MX Series Hazardous Duty 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.

KOLLMORGEN
A REGAL REXNORD BRAND

How To Use This Selection Guide:

This guide covers the technical information required to select and order MX Series hazardous duty 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 MX motors and available options: first refer to the Frame Size Overview, pg. 5. 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

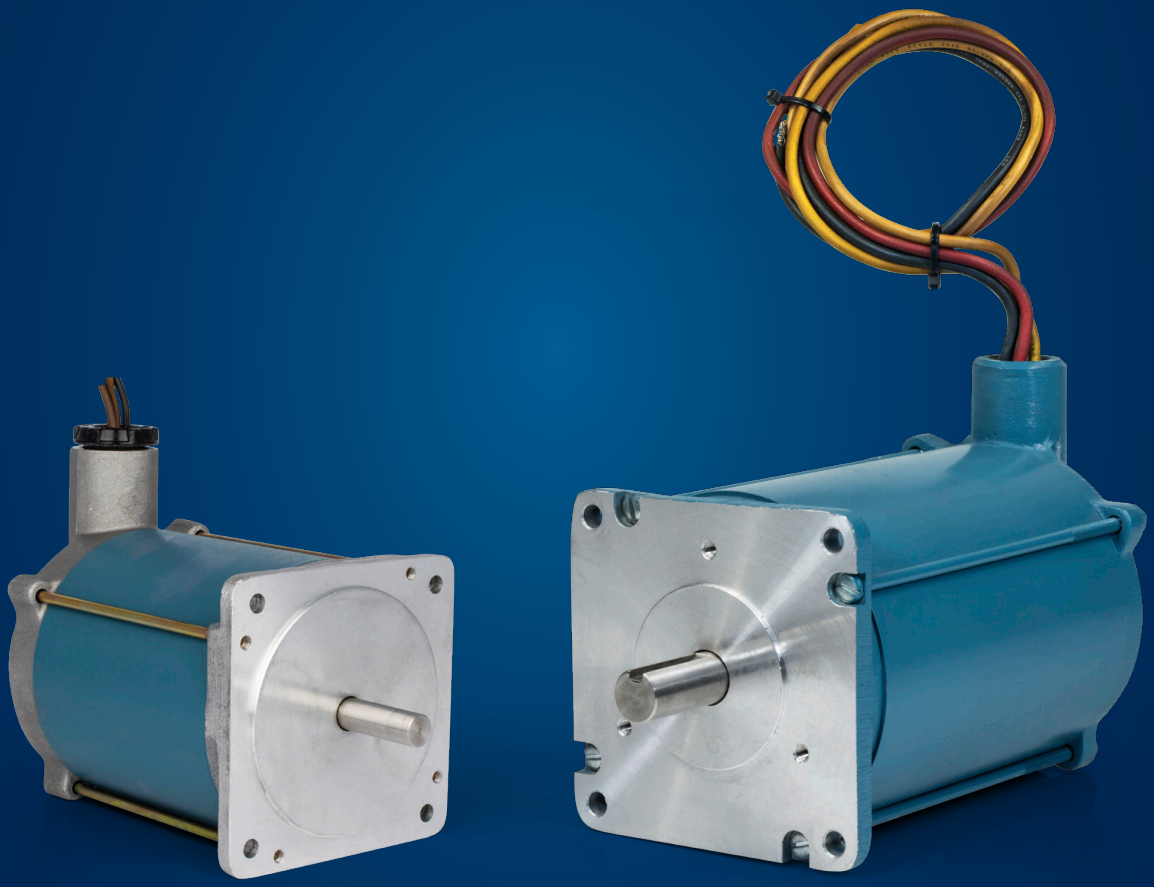
» Asia: +86-400 661 2802, sales.china@kollmorgen.com

Table of Contents

MX Series Hazardous Duty Stepper Motors

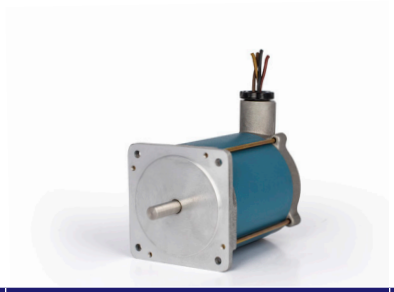
UL, File E32246 (MX9) and E120721 (MX11)
Class I, Divisions 1 & 2, Group D

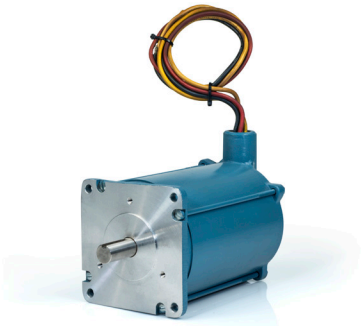
Explosion proof MX Series stepper motors are available in NEMA 34 and 42 frame sizes (90 and 110 mm). They move in 200 steps per revolution (1.8° step angle) and provide minimum holding torques from 1.27 to 9.82 N-m (180 to 1,390 oz-in). MX Series steppers are available with bipolar windings and a choice of stack lengths, providing speeds up to 3,000 rpm to meet the velocity demands of most high-torque applications.



General Specifications

» NEMA 34 and 42
» Conventional hybrid stepper motor
» Hazardous duty, UL Class 1, Division 1, Group D
» CE compliant
» Unipolar or Bipolar windings
» Features: leadwire connection
» Co-Engineered Options: Shaft Modifications, Special Windings



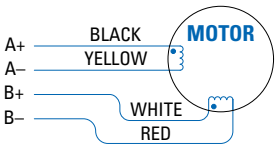


Parameter	MX9	MX11
NEMA frame size	34 (90 mm)	42 (110 mm)
Phases	2	
Full Steps per Revolution	200	
Step Angle (degrees)	1.8	
Step Accuracy % (of one full step, no load)	± 3.0 %	± 5.0 %
Operating Temperature	-20°C to +40°C	
Insulation Class	Class A, 105 °C	Class B, 130 °C
Insulation Voltage Rating	340 Vdc	
Insulation Resistance	100 Megohms	

MX Series Hazardous Duty Stepper Motors

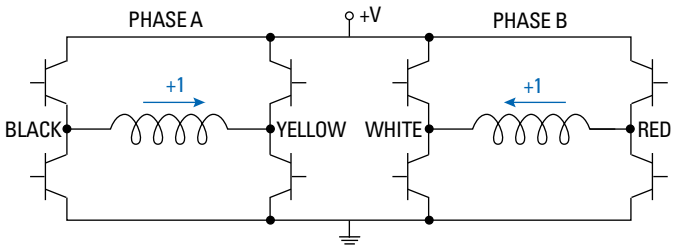
MX Series Stepper Motor Connection Information

4-Lead Configuration



4-Lead Connection

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



Full Step (One Phase On) Energizing Sequence

STEP	A	B
1	+1	0
2	0	–1
3	–1	0
4	0	+1
1	+1	0

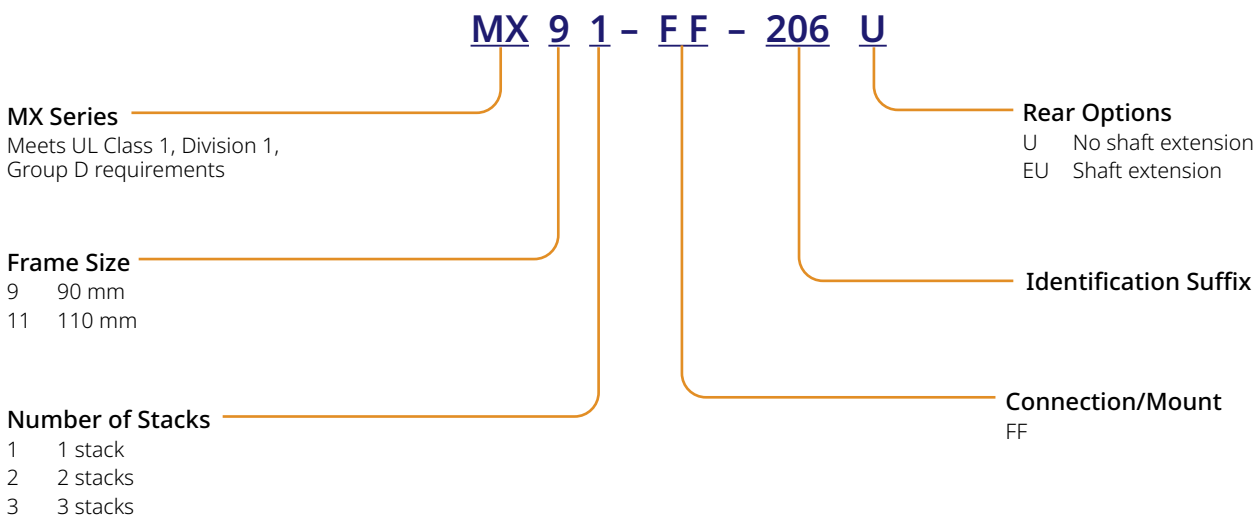
Full Step (Two Phase On) Energizing Sequence

STEP	A	B
1	+1	+1
2	+1	–1
3	–1	–1
4	–1	+1
1	+1	+1

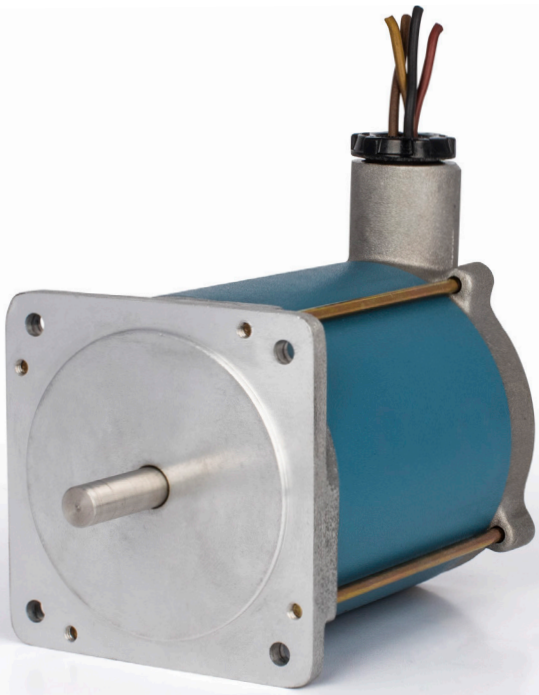
Half Step Energizing Sequence

STEP	A	B
1	+1	+1
2	+1	0
3	+1	–1
4	0	–1
5	–1	–1
6	–1	0
7	–1	+1
8	0	+1
1	+1	+1

MX Series Stepper Motor Nomenclature



MX9 Series Hazardous Duty Stepper Motor

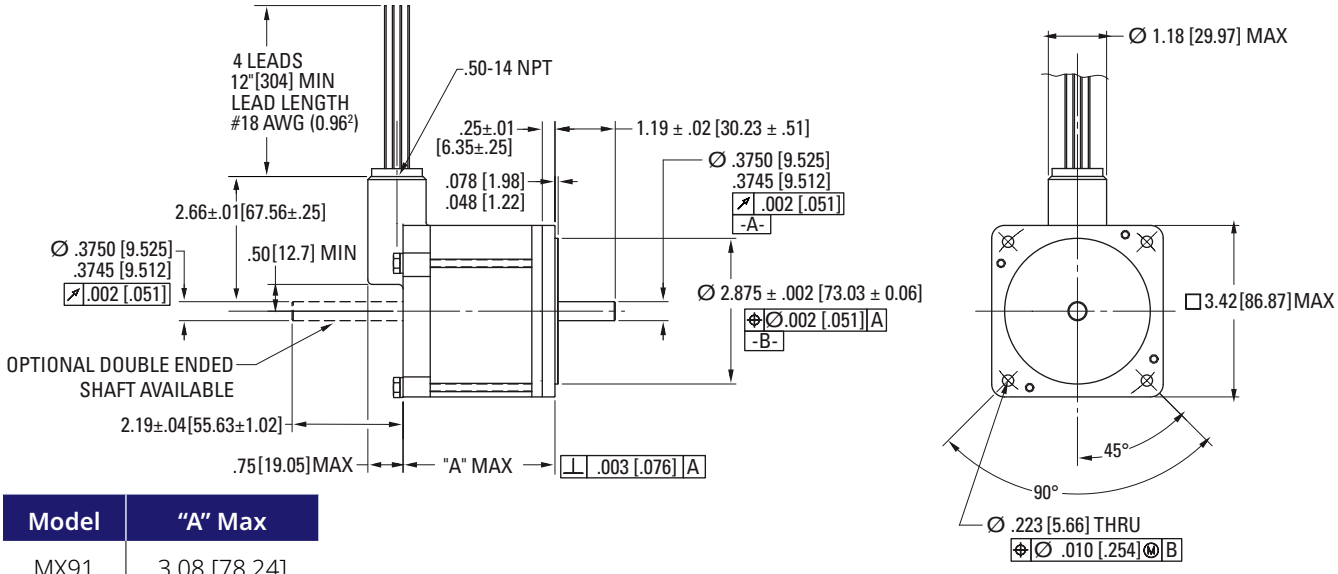


MX9 Specifications

- NEMA 34
- Conventional hybrid stepper motor
- Hazardous duty, UL Class 1, Division 1, Group D
- CE compliant
- Unipolar or Bipolar windings
- Features: leadwire connection
- Co-Engineered Options: Shaft Modifications, Special Windings

Phases	2
Full Steps per Revolution	200
Step Angle	1.8°
Step Accuracy (of one full step, no load)	± 3 %
Operating Temperature	-20°C to +40°C
Insulation Class	Class A, 105°C
Insulation Voltage Rating	340 Vdc
Insulation Resistance	100 Megohms

MX9 Outline Drawings



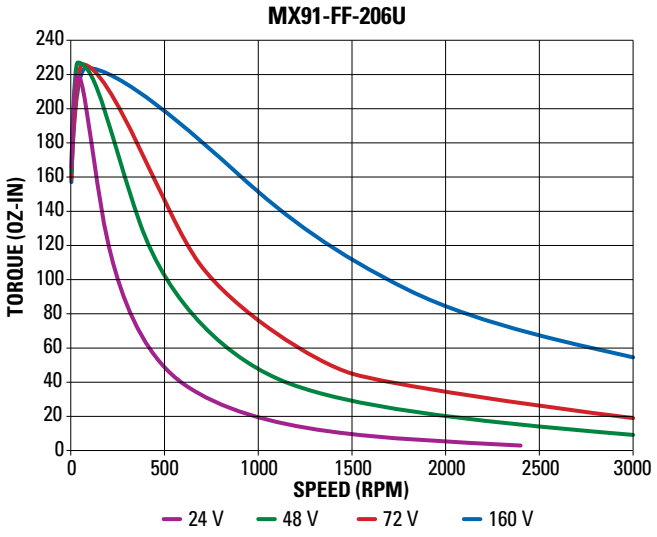
Model	"A" Max
MX91	3.08 [78.24]
MX92	4.33 [110.0]
MX93	5.70 [144.8]

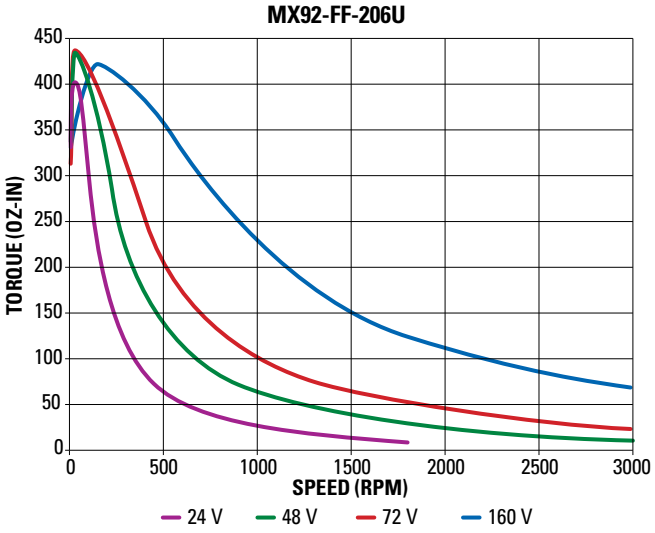
Dimensions in inches [mm]

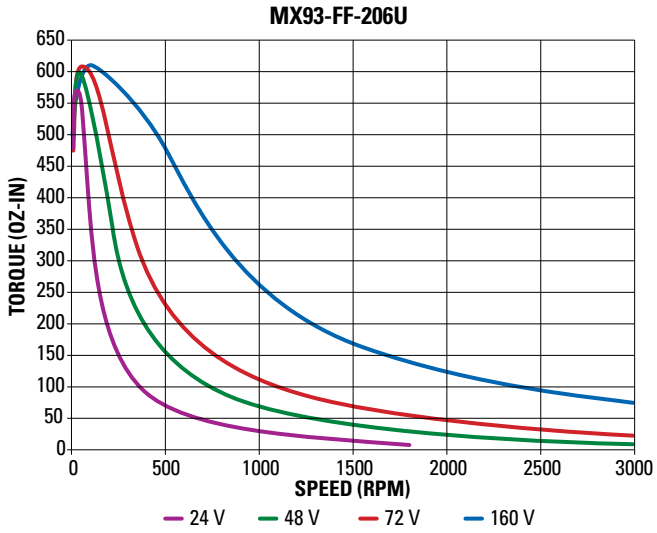
MX9 Performance Data

Motor Model Number	Config.			Holding Torque (2 Phases on)	Rated Current/ Phase	Phase Resistance	Phase Inductance	Thermal Resistance	Rotor Inertia	Weight	Shaft Loading	
	Parallel	Series	Unipolar	oz-in (Nm) +/-10%	Amps DC	Ohms +/-10%	mH Typical	Mounted °C/Watt	oz-in-s^2 (kg-m^2 x 10^{-3})	lb (kg)	Radial Force lb (N)	Axial Force lb (N)
MX91-FF-206U		•		180 (1.27)	3.0	1.0	10	2.9	0.0095 (0.067)	6.0 (2.7)	25 (111)	50 (222)
MX91-FF-402U		•			4.0	0.72	6.0					
MX91-FF-403U		•			6.0	0.18	1.5					
MX92-FF-206U		•		370 (2.61)	4.0	1.0	11	1.7	0.0174 (0.123)	9.0 (4.1)	25 (111)	50 (222)
MX92-FF-401U		•			7.0	0.28	2.8					
MX93-FF-206U		•		550 (3.88)	4.0	0.90	13	2.1	0.0265 (0.187)	11 (5.0)	25 (111)	50 (222)
MX93-FF-402U		•			7.0	0.16	2.0					

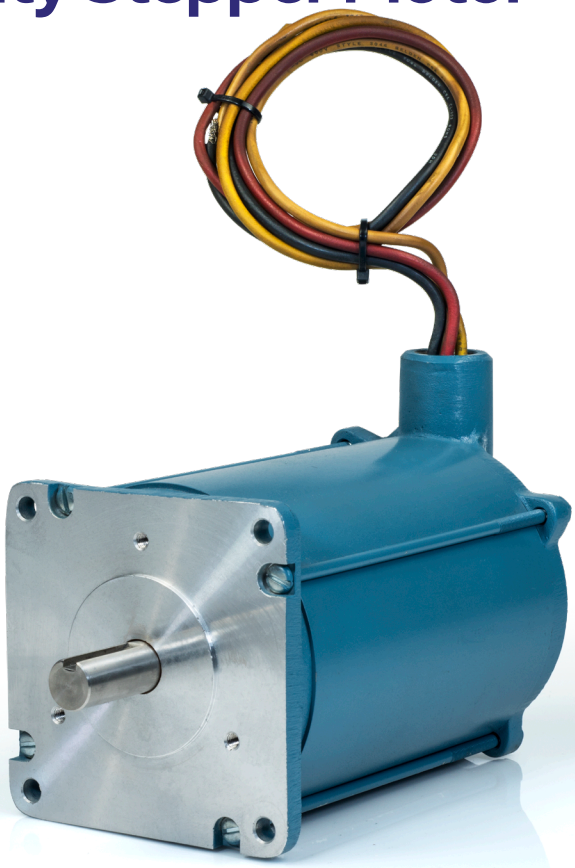
MX9 Performance Curves







MX11 Series Hazardous Duty Stepper Motor

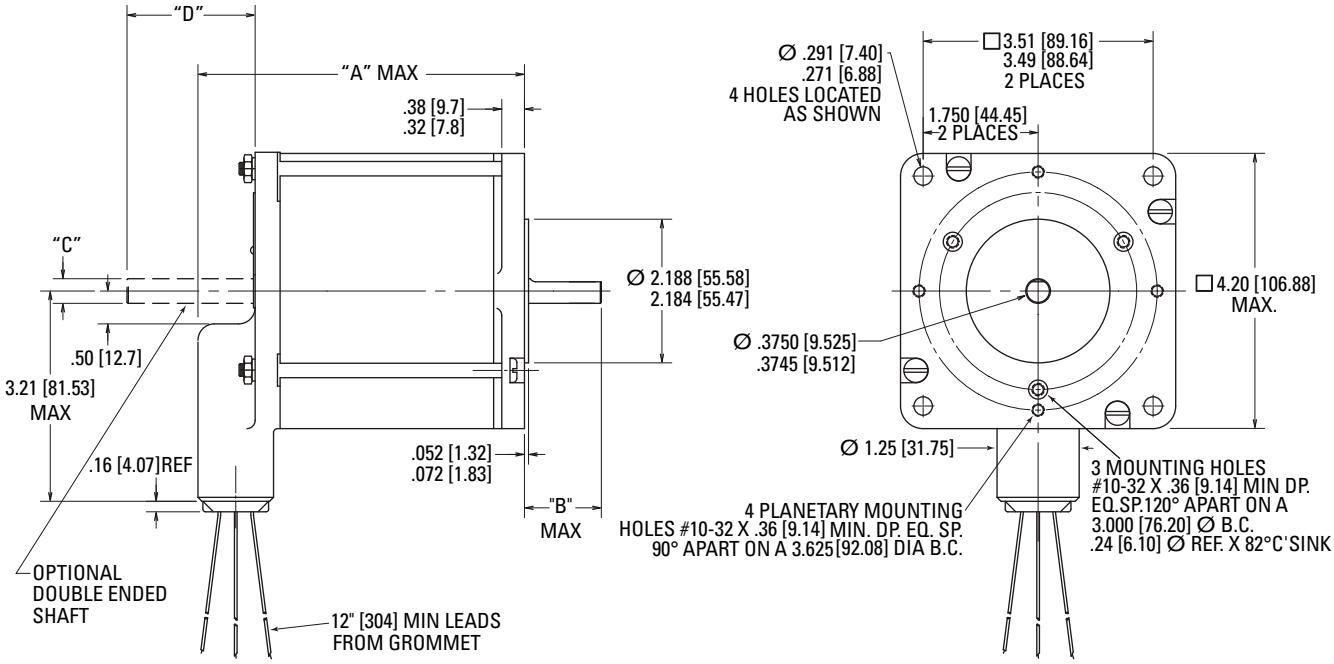


MX11 Specifications

- NEMA 34
- Conventional hybrid stepper motor
- Hazardous duty, UL Class 1, Division 1, Group D
- CE compliant
- Unipolar or Bipolar windings
- Features: leadwire connection
- Co-Engineered Options: Shaft Modifications, Special Windings

Phases	2
Full Steps per Revolution	200
Step Angle	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 Rating	340 Vdc
Insulation Resistance	100 Megohms

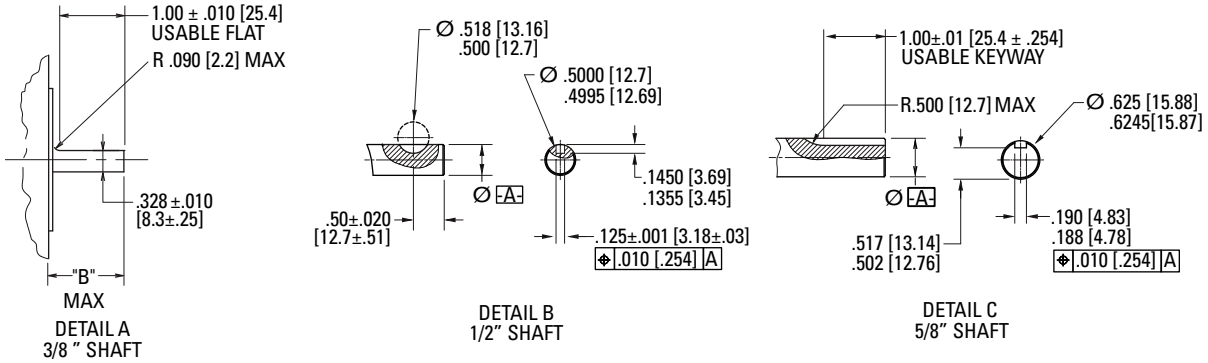
MX11 Outline Drawings



Dimensions in inches [mm]

See next page for dimensions table and shaft details.

MX11 Outline Drawings (continued)



Dimensions in inches [mm]

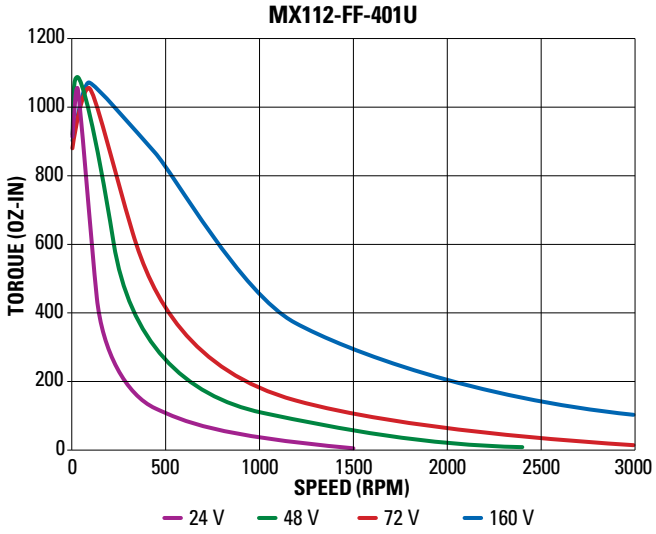
Dimensions and Shaft Details

Model	"A" Max	"B" Max	"C"	"D"	Shaft Detail
MX111-FF-401U	5.06 [128.6]	1.25 [31.8]	Ø 0.375/0.3745 [9.525/9.512]	2.18 ± 0.14 [55.3]	A
MX112-FF-401U	7.45 [189.2]	1.38 [35.1]	Ø 0.5000/0.4995 [12.70/12.69]	1.258 ± 0.04 [31.55]	C

MX11 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	
	Parallel	Series	Unipolar	oz-in (Nm) +/-10%	Amps DC	Ohms +/-10%	mH Typical	Mounted °C/Watt	oz-in-s² (kg-m² x 10^{-3})	lb (kg)	Radial Force lb (N)	Axial Force lb (N)
MX111-FF-401U		•		850 (6.0)	1.1	3.6	16	7.4	0.055 (3.93)	10 (4.5)	25 (111)	50 (222)
MX112-FF-401U		•		1390 (9.82)	2.7	0.64	2.5	1.8	0.114 (8.06)	18 (8.2)	25 (111)	50 (222)

MX112 Performance Curve



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.

About Kollmorgen

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.

KOLLMORGEN

A REGAL REXNORD BRAND

www.kollmorgen.com

KM_SG_00091-MX_RevD_EN