Preface

Document Overview

The EL10 is a versatile general-purpose inverter designed with a compact structure, featuring rich hardware and software configurations. It is characterized by its flexibility, ease of use, and reliability, primarily used for speed control of three-phase AC asynchronous motors. It is widely applied in industries such as food and beverage, logistics packaging, textiles, and woodworking machinery.

This manual provides detailed information on product communication, specifications, networking, and communication configuration.

More Information

Document Title	Content Summary
EL10 Series General Purpose Inverter Manual	This manual introduces installation, wiring, commissioning, and trial operation procedures, including installation dimensions, mechanical installation, electrical installation, commissioning and trial operation, fault handling, function code table, and peripheral electrical components.
EL10 Series General Purpose Inverter Communication Manual	Introduces product communication overview, specifications, networking, communication configuration, and other detailed content.

Version Change Record

Revision Date	Release Version	Change Content
2024–8	Ver 1.0	First release of the manual.

About Obtaining the Manual

This manual is not shipped with the product. To obtain the electronic PDF version, you can do so through the following methods:

Log in to the Changsha Risheng Electric official website (www.cssunye.com), go to the "Download Center," search for the keyword, and download.

Warranty Statement

Under normal use, if the product malfunctions or is damaged, we provide warranty service within the warranty period. After the warranty period, repair fees will be charged.

Within the warranty period, product damage caused by the following situations will incur repair fees.

设置格式[才]: 字体: （默认）Times New Roman

设置格式[才]: 标题 1, 段落间距段前: 10 磅, 段后: 10 磅, 行距: 固定值 20 磅, 2 级

设置格式[才]: 缩进: 首行缩进: 0 字符, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

设置格式[才]: 标题 1, 段落间距段前: 10 磅, 段后: 10 磅, 行距: 固定值 20 磅, 2 级

设置格式[才]: 字体: 加粗, （中文）中文(简体)

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 标题 1, 段落间距段前: 10 磅, 段后: 10 磅, 行距: 固定值 20 磅, 2 级

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 8 磅, 字体颜色: 黑色, 对齐到网格, 字距调整: 1 磅, （中文）中文(简体)

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 标题 1, 段落间距段前: 10 磅, 段后: 10 磅, 行距: 固定值 20 磅, 2 级

设置格式[才]: 缩进: 首行缩进: 0 字符, 行距: 单倍行距

设置格式[才]: 缩进: 首行缩进: 0 字符, 段落间距段前: 0 磅, 行距: 单倍行距

● Damage to the product caused by not operating it according to the specifications in the manual.

● Damage to the product caused by fire, water, or abnormal voltage.

● Damage to the product caused by using it for purposes other than its intended function.

● Damage to the product caused by using it beyond the specified operating range.

● Secondary damage to the product caused by irresistible forces (natural disasters, earthquakes, lightning strikes).

Service fees are calculated according to the manufacturer's uniform standards. In the event of a contract, the terms of the contract shall take precedence. For detailed warranty information, please refer to the 'Product Warranty Card'.

Precautions

Safety Statement

1) This chapter provides safety precautions necessary for the correct use of this product. Before using this product, please read the user manual and correctly understand the information related to safety precautions. Failure to comply with the matters specified in the safety precautions may result in death, serious injury, or equipment damage.

2) The 'Danger,' 'Warning,' and 'Caution' items in the manual do not represent all safety precautions, but are provided as a supplement to all safety precautions.

3) This product should be used in an environment that meets the design specifications; otherwise, it may cause malfunctions. Any functional abnormalities or component damage caused by non-compliance with these specifications are not covered by the product's quality warranty.

4) We will not assume any legal responsibility for personal injury, property damage, or other losses caused by non-compliance with the content of this manual or improper operation of the product.

Safety Level Definition

In this manual, safety precautions are divided into the following two categories:

Danger: Hazards caused by not operating as required, which may result in serious injury or even death;

Caution: Hazards caused by not operating as required, which may result in moderate injury or minor injury, and equipment damage;

Please read this chapter carefully when installing, commissioning, and maintaining this system, and strictly follow the safety precautions required in this chapter. The company shall not be liable for any injuries or losses caused by non-compliance with the operating procedures.

Safety Precautions

Usage Phase	Safety Level	Matters
Before Installation	⚡ Danger	If water ingress, missing parts, or damaged components are found when unpacking the control system, do not install! If the packing list does not match the actual items, do not install!
	⚠ Caution	Handle the equipment with care during transportation; otherwise, there is a risk of damaging the equipment! Do not touch the components of the control system with your hands; otherwise, there is a risk of static damage!
During Installation	⚡ Danger	Only trained personnel with electrical knowledge and experience in electrical equipment should operate. Non-professionals are strictly prohibited from operating!
	⚠ Caution	Do not allow wire ends or screws to fall into the driver; otherwise, it can cause damage to the driver! Install the driver in a place with minimal vibration and avoid direct sunlight.
When wiring	⚡ Danger	The installation must be carried out by a professional electrical engineer; otherwise, unexpected dangers may occur! Before wiring, ensure that the power supply is in a zero-energy state; otherwise, there is a risk of electric shock! Ground the inverter correctly and in accordance with standards; otherwise, there is a risk of electric shock!
	⚠ Caution	Follow the steps specified in the ESD (Electrostatic Discharge) prevention measures and wear an ESD wrist strap when performing wiring and other operations to avoid damaging the equipment or internal circuits of the product. When wiring the control circuit, use double-stranded twisted shielded wire and connect the shielding layer to the grounding terminal of the product; otherwise, it may cause abnormal operation of the product.
Before Powering On	⚠ Danger	Before powering on, ensure that the product is installed correctly, the wiring is secure, and the motor installation allows for reoperation.

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

Usage Phase	Safety Level	Matters
		Before powering on, ensure that the power supply meets the product requirements to avoid damaging the product or causing a disaster! Do not open the cabinet door or protective cover, touch any terminal, or dismantle any component or part of the product while it is powered, as this can result in electric shock!
	⚠C aution	The inverter must have its cover securely fastened before powering on; otherwise, it may cause an electric shock! Wire according to the connection methods provided in this manual; otherwise, accidents may occur!
After Powering On	⚡D anger	Do not open the cover after powering on. Otherwise, there is a risk of electric shock! Do not touch any input or output terminals of the inverter. Otherwise, there is a risk of electric shock!
	⚠C aution	If parameter identification is required, be cautious of the danger of injury from the rotating motor, as it may cause an accident! Do not arbitrarily change the manufacturer's parameters of the inverter, as this may cause damage to the equipment!
In Operation	⚡D anger	Non-professional technical personnel should not test signals while the equipment is in operation, as this may cause personal injury or equipment damage! Do not touch the cooling fan or discharge resistor to check the temperature, as this may cause burns!
	⚠C aution	While the inverter is in operation, avoid dropping any objects into the equipment, as this may cause damage to the equipment! Do not use contactors to control the start and stop of the driver, as this can cause equipment damage!
During	⚡D	Do not perform maintenance or servicing of the inverter without professional

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

Usage Phase	Safety Level	**Matters**
maintenance	anger	training, as this can result in personal injury or equipment damage! Do not perform maintenance or servicing on the equipment while it is energized, as this can result in electric shock! Ensure that the input power to the inverter has been disconnected for at least 10 minutes before performing maintenance or servicing on the driver, to avoid injury from residual charges on the capacitors! All plug-in modules must be inserted or removed only when the power is off! After replacing the communication module, it is necessary to set and check the parameters.

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

Contents

設置格式[才]: 字体: （默认）Times New Roman

第 1 章 Overview of Communication Protocols

Supported Communication Protocols	Communication Hardware	Model
Modbus	EL10A/EL10B Series Inverter	EL10A/EL10B
CANopen Communication	EL10B Series Inverter	EL10B

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

第 2 章 Modbus Communication

2.1 Introduction to Communication

The EL10 Series Inverter uses an RS485 communication interface to connect to a PC/PLC for communication, forming a single-master multiple-slave PC/PLC communication network. Each communication slave must have a unique slave address, with the address setting range being 1 ~ 254, and 0 being the broadcast communication address. Users can control slaves (inverters) centrally through the master (usually a PC or PLC), using the Modbus communication protocol to set inverter operation commands, modify and read parameters, and read inverter operating status and fault information.

The EL10 Series Inverter supports Modbus-ASCII and Modbus-RTU slave communication protocols, which are serial communication protocols that define the content and format of information transmitted in serial communications. If the slave device encounters an error while receiving information or cannot execute a command issued by the master, the slave will send a fault message to the master.

2.1.1 Communication Specifications

Item		Content
Communication Protocol		Modbus Protocol
Standard Specifications		Modbus-RTUSlave Communication Protocol
Topology		Bus Type
Maximum Communication Rate		19.2Kbps
Slave Functions	Number of Request Messages that Can be Received Simultaneously	1

2.1.2 Hardware Configuration

The communication module of the EL10A is integrated on the control board and is connected to the Modbus bus via a screw terminal block.

Fig. 2.1 Modbus Communication Terminals

Table 2-1 Terminal Pin Description

设置格式[才]: 缩进: 左侧: 0 毫米, 首行缩进: 0 毫米, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距, 无项目符号或编号

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线 Light, 10 磅

设置格式[才]: 缩进: 首行缩进: 7.4 毫米, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

设置格式[才]: 字体: （中文）思源黑体 CN Medium, 10 磅

设置格式[才]: 缩进: 首行缩进: 11.3 毫米

设置格式[才]: 项目符号和编号

设置格式[才]: 表格文字

设置格式[才]: 表格文字

设置格式[才]: 表格文字

设置格式[才]: 表格文字

设置格式[才]: 表格文字

设置格式[才]: 表格文字

设置格式[才]: 字体: （中文）思源黑体 CN Medium, 10 磅

设置格式[才]: 标题 3, 缩进: 首行缩进: 11.3 毫米, 段落间距段前: 10 磅, 段后: 10 磅, 行距: 多倍行距 1.73 字行

设置格式[才]: 项目符号和编号

设置格式[才]: 缩进: 首行缩进: 7.4 毫米, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

设置格式[才]: 字体: （默认）Times New Roman

设置格式[才]: 字体: （默认）Times New Roman

Category	Terminal/DIP Switch Symbol	Terminal/DIP Switch Name	Function Description
Communication Interface	485+	485 Communication Interface	485 Signal Positive
	485-	485 Communication Interface	485 Signal Negative
GND	GND	Power Ground	Connects the reference ground for all 485 nodes

设置格式[才]: 缩进: 左侧: 0 毫米, 左 0 字符, 右侧: 0 毫米, 右 0 字符, 行距: 单倍行距

设置格式[才]: 缩进: 左侧: 0 毫米, 左 0 字符, 右侧: 0 毫米, 右 0 字符, 行距: 单倍行距

设置格式[才]: 缩进: 左侧: 0 毫米, 左 0 字符, 右侧: 0 毫米, 右 0 字符, 行距: 单倍行距

2.2　RS485 Connection Topology

设置格式[才]: 字体: （默认）Times New Roman

RS485 buses typically use a daisy chain topology, where the 485+ interfaces of the master and multiple slaves are connected in sequence, as are the 485- interfaces. The daisy chain RS485 bus topology is shown in Fig. 2-2. The daisy chain topology has advantages such as low signal reflection, high communication success rate, and no need for additional equipment. To reduce the impact of interference on the output signal, it is recommended to use shielded twisted pair cables for RS485 bus transmission.
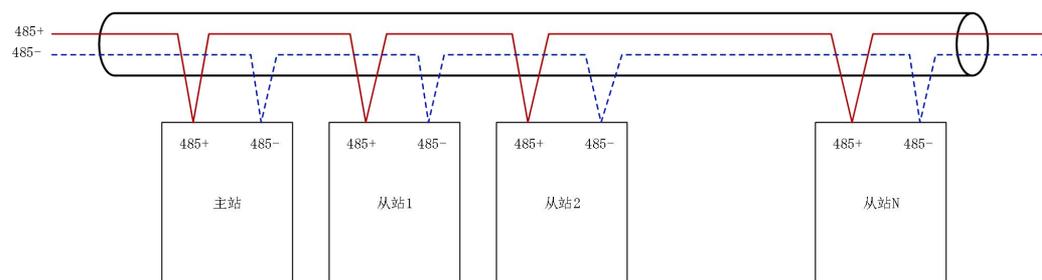
设置格式[才]: 缩进: 首行缩进: 7.4 毫米, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

Figure 2-2　Daisy Chain RS485 Bus Topology

设置格式[才]: 段落间距段后: 0 磅, 行距: 单倍行距

2.3　Communication Transmission Method

设置格式[才]: 字体: （默认）Times New Roman

The RS485 communication protocol supports both half-duplex and full-duplex modes. In most cases, we use the half-duplex mode, where at any given time, only one device (master or slave) can transmit data while the other can only receive data. The RS485 communication transmission method is shown in Figure 2-3. Data is transmitted in the form of messages as specified by the Modbus-RTU protocol. One frame of data is sent at a time, and when the idle time on the communication line exceeds the transmission time of 3.5 bytes, it indicates the start of a new communication frame.

设置格式[才]: 缩进: 首行缩进: 7.4 毫米, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距
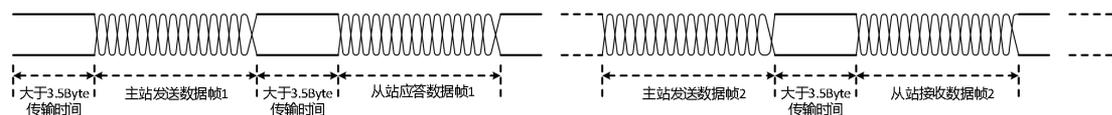

Figure 2-3　RS485 Communication Transmission Method

设置格式[才]: 段落间距段后: 0 磅, 行距: 单倍行距

The EL10 inverter is equipped with Modbus-RTU and Modbus-ASCII communication protocols, allowing users to choose which protocol to use. In the network, only one device (the master) can establish the protocol, that is, issue a "query/command."Other devices (slaves) can only respond to the master's "query/command" by providing data or performing

设置格式[才]: 缩进: 首行缩进: 7.4 毫米, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

operations as directed by the master. The master can be a PC, PLC, etc., and the slave refers to the inverter. The master can communicate independently with a specific slave or broadcast information to all slaves. When the master sends a "query/command," the slave must return a response, but if the master sends a broadcast, the slaves do not need to respond.

2.4 Communication Data Frame Structure

The Modbus-RTU protocol communication data format is shown in Figure 2-4. The inverter only supports read or write operations for Word-type parameters, with the corresponding communication read command being 03; the write command being 06, and the multiple write command being 10. Byte or bit read/write operations are not supported.
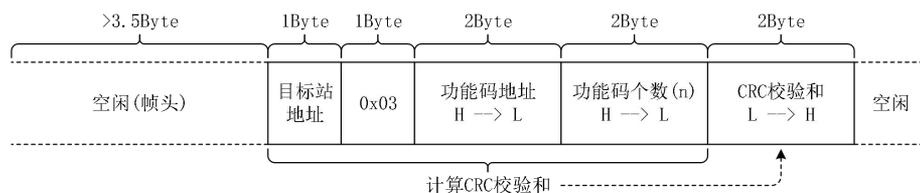
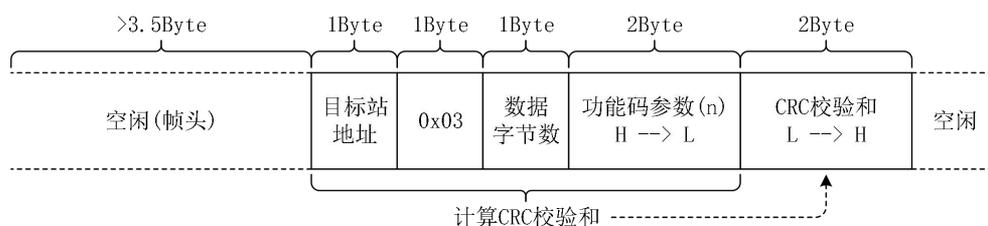Figure 2-4(a) Master Read Command Frame

Figure 2-4(b) Slave Read Response Frame

Note: Theoretically, the master can read multiple consecutive parameters at once (i.e., n can be up to 12), but it should be noted that it cannot exceed the last parameter of the current parameter group, otherwise, an error response will be returned.
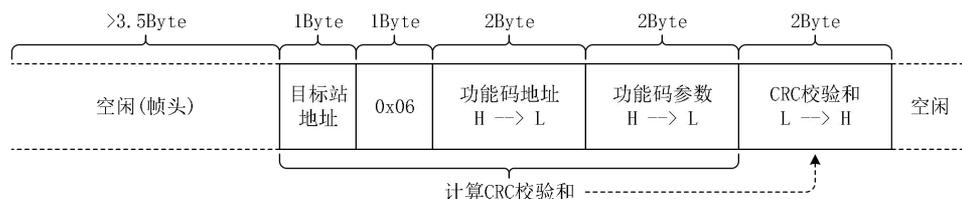
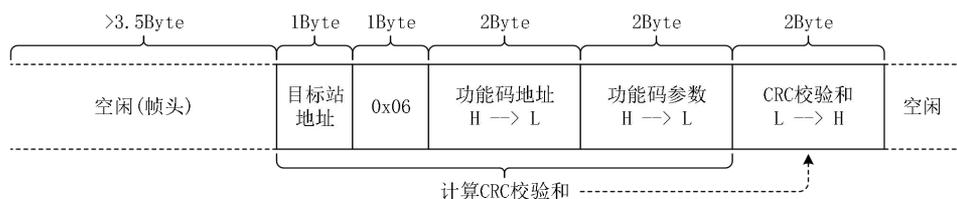Figure 2-4(c) Master Write Command Frame

Figure 2-4(d) Slave Write Response Frame

4

设置格式[才]: 字体: （默认）Times New Roman

设置格式[才]: 缩进: 首行缩进: 7.4 毫米, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

设置格式[才]: 段落间距段后: 0 磅, 行距: 单倍行距

设置格式[才]: 段落间距段后: 0 磅, 行距: 单倍行距

设置格式[才]: Table Text, 居中, 段落间距段后: 10 磅, 行距: 固定值 20 磅

设置格式[才]: Table Text, 居中, 段落间距段后: 10 磅, 行距: 固定值 20 磅
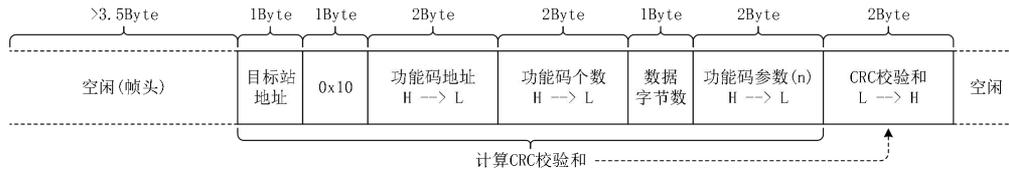
Figure 2-4(e) Master Station Multiple Write Command Frame

Note: Multiple write operations, like multiple reads, can only operate on up to 12 parameters.
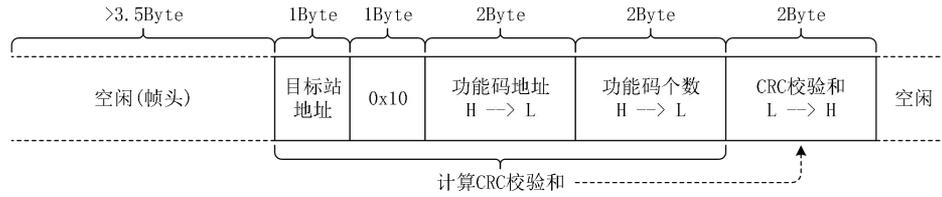
Figure 2-4(f) Slave Station Multiple Write Response Frame

The read response error command for the slave station is 0x83, the write response error command is 0x86, the multiple write response error command is 0x90, and CRC check errors do not respond. Additionally, in the error types, 0x01 indicates a command code error, 0x02 indicates an address error, 0x03 indicates a data error, and 0x04 indicates an unprocessable command.
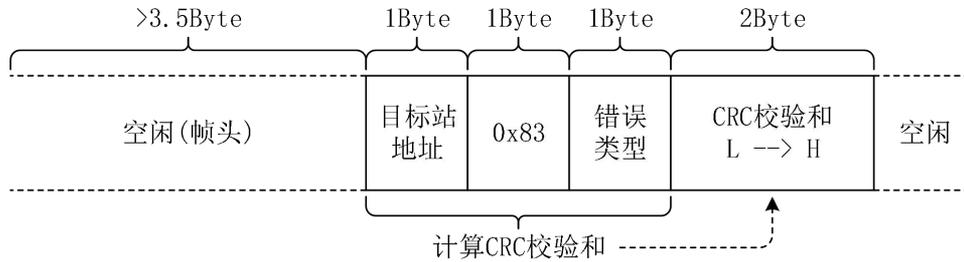
Figure 2-4(g) Slave Station Read Error Response Frame
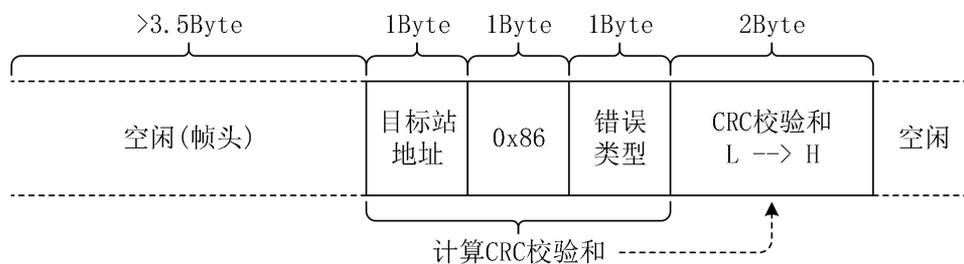
Figure 2-4(h) Slave Station Write Error Response Frame
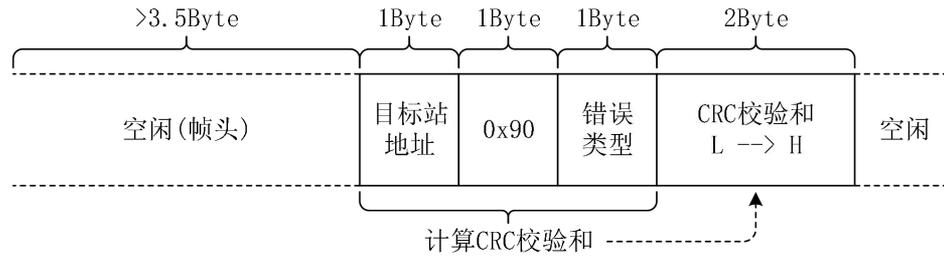
Figure 2-4(i) Slave Station Multiple Write Error Response Frame

2.5　Relevant Parameters

Function Code	Name	Content	Default Value	Parameter Description
F8-00	Baud Rate Setting	4.8～19.2 kb/s	19.2	Used to set the data transmission rate between the host computer and the inverter. The higher the baud rate, the faster the communication. Note: The baud rate set on the host computer and the inverter must be the same, otherwise communication cannot be performed.
F8-01	Communication Data Format	1：7,N,2 for ASCII 2：7,E,1 for ASCII 3：7,O,1 for ASCII 4：7,E,2 for ASCII 5：7,O,2 for ASCII 6：8,N,1 for ASCII 7：8,N,2 for ASCII 8：8,E,1 for ASCII	12	The data format set by the master device and the inverter must be consistent; otherwise, communication cannot be established.

6

Function Code	Name	Content	Default Value	Parameter Description
		9：8,O,1 for ASCII		
		10：8,E,2 for ASCII		
		11：8,O,2 for ASCII		
		12：8,N,1 for RTU		
		13：8,N,2 for RTU		
		14：8,E,1 for RTU		
		15：8,O,1 for RTU		
		16：8,E,2 for RTU		
		17：8,O,2 for RTU		
F8-02	Communication Address	1～254	1	Used to set the communication address of the inverter.
F8-03	Response delay	0.0～200.0ms	2.0	The intermediate interval time from the end of data reception by the inverter to the transmission of data to the higher-level machine. If the response delay is less than the system processing time, the response delay will be set to the system processing time; If the response delay is greater than the system processing time, the system will wait after processing the data

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

Function Code	Name	Content	Default Value	Parameter Description
				until the response delay time is reached before sending data to the higher-level machine.
F8-04	Communication timeout time	0.0～100.0s	0.0	When this parameter is set to a non-zero value, if the interval between one communication and the next exceeds the communication timeout time, the system will report a Modbus transmission timeout (E058) fault. In most cases, it is set to zero, which means it is invalid.

2.6   Communication Parameter Address

This section contains communication content used for controlling the inverter's operation, inverter status, and related parameter settings. R indicates read-only, and RW indicates read-write.

The parameter address is indicated by the function code group number and label:

High Byte: F0 ~ FF groups are 0x00 ~ 0x0F, U0 ~ U1 are 0x10 ~ 0x11, H1 ~ H3 are 0x12 ~ 0x15, L0 ~ L8 are 0x16 ~ 0x1E.

Low Byte: 0x00 ~ 0xFF

For example, the address F0-11 is represented as 0x000B

Caution:

FF group: Neither readable nor writable parameters;

U group: Read-only, not writable parameters.

Some parameters cannot be modified when the inverter is in operation; some parameters cannot be modified regardless of the inverter's state. When changing the function code parameters, also pay attention to the range, unit, and related descriptions of the parameters.

Function Code Group	Communication Access Address
F0～FE Groups	0x0000～0x0FFF

U0～U1 Groups	0x1000～0x11FF
H1～H3 Groups	0x1200～0x15FF
L0～L8 Groups	0x1600～0x1EFF

20xx Definition:

Address	Parameter Description	Address	Parameter Description
2102H	Set Frequency (Unit: 0.01Hz)	2210H	DI Switch Status, Read-Only
2103H	Output Frequency (Unit: 0.01Hz), Read-Only	2211H	DO Switch Status, Read-Only
2200H	Output Current (Unit: A), Read-Only	2212H	Multi-Speed, Read-Only
2201H	Count Value, Read-Only	2213H	DI CPU Pin Status, Read-Only
2202H	Actual Motor Speed (Unit: rpm), Read-Only	2214H	DO CPU Pin Status, Read-Only
2203H	Bus Voltage (Unit: V), Read-Only	2215H	Reserved, Read-Only
2204H	Output Voltage (Unit: V), Read-Only	2216H	Pulse Input Frequency (Unit: Hz), Read-Only
2205H	Power Factor Angle (Unit: deg), Read-Only	2217H	Pulse Input Position, Read-Only
2206H	Output Power (Unit: kW), Read-Only	221AH	GFF Detection Percentage (Unit: %)
2207H	Actual Feedback Speed (Unit: rpm), Read-Only	221EH	User-Defined Display
2208	Output Torque (Unit: Nm),	2223	Speed Mode, Read-Only

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 缩进: 首行缩进: 0 字符, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

H	Read-Only	H	
2209H	Reserved, Read-Only	2224H	Carrier Frequency (Unit: Hz), Read-Only
220AH	PID Feedback Value, Read-Only	222CH	Reserved, Read-Only
220BH	AI1, Read-Only	222DH	Reserved, Read-Only
220CH	Reserved, Read-Only	222EH	PID Setpoint, Read-Only
220DH	Reserved, Read-Only	222FH	PID compensation, read-only
220EH	IGBT temperature (unit: ℃), read-only	2230H	PID output frequency (unit: Hz), read-only

Stop/Run parameter section:

Type	Command Address	Command content
Control command input （Write-only）	2000H	xx12: Forward operation xx22: Reverse operation xx13: Forward jog xx23: Reverse jog xxx1: Stop operation
Set frequency (read/write)	2001H	Set frequency (unit: 0.01Hz)
External signal (read/write)	2002H	0001: External Fault Signal 0002: Fault Reset Signal 0004: Base Fault Signal
Inverter	210	xx01: Overcurrent During Acceleration xx33: External Interrupt

Type	Command Address	Command content
Fault Address (Read-Only)	0H	xx02: Overcurrent During Deceleration xx34: Password Input Three Times Incorrect xx03: Overcurrent During Constant Speed xx36: Invalid Communication Command xx04: Reserved xx37: Invalid Communication Address xx05: Reserved xx38: Communication Data Error xx06: Reserved xx39: Communication Write to Read-Only Address xx07: Overvoltage During Acceleration xx3A: Modbus Transmission Timeout xx08: Overvoltage During Deceleration xx3E: Regenerative Braking During Deceleration xx09: Overvoltage during constant speed xx3F: Excessive slip xx0A: Overvoltage during stop xx40: Please reset machine code xx0B: Undervoltage during acceleration xx42: Software overcurrent xx0C: Undervoltage during deceleration xx45: Reserved xx0D: Undervoltage during constant speed xx46: Reserved

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

Type	Command Address	Command content
		xx0E: Undervoltage during stop xx48: Reserved
		xx0F: Input phase loss protection xx4C: Reserved
		xx10: IGBT temperature too high xx4D: Reserved
		xx11: Reserved xx4F: U-phase overcurrent
		xx15: Inverter overload xx50: V-phase overcurrent
		xx16: Motor 1 overload protection xx51:W Phase Overcurrent
		xx17:Reserved xx52:U Phase Output Phase Loss
		xx18:Motor Overheat PTC xx53:V Phase Output Phase Loss
		xx1A:Over Torque 1 xx54:W Phase Output Phase Loss
		xx1B:Reserved xx57:Low Frequency Overload Protection
		xx1C:Low Current xx65:CANopen Disconnection
		xx1D:Reserved xx66:CANopen Disconnection
		xx1F:Memory Read Error xx68:CANopen Hardware Disconnection

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

Type	Command Address	Command content
		xx21:Reserved xx69:CANopen Index Error xx22:Reserved xx6A:CANopen Station Number Error xx23: Reserved xx6B: CANopen Memory Error xx24: CC Hardware Circuit Abnormality xx78: Reserved xx25: OC Hardware Circuit Abnormality xx80: Over Torque 3 xx26: Reserved xx81: Over Torque 4 xx29: PID Disconnection xx87: Reserved xx2A: Reserved xx8D: Ground Fault Before Operation xx30: AI Current Signal Disconnection xx92: Reserved xx31: External Terminal Abnormality xx93: Reserved xx32: External Terminal Emergency Stop
		01xx: Communication Command Error 16xx: Motor Overheat 02xx: Communication Address Error 18xx: Over Slip 03xx: Communication Data Error 19xx: Reserved

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

13

Type	Command Address	Command content
		04xx: Inverter cannot process 1Cxx: Output phase loss warning
		05xx: Communication transmission timeout 1Exx: Different model copy error
		07xx: Parameter copy error 1Fxx: Reserved
		08xx: Parameter copy error 20xx: Reserved
		09xx: IGBT overheating warning 24xx: CANopen software disconnect
		0Bxx: PID feedback signal warning 25xx: CANopen software disconnect
		0Cxx: AI current signal disconnect 27xx: CANopen hardware disconnect
		0Dxx: Low current warning 28xx: CANopen index error
		0Fxx: Reserved 29xx: CANopen station number error
		11xx: Reserved 2Axx: CANopen Memory Error
		12xx: Reserved 2Bxx: CANopen SDO Transfer Timeout
		13xx: Input Phase Loss 2Cxx: CANopen SDO Receive Overflow
		14xx: Over Torque 1 2Dxx: CANopen Initialization Error

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

Type	Command Address	Command content
		15xx: Reserved　　2Exx: CANopen Format Error

60xx Definition

Command Address	bit	Bit Name	Value	Parameter Description
6000h (RW)	0	CMD_ACT	0	fcmd =0
			1	fcmd = Fset(Fpid)
	1	EXT_CMD1	0	Forward Direction Command
			1	Reverse Direction Command
	2	-	-	-
	3	HALT	0	Continue Running to Target Speed
			1	Temporary Stop According to Deceleration Settings
	4	LOCK	0	Continue Running to Target Speed
			1	Maintain Current Frequency
	5	JOG	0	JOG OFF
			Pulse 1	JOG RUN
	6	QSTOP	0	None
			1	Quick Stop

15

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧:

设置格式[才]: 缩进: 首行缩进: 0 字符, 段落间距段前

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧:

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧:

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米,

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧:

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米,

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米,

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧:

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧:

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米,

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧:

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧:

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米,

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧:

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米,

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧:

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米,

Command Address	bit	Bit Name	Value	Parameter Description
	7	SERVO_ON	0	Servo OFF
			1	Servo ON
	11~8	GEAR	0000	Main Speed
			0001~1111	1~15 Segment Speed Frequency Switching
	13~12	ACC/DEC	00	First Segment Acceleration/Deceleration Time
			01	Second Segment Acceleration/Deceleration Time
			10	Third Segment Acceleration/Deceleration Time
			11	Fourth Segment Acceleration/Deceleration Time
	14	EN_SW	0	Do Not Allow Multi-Segment Command and Acceleration/Deceleration Time Switching
			1	Allow Multi-Segment Command and Acceleration/Deceleration Time Switching
	15	RST	Pulse 1	Clear Error Code
6002h (RW)	15-0	Velocity Cmd		Frequency Command (0.01Hz)

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

Command Address	bit	Bit Name	Value	Parameter Description
6100h (R)	0	ARRIVE	0	Frequency command not received
			1	Frequency command received
	1	DIR	0	Forward
			1	Reverse
	2	WARN	0	No warning
			1	Warning occurred
	3	ERROR	0	No error
			1	Error occurred
	5	JOG	0	None
			1	On JOG
	6	QSTOP	0	None
			1	On Quick Stop
	7	SERVO_ON	0	PWM OFF
			1	PWM ON
	8	Ready	0	Ready OFF
			1	Ready ON
	15-9	-	-	-
6102h (R)	15-0	Velocity cmd		Actual Output Frequency

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, …

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, …

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: …

第 3 章 CANopen Communication

3.1　Communication Overview

3.1.1　Communication Specifications

Item		Content
Function Code Support	Function Code to Switch Node Address	Node Address Manually Set, Maximum 127, Cannot Be Automatically Assigned
	Function Code to Switch Baud Rate	Baud Rate Manually Set, Cannot Be Automatically Assigned
Baud Rate	20Kbps~1Mbps Baud Rate	50Kbps, 100Kbps, 125Kbps, 250Kbps, 500Kbps, 1Mbps
SYNC	SYNC Consumer	Consumption Synchronization Signal
SDO	Initialization Upload/Download	Transmission of Data Less Than or Equal to 4 Bytes
PDO	Synchronous TPDO/RPDO	Synchronization Range 1~240, Default Only TPDO1 and RPDO1 Enabled, Configurable
	Asynchronous TPDO/RPDO	Time-Triggered, Default Only TPDO1 and RPDO1 Enabled, Configurable
EMCY	Communication Emergency Message	Send Internal Error Code, See Section 3.5
NMT	Bootup Service	Supports Startup Message Sending
NMTErrCtl	Life Guard	Optional Node Protection Function (Cannot Be Used with Heartbeat Production)
	Heartbeat Consumer	Support Node Heartbeat Consumption
	Heartbeat Producer	Support Node Heartbeat Production
Expert Mode	Configure PDO Communication Parameters and	Manually Configure PDO Communication Parameters and Mapping

18

设置格式[才]: 字体: （默认）Times New Roman

设置格式[才]: 字体: （默认）Times New Roman, 10 磅, 加粗

设置格式[才]: 缩进: 首行缩进: 11.3 毫米

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

	Mapping via Function Codes	

3.2 Hardware Configuration

3.2.1 Communication Port

The CAN communication module of the EL10B is integrated on the control board and connects to the CAN bus via a screw-type terminal block.

Figure 3.1 CANopen Communication Terminal

Table 3-2 Terminal Pin Description

Category	Terminal/DIP Switch Symbol	Terminal/DIP Switch Name	Function Description
Communication Interface	CAN+	CAN Communication Interface	CAN Signal Positive
	CAN-	CAN Communication Interface	CAN Signal Negative
GND	GND	Power Ground	Connects the Reference Ground for All CAN Nodes

设置格式[才]: 字体: （默认）Times New Roman

设置格式[才]: 字体: （默认）Times New Roman, 10 磅, 加粗

设置格式[才]: 缩进: 左 0 字符, 首行缩进: 0 字符, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

设置格式[才]: Table Text, 居中, 段落间距段后: 10 磅, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 10 磅, 行距: 固定值 20 磅

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

19

Figure 3-2 CANopen Terminal Resistor DIP Switch

Table 3-3 DIP Switch Description

DIP Switch Name	DIP Switch Position	Function Description
CAN Termination Matching	ON	Perform Termination Resistor Matching
	OFF	Do Not Perform Termination Resistor Matching

3.2.2 Wiring Instructions

The wiring diagram for the CAN Bus is shown in Figure 3.3. The CAN Bus is recommended to use shielded twisted pair cables for connection. Terminal matching resistors should be connected at both ends of the CAN Bus. The DIP switches should be set according to the diagram on the terminal block. Failing to connect or connecting insufficient terminal resistors can affect communication quality, leading to unstable communication.
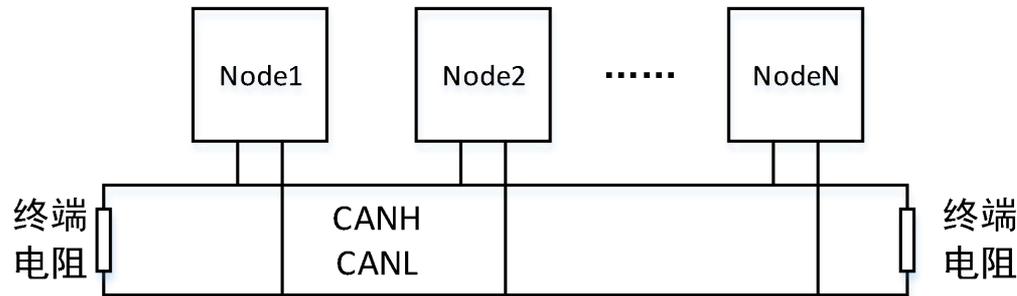
Figure 3.3 CAN Bus Wiring Diagram

3.3 Communication Instructions

3.3.1 Key Points for CANopen Communication

CANopen communication sub-protocol CiA 301 (DS 301) includes cyclic communication and event-triggered communication.

CANopen device sub-protocol defines direct access to inverter parameters and key process data.

The inverter's CANopen interface supports CiA 402 (DS 402, inverter and motion control sub-protocol) specifications and inverter manufacturer custom specifications.

The maximum transmission distance of CANopen is limited by the transmission speed; the higher the speed, the shorter the communication distance.

Theoretically, up to 127 communication nodes can be connected in a CAN network, but in practice, the number of nodes is limited by the transmission capability of the CAN transceiver.

Unless otherwise specified, the inverter is defined as a slave node (Server) in the CAN network.

Table 3-4 CANopen Protocol

Application layer	CANopen Application layer	CiA 402 CiA 301
Presentation layer		
Session layer		
Transport layer		
Network layer		
Data link layer		CAN2.0A/B
Physical layer		ISO 11898

Table 3-5 CANopen Parameter Settings

Name	Description	Defa ult Value
F8-07 Communication Decoding Method	Select manufacturer custom protocol, 0 indicates Custom Protocol One, 1 indicates Custom Protocol Two	1
F8-14 CANopen Node Address	Set the node address, each device in the same network must have a unique node address. 0: Disable CANopen slave, 1~127: Slave node address number, a CAN network supports up to 127 slave nodes.	0
F8-15 CAN Bus Communication Rate	User selects the CANopen communication rate, all devices in the same network must use the same communication rate.	0
F8-18 CANopen Warning Record	Displays the inverter's CANopen warning information	Rea d-only

设置格式[才]: Table Text, 居中, 缩进: 首行缩进: 0 毫米, 段落间距段前: 10 磅, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: Table Text, 居中, 缩进: 首行缩进: 0 毫米, 段落间距段前: 10 磅, 行距: 固定值 20 磅

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

Name	Description	Default Value
F8-19 CiA 402 Protocol Selection	Used to select the CiA 402 protocol and the inverter manufacturer's custom protocol for CANopen index parsing. 0: Inverter manufacturer's custom protocol, 1: CiA 402 protocol	0
F8-20 CANopen Communication Status	Display Inverter CANopen Node Status	Read-only
F8-21 CiA402 Operation Status	Display Inverter Motor Operation Status	Read-only
F8-22 CANopen Index Reset	CANopen Index Data Clear Command	0xFFFF

3.3.2　CANopen Communication Protocol

CANopen Communication Protocol includes NMT (Network Management Object), SYNC (Synchronous Object), SDO (Service Data Object), PDO (Process Data Object, including transmitted TPDO, Tx PDO and received RPDO, Rx PDO, transmission and reception are referenced to the CANopen node itself), EMCY (Emergency Object).

Table 3-6 Communication Protocol

Communication Object	Function Code (binary)	COB-ID(hex)
NMT	0000	00
SYNC	0001	80
EMCY	0001	81 ... FF
TPDO1	0011	181 ... 1FF
RPDO1	0100	201 ... 27F

22

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 字体: （默认）Times New Roman, 10 磅, 加粗

设置格式[才]: 缩进: 首行缩进: 11.3 毫米

设置格式[才]: 缩进: 首行缩进: 0 字符, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

设置格式[才]: Table Text, 居中, 缩进: 首行缩进: 0 毫米, 段落间距段前: 10 磅, 行距: 固定值 20 磅

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

Communication Object	Function Code (binary)	COB-ID(hex)
TPDO2	0101	281 ... 2FF
RPDO2	0110	301 ... 37F
TPDO3	0111	381 ... 3FF
RPDO3	1000	401 ... 47F
TPDO4	1001	481 ... 4FF
RPDO4	1010	501 ... 57F
TSDO	1011	581 ... 5FF
RSDO	1100	601 ... 67F

The COB-ID encoding format is as follows:

Table 3-7 COB-ID (CAN Object ID, 11 or 29 bits)

Function Code				Node ID						
10	9	8	7	6	5	4	3	2	1	0

3.3.2.1　NMT

NMT follows the Master/Slave protocol model, where the NMT master can unconditionally control the state transitions of the slave. NMT management involves six states from the start of power-up of a CANopen node, including initialization, application layer reset, communication reset, pre-operation mode, operation mode, and stop mode. The NMT message corresponds to a CAN communication data frame with a length of 2 bytes, and the ID field is 0.

Table 3-8 NMT messages

ID field	Data field (Byte 0)	Data field (Byte 1)
0	NMT CMD	Node ID

If Node ID is 0, it indicates all NMT broadcast frames, and all slave stations will respond. The NMT CMD list is as follows:

Table 3-9 NMT CMD

NMT CMD	Meaning
01h	Start remote node
02h	Stop remote node
80h	Enter pre-operation mode
81h	Node reset
82h	Communication reset

The list of node statuses is as follows:

Table 3-10 Node Statuses

Node Status Word	Meaning
00h	Boot-up
04h	Stopped State
05h	Operational Mode
FFh	Pre-Operation Mode

The CANopen state machine is as follows:

Figure 3-4 CANopen State Machine

The effective operating states of each communication protocol object are listed in the following table:

Table 3-11 Effective Operating States

	Initialization	Pre-Operation Mode	Operational Mode	Stopped State
PDO	\	\	Active	\
SDO	\	Active	Active	\
SYNC	\	Active	Active	\
EMCY	\	Active	Active	\

设置格式[才]: Table Text, 居中, 缩进: 首行缩进: 0 毫米, 段落间距段后: 10 磅, 行距: 固定值 20 磅

设置格式[才]: 缩进: 首行缩进: 0 字符, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

设置格式[才]: Table Text, 居中, 段落间距段前: 10 磅, 行距: 固定值 20 磅

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

	Init ialization	Pre-Operation Mode	Operational Mode	Stopped State
NMT	\	Active	Active	Active
Boot-up	Active	\	\	\

3.3.2.2 SDO

SDO follows the Client/Server protocol model, used for transmitting data with non-string time requirements (parameter settings), data length 0~4Byte. Common SDO protocol is Fast SDO (SDO command byte bit1 set to 1 indicates Fast SDO), which means all data is transmitted during initialization (initial SDO upload/download). If the transmission length is greater than 4Byte, Fast SDO cannot be used, and standard SDO must be used for segmented transmission. The Object Dictionary is a group object of the CANopen node, each node has its own Object Dictionary, which contains multiple parameters, and the parameters describe the supported parameter attributes and values. SDO accesses the device Object Dictionary through index and sub-index, each object has a single index value, and a single index can have multiple sub-index values. The SDO data frame format is as follows:

Table 3-12 SDO Data Frame Format

SDO Data Frame Analysis

data byte num	Comment	
byte0	SDO CMD	
byte1	SDO Index Low Byte	
byte2	SDO Index High Byte	
byte3	SDO sub-index	
b	SDO data low word low byte	When SDO

SDO CMD Analysis

bit num	Comment
bit0	size
bit1	expedited
bit2	SDO Unused Byte Count
bit3	
b	\

26

Byte		status inquiry is performed from client to server, these 4 bytes are invalid	Bit	
byte4			it4	
byte5	SDO data low word high byte		it5	cmd
byte6	SDO data high word low byte		it6	1: init download (issue parameters)
byte7	SDO data high word high byte		it7	2: init upload (status inquiry) 3: stop SDO transfer

3.3.2.3 PDO

PDO follows the Producer/Consumer protocol model, where each network node can receive information from the transmitting node and can also determine whether to process the received information, used for transmitting time-critical process data (reference values, control commands, status information, etc.), allowing for one-to-one or one-to-many data transmission. PDO transmission can be initiated through an internal timer (asynchronous communication), upon receiving a synchronization frame (synchronous communication), and via remote requests. The CAN interface supports up to 8 PDOs (including 4 TPDOs and 4 RPDOs), with only TPDO1 and RPDO1 enabled by default. Multiple application objects can be transmitted in a single PDO frame through PDO mapping. PDO object mapping can only be modified when the node is in Pre-Operation Mode.

PDO mapping format CANopen object mapping value is hexadecimal encoding, PDO mapping data format is as follows:

Table 3-13 PDO Mapping Data Format

Type	MSB		LSB
UINT32	31 16	15 8	7 0
Description	Index (e.g., 6040h)	Sub-Index (e.g., 02h)	Object bit length (e.g., 10h corresponds to 16 bits, 08h corresponds to 8 bits)

Note:

1) PDO mapping sub-index starts from 1.

2) If the PDO mapping input value is 0, the mapping of the current sub-index and all subsequent sub-indices will be ignored.

The relationship between PDO transmission type settings and transmission methods is as follows:

Table 3-14 PDO Transmission Type

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 左, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, 行距: 固定值 20 磅

设置格式[才]: 字体: （默认）Times New Roman, 8 磅

设置格式[才]: 缩进: 首行缩进: 0 字符, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

设置格式[才]: Table Text, 居中, 段落间距段前: 10 磅, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 字体: （默认）Times New Roman, 8 磅

设置格式[才]: 行距: 单倍行距

设置格式[才]: Table Text, 居中, 段落间距段前: 10 磅, 行距: 固定值 20 磅

Transmission type setting value	Cyclic	Non-cyclic	Synchronous	Asynchronous	Remote Request
0	\	Active	Active	\	\
1~240	Active	\	Active	\	\
252	\	\	Active	\	Active
253	\	\	\	Active	Active
255	\	\	\	Active	\

A transmission type value of 0 indicates that two PDOs transmit synchronous non-cyclic information (currently unsupported). A transmission type value of 1~240 indicates the number of SYNCs between two PDO transmissions. A transmission type value of 252 indicates that data is updated immediately after receiving SYNC (currently unsupported). A transmission type value of 253 indicates that data is updated immediately after receiving RTR (currently unsupported). A transmission type value of 255 indicates asynchronous non-cyclic transmission.

PDO Mapping Configuration via SDO This section provides an example of configuring the slave PDO mapping via the CANopen master SDO. Refer to this example for other PDO configurations. The slave PDO configuration is as follows:

1) Node ID = 1;

2) RPDO1 : 6040h Control Word, 6042h Target Speed;

3) TPDO1 : 6041h Status Word, 6043h Actual Target Speed;

4) TPDO1 is sent to the master station at a 100ms cycle.

In the pre-operation mode of the CANopen slave node, the object configuration is as shown in the following table: RPDO1 mapping configuration steps:

Table 3-15 RPDO1 Mapping Configuration Steps

28

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 缩进: 左侧: 1.4 毫米, 右侧: 1.4 毫米, 行距: 固定值 20 磅

设置格式[才]: 缩进: 首行缩进: 0 字符, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

设置格式[才]: 字体: （默认）Times New Roman, 8 磅

设置格式[才]: Table Text, 居中, 段落间距段前: 10 磅, 行距: 固定值 20 磅

Step	Index (hex)	sub-Index (hex)	Name	Write Value (hex)	Description
	1400	01	RPDO1 Parameter: COB-ID	80000201	Disable RPDO1
	1400	02	RPDO1 Parameter: Transmission Type	FF	Transmission Type 255
	1600	00	RPDO1 Mapping: Number of Entries	0	Write 0 Before Mapping Configuration
	1600	01	RPDO1 Mapping: Mapping Object 1	60400010	6040h Control Word, Sub-index 00, Data Length 16 bits
	1600	02	RPDO1 Mapping: Mapping Object 2	60420010	6042h Target Speed, Sub-index 00, Data Length 16 bits
	1600	00	RPDO1 Mapping: Number of Entries	2	Map 2 Objects
	1400	01	RPDO1 Parameter: COB-ID	201	Enable RPDO1

TPDO1 Mapping Configuration Steps:

Table 3-16 TPDO1 Mapping Configuration Steps

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

设置格式[才]: Table Text, 居中, 段落间距段前: 10 磅, 段后: 10 磅, 行距: 固定值 20 磅

S t e p	Index (hex)	sub-Index (hex)	Name	Write Value （hex）	Description
	1 800	01	TPDO1 Parameter: COB-ID	80000 181	Disable TPDO1
	1 800	02	TPDO1 Parameter: Transmission Type	1	Transmission Type 1
	1 800	05	TPDO1 Parameter: Event Timer	64	100ms
	1 A00	00	TPDO1 Mapping: Number of Entries	0	Write 0 Before Mapping Configuration
	1 A00	01	TPDO1 Mapping: Mapping Object 1	60410 010	6041h Status Word, Subindex 00, Data Length 16 bits
	1 A00	02	TPDO1 Mapping: Mapping Object 2	60430 010	6043h Actual Target Speed, Subindex 00, Data Length 16 bits
	1 A00	00	TPDO1 Mapping: Number of Entries	2	Map 2 Objects
	1 800	01	TPDO1 Parameter: COB-ID	181	Enable TPDO1

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

3.3.2.4 EMCY

The emergency object is triggered when an internal fault occurs in the CANopen device, informing the CANopen master of the fault code via an emergency frame. The emergency frame is a diagnostic message and does not affect CANopen communication. Refer to 6.5 CANopen Fault Codes for CANopen fault codes.

3.3.3 Sub-Protocol

The sub-protocol specifies the meaning of parameters, control words, status words, and variable values (reference values and actual values) transmitted and received via the CAN bus. The inverter supports two sub-protocols:

CiA 402. The inverter internally converts the CiA 402 protocol. The inverter does not use the CiA 402 protocol by default.

Manufacturer-specific protocol. Two manufacturer-specific protocols, Protocol One (F8-07=0) and Protocol Two (F8-07=1), can both allow the inverter to operate in speed mode.

The selection of sub-protocol standards can be achieved through parameter F8-19.
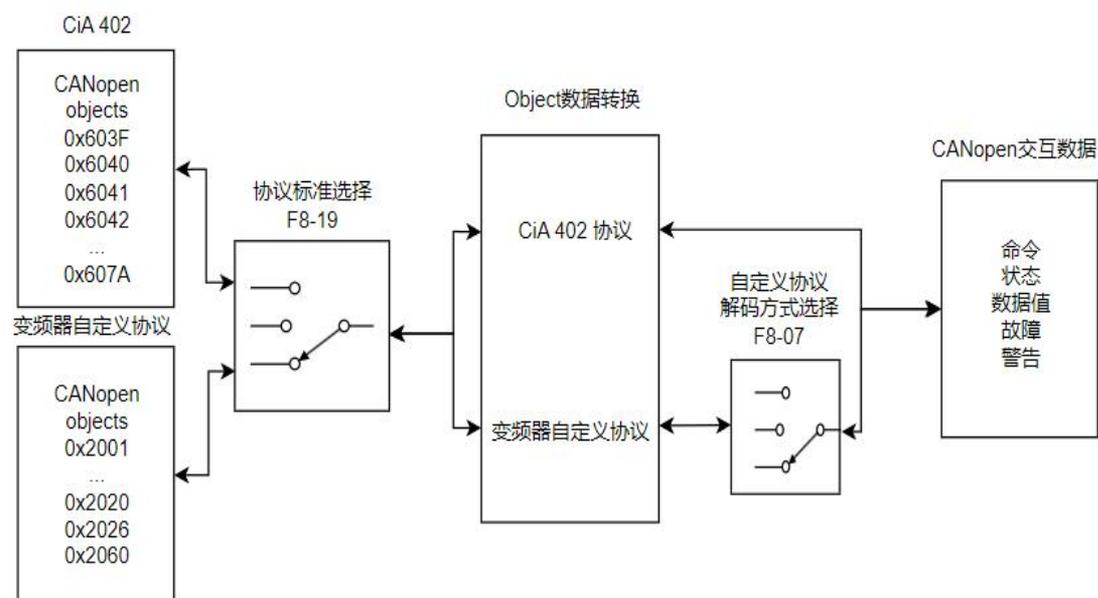
Figure 3-5 Communication Sub-Protocol

The CANopen control index definitions supported by the inverter are as follows:

Table 3-17 CANopen Control Index

CANopen Protocol Standard Selection	Speed Mode	
	index-subindex	Meaning
CiA402	6042-0x00	Target Speed (rpm)
Midea Protocol One	2020-0x02	Target Frequency (Hz)

31

設置格式[才]: 字体: （默认）Times New Roman, 8 磅

設置格式[才]: 缩进: 首行缩进: 0 字符, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

設置格式[才]: 字体: （默认）Times New Roman, 8 磅, 加粗

設置格式[才]: 缩进: 首行缩进: 0 字符, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

設置格式[才]: Table Text, 居中, 段落间距段后: 10 磅, 行距: 固定值 20 磅

設置格式[才]: 缩进: 首行缩进: 0 字符, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

設置格式[才]: Table Text, 居中, 段落间距段前: 10 磅, 行距: 固定值 20 磅

設置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

設置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, 行距: 固定值 20 磅

設置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

設置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

Midea Protocol Two	2060-0x03	Target Frequency (Hz)

General indexes do not require sub-protocol selection and can be used universally, relevant indexes are as follows:

- Indexes with read-only (RO) attributes.

- Parameter group read/write indexes (0x2010-0x01 ~ 0x201F-0x64, 0x2070-0x01 ~ 0x20B0-0x64)

- Acceleration/deceleration time setting indexes (604F-0x00, 6050-0x00)

3.3.3.1   Sub-protocol Introduction

The CiA 402 Protocol is a CANopen application layer protocol specifically designed for inverters and motion control scenarios, built upon the CiA 301 Protocol. The inverter is divided into 9 operating states, including Start, Initialization (Not ready to switch on), Not Running (Switch on disable), Ready to Run (Ready to switch on), Running (Switch on), Operation Enabled (Operate enable), Quick Stop Active, Fault Reaction Active, and Fault. After the inverter is powered on and completes initialization, it will remain in the Ready to Run state. The inverter can only be controlled to run when it is in the normal operating state.
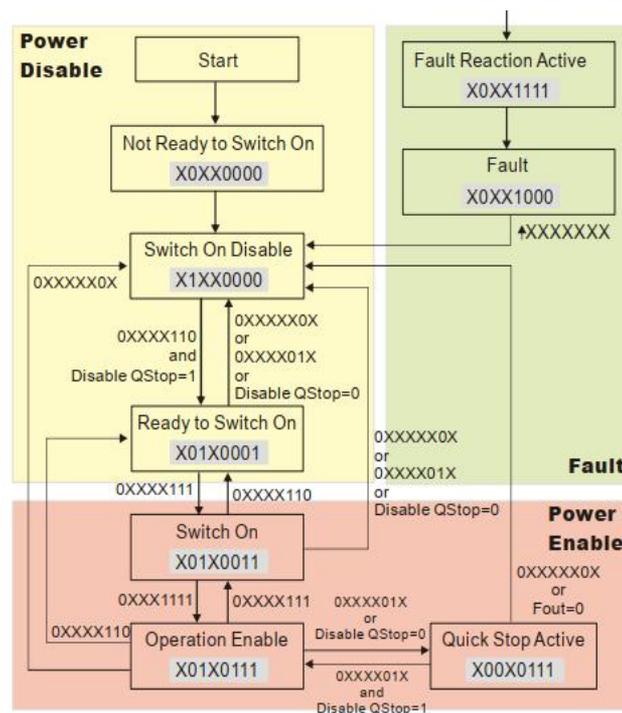
Figure 3-6 Inverter State Machine

Caution: When the set value of Index 605A is 5~7, the inverter can be controlled to return directly from fast shutdown to operational enable by disabling the fast shutdown and control commands. Otherwise, the inverter cannot return directly from fast shutdown to operational enable.

Table 3-18 Control Word (Index 6040h)

bits	15~9	8	7	6~4	3	2	1	0
Meaning	Reserved	Halt	Fault Reset	Normal Operation	Operational Enable	Fast Shutdown	Enable Voltage	Running

Note: To start the motor, first send 0xxxx110 (06h) to enter the Ready to Switch ON state, and then send 0xxxx111 (07h) to enter the Switch ON state, at which point the motor will start rotating.

Table 3-19 Status Word (Index 6041h)

bits	15~14	13~12	11	10	9	8	7	6	5	4	3	2	1	0
Meaning	Reserved	Normal Operation	Amplitude Limiting Action	Reach Target Value	Remote Control	Reserved	Warning	Disable Operation	Fast Shutdown	Voltage Enable	Fault	Operation Enable	Running	Operation Preparation Complete

CANopen Object Dictionary

Table 3-20 Standard Object Dictionary (Object Dictionary)

Index	Object
0000h	Reserved

33

Index	Object
0001h ~ 025Fh	Data Types (Data types)
0260h ~ 0FFFh	Reserved
1000h ~ 1FFFh	Communication Profile Area
2000h ~ 5FFFh	Manufacturer-Specific Profile Area
6000h ~ 9FFFh	Standardized Profile Area
A000h ~ AFFFh	Standardized Network Variable Area (Compliant with IEC61131-3)
B000h ~ BFFFh	Standardized System Variable Area for Routing Gateway
C000h ~ FFFFh	Reserved

Table 3-21 Communication Profile Area

Index (hex)	sub-Index (hex)	Name	Data Format	Read/Write	Meaning
1000	0	Device Type	unsigned 32	RO	Device Type Description
1001	0	Fault Register	unsigned 8	RO	Describe fault types, refer to the fault register description table below for details
1	0	Synch	unsigne	R	Synchronous message

34

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 左, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 左, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 左, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 左, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 左, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 左, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 左, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 左, 行距: 固定值 20 磅

设置格式[才]: Table Text, 居中, 段落间距段前: 10 磅, 行距: 固定值 20 磅

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

Index (hex)	sub-Index (hex)	Name	Data Format	Read /Write	Meaning
1005		ronous message COB-ID	d 32	W	COB-ID for synchronized transmission
1006	0	Synchronous communication cycle period	unsigned 32	RW	Set synchronous communication cycle period (us)
100C	0	Watch dog time	unsigned 16	RW	Watchdog time (ms) * Lifetime Factor = Node Watchdog Protocol Lifetime
100D	0	Lifetime Factor	unsigned 8	RW	Watchdog time (ms) * Lifetime Factor = Node Watchdog Protocol Lifetime
1010	1	Save parameters	unsigned 32	RW	Write SDO value 0x65766173 ("evas") to save all parameters
	2				Write SDO value 0x65766173 ("evas") to save communication parameters (index 0x1000~0x1FFF)

Index (hex)	sub-Index (hex)	Name	Data Format	Read/Write	Meaning
1011	1	Restore Default Parameters	unsigned 32	RW	Write SDO value 0x64616F6C ("daol") to restore all parameters to default values
	2				Write SDO value 0x64616F6C ("daol") to restore communication parameters (index 0x1000~0x1FFF) to default values
1014	0	Emergency Message COB-ID	unsigned 32	RW	Define Emergency Object (EMCY) COB-ID, default value: 0x80 + Node-ID
1016	1	Consumer Heartbeat Time	unsigned 32	RW	Value definition: bits 31 ~ 24 reserved, bits 23 ~ 16 Node-ID, bits 15 ~ 0 heartbeat time (ms)
1017	0	Producer Heartbeat Time	unsigned 32	RW	Define heartbeat cycle time (ms), write 0 to disable heartbeat function

Index (hex)	sub-Index (hex)	Name	Data Format	Read/Write	Meaning
1018	1	Vendor ID	unsigned 32	RO	Vendor ID, inverter manufacturer value: 0x476 (for temporary use)
	2	Product Code			Product Code
	3	Version Number			Version Number
1400	0	RPDO1 Communication Parameters	unsigned 8	RO	Maximum Supported Sub-index Number
	1	COB-ID	unsigned 32	RW	Default Value:0x200 + Node-ID
	2	Transmission Type	unsigned 8	RW	Default Value:5
1401	0	RPDO2 Communication	unsigned 8	RO	Maximum Supported Sub-index Number

Index (hex)	sub-Index (hex)	Name	Data Format	Read/Write	Meaning
		Parameters			
	1	COB-ID	unsigned 32	RW	Default Value:0x80000300 + Node-ID (RPDO2 Disabled)
	2	Transmission Type	unsigned 8	RW	Default Value:5
1402	0	RPDO3 Communication Parameters	unsigned 8	RO	Maximum Supported Sub-index Number
	1	COB-ID	unsigned 32	RW	Default Value:0x80000400 + Node-ID (RPDO3 Disabled)
	2	Transmission Type	unsigned 8	RW	Default Value:5
1403	0	RPDO4 Communic	unsigned 8	RO	Maximum Supported Sub-index Number

Index (hex)	sub-Index (hex)	Name	Data Format	Read/Write	Meaning
		...ation Parameters			
	1	COB-ID	unsigned 32	RW	Default Value:0x80000500 + Node-ID (RPDO4 Disabled)
	2	Transmission Type	unsigned 8	RW	Default Value:5
1600	0	RPDO1 Mapping Parameters	unsigned 8	RO	Number of Mapping Objects (0~4)
	1	Mapping Object 1	unsigned 32	RW	Default Value: 0x60400010, 0x6040-0x00 Indicates 16-bit Control Word in CiA 402 Protocol
	2	Mapping Object 2	unsigned 32	RW	Default Value: 0x60420010, 0x6042-0x00 Indicates 16-bit Status Word in CiA 402 Protocol
	3	Mapping Object 3	unsigned 32	RW	

Index (hex)	sub-Index (hex)	Name	Data Format	Read/Write	Meaning
	4	Mapping Object 4	unsigned 32	RW	
1601	0	RPDO 2 Mapping Parameters	unsigned 8	RO	Number of Mapping Objects (0~4)
	1	Mapping Object 1	unsigned 32	RW	Default Value: 0x20264110, 0x2026-0x41 Indicates 16-bit DO Status Setting in Custom Protocol One
	2	Mapping Object 2	unsigned 32	RW	
	3	Mapping Object 3	unsigned 32	RW	
	4	Mapping Object 4	unsigned 32	RW	
1602	0	RPDO 3 Mapping Parameters	unsigned 8	RO	Number of Mapping Objects (0~4)
	1	Mappi	unsigne	R	Default Value:

Index (hex)	sub-Index (hex)	Name	Data Format	Read /Write	Meaning
		ng Object 1	d 32	W	0x60400010, 0x6040 Indicates 16-bit Control Word in CiA 402 Protocol
	2	Mappi ng Object 2	unsigne d 32	R W	
	3	Mappi ng Object 3	unsigne d 32	R W	
	4	Mappi ng Object 4	unsigne d 32	R W	
1 603	0	RPDO 4 Mapping Parameter	unsigne d 8	R O	Number of Mapping Objects (0~4)
	1	Mappi ng Object 1	unsigne d 32	R W	Default Value: 0x60400010, 0x6040 Indicates 16-bit Control Word in CiA 402 Protocol
	2	Mappi ng Object 2	unsigne d 32	R W	
	3	Mappi ng Object 3	unsigne d 32	R W	

Index (hex)	sub-Index (hex)	Name	Data Format	Read/Write	Meaning
	4	Mapping Object 4	unsigned 32	RW	
1800	0	TPDO 1 Communication Parameter	unsigned 8	RO	Maximum Supported Sub-index Number
	1	COB-ID	unsigned 32	RW	Default Value:0x180 + Node-ID
	2	Transmission Type	unsigned 8	RW	Default Value:5
	3	Inhibition Time	unsigned 8	RW	PDO Transmission Minimum Interval, Default Value:0 (Not Used)
	5	Event Timer	unsigned 8	RW	Default Value:0 (Not Used)
1801	0	TPDO 2 Communication	unsigned 8	RO	Maximum Supported Sub-index Number

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

Index (hex)	sub-Index (hex)	Name	Data Format	Read/Write	Meaning
		Parameter			
	1	COB-ID	unsigned 32	RW	Default Value:0x80000280 + Node-ID (TPDO2 Disabled)
	2	Transmission Type	unsigned 8	RW	Default Value:5
	3	Inhibition Time	unsigned 8	RW	PDO Transmission Minimum Interval, Default Value:0 (Not Used)
	5	Event Timer	unsigned 8	RW	Default Value:0 (Not Used)
1802	0	TPDO 3 Communication Parameter	unsigned 8	RO	Maximum Supported Sub-index Number
	1	COB-ID	unsigned 32	RW	Default Value:0x80000380 + Node-ID (TPDO3 Disabled)

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

Index (hex)	sub-Index (hex)	Name	Data Format	Read/Write	Meaning
	2	Transmission Type	unsigned 8	RW	Default Value:5
	3	Inhibition Time	unsigned 8	RW	PDO Transmission Minimum Interval, Default Value:0 (Not Used)
	5	Event Timer	unsigned 8	RW	Default Value:0 (Not Used)
1803	0	TPDO 4 Communication Parameter	unsigned 8	RO	Maximum Supported Sub-index Number
	1	COB-ID	unsigned 32	RW	Default Value:0x80000480 + Node-ID (TPDO4 Disabled)
	2	Transmission Type	unsigned 8	RW	Default Value:5
	3	Inhibition Time	unsigned 8	RW	PDO Transmission Minimum Interval, Default

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

Index (hex)	sub-Index (hex)	Name	Data Format	Read/Write	Meaning
					Value:0 (Not Used)
	5	Event Timer	unsigned 8	RW	Default Value:0 (Not Used)
1A00	0	TPDO 1 Mapping Parameter	unsigned 8	RW	Number of Mapping Objects (0~4)
	1	Mapping Object 1	unsigned 32	RW	Default value: 0x60410010, 0x6041-0x00 represents the 16-bit status word in the CiA 402 protocol
	2	Mapping Object 2	unsigned 32	RW	Default value: 0x60430010, 0x6043-0x00 represents the 16-bit real-time target speed (rpm) in the CiA 402 protocol
	3	Mapping Object 3	unsigned 32	RW	
	4	Mapping Object 4	unsigned 32	RW	
1	0	TPDO	unsigne	R	Number of Mapping

Index (hex)	sub-Index (hex)	Name	Data Format	Read /Write	Meaning
A01		2 Mapping Parameters	d 8	W	Objects (0~4)
	1	Mapping Object 1	unsigned 32	R W	Default value: 0x20260110, 0x2026-0x01 represents the 16-bit DI terminal status in Custom Protocol One
	2	Mapping Object 2	unsigned 32	R W	Default value: 0x20266110, 0x2026-0x61 represents the 16-bit AI ratio value in Custom Protocol One
	3	Mapping Object 3	unsigned 32	R W	
	4	Mapping Object 4	unsigned 32	R W	
1 A02	0	TPDO 3 Mapping Parameters	unsigned 8	R W	Number of Mapping Objects (0~4)
	1	Mapping Object 1	unsigned 32	R W	Default value: 0x60410010, 0x6041-0x00 represents the 16-bit status

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

Index (hex)	sub-Index (hex)	Name	Data Format	Read/Write	Meaning
					word in the CiA 402 protocol
	2	Mapping Object 2	unsigned 32	RW	
	3	Mapping Object 3	unsigned 32	RW	
	4	Mapping Object 4	unsigned 32	RW	
1A03	0	TPDO 4 Mapping Parameters	unsigned 8	RW	Number of Mapping Objects (0~4)
	1	Mapping Object 1	unsigned 32	RW	Default value: 0x60410010, 0x6041-0x00 represents the 16-bit status word in the CiA 402 protocol
	2	Mapping Object 2	unsigned 32	RW	
	3	Mapping Object 3	unsigned 32	RW	
	4	Mapping	unsigned	R	

设置格式[才]: 字体: (默认) Times New Roman, (中文) 等线, 小五

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 字体: (默认) Times New Roman, (中文) 等线, 小五

设置格式[才]: 字体: (默认) Times New Roman, (中文) 等线, 小五

设置格式[才]: 字体: (默认) Times New Roman, (中文) 等线, 小五

设置格式[才]: 字体: (默认) Times New Roman, (中文) 等线, 小五

设置格式[才]: 字体: (默认) Times New Roman, (中文) 等线, 小五

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 行距: 固定值 20 磅

Index (hex)	sub-Index (hex)	Name	Data Format	Read/Write	Meaning
		ng Object 4	d 32	W	

Table 3-22 Fault Register Description

Bit	Description
0	General Fault
1	Current
2	Voltage
3	Temperature
4	Communication Fault
5	Device Protocol Specification
6	Reserved
7	Manufacturer Specified

3.3.4 Custom Protocol One

Table 3-23 Custom Protocol One

Index	Sub-Index	R/W	Data Format	Meaning

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 表格文字, 行距: 固定值 20 磅

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, （中文）等线, 小五

设置格式[才]: 字体: （默认）Times New Roman, 8 磅, 加粗

设置格式[才]: Table Text, 段落间距段前: 7.8 磅

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, 行距: 固定值 20 磅

Index	Sub-Index	R/W	Data Format	Meaning
0x2010+PrGroupNum 0x2070+PrGroupNum-0xE	PrNum+1	R/W	unsigned 16	Inverter Parameter Setting and Reading※
	0x01	R/W	unsigned 16	Control Command Word
	0x02	R/W	unsigned 16	Frequency Command (0.01Hz)
0x2020	0x03	R/W	unsigned 16	Trigger Command
	0x01			Hbyte: Warn Code Lbyte: Error Code
	0x02			Inverter Operating Status
	0x03			Frequency Command (0.01Hz)
	0x04			Output Frequency (0.01Hz)
	0x05			Output Current (0.1A)
0x2021	0x06	R	unsigned 16	DC Bus Voltage (0.1V)
	0x07			Output Voltage (0.1V)
	0x08			Current Multi-Segment Speed Command Segment Number
	0x09			Reserved
	0x0A			Display Count Value
	0x0B			Output Power Factor

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅, ...

Index	Sub-Index	R/W	Data Format	Meaning
				Angle (0.1°)
	0x0D			Actual Motor Speed (rpm)
	0x10			Output Power (0.001kWh)
	0x11			Parameter Group Number
	0x13			Firmware Version (highword)
0x2022	0x01	R	unsigned 16	Output Current (0.01A), when current is greater than 655.36A, the decimal place automatically switches to 1
	0x02			Display Count Value
	0x03			Output Frequency (0.01Hz)
	0x04			DC Bus Voltage (0.1V)
	0x05			Output Voltage (0.1V)
	0x06			Output Power Factor Angle (0.1°)
	0x07			Three-Phase Output Power (kW)
	0x08			Actual Motor Speed (rpm)
	0x09			Output Torque (0.1%)
	0x0B			After PID function is

Index	Sub-Index	R/W	Data Format	Meaning
				activated, display PID feedback value (0.01%)
	0x0C			AI Terminal Input Value (0-100%)
	0x0F			Power Module IGBT Temperature (0.1℃)
	0x11			Digital Terminal Input Mode Selection (F5—15)
	0x12			Digital Terminal Output Mode Direction (F6—04)
	0x13			Current Multi-Segment Speed Command Segment Number
	0x14			Digital Terminal Input Status (1: on)
	0x15			Digital Terminal Output Status (1: on)
	0x1A			Overload Count (0.00-100.00%)
	0x1C			DC Bus Voltage (0.1V)
	0x1F			User Physical Quantity Output
	0x20			Actual Output Frequency Gain Coefficient (0.01)
	0x25			Inverter Carrier Frequency (kHz)

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

设置格式[才]: 表格文字, 居中, 段落间距段前: 4.2 磅

Index	Sub-Index	R/W	Data Format	Meaning
	0x27			Inverter Status
	0x2A			Energy Display (0.1kWh)
	0x2F			PID Reference Target (0.01%)
	0x30			PID Offset (0.01%)
	0x31			PID Output Frequency (0.01Hz)
0x2026	0x01	R	unsigned 16	DI Terminal Input Status
	0x03-0x40	R	\	Reserved
	0x41	R/W		DO Terminal Output Status
	0x42-0x60	R	unsigned 16	Reserved
	0x61	R		AI Ratio Value
	0x64-0x6A	R		Reserved

※: Note the mapping relationship between the Object Dictionary and the inverter function codes is as follows:

Object Dictionary Index = 0x2010 + Function Code Group Number (F0-FF Function Group);

or 0x2070 + Function Code Group Number (U0-L8 Function Group)

Object Dictionary Sub-index = Function Code Group Internal Offset in Hexadecimal + 1;

Table 3-24 Control Command Word Bit Definitions:

Control Command Word	

52

Control Command Word	
bit 1-0	0: No function
	1: Stop
	2: Start
	3: JOG Start
bit 3-2	Reserved
bit 5-4	0: No function
	1: Forward Command
	2: Reverse Command
	3: Change Direction
bit 7-6	0: First Segment Acceleration/Deceleration
	1: Second Segment Acceleration/Deceleration
	2: Third Segment Acceleration/Deceleration
	3: Fourth Segment Acceleration/Deceleration
bit 11-8	0: Main Speed
	1-15: First to Fifteenth Segment Speed Selection
bit 12	1: Enable bit 6-11 Function
bit 15-13	Reserved

Table 3-25 Trigger Command Word Bit Definition

Trigger Command	
bit 0	1: External Fault (EF)
bit 1	1: Reset Command
bit 2	1: External Interrupt (BB)
bit 15-3	Reserved

Table 3-26 Inverter Operation Status Word Bit Definitions

Inverter Operating Status	
bit 1-0	0: Stopped
	1: Accelerating
	2: Standby
bit 2	JOG Operation
bit 4-3	0: Forward
	1: Reverse to Forward
	2: Forward to Reverse
	3: Reverse
bit 7-5	Reserved
bit 8	1: Main frequency source is communication interface
bit 9	1: Main frequency source is analog signal input
bit 10	1: Main command source is communication interface
bit 11	1: Parameter Lock
bit 12	1: Enable Keypad Parameter Copy Function
bit 15-13	Reserved

Table 3-27 Inverter Status Word Bit Definitions

Inverter Status	
bit 1-0	0: No Direction
	1: Forward
	2: Reverse

bit 3-2	0: Inverter Ready
	1: Inverter Fault
bit 4	1: Inverter Has Output 0: No Output
bit 5	1: Warning Present 0: No Warning

For the mapping relationship between terminal inputs/outputs and CANopen index, refer to 6.4.3 CANopen Analog AIO and DIO Description.

3.3.5 Custom Protocol Two

Table 3-28 Custom Protocol Two

Index	Sub-Index	R/W	Data Format	Bit Definitions		Speed Mode
				Bit	Meaning	
0x 2060	0x 01	R /W	unsigned 16	0	Ack	0: fcmd = 0 / 1: fcmd = fset
				1	Dir	0: Forward Command / 1: Reverse Command
				2	Move	\
				3	Halt	0: Continue Running to Target Speed / 1: Temporarily Stop According to Deceleration Settings
				4	Hold	0: Continue Running to Target Speed / 1: Maintain Current Frequency
				5	JOG	0: OFF 1: RUN
				6	Qstop	Fast Shutdown

Index	Sub-Index	R/W	Data Format	Bit	Bit Definitions	Speed Mode
Index	Sub-Index	R/W	Data Format	7	RUN	0: Shutdown / 1: Startup
				8	Multi-Speed Selection Bit	Multi-Speed Selection Bit 1
				9		Multi-speed Selection Bit 2
				10		Multi-speed Selection Bit 3
				11		Multi-speed Selection Bit 4
				12	Acceleration/Deceleration Time Selection Bit	Acceleration/Deceleration Time Selection Bit 1
				13		Acceleration/Deceleration Time Selection Bit 2
				14	Software Terminal Function Enable	Software Multi-speed and Acceleration/Deceleration Time Switch Enable
				15	Reset	Clear Fault Codes
	0x02			0-15	Run Mode CMD 0: Speed Mode	0: Speed Mode
	0x03			0-15	Frequency Command	Frequency Command (0.01Hz)
	0x05		signed 32	0-31	Reserved	\

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

Index	Su(b)	R/W	Data		Bit Definitions	Speed Mode
Index	0x06	R/W	unsigned 16	0-15	Reserved	\
	0x07		signed 16	0-15	Reserved	\
	0x08		unsigned 16	0-15	Reserved	\
0x2061	0x01	R	unsigned 16	0	Arrive	Frequency command received
				1	Dir	0: Forward 1: Reverse
				2	Warn	Warning Occurred
				3	Error	Fault Occurred
				4	Reserved	Reserved
				5	JOG	JOG Operation
				6	Qstop	Fast Shutdown
				7	PowerOn	Excitation
				15-8	Reserved	Reserved
	0x02			0-15	Reserved	Reserved
	0x03			0-15	Frequency	Actual Output Frequency
	0x04			0-15	Reserved	Reserved
	0x05		signed 32	0-31	Reserved	Reserved

Index	Su	R/W	Data		Bit Definitions	Speed Mode
	0x 06	/W	unsigned 16	0 -15	Reserved	Reserved

3.3.6 CiA 402

Table 3-29 Supported CiA 402 Index

Index	Sub-Index	Definition	Default Value	/W	Data Format	Unit	PDO Mapping
0x 6007	00h	Communication Abnormal Action Selection	2	/W	signed 16	\	Yes
0x 603F	00h	CANopen Fault Code	0	O	unsigned 16	\	Yes
0x 6040	00h	Control Word	0	/W	unsigned 16	\	Yes
0x 6041	00h	Status Word	0	O	unsigned 16	\	Yes
0x 6042	00h	Target Speed (vl)	0	/W	signed 16	rpm	Yes
0x 6043	00h	Actual Target Speed (vl)	0	O	signed 16	rpm	Yes
0x 6044	00h	Actual Speed (vl)	0	O	signed 16	rpm	Yes
0x 604F	00h	First Acceleration Time (vl)	10000	/W	unsigned 32	ms	Yes

Index	Sub-Index	Definition	Default Value	/W	Data Format	Unit	PDO Mapping
0x 6050	00h	First Deceleration Time (vl)	10000	/W	unsigned 32	ms	Yes
0x 6051	00h	Rapid Stop Time (vl)	0	/W	unsigned 32	ms	Yes
0x 605A	00h	Rapid Stop Option	2	/W	signed 16	\	No
0x 605C	00h	Stop Option	1	/W	signed 16	\	No
0x 6075	00h	Motor Rated Current (tq)	0	O	unsigned 32	mA	No
0x 6078	00h	Actual Current Value (tq)	0	O	signed 16	0.1%*	No
0x 6079	00h	DC Bus Voltage (tq)	0	O	unsigned 32	mV	Yes

*: Motor rated value is 100%

Control Word (6040h-00h) bit definitions are as follows:

15						6				
11		0			4					
ms		ms	r		oms		o	s	v	o
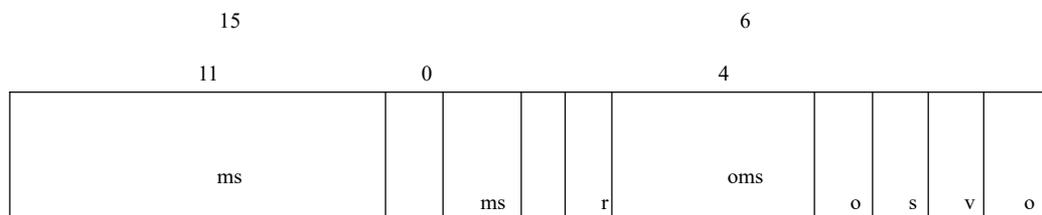
MSB

S B

Note: ms = manufacture-specific; r = reserved; oms = operation mode specific; h = halt;

fr = fault reset; eo = enable operation; qs = quick stop; ev = enable voltage; so = switch on

Status Word (6041h-00h) bit definitions are as follows:

	5	4	3	2	1	0										
ms		oms		lia	r	m	s	od	s	e		e	o	tso
	SB														SB
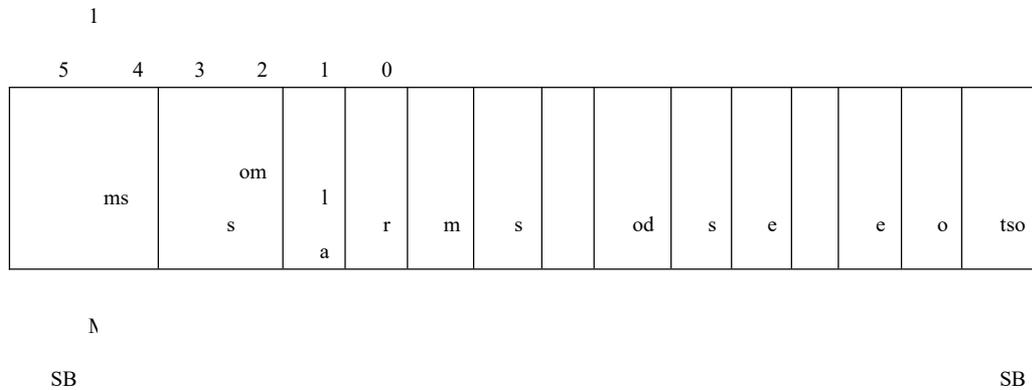
Note: ms = manufacture-specific; oms = operation mode specific; lia = internal limit active; tr = target reached; rm = remote; w = warning; sod = switch on disable; qs = quick stop;

ve = voltage enable; f = fault; oe = operation enable; so = switch on; rtso = ready to switch on

The status word encoding mapping table is as follows:

Table 3-30 Status Word Encoding Mapping Table

statusword	PDS FSA state
xxxx xxxx x0xx 0000b	Not ready to switch on
xxxx xxxx x1xx 0000b	Switch no disable
xxxx xxxx x01x 0001b	Ready to switch on
xxxx xxxx x01x 0011b	Switched on
xxxx xxxx x01x 0111b	Operation enable
xxxx xxxx x00x 0111b	Quick stop active
xxxx xxxx x0xx 1111b	Fault reaction active
xxxx xxxx x0xx 1000b	Fault

3.4 CANopen control inverter function debugging

The preparation for controlling the inverter through CANopen is as follows:

1) Wiring, refer to 6.2.2 CAN wiring method

60

2)   Set the frequency command source, parameter F0-06 = 6, select the frequency command source as CANopen setting.

3)   Set the operation command source, parameter F0-05 = 3, select the operation command source as CANopen setting.

4)   Set the CANopen slave node address, parameter F8-14 sets the slave address (default value is 0, indicating the slave function is disabled, 1~127 are valid slave node addresses). After setting the slave node address, if a station number error or CANopen memory error is reported, the CANopen can be reset by setting parameter F0-18 = 7.

5)   Set the CAN communication speed, parameter F8-15 sets the CANopen communication speed, parameter value setting range 0 (1Mbps), 1 (500kbps), 2 (250kbps), 3 (125kbps), 4 (100kbps), 5 (50kbps).

6)   The master station controls the slave station to enter the operational mode through NMT.

3.4.1   CANopen selects the CiA 402 protocol.

Speed mode is supported under the CiA 402 protocol. Parameter F8-19 = 1 enables the CiA 402 protocol. To enable the fast shutdown function using external terminals, set one of the parameters F5-00~F5-03 to 53.

The debugging steps are as follows:

1)   Set the operation mode at index 6060h-00h to 2, setting the inverter to speed mode.

2)   Control command words control the inverter to enter the operational enable state; send the control command word 0x0E at index 6040h-00h, then send 0x0F to enable the inverter to enter the operational enable state. Note the control of command word bits 6~4, defined as follows:

Table 3-31 Control command word bits 6~4

bit 6	bit 5	bit 4	Function
1	0	1	Run at the current frequency
1	1	1	Run to target
x	x	x	Decelerate to 0Hz

3)   Set the target speed, set the target speed at index 6042h-00h, the unit is rpm, a positive value indicates forward rotation,

设置格式[才]: 字体: （默认）Times New Roman, 10 磅, 加粗

设置格式[才]: 缩进: 首行缩进: 0 字符, 段落间距段前: 0 磅, 段后: 0 磅, 行距: 单倍行距

设置格式[才]: 字体: （默认）Times New Roman, 8 磅

设置格式[才]: Table Text, 居中, 段落间距段前: 10 磅, 行距: 固定值 20 磅

设置格式[才]: 字体: 加粗

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 表格文字, 居中, 行距: 固定值 20 磅

设置格式[才]: 字体: （默认）Times New Roman, 8 磅

设置格式[才]: 行距: 单倍行距

and a negative value indicates reverse rotation. Note the relationship between motor speed and frequency (information on the number of motor pole pairs).

4) Set the acceleration and deceleration time, set the inverter acceleration and deceleration time at index 604Fh-00h and 6050h-00h, the unit is ms.

5) Get the current operating speed, read the current operating speed at index 6043h-00h, the unit is rpm.

3.4.2 CANopen selects the inverter manufacturer's custom protocol.

Parameter F8-19 = 0 enables the inverter manufacturer's custom protocol.

3.4.2.1 Custom Protocol One

Custom Protocol One only supports speed mode. Debugging steps are as follows:

1) Parameter F8-07 = 0 enables Custom Protocol One.

2) Set the target frequency, index 2020h-02 sets the target frequency, the unit is 0.01Hz, for example, 5000 represents 50Hz.

3) Operation control, index 2020h-01h set to 2 indicates operation, index 2020h-01h set to 1 indicates stop.

3.4.2.2 Custom Protocol One

Custom Protocol Two supports speed mode. Debugging steps are as follows:

1) Parameter F8-07 = 1 enables Custom Protocol Two.

2) Set the target frequency, index 2060h-03 sets the target frequency, the unit is 0.01Hz, for example, 5000 represents 50Hz.

3) Operation control, set index 2060h-01h to 80h for excitation, set index 2060h-01h to 81h for operation.

3.4.3 Analog AIO and DIO

The inverter can simulate the status of IO ports through CANopen data, achieving software simulation of DO (Digital output) function, and can obtain the status of AI (Analog input) and DI (Digital input) and send it to the CAN Bus. CANopen index mapping for DIO (Digital input and output) and AIO (Analog input and output) is as follows: DI terminal (physical terminal name MI, Multi-function input) and CANopen index (2026h-01h) data bit mapping table:

Table 3-32 DI Terminal to CANopen Index Data Bit Mapping Table

Terminal Name	Attribute	bit

62

Terminal Name	Attribute	bit
FWD	RO	bit 0
REV	RO	bit 1
MI 1	RO	bit 2
MI 2	RO	bit 3
MI 3	RO	bit 4
MI 4	RO	bit 5

DO Terminal (Physical Terminal Name MO, Multi-function Output) to CANopen Index (2026h-41h) Data Bit Mapping Table:

Table 3-33 DO Terminal to CANopen Index Data Bit Mapping Table

Terminal Name	Parameter Setting	Attribute	bit
RY 1	F6-00 = 50	RW	bit 0

AI Terminal (Physical Terminal Name AI, Analog Input) to CANopen Index (2026h) Data Bit Mapping Table:

Table 3-34 AI Terminal to CANopen Index Data Bit Mapping Table

Terminal Name	Attribute	sub-index
AI	RO	61h

3.5 CANopen Fault Code

Fault codes can be read through object 0x603F, and fault types can be read through object 0x1001. Fault codes xx80h~xxFFh and FF00h~FFFFh are manufacturer-defined.

Table 3-35 CANopen Fault Codes

Fault Code	Meaning

Fault Code	Meaning
2213h	Overcurrent during acceleration and deceleration
2240h	Ground fault
2250h	Short circuit fault
2310h	Continuous overcurrent
2314h	Overcurrent at constant speed
2331h	U phase output missing
2332h	V Phase Output Missing
2333h	W Phase Output Missing
3130h	Input Phase Missing
3210h	DC Bus Overvoltage
3220h	DC Bus Undervoltage
3330h	Motor Connection Switching Error
4310h	Inverter Overtemperature
5530h	EEPROM Abnormal
7500h	Modbus Communication Fault
8100h	CANopen software fault
8130h	CANopen communication timeout

Fault Code	Meaning
8140h	CANopen disconnection
8321h	Undercurrent
8A00h	Low frequency overload protection
9000h	External trigger fault
FF00h	IGBT temperature detection abnormal (th1o)
FF01h	Capacitor temperature detection abnormal (th2o)
FF04h	U phase current detection error (cd1)
FF05h	V Phase Current Detection Error (cd2)
FF06h	W Phase Current Detection Error (cd3)
FF07h	cbc Hardware Circuit Abnormal (hd0)
FF08h	oc Hardware Circuit Abnormal (hd1)
FF20h	Motor Overheat (oh3)
FF22h	PID Feedback Disconnection
FF25h	AI Disconnection (ACE)
FF26h	Password Input Three Times Incorrect (Pcod)
FF2Bh	Pre-Operation U Phase Short Circuit Detected (Aoc)
FF2Ch	V phase short circuit detected before operation (boc)

Fault Code	Meaning
FF2Dh	W phase short circuit detected before operation (coc)
FF30h	Abnormality detected in S1 internal circuit (STL1)
FF32h	Abnormality detected in S2 internal circuit (STL2)
FF33h	Abnormality detected in internal circuit (STL3)

Fault type data bit definitions are as follows:

bit	Meaning
0	General Fault
1	Current
2	Voltage
3	Temperature
4	Communication Fault
5	Sub-protocol specified by the device
6	Reserved
7	Manufacturer Specified

3.6 Communication configuration

For example, to establish CANopen communication between a configuration module and a PLC. The configuration process varies for different PLC models; please consult technical support for details.

3.6.1 Configuration settings

1) Create project

Double-click to open the programming software for the upper computer, and click "New Project". Select the PLC device type and programming language, change the save path and project name, then click "OK"

Enter the "Network Configuration" interface, click the PLC icon, and check "CANopen Master".

2)   Install EDS file

If the EDS file has not been installed before, it needs to be installed first. Enter the "Network Configuration" interface, click "Import EDS File", find the path where the EDS file is stored, and click "Open".

After the EDS file is successfully installed, you can find the CANopen device in the network device list — CANopen port — third-party manufacturer — SUYNE.

3)   Configure Slave

In the network device list, find the CANopen module, double-click to add the module.

In the "Device" list, under "CANopen", find the module device, double-click to enter the configuration interface. In the "Slave Parameter Configuration" page, check "Enable Expert Mode" to open more configuration items.

The 'Slave Parameter Configuration' page can be used to configure the Node ID, which must match the setting in the inverter F8-14.

The 'CANopen Master' page can be used to configure the Baud Rate, which must match the setting in the inverter F8-15.

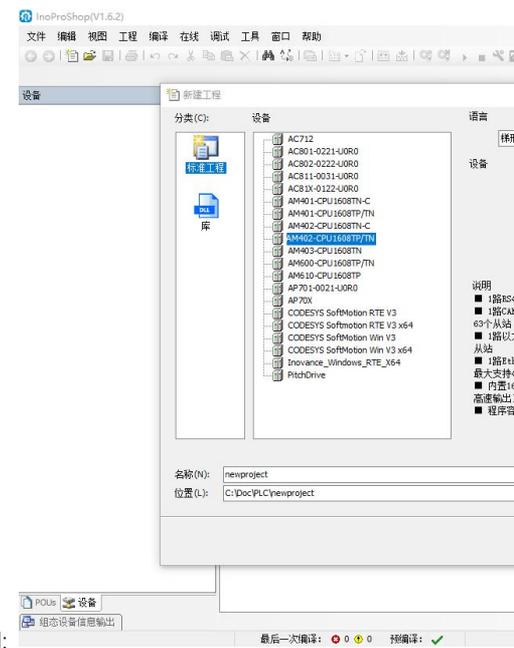### 3.6.2   Configure Cyclic Communication

1)   Configure RPDO

EL10 supports 4 RPDO transmissions, with a maximum of 16 register data transmissions.

2)   Configure TPDO

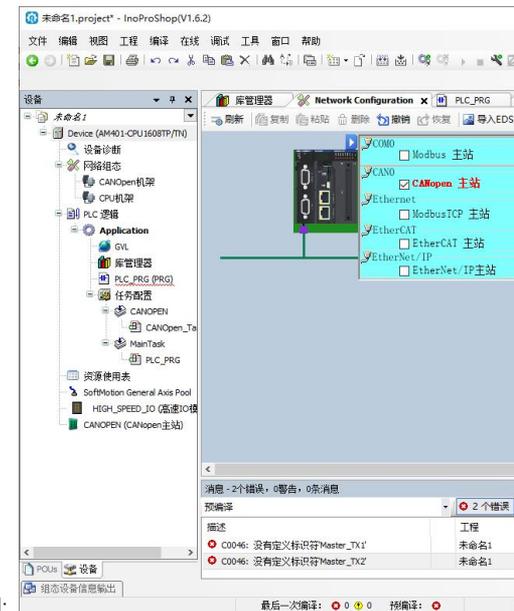EL10 supports 4 TPDO transmissions, with a maximum of 16 register data transmissions.

After configuration is complete, download the configuration, and the PLC and EL10 will automatically perform cyclic data exchange.
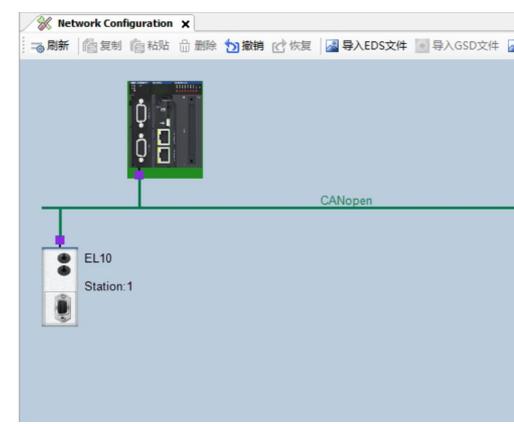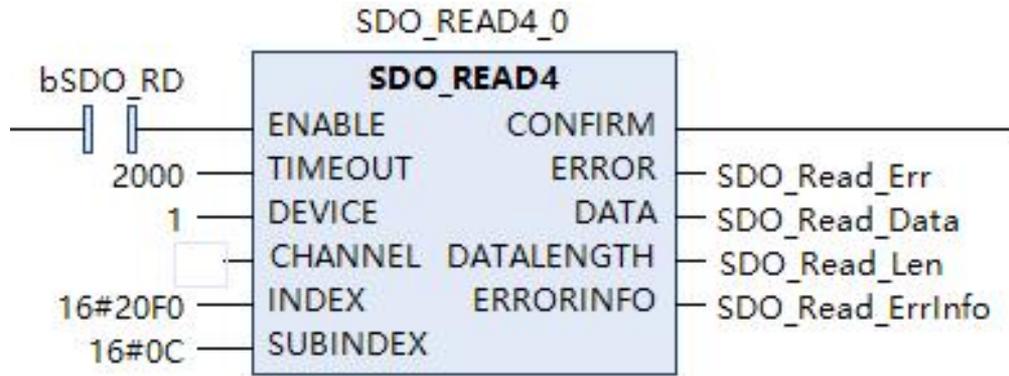
3.6.3 Configure Aperiodic Communication

1) SDO Read Operation

EL10 supports the fast SDO transfer mechanism, with each data transmission length ranging from 0~4 bytes. The SDO_READ4 function block in the PLC can achieve SDO read operations.
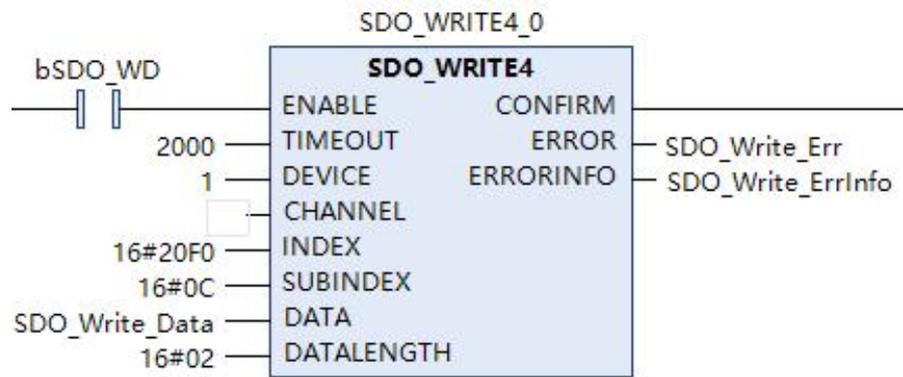
SDO_READ4_0

```
bSDO_RD           SDO_READ4
  ┤ ├──── ENABLE          CONFIRM
      2000 ── TIMEOUT        ERROR ─── SDO_Read_Err
         1 ── DEVICE          DATA ─── SDO_Read_Data
           ── CHANNEL   DATALENGTH ─── SDO_Read_Len
   16#20F0 ── INDEX       ERRORINFO ─── SDO_Read_ErrInfo
     16#0C ── SUBINDEX
```

2）SDO write operation

The SDO_WRITE4 function block of the PLC can achieve SDO write operation.

SDO_WRITE4_0

```
bSDO_WD            SDO_WRITE4
  ┤ ├──── ENABLE          CONFIRM
      2000 ── TIMEOUT        ERROR ─── SDO_Write_Err
         1 ── DEVICE      ERRORINFO ─── SDO_Write_ErrInfo
           ── CHANNEL
   16#20F0 ── INDEX
     16#0C ── SUBINDEX
SDO_Write_Data ── DATA
     16#02 ── DATALENGTH
```

Appendix: General Periodic Fault Codes

Diagnostic Classification	Status Code
Inverter Body Diagnostic Information (Register Address: 0x2100)	Low Byte (Fault Error Code): 0 No abnormal record 1 Overcurrent during acceleration (ocA) 2 Overcurrent during deceleration (ocd) 3 Overcurrent during constant speed operation (ocn) 6 Overcurrent during stop (ocS) 7 Overvoltage during acceleration (ovA) 8 Overvoltage during deceleration (ovd) 9 Overvoltage during constant speed operation (ovn) 10 Overvoltage during stop (ovS) 11 Low Voltage During Acceleration (LvA) 12 Low Voltage During Deceleration (Lvd) 13 Low Voltage During Constant Speed (Lvn) 14 Low Voltage During Stop (LvS) 15 Input Phase Loss Protection (OrP) 55 Invalid Communication Address (CE2) 56 Communication Data Value Error (CE3) 57 Communication Write to Read-Only Address (CE4) 58 Modbus Transmission Timeout (CE10) 62 Regenerative Braking Energy Action (dEb) 63 Excessive Slip (oSL) 79 U Phase Short Circuit Detected Before Operation (Aoc) 80 V Phase Short Circuit Detected Before Operation (boc) 81 W phase short circuit detected before operation (coc) 82 U phase output missing (oPL1) 83 V phase output missing (oPL2) 84 W phase output missing (oPL3) 87 Low frequency overload protection (oL3) 101 CANopen disconnection (CGdE)

16　　IGBT Overtemperature (oH1) 21　　Inverter Overload (oL) 22　　Motor Overload Protection 　　　　(EoL) 24　　Motor Overheat (oH3) 26　　Over Torque 1 (ot1) 28　　Low Current (uC) 31　Abnormal Memory Read (cF2) 36　cc Hardware Circuit Abnormal 　　　　(Hd0) 37　oc Hardware Circuit Abnormal 　　　　(Hd1) 41　PID Disconnection ACI (AFE) 48　　ACI Disconnection (ACE) 49　External Terminal Abnormality 　　　　(EF) 50　　External Terminal Emergency 　　　　Stop (EF1) 51　　External Interrupt (bb) 52　Password Input Three Times 　　　Incorrect (Pcod) 54　　Invalid Communication 　　　Command (CE1) High byte (Warn warning code): 0　　No abnormal record 1　　Communication error (CE1)	102　　CANopen disconnection 　　　　(CHbE) 104　　CANopen hardware disconnection (CbFE) 105　　CANopen index error (CIdE) 106　　CANopen station number error 　　　　(CAdE) 107　　CANopen memory error (CFrE) 141　　Abnormal current detected 　before operation (b4GFF)

设置格式[才]: 表格文字, 行距: 固定值 20 磅

	2	Communication Address Error (CE2)
	3	Communication Data Error (CE3)
	4	Inverter Cannot Process (CE4)
	5	Communication Transmission Timeout (CE10)
	7	Parameter Copy Error (SE1)
	8	Parameter Copy Error (SE2)
	9	IGBT Overheat Warning (oH1)
	11	PID Feedback Signal Warning (PID)
	12	ACI Current Signal Disconnection (AnL)
	13	Low Current Warning (uC)
	19	Input Phase Loss (PHL)
	20	Over Torque (ot1)
	22	Motor Overheat (oH3)
	24	Over Slip (oSL)
	28	Output Phase Loss Warning (OPHL)
	30	Parameter copy error for different models (SE3)
	36	CANopen software disconnection (CGdn)
	37	CANopen software disconnection (CHbn)

	39　CANopen hardware disconnection (CbFn) 40　CANopen index error (CIdn) 41　CANopen node address error (CAdn) 42　CANopen memory error (CFrn) 44　CANopen SDO receive overflow (CSbn) 46　CANopen format error (CPtn)

设置格式[才]: 表格文字, 行距: 固定值 20 磅