EC4-ENC2IT

EtherCAT SubDevice Slim Two-Channel Incremental Encoder Counter Module with Compare Trigger and Latch Function

Features

- On the fly processing: EtherCAT
- Two channels, 32-bit incremental encoder counters
- Encoder counting mode: CW/CCW , Pulse/Direction, A/B Phase
- Maximum counting rate: 4 MHz
- Encoder Input: A, B, C differential or single-ended signals
- Two digital input for counter latching
- Two digital output for position compare signal trigger: single, auto-increment and array compare
- Position difference value for velocity calculation
- Encoder digital input filter
- Input level: 5V, 12V/24V with internal resistor
- Polarity setting by software for active high or active low encoder input
- A/B/C signal isolation voltage: 2500V optical isolation

Introduction

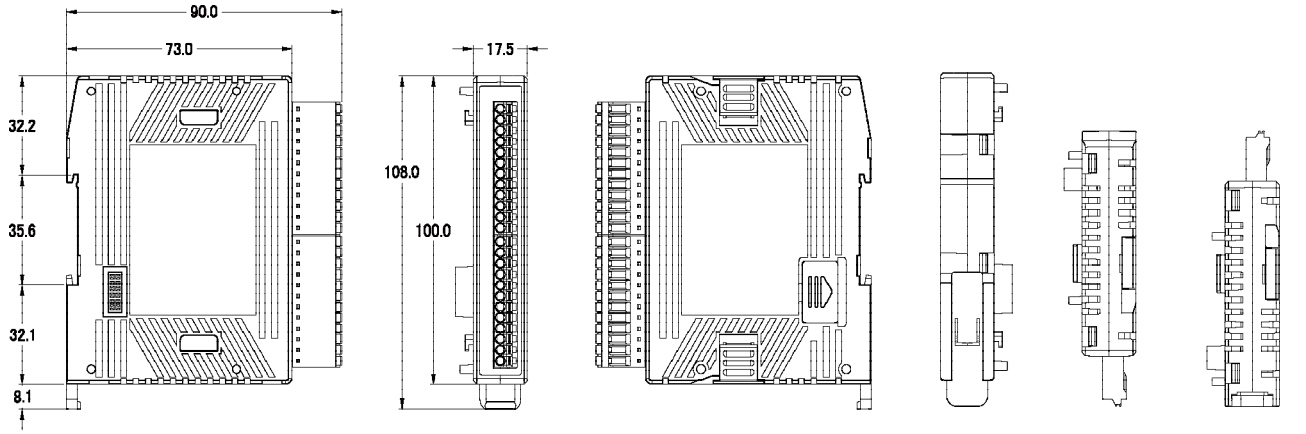
EC4-ENC2IT is an incremental encoding counter module with two independent high-speed counter channels, based on a slim design. It reads the pulse train generated by an incremental encoder and can be used in positioning feedback applications. Each channel has two counter (A, B) and one index inputs (C). The inputs can either be single-ended or differential signals. Three counting modes are supported: clockwise/counterclockwise, pulse/direction and quadrant counting mode. Each 32-bit counter and the trigger level (falling/rising edge) can be configured and set by software.

In addition to the encoder inputs A, B and C, a latch input I for each encoder channel allows the latching and clearing of each encoder counter. Encoder position are latched at rising and falling input signal and are recorded in two separate register.

The EC4-ENC2IT supports position compare: Each encoder channel is equipped with one 32-bit compare register which compares the counter position with the compare position and generates an output signal when the counter reaches or passes the compare position. The compare function supports single, auto incremental and array position compare. The pulse width of the compare output can be set.

Each channel has got an adjustable input signal filter for filtering out electrical noises.

Dimensions (Units: mm)



Left View | Front View | Right View | Rear View | Top View | Bottom View

Specifications

Model		EC4-ENC2IT
Encoder Input		
Number of encoder inputs		2x encoder counter (A, B, C), differential or single-ended
Counter resolution		32 bit
Encoder mode		A/B Phase, CW/CCW, Pulse/Dir
Maximum input pulse frequency	A/B Phase	4 MHz
	CW/CCW	4 MHz
	Pulse/Dir	4 MHz
Programmable digital filter		1 ~ 250 μs
Input level	5V (default)	Logic high: 4 V ~ 5 V, Logic low: 0 V ~ 2 V
	12 V (set by jumper)	Logic high: 5 V ~ 12 V, Logic low: 0 V ~ 2 V
	24 V (set by jumper)	Logic high: 5 V ~ 24 V, Logic low: 0 V ~ 2 V
A/B/C signal photo-isolation		2500 V_{DC}
External Latch Input		
Channel		2
Input level	5V (default)	Logic high: 4 V ~ 5 V, Logic low: 0 V ~ 2 V
	12 V (set by jumper)	Logic high: 5 V ~ 12 V, Logic low: 0 V ~ 2 V
	24 V (set by jumper)	Logic high: 5 V ~ 24 V, Logic low: 0 V ~ 2 V
Compare Trigger Output		
Channel		2
Trigger pulse width		1 ~ 32,767 μs
Load voltage		5 ~ 48 V
Max load current		100 mA
LED Indicators		
Diagnostic LED		Power, EtherCAT status, signal status of each encoder input
EtherCAT		
Cycle time		200 μs
Distributed clocks		Yes
Power		
Input voltage range		+24 V_{DC}
Power consumption		Maximum 4.5W
EMS Protection		
ESD (IEC 61000-4-2)		4 KV Contact for each channel
EFT (IEC 61000-4-4)		Signal: 1 KV Class A; Power: 1 KV Class A
Mechanism		
Casing		Plastic
Dimensions (mm)		17.5 × 108 × 90 (W × L × D)
Installation		DIN-Rail or Wall Mounting
Environment		
Operating temperature		-25°C ~ +75°C
Storage temperature		-30°C ~ +80°C
Relative humidity		10 ~ 90% RH, Non-condensing

Ordering Information

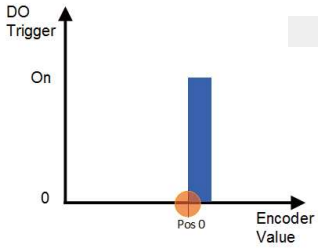
EC4-ENC2IT CR	EtherCAT SubDevice Slim Two-Channel Incremental Encoder Counter Module with Compare Trigger and Latch Function (RoHS)

Connection Interfaces

Name	Signal	Signal Description	
A0+	Input	Encoder input A0+	Encoder Channel 0
A0−	Input	Encoder input A0−	
B0+	Input	Encoder input B0+	
B0−	Input	Encoder input B0−	
C0+	Input	Encoder input C0+	
C0−	Input	Encoder input C0−	
I0+	Input	Latch input I0+	
I0−	Input	Latch input I0−	
T0	Output	Compare trigger DO0	
GND		External ground for DO0	
5Vo	Output	Power supply to encoder	
A1+	Input	Encoder input A1+	Encoder Channel 1
A1−	Input	Encoder input A1−	
B1+	Input	Encoder input B1+	
B1−	Input	Encoder input B1−	
C1+	Input	Encoder input C1+	
C1−	Input	Encoder input C1−	
I1+	Input	Latch input I1+	
I1−	Input	Latch input I1−	
T1	Output	Compare trigger DO1	
GND		External ground for DO1	

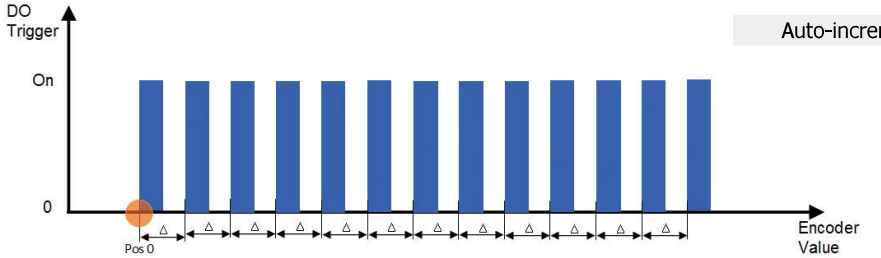
Position Compare Trigger Types

Single position compare:The user has to set one compare position at which a digital output signal will be triggered. The DO trigger will always be generated once the encoder counter reaches this position, regardless from which direction.



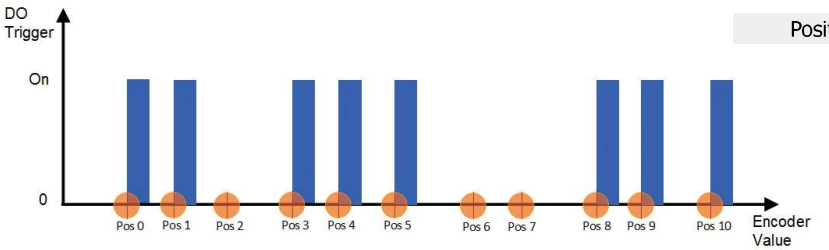
Single position compare

Fixed distance auto-increment compare:In a unidirectional movement the next compare position will be automatically set by incrementing the current compare position with a fixed distance. This means the position compare output is generated at a fixed pitch.



Auto-increment compare

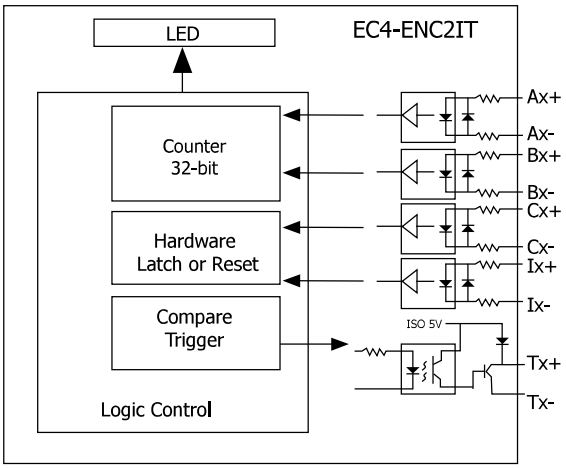
Position compare array:A sequential compare which triggers a position compare output according to a set number of positions stored in the hardware registers. Up to 200 compare values are supported for each encoder channel. Each individual position in the array can be set whether to trigger an output when its position has been reached.



Position array compare

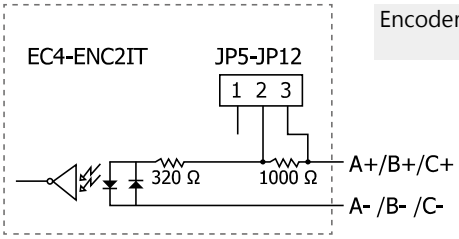
The position compare function can be either be enabled via software or a dedicated DI.

Internal I/O Structure



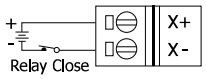
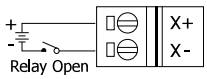
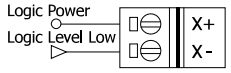
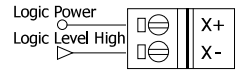
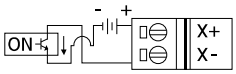
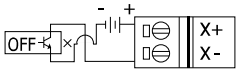
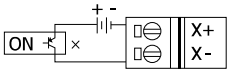
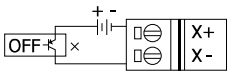
Digital Input Channel

The EC4-ENC2IT can accept encoder inputs from either differential or single-ended signals.
By default it is set to support differential encoder signals as they are preferred due to their excellent noise immunity. For single-ended encoder connection the EC4-ENC2IT provides an internal 1k Ohm resistor for each signal input. The internal resistor can be selected via jumper setting.

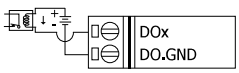
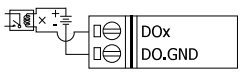
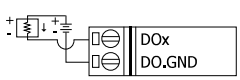
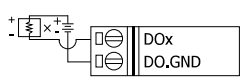


Encoder input channel circuit

Digital Input Wiring

Input Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0
Relay Contact	Relay ON	Relay OFF
		
TTL/ CMOS Logic	Voltage > 4 V	Voltage < 0.8 V
		
NPN Output	Open Collector ON	Open Collector OFF
		
PNP Output	Open Collector ON	Open Collector OFF
		

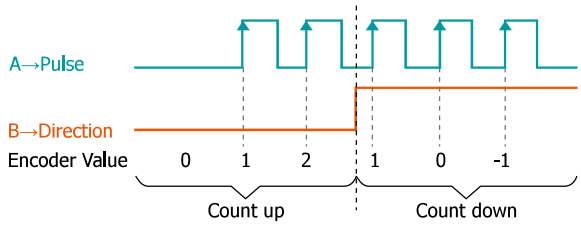
Compare Trigger Output Wiring

Output Type	ON State Readback as 1	OFF State Readback as 0
Drive Relay	Relay ON	Relay OFF
		
Resistance Load		

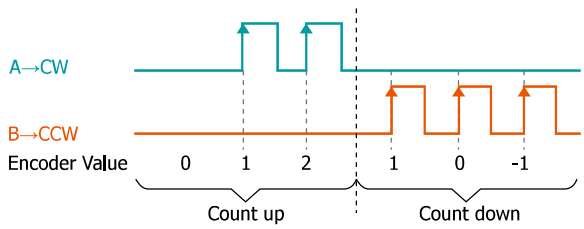
Counting Modes

The EC4-ENC2IT encoder counter supports three modes:

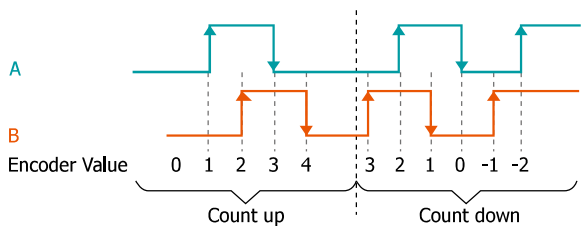
Pulse/Direction counting mode



Clockwise/Counterclockwise mode



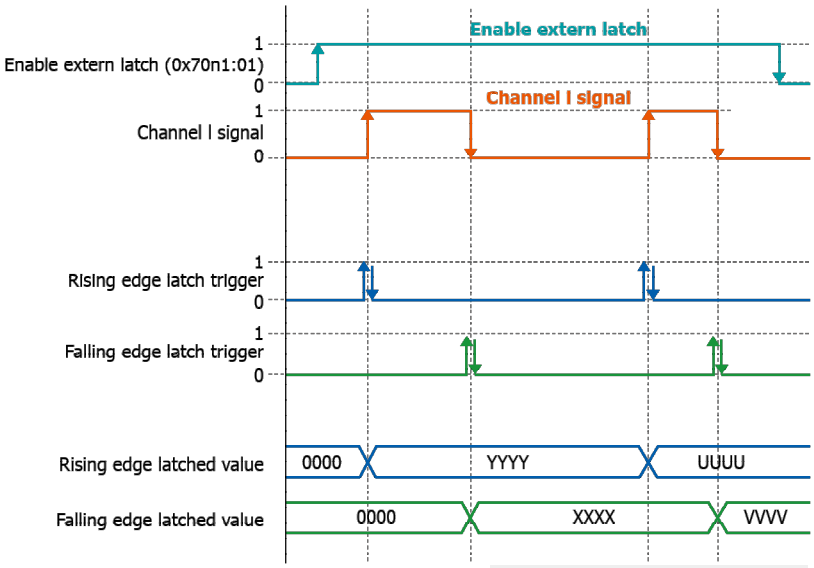
Quadrant counting mode



Extern Latch

Two registers are reserved for each encoder channel: One register stores the encoder value latched by an rising and the other the value latched by an falling input signal edge.

Application for the latch function:
- Position capture
- Position measurement:
  the value difference between the rising and falling latched position indicates the distance the encoder counter moved between the rising and falling input signal.
- Homing



Rising and falling edge latch

Applications

- Position measurement
- Image capture
- Automated optical inspection
- Line-scan vision inspection
- Data acquisition