

MC500 Series PLC Programming Manual







www. leadshine.com



Contents

1. Introduction	5
2. Quick Start	7
2.1. Programing Environment Launching	7
2.1.1. MC500 Series PLC Package Install	7
2.1.2. Basic Function Libraries Install	8
2.1.3. Install basic device .XML file	8
2.2. Create New Project	10
2.3. Login And Running PLC	12
2.4. Device Configuration	14
2.4.1. Auto-Scanning Device	14
2.4.2. Off-Line Device Configuration	14
2.5. PLC Sample Program Writing	15
2.5.1. Create Main Program	15
2.5.2. Variable Definition	16
2.5.3. Variable address definition	17
2.5.4. Variable type	17
2.5.5. Create Action Program	18
2.5.5. Create Retain Program	18
2.5.7 Locate Program Compiling Error	18
3 Local Module	20
3.1 Local Module Configuration	21
3.1.1 Digital module configuration	$\frac{21}{21}$
3.1.2. Analog module configuration	$\frac{21}{21}$
A High Speed Counter Configuration	$\frac{21}{24}$
4. Ingli Speed Counter Configuration	24
4.1. Add high speed device	24
4.2. Configure the high speed counter parameters	24
4.5. Setting input inter parameters	20
5. Serial Port Communication	27
5.1. R5485 Communication wiring	27
5.2. Modbus-RTU Communication configuration	28
5.2.1. Modbus Master Station Configuration	28
5.2.2. Modbus Slave Station Configuration	32
5.2.3. Modbus Variable Address	32
5.3. Ethernet Communication	34
5.4. Ethernet/IP Communicating	34
5.4.1. Configuring PLC As Master Station	34
6. EtherCAT Configuration	37
6.1. Overview	37
6.2. Add ".Xml" File	37
6.3. EtherCAT Master Station Configuration	38
6.4. EtherCAT Slave Station Configuration	39
6.4.1. General Configuration	39
6.5. Process Data Object (PDO)	40
6.5.1. Starting Data Object (SDO)	40
6.5.2. EtherCAT I/O manning	40
6.6 Add 402 Axis To Servo Slave Station	40
7 Motion Configuration	42
7.1 Local High Sneed Pulse Axis Configuration	42
7.1.1 Axis Configuration Interface	-τ <i>Δ</i> Δ2
7.1.2 High Speed Output Wiring	∠ 1
7.1.2. High Speed Pulse Avis Control Program	-+/ ⊿7
7.1.5. Then Speed I dise Aris Configuration	+/ /0
7.2. EURICAT AXIS CONTIGUIATION	47 10
7.2.1. Otheral Configuration.	49 10
7.2.2. Scalling And Wapping	49 50
1.2.5. Homing Parameters Configuration	30



7.2.4. EtherCAT Axis Control Program5	1
7.3. CANopen axis configuration	2
7.3.1. General configuration	3
7.3.2. CANopen bus manager configuration	4
7.3.3. CANopen slave configuration	4
7.3.4. CANopen axis motion program	5
7.4. E-CAM function	7
7.4.1. Function Block	7
7.4.2. Sample Program	8
7.5. G-code Function	0
7.5.1. G-code in PLC program	0
7.5.2. G-code in processing files	2
8. Motion Control Command	3
8.1. Command table	3
8.2. Axis Variables	3
9. Leadshine Libraries Description	5
9.1. Basic Libraries list	5
10. Q&A	5
Contact us	6



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

Record of revisions



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

Model Specifications	MC508CS	MC516CS MC532C			
	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	EtherCA	Γ 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 po	int, 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)				

MC500 series PLC specification



MC500 series PLC programming manual

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



2)Then click the "tool" option ,select the CODESYS installer



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

۲	CODESYS	Installer

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📌 快速访问	名称	修改日期	类型	大小			
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					ilo	Export Config	Import Config
						Lipert comig	



2.1.2.Basic Function Libraries Install

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

cation	System V	Edit Locations
	(C: \ProgramData \CODESYS \Managed Libraries)	
nstalled Li	braries	Install
Company	(All companies)	Uninstall
• • • • •	Miscellaneous)	Export
• • A	ppication	
± 🔋 I	ntern	
● 8 L	eadshinePAC	
• • • •	eadSys	Find
± 🖁 S	ystem	Details
± ≣ U	se Cases	Trust Certificate
Group	by category	Dependencies

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

A X Start Page X		▼ ToolBox
CODESYS V3.5 SP18		
Basic operations	Latest news	
New Project		÷.
Open Project	COUESTS.COM COUESTS.SIDRE	
Open Project from PLC	# Ubray Repository ×	
Recent projects	a Selet Deav	
	← → * ↑ → IDHBA → MUE → MCS00 series Description hite → function libraries ∨ O > → ← function libraries ⊞BER	
	· 御祭 · 新建文件夹 · · · · · · · · · · · · · · · · · · ·	
	★ 快速动同 名称 停波日期 供型 大小	
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	2023-06 PMC Basic Hibrary. 2023/4/28 17:17 COMPLED-LIBR. 183 KB	
	Download SM3_Basic.compiled-library-ge32.co 2023/3/10 8:54 COMPILED-LIBR 3,756 KB	
	MAS dates is	
	文件名(t): Any library files (*.compiled- ッ	
	打开(2) 取消	

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.

Eile Edit View Project Build Online Debug Image: Second S	Tools <u>Window H</u> elp © <u>C</u> ODESYS Installer][11 11 11 11 12 4 要 m 장
	Library Repository	
Devices • 4	Usual Element Repository Usualization Style Repository	
	Ucense Repository QPC UA Information Model Repository License Manager Device License Reader	Latest news 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.
	Cystomize Ogtions Import and Export Options	
	Scripting Edge Gateway Miscellaneous	



Location System Repository (C:\ProgramData\CODESYS\Devices)	Edit Locations
Installed Degice Descriptions String for a full text search Vendor Name Vendor Vendor Description * Miscelaneous * Fieldbuses * Fieldbuses * Ø Notelaneous * Ø SoftMotion drives	Install Uninstalli Export Details
	film

2) Select the devices XML files to install

名称 ^	修改日期	类型	大小
_	12 BORNA		
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
	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"



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

Li	praries				
: Pr	ojects	Empty project	HMI project	Standard	Standard
				project	project w
	ontaining one device, one	application, and an	empty implemen	tation for PLC	PRG
A project o					
A project o <u>N</u> ame	new_project_1				

3)Selecting the device and programing language, MC500 series PLC supports ST, LD, CFC, SFC, FBD, IL programing language.



4)After finish above steps, window shows as below





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.

Untitled17.project - CODESYS	e			
<u>File Edit View Project Build</u>	<u>Online Debug Tools Wind</u>	ow <u>H</u> elp		
8 2 ■ 5 0 o 1 h @ X	(146.0%) (46.0%) [11.1%] [21.1%] [21.1%]		Device: PLC Logic1 👻 📽 🕮	
			betteen ze zegiej - sji -sji	
2011				
	-			
Project Settings				
	Project Settings			×
	Compile options	SoftMotion		
	Compiler warnings			
	Library developmen	t SoftMotionVersion:	4.13.0.0	<u> </u>
	Monitoring		<not set=""> 4.13.0.0</not>	
	Page Setup		4.12.0.0	
	Security		4.10.0.0	
	SFC		4.8.0.0 4.7.0.0	
	SoftMotion		4.6.3.0	
	Source Download		4.6.1.0	
	Static Analysis Light		4.6.0.0 4.5.1.0	
	Users and Groups		4.5.0.1	
	Visualization		4.4.0.2	
	visualization Profile		4.4.0.1 4.4.0.0	
			4.3.2.0	
			4.3.0.0	
			4.2.2.0 4.2.1.2	
			4.2.1.1	
			4.2.0.0	
			4.1.1.0 4.1.0.0	K Cancel
	L		4.0.0.0	
	Messages - Total 0 error(s	;), 0 warning(s), 0 message(s)		
		-	0 error(s) 😗 0 warning(s) 🟮 0 message(s) 📉 💥
	Description			
POUs Se Devices				
· · · · · · · · · · · · · · · · · · ·				



2.3.Login And Running PLC

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



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 N	etwork Path to the Controller ateway-1 (Scanning) MC-508 [0003]			Device Name: MC-508	^	Scan Network
				Device Address: 0003		
				Block driver: UDP		
				Number of channels: 4		
				Target ID: 109D 020F		
				Target Name: Leadshine-ARM-Linux-SM-CN	ic y	
Hide non	-matching devices	, flitter by Target I	D		<u>O</u> K	. <u>C</u> ancel
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3)Then download the project to PLC, click "online" to select login option





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

	-11	Start	F5	on [Device	PLC Logk] • 9; 9 • =	46 101 61 6	비 11 응 이 開 박 집							
		Stop	Shift+F8											
		single cycle	Cen+r5	-										
ev_project_1	12	New Breakpoint			Gran Natural Gatavari +	Deside a								
🗦 🚮 Device (connected) (MC508)	-	Edit Breakpoint		e*	starreenere ooseney -	and a								
* 🔝 PLC Logic		Toggle Breakpoint	F9											
- O Application [stop]	0	Disable Bregkpoint					•							
- 🎁 Library Manager		Enable Breakpoint												
PLC_PRG (PRG)	0	Step Over	F10				and and and and							
🖹 🧱 Task Configuration		Step Into	E0.				•		•					
H-G 🔂 Mair/Task		Firm Out	ENIX- E10				Gabeway		-					
- I PLC_PRG		Bug to Conne				Gateway-1		MC-508 (active)						
SoftMotion General Axis Pool		Earl to carsor				IP-Address:		Device Name:						
	10	Set Negt Statement				localhost		MC-508						
	10	Show Next Statement				Port		DeviceAddress:						
		Write Values	Ctrl+F7			1217		0003						
		Force Values	F7					Target ID:						
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				-										
			Common.PCI Param	eters										
			Task Deslowment											
			Satur											
			Televentine .											
			anotheosti											
					Your desire can be served.	ears more								
			Watch 1											
			Expression						Application	Type	Value	Prepared value	Execution point	



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.



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.



2.5.PLC Sample Program Writing 2.5.1.Create Main Program

Information

1) Interface introduction

SV2.CAN

1) Interface introd	uction				
File Edit View Project FBD/LD/IL Build Onl	line <u>D</u> ebug Iools <u>W</u> indow <u>H</u> elp				₹9
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Device (MC508)	Scope Name Address D	Data type Initialization Comment Attributes	E .	Network	
- BH PLC Logic		(2)		Box Box with EN/ENO	
Library Manager				-we Assignment	
PLC_PRG (PRG)				-> Jump	
😑 🧱 Task Configuration				- Return	
⊟- 😂 MainTask				14 Input	
-@] PLC_PRG	<		>	T Branch	
SoftMotion General Axis Pool	1			Execute	
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				Other Operators	
(1)				* Function Blocks	
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		(3)		_	
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	¢				
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	Build	 O error(s) 0 warning(s) 0 message(s) X 			
	Description		Project Object Position		
		(4)			
Services POUs					
	L		Lascoulo: 👽 o 💌 o Precomple 🗸 😪	Project user: (nobody)	
(1) device configui	ration area	(4) project inform	nation area		
		\bigcirc Γ J			

2 local variable definition area

③ programing area

④ project information area⑤ LD quick command bar⑥ toolbox



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

program.		
Ele Edit View Project FBD/LD/IL Build Online	2ebug Iools Window Help	₹ 9
🛅 🚅 📓 🗠 🗠 🕉 🐜 🛝 🗙 🖓 🐐 🐪	14 🦄 🐘 🛅 - 🚰 Application (Device: PLC Logic) - 🧐 🤍 🗛 📲 🖏 (江 22 🧐 11 名) (第二〇 11 名)	
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Devices • 7 >	V B PLC_PRG X	ToolBax 👻 🛱 🗙
= 💮 Untitled Isa	PROGRAM PLC_PRG	S General
E Device (MCS08)	Scope Name Address Data type Initialization Comment Attributes	1 Network
B B PLC Logic		📑 Dox
Application		Bax with EN/ENO
- 💼 Library Manager		-ma Assignment
PLC_PRG (PRG)		-> Jump
Task Configuration		eur Return
🖮 😂 MainTask		4 Input
- @ PLC_PRG	۲ () () () () () () () () () (T Branch
SoftMotion General Axis Pool	A V	1 Execute
		* Boolean Operators

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.

/ 🏪 PLC_	PRG X						
ې ۱۰ 🗳	$ \mathbf{X} $						PROGRAM PLC_PRG
^	Scope	Name	Address	Data type	Initialization	Comment	Attributes
1	🖗 VAR	local_variable_1		BOOL			
<							
Ť	local	variable 1					
<							
R PLC_	PRG.ACT	<					
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

۵	$\Rightarrow \Rightarrow X $									
	^	Scope	Name	Address	Data type	Initialization	Comment	Attributes		
	1	VAR_GLOBAL	global_variable_1		BOOL					

Global variable can be called within all program body



Devices 🔹	Ψ Χ	🖉 🎯 GVL	×						
Ethercat_sample_program	•	🈼 🕁 🕸	X						
Gill Device (MC508) Gill PLC Logic Gold Control C		1	Scope VAR_GLOBAL	Name global_variable_1	Address	Data type BOOL	Initialization	Comment	Attributes
PLC_PRG (PRG) ₩ PLC_PRG (PRG) ₩ PLC_PRG 1 (PRG) ₩ PLC_PRG 1 (PRG) ₩ MainTask ₩ PLC_PRG		PLC_F	GVL.global_v	rariable_1					~ •
SottMotion General Axis Pool		<111111111111111111111111111111111111111	GVL.global_v	rariable_1					A V

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
В	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	$0 \sim (2^{64} - 1)$
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	$-263 \sim (2^{63} - 1)$
REAL	32bit	1.175494351e ⁻³⁸ ~3.402823466e ⁺³⁸
LREAL	64bit	2.2250738585072014e ⁻³⁰⁸ ~1.7976931348623158e ⁺³⁰⁸
STRING	$8 \times N$ bit	
WSRING	16×N bit	
TIME		T#0ms~T#71582m47s295ms
TIME_OF_DAY	201:4	TOD#0:0:0~TOD#1193:02:47.295
DATE	32011	D#1970-1-1~D#2106-02-06
DATE AND TIME	1	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

Ethercat_sample_program.p	project - CODESYS					
<u>File E</u> dit <u>V</u> iew <u>P</u> roject	t FBD/LD/I <u>L B</u> u	ild <u>C</u>	<u>)</u> nline	<u>D</u> ebug	<u>T</u> ools	<u>W</u> ind
🎦 🚔 🖪 🕼 🗠 🖓 🗄	6 🖻 🗙 🖊 😘	il 🙆	1	同常	🛱 🟪	• 🖻
[<u>1270</u> (××) =∪ee € 3 €53 €53 -1 1 -1/	ଜ ଜୈଜ ଏହା ଏହା ଶିଳ ଶ	F = 1		∲ 🕮 -¢ret	· *4 -0	
Devices	↓ 1	¥ ¥	🕂 🕂 P	LC_PRG	< 🔣 T	ask Cor
Ethercat_sample_program		-	1	$* \times$		
Device (MC508)			^	Scope	e Nam	e Ad
Application						
🎁 Library Man	ager					
PLC_PRG (P	RG)					
🖹 🎆 Task Ci 👗	Cut					
🖹 🍪 Ma 🗎	Сору					
	Paste					
🔉 SoftMotion Gen 🗙	Delete					
	Brow <u>s</u> e	•				
	<u>R</u> efactoring	•	<			
e	Properties		1			
***	Add Object	•	Ac Ac	tion		
	Add Folder		B M	ethod		
G	Edit Object		🗊 Pr	operty		
	Edit Object With		昰 日 Tr	ansition		

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

Culerent_semble_bredrembrejeer eer	
<u>File Edit View Project Build</u>	Qnline Debug Iools Window Help
🗄 📽 🖬 🚳 🗠 여 🕉 🖷 🗮 🗡 🖻	🛤 锰 🍓 🤮 📙 🎕 🦄 🍓 [編] 🏙 🖆 👔 [翻] Application (Device: PLC Logic) 🔹 🧐 🤴 🕞 💼 🖏 (三) 역 역 🥶 🤤 🖇 👳 👘 🐨
Devices	▼ # X / 例 PLC PRG @ TackConfiguration & MainTask X
= 💮 Ethercat sample program	Configuration
Device (MC508)	
PLC Logic	Priority (0.31): 1
🖹 🔘 Application	Ten
Library Manager	()per
PLC_PRG (PRG)	Caller and the caller
😑 🎇 Task Configuration	Wathdon
🖻 🥩 MainTask	- Enable
- @] PLC_PRG	
SoftMotion General Axis Pool	Time (e.g. t#200ms) (t=5000ms
	Sensitivity 1
	💠 Add Call 🔀 Remove Call 📝 Change Call 🕸 Move Up 🔿 Move Down 🎫 Open POU
	POU Comment
	型 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.

Ethercat_sample_program.project - CODESYS	
<u>File Edit View Project FBD/LD/IL Bui</u>	ld <u>O</u> nline <u>D</u> ebug <u>T</u> ools <u>W</u> indow <u>H</u> elp
🛅 🛩 🖬 🏉 🗠 🐃 🛍 🗶 🖊 🎬	<u>G</u> enerate Code F11 Applicat
ы book and a set and a set and a set a se	<u>C</u> lean 는 菲
Devices	Clean <u>a</u> ll
	<pre>1 local_variable_1 2 local_variable_1</pre>



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



Messages - Total 2 error(s), 0 warning(s), 0 message(s)				
Build 👻 🗘 Build	e(s)	××		
Description		Project	Object	Position
Build started: Application: Device. Application				
Typify code				
Generate code				
O 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





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.



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.

Ethercat_sample_program	-	71.	Add De	vice					×
🖹 👔 Device (MC508)									
PLC Logic		Na	Action	010					
🖹 🧔 Application			 Append 	d device 🔿 Ins	sert device O Plug de		Ipdate device		
- 🧭 GVL									
Library Manager			String for a	full text search		Vendor	<all vendors=""></all>		~
PLC PRG (PRG)			Name	_	Vendor		Version	Description	
- HR ACT			— <u>Ш</u> Ме	scelaneous	Londshino Toshnology	Co. Ltd	2 5 15 40		
	0		- 6	PM0016P	Leadshine Technology	y Co., Ltd.	3.5.15.40		
	·/		- 6	PM0016R	Leadshine Technology	y Co., Ltd.	3.5.15.40		
Task Configurate			- 6	PM0032	Leadshine Technology	y Co., Ltd.	3.5.15.40		
□ · ⊘ Main Lask				PM0032N1	Leadshine Technology	y Co., Ltd.	3.5.15.40		
e PLC_PRO	5_1			PM0032N2	Leadshine Technology	y Co., Ltd.	3.5.15.40		
PLC_PRG	G Contraction of the second seco			PM1616	Leadshine Technology	v Co., Ltd.	3.5.15.40		
LocalBus_Master (Lq 👘	Cut.		- 6	PM3200	Leadshine Technology	y Co., Ltd.	3.5.15.40		
SoftMotion General	Cut		- 6	PM32001	Leadshine Technology	y Co., Ltd.	3.5.15.40		
	Сору		- 11	PM32002	Leadshine Technology	y Co., Ltd.	3.5.15.40		
ria.	Paste			PMA0004IV	Leadshine Technology	y Co., Ltd.	3.5.15.40		
×	Delete			PMA04001V	Leadshine Lechnology	y Co., Ltd.	3.5.15.40		
	Ref <u>a</u> ctoring	•							
e	Properties								
1000	Add Object		Group b	oy category] Display all versions (fo	or experts o	nly) 🗌 Displa	y outdated versions	,
E	Add Folder		ii Na	me: PM0016					
	Add Device		Ve	ndor: Leadshine	Technology Co., Ltd.				~
	Insert Device		Ve	rsion: 3.5.15.40	D				S
	Disable Device		Or De	der Number: * scription:					
	Update Device								
l d'	Edit Object								
	Edit Object With	A	Append s	elected device	as last child of				
	Edit IO mapping		ocalBus <u>(</u> You	_Master can select anot	ther target node in the r	navigator w	hile this windov	vis open.)	
	Import mappings from CSV								
	Export mappings to CSV							Add Device	Close



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.

Devices - 4 ×	M0016 🗙									
Ethercat_sample_program	PCI-Bus IEC Objects	Find		Filter Show	all			- 🕆 Add	FB for IO Channel	→ Go to Ins
= = = PLC Logic		Variable	Mapping	Channel	Address	Туре	Unit	Description		
- O Application	Internal Parameters			ErrorCode	%IW22	WORD		ErrorCode		
GVL	Internal I/O Mapping	B- *		OUTPUT_0	%QW22	WORD		OUT0-OUT15		
Library Manager		**		BitO	%QX44.0	BOOL				
PLC_PRG (PRG)	Status	- **		Bit1	%QX44.1	BOOL				
Symbol Configuration	Information	- **		Bit2	%QX44.2	BOOL				
Task Configuration		50		Bit3	%QX44.3	BOOL				
😑 🥩 Task		🍫		Bit4	%QX44.4	BOOL				
EtherCAT_Master_Leadshine.EtherCAT				Bit5	%QX44.5	BOOL				
PLC_PRG		🍫		Bit6	%QX44.6	BOOL				
LocalBus_Master (LocalBus Master)		* *		Bit7	%QX44.7	BOOL				
High_Speed_IO (High Speed IO)		* ø		Bit8	%QX45.0	BOOL				
😑 🚮 EtherCAT_Master_Leadshine (EtherCAT Master Leadshi		* *		Bit9	%QX45.1	BOOL				
Section 2015 (ELP-EC1000S(COE))		🍫		Bit10	%QX45.2	BOOL				
EC_Axis_0 (SM_Drive_GenericDSP402)		**		Bit11	%QX45.3	BOOL				
CANbus (CANbus)		* *		Bit12	%QX45.4	BOOL				
CANopen_Manager (CANopen_Manager)		**		Bit13	%QX45.5	BOOL				
ISV2_CAN6020 (ISV2-CAN6020)		- * *		Bit14	%QX45.6	BOOL				
LocalBus_Master_1 (LocalBus Master)		- *		Bit15	%QX45.7	BOOL				
PM0016 (PM0016)										
🚮 PM1600 (PM1600)										
PM1616 (PM1616)										
- m PMA0004IV (PMA0004IV)										
PMA0400IV (PMA0400IV)										
🐵 🍐 SoftMotion General Axis Pool										

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.

o the below ta	uic.								
Data_Buffe	r value	A	Analog	g input ty	ype		Inter	nal variable range	
0			-5	5~5V,			-:	32000~32000	
1		1	1	~5V			0~32000		
2		+	10	101			22000 22000		
Z			-10	/~ +10∨				32000~32000	
3			0	~10V				0~32000	
4			0~	·20mA				0~32000	
5		-	4	20				0 22000	
5			4~	20INA				0~32000	
6			()~5V			0~32000 -32000~32000		
7			-20m	A~20m.	A				
PCI-Bus IEC Objects	Parame	eter	Туре	Value	Default Value	Unit	Description		
Internal Parameters		ocalBusSlave Info							
Internal Farameters		SlaveAddr	BYTE	0	0				
Internal I/O Mapping		SlaveNodeID	dword	1627389989	1627389989				
Chalus	- Q A	D0 config							
Status		Index	UINT	16#8000	16#8000				
Information		SubIndex	UINT	16#01	16#01				
		Data_Buffer	UINT	0	0				
		Data_Size	UINT	1	1				
	🖗 A	ND1 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				
		 A star at the set of 	the set of the						

0

1

0

Data_Buffer

🖗 Data Size

UINT

UINT



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

ADU 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

PCI-Bus IEC Objects	Parameter	Туре	Value	Default Value	Unit	Description	
Internal Parameters	🖃 🖗 LocalBusSlave Info						
Internal Parameters	🖤 🕸 SlaveAddr	BYTE	0	0			
Internal I/O Mapping	SlaveNodeID	dword	1627390469	1627390469			
	📮 🖗 DA0 config						
Status	🖉 🖗 Index	UINT	16#8000	16#8000			
Tefermation	🖤 🕸 SubIndex	UINT	16#01	16#01			
Inormation	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			
	Ø Data_Size	UINT	1	1			
	🖃 🖤 🖗 DA2 config						
	🖤 🖗 Index	UINT	16#8000	16#8000			
	SubIndex	UINT	16#03	16#03			
	Data_Buffer	UINT	0	0			
	Ø 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.

PCI-Bus IEC Objects	Parameter	Туре	Value	Default Value	Unit	Description	
Internal Darameters	🖨 🛛 🖗 DA0 en						
	🖤 🌵 Index	UINT	16#8001	16#8001			
Internal I/O Mapping	🖤 🖗 SubIndex	UINT	16#01	16#01			
	🖤 🖗 Data_Buffer	UINT	1	1			
Status	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_I	Buffer	value			Channel state	
			0			Ke	eep previous status	
			1				Reset status	
			2			Out	put the preset value	
PCI-Bus IEC Objects	Parameter	Туре	Value	Default Value	Unit	Description		· · · · · · · · · · · · · · · · · · ·
Internal Parameters	😑 🗇 DA0 state when	n link lost						
ancentari arametera	🔷 🖗 Index	UINT	16#8002	16#8002				
Internal I/O Mapping	🔷 🖗 SubIndex	UINT	16#01	16#01				
	🖗 🖗 Data_Buffe	r UINT	0	0				
Status	Ø 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 " $0\sim10V$ " 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.



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	Туре	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

I-Bus IEC Objects	Parameter		Туре	Value	Default Value	Unit	Description	
al Parameters	Axis_3_Special_IO_LT	C_Info						
8	Axis_4_Pulse_FPGA_C	Config						
I I/O Mapping	Axis_4_Special_IO_LT	C_Info						
	Axis_5_Puise_PPGA_C	oning C. Info						
	W AXIS_5_Special_10_L1	C_INO						
mation								
6	+ IS PWM 3							
6	B Ø HS PWM 4							
6	W HS CMP 1							
8	B I W HS CMP 2							
8	I W HS CMP 3							
8	HS CMP 4							
	HS CMP 5							
	HS CMP 6							
	E @ HS CMP 8							
6	B W HS CMP 9							
6	HS Cmp2d 1							
	± 🖗 HS counter 1							
6	🗄 🖗 HS counter 2							
8	HS counter 3							
8	HS counter 4							
	HS counter 5							
	HS counter 6		J					
HS counter 1								
🖤 🖗 Counter_Channe	el	DINT			0		0	
🖉 🖗 Counter_Preset	InputNum	DINT			-1		-1	
🗝 🖗 Counter_SetWo	orkMode	UDINT			0		0	
🗝 🖗 Counter_Dir		UDINT			0		0	
Counter_Count	Mode	UDINT			0		0	
Counter_MaxVa	alue	DINT		21474	i 21	147483	3647	
🖤 🖗 Counter_MinValu	ue	DINT		-2147	21	147483	3648	
👻 🖗 Counter Touch P	Probe Pin0	DINT			-1		-1	
🖤 🖗 Counter Touch P	Probe Pin 1	DINT			-1		-1	
Counter Compar	re Pin	DINT			-1		-1	
Counter Compar	re2D Pin	DINT			-1		-1	
Counter A Phase	e	DINT			-1		-1	
Counter B Phase	e	DINT			-1		-1	
HS counter 2	-				-		-	
* 1.5 Counter 2								



3) Setting the counting direction

Value =0 is Positive, -	-1	is negative
-------------------------	----	-------------

	6			
Ounter_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 Pin 1	DINT	-1	-1	
🖤 🖗 Counter Compare Pin	DINT	-1	-1	
🖤 🕸 Counter Compare 2D 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

Ø 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 Compare 2D 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.

PCI-Bus IEC Objects	Parameter	Туре	Value	Default Value	Unit	Description
Tekenal Decemators	HS LTC 5					
Internal Parameters	HS LTC 6					
Internal I/O Mapping	HS LTC 7					
	HS LTC 8					
Status	HS LTC 9					
Televentine	HS Encoder 1					
mornation						
	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		
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	Time_In11	UDINT	2	65535		
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	Time_In14	UDINT	65535	65535		
	Time_In15	UDINT	65535	65535		
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	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.

Add Library Delete Library Properties Details Placeholders Ibrary Repository Icon Legend Summary praries used in application 'Device.Application' Image: Constraint on 'Device.Application' Image: Constraint on 'Device.Application' Image: Constraint on 'Device.Application' Iame Namespace Effective Version	🗃 PM0016 🛛 PMA0004IV 🧭 GVL 🎢 Library Manager 🗙		
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3) Find the function library, add to the manager.

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





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

Name	Description	Data type	Range	Initialization
arstModbus	Moebus communication	ARRAY[0127] OF		
Config	config	ModbusConfig	-	-
stSerialCom municationPara	Serial port communication parameters	SerialCommu nicationPara	-	-
byModbusConfig Number	Modbus command quantity,maximum 128 configurations	BYTE	0-128	0
xError	Error	BOOL	TRUE/F ALSE	FALSE
ErrorID	Error code	ModbusMaste rErrorCode	-	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.

Library M	X								
Sco	ope Name		Address Data	a type	Initialization Com	ment Attributes	s		
1	VAR local_v	ariable_1	BOOL						
3	VAR LS_MOO	ibusmaster_u r_enable	BOOL	odbusmaster					
4 🐠	VAR modbu	s_config	ARRA	VY [0127] OF ModbusCo	nfig				
5	VAR commu	inication_configuratio	n Serial	CommunicationPara					
7	VAR modulu VAR error_s	s_command_quantity status	BOOL						
8	VAR error_I	D	Modb	usMasterErrorCode					
					▲ ▽				
PLC_PF	RG.modbus_maste	r_configuration X	LS_Mod	busMaster_0					
	master_enabl	.e	LS_Mo	dbusMaster	FNO				
	u u	modbus_config -	arstModbusConfiç	J XE:	rror - error_status				
C	communication modbus co	_configuration —	-stSerialCommunic	cationPara Erro	orID - error_ID				
		anna_quanor of	bynoubusconright	AIDEL					
itializati	ion value								
(ariable I	Initialization								
Evores	sion		Init value		Data tv	ne .		Comment	
		- C	The value		CarialCar			Comment	
= comn	munication_col	inguration	2		SerialCon	municationPara		Contral and Dr. COMP. 41. CC	
	uairort		3		UDINI			Senai port.3: COMU;4: CC	лт 1
	udiBaudrate	1	115200		UDINT			Baud rate	
•	UdiPARITY		COM.PARITY	.EVEN	COM.PAR	111		Parity	
	udiStopBits		COM.STOPBI	I. ONESTOPBIT	COM.STC	PRIT		Stop bit	
	udiTimeout		1000		UDINT			Time out, Unit: ms	
···· (udiByteSize		8		UDINT			Data bit	
							Apply Value to Selev	ted Lines Decet Selected Lin	er to Default Value
alues dit	ifferent from t	ne default are disp	layed in bold letter				Apply Value to Selec	tted Lines Reset Selected Lin	es to Default Value
alues dif efault va nly the f	ifferent from t alues will not first 100 value	he default are disp be explicitly initial 15 are displayed. T	layed in bold letter zed. he remaining value	rs. 25 are set to the de	efault value.		Apply Value to Selec	cted Lines Reset Selected Lin	es to Default Value
alues dii efault va nly the f	ifferent from t alues will not first 100 value 1figure	he default are disp be explicitly initial is are displayed. T ; the com	layed in bold letter ized. he remaining value imunicat	rs. 25 are set to the de ion comi	efault value. mand items		Apply Value to Selec	ted Lines Reset Selected Lin	es to Default Value
alues did efault va nly the f	ifferent from the source of th	he default are disp be explicitly initial is are displayed. T the com	layed in bold letter ized. he remaining value imunicati	rs. es are set to the de ion comm tion	efault value. mand items MainTask 🐼 Ta:		Apply Value to Selec	tted Lines Reset Selected Line	es to Default Value Cancel PLC PRG X
alues dii efault va nly the f Con 1 Libr	ifferent from t alues will not first 100 value nfigure ary Manager ► X	he default are disp be explicitly initial ts are displayed. T the com	layed in bold letter ized. The remaining value Imunicati indancy Configura	rs. ts are set to the de ion commition	efault value. mand items MainTask	k	Apply Value to Selec PLC_PRG.ACT PROGR.	ted Lines Reset Selected Lin OK UPLC_PRG_1 UPLC_PRG	es to Default Value Cancel PLC_PRG X
alues dii efault va Ily the f Corr I Libra A	ifferent from t alues will not first 100 value nfigure ary Manager	he default are disp be explicitly initial as are displayed. T the com Redu	layed in bold letter zed. he remaining value Imunicat indancy Configura	rs. es are set to the de ion comi tion i i i i i i i i i i i i i i i i i i	efault value. mand items MainTask 😵 Ta: Data type	k	Apply Value to Selec PLC_PRG.ACT PROGR. Initialization	tted Lines Reset Selected Lin OK PLC_PRG_1 H AM PLC_PRG Comment Attributes	es to Default Value Cancel PLC_PRG
alues dil efault va ly the f Corr i Libra 1	ifferent from t alues will not first 100 value nfi gure ary Manager Scope	he default are disp be explicitly initial as are displayed. T the com @ Redu Name local unitable	layed in bold letter ized. he remaining value imunicati indancy Configura	rs. es are set to the de ion comm tion @ n Address	efault value. mand items MainTask 🐼 Tas Data type 8001	k	Apply Value to Selec PLC_PRG.ACT PROGR Initialization	Lines Reset Selected Lines OK Image: the selected Lines OK AM PLC_PRG_1 AM PLC_PRG Comment Attributes	es to Default Value Cancel PLC_PRG X
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alues dit efault vi nly the f Corr 1 2 3 4 5 6 7 7	ifferent from t alues will not first 100 value ary Manager VAR VAR VAR VAR VAR VAR VAR VAR VAR VAR	he default are disp be explicitly initial ss are displayed. T the com of Redu Name local_variable L5_ModbusMa master_enabl modbus_confi communicatio modbus_comr error_status	layed in bold letter ized. The remaining value imunicat: undancy Configurat 	rs. es are set to the de ion commi tion 🐼 M Address	efault value. mand items MainTask 😵 Tas Data type BOOL LS_ModbusMaster BOOL ARRAY [0127] OF Mo SerialCommunicationPar BYTE BOOL	k Ita P dbusConfig a	Apply Value to Select PLC_PRG.ACT PROGRI Initialization	ines Reset Selected Lines OK Image: PLC_PRG_1 AM PLC_PRG Comment Attributes	es to Default Value Cancel
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alues dii efault va ly the f Cont 1 2 3 4 5 6 7 8 8 2 7 8 2 1	ifferent from t alues will not first 100 value ary Manager VAR VAR VAR VAR VAR VAR VAR VAR VAR VAR	he default are disp be explicitly initial ss are displayed. T the com for Redu Name local_variable L5_ModbusMa master_enabl modbus_confi communicatio modbus_comr error_status error_ID	layed in bold letter ized. The remaining value imunicat: indancy Configurat _1 ster_0 e g n_configuration nand_quantity	rs. es are set to the di ion comi tion I I I I I I I I I I I I I I I I I I I	efault value. mand items MainTask 🔊 Tas Data type BOOL LS_ModbusMaster BOOL ARRAY [0127] OF Moi SerialCommunicationPar BYTE BOOL ModbusMasterErrorCod ModbusMaster_0 SModbusMaster	k the second	Apply Value to Select PLC_PRG.ACT PROGRU Initialization	tted Lines Reset Selected Lines OK	es to Default Value Cancel PLC_PRG X
alues division of the second s	ifferent from t alues will not first 100 value ary Manager VAR VAR VAR VAR VAR VAR VAR VAR VAR VAR	he default are disp be explicitly initial is are displayed. T is the com for Redu Name local_variable LS_HodbusMa master_enabl modbus_com error_status error_ID vus_master_config r_enable	layed in bold letter ized. The remaining value imunication 	rs. es are set to the di ion commi tion 😵 r Address Address	efault value. mand items MainTask 🐼 Ta: Data type BOOL LS_ModbusMaster BOOL ARRAY [0127] OF Mo SerialCommunicationPar BYTE BOOL ModbusMasterErrorCod ModbusMaster_0 S_ModbusMaster pfig	a ENO	Apply Value to Select LC_PRG.ACT PROGRU Initialization	Cted Lines Reset Selected Line OK Comment Attributes	es to Default Value Cancel PLC_PRG X
alues diversity of the second	ifferent from t alues will not first 100 value ary Manager VAR VAR VAR VAR VAR VAR VAR VAR VAR VAR	he default are disp be explicitly initial is are displayed. T is the com for Redu Name local_variable LS_HodbusMa master_enabl modbus_com error_status error_ID vus_master_config r_enable for modbus_com error_status	layed in bold letter ized. The remaining value imunication 	rs. es are set to the di ion commi tion 😵 r Address Address Li EN arstModbusCo stSerialCommi	efault value. mand items MainTask Tat Data type BOOL LS_ModbusMaster BOOL ARRAY [0127] OF Mo SerialCommunicationPar BYTE BOOL ModbusMasterErrorCod ModbusMaster_0 SModbusMaster ponfig nunicationPara	k TA F	Apply Value to Select LC_PRG.ACT PROGR. Initialization - error_statu - error ID	Comment Attributes	es to Default Value Cancel PLC_PRG X
alues division of the second s	ifferent from t alues will not first 100 value ary Manager X VAR VAR VAR VAR VAR VAR VAR VAR VAR VAR	he default are disp be explicitly initial is are displayed. T the com Redu Name local_variable LS_HodbusMa master_enabl modbus_comr error_status error_ID us_master_config r_enable modbus_comr	layed in bold letter ized. imunicati indancy Configura 	rs. es are set to the di ion comit tion & r Address Address L: EN arstModbusConf stSerialComr	efault value. mand items MainTask Tat Data type BOOL LS_ModbusMaster BOOL ARRAY [0127] OF Mo SerialCommunicationPar BYTE BOOL ModbusMasterErrorCod 	k RNO xError ErrorID	Apply Value to Select PLC_PRG.ACT PROGRU Initialization	ted Lines Reset Selected Line OK PLC_PRG_1 III AM PLC_PRG Comment Attributes	es to Default Value Cancel PLC_PRG X



l	nitialization value				×
	Variable Initialization				
	Expression	Init value	Data type	Comment	^
	□ modbus_config		ARRAY [0127] 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	
	×Trigger	FALSE	BOOL	Trigger signal, used for trigger mode	
	byRetransmissionNumber	3	BYTE	Retransmissions numbers	
	×Error	FALSE	BOOL		
	ErrorCode	ModbusMasterErrorCode.NO_ERROR	ModbusMasterErrorCode		
	xDone	FALSE	BOOL	Processing completion signal	
	arwReadData		ARRAY [0126] OF WORD	Read Data Cache,01/02/03/04 function code	
	arwWriteData		ARRAY [0126] OF WORD	Write Data Cache,05/06/15/16 function code	
	modbus_config[1]		ModbusConfig		
	modbus_config[2]		ModbusConfig		
	± module confin[3]		ModhusConfia	_	~
				Apply Value to Selected Lines Reset Selected Lines	to Default Values
	Values different from the default are displaye	d in bold letters.			
	Default values will not be explicitly initialized Only the first 100 values are displayed. The r	emaining values are set to the default valu	ie.	ОК	Cancel

7) Select the command quantity

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

Variable Initialization				
Expression	Init value	Data type	Comment	
□- modbus_config		ARRAY [0127] OF ModbusConf	ig	
modbus_config[0]		ModbusConfig		
modbus_config[1]		ModbusConfig		
± modbus_config[2]		ModbusConfig		
modbus_config[3]		ModbusConfig		
		ModbusConfig		
i 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		
٤				>
			Apply Value to Selected Lines	Reset Selected Lines to Default Value
Values different from the default are displayed in b Default values will not be explicitly initialized.	old letters.			OK Cancel
Only the first 100 values are displayed. The remain	ing values are set to the default value.			OK Cancel

stSerialCommunicationPara =5 , it's means enable Modbus_config[0] \sim [4] command

xpression	Init value	Data type	Comment	
modbus config		ARRAY [0., 127] OF ModbusConfig		
🕮 modbus_config[0]		ModbusConfig		
modbus_config[1]		ModbusConfig		
		ModbusConfig		
modbus_config[3]		ModbusConfig		
■ modbus_config[4]		ModbusConfig		
■ modbus_config[5]		ModbusConfig		
		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		
				>
			Apply Value to Selected Lines Re	set Selected Lines to Default Val
use different from the default are die	played in hold letters			



5.2.2.Modbus Slave Station Configuration

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



2) Configure the slave station parameters.

PCI-Bus IEC Objects	Parameter	Туре	Value	Default Value	Unit	Description
Teherrel Deservation	🗇 Vendor	STRING	'Leadshine Technology Co., Ltd.'	'Leadshine Technology Co., Ltd.'		Vendor of the device
Internal Parameters	🖉 Mode Name	STRING	'Modbus Com Slave'	'Modbus Com Slave'		Modbus Slave Com Port
Status	🖹 🖗 Vendor					Vendor of the device
	SlaveID	INT	1	1		
Information	FrameIntervTime	TIME	T#5MS	T#5MS		
	🖗 Timeout	TIME	T#5S	T#5S		
	Ø Baudrate	UDINT	9600	9600		
	Ø 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)) + (QX1.0-QX1.7) + (QX2.0-QX2.7) + (QX3.0-QX3.7)) + (QX1.0-QX1.7) + (QX2.0-QX2.7) + (QX3.0-QX3.7)) + (QX3.0-QX3.7) + (QX3.0-QX3

3) Variables addressing table

Bitwise addressing	Bytewise addressing	Wordwise addressing	DWordwise addressing	Bitwise addressing	Bytewise addressing	Wordwise addressing	DWordwise addressing
QX0.0				MX0.0			
QX0.1				MX0.1			
QX0.2	OPO	011/0	0.000	MX0.2	MDO	MWO	MD0
QX0.3	QB0	Qwu	QD0	MX0.3	MDU	IVI VV U	MD0
QX0.4				MX0.4			
QX0.5				MX0.5			



QX0.6				MX0.6			
QX0.7				MX0.7			
QX1.0				MX1.0			
QX1.1				MX1.1			
QX1.2				MX1.2			
QX1.3	0.01			MX1.3			
QX1.4	QBI			MX1.4	MB1		
QX1.5				MX1.5			
QX1.6				MX1.6			
QX1.7				MX1.7			
QX2.0				MX2.0			
QX2.1				MX2.1			
QX2.2				MX2.2			
QX2.3	0.02			MX2.3	MD2		
QX2.4	QB2			MX2.4	MB2		
QX2.5				MX2.5			
QX2.6				MX2.6			
QX2.7		OWI		MX2.7		N // XX / 1	
QX3.0		Qwi		MX3.0		IVI W I	
QX3.1				MX3.1			
QX3.2				MX3.2			
QX3.3	0.0.2			MX3.3	MD2		
QX3.4	UR2			MX3.4	MBS		
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	0x01,0x05,0x0f	0	65536
	(QX0.0 ~ QX8191.7)			
I type	%IW0~%IW4095	0x02	0	65536
	(IX0.0 ~ IX8191.7)			
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.





2) Add the Ethernet/IP scanner

● ethernetip_sample_project.project - CODESYS
 <u>File</u> <u>E</u>dit <u>View</u> <u>Project</u> <u>Build</u> <u>Online</u> <u>Debug</u> <u>Iools</u> <u>Window</u> <u>Help</u>
 <u>Marcial Application</u> [Device: PLC Logic] <u>Signal Application</u> <u>Signal Application</u> [Device: PLC Logic] <u>Signal Application</u> <u>Signal Appl</u>



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

ices 🗸 🗘 🗸	C Bevice	EtherNet_JP_Scanner	🦯 🛉 СЗ_ЕІ	P507 ×						
ethernetip_sample_project	General	Find		Filter Show all		- +	Add FB for IO Channe			
ID Device [connected] (MC508)		Variable	Mapping	Channel	Address	Type	Current Value	Prenared Value Unit	Description	
B-C Application [cup]	Connections	E- De Evolutive Ourser								
Library Manager	Assemblies	1 - 10		Last Error Code Axis 1	%/W0	UDIT	16#8218		Last Error Code Axis 1	
PLC_PRG (PRG)		8.9		Status Word Axis 1	%IW1	UINT	16#0618		Status Word Axis 1	
E Task Configuration	User-Defined Parameters	8-10		Actual Position Axis 1	%ID1	DINT	16#000033EA		Actual Position Axis1	
🖶 😏 🅪 EHEPScannerIOTask	100	8.9		Actual Velocity Axis 1	%ID2	DINT	16#00000000		Actual Velocity Axis1	
EtherNet_JP_Scanner.IOCycle	cog	* *		Digital Input Axis 1	%ID3	UDINT	16#03000000			
😑 😏 🥵 ENIPScannerServiceTask	EtherNet/IP I/O Mapping	8-10		Physical Input Level Axis 1	%ID4	UDINT	16#00000100			
EtherNet_IP_Scanner.ServiceCycle		8- %		Mode of Operation Display Axis 1	%IW10	UDNT	16#0001		Mode of Operation Display Axis 1	
🖻 🚭 🚱 MainTask	EtherNet/IP IEC Objects	* *		Target Position Axis 1	%QD0	DINT	16#00000000		Target Position Axis 1	
B PLC_PRG	Status	8-70		Profile Velocity Axis 1	%QD1	UDINT	16#00000000		Profile Velocity Axis1	
= 😏 🔢 Ethernet (Ethernet)		* *		Profile Acceleration Axis 1	%QD2	UDINT	16#00000000		Profile Acceleration Axis 1	
EtherNet_IP_Scanner (EtherNet/IP Scanner)	Information	8.0		Profile Deceleration Axis 1	%QD3	UDINT	16#00000000		Profile Deceleration Axis 1	
😏 🗐 CL3_EIP507 (CL3-EIP507)		8.0		Target Velocity Axis 1	%QD4	DINT	16#00000000		Target Velocity Axis 1	
😔 🏅 SoftMotion General Axis Pool		8-9		Home Method Axis 1	%Q820	SINT	16#00			
		8.0		Mode of Operation Axis 1	%Q821	SINT	16#00		Mode of Operation Axis 1	
								Reset Mapping Alwa	ays updatevariables Enabled 2 (always	n bus cyde task)
		×₀ = Create new variable	~ p = Ma	p to existing variable				Reset Mapping Alwa	ays update variables Enabled 2 (always	in bus cycle task)
	Watch 2	Prove a create new variable	ිල = Ma	p to existing variable				Reset Mapping Alwa	nys update variables Brubbled 2 (always	n bus cyde task)
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	Webh 2 Expression	verate new vertable	°g = Na	p to existing variable		Арр	Ecation Type	Reset Mapping Alwa	rys updatevariables Imabled 7 (bloog) Prepared value Execution	n bus cycle task) point



4) Download to PLC then create the control program.





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.







Device	Repository			
ocation	System Repository (C:\ProgramData\CODESYS\Devices)		~	<u>E</u> dit Locations
nstalled D	e <u>v</u> ice Descriptions			Testell
Name	vendor vendor	<all vendors=""></all>	~	Uninstall
<	 ↓ 1.7 £C2000F(COE) ↓ 1.7 £C400F(COE) ↓ 1.7 £C750F(COE) ↓ 1.8 £C1500(COE) ↓ 1.8 £C1500(COE) ↓ 1.8 £C2000(COE) ↓ 1.8 £C400(COE) ↓ 1.8 £C750(COE) 	Leadshine Technology Co.,Ltd. Leadshine Technology Co.,Ltd. Leadshine Technology Co.,Ltd. Leadshine Technology Co.,Ltd. Leadshine Technology Co.,Ltd. Leadshine Technology Co.,Ltd. Leadshine Technology Co.,Ltd.	~	Export Renew Device Repository
	Device "EL7-5500FT(COE)" installed to device Device "EL7-5500FT(COE)" installed to device Device "EL8-EC400(COE)" installed to device Device "EL8-EC1500(COE)" installed to device Device "EL8-EC1500(COE)" installed to device Device "EL8-EC1500(COE)" installed to device Device "EL8-EC2000(COE)" installed to device	epository epository spository epository repository repository repository	~	<u>D</u> etails
				Close

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"





2) Select the EtherCAT source address

+	PLC_PRG BtherCAT_	Master_Leadshine 🗙 📆 De	evice			
Effercal_Lample_program Image: Decice (INC38) Image: Decice (INC38) Image: Decice (INC38) Image: Decire (Incase) Image: Decire (Incase)	General Sync Unit Assignment EtherCAT I/O Mapping EtherCAT I/C Objects S Select Network Adapter IMAC address Name 000035020122 eest 000035020122 eest 000035020122 eist 000035020122 eist 000035020122 eist 00003502012 eist 00003502012 eist 00003502012 eist 00003502012 eist 0000000000 eist0	Autoconfig master/slave EtherCAT NIC Settings Destination address (MAC) Source address (MAC) Network name Description	s rr+r+r+r+r+r 00:00:00:00:00 ef0	Øroadcast	EtherCAT.	Abert

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

nce 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					
<u>File Edit View Project Build Online Debug Tools</u>	<u>W</u> indow <u>H</u> elp				
🎦 🚔 🔚 😂 🗠 🖙 🚡 🛍 🏦 🗙 🛤 🍕 🍓 🛀 則 🔋 🦎	🎕 🕒 🛅 🖻	Application [Device: PLC Logic]	- 0\$ 0\$ → = 4	(≡ ~≡ 4≣ +≡ \$ ¢)	瓢 吉 シ
Devices - T X	PLC_PRG	EtherCAT_Master_Leadshine	🚹 Device 📝 🕥 EL	P_EC10005 X	
Ethercat_sample_program	Canaral	Address		Additional	
E m Device (MC508)	General		0		Ether CAT.
🖶 🗐 PLC Logic	Process Data	AutoIncaddress	U 👻	Expert settings	
🖃 🧔 Application		EtherCAT address	1001 🜩	Optional	
GVL	Startup Parameters	▲ Distributed Clock			
UD ary Manager	EtherCAT I/O Mapping	Select DC	DC-Synchron	~	
Task Configuration	EtherCAT IEC Objects	🖂 Enable	2000 Sync unit	: cycle (µs)	
= ⊘ Task - ⊕ ElerCAT_Master_Leadshine.EtherCAT_Task	Status	Sync0 Enable Sync 0			
LocalBus_Master (LocalBus Master)	Information	Sync unit cycle	x 1 🛛 🗸	2000 🗘 Cycle time (j.	ıs)
🖶 🛐 EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)		 User-defined 		0 🗘 Shift time (µ	s)
ELP_EC1000S (ELP-EC1000S(COE))					
SoftMotion General Axis Pool		Synci			
		Enable Sync 1			
		Sync unit cycle	x 1 🛛 🗸	2000 🗘 Cycle time (µ	is)
		O User-defined		0 🗘 Shift time (µ	s)



6.5.Process Data Object (PDO)

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vices 👻 🕈 🗙	PLC_PRG 🕤 Ether	CAT_Master_Leadshine	O ELP_EC1	0005 x			
Notes	P.C. PRG Control Control Control Contro Control Control	2AT / Master Leadshine Image: Device Select the Outputs Name VI / 66/600 Receive PO0 1 Control word Profile target position Control word Target velocity Target velocity Control word Control word Target velocity Control word Control word Target Target Control word Target Torget Target Torget Target Torget Control word Target Torget Control word Target Torget Control word Target Receive PO 3 Control word Target Receive PO 4	(0) (16464400 16464400 16464400 16464000 16464700 16464000 16464000 16464000 16464000 16464000 16464000 16464000 164640700 164640700	Select the Inputs Name 2 168:1A00 Transmit PDD 1 Last error code Satus word Modes of operation display Actual motor position Toruh Probe Satus Toruh probe Satus Toruh probe Satus 1 168:1A01 Transmit PDD 2	Type UINT UINT SINT DINT UINT UDINT	Index 16#603F:00 16#6041:00 16#6064:00 16#6069:00 16#6080:00 16#60FD:00
		Control word Homing method Homing velocity (fast) Homing velocity (slow) Homing acceleration Homing offset Modes of operation	UINT SINT UDINT UDINT DINT USINT	16#6040:00 16#6099:01 16#6099:01 16#6099:02 16#6097:00 16#6077:00			

6.5.1.Starting Data Object (SDO)

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 PLC_PRG
 EtherCAT_Master_Leadshine
 Device
 Comparison
 ELP_EC10005 X rcat_sample_prog 🖶 Add 📝 Edit 🗙 Delete 🕆 Move Up 🔅 Move Down General E MC508) PLC Logi Process Data 8-0 A Modes of Opera Startup Parameters 🚺 Library Ma EtherCAT I/O Mapping PLC_PRG (PRG) EtherCAT IEC Objects 🗄 🎲 Task Stak
 General EtherCAT_Master_Leadshine.EtherCAT_Ta
 General EtherCAT_Master_Leadshine.EtherCAT_Ta
 General EtherCAT_Master_Leadshine(BetherCAT_Master_Leadshine)
 SetHerCAT_Master_Leadshine(BetherCAT_Master_Leadshine)
 SetLP_EC100005 (EIP-EC10005(COE)) Status Information 2 9 General Axis Pool

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.

Characterization and an and a second s			and the second	ttr_ttroods A						
Constal sample program	General	Find		Filter Show all			• Ad	dd FB for IO Channel ***	io to Instance	
Device (MCS08)	verie .	Lange Alle		et al.	Tatations		11.5	0.14		
= mil PLC Logic	Process Data	Variable	mapping	Channel	Address	Type	Unit	Description		
- Q Application				Control word	%GWV0	UINT		Control word		
GVL	Startup Parameters			Profile target position	%Q01	DINT		Profile target position		
Ubrary Manager	EtherCAT I/O Mapping			Touch Probe Function	%QW4	UDNT		Touch Probe Function		
PLC_PRG (PRG)				Last error code	%EW0	UINT		Last error code		
 Task Configuration 	EtherCAT IEC Objects			Status word	%7W1	UINT		Status word		
= QS Task		1.19		Modes of operation display	%184	SDVT		Modes of operation display		
EtherCAT_Master_Leadshine.EtherCAT_Task	Status			Actual motor position	%ID2	DINT		Actual motor position		
- 셴] PLC_PRG	Information			Touch Probe Status	%5TW6	LIINT		Touch Probe Status		
LocalBus_Master (LocalBus Master)	and matter	8-19		Touch probe post pos value	%ID4	DINT		Touch probe posit pos value		
······································		8.9		Digital inputs	%ID5	UDINT		Digital inputs		
ELP_EC1000S (ELP-EC1000S(COE))										
SoftMation General Axis Pool										

6.6.Add 402 Axis To Servo Slave Station

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



🖃 🌃 Task Configuration			EtherCAT	IEC Objects				
🖹 🗇 Task								
- EtherCAT_Ma	aster_	Leadshine.EtherCAT_Task	Status					
PLC_PRG	PLC_PRG							
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EtherCAT_Master_Leadshine	(Ether	CAT Master Leadshine)						
ELP_EC1000S (ELP-EC100	ns(cr	DE))						
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	6	Add Folder						
		Insert Device						
		Disable Device						
		Update Device						
	Fî	Edit Object		0 error(
		Edit Object With		i o enore				
		Edit IO mapping						
		Import mappings from CS	SV	created				
		Export mappings to CSV		o conco				
		Add SoftMotion CiA402 A	xis					
		Add SoftMotionLight CiA4	02 Axis					

2) Axis general configuration

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Ethercat_sample_program	Consul	فانتفا ليسم مسط انسانه					Malaniti, sama k	
Device (MC508)	General	Axis type and limits	Software limits				Velocity ramp t Transmid	type
PLC Logic	Scaling/Mapping	Virtual mode	Activated	Negative [u]:	0.0			
Application		() Modulo		Positive [u]:	100	0.0	O sin-	
- 🧭 GVL	Commissioning	Finite		Logicite [o]:			Quadratic	
👘 Library Manager	SM_Drive_ETC_GenericDSP402: I/O		Software error reacti	on			Quadratic (smooth)
PLC_PRG (PRG)	Mapping			Deceleration	[u/s²]: 0		Identification	
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🖻 🥩 Task	ice objects	Dunamic limite					Position lag sur	pervision
EtherCAT_Master_Leadshine.EtherCAT_Task	Status	by numeration					deactivated	
PLC_PRG	Information	velocity [u/s]:	Acceleration [u/s*]	Deceleration [u/s	s-j Jerk [u/s-j		dedeuvated	-
LocalBus_Master (LocalBus Master)	anomation	30	1000	1000	10000		Lag limit [u]:	1.0
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)								
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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 - 4 X	Add Device			×
Ethercat_sample_program	u luti a inc			
E Device (MC508)	Name High_Speed_IO			
🖶 🗐 PLC Logic	Action			
C Application	Append device Insert device Plu	ug device OUpdate device		
SVL	String for a full text search	Vendor <all vendors=""></all>		~
🖓 📶 Library Manager				
PLC_PRG (PRG)	Name	Vendor	Version Description	
Task Configuration	Miscellaneous			
🖹 🗐 Task	Free Protocol RS232 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
EtherCAT_Master_Leadshine.EtherCAT_Task	Free Protocol RS485 COM	Leadshine Technology Co., Ltd.	3.5.15.40	
PLC_PRG	Free Protocol RS485-2	Leadshine Technology Co., Ltd.	3.5.15.40	
LocalBus_Master (LocalBus Master)	Free Protocol RS485-3	Leadshine Technology Co., Ltd.	3.5.15.40	
😑 💮 EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)	High Speed IO	Leadshine Technology Co., Ltd.	3.5.15.40	
ELP_EC1000S (ELP-EC1000S(COE))	High Speed IO Module	Leadshine Technology Co., Ltd.	3.5.15.40	
SM_Drive_GenericDSP402 (SM_Drive_GenericDSP402)	LocalBus Master	Leadshine Technology Co., Ltd.	3.5.15.40	
SoftMotion General Axis Pool	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 Master 2	Leadshine Technology Co., Ltd.	3.5.15.40	
	ModbusCOM RS-485 Master 3	Leadshine Technology Co., Ltd.	3.5.15.40	~
	Group by category Display all version	ns (for experts only) 🔲 Display	outdated versions	
	Name: High Speed IO Vendor: Leadshine Technology Co., Li Categories: Version: 3.5. 15. 40 Order Number: *	td.	×.	
	Description:			



2) Add virtual axis

Ethe	rcat_sa	mple_pr	ogram.proj	ject - CO	DESYS												
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		PL	C_PRG (PRG)						Nam	ie -		Vendo	r		Version	Description	
		🖹 🎆 Та	sk Configurati	ion					= 6	SoftMotion drives							
		i - 🗳	🗟 Task						E E	🗁 🔗 Free Encoder	s						
			🗄 EtherCA	AT_Master	Leadshin	e.EtherCAT	Task		Œ	🛛 📅 position contr	olled drives						
			PLC_PR	G					Ē	🗠 🔗 virtual drives							
	- 🗊 L	.ocalBus_N	1aster (LocalB	us Master))					SM_Drive	_Virtual	3S - Smi	art Software	Solutions GmbH	4.0.0.0	SoftMotion virtu	ual driv
	🖣 - 🛐 E	EtherCAT_	Master_Leads	shine (Ethe	rCAT Mas	ter Leadshin	e)										
	<u> </u>	🕖 ELP_E	C1000S (ELP-E	EC 1000S (C	:OE))												
		- \$ @ \$	M_Drive_Gen	ericDSP40	2 (SM_Driv	ve_GenericD	SP402)										
	- 🗊 I	ligh_Spee	d_IO (High Sp	eed IO)													
	2 :	SoftMotion	General Axis	Pool													

3) Configured the high speed outputs parameters

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Devices 👻 9 💙	🕻 📝 PLC_PRG 🛛 🕥 ELP_	EC1000S 🛛 🔂 EtherCAT_Master_Leadshir	e 🐶 SM_Drive_G	GenericDSP402 🛛 🕤 High_Speed_IO	🗙 📆 Device 🛛 🔗 SM_Drive_Vi	tual 🏾 🎁 Library Manager
Ethercat_sample_program	PCI-Rus IEC Objects	Descentes	T	Webe	Defendation (1)	Description
Device (MC508)	, er bus ize objetts	Faraneter	Type	value	Default value on	beschpuon
PLC Logic	Internal Parameters	e vendor	STRUNG	Leadsnine Technology Co., Ltd.	Leadshine Technology Co., Ltd.	vendor of the device
Application		Model Name	STRUNG	High Speed 10	High Speed 10	Description of the Device
- 🎒 GVL	Internal I/O Mapping	HS_IO_Mode_0				
Library Manager	Chatur	HS_IO_Mode_1				
PLC_PRG (PRG)	5.6.63	Axis_Name_0	STRUNG	LS_Axis_0	LS_Axe_U	
Task Configuration	Information	Axis_Name_1	STRUNG	LS_Axis_1	LS_Axs_1	
🖹 🎲 Task		Axis_Name_2	STRUNG	LS_Axis_Z	LS_Axis_2	
EtherCAT_Master_Leadshine.EtherCAT_Task		Axis_Name_3	STRING	'LS_Axis_3'	LS_Axis_3	
- DLC_PRG		Axis_Name_4	STRING	LS_Axis_4	LS_Axis_4	
LocalBus_Master (LocalBus Master)		Axis_Name_5	STRING	'LS_Axis_5'	'LS_Axis_5'	
😑 💮 EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)		Axis_Mask	UENT	0	0	
ELP_EC1000S (ELP-EC1000S(COE))		All	UINT	0	0	
SM_Drive_GenericDSP402 (SM_Drive_GenericDSP402)		Counter_Mask	UINT	0	0	
High_Speed_IO (High Speed IO)		Cmp_Mask	UDINT	0	0	
😑 🏅 SoftMotion General Axis Pool		Pwm_Mask	UDINT	0	0	
SM_Drive_Virtual (SM_Drive_Virtual)		··· / Ioin_Mask	DWORD	0	0	
		 Ø 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 HardLinit	BOOL	FALSE	FALSE	
		Axis ELPFilter	DINT	0	0	
		Axis ELNFilter	DINT	0	0	
		 Axis ServOn 	BOOL	FALSE	FALSE	
		😑 🖉 Home Parameter				
		- Ø 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	-	-	
		Home Intel Invel	UNT	0	0	

For example: enable axis 0 to control the stepper motor. 3.1) modify the axis 0 name

evices 👻 🕈 🗙	PLC_PRG 🚺 ELP_	EC 1000S 🔂 EtherCAT_Master_Leads	hine 🕼 SM_Drive_(GenericDSP402 II High_Speed_IO	🗙 📆 Device 🔗 SM_Drive_Viri	ນal 👔 Library Man
Ethercat_sample_program	DCT Rue TEC Objects		-		56.691.05	
E Device (MC508)	Perbus ice objects	Parameter	Type	value	Default Value Unit	Description
😑 🔜 PLC Logic	Internal Parameters	Vendor	STRING	'Leadshine Technology Co., Ltd.'	'Leadshine Technology Co., Ltd.'	Vendor of the device
Application		Model Name	STRING	'High Speed IO'	'High Speed IO'	Description of the Device
- 🏄 GVL	Internal I/O Mapping	HS_IO_Mode_0				
👘 Library Manager		H W HS_IO_Mode_1			-	
PLC_PRG (PRG)	Status	Axis_Name_0	STRING	'SM_Drive_Virtual'	'LS_Axis_0'	
Task Configuration	Information	Axis_Name_1	STRING	'LS_Axis_1'	'LS_Axis_1'	
🖹 🗱 Task	anomation	Axis_Name_2	STRING	'LS_Axis_2'	'LS_Axis_2'	
EtherCAT Master Leadshine.EtherCAT Task		Axis_Name_3	STRING	'LS_Axis_3'	'LS_Axis_3'	
DLC PRG		Axis_Name_4	STRING	'LS_Axis_4'	'LS_Axis_4'	
LocalBus Master (LocalBus Master)		Axis_Name_5	STRING	'LS_Axis_5'	'LS_Axis_5'	
EtherCAT Master Leadshine (EtherCAT Master Leadshine)		Axis_Mask	UINT	0	0	
- 0 ELP EC1000S (ELP-EC1000S(COE))		Latch_Mask	UINT	0	0	
SM Drive GenericDSP402 (SM Drive GenericDSP402)		Ocunter_Mask	UINT	0	0	
(1) High Speed TO (High Speed TO)		- @ Cmp_Mask	UDINT	0	0	
SoftMation General Axis Pool		··· Ø Pwm_Mask	UDINT	0	0	
CM Drive Michael CM Drive Michael		🖉 Ioin Mask	DWORD	0	0	
B. aufinite function outputte function		- di Toput Maek	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	Туре	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
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	24=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.

\sim	AL	P۲	11	U.	
÷		HS.	IO	Mode	e_1

™ W HS_IO_Mode_I				
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	
Ø Counter_Mask	UINT	0	0	
🖤 🖗 Cmp_Mask	UDINT	0	0	
🖗 Pwm_Mask	UDINT	0	0	
🖤 🖗 Ioin_Mask	DWORD	0	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
INO	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
Ø DriverCounter	DINT	200	200
 🖗 IsRevolveAxis	BOOL	FALSE	FALSE
 🖗 RevolveAxisSafeAngel	REAL	90	90
Home Switch Num	INT	0	-1
Limit Switch Num	INT	-1	-1

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

6	🗏 🛛 🖗 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

⁽⁵⁾Homing 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.



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.







4) Create motion control function blocks







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.

<u>File Edit View Project Build Online Debug Tools</u>	<u>W</u> indow <u>H</u> elp						
19 🛩 🖬 🎒 🗠 🗠 🐰 🛍 🛍 🗙 🖬 🌿 🎽 🌿 🗍 🦘	🐐 🛗 🛅 🕤 🛗 Applicatio	n [Device: PLC Logic]	- OS OS -> =	🔏 Çill Fill 🗠 +11 🖇	3 ¢ 🎫 📰	7./	
Devices - + ×	PLC_PRG.Axis_motion_control	PLC_PRG	Library Manage	er 🕼 SM_Drive_	GenericDSP402 X		
Ethercat_sample_program	Course 1	And a family and finder				Male of the second be	
E- 1 Device (MC508)	General	Axis type and limits	Software limits			velocity ramp ty	ype
PLC Logic	Scaling/Mapping	Virtual mode	Activated	Negative [u]:	0.0	Irapezoid	
🖃 🧔 Application		O Modulo			1000.0	⊖ Sin²	
GVL	Commissioning	Finite		Positive [u]:	1000.0	Quadratic	
1 Library Manager	SM Drive ETC Capacit/DSB402: 1/0		Software error react	tion		O Quadratic (s	smooth)
PLC_PRG (PRG)	Mapping			Deceleration [u/s ²]:	0	Identification	
Axis_motion_control	SM_Drive_ETC_GenericDSP402:			Max. distance [u]:	0	ID:	2
Task Configuration	IEC Objects				-		
🖹 🐯 Task	Status	Dynamic limits				Position lag sup	ervision
EtherCAT Master Leadshine.EtherCAT Task		Velocity [u/s]:	Acceleration [u/s ²]	Deceleration [u/s ²] Jer	rk [u/s³]:	deactivated	~
PLC_PRG	Information	30	1000	1000 10	0000	Lag limit [u]:	1.0
LocalBus_Master (LocalBus Master)							
High_Speed_IO (High Speed IO)							
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)							
=							
Memory SM_Drive_GenericDSP402 (SM_Drive_GenericDSP402)							
😑 🍐 SoftMotion General Axis Pool 😳 DSP402 (SM: Drive: Generic DS	402)						
LS_Axis_0 (SM_Drive_Virtual)							

7.2.2.Scaling And Mapping

General	Motor Type Scaling				
	Invert dire	ction			
Scaling/Mapping	Rotary 16#10000	increm	ents <=> mo	tor turns	1
Commissioning	Linear 1	motor tur	ns <=> gear	output turns	1
SM_Drive_ETC_GenericDSP402: I/O Mapping	1	gear output t	urns <=> uni	ts in application	1
SM Drive ETC GenericDSP402:	Mapping				
IEC Objects	Automatic mapping				
Status	Inputs:				
	Cyclic object	Object number	Address	Type	
Information	status word (in wStatusWord)	16#6041:16#00	'%TW3'	'LIINT'	
	actual position (diActPosition)	16#6064:16#00	'%ID3'	'DINT'	
	actual velocity (diActVelocity)	16#606C:16#00			
	actual torgue (wActTorgue)	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#6089:16#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	Туре	
	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#6088:16#00	'%QW6'	'UINT'	
	Add velocity value	16#60B1:16#00			
	Add torque value	16#60B2:16#00			
	Digital outputs (A637)	16#60FE:16#01			
	11				

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	tion	
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	Туре		
	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	Туре
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



General									
Process Data	Line	Index:Subindex	Name	Value	Bit Length	Abort on Error	Jump to Line on Err	Next Line	Comment
Process Data	- 1	16#6060:16#00	Modes of Operation	8	8			0	Modes of Operation
Startup Parameters	2	16#6098:16#00	Homing method	19	8			0	
EtherCAT I/O Mapping	- 3	16#6099:16#01	Homing velocity (fast)	10000	32			0	
Etherewit the Happing	4	16#6099:16#02	Homing velocity (slow)	1000	32			0	
EtherCAT IEC Objects	- 5	16#609A:16#00	Homing acceleration	100000	32			0	
Status									
Information									

2) Homing command

4

MC_Home_0						
TRUE		MC Home				
┝───────────	EN	ENO				
EC_Axis_0	Axis	Done				
homing_ex —	Execute	Busy				
0	Position	CommandAborted	-			
		Error				
		ErrorID				
]			

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

Location	System (C:\ProgramData\CODESYS\Managed Libraries)	~	Edit Locations
-Installed Lib	praries		Install
Company	(All companies)	~	Uninstall
I) 🗄 🗐	1iscellaneous)	^	
A 1	pplication		Export
.	CANopenLib Leadshine Technology Co.Ltd		
	- 🦰 1.0.0.4		
	LS_UtilsLib Leadshine Technology Co.Ltd		
Ē. Ē∟	Net Base Services 35-Smart Software Solutions GmbH		
■ • =	Common		Find
E	Fieldbus		Details
	OCS	>	Trust Certificate
Group t	by category		Deserved
			Dependencies

2)Add the library to project

Ethercat_sample_program.project* - CODESYS			
<u>File Edit View Project Libraries Build Online Deb</u>	ug <u>T</u> ools <u>W</u> indow <u>H</u> elj	p	
- [1] 🖆 🔜 😂 너 어 있 ங 🛍 🗙 🗛 😘 🐴 🛵 則 🤋 1	11 🎕 🖷 🛅 💣 🗛	oplication [Device: PLC Logic] 🔹 🧐 🕠 🔳 🔧	[피앤 햄 밴 왕 ㅎ 麗 북 장
Devices 👻 🖣 🗙	Library Manager 🗙		
Ethercat_sample_program	🔂 Add Library 🔀 Delete Lib	brary 🔄 Properties 💿 Details 🔄 Placeholders	🎁 Library Repository 🕕 Icon Legend 🚊 Summary.
E MC508)	Libraries used in application 'Dev		
🖃 🗐 PLC Logic	Name	Add Library	× -
E O Application	Tulle 25 ChlopenStadk - 25 C	Ctring for a fulltaut search	
- 🎑 GVL	SI icance = 35 icance 3	string for a funcext search	
Library Manager	Breakpointl opping = Break	Library	Company
= 💾 PLC_PRG (PRG)		= S Application	
Axis_motion_control	CAA Device Diagnosis = C	CANopenLib	Leadshine Technology Co.Ltd
CANopen_axis	. CANihusDourise - CANihus	Common	
EC_Axis_motion_control		* . Fieldbus	
Task Configuration			Leadshine Technology Co.Ltd
🗏 💝 Task		Net Base Services	35 - Smart Software Solutions GmbH
EtherCAT_Master_Leadshine.EtherCAT_Task			
□ <u>del</u> PLC_PRG		eadShinePAC	
LocalBus_Master (LocalBus Master)			
High_Speed_IO (High Speed IO)		• • • Sustem	
EtherCAT_Master_Leadshine (EtherCAT Master Leadshine)		System	
ELP_ECIDOUS (ELP-ECIDOUS(COE))		(Miscellaneous)	
CANbus (CANbus)			
CANopen Manager (CANopen Manager)			
SoftMotion General Axis Pool		1	
			OK Cancel



7.3.1.General configuration 1) Add the CANopen device

Add Device					
ame CANbus_1					_
Action					
Append deviceInsert dev	rice O <u>P</u> lug dev	ice O Update device			
String for a full text search		Vendor <all vendors=""></all>			``
Name	Vendor		Version	Description	
Miscellaneous					
Fieldbuses					
CANbus	20. 0.00	t Coffeena Colutions Carbo	1 25170	No. J.J. S II S. J.L.	20
LANDUS	35 - Smar 35 - Smar	t Software Solutions Gmb	- 3.5.17.0	CANbus on a net? device	59.
EtherCAT	35 - 3ilidi	contrare oblations dillo		Grand Strand Conce	
Ethernet Adapter					
🗉 😝 EtherNet/IP					
🖲 🚮 Home&Building Automa	ation				
🗈 💷 Modbus					
🕷 🛲 Profibus					
Profinet IO					
* S sercos					
Group by category Display	y all versions (for	experts only) Displ	ay outdated vers	lons	
Name: CANbus	va Calutiona Carbi				
Categories: CANbus	are solutions onbi			æ	œ
Version: 3.5.17.0					2
Order Number:					
Description: Needed for a	all fieldbusses whic	n communicate over the C	ANBUS, e.g. CAN	open or J1939.	
ppend selected device as last	t child of				
evice (You can select another targ	jet node in the na	vigator while this windo	w is open.)		
				Add Device	Close

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

r anager 35 - Smart So anager_SIL2 35 - Smart So anager_SoftMotion 3S - Smart So	ftware Solutions GmbH ftware Solutions GmbH ftware Solutions GmbH	Version 3.5.17.0 3.5.17.0 3.5.17.0	Description CANopen Manager CANopen_Manager_SIL2 CANopen Manager SoftMotion		
anager 35 - Smart So anager_SIL 35 - Smart So anager_SoftMotion 3S - Smart So	ftware Solutions GmbH ftware Solutions GmbH ftware Solutions GmbH	3.5.17.0 3.5.17.0 3.5.17.0	CANopen Manager CANopen_Manager_SIL2 CANopen Manager SoftMotion		
anager 35 - Smart So anager_SIL2 35 - Smart So anager_SoftMotion 35 - Smart So	ftware Solutions GmbH ftware Solutions GmbH ftware Solutions GmbH	3.5.17.0 3.5.17.0 3.5.17.0	CANopen Manager CANopen_Manager_SIL2 CANopen Manager SoftMotion		
r anager_33 - Smart So anager_SIL2 3S - Smart So anager_SoftMotion 3S - Smart So	ftware Solutions GmbH ftware Solutions GmbH ftware Solutions GmbH	3.5.17.0 3.5.17.0 3.5.17.0	CANopen Manager CANopen_Manager_SIL2 CANopen Manager SoftMotion		
anager 3S - Smart So anager_SIL2 3S - Smart So anager_SoftMotion 3S - Smart So	ftware Solutions GmbH ftware Solutions GmbH ftware Solutions GmbH	3.5.17.0 3.5.17.0 3.5.17.0	CANopen Manager CANopen_Manager_SIL2 CANopen Manager SoftMotion		
anager_SIL2 3S - Smart So anager_SoftMotion 3S - Smart So	ftware Solutions GmbH ftware Solutions GmbH	3.5.17.0	CANopen_Manager_SIL2 CANopen Manager SoftMotion		
anager_SoftMotion 3S - Smart So	ftware Solutions GmbH	3.5.17.0	CANopen Manager SoftMotion		
lay all versions (for experts only)	Display outdated version	ons			
er					
vare Solutions GmbH					
anager					
					2
1anager					
igi ftv Ma	ger Tware Solutions GmbH Manager I Manager	ger tware Solutions GmbH Manager	ger Tware Solutions GmbH Manager	iger tware Solutions GmbH Manager	iger



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

canned Devices						
Device name	Device type		Node-ID			
ISV2_CAN6020	ISV2-CAN6020 (Re	vision=16#00000100, FileVers	ion=1.0) 1			
onfiguro th	a haud rata					
onfigure th	e baud rate					
Onfigure th at_sample_program.proj Edit View Project	e baud rate ht* - CODESYS Quild <u>O</u> nline <u>D</u> ebug	<u>I</u> ools <u>W</u> indow <u>H</u> elp				
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onfigure th at_sample_program.proj (dit View Project] @ ▷ ○ ☆ ֎ ₪ [e baud rate htt:- CODESYS Build Qnline Debug X A & A & A A	Iools Window Help 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	tion [Device: PLC Logic] 🔹 😋 🔇	¥y → = ℃ (Ç= ?)	1¢]*1 φ ∰ π	- 1 Ty
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7.3.2.CANopen bus manager configuration

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

General	General
Log	Node-ID 127 Check and Fix Configuration
CANopen I/O Mapping	Autostart CANopen Manager 🛛 Polling of optional slaves
CANopen IEC Objects	Start slaves NMT error behavior Restart Slave V
Status	MMTstart all (if possible)
Information	☐ Enable heartbeat producing
	Node-ID
	Producer time (ms) 200
	▲ SYNC ▷ TIME
	Enable SYNC producing
	COB-ID (Hex) 16# 80
	Cycle period (µs)
	Window length (µs) 1200
	Finable SYNC consuming

7.3.3.CANopen slave configuration

1) PDO configuration

Configure all the PDO items transmission type "Asynchronous device profile specific"

Ele Edit View Project Build Online Debug Iools ⓑ ☞ ■ ⊕ ∞ ○ ∝ & ⓑ ⓑ ☎ × ♣ ⓑ ✿ 실 用 ♥ *	· Window Help 계 계 대급 (111- 다 프 Applic	ation [Device: PLC Logic] + 😂 🕻	○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	12			۲
Image: Section of the sectio	18 79 Ga Library Managar C C General FOCS SOCS Long CAlogan B0 Macping CAlogan BC Objects Software Defendion	Auton (Device PLC Logid) - C Color Colora C Color - S Color Recent PCC Point - S Color Name C Color C Colo	Image: State of the s	82 length 56 15 22 22 22 22 22 22 22 22	Terrami FOG, (See => Nester) ALTFOG, (See => Nester) Name Viscasson FOG 1 state word Viscasson FOG 1 state word Viscasson FOG 1 poston statut visit Viscasson FOG 3 poston statut visit	Control 1 Novello 4 NoveDown Object 164448 (MONCEN-164980) 1646488 (MONCEN-164980) 1646488 (MONCEN-164980) 1646483 (MONCEN-164980) 1646483 (MONCEN-164980) 1646483 (MONCEN-164980) 1646483 (MONCEN-164980) 1646493 (MONCEN-164980) 164643 (MONCEN-164980) 164643 (MONCEN-164980) 164643 (MONCEN-164980) 164640 (MONCEN-164800) 164640 (MONCEN-164800) 164640 (MONCEN-164800) 164640 (MONCEN-164800) 164640 (MONCEN-164800) 164640 (MONCEN-164800) 16470 (MONCEN-164800) 16470 (MONCEN-164800) 16470 (MONCEN-1648000) 164	801 longt) 16 15 8 4 4 22 23 23 33 22 22
		Process by CANope	n 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		Control Word 16#6040	TPDO1	Status Word 16#6041
2	RPDO1	Target Position 16#607A	TPDO2	Modes Of Operation Display 16#6061
3		Modes Of Operation 16#6060		Position Actual Value 16#6064
4	DDDO1	Profile Velocity 16#6081	IPDOS	Velocity Actual Value 16#606C
5	KPD02	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

General	Find		Filter	Show all		- 🕂 Add	B for IO Chan	el ⇒≣Goto	Instance		
PDOe	Variable	Mappi	Channel	Address	Type	Unit	Descri				
1003	B- 🍫		control word	%QW8	UINT						
SDOs	8-50		target position	%QD5	DINT						
	B- 🍫		modes of operation	%QB24	SINT						
-og	8-50		profile velocity	%QD7	UDINT						
CANopen I/O Mapping	B- **		profile acceleration	%QD8	UDINT						
	B- **		target velocity	%QD9	DINT						
CANopen IEC Objects	6- *		profile deceleration	%QD10	UDINT						
	🕸 - 🎭		status word	%IW14	UINT						
Status	10 - Ma		modes of operation display	%IB30	SINT						
Information	10 - 1 9		position actual value	%ID8	DINT						
	B- 🎭		velocity actual value	%ID9	DINT						
	🗄 🍫		digital inputs	%ID 10	UDINT						

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.



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





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

General	Find	Filter	Show all		- 🕆 Add I	B for IO Ch	nnel * = Go to Instance
DOs	Variable Ma	appi Channel	Address	Type	Unit	Descri	
		control word	%QW8	UINT			
SDOs	B- **	target position	%QD5	DINT			
	⊞- * ≱	modes of operation	%QB24	SINT			
Log	B- 💊	profile velocity	%QD7	UDINT			
CANopen I/O Mapping	H- 🍫	profile acceleration	%QD8	UDINT			
	÷.*	target velocity	%QD9	DINT			
CANopen IEC Objects	B- 🖗	profile deceleration	%QD10	UDINT	_		
Status	i≣*≱	status word	%IW14	UINT			
Status	8- 🍫	modes of operation display	%IB30	SINT			
Information	B- 🏘	position actual value	%ID8	DINT			
	8-19	velocity actual value	%ID9	DINT			
	😟 🎭	digital inputs	%ID10	UDINT			
Library Manager	ISV2_CAN6020	CANbus CANopen_M	lanager III P Initialization Co	nLC_PRG X 🙀 PLI	C_PRG.CANopen_ax PROGRAM I	is PLC_PRG	2
Cope Nam Cope N	ISV2_CAN6020 e _CAN6040_Axis_1 rolWord	CANbus CANopen_M Address Data type Str_LTCANopenAxis %QW8 UINT	lanager 🕐 P	nLC_PRG X	C_PRG.CANopen_ax PROGRAM I	is PLC_PRG	3
Scope Nam 36 VAR ISV2 37 VAR Contr 38 VAR Statu	ISV2_CAN6020 e CAN6040_Axis_1 robWord usWord	CANbus CANopen_M Address Data type Str_ITCANopenAxis %QW8 UINT %GW14 UINT	lanager t P	LC_PRG X 强 PL	C_PRG.CANopen_ax PROGRAM I	is PLC_PRG	
Cope Nam Scope Nam 3c VAR ISV2 33 VAR Cont 39 VAR Statu	ISV2_CAN6020 e CAN6040_Axis_1 rofWord usWord MCMC	Address Data type Sr_JTCANopenAus %QW8 UDIT %UW14 UDIT AxiaConfi_CAN_0	Initialization Co	ntc_PRG x R PL	C_PRG.CANopen_ax PROGRAM I	is PLC_PRG	
Ubrary Manager Scope Nam Scope Nam Scope Nam VAR Statu TRUE 0	ISV2_CAN6020	Address Data type Str_LTCANopenAus %QW8 UNT %LW14 UNT AxisConfi_CAN_0 CAXisConfi_CAN_0	Initialization Co	1C_PRG X i in P U	C_PRG.CANopen_ax PROGRAM I	is PLC_PRG	
Clovery Manager Clove	ISV2_CAN6020 e CAN6040_Axis_1 roWord ssWord MCMMCMMM	CANbus CANopen_M Address Data type Sr_ITCMtopenAus %CW8 UNT %LW14 UNT AxisConfi_CAN_0 C_AxisConfi_CAN_EN	Initialization Co	IL_PRG X R PU	C_PRG.CANopen_ax PROGRAM I	is PLC_PRG	
Lbrevy Marager	ISV2_CAN6020 e CAN6040_Axis_1 roWord MC_ EN L_EN MC	Address Data type SF_ITCANopenAus %QN8 UDIT %UN1 UDIT AxisConfi_CAN_0 C_AxisConfi_CAN_EN Dom	Initialization Co	uc PRG x R PL	C_PRG.CANopen_ax PROGRAM I s	is PLC_PRG	
Lbrary Manager • •	ISV2_CAN6020 e CAN6040_Axis_1 cMk6040_Axis_1 moWord MC_ EN IEN Enable E_E_Enable	CANbus CANoper_M Address Data type Sr_ITCMOperAnts %CWB UNF %CWU4 UNT AxisConfi_CAN_0 C_AxisConfi_CAN_0 Dorn StateMachine	Initialization Co	nc_PRG x 🙀 PL	C_PRG.CANopen_ax PROGRAM I	is	
Ibrary Manager Ibrary Manager Ibrary Manager Ibrary Manage	E ISV2_CAMED20 e CANEGOD_Acts_1 roNWord sWord EN MC EN MC EN MC EN MC EN MC EN MC EN MC EN MC	Address Data type Sr_JTCANopenAus Sr_JTCANopenAus Sreve unit MRW14 UNIT AxisConfi_CAN_0 CAN_0 Don StateMachin StatusMort	Initialization Co	nc PRG x n Pl	C_PRG.CANopen_ax PROGRAM I	is	
Lbrery Manager Scope Nam Scope Nam Scope Nam Svar ISV2 VAR Statu TRUE ISV2_CANE040_Ax1s TRU	IV2_CAN6020 e CAN6040_Axis_1 cAN6040_Axis_1 wWord MC EN K EN K D CAN5040 MC I Axis D CAN50x I NodeID N CAN50x I NodeID CAN50x I CAN50	Address Data type St LTCANopenAus St LTCANopenAus Stewn URT StatusConfi_CAN_0 C_AxisConfi_CAN_0 C_AxisConfi_CAN_EN StatusAchine Status	Initialization Co	uc_PRG x 🙀 Pu	PROGRAM I	is PLC_PRG	
Ubravy Manager Ubravy Manager Scope Nam Scope Nam VaR ISV2, VAR Statu TRUE ISV2_CAN6040_Ax1= TRU ADB (ControlWord	e <u>CAREOL ACAS</u> <u>CAREOL ACAS</u> <u>SWord</u> <u>MC</u> <u>EN</u> <u>KC</u> <u>EN</u> <u>KC</u> <u>EN</u> <u>KC</u> <u>CAREOL ACAS</u> <u>MC</u> <u>I</u> <u>I</u> <u>I</u> <u>I</u> <u>I</u> <u>I</u> <u>I</u> <u>I</u>	Address Data type Sy_ITCANopenAxis Sy_ITCANopenAxis Sy UTCANopenAxis Sy UTCANopenAxis Sy UTCANopenAxis Sy UTCANopenAxis Status Status CAXISCONFI_CAN Don StateMachian Status Carror II Address Error II	Initialization Co	LC PRG X R	PROGRAM I	PLC_PRG	

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.

🖥 Add Library 🗙 Delete Library 📑 Properties 👼 Details 📑 Placeholder	s 👔 Library Repositor	y 🕦 Icon Legend 🗎 Sur	nmary				0 (
Libraries used in application 'Device.Application'			511 vi vi				
Name		inamespace	Effective vers	ion			
BreakpointLogging = Breakpoint Logging Functions, 3.5. 17.0 (3S - Smart Software Solution)	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	•			
H. Construction - Construction 2 5 14 0 (Cristian)	Dataile at autorita	ConcEuronMor	2 5 14 0				
Contents of selected library CANopenLib, 1.0.0.4 (Leadshine Technology Co.Ltd)	Details about select	ted library element MC_Hait_CA	N				
CANapenLib, 1.0.0.4 (Leadshine Technology Co.Ltd)		Graphical Y Document	ation				
ST_LICANOPENAXS	FUNCTION_BLC	CK MC_Halt_CAN					
SygMod		Name	Type	Inherite	Address	Initial	
G CVL_CANopenKernelerr	S IN OUT	Avis	Str. LTCANopenAvis				
GVL_CANopenSDOErr	NPIN T	Evenute	BOOL			FALSE	
E MC_AxisConfi_CAN	NOT NOT	Deceleration	LIDINT			1000	
E MC_Halt_CAN		Done	BOOL			EALSE	
MC_HomeSetPara_CAN		Burne	800			EALCE	
E MC_Home_CAN		CommandAborted	BOOL			EALCE	
E MC_JOG_CAN		Error	800			TALSE	
MC_MoveAbsoluteIme_CAN		Error	BOOL			2	
MC_MoveRelativeIme_CAN	V COIPOI	Enorio	UDINI			0	
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							



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





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



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





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.



7.5.1.G-code in PLC program

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





2) Function block



3) Sample program Add the CNC setting

Axis_Program G_CODE1



🙀 G_CODE_FILE 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.

11 12 13





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

o.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	ВҮТЕ	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".

Generate code	
C0231: Expression of type 'BOOL' expected in this place mc_hsio, 1.0.2.3 (eadshine technology co.ltd) ACT_Init_Para_ID [LS_MotionControl_P]	
C0077: Unknown type: hull mc_hsio, 1.0.2.3 (leadshine technology co.ltd) ACT_Init_Para_ID [LS_MotionControl_P]	
C0046: Identifier hull 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 (eadshine 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: Linknown twne: hull mc hsin, 1.0.2.3 (Beadshine technolony cn.ltd) ACT. SyncPos II S. MotionControl P1	~

: 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

General	Autoconfig master/slave	Ether CAT.		
Sync Unit Assignment	EtherCAT NIC Settings —			
EtherCAT I/O Mapping	Destination address (MAC)	FF-FF-FF-FF-FF	Broadcast	Redundancy
EtherCAT IEC Objects	Source address (MAC)	00-00-00-00-00	Select	
	Network name	eth0		
Status	◯ 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 • O 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



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