EM3E Series Stepper Drive

The newly released EM3E series drives support CANopen over EtherCAT (CoE) control and CiA 402 operating modes including Profile Position (PP), Profile Velocity (PV), Homing (HM) and Cyclic Synchronous Position (CSP). The products can be matched with many brands of EtherCAT controller/PLC such as Beckhoff, Omron, Trio, Keneyce, etc.

The EM3E series is highly reliable, affordable and performs excellently in many industrial applications such as solar equipment, textile, civil, robotics, power generation equipment, 3C, packaging...

Feature

- CANopen over EtherCAT (CoE) with full support of CiA402, 100Mbps full-duplex.
- Operation modes: Profile Position, Profile Velocity, Cyclic Synchronous Position, Homing
- 6 configurable digital inputs, 2 optically isolated digital outputs
- Low noise and vibration, smooth motion
- Supply voltage: 20-50VDC. Max output current: 2.2A, 5.6A, or 7.0A
- Micro-USB port for parameters configuration
- Matched with NEMA11/17/23/24/ 34 CM series stepper motors
- Protections for over voltage, over current, limit switch error, phase loss error, etc.

Model Designation

EM3E - 5 56 E

① ② ③ ④ ⑤

① Series Name
EM3: 3rd generation stepper drives

② Communication Mode
E: EtherCAT

③ Maximum Operating Voltage
5: 50VDC
8: 80VDC

④ Maximum Output
Current
22: 2.2A
56: 5.6A
70: 7.0A

⑤ E: Economic Version

Technical Specification

Name	EM3E-522E	EM3E-556E	EM3E-870E
Supply Voltage	20-50VDC	20-50VDC	20-80VDC
Output Current (Peak)	0.3-2.2A	1.0-5.6A	1.0-7.0A
Size (H*W*L mm)	118*90.4*34		
Weight (kg)	0.28		
Matched Motor	NEMA 11, 14, 17	NEMA 17, 23, 24	NEMA 23, 24, 34
Input Signals	Home Switch, Positive Limit, Negative Limit, Quick Stop, Touch Probe, GPIOs		
Output Signals	Brake, Alarm		
Protection Functions	Over Current, Over Voltage, etc.		
PC Software	Leadshine Motion Studio		
Operating Environment	Environment	Avoid dust, oil ,fog and corrosive gases	
	Operating Temperature	0-40℃ (32 F – 104 F)	
	Storage Temperature	-20℃-65℃ (-4 F – 149 F)	
	Humidity	40-90%RH	
	Vibration	10-55Hz/0.15mm	
	Mount	Vertical or horizontal mounting	

Dimension
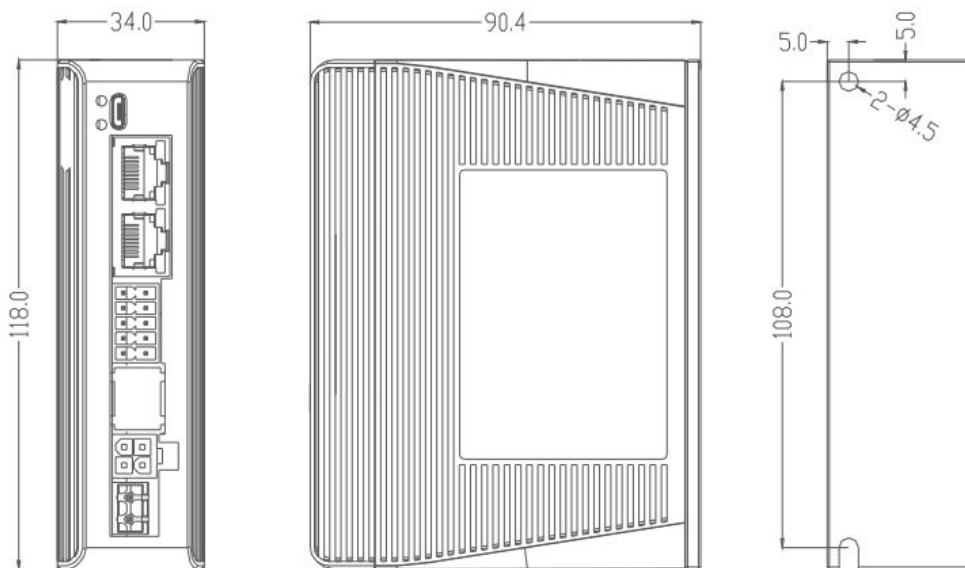
Connector and Pin Assignment
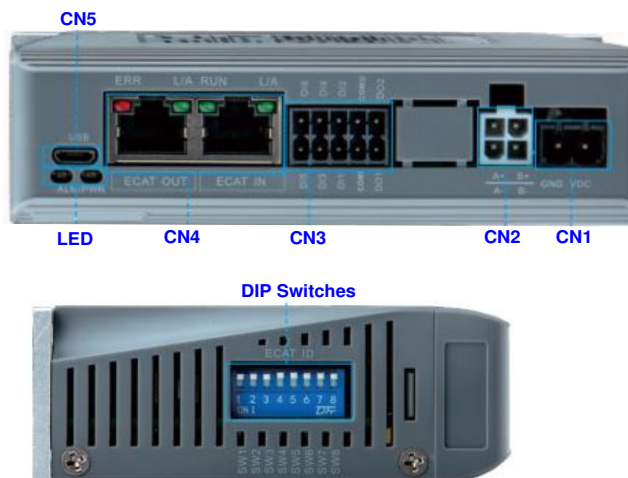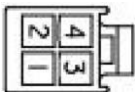
Name	Description
CN1	Input power connector
CN2	Motor connector
CN3	I/O signals connector
CN4	EtherCAT communication connector
CN5	Micro-USB tuning connector
LED	The LED for the drive's running status
DIP Switches	8-bits switches: SW1 - SW7 to set 0-127 Node ID, SW8 for self test
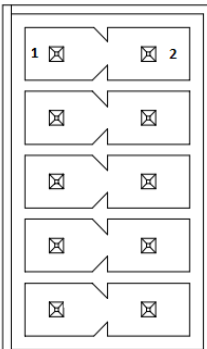
➢ **CN1-Input Power Connector**

Name	Pic	PIN	Signal	Description
CN1		1	VDC	20- 50V
		2	GND	GND

➢ **CN2-Motor Connector**

Name	Pic	PIN	Signal	Description
CN2		4	A+	Motor phase A+
		2	A-	Motor phase A-
		3	B+	Motor phase B+
		1	B-	Motor phase B-

➢ **CN3-I/O Signals Connector**
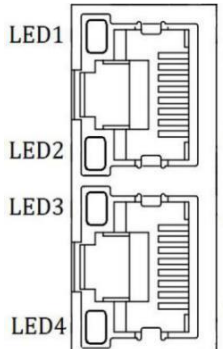
Name	Pic	PIN	Signal	I/O	Description
CN3		1	DI5	I	Configurable Single-ended Digital Input 5,12V - 24V, 10KHz, Negative Limit (default)
		2	DI6	I	Configurable Single-ended Digital Input 6, ,12V - 24V, 10KHz, GPIO
		3	DI3	I	Configurable Single-ended Digital Input 3,12V - 24V, 10KHz, Home Switch (default)
		4	DI4	I	Configurable Single-ended Digital Input 4,12V - 24V, 10KHz, Positive Limit (default)
		5	DI1	I	Configurable Single-ended Digital Input 1,12V - 24V, 10KHz, Touch Probe 1 (default)
		6	DI2	I	Configurable Single-ended Digital Input 2,12V - 24V, 10KHz, Touch Probe 2 (default)
		7	COMI	I	Common anode of external input signals
		8	COMO	O	Common ground of digital output signals
		9	DO1	O	Configurable Single-ended Digital Outputs 1, OC output, Max. 30V/100mA. Alarm output (default)
		10	DO2	O	Configurable Single-ended Digital Outputs 2, OC output, Max. 30V/100mA. Brake output (default)

Remark:

(1) I/O interface and corresponding parameter setting refer to chapter 4.3

(2) In Leadshine MotionStudio, digital input(DI) and digital output(DO) are displayed as SI and SO.

➢ **CN4-EtherCAT Communication Connector**
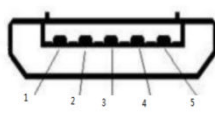
Name	Pic	PIN	Signal	Description
CN4	LED1 LED2 LED3 LED4	1, 9	E_TX+	EtherCAT TxD+
		2, 10	E_TX-	EtherCAT TxD-
		3, 11	E_RX+	EtherCAT RxD+
		4, 12	/	/
		5, 13	/	/
		6, 14	E_RX-	EtherCAT RxD-

		7, 15	/	/
		8, 16	/	/
		Cover	PE	Shield earthing
Note	(1) LED1 as'Link/Activity IN' indicator, green (2) LED3 as'Link/Activity OUT' indicator, green (3) LED2 as'RUN' indicator, green (4) LED4 as'ERR' indicator, red			

Table 3.3 Link/Activity LED status

Name	Color	Status	Description
RUN	Green	off	Initialization Status
		Blinking	Pre-operation status
		Single Flash	Safe operating status
		on	Operation Status
ERR	Red	Refer to Chapter 5.2	
L/A IN	Green	off	Physical layer link cannot be established
		on	Physical layer link establishment
		Blinking	Interaction data
L/A OUT	Green	off	Physical layer link cannot be established
		on	Physical layer link establishment
		Blinking	Interaction data

➢ **CN5-Micro-USB Tuning Port**

Name	Pic	PIN	Signal
CN5		1	GND
		2	Reserved
		3	Data+
		4	Data-
		5	V_Bus

➢ **DIP Switches- SW1-SW8**

There are 8-bit DIP switches in EM3E series drives, SW1-SW7 are used to set slave ID, SW8 is used for self-test.

(1) SW1-SW7 for Slave ID

The slave ID (also called Site Alias) of EM3E series can be set by the following 3 methods:

2151h	2150h	DIP Switches	Slave ID
0	Read ID	0~127	Setting by DIP Switches SW1-SW7
1	Write ID	-	Setting by writing a value to 2050h
2	-	0	Configure to EEPROM 0004h of ESC automatically.

● **When 2151h=0, setting via DIP Switches SW1-SW7**

SW1	SW2	SW3	SW4	SW5	SW6	SW7

Slave ID can be set a value non-zero via the SW1-SW7, activated after restarting the power supply. The specific definition is as below:

ID	SW1	SW2	SW3	SW4	SW5	SW6	SW7
0	ON	ON	ON	ON	ON	ON	ON
1	OFF	ON	ON	ON	ON	ON	ON
2	ON	OFF	ON	ON	ON	ON	ON
3	OFF	OFF	ON	ON	ON	ON	ON
---	---	---	---	---	---	---	---
126		OFF	OFF	OFF	OFF	OFF	OFF
127	OFF	OFF	OFF	OFF	OFF	OFF	OFF

OFF=1, ON=0
ID = SW1*(1)+ SW2*(2)+SW3*(4)+SW4*(8)+SW5*(16)+SW6*(32)+SW7*(64)

● **When 2151h=1, setting via Object (2150h)**

The value written in Object (2150h) is as the slave ID, activated after saving parameter and restarting the power supply.

● **When 2151h=2, master configure ID to ESC(EtherCAT slave Controller)**

Setting all SW1-SW7 to ON, the EtherCAT master will configure slave ID to the address of EEPROM 0004h of ESC automatically.

(2) SW8 for Self Test

SW8 is used for self-test, when SW8=OFF, self-test is disabled, when SW8=ON, self-test is activated, the motor will run at a speed of 0.2r/s, back and forth 5 circles.

Wiring

Power Supply 20-50VDC	

EM3E

+VDC

GND

CI+

I1

24VDC   I2

I3

I4

I5

I6

O1

24VDC   O2

CO-

A+
A-
B+
B-

CM Series Motor

Leadshine Motion Studio

Tuning Cable Model: CABLE-MUSB1M5

EtherCATOUT

EtherCAT IN