

ECAT-2091S

EtherCAT Single Axis Stepper Motor Controller/ Driver

Features

- 1 x stepper motor (2-phase bipolar stepper motor)
- Open loop operation
- Programmable coil current level: up to 1.5 A
- Programmable microstep size: maximum 256 microsteps per full step
- Voltage range of the motor: 5 to 46 VDC
- 1 × Encoder interfaces (A, B, Z)
- 2 × Digital input: reference switch input, latch input
- 1 × 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 x 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
- Removable terminal block connector

Introduction

The ECAT-2091S stepper motor controller is a cost-effective, two-phase bipolar stepper driver. A motor voltage range between 5 and 46 VDC and a maximum motor coil current of 1.5A is being supported. The maximum running motor current, microstep resolution and other motion parameters are software selectable.

The ECAT-2091S is a standard EtherCAT slave and an EtherCAT master is required to operate the device. The ECAT-2091S supports three operation modes: Free-Run, SM synchron and Distributed Clock (DC).

Two-phase bipolar stepper motors can be directly connected to the ECAT-2091S device. The device is designed to operate in a open loop. Configuration has to be done by the EtherCAT master and the application program. The stepper motor driver automatically controls the torque and position of the motor. An integrated ramp generator automatically calculates the acceleration and deceleration distance. In position mode the controller drives the motor to the target position and in velocity mode accelerates the motor to the target velocity. All motion parameters can be changed on the fly.

The ECAT-2091S has a 32 bit high frequency encoder counter which counts the input signal of an external incremental encoder. 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 a ensuring smooth and precise motor operation.

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 two power sources. A motor supply and a 24 VDC control supply.

☑ Hardware Specifications

Model		Specification
Motor outputs		
Number of Outputs		1 × stepper motor, 2 phases
Output Current		1.5A
Voltage Range of the Motor Output		5 to 46 VDC
Current Controller Frequency		24.5 kHz
Maximum Step Frequency		8.388 MHz
Microsteps per step		256, 128, 64, 32, 16, 8, 4, 2
Encoder Inputs		
Number of Encoder Inputs		1 × encoder counter (A, B, Z), differential
Maximum Encoder Pulse Frequency		4 MHz
Digital Inputs		
Number of Digital Inputs		2
Wet contact	ON Voltage Level	+19 to 30 VDC
	OFF Voltage Level	+11 VDC MAX
Photo-Isolation		3750 VDC
Digital Output		
Number of Digital Outputs		1
Output Type		Open collector
Load Voltage		+5 to 30 VDC
Max. Load Current		100 mA
Isolation Voltage		3750 VDC
LED Indicators		
Diagnostic LED		Power, EtherCAT status, Digital IO, driving, temperature warning, over-temperature error, phase A and B under-voltage
Communication Interface		
Connector		2 × RJ-45
Protocol		EtherCAT
Distance Between Stations		Max. 100 m (100BASE-TX)
Data Transfer Medium		Ethernet/EtherCAT Cable (Min. CAT 5), Shielded
Power		
Input Voltage Range		20 V ~ 30 VDC
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 (L × W × H) [mm]		110 mm × 90 mm × 33 mm (without connectors)
Case Material		UL 94V-0 housing
Environment		
Operating Temperature		-25 ~ +40°C
Storage Temperature		-30 ~ +80°C
Relative Humidity		10 ~ 90% RH, Non-condensing

Table 1: Technical data

Dimensions (Units: mm)

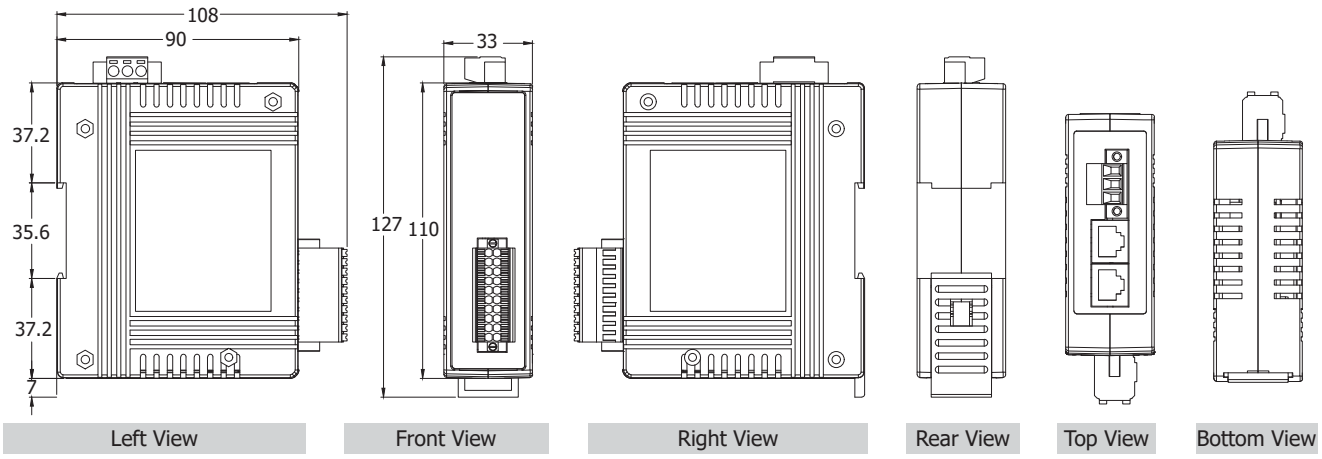
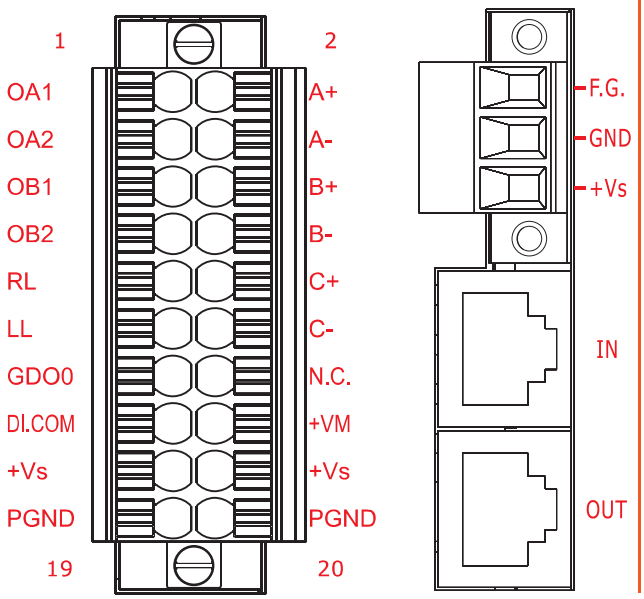


Figure 1: Dimensions of the ECAT-2091S

Pin Assignments



Wire connection

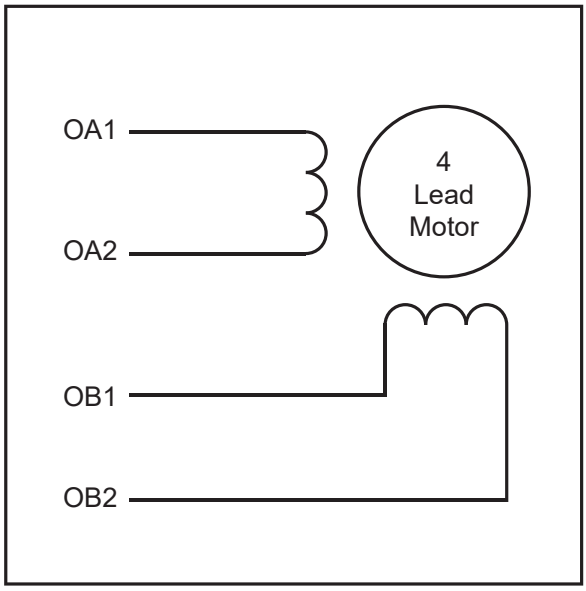


Figure 2: Four lead bipolar motor connection

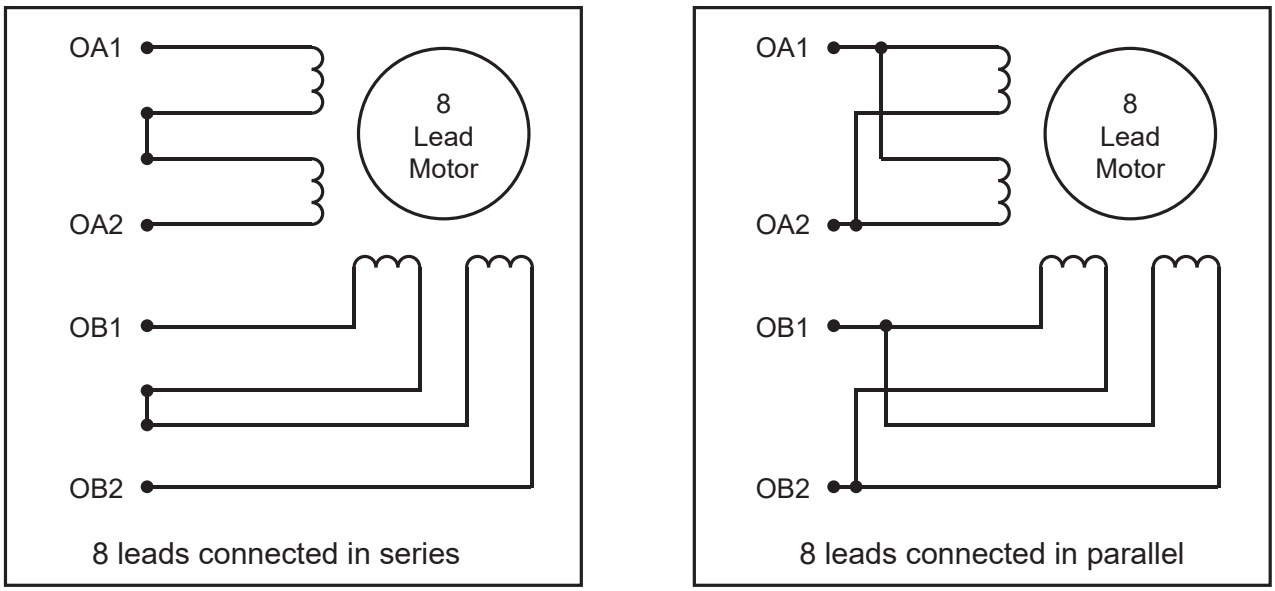


Figure 3: Eight lead bipolar motor connection (left: series, right: parallel)

☑ Wire Connections

Digital Input Channel

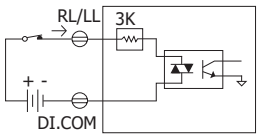
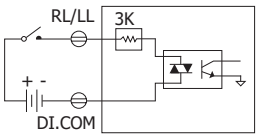
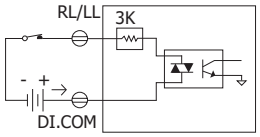
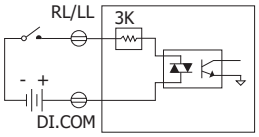
Digital Input	Readback as 1	Readback as 0
Sink	+10 ~ +24 VDC	OPEN or <4 VDC
		
Source	+10 ~ +24 VDC	OPEN or <4 VDC
		

Figure 4: Digital inputs RL and LL

Digital Output Channel

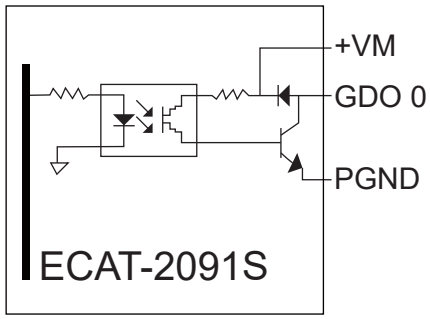


Figure 5: General purpose DO block diagram

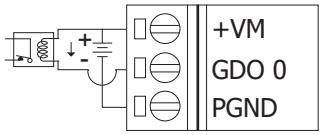
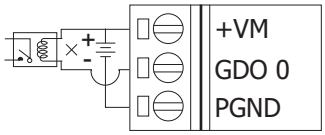
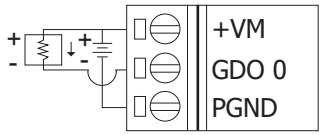
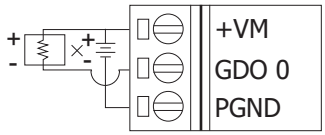
Output Type	ON State Readback as 1	OFF State Readback as 0
Drive Relay		
Resistance Load		

Figure 6: General purpose DO channel 0

☑ Application Example



☑ Ordering Information

ECAT-2091S CR	EtherCAT single axis stepper motor controller/ driver (RoHS)