

MAXIMIZING TORQUE AT DESIRED SPEED



We Provide Solutions for Motion Control Applications



- ▶ We know how to maximize torque at your operating speed to **eliminate guesswork** from the motor selection process. (See page 9) Trial and error is **not** an option.
- ▶ We inventory components in Morgan Hill, California to provide **Rapid Prototype Delivery and Short Lead Times**.
- ▶ We have **full manufacturing capabilities in California**.
- ▶ We have **volume manufacturing capabilities in China**. (See page 5-6)

- ▶ We have our **own quality team in China and in the U.S.** to guarantee high quality products prior to shipping.
- ▶ We have the best microstepping motor in the world in terms of step accuracy to provide **smooth motion**. (See page 25-26)
- ▶ We follow Statistical Process Control to have a mind set of **lifetime warranty**.
- ▶ We offer the **best price** for performance.
- ▶ As a **valued business partner**, we strive to solve our clients' issues.

See pages 12 and 18 for
tips on Energy Efficiency

Lin Engineering's RoHS Policy:

Lin Engineering is committed to offering products compliant with the RoHS initiative. Nearly all standard Lin Engineering products are now available as RoHS compliant.

For some aerospace and extreme environmental applications, lead free and RoHS compliant products cannot be accepted due to a higher requirement for safety. Therefore, Lin Engineering is offering specific versions of our products that will comply with the Hazardous Materials Regulations.

Please contact Lin Engineering for more information regarding specifics to each product.

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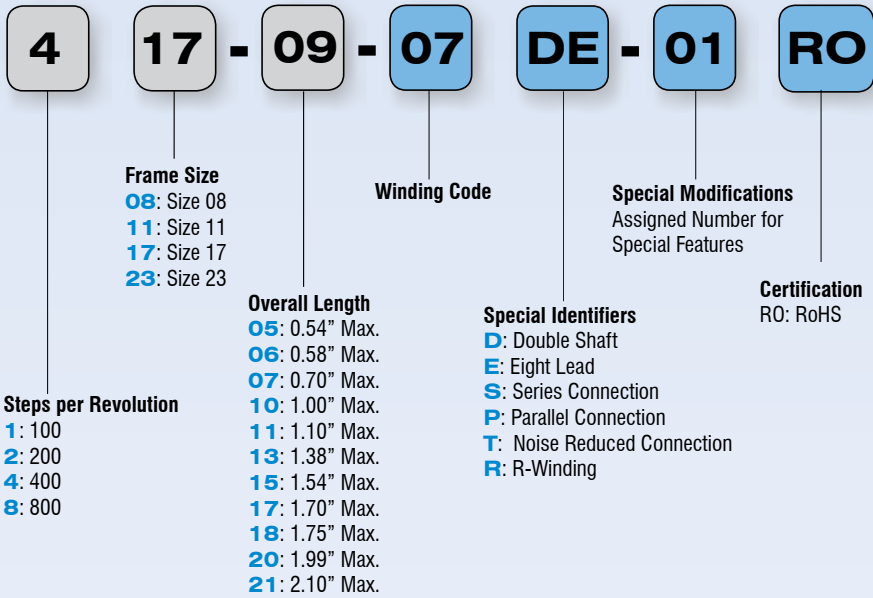
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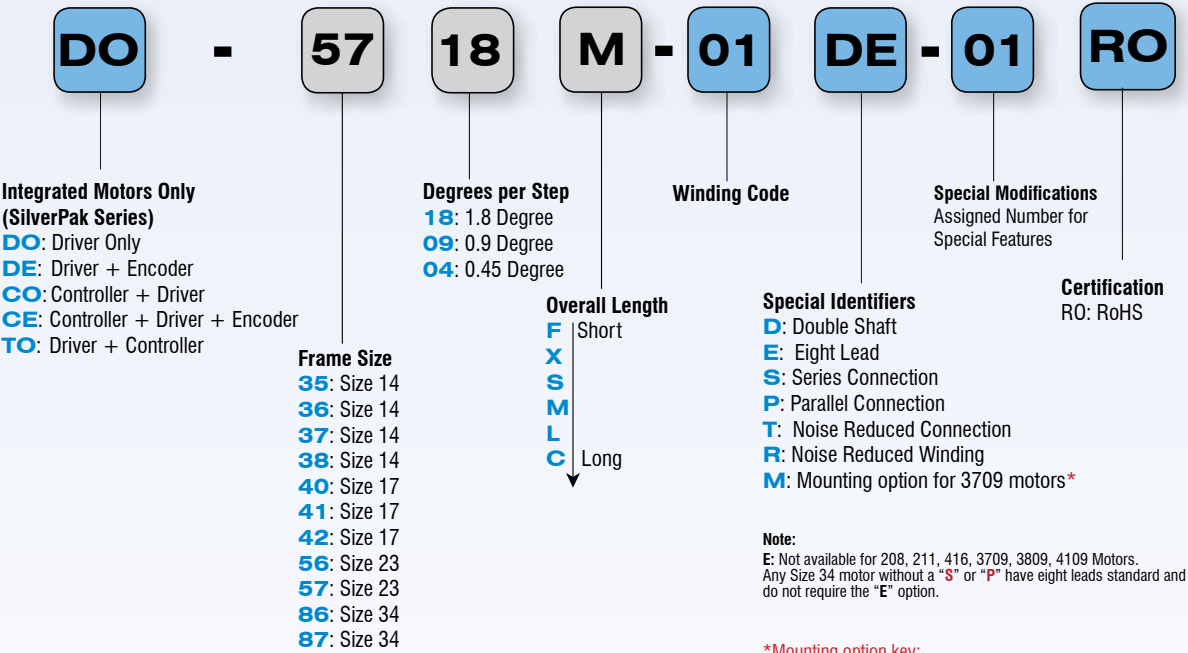
SYSTEM 1

Example: 417-09-07DE-01RO



SYSTEM 2

Example: 5718M-01DE-01RO

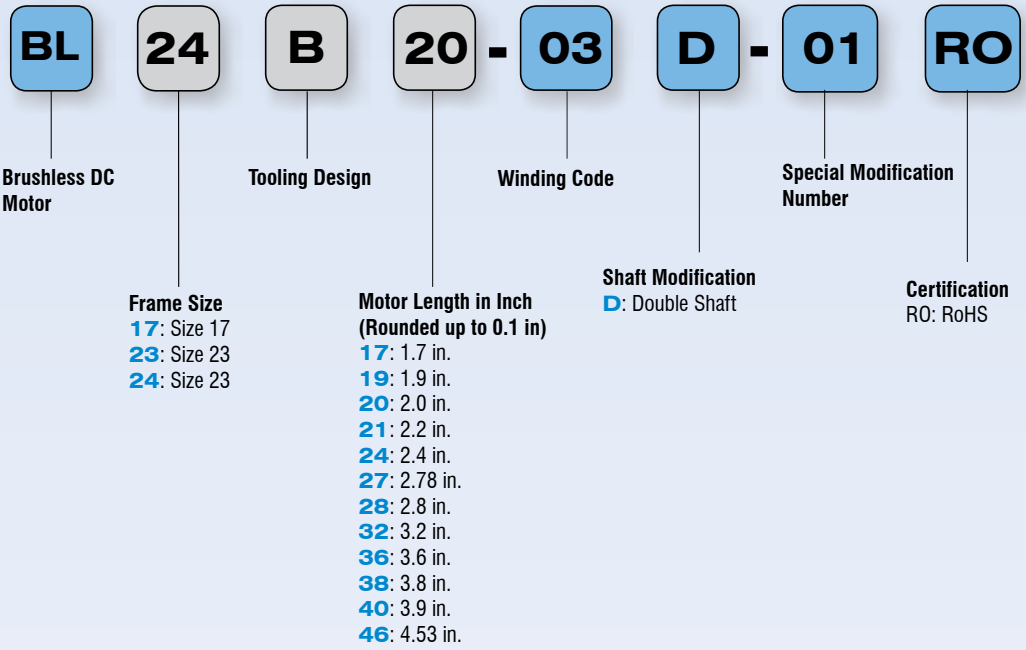


Note:
E: Not available for 208, 211, 416, 3709, 3809, 4109 Motors.
Any Size 34 motor without a "S" or "P" have eight leads standard and do not require the "E" option.

*Mounting option key:
M1, SIGNATURE, CAST, MTG SIZE 17, #4-40 UNC
M2, SIGNATURE, CAST, MTG SIZE 17, M3 X 0.5
M3, SIGNATURE, CAST, MTG SIZE 17, 0.130 THRU
M4, SIGNATURE, CAST, MTG SIZE 14, #4-40 UNC
M5, SIGNATURE, CAST, MTG SIZE 14, M3 X 0.5
M6, SIGNATURE, STAMPED, MTG SIZE 17, M3 X 0.5
M7, SIGNATURE, STAMPED, MTG SIZE 17, 0.130 THRU

BRUSHLESS DC

Example: BL24B20-03D-01RO



MISSION STATEMENT

The main reason for our existence is that we provide solutions for motion control applications. We are your solution.

COMPANY HISTORY

Over the years Lin Engineering has earned the reputation as the technical leader in step motor design with the ability to **“Maximize Torque at Desired Speed”**.

Founded by Ted T. Lin in 1987, Lin Engineering began as a consulting company specializing in step motor applications. Throughout its history, Lin Engineering has continued to develop its capabilities in the areas of design engineering, manufacturing, and customer service. In 1990, Lin Engineering expanded its operations to include the manufacturing of its own hybrid step motors. Since then, the company has developed its product line to include drivers, controllers, optical encoders, and spur & planetary gearboxes.

President Ted T. Lin is one of the foremost step motor designers in the industry. In 1984, Warner Electric named him **“Father of New Step Motor Technology”** at their Motion Control System Division, where he directed the design of step motors for early disk drive applications.

Lin Engineering’s diversified customer base includes such industries as:

- | | |
|-------------------------------|--------------------------------|
| • Automated Test Equipment | • Automatic Feeding Machines |
| • Surveillance Systems | • 3D Image Acquisition Systems |
| • Avionics | • Label and Die Feeders |
| • Defense Contracting | • Wave Length Meters |
| • Labeling Machinery | • Bar Code Printing |
| • Medical Equipment | • Antenna Systems |
| • Packaging | • Fiber Optics Switch |
| • Semiconductor Manufacturing | • Laser Measurement |
| • Metering and Dispensing | • Press Printing |
| • Engraving Machines | • Color and Photo Imaging |
| • Aerospace | • Solar and Green Technology |



If there is a single precept to which we dedicate ourselves, it is that of excellence. Excellence in attitude. Excellence in performance. Excellence in our interrelationships with each other and our customers.

Over the years, Lin Engineering has developed capabilities in design, manufacturing and marketing of hybrid step motors. We have done this with great dedication and will continue to push forward as a leader in these areas. Today, we are the largest volume manufacturer of the best 0.9 degree step motor in the industry, while still offering the best price for performance.

Our motors can be found in a variety of industries & applications including: surveillance cameras that can be seen in casinos and department stores, food wrapping machines found in practically every supermarket, medical equipment, eye surgery equipment, and other motion controlled products. We are thrilled that you will find our motor in the B-2 Stealth Bomber.

We are a solution-oriented company, known for being able to maximize torque at the customer’s desired speed in order to eliminate guesswork from the motor selection process. Our customers use Lin Engineering for a number of reasons, but most commonly to find a solution for the following problems:

- Sizing and selecting the right motor is time consuming
- The design margin of the motor being selected is unknown
- Existing motor is too noisy or has too much resonance
- The price of motors from China is inexpensive, but there are concerns about quality and long lead-time.

We have an outstanding quality team at our Morgan Hill and China locations, whose sole purpose is to guarantee quality in every process. This allows our customers to receive products that meet or exceed their expectations. We also have dedicated a team of engineers and production staff for prototypes. This allows for immediate service and short lead times.

We are proud to have gained market share by having a team of engineers creating cutting edge designs, and a technical support staff trained to help you with selecting and using the proper motion control product for your application.

Scale your business with Lin Engineering at design and pre-production levels. At low volumes, Lin Engineering has full design and manufacturing capabilities in Morgan Hill, CA. For high volumes, we have a proven process for transferring both technology and product to our Asia Headquarters, Linex, for cost effective manufacturing without sacrificing quality.

The Benefits?

- ✓ Cost effective solution without sacrificing quality
- ✓ Double source through a single supplier
- ✓ Consistently high service and support
- ✓ Minimize lead times

Linex CAPABILITIES

Customer Service

Linex has a team of customer service personnel dedicated to provide you with personal and professional service.

Quality & Reliability

Similar to Lin Engineering's U.S. headquarters, Linex produces high quality and consistently reliable products.

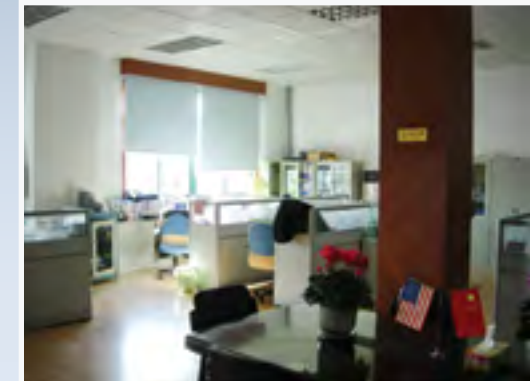
Value Added Services

Whether its a simple request to add a cable or connector or something a bit more complex like mounting a pulley or customizing the motor's shaft, Linex has a long list of value added services that help you minimize costs and lead times.

CONTACT Linex

Located within the industrialized Nanjing province:
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Nanjing 210061, P.R. China**

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- ☎ FAX. **86-25-58690086**
- ✉ EMAIL. **linexsales@linengineering.com**



MAXIMIZE TORQUE AT DESIRED SPEED

Within the constraints of power input and motor size, Lin Engineering can design a motor to maximize torque at your desired operating speed. With a given power input, the power output $fT\omega$ (T = torque at angular velocity ω) from a given size of motor will not change. In other words, we design a motor's maximum operating efficiency at your desired speed. *See page 9 for more information.*

HIGH STEP ACCURACY

Lin Engineering's 0.45° NEMA 23 motor has the best step accuracy in the step motor industry. Our 0.45° motor is constructed with 200 rotor teeth (a typical 1.8° motor is constructed with only 50 teeth). Better step accuracy is achieved by having more rotor teeth.

HIGH RESOLUTION

Lin Engineering's 0.9° and 0.45° motors provide 2 and 4 times higher resolution, respectively, than a standard 1.8° motor.

SMOOTH MOTION

Every step motor has a resonant frequency. Lin Engineering can remove this resonance from your operating speed, so you never experience any oscillation in your application.

EXCELLENT ENGINEERING SUPPORT

Lin Engineering's technical support and knowledge base are unmatched in the industry. Our engineers will eliminate the guesswork in motor selection. There is no need to buy multiple motors just to find the correct one, because Lin Engineering will configure a motor for your application that will work right the first time.

EXTENSIVE SALES NETWORK

In addition to our inside sales team, Lin Engineering employs a worldwide network of over 40 sales representative firms located throughout the United States, Canada, Europe, the Middle East and Asia. Our sales reps can provide the service and personal attention required to serve your company.

OFFSHORE QUALITY TEAM

Should problems arise in high volume production, our overseas quality assurance team guarantees that the issue will be dealt with at the source.

SHORT LEAD TIMES

The typical step motor manufacturer can require as long as 4 to 6 weeks to deliver prototypes; Lin Engineering can provide the same quantity of most motors in less than 1 week. This is made possible by maintaining an inventory of components in our U.S. facility, allowing us to respond quickly to the demands of modern business.

DOMESTIC AND OVERSEAS OPERATIONS

In addition to minimizing lead-time, our U.S. facility also functions to support our overseas production. This allows Lin Engineering to meet the initial demands for high volume orders, thus helping your company to avoid the delays associated with high volume production ramp-ups. *(See page 5)*

MILITARY/AEROSPACE APPLICATIONS

As a military qualified vendor, Lin Engineering designed, tested, and manufactured disk drive step motors used in the B-2 Stealth Bomber.

NEW PRODUCT/TECHNOLOGY DEVELOPMENT

Each year, Lin Engineering continues to develop innovative step motor products. Recent developments include:

- **Xtreme Torque (4418)** — Pages 53-54
Up to 35% More Torque for Size 17 Steppers
- **Signature Series** — Page 17
Ultimate Combination of Smooth Motion and High Accuracy

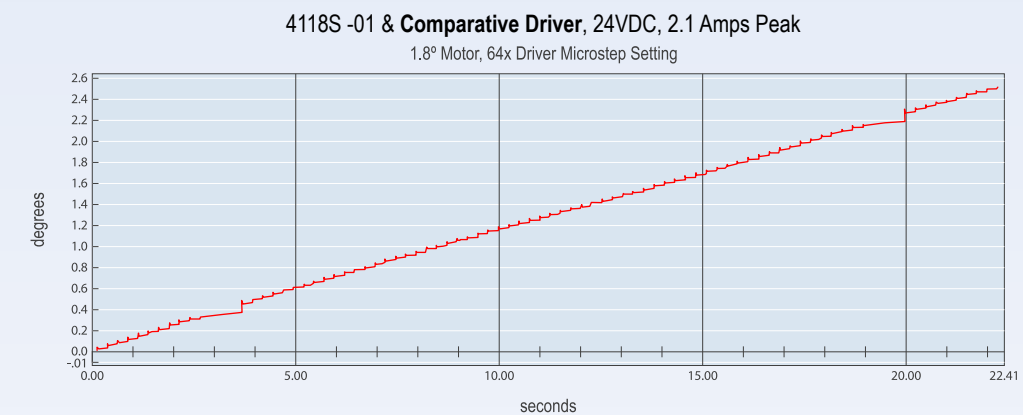
PRODUCT BREADTH

- **Hybrid Stepper Motors** — Pages 19-66
- **Integrated Motors/Mechatronics** — Pages 71-82
- **Brushless DC (BLDC) Motors** — Pages 83-88
- **Gearboxes** — Pages 89-92
- **Optical Encoders** — Pages 93-96
- **Microstepping Drivers and Controllers** — Pages 99-107

Pole Damping Technology™ (PDT) enhances step motor performance by creating a more accurate and smooth motion profile. PDT optimizes the microstepping performance of the step motor by outputting the correct amount of run and hold current to the motor. Thus, each step will overcome the motor's natural tendency to want to forcefully pull towards the full step ON position.

Currently, the SilverPak 23D Plus integrated motor + driver (*page 77-78*), the Silverpak 34D integrated motor + driver (*page 81-82*), the R525 microstepping driver (*page 103*) and the R325 microstepping driver (*page 102*) contain the PDT technology. Lin Engineering strives to constantly improve technology. Products that are currently under development will have PDT implemented for the purposes of further enhancing the smooth motion and accuracy of our products.

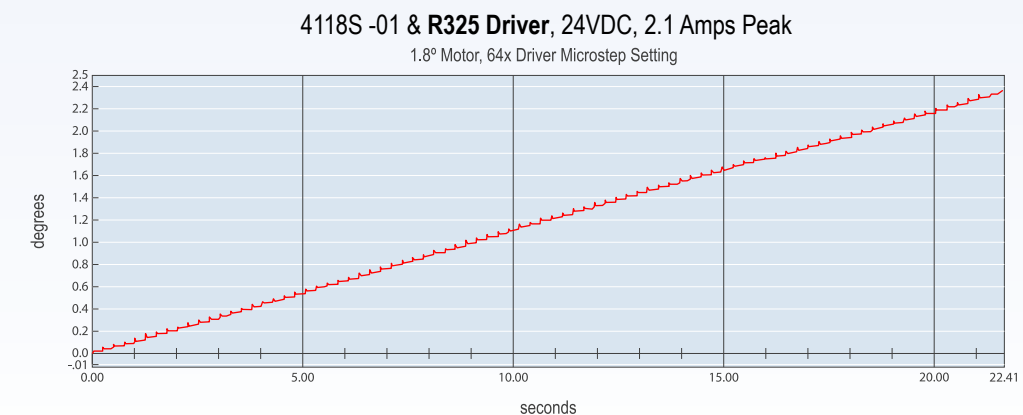
The graph below shows what PDT can do for your applications. Notice the spikes that a competitor's driver creates at every 64th step when running the motor at 64x microstepping. These sudden "jumps" are caused by the detent torque of the motor. Taking a closer look at the graph reveals that the few microsteps prior to the huge spike are inconsistent as well. The spikes are due to the step motor correcting itself over time; when errors are accumulated during the 63 microsteps, the 64th step forces the motor to line up evenly between stator and rotor. After the stator and rotor are aligned, the problem is repeated during the next 1.8°.



The spikes occur because of the step motor's poles forcefully being pulled towards each other. Pole Damping Technology™, as the name implies, dampens each step as it nears the full step positions where the poles are the strongest.

When using a product with PDT, the spikes are eliminated.

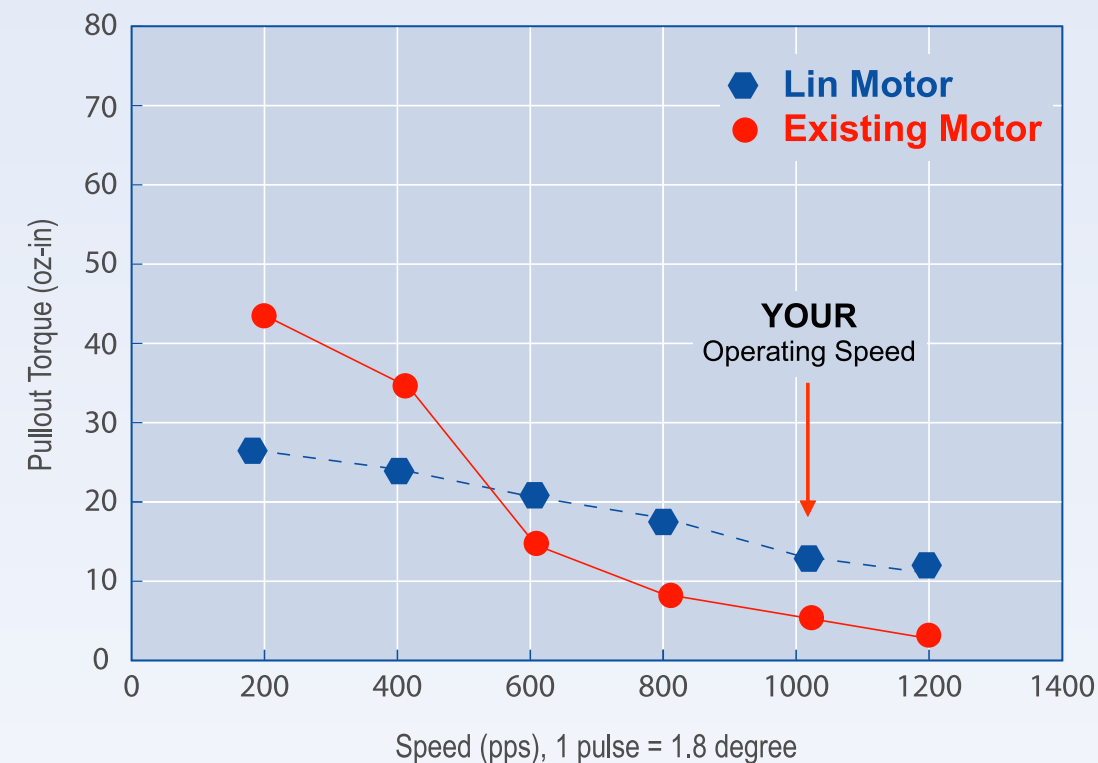
The R325 driver (*page 102*) eliminates these spikes, resulting in smooth motion and even steps.



One of the most common issues with selecting the correct motor is getting the right amount of torque. That's how Lin Engineering's ability to Maximize Torque @ Speed can be utilized.

Lin Engineering specializes in maximizing torque at your desired speed. Each step motor is characterized by its speed-torque curve, or, its power output capabilities. Within the constraints of power input and motor size, Lin Engineering can design a motor by manipulating the speed-torque curve to maximize torque in a given area across the speed range. In other words, we design a motor's maximum efficiency at your desired speed. As the technical leader in step motor design, we get it right the first time by maximizing torque at your desired speed – trial and error is not an option.

MAXIMIZE YOUR TORQUE WITH LIN ENGINEERING



This graph demonstrates what "Maximize Torque at Desired Speed" means. The existing motor has a characteristic shown with the red line. The user of this motor had an operating speed of 1000 pps and needed higher torque at that speed. Lin Engineering designed a motor, using the same motor size and power input, and manipulated the curve to output more torque at the crucial point. This crucial point is the user's operating speed.

We compared the accuracy and torque performance between Lin's 2-phase motor versus a competitor's 5-phase motor. The 2-phase motor resulted in better accuracy and more torque. Let's see how the tests were conducted and understand the results.

2-PHASE VS. 5-PHASE STEP ACCURACY COMPARISON

To compare these two mechanically different step motors, we were able to run both motors at a step resolution such that each microstep was the equivalent of 0.018°.

2-Phase: 0.9° Motor / 50x microstepping = 0.018°

5-Phase: 0.72° Motor / 40x microstepping = 0.018°

SPECIFICATIONS OF BOTH MOTORS

Input Voltage of 24VDC

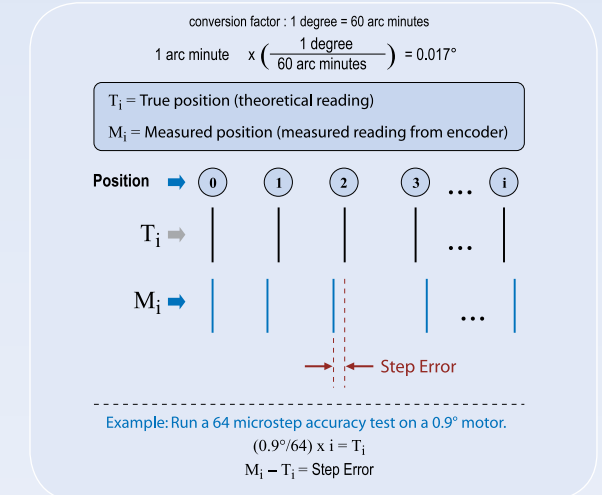
Output Current set to motor's rated current

2-Phase: 0.6 Amps/Phase

5-Phase: 0.75 Amps/Phase

MEASURING STEP ACCURACY

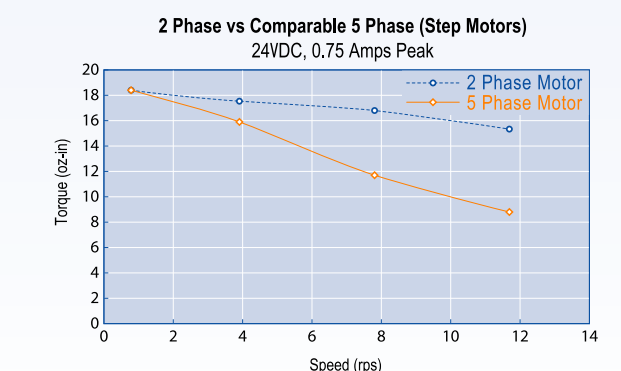
How does step accuracy work? Step error is measured in arc minutes. Arc minutes are:



ADDED BENEFIT OF 2-PHASE OVER 5-PHASE: MORE TORQUE

Not only are 0.9° 2-Phase step motors more accurate than 0.72° 5-Phase step motors, they also produce more torque as well. In a 0.72° 5-Phase step motor, there are 50 rotor teeth. A rotor and stator must be offset from each other; therefore, the maximum number of stator teeth must be less than 50 in order to create the offset spacing. Since 5-Phase steppers contain 10 poles, the maximum number of teeth per pole is 4 which will result in 40 stator teeth.

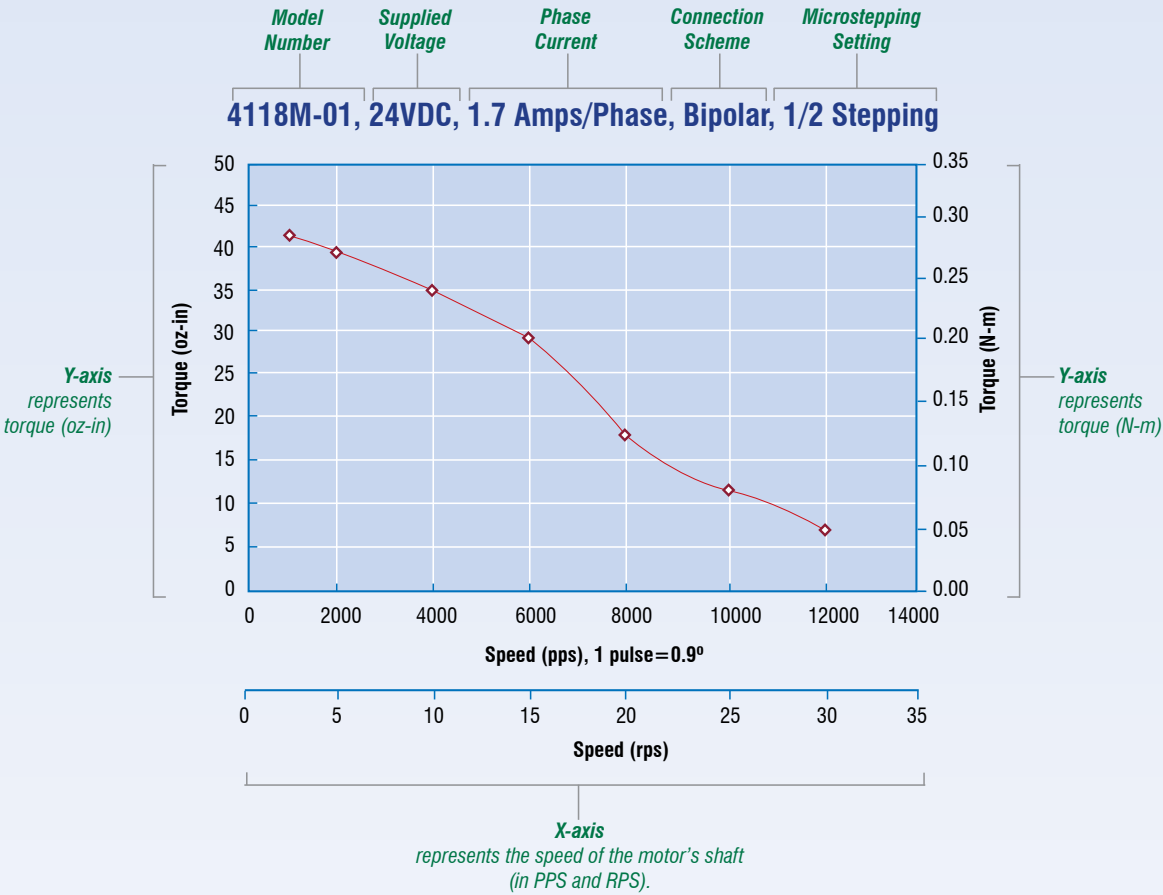
However, on a typical 0.9° 2-Phase step motor, there are 100 rotor teeth and 16 stator poles. Therefore, the maximum number of teeth allowable on each pole is 5, resulting in a total of 80 teeth on the stator. The more stator teeth, the more output torque.



A Simple Tutorial for Common Stepper Terminology

READING A SPEED & TORQUE CURVE

The graph below depicts the relationship between speed and torque while a step motor is running. The output torque is very critical during the motor selection process. On the graph, the vertical y-axis represents torque (oz-in and N-m) while the horizontal x-axis represents the speed of the motor's shaft (in PPS and RPS).



ROTATIONAL SPEED

Step motors rotate continuously when given a specific series of pulses. Motor phases are turned on and off in a designated step sequence and thus, the faster the step pulses are sent to the motor, the faster it will rotate. Pulses per second, or PPS, is the rate at which the step pulses are sent to the motor per second. To translate this to revolutions per second, or RPS, one would need to know how many steps are in 1 revolution. In the example above, the motor is a 1.8 degree stepper and requires 200 steps to make 1 full revolution. The motor is operating at half stepping, so each step is now 0.9 degrees resulting in 400 steps needed per revolution. In the above example, 400 PPS is the equivalent to 1 RPS.

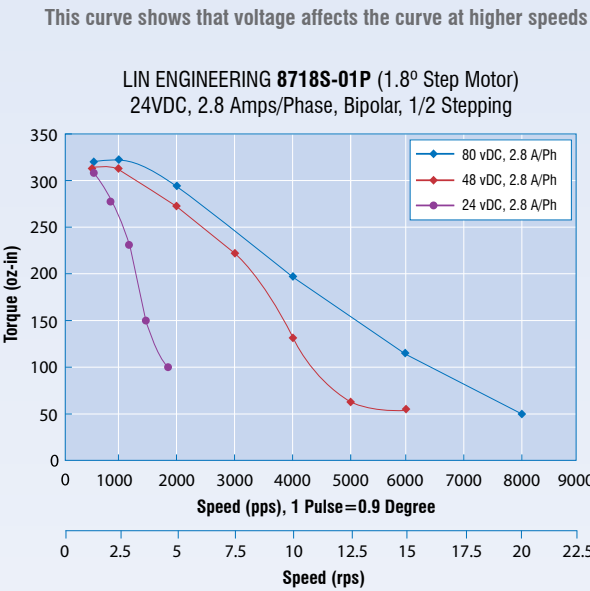
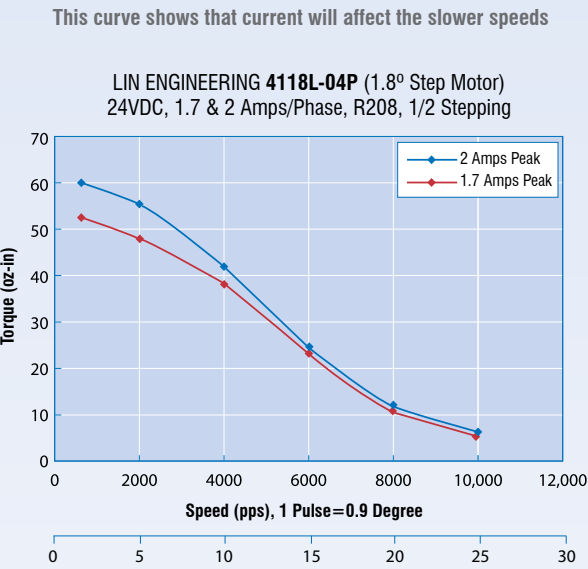
TORQUE

Torque is the measurement of rotational force that a step motor can output; this force is measured at the motor's front shaft. For example, 1 oz-in means that the motor can handle a 1 ounce load that is 1 inch away from the motor shaft. As the motor rotates faster, it will output less torque and be less likely to continue carrying a heavy load. Designing in a torque margin of 20% is typical in most applications.

CURRENT & VOLTAGE

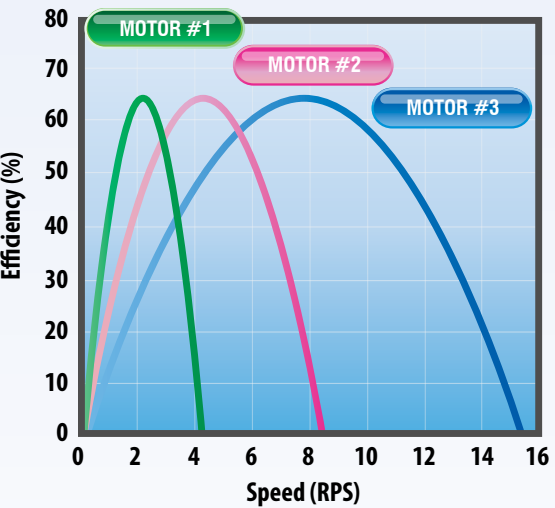
Since step motors rotate by sending current to the different phases in a specific switching sequence each pulse that is sent to the motor must rise and deplete (also known as a current-rise time). At slow speeds, each step it takes should have plenty of time to fully rise to 100% current and deplete. You will receive maximum power and thus, the reason why torque-speed curves have high torque at the low speeds. Voltage acts like a means to allow current to flow faster or slower. If you increase voltage, you are pushing the current through the motor windings at a faster rate. Now, instead of only rising and depleting about 50% of the max current, perhaps it has increased to about 60 or 75% by increasing the voltage.

Below shows a few curves that depict what different voltages and currents do to the torque-speed curves of several motors.



EFFICIENCY

An efficiency curve exists for every motor to help ensure that the proper one has been selected. The image depicts three different motor efficiencies when plotted across a speed range. Some motors, such as #1, perform at their best only at low speeds while others, such as #3, perform better at high speeds.



WHAT IS MICROSTEPPING?

The following table shows the number of pulses, or steps, for a given type of step motor:

Type of Motor	Number of steps in one revolution
1.8°	200
0.9°	400
0.45°	800

When microstepping the motor, the number of pulses increases. This is because microstepping will cause the motor to step in finer, or smaller, increments. Instead of a 1.8° motor stepping every 1.8°, half stepping it will then force the motor to move every 0.9°. The motor then needs to step twice as much to go 1 full revolution, or a total of 400 steps.

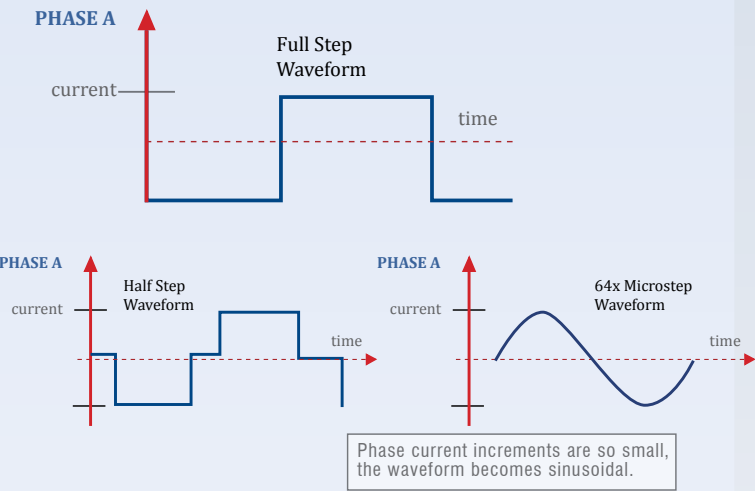
The following table provides the multiplier for each microstep:

Microstep value	Multiplier to the motor's natural steps in one revolution	Number of steps per revolution for 1.8° motors
Full step	no multiplier	200
Half step	2x	400
Quarter step	4x	800
Eighth step	8x	1600
Sixteenth step	16x	3200
5 step	5x	1000
10 step	10x	2000
25 step	25x	5000
128 step	128x	25600
256 step	256x	51200
etc	etc	etc

AFFECTS OF MICROSTEPPING ON TORQUE

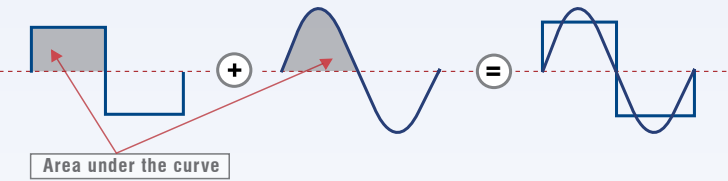
The amount of current going from the driver to the motor continuously changes in order to rotate the motor constantly. When you change microstep values this current waveform also changes.

For example, below are three different current waveforms to compare:



The area under each curve provides the total amount of torque available to the motor. Therefore, when you overlay one curve on top of another you will be able to see which microstepping provides more area under the curve.

Overlaying Full Stepping with 64x Microstepping:



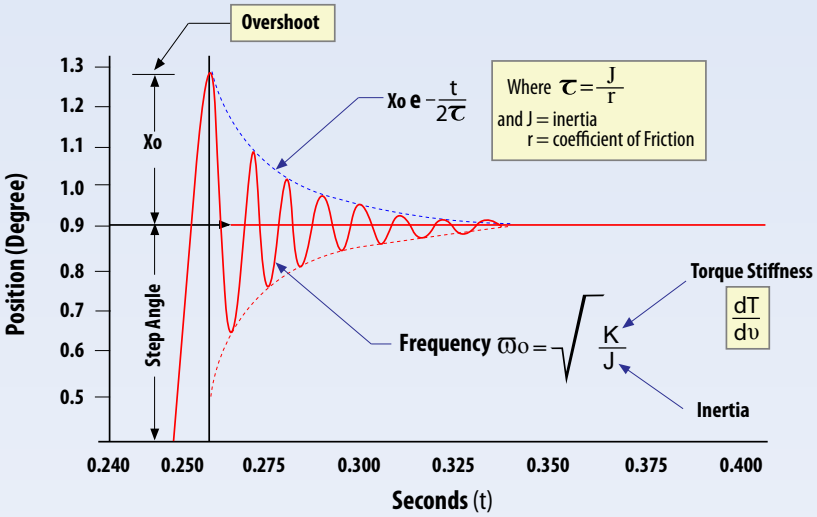
Our test results have proven the theory that you will in fact get the most torque when full stepping the motor. The next best torque result is when microstepping at 64x or higher. The least torque output is when users use half stepping. The torque differences are only within 5 to 10%, but sometimes, it is enough to make a difference. Keep in mind, with more torque, gives more vibration. If both torque and vibration are an issue, it is recommended to use 64x microstepping.

TIPS ON REDUCING RESONANCE:

Every step motor has a resonant frequency wherein more vibration will be seen by the motor at a specific speed. This resonant frequency is due to the oscillation (i.e. back and forth movement) that occurs before the motor settles into each desired position. The oscillation frequency will resonate at certain speeds and cause a 1st order, 2nd order and sometimes even a 3rd order amplitude at several speed ranges. A classic example is vibration seen at 1 RPS (the 1st order), and then slightly less vibration at 2 RPS (the 2nd order).

Below is a graph of a step motor's step response or the oscillation that the motor makes just prior to settling into the desired position. In this particular graph, the desired position was going from 0 to 0.9 degrees.

STEP RESPONSE



Although resonance cannot truly be avoided, there are ways to both reduce resonance and shift the resonance to a different speed location altogether. Looking at the equation for the resonant frequency, ω , the two main factors are Torque Stiffness and Inertia. By changing one of these factors, you can shift the resonance to a lower or higher speed.

INCREASE OR DECREASE VOLTAGE AND/OR CURRENT

By changing the input voltage to the drive, or changing the current (Amps) going from the driver to the motor windings you are essentially altering the torque, and therefore the top numerator of the frequency equation. If you are able to sacrifice some torque, try decreasing the overall power as this could help reduce or shift resonance away from your operating point.

INCREASE YOUR INERTIA LOAD

When you add more load to the shaft of the motor, you are essentially dampening the vibrations. Based on the equation, increasing the bottom denominator will shift the resonance to a lower spot.

INCREASE MICROSTEPPING

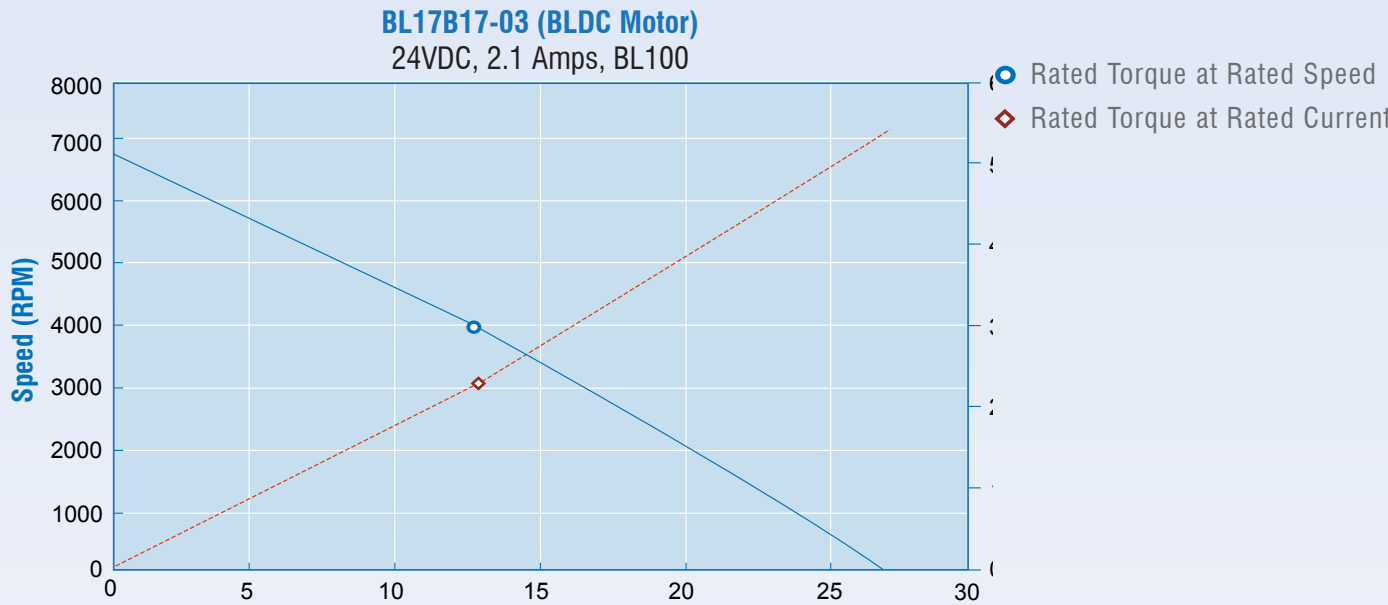
If you have capabilities to increase microstepping from the driver this will force the motor to take much smaller steps which will oscillate much less. Reducing the amount of oscillation directly reduces the amount of resonance. This method reduces resonance across the entire speed range.

CHOOSE A DIFFERENT MOTOR

If all else fails you may need a different motor. In most cases, the motor is too powerful and causes vibration and resonance since it is expecting to move a much heavier load. Choosing a motor that is more suitable for the job could be the solution. If all else fails try Lin Engineering's Signature Series line of stepers which are mechanically designed to reduce vibrations for a smoother motion profile. See page 17 for further details.

HOW TO READ BLDC CURVES

The graph below provides three main motor specifications that can help users determine whether or not this BLDC motor is sufficient for the job. The left-side vertical Y-axis represents speed in revolutions per minute (RPM). The speed increments and the title “Speed (RPM)” are blue, which corresponds to the blue curve on the graph. The right-side vertical Y-axis represents Current in Amps. This axis is red, which corresponds to the red line on the graph. The horizontal X-axis is for torque in ounce-inches (oz-in).



The two specifications that can be read from this graph are:

- Speed versus Torque
(Blue line)
- Current versus Torque
(Red line)

SPEED VS. TORQUE CURVE

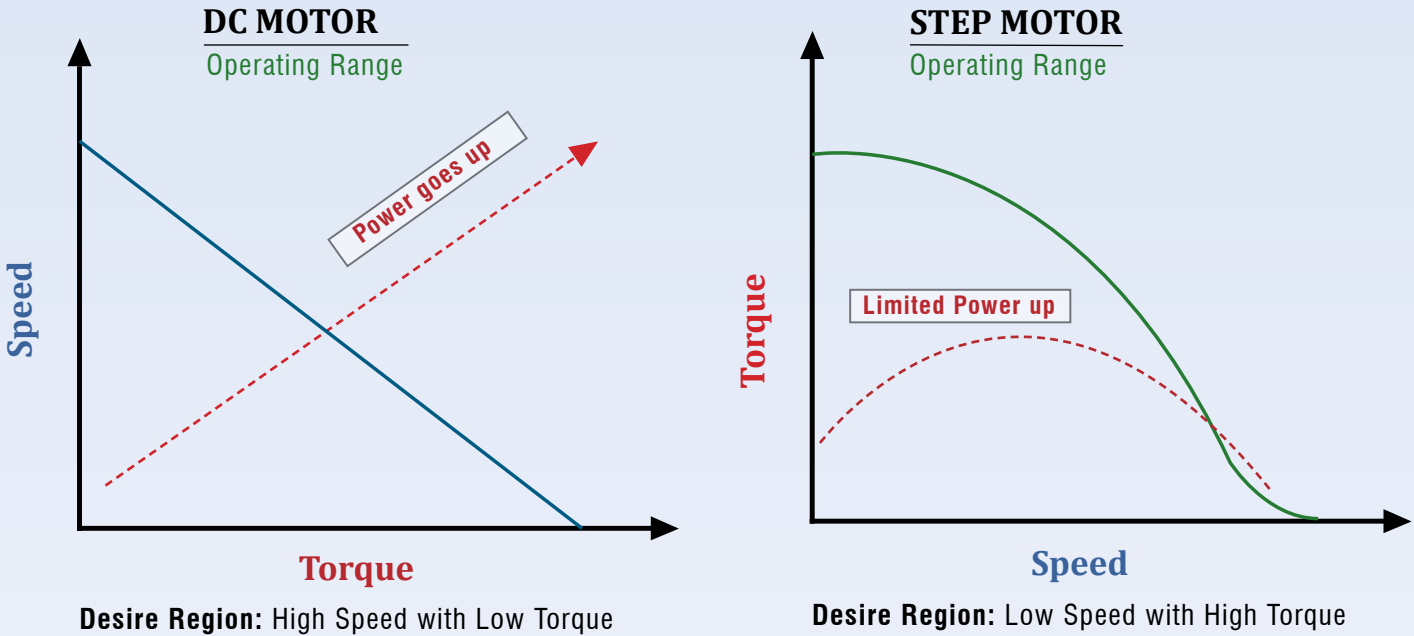
It is crucial to know how much torque this BLDC motor can output at different speeds. Typically, a user has selected a certain speed range and can then understand the torque capabilities of a motor. This speed and torque relationship is linear.

CURRENT VS. TORQUE CURVE

It is just as important to understand the relationship between how much torque the motor provides and how much current is required by the motor. More torque naturally requires more current. It is also a linear relationship.

EXPLANATION OF AXIS ORIENTATION

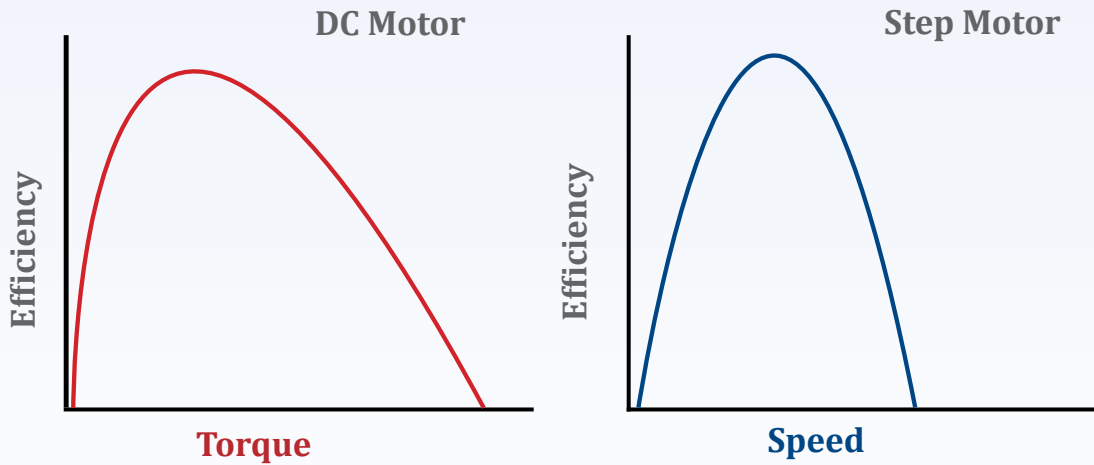
Notice how Speed and Torque are flipped when compared to Step Motor curves. The reason for this is to stay consistent with general presumptions about graphs. In general, X-Y graphs show curves where power goes up when moving to the right and upper corner. Below shows a simple comparison between DC motors and Step Motors; by swapping Speed with Torque in each graph, both graphs can be well understood in the same fashion.



DC Motors work best when maximizing efficiency of the torque. Step Motors work best when maximizing efficiency of the speed.

MAXIMIZING EFFICIENCY FOR BOTH STEPPERS AND BLDC MOTORS

The crucial factor to make most efficient are different in DC motors and Step motors. Looking at an efficiency curve, one can further see the correlation for swapping the X and Y axes when comparing the two different types of motors.



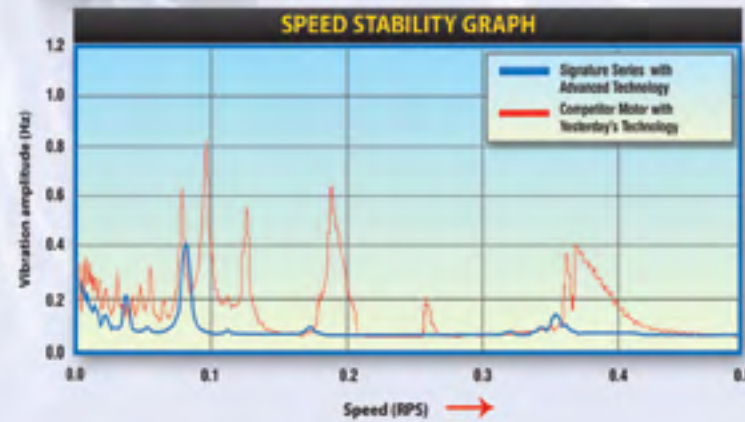


FOR:

- * Smooth Motion
- * High Accuracy & Reliability
- * Low Noise



Reduce System
Resonance
by up to **50%**



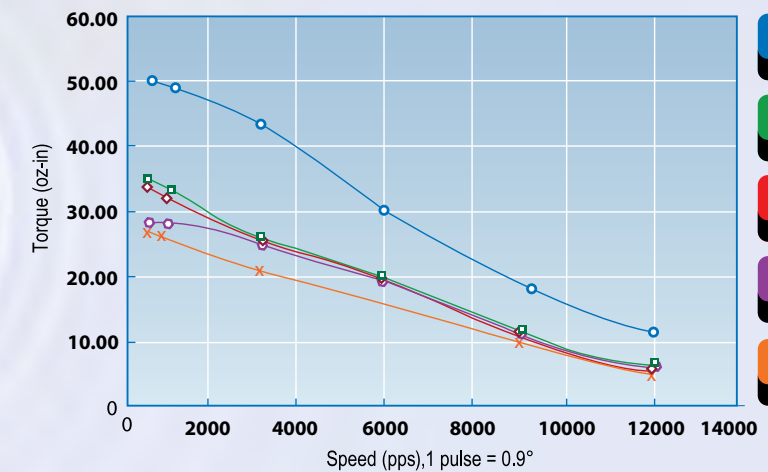
FOR:

- * High Torque & Reliability
- * Energy & Space Efficiency
- * Low Noise



Get Up to
35%
MORE TORQUE
with the SAME
POWER INPUT

Xtreme Torque 4418S Series Comparison
1.8° Step Motor, 24VDC, Rated Current, Bipolar, 1/2 Stepping



- Lin's Xtreme Torque 4418S**
Motor length: 1.35"
- Lin's Standard 4118S**
Motor length: 1.34"
- Competitor 1**
Motor length: 1.34"
- Competitor 2**
Motor length: 1.34"
- Competitor 3**
Motor length: 1.30"

THE BENEFITS?

- * No Stalling
- * Better Heat Dissipation
- * Space Efficient

INDUSTRIES BEST USED FOR:

- * Medical
- * Printing
- * Semiconductor
- * Surveillance
- * Engraving
- * Automation

INDUSTRIES BEST USED FOR:

- * Medical
- * Printing
- * Semiconductor
- * Surveillance
- * Engraving
- * 3D Imaging

NEMA 8 - 1.8°



208
Up to 4 oz-in
Holding Torque
page 43

NEMA 11 - 1.8°



211
Up to 16.6 oz-in
Holding Torque
page 45

211
Vacuum Rated
page 67

NEMA 14 - 0.9°



3709/3809
Signature Series
Reduces Resonance
Up to 16 oz-in
Holding Torque
page 25/27

NEMA 14 - 1.8°



3518
Integral Connector Available
Up to 20 oz-in
Holding Torque
page 47

NEMA 17 - 0.9°



416-05/06
Super Slim Line
Up to 7.3 oz-in
Holding Torque
page 29

416-07
Low Profile
Up to 8.4 oz-in
Holding Torque
page 31

4109
Ideal for High Speed
Up to 22 oz-in
Holding Torque
page 33

4209
High Torque
High Accuracy
Up to 62 oz-in
Holding Torque
page 35

417-09/11/13/15
High Accuracy
Up to 30 oz-in
Holding Torque
page 37

NEMA 17 - 1.8°



4018
Cost Effective
Up to 42 oz-in
Holding Torque
page 49

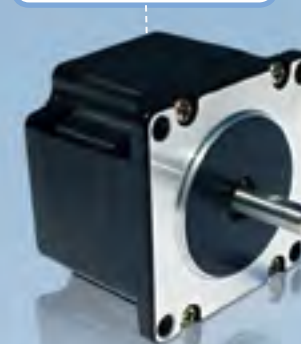
4118
Super Torque
Integral Connector Available
Vacuum Option Available
Up to 125 oz-in
Holding Torque
page 51

4418
Xtreme Torque Series
Up to 35% More Torque
Compared to Standard
NEMA 17 Motors
Up to 100 oz-in
Holding Torque
page 53

4518
Signature Series
Reduces Resonance
Up to 83 oz-in
Holding Torque
page 55

Reduces Resonance
Easy Installation
page 97

NEMA 23 - 0.45°



5704
Power & Precision
Up to 140 oz-in
Holding Torque
page 23

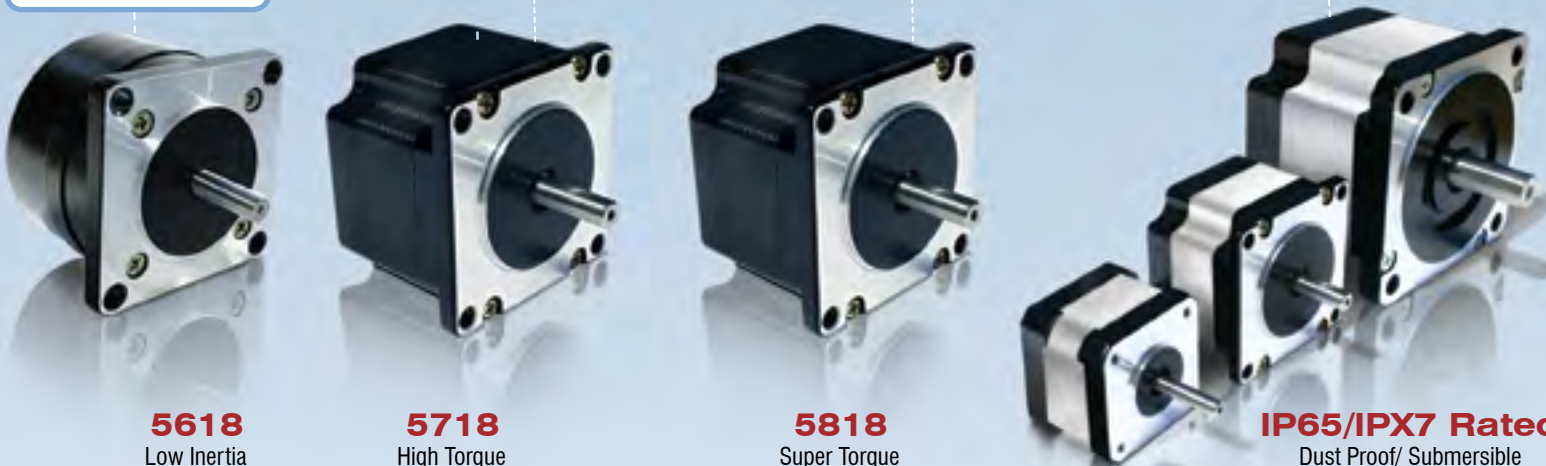
NEMA 23 - 0.9°



5609
High Precision
High Accuracy
Up to 108 oz-in
Holding Torque
page 39

5709
High Precision
High Accuracy
Up to 203 oz-in
Holding Torque
page 41

NEMA 23 - 1.8°



5618
Low Inertia
Up to 175 oz-in
Holding Torque
page 57

5718
High Torque
Up to 294 oz-in
Holding Torque
Vacuum Option Available
page 59

5818
Super Torque
Up to 305 oz-in
Holding Torque
page 61

IP65/IPX7 Rated
Dust Proof/ Submersible
page 68

NEMA 23 Dampers



Reduces Resonance
Easy Installation
page 98

NEMA 34 - 1.8°



8618
High Torque
Up to 700 oz-in
Holding Torque
page 63

8718
High Torque
Up to 1,288 oz-in
Holding Torque
page 65

* Motors are not to scale

HAVE A SPECIAL REQUEST?

LIN'S VALUE ADDED RESOURCES

- ✓ Reduce Cost
- ✓ Save Time
- ✓ Better Supply Chain Management
- ✓ Lin Quality Standards for Every Component



MULTIPLE MOUNTING CONFIGURATIONS

NEMA's 8, 11, 14, 17, 23 and 34
page 19-68

MULTIPLE SHAFT OPTIONS*

EXTENDED FLAT HELICAL CUT



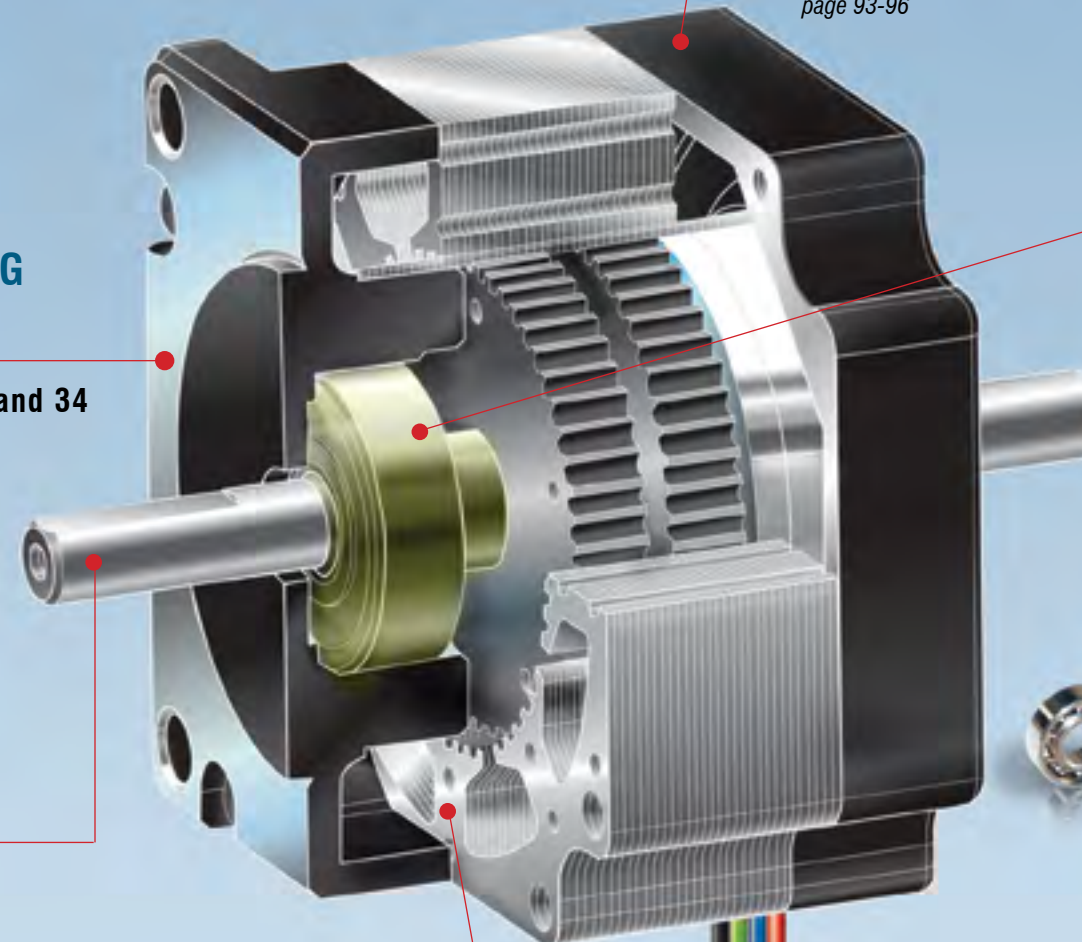
SLOTTED HOLLOW CROSS DRILLED



PRESS FIT GEAR & PULLEY



* Based on customer provided drawings and specifications.
See page 69 for more shaft options.



ENCODERS, DAMPERS, GEARBOXES, & MECHATRONICS



Position
Verification & Accuracy
with Encoders
page 93-96



Reduce
Resonance & Vibration
with Dampers
page 97-98



Increase
Torque & Speed
with Gearboxes
page 89-92



Utilize
Intelligent Motors
with Mechatronics
page 71-82



Customize
Drivers & Controllers
with Tailor Made
Motion Control Solutions
page 99-100

BEARINGS & LUBRICANTS

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



WATER/ DUST PROTECTION

NEMA 17, 23 & 34
IP65 (Splash proof)
IPX7 (Submersible)
page 68



VACUUM RATED

NEMA 11, 17 & 23
1.8° MOTOR
page 67

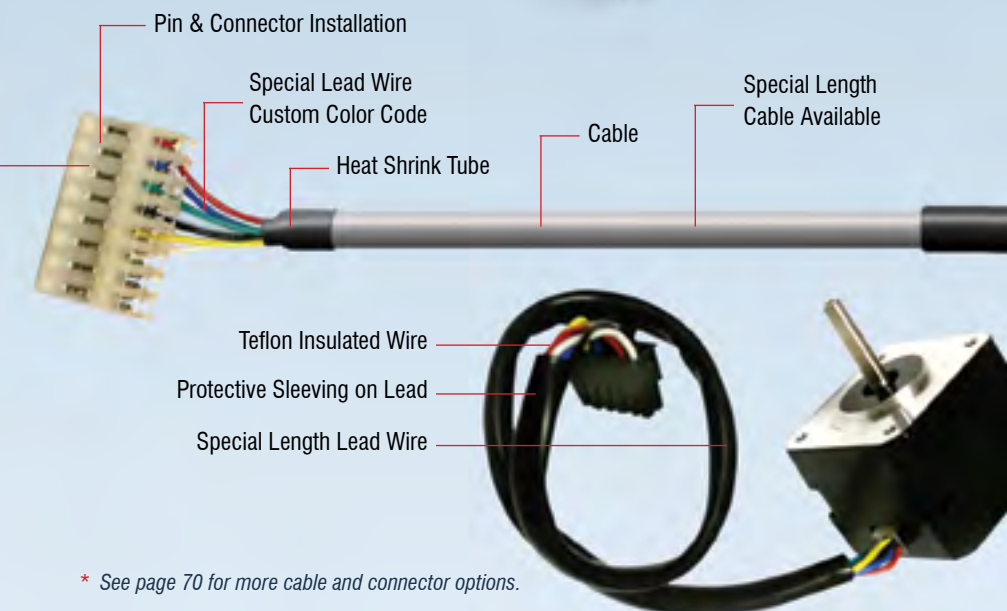
LEAD WIRES & CABLES

WINDING

Lin can help calculate speed, torque & input power
creating a winding that is specific to your application
at no extra cost

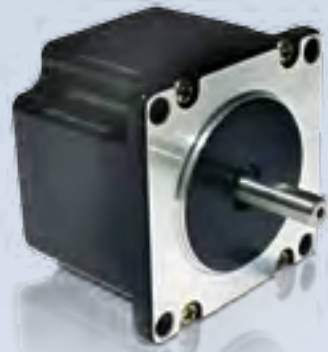
THE BENEFITS?

- ★ Torque at Your Required Speed (High, Low, or Mid-Range)
- ★ No Trial & Error
- ★ Save Time, Resources, and Energy



* See page 70 for more cable and connector options.





- High Torque
- Highest Step Accuracy and Resolution
- High Inertia
- 0.45° Full Step $\pm 0.017^\circ$ (1 arc minute)
- Can be Customized for:
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)

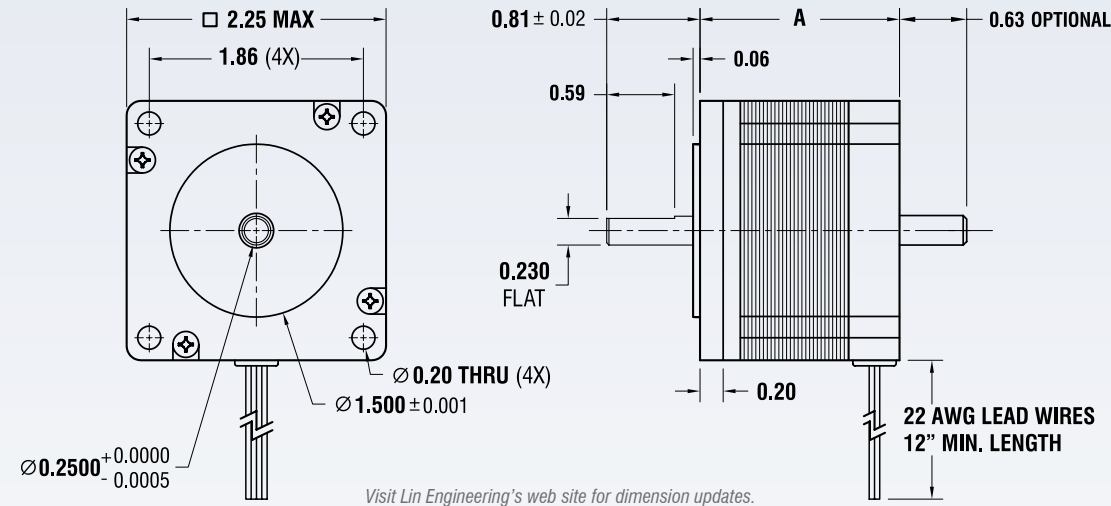


SPECIFICATIONS

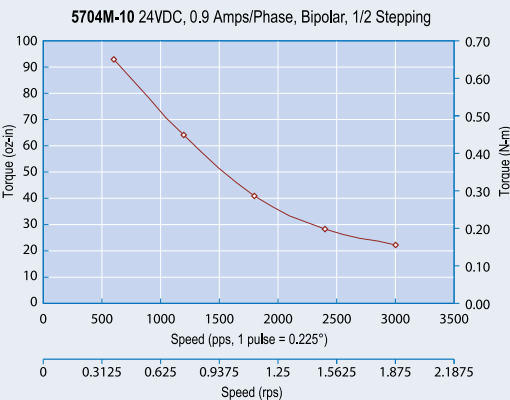
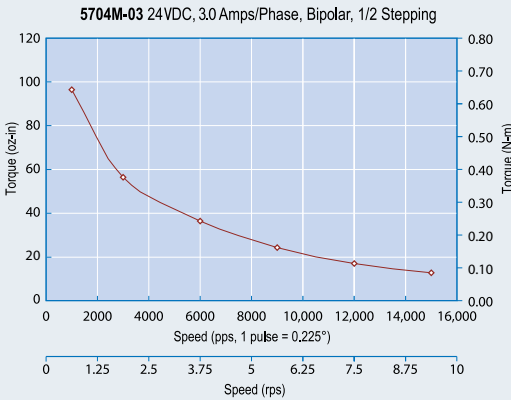
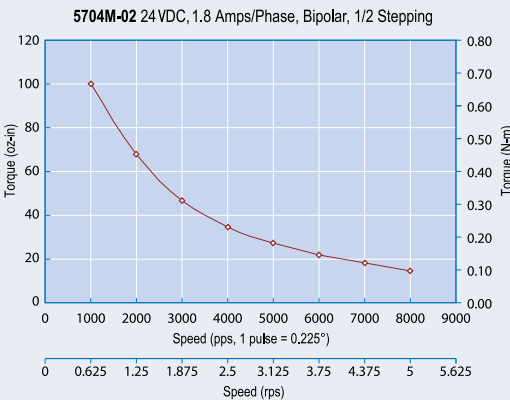
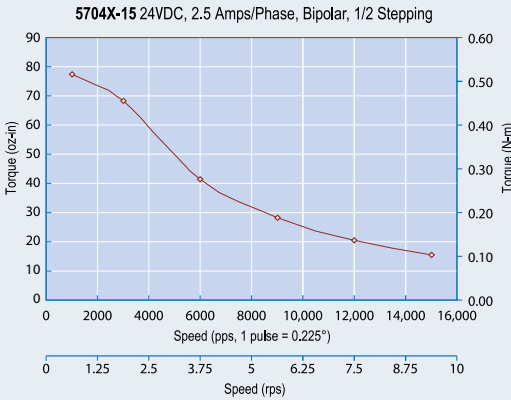
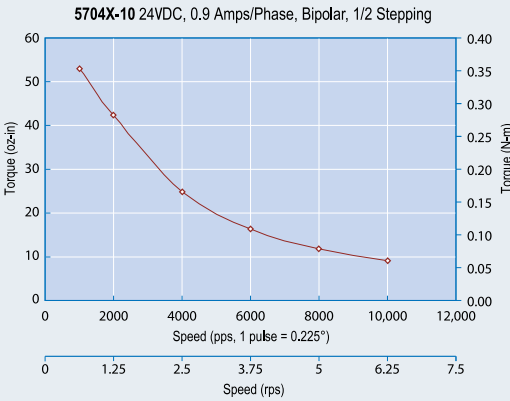
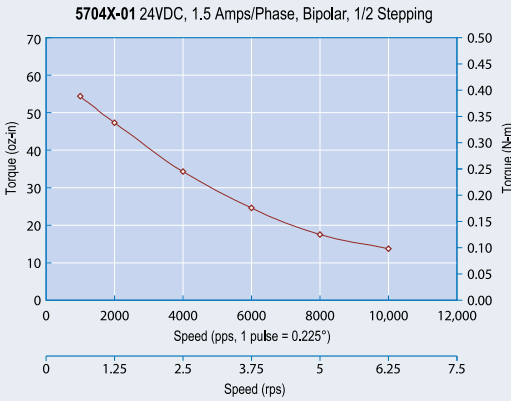
BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
1.73" 44 mm		5704X-01	1.50	75.0	0.53	3.0	2.6	1.00	1.05	4
		5704X-02	1.80	75.0	0.53	2.0	1.8	1.00	1.05	4
		5704X-10	0.90	75.0	0.53	9.6	10.1	1.00	1.05	4
		5704X-15	2.50	75.0	0.53	1.3	1.8	1.00	1.05	4
2.17" 55 mm		5704M-02	1.80	140.0	0.99	3.0	3.3	2.10	1.50	4
		5704M-03	3.00	140.0	0.99	1.2	1.2	2.10	1.50	4
		5704M-10	0.90	140.0	0.99	11.7	16.4	2.10	1.50	4

- Please complete our application data sheet on page 116 for different windings.
- Call Lin Engineering for additional bipolar torque curves.
- Performance, use, and appearance specifications of the products listed here are subject to change without notice.
- For operating temperatures, see page 114.
- All specifications are approximations. Please contact Lin Engineering for more details.

DIMENSIONS



TORQUE CURVES



AVAILABLE OPTIONS

SHAFTS

Pages 21/69

ENCODERS

Pages 93-96

CABLES & ASSEMBLIES

Pages 21/70

DRIVERS & CONTROLLERS

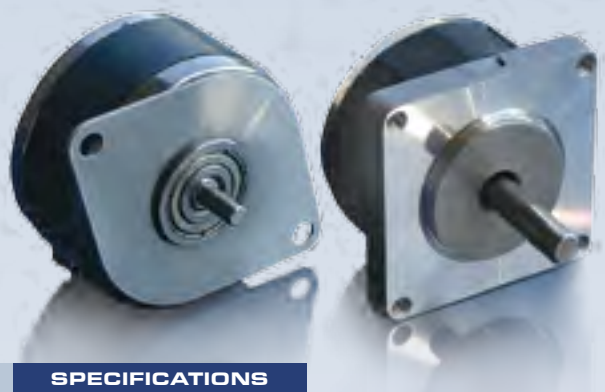
Pages 99-108

DID YOU KNOW...

Lin Engineering is the only manufacturer of 0.45° two phase NEMA 23 step motors. It's the highest resolution 2-phase step motor in the industry.

DID YOU KNOW...

Lin Engineering inventories components in Morgan Hill, CA to provide our customers with short lead-times and to support volume production overseas.



- NEMA Size 14 or 17 Mountings
- High Step Accuracy & Resolution
- Can be Customized for:
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)

SPECIFICATIONS

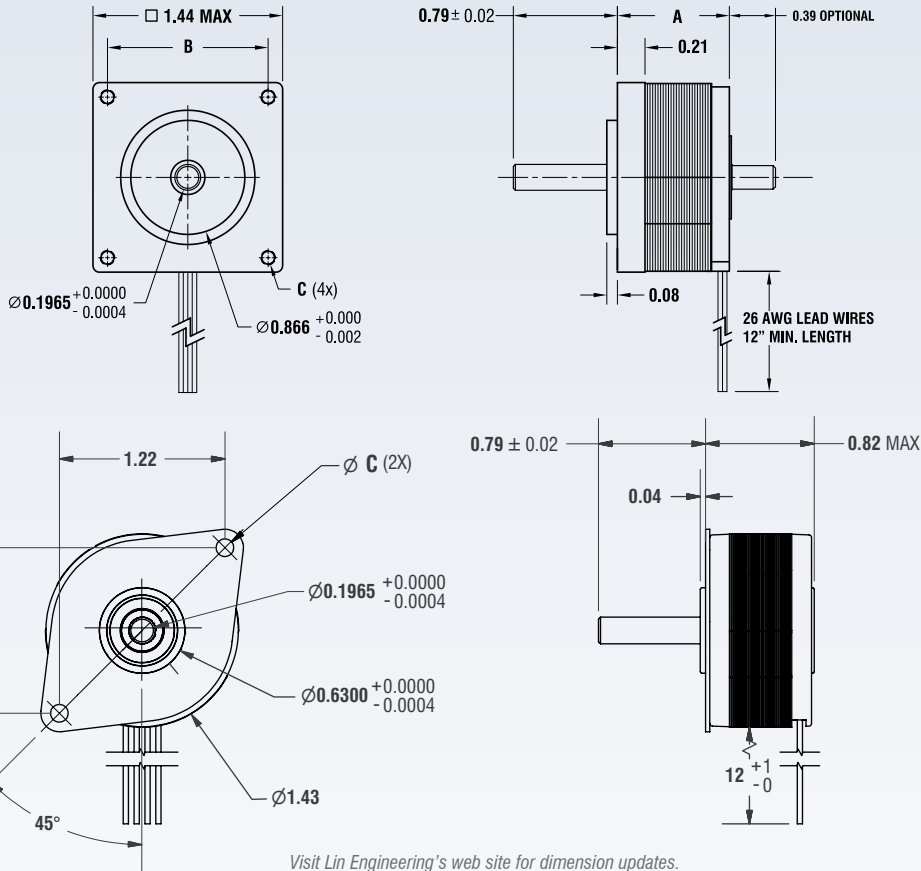
BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	0.85" 21.6 mm	3709V-03	1.20	16.0	0.11	3.0	2.2	0.09	0.27	4
		3709V-06	0.80	16.0	0.11	7.0	6.0	0.09	0.27	4
		3709V-18	0.60	16.0	0.11	10.0	7.7	0.09	0.27	4

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DIMENSIONS

Mounting Option	Mounting Size	Dim B	Dim C
1	17	1.22"	#4-40 UNC
2	17	1.22"	M3 x 0.5
3	17	1.22"	ø 0.130 THRU
4	14	1.14"	#4-40 UNC
5	14	1.14"	M3 x 0.5

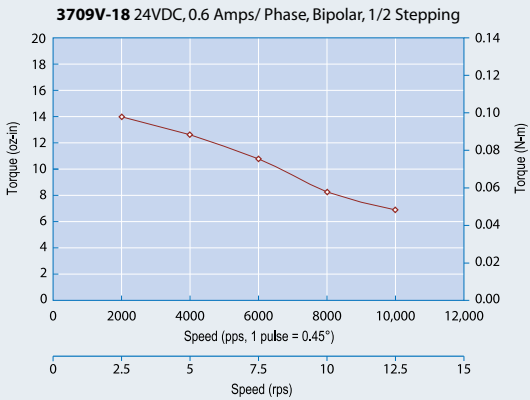
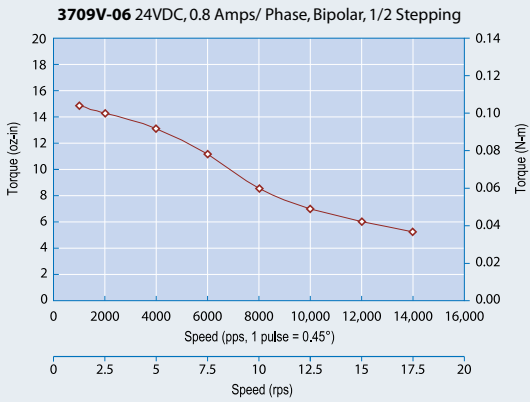
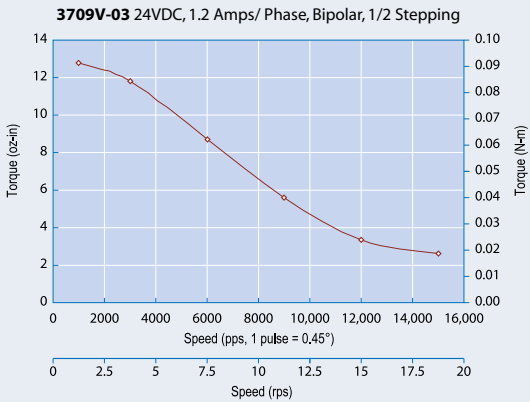
Mounting Option	Mounting Size	Dim C
6	17	M3 x 0.5
7	17	ø 0.130 THRU
8	17	#4-40 UNC



DID YOU KNOW...

Lin Engineering has the capability to increase the dynamic torque when constrained to a specific motor size. (See page 9)

TORQUE CURVES



AVAILABLE OPTIONS

SHAFTS

Pages 21/69

ENCODERS

Pages 93-96

CABLES & ASSEMBLIES

Pages 21/70

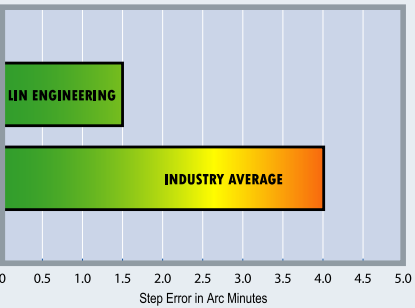
DRIVERS & CONTROLLERS

Pages 99-108

DID YOU KNOW...

Lin Engineering Step Motors have smooth motion because of their high accuracy. Our 3709V and 3809V Series 0.9° steppers have a step error of only ±1.5 arc minutes at 1/64 microstepping.

The average step motor step error is ±4 arc minutes at 1/64 microstepping. When you have almost three times less step error, you get smoother motion.





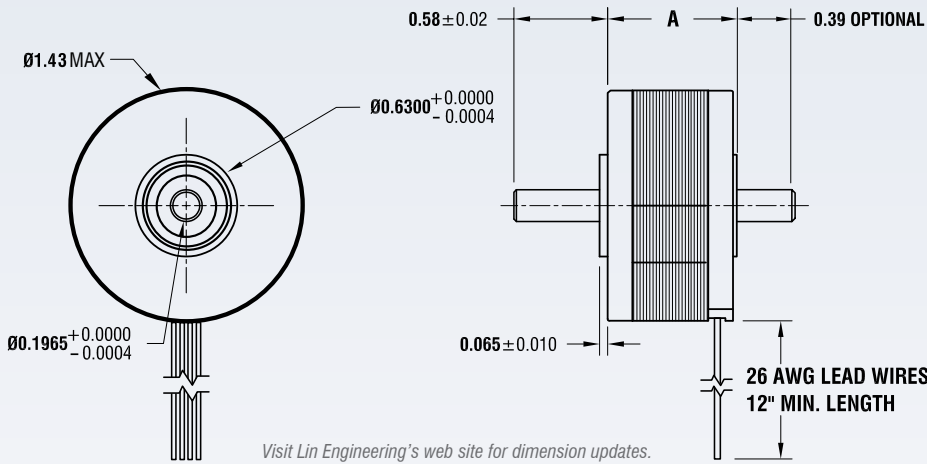
- High Step Accuracy & Resolution
- Ideal for Your Custom Housings
- *Can be Customized for:*
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)

SPECIFICATIONS

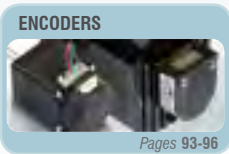
BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	0.50" 12.7 mm	3809Z-12	0.30	4.0	0.03	15.4	6.5	0.02	0.12	4
		3809Z-14	0.25	4.0	0.03	15.4	7.2	0.02	0.12	4
	0.55" 14.0 mm	3809Y-51	0.60	6.0	0.04	5.0	2.8	0.02	0.16	4
	0.58" 14.7 mm	3809X-15	0.30	7.3	0.05	15.1	9.1	0.04	0.18	4
		3809X-51	0.60	7.3	0.05	5.0	2.8	0.04	0.18	4
	0.79" 19.8 mm	3809V-03	1.20	16.0	0.11	3.0	2.2	0.07	0.27	4
		3809V-06	0.80	16.0	0.11	7.0	6.0	0.07	0.27	4
		3809V-18	0.60	16.0	0.11	10.0	8.0	0.07	0.27	4

- Please complete our application data sheet on page 116 for different windings.
- Call Lin Engineering for additional bipolar torque curves.
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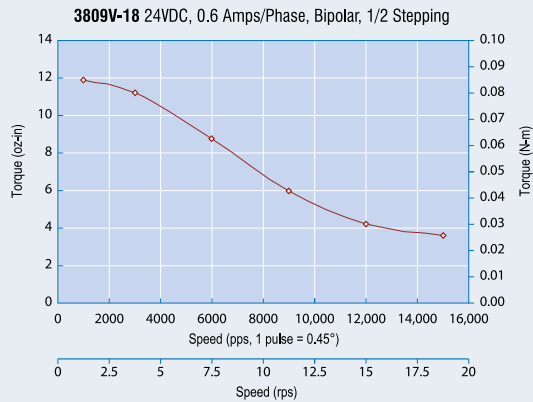
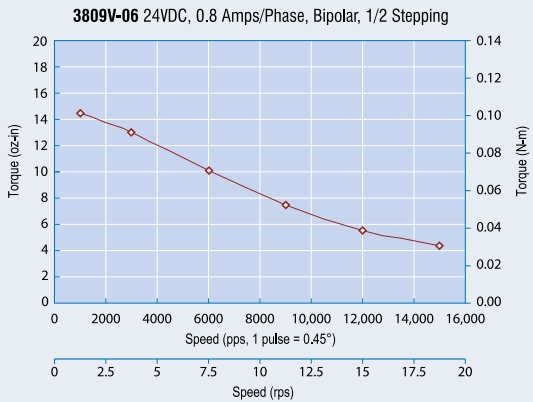
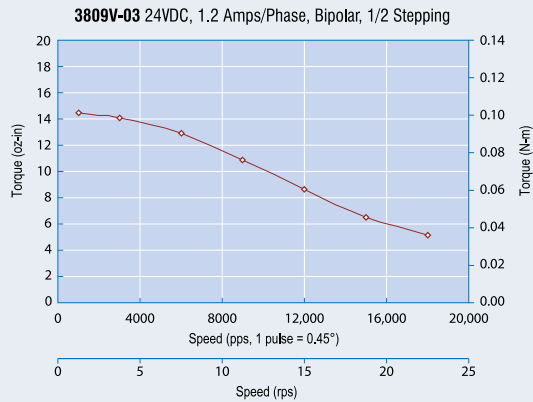
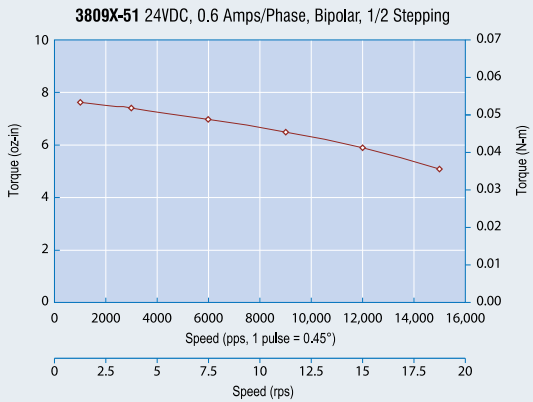
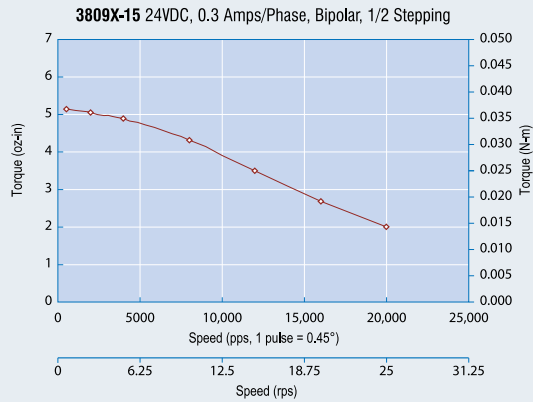
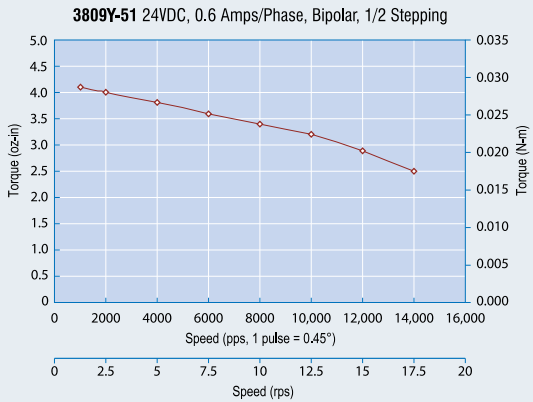
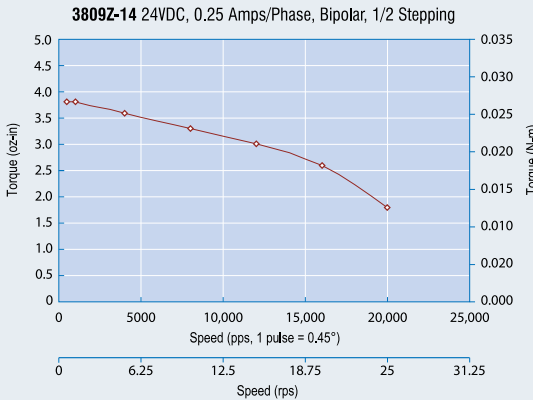
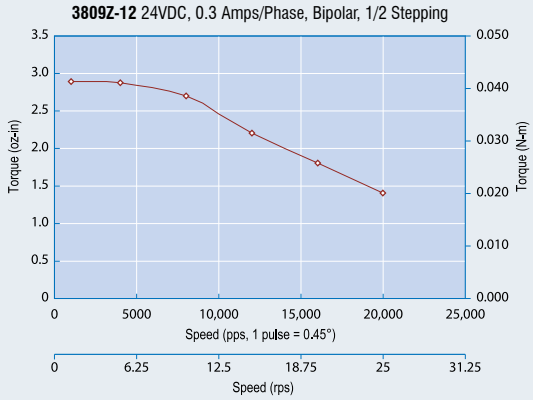
DIMENSIONS



AVAILABLE OPTIONS



TORQUE CURVES





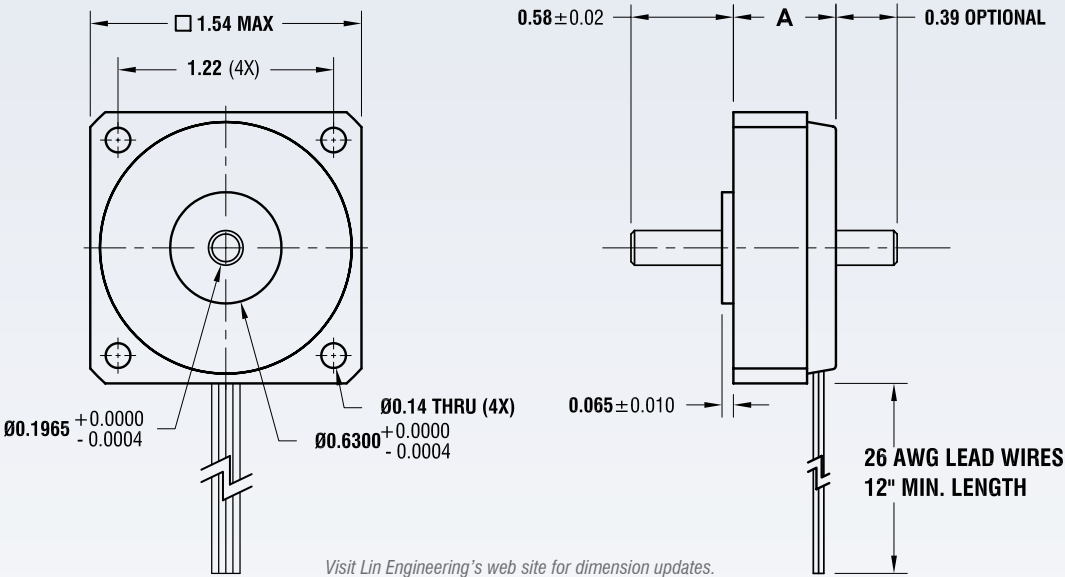
- Low Inertia
- Ideal for High Speed Applications
- Can be Customized for:
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)

SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
0.54" 14 mm		416-05-03	0.70	6.0	0.04	3.0	1.8	0.03	0.20	4
		416-05-04	0.60	6.0	0.04	5.0	3.0	0.03	0.20	4
		416-05-17	0.30	6.0	0.04	17.5	10.0	0.03	0.20	4
		416-05-60	0.15	6.0	0.04	63.5	33.9	0.03	0.20	4
0.58" 14.7 mm		416-06-05	0.60	7.3	0.05	4.5	2.8	0.03	0.21	4
		416-06-57	0.21	7.3	0.05	57.1	28.6	0.03	0.21	4

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- For operating temperatures, see page 114.
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DIMENSIONS



Visit Lin Engineering's web site for dimension updates.

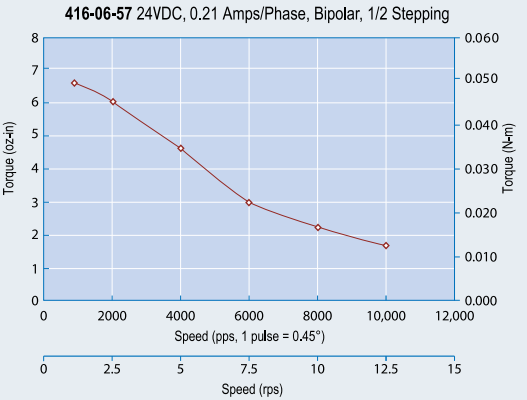
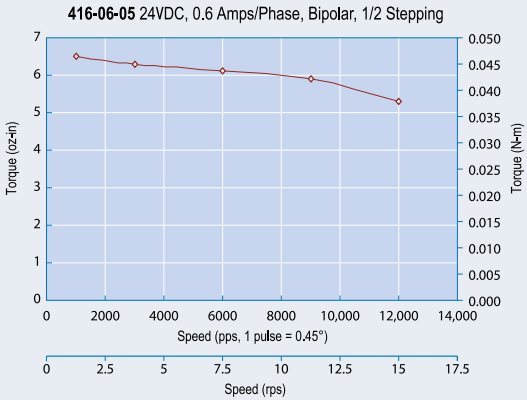
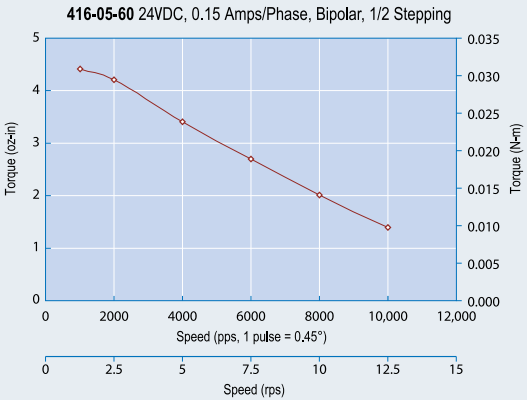
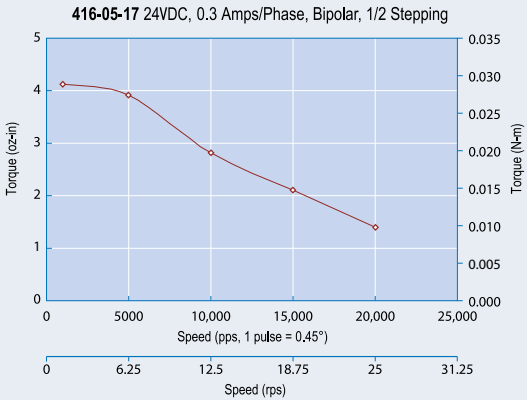
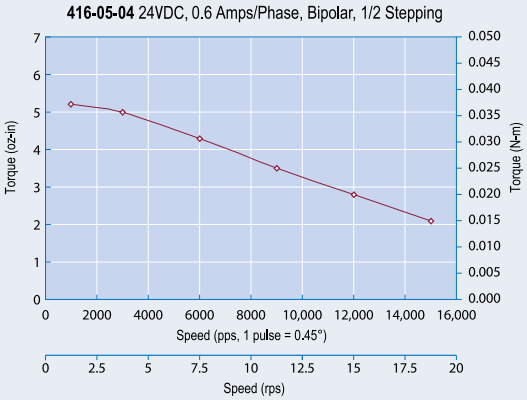
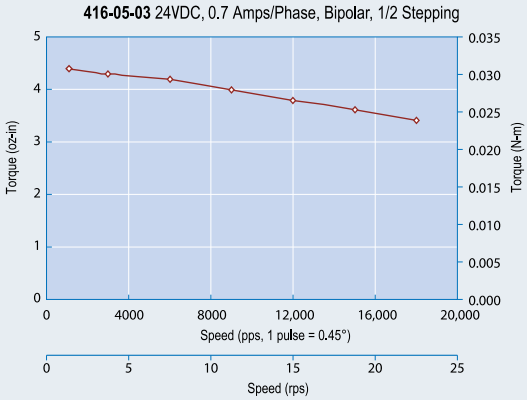


DID YOU KNOW...

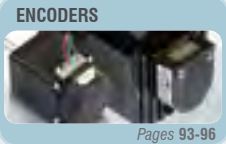
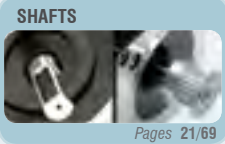
Lin Engineering's step motor operates the optical disk drive in the B-2 Stealth Bomber.



TORQUE CURVES



AVAILABLE OPTIONS





- Low Inertia
- Ideal for High Speed Applications
- *Can be Customized for:*
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)

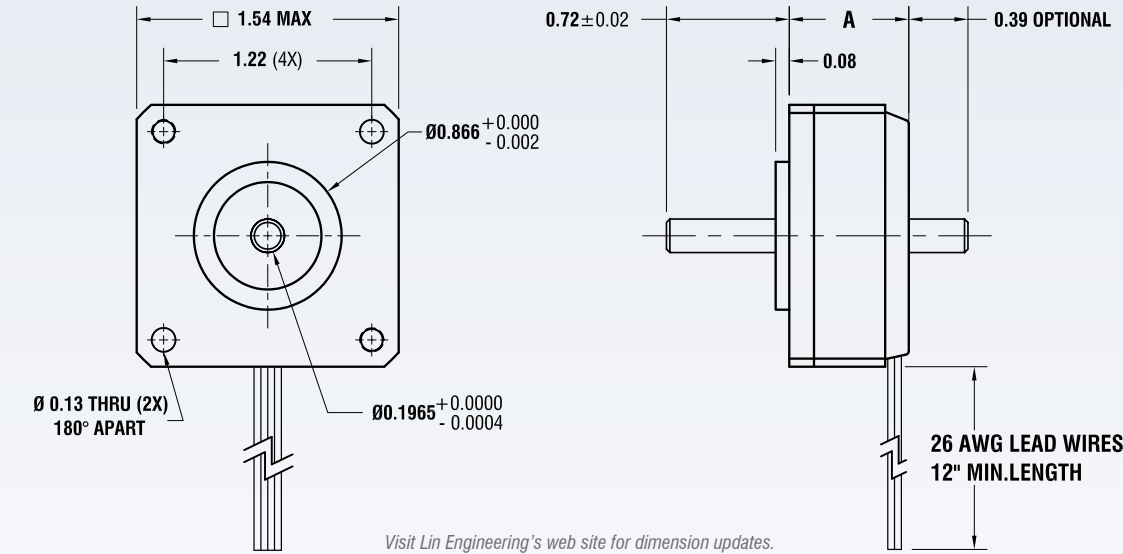
SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	0.70" 17.8 mm	416-07-05	0.60	8.4	0.06	5.4	2.8	0.04	0.25	4
		416-07-80	0.16	8.4	0.06	68.0	33.5	0.04	0.25	4

UNIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	0.70" 17.8 mm	416-07-06	0.50	6.0	0.04	6.0	1.5	0.04	0.25	6
		416-07-14	0.36	6.0	0.04	14.0	3.4	0.04	0.25	6
		416-07-65	0.18	6.0	0.04	62.4	12.5	0.04	0.25	6

- Please complete our application data sheet on page 116 for different windings.
- Call Lin Engineering for additional bipolar torque curves.
- Performance, use, and appearance specifications of the products listed here are subject to change without notice.
- For operating temperatures, see page 114.
- All specifications are approximations. Please contact Lin Engineering for more details.

DIMENSIONS

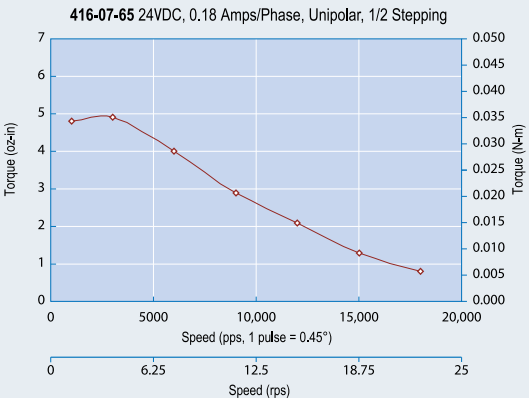
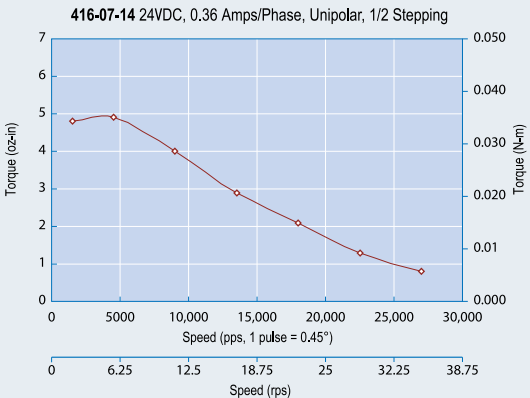
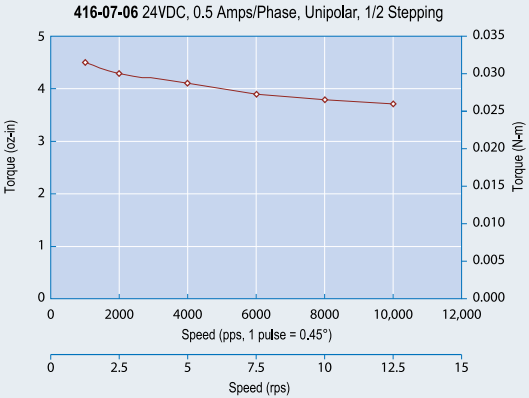
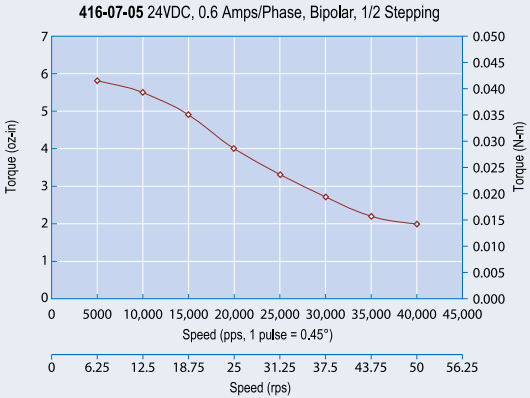


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DID YOU KNOW...

Lin Engineering is the largest volume manufacturer of the 0.9° Size 17 step motor.

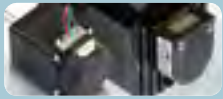
TORQUE CURVES



AVAILABLE OPTIONS



SHAFTS
Pages 21/69



ENCODERS
Pages 93-96



CABLES & ASSEMBLIES
Pages 21/70



DRIVERS & CONTROLLERS
Pages 99-108

?

DID YOU KNOW...

Lin Engineering has full manufacturing capabilities in Morgan Hill, CA.



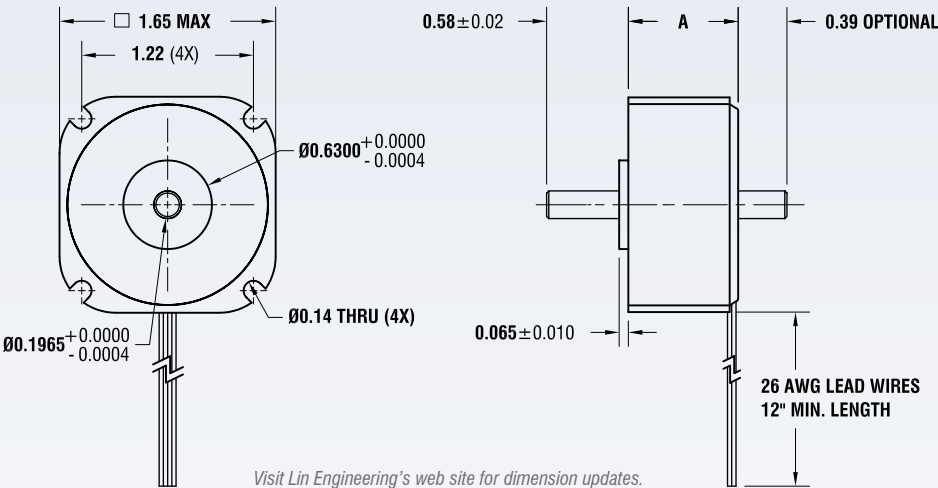
- Low Inertia
- Ideal for High Speed Applications
- Can be Customized for:
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)

SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	0.49" 12.5 mm	4109Z-51	0.50	4.5	0.03	4.1	2.5	0.03	0.12	4
	0.54" 14 mm	4109Y-51	0.60	6.0	0.04	5.0	2.8	0.03	0.16	4
	0.58" 15 mm	4109X-51	0.60	7.0	0.05	5.0	2.8	0.04	0.18	4
	0.78" 19.8 mm	4109V-51	1.20	15.0	0.11	3.0	2.2	0.09	0.28	4
	1.10" 28 mm	4109R-05	0.80	22.0	0.16	6.5	4.4	0.11	0.41	4
		4109R-08	0.60	22.0	0.16	11.6	7.8	0.11	0.41	4

- Please complete our application data sheet on page 116 for different windings.
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- Performance, use, and appearance specifications of the products listed here are subject to change without notice.
- For operating temperatures, see page 114.
- All specifications are approximations. Please contact Lin Engineering for more details.

DIMENSIONS

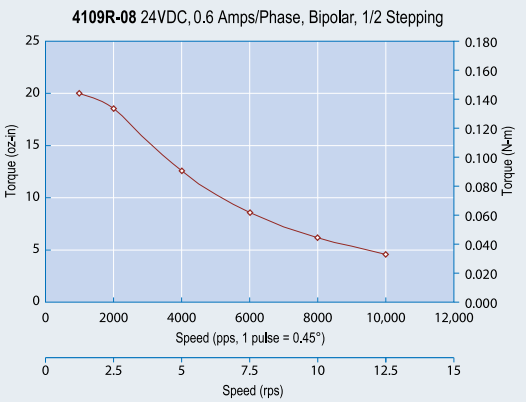
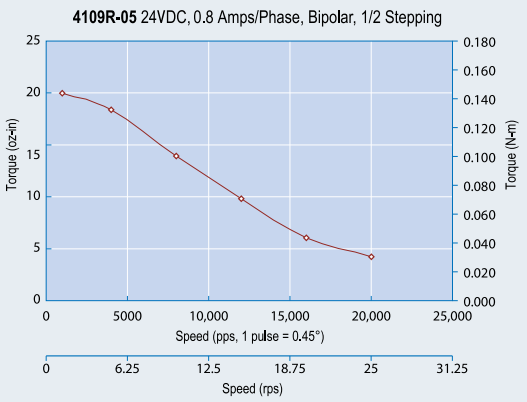
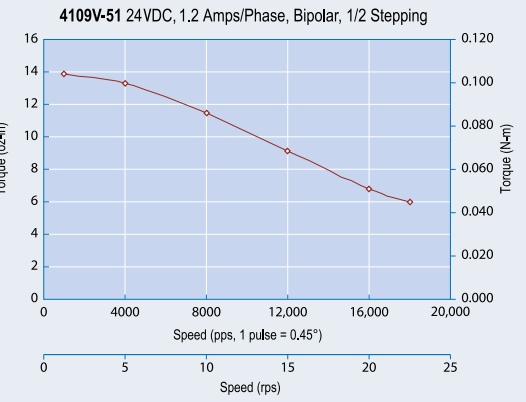
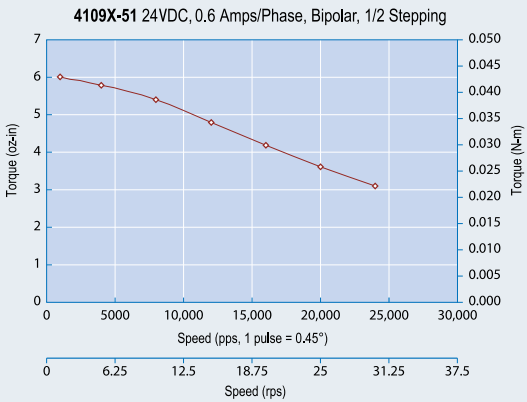
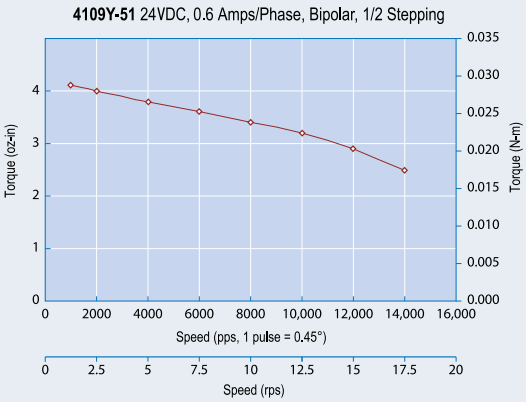
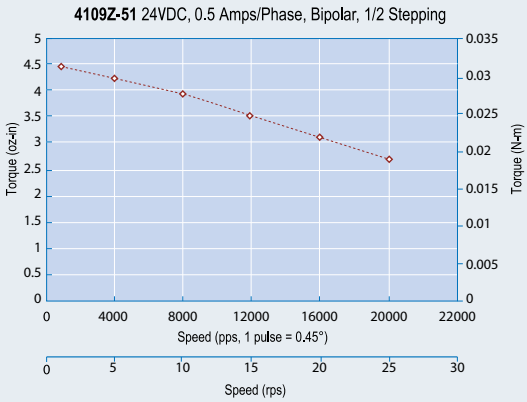


Visit Lin Engineering's web site for dimension updates.

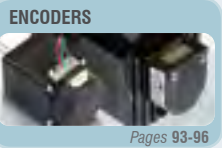
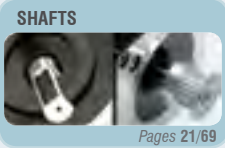
? DID YOU KNOW...

Lin Engineering's motor selection process has a 90% application success rate. There is no need for customers to go through trial and error in the motor selection process.

TORQUE CURVES



AVAILABLE OPTIONS



? DID YOU KNOW...

Lin Engineering has their own quality team in China to guarantee quality products prior to shipping. (See page 5-6)



- Wide Selection of Windings
- Cost Effective 0.9° Stepper
- Can be Customized for:
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)



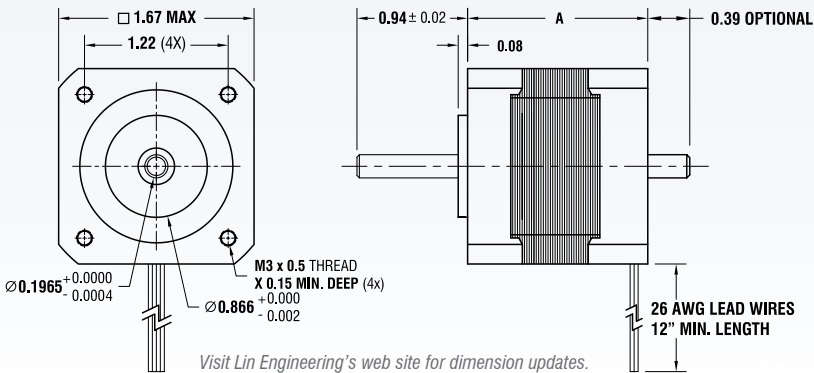
SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
1.34" 34 mm		4209S-01S	0.67	31.0	0.22	9.6	18.4	0.19	0.44	4
		4209S-01P	1.34	31.0	0.22	2.4	4.6	0.19	0.44	4
		4209S-02S	0.42	31.0	0.22	19.2	39.7	0.19	0.44	4
		4209S-02P	0.84	31.0	0.22	4.8	9.9	0.19	0.44	4
		4209S-03S	0.22	31.0	0.22	74.4	172.0	0.19	0.44	4
		4209S-03P	0.44	31.0	0.22	18.6	43.0	0.19	0.44	4
1.57" 39.9 mm		4209M-01S	0.84	51.0	0.36	6.1	15.2	0.30	0.56	4
		4209M-01P	1.68	51.0	0.36	1.5	3.8	0.30	0.56	4
		4209M-02S	0.56	51.0	0.36	11.0	22.1	0.30	0.56	4
		4209M-02P	1.12	51.0	0.36	2.8	2.8	0.30	0.56	4
		4209M-03S	0.28	51.0	0.36	63.0	164.9	0.30	0.56	4
		4209M-03P	0.56	51.0	0.36	15.8	41.2	0.30	0.56	4
1.89" 48 mm		4209L-01S	0.84	62.0	0.44	7.6	21.2	0.37	0.80	4
		4209L-01P	1.68	62.0	0.44	1.9	5.3	0.37	0.80	4
		4209L-02S	0.56	62.0	0.44	13.2	35.0	0.37	0.80	4
		4209L-02P	1.12	62.0	0.44	3.3	8.7	0.37	0.80	4
		4209L-03S	0.29	62.0	0.44	57.3	163.7	0.37	0.80	4
		4209L-03P	0.57	62.0	0.44	14.3	40.9	0.37	0.80	4

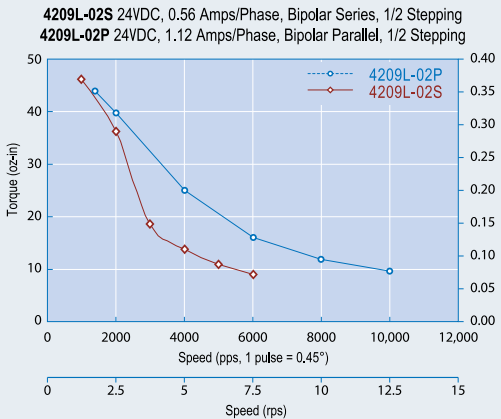
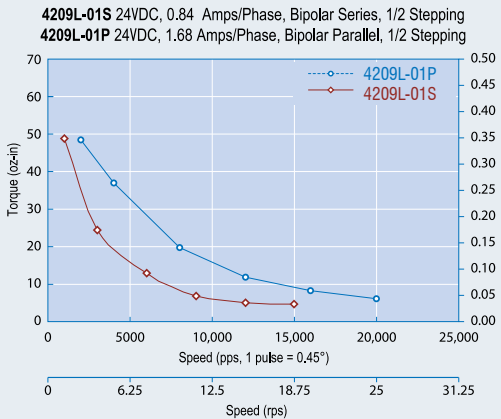
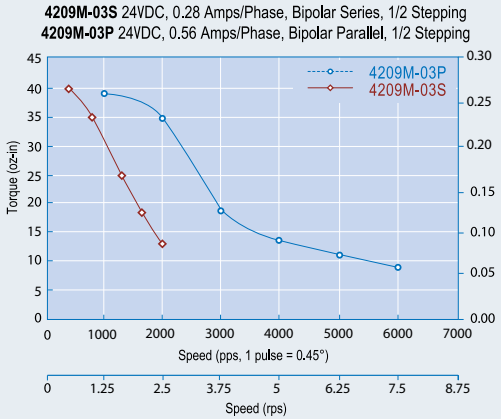
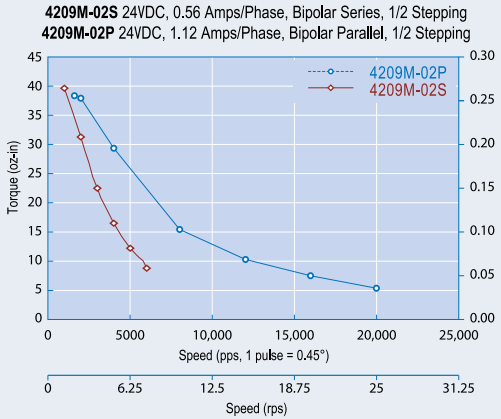
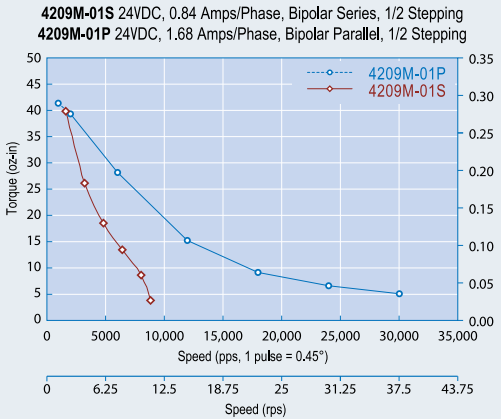
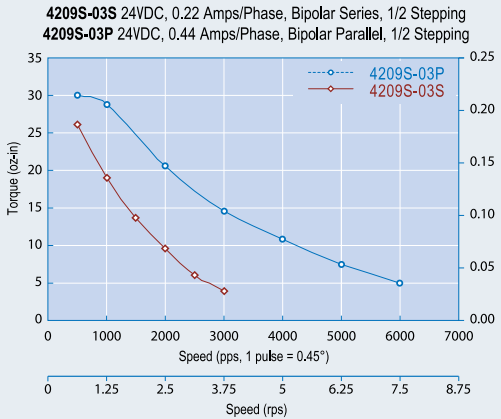
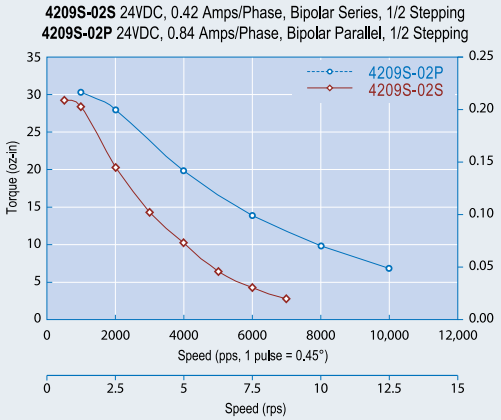
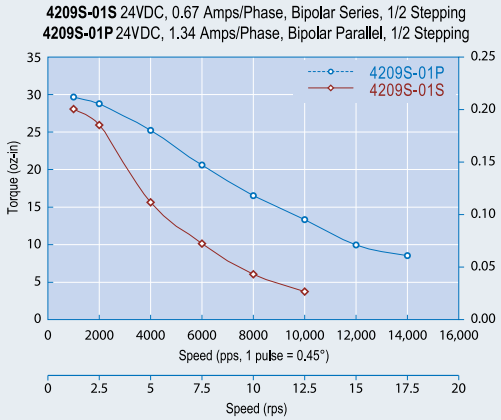
UNIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
1.34" 34 mm		4209S-01	0.95	22.2	0.16	4.8	4.6	0.19	0.44	6
		4209S-02	0.60	22.2	0.16	10.1	11.9	0.19	0.44	6
		4209S-03	0.31	22.2	0.16	37.2	43.0	0.19	0.44	6
1.57" 39.9 mm		4209M-01	1.20	36.1	0.25	3.0	3.8	0.30	0.56	6
		4209M-02	0.80	36.1	0.25	5.5	6.5	0.30	0.56	6
		4209M-03	0.40	36.1	0.25	31.5	41.2	0.30	0.56	6
1.89" 48 mm		4209L-01	1.20	44.4	0.31	3.8	5.3	0.37	0.80	6
		4209L-02	0.80	44.4	0.31	6.6	8.7	0.37	0.80	6
		4209L-03	0.40	44.4	0.31	28.7	40.9	0.37	0.80	6

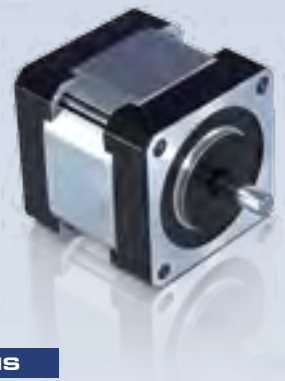
- Please complete our application data sheet on page 116 for different windings.
- Call Lin Engineering for additional bipolar torque curves.
- Performance, use, and appearance specifications of the products listed here are subject to change without notice.
- For operating temperatures, see page 114.
- All specifications are approximations. Please contact Lin Engineering for more details.

DIMENSIONS



TORQUE CURVES





- Low Inertia
- Excellent Step Accuracy
- Can be Customized for:
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)

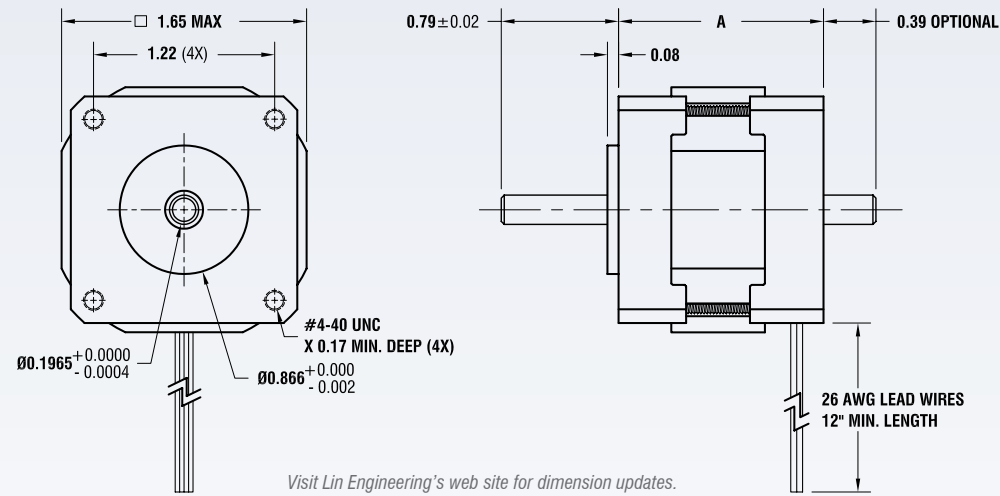


SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	0.93" 23.6 mm	417-09-03	1.20	12.0	0.08	3.0	2.2	0.09	0.30	4
		417-09-18	0.60	12.0	0.08	10.0	3.8	0.09	0.30	4
	1.1" 27.9 mm	417-11-03	1.20	16.0	0.11	3.0	2.2	0.09	0.31	4
		417-11-06	0.80	16.0	0.11	7.0	5.1	0.09	0.31	4
		417-11-09	0.80	16.0	0.11	10.0	6.9	0.09	0.31	4
		417-11-18	0.60	16.0	0.11	10.0	7.1	0.09	0.31	4
	1.38" 35.1 mm	417-13-08	0.60	23.0	0.16	11.0	7.8	0.12	0.41	4
		417-13-18	0.60	23.0	0.16	12.0	8.8	0.12	0.41	4
	1.54" 39.1 mm	417-15-03	1.20	30.0	0.21	3.0	2.6	0.15	0.53	4
		417-15-08	2.00	30.0	0.21	0.7	0.3	0.15	0.53	4
		417-15-12	0.60	30.0	0.21	12.0	10.5	0.15	0.53	4

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DIMENSIONS



Visit Lin Engineering's web site for dimension updates.

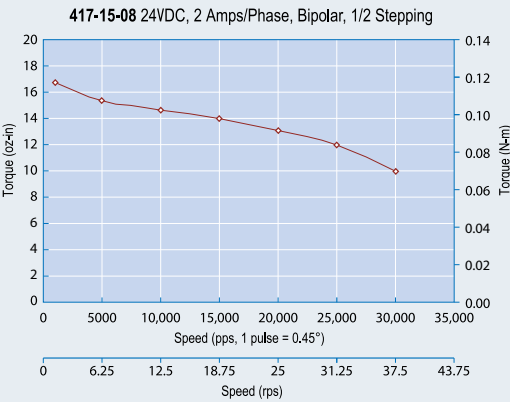
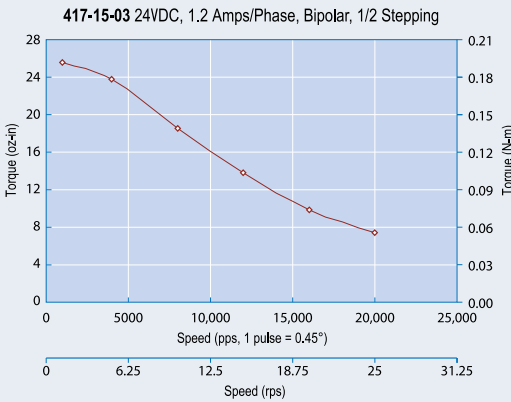
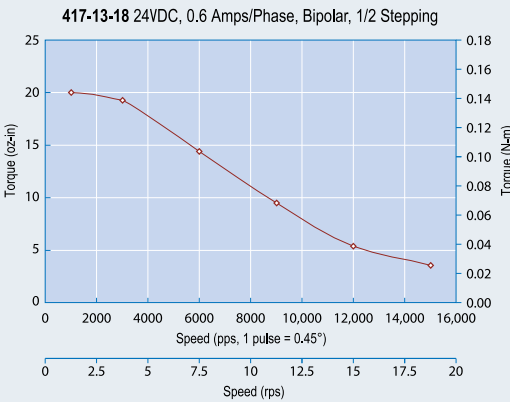
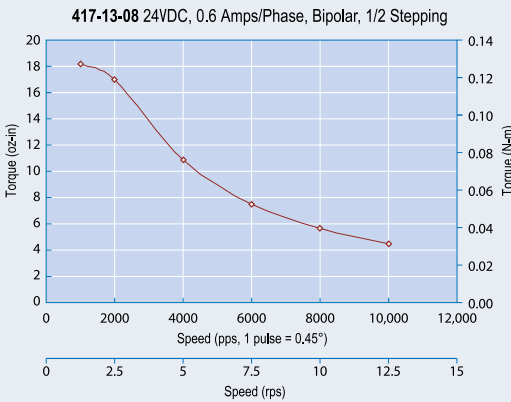
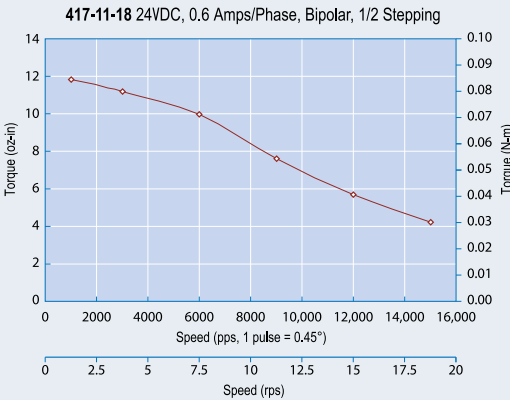
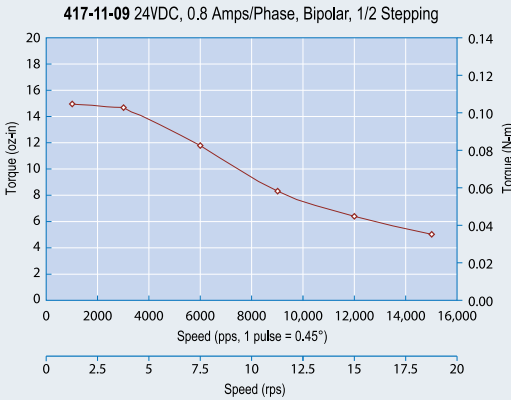


DID YOU KNOW...

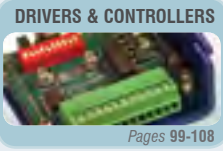
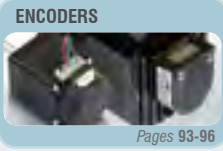
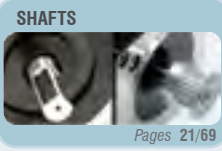
Lin Engineering's 0.9° motor has the best microstepping accuracy in the industry.

- Lin's accuracy: ±1.5 arc minutes.
- Competitor's accuracy: ±4.0 arc minutes.

TORQUE CURVES



AVAILABLE OPTIONS



DID YOU KNOW...

Lin Engineering can eliminate guesswork for motor selection to save you significant development time.



- High Precision
- High Resolution
- *Can be Customized for:*
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)



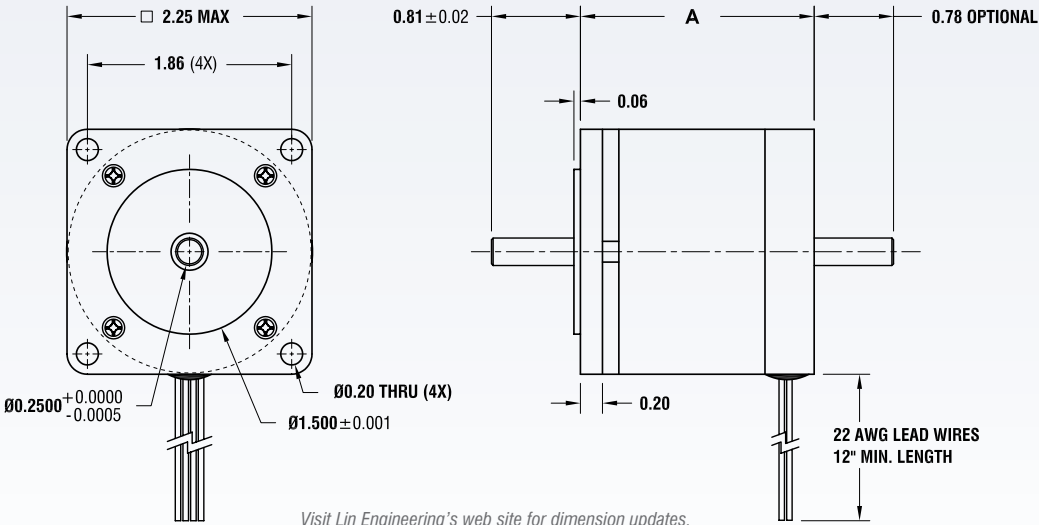
SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	1.55" 39.4 mm	5609X-01S	0.77	39.2	0.28	8.0	20.6	0.30	0.75	4
		5609X-01P	1.54	39.2	0.28	1.8	5.1	0.30	0.75	4
	2.08" 52.8 mm	5609S-04S	0.90	57.6	0.40	6.0	6.5	0.60	1.12	4
		5609S-04P	1.80	57.6	0.40	1.5	1.6	0.60	1.12	4
	2.20" 55.9 mm	5609M-01S	0.84	112.0	0.79	10.0	54.0	0.74	1.20	4
		5609M-01P	1.68	112.0	0.79	2.5	13.5	0.74	1.20	4
	3.08" 78.2 mm	5609L-05S	1.05	168.0	1.19	7.6	29.0	1.20	1.90	4
		5609L-05P	2.10	168.0	1.19	1.8	7.3	1.20	1.90	4

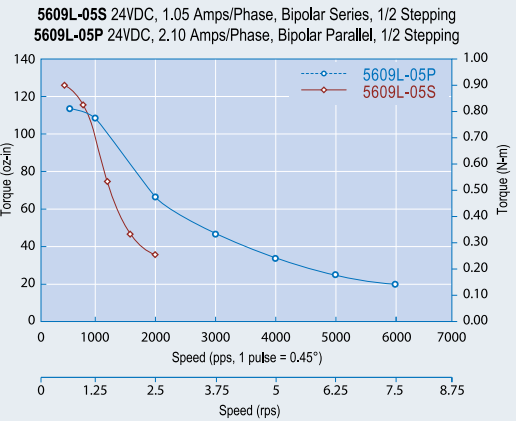
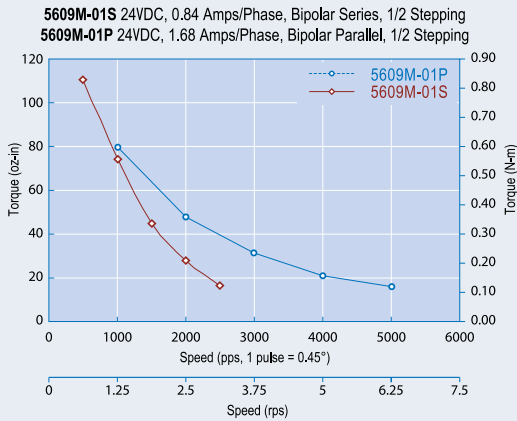
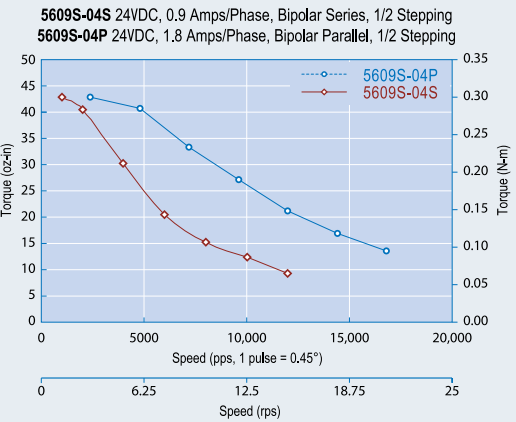
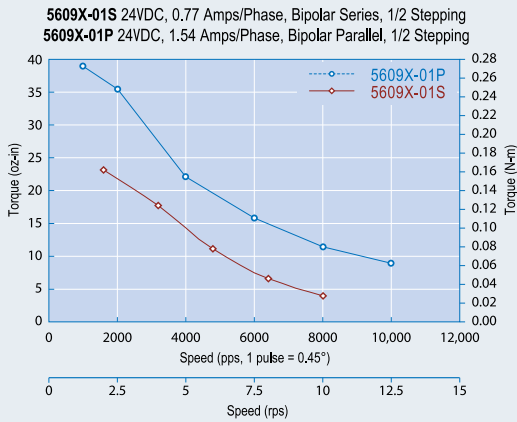
UNIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	1.55" 39.4 mm	5609X-01	1.10	28.0	0.20	3.6	5.1	0.30	0.75	6
	2.08" 52.8 mm	5609S-04	1.30	55.0	0.39	3.0	1.6	0.60	1.12	6
	2.20" 55.9 mm	5609M-01	1.20	98.0	0.69	5.0	13.5	0.74	1.20	6
	3.08" 78.2 mm	5609L-05	1.50	120.0	0.84	3.6	7.3	1.20	1.90	6

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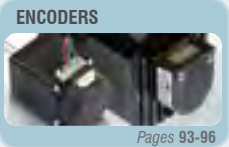
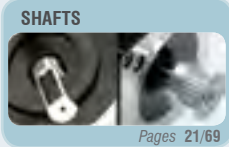
DIMENSIONS



TORQUE CURVES

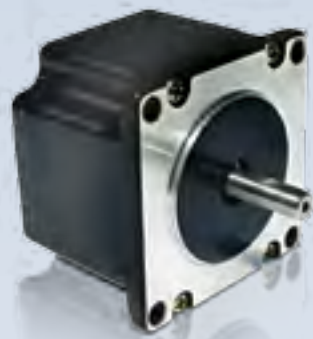


AVAILABLE OPTIONS



DID YOU KNOW...

Lin Engineering has implemented Statistical Process Control along with a 4.5 Sigma System to meet your expectations for product quality & reliability.



- High Torque
- High Step Accuracy
- Can be Customized for:
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)



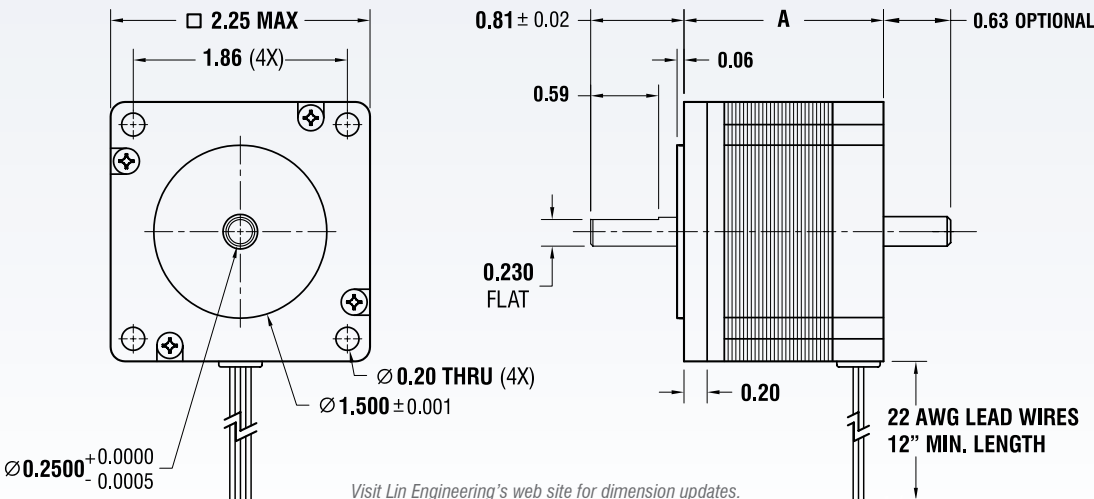
SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	1.74" 44.2 mm	5709X-01S	1.40	98.0	0.69	3.0	6.0	0.70	1.05	4
		5709X-01P	2.80	98.0	0.69	0.8	1.5	0.70	1.05	4
		5709X-15S	2.10	98.0	0.69	1.2	2.3	0.70	1.05	4
		5709X-15P	4.20	98.0	0.69	0.3	0.6	0.70	1.05	4
	2.20" 55.9 mm	5709M-02S	2.10	175.0	1.24	1.6	5.8	1.50	1.50	4
		5709M-02P	4.20	175.0	1.24	0.4	1.5	1.50	1.50	4
		5709M-05S	1.40	175.0	1.24	3.8	13.1	1.50	1.50	4
		5709M-05P	2.80	175.0	1.24	0.9	3.3	1.50	1.50	4
	3.08" 78.2 mm	5709L-01S	1.40	263.0	1.86	4.5	15.1	2.60	2.30	4
		5709L-01P	2.80	263.0	1.86	1.1	3.8	2.60	2.30	4
		5709L-04S	3.30	263.0	1.86	0.8	2.5	2.60	2.30	4
		5709L-04P	6.60	263.0	1.86	0.2	0.6	2.60	2.30	4

UNIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	1.74" 44.2 mm	5709X-01	2.00	70.0	0.49	1.5	1.5	0.70	1.05	6
		5709X-15	3.00	70.0	0.49	0.6	0.6	0.70	1.05	6
	2.20" 55.9 mm	5709M-02	3.00	125.0	0.88	0.8	1.5	1.50	1.50	6
		5709M-05	2.00	125.0	0.88	1.8	2.5	1.50	1.50	6
	3.08" 78.2 mm	5709L-01	2.00	188.0	1.33	2.3	3.8	2.60	2.30	6
		5709L-04	4.67	188.0	1.33	0.4	0.6	2.60	2.30	6

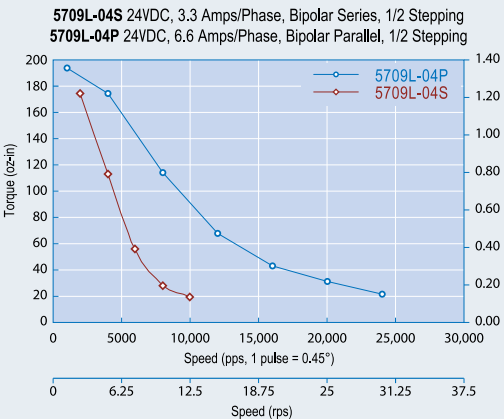
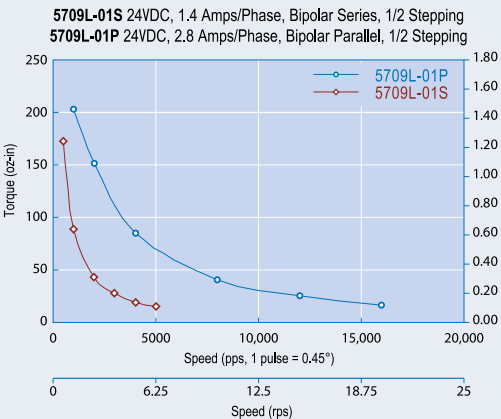
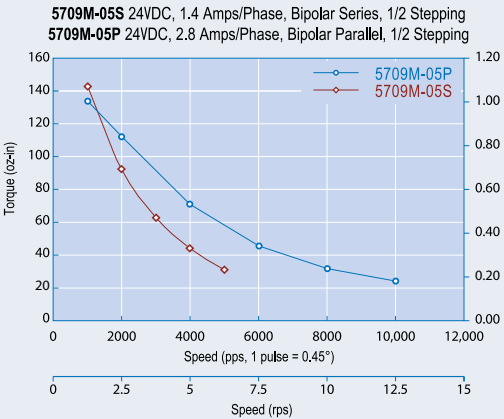
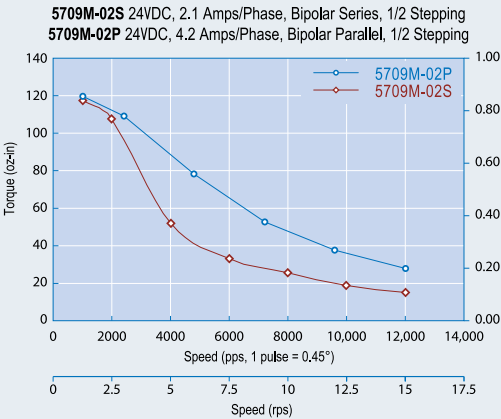
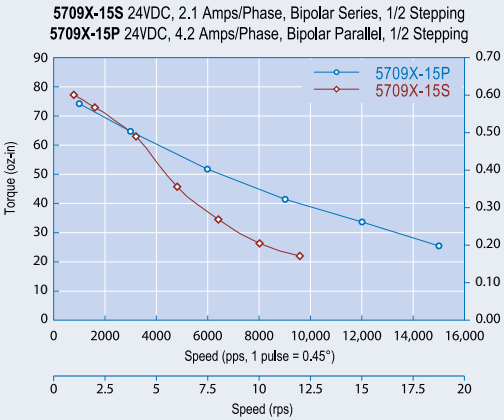
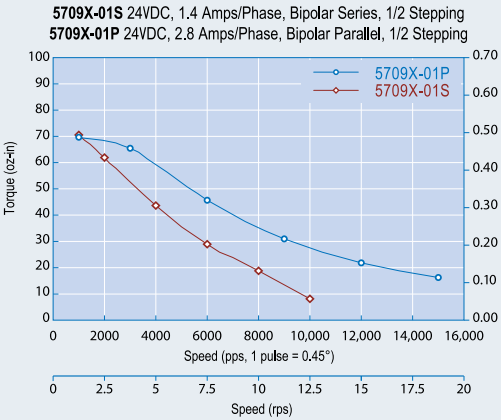
- Please complete our application data sheet on page 116 for different windings.
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- For operating temperatures, see page 114.
- All specifications are approximations. Please contact Lin Engineering for more details.

DIMENSIONS

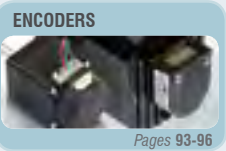
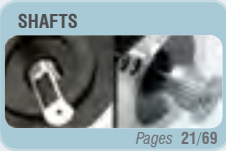


Visit Lin Engineering's web site for dimension updates.

TORQUE CURVES



AVAILABLE OPTIONS



DID YOU KNOW...

Lin Engineering's real business is to provide solutions for motion control applications.



- High Torque in a Compact Size
- Space Efficient
- Can be Customized for:
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)

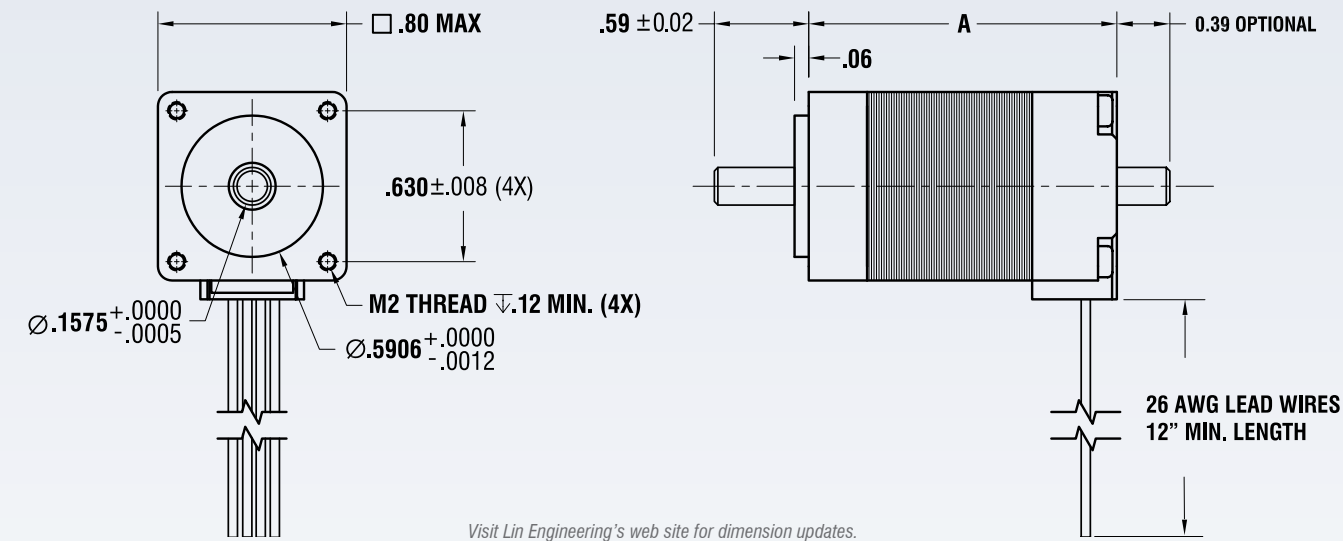


SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in²)	Weight (Lbs.)	Number of Leads
	1.3" 33 mm	208-13-01	0.60	3.0	0.02	6.5	1.7	0.01	0.10	4
	1.7" 43 mm	208-17-01	0.80	4.0	0.03	5.4	1.5	0.01	0.15	4

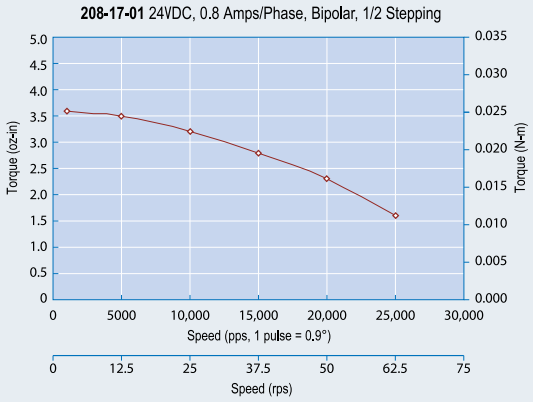
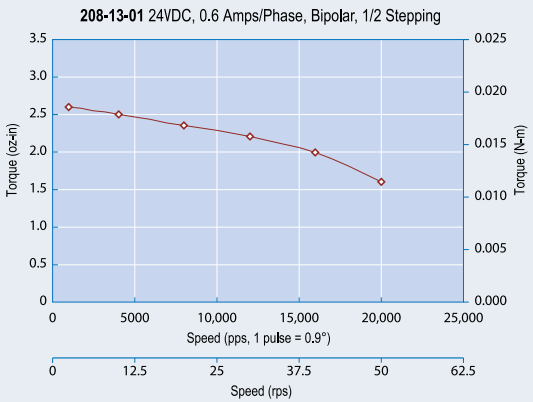
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DIMENSIONS

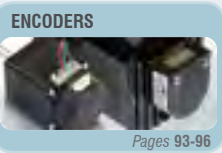


? DID YOU KNOW...
A motor operating under full-stepping yields more torque than operating at microstepping.
See page 13 for more details.

TORQUE CURVES



AVAILABLE OPTIONS



? DID YOU KNOW...
The quickest way to solve your step motor problems is to see the specialists
– Lin Engineering



- Small Package
- Cost Effective
- *Can be Customized for:*
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)

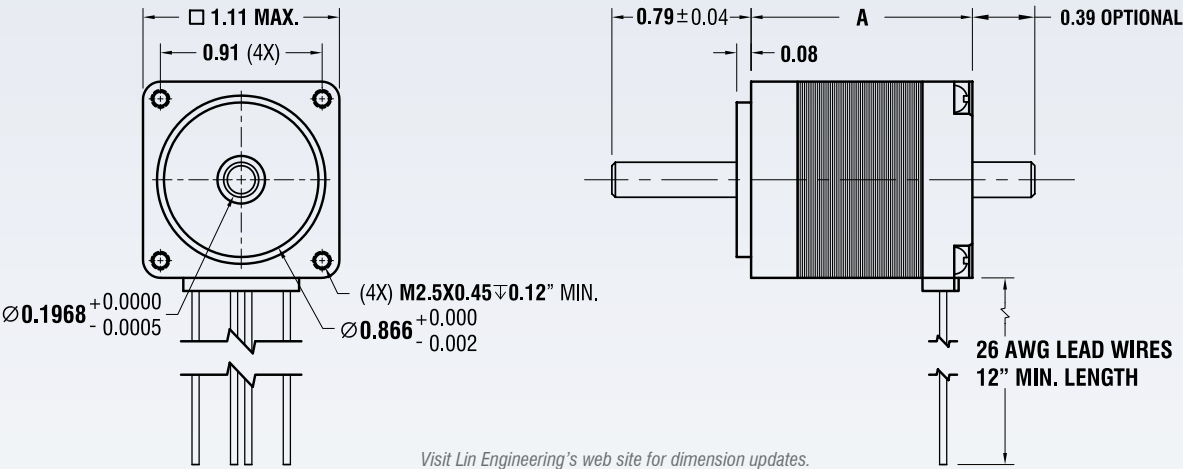


SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	1.26" 32 mm	211-13-01	0.67	9.2	0.06	5.6	3.4	0.05	0.24	4
		211-13-02	1.30	9.2	0.06	1.7	1.1	0.05	0.24	4
	1.77" 45 mm	211-18-01	0.67	13.7	0.10	7.1	4.8	0.07	0.35	4
		211-18-02	1.30	13.7	0.10	1.3	0.8	0.07	0.35	4
	2.01" 51.1 mm	211-20-01	0.67	16.6	0.12	8.6	6.7	0.10	0.45	4
		211-20-02	1.30	16.6	0.12	1.9	1.7	0.10	0.45	4

- Please complete our application data sheet on page 116 for different windings.
- Call Lin Engineering for additional bipolar torque curves.
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- For operating temperatures, see page 114.
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DIMENSIONS



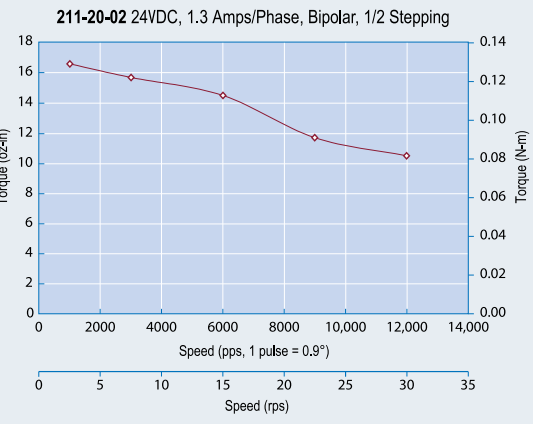
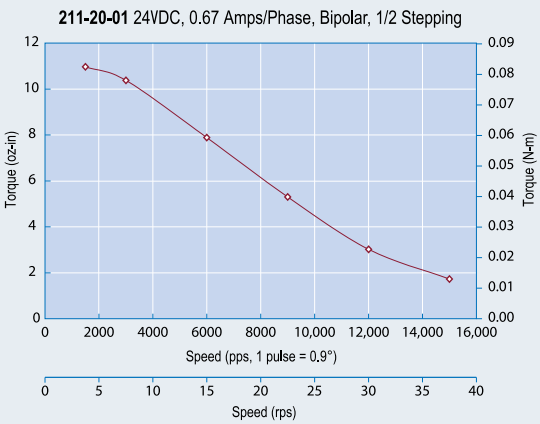
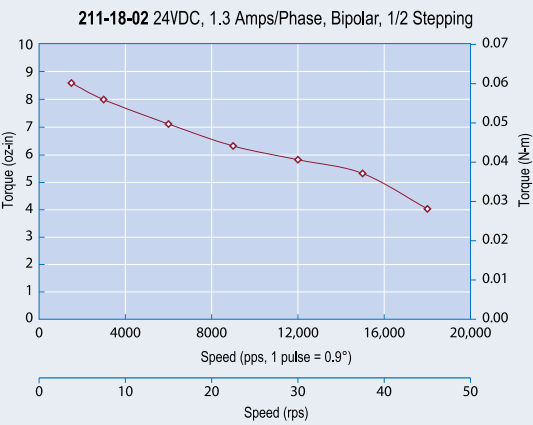
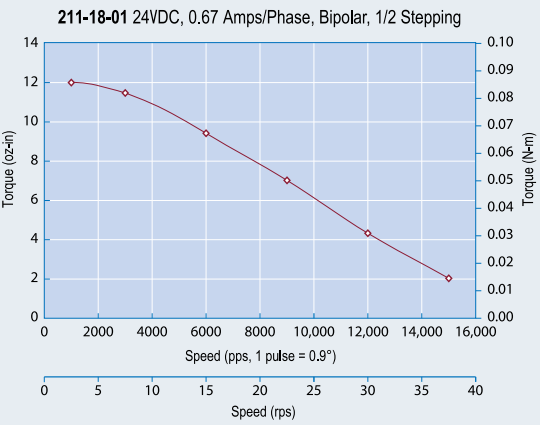
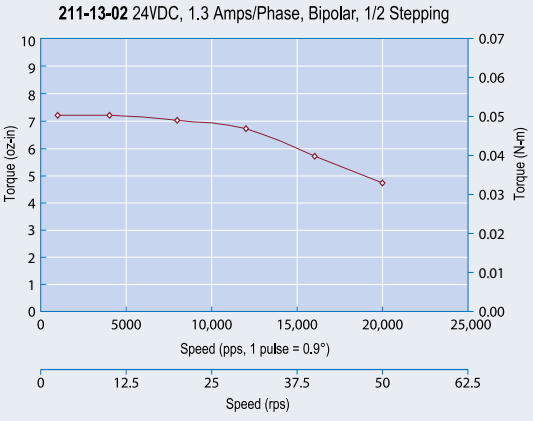
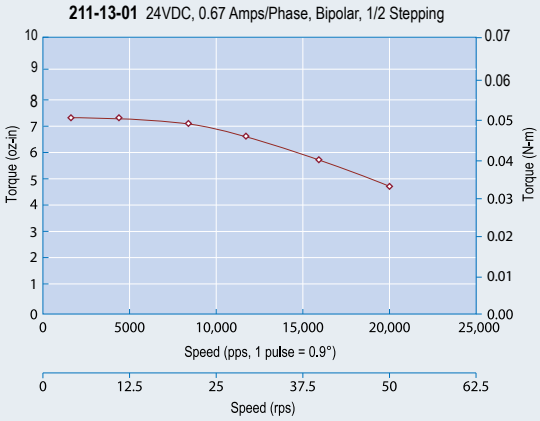
Visit Lin Engineering's web site for dimension updates.



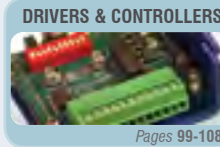
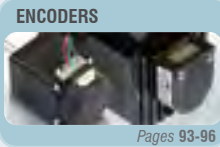
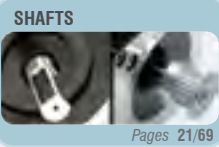
DID YOU KNOW...

You can move resonance away from your operating point by changing either your input voltage, output current or inertial load on the motor. See page 14 for more details.

TORQUE CURVES



AVAILABLE OPTIONS





- Ideal for Limited Mounting Space
- Integral Connector Available (*3518M only*)
- *Can be Customized for:*
 - Maximum Torque (*see page 9*)
 - Cables & Assemblies (*see pages 21/70*)
 - Shafts (*see pages 21/69*)
 - Drivers & Controllers (*see page 99-108*)
 - Maximum Efficiency (*see page 12*)

SPECIFICATIONS

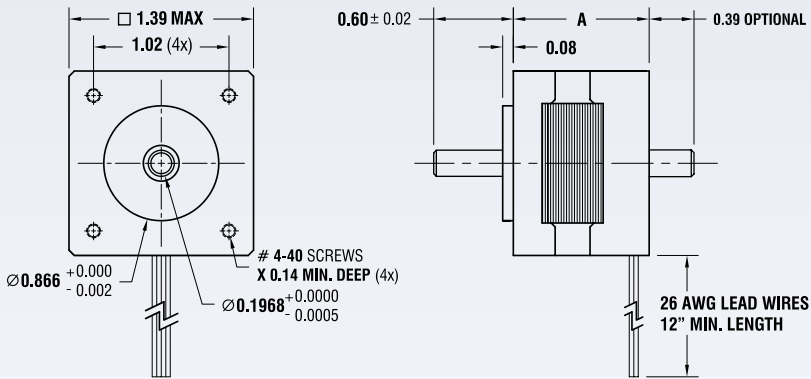
BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	1.02" 26 mm	3518X-04	0.45	7.5	0.05	3.8	2.7	0.06	0.25	4
		3518X-08	0.35	7.5	0.05	8.5	5.8	0.06	0.25	4
	1.34" 34.0 mm	3518M-07*	0.80	20.0	0.14	7.5	8.1	0.08	0.35	4

UNIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	1.02" 26 mm	3518X-12	0.30	5.5	0.04	12.0	4.4	0.06	0.25	6

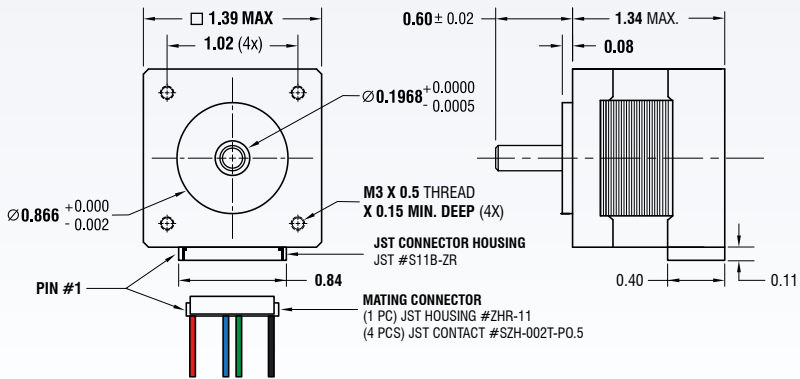
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* Includes an integral connector

DIMENSIONS (STANDARD MOTOR)

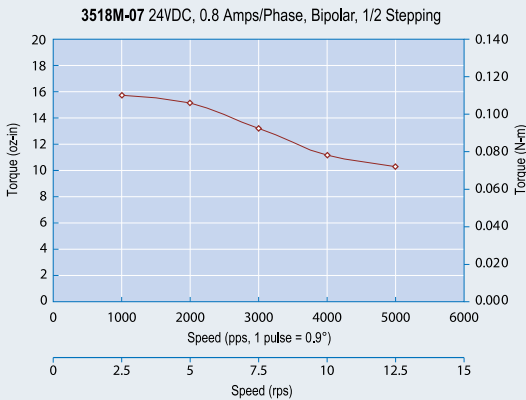
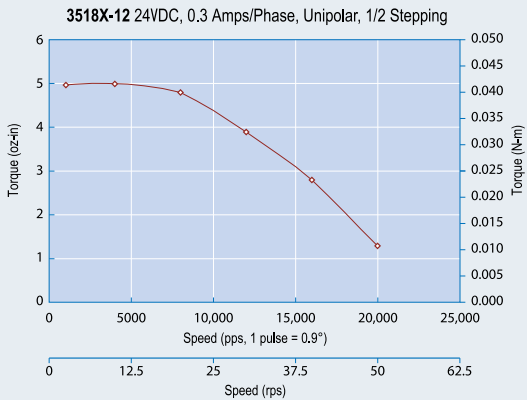
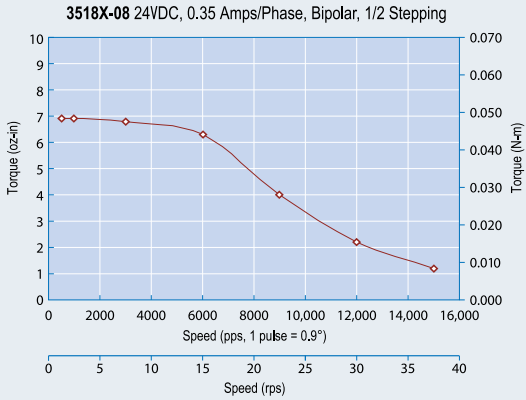
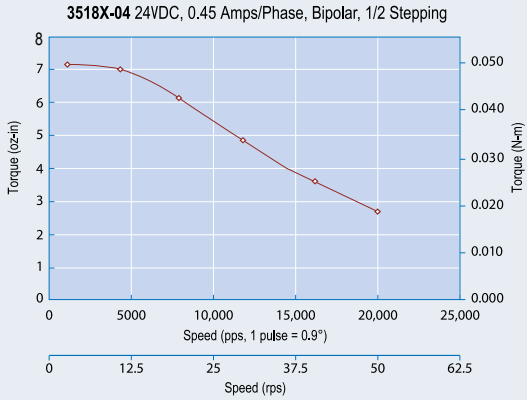


DIMENSIONS (INTEGRAL CONNECTOR)

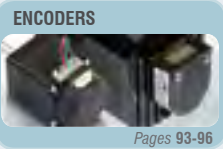
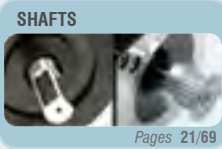


Visit Lin Engineering's web site for dimension updates.

TORQUE CURVES



AVAILABLE OPTIONS



DID YOU KNOW...

Motors connected in series are mostly used to accommodate applications with speeds lower than 5 RPS.



- Wide Selection
- Cost Effective
- Can be Customized for:
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)



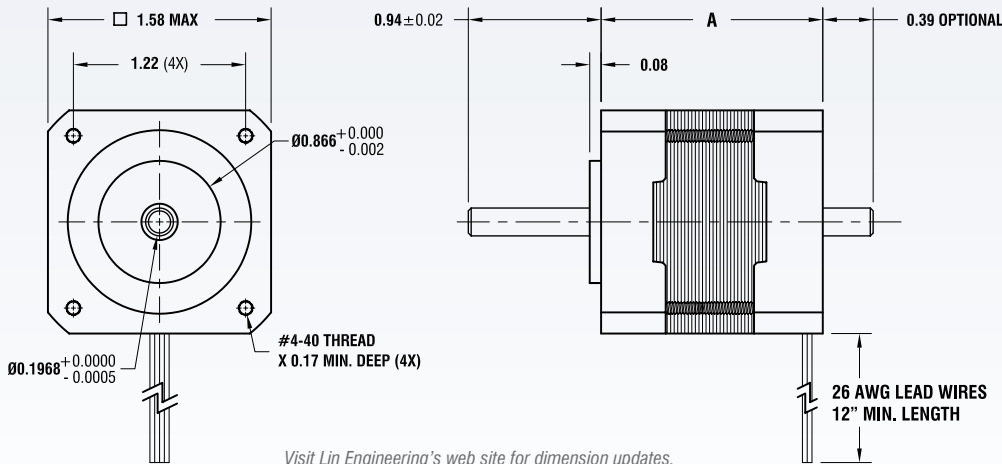
SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	0.9" 22.9 mm	4018F-08	0.50	8.4	0.06	8.0	5.0	0.06	0.25	4
	1.03" 26.2 mm	4018X-07	1.00	15.0	0.11	5.0	6.0	0.07	0.27	4
		4018X-51	0.60	15.0	0.11	5.4	2.8	0.07	0.27	4
	1.33" 33.8 mm	4018S-01	1.00	21.0	0.15	4.1	4.7	0.09	0.44	4
		4018S-18S	0.63	21.0	0.15	10.2	10.2	0.09	0.44	4
		4018S-18P	1.26	21.0	0.15	2.6	2.5	0.09	0.44	4
	1.57" 39.9 mm	4018M-04	1.10	31.0	0.22	4.0	7.0	0.13	0.48	4
		4018M-05	2.50	31.0	0.22	0.5	0.8	0.13	0.48	4
	1.88" 47.8 mm	4018L-04	2.10	42.0	0.30	1.1	2.1	0.20	0.66	4
		4018L-06	0.90	42.0	0.30	5.8	8.1	0.20	0.66	4

UNIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	0.9" 22.9 mm	4018F-02	0.40	4.1	0.03	5.0	1.7	0.06	0.25	6
	1.33" 33.8 mm	4018S-10	0.40	15.0	0.11	24.0	15.8	0.09	0.44	6
		4018S-18	0.90	15.0	0.11	5.1	2.5	0.09	0.44	6
		4018S-20	0.30	15.0	0.11	42.3	28.2	0.09	0.44	6
	1.57" 39.9 mm	4018M-03	0.40	22.0	0.16	30.0	28.8	0.13	0.48	6
		4018M-08	0.80	22.0	0.16	8.5	7.0	0.13	0.48	6
	1.88" 47.8 mm	4018L-01	0.80	30.0	0.21	7.5	6.0	0.20	0.66	6
		4018L-03	1.20	30.0	0.21	3.3	3.1	0.20	0.66	6

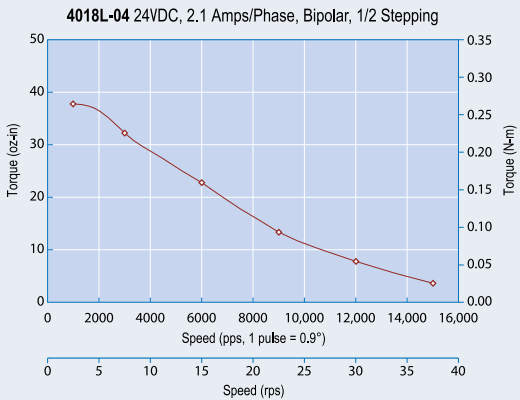
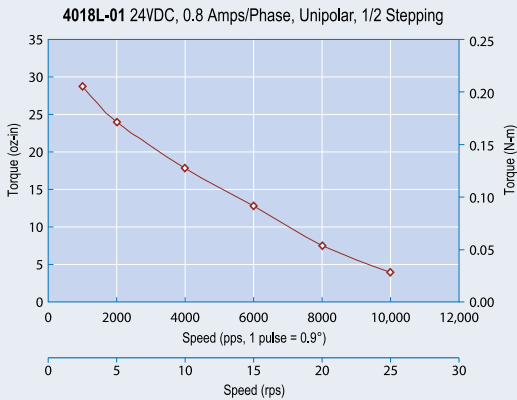
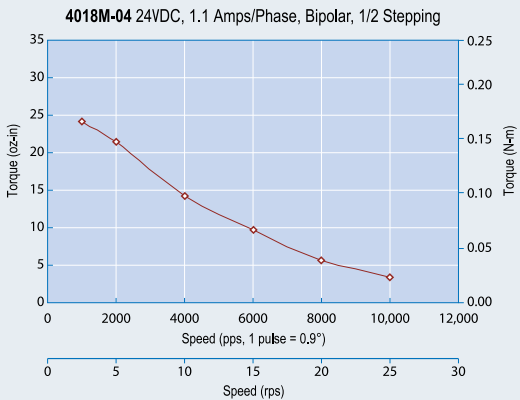
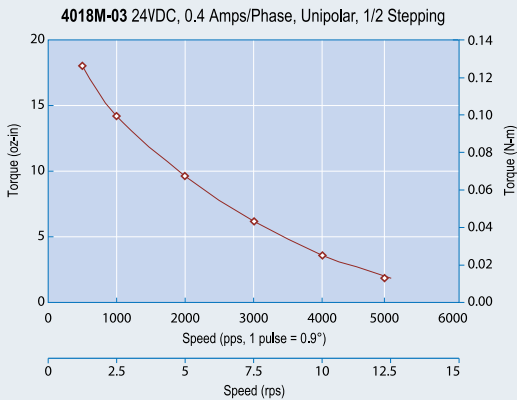
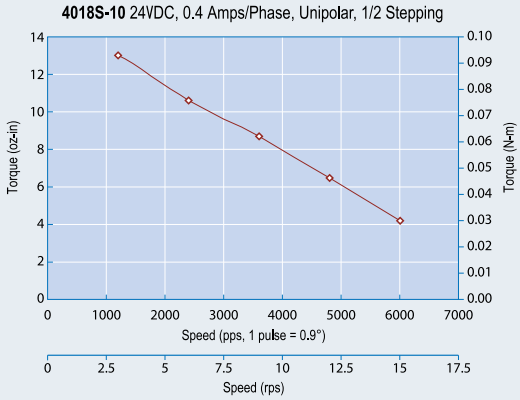
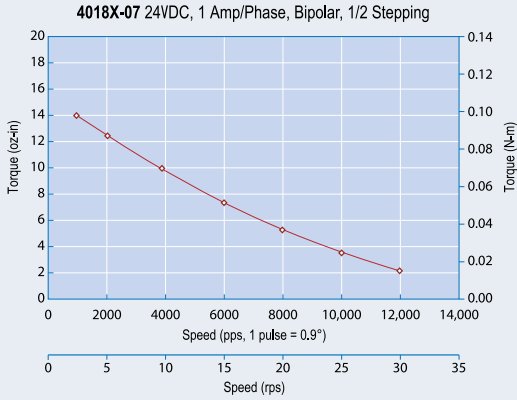
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DIMENSIONS

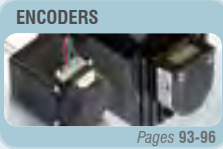
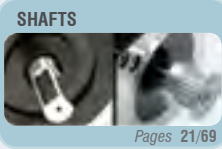


Visit Lin Engineering's web site for dimension updates.

TORQUE CURVES



AVAILABLE OPTIONS





- Cost Effective
- Integral Connector Available
- Can be Customized for:
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)



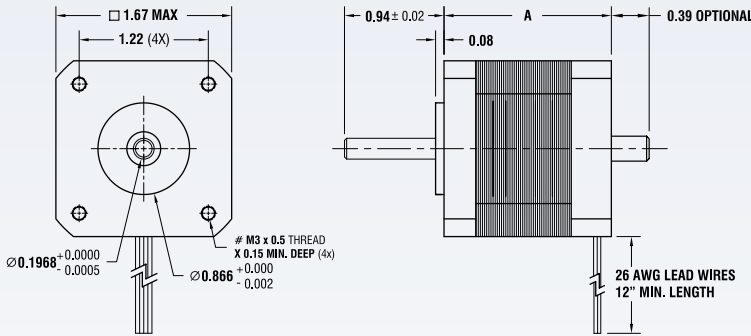
SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
1.34" 34.0 mm		4118S-02	1.30	45.0	0.32	2.8	3.6	0.18	0.50	4
		4118S-04S	0.67	45.0	0.32	9.9	12.5	0.18	0.50	4
		4118S-04P	1.34	45.0	0.32	2.5	3.1	0.18	0.50	4
		4118S-09	0.90	45.0	0.32	5.3	6.7	0.18	0.40	4
1.58" 40.1 mm		4118M-01	1.70	63.0	0.44	1.5	3.0	0.28	0.65	4
		4118M-06S	0.70	63.0	0.44	10.8	21.8	0.28	0.65	4
		4118M-06P	1.40	63.0	0.44	2.7	5.5	0.28	0.65	4
1.89" 48.0 mm		4118L-01	2.00	83.0	0.59	1.4	2.7	0.37	0.80	4
		4118L-07S	1.05	83.0	0.59	5.2	9.4	0.37	0.80	4
		4118L-07P	2.10	83.0	0.59	1.3	2.3	0.37	0.80	4
2.34" 59.9 mm		4118C-01	2.00	125	0.89	2.0	3.3	0.56	0.90	4

UNIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
1.34" 34.0 mm		4118S-04	0.95	30.0	0.21	5.0	3.1	0.18	0.50	6
1.58" 40.1 mm		4118M-06	1.00	45.0	0.32	5.4	5.5	0.28	0.65	6
1.89" 48.0 mm		4118L-07	1.50	65.0	0.46	2.6	2.3	0.37	0.80	6
		4118L-25	0.45	65.0	0.46	25.0	17.4	0.37	0.80	6

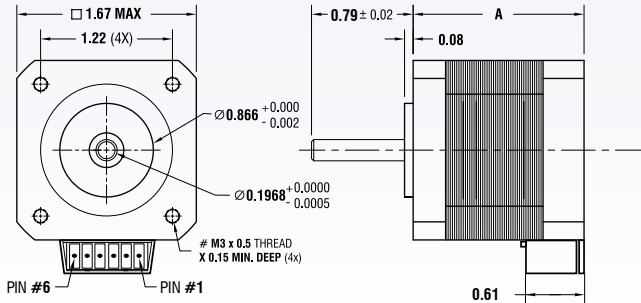
- Please complete our application data sheet on page 116 for different windings.
- Call Lin Engineering for additional bipolar torque curves.
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- For operating temperatures, see page 114.
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DIMENSIONS (STANDARD MOTOR)

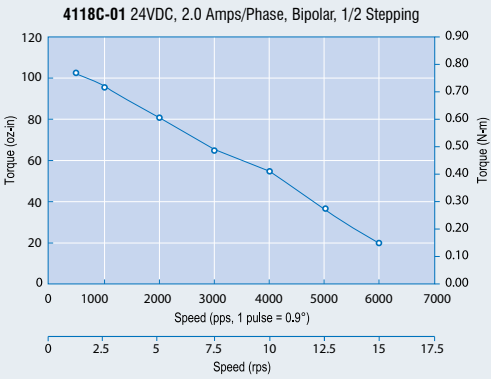
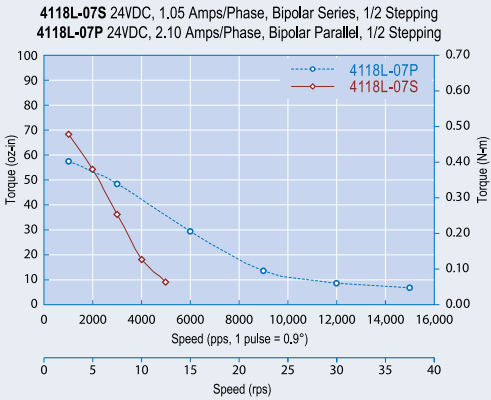
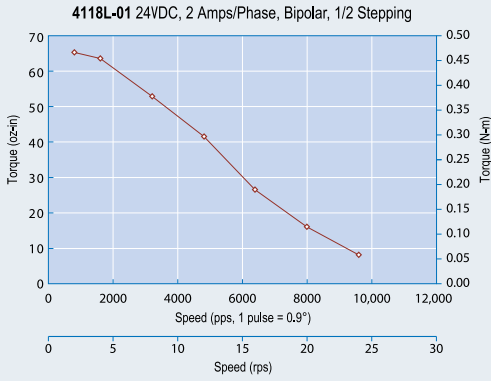
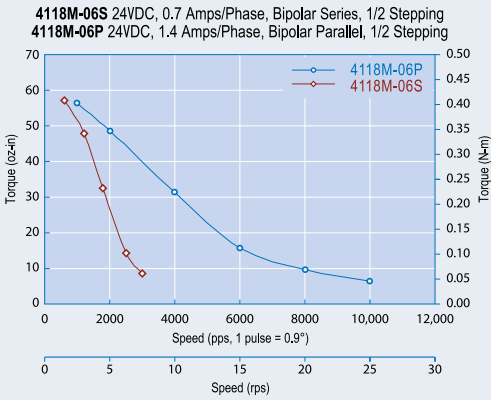
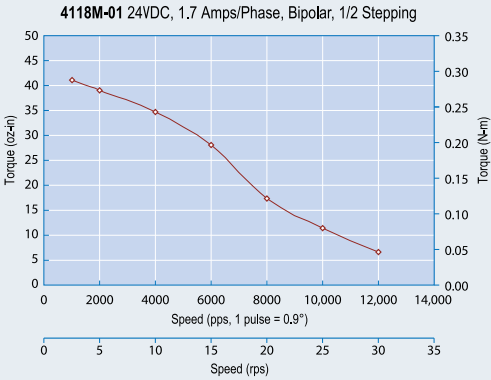
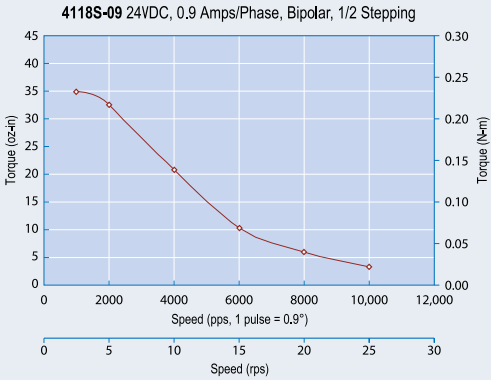
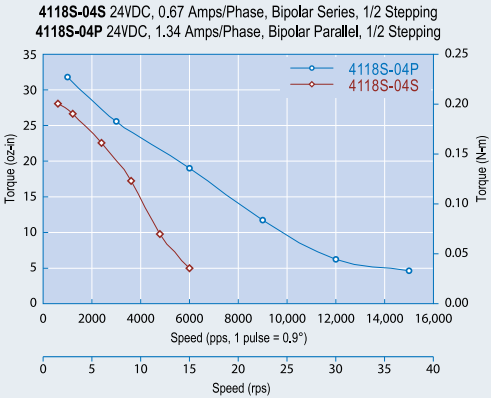
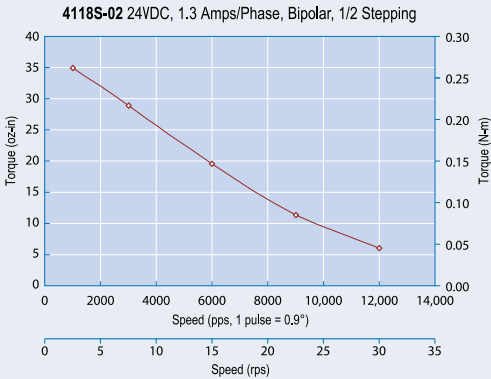


Visit Lin Engineering's web site for dimension updates.

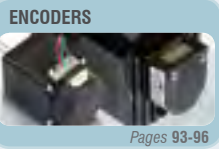
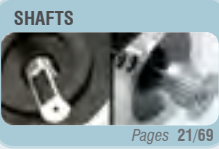
DIMENSIONS (INTEGRAL CONNECTOR)



TORQUE CURVES



AVAILABLE OPTIONS





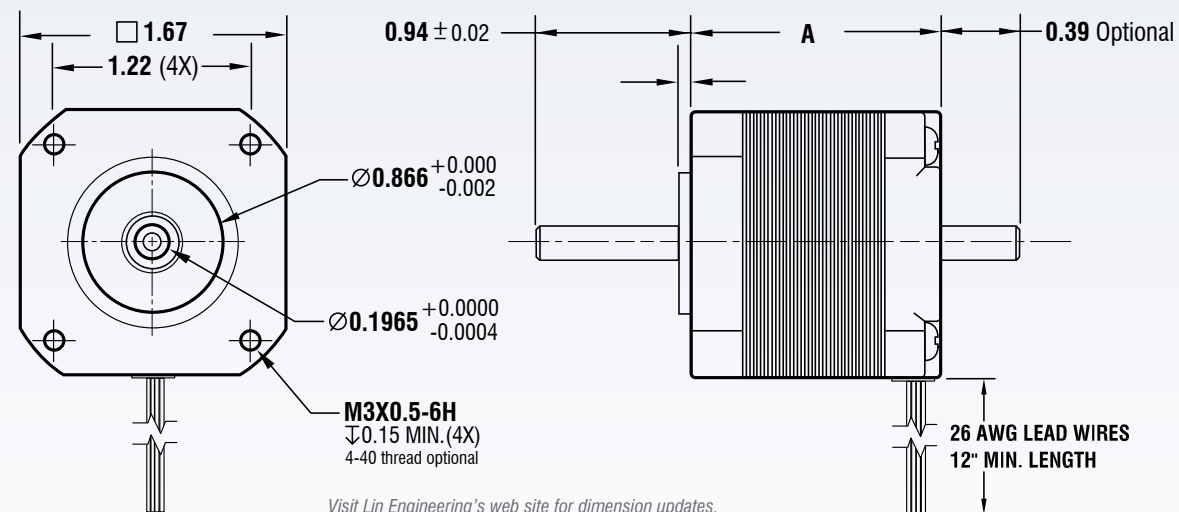
- NEMA Size 17 Mounting
- Up to 35% more torque in a smaller package
- *Can be Customized for:*
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)

SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	1.02" 25.9 mm	4418F-01	0.7	27	0.19	7.5	6.8	0.14	0.35	4
	1.17" 29.7 mm	4418X-01	1.5	37	0.26	1.6	1.54	0.21	0.45	4
		4418X-02	1.3	37	0.26	2.9	2.89	0.21	0.45	4
		4418X-04P	1.33	37	0.26	2.7	2.49	0.21	0.45	4
		4418X-04S	0.67	37	0.26	10.7	9.96	0.21	0.45	4
	1.35" 34.3 mm	4418S-01	1.7	61	0.43	1.6	2.34	0.29	0.55	4
		4418S-04	2.0	61	0.43	1.1	1.79	0.29	0.55	4
		4418S-06P	1.4	61	0.43	2.6	3.95	0.29	0.55	4
		4418S-06S	0.7	61	0.43	10.5	15.8	0.29	0.55	4
		4418S-51	1.0	61	0.43	4.2	6.55	0.29	0.55	4
	1.58" 40.1 mm	4418M-01	2.0	71	0.50	1.2	2.56	0.37	0.65	4
		4418M-04P	1.7	71	0.50	1.7	3.33	0.37	0.65	4
		4418M-06P	1.5	71	0.50	3.0	5.64	0.37	0.65	4
		4418M-07S	1.05	71	0.50	4.7	9.08	0.37	0.65	4
	1.89" 48.0 mm	4418L-36	2.0	100	0.71	1.5	2.92	0.46	0.85	4

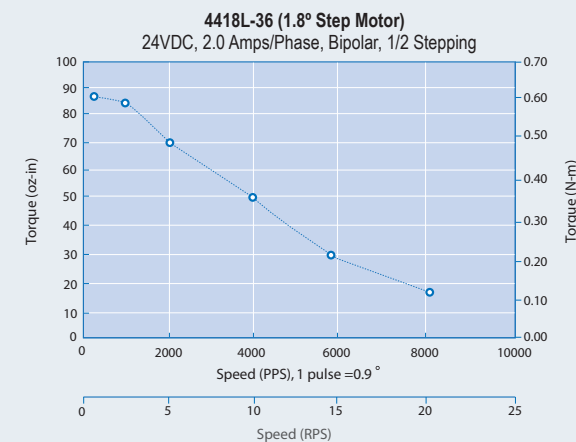
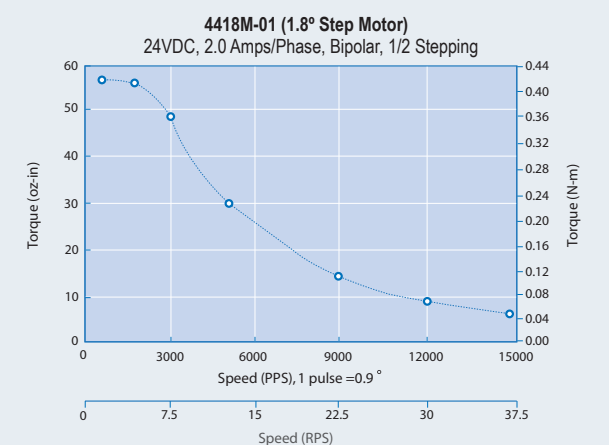
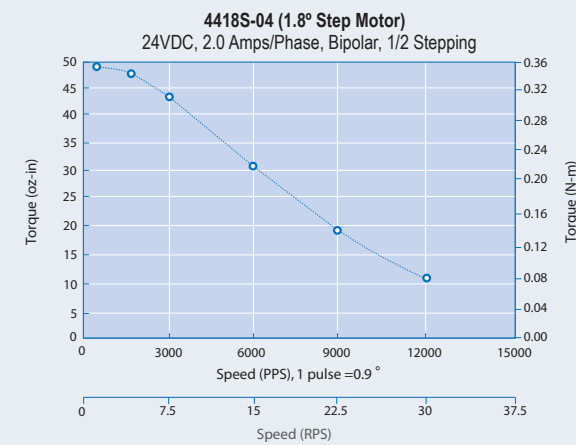
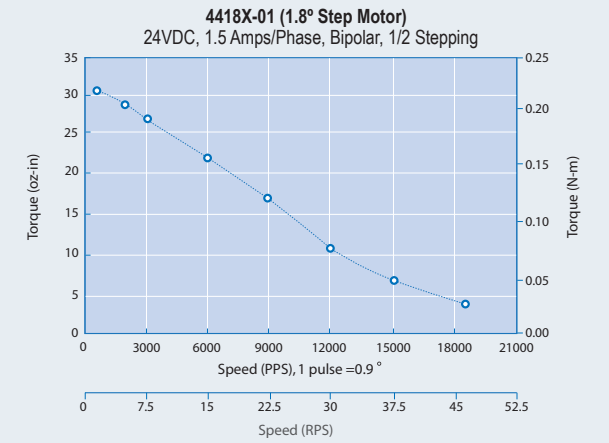
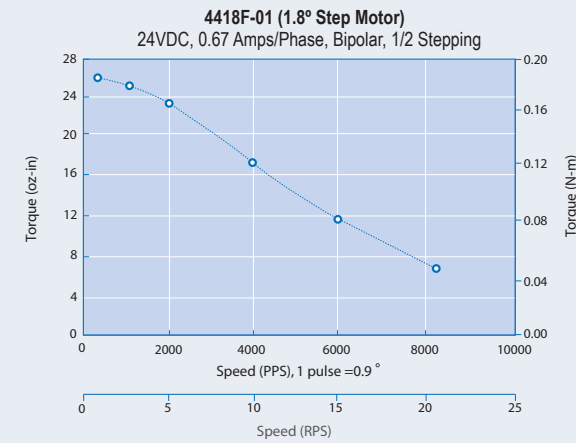
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DIMENSIONS

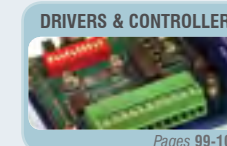
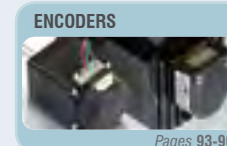


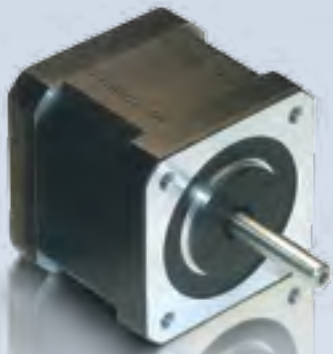
Visit Lin Engineering's web site for dimension updates.

TORQUE CURVES



AVAILABLE OPTIONS





- Patented Signature Series Technology (see page 17)
- Ultimate Smoothness & High Accuracy
- Can be Customized for:
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)

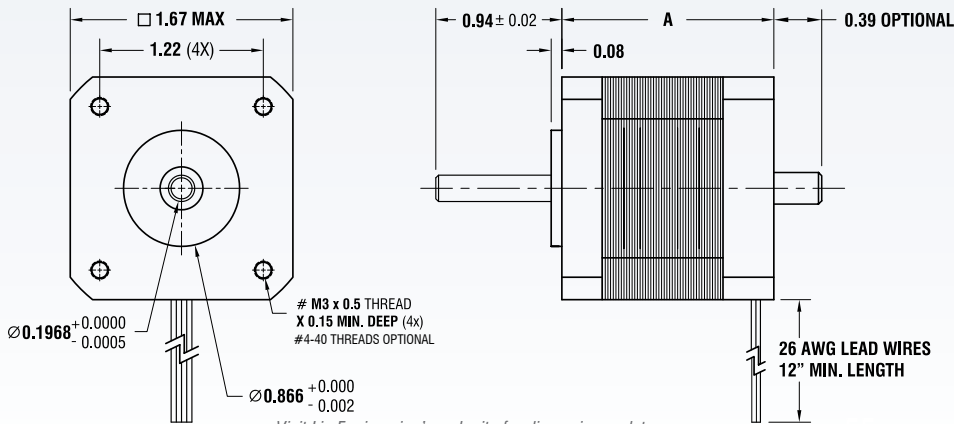
SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
1.34" 34.0 mm		4518S-01	1.50	42.0	0.30	1.7	1.9	0.18	0.50	4
		4518S-02	1.30	42.0	0.30	2.8	3.6	0.18	0.50	4
		4518S-04S	0.67	42.0	0.30	9.9	12.5	0.18	0.50	4
		4518S-04P	1.34	42.0	0.30	2.5	3.1	0.18	0.50	4
		4518S-09	0.90	42.0	0.30	5.3	6.7	0.18	0.50	4
1.58" 40.1 mm		4518M-01	1.70	61.0	0.43	1.5	3.0	0.28	0.65	4
		4518M-06S	0.70	61.0	0.43	10.8	21.8	0.28	0.65	4
		4518M-06P	1.40	61.0	0.43	2.7	5.5	0.28	0.65	4
		4518M-51	1.20	61.0	0.43	4.1	10	0.28	0.65	4
1.89" 48 mm		4518L-01	2.00	83.0	0.59	1.4	2.7	0.37	0.80	4
		4518L-04S	0.84	83.0	0.59	7.8	13.84	0.37	0.80	4
		4518L-04P	1.70	83.0	0.59	1.95	3.46	0.37	0.80	4
		4518L-07S	1.05	83.0	0.59	5.2	9.4	0.37	0.80	4
		4518L-07P	2.10	83.0	0.59	1.3	2.3	0.37	0.80	4

UNIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
1.34" 34.0 mm		4518S-04	0.95	30.0	0.21	5.0	3.1	0.18	0.45	6
1.58" 40.1 mm		4518M-06	1.00	42.0	0.30	5.4	5.5	0.28	0.65	6
1.89" 48 mm		4518L-04	1.20	63.0	0.45	3.9	3.46	0.37	0.80	6
		4518L-07	1.50	63.0	0.45	2.6	2.3	0.37	0.80	6
		4518L-25	0.45	63.0	0.45	25.0	17.4	0.37	0.80	6

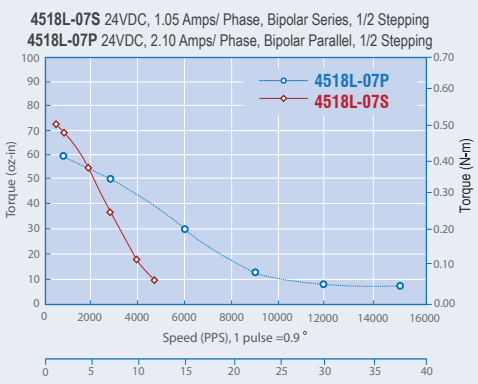
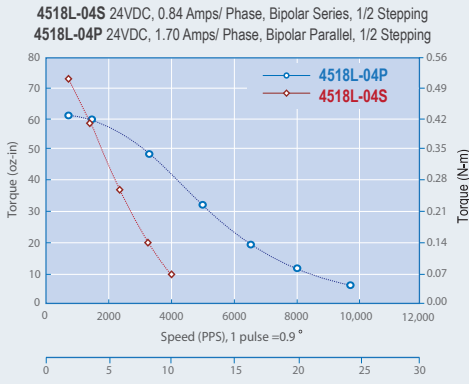
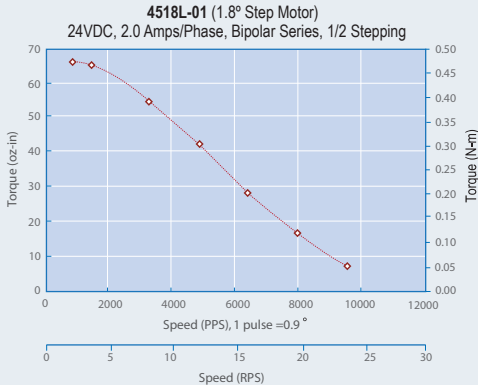
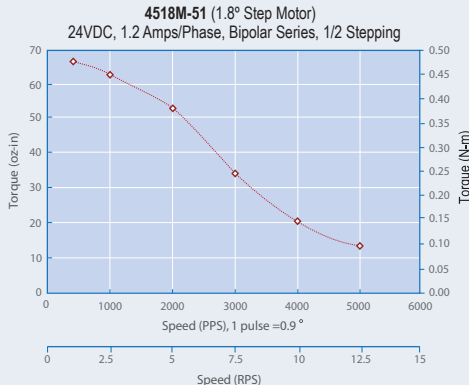
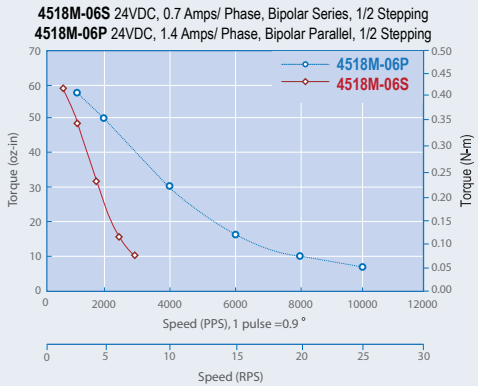
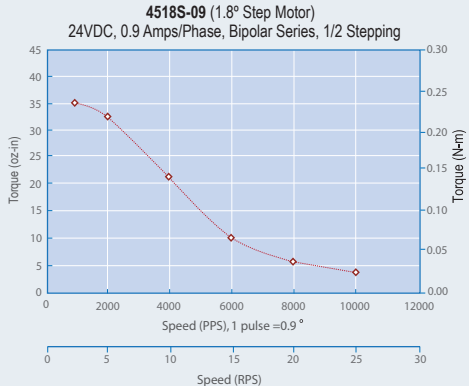
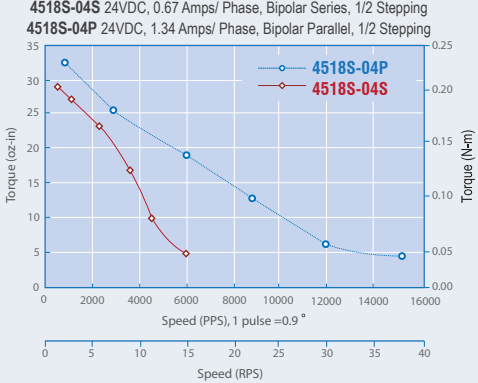
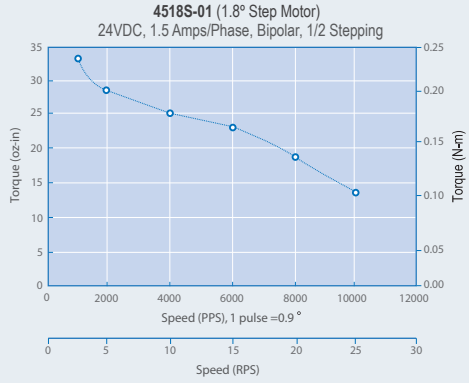
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DIMENSIONS

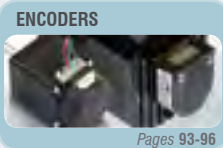
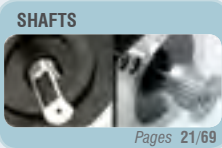


Visit Lin Engineering's web site for dimension updates.

TORQUE CURVES



AVAILABLE OPTIONS





- Low Inertia
- Cost Effective
- *Can be Customized for:*
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)



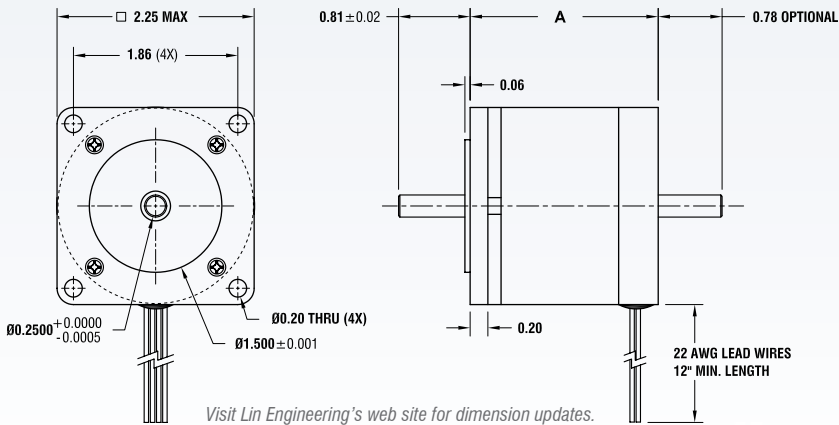
SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	1.62" 41.1 mm	5618X-09S	0.35	56.0	0.40	40.0	83.0	0.30	0.80	4
		5618X-09P	0.70	56.0	0.40	10.0	20.8	0.30	0.80	4
	2.01" 51.1 mm	5618S-01S	0.70	84.0	0.59	9.4	18.8	0.60	1.20	4
		5618S-01P	1.40	84.0	0.59	2.4	4.7	0.60	1.20	4
		5618S-42S	2.70	84.0	0.59	0.7	1.32	0.60	1.20	4
		5618S-42P	5.40	84.0	0.59	0.2	0.4	0.60	1.20	4
		5618S-54S	0.35	84.0	0.59	40.0	113.6	0.60	1.20	4
		5618S-54P	0.70	84.0	0.59	10.8	28.4	0.60	1.20	4
	2.25" 57.2 mm	5618M-06S	0.85	117.6	0.83	9.4	28.4	0.74	1.40	4
		5618M-06P	1.70	117.6	0.83	2.4	7.1	0.74	1.40	4
		5618M-08S	1.55	117.6	0.83	2.7	9.6	0.74	1.40	4
		5618M-08P	3.10	117.6	0.83	0.7	2.4	0.74	1.40	4
	3.03" 77.0 mm	5618L-52S	2.17	175.0	1.24	2.4	4.9	1.20	2.05	4
		5618L-52P	4.34	175.0	1.24	0.6	1.2	1.20	2.05	4
		5618L-54S	1.12	175.0	1.24	5.1	29.8	1.20	2.05	4
		5618L-54P	2.24	175.0	1.24	1.3	5.2	1.20	2.05	4

UNIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	1.62" 41.1 mm	5618X-09	0.5	40.0	0.28	20.0	20.8	0.30	0.80	6
		5618S-01	1.0	60.0	0.42	4.7	4.7	0.60	1.20	6
	2.01" 51.1 mm	5618S-42	3.8	60.0	0.42	0.4	0.4	0.60	1.20	6
		5618S-54	0.5	60.0	0.42	21.5	28.4	0.60	1.20	6
	2.25" 57.2 mm	5618M-06	1.2	84.0	0.59	4.7	7.1	0.74	1.40	6
		5618M-08	2.2	84.0	0.59	1.4	2.4	0.74	1.40	6
	3.03" 77.0 mm	5618L-52	3.1	125.0	0.88	1.2	1.2	1.20	2.05	6
		5618L-54	1.6	125.0	0.88	2.6	5.2	1.20	20.5	6

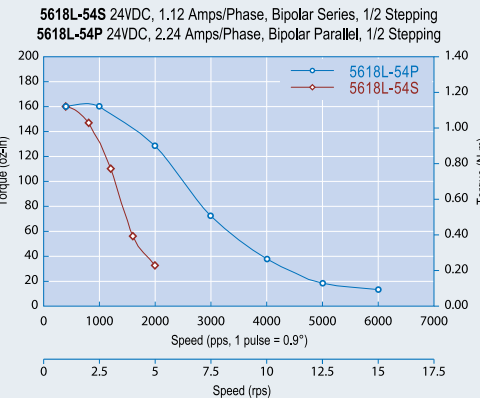
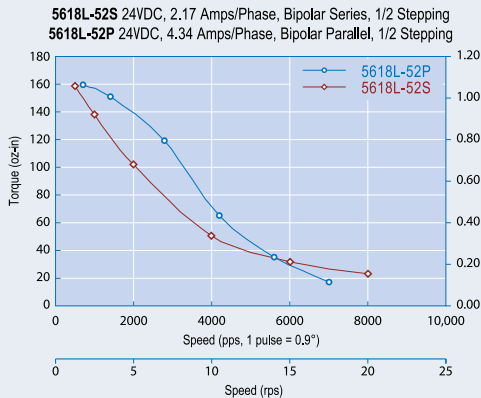
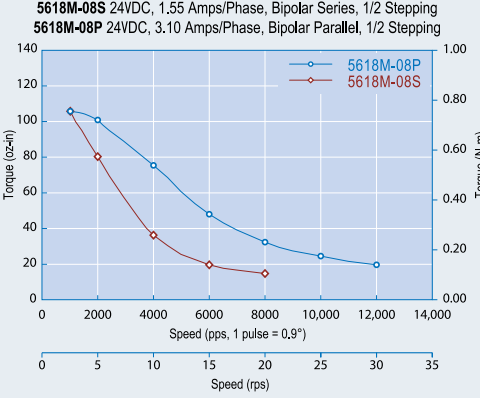
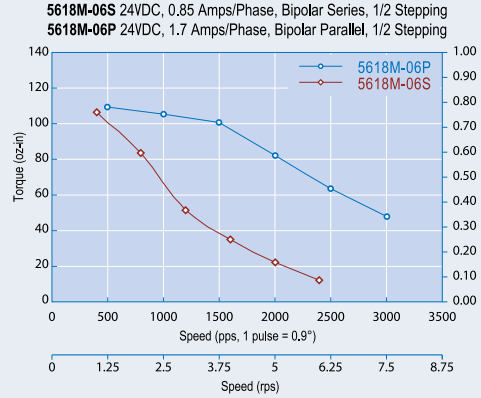
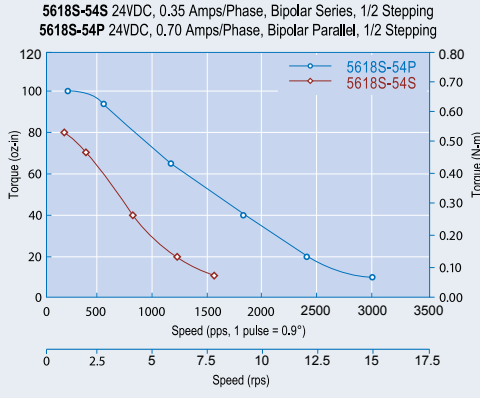
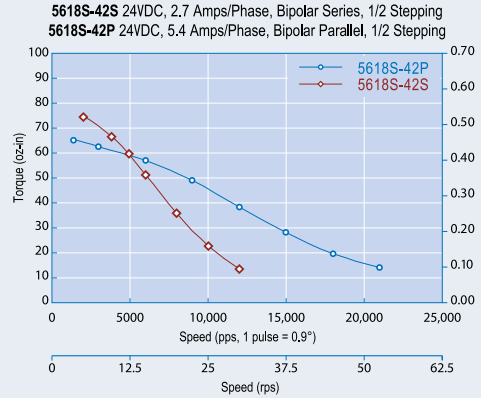
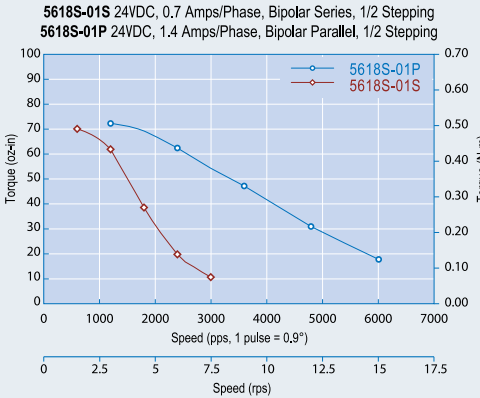
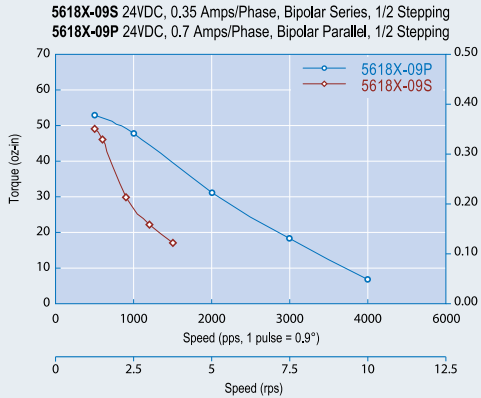
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DIMENSIONS



Visit Lin Engineering's web site for dimension updates.

TORQUE CURVES



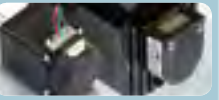
AVAILABLE OPTIONS

SHAFTS



Pages 21/69

ENCODERS



Pages 93-96

CABLES & ASSEMBLIES



Pages 21/70

DRIVERS & CONTROLLERS



Pages 99-108



- High Torque
- Wide Selection of Windings
- Can be Customized for:
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)



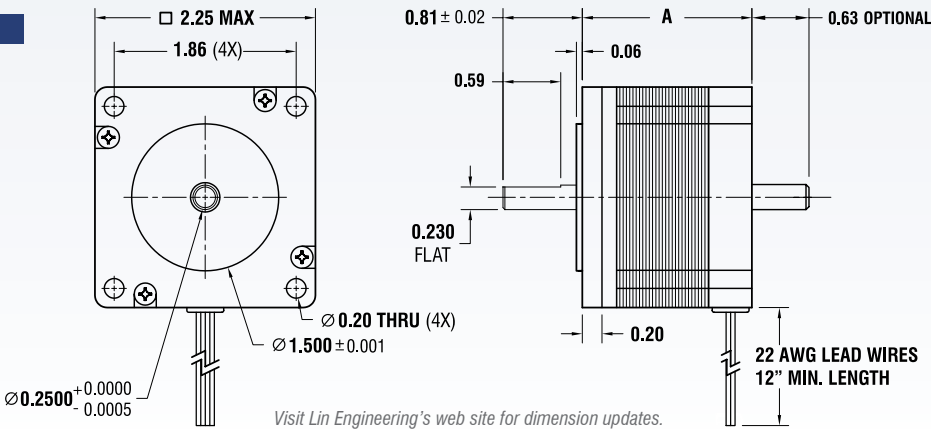
SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
1.74" 44.2 mm		5718X-01S	1.40	100.0	0.71	2.8	5.6	0.70	1.05	4
		5718X-01P	2.80	100.0	0.71	0.7	1.4	0.70	1.05	4
		5718X-05S	0.70	100.0	0.71	10.0	16.8	0.70	1.05	4
		5718X-05P	1.40	100.0	0.71	2.5	4.2	0.70	1.05	4
		5718X-15S	2.10	100.0	0.71	1.2	1.6	0.70	1.05	4
		5718X-15P	4.20	100.0	0.71	0.3	0.4	0.70	1.05	4
2.22" 56.4 mm		5718M-02S	2.10	173.0	1.22	1.8	5.2	1.50	1.50	4
		5718M-02P	4.20	173.0	1.22	0.5	1.4	1.50	1.50	4
		5718M-04S	0.70	173.0	1.22	14.0	42.3	1.50	1.50	4
		5718M-04P	1.40	173.0	1.22	3.5	10.6	1.50	1.50	4
		5718M-05S	1.40	173.0	1.22	3.6	10.0	1.50	1.50	4
		5718M-05P	2.80	173.0	1.22	0.9	2.5	1.50	1.50	4
3.1" 78.7 mm		5718L-01S	1.40	294.0	2.08	4.5	15.3	2.60	2.35	4
		5718L-01P	2.80	294.0	2.08	1.1	3.8	2.60	2.35	4
		5718L-03S	2.10	294.0	2.08	2.4	7.0	2.60	2.35	4
		5718L-03P	4.20	294.0	2.08	0.6	1.8	2.60	2.35	4
		5718L-04S	3.27	294.0	2.08	1.0	5.2	2.60	2.35	4
		5718L-04P	6.54	294.0	2.08	0.3	1.3	2.60	2.35	4

UNIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
1.74" 44.2 mm		5718X-01	2.00	72.0	0.51	1.4	1.4	0.70	1.05	6
		5718X-05	1.00	72.0	0.51	5.0	4.2	0.70	1.05	6
		5718X-15	3.00	72.0	0.51	0.6	0.4	0.70	1.05	6
2.22" 56.4 mm		5718M-02	3.00	130.0	0.92	0.9	1.4	1.50	1.50	6
		5718M-04	1.00	130.0	0.92	7.0	10.6	1.50	1.50	6
		5718M-05	2.00	130.0	0.92	1.8	2.5	1.50	1.50	6
3.1" 78.2 mm		5718L-01	2.00	210.0	1.48	2.3	3.8	2.60	2.35	6
		5718L-03	3.00	210.0	1.48	1.2	1.8	2.60	2.35	6
		5718L-04	4.67	210.0	1.48	0.5	1.3	2.60	2.35	6

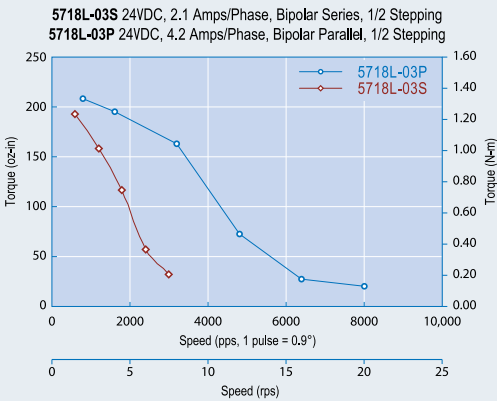
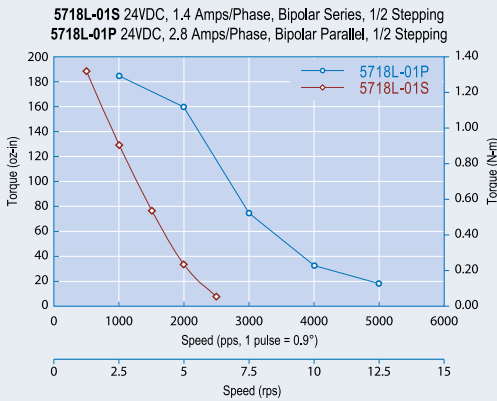
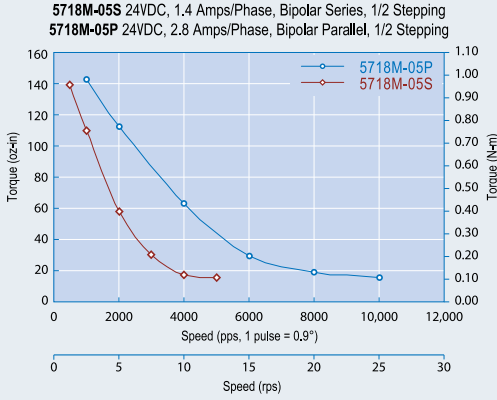
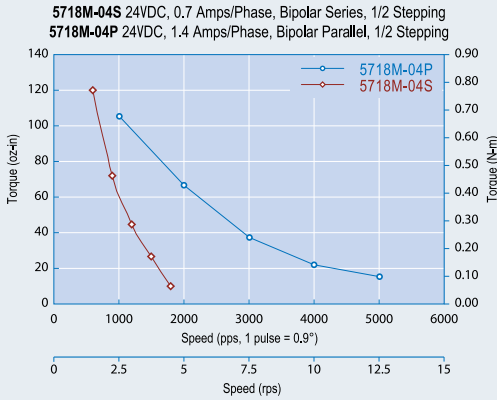
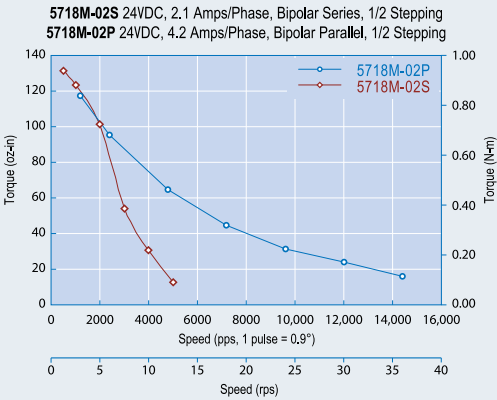
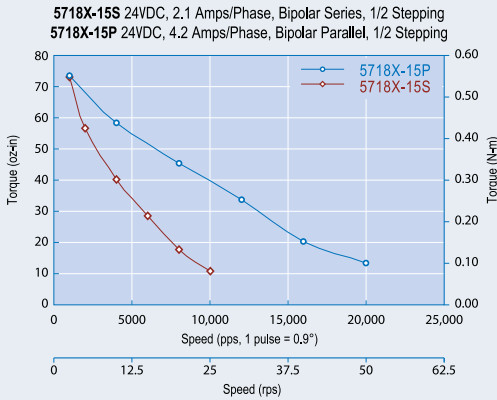
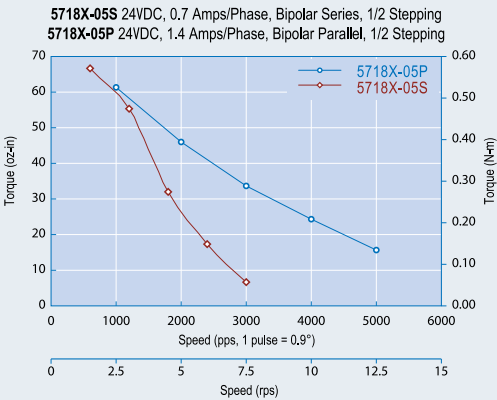
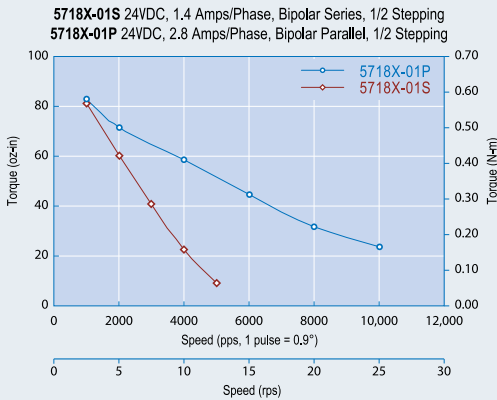
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DIMENSIONS



Visit Lin Engineering's web site for dimension updates.

TORQUE CURVES



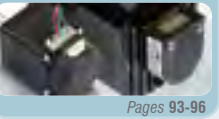
AVAILABLE OPTIONS

SHAFTS



Pages 21/69

ENCODERS



Pages 93-96

CABLES & ASSEMBLIES



Pages 21/70

DRIVERS & CONTROLLERS



Pages 99-108



- Larger Body But Same Mounting As Size 23 Motors
- High Torque
- *Can be Customized for:*
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)

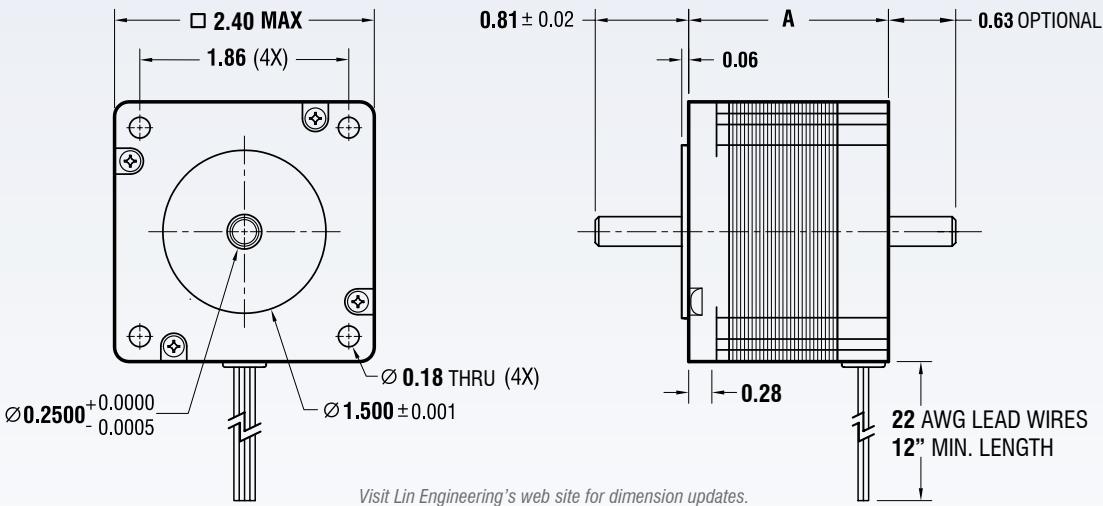
SPECIFICATIONS

BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	1.74" 44.2 mm	5818X-03S	1.40	155.4	1.10	3.0	6.6	1.53	1.26	4
		5718X-03P	2.80	155.4	1.10	0.8	1.7	1.53	1.26	4
	2.20" 55.9 mm	5818M-06S	1.40	253.4	1.79	4.1	11.8	2.50	1.77	4
		5818M-06P	2.80	253.4	1.79	1.0	2.9	2.50	1.77	4
	2.60" 66 mm	5818L-04S	1.40	305.2	2.16	4.7	15.8	3.10	2.18	4
		5818L-04P	2.80	305.2	2.16	1.2	3.9	3.10	2.18	4

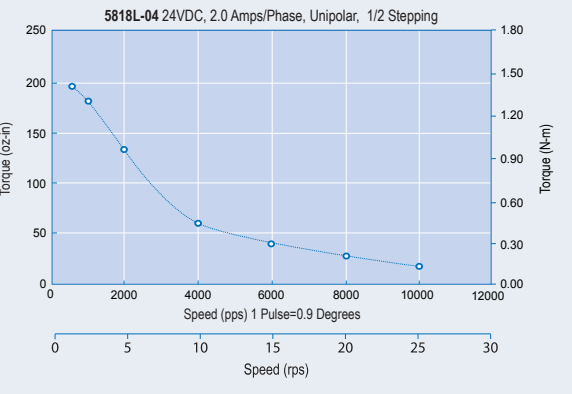
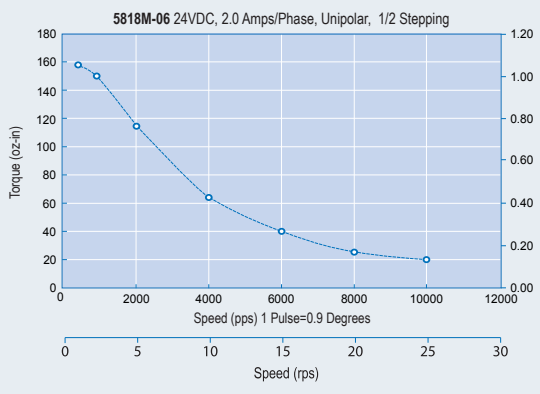
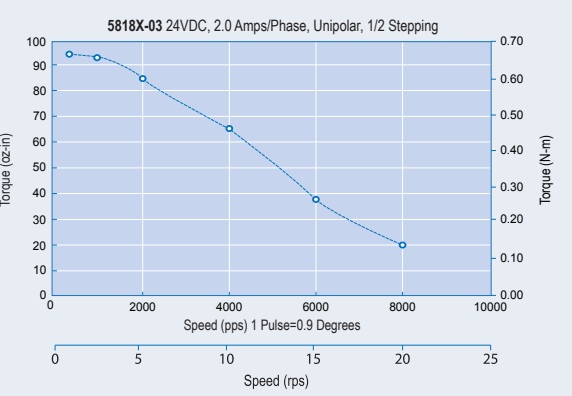
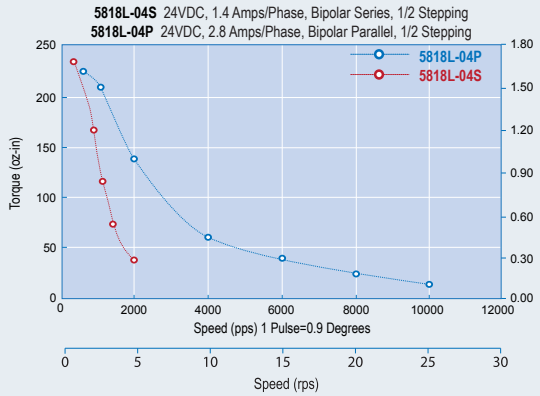
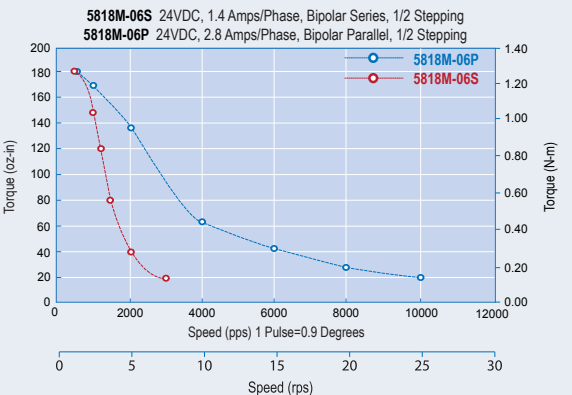
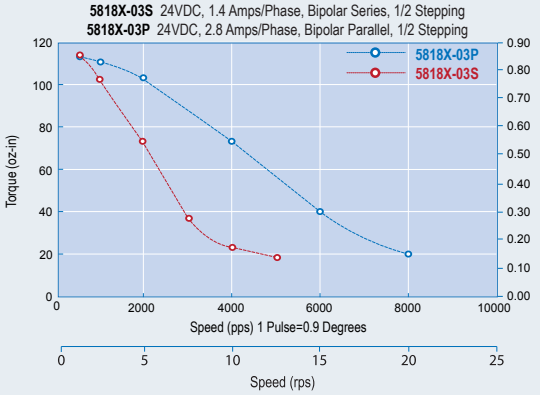
UNIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
	1.74" 44.2 mm	5818X-03	2.00	111.0	0.79	1.5	1.7	1.53	1.26	6
	2.20" 55.9 mm	5818M-06	2.00	181.0	1.28	2.0	2.9	2.50	1.77	6
	2.60" 66 mm	5818L-04	2.00	218.0	1.54	2.4	15.8	3.10	2.18	6

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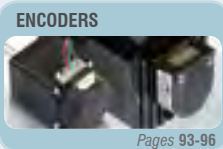
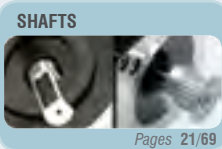
DIMENSIONS



TORQUE CURVES



AVAILABLE OPTIONS





- Cost Effective
- Robust Design
- Can be Customized for:
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)



SPECIFICATIONS

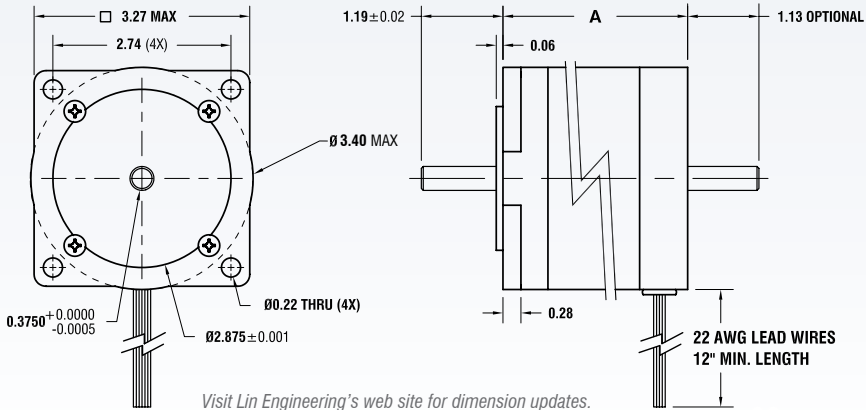
BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
2.50" 63.5 mm		8618S-01S	4.27	252.0	1.78	0.4	4.4	3.10	3.20	4
		8618S-01P	8.54	252.0	1.78	0.1	1.1	3.10	3.20	4
		8618S-02S	3.15	252.0	1.78	0.8	5.4	3.10	3.20	4
		8618S-02P	6.30	252.0	1.78	0.2	1.4	3.10	3.20	4
		8618S-03S	0.88	252.0	1.78	10.0	58.2	3.10	3.20	4
		8618S-03P	1.75	252.0	1.78	2.5	14.6	3.10	3.20	4
3.74" 95.0 mm		8618M-02S	2.80	490.0	3.46	1.5	14.6	6.02	5.65	4
		8618M-02P	5.60	490.0	3.46	0.4	3.7	6.02	5.65	4
		8618M-03S	1.40	490.0	3.46	6.9	60.0	6.02	5.65	4
		8618M-03P	2.80	490.0	3.46	1.7	15.0	6.02	5.65	4
		8618M-11S	3.00	490.0	3.46	0.9	9.6	6.02	5.65	4
		8618M-11P	6.00	490.0	3.46	0.2	2.4	6.02	5.65	4
5.07" 128.8 mm		8618L-02S	2.80	700.0	4.94	2.3	23.8	9.85	8.00	4
		8618L-02P	5.60	700.0	4.94	0.6	6.0	9.85	8.00	4
		8618L-03S	4.69	700.0	4.94	0.9	7.4	9.85	8.00	4
		8618L-03P	9.38	700.0	4.94	0.2	1.9	9.85	8.00	4

UNIPOLAR*	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
2.50" 63.5 mm		8618S-01	6.10	180.0	1.27	0.2	0.8	3.10	3.20	8
		8618S-02	4.50	180.0	1.27	0.4	1.4	3.10	3.20	8
		8618S-03	1.25	180.0	1.27	5.0	14.6	3.10	3.20	8
3.74" 95.0 mm		8618M-02	4.00	350.0	2.47	0.7	3.7	6.02	5.65	8
		8618M-03	2.00	350.0	2.47	3.4	15.0	6.02	5.65	8
		8618M-11	4.29	350.0	2.47	0.4	2.4	6.02	5.65	8
5.07" 128.8 mm		8618L-02	4.00	500.0	3.53	1.2	6.0	9.85	8.00	8
		8618L-03	6.70	500.0	3.53	0.5	1.9	9.85	8.00	8

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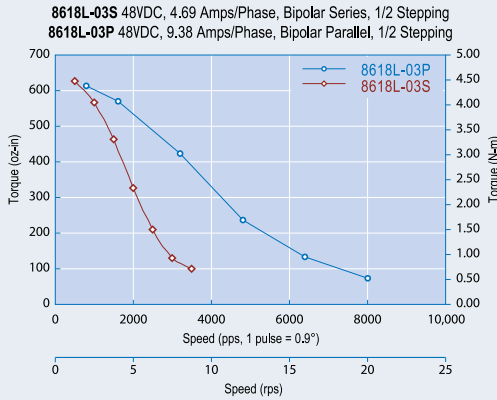
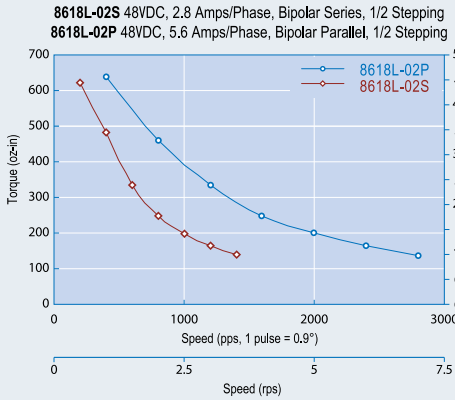
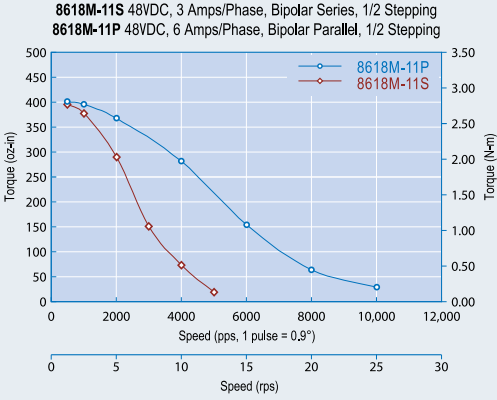
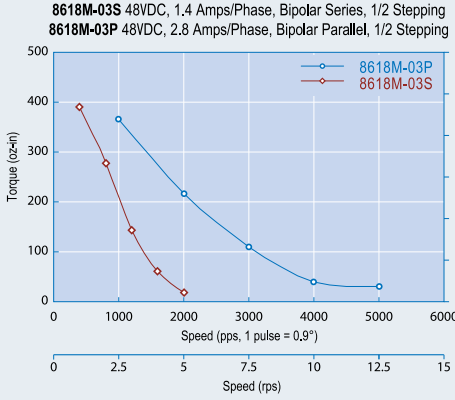
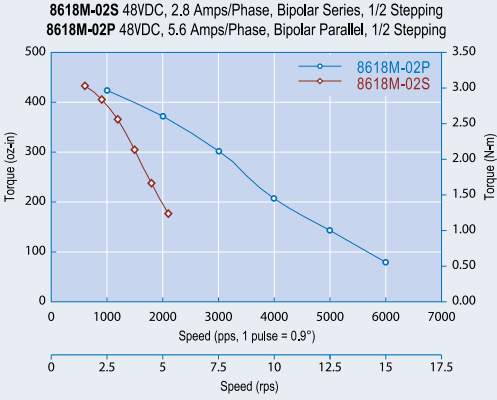
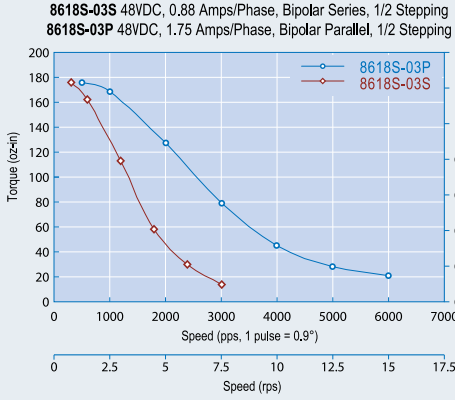
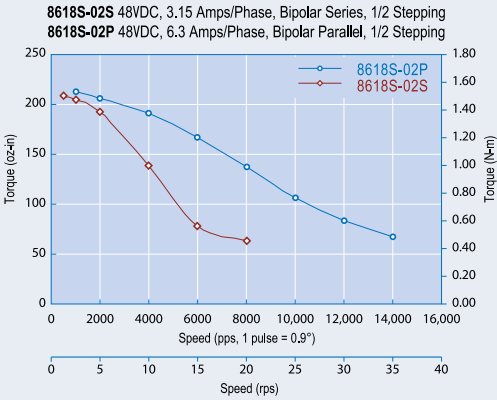
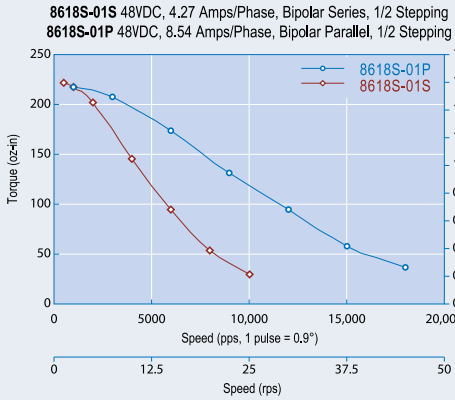
* These 8-wire motors are based on unipolar ratings. The motors can perform at both Bipolar Series and Parallel ratings.

DIMENSIONS



Visit Lin Engineering's web site for dimension updates.

TORQUE CURVES



AVAILABLE OPTIONS

SHAFTS



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ENCODERS



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CABLES & ASSEMBLIES



Pages 21/70

DRIVERS & CONTROLLERS



Pages 99-108



- High Torque
- Robust Design
- Can be Customized for:
 - Maximum Torque (see page 9)
 - Cables & Assemblies (see pages 21/70)
 - Shafts (see pages 21/69)
 - Drivers & Controllers (see page 99-108)
 - Maximum Efficiency (see page 12)



SPECIFICATIONS

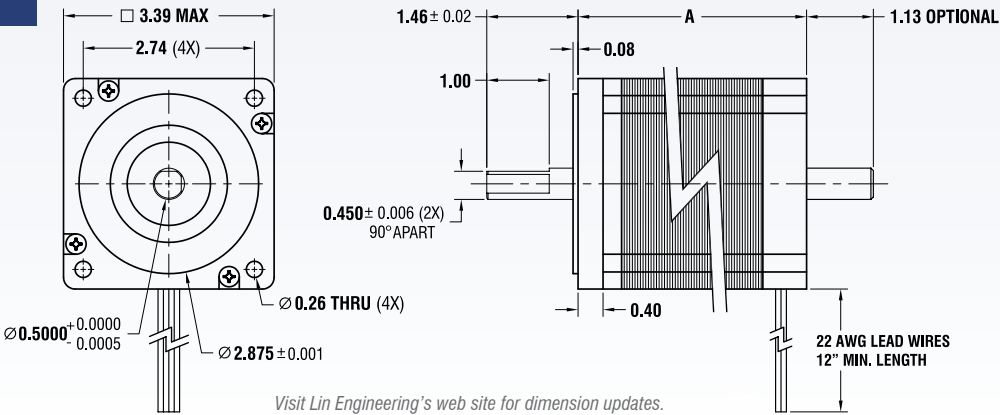
BIPOLAR	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
2.64" 67.1 mm		8718S-01S	1.40	434.0	3.06	4.7	32.1	7.66	3.85	4
		8718S-01P	2.80	434.0	3.06	1.2	6.8	7.66	3.85	4
		8718S-03S	2.10	434.0	3.06	2.0	14.0	7.66	3.85	4
		8718S-03P	4.20	434.0	3.06	0.5	3.5	7.66	3.85	4
		8718S-05S	3.15	434.0	3.06	1.0	6.1	7.66	3.85	4
		8718S-05P	6.30	434.0	3.06	0.3	1.5	7.66	3.85	4
3.82" 97 mm		8718M-04S	1.40	861.0	6.08	6.7	64.5	14.80	5.94	4
		8718M-04P	2.80	861.0	6.08	1.7	16.1	14.80	5.94	4
		8718M-06S	2.10	861.0	6.08	2.5	23.6	14.80	5.94	4
		8718M-06P	4.20	861.0	6.08	0.6	5.9	14.80	5.94	4
		8718M-16S	3.15	861.0	6.08	1.2	8.3	14.80	5.94	4
		8718M-16P	6.30	861.0	6.08	0.3	2.1	14.80	5.94	4
5.00" 127 mm		8718L-02S	1.40	1288.0	9.10	7.5	78.1	21.90	8.44	4
		8718L-02P	2.80	1288.0	9.10	1.9	19.5	21.90	8.44	4
		8718L-04S	3.15	1288.0	9.10	1.9	16.6	21.90	8.44	4
		8718L-04P	6.30	1288.0	9.10	0.5	4.1	21.90	8.44	4
		8718L-08S	3.85	1288.0	9.10	1.2	10.8	21.90	8.44	4
		8718L-08P	7.70	1288.0	9.10	0.3	2.7	21.90	8.44	4

UNIPOLAR*	Dimension "A" Max	Model #	Rated Current (Amps/Phase)	Holding Torque (oz-in)	Holding Torque (N-m)	Resistance (Ohms/Phase)	Inductance (mH/Phase)	Inertia (oz-in ²)	Weight (Lbs.)	Number of Leads
2.64" 67.1 mm		8718S-01	2.00	310.0	2.19	2.3	6.6	7.66	3.85	8
		8718S-03	3.00	310.0	2.19	1.0	3.5	7.66	3.85	8
		8718S-05	4.50	310.0	2.19	0.5	1.5	7.66	3.85	8
3.82" 97 mm		8718M-04	2.00	615.0	4.34	3.3	16.1	14.80	5.94	8
		8718M-06	3.00	615.0	4.34	1.3	5.9	14.80	5.94	8
		8718M-16	4.50	615.0	4.34	0.6	2.1	14.80	5.94	8
5.00" 127 mm		8718L-02	2.00	920.0	6.50	3.8	19.5	21.90	8.44	8
		8718L-04	4.50	920.0	6.50	1.0	4.1	21.90	8.44	8
		8718L-08	5.50	920.0	6.50	0.6	2.7	21.90	8.44	8

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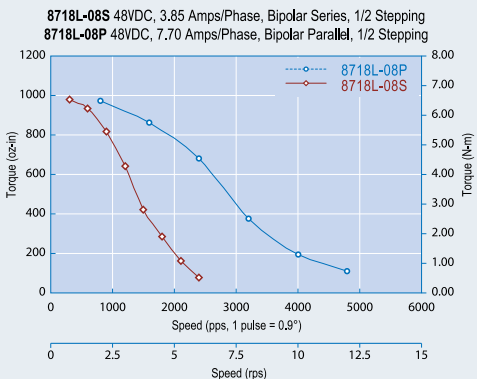
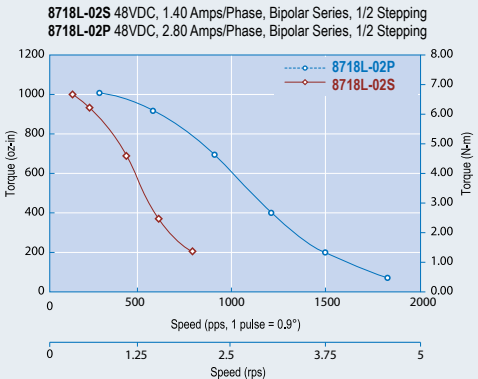
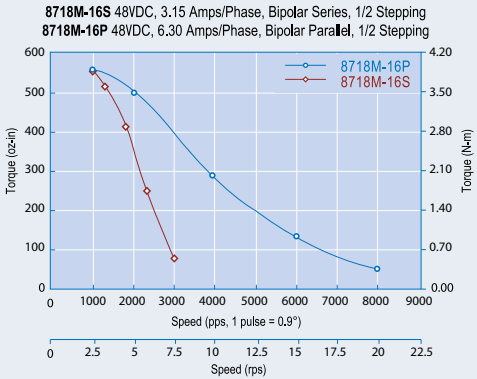
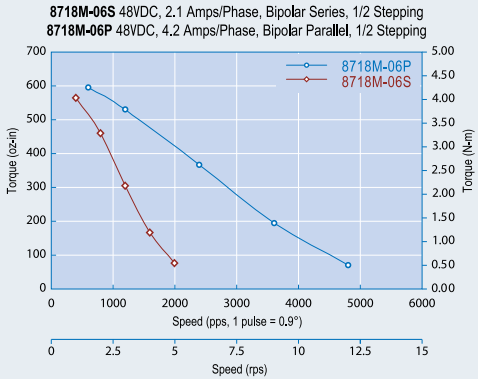
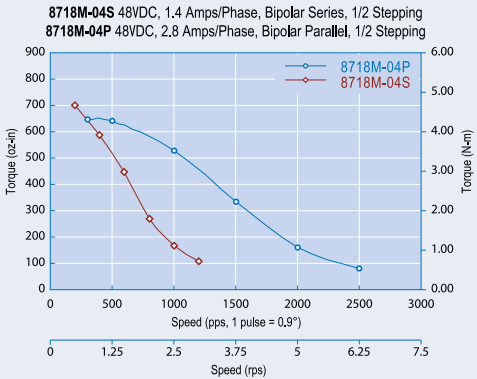
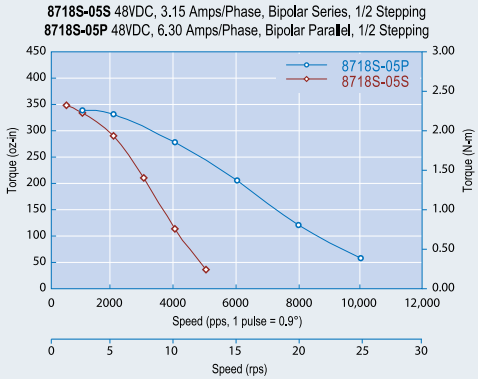
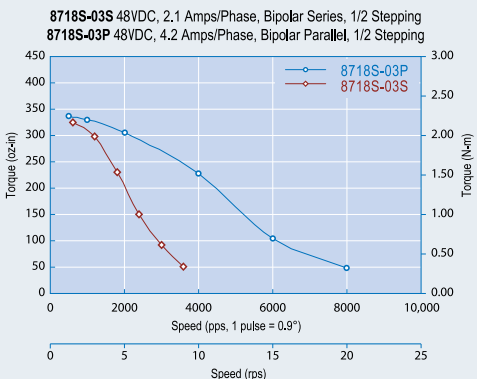
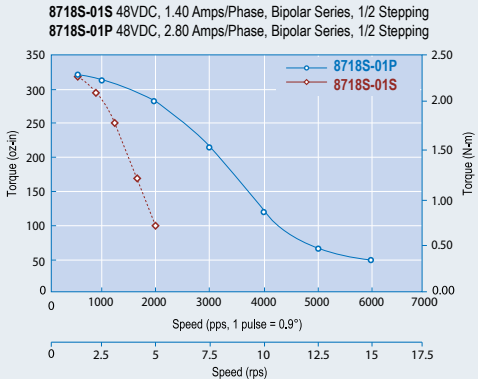
* These 8-wire motors are based on unipolar ratings. The motors can perform at both Bipolar Series and Parallel ratings.

DIMENSIONS

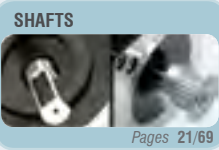


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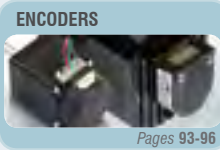
TORQUE CURVES



AVAILABLE OPTIONS



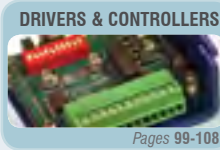
Pages 21/69



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Pages 21/70



Pages 99-108



Vacuum Rating

From 10^{-4} torr down to 10^{-7} torr

AVAILABLE FOR

- **211 Series** (Size 11, 1.8°)
- **4118 Series** (Size 17, 1.8°)
- **5718 Series** (Size 23, 1.8°)

FEATURES

- Increase design flexibility and reduce cost (motors may be placed inside vacuum chamber)
- Limit outgassing
- Ensure cleanliness
- Cooler operation with high temperature windings and teflon leads

OPTIONS

- Up to 16 oz-in of torque with the 211 series (*page 45*)
- Up to 83 oz-in of torque with the 4118 (*page 51*)
- Up to 294 oz-in of torque with the 5718 (*page 59*)

APPLICATIONS

- Motion control in vacuum related environments
- Cleanroom environment



• IP65 Rating

(Protected against dust & low pressure jets of water)

• IPX7 Rating (Submersible)

AVAILABLE FOR

- **4118 Series** (Size 17, 1.8°)
- **5718 Series** (Size 23, 1.8°)
- **8718 Series** (Size 34, 1.8°)

FEATURES

IP65

- Dust proof
- Withstands low pressure jets of water

IPX7

- Includes all characteristics of IP65 rating
- Submersible in liquids

OPTIONS

- Up to 83 oz-in of high torque with the 4118 (*page 51*)
- Up to 294 oz-in of high torque with the 5718 (*page 59*)
- Up to 1,288 oz-in of high torque with the 8718 (*page 65*)

APPLICATIONS

- Food processing
- Drug manufacturing
- Machine tools
- Chemical manufacturing
- Boating



PRESS FIT GEAR & PULLEY



MULTIPLE FLAT OPTIONS



CROSS DRILLED



HELICAL CUT



EXTENDED



SLOTTED OPTIONS



OVERSIZED



HOLLOW



All custom shaft modifications are based on customer provided drawings and specifications.



Connectors



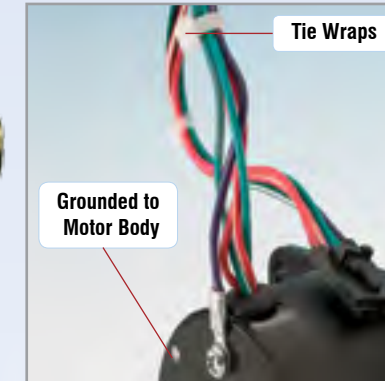
Wire Grounded to Motor Body



Front End Cap Lead Wire Exit

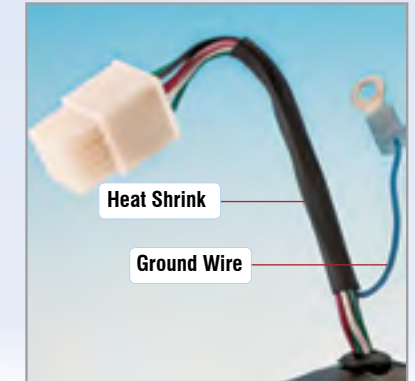


Custom Cable & Connector



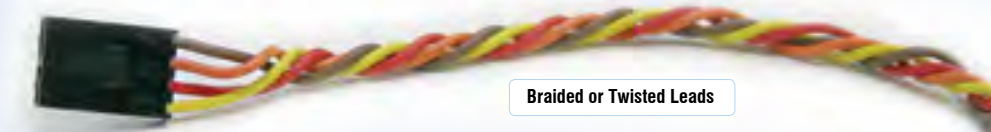
Tie Wraps

Grounded to Motor Body

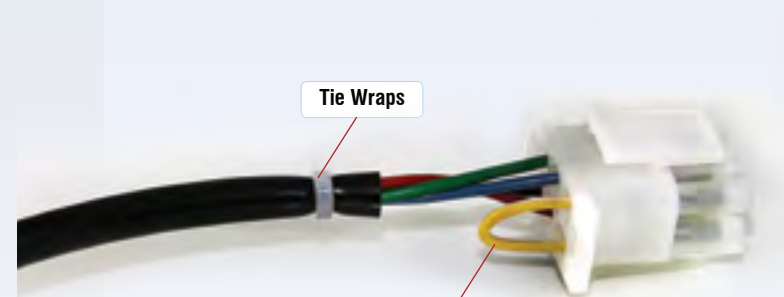


Heat Shrink

Ground Wire

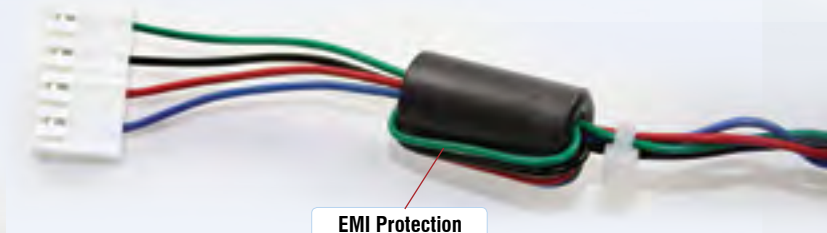


Braided or Twisted Leads

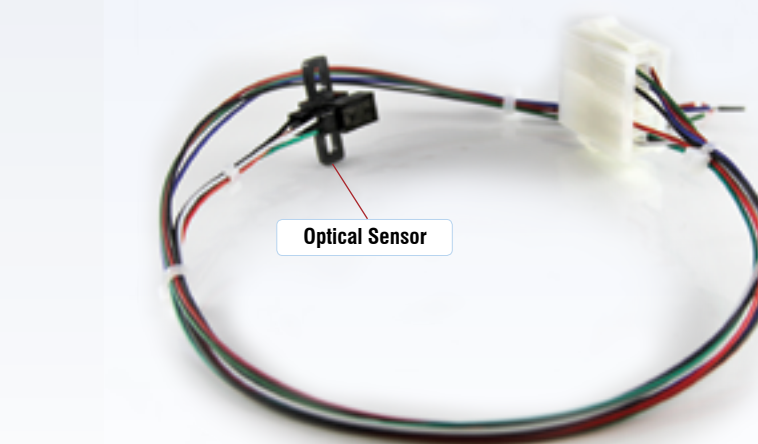


Tie Wraps

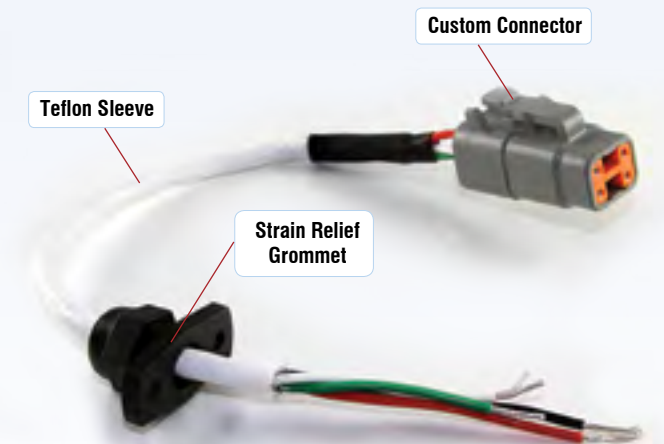
Jumper



EMI Protection



Optical Sensor



Custom Connector

Teflon Sleeve

Strain Relief Grommet



FEATURES

- NEMA 17, 1.8° Bipolar Step Motor
- Operates from +12 to 24 VDC
- Up to 83 oz-in of Holding Torque
- Phase current ranges from 0.35 to 2.0 Amps Peak
- Step Resolutions from Full, 2x, 4x, 8x
- Optically isolated Step, Direction, and Disable/Enable Inputs
- Selectable Current Reduction of 23%
- Low Power Dissipation
- Efficient Current Control
- Thermal Shutdown, Under-voltage Protection
- 3 stack lengths available



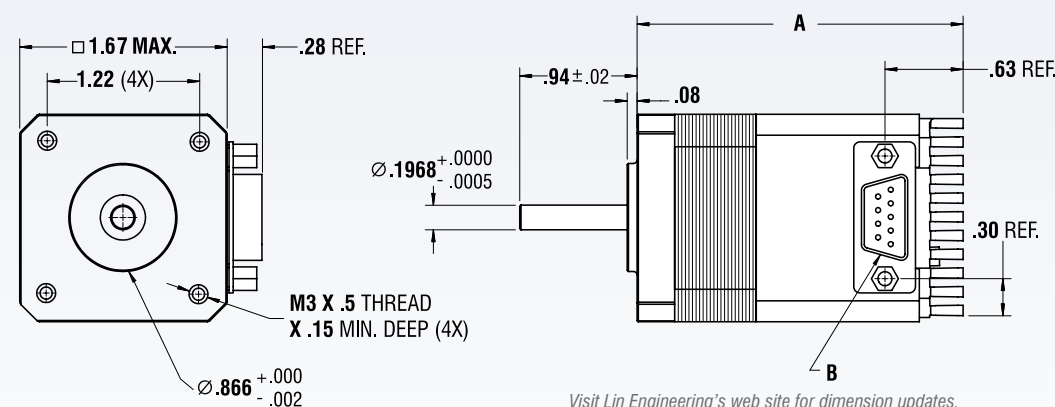
SPECIFICATIONS

- **INPUT VOLTAGE:**
+12 to 24 VDC (Including Unregulated Power Supplies)
- **DRIVE CURRENT (PER PHASE):**
0.35 to 2 Amps Peak
- **OPTICALLY ISOLATED INPUTS:**
Step Clock, Direction, Enable & Disable
- **STEP FREQUENCY (MAX):**
500 kHz
- **STEPS PER REVOLUTION (1.8° MOTOR):**
200, 400, 800, 1600
- **MICROSTEP RESOLUTIONS (1.8° MOTOR):**
Full, 2x, 4x, 8x

DIMENSIONS

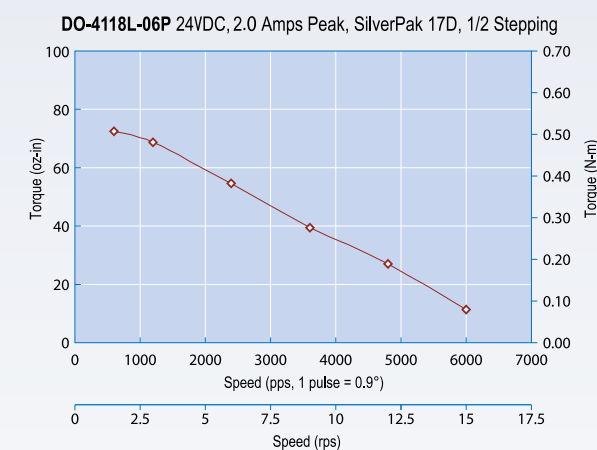
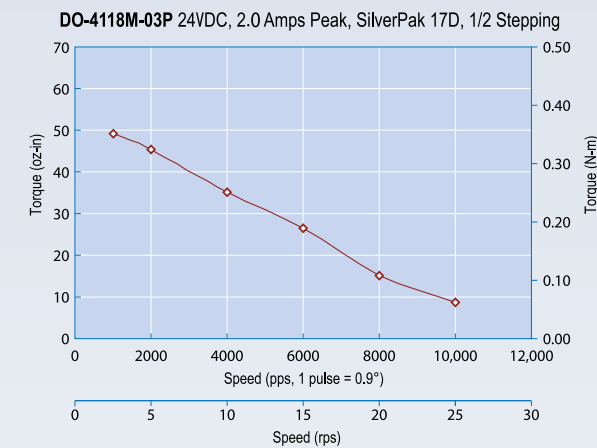
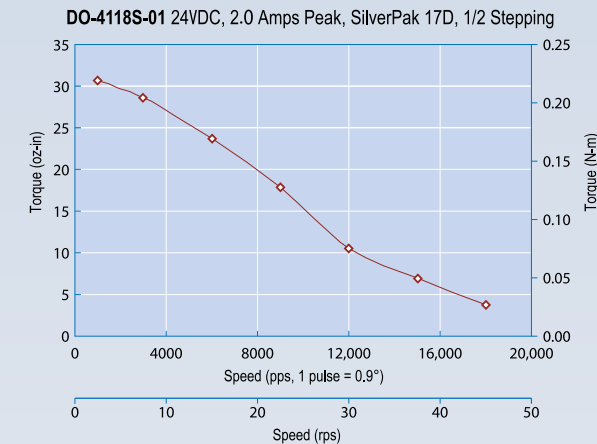
A. Overall Body Length
 DO-4118S: 2.69" (68.33 mm)
 DO-4118M: 2.92" (74.17 mm)
 DO-4118L: 3.24" (82.30 mm)

B. DB-9 Connector for Operation



Visit Lin Engineering's web site for dimension updates.

TORQUE CURVES



MOTOR SPECIFICATIONS

Model DO-4118S-01

Holding Torque oz-in (N-m)	45.0 (0.32)
Rotor Inertia oz-in ² (kg-cm ²)	0.18 (0.03)
Weight (Motor + Driver) lbs (kg)	0.55 (0.25)

Model DO-4118M-03P

Holding Torque oz-in (N-m)	63.0 (0.44)
Rotor Inertia oz-in ² (kg-cm ²)	0.28 (0.05)
Weight (Motor + Driver) lbs (kg)	0.75 (0.34)

Model DO-4118L-06P

Holding Torque oz-in (N-m)	83.0 (0.59)
Rotor Inertia oz-in ² (kg-cm ²)	0.37 (0.07)
Weight (Motor + Driver) lbs (kg)	0.85 (0.39)

OPTIONAL ENCODER

Optional encoder available with **SilverPak 17DE**

Encoder features:

- Max 1,250 cycles per revolution (CPR)
- Max 5,000 pulses per revolution (PPR) (quadrature)
- 2 channel quadrature TTL squarewave outputs
- Optional index (3rd channel)
- Position correction capabilities with user's external controller

OPTIONAL SHAFT MODIFICATIONS

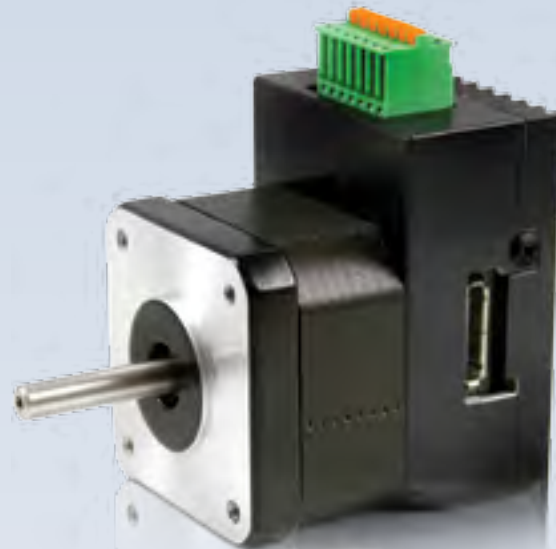


For more shaft modifications options, see page 69



FEATURES

- NEMA 17, 1.8° Bipolar Signature Series Step Motor (see page 17)
- Operates from +12 to 48 VDC
- Up to 83 oz-in of Holding Torque
- Phase current ranges from 0.1 to 3.0 Amps Peak
- Step Resolutions from Full Step to 256x microstepping and from 5x to 250x
- Optically isolated Step, Direction, and Disable/Enable inputs
- Four selectable damping modes for smooth motion
- Pole Damping Technology™ (See page 8)

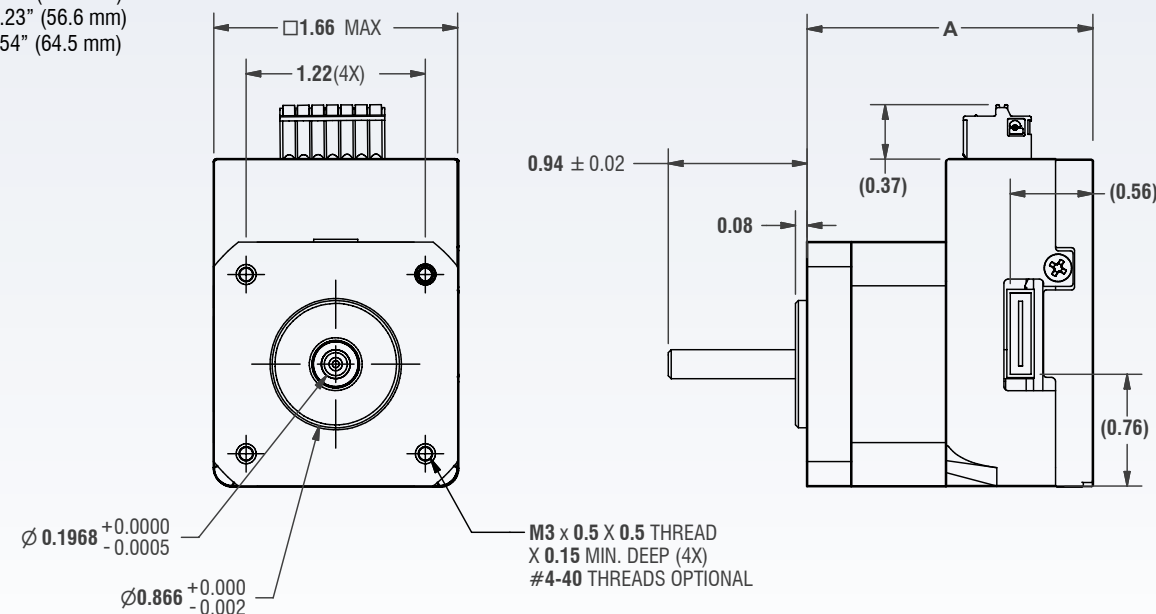


SPECIFICATIONS

- **INPUT VOLTAGE:**
+12 to 48 VDC (Including Unregulated Power Supplies)
- **DRIVE CURRENT (PER PHASE):**
0.1 to 3 Amps Peak
- **OPTICALLY ISOLATED INPUTS:**
Step Clock, Direction, Enable & Disable
- **STEP FREQUENCY (MAX):**
5 MHz
- **STEPS PER REVOLUTION (1.8° MOTOR):**
200, 400, 800, 1000, 1600, 2000, 3200, 5000, 6400, 10000, 12800, 25000, 25600, 50000, 51200
- **MICROSTEP RESOLUTIONS (1.8° MOTOR):**
Full, 2x, 4x, 5x, 8x, 10x, 16x, 25x, 32x, 50x, 64x, 125x, 128x, 250x, 256x

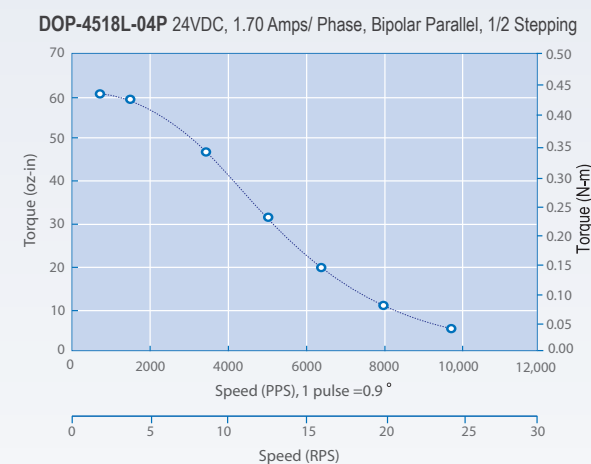
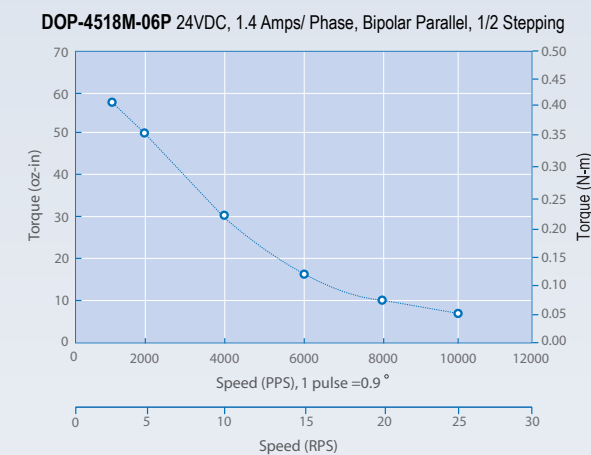
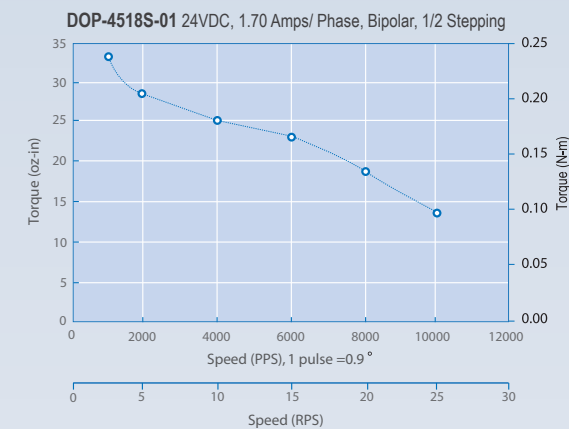
DIMENSIONS

A. Overall Body Length
 DO-4518S: 1.99" (50.5 mm)
 DO-4518M: 2.23" (56.6 mm)
 DO-4518L: 2.54" (64.5 mm)



Visit Lin Engineering's web site for dimension updates.

TORQUE CURVES



MOTOR SPECIFICATIONS

Model DOP-4518S-01
Holding Torque oz-in (N-m) 45.0 (0.32)
Rotor Inertia oz-in² (kg-cm²) 0.18 (0.03)
Weight (Motor + Driver) lbs (kg) 0.60 (0.27)

Model DOP-4518M-06P
Holding Torque oz-in (N-m) 63.0 (0.44)
Rotor Inertia oz-in² (kg-cm²) 0.28 (0.05)
Weight (Motor + Driver) lbs (kg) 0.80 (0.36)

Model DOP-4518L-04S
Holding Torque oz-in (N-m) 83.0 (0.59)
Rotor Inertia oz-in² (kg-cm²) 0.37 (0.07)
Weight (Motor + Driver) lbs (kg) 0.90 (0.41)

OPTIONAL ENCODER

Optional encoder available with **SilverPak 17DE Plus**

Encoder features:

- Max 1,250 cycles per revolution (CPR)
- Max 5,000 pulses per revolution (PPR) (quadrature)
- 2 channel quadrature TTL squarewave outputs
- Optional index (3rd channel)
- Position correction capabilities with user's external controller

OPTIONAL SHAFT MODIFICATIONS



For more shaft modifications options, see page 69



FEATURES

- NEMA 17, 1.8° Bipolar Step Motor
- Up to 83 oz-in of holding torque
- Input voltage of +12 to 40 VDC
- Phase current ranges from 0.3 to 2.0 Amps Peak
- Microstepping capabilities of Full, 2x, 4x, 8x, 16x, 32x, 64x, 128x, and 256x
- 2 user configurable digital I/O's
- 2 dedicated inputs:
 - » 1 optical sensor for homing
 - » switch closure to ground
- Fully programmable ramps and speeds
- Software selectable Hold and Move currents
- Stand Alone Operation with no connection to PC
- Stores up to 16 different programs at once with 4 kBytes of memory
- Lin Control GUI available
- 3 stack lengths available



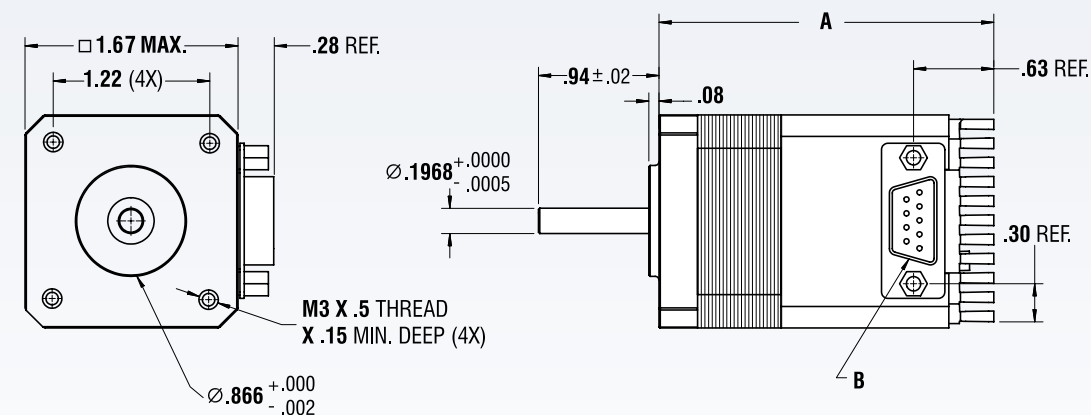
SPECIFICATIONS

- **INPUT VOLTAGE:**
+12 to 40 VDC
- **DRIVE CURRENT (PER PHASE):**
0.3 to 2.0 Amps Peak
- **I/O's:**
2 user configurable digital
2 dedicated inputs:
1 optical sensor for homing
1 switch closure to ground
- **STEPS PER REVOLUTION (1.8° MOTOR):**
200, 400, 800, 1600, 3200, 6400, 12800, 25600, 51200
- **MICROSTEP RESOLUTIONS (1.8° MOTOR):**
Full, 2x, 4x, 8x, 16x, 32x, 64x, 128x, 256x

DIMENSIONS

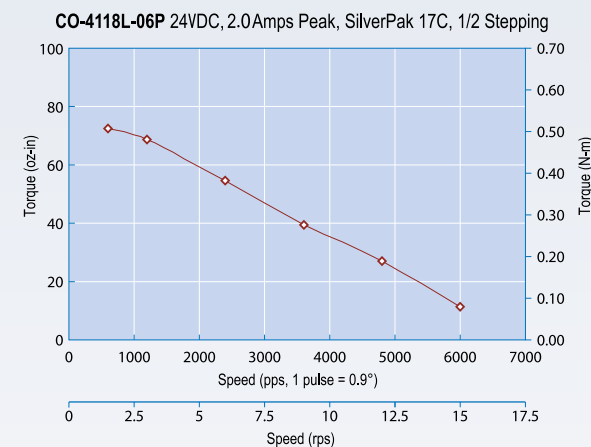
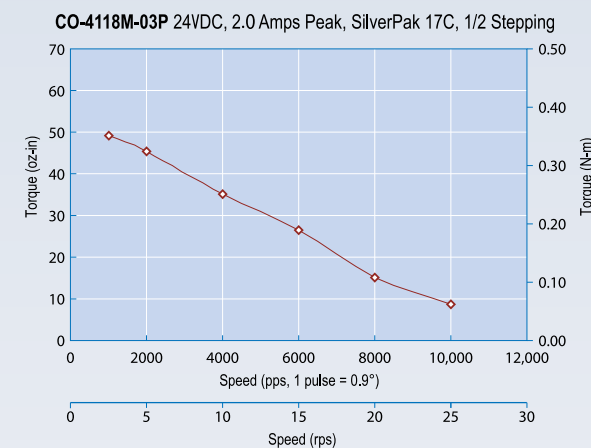
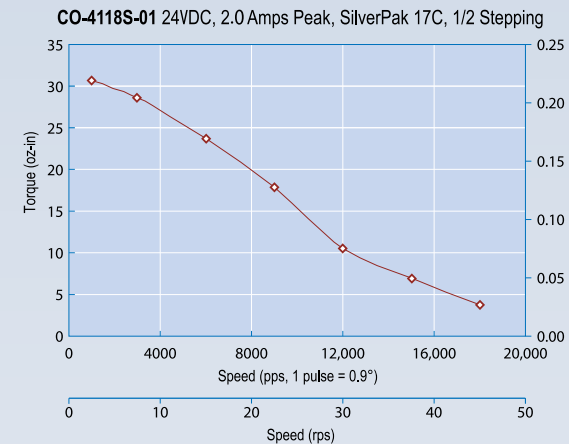
A. Overall Body Length
 CO-4118S: 2.69" (68.33 mm)
 CO-4118M: 2.92" (74.17 mm)
 CO-4118L: 3.24" (82.30 mm)

B. DB-9 Connector for Operation



Visit Lin Engineering's web site for dimension updates.

TORQUE CURVES



MOTOR SPECIFICATIONS

Model CO-4118S-01

Holding Torque oz-in (N-m)	45.0 (0.32)
Rotor Inertia oz-in ² (kg-cm ²)	0.18 (0.03)
Weight (Motor + Driver) lbs (kg)	0.55 (0.25)

Model CO-4118M-03P

Holding Torque oz-in (N-m)	63.0 (0.44)
Rotor Inertia oz-in ² (kg-cm ²)	0.28 (0.05)
Weight (Motor + Driver) lbs (kg)	0.75 (0.34)

Model CO-4118L-06P

Holding Torque oz-in (N-m)	83.0 (0.59)
Rotor Inertia oz-in ² (kg-cm ²)	0.37 (0.07)
Weight (Motor + Driver) lbs (kg)	0.85 (0.39)

OPTIONAL ENCODER

Optional encoder available with **SilverPak 17CE**

Encoder features:

- Max 1,250 cycles per revolution (CPR)
- Max 5,000 pulses per revolution (PPR) (quadrature)
- 2 channel quadrature TTL squarewave outputs
- Optional index (3rd channel)
- Position correction capabilities with user's external controller

DESIGNER'S KITS

RS485 Designer's Kit (Lin part number: RS232KIT)



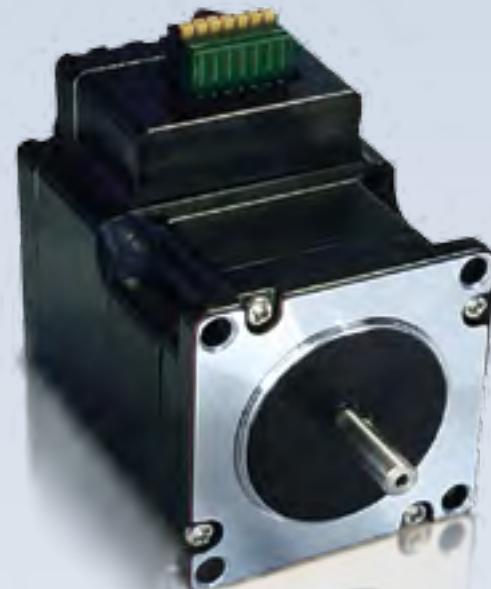
USB485 Designer's Kit (Lin part number: USBKIT)





FEATURES

- NEMA Size 23, 2 phase, 1.8° bipolar step motor w/ Built-In microstepping Driver
- Up to 294 oz-in of holding torque
- Operates from +12 to 75 VDC
- Phase currents from 0.1 to 5.0 Amps Peak
- Step resolutions from Full Step to 256x microstepping and from 5x to 250x
- Four selectable damping modes for smooth motion
- Uses the new Lin Driver GUI software to set parameters
- Pole Damping Technology™

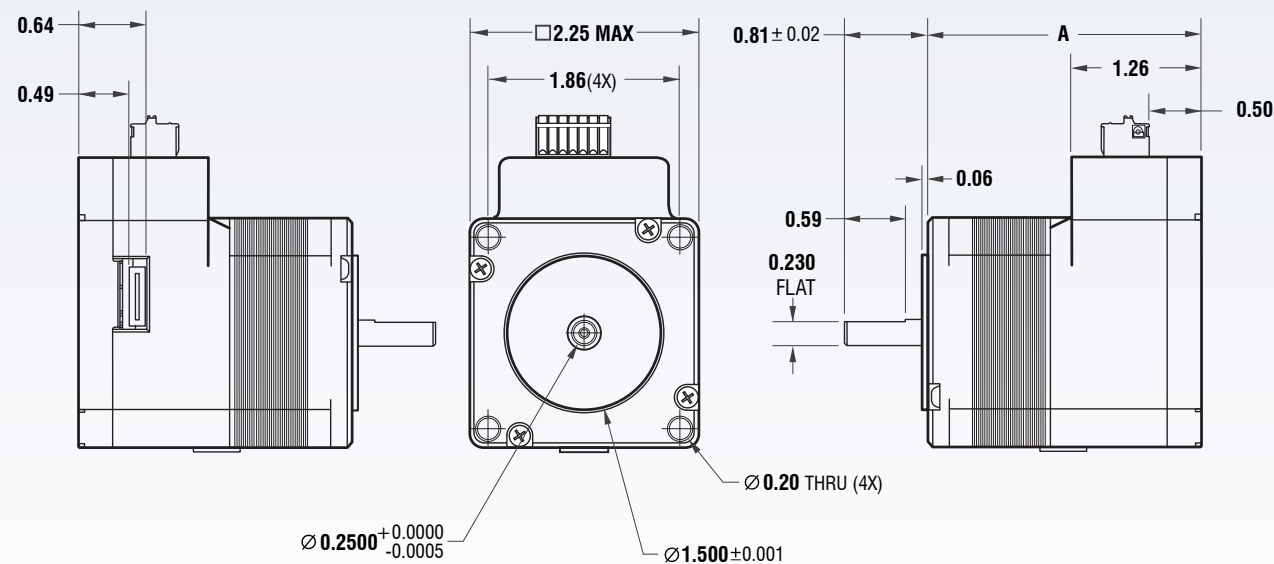


SPECIFICATIONS

- **INPUT VOLTAGE:**
+12 to 75 VDC
- **DRIVE CURRENT(PER PHASE):**
0.1 to 5.0 Amps Peak
- **OPTICALLY ISOLATED INPUTS:**
Step, Direction, and Disable
- **STEP FREQUENCY (MAX):**
5.0 MHz
- **STEPS PER REVOLUTION (1.8° MOTOR):**
200, 400, 800, 1600, 2000, 3200, 5000, 6400, 10000, 12800, 25000, 25600, 50000, 51200
- **MICROSTEP RESOLUTIONS (1.8° MOTOR):**
Full, 2x, 4x, 8x, 10x, 16x, 25x, 32x, 50x, 64x, 125x, 128x, 250x, 256x
- **POLE DAMPING TECHNOLOGY™:** See page 8.

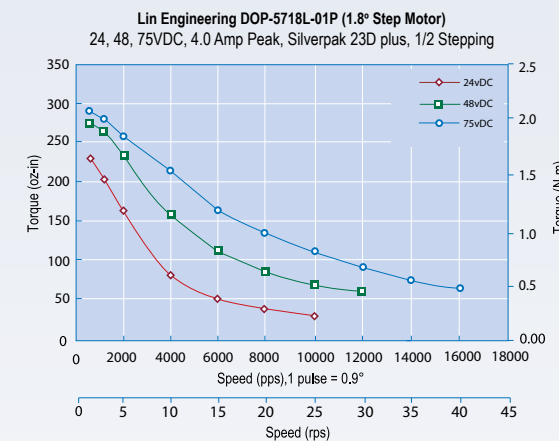
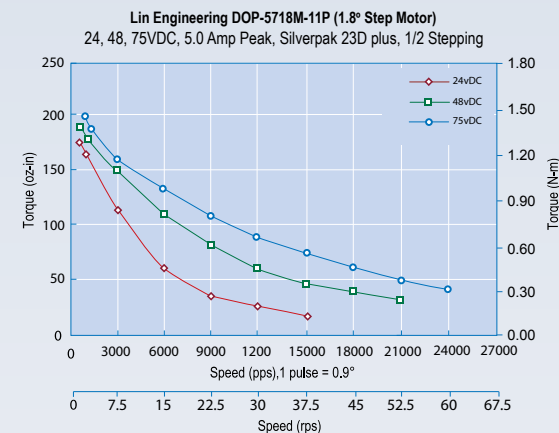
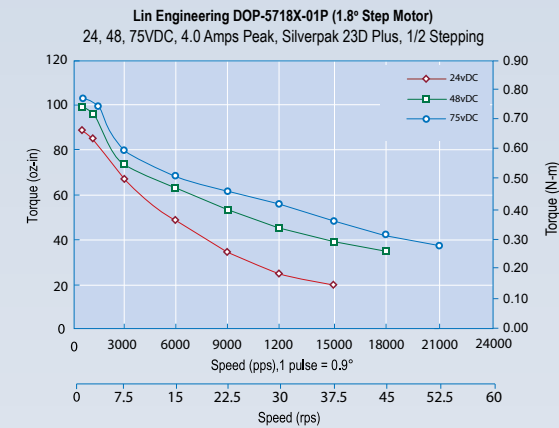
DIMENSIONS

A. Overall Body Length
 DOP-5718X: 2.65" (67.31 mm)
 DOP-5718M: 3.16" (80.26 mm)
 DOP-5718L: 4.03" (102.3 mm)



Visit Lin Engineering's web site for dimension updates.

TORQUE CURVES



MOTOR SPECIFICATIONS

Model DOP-5718X-01P

Holding Torque oz-in (N-m)	100.0 (0.71)
Rotor Inertia oz-in ² (kg-cm ²)	0.7 (0.13)
Weight (Motor + Driver) lbs (kg)	1.2 (0.55)

Model DOP-5718M-11P

Holding Torque oz-in (N-m)	173.0 (1.22)
Rotor Inertia oz-in ² (kg-cm ²)	1.50 (0.27)
Weight (Motor + Driver) lbs (kg)	1.65 (0.75)

Model DOP-5718L-01P

Holding Torque oz-in (N-m)	294.00 (2.08)
Rotor Inertia oz-in ² (kg-cm ²)	2.60 (0.47)
Weight (Motor + Driver) lbs (kg)	2.35 (1.07)

OPTIONAL ENCODER

Optional encoder available with **SilverPak 23DE Plus**

Encoder features:

- Max 1,250 cycles per revolution (CPR)
- Max 5,000 pulses per revolution (PPR) (quadrature)
- 2 channel quadrature TTL squarewave outputs
- Optional index (3rd channel)
- Position correction capabilities with user's external controller



SHAFT MODIFICATIONS



For more shaft modifications options, see page 69.



FEATURES

- 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 3.0 Amps Peak
- Microstepping capabilities of Full, 2x, 4x, 8x, 16x, 32x, 64x, 128x, 256x
- RS485 communication with optional converter cards available
- 4 user configurable digital I/O's
- 2 dedicated inputs:
 - 1 optical sensor for homing
 - 1 switch closure to ground
- Fully programmable ramps and speeds
- Software selectable Hold and Move currents
- Stand Alone Operation with no connection to PC
- Stores up to 16 different programs at once with 4 kBytes of memory
- 3 stack lengths available

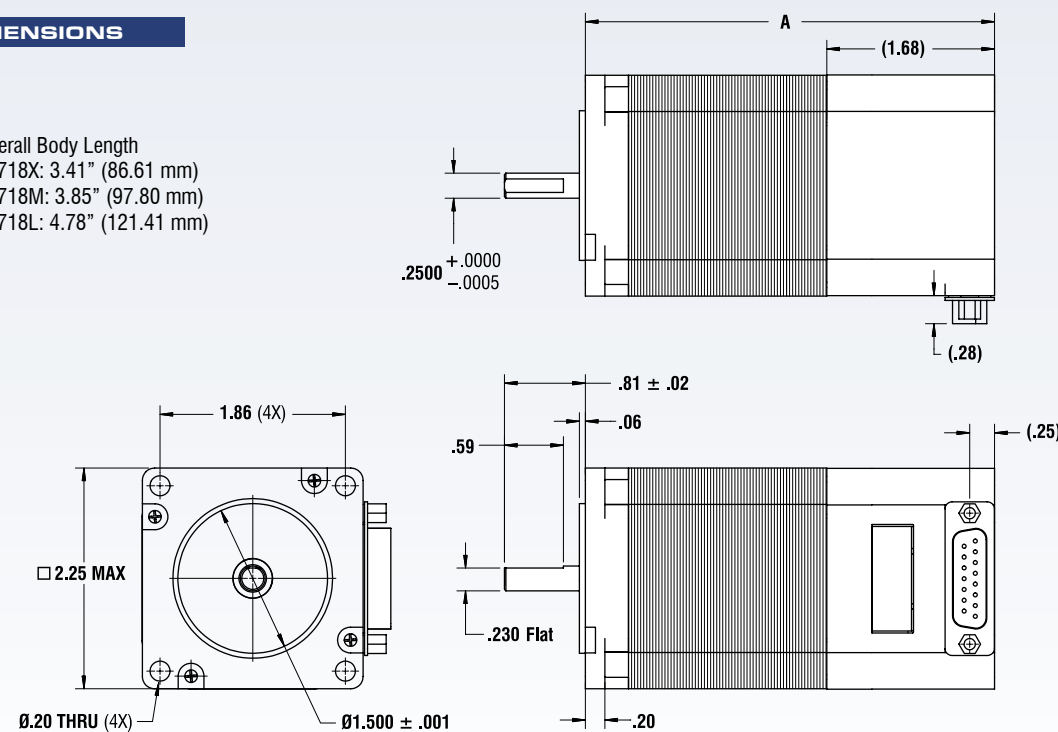


SPECIFICATIONS

- **INPUT VOLTAGE:**
+12 to 40 VDC
- **DRIVE CURRENT(PER PHASE):**
0.3 to 3.0 Amps Peak
- **ISOLATED INPUTS:**
4 I/O's, Switch Closure to Ground, Opto Phototransistor
- **STEPS PER REVOLUTION (1.8° MOTOR):**
200, 400, 800, 1600, 3200, 6400, 12800, 25600, 51200
- **MICROSTEP RESOLUTIONS (1.8° MOTOR):**
Full, 2x, 4x, 8x, 16x, 32x, 64x, 128x, 256x

DIMENSIONS

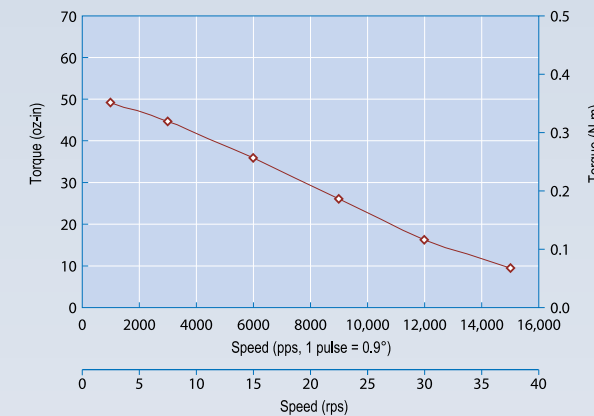
A. Overall Body Length
 CO-5718X: 3.41" (86.61 mm)
 CO-5718M: 3.85" (97.80 mm)
 CO-5718L: 4.78" (121.41 mm)



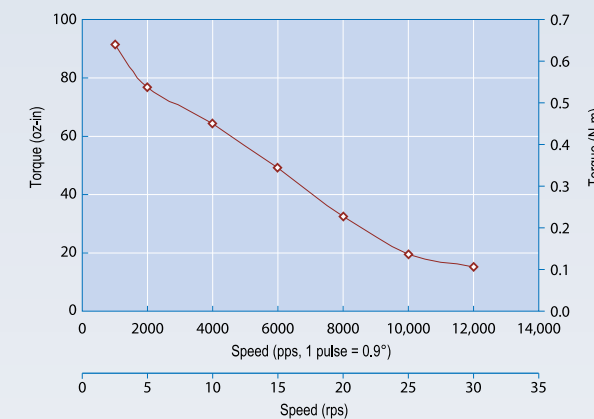
Visit Lin Engineering's web site for dimension updates.

TORQUE CURVES

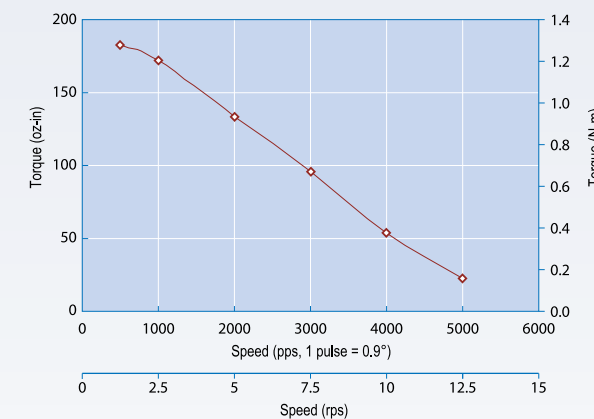
CO-5718X-01P 24VDC, 3.0 Amps Peak, SilverPak 23C, 1/2 Stepping



CO-5718M-02P 24VDC, 3.0 Amps Peak, SilverPak 23C, 1/2 Stepping



CO-5718L-01P 24VDC, 3.0 Amps Peak, SilverPak 23C, 1/2 Stepping



MOTOR SPECIFICATIONS

Model CO-5718X-01P

Holding Torque oz-in (N-m)	100.0 (0.71)
Rotor Inertia oz-in ² (kg-cm ²)	0.7 (0.13)
Weight (Motor + Driver) lbs (kg)	1.3 (0.59)

Model CO-5718M-02P

Holding Torque oz-in (N-m)	173.0 (1.22)
Rotor Inertia oz-in ² (kg-cm ²)	1.5 (0.27)
Weight (Motor + Driver) lbs (kg)	1.8 (0.82)

Model CO-5718L-01P

Holding Torque oz-in (N-m)	294.0 (2.08)
Rotor Inertia oz-in ² (kg-cm ²)	2.6 (0.47)
Weight (Motor + Driver) lbs (kg)	2.5 (1.13)

OPTIONAL ENCODER

Optional encoder available with **SilverPak 23CE**

Encoder features:

- Max 1,250 cycles per revolution (CPR)
- Max 5,000 pulses per revolution (PPR) (quadrature)
- 2 channel quadrature TTL squarewave outputs
- Index (3rd channel)
- Position correction capabilities

DESIGNER'S KITS

RS485 Designer's Kit (Lin part number: RS232KIT)



USB485 Designer's Kit (Lin part number: USBKIT)



FEATURES

- NEMA Size 34, 2 Phase, 1.8° Bipolar Step Motor w/ Built-In Microstepping Driver
- Operates from +24 to 75 VDC
- Selectable phase currents from 0.5 to 7.0 Amps Peak (in 0.1A increments)
- Step Resolutions include: Full, 2x, 4x, 8x, 16x, 32x, 64x, 128x, and 256x microstepping
- Four selectable damping modes
- Three optically isolated control inputs (step, direction change, enable/disable)
- Hold current settings from 0 to 7 Amps (in 0.1 Amp increments)
- Pole Damping Technology™ for smooth motion (see page 8)
- Multiple motor windings available upon request
- Easy to use GUI interface for setting parameters

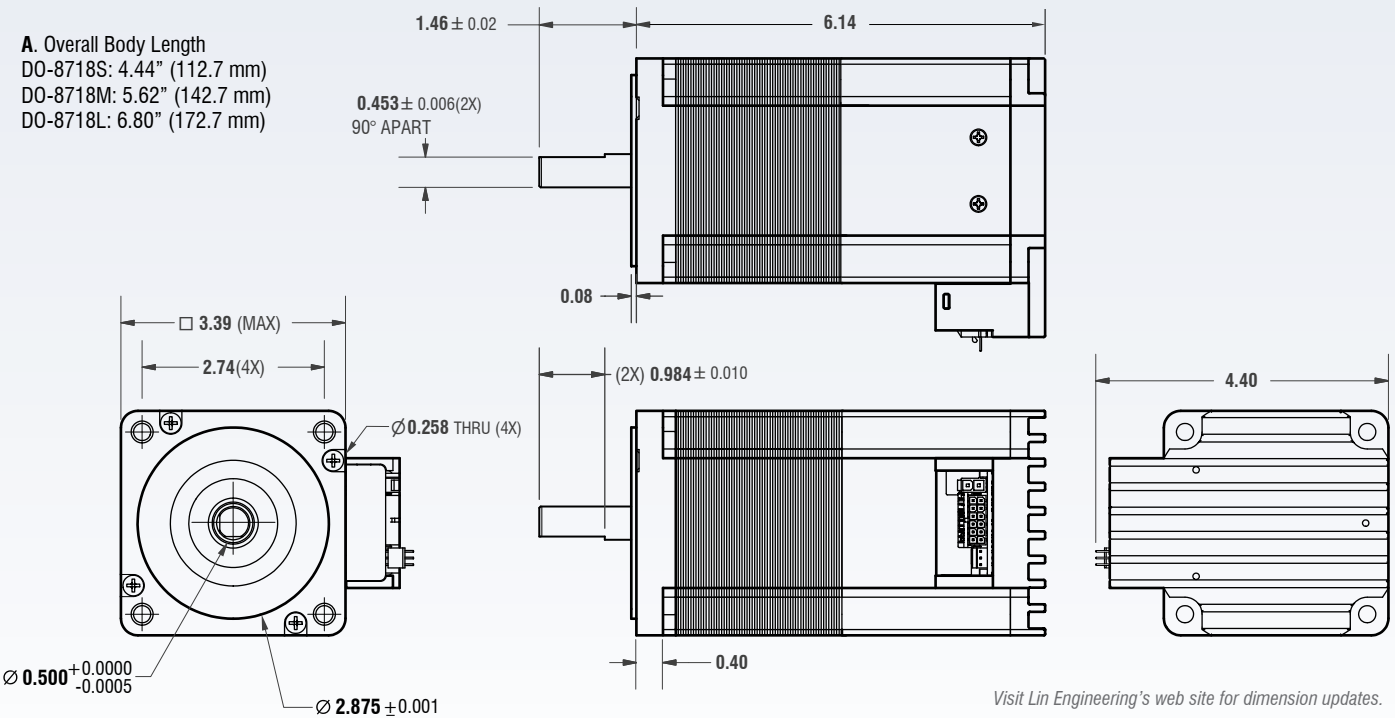


SPECIFICATIONS

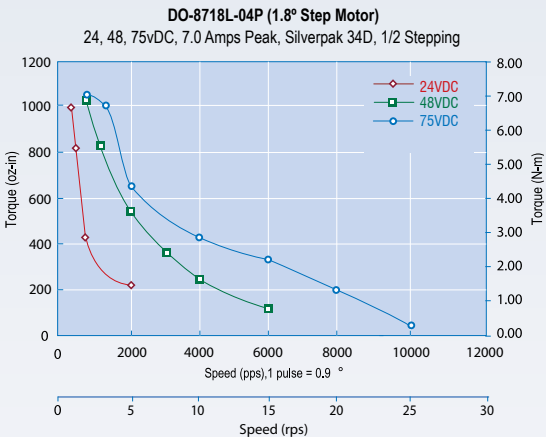
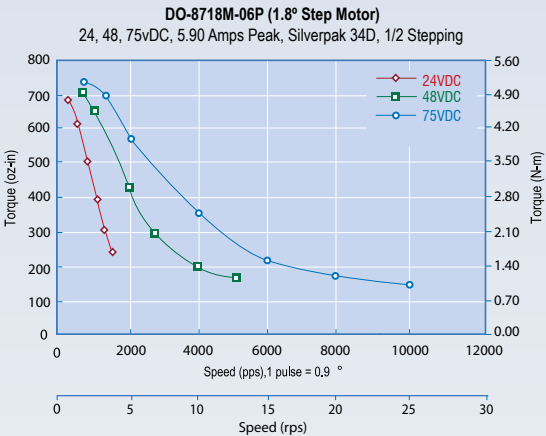
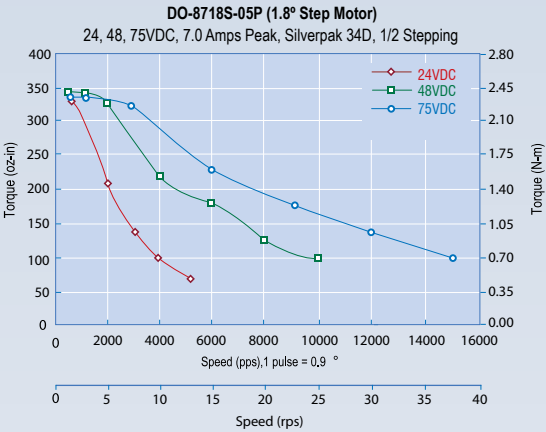
- **INPUT VOLTAGE:**
+24 to 75 VDC
- **DRIVE CURRENT(PER PHASE):**
0.5 to 7.0 Amps Peak with 0.1 Amp increments
- **ISOLATED INPUTS:**
Step, Direction, and Disable
- **STEP FREQUENCY (MAX):**
5.0 MHz
- **STEPS PER REVOLUTION (1.8° MOTOR):**
200, 400, 800, 1600, 3200, 6400, 12800, 25600, 51200
- **MICROSTEP RESOLUTIONS (1.8° MOTOR):**
Full, 2x, 4x, 8x, 16x, 32x, 64x, 128x, 256x

DIMENSIONS

A. Overall Body Length
DO-8718S: 4.44" (112.7 mm)
DO-8718M: 5.62" (142.7 mm)
DO-8718L: 6.80" (172.7 mm)



TORQUE CURVES



MOTOR SPECIFICATIONS

Model DO-8718S-05P
Holding Torque oz-in (N-m) 434.0 (3.06)
Rotor Inertia oz-in² (kg-cm²) 7.66 (1.39)
Weight (Motor + Driver) lbs (kg) 4.75 (2.15)

Model DO-8718M-06P
Holding Torque oz-in (N-m) 861.0 (6.08)
Rotor Inertia oz-in² (kg-cm²) 14.8 (2.69)
Weight (Motor + Driver) lbs (kg) 6.85 (3.10)

Model DO-8718L-04P
Holding Torque oz-in (N-m) 1288.0 (9.10)
Rotor Inertia oz-in² (kg-cm²) 21.9 (3.98)
Weight (Motor + Driver) lbs (kg) 9.35 (4.24)

OPTIONAL ENCODER

Optional encoder available with SilverPak 34DE

- Encoder features:**
- Max 1,250 cycles per revolution (CPR)
 - Max 5,000 pulses per revolution (PPR) (quadrature)
 - 2 channel quadrature TTL squarewave outputs
 - Optional index (3rd channel)
 - Position correction capabilities with user's external controller

DESIGNER'S KITS

RS485 Designer's Kit (Lin part number: RS232KIT-03)



USB485 Designer's Kit (Lin part number: USBKIT-03)





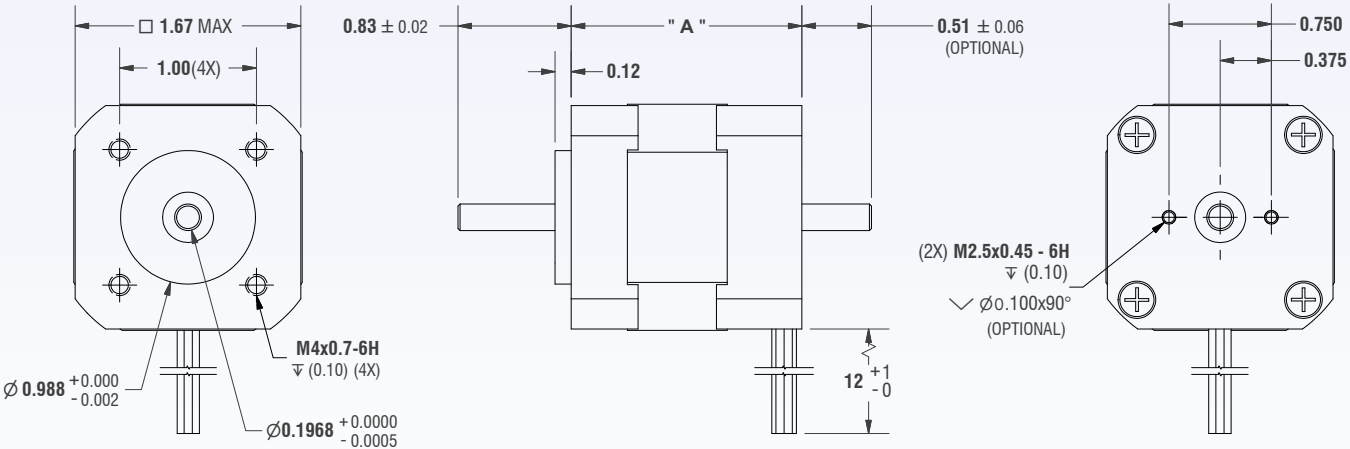
- Standard Torque Motor
- High Speed
- High Efficiency
- Additional Windings Available

SPECIFICATIONS

Dimension "A" Inches (mm)	Model Number	Rated Torque (oz-in)	Rated Voltage (VDC)	Rated Speed (RPM)	Rated Power (Watts)	Rated Current (Amps)	Peak Torque (oz-in)	Peak Current (Amp)	Torque Constant Kt (oz-in/Amp)	Back EMF Constant Ke (Vpeak/kRPM)	Resistance (ohms)	Inductance (mH)	Rotor Inertia (oz-in ²)	Weight lbs (kg)
1.7" max (43 mm)	BL17B17-03	10	24	4000	30	2.1	26.91	5.4	5	3.8	1.5	2	0.13	0.54 (0.25)
2.4" max (62 mm)	BL17B24-04	17	24	4000	50	3.6	53.81	10.6	4.75	3.1	0.75	1.3	0.26	0.94 (0.43)
3.2" max (82 mm)	BL17B32-02	31	24	4000	92	6.1	79.3	15.5	5.1	3.6	0.49	0.64	0.39	1.31 (0.60)
3.9" max (100 mm)	BL17B40-02	41	24	4000	121	8.1	106.21	20	5.1	3.7	0.32	0.46	0.52	1.74 (0.80)

- Please complete our application data sheet on page 116 for different windings.
- Performance, use, and appearance specifications of the products listed here are subject to change without notice.
- For operating temperatures, see page 114.

DIMENSIONS



* Rear shaft and encoder holes are optional features. All standard double shaft motors come with encoder holes on rear end cap. Visit Lin Engineering's web site for dimension updates.

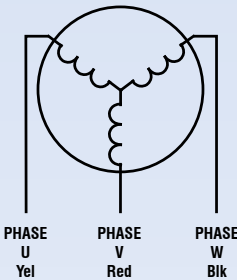
WIRING DIAGRAM

WINDING TYPE	STAR CONNECTION
Hall Effect angle:	120° electrical angle
Number of rotor poles:	8
Number of Phases:	3
Radial Play:	0.06 mm @ 450 g
End Play:	0.08 mm @ 450 g
Max. radial force:	15 N @ 20 mm from flange
Max. axial force:	10 N
Insulation class:	Class B
Dielectric strength:	500VDC for 1 minute
Insulation resistance:	100M Ω Min. 500VDC
Ambient Temperature:	-20 to 50°C
Storage Temperature:	-20 to 100°C
Operating Temperature:	-20 to 50°C
Humidity Range:	85% (RH) non-condensing
Lead Wire AWG:	UL1007, AWG 20
Direction of rotation:	CCW

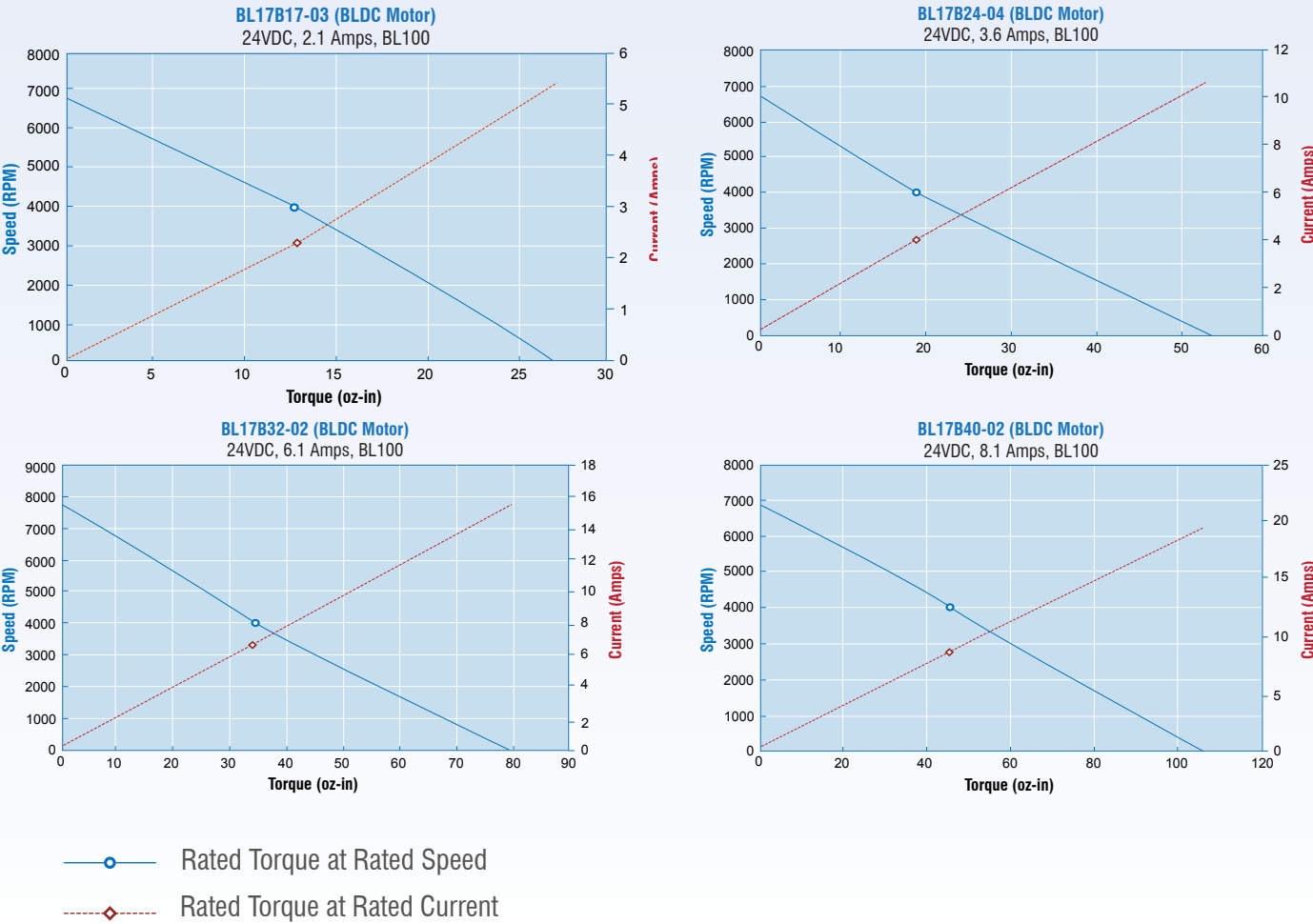
WIRE COLOR	DESCRIPTION
red/ white	Hall Supply
blue	Hall A
green	Hall B
white	Hall C
black/white	Hall Ground
yellow	Phase A (U)
red	Phase B (V)
black	Phase C (W)

H1 blue	H1 green	H3 white	U yellow	V red	W black	CCW
0	1	0	L	X	H	
1	1	0	X	L	H	
1	0	0	H	L	X	
1	0	1	H	X	L	
0	0	1	X	H	L	
0	1	1	L	H	X	

STAR CONNECTION



TORQUE CURVES





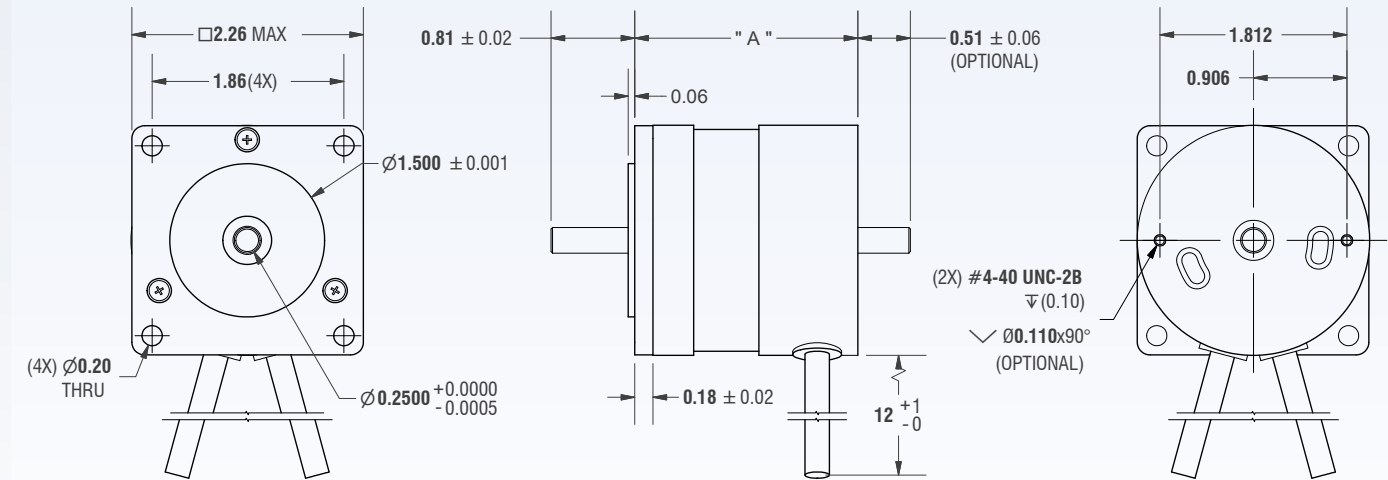
- Standard Torque Motor
- High Speed
- High Efficiency
- Additional Windings Available

SPECIFICATIONS

Dimension "A" Inches (mm)	Model Number	Rated Torque (oz-in)	Rated Voltage (VDC)	Rated Speed (RPM)	Rated Power (Watts)	Rated Current (Amps)	Peak Torque (oz-in)	Peak Current (Amp)	Torque Constant Kt (oz-in/Amp)	Back EMF Constant Ke (Vpeak/kRPM)	Resistance (ohms)	Inductance (mH)	Rotor Inertia (oz-in ²)	Weight lbs (kg)
2.00" max (52 mm)	BL24B20-02	16	36	4000	46	2.1	55	5.1	9.1	7.8	1.86	4.2	0.37	0.95 (0.43)
2.80" max (72 mm)	BL24B28-04	38.5	36	4000	114	4.1	129	12.32	9.32	7.8	0.78	1.89	0.67	1.50 (0.68)
3.60" max (92 mm)	BL24B36-02	67.5	36	4000	200	7.3	126.3	15.1	9.24	7.5	0.5	1.15	0.94	2.01 (0.91)
4.53" max (115 mm)	BL24B46-01	87.8	56	3000	259	4.7	259	19.5	18.8	13	1.1	2.97	1.28	2.35 (1.07)

- Please complete our application data sheet on page 116 for different windings.
- Performance, use, and appearance specifications of the products listed here are subject to change without notice.
- For operating temperatures, see page 114.

DIMENSIONS



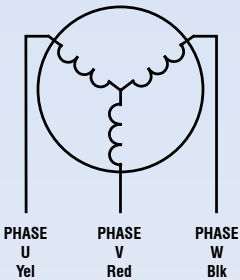
* Rear shaft and encoder holes are optional features. All standard double shaft motors come with encoder holes on rear end cap. Visit Lin Engineering's web site for dimension updates.

WIRING DIAGRAM

WINDING TYPE	STAR CONNECTION
Hall Effect angle:	120° electrical angle
Number of rotor poles:	4
Number of Phases:	3
Radial Play:	0.06 mm @ 450 g
End Play:	0.08 mm @ 450 g
Max. radial force:	15 N @ 20 mm from flange
Max. axial force:	10 N
Insulation class:	Class B
Dielectric strength:	500VDC for 1 minute
Insulation resistance:	100M Ω Min. 500VDC
Ambient Temperature:	-20 to 50 °C
Storage Temperature:	-20 to 100 °C
Operating Temperature:	-20 to 50 °C
Humidity Range:	85% (RH) non-condensing
Lead Wire AWG:	UL1007, AWG 20
Direction of rotation:	CCW

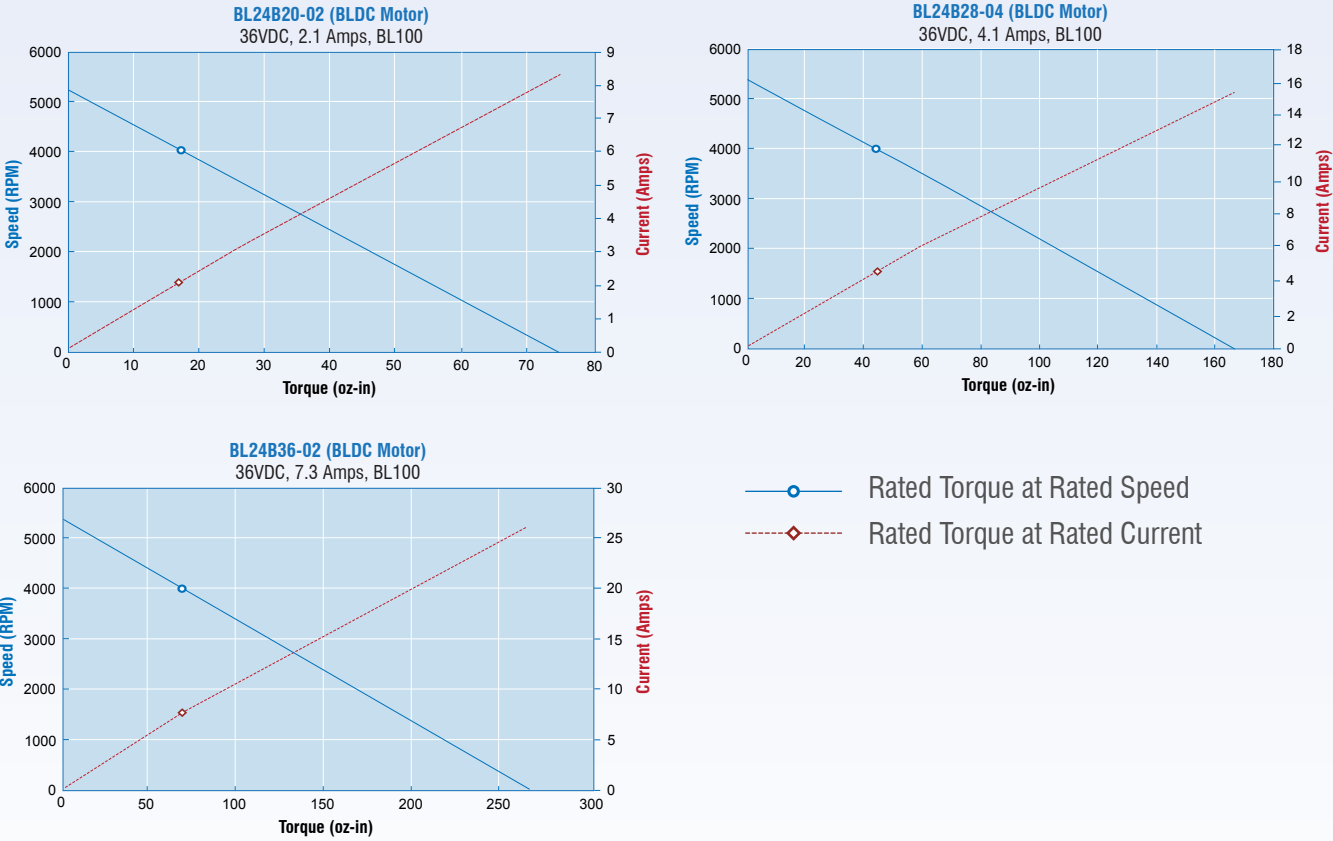
STAR CONNECTION

WIRE COLOR	DESCRIPTION
red/ white	Hall Supply
blue	Hall A
green	Hall B
white	Hall C
black/white	Hall Ground
yellow	Phase A (U)
red	Phase B (V)
black	Phase C (W)



H1 blue	H1 green	H3 white	U yellow	V red	W black	CCW
0	1	0	L	X	H	
1	1	0	X	L	H	
1	0	0	H	L	X	
1	0	1	H	X	L	
0	0	1	X	H	L	
0	1	1	L	H	X	

TORQUE CURVES





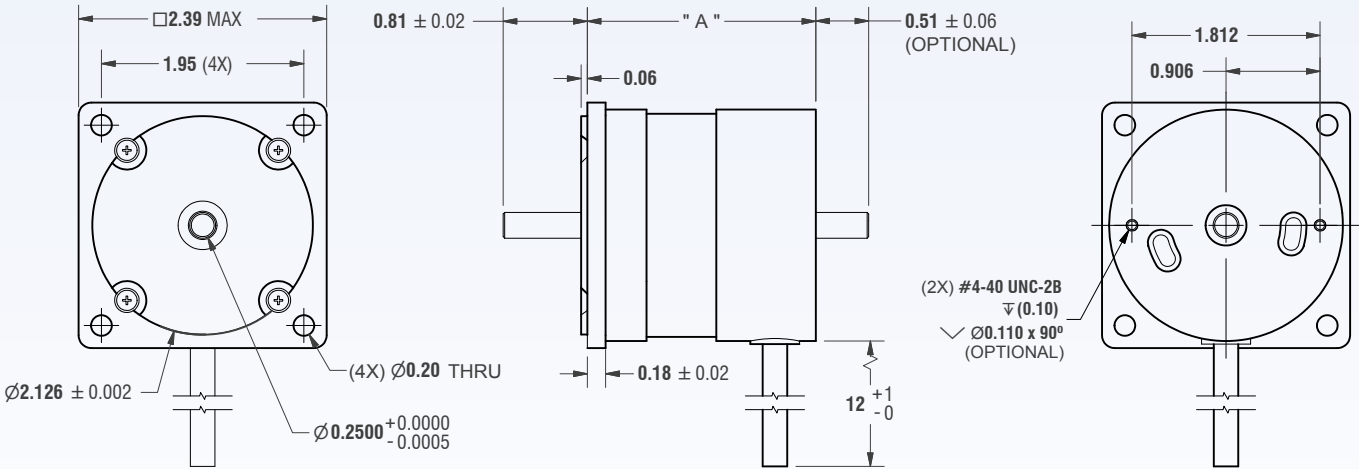
- High Torque Motor
- High Speed
- High Efficiency
- Additional Windings Available

SPECIFICATIONS

Dimension "A" Inches (mm)	Model Number	Rated Torque (oz-in)	Rated Voltage (VDC)	Rated Speed (RPM)	Rated Power (Watts)	Rated Current (Amps)	Peak Torque (oz-in)	Peak Current (Amp)	Torque Constant Kt (oz-in/Amp)	Back EMF Constant Ke (Vpeak/kRPM)	Resistance (ohms)	Inductance (mH)	Rotor Inertia (oz-in ²)	Weight lbs (kg)
1.90" max (49 mm)	BL25B19-01	24	36	2300	58	4.7	55	5.1	7.1	6	1.3	2.17	0.36	0.93 (0.42)

- Please complete our application data sheet on page 116 for different windings.
- Performance, use, and appearance specifications of the products listed here are subject to change without notice.
- For operating temperatures, see page 114.

DIMENSIONS



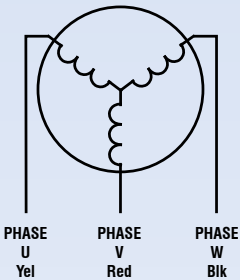
* Rear shaft and encoder holes are optional features. All standard double shaft motors come with encoder holes on rear end cap. Visit Lin Engineering's web site for dimension updates.

WIRING DIAGRAM

WINDING TYPE	STAR CONNECTION
Hall Effect angle:	120° electrical angle
Number of rotor poles:	4
Number of Phases:	3
Radial Play:	0.06 mm @ 450 g
End Play:	0.08 mm @ 450 g
Max. radial force:	15 N @ 20 mm from flange
Max. axial force:	10 N
Insulation class:	Class B
Dielectric strength:	500VDC for 1 minute
Insulation resistance:	100M Ω Min. 500VDC
Ambient Temperature:	-20 to 50 °C
Storage Temperature:	-20 to 100 °C
Operating Temperature:	-20 to 50 °C
Humidity Range:	85% (RH) non-condensing
Lead Wire AWG:	UL1007, AWG 20
Direction of rotation:	CCW

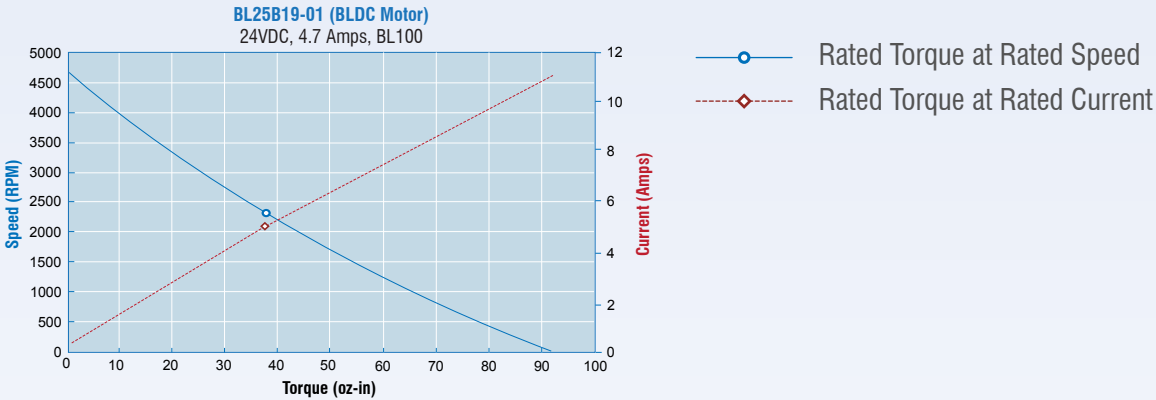
STAR CONNECTION

WIRE COLOR	DESCRIPTION
red/ white	Hall Supply
blue	Hall A
green	Hall B
white	Hall C
black/white	Hall Ground
yellow	Phase A (U)
red	Phase B (V)
black	Phase C (W)



H1 blue	H1 green	H3 white	U yellow	V red	W black	CCW
0	1	0	L	X	H	
1	1	0	X	L	H	
1	0	0	H	L	X	
1	0	1	H	X	L	
0	0	1	X	H	L	
0	1	1	L	H	X	

TORQUE CURVES



- Rated Torque at Rated Speed
- - -◇- - - Rated Torque at Rated Current

HOW TO PROPERLY SELECT A GEARBOX

WHEN IS A GEARBOX NEEDED?

- If your inertia load is much higher than the step motor's rotor inertia (deciding factor: inertial load) see sidebar for calculating load
- If you require very slow speeds (deciding factor: slower than 1 RPM)
- If you require high torque (deciding factor: more than Frame Size 34 motors)

WHAT TYPE OF GEARBOX SHOULD BE USED?

OFFSET SPUR GEARBOXES:

- Low Cost but lower performance in both torque and accuracy

PLANETARY GEARBOXES:

- More expensive but provide plenty of torque
- Many choices of backlash for high accuracy

WHAT SHOULD FIRST BE CONSIDERED?

HEAVY LOAD:

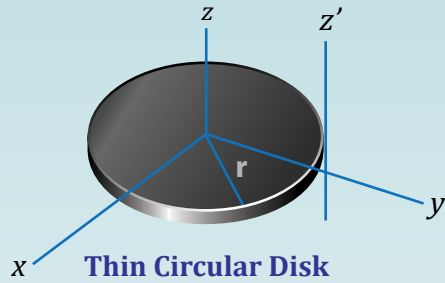
1. Calculate the inertial load
2. Determine approximately how fast you plan to accelerate the load
3. Select a suitable gearbox and motor

VERY SLOW SPEEDS

1. Determine how slow you need to move
2. Select a ratio that can allow the motor speed to be around 10 RPM or higher

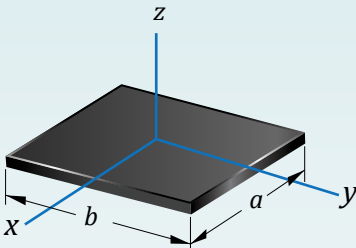
HIGH TORQUE:

1. Determine the torque required for the application and choose a suitable gear ratio that requests for a reasonable amount of torque from the motor
2. Determine the desired speed of rotation
3. Select a motor that suits your needs



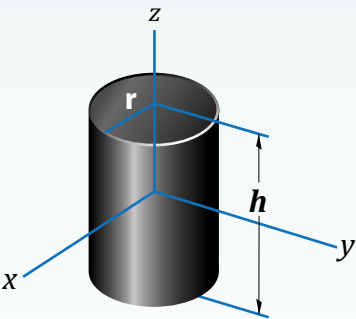
Thin Circular Disk

$$I_{xx}=I_{yy}=\frac{1}{4}mr^2$$
$$I_{zz}=\frac{1}{2}mr^2$$
$$I_{z'z'}=\frac{3}{2}mr^2$$



Thin plate

$$I_{xx}=\frac{1}{12}mb^2$$
$$I_{yy}=\frac{1}{12}mb^2$$
$$I_{zz}=\frac{1}{12}m(a^2+b^2)$$



Cylinder

$$V=\pi r^2 h$$
$$I_{xx}=I_{yy}=\frac{1}{12}m(3r^2+h^2)$$
$$I_{zz}=mr^2$$



- High Efficiency
- Multiple ratios available
- Standard NEMA mountings
- Quick installation
- Cost Effective
- Low Noise Gearheads Available
- Can be used with model 208 motors (see page 43)

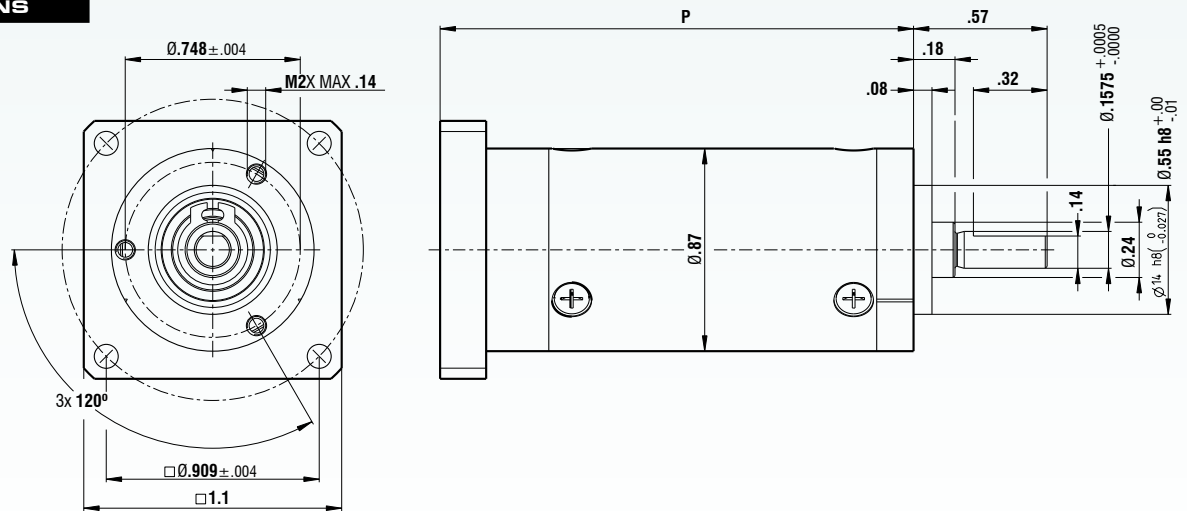
SPECIFICATIONS

PM11 (NEMA 11)

PARAMETER	1-STAGE	2-STAGE	3-STAGE	4-STAGE
Perm. output torque (Appl.factor C _g =1.0)	84 oz-in	99 oz-in	113 oz-in	141 oz-in
Gearbox efficiency, approx.	90%	80%	70%	60%
Max. backlash in degree	1.5°	2.0°	2.5°	3.0°
Recommended initial speed	6,000 rpm	6,000 rpm	6,000 rpm	6,000 rpm
Operating temperature	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C
OUTPUT SIDE WITH BALL BEARING (2RS)				
Max. load, radial	17.9 lbs.	17.9 lbs.	17.9 lbs.	17.9 lbs.
Max. load, axial	6.7 lbs.	6.7 lbs.	6.7 lbs.	6.7 lbs.
Max. perm. fitting pressure	33.7 lbs.	33.7 lbs.	33.7 lbs.	33.7 lbs.
Gearbox length p (in)	1.72 ± .02	2.10 ± 0.2	2.47 ± .02	2.85 ± 0.2
Weight (for gearbox length p)	.09 lbs.	.13 lbs.	.16 lbs.	.19 lbs.
Shaft OD (in)	.47	.47	.47	.47
Tolerance (in)	.00/- .0007	.00/- .0007	.00/- .0007	.00/- .0007
Available ratios *	4:1	14:1	51:1	Contact Lin
	5:1	19:1	71:1	Contact Lin
	7:1	25:1	100:1	Contact Lin
		35:1		

(* Additional ratios are available. Please contact Lin Engineering)

DIMENSIONS

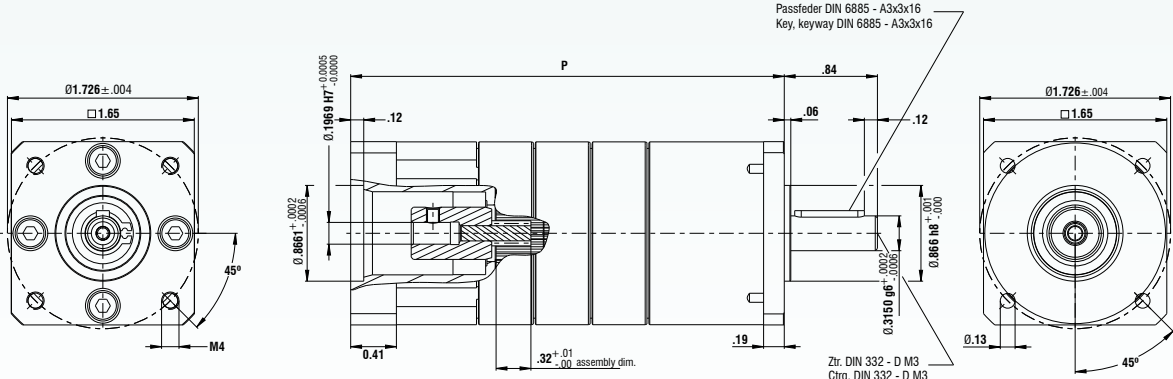




SPECIFICATIONS

PARAMETER	1-STAGE	2-STAGE	3-STAGE	4-STAGE
Perm. output torque (Appl.factor $C_g = 1.0$)	424 oz-in	1062 oz-in	2124 oz-in	2124 oz-in
Gearbox efficiency, approx.	80%	0.75%	0.70%	0.65%
Max. backlash in degree	0.90°	0.95°	1.00°	1.05°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C
OUTPUT SIDE WITH BALL BEARING (2RS)				
Max. load, radial	35.97 lbs.	51.71 lbs.	67.44 lbs.	80.93 lbs.
Max. load, axial	11.24 lbs.	17.98 lbs.	24.73 lbs.	31.47 lbs.
Max. perm. fitting pressure	71.94 lbs.	71.94 lbs.	71.94 lbs.	71.94 lbs.
Gearbox length p	2.89 ± .02	3.41 ± .02	3.93 ± .02	4.44 ± .02
Weight (for gearbox length p)	.88 lbs.	1.10 lbs.	1.32 lbs.	1.54 lbs.
Shaft OD (in)	.03	.03	.03	.03
Tolerance (in)	.0001/- .0006	.0001/- .0006	.0001/- .0006	.0001/- .0006
Tapped Hole Thread (Shaft center)	M3	M3	M3	M3
Available ratios *	4:1	14:1	51:1	Contact Lin
	5:1	19:1	71:1	Contact Lin
	7:1	25:1	100:1	Contact Lin
		35:1		

DIMENSIONS



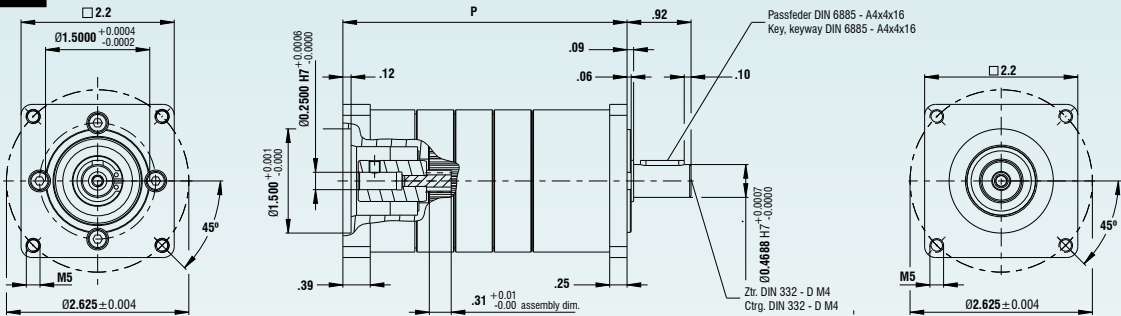
PM17 (NEMA 17)

SPECIFICATIONS

PARAMETER	1-STAGE	2-STAGE	3-STAGE	4-STAGE
Perm. output torque (Appl.factor $C_g = 1.0$)	566 oz-in	1699 oz-in	3540 oz-in	3540 oz-in
Gearbox efficiency, approx.	80%	75%	70%	65%
Max. backlash in degree	0.70°	0.75°	0.80°	0.85°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C
OUTPUT SIDE WITH BALL BEARING (2RS)				
Max. load, radial	44.96 lbs.	71.94 lbs.	101.16 lbs.	112.40 lbs.
Max. load, axial	13.49 lbs.	22.48 lbs.	33.72 lbs.	44.96 lbs.
Max. perm. fitting pressure	112.40 lbs.	112.40 lbs.	112.40 lbs.	112.40 lbs.
Gearbox length p (in)	2.98 ± .02	3.54 ± .02	4.09 ± .02	4.65 ± .02
Weight (for gearbox length p)	1.54 lbs.	1.98 lbs.	2.43 lbs.	2.87 lbs.
Shaft OD (in)	.47	.47	.47	.47
Tolerance (in)	.000/- .0007	.000/- .0007	.000/- .0007	.000/- .0007
Tapped Hole Thread (Shaft center)	M4	M4	M4	M4
Available ratios *	4:1	14:1	51:1	Contact Lin
	5:1	19:1	71:1	Contact Lin
	7:1	25:1	100:1	Contact Lin
		35:1		

(* Additional ratios are available. Please contact Lin Engineering)

DIMENSIONS

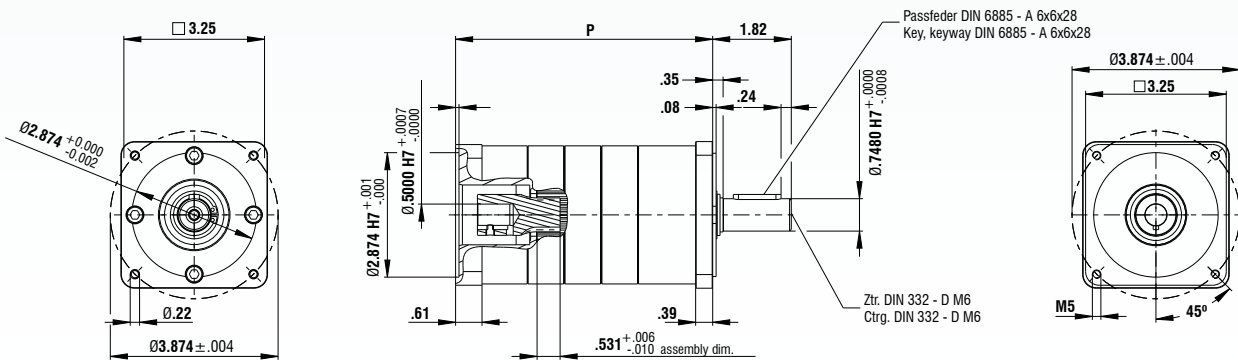


SPECIFICATIONS

PARAMETER	1-STAGE	2-STAGE	3-STAGE	4-STAGE
Perm. output torque (Appl.factor $C_g = 1.0$)	2832 oz-in	8496 oz-in	16993 oz-in	16993 oz-in
Gearbox efficiency, approx.	80%	0.75%	70%	65%
Max. backlash in degree	0.50°	0.55°	0.60°	0.65°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C
OUTPUT SIDE WITH BALL BEARING (2RS)				
Max. load, radial	89.92 lbs.	134.89 lbs.	224.81 lbs.	292.25 lbs.
Max. load, axial	17.98 lbs.	26.98 lbs.	44.96 lbs.	62.95 lbs.
Max. perm. fitting pressure	337.21 lbs.	337.21 lbs.	337.21 lbs.	337.21 lbs.
Gearbox length p (in)	4.24 ± .02	5.09 ± .02	5.94 ± .02	6.79 ± .02
Weight (for gearbox length p)	3.97 lbs.	5.51 lbs.	7.05 lbs.	8.60 lbs.
Shaft OD (in)	.75	.75	.75	.75
Tolerance (in)	.000/- .0008	0.00/- .0021	0.00/- .0021	0.00/- .0021
Tapped Hole Thread (Shaft center)	M6	M6	M6	M6
Available ratios *	4:1	14:1	51:1	Contact Lin
	5:1	19:1	71:1	Contact Lin
	7:1	25:1	100:1	Contact Lin
		35:1		

(* Additional ratios are available. Please contact Lin Engineering)

DIMENSIONS



PM34 (NEMA 34)



With a common dedication to quality products and excellent customer service, Lin Engineering and US Digital have partnered countless times to provide their customers with motion control solutions.

More about US Digital:

Founded in 1980, US Digital's mission is to make customers successful by inventing, manufacturing, and quickly delivering the most practical motion control components world-wide.

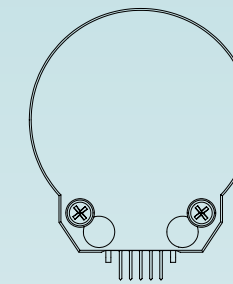
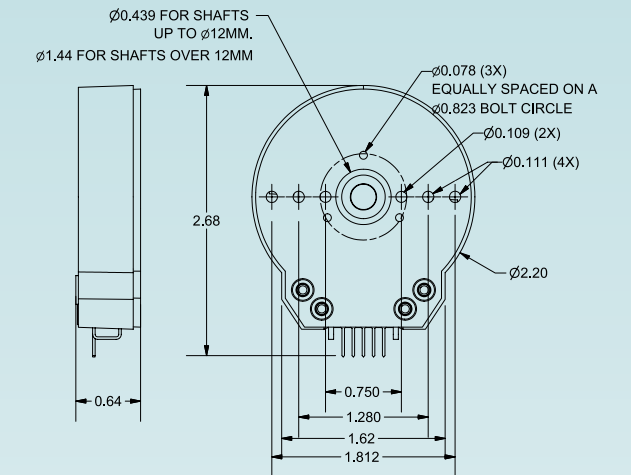
SPECIFICATIONS

- Best for NEMA 23 and 34 step motors
- Tracks from 0 to 100,000 cycles/sec
- 64 to 2,500 cycles per revolution (CPR)
- 256 to 10,000 pulses per revolution (PPR)
- 2 channel quadrature TTL squarewave outputs
- Optional index (3rd channel)
- -40 to 100 °C operating temperature
- 2 year warranty
- Through shaft hole option available

E3 OPTICAL ENCODER



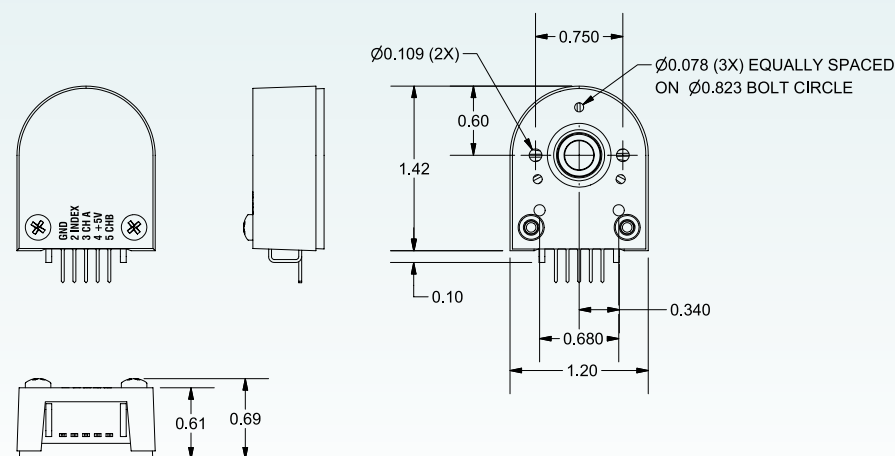
Cycles per second	Cycles per Revolution (CPR)	Pulses per Revolution (PPR)
0 to 100,000	64 to 2,500	256 to 10,000



E2 OPTICAL ENCODER



Cycles per second	Cycles per Revolution (CPR)	Pulses per Revolution (PPR)
0 to 100,000	32 to 1,250	128 to 5,000



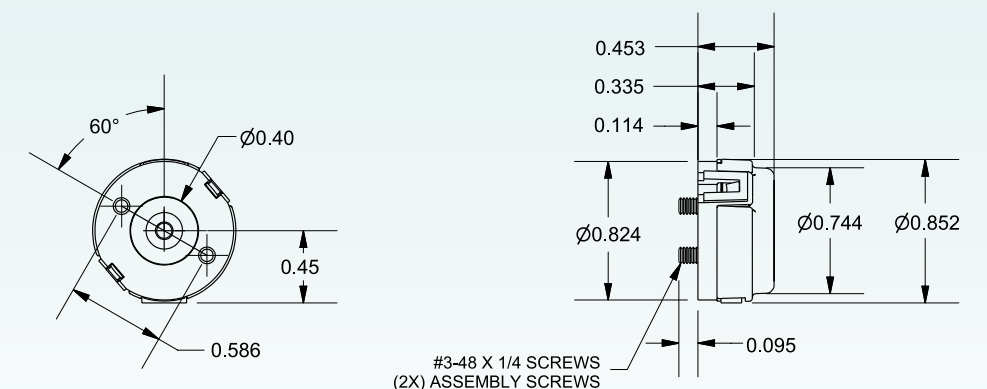
SPECIFICATIONS

- Compact Miniature size best for NEMA 8, 11, 14, and 17
- High retention Snap-in polarized connector
- Tracks from 0 to 60,000 cycles/sec
- 100 to 360 cycles per revolution (CPR)
- 400 to 1440 pulses per revolution (PPR)
- -20 to + 100°C operating temperature
- Low power strobe option available
- 2 year warranty
- Through shaft hole option available

E4/E4P OPTICAL ENCODER

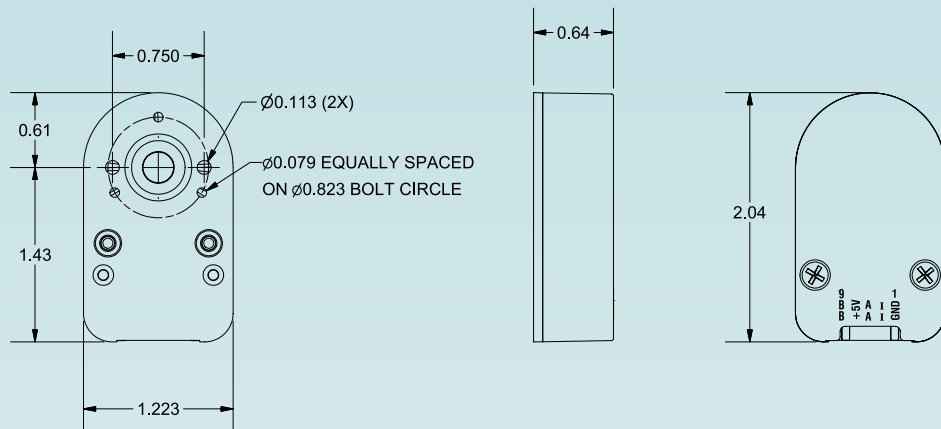


Cycles per second	Cycles per Revolution (CPR)	Pulses per Revolution (PPR)
0 to 60,000	100 to 360	400 to 1,440



SPECIFICATIONS

- Best for NEMA 17, 23, and 34
- Differential Output signals (or single ended)
- 32 to 1,250 Cycles per Revolution (CPR)
- 128 to 5,000 pulses per revolution (PPR)
- Positive finger-latching polarized connector
- Tracks from 0 to 100,000 cycles/sec
- Optional index (3rd channel)
- -40 to 100°C operating temperature
- 2 year warranty
- Through shaft hole option available



E5 OPTICAL ENCODER



Cycles per second	Cycles per Revolution (CPR)	Pulses per Revolution (PPR)
0 to 100,000	32 to 1,250	128 to 5,000

SPECIFICATIONS

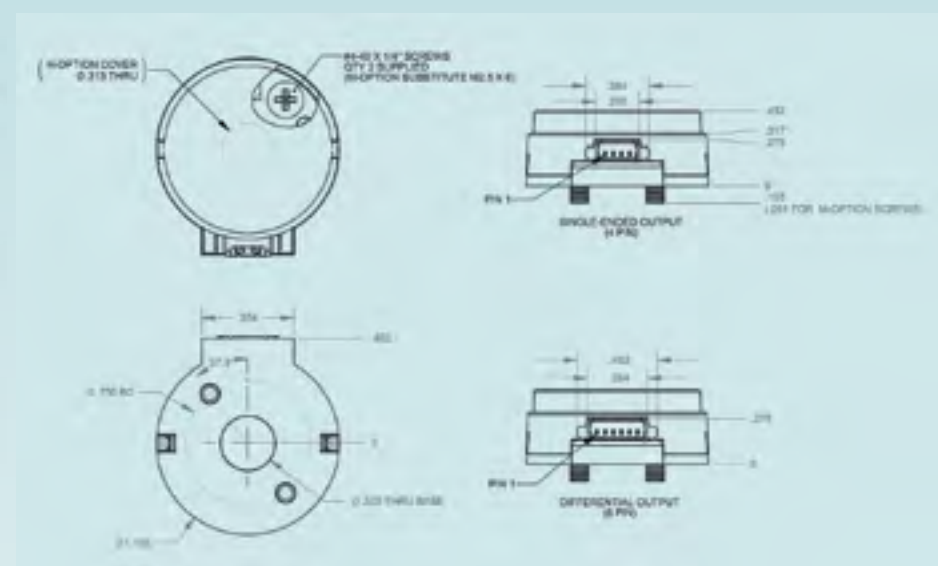
- Best for Size 11 Step Motor
- High retention Snap-in polarized connector
- Tracks from 0 to 60,000 cycles/ sec
- 180 to 512 cycles per revolution (CPR)
- 720 to 2048 pulses per revolution (PPR)
- -20 to +100°C operating temperature
- Through shaft hole option available.
- 2 Year warranty



E8P OPTICAL ENCODER



Cycles per second	Cycles per Revolution (CPR)	Pulses per Revolution (PPR)
0 to 60,000	180 to 512	720 to 2048



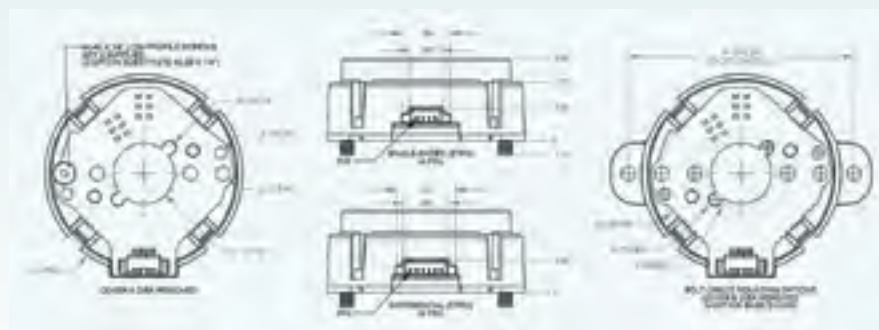
SPECIFICATIONS

- Best for NEMA Size 17 & 23
- High retention Snap-in polarized connector
- Tracks from 0 to 60,000 cycles/ sec
- 180 to 720 cycles per revolution (CPR)
- 720 to 2880 pulses per revolution (PPR)
- -20 to +100°C operating temperature
- Through shaft hole option available
- 2 Year warranty

E7P OPTICAL ENCODER



Cycles per second	Cycles per Revolution (CPR)	Pulses per Revolution (PPR)
0 to 60,000	180 to 720	720 to 2,880



Accessories



Used with
E4P, E7P & E8P
Lin part #090-00023



Used with
E2, E3 & E5
Lin part #090-00223



Used with E5 with
the D output option
(E5 with D option)
Lin part #090-00226

For more information, please visit
www.linengineering.com/encoders

FEATURES

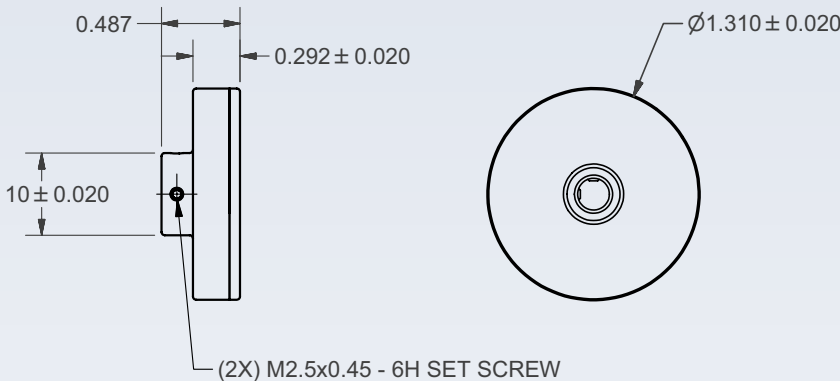
- Absorbs vibration and decreases resonance
- Smoother motion
- Durable
- Easy installation
- Cost effective



SPECIFICATIONS

Part Number	Inertia oz-in ² (gm-cm ²)	Weight lb. (g)	Mounting (Screw Type)	Shaft Size in. (mm)	Wet/Dry Operation	COMPATIBLE MTORS	
						0.9°	1.8°
057-00011	0.064 (11.71)	0.05	Set Screw (M2)	0.196 (5)	Dry	416, 417, 4109, 4209	4018, 4118, 4418, 4518

DIMENSIONS

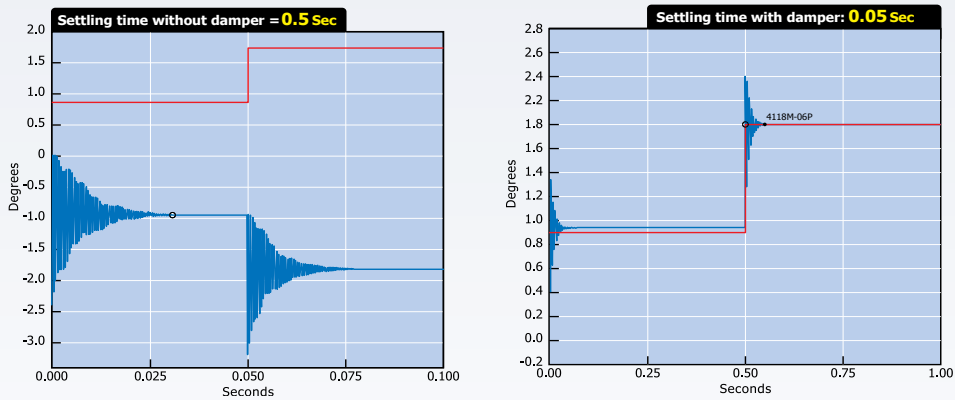


COMPARISON

As motors step, inertia makes the rotor oscillate about its new position (the motor's settling time). This natural back and forth movement might sometimes contribute to the erratic movement of motors. Adding a Lin damper to the step motor's shaft translates into smaller oscillations and thus, smoother motion. This reduced step response time can ultimately result in much improved motor performance.

Here is a comparison of one motor's settling time with and without the use of a damper.

Without Damper = 0.5 Seconds
With Damper = 0.05 Seconds
That's up to 10 times less resonance when you use a damper from Lin Engineering



FEATURES

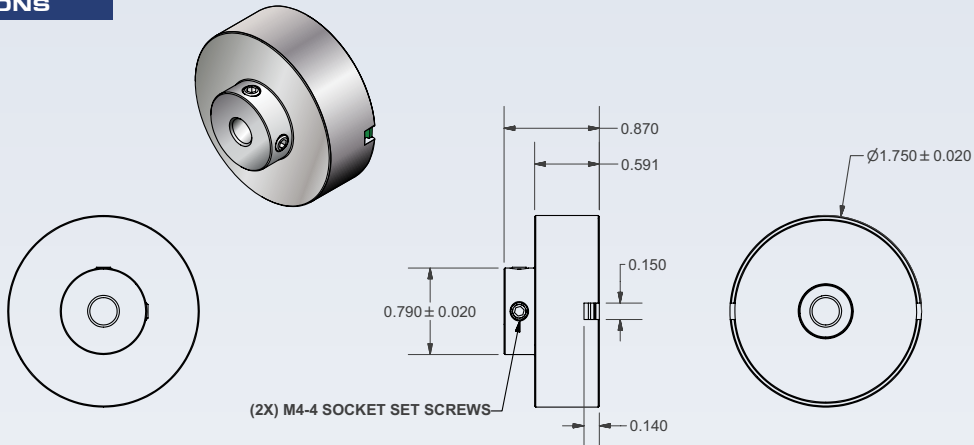
- Absorbs vibration and decreases resonance
- Smoother motion
- Durable
- Easy installation
- Cost effective



SPECIFICATIONS

Part Number	Inertia oz-in ² (gm-cm ²)	Weight lb. (g)	Mounting (Screw Type)	Shaft Size in. (mm)	Wet/Dry Operation	COMPATIBLE MTORS	
						0.9°	1.8°
057-00006	0.36 (65.84)	0.15	Set Screw (M4)	0.2500 (6.35)	Dry	5609, 5709	5618, 5718, 5818

DIMENSIONS

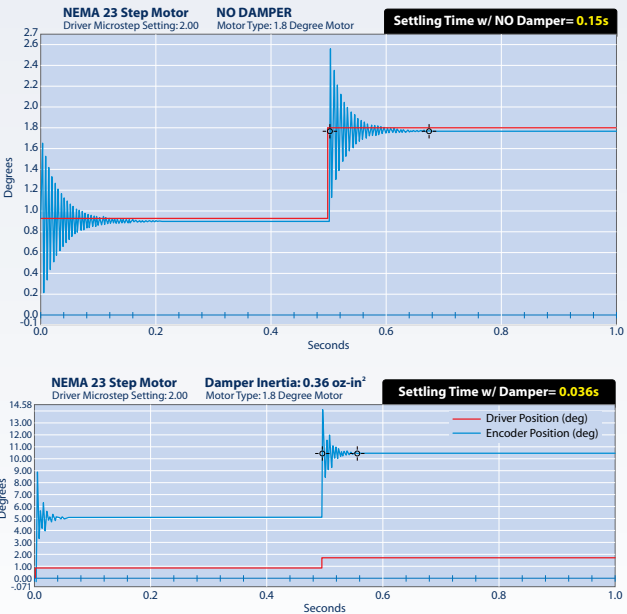


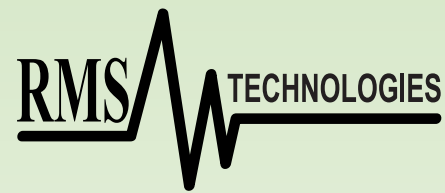
COMPARISON

As motors step, inertia makes the rotor oscillate about its new position (the motor's settling time). This natural back and forth movement might sometimes contribute to the erratic movement of motors. Adding a Lin damper to the step motor's shaft translates into smaller oscillations and thus, smoother motion. This reduced step response time can ultimately result in much improved motor performance.

Here is a comparison of one motor's settling time with and without the use of a damper.

Without Damper = 0.15 Seconds
With Damper = 0.036 Seconds
That's up to 4 times less resonance when you use a damper from Lin Engineering





Mission Statement

To provide the motion control industry with leading technology in drivers, controllers, and complete integrated solutions. Striving for innovative design and development of products to serve a wide range of customers, we are the Driving Force in Motion Control.

Overview

RMS Technologies designs and manufactures cutting edge, low-cost, high-performance step motors, drivers, and controllers.

Our specialty is the design and development of high-performance step motor drivers. We are continually striving to improve our technology and deliver the best possible products available.

RMS Technologies currently designs drivers and controllers to reduce resonance allowing step motors to run with less noise, while also reducing the amount of step errors when driving a motor at 64 microstepping.

Typical applications for step motor systems include surveillance cameras, automated test equipment, robotics, medical equipment, labeling and packaging equipment.

About RMS

Founded in 2000, RMS Technologies has gained acknowledgement in the motion control industry based on differentiating and innovative products. Headquartered in Carson City, Nevada, RMS Technologies has a team of Product Development Engineers, with over 40 years of experience in the motion control industry, constantly thinking of better ways to drive and control step motors.

MICROSTEPPING DRIVERS



R208
Low Cost Driver
Microstepping: Full - 8x
Current: 0.35 - 2.0 Amps
RoHS Compliant
Page 101



R325
Smooth Driver
Microstepping: Full - 256x
Current: 0.3 - 3.0 Amps
Easy Configuration
Page 102



R525
Power House Driver
Microstepping: Full - 256x
Current: 0.1 - 5 Amps
RoHS Compliant
Page 103



R701/710
High Power Driver
Microstepping: 10x
Current: 1 - 7 Amps
RoHS Compliant
Page 104

CONTROLLERS



R256
Driver/ Intelligent Controller
Microstepping: 2x - 256x
Current: 0.3 - 2.0 Amps
RoHS Compliant
Page 105



R356
Single Axis Driver/ Controller
Microstepping: 2x - 256x
Current: 0.3 - 3.0 Amps
RoHS Compliant
Page 106



BL100
Brushless DC Speed Controller
Current: 10 Amps RMS
20 Amps Peak
Easy Configuration
RoHS Compliant
Page 107

ACCESSORIES



RS232-RS485
Converter Card
Compatibility: Serial Port
Used with: SP17C, SP23C,
R256, R356, R525, BL100
RoHS Compliant
Page 109



USB485
Converter Card
Compatibility: USB (1.1.2.0)
Used with: SP17C, SP23C,
R256, R356, R525, BL100
RoHS Compliant
Page 110

Utilize over 40 years of design & development experience.

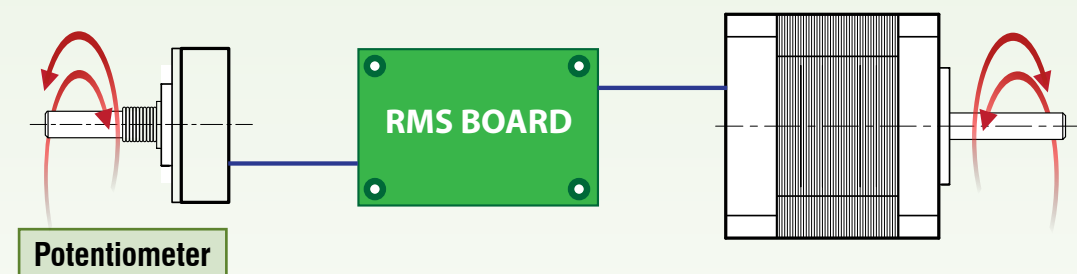
Whether you are looking for a simple plug & play solution or something a bit more advanced, we can help design, develop, and even manufacture products that are tailor made for your application.

The Benefits?

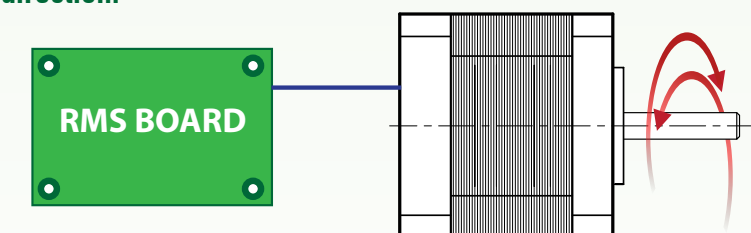
- ✓ Save on development time
- ✓ Reduce overall product cost
- ✓ Utilize over 40 years of motion control experience
- ✓ High quality

Below are 2 examples of products that were developed for specific customer applications:

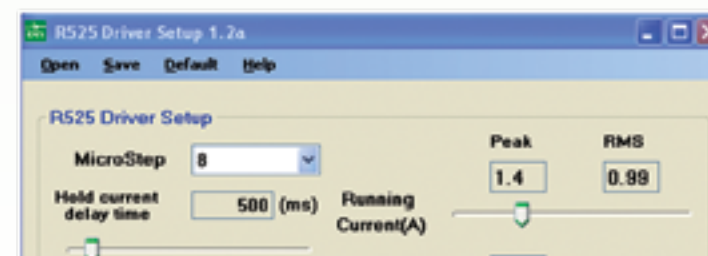
1- Simple controller with variable microstepping and speed control via potentiometer



2- Controller with factory programmed settings. Variable settings include speed, time, microstepping, and direction.



Intuitive Graphical User Interfaces (GUI) can also be developed



RMS Driver (complimentary with any RMS product) shown as an example



FEATURES

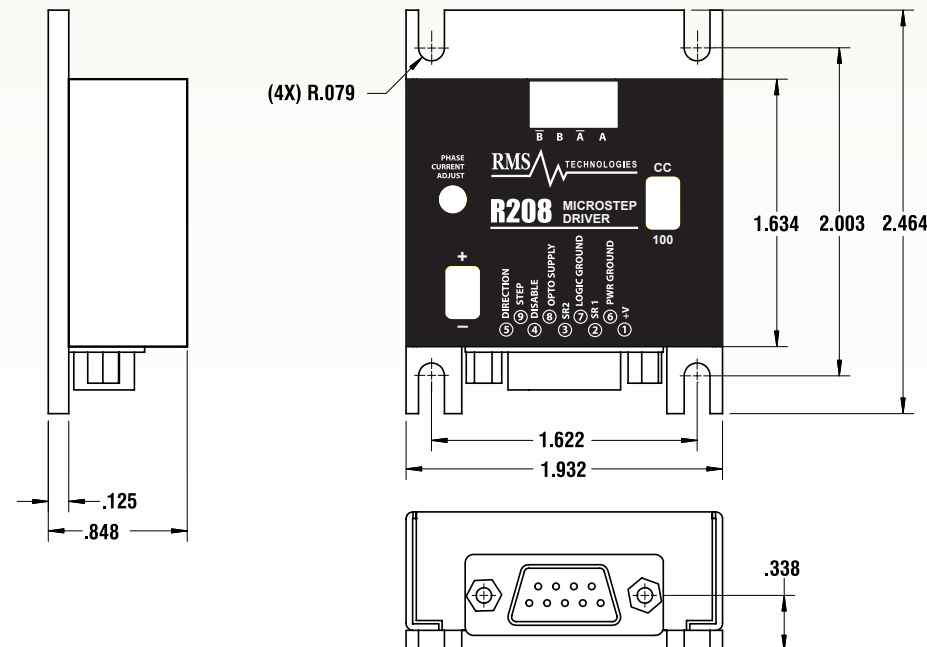
- Bipolar Step Motor Driver
- Operates from +12 to 24 VDC
- Phase Current ranges from 0.35 to 2.0 Amps Peak
- Selectable Step Resolution from Full, 2x, 4x, and 8x Microsteps
- Optically Isolated Step, Direction, and Disable/Enable Inputs
- Selectable Current Reduction of 23%
- Low Power Dissipation
- Efficient Current Control
- Thermal Shutdown, Under-Voltage Protection
- Power-On Indicator
- Power Disable/Enable Control
- Sinusoidal Current Waveform
- Low Cost Driver



SPECIFICATIONS

- **INPUT VOLTAGE:**
+12 to 24 VDC (Includes Unregulated Power Supplies)
- **DRIVE CURRENT (PER PHASE):**
0.35 to 2 Amps Peak
- **ISOLATED INPUTS:**
Step Clock, Direction, Enable and Disable
- **STEP FREQUENCY (MAX):**
500 kHz
- **STEPS PER REVOLUTION (1.8° MOTOR):**
200, 400, 800, 1600
- **MICROSTEP RESOLUTIONS (1.8° MOTOR):**
Full, 2x, 4x, 8x

DIMENSIONS



FEATURES

- Operates from +15 to 48 VDC
- Phase Current from 0.3 to 3.0 Amps Peak
- Step Resolutions from Full to 256x Microstepping
- Hold Current Reduction Capability with Adjustable Current and Timeout Settings
- Pole Damping™ Technology (see page 8)

R325I & R325IE additional features

- Configuration Parameters stored in Non-Volatile Memory
- Multiple Module Control through Software Assigned Single Character Addresses
- Built-in Control Routines for Trapezoidal Position and Velocity Moves
- Three Optically Isolated Control Inputs and one Optically Isolated Full Step Output

R325IE only features

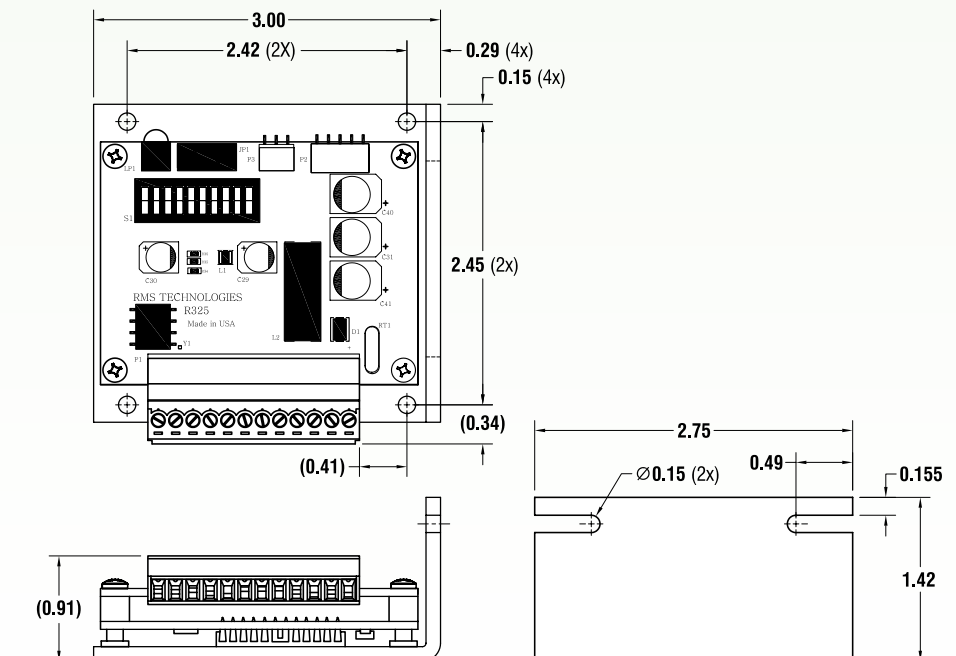
- Static Encoder Feedback with a full set of parameters to configure a wide variety of motor and encoder combinations
- Homing on Encoder Index
- Eight User Configurable Target Positions



SPECIFICATIONS

- **INPUT VOLTAGE:**
+15 to 48 VDC
- **DRIVE CURRENT (PER PHASE):**
0.3 to 3.0 Amps Peak
- **ISOLATED INPUTS:**
Step, Direction, and Disable
- **STEP FREQUENCY (MAX):**
2.5 MHz
- **STEPS PER REVOLUTION (1.8° MOTOR):**
200, 400, 800, 1600, 3200, 6400, 12800, 25600, 51200
- **MICROSTEP RESOLUTIONS (1.8° MOTOR):**
Full, 2x, 4x, 8x, 16x, 32x, 64x, 128x, 256x
- **POLE DAMPING TECHNOLOGY™:**
See page 8

DIMENSIONS





FEATURES

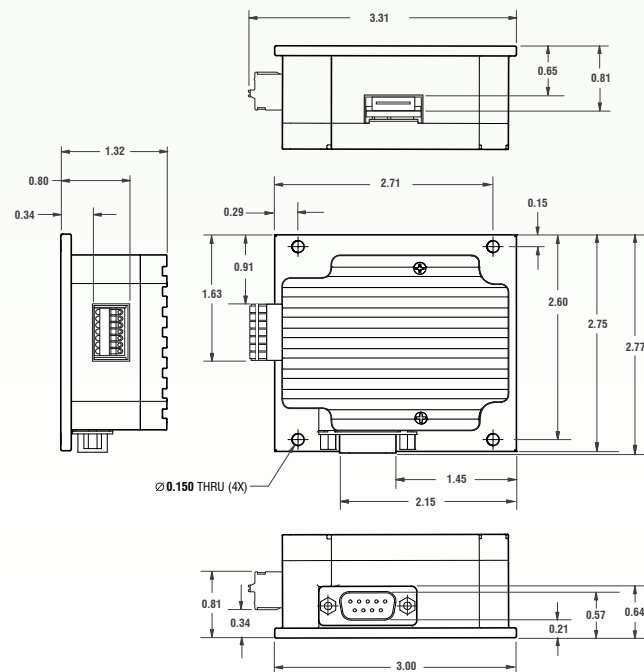
- Operates from +12 to 75 VDC
- Software selectable run currents from 0.1 to 5.0 Amp Peak (in 0.05 Amp increments)
- Software selectable hold currents from 0.1 to 5.0 Amp Peak (in 0.05 Amp increments)
- Step Resolutions from Full, 2x, 4x, 5x, 8x, 10x, 16x, 25x, 32x, 50x, 64x, 125x, 128x, 250x, 256x Microstepping
- Four Selectable Damping modes for smooth motion
- No low minimum inductance
- Step sensing on the rising or falling edge of step pulse input
- Direction switching – to change initial powered on direction of rotation
- Disable active high or low – to allow unit to be disabled with a high or low signal
- Smooth motion
- Three optically isolated control inputs (step, direction, disable)
- Inputs are sinking inputs, maximum current input is 15mAmps
- Pole Damping™ Technology - Integrated within driver board (see page 8)



SPECIFICATIONS

- **INPUT VOLTAGE:**
+12 to 75 VDC
- **DRIVE CURRENT(PER PHASE):**
0.1 to 5.0 Amps Peak in 0.05 Amp increments
- **ISOLATED INPUTS:**
Step, Direction, and Disable
- **STEP FREQUENCY (MAX):**
5 MHz
- **STEPS PER REVOLUTION (1.8° MOTOR):**
200, 400, 800, 1600, 2000, 3200, 5000, 6400, 10000, 12800, 25000, 25600, 50000, 51200
- **MICROSTEP RESOLUTIONS (1.8° MOTOR):**
Full, 2X, 4X, 5X, 8X, 10X, 16X, 25X, 32X, 50X, 64X, 125X, 128X, 250X, 256X
- **POLE DAMPING TECHNOLOGY™:**
See page 8

DIMENSIONS



FEATURES

- Bipolar Step Motor Driver
- Operates from +24 to 80 VDC
- Phase Current Ranges from 1 to 7 Amps or 0.3 to 2 Amps
- 10x Microstepping Driver
- Optically Isolated Step, Direction, and Disable/Enable Inputs
- Selectable Current Reduction of 33%
- Low Power Dissipation
- Step Frequency of 200 kHz
- Efficient Current Control
- Power-On Indicator
- Power Disable/Enable Control
- Sinusoidal Current Waveform
- Low Cost Driver



R710 - includes a built-in Step Pulse Multiplier board

The R710 has the same features as the R701 plus two additional features:

• Input Option Header:

Allows the use of a Common Ground or a Common +5VDC for optically isolated inputs

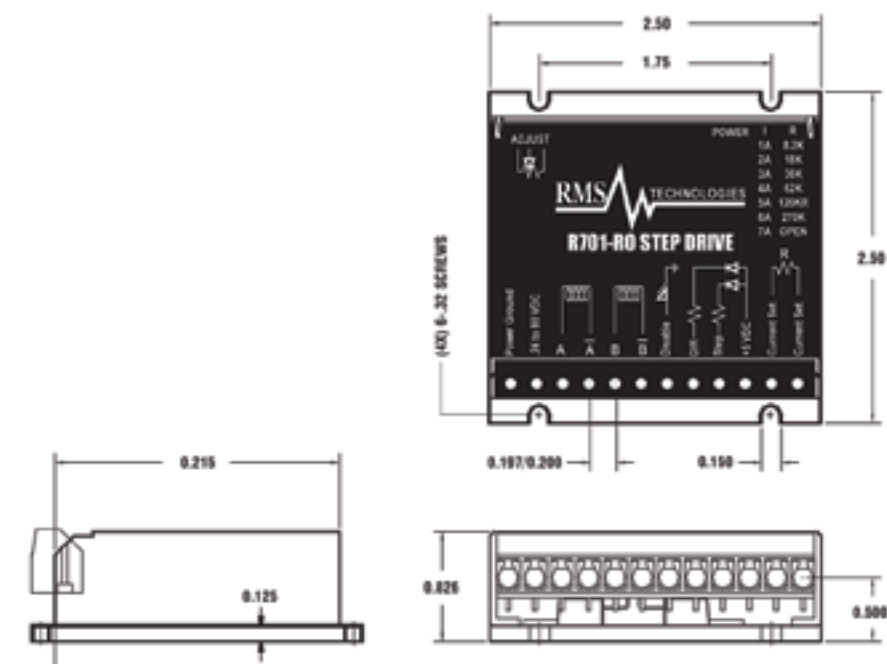
• Step Pulse Multiplier:

The R701 will always output 10 microstepping, even with a step input of Full Step, Half Step, 5 Microstep, or 10 Microstep. The user no longer needs to change their original setup to get microstepping. Simply select the desired step multiplier of 1, 2, 5 or 10; to achieve the 10 microstepping output from the driver, while maintaining the rotational speed that you had in your original setup.

SPECIFICATIONS

- **INPUT VOLTAGE:**
+24 to 80 VDC
- **DRIVE CURRENT(PER PHASE):**
0.3 to 2.0 Amps or 1 to 7 Amps
- **ISOLATED INPUTS:**
Step Clock, Direction, Disable
- **STEP FREQUENCY (MAX):**
200 kHz
- **STEPS PER REVOLUTION (1.8° MOTOR):**
2000
- **MICROSTEP RESOLUTIONS (1.8° MOTOR):**
10x

DIMENSIONS





FEATURES

- Input Voltage of +12 to 40 VDC
- Phase Current Ranges from 0.3 to 2.0 Amps Peak
- Microstepping Capabilities of Full, 2x, 4x, 8x, 16x, 32x, 64x, 128x, and 256x
- 2 User Configurable Digital I/O's
- 2 Dedicated Inputs:
 - * 1 Optical Sensor for Homing
 - * 1 Switch Closure to Ground
- Fully Programmable Ramps and Speeds
- Software Selectable Hold and Run Currents
- Stand Alone Operation with No Connection to PC
- Stores up to 16 Different Programs at Once with 4 kBytes of Memory
- RS485 Communication with Optional Converter Cards

Converter Cards Available

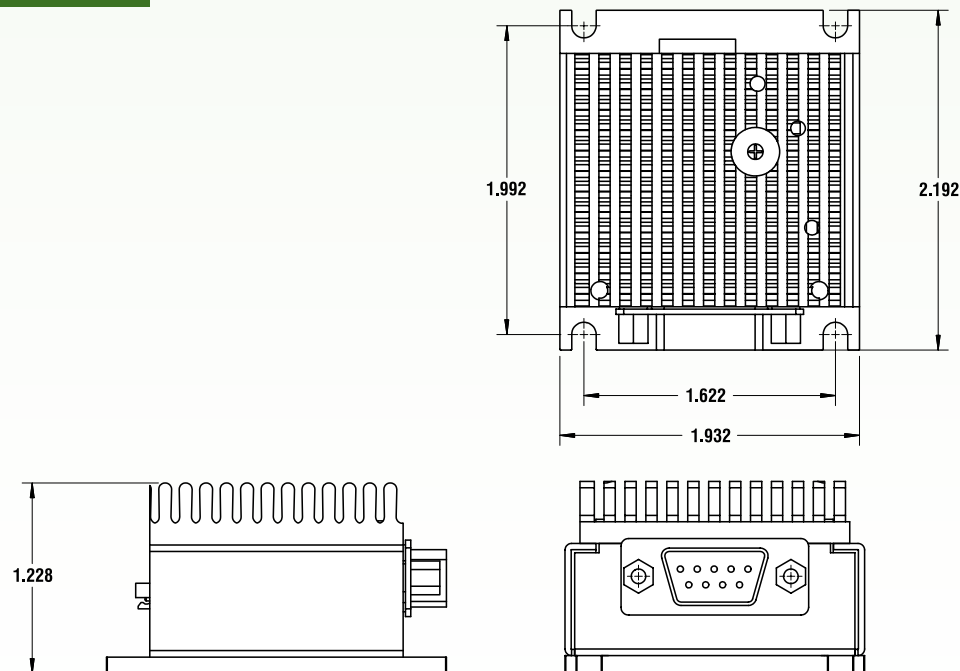
- USB485 - see page 110
- RS232 to RS485 - see page 109



SPECIFICATIONS

- **INPUT VOLTAGE:**
+12 to 40 VDC
- **DRIVE CURRENT(PER PHASE):**
0.3 to 2.0 Amps Peak
- **ISOLATED INPUTS:**
I/O, Switch Closure Ground, Opto Phototransistor
- **STEPS PER REVOLUTION (1.8° MOTOR):**
200, 400, 800, 1600, 3200, 6400, 12800, 25600, 51200
- **MICROSTEP RESOLUTIONS (1.8° MOTOR):**
Full, 2x, 4x, 8x, 16x, 32x, 64x, 128x, 256x

DIMENSIONS



FEATURES

- Input Voltage of +12 to 40 VDC
- Phase Current Ranges from 0.3 to 3.0 Amps Peak
- Microstepping Capabilities of Full, 2x, 4x, 8x, 16x, 32x, 64x, 128x, and 256x
- 2 User Configurable Digital I/O's
- 2 Dedicated Inputs:
 - 1 Optical Sensor for Homing
 - 1 Switch Closure to Ground
- Fully Programmable Ramps and Speeds
- Software Selectable Hold and Move Currents
- Stand Alone Operation with No Connection to PC
- Stores up to 16 Different Programs at Once with 4 kBytes of Memory
- RS485 Communication with Optional Converter Cards

Converter Cards Available

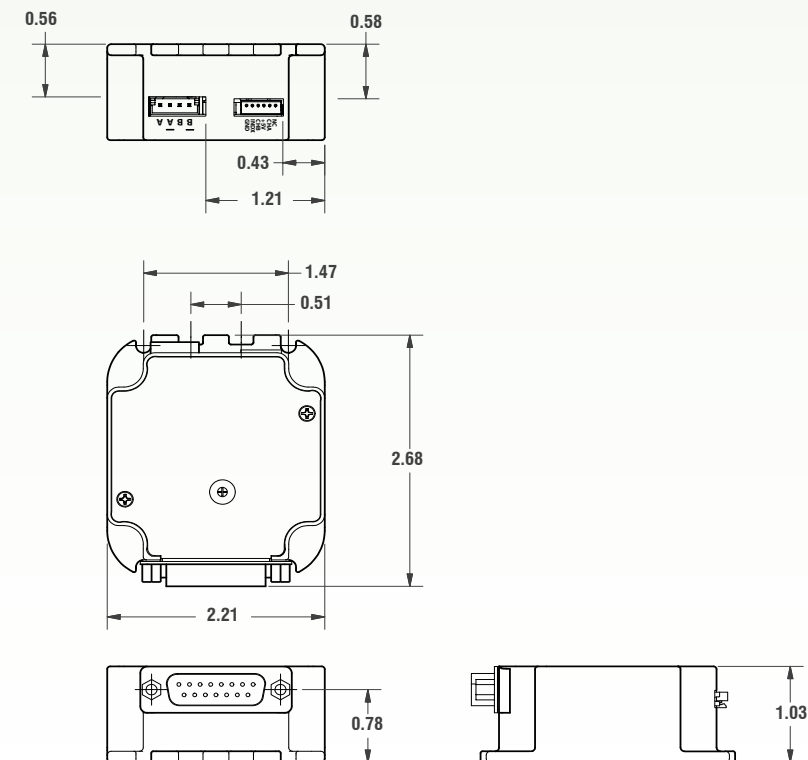
- USB485 - see page 110
- RS232 to RS485 - see page 109



SPECIFICATIONS

- **INPUT VOLTAGE:**
+12 to 40 VDC
- **DRIVE CURRENT(PER PHASE):**
0.3 to 3.0 Amps Peak
- **ISOLATED INPUTS:**
4 I/O's, Switch Closure to Ground, Opto Phototransistor
- **STEPS PER REVOLUTION (1.8° MOTOR):**
200, 400, 800, 1600, 3200, 6400, 12800, 25600, 51200
- **MICROSTEP RESOLUTIONS (1.8° MOTOR):**
Full, 2x, 4x, 8x, 16x, 32x, 64x, 128x, 256x

DIMENSIONS





FEATURES

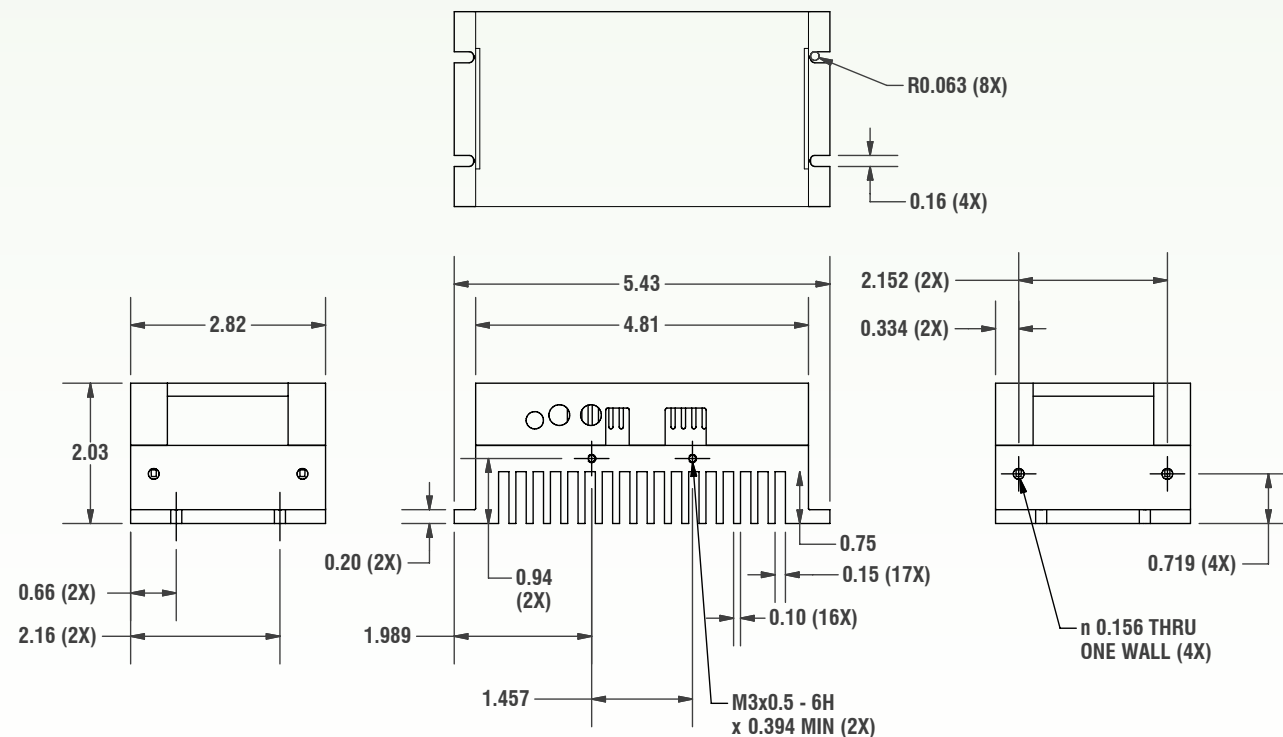
- Input voltage from +12VDC to 48VDC
- Peak current up to 20 Amps (continuous current up to 10 Amps)
- Maximum wattage of 500 Watts
- Three fault outputs via Red LED (flashes on and off)
- Closed-loop with hall sensors for speed control
- Direction of rotation change
- Direction mode which allows potentiometer to be used to rotate motor forwards and reverse based on pot value
- Brake input for stopping motor rotation
- Speed control via +0-5VDC or +0-10VDC with external voltage input
- User selectable PI values via GUI
- Control speed through RS485
- Multiple module control through software assigned single character address
- Configuration parameter stored in flash memory



RECOMMENDED FOR

- BL17 *page* 83-84
- BL24 *page* 85-86
- BL25 *page* 87-88

DIMENSIONS



- Universal Input
- Built in PFC Circuit
- 3000 V Isolation
- Single Outputs

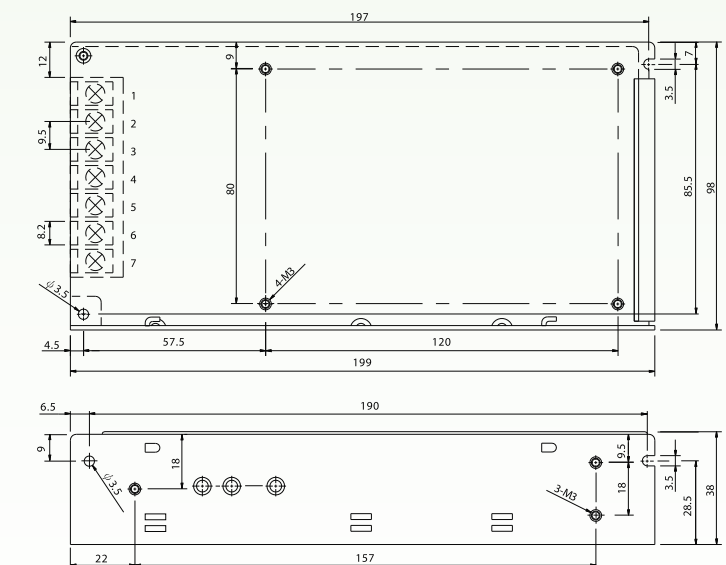
ENVIRONMENTAL SPECIFICATIONS

Oper. Temperature	-10°C ~ +60°C
Storage Temperature	-20 to +85°C
Relative Humidity	10% to 95%, non-cond *
Vibration	10 ~ 500Hz, 2G 10min./ 1cycle, Period for 60 min. Each Axis
EMC	CISPR22 (EN55022)B, EN61000-4-2, 3, 5, 6, 8, 11 ENV50204 EN61000-3-2, 3
MTBF	314,900 Hrs

PHYSICAL SPECIFICATIONS

Size	3.0" x 8.7" x 1.6"
Construction	Closed Frame
Weight	19.4 oz, (550g)

MECHANICAL SPECIFICATIONS



Notes:

1. Dimensions are in mm
2. Tolerance .xxx .01 (.253)
.xx .02 (.508)

* These are stress ratings. Exposure of the devices to any of these conditions may adversely affect long term reliability. Proper operation under conditions other than the standard operating conditions is neither warranted nor implied.

INPUT SPECIFICATIONS

Voltage Range	88-264 VAC
Input Current	3.15 A / 115 VAC 1.5A / 230 VAC
Frequency	Range: 47-63Hz
Inrush Current	Cold Start 30A / 115 VAC
Leakage Current	<1mA / 240 VAC

OUTPUT SPECIFICATIONS

Voltage and Current	See Selection Chart
Load Regulation (0%-FL)	+/- 0.5%
Line Regulation	+/- 0.5%
Voltage Tolerance	+/- 1.0%
Ripple and Noise (max)	150m Vp-p
Over Voltage Protection	105 ~ 150% Shutdown; Re-power on
Overload Protection	105 ~ 150%, Constant 1 Limit Auto Recovery
Setup/ Rise/ Holdup (230 VAC)	1s, 30ms, 15ms at full load

GENERAL SPECIFICATIONS

Input-Out Isolation	I/P-O/P: 300 VAC I/P-G: 1500 VAC O/P: 0.5KVAC
Isolation Resistance I/P-O/P, I/P-FG O/P-FG:	500VDC/100Ω
Efficiency (3.3 V through 48V)	83%, typ
Switching Frequency	135 Khz, (fixed, typical)
Safety EN60950 UL 1950	TUV File #R 9754834 UL File # E183223



FEATURES

- Allows the user to connect the R256 and R356 Controllers or the SilverPak C Series (17 & 23) integrated motors to a PC via standard serial port
- Min and Max voltage levels: +7 to 40 VDC
- RoHS Compliant

The **RS485 to RS232 Converter Card** can also be purchased as part of the Designer's Kit. It allows the user to get acquainted with the unit by providing the necessary cabling to add the optional Push Button and Optical Sensor.

Designer's Kit (RS232 KIT) Includes:

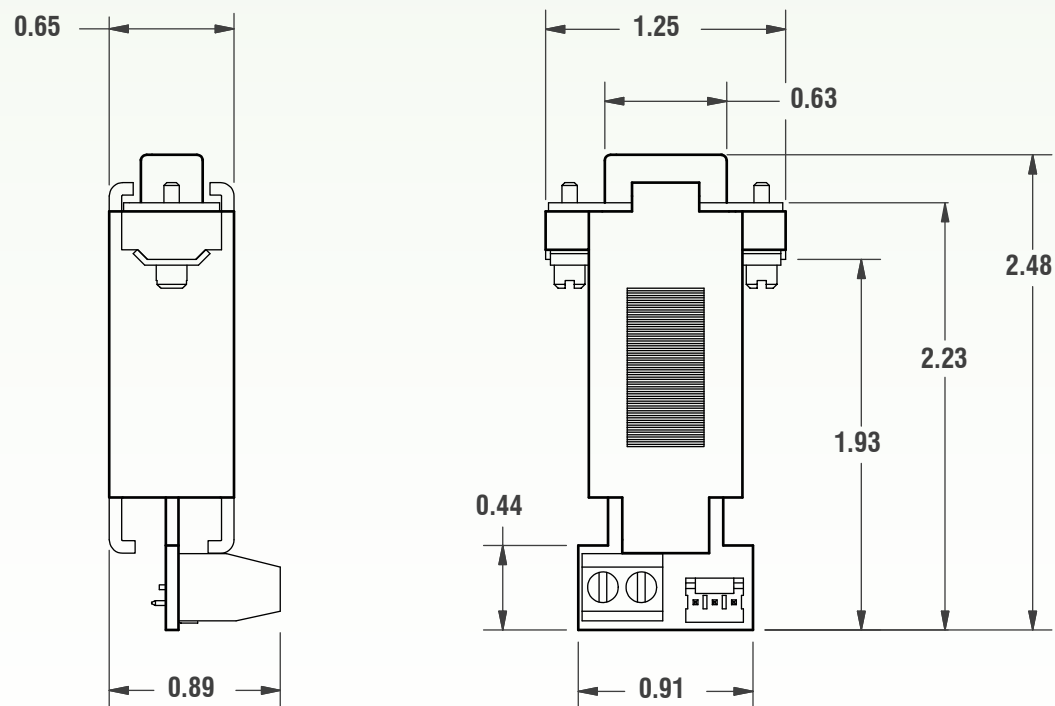
- RS485 to RS232 Converter Card
- An Optical Sensor
- Red Push Button Switch



RECOMMENDED FOR

- SilverPak 17C *page 75-76*
- SilverPak 23C *page 79-80*
- R525 *page 103*
- R256 *page 105*
- R356 *page 106*
- BL100 *page 107*

DIMENSIONS



FEATURES

- Allows the user to connect the R256 and R356 Controllers to a PC via standard USB port
- UART I/F Supports 7/8 Bit Data, 1/2 Stop Bits and Odd/Even/Mark/Space/No Parity
- Data rate 300 => 250K Baud 384 Byte Receive Buffer/ 128 Byte Transmit
- Buffer for high data throughput
- Auto Transmit Buffer control
- Integrated Power-On-Reset circuit
- Integrated 6 MHz – 48 MHz clock multiplier PLL
- USB 1.1 and USB 2.0 compatible
- Windows 98/98Se/ME/2000/XP/7 Compatible

The **USB485 Converter Card** can also be purchased as part of the Designer's Kit. It allows the user to get acquainted with the unit by providing the necessary cabling to add the optional Push Button and Optical Sensor.

Designer's Kit (USBKIT) Includes:

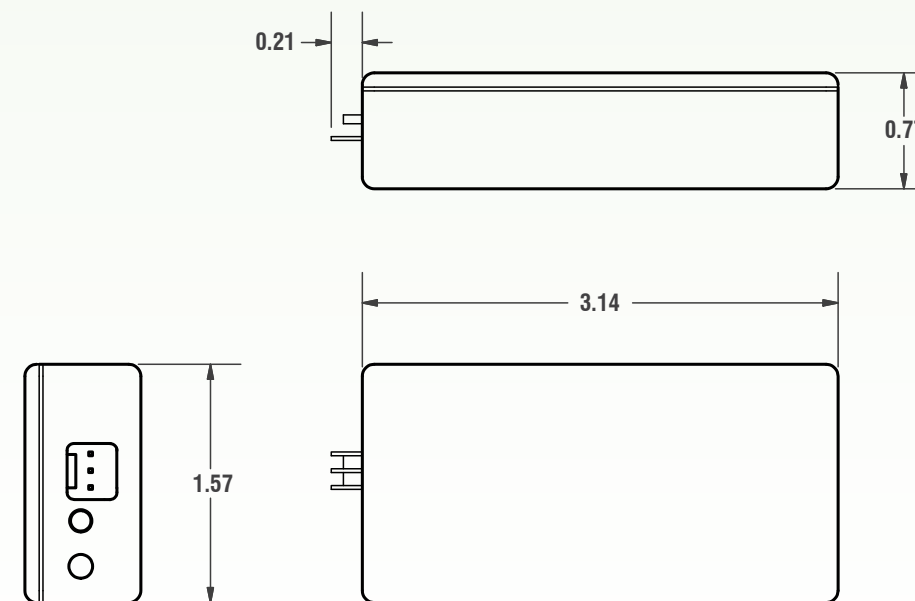
- USB485 Converter Card
- An Optical Sensor
- Red Switch Push Button
- 6 ft USB Cable



RECOMMENDED FOR

- SilverPak 17C *page 75-76*
- SilverPak 23C *page 79-80*
- R325 *page 102*
- R525 *page 103*
- R256 *page 105*
- BL100 *page 107*

DIMENSIONS



Designer's Corner Featuring:



Patent pending step motor selection tool

- 3 step selection process for general and specific applications such as:

Conveyer Belt

Lead Screw



Direct Drive

Rack & Pinion

- Instantly generate performance curves
- Compare motor models
- Archive data for up to 3 years



Get access to:

- White Papers
- Step Motor Basics
- FAQ's



Have a Question? Ask the Specialists via:

- Online Forum
- Live Chat



Online Store

LinExpress store with standard and Customizable options:

- Add standard flats
- Double shaft
- Extended lead wires



Interactive Content

Quick Start Tutorials

3-5 minute videos on easily setting up motors, drivers, and controllers

Videos

Short videos on new stepper technology

Conversion Calculator

Easily convert parameters such as torque, inertia, speed, resolution, and distance



Downloads

3D Models

Available for most products

Manuals and Datasheets



CABLES & CONNECTORS

Lin Engineering step motors are available with either 2-coil Bipolar, or 4-coil Unipolar windings. Bipolar motors have 4 leads, while unipolar motors have 6 leads. Additionally, some motors are designed with 8 leads, so they may be connected in a variety of ways.

CONNECTION INSTRUCTIONS

By following a series of easy steps, the below charts can be used to properly connect your motor to your drive.

- 1
- Determine how many lead wires your motor has: 4, 6, or 8 wires. Locate the proper box below.
- 2
- Next, examine the color code of the lead wires on your motor; find the row of colors that match your wires, this is your "Color Code". You will have either Code 1, Code 2, or Code 3. For example, if you have 4 wires and the wires are Red, Blue, Green, and Black, your Color Code is 1.
- 3
- Next, connect the proper color to the appropriate terminal on your drive. If you have a Bipolar drive, the terminal on your drive will be labeled A, A, B, B.

For example, if using the above 4 wire motor with Color Code 1, the Red wire would be connected to A, Blue connected to A, Green connected to B, and Black connected to B.

If you have a Unipolar drive, the terminal will be labeled A, B, C, D and A/C Common, B/D Common (or Comm.)

- Notes:
- Indicates that the particular wire is not connected to the drive.
- Indicates that two particular wires are connected to each other, but not the driver.
- Indicates that two particular wires are connected to each other, and then connected to the indicated terminal on the drive. In this example, two wires are connected together, then both wired to terminal A on the drive.

4 LEADS	Code 1	Red	Blue	Green	Black
	Code 2	Brown	Orange	Red	Yellow
	Code 3	Red	Red / White	Green	Green / White
	Bipolar Drive	A	A	B	B

6 LEADS	Code 1	Red	White	Blue	Green	Yellow	Black
	Code 2	Brown	Black	Orange	Red	White	Yellow
	Code 3	Red	Black	Red / White	Green	White	Green / White
	Bipolar Drive	Half Coil Connection	A	A	B	B	
		Series Connection	A	A	B	B	
	Unipolar Drive	A	A/C Comm	C	B	B/D Comm	D

8 LEADS	Code 1	Blue / White	Red / White	Blue	Red	Green / White	Black / White	Green	Black
	Code 2	Red	Yellow / White	Red / White	Yellow	Orange	Black / White	Orange / White	Black
	Code 3	Red	Black / White	Red / White	Black	Green	Yellow / White	Green / White	Yellow
	Bipolar Drive	Parallel Connection	A	A	B	B			
		Series Connection	A	A	B	B			
	Unipolar Drive	A	A/C Comm	C	B	B/D Comm	D		

BLDC

Vcc	Hall A	Hall B	Hall C	GND	Phase A	Phase B	Phase C
Red	Blue	Green	White	Black	Yellow	Red	Black

Specifications	Nema size	8	11	14	14	17	17	17	23	23	23	34	34	34
	Motor Family	208	211	3509 3609 3709 3809	3518	416 417 4109	4209	4018 4118 4218 4418 4518	5704	5609 5709	5618 5718	8609 8709	8618	8718
Step Size Angle		1.8º	1.8º	0.9º	1.8º	0.9º	0.9º	1.8º	0.45º	0.9º	1.8º	0.9º	1.8º	1.8º
Radial Play (inches)		0.001" max @ 1 lbs load												
End Play (inches)		0.003" max @ 2 lbs load												
Shaft Run Out		0.002" TIR												
Concentricity of Mounting Pilot to Shaft		0.003" TIR												
Perpendicularity of Shaft to Mounting Face		0.003" TIR												
Max. Radial Load at Dimension " K" from mounting face (lbs)		4.5	5.0	6					15			24		39
Dimension "K"		0.5"			0.62"				0.55"			0.8"		0.9"
Max Axial Load (lbs)		0.45	2.25	6					13			22		25
Maximum Case Temperature (°C)		60°C		80°C maximum*										
Ambient Temperature (°C)		-20º to 50º C *												
Storage Temperature (°C)		-20º to 100º C *												
Humidity Range (%)		85% or less, non-condensing												
Magnet Wire Insulation		Class B 130º C *												
Insulation Resistance		100MΩ at 500 VDC												
Dielectric Strength		500 VAC for 1 minute											900 VAC for 1 minute	

BLDC MODEL	BL17	BL24	BL25
Hall Effect Angle	120°C electrical Angle	120°C electrical Angle	120°C electrical Angle
Number of Rotor Poles	8	4	4
Number of Phase	3	3	3
Radial Play	.002" @ .99 lb	.002" @ .99 lb	.002" @ .99 lb
End Play	.003" @ 99 lb	.003" @ 99 lb	.003" @ 99 lb
Max. Radial Force	3.37 lbs @ .394" from flange	16.8 lbs @ .787" from flange	16.8 lbs @ .787" from flange
Max. Axial Force	2.25 lbs	3.37 lbs	3.37 lbs
Insulation Class	Class B	Class B	Class B
Dielectric Strength	500 VDC for 1 minute	500 VDC for 1 minute	500 VDC for 1 minute
Insulation Resistance	100 Ω Min. 500 VDC	100 Ω Min. 500 VDC	100 Ω Min. 500 VDC
Ambient Operating Temperature	-30° to 85° C	-30° to 85° C	-30° to 85° C
Storage Temperature	-20° to 100° C	-20° to 100° C	-20° to 100° C
Humidity Range	85% (RH) non-condensing	85% (RH) non-condensing	85% (RH) non-condensing
Lead wire AWG	UL1007, AWG 20	UL1007, AWG 20	UL1007, AWG 20
Direction of Rotation **	CCW	CCW	CCW

*Custom designs available upon request

**Follow commutation sequence on page 84-88

OPERATION & USAGE TIPS



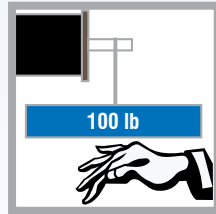
Do not disassemble motors; a significant reduction in motor performance will occur.



Do not machine shafts; this will have a negative effect on shaft run out and perpendicularity.



Do not disconnect motor from drive while in operation.



Do not use holding torque/detent torque of motor as a fail safe brake.



Do not hold motor by lead wires.

FAILURE TO COMPLY WITH THESE RECOMMENDATIONS WILL VOID ALL WARRANTY TERMS

TORQUE CONVERSION CHART

KNOWN VALUE								DESIRED VALUE
lb-ft x	lb-in x	oz-in x	dyne-cm x	N-m x	N-cm x	kg-m x	gr-cm x	
1	0.08333	0.005208	7.376x10 ⁻³	0.7376	0.007376	7.233	7.233x10 ⁻³	
12	1	0.0625	8.851x10 ⁻⁷	8.8509	0.08851	86.796	0.000868	
192	16	1	1.416X10 ⁻⁵	141.61	1.4161	1,389	0.01389	
1.356x10 ⁷	1.1298x10 ⁶	70,620	1	10 ⁷	10 ⁶	9.8067x10 ⁸	980.67	
1.356	0.113	0.007062	10 ⁻⁷	1	.01	9.8066	9.8x10 ⁻⁵	
135.6	11.3	0.7062	10 ⁻⁶	100	1	980.66	9.8x10 ⁻³	
0.1383	0.01152	7.201x10 ⁻⁴	1.0197x10 ⁻⁸	0.10197	0.001097	1	0.00001	
13,830	1,152	72.01	1.0197x10 ⁻³	11019.7	101.97	100,000	1	

Conversion factors may be read directly from the tables

Example:
If you need to convert 10 kg-m to oz-in, take known value (10 kg-m) multiply (X) by conversion factor (1,389) to convert to oz-in. The same method applies to the inertia conversion chart.

10kg-m x 1,389 = 13,890 oz-in

kg-m x	gr-cm x	
7.233	7.233x10 ⁻³	=lb-ft
86.796	0.000868	=lb-in
1,389	0.01389	=oz-in

INERTIA CONVERSION CHART

KNOWN VALUE										DESIRED VALUE
lb-ft ² x	lb-in ² x	lb-ft-sec ² x	lb-in-sec ² x	oz-in ² x	oz-in-sec ² x	kg-m ² x	kg-m-sec ² x	gr-cm ² x	gr-cm-sec ² x	
1	0.006944	32.17	2.681	0.000434	0.1676	23.73	232.7	2.73x10 ⁻⁶	0.002327	
144	1	4,633	386.1	0.0625	24.13	3,417	33,510	3.417x10 ⁻⁴	0.3351	
0.03108	0.0002158	1	0.08333	1.349x10 ⁻⁵	0.005208	1	7.233	7.376x10 ⁻⁸	7.233x10 ⁻⁵	
0.373	0.00259	12	1	0.0001619	0.0625	8.851	86.8	8.851x10 ⁻⁷	0.000868	
2,304	16	74,130	6,177	1	386.1	54,670	536,200	0.005467	5.362	
5.968	0.04144	192	16	0.00259	1	141.6	1,389	1.416x10 ⁻⁵	0.01389	
0.04214	0.0002926	1.356	0.113	1.829x10 ⁻⁵	0.007062	1	9.807	10 ⁻⁷	9.807x10 ⁻⁵	
0.004297	2.984x10 ⁻⁵	0.1383	0.01152	1.856x10 ⁻⁶	0.0007201	0.102	1	1.02x10 ⁻⁸	10 ⁻⁵	
421,400	2,926	1.356x10 ⁷	1,130,000	182.9	70,620	10 ⁷	9.807x10 ⁷	1	9.807	
429.7	2.984	1.383x10 ⁻⁴	1,152	0.1865	72.01	10,200	100,000	0.00102	1	



DID YOU KNOW...

The Lin Engineering website has automated tools for conversions.

Company Name: _____ Contact: _____

Address: _____

Phone: _____ FAX: _____

Email: _____

Please describe your Application, Potential Quantity, Environmental Conditions and Target Price:

(Information in bold is required)

Motor Operating Speed: _____ RPM
_____ RPS

☐ Full-Step
☐ Half-Step
☐ Micro-Step _____

Max. Voltage Available: _____ Volts

☐ Unipolar Driver ☐ Bipolar Driver

Max. Current Available: _____ Amps

Step Angle: _____ deg.

Max. Holding Torque Required: _____

Duty Cycle: _____

Max. Motor Length: _____

Motor Frame Size: ☐ NEMA 8 ☐ NEMA 23
 ☐ NEMA 11 ☐ NEMA 34
 ☐ NEMA 14 ☐ Other:
 ☐ NEMA 17

Pullout Torque Required at Operating Speed: _____ ☐ oz-in ☐ gm-cm

Type of Coupling: ☐ Direct ☐ Gear Ratio: _____
 ☐ Belt Ratio: _____ ☐ Other Ratio: _____

Reason for New Supplier: ☐ New Application ☐ Quality ☐ Performance
 ☐ Delivery ☐ Price
 ☐ Other: _____

How did you hear about us? _____

Please describe any other Critical Motor Specifications:



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Email: sales@linengineering.com
Website: www.linengineering.com

Lin Engineering's diversified customer base includes such industries as:

- Automated Test Equipment
- Surveillance Systems
- Avionics
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- Semiconductor Manufacturing
- Metering and Dispensing
- Engraving Machine
- Aerospace
- Automatic Feeding Machine
- 3D Image Acquisition System
- Label and Die Feeder
- Wave Length Meter
- Bar Code Printing
- Antenna
- Fiber optics Switch
- Laser Measurement
- Press Printing
- Color and Photo Imaging
- Solar and Green Technology

