ServoTrack™ Vector Systems

KOCO MOTION DINGS™

In-Position Technologies

www.iptech1.com | (877) 478-3241 | help@iptech1.com

VECTOR23

INTEGRATED MOTION SYSTEMS

ONE PACKAGE

Simple • Reliable • Compatible

Real-Time Closed Loop Control | Rotary Torque Or Linear Force Control

ServoTrack:™ Bridging the gap between servo, brushless DC and step motor performance.

...Intelligence in motion

DESIGN SMART WITH SERVOTRACK™

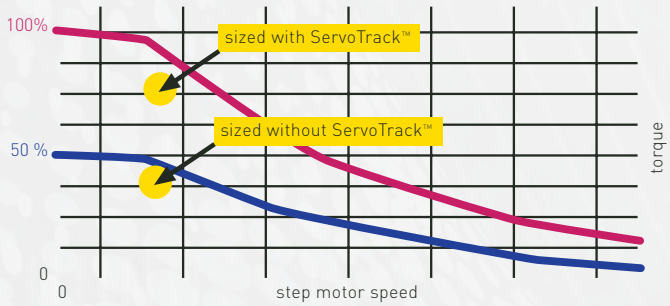
Add torque control capability to your stepping system!

Why step motors were a great invention...

Step motors, as a result of the way they are constructed, are inherently lower cost than servo motors. Step motors do not require tuning, allow for a greater inertia mismatch and have very high torque density. This torque is 100% available immediately upon startup, which can be very advantageous when doing short quick moves or when coupled to high inertia loads. Because step motors are synchronous motors with a high pole count, they are able to run smoothly at extremely slow speeds with little torque ripple.

Step motor systems have unique characteristics such as smooth motion, stiffness as stand-still, no tuning, and low cost. Popular for decades, these systems will continue to be a popular choice among design engineers.

Typical stepper speed-torque curve



ServoTrack™ control is hardware based for real-time response. It continually monitors the relationship between the rotor and stator at nano-second intervals, and will not allow that relationship to exceed the point where motor synchronization is lost.

Although both servo and step motors are permanent magnet synchronous motors, there are differences. Brushless Servo motors typically have 2 to eight magnetic poles on the rotor, whereas the 1.8 degree step motor has 50 poles. It can be thought of as electromagnetically geared down compared to servo motors and thus has a higher torque density.

Key benefits:

- **Solve applications previously considered too demanding for stepper Systems.**
- **Reduce system cost with an enhanced stepper based system.**
- **Do you need torque control in your stepper system?**
- **Does your system stall due to transient loads or friction?**
- **Eliminate unintentional stalling or loss of synchronization.**
- **Increase throughput efficiency**
- **Reduce motor heating and energy costs with variable current control**
- **Optimize the torque utilization of your motor**
- **Greater compliance with inertial mismatch**

However, there are some disadvantages with today's step motor control technology. The most critical drawback is the loss of synchronization and torque if a large load exceeds the motor's capacity and it's ability to resynchronize once the load is reduced to a level within the motor's capability. Step motors also tend to run hot because of the use of full phase current independent of load.

Historically, these disadvantages may have influenced the decision to choose higher cost servo technology over traditional step motor technology.

Now – with the introduction of ServoTrack™, unintentional stalling due to transient loads, or excess friction, is eliminated and torque control becomes an integral function of your stepper system.

Features:

- ROTARY TORQUE UP TO 300 OZ-IN
- LINEAR THRUST UP TO 200 LBS
- LOW Cost Motion Control Systems
- 12-48 VDC Input
- Dynamic Closed Loop Control
- HMI Interface Capable
- Up to 256 uSteps / Full Step
- USB Programming Interface
- Multifunction Diagnostic LED
- SnapTrack™ Programming Software
- Secondary Encoder input for Electronic Gearing OR Camming
- Distributed Motion for Multi-Axis Control (Master and Slave)
- RS485 Communication and Command Structure (Dynamic Link Library)
- Qty 3 Programmable Inputs (5-24VDC)
- Qty 3 Programmable Outputs (5-24VDC)
- Qty 1 16 Bit Analog Input
- 5 VDC output on board

SNAPTRACK™ Programming Overview

- Simple and powerful programming
- "Block" programming
- Eliminates traditional "coding" and syntax learning
- Creates buttons with labels with underlying programs that can be executed with a simple click
- User-friendly software

Typical Programming Blocks

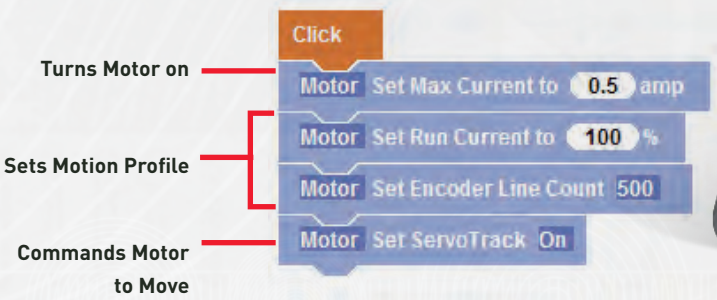
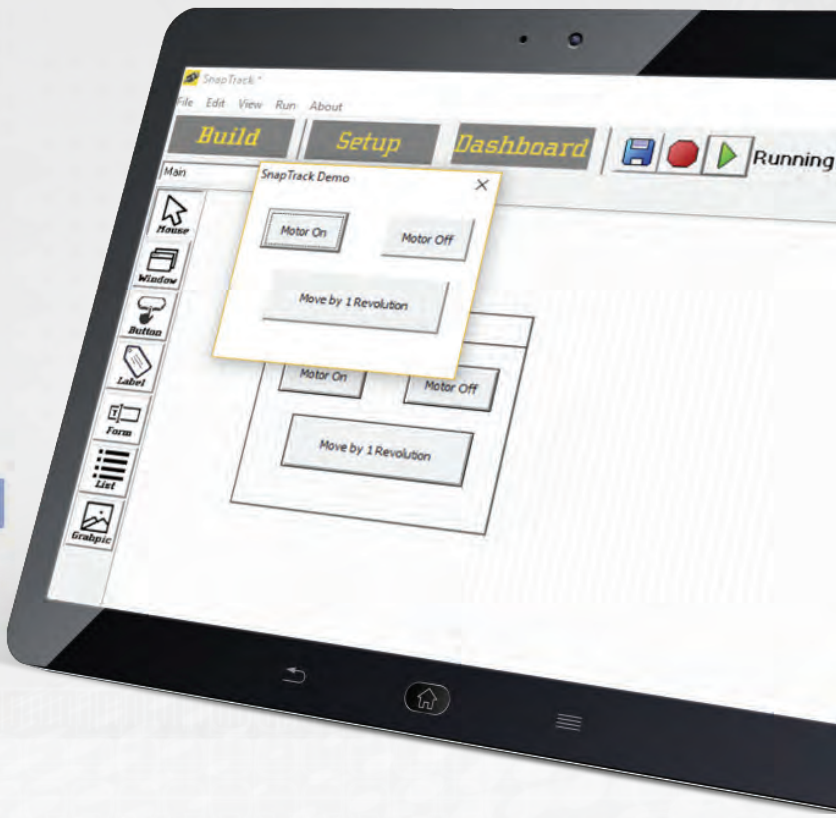


Figure 1. Push Button Block Program, Click and Set Motor

COMPUTER PROGRAMMING INTERFACE



Download Snaptrack Software at **http://www.kocomotionus.com/servotrack**

VECTOR LINEAR ACTUATOR VERSION

PRODUCT SELECTION SYSTEMS					
1.	V = Vector Series				
2.	Drive Option	☐ D = Drive ONLY	☐ P = Programmable Controller and Driver		
3.	Linear Version	☐ E = External	☐ N = Non-Captive	☐ K = Captive	☐ C = Electric Cylinder
4.	Motor Length (See Speed / Force Curves)	☐ 1 = Single Stack	☐ 2 = Double Stack		
5.	Lead Screw Code	See Table on page 5 (See Screw Lead Selection Table AND Speed / Force Curves)			
6.	Lead Screw Length / Stroke	☐ XXX = length in mm (For External and Non-Captive)	☐ XXX = mm Stroke stroke (For Captive and Electric Cylinder)		
7.	Lead Screw Surface	☐ S = Standard / No Teflon Coating	☐ T= Teflon Coating		
8.	End Machining (See Table XX)	☐ M = Metric	☐ U = UNC	☐ S = Smooth	☐ N = None
9.	Nut Version	☐ S = Standard Free Wheeling Nut	☐ A = Anti-Backlash Nut		

NOTE: RADIAL (SIDE) LOADING OF THE LEAD SCREW OR SHAFT IS NOT RECOMMENDED!

Linear Version Selection Considerations

Why Choose One Form Factor Over The Other?

1. What is the best mechanical fit for your application?
2. How do you plan to attach the screw?
3. Is rotation of the screw acceptable?
4. What is the stroke of your application?

What Environmental Considerations Do You Have?

Koco Motion / DINGS linear motion systems are designed to operate in dry and non-corrosive environments. Standard products do not have an IP rating. Operating non-IP rated linear systems in dirty or corrosive environments will significantly reduce product life.

Temperature

Very high or low temperatures may case significant changes in nut fit or drag force.

Maximum Dynamic Load

Each NEMA frame size motor has a mechanical load maximum that should not be exceeded. For more information, see Speed/Force curves for the individual frame sizes.

EXAMPLE:

Part Number **VPE1A150SMS**

Description

V= Vector Series
P= Programmable Controller/Drive
E= External Linear Version
1= Single Stack Motor
A= Lead Choice
150mm = Lead Screw Length
S= No Teflon Coating
M= Metric End Machining
S= Standard Free-Wheeling Nut

BASIC SPECIFICATIONS FOR LINEAR SYSTEMS

LEAD SCREW MATERIAL

Unless otherwise noted, all reference to lead screws in this ca talog have the following characteristics:

Lead Screw Material	303 Stainless precision cold rolled steel
Screw Coating	Teflon coating is optional

Lead screws are manufactured via precision rolling process at our San José, California facility.

Standard Screw Accuracy (Lead accuracy)	0.0006 in /inch
Screw Repeatability	± 0.006 inch
System Repeatability (Motor and Screw)	Nominally the same as screw repeatability; motor variance adds ±6 micro steps.
Screw Straightness	0.003 inch/foot, measured as Total Indicated Runout (TIR) All screws are carefully checked for straightness before shipment.
Screw Efficiency	From 35% to 85% dependent on lead. Also depends on the usage of an anti-backlash nut with screw. The larger the lead, the higher the efficiency of the screw.
Operating Temperature	–10 °C to +50 °C (14 °F to 122 °F)
Screw Backlash	Depends on lead (nominally ± 0.005 in)
System Backlash	Includes screw, motor, and attached mechanics This will be the sum of all the backlash in your motion axis.
Nut Material	Polyacetal with lubricating additive; Standard is a free-wheeling nut. [Anti-backlash version is available]
Wear life of Screw and nut	Depends on load, speed, duty cycle, and environmental factors and Nut [typically → 5 million cycles]

NOTE: Koco Motion / DINGS' linear systems are manufactured from high quality materials. Because of the variable effects of friction, lubrication, and cleanliness, an exact life cannot be predicted for a given application.

NOTE: Please reference the complete hardware and Snaptrack™ software manuals at our website: **www.kocomotionus.com**

CAUTION OVER VOLTAGE:
VECTOR SERIES MAXIMUM DC voltage is +48 VDC. Allow 6.0 A maximum power supply output current in the system per Vector Unit. Actual power supply current will depend upon voltage and load. Failure to follow these instructions can result in equipment damage.

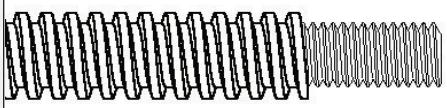
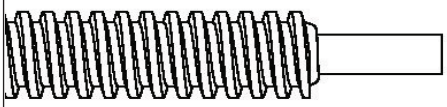
CAUTION: DO NOT "HOT PLUG" THE DRIVER/ CONTROLLER WHEN POWER IS APPLIED AS THIS CAN CAUSE DAMAGE TO THE ELECTRONICS!
NOTE: "Hot Plugging" means disconnecting or connecting the DC Power, Logic, or USB Communications from the System before turning off AC Power at the Power Supply.

AVAILABLE SCREW, LEADS AND LINEAR TRAVEL

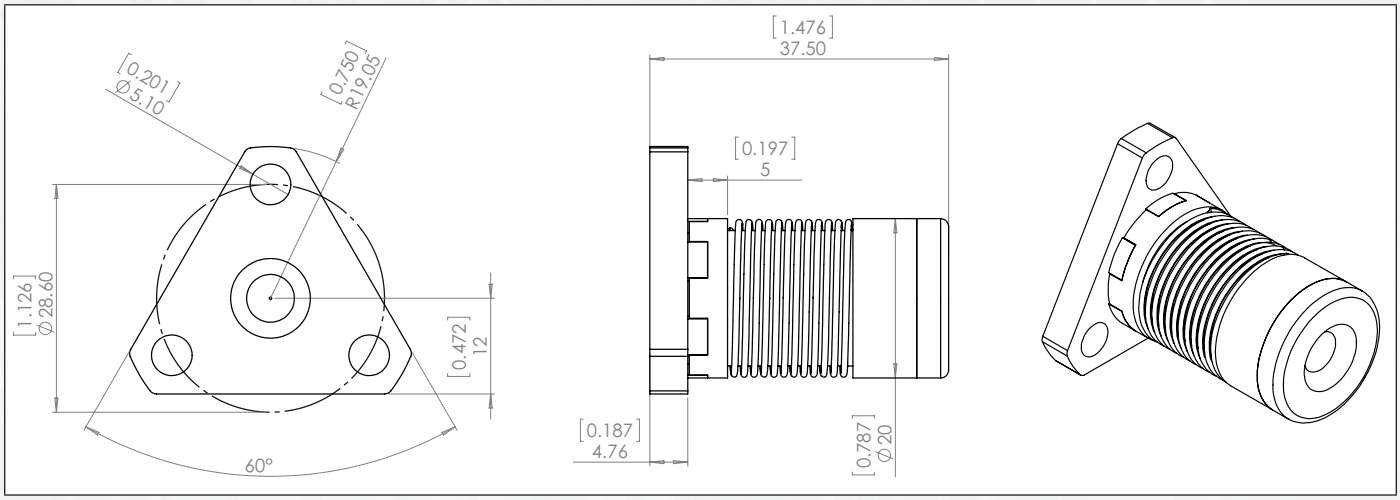
PLEASE CONTACT KOCO MOTION US FOR CUSTOM PRODUCTS.

Screw Dia. (inch)	Screw Dia. (mm)	Lead (inch)	Lead (mm)	Lead Code	Travel Per Step @ 1.8 deg (mm)	Travel Per Step @ 0.9 deg (mm)*
0.375	9.525	0.025	0.635	A	0.003	0.0016
0.375	9.525	0.05	1.27	D	0.006	0.0032
0.375	9.525	0.0625	1.5875	F	0.0079375	0.0039688
0.375	9.525	0.083	2.1082	H	0.01	0.0053
0.375	9.525	0.1	2.54	K	0.012	0.0064
0.375	9.525	0.125	3.175	L	0.015	0.0079
0.375	9.525	0.167	4.2418	P	0.021	0.0106
0.375	9.525	0.2	5.08	R	0.025	0.0127
0.375	9.525	0.25	6.35	S	0.031	0.0159
0.375	9.525	0.375	9.525	V	0.047	0.0238
0.375	9.525	0.384	9.7536	W	0.048	0.0244
0.375	9.525	0.5	12.7	Y	0.063	0.0318
0.375	9.525	1.0	25.4	Z	0.127	0.0635

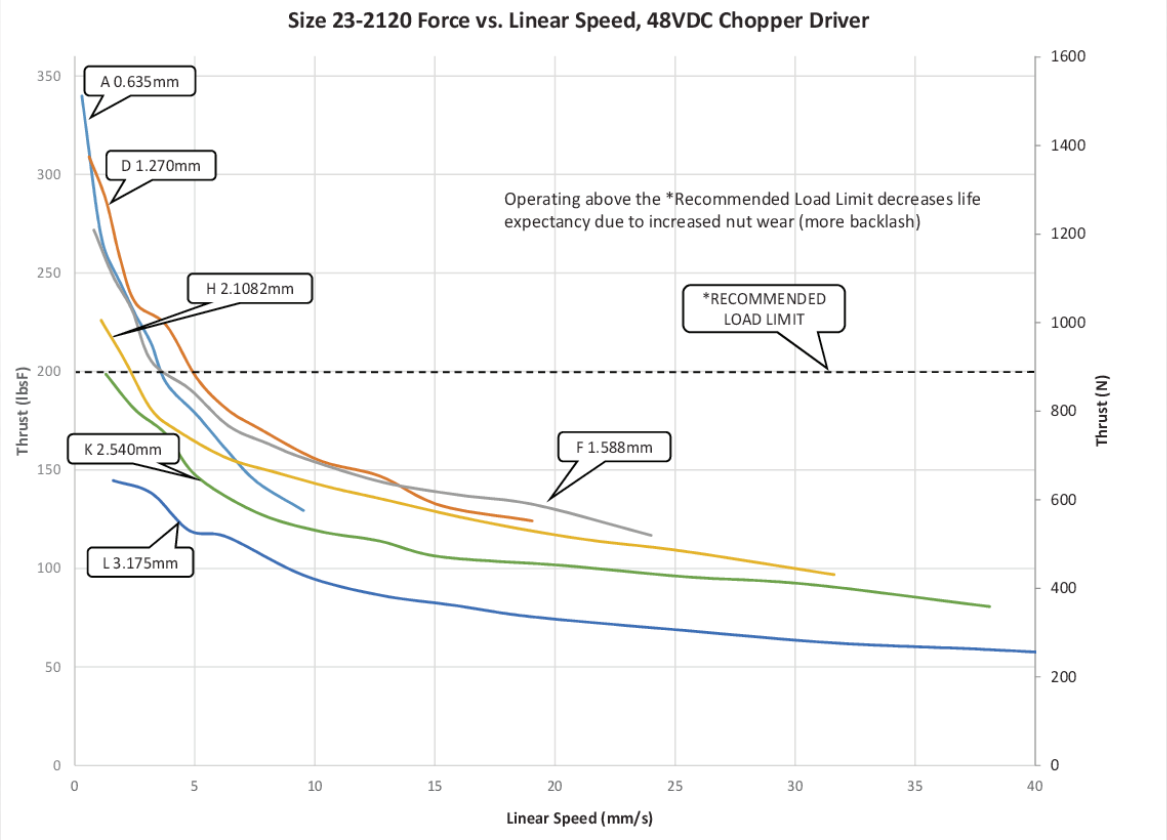
Standard Lead Screw End Machining Selection

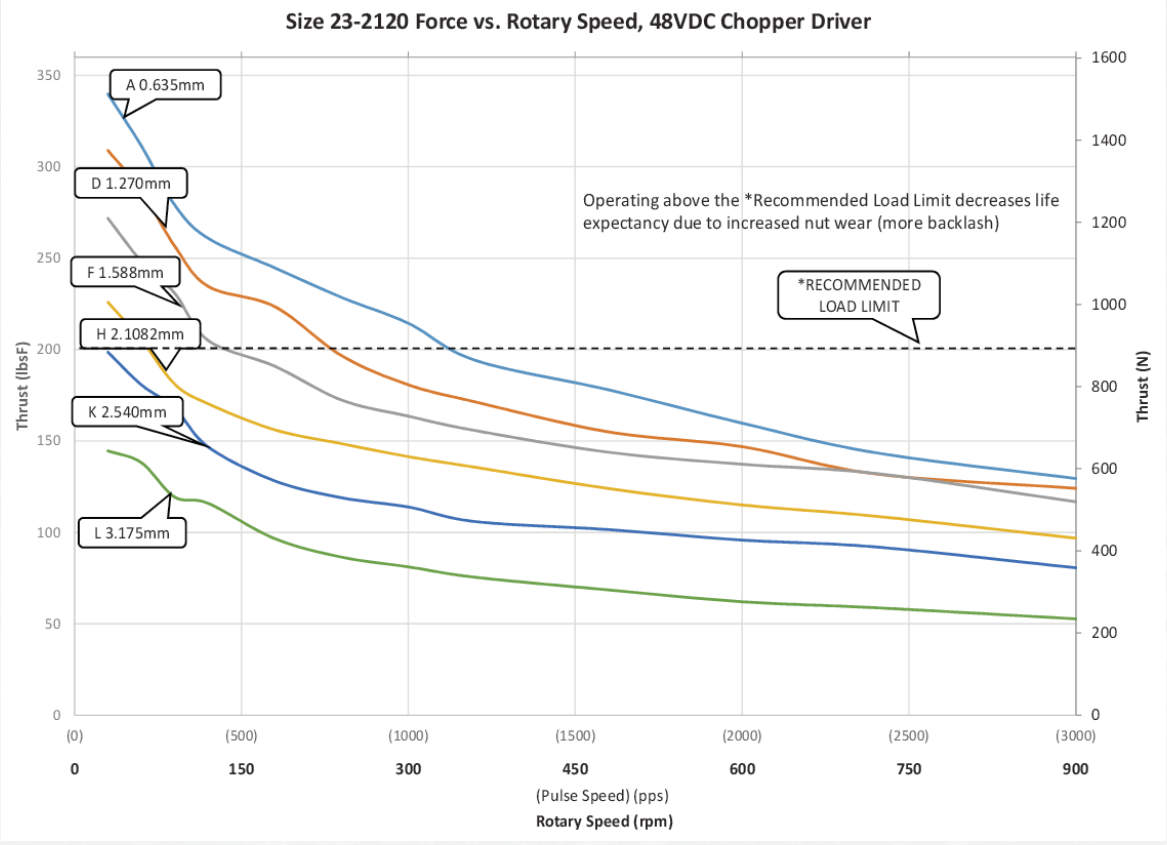
 Threaded End	 Smooth End	None
Metric End: M6 X 1.0 UNC End: 1/4-20 UNC	Ø6mm ± 0.025 Ø0.2362" ± 0.0010	

Anti-Back Lash Nut Drawing

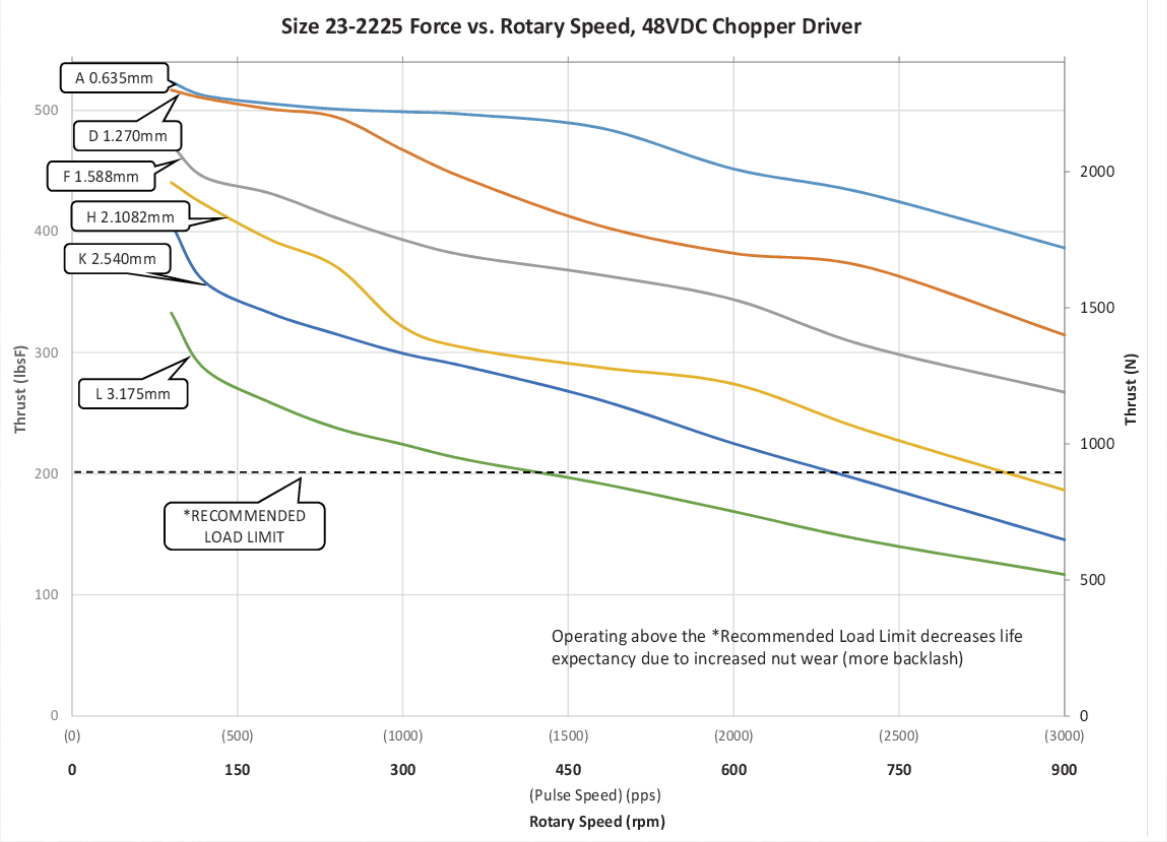


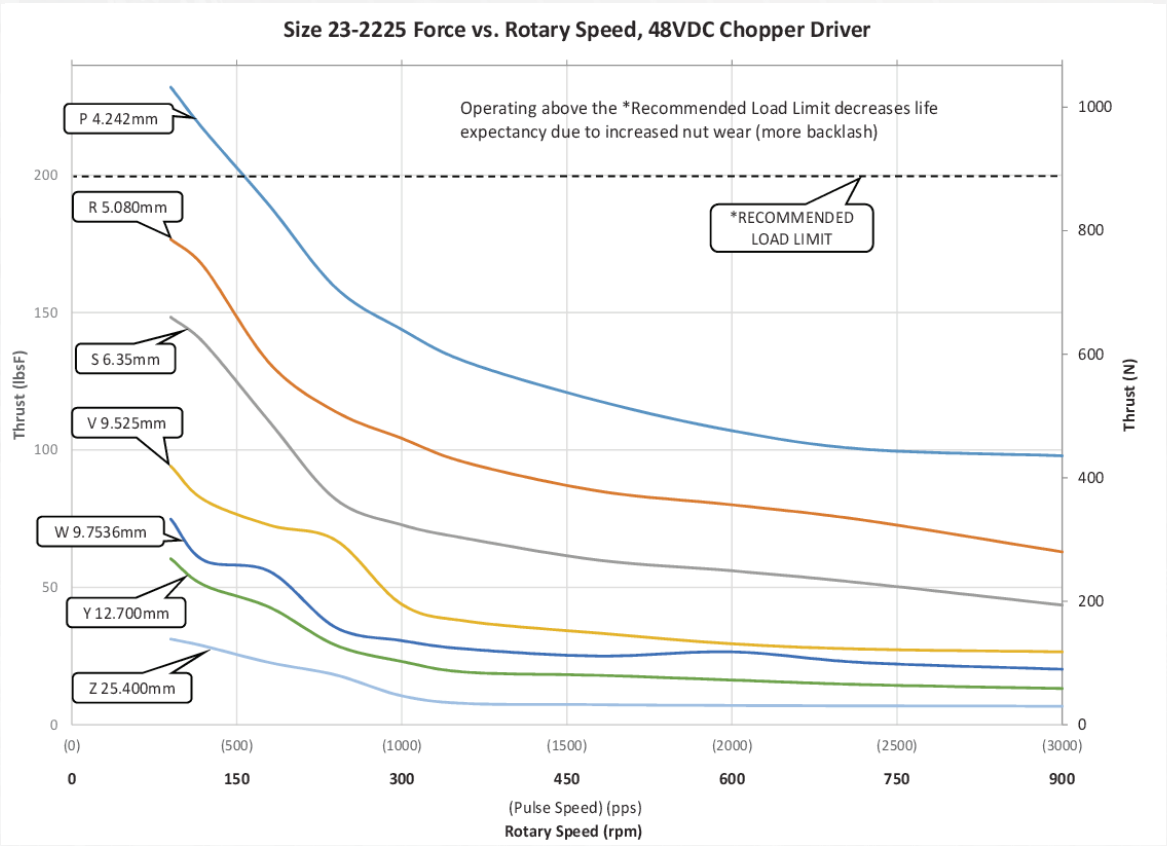
SPEED THRUST CURVES



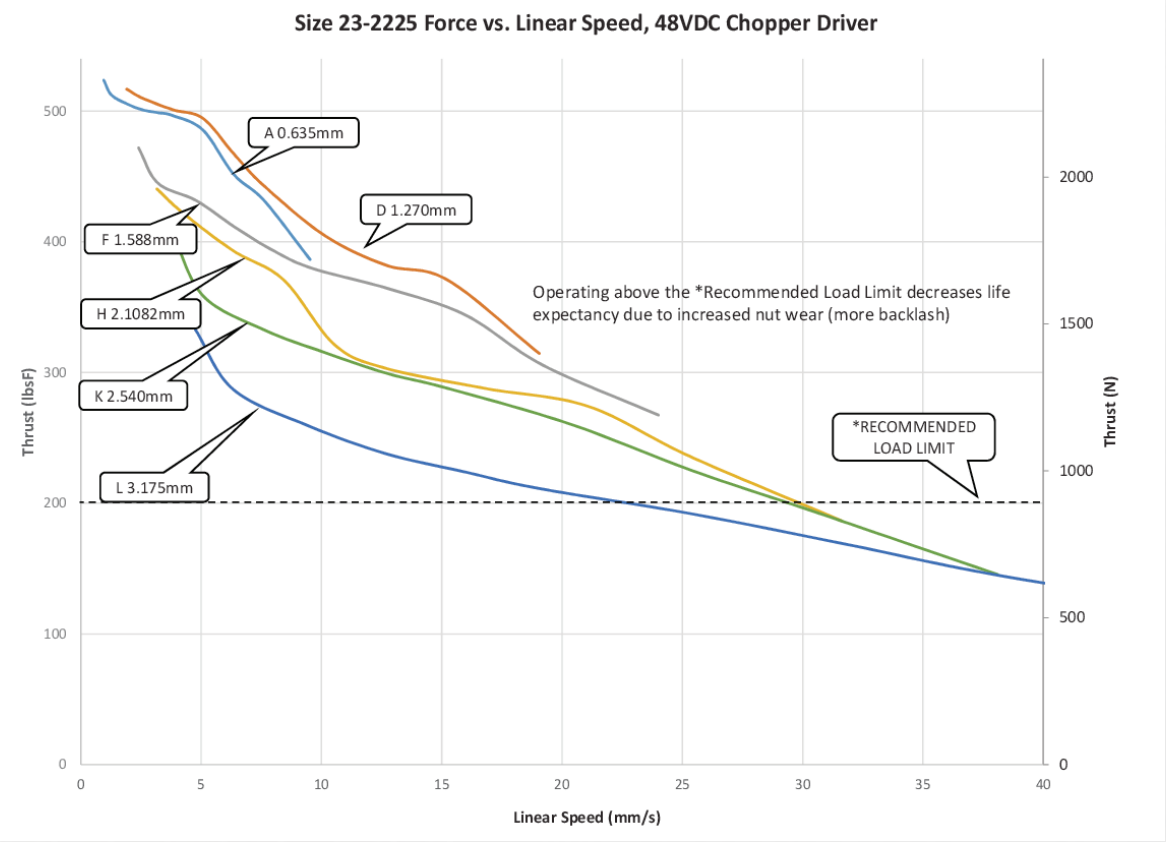


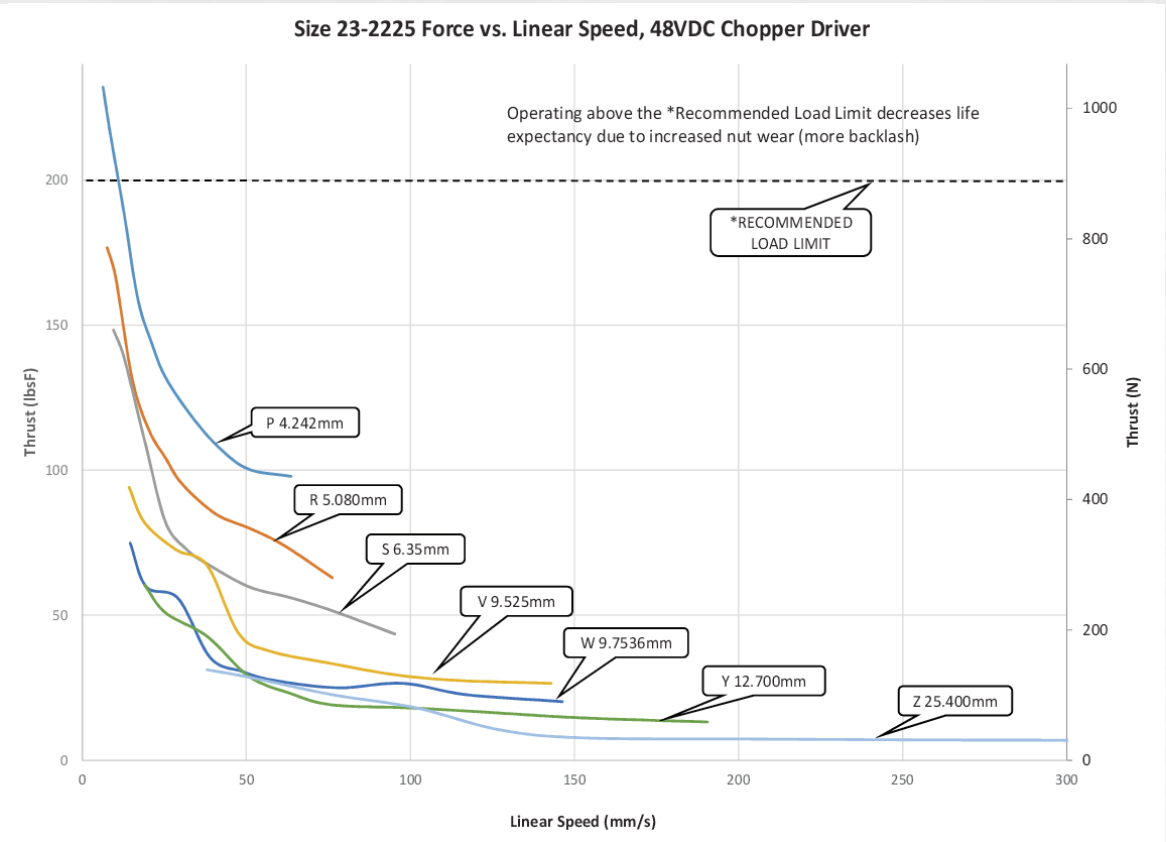
SPEED THRUST CURVES continued



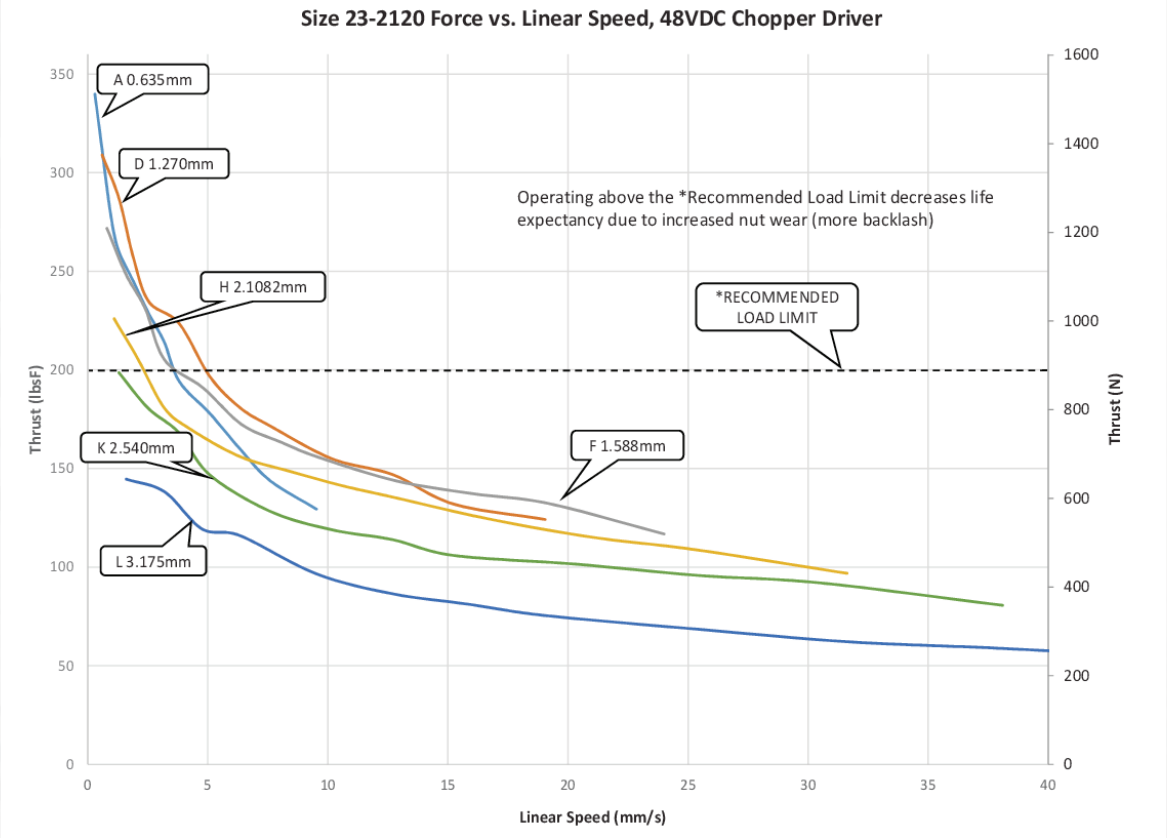


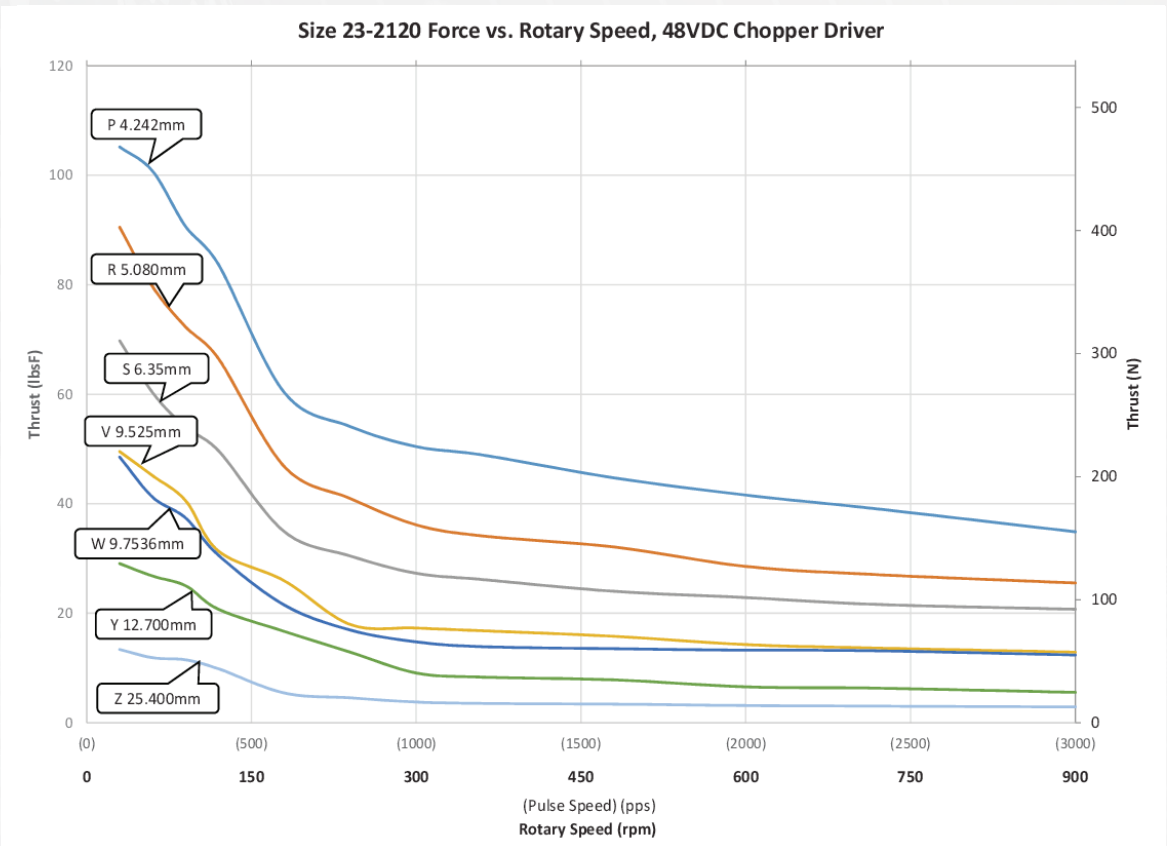
SPEED THRUST CURVES continued





SPEED THRUST CURVES continued





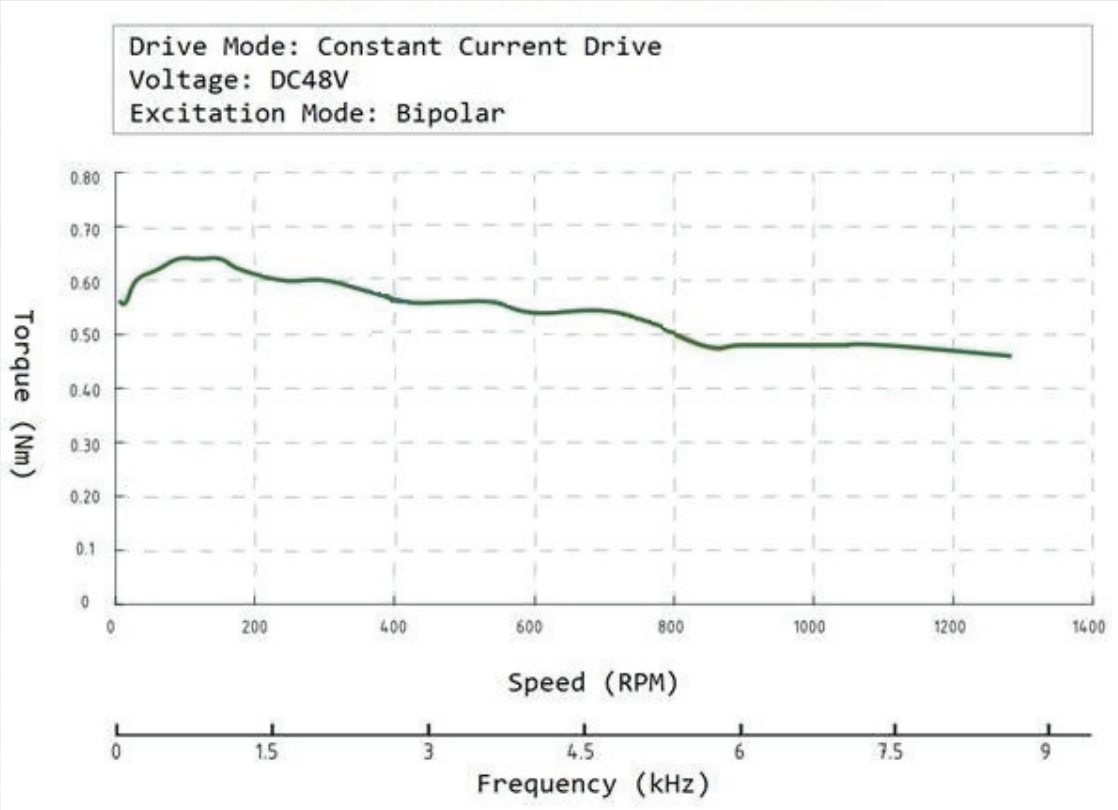
VECTOR ROTARY VERSION

PRODUCT SELECTION SYSTEMS		
1.	V	Vector Series
2.	P	Programmable Controller with Driver
3.	23	Nema Size
4.	H	Rotary Version
5.	Motor Selection: (See Speed / Torque Curves)	-45 = 0.8 Nm Torque Motor -55 = 1.2 Nm Torque Motor -75 = 2.0 Nm Torque Motor
6.	-GR	Gearbox Ready
7.	-PG10	Planetary Gearbox (10:1 Ratio)
8.	-XYZ	Custom Suffix

EXAMPLES:
VP23H-45
VP23H-55-GR
VP23H-75-PG10
VP23H-45-XXX-001 = Custom Suffix

Rotary Motor Options

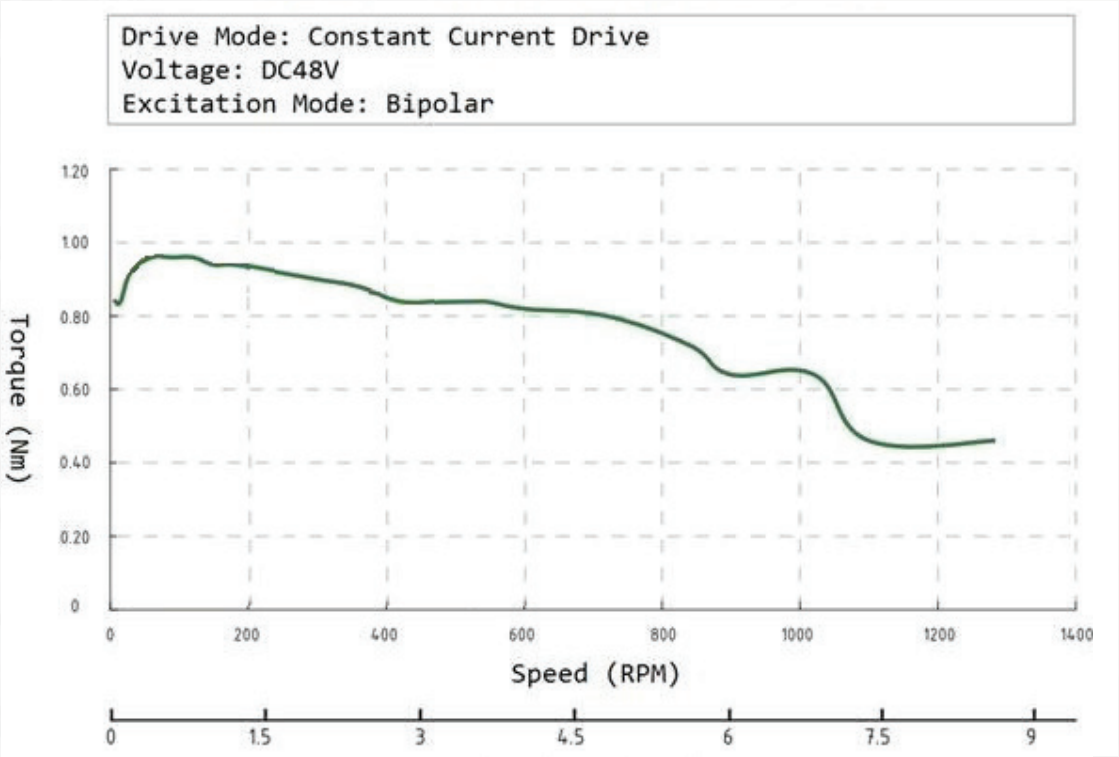
Speed / Torque Curves: -45 Option



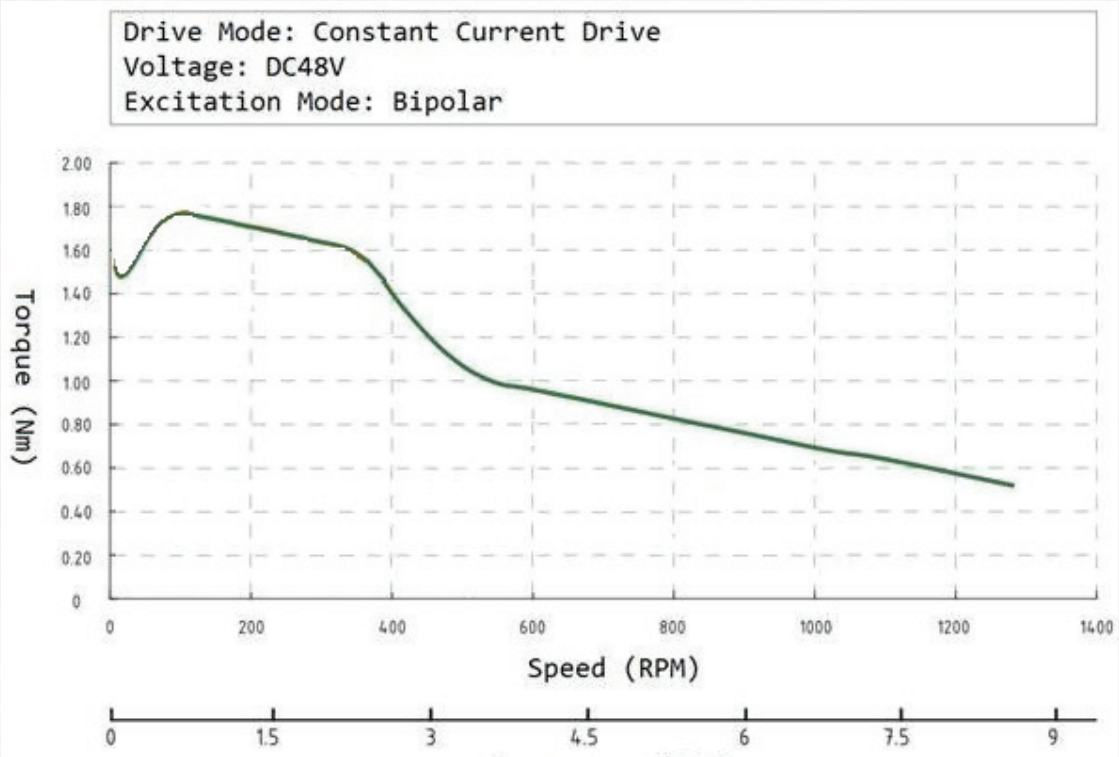
CAUTION OVER VOLTAGE:
VECTOR SERIES MAXIMUM DC voltage is +48 VDC.
Allow 6.0 A maximum power supply output current in the system per Vector Unit. Actual power supply current will depend upon voltage and load. Failure to follow these instructions can result in equipment damage.

CAUTION: DO NOT "HOT PLUG" THE DRIVER/ CONTROLLER WHEN POWER IS APPLIED AS THIS CAN CAUSE DAMAGE TO THE ELECTRONICS!
NOTE: "Hot Plugging" means disconnecting or connecting the DC Power, Logic, or USB Communications from the System before turning off AC Power at the Power Supply.

Speed / Torque Curves: -55 Option

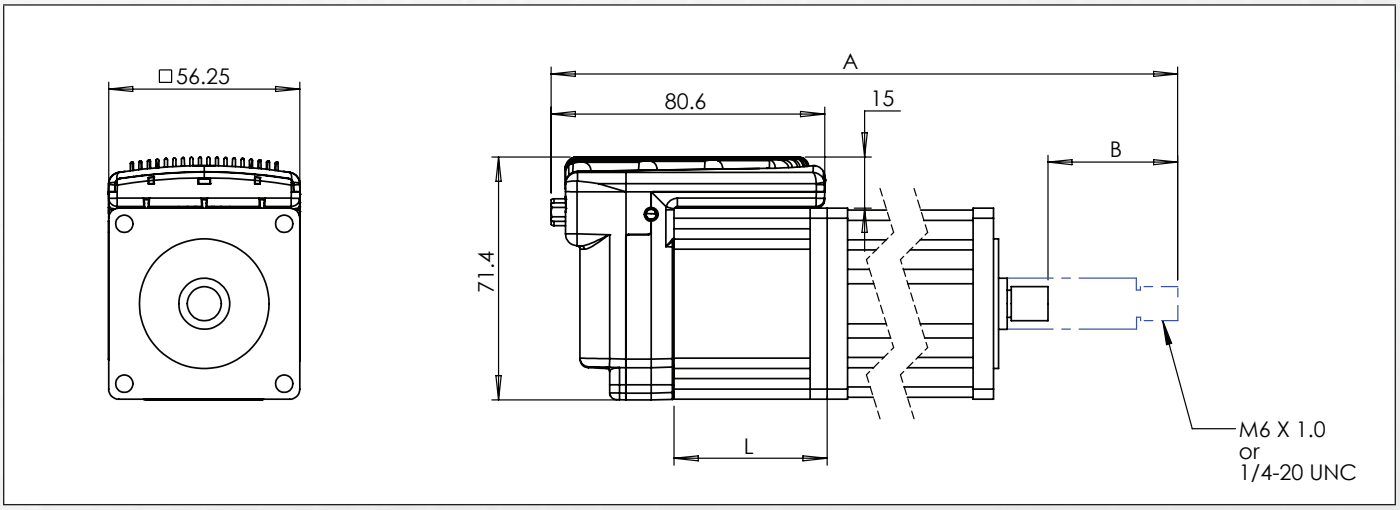


Speed / Torque Curves: -75 Option



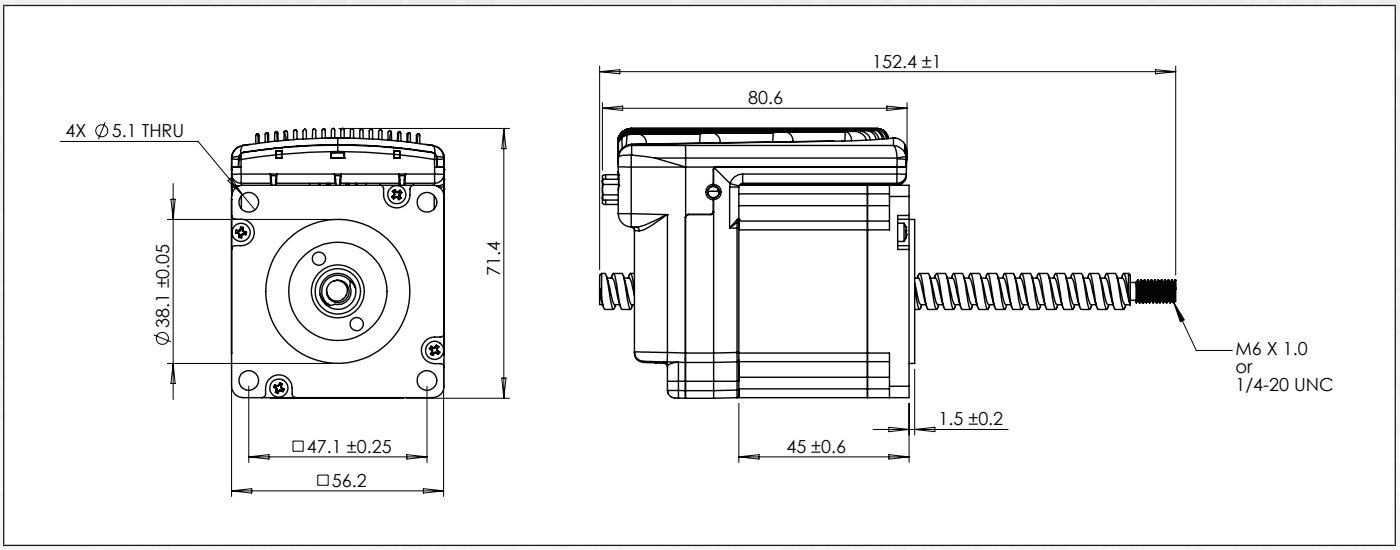
DIMENSIONAL SPECIFICATIONS CAD Models Available

Electric Cylinder



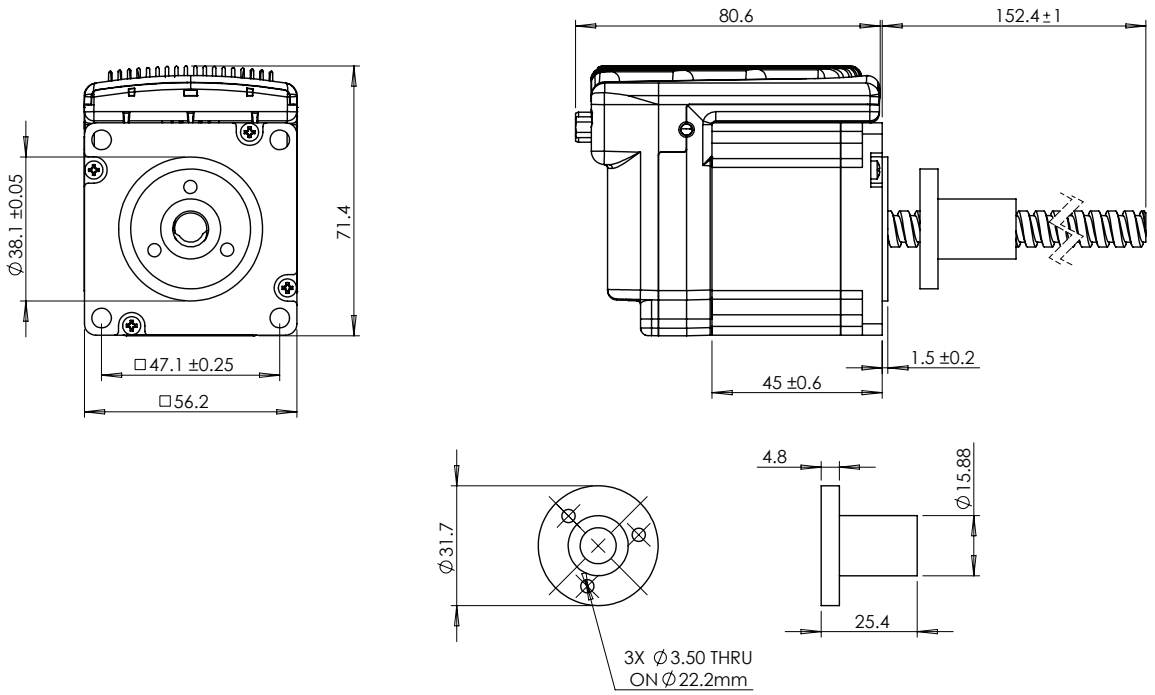
Stroke B inch (mm)	Dimension A (mm)	Dimension L (mm)	
0.5 (12.7)	45.7	Single stack motor 47 mm	Double stack motor 66 mm
0.75 (19.05	52.05		
1.0 (25.4)	58.4		
1.25 (31.8)	64.8		
1.5 (38.1)	71.1		
2.0 (50.8)	83.8		
2.5 (63.5)	96.5		

Non-captive Linear Vesion

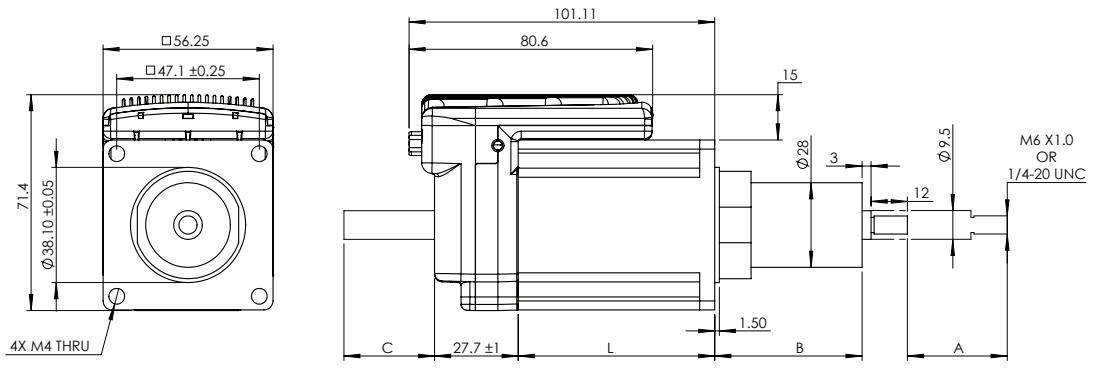


DIMENSIONAL SPECIFICATIONS continued

External Linear Vesion



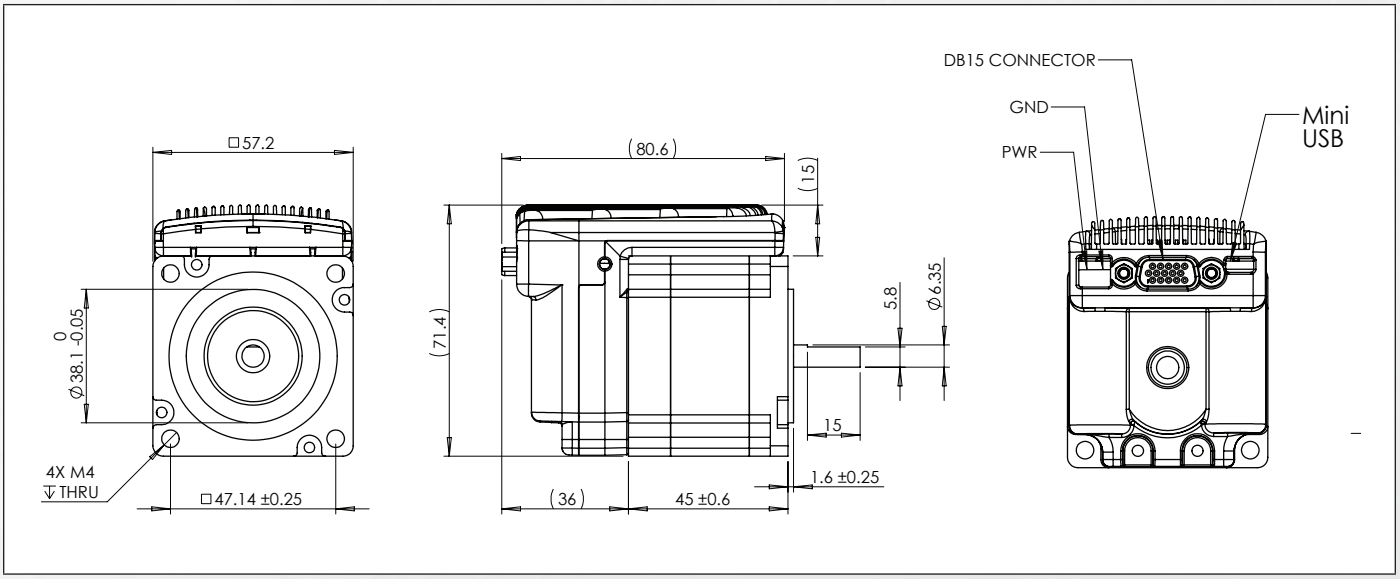
Captive Linear Version



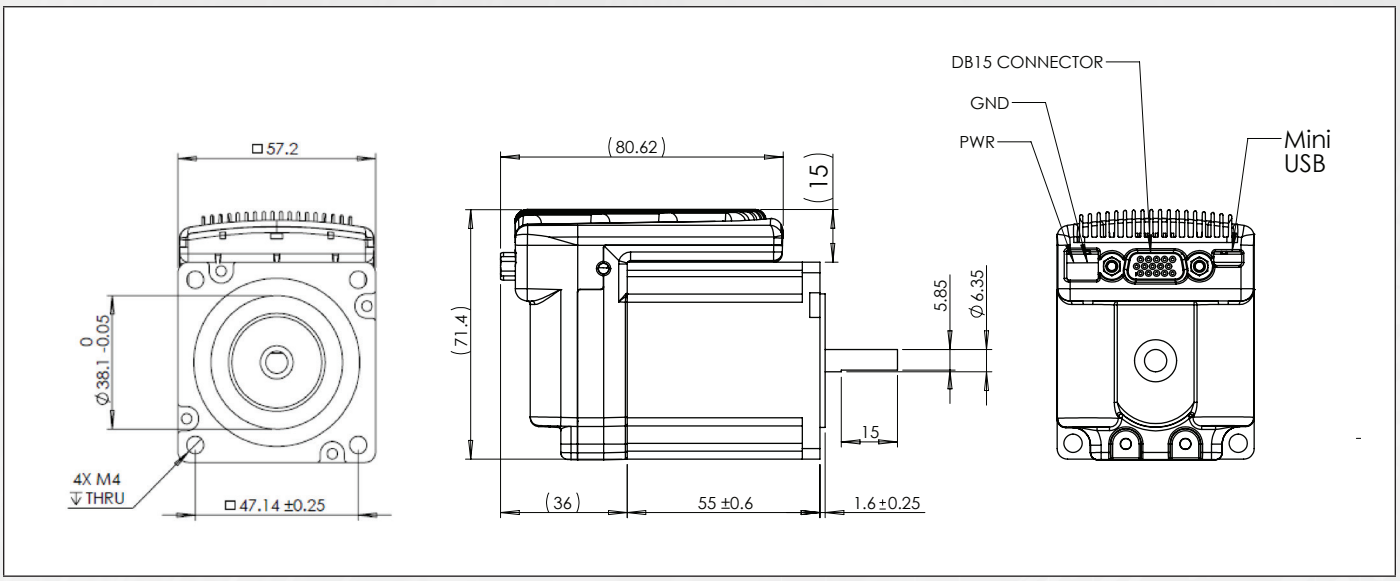
Stroke A (mm)	B (mm)	Single Stack Motor Length L= 45mm	Double Stack Motor Length L= 65mm
		Max Lead Screw Rear Extention (Fully Retracted) C(mm)	
12.7	23.3	0	0
19.05	29.65	0	0
25.4	36	0	0
31.75	42.35	0	0
38.1	48.7	6	0
50.8	61.4	18.7	8.7
63.5	74.1	31.4	21.4

Rotary Versions

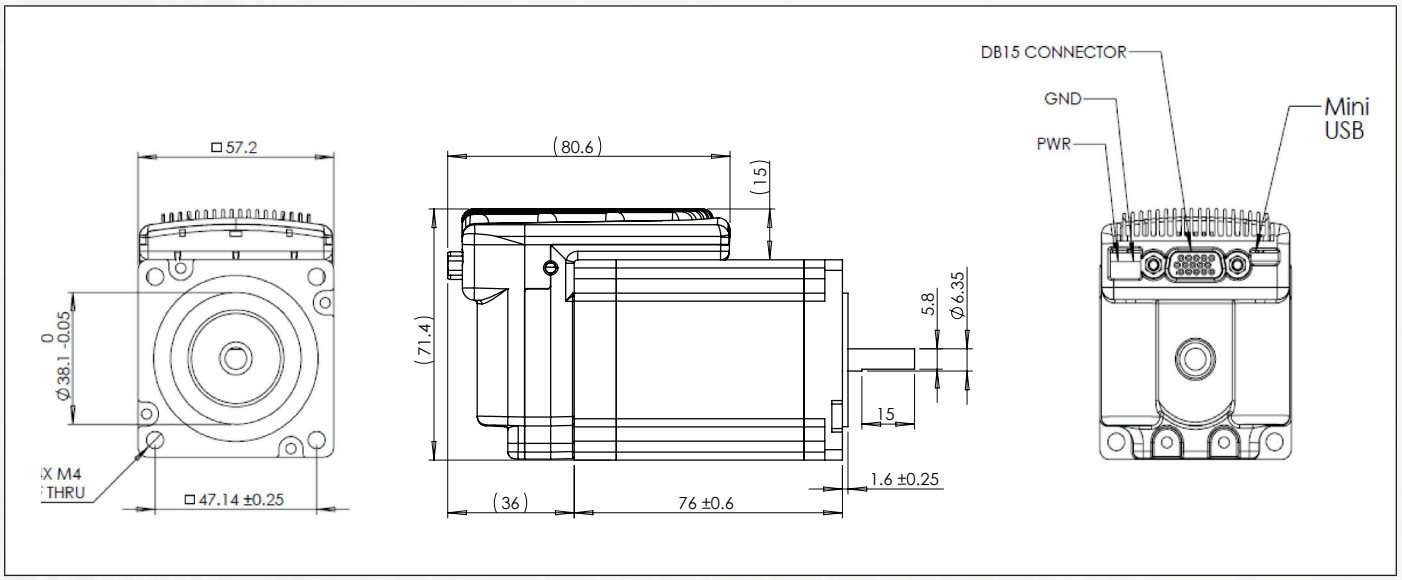
-45 Option



-55 Option

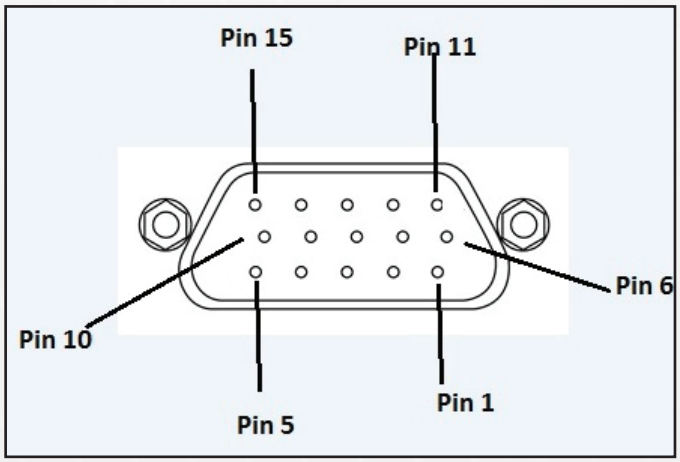


-75 Option



DB15 Connector Designations

Pin#	Function
1	General Purpose Output #1 +
2	General Purpose Output #2 +
3	+5VDC Out
4	Rx
5	General Purpose Input #1 (OR Secondary Encoder Input, Single Ended)
6	General Purpose Output #1-
7	General Purpose Output #2 -
8	General Purpose Output #3 +
9	N/A
10	Tx
11	General Purpose Input #2 (Or Secondary Encoder Input, Single Ended)
12	General Purpose Output #3 -
13	General Purpose Input #2
14	GND
15	Analog Input



DB15 Connector

NOTE: We recommend purchasing the breakout board (Part #VBB-1) on page 17.

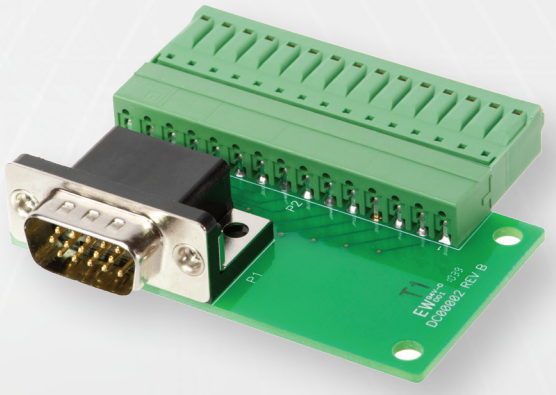
NOTE: Using pins 5 and 11 for a secondary encoder input will reduce the number of inputs down to one.

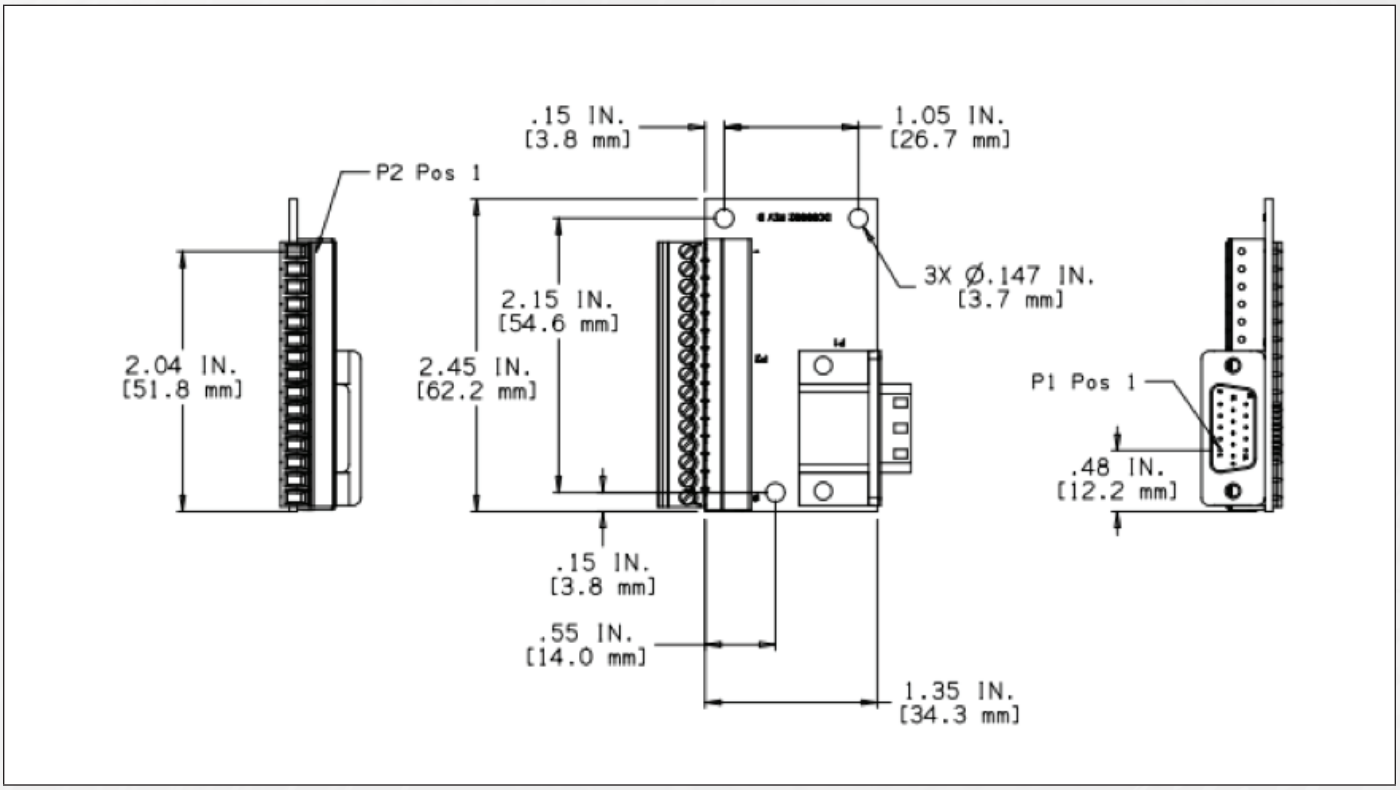
VBB-1 BREAKOUT BOARD

DB15 Pin Breakout Board For Rapid Prototyping

The optional breakout board is ideal for rapid prototyping and proof of concept designs. The breakout board may be plugged directy into into the Vector unit.

Signals are accessed via a pluggable 15-pin Phoenix clamp-type terminal connector.





NOTE: Please reference the complete hardware and Snaptrack™ software manuals at our website: **http://www.kocomotionus.com/**

SERVOTRACK ST484 STAND ALONE VERSION **ALSO AVAILABLE**

Tomorrow's Technology for Today's Application™

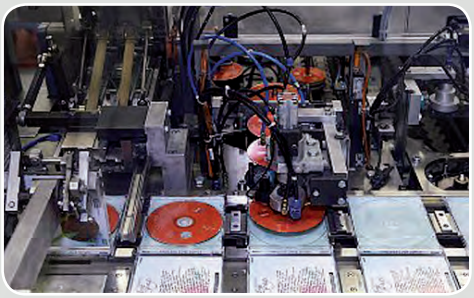
Features

- HMI Interface
- USB Programming Interface
- Multifunction diagnostic LED
- SnapTrack™ Programming Software
- Secondary Encoder input for electronic gearing OR camming
- Secure screw terminal connectors
- 35 mm Din Rail or Panel mountable
- Distributed Motion for Multi-Axis Control
- Control motors from size Nema 8 to Nema 34

Specifications

Input Voltage:	12-48 VDC
Variable Control Modes:	Rotary Torque Control Linear Force Control
Current:	4 Amps/Phase RMS
Control:	Dynamic Closed Loop or Open Loop
Programmable I/O's:	3 Digital Inputs (5V-24V) 3 Digital Outputs (5V-24V) 1 16-Bit Analog Input
Microstep Resolution:	Up to 256 µsteps/step
Communication:	Serial RS232 Serial RS485

SERVOTRACK™ – THE APPLICATIONS ARE ENDLESS...



Whether you are designing a new system or wanting to improve the performance of an existing one, ServoTrack™ will make your application more robust and dependable and keep your costs low.

Dramatically simplify and expand the ways in which you apply step motor technology to solve motion control applications:

1. Allow full use of the motor's torque with minimal de-rating of the speed/ torque curve.
2. Never lose functional control of the motor.
3. Lower the cost of your servo axis.
4. Minimize the impact of system resonance.
5. Allow for higher inertia mismatch when sizing your system.
6. Torque Control for clamping and winding/unwinding and tension control.
7. With variable current control minimize motor heating and improve efficiency.
8. Prevent transient load stalling on smart conveyor systems.
9. Simple set-up with no tuning required.
10. ServoTrack™ works through hardware, not PID software; greatly improving response time.
11. Reduce servo system complexity.

WARRANTY

Twenty Four Month Limited Warranty

Seller warrants its products delivered hereunder to confirm to stated specifications and to be free from defects in materials and workmanship. This warranty shall not apply to any product which shall have been improperly installed or subjected to misuse or neglect or which has been repaired or altered except by seller's accredited representative, nor to any product which has been subjected to accident.

DISCLAIMER

The information in this catalog has been carefully checked and is believed to be accurate; however, no responsibility is assumed for inaccuracies.

Koco Motion US LLC / DINGS' reserves the right to make changes without further notice to any products herein to improve reliability, function,or design.

Koco Motion US LLC / DINGS' does not recommend the use of its products in life support or aircraft applications wherein a failure or malfunction of the product may directly threaten life or injury.

APPLICATION ENGINEERING SUPPORT

Monday through Friday
(8:00AM to 5:00PM Pacific Standard Time)

Phone: (+1) 408-612-4970

In-Position Technologies

www.iptech1.com | (877) 478-3241 | help@iptech1.com

Local Sales and Support

For more detailed information...

KOCO MOTION DINGS'™
...Intelligence in motion

Koco Motion US LLC | DINGS'
335 Cochrane Circle
Morgan Hill, CA 95037
Phone (+1) 408-612-4970
www.kocomotionus.com

© 2017 KOCO MOTION US · · DATE SEPTEMBER 2017 · PDF