

FX20 User Manual for High-Speed Counting Module

FX20-CNT-BB00

Version 1.0, 2024-04-23



Tianjin Elco Automation Co.,Ltd



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1. Product Introduction

The FX20 series high-speed counting module adopts a dual channel design, and each channel supports multiple counting modes of phase A, B, and Z, with forward and reverse counting functions. The maximum counting frequency is 500KHz, and it supports multiple types of high-speed pulse signals, including source, drain, and push-pull. At the same time, each channel is equipped with a pair of DI/DO signal points, which can easily set control logic such as overspeed alarm and counting reset.

Product features:

- High measurement accuracy
- Fast response speed
- Supports counting and frequency doubling
- Maintain the value of the power outage meter

The FX20 high-speed counting module is suitable for application scenarios such as motor speed measurement, servo control, and grating ruler measurement, providing a cost-effective IO comprehensive solution for industries such as metallurgy and machine tools.

2. Version change records

Revision date	Release version	Change content
2024-4	V1.0	First edition manual release

3. Regarding manual acquisition

This manual is not shipped with the product. If you need to obtain an electronic PDF file, you can obtain it through the following methods:

Log in to the official website of ELCO (www.elco holding. com. cn), search for keywords, and download.

Use WeChat to search and follow the official official account of "ELCO Automation" to obtain the product manual.

Contact the sales engineer of ELCO Automation in your region to obtain the latest manual materials.

4. Warranty Statement

Under normal use, if the product malfunctions or is damaged, ELCO Automation is responsible for an 18 months warranty (from the date of manufacture, the delivery date shall prevail, and any contractual agreements shall be executed in accordance with the agreement). If it exceeds 18 months, maintenance fees will be charged.

Within 18 months, repair fees will be charged for product damage caused by the following circumstances.



- Failure to operate this product according to the instructions in the manual, resulting in product damage.
- Damage to products caused by fires, floods, and abnormal voltage.
- Using this product for abnormal functions may cause product damage.
- Damage to the product caused by exceeding the specified usage range.
- Secondary damage to products caused by force majeure factors such as natural disasters, earthquakes, and lightning strikes.

The service fees shall be calculated according to the unified standards of ELCO. If there is a contract, the principle of contract priority shall be applied.



5. FX20 introduction to Dual Channel High Speed Counting Module

5.1. Introduction to Appearance and Function



No.	Items	Function	Status
1	Running Indicators		
	PW	Module power supply indicator light	Green: normal; Red: module power supply undervoltage, overvoltage; Off: No power supply to the module;
	MD	Module status indicator light	Green light: normal; Green flashing: Connected, not configured; Flashing red and green alternately: not connected; Red: Counter error
	EN1、EN2	Channel1 or 2 Enable	Green: enable; Off: Not enabled
	A1、B1、Z1 A2、B2、Z2	Channel1 or 2 Data receiving	Green: Data available; Off: No data
	UP1、UP2	Channel1 or 2 Forward Counting	Green: Counting Forward
	DN1、DN2	Channel1 or 2 Reverse counting	Green: Counting Reverse
	DI1、DI2	Channel1 or 2 Digital input	Green: DI ON

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	DO1、DO2	Channel1 or 2 Digital output	Green: Do ON
	Terminal	Pressing the buckle can	
2	disassembly	separate the wiring terminal	_
L	huckle	block from the module	
	Encoder wiring	Encoder signal wiring	
3	torminals	connection	-
00		Channel1 A-nhase signal input	terminal
01	B1	Channel1 R-phase signal input	terminal
02	71	Channel1 Z-phase signal input	terminal
02	24\/	24V+ Power supply 24VDC	terminar
04	GND	GND Power supply 0V	
05	PF	Protective Farth	
06	DI1	Channel1 DI	
07	DO1	Channel1 DO	
20	A2	Channel2 A-phase signal input	terminal
22	B2	Channel2 B-phase signal input	terminal
22	Z2	Channel2 Z-phase signal input terminal	
23	24V	24V+, Power supply 24VDC	
24	GND	GND, Power supply 0V	
25	PE	Protective Earth	
26	DI2	Channel2 DI	
27	DO2	Channel2 DO	
4	24V in	24V+	-
5	24V in	0V	-
	Module fixing	Lised to secure modules to	Pulling up: installation
6	buckle	standard DIN rails	Pressing down: locking
			position
	Backplane bus	Backboard communication	
7	expansion	between modules	-

5.2. Technical specifications

Ordering parameters			
Product model	FX20- CNT -BB00		
Description	Dual channel high-speed counting module		
Electrical parameters	Electrical parameters		
Input channel	2		
Interface type	Terminal type		
Power supply	2×24VDC		
Encoder input	A/B/Z 3-phase, 24V		



Input signal type	Source, leakage, and push-pull type can be set		
Counting type	B mode, B+A dir mode, A+B mode, A+B+Z mode		
Counting frequency	Max.500kHz		
Encoder frequency doubling	x1/x2/x4		
Count data length	32bit		
Counting range	-2147483648 ~ 2147483647		
Count comparison function	support		
Forward and reverse counting	support		
Counting alarm function	support		
Filtering function	0-10ms		
I/O	Input: 2 PNP/NPN, Output: 2 PNP		
General parameters			
Protective class	IP20		
Installation	Standard 35mm DIN rails installation		
Temperature	Operation: -5 $^\circ \!\!\! \mathbb{C}$ to 60 $^\circ \!\!\! \mathbb{C}$, storage: -25 $^\circ \!\!\! \mathbb{C}$ to 70 $^\circ \!\!\! \mathbb{C}$		
Relative humidity	95%, non-condensing		
Weight	70g		
Size (H×W×D)	79mm×15mm×110mm		

5.3. Dimension drawing





6. Mechanical installation and disassembly 6.1. FX20 coupler installation

The installation is carried out according to the following steps:





During installation, align the module with the DIN rail and press the fixing device in the direction indicated by the arrow. After installation, there will be a noticeable clicking sound; change the position of the locking device slightly; after installing the module properly, make the locking device clamp the upper edge of the rail; to avoid damaging the product, do not apply excessive force.

6.2. I/O modules installation

After the installation of the coupler, the function modules can be sequentially inserted from the right side of the coupler. Before the insertion, ensure to pull out the fixing device and aligned with the two slots on the module.





The end cover is only to protect the backplane bus interface of the end module, and it is packaged and shipped together with the coupler.

6.3. Module disassembly

Use a flat screwdriver or similar tool to pry up the locking device on the rail, and then pull the module away from the DIN rail.



The wiring terminals of all modules can be removed separately to facilitate module replacement, as follows:





The mechanical installation and disassembly of modules require qualified professional mechanical personnel to operate and pay attention to the correct wearing and use of labor protection equipment.

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6.4. Installation position and minimum distances

Mount the mounting rail horizontally for the specified installation position. The connection surfaces of the coupler and the I/O modules must face forwards. This can be seen from the illustration.

The components are ventilated from bottom to top, which enables optimum cooling of the electronics by convection ventilation. The direction specification "down" corresponds to the direction of the positive acceleration due to gravity.



Observe minimum distances

Maintain the distances to neighboring devices and control cabinet walls specified in the figure. This is the only way to ensure optimum convection cooling.

If sufficient convection cooling is not ensured, the devices may overheat and be damaged.



7. Electrical installation and wiring 7.1. Cable specification

7.1.1. Communication cable

Bus communication uses shielded network cables for data transmission,

without short circuits, misalignment, and poor contact; The length of the cable

between devices cannot exceed 100m, as exceeding this length will cause

signal attenuation and affect normal communication. The following

specifications of communication cables are recommended:

Item	Specification	
Cable type	Elastic crossover cable, S-FTP, category 5	
Standarda mat	EIA/TIA568A, EN50173, ISO/IEC11801	
Standards met	EIA/TIA bulletin TSB, EIA/TIA SB40-A&TSB36	
Conductor section	AWG26	
Wire type	Twisted pair	
Wire pair	4	

Pre-wired connectors are better for communication and construction. Elco prewired connectors can provide customized cable material and cable length in accordance with communication technology requirements. The following Elco Ethernet connectors are available:

Model	Description
E16DA4002M020	RJ45-M12 double-ended pre-wired Ethernet connector, male straight, D-CODE, 4-pin, Cat5e, PVC, 2 M, fixed installation
E66D04002M020	RJ45-RJ45 double-ended pre-wired Ethernet connector, male straight-male straight, 4-pin, Cat5e, PVC, 2 M, fixed installation
E16DA4004M020	RJ45-M12 double-ended pre-wired Ethernet connector, male straight, D-CODE, 4-pin, Cat5e, PVC, 2 M, suitable for drag chain
E66D04004M020	RJ45-RJ45 double-ended pre-wired Ethernet connector, male straight-male straight, 4-pin, Cat5e, PUR, 2 M, suitable for drag chain





For more selection of Ethernet connectors, please refer to Elco's "Connectivity System Catalog".

7.1.2. Power and signal cables

The FX20 series adopts tool-free spring wiring terminals, and the wiring needs to be equipped with tube type cold pressing cable lugs. Please refer to the following figure for the stripping length and cable lug specifications:



Standard cable crimper can be used for pressing the wire ear, as shown in the following figure:



The wire connection does not need tools, and the wiring method is as follows:

- 1) Install the wire ear on the wire;
- Insert the wire installed with the wire ear into the plug-in terminal to its most;
- 3) Pull the cable to ensure it's fixed securely.

To release the wire:

- 1) Press the terminal spring button with your hand or a flat screwdriver
- 2) Pull out the wire and release the button.





7.2. FX20 wiring diagram

7.2.1. FX20 system power supply diagram

The FX20 series backplane 5VDC power supply is provided by the coupler, and IO power supply for function module needs to provide separately. Additionally, an auxiliary power supply module can provide a larger backplane power supply current. The power supply system diagram is as follows:





WARNING

- Be sure to disconnect all power connections before wiring!
- To ensure safety, must reliably connect the module grounding terminal to the ground!
- The wiring work must be operated by authorized electrical personnel to ensure safety!
- Using cables that do not meet the requirements will result in serious equipment damage or personal injury!
- Please refer to this manual or the wiring diagram printed on the side of the module for wiring. Incorrect wiring will cause module damage or personal injury!



7.2.2. Terminal Definition



A1	1	A2	
B1	2	B2	
Z1	3	Ζ2	
24V	4	24V	
GND	5	GND	
PE	6	PE	
DI1	7	DI2	
D01	8	D02	
+24V	9	0V	



8. Configuration and debugging 8.1. Debugging in Siemens PORTAL

This section introduces the usage of the FX20 high-speed counting module through a configuration practical operation process.

This example uses ELCO's FX20 distributed I/O as the Profinet slave station, and connects to Siemens PLC CPU1211C through the Profinet bus. By default, all power supply and bus connections have been completed, and the device name of the FX20 coupler module is set to "fx gateway".

The minimum firmware version for using the ELCO FX20 Profinet coupler in conjunction with the high-speed counting module is A692.

The list of selected products is as follows:

Model	Description	Quantity
FX20-GW-PN00	FX20 PROFINET coupler	1
FX20-CNT-BB00	Dual channel high-speed counting module	1

8.1.1. Configuration steps

8.1.1.1. Create a new Portal project

Open the TIA software, click "Create New Project", change the "Project Name" to FX20, select the save path, and click "Create".

V Siemens			_ ¤ ×
			Totally Integrated Automation PORTAL
启动		创建新项目	
	打开现有项目	项目名称:	FX20
设备与网络		路径:	C:\Users\Elco\Documents\Automation
	🥚 创建新项目	版本:	V17 *
	移植项目	作者:	Elco
	▲ 关闭项目	注释 ·	
运动控制 & 技术			~
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	 新手上路 		
在线与诊断 🦯	1		
	💮 已安装的软件		
	● 帮助		
	🕥 用户界面语言		
▶ 项目视图			

- 8.1.1.2. Install the GSD file for FX20 products, refer to the relevant content in the FX20 Series Distributed IO PROFINET User Manual for specific methods.
- 8.1.1.3. Double click on "Add New Device" on the left and select the PLC model to use in the "Controller" window.





8.1.1.4. Double click on the "Device Configuration" window on the left, select "Properties" ->"PROFINET Interface [X2]" ->"Ethernet Address" in the "Device View" window, and set the IP address of the PLC.



- 8.1.1.5. Add FX20 coupler module and communicate with PLC.
 - Double click on "Devices and Networks" on the left to enter the "Network View" interface. Select the FX20-GW-PN00 coupler for "Other Field Devices -->PROFINET IO -->I/O -->ELCO -->FX20" from the "Hardware Catalog", and double-click or drag to add it to the network.



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项目(P) 编辑(E) 视图(V) 插入(I) 在线(O)	选项(N) 工具(T) 窗口(M) 帮助(H) - うま (Pl ± 🖫 🛄 🛄 🔛 💋 转至在线 🖉 转至高线 🎎 🖪 📰 🗶 🖃	Totally Integrated Automation PORTAL		
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▶ 彊 设备代理数据		▼ F X20		
四 程序信息		FX20-GW-PN00		
■ PLC 报警文本列表		IDLink 67 Master		
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- 2) Click "Unassigned" with the mouse and select
 - "PLC 2.PROFINET interface 2".



 The FX20 coupler module is connected to the PLC for communication.



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8.1.1.6. Modify the device name and IP address settings of the FX20 coupler module.

1) Click on the FX20 coupler module in the "Network View", select "Properties -->PROFINET Interface -->Ethernet Address", set the FX20 coupler module device name fx20 gateway in the window, and set the IP address. (Should be in the same network segment as the IP address of the PLC).

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2) Select FX20-GW-PN00, right-click on the menu and select "Assign Device Name". In the interface for assigning Profinet device names, click "Update List". At this time, the name and MAC address of the FX20 coupler module connected will be scanned. Select the device whose MAC address matches and click "Assign Name".

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PROFINET 设备名和	►	狙态的 PROFINI PROFINET设 设 在线访问 PGIPC接□ PGIPC接□ PGI PGI C摄示同- ① 仅显示同- ① 仅显示读者 带去:	ET 设备	20-gateway x20-GW-PN00 PN/IE Realtek PCIe GbE Fa	amily Controller	•
PROFINET 设备名和	► 0 网络中的可访问 IP 地址	狙态的 PROFINI PROFINET设 设 在线访问 PGIPC接□ PGI PGI PGI PGI C摄示同- ① 仅显示同- ① 仅显示词者 带点: MAC 地址	ET 设备	20-gateway X20-GW-PN00 PN/IE @ Realtek PCIe GbE Fa 看 希	amily Controller 状态	
PROFINET 设备名和	网络中的可访问 IP 地址 192.168.0.2	狙态的 PROFINI PROFINET 设 设 在线访问 PGIPC 接口 PGIPC 接口 PGI C型 な器 (仅显示影響 (仅显示影響) (仅显示影響) (仅显示影響) (200400-1E-99-34	ET 设备 當名称: 「 「 」 的类型: 「 PC 接口: 」 一类型的设备 」 协设置错误的设备 」 设备 下 FX20-GW	20-gateway X20-GW-PN00 PN/IE @ Realtek PCIe GbE Fa a a PROFINET 设备名称 	amily Controller 状态 t 未分配设备名称	• • @ Q
PROFINET 设备名和	网络中的可访问 IP 地址 192.168.0.2	狙态的 PROFINI PROFINET 设 设 在线访问 PGIPC 接口 PGIPC 接口 PGIPC 接口 PGI C型示器 (仅显示影響) (仅显示影響) (の一次の一下の一部の (の一での一下の一部の) (の一での一下の一部の) (の一での一下の一部の) (の一での一下の一部の) (の一での一下の一部の) (の一での一下の) (の一での一下の) (の一での一下の) (の一での一下の) (の一での一下の) (の一での一下の) (の一での一下の) (の一での一下の) (の一での一下の) (の一での) (の一) (の一での) (の一での) (の一) (の一での) (の一) (の一) (の一) (の一) (の一) (の一) (の一) (の	ET 设备 當名称: 「 合类型: F PC 接口: 中の类型: 中の类型: 中の类型: 中の类型: 中の类型: 中の数量: 中の数型: 中の数量: 中型: 中の数量: 中の: 中 : 中の: 中の: 中 : 中 : 中 : 中 : 中 : 中	20-gateway X20-GW-PN00 PN/IE @ Realtek PCIe GbE Fa 都 PROFINET 设备名称 	amily Controller 状态 1. 未分配设备名称	
PROFINET 设备名和	网络中的可访问 IP 地址 192.168.0.2	狙态的 PROFINI PROFINET设 设 在线访问 PGIPC接口 PGI PGIPC接口 PGI PGI C型示题 (仅显示题 (仅显示数) (仅显示数) (仅显示数) (0200-00-1E-99-34)	ET 设备 着名称: 「 」 合类型: F 」 的类型: PC 接口: 一类型的设备 协设置错误的设备 设备 FX20-GW	20-gateway X20-GW-PN00 PN/IE @ Realtek PCIe GbE Fa 奇 命 ——————————————————————————————————	amily Controller 状态 【	
PROFINET 设备名和	网络中的可访问 IP 地址 ↓192.168.0.2	狙态的 PROFINI PROFINE 设 设 在线访问 PGIPC 接口 PGI C 接口 PGI C 接口 。 の の の 示 の 一 の の 示 の の の の の の の の の の の	ET 设备 當名称: 「 「 」 」 」 」 」 」 」 」 」 」 」 」 」	20-gateway X20-GW-PN00 PN/IE @ Realtek PCIe GbE Fa 备 备 = PROFINET 设备名称 	amily Controller 状态 1. 未分配设备名称	
ROFINET 设备名和	网络中的可访问 IP 地址 192.168.0.2	狙 杰 的 PROFINI PROFINE 设 设 在线访问 PGIPC 接口 PGI C 接口 PGI C 接加 (仅显示得一 ① 仅显示参数 ① 仅显示参数 ① 仅显示参数 ① 仅显示参数 ① 仅显示参数	ET 设备 當名称: f 「 「 」 」 」 」 」 」 」 」 」 」 」 」 」	20-gateway X20-GW-PN00 PN/IE @ Realtek PCIe GbE Fa 都 ReoFINET 设备名称 	emily Controller 状态 1. 未分配设备名称	
PROFINET 设备名和	网络中的可访问 IP 地址 192.168.0.2	組态的 PROFINI PROFINET设 设 在线访问 PGIPC接口 PGIPC接口 PGIPC接口 C規示局一 (仅显示局一 (仅显示参考 竹点: MAC地址 02-00-00-1E-99-34	ET 设备 當名称: 「 「 」 「 」 」 」 」 」 」 」 」 」 」 」 」 」	20-gateway X20-gW-PN00 PN/IE @ Realtek PCIe GbE Fa 看 PROFINET 设备名称 	emily Controller 状态 1. 未分配设备名称	
PROFINET 设备名和	网络中的可访问 IP 地址 192.168.0.2	組态的 PROFINI PROFINET设 设 在线访问 PGIPC接口 PGIPC接口 PGIPC接口 C銀示局- ① 仅显示参数 ○ 仅显示参数 ○ 仅显示参数 ○ 仅显示参数 10.200-00-1E-99-34	ET 设备 增名称: f 序 如的类型: 更 PC 接口: 面 小设置错误的设备 收设置错误的设备 设备 FX20-GW	20-gateway X20-gWPN00 PN/IE @ Realtek PCIe GbE Fa @ PROFINET 设备名称 	amily Controller 状态 1. 未分配设备名称	
PROFINET 设备名和	网络中的可访问 IP 地址 192.168.0.2	組态的 PROFINI PROFINET设 设 在线访问 PG/PC 接口 PG/PC 接口 PG/PC 接口 PG/PC # PG/PC	ET 设备 潜名称: 「 「 」 」 」 一 二 型 二 二 型 二 二 一 一 一 一 一 一 一 一 一 一 一 一 一	20-gateway X20-gWPN00 PN/IE @ Realtek PCIe GbE Fa 看 PROFINET 设备名称 	amily Controller	
PROFINET 设备名和	网络中的可访问 IP 地址 192.168.0.2	組态的 PROFINI PROFINET设 设 在线访问 PGiPC İğu PGiPC İğu PGiPC İğu PGIPC İğ	ET 设备	20-gateway X20-gWPN00 PN/IE Realtek PCIe GbE Fa	amīly Controller	

8.1.1.7. Add the corresponding model of plug-in I/O module in the



"Device Overview", select "Module -->Function Modules -->FX20-CNT-BB00" module in the "Hardware Catalog" window, and drag it to the corresponding slot.

发备 戳 览			
模块	机架	插槽	. ▼ 目录
 fx20-gateway 	0	0	▲ <捜索> →
PN-IO	0	0 X1	
FX20-CNT-BB00_1	0	1	
	0	2	
	0	3	Analog input/Output Modules
	0	4	Diagnostic Modules
	0	5	Digital input Modules
	0	6	Digital Output Modules
	0	7	 Eunction Modules
	0	8	FX20-CNT-BB00
	0	9	FX20-LKM-BD00
	0	10	FX20-SCM-BB00
	0	11	━━ ┃ ▶ 🛄 削端模状
	0	12	
	-		-

Tip: In this example, the high-speed counter inputs addresses 1-28; Output addresses 1-20 (input/output addresses can be modified as needed).

PN-IO	0	0 X1		
FX20-CNT-BB00_1	0	1	128	120
	0	2		

8.1.1.8. Select "FX20-CNT-BB00" ->"Properties" ->"Module

Parameters" for parameter settings.

Taking channel 1 as an example, the setting method for channel 2 is consistent with this.

FX20-CNT-BB00_1 [FX20-CN	NT-BB00]	◎ 属性 11 信息 3 12 诊断	
常規 10 变量 系统	充常数 文本		
 > 常规 硬件中断 	模块参数		
模块参数 1/0 地址	Channel1 - Parameter Settin	g	
	Encoder Mode:	Incremental Encoder(A, B)	1
	Direction:	Count Up	•
	Multiples:	X1	•
	Response to Z:	No Response	
	ABZ Type:	Push-Pull	•
	Over Set:	Continue	
	DI Active:	Digital Input	
	DI Mode:	Rising edge trigger	
	DO Control mode:	Control by PLC	•
	Trigger Mode:	Between the Comparison value 1 and the upper limit	•
	Format16:	BA	
	Format32:	DCBA	•
	Filter:	0 ms	•
	Storage:	Disable	



The meanings of each parameter are explained as follows:

1) Encoder Mode: Default incremental encoder (A,B)mode

模块参数		
Channel1 - Parameter Setting		
Encoder Mode:	Pulse(8)	
	Pulse(B) + Direction(A) Incremental Encoder(A, B)	

- a) Pulse B mode, only supports x1 frequency multiplication;
- b) Pulse B, direction A, only supports x1 frequency multiplication;
- AB incremental encoder mode, supporting x1/x2/x4 frequency multiplication;
- d) ABZ incremental encoder mode, supporting x1/x2/x4 frequency multiplication.

2) Direction: Counting direction, defaults to count up

- Direction: Count Up Count Up Count Down
- a) Count Up;
- b) Count Down.

3) Multiples:Frequency multiplication setting



- a) X1: 1 Multiplication;
- b) X2: 2 Multiplication;
- c) X4: 4 Multiplication;

4) Response to Z: Z-mode setting: default no response

Response to Z: No Response No Response Synchronise

- a) No response;
- b) Synchronise;

5) ABZ Type: ABZ signal input type



- a) Push-pull type;
- b) PNP type;
- c) NPN type;

6) Over Set: Configure calculation mode





.

- a) Continue
- b) Stop

7) DI Active:Input detection function,default normal IO input

- DI Active: Digital Input Digital Input Pulse Capture
- a) Digital Input;
- b) Pulse Capture;
- 8) DI Mode: DI mode, default rising edge triggered

DI Mode:	Rising edge trigger	
	Rising edge trigger Falling edge trigger Rising/Falling edge trigger	

- a) Rising edge trigger;
- b) Failing edge trigger;
- c) Rising/ Failing edge trigger;
- 9) DO Control Mode: DO control mode, default controlled by PLC

-,			······································	
		DO Control mode:	Control by PLC	
			Control by PLC Control by module	
	a)	Control b	y PLC;	
	b)	Control b	y Module;	
10)	Tri	gger Mod	e	
	Trigger Mode:		Between the Comparison value 1 and the upper limit.	
			Between the Comparison value 1 and the upper limit Between the Comparison value 1 and the lower limit Between the Comparison value 1 and 2 Not between the Comparison value 1 and 2	
	a)	Between	the Comparison value 1 and the upper limit;	
	b)	Between	the Comparison value 1 and the lower limit;	
	c)	Between	the Comparison value 1 and 2;	
	d)	Not betw	een the Comparison value 1 and 2;	
11)	Fo	rmat16: Da	ta format settings, default BA	
		Format16: AB		
		BA		
	\sim	۸D.		

- a) AB;
- b) BA;
- 12) Format32: Data format settings, default DCBA

Format32:	ABCD	•
Filter	ABCD	
rincer.	CDAB	
Storage:	BADC	
	DCBA	

- a) ABCD
- b) CDAB
- c) BADC



- d) DCBA
- 13) Filter: Filter setting, default 0ms

Filter:	0 ms	
	0 ms	
	10 ms	
	5 ms	
	2 ms	
	1 ms	
	0.5 ms	
	0.2 ms	
	0.1 ms	
	50 us	
	20 us	
	10 us	
	5 us	

14) Storage Counter storage function, default disable

Storage:	Disable	
	Disable	
	Enable	

- a) Disable;
- b) Enable;
- 15) Measure Mode: Configure counter calculation mode, default to Frequency frequency measurement mode

Channel1 - Measure Mode Setting

Measure Mode:	Frequency
Measure Time:	Frequency Speed
Encoder Resolution:	1

If you need to modify it to "Speed", you need to modify the "Encoder Resolution" value based on the encoder's own resolution; For example, if the encoder resolution is 2000, modify the Encoder Resolution value to 2000.

16) Measure time: Calculation cycle, default to 1000ms

Measure Time:	1000 ms	-
	10 ms	
	20 ms	
	50 ms	
	100 ms	
	200 ms	
	500 ms	
	1000 ms	
	2000 ms	

17) Encoder Resolution: Encoder resolution, default value is 1, range of values from 1 to 65535, to be filled in according to the encoder resolution value used

Channel1 - Measure Mode Setting				
Measure Mode:	Speed			
Measure Time:	100 ms			
Encoder Resolution:	2000			
	① 值范围:[165535]。 ×			

18) Upper limit value: Count upper limit value, default to 2147483647



Channel1 - Upper limit value

Channel1 - Upper limit value: 2147483647

19) Initial value: Count initial value, default to 0, value range -2147483648 ~ 2147483647

Channel1 - Initial value			
Channel1 - Initial value:	0		

20) Comparison_value1: Count comparison value 1, default to 0, value range -2147483648 ~ 2147483647



21) Comparison_value2: Count comparison value 1, default to 0, value range -2147483648 ~ 2147483647

Channel1 - Comparison value 2		
Channel1 - Comparison value 2:	10	

The setting method for Channel2 is completely consistent with Channel1 and will not be repeated.

8.1.1.9. After completing the parameter settings and saving the compilation, download the configured configuration to the PLC to complete the configuration work.



8.1.1.10. If everything is configured correctly at this time, the indicator



lights of the FX20 coupler will be displayed in green, and the MD light of the serial communication module will be displayed in green and remain on.



). Fault diagnosis					
ltem	Status	Meaning	Handling suggestions		
High-speed co	ounting m	odule indicator lig	hts		
	Green	Normal	None		
	Off	Abnormal auxiliary power supply	 Check if the high-speed counting module is connected to auxiliary power supply; Check whether the polarity of the auxiliary power supply is correct; The module is damaged and needs to be replaced. 		
PW	Red	Abnormal 24VDC power supply	 Check whether the 24V auxiliary power supply of the module is overvoltage; Check if the 24V auxiliary power supply of the module is under voltage; The module is damaged and needs to be replaced. 		
	Green	Normal	None		
	Green flashing	Connected, not configured	 Check if the PLC configuration is complete; Check if the module configuration is correct; 		
MD	Red/ green flashing	Not connected	 Check if the gold finger connection between modules is reliable; Check if the left and right modules of the module are connected properly; 		
	Red	Counter error	 Check if the module count parameters are correct; Check if there is a short circuit or overload in the module; Module damaged, replace; 		
EN1、EN2	Green	Channel1 or 2 Enable	None		
	Off	Disable	None		
A1、B1、Z1	Green	With signal input	None		
A2、B2、Z2	Off	No signal input	Check the encoder cable connection		
UP	Green Off	Upward Count	-		
DN	Green	Downward	-		



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		Count	
	Off	-	-
ы	Green	DI on	-
	Off	DI off	-
DO	Green	DO on	-
DO	Off	DO off	-



Appendix

Description of configuration data and process data

1. Configuration parameters

1.1. Configuration Data Description

No	Туре	Description	Data length	
1	Control register 1	Refer to 1.3	31bytes	
2	Control register 2	Refer to 1.5	31bytes	

1.2. Channel 1 configuration parameters

No.	index	subindex	Parameters	Description
1		0x01	Encoder control register	Form 1.3 BYTE1-4
2		002	Encoder calculation	Form 1.2 DVTEE 7
Ζ		UXUZ	control register	FOITH 1.5 DITES-1
3		0x03	Transmission ratio setting	Form 1.3 BYTE8-11
4	0x3000	0x04	ch1_value_max	Form 1.3 BYTE12-15
5		0x05	ch1_value_reset	Form 1.3 BYTE16-19
6		0x06	ch1_value_min	Form 1.3 BYTE20-23
7		0x07	ch1_comparison_value1	Form 1.3 BYTE24-27
8		0x08	ch1_comparison_value2	Form 1.3 BYTE28-31

1.3. Channel 1 Control Register Description

No.	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
1	ch1_Z_set	ch1_mul	tiples ch1		dir	ch1_er	ncoder_mo	de
2	res	ch1_over_set	ch1_Al	BZ_type	ch1_di_enable	ch1	di_mode	
3	res	ch1_do_control		-	C	h1_trigger_m	ode	
4	ch1_storage	ch1_forn	nat32	ch1_format16		ch1_filter		
5	res		ch1_me	easur_mode	(ch1_measur_t	ime	
6			ch1_	encoder_resoluti	ion_h			
7			ch1_	_encoder_resolut	ion_l			
8			ch1_r	neasur_ratio_ma	ster_h			
9	ch1_measur_ratio_master_l							
10	ch1_measur_ratio_slave_h							
11	ch1_measur_ratio_slave_l							
12	ch1_value_max_4							
13	ch1_value_max_3							
14	ch1_value_max_2							
15	ch1_value_max_1							
16	ch1_value_reset_4							
17			(ch1_value_reset_	3			

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18	ch1_value_reset_2
19	ch1_value_reset_1
20	ch1_value_min_4
21	ch1_value_min_3
22	ch1_value_min_2
23	ch1_value_min_1
24	ch1_comparison_value1_4
25	ch1_comparison_value1_3
26	ch1_comparison_value1_2
27	ch1_comparison_value1_1
28	ch1_comparison_value2_4
29	ch1_comparison_value2_3
30	ch1_comparison_value2_2
31	ch1_comparison_value2_1

1.4. Channel 2 configuration parameters

No.	index	subindex	Parameters	Description
1		0x01	Encoder control register	Form 1.5 BYTE1-4
2		0x02	Encoder calculation control register	Form 1.5 BYTE5-7
3		0x03	Transmission ratio setting	Form 1.5 BYTE8-11
4	0x3000	0x04	ch2_value_max	Form 1.5 BYTE12-15
5		0x05	ch2_value_reset	Form 1.5 BYTE16-19
6		0x06	ch2_value_min	Form 1.5 BYTE20-23
7		0x07	ch2_comparison_value1	Form 1.5 BYTE24-27
8		0x08	ch2_comparison_value2	Form 1.5 BYTE28-31

1.5. Channel 2 Control Register Description

No.	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
1	ch2_Z_set	ch2_mul	tiples	ch2	_dir	ch2_encoder_mode		
2	res	ch2_over_set	ch2_A	BZ_type	ch2_di_enable	ch2_di_mode		
3	res	ch2_do_control		-	ch2_trigger_mode			
4	ch2_storage	ch2_forr	nat32	ch2_format16	ch2_filter			
5	res		easur_mode	ch2_measur_time				
6	ch2_encoder_resolution_h							
7	ch2_encoder_resolution_l							
8	ch2_measur_ratio_master_h							
9	ch2_measur_ratio_master_l							
10	ch2_measur_ratio_slave_h							
11	ch2_measur_ratio_slave_l							
12	ch2_value_max_4							

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13	ch2_value_max_3
14	ch2_value_max_2
15	ch2_value_max_1
16	ch2_value_reset_4
17	ch2_value_reset_3
18	ch2_value_reset_2
19	ch2_value_reset_1
20	ch2_value_min_4
21	ch2_value_min_3
22	ch2_value_min_2
23	ch2_value_min_1
24	ch2_comparison_value1_4
25	ch2_comparison_value1_3
26	ch2_comparison_value1_2
27	ch2_comparison_value1_1
28	ch2_comparison_value2_4
29	ch2_comparison_value2_3
30	ch2_comparison_value2_2
31	ch2_comparison_value2_1

1.6. Configuration parameter description

- ch(1,2)_Z_set: Z mode set, default 0
 - 0- No response;
 - 1- Synchronization;
- ch(1,2)_multiples: Frequency multiplication setting, default value 0
 0- ×1
 - 1- ×2
 - 2- ×4
- ch(1,2)_dir: Counting direction, default 01
 01-Upward
 - 10-Downward
- ch(1,2)_encoder_mode: Encoder mode configuration, default value
 011
 - 001- Pulse B mode, only x1 Frequency multiplication;
 - 010- Pulse B, direction A, only x1 Frequency multiplication;
 - 011- Incremental encoder AB mode, support x1/ x2/ x4 FM;
 - 100- Incremental encoder ABZ mode, support x1/ x2/ x4 FM.
- ch(1,2)_over_set: Configure calculation mode, default 0
 0- Continue counting;
 - 1- Stop counting;
- ch(1,2)_ABZ_type: ABZ input type settings



00-Push-pull 01-PNP 02-NPN ch(1,2)_DI_enable: Input detection function, default 0 0- Normal IO input; 1- Pulse capture function; ■ ch(1,2)_di_mode: DI mode, default 000 000- Rising edge trigger; 001 - Falling edge trigger; 002 - Edge trigger; ■ ch(1,2)_do_control: DO control mode, default 0 0- Controlled by PLC; 1- Controlled by module; ch(1,2)_trigger_mode: Trigger mode configuration, default 0000 0000- Between comparation value1 and maximum value; 0001- Between the minimum value and comparation value1; 0010- Between comparation value 1 and comparation value 2; 0011- Not between comparation value 1 and comparation value 2; ch(1,2)_storage: Counting value storage function, default 0 0- Not stored; 1- Stored; ch(1,2) format32: 32-bit data format setting, default to 03 00-ABCD 01-CDAB 02-BADC 03-DCBA ch(1,2)_format16: 16-bit data format setting, default to 1 0- AB 1- BA ch(1,2) filter: Filter settings, default 0 0- 0ms 1- 10ms 2- 5ms 3- 2ms 4- 1ms 5- 500µs 6- 200µs 7- 100µs 8- 50µs 9- 20µs 10-10µs

11-5µs



ch(1,2)_measur_mode: Configure calculation mode, default 01 01-Frequency; 02-Speed; ch(1,2)_measur_time: Calculation cycle, default 0110 0000-10ms; 0001-20ms; 0010- 50ms; 0011-100ms: 0100-200ms; 0101-500ms; 0110-1000ms; 0111-2000ms; ■ ch(1,2)_encoder_resolution_h、ch(1,2)_encoder_resolution_l: Sensor resolution, default value 1 Input range: 1 ~ 65535; ch(1,2)_measur_ratio_master_h、ch(1,2)_measur_ratio_master_l: Configure measure master conversion ratio, default value 1 Input range: 1 ~ 65535; ch(1,2)_measur_ratio_slave_h、ch(1,2)_measur_ratio_slave_l: Configure measure slave conversion ratio, default value 1; Input range: 1 ~ 65535; ch(1,2) value max(4-1): Count upper limit value, default value 2147483647 Input range: -2147483648 ~ 2147483647; ch(1,2)_value_reset(4-1): Initial value of count value, default value 0 Input range: -2147483648 ~ 2147483647; ch(1,2)_value_min(4-1): Count lower limit value, default value -2147483648 Input range: -2147483648 ~ 2147483647; ch(1,2) comparison value1(4-1): Count comparison value 1, default value 0 Input range: -2147483648 ~ 2147483647; ch(1,2)_comparison_value2(4-1): Count comparison value 2, default value 0 Input range: -2147483648 ~ 2147483647;



2. Process Data Description 2.1. Input Data

No.	Register Name	Register Description	Description	Data format	Data length
1	status	Status register	Refer to form 2.2	-	4bytes
2	ch1_count	Channel 1 Counting Value	Pulse count value for channel 1	int	4bytes
3	ch1_capture Channel 1 capture value		When DI is triggered, the pulse count value	int	4bytes
4	ch1_measured	Channel 1 measurement value	Display conversion results based on configuration information	float	4bytes
5	ch2_count Channel 2 Counting Value		Pulse count value for channel 2	int	4bytes
6	ch2_capture Channel 2 capture value		When DI is triggered, the pulse count value	int	4bytes
7	ch2_measured	Channel 2 measurement value	Display conversion results based on configuration information	float	4bytes

2.2. Input Status Register Description

No.	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BITO
1	ch1_sync	ch1_cap	ch1_cns	ch1_DI	ch1_up	ch1_down	ch1_over	ch1_under
2	ch2_sync	ch2_cap	ch2_cns	ch2_DI	ch2_up	ch2_down	ch2_over	ch2_under
3	suppower	res			res	res	res	ch1_ld_error
4	syspower	res			res	res	res	ch2_ld_error

 chx_sync: Indicates whether the current count loads the initial value through an external reference signal

- 0- Not loaded;
- 1- Loaded;
- chx_cap: Indicates whether the current count (capture) is updated
 - 0- Not Updated;
 - 1- Updated;
- chx_cns: Indicates the counting status of the current channel within 0.5 seconds
 - 0- No count;
 - 1- Counted;
- chx_DI: Indicates the current channel input signal status
 - 0- Low level;
 - 1- High level;
- chx_up: Display the current channel count up status
 1- Upward counting;



- chx_down: Display the current channel count down status
 1- Downward counting;
- chx_over: Determine whether the current count has caused an upward overflow;
 - 0- No overflow,
 - 1- Overflow;
- chx_under: Determine whether the current count has caused a downward overflow;
 - 0- No overflow;
 - 1- Overflow;
- suppower: External voltage overvoltage and undervoltage alarm;
- syspower: System voltage overvoltage or undervoltage alarm;
- chx_ld_error: Encoder error indication, not meeting the following conditions:

Lower limit value≤counter value≤upper limit value;

Lower limit value≤initial value≤upper limit value;

Lower limit value \leq Comparison value $1 \leq$ upper limit value; Lower limit value \leq Comparison value $2 \leq$ upper limit value;

- Ch (1、2) _count: Current encoder count value;
- Ch (1、2) _di_count: Count value when DI is triggered;
- Ch (1、2) _measured: Converted value;

2.3. Output data

No.	Register	Descr	Description Data format		Data length
1	control	Control register See Form 2.4			4bytes
2	ch1 dot1	Channel 1	Channel 1	int	Abutaa
	CHT_SIOLI	loading value 1	loading value 1		409185
3	ch1 dot2	Channel 1 Channel 1		int	Abutos
	CHT_SIOTZ	loading value 2	loading value 2		409165
4	ch2 dot1	Channel 2	Channel 2	int	Abutos
	CHZ_SIOLI	loading value 1	loading value 1		409165
5	ch2 clot2	Channel 2 Channel 2		int	Abutas
	GIZ_SIULZ	loading value 2	loading value 2	1111	40yles

2.4. Output Status Control Register Description

		-				•			
No.	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0	
1	ch1_t	tv_set	ch1	_DO	ch1_clear	ch1_DO_enable	ch1_Dl_enable	ch1_enbale	
2	ch2_tv_set		et ch2_DO		ch2_clear	ch2_DO_enable ch2_DI_enable		ch2_enbale	
3	ch1_ld_slot2				ch1_ld_slot1				
4	ch2_ld_slot2				ch2_ld_slot1				

ch(1,2)_tv_set: Trigger value setting, default 01
 01-comparison_value1 is upper limit value,comparison_value2 is Lower



limit value;

10- comparison_value2 is upper limit value,comparison_value1 is Lower limit value;

 ch(1,2)_DO: DO output, default 00 00-Off;

01-On;

- ch(1,2)_clear: Clear overflow flag
 - 0- Disable;
 - 1- Enable;
- ch(1,2)_DO_enable: DO enable setting, default 0
 - 0- Disable;
 - 1- Enable;
- ch(1,2)_DI_enable: DI input capture function setting, default 0
 0- Disable;
 - 1- Enable;
- ch(1,2)_enbale: Encoder enable configuration, default 0
 - 0- Stop;
 - 1- Start counting;
- ch(1,2)_ld_slot(1,2): Set encoder trigger value
 - 0000- No response;
 - 0001- Load Count Values;
 - 0010- Reserved;
 - 0011- Load Initial Values;
 - 0100- Load Comparison Value 1;
 - 0101- Load Comparison Value 2;
 - 0110- Load Count Lower Limit;
 - 0111- Load Count Upper Limit;
 - 1000 ~ 1111-Reserved;
- ch(1,2)_slot(1,2): Set encoder range value Input Range: -2147483648 ~ 2147483647.