ElectroCraft®
powering innovation™

Catalog SM03EN

Stepper Products

Motors

- TorquePower Series
- TorquePower Plus Series

Drives

- SA-Series

www.electrocraft.com

ElectroCraft®
powering innovation™

For over 60 years, ElectroCraft has been helping engineers translate innovative ideas into reality – one reliable motor at a time. As a global specialist in custom motor and motion technology, we provide the engineering capabilities and worldwide resources you need to succeed.

Designed by media & brands · www.media-brands.de

Table of Contents

TP

TTP

SA

ElectroCraft®
powering innovation™

Typical applications for

ElectroCraft Stepper Motors:

- Custom OEM applications (Our Specialty)
- Packaging
- Semiconductor handling and testing
- Antenna positioning
- Laboratory equipment
- Rapid prototyping machines
- Medical equipment
- Dispensing

Dialysis Machine

Situation: A next generation kidney dialysis machine was being designed with two modifications to the original stepper motor used for the blood pump due to problematic issues during operation. The first design challenge was the mechanism that coupled the motor shaft to the machine was a cause of long-term failure due to stress caused by point loading. The second challenge was the noise inherent to stepper motor operation was bothersome to patients who were connected to the machine for hours at a time.

Solution: The motor shaft was designed and machined such that it mated directly to the pump by customizing the shaft diameter, tapping a concentric threaded hole, providing a thru-hole for set-screw and incorporating a ridge for an O-ring seal. The rotor was designed to eliminate the detent torque by skewing the normally straight laminations on the teeth. This patented design provides reduced vibration and noise from the motor when operated in all full, half and micro-stepping resolutions.

Results: Working with the ElectroCraft engineering team, the medical machine manufacturer was able to resolve several problems in their original machine design with an updated design that better integrated the motor into the machine improving both the reliability and the patient experience.

A redesigned motor from ElectroCraft improved both machine reliability and the patient experience

Industrial Surveillance Equipment

Situation: A manufacturer of outdoor pan-and-tilt surveillance cameras experienced a problem with their newly-designed system. The stock stepper motors they had integrated into their design kept breaking at the shaft, and their motor vendor could not remedy the issue.

Solution: ElectroCraft created a stepper with a larger, more rugged shaft that could be retrofit into the customer's products already in the field. The custom stepper motors were built into the newer models to maintain long-term product durability.

Results: Over 1000 surveillance systems have shipped with the custom stepper motor system installed. Since the stepper switch, not one stepper motor shaft failure has been reported.

Custom rock-solid steppers gave surveillance cameras the added security of long life.

Medical Diagnostic Imaging Equipment

Situation: A medical diagnostic imaging machine manufacturer kept experiencing stepper motor failures in its imaging machines, and customers of their higher-priced units were complaining about reliability.

Solution: ElectroCraft built a fully customized, compact and ultra-rugged stepper that would fit more securely into the imager. The new motor included a custom-designed housing, shaped to fit into the machine itself.

Results: By working with ElectroCraft's engineering team to integrate in the new system, the company cut their anticipated time to market by one quarter. In addition, the new motor integration prompted a successful product marketing launch and helped the manufacturer gain significant market share.

A fully-customized, ultra-rugged stepper became the heart of a new, market-leading line of medical diagnostic image machines.

ElectroCraft®
powering innovation™

Select your

Stepper Products!

ElectroCraft TorquePower™

Sizes: Nema 23, 34 & 42

Torque: up to 2100 oz-in or 1482 Ncm

Features:
- Conventional stepper
- Environmentally sealed
- Imperial sizes
- Housed motor reduces radiated magnetic flux
- High step accuracy

ElectroCraft TorquePower™ Plus

Sizes: Nema 11, 17, 23 & 34

Torque: up to 1190 oz-in or 840 Ncm

Features:
- High torque stepper
- Highest performing
- Metric and imperial sizes
- High step accuracy

TPP Drive Product Matrix

	Bipolar Stepper Drive	
	SA4505	SA4510
Product Description		
See on page	21	21
Power Features		
Min. Voltage (VDC)	11	11
Max. Voltage (VDC)	48	48
Dual Bridge MOSFET Driver	●	●
Chopping Frequency (kHz)	50	50
Power Ratings		
Nominal Current	5	10
Adjustable Current	●	●
Max Power (W)	240	480
Control Modes		
Max. Step Input Frequency	40 kHz	40 kHz
Microstepping up to 1/16	●	●
Internal Oscillator (x8)	●	●
External Pulse Train (5-24 Logic)	●	●
Fallback Current	●	●
Analog Command (VDC)	+1 to +5 VDC	+1 to +5 VDC
Communication / Compliance		
CE Compliance (LV Directive)	●	●
Optically Isolated Control Logic	●	●
Physical Enclosure		
Totally Enclosed	●	●
Case Type	Book Shelf	Book Shelf

Still need help?
Easily build your own motor at
www.configureamotor.com

Don't see exactly what you need?
Have ElectroCraft build you a custom winding, stack length or fully customized motor… that's our specialty!

TP23 : ElectroCraft RapidPower™ | Stepper Motor

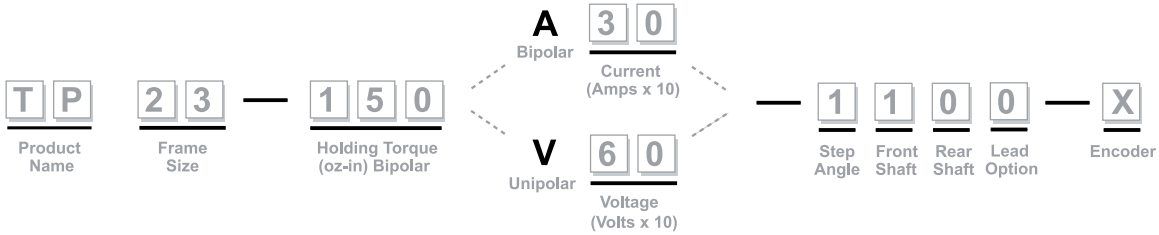
Size	Holding Torque oz-in (Ncm)	Speeds up to RPS
Nema 23, 1.8°	210 (148)	85

Forceful. Extra-sturdy.

This 1.8° size 23 hybrid DC stepping motor is built with an extra-sturdy casing for when you need small, powerful torque with a little more durability. The motor is totally enclosed with permanently lubricated ball bearings. The bi-directional size 23 has a step angle accuracy of ±3%.

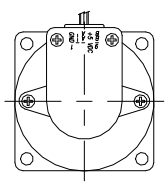
To build your own motor, choose the:

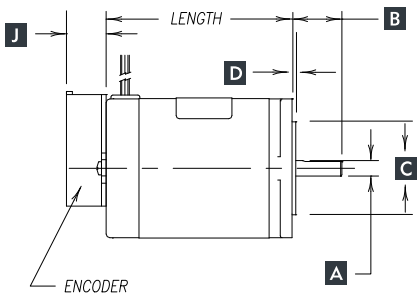
1 - Frame Size (Imperial)
2 - Torque (Stack Length)
3 - Winding
4 - Features (See page 27)

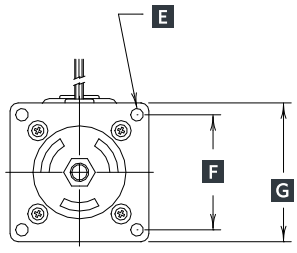


Step 1: TP23 Frame Size Drawing Key

Model	MAX Length	A Front Shaft Diameter	B Front Shaft Length	C Pilot Diameter	D Pilot Length (Ref)	E Mount Hole Callout	F Mount Hole Spacing (Ref)	G Flange External Dimension (Ref)	H Rear Shaft Diameter	I Rear Shaft Length	J Encoder Length (max)
TP23–48	1.60 in ±.03	0.2500 in 0.2495 in	0.81 in ±0.03	1.502 in 1.498 in	0.06 in	[4] 0.205 ±.010 Through	1.86 in	2.25 in	0.2500 in 0.2495 in	0.75 in ±0.040	0.68
TP23–72	2.00 in ±.03										
TP23–150	3.00 in ±.03										
TP23–210	4.00 in ±.03										

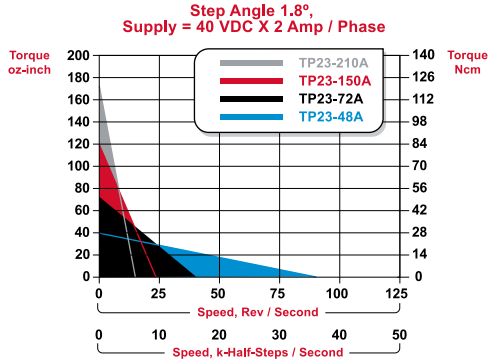




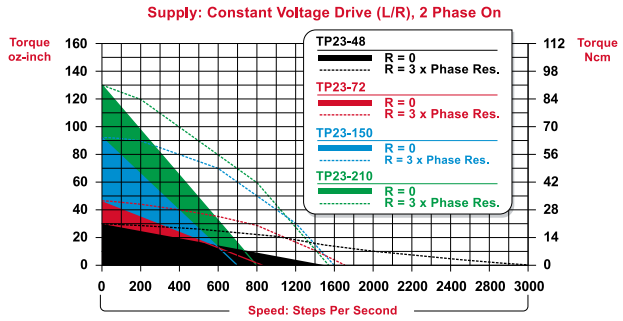


Step 2: TP23 Torque and Mechanical Data

TP23 Bipolar



TP23 Unipolar



Stack Size Models	48A	48V	72A	72V	150A	150V	210A	210V
Holding Torque Bipolar oz-in (Ncm)	48.0 (33.89)	48.0 (33.89)	72.0 (50.84)	72.0 (50.84)	150.0 (105.92)	150.0 (105.92)	210.0 (148.28)	210.0 (148.28)
Holding Torque Unipolar oz-in (Ncm)	N/A	38.5 (27.2)	N/A	57.5 (40.66)	N/A	120.0 (84.7)	N/A	168.0 (118.6)
Step Angle (°/step)	1.8°	1.8°	1.8°	1.8°	1.8°	1.8°	1.8°	1.8°
Rotor Inertia (oz-in-sec²)	0.00081	0.00081	0.00166	0.00166	0.00331	0.00331	0.00497	0.00497

Step 3: Available Windings

Bipolar

Imperial	48A10	48A20	48A30	48A40	72A10	72A20	72A30	72A40	150A10	150A20	150A30	150A40	210A20	210A30	210A40
Current Bipolar (A/Phase)	1.0	2.0	3.0	4.0	1.0	2.0	3.0	4.0	1.0	2.0	3.0	4.0	2.0	3.0	4.0
Phase Resistance (ohm)	5.9	1.5	0.66	0.37	5.6	1.4	0.62	0.35	7.6	1.9	0.84	0.48	2.65	1.18	0.66
Phase Inductance (mH)	16.9	4.2	1.9	1.11	25.6	6.4	2.8	1.6	35.2	8.8	3.9	2.2	13.2	5.88	3.33

Unipolar

Imperial	48V40	48V60	48V120	48V240	72V51	72V60	72V120	72V240	150V54	150V60	150V120	150V240	210V34	210V60	210V120
Unipolar (V/Phase)	4.0	6.0	12.0	24.0	5.1	6.0	12.0	24.0	5.4	6.0	12.0	24.0	3.4	6.0	12.0
Unipolar (A/Phase)	1.5	1.2	0.6	0.3	1.0	1.0	0.5	0.3	1.5	1.3	0.7	0.4	2.8	1.8	0.8
Phase Resistance (ohm)	2.6	5	20	80	5.1	6.2	25	96	3.5	4.8	18.2	66	1.2	3.4	16
Phase Inductance (mH)	3.2	5.4	21.6	81.2	9.7	10.6	41.19	131.4	7.8	11.4	41.2	143.3	2.9	8.4	39
Bipolar (A/Phase)*	1.1	0.9	0.4	0.2	0.7	0.7	0.3	0.2	1.1	0.9	0.5	0.3	2.0	1.3	0.5

*Data represents Unipolar windings configured as Bipolar

Still need help?
Easily build your own motor at
www.configureamotor.com

Don't see exactly what you need?
Have ElectroCraft build you a custom winding, stack length or fully customized motor… that's our specialty!

TP34 : ElectroCraft RapidPower™ | Stepper Motor

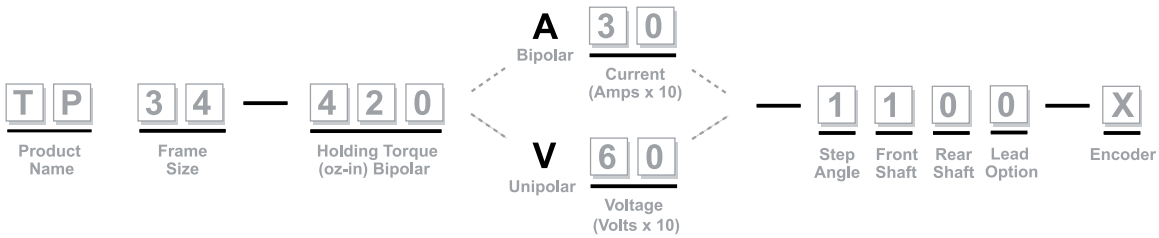
Size	Holding Torque oz-in (Ncm)	Speeds up to RPS
Nema 34, 1.8°	620 (438)	55

Forceful. Extra-sturdy.

This 1.8° size 34 hybrid DC stepping motor is built with an extra-sturdy casing for when you need medium-sized, powerful torque with a little more durability. The motor is totally enclosed with permanently lubricated ball bearings. The bi-directional size 34 has a step angle accuracy of ±3%.

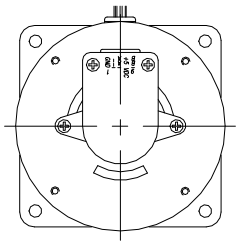
To build your own motor, choose the:

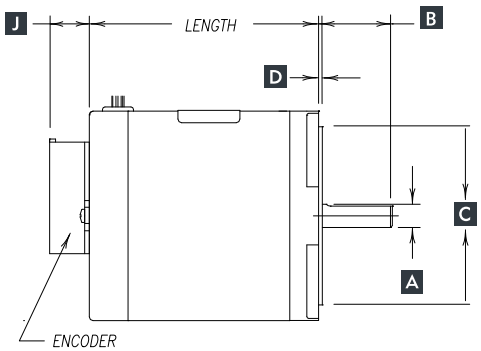
1 - Frame Size (Imperial)
2 - Torque (Stack Length)
3 - Winding
4 - Features (See page 27)

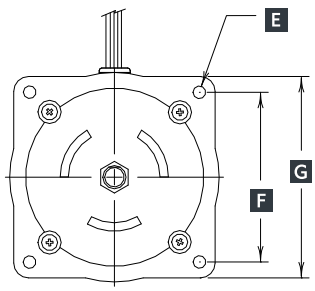


Step 1: TP34 Frame Size Drawing Key

Model	MAX Length	A Front Shaft Diameter	B Front Shaft Length	C Pilot Diameter	D Pilot Length (Ref)	E Mount Hole Callout	F Mount Hole Spacing (Ref)	G Flange External Dimension (Ref)	H Rear Shaft Diameter	I Rear Shaft Length	J Encoder Length (max)
TP34–235	2.45 in ±.03	0.3750 in 0.3745 in	1.19 in ±0.03	2.877 in 2.873 in	0.06 in	[4] 0.22 ±.010 Through	2.74 in	3.25 in	0.3750 in 0.3745 in	1.19 in ±0.04	0.68
TP34–420	3.70 in ±.03										
TP34–620	5.08 in ±.03										

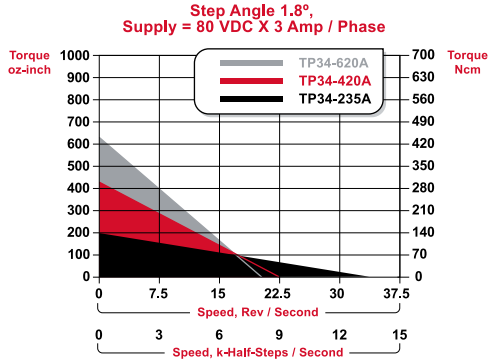




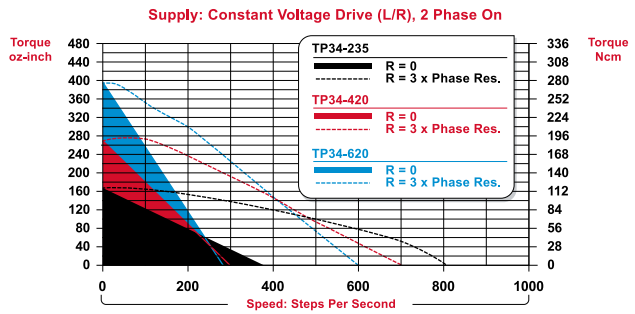


Step 2: TP34 Torque and Mechanical Data

TP34 Bipolar



TP34 Unipolar



Stack Size Models	235A	235V	420A	420V	620A	620V
Holding Torque Bipolar oz-in (Ncm)	235.0 (165.93)	235.0 (165.93)	420.0 (296.56)	420.0 (296.56)	620.0 (437.78)	620.0 (437.78)
Holding Torque Unipolar oz-in (Ncm)	N/A	188.0 (133)	N/A	336.0 (237)	N/A	496.0 (350)
Step Angle (°/step)	1.8°	1.8°	1.8°	1.8°	1.8°	1.8°
Rotor Inertia (oz-in-sec²)	0.0091	0.0091	0.017	0.017	0.0265	0.0265

Step 3: Available Windings

Bipolar

Imperial	235A20	235A30	235A40	235A60	420A20	420A30	420A40	420A60	620A20	620A30	620A40	620A60
Current Bipolar (A/Phase)	2.0	3.0	4.0	6.0	2.0	3.0	4.0	6.0	2.0	3.0	4.0	6.0
Phase Resistance (ohm)	2.2	0.96	0.55	0.24	3	1.33	0.75	0.33	3.8	1.7	0.96	0.43
Phase Inductance (mH)	20.4	9.07	5.1	2.27	33.2	14.8	8.3	3.7	54.5	24.2	13.6	6.1

Unipolar

Imperial	235V26	235V53	235V120	235V240	420V25	420V30	420V60	420V120	420V240	620V22	620V43	620V120	620V240
Unipolar (V/Phase)	2.6	5.3	12.0	24.0	2.5	3.0	6.0	12.0	24.0	2.2	4.3	12.0	24.0
Unipolar (A/Phase)	3.1	1.6	0.7	0.3	4.6	4.0	2.0	1.0	0.6	7.1	3.6	1.2	0.6
Phase Resistance (ohm)	0.85	3.3	18	72	0.55	0.75	3	11.5	44	0.31	1.2	10.3	41
Phase Inductance (mH)	4.15	17.5	80	315	2.75	3.6	16.45	64.2	237	1.81	7.65	60	249
Bipolar (A/Phase)*	2.2	1.1	0.5	0.2	3.2	2.8	1.4	0.7	0.4	5.0	2.5	0.8	0.4

*Data represents Unipolar windings configured as Bipolar

Still need help?
Easily build your own motor at
www.configureamotor.com

Don't see exactly what you need?
Have ElectroCraft build you a custom winding, stack length or fully customized motor… that's our specialty!

TP42 : ElectroCraft RapidPower™ | Stepper Motor

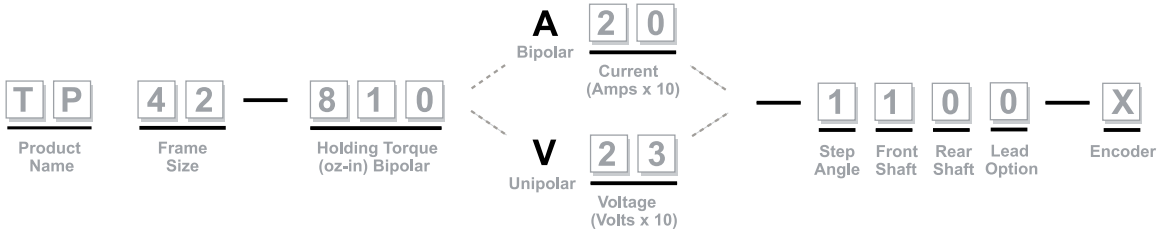
Size	Holding Torque oz-in (Ncm)	Speeds up to RPS
Nema 42, 1.8°	2100 (1480)	24

Protected. Force.

If you need a corrosion-resistant motor with powerful force, this 1.8° size 42 hybrid DC stepping motorcould be for you. It is totally enclosed with permanently lubricated ball bearings. The bi-directional size 42 has holding torque up to 2100 oz-in with a step angle accuracy of ±3% non-cumulative.

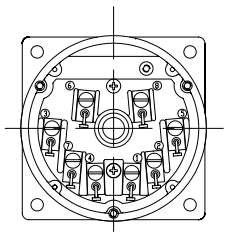
To build your own motor, choose the:

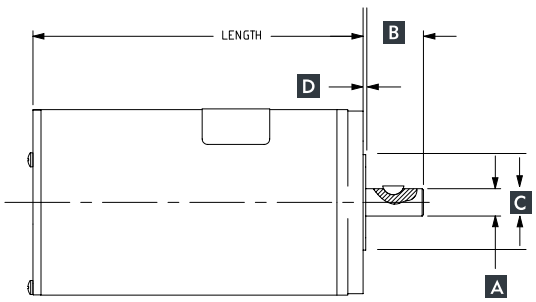
1 - Frame Size (Imperial)
2 - Torque (Stack Length)
3 - Winding
4 - Features (See page 27)

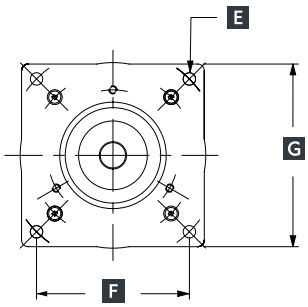


Step 1: TP42 Frame Size Drawing Key

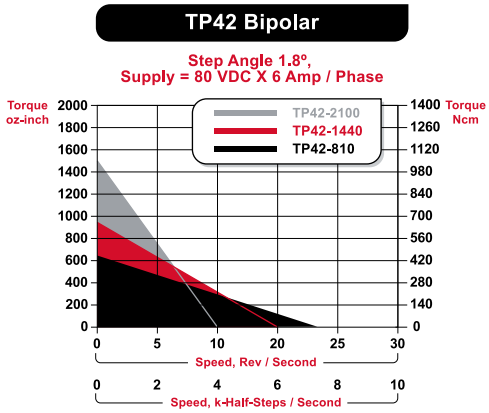
Model	MAX Length	A Front Shaft Diameter	B Front Shaft Length	C Pilot Diameter	D Pilot Length (Ref)	E Mount Hole Callout	F Mount Hole Spacing (Ref)	G Flange External Dimension (Ref)	H Rear Shaft Diameter	I Rear Shaft Length	J Encoder Length (max)
TP42–810	5.39 in ±0.04	0.6250 in 0.6245 in	1.38 in ±0.03	2.188 in 2.184 in	0.06 in	[4] 0.28 in ±.010 Through	3.50 in	4.19 in	0.5000 in 0.4995 in	1.25 in ±0.04	TBD
TP42–1440	7.56 in ±0.04										
TP42–2100	9.90 in ±0.04										







Step 2: TP42 Torque and Mechanical Data



Stack Size Models	810A	810V	1440A	1440V	2100A	2100V
Holding Torque Bipolar oz-in (Ncm)	810.0 (571.94)	810.0 (571.94)	1440.0 (1016.78)	1440.0 (1016.78)	2100.0 (1482.81)	2100.0 (1482.81)
Holding Torque Unipolar oz-in (Ncm)	N/A	650.0 (458.96)	N/A	1150.0 (812.01)	N/A	1650.0 (1165.07)
Step Angle (°/step)	1.8°	1.8°	1.8°	1.8°	1.8°	1.8°
Rotor Inertia (oz-in-sec²)	0.055	0.055	0.114	0.114	0.172	0.172

Step 3: Available Windings

Bipolar

Imperial	810A20	810A30	810A50	1440A20	1440A30	1440A50	2100A20	2100A30	2100A50
Current Bipolar (A/Phase)	2.0	3.0	5.0	2.0	3.0	5.0	2.0	3.0	5.0
Phase Resistance (ohm)	3.5	1.6	0.6	5.5	2.4	0.9	6.25	3.04	1.0
Phase Inductance (mH)	63.8	28.3	10.2	186	82.8	29.8	140	64	22.2

Unipolar

Imperial	810V23	810V41	810V79	810V98	1440V37	1440V46	1440V58	1440V74	2100V24	2100V32	2100V39	2100V45
Unipolar (V/Phase)	2.3	4.1	7.9	9.8	3.7	4.6	5.8	7.4	2.4	3.2	3.9	4.5
Unipolar (A/Phase)	6.1	3.5	1.8	1.4	6.1	4.7	3.8	3.1	10.4	8.4	6.8	5.2
Phase Resistance (ohm)	0.37	1.17	4.47	7	0.6	0.97	1.53	2.4	0.23	0.38	0.57	0.86
Phase Inductance (mH)	3.5	10.5	40.1	63.8	7	11.3	17.4	26.9	2.6	4	6.9	10.6
Bipolar (A/Phase)*	4.3	2.5	1.3	1.0	4.3	3.4	2.7	2.2	7.3	6.0	4.8	3.7

*Data represents Unipolar windings configured as Bipolar

Still need help?
Easily build your own motor at
www.configureamotor.com

Don't see exactly what you need?
Have ElectroCraft build you a custom winding, stack length or fully customized motor… that's our specialty!

TPP11M : ElectroCraft RapidPower™ Plus | Stepper Motor

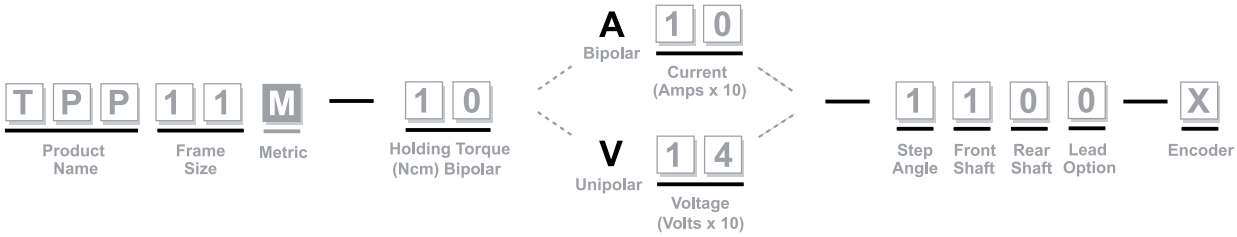
Size	Holding Torque oz-in (Ncm)	Speeds up to RPS
Nema 11, 1.8°	18 (13)	140

Quiet. Durable.

This extremely quiet hybrid stepping motor is made with ball bearings. Only available in metric configuration, sizes in metric units and has a holding torque up to 18 oz-in with a step angle accuracy of ±5%.

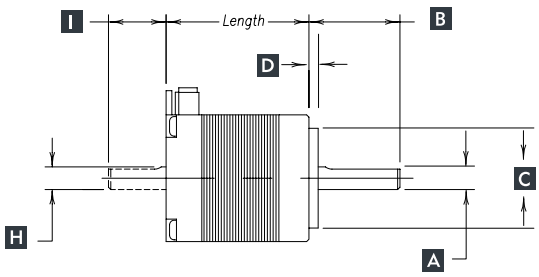
To build your own motor, choose the:

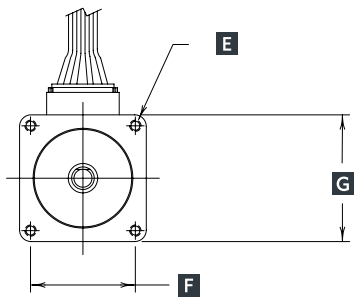
1 - Frame Size (Metric)
2 - Torque (Stack Length)
3 - Winding
4 - Features (See page 27)



Step 1: TPP11M Frame Size Drawing Key

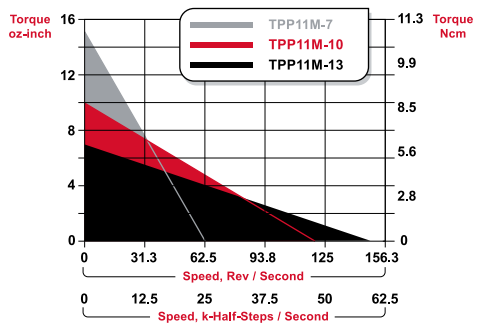
Model	MAX Length	A Front Shaft Diameter	B Front Shaft Length	C Pilot Diameter	D Pilot Length (Ref)	E Mount Hole Callout (Ref)	F Mount Hole Spacing (Ref)	G Flange External Dimension (Ref)	H Rear Shaft Diameter	I Rear Shaft Length	J Encoder Length (max)
TPP11M–7	31.5 mm ±.08	4.999 in 4.986 in	20 mm ±0.08	22.00 mm 21.07 mm	2.0 mm	(4) M3 x 0.5-6H 3.5 mm Deep min	23.0 mm	28.0 mm	4.999 mm 4.986 mm	12.7 mm ±0.08	N/A
TPP11M–10	39.6 mm ±.08										
TPP11M–13	49.3 mm ±.08										



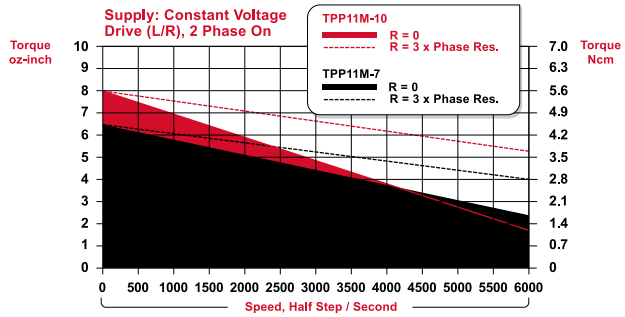


Step 2: TP11M Torque and Mechanical Data

TPP11M Bipolar



TPP11M Unipolar



Stack Size Models	TPP11M - 7A	TPP11M - 7V	TPP11M - 10A	TPP11M - 10V	TPP11M - 13A	TPP11M - 13V
Holding Torque Bipolar oz-in (Ncm)	9.5 (6.71)	9.5 (6.71)	13.7 (9.67)	13.7 (9.67)	18 (12.71)	18 (12.71)
Holding Torque Unipolar oz-in (Ncm)	N/A	6.6 (4.7)	N/A	9.6 (6.8)	N/A	13.0 (9.2)
Step Angle (°/step)	1.8°	1.8°	1.8°	1.8°	1.8°	1.8°
Rotor Inertia (oz-in-sec²)	0.000155	0.000155	0.000208	0.000208	0.000268	0.000268

Step 3: Available Windings

Bipolar

Metric	7A05	7A10	7A15	10A05	10A10	10A15	13A05	13A10	13A15
Current Bipolar (A/Phase)	0.5	1.0	1.5	0.5	1.0	1.5	0.5	1.0	1.5
Phase Resistance (ohm)	10	2.5	1.1	12.4	3.1	1.4	16.4	4.1	1.8
Phase Inductance (mH)	6.8	1.5	0.7	9.1	2.6	1	9.8	2.6	1.2

Unipolar

Metric	7V14	7V27	10V17	10V33	13V22	13V43
Unipolar (V/Phase)	1.4	2.7	1.7	3.3	2.2	4.4
Unipolar (A/Phase)	1.8	0.9	1.8	0.9	1.8	0.9
Phase Resistance (ohm)	0.7	2.8	0.9	3.4	1.2	4.6
Phase Inductance (mH)	0.23	1	0.36	1.5	0.42	1.7
Bipolar (A/Phase)*	1.3	0.7	1.3	0.7	1.3	0.7

*Data represents Unipolar windings configured as Bipolar

Still need help?
Easily build your own motor at
www.configureamotor.com

Don't see exactly what you need?
Have ElectroCraft build you a custom winding, stack length or fully customized motor… that's our specialty!

TPP17 & TPP17M : ElectroCraft RapidPower™ Plus | Stepper Motor

Size	Holding Torque oz-in (Ncm)	Speeds up to RPS
Nema 17, 1.8°	58 (41)	80

Precise. Compact.

This 1.8° size 17 hybrid DC stepping motor has permanently lubricated ball bearings. The bi-directional size 17 has holding torque up to 58 oz-in with a step angle accuracy of ±5%

To build your own motor, choose the:

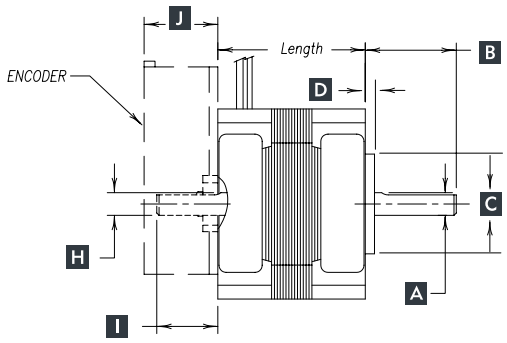
1 - Frame Size (Metric or Imperial)
2 - Torque (Stack Length)
3 - Winding
4 - Features (see page 27)

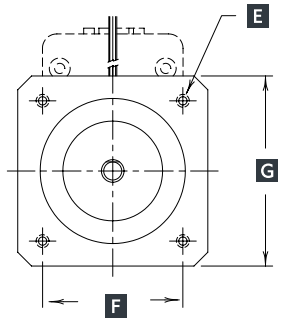
a. TPP17 — 29 — A Bipolar 10 — 1100 — X
b. TPP17M — 20 — V Unipolar 40 — 1100 — X

- TPP17 / TPP17M: Product Name
- 17: Frame Size
- M: Optional Metric
- 29 / 20: Holding Torque (oz-in) Bipolar / Holding Torque (Ncm) Bipolar
- A / V: Bipolar / Unipolar
- 10 / 40: Current (Amps x 10) / Voltage (Volts x 10)
- 1100: Step Angle, Rear Shaft, Rear Shaft, Lead Option
- X: Encoder

Step 1: TPP11M Frame Size Drawing Key

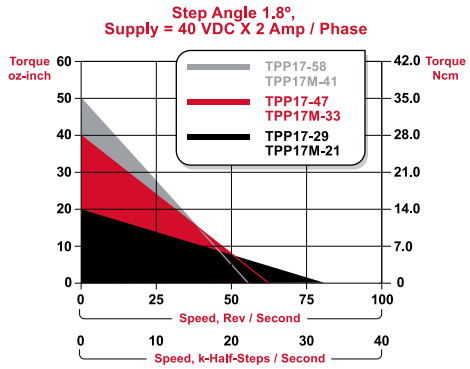
Model	MAX Length	A Front Shaft Diameter	B Front Shaft Length	C Pilot Diameter	D Pilot Length (Ref)	E Mount Hole Callout (Ref)	F Mount Hole Spacing (Ref)	G Flange External Dimension (Ref)	H Rear Shaft Diameter	I Rear Shaft Length	J Encoder Length (max)
TPP17–29	1.28 in ±0.03	0.1968 in 0.1963 in	0.79 in ±0.03	0.8660 in 0.8648 in	0.08 in	[4] 4-40 UNC-2B 0.17 in Deep Min	1.22 in	1.65 in	0.1968 in 0.1963 in	0.53 in ±0.04	0.68
TPP17–47	1.52 in ±0.03										
TPP17–58	1.85 in ±0.03										
TPP17M–21	32.5 mm ±0.8	4.999 mm 4.986 mm	20 mm ±0.08	22.00 mm 21.07 mm	2.0 mm	(4) M3 x 0.5-6H 3.5 mm Deep min	30.9 mm	41.9 mm	4.999 mm 4.986 mm	13.5 mm ±1.0	17 mm
TPP17M–33	38.6 mm ±0.8										
TPP17M–41	47.0 mm ±0.8										



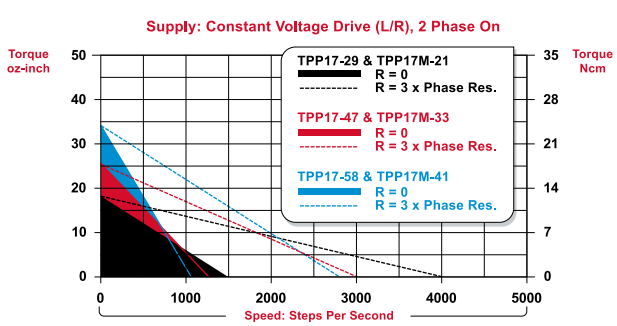


Step 2: TPP17 & TPP17M Torque and Mechanical Data

TPP17 & TPP17M Bipolar



TPP17 & TPP17M Unipolar



Stack Size Models	29A	29V	47A	47V	58A	58V
Holding Torque Bipolar oz-in (Ncm)	29.0 (20.5)	29.0 (20.5)	47.0 (33.2)	47.0 (33.2)	58.0 (41.0)	58.0 (41.0)
Holding Torque Unipolar oz-in (Ncm)	N/A	22.2 (15.7)	N/A	36.1 (25.5)	N/A	44.4 (31.4)
Step Angle (°/step)	1.8°	1.8°	1.8°	1.8°	1.8°	1.8°
Rotor Inertia (oz-in-sec²)	0.00053	0.00053	0.00081	0.00081	0.00106	0.00106

Step 3: Available Windings

Bipolar

Imperial	29A10	29A15	29A20	47A10	47A15	47A20	58A10	58A15	58A20
Metric	21A10	21A15	21A20	33A10	33A15	33A20	41A10	41A15	41A20
Current Bipolar (A/Phase)	1.0	1.5	2.0	1.0	1.5	2.0	1.0	1.5	2.0
Phase Resistance (ohm)	3.8	1.9	0.95	4.7	2.4	1.2	5.2	2.5	1.2
Phase Inductance (mH)	4.8	2.3	1.2	9.1	4.7	2.3	8.4	4.3	2.2

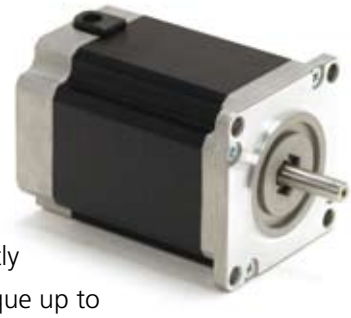
Unipolar

Imperial	29V40	29V60	29V96	29V120	47V40	47V60	47V120	47V240	58V40	58V60	58V120	58V240
Metric	21V40	21V60	21V96	21V120	33V40	33V60	33V120	33V240	41V40	41V60	41V120	41V240
Unipolar (V/Phase)	4.0	6.0	9.6	12.0	4.0	6.0	12.0	24.0	4.0	6.0	12.0	24.0
Unipolar (A/Phase)	1.0	0.6	0.4	0.3	1.2	0.8	0.4	0.2	1.2	0.8	0.4	0.2
Phase Resistance (ohm)	4.2	9.6	24	38.5	3.3	7.5	30	120	3.3	7.5	30	120
Phase Inductance (mH)	2.5	5.8	15	23	3.2	7	28	112	2.8	7	28	112
Bipolar (A/Phase)*	0.7	0.4	0.3	0.2	0.9	0.6	0.3	0.1	0.9	0.6	0.3	0.1

*Data represents Unipolar windings configured as Bipolar

TPP23 & TPP23M : ElectroCraft RapidPower™ Plus | Stepper Motor

Size	Holding Torque oz-in (Ncm)	Speeds up to RPS
Nema 23, 0.9° or 1.8°	240 (169)	90



Powerful. Precise.

This 1.8° degree size 23 hybrid DC stepping motor has permanently lubricated ball bearings. The bi-directional size 23 has holding torque up to 240 oz-in with a step angle accuracy of ±3%.

To build your own motor, choose the:

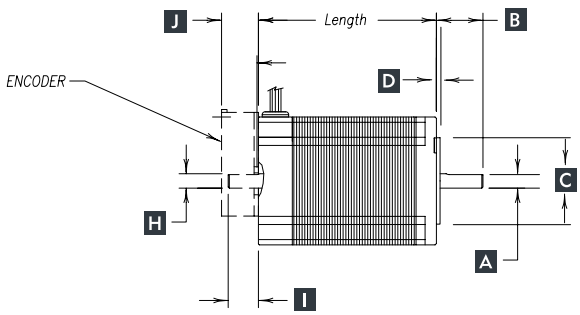
1 - Frame Size (Metric or Imperial)
2 - Torque (Stack Length)
3 - Winding
4 - Features (See page 27)

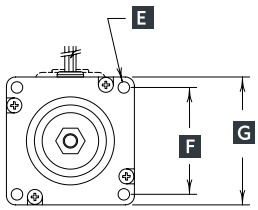
a. T P P 2 3 — 9 0 — A (Bipolar) 3 0 — 1 1 0 0 — X
Product Name | Frame Size | Holding Torque (oz-in) Bipolar | Current (Amps x 10) | Step Angle | Front Shaft | Rear Shaft | Lead Option | Encoder

b. T P P 2 3 M — 6 4 — V (Unipolar) 6 0 — 1 1 0 0 — X
Product Name | Frame Size | Optional Metric | Holding Torque (Ncm) Bipolar | Voltage (Volts x 10) | Step Angle | Front Shaft | Rear Shaft | Lead Option | Encoder

Step 1: TPP11M Frame Size Drawing Key

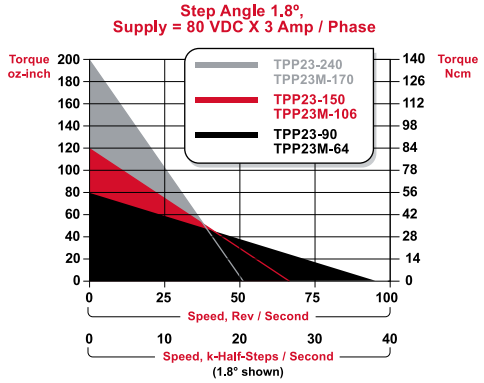
Model	MAX Length	A Front Shaft Diameter	B Front Shaft Length	C Pilot Diameter	D Pilot Length (Ref)	E Mount Hole Callout (Ref)	F Mount Hole Spacing (Ref)	G Flange External Dimension (Ref)	H Rear Shaft Diameter	I Rear Shaft Length	J Encoder Length (max)
TPP23–90	1.75 in ±0.03	0.2500 in 0.2495 in	0.81 in ±0.03	1.502 in 1.498 in	0.06 in	[4] 0.205 ±0.10 Through	1.86 in	2.22 in	0.2500 in 0.2495 in	0.53 in ±0.04	0.68
TPP23–150	2.21 in ±0.03										
TPP23–240	3.09 in ±0.03										
TPP23M–64	44.5 mm ±0.8	7.988 mm 7.976 mm	20.5 mm ±0.08	38.15 mm 38.05 mm	1.5 mm	(4) 5.08 mm ±0.25 Through	47.1 mm	56.4 mm	4.998 mm 4.986 mm	16.5 mm ±1.0	17 mm
TPP23M–106	56.1 mm ±0.8										
TPP23M–170	78.5 mm ±0.8										



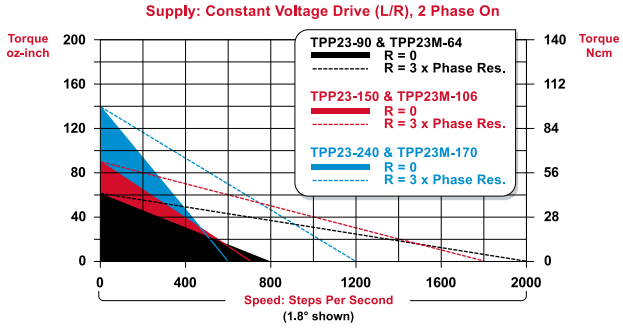


Step 2: TPP23 & TPP23M Torque and Mechanical Data

TPP23 & TPP23M Bipolar



TPP23 & TPP23M Unipolar



Stack Size Models	90A	90V	150A	150V	240A	240V
Holding Torque Bipolar oz-in (Ncm)	90.0 (63.55)	90.0 (63.55)	150.0 (105.92)	150.0 (105.92)	240.0 (169.46)	240.0 (169.46)
Holding Torque Unipolar oz-in (Ncm)	N/A	72.0 (50.8)	N/A	120.0 (84.7)	N/A	168.0 (118.66)
Step Angle (°/step)	0.9° or 1.8°	0.9° or 1.8°	0.9° or 1.8°	0.9° or 1.8°	0.9° or 1.8°	0.9° or 1.8°
Rotor Inertia (oz-in-sec²)	0.002	0.002	0.0035	0.0035	0.0061	0.0061

Step 3: Available Windings

Bipolar

Imperial	90A10	90A20	90A30	150A10	150A20	150A30	240A10	240A20	240A30
Metric	64A10	64A20	64A30	106A10	106A20	106A30	170A10	170A20	170A30
Current Bipolar (A/Phase)	1.0	2.0	3.0	1.0	2.0	3.0	1.0	2.0	3.0
Phase Resistance (ohm)	5.78	1.5	0.6	7.92	1.9	0.8	9.13	2.33	1
Phase Inductance (mH)	20.3	5.2	2	35	8.6	3.5	45.4	11.5	4.8

Unipolar

Imperial	90V18	90V30	90V60	90V120	150V23	150V38	150V60	150V76	150V154	240V28	240V45	240V60	240V92	240V179
Metric	64V18	64V30	64V60	64V120	106V23	106V38	106V60	106V76	106V154	170V28	170V45	170V60	170V92	170V179
Unipolar (V/Phase)	1.8	3.0	6.0	11.9	2.3	3.8	6.0	7.6	15.4	2.8	4.5	6.0	9.2	17.9
Unipolar (A/Phase)	3.0	2.0	1.0	0.5	3.0	2.0	1.3	1.0	0.5	3.0	2.0	1.5	1.0	0.5
Phase Resistance (ohm)	0.61	1.57	6	23.5	0.76	1.91	4.73	7.59	30.9	0.92	2.24	4	9.23	35.7
Phase Inductance (mH)	1	2.6	10.8	41.4	1.6	4.2	11	17.7	67.3	2.1	5.2	9.25	22.5	93.8
Bipolar (A/Phase)*	2.1	1.4	0.7	0.4	2.1	1.4	0.9	0.7	0.4	2.1	1.4	1.1	0.7	0.4

*Data represents Unipolar windings configured as Bipolar

TPP34 & TPP34M : ElectroCraft RapidPower™ Plus | Stepper Motor

Size	Holding Torque oz-in (Ncm)	Speeds up to RPS
Nema 34, 1.8°	1190 (840)	35

Compact. Force.

This bi-directional, 1.8° size 34 hybrid DC stepping motor provides a lot of torque in a relatively small size. The TPP34 has holding torque up to 1190 oz-in with a step angle accuracy of ±3%.

To build your own motor, choose the:

1 - Frame Size (Metric or Imperial) | **2 - Torque** (Stack Length) | **3 - Winding** | **4 - Features** (see page 27)

a. T P P 3 4 — 3 9 6 — A Bipolar 3 0 — 1 1 0 0 — X

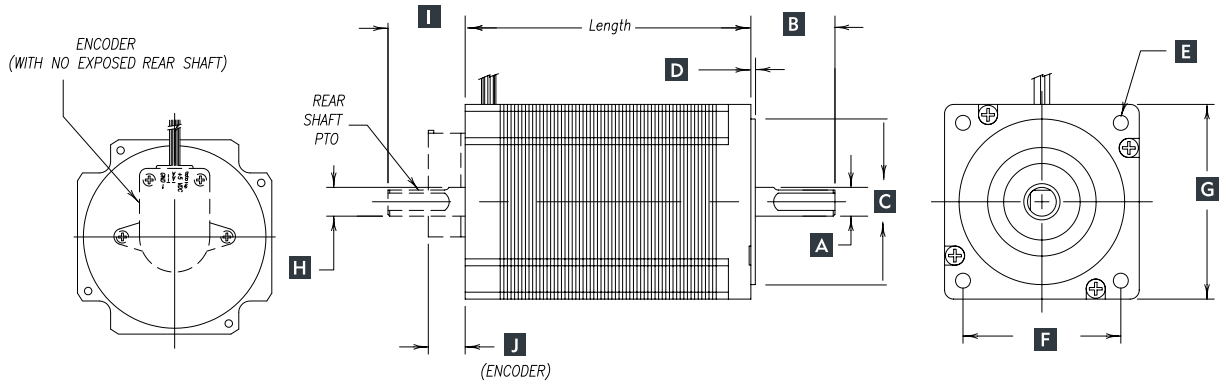
Product Name | Frame Size | Holding Torque (oz-in) Bipolar | Current (Amps x 10) | Step Angle | Front Shaft | Rear Shaft | Lead Option | Encoder

b. T P P 3 4 M — 2 8 0 — V Unipolar 3 0 — 1 1 0 0 — X

Product Name | Frame Size | Optional Metric | Holding Torque (Ncm) Bipolar | Voltage (Volts x 10) | Step Angle | Front Shaft | Rear Shaft | Lead Option | Encoder

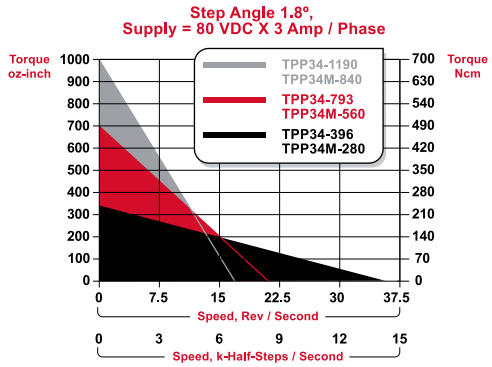
Step 1: TPP11M Frame Size Drawing Key

Model	MAX Length	A Front Shaft Diameter	B Front Shaft Length	C Pilot Diameter	D Pilot Length (Ref)	E Mount Hole Callout (Ref)	F Mount Hole Spacing (Ref)	G Flange External Dimension (Ref)	H Rear Shaft Diameter	I Rear Shaft Length	J Encoder Length (max)
TPP34–396	2.60 in ±0.04	0.5000 in 0.4995 in	1.46 in ±0.04	2.876 in 2.874 in	0.08 in	[4] 0.260 ±0.10 Through	2.74 in	3.38 in	0.5000 in 0.4995 in	1.34 in ±0.04	0.68
TPP34–793	3.78 in ±0.04										
TPP34–1190	4.96 in ±0.04										
TPP34M–280	66.0 mm ±1.0	14.000 mm 13.988 mm	37 mm ±1.0	73.05 mm 73.00 mm	2.0 mm	(4) 6.60 mm ±0.25 Through	69.6 mm	85.8 mm	14.000 mm 13.988 mm	34.0 mm ±1.0	17 mm
TPP34M–560	96.0 mm ±1.0										
TPP34M–840	126.0 mm ±1.0										

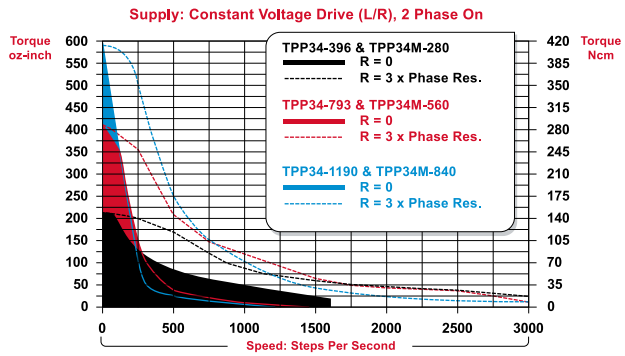


Step 2: TPP34 & TPP34M Torque and Mechanical Data

TPP34 & TPP34M Bipolar



TPP34 & TPP34M Unipolar



Stack Size Models	396A	396V	793A	793V	1190A	1190V
Holding Torque Bipolar oz-in (Ncm)	396.0 (279.62)	396.0 (279.62)	793.0 (559.94)	793.0 (559.94)	1190.0 (840.26)	1190.0 (840.26)
Holding Torque Unipolar oz-in (Ncm)	N/A	305.0 (215)	N/A	610 (430)	N/A	916.0 (650)
Step Angle (°/step)	1.8°	1.8°	1.8°	1.8°	1.8°	1.8°
Rotor Inertia (oz-in-sec²)	0.0198	0.0198	0.0382	0.0382	0.0566	0.0566

Step 3: Available Windings

Bipolar

Imperial	396A20	396A30	396A50	793A20	793A30	793A50	1190A20	1190A30	1190A50
Metric	280A20	280A30	280A50	560A20	560A30	560A50	840A20	840A30	840A50
Current Bipolar (A/Phase)	2.0	3.0	5.0	2.0	3.0	5.0	2.0	3.0	5.0
Phase Resistance (ohm)	2.52	1	0.4	3.93	1.56	0.62	4.33	1.72	0.68
Phase Inductance (mH)	21.9	8.67	3.44	34.3	13.6	5.39	44.3	17.6	6.98

Unipolar

Imperial	396V23	396V30	396V50	793V35	T793V47	793V79	1190V39	1190V52	1190V87
Metric	280V23	280V30	280V50	560V35	560V47	560V79	840V39	840V52	840V87
Unipolar (V/Phase)	2.3	3.0	5.0	3.5	4.7	7.9	3.9	5.2	8.7
Unipolar (A/Phase)	4.5	3.0	2.0	4.5	3.0	2.0	4.5	3.0	2.0
Phase Resistance (ohm)	0.5	1	2.52	0.78	1.56	3.93	0.86	1.72	4.33
Phase Inductance (mH)	2.17	4.34	10.9	3.4	6.8	17.1	4.4	8.6	22.2
Bipolar (A/Phase)*	3.2	2.1	1.4	3.2	2.1	1.4	3.2	2.1	1.4

*Data represents Unipolar windings configured as Bipolar

SA45 : Electrocraft CompletePower™ | Motion Control

Power Supply Voltage	Nominal Current	Phases	Operation Mode		Special Functions		
			Fullstep	Micro stepping	Integrated Oscillator	Current Fallback	Anti-Resonance Anti-Noise
11 - 48	5 / 10	2	●	●	●	●	●

For Stepper Motors. Up to 480W.

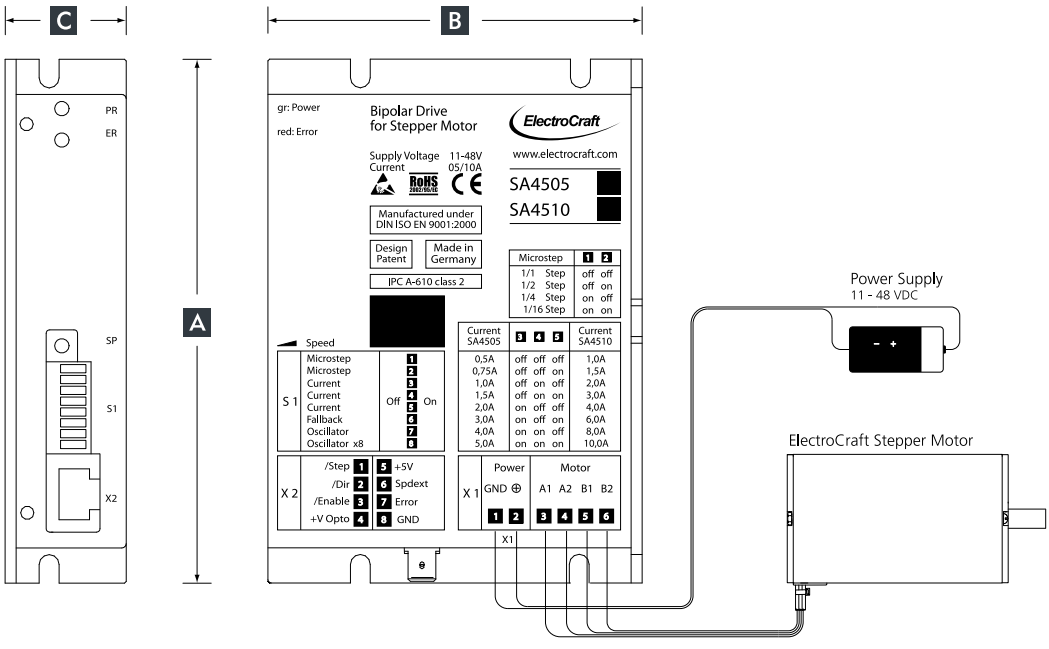
This bipolar stepper drive provides microstepping to 1/16 built into a fully enclosed rugged aluminum case. It can be DIN-rail mounted or panel mounted for fast integration. The mode of operation is set by simple DIP switches. Features include an internal oscillator that allows operation of the drive at a internal speed set point or with an external analog speed reference that can scale this set point. Both the 5 A and 10 A versions of this drive can be powered by the same range of voltage supplies. This drive is protected against over-current and overtemperature and incorporates the state of the art dual full bridge MOSFET driver for maximum efficiency. Connectivity is tool-free with RJ45-CAT5 plugs for the control inputs and push-type terminals for power.

Drive Model Example

S	A	4	5	10
Drive Technology	Revision	# Quadrants	Voltage 10x VDC	Nominal Amps

SA45 Outline Drawing

Model	A	B	C	Weight oz (g)
	Length in (mm)	Width in (mm)	Height in (mm)	
SA4505	4.69 (120.0)	3.35 (85.0)	1.08 (27.5)	7.05 (200)
SA4510				7.76 (220)



SA45 Specifications					
Model Number	Power Supply Voltage (VDC)	Nominal Current (Amps)	Max. Power with Heatsink (Watts)	Frequency of power output stage (kHz)	Efficiency (%)
SA4505	11 - 48	5	240	50	95
SA4510	11 - 48	10	480	50	95

Control Inputs	
Enable	Optical, Ri = 1 kOhm; max. 20 mA
Direction	Optical, Ri = 1 kOhm; max. 20 mA
Step	Optical, Ri = 1 kOhm; max. 20 mA
Speed extern	+1to +5 VDC; Ri = 100 kOhm
Switches	
Microstep	1/1; 1/2; 1/4; 1/16
Current	0,5 A to 5 A / 1 A to 10 A
Fallback	on / off
Oscillator	on / off
Oscillator x8	on / off
Outputs	
Auxiliary voltage source +5V	+5 VDC / 50 mA
Error	Optical, max. 20 mA
Display	
LEDs	green= Power / red = Error
Function of Potentiometers	
Speed	Range: 1,5 Hz - 1,2 kHz / 12 Hz - 9,6 kHz
Ambient conditions	
Operation temperature (°C)	-10 to +45
Storage temperature (°C)	-40 to +85
Humidity Range Not Condensing (%rel)	20 to 80 % rel.
Mode of Operation	
Fullstep; Microstep: 1/2, 1/4, 1/16	

Available Accessorie for SA45 (details see page 27)

IA210x	CAxxx	HA3008	HA3018	HA3028	MA0025	WA2509
						

ElectroCraft®
powering innovation™

GO FIGURE.

Customize your options ...

To easily find a motor / motion system that best meets your needs:

Step 1: Select a base technology

Step 2: Select a model type & features

Step 3: Select a performance

Step 4: Select an electrical winding

Step 5: Select any options & accessories

Easily build your own motor at

www.configureamotor.com

Build Your Own ElectroCraft Motor

To Fit Your Exact Application

For the past 60 years, the global team at ElectroCraft has helped engineers like you translate innovative ideas into reality. To build on that legacy, we created this Build-Your-Own ElectroCraft Motor web tool to get you started with our technology.

A web configuration tool from ElectroCraft ... Go Figure!

Your Genius. Our Drive.

System Matrix - Matching Motor and Drive Combinations

Motor Series			Drive Models	
	Motor P/N		Bipolar Stepper Drive	
	Imperial	Metric	SA4505	SA4510
TorquePower - TP	TP23-150A10		●	
	TP23-150A20		●	
	TP23-150A30		●	
	TP23-150A40		●	
	TP23-210A20		●	
	TP23-210A30		●	
	TP23-210A40		●	
	TP23-48A10		●	
	TP23-48A20		●	
	TP23-48A30		●	
	TP23-48A40		●	
	TP23-72A10			
	TP23-72A20			
	TP23-72A30			
	TP23-72A40			
	TP34-235A20		●	
	TP34-235A30		●	
	TP34-235A40		●	
	TP34-235A60			●
	TP34-420A20		●	
	TP34-420A30		●	
	TP34-420A40		●	
	TP34-420A60			●
	TP34-620A20		●	
	TP34-620A30		●	
	TP34-620A40		●	
	TP34-620A60			●
	TP42-1440A20		●	
	TP42-1440A30		●	
	TP42-1440A50		●	
	TP42-2100A20		●	
	TP42-2100A30		●	
	TP42-2100A50		●	
	TP42-810A20		●	
	TP42-810A30		●	
	TP42-810A50		●	

Motor Series			Drive Models	
	Motor P/N		Bipolar Stepper Drive	
	Imperial	Metric	SA4505	SA4510
TorquePower Plus - TPP		TPP11M-10A10	●	
		TPP11M-10A15	●	
		TPP11M-10A05	●	
		TPP11M-14A10	●	
		TPP11M-14A15	●	
		TPP11M-14A05	●	
		TPP11M-18A10	●	
		TPP11M-18A15	●	
		TPP11M-18A05	●	
	TPP17-29A10	TPP17M-21A10	●	
	TPP17-29A15	TPP17M-21A15	●	
	TPP17-29A20	TPP17M-21A30	●	
	TPP17-47A10	TPP17M-33A10	●	
	TPP17-47A15	TPP17M-33A15	●	
	TPP17-47A20	TPP17M-33A20	●	
	TPP17-58A10	TPP17M-41A10	●	
	TPP17-58A15	TPP17M-41A15	●	
	TPP17-58A20	TPP17M-41A20	●	
	TPP23-150A10	TPP23M-106A10	●	
	TPP23-150A20	TPP23M-106A20	●	
	TPP23-150A30	TPP23M-106A30	●	
	TPP23-240A10	TPP23M-170A10	●	
	TPP23-240A20	TPP23M-170A20	●	
	TPP23-240A30	TPP23M-170A30	●	
	TPP23-90A10	TPP23M-64A10	●	
	TPP23-90A20	TPP23M-64A20	●	
	TPP23-90A30	TPP23M-64A30	●	
	TPP34-1190A20	TPP34M-840A20	●	
	TPP34-1190A30	TPP34M-840A30	●	
	TPP34-1190A50	TPP34M-840A50	●	
	TPP34-396A20	TPP34M-286A20	●	
	TPP34-396A30	TPP34M-286A30	●	
	TPP34-396A50	TPP34M-286A50	●	
	TPP34-793A20	TPP34M-563A20	●	
	TPP34-793A30	TPP34M-563A30	●	
	TPP34-793A50	TPP34M-563A50	●	

Still need help?
Easily build your own motor at
www.configureamotor.com

Don't see exactly what you need?
Have ElectroCraft build you a custom winding, stack length or fully customized motor… that's our specialty!

ElectroCraft®
powering innovation™

Other Products available from

ElectroCraft:

- CompletePower™ I Motion Control
- RapidPower™ I BLDC
- AxialPower™ I Linear Actuator
- DirectPower™ I PMDC
- MobilePower™ I Transmissions
- SolidPower™ Plus I Housed AC
- SurePower™ I C-Frame AC

CompletePower™ I Drives

With meticulous engineering and advanced electronics, our CompletePower speed controls and servo drives offer reliability and precision servo motion control. From sensitive medical dosing systems to rugged professional power tools, our CompletePower devices can handle a wide variety of applications.

TorquePower™ I Steppers

With non-cumulative position accuracies as low as ±3%, the precision of our TorquePower motor is matched only by the dependability of its performance. Bi-directional operation and enclosed, permanently lubricated ball bearings provide long-lasting, smooth operation.

RapidPower™ I BLDC

Our BLDC motors provide the rapid acceleration and consistent speed needed for applications from centrifuges to x-y positioning systems. The RapidPower product line ensures a steady operation at any speed by utilizing sealed ball bearings and reduced torque ripple from skewed magnetization.

AxialPower™ I Linear Actuator

Based on modified hybrid steppers, PMDC, and BLDC motors, our family of AxialPower linear actuators are built to last. Our unique approach to linear motion with low-friction, polymer rotating nuts and stainless steel leadscrews provides high force and linear precision in the smallest packages available.

DirectPower™ I PMDC

Dynamically balanced armatures and precision ball bearings ensure that the DirectPower line maintains its characteristically smooth performance. This durable, totally enclosed, non-ventilated (TENV) motor is available in a broad product line from lower cost, general purpose options to high performance PMDC servo motors.

MobilePower™ I Transmissions

With a choice of output ratios, our MobilePower line of products helps power battery-operated vehicles from wheelchairs to lift trucks. And, to increase durability and decrease noise levels, the robust all metallic gears are hobbed to a precision AGMA 9-Class.

SolidPower™ Plus I Housed AC

High starting torques and stator windings matched to your application ensure the SolidPower product provides lasting performance. The dynamically balanced, skewed rotor bars and precision-machined fits keep vibration levels at a minimum.

SurePower™ I C-Frame AC

Our AC shaded-pole motor, the SurePower product, can be utilized for a wide range of air-moving applications - perfect for the rigors of refrigeration and commercial food equipment applications.

Drives Accessories

CAxxxx		CA2005 - Red 50cm CA2010 - Red 100cm CA2020 - Red 200cm CA2030 - Red 300cm CA4005 - Yellow 50cm CA4010 - Yellow 100cm CA4020 - Yellow 200cm CA4030 - Yellow 300cm CA8005 - Gray 50cm CA8010 - Gray 100cm CA8020 - Gray 200cm CA8030 - Gray 300cm
HA3008		Passive heatsink optimized for drives: SA45
HA3018		One fan heatsink optimized for drives: SA45 Fan is 1 x 24VDC, .8W.
HA3028		Two fan heatsink optimized for drives: SA45 Fans are 2 x 24VDC, .8W.
IA210x		Choke module optimized for brushless drives. Inductance: IA2100 = 2 x 50 µH; IA2101 = 2 x 100 µH Nominal current: 10 A
MA0025		DIN Rail mounting kit for units: SA45
WA2509		Break Out Board

To build your own motor, choose the:

1 - Frame Size (Imperial)
2 - Torque (Stack Length)
3 - Winding
4 - Features (Select Appropriate Code)

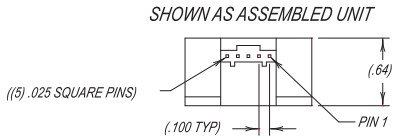
TP	23	—	150	A (Bipolar)	30 (Current (Amps x 10))	—	1	1	0	0	—	X
Product Name	Frame Size		Holding Torque (oz-in) Bipolar				Step Angle	Front Shaft	Rear Shaft	Lead Option		Encoder

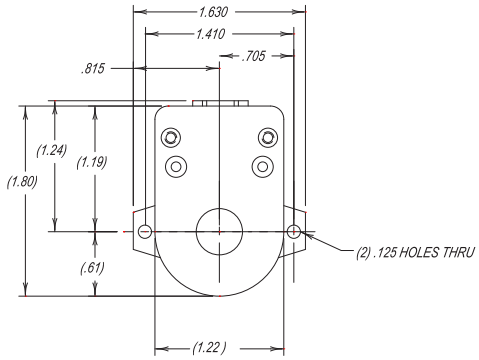
V (Unipolar) 60 (Voltage (Volts x 10))

Step 4: Stepper Motor Features

Step Angles	Front Shaft Modification	Rear Shaft Modification	Lead Option	Encoder Options
1 = 1.8°	0 = none	0 = none	0 = flying leads	H = 400 PPR
0 = 0.9°	1 = standard flat	1 = standard shaft	1 = connector	K = 1000 PPR
	2 = key seat			

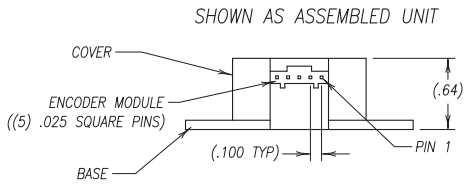
Encoder Specifications for TPP17, TPP23, and TPP34

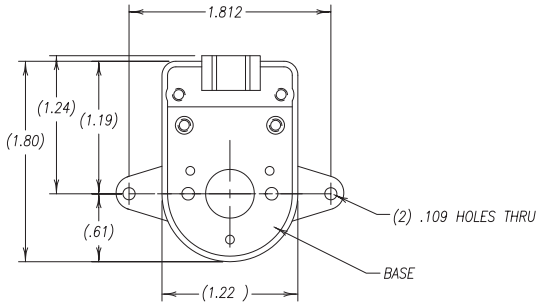




Motor Size	Encoder	Line Count
TPP17	H	400
	K	1000

Pin Number	Parameter	Max Current Draw	Typ Current Draw	Supply Voltage	Mating Connector (Ref)	Contact (Ref)
Pin 1	Ground	85 ma	55 ma	5V	AMP P/N: 104257-4	AMP P/N 104480-4
Pin 2	Index					
Pin 3	Channel A					
Pin 4	+5 VDC					
Pin 5	Channel B					





Motor Size	Encoder	Line Count
TPP23	H	400
	K	1000
TPP34	H	400
	K	1000

To learn more about our products and services, please visit www.electrocraft.com or contact ElectroCraft today and see how we can help power your innovation.

ElectroCraft®
powering innovation™

Headquarters:

USA: 1 Progress Drive I Dover I New Hampshire I 03820
Telephone: +1 603 516 1200 | Fax: +1 603 742 9080

Sales & Applications Engineering:

USA: 250 McCormick Road | Gallipolis | Ohio | 45631
Telephone: +1 740 441 6200 | Fax: +1 740 441 6309

Hong Kong: Rm 1118, Delta House I 3 On Yiu Street I Shatin, NT.
Telephone: +852 316 3225 0 | Fax: +852 316 3225 1

Germany: Vor dem Lauch 19 I D-70567 I Stuttgart
Telephone: +49 (0) 711 7272 05 0 | Fax: +49 (0) 711 7272 05 44

EMEA: Unit 4 I Crewe Trade Park I Crewe I Cheshire I CW1 6JT, UK
Telephone: +44 (0) 127 0580 14 2 | Fax: +44 (0) 127 0251 24 0