Leadshine Technology Co., Ltd.

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Leadshine
Reliable Motion Control Products

EtherCAT®
Conformance tested

EM3E

Network Stepper Drive

Passed the conformance testing of ETG

- Support CoE control and CiA 402 protocol
- Maximum communication rate of 100 Mbps
- Simplicity & High reliability
- Excellent performance
- 60% lower cost than EtherCAT servo

CE RoHS www.leadshine.com

EM3E Series

These 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), Cyclic Synchronous Position (CSP). The products can be matched with most of EtherCAT controller/PLC such as Leadshine, Beckhoff, Omron, etc. The EM3E series has excellent performance including enhanced reliability, super-low stepper noise, anti-resonance, low-speed ripple smoothing and remains 60% less cost than EtherCAT servo at least.

EM3E Series Advantages

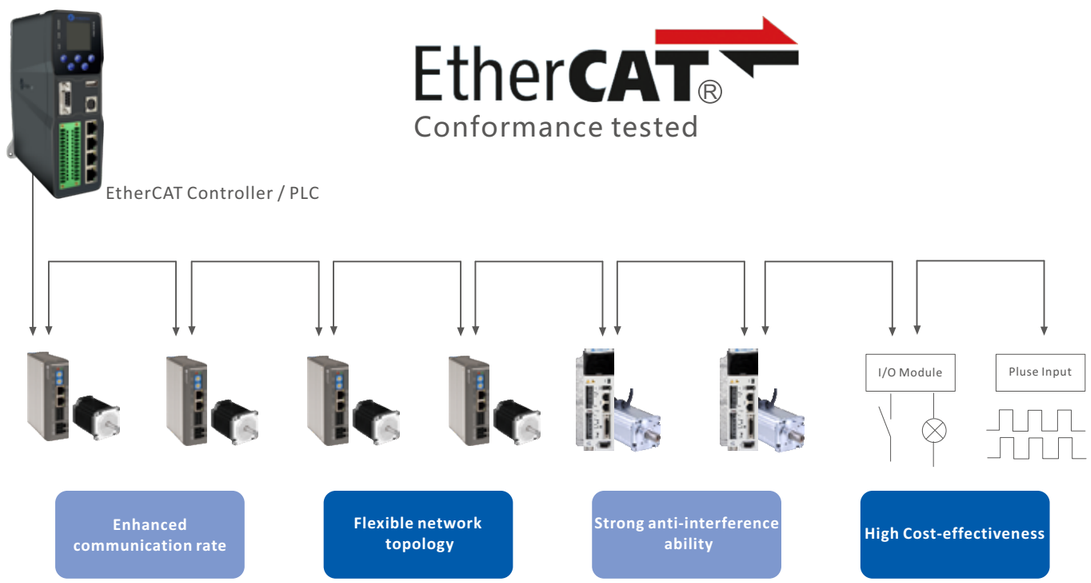
No.1 stepper products manufacturer in terms of shipment volume globally nowadays.

- **High Reliability:**
  Successfully passed the conformance testing of the ETG, and applied in rich applications since released in 2016.
- **Enhanced Communication Rate:**
  Maximum rate of 100Mbps to ensure real-time control in automation environments.
- **Excellent performance:**
  Adopt Leadshine mature DSP control technology which enables super-low noise, anti-resonance, low-speed ripple smoothing, etc.

Customer Benefits

- **Significantly reduced equipment cost:**
  At least lower 60% cost to replace EtherCAT servo when the required speed of applications under 1500 RPM.
- **Significantly reduced potential cost:**
  Lower labor cost, lower cable cost and maintenance cost.
- **Real-time data transfer:**
  Online monitoring of the status of motor and drive.

EM3E Series
EtherCAT System Connection Topology



Contents

01 EM3E Series Overview

1.1 Overview

Item		Description
EtherCAT Specifications	Communication protocol standard	CoE (CANopen over EtherCAT)
	Equipment protocol standard	IEC61800-7 CiA 402 Drive Profile
	Control Modes	CSP (Cyclic Synchronous Position) pp(Profile Position) PV(Profile Velocity) HM(Homing)
	Synchronization Modes	DC Synchronization and Free-run mode
	Synchronization cycle	250us,500us,750us, 1ms, 2ms, 4ms
General Specifications	Operating Voltage	20 - 80VDC
	Bus Address Setting	Two 16-rotary Code
	Digital Input	EM3E-522/556/870: 5 input signals, include 4 single-ended and 1 differential connections; EM3E-A882: 7 input signals, include 5 single-ended and 2 differential connections Single-ended input voltage is 12-24V, 20KHz maximum Differential input voltage is 3.3-5V, 200/500 KHz maximum
	Digital Output	EM3E-522/556/870: 2 output signals, include alarm and brake; EM3E-A882: 6 output signals, include alarm and brake, etc. Optically isolated, 24V/100mA maximum
	Alarm Output	Over voltage, over current, etc.

1.2 Typical Applications

Automatic Lamination Machine

Solar Production Line

Packing Machine

EM3E Series
EtherCAT System

Automatic Production Line

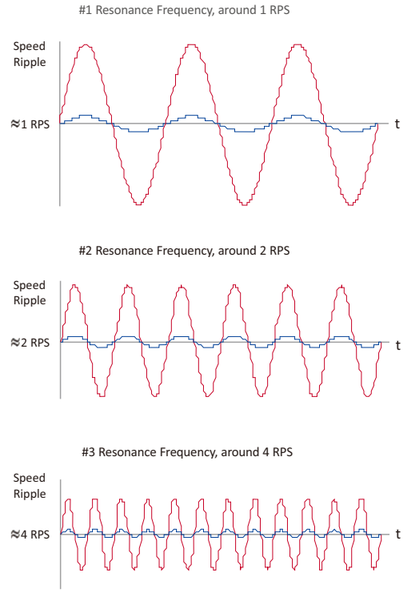
Stage Entertainment Equipment

Lithium Battery Production Line

1.3 Features

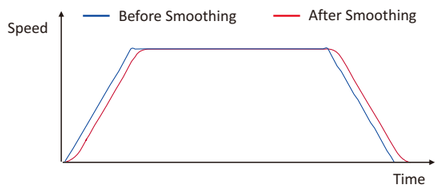
1. Low-speed Ripple Smoothing

Electronic damping for 3 major resonance frequencies for stepper motors at low speed range, eliminating undesirable motor speed oscillation and delivering unique level of smoothness.



2. Command Signal Smoothing

Command signal smoothing can soften the effect of sudden changes in velocity and direction, thus delivering smoother performance and improving system lifetime.



3. Alarm Output

Using alarm indicator and output signal feedback failure such as over-voltageor over-current timely to ensure the safety and reliability of equipment operation.

02 EM3E Series Drives

2.1 Part Number

EM3 □ - □ 5 56 □
① ② ③ ④ ⑤ ⑥

① Series Name:
EM3: EM3 Series

② Communication Modes:
E: EtherCAT

③ DC or AC Power Input:
Blank: DC Input
A: AC or DC Input Optional

④ Operating Voltage:
5: Max 50V
8: Max 80V

⑤ Max Output Current:
56: 5.6A

⑥ Custom Models:

2.2 Electrical Specifications

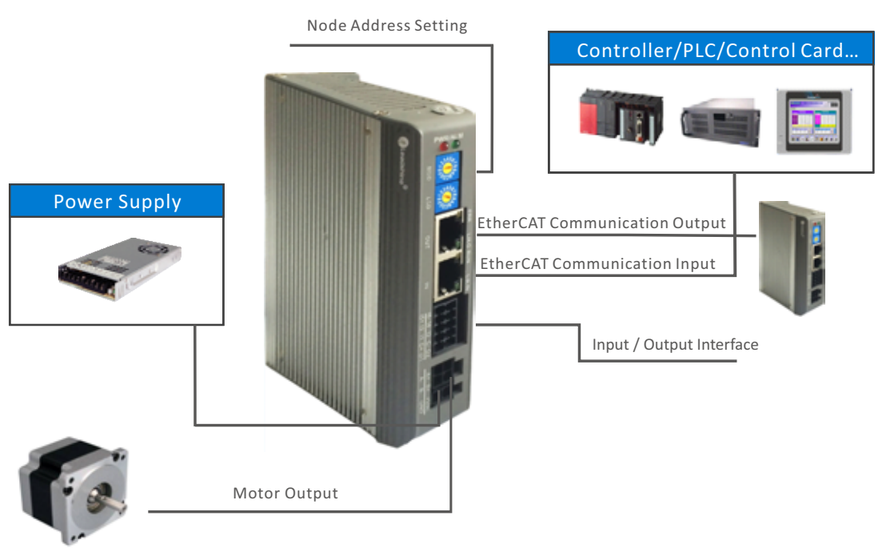
EtherCAT Network Stepper Drives				
Models				
	EM3E-522	EM3E-556	EM3E-870	EM3E-A882
Operating Voltage	20-50VDC	20-50VDC	20-80VDC	20-80VAC or 30-110 VDC
Output Current	0.3-2.2A(RMS 1.6A)	1.0-5.6A(RMS 4A)	2.1-7.0A(RMS 5A)	3.2-8.2A(RMS 6A)
Matched Motor	NEMA 8,11,14,17	NEMA 23,24	NEMA 23,24,34	NEMA 34

1 DC Power Input

Models	Operating Voltage (VDC)			Output Peak Current① (A)		Control Signal Current (mA)		Control Signal Voltage② (VDC)	Over Voltage Point (VDC)
	Min	Typical	Max	Min	Max	Min	Max		
EM3E-522	20	24	50	0.5	2.2	7	16	5 - 24	90
EM3E-556	20	24, 36	50	2.1	5.6	7	16	5 - 24	90
EM3E-870	20	48,70	80	2.1	7.0	7	16	5 - 24	113
EM3E-A882	20	90	110	3.2	8.2	7	16	5 - 24	160

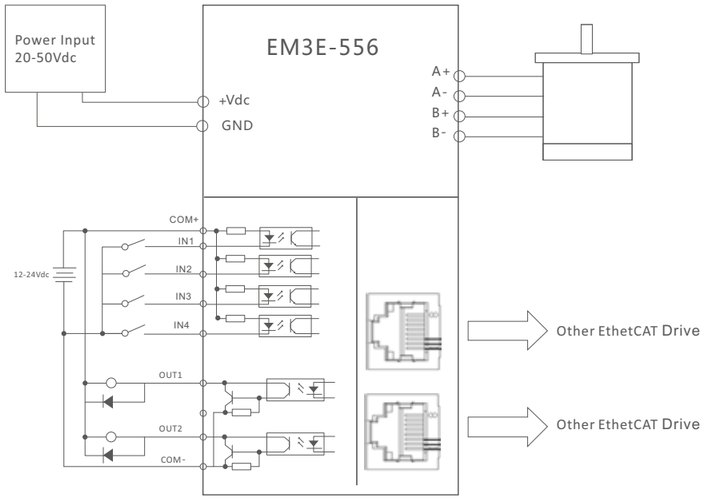
Note: ① The minimum output current is default value, can be set to 0.1A via PC software;
② No additional resistance for 5V, 12V, 24V normally, while recommended to connect 1KΩ or 2KΩ resistance when using 12V or 24V in strong interference condition.

2.3 Typical Configuration



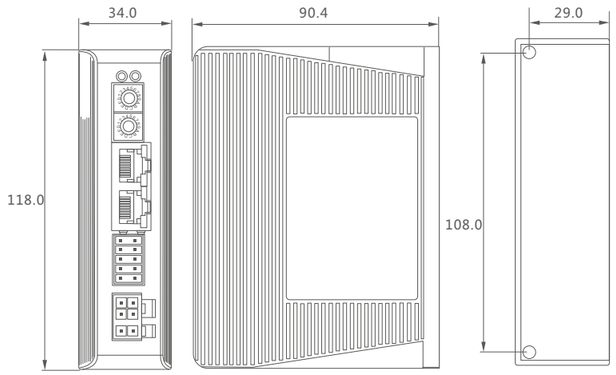
2.4 Connector Description

■ EM3E-522/556/870 Connector Description

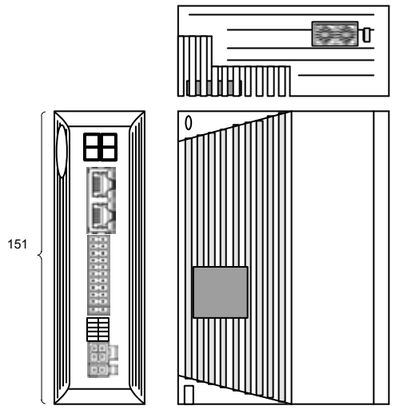


2.5 Mechanical Specifications

Unit: mm 1inch=25. 4mm



EM3E-522/556/870



EM3E-A882

03 Matching Stepper Motor — CM Series

3.1 Part Number

□ 57 □ CM 06 −(□A)−□ □□

① ② ③ ④ ⑤ ⑥ ⑦

① Motor Frame Size
- 42: NEMA 17 motor
- 57: NEMA 23 motor
- D57: NEMA 23 motor with larger body
- 60: NEMA 24 motor
- 86: NEMA 34 motor

② Motor Phase
- Blank: 2 phase motor
- 3 : 3 phase motor

④ Holding Torque

For NEMA 8/11/14 motor:
Divide the value by 100
044 : 0.44N.m

For NEMA 17/23/24/34 motor:
Divide the value by 10
06: 0.6N.m

⑤ Motor Rate Current
- Blank: Standard rate current
- 4A : Rate current 4A

⑥ Standard Customized Specification
- SZ : Double shaft motor
- BZ : Brake motor
- FS : Waterproof motor

⑦ Customized model

3.2 Models

Motor Size	Model	Holding Torque (N.m)	Standard Type Length(mm)	Rate Current (A)	Matched EtherCAT Drive
NEMA 8	20CM003	0.03	33	0.6	EM3E-522
	20CM005	0.05	45	0.6	EM3E-522
NEMA 11	28CM006	0.06	32	1.2	EM3E-522
	28CM010	0.10	41	1.2	EM3E-522
	28CM013	0.13	51	1.2	EM3E-522
NEMA 14	35CM015	0.15	31	2.0	EM3E-522
	35CM04	0.36	47	2.0	EM3E-522
NEMA 17	42CM02	0.2	33	1.5	EM3E-522
	42CM04	0.4	40	1.5	EM3E-522
	42CM06	0.6	47	2.5	EM3E-522/EM3E-556
	42CM08	0.8	60	2.5	EM3E-522/EM3E-556

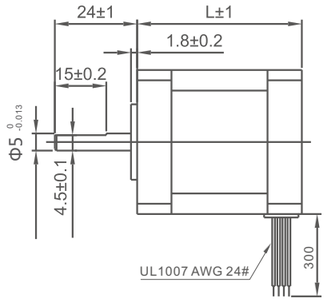
Motor Size	Model	Holding Torque (N.m)	Standard Type Length(mm)	Rate Current (A)	Matched EetherCAT Drive
NEMA 23	57CM06	0.6	41	3	EM3E-556
	57CM13	1.3	56	4	EM3E-556
	57CM23	2.3	76	5	EM3E-556/EM3E-870
	57CM23-4A	2.3	76	4	EM3E-556
	57CM26	2.6	84	5	EM3E-556/EM3E-870
	57CM26-4A	2.6	84	4	EM3E-556
	D57CM21-4A	2.1	67	4	EM3E-556
	D57CM31-4A	3.1	88	4	EM3E-556
	D57CM21	2.1	67	5	EM3E-556/EM3E-870
	D57CM31	3.1	88	5	EM3E-556/EM3E-870
NEMA 24	60CM22X	2.2	67	5	EM3E-556/EM3E-870
	60CM30X	3.0	85	5	EM3E-556/EM3E-870
NEMA 34	86CM35	3.5	66	4	EM3E-556/EM3E-870
	86CM45	4.5	80	6	EM3E-A882
	86CM80	8.0	98	6	EM3E-A882
	86CM85	8.5	118	6	EM3E-A882
	86CM120	12	129	6	EM3E-A882

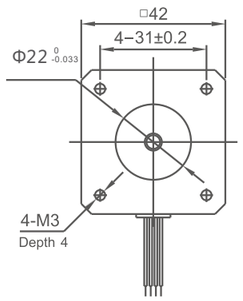
3.3 Motor Specifications

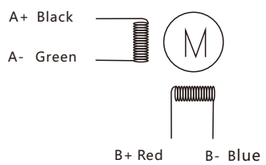
Unit: mm 1 inch=25.4mm

■ NEMA17

Model	Standard Type Length(mm)	Holding Torque (N.m)	Rate Current (A)	Resistance/ Phase(Ω)	Inductance / Phase (mH)	Inertia ($Kg.cm^2$)
42CM02	33	0.2	1.5	1.4	1.4	0.035
42CM04	39	0.4	1.5	2.4	4.3	0.054
42CM06	47	0.6	2.5	0.9	1.6	0.072
42CM08	60	0.8	2.5	1.0	2.4	0.11

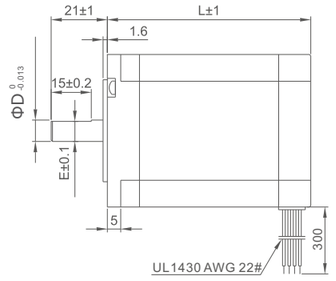


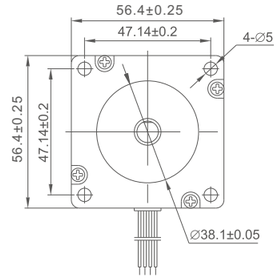


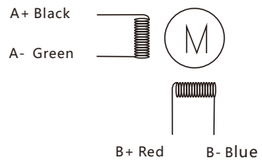


■ NEMA23

Model	Standard Type Length(mm)	Holding Torque (N.m)	Rate Current (A)	Resistance/ Phase(Ω)	Inductance / Phase (mH)	Inertia ($Kg.cm^2$)
57CM06	41	0.6	3	0.7	1.4	0.12
57CM13	56	1.3	4	0.42	1.4	0.3
57CM23	76	2.3	5	0.38	1.75	0.48
57CM26	84	2.6	5	0.44	2.0	0.52



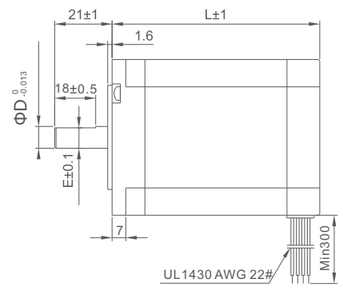


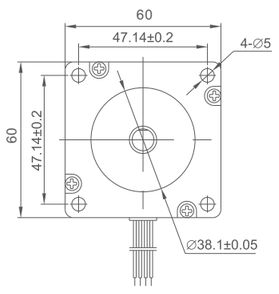


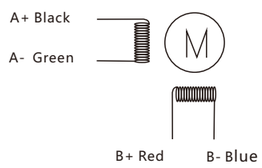
Model	L (mm)	D (mm)	E (mm)
57CM06	41	6.35	5.8
57CM13	56	6.35	5.8
57CM23	76	8	7.5
57CM26	84	8	7.5

■ NEMA23(Continious)

Model	Standard Type Length(mm)	Holding Torque (N.m)	Rate Current (A)	Resistance/ Phase(Ω)	Inductance / Phase (mH)	Inertia ($Kg.cm^2$)
D57CM21	67	2.1	4/6	0.21	0.75	0.57
D57CM31	88	3.1	4/6	0.26	1.18	0.84



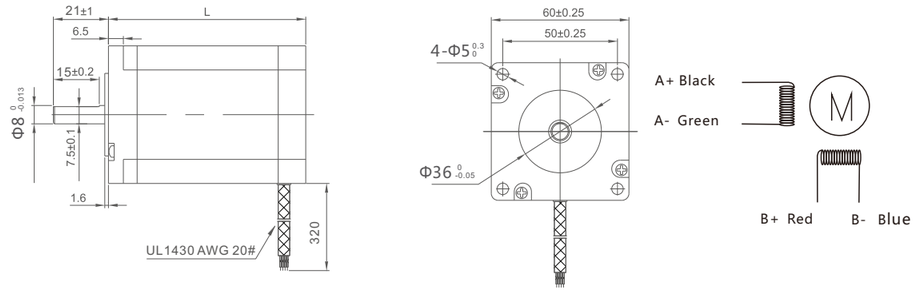




Model	L (mm)	D (mm)	E (mm)
D57CM21	67	8	7.5
D57CM31	88	8	7.5

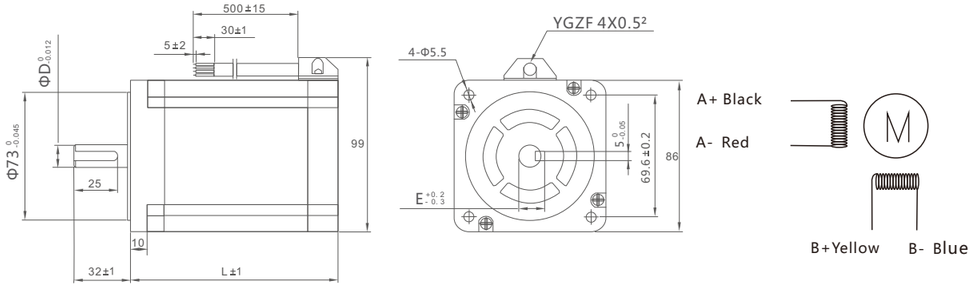
■ NEMA24

Model	Standard Type Length(mm)	Holding Torque (N.m)	Rate Current (A)	Resistance/ Phase(Ω)	Inductance / Phase (mH)	Inertia ($Kg.cm^2$)
60CM22X	67	2.2	5	0.33	1.05	0.49
60CM30X	85	3.0	5	0.46	2.0	0.69



■ NEMA34

Model	Standard Type Length(mm)	Holding Torque (N.m)	Rate Current (A)	Resistance/ Phase(Ω)	Inductance / Phase (mH)	Inertia ($Kg.cm^2$)
86CM35	66	3.5	4	0.42	2.67	1.0
86CM45	80	4.5	6	0.43	2.95	1.4
86CM80	98	8.0	6	0.63	4.0	2.5
86CM85	118	8.5	6	0.53	4.25	2.7



Model	L (mm)	D (mm)	E (mm)
86CM35	66	12.7	14.7
86CM45	80	12.7	14.7
86CM80	98	12.7	14.7
86CM85	118	12.7	14.7

Note:
① NEMA 8/11/14 stepper motors are coming soon
② Contact Leadshine for special type motor such as brake, double shaft, waterproof, etc.

04 Cables and Power Supplies

4.1 Power Supplies

1 SPS Series Power Supplies

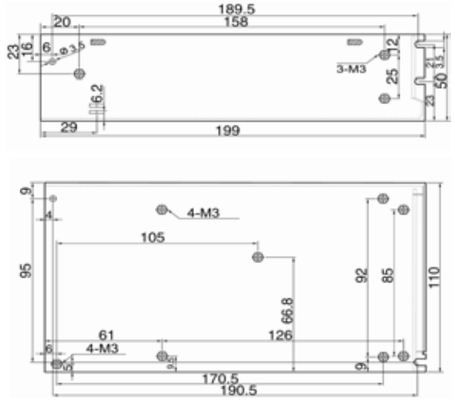
■ **Features**

- Specially Designed Power Suppliers for Stepper and Servo Controls
- Compact Size, Light in Weight
- Wide Input Voltage Range, 220VAC ± 10% or 110 VAC ± 10%
- Shortcut, Over-current, Over-voltage, Low-voltage Protections Big
- Power with High Efficiency
- Easy to Use

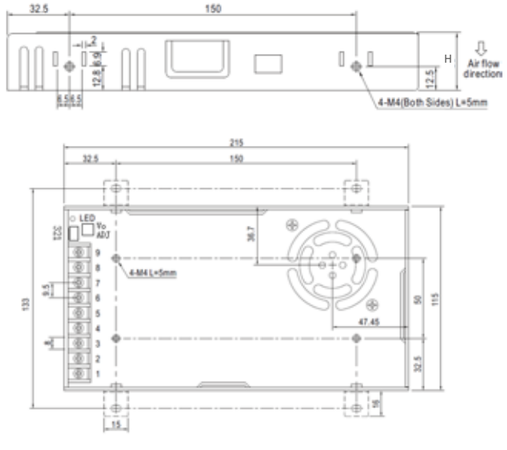
■ **Electrical Specifications**

Model	Output Voltage (VDC)	Continuous Current (A)	Peak Current (A)	Input Voltage	Matching Drives	Dimensions	Weight(Kg)
SPS2410(V2.0)	24	10	30	220VAC± 10% or 110 VAC ± 10%	EM3E-522/ EM3E-542/ EM3E-556	199*110*50mm	0.8
SPS3611(V2.0)	36	11	33			215*110*30mm	0.6
SPS488(V2.0)	48	8.3	24.9			215*110*30mm	0.6
SPS4810(V2.0)	48	10	30			215*110*50mm	0.8
SPS606(V2.0)	60	6.7	20.1		EM3E-870/ EM3E-A882	215*110*30mm	0.6

■ **Mechanical Specifications**



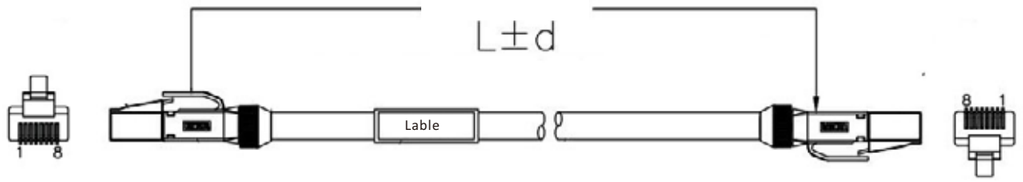
SPS2410(V2.0)



SPS3611(V2.0)/SPS488(V2.0)/SPS606(V2.0) H=30mm
SPS4810(V2.0) H=50mm

4.2 Cables

1 Cables for Communication



2 Specification

Model	Length (L)	Tolerance (d)
CABLE-TX0M1-BUS RoHS	100mm	±10mm
CABLE-TX0M2-BUS RoHS	200mm	±10mm
CABLE-TX0M3-BUS RoHS	300mm	±10mm
CABLE-TX0M5-BUS RoHS	400mm	±10mm
CABLE-TX1M0-BUS RoHS	1000mm	±10mm
CABLE-TX1M5-BUS RoHS	1500mm	±10mm
CABLE-TX2M0-BUS RoHS	2000mm	±10mm
CABLE-TX3M0-BUS RoHS	3000mm	±10mm
CABLE-TX5M0-BUS RoHS	5000mm	±10mm
CABLE-TX7M0-BUS RoHS	7000mm	±10mm
CABLE-TX10M0-BUS RoHS	10000mm	±10mm
CABLE-TX15M0-BUS RoHS	15000mm	±10mm
CABLE-TX20M0-BUS RoHS	20000mm	±10mm

05 Ordering Information

EtherCAT Drive Model	Input Power Voltage	Output Peak Current	Matched Motor	Holding Torque (N.m)
EM3E-522	20 - 50 (VDC)	0.5 - 2.2 (A)	20CM003	0.03
			20CM005	0.05
			28CM006	0.06
			28CM010	0.10
			28CM013	0.13
			35CM015	0.15
			35CM04	0.36
			42CM02	0.2
			42CM04	0.4
			42CM06	0.6
			42CM08	0.8
EM3E-556	20 - 50 (VDC)	2.1 - 5.6 (A)	57CM06	0.6
			57CM13	1.3
			57CM23	2.3
			57CM23-4A	2.3
			57CM26	2.6
			57CM26-4A	2.6
			D57CM21-4A	2.1
			D57CM31-A4	3.1
EM3E-870	20 - 80 (VDC)	2.1 - 7.0 (A)	D57CM21	2.1
			D57CM31	3.1
			60CM22X	2.2
			60CM30X	3.0
			86CM35	3.5
EM3E-A882	20 - 80 (VAC) 30 - 110 (VDC)	3.2 - 8.2 (A)	86CM45	4.5
			86CM80	8.0
			86CM85	8.5
			86CM120	12
Accessories	Cables of communication			