HYBRID STEPPING MOTORS

General Introduction to Stepping Motor

Stepping Motors are highly precise, digitally controlled motors that are able to provide reliable operation without using detectors to sense or indicate position. The operation of the motors is controlled through electrical pulses. The direction of current flowing through the windings of the motor are switched with each pulse. The electrical pulse is converted into shaft rotation in steps of a fixed angle. Together with the driver it constitutes an open loop controlling system, which is of low cost and simple to construct.

1 Precise Position Control

The specified number of pulses determines the output degree(s) generated.

2 Linear Speed Selection

The running speed is linearly variable and determined by the frequency of the pulses.

3 Forward & Reverse, Pause and Holding Function

The forward & reverse rotation is controlled by the polarity. There is still Holding torque even while the motor rotor is being locked. There is still current flowing through the motor winding, but no pulse signal creating rotation from the outside controller.

4 Low Speed Feature

Low frequency pulses being input, a stepping motor can operate at very low rotating speeds. This can be done without a speed reduction gearbox and there by save power and maintain precision.

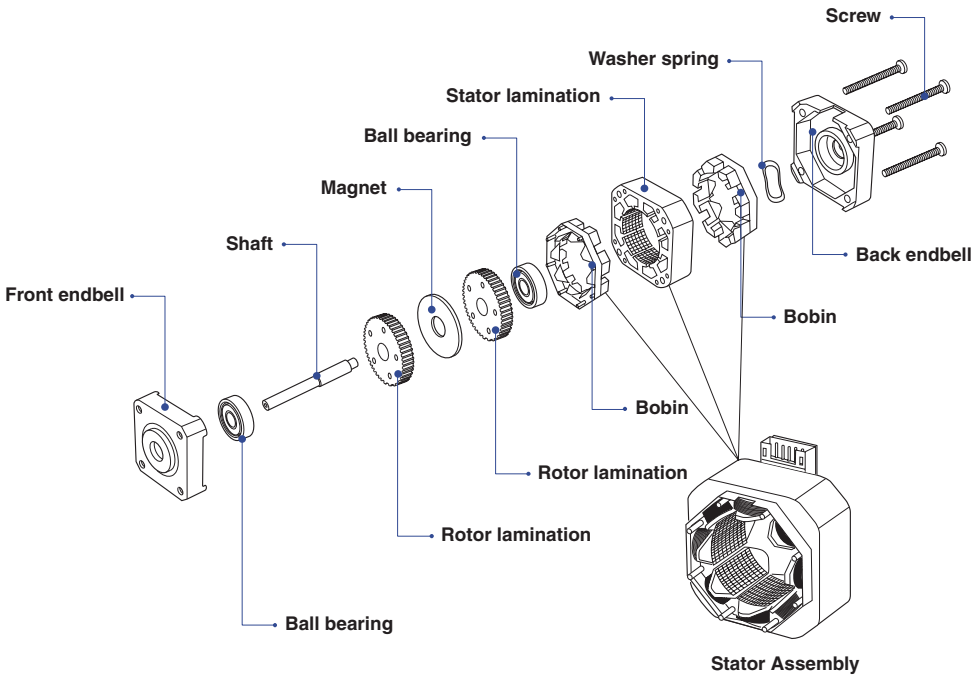
5 Long Life

The brushless design provides stepping motors with a very long life. In fact, the stepping motor life is determined by the life of the bearings.

Stepping motors are widely being used in many types of digitally controller motion control applications, such as printers, intelligent (performance) stage lighting, office, bank and industrial equipment, medical, packaging, textile, aerospace, robotics and automotive.

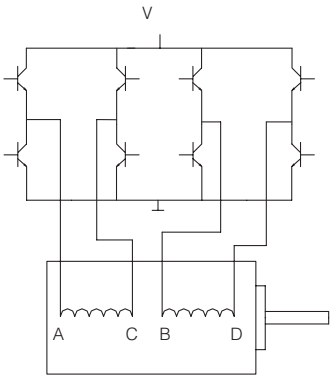
General Structure and Operating Principles of Sepping Motor

1 Basic Structure



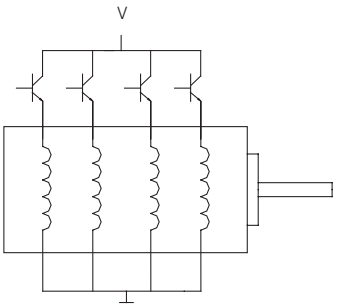
2 Operating Principles

The driver's internal logic circuit generates a series of pulses in a specified order that drive the stepping motor windings, causing the rotor to rotate forward, reverse, or lock in position. For example: a 1.8 degree stepping motor normally is designed with two types of windings, i.e. 2 phase (bipolar) or 4 phase (unipolar).



2 phase stepping motor with bipolar driver

When energizing its coils by special sequence, this motor will rotate 1.8 degree per step. On average, a 2 phase stepping motor provides, 40% more holding torque than a 4 phase stepping motor, because 100% of the winding is used in a bipolar drive.



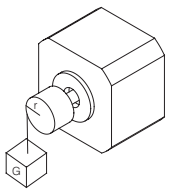
4 phase stepping motor with unipolar driver

This is brief introduction to stepping motor operating principles. Various conditions and applications may need customized designs which MOONS' can provide.

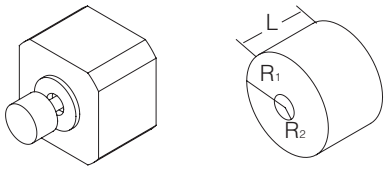
Explanation to Acceleration of Stepping Motor

1 Type of Load

A. Torque load (Tf)
Tf = G • r
G: weight
r: radius

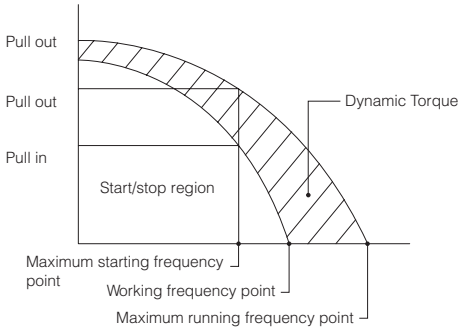


B. Inertia load (TJ)
TJ = J * dw/dt
$J = M * (R_1^2+R_2^2) / 2$ (Kg * cm)
M: mass
R1: outside radius
R2: inside radius
dw/dt: angle acceleration



2 Explanation of the Dynamic Torque Curve

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



Keyword Explanation

1. Working Frequency Point express the stepping motors rotational speed value at this point
   Units Hz
   n= q * Hz / (360 * D)
   n: rev/sec
   Hz: the frequency value at this point
   D: the subdividing value of motor driver
   q: the step angle of stepping motor
   E.g.: 1.8° stepping motor, in the condition of I/2 subdividing (each step 0.9°) runs at 500Hz its speed is 1.25r/s.

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

3 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.

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

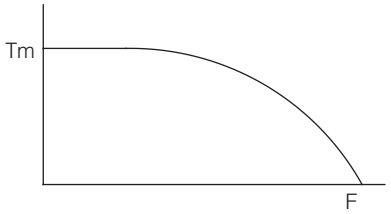
5 Maximum running frequency point at this point the stepping motor can reach its maximum running speed under an unloaded condition.

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

7 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.

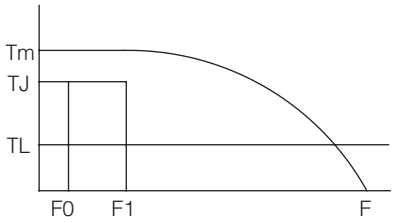
3 Control of Acceleration and Deceleration

How to accelerate or decelerate in the shortest time is the most important when the system's operating frequency point is in the slew range of the dynamic torque curve graph.

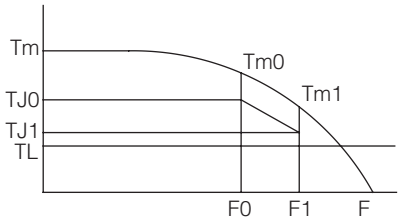


It is shown by the following graph: the dynamic torque's performance of stepping motor will always keep a horizontal straight line in low speed. But in high speed, the curve will slope down quickly influenced by the inductance.

(1) Accelerated Motion of Straight Line
Motor's load value is known as TL, it has to be accelerated from F0 to F1 in the shortest time (tr), what is the value of tr?
A. Generally TJ = 70%Tm
B. $tr = 1.8 * 10^{-5} * J * q * (F1-F0)/(TJ-TL)$
C. F (t) = (F1-F0) * t/tr + F0, 0<t<tr



(2) Exponential Acceleration
A. Generally TJ0 = 10%Tm0, TJ1 = 70%Tm1, TL = 60%Tm1
B. tr = F4 * In [(TJ0-TL)/(TJ1-TL)]
C. F (t) = F2 * [1 – e^(-t/F4)] + F0, 0<t<tr
F2 = (TL-TJ0) * (F1-F0)/(FJ1-TJ0)
$F4 = 1.8 * 10^{-5} * J * q * F2/(TJ0-TL)$



Note: J is the torque inertia of motor rotor plus its load q is the angle of each step, it equals to the step angle of stepping motor when motor runs in full step. As for the control of deceleration, it can be realized by turning the accelerate pulse frequency above-mentioned.

Reduction of Vibration and Noise

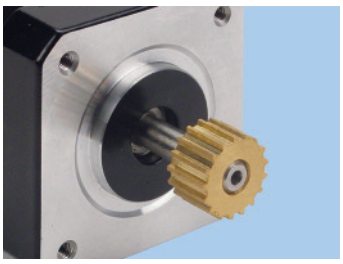
In a non-loading condition, stepping motors may appear to have vibration or even lose steps when the motor is running at or close to resonant frequency.

Solutions for These Conditions

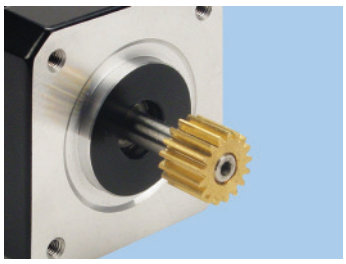
A. Having the motor operate outside of this range.

B. By adopting the micro-step driving method, you can divide one step into multiple steps thereby reducing the vibration, Micro-step is used for increasing a motor's step resolution. This is accomplished by controlling the motor's phase current ratio. Micro-step does not increase step accuracy. However it will allow a motor to run more smoothly and with less noise When the motor runs in half step mode the motor torque will be 15% less than running in full step mode If the motor is controlled by sine wave current the motor torque will be reduced by 30%.

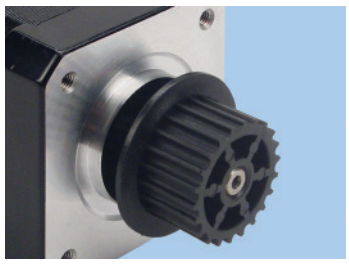
Shaft Configuration



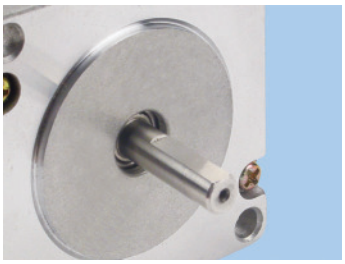
Pulley



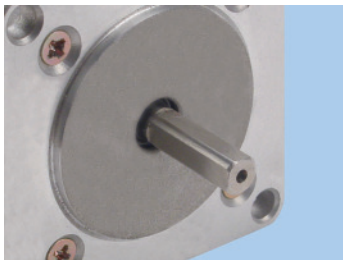
Gear



Plastic Pulley

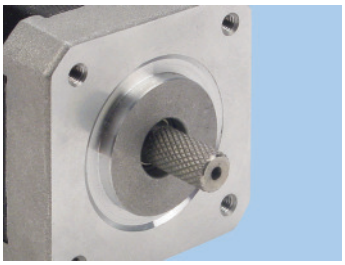


Single Flat



Double Flat

Key Way



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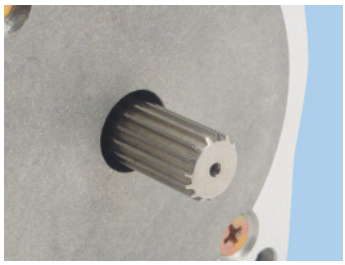
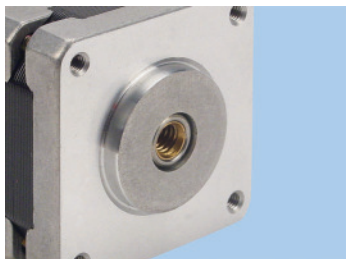
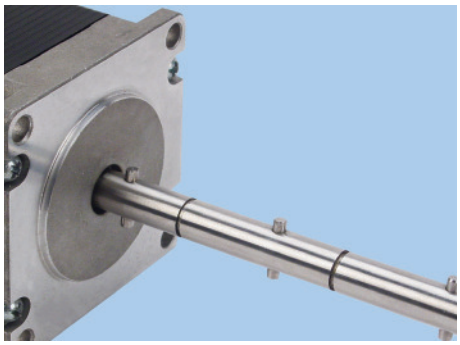


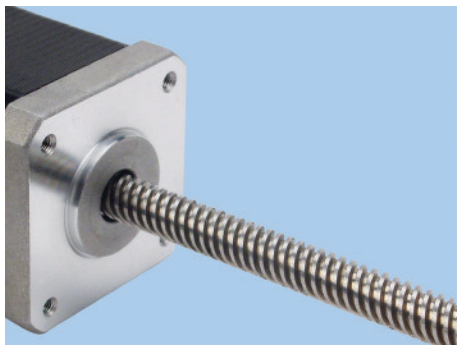
Hobbed Gear



Hollow Shaft



Dowel

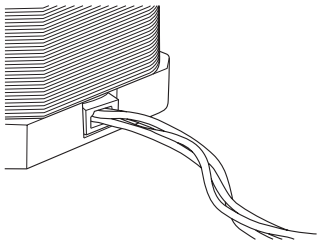


Worm Shaft

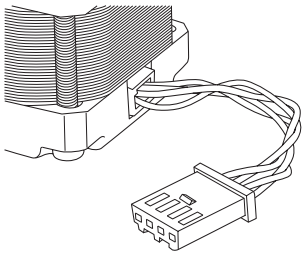
Note:

The styles above are in normal way.
Other special shafts can be customized.

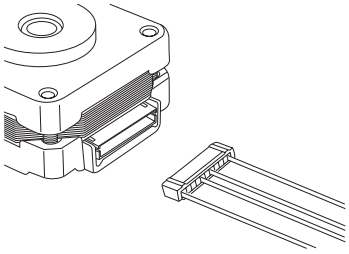
Connection Configuration



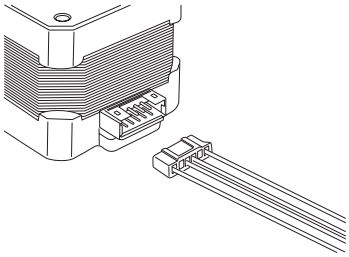
Lead Wire



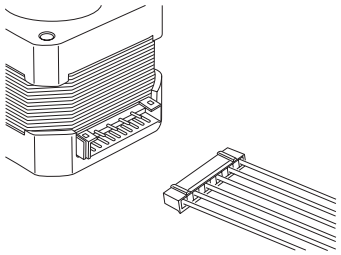
Lead Wire with Connector



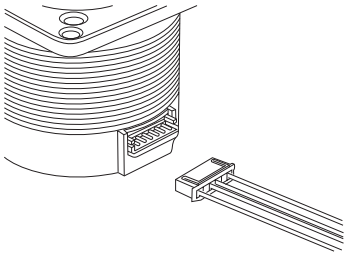
16HY7 Male: JST S11B-ER (LF)(SN)
Female: JST ZHR-11



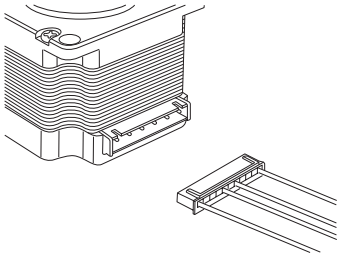
16HY Male: JST S6B-PH-K (LF)(SN)
Female: JST PHR-6



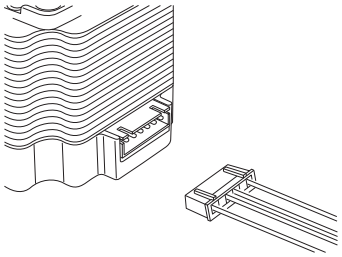
17HD Male: Molex 89401-1160
Female: Molex 87369-1100



23HY Male: JST S6B-FH (LF)(SN)
Female: JST PHR-6



23HS Male: JST S11B-XH-A-1 (LF)(SN)
Female: JST-XHP-11



23HS Male: JST S6B-XH-A-1 (LF)(SN)
Female: JST-XHP-6

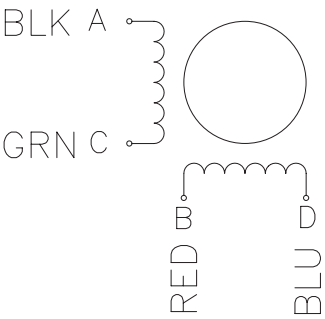
Note:

The styles above are in normal way.
Other special connectors can be customized.

Wiring Diagram & Drive Sequence Model

Bipolar - 4 Lead Wire

WIRING DIAGRAM



DRIVE SEQUENCE MODEL

BI-POLAR FULL STEP

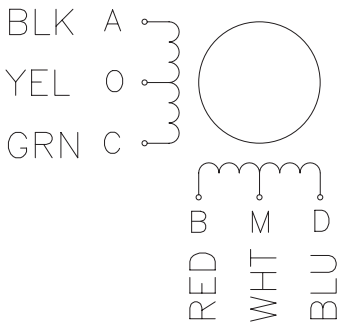
STEP	A	B	C	D
1	+	+	−	−
2	−	+	+	−
3	−	−	+	+
4	+	−	−	+

CW ↓ (step 1 → 4) / CCW ↑ (step 4 → 1)

CW(CLOCKWISE)&CCW(COUNTER CLOCKWISE) ROTATION
WHEN SEEN FROM THE FLANGE SIDE OF THE MOTOR

Unipolar – 6 Lead Wire

WIRING DIAGRAM



DRIVE SEQUENCE MODEL

UNI-POLAR FULL STEP

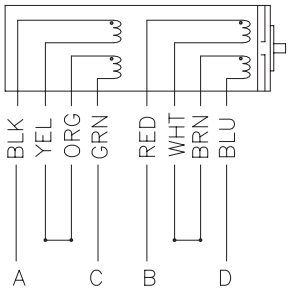
STEP	A	B	C	D	O	M
1	−	−			+	+
2		−	−		+	+
3			−	−	+	+
4	−			−	+	+

CW ↓ (step 1 → 4) / CCW ↑ (step 4 → 1)

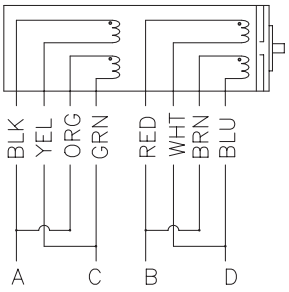
CW(CLOCKWISE)&CCW(COUNTER CLOCKWISE) ROTATION
WHEN SEEN FROM THE FLANGE SIDE OF THE MOTOR

8 Lead Wire Serie

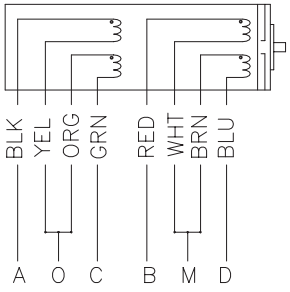
1. BI-POLAR SERIES

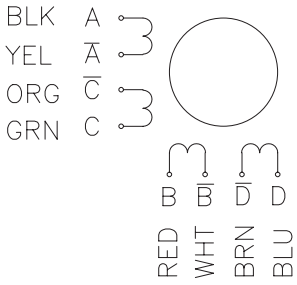


2. BI-POLAR PARALLEL



3. UNI-POLAR





1. BI-POLAR FULL STEP

STEP	A	B	C	D
1	+	+	−	−
2	−	+	+	−
3	−	−	+	+
4	+	−	−	+

CW ↓ (step 1 → 4) / CCW ↑ (step 4 → 1)

2. UNI-POLAR FULL STEP

STEP	A	B	C	D	O	M
1	−	−			+	+
2		−	−		+	+
3			−	−	+	+
4	−			−	+	+

CW ↓ (step 1 → 4) / CCW ↑ (step 4 → 1)

CW(CLOCKWISE)&CCW(COUNTER CLOCKWISE) ROTATION
WHEN SEEN FROM THE FLANGE SIDE OF THE MOTOR

Hybrid Stepping Motor Series

Model Numbering System

17 H D 0 0 01 - 01

1 2 3 4 5 6 7

1. Size: Motor outside diameter in tenths of an inch (Ex: size 17 = 1.7")
2. Type of Stepping Motor: "H" means Hybrid Stepping Motor
3. Type of Step Angle:
   - Y: Step angle 1.8°, stator with 8 polar, small rotor
   - M: Step angle 1.8°, stator with 8 polar, middle rotor
   - S: Step angle 1.8°, stator with 8 polar, large rotor
   - A: Step angle 0.9°, stator with 8 polar
   - B: Step angle 0.72°
   - C: Step angle 1.2°
   - D: Step angle 1.8°, stator with 8 polar, teeth distributing asymmetrically
   - E: Step angle 3.6°, stator with 8 polar
   - F: Step angle 3.75°, stator with 8 polar
4. Length of stator core
5. Type of lead wires:
   - "0" indicates connector only
   - "4, 5, 6, 8" indicates number of lead wires
6. Electric variation: variety of current, torque, etc.
7. Mechanical variation: variety of shaft, lead wires, screws, etc.

14HA SERIES 0.9°

Key Features

- High Accuracy
- Low Inertia
- Small Size

General Specifications

Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
14HA0001N	23	18	0.4	100	14.16	10	1.42	14	0.08
14HA0004N	6.6	6	0.6	85	12.04	10	1.42	14	0.08

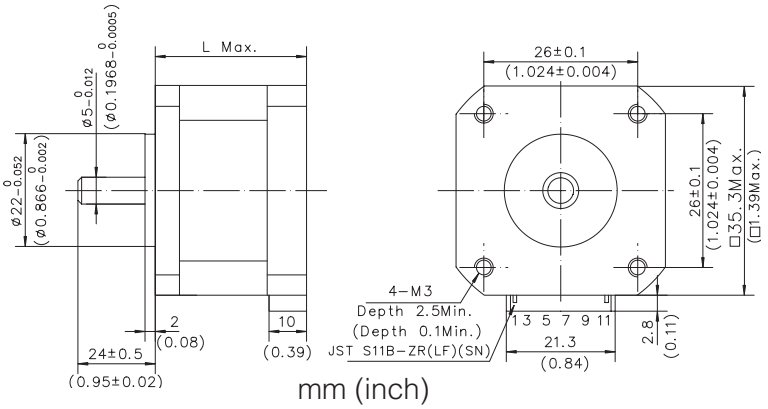
Uni-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
14HA0005N	6.6	2.7	0.6	70	9.92	10	1.42	14	0.08
14HA0006N	23	9	0.4	90	12.75	10	1.42	14	0.08

Motor Wiring Diagram —> Page A-8

Mechanical Dimension

Model Number	L	Mass
	mm (in.)	kg (lb.)
14HA0**N	28 (1.10)	0.16 (0.35)

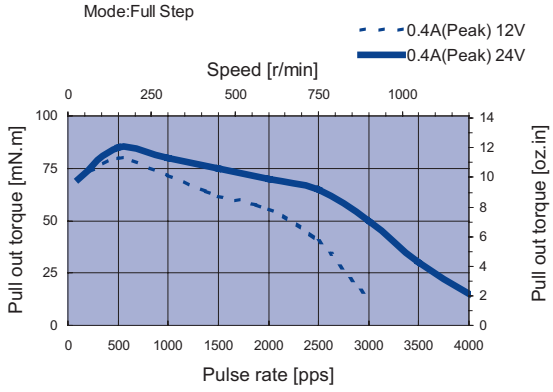


mm (inch)

Dynamic Torque Curves

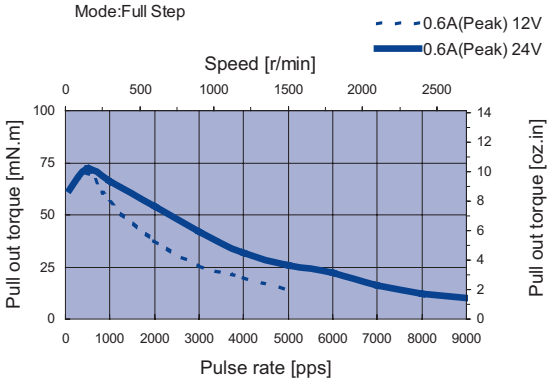
14HA0001N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



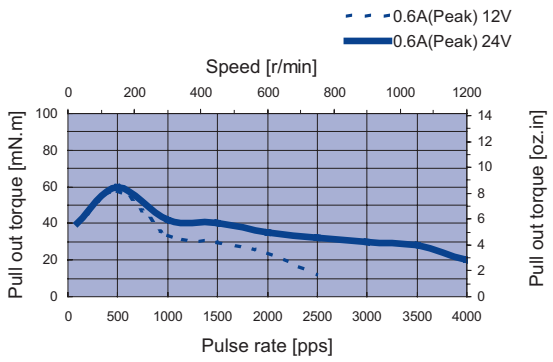
14HA0004N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



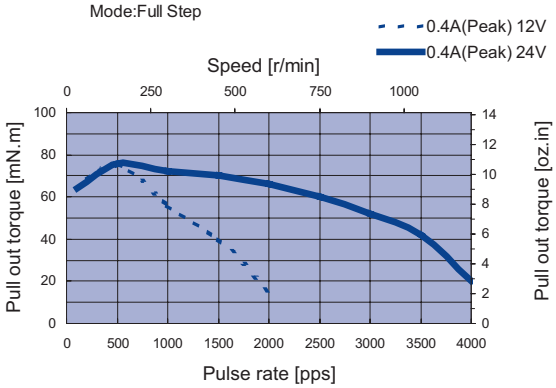
14HA0005N

Conditions: Uni-polar Constant Current Drive
IC: AMA MSU3040M
Mode:Full Step



14HA0006N

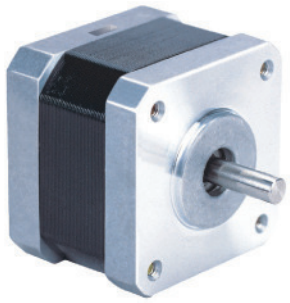
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



17HA SERIES 0.9°

Key Features

- High Accuracy
- Low Noise
- Smooth Movement



General Specifications

Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
17HA0403-44N	8	11	0.43	90	12.75	8	1.13	20	0.11
17HA4401-05N	3.1	3.6	0.87	180	25.50	12	1.70	38	0.21
17HA4402-16N	20	23	0.5	220	31.16	12	1.70	38	0.21
17HA7402-06	6.6	7	0.65	70	9.92	5	0.71	15	0.08

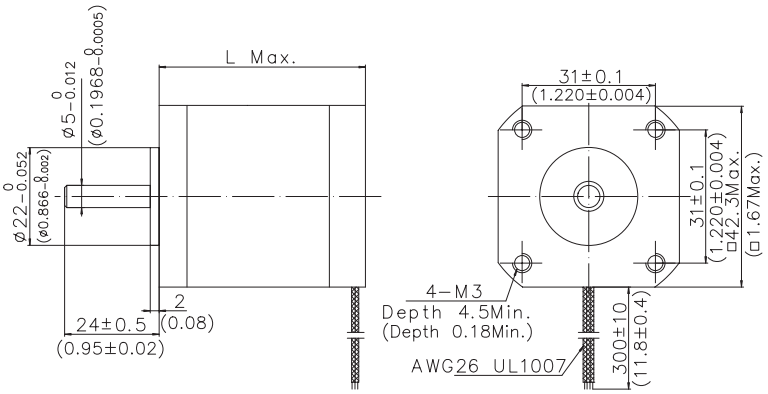
Uni-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
17HA0601N	8	4	0.43	50	7.08	8	1.13	20	0.11
17HA4605N	3.1	2.3	0.87	160	22.66	12	1.70	38	0.21
17HA4606N	20	13	0.5	200	28.33	12	1.70	38	0.21
17HA7602	6.6	2.9	0.65	30	4.25	5	0.71	15	0.08

Motor Wiring Diagram —> Page A-8

Mechanical Dimension

Model Number	L	Mass
	mm (in.)	kg (lb.)
17HA0**N	28 (1.10)	0.19 (0.42)
17HA4**N	34.3 (1.35)	0.23 (0.51)
17HA7**	20 (0.79)	0.12 (0.26)

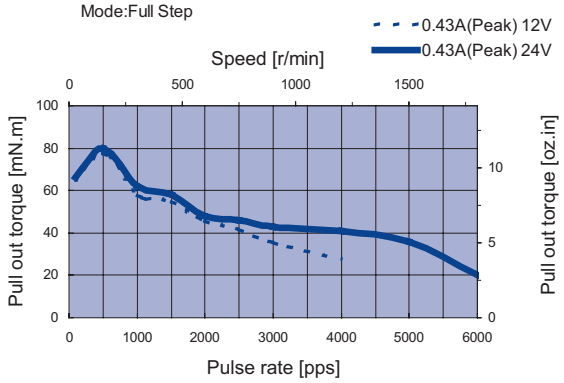


mm (inch)

Dynamic Torque Curves

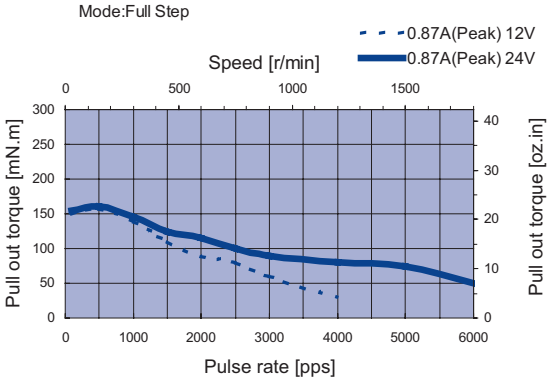
17HA0403-44N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



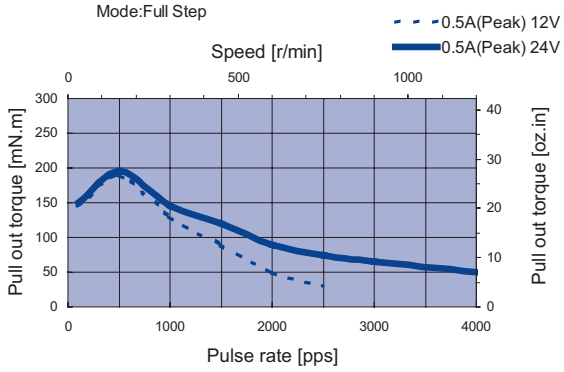
17HA4401-05N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



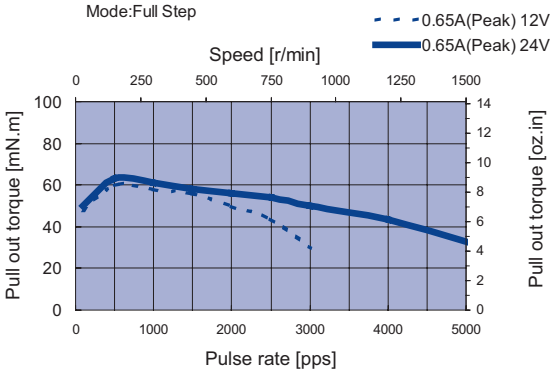
17HA4402-16N

Conditions:Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



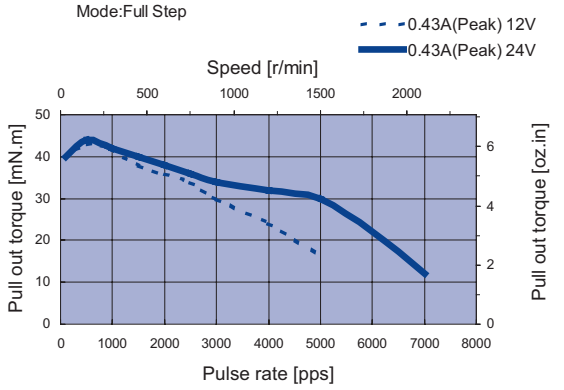
17HA7402-06

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



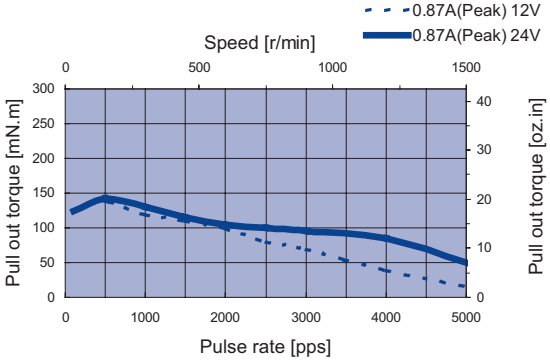
17HA0601N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



17HA4605N

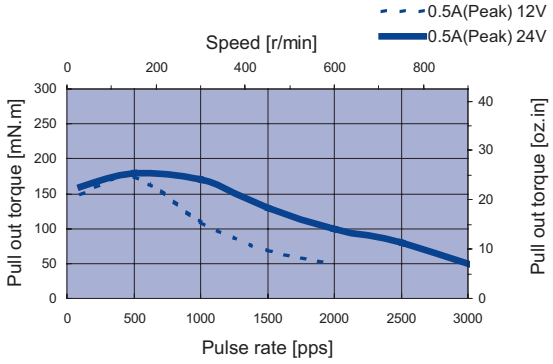
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



Dynamic Torque Curves

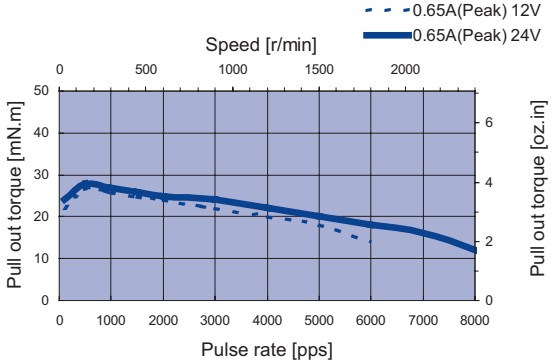
17HA4606N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



17HA7602

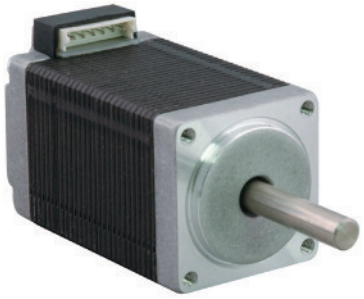
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



11HS SERIES 1.8°

Key Features

- High Accuracy
- Low Inertia
- Small Size



General Specifications

Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
11HS1005	40	27.8	0.25	55	7.79	5	0.71	9	0.05
11HS1006	5.6	4.3	0.67	60	8.50	5	0.71	9	0.05
11HS1007	10.4	7.6	0.5	50	7.08	5	0.71	9	0.05
11HS1008	2.5	2.2	1	55	7.79	5	0.71	9	0.05
11HS3005	6.8	6.0	0.67	90	12.75	6	0.85	12	0.07
11HS5005	12	12	0.5	100	14.16	8	1.13	18	010
11HS5007	51.8	30.7	0.25	95	13.46	8	1.13	18	010
11HS5008	3.5	2.3	1	100	14.16	8	1.13	18	010
11HS5009	9.2	5.4	0.67	110	15.58	8	1.13	18	010

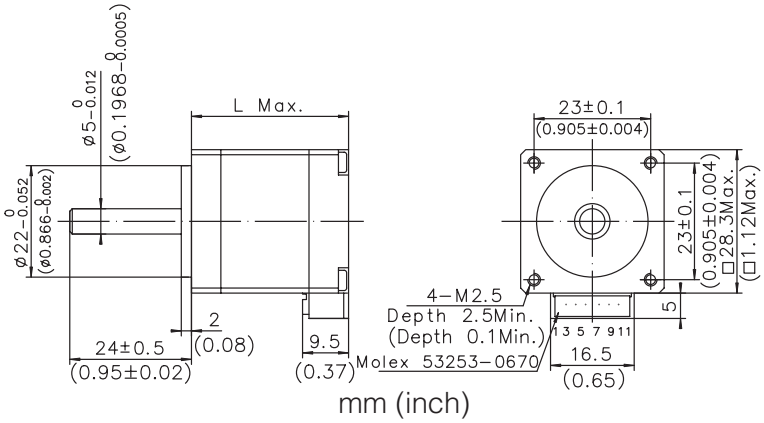
Uni-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
11HS1003	2.8	1.3	0.95	48	6.80	5	0.71	9	0.05
11HS1009	40	12	0.25	32	4.53	5	0.71	9	0.05
11HS1010	9.4	3	0.5	32	4.53	5	0.71	9	0.05
11HS3002-01	3.4	1.6	0.95	65	9.21	6	0.85	12	0.07
11HS5002-01	4.6	2.3	0.95	90	12.75	8	1.13	18	0.10
11HS5003	12	6.3	0.5	80	11.33	8	1.13	18	0.10
11HS5010	2.6	0.9	1	70	9.92	8	1.13	18	0.10

Motor Wiring Diagram —> Page A-8

Mechanical Dimension

Model Number	L	Mass
	mm (in.)	kg (lb.)
11HS1**	31 (1.21)	0.10 (0.22)
11HS3**	40 (1.56)	0.15 (0.33)
11HS5**	51 (2.01)	0.20 (0.44)

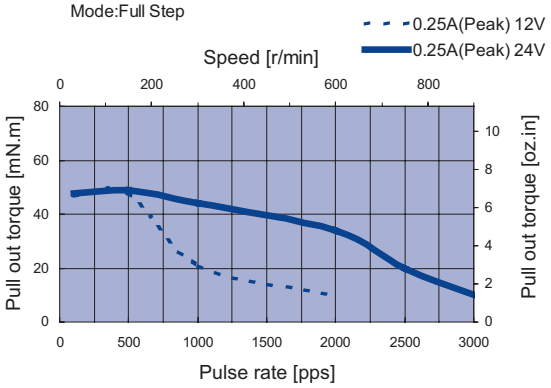


mm (inch)

Dynamic Torque Curves

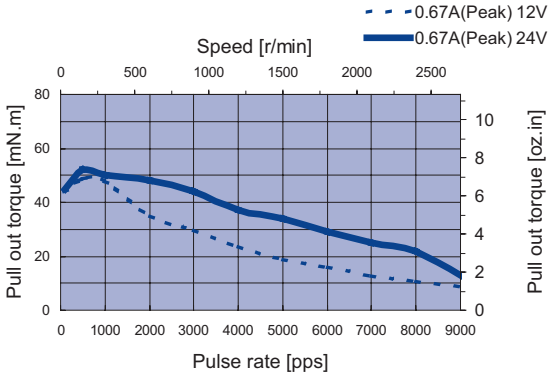
11HS1005

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



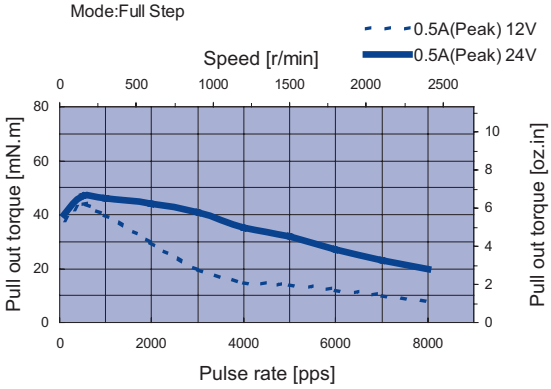
11HS1006

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



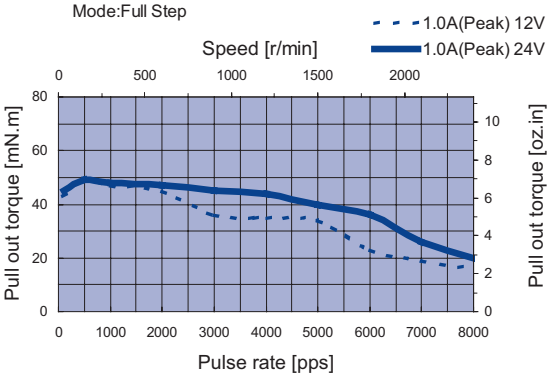
11HS1007

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



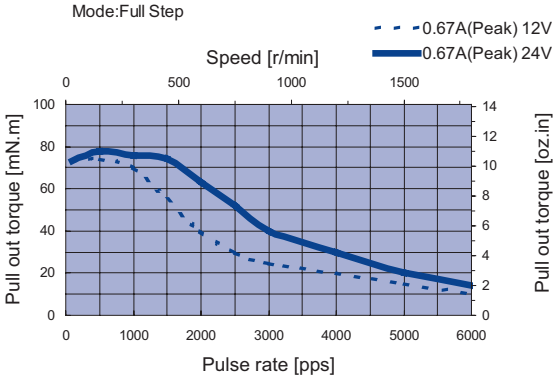
11HS1008

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



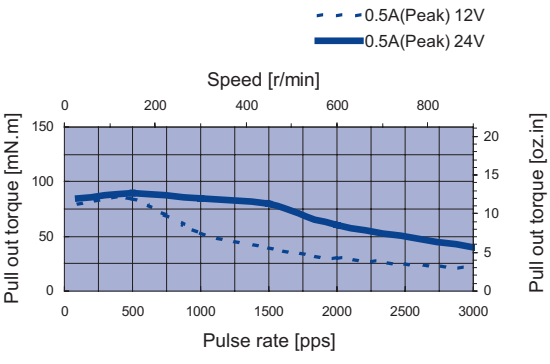
11HS3005

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



11HS5005

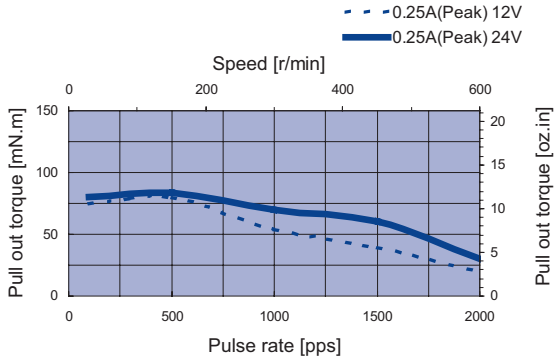
Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



Dynamic Torque Curves

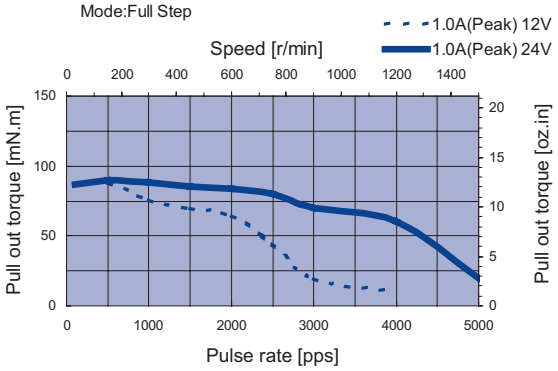
11HS5007

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



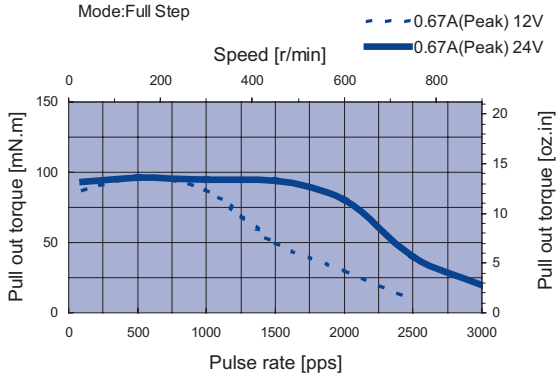
11HS5008

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



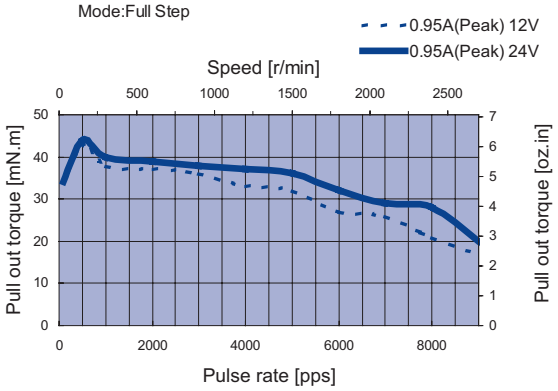
11HS5009

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



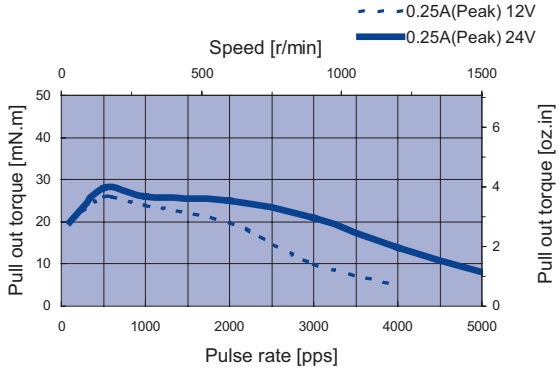
11HS1003

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



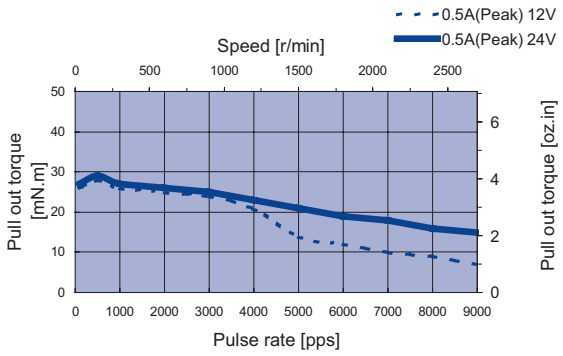
11HS1009

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



11HS1010

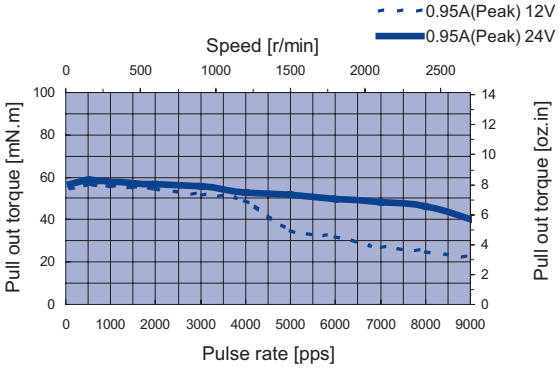
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



Dynamic Torque Curves

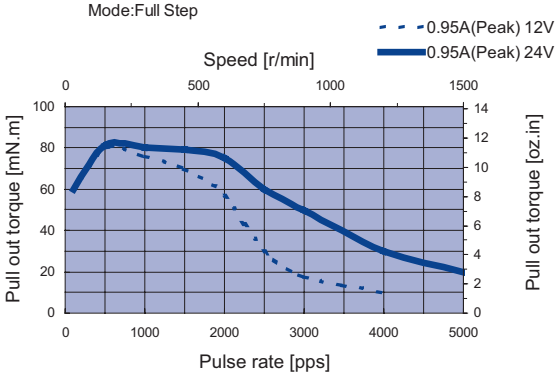
11HS3002-01

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



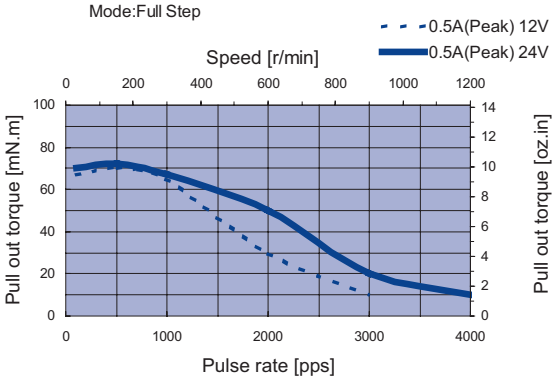
11HS5002-01

Conditions:Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



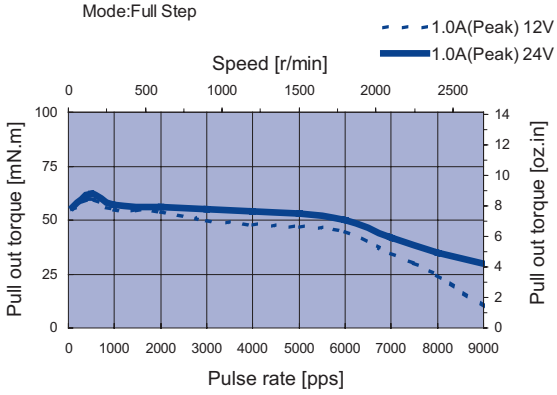
11HS5003

Conditions:Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



11HS5010

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



14HY SERIES 1.8°

Key Features

- Low Inertia
- Small Size
- High Acceleration

General Specifications

Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
14HY5010	9	8	0.4	60	8.50	10	1.42	12	0.07
14HY8002	5.5	5	0.85	100	14.16	15	2.12	20	0.11

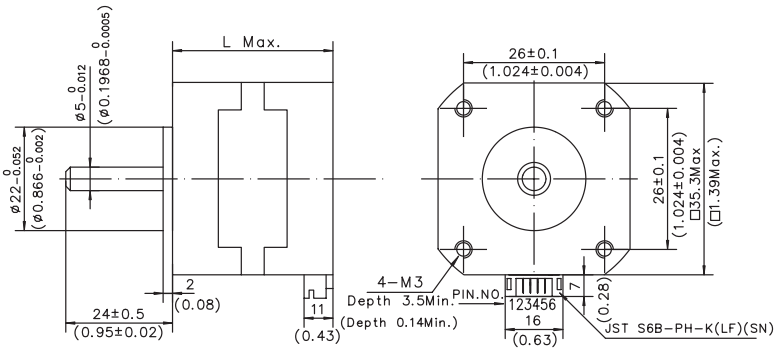
Uni-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
14HY5011	9	4.2	0.4	45	6.37	10	1.42	12	0.07
14HY8001	2.7	1.4	1.2	80	11.33	15	2.12	20	0.11

Motor Wiring Diagram —> Page A-8

Mechanical Dimension

Model Number	L	Mass
	mm (in.)	kg (lb.)
14HY5**	26 (1.01)	0.15 (0.33)
14HY8**	37 (1.44)	0.21 (0.46)

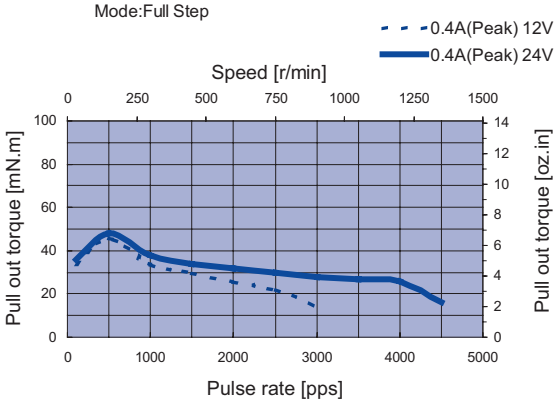


mm (inch)

Dynamic Torque Curves

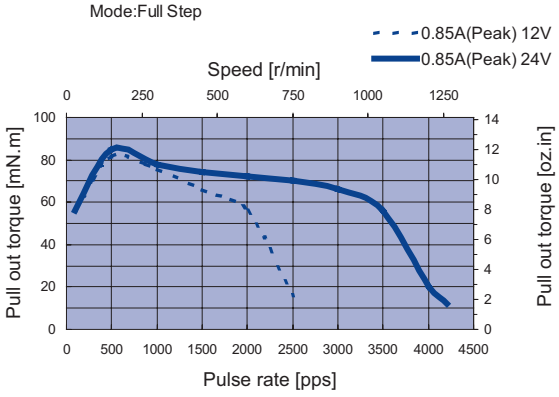
14HY5010

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



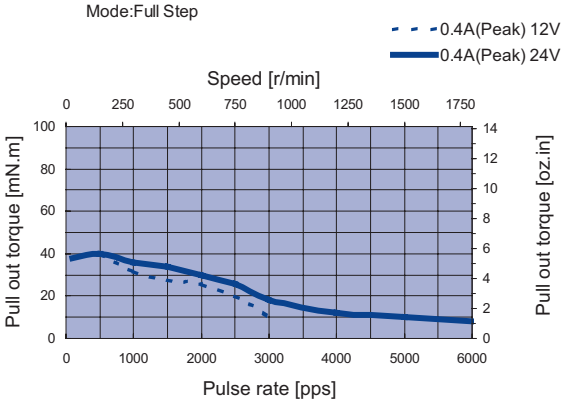
14HY8002

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



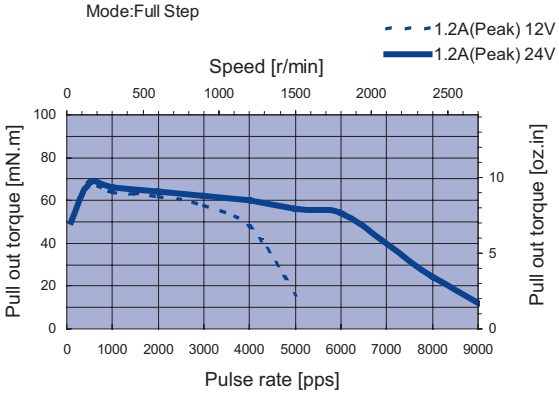
14HY5011

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



14HY8001

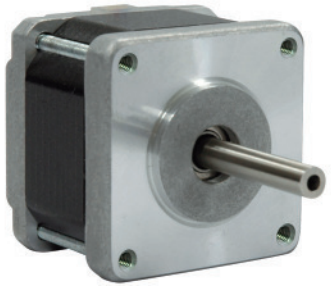
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



16HS SERIES 1.8°

Key Features

- High Torque
- High Accuracy
- Smooth Movement



General Specifications

Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
16HS4401N	7	9.6	0.65	200	28.33	15	2.12	30	0.17

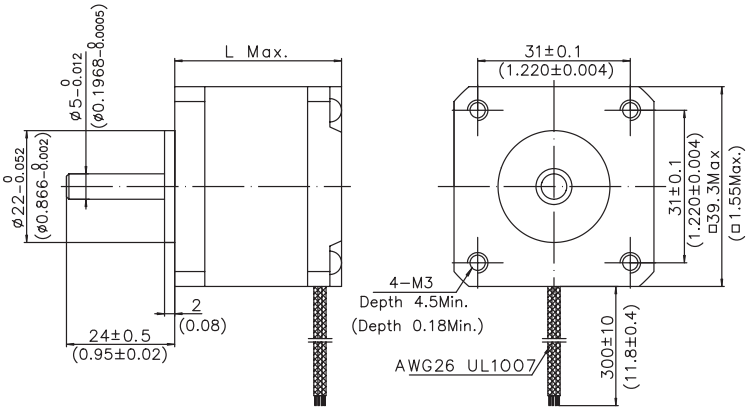
Uni-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
16HS4601N	7	5.6	0.65	150	21.25	15	2.12	30	0.17

Motor Wiring Diagram —> Page A-8

Mechanical Dimension

Model Number	L	Mass
	mm (in.)	kg (lb.)
16HS4**N	36 (1.40)	0.21 (0.46)

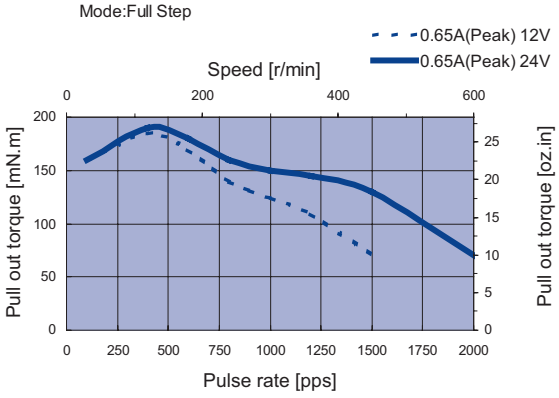


mm (inch)

Dynamic Torque Curves

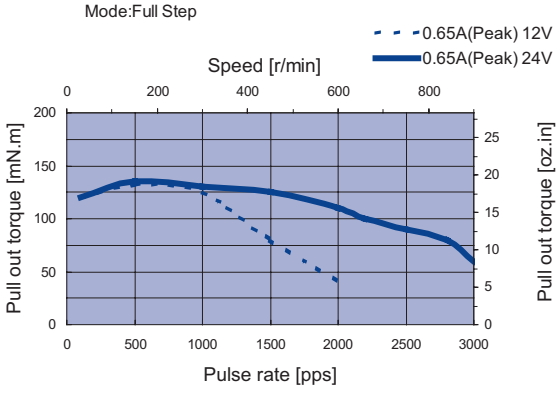
16HS4401N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



16HS4601N

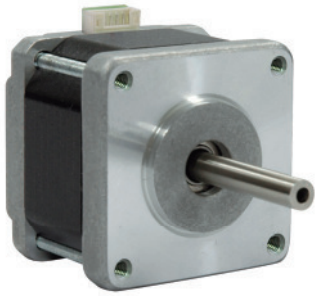
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



16HY SERIES 1.8°

Key Features

- High Accuracy
- Low Inertia
- High Acceleration



General Specifications

Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
16HY0016	39	50	0.3	150	21.25	12	1.70	20	0.11
16HY1005-04	9.8	18	0.5	200	28.33	18	2.55	24	0.13
16HY7010	14	12.2	0.5	80	11.33	5	0.71	11	0.06

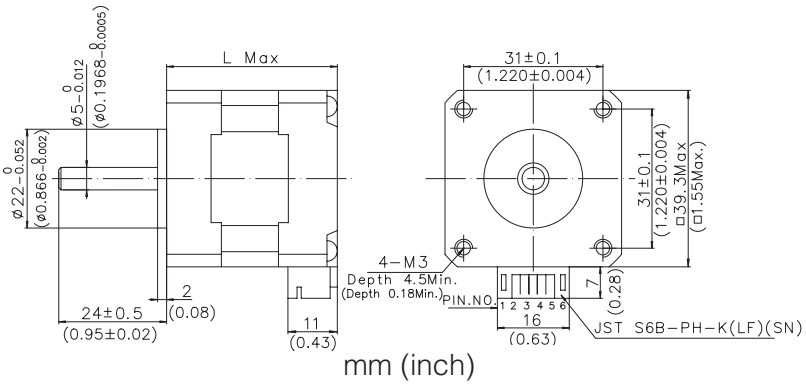
Uni-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
16HY0017	39	23.5	0.3	100	14.16	12	1.70	20	0.11
16HY1006	10.2	10.7	0.5	160	22.66	18	2.55	24	0.13
16HY7006-06	13.3	6.4	0.5	60	8.50	5	0.71	11	0.06

Motor Wiring Diagram —> Page A-8

Mechanical Dimension

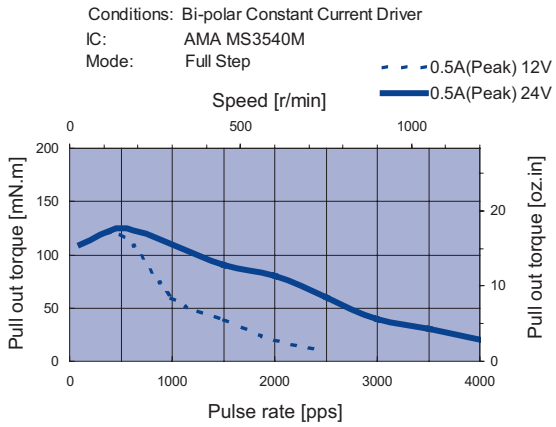
Model Number	L	Mass
	mm (in.)	kg (lb.)
16HY0**	33.3 (1.30)	0.18 (0.40)
16HY1**	38 (1.48)	0.2 (0.44)
16HY7**	20 (0.78)	0.12 (0.26)



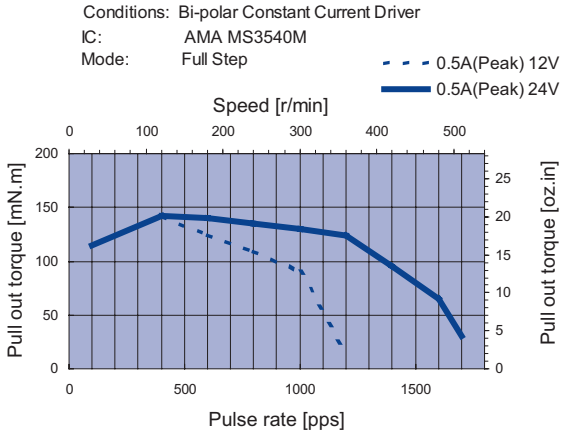
mm (inch)

Dynamic Torque Curves

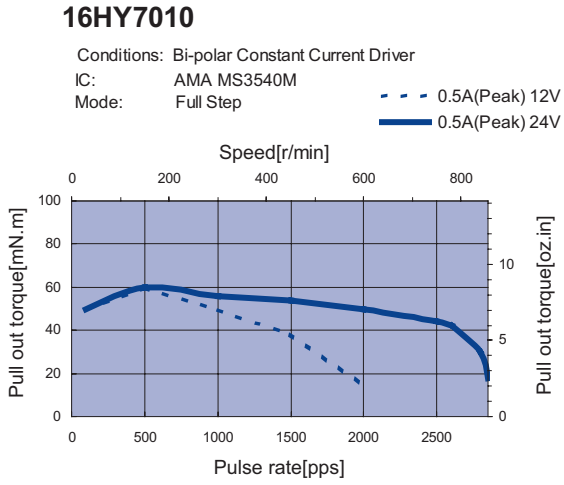
16HY0016



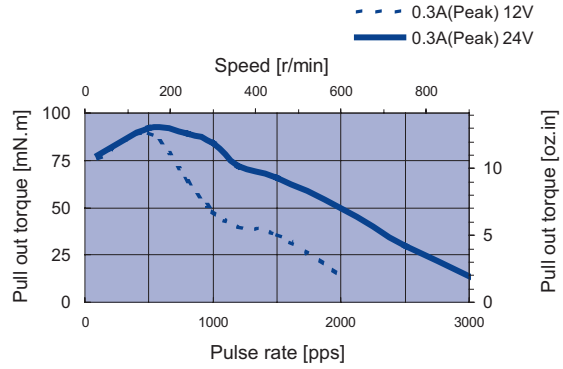
16HY1005-04



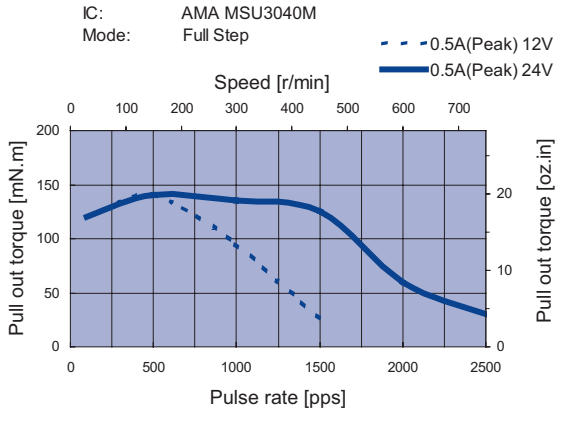
16HY7010



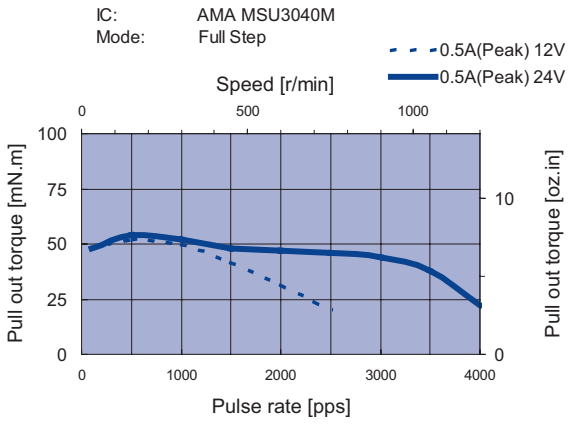
16HY0017



16HY1006



16HY7006-06



17HD SERIES 1.8°

Key Features

- High Torque
- Low Noise
- Small Size

General Specifications

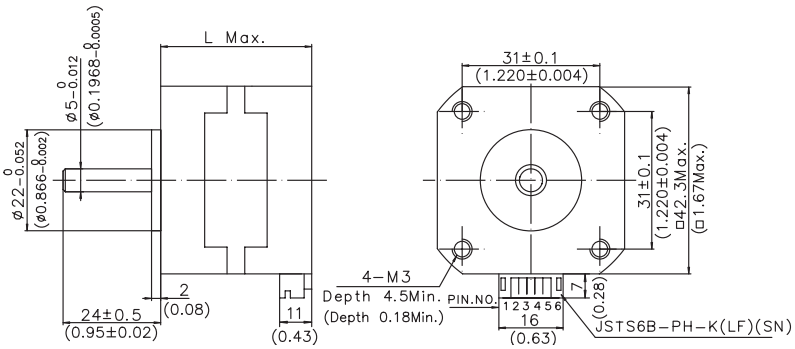
Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
17HD0013	30	27	0.4	260	36.83	12	1.70	38	0.21
17HD1004-01	25	50	0.5	400	56.66	15	2.12	57	0.31
17HD3005-10	30	45	0.4	460	65.16	25	3.54	82	0.45
17HD5003-10	24	36	0.4	180	25.50	5	0.71	20	0.11

Motor Wiring Diagram —> Page A-8

Mechanical Dimension

Model Number	L	Mass
	mm (in.)	kg (lb.)
17HD0**	33.3 (1.30)	0.21 (0.46)
17HD1**	39.3 (1.53)	0.28 (0.62)
17HD3**	47.3 (1.84)	0.36 (0.79)
17HD5**	25.3 (0.99)	0.15 (0.33)

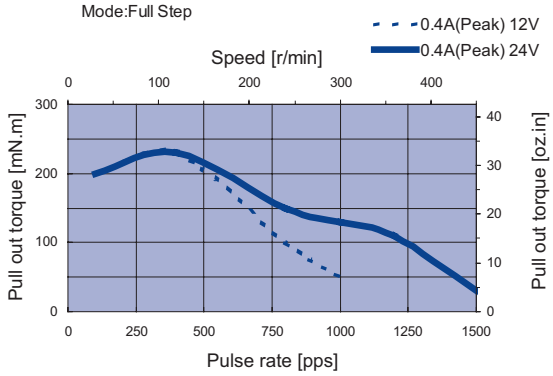


mm (inch)

Dynamic Torque Curves

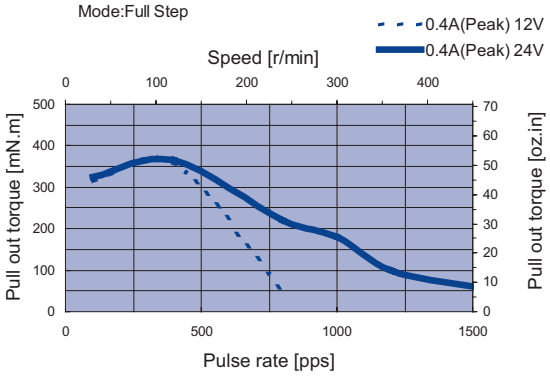
17HD0013

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



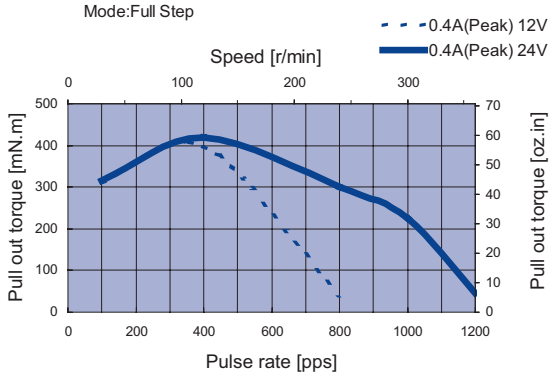
17HD1004-01

Conditions:Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



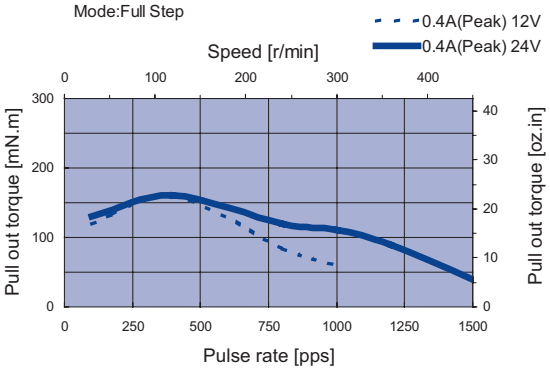
17HD3005-10

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



17HD5003-10

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



17HDN SERIES 1.8°

Key Features

- High Torque
- High Accuracy
- Smooth Movement

General Specifications

Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
17HD2011N	1.9	4	1.5	380	53.82	15	2.12	57	0.31
17HD2015N	18	35	0.5	420	59.49	15	2.12	57	0.31
17HD2018N	6	14	0.85	400	56.66	15	2.12	57	0.31
17HD2022N	16	32.0	0.50	330	46.74	15	2.12	57	0.31
17HD2023N	3.5	5	1	300	42.49	15	2.12	57	0.31
17HD2024N	4.1	8.5	1	390	55.24	15	2.12	57	0.31
17HD2025N	66	116	0.25	370	52.41	15	2.12	57	0.31
17HD2026N	4.4	10	1	390	55.24	15	2.12	57	0.31
17HD2027N	71.4	140	0.25	380	53.82	15	2.12	57	0.31
17HD2028N	60	120	0.28	400	56.66	15	2.12	57	0.31
17HD4005-01N	7.4	11.0	0.60	200	28.33	12	1.70	38	0.21
17HD4022-01N	3.0	4.2	1.10	210	29.75	12	1.70	38	0.21
17HD4024N	15	20.0	0.50	240	33.99	12	1.70	38	0.21
17HD4025N	54	78.0	0.25	230	32.58	12	1.70	38	0.21
17HD4026N	80	89.0	0.22	220	31.16	12	1.70	38	0.21
17HD4027N	48	60.0	0.28	220	31.16	12	1.70	38	0.21
17HD6012N	2.4	4.5	1.5	490	69.41	25	3.54	82	0.45
17HD6016N	5.0	8.4	1	460	65.25	25	3.54	82	0.45
17HD6017N	7.5	14	0.8	490	69.41	25	3.54	82	0.45
17HD6018N	14	23	0.57	460	65.25	25	3.54	82	0.45
17HD6019N	80	130	0.25	460	65.25	25	3.54	82	0.45
17HD6020N	20	35	0.5	490	69.41	25	3.54	82	0.45
17HD6021N	58	104	0.3	460	65.25	25	3.54	82	0.45
17HDB001N	2.3	4.6	1.5	630	89.24	30	4.25	123	0.68
17HDB002N	1.6	3	2	650	92.07	30	4.25	123	0.68

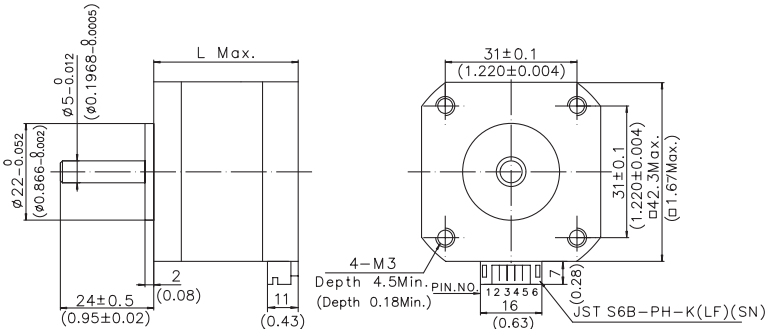
Uni-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm±10%	mH±20%	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
17HD2032N	1.8	1.7	1.6	290	41.08	15	2.12	57	0.31
17HD2033N	7.5	6.9	0.8	290	41.08	15	2.12	57	0.31
17HD4028N	8.3	5.8	0.67	167	23.65	12	1.70	38	0.21
17HD4029N	3	2.1	1.1	167	23.65	12	1.70	38	0.21
17HD4030N	2.4	2	1.2	190	26.91	12	1.70	38	0.21
17HD4031N	4.2	2.2	0.95	160	22.66	12	1.70	38	0.21
17HD4032N	24	13	0.4	160	22.66	12	1.70	38	0.21
17HD4033N	38.5	21	0.31	160	22.66	12	1.70	38	0.21
17HD6022N	3.3	2.8	1.2	360	55.99	25	3.54	82	0.45
17HD6023N	4.6	4	1.1	320	45.33	25	3.54	82	0.45
17HD6024N	30	21.6	0.4	320	45.33	25	3.54	82	0.45
17HD6025N	7.5	7.3	0.85	350	49.58	25	3.54	82	0.45
17HD6026N	2.4	2.2	1.4	422	59.77	25	3.54	82	0.45
17HDB003N	2.3	2.4	1.7	450	63.74	30	4.25	123	0.68
17HDB004N	1.6	1.6	2	450	63.74	30	4.25	123	0.68

Motor Wiring Diagram —> Page A-8

Mechanical Dimension

Model Number	L	Mass
	mm (in.)	kg (lb.)
17HD2**N	39.8 (1.57)	0.28 (0.62)
17HD4**N	34.3 (1.35).	0.21 (0.46)
17HD6**N	48.3 (1.90)	0.36 (0.79)
17HDB**N	62.8 (2.47)	0.60 (1.32)

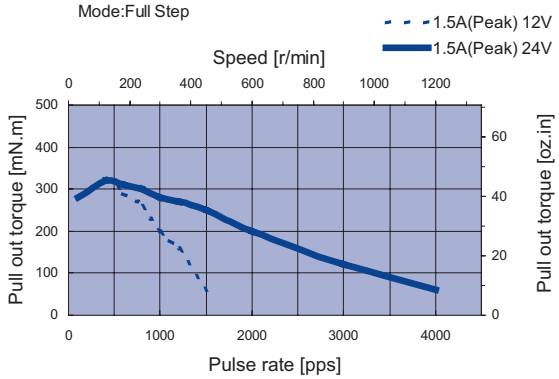


mm (inch)

Dynamic Torque Curves

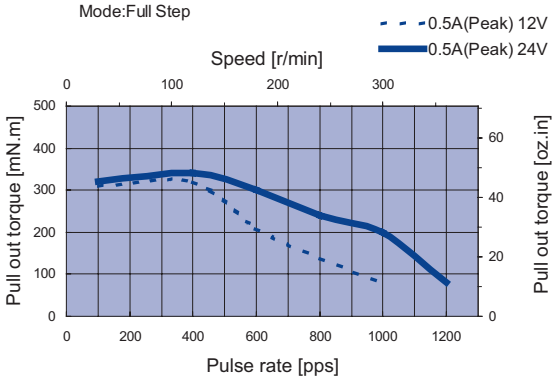
17HD2011N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



17HD2015N

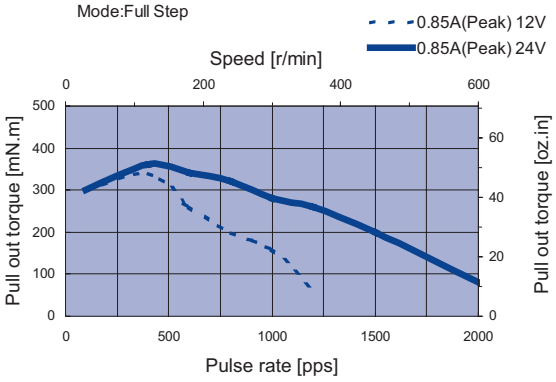
Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



Dynamic Torque Curves

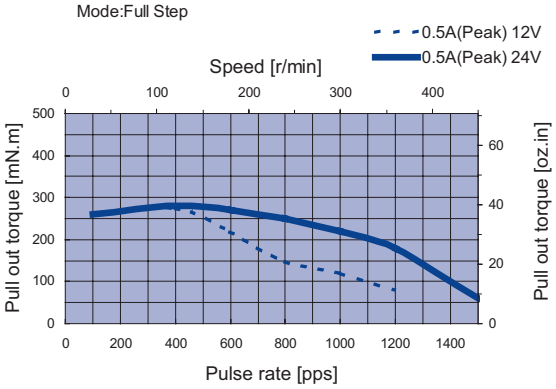
17HD2018N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



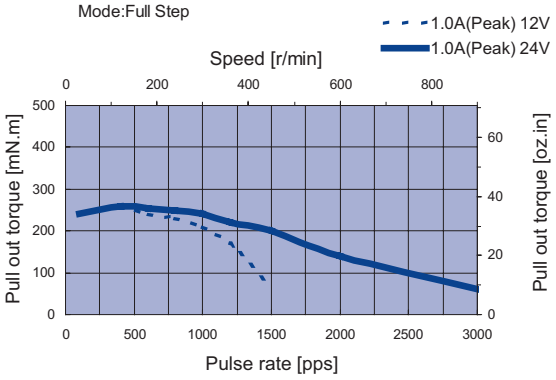
17HD2022N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



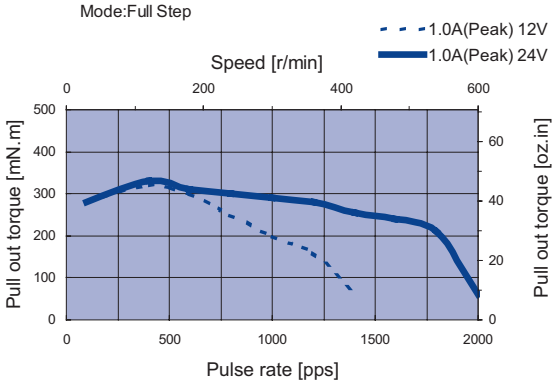
17HD2023N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



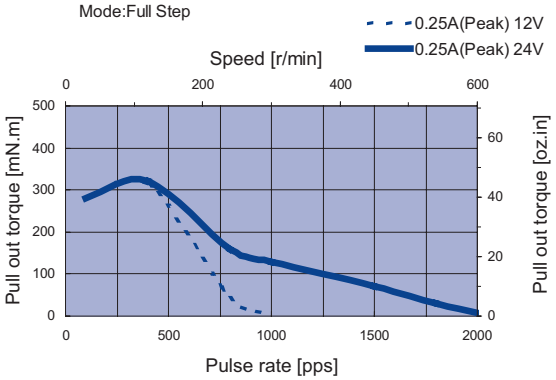
17HD2024N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



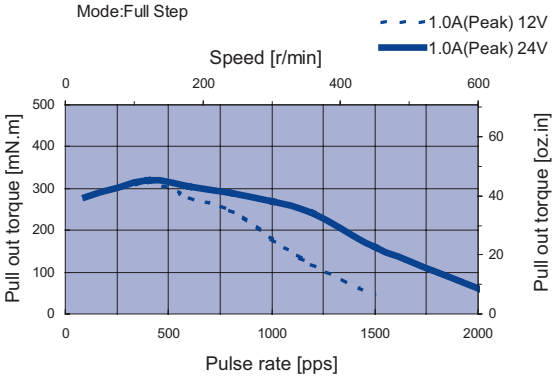
17HD2025N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



17HD2026N

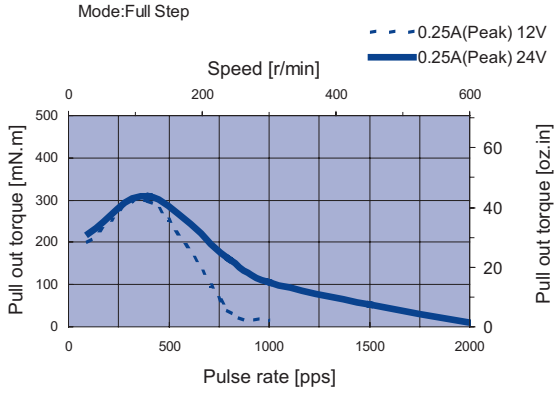
Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



Dynamic Torque Curves

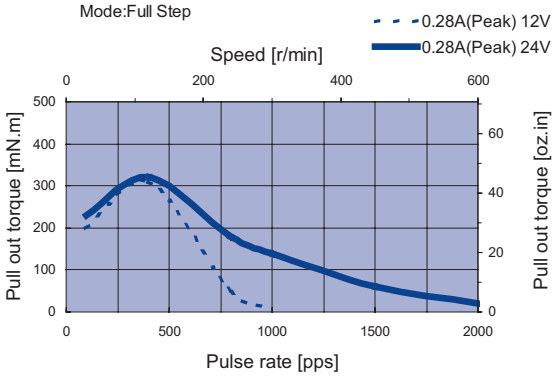
17HD2027N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



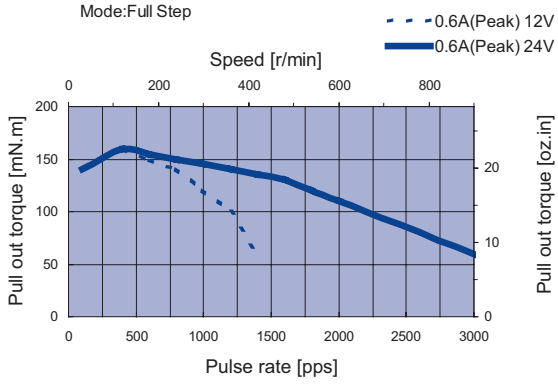
17HD2028N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



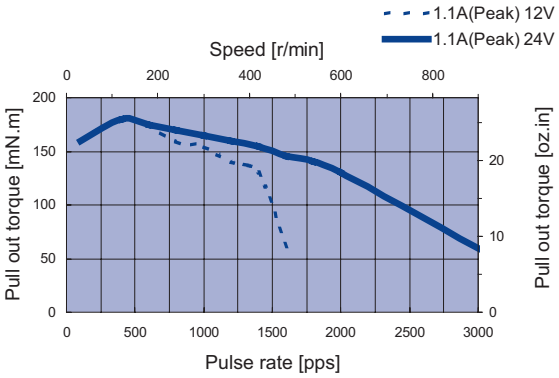
17HD4005-01N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



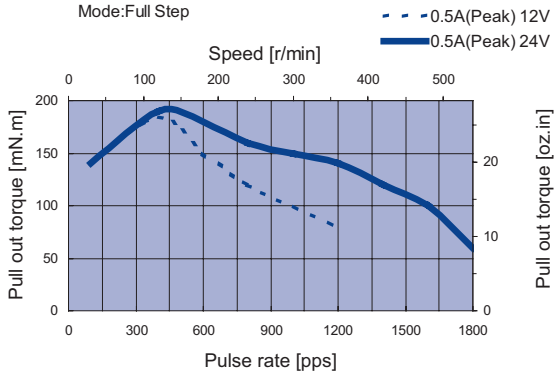
17HD4022-01N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



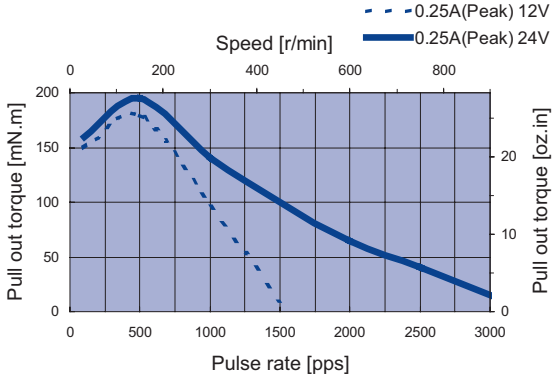
17HD4024N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



17HD4025N

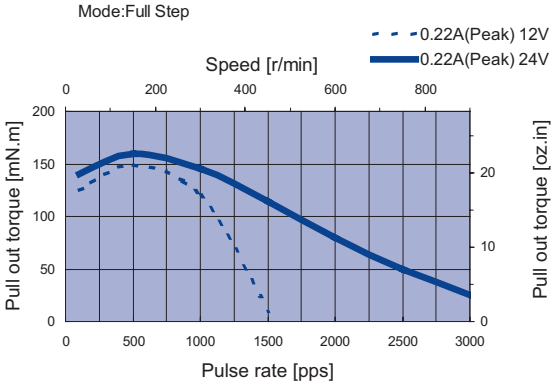
Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



Dynamic Torque Curves

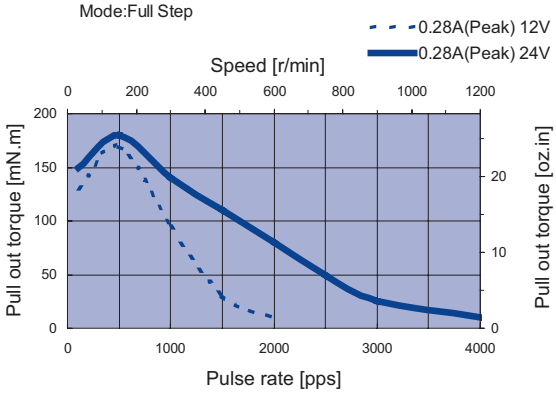
17HD4026N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



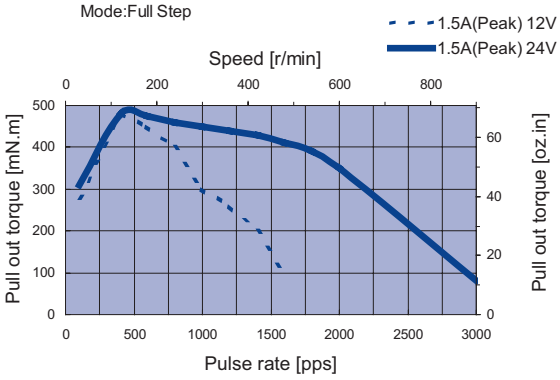
17HD4027N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



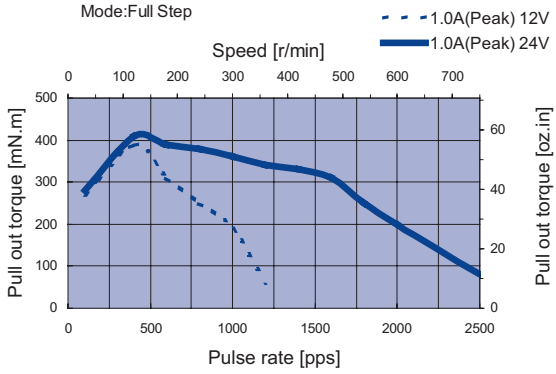
17HD6012N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



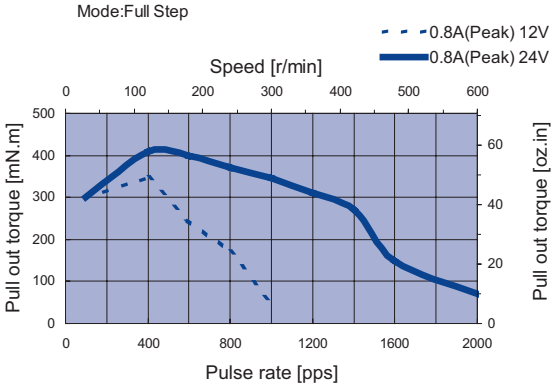
17HD6016N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



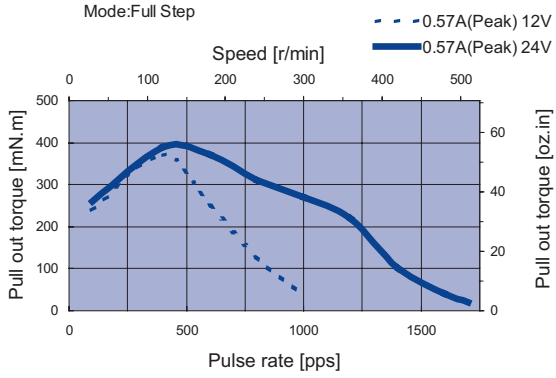
17HD6017N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



17HD6018N

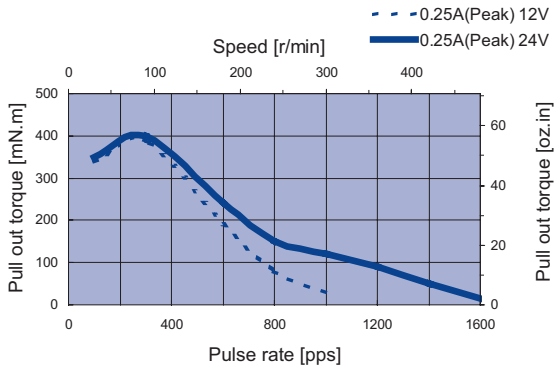
Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



Dynamic Torque Curves

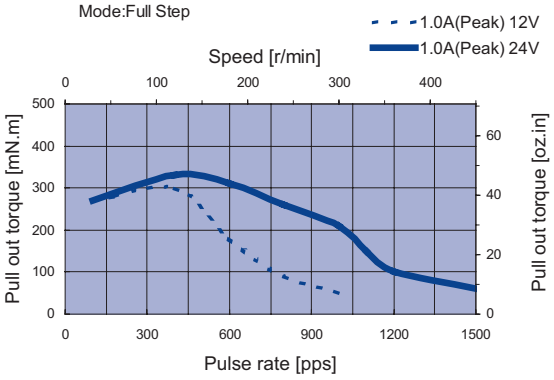
17HD6019N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



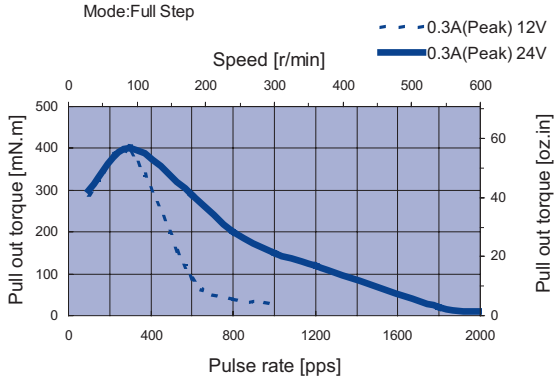
17HD6020N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



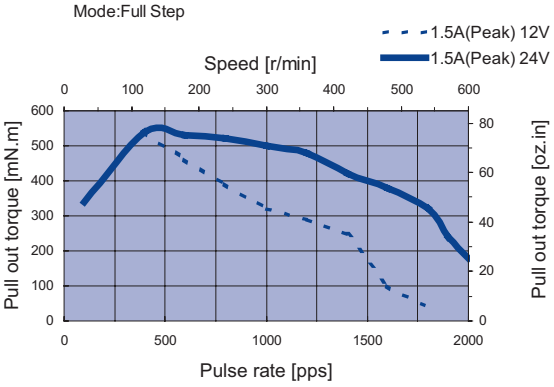
17HD6021N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



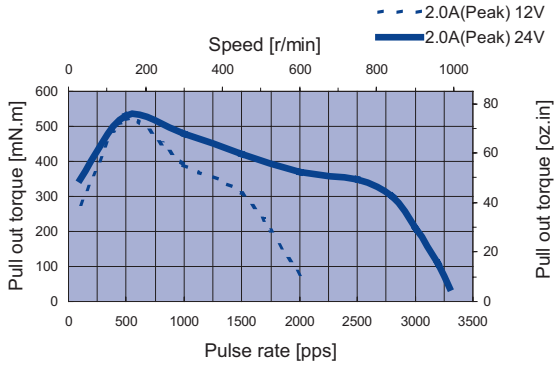
17HDB001N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



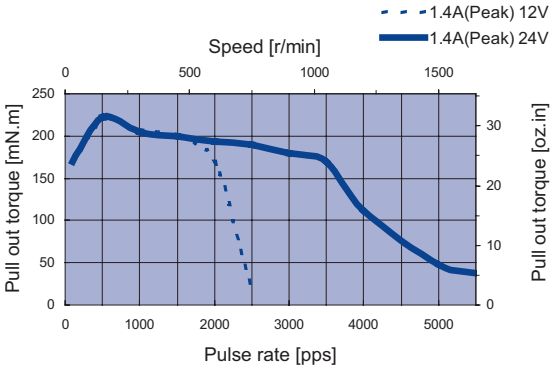
17HDB002N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



17HD2032N

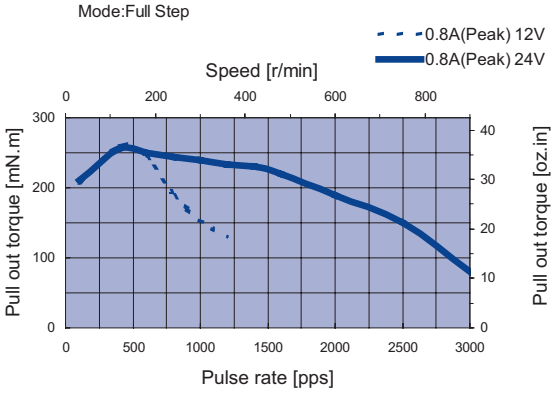
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



Dynamic Torque Curves

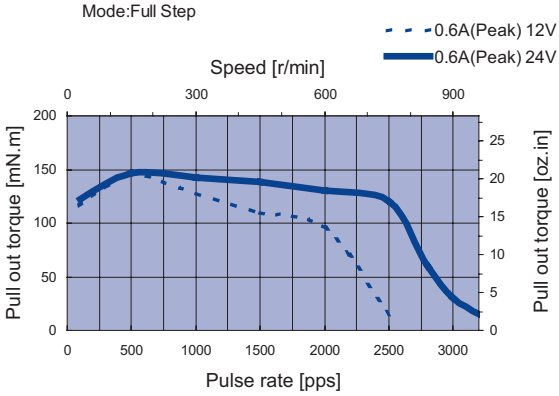
17HD2033N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



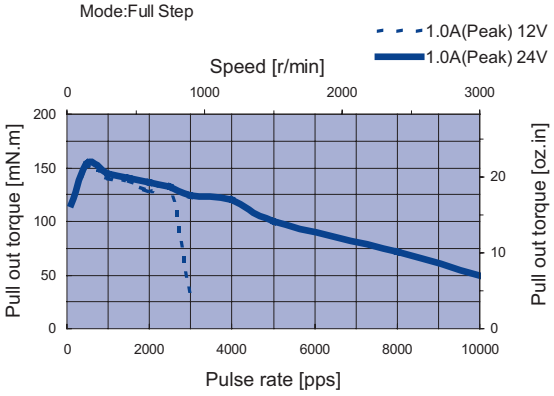
17HD4028N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



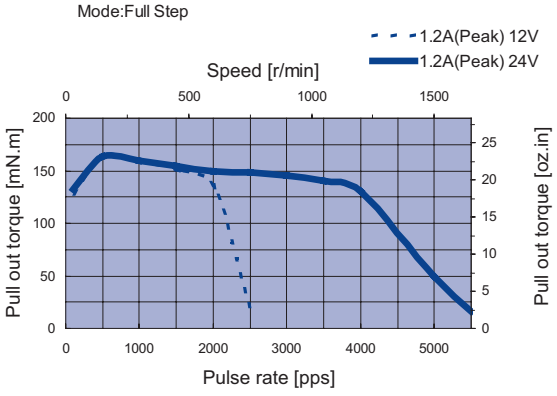
17HD4029N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



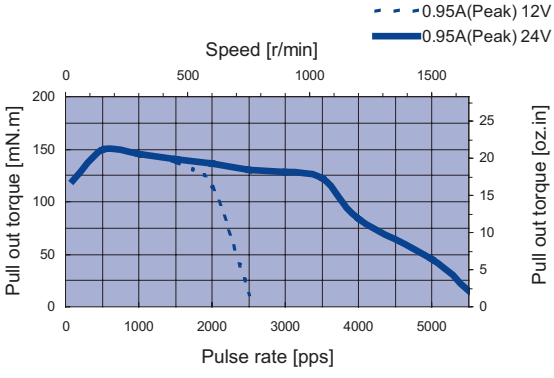
17HD4030N

Conditions:Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



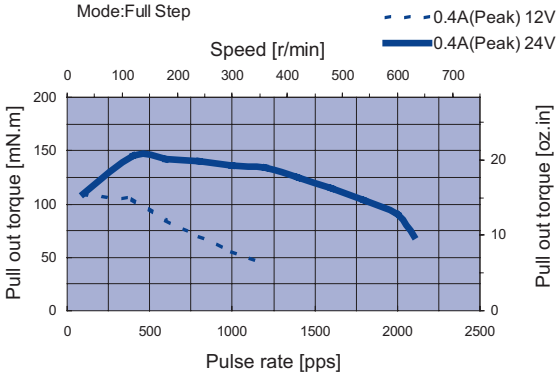
17HD4031N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



17HD4032N

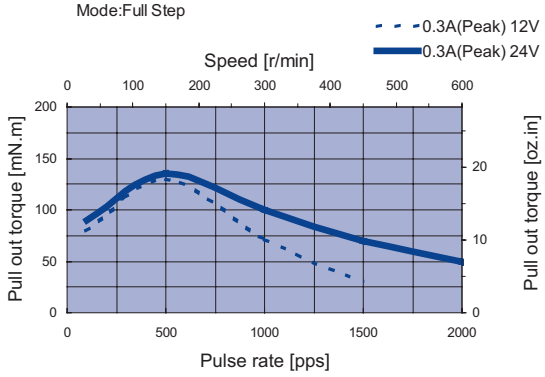
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



Dynamic Torque Curves

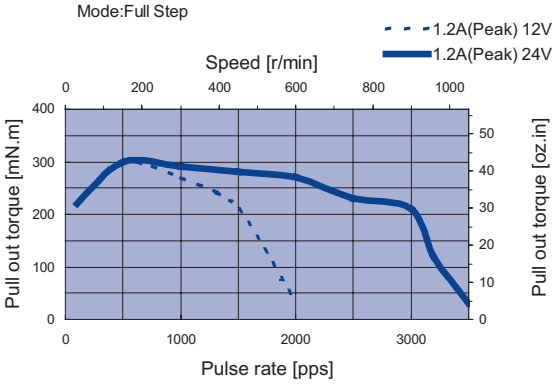
17HD4033N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



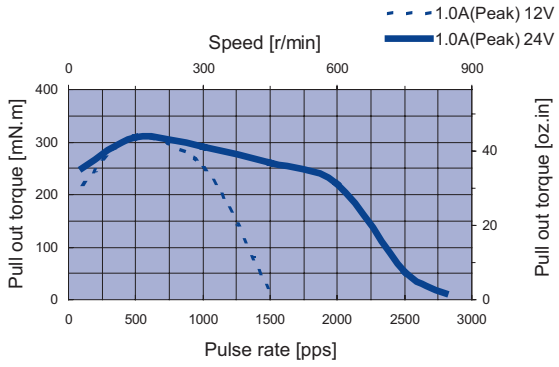
17HD6022N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



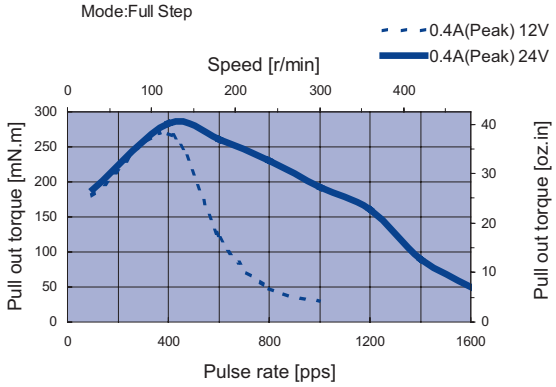
17HD6022N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



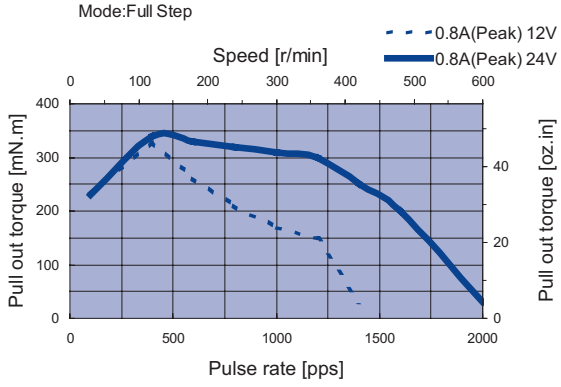
17HD6024N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



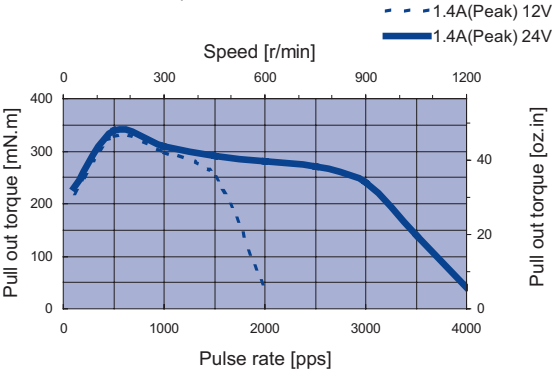
17HD6025N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



17HD6026N

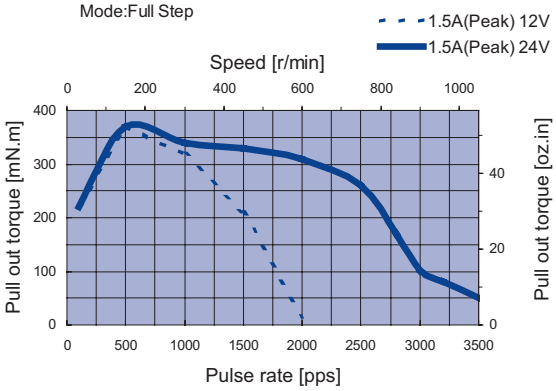
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



Dynamic Torque Curves

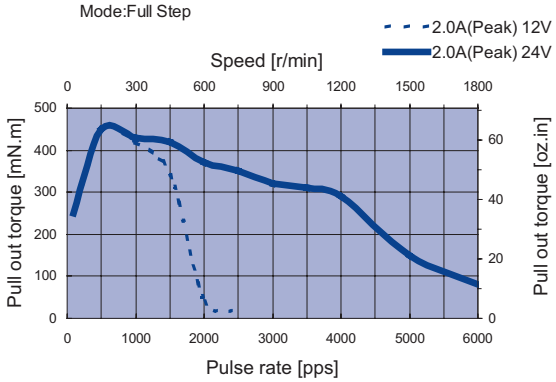
17HDB003N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



17HDB004N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



23HS SERIES 1.8°

Key Features

- High Torque
- High Accuracy
- Smooth Movement

General Specifications

Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
23HS0402-02	1.2	2.3	2.1	500	70.82	22	3.12	135	0.74
23HS0403-02	2.8	7	1.3	500	70.82	22	3.12	135	0.74
23HS0404-01	0.75	1.75	2.5	500	70.82	22	3.12	135	0.74
23HS0406	1.6	4.3	1.5	500	70.82	22	3.12	135	0.74
23HS0411	0.65	1.3	2	390	55.22	22	3.12	135	0.74
23HS0412	11.4	22.4	0.71	480	67.97	22	3.12	135	0.74
23HS0413	4.3	10	1	500	70.82	22	3.12	135	0.74
23HS1407	2.7	7	1.5	850	120.40	32	4.53	220	1.21
23HS1408	1.5	3.7	2	850	120.40	32	4.53	220	1.21
23HS2403	2	6.4	2	1100	155.81	40	5.66	260	1.43
23HS2409-01	0.85	2.7	3	1000	141.64	40	5.66	260	1.43
23HS2416-03	1.0	3.1	2.6	1000	141.64	40	5.66	260	1.43
23HS2420-01	1.54	4.6	1.8	900	127.48	40	5.66	260	1.43
23HS2428	0.62	2	2.8	900	127.48	40	5.66	260	1.43
23HS2434	14	43	0.7	1000	141.64	40	5.66	260	1.43
23HS2438	5.6	20.4	1.15	1100	155.81	40	5.66	260	1.43
23HS2443	3.4	9.2	1.5	1000	141.64	40	5.66	260	1.43
23HS3409	1	3.36	3	1650	233.71	70	9.91	460	2.53
23HS3431-02	1.2	4	2.8	1650	233.71	70	9.91	460	2.53
23HS3432-02	2	7.5	2.1	1650	233.71	70	9.91	460	2.53
23HS3434	4.2	17	1.4	1650	233.71	70	9.91	460	2.53
23HS3442	7.9	27	1	1500	212.46	70	9.91	460	2.53
23HS3443	17.2	62	0.7	1650	233.71	70	9.91	460	2.53
23HS4401-09	1.0	2.4	2.4	700	99.15	28	3.96	180	0.99
23HS4402	0.65	1.6	3	700	99.15	28	3.96	180	0.99
23HS4404	1.7	4.2	2.1	750	106.23	28	3.96	180	0.99
23HS5402-08	0.5	1.8	6	2700	382.44	120	17.00	750	4.13
23HS5408	2	7.2	3	2700	382.44	120	17.00	750	4.13

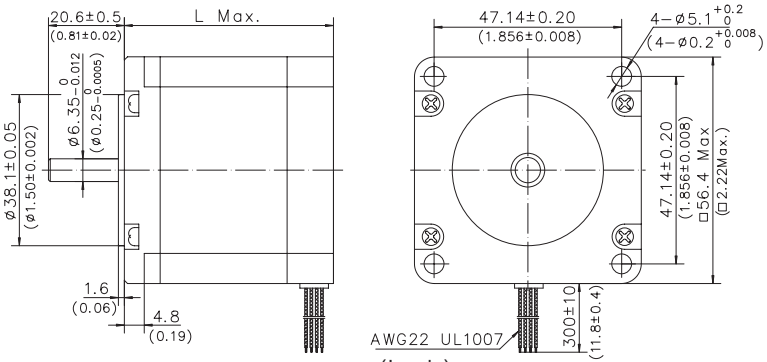
Uni-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
23HS0602-02	5.7	6.0	1	390	55.22	22	3.12	135	0.74
23HS0603	1.4	1.6	2	400	56.64	22	3.12	135	0.74
23HS0605	4.9	6.0	1	400	56.64	22	3.12	135	0.74
23HS0609	0.6	0.6	3	380	53.81	22	3.12	135	0.74
23HS0611	2.2	2.2	1.5	380	53.81	22	3.12	135	0.74
23HS1602	1.65	2.47	2.1	700	99.12	32	4.53	260	1.43
23HS1604	6.3	12	1.0	680	96.29	32	4.53	220	1.21
23HS1605	2.75	3.7	1.5	660	93.46	32	4.53	220	1.21
23HS1606	1	1.4	2.7	700	99.12	32	4.53	260	1.43
23HS2602-03	0.75	1.12	3	800	113.31	40	5.66	260	1.43
23HS2603-06	1.8	2.7	2	800	113.31	40	5.66	260	1.43
23HS2611-03	7.4	12.5	1	850	120.40	40	5.66	260	1.43
23HS2619	3.4	5.5	1.5	800	113.31	40	5.66	260	1.43
23HS3604-02	4.1	7.6	1.5	1300	184.14	70	9.91	460	2.53
23HS3605-06	2.25	4.6	2	1200	169.97	70	9.91	460	2.53
23HS3606-04	1	2.1	3	1200	169.97	70	9.91	460	2.53
23HS3607-01	8.6	17	1	1200	169.97	70	9.91	460	2.53
23HS5604	1	1.8	4.3	2000	283.29	120	17.00	760	4.13

Motor Wiring Diagram —> Page A-8

Mechanical Dimension

Model Number	L	Mass
	mm (in.)	kg (lb.)
23HS0**	41 (1.61) .	0.42 (0.93)
23HS1**	50 (1.97)	0.55 (1.21)
23HS2**	54 (2.13) .	0.60 (1.32)
23HS3**	76 (2.99) .	1.00 (2.20)
23HS4**	45 (1.77) .	0.48 (1.06)
23HS5**	111 (4.37) .	1.50 (3.30)

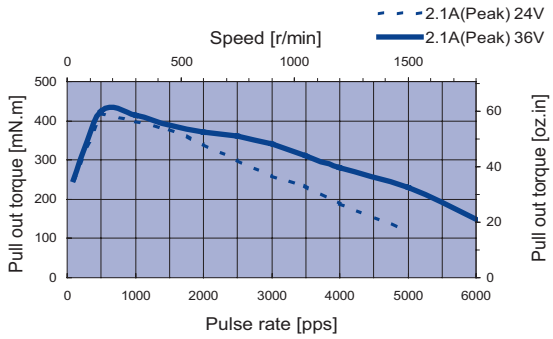


mm (inch)

Dynamic Torque Curves

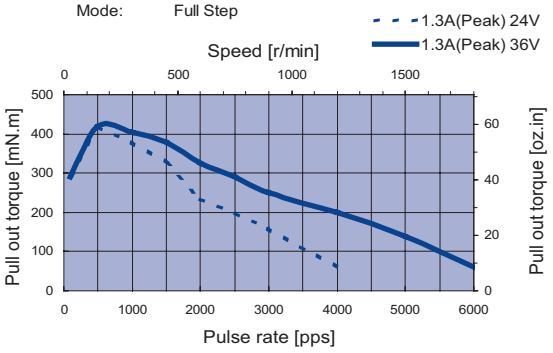
23HS0402-02

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode: Full Step



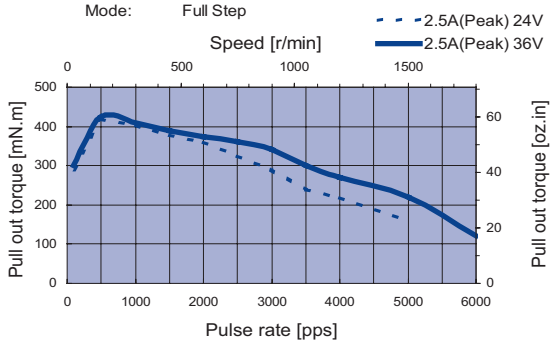
23HS0403-02

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode: Full Step



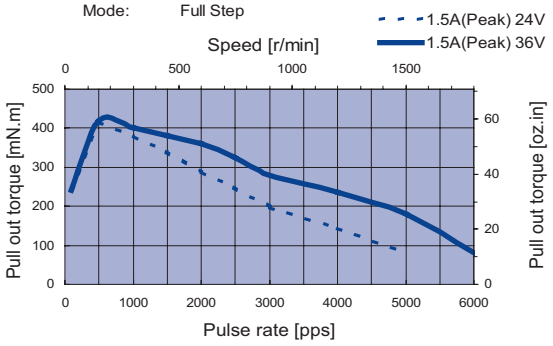
23HS0404-01

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode: Full Step



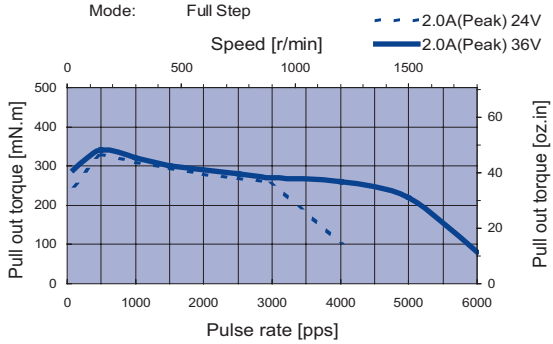
23HS0406

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode: Full Step



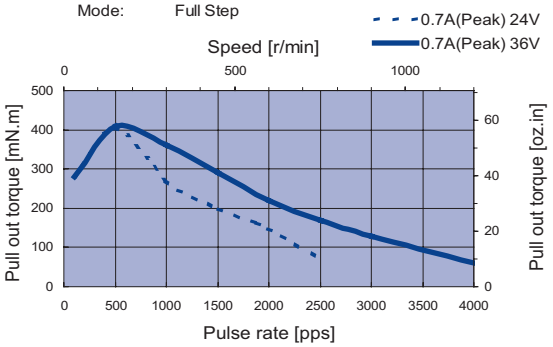
23HS0411

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode: Full Step



23HS0412

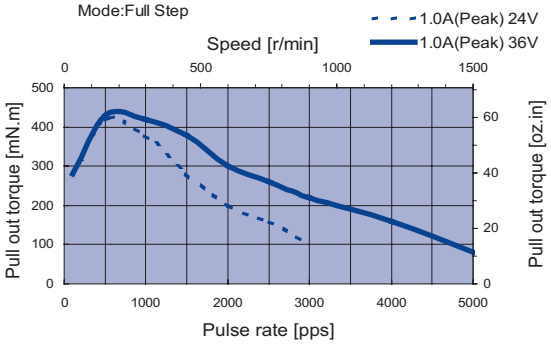
Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode: Full Step



Dynamic Torque Curves

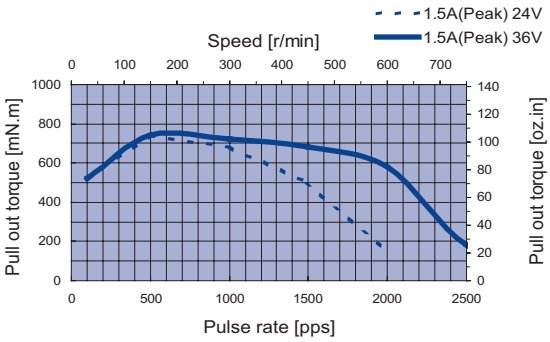
23HS0413

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



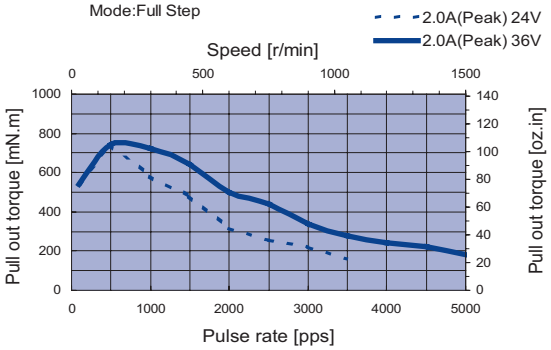
23HS1407

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



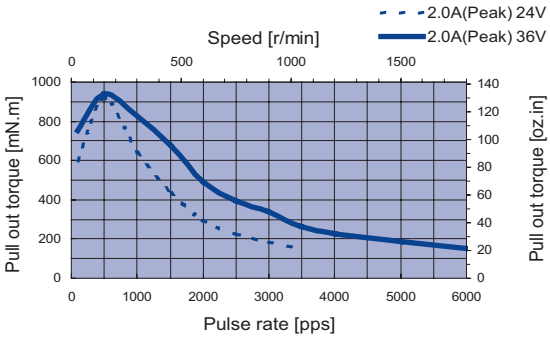
23HS1408

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



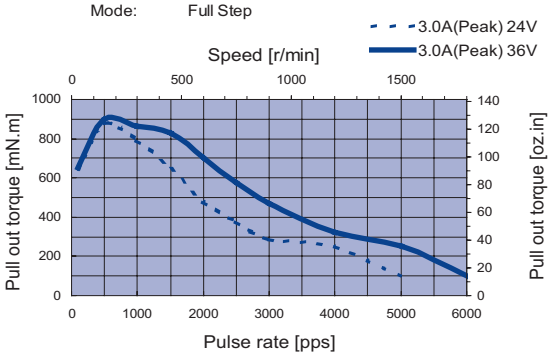
23HS2403

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode: Full Step



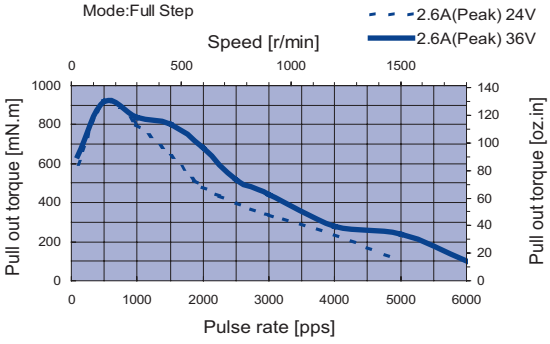
23HS2409-01

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode: Full Step



23HS2416-03

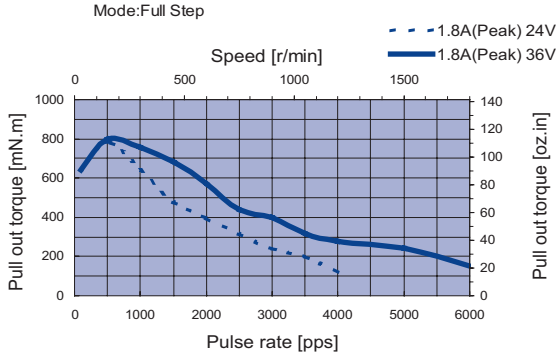
Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



Dynamic Torque Curves

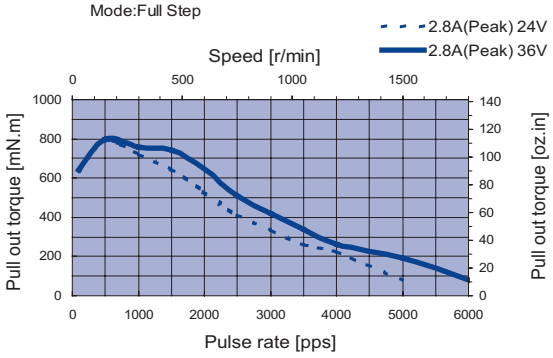
23HS2420-01

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



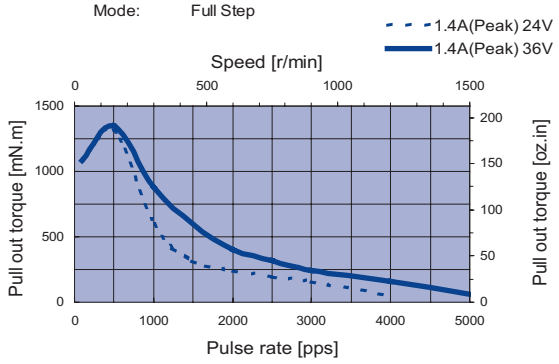
23HS2428

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



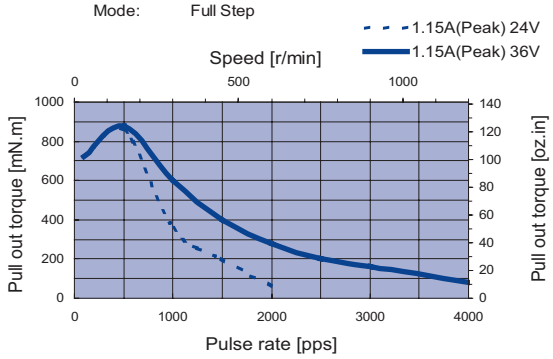
23HS3434

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode: Full Step



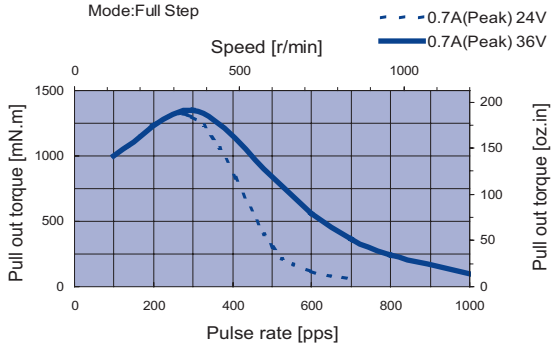
23HS2438

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode: Full Step



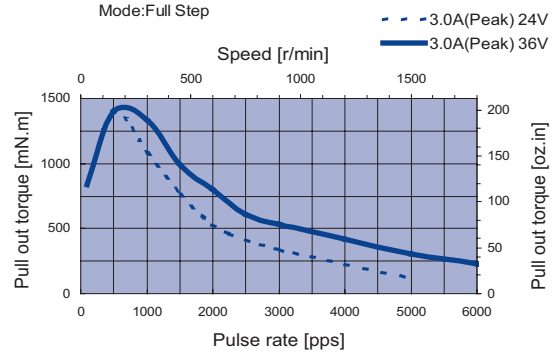
23HS3443

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



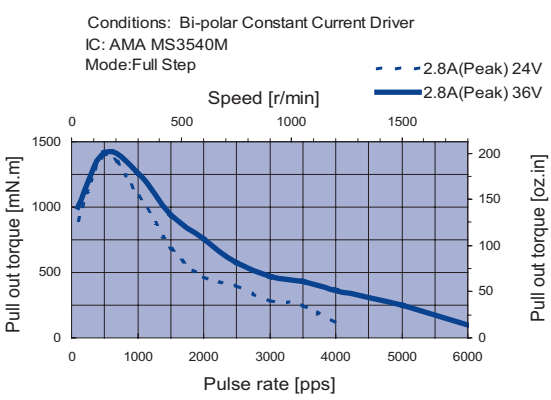
23HS3409

Conditions:Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step

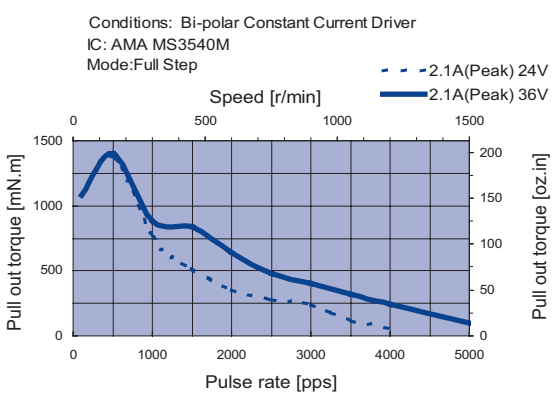


Dynamic Torque Curves

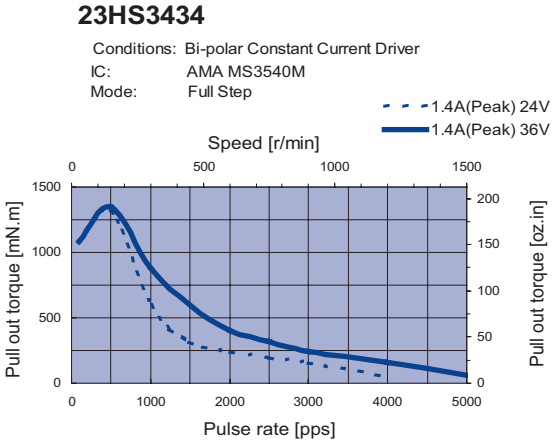
23HS3431-02



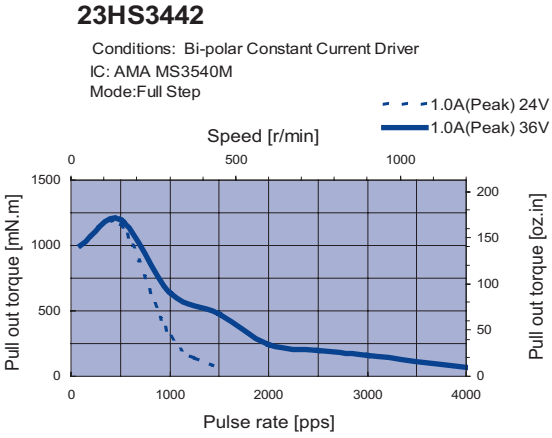
23HS3432-02



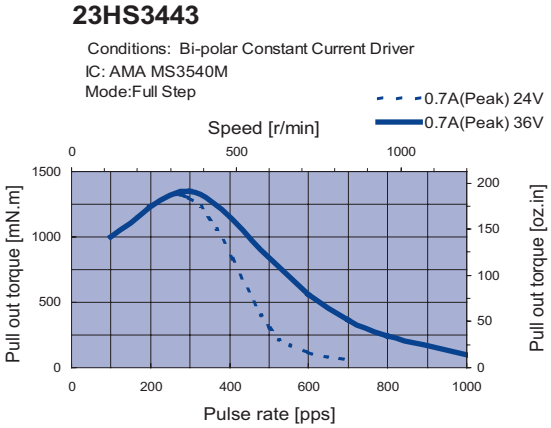
23HS3434



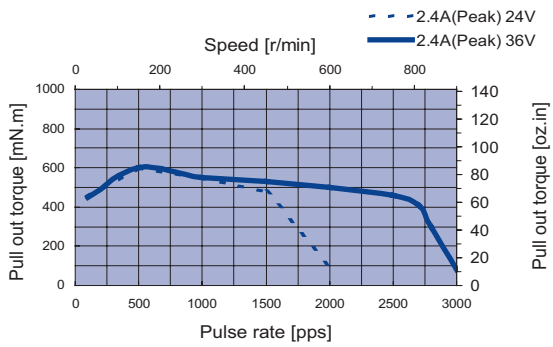
23HS3442



23HS3443



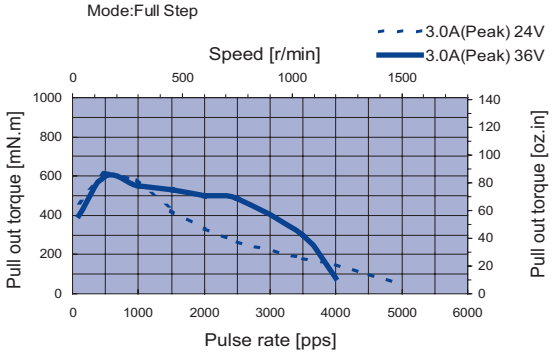
23HS4401-09



Dynamic Torque Curves

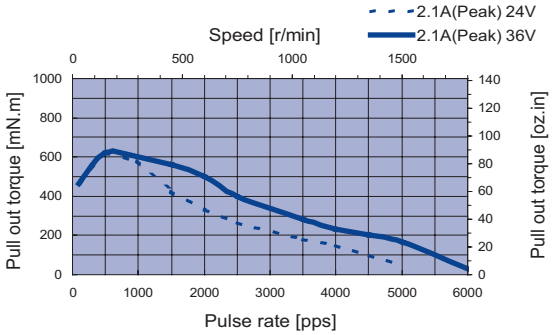
23HS4402

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



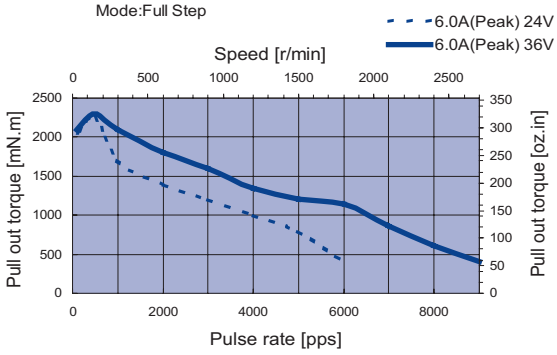
23HS4404

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



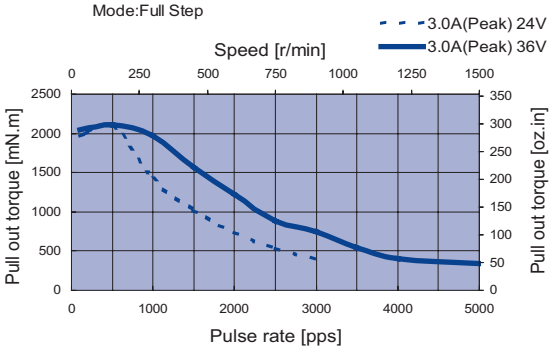
23HS5402-08

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



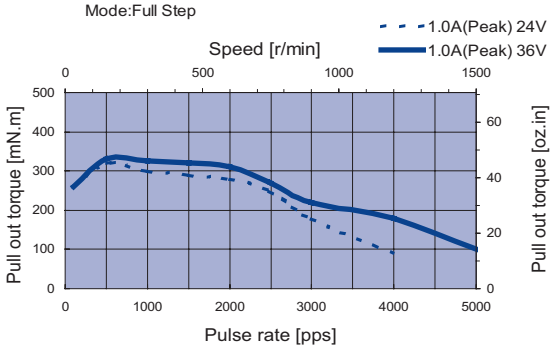
23HS5408

Conditions:Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



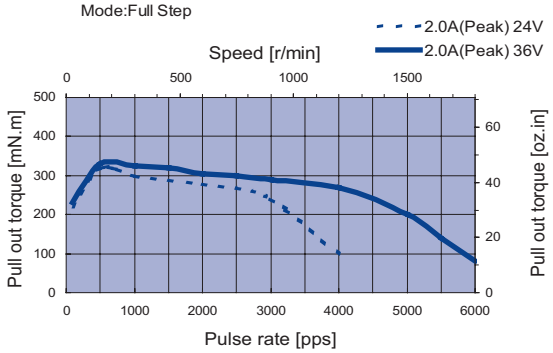
23HS0602-02

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



23HS0603

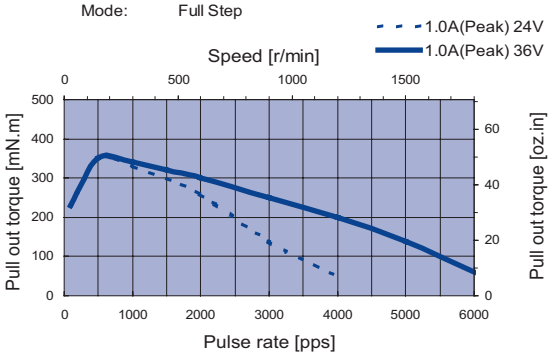
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



Dynamic Torque Curves

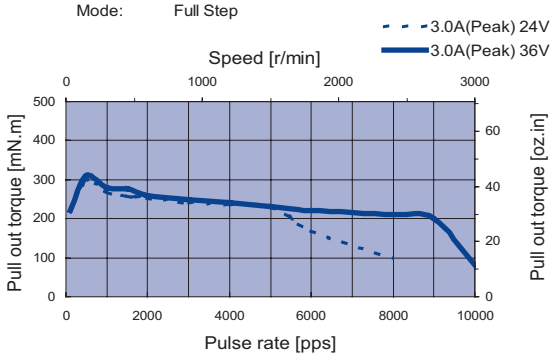
23HS0605

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode: Full Step



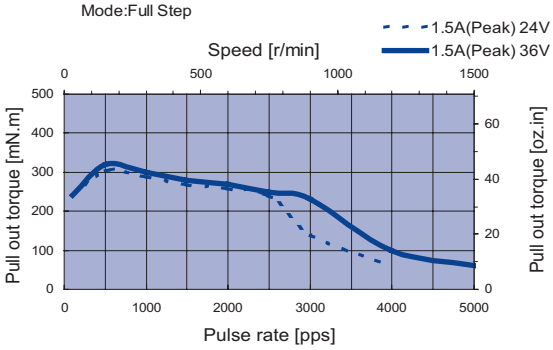
23HS0609

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode: Full Step



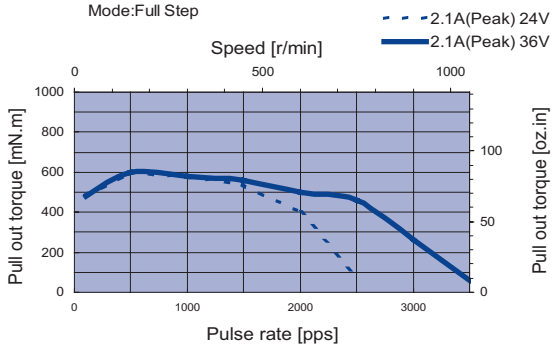
23HS0611

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



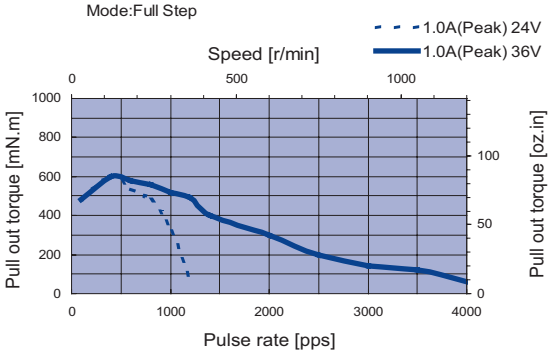
23HS1602

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



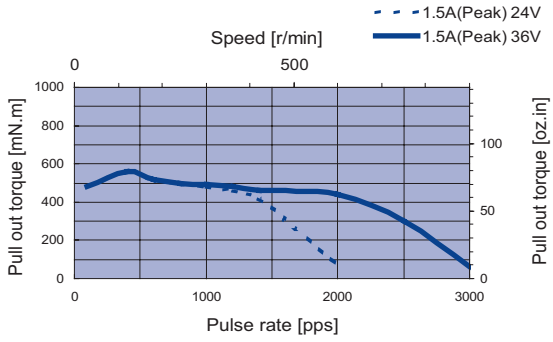
23HS1604

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



23HS1605

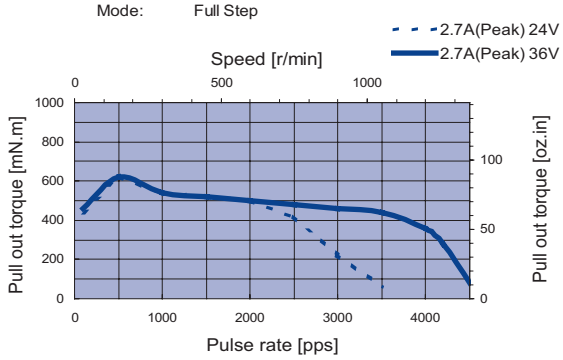
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



Dynamic Torque Curves

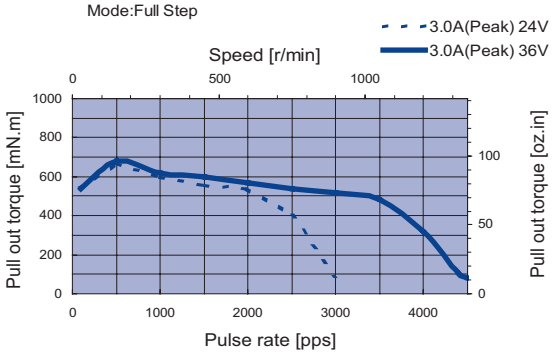
23HS1606

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode: Full Step



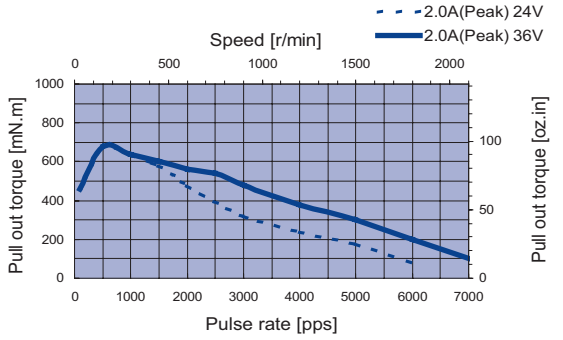
23HS2602-03

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



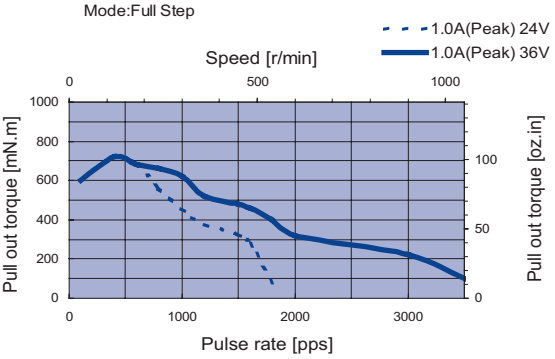
23HS2603-06

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



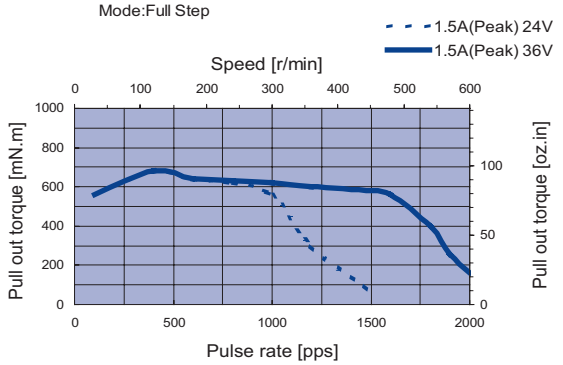
23HS2611-03

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



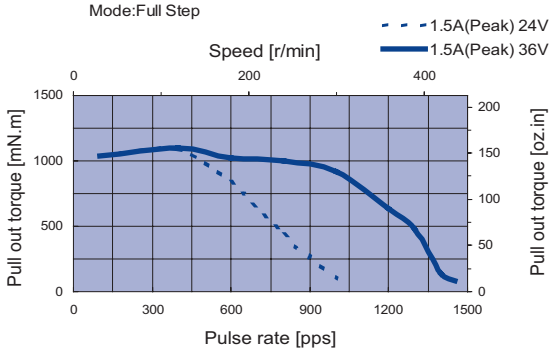
23HS2619

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



23HS3604-02

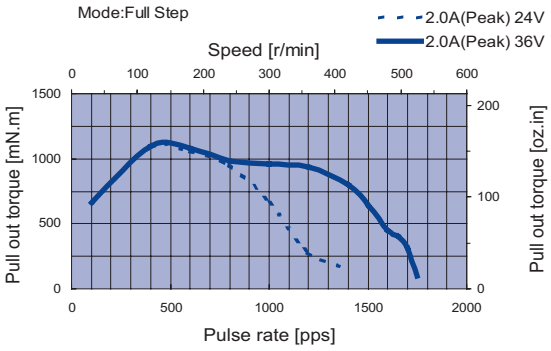
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



Dynamic Torque Curves

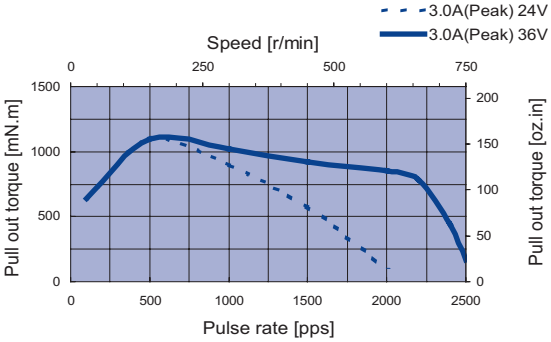
23HS3605-06

Conditions:Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



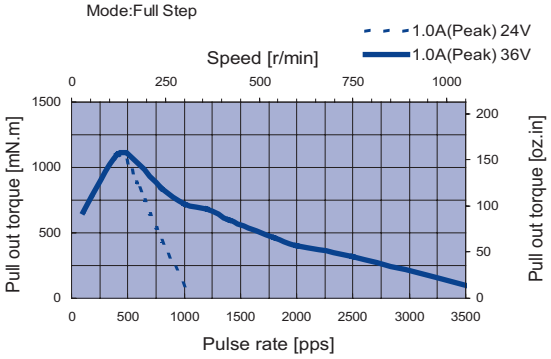
23HS3606-04

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



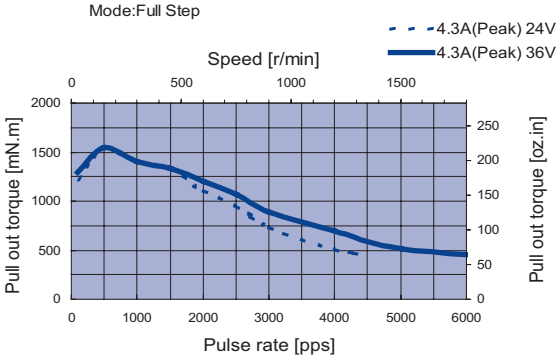
23HS3607-01

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



23HS5604

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU8080M
Mode:Full Step



23HM SERIES 1.8°

Key Features

- Low Noise
- Low Inertia
- High Acceleration

General Specifications

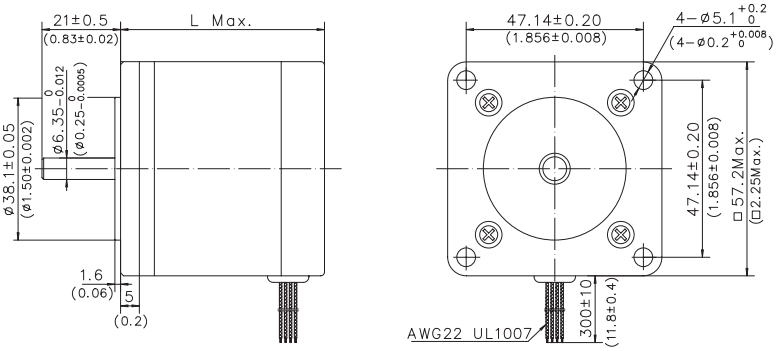
Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
23HM0401-01	1.8	3.2	1.5	420	59.49	25	3.54	100	0.55
23HM0402-01	0.85	1.5	2.2	420	59.49	25	3.54	100	0.55
23HM1402-01	2.6	5.6	1.5	650	92.07	45	6.37	175	0.96
23HM1403-01	1.2	2.6	2.2	650	92.07	45	6.37	175	0.96
23HM2403-01	1.4	3.1	2.2	900	127.48	52	7.37	210	1.16
23HM2404-01	0.7	1.4	3.1	900	127.48	52	7.37	210	1.16
23HM4401-01	1.7	4.7	2.2	1250	177.05	88	1246	360	1.98
23HM4402-01	0.85	2.4	3.1	1250	177.05	88	12.46	360	1.98

Motor Wiring Diagram —> Page A-8

Mechanical Dimension

Model Number	L	Mass
	mm (in.)	kg (lb.)
23HM0**	40 (1.56)	0.36 (0.79)
23HM1**	51 (1.99)	0.52 (1.14)
23HM2**	55 (2.15)	0.60 (1.32)
23HM4**	76 (2.96)	0.90 (1.98)

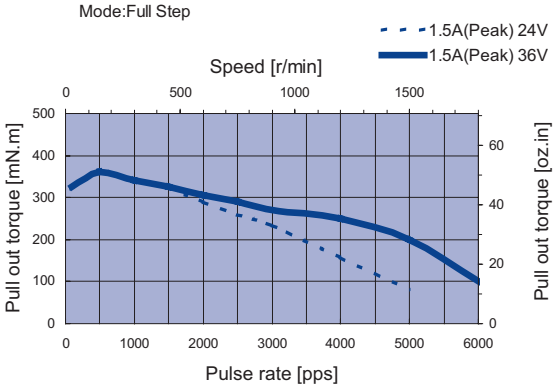


mm (inch)

Dynamic Torque Curves

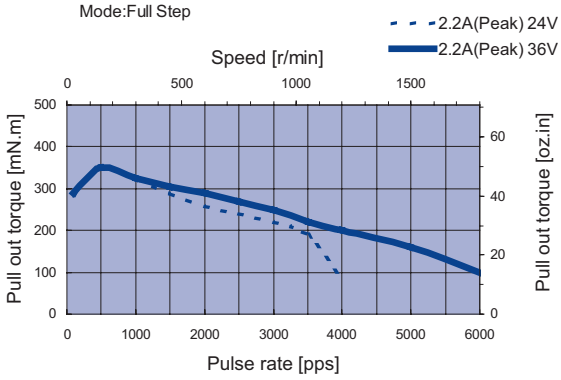
23HM0401-01

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



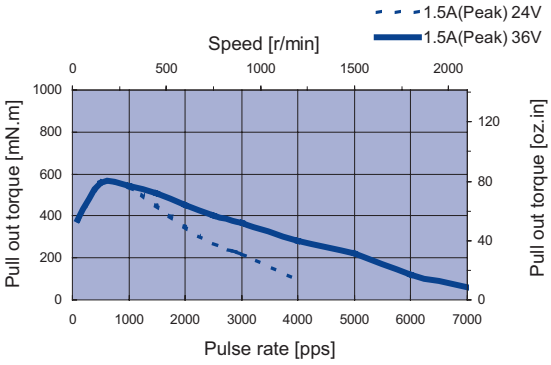
23HM0402-01

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



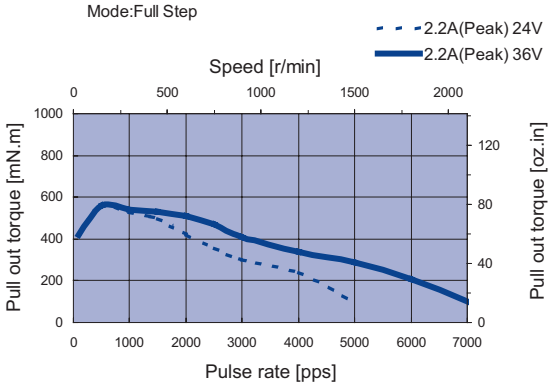
23HM1402-01

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



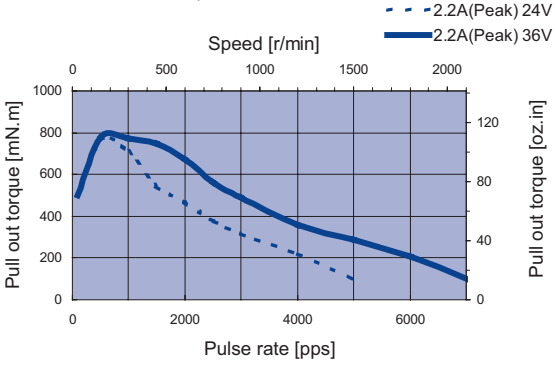
23HM1403-01

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



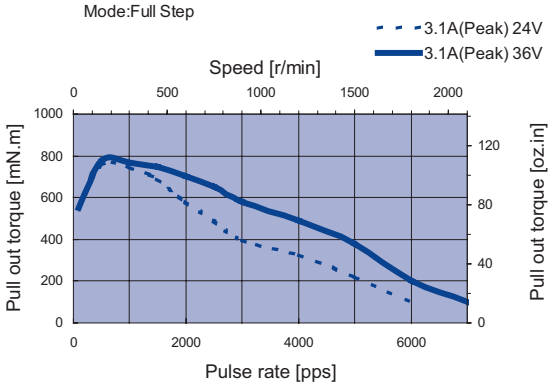
23HM2403-01

Conditions:Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



23HM2404-01

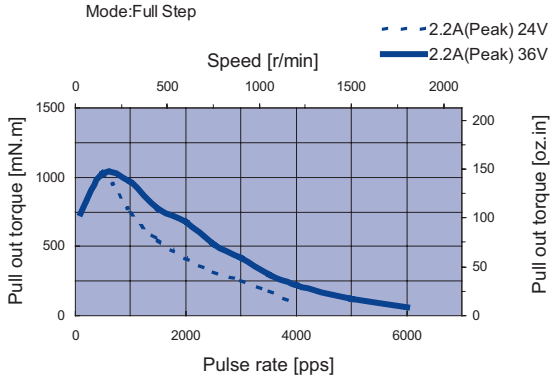
Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



Dynamic Torque Curves

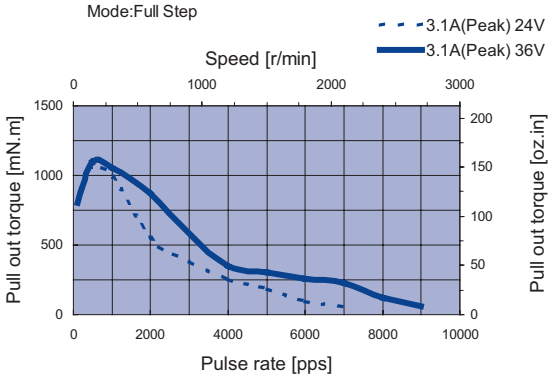
23HM4401-01

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



23HM4402-01

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



23HY SERIES 1.8°

Key Features

- High Accuracy
- Low Inertia
- High Acceleration

General Specifications

Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
23HY0407-01	1.5	2.5	1.5	350	49.58	18	2.55	55	0.30
23HY0414	3.5	6.4	1	350	49.58	18	2.55	55	0.30
23HY1411	4.5	12.2	1	630	89.24	35	4.96	120	0.66
23HY1413-01	2.5	5.4	1.4	630	89.24	35	4.96	120	0.66
23HY2416	7	14.5	1	730	103.40	42	5.95	145	0.80
23HY2417	3	6.4	1.5	730	103.40	42	5.95	145	0.80

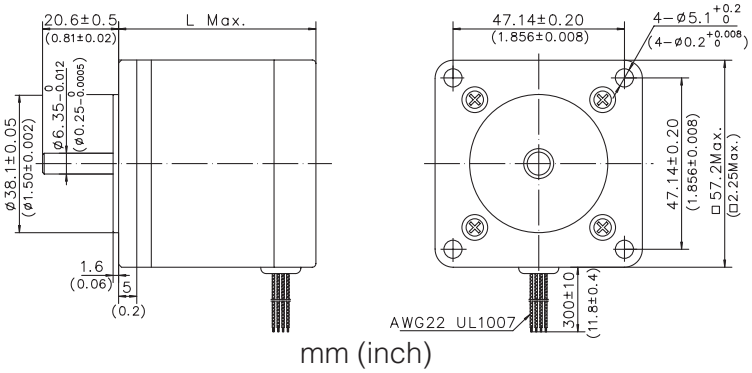
Uni-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
23HY0601	1.5	1.5	1.5	300	42.49	18	2.55	55	0.30
23HY0602	3.6	3.6	1	300	42.29	18	2.55	55	0.30
23HY1602	2.5	3.5	1.4	500	70.82	35	4.96	120	0.66
23HY1615-08	5	6.5	1	500	70.82	35	4.96	120	0.66
23HY2602	2.5	3	1.6	600	84.99	42	5.95	145	0.80
23HY2609	7	8.5	1	600	84.99	42	5.95	145	0.80

Motor Wiring Diagram —> Page A-8

Mechanical Dimension

Model Number	L	Mass
	mm (in.)	kg (lb.)
23HY0**	40 (1.56)	0.36 (0.79)
23HY1**	51 (1.99)	0.52 (1.14)
23HY2**	55 (2.15)	0.60 (1.32)

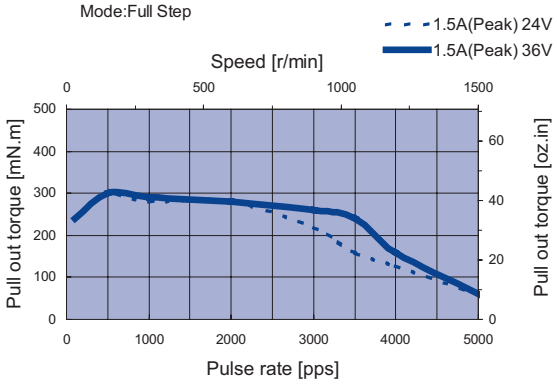


mm (inch)

Dynamic Torque Curves

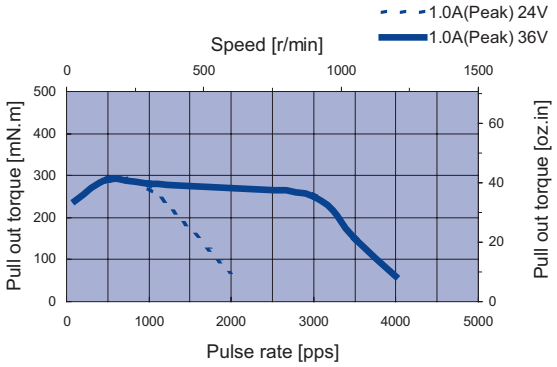
23HY0407-01

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



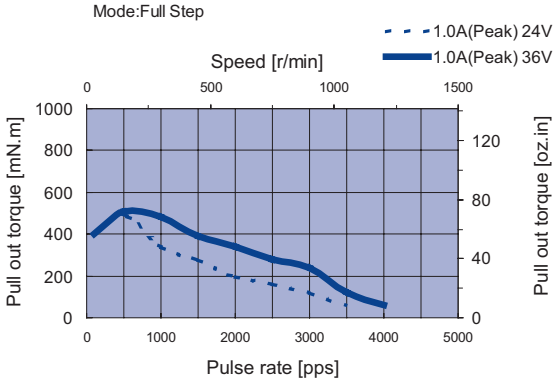
23HY0414

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



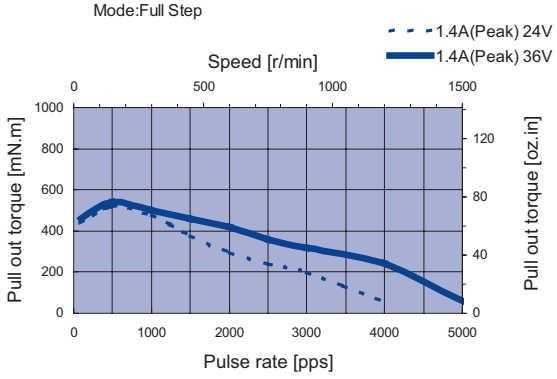
23HY1411

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



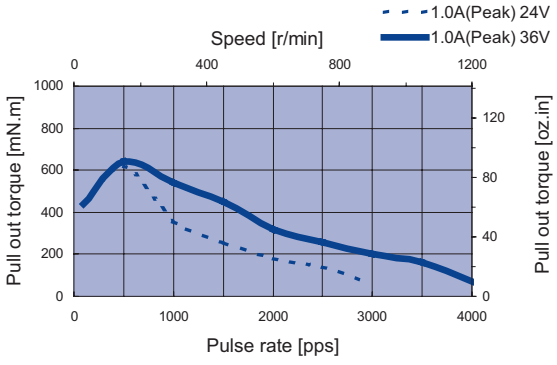
23HY1413-01

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



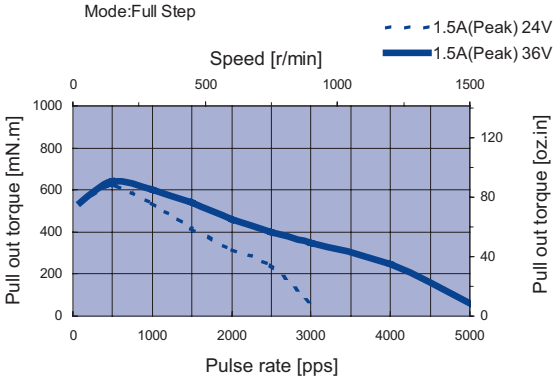
23HY2416

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



23HY2417

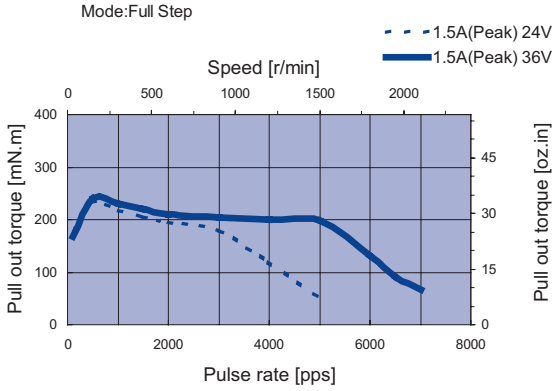
Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



Dynamic Torque Curves

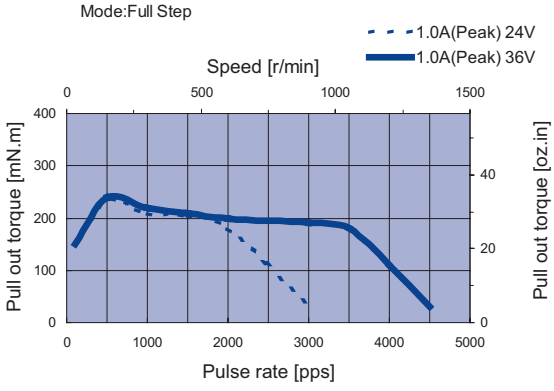
23HY0601

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



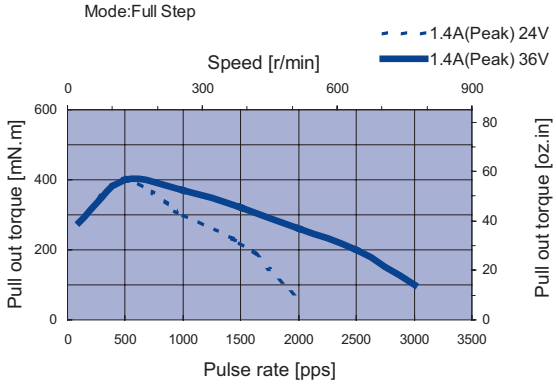
23HY0602

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



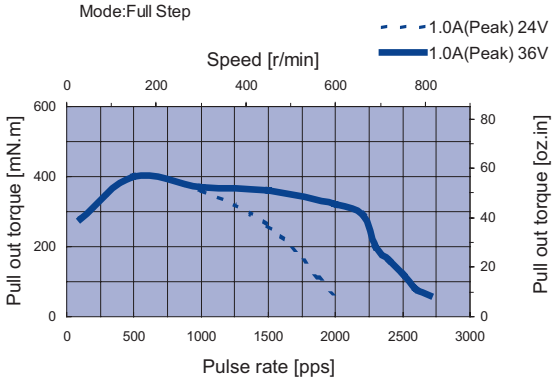
23HY1602

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



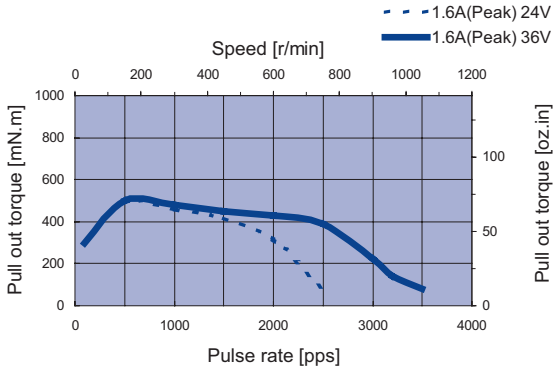
23HY1615-08

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



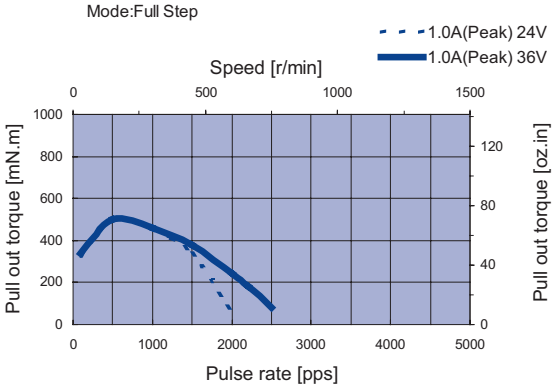
23HY2602

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



23HY2609

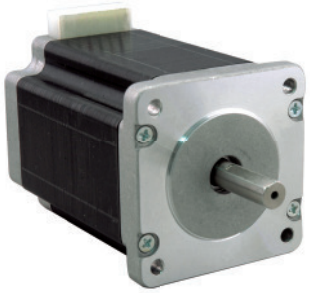
Conditions:Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



24HS SERIES 1.8°

Key Features

- High Torque
- High Accuracy
- Smooth Movement



General Specifications

Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
24HS1402N	0.73	1.6	2.8	1060	150	40	5.66	280	1.54
24HS1403N	2.92	6.4	1.4	1060	150	40	5.66	280	1.54
24HS1404N	0.35	0.8	4	880	125	40	5.66	280	1.54
24HS2401-03N	1.1	3.4	2.8	1600	227	90	12.75	450	2.48
24HS2402N	0.43	1.1	4	1250	177	90	12.75	450	2.48
24HS2404N	4	13	1.4	1600	227	90	12.75	450	2.48
24HS3401N	1.1	3.5	2.8	1950	276	95	13.46	560	3.08
24HS3403N	4.4	14	1.4	1950	276	95	13.46	560	3.08
24HS5401N	0.65	2.4	4	2500	354	100	14.16	900	4.95
24HS5402N	1.49	6.5	2.8	2700	382	100	14.16	900	4.95
24HS5403N	5.96	25	1.4	2700	382	100	14.16	900	4.95

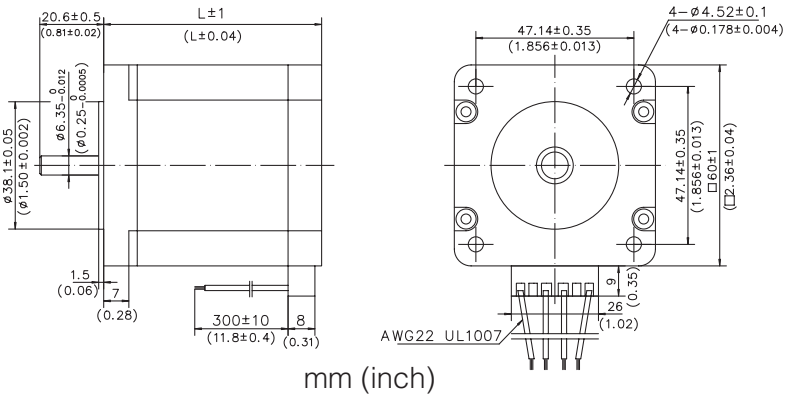
Uni-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
24HS1601N	5.7	6.8	1	740	105	40	5.66	280	1.54
24HS1603N	0.74	0.8	2.8	740	105	40	5.66	280	1.54
24HS1604N	1.46	1.8	2	740	105	40	5.66	280	1.54
24HS2601N	0.9	1.32	3	1130	160	90	12.75	450	2.48
24HS2602N	1.9	3	2	1130	160	90	12.75	450	2.48
24HS2607N	6.9	10.7	1	1100	156	90	12.75	450	2.48
24HS3601N	2.2	3.5	2	1500	212	95	13.46	560	3.08
24HS5601N	1.3	2.4	3	2100	297	100	14.16	900	4.95
24HS5602N	2.8	5.9	2	2100	297	100	14.16	900	4.95
24HS5604N	10	19.5	1	2100	297	100	14.16	900	4.95

Motor Wiring Diagram —> Page A-8

Mechanical Dimension

Model Number	L	Mass
	mm (in.)	kg (lb.)
24HS1**	44 (1.73)	0.60 (1.32)
24HS2**	54 (2.13)	0.83 (1.83)
24HS3**	65 (2.56)	1.05 (2.31)
24HS5**	85 (3.35)	1.40 (3.09)

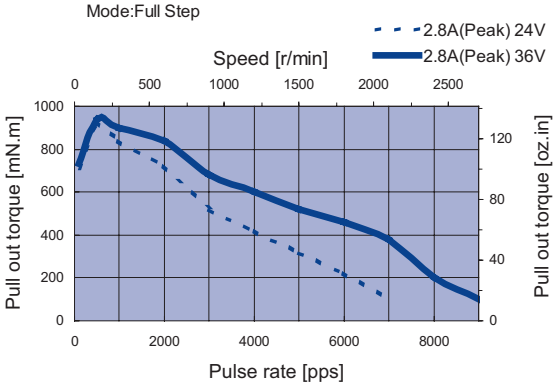


mm (inch)

Dynamic Torque Curves

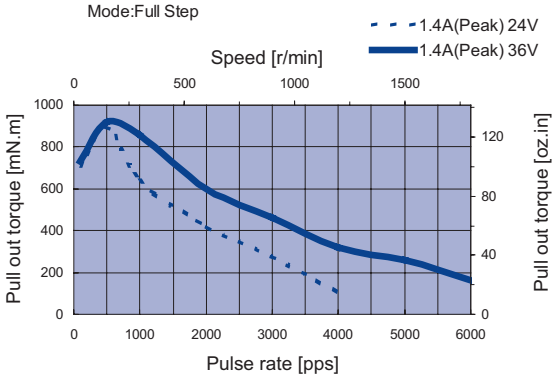
24HS1402N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



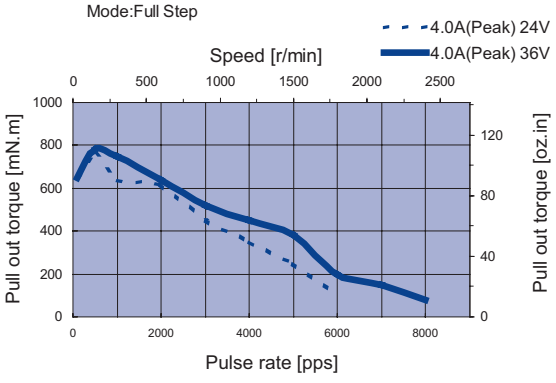
24HS1403N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



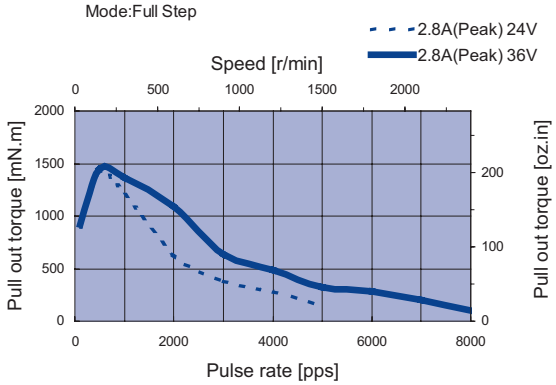
24HS1404N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



24HS2401-03N

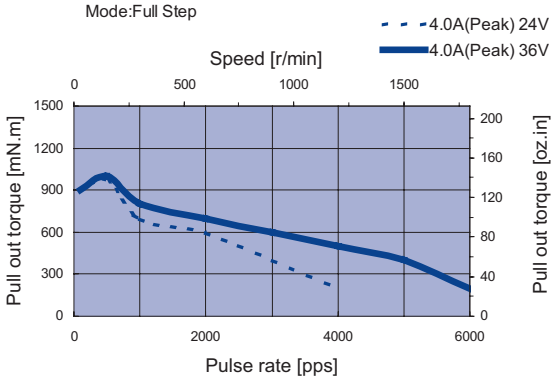
Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



Dynamic Torque Curves

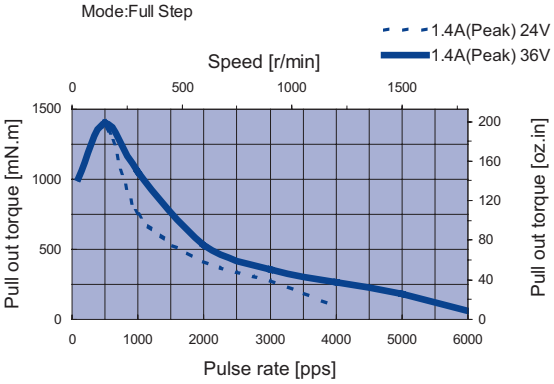
24HS2402N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



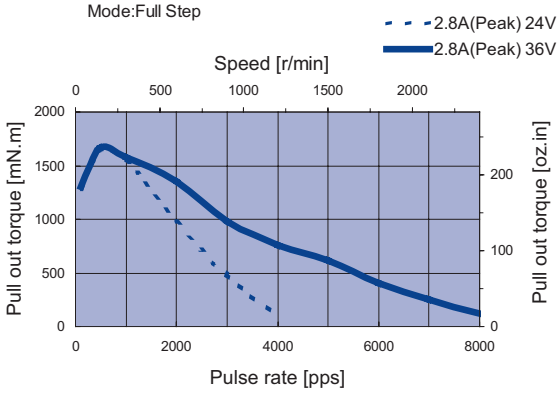
24HS2404N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



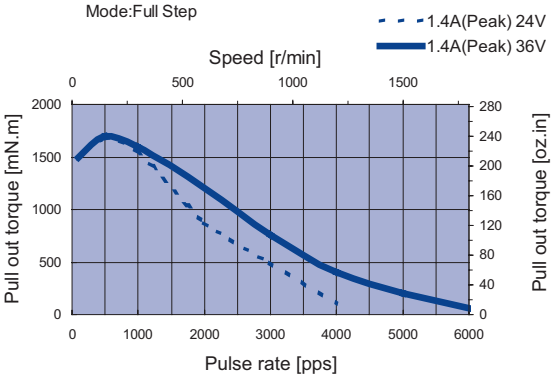
24HS3401N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



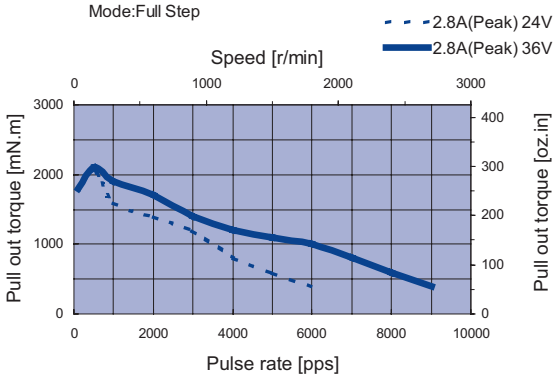
24HS3403N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



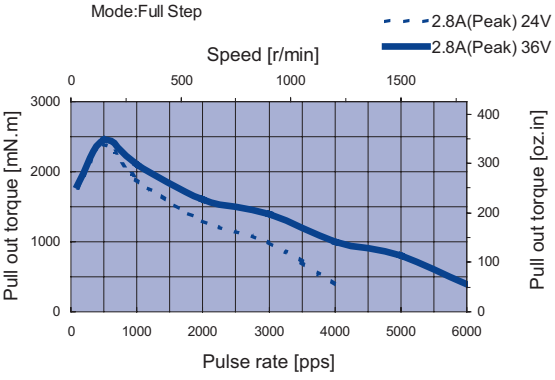
24HS5401N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



24HS5402N

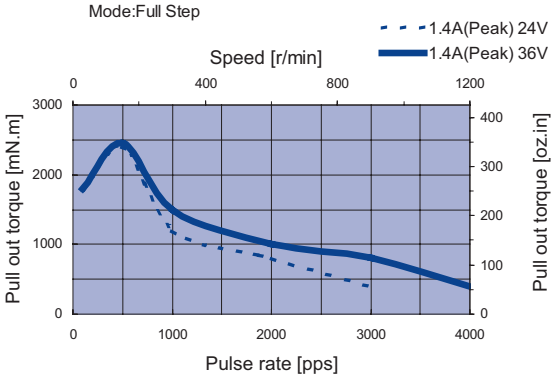
Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



Dynamic Torque Curves

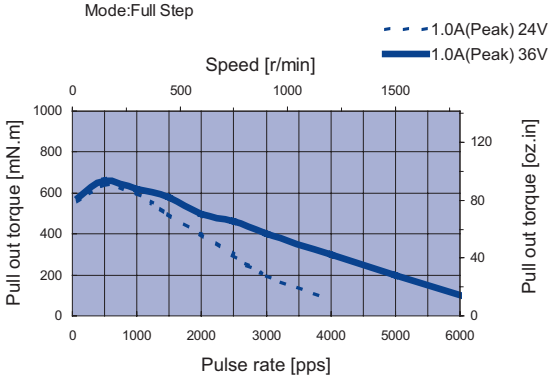
24HS5403N

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



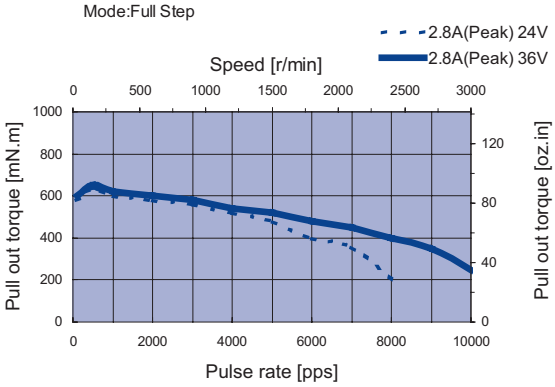
24HS1601N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



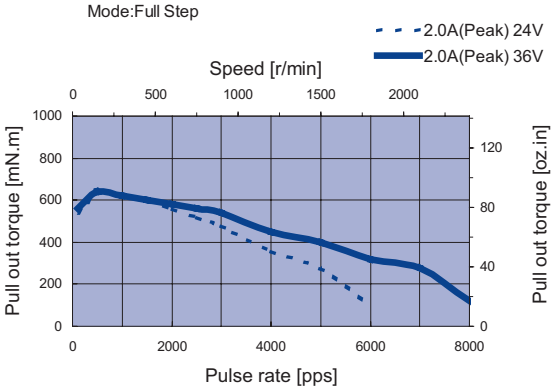
24HS1603N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



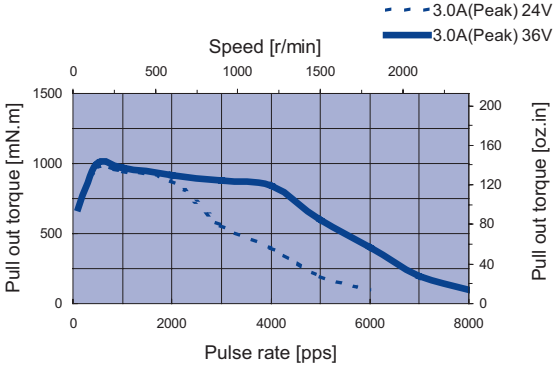
24HS1604N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



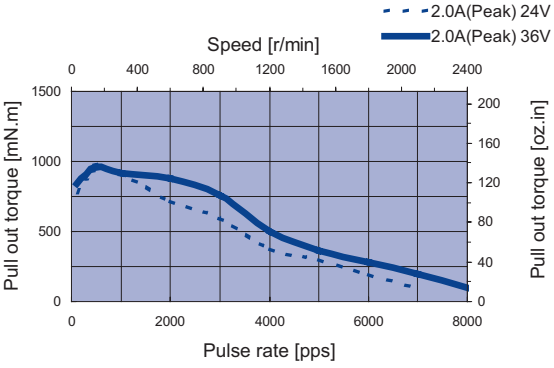
24HS2601N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



24HS2602N

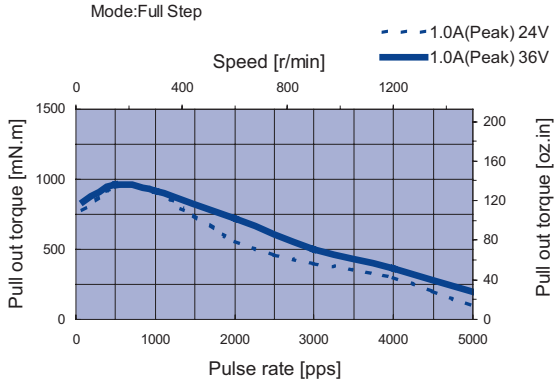
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



Dynamic Torque Curves

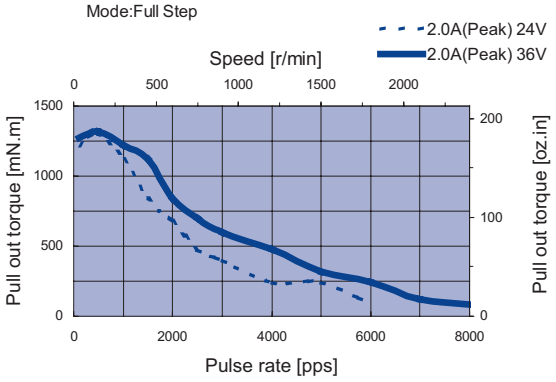
24HS2607N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



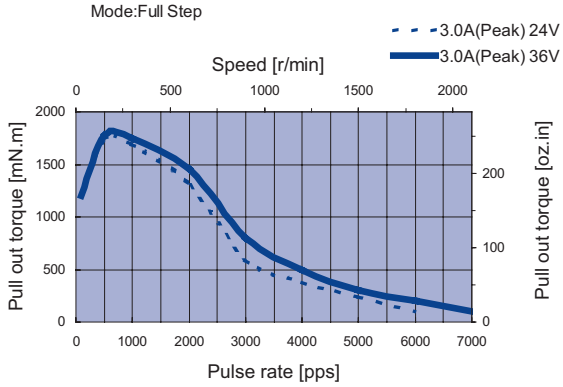
24HS3601N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



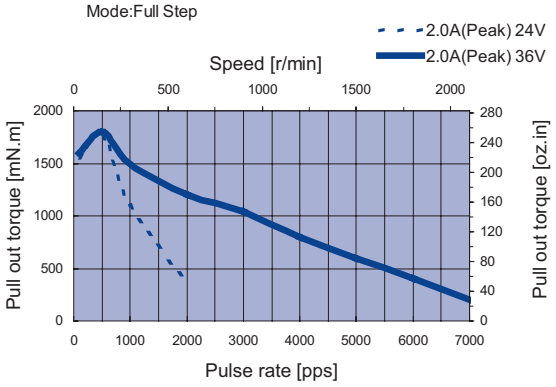
24HS5601N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



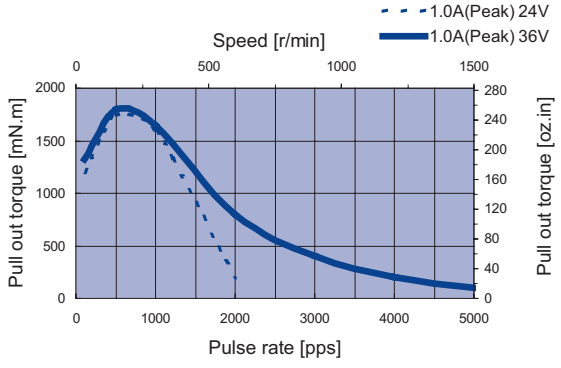
24HS5602N

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



24HS5604N

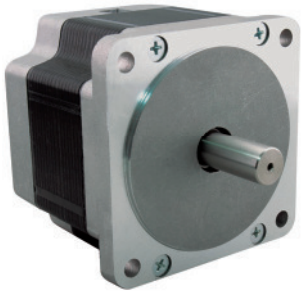
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



34HD SERIES 1.8°

Key Features

- High Torque
- High Accuracy
- Smooth Movement



General Specifications

Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
34HD0401	4.4	29.6	1.4	2800	396.60	150	21.25	1100	6.05
34HD0402	2	13.2	2.1	2800	396.60	150	21.25	1100	6.05
34HD0403	0.96	5.8	3.18	2800	396.60	150	21.25	1100	6.05
34HD0404	0.24	1.45	6.3	2800	396.60	150	21.25	1100	6.05
34HD1401	6.6	56	1.4	5600	793.20	250	35.41	1850	10.18
34HD1402	3	24	2.1	5600	793.20	250	35.41	1850	10.18
34HD1403	1.32	10.8	3.18	5600	793.20	250	35.41	1850	10.18
34HD1404	0.33	2.7	6.3	5600	793.20	250	35.41	1850	10.18
34HD2401	7.6	70.4	1.4	8400	1189.80	350	49.58	2750	15.13
34HD2402	1.94	17.6	2.8	8400	1189.80	350	49.58	2750	15.13
34HD2403	0.49	4.4	5.6	8400	1189.80	350	49.58	2750	15.13

Uni-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
34HD0601	2.2	7.4	2	2100	297.45	150	21.25	1100	6.05
34HD0602	1	3.3	3	2100	297.45	150	21.25	1100	6.05
34HD0603	0.48	1.45	4.5	2100	297.45	150	21.25	1100	6.05
34HD1601	3.3	14	2	4300	609.07	250	35.41	1850	10.18
34HD1602	1.5	6	3	4300	609.07	250	35.41	1850	10.18
34HD1603	0.66	2.7	4.5	4300	609.07	250	35.41	1850	10.18
34HD2601	3.8	17.6	2	6400	906.52	350	49.58	2750	15.13
34HD2602	0.97	4.4	4	6400	906.52	350	49.58	2750	15.13

8-Leadwire Motors

Model Number	Type of Polar	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
		ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
34HD0801	Bi-polar Parallel	0.24	1.4	6.3	3100	439.09	150	21.25	1100	6.05
	Bi-polar Series	0.96	5.6	3.18	3100	439.09	150	21.25	1100	6.05
	Unipolar	0.48	1.4	4.5	2200	311.61	150	21.25	1100	6.05
34HD1801	Bi-polar Parallel	0.33	2.7	6.3	6200	878.19	250	35.41	1850	10.18
	Bi-polar Series	1.32	10.8	3.18	6200	878.19	250	35.41	1850	10.18
	Unipolar	0.66	2.7	4.5	4400	623.23	250	35.41	1850	10.18

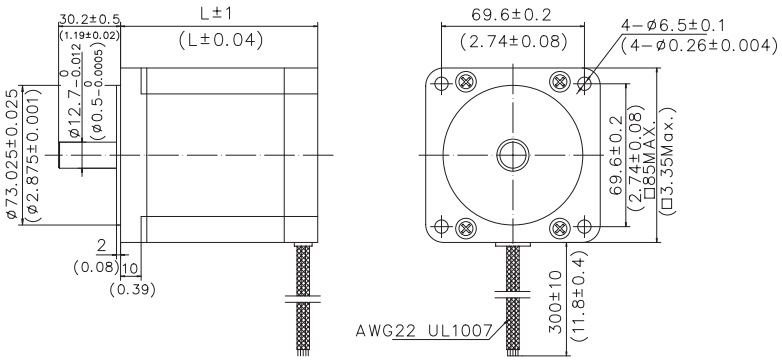
8-Leadwire Motors

Model Number	Type of Polar	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
		ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
34HD2801	Bi-polar Parallel	0.49	4.4	5.6	9300	1317.28	350	49.58	2750	15.13
	Bi-polar Series	1.94	17.6	2.8	9300	1317.28	350	49.58	2750	15.13
	Unipolar	0.97	4.4	4	6600	934.84	350	49.58	2750	15.13

Motor Wiring Diagram —> Page A-8

Mechanical Dimension

Model Number	L	Mass
	mm (in.)	kg (lb.)
34HD0**	66.5 (2.59)	1.6 (3.52)
34HD1**	96 (3.74)	2.7 (5.94)
34HD2**	125.5 (4.89)	3.8 (8.36)

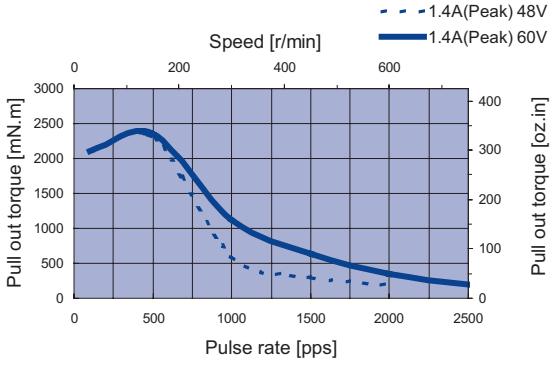


mm (inch)

Dynamic Torque Curves

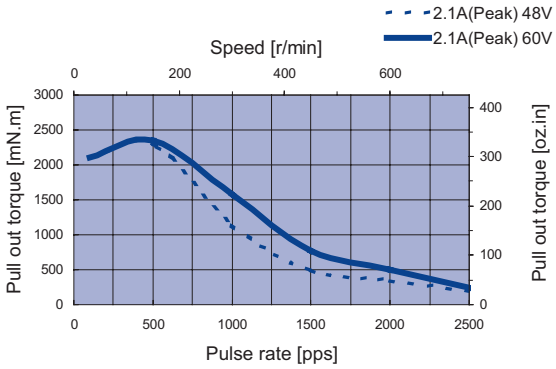
34HD0401 Bi-polar series

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



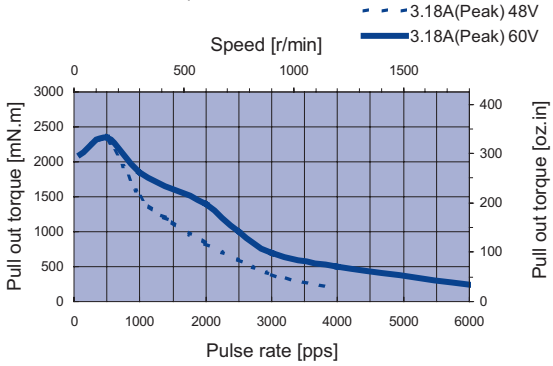
34HD0402 Bi-polar series

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



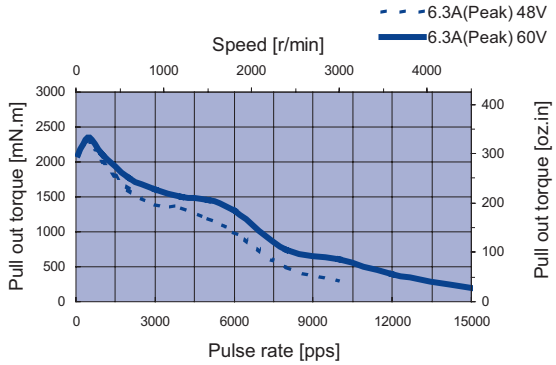
34HD0403 Bi-polar series

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



34HD0404 Bi-polar parallel

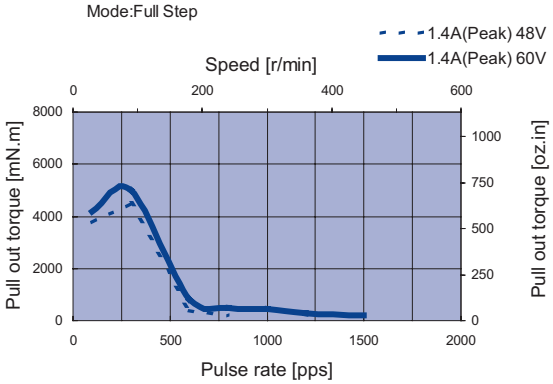
Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



Dynamic Torque Curves

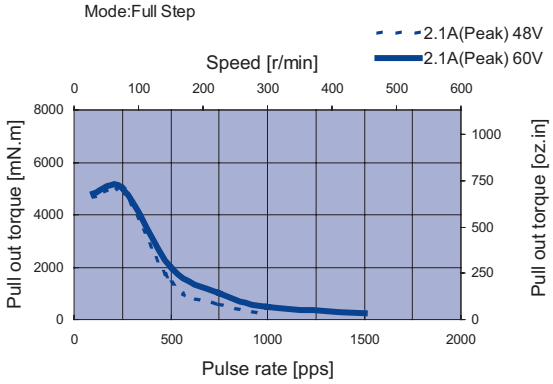
34HD1401 Bi-polar series

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



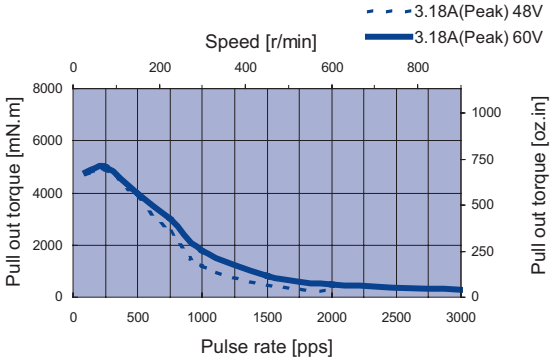
34HD1402 Bi-polar series

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



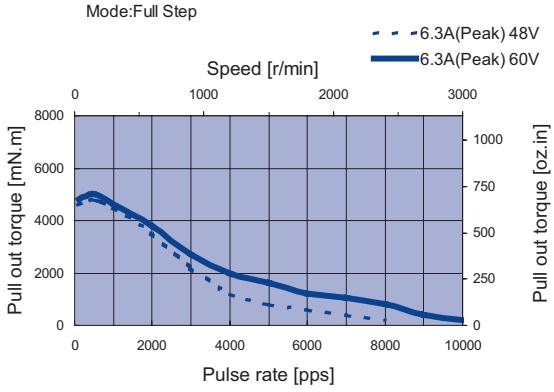
34HD1403 Bi-polar series

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



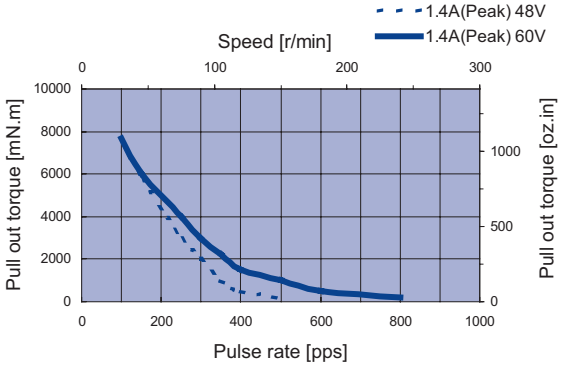
34HD1404 Bi-polar parallel

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



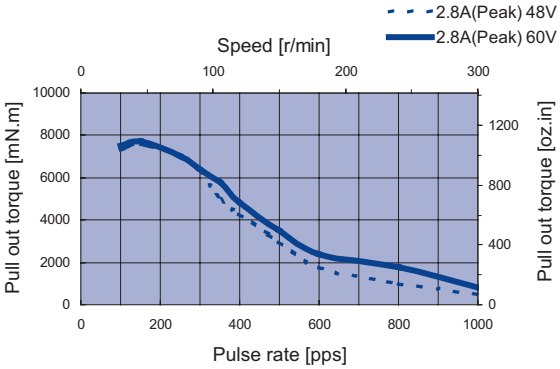
34HD2401 Bi-polar series

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



34HD2402 Bi-polar series

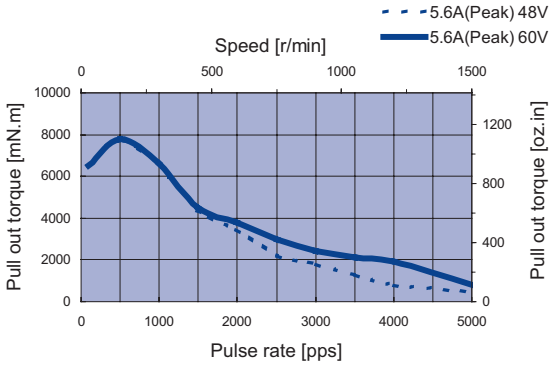
Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



Dynamic Torque Curves

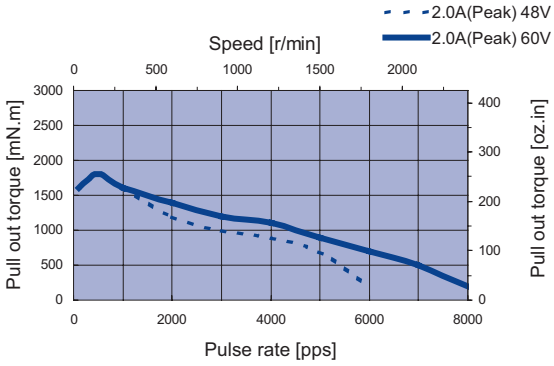
34HD2403 Bi-polar parallel

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



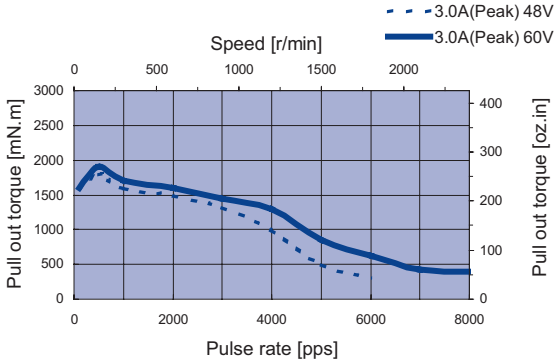
34HD0601 Uni-polar

Conditions: Uni-polar Constant Current Driver
IC: AMA AMA MSU8080M
Mode:Full Step



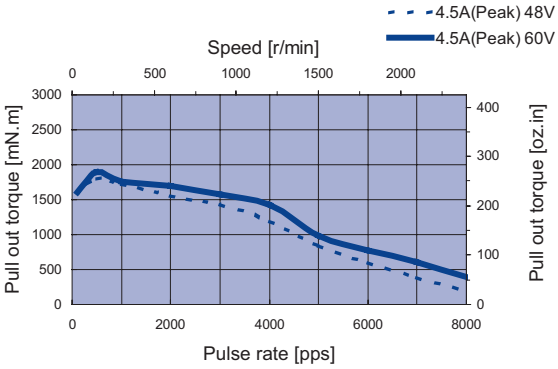
34HD0602 Uni-polar

Conditions: Uni-polar Constant Current Driver
IC: AMA AMA MSU8080M
Mode:Full Step



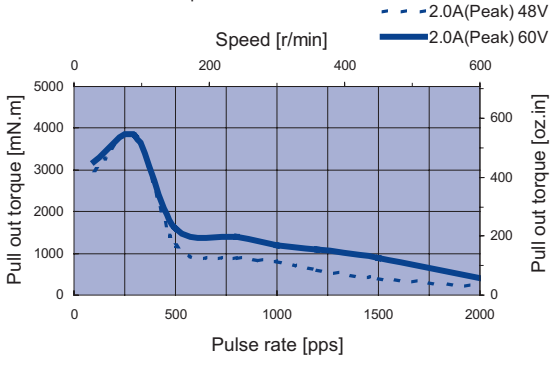
34HD0603 Uni-polar

Conditions: Uni-polar Constant Current Driver
IC: AMA AMA MSU8080M
Mode:Full Step



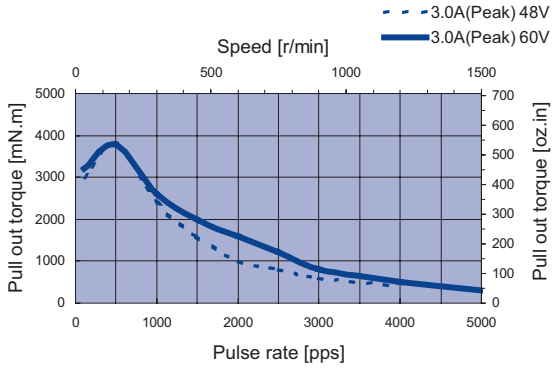
34HD1601 Uni-polar

Conditions: Uni-polar Constant Current Driver
IC: AMA AMA MSU8080M
Mode:Full Step



34HD1602 Uni-polar

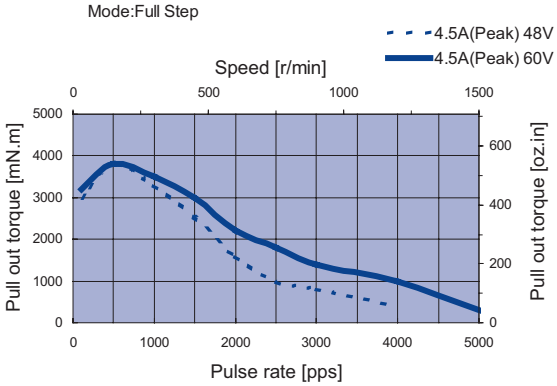
Conditions: Uni-polar Constant Current Driver
IC: AMA AMA MSU8080M
Mode:Full Step



Dynamic Torque Curves

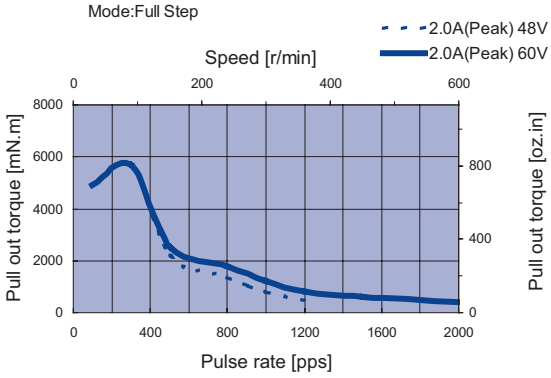
34HD1603 Uni-polar

Conditions: Uni-polar Constant Current Driver
IC: AMA AMA MSU8080M
Mode:Full Step



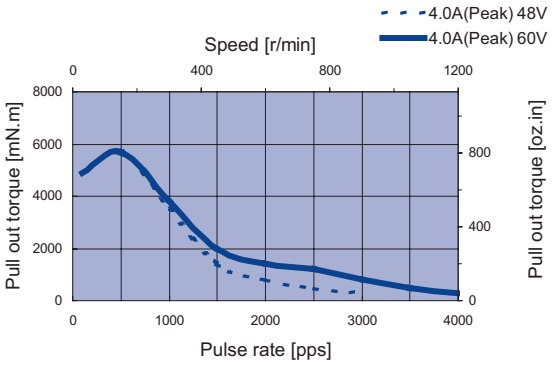
34HD2601 Uni-polar

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU8080M
Mode:Full Step



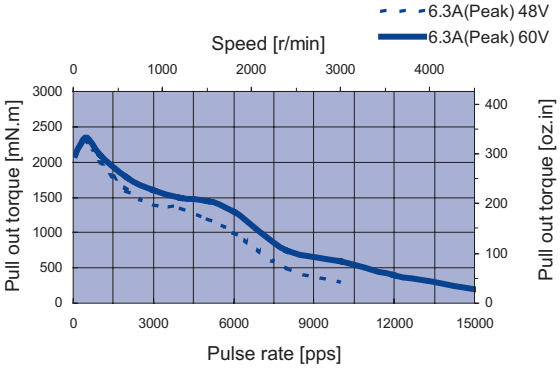
34HD2602 Uni-polar

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU8080M
Mode:Full Step



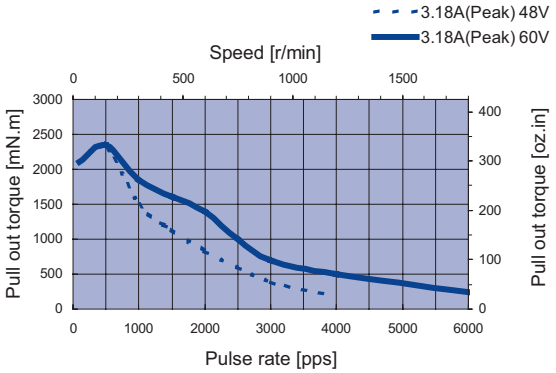
34HD0801 Bi-polar parallel

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



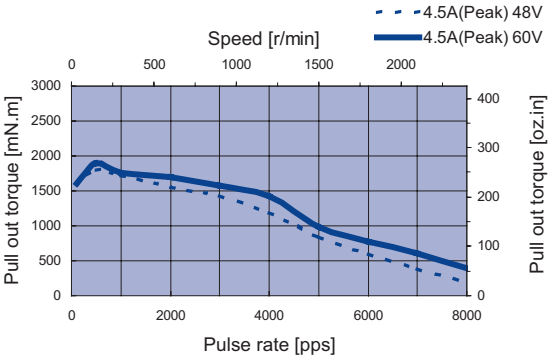
34HD0801 Bi-polar series

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



34HD0801 Uni-polar

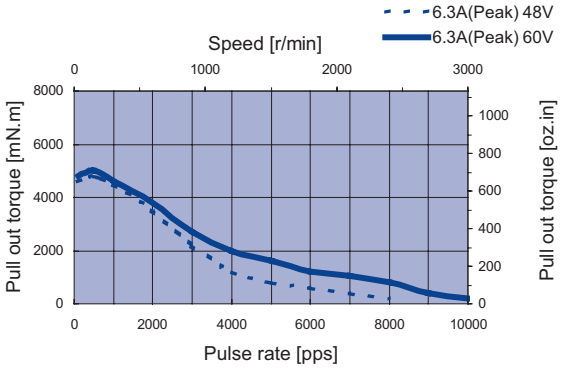
Conditions: Uni-polar Constant Current Driver
IC: AMA AMA MSU8080M
Mode:Full Step



Dynamic Torque Curves

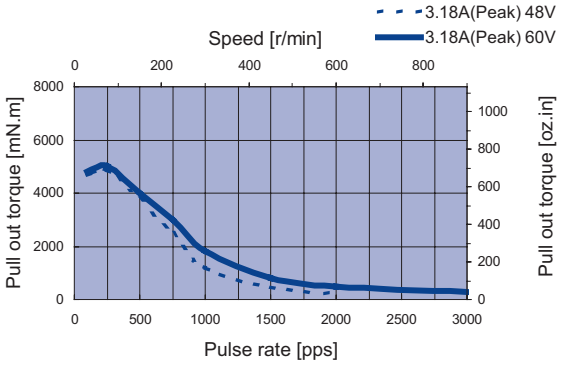
34HD1801 Bi-polar parallel

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



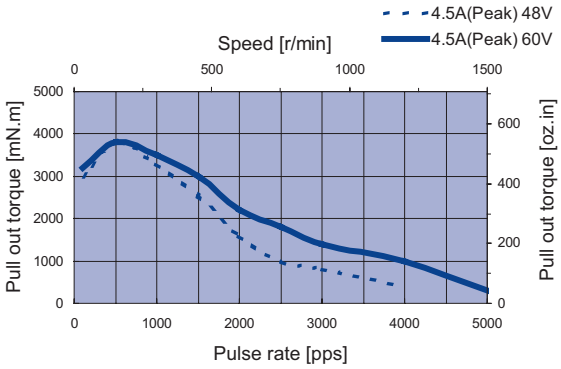
34HD1801 Bi-polar series

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



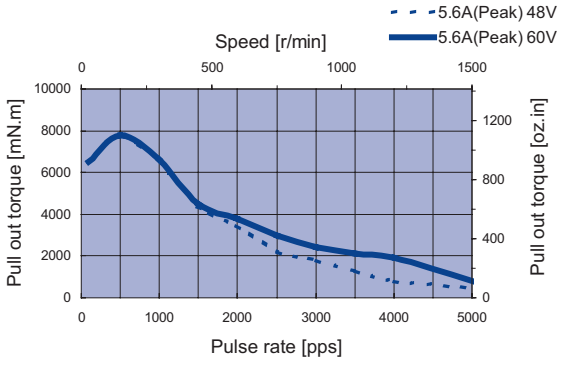
34HD1801 Uni-polar

Conditions: Uni-polar Constant Current Driver
IC: AMA AMA MSU8080M
Mode:Full Step



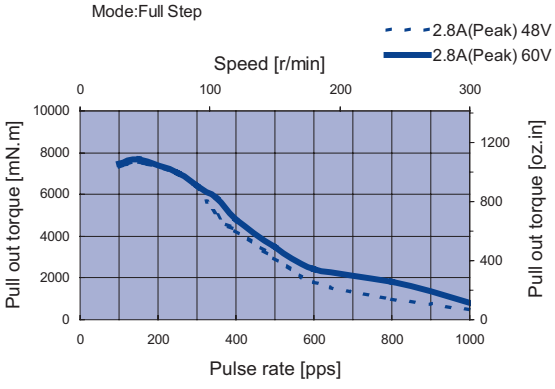
34HD2801 Bi-polar parallel

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



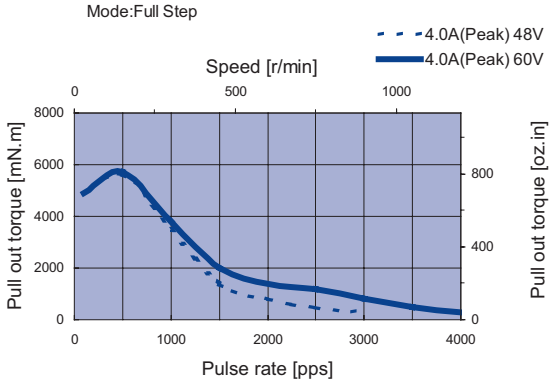
34HD2801 Bi-polar series

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



34HD2801 Uni-polar

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU8080M
Mode:Full Step



34HY SERIES 1.8°

Key Features

- Low Noise
- Low Inertia
- High Acceleration

General Specifications

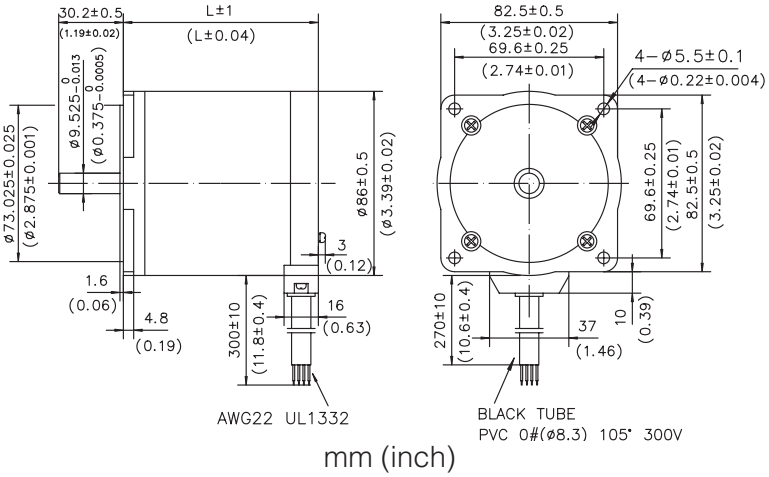
8-Leadwire Motors

Model Number	Types of Connection	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
		ohm	mH	A	mN.m	oz-in	mN.m	oz-in	g.cm²	oz-in²
34HY0809	Bi-polar Parallel	2.3	18	1.8	2300	326	120	16.99	560	3.08
	Bi-polar Series	9.2	72	0.9	2300	326	120	16.99	560	3.08
	Unipolar	4.6	18	1.3	1800	255	120	16.99	560	3.08
34HY0810	Bi-polar Parallel	0.6	3.6	4.2	2300	326	120	16.99	560	3.08
	Bi-polar Series	2.4	14.4	2.1	2300	326	120	16.99	560	3.08
	Unipolar	1.2	3.6	3.0	1800	255	120	16.99	560	3.08
34HY1801-10	Bi-polar Parallel	0.3	2.4	5.6	4000	566	210	29.74	1200	6.60
	Bi-polar Series	1.2	9.6	2.8	4000	566	210	29.74	1200	6.60
	Unipolar	0.6	2.4	4	3100	439	210	29.74	1200	6.60
34HY1803	Bi-polar Parallel	0.8	6.7	3.9	4600	651	210	29.74	1200	6.60
	Bi-polar Series	3.2	26.8	1.9	4600	651	210	29.74	1200	6.60
	Unipolar	1.6	6.7	2.8	3500	496	210	29.74	1200	6.60
34HY2801	Bi-polar Parallel	0.47	4.0	8.4	7800	1104	180	25.49	2100	11.55
	Bi-polar Series	1.88	16	4.2	7800	1104	180	25.49	2100	11.55
	Unipolar	0.94	4.0	6	6000	850	180	25.49	2100	11.55
34HY2802	Bi-polar Parallel	0.19	1.6	9.4	5600	793	180	25.49	2100	11.55
	Bi-polar Series	0.76	6.0	4.7	5600	793	180	25.49	2100	11.55
	Unipolar	0.38	1.5	6.7	4300	609	180	25.49	2100	11.55

Motor Wiring Diagram —> Page A-8

Mechanical Dimension

Model Number	L	Mass
	mm (in.)	kg (lb.)
34HY0**	63 (2.48)	1.5 (3.31)
34HY1**	91 (3.58)	2.6 (5.73)
34HY2**	130 (5.12)	3.6 (7.94)

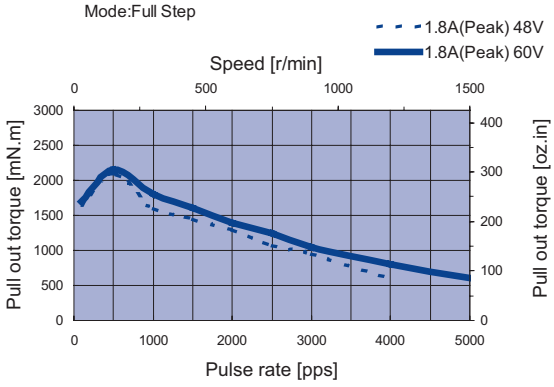


mm (inch)

Dynamic Torque Curves

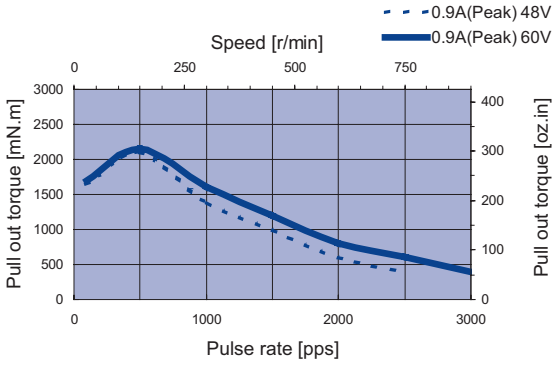
34HY0809 Bi-polar Parallel

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



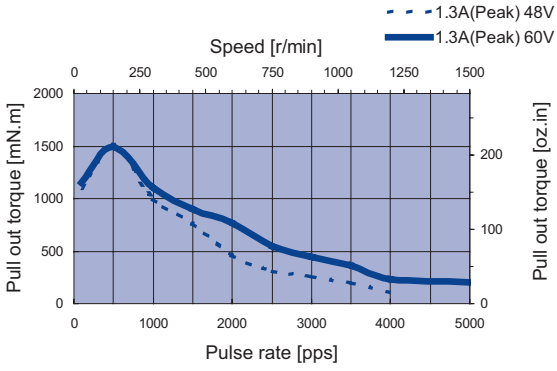
34HY0809 Bi-polar series

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



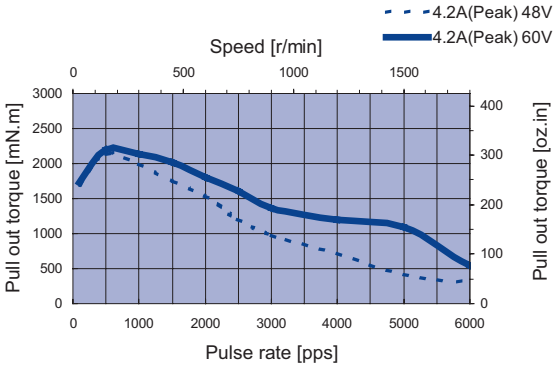
34HY0809 Uni-polar

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU8080M
Mode:Full Step



34HY0810 Bi-polar Parallel

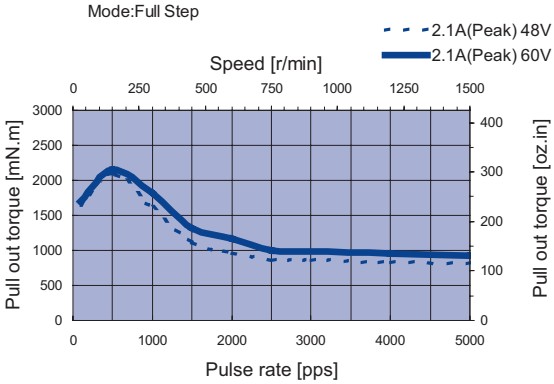
Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



Dynamic Torque Curves

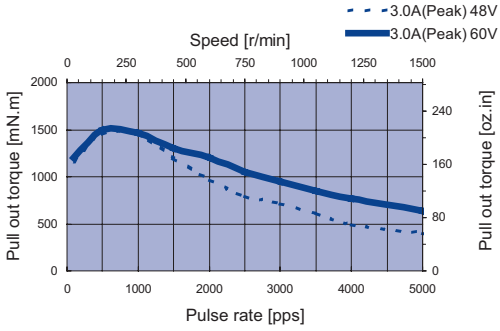
34HY0810 Bi-polar series

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



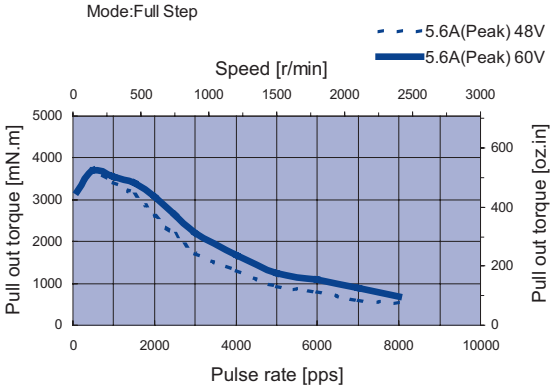
34HY0810 Uni-polar

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU8080M
Mode:Full Step



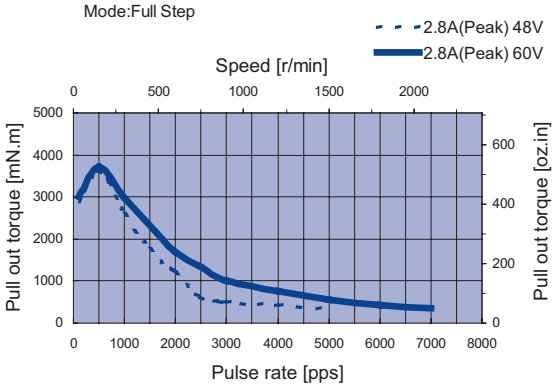
34HY1801-10 Bi-polar Parallel

Conditions: Bi-polar Constant Current Driver
IC: AMA MSU8080M
Mode:Full Step



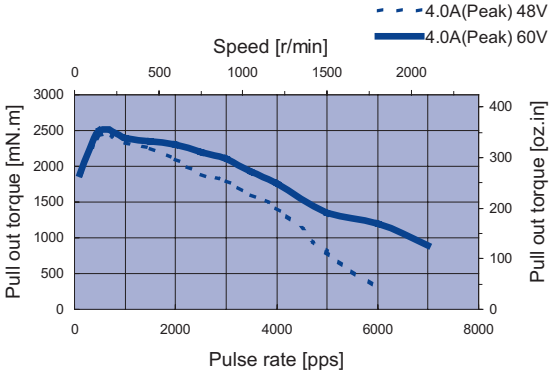
34HY1801-10 Bi-polar Series

Conditions: Bi-polar Constant Current Driver
IC: AMA MSU8080M
Mode:Full Step



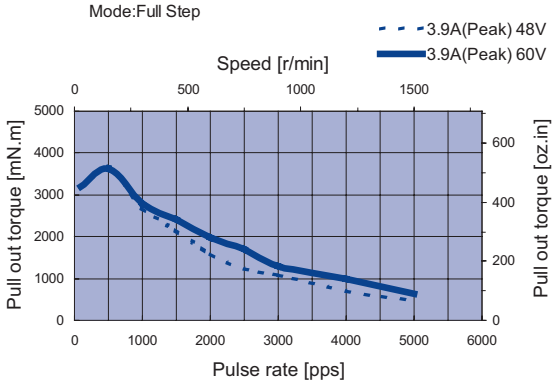
34HY1801-10 Uni-polar

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU8080M
Mode:Full Step



34HY1803 Bi-polar Parallel

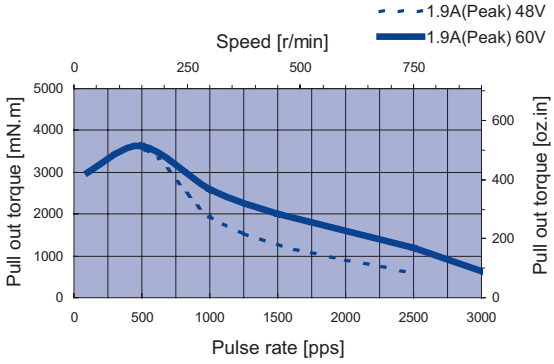
Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



Dynamic Torque Curves

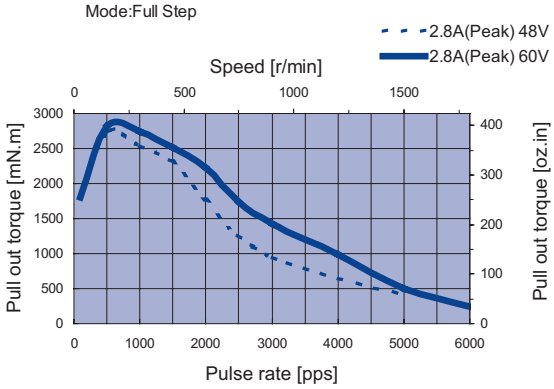
34HY1803 Bi-polar Series

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



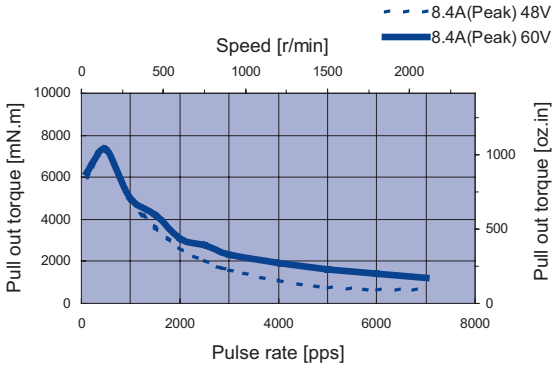
34HY1803 Uni-polar

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU8080M
Mode:Full Step



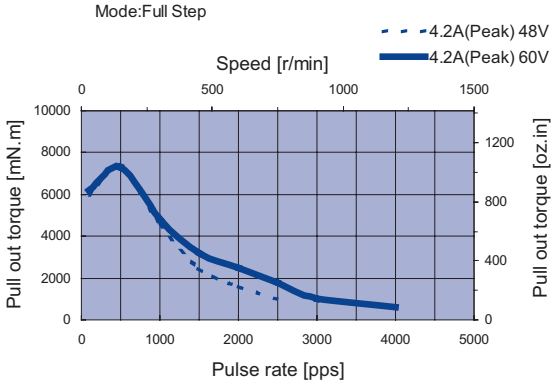
34HY2801 Bi-polar Parallel

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



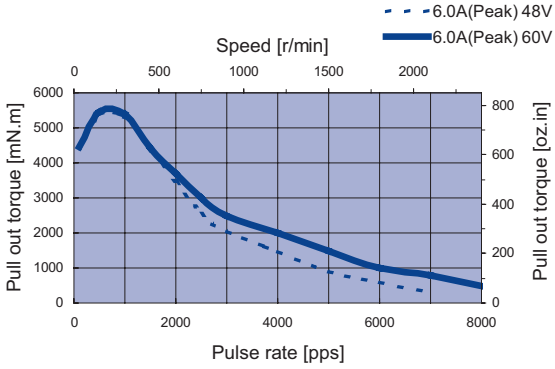
34HY2801 Bi-polar Series

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



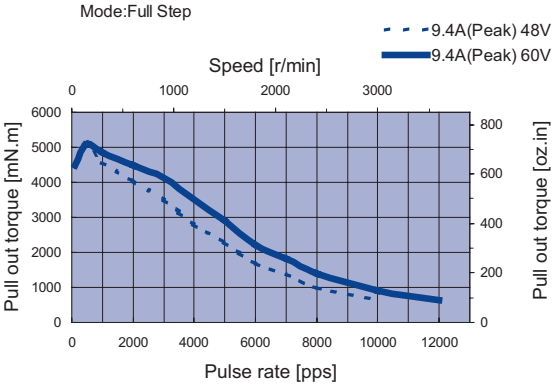
34HY2801 Uni-polar

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU8080M
Mode:Full Step



34HY2802 Bi-polar Parallel

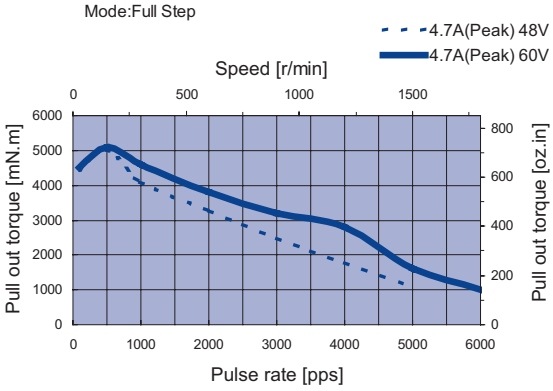
Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



Dynamic Torque Curves

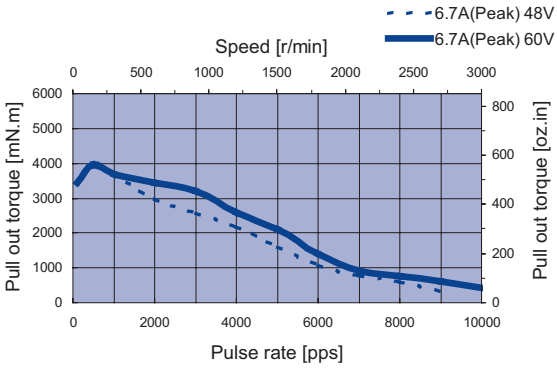
34HY2802 Bi-polar Series

Conditions: Bi-polar Constant Current Driver
IC: AMA MS7080M
Mode:Full Step



34HY2802 Uni-polar

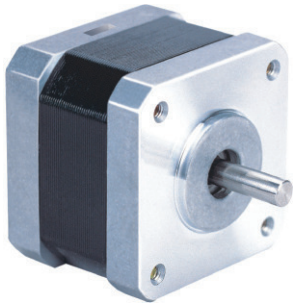
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU8080M
Mode:Full Step



17HE SERIES 3.6°

Key Features

- Low Inertia
- Low Noise
- High Acceleration



General Specifications

Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
17HE1401-01	12	9.4	0.58	80	11.33	15	2.12	20	0.11
17HE1402-01	150	100	0.16	80	11.33	15	2.12	20	0.11
17HE1403-01	0.85	0.7	2.5	90	12.74	15	2.12	20	0.11

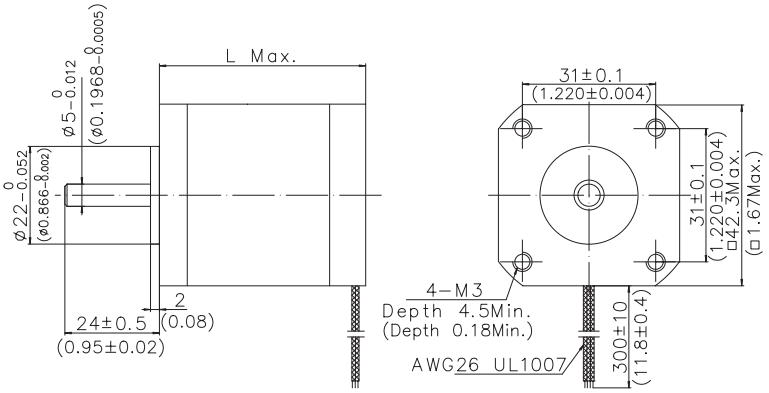
Uni-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
17HE1603-02	75	35	0.2	60	8.50	15	2.12	20	0.11
17HE1604-01	50	25	0.25	60	8.50	15	2.12	20	0.11
17HE1606-02	12	5.5	0.58	60	8.50	15	2.12	20	0.11

Motor Wiring Diagram —> Page A-8

Mechanical Dimension

Model Number	L	Mass
	mm (in.)	kg (lb.)
17HE**	34.3 (1.35)	0.2 (0.44)

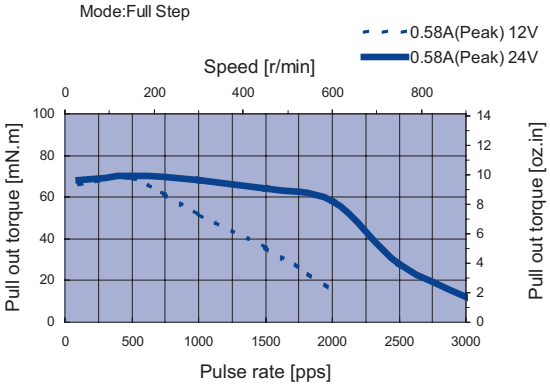


mm (inch)

Dynamic Torque Curves

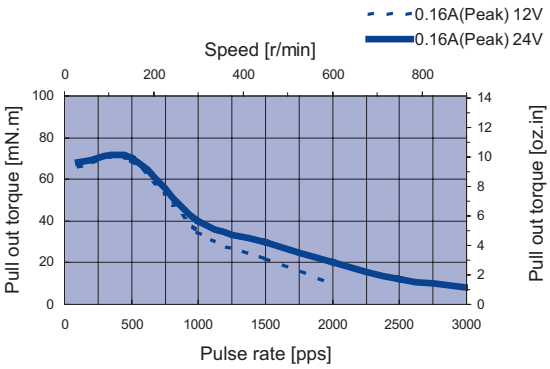
17HE1401-01

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



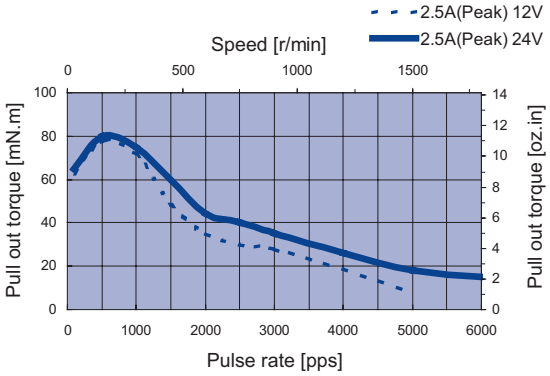
17HE1402-01

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



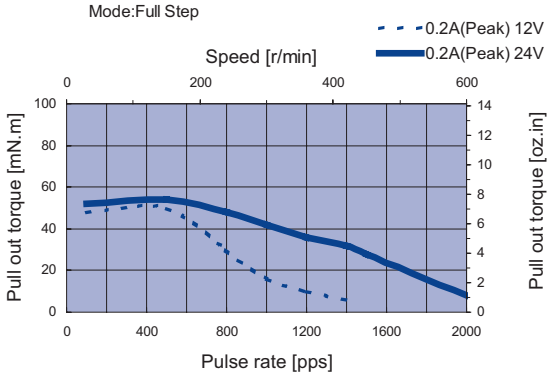
17HE1403-01

Conditions: Bi-polar Constant Current Driver
IC: AMA MS3540M
Mode:Full Step



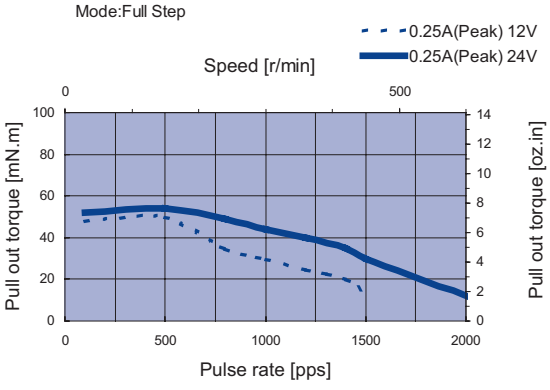
17HE1603-02

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



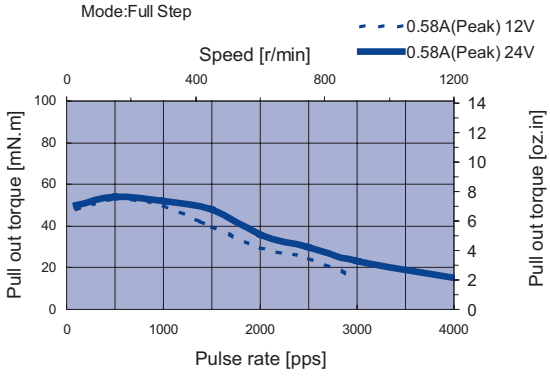
17HE1604-01

Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



17HE1606-02

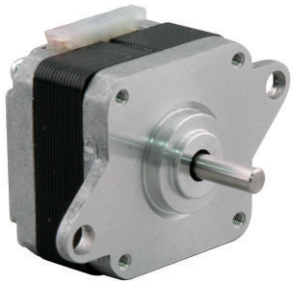
Conditions: Uni-polar Constant Current Driver
IC: AMA MSU3040M
Mode:Full Step



10HF SERIES 3.75°

Key Features

- Low Inertia
- Low Noise
- Small Size



General Specifications

Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
10HF7402-02	84	21	0.143	12	1.70	3	0.42	2	0.01

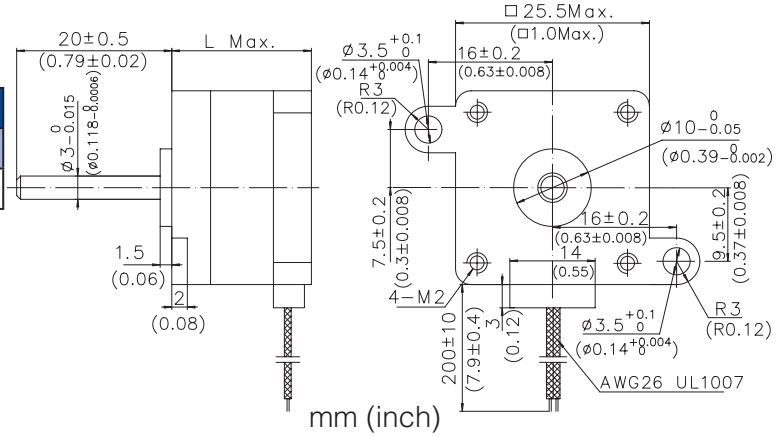
Uni-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
10HF7602-03	42	4.5	0.2	8	1.13	3	0.42	2	0.01

Motor Wiring Diagram —> Page A-8

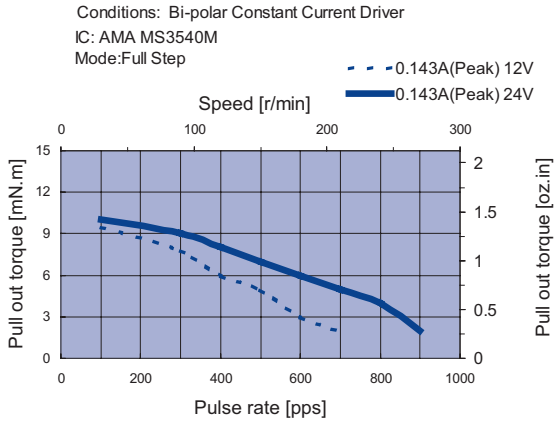
Mechanical Dimension

Model Number	L	Mass
	mm (in.)	kg (lb.)
10HF7**	18.5 (0.72)	0.045 (0.10)

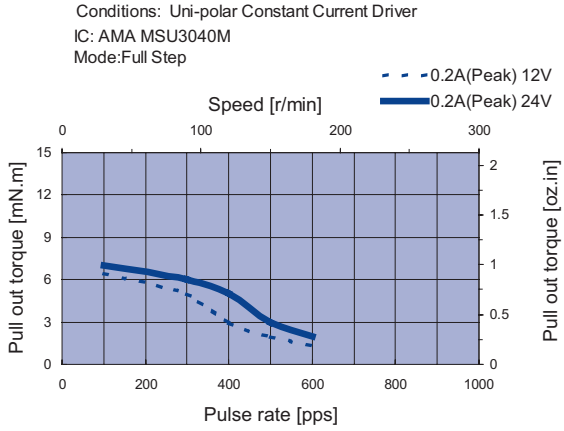


Dynamic Torque Curves

10HF7402-02



10HF7602-03



24HC SERIES 1.2°

Key Features

- 3-phase Motor
- Low Noise
- Smooth Movement
- Low Vibration

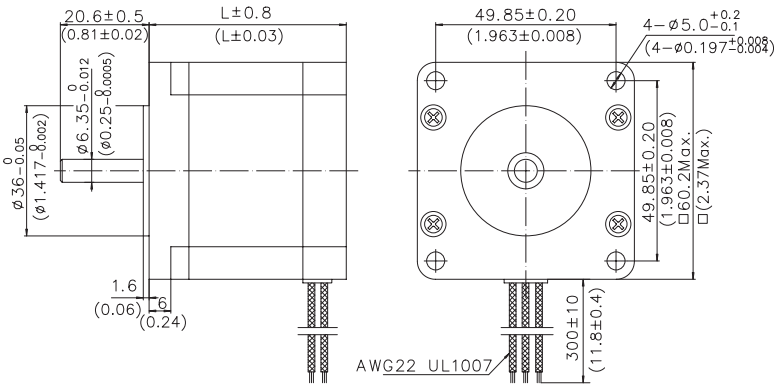
General Specifications

Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
24HC2301	0.32	0.76	5.8	900	127.48	40	5.67	260	1.43
24HC3301	0.45	1.30	5.8	1500	212.46	70	9.92	460	2.53
24HC4301	6	10.2	1.5	540	76.49	25	3.54	180	0.99

Mechanical Dimension

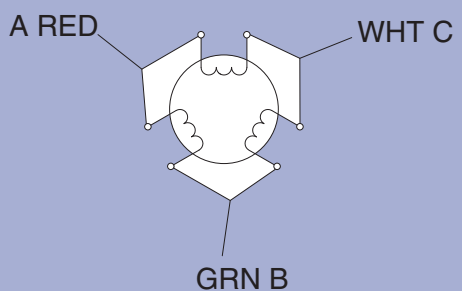
Model Number	L	Mass
	mm (in.)	kg (lb.)
24HC2**	54.5 (2.13)	0.8 (1.76)
24HC3**	76.5 (2.98)	1.3 (2.86)
24HC4**	45.5 (1.77)	0.5 (1.10)



mm (inch)

Wrie Diagram and Drive Sequence model

Wire Diagram



Drive Sequence model

When seen from the flange side of the motor

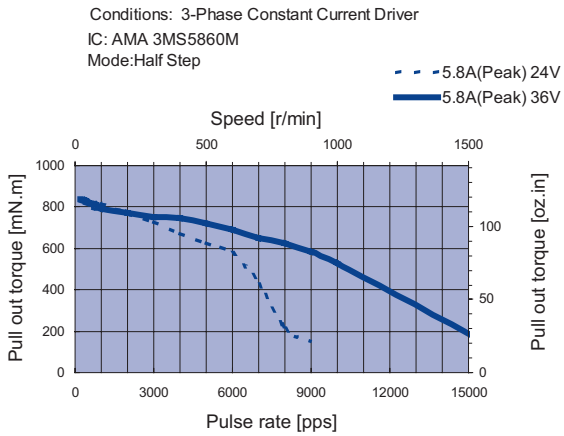
STEP	A	B	C
1	+	−	
2		−	+
3	−		+
4	−	+	
5		+	−
6	+		−

CW

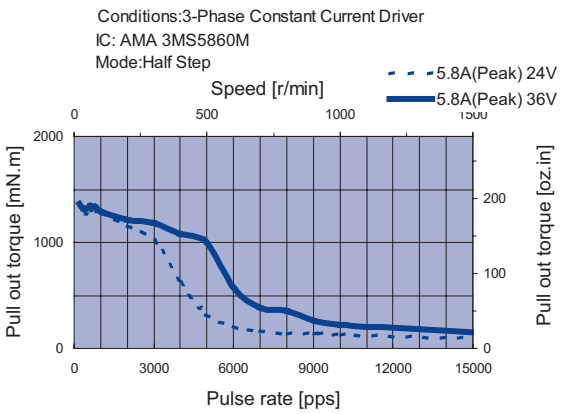
CW(CLOCKWISE) ROTATION

Dynamic Torque Curves

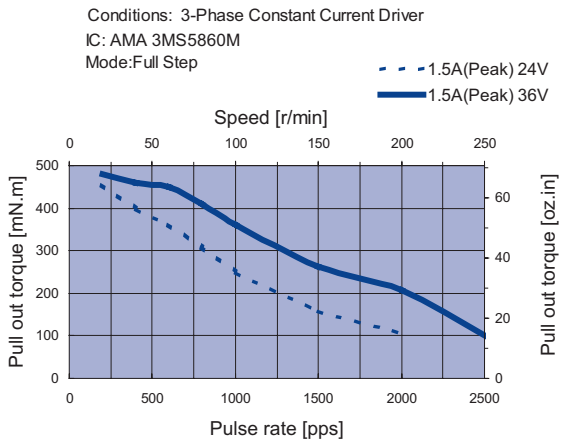
24HC2301



24HC3301



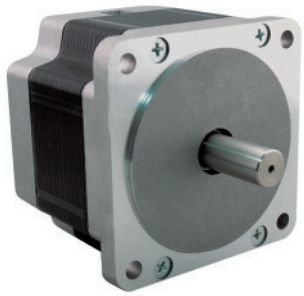
24HC4301



34HC SERIES 1.2°

Key Features

- 3-phase Motor
- Low Noise
- Smooth Movement
- Low Vibration



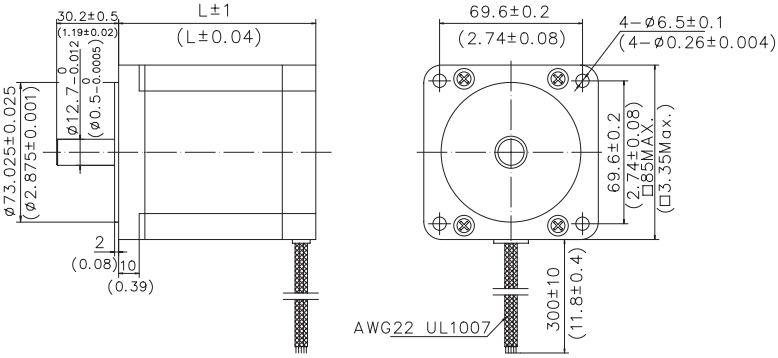
General Specifications

Bi-polar

Model Number	Resistance per Phase	Inductance per Phase	Rated Current	Holding Torque		Detent Torque		Rotor Inertia	
	ohm	mH	A	mNm	oz-in	mNm	oz-in	g.cm²	oz-in²
34HC0301	1.8	11.5	3.0	2000	283.29	100	14.16	1100	6.05
34HC1301	4.6	39.0	2.0	4000	566.57	150	21.25	1850	10.18
34HC2301	1.2	10.5	5.2	6000	849.86	200	28.33	2750	15.13

Mechanical Dimension

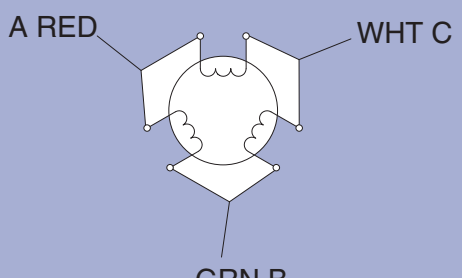
Model Number	L	Mass
	mm (in.)	kg (lb.)
34HC0**	66.5 (2.59)	1.6 (3.52)
34HC1**	96.0 (3.74)	2.7 (5.94)
34HC2**	125.5 (4.89)	3.8 (8.36)



mm (inch)

Wrie Diagram and Drive Sequence model

Wire Diagram



Drive Sequence model

When seen from the flange side of the motor

STEP	A	B	C
1	+	−	
2		−	+
3	−		+
4	−	+	
5		+	−
6	+		−

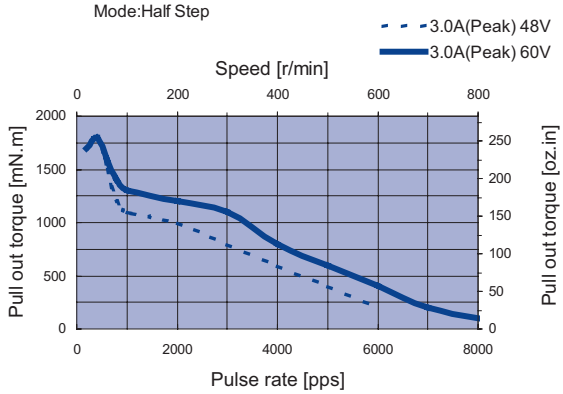
CW

CW(CLOCKWISE) ROTATION

Dynamic Torque Curves

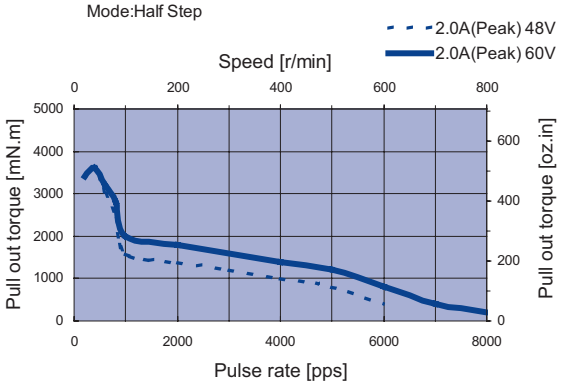
34HC0301

Conditions: 3-Phase Constant Current Driver
IC: AMA 3MS5860M
Mode:Half Step



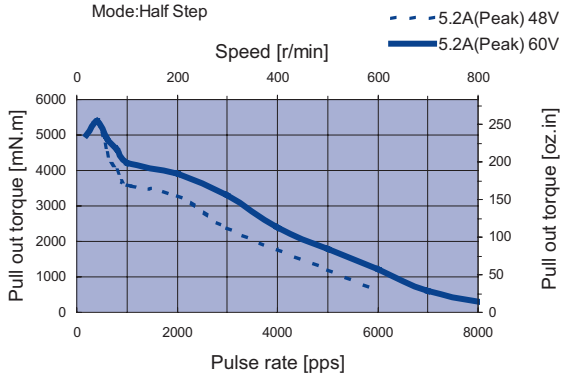
34HC1301

Conditions: 3-Phase Constant Current Driver
IC: AMA 3MS5860M
Mode:Half Step

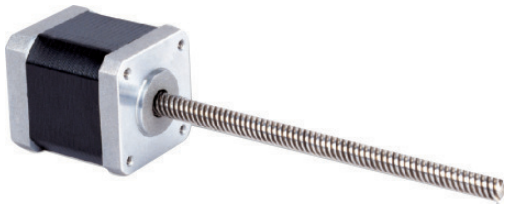


34HC2301

Conditions: 3-Phase Constant Current Driver
IC: AMA 3MS5860M
Mode:Half Step



Digital Linear Actuator (External Nut)



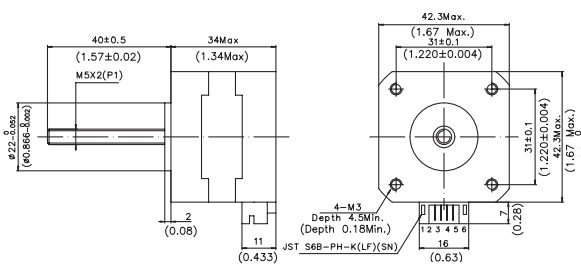
Description

Conversion of rotary to linear motion inside a linear actuator is accomplished through a threaded nut and lead screw. The external shaft is threaded. In order to generate linear motion the lead screw must rotating together with rotor, and the shaft threads engages the nut resulting in linear motion. Changing the direction of rotation combination determines the linear travel per step of the nut. The travel length and speed can be digital controlled by the input of data pulses. Moons DLA 16HY0416-02N, is designed as travel of 0.004mm per step and can be accurately controlled to drive 40mm movement by a 10K data pulses input. Application: Various zoom controls, X-Y stages, as well as other linear motion control applications.

General Specifications

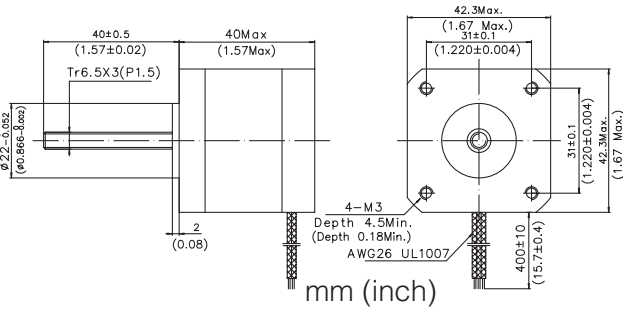
Model Number	Number of leads	Step Distance		Rated Current	Resistance per Phase	Inductance per Phase	Rotor Inertia		Motor Mass	
		mm	inch	A	ohm	mH	g.cm²	oz-in²	kg	lb.
17HD0007-34	4	0.01	0.0004	0.4	35	44	38	0.21	0.20	0.44
17HD2405-20N	4	0.015	0.0006	0.5	25	45	57	0.31	0.24	0.53
17HD4001-15N	4	0.04	0.0016	0.4	30	45	38	0.21	0.20	0.44

Mechanical Dimension



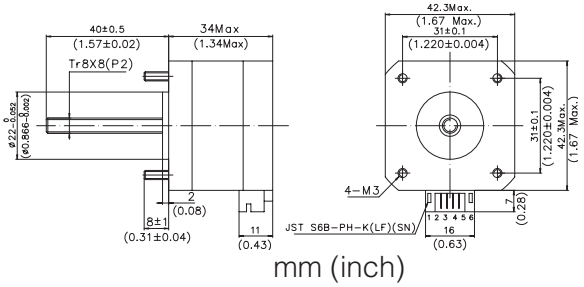
mm (inch)

17HD0007-34



mm (inch)

17HD2405-20N

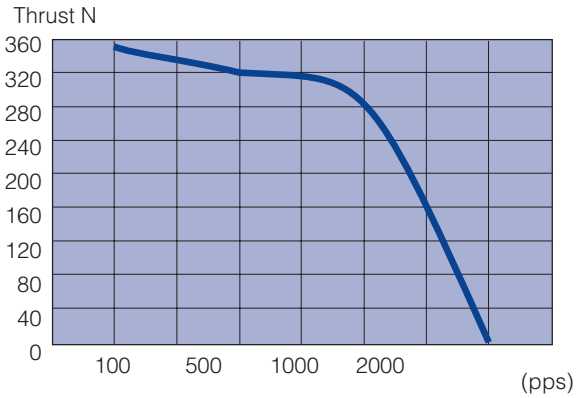


mm (inch)

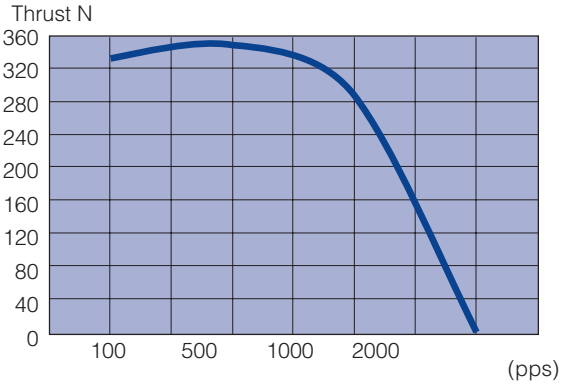
17HD4001-15N

Dynamic Torque Curves

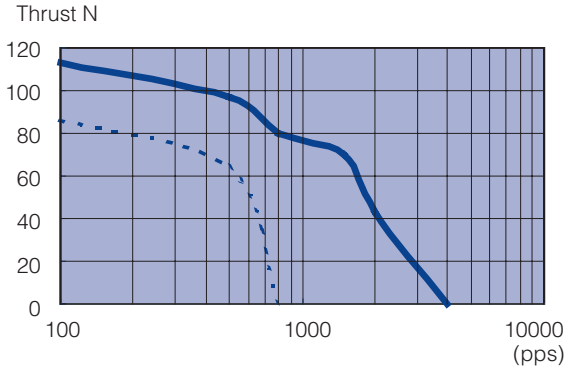
Speed Vs Thrust
17HD0007-34
0.4A/24V



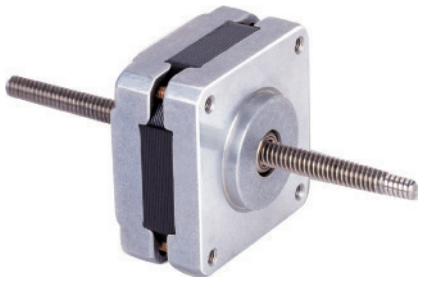
Speed Vs Thrust
17HD2405-20N
0.5A/24V



Speed Vs Thrust
17HD4001-15N
0.4A/24V



Digital Linear Actuator (Internal Nut)



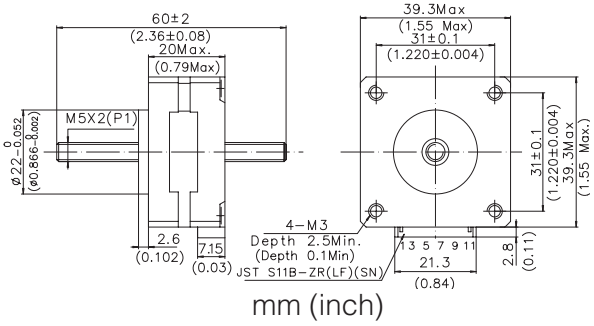
Description

Conversion of rotary to linear motion inside a linear actuator is accomplished through a threaded nut and lead screw. The inside of the rotor is threaded and the shaft is replaced by a lead screw. In order to generate linear motion the lead screw must be prevented from rotation. As the rotor turns the internal threads engage the lead screw resulting in linear motion. Changing the direction of rotation reverses the direction of linear motion. The motors rotary step angle. The thread pith of the rotor nut and lead screw combination determine the linear travel per step of the motor. The travel length and speed can be digital controlled by the input of data pulses. Moons DLA 11 HS1002-04, is designed as travel of 0.0035mm per step and can be accurately controlled to drive 35mm movement by a 10K data pulses input.
Accomplishing the conversion of rotary to linear motion inside the rotor greatly simplifies the process of delivering linear motion for many applications. Because the linear actuator is self-contained, the requirements for external components such as belts and pulleys are greatly reduced or eliminated. Fewer components make the design process easier, reduce overall system cost and size and improve product reliability. Application: Various valve intelligent controls, Telecommunication Tuning, as vell as other linear motion control applications.

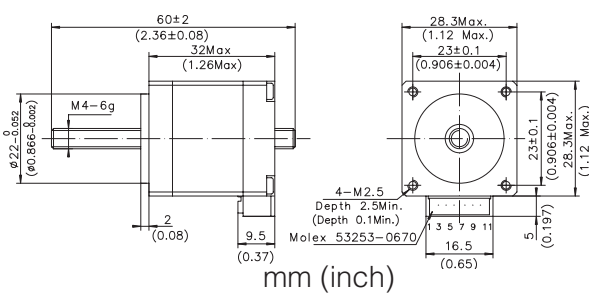
General Specifications

Model Number	Number of leads	Step Distance		Current Phase	Resistance per Phase	Inductance per Phase	Rotor Inertia		Motor Mass	
		mm	inch	A	ohm	mH	g.cm²	oz-in²	kg	lb.
16HY7001-52	4	0.1270	0.0050	0.48	25	26	11	0.06	0.1	0.22
11HS1002-14	4	0.0035	0.0001	0.7	4.8	3.4	9	0.05	0.12	0.26

Mechanical Dimension



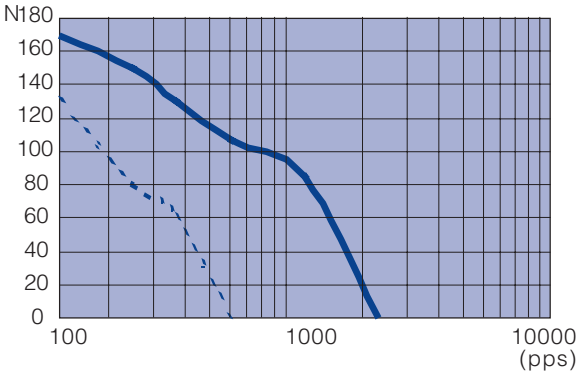
16HY7001-52



11HS1002-14

Dynamic Torque Curves

24V constant current driver
16HY7001-52
0.48A



Speed Vs Thrust
11HS1002-14
0.7A/24V