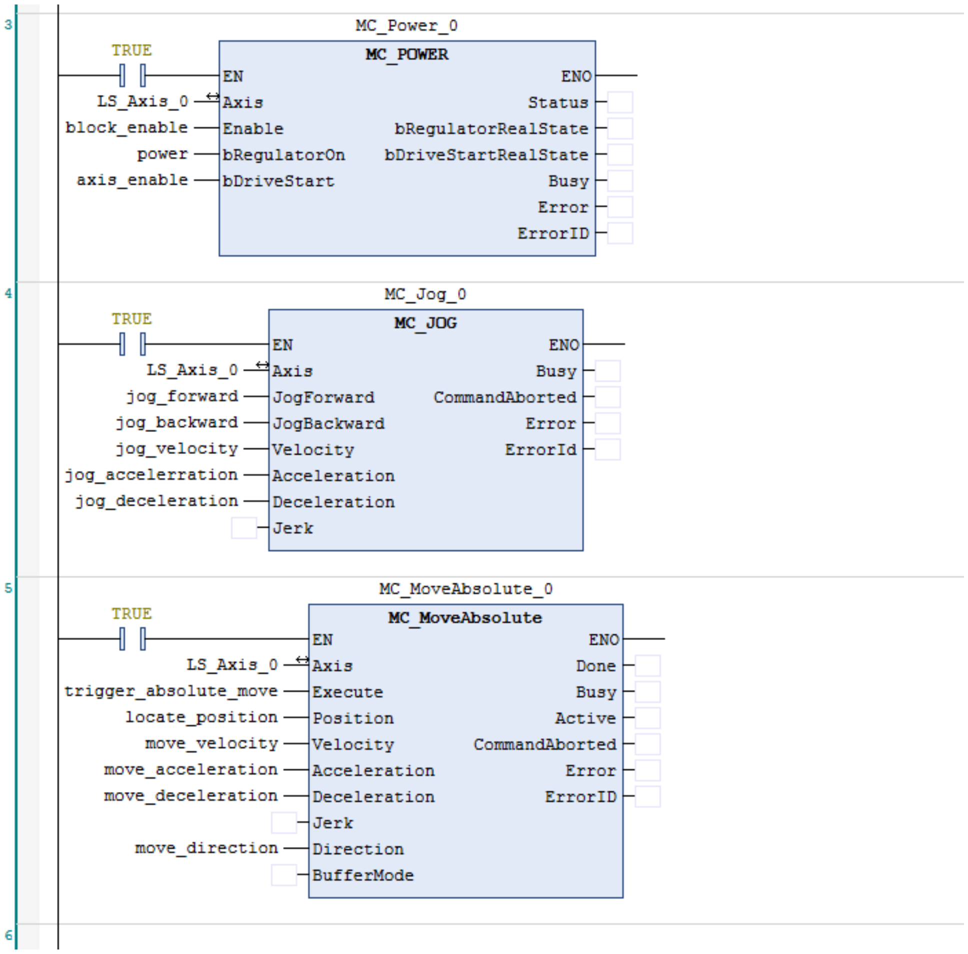
2) add the “ LS_MotionControl_P ” , it’s the special function block developed by Leadshine for high speed pulse output axis control, then define pin “stAxis” variable, the data type is “DUT_Pulse_Axis”, as the follow picture shows.



3) Use “ADR” command to define axis 0 name “LS_Axis_0” as the axis group 0 axis



4) Create motion control function blocks

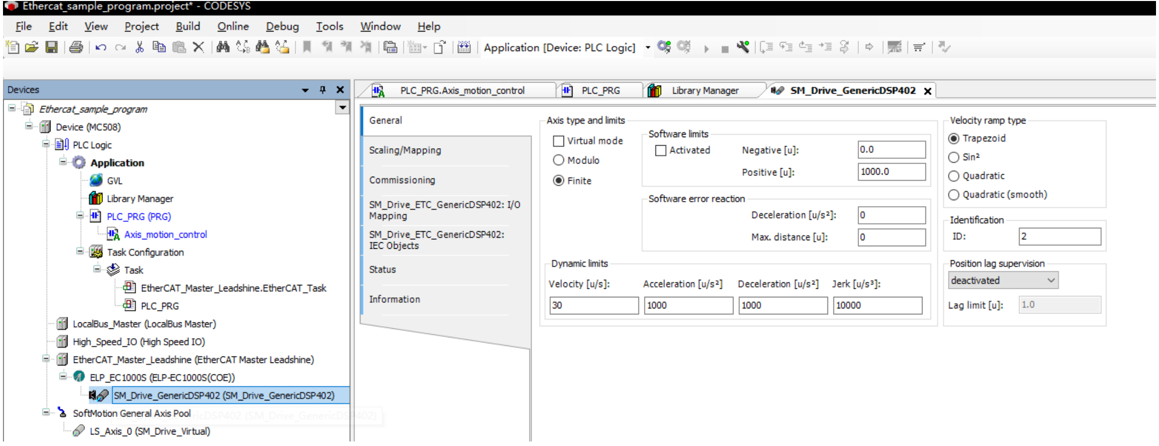

3
MC_Power_0
MC_POWER
TRUE
EN
ENO
LS_Axis_0
Axis
Status
block_enable
Enable
bRegulatorRealState
power
bRegulatorOn
bDriveStartRealState
axis_enable
bDriveStart
Busy
Error
ErrorID
4
MC_Jog_0
MC_JOG
TRUE
EN
ENO
LS_Axis_0
Axis
Busy
jog_forward
JogForward
CommandAborted
jog_backward
JogBackward
Error
jog_velocity
Velocity
ErrorId
jog_accelerration
Acceleration
jog_deceleration
Deceleration
Jerk
5
MC_MoveAbsolute_0
MC_MoveAbsolute
TRUE
EN
ENO
LS_Axis_0
Axis
Done
trigger_absolute_move
Execute
Busy
locate_position
Position
Active
move_velocity
Velocity
CommandAborted
move_acceleration
Acceleration
Error
move_deceleration
Deceleration
ErrorID
Jerk
move_direction
Direction
BufferMode
6

7.2.EtherCAT Axis Configuration

Users have to add the CIA402 axis device to project when using MC500 series PLC control the EtherCAT axis.

7.2.1.General Configuration

In the general interface, user can configure the axis type and software limits, motion maximum etc.


Ethercat_sample_program.project* - CODESYS
File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
PLC_PRG.Axis_motion_control
PLC_PRG
Library Manager
SM_Drive_GenericDSP402

Ethercat_sample_program
- Device (MC508)
  - PLC Logic
    - Application
      - GVL
      - Library Manager
      - PLC_PRG (PRG)
        - Axis_motion_control
      - Task Configuration
        - Task
          - EtherCAT_Master_Leadshine.EtherCAT_Task
          - PLC_PRG
  - LocalBus_Master (LocalBus Master)
  - High_Speed_IO (High Speed IO)
  - EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
    - ELP_EC1000S (ELP-EC1000S(COE))
      - SM_Drive_GenericDSP402 (SM_Drive_GenericDSP402)
  - SoftMotion General Axis Pool
    - LS_Axis_0 (SM_Drive_Virtual)

General | Scaling/Mapping | Commissioning | SM_Drive_ETC_GenericDSP402: I/O Mapping | SM_Drive_ETC_GenericDSP402: IEC Objects | Status | Information

Axis type and limits
- ☐ Virtual mode
- ○ Modulo
- ● Finite

Software limits
- ☐ Activated
- Negative [u]: 0.0
- Positive [u]: 1000.0

Software error reaction
- Deceleration [u/s²]: 0
- Max. distance [u]: 0

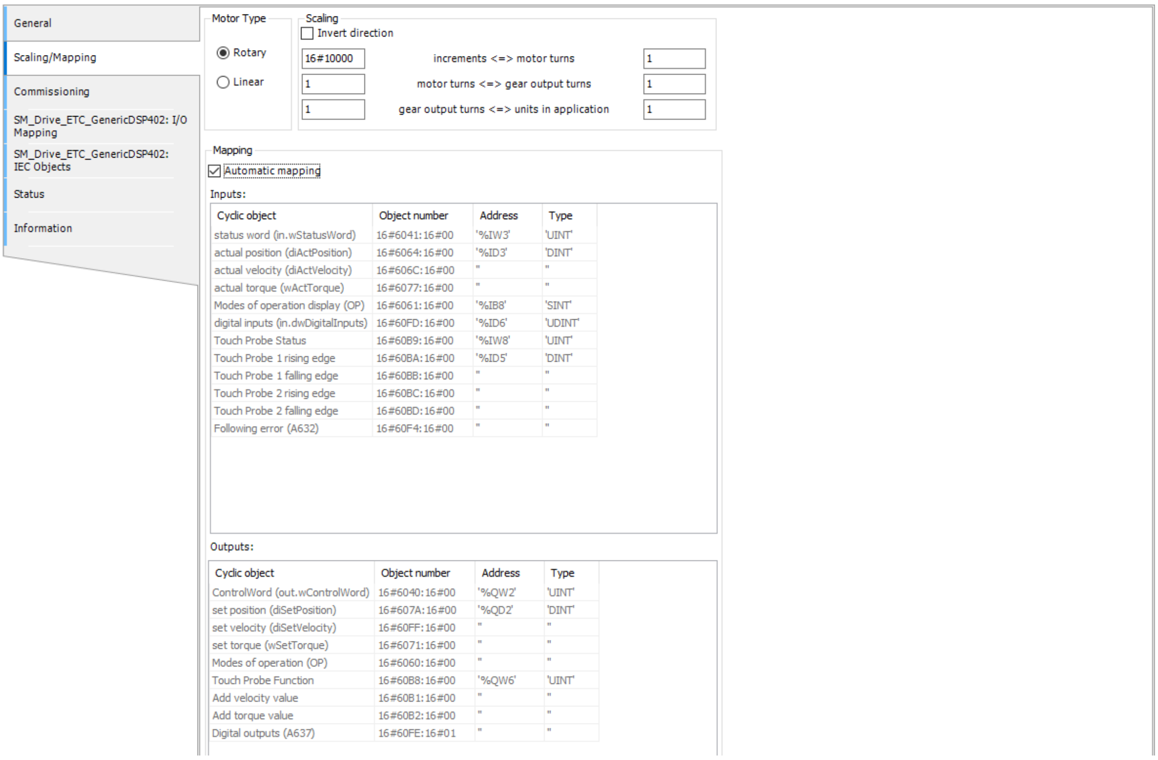
Dynamic limits
- Velocity [u/s]: 30
- Acceleration [u/s²]: 1000
- Deceleration [u/s²]: 1000
- Jerk [u/s³]: 10000

Velocity ramp type
- ● Trapezoid
- ○ Sin²
- ○ Quadratic
- ○ Quadratic (smooth)

Identification
- ID: 2

Position lag supervision
- deactivated
- Lag limit [u]: 1.0

7.2.2.Scaling And Mapping



General | Scaling/Mapping | Commissioning | SM_Drive_ETC_GenericDSP402: I/O Mapping | SM_Drive_ETC_GenericDSP402: IEC Objects | Status | Information

Motor Type
- ● Rotary
- ○ Linear

Scaling
- ☐ Invert direction
- 16#10000 increments <=> motor turns 1
- 1 motor turns <=> gear output turns 1
- 1 gear output turns <=> units in application 1

Mapping
- ☑ Automatic mapping

Inputs:

Cyclic object	Object number	Address	Type
status word (in.wStatusWord)	16#6041:16#00	'%IW3'	'UINT'
actual position (diActPosition)	16#6064:16#00	'%ID3'	'DINT'
actual velocity (diActVelocity)	16#606C:16#00	''	''
actual torque (wActTorque)	16#6077:16#00	''	''
Modes of operation display (OP)	16#6061:16#00	'%IB8'	'SINT'
digital inputs (in.dwDigitalInputs)	16#60FD:16#00	'%ID6'	'UDINT'
Touch Probe Status	16#60B9:16#00	'%IW8'	'UINT'
Touch Probe 1 rising edge	16#60BA:16#00	'%ID5'	'DINT'
Touch Probe 1 falling edge	16#60BB:16#00	''	''
Touch Probe 2 rising edge	16#60BC:16#00	''	''
Touch Probe 2 falling edge	16#60BD:16#00	''	''
Following error (A632)	16#60F4:16#00	''	''

Outputs:

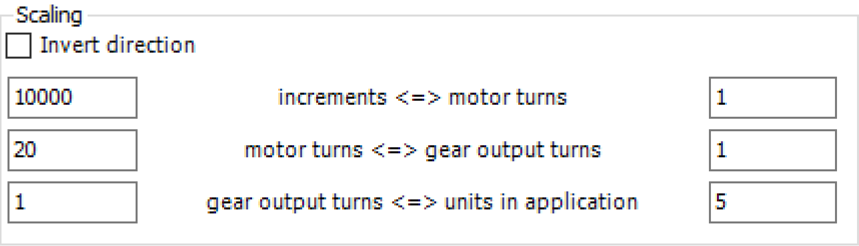
Cyclic object	Object number	Address	Type
ControlWord (out.wControlWord)	16#6040:16#00	'%QW2'	'UINT'
set position (diSetPosition)	16#607A:16#00	'%QD2'	'DINT'
set velocity (diSetVelocity)	16#60FF:16#00	''	''
set torque (wSetTorque)	16#6071:16#00	''	''
Modes of operation (OP)	16#6060:16#00	''	''
Touch Probe Function	16#60B8:16#00	'%QW6'	'UINT'
Add velocity value	16#60B1:16#00	''	''
Add torque value	16#60B2:16#00	''	''
Digital outputs (A637)	16#60FE:16#01	''	''

1) Scaling configuration

User can accord the actual application scenarios to configure “increments” (the motor command pulse counts per revolution), “gear output turns” (gearbox ratio), the unit of actual move distance.

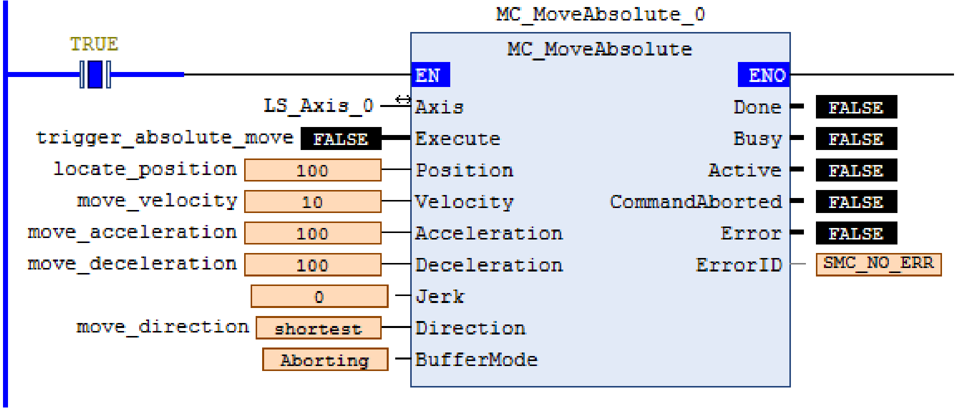
For example: setting the servo motor or stepper motor 10000 pulses per rotation, motor connect with 1:20 gearbox, and gearbox output shaft directly drives the ball screw to move, screw lead is 5 mm.

In this case, scaling configuration refer to follow picture



Scaling
- ☐ Invert direction
- 10000 increments <=> motor turns 1
- 20 motor turns <=> gear output turns 1
- 1 gear output turns <=> units in application 5

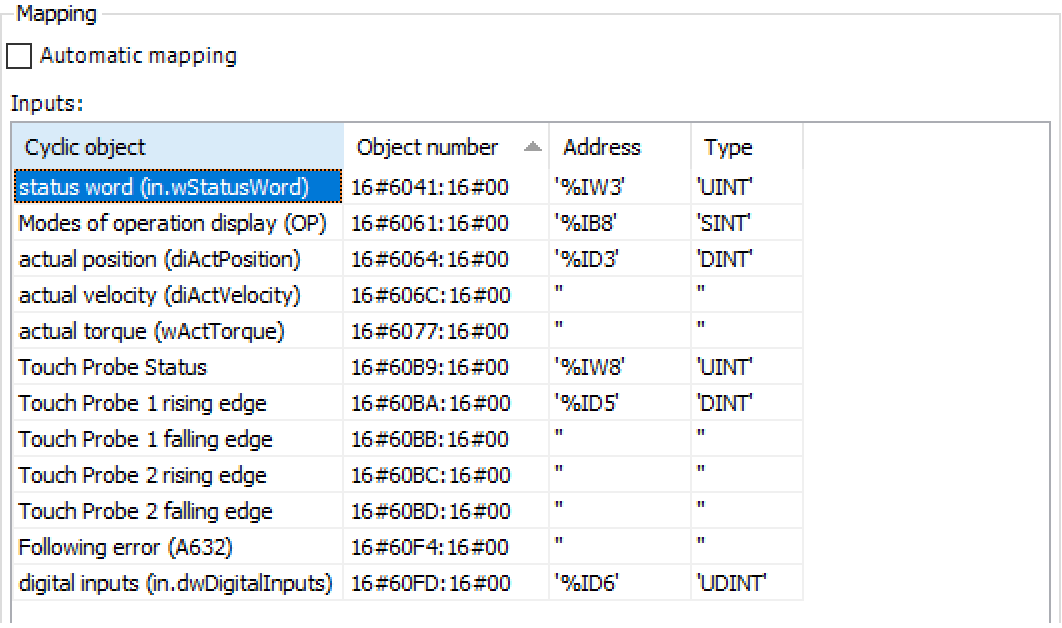
Using the motion command “MC_MoveAbsolute”, setting the position=100,velocity=10.It’s means that move actual load 100mm, the velocity is 10 mm/s



2) Mapping configuration

When automatic mapping is selected, the slave station is associated with axis. The slave station data is mapped to the axis directly, otherwise, user can manually modify the address in axis mapping, in which:

Input format is %I+ Type letters + Arabic numbers



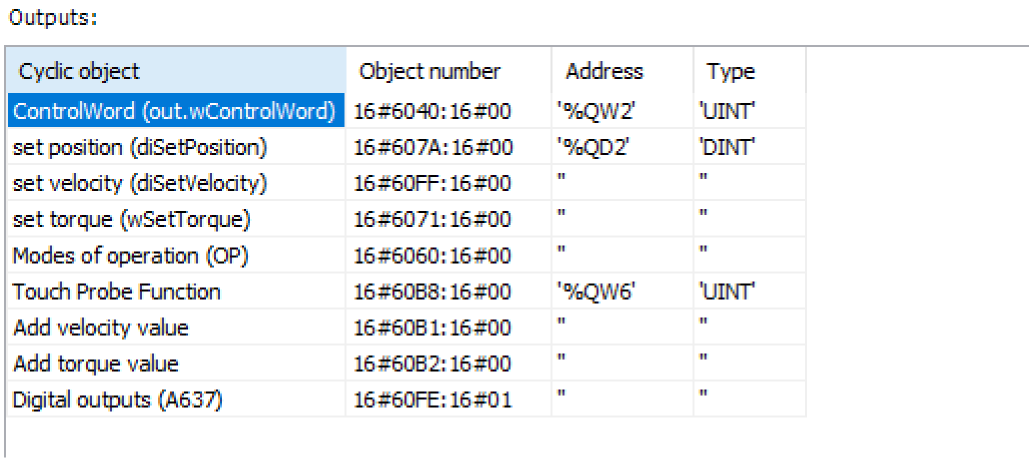
Mapping

□ Automatic mapping

Inputs:

Cyclic object	Object number	Address	Type
status word (in.wStatusWord)	16#6041:16#00	'%IW3'	'UINT'
Modes of operation display (OP)	16#6061:16#00	'%IB8'	'SINT'
actual position (diActPosition)	16#6064:16#00	'%ID3'	'DINT'
actual velocity (diActVelocity)	16#606C:16#00	''	''
actual torque (wActTorque)	16#6077:16#00	''	''
Touch Probe Status	16#60B9:16#00	'%IW8'	'UINT'
Touch Probe 1 rising edge	16#60BA:16#00	'%ID5'	'DINT'
Touch Probe 1 falling edge	16#60BB:16#00	''	''
Touch Probe 2 rising edge	16#60BC:16#00	''	''
Touch Probe 2 falling edge	16#60BD:16#00	''	''
Following error (A632)	16#60F4:16#00	''	''
digital inputs (in.dwDigitalInputs)	16#60FD:16#00	'%ID6'	'UDINT'

Output format is %Q+ Type letters + Arabic numbers



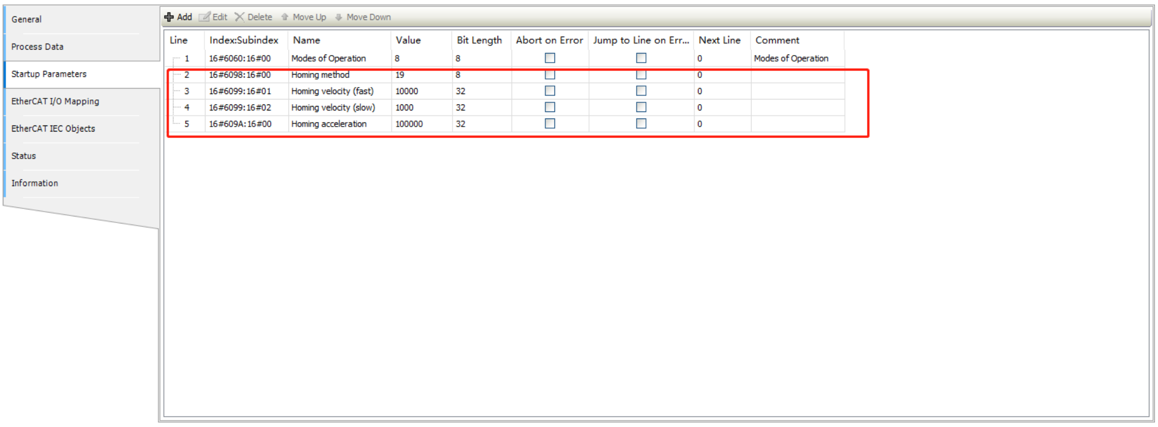
Outputs:

Cyclic object	Object number	Address	Type
ControlWord (out.wControlWord)	16#6040:16#00	'%QW2'	'UINT'
set position (diSetPosition)	16#607A:16#00	'%QD2'	'DINT'
set velocity (diSetVelocity)	16#60FF:16#00	''	''
set torque (wSetTorque)	16#6071:16#00	''	''
Modes of operation (OP)	16#6060:16#00	''	''
Touch Probe Function	16#60B8:16#00	'%QW6'	'UINT'
Add velocity value	16#60B1:16#00	''	''
Add torque value	16#60B2:16#00	''	''
Digital outputs (A637)	16#60FE:16#01	''	''

7.2.3.Homing Parameters Configuration

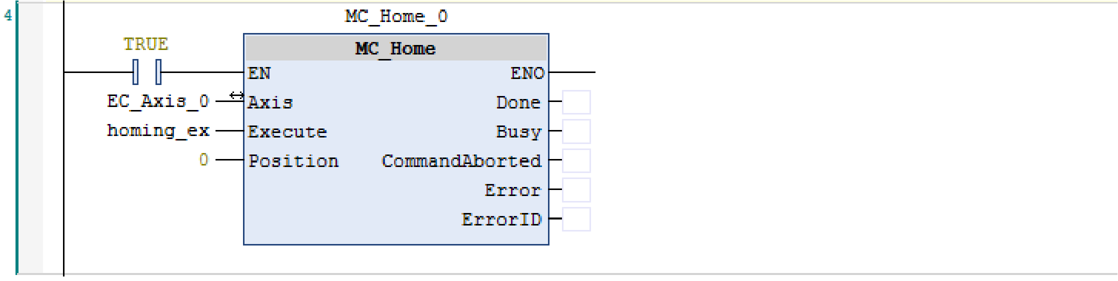
User need to use the SDO to configure the homing parameters, then via motion command “MC_Home” to trigger homing.

1) SDO configuration



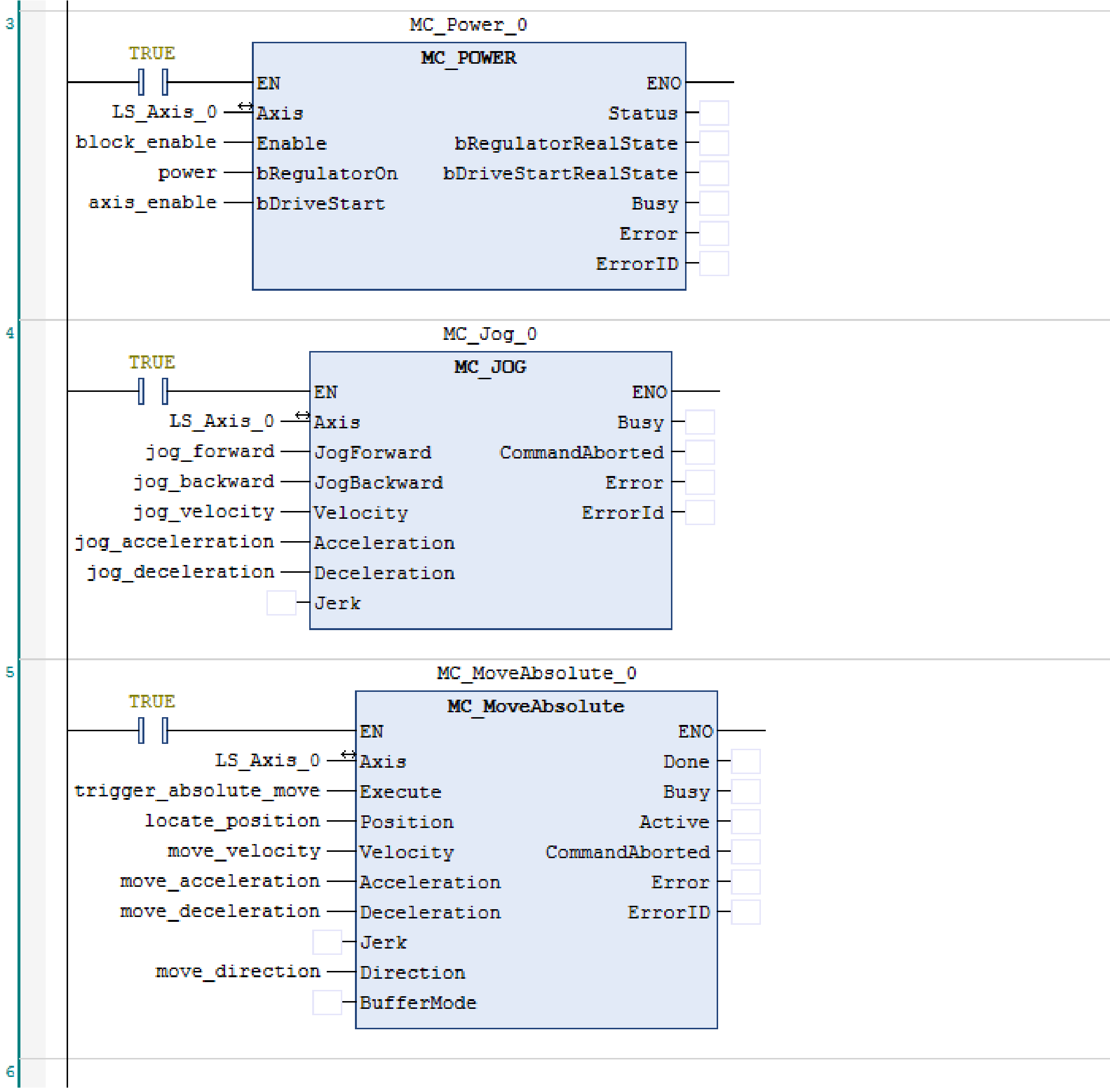
Line	Index:Subindex	Name	Value	Bit Length	Abort on Error	Jump to Line on Err...	Next Line	Comment
1	16#6060:16#00	Modes of Operation	8	8	□	□	0	Modes of Operation
2	16#6098:16#00	Homing method	19	8	□	□	0	
3	16#6099:16#01	Homing velocity (fast)	10000	32	□	□	0	
4	16#6099:16#02	Homing velocity (slow)	1000	32	□	□	0	
5	16#609A:16#00	Homing acceleration	100000	32	□	□	0	

2) Homing command



7.2.4.EtherCAT Axis Control Program

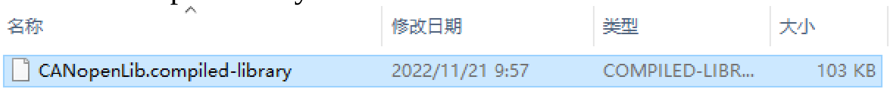
The EtherCAT axis motion command is same with the high speed motion command except the homing command.



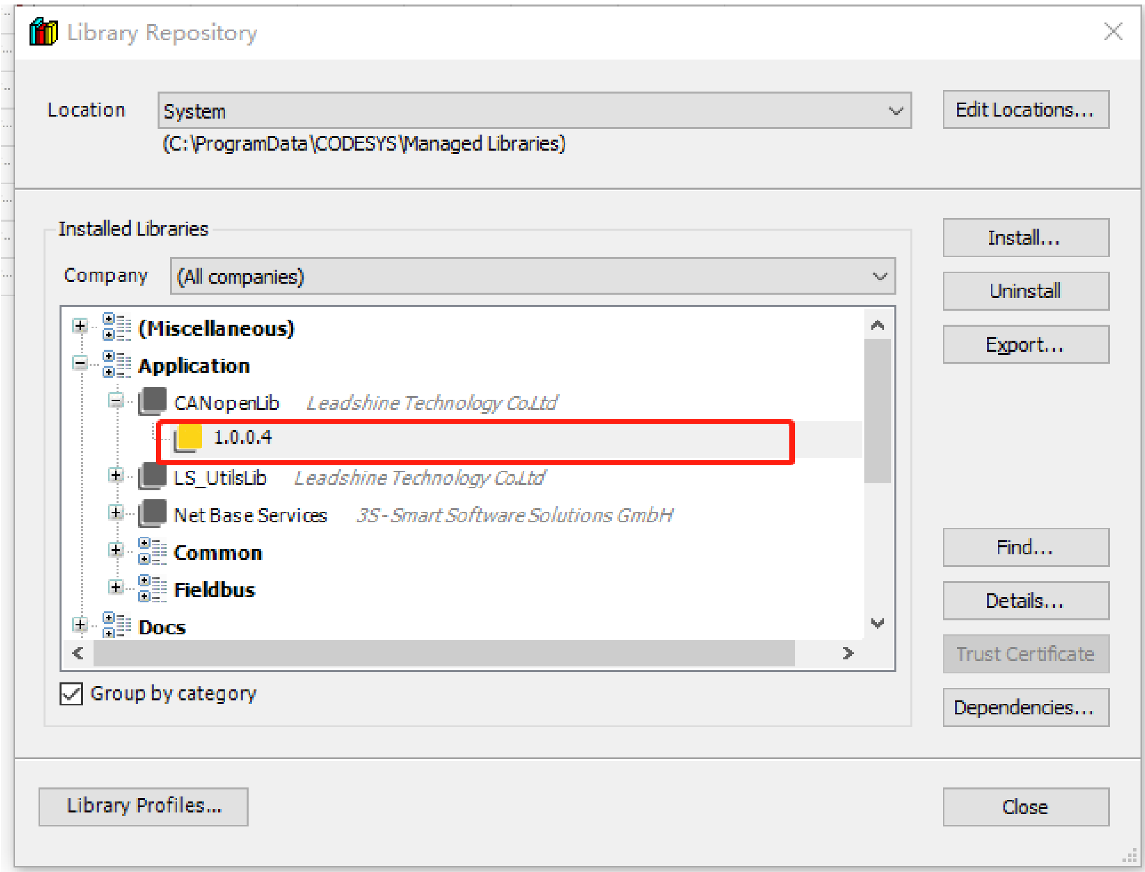
7.3.CANopen axis configuration

MC500 series PLC support standard CANopen protocol, user can via canopen function libraries to control the CANopen slave axis.

1) Install the CANopen library



名称	修改日期	类型	大小
CANopenLib.compiled-library	2022/11/21 9:57	COMPILED-LIBR...	103 KB



Library Repository

Location: System (C:\ProgramData\CODESYS\Managed Libraries)

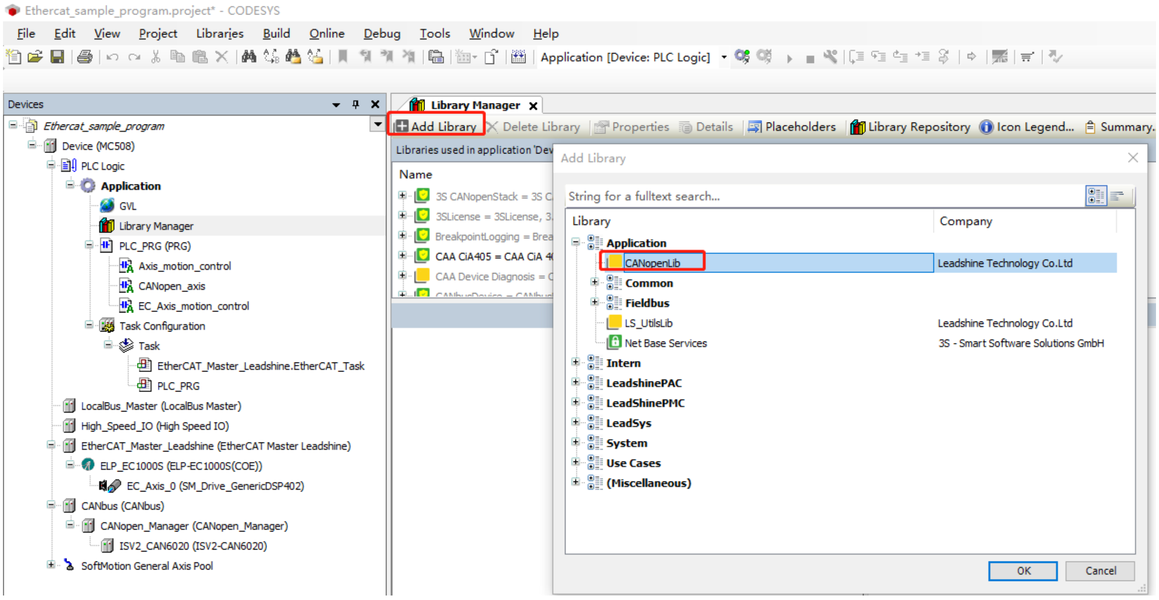
Installed Libraries

Company: (All companies)

- (Miscellaneous)
- Application
  - CANopenLib — Leadshine Technology Co.Ltd
    - 1.0.0.4
  - LS_UtilsLib — Leadshine Technology Co.Ltd
  - Net Base Services — 3S - Smart Software Solutions GmbH
  - Common
  - Fieldbus
- Docs

☑ Group by category

2)Add the library to project



Ethercat_sample_program.project* - CODESYS

- Ethercat_sample_program
  - Device (MC508)
    - PLC Logic
      - Application
        - GVL
        - Library Manager
        - PLC_PRG (PRG)
          - Axis_motion_control
          - CANopen_axis
          - EC_Axis_motion_control
        - Task Configuration
          - Task
            - EtherCAT_Master_Leadshine.EtherCAT_Task
            - PLC_PRG
    - LocalBus_Master (LocalBus Master)
    - High_Speed_IO (High Speed IO)
    - EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
      - ELP_EC1000S (ELP-EC1000S(COE))
        - EC_Axis_0 (SM_Drive_GenericDSP402)
    - CANbus (CANbus)
      - CANopen_Manager (CANopen_Manager)
        - ISV2_CAN6020 (ISV2-CAN6020)
    - SoftMotion General Axis Pool

Libraries used in application 'Dev

Name
- 3S CANopenStack = 3S C
- 3SLicense = 3SLicense, 3.
- BreakpointLogging = Brea
- CAA CiA405 = CAA CiA 4
- CAA Device Diagnosis = C
- CANbusDevice = CANbus

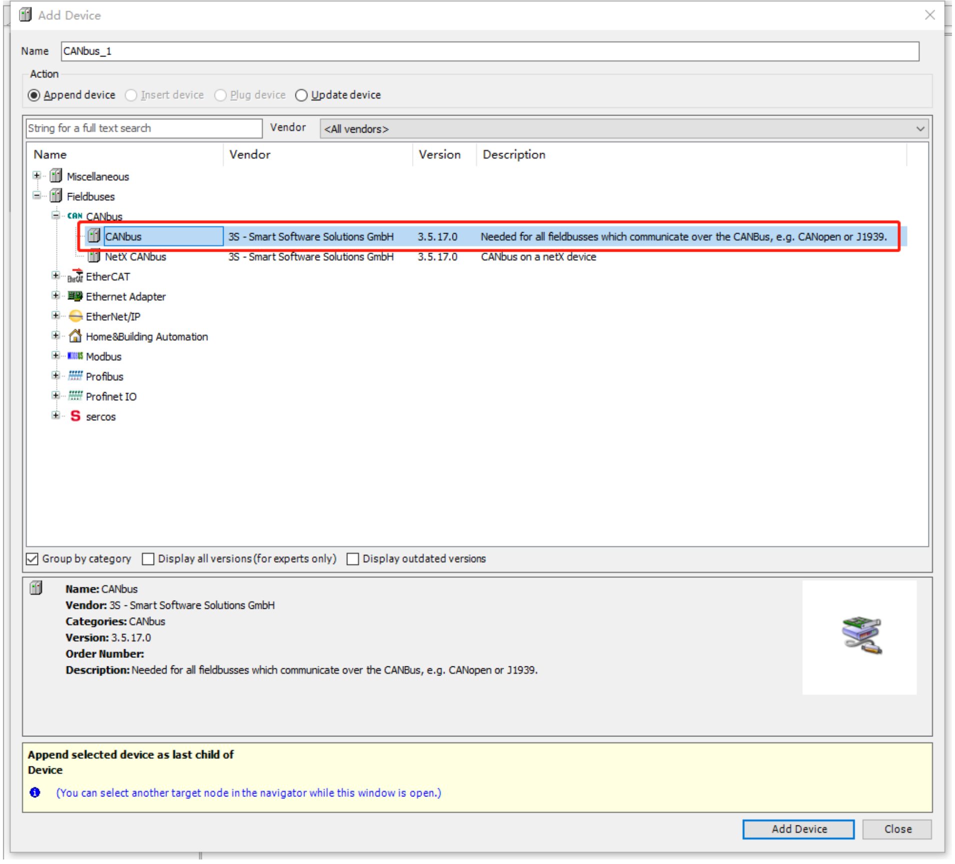
Add Library

String for a fulltext search...

Library	Company
Application	
CANopenLib	Leadshine Technology Co.Ltd
Common	
Fieldbus	
LS_UtilsLib	Leadshine Technology Co.Ltd
Net Base Services	3S - Smart Software Solutions GmbH
Intern	
LeadshinePAC	
LeadShinePMC	
LeadSys	
System	
Use Cases	
(Miscellaneous)	

7.3.1.General configuration

1) Add the CANopen device



Add Device

Name: CANbus_1

Action: ● Append device ○ Insert device ○ Plug device ○ Update device

String for a full text search

Vendor: <All vendors>

Name	Vendor	Version	Description
Miscellaneous			
Fieldbuses			
CANbus			
CANbus	3S - Smart Software Solutions GmbH	3.5.17.0	Needed for all fieldbusses which communicate over the CANBus, e.g. CANopen or J1939.
NetX CANbus	3S - Smart Software Solutions GmbH	3.5.17.0	CANbus on a netX device
EtherCAT			
Ethernet Adapter			
EtherNet/IP			
Home&Building Automation			
Modbus			
Profibus			
Profinet IO			
sercos			

☑ Group by category ☐ Display all versions (for experts only) ☐ Display outdated versions

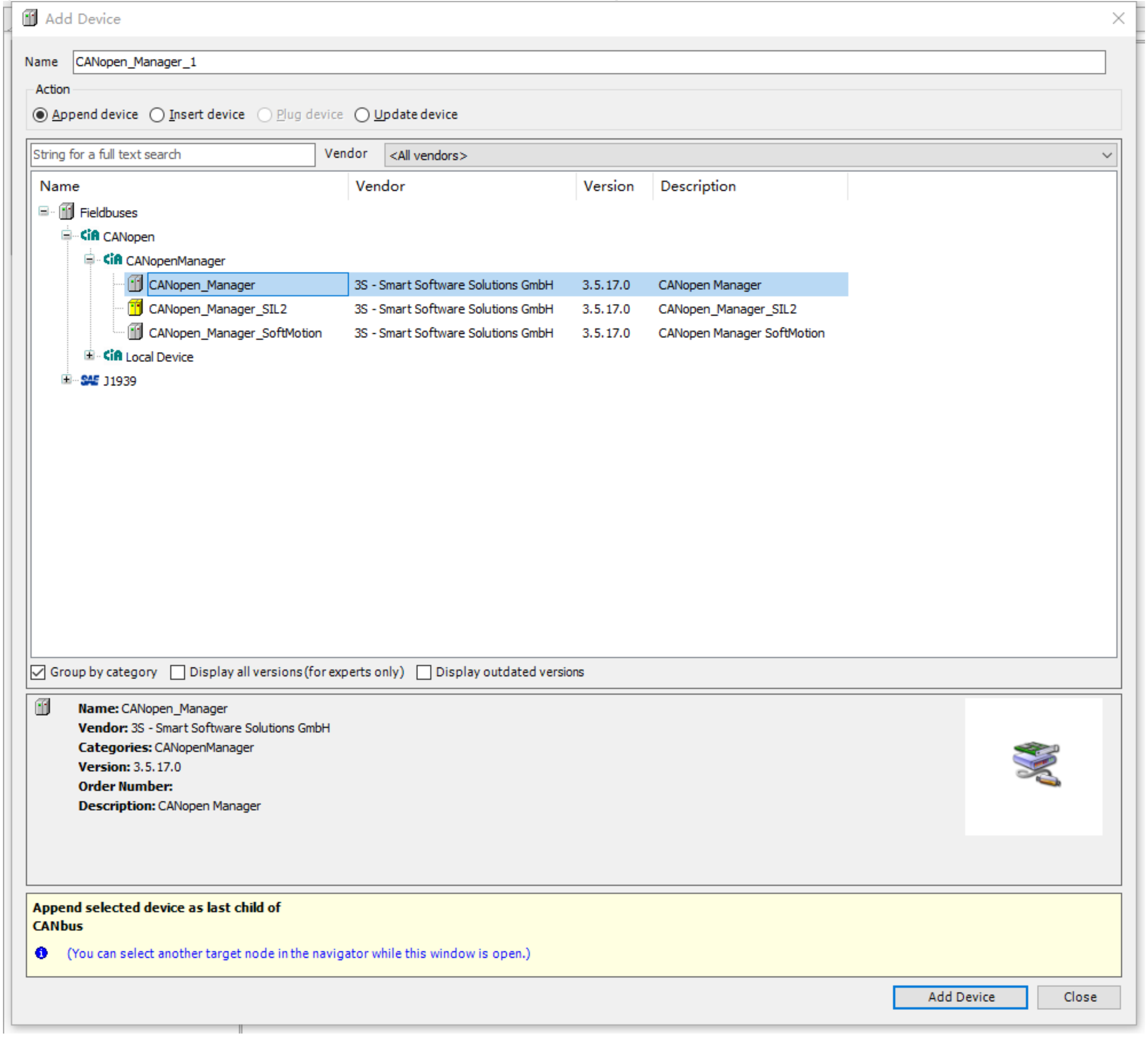
Name: CANbus
Vendor: 3S - Smart Software Solutions GmbH
Categories: CANbus
Version: 3.5.17.0
Order Number:
Description: Needed for all fieldbusses which communicate over the CANBus, e.g. CANopen or J1939.

Append selected device as last child of
Device

(You can select another target node in the navigator while this window is open.)

Add Device | Close

2) Right click "CANbus" to add the CANopen Manager



Add Device

Name: CANopen_Manager_1

Action: ● Append device ○ Insert device ○ Plug device ○ Update device

String for a full text search

Vendor: <All vendors>

Name	Vendor	Version	Description
Fieldbuses			
CANopen			
CANopenManager			
CANopen_Manager	3S - Smart Software Solutions GmbH	3.5.17.0	CANopen Manager
CANopen_Manager_SIL2	3S - Smart Software Solutions GmbH	3.5.17.0	CANopen_Manager_SIL2
CANopen_Manager_SoftMotion	3S - Smart Software Solutions GmbH	3.5.17.0	CANopen Manager SoftMotion
Local Device			
J1939			

☑ Group by category ☐ Display all versions (for experts only) ☐ Display outdated versions

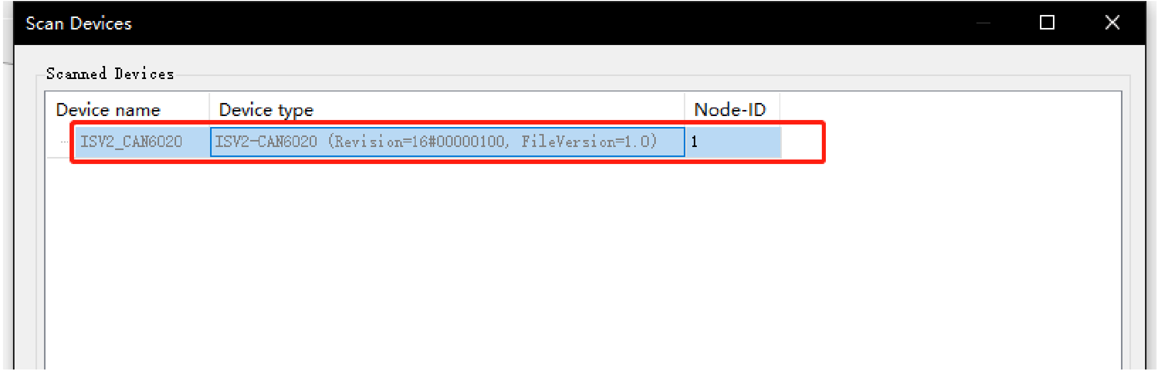
Name: CANopen_Manager
Vendor: 3S - Smart Software Solutions GmbH
Categories: CANopenManager
Version: 3.5.17.0
Order Number:
Description: CANopen Manager

Append selected device as last child of
CANbus

(You can select another target node in the navigator while this window is open.)

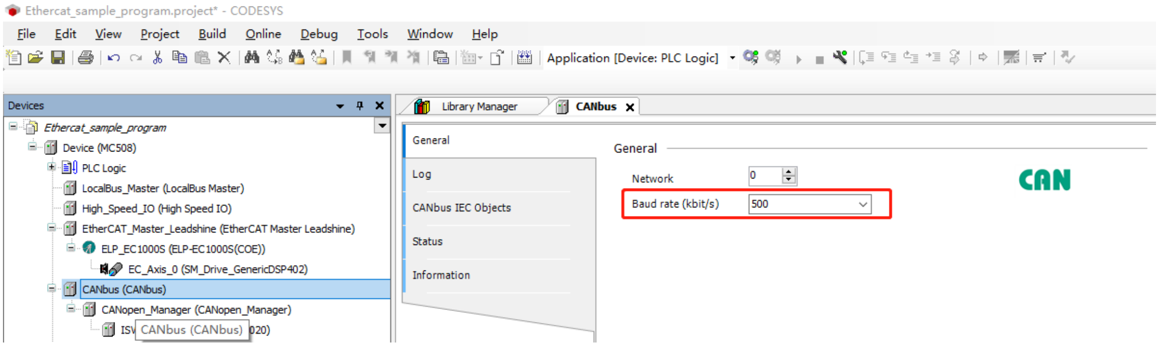
Add Device | Close

3) Auto-Scanning or offline to add the device(have to add the .eds device description file when use offline to add device)



Device name	Device type	Node-ID
ISV2_CAN6020	ISV2-CAN6020 (Revision=16#00000100, FileVersion=1.0)	1

4) Configure the baud rate


Ethercat_sample_program.project* - CODESYS
File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
Ethercat_sample_program
Device (MC508)
PLC Logic
LocalBus_Master (LocalBus Master)
High_Speed_IO (High Speed IO)
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
ELP_EC1000S (ELP-EC1000S(COE))
EC_Axis_0 (SM_Drive_GenericDSP402)
CANbus (CANbus)
CANopen_Manager (CANopen_Manager)
ISV CANbus (CANbus) 020)
Library Manager
CANbus
General
Log
CANbus IEC Objects
Status
Information
CAN

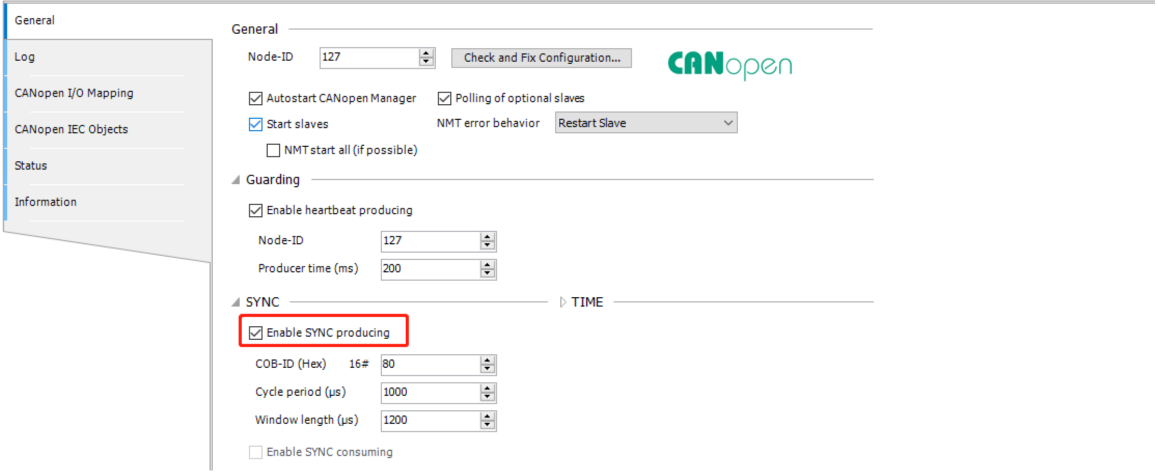
General

Network: 0

Baud rate (kbit/s): 500

7.3.2.CANopen bus manager configuration

1) Communication configuration, select the “Enable SYNC producing”, the other configuration refer to the default setting.



General

Node-ID: 127

☑ Autostart CANopen Manager ☑ Polling of optional slaves

☑ Start slaves NMT error behavior: Restart Slave

□ NMT start all (if possible)

Guarding

☑ Enable heartbeat producing

Node-ID: 127

Producer time (ms): 200

SYNC

TIME

☑ Enable SYNC producing

COB-ID (Hex) 16# 80

Cycle period (μs): 1000

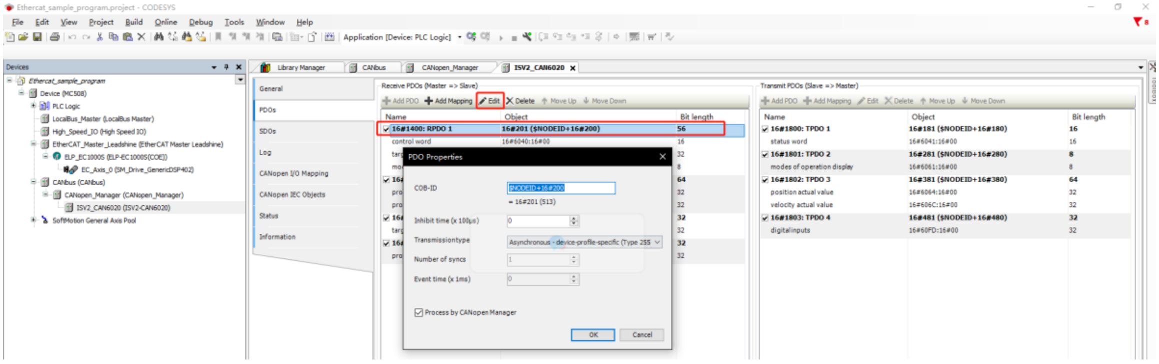
Window length (μs): 1200

□ Enable SYNC consuming

7.3.3.CANopen slave configuration

1) PDO configuration

Configure all the PDO items transmission type “Asynchronous device profile specific”


Ethercat_sample_program.project - CODESYS
File Edit View Project Build Online Debug Tools Window Help
Application [Device: PLC Logic]
Devices
Ethercat_sample_program
Device (MC508)
PLC Logic
LocalBus_Master (LocalBus Master)
High_Speed_IO (High Speed IO)
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)
ELP_EC1000S (ELP-EC1000S(COE))
EC_Axis_0 (SM_Drive_GenericDSP402)
CANbus (CANbus)
CANopen_Manager (CANopen_Manager)
ISV2_CAN6020 (ISV2-CAN6020)
SoftMotion General Axis Pool
Library Manager
CANbus
CANopen_Manager
ISV2_CAN6020
General
PDOs
SDOs
Log
CANopen I/O Mapping
CANopen IEC Objects
Status
Information
Add PDO
Add Mapping
Edit
Delete
Move Up
Move Down
Toolbox

Receive PDOs (Master => Slave)

Name	Object	Bit length
☑ 16#1400: RPDO 1	16#201 ($NODEID+16#200)	56
control word	16#6040:16#00	16

Transmit PDOs (Slave => Master)

Name	Object	Bit length
☑ 16#1800: TPDO 1	16#181 ($NODEID+16#180)	16
status word	16#6041:16#00	16
☑ 16#1801: TPDO 2	16#281 ($NODEID+16#280)	8
modes of operation display	16#6061:16#00	8
☑ 16#1802: TPDO 3	16#381 ($NODEID+16#380)	64
position actual value	16#6064:16#00	32
velocity actual value	16#606C:16#00	32
☑ 16#1803: TPDO 4	16#481 ($NODEID+16#480)	32
digitalinputs	16#60FD:16#00	32

PDO Properties

COB-ID: $NODEID+16#200

= 16#201 (513)

Inhibit time (x 100μs): 0

Transmissiontype: Asynchronous - device-profile-specific (Type 255

Number of syncs: 1

Event time (x 1ms): 0

☑ Process by CANopen Manager

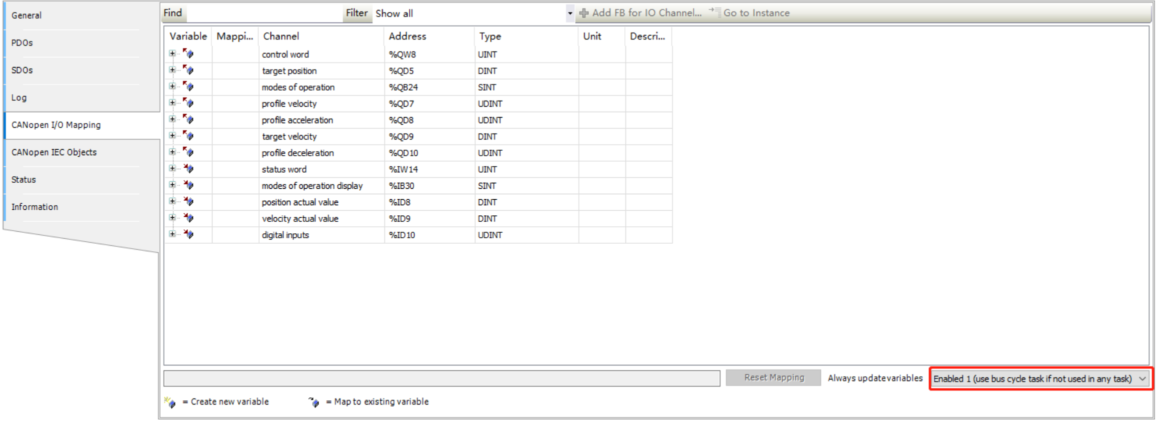
OK Cancel

Please refer to the follow table to configure the PDO items order, and the extend PDO items only can be added at the table end.

1	RPDO1	Control Word 16#6040	TPDO1	Status Word 16#6041
2		Target Position 16#607A	TPDO2	Modes Of Operation Display 16#6061
3		Modes Of Operation 16#6060	TPDO3	Position Actual Value 16#6064
4	RPDO2	Profile Velocity 16#6081		Velocity Actual Value 16#606C
5		Profile Acceleration 16#6083	TPDO4	Digital inputs 16#60FD
6	RPDO3	Target Velocity 16#60FF		
7	RPDO4	Profile Deceleration 16#6084		

2) I/O mapping configuration

Modify the type of updating variables



Variable	Mappi...	Channel	Address	Type	Unit	Descri...
		control word	%QW8	UINT		
		target position	%QD5	DINT		
		modes of operation	%QB24	SINT		
		profile velocity	%QD7	UDINT		
		profile acceleration	%QD8	UDINT		
		target velocity	%QD9	DINT		
		profile deceleration	%QD10	UDINT		
		status word	%IW14	UINT		
		modes of operation display	%IB30	SINT		
		position actual value	%ID8	DINT		
		velocity actual value	%ID9	DINT		
		digital inputs	%ID10	UDINT		

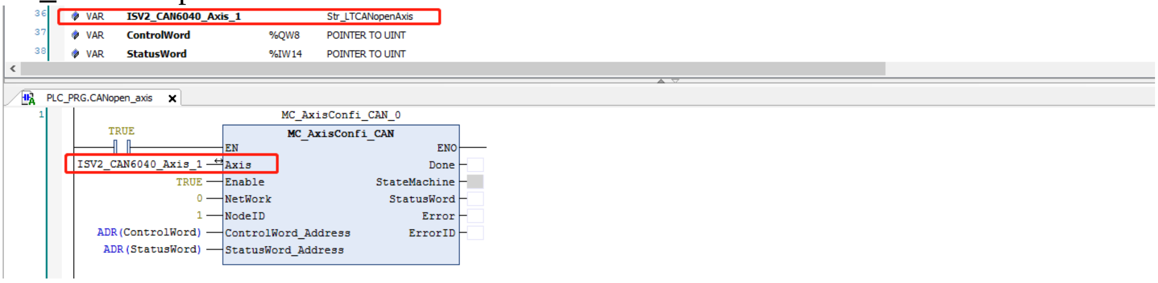
Reset Mapping

Always update variables: Enabled 1 (use bus cycle task if not used in any task)

7.3.4.CANopen axis motion program

1) Create axis variable to bind the CANopen slave

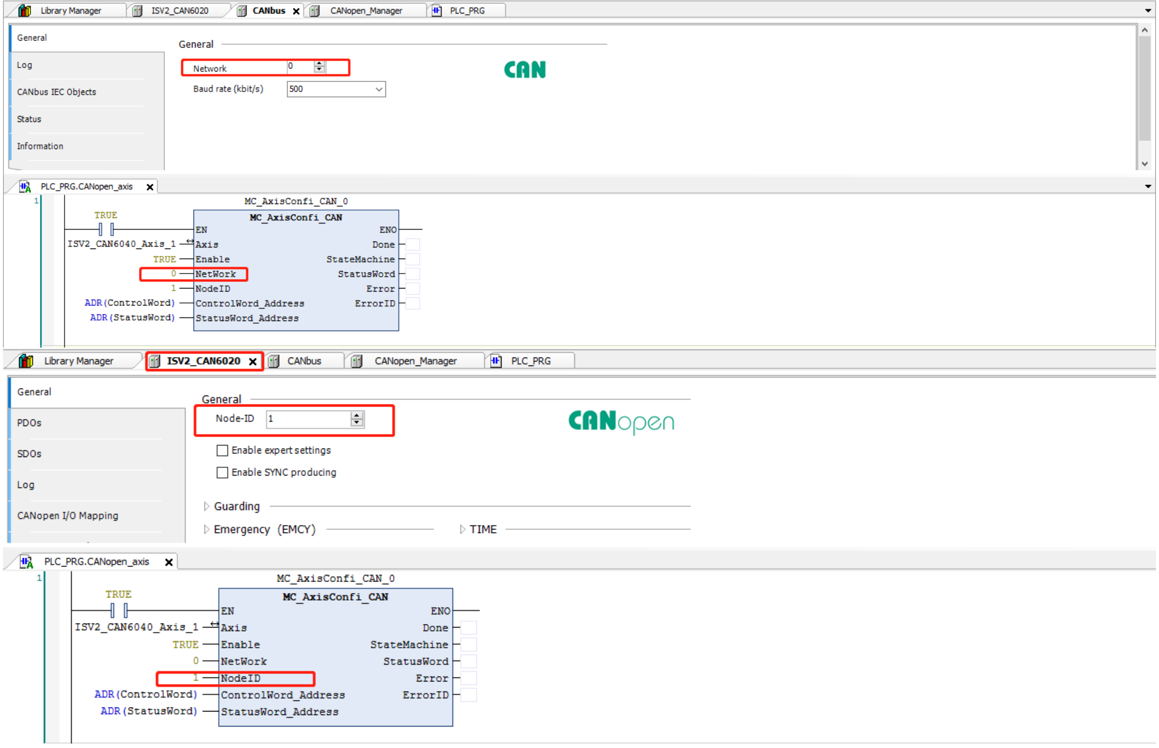
Add "MC_AxisConfi_CAN " function block, define axis variable which data type is Str_LTCANopenAxis.



```
VAR   ISV2_CAN6040_Axis_1                 Str_LTCANopenAxis
VAR   ControlWord            %QW8         POINTER TO UINT
VAR   StatusWord             %IW14        POINTER TO UINT
```

```
ISV2_CAN6040_Axis_1 — Axis
TRUE                — Enable
0                   — NetWork
1                   — NodeID
ADR(ControlWord)    — ControlWord_Address
ADR(StatusWord)     — StatusWord_Address
```

2) Then setting the Network ID and Node-ID value according the CANopen configuration



CANbus — General: Network 0; Baud rate (kbit/s) 500

NetWork input: 0

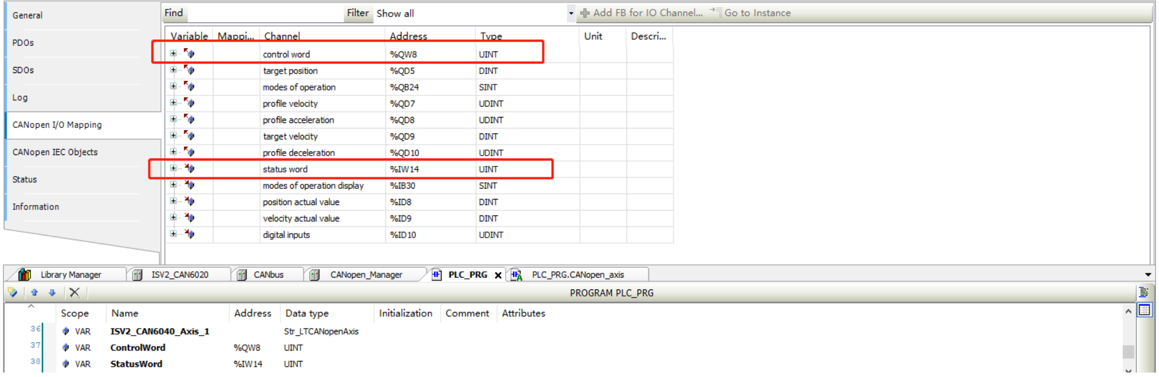
ISV2_CAN6020 — General: Node-ID 1

□ Enable expert settings

□ Enable SYNC producing

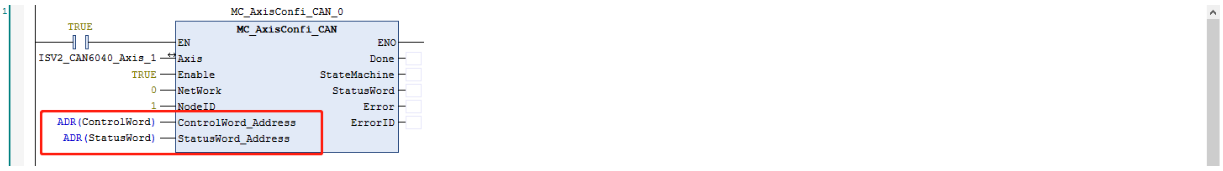
NodeID input: 1

3) Refer the CANopen I/O mapping table, define the address of control word and status word, setting the control word and status word via ADR command



Variable	Mappi...	Channel	Address	Type	Unit	Descri...
		control word	%QW8	UINT		
		target position	%QD5	DINT		
		modes of operation	%QB24	SINT		
		profile velocity	%QD7	UDINT		
		profile acceleration	%QD8	UDINT		
		target velocity	%QD9	DINT		
		profile deceleration	%QD10	UDINT		
		status word	%IW14	UINT		
		modes of operation display	%IB30	SINT		
		position actual value	%ID8	DINT		
		velocity actual value	%ID9	DINT		
		digital inputs	%ID10	UDINT		

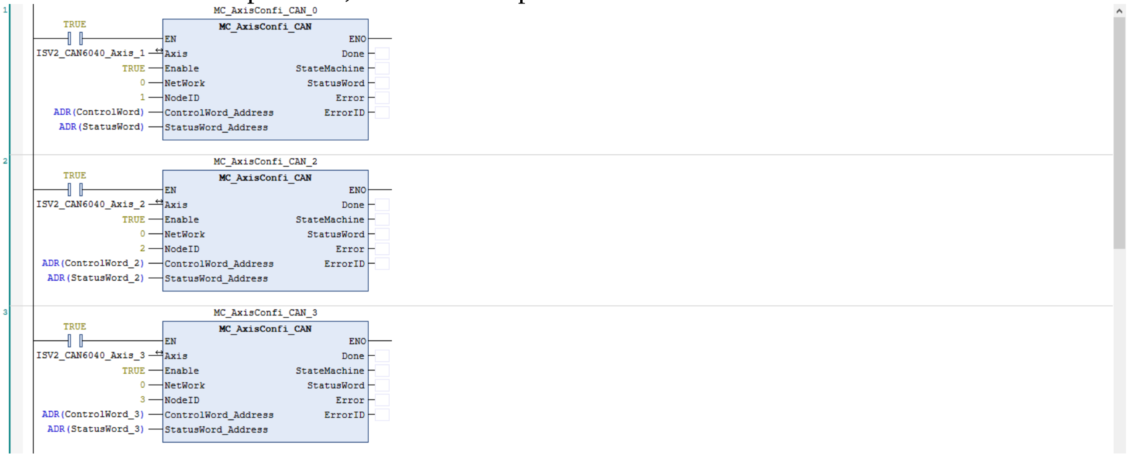
	Scope	Name	Address	Data type	Initialization	Comment	Attributes
36	VAR	ISV2_CAN6040_Axis_1		Str_LTCANopenAxis			
37	VAR	ControlWord	%QW8	UINT			
38	VAR	StatusWord	%IW14	UINT			



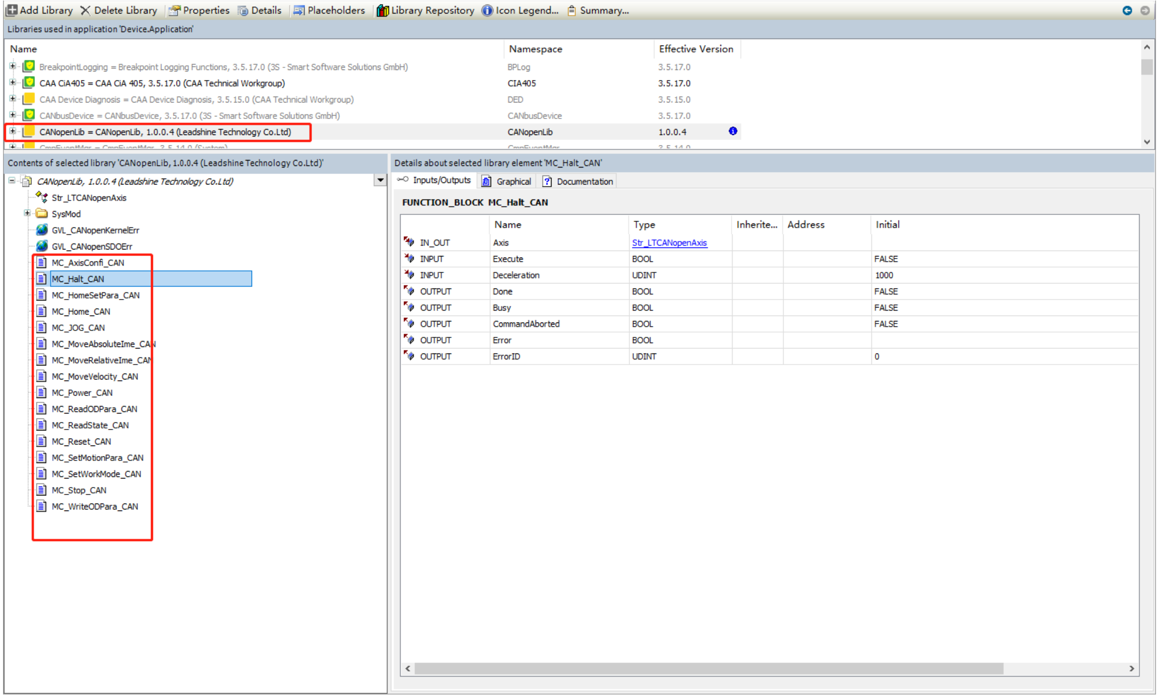
Note:

1. The information of “Str_LTCANopenAxis” please refer to the library “CANopenLib 1.0.0.0”.

2. User have to bind the Network-ID and Node-ID to the “MC_AxisConfi_CAN” function block when want to add one more CANopen axis, as the follow picture shows.



4) Add CANopen axis motion command, about the details please refer to the CANopenLib 1.0.0.4 library introduction.



Libraries used in application 'Device.Application'

Name	Namespace	Effective Version
BreakpointLogging = Breakpoint Logging Functions, 3.5.17.0 (3S - Smart Software Solutions GmbH)	BPLog	3.5.17.0
CAA CiA405 = CAA CiA 405, 3.5.17.0 (CAA Technical Workgroup)	CIA405	3.5.17.0
CAA Device Diagnosis = CAA Device Diagnosis, 3.5.15.0 (CAA Technical Workgroup)	DED	3.5.15.0
CANbusDevice = CANbusDevice, 3.5.17.0 (3S - Smart Software Solutions GmbH)	CANbusDevice	3.5.17.0
CANopenLib = CANopenLib, 1.0.0.4 (Leadshine Technology Co.Ltd)	CANopenLib	1.0.0.4

Contents of selected library 'CANopenLib, 1.0.0.4 (Leadshine Technology Co.Ltd)'

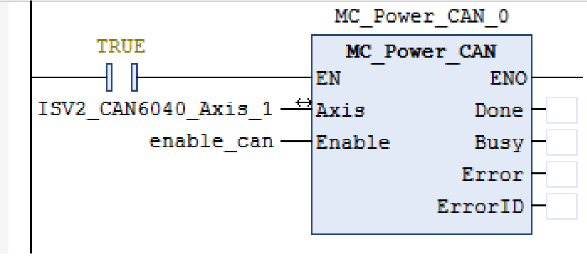
- *CANopenLib, 1.0.0.4 (Leadshine Technology Co.Ltd)*
  - Str_LTCANopenAxis
  - SysMod
  - GVL_CANopenKernelErr
  - GVL_CANopenSDOErr
  - MC_AxisConfi_CAN
  - MC_Halt_CAN
  - MC_HomeSetPara_CAN
  - MC_Home_CAN
  - MC_JOG_CAN
  - MC_MoveAbsoluteIme_CAN
  - MC_MoveRelativeIme_CAN
  - MC_MoveVelocity_CAN
  - MC_Power_CAN
  - MC_ReadODPara_CAN
  - MC_ReadState_CAN
  - MC_Reset_CAN
  - MC_SetMotionPara_CAN
  - MC_SetWorkMode_CAN
  - MC_Stop_CAN
  - MC_WriteODPara_CAN

Details about selected library element 'MC_Halt_CAN'

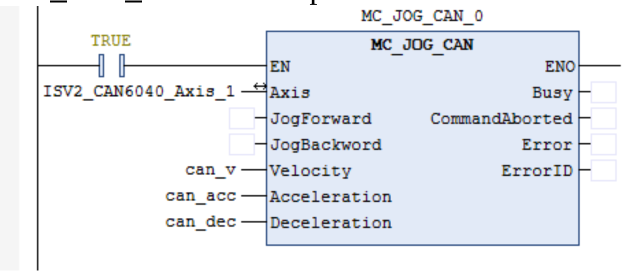
FUNCTION_BLOCK MC_Halt_CAN

	Name	Type	Inherite...	Address	Initial
IN_OUT	Axis	Str_LTCANopenAxis			
INPUT	Execute	BOOL			FALSE
INPUT	Deceleration	UDINT			1000
OUTPUT	Done	BOOL			FALSE
OUTPUT	Busy	BOOL			FALSE
OUTPUT	CommandAborted	BOOL			FALSE
OUTPUT	Error	BOOL			
OUTPUT	ErrorID	UDINT			0

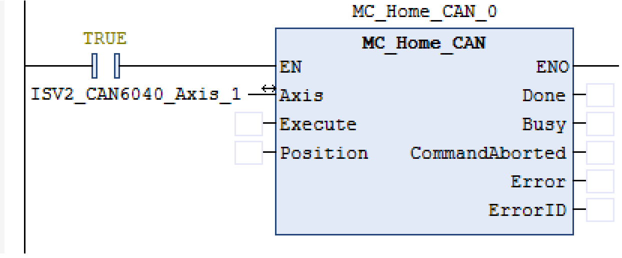
MC_Power_CAN: CANopen axis enable function block.



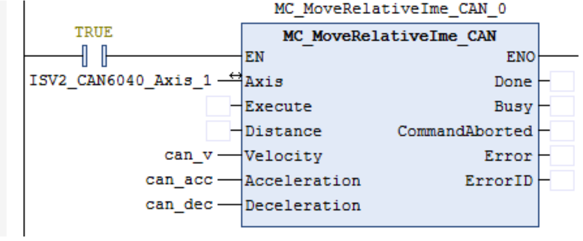
MC_JOG_CAN: CANopen axis JOG function block (support online change speed)



MC_Home_CAN: CANopen axis homing function block



MC_MoveRelativeIme_CAN: CANopen axis relative move function block.



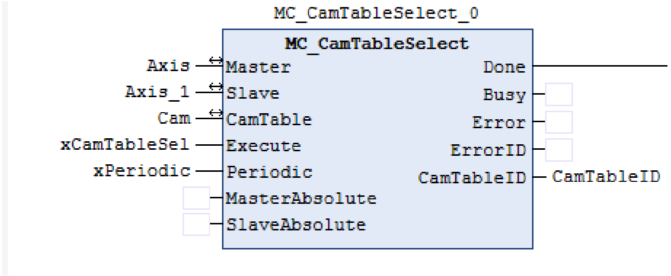
About other motion command, please refer to the function library introduction

7.4.E-CAM function

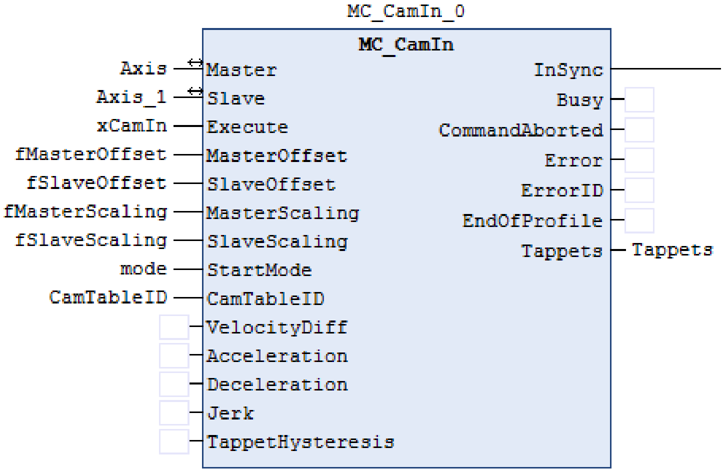
Generally, by digitizing cam movements, the problems of low precision, easy wear and noise in mechanical cams can be solved.MC500 series PLC provide the CAM graph and CAM function block to achieve the E-CAM function.

7.4.1.Function Block

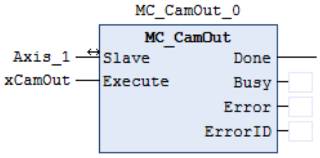
1) MC_CamTableSelect



2) MC_CamIn

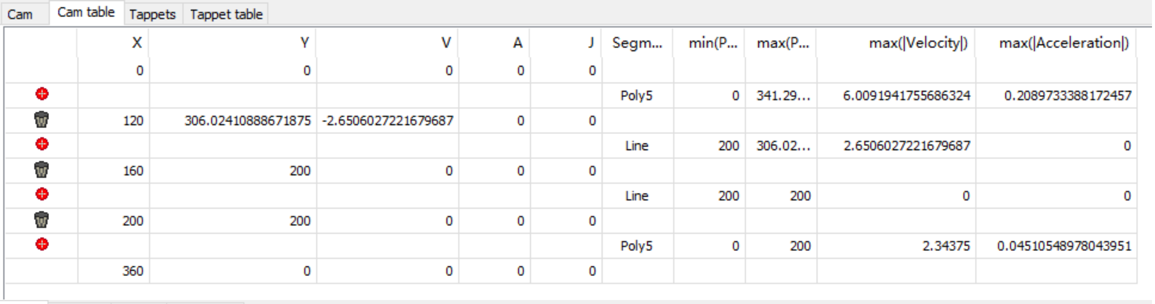


3) MC_CamOut

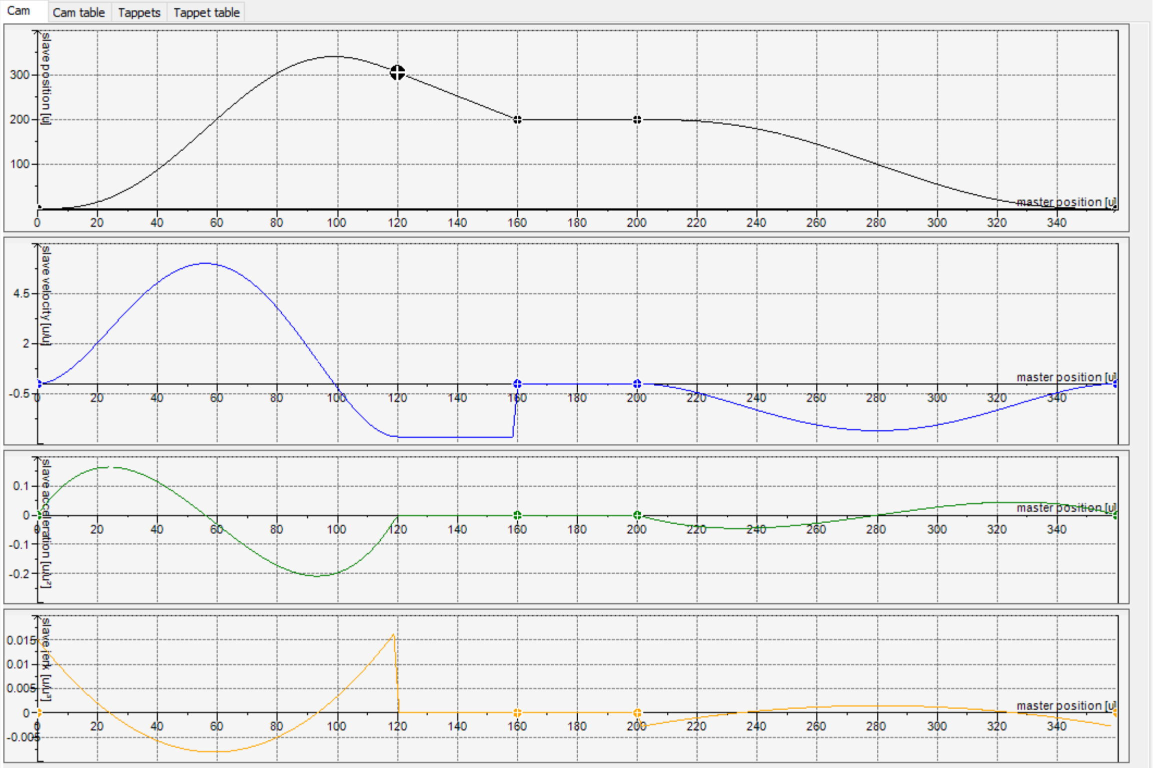


7.4.2.Sample Program

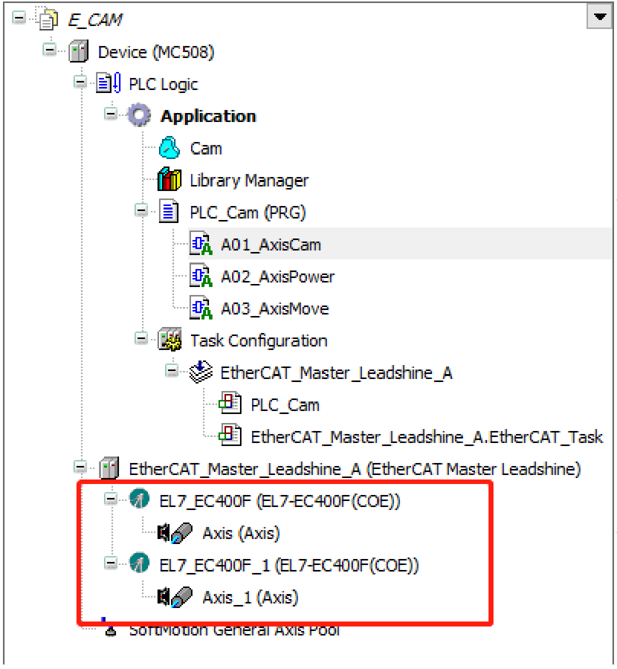
1) Add the CAM to application then change the CAM table, or change the key points of the graph manually



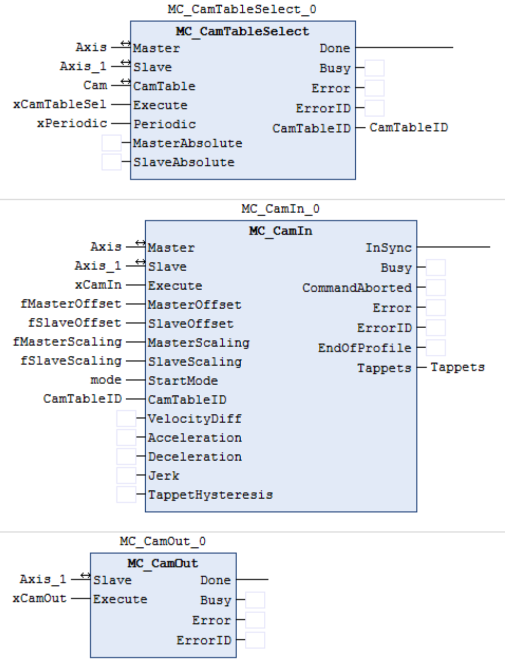
	X	Y	V	A	J	Segm...	min(P...	max(P...	max(|Velocity|)	max(|Acceleration|)
	0	0	0	0	0					
⊕						Poly5	0	341.29...	6.0091941755686324	0.2089733388172457
🗑	120	306.02410888671875	-2.6506027221679687	0	0					
⊕						Line	200	306.02...	2.6506027221679687	0
🗑	160	200	0	0	0					
⊕						Line	200	200	0	0
🗑	200	200	0	0	0					
⊕						Poly5	0	200	2.34375	0.04510548978043951
	360	0	0	0	0					



2) Add master and slave axis and E-CAM function blocks.

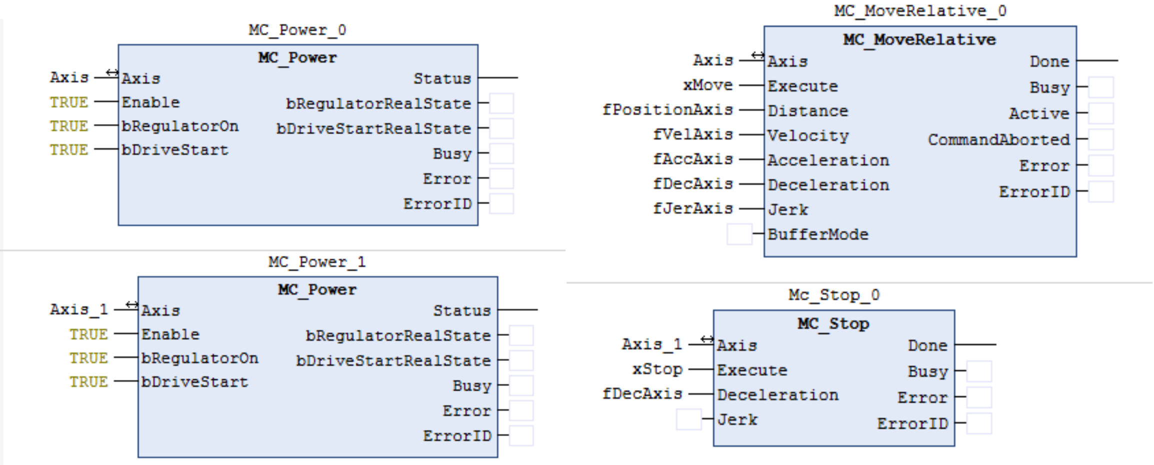


```
E_CAM
  Device (MC508)
    PLC Logic
      Application
        Cam
        Library Manager
        PLC_Cam (PRG)
          A01_AxisCam
          A02_AxisPower
          A03_AxisMove
        Task Configuration
          EtherCAT_Master_Leadshine_A
            PLC_Cam
            EtherCAT_Master_Leadshine_A.EtherCAT_Task
    EtherCAT_Master_Leadshine_A (EtherCAT Master Leadshine)
      EL7_EC400F (EL7-EC400F(COE))
        Axis (Axis)
      EL7_EC400F_1 (EL7-EC400F(COE))
        Axis_1 (Axis)
    SoftMotion General Axis Pool
```



```
MC_CamTableSelect_0
MC_CamTableSelect
Axis        — Master                     Done —
Axis_1      — Slave                      Busy —
Cam         — CamTable                  Error —
xCamTableSel — Execute                ErrorID —
xPeriodic   — Periodic             CamTableID — CamTableID
            — MasterAbsolute
            — SlaveAbsolute

MC_CamIn_0
MC_CamIn
Axis           — Master                 InSync —
Axis_1         — Slave                    Busy —
xCamIn         — Execute      CommandAborted —
fMasterOffset  — MasterOffset            Error —
fSlaveOffset   — SlaveOffset           ErrorID —
fMasterScaling — MasterScaling    EndOfProfile —
fSlaveScaling  — SlaveScaling          Tappets — Tappets
mode           — StartMode
CamTableID     — CamTableID
               — VelocityDiff
               — Acceleration
               — Deceleration
               — Jerk
               — TappetHysteresis

MC_CamOut_0
MC_CamOut
Axis_1  — Slave        Done —
xCamOut — Execute      Busy —
                      Error —
                    ErrorID —
```

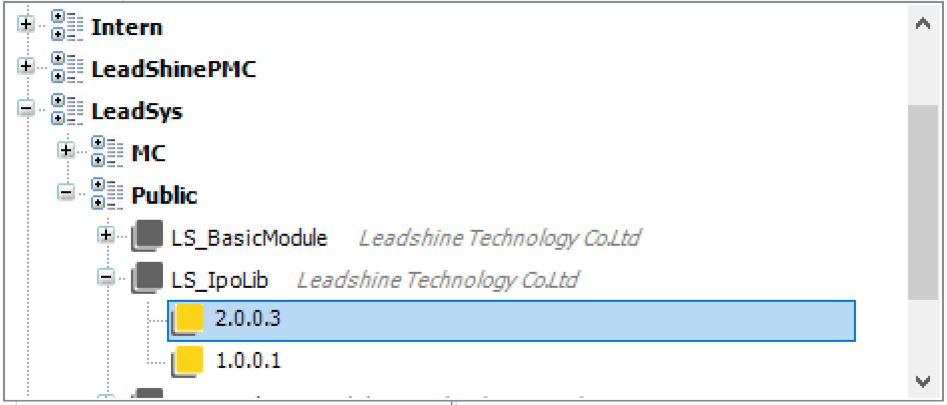
3) Add axis control blocks, execute the “MC_MoveRelative” block then the master axis and slave axis will follow the CAM graph rotate.



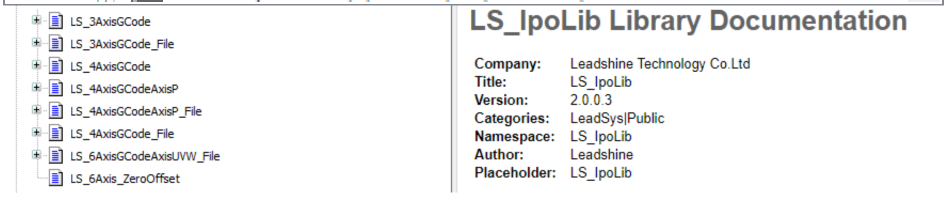
```
MC_Power_0
MC_Power
Axis — Axis                          Status —
TRUE — Enable          bRegulatorRealState —
TRUE — bRegulatorOn  bDriveStartRealState —
TRUE — bDriveStart                     Busy —
                                      Error —
                                    ErrorID —

MC_Power_1
MC_Power
Axis_1 — Axis                        Status —
TRUE — Enable          bRegulatorRealState —
TRUE — bRegulatorOn  bDriveStartRealState —
TRUE — bDriveStart                     Busy —
                                      Error —
                                    ErrorID —

MC_MoveRelative_0
MC_MoveRelative
Axis          — Axis                     Done —
xMove         — Execute                  Busy —
fPositionAxis — Distance               Active —
fVelAxis      — Velocity       CommandAborted —
fAccAxis      — Acceleration            Error —
fDecAxis      — Deceleration          ErrorID —
fJerAxis      — Jerk
              — BufferMode

Mc_Stop_0
MC_Stop
Axis_1   — Axis              Done —
xStop    — Execute           Busy —
fDecAxis — Deceleration     Error —
         — Jerk           ErrorID —
```

7.5.G-code Function

MC500 series PLC support standard G-code file, user can define the G-code in the program or import the processing file into the PLC (MC500 only support .cnc type G-code file yet.). Leadshine have developed the motion control libraries “LS_Ioplib”, before using this function, please install the library first.



- Intern
- LeadShinePMC
- LeadSys
  - MC
  - Public
    - LS_BasicModule   *Leadshine Technology Co.Ltd*
    - LS_IpoLib   *Leadshine Technology Co.Ltd*
      - 2.0.0.3
      - 1.0.0.1



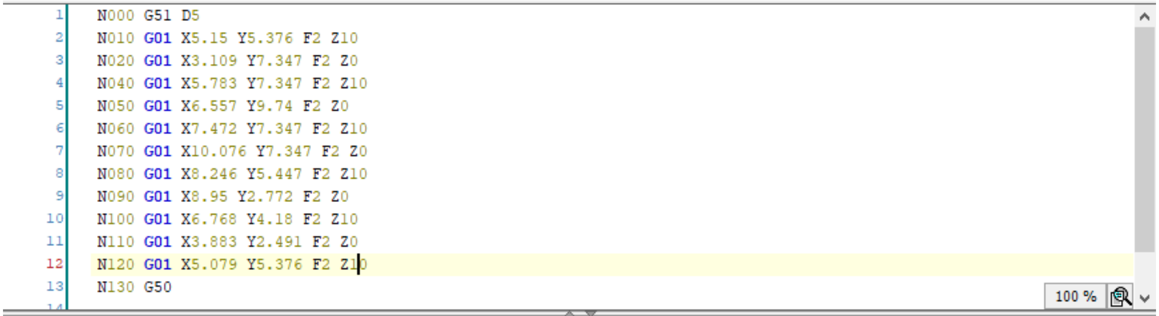
- LS_3AxisGCode
- LS_3AxisGCode_File
- LS_4AxisGCode
- LS_4AxisGCodeAxisP
- LS_4AxisGCodeAxisP_File
- LS_4AxisGCode_File
- LS_6AxisGCodeAxisUVW_File
- LS_6Axis_ZeroOffset

LS_IpoLib Library Documentation

Company:	Leadshine Technology Co.Ltd
Title:	LS_IpoLib
Version:	2.0.0.3
Categories:	LeadSys|Public
Namespace:	LS_IpoLib
Author:	Leadshine
Placeholder:	LS_IpoLib

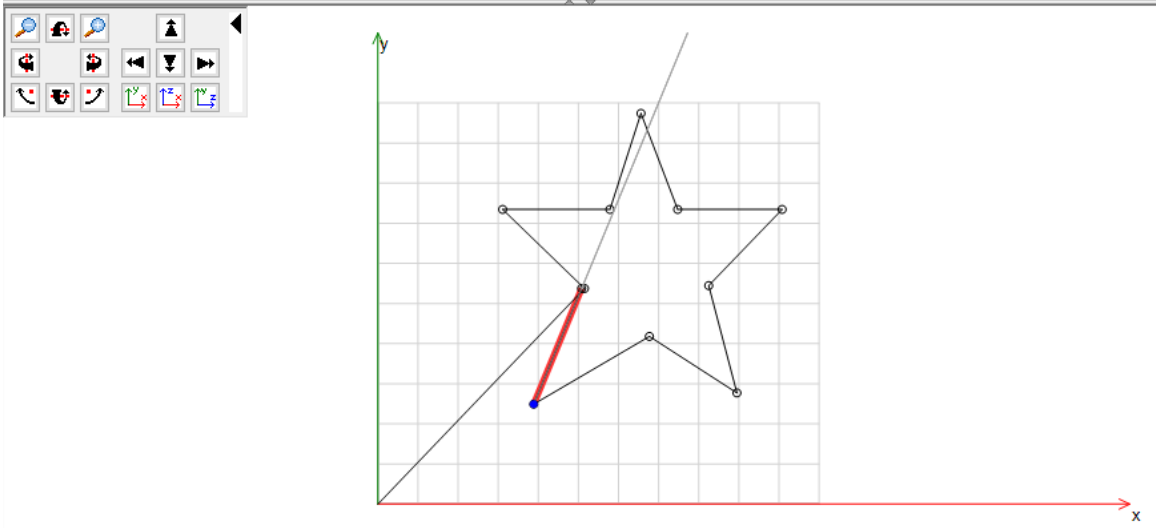
7.5.1.G-code in PLC program

User can add the CNC program into the application bar, and change the processing path conveniently

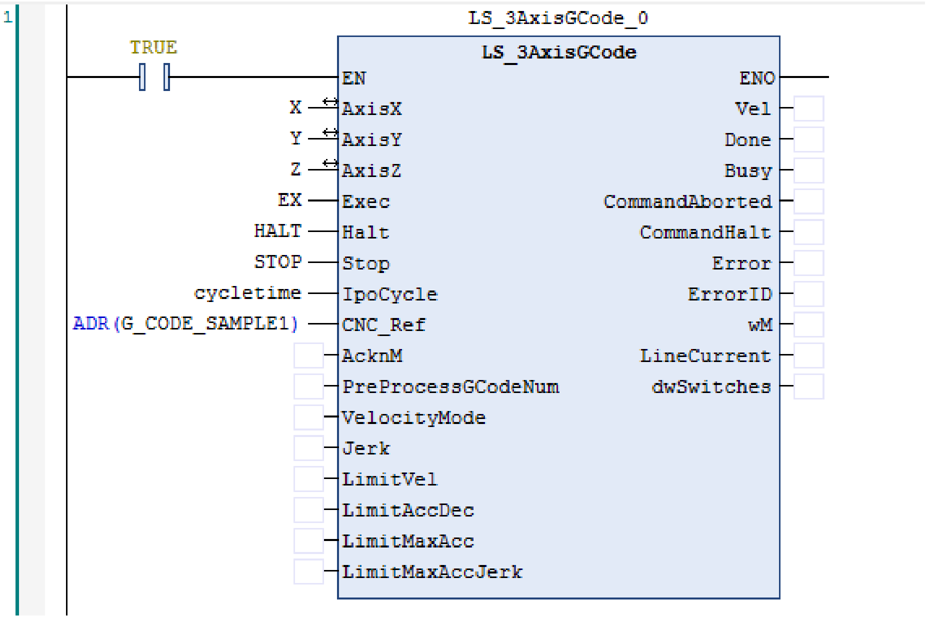


```
N000 G51 D5
N010 G01 X5.15 Y5.376 F2 Z10
N020 G01 X3.109 Y7.347 F2 Z0
N040 G01 X5.783 Y7.347 F2 Z10
N050 G01 X6.557 Y9.74 F2 Z0
N060 G01 X7.472 Y7.347 F2 Z10
N070 G01 X10.076 Y7.347 F2 Z0
N080 G01 X8.246 Y5.447 F2 Z10
N090 G01 X8.95 Y2.772 F2 Z0
N100 G01 X6.768 Y4.18 F2 Z10
N110 G01 X3.883 Y2.491 F2 Z0
N120 G01 X5.079 Y5.376 F2 Z10
N130 G50
```

100 %

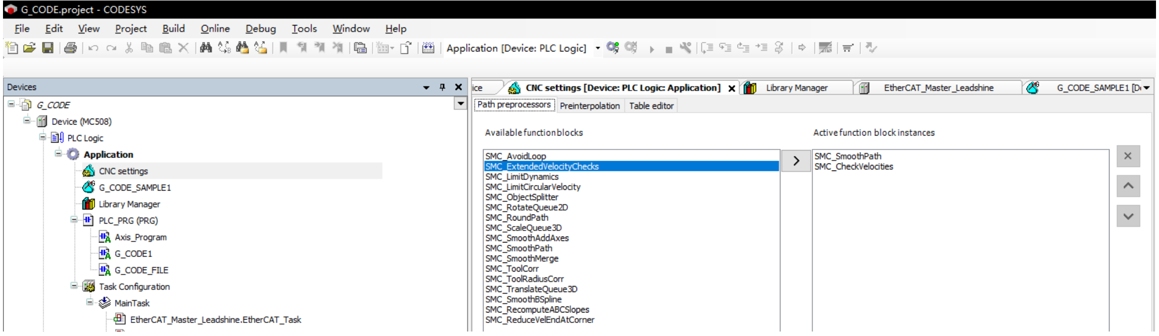


2) Function block



3) Sample program

Add the CNC setting



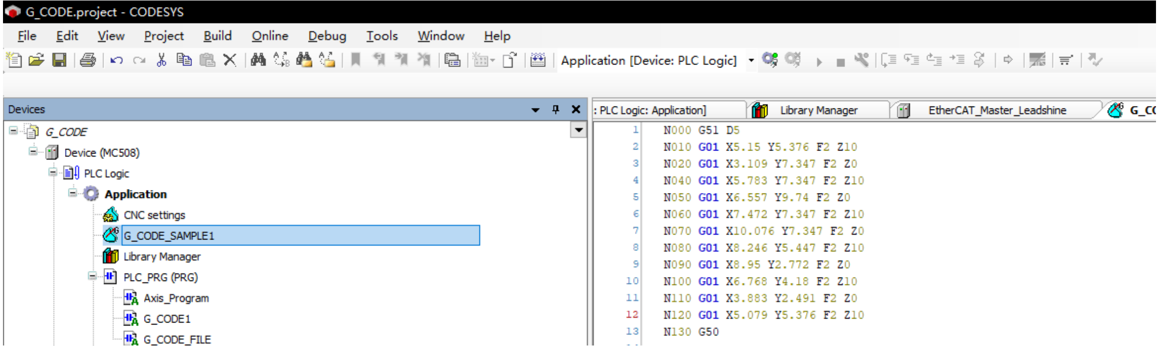
Available function blocks

SMC_AvoidLoop
SMC_ExtendedVelocityChecks
SMC_LimitDynamics
SMC_LimitCircularVelocity
SMC_ObjectSplitter
SMC_RotateQueue2D
SMC_RoundPath
SMC_ScaleQueue3D
SMC_SmoothAddAxes
SMC_SmoothPath
SMC_SmoothMerge
SMC_ToolCorr
SMC_ToolRadiusCorr
SMC_TranslateQueue3D
SMC_SmoothBSpline
SMC_RecomputeABCSlopes
SMC_ReduceVelEndAtCorner

Active function block instances

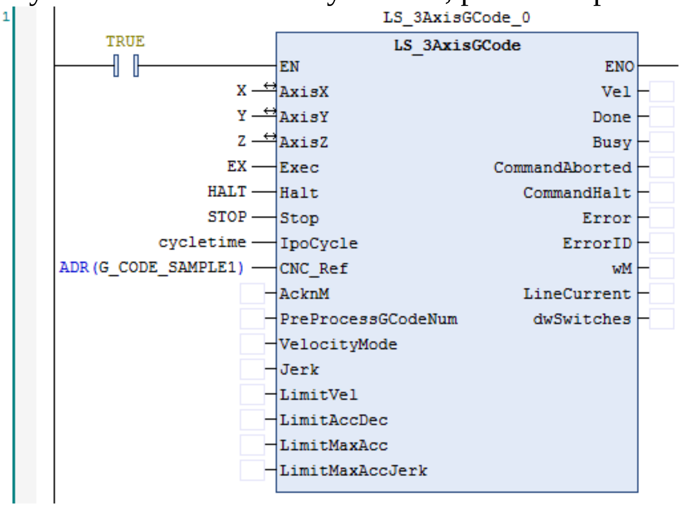
SMC_SmoothPath
SMC_CheckVelocities

Add the CNC program, and define the G-code



```
N000 G51 D5
N010 G01 X5.15 Y5.376 F2 Z10
N020 G01 X3.109 Y7.347 F2 Z0
N040 G01 X5.783 Y7.347 F2 Z10
N050 G01 X6.557 Y9.74 F2 Z0
N060 G01 X7.472 Y7.347 F2 Z10
N070 G01 X10.076 Y7.347 F2 Z0
N080 G01 X8.246 Y5.447 F2 Z10
N090 G01 X8.95 Y2.772 F2 Z0
N100 G01 X6.768 Y4.18 F2 Z10
N110 G01 X3.883 Y2.491 F2 Z0
N120 G01 X5.079 Y5.376 F2 Z10
N130 G50
```

Add the G-code function block. Define the axes and the name of the CNC program, and the “IpoCycle” is the POU task cycle time, please keep the same value.

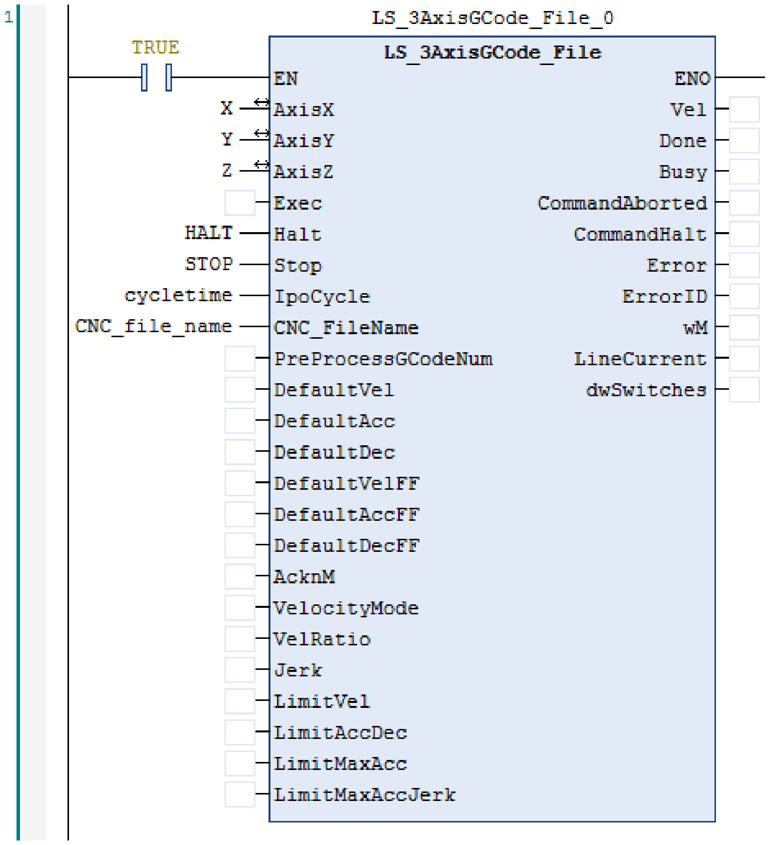


7.5.2.G-code in processing files

Open the .cnc file in the computer, then download it into PLC, and configure the function block to execute the G-code command.

Path variable of the “LS_3AxisGCode_File” is /usr/src/CODESYSControl/UsrData/, so before execute the command, user need use file operation tool to copy the file to default path.

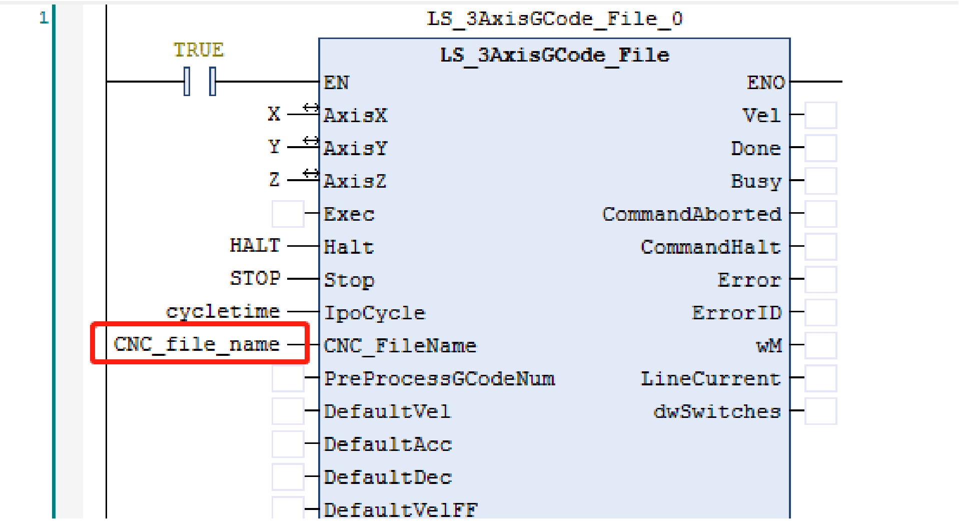
1) Function Block



2) Sample Program

Prepare the .cnc file, download it into the PLC, use file operation tool to copy the file to the path “/usr/src/CODESYSControl/UsrData/”.add the function block “LS_3AxisGCode_File”.

the “CNC_FileName” have to be defined same with the file name.



8.Motion Control Command

8.1.Command table

MC command	Description
MC_Power	Enable the axis
MC_SetPosition	Sets the axis position.
MC_ReadStatus	Reads the current axis status.
MC_Jog	Indicates jog control.
SMC_Inch	Controls motion in single step mode (the motion distance can be controlled).
MC_MoveRelative	Moves the axis in relative position mode
MC_MoveAdditive	Adds a specified movement distance from the previous axis position.
MC_MoveAbsolute	Moves the axis to a specified absolution position.
MC_MoveVelocity	Moves the axis at a constant speed.
MC_Halt	Stops axis motion (which can be interrupted).
MC_Stop	Stops axis motion (which cannot be interrupted).
MC_Reset	Resets the axis.
SMC3_ReinitDrive	Initialize Drive
SMC_ClearFBError	Deletes previous function block errors.
SMC_SetControllerMode	Sets the control mode.
SMC_SetTorque	Sets the torque.
MC_Home	Moves the axis to home.

8.2.Axis Variables

Variable name	Data type	Description
nAxisState	SMC_AXIS_STATE	Status of PLCopen axis state machine 0:Power_off: axis disable 1:ErrorStop: axis error stop 2:Stopping: stop 3:StandStill: enable 4:Discrete_Motion: in positioning motion 5:Continuous_Motion:in speed motion 6: Synchronized_Motion:in synchronized motion 7:Homing:in homing process
bRegulatorOn	BOOL	Enable axis (MC_Power. bRegulatorOn)
bDriveStart	BOOL	Disable the quick stop mechanism (MC_Power. bDriveStart)
bCommunication	BOOL	Symbol of axis communication normal
wCommunicationState	WORD	Status of axis communication 0~9: Initialize detection and associate the slave station with the synchronization axis 10~18:Initialize communication 19:Detect communication initialize completed 20~28:initialize 402 status machine and SDO 80~89:Waitting for master station synchronize all slaves 90:initialize completed 100: Axis reaches operable state 200: Received axis reinitialization command 201~209: Preparing to reinitialize the axis 210: The axis data has been reinitialized and the communication status has been switched to the state 10(Run communication initialization) >=1000: Abnormal communication status
sfTaskCycle	LREAL	Task Cycle Time
dwRatioTechUnitsNum	DWORD	Axis Scaling Numerator
iRatioTechUnitsNum	DINT	Axis Scaling Denominator
nDirection	MC_DIRECTION	Axis Direction (MC_MoveVelocity.Direction)
fFactorACC	LREAL	Acceleration Scaling Ratio
fFactorTor	LREAL	Torque Scaling Ratio

fFactorJerk	LREAL	Jerk Scaling Ratio
iMovementType	INT	Axis Type,0:Modulo ;1:Linear
fPositionPeriod	LREAL	Modulus Value
eRampType	SMC_RAMPTYPE	Velocity Ramp Type
byControllerMode	BYTE	Axis Control Mode (SMC_SetControllerMode)
byRealControllerMode	BYTE	Feedback Of Axis Control Mode
fSetPosition	LREAL	Set Position
fActPosition	LREAL	Actual Position
fAimPosition	LREAL	Target Position
fSetVelocity	LREAL	Set Velocity
fActVelocity	LREAL	Actual Velocity
fMaxVelocity	LREAL	Maximum Velocity
fSWMaxVelocity	LREAL	Limit Velocity
bConstantVelocity	BOOL	Reach Target Velocity
fSetAcceleration	LREAL	Set Acceleration
fActAcceleration	LREAL	Actual Acceleration
fMaxAcceleration	LREAL	Maximum Acceleration
diSetPosition	DINT	Set Position 607A
diActPosition	DINT	Actual Position 6063
diSetVelocity	DINT	Set Position 60FF
diActVelocity	DINT	Actual Velocity 606C
fSetJerk	LREAL	Set Jerk
fActJerk	LREAL	Actual Jerk
fSetTorque	LREAL	Set Torque%
fActTorque	LREAL	Actual Torque%
fSWLimitPositive	LREAL	Positive Limit Location
fSWLimitNegative	LREAL	Negative Limit Location
usiSWEndSwitchState	USINT	Status Of Axis Limits
bSWLimitEnable	BOOL	Enable Limit Switch
fOffsetPosition	LREAL	Position Offset
dwPosOffsetForResiduals	DWORD	Residual Position Offset Error
dwOneTurn	DWORD	Modulus Pulse
dwLastPosition	DWORD	Pulse Count
iTurn	INT	Turns
dwActPosition	DWORD	Actual Position
bVirtual	BOOL	Virtual Axis Switch

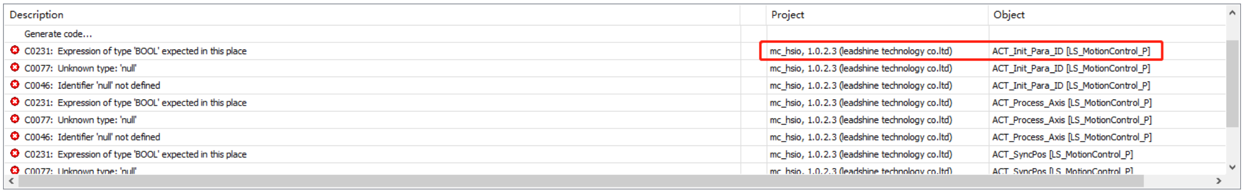
9.Leadshine Libraries Description

9.1.Basic Libraries list

Name	Description	Note
LS_BasicModule	Leadshine basic module library	
MC_HSIO	Leadshine IEC controller high speed IO library	
LS_IpoLib	Leadshine interpolation motion library	
CANopenLib	Leadshine CANopen servo and stepper library	
LS_ModbusMasterlib	Leadshine MC500 series PLC Modbus RTU master station function block	
LS_SysLib	Leadshine system general function library	
LS_UtilsLib	Leadshine data process, filter	
MC_SysLib	Leadshine MC series controller system function library	

10.Q&A

1. After compiling the program, the message interface occur some error of the function library “MC_HSIO”.

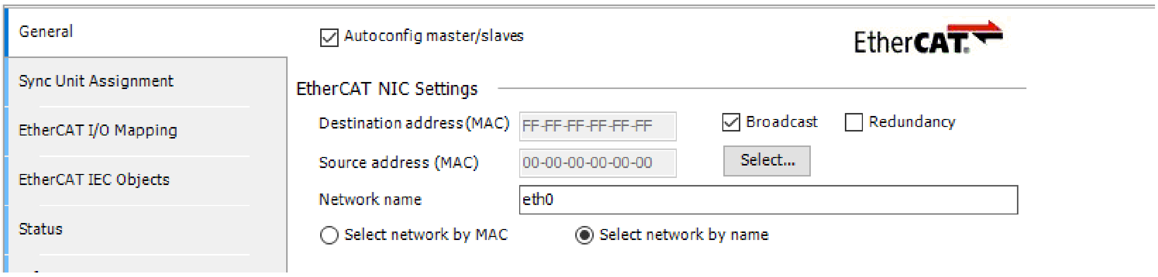


Description	Project	Object
Generate code...		
C0231: Expression of type 'BOOL' expected in this place	mc_hsio, 1.0.2.3 (leadshine technology co.ltd)	ACT_Init_Para_ID [LS_MotionControl_P]
C0077: Unknown type: 'null'	mc_hsio, 1.0.2.3 (leadshine technology co.ltd)	ACT_Init_Para_ID [LS_MotionControl_P]
C0046: Identifier 'null' not defined	mc_hsio, 1.0.2.3 (leadshine technology co.ltd)	ACT_Init_Para_ID [LS_MotionControl_P]
C0231: Expression of type 'BOOL' expected in this place	mc_hsio, 1.0.2.3 (leadshine technology co.ltd)	ACT_Process_Axis [LS_MotionControl_P]
C0077: Unknown type: 'null'	mc_hsio, 1.0.2.3 (leadshine technology co.ltd)	ACT_Process_Axis [LS_MotionControl_P]
C0046: Identifier 'null' not defined	mc_hsio, 1.0.2.3 (leadshine technology co.ltd)	ACT_Process_Axis [LS_MotionControl_P]
C0231: Expression of type 'BOOL' expected in this place	mc_hsio, 1.0.2.3 (leadshine technology co.ltd)	ACT_SyncPos [LS_MotionControl_P]
C0077: Unknown type: 'null'	mc_hsio, 1.0.2.3 (leadshine technology co.ltd)	ACT_SyncPos [LS_MotionControl_P]

: Please check the project soft motion version, change it to 4.10.0.0 version

2. EtherCAT master can’t find the slave drive

: Please check the EtherCAT source (MAC) address setting, refer to the chapter 6.3 to set the master station



☑ Autoconfig master/slaves

EtherCAT NIC Settings

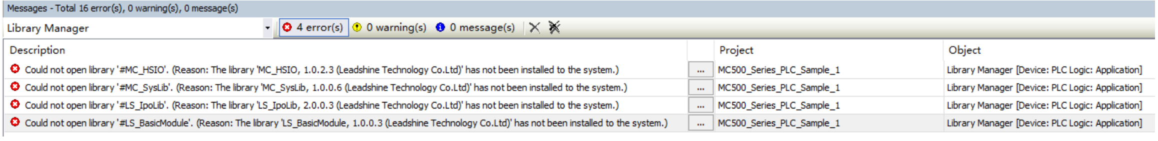
Destination address(MAC) FF-FF-FF-FF-FF-FF ☑ Broadcast □ Redundancy

Source address (MAC) 00-00-00-00-00-00

Network name eth0

○ Select network by MAC ● Select network by name

3. After compiling the program, message interface occur “Could not open library, reason the library has not been installed to the system”



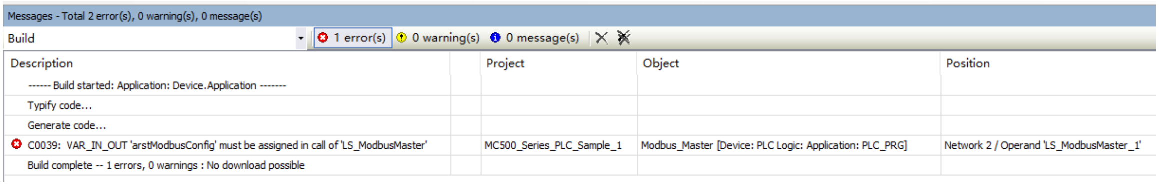
Messages - Total 16 error(s), 0 warning(s), 0 message(s)

Library Manager | 4 error(s) | 0 warning(s) | 0 message(s)

Description	Project	Object
Could not open library '#MC_HSIO'. (Reason: The library 'MC_HSIO, 1.0.2.3 (Leadshine Technology Co.Ltd)' has not been installed to the system.)	MC500_Series_PLC_Sample_1	Library Manager [Device: PLC Logic: Application]
Could not open library '#MC_SysLib'. (Reason: The library 'MC_SysLib, 1.0.0.6 (Leadshine Technology Co.Ltd)' has not been installed to the system.)	MC500_Series_PLC_Sample_1	Library Manager [Device: PLC Logic: Application]
Could not open library '#LS_IpoLib'. (Reason: The library 'LS_IpoLib, 2.0.0.3 (Leadshine Technology Co.Ltd)' has not been installed to the system.)	MC500_Series_PLC_Sample_1	Library Manager [Device: PLC Logic: Application]
Could not open library '#LS_BasicModule'. (Reason: The library 'LS_BasicModule, 1.0.0.3 (Leadshine Technology Co.Ltd)' has not been installed to the system.)	MC500_Series_PLC_Sample_1	Library Manager [Device: PLC Logic: Application]

: Check the function libraries, installing all of the library files which provide by us.

4. After adding “LS_ModbusMaster”,occur error notice.



Messages - Total 2 error(s), 0 warning(s), 0 message(s)

Build | 1 error(s) | 0 warning(s) | 0 message(s)

Description	Project	Object	Position
------ Build started: Application: Device.Application -------			
Typify code...			
Generate code...			
C0039: VAR_IN_OUT 'arstModbusConfig' must be assigned in call of 'LS_ModbusMaster'	MC500_Series_PLC_Sample_1	Modbus_Master [Device: PLC Logic: Application: PLC_PRG]	Network 2 / Operand 'LS_ModbusMaster_1'
Build complete -- 1 errors, 0 warnings : No download possible			

: Please define the function block input and outputs variables completely

Contact us

Leadshine Technology Co., Ltd.

Headquarters Address:
15-20/F, Block B, Nanshan i-Valley, No.3157, Nanshan District,
Shenzhen City, Guangdong Province, China

Tel: +86 755 26411692
Fax: +86 755 26402718
Website: www.leadshine.com
Emails: sales@leadshine.com

Leadshine Global Retailers Network

Get in touch with us or any of your local Leadshine certified retailers by visiting our global website.

Technical Support
Tel: 86-755-2641-8447
86-755-2641-8774 (Asia, Australia, Africa)
86-755-2665-5136 (North and South America)
86-755-8654-2465 (Europe)

Fax: 86-755-2640-2718
Email: tech@leadshine.com
Author Email: Sean@leadshine.com

Sales Hot Line
Tel: 86-755-2641-7674 (Asia, Australia, Africa)
86-755-2641-7617 (North and South America)
86-755-2640-9254 (Europe)
Email: sales@leadshine.com

Leadshine overseas

Leadshine America, Inc.

North America Office

Address: 26050 Towne Centre Dr. Foothill Ranch California
United States
Tel: 1-949-608-7270
Fax: 1-949-638-7298
Website:
www.leadshineusa.com
Emails:
sales@leadshineusa.com