VH6 series CANopen expansion card

User manual

Wuxi Xinje Electric Co., Ltd.

Data No. INV C 07 20210127EN 1.0

Basic instruction

- Thank you for purchasing Xinje VH6 series frequency converter and CANopen communication expansion card. Please read this product manual carefully before carrying out relevant operations.
- This manual mainly provides users with relevant guidance and instructions for the correct use and maintenance of the frequency converter. It covers the functions, use methods, installation and maintenance of the frequency converter.
- The contents in the manual are only applicable to the frequency converter products of Xinje Company.

Instructions to users

This manual is applicable to the following personnel:

- Installation personnel of frequency converter
- Engineering technicians (electrical engineers, electrical operators, etc.)
- Designer

The above personnel should carefully read the safety precautions section of this manual before operating or debugging the frequency converter.

Statement of responsibility

- Although the contents in the manual have been carefully checked, errors are unavoidable, and we cannot guarantee that they are completely consistent.
- We will regularly check the contents of the manual and make corrections in subsequent versions, and welcome your valuable comments.
- 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 that purchased the product, or directly contact Xinje Company.

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Catalog

1. CANopen expansion card station number and baud rate

1.1 Slave station number

The CANopen slave station number can be set through the dial switch (dial 1 to dial 6) on the expansion card. The range of settings is 1 to 64. If all dial codes are set to OFF, it means the station number is 64.

Setting method: Dial 1~6 correspond to Bit0~Bit5 respectively. For example, set the slave station number to 37, first convert 37 to the binary number 100101 (Bit0 from the right end), and then toggle the dial switch as follows:

Dial switch 1	Dial switch 2	Dial switch 3	Dial switch 4	Dial switch 5	Dial switch 6
1（ON）	0（OFF）	1（ON）	0（OFF）	0（OFF）	1（ON）
Bit0	Bit1	Bit2	Bit3	Bit4	Bit5

Note: After the dial switch is turned, it will take effect only when the power is turned on again.

1.2 CAN baud rate

The CAN baud rate can be set through the dial switch (dial 7, dial 8) on the expansion card. There are four baud rates available: 500kbyte, 125kbyte, 250kbyte, 1Mbyte. The default baud rate is 500k.

Dial switch 7	Dial switch 8	Baud rate
0	0	500kbyte
1	0	125kbyte
0	1	250kbyte
1	1	1Mbyte

Note:

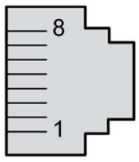
(1) After the dial switch is turned, it will take effect only when the power is turned on again.

(2) The station numbers of master station and slave station cannot be duplicate.

(3) The baud rate of master station and slave station must be consistent.

1.3 CAN RJ45 port wiring

RJ45 pins are assigned as follows:



Pin	Name
1	CAN+
2	CAN-
3	GND

Cut off one end of the crystal head. According to the definition of the network interface pin, the first wire is connected to the CAN+ of the master station, the second wire is connected to the CAN- of the master station, and the third wire is connected to the CAN_ GND. One end of the crystal head is inserted into the lower network port of the expansion card.

Take out another network cable from the first expansion card upper internet port to connect the second expansion card lower internet port. And so on, come out from the second expansion card upper internet port and connect to the third expansion card lower internet port. (The expansion card network interface follows the principle of "bottom in and top out")

1.4 LED indicator

The number 1, 2 and 3 are engraved on the side of the expansion card mounting sheet metal, which correspond to three LED lights, respectively:

Light 1	Light 2	Light 3
Power LED	Communication status light with VFD	CANopen status light

LED light explanation:

Light	Status	Function
Power LED	Always ON	The expansion card is powered on normally
	Always OFF	The expansion card is powered on abnormally
Communication status light with VFD	Always ON	Expansion card is establishing connection with frequency converter
	Twinkle	Communication between expansion card and frequency converter is normal
	Always OFF	Communication between expansion card and frequency converter is abnormal
CANopen status light	Always ON	CANopen in OP state
	Twinkle	CANopen in Pre-OP state
	Always OFF	CANopen in OFF state

1.5 Communication parameter setting

To use the VH6 CANopen expansion card to communicate with the frequency converter, first set the following three parameters in the frequency converter:

Parameter	Name	Property	Set value	Range	Note
P9-00	Communication protocol selection	Read only when operation	1	0~2	Communication expansion card. After this parameter is changed to 1, the second LED will start flashing under normal conditions, indicating that the communication between the expansion card and the frequency converter is normal
P0-02	Command source selection	Read only when operation	2	0~2	Communication operation command channel

P0-03	Main frequency source X selection	Read only when operation	6	0~9	Communication given

After setting the parameters, power on the VFD again and observe the indicator light on the VH6 CANopen expansion card (mainly for communication with the converter, see LED indicator light for details). If it flashes, it means that the communication between the expansion card and the converter is normal.

2. CANopen object dictionary description

2.1 CANopen object dictionary naming and partitioning

Hex format	The fourth place from the right	The third place from the right	The second place from the right	The first place from the right
0x	2	0	1	A
	2: P group parameters 3: Group A parameters 4: U group parameters 5: Independent protocol object 6: DS402 protocol object	Group number, for example, group P parameters are divided into P0, P1, P2, etc	Parameter number, such as 1A for 26 (decimal)	

For example, 0x201A represents P0-26; 0x2210 indicates P2-16; 0x4001 indicates U4-01.

Area	Object dictionary index	Explanation
Manufacturer custom area	0x2000~0x2F08	Correspond to VFD group P parameters
	0x3000~0x3D13	Correspond to VFD group A parameters
	0x4000~0x404A	Correspond to VFD group U parameters
Independent protocol object area	0x5000~0x5110	Independent protocol area
CiA402 protocol object area	0x6000~0x60FF	CiA402 Object dictionary

2.2 Manufacturer custom area object dictionary

The object words in the user-defined area of the manufacturer correspond to the parameters of the VFD. By reading and writing the object word, you can access the parameters in the converter. For example, reading and writing the value of 0x2001 through SDO can read and write the value of P0-01. In addition, the manufacturer's user-defined area parameter cannot be configured as PDO.

Object dictionary index	Corresponding converter parameters	Object dictionary index	Corresponding converter parameters
0x2000~0x201A	P0-00~P0-26	0x2A00~0x2A1D	PA-00~PA-29
0x2100~0x2123	P1-00~P1-35	0x2B00~0x2B33	PB-00~PB-51
0x2200~0x2246	P2-00~P2-70	0x2C00~0x2C4F	PC-00~PC-79
0x2300~0x2317	P3-00~P3-23	0x2F00~0x2F08	PF-00~PF-08
0x2400~0x241B	P4-00~P4-27	0x3000~0x3009	A0-00~A0-09
0x2500~0x2532	P5-00~P5-50	0x3100~0x3115	A1-00~A1-21
0x2600~0x2617	P6-00~P6-23	0x3200~0x3240	A2-00~A2-64
0x2700~0x2750	P7-00~P7-80	0x3900~0x390E	A9-00~A9-14
0x2800~0x2818	P8-00~P8-24	0x3D00~0x3D13	AD-00~AD-19
0x2900~0x291E	P9-00~P9-30	0x4000~0x404A	U0-00~U0-74

2.3 CIA402 protocol object dictionary

CIA402 motion control protocol currently only supports vl (speed mode).

Index	Subindex	Name	Unit	Range	Data type	Flag	PDO
6040h	00h	Controlword	-	0~65535	U16	RW	RxPDO
6041 h	00h	Statusword	-	0~65535	U16	RO	TxPDO
6042h	00h	vl target velocity	0.01Hz	-32768~32767	I16	RW	RxPDO
6043h	00h	vl velocity demand	0.01Hz	-32768~32767	I16	RO	TxPDO
6044h	00h	vl velocity actual value	0.01Hz	-32768~32767	I16	RO	TxPDO
603Fh	00h	Error code	-	0~65535	U16	RO	TxPDO
6046h	-	vl velocity min max amount	-	-	-	-	-
	00h	Number of entries	-	2	U8	RO	NO
	01h	vl velocity min amount	0.01Hz	0~4294967295	U32	RW	NO
	02h	vl velocity max amount	0.01Hz	0~4294967295	U32	RW	NO
6048h	-	vl velocity acceleration	-	-	-	-	-
	00h	Number of entries	-	2	U8	RO	NO
	01h	Delta speed	0.01Hz	0~4294967295	U32	RW	NO
	02h	Delta time	0.01S	0~65535	U16	RW	NO
6049h	-	vl velocity deceleration	-	-	-	-	-
	00h	Number of entries	-	2	U8	RO	NO
	01h	Delta speed	0.01Hz	0~4294967295	U32	RW	NO
	02h	Delta time	0.01S	0~65535	U16	RW	NO
605Bh	00h	Shutdown option code	-	0~1	U16	RW	NO
605Ch	00h	Disable operation option code	-	0~1	U16	RW	NO
605Eh	00h	Fault reaction option code	-	0~1	U16	RW	NO
6060h	00h	Mode of operation	-	2	I8	RW	NO
6061h	00h	Mode of operationdisplay	-	2	I8	RO	NO
6502h	00h	Supported drive modes	-	0~4294967295	U32	RO	NO

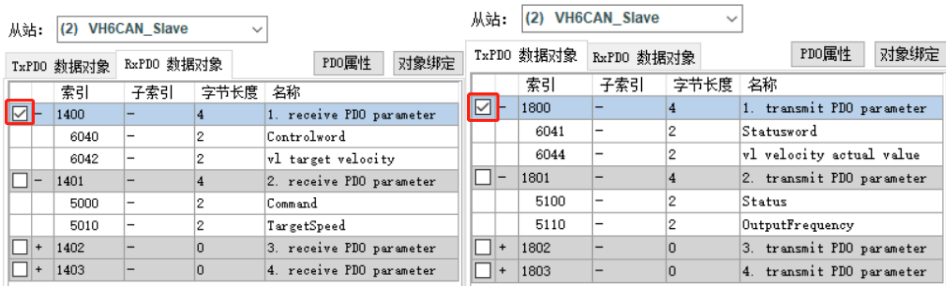
2.4 Independent Protocol Object Dictionary

Index	Subindex	Name	Unit	Range	Data type	Flag	PDO
5000h	00h	Command	-	0~65535	U16	RW	RxPDO
5010 h	00h	TargetSpeed	0.01Hz	0~65535	U16	RW	RxPDO
5100h	00h	Status	-	0~65535	U16	RO	TxPDO
5110h	00h	OutputFrequency	0.01Hz	0~65535	U16	RO	TxPDO
5200h	-	Communicate State	-	-	-	-	-
	00h	Number of entries	-	6	U8	RO	NO
	01h	Number of frame lost	times	0~65535	U16	RO	NO
	02h	Number of CRC error	times	0~65535	U16	RO	NO
	03h	Number of rejections	times	0~65535	U16	RO	NO

	04h	Newest error cause	-	0~65535	U16	RO	NO
	05h	Newest error index	-	0~65535	U16	RO	NO
	06h	Cycle time	ms	0~65535	U16	RO	NO

3. CIA402 mode control

This expansion card supports two motion control protocols: CIA402 motion control protocol (recommended) and independent protocol (customized by the manufacturer). Users can choose to use one of them. The method to select the CIA402 protocol is to open the COBox module of the XNetConfigTool software, scan out the slave station, choose it in the PDO configuration interface of the slave station, choose 0x1400 and 0x1800 at the same time, and click Download Configuration, which means that the CIA402 protocol is selected. Note that for CIA402 and independent protocol, only one of them can be selected. See Chapter 4 for the use of independent protocol.



Note: 0x1400 and 0x1401 cannot be selected at the same time, and 0x1800 and 0x1801 cannot be selected at the same time.

3.1 CIA402 motion control mode setting

CIA402 motion control protocol currently only supports vl (speed mode).

You can confirm the supported modes of operation according to 6502h (Supported drive modes).

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 the current device. The current device only supports vl mode.
- 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）	0：Not supported
10~31	Reserved	0

The control mode is set through 6060h (Modes of operation).

6060hex	Mode of operation	
Range：2	Unit：-	Default value：02 hex

Size：1 byte（INT8）	Access：RW	PDO map：Not possible

Note: Because the expansion card only supports vl mode (speed mode), the default value 2 of 0x6060 should be kept unchanged.

The confirmation of control mode is performed according to 6061h (Modes of operation display).
After setting 6060h (Modes of operation), please confirm whether it is feasible to set this object action through detection.

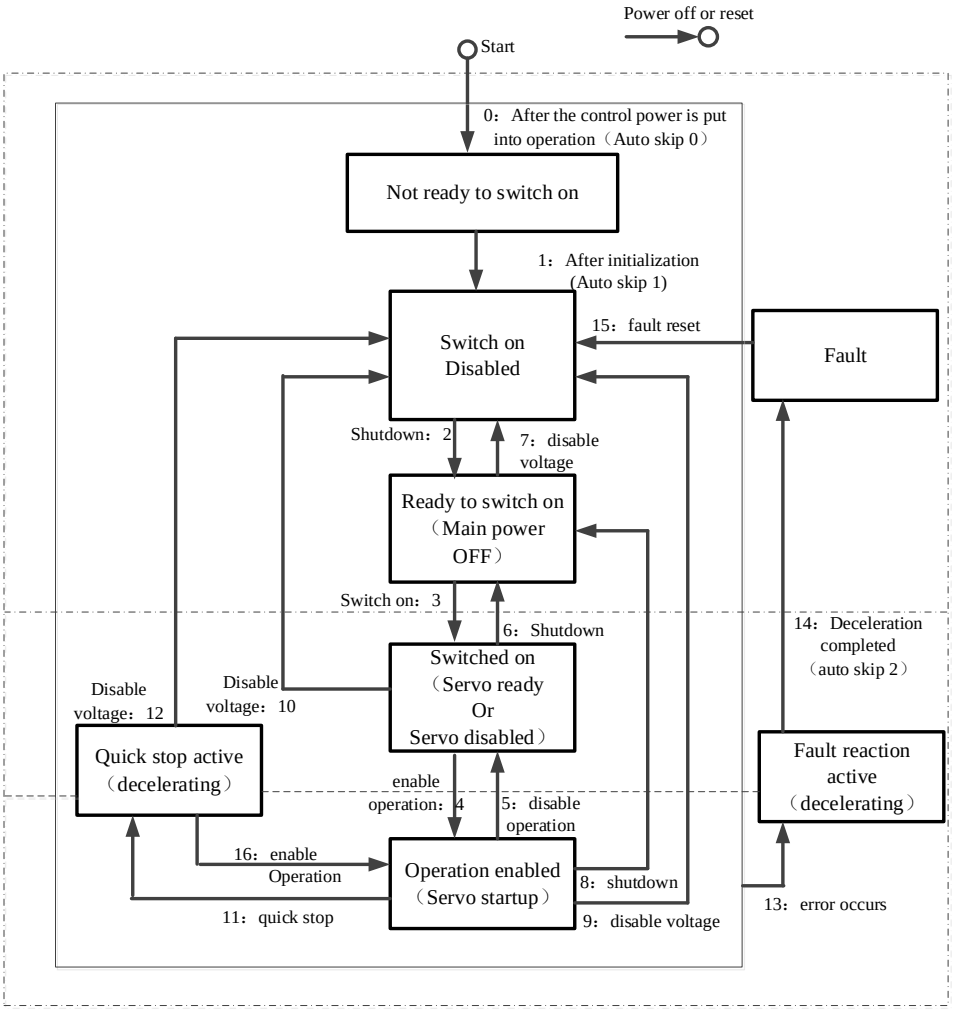
6061hex	Mode of operation display	
Range：0~10	Unit：-	Default value：02 hex
Size：1 byte（INT8）	Access：RO	PDO map：Not possible

This object displays the current operation mode. The value is equal to 6060 hex (Mode of operation) during normal operation.

3.2 CIA402 motion control PDS specification

3.2.1 PDS(Power Drive Systems) specification

According to user commands or abnormal detection, the state transition of the PDS associated with the inverter control is defined in the following figure. (Note: The following will be described in "PDS status")



- Quick stop（Not supported temporarily）

3.2.2 Controlword (6040h)

Set the control command for PDS status migration to wait for variable frequency drive.

6040hex	Controlword	
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, that is, the state jump of the PDS state machine.
- Bit description is as follows:

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

Indicates the PDS command. Represents the combination of the following commands and the corresponding bit.

Command	0x6040					Transition
	Bit7	Bit3	Bit2	Bit1	Bit0	
	Fault reset	Enable operation	Quick stop	Enable voltage	Switch on	
Shutdown	0	X	1	1	0	2, 6, 8
Switch on	0	0	1	1	1	3
Switch on + Enable operation	0	1	1	1	1	3 + 4
Disable voltage	0	X	X	0	X	7, 9, 10, 12
Quick stop	0	X	0	1	X	7, 10, 11
Disable operation	0	0	1	1	1	5
Enable operation	0	1	1	1	1	4, 16
Fault reset	Rising edge	X	X	X	X	15

Note: X means no value is specified.

The PDS status jump is controlled by setting different values to 0x6040. For example, if 0x6040 is set to 0x06, the state machine should jump to Ready to Switch On, and then 0x07, the state machine should jump to Switch On, and then 0xF, the state machine should jump to Operational Enable. At this time, the frequency converter is enabled, and then set the frequency of the frequency converter, the forward or reverse operation of the converter can be controlled. Read 0x6041 to determine whether the current state is in the specified state.

In addition, if the expansion card fails (reading 0x603F shows the fault code), the fault can be cleared by writing 0x80 to address 0x6040.

3.2.3 Statusword （6041h）

The status of the slave station (VH6 converter) is confirmed through 6041h (Statusword).

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	
2	Operation enabled	
3	Fault=U0-69bit2 (If this Fault is 1, it means that there is a fault inside the converter)	
4	Voltage enabled	
5	Quick stop（Not supported temporarily）	
6	Switch on disable	
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: Indicates the status that 6040 (Controlword) cannot process 1: Indicates that 6040 (Controlword) is in a processable state The ESM status changes to 1 when it is converted to above PreOP.
10-15	Reserved	Not used

The PDS status can be confirmed according to Bit6,5,3-0. The following shows the status and corresponding bit.

StatusWord	PDS State	
xxxx xxxx x0xx 0000 b	Not ready to switch on	Initialization incomplete status
xxxx xxxx x1xx 0000 b	Switch on disabled	Initialization completion status
xxxx xxxx x01x 0001 b	Ready to switch on	Initialization completion status
xxxx xxxx x01x 0011 b	Switched on	Servo enable off/servo ready
xxxx xxxx x01x 0111 b	Operation enabled	Servo enabled
xxxx xxxx x00x 0111 b	Quick stop active	Stop immediately
xxxx xxxx x0xx 1111 b	Fault reaction active	Abnormal (alarm) judgment
xxxx xxxx x0xx 1000 b	Fault	Abnormal (alarm) judgment

Note: x means no value is specified.

The state of the CIA402 state machine can be determined by reading the value of 0x6041. 0x6041 and 0x6040 are usually used together. For example, 0x6040 set to 6, theoretically, the state machine should jump to Ready to switch on, and then read the value of 0x6041. If bit0=1, bit1=0, bit2=0, bit3=0, bit5=1, bit6=0, then the current actual state is Ready to switch on.

3.3 CIA402 speed control associated objects (setting type)

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

Given the frequency of the converter, the frequency of the converter can be changed. The given frequency can be observed through the frequency converter panel.

6046hex	vl velocity min max amount	
Sub-index 0: Number of entries		
Range：-	Unit：-	Default value：02hex
Size：1byte（U8）	Access：RO	PDO map：Not possible
Sub-index 1：vl velocity min amount		
Range：0~ FFFFFFFF hex	Unit：0.01Hz	Default value：00000000hex
Size：4byte（U32）	Access：RW	PDO map：Not possible
Sub-index 2：vl velocity max amount		
Range：0~ FFFFFFFF hex	Unit：0.01Hz	Default value：00001388hex
Size：4byte（U32）	Access：RW	PDO map：Not possible

- This object sets the lower limit frequency and the upper limit frequency.
- 6046:01 represents the lower limit frequency, which will be associated with the inverter parameter P0-17.
- 6046:02 represents the upper limit frequency, which will be associated with the inverter parameter P0-15.
- Note: if the value is written to 0x6046:01 using CANopen SDO method, the new value will be displayed in the panel parameter P0-17 synchronously. At this time, it is not allowed to use the VFD panel keys to continue to modify the value of P0-17, which will cause confusion. Similar parameters include 0x6046:02, 0x6048:02 and 6049:02. It is recommended that these four parameters be read and written in the bus mode all the time.

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：Delta speed		
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 acceleration time, from 0 to the frequency set by Delta speed, and the required Delta time .
- 6048:01 is read-only and displays the value of inverter parameter P0-13.
- 6048:02 indicates the acceleration time, which will be related to the inverter parameter P0-18.

6049hex	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：Delta speed		
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 from the frequency set by Delta speed to 0, and the required Delta time.
- 6049:01 is read-only and displays the value of inverter parameter P0-13.
- 6049:02 represents the deceleration time, which will be related to the inverter parameter P0-19.

605Bhex	Shutdown option code	
Range：0~1	Unit：-	Default value：1
Size：2byte（INT16）	Access：RW	PDO map：Not possible

- This object describes the action when shutting down (6040PDS command status Operation enable → Ready to switch on, i.e. 15 → 6).
- When this object is set to 1, it means deceleration and shutdown. 0 is free stop.

605Chex	Disable operation option code	
Range：0~1	Unit：-	Default value：1
Size：2byte（INT16）	Access：RW	PDO map：Not possible

- This object describes the action of canceling the operation (6040PDS command status Operation enable → Switch on, i.e. 15 → 7).
- When this object is set to 1, it means deceleration and shutdown. Otherwise, stop freely.

605Ehex	Fault reaction option code	
Range：0~1	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 to slow down and stop, otherwise it will stop freely.

3.4 CIA402 speed control association object (monitor type)

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

- This object is the speed command given by the expansion card to the converter. By reading the value of this object, the command frequency of the converter can be read.

6044hex	vl velocity actual value	
Range：-32768~32767	Unit：0.01Hz	Default value：0000 hex
Size：2byte（INT16）	Access：RO	PDO map：Possible

- This object indicates the speed command fed back by the frequency converter. The actual frequency of the frequency converter can be read by reading the value of this object.

603Fhex	Error code=U0-73（Map to converter panel parameters U0-73）	
Range：0000 ~ FFFF hex	Unit：-	Default value：0000 hex
Size：2byte（U16）	Access：RO	PDO map：Possible

- This object displays the error or alarm code of the expansion card, which is mapped to the inverter panel parameter U0-73. When the error occurs, the value of this object can be viewed through the panel parameter U0-73 (note: U0-73 is decimal, which needs to be converted to hexadecimal).

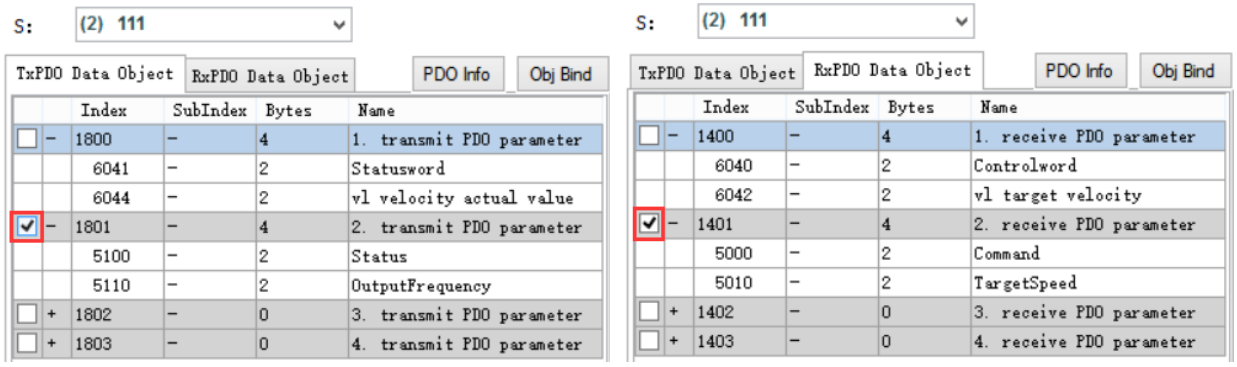
Object	Name	Data type	Description
603F hex	Error code	U16	0000 hex：No error
			5300 hex：Converter not responding
			7500 hex：The communication between the expansion card and the frequency converter is abnormal. It can be further judged by observing the flashing condition of Led lamp 2
			7600hex: The COBox communication between the expansion card and the main station is abnormal. Possible causes: (1) The CAN network cable is loose or damaged (2) The master station is abnormally powered off during the operation of frequency converter (3) The synchronization frame interval in the main station COBox is set too large, and the recommended range is 0~500ms
			FFXX hex： The frequency converter reports an error, where the lower eight digits XX represent the internal fault code of the frequency converter

Note: The fault code in 0x603F can be cleared through writing 0x80 to address 0x6040.

4. Independent protocol control

Independent protocol is a set of motion control protocol customized by the manufacturer, similar to the CIA402 motion control protocol. Users can choose to use the independent protocol or the CIA402 protocol.

The selection method is to open the COBox module of XNetConfigTool software, scan out the slave station, selected 0x1401 and 0x1801 in the PDO configuration interface, and click to download the configuration, which means that you choose to use the independent protocol. The user can control the operation of the converter by accessing the object word related to the independent protocol.



Note: 0x1400 and 0x1401 cannot be selected at the same time, and 0x1800 and 0x1801 cannot be selected at the same time.

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

- This object is directly provided to the action command of the frequency converter.
- bit description is as follows:

Bit	Meaning	Detail
0	Forward operation	0：stop 1：forward operation
1	Reverse operation	0：stop 1：reverse operation
2~3	Reserved	Usually 0
4	Stop mode	0：deceleration stop 1：free stop
5~6	Reserved	Usually 0
7	Fault reset	1：Fault and warning clearing
8	Enable valid	0：default CIA402 protocol 1：Independent protocol (this protocol)
9~15	Reserved	Usually 0

By giving different values of 0x5000, the start and stop, positive and reverse rotation of the frequency converter can be controlled.

Note: If the independent protocol is used, the bit8 of 0x5000 should always be set to 1, indicating that the independent protocol is used. For example, write 0x101 to 0x5000 to control the forward rotation of the frequency converter; Write 0x102 to 0x5000 to control the inverter to reverse. When the frequency converter is running, write 0x100, and the frequency converter will slow down and stop. Write 0x110 and the frequency converter will

stop freely.

If you do not want to use the independent protocol, you need to set bit8 to 0, which means that you choose the CIA402 protocol.

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

- The object is given the output frequency of frequency converter.
- Refer to P0-13 and P0-14 for upper frequency limit and upper frequency source.

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

- This object returns the current status of the converter, in which 8 to 15 digits display the fault code or error code of the converter.
- bit description is as follows:

Bit	Meaning	Detail
0	Run/stop	0：stop 1：run
1	Forward/reverse	0：reverse run 1：forward run
2	Fault	0：normal 1：fault
3	Frequency reached	1：Reach the set frequency
4~6	Reserved	Usually 0
7	Communication error	0：normal 1：fault

Determine the current status of the converter by reading the value of 0x5100. For example, when the frequency converter is running, bit0 should be 1.

5110hex	OutputFrequency	
Range：0000 ~ FFFF hex	Unit：0.01Hz	Default value：0000 hex
Size：2byte（INT16）	Access：RO	PDO map：Possible

This object is the output frequency of frequency conversion.

The current frequency of the converter can be read by reading the value of 0x5110.

5200hex	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		
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-objects 1 to 3 display the status of the communication data frame between the expansion card and the frequency converter, which are the number of packet loss, the CRC check error count and the number of illegal instructions.
- Sub-object 4 shows the latest error reason, 1/2/3 represents sub-object 1 to 3, and 0 represents no error temporarily.
- Sub-object 5 shows the corresponding access object for fault location when the latest error occurs.
- Sub-object 6 displays the period of the communication frame, which is generally 10ms. Too large value indicates that there is a problem in communication with the frequency converter.

5. Application

5.1X-NETConfig tool

Before using the CANopen device, you need to configure the PLC serial port parameters. Here will introduce the use of the configuration tool X-NETConfig to configure the PLC serial port parameters.

5.1.1 X-NETConfig installation

1. Config software must use version V2.2 or above, which is generally built into XDPPro software compression package.
2. After downloading, decompress it. Double-click the decompressed one and install it according to the installation wizard.

5.1.2 X-NETConfig using

When using software to configure PLC, use USB download cable to connect PLC and computer. The USB download cable here is the download cable of the HMI, as shown below:

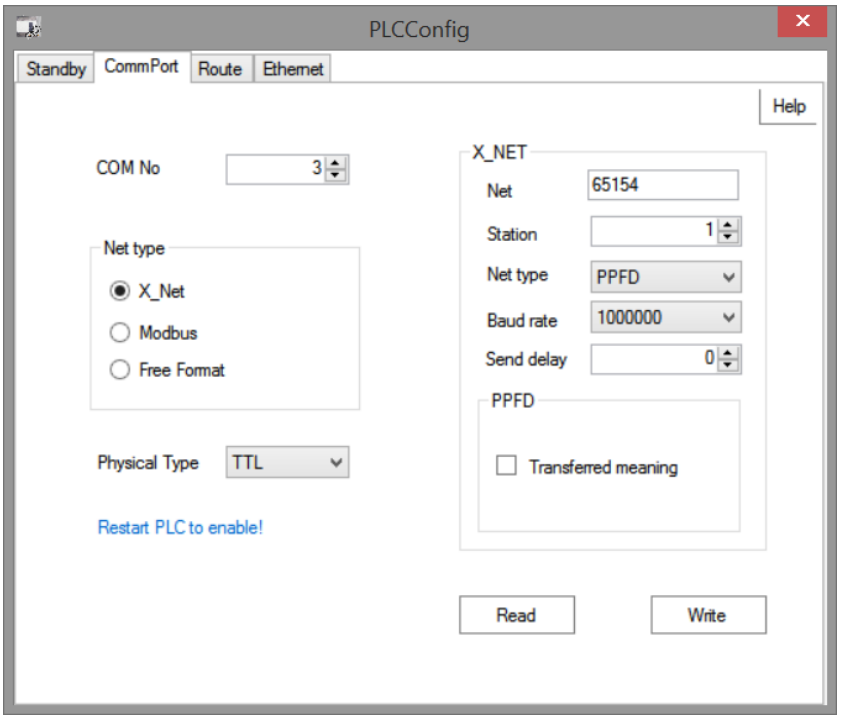
The USB download cable can be used only when the driver is installed. The driver will install automatically when the X-NET Config software is installed.

1. Configure the parameters of COM3

Open X-NetConfig tool, click PLC 

to show the finding device interface, click connecting to connect the PLC. Then set the COM3 (expansion ED module) parameters.

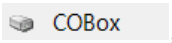
The serial port parameters of COM3 are set here so that XD-COBOX-ED can communicate with PLC through the left serial port, so select "X-NET" in the "network type selection", "TTL" in the physical layer, "PPFD" in the net type, and "1M" in the baud rate (this baud rate is not the CANopen communication baud rate). The net number is "65154", and the station number can be arbitrarily specified. The parameters are as follows.



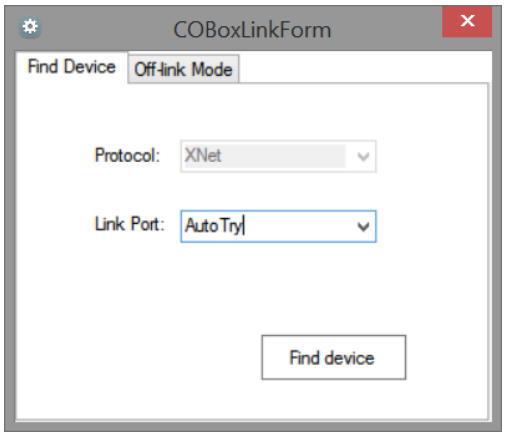
After the configuration is completed, click [Write], and the [Write Successful] prompt will pop up, indicating that the configuration is complete. It will take effect after power on again. After power on again, the COM light of XD-COBOX-ED flashes, indicating that the communication between XD-COBOX-ED and PLC is normal.

Note: The baud rate and station number here are not the baud rate and station number of XD-COBOX-ED in CANopen network, but the parameters of PLC serial port. All PLCs using XD-COBOX-ED need to set COM3 parameters, which will take effect after being powered on again.

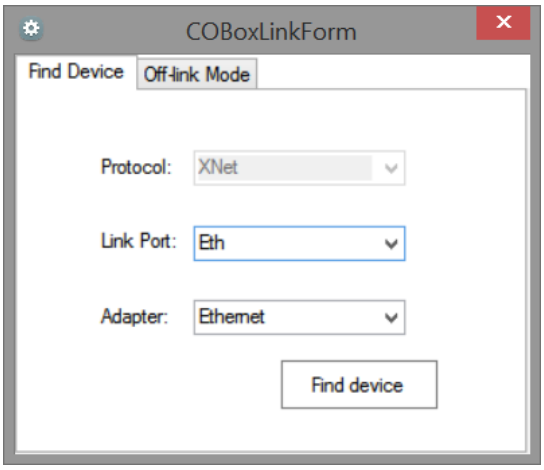
2. Search the XD-COBOX-ED

Click COBox 

, the interface for finding devices shown in the figure below will also pop up. The search method can only use X-NET, that is, USB or Ethernet. After finding XD-COBOX-ED correctly, enter the main interface of CANopen configuration. Or you can use offline mode to enter the configuration interface, but you can't perform scanning, uploading and downloading. After configuration, pay attention to saving the configuration.



If you want to find the device through the Ethernet port, you can select "Eth" here for the "Link Port":



[Find device]: The PLC of the CANopen master station must be connected, and the PLC serial port 3 parameter configuration is correct, and the communication with XD-COBOX-ED is normal, so that the XD-COBOX-ED can be found and the CANopen configuration can be performed in the configuration main interface. "Connection protocol" can only use X-NET. "Link port" can select AutoTry, specified port and Eth.

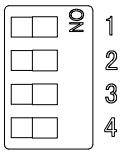
If the prompt "Find timeout" after clicking to find the device indicates that the communication between PLC and XD-COBOX-ED is abnormal, please check: ① whether the COM3 parameter of PLC is correct. ② Communication connection between PLC and XD-COBOX-ED. ③ Check whether it is CANopen master station.

[Offline mode]: You can enter the configuration main interface to configure CANopen without connecting the device, but you can only configure PDO and cannot perform scanning, uploading and downloading.

Note: Only the PLC connected to the CANopen master station can find XD-COBOX-ED and enter the CANopen configuration interface. The configuration of the slave station is also configured in this interface.

5.2 Master station number and baud rate

5.2.1 Dial switch

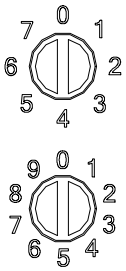


- Dial switch is used to set baud rate and master/slave station.
- Dial switch 4 is set as master/slave station, with ON as master station and OFF as slave station.
- Dial switches 1~3 are used to set the baud rate. See the following table for details:

DIP1	DIP2	DIP3	Speed/bps	Communication distance
ON	ON	ON	10K	5000m
OFF	ON	ON	20K	2500m
ON	OFF	ON	50K	1000m
OFF	OFF	ON	100K	500m
ON	ON	OFF	125K	500m
OFF	ON	OFF	250K	250m
ON	OFF	OFF	500K	100m
OFF	OFF	OFF	1000K	25m

Note: The dial switch is only valid when the module is powered off. After setting, power on the module.

5.2.2 Knob



- The knob switch 1, 2 is used to set the node address (station number) of XD-COBOX-ED module in CANopen network.
- Setting range: 1~64 (0, 65~79 unavailable).
- Knob switch 1: range 0~7, representing the high position of station number (decimal).
- Knob switch 2: range 0~9, representing the low position of station number (decimal).

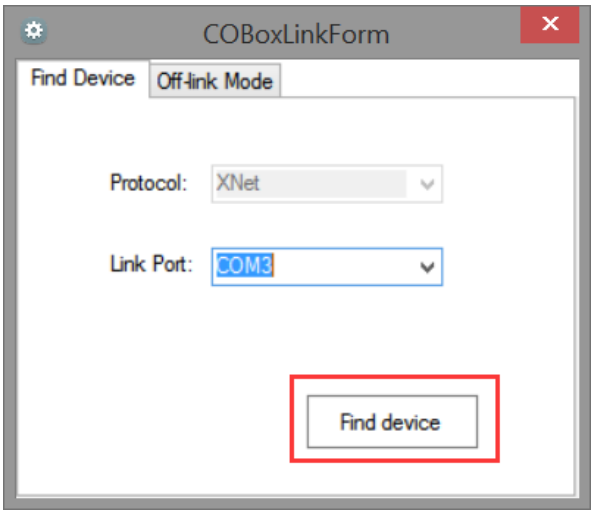
For example, if the user wants to set the communication station number of XD-COBOX-ED module to 37, just turn knob switch 1 to 3, and then turn knob switch 2 to 7.

Note: The knob switch is only valid when the module is powered off. After setting, power on the module.

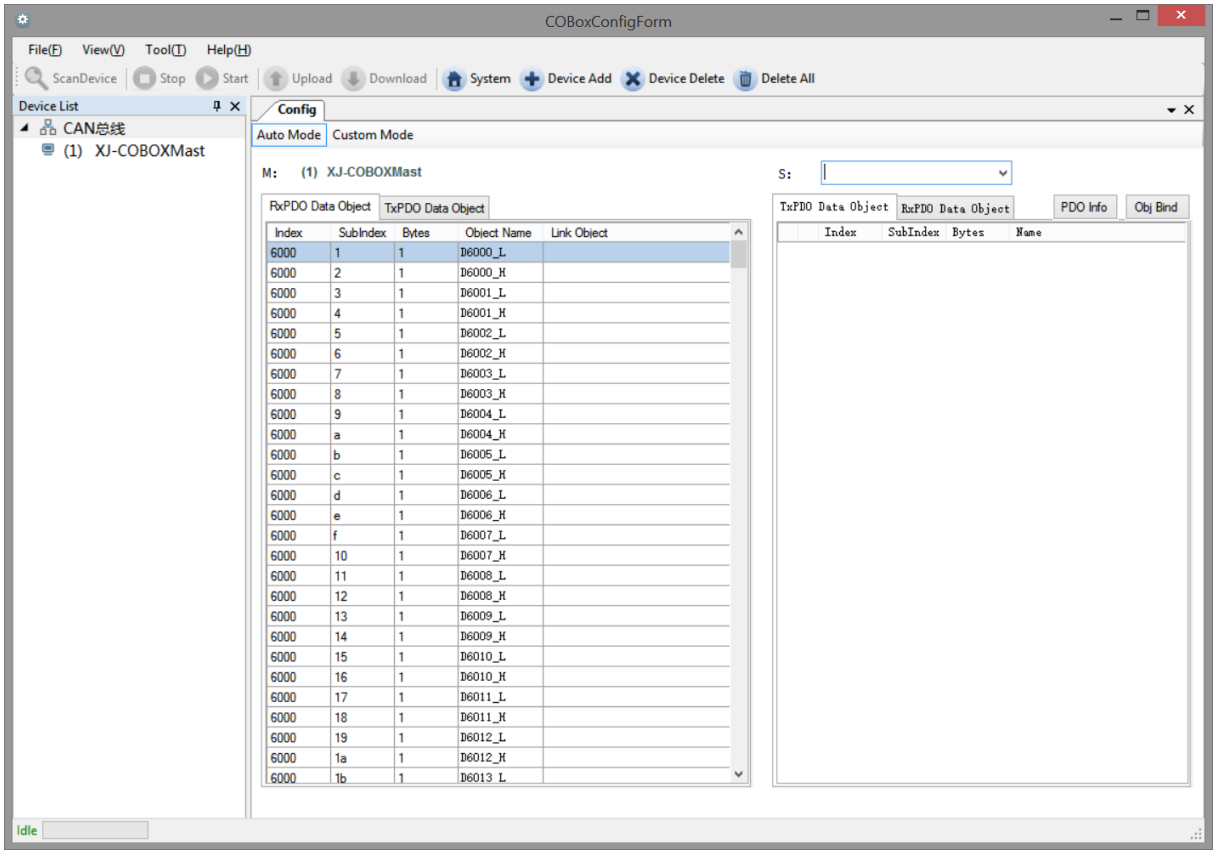
5.3 CANopen configuration

1. Confirm that the station numbers of master and slave stations are not duplicate, the baud rates of master and slave stations are consistent, that the communication parameters of frequency converter are set correctly, and that the network cable is connected correctly.

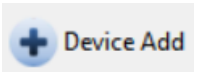
2. Open X-NET Config, click COBOX, and click Find Device in the pop-up window.



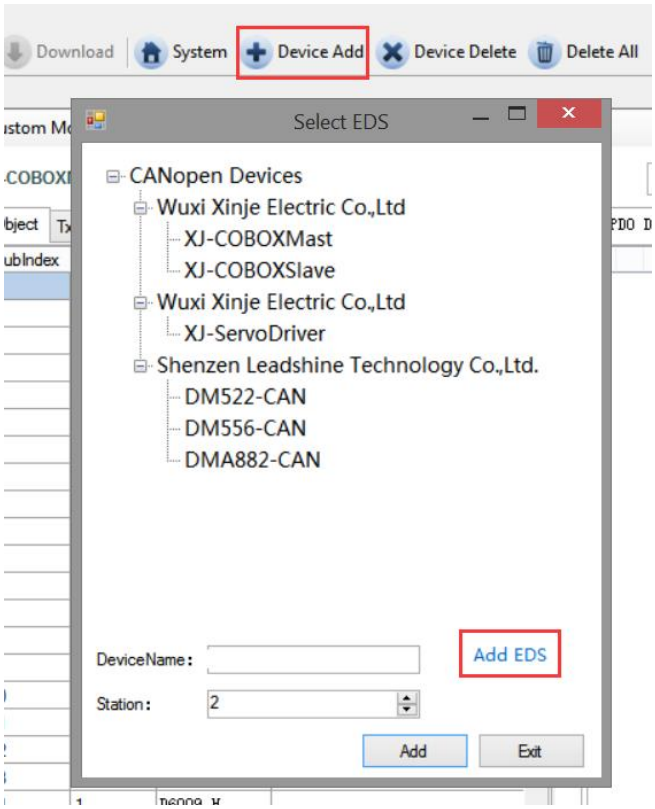
The pop-up window is the CANopen configuration interface.



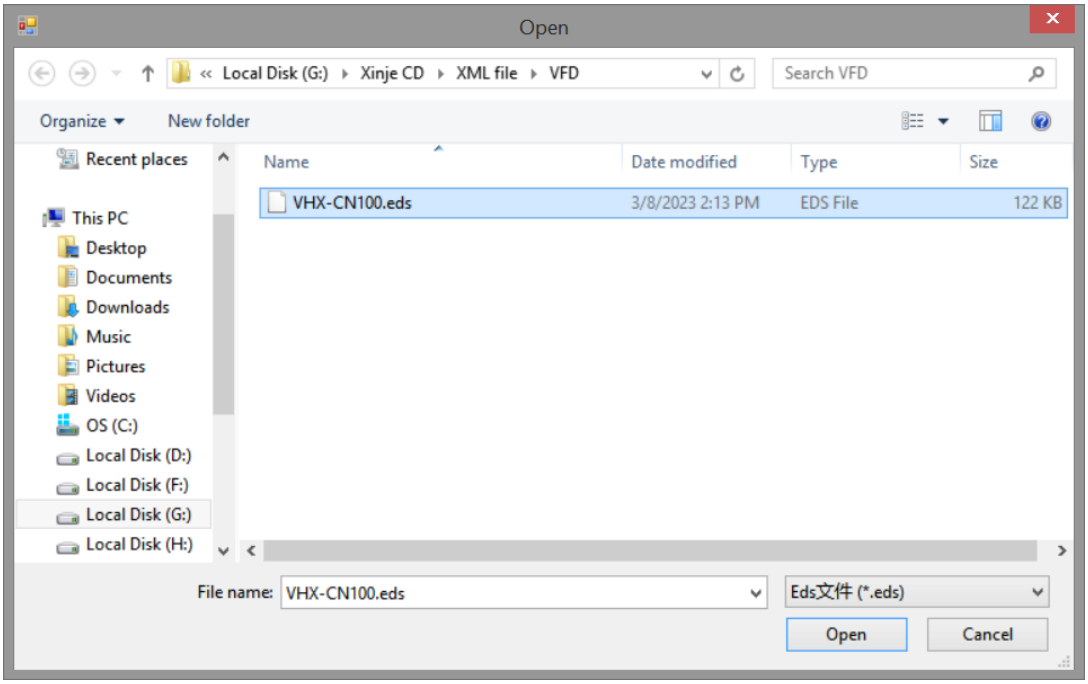
3. Add ESD file

Click 

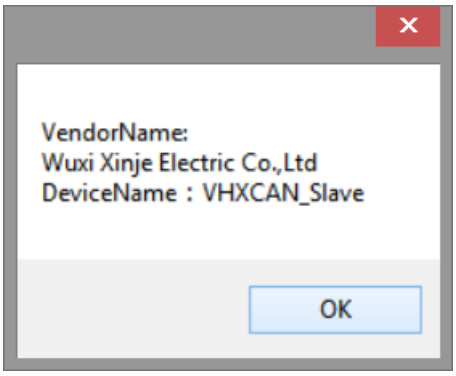
to pop up below window, add EDS file.



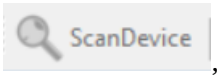
Select the EDS file of CANopen frequency conversion in the pop-up dialog box, and click open.



The following prompt box pops up, indicating that the addition is complete. Click OK.



4. Scan the slave station

Click 

, pop up below window, select the scanning station range, click ok.

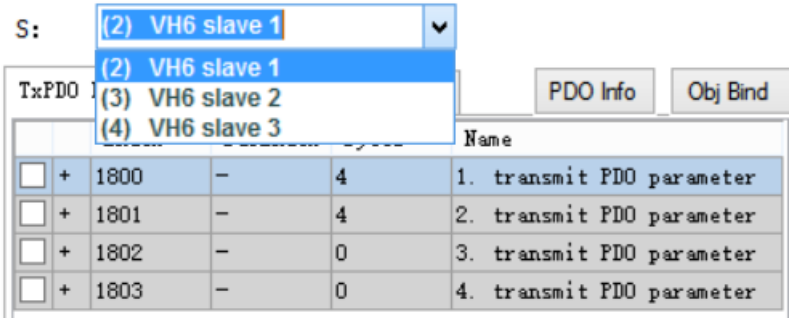
The scanning process will be displayed in the lower left corner.

After the process is completed, the scanning success will be displayed, and click OK.

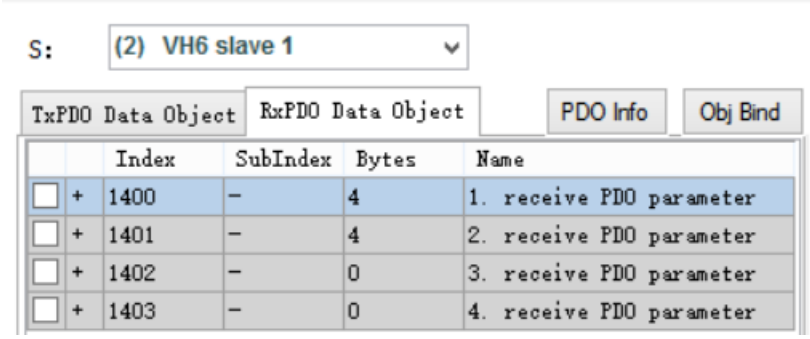
The device list on the left is the scanning content, and the content in brackets is the station number, which is sorted from the smallest to the largest, not the actual position.

5. Slave station configuration

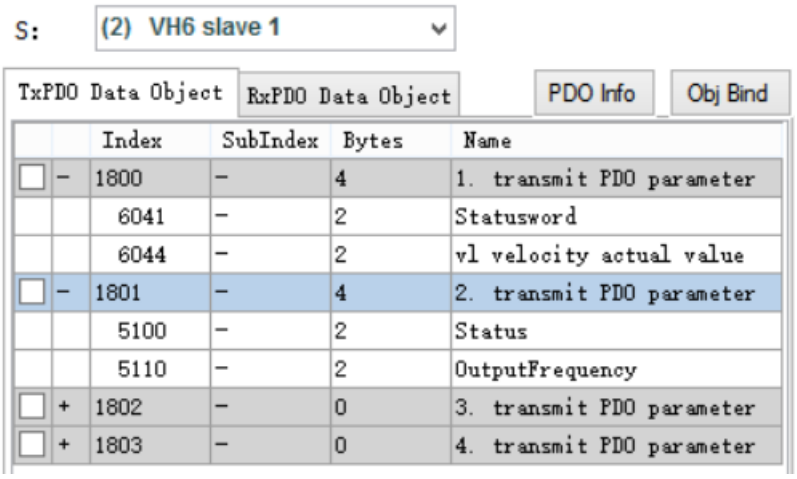
In the slave station configuration interface on the right, select the desired slave station from the drop-down list.



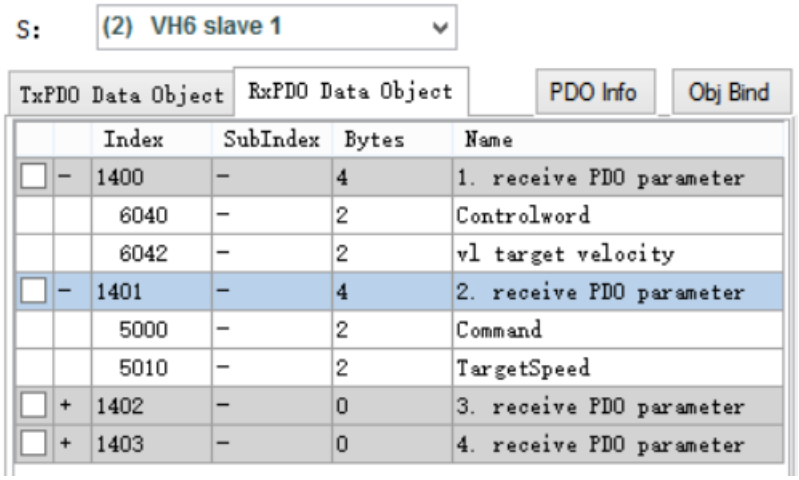
The slave configuration interface includes TxPDO data object, RxPDO data object, PDO attribute and object binding.



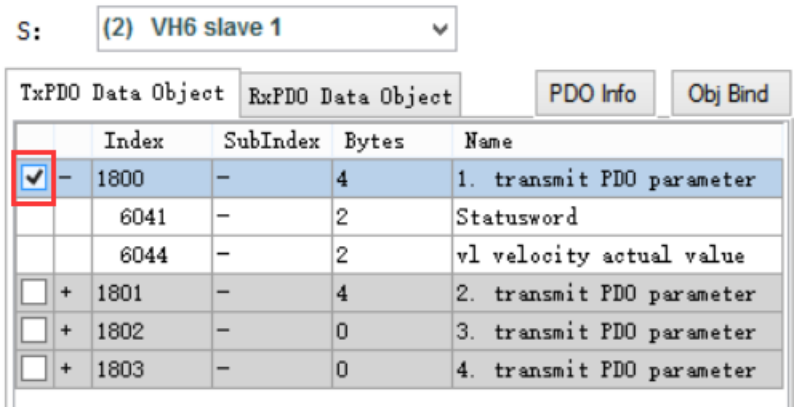
(1) TxPDO data object has four channels, 1800 is configured as CIA404 protocol by default, 1801 is an independent protocol, and the two protocols cannot be selected at the same time. 1802, 1803 has no configuration data.



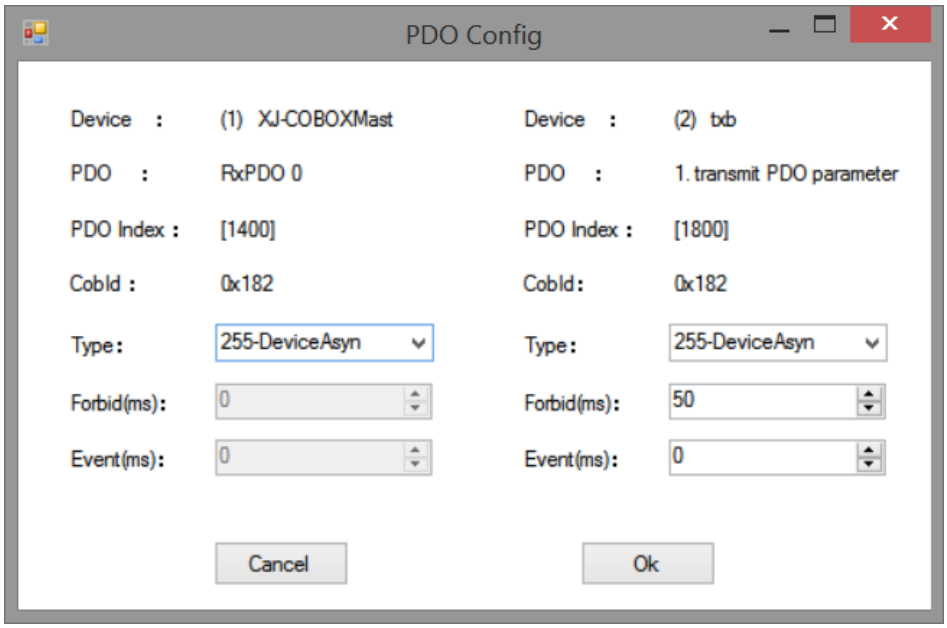
(2) The RxPDO data object has four channels. 1400 is configured as CIA404 protocol by default, and 1401 is an independent protocol. The two protocols cannot be selected at the same time. 1402, 1403 has no configuration data.



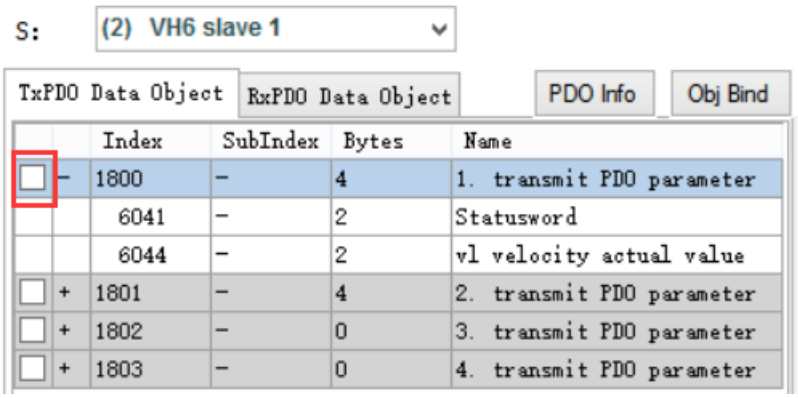
(3) When editing the 1800 channel with PDO attribute, you need to select the channel first and then click PDO attribute.



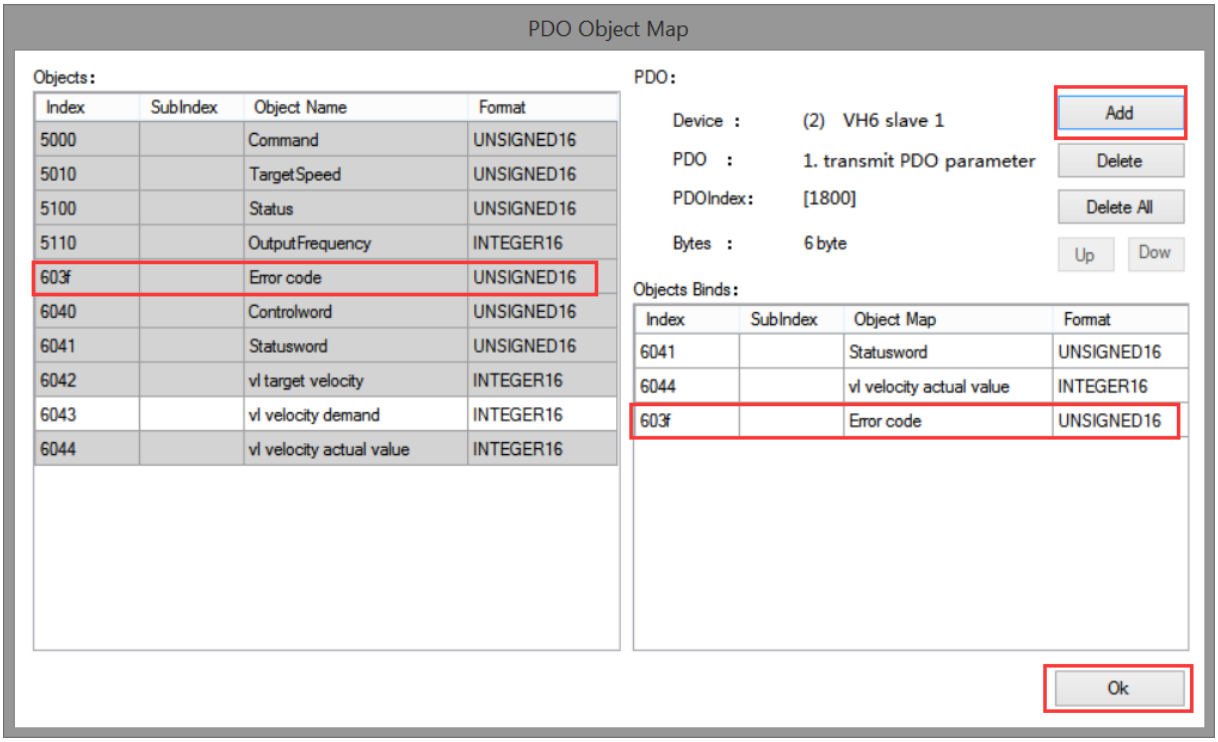
The editing interface is as shown in the figure below. For the communication type, refer to chapter 2-3-2 of CANOPEN Communication User Manual.



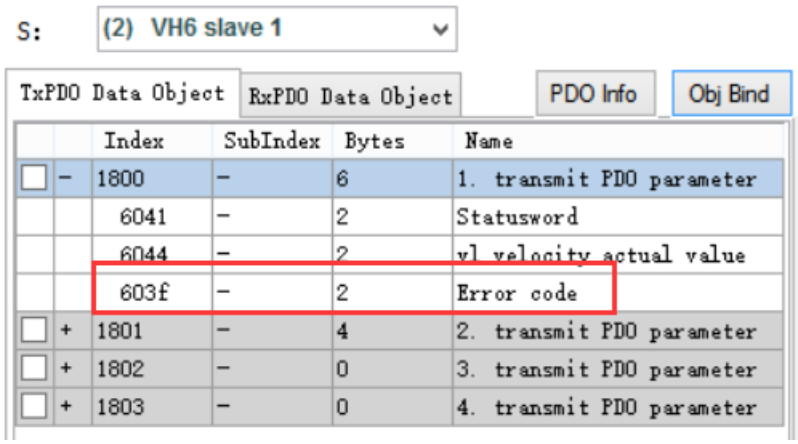
(4) 1800 channels must be unchecked when binding objects.



Click object binding to pop up the following interface, ① select the device object on the left, ② click to add the selected object, ③ the object will be displayed in objects binds list, and ④ click OK at last.

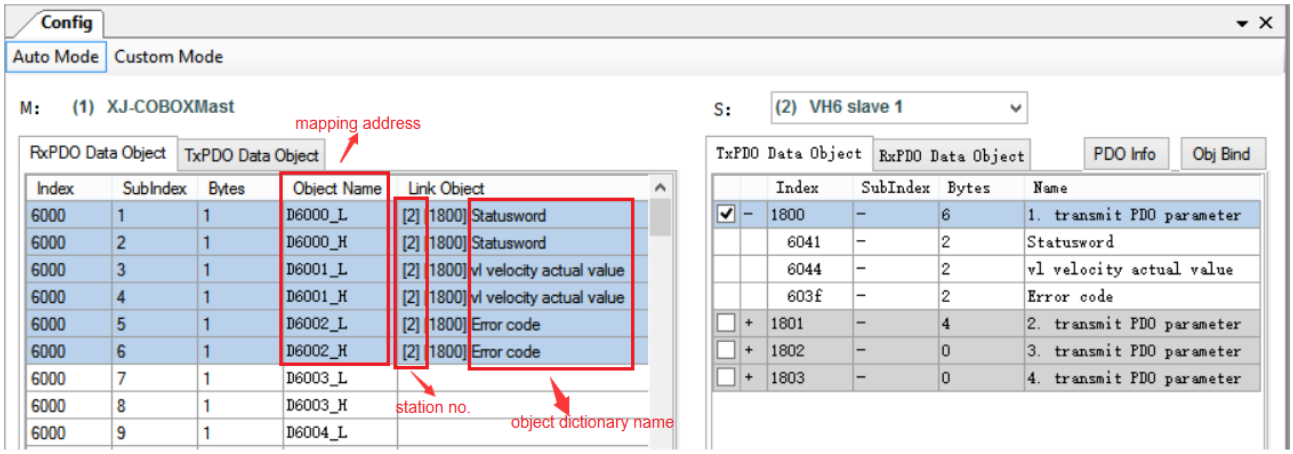


The binding is added as shown in the following figure:



6. Object dictionary mapping address

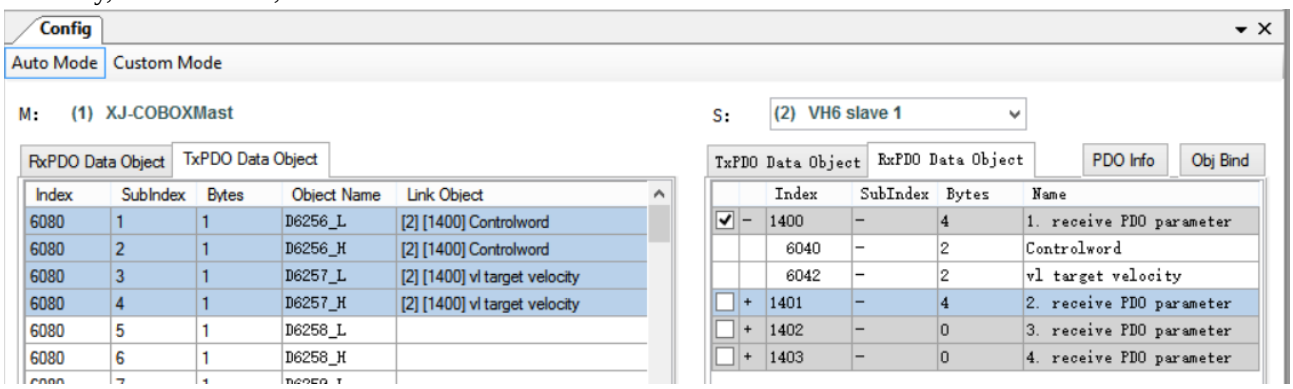
Select 1800, as shown in the figure below, the master interface will automatically add the mapping address.



Object name D6000_ L, D6000_ H is the low and high octets of the mapped PLC register address, that is, D6000 single word.

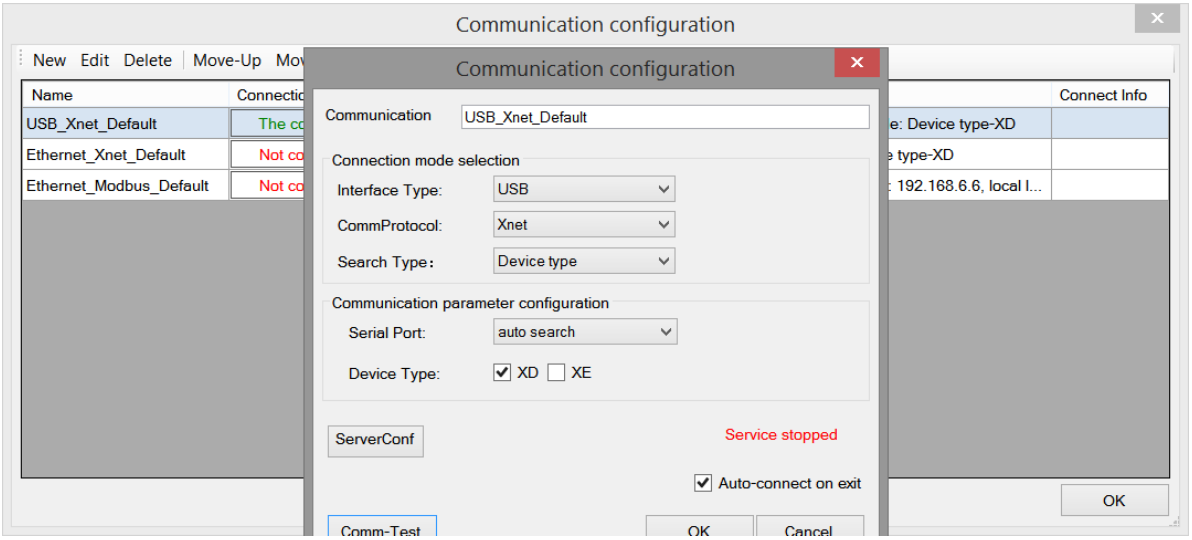
The 1 in the first [ ] of the Link object represents the slave station number, the 1800 in the second [ ] represents the channel name, and the “Statusword” represents the 6041 status word in the slave station 1800. Namely, D6000 single word represents 6041 status word of slave station No. 1.

Similarly, selected 1400, and the address is shown below. The address starts from D6256.



7. After configuration, click the menu bar to download the configuration.

8. Open XDPpro software, click  . The configuration is shown in the figure below. The communication protocol is Xnet.



9. The following figure is drawn from the mapping address of the object dictionary. It is better to write a note for explanation.

PLC1-自由监控1

监控窗口 | 添加 | 修改 | 删除 | 删除全部 | 置顶 | 置底

寄存器	监控值	字长	进制	注释
D6000	4657	单字	10进制	6041 状态字
D6001	0	单字	10进制	6044 频率反馈
D6002	0	单字	10进制	603f 错误代码
D6256	6	单字	10进制	6040 控制字
D6257	100	单字	10进制	6042 频率给定

Write 6 → 7 → 15 in D6256, write frequency 100 in D6257 (unit: 0.01Hz), D6001 frequency feedback becomes 100, and frequency converter operates at 1Hz forward direction.

PLC1-自由监控1

监控窗口 | 添加 | 修改 | 删除 | 删除全部 | 置顶 | 置底

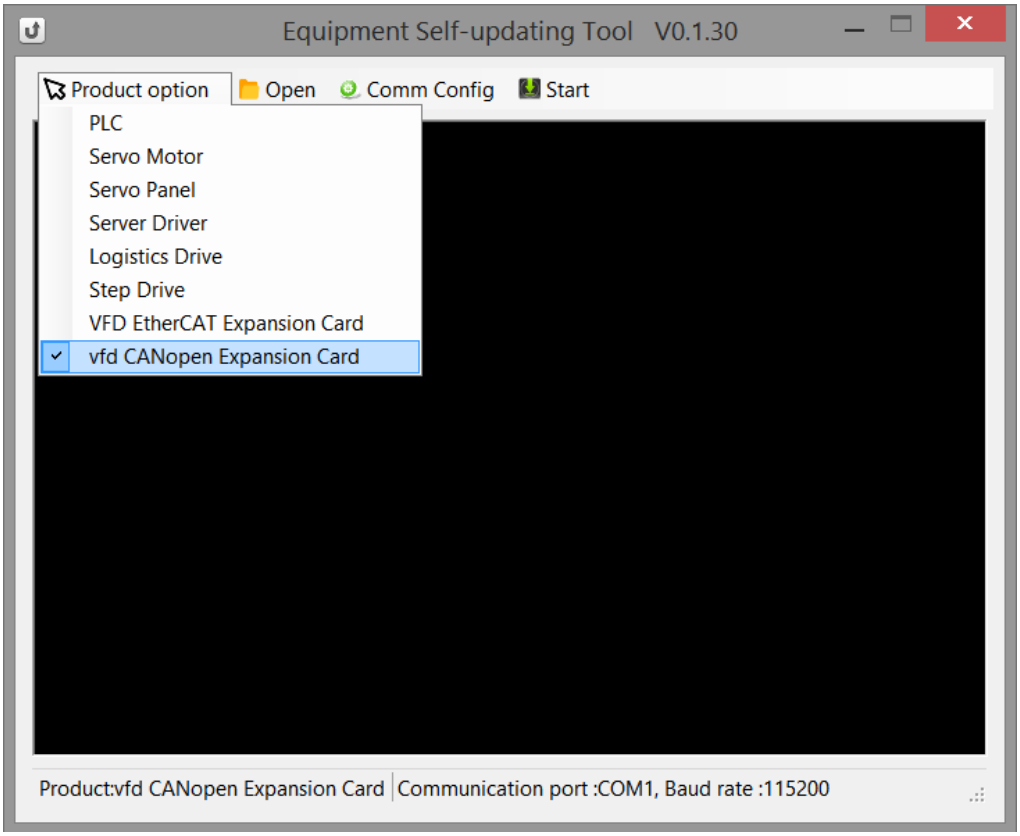
寄存器	监控值	字长	进制	注释
D6000	4663	单字	10进制	6041 状态字
D6001	100	单字	10进制	6044 频率反馈
D6002	0	单字	10进制	603f 错误代码
D6256	15	单字	10进制	6040 控制字
D6257	100	单字	10进制	6042 频率给定

6. Firmware update

The firmware upgrade of the expansion card is carried out through the self-updating software of the upper computer. The firmware format is ds. The upper computer self-updating software and firmware ds file can be obtained from the Xinje technical support. The use method of the upper computer self-updating software is as follows:

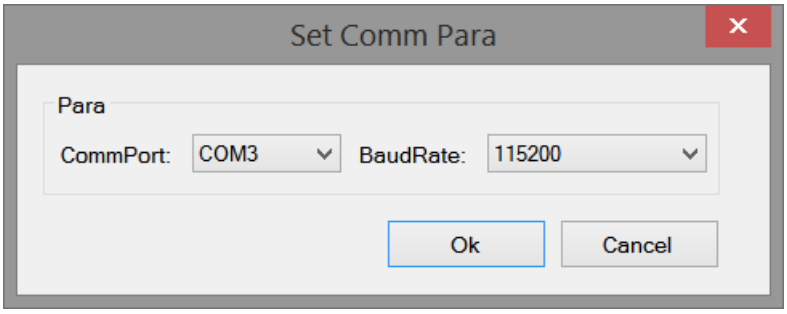
Step 1: Insert the cable into the network port on the right side of the VFD, and connect the other end to the USB port of the computer through the USB adapter. And turn left for dial code 1 and 2 in the code hole of the main board of the VFD.

Step 2: install the self-updating software of the upper computer, then open the software, click "Select Product", and select the VFD CANopen expansion card.



Step3：click “open”, find the ds file to be updated.

Step4：click “comm config”, select the correct com port (check from the device manager), please note the baud rate must be 115200, otherwise the updating will fail.



Step 5: After the converter is powered off and the panel LED light off, click "Start", and then the converter is powered on. At this time, the upper computer software starts to upgrade the firmware until the download is successful.

Common problem:

(1) Under normal circumstances, the three dials in the code hole of the VFD main board are all set to the right. If the upper computer is used to update the firmware, dial the dial 1 and 2 to the left (close to the VFD operate panel network port), and then update the firmware. After the firmware is updated, dial the dials 1 and 2 to the right, and then power on the converter. The dial number is: remove the VFD operate panel, and the observer is facing the panel. There are three dial numbers in the dial hole, which are dial number 1, dial number 2, and dial number 3 from top to bottom.

(2) If the VFD operate panel shows “88888” after the converter is powered on, dial 3 to the right (away from the panel network port).

(3) If the frequency converter makes a loud fan sound after being powered on, dial code 3 to the right (away from the panel network port).

(4) If 6040 is enabled (set to 6/7/15), the operate panel will report err08, the voltage value of parameter PC-45 needs to be modified (the default value is 350V) to the actual value.

(5) If the operate panel reports err21, check the value of P0-01. If it is 1, change the value of P0-01 to 0.

(6) If the CIA402 protocol cannot be used (cannot enable when set 6040 to 6/7/15), please check whether the bit8 of the object word 0x5000 is 1. If it is 1, please set the bit8 to 0.

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