# Leadshine

# Easy Servo Systems
## Closed−loop, No Tuning

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Note: Product appearance and technical parameters are subject to change without notice.

- **High Performance**
- **High Quality**
- **Highly Cost-effective**
  (Holding Torque: 0.9 Nm to 20 Nm)

*Leading* **Technology**　　*Shining* **Value**

# Easy Servo Systems

## CONTENTS

## Company Overview

Founded in 1997, Leadshine Motion Technology Ltd. specializes in developing, manufacturing, and distributing high-quality cost-effective motion control products. Its products include motion controllers, stepper motors and drives, integrated steppers, easy servo motors and drives, integrated easy servos, servo motors and drives, integrated servos and power supplies. Leadshine serves various industrial and OEM customers in Asia, Europe, North/South America, Africa and Australia.

Leadshine is a global leader in stepper and servo technology, and it's also one of the LARGEST manufacturers of motion control products around the world. Led by an MIT PhD graduate, Leadshine's R&D team of 100 talented engineers is capable of designing high-quality motion control products based on the latest technologies. Leadsine's manufacturing facilities are ISO-9001 certified and professionally staffed.

Leadshine is committed to provide its customers with world-class motion control products at highly competitive prices. "LEADING technology and SHINING value" is always what Leadshine intends to offer to its customers.

## R&D

Leadshine is proud of its talented research & development team, which is one of the best in the motion control industry. We are capable of designing world-class products which can meet high requirements of our customers. Many innovative designs and products from Leadshine have been awarded for patents by Chinese government.

## Product Quality

Leadshine has been awarded the ISO 9001 registration for quality management practices since September 2004. The certification is a testimony of Leadshine's commitment to provide its customers with high quality products and services.

## Technical Support

Staffed with a highly professional and experienced technical support team, Leadshine can help its customers to increase productivity, reduce design & selection risks, and minimize the product development time. We are able to support our customers through email, telephone, field support, product studying conference, and some other approaches.

You can contact Leadshine technical support by phone at 86-755-2641-8447, by fax at 86-755-2640-2718, or by email at tech@leadshine.com.

# 01 ES Series
## Easy Servo Systems

## 1.1 Introduction

The ES series easy servos offer an alternative for applications requiring high performance and high reliability when the servo was the only choise, while it remains cost-effective. The system includes an easy servo motor combined with a fully digital, high performance easy servo drive. The internal encoder is used to close the position, velocity and current loops in real time, just like servo systems. It combines the best of servo and stepper motor technologies, and delivers unique capabilities and enhancements over both, while  at a fraction of the cost of a servo system !

Beside can be used to upgrade all stepper systems, its great feature of quick response and no hunting make it ideal for applications such as bonding and vision systems in which rapid motions with a short distance are required and hunting would be a problem. And it is ideal for applications where the equipment uses a belt-drive mechanism or otherwise has low rigidity and you don't want it to vibrate when stopping.

## 1.2 Advantages

### Compare to a Conventional Stepper
- Closed-loop, eliminates loss of synchronization
- Broader operating range, higher torque and higher speed
- Reduced motor heating and more efficient
- Smooth motion and extra-low motor noise
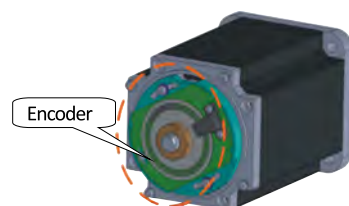- Do not need a high torque margin

### Compare to a Conventional Servo
- No tuning for most of applications and always stable
- Quick response, no delay and almost no settling time
- No hunting or no inherent dither
- High torque at starting and low speed, high stiffness at standstill
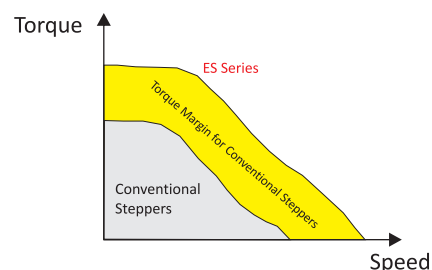- Lower cost

## 1.3 Features

### Closed-loop, eliminates loss of synchronization

The ES series use an encoder to detect the motor's real position continuously. If necessary, the ES drives will compensate the loss of synchronization, which is usually caused by abrupt load fluctuations or accelerations, and can not be compensated with a conventional stepper. Thus, the ES can provide very reliable control like a servo.

Encoder

### Broader operating range

Owing to closed-loop control and advanced control algorithm, the ES series do not need to size with a 50% torque margin as a conventional stepper system. Instead, the ES series can continuously operate at their maximum capabilities without loss of synchronism, achieving a broader operating range. The same size, but can output higher toque and run at higher speed.

Torque

ES Series

Torque Margin for Conventional Steppers

Conventional Steppers

Speed

### Reduced motor heating and more efficient

Since the motor runs in closed-loop, the ES drives only put as much current into the motor as required to drive the motor to the target. Motor heat is 20 - 40 $^{o}$C lower compare to using a conventional stepper drive which runs at full current most of the time. Less power consumption and longer motor lifetime can be achieved, reducing using and maintenance cost.

$^{o}$C
Temperature rise
80
60
40
20
0
Conventional Stepper
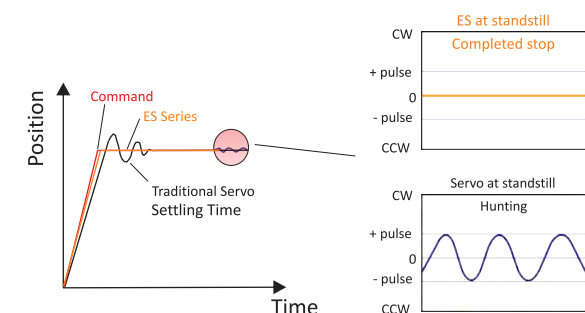ES Series
Time
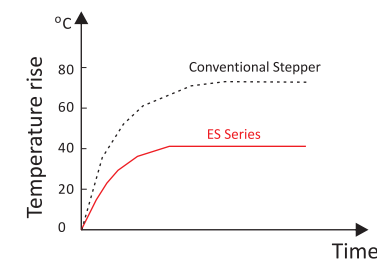
### Smooth motion and Extra-low motor noise

Unlike a conventional stepper drive, the ES drives adopt vector control and filtering, producing a smooth motion with minimum torque ripples. Extra-low motor noise is achieved.

1.2
Vibration
0.8
0.4
0
ES Series
Open-loop
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5 8
Speed(rps)
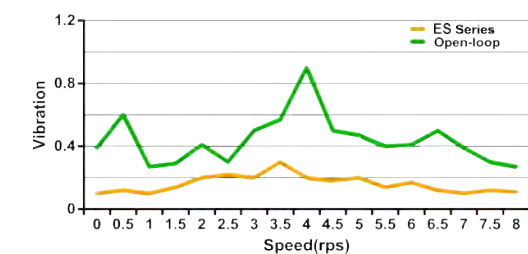
### Quick response, no hunting

For the case of traditional servo motor systems, there is a considerable delay between the commanding input signals and the resultant motion because of the constant monitor of the current position, necessitating a waiting time until it settles, called settling time.

Since the ES series is a stepper motor based system, it operates in synchronism with command pulses and has no hunting problem. When it stops, its position is completely stable and does not fluctuate. It is a great feature of the ES when rapid motions with a short distance are required and it is ideal for applications such as bonding and vision systems in which hunting would be a problem.

Position
Command
ES Series
Traditional Servo
Settling Time
Time

CW
+ pulse
0
- pulse
CCW
ES at standstill
Completed stop

CW
+ pulse
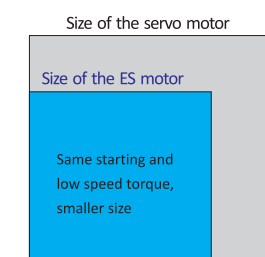0
- pulse
CCW
Servo at standstill
Hunting

### Plug and play, no tuning for most of applications

Unlike a conventional servo system which usually needs the engineer to spend a long time to learn how to use tuning tools and tune the gains for a satisfying  performance, the ES series is ready for operation within a very short period of time. Connect the motor to the drive, set the microstep resolution and operating current, then the system is ready and offers high performance approaching to a fine tuned servo. Save time and save cost.

### High torque at starting/low speed,  high inertial loads

Since the ES series is a stepper motor based system, so it has the advantages of high stiffness at standstill, high torque at starting and low speed, eliminating gear box.  The ES adopts sophisticated control algorithms to take advantage of high-torque capability, providing direct-drive of high inertia loads such as flywheels and belt drives. These load inertias may be as large as 100 times the motor inertia while still providing smooth positioning control. Traditional servo systems typically cannot exceed a 10:1 inertial mismatch.

Size of the servo motor

Size of the ES motor

Same starting and low speed torque, smaller size

## 1.4 Part Number

ES - D 808
① ② ③

ES - M 2 23 20
① ② ③ ④ ⑤

| ① | **ES**: Easy Servo |
|---|---|
| ② | **D**: Drive **DH**: High Voltage Drive (AC input) |
| ③ | **508**: 50VDC, 8A Peak; **808**: 80VDC, 8A Peak; **1008**: 100VDC, 8A Peak ... **1208**: 120 VAC, 8A Peak; **2306**: 230 VAC, 6A Peak ... |

| ① | **ES**: Easy Servo |
|---|---|
| ② | **M**: Motor **MH**: High Voltage Motor |
| ③ | **Motor Type:** 2: 2-phase; 3: 3-phase |

| ④ | **Motor Size:** 23: NEMA23 / ☐ 57 mm 34: NEMA34 / ☐ 86 mm |
|---|---|
| ⑤ | **Holding Torque:** 09: 0.9 N*m 20: 2.0 N*m 40: 4.0 N*m ... |

| | ES-D508 | ES-D808 | ES-DH2306 |
|---|---|---|---|
| Drive | 24 to 50 VDC, Typical: 36 VDC | 24 to 80 VDC, Typical: 48 VDC | 150 to 240 VAC, Typical: 220 VAC |

| | NEMA23 | | NEMA24 | | NEMA42 | |
|---|---|---|---|---|---|---|
| Motor | ES-M32309 | ES-M32320 | ES-M22415 | ES-M22430 | ES-MH342120 | ES-MH342200 |
| | 0.9 Nm | 2 Nm | 1.5 Nm | 3 Nm | 12 Nm | 20 Nm |

| | ES-D808 / ES-D1008 | ES-D1008 / ES-D808 | ES-DH1208 | ES-DH2306 |
|---|---|---|---|---|
| Drive | 24 to 80 VDC, Typical: 48 VDC | 24 to 100 VDC, Typical: 60 VDC | 90 to 130 VAC, Typical: 110 VAC | 150 to 240 VAC, Typical: 220 VAC |

| | NEMA34 | | | | |
|---|---|---|---|---|---|
| Motor | ES-M23440 | ES-M23480 | ES-MH23480 | ES-MH234120 | ES-MH33480 |
| | 4 Nm | 8 Nm | 8 Nm | 12 Nm | 8 Nm |

### Operating Voltage up to

| 50VDC | 80VDC | 100VDC | 150VAC | 230VAC |
|---|---|---|---|---|

## 2.1 Specifications

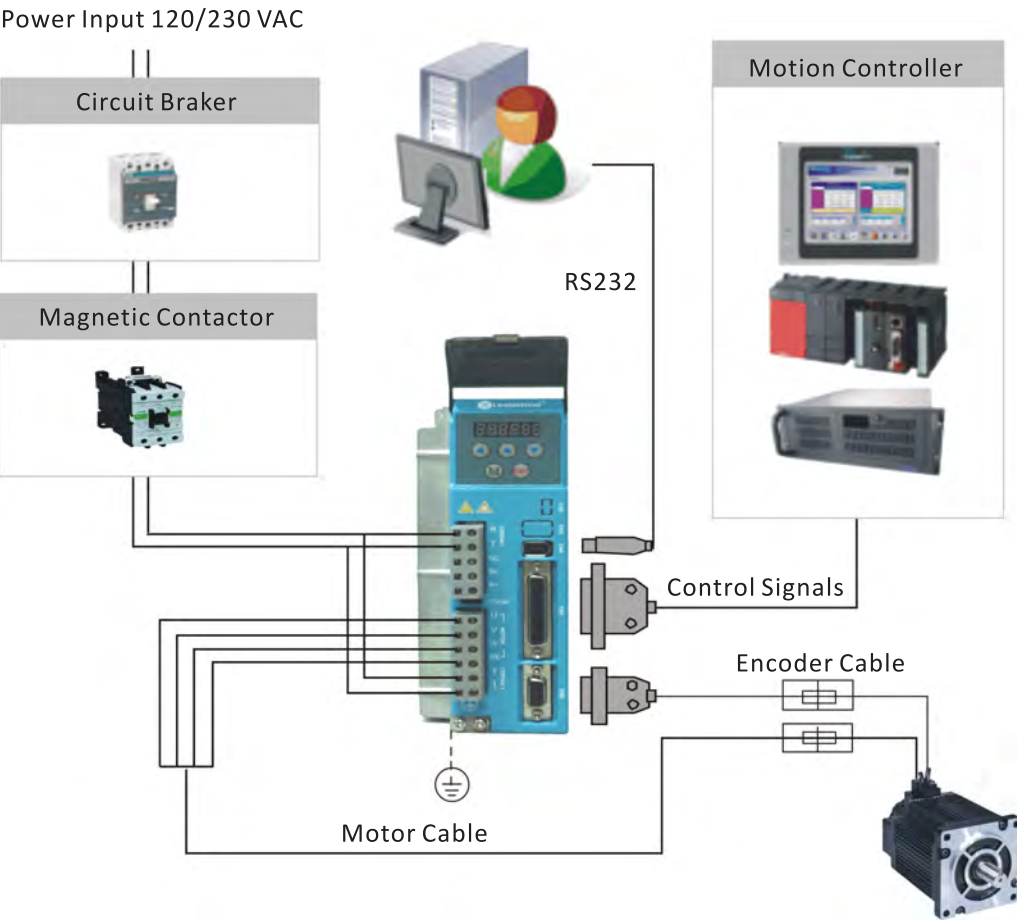| Model | ES-D508 | ES-D808 | ES-D1008 | ES-DH1208 | ES-DH2306 |
|---|---|---|---|---|---|
| Operating Voltage | 18 to 48 VDC | 24 to 75 VDC | 24 to 70 VAC | 90 to 130 VAC | 150 to 240 VAC |
| Output (Peak) | 8.0 A | | | | 6.0 A |
| Control Algorithm | SVPWM | | | | |
| Maximum Input Frequency | 200 kHz* | | | | |
| Command Input | Step/Direction, Enable/Disable | | | | |
| Status Output | In position, Fault status | | | | |
| Encoder Feedback | A, B (differential) | | | | |
| Protection Functions | Over-current, Over-voltage, Position following error | | | | |
| Matching Motors | ES-M32309 ES-M32320 | ES-M22415 ES-M22430 | ES-M23440 ES-M23480 | ES-MH234120 ES-MH23480 | ES-MH33480 ES-MH342120 ES-MH342200 |
| Encoder Resolution | 1000 line | | | | |
| Weight | 280 g | 570 g | 600 g | 1600 g | 1800 g |

*Can be customized.
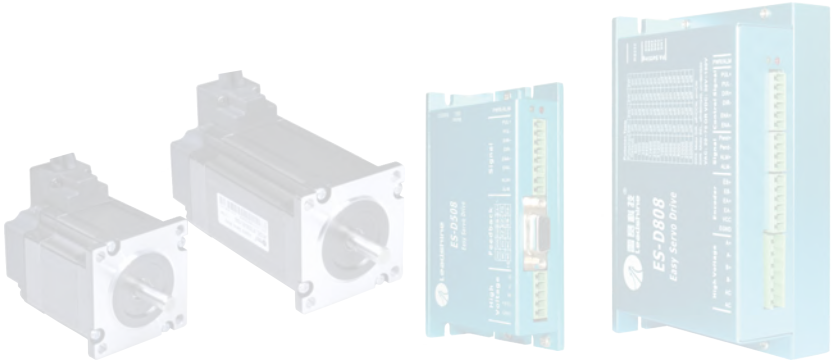
# 2.2 Typical System Configurations

**ES-D508/ES-D808/ES-D1008**
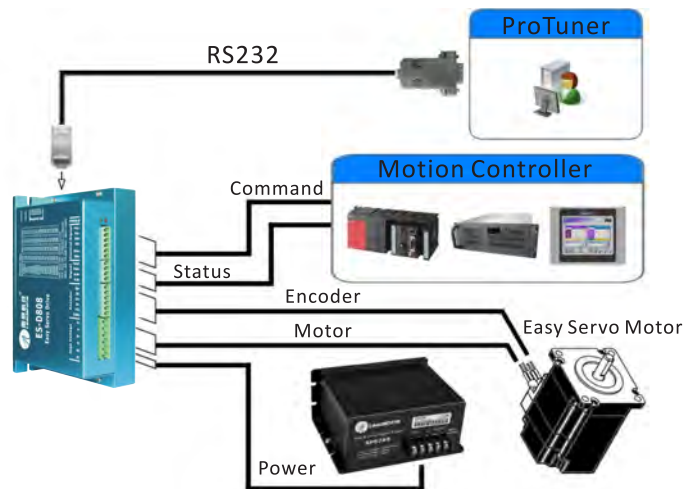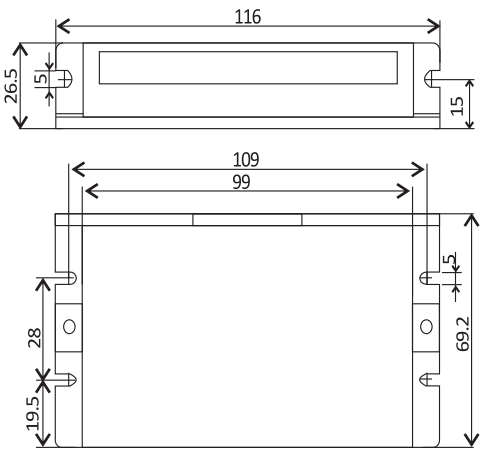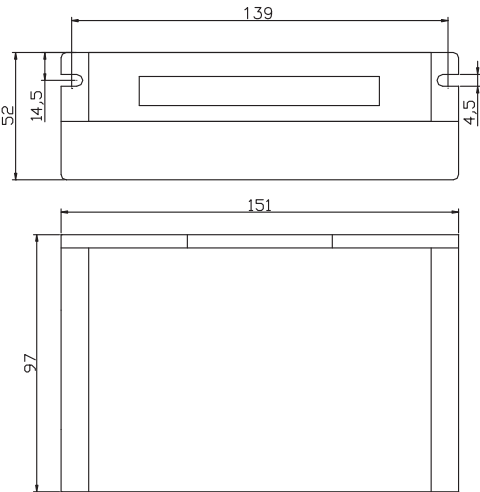


**ES-DH1208/ES-DH2306**



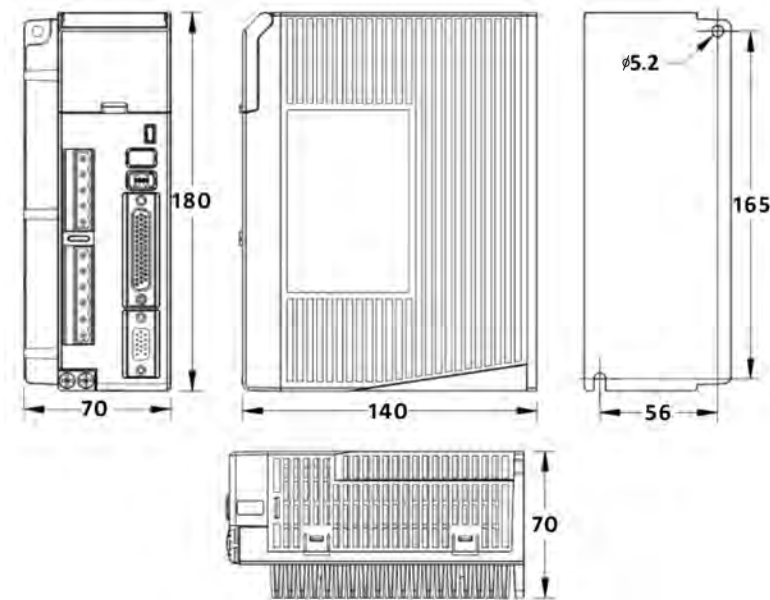# 2.3 Mechanical Specifications

Units: mm    1 inch = 25.4mm

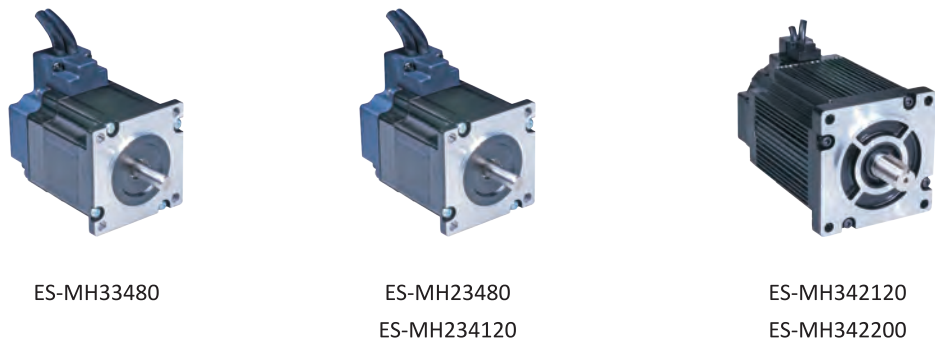ES-D508



ES-D808 / ES-D1008



ES-DH1208 / ES-DH2306

# 03 ES Series
## Easy Servo Motors

| | Frame Size | NEMA23 (57mm) | NEMA24 (60mm) | NEMA34 (86mm) | NEMA42 (110mm) |
|---|---|---|---|---|---|
| | Rated Power | 0.9 Nm 2.0 Nm | 1.5 Nm 3.0 Nm | 4.0 Nm 8.0 Nm 12.0 Nm | 12.0 Nm 20.0 Nm |

### Low and medium voltage

ES-M32309
ES-M32320

ES-M22415
ES-M22430

ES-M23440
ES-M23480

### High voltage

ES-MH33480

ES-MH23480
ES-MH234120

ES-MH342120
ES-MH342200

# 3.1 Specifications

### Low and medium voltage

| Model | Units | ES-M32309 | ES-M32320 | ES-M22415 | ES-M22430 | ES-M23440 | ES-M23480 |
|---|---|---|---|---|---|---|---|
| Current/Phase | A | 5.8 | 5.8 | 2.5 | 3 | 5.5 | 6 |
| Holding Torque | Nm | 0.9 | 2 | 1.5 | 3 | 4 | 8 |
| Speed Range | RPM | 0 to 2000 | 0 to 2000 | 0 to 2000 | 0 to 2000 | 0 to 2000 | 0 to 2000 |
| Weight | Kg | 0.85 | 1.4 | 1.1 | 1.6 | 2.56 | 3.95 |

### High voltage

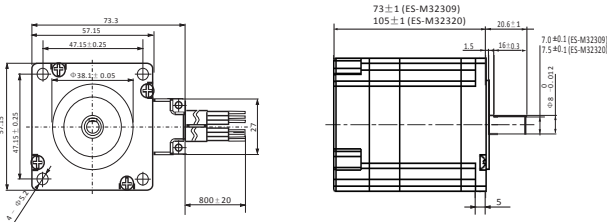| Model | Units | ES-MH23480 | ES-MH234120 | ES-MH33480 | ES-MH342120 | ES-MH342200 |
|---|---|---|---|---|---|---|
| Current/Phase | A | 5.0 | 5.5 | 3.5 | 4.0 | 4.5 |
| Holding Torque | Nm | 8 | 12 | 8 | 12 | 20 |
| Speed Range | RPM | 0 to 2000 | 0 to 2000 | 0 to 2000 | 0 to 2000 | 0 to 2000 |
| Weight | Kg | 4.0 | 5.6 | 5.6 | 8.6 | 10.5 |

# 3.2 Speed-Torque Curves and Mechanical Specifications

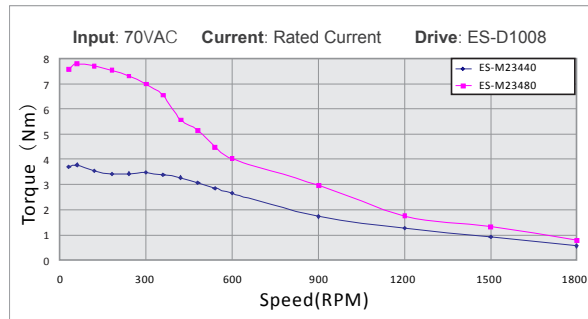### ( a ) ES-M32309 and ES-M32320
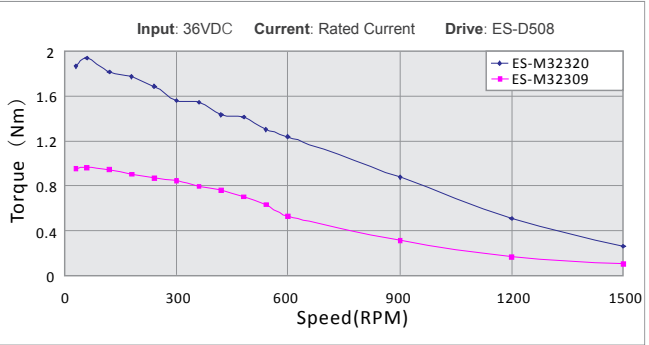
Units: mm   1 inch = 25.4mm

Input: 36VDC   Current: Rated Current   Drive: ES-D508

ES-M32320
ES-M32309

### ( b ) ES-M22415 and ES-M22430

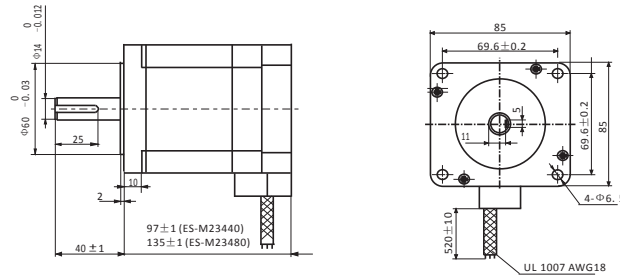Input: 48VDC   Current: Rated Current   Drive: ES-D808

ES-M22430
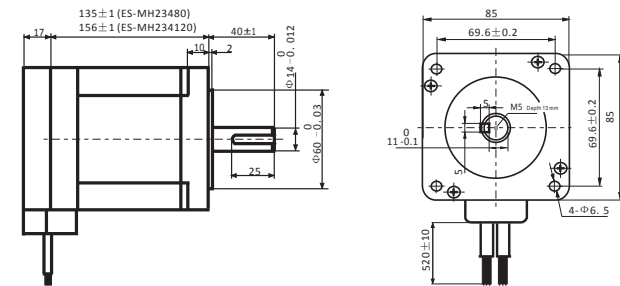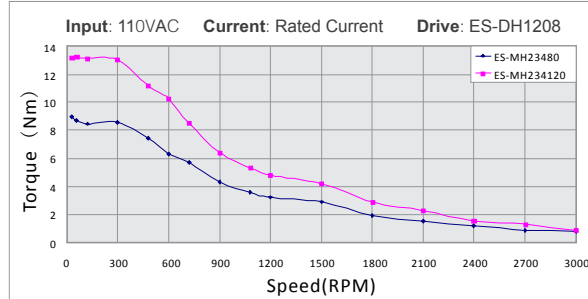ES-M22415
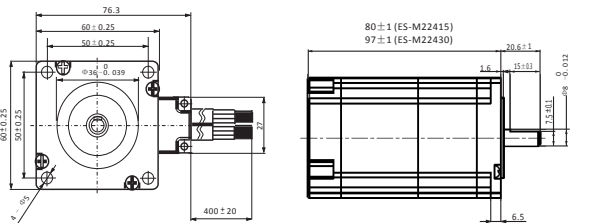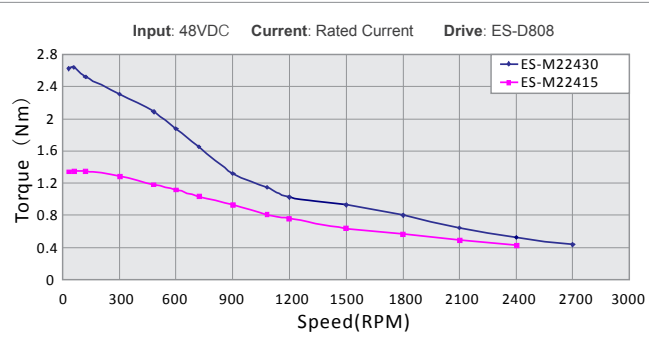
# 3.2 Speed-Torque Curves and Mechanical Specifications
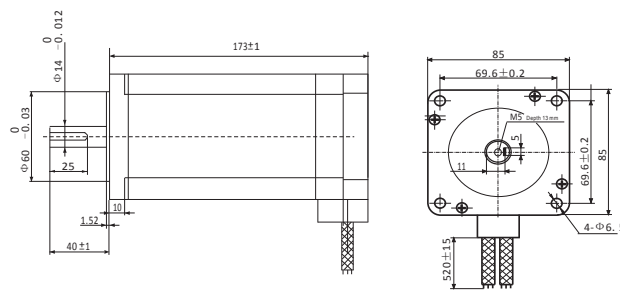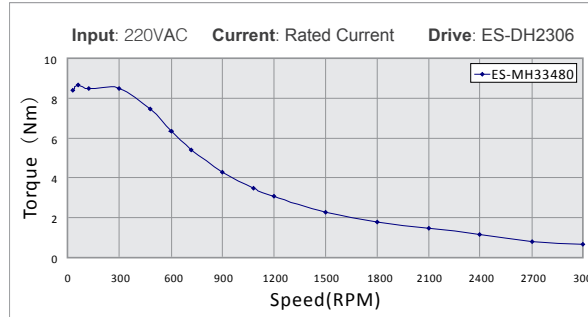
## ( c ) ES-M23440 and ES-M23480

Units: mm    1 inch = 25.4mm



Input: 70VAC    Current: Rated Current    Drive: ES-D1008

## ( d ) ES-MH23480 and ES-MH234120



Input: 110VAC    Current: Rated Current    Drive: ES-DH1208

## ( e ) ES-MH33480



Input: 220VAC    Current: Rated Current    Drive: ES-DH2306

## ( f ) ES-MH342120 and ES-MH342200



Input: 220VAC    Current: Rated Current    Drive: ES-DH2306

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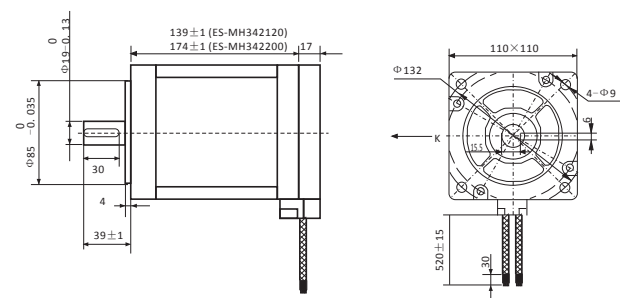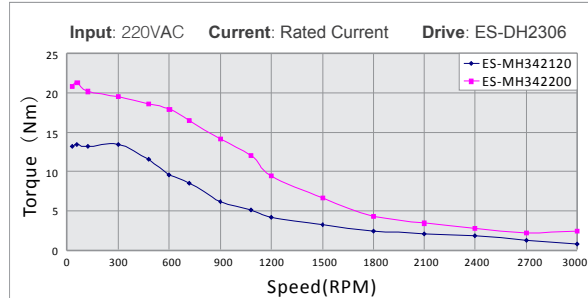
# 04 ES Series Accessories

| Number | Picture | Name | Discreption |
|---|---|---|---|
| 1 | | **Motor Cable:**<br>CABLEH-RZ3M0<br>CABLEH-RZ5M0<br>CABLEH-RZ10M0 | Length 3 m（Standard）, 5m and 10m optional<br>For the ES-D508, ES-D808, ES-D1008, ES-DH1208 and ES-DH2306. |
| 2 | | **Encoder Cable:**<br>CABLEG-BM3M0<br>CABLEG-BM5M0<br>CABLEG-BM10M0 | Length 3 m（Standard）, 5m and 10m optional<br>For the ES-D508, ES-DH1208 and ES-DH2306. |
| 3 | | **Encoder Cable:**<br>CABLEH-BM3M0<br>CABLEH-BM5M0<br>CABLEH-BM10M0 | Length 3 m（Standard）, 5m and 10m optional<br>For the ES-D1008 and ES-D808 |
| 4 | | RS232 Cable for ProTuner:<br>CABLE-ACH1000 | Length 1.2 m<br>For the ES-DH2308 and ES-DH1208 |
| 5 | | RS232 Cable for ProTuner:<br>CABLE-PC | Length 1.2 m<br>For the ES-D508, ES-D808 and ES-D1008 |
| 6 | | Control Signal Connector:<br>HDB-44P | Control Signal Connector for the ES-DH1208 and ES-DH2306. |

# 05 ES Series Order Information

| Easy Servo Packages | Motors | Drives | Accessories |
|---|---|---|---|
| ES-P2309 | ES-M32309 | ES-D508 | CABLEH-RZ3M0,CABLEG-BM3M0, CABLE-PC * |
| ES-P2320 | ES-M32320 | ES-D508 | CABLEH-RZ3M0,CABLEG-BM3M0, CABLE-PC * |
| ES-P2415 | ES-M22415 | ES-D808 | CABLEH-RZ3M0,CABLEH-BM3M0, CABLE-PC * |
| ES-P2430 | ES-M22430 | ES-D808 | CABLEH-RZ3M0,CABLEH-BM3M0, CABLE-PC * |
| ES-P3440 | ES-M23440 | ES-D808 | CABLEH-RZ3M0,CABLEH-BM3M0, CABLE-PC * |
| ES-P3480 | ES-M23480 | ES-D1008 | CABLEH-RZ3M0,CABLEH-BM3M0, CABLE-PC * |
| ES-P3480H-1 | ES-MH23480 | ES-DH1208 | CABLEH-RZ3M0,CABLEG-BM3M0, CABLE-ACH1000, HDB-44P * |
| ES-P3480H-2 | ES-MH33480 | ES-DH2306 | CABLEH-RZ3M0,CABLEG-BM3M0, CABLE-ACH1000, HDB-44P * |
| ES-P34120H-1 | ES-MH234120 | ES-DH1208 | CABLEH-RZ3M0,CABLEG-BM3M0, CABLE-ACH1000, HDB-44P * |
| ES-P42120 | ES-MH342120 | ES-DH2306 | CABLEH-RZ3M0,CABLEG-BM3M0, CABLE-ACH1000, HDB-44P * |
| ES-P42200 | ES-MH342200 | ES-DH2306 | CABLEH-RZ3M0,CABLEG-BM3M0, CABLE-ACH1000, HDB-44P * |

*See the "Accessories" section for more information.
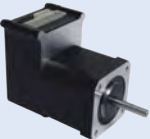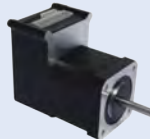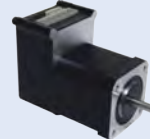
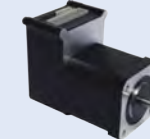# 06 iES Series
## Integrated Easy Servo Systems

## 6.1 Introduction

Leadshine's iES series easy servos are highly integrated closed-loop stepper systems. An iES integrated easy servo has an easy servo motor and an easy servo drive. At very compact size and with all components integrated, the iES series easy servos can save mounting space, eliminate encoder connection and motor wiring time, reduce interference, and lower cable and labour cost.

By adopting Leadshine's latest easy servo control technology, the iES series integrated easy servos offer high starting torque, high precision and smooth movement, and extra-low noise at low speed movement with no obvious resonance area. Different from a conventional constant-current drive in open-loop stepper controls, output current of the iES is dynamic and changes depending on load condition, the same as servo controls. Therefore, it can significantly reduce motor heating and increase motor lifetime. The drive takes step & direction commands, and is capable of outputting in-position and fault signals back to the master controller or external devices for complete system controls.

The integrated 1,000-line encoder offers the real-time motor shaft position to the drive. Based on that position, the drive can close the loop between the motor and drive, eliminating the possibility of stall or loss of movement synchronization which is often found in open-loop stepper systems. By getting rid of torque reservation in open-loop stepper systems, the iES series integrated easy servos can significantly improve high speed performance by as much as 30%. In addition, they perform much better in response time and acceleration over open-loop stepper systems.

Compared with brushless servo systems, the iES series integrated easy servos offer much higher low-speed-torque, no overshooting and zero settling time, no hunting, and no tuning for most of applications. Significant cost cutting of the package (motor + encoder + drive) also makes the iES series integrated easy servos ideal for the motion control systems in many applications.

| | | | | |
|---|---|---|---|---|
| **iES-17** (NEMA17) | iES-1703 | iES-1704 | iES-1705 | iES-1706 |
| **iES-23** (NEMA23) | iES-2309 | iES-2320 | | |
| **iES-24** (NEMA24) | iES-2412 | iES-2418 | iES-2424 | iES-2430 |

Please visit Leadshine's website at www.leadshine.com for the latest information about the iES series easy servos.
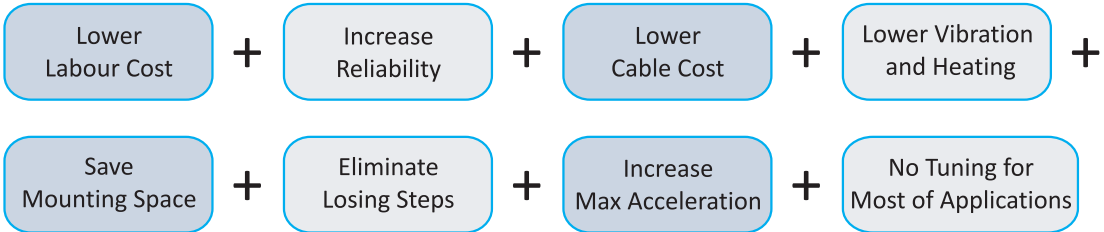
## 6.2 Advantages

### Compare to a Conventional Stepper
- Closed-loop, eliminates loss of synchronization
- Broader operating range, higher torque and higher speed
- Reduced motor heating and more efficient
- Smooth motion and extra-low motor noise
- Do not need a high torque margin

### Compare to a Conventional Servo
- No tuning for most of applications and always stable
- Quick response, no delay and almost no settling time
- No hunting or no inherent dither
- High torque at starting and low speed, high stiffness at standstill
- Lower cost

Lower Labour Cost + Increase Reliability + Lower Cable Cost + Lower Vibration and Heating +

Save Mounting Space + Eliminate Losing Steps + Increase Max Acceleration + No Tuning for Most of Applications

## 6.3 Features

### Closed-loop, eliminates loss of synchronization

The iES series use an encoder to detect the motor's real position continuously. If necessary, the iES drives will compensate the loss of synchronization, which is usually caused by abrupt load fluctuations or accelerations, and can not be compensated with a conventional stepper. Thus, the iES can provide very precise position control like a servo without time consuming servo tuning.

Encoder
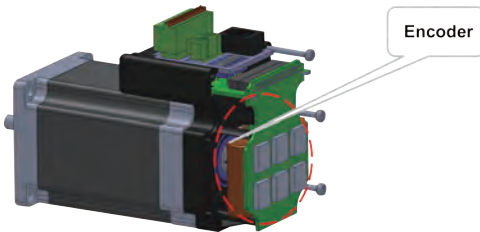
### Broader operating range

Owing to closed-loop control and advanced control algorithm, the iES series do not need to size with a 50% torque margin as a conventional stepper system. Instead, the iES series can continuously operate at their maximum capabilities without loss of synchronism, achieving a broader operating range. The same size, but can output higher toque and run at higher speed.

Torque

iES Series

Torque Margin for Conventional Steppers

Conventional Steppers

Speed
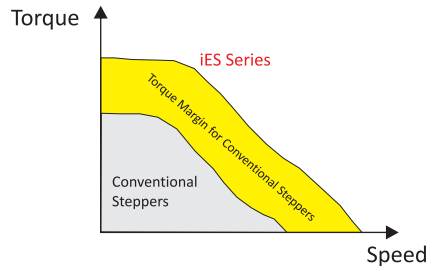
### Reduced motor heating and more efficient

Since the motor runs in closed-loop, the iES drives only put as much current into the motor as required to drive the motor to the target. Motor heat is 20 to 40 $^\circ$C lower compare to a conventional stepper drive which runs at full current most of the time. Less power consumption and longer motor lifetime can be achieved, reducing using and maintenance cost.

$^\circ$C
80
60
40
20
0

Temperature rise

Conventional Stepper

iES Series

Time
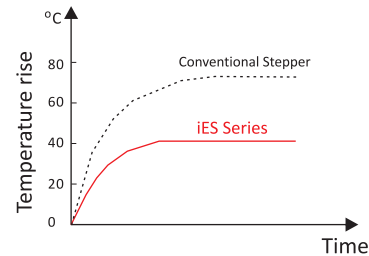
## 6.3 Features (Con't)

### Smooth motion and Extra-low motor noise

Unlike a conventional stepper drive, the iES easy servo drives adopt vector control and filtering, producing a smooth motion with minimum torque ripples. Extra-low motor noise is achieved.
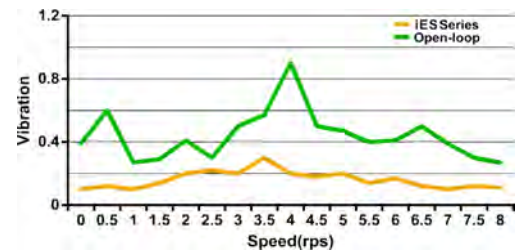
### Quick response, no hunting

For the case of traditional servo motor systems, there is a considerable delay between the commanding input signals and the resultant motion because of the constant monitor of the current position, necessitating a waiting time until it settles, called settling time.

Since the iES series is a stepper motor based system, it operates in synchronism with command pulses and has no hunting problem. When it stops, its position is completely stable and does not fluctuate. It is a great feature of the iES when rapid motions with a short distance are required and it is ideal for applications such as bonding and vision systems in which hunting would be a problem.
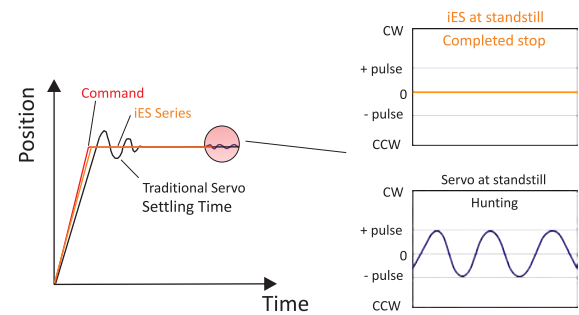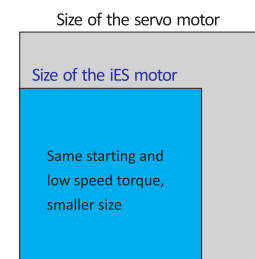
### Plug and play, no tuning for most of applications

Unlike a conventional servo system which usually needs the engineer to spend a long time to learn how to use tuning tools and tune the gains for a satisfying performance, the iES series is ready for operation within a very short period of time. Connect the motor to the drive, set the microstep resolution and operating current, then the system is ready and offers high performance approaching to a fine tuned servo. Save time and save cost.
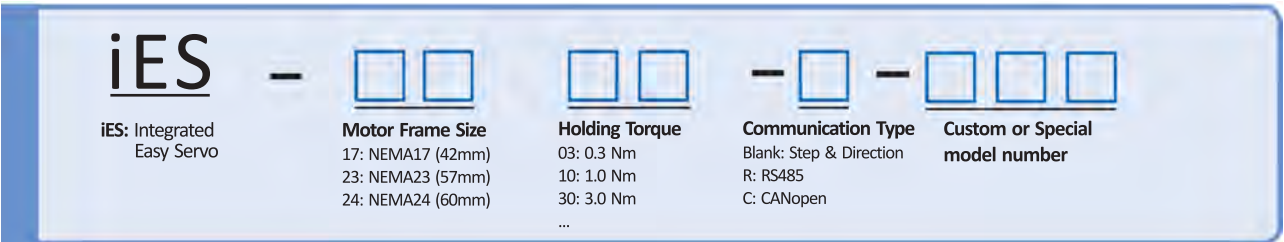
### High torque at starting/low speed, high inertial loads

Since the iES series is a stepper motor based system, so it has the advantages of high stiffness at standstill, high torque at starting and low speed, eliminating gear box. The iES adopts sophisticated control algorithms to take advantage of high-torque capability, providing direct-drive of high inertia loads such as flywheels and belt drives. These load inertias may be as large as 100 times the motor inertia while still providing smooth positioning control. Traditional servo systems typically cannot exceed a 10:1 inertial mismatch.

## 6.4 Part Number

iES

**iES:** Integrated Easy Servo

**Motor Frame Size**
17: NEMA17 (42mm)
23: NEMA23 (57mm)
24: NEMA24 (60mm)

**Holding Torque**
03: 0.3 Nm
10: 1.0 Nm
30: 3.0 Nm
...

**Communication Type**
Blank: Step & Direction
R: RS485
C: CANopen

**Custom or Special model number**

## 6.5 ElectricalSpecifications

| Model | | iES-17 | iES-23 | iES-24 |
|---|---|---|---|---|
| Operating Voltage (VDC) | | 24 | 18 to 48 | 18 to 70 |
| Holding Torque (Nm) | | 0.3, 0.4, 0.5 and 0.6 | 0.9 and 2.0 | 1.2, 1.8, 2.4 and 3.0 |
| Operation Modes | | Step & Direction, RS485 and CANopen | | |
| Maximum Input Frequency (kHz) | | 500 | | |
| Protection Functions | | Over-current, Over-voltage, Position following error | | |
| Inputs | Step & Direction | Step & Direction, Enable (differential) | | |
| | RS485 / CANopen | 4 digital inputs, 1 analog input (single-end) | | |
| Outputs | Step & Direction | In position and fault out (differential) | | |
| | RS485 / CANopen | 2 digital outputs (open collector) | | |
| Encoder Resolution | | 1000-line (4000 ppr) | | |
| Storage Temperature | | -20 ℃ to 80 ℃ | | |
| Ambient Temperature | | 0 ℃ to 50 ℃ (Heat sink) | | |
| Humidity | | 40%RH to 90%RH | | |
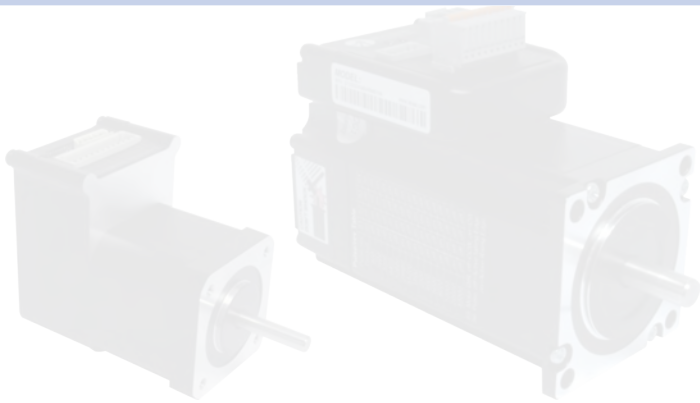
# 6.6 Pin Assignment



| Model | Step&Direction | RS485 | CANopen |
|---|---|---|---|
| iES-17 | +5V | T+ | CANH |
| iES-23 | TX | T- | CANH |
| iES-24 | GND | R+ | CANH |
| | RX | R- | CANL |
| | GND | GND | GND |

| Model | Step&Direction | RS485/ CANopen |
|---|---|---|
| iES-17 | PUL+ PUL- DIR+ DIR- ENA+ ENA- PEND+ PEND- ALM+ ALM- +VDC GND | IN1 IN2 IN3 IN4 OUT1 OUT2 VIN+ VIN- COM+ COM- +VDC GND |
| iES-23 | PUL+ PUL- DIR+ DIR- ENA+ ENA- PEND+ PEND- ALM+ ALM- | IN1 IN2 IN3 IN4 OUT1 OUT2 VIN+ VIN- COM+ COM- |
| iES-24 | | |

# 6.7 Operation Modes

## 1. Step & Direction



Step & Direction
CW / CCW Pulse

Motion Controller
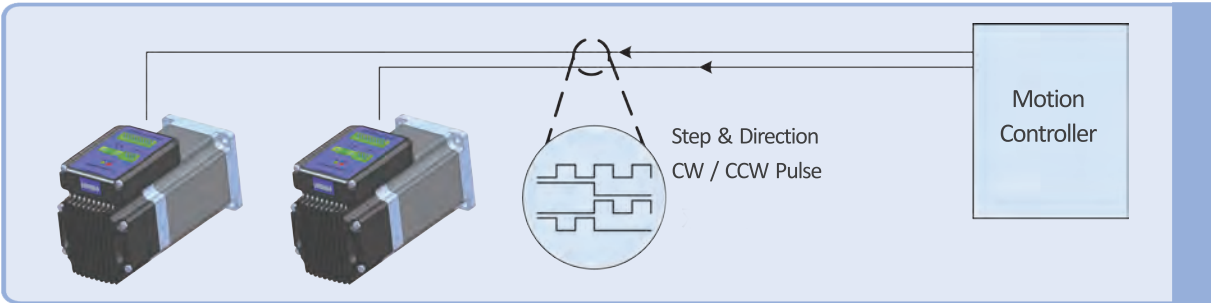
- Support step & direction and CW/CCW pulse commands
- Compatible with 5 to 24 V command signals

## 2. RS485



IDn ... ID2 ID1
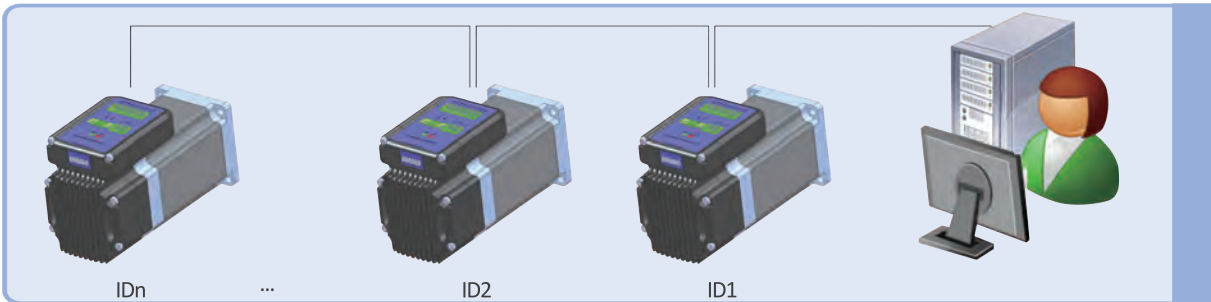
- One host up to 32 drives
- Can be used with either 2-wire (half-duplex) or 4-wire RS485 (full-duplex) implementation
- DLL is available for API function calling
- Easy to wire and build multi-axis systems

## 3. CANopen



IDn ... ID2 ID1
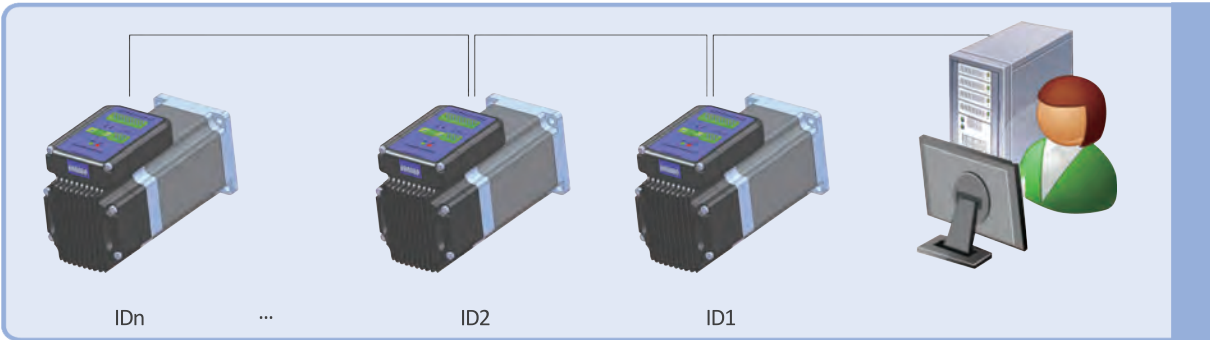
- One host up to 127 drives
- CANopen standards: CiA Standard 301 (DS301), CiA Standard 402 (DSP402)
- Up t 1 Mbit/sec speeds possible
- Easy to wire and build multi-axis systems

# 6.8 Typical System Configurations

## 1. Step & Direction



Master Controller

Power Supply

Control Signals

In position, Fault out

PC

RS232

## 6.8 Typical System Configurations (Con't)

2. RS485 and CANopen
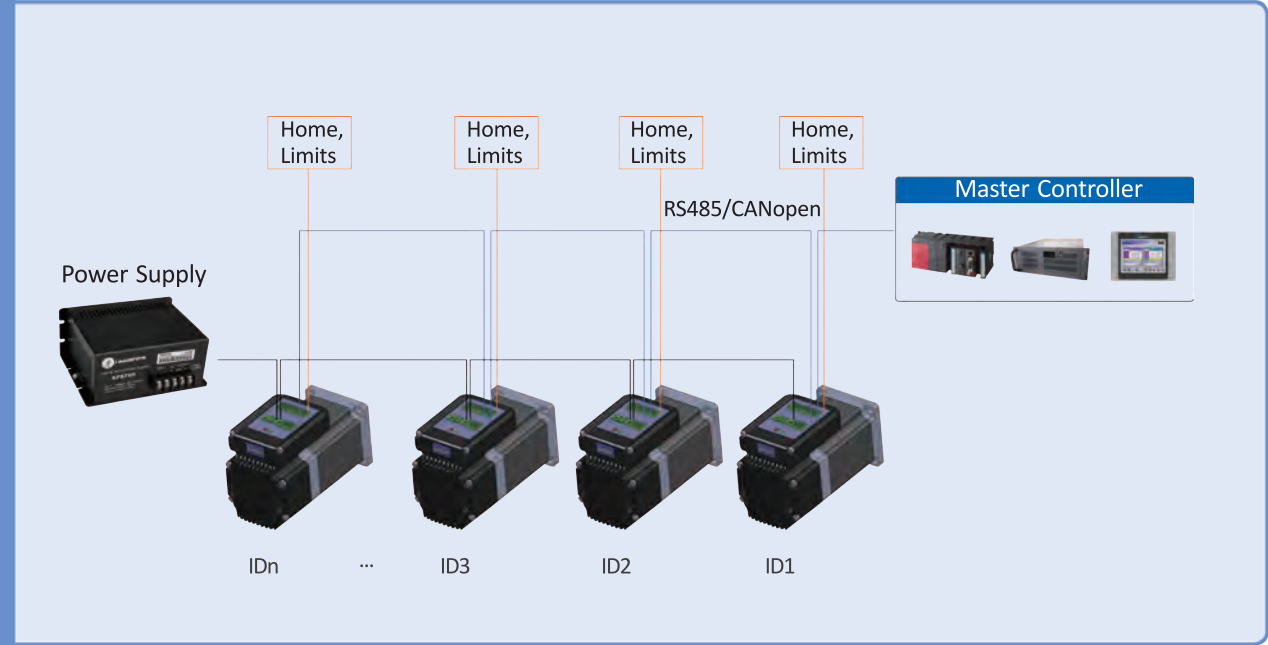


## 6.9 Speed-Torque Curves*
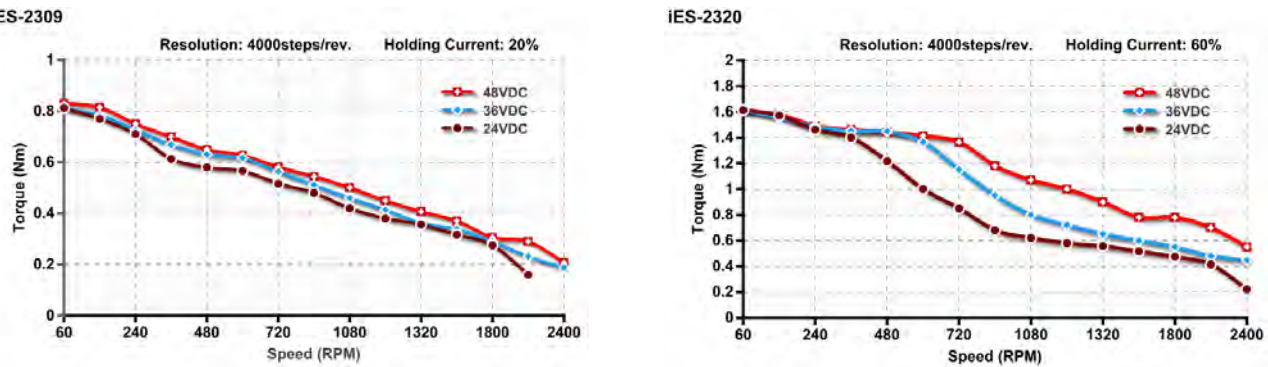


* Please contact Leadshine or visit www.leadshine.com for more speed-torque curves of other models.
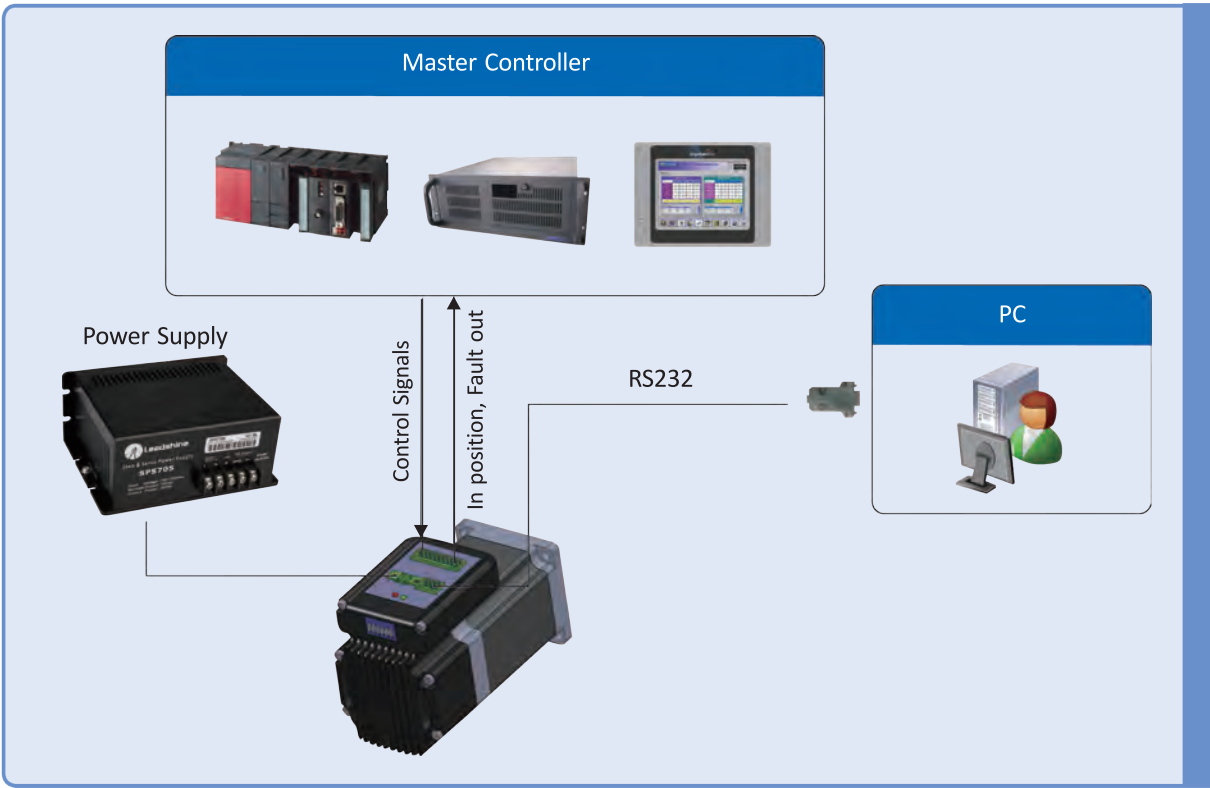
## 6.10 Mechanical Specifications

Units: mm   1 inch = 25.4mm
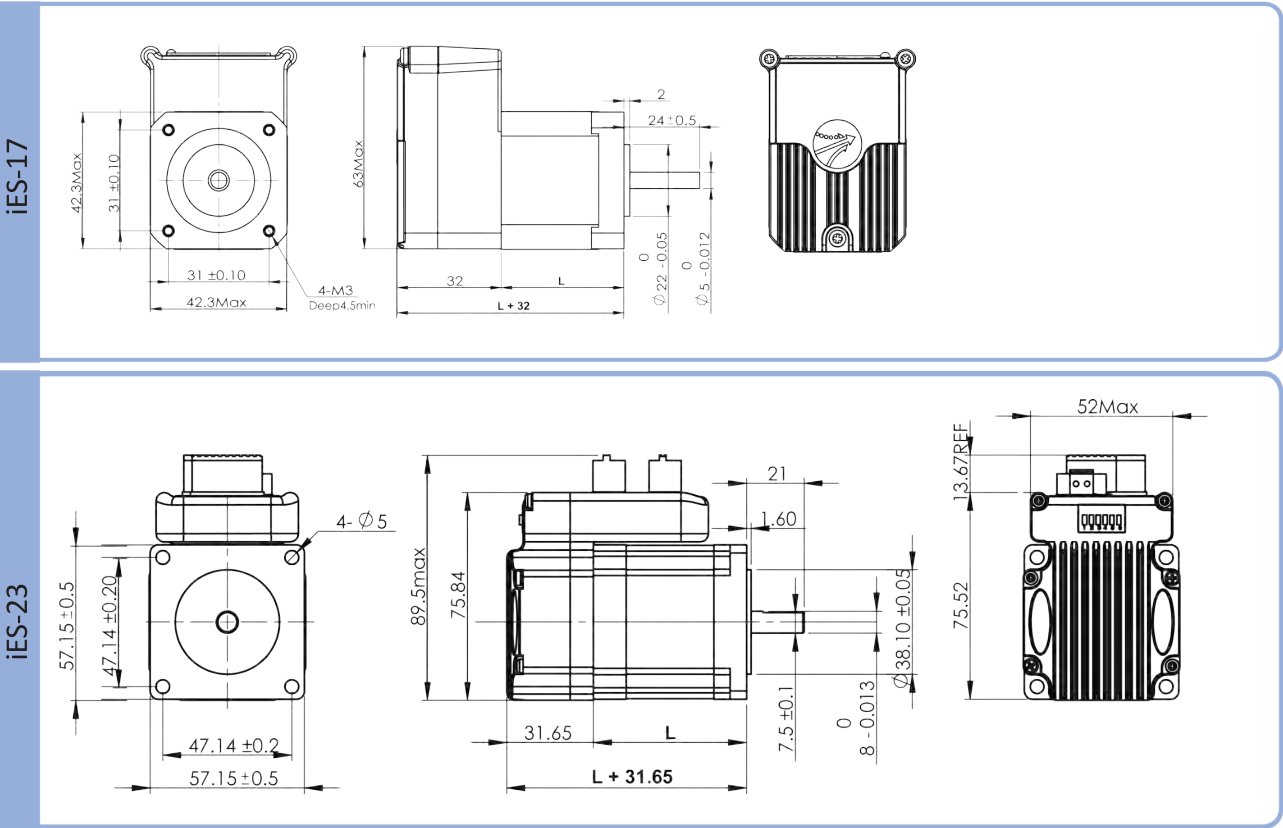


| Frame Size | Motor Body Length (mm) | Holding Torque (Nm) | Model |
|---|---|---|---|
| iES-17 (NEMA17) | L = 33 | 0.3 | iES-1703-x |
| | L = 39 | 0.4 | iES-1704-x |
| | L = 47 | 0.5 | iES-1705-x |
| | L = 58 | 0.6 | iES-1706-x |
| iES-23 (NEMA23) | L = 56 | 0.9 | iES-2309-x |
| | L = 80 | 2.0 | iES-2320-x |
| iES-24 (NEMA24) | L = 47 | 1.2 | iES-2412-x |
| | L = 55 | 1.8 | iES-2418-x |
| | L = 68 | 2.4 | iES-2424-x |
| | L = 85 | 3.0 | iES-2430-x |

## SPS Series Unregulated Switching Mode Power Supplies

- Specifically designed to power stepper and servo drives
- High efficiency, compact size, light weight
- Input voltage 220VAC± 10% or 110VAC± 10% 50/60 Hz
- Short circuit, over-current, over-voltage and short-voltage protection

### Electrical Specifications

| Model | Output Voltage (V) | Output Current (A) | Input Voltage | Size (mm) | Weight (kg) |
|---|---|---|---|---|---|
| SPS407 | 42 | 7 (RMS) | 220VAC±10% | 132*104*60 | 0.638 |
| SPS487 | 48 | 7 (RMS) | | | |
| SPS705 | 68 | 5 (RMS) | | | |
| SPS407-L | 42 | 4.7 (RMS) | 110VAC±10% | 132*104*60 | 0.638 |
| SPS487-L | 48 | 4.0 (RMS) | | | |
| SPS705-L | 68 | 3.0 (RMS) | | | |

## RPS Series Regulated Switching Mode Power Supplies

- Specifically designed to power stepper and servo drives
- High efficiency, compact size, light weight
- Input voltage 220VAC±10% or 110VAC±10% 50/60 Hz
- Short circuit, over-current, over-voltage and short-voltage protection

### Electrical Specifications

| Model | Output Voltage (V) | Output Current (A) | Input Voltage | Size (mm) | Weight (kg) |
|---|---|---|---|---|---|
| RPS2410 | 24 | 10 (RMS) | 220VAC±10% or 110VAC±10% | 199*110*50 | 0.8 |
| RPS369 | 36 | 9.7 (RMS) | | 215*113.6*50 | 0.88 |
| RPS488 | 48 | 8.3 (RMS) | | 215*113.6*50 | 0.88 |
| RPS608 | 60 | 8.5 (RMS) | | 261*102.4*65 | 1.13 |

## PS Series Linear Power Supplies

- Low cost and high reliability
- 3 main output plus 1 auxiliary output
- Short circuit and over-voltage protection
- Simple structure

### Electrical Specifications

| Model | Main DC Output | Auxiliary DC Output | Rated Power | Size (mm) | Weight (kg) |
|---|---|---|---|---|---|
| PS405-5 | DC36V/5A | DC5V/1A | 200 | 175*110*70 | 1.6 |
| PS405-12 | DC36V/5A | DC12V/1A | 200 | | |
| PS408-5 | DC36V/8A | DC5V/1A | 300 | | |
| PS408-12 | DC36V/8A | DC12V/1A | 300 | | |
| PS804-5 | DC68V/4A | DC5V/1A | 300 | 175*110*70 | 2.0 |
| PS804-12 | DC68V/4A | DC12V/1A | 300 | | |
| PS806-5 | DC68V/6A | DC5V/1A | 500 | 215*130*70 | 3.5 |
| PS806-12 | DC68V/6A | DC12V/1A | 500 | | |

DMC2410B  DMC5480  DMC4420  SMC6480  ENC7480
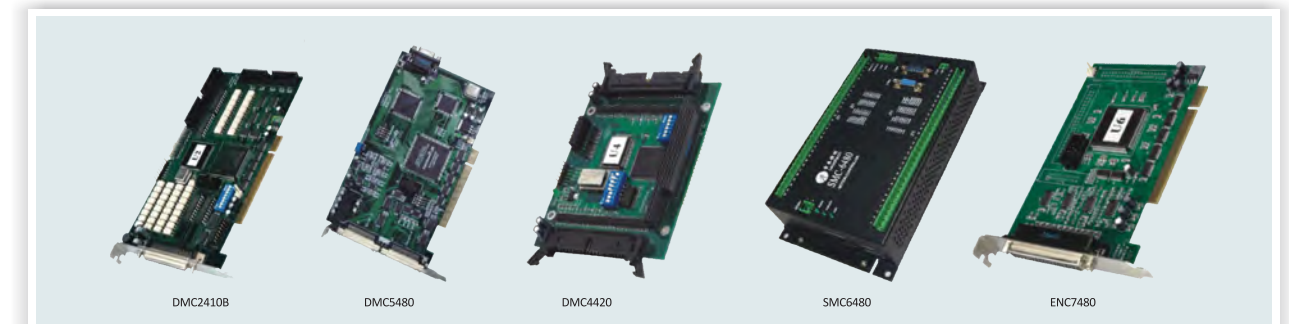
### Leadshine's Motion Controllers

Since releasing its first motion controller in 1997, Leadshine has been developing new products to meet the needs of its customers in a wide range of industries. Today, thousands of Leadshine motion controllers are deployed around the world in hundreds of industries. These applications include PCB drilling and milling machines, coordinate measuring machines (CMM), laser welding machines, vision and photo composition automation, electronic manufacturing and assembly, measurement device, biotech sampling and handing, LCD manufacturing, robotics, electronic assembly and measurement equipment, AOI machines, screen printing machines, and so on.

Leadshine is distinguished from others by providing motion controllers that are highly reliable, cost-effective, and easy-to-use. Leadshine's full line of motion controllers includes single and multi-axis, bus-based and stand-alone controllers. Available interface options for international markets include PCI bus, Ethernet, USB and RS232 for the moment. By using one ASIC microcomputer, Leadshine's controllers provide high speed performance and can handle many modes of motion such as point-to-point positioning, jogging, linear and circular interpolation, continuous interpolation and helix interpolation.

All of them are SMT processed with high reliability. They are suitable for stepping and digital servo control systems. Leadshine offers drivers, demo software, and documents to help the users to develop their own application software with G code or VB/VC/C++ Builder/LabVIEW in Window95/98/2000/NT/XP.

### Selection Table (Visit www.leadshine.com for information about other motion controllers.)

| Features \ Model | DMC1000B | DMC2410B | DMC5480 | SMC6480 | SMC3481 | ENC7480 |
|---|---|---|---|---|---|---|
| Number of Controllable Axes | 4 | 4 | 4 | 4 | 4 (4 stepper drives Integrated) | 4 |
| Interfaces | PCI | PCI | PCI | Stand-alone, USB RS232, Ethernet | Stand-alone, CAN RS232 | PCI |
| Pulse Output Frequency (Max) | 1.2 MPPS | 5 MPPS | 8.0 MPPS | 5.0 MPPS | 1.0 MPPS | - |
| Encoder Input Frequency (Max) | - | 4 MHz | 6 MHz | - | - | 6.5 MHz |
| Position Ranges | 24-bit ± (8,388,608 pulses) | 28-bit ± (134,217,728 pulses) | 28-bit ± (134,217,728 pulses) | 32-bit ± (2,147,483,648 pulses) | 32-bit ± (2,147,483,648 pulses) | - |
| General purpose I/O | 32 Inputs / 28 Outputs | 20 Inputs / 20 Outputs | 20 Inputs / 20 Outputs | 32 Inputs / 24 Outputs | 21 Inputs / 8 Outputs | 32 Inputs / 32 Outputs |
| Linear Interpolation | 2~4 axes | 2~4 axes | 2~4 axes | 2~4 axes | 2~4 axes | - |
| Circular Interpolation | Any 2 axes Software Interpolation | Any 2 axes High Speed Hardware Interpolation | Any 2 axes High Speed Hardware Interpolation | Any 2 axes High Speed Hardware Interpolation | Any 2 axes Software Interpolation | - |
| Continuous Interpolation | - | Yes | Yes | Yes | Yes | - |
| Acceleration and Deceleration | Equal | Equal or Unequal | Equal or Unequal | Equal or Unequal | Equal or Unequal | - |
| Encoder Counter | - | 28-bit ± (134,217,728 pulses) | 32-bit ± (2,147,483,647 pulses) | 28-bit ± (134,217,728 pulses) | - | 28-bit ± (134,217,728 pulses) |
| Manual Pulser Input | - | 100 KHz (Max) | 100 KHz (Max) | 100 KHz (Max) | - | - |
| Index Signal Input | - | Yes | Yes | Yes | - | Yes |