



## ECAT-2094S

4-Axis Stepper Motor Controller/ Driver

### Features

- Supports 4 stepper motor (2-phase bipolar)
- Stepper motors are controlled in an open loop operation
- Programmable coil current level: up to 1.5 A/phase
- Programmable microstep size: maximum 256 microsteps per full step
- Supported motor voltage range: 6 to 46 Vdc
- 4 × Encoder interfaces (A, B, Z), differential
- 8 × Digital input. Two DI channels for each axis: reference switch input, latch input
- 2 × Digital output
- Automatic current reduction to reduce heat when motor is not moving
- Drive protection:
  - Over-temperature
  - Under voltage
  - Short circuit
- Optically isolated I/O
- LED indicators for I/O, EtherCAT and motion status
- Internal memory for storing configuration data
- EtherCAT:
  - 2 × RJ-45 bus interface
  - Distance between stations up to 100 m (100BASE-TX)
  - Support daisy chain connection
  - EtherCAT conformance test tool verified
  - Supports Free-Run, SM synchron and Distributed Clock (DC) operation modes
  - Supports CoE and FoE
- Removable terminal block connector
- Two 16-position rotary switch for station alias addressing



### Introduction

The ECAT-2094S stepper motor controller is a cost-effective, two-phase bipolar stepper driver. The ECAT-2094S simultaneously controls up to four stepper motors. A motor voltage range between 6 and 46V DC and a maximum motor coil current of 1.5A/phase is being supported. The running motor current, microstep resolution and other motion parameters are software selectable.

Two-phase bipolar stepper motors can be directly connected to the ECAT-2094S device. The device is designed to operate in an open loop. Configuration and motion control has to be done by the EtherCAT master and the application program. The torque and step control is done by an internal stepper motor driver IC. Each stepper motor is being independently controlled by a separated driver IC. The four driver ICs are not synchronized and work independently from each other. An integrated ramp generator automatically calculates the acceleration and deceleration distance. The motion controller drives the motor to the target position or accelerates the motor to the target velocity. All motion parameters can be changed on the fly. A minimum set of configuration data consists of acceleration, deceleration and maximum motion velocity. After receiving the target position the motor driver starts controlling the motion movement.

The ECAT-2094s has four integrated incremental encoder interfaces. Four 32 bit high frequency encoder counter counts the input signal of external incremental encoders. The encoder can for example be used for homing purposes and for consistency checks.

High resolution of up to 256 microsteps per full step is supported for ensuring smooth and precise motor operation.

For each motor two digital input channels are provided. The digital inputs can be set to act as a simple DI, as a left and right hardware limit switch which automatically stops the motor when activated, or a latch trigger for latching the current motor and encoder position.

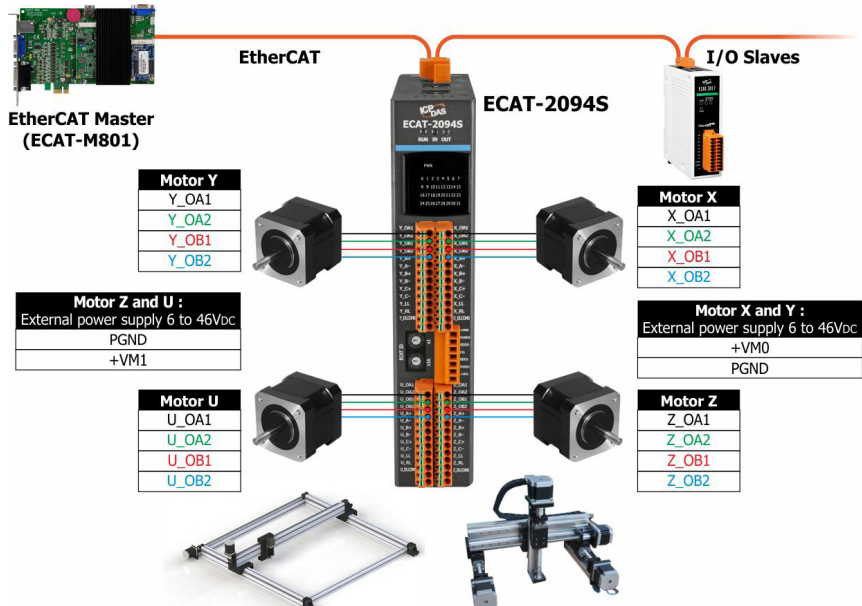
The module must be supplied by three power sources. Two motor supply and a 24Vdc control supply. Two motors share one power supply.

## Specifications

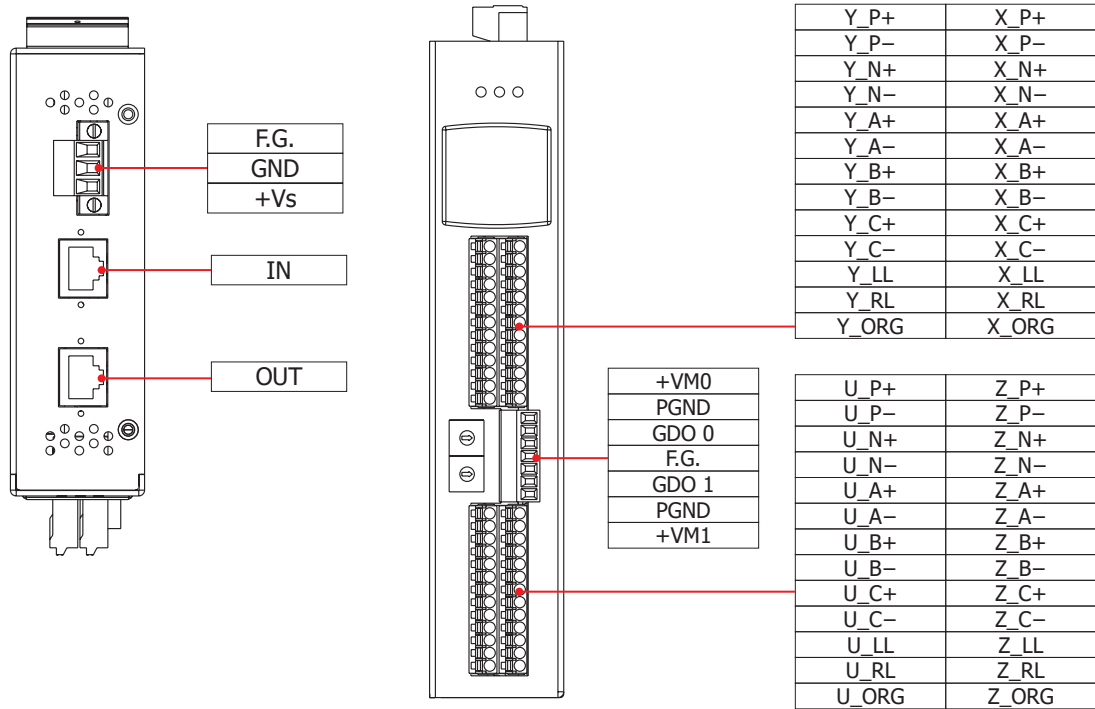
Model	ECAT-2094S
<b>EMS Protection</b>	
EFT (IEC 61000-4-4)	Signal : 1 KV Class A; Power : 1 KV Class A
ESD (IEC 61000-4-2)	4 KV Contact for each channel
Surge (IEC 61000-4-5)	1 KV Class A
<b>LED Indicators</b>	
Status	1 x Power 1 x Operation State 2 x Communication 8 x DI status 2 x DO status 16 x Motion status
<b>Encoder Input</b>	
No. of Axes	4, differential
Mode	A/B phase, CW/CCW, Pules/Dir
Frequency	4 MHz Max.
<b>Motor Output</b>	
No. of Axes	4x Stepper motor, 2 phases
Current Controller Frequency	24.5 kHz
Microsteps Per Step	256, 128, 64, 32, 16, 8, 4, 2
Output Current	1.5 A/phase
Step Frequency	8.388 MHz Max.
Voltage Range of The Motor Output	6 to 46 VDC
<b>Digital Input</b>	
Channels	8 (2x Limit position for each motor)
Type	Wet Contact
ON Voltage Level	10 ~ 30 VDC
OFF Voltage Level	5 VDC Max.
Isolation	3750 VDC
<b>Digital Output</b>	
Channels	2
Type	Open collector
ON Voltage Level	+5 to 30 VDC
OFF Voltage Level	100 mA
Isolation	3750 VDC
<b>EtherCAT</b>	
Ports	2 x RJ-45
Distance Between Stations	100 m Max. (100Base-TX)
Data Transfer Medium	Ethernet/EtherCAT Cable (Min. CAT 5), Shielded
Distributed Clocks	Yes
<b>Power</b>	
Input Range	+20 VDC ~ +30 VDC
<b>Mechanical</b>	
Casing	Metal
Dimensions (W x L x H)	37 mm x 123.5 mm x 181 mm
Installation	DIN-rail mounting or wall mounting
<b>Environmental</b>	
Operating Temperature	-25 ~ +40 °C
Storage Temperature	-30 ~ +80 °C
Ambient Relative Humidity	10 ~ 90% RH (non-condensing)

### Applications

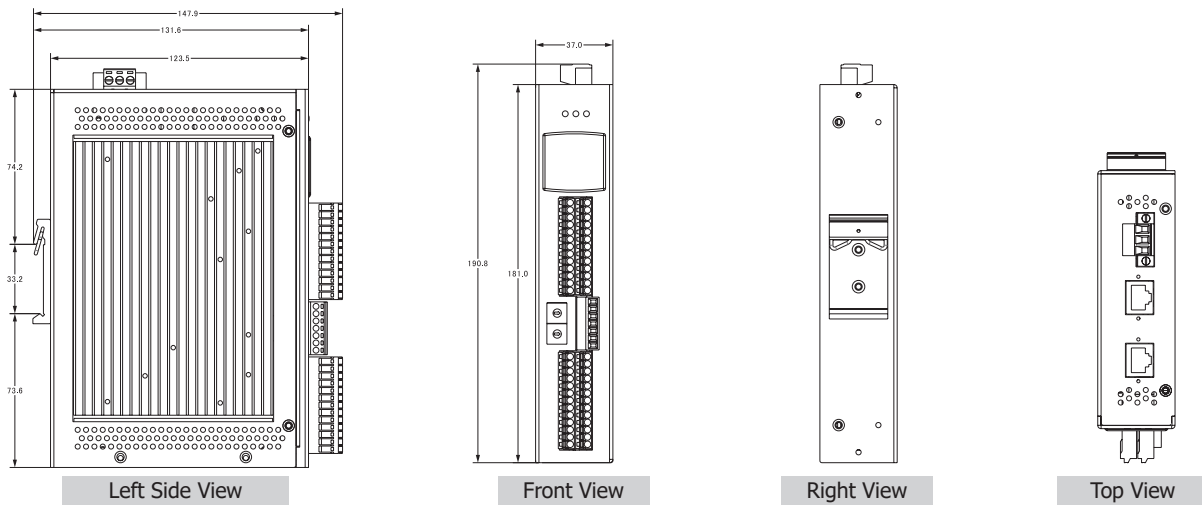
- Automated Test Equipment
- Surveillance Systems
- Labeling Machinery
- Packaging
- Semiconductor Manufacturing
- Engraving Machine
- Automatic Feeding Machine



### Pin Assignments



### Dimensions (Units: mm)



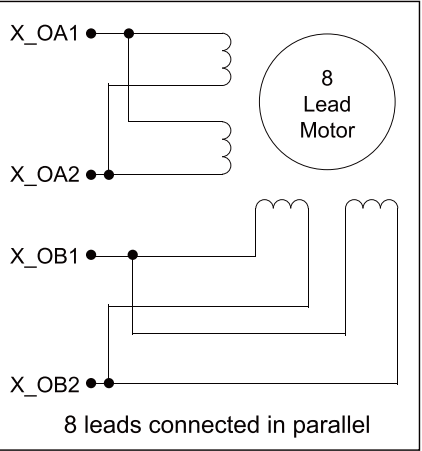
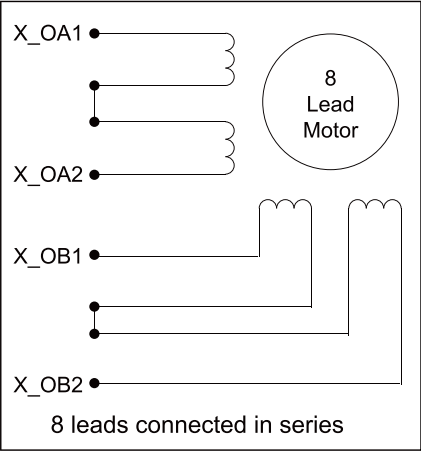
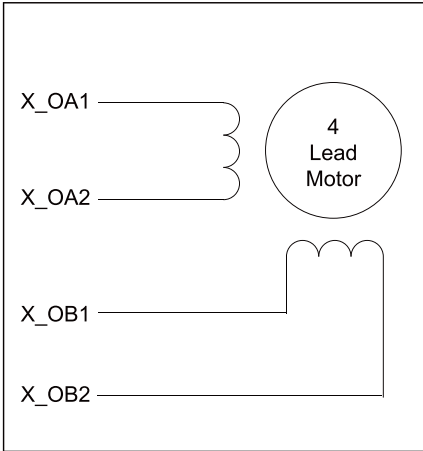
■ Wire Connections

Digital Input Channel

Digital Input	Readback as 1	Readback as 0
Sink	+10 ~ +24 VDC 	OPEN or <4 VDC 
	+10 ~ +24 VDC 	OPEN or <4 VDC 

Digital Output Channel

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



■ Ordering Information

<b>ECAT-2094S CR</b>	EtherCAT slave 4-axis stepper motor controller/driver (Metal Case) (RoHS)
----------------------	---