

CT Series Stepper Motor

Selection Guide



KOLLMORGEN

A REGAL REXNORD BRAND

Kollmorgen: Your Partner, In Motion.

Every solution comes from a real understanding of the challenges facing machine designers and users.

Innovators consistently rate Kollmorgen as one of their best motion systems manufacturing partners. Whether you are looking for classic servo motors, direct-drive servo motors, stepper motors, drives & amplifiers, gearing, actuation, or multi-axis motion controllers, Kollmorgen is one of the few companies in the world that actually designs and manufactures all of these products.

Our customers are leaders in many industries such as Aerospace & Defense, Printing, Packaging & Converting, Food & Beverage Processing, Medical Imaging, In Vitro Diagnostics & Laboratory Automation, Pharmaceutical Manufacturing, Material Forming and Cutting, Oil & Gas, and Robotics. Kollmorgen is also a leader in Warehouse Automation, including complete AGV systems, software, awareness and autonomy.

Our Automation Solutions can be found on Mars and in space, ships and submarines, O&G drilling and metrology, surgical robots and laser eye surgery, even inside artificial hearts. These are just a few applications that demand high-performance and high-quality while satisfying their specific needs.

Because motion matters, it's our focus: Motion can distinctly differentiate a specific machine and deliver a marketplace advantage by increasing its performance and dramatically improving Overall Equipment Effectiveness (OEE).

High-performance motion can make your customer's machine more reliable and energy-efficient, enhance accuracy and improve operator safety. Motion also represents endless possibilities for innovation.

We've always understood this potential, and thus have kept motion at our core and in our Vision, Mission & Values, relentlessly developing products that offer precise control of torque, velocity and position accuracy in machines that rely on complex motion.

How To Use This Selection Guide:

This guide covers the technical information required to select and order CT Series hybrid step motors. Select the proper motor using one of the following procedures:

- » If you're already familiar with these motors and the available options, refer to the Model Nomenclature on pg. 7 to verify the part number and corresponding motor options prior to order.
- » If you're not familiar with CT motors and available options: first refer to the Frame Size Overview, pg. 5, and the general specification, pgs. 8 and 12. To further evaluate individual winding specifications refer to the Drawings and Performance Data, using the table of contents above as a reference for each frame size. After all the technical parameters and options are determined, construct a part number using the Model Nomenclature (pg. 7).

Where To Order:

Kollmorgen utilizes an experienced channel of Authorized High-Tech Distributors (AHTDs) to assist our customers with applications, sizing and selection, ordering, and technical support. Visit our Distributor Locator to find locally available distributors. www.kollmorgen.com/enus/where-to-buy/

Kollmorgen Customer Service Representatives are also available by phone or e-mail and can assist in selecting and contacting local distributors.

- » North America: 1-540-633-3545, support@kollmorgen.com
- » Europe/Middle East/Africa: +49 (0) 2102 9394 0, think@kollmorgen.com
- » Asia: +86-400 661 2802, sales.china@kollmorgen.com

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CT Series Stepper Motors

CT Series Stepper Motors run cooler, produce more torque, and support higher shaft loads than any other stepper motor.

CTM Series motors incorporate enhanced magnets in the stator to provide 25% more torque at all speeds. The increased power output comes from higher efficiency. This allows the use of smaller drives and power supplies and is available in size 23 motors. All CT motors utilize high torque magnetic designs that feature a large rotor diameter, small air gap, high energy rotor magnets and computer controlled windings. This provides maximum torque in the smallest package.

- » Lower Energy Usage
- » Faster Machines
- » Lower System Cost

High Voltage Insulation

Inset molded insulation system encases the stator, eliminating joints and gaps that can fail. Reliability and voltage ratings are increased. CT Series motors can be used with all standard drives, as well as high voltage high performance drives.

- » Faster design cycles knowing CT Series motors work with all drives.
- » Higher reliability

Cooling Shell

Aluminum shell and aluminum end-caps quickly remove heat from the motor. This allows for higher current and torque ratings, especially when the motor is mounted. CT motors produce the same torque at lower temperatures for longer life.

- » Faster, higher throughput machines
- » Reduced size
- » Longer Life

Large Bearing System

To accommodate high thrust loads and high side loading, CT Series motors feature large bearings. Size 23 motors have the front bearing retained with a snap ring. And, the rear bearing is mounted in an O-ring to prevent spinout and minimize motor noise.

- » Lower machine costs. Loads can be directly mounted on motor shaft eliminating couplings and load support bearings.
- » Excellent for leadscrew applications
- » Longer life

CT Series

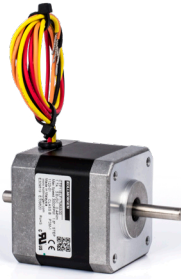
CT Series motors include the most popular sizes, options and value suitable for most commercial and industrial applications. Enhanced motors provide the maximum performance available. This technology boosts torque an additional 25% to 40% across the entire speed range, and allows machines to be designed that are smaller and move faster.

CT Series Benefits

- » Smaller drives result in a lower system cost
- » More torque allows for smaller, faster machines
- » Higher efficiency enables lower operating costs



Size 17 CT Series

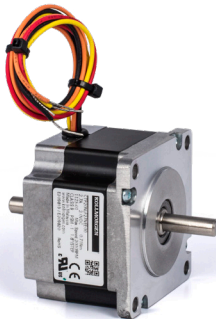


2 Phase, 1.8° Step Motors. Frame size: 1.7 inch, 43 mm (CTP High Torque Performance Series)

Series	Construction		Holding Torque (Motor Mounted)		Length	
	Style	Stacks	Bipolar		in	mm
			oz-in	Nm		
CTP10	Un-Enhanced	Short	43	0.30	1.37	34.7
CTP11		1	62	0.44	1.61	40.9
CTP12		2	80	0.56	1.92	48.8

- » Inch or metric mounting
- » Rear shaft option

Size 23 CT Series



2 Phase, 1.8° Step Motors. Frame size: 2.2 inch, 57 mm (CTM Enhanced-Max Torque and Efficiency, CTP High Torque Performance Series)

Series	Construction		Holding Torque (Motor Mounted)		Length	
	Style	Stacks	Bipolar		in	mm
			oz-in	Nm		
CTM21	Enhanced	1	260	1.84	2.13	54.1
CTM22		2	470	3.32	3.32	84.3
CTP20	Un-Enhanced	Short	100	0.71	1.62	41.2
CTP21		1	200	1.41	2.13	54.1
CTP22		2	360	2.54	3.32	84.3

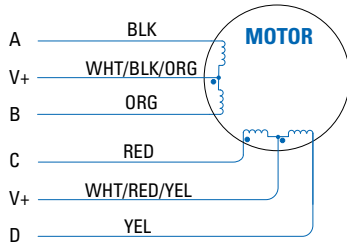
- » Captured heavy duty bearings
- » High voltage insulation system
- » Rear shaft option



CT Series Stepper Motors

CT Series Stepper Motor Connection Information

"S" 6-Lead Configuration



6-Lead Unipolar Connection

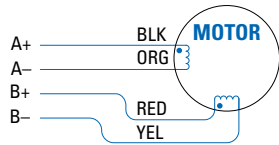
Driver Connection	Lead Color
A	Black (Blk)
B	Orange (Org)
C	Red
D	Yellow (Yel)
V+	Wht/Blk/Org
V+	Wht/Red/Yel

Unipolar Full Step Phase Sequence

STEP	A	B	C	D
1	GND	0	GND	0
2	0	GND	GND	0
3	0	GND	0	GND
4	GND	0	0	GND
1	GND	0	GND	0

CCW ↓ ↑ CW

"F" 4-Lead Configuration



4-Lead Bipolar Connection

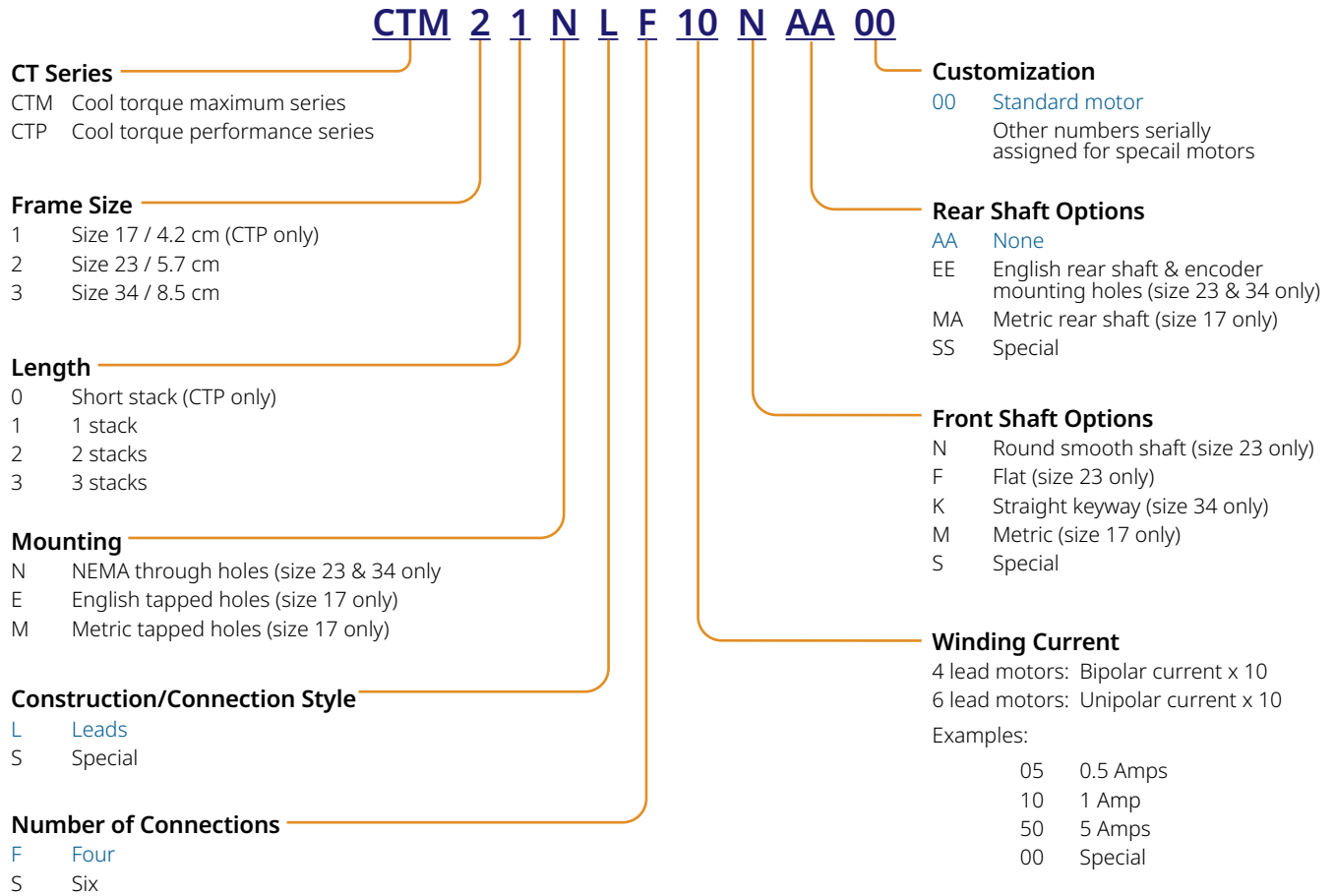
Driver Connection	Lead Color
A	Black
\bar{A}	Orange
B	Red
\bar{B}	Yellow

Bipolar Full Step Phase Sequence

STEP	A	\bar{A}	B	\bar{B}
1	+	-	-	+
2	-	+	-	+
3	-	+	+	-
4	+	-	+	-
1	+	-	-	+

CCW ↓ ↑ CW

CT Series Stepper Motor Nomenclature

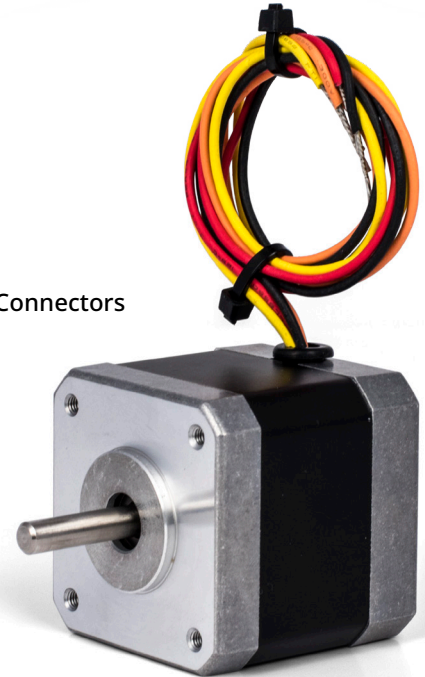


CTP1 Series Stepper Motors

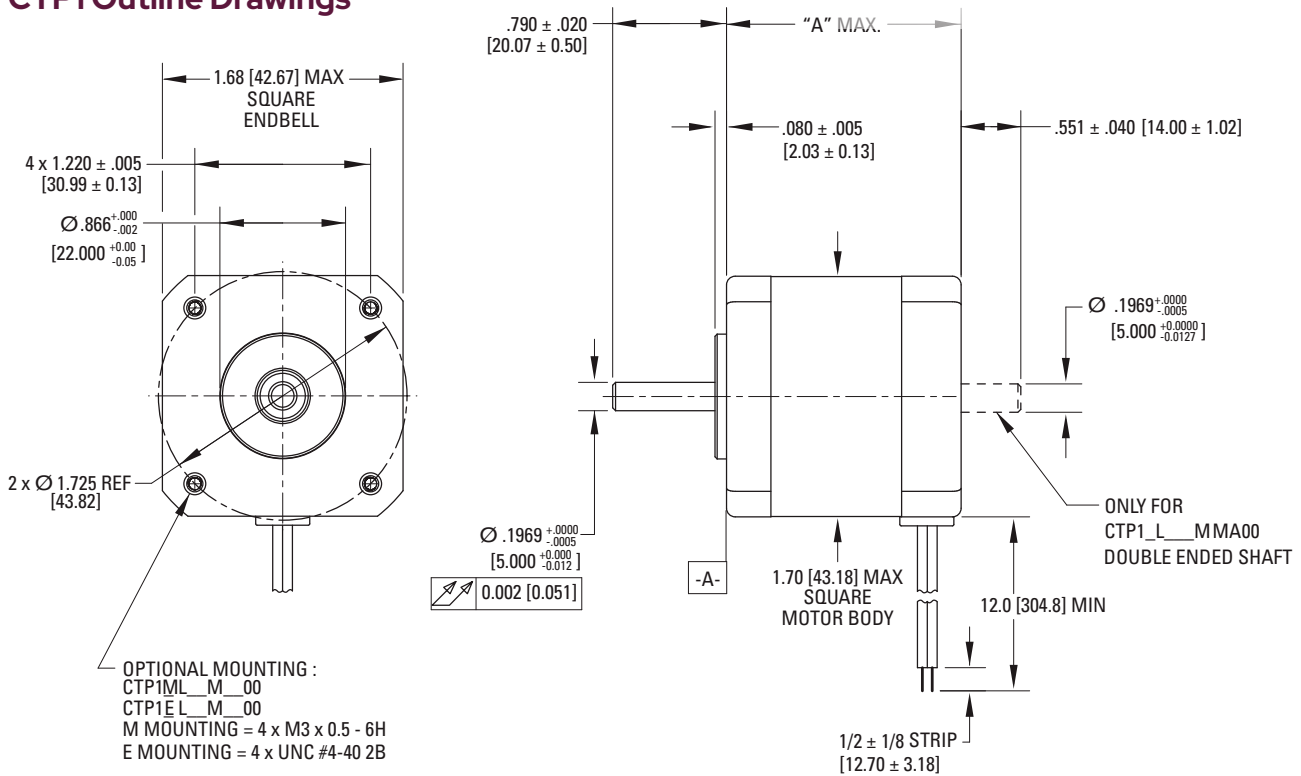
CTP1 General Specifications

- » NEMA Size 17
- » Excellent for use with leadscrews
- » UL, CE, and RoHS compliant
- » Unipolar or Bipolar windings
- » Standard Features: Shaft Flats, Rear Shaft, Encoder Mounting Provisions
- » Co-Engineered Options: Shaft Modifications, Special Windings, Lead Lengths, Connectors

Parameter	CTP1
NEMA frame size	17
Windings	Unipolar and Bipolar
Full Steps per Revolution	200
Step Angle (degrees)	1.8
Step Accuracy % (of one full step, no load)	+/- 5
Operating Temperature	-20° C to +40° C
Insulation Class	Class B, 130° C
Insulation Voltage (Vdc)	80
Insulation Resistance	100 Megohms



CTP1 Outline Drawings



Dimensions in inches [mm]

Model	"A" MAX
CTP10	1.350 ± 0.015 (34.3 ± 0.38)
CTP11	1.590 ± 0.015 (40.4 ± 0.38)
CTP12	1.900 ± 0.015 (48.3 ± 0.38)

CTP1 Performance Data

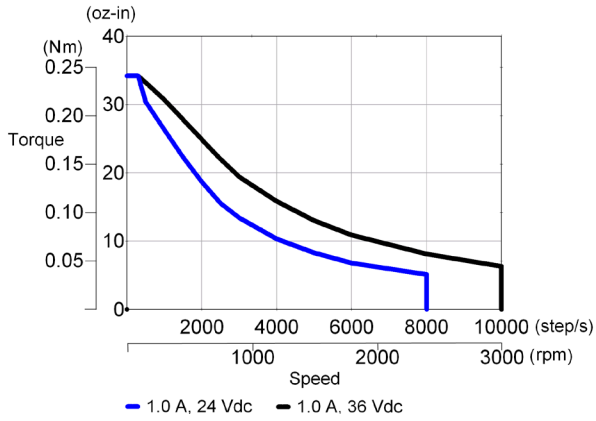
Motor Model Number	Config.		Holding Torque (2 phases on)	Rated Current/Phase	Phase Resistance	Phase Inductance	Thermal Resistance	Rotor Inertia	Weight	Shaft Loading*	
	Series	Unipolar								oz-in (Nm) +/-10%	Amps DC
			lb (N)	lb (N)							
Short Stack	CTP10xxF16	•	43 (0.30)	1.6	2.15	3.0	6.21	0.00051 (0.0036)	0.45 (0.20)	15 (67)	Push 6.0 (27) Pull 15 (67)
	CTP10xxF10	•		1.0	5.25	7.7					
	CTP10xxF06	•		0.63	12.8	18					
	CTP10xxF04	•		0.40	30.5	42					
	CTP10xxS12	•	33 (0.23)	1.2	3.38	2.4					
	CTP10xxS08	•		0.80	8.04	5.5					
	CTP10xxS05	•		0.50	19.4	13					
	CTP10xxS03	•		0.33	47.1	31					
1 Stack	CTP11xxF17	•	62 (0.44)	1.7	2.12	4.2	5.44	0.00075 (0.0053)	0.57 (0.26)	15 (67)	Push 6.0 (27) Pull 15 (67)
	CTP11xxF11	•		1.1	5.19	11					
	CTP11xxF07	•		0.68	12.5	26					
	CTP11xxF04	•		0.44	30.4	60					
	CTP11xxS13	•	49 (0.35)	1.3	3.31	3.4					
	CTP11xxS09	•		0.85	8.02	8.0					
	CTP11xxS06	•		0.55	18.9	18					
	CTP11xxS03	•		0.35	48.1	47					
2 Stack	CTP12xxF26	•	80 (0.56)	2.6	1.09	1.9	4.71	0.00106 (0.075)	0.76 (0.34)	15 (67)	Push 6.0 (27) Pull 15 (67)
	CTP12xxF16	•		1.6	2.65	4.9					
	CTP12xxF10	•		1.0	6.51	12					
	CTP12xxF07	•		0.65	15.7	30					
	CTP12xxS20	•	62 (0.44)	2.0	1.70	1.6					
	CTP12xxS13	•		1.3	4.13	3.9					
	CTP12xxS08	•		0.82	10.1	9.2					
	CTP12xxS05	•		0.53	23.8	21					

*Notes: *Maximum shaft loading based on 20,000 hours of operation at 1500 rpm.

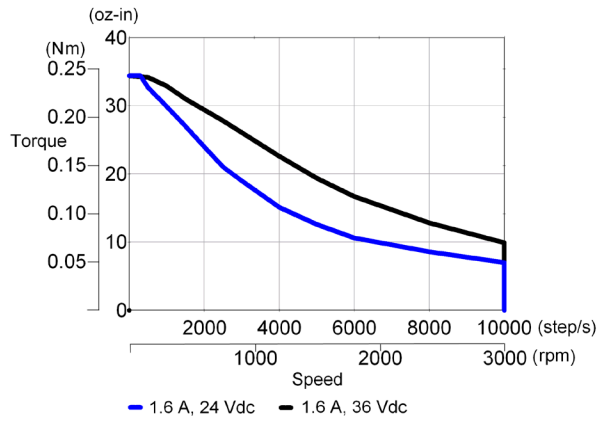
CTP1 Series Stepper Motors

CTP1 Performance Curves

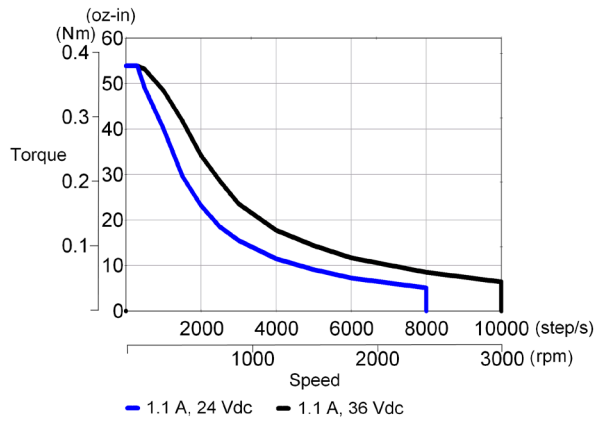
CTP10xxF10 w/ P70530



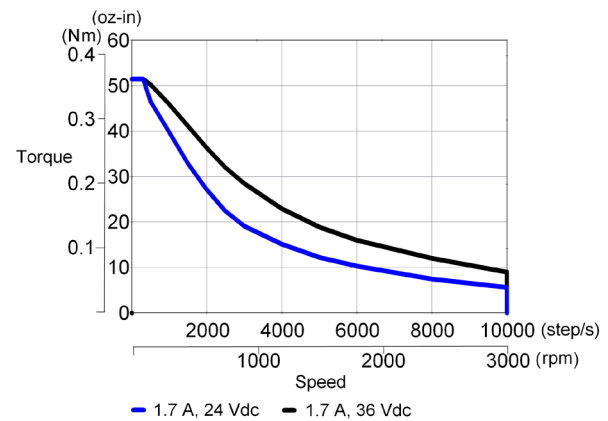
CTP10xxF16 w/ P70530



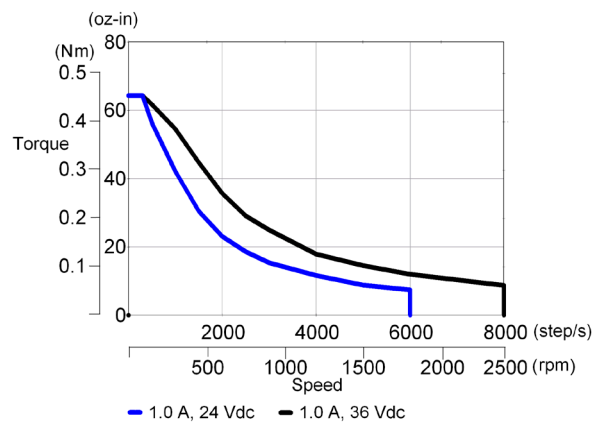
CTP11xxF11 w/ P70530



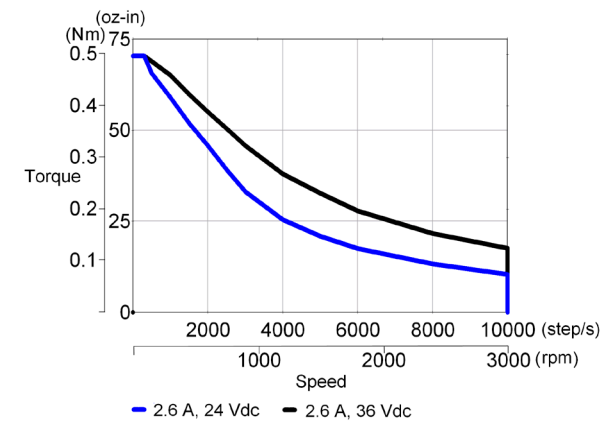
CTP11xxF17 w/ P70530



CTP12xxF10 w/ P70530



CTP12xxF26 w/ P70530



Notes

CTP Motor Series
1 Frame Size
2 Stack Length
M Mounting
L Connection
F # of Connections
10 Winding Current
M Front Shaft Opt.
AA Rear Shaft Opt.
00 Customization

A large grid area for taking notes, with a 0.125 inch division size.

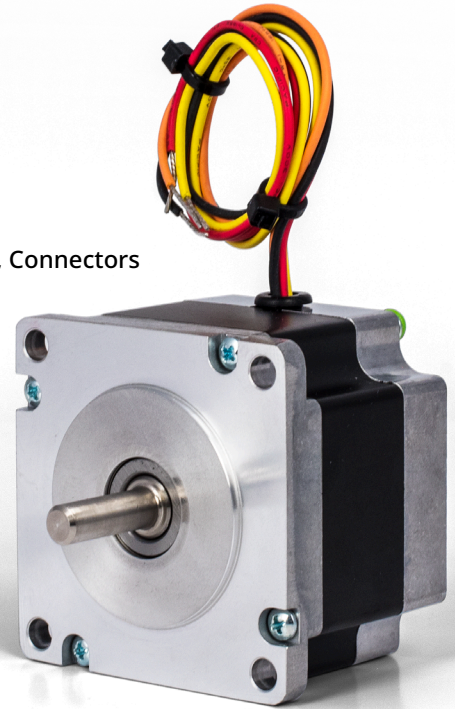
0.125 inch divisions

CT(P/M)2 Series Stepper Motors

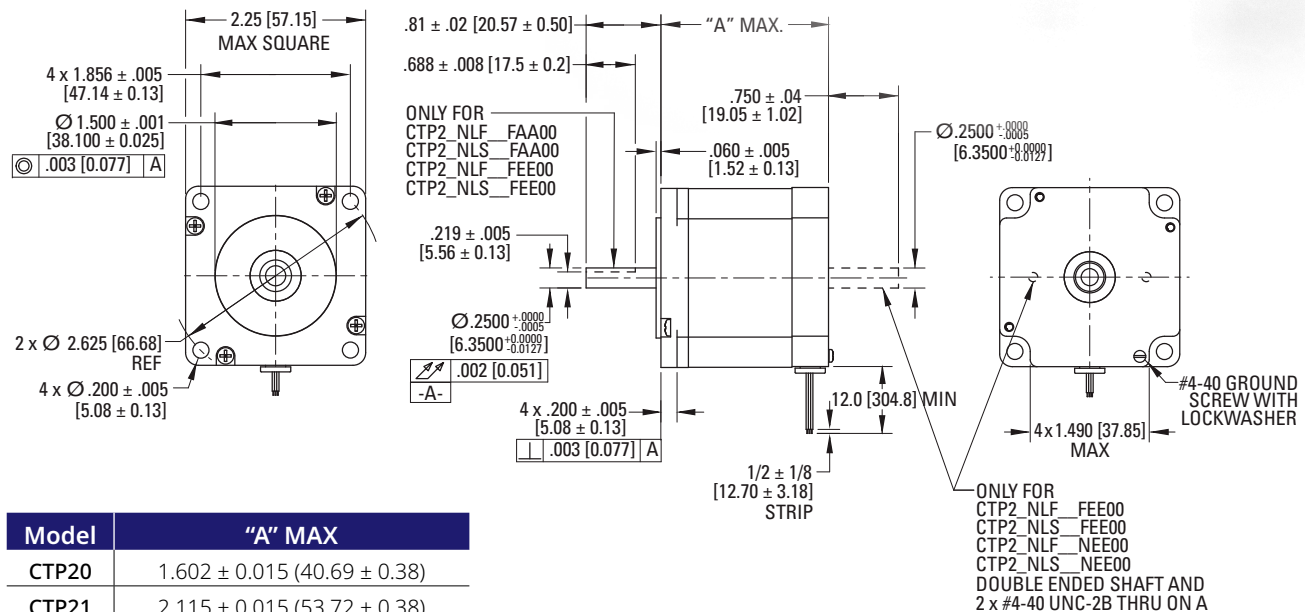
CTP2 / CTM2 General Specifications

- » NEMA Size 23
- » CTM Enhanced Series - Maximum Torque and Efficiency
- » Excellent for use with leadscrews
- » UL, CE, and RoHS compliant
- » Unipolar or Bipolar windings
- » Standard Features: Shaft Flats, Rear Shaft, Encoder Mounting Provisions
- » Co-Engineered Options: Shaft Modifications, Special Windings, Lead Lengths, Connectors

Parameter	CTP2 / CTM2
NEMA frame size	23
Windings	Unipolar and Bipolar
Full Steps per Revolution	200
Step Angle (degrees)	1.8
Step Accuracy % (of one full step, no load)	+/- 3
Operating Temperature	-20° C to +40° C
Insulation Class	Class B, 130° C
Insulation Voltage (Vdc)	340
Insulation Resistance	100 Megohms



CTP2 / CTM2 Outline Drawings



Model	"A" MAX
CTP20	1.602 ± 0.015 (40.69 ± 0.38)
CTP21	2.115 ± 0.015 (53.72 ± 0.38)
CTP22	3.297 ± 0.015 (83.74 ± 0.38)

Dimensions in inches [mm]

CTP2 / CTM2 Performance Data

Motor Model Number	Config.		Holding Torque (2 phases on) oz-in (Nm) +/-10%	Rated Current/Phase Amps DC	Phase Resistance Ohms +/-10%	Phase Inductance mH Typical	Thermal Resistance Mounted °C/Watt	Rotor Inertia oz-in-s ² (kg-m ² x10 ⁻³)	Weight lb (kg)	Shaft Loading*	
	Series	Unipolar								Radial Force lb (N)	Axial Force lb (N)
Short Stack	CTP20xxF38	•	100 (0.71)	3.8	0.58	1.3	3.99	0.0026 (0.018)	1.0 (0.45)	20 (89)	50 (222)
	CTP20xxF27	•		2.7	1.11	2.5					
	CTP20xxF17	•		1.7	2.87	7.1					
	CTP20xxF11	•		1.1	6.98	17					
	CTP20xxF07	•		0.68	17.1	41					
	CTP20xxF04	•		0.45	40.6	89					
	CTP20xxS34	•	75 (0.53)	3.4	0.73	0.83					
	CTP20xxS21	•		2.1	1.83	2.2					
	CTP20xxS13	•		1.3	4.39	5.2					
CTP20xxS09	•		0.87	10.5	12						
1 Stack	CTP21xxF56	•	200 (1.41)	5.6	0.31	1.1	3.57	0.0035 (0.025)	1.4 (0.64)	20 (89)	50 (222)
	CTP21xxF39	•		3.9	0.60	2.2					
	CTP21xxF25	•		2.5	1.48	5.8					
	CTP21xxF15	•		1.5	3.86	16					
	CTP21xxF10	•		1.0	9.40	38					
	CTP21xxF04	•		0.45	44.0	170					
	CTP21xxS48	•	160 (1.13)	4.8	0.41	0.74					
	CTP21xxS31	•		3.1	0.97	1.9					
	CTP21xxS19	•		1.9	2.44	5.0					
CTP21xxS12	•		1.2	5.89	12						
Enhanced 1 Stack	CTM21xxF56	•	260 (1.84)	5.6	0.31	0.78	3.57	0.0035 (0.025)	1.5 (0.68)	20 (89)	50 (222)
	CTM21xxF39	•		3.9	0.60	1.6					
	CTM21xxF25	•		2.5	1.48	4.2					
	CTM21xxF15	•		1.5	3.86	12					
	CTM21xxF10	•		1.0	9.40	28					
	CTM21xxF04	•		0.45	44.0	123					
	CTM21xxS48	•	200 (1.41)	4.8	0.41	0.54					
	CTM21xxS31	•		3.1	0.97	1.4					
	CTM21xxS19	•		1.9	2.44	3.7					
CTM21xxS12	•		1.2	5.89	8.6						

Notes: *Maximum shaft loading based on 20,000 hours of operation at 1500 rpm.

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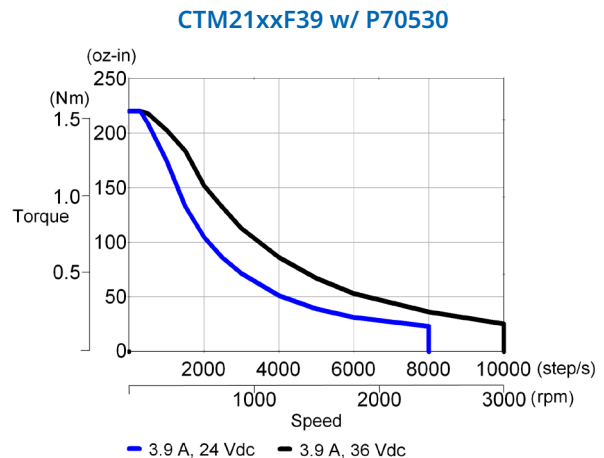
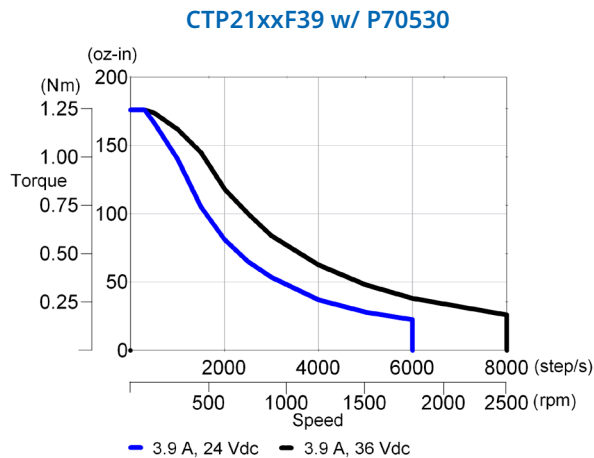
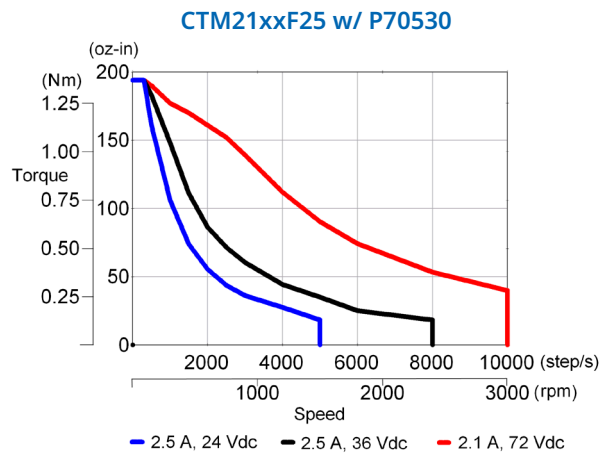
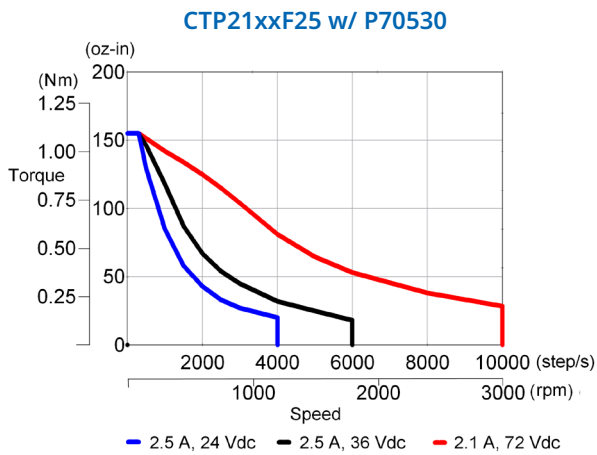
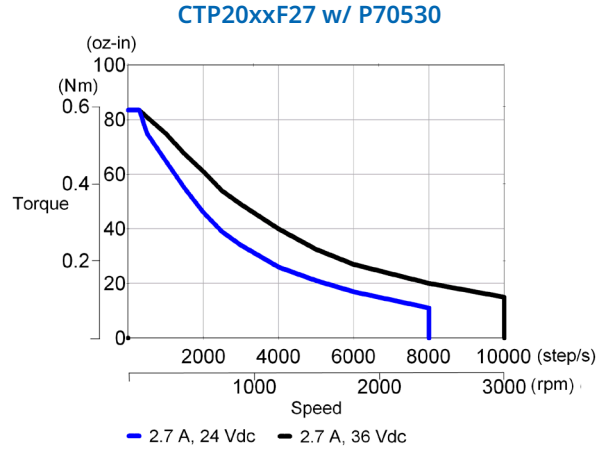
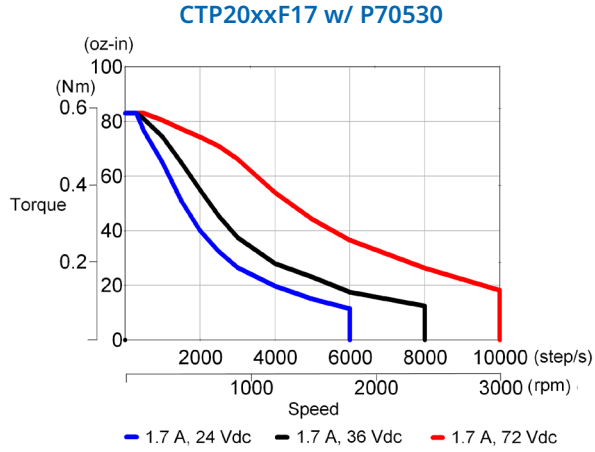
CT(P/M)2 Series Stepper Motors

CTP2 / CTM2 Performance Data (continued)

Motor Model Number	Config.		Holding Torque (2 phases on) oz-in (Nm) +/-10%	Rated Current/Phase Amps DC	Phase Resistance Ohms +/-10%	Phase Inductance mH Typical	Thermal Resistance Mounted °C/Watt	Rotor Inertia oz-in-s ² (kg-m ² x10 ⁻³)	Weight lb (kg)	Shaft Loading*	
	Series	Unipolar								Radial Force lb (N)	Axial Force lb (N)
2 Stack	CTP22xxF69	•	360 (2.54)	6.9	0.28	1.2	2.62	0.0068 (0.048)	2.4 (1.09)	20 (89)	50 (222)
	CTP22xxF50	•		5.0	0.52	2.2					
	CTP22xxF31	•		3.1	1.31	6.1					
	CTP22xxF19	•		1.9	3.25	16					
	CTP22xxF12	•		1.2	8.40	41					
	CTP22xxF06	•		0.60	32.2	150					
	CTP22xxS49	•	285 (2.01)	4.9	0.53	1.2					
	CTP22xxS31	•		3.1	1.30	3.0					
	CTP22xxS19	•		1.9	3.39	8.3					
	CTP22xxS12	•		1.2	8.26	20					
Enhanced 2 Stack	CTM22xxF69	•	470 (3.32)	6.9	0.28	0.81	2.62	0.0068 (0.048)	2.5 (1.13)	20 (89)	50 (222)
	CTM22xxF50	•		5.0	0.52	1.6					
	CTM22xxF31	•		3.1	1.31	4.3					
	CTM22xxF19	•		1.9	3.25	11					
	CTM22xxF12	•		1.2	8.40	29					
	CTM22xxF06	•		0.60	32.2	108					
	CTM22xxS49	•	360 (2.54)	4.9	0.53	0.81					
	CTM22xxS31	•		3.1	1.30	2.1					
	CTM22xxS19	•		1.9	3.39	5.9					
	CTM22xxS12	•		1.2	8.26	14					

Notes: *Maximum shaft loading based on 20,000 hours of operation at 1500 rpm.

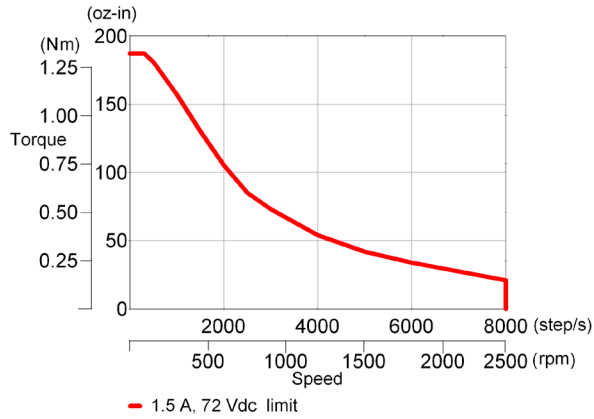
CTP2 / CTM2 Performance Curves



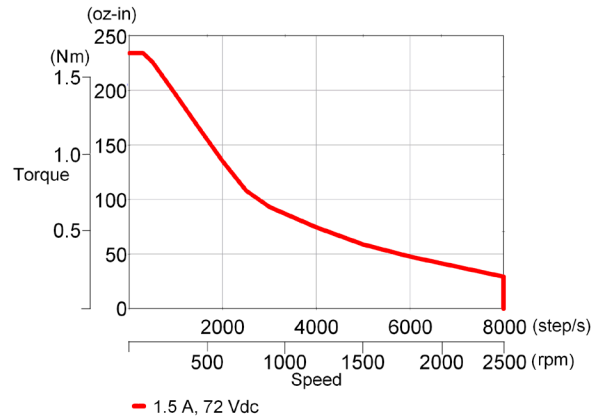
CT(P/M)2 Series Stepper Motors

CTP2 / CTM2 Performance Curves (continued)

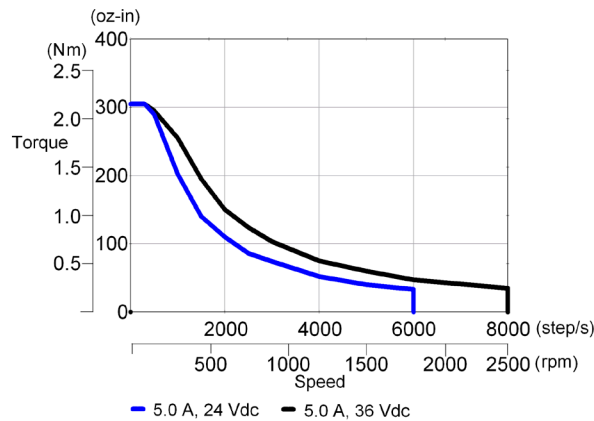
CTP21xxF15 w/ P70530



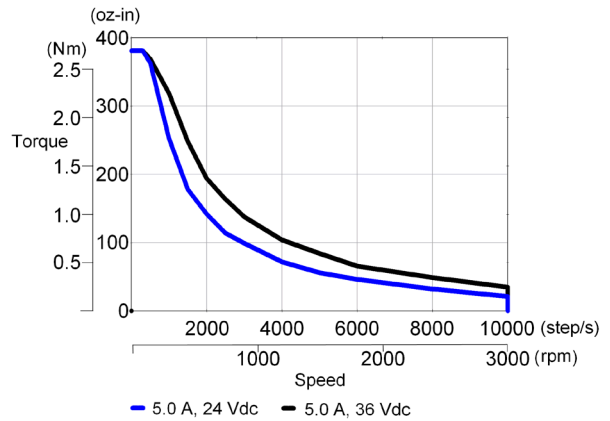
CTM21xxF15 w/ P70530



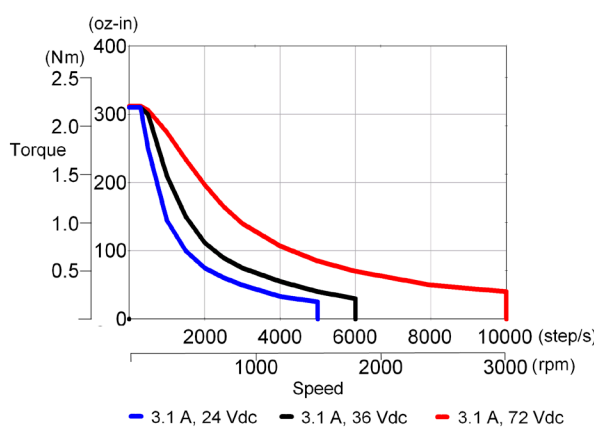
CTP22xxF50 w/ P70530



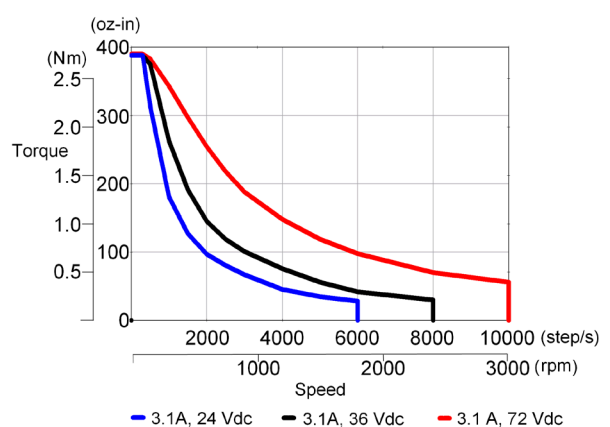
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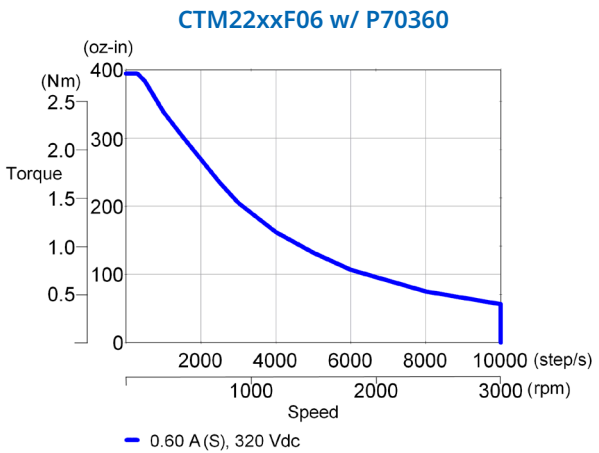
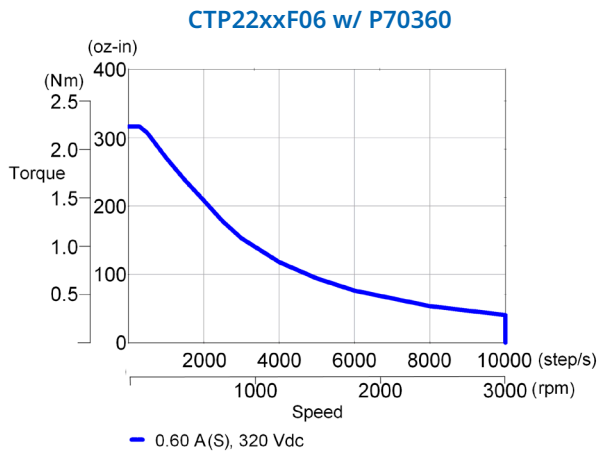
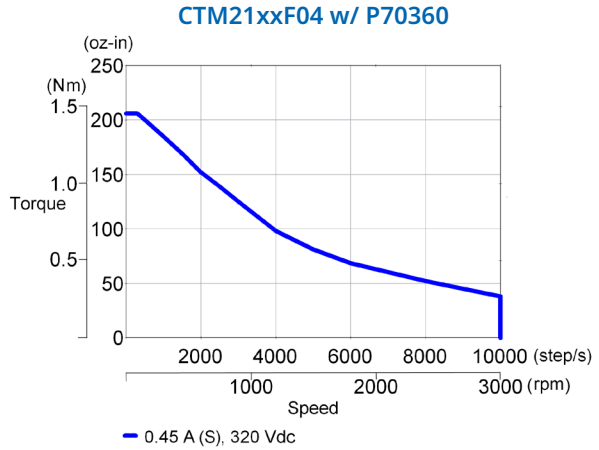
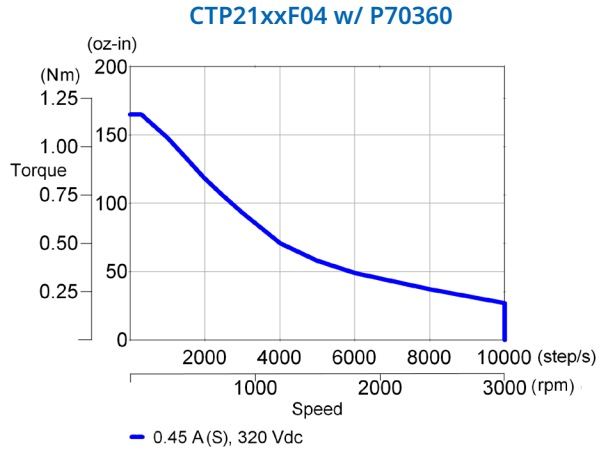
CTP22xxF31 w/ P70530



CTM22xxF31 w/ P70530



CTP2 / CTM2 Performance Curves (continued)



More Expertise for a More Successful Machine

Our global engineering, service and support network provides deep knowledge of all the major industries that rely on advanced motion control and automation technology. We offer world-class engineering expertise, self-service design tools, personalized field service, and easy access to our design, application and manufacturing centers in strategic locations across the globe.

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Kollmorgen, a Regal Rexnord brand, has more than 100 years of motion experience, proven in the industry's highest-performing, most reliable motors, drives, linear actuators, AGV (Automated Guided Vehicle) control solutions, and automation control platforms. We deliver breakthrough solutions that combine exceptional performance, reliability and ease of use, giving machine builders an irrefutable marketplace advantage.

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