

# XB6S-PL20

# **Incremental Encoder Counter Module**

# **User Manual**



Nanjing Solidot Electronic Technology Co., Ltd. 2024

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# CONTENTS

1 Product Introduction	1
1.1 Product Overview	1
1.2 Product Characteristics	1
2 Product Parameters	3
2.1 General parameter	3
3 Panel	5
3.1 Panel Structure	5
3.2 Indicator light function	6
4 Installation and uninstall	7
4.1 Installation Guide	7
4.2 Installation and uninstall steps	10
4.3 Installation and uninstall diagram	11
4.4 External dimensions	17
5 Wiring	18
5.1 Wiring Diagram	18
5.2 Terminal Block Definition	19
6 Operation	21
6.1 Process Data	21
6.1.1 Upstream Data	21
6.1.2 Downstream Data	24
6.2 Configuration Parameter Definitions	28
6.2.1 Encoder count function	29
6.2.2 Probe Functions	30
6.2.3 Compare Output Function	31
6.2.4 Power-Down Storage Function	32
6.3 Application Cases	33
6.4 Module Configuration Description	34
6.4.1 Application in TwinCAT3 software environment	34

# 1 Product Introduction

### 1.1 Product Overview

XB6S-PL20 is a plug-in incremental encoder counter module, which adopts X-bus backplane and can be connected with two 24V single-ended incremental encoders. The module supports Z-phase clear, compare output, probe latch and other functions, and can be widely used in various industrial systems and equipment with our XB6S series couplers.

### 1.2 Product Characteristics

- Three Pulse Modes
   Supports AB orthogonal (ABZ), direction pulse (Pul+Dir), and double pulse (CW/CCW).
- Two Ring Count Ranges
   0~2^32-1 or 0~ ring count resolution x count ratio-1.
- Speed Report Supports reporting the real-time speed of two encoder channels.
- Z-Phase Clear
   Supports Z-phase clear function.
- Compare Output

Supports the output of a time-adjustable pulse signal from the corresponding output channel when the count value reaches the set value.

- Probe Latch Supports latching the current count value when a voltage change occurs on the probe input pin.
- Magnification Count
- Supports 4x/2x/1x count.
- Power-Down Storage Supports power-down storage of count values.
- Small Volume
   Compact and small footprint.
- Easy Configuration

The configuration is simple and supports mainstream masters.

Easy Installation
 DIN 35 mm standard rail installation
 Adopts shrapnel type terminals for easy and quick wiring.

# 2 Product Parameters

## 2.1 General parameter

Interface Parameter	
Product Model	XB6S-PL20
Bus Protocol	X-bus
Process Data Volume:	20 Bytes
Downstream	
Process Data Volume:	34 Bytes
Upstream	
	Encoder input channels: 2 sets of channels (A-phase, B-phase and
	Z-phase), PNP/NPN
	Probe input channels: 4 channels (1 encoder with 2 probe functions),
	PNP/NPN
Channel Type	General digital input channels: 4 channels (1 encoder with 2 common
	digital inputs), PNP/NPN
	compare output channels: 4 channels (1 encoder with 2 compare
	outputs), NPN
	General digital output channels: 4 channels (1 encoder with 2 common
	digital outputs), NPN
Refresh Rate	1ms

Technical Parameters	
System Input Power	5VDC (4.5V~5.5V)
Rated Current Consumption	160mA
Power Consumption	0.7W
Field-Side Power Rated	24VDC (20.4V~28.8V)
Supply (Range)	
Input Channel Rated Voltage	24VDC (20.4V~28.8V)
(Range)	
Encoder Pulse Input Mode	AB orthogonal (ABZ), directional pulse (Pul+Dir), double pulse
	(CW/CCW)
Encoder Pulse Input	1MHz
Frequency	
Real-Time Speed Of The	Support
Report Channel	
Z-Phase Clear	Support
Count Multiplier Setting	4x/2x/1x (default 1x)
Ring Count	Support
Count Range	0~2^32-1 or 0~Ring Count Resolution x Count Multiplier-1
Encoder Ring Count	Support (ring count resolution setting range 0~65535)
Resolution Setting <sup>[1]</sup>	
Count Initial Value Setting	Support (count initial value setting range 0 to 2^32-1)
Reverse Count	Support
Encoder Input Hardware	Support (0 to 15 levels)
Filter	
Probe Function (High Speed	Support
Hardware Latch)	
Probe Input Frequency	1MHz
Compare Output Function	Support
Compare Output Signal	<10us
Response Speed	
Input And Output Pin	Support
Function Selection	
Power-down Storage	Support
External Dimensions	106.4 x 25.7 x 72.3mm
Weight	110g
Wiring Method	Screwless Quick Plugs
Installation	35mm standard rail installation
Operating Temperature	-20°C~+60°C
Storage Temperature	-40°C~+80°C
Relative Humidity	95%, non-condensing
Protection Class	IP20

Note [1]: The ring count resolution here is only used to set the ring count range of the encoder and is different from the physical resolution of the encoder itself.

# **3** Panel

## 3.1 Panel Structure

Name of each part of the product



# 3.2 Indicator light function

Name	Markings	Color	Status	Description
			ON	Power supply normal
Power indicator	PWR	GREEN	OFF	The product is not powered up or the
			OFF	power supply is abnormal
			ON	The system is functioning normally
			Flaching	No business data interaction, waiting
System operation			1117	for business data interaction to be
indicator	SYS	GREEN	1112	established
			Flashing	Firmware Ungrade
			10Hz	
			OFF	System not working
Encoder input AB	0	ON ON		Encoder enabled
phase indicator	1	GREEN	OFF	Encoder Disabled
				Encoder Z-phase clear function
Encoder input Z-phase	2	CDEEN		enabled
indicator	2	GREEN	OFF	Encoder Z-phase zero function not
			UFF	enabled
Input Channel	3 to 6 (left	CDEEN	ON	Channels have signal inputs
Indicator	side)	GREEN	OFF	No signal input for channel
Output Channel	3 to 6 (right	GREEN	ON	Channel has signal output
Indicator	side)	GREEN	OFF	No signal output from channel

# **4** Installation and uninstall

## 4.1 Installation Guide

#### Precautions for installation\uninstall

- The module protection class is IP20 and the module needs to be installed in the cabinet for indoor use.
- Ensure that the cabinet is well ventilated (e.g., the cabinet is fitted with an exhaust fan).
- Do not install this equipment next to or above equipment that may cause overheating.
- Be sure to mount the module vertically on the fixed rails and maintain air circulation around it (at least 50 mm air circulation space above and below the module).
- Once the module is installed, be sure to secure the module by installing rail mounts on both ends.
- Be sure to disconnect the power supply when installing/uninstalling.
- Once the module is installed, it is recommended that wiring and cabling be done in accordance with the top and bottom alignments.

## **A** warnings

• The protection provided by the device may be jeopardized if it is not used in accordance with the product user manual.







#### Ensure that the module is installed vertically on the fixed rail

### Be sure to install the rail mounts



### Schematic diagram of upper and lower wiring of the module



# 4.2 Installation and uninstall steps

Module install	Module installation and uninstall			
	1. Install the coupler module first on the rail that has been fixed.			
	2. Install the required I/O modules or function modules in order to the right of the			
Module	coupler module.			
Installation	3、After installing all the required modules, install the end cap to complete the			
Steps	installation of the module.			
	4. Install the rail fixings at both ends of the coupler module and end cap to fix the			
	module.			
Module	1. Loosen the guide rail fixings at both ends of the module.			
Uninstall	2. Use a screwdriver to pry off the module snap.			
Steps	3. Pull out the uninstalled module.			

# 4.3 Installation and uninstall diagram

#### **Coupler Module Installation**

■ Align the coupler module vertically in the rail slot as shown in Figure ① below.



Press the coupler module in the direction of the guide rail, and when you hear a "click" sound, the module is installed in place, as shown in Figure ② below.



#### I/O Module Installation

Install the required I/O modules or function modules one by one according to the above steps of installing coupler modules as shown in Figures ③, ④ and ⑤ below, and push them in, and the modules will be installed in place when you hear the "click" sound.



3





(5)

#### **End cap installation**

Install the end cap on the right side of the last module, with the grooved side of the end cap aligned with the guide rail. Refer to the installation method of the I/O module for the installation method, and push the end cap inward into place, as shown in Figure (6) below.



■ After the end cap is installed, check whether the entire front of the module is flat to ensure that all modules and end caps are installed in place and the front is flush, as shown in Figure ⑦ below.



#### Installation of guide rail fixings

Install and tighten the rail fixings firmly against the left side face of the coupler as shown in Figure (8) below.



Install the rail fixing on the right side of the end cap, first push the rail fixings firmly in the direction of the coupler to ensure that the module is installed tightly, and lock the rail fixings with a screwdriver, as shown in Figure (9) below.



#### Uninstall

Loosen the rail fixings at one end of the module with a screwdriver and move it to one side, making sure there is clearance between the module and the rail retainer, as shown in Figure <sup>(1)</sup> below.



10

Insert a screwdriver into the snap of the module to be installed, and apply pressure (hear the rattle) in the direction of the module sideways, as shown in the following figures (1) and (2). Note: There is one snap on the top and bottom of each module, follow this method.



(11)



Uninstall the module as shown in figure (3) below, following the same steps as for installing the module.



13

# 4.4 External dimensions



# 5 Wiring

# 5.1 Wiring Diagram



- For personal and equipment safety, it is recommended that the power supply be disconnected during wiring operations.
- COM0 and COM2 are DI common, not internally interoperable and NPN/PNP compatible.
- COM1 and COM3 are encoder signal common, not internally interoperable and NPN/PNP compatible.
- 24V internal conduction, 0V internal conduction.

## 5.2 Terminal Block Definition

	Encoder0				
А			В		
Terminal markings	Terminal Definition	Description	Terminal markings	Terminal Definition	Description
0	A0	ENC0_A	0	EOV	24V Encoder Power Supply
1	BO	ENC0_B	1	E0G	0V encoder power supply
2	ZO	ENC0_Z	2	COM1	ENC0 Encoder Common
3	X00	ENC0_Input0 (probe function)	3	Y00	ENC0_Output0 (compare output)
4	X01	ENC0_Input1 (probe function)	4	Y01	ENC0_Output1 (compare output)
5	X02	ENC0_Input2 Common DI	5	Y02	ENC0_Output2 common DO
6	X03	ENC0_Input3 Common DI	6	Y03	ENC0_Output3 Common DO
7	COM0	Input common COM0	7	NC	Empty terminal
		Enco	oder1		
		c			D
Terminal markings	Terminal Definition	Description	Terminal markings	Terminal Definition	Description
0	A1	ENC1_A	0	E1V	24V Encoder Power Supply
1	B1	ENC1_B	1	E1G	0V encoder power supply
2	Z1	ENC1_Z	2	СОМЗ	ENC1 Encoder Common
3	X10	ENC1_Input0 (probe function)	3	Y10	ENC1_Output0 (compare output)
4	X11	ENC1_Input1 (probe	4	Y11	ENC1_Output1 (compare

		function)			output)
5	X12	ENC1_Input2 Common	5	Y12	ENC1_Output2 Common
		DI			DO
6	X13	ENC1_Input3 Common	6	Y13	ENC1_Output3 Common
		DI			DO
7	COM2	Input common COM2	7	NC	Empty terminal
8	24V	Field side power supply	8	24V	Field side power supply
		24V			24V
9	0V	Field side power supply	9	0V	Field side power supply
		0V			0V

# 6 Operation

## 6.1 Process Data

#### 6.1.1 Upstream Data

34 bytes of upstream data (17 bytes per encoder, encoder [n] takes values 0 to 1)				
Name	Meaning	Range Of Values	Data Type	Lengths
	Encoder probe	0: No signal input		1 bit
E[n] Input CH0 (Latch)	input signal channel 0	1: With signal input	bool	
	Encoder probe	0: No signal input		
E[n] Input CH1 (Latch)	input signal channel 1	1: With signal input	bool	1 bit
	Encoder common	0: No signal input	bool	
E[n] Input CH2	input signal channel 2	1: With signal input	bool	1 bit
	Encoder common	0: No signal input		1 bit
E[n] Input CH3	input signal channel 3	1: With signal input	bool	
	Encoder probe	0: 1->0 latch once, reverse		
F[n] Latched Flag CH0	input channel 0	once	bool	1 hit
	latch completion	1: 0->1 latch once, reverse	5001	1 Dit
	flag bit	once		
	Encoder probe	0: 1->0 latch once, reverse		
E[n] Latched Elag CH1	input channel 1	once	heal	
	latch completion	1: 0->1 latch once, reverse	5001	T DIL
	flag bit	once		
E[n] Count Value	Encoder count value	0~2^32-1	unsigned32	4 bytes

	Encoder probe			
E[n] Latch Value CH0	input channel 0	0~2^32-1	unsigned32	4 bytes
	latch value			
	Encoder probe			
E[n] Latch Value CH1	input channel 1	0~2^32-1	unsigned32	4 bytes
	latch value			
E[n] Speed	Encoder speed	-2^31~2^31-1	signed32	4 bytes

#### **Upstream Data Notes:**

• Encoder Probe Input Signal Channel E[n] Input CH0/CH1 (Latch)

Each encoder is equipped with 2 probe input channels, indicating the presence or absence of the input signal of the corresponding probe input channel.

When the probe input channel latch function is not turned on, it can be used as a common digital input channel.

#### Encoder Common Input Signal Channel E[n] Input CH2/CH3

Each encoder is equipped with 2 ordinary digital input channels, indicating the presence or absence of the corresponding DI channel input signal.

• Encoder Probe Input Channel Latched Completion Flag Bit E[n] Latched Flag CH0/CH1

1 encoder with 2 probe input channels, after the probe input channel completes a latch, the flag bit will reverse 0->1 or 1->0.

Example 1: The encoder 0 probe input channel 1 latch completion flag bit is 0. After completing one latch, the flag bit changes to 1, and after completing another latch, the flag bit changes to 0.

#### • Encoder Count Value E[n] Count Value

The encoder count value is the current count size of the corresponding encoder, the value range is  $0 \sim 2^{32-1}$ .

#### Encoder Probe Input Channel Latch Value E[n] Latch Value CH0/CH1

Each encoder is equipped with 2 probe input channels. By inputting a signal that meets the set conditions to the probe input channels, the current count value of the corresponding encoder can be quickly latched, so that the numerical range of the latched value is the same as that of the count value, and the numerical range is  $0 \sim 2^{32-1}$ .

#### • Encoder Speed E[n] Speed

The encoder speed is the magnitude of the pulse speed of the encoder input channel, and the value ranges from -2^31 to 2^31-1.

#### 6.1.2 Downstream Data

Downstream command 20 bytes (10 bytes per encoder, encoder [n] takes values 0 to 1)				
Name	Meaning	Range Of Values	Data Type	Lengths
	For a day around a solution	0: Disabled		1
E[n] Enable	Encoder count enable	1: Enabled	1000	T bit bit0
E[n] Z Phase Clear	Freeder - rhees deer orable	0: Disabled	haal	1 6:+ 6:+1
Enable	Encoder 2-phase clear enable	1: Enabled		
E[n] Count Clear	Clear of ancoder count value	0: Disabled	haal	1 bit bit2
E[II] Count Clear		1: Enabled	5001	
E[n] Compare Output	Encoder compare output	0: Disabled	haal	1 bit bit2
CH0 Enable	channel 0 enable	1: Enabled	1000	
E[n] Compare Output	Encoder compare output	0: Disabled	haal	1 bit bit4
CH 1 Enable	channel 1 enable	1: Enabled	1000	
		0: Decreasing		
E[n] Compare Output	Encoder compare output	comparison	bool	1 bit bit5
CH0 Direction	channel 0 compare direction	1: Incremental	DOOI	
		comparison		
		0: Decreasing		1 bit bit6
E[n] Compare Output	Encoder compare output channel 1 compare direction	comparison	bool	
CH1 Direction		1: Incremental		
		comparison		
E[n] Compare Output	Encoder compare output	0: Single trigger	bool	1 bit bit7
CH0 Mode	channel 0 trigger mode	1: Repeat Trigger		
E[n] Compare Output	Encoder compare output	0: Single trigger	bool	1 bit bit0
CH1 Mode	channel 1 trigger mode	1: Repeat Trigger		
		0: Output high		
E[n] Output CH0	Encoder output channel 0	level 24V	bool	1 bit bit1
(Compare)	(compare output)	1: Output low level		
		0V		
		0: Output high		
E[n] Output CH1	Encoder output channel 1	level 24V	bool	1 bit bit2
(Compare)	(compare output)	1: Output low level		
		0V		
		0: Output high		
E[n] Output CH2	Encoder output channel 2	level 24V	bool	1 bit bit3
·	(common output)	1: Output low level		
		0V		
	Encoder autority 10	0: Output high		
E[n] Output CH3	Encoder output channel 3	level 24V	bool	1 bit bit4
	(common output)			
		UV		

	Encoder probe input channel	0: Disabled	haal	1 6:4 6:45
E[n] Laten CHU Enable	0 latch enable	1: Enabled		
E[n] Latch CU1 Enable	Encoder probe input channel	0: Disabled 1: Enabled bool		1 bit bit6
E[n] Latch CHT Enable	1 latch enable			
E[n] Compare Value	Encoder compare output	02422 1	uncignod22	1 bytes
СН0	channel 0 set value	0~2^52-1	unsigneusz	4 bytes
E[n] Compare Value	Encoder compare output	02422 1	uncignod22	1 bytes
CH1	channel 1 set value	0~22-1	unsigneusz	4 Dytes

#### **Downside Data Notes:**

Encoder count enable E[n] Enable
 Encoder count enable is disabled if set to 0, and enabled if set to 1.

#### • Encoder Z Phase Clear Enable E[n] Z Phase Clear Enable

Encoder Z-phase clear enable set to 0 is disabled, set to 1 is enabled.

When Z-phase clear is enabled, the current count value is cleared by detecting the Z-phase signal of the encoder. For each rotation of the encoder, a Z-phase pulse is generated and the count value is cleared once.

The physical resolution of the encoder is the number of pulses output by one rotation of the encoder, and the count ratio×physical resolution is the maximum value of single rotation count. z-phase clear function is on, and the count value is cleared once for each rotation of the encoder when the count value is incremented or decremented.

#### Encoder Count Clear E[n] Count Clear

Edge control, the corresponding encoder count value is cleared to zero when this bit is detected to be set from 0 to 1. If the initial value of the encoder count is set, the count value is also set to 0.

#### Encoder Compare Output - Channel Enable E[n] Compare Output CH0/CH1 Enable

The encoder compare output enable is disabled when set to 0, and enabled when set to 1. When the compare output channel function is not enabled, it can be used as a common digital output channel.

Note: You must ensure that the compare output channel is not output before enabling the compare output, otherwise enabling the compare output in the output state will result in an output all the time.

See <u>6.2.3 Compare Output Function</u> for details.

#### Encoder Compare Output - Channel Compare Direction E[n] Compare Output CH0/CH1 Direction

The compare direction of the encoder compare output channel is set to 0 for decreasing comparison, i.e., the direction of count value from large to small; set to 1 for increasing comparison, i.e., the direction of count value from small to large.

#### Encoder Compare Output - Channel Trigger Mode E[n] Compare Output CH0/CH1 Mode

The encoder compare output channel trigger mode can be set to 0 (single trigger), 1 (repeat trigger). Single trigger, i.e., after the compare output function is enabled, the pulse output is triggered once when the count value meets the condition, after that, no more comparison is made, and the compare output is triggered again by re-enabling the compare output function. Repeat trigger, i.e., after the compare output function is enabled, a pulse output is triggered once when the count value meets the condition, and then the next comparison will start immediately, but the pulse output will not restart for a period of time again within the time of the compare output pulse. After a period of time is completed, the pulse output will be triggered again when the conditions of the compare output are met. For details, see 6.2.3 Compare Output Function.

#### • Encoder output channel (Compare output) E[n] Output CH0/CH1 (Compare)

When the compare output channel function is not enabled, it can be used as a common digital output channel. Digital output (NPN type output): Setting "0" outputs high level 24V, setting "1" outputs low level 0V.

When the compare output is established, the level of this pin will be reversed, so the invalid/valid level corresponding to the compare output can be set by setting this bit first and then enabling the compare output.

#### • Encoder output channel (Common output) E[n] Output CH2/CH3

Digital channel output (NPN type output): Set "0" to output high level 24V, set "1" to output low level 0V.

#### • Encoder Probe Input Channel Latch Enable E[n] Latch CH0/CH1 Enable

The latch function is enabled when the encoder input latch channel enable flag bit is set to 1, and disabled when it is set to 0.

#### Encoder Compare Output Channel Set Value E[n] Compare Output CH0/CH1 Set Value

The encoder compare output channel setting value is consistent with the encoder count range, which ranges from 0 to 2^32-1.

When the compare output function is enabled, the module will compare the current count value with the set value to see if it is the same. When both the comparison direction and the comparison setting value are the same, the corresponding compare output channel will output a time-adjustable pulse. For details, see <u>6.2.3 compare output function</u>.

# 6.2 Configuration Parameter Definitions

Module configuration has a total of 23 parameters, two encoders have 11 configuration parameters are the same and independently configured, there is one configuration parameter for the two encoders common (common parameters have been marked green in the following table), encoder 0 as an example of the introduction of configuration parameters, as shown in the table below. **Note: The configuration parameters will take effect when the encoder is enabled next time.** 

Functionality	Parameter Name	Name Range Of Values		
			Value	
Francisco Dulas		0: ABZ (AB orthogonal)		
Encoder 0 Pulse	E0 Pulse Mode	1: Pul+Dir (directional pulse)	0	
Mode		2: CW/CCW (double pulse)		
Encoder 0 Filter	E0 Filter Level	0 to 15	7	
Encoder 0 Count Ratio	E0 Count Ratio	MUL_1, 2, 4 (effective only in AB orthogonal mode)	MUL_1	
		0: 2^32 (0~2^32-1)		
Encoder 0 Count	FO Count Banga	1: Resolution x Multiple		
Range	EU Count Range	(0 ~ ring count resolution x count ratio	0	
		-1, valid only in AB orthogonal mode)		
Encoder 0 Ring Count Resolution	E0 Count Resolution	0~65535	1	
Encoder 0 Count	er 0 Count 0: Forwa			
Direction	EU Count Direction	1: Backward	0	
Encoder 0 Count Initial Value	E0 Initial Value	0~2^32-1	0	
		0: CH0 Single, CH1 Single	0	
		Channel 0 Single, Channel 1 Single		
		1: CH0 Repeat, CH1 Single		
Encoder 0 Probe	FO Lately March	Channel 0 Repeat, Channel 1 Single		
Mode	Lo Lateri Mode	2: CH0 Single, CH1 Repeat	0	
		Channel 0 Single, Channel 1 Repeat	_	
		3: CH0 Repeat, CH1 Repeat		
		Channel 0 Repeat, Channel 1 Repeat		
		0: CH0 Raising, CH1 Raising		
		Channel 0 rising edge, Channel 1 rising		
		edge	-	
Encoder 0 probe	F0 Latch Edge	1: CH0 Falling, CH1 Raising	0	
trigger edge	Lo Laten Lage	Channel 0 falling edge, Channel 1 rising		
		edge		
		2: CH0 Raising, CH1 Falling		
		Channel 0 rising edge, channel 1 falling		

		edge	
		3: CH1 Falling, CH1 Falling	
		Channel 0 falling edge, Channel 1 falling	
	edge3: CH1 Falling, CH1 FallingChannel 0 falling edge, Channel 1cder 0 Compare put Channel 0CH0Pulse Timeder 0 Compare put Channel 1E0 Compare Output Time CH0CH0CH0CH0CH1CH1CH1O~65535 (unit: ms)O~65535 (unit: ms)O~65535 (unit: ms)Ower-downPower Off Storage	edge	
Encoder 0 Compare	EQ Compare Output Time		
Output Channel 0		0~65535 (unit: ms)	10
Pulse Time	Спо		
Encoder 0 Compare	EQ Compare Output Time		
Output Channel 1		3: CH1 Falling, CH1 Falling Channel 0 falling edge, Channel 1 falli edge 0~65535 (unit: ms) e 0~65535 (unit: ms) 0~65535 (unit: ms) <u>0: OFF</u> 1: ON	10
Pulse Time	CHI		
Power-down	Dower Off Storage	0: OFF	1
storage enable	Power Off Storage	1: ON	I

#### 6.2.1 Encoder count function

The encoder counting parameters include seven parameters: **encoder pulse mode**, **filter**, **count ratio**, **count range**, **ring count resolution**, **count direction** and **count initial value**.

**Encoder Pulse Modes:** The input pulse modes supported by the encoder counter are AB orthogonal mode, directional pulse mode and CW/CCW mode.

**Encoder Filter:** Encoder filter is valid in all three pulse modes, and there are 16 levels of filter (0~15), level 0 means no filter, and level 15 means the maximum degree of filter. The default encoder filter parameter is level 7, which can be configured as needed.

Encoder Count Ratio: The encoder count ratio is only valid in AB orthogonal pulse mode.

**Encoder Count Range:** The count range of the encoder can be set to  $0 \sim 2^{32-1}$  or  $0 \sim Ring$  count resolution x count ratio-1, the former is suitable for most cases, the latter is suitable for the case where the encoder does not have a Z-phase signal, but is still needed for single-turn count.

**Encoder Ring Count Resolution:** The ring count resolution is used to set the count range of the encoder, the setting range is 0~65535.

Note: The ring count resolution here is different from the physical resolution of the encoder itself. When the resolution is set to 0 and the count range is set to 1 i.e. 0~Ring Count Resolution x Count Multiplier -1, ring count does not take effect.

**Encoder Count Direction:** The default encoder counting direction is 0 for forward counting; when set to 1, the encoder will be counted in reverse direction after the encoder is re-enabled.

**Encoder Count Initial Value:** The count initial value of the encoder supports configuration and takes effect automatically after the encoder is re-enabled. The setting range of the count initial value is  $0 \sim 2^{32-1}$ . Note: When the power-down storage function is enabled, the count initial value is invalid, and the encoder count initial values are all 0. When the count initial value is larger than the maximum value of the ring count, the ring count does not take effect.

**Example 1:** The encoder 0 pulse mode is set to AB orthogonal mode, the counting range of the encoder is selected from 0 to ring count resolution × count ratio -1, the ring count resolution is set to 50000, the count ratio is 4, the counting direction is forward, the initial count value is 0, then the count range is  $0 \sim 200000$ . the module is connected to an encoder with a physical resolution of 1000, and the count starts from 0 and increases. The module is connected to an encoder with a physical resolution of 1000, after the

count starts, the count starts from 0 and increases, the encoder rotates one turn and the count value is 1000×4=4000, and after it reaches 200000, it returns to 0 and continues to count.

#### 6.2.2 Probe Functions

The probe function parameters include two parameters: **probe mode** and **probe trigger edge**. Each encoder is equipped with two probe input channels. By inputting the corresponding signals to the probe input channels, the count value of the corresponding encoder can be latched.

**Probe Mode:** The Probe Mode parameter can be configured for single/continuous mode for each probe function channel of the encoder.

If the probe function channel is configured as single mode, the count value can be latched once when the channel inputs a signal that meets the set condition after the probe function is enabled; the subsequent input of a signal that meets the set condition again will no longer be latched unless the probe function channel is re-enabled.

If the probe function channel is configured as continuous mode, after the probe function is enabled, each time the channel inputs a signal that meets the set conditions, the count value can be latched once, which can be latched several times.

**Probe Trigger Edge:** The Probe Trigger Edge parameter allows to configure each probe function channel of the encoder to be triggered on the rising/falling edge. The latch trigger signals of the two probe channels of each encoder can be configured individually, and the latch values can be displayed separately.

The probe input channel is compatible with PNP/NPN signals through the COM terminal. When the COM terminal is connected to 0V, the input signal is PNP type, the input high level 24V signal is valid, the input low level 0V signal is invalid; when the COM terminal is connected to 24V, the input signal is NPN type, the input low level 0V signal is valid, the input high level 24V signal is invalid.

Raising edge triggering indicates that the probe input channel is triggered from an invalid signal to a valid signal, and falling edge triggering indicates that it is triggered from a valid signal to an invalid signal.

#### 6.2.3 Compare Output Function

**Compare output function** is configured by the compare output channel enable, compare output set value, compare direction, single/repeat trigger mode and compare output channel pulse time. When the encoder count value reaches the set value and the compare direction is satisfied, the corresponding compare output channel will output a pulse with adjustable time, and the adjustable time is the compare output pulse time. The pulse response speed of the compare output function can reach 10us level.

Compare output function configuration parameters include **encoder compare output channel pulse time**, configurable time range is 0~65535ms.

Each encoder is equipped with 2 compare output channels. Compare output channel enable, compare output set value, compare direction and single/repeat trigger mode can be set in the downstream data. When the compare output channel function is not enabled, the compare output channels can be used as common digital outputs.

**Example 1:** When the compare output channel 1 of encoder 0 is used as a common digital output, the output value is set to 0 (NPN type output, at which time the output is 24V), and the channel indicator is off.

The set value of the compare output channel 1 of encoder 0 is set to 1000, the compare direction is set to incremental comparison, the compare output trigger mode is single trigger, the pulse time of the compare output channel 1 is configured as 5s, after the function of the compare output channel 1 is enabled, when the count value of the encoder 0 reaches 1000 from small to large (to satisfy the compare direction), the compare output channel 1 will be outputted as the compare output channel, the state is reversed, from the original high level output to low level output, the pulse output time is 5s, the channel indicator light will be on for 5s. 5 seconds later the high level output is restored, the channel indicator light is off. When the count value meets the set value of compare output and the compare direction again, the compare output channel does not react because the trigger mode of compare output is single trigger.

**Example 2:** When the compare output channel 1 of encoder 0 is used as a common digital output, the output value is set to 1 (NPN type output, at which time the output is 0V), and the channel indicator is on.

Encoder 0 compare output channel 1 set value is set to 1000, the compare direction is set to decreasing comparison, the compare output trigger mode is repeat trigger, the compare output channel 1 pulse time is configured to 5s, the compare output channel 1 function is enabled, when the count value of encoder 0 reaches 1000 from small to large (does not satisfy the compare direction), the compare output channel 1 has no reaction; when the count value of encoder 0 When the count value of encoder 0 reaches 1000 from large to small (to satisfy the comparison direction), the compare output channel will be output as a compare output channel, and the state will be reversed from the original low level output to high level output, the pulse output time is 5s, and the channel indicator will be off for 5s. 5 seconds later, the low level output will be restored, and the channel indicator is on.

compare output trigger mode is repeat trigger, pulse output time 5s within the count value again to meet the compare output set value and compare direction, the compare output channel will not change the pulse output state, still continue to complete the 5s pulse output. 5s to meet the conditions of the comparison again, the state will be reversed again, from the original high level output to a low level

output, the pulse output time of 5s, the channel indicator will be off for 5s. compare output is triggered repeatedly and so on.

#### 6.2.4 Power-Down Storage Function

When the power-down storage enable parameter is turned on, the encoder count value can be stored in case of system power failure. The default value is 1 to enable the power-down storage function, and 0 to disable the power-down storage function.

When the power-down storage function is enabled, the initial value of the encoder count is invalid and the initial values of the encoder counts are all 0.

# 6.3 Application Cases

- Encoder 0 Input AB orthogonal pulses, 40,000 pulses, Encoder 0 probe input channel 0 for latching
  - a. Configure the configuration parameters;
    - a) The Encoder 0 Pulse Mode is set to AB Orthogonal Pulse Mode, i.e., E0 Pulse Mode is set to 0: ABZ;
    - b) The Encoder 0 Count Ratio is set to 4x, i.e. E0 Count Ratio is set to MUL\_4;
    - c) The Encoder 0 Count Range is set to 0~Ring Count Resolution x Count Multiple-1, i.e., E0
       Count Range is set to 1: Resolution x Multiple;
    - d) Encoder 0 Ring Count Resolution is set to 20000, i.e. E0 Count Resolution is set to 20000;
    - e) The Encoder 0 Count Direction is set to Forward Count, i.e. E0 Count Direction is set to 0: Forward;
    - f) The Encoder 0 Count Initial Value is set to 0, i.e., E0 Initial Value is set to 0;
    - g) Encoder 0 Probe Mode is set to Channel 0 Single, Channel 1 Single, i.e. E0 Latch Mode is set to 0: CH0 Single, CH1 Single;
    - h) The Encoder 0 Probe Trigger Edge is set to Channel 0 Raising Edge, Channel 1 Raising Edge, i.e. E0 Latch Edge is set to 0: CH0 Raising, CH1 Raising;
  - b. Set the encoder 0 count enable and the encoder 0 probe input channel 0 latch enabled;
    - a) Downstream Data E0 Enable is set to 1;
    - b) Downstream Data E0 Latch CH0 Enable is set to 1;
  - c. Encoder 0 starts to input pulses and Encoder 0 probe input channel 0 inputs a valid signal.
- Encoder 0 input directional pulses, number of pulses 40,000, encoder 0 compare output channel 0 for compare outputs
  - a. Configure the configuration parameters;
    - a) The Encoder 0 Pulse Mode is set to Direction Pulse Mode, i.e. E0 Pulse Mode is set to 1: Pul+Dir;
    - b) The Encoder 0 Count Range is set to 0~2^32-1, i.e., the E0 Count Range is set to 0:2^32;
    - c) The Encoder 0 Count Direction is set to Forward Count, i.e. E0 Count Direction is set to 0: Forward;
    - d) The Encoder 0 Count Initial Value is set to 0, i.e., E0 Initial Value is set to 0;
    - e) The Encoder 0 Compare Output Channel 0 pulse time is set to 10s, i.e. E0 Compare Output Time CH0 is set to 10000;
  - b. Set encoder 0 count enable, and encoder 0 compare output channel 0 sets and enables the compare set value, compare direction, and compare mode;
    - a) Downstream Data E0 Enable is set to 1;
    - b) Downstream Data E0 Compare Value CH0 is set to 1000;
    - c) Downstream Data E0 Compare Output CH0 Direction set to 1 Incremental Compare;
    - d) Downstream Data E0 Compare Output CH0 Mode is set to 1 Repeat Trigger;
    - e) Downstream Data E0 Compare Output CH0 Enable is set to 1 to enable;
  - c. Encoder 0 starts inputting pulses.

# 6.4 Module Configuration Description

#### 6.4.1 Application in TwinCAT3 software environment

#### 1、Preliminary

- Hardware Environment
  - > Module Model XB6S-PL20
  - EtherCAT Coupler, End Cap
     This description uses the XB6S-EC2002 coupler as an example
  - > A computer with pre-installed TwinCAT3 software
  - > Shielded cables for EtherCAT
  - > This description takes the connection of the XB6S-PT04A module as an example
  - > Encoders and other devices
  - > One switching power supply
  - > Module installation rails and rail fixings
  - Device Configuration Files
     Configuration file access: <u>https://www.solidotech.com/documents/configfile</u>
- Hardware configuration and wiring Follow "4 Installation and uninstall" and "5 Wiring".

#### 2、Preset Profiles

Place the ESI configuration file (EcatTerminal-XB6S\_V1.19.3\_ENUM.xml) in the TwinCAT installation directory under "C:\TwinCAT\3.1\Config\Io\EtherCAT" as shown below.

📕 » 此电脑 » Windows (C:) » TwinCAT » 3.1 »	Config > Io > EtherC	AT.	い ~
名称 ^	修改日期	类型	大小
Beckhoff EPP4xxx.xml	2016/12/22 10:57	XML文档	500 KB
Beckhoff EPP5xxx.xml	2016/12/22 10:57	XML文档	736 KB
Beckhoff EPP6xxx.xml	2017/4/5 14:46	XML文档	1,272 KB
Beckhoff EPP7xxx.xml	2016/12/22 10:57	XML文档	1,466 KB
Beckhoff EQ1xxx.xml	2015/11/12 14:24	XML文档	22 KB
Beckhoff EQ2xxx.xml	2016/11/23 10:42	XML文档	73 KB
Beckhoff EQ3xxx.xml	2016/11/22 11:22	XML文档	1,386 KB
Beckhoff ER1xxx.XML	2016/11/21 15:46	XML文档	165 KB
Beckhoff ER2xxx.XML	2016/11/21 14:32	XML文档	259 KB
Beckhoff ER3xxx.XML	2017/6/9 13:35	XML文档	1,177 KB
Beckhoff ER4xxx.xml	2016/11/22 12:58	XML文档	318 KB
Beckhoff ER5xxx.xml	2016/3/14 11:52	XML 文档	273 KB
Beckhoff ER6xxx.xml	2016/3/14 11:52	XML文档	494 KB
Beckhoff ER7xxx.xml	2016/11/22 12:14	XML 文档	1,503 KB
Beckhoff ER8xxx.xml	2016/3/14 11:52	XML文档	207 KB
Beckhoff EtherCAT EvaBoard.xml	2015/2/4 12:57	XML 文档	72 KB
Beckhoff EtherCAT Terminals.xml	2015/2/4 12:57	XML 文档	53 KB
Beckhoff FB1XXX.xml	2017/5/24 12:26	XML 文档	49 KB
Beckhoff FCxxxx.xml	2015/2/4 12:57	XML文档	21 KB
Beckhoff ILxxxx-B110.xml	2015/2/4 12:57	XML 文档	8 KB
EcatTerminal-XB6S_V1.19.3_ENUM.xml	2024/3/18 18:43	XML 文档	1,113 KB

#### 3、Create Project

a. Click the TwinCAT icon in the lower right corner of the desktop and select "TwinCAT XAE (VS xxxx)" to open the TwinCAT software as shown below.



b. Click "New TwinCAT Project", in the pop-up window, "Name" and "Solution name" correspond to the project name and solution name, respectively, and "Location" corresponds to the project path, and these three items can be selected by default, then click "OK", the project is created successfully, as shown in the following figure.

New TwinCAT F	Project	Get Started	Beckhoff Ne	ews	
New Measuren	nent Project			What's New in 1	winCAT 3
New Project					? ×
▶ Recent		.NET Framework 4.5 + Sort b	y: Default	- II' 🗉	Search Installed 👂
<ul> <li>Installed</li> <li>Templates         <ul> <li>Other Project</li> <li>TwinCAT Me</li> <li>TwinCAT PLC</li> <li>TwinCAT Pro</li> <li>Samples</li> </ul> </li> <li>Online</li> </ul>	tt Types easurement C jects	TwinCAT XAE Projec The Click here to go online and	winCAT Projects	Type: TwinCAT TwinCAT XAE Sys Configuration	Projects stem Manager
Name:	TwinCAT Proj	ect1			
Location: Solution name:	D:\workspace	e\TwinCAT Project ect1	-	Browse Create directory	for solution
					OK Cancel

#### 4、Scanning device

a. After creating the project, right-click on the "Scan" option under "I/O -> Devices" to perform a slave device scan, as shown in the following figure.



b. Check the "Local Connection" box, as shown in the following figure.



c. Click on the pop-up window "Scan for boxes" and select "Yes"; click on the pop-up window "Activate Free Run" and select "Yes". "Yes", as shown in the figure below.



d. After scanning to the device, you can see Box1 (XB6S-EC2002) and Module 1 (XB6S-PL20) in the left navigation tree, and you can see that TwinCAT is in the "OP" state at "Online". You can observe that the RUN indicator of the slave device is always on, as shown in the figure below.



#### 5、Validating Basic Functions

a. Click "Box1 -> Startup -> New" in the left navigation tree to enter the configuration parameter editing page, as shown in the following figure.



b. In the Edit CANopen Startup Entry pop-up window, click the "+" in front of Index 2000:0 to expand the configuration parameter menu, you can see 23 configuration parameters, click on any one of the parameters, you can set the relevant configuration, as shown in the following figure.

Edit CANoper	Startup Entry					$\times$
Transition □ I -> P ☑ P -> S □ S -> 0	□S→P □O→S	Index (hex) Sub-Index I	: (dec):	2000 0 Complete Access	OI Can	< cel
Data (hexbin):	17				Hex E	idit
Validate Mask:					_	
Comment:	SubIndex 000				Edit E	.ntry
Index	Name		Flags	Value	Unit	^
<mark>⊜-</mark> 2000:0	XB6S-PL20 Conf	g	RO	> 23 <		
2000:01	E0 Pulse Mode		RW	ABZ (0)		
2000:02	E0 Filter Level		RW	Filter_Level_7 (7)		
2000:03	E0 Count Ratio		RW	MUL_1 (1)		
2000:04	E0 Count Range		RW	2^32 (0)		
2000:05	E0 Count Resolu	tion	RW	0x00000001 (1)		
2000:06	E0 Count Directio	n	RW	Forward (0)		
2000:07	E0 Initial Value		RW	0x00000000 (0)		
2000:08	E0 Latch Mode		RW	CH0 Single, CH1 Single (0)		
2000:09	E0 Latch Edge		RW	CH0 Raising, CH1 Raising (0)		
-2000:0A	E0 Compare Out	out Time CH0	RW	0x0000000A (10)		
-2000:0B	E0 Compare Out	out Time CH1	RW	0x000000A (10)		
2000:0C	E1 Pulse Mode		RW	ABZ (0)		
2000:0D	E1 Filter Level		RW	Filter_Level_7 (7)		
⊢2000:0E	ET Count Ratio		RW	MUL_1 (1)		
-2000:0F	ET Count Range		RW	2 32(0)		~

c. For example, to modify the encoder 0 ring count resolution parameter, you can double-click "E0 Count Resolution" to modify the parameter value, as shown in the following figure.

Edit CANoper	n Startup Entry			$\times$
Transition □ I -> P ☑ P -> S □ S -> O	□S->P □0->S	Index (hex): Sub-Index (dec): Validate	2000 5 Complete Access	OK Cancel
Data (hexbin): ∀alidate Mask: Comment:	01 00 00 00 E0 Count Resoluti	on		Hex Edit Edit Entry
Index - 2000:04 - 2000:05	Name E0 Count Range E0 Count Resolution	Flag RW BW	s Value 2^32 (0) 0x00000001 (1)	Unit
-2000:06 -2000:07 -2000:08	E0 Count Direction E0 Initial Value E0 Latch Mode	Set Value Dia	log	×
- 2000:09 - 2000:0A - 2000:0B	E0 Latch Edge E0 Compare Output T E0 Compare Output T	Dec: Hex:	0x000003E8	OK Cancel
- 2000:0C - 2000:0D - 2000:0E	E1 Pulse Mode E1 Filter Level E1 Count Ratio	Float:	1.4012985e-42	
- 2000:0F - 2000:10 - 2000:11	E1 Count Range E1 Count Resolution E1 Count Direction	Bool: Binary	Q 1	Hex Edit
-2000:12 -2000:13	E1 Initial Value E1 Latch Mode	Bit Size:		64 ()?

d. After the parameter modification is completed, you can see the modified parameter items and parameter values under Startup, as shown in the following figure. After the parameter setting is completed, it is necessary to carry out Reload operation and re-power up the module to realize that the master station automatically sends down the parameter setting.

neral Ether	CALDC	Process Data	Slots Startup CoE - (	Online Diag History Onli	ne	
Transition	Protocol	Index	Data	Comment		
c <ps></ps>	CoE	0xF030 C 0	01 00 01 E4 00 00	download slot cfg		
C PS	CoE	0x2000:05	0x000003E8 (1000)	E0 Count Resolution		

e. The left navigation tree "Module 1 -> Inputs" displays the module's upstream data, which is used to monitor the module's inputs, as shown in the following figure.

Solution Explorer	• 4 ×	TwinCAT Project1 🖷 🗙							<u> </u>
○ ○ ☆ · ○ · □ ≠ <u>-</u>		Name	Online	Type	Size	>Address	In/Out	User ID	Linked to
Search Solution Explorer (Ctrl+:)	۰ 0	E0 Input CH0 (Latch)	0	BIT	0.1	41.0	Input	0	
	-	🕫 E0 Input CH1 (Latch)	0	BIT	0.1	41.1	Input	0	
Solution 'TwinCAT Project1' (1 project)		E0 Input CH2	0	BIT	0.1	41.2	Input	0	
IwinCAT Project1		🕶 E0 Input CH3	0	BIT	0.1	41.3	Input	0	
P SYSTEM		E0 Latched Flag CH0	0	BIT	0.1	41.4	Input	0	
MOTION III DI C	- 11	E0 Latched Flag CH1	0	BIT	0.1	41.5	Input	0	
	- 11	E1 Input CH0 (Latch)	0	BIT	0.1	42.0	Input	0	
SAFELT		🕫 E1 Input CH1 (Latch)	0	BIT	0.1	42.1	Input	0	
		E1 Input CH2	0	BIT	0.1	42.2	Input	0	
Devices	- 11	✓ E1 Input CH3	0	BIT	0.1	42.3	Input	0	
Device 1 (EtherCAT)		E1 Latched Flag CH0	0	BIT	0.1	42.4	Input	0	
1 Image		E1 Latched Flag CH1	0	BIT	0.1	42.5	Input	0	
Image-Info		✤ E0 Count Value	0	UDINT	4.0	43.0	Input	0	
SyncUnits	- 11	E0 Latch Value CH0	0	UDINT	4.0	47.0	Input	0	
Inputs		🕫 E0 Latch Value CH1	0	UDINT	4.0	51.0	Input	0	
Outputs	- 11	✓ E0 Speed	0	DINT	4.0	55.0	Input	0	
InfoData			0	UDINT	4.0	59.0	Input	0	
Box 1 (XB6S-EC2002)		E1 Latch Value CH0	0	UDINT	4.0	63.0	Input	0	
Inputs			0	UDINT	4.0	67.0	Input	0	
Outputs			0	DINT	4.0	71.0	Input	0	
<ul> <li>P         Module 1 (XB6S-PL20)</li> </ul>			-					17.	
Inputs									
P Gutputs									
P Module 2 (XB6S-P104A)									
P 🛄 Inputs									
v 🖬 Outputs									

f. The left navigation tree "Module 1 -> Outputs" displays the downstream data of the module, which is used to control the outputs of the module, as shown in the following figure.

Solution Explorer 🔹 4 🗙	TwinCAT Project1 👳 🗙							*
000 0-0 8-	Name	Online	Type	Size	>Address	In/Out	User ID	Linked to
Search Solution Europerer (Ctrlu)	E0 Enable	0	BIT	0.1	41.0	Output	0	
	E0 Z Phase Clear Enable	0	BIT	0.1	41.1	Output	0	
Solution 'TwinCAT Project1' (1 project)	E0 Count Clear	0	BIT	0.1	41.2	Output	0	
TwinCAT Project1	E0 Compare Output CH0 Enable	0	BIT	0.1	41.3	Output	0	
SYSTEM	E0 Compare Output CH1 Enable	0	BIT	0.1	41.4	Output	0	
MOTION	E0 Compare Output CH0 Direction	0	BIT	0.1	41.5	Output	0	
PLC	E0 Compare Output CH1 Direction	0	BIT	0.1	41.6	Output	0	
SAFETY	E0 Compare Output CH0 Mode	0	BIT	0.1	41.7	Output	0	
	E0 Compare Output CH1 Mode	0	BIT	0.1	42.0	Output	0	
A The Devices	E0 Output CH0 (Compare)	0	BIT	0.1	42.1	Output	0	
Device 1 (EtherCAT)	E0 Output CH1 (Compare)	0	BIT	0.1	42.2	Output	0	
	E0 Output CH2	0	BIT	0.1	42.3	Output	0	
Image-Info	E0 Output CH3	0	BIT	0.1	42.4	Output	0	
SyncUnits	E0 Latch CH0 Enable	0	BIT	0.1	42.5	Output	0	
Inputs	E0 Latch CH1 Enable	0	BIT	0.1	42.6	Output	0	
Outputs	E1 Enable	0	BIT	0.1	43.0	Output	0	
InfoData	E1 Z Phase Clear Enable	0	BIT	0.1	43.1	Output	0	
<ul> <li>Box 1 (XB6S-EC2002)</li> </ul>	E1 Count Clear	0	BIT	0.1	43.2	Output	0	
Inputs	E1 Compare Output CH0 Enable	0	BIT	0.1	43.3	Output	0	
Outputs	E1 Compare Output CH1 Enable	0	BIT	0.1	43.4	Output	0	
Module 1 (XB6S-PL20)	E1 Compare Output CH0 Direction	0	BIT	0.1	43.5	Output	0	
P Inputs	E1 Compare Output CH1 Direction	0	BIT	0.1	43.6	Output	0	
Modulo 2 (XR65 DT044)	E1 Compare Output CH0 Mode	0	BIT	0.1	43.7	Output	0	
Pi Module 2 (Ab03-F104A)	E1 Compare Output CH1 Mode	0	BIT	0.1	44.0	Output	0	
Dutputs	E1 Output CH0 (Compare)	0	BIT	0.1	44.1	Output	0	
V WcState	E1 Output CH1 (Compare)	0	BIT	0.1	44.2	Output	0	
InfoData	E1 Output CH2	0	BIT	0.1	44.3	Output	0	
and Mappings	E1 Output CH3	0	BIT	0.1	44.4	Output	0	
	E1 Latch CH0 Enable	0	BIT	0.1	44.5	Output	0	
	E1 Latch CH1 Enable	0	BIT	0.1	44.6	Output	0	
	E0 Compare Value CH0	0	UDINT	4.0	45.0	Output	0	
	E0 Compare Value CH1	0	UDINT	4.0	49.0	Output	0	
	E1 Compare Value CH0	0	UDINT	4.0	53.0	Output	0	
	E1 Compare Value CH1	0	UDINT	4.0	57.0	Output	0	

#### **Examples of Module Functions**

- Encoder 0 input AB orthogonal pulses, 40,000 pulses, encoder 0 probe input channel 0 for latching
  - a. Configure the configuration parameters as shown below.
    - a) The Encoder 0 Pulse Mode is set to AB orthogonal Pulse Mode, i.e., E0 Pulse Mode is set to 0: ABZ;
    - b) The Encoder 0 Count Ratio is set to 4x, i.e. E0 Count Ratio is set to MUL\_4;
    - c) The Encoder 0 Count Range is set to 0 to Ring Count Resolution x Count Multiple 1, i.e., E0 Count Range is set to 1: Resolution x Multiple;
    - d) Encoder 0 Ring Count Resolution is set to 20000, i.e. E0 Count Resolution is set to 20000;
    - e) The Encoder 0 Count Direction is set to Forward Count, i.e. E0 Count Direction is set to 0: Forward;
    - f) The Encoder 0 Count Initial Value is set to 0, i.e., E0 Initial Value is set to 0;
  - g) Encoder 0 Probe Mode is set to Channel 0 Single, Channel 1 Single, i.e. E0 Latch Mode is set to 0: CH0 Single, CH1 Single;
  - h) The Encoder 0 Probe Trigger Edge is set to Channel 0 Raising Edge, Channel 1 Raising Edge, i.e.
     E0 Latch Edge is set to 0: CH0 Raising, CH1 Raising.

Edit CANoper	n Startup Entry					$\times$
Transition				2000	0	K
∐1-> P		Index (hex):	Ź	2000	Car	ncel
🗹 P -> S	S-> P	Sub-Index (d	dec): 8	3		
S→0	0->S	Validate		Complete Access		
Data (hexbin):	00 00 00 00				Hex E	Edit
Validate Mask:					1	
Comment:	E0 Latch Mode				Edit E	Entry
Index	Name		Flags	Value	Unit	~
≘-2000:0	XB6S-PL20 Config		RO	> 23 <		
2000:01	E0 Pulse Mode		RW	ABZ (0)		
2000:02	E0 Filter Level		RW	Filter_Level_7 (7)		
2000:03	E0 Count Ratio		RW	MUL_4 (4)		
2000:04	E0 Count Range		RW	Resolution* Multiple (1)		
2000:05	E0 Count Resolution		RW	0x00004E20 (20000)		
2000:06	E0 Count Direction		RW	Forward (0)		
2000:07	E0 Initial Value		RW	0x00000000 (0)		
2000:08	E0 Latch Mode		RW	CH0 Single, CH1 Single (0)		
2000:09	E0 Latch Edge		RW	CH0 Raising, CH1 Raising (0)		
-2000:0A	E0 Compare Output	Fime CH0	RW	0x0000000A (10)		
	E0 Compare Output	Fime CH1	RW	0x0000000A (10)		
2000:0B	Lo compare carpar					
-2000:0B	E1 Pulse Mode		RW	ABZ (0)		
- 2000:0B - 2000:0C - 2000:0D	E1 Pulse Mode E1 Filter Level		RW RW	ABZ (0) Filter_Level_7 (7)		
2000:0B 2000:0C 2000:0D 2000:0E	E1 Pulse Mode E1 Filter Level E1 Count Ratio		RW RW RW	ABZ (0) Filter_Level_7 (7) MUL_1 (1)		

After the parameter setting is completed, Reload operation and module re-powering are required to realize the master station automatically sends down the parameter setting.

- b. Set the encoder 0 count enable and the encoder 0 probe input channel 0 latch enable as shown below.
  - a) Downstream Data E0 Enable is set to 1;
  - b) Downstream Data E0 Latch CH0 Enable is set to 1.

Solution Explorer - 4 ×	TwinCAT Project1 🗢 🗙							-
000 10-0 1-	Name	Online	Type	Size	>Address	In/Out	User ID	Linked to
Coarse Solution Suplayer (Ctd )	E0 Enable	1	BIT	0.1	41.0	Output	0	
search solution explorer (Ctrl+;)	E0 Z Phase Clear Enable	0	BIT	0.1	41.1	Output	0	
Solution 'TwinCAT Project1' (1 project)	E0 Count Clear	0	BIT	0.1	41.2	Output	0	
TwinCAT Project1	E0 Compare Output CH0 Enable	0	BIT	0.1	41.3	Output	0	
SYSTEM	E0 Compare Output CH1 Enable	0	BIT	0.1	41.4	Output	0	
MOTION	E0 Compare Output CH0 Direction	0	BIT	0.1	41.5	Output	0	
PLC	E0 Compare Output CH1 Direction	0	BIT	0.1	41.6	Output	0	
SAFETY	E0 Compare Output CH0 Mode	0	BIT	0.1	41.7	Output	0	
	E0 Compare Output CH1 Mode	0	BIT	0.1	42.0	Output	0	
A Straines	E0 Output CH0 (Compare)	0	BIT	0.1	42.1	Output	0	
Device 1 (EtherCAT)	E0 Output CH1 (Compare)	0	BIT	0.1	42.2	Output	0	
Image	E0 Output CH2	0	BIT	0.1	42.3	Output	0	
Image-Info	E0 Output CH3	0	BIT	0.1	42.4	Output	0	
SyncUnits	E0 Latch CH0 Enable	1	BIT	0.1	42.5	Output	0	
Inputs	E0 Latch CH1 Enable	0	BIT	0.1	42.6	Output	0	
Outputs	E1 Enable	0	BIT	0.1	43.0	Output	0	
InfoData	E1 Z Phase Clear Enable	0	BIT	0.1	43.1	Output	0	
<ul> <li>Box 1 (XB6S-EC2002)</li> </ul>	E1 Count Clear	0	BIT	0.1	43.2	Output	0	
Inputs	E1 Compare Output CH0 Enable	0	BIT	0.1	43.3	Output	0	
P Utputs	E1 Compare Output CH1 Enable	0	BIT	0.1	43.4	Output	0	
P Module I (XB6S-PL20)	E1 Compare Output CH0 Direction	0	BIT	0.1	43.5	Output	0	
P inputs	E1 Compare Output CH1 Direction	0	BIT	0.1	43.6	Output	0	
Module 2 (YB6S-PT04A)	E1 Compare Output CH0 Mode	0	BIT	0.1	43.7	Output	0	
	E1 Compare Output CH1 Mode	0	BIT	0.1	44.0	Output	0	
Outputs	E1 Output CH0 (Compare)	0	BIT	0.1	44.1	Output	0	
WcState	E1 Output CH1 (Compare)	0	BIT	0.1	44.2	Output	0	
👂 🛄 InfoData	E1 Output CH2	0	BIT	0.1	44.3	Output	0	
Mappings	E1 Output CH3	0	BIT	0.1	44.4	Output	0	
	E1 Latch CH0 Enable	0	BIT	0.1	44.5	Output	0	
	E1 Latch CH1 Enable	0	BIT	0.1	44.6	Output	0	
	E0 Compare Value CH0	0	UDINT	4.0	45.0	Output	0	
	E0 Compare Value CH1	0	UDINT	4.0	49.0	Output	0	
	E1 Compare Value CH0	0	UDINT	4.0	53.0	Output	0	
	E1 Compare Value CH1	0	UDINT	4.0	57.0	Output	0	

c. Encoder 0 starts to input 40000 pulses, after the pulse counting is completed, encoder 0 probe input channel 0 inputs a valid signal, encoder 0 counts the value of 40000, probe input channel 0 latches the value of 40000, and the encoder probe input channel 0 latches the value of the completion flag bit value reversed once to 1, as shown in the following figure.

TwinCAT Project T + X							
Name	Online	Туре	Size	>Address	In/Out	User ID	Linked to
🕶 E0 Input CH0 (Latch)	0	BIT	0.1	41.0	Input	0	
🕶 E0 Input CH1 (Latch)	0	BIT	0.1	41.1	Input	0	
🕫 E0 Input CH2	0	BIT	0.1	41.2	Input	0	
🕫 E0 Input CH3	0	BIT	0.1	41.3	Input	0	
E0 Latched Flag CH0	1	BIT	0.1	41.4	Input	0	
E0 Latched Flag CH1	0	BIT	0.1	41.5	Input	0	
🕿 E1 Input CH0 (Latch)	0	BIT	0.1	42.0	Input	0	
E1 Input CH1 (Latch)	0	BIT	0.1	42.1	Input	0	
E1 Input CH2	0	BIT	0.1	42.2	Input	0	
E1 Input CH3	0	BIT	0.1	42.3	Input	0	
E1 Latched Flag CH0	0	BIT	0.1	42.4	Input	0	
E1 Latched Flag CH1	0	BIT	0.1	42.5	Input	0	
🕫 E0 Count Value	40000	UDINT	4.0	43.0	Input	0	
E0 Latch Value CH0	40000	UDINT	4.0	47.0	Input	0	
E0 Latch Value CH1	0	UDINT	4.0	51.0	Input	0	
✓ E0 Speed	0	DINT	4.0	55.0	Input	0	
✓ E1 Count Value	0	UDINT	4.0	59.0	Input	0	
E1 Latch Value CH0	0	UDINT	4.0	63.0	Input	0	
E1 Latch Value CH1	0	UDINT	4.0	67.0	Input	0	
✓ E1 Speed	0	DINT	4.0	71.0	Input	0	
	IwincAl Project 1 + X Name * E0 Input CH0 (Latch) * E0 Input CH1 (Latch) * E0 Input CH2 * E0 Input CH3 * E0 Latched Flag CH0 * E0 Latched Flag CH1 * E1 Input CH0 (Latch) * E1 Input CH1 (Latch) * E1 Input CH3 * E1 Latched Flag CH0 * E1 Latched Flag CH1 * E0 Count Value * E0 Latch Value CH0 * E1 Latch Value CH1 * E0 Speed * E1 Latch Value CH0 * E1 Latch Value CH0 * E1 Latch Value CH0 * E1 Latch Value CH0 * E1 Latch Value CH1 * E1 Speed	IwincAl Project 1         4         Online           © E0 Input CH0 (latch)         0         0           © E0 Input CH1 (latch)         0         0           © E0 Input CH2         0         0           © E0 Input CH2         0         1           © E0 Latched Flag CH0         1         0           © E1 Input CH1 (latch)         0         0           © E1 Input CH0 (Latch)         0         0           © E1 Input CH1 (latch)         0         0           © E1 Input CH3         0         0           © E1 Latched Flag CH1         0         0           © E1 Latched Flag CH0         0         0           E1 Latched Flag CH1         0         0           © E0 Latch Value CH0         40000         0           © E0 Latch Value CH1         0         0           © E1 Latch Value CH1         0         0           © E1 Latch Value CH0         0         0           © E1 Latch Value CH1         0         0           © E1 Latch Value CH1         0         0	IwmeAl Project14 ×NameOnlineType© E0 Input CH0 (Latch)0BIT© E0 Input CH1 (Latch)0BIT© E0 Input CH20BIT© E0 Input CH30BIT© E0 Latched Flag CH01BIT© E1 Input CH1 (Latch)0BIT© E1 Input CH1 (Latch)0BIT© E1 Input CH1 (Latch)0BIT© E1 Input CH30BIT© E1 Latched Flag CH10BIT© E1 Latched Flag CH10BIT© E1 Latched Flag CH10BIT© E1 Latched Flag CH10BIT© E0 Latch Value CH040000UDINT© E0 Latch Value CH10UDINT© E1 Latch Value CH10UDINT© E1 Latch Value CH00UDINT© E1 Latch Value CH10UDINT© E1 Latch Value CH10UDINT© E1 Speed0DINT© E1 Speed0DINT© E1 Speed0DINT	Iwme         Online         Type         Size           © E0 Input CH0 (Latch)         0         BIT         0.1           © E0 Input CH1 (Latch)         0         BIT         0.1           © E0 Input CH2         0         BIT         0.1           © E0 Input CH2         0         BIT         0.1           © E0 Input CH2         0         BIT         0.1           © E0 Latched Flag CH0         1         BIT         0.1           © E0 Latched Flag CH1         0         BIT         0.1           © E1 Input CH0 (Latch)         0         BIT         0.1           © E1 Input CH3         0         BIT         0.1           © E1 Input CH3         0         BIT         0.1           © E1 Input CH3         0         BIT         0.1           © E1 Latched Flag CH0         0         BIT         0.1           © E0 Latch Value CH0         40000         UDINT         4.0           © E0 Latch Value CH1         0         UDINT         4.0           © E0 Latch Value CH1         0         UDINT         4.0           © E1 Latch Value CH1         0         UDINT         4.0           © E1 Latch Value CH1         0 </td <td>Name         Online         Type         Size         &gt;Address           © E0 Input CH0 (Latch)         0         BIT         0.1         41.0           © E0 Input CH1 (Latch)         0         BIT         0.1         41.1           © E0 Input CH2         0         BIT         0.1         41.1           © E0 Input CH2         0         BIT         0.1         41.2           © E0 Input CH2         0         BIT         0.1         41.3           © E0 Latched Flag CH0         1         BIT         0.1         41.5           © E1 Input CH0 (Latch)         0         BIT         0.1         42.0           © E1 Input CH0 (Latch)         0         BIT         0.1         42.2           © E1 Input CH3         0         BIT         0.1         42.4           © E1 Input CH3         0         BIT         0.1         42.4           © E1 Latched Flag CH0         0         BIT         0.1         42.5           © E0 Count Value         40000         UDINT         4.0         43.0           © E0 Latch Value CH1         0         UDINT         4.0         55.0           © E1 Count Value         0         UDINT         4.0</td> <td>Instruct Al Project 1         4         X           Name         Online         Type         Size         &gt;Address         In/Out           © E0 Input CH0 (Latch)         0         BIT         0.1         41.0         Input           © E0 Input CH1 (Latch)         0         BIT         0.1         41.1         Input           © E0 Input CH2         0         BIT         0.1         41.1         Input           © E0 Input CH3         0         BIT         0.1         41.3         Input           © E0 Latched Flag CH0         1         BIT         0.1         41.5         Input           © E0 Latched Flag CH1         0         BIT         0.1         41.5         Input           © E1 Input CH0 (Latch)         0         BIT         0.1         42.0         Input           © E1 Input CH3         0         BIT         0.1         42.1         Input           © E1 Input CH3         0         BIT         0.1         42.4         Input           © E1 Input CH3         0         BIT         0.1         42.4         Input           © E1 Latched Flag CH0         0         BIT         0.1         42.4         Input</td> <td>Name         Online         Type         Size         &gt;Address         In/Out         User ID           © E0 Input CH0 (Latch)         0         BIT         0.1         41.0         Input         0           © E0 Input CH1 (Latch)         0         BIT         0.1         41.1         Input         0           © E0 Input CH2         0         BIT         0.1         41.2         Input         0           © E0 Input CH2         0         BIT         0.1         41.3         Input         0           © E0 Latched Flag CH1         0         BIT         0.1         41.5         Input         0           © E1 Input CH0 (Latch)         0         BIT         0.1         42.0         Input         0           © E1 Input CH1 (Latch)         0         BIT         0.1         42.1         Input         0           © E1 Input CH3         0         BIT         0.1         42.2         Input         0           © E1 Input CH3         0         BIT         0.1         42.4         Input         0           © E1 Latched Flag CH0         0         BIT         0.1         42.4         Input         0           © E0 Latch Value CH1</td>	Name         Online         Type         Size         >Address           © E0 Input CH0 (Latch)         0         BIT         0.1         41.0           © E0 Input CH1 (Latch)         0         BIT         0.1         41.1           © E0 Input CH2         0         BIT         0.1         41.1           © E0 Input CH2         0         BIT         0.1         41.2           © E0 Input CH2         0         BIT         0.1         41.3           © E0 Latched Flag CH0         1         BIT         0.1         41.5           © E1 Input CH0 (Latch)         0         BIT         0.1         42.0           © E1 Input CH0 (Latch)         0         BIT         0.1         42.2           © E1 Input CH3         0         BIT         0.1         42.4           © E1 Input CH3         0         BIT         0.1         42.4           © E1 Latched Flag CH0         0         BIT         0.1         42.5           © E0 Count Value         40000         UDINT         4.0         43.0           © E0 Latch Value CH1         0         UDINT         4.0         55.0           © E1 Count Value         0         UDINT         4.0	Instruct Al Project 1         4         X           Name         Online         Type         Size         >Address         In/Out           © E0 Input CH0 (Latch)         0         BIT         0.1         41.0         Input           © E0 Input CH1 (Latch)         0         BIT         0.1         41.1         Input           © E0 Input CH2         0         BIT         0.1         41.1         Input           © E0 Input CH3         0         BIT         0.1         41.3         Input           © E0 Latched Flag CH0         1         BIT         0.1         41.5         Input           © E0 Latched Flag CH1         0         BIT         0.1         41.5         Input           © E1 Input CH0 (Latch)         0         BIT         0.1         42.0         Input           © E1 Input CH3         0         BIT         0.1         42.1         Input           © E1 Input CH3         0         BIT         0.1         42.4         Input           © E1 Input CH3         0         BIT         0.1         42.4         Input           © E1 Latched Flag CH0         0         BIT         0.1         42.4         Input	Name         Online         Type         Size         >Address         In/Out         User ID           © E0 Input CH0 (Latch)         0         BIT         0.1         41.0         Input         0           © E0 Input CH1 (Latch)         0         BIT         0.1         41.1         Input         0           © E0 Input CH2         0         BIT         0.1         41.2         Input         0           © E0 Input CH2         0         BIT         0.1         41.3         Input         0           © E0 Latched Flag CH1         0         BIT         0.1         41.5         Input         0           © E1 Input CH0 (Latch)         0         BIT         0.1         42.0         Input         0           © E1 Input CH1 (Latch)         0         BIT         0.1         42.1         Input         0           © E1 Input CH3         0         BIT         0.1         42.2         Input         0           © E1 Input CH3         0         BIT         0.1         42.4         Input         0           © E1 Latched Flag CH0         0         BIT         0.1         42.4         Input         0           © E0 Latch Value CH1

#### Encoder 0 input directional pulses, number of pulses 40,000, encoder 0 compare output channel 0 for compare outputs

- a. Configure the configuration parameters as shown below.
- a) The Encoder 0 Pulse Mode is set to Direction Pulse Mode, i.e. E0 Pulse Mode is set to 1: Pul+Dir;
- b) The Encoder 0 Count Range is set to 0~2^32-1, i.e., the E0 Count Range is set to 0:2^32;
- c) The Encoder 0 Count Direction is set to Forward Count, i.e. E0 Count Direction is set to 0: Forward;
- d) The Encoder 0 Count Initial Value is set to 0, i.e., E0 Initial Value is set to 0;
- e) The Encoder 0 Compare Output Channel 0 pulse time is set to 10s, i.e. E0 Compare Output Time CH0 is set to 10000.

Edit CANoper	n Startup Entry				×
Transition ☐ I -> P ✓ P -> S ☐ S -> 0	Index (h           S -> P           Sub-Ind           O -> S           Valid	ex): [ ex (dec): [ late [	2000 0 Complete Access	OK Cance	əl
Data (hexbin):	17			Hex Edi	it
Validate Mask: Comment:	SubIndex 000			Edit Ent	try
Index	Name	Flags	Value	Unit	^
⊜-2000:0	XB6S-PL20 Config	RO	> 23 <		
2000:01	E0 Pulse Mode	RW	Pul+Dir (1)		
-2000:02	E0 Filter Level	RW	Filter_Level_7 (7)		
-2000:03	E0 Count Ratio	RW	MUL_1 (1)		
2000:04	E0 Count Range	RW	2^32 (0)		
-2000:05	E0 Count Resolution	RW	0x00000000 (0)		
-2000:06	E0 Count Direction	RW	Forward (0)		
2000:07	E0 Initial Value	RW	0x00000000 (0) ]		
-2000:08	E0 Latch Mode	RW	CH0 Single, CH1 Single (0)		
-2000:09	E0 Latch Edge	RW	CH0 Raising, CH1 Raising (0)		
-2000:0A	E0 Compare Output Time CH	0 RW	0x00002710 (10000)		
-2000:0B	EU Compare Output Time CH	I RW	0x0000000A (10)		
-2000:0C	ET FUISE Mode	RW	ABZ (V)		
2000:0D	E I HITER Level	RW	Filter_Level_/(/)		
2000:0E	ET Count Ratio	RW	MUL_I(I)		
2000.0F	ET Count Nange	E W	2 02 (0)		~

After the parameter setting is completed, Reload operation and module re-powering are required to realize the master station automatically sends down the parameter setting.

- b. Set the encoder 0 count enable, and the encoder 0 compare output channel 0 sets the compare set value, compare direction, and compare mode and enables them as shown below.
  - a) Downstream Data E0 Enable is set to 1;
  - b) Downstream Data E0 Compare Value CH0 is set to 1000;
  - c) Downstream Data E0 Compare Output CH0 Direction set to 1 Incremental Compare;
  - d) Downstream Data E0 Compare Output CH0 Mode is set to 1 Repeat Trigger;
  - e) Downstream Data E0 Compare Output CH0 Enable is set to 1 to enable.

Solution Explorer 👻 👎	× TwinCAT Project1 ↔ ×							
000 10-0 4-	Name	Online	Type	Size	>Address	In/Out	User ID	Linked to
Search Solution Explorer (Ctrl +)	E0 Enable	1	BIT	0.1	41.0	Output	0	
	E0 Z Phase Clear Enable	0	BIT	0.1	41.1	Output	0	
Solution 'TwinCAT Project1' (1 project)	E0 Count Clear	0	BIT	0.1	41.2	Output	0	
<ul> <li>TwinCAT Project1</li> </ul>	E0 Compare Output CH0 Enable	1	BIT	0.1	41.3	Output	0	
P SYSTEM	E0 Compare Output CH1 Enable	0	BIT	0.1	41.4	Output	0	
MOTION	E0 Compare Output CH0 Direction	1	BIT	0.1	41.5	Output	0	
SAFETY	E0 Compare Output CH1 Direction	0	BIT	0.1	41.6	Output	0	
SALETT SALETT	E0 Compare Output CH0 Mode	1	BIT	0.1	41.7	Output	0	
	E0 Compare Output CH1 Mode	0	BIT	0.1	42.0	Output	0	
Pevices	E0 Output CH0 (Compare)	0	BIT	0.1	42.1	Output	0	
▲ ➡ Device 1 (EtherCAT)	E0 Output CH1 (Compare)	0	BIT	0.1	42.2	Output	0	
🛟 Image	E0 Output CH2	0	BIT	0.1	42.3	Output	0	
📲 Image-Info	E0 Output CH3	0	BIT	0.1	42.4	Output	0	
SyncUnits	E0 Latch CH0 Enable	0	BIT	0.1	42.5	Output	0	
Inputs	E0 Latch CH1 Enable	0	BIT	0.1	42.6	Output	0	
Outputs	E1 Enable	0	BIT	0.1	43.0	Output	0	
InfoData	E1 Z Phase Clear Enable	0	BIT	0.1	43.1	Output	0	
<ul> <li>Box 1 (XB6S-EC2002)</li> </ul>	E1 Count Clear	0	BIT	0.1	43.2	Output	0	
P 🧾 Inputs	E1 Compare Output CH0 Enable	0	BIT	0.1	43.3	Output	0	
P Uutputs	E1 Compare Output CH1 Enable	0	BIT	0.1	43.4	Output	0	
P Module I (XBoS-PL20)	E1 Compare Output CH0 Direction	0	BIT	0.1	43.5	Output	0	
P outputs	E1 Compare Output CH1 Direction	0	BIT	0.1	43.6	Output	0	
Module 2 (XR6S-PT04A)	E1 Compare Output CH0 Mode	0	BIT	0.1	43.7	Output	0	
	E1 Compare Output CH1 Mode	0	BIT	0.1	44.0	Output	0	
Outputs	E1 Output CH0 (Compare)	0	BIT	0.1	44.1	Output	0	
WcState	E1 Output CH1 (Compare)	0	BIT	0.1	44.2	Output	0	
InfoData	E1 Output CH2	0	BIT	0.1	44.3	Output	0	
Mappings	E1 Output CH3	0	BIT	0.1	44.4	Output	0	
	E1 Latch CH0 Enable	0	BIT	0.1	44.5	Output	0	
	E1 Latch CH1 Enable	0	BIT	0.1	44.6	Output	0	
	E0 Compare Value CH0	1000	UDINT	4.0	45.0	Output	0	
	E0 Compare Value CH1	0	UDINT	4.0	49.0	Output	0	
	E1 Compare Value CH0	0	UDINT	4.0	53.0	Output	0	
	E1 Compare Value CH1	0	UDINT	4.0	57.0	Output	0	
		5			101010101		11.50	

c. Encoder 0 starts to input 40000 pulses, the count value is up from 0, when it reaches 1000 (to meet the compare set value and direction), the compare output channel 0 state is reversed, from the original low level output to high level output, the pulse output time is 10s, the channel indicator will be on for 10s. after the counting is completed, the count value of encoder 0 is 40000, as shown in the figure below.

Solution Explorer 👻 🖣 🗙	TwinCAT Project1 😐 🗙							
00 <u>0</u> 10-0 1	Name	Online	Type	Size	>Address	In/Out	User ID	Linked to
Search Solution Explorer (Ctrl+:)	🛫 E0 Input CH0 (Latch)	0	BIT	0.1	41.0	Input	0	
	🕶 E0 Input CH1 (Latch)	0	BIT	0.1	41.1	Input	0	
Solution 'TwinCAT Project1' (1 project)	🕿 E0 Input CH2	0	BIT	0.1	41.2	Input	0	
IwinCAT Project1	💌 E0 Input CH3	0	BIT	0.1	41.3	Input	0	
P SYSTEM	E0 Latched Flag CH0	0	BIT	0.1	41.4	Input	0	
	E0 Latched Flag CH1	0	BIT	0.1	41.5	Input	0	
	E1 Input CH0 (Latch)	0	BIT	0.1	42.0	Input	0	
	E1 Input CH1 (Latch)	0	BIT	0.1	42.1	Input	0	
	E1 Input CH2	0	BIT	0.1	42.2	Input	0	
Devices	E1 Input CH3	0	BIT	0.1	42.3	Input	0	
Device 1 (EtherCAT)	E1 Latched Flag CH0	0	BIT	0.1	42.4	Input	0	
🛟 Image	E1 Latched Flag CH1	0	BIT	0.1	42.5	Input	0	
🛟 Image-Info	🕿 E0 Count Value	40000	UDINT	4.0	43.0	Input	0	
SyncUnits	E0 Latch Value CH0	0	UDINT	4.0	47.0	Input	0	
Inputs	E0 Latch Value CH1	0	UDINT	4.0	51.0	Input	0	
Outputs	✓ E0 Speed	0	DINT	4.0	55.0	Input	0	
InfoData	🕿 E1 Count Value	0	UDINT	4.0	59.0	Input	0	
Box 1 (XB6S-EC2002)	E1 Latch Value CH0	0	UDINT	4.0	63.0	Input	0	
P 🛄 Inputs	E1 Latch Value CH1	0	UDINT	4.0	67.0	Input	0	
Outputs     Modulo 1 (XR65, DI 20)	✓ E1 Speed	0	DINT	4.0	71.0	Input	0	
Pi Module 1 (Abos-FL20)								
Outputs								
Module 2 (XB6S-PT04A)								
▷ □ Inputs								
Outputs								