PM STEP MOTORS

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PM STEP MOTORS

Contents

Product List

Product Line Up

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15PM020S	15	11.4	20	18
15PM020D	15	20.1	20	18
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20PM020L	20	19.3	20	18
25PM024S	25	12.5	24	15
25PM048S	25	12.5	48	7.5
25PM024L	25	17.0	24	15
25PM048L	25	17.0	48	7.5
28PN024L	28	15.0	24	15
35PM024S	35	15.3	24	15
35PM048S	35	15.3	48	7.5
35PM024L	35	21.3	24	15
35PM048L	35	21.3	48	7.5
42PM048S	42	15.3	48	7.5
42PM096S	42	15.3	96	3.75
42PM048L	42	21.3	48	7.5
42PM096L	42	21.3	96	3.75
Series	Outer Diameter (mm)	Shaft Stroke (mm)	Step No.	Step Travel (mm)
20LN024M	20	20	24	0.0254
20LN024L	20	12.5	24	0.0254
25LN024L	25	20	24	0.0508
25LN024S	25	13	24	0.0254
28LN024L	28	13	24	0.0420
35LN024L	35	36	24	0.0333
35LN024L	35	12	24	0.0333

Model Numbering System

42 PM 048 L 1 - 003 02

Base frame code
Outer diameter size: 42mm diameter = 42

Motor type code
PM: permanent magnet step motor
LN: permanent magnet linear step motor

Step code
020: 20 steps per rotation, 18° step angle
024: 24 steps per rotation, 15° step angle
048: 48 steps per rotation, 7.5° step angle
096: 96 steps per rotation, 3.75° step angle

Length code
S: short version
M: middle version
L: long version

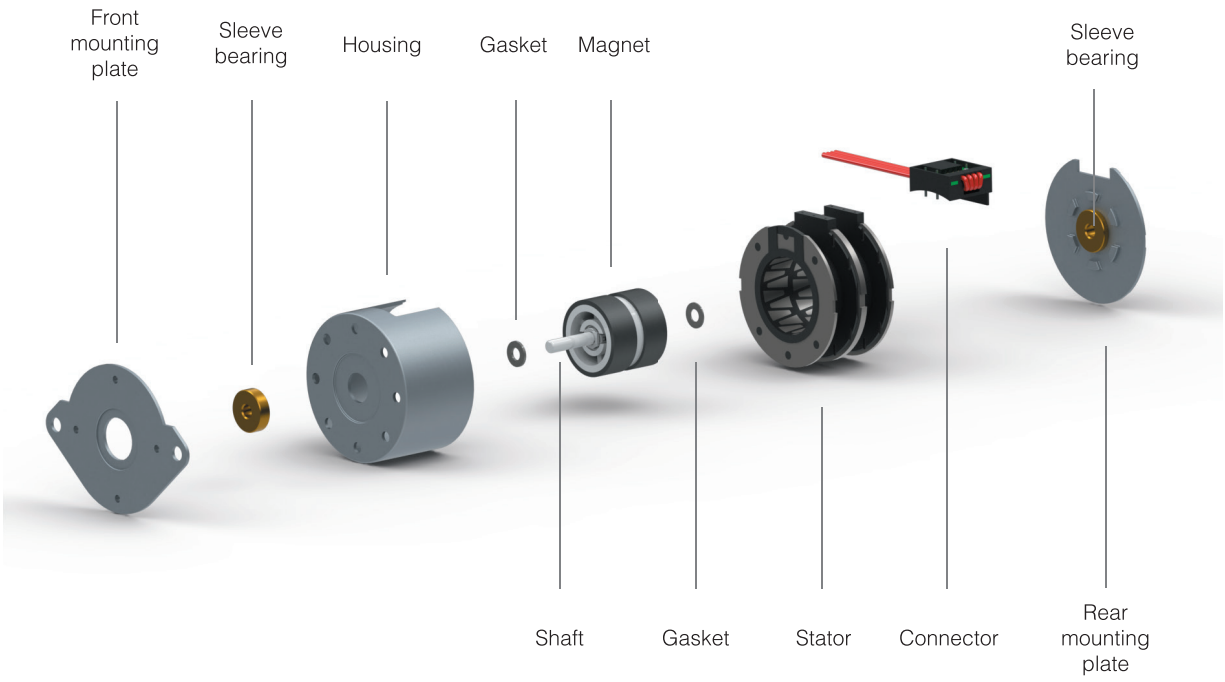
Magnet grade code

Resistance code
Winding resistance: 3Ohm = 003

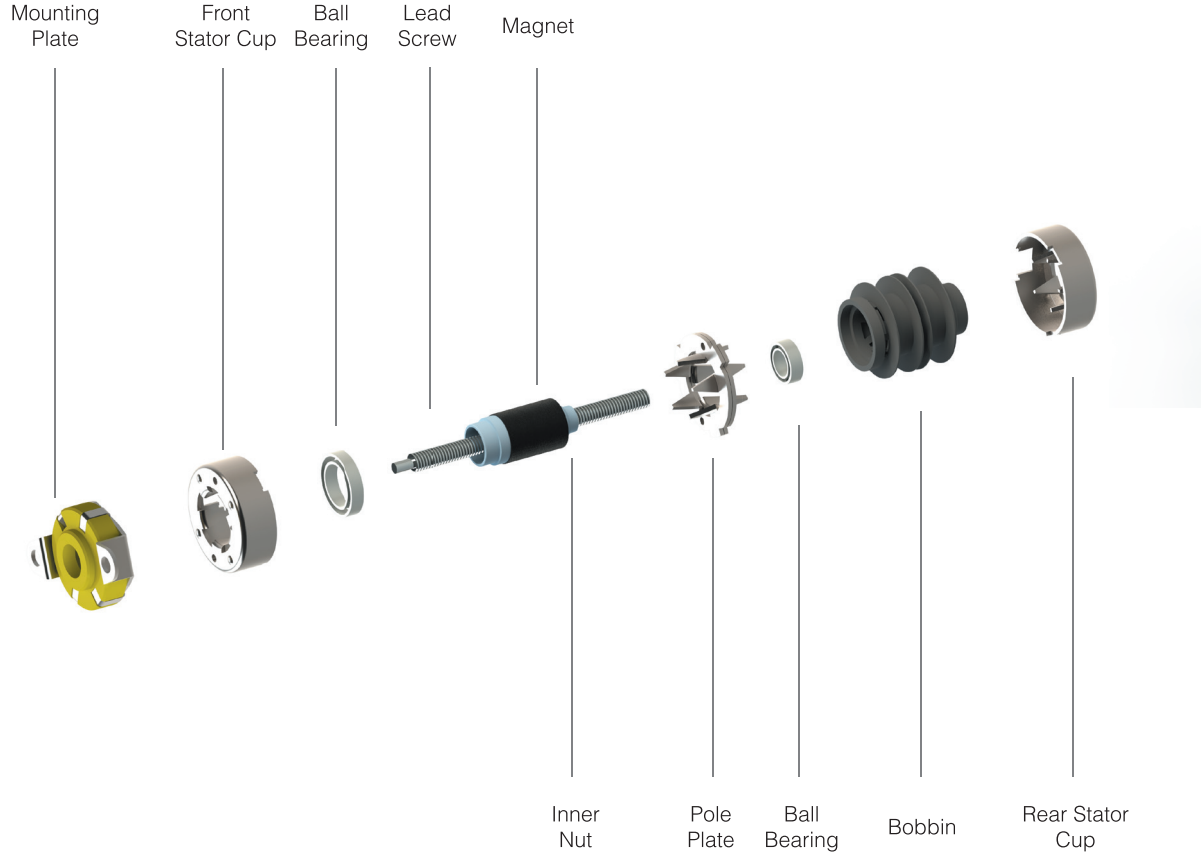
Mechanical code

Structure

Rotary Motors

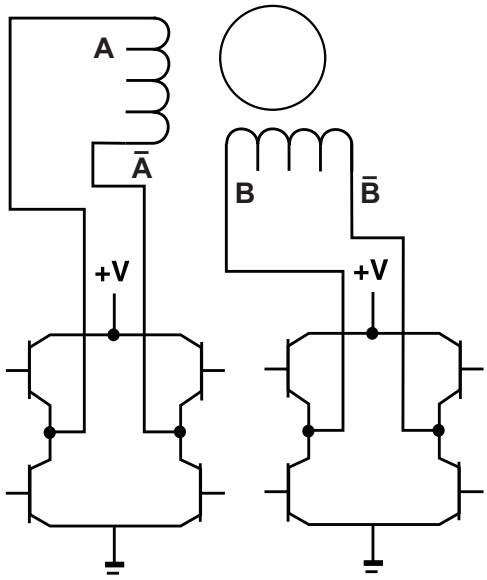


Linear Actuators



Operating Principles

Schematic Diagrams



Step Sequence

CONNECTOR PIN LOCATION							
PIN NO.	COLOR	CCW ← → CW (SEEN FROM FLANGE SIDE)					PHASE
1	BLACK	ON	ON			ON	A
2	YELLOW			ON	ON		Ā
3	ORANGE		ON	ON			B
4	BROWN	ON			ON	ON	B̄

Operating Principles

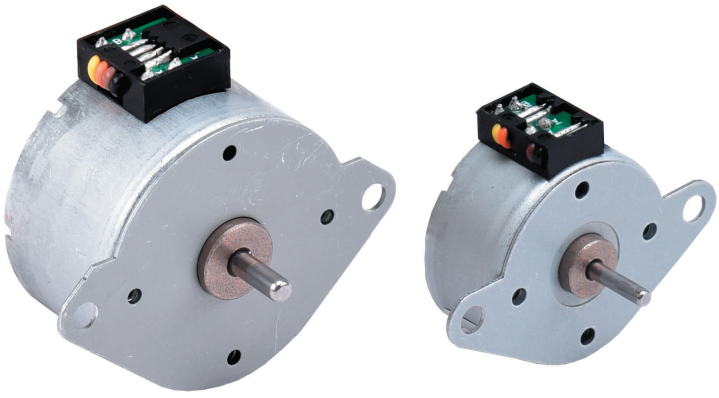
In response to each individual control pulse and direction signal, the drive applies power to the motor windings to cause the rotor to take a step forward, a step in reverse, or hold in position.

For example, in a 7.5 degree two phase step motor: When both phases are energized with DC current, the motor will stop rotating and hold in position. The maximum torque the motor can hold in place with rated DC current, is the rated holding torque. If the current in one phase is reversed, the motor will move 1 step (7.5 degrees) in a known direction. If the current in the other phase had been reversed, the motor would move 1 step (7.5 degrees) in the other direction. As current is reversed in each phase in sequence, the motor continues to step in the desired direction. These steps are very accurate. For a 7.5 degree step motor, there are exactly 48 steps in one revolution.

Two phase stepping motors are furnished with two types of windings: bipolar or unipolar. In a bipolar motor there is one winding on each phase. The motor moves in steps as the current in each winding is reversed. This requires a drive with eight electronic switches. In a unipolar motor there are two windings on each phase. The two windings on each phase are connected in opposite directions. Phase current is reversed by turning on alternate windings on the same phase. This requires a drive with only four electronic switches. Bipolar operation typically provides 40% more holding torque than unipolar, because 100% of the winding is energized in the bipolar arrangement.

Rotary Motors

- Ø8mm
- Ø10mm
- Ø15mm
- Ø20mm
- Ø25mm
- Ø28mm
- Ø35mm
- Ø42mm



8PM020S - Ø8mm, S, 18°

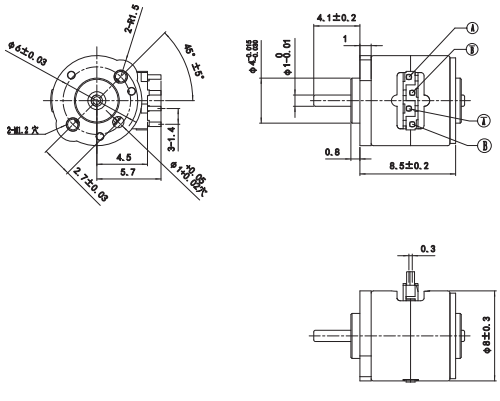
- Phases 2
- Steps / Revolution 18°
- Shaft Load
  - Axial
  - Radial 0.2N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -30°C to +70°C
- Insulation Class E, 130°C
- Insulation Resistance 50 MegOhms

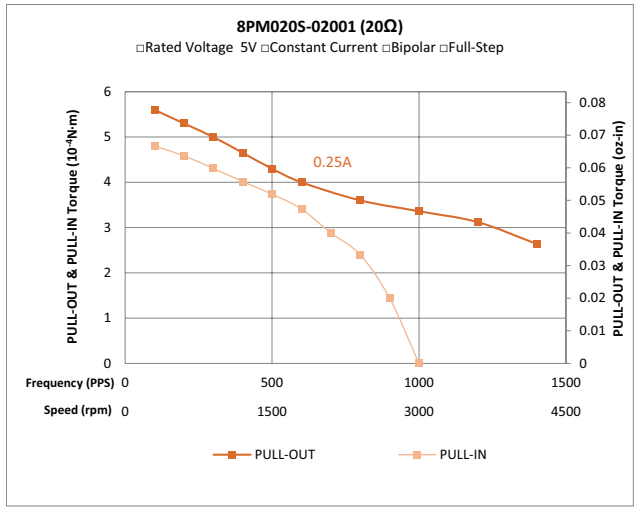
Motor Data

Model Number			8PM020S1-02001
Length			8.5mm (0.33in.)
Step Angle	°		18
Rated Current	Amps		0.25
Holding Torque	10^{-4} Nm	Typ.	4
	oz-in	Typ.	0.06
Coil Resistance	Ohms	±10% @ 20°C	20
Coil Inductance	mH	Typ.	2.8
Detent Torque	10^{-4} Nm	Max.	1.5
	oz-in	Max.	0.02
Rotor Inertia	gcm^2		0.1
	10^{-4} oz-in^2		5.5
Motor Weight	g		2.2
	Lbs		0.005

^ Preferred model

Dimensions: mm





8PM020S - Ø8mm, S, 18°

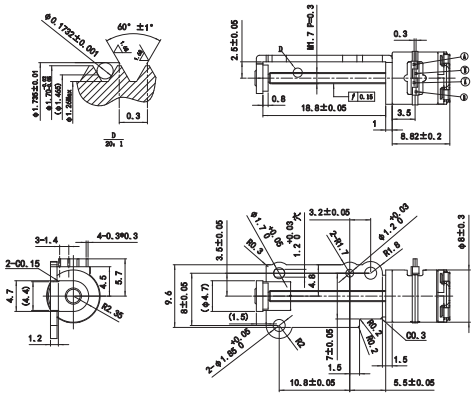
- Phases 2
- Steps / Revolution 18°
- Shaft Load
  - Axial
  - Radial 0.2N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -30°C to +70°C
- Insulation Class E, 120°C
- Insulation Resistance 50 MegOhms

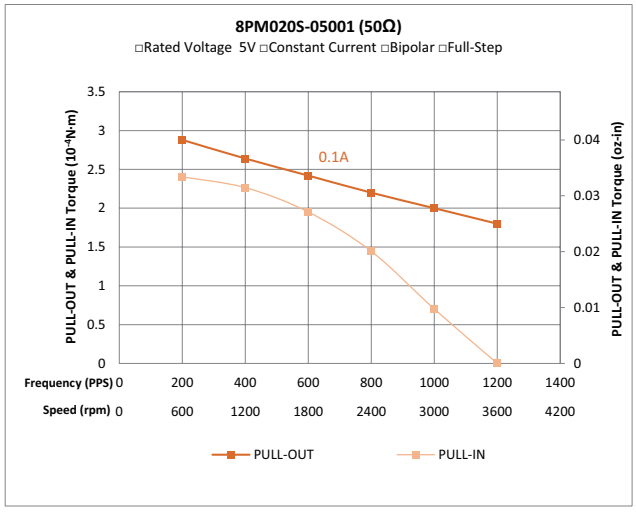
Motor Data

Model Number			8PM020S1-05001
Length			8.82 (0.35in.)
Step Angle	°		18
Rated Current	Amps		0.1
Holding Torque	10^{-4} Nm	Typ.	4
	oz-in	Typ.	0.06
Coil Resistance	Ohms	±10% @ 20°C	50
Coil Inductance	mH	Typ.	18.2
Detent Torque	10^{-4} Nm	Max.	1.5
	oz-in	Max.	0.02
Rotor Inertia	gcm^2		0.1
	10^{-4} oz-in^2		5.5
Motor Weight	g		4
	Lbs		0.009

^ Preferred model

Dimensions: mm





10PM020S - Ø10mm, S, 18°

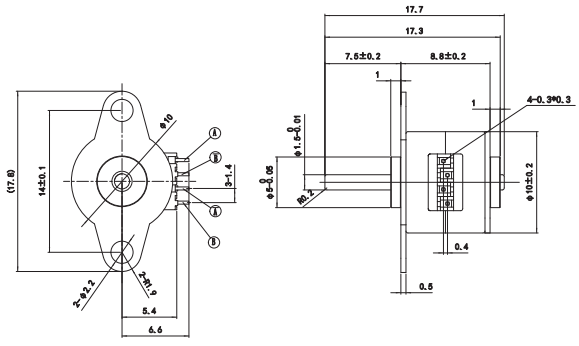
- 相数 2
- 步数/每圈 18°
- 轴负载
  - 轴向
  - 径向 1.5N
- IP等级 40
- 认证 RoHS
- 环境温度 −20° C to +60° C
- 绝缘等级 E, 120° C
- 绝缘电阻 50 MegOhms

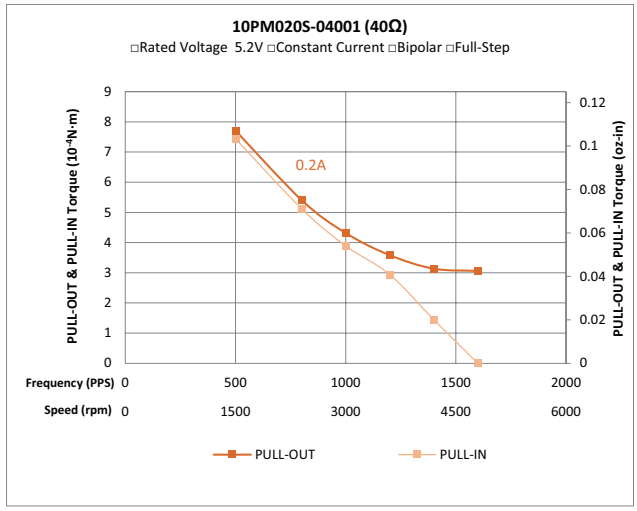
Motor Data

Model Number			10PM020S1-04001
Length			8.8mm (0.35in.)
Step Angle	°		18
Rated Current	Amps		0.2
Holding Torque	10^{-4} Nm	Typ.	5
	oz-in	Typ.	0.07
Coil Resistance	Ohms	±10% @ 20°C	40
Coil Inductance	mH	Typ.	5.6
Detent Torque	10^{-4} Nm	Max.	2
	oz-in	Max.	0.03
Rotor Inertia	gcm^2		0.3
	10^{-4} oz-in^2		16.4
Motor Weight	g		4
	Lbs		0.009

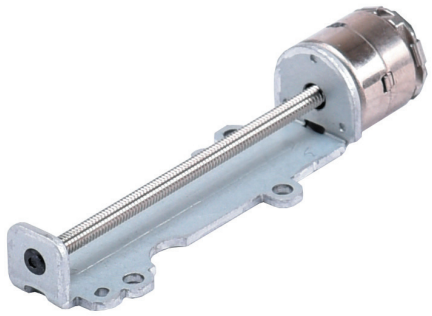
^ Preferred model

Dimensions: mm





10PM020S - Ø10mm, S, 18°



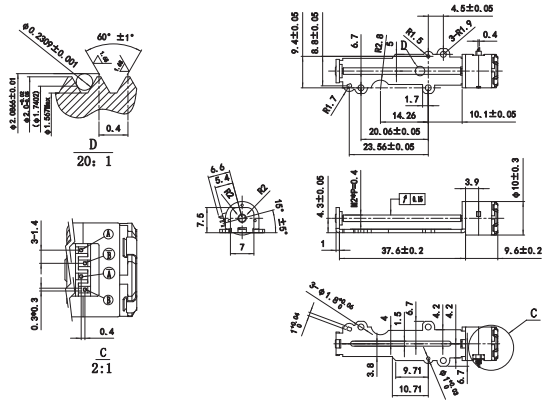
- 相数 2
- 步数/每圈 18°
- 轴负载
  - 轴向
  - 径向 1.5N
- IP等级 40
- 认证 RoHS
- 环境温度 −20° C to +60° C
- 绝缘等级 E，120° C
- 绝缘电阻 50 MegOhms

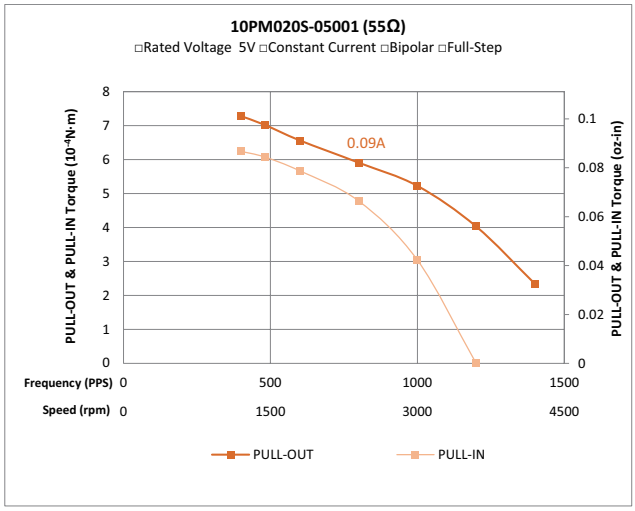
Motor Data

Model Number			10PM020S1-05001
Length			9.6 (0.38in.)
Step Angle	°		18
Rated Current	Amps		0.09
Holding Torque	10^{-4} Nm	Typ.	6
	oz-in	Typ.	0.08
Coil Resistance	Ohms	±10% @ 20°C	55
Coil Inductance	mH	Typ.	7.2
Detent Torque	10^{-4} Nm	Max.	2.5
	oz-in	Max.	0.03
Rotor Inertia	gcm^2		0.3
	10^{-4} oz-in^2		16.4
Motor Weight	g		8
	Lbs		0.018

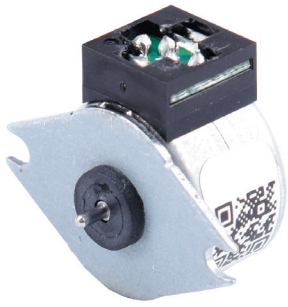
^ Preferred model

Dimensions: mm





15PM020S - Ø15mm, S, 18°



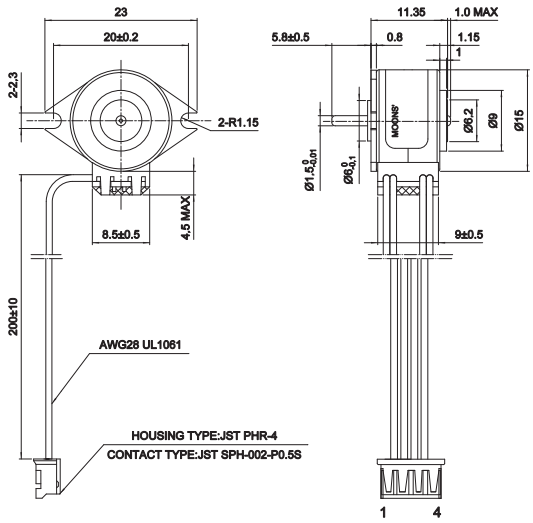
- Phases 2
- Steps / Revolution 20(18°)
- Shaft Load
  - Axial 1N
  - Radial 5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

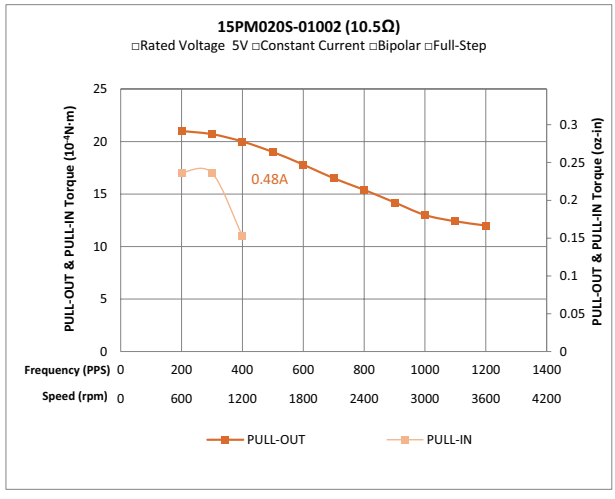
Motor Data

Model Number			15PM020S0-01002
Length			11.35mm (0.45in.)
Step Angle	°		18
Rated Current	Amps		0.48
Holding Torque	10^{-4} Nm	Typ.	36
	oz-in	Typ.	0.5
Coil Resistance	Ohms	±10% @ 20°C	10.5
Coil Inductance	mH	Typ.	2.8
Detent Torque	10^{-4} Nm	Max.	13
	oz-in	Max.	0.18
Rotor Inertia	gcm^2		0.039
	10^{-4} oz-in^2		2.1
Motor Weight	g		9
	Lbs		0.02

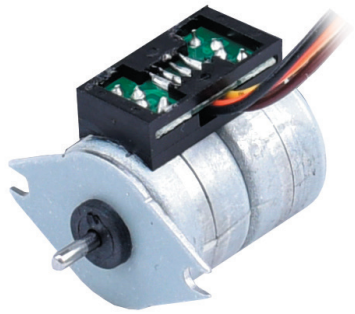
^ Preferred model

Dimensions: mm





15PM020D - Ø15mm, S, 18°



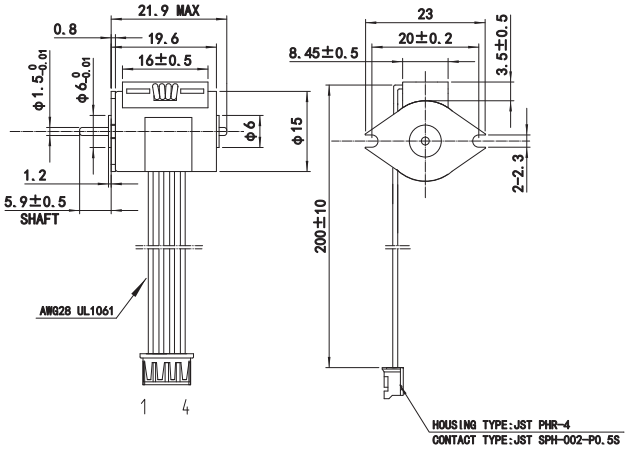
- Phases 2
- Steps / Revolution 20(18°)
- Shaft Load
  - Axial 1N
  - Radial 5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

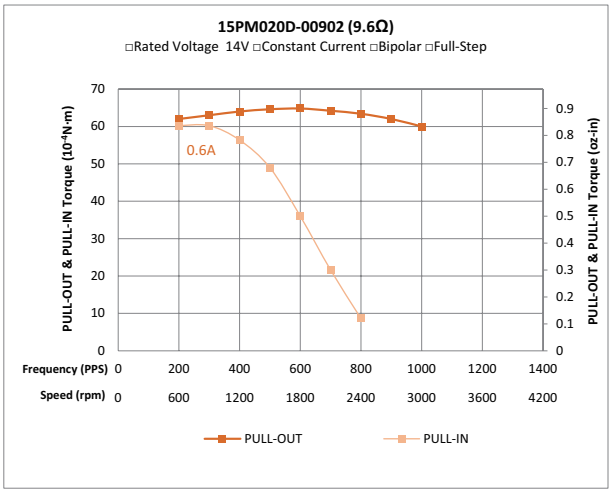
Motor Data

Model Number			15PM020D0-00902
Length			19.6mm (0.79in.)
Step Angle	°		18
Rated Current	Amps		0.6
Holding Torque	10^{-4} Nm	Typ.	72
	oz-in	Typ.	1.0
Coil Resistance	Ohms	±10% @ 20°C	9.6
Coil Inductance	mH	Typ.	2.65
Detent Torque	10^{-4} Nm	Max.	14
	oz-in	Max.	0.19
Rotor Inertia	gcm^2		
	10^{-4} $oz\text{-}in^2$		
Motor Weight	g		18
	Lbs		0.04

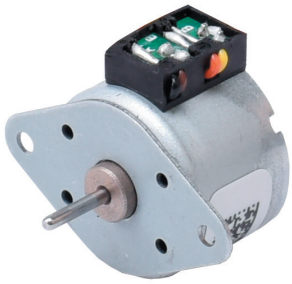
^ Preferred model

Dimensions: mm





20PM020S - Ø20mm, S, 18°



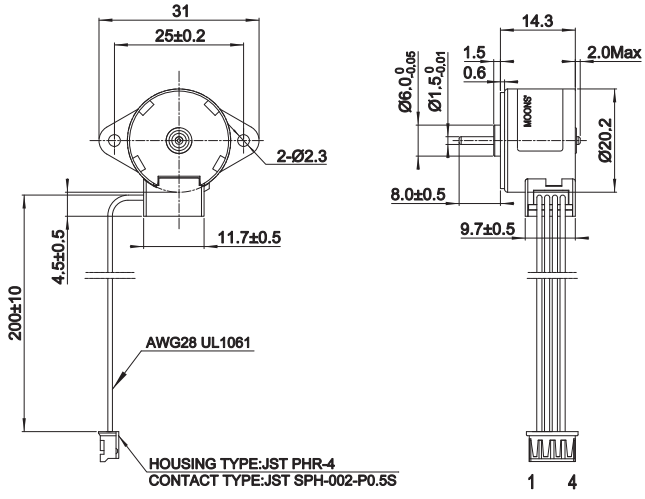
- Phases 2
- Steps / Revolution 20(18°)
- Shaft Load
  - Axial 1N
  - Radial 5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

Model Number			20PM020S0-01002	20PM020S0-02501
Length			14.3mm (0.56in.)	
Step Angle	°		18	
Rated Current	Amps		0.33	0.21
Holding Torque	10^{-4} Nm	Typ.	85	85
	oz-in	Typ.	1.18	1.18
Coil Resistance	Ohms	±10% @ 20°C	10.3	25
Coil Inductance	mH	Typ.	5.1	11.7
Detent Torque	10^{-4} Nm	Max.	18	18
	oz-in	Max.	0.25	0.25
Rotor Inertia	gcm^2		0.25	0.25
	10^{-4} oz-in^2		13.7	13.7
Motor Weight	g		21	
	Lbs		0.046	

^ Preferred model

Dimensions: mm



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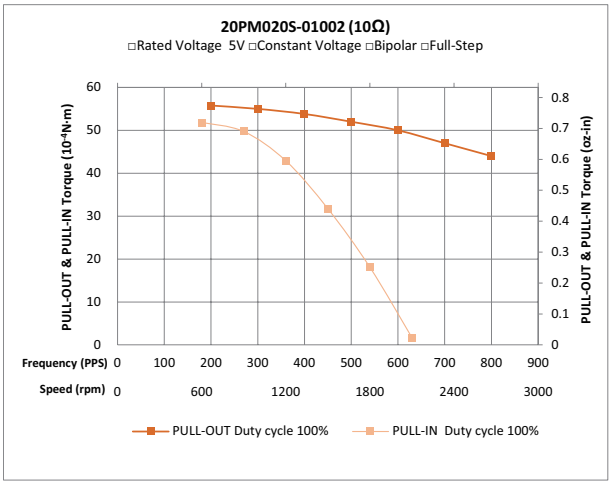

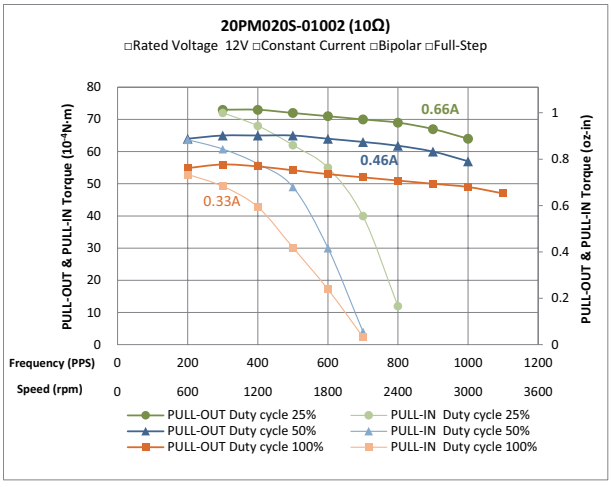

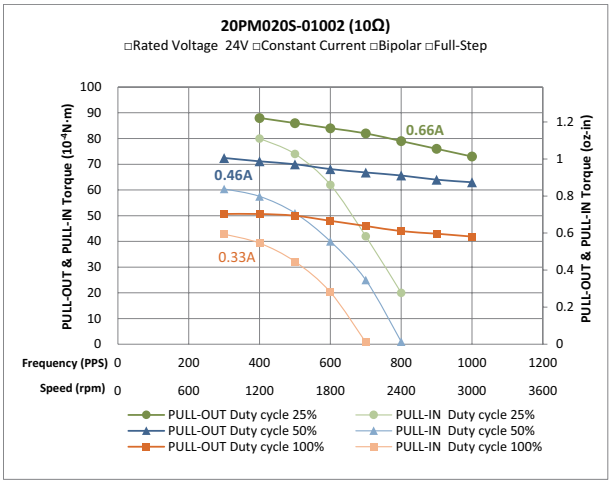

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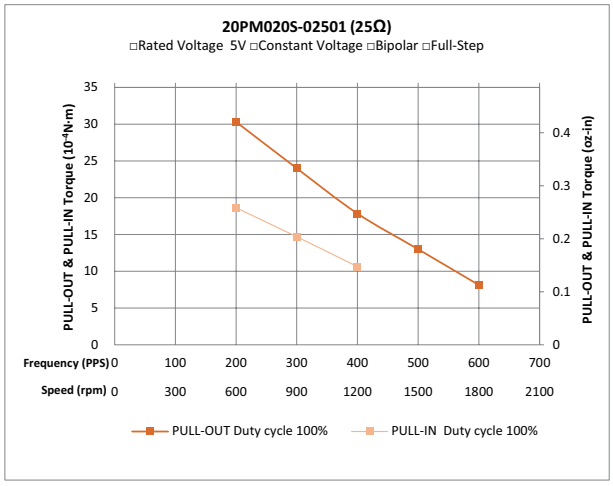
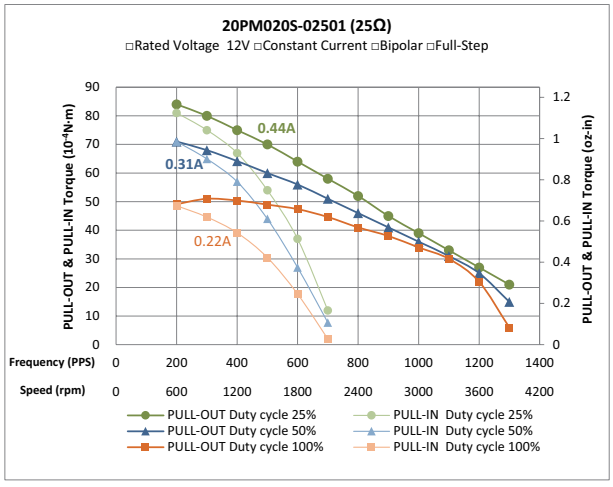
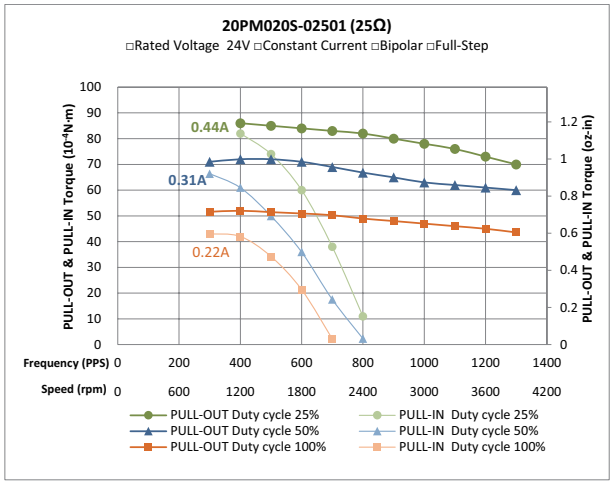






20PM020L - Ø20mm, L, 18°

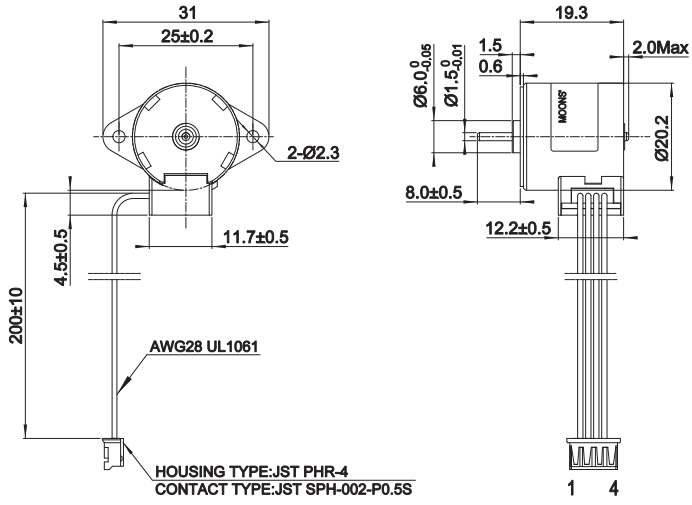
- Phases 2
- Steps / Revolution 20(18°)
- Shaft Load
  - Axial 1N
  - Radial 5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

Model Number			20PM020L8-00702	20PM020L8-02101
Length			19.3mm (0.76in.)	
Step Angle	°		18	
Rated Current	Amps		0.43	0.25
Holding Torque	10^{-4} Nm	Typ.	120	120
	oz-in	Typ.	1.67	1.67
Coil Resistance	Ohms	±10% @ 20°C	7	21.5
Coil Inductance	mH	Typ.	5.6	16.5
Detent Torque	10^{-4} Nm	Max.	25	25
	oz-in	Max.	0.35	0.35
Rotor Inertia	gcm^2		0.41	0.41
	10^{-4} oz-in^2		22.4	22.4
Motor Weight	g		27	
	Lbs		0.060	

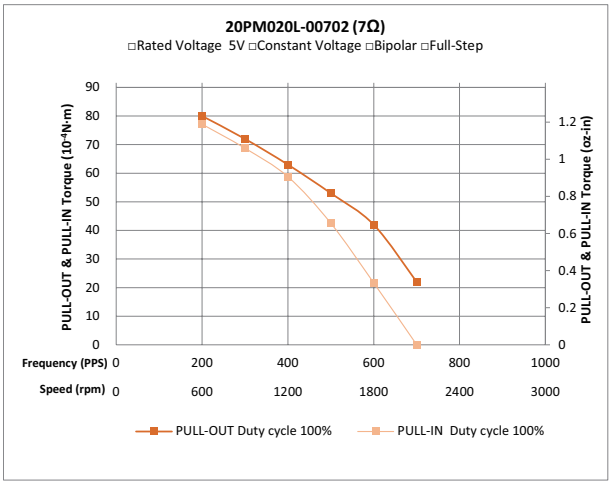
^ Preferred model

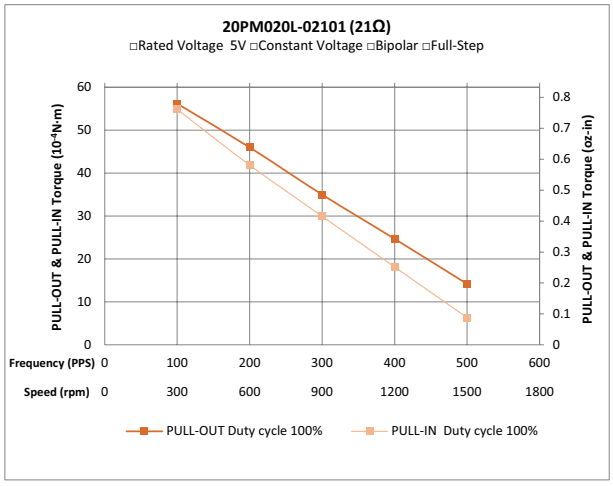
Dimensions: mm

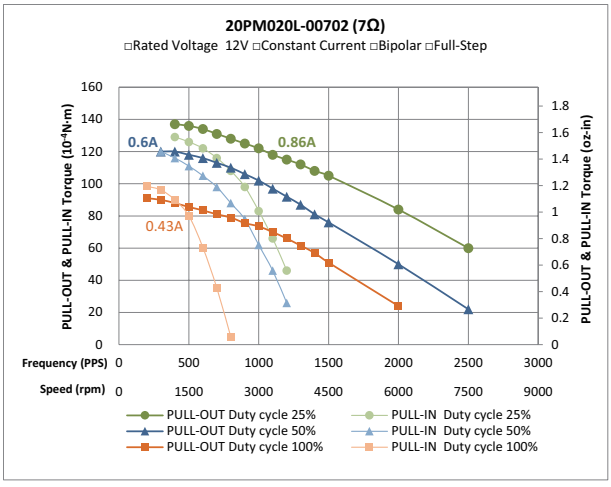


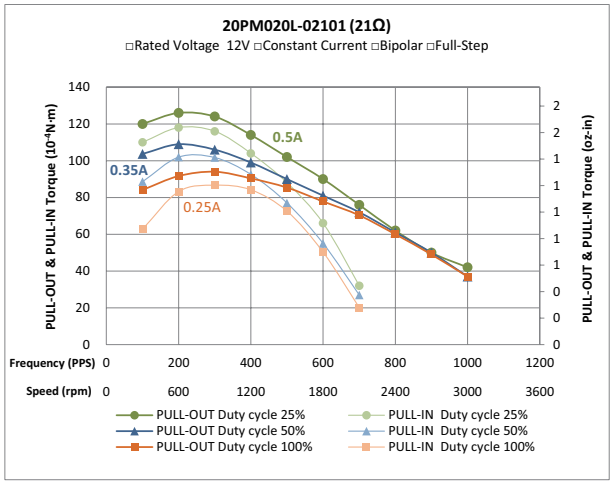
20PM020L8-00702

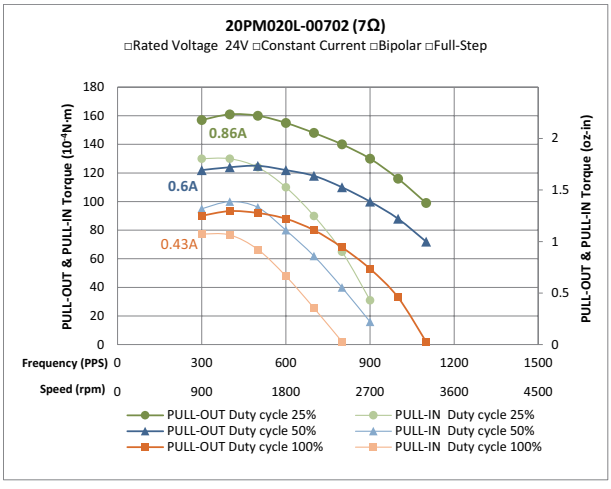
20PM020L8-02101

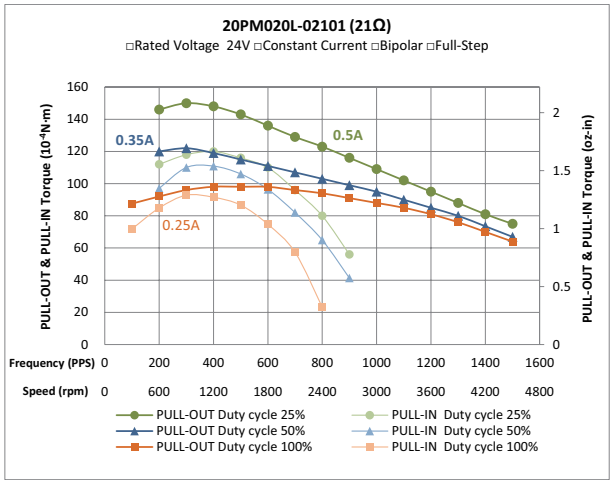












25PM024S - Ø25mm, S, 15°

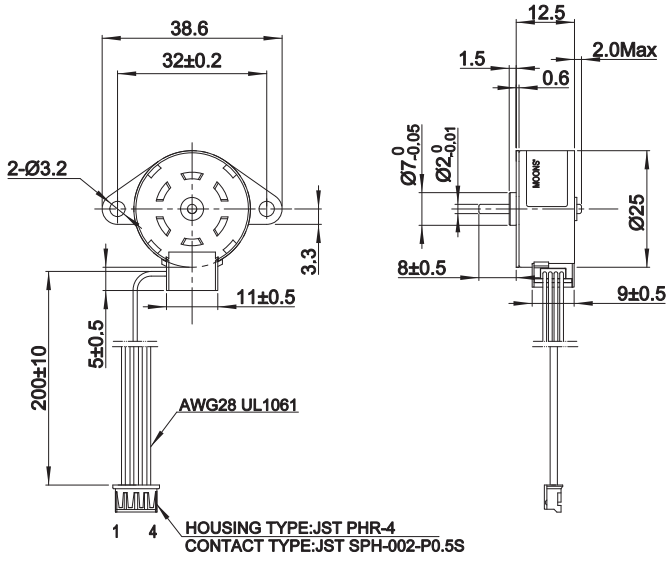
- Phases 2
- Steps / Revolution 15°
- Shaft Load
  - Axial 1N
  - Radial 5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

Model Number			25PM024S8-00601	25PM024S8-01601
Length			12.5mm (0.49in.)	
Step Angle	°		15	
Rated Current	Amps		0.5	0.32
Holding Torque	10^{-4} Nm	Typ.	100	110
	oz-in	Typ.	1.39	1.53
Coil Resistance	Ohms	±10% @ 20°C	6	16
Coil Inductance	mH	Typ.	3	8.6
Detent Torque	10^{-4} Nm	Max.	25	25
	oz-in	Max.	0.35	0.35
Rotor Inertia	gcm^2		0.56	0.56
	10^{-4} oz-in^2		30.6	30.6
Motor Weight	g		30	
	Lbs		0.066	

^ Preferred model

Dimensions: mm

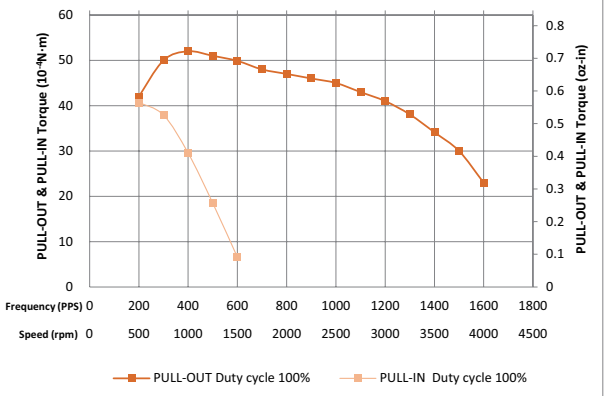


25PM024S8–00601

25PM024S8–01601

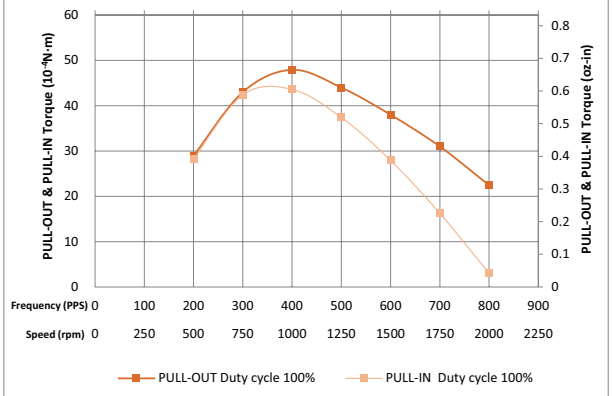
25PM024S-00601 (6Ω)

□Rated Voltage 5V □Constant Voltage □Bipolar □Full-Step



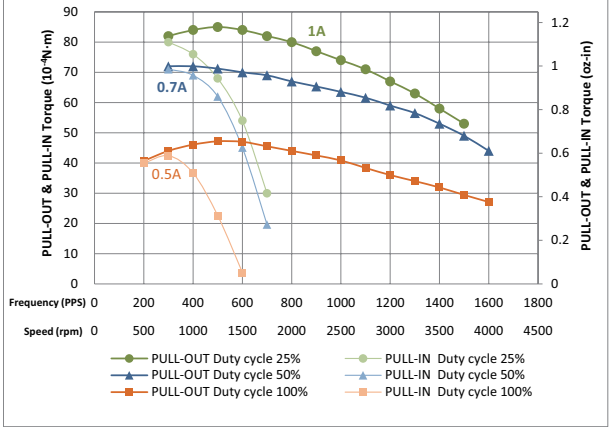
25PM024S-01601 (16Ω)

□Rated Voltage 5V □Constant Voltage □Bipolar □Full-Step



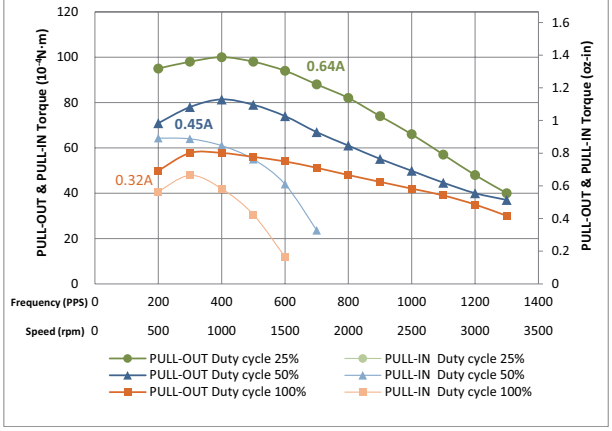
25PM024S-00601 (6Ω)

□Rated Voltage 12V □Constant Current □Bipolar □Full-Step



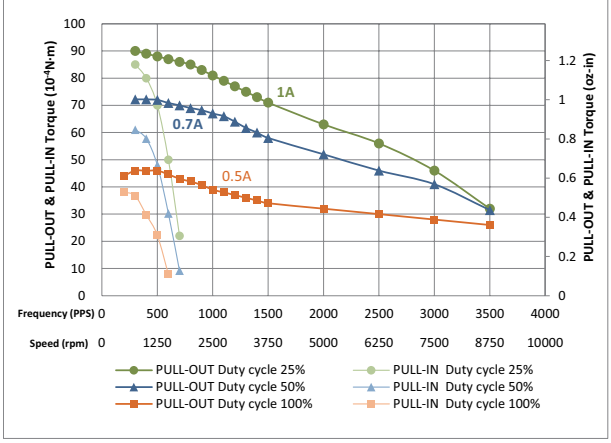
25PM024S-01601 (16Ω)

□Rated Voltage 12V □Constant Current □Bipolar □Full-Step



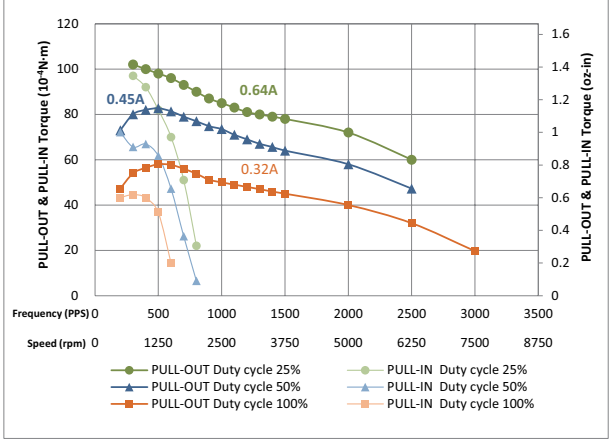
25PM024S-00601 (6Ω)

□Rated Voltage 24V □Constant Current □Bipolar □Full-Step



25PM024S-01601 (16Ω)

□Rated Voltage 24V □Constant Current □Bipolar □Full-Step



25PM048S - Ø25mm, S, 7.5°

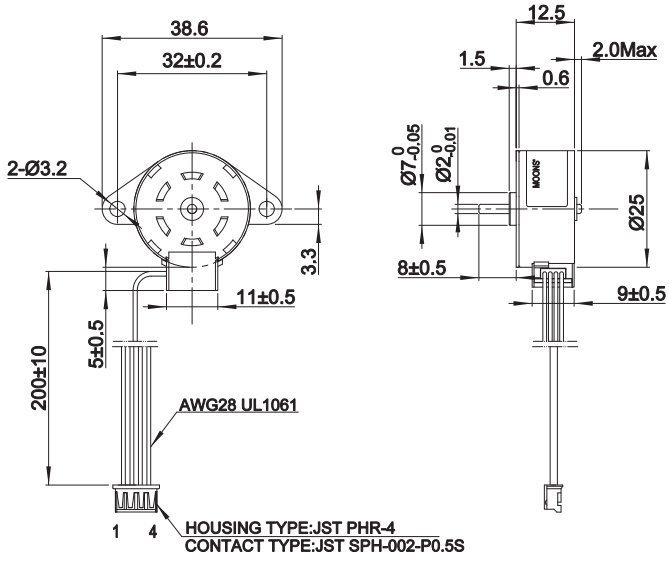
- Phases 2
- Steps / Revolution 7.5°
- Shaft Load
  - Axial 1N
  - Radial 5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

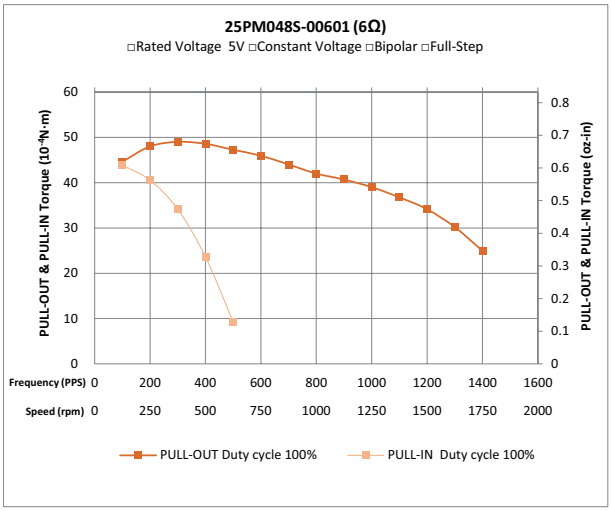
Motor Data

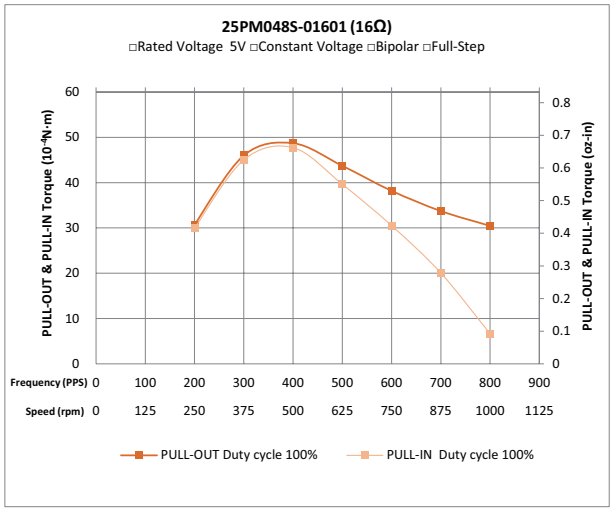
Model Number			25PM048S9-00601	25PM048S9-01601
Length			12.5mm (0.49in.)	
Step Angle	°		7.5	
Rated Current	Amps		0.5	0.32
Holding Torque	10^{-4} Nm	Typ.	160	160
	oz-in	Typ.	2.22	2.22
Coil Resistance	Ohms	±10% @ 20°C	6	16
Coil Inductance	mH	Typ.	2.7	8
Detent Torque	10^{-4} Nm	Max.	25	25
	oz-in	Max.	0.35	0.35
Rotor Inertia	gcm^2		0.56	0.56
	10^{-4} oz-in^2		30.6	30.6
Motor Weight	g		30	
	Lbs		0.066	

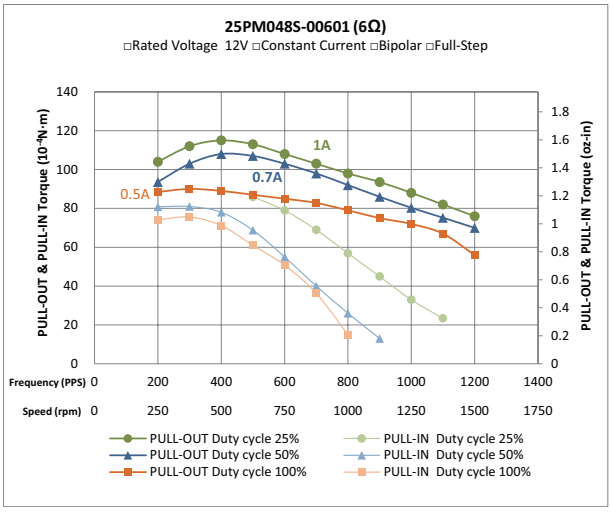
^ Preferred model

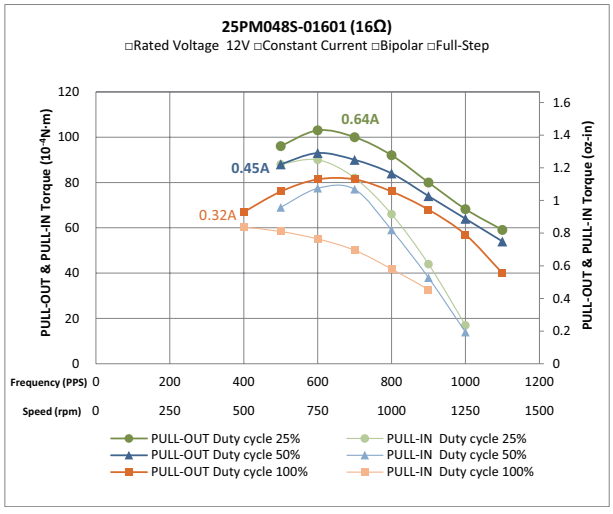
Dimensions: mm

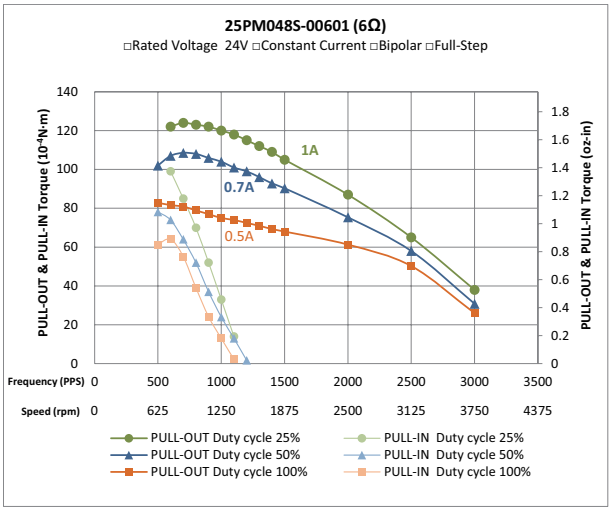


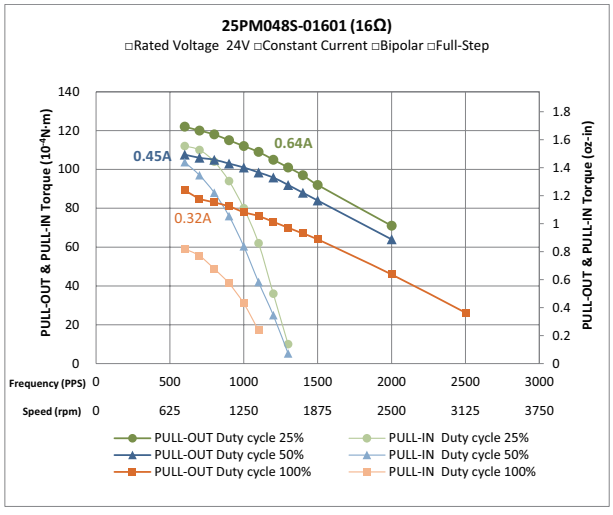












25PM024L - Ø25mm, L, 15°

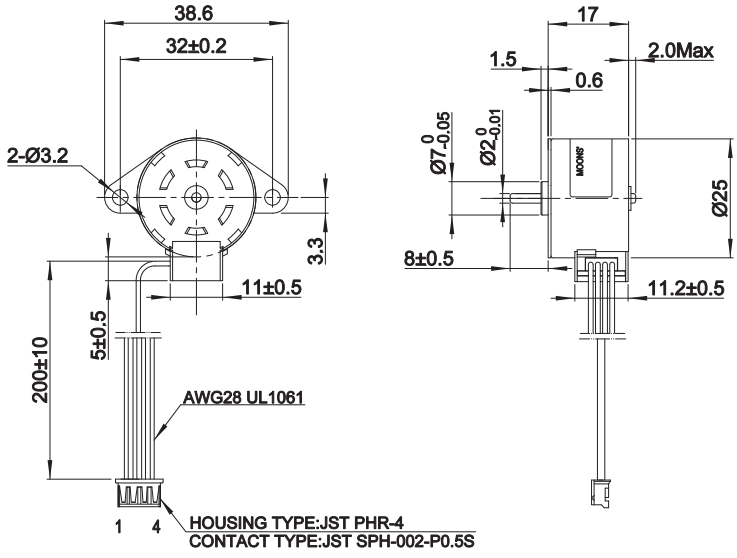
- Phases 2
- Steps / Revolution 15°
- Shaft Load
  - Axial 1N
  - Radial 5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

Model Number			25PM024L6-00801	25PM024L6-01401
Length			17mm (0.67in.)	
Step Angle	°		15	
Rated Current	Amps		0.47	0.35
Holding Torque	10^{-4} Nm	Typ.	170	180
	oz-in	Typ.	2.36	2.50
Coil Resistance	Ohms	±10% @ 20°C	8	14
Coil Inductance	mH	Typ.	6	11.5
Detent Torque	10^{-4} Nm	Max.	25	25
	oz-in	Max.	0.35	0.35
Rotor Inertia	gcm^2		0.85	0.85
	10^{-4} oz-in^2		46.5	46.5
Motor Weight	g		39	
	Lbs		0.086	

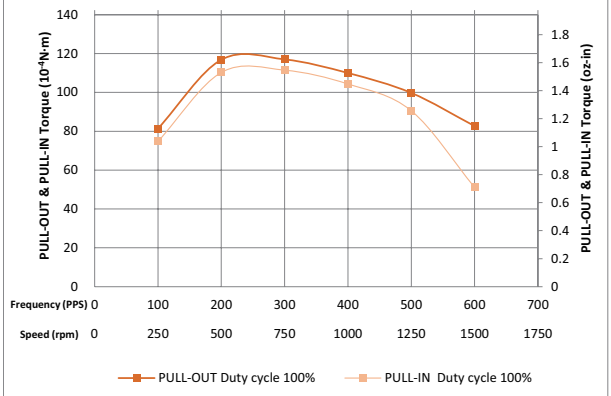
^ Preferred model

Dimensions: mm



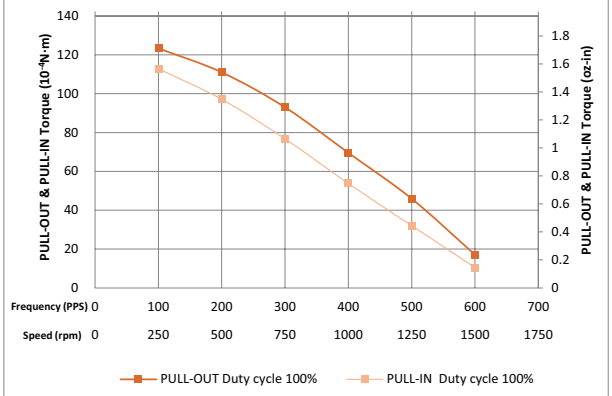
25PM024L-00801 (8Ω)

□Rated Voltage 5V □Constant Voltage □Bipolar □Full-Step



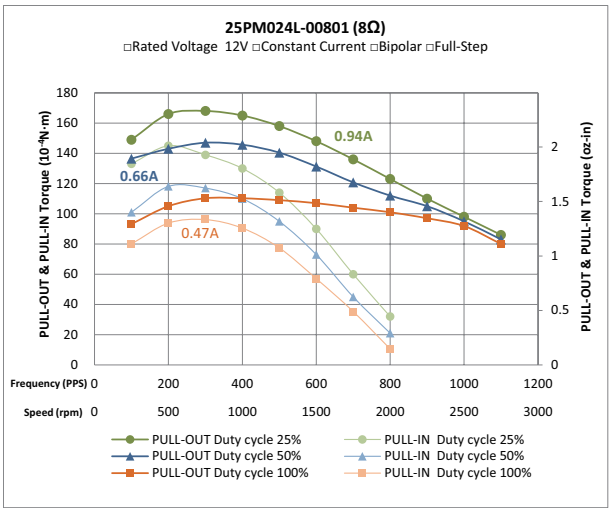
25PM024L-01401 (14Ω)

□Rated Voltage 5V □Constant Voltage □Bipolar □Full-Step



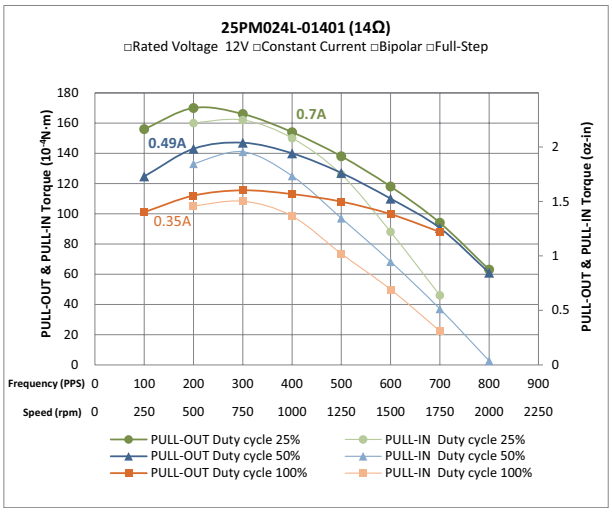
25PM024L-00801 (8Ω)

□Rated Voltage 12V □Constant Current □Bipolar □Full-Step



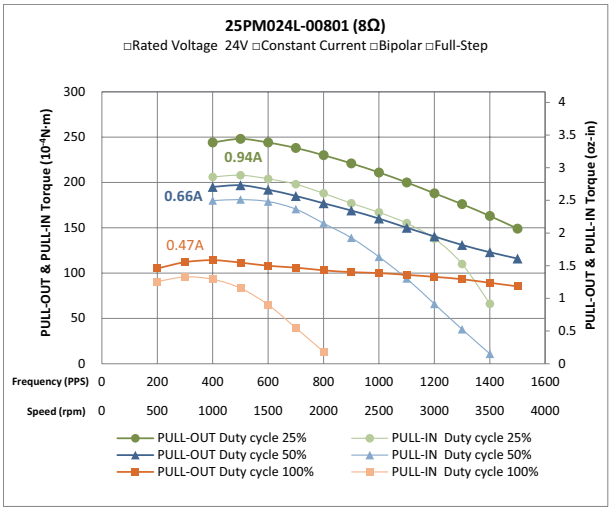
25PM024L-01401 (14Ω)

□Rated Voltage 12V □Constant Current □Bipolar □Full-Step



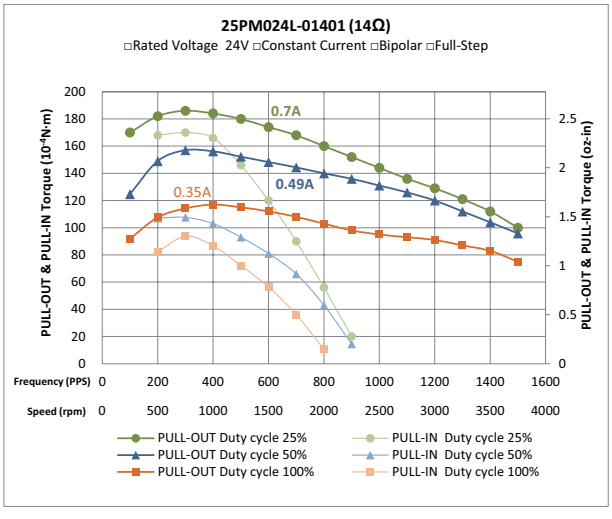
25PM024L-00801 (8Ω)

□Rated Voltage 24V □Constant Current □Bipolar □Full-Step



25PM024L-01401 (14Ω)

□Rated Voltage 24V □Constant Current □Bipolar □Full-Step



25PM048L - Ø25mm, L, 7.5°

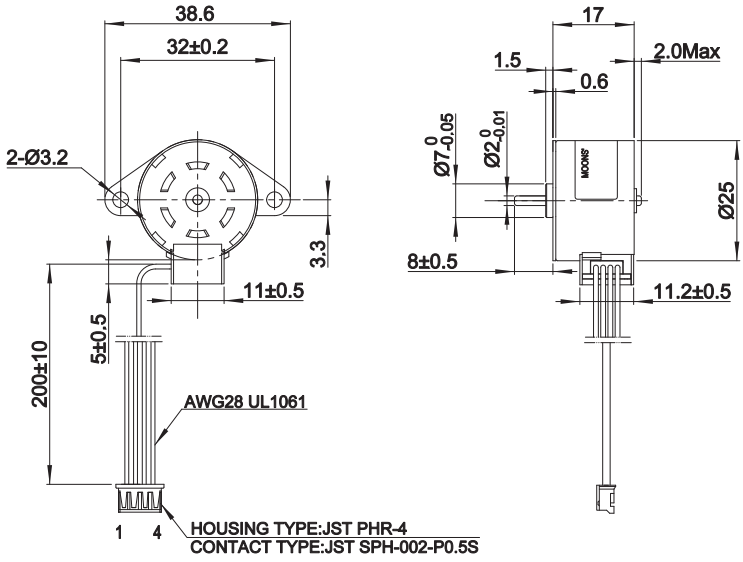
- Phases 2
- Steps / Revolution 7.5°
- Shaft Load
  - Axial 1N
  - Radial 5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

Model Number			25PM048L6-00801	25PM048L6-01401
Length			17mm (0.67in.)	
Step Angle	°		7.5	
Rated Current	Amps		0.47	0.35
Holding Torque	10^{-4} Nm	Typ.	250	270
	oz-in	Typ.	3.47	3.75
Coil Resistance	Ohms	±10% @ 20°C	8	14
Coil Inductance	mH	Typ.	7.5	13
Detent Torque	10^{-4} Nm	Max.	45	45
	oz-in	Max.	0.63	0.63
Rotor Inertia	gcm^2		0.85	0.85
	10^{-4} oz-in^2		46.5	46.5
Motor Weight	g		39	
	Lbs		0.086	

^ Preferred model

Dimensions: mm

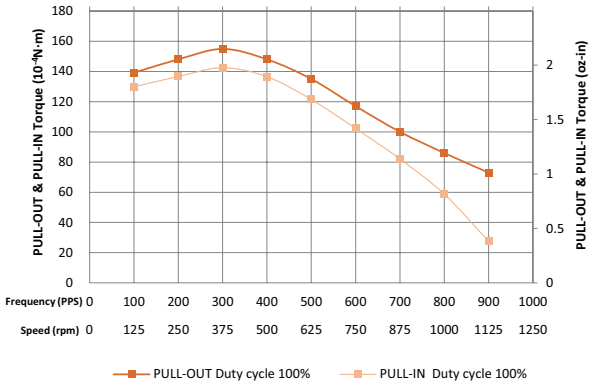


25PM048L6-00801

25PM048L6-01401

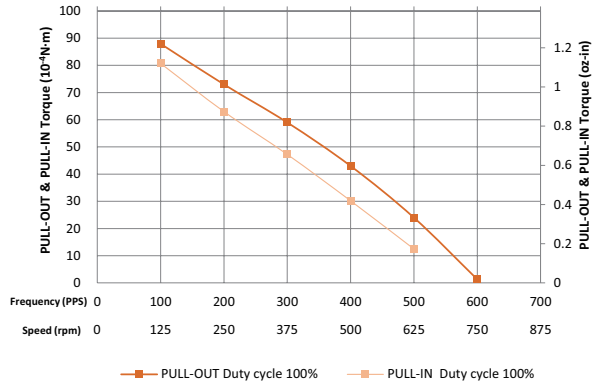
25PM048L-00801 (8Ω)

□Rated Voltage 5V □Constant Voltage □Bipolar □Full-Step



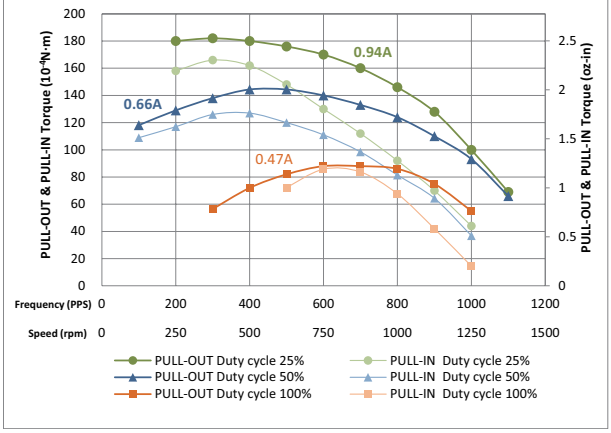
25PM048L-01401 (14Ω)

□Rated Voltage 5V □Constant Voltage □Bipolar □Full-Step



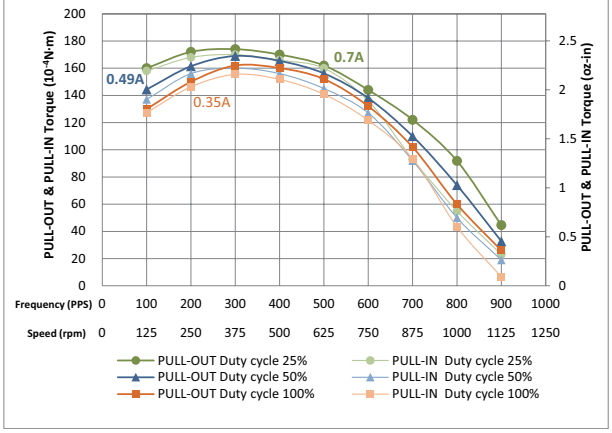
25PM048L-00801 (8Ω)

□Rated Voltage 12V □Constant Current □Bipolar □Full-Step



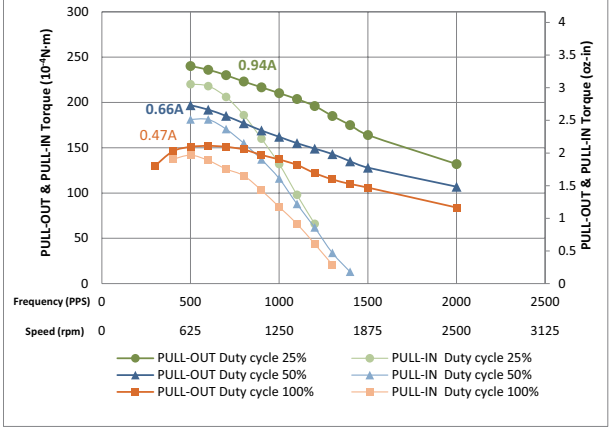
25PM048L-01401 (14Ω)

□Rated Voltage 12V □Constant Current □Bipolar □Full-Step



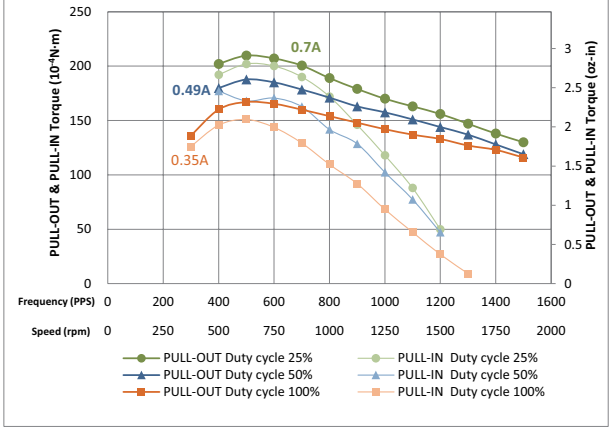
25PM048L-00801 (8Ω)

□Rated Voltage 24V □Constant Current □Bipolar □Full-Step

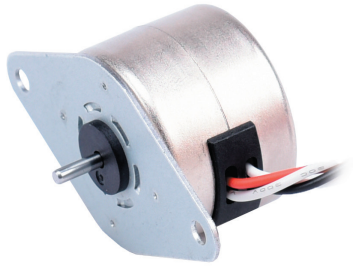


25PM048L-01401 (14Ω)

□Rated Voltage 24V □Constant Current □Bipolar □Full-Step



28PN024L - Ø28mm, L, 15°



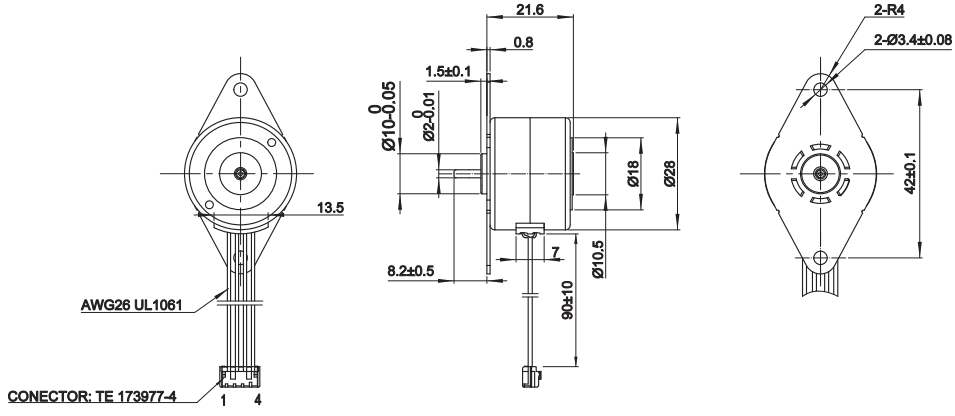
- Phases 2
- Steps / Revolution 15°
- Shaft Load
  - Axial 1N
  - Radial 5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -15°C to +60°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

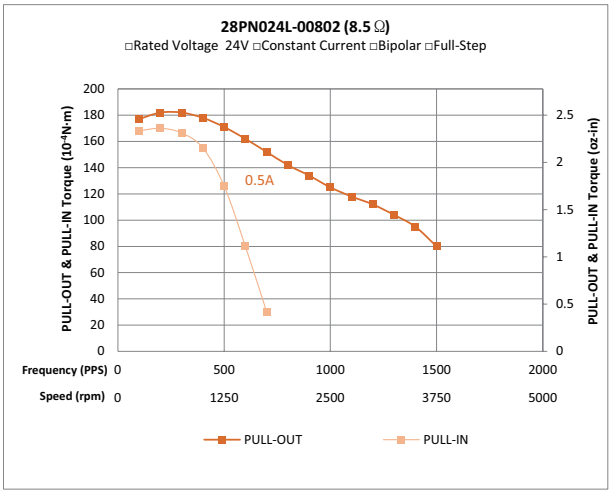
Model Number			28PN024L8-00802	28PN024L6-02402
Length			21.6mm (0.85in.)	
Step Angle	°		15	
Rated Current	Amps		0.5	0.16
Holding Torque	10^{-4} Nm	Typ.	330	160
	oz-in	Typ.	4.58	2.22
Coil Resistance	Ohms	±10% @ 20°C	8.5	24
Coil Inductance	mH	Typ.	7	18.4
Detent Torque	10^{-4} Nm	Max.	65	50
	oz-in	Max.	0.90	0.69
Rotor Inertia	gcm^2		3.9	3.9
	10^{-4} oz-in^2		213.3	213.3
Motor Weight	g		60	
	Lbs		0.132	

^ Preferred model

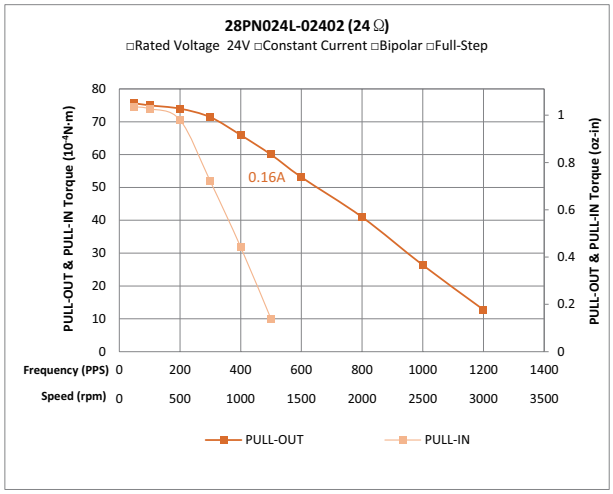
Dimensions: mm



28PN024L–00802



28PN024L–02402



35PM024S - Ø35mm, S, 15°

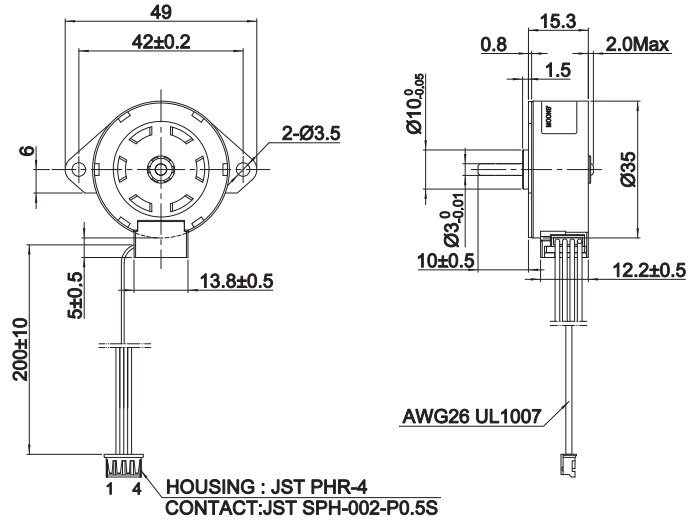
- Phases 2
- Steps / Revolution 15°
- Shaft Load
  - Axial 1N
  - Radial 7.5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

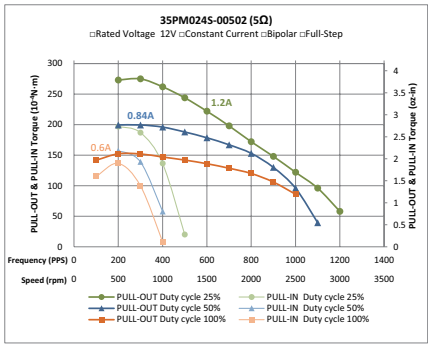
Model Number			35PM024S8-00502	35PM024S8-01201	35PM024S8-08001
Length			15.3mm (0.60in.)		
Step Angle	°		15		
Rated Current	Amps		0.6	0.38	0.15
Holding Torque	10^{-4} Nm	Typ.	220	220	220
	oz-in	Typ.	3.06	3.06	3.06
Coil Resistance	Ohms	±10% @ 20°C	5	12	80
Coil Inductance	mH	Typ.	4	10	73
Detent Torque	10^{-4} Nm	Max.	60	60	60
	oz-in	Max.	0.83	0.83	0.83
Rotor Inertia	gcm^2		2.9	2.9	2.9
	10^{-4} oz-in^2		153	153	153
Motor Weight	g		70		
	Lbs		0.15		

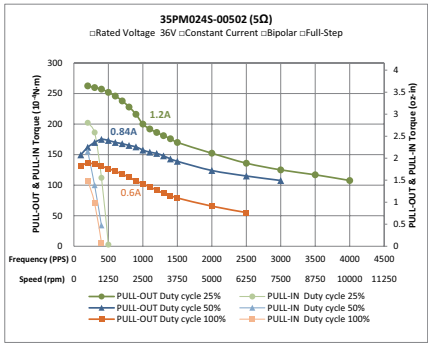
^ Preferred model

Dimensions: mm

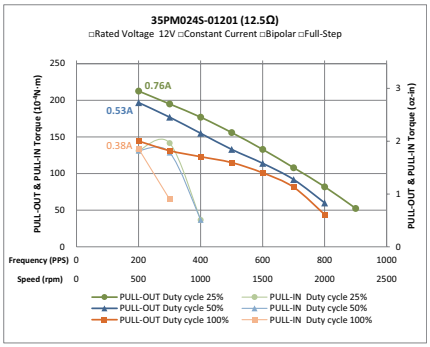


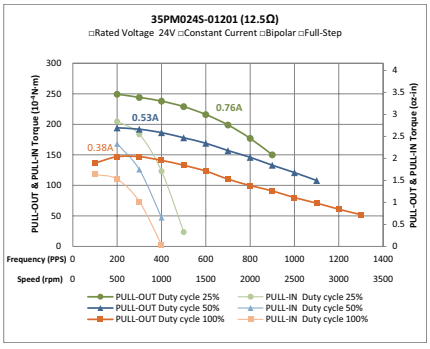
35PM024S8-00502

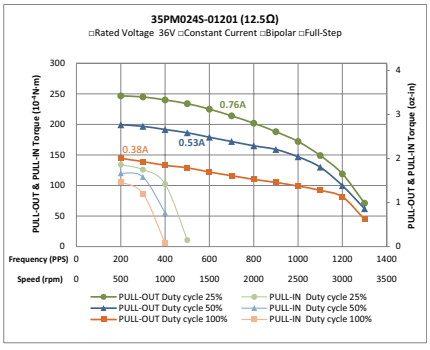




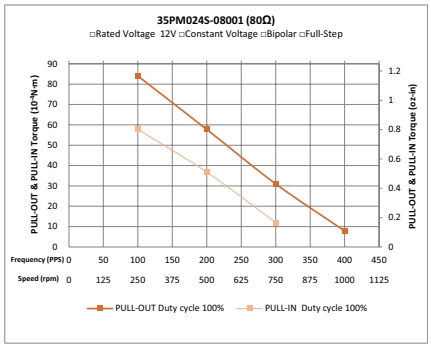
35PM024S8-01201

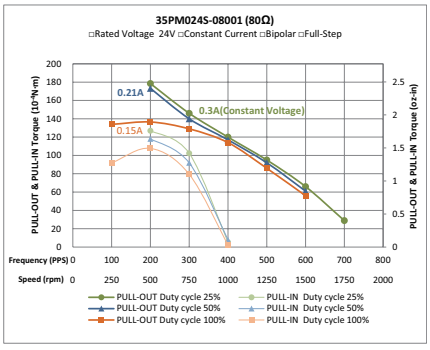


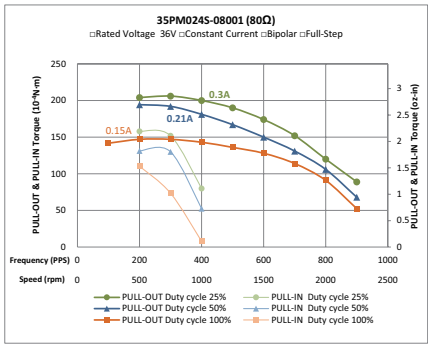




35PM024S8-08001







35PM048S - Ø35mm, S, 7.5°

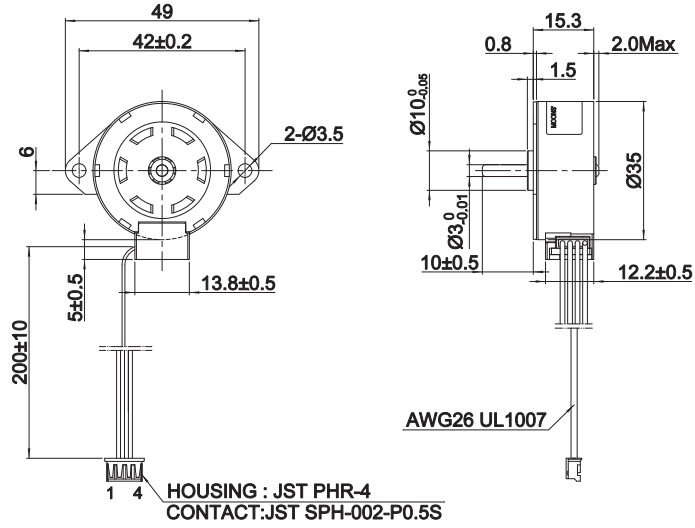
- Phases 2
- Steps / Revolution 7.5°
- Shaft Load
  - Axial 1N
  - Radial 7.5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

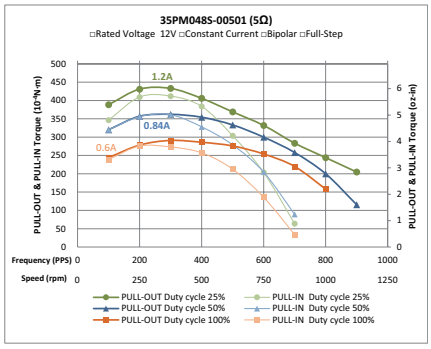
Model Number			35PM048S0-00508	35PM048S0-01203	35PM048S0-08001
Length			15.3mm (0.60in.)		
Step Angle	°		7.5		
Rated Current	Amps		0.6	0.38	0.15
Holding Torque	10^{-4} Nm	Typ.	480	460	460
	oz-in	Typ.	6.67	6.39	6.39
Coil Resistance	Ohms	±10% @ 20°C	5	12	80
Coil Inductance	mH	Typ.	5.4	11.9	74
Detent Torque	10^{-4} Nm	Max.	75	75	75
	oz-in	Max.	1.04	1.04	1.04
Rotor Inertia	gcm^2		2.9	2.9	2.9
	10^{-4} oz-in^2		153	153	153
Motor Weight	g		70		
	Lbs		0.15		

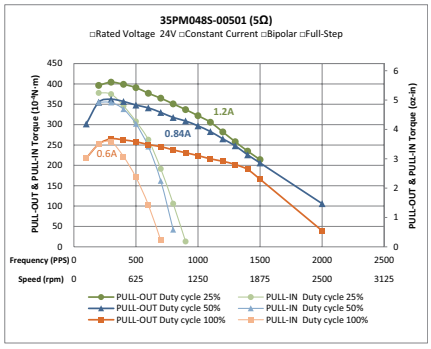
^ Preferred model

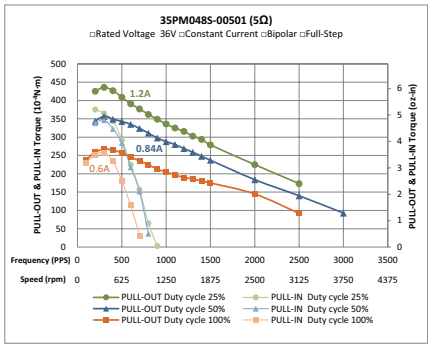
Dimensions: mm



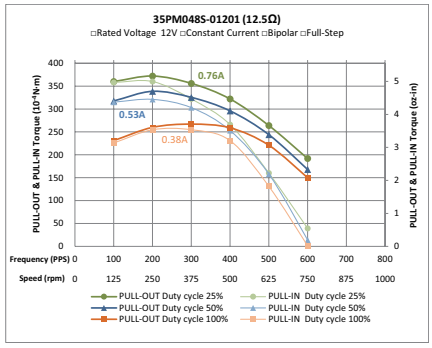
35PM048S0-00501

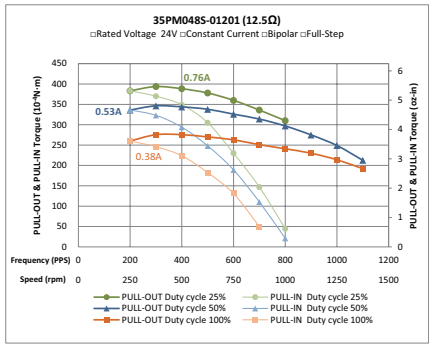


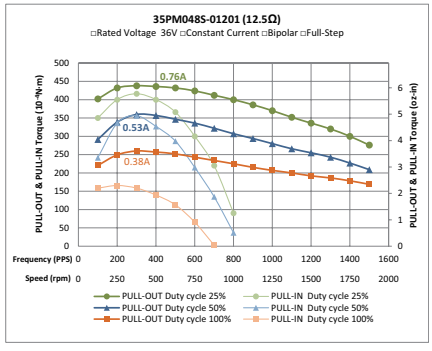




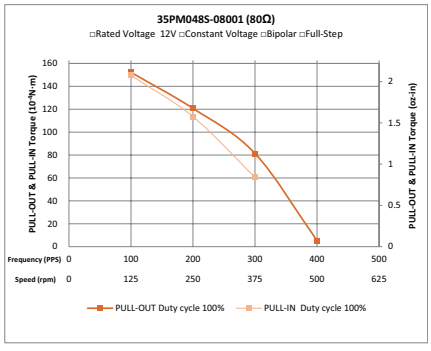
35PM048S0-01201

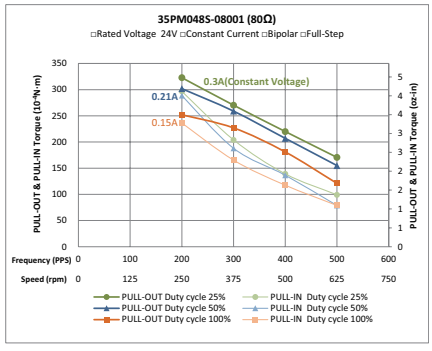


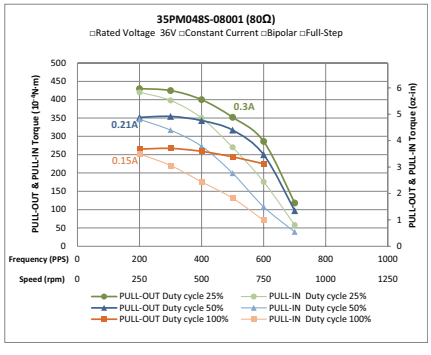




35PM048S8-01201







35PM024L - Ø35mm, L, 15°

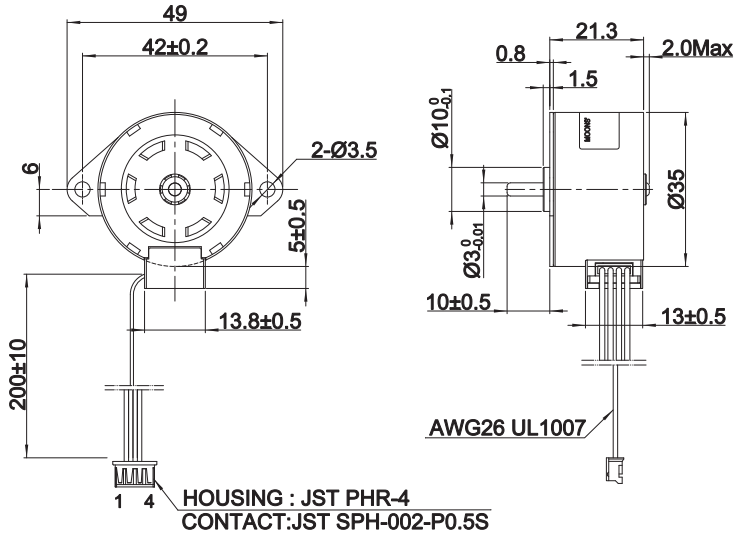
- Phases 2
- Steps / Revolution 15°
- Shaft Load
  - Axial 1N
  - Radial 7.5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

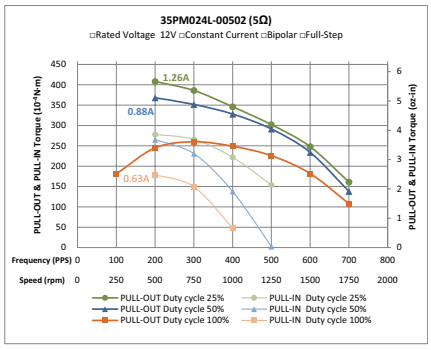
Model Number			35PM024L8-00502	35PM024L8-01202	35PM024L8-07501
Length			21.3 mm (0.84 in.)		
Step Angle	°		15		
Rated Current	Amps		0.63	0.4	0.16
Holding Torque	10^{-4} Nm	Typ.	420	420	360
	oz-in	Typ.	5.83	5.83	5.00
Coil Resistance	Ohms	±10% @ 20°C	5.3	12.5	75
Coil Inductance	mH	Typ.	7.7	18.2	87
Detent Torque	10^{-4} Nm	Max.	75	75	75
	oz-in	Max.	1.04	1.04	1.04
Rotor Inertia	gcm^2		4.65	4.65	4.65
	10^{-4} oz-in^2		257	257	257
Motor Weight	g		90		
	Lbs		0.2		

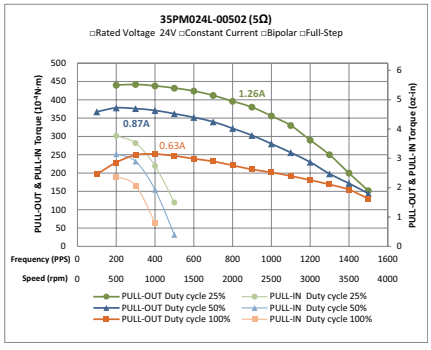
^ Preferred model

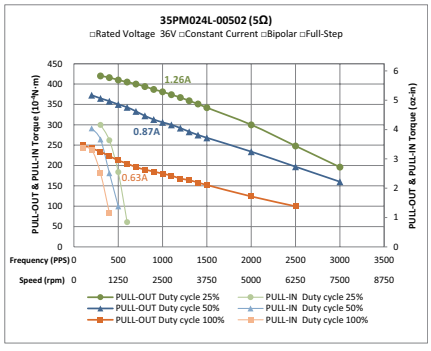
Dimensions: mm



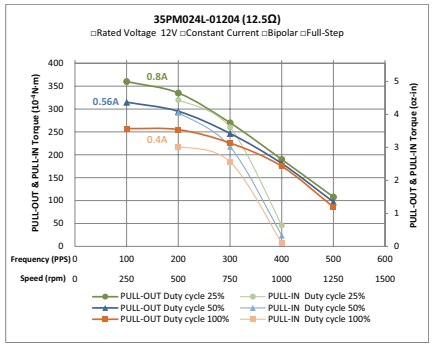
35PM024L8-00502

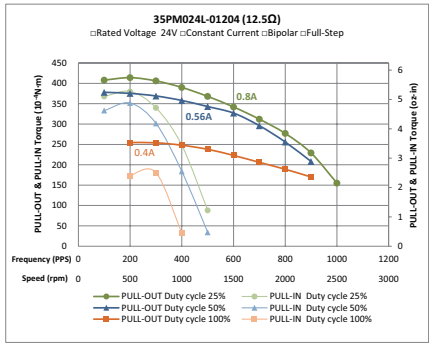


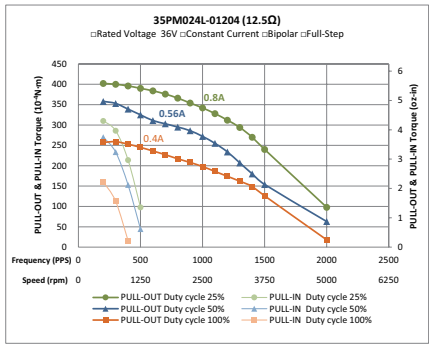




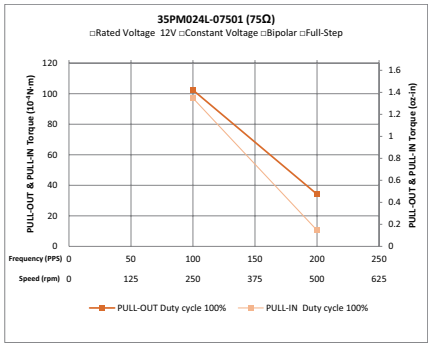
35PM024L8-01202

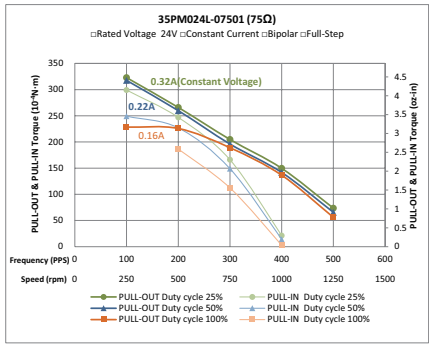


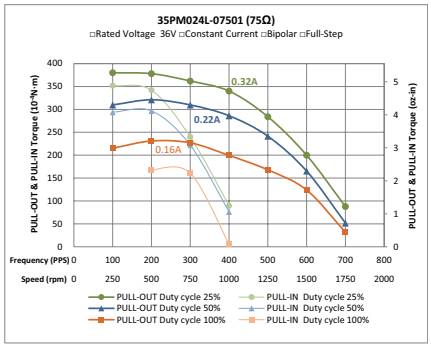




35PM024L8-07501







35PM048L - Ø35mm, L, 7.5°

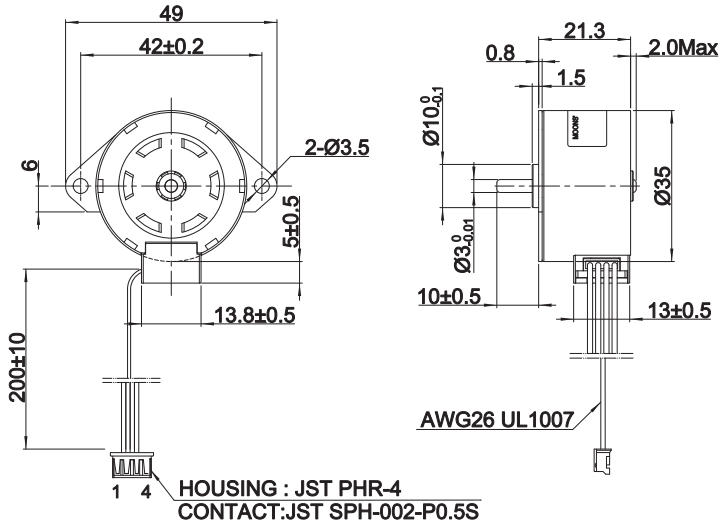
- Phases 2
- Steps / Revolution 7.5°
- Shaft Load
  - Axial 1N
  - Radial 7.5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

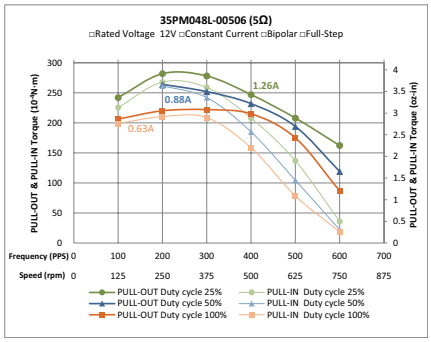
Model Number			35PM048L6-00501	35PM048L6-01201	35PM048L6-07501
Length			21.3 mm (0.84 in.)		
Step Angle	°		7.5		
Rated Current	Amps		0.63	0.4	0.16
Holding Torque	10^{-4} Nm	Typ.	620	620	620
	oz-in	Typ.	8.61	8.61	8.61
Coil Resistance	Ohms	±10% @ 20°C	5	12.5	75
Coil Inductance	mH	Typ.	8.6	21.3	102
Detent Torque	10^{-4} Nm	Max.	95	95	95
	oz-in	Max.	1.32	1.32	1.32
Rotor Inertia	gcm^2		4.65	4.65	4.65
	10^{-4} oz-in^2		257	257	257
Motor Weight	g		90		
	Lbs		0.2		

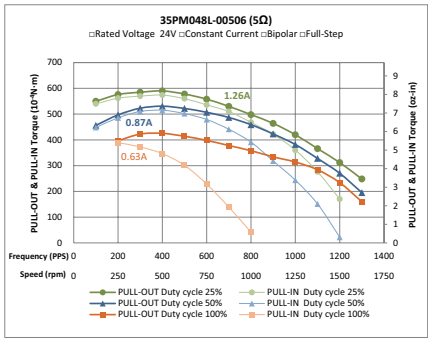
^ Preferred model

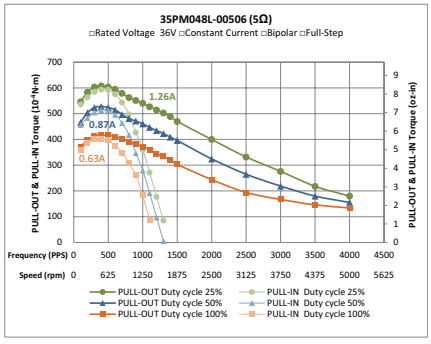
Dimensions: mm



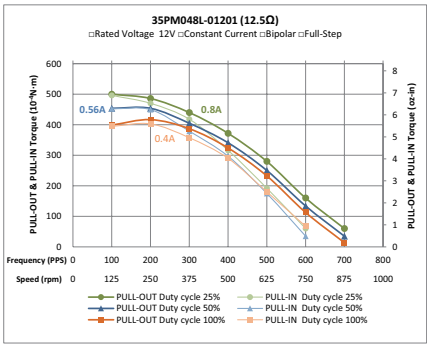
35PM048L6-00501

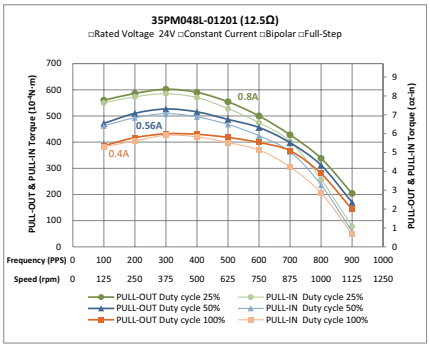


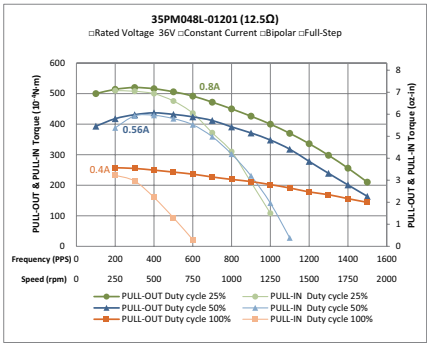




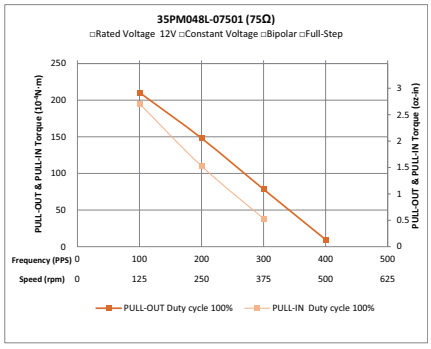
35PM048L6-01201

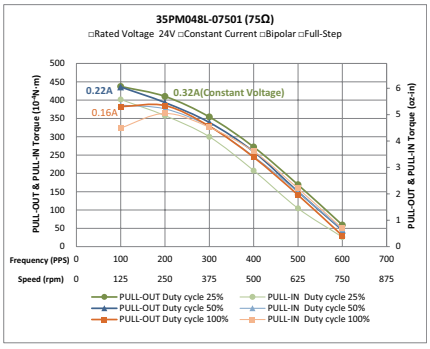


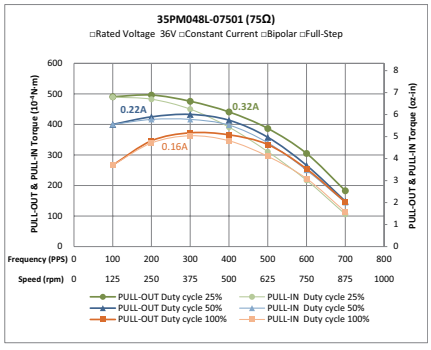




35PM048L6-07501







42PM048S - Ø42mm, S, 7.5°

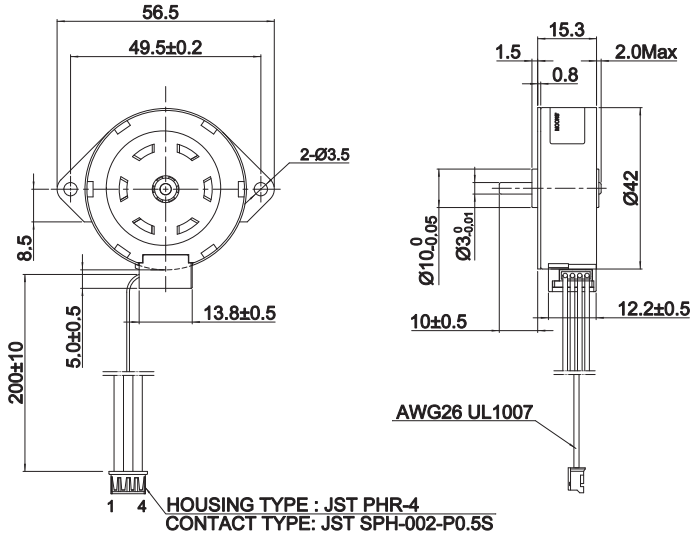
- Phases 2
- Steps / Revolution 7.5°
- Shaft Load
  - Axial 1N
  - Radial 7.5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

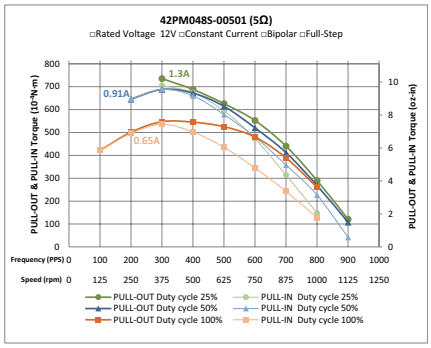
Model Number			42PM048S8-00501	42PM048S8-01209	42PM048S8-08001
Length			15.3mm (0.60in.)		
Step Angle	°		7.5		
Rated Current	Amps		0.65	0.42	0.15
Holding Torque	10^{-4} Nm	Typ.	740	640	640
	oz-in	Typ.	10.28	8.89	8.89
Coil Resistance	Ohms	±10% @ 20°C	5.4	11.5	80
Coil Inductance	mH	Typ.	6	12	79
Detent Torque	10^{-4} Nm	Max.	85	85	85
	oz-in	Max.	1.18	1.18	1.18
Rotor Inertia	gcm^2		7.26	7.26	7.26
	10^{-4} oz-in^2		404	404	404
Motor Weight	g		90		
	Lbs		0.2		

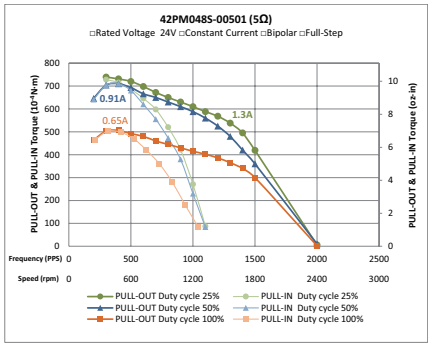
^ Preferred model

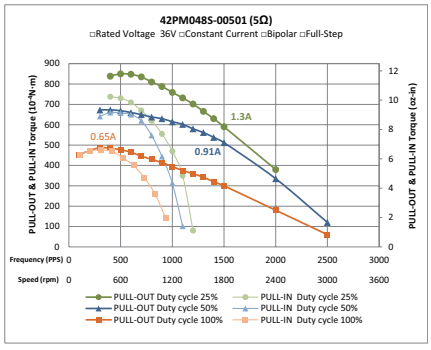
Dimensions: mm



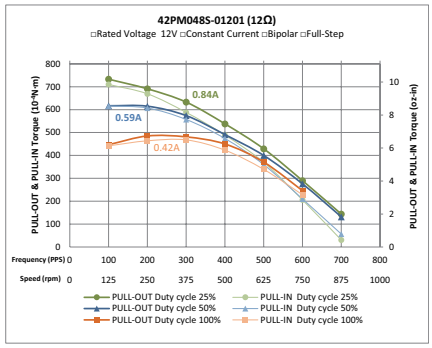
42PM048S8-00501

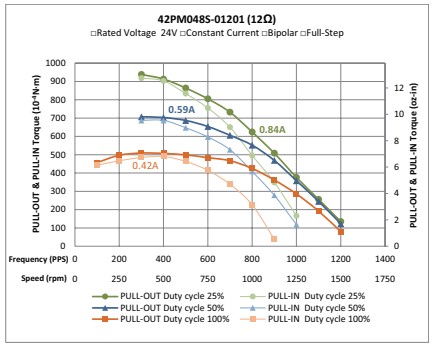


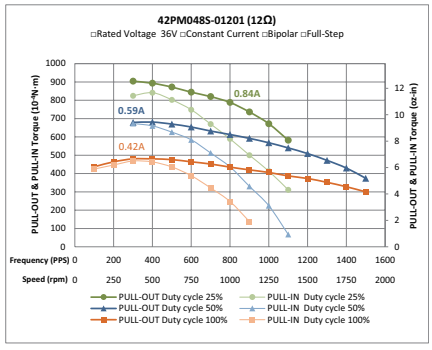




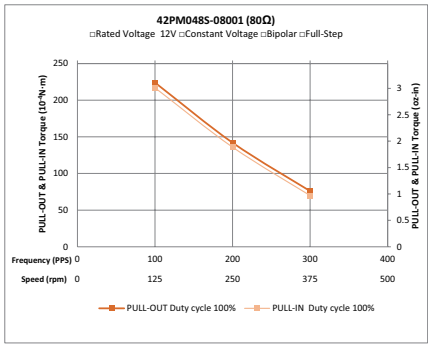
42PM048S8-01209

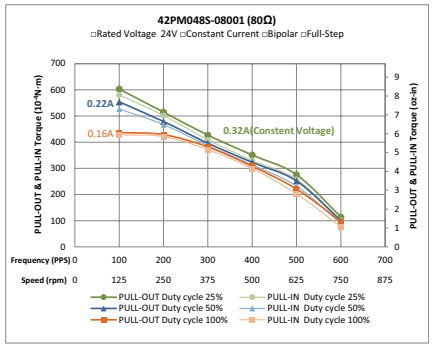


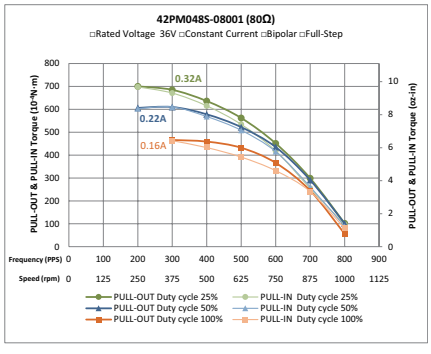




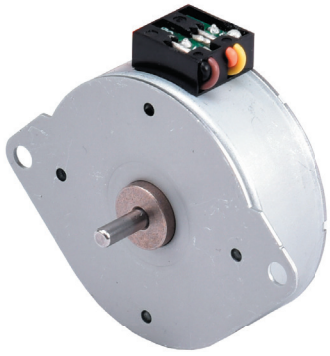
42PM048S8-08001







42PM096S - Ø42mm, S, 3.75°



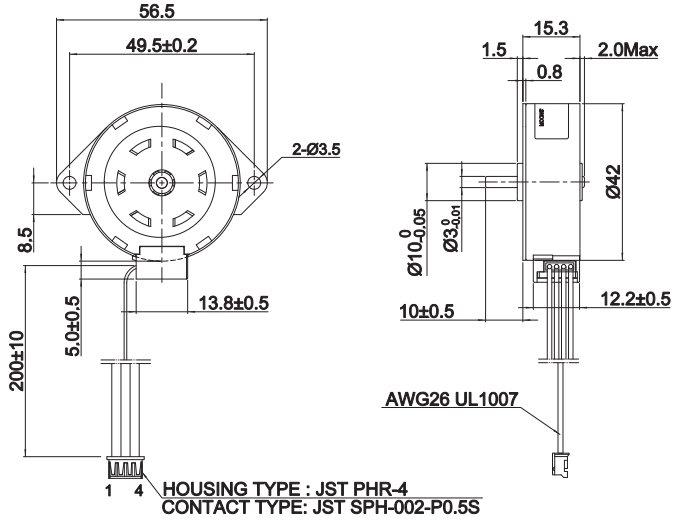
- Phases 2
- Steps / Revolution 3.75°
- Shaft Load
  - Axial 1N
  - Radial 7.5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

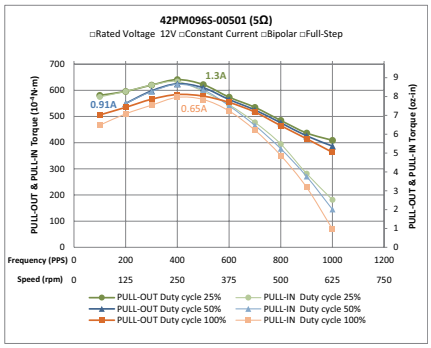
Model Number			42PM096S4-00501	42PM096S4-01201	42PM096S4-08001
Length			15.3mm (0.60in.)		
Step Angle	°		3.75		
Rated Current	Amps		0.65	0.42	0.15
Holding Torque	10^{-4} Nm	Typ.	540	540	540
	oz-in	Typ.	7.50	7.50	7.50
Coil Resistance	Ohms	±10% @ 20°C	5.5	11.5	80
Coil Inductance	mH	Typ.	7.1	15.2	91
Detent Torque	10^{-4} Nm	Max.	65	65	65
	oz-in	Max.	0.90	0.90	0.90
Rotor Inertia	gcm^2		7.26	7.26	7.26
	10^{-4} oz-in^2		404	404	404
Motor Weight	g		90		
	Lbs		0.2		

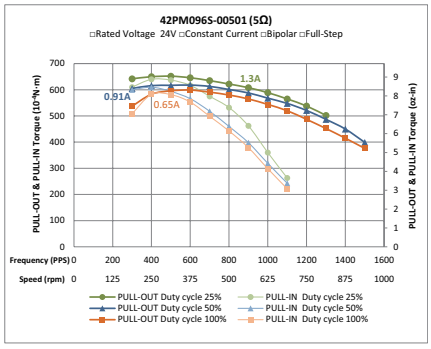
^ Preferred model

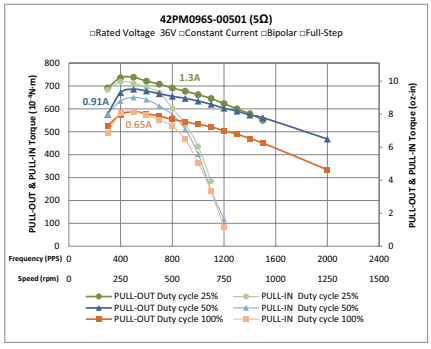
Dimensions: mm



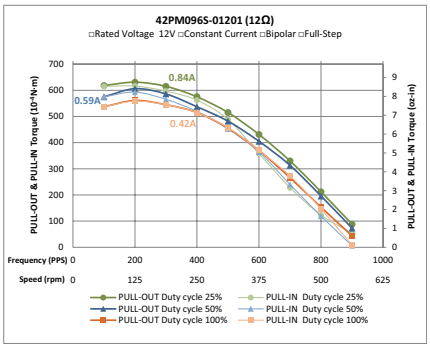
42PM096S4-00501

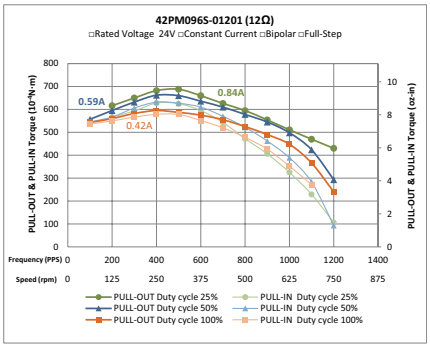


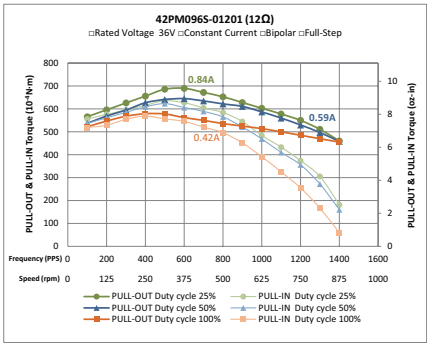




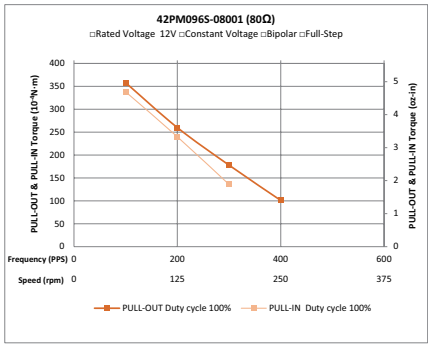
42PM096S4-01201

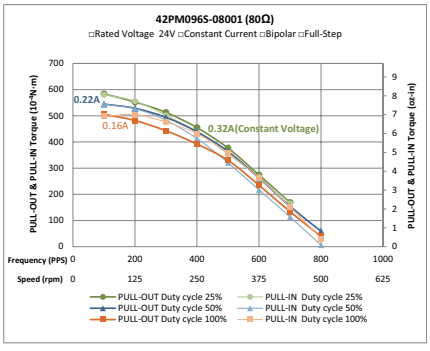


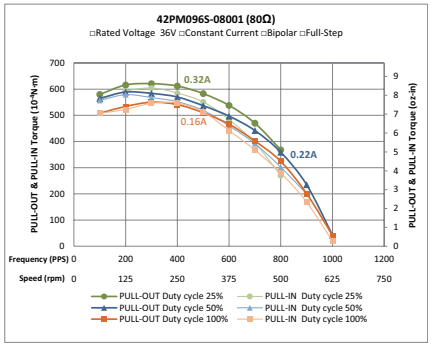




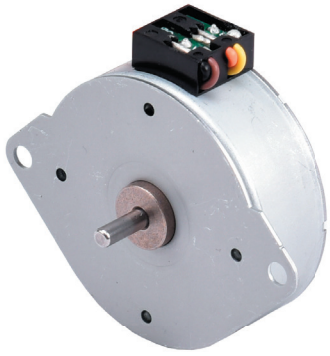
42PM096S4-08001







42PM100S - Ø42mm, S, 3.6°



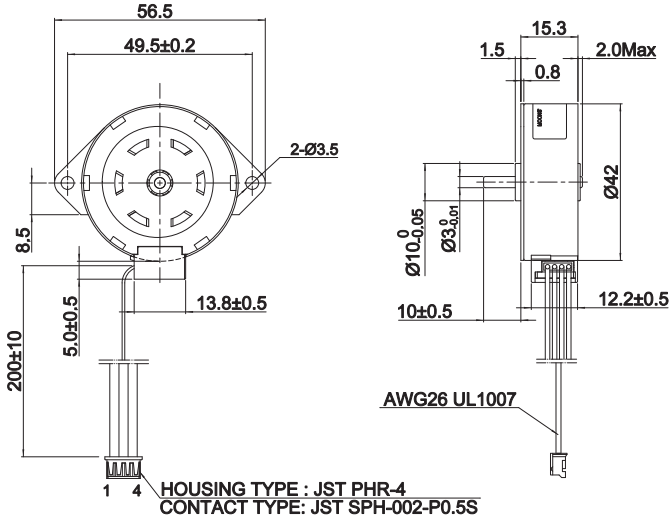
- Phases 2
- Steps / Revolution 3.6°
- Shaft Load
  - Axial 1N
  - Radial 7.5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

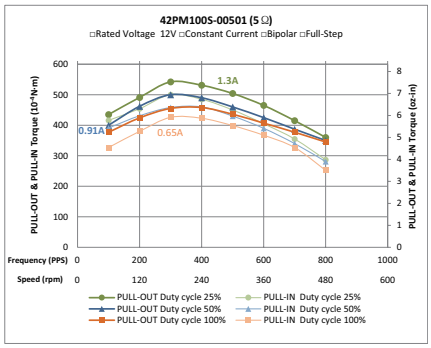
Model Number			42PM100S4-00501	42PM100S4-01201	42PM100S4-08001
Length			15.3mm (0.60in.)		
Step Angle	°		3.6		
Rated Current	Amps		0.65	0.42	0.15
Holding Torque	10^{-4} Nm	Typ.	540	540	540
	oz-in	Typ.	7.50	7.50	7.50
Coil Resistance	Ohms	±10% @ 20°C	5.5	11.5	80
Coil Inductance	mH	Typ.	6.6	14.3	87
Detent Torque	10^{-4} Nm	Max.	65	65	65
	oz-in	Max.	0.90	0.90	0.90
Rotor Inertia	gcm^2		7.26	7.26	7.26
	10^{-4} $oz\text{-}in^2$		404	404	404
Motor Weight	g		90		
	Lbs		0.2		

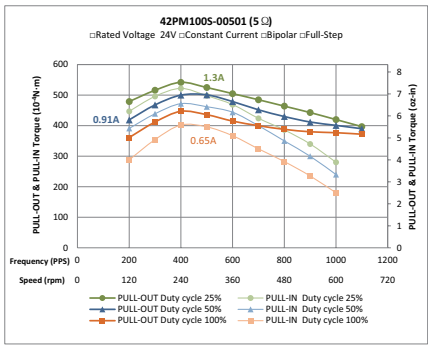
^ Preferred model

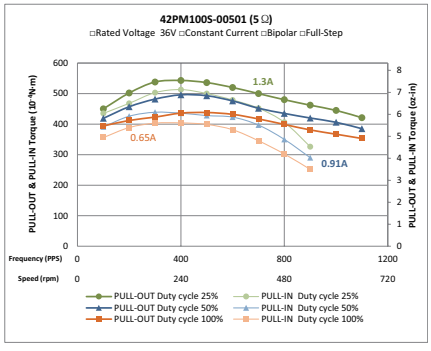
Dimensions: mm



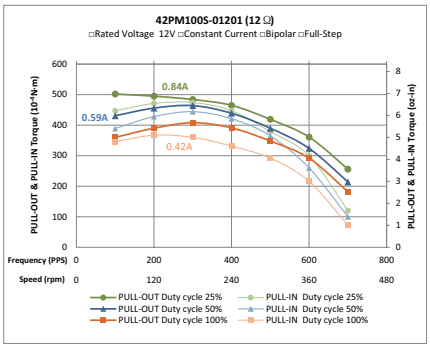
42PM100S4–00501

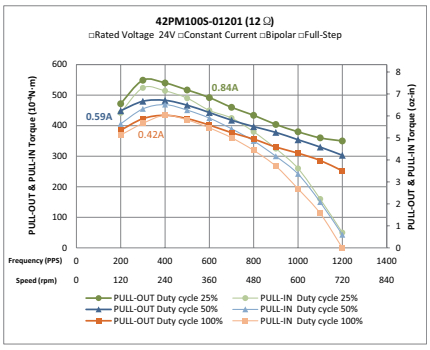


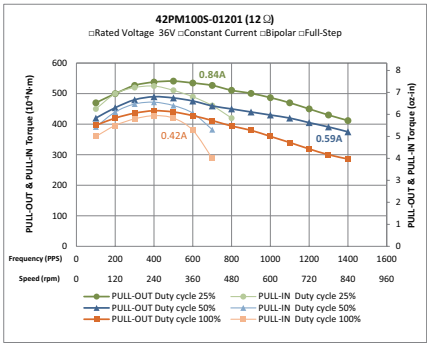




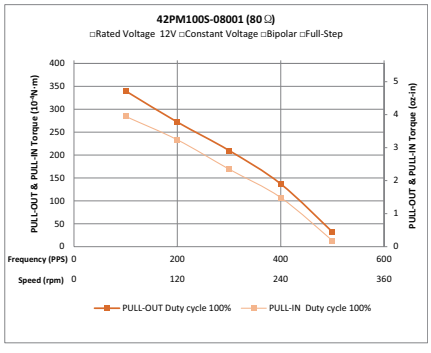
42PM100S4–01201

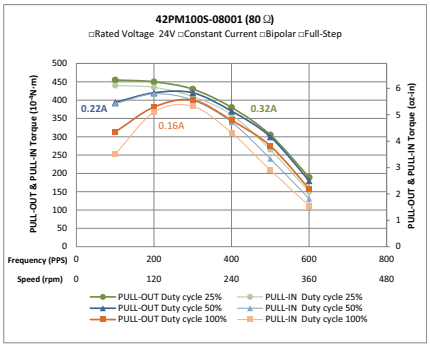


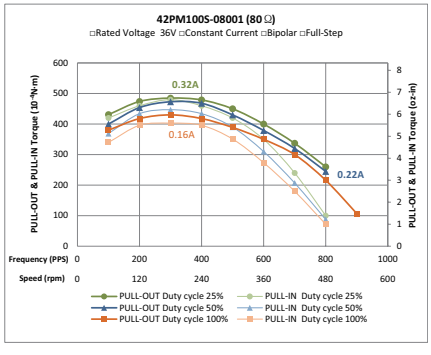




42PM100S4–08001







42PM048L - Ø42mm, L, 7.5°

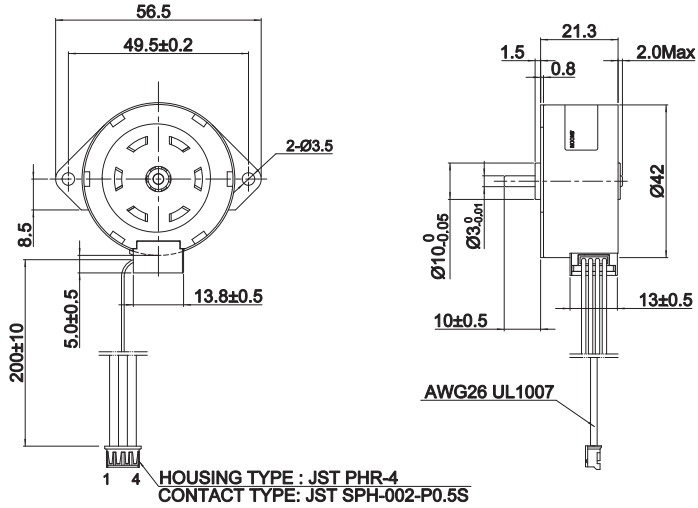
- Phases 2
- Steps / Revolution 7.5°
- Shaft Load
  - Axial 1N
  - Radial 7.5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

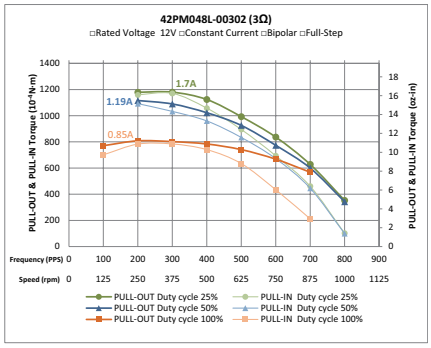
Model Number			42PM048L8-00302	42PM048L8-00703	42PM048L8-06001
Length			21.3 mm (0.84 in.)		
Step Angle	°		7.5		
Rated Current	Amps		0.85	0.55	0.2
Holding Torque	10^{-4} Nm	Typ.	950	950	1020
	oz-in	Typ.	13.20	13.20	14.17
Coil Resistance	Ohms	±10% @ 20°C	3.2	7	60
Coil Inductance	mH	Typ.	4.7	11.8	90
Detent Torque	10^{-4} Nm	Max.	140	140	140
	oz-in	Max.	1.94	1.94	1.94
Rotor Inertia	gcm^2		11.57	11.57	11.57
	10^{-4} oz-in^2		601	601	601
Motor Weight	g		120		
	Lbs		0.26		

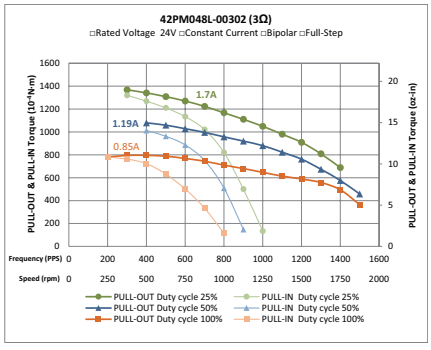
^ Preferred model

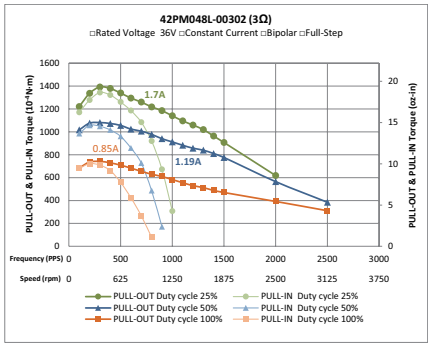
Dimensions: mm



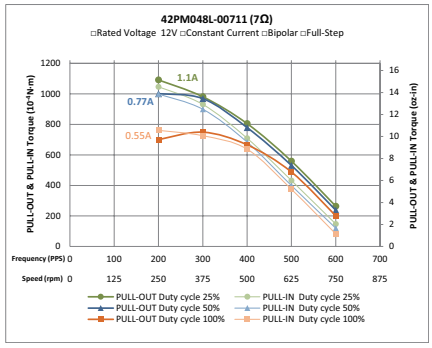
42PM048L1-00302

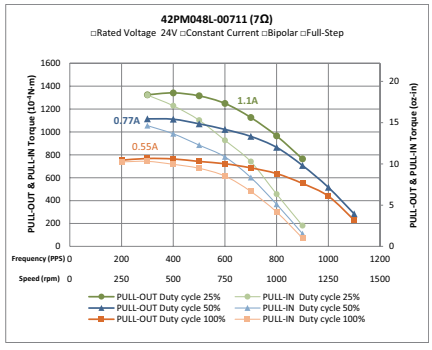


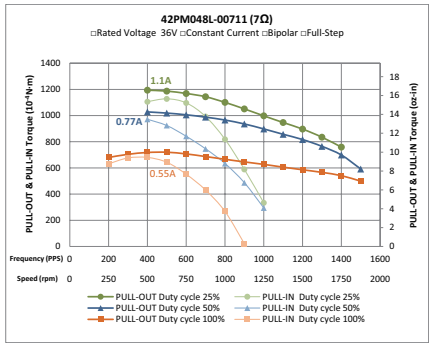




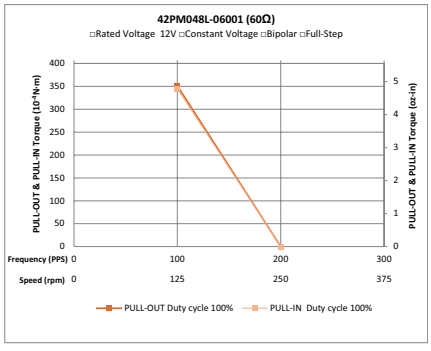
42PM048L1-00711

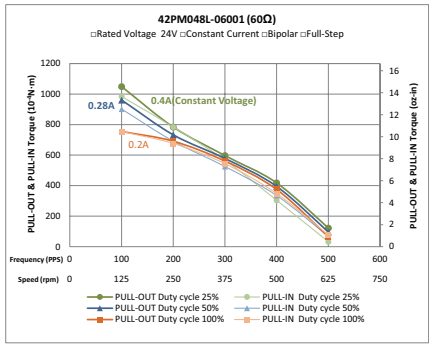


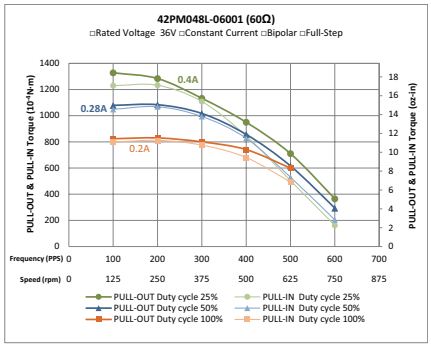




42PM048L1-06001







42PM096L - Ø42mm, L, 3.75°

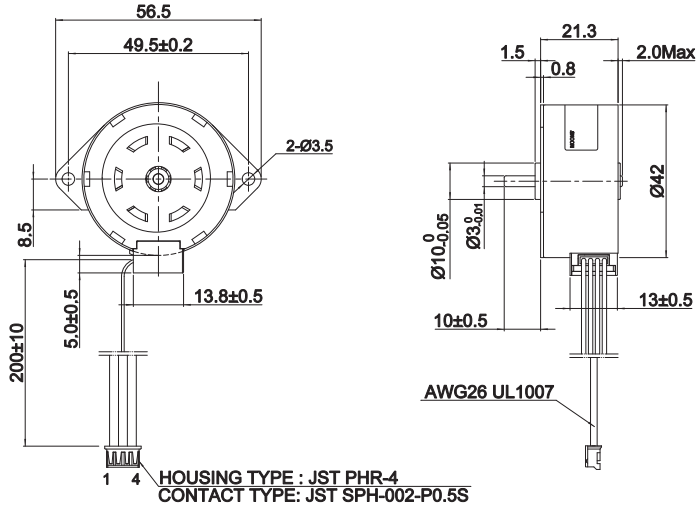
- Phases 2
- Steps / Revolution 3.75°
- Shaft Load
  - Axial 1N
  - Radial 7.5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

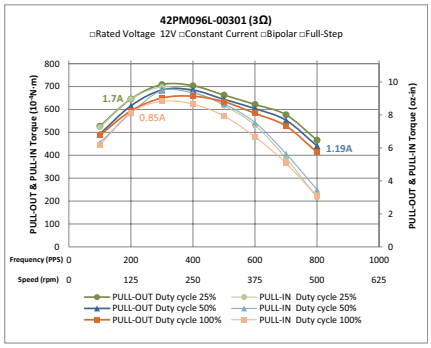
Model Number			42PM096L8-00301	42PM096L8-00701	42PM096L8-06001
Length			21.3 mm (0.84 in.)		
Step Angle	°		3.75		
Rated Current	Amps		0.85	0.55	0.2
Holding Torque	10^{-4} Nm	Typ.	800	800	800
	oz-in	Typ.	11.11	11.11	11.11
Coil Resistance	Ohms	±10% @ 20°C	3.1	7	60
Coil Inductance	mH	Typ.	5.5	12.1	100
Detent Torque	10^{-4} Nm	Max.	120	120	120
	oz-in	Max.	1.67	1.67	1.67
Rotor Inertia	gcm^2		11.57	11.57	11.57
	10^{-4} oz-in^2		601	601	601
Motor Weight	g		120		
	Lbs		0.26		

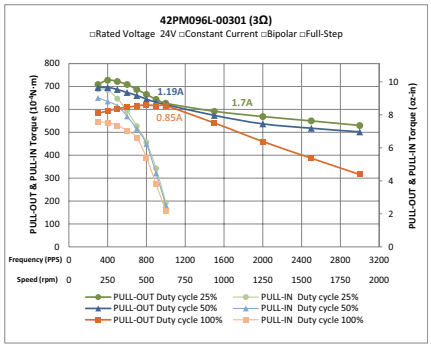
^ Preferred model

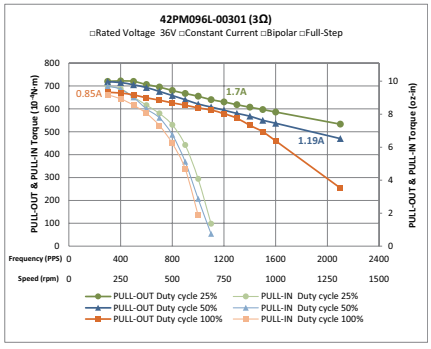
Dimensions: mm



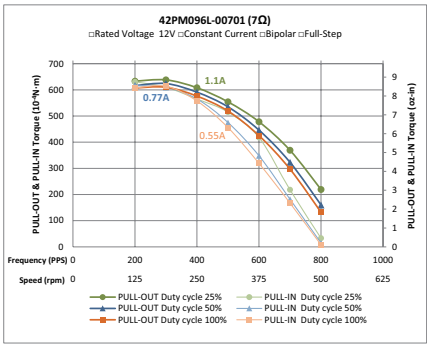
42PM096L8-00301

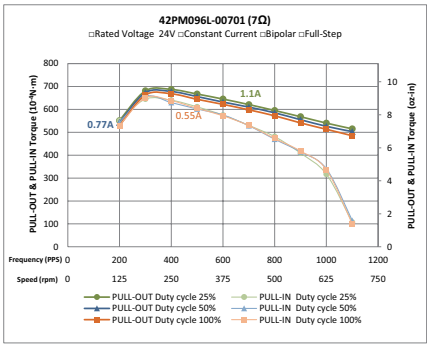


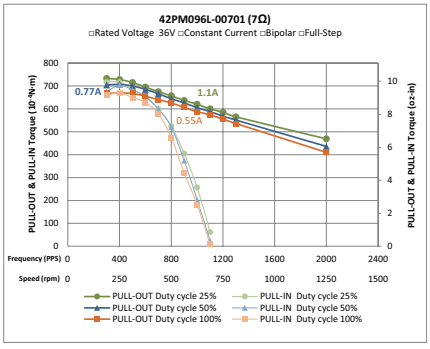




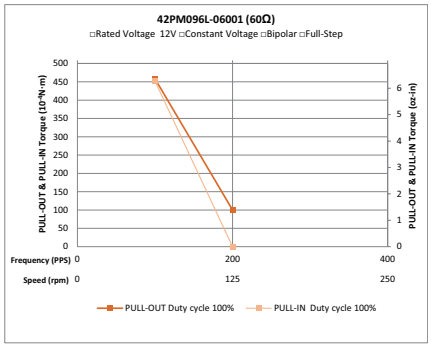
42PM096L8-00701

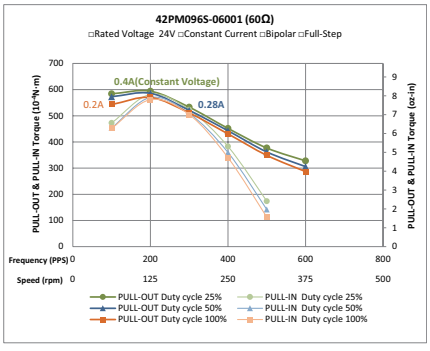


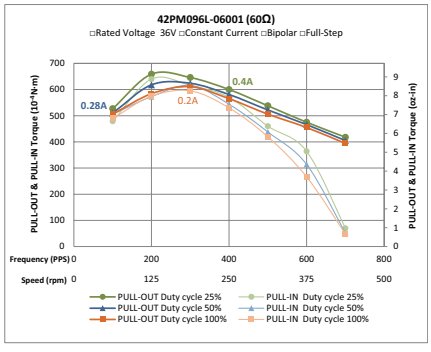




42PM096L8-06001







42PM100L - Ø42mm, S, 3.6°

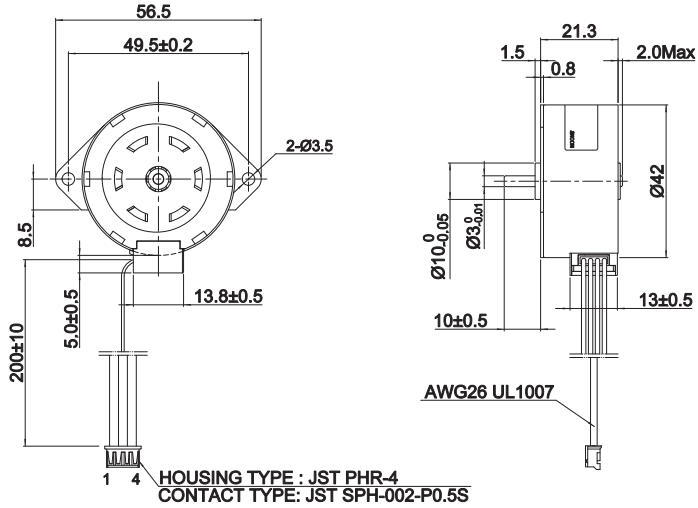
- Phases 2
- Steps / Revolution 3.6°
- Shaft Load
  - Axial 1N
  - Radial 7.5N
- IP Rating 40
- Approvals RoHS
- Operating Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100 MegOhms

Motor Data

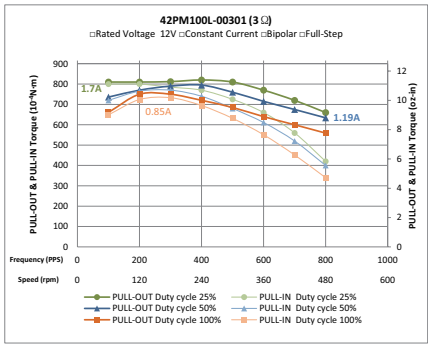
Model Number			42PM100L8-00301	42PM100L8-00701	42PM100L8-06001
Length			21.3 mm (0.84 in.)		
Step Angle	°		3.6		
Rated Current	Amps		0.85	0.55	0.2
Holding Torque	10^{-4} Nm	Typ.	850	850	850
	oz-in	Typ.	11.81	11.81	11.81
Coil Resistance	Ohms	±10% @ 20°C	3.1	7	60
Coil Inductance	mH	Typ.	5.2	11.6	98
Detent Torque	10^{-4} Nm	Max.	140	140	140
	oz-in	Max.	1.94	1.94	1.94
Rotor Inertia	gcm^2		11.57	11.57	11.57
	10^{-4} oz-in^2		601	601	601
Motor Weight	g		120		
	Lbs		0.26		

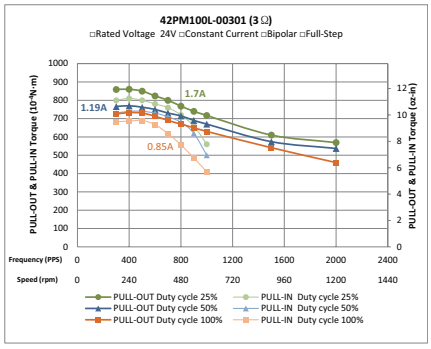
^ Preferred model

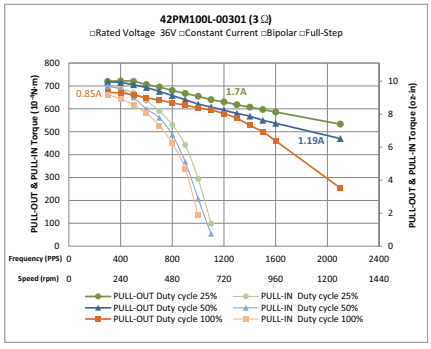
Dimensions: mm



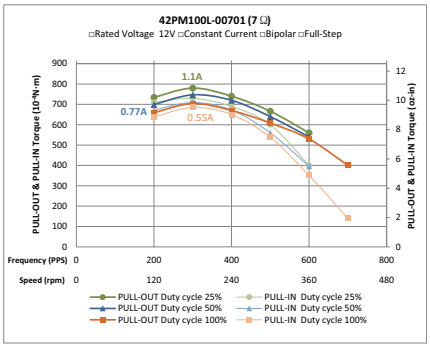
42PM100L8–00301

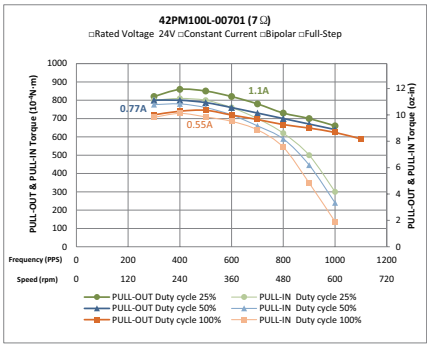


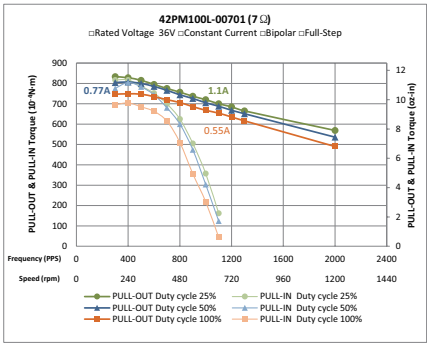




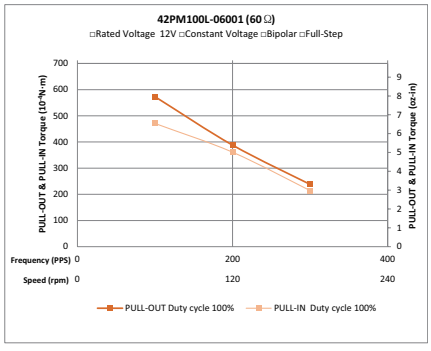
42PM100L8–00701

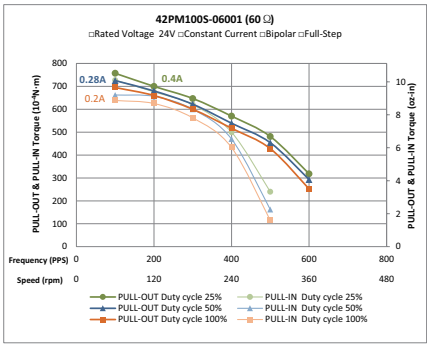


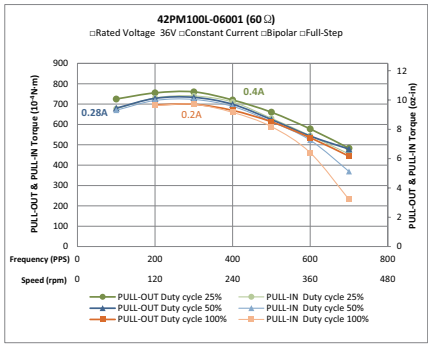




42PM100L8–06001



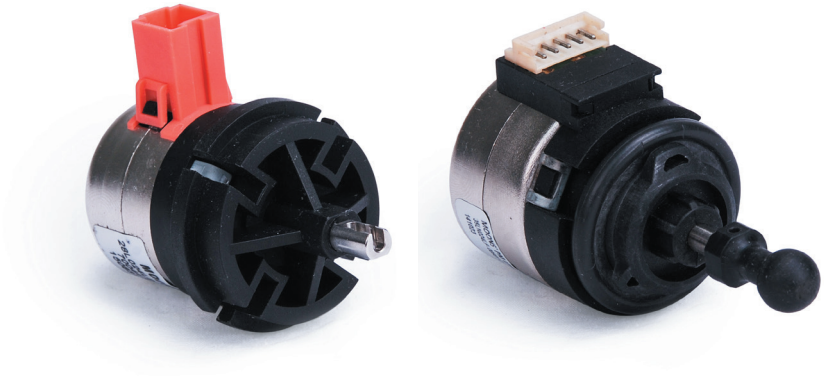




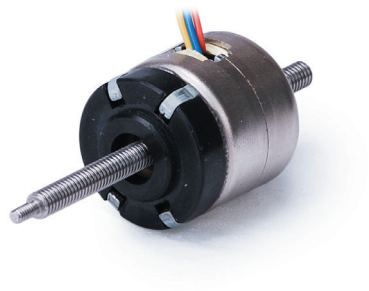
Note

Linear Actuators

- Ø20mm
- Ø25mm
- Ø28mm
- Ø35mm



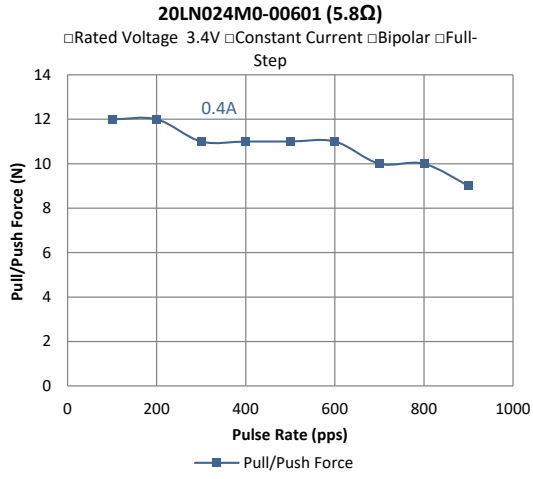
20LN024M0 - 00601 Non-Captive



- Phases 2
- Steps 24
- Shaft Stroke 20 mm
- Linear Step Travel 0.0254 mm
- Bearing System 2 Ball Bearings
- Ambient Temp. -10°C to +65°C
- Insulation Class B, 130°C
- Insulation Resistance 20MegOhms

Motor Data

Model Number			20LN024M0-00601
Step Angle	°		15
Constant Current	Amps		0.4
Holding Force	N	Typ.	30
	oz	Typ.	107.9
Coil Resistance	Ohms	±7% @ 25°C	5.8
Coil Inductance	mH	±15%	2.85
Pull/Push Force	N	@ 400pps	9
	oz		32.4
Rated Net Weight	g		27
	Lbs		0.060



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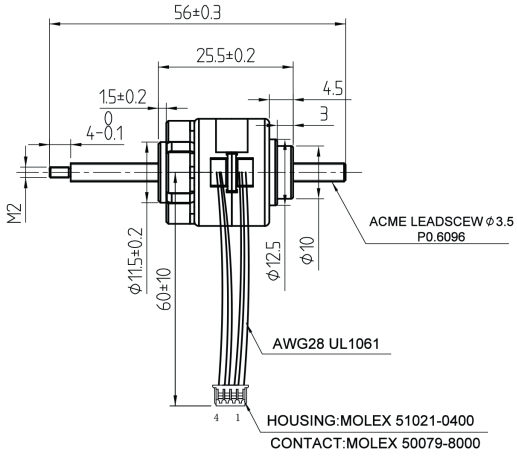
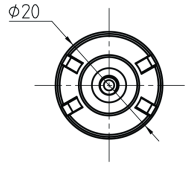
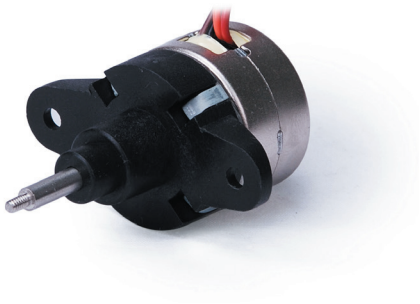




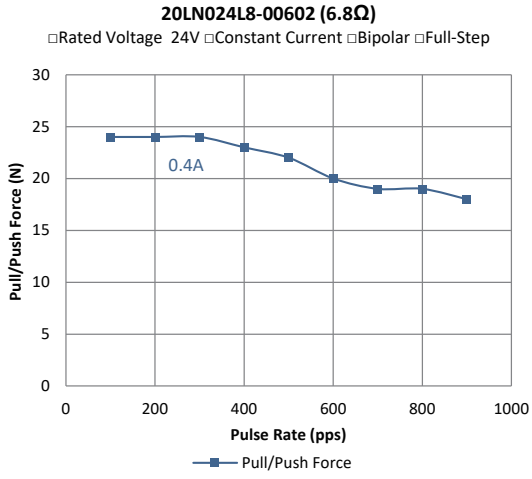
20LN024L8 - 00602 Captive



- Phases 2
- Steps 24
- Shaft Stroke 12.5 mm
- Linear Step Travel 0.0254 mm
- Bearing System 2 Ball Bearings
- Ambient Temp. -10°C to +65°C
- Insulation Class B, 130°C
- Insulation Resistance 20MegOhms

Motor Data

Model Number			20LN024L8-00602
Step Angle	°		15
Constant Current	Amps		0.4
Holding Force	N	Typ.	
	oz	Typ.	
Coil Resistance	Ohms	±7% @ 25°C	6.8
Coil Inductance	mH	±15%	3.29
Pull/Push Force	N	@ 400pps	23
	oz		82.7
Rated Net Weight	g		32
	Lbs		0.071



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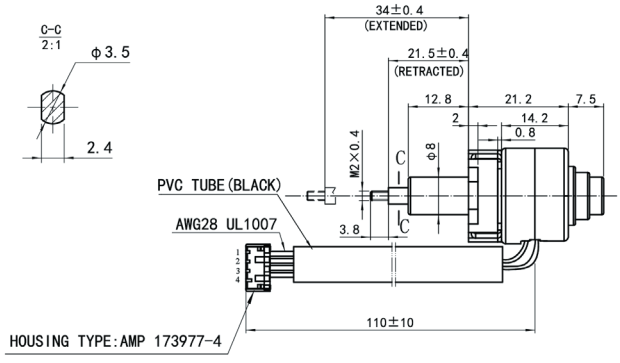
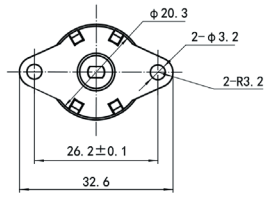
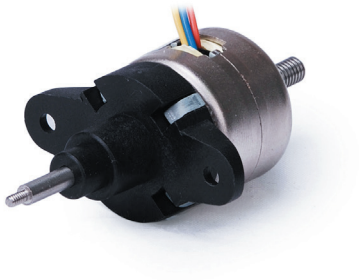




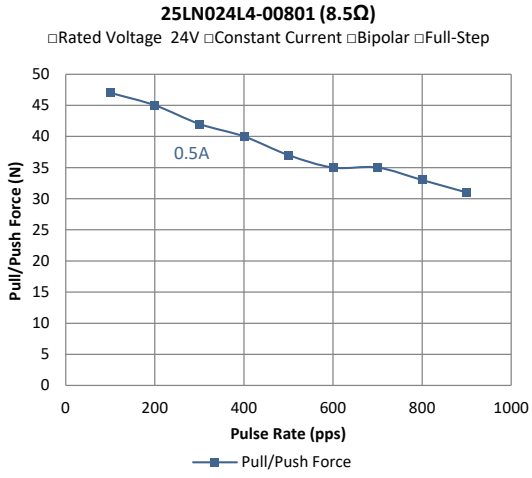
25LN024L4 - 00801 Non-Captive



- Phases 2
- Steps 24
- Shaft Stroke 20 mm
- Linear Step Travel 0.0508 mm
- Bearing System 2 Ball Bearings
- Ambient Temp. -10°C to +65°C
- Insulation Class B, 130°C
- Insulation Resistance 20MegOhms

Motor Data

Model Number			25LN024L4-00801
Step Angle	°		15
Constant Current	Amps		0.5
Holding Force	N	Typ.	40
	oz	Typ.	143.9
Coil Resistance	Ohms	±7% @ 25°C	8.5
Coil Inductance	mH	±15%	4.5
Pull/Push Force	N	@ 400pps	31.5
	oz		113.3
Rated Net Weight	g		45
	Lbs		0.099



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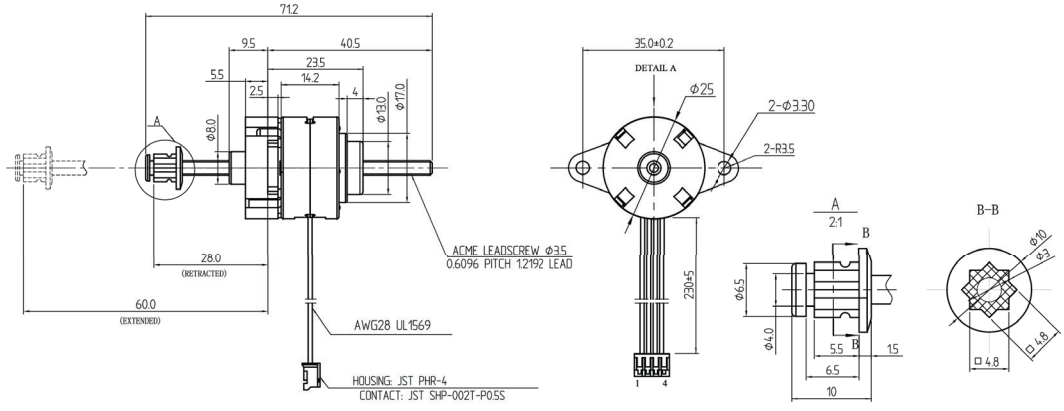
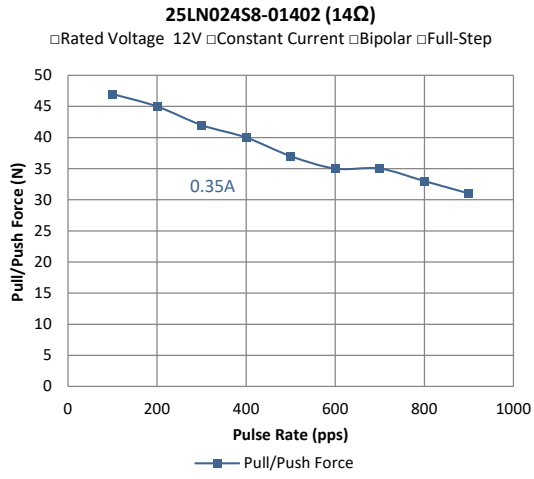


25LN024S8 - 01402 Captive

- Phases 2
- Steps 24
- Shaft Stroke 13 mm
- Linear Step Travel 0.0254 mm
- Bearing System 2 Ball Bearings
- Ambient Temp. -10°C to +65°C
- Insulation Class B, 130°C
- Insulation Resistance 20MegOhms

Motor Data

Model Number			25LN024S8-01402
Step Angle	°		15
Constant Current	Amps		0.35
Holding Force	N	Typ.	40
	oz	Typ.	143.9
Coil Resistance	Ohms	±7% @ 25°C	14
Coil Inductance	mH	±15%	9.1
Pull/Push Force	N	@ 400pps	32
	oz		115.1
Rated Net Weight	g		45
	Lbs		0.099



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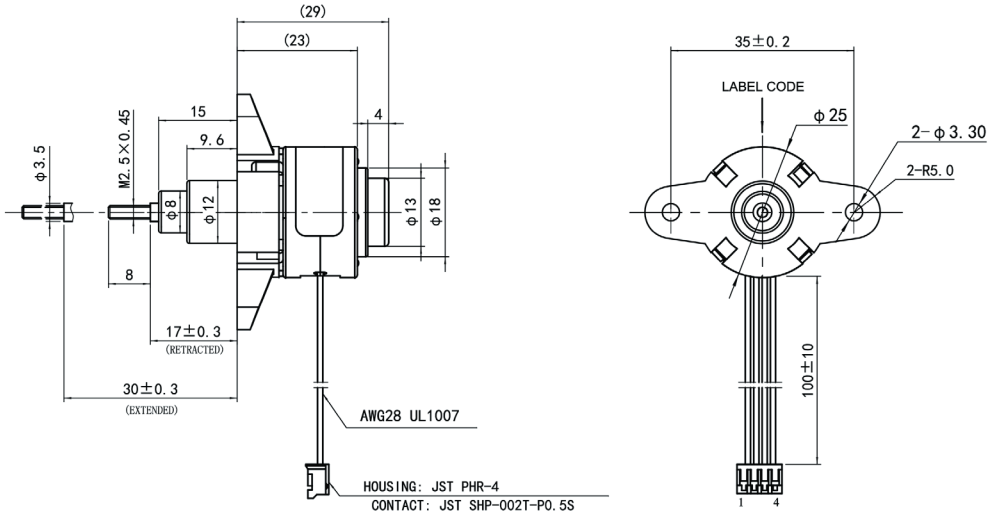
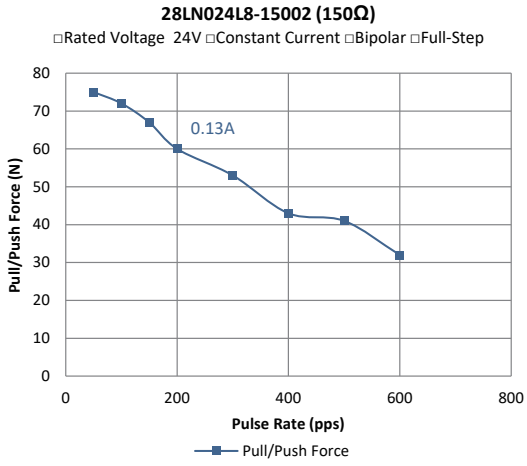


28LN024L8 - 15002 Captive

- Phases 2
- Steps 24
- Shaft Stroke 13 mm
- Linear Step Travel 0.042 mm
- Bearing System 2 Ball Bearings
- Ambient Temp. -10°C to +80°C
- Insulation Class B, 130°C
- Insulation Resistance 20MegOhms

Motor Data

Model Number			28LN024L8-15002
Step Angle	°		15
Constant Current	Amps		0.13
Holding Force	N	Typ.	
	oz	Typ.	
Coil Resistance	Ohms	±7% @ 25°C	150
Coil Inductance	mH	±15%	112
Pull/Push Force	N	@ 400pps	45
	oz		161.9
Rated Net Weight	g		45
	Lbs		0.099



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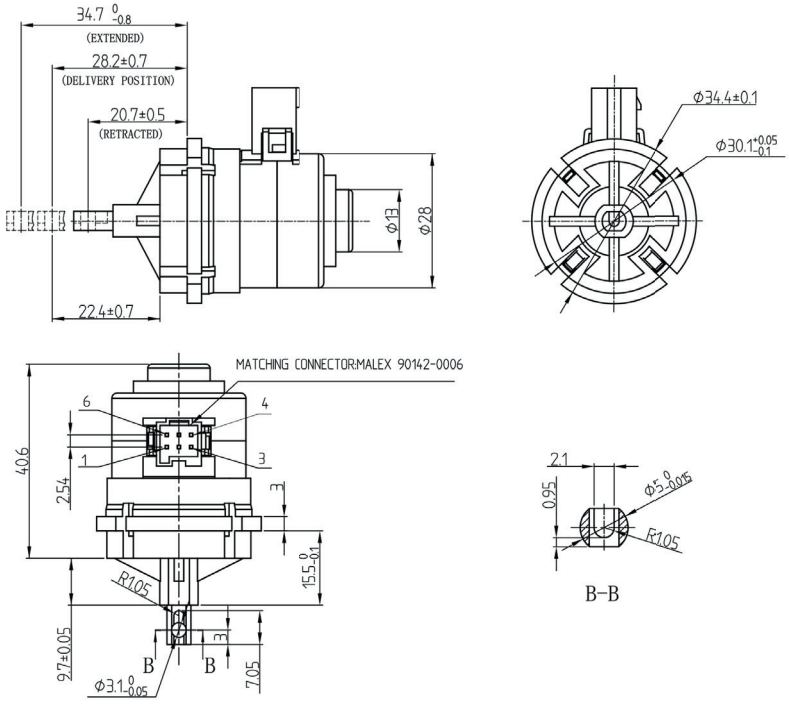
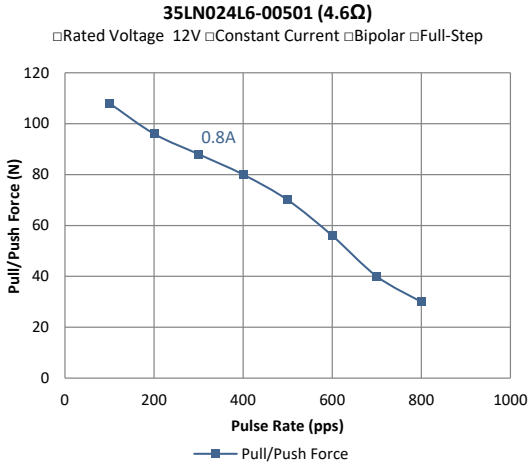


35LN024L6 - 00501 Non-Captive

- Phases 2
- Steps 24
- Shaft Stroke 36 mm
- Linear Step Travel 0.0333 mm
- Bearing System 2 Ball Bearings
- Ambient Temp. -20°C to +50°C
- Insulation Class B, 130°C
- Insulation Resistance 100MegOhms

Motor Data

Model Number			35LN024L6-00501
Step Angle	°		15
Constant Current	Amps		0.8
Holding Force	N	Typ.	
	oz	Typ.	
Coil Resistance	Ohms	±7% @ 25°C	4.6
Coil Inductance	mH	±15%	5
Pull/Push Force	N	@ 400pps	50
	oz		179.9
Rated Net Weight	g		
	Lbs		



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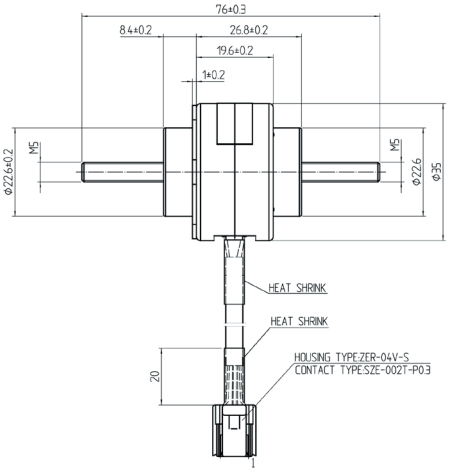
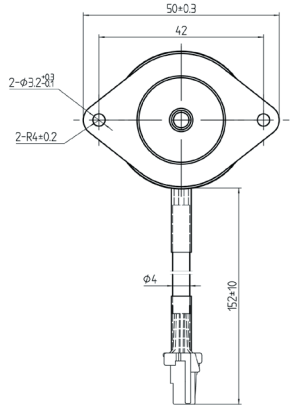
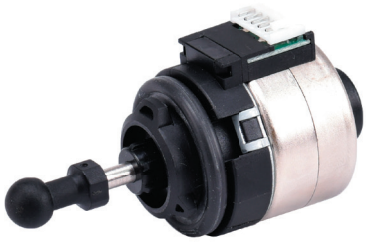




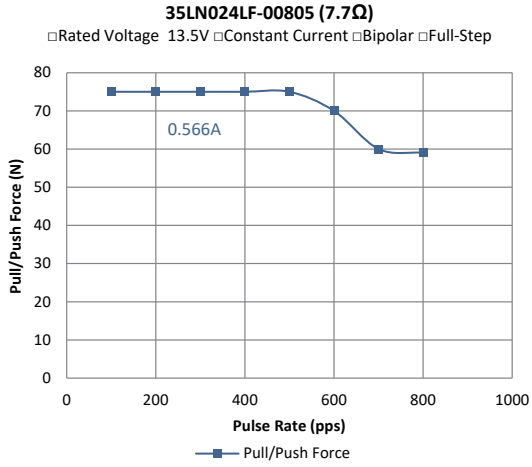
35LN024LF - 00805 Captive



- Phases 2
- Steps 24
- Shaft Stroke 12 mm
- Linear Step Travel 0.0333 mm
- Bearing System 2 Ball Bearings
- Ambient Temp. -40°C to +120°C
- Insulation Class B, 130°C
- Insulation Resistance 100MegOhms

Motor Data

Model Number			35LN024LF-00805
Step Angle	°		15
Constant Current	Amps		0.566
Holding Force	N	Typ.	110
	oz	Typ.	395.7
Coil Resistance	Ohms	±7% @ 25°C	7.7
Coil Inductance	mH	±15%	9.75
Pull/Push Force	N	@ 400pps	50
	oz		179.9
Rated Net Weight	g		
	Lbs		



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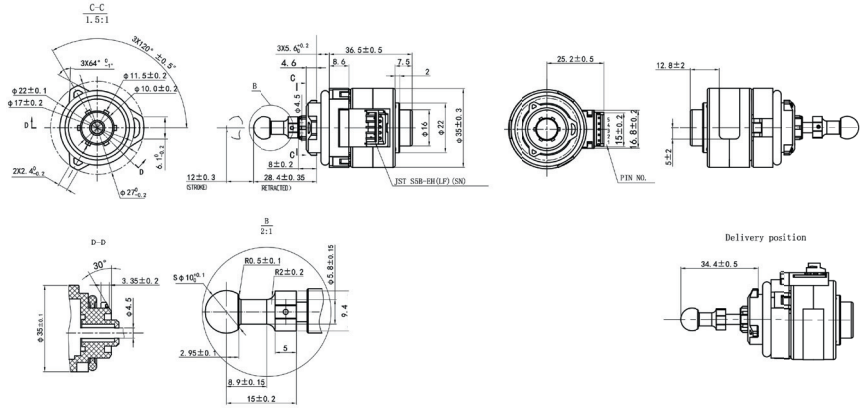
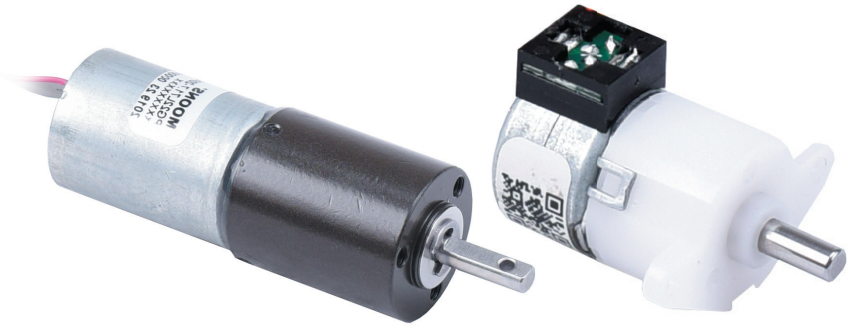
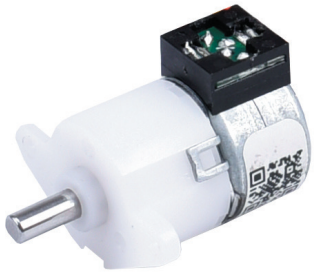


Gearmotor

PG15L
PG16L
PG22L

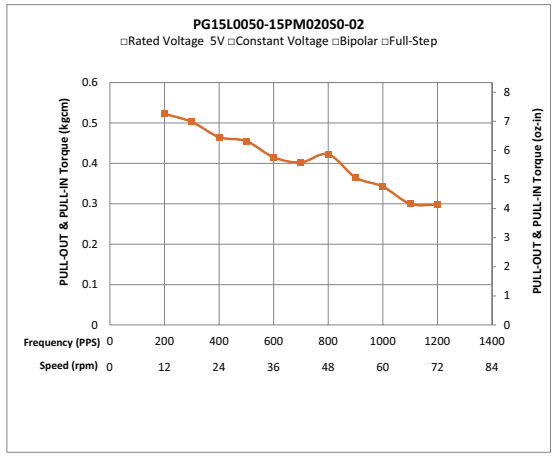


PG15L0050-15PM020S0-02



Motor Data

Phases		2
Steps/Revolution		18°/50(0.36°)
Rated Voltage	Vdc	5
Frame Size	mm	15mm
Length	mm	22.5
Holding Torque	mNm	49 @200pps
	oz-in	
Gear Ratio		50:1
Resistance	Ohms ±10%@20°C	10
Coil Type		Bi-Polar
Insulations Class		Class E(120°C)
IP Rating		IP40
Weight	g	11



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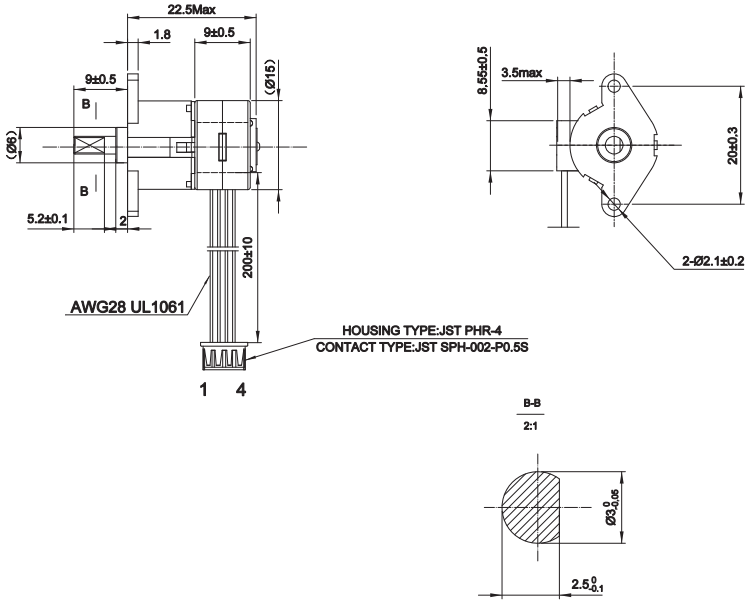
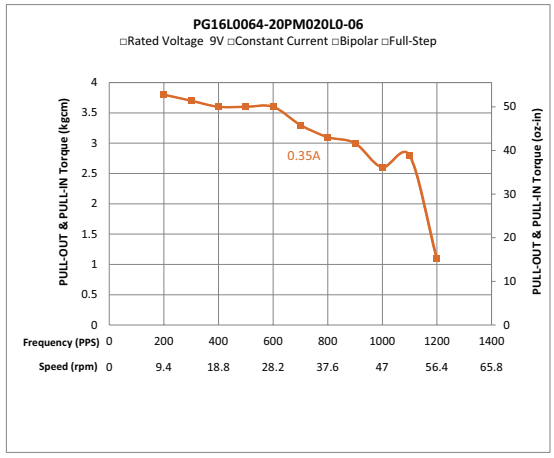


PG16L0064-20PM020L0-06

Motor Data

Phases		2
Steps/Revolution		18°/64(0.28°)
Rated Voltage	Vdc	9
Frame Size	mm	20mm
Length	mm	55
Holding Torque	mNm	180 @1080pps
	oz-in	
Gear Ratio		64:1
Resistance	Ohms ±10%@20°C	7.6
Coil Type		Bi-Polar
Insulations Class		Class B(130°C)
IP Rating		IP54
Weight	g	100



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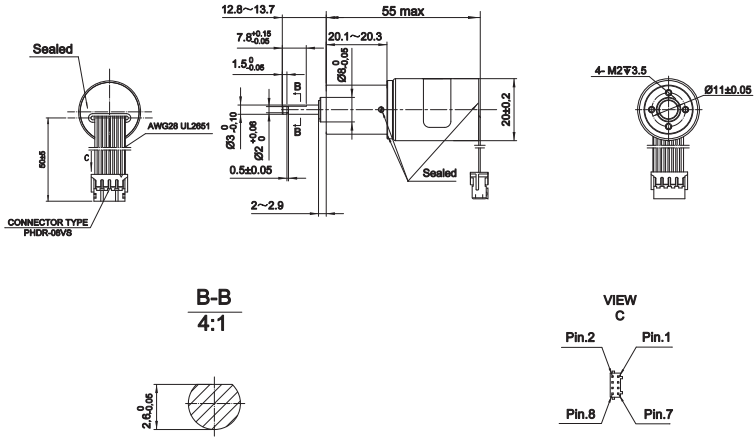
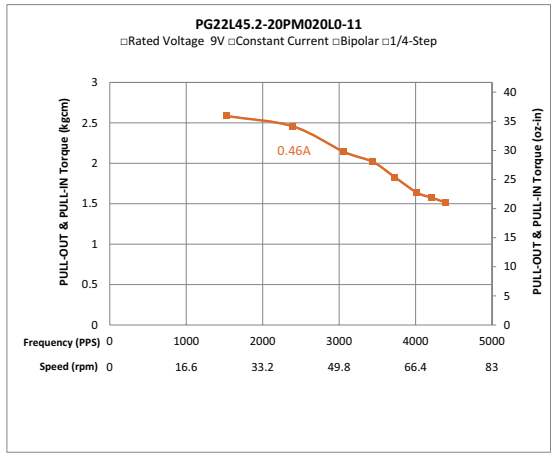


PG22L45.2-20PM020L0-11

Motor Data

Phases		2
Steps/Revolution		18°/45(0.4°)
Rated Voltage	Vdc	8.5
Frame Size	mm	22mm
Length	mm	60
Holding Torque	mNm	200 @753pps
	oz-in	
Gear Ratio		45.2:1
Resistance	Ohms ±10%@20°C	6.4
Coil Type		Bi-Polar
Insulations Class		Class B(130°C)
IP Rating		IP56
Weight	g	120



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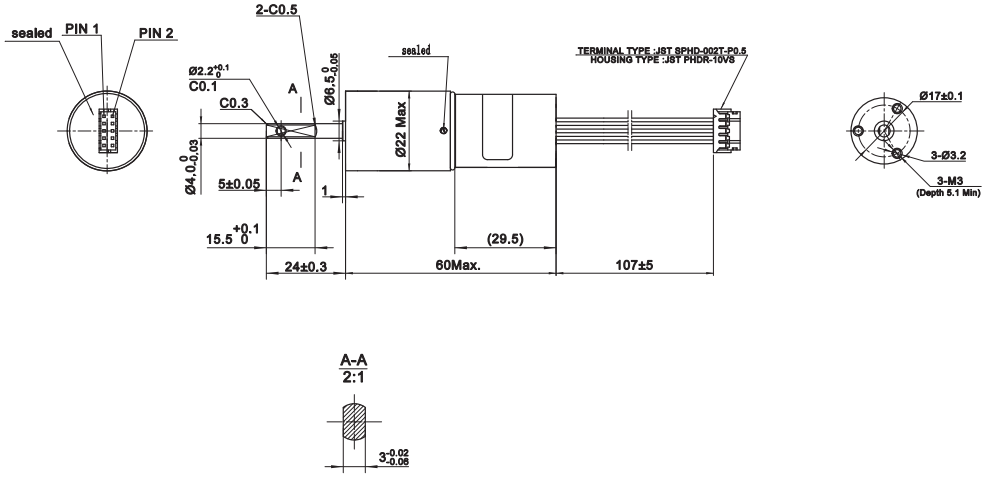
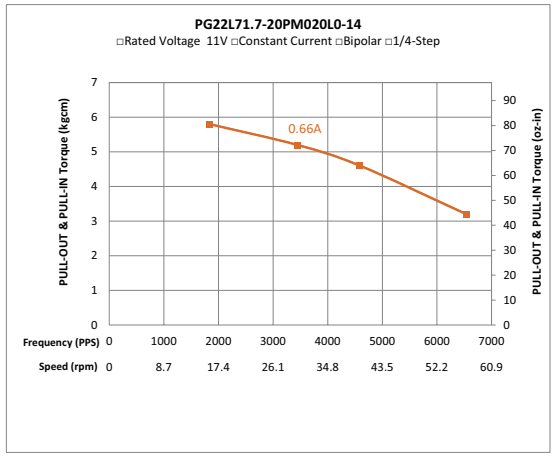


PG22L71.7-20PM020L0-14

Motor Data

Phases		2
Steps/Revolution		18°/72(0.25°)
Rated Voltage	Vdc	9.2
Frame Size	mm	22mm
Length	mm	55
Holding Torque	mNm	420 @384pps
	oz-in	
Gear Ratio		71.7:1
Resistance	Ohms ±10%@20°C	6.4
Coil Type		Bi-Polar
Insulations Class		Class B(130°C)
IP Rating		IP56
Weight	g	100



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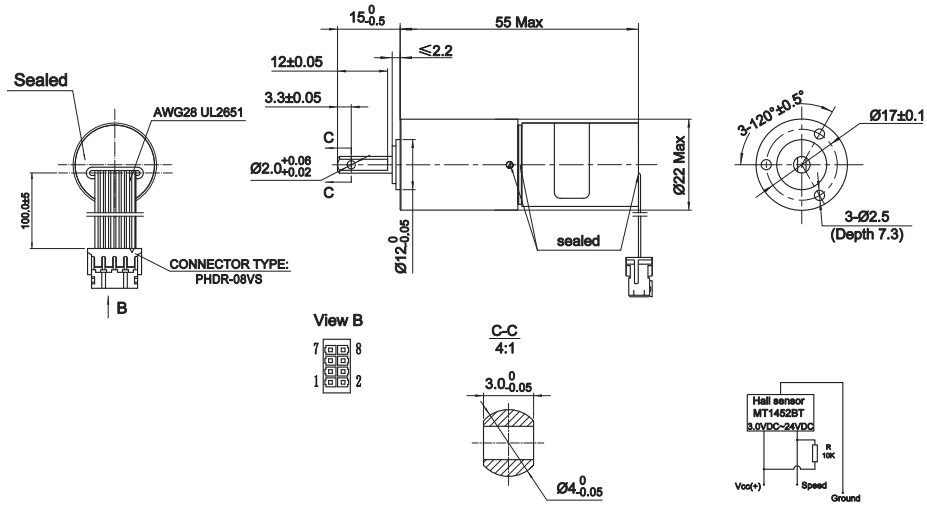
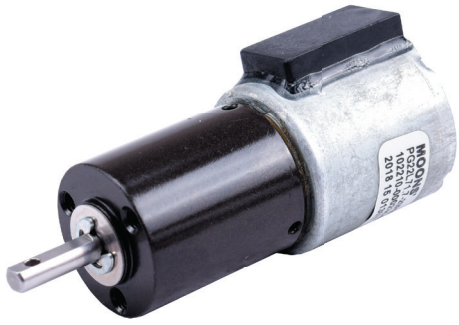
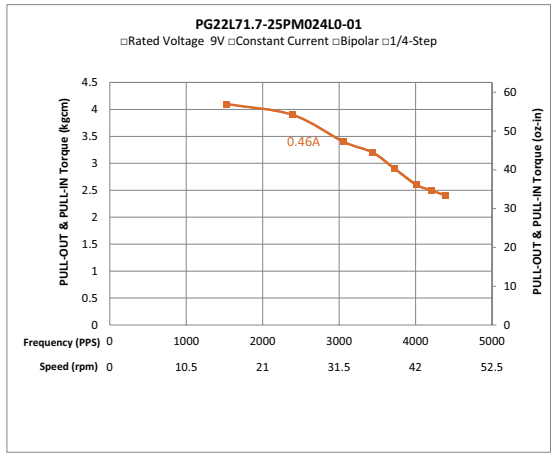


PG22L71.7-25PM024L0-01



Motor Data

Phases		2
Steps/Revolution		15°/72(0.21°)
Rated Voltage	Vdc	11
Frame Size	mm	25mm
Length	mm	58
Holding Torque	mNm	500 @457pps
	oz-in	
Gear Ratio		71.7:1
Resistance	Ohms ±10%@20°C	4
Coil Type		Bi-Polar
Insulations Class		Class B(130°C)
IP Rating		IP56
Weight	g	100



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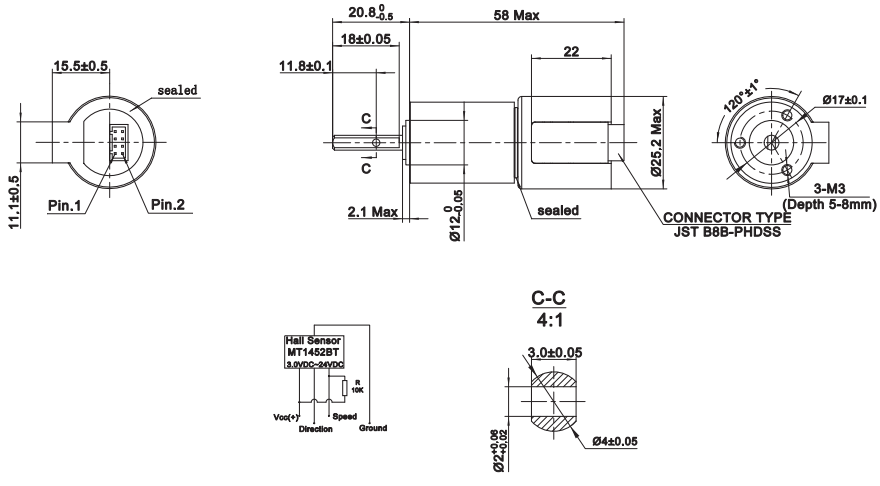


Technical

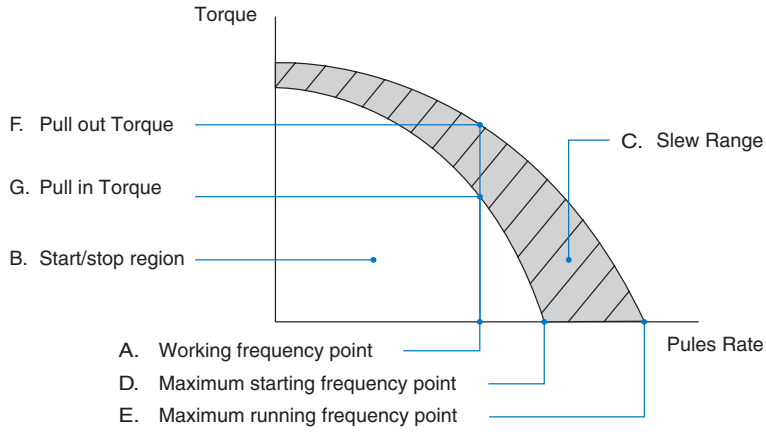
· Speed-Torque Characteristics

· About Rated Current

· Conversion Factors

Speed-Torque Characteristics

The dynamic torque curve is an important aspect of stepping motor's output performance. The followings are some keyword explanations.



A. Working frequency point express the stepping motors rotational speed versus the drive pulse rate.
n = q * Hz / (360 * D)
n: rev/sec
Hz: the frequency value or the driver pulse rate.
D:the subdividing value of motor driver
q: the step angle of stepping motor

B. Start/Stop region: the region in which a stepping motor can be directly started or stopped.

C. Slew Range: the motor cannot be started directly in this area. It must be started in the start/stop region first and then accelerated to this area. In this area, the motor can not be directly stopped, either. Otherwise this will lead to losing-step. The motor must be decelerated back to the start/stop region before it can be stopped.

D. Maximum starting frequency point at this point, the stepping motor can reach its maximum starting speed under unloaded condition.

E. Maximum running frequency point at this point the stepping motor can reach its maximum running speed under an unloaded condition.

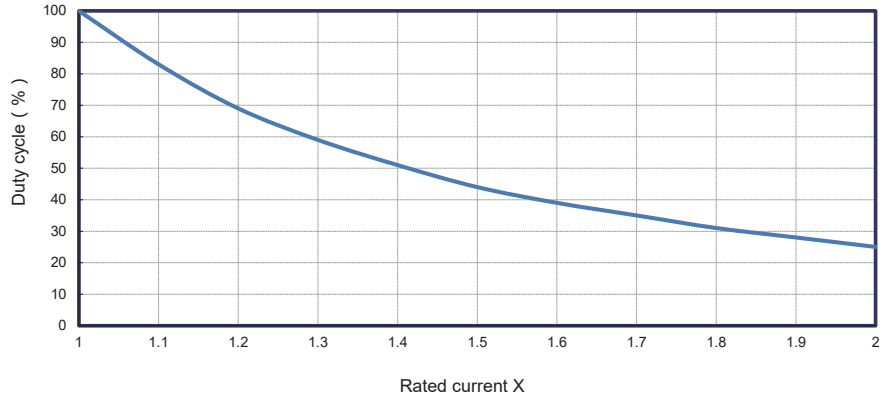
F. Pull-in Torque: the maximum dynamic torque value that a stepping motor can load directly at the particular operating frequency point.

G. Pull-out Torque: the maximum dynamic torque value that a stepping motor can load at the particular operating frequency point when the motor has been started. Because of the inertia of rotation the Pull-Out Torque is always larger than the Pull-In Torque.

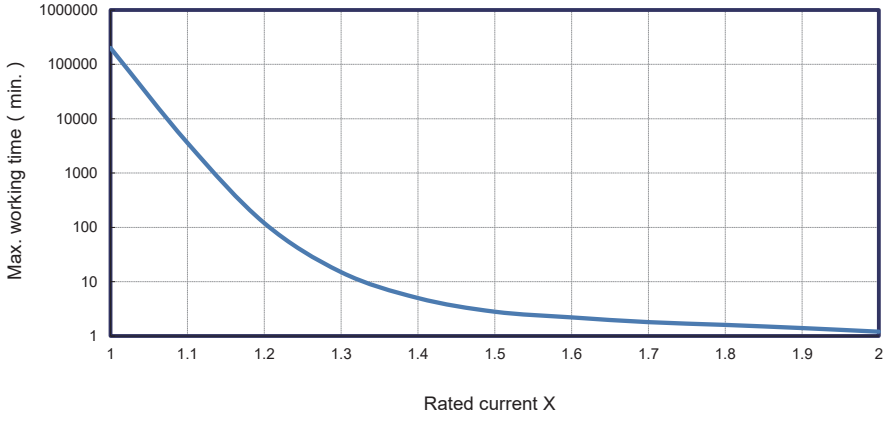
About Rated Current

Rated current of PM stepper is limited by thermal characteristics.
In actual application, to get higher output torque we can supply with higher current, which extend rated value. In such case, the motor can't be in continuous working, otherwise the winding will be overheat even damage device. Duty cycle need to be not reach to 100%, also we must consider Max. working time - Ton Max.

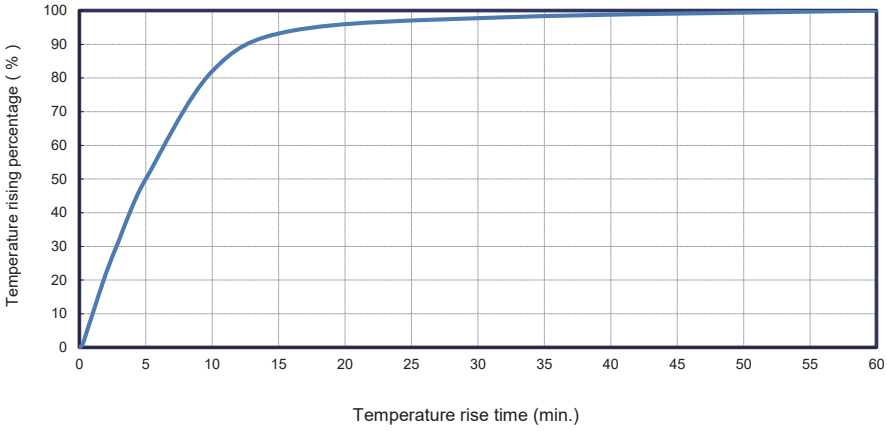
How to define the duty cycle with multiple of rated current



How to calculate the max. Single working time with multiple of rated current



Motor winding temperature rising curve



Conversion Factors

- Length

A \ B	mm	cm	m	inch	feet
mm	--	0.1	0.001	0.03937	0.003281
cm	10	--	0.01	0.3937	0.03281
m	1,000	100	--	39.37	3.281
inch	25.4	2.54	0.0254	--	0.08333
feet	304.8	30.48	0.348	12	--

Multiply "A" units by conversion factor to obtain "B" units

- Force

A \ B	g	kgf	oz	lb	Newton
g	--	0.001	0.03527	0.002205	0.0098
kgf	1,000	--	35.27	22.05	9.807
oz	28.35	0.02835	--	0.0625	0.278
lb	453.6	0.4536	16	--	4.448
Newton	102	0.102	3.597	0.2248	--

- Torque

A \ B	Nm	Ncm	mNm	kgm*	kgcm*	gcm*	oz-in	lb-ft	lb-in
Nm	--	100	1,000	0.102	10.2	10,200	141.6	0.7376	8.851
Ncm	0.01	--	10	0.00102	0.102	102	1.416	0.007376	0.08851
mNm	0.001	0.1	--	0.000102	1.0102	10.2	0.1416	0.000738	0.008851
kgm*	9.807	980.7	9807	--	100	100,000	1,389	7.233	86.8
kgcm*	0.09807	9.807	98.07	0.01	--	1,000	13.89	0.07233	0.868
gcm*	9.81E-05	0.009807	0.09807	0.00001	0.001	--	0.01389	7.23E-05	0.000868
oz-in	0.007062	0.7062	7.062	0.00072	0.07201	72.01	--	0.00521	0.0625
lb-ft	1.356	135.6	135.6	0.1383	13.83	13,830	192	--	12
lb-in	0.113	11.3	113	0.01152	1.152	1,152	16	0.0833	--

- Inertia

A \ B	kgm²	kgcm²	gcm²	oz-in²	oz-in-sec²	lb-in²	lb-in-sec²	lb-ft²	lb-ft-sec² (slug ft²)
kgm²	--	10,000	10,000,000	54,700	142	3,420	8.85	23.7	0.738
kgcm²	0.0001	--	1,000	5.47	0.0142	0.342	0.000885	0.00237	7.38E-05
gcm²	1E-07	0.001	--	0.00547	1.42E-05	0.000342	8.85E-07	2.37E-06	7.38E-08
oz-in²	1.83E-05	0.1829	183	--	0.00259	0.0625	0.000162	0.000434	1.35E-05
oz-in-sec²	0.00706	70.62	70,600	386	--	24.1	0.0625	0.168	0.00521
lb-in²	0.000293	2.926	2,930	16	0.0414	--	0.00259	0.00694	0.000216
lb-in-sec²	0.113	1,130	1,130,000	6,180	1.6	386	--	2.68	0.0833
lb-ft²	0.0421	421.4	421,000	2,300	5.97	144	0.373	--	0.318
lb-ft-sec² (slug ft²)	1.36	13,600	13,600,000	74,100	192	4,630	12	32.2	--

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