

VH5/VH6 series EtherCAT communication

User manual



Wuxi XINJE Electric Co., Ltd.

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Basic description

- Thank you for purchasing Xinje VH5 series frequency converter. Please read this product manual carefully before carrying out relevant operation.
- The manual mainly provides users with relevant guidance and instructions for the correct use and maintenance of the frequency converter. The manual involves the functions of the frequency converter communication expansion card, usage, installation and maintenance, etc.
- The contents in the manual are only applicable to the inverter products of Xinje company.

Notice to users

This manual is suitable for the following users

- The installation personnel of frequency converter
- Engineering and technical personnel (electrical engineer, electrical operator, etc.)
- The designer

Before the above personnel operate or debug the inverter, please carefully read the chapter of safety precautions in this manual.

Statement of responsibility

- Although the contents of the manual have been carefully checked, errors are inevitable, and we can't guarantee complete consistency.
- We will often check the contents of the manual and correct them in subsequent versions. We welcome your valuable comments.
- Please understand that the contents described in the manual are subject to change without notice.

Contact us

If you have any questions about the use of this product, please contact the agent and office purchasing the product, or directly contact Xinje company.

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1. Product confirmation

Thank you for using XINJE VH5 / VH6 series frequency converter and selecting EtherCAT expansion card.

Please confirm the following when receiving the product:

- Check whether the Ethercat expansion card is damaged.
- Confirm whether the received card is correct through the label on the board, refer to Fig1.
- Confirm whether the package is complete. Refer to Table 1.
- If the card is damaged, the model is wrong, or there are omissions in the package, please contact the supplier or salesman immediately.
- Please download the XML file of this card on the website:www.xinje.com, file name: VHX-CC100.xml.



Fig. 1 Nameplate label location Table 1 Package

Model	Content	Photo	Quantity
	Communication card		1
VH3-CC100	Screw and bracket		1
VH6-CC100	Communication card		1

2. Summary

This manual provides functional specifications, installation, basic operation and settings, as well as a brief introduction to the contents of EtherCAT protocol. To ensure the correct installation and operation of this product, please carefully read this manual and the communication protocol of the frequency converter before using this communication card.

This manual is only used as the VHX-CC100 operation guide and related instructions. The details of EtherCAT protocol are not introduced here. If readers want to know more about EtherCAT protocol, please refer to relevant professional articles or books.

This EtherCAT communication card supports two kinds of reading and writing process quantities, one is through PDO, and the other is through SDO to read and write the object dictionary defined by the manufacturer.

3. Product characteristics

Supported functions

Support EtherCAT COE 402 protocol

- Supported services
 - Support PDO
 - Support SDO
 - Support the object dictionary defined by the manufacture
 - Support SDO to read and write the function code of VFD
- Supported EtherCAT Synchronization cycle

Item	Supported specifications
	250us
	lms
Synchronization cycle	2ms
	4ms

■ SDO/PDO data description

SDO(Service Data Object) is used to transmit aperiodic communication data. The master station reads and writes data in the object dictionary , and can set the objects and monitor various states of the slave station. The response to the read / write action to the SDO takes time. Objects refreshed with PDO should not be refreshed with SDO, but overwritten with the value of PDO.

PDO(Process Data Object) is used to transmit periodic communication data.

The data in PDO area can realize the real-time change of VFD data by the master station and the real-time reading of periodic data interaction.

The communication address of the data is directly configured by the VFD. It mainly includes the following contents:

Master station send PDO data(RxPDO 0x1600)									
Fixed RxPDO								Variable RxPDO	
Controlwo 6040h	ord	vl ta veloo 604	rget city 2h	Modes of operation 6060h	,	Target position 607A h (reserved)	Target torque 6071h		Functional parameters of VFD can be changed in real time
RxPDO	1 F	RxPI	002	RxPDO3		RxPDO4	RxPDO5		None
			i	VFD corr	espond	ing PDO data(Tx	PDO 0x1a	.00)	
				Fix	ed TxP	DO			Variable TxPDO
Statusword 6041 h	Veloc actua valu 606C	ity al le Ch	Mode of operation display 6061 h	Torque actual value 6077 h	Positic actual value 6064	vl target demand 6043 h	Error code 603Fh	vl target actual value 6044h	Functional parameters of VFD can be changed in real time
TxPDO1	TxPD	02	TxPDO3	TxPDO4	TxPDC	D5 TxPDO6	TxPDO7	TxPDO8	TxPDO9~TxPDO12

Note: RxPDO and TxPDO can be configured with 12 at most. RxPDO cannot be added. 8 TxPDOs can be fixed and 4 TxPDOs can be added.

4. Communication card components

4.1 VH5-CC100 communication card components & indicator description



The expansion card has three LED lights, as shown in the figure .

The status indicators in the figure are error indicator, operation indicator and VFD communication status indicator from left to right. The descriptions are as follows:

Туре	Status	Description
	Normally OFF	No error
Emon in diastan	OFF 0.2s ON 0.2s flashing	Pre-OP fault status
Error indicator	OFF 1s ON 1s flashing	Safe-OP fault status
	Normally ON	OP fault status
	Normally OFF	Init status
On anotion in diastan	OFF 0.2s ON 0.2s flashing	Pre-OP status
Operation indicator	OFF 1s ON 1s flashing	Safe-OP status
	Normally ON	OP status

VFD communication status indicator	Normally OFF	The expansion card is disconnected from the frequency converter
	1Hz flashing	The connection between the expansion card
		and the frequency converter is normal
	Nameally, ON	The expansion card is establishing connection
	Normally ON	with the frequency converter

4.2 VH6-CC100communication card components & indicator description



The status indicators in the figure are VFD communication status indicator, operation indicator and the error indicator from top to bottom. The descriptions are as follows:

Туре	Status	Description	
	Normally OFF	The expansion card is disconnected from the	
		frequency converter	
VFD communication status	1117 flocking	The connection between the expansion card and	
indicator	THZ Hashing	the frequency converter is normal	
	Normally ON	The expansion card is establishing connection	
		with the frequency converter	
	Normally OFF	Init status	
Operation indicator	OFF 0.2s ON 0.2s flashing	Pre-OP status	
	OFF 1s ON 1s flashing	Safe-OP status	
	Normally ON	OP status	
	Normally OFF	No error	
Emerindicator	OFF 0.2s ON 0.2s flashing	Pre-OP fault status	
Error indicator	OFF 1s ON 1s flashing	Safe-OP fault status	
	Normally ON	OP fault status	

5. Installation

5.1 Install VH5-CC100 communication card

1. Disconnect all power inputs of frequency converters to ensure that the internal voltage of the frequency converter is safe.

2. Disassemble the frequency converter cover plate and find the control board.

3. Install the hexagon stud at the corresponding position of the board, and tighten the M3 single head hexagon stud on the drive plate. As shown in the following figure:



- 4. Align the communication card pin with the expansion card slot of the control board and insert it firmly.
- 5. Tighten M3 screws.
- 6. Install the frequency converter cover plate.
- 7. Connect and fix the communication line.

Note: Hot plugging is prohibited.



5.2 Install VH6-CC100 communication card

- 1. Disconnect all power inputs of VFD to ensure that the internal voltage of the frequency converter is safe.
- 2. Remove the C card cover plate of the VFD.
- 3. Align the communication card pin with the control board expansion card slot and insert it firmly.
- 4. Tighten M3 screws.
- 5. Connect and fix the communication line.
- Note: Hot plugging is prohibited.



6. CoE Object dictionary

6.1 Object dictionary area assignment

CoE	Object dictionary	VHX-CC100 object dictionary		
Index	Content	Index	Content	
0000h~0FFFh	Data type area	0000h~0FFFh	Data type area	
1000h~1FFFh	COE communication area	1000h~1C33h	DS301 object dictionary (CANopen protocol communication area)	
2000h~4FFFh	Factory parameter display and setting area	2000h~4FFFh	VFD Internal parameter mapping area (manufacturer defined area)	
5000h~5FFFh	Independent Protocol area	5000h~5200h	Independent motion control (manufacturer defined area)	
	Device CiA402 protocol	6000h~6502h	CiA402object(Driver profile area)	
6000n~9FFFh	area	7000h~9FFFh	Reserved	
A000~FFFFh	Reserved	A000h~FFFFh	Reserved	

The object dictionary of EtherCAT bus is all in the device description file, i.e. XML file. The XML file of VH5 and VH6 EtherCAT expansion card is: VHX-CC.xml.

6.2 COE communication area

Index	Sub-index	Name	Data type	Access
1000h	-	Device type	UINT32	RO
1001h	-	Error register	UINT8	RO
1008h	-	Manufacture device name	STRING	-
1009h	-	Manufacture hardware version	STRING	-
100Ah	-	Manufacture software version	STRING	-
	-	Identity object	-	-
	00	Number of entries	UINT8	RO
10194	01	Vendor ID	UINT32	RO
10180	02	Product code	UINT32	RO
	03	Revision number	UINT32	RO
	04	Serial number	UINT32	RO
	-	Receive PDO mapping 1	-	-
	00	Number of entries	UINT8	RW
	01	1st receive PDO mapped	UINT32	RW
	02	2nd receive PDO mapped	UINT32	RW
1600h	03	3rd receive PDO mapped	UINT32	RW
	04	4th receive PDO mapped	UINT32	RW
	11	11th receive PDO mapped	UINT32	RW
	12	12th receive PDO mapped	UINT32	RW
	-	Receive PDO mapping 2	-	-
16016	00	Number of entries	UINT8	RW
100111	01	1st receive PDO mapped	UINT32	RW
	02	2nd receive PDO mapped	UINT32	RW

Index	Sub-index	Name	Data type	Access
	03	3rd receive PDO mapped	UINT32	RW
	04	4th receive PDO mapped	UINT32	RW
	11	11th receive PDO mapped	UINT32	RW
	12	12th receive PDO mapped	UINT32	RW
	-	Receive PDO mapping 3	-	-
	00	Number of entries	UINT8	RW
	01	1st receive PDO mapped	UINT32	RW
	02	2nd receive PDO mapped	UINT32	RW
1602h	03	3rd receive PDO mapped	UINT32	RW
	04	4th receive PDO mapped	UINT32	RW
	11	11th receive PDO mapped	UINT32	RW
	12	12th receive PDO mapped	UINT32	RW
	-	Receive PDO mapping 4	-	-
	00	Number of entries	UINT8	RW
	01	1st receive PDO mapped	UINT32	RW
	02	2nd receive PDO manned	UINT32	RW
1603h	03	3rd receive PDO mapped	UINT32	RW
100511	04	4th receive PDO manned	UINT32	RW
			011152	100
	11	 11th receive PDO manned	UINT32	RW
	12	12th receive PDO mapped	UINT32	RW
	12	Transmit PDO manning 1	-	-
	00	Number of entries	LUNT8	RW
	01	1st transmit PDO manned	UINT32	RW
	02	2nd transmit PDO mapped	UINT32	RW
1400b	02	3rd transmit PDO mapped	UINT32	RW
	03	Ath transmit PDO mapped	UINT32	RW
	04		011132	K W
	11	 11th transmit PDO manned		 DW
	11	12th transmit PDO mannad		
	12	Transmit PDO mapping 2	011132	Γ.VV
	- 00	Number of entries		- DW/
	00	1 at transmit PDO mannad		
		2nd transmit PDO mapped		
14016	02	2nd transmit PDO mapped		
IAUIII	03	Ath transmit PDO mapped		
	04	4th transmit PDO mapped	011132	Γ.VV
	11	 11th transmit DDO manual		 DW
	11	11th transmit PDO mapped		KW DW
	12	Transmit PDO magging 2	0111132	K.W
	-	Transmit PDO mapping 3		-
	00	Number of entries		RW
1 4 0 21		1st transmit PDO mapped		KW
IAU2h	02	2nd transmit PDO mapped	UIN132	KW
	03	Stu transmit PDO mapped	UIN132	KW
	04	4th transmit PDO mapped	UINT32	KW

Index	Sub-index	Name	Data type	Access
	11	11th transmit PDO mapped	UINT32	RW
	12	12th transmit PDO mapped	UINT32	RW
	-	Transmit PDO mapping 4	-	-
	00	Number of entries	UINT8	RW
	01	1st transmit PDO mapped	UINT32	RW
	02	2nd transmit PDO mapped	UINT32	RW
1A03h	03	3rd transmit PDO mapped	UINT32	RW
	04	4th transmit PDO mapped	UINT32	RW
	11	11th transmit PDO mapped	UINT32	RW
	12	12th transmit PDO mapped	UINT32	RW
	-	Sync manager communication type	-	-
	01	Communication type sync manager 0	UINT8	RO
1C00h	02	Communication type sync manager 1	UINT8	RO
	03	Communication type sync manager 2	UINT8	RO
	04	Communication type sync manager 3	UINT8	RO
	-	Sync manager channel 2	-	-
	00	Number of assigned PDOs	UINT8	RW
1012h	01	PDO mapping object index of assigned RxPDO1	UINT16	RW
101211	02	PDO mapping object index of assigned RxPDO2	UINT16	RW
	03	PDO mapping object index of assigned RxPDO3	UINT16	RW
	04	PDO mapping object index of assigned RxPDO4	UINT16	RW
	-	Sync manager channel 3	-	-
	00	Number of assigned PDOs	UINT8	RW
1C12h	01	PDO mapping object index of assigned TxPDO1	UINT16	RW
	02	PDO mapping object index of assigned TxPDO2	UINT16	RW
	03	PDO mapping object index of assigned TxPDO3	UINT16	RW
	04	PDO mapping object index of assigned TxPDO4	UINT16	RW
	-	SM output parameter	-	-
	00	Number of sub-objects	UINT8	RO
	01	Synchronization Type	UINT16	RW
	02	Cycle time	UINT32	RO
	03	Shift time	UINT32	RW
	04	Sync modes supported	UINT16	RO
1C32h	05	Minimum cycle time	UINT32	RO
10.5211	06	Calc and copy Time	UINT32	RO
	08	Get cycle time	UINT16	RW
	09	Delay time	UINT32	RO
	10	Sync0 cycle time	UINT32	RW
	11	SM-Event Missed	UINT16	RO
	12	Cycle time too small	UINT16	RO
	32	Sync error	UINT8	RO
	-	SM input parameter	-	-
	00	Number of sub-objects	UINT8	RO
1C33h	01	Sync mode	UINT16	RW
103311	02	Cycle time	UINT32	RO
	04	Sync modes supported	UINT16	RO
	05	Minimum cycle time	UINT32	RO

Index	Sub-index	Name	Data type	Access
	06	Calc and copy Time	UINT32	RO
	08	Get cycle time	UINT16	RW
	09	Delay time	UINT32	RO
	10	Sync0 cycle time	UINT32	RW
	11	SM-Event Missed	UINT16	RO
	12	Cycle time too small	UINT16	RO
	32	Sync error	UINT8	RO

Note: Items marked with "-" in the table indicate that there are no related attributes in the object dictionary.

6.3 VFD Internal parameter mapping area (manufacturer defined area)

The object dictionary in the user-defined area of the manufacturer corresponds to the panel parameters of VFD one by one. Only Group U parameters of the object dictionary in this area can be TPDO mapped and can be read by PDO. Other object dictionaries can only be operated based on SDO.

Index	Sub-index	Parameter	Index	Sub-index	Parameter
2000h	00	P0-00	2900h	00	P9-00
2001h	00	P0-01	2901h	00	P9-01
2002h	00	P0-02	0902h	00	P9-02
2003h	00	P0-03	2903h	00	P9-03
201Ah	00	P0-26	291Eh	00	P9-30
2100h	00	P1-00	2A00h	00	PA-00
2101h	00	P1-01	2A01h	00	PA-01
2102h	00	P1-02	2A02h	00	PA-02
2103h	00	P1-03	2A03h	00	PA-03
2123h	00	P1-35	2A1Dh	00	PA-29
2200h	00	P2-00	2B00h	00	PB-00
2201h	00	P2-01	2B01h	00	PB-01
2202h	00	P2-02	2B02h	00	PB-02
2203h	00	P2-03	2B03h	00	PB-03
2246h	00	P2-70	2B33h	00	PB-51
2300h	00	P3-00	2C00h	00	PC-00
2301h	00	P3-01	2C01h	00	PC-01
2302h	00	P3-02	2C02h	00	PC-02
2303h	00	P3-03	2C03h	00	PC-03
2317	00	P3-23	2C46	00	PC-70
2400	00	P4-00	2F00h	00	PF -00
2401	00	P4-01	2F01h	00	PF -01
2402	00	P4-02	2F02h	00	PF -02
2403h	00	P4-03	2F03h	00	PF -03

Index	Sub-index	Parameter	1	Index	Sub-index	Parameter
241B	00	P4-27	1	2F08h	00	PF -08
			1			
2500h	00	P5-00	1	3000h	00	A0-00
2501h	00	P5-01]	3001h	00	A0-01
2502h	00	P5-02		3002h	00	A0-02
2503h	00	P5-03		3003h	00	A0-03
2532	00	P5-50		3009	00	A0-09
2600h	00	P6-00		3100h	00	A1-00
2601h	00	P6-01		3101h	00	A1-01
2602h	00	P6-02		3102h	00	A1-02
2603h	00	P6-03		3103h	00	A1-03
2617h	00	P6-23		3115h	00	A1-21
2700h	00	P7-00		3200h	00	A2-00
2701h	00	P7-01		3201h	00	A2-01
2702h	00	P7-02		3202h	00	A2-02
2703h	00	P7-03		3203h	00	A2-03
2750h	00	P7-80		3240h	00	A2-64
2800h	00	P8-00		4000h	00	U0-00
2801h	00	P8-01		4001h	00	U0-01
2802h	00	P8-02		4002h	00	U0-02
2803h	00	P8-03		4003h	00	U0-03
2818h	00	P8-24		404Bh	00	U0-75

6.4 Independent Protocol

Index	Sub-index	Object Type	Name	Data Type	Access	PDO
5000	-	VAR	Command	UINT16	RW	YES
5010	-	VAR	Target speed	UINT16	RW	YES
5100	-	VAR	Status	UINT16	RO	YES
5110	-	VAR	Output frequency	UINT16	RO	YES
	-	RECORD	Communicate state	-	-	-
	01	VAR	Number of frame lost	UINT16	RO	NO
5200	02	VAR	Number of CRC errors	UINT16	RO	NO
5200	03	VAR	Number of rejects	UINT16	RO	NO
	04	VAR	Newest error cause	UINT16	RO	NO
	05	VAR	Newest error index	UINT16	RO	NO

06 VAR Cycle time UINT16 RO NO

Note: the 5200hex is used to observe the communication status between the expansion card and the frequency converter and does not participate in the actual control.

Index	Sub-index	Object Type	Name	Data Type	Access	PDO
603F	-	VAR	Error code	UINT16	RO	YES
6040	-	VAR	Control word	UINT16	RW	YES
6041	-	VAR	Status word	UINT16	RO	YES
6042	-	VAR	vl target velocity(0.01%)	INT16	RW	YES
6043	-	VAR	vl target demand	INT16	RO	YES
6044	-	VAR	vl target actual value	INT16	RO	YES
	-	RECORD	vl velocity acceleration			
6046	01	VAR	Lower limit frequency	UINT32	RW	NO
	02	VAR	Upper limit frequency	UINT32	RW	NO
	-	RECORD	vl velocity acceleration			
6048	01	VAT	Maximum output frequency	UINT32	RO	NO
	02	VAR	Acceleration time	UINT16	RW	NO
	-	RECORD	vl velocity deceleration			
6049	01	VAT	Maximum output frequency	UINT32	RO	NO
	02	VAR	Deceleration time	UINT16	RW	NO
605B	-	VAR	Shutdown option code	UINT16	RW	NO
605C	-	VAR	Disable operation option code	UINT16	RW	NO
605E	-	VAR	Fault reaction option code	UINT16	RW	NO
6060	-	VAR	Modes of operation	INT8	RW	NO
6061	-	VAR	Modes of operation display	INT8	RO	NO
6064	-	VAR	Position actual value	INT32	RO	YES
606C	-	VAR	Velocity actual value(reserved)	INT32	RO	YES
6071	-	VAR	Target torque	INT16	RW	YES
6077	_	VAR	Torque actual value	INT16	RO	YES
607A	_	VAR	Target position(reserved)	INT32	RW	YES
6502	-	VAR	Supported drive modes	UINT32	RO	NO

6.5 CiA402 object(Driver profile area)

7. State control

7.1 VFD status control

7.1.1 State machine

The operation state transition of VFD is shown in the figure below. Each box represents a state, and the serial number 2-10,15 represents the state control command.



Note: quick stop command is not supported. If the master station executes quick stop command, it will execute the command of conversion 9 (free shutdown).

7.1.2 Status description

Description
Power on the power supply and execute the initialization procedure
Initialization end
Waiting to enter the Switch On state, the motor is not excited
VFD is ready, main loop power supply is normal
VFD can be controlled and work normally
Occur the error and the cause of the fault needs to be determined
Fault status

7.1.3 Control command

The status is controlled by the bit of the control command (Controlword 6040 h). The combined control table is as follows.

Command	Bit7	Bit3	Bit2	Bit 1	Bit 0	Transitions
Commanu	Fault	Enable	Quick	Enable	Switch	Transitions
	reset	Operation	Stop	Voltage	On	
Switch on	0	-	1	1	0	2,6,8
Switch on+	0	0	1	1	1	2
Enable operation	0	0	1	1	1	5
Disable voltage	-	1	1	1	1	3,4 (Automatic
						conversion)
Quick stop	-	-	-	0	-	7,9,10
Disable operation	-	0	1	1	1	5
Enable operation	-	1	1	1	1	4
Fault reset	0->1	-	-	-	-	15

7.1.4 Status

The bit combination of statusword (6041 hex) indicates the working status of the equipment, as shown in the following table:

Status	Bit 12 FC	Bit 9 RO	Bit 6 SOD	Bit5 QS	Bit 4 VE	Bit 3 F	Bit 2 OE	Bit 1 SO	Bit 0 RTSO
Not ready to switch on	1	1	0	0	-	0	0	0	0
Switch on disable	1	1	1	-	-	0	0	0	0
Ready to switch on	1	1	0	1	-	0	0	0	1
Switched on	1	1	0	1	1	0	0	1	1
Operation enabled	1	1	0	1	1	0	1	1	1
Fault reaction active	1	1	0	1	-	1	1	1	1
Fault	1	1	0	1	-	1	0	0	0

Note:

(1)FC = Follow command; RO = Remote; SOD = Switch on disabled; QS = Quick stop; VE = Voltage enabled;

F = Fault; OE = Operation enabled; SO = Switched on; RTSO = Ready to switch on.

(2)"-" means no requirement, which may be 0 or 1. It does not participate in the judgment.

7.2 Operating mode

The operation mode supports speed mode and torque mode, which are set by parameter PF-00:

Speed mode: PF-00=0. Torque mode: PF-00=1.

The operation mode supported by the frequency converter is displayed by "Supported drive modes (6502 hex)".

This mode supports clock synchronization mode (DC sync) and periodic synchronization mode (SM sync).

Note: Mode switching can only be realized by setting variable frequency pf-00 parameters, which cannot be modified during operation.

Setting "modes of operation (6060 hex)" cannot switch the operation mode. The default is 6060h=2.

7.2.1 Speed mode



Note: 6043h and 6044h give the same value.

7.2.2 Torque mode

Object	Name	Description
6071 h	Target torque	Target torque
6077 h	Torque actual value	Torque actual value

8. Independent protocol object

The independent protocol object enables the master station to directly operate the VFD remotely, and all performance parameters directly use the parameters of the original frequency converter.

5000 hex	Command				
Range: 0000 ~ FFFF hex		Unit:-	Default value: 0000 hex		
Size: 2byte(U16)		Access: RW	PDO map: Possible		

This object directly provides action instructions to the VFD.

Bit description is as follows:

Bit	Meaning	Detail		
0	Forward	0:stop 1:Forward running		
1	Reverse	0:stop 1:Reverse running		
2-3	Reserved			
4	Parking mode	0:Deceleration shutdown 1: Free shutdown		
5-6	Reserved			
7	Fault reset	1: Fault and warning clearing		
8	Enable effective	0: Default CiA402 protocol		
		1: Independent protocol (this agreement)		
9-15	Reserved			

• The instructions are as follows:

Forward running 0x0101 (decimal corresponding to 257)

Reverse running 0x0102 (decimal corresponding to 258)

Deceleration shutdown 0x0110 (decimal corresponding to 256)

Free shutdown 0x0100 (decimal corresponding to 272)

For example, 0x0101 is converted to binary 10000001, bit0 is 1, which means forward running, and bit8 is 1, which means independent protocol.

5010 hex	Target Speed		
Range: 0000 ~ FFFF hex		Unit: 0.01Hz	Default value: 0000 hex
Size: 2byte(U16)		Access: RW	PDO map: Possible

• The object gives the output frequency of the frequency converter.

• Refer to P0-13 and P0-14 for upper frequency limit and upper frequency source.

5100 hex	Status		
Range:0000 ~ FFFF hex		Unit : -	Default value: 0000 hex
Size: 2byte(U16)		Access: RO	PDO map: Possible

- The current state of the frequency converter.
- Bit description is as follows:

Bit	Meaning	Detail
0	Operation / shutdown	0: Shutdown 1: Operation
1	Forward/Reverse	0: Forward 1: Reverse
2	Fault flag	0: Normal 1: Fault
3	Frequency arrival	1: Reach the set frequency
4-6	Reserved	Normally 0
7	Abnormal communication	0: normal 1: abnormal

8-15	Fault code	Refer to the VH5/VH6 frequency inverter manual
		or appendix

5110 hex	Output Frequency		
Range: 0000 ~ FFFF hex		Unit: 0.1Hz	Default value: 0000 hex
Size: 2byte(INT16)		Access: RO	PDO map: Possible

5200 hex Communicate S	Communicate State		
Sub-index 0:Number of entries			
Range: -	Unit : -	Default value: 0006hex	
Size: 1byte(U8)	Access: RO	PDO map: Not possible	
Sub-index 1: Number of frame lost			
Range:-	Unit : times	Default value: 0000hex	
Size: 2byte(U16)	Access: RO	PDO map: Not possible	
Sub-index 2:Number of CRC error 0	CRC		
Range:-	Unit :times	Default value: 0000hex	
Size: 2byte(U16)	Access: RO	PDO map: Not possible	
Sub-index 3: Number of rejections			
Range:-	Unit :times	Default value: 0000hex	
Size:2byte(U16)	Access: RO	PDO map: Not possible	
Sub-index 4:Newest error cause			
Range: 0-3	Unit :-	Default value: 0000hex	
Size:2byte(U16)	Access: RO	PDO map: Not possible	
Sub-index 5:Newest error index			
Range: -	Unit :-	Default value: 0000hex	
Size:2byte(U16)	Access: RO	PDO map: Not possible	
Sub-index 6:Cycle time			
Range:-	Unit : ms	Default value: 0000hex	
Size:2byte(U16)	Access: RO	PDO map: Not possible	

• Sub-index 1~3 diaplay the status of the communication data frame between the expansion card and the frequency converter.

- Sub-index 4 displays the latest error reason, 1/2/3 respectively represents sub objects 1 to 3, and 0 represents no error at present.
- Sub-index 5 displays the latest access object when an error occurs, which is used for fault location.
- Sub object 6 displays the cycle of the communication frame, which is generally 10ms (version below 3720) /15ms (version 3720). If the value is too large, it indicates that there is a problem in the communication with the frequency converter.
- This object is used to monitor and analyze the communication status between the expansion card and the frequency converter, which can be ignored in normal use.

Notes:

① The independent protocol does not support torque mode, only speed mode. If the customer wants to use torque mode, please use CiA402 protocol.

② The firmware version of VFD can be queried through P8-16.

9. CiA402 protocol object

603Fhex	Error code		
Range: 0000 ~ FFFF hex		Unit : -	Default value: 0000 hex
Size:2byte(U16)		Access: RO	PDO map: Possible

• This object displays the latest error or alarm code of the equipment.

Object	name	Data type	Description
603F hex	Error code	U16	0000: No error
			8**:EtherCAT expansion card related errors, please
			refer to 11. EtherCAT communication alarm code
			9**: error reported by frequency converter, ** is
			the error number of frequency converter
			For example,
			901 indicates acceleration overcurrent, Err01
			910 indicates motor overload,Err10
			Refer to chapter 7-1 of VH5/VH6 frequency
			inverter manual

6040hex	Control word		
Range: 0000 ~ FFFF hex		Unit : -	Default value: 0000 hex
Size:2byte(U16)		Access: RW	PDO map: Possible

• This object controls the working state of the equipment.

• Bit description is as follows:

Bit	Name	Details
0	Switch on	The state is controlled by these bits.
1	Enable voltage	Quick stop is not supported.
2	Quick stop(reserved)	
3	Enable operation	
4-6	Reserved	Normally 0
7	Fault reset	Faults and warnings are cleared when this bit turns ON
8-15	Error code	Unused, normally 0

6041hex	Statusword		
Range :0000 ~ FFFF hex		Unit: -	Default value: 0000 hex
Size:2byte(U16)		Access: RO	PDO map: Possible

- This object displays the working status of the current equipment.
- Bit description is as follows:

Bit	Name	Details
0	Ready to switch on	these bits gives the state.
1	Switched on	Quick stop is not supported.
2	Operation enabled	
3	Fault	
4	Voltage enabled	
5	Quick stop	
6	Switch on disable	Normally 0
7	Warning	0:No warning occurred for the unit or inventor
		1:Warning occurred for the unit or inventor
8	Reserved	Not used

9	Remote	0:Control from Controlword is diabled
		1:Indicates that being performed by Controlword
10-15	Reserved	Not used

6042hex	vl target velocity		
Range : -32768-32767		Unit: 0.01%	Default value: 0
Size: 2byte(INT16)		Access:RW	PDO map:Possible

This object corresponds to the percentage of the maximum output frequency P0-13, namely:

vl target velocity =
$$\frac{\text{Data} \times \text{Maximum output frequency P0-13}}{100000}$$

10000

Data corresponds to the value given in 6042h. The given range of data is 0~10000. Values beyond the given range cannot be written.

6043hex vl veloc	vl velocity demand		
Range :-32768-32767	Unit	:: 0.01Hz	Default value: 0000 hex
Size:2byte(INT16)		ess: RO	PDO map: Possible

6044hex	vl velocity actual value		
Range :-32768-32	767	Unit: 0.1Hz	Default value: 0000 hex
Size:2byte(INT16)		Access: RO	PDO map: Possible

• This object indicates the speed command fed back by the frequency converter.

6046hex	vl velocity min max amount		
Sub-index 0:Numb	per of entries		
Range :-		Unit: -	Default value: 02hex
Size:1byte(U8)		Access: RO	PDO map: Not possible
Sub-index 1: vl velocity min amount (Lower limit frequency)			
Range :0 – FFFFFFF hex		Unit: 0.01Hz	Default value: 00000000hex
Size:4byte(U32)		Access: RW	PDO map: Not possible
Sub-index 2: vl velocity max amount (Upper limit frequency)			
Range :0 – FFFFF	FFF hex	Unit: 0.01Hz	Default value: 00001388hex
Size:4byte(U32)		Access: RW	PDO map: Not possible

• This object sets the maximum and minimum speed.

- Sub index 01 supports the minimum speed of reading and writing, which will be associated with frequency converter parameter P0-17
- Sub index 02 supports the maximum speed of reading and writing, which will be associated with frequency converter parameter P0-15(the maximum allowable setting value is determined by the maximum output frequency of P0-13)

6048hex	vl velocity acceleration			
Sub-index 0: Number of entries				
Range :-		Unit:-	Default value: 02hex	
Size:1 byte(U8)		Access: RO	PDO map: Not possible	
Sub-index 1: the maximum output frequency P0-13				
Range :0 – FFFFFFF hex		Unit:0.01Hz	Default value: 00001388hex	
Size:4 byte(U32)		Access: RO	PDO map: Not possible	
Sub-index 2: Delta time				
Range :0 – FFFF hex		Unit:0. 1s	Default value: 00000200hex	
Size:2 byte(U16)		Access: RW	PDO map: Not possible	

- This object sets the acceleration time.
- Read / write delta time will be associated with VFD parameter P0-18.

6049hex vl velocity	vl velocity deceleration		
Sub-index 0:Number of entries			
Range :-	Unit:-	Default value: 02hex	
Size:1 byte(U8)	Access: RO	PDO map: Not possible	
Sub-index 1: the maximum output frequency P0-13			
Range :0 – FFFFFFFF hex	Unit: 0.01Hz	Default value: 00001388hex	
Size:4 byte(U32)	Access: RO	PDO map: Not possible	
Sub-index 2: Delta time			
Range :0 – FFFF hex	Unit: 0.1s	Default value: 00000200hex	
Size:2 byte(U16)	Access: RW	PDO map: Not possible	

- This object sets the deceleration time.
- Read / write delta time will be associated with VFD parameter P0-18.

605Bhex	Shutdown option code		
Range :1		Unit:-	Default value: 1
Size:2byte(INT16))	Access: RW	PDO map: Not possible

• This object describes the action during shutdown (operation enable → ready to switch on). When this object is set to 1, it indicates deceleration shutdown, otherwise it will free shutdown.

605Chex	Disable operation option code		
Range :1		Unit:-	Default value: 1
Size:2byte(INT16)	1	Access: RW	PDO map: Not possible

• This object describes the action of canceling operation (operation enable → switch on). When this object is set to 1, it indicates deceleration shutdown, otherwise it will free shutdown.

605Ehex	Fault reaction option code		
Range :1		Unit:-	Default value: 1
Size:2byte(INT16)		Access: RW	PDO map: Not possible

• This object describes the action when an error occurs (operation enable → fault reaction active). When this object is set to 1, it means deceleration and shutdown, otherwise free shutdown (this function is reserved for standby).

6060hex	Mode of operation		
Range :2		Unit::-	Default value: 02 hex
Size:1 byte(INT8)		Access: RW	PDO map: Not possible

6061hex	Mode of operation display		
Range : 0 - 10		Unit:-	Default value: 02 hex
Size:1 byte(INT8)		Access: RO	PDO map: Not possible

• This object displays the current operation mode, which is equal to 6060 hex (mode of operation) during operation.

6064hex	Position actual value			
Range :-2147483648 - 2147483647		Unit:-	Default value: 00000002 hex	
Size:4 byte(U32)		Access: RO	PDO map: Not possible	

• This object displays the encoder position fed back by the frequency converter.

6071hex	Target torque		
Range :-32768 -32	2767	Unit: 0.01%	Default value: 0
Size:2 byte(INT16		Access: RW	PDO map: Possible

6077hex	Torque actual value				
Range :-32768 -32	2767	Unit:0.01%	Default value: 0		
Size:2 byte(INT16)		Access: RO	PDO map: Possible		
• • • • • • • • •					

• This object displays the torque command fed back by the frequency converter.

6502hex	Supported drive modes			
Range : 0 - 10		Unit:-	Default value: 00000002 hex	
Size:4 byte(U32)		Access: RO	PDO map: Not possible	

• This object displays the operation mode supported by expansion card.

• Bit description is as follows:

Bit	Supported mode	Definition	
0	pp (Profile Position mode)	0:Not supported	
1	vl (velocity mode)	1:Support	
2	pv (Profile Velocity mode)	0:Not supported	
3	tq (Profile Torque mode)	0:Not supported	
4	Reserved	0	
5	hm (Homing mode)	0:Not supported	
6	ip (Interpolated Position mode)	0:Not supported	
7	csp (Cyclic Sync Position mode)	0:Not supported	
8	csv (Cyclic Sync Velocity mode)	0:Not supported	
9	cst (Cyclic Sync Torque mode)	1:support	
10 - 31	Reserved	0	

10. EtherCAT use case

10.1 XINJE XDH series PLC and VH5/VH6

10.1.1 System topology

VH5/VH6 has two communication network ports. The network port at the upper end is the outgoing port (out port) and the network port at the lower end is the incoming port (in port). The principle of "bottom in and top out" shall be followed when connecting multiple frequency converters.

VH5 and VH6 EtherCAT expansion cards are connected to PLC master station and frequency converter slave station according to the series topology shown in the figure below.



10.1.2 Physical wiring

Take Xinje XDH series PLC and VH5 as an example, the physical wiring is shown in the figure:



10.1.3 System configuration

10.1.3.1 Parameter setting

The frequency converter slave station needs to be configured as EtherCAT communication mode, and the parameters to be modified are as follows:

Parameter	Name	Access	Set	Range	Explanation
			value		
P0-02	Operation command channel selection	Runtime read only	2	0-2	Communication
P0-03	Main frequency A input channel	Runtime read	6	0-9	Communication setting

	selection	only			
P9-00	Communication protocol	Runtime read only	1	0-2	EtherCAT
P9-12	Slave station No.	RW	-	0-65535	After modification, it is valid when power on again.

Note: When using the CiA402 protocol for control, other parameters of the frequency converter can be factory parameters. If the master station supports automatic reading of the slave station number (e.g. Xinje bus type PLC), P9-12 does not need to be set.

10.1.3.2 Add XML file

Before opening the PLC software, you need to add the XML file. (when installing the XDPPro software, the XML file of frequency conversion has been included.) If you need to update the XML file, please go to the official website \rightarrow service and support \rightarrow download center to download it by yourself.

Right click XDPPro software, open the location of the file, find the directory [plugins] ethercat[vendorxml], and add the XML file here.

This PC → Local Disk (D:) → XINJE → XDPPro → 3.7.14a_20220	1428 🕨 plugins 🕨 ethe	ercat ⊧ vendorxml	
Name	Date modified	Туре	Size
Profile402.xml	10/8/2020 10:45 A	XML File	22 KB
VHX-CC100.xml	6/3/2021 10:03 AM	XML File	417 KB
XINJE-DP3C-Rev2.0-v1.2.20.20210615-30	9/10/2021 1:26 PM	XML File	260 KB
XINJE-DS5C-ECT.xml	7/29/2021 9:32 AM	XML File	787 KB
XINJE-LC3-AP-Rev1.3.0.xml	6/3/2021 10:03 AM	XML File	230 KB

10.1.3.3 New project(take XDH-60T4 as an example)



10.1.3.4 Master connection configuration

1.Computer configuration

After the network cable is plugged in, open "control panel" \rightarrow "network and Internet" \rightarrow "network connection". Find the Ethernet that has been successfully connected. Right click the Ethernet and click properties. The Ethernet properties interface pops up. Then follow the steps below:

- (1) Double click "Internet Protocol Version 4 (TCP/IPV4)".
- (2) Select "use the following IP address".
- (3) Set IP address: 192.168.6.xxx, "xxx" can be set arbitrarily (except 6).

Note: The last digit of the computer address and the IP address of the PLC device cannot be set repeatedly.

Ethern	net Propertie	25	Internet Protocol Vers	sion 4 (TCP/IPv4) Properties
Connect using:			You can get IP settings assigned	automatically if your network supports
Realtek PCIe GBE Fa	mily Controller #	2	this capability. Otherwise, you ne for the appropriate IP settings.	eed to ask your network administrator
This second strength of the fail	lau ina Nama	Configure	Obtain an IP address autom	atically
This connection uses the fol	lowing items:	100	Use the following IP address	51
GoS Packet Sched Microsoft Network	Juler Adapter Multiple:	Kor Protocol	IP address:	192.168.6.10
Microsoft LLDP Pro	otocol Driver		Subnet mask:	255 . 255 . 255 . 0
Link-Layer Topolog Link-Layer Topolog	y Discovery Map y Discovery Res	pper I/O Driver	Default gateway:	
Internet Protocol Ve Internet Protocol Ve	ersion 6 (TCP/IP ersion 4 (TCP/IP	v6) v4) v	Obtain DNS server address	automatically
<		>	Use the following DNS serve	er addresses:
Install	Uninstall	Properties	Preferred DNS server:	• • •
Description			Alternate DNS server:	
Transmission Control Prote wide area network protoc across diverse interconne	ocol/internet Pro ol that provides cted networks.	communication	Validate settings upon exit	Advanced
		OK Cancel		OK Cancel

2.PLC configuration

After checking the wiring and Ethernet configuration, open XDPPRO programming tool----click communication configuration----------double click Ethernet-Xnet.

Configure according to the following figure:

Communication configura	tion ove-Up Move-Dow	n	1 mm = 1 mm = 1 mm		
Name NGD V 1	Connection status	Status	Belonging	Description	Connect Inf
USD_ARET_I	Not connected	in use	GIODAL	Jearch type: Automatic search, Search mode:	10
Ethernet_Modbus_Default	Not connected		Global	Modbus-TCP connection, device IP address: 19	

ommunication Name	: Ethernet_Xnet_1		
Connection mode s	selection		
Interface Type:	Ethernet	~	
CommProtocol:	Xnet	~	
Connect Type:	designated addre	s ~	
Communication par	ameter configurati	on	
IP Address:	192.168.6.6		
		Service	stopped
ServerConfig			
ServerConfig		🗹 Auto-o	connect on exi

Click OK after configuration and select " in use" for corresponding status.

After the communication connection is successful, find the "PLC configuration" column, click "EtherCAT" to open the configuration interface, click "Scan", and then the page will display the scanned slave station and master station.



10.1.4 Control under CIA 402 protocol and Independent protocol

10.1.4.1 Configuration

- (1) Click Scan
- (2) Select the function module: User Define/Servo Module
- (3) Click write, then click activate
- (4) Confirm that the State Machine is switched to the OP state.
- (5) Enter the Expert process data and click input and output respectively.

PDO allocation selection 1600 (CiA402 protocol).

PDO allocation selection 1601 (Independent protocol).

The PDO list can be selected. If you need to set a new address, you can add or modify it in the PDO content.

EthercatConfig	General Expert process data Launch parameter	x IO Mapping COE-Online ESC Reg
Master PLC Master Slave StationID:0 VH5-CC100	Offset time(us): 0 - SM Watchdog: Slave Information Init State Machine Current State OP Requested OP State Error Message	FundMappingMum: 0 😍 2 FundModeule: Servo Module v
		3 (4)

Note: If you need to use the function module: Servo Module, please ensure that the PLC firmware is 3.7.2 and above, and update the PLC programming software to version 3.7.14b or above. Use A_ PWR instruction to control the start and stop of frequency conversion.

10.1.4.2 CiA402 protocol control

1) Enter the Expert process data and click "Input" and "Output" respectively in the SynManager. Select 1600, 1a00 from PDO list. If you need a new address, you can add or modify it in the PDO content. After checking, click configuration write and activate.

EthercatConfig

Scan	General	Expert pr	rocess data	Launch param	eters IO M	lapping	COE-O1	nline ESC B	leg				
laster	SyncMa	nager			PDO list								
PLC Master	SM	Size	Type		Index	Size	Ne	ame			Sign	SM	6.th
lave	0		Mailbo	2	#x1600	4.0	Rx	1st process	s data mapping			2	
-StationID:0 VH5-CC100	1		Mailbo		#x1601	4.0	Rx	2nd process	s data mapping				
	2	4.0	Output		#x1602	4.0	Rx	3rd process	s data mapping				
	3	6.0	Input		#x1603	4.0	Rx	4th process	s data mapping				
				~	#x1a00	6.0	Tx	1st proces	ss data mapping			3	
	PDO As	sign			#x1a01	4.0	Tx	2nd process	s data mapping				
	🗹 #x1	600			#x1aU2	6.0	IX	and process	s data mapping				
	# x1	601			#x1aU3	4.0	IX	4th process	s data mapping				
	#x1	602											
	= #x1	603			PDO: A	dd Ec	lit Del	lete Move	up Move dowr	1			
					Index:Su	bIdx	Size	Offset	Name		Туре		
					#x6040:0	0	2.0	0.0	Control Word		UINT		
					#x6042:0	0 :	2.0	2.0	vl target veld	city	INT		
					_								
					_								
									1				

2) View the register address of the control word through IO mapping

Note: the specific IO address value shall be used according to the actual display setting of PLC

Scan	General Expert	process data Launch paramete	rs IO Mapping CO	E-Online ESC R	eg
Master	Address				
PLC Master	Index:SubIdx	Name	Address	Туре	Bit lengt
Slave	⊕-#x6040:00	Control Word	НД10000	UINT	16
-StationID:0 VH5-CC100	⊕- # x6042:00	vl target velocity	HD10002	INT	16
	⊕-#x6060:00	ModeOfOperation	HD10004	SINT	8
	⊕-#x607A:00	Target position	HD10006	DINT	32
	⊕-#x6071:00	Target torque	HD10008	INT	16
	te−#x6041:00	Status Word	10010	UINT	16
	⊕-#x606C:00	Velocity actual value	10012	DINT	32
	te-#x6061:00	ModeOfOperationDisplay	10014	SINT	8
	⊕-#x6077:00	Torque actual value	10016	INT	16
	te−#x6064:00	Position actual value	10018	DINT	32
	⊕ - # x6043:00	vl target demand	HD10020	DINT	32
	⊕-#x603F:00	ErrorCode	HD10022	VINT	16
	±−#x6044:00	vl target actual value	HD10024	INT	16

3)VFD operation (function module selection: User define & speed mode: PF-00=0 as an example)

FuncModeule: User Define ~

Set **[**6060h: Mode of operations **]** to 2 (speed mode).

Set [6040h: Control word] to start / stop the frequency converter.

For example, when 15 is written, the VFD starts. Write the value other than 15, and the VFD stops. Write 128 to clear the VFD alarm.

Set [6042h:vl target velocity], which corresponds to the percentage of the maximum output frequency P0-13

vl target velocity = $\frac{\text{Data} \times \text{Maximum output frequency P0-13}}{10000}$

Data corresponds to the value given in 6042h. The given range of data is $0\sim10000$. Values beyond the given range cannot be written.

For example: P0-13=50.00Hz, if 1000 is written in 6042h, the frequency converter operates at 5.00Hz forward, write -1000, and the frequency converter operates at 5.00Hz reverse.

Set [6071h: target torque] to set the upper limit value of torque in the speed mode, which is 150.0% by default.

Read **[**6041h: status word **]** to obtain the status feedback of the frequency converter.

Read [6064h: position actual value] to obtain encoder position feedback. (only valid when PG card is used).

Read **[**603Fh: ErrorCode **]** to obtain the alarm code. For details, refer to Chapter 11.Alarms related to EtherCAT communication.

Note:

①Check the version number of the expansion card through the frequency converter U4-09. If U4-09=100, 6042h will give the frequency (unit: 0.01Hz).

For example, if 1000 is written in 6042h, the frequency converter operates in forward direction at 10.00 Hz, if -1000 is written, the frequency converter operates in reverse direction at 10.00 Hz.

⁽²⁾Parameters in torque mode

Parameter	Name	Access	Set	Range	Explanation
			value		
PF-00	Torque control	Runtime read only	1	0: Speed control 1: Torque control	Torque control
PF-01	Upper limit source of driver torque	Runtime read only	5	0-7	communicati on setting
PF-03	Torque control forward maximum frequency source	Can be modified during operation	5	0-7	communicati on setting
PF-05	Torque control inverse maximum frequency source	Can be modified during operation	5	0-7	communicati on setting

Set **[**6071h: target torque **]** to set the torque setting.

When the torque is given as positive, the VFD operates in the forward direction.

When the torque is given as negative, the VFD operates in the reverse direction.

For example, if 1000 is set, the frequency converter operates at 10.00% of the rated torque

Set **[**6042h:vl target velocity **]** to modify the upper speed limit (0.01%) under torque mode, corresponding to the percentage of maximum output frequency P0-13.

10.1.4.3 Independent protocol control

(1) Enter the expert process data and click input and output respectively in the synchronization manager. PDO allocation selection 1601,1a01. If you need to set a new address, you can add or modify it in the PDO content. After checking, click write and activate.

				-						R
SM	Size	Туре		Index	Size	e Na	me		Sign	SM
0		Mailbo	8	#x1600	11.0	1s	t RxPDO Map	oping		
1		Mailbo		#x1601	4.0	Rx	2nd proces	ss data mapping		2
2	4.0	Output		#x1602	4.0	Rx	3rd proces	ss data mapping		
3	6.0	Input		#x1603	4.0	Rx	4th proces	ss data mapping		
				#x1a00	21.0	1s	t TxPDO Map	oping		
PDO A:	ssign			#x1a01	6.0	Tx	2nd proces	ss data mapping		3
	1600			#x1a02	6.0	Tx	3rd proces	ss data mapping		
/ #v	1601			#x1a03	6.0	Тх	4th proces	ss data mapping		
- #v	1602									
#x	1603			PDO: A	dd E	dit Del	ete Move	up Move down		
				Index:Su	bIdx	Size	Offset	Name	Туре	
				#x5000:0	0	2.0	0.0	Command	UINT	
				#x5010:0	0	2.0	2.0	TargetSpeed	UINT	

(2) View the register address of the control word through IO mapping Note: the specific IO address value shall be used according to the actual display setting of PLC.

General	Expert	process data	Launch parameters	IO Mapping	COE-Online	ESC Reg	
Addres	55						
Index:S	SubIdx	Name		Address	Тура	2	Bit length
⊕ -#x500	00:00	Command		10026	UINT		16
⊕-#x501	10:00	TargetSpeed		10028	UINT		16
∯-#x510	00:00	Status		HD10030	UINT		16
<u>∔</u> -#x511	10:00	OutputFreque	ency	HD10032	DINT		32

(3) VFD Operation

Set **[**6060h:Mode of operations **]** to 2 (speed mode)

Set [5000h:Command] to control the frequency converter.

For example, if 257 is written, the frequency converter will run forward. Write 256, and the frequency converter deceleration shutdown. Other commands can be converted by customers. (see Chapter 8 for detailed usage rules) Set [5010h:Target Speed], which corresponds to the percentage of the maximum output frequency P0-13

vl target velocity = $\frac{\text{Data} \times \text{Maximum output frequency P0-13}}{\text{Maximum output frequency P0-13}}$

10000

Data corresponds to the value given in 5010h. The given range of data is $0\sim10000$. Values beyond the given range cannot be written.

For example: P0-13=50.00Hz, if 1000 is written in 5010h, the frequency converter operates at 5.00Hz forward, write -1000, and the frequency converter operates at 5.00Hz reverse.

Read [5100h: status word] to obtain the status feedback of the frequency converter.

Note: Check the version number of the expansion card through the frequency converter U4-09. If U4-09=100, 5010h will give the frequency (unit: 0.01Hz).

For example, if 1000 is written in 5010h, the frequency converter operates in forward direction at 10.00 Hz, if -1000 is written, the frequency converter operates in reverse direction at 10.00 Hz.

10.1.5 Instruction read / write

Note: Select the corresponding register address according to different protocols.

Taking the CiA402 protocol as an example:

(1) Write SDO write instructions to associate addresses with registers, or modify parameters with corresponding register addresses.

Example ①: Modify the acceleration time P0-18 through SDO write instruction. According to chapter 6.3, write the object index of reading acceleration time P0-18: H2012.



Operand	Function	Range	Туре
S 0	EtherCAT slave station no.: Station ID	0~63	16-bit constant or single word register
81	Object index	0x1000~0xffff	16-bit constant or single word register
<u>82</u>	Object subIndex	0~255	16-bit constant or single word register
S 3	Write value register		single word register
<u>84</u>	write value byte length		16-bit constant or single word register
S 5	Status register		single word register
S6	Completion flag bit		Bit

Example ②: Read the deceleration time P0-19 through SDO reading instruction. According to chapter 6.3, write the object index of deceleration time P0-19: H2013.



Operand	Function	Range	Туре
SO	EtherCAT slave station no.: Station ID	0~63	16-bit constant or single word register
S1	Object index	0x1000~0xffff	16-bit constant or single word register
S2	Object subIndex	0~255	16-bit constant or single word register
S3	Value register		Single word register
S4	Status register		Single word register
S5	Completion flag bit		Bit

Note: ①The first slave station ID is 0, not 1.

②For instructions, please refer to *XDHXLH motion control manual*.

10.2 Omron series PLC and VH5/VH6(CiA402 protocol)

10.2.1 System configuration

Name	Model	Quantity	Explanation
Upper computer	Sysmac Studio	1	Omron upper computer software
Controller	OMRON NJ501-1500 series	1	-
Communication card	VHX-CC100(V2.0)	1	-
Network cable	JC-CB-3	some	For connection between computer and PLC and between PLC and VFD

10.2.2 Parameter setting

The frequency converter slave station needs to be configured as EtherCAT communication mode, and the parameters to be modified are as follows:

Parameter	Name	Access	Set	Range	Explanation
			value		
P0-02	Operation command channel selection	Runtime read only	2	0-2	Communication
P0-03	Main frequency A input channel selection	Runtime read only	6	0-9	Communication setting
P9-00	Communication protocol	Runtime read only	1	0-2	EtherCAT
P9-12	Slave station No.	RW	-	0-65535	After modification, it is valid when power on again.

10.2.3 Setup steps

1) New project

Open the Omron upper computer software SYSMAC studio. If "new project" is selected for the first time, select the model: NJ501-1500, version 1.02 in the project attribute interface, and click "create" to generate the programming interface.

Sysmac Studio						-	×
高线 New project ● 前夏工程(N) ● ● 打开工程(O) ● ● 「引开工程(D) ● ● 「引开工程(D) ● ● 「引开工程(D) ● ● 「引开工程(D) ● ● 「引用工程(D) ● ● 「引用工程(D) ● ● 「注接到设备(C) ● 许可(L) ●		 12程属性 12名称 作者 注释 类型 	新建工程 p'c 标准工程				
□ 许可(L) 试用版 除东天型 10	Dev Vers	1. 动择设1 类型 2. 设备 OH 版本	8 12448 1.02	Tisso Creat	▼ ▼ ●		

2) Add XML file

For initial use, customers need to add XML files to the library. Double click "EtherCAT", pop up the EtherCAT configuration screen. Right click master device and select "Display ESI Library".



Then in the pop-up ESI library, we need to add the XML file of VHX-CC100. Select "this folder" to display the path of the storage folder, where the "VHX-CC100" XML type file is placed.

所有ESI文件 Omron 3G3AX-MX2-FCT		·····································	名称 值 主设备	全部组	inal Coupler
Omron 3G3AX-RX-ECT Omron CJ1W-ECTxx	M 打开				×
Omron E3NW-ECT Omron E3X-ECT	$\leftrightarrow \rightarrow \times \uparrow$	> 此电脑 > 桌面 > 适配文件 > VH6适配	欧姆龙 ~ じ	搜索"VH6适配欧姆龙"	م
Omron EJ1N-HFUC-ECT Omron FHV7x-xxxxx	组织 • 新建文件	挟		-	
Omron FH-xxxx-xx Omron FQ-MS12x-x-ECT	📕 XLM	^ 名称 ^	修改日期	类型	大小
Omron FZM1-XXX-ECT Omron GRT1-ECT Ver2 0	时间戳	VHX-CC100.xml	2021/6/1 10:15	XML文档	416
Omron GX-Analog IO Omron GX-Digital IO	📥 OneDrive - Pe	rsc			
Omron GX-Digital IO-T Omron GX-Encoder	.> 此电脑				
Omron GX-IO-Link	🗊 3D 对象				
	THINK BE				
Omron GX-JC Omron GX-JC06-H	副视频		\mathbf{i}		
Omron GX-JC Omron GX-JC Omron GX-JC06-H Omron NX_Coupler Omron R88D-1SAN02H-ECT	 ■ 视频 ■ 原片 文档 		\mathbf{i}		
Omron GX-JC Omron GX-JC06-H Omron GX-JC06-H Omron NX_Coupler Omron R88D-1SAN02H-ECT Omron R88D-1SAN08H-ECT Omron R88D-1SAN08H-ECT	 ■ 视频 ■ 原片 文档 ◆ 下载 		\mathbf{i}		
Omron GX-JC Omron GX-JC06-H Omron GX-JC06-H Omron R82D-1SAN02H-ECT Omron R88D-1SAN04H-ECT Omron R88D-1SAN04H-ECT Omron R88D-1SAN10H-ECT Omron R88D-1SAN10H-ECT Omron R88D-1SAN10H-ECT	 ■ 限告 ● 反告 ● 下载 ● 音乐 		\backslash		
Omron GX-JCG Omron GX-JCG+H Omron GX-JCG+H Omron RX-Coupler Omron R88D-1SAN02H-ECT Omron R88D-1SAN04H-ECT Omron R88D-1SAN04H-ECT Omron R88D-1SAN104-ECT Omron R88D-1SAN104-ECT Omron R88D-1SAN104-ECT Omron R88D-1SAN154-ECT	 ■ 视频 ■ 原片 ● 下载 ● 音乐 ■ 桌面 	~ <	\backslash		
Omron GX-JCG Omron GX-JCG+H Omron GX-JCG+H Omron R88D-1SAN02H-ECT Omron R88D-1SAN04H-ECT Omron R88D-1SAN04H-ECT Omron R88D-1SAN16H-ECT Omron R88D-1SAN15FECT Omron R88D-1SAN15FECT Omron R88D-1SAN15FECT Omron R88D-1SAN15FECT Omron R88D-1SAN15FECT	 副 视频 ■ 四片 文档 ◆ 下载 ♪ 音乐 ■ 桌面 	、		XMI files(* xml)	
Omron GX-JCG Omron GX-JCG Omron GX-JCG+H Omron RX-Coupler Omron R88D-1SAN02H-ECT Omron R88D-1SAN04H-ECT Omron R88D-1SAN04H-ECT Omron R88D-1SAN16F-ECT Omron R88D-1SAN15F-ECT Omron R88D-1SAN15F-ECT Omron R88D-1SAN20H-ECT Omron R88D-1SAN20H-ECT	 ■ 视频 ■ 四升 文档 ▼下载 ♪ 音乐 ■ 桌面 ■ WF 	文(牛名(N): VHX-CC100.xml		XML files(*.xml)	2
Omron GX-JCG Omron GX-JCG+H Omron GX-JCG+H Omron XX_Coupler Omron R88D-1SAN02H-ECT Omron R88D-1SAN04H-ECT Omron R88D-1SAN10F-ECT Omron R88D-1SAN10F-ECT Omron R88D-1SAN15F-ECT Omron R88D-1SAN15F-ECT Omron R88D-1SAN15F-ECT Omron R88D-1SAN30F-ECT Omron R88D-1SAN30F-EC	 ■ 视频 ■ 四升 文档 ▼ 下载 ♪ 音乐 ■ 桌面 	文(牛名(N): VHX-CC100.xml		XML files(*.xml) 打开(①	、 取消
The installation is completed as shown below:



3)Scan and add devices

When using the device, ensure that P9-12 is set. The station number can be increased from 1 in actual connection sequence. After modification, it needs to be powered on again.

If the controller is online, right-click the master device to compare and merge the configurations with those of the physical network.



aeur Svsm	ac Studio 上的原	网络设置	节点地址1物理网	络配置	Sysmac Studio	比較結果	思 物理网络配置	40/05.8
				主设备	主设备	匹配	主设备	
1	-XJ	E003 VH6-CC100 Rev:0x2021	1	VH6-CC100 Rev:0x	2021030 1 : VH6-CC100	匹配	1 : VH6-CC100.	
2	XJ	E004 VH6-CC100 Rev:0x2022	2	VH6-CC100 Rev:0x	2022010 2 : VH6-CC100	0566	2 : VH6-CC100.	
3	-xJ	E002 VH5-CC100 Rev:0x2022	3	VH5-CC100 Rev:0x	2022010 3 : VH5-CC100	匹配	3 : VH5-CC100.	

The actual connection is shown in the following figure:

节点地址网络设置		
	项目名称	
E003	设备名称	主设备
VH6-CC100 Rev:0x20210301	机型	主设备
2 6004	产品名称	主设备
VH6-CC100 Rev:0x20220107	从设备数量	
3 6002	PDO通信周期	1000 間形
VH5-CC100 Kev:0x20220106	参考时钟	
	电缆总长度	1000 米
	故障弱化操作设置	故障弱化操作
	从设备启动等待时间	30 秒
	PDO通信超时检测次数	2 次
	版本检测方法	设置值 < = 实际设备
	串口号检测方法	不检查
	设备名称	

4)Add Group U parameters to the PDO.

After adding a node, select the node with the cursor to display the current node PDO configuration. Select "Edit PDO mapping settings". The pop-up interface displays the current output PDO mapping on the left and PDO entries on the right. You can add or delete PDO as required.

To add a PDO, select "Add PDO entry", and the PDO object that can be added will be displayed in the pop-up window. Select it, click OK, and then click apply to add it successfully.

制	🚮 编辑PDO映射谈	📧 Edit PDO mappir	ng			- 0	1 × 1		
	PDO映射 PDO() 选择 場入/物出1 ● 第 物出 1 物出 F	mapping 过程数据大小输入 168[位] / 輸出 88[位] / 2 名称 未选择 Ist RxPDO Mapping Rx 3rd process data mapping 未选择	19 2048[位] 048[位] □ 标志 可编辑 可编辑 可编辑	回合在1st TxH 家引 0x6041:00 0x606C:00 0x6043:00 0x6043:00 0x6044:00 0x6044:00 0x6061:00	PDO Mapping 1 大小 数据类 16(位) UINT 32(位) DINT 32(位) DINT 16(位) INT 16(位) INT 8(位) SINT	的PDO条目PDO条 型PDO条 Statusword Velocity actua vl target dema Torque actua Position actua vl target actua Modes of ope) entiries 日名称 al value and value al value al value eration disp	项目名称 设备名称 机型 产品名称 版本	值 E004 VH6-CC100 XINJE-VH6 EtherCAT(Co bv2D221107
	● 第344 F 第944 F ● 1 第 ● 第9入 1 ● 第9 ● 第9	kt 4th process data mapping	可編編 可編編 可编辑 可编辑 可编辑	0x603F:00	16(位) UINT Add PDO ふロ 務加	ErrorCode	为齐 PDO条目 应用	节点地址 "效/无效设置 串。号 PDO映射设置	2 す液 ひx00000000 のx6040:00 1st RxPDO M 0x607A:00 1st RxPDO M 0x607A:00 1st RxPDO M 0x6071:00 1st RxPDO M 0x6060:00 1st TxPDO M 0x6041:00 1st TxPDO M 0x6043:00 1st TxPDO M 0x604:00 1st TxPDO M 0x604:00 1st TxPDO M 0x606:00 1st TxPDO M
	■ 編輯PDO映録 0x0000:00 0x4000:00 U0 0x4002:00 U0 0x4002:00 U0 0x4002:00 U0 0x4000:00 U0 0x4007:00 U0 0x4000:00 U0 0x4000:00 U0 0x4000:00 U0 0x4000:00 U0 0x4000:00 U0 0x4000:00 U0 0x4000:00 U0 10-00	地译 Edit PDO mapp / -00 / U0-00 -01 / U0-01 -02 / U0-02 -03 / U0-03 -04 / U0-04 -07 / U0-07 -08 / U0-08 -12 / U0-17 -13 / U0-13 -13 / U0-14 -15 / U0-15	ok mer I		位置	1		分布式的钟有效 换档时间设置 参考时钟 PDO映射设置 数据被过程数据(PDO))	高用(ou-synchron) 禁用 有 香信周期性的输入/输出。 ● 1 ×

After adding, see the following figure:

			1						
PDO映射				包含在1st Txl	PDO Ma	pping中的	PDO条目		
	过程数据大小:输入	184[位]	/ 2048[位]	索引	大小	数据类型	PDO条目名称	注释	
	輸出	88[位] /	2048[位]	0x6041:00	16[位]	UINT	Statusword		
选择 输入/输出	名称	标志	I I	0x4000:00	16[位]	UINT	U0-00		
— — — — — — — — — — — — — — — — — — —	未选择			0x606C:00	32[位]	DINT	Velocity actual		
输出	1st RxPDO Mapping	可编辑		0x6043:00	32[位]	DINT	vl target dema		
● 輸出	Rx 3rd process data mapping	可编辑		0x6077:00	16[位]	INT	Torque actual		
	+洗择	I		0x6064:00	32[位]	DINT	Position actual		
▲ 榆田	Ry 2nd process data mapping	可编辑		0x6044:00	16[位]	INT	vl target actua		
	Ry 4th process data mapping	可编辑		0x6061:00	8[位]	SINT	Modes of oper	. I I I I	
	in process data mapping	-J-marine		0x603F:00	16[位]	UINT	ErrorCode		
	未选择								
	1st TxPDO Mapping	可编辑							
● 輸入	Tx 3rd process data mapping	可编辑							
Image: Control of the second secon		1							
● 输入	Tx 2nd process data mapping	可编辑							
၍ 協 A	Tx 4th process data mapping	可编辑							

5)Gateway communication settings

First, check the IP address of the PLC: in the multi view browser, select Controller settings-Bulit-in Ethernet/IP

port settings \rightarrow TCP/IP settings.

In the configuration interface, you can view the fixed IP address set by the current project. For a new program, the default IP address is 192.168.250.1.



Select Controller - Communicate setting

插入(I) 工程	P) 控制器(C 94)(ommunicate	atting A
	变更设备(V)		
🗸 🖡 🦾 Sect	ior 在线(O)	Ctrl+W	as000 (0) 🛛 🐼 数据
(日日) 空量	离线(F)	Ctrl+Shift+W	
命名	空 同步(Y)	Ctrl+M	
内部	传送中(A)	•	初始值
小部	MC 模式(M)	•	

Select "Ethernet - Direct connection" in the "communication setting" interface, and then click "OK" to close the interface.

Note: Ethernet connection requires that the IP address of the connected device (PC) is automatically obtained or within the PLC IP address network segment, so confirm whether the IP address setting of the PC meets the requirements before connection.

📓 通信设置		– 🗆 X
▼ 连接类型		
请选择一个在线时每次与控制器连接时使用的。	方法。	
O Ethernet - #123412 Ethern		
USO-EMELLER	er-unect connect	
 ● Ethernet-Hub连接 ● 每次在线连接时,请从以下选项中选择。 ■ USB-直接连接 ■ Ethernet-直接连接 		
■ USB-远程连接		& 11 153
Ethemet-Hub)		
▼远程IP地址		
指定远程呼地址。	USB通信测试 Ethernet通信测试	
▼选项		
☑ 在线时确认序列ID。 ☑ 离线时检查强制刷新。		
▼ 响应监测时间		
设置与控制器连接的响应监测时间。 2 (秒)		

6)Synchronous Download

Select synchronize in the toolbar, and a pop-up window will pop up to compare the local project with the project in the controller. The local project is different from the project in the controller and "out of sync" is displayed. If you click transfer to controller, the local project will be downloaded and the original project of the controller will be overwritten.





After synchronization is completed, click recomparison to view the synchronization of the entries of the local project and the controller project. When the subsequent modified projects are synchronized again, the entries different from the controller project will be marked in detail.

1 同步						×
计算机: 数据名称	计算机:更新日期	控制器 更新日期	控制器: 数据名称	比较		
V NJ501	2019/1/15 9:18:45	2019/1/15 16:59:53	NJ501			
						-
凡例 同步 日本 日本 日本	壁					
初始化当前具有保持属性变量的值(有效传送)	判控制器)。 今たは淡雨水流いけます/	2/E)¥				
▲ 不要传送以下内容。(所有项目不被传送、)	一去11.1822-9483-5-91879/	NY42+				
- CI系列特殊单元参数和EtherCAT从设备备份	参数。					
- 从设备终端甲元操作设置和INX甲元应用数3	者。 单元)_					
同先が理会成						
I-JU-XLIE7GAX.						
	传送到控制器内	从控制器上使用	较(R) 关闭(C)			
		The provide and the providence of the Address of th				
		an Sp.				
2 同步						×
■ 同步 计算机: 数据合称 → 201500	计算机 更新日期	控制器:更新日期	拉制器 数据名称	比较	-	×
 □ 同步 ↓ 计算机: 数据合称 ■ ▼N550 ■ BtherCAT主机设置 	计算机: 更新日期 2019/1/15 9:18:45 2019/1/14 17:53:09	控制器: 更新日期 2019/1/15 9:18:45 2019/1/14 17:53:09	拉制器 数据名称 TANIS01 EtherCAT主机设置	比较		×
S 同步 计算机: 数据名称 FtherCAT主机设置 EtherCAT主机设置 EtherCAT注设备设置 ▼CPUPT展机梁	计算机:更新日期 2019/1/159:18:45 2019/1/14 17:53:09 2019/1/14 17:53:09 2019/1/14 17:53:09	控制器:更新日期 2019/1/159:18:45 2019/1/14 17:53:09 2019/1/14 17:53:09 2019/1/14 17:53:09	拉制器 数据名称 ▼NIS01 EtherCAT主机设置 EtherCAT法设备设置 ▼CPU扩展机架	比较		×
回步 计算机:数据名称 ● Muscil EtherCAT主机设置 ● EtherCAT主机设置 ● CPUが展机梁 ● CPUが展机梁 ● CPUが展れ梁	计算机:更新日期 2019/1/15 9:18:45 2019/1/14 17:53:09 2019/1/14 17:53:09 2019/1/14 17:53:09 2019/1/14 17:53:09	控制器,更新日期 2019/1/15 9:18:45 2019/1/14 17:53:09 2019/1/14 17:53:09 2019/1/14 17:53:09 2019/1/14 17:53:09	拉制器 数据名称 ▼NIS01 EtherCAT主机设置 EtherCAT法设备设置 ▼CPU机架 ▼CPU机架	比较		×
□ → → 计算机:数据名称 → ■ EtherCAT主机设置 ■ EtherCAT主机设置 ■ ● ■ ▼CPUUT展机梁 ■ ▼CPUUT器 ■ ▼CPUUT器 ■ ▼CPUUT器 ■ ▼CPUUT器	1 1 1 1 1 1 1 1 1 1 1 1 1		拉制器。数据名称 ▼NIS01 EtherCAT主机设置 EtherCAT从设备设置 ▼CPufL限制架 ▼CPUfL架 单元 ▼控制器设置	比较		×
 ○ 同步 计算机: 数据各称 ▼NJS01 EtherCAT主机设置 EtherCAT法设备设置 ▼CPU的常規規定 ▼CPU的常規 単元 単元 単元 季応 支内容therberter/DP第门设置 	计算机。更新日期 2019/1/159:1845 2019/1/14 1753:09 2019/1/14 1753:09 2019/1/14 1753:09 2019/1/14 1753:09 2019/1/14 1753:09 2019/1/14 1753:09		拉制器。数据名称 ¥NI501 EtherCAT主机设置 EtherCAT从设备设置 ¥CPU/扩展机架 ▼CPU机架 单元 ¥CPU机梁 单元 ¥CPU制梁 操作设置 内容HeeAter/D0端口设要	比较		×
 □ 同步 ↓ 计算机: 数据名称 ↓ TherCAT主机设置 ■ EtherCAT主机设置 ■ EtherCAT法设备设置 ■ ♥ CPUが「無限梁 ■ ♥ CPUが「課 ■ 単元 ■ 単元 ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●	计算机。更新日期 2019/1/159:1845 2019/1/14 1753:09 2019/1/14 1753:09 2019/1/14 1753:09 2019/1/14 1753:09 2019/1/14 1753:09 2019/1/14 1753:09 2019/1/14 1753:09 2019/1/14 1753:09		拉制器。数据名称 ▼NIS01 EtherCAT主机设置 EtherCAT从设备设置 ▼CPU机规 単元 単定型 操作设置 内置thenterLPp确口设置 ▼运动控制设置	比较		×
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7)PDO data read/write(enable and speed setting)

PDO object data can monitor real-time changing values through "IO mapping".



位置	調日	说明	R/W	数据类型	值	安量	变量注释
	▼ <u> ●</u> EtherCAT网络配置						
节点1	VH6-CC100				ра. 		
	Rx 1st process data mapping_Controlword_6040_00		W	UINT	0		
	Rx 1st process data mapping_vl target velocity_6042_00		W	INT	0		
	Tx 1st process data mapping_Statusword_6041_00		R	UINT	4688		
	Tx 1st process data mapping_vl target demand_6043_00		R	INT	0		
	Tx 1st process data mapping_vl target actual value_6044_00		R	INT	0		
节点2	VH6-CC100						
节点3	VH5-CC100						
	1st RxPDO Mapping_Controlword_6040_00		W	UINT	0		
	1st RxPDO Mapping_vl target velocity_6042_00		W	INT	0		
	1st RxPDO Mapping_Modes of operation_6060_00		W	SINT	0		
	1st RxPDO Mapping_Target position_607A_00		W	DINT	0		
	1st RxPDO Mapping_Target torque_6071_00		W	INT	0		
	1st TxPDO Mapping_Statusword_6041_00		R	UINT	4688		
	1st TxPDO Mapping_Velocity actual value_606C_00		R	DINT	0		
	1st TxPDO Mapping_Modes of operation display_6061_00		R	SINT	2		
	1st TxPDO Mapping_Torque actual value_6077_00		R	INT	0		
	1st TxPDO Mapping_Position actual value_6064_00		R	DINT	0		
	1st TxPDO Mapping_vl target demand_6043_00		R	DINT	0		
	1st TxPDO Mapping_ErrorCode_603F_00		R	UINT	0		
	1st TxPDO Mapping_vl target actual value_6044_00		R	INT	0		
	▼ <u>↓</u> CPU/扩展机架						
CPU机架0	CPU机架0			1	l l		

Set **(**6040h: Control word **)** : write $6 \rightarrow 7 \rightarrow 15$ enable. $15 \rightarrow 7$ turn off enable. Write 128 to clear the frequency conversion alarm.

Set **(**6042h:vl target velocity **)**, for example, write 1000, P0-13=50Hz. The frequency converter operates with 5Hz forward rotation, writes -1000, and the frequency converter operates with 5Hz reverse rotation.

8)SDO data read/write

Variable definition and assignment:

	名称	数据类型	初始值	分配到	保持	常量	注释
	Trigger	BOOL	False				1
	SdoObject	_sSDO_ACCESS	(Index := 0, Subind				
155	EC_CoESDORead_instance	EC_CoESDORead					
552 -	VersionInfo	UINT	0				
145	DoSdoRead	BOOL	False				
555 -	ErrorEnd	UINT	0				
560 -	ADDHGD	BOOL	False				
	NormalEnd	UINT	0		B		
222	ASD	BOOL	False				
	asdf	DWORD					
111	sdfty	UINT					
::::	EC_CoESDOWrite_instance	EC_CoESDOWrite					
	Trigger1	BOOL					
	ASD1	BOOL					
555 -	ADDHGD1	BOOL					
	asdf1	DWORD					
-	VersionInfo1	UINT					
	SdoObject1	_sSDO_ACCESS	(Index := 0, Subinc		1		

Programming:



The contacts are connected, and the input object dictionaries are read and written respectively. Abortcode is displayed as 0 after reading and writing is successful.

10.3 Beckhoff series PLC (TWINCAT) and VH5/VH6

10.3.1 System configuration

Name	Model	Quantity	Explanation
Upper computer	TwinCAT	1	Beckhoff upper computer software
Controller	CX5120	1	-
Communication card	VHX-CC100	1	-
Network cable	JC-CB-3	some	For connection between devices

10.3.2 Parameter setting

The frequency converter slave station needs to be configured as EtherCAT communication mode, and the parameters to be modified are as follows:

Parameter	Name	Access	Set	Range	Explanation
			value		
P0-02	Operation command channel selection	Runtime read only	2	0-2	Communication
P0-03	Main frequency A input channel selection	Runtime read only	6	0-9	Communication setting
P9-00	Communication protocol	Runtime read only	1	0-2	EtherCAT
P9-12	Slave station No.	RW	-	0-65535	After modification, it is valid when power on again.

10.3.3 Setup steps

1) Add XML file

Before opening the software operation, we need to copy the XML file to the TwinCAT installation directory, and the default path is c:\twincat\3.1\config\io\ethercat.

2) New project

Open the upper computer software TwinCAT. File—New—Project:



3)Master station connection configuration:

Red. Times Settings Additional Tasks Red. Settings Configuration UV Confi			Versie - 0	all w i or				
Bit Additional Tarks Note: Setilization Note: Setilization Set DefAnd: Set DefAnd: Set DefAnd: Set Note: Setilization Note: Setilization	🕵 Real-Time Settings		Version (Loc	al) Version (Targe	t) Boot Settings (T	arget)		
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Configuration Pre - C	Route Settings			TwinCAT System	Manager		Townst .	
In C- Configuration 100 - Con	S ICOM Objects			v2 11 (Puild 2299)	en	oose Target	
The Configuration To Configu	PLC Configuration			V2.11 (build 2200	,			
V2.11 [Build 23] Choose Target System X	I/O - Configuration			TwinCAT NC PT	Р			
Add Route Dalog Correcton to DX-508A64 (abd Correcton to DX-508	1/O Devices			v2.11 (Build 23	Choose Target Sys	tem	<u> </u>	×
Copyright ECKT Copyrigh	Mappings			Alexa Restandare O				
Copyright BEAK Bit Conception BEAK Bit Conception BEAK Bit Conception BEAK Intern/Lowersheet Registration: Nome: Company: Registration: Nome: Company: Registration: Registration: Convection to DX-508A6F lated Convection to DX-508A6F lated Convection to DX-508A6F lated Enter Hout Name / IP Refersh Status Registration: Nome: Convection to DX-508A6F lated Convection to DX-508A6F lated Termed (a) S Convection Timeout (a) Enter Hout Name / IP Refersh Status Reside 1183:254:220:133:11 Termed Name / IP Refersh Status Reside 1183:254:220:132:11 Tage Roade Reside Remove / IP DESKTOP SONORIN Teg S24:220:132:11 Tage Roade Reside Remove / IP <t< td=""><td></td><td></td><td></td><td>Grandisht BECKL</td><td>🖃 🚮Local</td><td>(127.255.255.1.1.1)</td><td></td><td>OK</td></t<>				Grandisht BECKL	🖃 🚮Local	(127.255.255.1.1.1)		OK
Interded Ended				Copyright BECKH	E - 50 UX-47U	UA2 (5.34.200.96.1. A64 (169.254.220.1		Cancel
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Connection complete.

TwinCAT System Manager v2.11 (Build 2288)	Choo	ose Target					
ose Target System - Joint - Local (127,255,255,1.1,1) - A. CX47C0A2 (5,34,200,96,1.1) - A. CX508A64 (169,254,220,193,1.1)	OK Cancel Search (Ethernet), Search (Fieldbus)	×]] Add Route Dialog					
	Set as Defau	Enter Host Name / IP: Host Name Connec CHORA64 X DESKTOP-301VOFN DESKTOP-03087DA DESKTOP-03087DA	Address 169.254.22 10.100.47.35 10.100.47.1 169.254.22	AMS NetId 169.254.220.19 169.254.73.90.1.1 10.100.47.116.1.1 127.255.255.1.1.1	Refresh Status TwinCAT 2.11.2304 3.1.4022 3.1.4022 2.11.2306	OS Version Win CE (7.0) Windows (1 Windows 8	oadcast Sean

At this time, if the controller is not in config mode, you need to click this icon to switch the controller to config mode first, and then right-click Device and click Scan to scan the slave station of EtherCAT.



Click online, and the current state is the running state, indicating that the activation is correct.

吊规	设备状态		Current et	ato: running
过程数据(PDO设置)	初始化	引导状态	unent sta 当台状态·	ate. running
	预运行	安全运行	ヨ前小心・	运行
自动参数(500设置)	运行	清除错误	用-小1八心・	
在线 Online				
在绪CoF	FOE			
104	下载	上传		
therCAT I/O映射	E ² PROM接口 -			
伏态	写E2PROM	读 E ² PROM	写入E2P	ROM XML

5)Add Group U parameters to the PDO.

As shown in the following figure: click Drive 1 (VH5-CC100), select Process Data, click 0x1A00 in PDO list, and right-click in PDO content to insert U0-00 parameter.

SYSTEM - Configuration		Data a la			
NC - Configuration	General EtherCAI DC Proces	s Data Startup Co	E - Online Online		
PLC - Configuration	Sume Managara	DO List			
Cam - Configuration	sync ivianager.	PO LISU			
I/O - Configuration	SM Size Type Flags	Intex Size	Name Flags	s SM	SU
I/O Devices	128 Mbx	0x1_00_23.0	Tx 1st process data mappi	3	0
🖻 🗮 Device 3 (EtherCAT)	1 128 MbxIn	0x1A01 6.0	Tx 2nd process data mapp		0
	2 11 Outp	0x1A02 6.0	Tx 3rd process data mappi		0
+ Device 3-Image-Info	3 23 Inputs	0x1A08 6.0	Tx 4th process data mappi		0
⊕		0x1600 11.0	By 1st process data mappi	2	0
🕀 😣 Outputs		0x1601 4.0	By 2nd process data mann	-	0
😥 🚯 InfoData		0×1601 4.0	Px 2rd process data mappin		0
B → I Drive 1 (VH5-CC100)		0.1001 4.0	D til		0
⊕ \$ Tx 1st process data mapping	PDO Assignment (0x1C12):	PDO Content (0x	(1A00):		
H→ W Ist process data mapping W⊂State	₩0×1600	Index Size	Offs Name	Туре	Default (h
🕀 😫 InfoData	0x1601	0x4000 2.0	0.0 U0-00	UINT	
A Mappings	0x1602	0x6041 2.0	2.0 Statusword	UINT	
RC-Task 1 SAF - Device 3 (EtherCAT)		0x606C 4.0	4.0 Velocity actual value	DINT	
RC-Task 1 SAF - Device 3 (EtherCAT) - Info		0x6061 1.0	8.0 Modes of operation displa	y SINT	
	Download	Predefined PDC	Assignment: (none)		
	PDO Assignment				
	E PDO Configuration	Load PDO into t	from device		
		Sync Unit Assign	nment		
	Name Online	Туре	Size >Add In/Out User Link	ked to	
	otun-00 0v0000 (0)	LUNT	2.0 71.0 Input 0		

In config mode, add PDO data. As shown in the above figure, it was added successfully.

6) PDO data read/write(enable and speed setting)

As shown in the figure below, the object words 6040h and 6042h are written successfully.





Set **(**6040h: Control word **)** : write $6 \rightarrow 7 \rightarrow 15$ enable. $15 \rightarrow 7$ turn off enable. Write 128 to clear the frequency conversion alarm.

Set **(**6042h:vl target velocity **)**, for example, write 1000, P0-13=50Hz. The frequency converter operates with 5Hz forward rotation, writes -1000, and the frequency converter operates with 5Hz reverse rotation.

7)SDO data read/write

As shown in the following figure, the COE object dictionary 10F1 is read and written. The value of 10F1-01 is written from 1 to 3, and the value of 10F1-02 is written from 4 to 3. The writing and reading is successful.

SYSTEM - Configuration			-	
IC - Configuration	General Ether	CAT DC Process Data Start	JD OE - I	Online
LC - Configuration			_	
Cam - Configuration	Update	e List Update	Single U	Jpdate 🗌 Show Offline Data
/O - Configuration	Advanc	ed		
I/O Devices				
Device 3 (EtherCAT)	Add to St	artup Online Data	Mo	dule OD (AoE 0
📥 Device 3-Image				1
🕂 Device 3-Image-Info	Index	Name	Flags	Value
	1000	Device type	M RO	0x00010192 (65938)
🗄 😫 Outputs	1001	Error register	RO	0x00 (0)
🕀 🗣 InfoData	1008	Device name	RO	VH5-CC100
Drive 1 (VH5-CC100)	1009	Hardware version	RO	v1.0
🗄 😫 Tx 1st process data mapping	100A	Software version	RO	v5.12
🖶 😫 Rx 1st process data mapping	⊕ 1018:0	Identity	-	> 4 <
🕀 😵 WcState	⊡ 10F1:0	Error Settings		> 2 <
⊞ S InfoData	10F1:01	Local Error Reaction	RW	0x0000003 (3)
Mappings No Table 1 CAE Device 3 (EtherCAT)	10F1:02	Sync Error Counter Limit	RW	0x0003 (3)
NC-Task 1 SAF - Device 3 (EtherCAT)	€ 1600:0	Rx 1st process data mapping	RW	> 6.<
E NC-Task I SAF - Device S (EtherCAT) - Into	⊞ 1601:0	Rx 2nd process data mapping	RW	> 2 <
	⊞ 1602:0	Rx 3rd process data mapping	RW	> 2 <
		Rx 4th process data mapping	RW	> 2 <
		Tx 1st process data mapping	RW	> 8 <
	⊕ 1A01:0	Tx 2nd process data mapping	RW	> 2 <

10.4 Inovance AM600 (CODESYS) and VH5/VH6

10.4.1 System configuration

Name	Model	Quantity	Explanation
Upper	InoProShop	1	Inovanceupper computer software
computer		1	
Controller	AM600	1	-
Communication	VHX-CC100	1	
card		I	-
Cable	JC-CB-3	~~~~	For connection between computer and
Cable		some	PLC and between PLC and VFD

10.4.2 Parameter setting

The frequency converter slave station needs to be configured as EtherCAT communication mode, and the parameters to be modified are as follows:

Parameter	Name	Access	Set value	Range	Explanation
P0-02	Operation command channel selection	Runtime read only	2	0-2	Communication
P0-03	Main frequency A input channel selection	Runtime read only	6	0-9	Communication setting
P9-00	Communication protocol	Runtime read only	1	0-2	EtherCAT
P9-12	Slave station No.	RW	-	0-65535	After modification, it is valid when power on again.

10.4.3 Setup steps

1)New project

Open the software InoProShop. Select "new project", select the model: AM600-CPU1608TP/TN in the project attribute interface, define the name and select the save path, and click "OK" to generate the programming interface.



2)Hardware configuration

Double click the "CPU rack" item on the left to enter the hardware configuration screen of PLC mainframe:



① Double click to enter the local expansion module configuration interface.

2 Expansion module component library.

③ Select the position on the right side of the CPU unit on the installation slot, and in the expansion module component library, double-click to select the required IO modules and place them in order.

According to the module model and installation sequence used by the actual application system, double-click the selected module from the expansion module library on the right, and drag it to the "installation rack".

To delete a module, select the module and press Del to delete it. Take AM600 as an example, up to 16 expansion modules can be connected to the mainframe, including 8 analog modules.

3)Add XML file

(1) Install in the network configuration interface.

Click "import ECT file", and the following dialog box will pop up:

Select the XML file of the corresponding device and click "open".



② Install through menu tools.

Choose Tool-Device library



Select "Install" in the pop-up dialog box.

位置(L):	System Repository			▼ 编辑位置(E)
	(C:\InovanceControl\InoProSho	p(V1.3.50.0)\	CODESYS\Repository\De	vices)
安装的设行	昏描述(v):		0	install
在所有设	备中输入全文搜索的字符串	Vendor:	<全部供应商>	▼ 安装(1)
名称	供应商 勵	反本 描述		Blac(U)
* 🗊 🕯	与用设备			寻出
9 👔 P	LC			
* Ø s	oftMotion服态力			
	则场总线			
				C 24 dm et man

Select the "EtherCAT XML device description configuration file" item in the pop-up "install device description"

dialog box, select the slave device description file saved in the local path, and open the corresponding XML file.

4)Add master device

It is recommended to use the scanning function and follow the **[**hot reset**]**-**[**log out**]**-**[**scanning device**]** process. Preparation conditions:

(1) The PC and PLC are correctly connected through the gateway, search the PLC in the same network segment, and click OK after finding it.

Note: Ethernet connection requires that the IP address of the connecting device (PC) and the IP address of the PLC are in the same network segment, so confirm whether the IP address setting of the PC meets the requirements before making the connection action.

The following figure:



2 PLC and slave networking are normal.

③ The configuration information of the background configuration port is consistent with the actual PLC connection port, as shown in the following figure.



5)Set master station parameters

ices 👻 🗸	Xinje_Cortex_Linux_SM_CNC StherCAT_Task BetherCAT_Master :	<
© Uneedd ⇒ Trope, Conte, Linux, SH, QNC (Inje-Cartex-Linux-SH Q) ⇒ B RC Logc ⇒ Application m Lineary Manager ⇒ B Teck Configuration ⇒ EtherCAT_Task	General Autoconfig Master/Slaves Sync Unit Assignment EtherCAT NIC Setting BeherCAT (JO Mapping Destination Address (MAC) BeherCAT IEC Objects Source Address (MAC) BeherCAT IEC Objects Network Name	Ether CAT.
Element Al Master (Element Al Master) Element Al Master) Element Al Master Element Al Mast	Select Network Adapter	5 OK Abert
Xinje_Cortex_Linux_SM_CNC General	EtherCAT_Master X	Ether CAT.
Sync Unit Assignment	EtherCAT NIC Setting Destination Address (MAC) FF-FF-FF-FF-FF	🖉 Broadcast 📄 Enable Redundancy
EtherCAT IEC Objects	Source Address (MAC) OC-B2-B7-85-78-21	Browse
Status	Select Network by MAC Select Network	by Name

6)Scan slave station

After the configuration information of the background configuration port is consistent with the actual PLC connection port, scan the EtherCAT slave device.



The scanning results are shown in the figure below. Click Copy scanned device to add all the scanned slave stations to the project.

Device [i车接的] (AM600-CPU 1608TP/TN)	100000								
🔍 设备诊断	111日1月1日1月1日								U X
※ 网络组态	扫描到的设备				配置的设备				
 ● EtherCAT机架 ● CPU机架 ● IPLC 逻辑 	设备名 VH5_CC100	设备类型 XINJE-Vi65	EtherCAT(CoE) Drive Rev2.0	别名地址 3	向上插入	设备名 — VH5_CC100	设备类型 XINJE-VH5	EtherCAT(CoE)	Drive Rev2.0
 Application 庫管理器 PLC_PRG (PRG) 					向下插入				
 ● 任务配置 ● ETHERCAT ● ETHERCAT EtherCAT Task 					る				
MainTask					全部拷贝				
回 资源使用表 SoftMotion General Axis Pool HIGH_SPEED_IO (高速IO模块)					× 7 878				
ETHERCAT (EtherCAT Master SoftMotion)									
	分配地址	-			c	copy scar	ned de	evice	🛃 显示差异





→ ∓ X	Device	Hardware Config	uration 🛛 🔣 I	Network Configuration	ion 🗙 💮 VH5_C	CC 100
) 变频器制试程序 💽		胸粘贴 金 删除	□撤销 Ⅰ 恢复	局入EDS文件	● 导入GSD文件	🔏 导入ECT
 ● Wice 「直接的」(AM600-CPU1608TP/TN ● 设备诊断 ● 没备诊断 ● PLC 逻辑 ● PLC 逻辑 ● PLC 逻辑 ● PLC_PRG (PRG) ● 经 任务配置 ● PLC_PRG (PRG) ● 经 任务配置 ● ETHERCAT ● PLC_PRG ● ※ ETHERCAT.EtherCAT_T ● ※ MainTask ● PLC_PRG ● ※ SoftMotion General Axis Pool ● ● ● ■ HIGH_SPEED_IO (高速IO模块) ● ● ● ■ ETHERCAT (EtherCAT Master SoftMc ● ● ● ● ■ ETHERCAT (EtherCAT Master SoftMc ● ● ● ● ■ ETHERCAT (EtherCAT Master SoftMc ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●	VH5_CC 100			Emotowi		

Click online, and the current state is the running state, indicating that the activation is correct.

帛规	设备状态 ——		Current et	
过程数据(PDO设置)	初始化	引导状态	urrent sta 当前状态。	ate: running
	预运行	安全运行	ヨ前1八心・ 语求状态・	运行
后的多数(300反应)	运行	清除错误	H-1/1//00-	20
在线 Online				
在线CoE	FOE	上住		
EtherCAT I/O映射	E ² PROM接口 —	⊥1∞…		
状态	写E ² PROM	读 E ² PROM	写入E2P	ROM XML
信息				

8)Add Group U parameters to the PDO.

data	输/编出	名称	索引	子索引	长度	美型	标志	SM
自动参数(SDO设置)		1st RxPDO Mapping	16#1600	16#00	11.0		可编辑	2
	1 1	Control Word	16#6040	16#00	2.0	UINT		
(±13)		vl target velocity	16#6042	16#00	2.0	INT		
在线CoE		ModeOfOperation	16#6060	16#00	1.0	SINT		
\	- 10	Targetposition	16#607A	15#00	4.0	DINT		
EtherCAT I/O映射	-**	Target torque	16#6071	16#00	2.0	INT		
().+	* 🗆 新出	Rx 2nd process data mapping	16#1601	16#00	4.0		可编辑	
沃岛	* 🗌 輸出	Rx 3rd process data mapping	16#1602	16#00	4.0		可编辑	
信息	1 新出	Rx 4th process data mapping	16#1603	16#00	4.0		可编辑	
	- Φ	1st TxPDO Mapping	16#1A00	16#00	23.0		可编辑	3
	input	00-00	16#4000	16#00	2.0	UINT		
	-*>	Status Word	16#6041	16#00	2.0	UINT		
	-*>	Velocity actual value	16#606C	16#00	4.0	DINT		
	-*>	ModeOfOperationDisplay	16#6061	16#00	1.0	SINT		
	- **	Torque actual value	16#6077	15#00	2.0	INT		
	-*>	Position actual value	16#6064	16#00	4.0	DINT		
	- *>	vl target demand	16#6043	16#00	4.0	DINT		
	- *>	ErrorCode	16#603F	16#00	2.0	UINT		
	-*•	vi target actual value	16#6044	16#00	2.0	INT		
	■ 🗐 输入	Tx 2nd process data mapping	16#1A01	16#00	6.0		可编辑	
	◎ 🗌 输入	Tx 3rd process data mapping	16#1A02	16#00	6.0		可编辑	
	第一□ 輸入	Tx 4th process data mapping	16#1A03	15#00	6.0		可编辑	
	- 🗌 輸入		16#0000	16#00	0.0		可编辑	

Add PDO data without login. As shown in the above figure, it is added successfully.

1974	查找			抖动 显	示所有			•						
提粉堆(PDO设置)	变量		缺財	通道		地址	类型	默认值		当前值	准备值	单位	描述	
THE ROAD (FOOL CLICK)	B- 🍫			Control Wo	rd	%QW2	UINT	<	128		6		Control Word	
动参数(SDO设置)	⊕_ * ≱			vl target ve	slocity	%QW3	INT		0				vl target velocity	
ce.	B- 🍫			ModeOfOp	eration	%QB8	SINT		0				ModeOfOperation	
绒	B- *			Target pos	ition	%QD3	DINT		0				Target position	
线CoE	8-**			Target toro	lue	%QW8	INT		0				Target torque	
	8-*	B- 19		U0-00		%IW2	UINT		0				U0-00	
herCAT I/O映射	18- 19			Status Wor	d	%IW3	UINT		4688				Status Word	
			-											
· 变量 ■ - * ቃ	映射	通道 Control	Word		地址 %OW2	类型 UINT	默认值	í 6	当	前值	准备值	单位	描述 Control Word	
变量 ⊮ * ∳ ∗ * ≱	映動	通道 Control vl targe	Word		地址 %QW2 %QW3	类型 UINT INT	默认值	6 5000	当i)	前值	准备值	单位	描述 Control Word vl target velocity	
安量 〒- ⁵ ∳ 〒- ⁵ ∳	映動	通道 Control vl targe ModeO	- Word t velocity	n	地址 %QW2 %QW3 %QB8	类型 UINT INT SINT	默认值	í 6 5000 0	当i)	前值	准备值	单位	描述 Control Word vl target velocity ModeOfOperation	
交量 ■-5↓ ■-5↓ ■-5↓ ■-5↓	映新	通道 Control vl targe ModeO Target	- Word t velocity fOperation	n	地址 %QW2 %QW3 %QB8 %QD3	类型 UINT INT SINT DINT	默认值	i 6 5000 0 0	当i)	前值	准备值	单位	描述 Control Word vl target velocity ModeOfOperation Target position	
交量 ■- 5↓ ■- 5↓ ■- 5↓ ■- 5↓	映動	通道 Control vl target ModeO Target Target	Word t velocity fOperation position torque	n	地址 %QW2 %QW3 %QB8 %QD3 %QW8	类型 UINT INT SINT DINT INT	默认值	i 6 5000 0 0 0	当i)	前值	准备值	单位	描述 Control Word vl target velocity ModeOfOperation Target position Target torque	
安量 ※ * * * * * * * * * * * * * * * * * * *	映射	通道 Control VI target ModeO Target Target U0-00	Word t velocity fOperation position torque	n	地址 %QW2 %QW3 %QB8 %QD3 %QW8 %IW2	类型 UINT INT SINT DINT INT UINT	默认值	i 6 5000 0 0 0 0	当i	前值	准备值	单位	描述 Control Word VI target velocity ModeOfOperation Target position Target torque U0-00	

9)PDO data read/write(enable and speed setting)

As shown in the figure above, the object words 6040h and 6042h are written successfully.

Set **(**6040h: Control word **)** : write $6 \rightarrow 7 \rightarrow 15$ enable. $15 \rightarrow 7$ turn off enable. Write 128 to clear the frequency conversion alarm.

Set **(**6042h:vl target velocity **)**, for example, write 1000, P0-13=50Hz. The frequency converter operates with 5Hz forward rotation, writes -1000, and the frequency converter operates with 5Hz reverse rotation.

10)SDO data read/write

As shown in the following figure, the COE object dictionary 10F1 is read and written. The value of 10F1-01 is written from 1 to 3, and the value of 10F1-02 is written from 4 to 3. The writing and reading is successful.

	16#1009:16#00	Hardware version	RO	STRING(3)	'v1.0'	
在线CoE CoE online	16#100A:16#00	Software version	RO	STRING(4)	'v5.12'	
	I6#1018:16#00	Identity				
EtherCAT I/O映射	= 16#10F1:16#00	Error Settings				
状态	:16#01	Local Error Reaction	RW	UDINT	1	
100	:16#02	Sync Error Counter Limit	RW	UINT	4	
信息	= 16#1600:16#00	Rx 1st process data mapping	RW	USINT	5	

10.5 Inovance H5U and VH5/VH6

10.5.1 System configuration

Name	Model	Quantity	Explanation
Upper	AutoShop	1	Inovance upper computer software
computer		1	
Controller	H5U	1	-
Communication	VHX-CC100	1	
card		I	-
Cable	JC-CB-3		For connection between computer and
Cable		some	PLC and between PLC and VFD

10.5.2 Parameter setting

The frequency converter slave station needs to be configured as EtherCAT communication mode, and the parameters to be modified are as follows:

Parameter	Name	Access	Set value	Range	Explanation
P0-02	Operation command channel selection	Runtime read only	2	0-2	Communication
P0-03	Main frequency A input channel selection	Runtime read only	6	0-9	Communication setting
P9-00	Communication protocol	Runtime read only	1	0-2	EtherCAT
P9-12	Slave station No.	RW	-	0-65535	After modification, it is valid when power on again.

10.5.3 Setup steps

1)New project

Double click to open autoshop v4.4.6.0 software and create a new project:

1) Executive document - new project;

② Select a new project, select H5U series, enter the project name and save path, click OK, then the project column will appear attribute explorer.

→ 打开工程(<u>O</u>) Ctrl+O 保存工程(<u>S</u>)	 ●新建工程 ○临时工程 工程设定 工程々・
工程另存为(<u>A</u>) 工程属性(PLC类型)(<u>T</u>)	保存路径: C:\Users\HONOR\Documents\ 編編要: 詳知例
打包工程档案 解压工程档案	····································
大肉工程(C) 保存文件(E) 关闭文件(E)	技術 22 系列与型号: H5U系列 ∨ - H5U ∨ <1>EtherCAT总线高性能小型PLC
D220 — Index K1 — SubIndex K4 — DstLength D230 — Data 网络注释	 <2>支持自定义变量和PB/PC <3>最大支持32轴运动控制(含EtherCAT和本地脉)、支持定位、插补和电子凸轮 <4>支持4轴200KHz脉冲输出,4路200KHz高速输入 <5>1路以太网支持ModBus TCP和Socket、1路CAN支持 CANDink和CANopen、1路485支持ModBus和自由协议

2)Add XML file

具箱	4 x	🚞 « 眞面 > 临时文件 > XLM(1) > XLM	~ C		
~	搜索	挟		≣ •	
EtherCAT Devices Add XML	file	名称	修改日期	类型	大小
Inovan 导入设备XML	145	🖹 VHX-CC100	2022/4/18 10:39	XML 文档	41
⊞ Other Devices 上指今隹	助	E VHX-CC100-3720	2022/1/11 13:47	XML 文档	43
● 程序逻辑指令	之档				
➡ 流程控制指令	下載				
由 触点运算指令	新乐				
出 数据还具指令 1. 粉据处理指令	100	1			
● 新時指令	Vindows (C	0			
➡ 字符串指令					
■ 时钟指令		文件名(N): VHX-CC100-3720	~ :	xml Files (*.xml)	~
■ MC轴控(EtherCAT&脉冲输出)			(打开(0)	取消

3) Master station connection configuration

通讯设置					
PLCim	飛设置 通讯类型:	学以太	网 7		~ 确定
	设备12:	192	. 168	. 1 . 88	alist
	设备名称:	1.000	20202		PING
					修改IP/设备:
搜索 PL	.C				搜索
序4	弓 即地址		设备类型	设备名称	MAC地址

j	∞血 通讯类型:	登以太网 7 ~	确定
	设备IP:	192 . 168 . 1 . 88	测试
ì	设备名称:		PING
		AutoShop X	修改IP/设备名
索PLC			搜索
序号	IP地址	连接状态: 已连通! 当前PLC交替显示"0"	MAC地址
		确定	

4)Add slave station

If the controller is not in the monitoring state 1, the frequency converter does not support automatic scanning of the slave station at present, and it needs to be added manually.

Ó

11 编程	过程数据	Marsa.vm	B- Inovance Devices
●-■ 程序块 ●-□ MAIN ●-□ SBR_001	启动参数	分布式四封钟	Other Devices Winge Electronics, Inc. Winge Dectronics, Inc. Winger D
	I/0功能映射	同步模式选择	 XINJE-DSSC EtherCAT(CoE) Drive Rev2.0 v3.7.30 XINJE-DSSC EtherCAT(CoE) Drive Rev4.0 v3.7.70 IC3.46 EtherCAT Educators 10.2
● 回数(FC) ● 配置 ● 小 输入滤波	信息	山 使能加四時事件 4000 µms Syn-0:	VIDE-IHS EtherCAT(CoE) Drive Rev1.0 VIDE-IHS EtherCAT(CoE) Drive Rev1.0 VIDE-IHS EtherCAT(CoE) Drive Rev1.0 VIDE-IHAS EtherCAT(CoE) Drive Rev2.0
	状态	□ STRU 後底 ● 同中他 - 同時 - 「」	ABDE HING CARLOS CARL
 ● 1 适动控制轴 - (@) 轴组设置 □ 二 EtherCAT 		シードー・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・	 () 法理控制指令 () 缺点运算指令 () 融点运算指令 () 新报运算指令
		bynet: □ STNCL使版	 ● 教権が理指令 ● 方得単指令
一話 CAN(CANLink) 一〇〇 以太网		 · 同步单元周期 4000 周期設局(μs) 	B: 时钟指令 B: MC轴控(therCAT&脉/中输出) MC轴控(carOnen)
MAIN		○ 用户定义	A Lundelthrast head 2 2

If you need to automatically add an axis, please check the following operation to automatically create an axis and associate the slave when creating a new slave station.



5)Activate configuration

1 Click compile

to confirm whether the configuration and program are wrong, then download the



② Click status to confirm that all slave state machines are in OP status.



6) Add Group U parameters to the PDO.

· 计程序 米拉士属	前入/输出		名字	索引 子索引	长度	EtherCAT Devices	
	≝ ☑ 输出	Rx 1st process	新增/编辑			~ .	
Divess uata	2 🗔 🍿	Rx 2nd process	索引:子索引	名称	村	志 类型	默认住
后4月影教	≝ □ #出	Rx 3rd process	16#5100:16#00	Status	RO	UINT	
Inthe BL	🖱 🗐 輸出	Rx 4th process	16#5110:16#00	OutputFrequency	RO	INT	
/0.9] 能映列	🗏 🗹 输入	Tx 1st process	16#603F:16#00	ErrorCode	RO	UINT	
法由	氧入	Statusword	16#6041:16#00	Statusword	RO	UINT	
信思	輸入	vl target deman	16#6043:16#00	vl target demand	RO	INT	
4.0-**	input 🙀 🔨	vl target actua	16#6044:16#00	vl target actual value	RO	INT	
10,535	🗏 🗌 輸入	Tx 2nd process	16#6061:16#00	Modes of operation display	RO	SINT	
	🗉 🗌 输入	Tx 3rd process					
	🗏 🗌 輸入	Tx 4th process					
			名称: 10-0	00	数据类型:	VINT	•
			索引: 16# 4000		位长度:	16	
IN TO VH5-CC100	EtherCat		7 = 7 + 10			1	

7) PDO data read/write(enable and speed setting)

Click IO function mapping to perform relevant operations on the required values. Clear alarm:



Set velocity:

4 ×	带和近星	☑十六进制显示当前值	工具箱		
- 67 変量表	#Migh	安里	通道	类型	
11 编程		S_IQ1_0	Control Word	UINT	EtherCAT Devices
	过程数据	JQ1 1	vl target velocity	INT	Inovance Devices
		TOL	Statusword	UINT	Other Devices Electronic
	启动参数	* TOL 2	v] target depend	TNT	-XINJE-DS5
Theste(FR)		-141_3		101	XINJE-DS5
函数(FC)	1/9 刃能映射		VI farget actual value	191	XINJE-DS5
					-XINJE-VHS
	信息		写入元件		× INJE-VH6
● 横块配置	14,723				INJE-VHS
电子凸轮			位软元件		C3-AP Et
	状态		软元件:		~
一〇 物组设置					諸令
EtherCAT			强制ON	强制 OFF 强制 ON/G	OFF取反 指令
VH5-CC100			×		1/11-2
COM					
- CAN(CANLink)			学校元件		2
			校元 101.1	1	
TA 态量改结素			20 di 1		EtherCAT
MAIN			数据类型: 16位整	繊 〜 显示格式: 十速	主制 · CanOpen
				enne	R3-md9-3
			值: 2000		设置 CAT(CoE)
ing trace	1 MAIN M VH5-CC100	& EtherCat			关闭

8) SDO data reading and writing

① Operate in sequence according to the steps written in the figure, and then read and write according to the required parameters.

- 2 Note: the trigger condition of the command is normally on / off.
- 3 Read / write program.



10.6 KEYENCE PLC KV 7300 and VH5/VH6

Name	Model	Quantity	Explanation
Upper computer	KV STUDIO Ver.9G	1	Omron upper computer software
Controller	KV_7300 series	1	-
Communication	VHX-CC100(V2.0)	1	
card		1	-
Network cable	JC-CB-3	some	For connection between PLC and slave
UCD ashla	USB cable		For connection between computer and
USB cable		-	PLC

10.6.1 System configuration

10.6.2 Parameter setting

The frequency converter slave station needs to be configured as EtherCAT communication mode, and the parameters to be modified are as follows:

Parameter	Name	Access	Set value	Range	Explanation
P0-02	Operation				
	command	Runtime	2	0.2	Communication
	channel	read only	2	0-2	Communication
	selection				
P0-03	Main frequency	Puntime			
	A input channel	read only	6	0-9	Communication setting
	selection	Tead only			
P9-00	Communication	Runtime	1	0.2	Ether C A T
	protocol	read only	1	0-2	EuciCAI
DO 12	Slave station	DW		0 (5525	After modification, it is
F 7-12	No.		-	0-05555	valid when power on again.

10.6.3 Setup steps

1)New project

(1) The computer and PLC are connected and communicated through USB port.

②Open the software and create a new project.

File(E) View(V) Monitor/Simulator(N) Tool(T) Window(W) Help(H)	
🗄 🖻 🕐 🖶 🚔 🐘 🖶 🕼 🕢 🖉 🗄 🔛 USB 🔹 🔹 🖆	이 매 다 다 다 다 다 다 다 다 다 다 다 다 다 다 다 다 다 다
i plsz plsy jogy jogy oraz oray terz way i 🖈 🖽 🔠 📰 🖉 🎬 📲 🎜 💀 🔂 🖫	● ● ■ II HI ▲ H ≯ ▼ H > ۞ 🖑 🖳 🗑
	New project X
	Project name(<u>N</u>) PLC model(<u>K</u>)
	KV-7500 ~
	Position(P)
	C:\Users\admin\Desktop\JIWNSHI
	Comment(C)
	×
	AW display comments(<u>W)</u>
	KVS PROJECT
	Register special device cmnts(M) OK Cancel

③Pop up the confirm unit configuration setting interface, and click "yes".

Confirm unit setting informatio	n	×
Setup unit setting info now?		
* [Yes]Start Unit Editor. * [No]Close this dialog. * [Read unit setting]Read uni Yes(Y)	t setting inform No(<u>N</u>)	ation from PLC.

(4)Click the icon in the upper left corner: obtain the unit configuration information connected to the PLC, double-click the model "KV-7300" to open the unit editor.

Project 🗸 🖓 🗙	Main 🗙	
Unit configuration [0] kV-7300		3
The Unit configuration switching Device comment Device Comme	00001	
 ・ ・ ・	00002	
Fixed-period module Inter-unit sync module Function Block Macro Subroutine macro	00003	
Self-hold macro Englisher setting O:Memory card I:CFU memory	00004	
n 🚔 User document	00005	
	00006	

2)Get configuration information (master station connection)

1 Click "get unit configuration information connected to PLC".



②Click OK.



3)ESI file registration

Click "axis composition setting" and "ESI file registration".



Select the XML file .

3000	He	le		XINJE-VH5 EtherCAT(CoE) Drive R XINJE-VH6 EtherCAT(CoE) Drive R XINJE-DSC1 EtherCAT(CoE) Drive XINJE-DSC1 EtherCAT(CoE) Drive XINJE-DSSC1 EtherCAT(CoE) Drive XINJE-DSSC1 EtherCAT(CoE) Drive
lease select the ESI file to be registered.			×	XINJE-DS5C EtherCAT(CoE) Drive
\leftrightarrow \rightarrow \checkmark \uparrow \blacksquare « PKBACK# 001 (F:) \rightarrow XLN	(1) v ت	搜索"XLM(1)"	م	LC3-AP EtherCAT Adapter 3.0.2 [De
组织 ▼ 新建文件夹		83	- 🔳 🖓	[Register ESI file]
3D 对象 名称	^ /	參改日期	类型	
III 视频	2	022/4/18 10:40	文件夹	
■ 图片 ● 文档	2	2022/4/19 8:27	XML 文档	
↓ 下載 ♪ 音乐				
三 桌面				
🏪 本地磁盘 (C:)				
新加卷 (D:)				-
新加卷 (E:)				1
PKBACK# 001				
- PKRACK# 001 /F * <			,	•
文件名(N):	``````````````````````````````````````	ESI file(*.xml)	~	
		打开(<u>O</u>)	取消	

After adding successfully, it is shown in the following figure:

En XI Xinje Electric Co., Ltd.
E-XJ Frequency Converter
XINJE-VH5 EtherCAT(CoE) Drive Rev1.0 [Detailed setting required]
XINJE-VH6 EtherCAT(CoE) Drive Rev1.0 [Detailed setting required]
XINJE-VH5 EtherCAT(CoE) Drive Rev2.0 [Detailed setting required]
XINJE-VH6 EtherCAT(CoE) Drive Rev2.0 [Detailed setting required]
- VI Cania Drivas

4)Add slave configuration

As shown in the figure below, double-click VH5 1.0 to add the first slave station, and a configuration interface will pop up after adding.

Set up max. number of				
Set up max. number of		All All vendors		
Control period(L)	faxes 16 axes 1ms ~ Help	Xinje Electric Co., Ltd. Xinje Electric Co., Ltd. Xinje Electric Co., Ltd. Xinje Xinje Zielectric CoE) Drive Rev1.0 [Deta Xinje X	ailed setti ailed setti ailed setti ailed setti 3.7.42 [De 3.7.70 [Det 7.70 [Det	
Basic PDO mapping Motion function	setting	^	ng requir	
Paran	neter	Setting item		
	Type	Servo -	-	
	Axis No.	1		
	Number of occupied axes	1	-	
Pasia	Product name	XINJE-VH5	v1.0	
Basic	Vendor	Xinje Electric Co., Ltd.	-	
	Vendor ID	0x00000556(1366) 0x0005C100(377088)		
	Product code			
	Revision No.	0x20210300(539034368)	-	
	Check vendor ID	Used		
	Check product code	Not used		
	Check revision No.	Not used		
Check at the start of communication	Check method of revision No.			
	Explicit device ID check	Not used		
	Explicit device ID	1001		
		308		
	Explicit device ID register			

Select the extension settings, as shown in the following figure:



DC setting-choose DC mode

Basic	PDO mapping	Motion function setting	Communication	n command at initialization	DC setting	Advanced settings	
		Parameter				Setting item	
		Operation mode				and the second	DC-Synchron
Desite		Sync cycle					1000 us
Basic		User setting mode					Vsed
		Sync					Vsed
	Suma	Sync mode					Sync cycle
Curr all		Sync cycle					x 1 (1000 us)
Syncu	User definition					1000-us	
		Shift time					0 us
		Sync mode					Not used
		Sync cycle					
Sync1		Sync 0 cycle					
		User definition					
		Shift time					

Select the operation mode supported by the slave station of the EtherCAT connection object.

Para	meter	Setti	ng item
	Туре	1/0	
	Axis No	Repue	
	Number of occupied axes	Stepper	
Desis	Product name	loverter	
basic	Vendor	1/O	
	Vendor ID		051) 86600000x0
	Product code	X	0x0005C100 (37708
	Revision No.	X	0x20210300 (53903436
	Check vendor ID		νs
	Check product code		Not us
	Check revision No.		Not us
Check at the start of communication	Check method of revision No.		
	Explicit device ID check		Not us
	Explicit device ID		10
	Explicit device ID register		
Other	Extension setting		Enab

5)Add PDO mapping

Add the required PDO parameters, including input and output, as shown in the figure below.

PD0 mapping Motion function setting Communication command at initialization DC setting Adva index PD0 mapping Motion function setting Communication command at initialization DC setting Adva index PD0 mapping Motion function setting Communication command at initialization DC setting Adva index PD0 mapping Motion function setting Communication command at initialization DC setting Adva index PD0 mapping Motion function setting Control Word 0x6042:00 index index Control Word 0x6042:00 0x6042:00 index Index Index Index Index index Index Index Index Index Index index Index Index Index Index		+ + *
PDC mapping Motion function setting Communication command at initialization DC setting Adva PDC mapping Motion function setting Communication command at initialization DC setting Adva Rs 1st process data mapping Motion function setting Communication command at initialization DC setting Adva Rs 1st process data mapping Motion function setting Communication command at initialization DC setting Adva Rs 1st process data mapping (0x1600) Vitarget velocity Ox6040:00 Vitarget velocity 0x6040:00 (Add) Add PDO Itaget velocity Itaget velocity Itaget velocity Itaget velocity (Add) Add PDO Itaget velocity Itaget velocity Itaget velocity Itaget velocity (Add PDO Itaget velocity Itaget velocity Itaget velocity Itaget velocity Itaget velocity Itaget velocity (Add PDO Itaget velocity	+EX ~	*
PDO 1600 Rx 1st process data mapping Name(t) Rx 1st process data mapping Index (map)(t) Rx 1st process data mapping Index (map)(t) Name Index (map)(t) Name Index (map)(t) Name Index (map)(t) Name Index (map)(t) Data size (bit) Vitarget velocity 0x6040:00 Vitarget velocity 0x6042:00 (Add) Communication command at initialization DC setting Adval PDO entry name Index Ro 1st process data mapping (0x1600) Vitarget velocity 0x6040:00 (Add PDO 1400 Tx 1st process data mapping Name(t) Tx 1st process data mapping Index (map)(t) TA00		* *
PD0 1600 Fx 1st process data mapping Name(N) Fx 1st process data mapping Index (map)(I) 1600 Vame Index (entry) Ox6040:00 Variation of the state of the s	→ #EX → 16 16	+ ×
PDC mapping Motion function setting Communication command at initialization DC setting Adval PDC mapping Motion function setting Communication command at initialization DC setting Adval Re 1st process data mapping Ox6040:00 Vitarget velocity Ox6042:00 Adval Re 1st process data mapping name (index) Control Word Ox6040:00 Vitarget velocity Ox6040:00 Re 1st process data mapping (0x1600) Control Word Ox6040:00 Ox6040:00 Ox6040:00 (A d) Add PDO Index (map)(I) Tx 1st process data mapping Index (map)(I) Indox		+ × +
PD0 mapping Motion function setting Communication command at initialization DC setting Adval PD0 mapping Motion function setting Communication command at initialization DC setting Adval m PD0 mapping name (index) PD0 entry name Index Ro 1st process data mapping 0x6040:00 0x6040:00 (A d) Vitarget velocity 0x6042:00 0x6040:00 Name Control Word 0x6040:00 0x6040:00 (A d) Vitarget velocity 0x6040:00 0x6040:00 (A d) Add PDO 1400 Tx 1st process data mapping Name(N) Tx 1st process data mapping Name(N) Tx 1st process data mapping Index (map)(I) 1A00 Index	1EX ~	+ × +
PDQ mapping Motion function setting Communication command at initialization DC setting Adva (Add) PDQ mapping Motion function setting Communication command at initialization DC setting Adva process data mapping (index) PDQ entry name index PDQ mapping name (index) Control Word Ox6042:00 (Add) PDQ mapping name (index) Control Word Ox6040:00 (A d) Vitarget velocity Ox6040:00 (A d) Add PDQ 1A00 Tx 1st process data mapping Index (map)(j) Tx 1st process data mapping Index (map)(j) Tx 00	16 16	+ × +
PD0 mapping Motion function setting Communication command at initialization DC setting Advar n PD0 mapping name (index) Control Word Control Word Ox6042:00 n PD0 mapping name (index) Control Word Ox6042:00 Ro 1st process data mapping (0x1600) Vi target velocity Ox6042:00 (A d) Add PDO Index (map)(j) Tx 1st process data mapping Name(N) Tx 1st process data mapping Index (map)(j) TA00	16 16	+ × †
Name Index (entry) Data size (bit) Control Word 0x6042:00 0x6042:00 Vitarget velocity 0x6042:00 0x6042:00 Vitarget velocity 0x6042:00 0x6042:00 PDO mapping Motion function setting Communication command at initialization DC setting Advain PDO mapping name (index) PDO entry name Index Ox6042:00 0x6042:00 Ro 1st process data mapping (0x1600) vitarget velocity 0x6042:00 0x6042:00 (A. J) Add PDO Ia00 Tx 1st process data mapping Index Index Name(N) Tx 1st process data mapping Index Index Index Index	16 16 [+ × +
PDQ mapping Motion function setting Communication command at initialization DC setting Advalue PDQ mapping Motion function setting Communication command at initialization DC setting Advalue PDO mapping name (index) PDO entry name Index Ro 1st process data mapping (0x1600) vi target velocity 0x6042:00 (A d) Add PDO Index Index (A d) Add PDO Index Index (A d) Index Index Index (A d) Add PDO Index Index (A d) Index Index Index	16 16	+ × +
PDQ mapping Motion function setting Communication command at initialization DC setting Advantage of the setting PDO mapping name (index) PDO entry name index over the setting o		+ × +
PD0 mapping Motion function setting Communication command at initialization DC setting Advaitable nn PD0 mapping name (index) PD0 entry name Index Ro 1st process data mapping (0x1600) Voir larget velocity 0x6042:00 (A d) Add PD0 Ido0 Tx 1st process data mapping Name(<u>N</u>) Tx 1st process data mapping Index (map)(j) Ido0		× †
PDO mapping Motion function setting Communication command at initialization DC setting Advail nn PDO mapping name (index) PDO entry name Index Ro 1st process data mapping (0x1600) Vit target velocity 0x6042:00 (A d) Add PDO IAdd PDO IAdd PDO It st process data mapping Name(N) Tx 1st process data mapping Index (map)(j) IA00 IA00		÷
PD0 mapping Motion function setting Communication command at initialization DC setting Advail on PD0 mapping name (index) PD0 entry name Index Ro 1st process data mapping (0x1600) Vi target velocity 0x6040:00 (A d) Add PD0 1400 Tx 1st process data mapping Name(N) Tx 1st process data mapping Index (map)(j)		↑ ↓
PDQ mapping Motion function setting Communication command at initialization DC setting Advail in PDO mapping name (index) PDO entry name Index Ro 1st process data mapping (0x1600) Vi target velocity 0x6040:00 (A d) Add PDO 1400 Tx 1st process data mapping Name(N) Tx 1st process data mapping Index (map)(j) 1400		+
PDO mapping Motion function setting Communication command at initialization DC setting Advant n PDO mapping name (index) PDO entry name Index Ro 1st process data mapping (0x1600) Vord 0x6040:00 (A d) 0x6042:00 (A d) Add PDO 1A00 Tx 1st process data mapping Name(<u>N</u>) Tx 1st process data mapping Index (map)(<u>1</u>) 1A00		
PDC mapping Motion function setting Communication command at initialization DC setting Advail n PDO mapping name (index) OPDO entry name Index Ro 1st process data mapping (0x1600) Voi target velocity 0x6042:00 (A d) Add PDO IA00 Tx 1st process data mapping Name(N) Tx 1st process data mapping Index (map)(j) IA00		
PDO mapping Motion function setting Communication command at initialization DC setting Advant n PDO mapping name (index) PDO entry name Index Ro 1st process data mapping (0x1600) Vitarget velocity 0x6040:00 (A d) Add PDO 1A00 Tx 1st process data mapping Name(N) Tx 1st process data mapping Index (map)(I) 1A00		
PDO mapping Motion function setting Communication command at initialization DC setting Advantage In PDO mapping name (index) PDO entry name Index Ro 1st process data mapping (0x1600) Control Word 0x6040:00 Vi target velocity 0x6042:00 (A, d) Add PDO 1A00 Tx 1st process data mapping Name(N) Tx 1st process data mapping Index (map)(j) 1A00		
Ro 1st process data mapping (0x1600) Utarget velocity 0x6042:00 (A d) Add PDO 1A00 Tx 1st process data mapping Name(N) Tx 1st process data mapping Index (map)(j) 1A00	-	Da
(A d) (A d) Add PDO 1A00 Tx 1st process data mapping Name(N) Tx 1st process data mapping Index (map)() 1A00		
(At d) Add PDO 1A00 Tx 1st process data mapping Name(N) Tx 1st process data mapping Index (map)(l) 1A00		
1A00 Tx 1st propess data mapping Name(N) Tx 1st process data mapping Index (map)(j)		
Name(N) Tx 1st process data mapping Index (map)(I) 1A00		
Name(N) Tx 1st process data mapping Index (map)(I) 1A00	~	
Index (map)(j) 1A00		
index (inap)()		i i
	HLX *	
Nam Index (entry) Data size (bit)	
Statusword 0x6041:00	16	-
vi target actual value 0x6044:00	16	+
(bbA)		
		^
		1
		_
		+
		-

6)Activate configuration

After adding the object dictionary, download the program . After downloading the program, power on the PLC again. When the lower computer PLC turns green, it indicates that the activation is successful.

7)Add Group U parameters to the PDO.

Direction	PDO mapping name (index)		PDO entry name	Index	Data size (bit)	UG	
_	By 1st process data mapping (0x1600)	Control V	Vord	0x6040:00	16	42064.0	00
	RX 1st process data mapping (0x 1000)	vi target v	velocity	0x6042:00	16	42065.0	00
	(Add)		2000 e		10	10000	-
		statuswo	ro demand	0x6041:00	16	42000.0	10
Tx 1st process data mapping (0x1A00)		vitarget a U0-00 Edit PDO					
	(Add)		No selectable dev	ice definition		~	
			Name(N)	Tx 1st process d	ata mapping		
			Index (map)(I)	1A00		HEX ~	
800 ml		×	Nam	e Ind	lex (entry)	Data size (bit)	
FDO ent	'y	~	vi target demand		0x6041:00	10	1.000
selectab	le device definition	1.000	vi target actual val	ue	0x6044:00	16	1.00
OO entry r	ame(N) U0-00		U0-00		0x4000:00	16	×
dex(])	4000 HEX			\sim			+
ib-index(2) 0 DEC						+
ata type(D	UINT	~					
	OK 🚩 Cancel						

8)PDO data read/write(enable and speed setting)

The following figure shows the register configuration of the object dictionary. Switch the controller to online

mode after configuration, as shown in the following figure:

Editor	
Editor	
Monitor	
Online edit	
Simulator	
Simulator edit	

The following figure shows the mapping address of the object dictionary:

e detailed setting

sic F	DO mapping	Communication comman	nd at initialization DC setting	Advanced settings		
rection	PDO m	apping name (index)	PDO entry name	Index	Data size (bit)	JG
ь	Rx 1st process data mapping (0x1600)		Control Word	0x6040:00	16	42064.00
			vl target velocity	0x6042:00	16	42065.00
	(Add)					
	Tx 1st process data mapping (0x1A00)		Statusword	0x6041:00	16	42000.00
			vI target demand	0x6043:00	16	42001.00
.			vi target actual value	0x6044:00	16	42002.00
	(Add)					

Open the monitor , select the expansion unit buffer memory, find the mapping address, and directly operate the object dictionary.

EX OREY TOHY TOHY : 🖋 💴 8= 8# 🚮	18日 府里 🎌 🗣 🕞 🦛		H V HI > O	r 🖄 🖬	Monitor	-	Comments Comment 1
					: Worldon		comments comment
s 🖂 🖷 📭 🛶 🛼 📄 📾 📭 🛢	i 🗃 🚍 🖪 😘 🚳 🚳	P3 -					
	[1] Contact output	× [1] Point narameter	× [1] Avis control settin	×	[1] Mnit common setting	× ×	Main ¥
miration							
-7300	Contact output setting(J) 1 V Display unit se	mind(D) %			10.15	
-YHIGEC R20000 DM10000	8 Batch monito	r				×	
ANTOLC RECOOL DATOOD	N O Device(D)	Unit buffer memory(G)	Unit Internal devices	an			
common setting	N	Contraction monitority(2)		(<u>52</u>)		- (C	
common secting	N Unit	Offset Current	value Display form	at	Comments	^	
concroi secting	N (1) KV-XHIGEC	42060	O DEC 16BIT	Dr1	I/O Input 61		
parameter	N LILINU-XHIEFC	42062	O DEC 16BIT	21	T/O Input 62		
control setting	LILIKV-XHIGEC	42063	O DEC 16BIT	Av1	T/O Input 63		
nc parameter	N 11KV-XH16EC	42064	0 DEC 16BIT	Ax1	T/O OUTPUT 0		
ntact output setting	11KV-XH16EC	42065	0 DEC 16BIT	Ax1	I/O Output 1		
n setting	11KV-XH16EC	42066	0 DEC 16BIT	Ax1	I/O Output 2		
Resolution setting	1] KV-XH16EC	42067	0 DEC 16BIT	Ax1	I/O Output 3		
Program	1] KV-XH16EC	42068	O DEC 16BIT	Ax1	I/O Output 4		
n setting	NIG 1] KV-XH16EC	42069	0 DEC 16BIT	Ax1	I/O Output 5		
-C32XTD R44000/R44200	No 11KV-XH16EC	42070	0 DEC 16BIT	Ax1	I/O Output 6		
figuration switching	Ng [1] KV-XH16EC	42071	0 DEC 16BIT	Ax1	I/O Output 7		
pent	Ng [1] KV-XH16EC	42072	0 DEC 16BIT	Ax1	I/O Output 8		
	Ng [1] KV-XH16EC	42073	0 DEC 16BIT	Ax1	I/O Output 9		
setting	Ng [1] KV-XH16EC	42074	O DEC 16BIT	Ax1	I/O Output 10		
+** 28	Ng [1] KV-XH16EC	42075	O DEC 16BIT	Ax1	I/O Output 11		
	Ng [1] KV-XH16EC	42076	O DEC 16BIT	Ax1	I/O Output 12		
an execution	Ng [1] KV-XH16EC	42077	0 DEC 16BIT	AXI	1/0 Output 13	· ·	
	No.22 None	0.000000%	0.000000%				
ze module	No.23 None		0.000000%	Bit 14			
module	No.24 None		0.000000%	Bit 15			
riod module	No.25 None		0.000000%				
hit sync module	No.26 None		0.000000%				
lock	No.27 None		0.000000%				
	No.28 None		0.0000000%				
>	No.29 None		0.0000000%				
roject	No.30 None		0.0000000%				

9) SDO data read/write

Read:

		-	3	4	5	6	7	8	9	10
	MR000	R37112	٠				UWRIT -		£1051	#1
0001							#1	#42144	\$10F1	#1
0000							KV-XH16E0	Ax1 Servo param read		
	R30512						UWRIT - #1	#42145	\$0001	#1
0000							KV-XH16EC	Ax1 Servo		
							UREAD -			
							- #1	#42148	EM10	#1
0003							KV-XH16EC	Ax1 Servo Param Read	#00004	
							UREAD -			
0004			-				#1	#42149	EMII	#1
0000							KV-XH16E0	Ax1 Servo Param Read	#00000	
.										
MR004	R371	13					UWRIT	#42152	\$10F1	#1
MR004	R371	13				[UWRIT	#42152	\$10F1	#1
MR004	R371	13				[UWRIT #1 /-XH16EC	#42152 Axl Servo param wrt	\$10F1	#1
R3051	R371:	13				[UWRIT #1 /-XH16EC UWRIT #1	#42152 Axl Servo param wrt #42153	\$10F1 \$0001	#1
MR004	R371.	¹³ ↑				[KX [UWRIT	#42152 Axl Servo param wrt #42153 Axl Servo param wrt	\$10F1 \$0001	#1
MR004	R371	13				[UWRIT	#42152 Axl Servo param wrt #42153 Axl Servo param wrt #42154	\$10F1 \$0001 #1	#1 #1 #1
R3051	R371	13 ↑				[UWRIT	#42152 Axl Servo param wrt #42153 Axl Servo param wrt #42154 Axl Servo param wrt	\$10F1 \$0001 #1	#1 #1 #1
R3051	R371	13 ↑				[K	UWRIT	#42152 Axl Servo param wrt #42153 Axl Servo param wrt #42154 Axl Servo param wrt	\$10F1 \$0001 #1 #4	#1 #1 #1

11. EtherCAT communication alarm code

When the EtherCAT communication is abnormal, the frequency converter panel displays an alarm with error Err44, and the object word 603Fh displays the error code "8xx", which can be queried through U0-73 on the frequency converter panel. After the fault is rectified, use the bit7 of Controlword to reset the fault. The following table lists the detailed fault causes. (When the frequency converter itself alarms, that is, errors other than Err44, need to clear the alarm twice through the panel, once clear the alarm itself and once clear the communication alarm Err44. Through the bit7 of controlword, the reset and clearing fault only needs to be cleared once.)

Alarm	Description	Reasons	Solutions		
code					
817	Incorrect ESM	Accept state transition requirements that cannot be	Confirm whether the		
	status request	transitioned from the current state:	master station's state		
	exception	Init→SafeOP	transition request is		
	protection	Init \rightarrow OP	correct		
		$PreOP \rightarrow OP$			

Alarm	Description	Reasons	Solutions		
code					
		ESM status after an error is reported: When the			
		ESM status is Init, PreOP, or SafeOP, the ESM			
		status remains. Change to SafeOP when the ESM			
		status is OP			
		ESC register AL Status Code:0011h			
818	No ESM	Receive state transition requirements other than:	Confirm whether the		
	required	1:Request Init State	master station's state		
	exception	2:Request Pre-Operational State	transition request is		
	protection	3:Request Bootstrap State	correct		
	defined	4:Request Safe-operational State			
		8:Request Operational State			
		ESM status after error reporting: stops at the			
		current status when the current status isInit, PreOP,			
		SafeOP, and changes to SafeOP when OP			
		ESC register AL status code:0012h			
819	Boot status	Accept the following state transition requirements:	Confirm whether the		
	request exception	3:Request Bootstrap State	master station's state		
	protection	ESM status after error reporting: init	transition request is		
		ESC register AL status code:0013h	correct		
822	Mailbox setting	The SM0/1 setting value of the mailbox is	Set syncmanager		
	exception	incorrect:	correctly according to		
	protection	The receiving and sending areas of the mailbox	ESI file description		
		overlap with SM2/3, and the addresses of the			
		receiving and sending areas are odd.			
		The starting address of the mailbox is outside the			
		range of SyncManager0:1000h~10ffh and			
		syncmanager1:1200h~12ffh			
		Incorrect setting of SyncManager 0/1 length (ESC			
		registers: 0802n, 0803n/080an, 0800n):			
		SyncManager1, out of the range of 40, 256byte			
		SyncManager 1. outside the range of 40~2500yte			
		0804b/080ch) of SyncManager 0/1:			
		Set other than 100110b to 0804b bits 0			
		Set other than 100110b to 080ch:bit5-0			
		ESM status after error reporting: init			
		ESC register al status code:0016h			
826	Synchronization	Invalid synchronization signal	Check whether the		
020	error	ESC register AL status code:001ah	network cable is		
			disconnected or		
			strongly disturbed		
827	PDO watchdog	During PDO communication (SafeOP or OP	Confirm whether the		
	abnormal	status), bit10 of time 0220 (AL event request) is set	sending time of PDO		
	protection	through ESC register addresses 0400 (watchdog	from the upper device is		
	·	divider) and 0420 (watchdog time process data)	fixed (interrupted).		
		without on.	Confirm that the PDO		
		ESM status after error reporting: Safe OP	watchdog detection		
Alarm	Description	Reasons	Solutions		
-------	-------------------	--	--		
code					
		ESC register al status code:001bh	delay value is too large. Confirm whether there is any problem with the wiring of EtherCAT communication cable and whether there is excessive noise on the cable.		
829	Syncmanager 2/3	SM2/3 is set to an incorrect value	Set syncmanager2/3		
/830	setting exception	The physical address of SM2/3 is set incorrectly	correctly according to		
	protection	(ESC register: 0810h/0818h): the receiving and	ESI file description		
		transmitting area overlaps, overlaps with SM2/3,			
		the starting address is an odd number, and the			
		starting address completion address is outside the			
		range			
		SM2/3 length setting (ESC register: 0812h/081a) is			
		different from RxPDO and TxPDO			
		The control register (ESC register: 0814h/081ch)			
		of SM2/3 is set incorrectly			
		ESM status after error reporting: PreOP			
021		ESC register al status code:001dh/001eh			
831	PDO watchdog	PDO watchdog setting error	Correctly set the		
	setting abnormal	hit of magistan 0804h is 1) and the set value of	watchdog detection		
	protection	PDO watchdog detection timeout value (registers	timeout value		
		0400h 0402h) does not meet the "communication			
		cycle *2" condition			
		ESM status after error reporting: PreOP			
		ESC register AL status code:001fh			
836	TxPDO	The data size of TxPDO mapping exceeds 24 bytes	Confirm that the data		
	distribution	ESM status after error reporting: PreOp	size of TxPDO		
	abnormal	ESC register Al status code:0024h	mapping is set within		
	protection		24 bytes		
837	RxPDO	The data size of RxPDO mapping exceeds 24 bytes	Confirm that the data		
	distribution	ESM status after error reporting: PreOp	size of RxPDO		
	abnormal	ESC register Al status code:0025h	mapping is set within		
	protection		24 bytes		
844	Synchronous	After the synchronization processing is completed,	Confirm the setting of		
	signal abnormal	the interrupt processing occurs above the set	DC and whether the		
	protection	threshold according to SYNC0 or IRQ	propagation delay		
		ESM status after error reporting: SafeOP	compensation and		
		ESC register al status code:002Ch	deviation compensation		
0.4-			are correct.		
845	PLL does not	Is after synchronous processing, the phase	Confirm the setting of		
	complete	combination (PLL locking) of master station and	DC		
	abnormal	slave station still cannot be completed			

Alarm	Description	Reasons	Solutions
coue	protection		
848	DC setting abnormal protection	The setting of DC is wrong. Bit2-0 of ESC register 0981h (activation) is set to a value other than the following: bit2-0=000b, bit2-0=011b ESM status after error reporting: PreOp ESC register al status code:0030h	Confirm the setting of DC
850	PLL abnormal protection	ESM status refers to the situation that the communication and servo phases (PLL locking) do not match under SafeOp or OP status ESM status after error reporting: SafeOp ESC register al status code:0032h	Confirm the setting of DC and whether the propagation delay compensation and deviation compensation are correct.
853	Synchronization cycle setting abnormal protection	Set unsupported synchronization cycle: The set value of synchronization cycle is beyond 500us, 1ms, 2ms and 4ms ESM status after error reporting:PreOP ESC register AL status code: 0035h	Set the synchronization period correctly
870	Data frame loss alarm	Data frame loss	 Check whether the baud rate set in P9-02 matches the communication card. The default baud rate of the general machine is 06. When setting ECAT communication parameters, power on again after modification, otherwise data frame loss may occur. After the firmware of the communication card or frequency converter is updated, it needs to be powered off and restarted. Check whether the communication card and the inverter backplane are properly inserted, or whether there is interference at the interface.
880	Internal	Expansion card and frequency converter failed to	Check whether there are

Alarm	Description	Reasons	Solutions
coue	communication failure	establish communication successfully.	foreign matters in the expansion card slot and
			whether the pins in the slot are intact.
881	Inverter not responding		Check whether the parameters of the inverter are correct.
890	Slave state machine error status	When the frequency converter is running, the master station requests non OP status without first closing the slave station. Or the error code is displayed after the key is reset, indicating that the key has no permission to reset the error (it may be enabled by the master station)	Check whether it enters non OP state during operation. If the reset key cannot clear it, it is necessary to check that the master station is forcibly enabling the operation command.





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