EtherCAT



ECAT-2093

EtherCAT Three-Channel Incremental Encoder Counter

Features

- EtherCAT SubDevice
- 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, Z differential or single-ended signals
- Index latch counter value
- Digital input fi lter
- Input level: 5V, 12V/24V with internal resistor
- Polarity setting by software for active high or active low encoder input
- A/B/Z signal isolation voltage: 2500V optical isolation
- LED indicators for EtherCAT and encoder status
- EtherCAT:
  - 2 x RJ-45 bus interface
  - Distance between stations up to 100 m (100BASE-TX)
  - Support daisy chain connection
  - EtherCAT conformance test tool verifi ed
  - Supports Free-Run, SM synchron and Distributed Clock (DC) operation modes

Introduction

The EtherCAT SubDevice ECAT-2093 is an incremental encoder counter which provides three independent high-speed counter channels. It reads the pulse train generated by an incremental encoder and can be used in positioning feedback applications. Each channel has two counter inputs. The inputs can either be single-ended or differential signals. Three counting modes are supported: clockwise/counterclockwise, pulse/direction and quadrant counting mode. The hardware index latch function allows the latching of encoder position. Low pass filter functions for filtering out electrical noises are provided.

Hardware Specifications

Model	Specification
Encoder	
Number of encoder inputs	3 × Encoder counter (A, B, Z), diff erential or single-ended
Resolution	32 Bit
Maximum input pulse frequency	4 MHz
Input level:	5V (default)
	12V/24V with internal resistor (set by jumper)
Photo-Isolation	2500 V_{DC}
LED Indicators	
Diagnostic LED	Power, EtherCAT status, signal status of each encoder input
Communication Interface	
Connector	2 x RJ-45
Protocol	EtherCAT
Distance between stations	Max. 100 m (100BASE-TX)
Data transfer medium	Ethernet/EtherCAT cable (Min. CAT5), shielded
Power	
Input voltage range	20 V_{DC} ~ 30 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
Surge (IEC 61000-4-5)	1 KV Class A
Mechanism	
Installation	DIN-Rail
Dimensions (W × L × H)	33 mm x 127 mm x 108 mm
Case material	UL 94V-0 housing
Environment	
Operating Temperature	-25°C ~ 75°C
Storage Temperature	-30°C ~ 80°C
Relative Humidity	10 ~ 90% RH, Non-condensing

Table 1 : Technical data

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Dimensions (Units: mm)

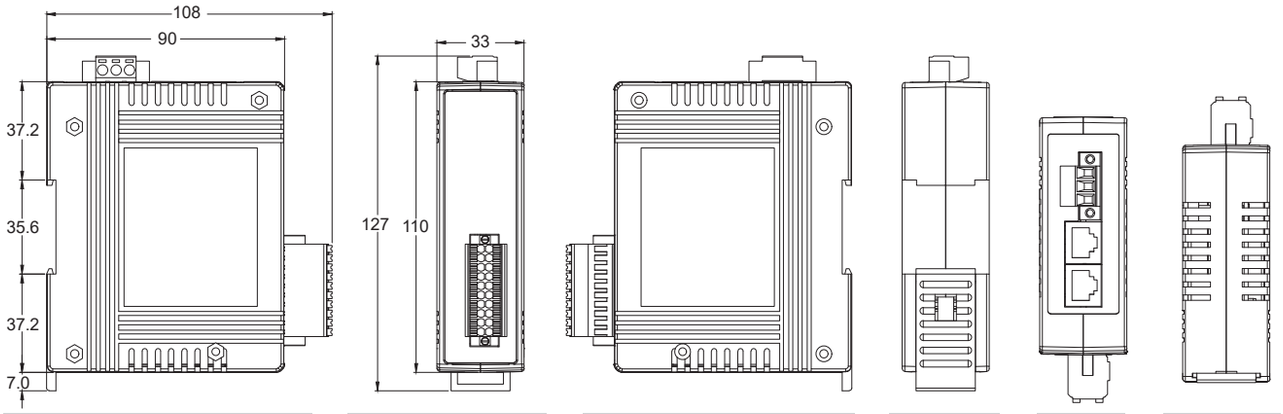
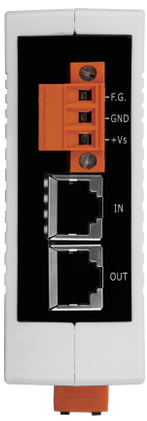


Figure 1 : Dimensions of the ECAT-2093

Connection Interfaces



Name	Signal
F.G	Frame ground
GND	Power supply: Ground 0V (from negative power contact)
+Vs	Power supply: +24 VDC (from positive power contact)
IN	EtherCAT signal input
OUT	EtherCAT signal output

Table 2 : ECAT-2093 power supply and EtherCAT interfaces

Figure 2 : ECAT-2093 side view with power supply and EtherCAT connection



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-	
Z0+	Input	Encoder input C0+	
Z0-	Input	Encoder input C0-	
A1+	Input	Encoder input A1+	Encoder Channel 1
A1-	Input	Encoder input A1-	
B1+	Input	Encoder input B1+	
B1-	Input	Encoder input B1-	
Z1+	Input	Encoder input C1+	
Z1-	Input	Encoder input C1-	
A2+	Input	Encoder input A2+	Encoder Channel 2
A2-	Input	Encoder input A2-	
B2+	Input	Encoder input B2+	
B2-	Input	Encoder input B2-	
Z2+	Input	Encoder input C2+	
Z2-	Input	Encoder input C2-	

Table 3 : Connection interfaces of the encoder counter

Figure 3 : ECAT-2093 front view with encoder inputs

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Wire Connections

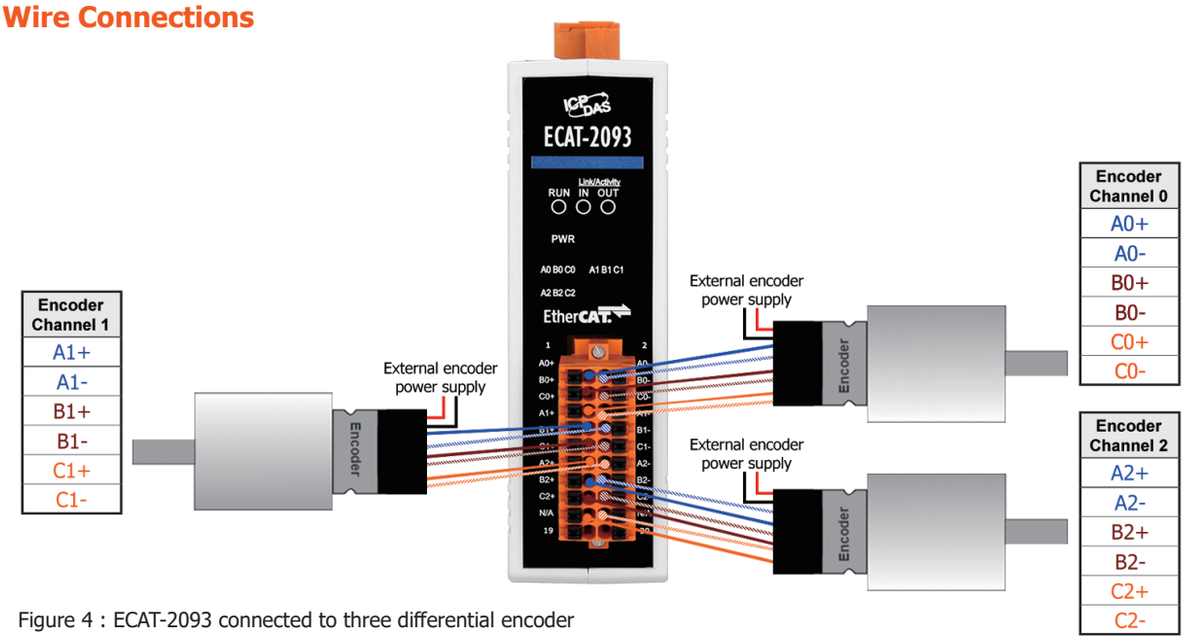


Figure 4 : ECAT-2093 connected to three differential encoder

Digital Input Channel

The ECAT-2093 can accept encoder input 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 ECAT-2093 provides an internal 1k Ohm resistor for each signal input. The internal resistor can be selected via jumper setting.

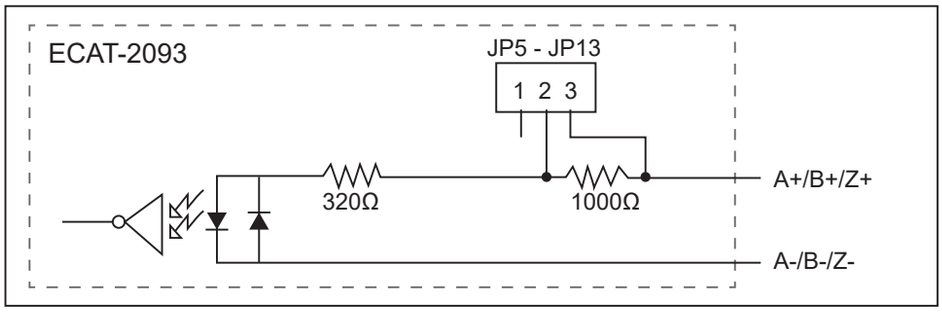
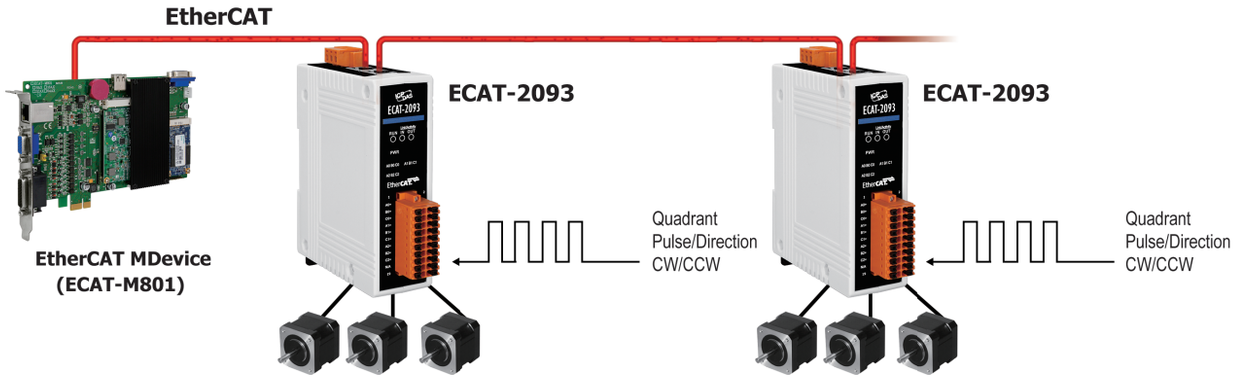


Figure 5 : Encoder input channel circuit

Applications



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Counting Modes

The ECAT-2093 encoder counter supports three modes:

- Pulse/Direction counting mode
- Clockwise/Counterclockwise mode
- Quadrant counting mode

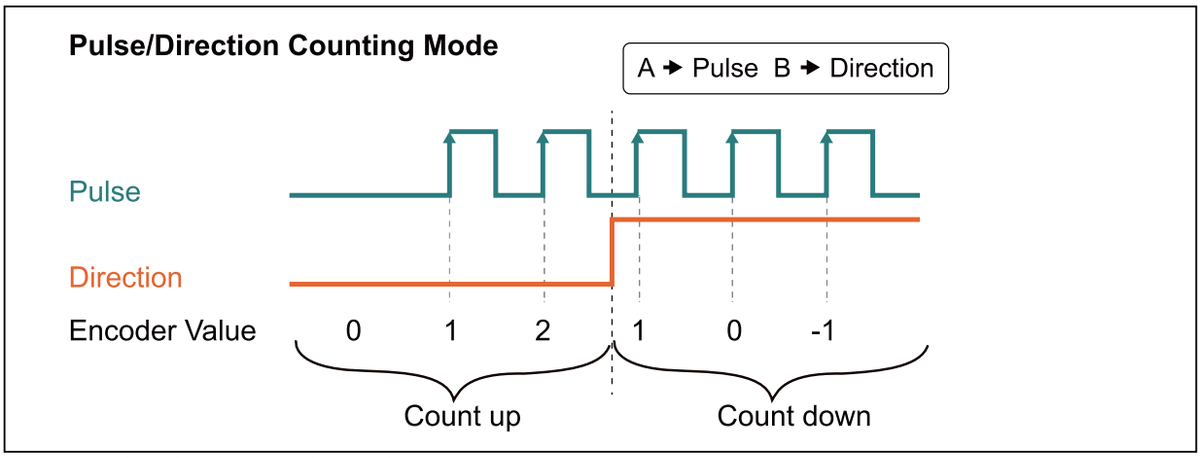


Figure 6 : Pulse/Direction counting mode

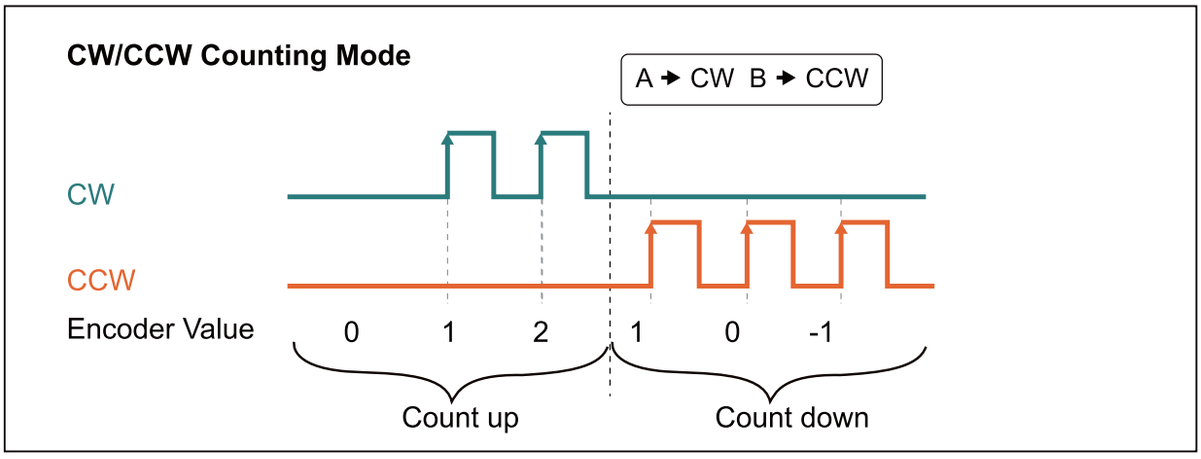


Figure 7 : Clockwise/ Counterclockwise counting mode

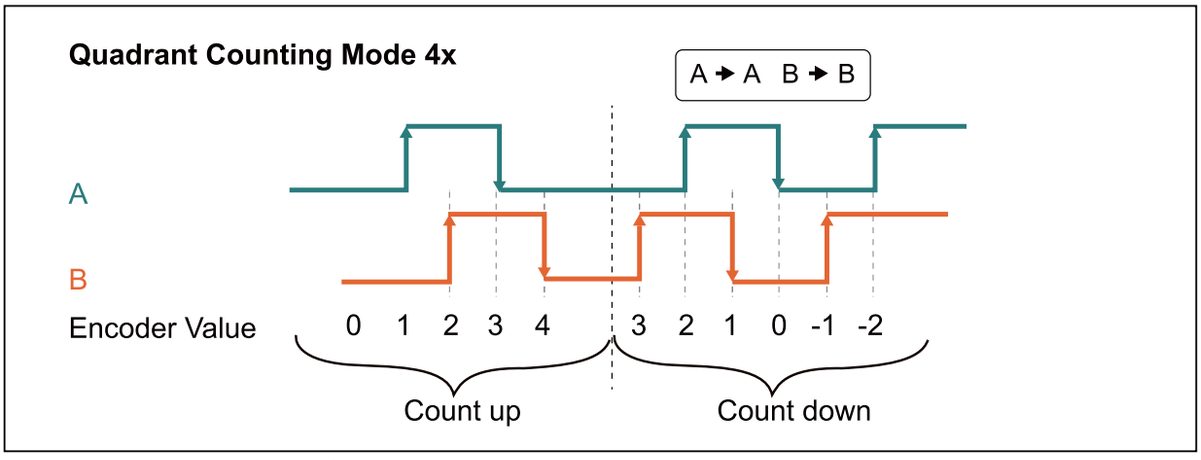


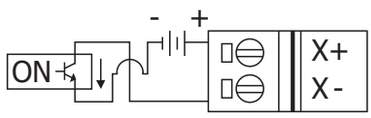
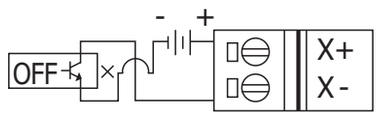
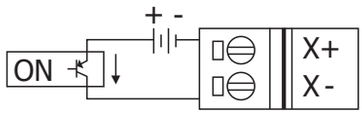
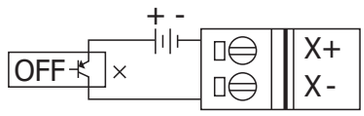
Figure 8 : Quadrant counting mode

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Digital Input Wiring

The input levels for the open collector with the internal resistor of 1 K ohm is as follows

- Input 12 V:
  - Logic High: 5 V ~ 12 V
  - Logic Low: 0 V ~ 2 V
- Input 24V:
  - Logic High: 5 V ~ 24 V
  - Logic Low: 0 V ~ 2 V

Input Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0
	Relay ON	Relay OFF
NPN Output		
PNP Output		

Ordering Information

ECAT-2093 CR	EtherCAT three-channel incremental encoder counter (RoHS)

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