LIN ENGINEERING
MOTOR SPECIALISTS IN MOTION
A MOONS' COMPANY

Motion Control, Solved.

MOTOR ENGINEERING & MANUFACTURING

Optimized For Your Application

Quick Prototype Turnaround

Small Batch to OEM Volume Production

US Based Support & Manufacturing

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AVAILABLE CERTIFICATIONS

NEW PRODUCTS

Why Lin?

Our expertise is in Motor Engineering and Manufacturing!

MOTOR ENGINEERING:

GET EXACTLY WHAT YOU NEED

In motion control, no two designs are the same. When you're optimizing for the best efficiency, accuracy, or speed, you don't want a motor that is close enough, you want a motor that meets your requirements precisely. This is exactly what we can provide: a motor with the exact specifications you need for your specific design or application.

INNOVATIVE SOLUTIONS

We've designed our motors to solve specific problems within your application. Our motors deliver more torque, smaller size, higher speeds, increased accuracy, and reduced noise and resonance—among many more benefits.

MANUFACTURING:

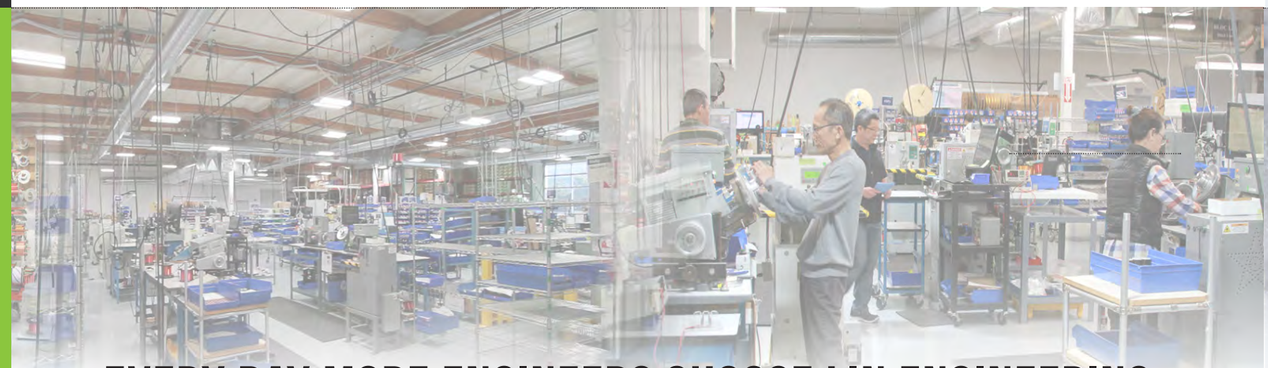
ON DEMAND ASSEMBLY

Our unique method of assembly allows us to stock a large selection of standard components that can be assembled in a multitude of ways for your specific needs. This allows us to assemble a motor that meets your exact specifications, with minimal lead time, and at a great price point.

MEET REQUIREMENTS

We manufacture and keep data with accordance to ISO9001:2015, AS9100D and many other standards. For this reason, our motors can be found in numerous FDA and FAA-approved applications.

MOTOR **ENGINEERING**



EVERY DAY MORE ENGINEERS CHOOSE LIN ENGINEERING

This is how we earn your business and become a valued supply chain partner

UNRIVALED APPLICATION SUPPORT

- 98% application success rate
- 90% of prototypes shipped in less than 2 weeks
- California based support

HIGH PERFORMANCE

- Highest torque output
- High accuracy = no skipping steps
- Reduced vibration and resonance

OEM ENGINEERING SUPPORT

For OEM orders, we'll work directly with your engineering team throughout the design phase of your project to ensure the best overall system optimization and motor fit while avoiding over-engineering.

CONFIGURED SOLUTIONS

- Standard / off-the-shelf motors are easily accessible via the web store
- Easily configure your solution:
  - Windings for efficiency
  - Cabling and connectors
  - Much more!

Customers in 2010

Customers in 2020

MOTOR **MANUFACTURING**

From Prototypes to Volume Production,
we are here to support you

FAST PROTOTYPE TURNAROUND

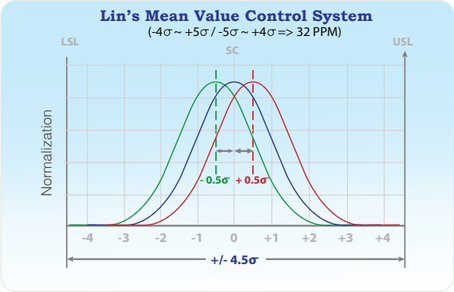
Our Northern California manufacturing facility doubles as our prototyping facility. This gives us a much higher flexibility to try out different components and windings to ensure the motor will perform at its best. This also ensures that prototypes operate the same as the volume parts. Plus, we test each motor in real time.

SCALABLE MANUFACTURING VOLUMES

We grow with your needs. The benefit of multiple manufacturing facilities—within the United States and in Asia—allows us to maintain whatever volume you need, as well as handle spikes with minimal concern. Our Northern California facility is optimized for low to mid volume production, while our off-shore facilities are optimized for high volume production, which allows us to scale with your manufacturing requirements. As the demand for your product in the marketplace multiplies, our ability to provide what you need increases as well. Furthermore, we guarantee the identical quality assurance.

QUALITY DONE RIGHT

4.5 Sigma From Lin Engineering - a True Quality System



We've implemented 4.5 Sigma in order to accomplish the following goals:

- Establish a robust Mean Value Control System
- Perform incoming inspection at our supplier's site
- Ensure quality products with every shipment

WE DESIGN, ENGINEER AND MANUFACTURE MOTORS

that solve specific problems within your application.

Lin Engineering Motors enable you to achieve:

- Smaller Frame Size
- Less Resonance
- Less Noise
- Low Power Consumption
- High Temperature Operation
- Low Temperature Operation
- Vacuum Environment Operation
- Clean Room Environment Operation
- Wet Environment Operation
- Dusty Environment Operation
- And Much More

OUR STEPPER MOTORS AND MOTION CONTROL PRODUCTS

are used by Engineers in many different industries, including:

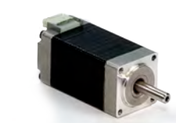
- Automated Guided Vehicles (AGV)
- Automotive
- Aviation
- Industrial Automation
- Life Science
- Medical
- Packaging
- Food & Beverage
- Printing & Engraving
- Robotics
- Scanning
- Security & Surveillance
- Semiconductor
- Space

PRODUCTS: OEM STEPPER MOTORS

NEMA 6 - 3.46°

▲ 106
Our Smallest Hybrid Stepper
Up to 2.1 oz-in (0.014 N-m)
Holding Torque

NEMA 8 - 1.8°



▲ 208
Compact Stepper
Up to 4 oz-in (0.03 N-m)
Holding Torque

NEMA 11 - 1.8°

▲ 211
Compact Stepper
Up to 16.6 oz-in (0.12 N-m)
Holding Torque

NEMA 14 - 0.9°

▲ 3709/3809
Signature Series
Reduces Resonance
Up to 16 oz-in (0.12 N-m)
Holding Torque

NEMA 14 - 1.8°

▲ 3518
Integral Connector Available
Up to 20 oz-in (0.14 N-m)
Holding Torque

NEMA 17 - 0.9°

▼ 416-05/06
Super Slim Line
Up to 7.3 oz-in (0.05 N-m)
Holding Torque

◀ 417
High Accuracy
Up to 30 oz-in (0.21 N-m)
Holding Torque

◀ 4209
High Torque/High Accuracy
Up to 62 oz-in (0.44 N-m)
Holding Torque

▲ 4109
Ideal for High Speed
Up to 22 oz-in (0.16 N-m)
Holding Torque

▲ 416-07
Low Profile
Up to 8.4 oz-in (0.06 N-m)
Holding Torque

NEMA 17 - 1.8°

▲ G3718
Cost Effective
Improved passive cooling
Up to 50% more torque.
Up to 42 oz-in (0.30 N-m)
Holding Torque

▲ 4118
Super Torque
Integral Connector Available
Vacuum Option Available
Up to 115 oz-in (0.81 N-m)
Holding Torque

▲ 4418
Xtreme Torque Series
Up to 35% More Torque
Compared to Standard
Up to 100 oz-in (0.71 N-m)
Holding Torque

▲ G4518
Cool Operating Stepper
Up to 30% cool operation.
Up to 130 oz-in (0.92 N-m)
Holding Torque

NEMA 17 Damper

▲ Damper
Reduces Resonance
Easy Installation

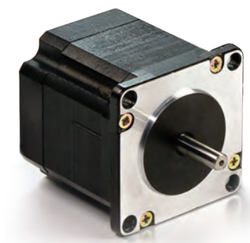
NEMA 23 Damper

▲ Damper
Reduces Resonance
Easy Installation

▲ ZH417
Hollow Shaft
Virtually zero detent torque.
Up to 33,5 oz-in (0.24 N-m)
Holding Torque
Hollow Shaft with up to 11mm ID available!

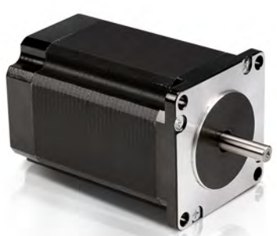
▲ Z/ZN417
Whisper Torque
Virtually zero detent torque.
Up to 28 oz-in (0.20 N-m)
Holding Torque

NEMA 23 - 0.45°



◀ 5704
Power & Precision
Up to 140 oz-in (0.99 N-m)
Holding Torque

NEMA 23 - 0.9°



▲ G5709
High Torque/High Accuracy
Up to 203 oz-in (1.43 N-m)
Holding Torque

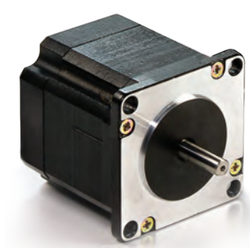
NEMA 23 - 1.8°

▲ 5618
Super Torque
Up to 175 oz-in (1.24 N-m)
Holding Torque

▲ 5718
High Torque
Up to 305 oz-in (2.16 N-m)
Holding Torque

▲ 5818
High Torque
Up to 294 oz-in (2.08 N-m)
Holding Torque

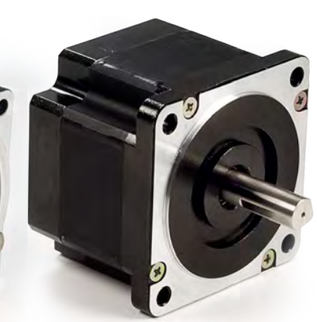
▲ E5618
Xtreme Torque
Up to 150 oz-in (1.06 N-m)
Holding Torque



▲ E5718
Hercules High Torque
Up to 600 oz-in (4.24 N-m)
Holding Torque

NEMA 34 - 1.8°

▲ 8618
High Torque
Up to 700 oz-in (4.94 N-m)
Holding Torque



▲ 8718
High Torque
Up to 1,288 oz-in (9.09 N-m)
Holding Torque

IP
RATED MOTORS

Every new application creates its own restrictions and challenges, so when you discover that your motion system will have to operate in extreme environmental conditions such as rain, dust or even under water, what do you do? Luckily, we continue to research, develop, and unveil cutting-edge technologies to facilitate wider and wider ranges of applications. While our standard lines of stepper motors are well-known for their durability, our IP65 and IPX7 lines can also withstand harsh environments where typical motors will fail.

IP65 RATED SERIES
Features & Benefits

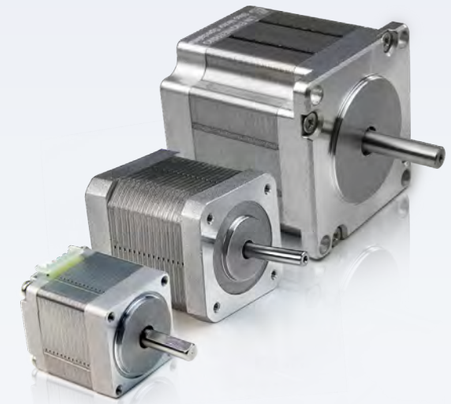
- DUST PROOF
- WATER RESISTANT
- MULTIPLE STACK LENGTHS

The IP65 Rated Series provides dust proof operation, and can withstand low-pressure jets of water sprayed from all directions from a distance as close as three meters for extended periods of time. The water jets can be delivered at pressures of up to 30kPa, at a rate of 12.5 l/mi, and for duration of up to three minutes. In addition to extended protection from challenging environmental factors, the IP65 rated motors have a food grade coating making them ideal for the "washdown" cycles of food processing applications.

IPX7 RATED SERIES
Features & Benefits

- DUST PROOF
- IMMERSION RESISTANT
- MULTIPLE STACK LENGTHS

The IPX7 Rated Series of motors are completely protected against dust and withstand immersion into liquids at depths of 15cm to 1m for up to 30 minutes. Stepper motors are now available with IPX7 Rating in three sizes—NEMA 17, 23, and 34—the motors are capable of producing holding torque up to 1,288 oz-in. Plus, unipolar and bipolar windings are available to allow for the torque and speed required to accommodate your specific application.



VACUUM
RATED STEPPER MOTORS

MANAGING HEAT

Heat is generated whenever motor coils are energized. In normal operation, air acts as a convector and dissipates that heat. In a vacuum, this solution won't work. When heat builds up, it can quickly overcome the motor. Our vacuum rated motors are specially wound to reduce heat generation. In addition, we've incorporated magnets constructed from an alloy with high temperature tolerance, and also bearing with high temperature tolerant grease.

MINIMIZING CONTAMINANTS

As air is removed from the environment, gas trapped inside of a motor expands. This can introduce unwanted contaminants into the environment, which can greatly affect other nearby components such as sensors and sensitive instruments. In vacuum environments outgassing needs to be avoided at all cost. That's why all motor components are made from low outgassing materials which are thoroughly cleaned and vacuum baked. Motor is then assembled in a cleanroom environment and vacuum sealed to ensure no contaminates enter the package.

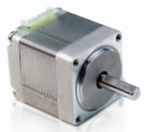
VACUUM APPLICATIONS


CLEANROOMS


SPACE FLIGHT


VACUUM CHAMBERS

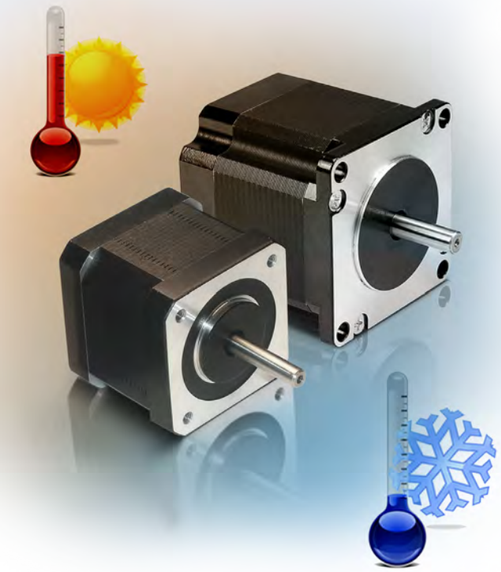
THE FOLLOWING MOTORS ARE AVAILABLE AS VACUUM RATED



211 Series
- NEMA 11 (28 mm)
- Up to 16 oz-in (0.12 N-m) Holding Torque

4118 Series
- NEMA 17 (42 mm)
- Up to 115 oz-in (0.81 N-m) Holding Torque

5718 Series
- NEMA 23 (57 mm)
- Up to 305 oz-in (2.16 N-m) Holding Torque



HIGH/LOW
TEMPERATURE MOTORS

Lin Engineering standard motors are rated to operate in ambient temperatures from -20° to +50° C. While this satisfies the majority of applications, there are certain applications that require the motor to operate at higher or lower temperature ranges.

Like any specific application concerns, motors that must work under extreme conditions of hot and cold require critical design features to accommodate their use. Whether your application is situated in the heat of a desert or the freezing temperatures of the arctic, Lin Engineering has the expertise to provide the right motor for you. The company has designed two types of specialty hot/cold motors meant to operate specifically in extreme temperature ranges—**Type I and Type II.**

TYPE I

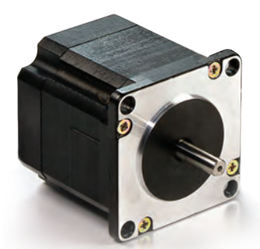
Type I operates in ambient temperatures from -40 °C (-40°F) to 80°C (176°F) and up to 110°C (230°F) for the case temperature.

TYPE II

Type II operates in ambient temperatures from -40°C to 110°C (230°F) with up to 140°C (284°F) for the case temperature.

MOTORS AVAILABLE FOR HOT/COLD OPERATION

4118 Series
- More torque than standard NEMA 17 stepper motors
- Custom wound for high speed or low speed applications
- Up to 115 oz-in (0.81 N-m) Holding Torque



5718 Series
- High Torque
- Cost effective
- Up to 305 oz-in (2.16 N-m) Holding Torque

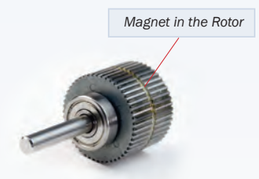
PATENTED DESIGN

Z SERIES
EXTREMELY ACCURATE & SMOOTH STEPPER MOTORS

Features and Benefits

- NEMA 17, 0.9° Step Angle
- Virtually Zero Detent Torque
- Smooth and Quiet Operation
- High Step Accuracy
- Reduced Resonance
- Hollow Shaft up to 11mm in diameter
- No Torque Loss Due to Large Hollow Bore

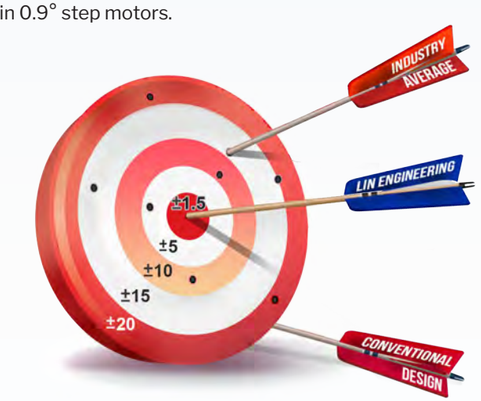
Conventional Motor



Z Series Motor

A conventional hybrid stepper motor utilizes a permanent magnet in the rotor. Our patented design uses a ring magnet in the stator instead. This drastically reduces the detent torque (unenergized drag torque) because the magnetic flux path is able to reach over the stator windings and only go through the outer edge of the rotor. Reducing detent torque improves accuracy, smooth operation and reduces noise. Best of all, modifying the magnet location does not change the dynamic torque.

Extreme Step Accuracy
Z-Series motor maintains ±1.5 arc minutes error under 64x microstepping. Industry average can range from ±4.5 to ±18 arc minutes in 0.9° step motors.



Quiet Operation
By eliminating detent torque, the motor operates substantially quieter than regular hybrid stepper motors.

Application
Z-Series motors are perfect for any application which requires extreme precision, smoothness, and quiet operation.

APPLICATION EXAMPLES

SCANNERS & PRINTERS

MEDICAL TOOLS

SEMICONDUCTOR MANUFACTURING

CAMERA STABILIZATION & SURVEILLANCE

PRODUCTS: **HPM NANO STEP MOTOR**

PTX05

HPM NANO STEP MOTOR

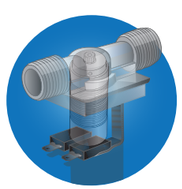
Features & Benefits:

- HPM (Hybrid-PM-Mix), a First of Its Kind.
- Just 13mm In Diameter
- Optimized for High and Low Speed Operations
- Precise Positioning Control
- Position Hold
- Low Noise and Vibration
- Cost Effective
- Gear Head Options

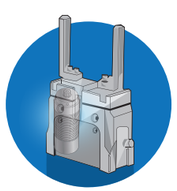
We've taken the best parts of a Hybrid Stepper, PM stepper, and a BLDC motor, and combined them to create a motor that acts as a high-speed BLDC motor with the benefits of a Hybrid Stepper technology: precise positioning control, position holding, and low speed operations.

This motor opens new possibilities for Engineers to create motion that was not feasible before. Imagine being able to precisely control the movement, stop and hold the position, and then drive the motor at speeds of 10,000 RPM.

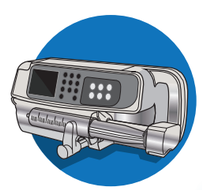
APPLICATION EXAMPLES



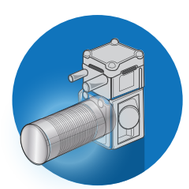
ELECTRONIC OIL VALVES



ELECTRIC GRIPPERS

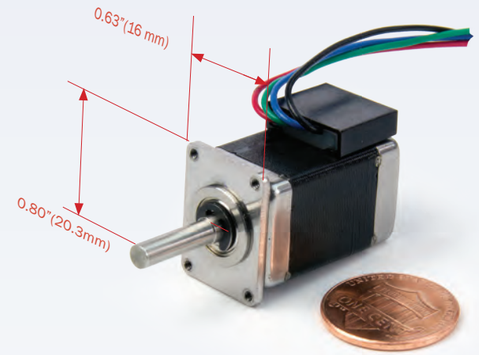


SYRINGE PUMPS



MINIATURE HYDRAULIC PUMPS

PRODUCTS: **MINIATURE HYBRID STEPPER MOTOR**



PT106

MINIATURE HYBRID STEPPER MOTOR

Features & Benefits:

- Just 16mm Wide - Our Smallest Hybrid Stepper
- NEMA 6, 3.46° Step Angle
- 104 Steps Per Revolution
- 4x More Holding Torque Than Can Stack PM Steppers
- 5x More Accurate Than Can Stack PM Steppers
- Operates At Over 8,000 RPM
- Up to 2.1 oz-in (14.82 mNm) Holding Torque

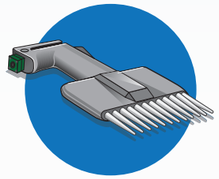
One of the biggest problems Engineers face while designing ever-smaller devices is making things move. As the size of equipment decreases, the demand for smaller motors increase. However, oftentimes small enough motors simply don't exist, and if they do, they do not provide enough torque or speed to be useful in the application. Often, the only option is to use a large framed motor and shrink everything else around it. Motion control is the real bottleneck which forces Engineers to compromise on the footprint of their device.

Our new 106 Hybrid Stepper Motor is what many Engineers have been waiting for. It solves many of the problems in motion control which prevented equipment from getting smaller.

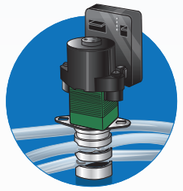
By applying our experience and our Engineering know-how in the field of Hybrid Stepper Motor technology, we were able to succeed where many have failed. We've successfully created a NEMA 6 sized stepper motor that delivers plenty of performance. The 106 outperforms all other motors of similar size on nearly all metrics: it delivers more torque at higher speeds with greater accuracy.

APPLICATIONS

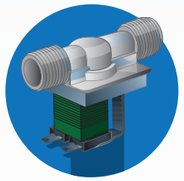
The 106 is a perfect candidate for many applications that require tiny motors, especially in the field of medical devices and laboratory automation. Applications that require high degree of precision like miniature pumps, fluid metering and control, and optical sensor controls can take advantage of the 106 motor. The 106 can even be incorporated into motorized hand tools like electronic pipettes, and other handheld devices where Hybrid Stepper Motors were previously impossible to integrate.



HANDHELD TOOLS

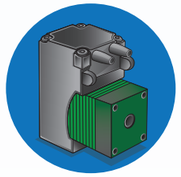


PINCH VALVES

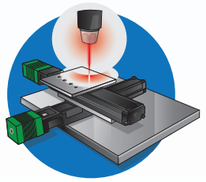


FLOW CONTROL VALVES

SHUTTER/APERTURE CONTROL

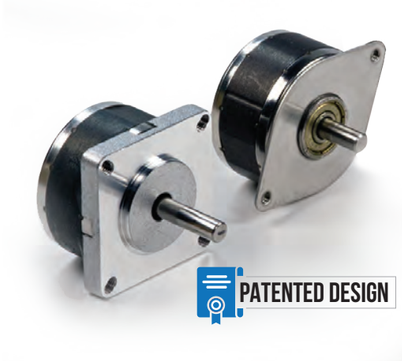


PUMPS



OPTICAL SENSOR CONTROL

PRODUCTS: **SLIM & COMPACT MOTORS**



3709

XTREME ACCURACY STEPPER MOTOR

Features & Benefits:

- NEMA 17 Mountings, 0.9° Step Angle
- Thin and Compact
- Multiple Mounting Plate Options
- Smooth Motion and High Accuracy
- Up to 22 oz-in (0.15 N-m) Holding Torque

THIN & COMPACT

3709 Series motors feature a flat/puck-shaped design and range from 14 to 22 mm in thickness. Making the motor a perfect fit for compact and portable devices, where size or weight is essential.

HOW DID WE DO IT?

The motors feature a unique end-cap design that incorporates the bearings, and the entire unit is sealed and laser welded for strength and longevity of the product. Being resourceful allows us to create a very compact motor.

HIGH TORQUE

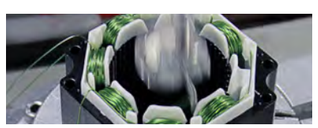
3709 Series motors are capable of producing up to 16 oz-in of holding torque. This is quite astounding for such a small motor.

MULTIPLE MOUNTING OPTIONS

Motors are offered in variety of standard mounting options in NEMA 17 offsets. Available hole patterns include Thru hole DO 0.13, #4-40 UNC and M3 x 0.5.

Additionally, Lin Engineering can place the motor in almost any customer supplied/designed housing imaginable. Multiple Shaft options are also available.

AVAILABLE OPTIONS



CUSTOM WINDING
Custom windings can insure maximum torque at a desired speed.

CUSTOMIZED LEADS
Custom connections can range from EMI or IP protection, to custom color coding.

VARIOUS SHAFT OPTIONS
With in-house machining capabilities, we're able to provide a variety of shaft options at a cost effective price with minimal lead times.

PRODUCTS: **WHISPER TORQUE STEPPER**

G3718

WHISPER TORQUE

Features & Benefits:

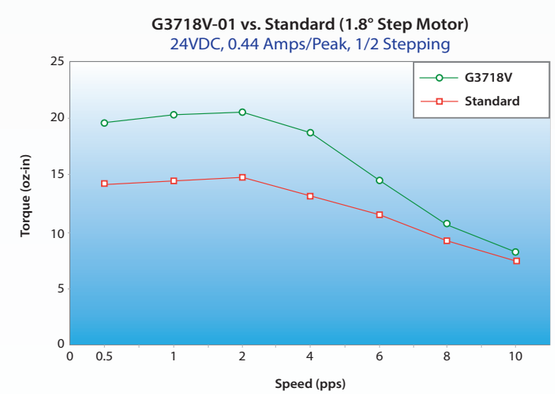
- NEMA 17, 1.8° Step Angle
- Improved Passive Cooling By Design
- Up To 50% More Torque Than Similar Size Motors
- Smooth Motion, High Accuracy Similar To a 0.9° Motor
- Holding Torque Up to 25 oz-in (0.18N-m)

EFFICIENT DESIGN

The G3718V whisper torque motor incorporates a heat-sink design within the stator laminations to allow for passive cooling. When your motor operates cooler, you can increase power to gain more torque without overheating, or you can save energy and still perform at an optimal performance.

SLIM AND POWERFUL

The G3718V is slim by design. Innovative end-cap design maximizes internal volume allocated for the rotor, while laser welded assembly eliminates the need for assembly screws to hold the motor together. This unique construction offers great length to torque ration. At only 22.8mm long the motor produces 25 oz-in of torque. The G3718V is about 40% shorter than other motors with similar performance and conventional construction. Motor can be mounted by utilizing the 4 through holes that are designed into the stator lamination.



SMOOTH, QUIET, AND ACCURATE

This stepper motor is a 1.8 degree per step motor, but it is as smooth as Lin's smoothest 0.9 degree stepper. With all the know-how and technology that Lin Engineering brings, implementing key design aspects from the 0.9 line into the G3718V has created a motor that wins in both smoothness, accuracy and torque. In traditional designs, one must compromise torque for smoothness or vice versa. With the G3718V, you can get both.

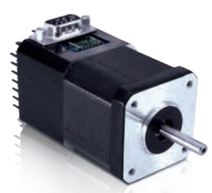
PRODUCTS: **INTERGRATED STEPPERS**

Silverpak 17D

INTEGRATED MOTOR + DRIVER

Features and Benefits:

- NEMA 17, 1.8° Bipolar Step Motor
- Operates from +12 to 24 VDC
- Up to 85 oz-in of Holding Torque
- Phase Current Ranges from 0.25 to 2.0 Amps Peak



Silverpak 17DE

INTEGRATED MOTOR + DRIVER+ENCODER

Features and Benefits:

- NEMA 17, 1.8° Bipolar Step Motor
- Operates from +12 to 24 VDC
- Up to 85 oz-in of Holding Torque
- Phase Current Ranges from 0.25 to 2.0 Amps Peak

Silverpak 17C

INTEGRATED MOTOR + DRIVER + CONTROLLER

Features and Benefits:

- NEMA 17, 1.8° Bipolar Step Motor
- Operates from +12 to 24 VDC
- Up to 84.8 oz-in of Holding Torque
- Phase Current Ranges from 0.1 to 2.0 Amps Peak

Silverpak 17CE

INTEGRATED MOTOR + DRIVER + CONTROLLER + ENCODER

Features and Benefits:

- NEMA 17, 1.8° Bipolar Step Motor
- Operates from +12 to 24 VDC
- Up to 84.8 oz-in of Holding Torque
- Phase Current Ranges from 0.1 to 2.0 Amps Peak

Silverpak 23C

INTEGRATED MOTOR + DRIVER + CONTROLLER

Features and Benefits:

- NEMA 23, 1.8° Bipolar Step Motor
- Up to 294 oz-in of holding torque
- Input voltage of +12 to 40 VDC
- Phase Current Ranges from 0.3 to of 3.0 Amps Peak

Silverpak 23CE

INTEGRATED MOTOR + DRIVER + CONTROLLER + ENCODER

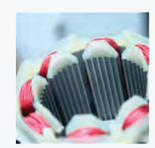
Features and Benefits:

- NEMA 23, 1.8° Bipolar Step Motor
- Up to 294 oz-in of holding torque
- Input voltage of +12 to 40 VDC
- Phase Current Ranges from 0.3 to of 3.0 Amps Peak

CUSTOMIZE YOUR INTEGRATED MOTORS

SHAFT

GEARBOXES



CUSTOM WINDING

PRODUCTS: **PM (CAN STACK) STEPPER MOTORS**

PERMANENT MAGNET

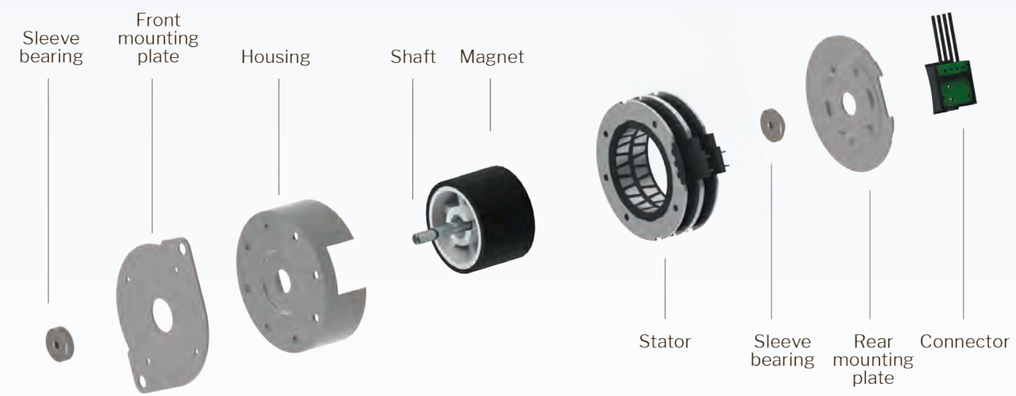
STEPPER MOTORS

Features & Benefits:

- Small Frame Size
- Cost Effective Solutions
- 20mm To 42mm Frame Size
- 3.75 To 18 Degree Step Angle
- 5V To 32V Rating

PM (Can-stack) Steppers are a popular choice for their small size, and low power draw. They also present a cost effective solution for applications that do not demand the speed, accuracy, or torque output of a Hybrid Stepper. These motors are commonly used in various Automotive, Printing/Scanning, and Consumer Electronics applications.

PM MOTOR CONSTRUCTION



COMMON APPLICATIONS

AUTOMOTIVE

PRINTERS/ SCANNERS

CONSUMER ELECTRONICS

VALVE CONTROLS

CONFIGURED **SOLUTIONS**

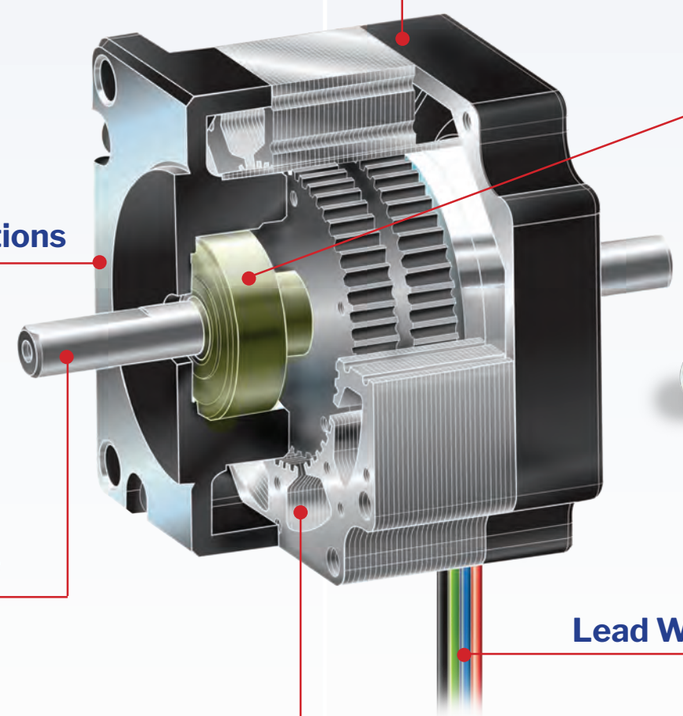
TAKE ADVANTAGE OF OUR VALUE ADDED SERVICES

OEM production volume reduces the overall cost per unit, which makes many customizations more economical to produce. We can provide motors that are designed to your precise needs with proprietary or non-proprietary customizations to ensure the perfect fit into your product.

- √ Reduce Cost
- √ Save Time
- √ Better Supply Chain Control
- √ Lin Quality Standards for Every Component

Multiple Mounting Configurations

NEMA 6, 8, 11, 14, 17, 23 and 34



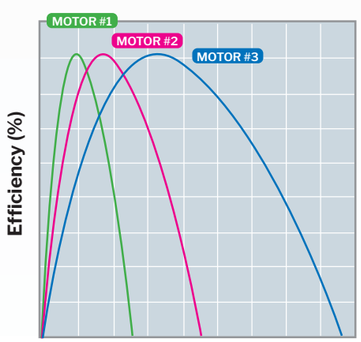
Multiple Shaft Options *

Extended **Flat** **Helical Cut**

Slotted **Hollow** **Cross Drilled**

Press Fit Gear & Pulley

* Based on customer provided drawings and specifications



Winding

Lin can help calculate speed, torque and input power creating a winding that is specific to your application.

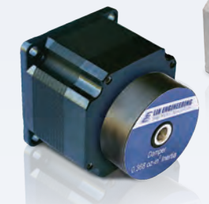
▲ The Benefits?

- √ High Efficiency
- √ Less Power Input
- √ No Trial & Error
- √ Save Time, Money, and Energy

Encoders, Dampers, Gearboxes, & Mechatronics

▲ Position

Verification & Accuracy with Encoders

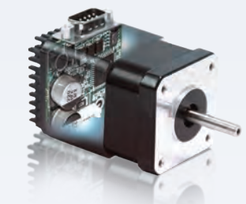


▲ Reduce

Resonance & Vibration with Dampers

▲ Increase

Torque & Speed with Gearboxes

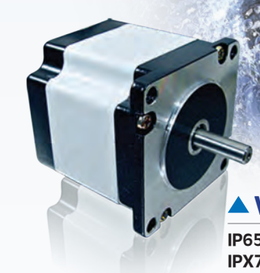


▲ Utilize

Intelligent Motors with Mechatronics

Bearings & Lubricants

Ball Bearings, Stainless Steel Bearings, Seals, Special Lubricants for high temperature/humid operation



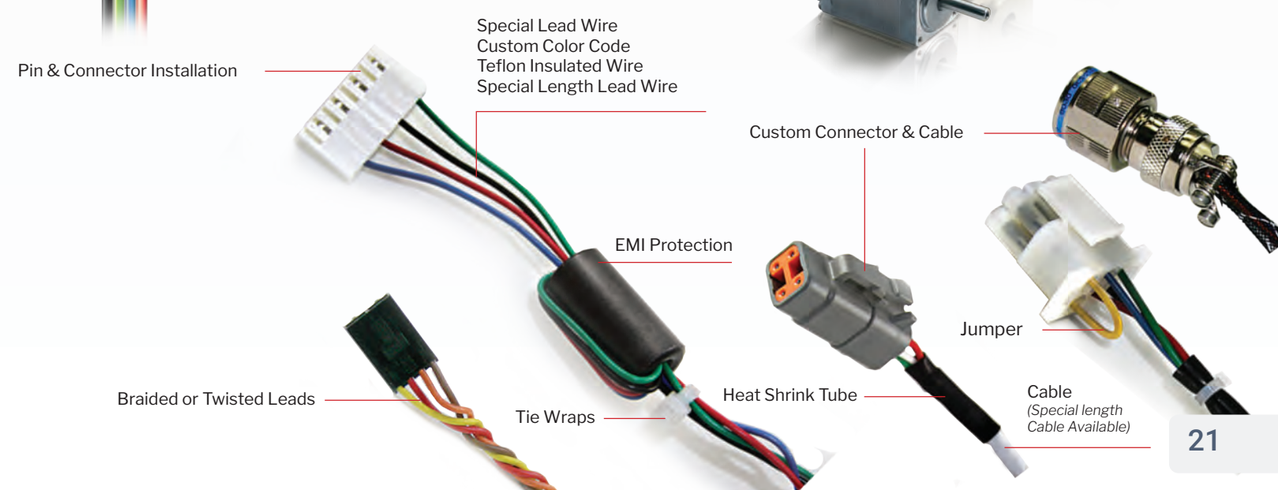
▲ Water/Dust Protection

IP65 (Splash Proof)
IPX7 (Submersible)

▶ Vacuum Rated

NEMA 11, 17 & 23 - 1.8°

Lead Wires & Cables



PRODUCTS: **BRUSHLESS DC MOTORS**

Features and Benefits:

- NEMA 17, 23 and 34 Mounting
- Wide Range Of Speed Control and Smooth Torque Output
- Excellent Speed Stability
- Small Size, High Power
- Low Temperature Rise, Low Noise, Low Vibration
- Long Life, Low Maintenance Costs
- Low Positioning Torque
- Energy Efficient
- Works With Planetary Gearboxes
- Custom Windings and Modifications Available

BLDC motors are a good choice for applications that require high speed operations but do not require precise positioning control or position hold of a stepper. BLDC motors are capable of delivering more torque at higher speeds than conventional steppers can, and also provide smoother and quieter motion. Unlike steppers, the torque output is consistent through the continuous operating speed range of the motor. Our BLDC motors are design to be continuous operation at speeds of up to 4000 RPM (5000 RPM peak)

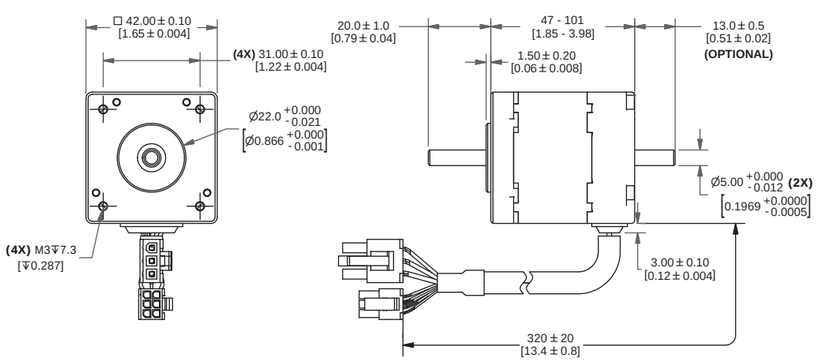
Our standard BLDC motors are available in NEMA 17, 23, and 34 frame sizes and various motor lengths.

NEMA 17 (43.2 mm)

BL17 Series

Specifications:

- Length: 1.85 in to 3.98 in (47 mm to 101mm)
- Rated Voltage: 24 and 48 VDC
- Rated Torque: 10.2 to 30.45 oz-in (0.072 N-m to 0.215 N-m)
- Rated Speed: 4000 RPM
- Rated Power: 30 to 90 W
- Rated Current : 1.67 to 2.4 Amps

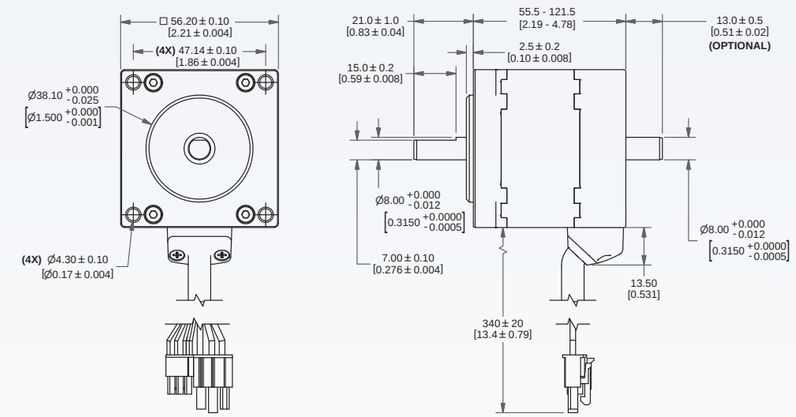


NEMA 23 (58.5 mm)

BL23 Series

Specifications:

- Length: 2.19 in to 4.78 in (55.5 mm to 121.5 mm)
- Rated Voltage: 24 and 48 VDC
- Rated Torque: 20.53 to 60.89 oz-in (0.15 N-m to 0.43 N-m)
- Rated Speed: 4000 RPM
- Rated Power: 60 to 180 W
- Rated Current : 3.2 to 4.5 Amps

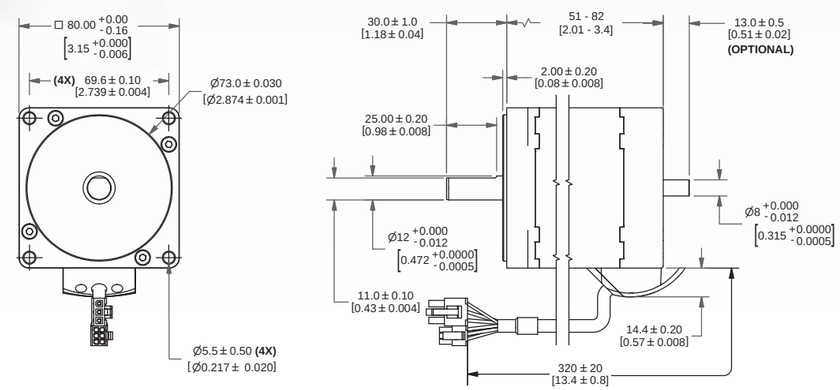


NEMA 34 (80 mm)

BL34 Series

Specifications:

- Length: 2.01 in to 3.4 in (51 mm to 82 mm)
- Rated Voltage: 24 and 48 VDC
- Rated Torque: 34 to 102 oz-in (0.24 N-m to 0.72 N-m)
- Rated Speed: 4000 RPM
- Rated Power: 100 to 300 W
- Rated Current : 5 to 7.49 Amps



PRODUCTS: FRAMELESS BRUSHLESS DC MOTORS

FRAMELESS

BLDC MOTORS

Features & Benefits:

- Highly Integrated
- High Torque
- High Efficiency
- Multiple Sizes
- Optional Hall Sensors

Frameless BLDC motors allow for maximum integration with your assembly.

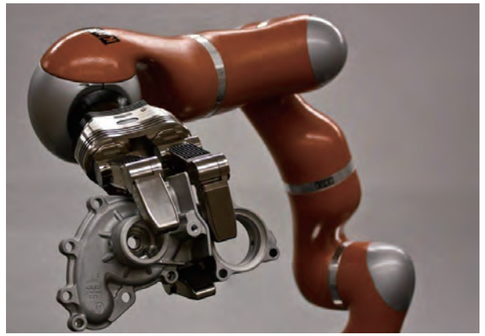
Typical standard BLDC motors are structurally and mechanically self-supporting. The rotor is suspended inside the stator using end-caps at both ends. Whatever apparatus needs to be attached, is usually bolted onto the end-caps. End caps can easily account for up to 50 percent of the motor's overall length.

Frameless motors reduce waste and redundancy by eliminating the need for additional mounting supports, plates, or brackets. All structural and mechanical supports needed for the design can be integrated directly into the apparatus. The benefit is that both the stator and the rotor can be seamlessly incorporated into the system, reducing size without sacrificing performance.

This provides you with greater opportunities to explore various shapes and sizes of the motor. The motor can be designed to fit the application rather than forcing the application to fit the motor. This gives you the freedom and flexibility to design systems with the smallest footprint possible.

COMMON APPLICATIONS

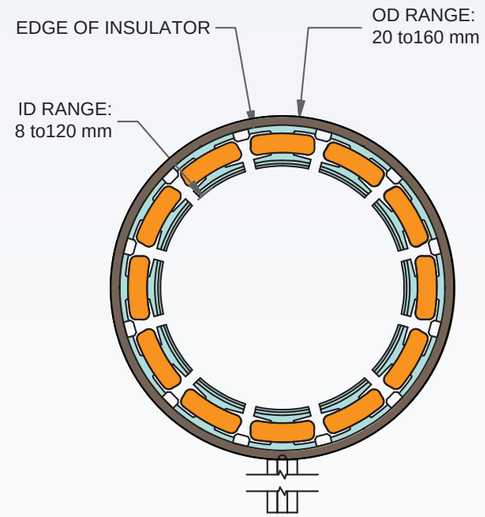
AUTONOMOUS VEHICLES

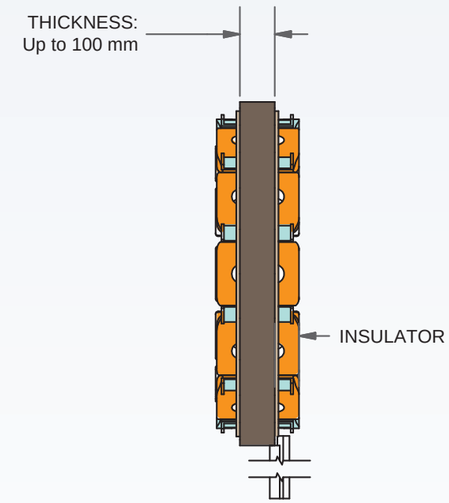


ROBOTICS

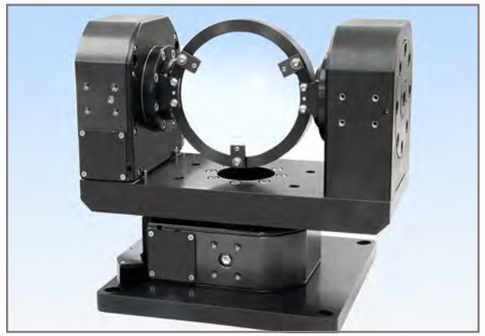
Specifications:

- OD Range: 20 to 160mm
- ID Range: 8 to 120mm
- Continuous Torque Range: up to 2 Nm
- Peak Torque Range: up to 6 Nm
- Current Range: up to 12 Amps
- Voltage: up to 80V
- Speed: up to 20,000 RPM
- Thickness: up to 100mm



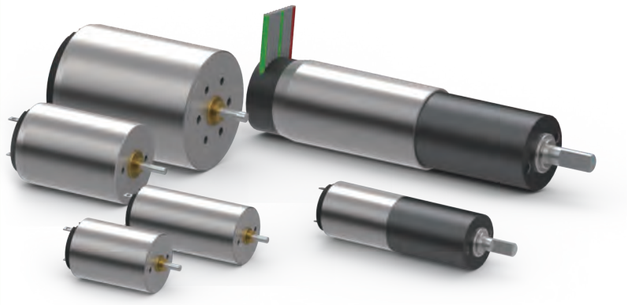


SECURITY & SURVEILLANCE



GIMBALS

PRODUCTS: **CORELESS BRUSHED DC MOTORS**



CORELESS (IRONLESS)

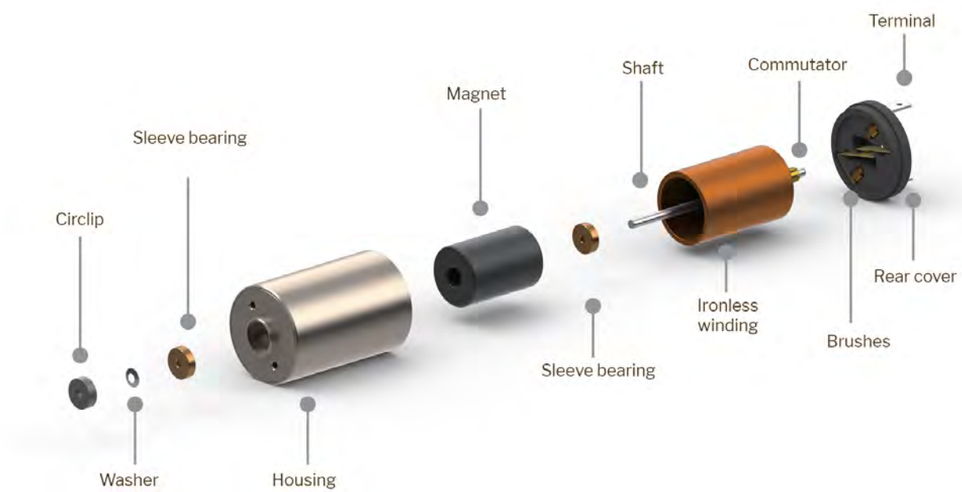
BRUSHED DC MOTOR

Features & Benefits:

- Speeds up to 13,000 RPM
- Ironless Design Eliminates Cogging
- Increased Efficiency and Torque
- Low Inertia Rotor for Fast Response Time
- 13mm to 24mm Diameter
- Cost Effective Motor and Implementation
- Gearbox Options Available

Simplifying the core design and removing iron components from the motor provides multiple benefits: it reduces the overall size of the motor without sacrificing the performance; and it virtually eliminates cogging that's present in ordinary motors with iron core. This is due to near elimination of eddy current—the electrical current induced within iron conductor. The benefit is increased efficiency and higher torque output. Also, low inertia rotor allows for faster response time.

The brushed motors are cost effective alternatives to the brushless motors due to simpler design--which lowers the unit price point. In addition, brushed motors do not require drivers which are needed to operate BLDC motors—further reducing the overall implementation cost.



FACTORY AUTOMATION

LABORATORY AUTOMATION

MEDICAL TECHNOLOGY

ROBOTICS

AEROSPACE

MEASURING TECHNOLOGY

PRODUCTS: **SLOTLESS BLDC MOTORS**

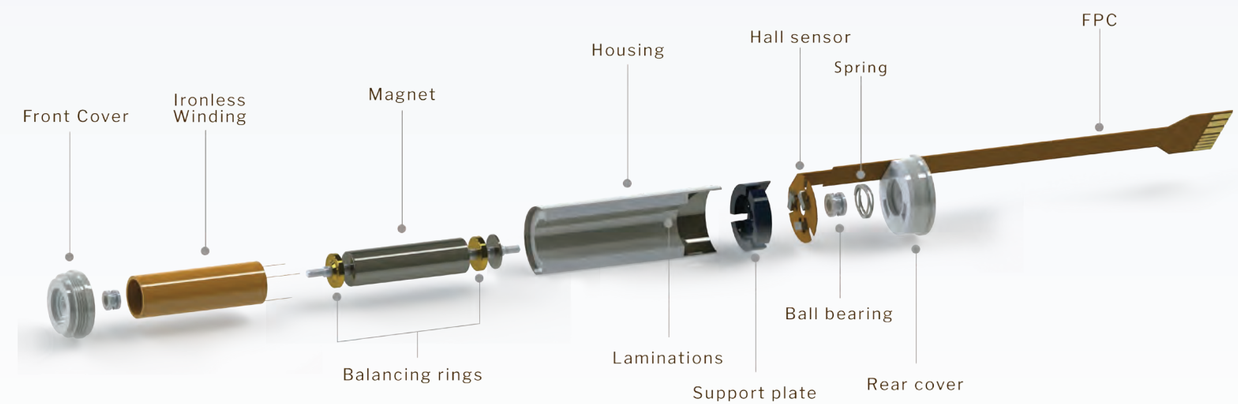
SLOTLESS

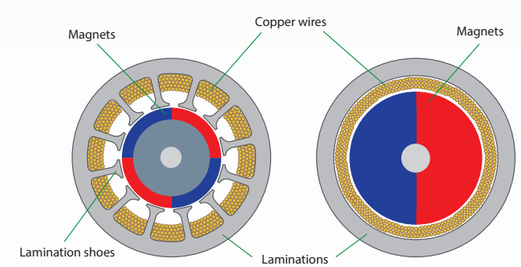
BLDC MOTOR

Features & Benefits:

- Speeds up to 50,000 RPM
- High Efficiency and Torque
- Operational Lifetime of Up To 20,000 Hours
- Smooth and Silent Operation
- High Accuracy Motion Control
- 13mm to 22mm Diameter
- Gearbox, Encoder, and Driver/Controller Options Available

Slotless BLDC Motors are capable of higher speeds and higher torque outputs than their brushed counterparts. Elimination of mechanical brushes increases the operational lifetime of the motor to 20,000 hours. BLDC motors offer more accurate speed control with the use of drivers and controllers. The Slotless BLDC motor can also be fitted with an encoder for precise positioning control. Slotless BLDC Motors are the right choice for applications requiring higher torque per size output, higher operating speeds, increased longevity, and high accuracy of speed or position control.





Slotted brushless motor **Slotless brushless motor**

Benefits of slotless vs. slotted motors

To combat issues related to detent torque, we've removed the slots from the motor. Instead, we're using a unique process of winding the copper wire without the need of slots; this drastically reduces cogging and improves the motor's ability to respond and accelerate quickly and operate smoothly. Slotless BLDC motors are also quieter and provide more power with a smaller frame size than their slotted counterparts.

PRODUCTS: **EXTERNAL NUT ACTUATORS**

The external nut configuration is simple, compact, and offers a high level of design flexibility. In the external nut configuration, the shaft of the stepper motor is replaced with a leadscrew. In a typical application, the motor is fixed in position and an apparatus is attached to the nut. As the leadscrew rotates, the external nut travels along the length of the screw, providing linear motion.

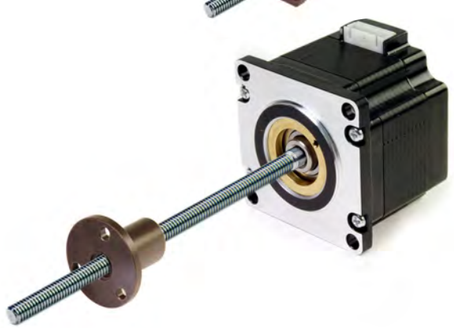
The length and the pitch of the leadscrews are highly customizable, making the external nut configuration useful for a wide variety of applications. Numerous mounting options paired with the many types of nuts available help tailor this linear actuator to fit a specific situation. In addition, the external nut configuration helps achieve greater acceleration and maximum speeds than other configurations while also offering greater efficiency in terms of power consumption.

NEMA 8 (20.3 mm)
LE08

NEMA 11 (28.3 mm)
LE11

NEMA 14 (35.5 mm)
LE14

NEMA 17 (43.2 mm)
LE17



NEMA 23 (58.5 mm)
LE23

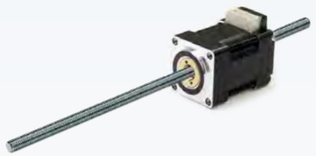
PRODUCTS: **NON-CAPTIVE ACTUATORS**

In non-captive configuration, the nut is incorporated into the motor's rotor. As the rotor rotates, it creates linear motion by passing the leadscrew. In this instance, the apparatus can be attached in one of two ways: directly to the motor, or to either ends of the leadscrew.

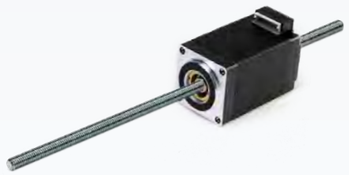
When the apparatus is attached directly to the motor, the leadscrew is usually rotationally fixed. As the rotor rotates, it moves the motor along the length of the leadscrew providing linear motion. Since both ends of the leadscrew are generally supported, the maximum length of the leadscrew can be greater than that of an actuator with external nut. This is a popular option for applications that require longer travel. This configuration can also handle more linear force than external nut design.

Another advantage to consider is that the motor provides more mass and, therefore, more damping power. This means that you experience less vibration, which often translates to quieter and more accurate motion. Non-captive design can also be desirable when a rotating leadscrew could potentially conflict with other components or prove to be hazardous. Since the leadscrew is fixed in position, less moving parts are exposed.

Another popular option is to attach an apparatus to the lead screw while keeping the motor fixed in position. This removes the need for long leads and lead tracking. Most of the benefits can be retained if the apparatus can be supported from both ends of the lead screw.

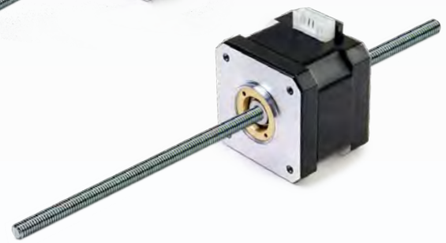


NEMA 8 (20.3 mm)
LN08

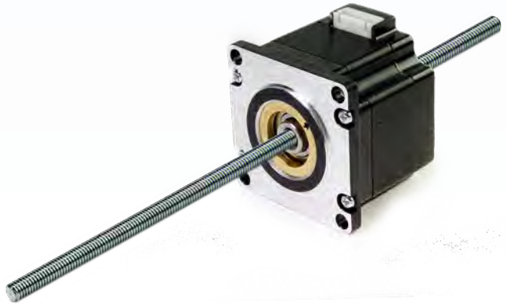


NEMA 11 (28.3 mm)
LN11

NEMA 14 (35.5 mm)
LN14



NEMA 17 (43.2 mm)
LN17



NEMA 23 (58.5 mm)
LN23

PRODUCTS: **LINFINITY NUT**

PATENTED DESIGN

Features & Benefits:

- Reduced friction and heat build up
- Quite operation
- Maintains high accuracy
- Increased life span
- No maintenance required
- Patented design

The LinFinity Nut is an internally lubricated anti-backlash nut proven to last over 12 million inches of travel in a typical application without maintenance.

The patented design incorporates an internal grease reservoir which distributes a consistent layer of grease throughout the entire surface of the lead screw as the nut travels. The internal reservoir maintains hydrodynamic lubrication throughout the life of the product, which drastically reduces friction and thus increases the performance and longevity of the product.

Ordinary externally lubricated anti-backlash nuts act as a wiper: instead of distributing the grease evenly, they tend to push the grease out to the edges of the screw. This results in the grease drying out and ultimately leads to product failure.

REDUCES HEAT BUILD UP

Less friction means less heat is being generated. LinFinity reduces heat buildup by at least 20% compared to the closest competing design. Heat leads to premature failure.

REDUCES NOISE

Ordinary externally lubricated nuts tend to increase friction throughout the life of the product. Friction causes excessive noise. LinFinity maintains low friction throughout the lifespan and does not generate more noise with age.

EXTENDS LIFE

Lower heat and reduced friction along with even distribution of grease result in the overall life of the Linear Actuator system to increase.

VALUE ADD: **LINEAR OPTIONS**

VARIOUS OD & LEADS

COATED & UNCOATED

VARIOUS END MACHINING OPTIONS

LENGTH MODIFICATIONS

NUT OPTIONS

FREE WHEELING NUTS

ANTI-BACKLASH NUTS

LINFINITY NUTS

OTHER OPTIONS

ACCESSORIES

LEAD & CONNECTORS

AND MUCH MORE

For complete listing and specifications, visit:
LinEngineering.com/Actuators

CONFIGURED OPTIONS **SHIPPED IN 2 WEEKS!**

Rapid Prototype Configurator is a tool to help you configure and receive a prototype linear actuator so you can start your evaluations quickly, easily, and with confidence.

- √ Answer four simple questions about your needs
- √ Select from thousands of potential combinations for fast delivery
- √ Start testing and configuring your system quickly
- √ Decide on your final motor requirements
- √ Nail down production unit specifications

Enter Your Speed and Force requirements and your available voltage and amperage (your driver output) and hit calculate.

1

Available configurations based on your requirements will be plotted in the chart to help you make your selections. Simply choose a motor or configuration that is within your required operating range

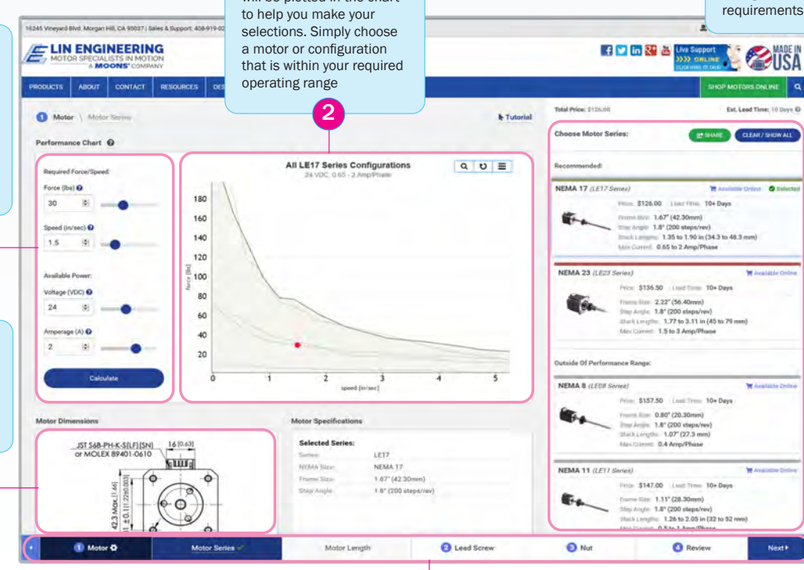
2

Choose the best product or configuration that fits your requirements

3

Dimensions and Specifications will appear in this area after making a selection.

4



Navigate steps using the navigation bar

LET US PUT OUR PRODUCTS & DESIGN EXPERTISE **to Work for You**

DIVERSE PRODUCTS

- Rotary Stepper
- Linear Stepper
- Brushless DC
- Servo
- Encoders
- Gearboxes

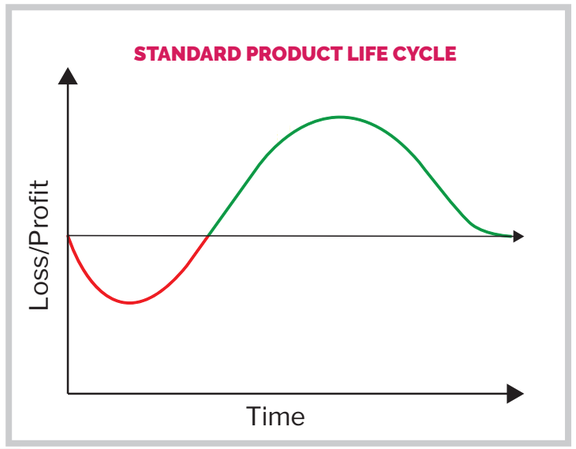
+

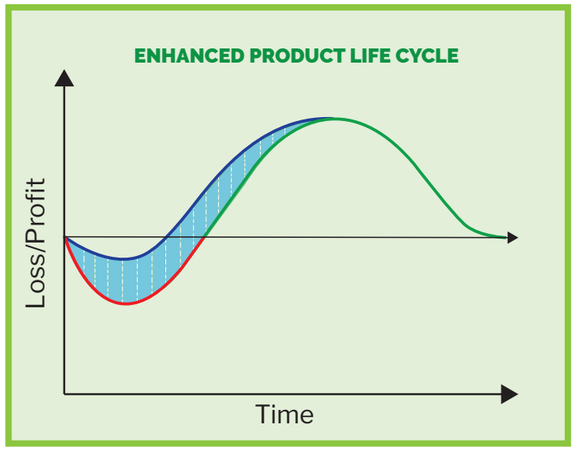
SCALABLE PRODUCTION

- Integrated Supply Chain
- Rapid Prototyping
- Environmental Testing & Reliability
- Complete Assembly Delivery

=

- Faster Prototypes
- Complete Solutions
- Lower Costs
- Enhanced Product Life Cycle





YOUR DESIGN: **INTEGRATED & MANUFACTURED**

CASE STUDY **1**: RAPID PROTOTYPING

PROBLEM STATEMENT
New product launch deadline quickly approaching.

SOLUTION
- Created a configured motor with new winding, housing, and encoder.
- Final Design in 3 weeks.
- Prototypes in 5 weeks.

CASE STUDY **2**: STREAMLINED SUPPLY CHAIN

PROBLEM STATEMENT
Current motor and pump stalling intermittently.

SOLUTION
- Created configured motor winding for more torque.
- Integrated motor and pump into single sub-assembly.

CASE STUDY **3**: SCALABLE PRODUCTION

PROBLEM STATEMENT
New product release with great reaction from the market that required expedited production ramp-up.

SOLUTION
- Incorporated product into automated production line.
- Worked with supply base to expedite setup and delivery.

PRODUCTS: DRIVERS/CONTROLLERS

▼ R325P
Smooth Driver
Microstepping: Full - 256x
Current: 0.3 - 3.0 Amps
RoHS Compliant

◀ R1025
Power House Driver
Microstepping: Full - 256x
Current: 0.8 - 10 Amps
RoHS Compliant

▼ R701/710
High Power Driver
Microstepping: 10x
Current: 1-7 Amps
RoHS Compliant

▲ R356
Single Axis Driver/Controller
Microstepping: 2x - 256x
Current: 0.2 - 3.0 Amps
RoHS Compliant

▶ R208
Low Cost Driver
Microstepping: Full - 8x
Current: 0.35 - 2.0 Amps
RoHS Compliant

▲ R256
Driver/Intelligent Controller
Microstepping: 2x - 256x
Current: 0.2 - 2.0 Amps
RoHS Compliant

VALUE ADD: GEARBOXES

Slim Planetary
GEARBOX

Features & Benefits:
- High efficiency
- Shortest Planetary Gearbox
- 5:1 gear ratio
- Cost effective
- Standard NEMA 17 Mount

PM Planetary
GEARBOX

Features & Benefits:
- High efficiency
- Multiple ratios available
- Standard NEMA mountings
- Quick installation
- Cost effective
- Low noise gearheads available

VALUE ADD: ENCODERS/ACCESSORIES

OPTICAL ENCODERS

AMT11
MODULAR INCREMENTAL ENCODER

Features and Benefits:
- Patented capacitive ASIC technology
- Incremental resolutions up to 4096 PPR
- Differential line driver versions
- 7 different mounting hole options

E2
ENCODER

Features and Benefits:
- Best for NEMA 17, 23 and 34
- 32 to 5,000 cycles per revolution (CPR)
- Tracks from 0 to 300,000 cycles/sec
- 128 to 5,000 pulses per revolution (PPR)

E5
ENCODER

Features and Benefits:
- Best for NEMA 23 and 34
- 32 to 5,000 cycles per Revolution (CPR)
- 128 to 5,000 pulses per revolution (PPR)
- Tracks from 0 to 100,000 cycles/sec

E4T
ENCODER

Features and Benefits:
- Compact miniature size best for NEMA 8, 11, 14, and 17.
- 100 to 500 cycles per revolution (CPR)
- Tracks from 0 to 100,000 cycles/sec
- 400 to 2000 pulses per revolution (PPR)

▲ USB485
Converter Card
Compatibility: Serial USB
Used with: SP17C, SP23C, R256, R356, R525

▲ RS232-RS485
Converter Card
Compatibility: Serial Port
Used with: SP17C, SP23C, R256, R356, R525

CAPACITIVE ENCODERS

AMT20
MODULAR ABSOLUTE ENCODER

Features and Benefits:
- Patented capacitive ASIC technology
- Low power consumption
- 12-bit absolute position via SPI (4096 positions)

AMT103
MODULAR INCREMENTAL ENCODER

Features and Benefits:
- Patented capacitive ASIC technology
- Low power consumption
- 16 DIP switch selectable resolutions up to 2048 PPR