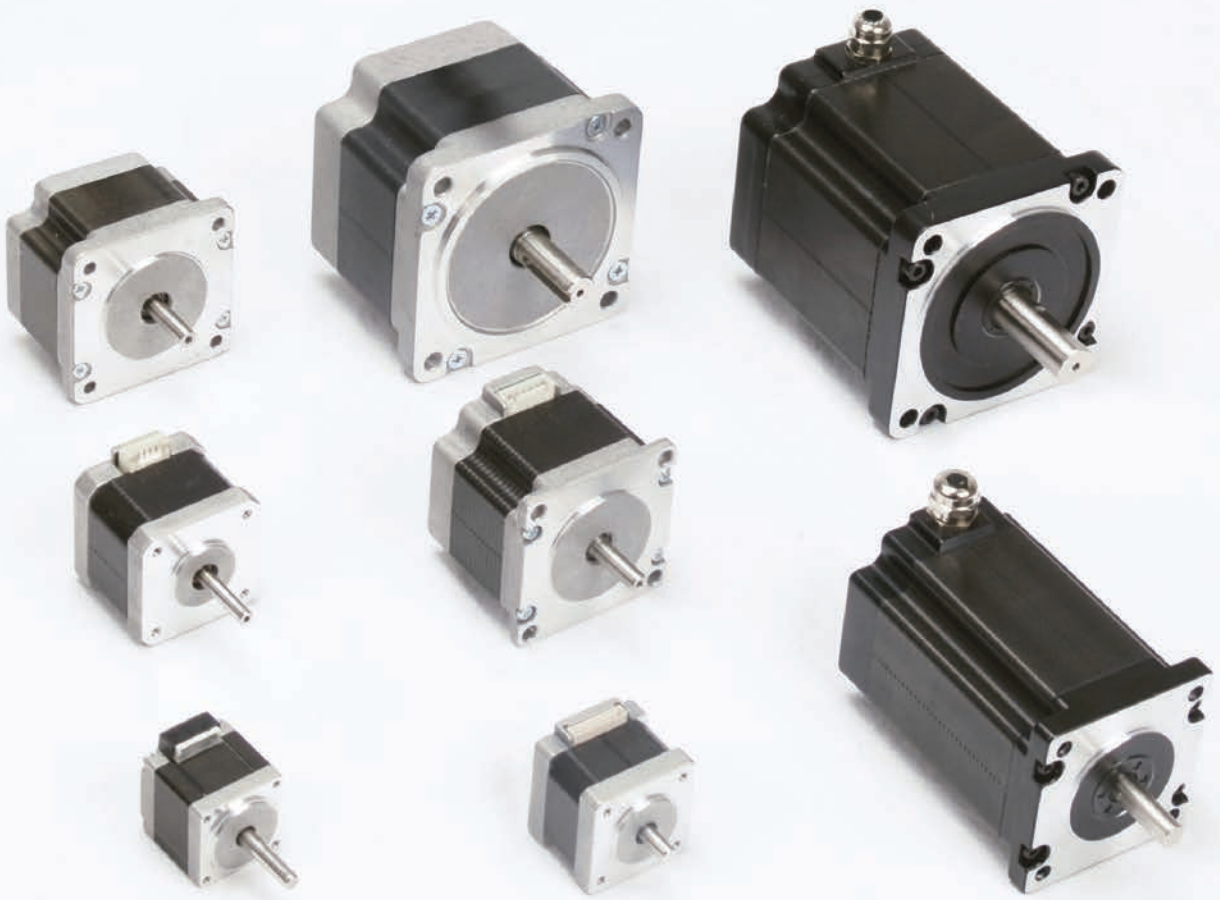
Stepper Motor



MOONS'

moving in better ways

Stepper Motor

Introduction 04
Quick Selection Of Motor 11

2-phase Stepper Motors

Stepper Motors

NEMA 8 (☐ 20mm)2-phase 1.8° - 8 HY Series DC 12
NEMA11(☐ 28mm)2-phase 1.8° - 11HS Series DC 13
NEMA14(☐ 35mm)2-phase 1.8° - 14HS Series DC 14
NEMA14(☐ 35mm)2-phase 0.9° - 14HA Series DC 15
NEMA17(☐ 42mm)2-phase 1.8° - 17HD Series DC 16
NEMA17(☐ 42mm)2-phase 0.9° - 17HA Series DC 17
NEMA23(☐ 56mm)2-phase 1.8° - 23HS Series DC 18
NEMA23(☐ 56mm)2-phase 1.8° - 23HS Power Plus Series DC 19
NEMA24(☐ 60mm)2-phase 1.8° - 24HS Series DC 21
NEMA34(☐ 86mm)2-phase 1.8° - 34HD Series DC 22
NEMA23(☐ 56mm)2-phase 1.8° - 23HS Series AC 23
NEMA24(☐ 60mm)2-phase 1.8° - 24HS Series AC 24
NEMA34(☐ 86mm)2-phase 1.8° - 34HD Series AC 25
NEMA42(☐ 110mm)2-phase 1.8° - 42HS Series AC 26

IP65 Type Stepper Motors

NEMA23(☐ 56mm)2-phase 1.8° - 23HS Series DC IP65 Type 27
NEMA24(☐ 60mm)2-phase 1.8° - 24HS Series DC IP65 Type 28
NEMA34(☐ 86mm)2-phase 1.8° - 34HD Series DC IP65 Type 29

Brake Type Stepper Motors

NEMA17(☐ 42mm)2-phase 1.8° - 17HD Series DC Brake Type 30
NEMA23(☐ 56mm)2-phase 1.8° - 23HS Series DC Brake Type 31
NEMA24(☐ 60mm)2-phase 1.8° - 24HS Series DC Brake Type 32
NEMA24(☐ 60mm)2-phase 1.8° - 24HS Series AC Brake Type 33
NEMA34(☐ 86mm)2-phase 1.8° - 34HD Series DC/AC Brake Type 34

Planetary Reducer Motors

NEMA17(☐ 42mm)2-phase 1.8° - 17HD Series DC Planetary Reducer Type 35
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NEMA24(☐ 60mm)2-phase 1.8° - 24HS Series DC Planetary Reducer Type 38
NEMA34(☐ 86mm)2-phase 1.8° - 34HD Series DC Planetary Reducer Type 39
NEMA34(☐ 86mm)2-phase 1.8° - 34HD Series AC Planetary Reducer Type 40

Encoder Type Stepper Motors

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NEMA23(☐ 56mm)2-phase 1.8° - 23HS Series DC Encoder Type 42
NEMA24(☐ 60mm)2-phase 1.8° - 24HS Series DC Encoder Type 43
NEMA34(☐ 86mm)2-phase 1.8° - 34HD Series DC/AC Encoder Type 44

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Stepper Motors

NEMA17(☐ 42mm)3-phase 1.2° - 17HC Series DC 46
NEMA24(☐ 60mm)3-phase 1.2° - 24HC Series DC 57 Flange Demension 47
NEMA24(☐ 60mm)3-phase 1.2° - 24HC Series DC 60 Flange Demension 48

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NEMA34(☐ 86mm)3-phase 1.2° - 34HC Series DC 49
NEMA34(☐ 86mm)3-phase 1.2° - 34HC Series AC 50

2-phaseUL Stepper Motors

UL Stepper Motors

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NEMA42(☐ 110mm)2-phase 1.8° - 42HS UL Series AC 55

Power Plus Type UL Stepper Motors

NEMA23(☐ 56mm)2-phase 1.8° - 23HS UL Series DC Power Plus.....56

IP65 Type UL Stepper Motors

NEMA23(☐ 56mm)2-phase 1.8° - 23HS UL Series DC IP65 Type.....58
NEMA24(☐ 60mm)2-phase 1.8° - 24HS UL Series DC IP65 Type.....59
NEMA34(☐ 86mm)2-phase 1.8° - 34HD UL Series DC IP65 Type 60

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Introduction of Stepping Motors

What is Stepping Motor

Stepping Motors provide precise position and speed control, without the need for feedback devices to sense position. The operation of step motors is controlled through electrical pulses that the drive converts to current flowing through the windings of the motor. As the current is switched the motor rotates in precise steps of a fixed angle. The motor and drive constitutes a low cost control system that is precise and simple to construct.

Performance Features of MOONS' Stepping Motors

- **Accurate Position Control**
  The number of control pulses defines the motor shaft position. Position error is very small (less than 1/10th of a degree), and non cumulative.

- **Precise Motor Speed**
  Step motor running speed, is exactly determined by the frequency of the control pulses. Because the speed is very precise and easy to control, step motors are often used where coordinated motion control is needed.

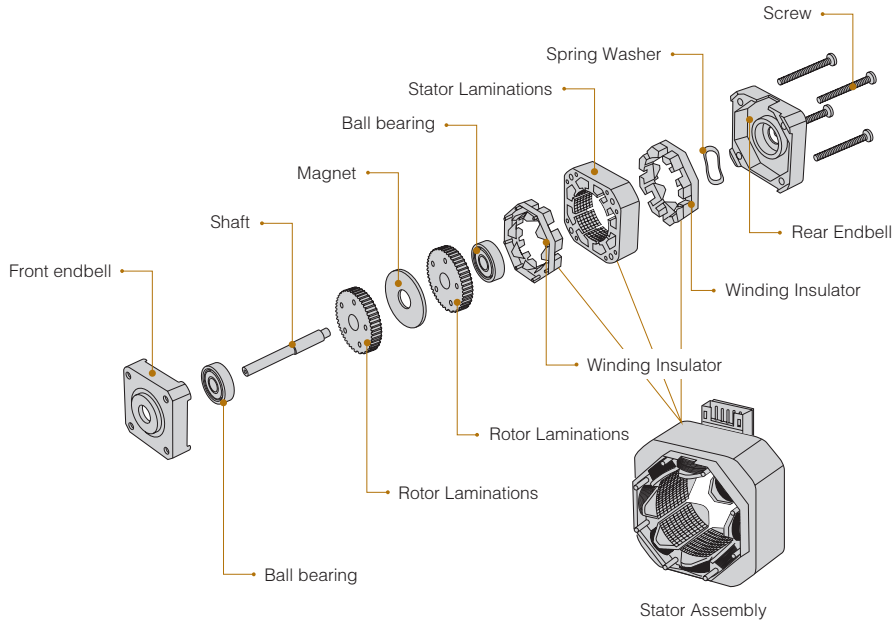
- **Forward & Reverse, Pause and Holding Function**
  Motor torque and position control is effective throughout the entire speed range, including zero speed holding torque. The zero speed holding torque locks the shaft at the desired position to hold the load in place.

- **Low Speed Operation**
  Step motors produce a large amount of torque, and are easy to control, at low speeds. This often eliminates the need for speed reduction gearboxes, reduces costs and saves space.

- **Long Life**
  The brushless design of step motors leads to motors with a very long life. Step motor life is usually determined by the life of the bearings.

Basic Structure and Motor Operation

- Basic Structure

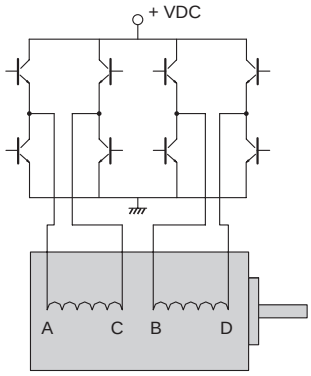


- Operating Principles

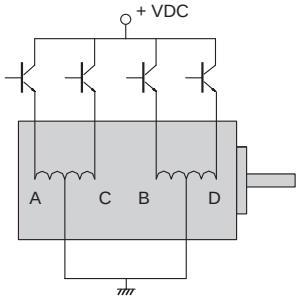
In response to each individual control pulse and direction signal, the drive applies power to the motor windings to cause the rotor to take a step forward, a step in reverse, or lock in position.

For example, in a 1.8 degree two phase step motor: When both phases are energized with DC current, the motor will stop rotating and hold in position. The maximum torque the motor can hold in place with rated DC current, is the rated holding torque. If the current in one phase is reversed, the motor will move 1 step (1.8 degrees) in a known direction. If the current in the other phase had been reversed, the motor would move 1 step (1.8 degrees) in the other direction. As current is reversed in each phase in sequence, the motor continues to step in the desired direction. These steps are very accurate. For a 1.8 degree step motor, there are exactly 200 steps in one revolution.

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



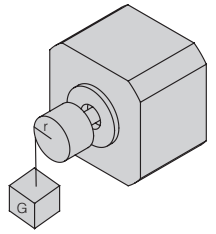
2 phase step motor with bipolar driver



2 phase step motor with unipolar driver

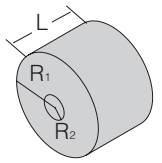
Technical Data and Terminology

- Load Calculations

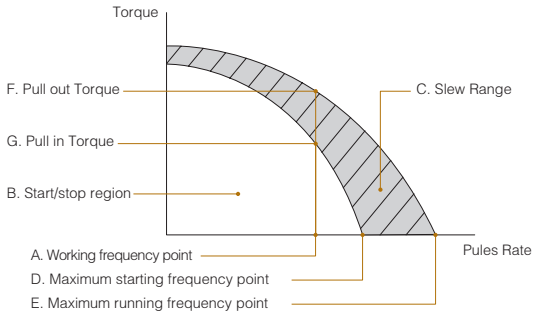


A. Torque load (Tf)
Tf = G * r
G: weight
r: radius

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



- Speed-Torque Characteristics



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

A. Working frequency point express the stepping motors rotational speed value at this point
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 moto

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.

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

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

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

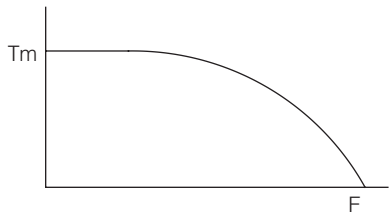
E. Maximum running frequency point at this point the stepping motor can reach its maximum running speed under an unloaded condition.

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

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

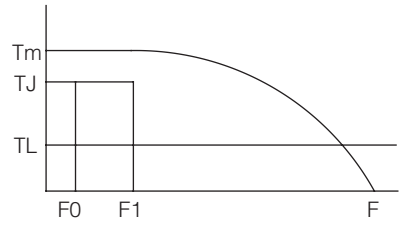
- Calculate the Acceleration Torque

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.

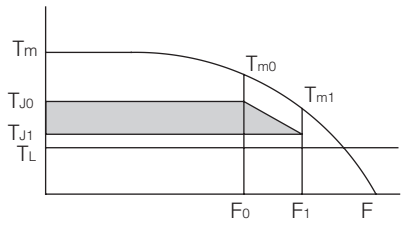


It is shown by the following graph: the dynamic torque's performance of stepping motor will always keep a horizontal straight line in low speed. But in high speed, the curve will slope

A. 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?
(1). Generally TJ = 70%Tm
(2). tr = 1.8 * 10 -5 * J * q * (F1-F0)/(TJ-TL)
(3). F (t) = (F1-F0) * t/tr + F0, 0<t<tr



B. Exponential Acceleration
(1). Generally
TJ0 = 70%Tm0,
TJ1 = 70%Tm1,
TL = 60%Tm1
(2). tr = F4 * In [(TJ0-TL)/(TJ1-TL)]
(3). 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. Have the motor operate outside of this speed 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%.



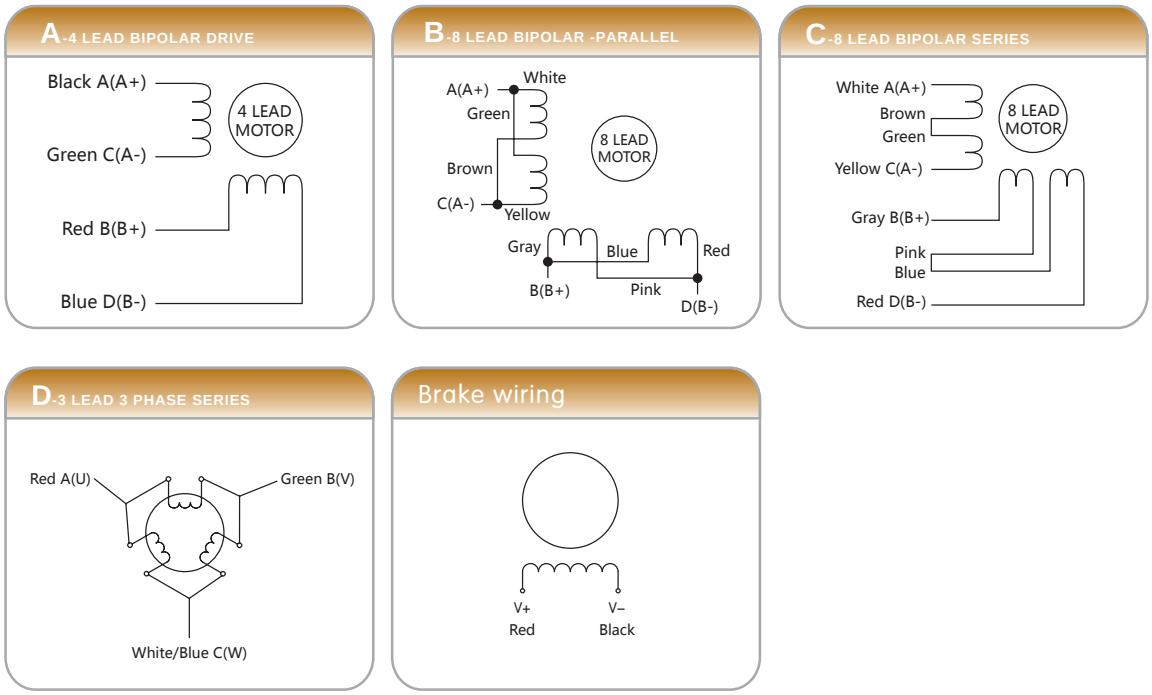
Numbering System

AM 17 HD 0 0 01 - 01

1 2 3 4 5 6 7

1. Motion Control Standard Series
2. Size: Motor outside diameter in tenths of an inch (Ex: size 17 = 1.7")
(8:20mm; 11:28mm; 14:35mm; 17:42mm; 23:56mm; 24:60mm; 34:86mm; 42:110mm)
3. Series:
   HA: step angle 0.9°
   HY,HS,HD: step angle 1.8°
   HC: step angle 1.2°
4. Length of stator
5. Number of lead wires
   0: Connector type
   3: 3 lead wires
   4: 4 lead wires
   6: 6 lead wires
   8: 8 lead wires
6. Electric variation: variety of current, torque, etc.
7. Mechanical variation: variety of shaft, lead wires, screws, etc.

Wiring Diagrams

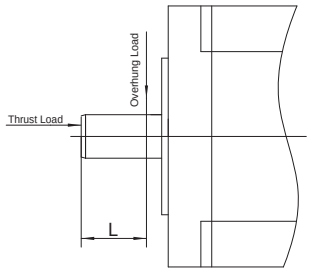


Generall Specifications

Specifications		Parameter
Step Accuracy		±5%(Tested by: Constant Current Drive/24V/Two Phase On/Rated Current/Full Step:1rps)
Insulation Class		Class B(130°C)
Operating Environment	Ambient Temperature	-20~+50°C(non-freezing)
	Ambient Humidity	85% or less (non-condensing)
	Atmosphere	No corrosive gases, dust, water or oil
Temperature Rise		Temperature rise of windings is 80˚C (144˚F) or less measured by the resistance change method. (at rated voltage, at standstill, two phases excited)
Shaft Runout		0.050T.I.R.(mm)
Radial Play		0.02mm Max.(500gf)
Axial Play		0.08mm Max.(500gf)
Concentricity		0.075T.I.R.(mm)
Perpendicularity		0.100T.I.R.(mm)

Permissible Overhung Load and Permissible Thrust Load(Unit:N)

Type	Permissible Overhung Load Distance(L) from Shaft End(mm)					Permissible Thrust Load
	0mm	5mm	10mm	15mm	20mm	
8HY	12	15	20	---	---	Less than the motor mass
11HS	20	25	34	52	- - -	
14HA/14HS	20	25	34	52	- - -	
17HD/17HA/17HC	20	25	34	52	- - -	
23HS	50	60	75	100	150	
24HS/24HC	61	73	90	110	160	
34HD/34HC	260	290	340	390	480	
42HS	390	435	510	585	720	



■ Motor Installation

Mounting Direction

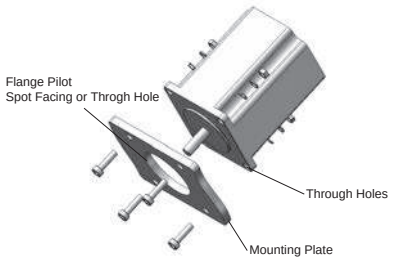
Motors can be mounted freely in any direction as shown below.

Regardless of how the motor is mounted, take care not to apply an overhung load or thrust load on the shaft. Make sure the cable does not contact the mounting surface causing undesirable force on the cable.

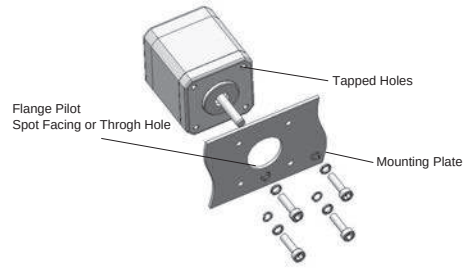
■ Mounting Method

Considering heat radiation and vibration isolation as much as possible, mount the motor tightly against a metal plane.

■ Mounting Method for Through Hole Type



■ Mounting Method for Tapped Hole Type



■ Installation Conditions

Install the motor in a location that meets the following conditions, or the product may be damaged.

- Indoors (This product is designed and manufactured to be installed within another device.)
- Ambient temperature: -20~+50°C(non-freezing)
- Ambient humidity: 85% or less (non-condensing)
- Not exposed to explosive, flammable or corrosive gases
- Not exposed to direct sunlight
- Not exposed to dust
- Not exposed to water or oil
- A place where heat can escape easily
- Not exposed to continuous vibration or excessive impact

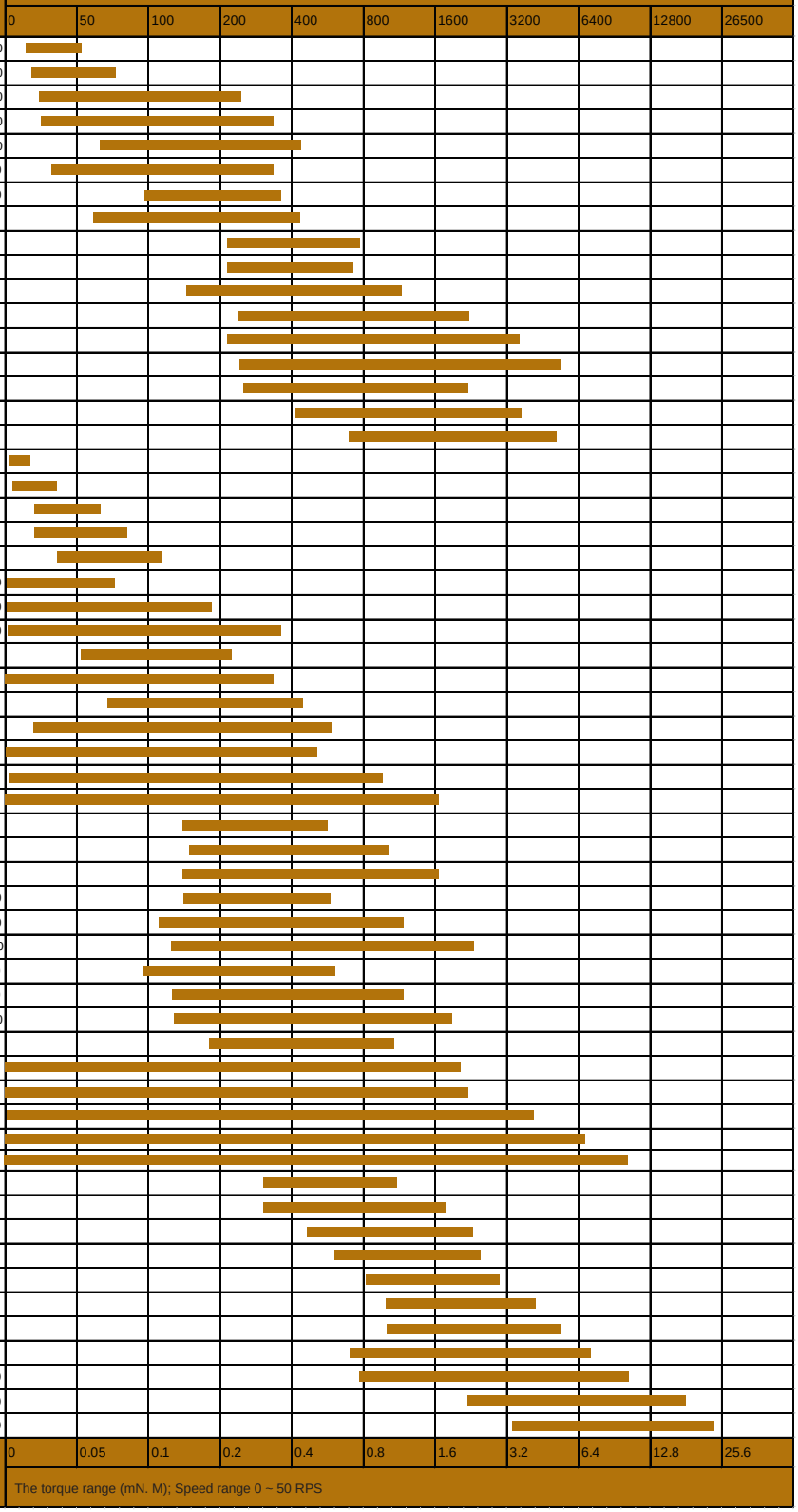
Notes:

When installing the motor in an enclosed space such as a control box, or somewhere close to a heat-radiating object, vent holes should be used to prevent the motor from overheating.

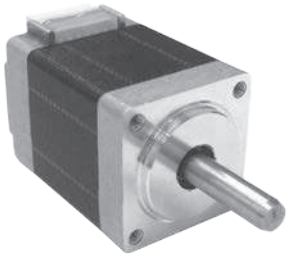
Do not install the motor in a location where a source of vibration will cause the motor to vibrate.

QUICK SELECTION OF MOTOR

step angle (°)	Size: Base (mm)	Size: Thickness (mm)	Size: Series	Recommended Driver	Model	The torque range (mN. M); Speed range 0 ~ 50 RPS
0.9	35	20	NEMA14	SR/ST	AM14HA74A0	
		28			AM14HA04A0	
	42	34.3	NEMA17		AM17HA44A0	
		39.8			AM17HA24A0	
		48.3			AM17HA64A0	
1.2	42	34	NEMA17	3SR/3ST	AM17HC20A0	
		43			AM17HC60A0	
	60	45.5	NEMA24		AM24HC4306	
		54.5			AM24HC2306	
		54.5			AM24HC2308	
		76.5			AM24HC3306	
	86	66.5	NEMA34		AM34HC0305	
		96			AM34HC1305	
		125.5			AM34HC2306	
		66.5			AM34HC0306	
		96			AM34HC1306	
		125.5			AM34HC2307	
1.8	20	29.5	NEMA8	SR/ST	AM8HY2050	
		46.5			AM8HY4043	
	28	31	NEMA11		AM11HS1008	
		40			AM11HS3007	
		51			AM11HS5008	
	35	27.3	NEMA14		AM14HS10A0	
		36			AM14HS30A0	
		55.5			AM14HS50A0	
	42	34.3	NEMA17		AM17HD4452	
		39.8			AM17HD2438	
		48.3			AM17HD6426	
		62.8			AM17HDB410	
	57	41	NEMA23		AM23HS0420	
		54			AM23HS2449	
		76			AM23HS3454	
		41			AM23HS0421	
		54			AM23HS2450	
		76			AM23HS3455	
		39			AM23HS04A0	
		55			AM23HS84A0	
		77			AM23HSA4A0	
		39			AM23HS04B0	
		55			AM23HS84B0	
		77			AM23HSA4B0	
	60	55	NEMA24		AM24HS2402	
		85			AM24HS5401	
	86	66.5	NEMA34		AM34HD0404	
		96			AM34HD1404	
		125.5			AM34HD2403	
		156			AM34HD3402	
	57	54	NEMA23	SRAC/ STAC	AM23HS2459	
		76			AM23HS3466	
	60	85	NEMA24		AM24HS5411	
	86	66.5	NEMA34		AM34HD0802	
		75			AM34HD4802	
		96			AM34HD1802	
		115			AM34HD6801	
		125.5			AM34HD2805	
	110	98.5	NEMA42		AM42HS04A0	
		149.5			AM42HS24A0	
		201			AM42HS34A0	



NEMA8(□20mm) 2-phase DC1.8°- 8HY Series



Phases	2
Steps / Revolution	± 5%
Step Accuracy	6 N (1.3 Lbs.)Push 25 N (5.6 Lbs.) Pull
Radial	18 N (4 Lbs.) At End of Shaft
IP Rating	40
Operating Temp	–20℃ to +50℃
Insulation Class	B, 130℃
Insulation Resistance	100 MegOhms

RoHS Compliant

■ Parameters

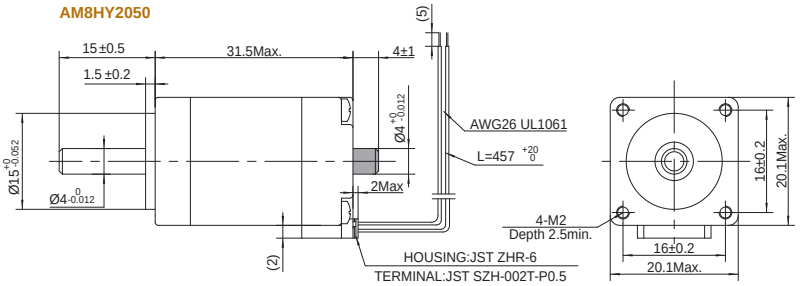
Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	Kg	
AM8HY2050-01N	Single Shaft	A	4	29.5	0.02	0.35	11.5	1.6	0.04	500VAC 1 minute
AM8HY2050-02N	Double Shaft									
AM8HY4043-01N	Single Shaft			46.5	0.042		20.3	4.2	0.09	
AM8HY4043-02N	Double Shaft									

* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

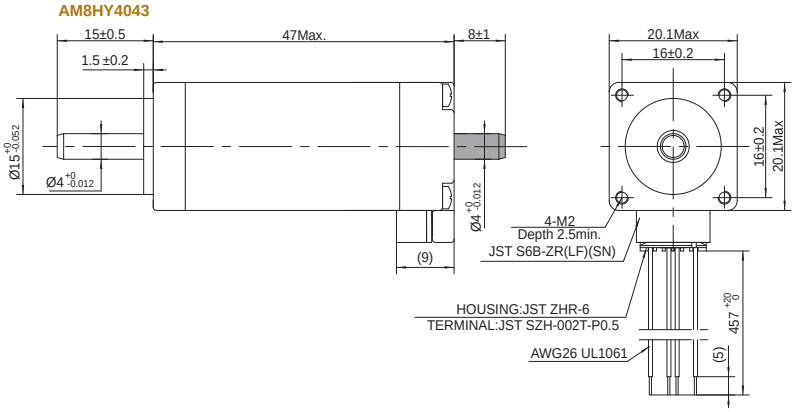
■ Dimensions (Unit: mm)

AM8HY2050



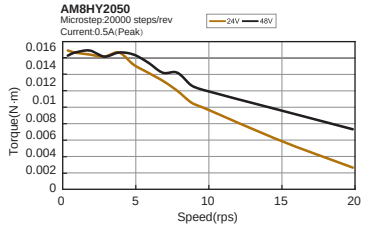
■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

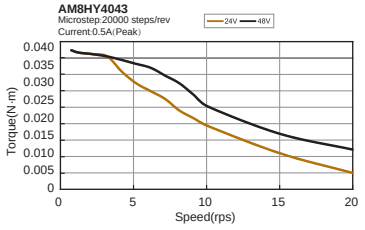
AM8HY4043



■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

■ Torque Curves (Recommended Driver: SR or ST)





NEMA11(□28mm) 2-phase DC 1.8°- 11HS Series



Phases	2
Steps / Revolution	±5%
Step Accuracy	15 N (3.4 Lbs.)Push 25 N (5.6 Lbs.) Pull
Radial	30 N (6.5 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

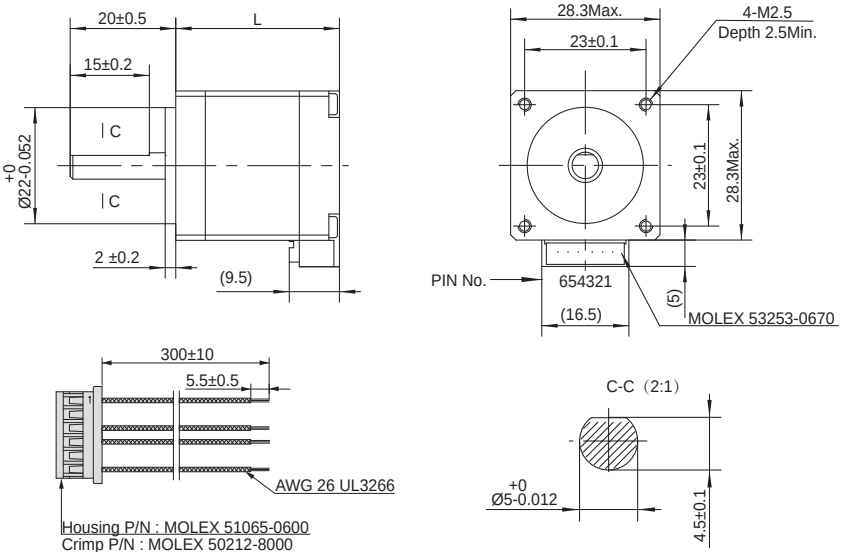
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM11HS1008-07	Single Shaft	A	4	31.0	0.072	1	2.5	9.0	0.1	500VAC 1 minute
AM11HS3007-02	Single Shaft			40.0	0.082		1.7	12.0	0.15	
AM11HS5008-01	Single Shaft			51.0	0.125		3.5	18.0	0.2	

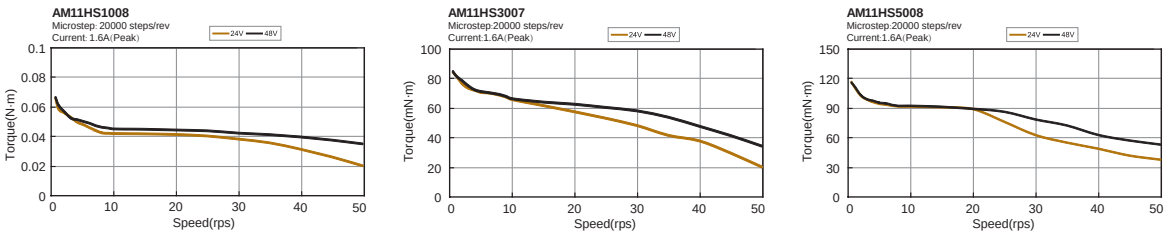
* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

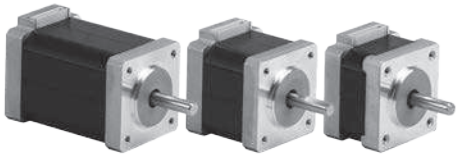
Dimensions (Unit: mm)



Torque Curves(Recommended Driver: SR or ST)



NEMA14(□35mm) 2-phase DC 1.8° - 14HS Series



Phases	2
Steps / Revolution	±5%
Step Accuracy	25 N (5.6 Lbs.)Push 65 N (15 Lbs.) Pull
Radial	30 N (6.5 Lbs.) At End of Shaft
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

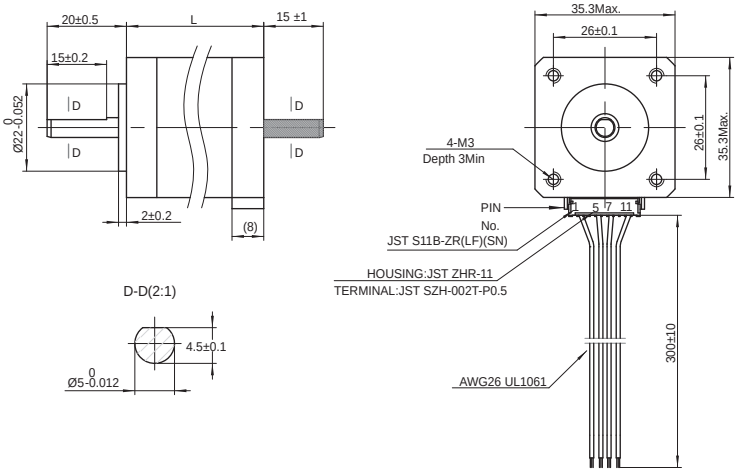
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	Kg	
AM14HS10A0-01	Single Shaft	A	4	27.3	0.14	1.0	3.3	12.0	0.15	500VAC 1 minute
AM14HS10A0-02	Double Shaft									
AM14HS30A0-01	Single Shaft			36	0.23		3.4	20.0	0.21	
AM14HS30A0-02	Double Shaft									
AM14HS50A0-01	Single Shaft			55.5	0.4		5.1	35.0	0.24	
AM14HS50A0-02	Double Shaft									

* Wiring Diagram A See Page 9

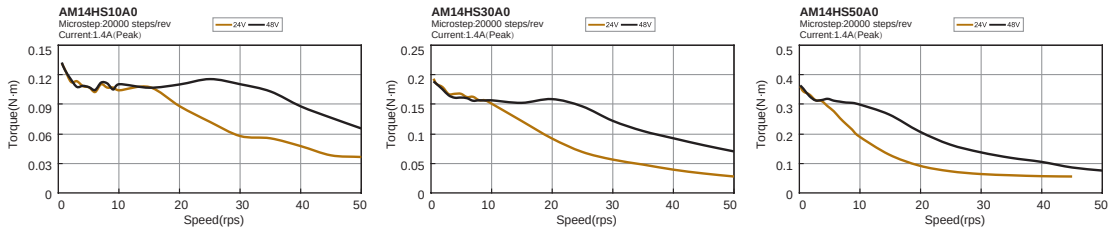
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)

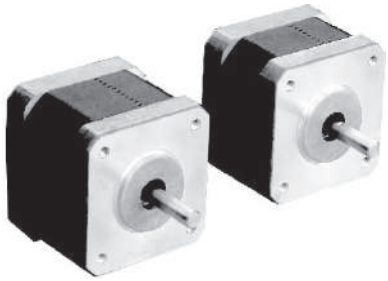


■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

Torque Curves (Recommended Driver: SR or ST)



NEMA14(□35mm) 2-phase DC 0.9°- 14HA Series



Phases	2
Steps / Revolution	±5%
Step Accuracy	25 N (5.6 Lbs.)Push 65 N (15 Lbs.) Pull
Radial	30 N (6.5 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

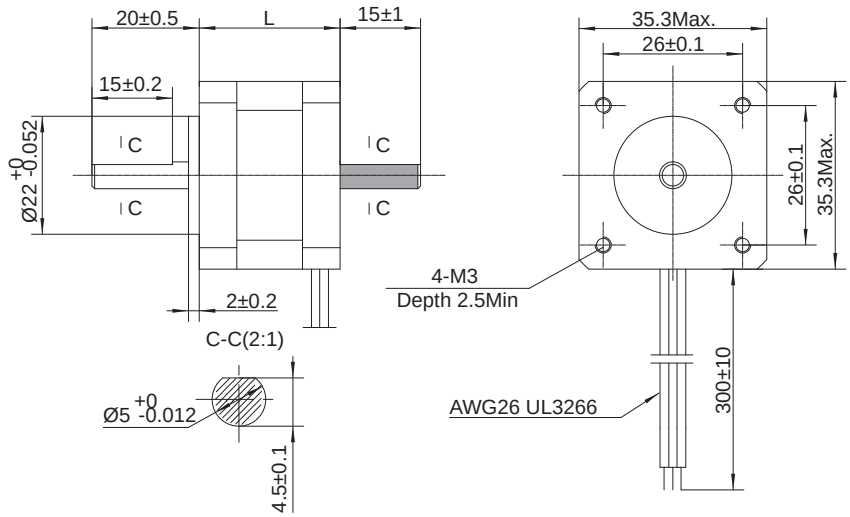
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM14HA74A0-01N	Single Shaft	A	4	20	0.065	1.5	0.9	10.0	0.09	500VAC 1 minute
AM14HA74A0-02N	Double Shaft									
AM14HA04A0-01N	Single Shaft			28	0.08	1.5	0.9	14.0	0.16	
AM14HA04A0-02N	Double Shaft									

* Wiring Diagram A See Page 9

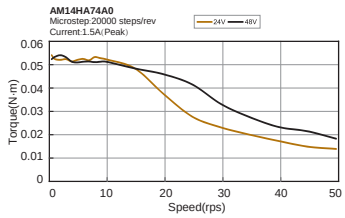
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

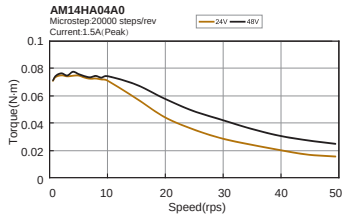
Dimensions (Unit: mm)



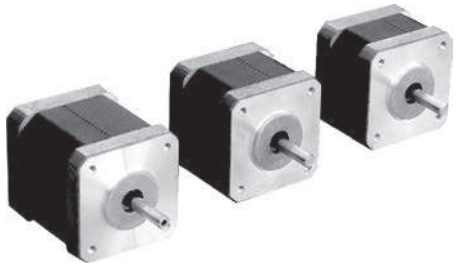
■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

Torque Curves (Recommended Driver: SR or ST)





NEMA17(□42mm) 2-phase DC 1.8°- 17HD Series



Phases	2
Steps / Revolution	± 5%
Step Accuracy	25 N (5.6 Lbs.)Push 65 N (15 Lbs.) Pull
Radial	30 N (6.5 Lbs.) At Flat Center
IP Rating	40
Operating Temp	−20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

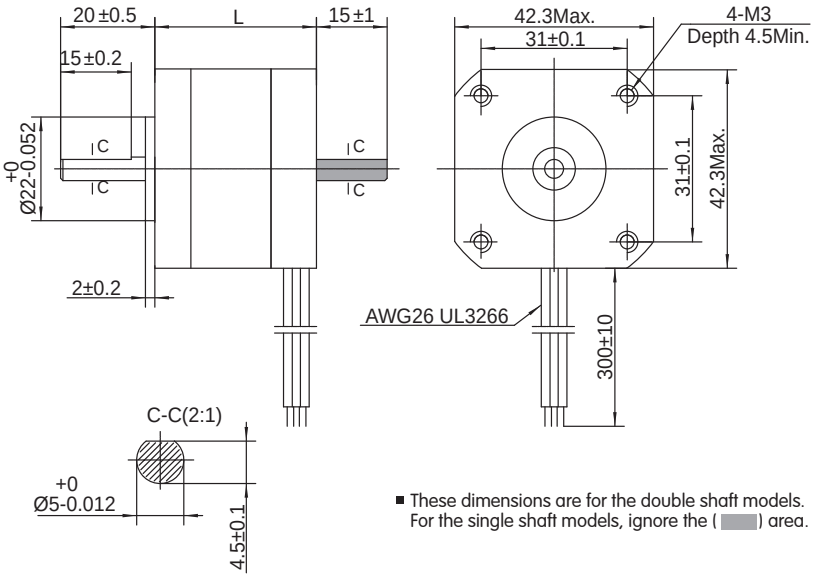
■ Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM17HD4452-02N	Single Shaft	A	4	34.3	0.285	1.5	1.5	38.0	0.23	500VAC 1 minute
AM17HD4452-01N	Double Shaft									
AM17HD2438-02N	Single Shaft			39.8	0.46		1.9	57.0	0.28	
AM17HD2438-01N	Double Shaft									
AM17HD6426-06N	Single Shaft			48.3	0.59		2.3	82.0	0.36	
AM17HD6426-05N	Double Shaft									
AM17HDB410-01N	Single Shaft			62.8	0.85	1.4	3.2	123.0	0.6	
AM17HDB410-02N	Double Shaft									

* Wiring Diagram A See Page 9

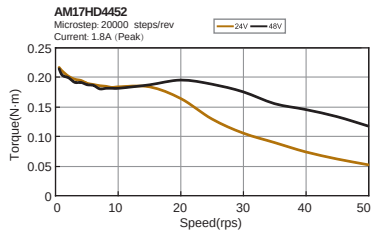
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

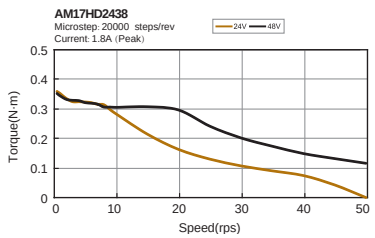
■ Dimensions (Unit: mm)

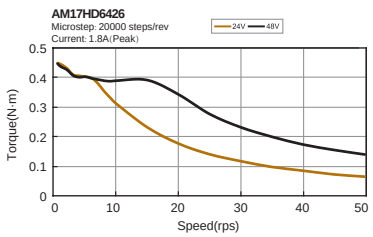


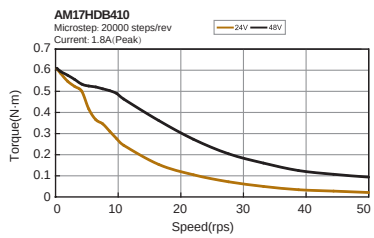
■ These dimensions are for the double shaft models.
For the single shaft models, ignore the ( ) area.

■ Torque Curves (Recommended Driver: SR or ST)

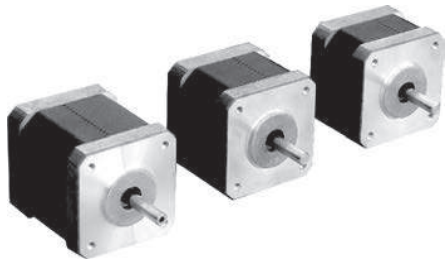








NEMA17(□42mm) 2-phase DC 0.9°- 17HA Series



Phases	2
Steps / Revolution	±5%
Step Accuracy	25 N (5.6 Lbs.)Push 65 N (15 Lbs.) Pull
Radial	30 N (6.5 Lbs.) At Flat Center
IP Rating	40
Operating Temp	−20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

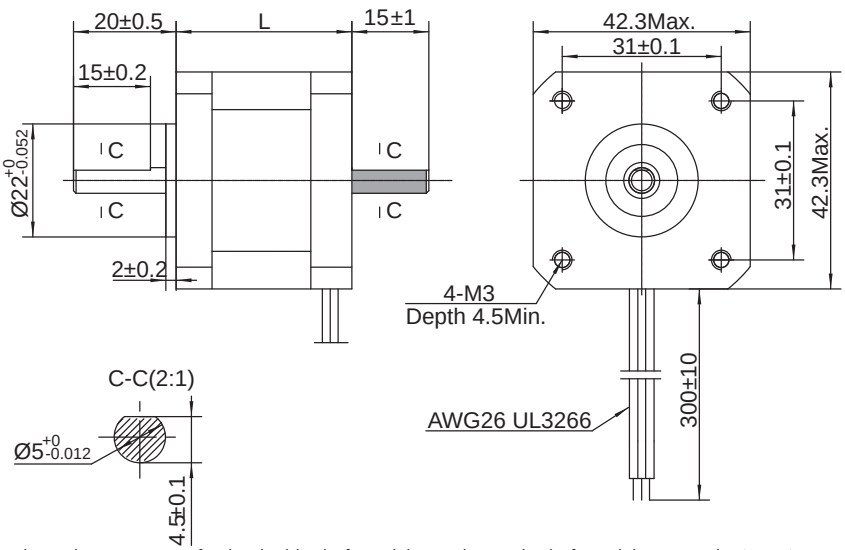
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM17HA44A0-01N	Single Shaft	A	4	34.3	0.25	1.5	1.6	38.0	0.23	500VAC 1 minute
AM17HA44A0-02N	Double Shaft									
AM17HA24A0-01N	Single Shaft			39.8	0.35		1.65	57.0	0.28	
AM17HA24A0-02N	Double Shaft									
AM17HA64A0-01N	Single Shaft			48.3	0.45		1.56	82.0	0.36	
AM17HA64A0-02N	Double Shaft									

* Wiring Diagram A See Page 9

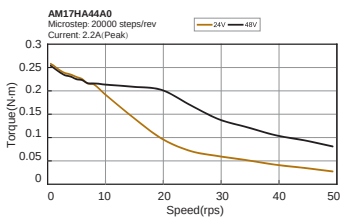
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

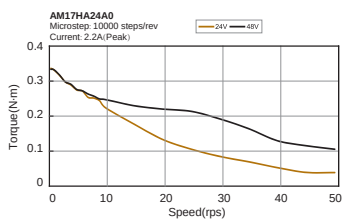
Dimensions (Unit: mm)

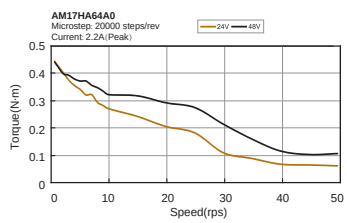


■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

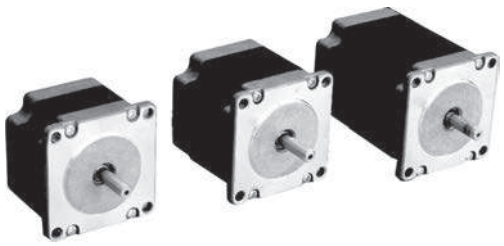
Torque Curves (Recommended Driver: SR or ST)







NEMA23(□ 56mm) 2-phase DC 1.8° - 23HS Series



Phases	2
Steps / Revolution	± 5%
Step Accuracy	40 N (9 Lbs.)Push
	130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

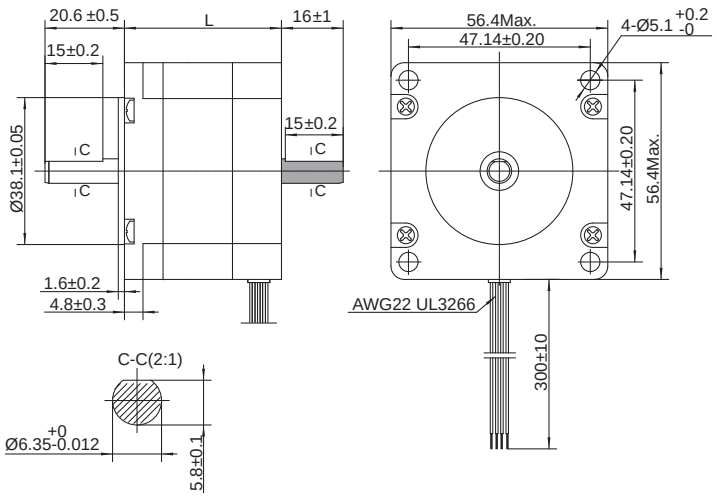
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM23HS0420-01	Single Shaft	A	4	41.0	0.72	1.8	1.8	135.0	0.42	500VAC 1 minute
AM23HS0420-02	Double Shaft									
AM23HS2449-01	Single Shaft			54.0	1.25		2.4	260.0	0.6	
AM23HS2449-02	Double Shaft									
AM23HS3454-01	Single Shaft			76.0	2.1		2.9	460.0	1.0	
AM23HS3454-02	Double Shaft									
AM23HS0421-01	Single Shaft			41.0	0.72	3.7	0.48	135.0	0.42	
AM23HS0421-02	Double Shaft									
AM23HS2450-01	Single Shaft			54.0	1.25		0.63	260.0	0.6	
AM23HS2450-02	Double Shaft									
AM23HS3455-01	Single Shaft			76.0	2.1		0.75	460.0	1.0	
AM23HS3455-02	Double Shaft									

* Wiring Diagram A See Page 9

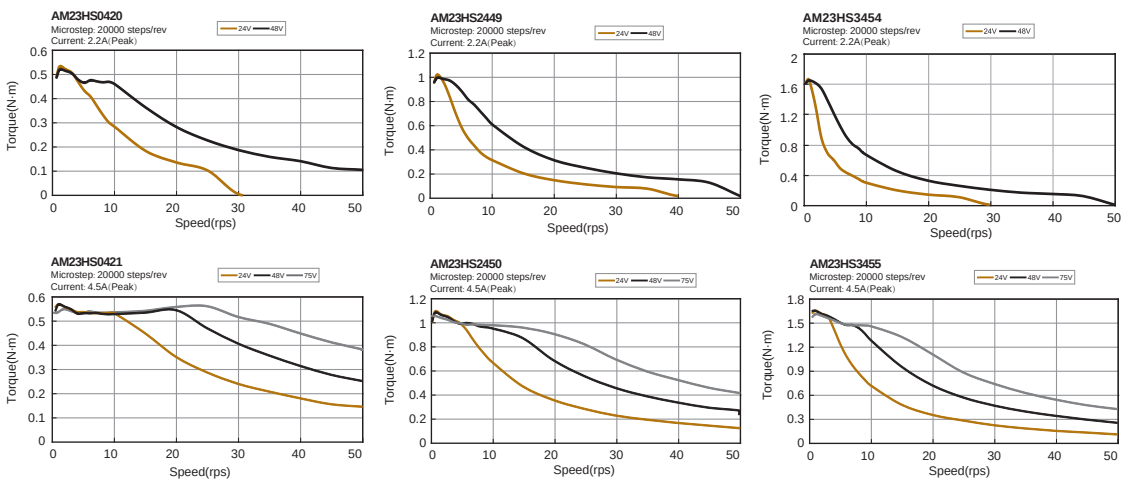
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)



■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

Torque Curves (Recommended Driver: SR or ST)



NEMA23(□56mm) 2-phase DC 1.8° - 23HS PowerPlus Series (6.35mm Shaft)



Phases	2
Steps / Revolution	± 5%
Step Accuracy	40 N (9 Lbs.)Push 130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

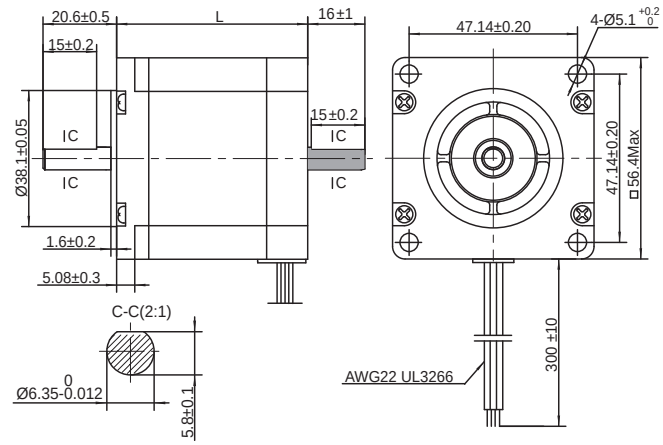
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM23HS04A0-01	Single Shaft	A	4	39	0.82	1.8	1.8	105.0	0.4	500VAC 1 minute
AM23HS04A0-02	Double Shaft									
AM23HS84A0-01	Single Shaft			55	1.5		2.4	215.0	0.6	
AM23HS84A0-02	Double Shaft									
AM23HSA4A0-01	Single Shaft			77	2.3		3	365.0	1.0	
AM23HSA4A0-02	Double Shaft									
AM23HS04B0-01	Single Shaft			39	0.82	3.7	0.48	105.0	0.4	
AM23HS04B0-02	Double Shaft									
AM23HS84B0-01	Single Shaft			55	1.5		0.63	215.0	0.6	
AM23HS84B0-02	Double Shaft									
AM23HSA4B0-01	Single Shaft			77	2.3		0.75	365.0	1.0	
AM23HSA4B0-02	Double Shaft									

* Wiring Diagram A See Page 9

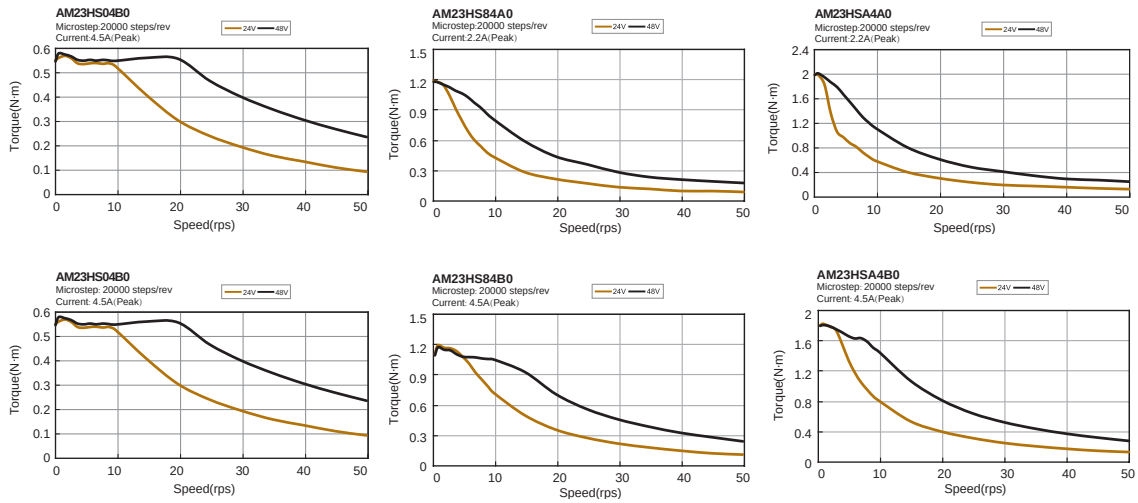
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)

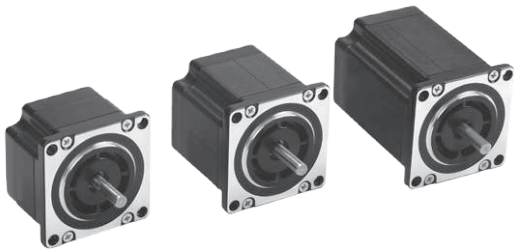


■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

Torque Curves (Recommended Driver: SR or ST)



NEMA23(□56mm) 2-phase DC 1.8° - 23HS PowerPlus Series (8mm Shaft)



Phases	2
Steps / Revolution	± 5%
Step Accuracy	40 N (9 Lbs.)Push 130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

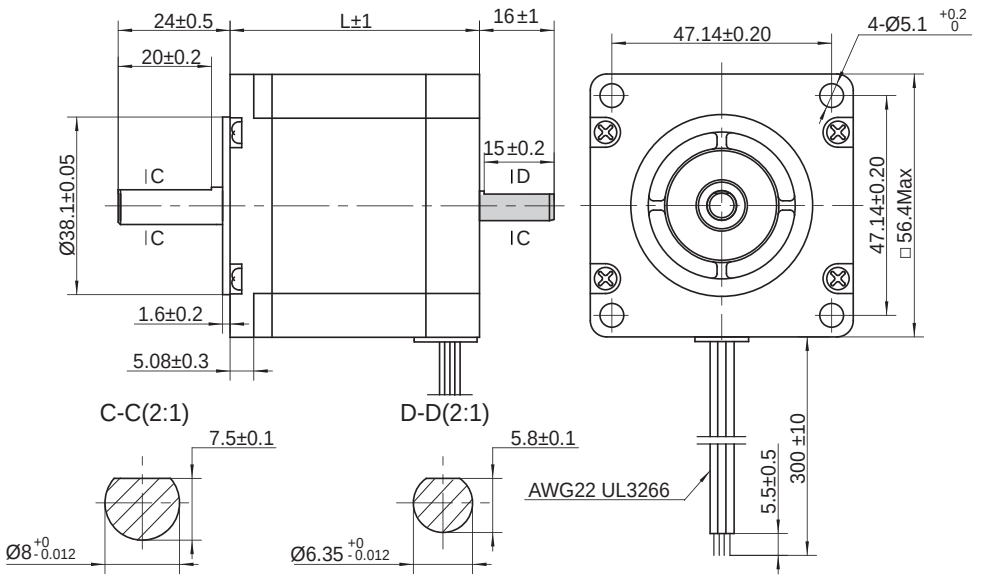
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM23HS04B0-03	Single Shaft	A	4	39	0.82	3.7	0.48	105.0	0.4	500VAC 1 minute
AM23HS04B0-04	Double Shaft									
AM23HS84B0-03	Single Shaft			55	1.5		0.63	215.0	0.6	
AM23HS84B0-04	Double Shaft									
AM23HSA4B0-03	Single Shaft			77	2.3		0.75	365.0	1.0	
AM23HSA4B0-04	Double Shaft									

* Wiring Diagram A See Page 9

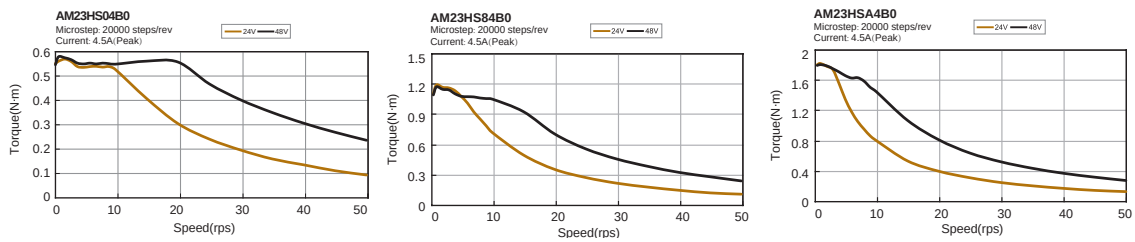
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)

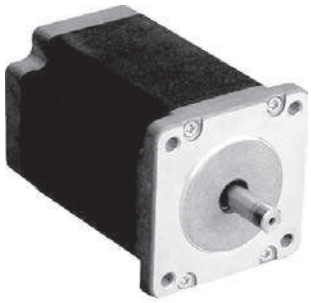


■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

Torque Curves (Recommended Driver: SR or ST)



NEMA24(□60mm) 2-phase DC 1.8°- 24HS Series



Phases	2
Steps / Revolution	±5%
Step Accuracy	40 N (9 Lbs.)Push 130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.)At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

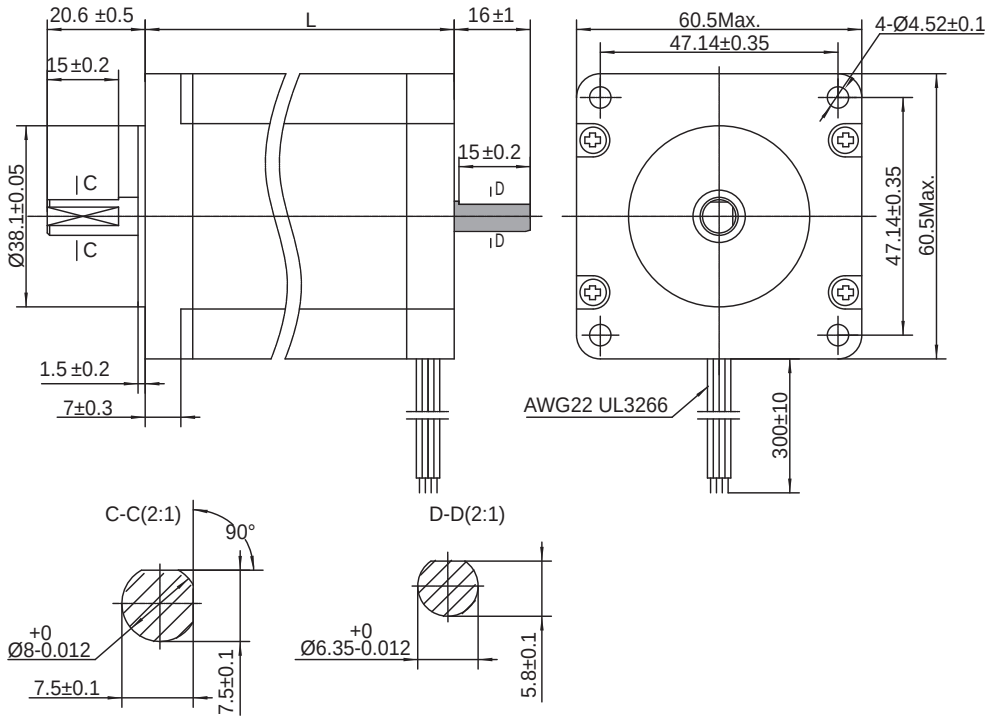
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM24HS2402-08N	Single Shaft	A	4	54.0	1.57	4.0	0.43	450.0	0.83	500VAC 1 minute
AM24HS2402-11N	Double Shaft									
AM24HS5401-10N	Single Shaft			85.0	3.2	4.0	0.65	900.0	1.4	
AM24HS5401-24N	Double Shaft									

* Wiring Diagram A See Page 9

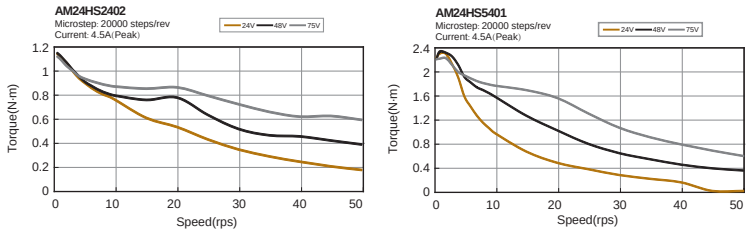
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)

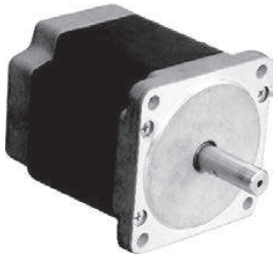


■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

Torque Curves (Recommended Driver: SR or ST)



NEMA34(□86mm) 2-phase DC 1.8°- 34HD Series



Phases	2
Steps / Revolution	± 5%
Step Accuracy	65 N (15 Lbs.)Push 155 N (35 Lbs.) Pull
Radial	220 N (50 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

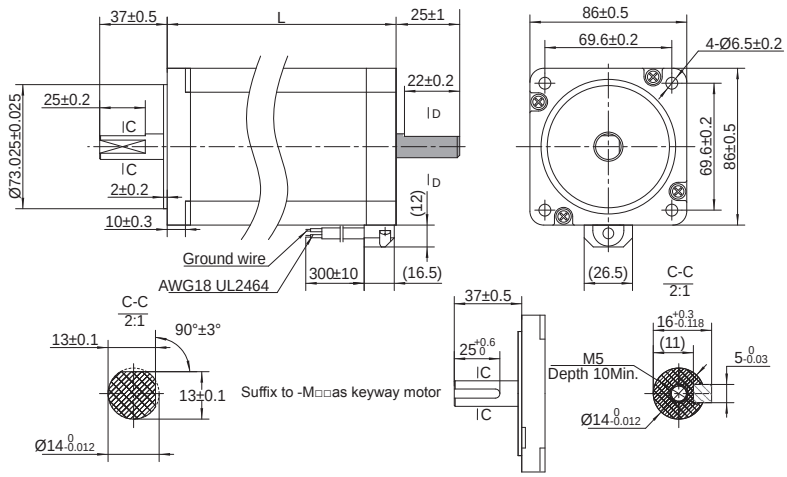
Parameters

Model		Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
Common Shaft	Keyway Shaft				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM34HD0404-08	AM34HD0404-M08	Single Shaft	A	4	66.5	3.7	6.3	0.25	1100.0	1.6	500VAC 1 minute
AM34HD0404-09	AM34HD0404-M09	Double Shaft									
AM34HD1404-06	AM34HD1404-M06	Single Shaft			96.0	6.7		0.35	1850.0	2.7	
AM34HD1404-07	AM34HD1404-M07	Double Shaft									
AM34HD2403-07	AM34HD2403-M07	Single Shaft			125.5	9.4	5.6	0.49	2750.0	3.8	
AM34HD2403-08	AM34HD2403-M08	Double Shaft									
AM34HD3402-01	AM34HD3402-M01	Single Shaft			156.0	11.5	5.6	0.63	4400.0	5.2	
AM34HD3402-02	AM34HD3402-M02	Double Shaft									

* Wiring Diagram A See Page 9

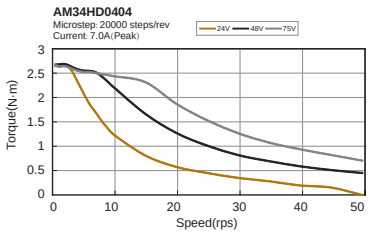
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.
NOTE: Model AM34HD0404-08 common shaft, model AM34HD0404-M08 is the keyway shaft, according to the suffix to select the required shaft.

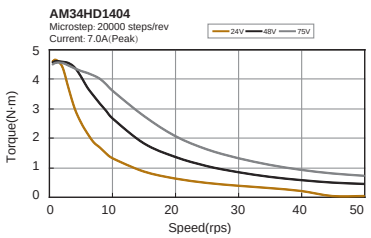
Dimensions (Unit: mm)

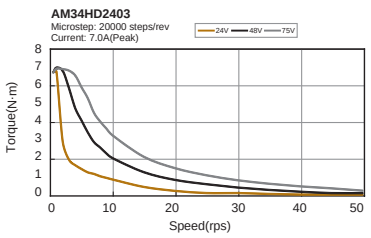


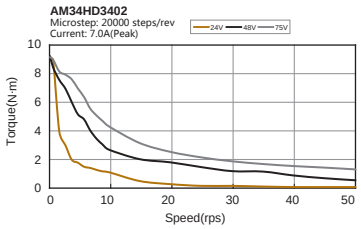
■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

Torque Curves (Recommended Driver: SR or ST)

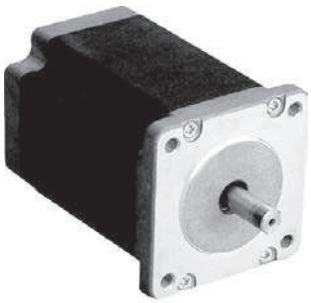








NEMA23(□56mm) 2-phase AC1.8°- 23HS Series



Phases	2
Steps / Revolution	±5%
Step Accuracy	40 N (9 Lbs.)Push 130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

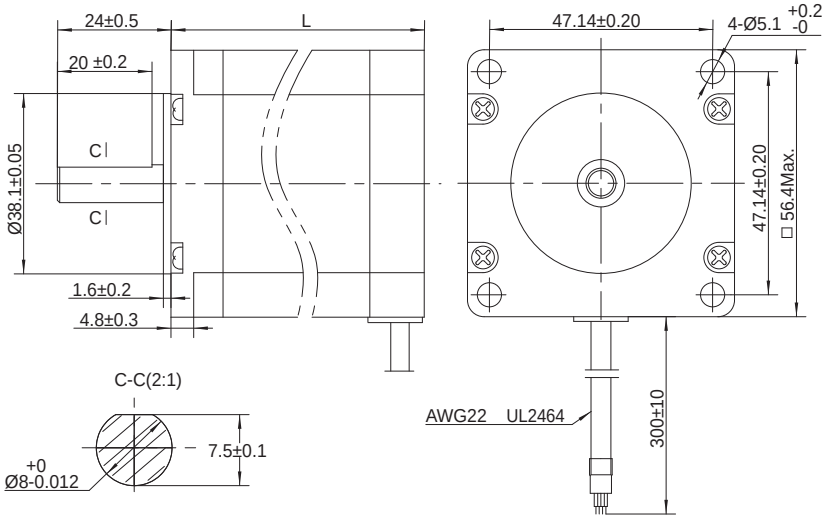
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	Kg	
AM23HS2459-01	Single Shaft	A	4	54	1.7	1	16.6	260.0	0.6	1500VAC 1 minute
AM23HS3466-01				76	2.2	0.6	25.4	460.0	1.0	

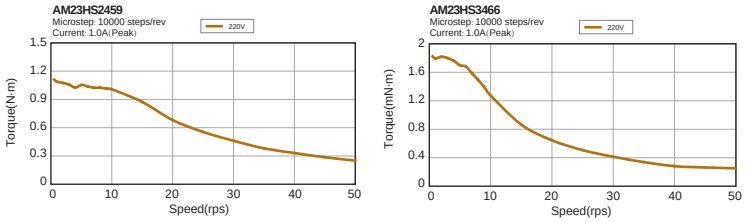
* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

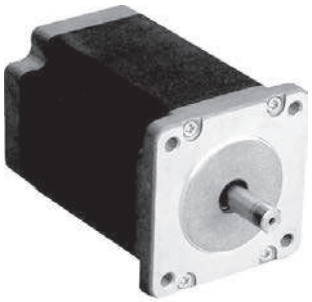
Dimensions (Unit: mm)



Torque Curves (Recommended Driver: SRAC or STAC)



NEMA24(□60mm) 2-phase AC1.8°- 24HS Series



Phases	2
Steps / Revolution	± 5%
Step Accuracy	40 N (9 Lbs.)Push 130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

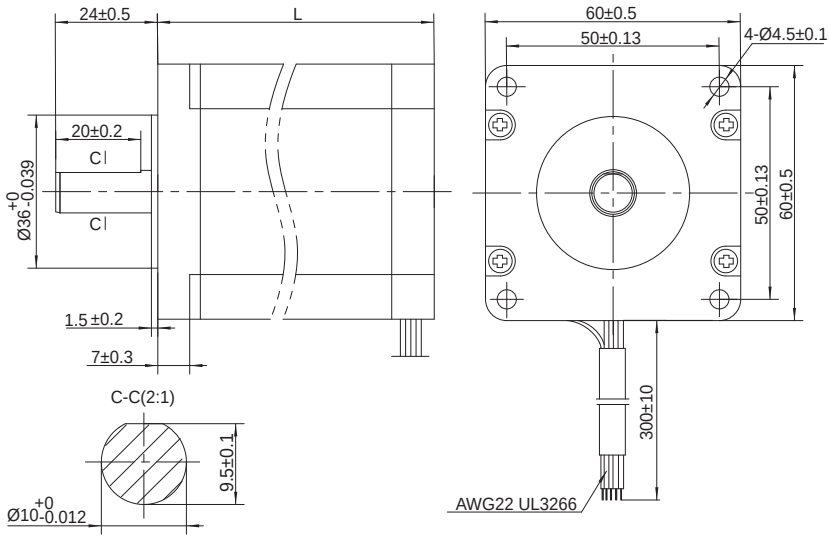
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	Kg	
AM24HS5411-01N	Single Shaft	A	4	85	3.1	0.8	15.4	900.0	1.4	1500VAC 1 minute

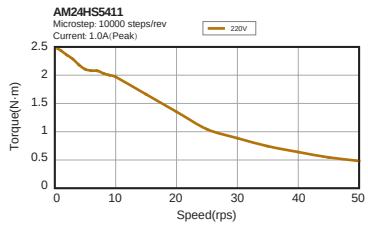
* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

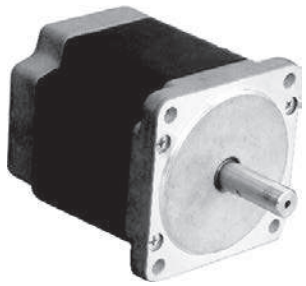
Dimensions (Unit: mm)



Torque Curves (Recommended Driver: SRAC or STAC)



NEMA34(□86mm) 2-phase AC 1.8°- 34HD Series



Phases	2
Steps / Revolution	± 5%
Step Accuracy	65 N (15 Lbs.)Push 155 N (35 Lbs.) Pull
Radial	220 N (50 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

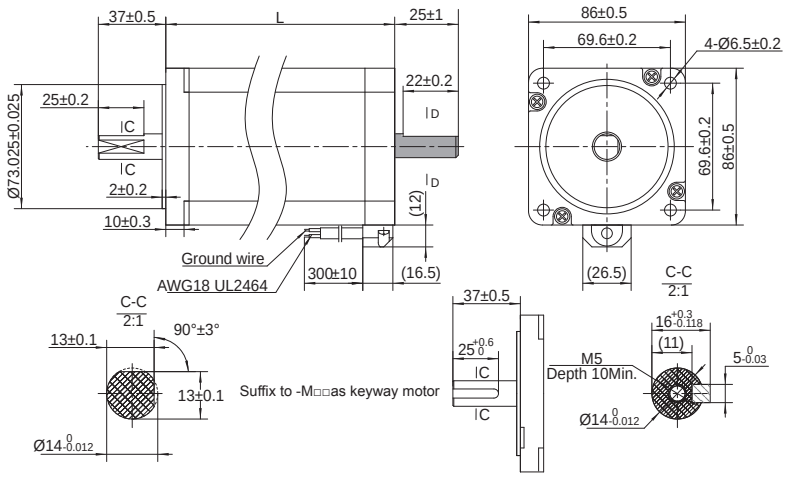
Parameters

Model		Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
Common Shaft,	Keyway Shaft				mm	N.m	A/Phase	Ω/Phase Series connection	g·cm²	Kg	
AM34HD0802-01	AM34HD0802-M01	Single Shaft	B (Parallel) / C (Series)	8	66.5	4.2	1.8 (220V Series connection) / 3.6 (110V Parallel connection)	3.4	1100.0	1.6	1500VAC 1 minute
AM34HD0802-02	AM34HD0802-M02	Double Shaft									
AM34HD4802-01	-	Single Shaft			75	4.7		3.6	1350.0	1.9	
AM34HD1802-01	AM34HD1802-M01	Single Shaft			96	7.3		3.6	1850.0	2.7	
AM34HD1802-03	AM34HD1802-M03	Double Shaft									
AM34HD6801-01	-	Single Shaft			115	7.6		4	2400.0	3.5	
AM34HD2805-01	AM34HD2805-M01	Single Shaft			125.5	8.7		4.2	2750.0	3.8	
AM34HD2805-03	AM34HD2805-M03	Double Shaft									

* Wiring Diagram B / C See Page 9

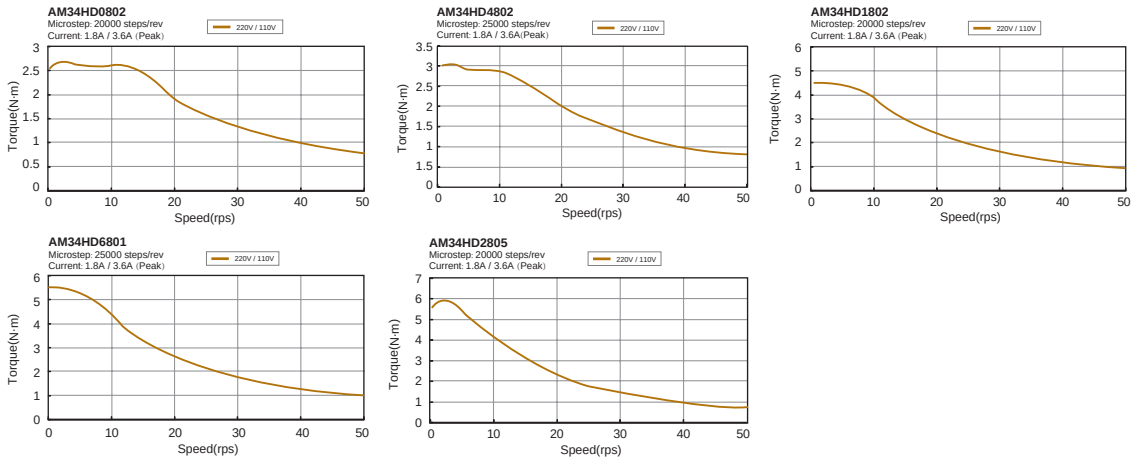
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.
NOTE: Model am34hd0802-01 common shaft, model am34hd0802-m01 is the keyway shaft, according to the suffix to select the required shaft.

Dimensions (Unit: mm)

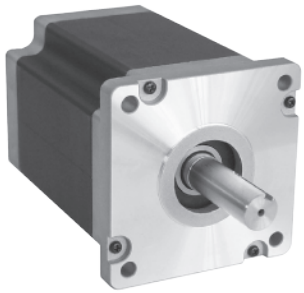


■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

Torque Curves (Recommended Driver: SRAC or STAC)



NEMA42(□110mm) 2-phase AC 1.8° - 42HS Series



Phases	2
Steps / Revolution	± 5%
Step Accuracy	250 N (56 Lbs.)Push
	250 N (56 Lbs.) Pull
Radial	450 N (100 Lbs.) At Flat Center
IP Rating	40
Operating Temp	−20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

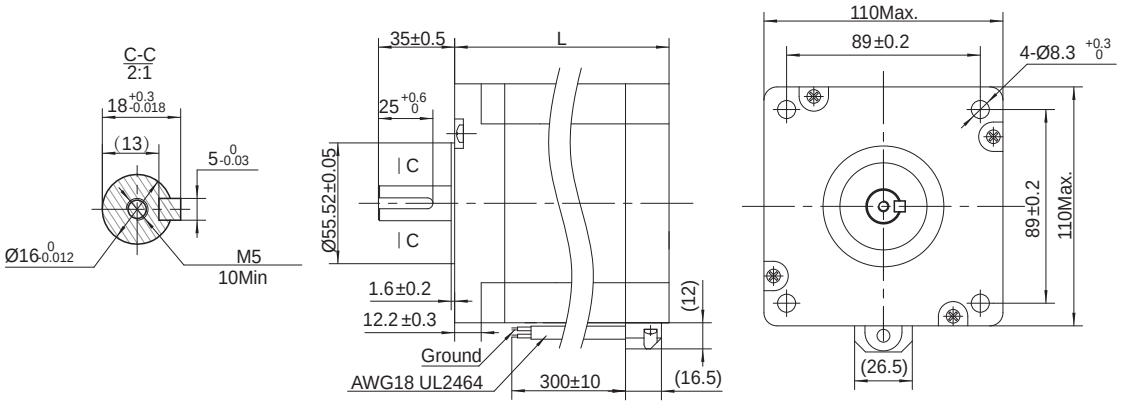
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	Kg	
AM42HS04A0-01	Single Shaft	A	4	98.5	12	2.1	4.2	5500	4.8	1500VAC 1 minute
AM42HS24A0-01				149.5	21	2.4	4.4	10900	8	
AM42HS34A0-01				201	30	2.7	4.4	16200	11.6	

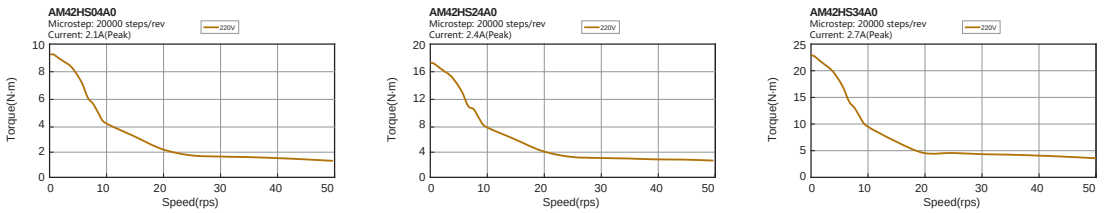
* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)



Torque Curves (Recommended Driver: SRAC or STAC)



NEMA23(□56mm) 2-phase DC1.8°- 23HS Series IP65 Type



Phases	2
Steps / Revolution	±5%
Step Accuracy	40 N (9 Lbs.)Push 130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.) At Flat Center
IP Rating	65
Operating Temp	−20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

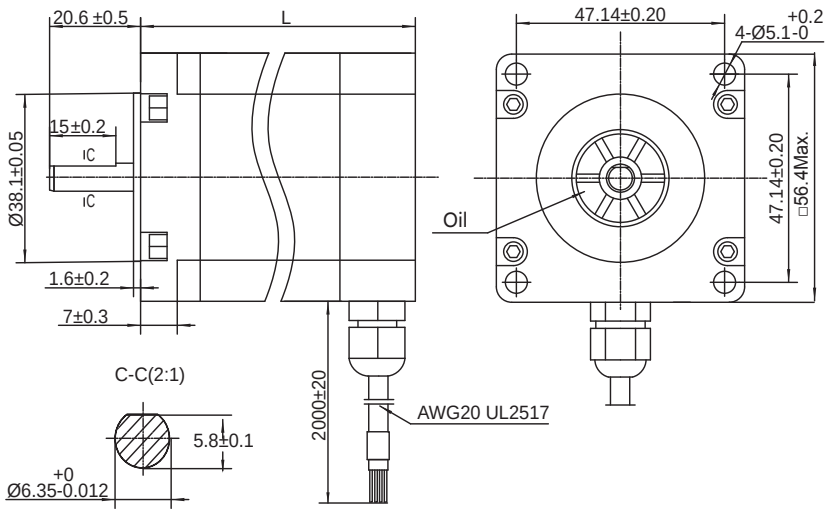
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	Kg	
AM23HS2450-03	Single Shaft	A	4	61.7	1.25	3.7	0.63	260.0	0.6	500VAC 1 minute
AM23HS3455-05				83.7	2.2		0.75	460.0	1	

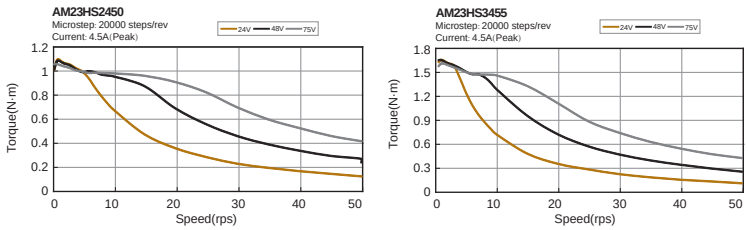
* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)



Torque Curves (Recommended Driver: SR or ST)



NEMA24(□60mm) 2-phase DC1.8°- 24HS Series IP65 Type



Phases	2
Steps / Revolution	± 5%
Step Accuracy	40 N (9 Lbs.)Push 130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.) At Flat Center
IP Rating	65
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

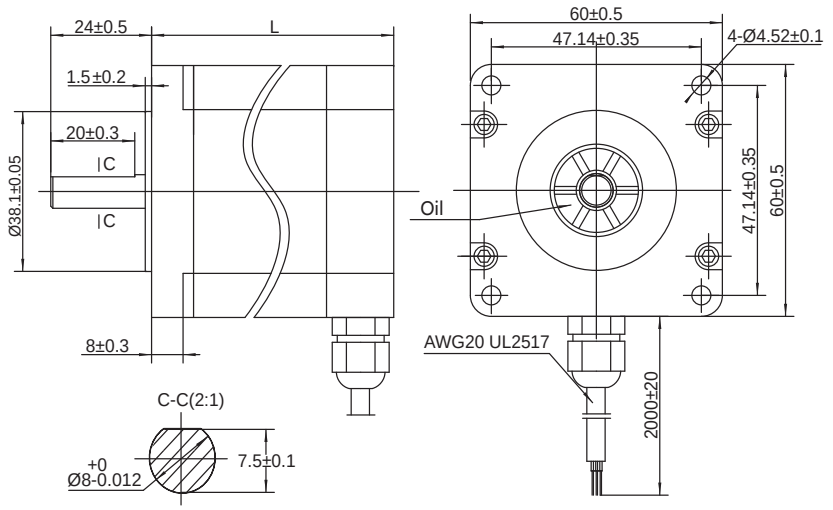
■ Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	Kg	
AM24HS5401-44N	Single Shaft	A	4	94.5	3.2	4.0	0.7	900.0	1.4	500VAC 1 minute

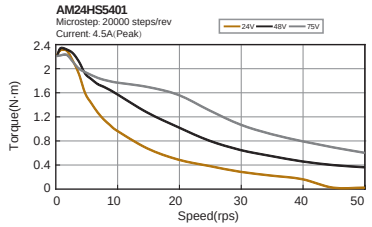
* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

■ Dimensions (Unit: mm)



■ Torque Curves (Recommended Driver: SR or ST)



NEMA34(□86mm) 2-phase DC1.8°- 34HD Series IP65 Type



Phases	2
Steps / Revolution	±5%
Step Accuracy	65 N (15 Lbs.)Push 155 N (35 Lbs.) Pull
Radial	220 N (50 Lbs.) At Flat Center
IP Rating	65
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

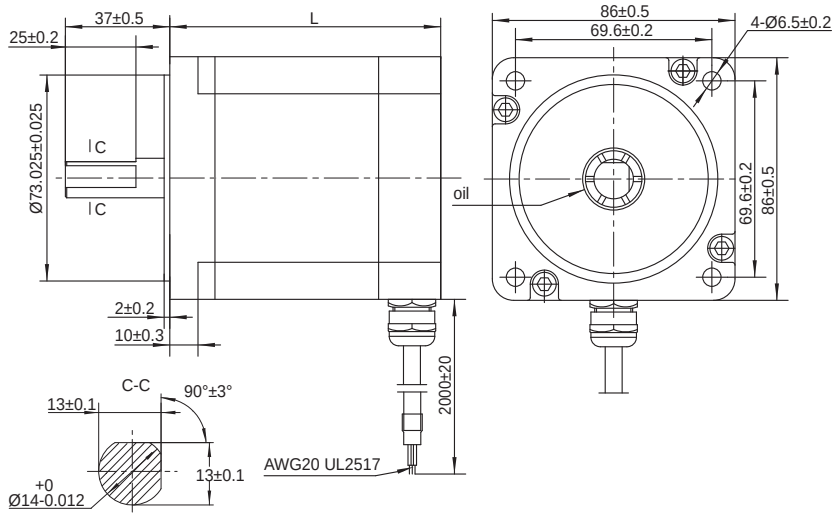
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	Kg	
AM34HD1404-13	Single Shaft	A	4	98	6.7	6.3	0.45	1850.0	2.7	500VAC 1 minute
AM34HD2403-13				127.5	9.4	5.6	0.62	2750.0	3.8	

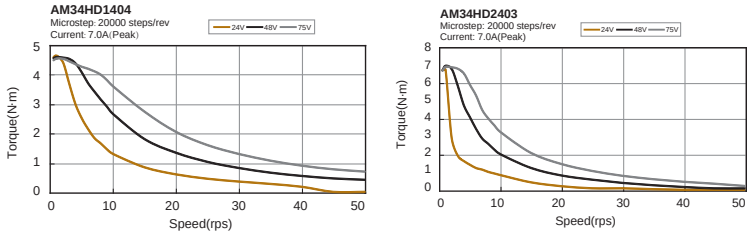
* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)



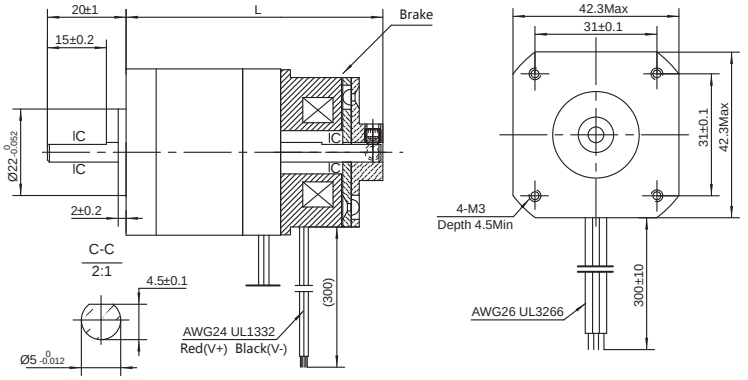
Torque Curves (Recommended Driver: SR or ST)



NEMA17(□42mm) 2-phase DC1.8°- 17HD Series Brake type



RoHS Compliant



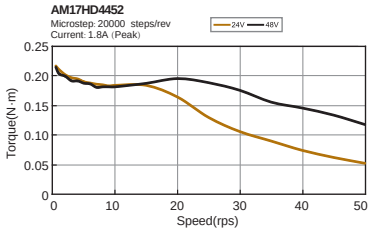
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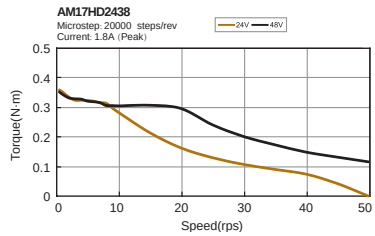
Model	Shaft	Wiring *	Leads	Length "L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Brake Torque	Brake Power	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	N.m	V(W)	Kg	
AM17HD4452-BR01	Single Shaft	A	4	60.3	0.285	1.5	1.5	38.0	0.6	24(10)	0.38	500VAC 1 minute
AM17HD2438-BR01				65.8	0.46	1.5	1.9	57.0	0.6	24(10)	0.43	
AM17HD6426-BR01				74.3	0.59	1.5	2.3	82.0	0.6	24(10)	0.51	
AM17HDB410-BR01				85.8	0.85	1.4	3.2	123.0	0.6	24(10)	0.75	

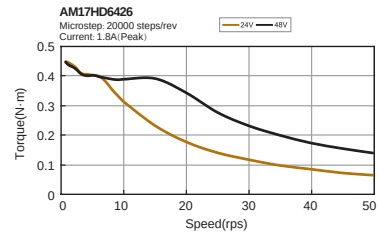
* Wiring Diagram A See Page 9

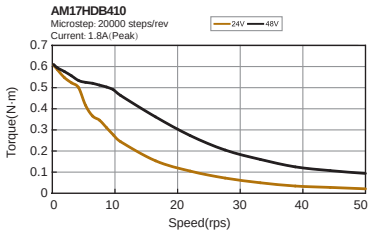
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Torque Curves (Recommended Driver: SR or ST)

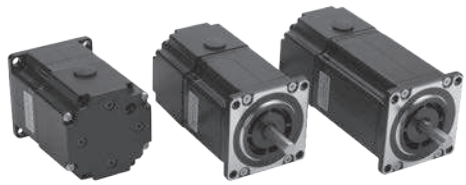




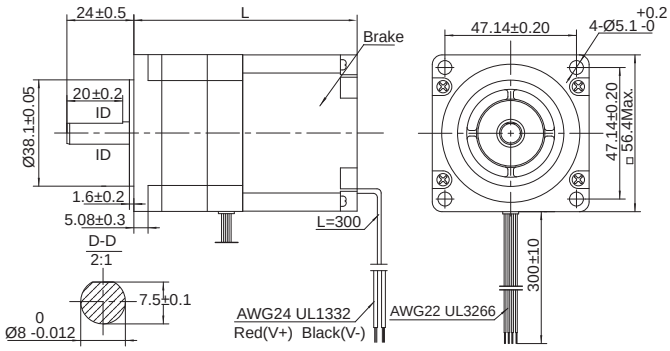




NEMA23(□56mm) 2-phase DC1.8°- 23HS Series Brake type



RoHS Compliant



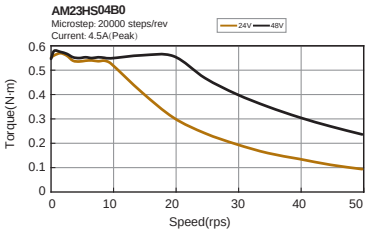
Parameters

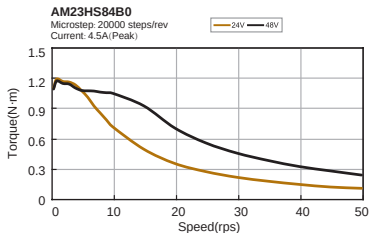
Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Brake Torque	Brake Power	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	N.m	V(W)	Kg	
AM23HS04B0-BR01	Single Shaft	A	4	80	0.82	3.7	0.48	105.0	1.5	24(15)	0.62	500VAC 1 minute
AM23HS84B0-BR01				96	1.5		0.63	215.0	1.5	24(15)	0.8	
AM23HSA4B0-BR01				118	2.3		0.75	365.0	1.5	24(15)	1.2	

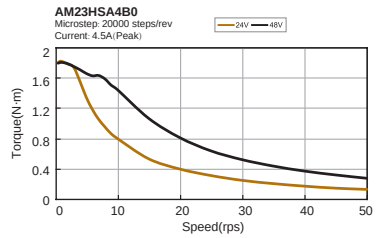
* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Torque Curves (Recommended Driver: SR or ST)



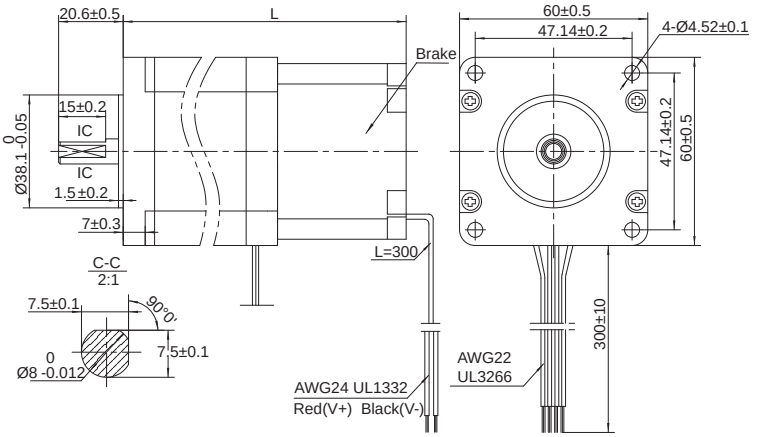




NEMA24(□60mm) 2-phase DC1.8°- 24HS Series Brake type



RoHS Compliant



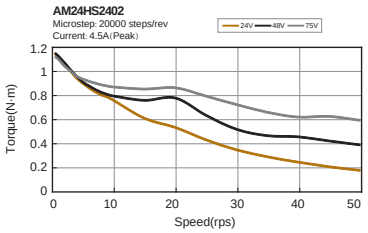
■ Parameters

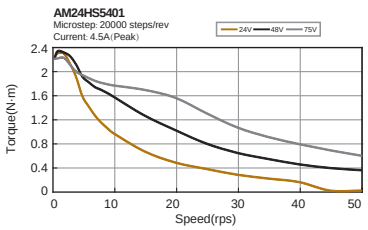
Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Brake Torque	Brake Power	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	N.m	V(W)	Kg	
AM24HS2402-BR01	Single Shaft	A	4	95	1.57	4.0	0.43	450.0	1.5	24(15)	1.03	500VAC 1 minute
AM24HS5401-BR01				126	3.2		0.65	900.0			1.6	

* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

■ Torque Curves (Recommended Driver: SR or ST)

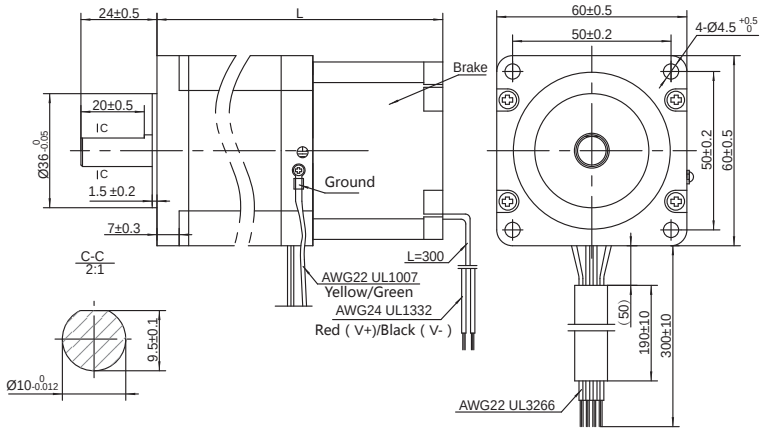




NEMA24(□60mm) 2-phase AC1.8°- 24HS Series Brake type



RoHS Compliant

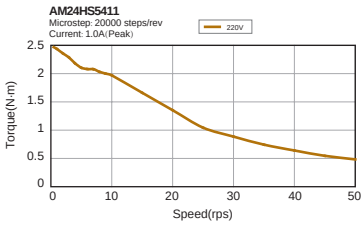


Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Brake Torque	Brake Power	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	N.m	V(W)	Kg	
AM24HS5411-BR01	Single Shaft	A	4	126	3.1	0.8	15.4	900.0	1.5	24(15)	1.6	1500VAC 1 minute

* Wiring Diagram A See Page 9
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

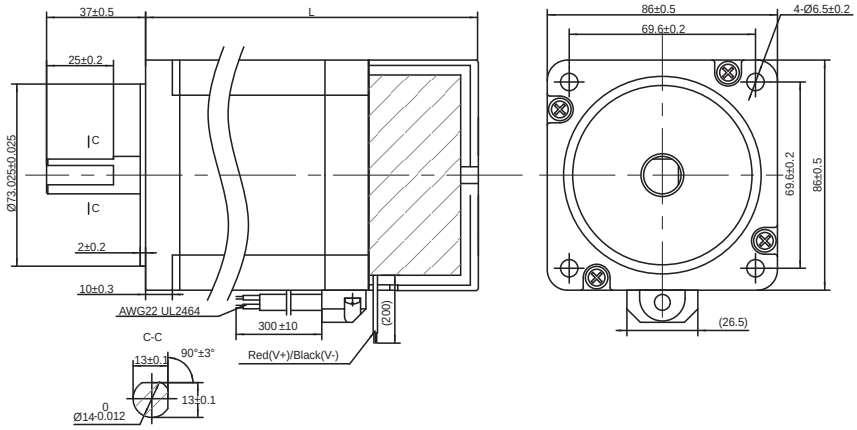
Torque Curves (Recommended Driver: SRAC or STAC)



NEMA34(□86mm) 2-phase DC1.8°/ 2-phase AC1.8°-34HD Series Brake type



RoHS Compliant



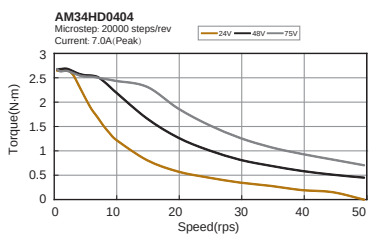
■ Parameters

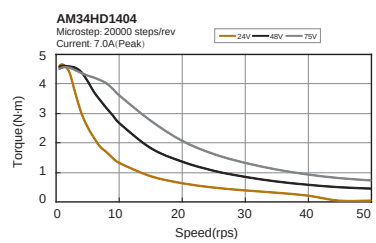
Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Brake Torque	Brake Power	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	N.m	V(W)	Kg	
AM34HD0404-BR01	Single Shaft	A	4	118.5	3.7	6.3	0.25	1100	6	24(30)	2.2	500VAC 1 minute
AM34HD1404-BR01	Single Shaft			148	6.7		0.35	1850			3.3	
AM34HD2403-BR01	Single Shaft			177.5	9.4	5.6	0.49	2750			4.4	
AM34HD0802-BR01	Single Shaft	C	8	118.5	4.2	1.8 (220V Series connection)	3.4 (Series onnection)	1100	6	24(30)	2.2	1500VAC 1 minute
AM34HD1802-BR01	Single Shaft			148	7.3		3.6 (Series onnection)	1850			3.3	
AM34HD2805-BR01	Single Shaft			177.5	8.7		4.2 (Series onnection)	2750			4.4	

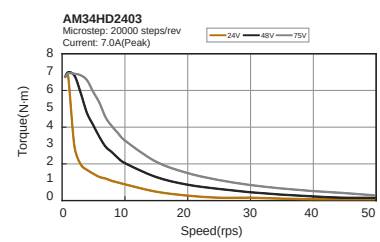
* Wiring Diagram A/C See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

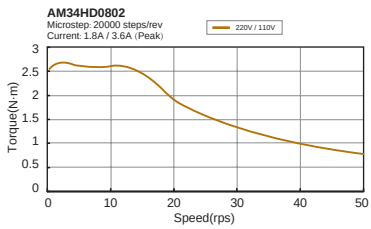
■ Torque Curves
(Recommended Driver: SR or ST)

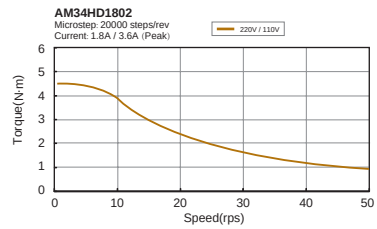


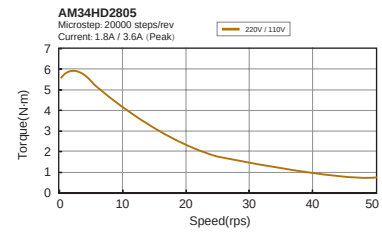




■ Torque Curves
(Recommended Driver: SRAC or STAC)

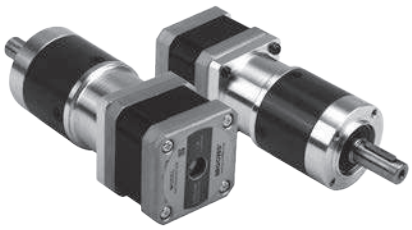




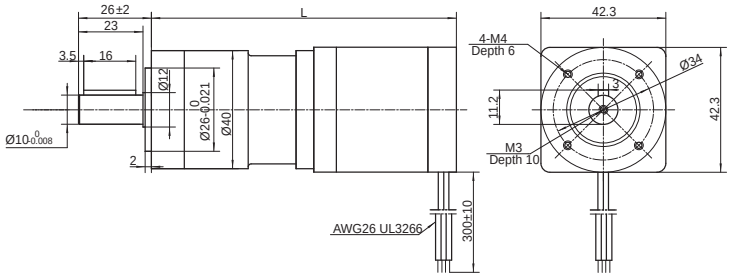


NEMA17(□42mm) 2-phase DC1.8° - 17HD Series Planetary Reducer Motor Type

Dimensions (Unit: mm)



RoHS Compliant



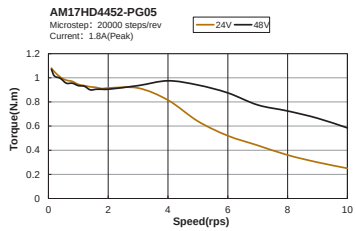
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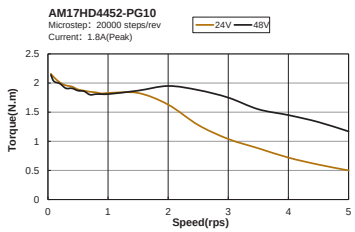
Model	Wiring *	Length"L"	Current ※	Series	Reduction ratio	Accuracy	Maximum output torque	Maximum load torque	Rotor Inertia	Efficiency	Noise	Mass
		mm	A/Phase			arc-min	N.m	N.m	g.cm^2		dB	Kg
AM17HD4452-PG05	A	101.8	1.5	1	5	12	1.25	6	950	96%	<60	0.55
AM17HD4452-PG10		101.8		1	10	12	2.5	4	3800	96%		0.55
AM17HD4452-PG20		114.8		2	20	15	5	20	15200	94%		0.63
AM17HD2438-PG05		107.3		1	5	12	2	6	1425	96%		0.6
AM17HD2438-PG10		107.3		1	10	12	4	4	5700	96%		0.6
AM17HD2438-PG20		120.3		2	20	15	8	20	22800	94%		0.68

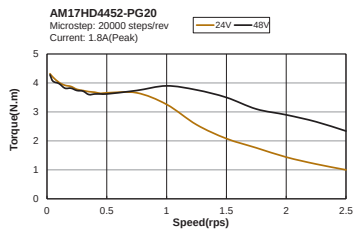
* Wiring Diagram A See Page 9

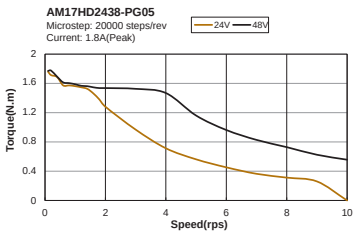
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

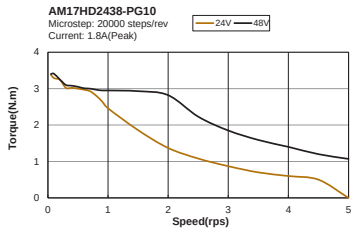
Torque Curves (Recommended Driver: SR or ST)

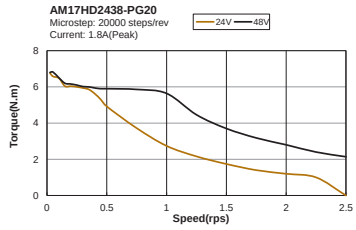






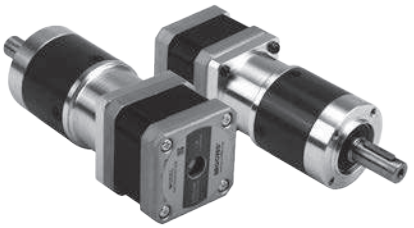


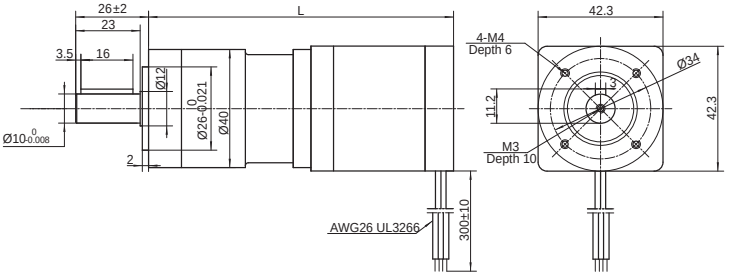




NEMA17(□42mm) 2-phase DC1.8° - 17HD Series Planetary Reducer Motor Type

Dimensions (Unit: mm)





RoHS Compliant

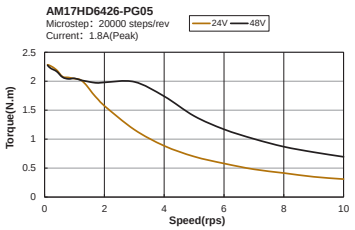
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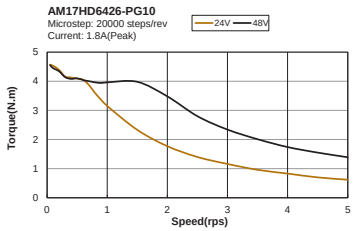
Model	Wiring *	Length"L"	Current ※	Series	Reduction ratio	Accuracy	Maximum output torque	Maximum load torque	Rotor Inertia	Efficiency	Noise	Mass
		mm	A/Phase			arc-min	N.m	N.m	g.cm^2		dB	Kg
AM17HD6426-PG05	A	115.8	1.5	1	5	12	2.5	6	2050	96%	<60	0.68
AM17HD6426-PG10		115.8		1	10	12	5	4	8200	96%		0.68
AM17HD6426-PG20		128.8		2	20	15	10	20	32800	94%		0.76
AM17HDB410-PG05		130.3	1.4	1	5	12	4.25	6	3075	96%		0.92
AM17HDB410-PG10		130.3		1	10	12	8.5	4	12300	96%		0.92
AM17HDB410-PG20		143.3		2	20	15	17	20	49200	94%		1

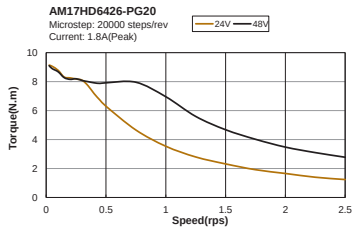
* Wiring Diagram A See Page 9

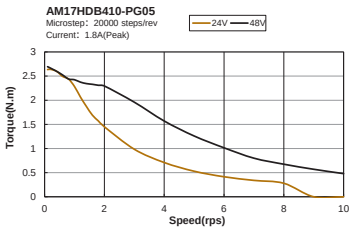
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

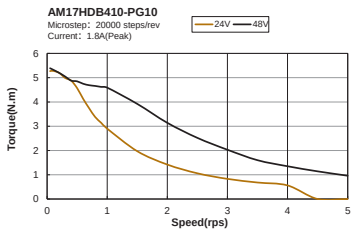
Torque Curves (Recommended Driver: SR or ST)

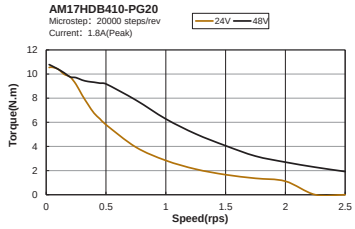




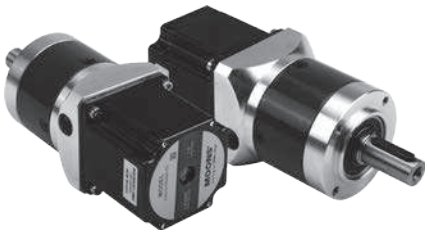


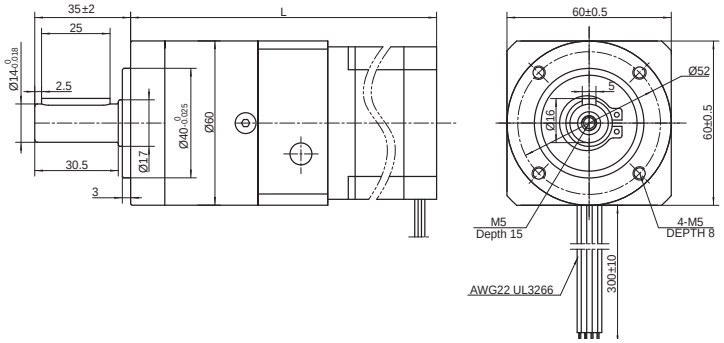






Dimensions (Unit: mm)





RoHS Compliant

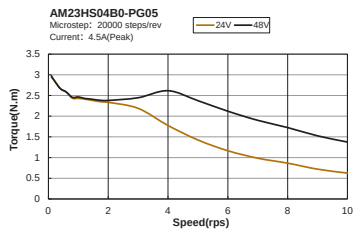
Parameters

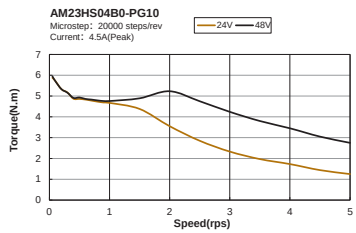
Model	Wiring *	Length"L"	Current ※	Series	Reduction ratio	Accuracy	Maximum output torque	Maximum load torque	Rotor Inertia	Efficiency	Noise	Mass
		mm	A/Phase			arc-min	N.m	N.m	g.cm^2		dB	Kg
AM23HS04B0-PG05		112.5		1	5	10	4.1	16	2625	96%	<65	1.23
AM23HS04B0-PG10		112.5		1	10	10	8.2	12	10500	96%	<65	1.23
AM23HS04B0-PG20		125.5		2	20	15	16.4	44	42000	94%	<60	1.44
AM23HS84B0-PG05		128.5		1	5	10	7.5	16	5375	96%	<65	1.43
AM23HS84B0-PG10	A	128.5	3.7	1	10	10	15	12	21500	96%	<65	1.43
AM23HS84B0-PG20		141.5		2	20	15	30	44	86000	94%	<60	1.64
AM23HSA4B0-PG05		150.5		1	5	10	11.5	16	9125	96%	<65	1.83
AM23HSA4B0-PG10		150.5		1	10	10	23	12	36500	96%	<65	1.83
AM23HSA4B0-PG20		163.5		2	20	15	46	44	146000	94%	<60	2.07

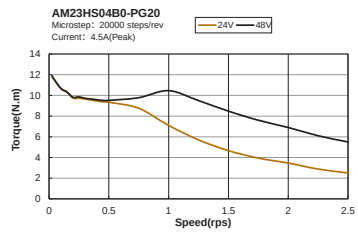
* Wiring Diagram A See Page 9

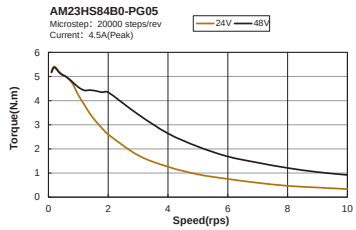
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

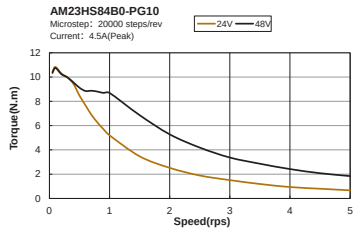
Torque Curves (Recommended Driver: SR or ST)

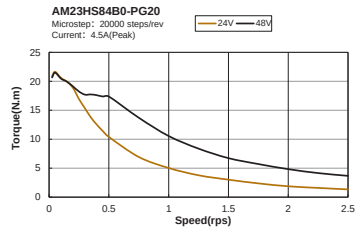


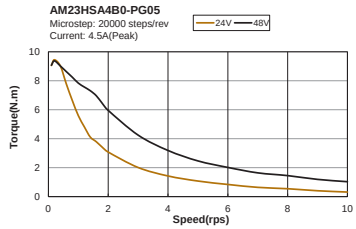


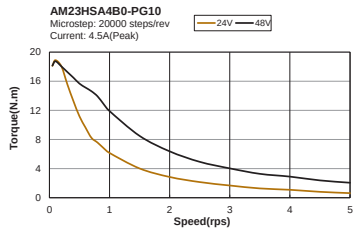


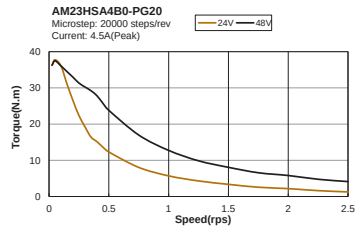






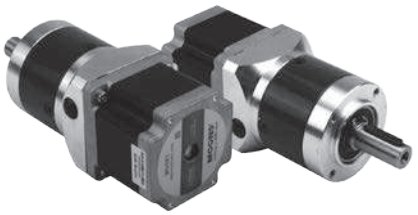


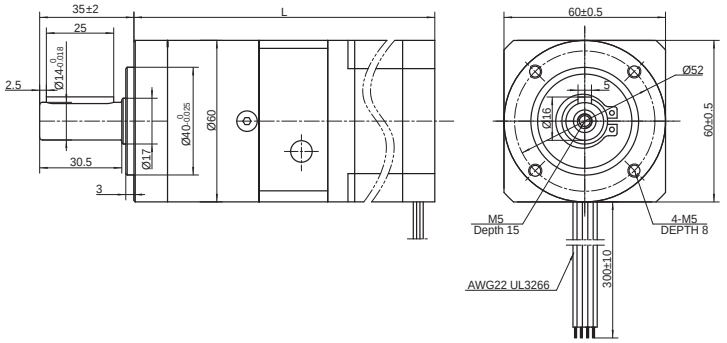




NEMA24(□60mm) 2-phase DC1.8° - 24HS Series Planetary Reducer Motor Type

Dimensions (Unit: mm)





RoHS Compliant

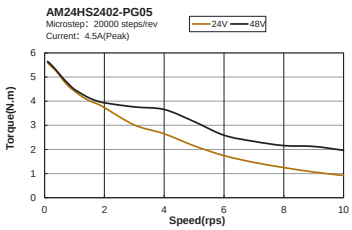
Parameters

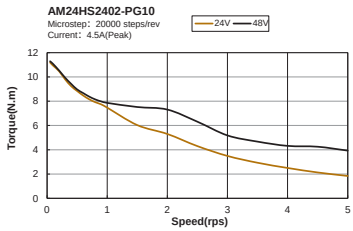
Model	Wiring *	Length"L"	Current ※	Series	Reduction ratio	Accuracy	Output torque	Load torque	Rotor Inertia	Efficiency	Noise	Mass
		mm	A/Phase			arc-min	N.m	N.m	g.cm^2		dB	Kg
AM24HS2402-PG05	A	127.5	4.0	1	5	10	6	16	11250	96%	<65	1.66
AM24HS2402-PG10		127.5		1	10	10	12	12	45000	96%	<65	1.66
AM24HS2402-PG20		140.5		2	20	15	24	44	180000	94%	<60	1.87
AM24HS5401-PG05		158.5		1	5	10	12.5	16	22500	96%	<65	2.23
AM24HS5401-PG10		158.5		1	10	10	25	12	90000	96%	<65	2.23
AM24HS5401-PG20		171.5		2	20	15	50	44	360000	94%	<60	2.44

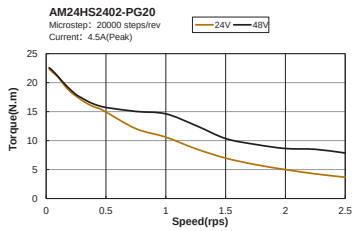
* Wiring Diagram A See Page 9

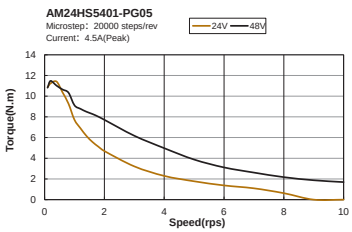
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

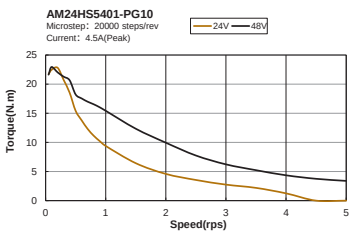
Torque Curves (Recommended Driver: SR or ST)

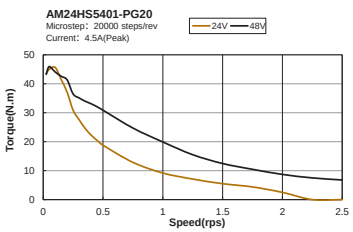






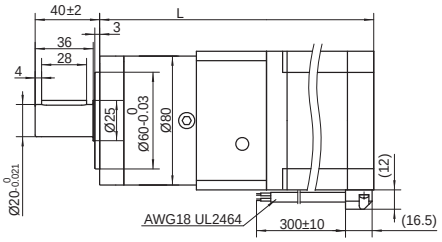


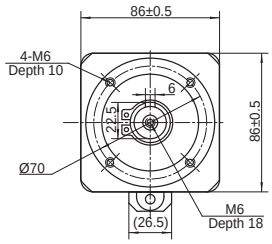




Dimensions (Unit: mm)







RoHS Compliant

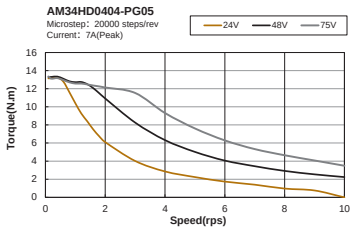
Parameters

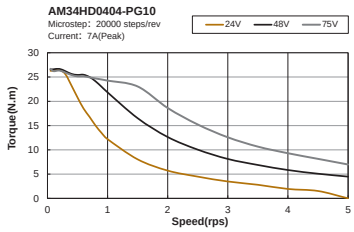
Model	Wiring *	Length"L"	Current ※	Series	Reduction ratio	Accuracy	Maximum output torque	Maximum load torque	Rotor Inertia	Efficiency	Noise	Mass
		mm	A/Phase			arc-min	N.m	N.m	g.cm^2		dB	Kg
AM34HD0404-PG05		170.5		1	5	10	15	50	27500	96%		3.71
AM34HD0404-PG10		170.5		1	10	10	30	40	110000	96%		3.71
AM34HD0404-PG20		188.5		2	20	15	60	120	440000	94%		4.21
AM34HD1404-PG05		200	6.3	1	5	10	25	50	46250	96%		4.81
AM34HD1404-PG10	A	200		1	10	10	50	40	185000	96%	<60	4.81
AM34HD1404-PG20		218		2	20	15	100	120	740000	94%		5.31
AM34HD2403-PG05		229.5		1	5	10	35.5	50	68750	96%		5.91
AM34HD2403-PG10		229.5	5.6	1	10	10	71	40	275000	96%		5.91
AM34HD2403-PG20		247.5		2	20	15	142	120	1100000	94%		6.41

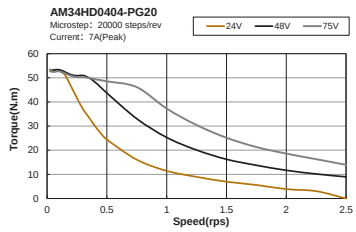
* Wiring Diagram A See Page 9

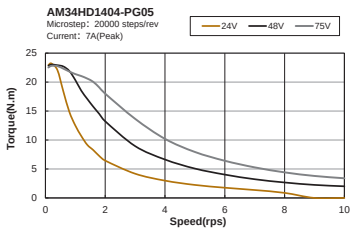
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

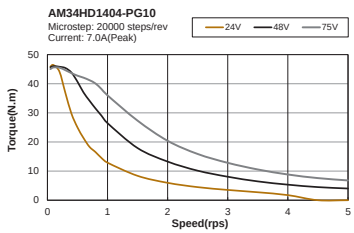
Torque Curves (Recommended Driver: SR or ST)

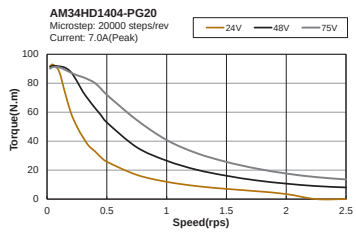


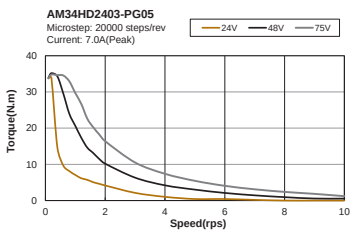


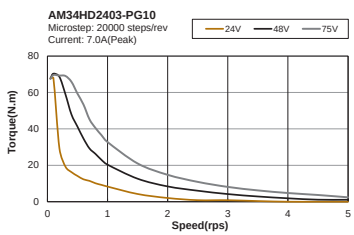


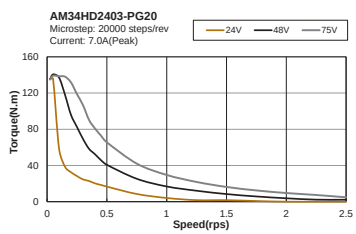








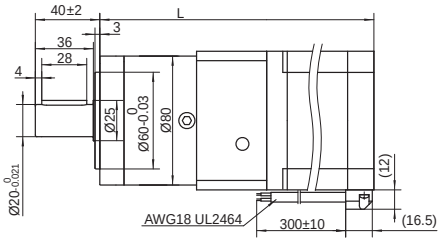


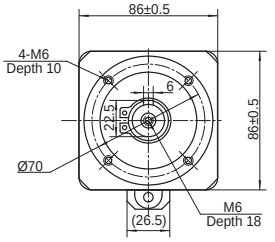


NEMA34(□86mm) 2-phase AC1.8° - 34HD Series Planetary Reducer Motor Type

Dimensions (Unit: mm)







RoHS Compliant

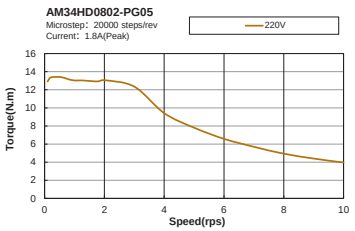
Parameters

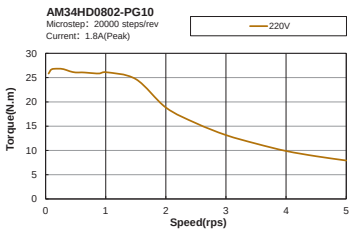
Model	Wiring *	Length"L"	Current ※	Series	Reduction ratio	Accuracy	Maximum output torque	Maximum load torque	Rotor Inertia	Efficiency	Noise	Mass
		mm	A/Phase			arc-min	N.m	N.m	g.cm^2		dB	Kg
AM34HD0802-PG05	B(Parallel) C(Series)	170.5	1.8 (Series connection)	1	5	10	15	50	27500	96%	<60	3.71
AM34HD0802-PG10		170.5		1	10	10	30	40	110000	96%		3.71
AM34HD0802-PG20		188.5		2	20	15	60	120	440000	94%		4.21
AM34HD1802-PG05		200		1	5	10	25	50	46250	96%		4.81
AM34HD1802-PG10		200		1	10	10	50	40	185000	96%		4.81
AM34HD1802-PG20		218		2	20	15	100	120	740000	94%		5.31
AM34HD2805-PG05		229.5		1	5	10	35.5	50	68750	96%		5.91
AM34HD2805-PG10		229.5		1	10	10	71	40	275000	96%		5.91
AM34HD2805-PG20		247.5		2	20	15	142	120	1100000	94%		6.41

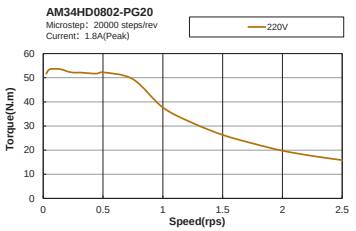
* Wiring Diagram B/C See Page 9

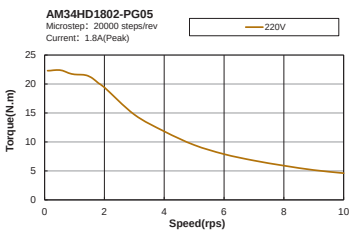
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

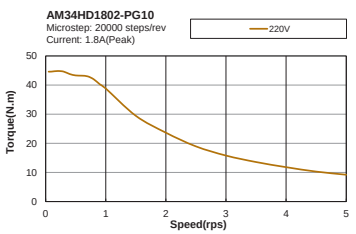
Torque Curves (Recommended Driver: SRAC or STAC)

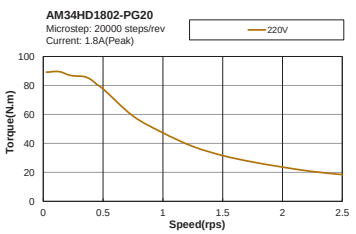


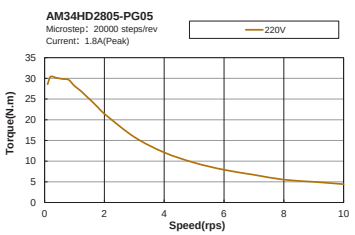


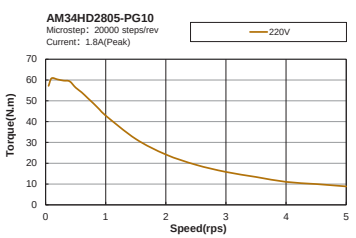


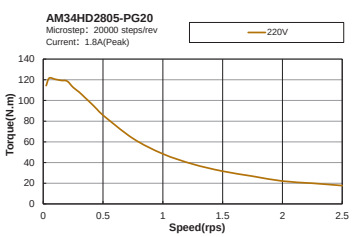




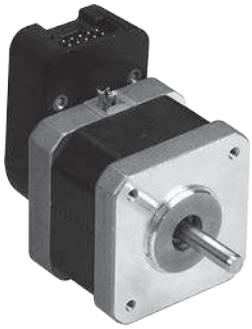


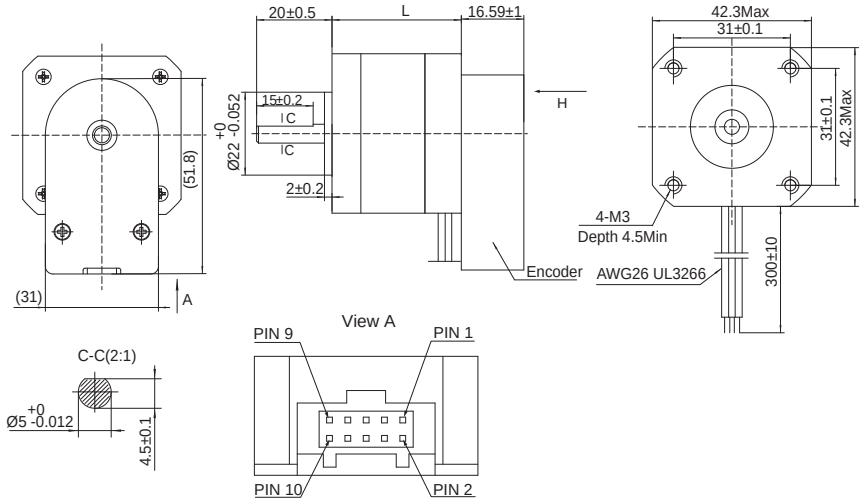






Dimensions (Unit: mm)





RoHS Compliant

Encode Electrical Specification

Resolution	4000 Counts/Rev(1000 Line)
Supply Current (no load)	Typ 56mA/Max 59mA
Output Voltage Low	0.4V@20mA Max.
Output Voltage High	2.4V@-20mA Min.

Pin.	9	7	5	3	1
Signal	CH B-	+5V	CH A-	Index-	GND
Pin.	**10**	**8**	**6**	**4**	**2**
Signal	CH B+	+5V	CH A+	Index+	GND

A leads B for clockwise shaft rotation, and B leads A for counterclockwise rotation viewed from direction H

Mating Connectors

Housing: Molex# 15-04-5104
Crimp: Molex# 14-60-0058
Crimp Tool: Molex# 62100-0700
Component model: E5-Connector

Accessories(Sold Separately)

General encoder Cable
P/N: 1001-100 Length: 1m
P/N: 1009-500 Length: 5m
Encoder cable used with MOONS'drive
P/N: 2005-200 Length: 2m
P/N: 2011-200 Length: 5m

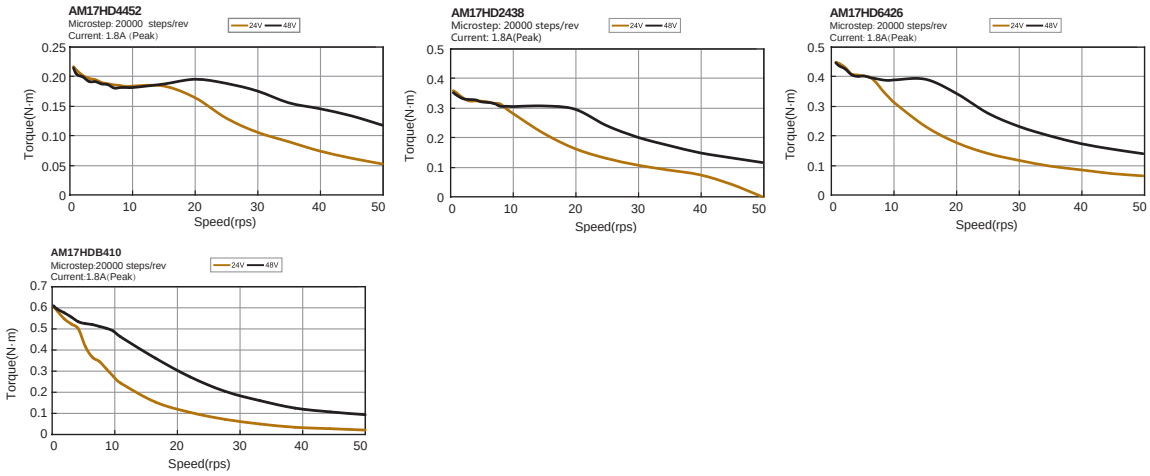
Parameters

Model	Wiring *	Leads	Length"L"	Minimum Holding Torque	Current ※	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
			mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM17HD4452-E1000D	A	4	34.3	0.285	1.5	1.5	38.0	0.23	500VAC 1 minute
AM17HD2438-E1000D			39.8	0.46	1.5	1.9	57.0	0.28	
AM17HD6426-E1000D			48.3	0.59	1.5	2.3	82.0	0.36	
AM17HDB410-E1000D			62.8	0.85	1.4	3.2	123	0.6	

* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Torque Curves (Recommended Driver: SR or ST)

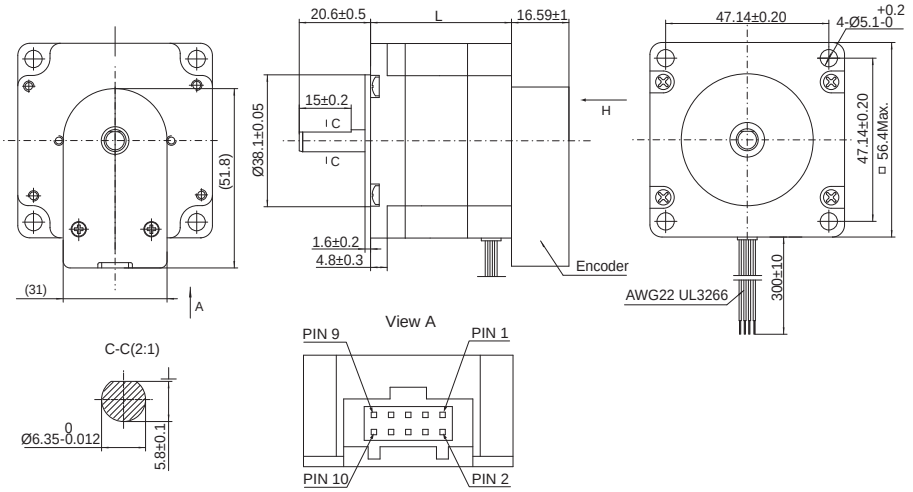


NEMA23(☐ 56mm) 2-phase DC 1.8°- 23HS Series Encoder Type

Dimensions (Unit: mm)



RoHS Compliant



Encode Electrical Specification

Resolution	4000 Counts/Rev(1000 Line)
Supply Current (no load)	Typ 56mA/Max 59mA
Output Voltage Low	0.4V@20mA Max.
Output Voltage High	2.4V@-20mA Min.

Pin.	9	7	5	3	1
Signal	CH B-	+5V	CH A-	Index-	GND
Pin.	**10**	**8**	**6**	**4**	**2**
Signal	CH B+	+5V	CH A+	Index+	GND

A leads B for clockwise shaft rotation, and B leads A for counterclockwise rotation viewed from direction H

Mating Connectors

Housing: Molex# 15-04-5104
Crimp: Molex# 14-60-0058
Crimp Tool: Molex# 62100-0700
Component model: E5-Connector

Accessories(Sold Separately)

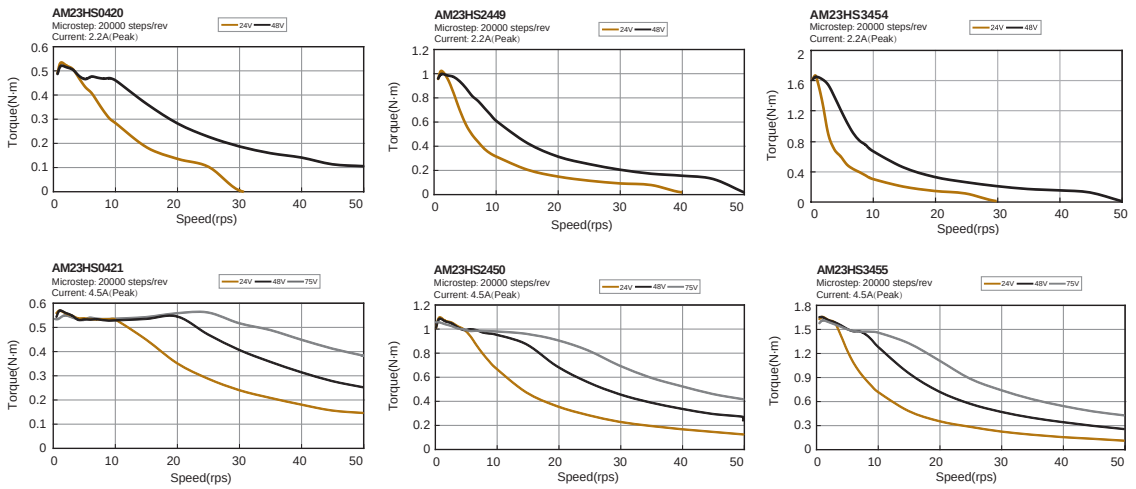
General encoder Cable
P/N: 1001-100 Length: 1m
P/N: 1009-500 Length: 5m
Encoder cable used with MOONS'drive
P/N: 2005-200 Length: 2m
P/N: 2011-200 Length: 5m

arameters

Model	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
			mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM23HS0420-E1000D	A	4	41.0	0.72	1.8	1.8	135.0	0.42	500VAC 1 minute
AM23HS2449-E1000D			54.0	1.25		2.4	260.0	0.6	
AM23HS3454-E1000D			76.0	2.1		2.9	460.0	1.0	
AM23HS0421-E1000D			41.0	0.72	3.7	0.48	135.0	0.42	
AM23HS2450-E1000D			54.0	1.25		0.63	260.0	0.6	
AM23HS3455-E1000D			76.0	2.1		0.75	460.0	1.0	

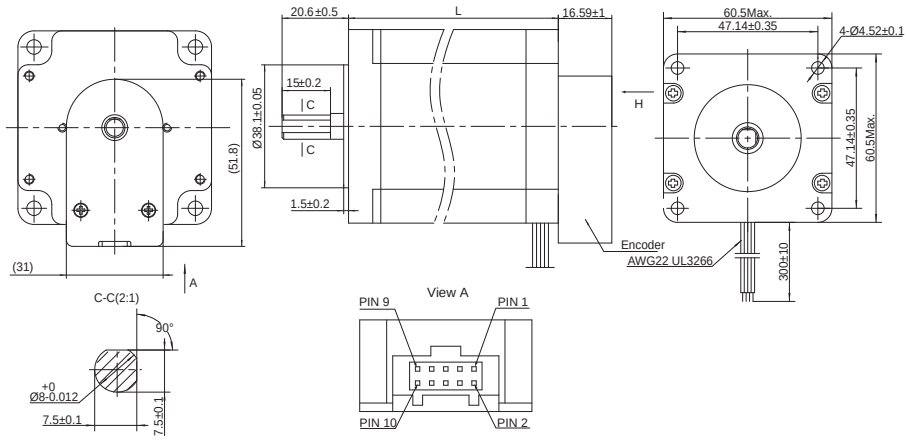
* Wiring Diagram A See Page 9
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Torque Curves (Recommended Driver: SR or ST)



Dimensions (Unit: mm)





RoHS Compliant

Encode Electrical Specification

Resolution	4000 Counts/Rev(1000 Line)
Supply Current (no load)	Typ 56mA/Max 59mA
Output Voltage Low	0.4V@20mA Max.
Output Voltage High	2.4V@-20mA Min.

Pin.	9	7	5	3	1
Signal	CH B-	+5V	CH A-	Index-	GND
Pin.	**10**	**8**	**6**	**4**	**2**
Signal	CH B+	+5V	CH A+	Index+	GND

A leads B for clockwise shaft rotation, and B leads A for counterclockwise rotation viewed from direction H

Mating Connectors

Housing: Molex# 15-04-5104
Crimp: Molex# 14-60-0058
Crimp Tool: Molex# 62100-0700
Component model: E5-Connector

Accessories(Sold Separately)

General encoder Cable
P/N: 1001-100 Length: 1m
P/N: 1009-500 Length: 5m
Encoder cable used with MOONS'drive
P/N: 2005-200 Length: 2m
P/N: 2011-200 Length: 5m

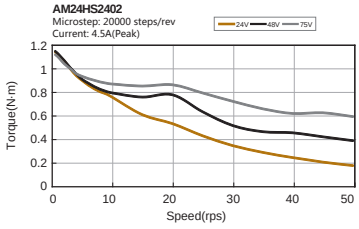
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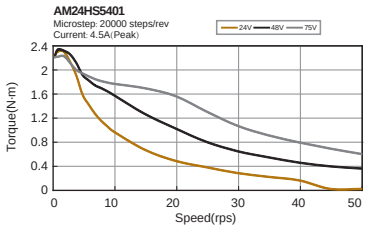
Model	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
			mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM24HS2402-E1000D	A	4	54.0	1.57	4.0	0.43	450.0	0.83	500VAC 1 minute
AM24HS5401-E1000D			85.0	3.2	4.0	0.65	900.0	1.4	

* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

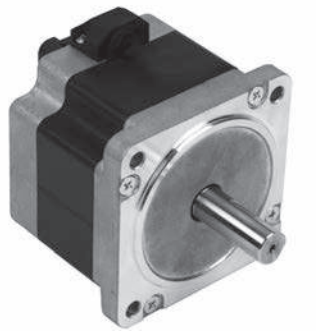
Torque Curves (Recommended Driver: ST or SR)



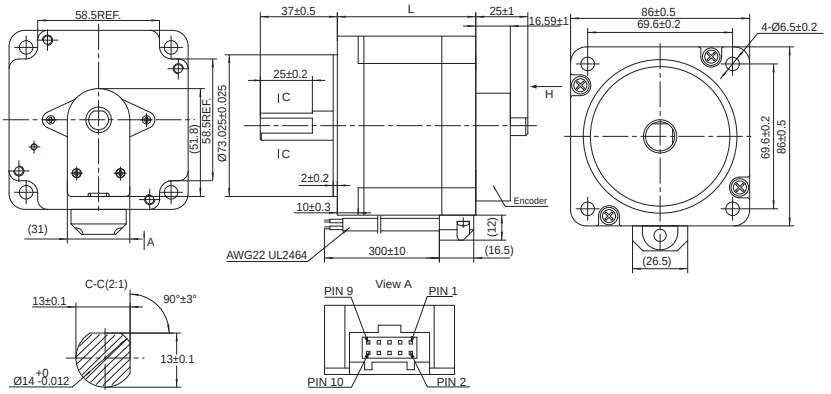


NEMA34(□ 86mm) 2-phase DC1.8°- 34HD Series Encoder Type

Dimensions (Unit: mm)



RoHS Compliant



Encode Electrical Specification

Resolution	4000 Counts/Rev(1000 Line)
Supply Current (no load)	Typ 56mA/Max 59mA
Output Voltage Low	0.4V@20mA Max.
Output Voltage High	2.4V@-20mA Min.

A leads B for clockwise shaft rotation, and B leads A for counterclockwise rotation viewed from direction H

Mating Connectors

Housing: Molex# 15-04-5104
Crimp: Molex# 14-60-0058
Crimp Tool: Molex# 62100-0700
Component model: E5-Connector

Pin.	9	7	5	3	1
Signal	CH B-	+5V	CH A-	Index-	GND
Pin.	**10**	**8**	**6**	**4**	**2**
Signal	CH B+	+5V	CH A+	Index+	GND

Accessories(Sold Separately)

General encoder Cable
P/N: 1001-100 Length: 1m
P/N: 1009-500 Length: 5m
Encoder cable used with MOONS'drive
P/N: 2005-200 Length: 2m
P/N: 2011-200 Length: 5m

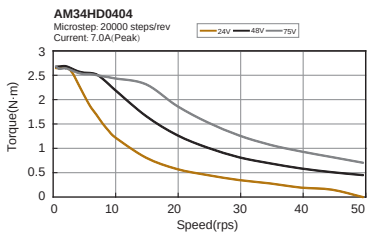
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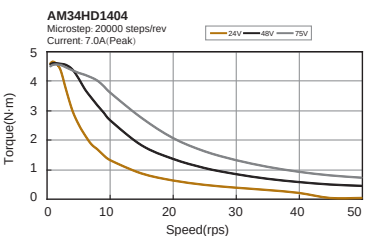
Model	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Motor Mass	Dielectric Strength
			mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM34HD0404-E1000D	A	4	66.5	3.7	6.3	0.25	1100.0	1.6	500VAC 1 minute
AM34HD1404-E1000D			96.0	6.7		0.35	1850.0	2.7	
AM34HD2403-E1000D			125.5	9.4	5.6	0.49	2750.0	3.8	

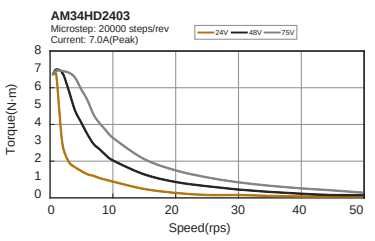
* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

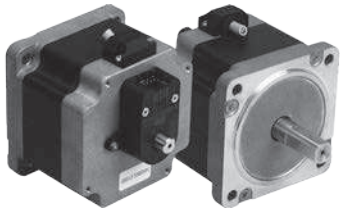
Torque Curves (Recommended Driver: ST or SR)



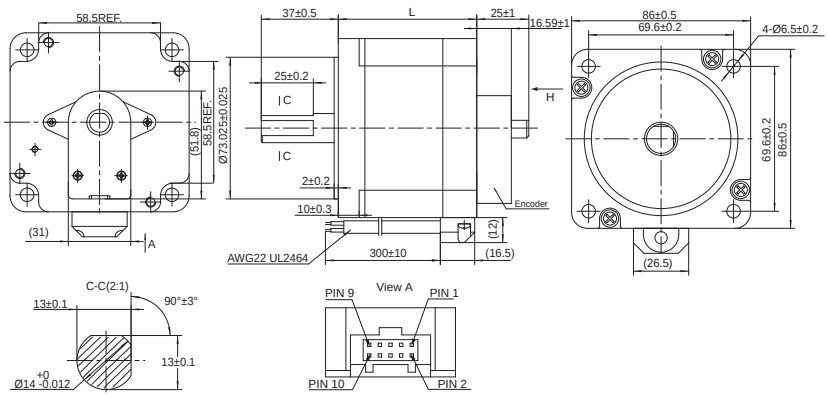




Dimensions (Unit: mm)



RoHS Compliant



Encode Electrical Specification

Resolution	4000 Counts/Rev(1000 Line)
Supply Current (no load)	Typ 56mA/Max 59mA
Output Voltage Low	0.4V@20mA Max.
Output Voltage High	2.4V@-20mA Min.

Pin.	9	7	5	3	1
Signal	CH B-	+5V	CH A-	Index-	GND
Pin.	**10**	**8**	**6**	**4**	**2**
Signal	CH B+	+5V	CH A+	Index+	GND

A leads B for clockwise shaft rotation, and B leads A for counterclockwise rotation viewed from direction H

Mating Connectors

Housing: Molex# 15-04-5104
Crimp: Molex# 14-60-0058
Crimp Tool: Molex# 62100-0700
Component model: E5-Connector

Accessories(Sold Separately)

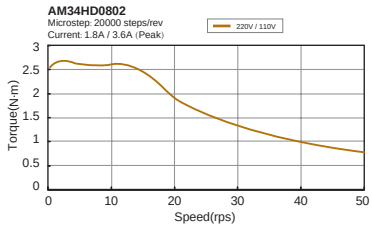
General encoder Cable
P/N: 1001-100 Length: 1m
P/N: 1009-500 Length: 5m
Encoder cable used with MOONS'drive
P/N: 2005-200 Length: 2m
P/N: 2011-200 Length: 5m

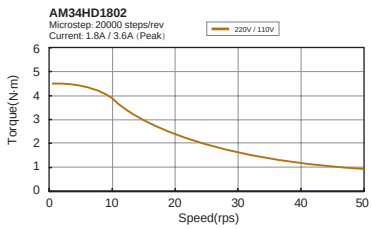
Parameters

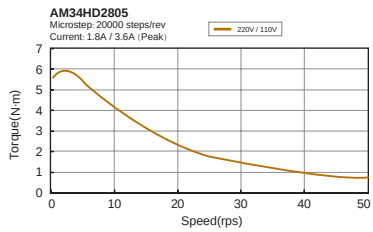
Model	Wiring *	Leads	Length"L"	Holding Torque	Current ※ (A/Phase)		Resistance (Ω/Phase)		Rotor Inertia	Motor Mass	Dielectric Strength
			mm	N·m	Series	Parallel	Series	Parallel	g·cm²	Kg	
AM34HD0802-E1000D	B(Parallel) C(Series)	8	66.5	4.2	1.8(When drive by 220VAC)	3.6(When drive by 110VAC)	3.4	0.9	1100.0	1.6	1500VAC 1 minute
AM34HD1802-E1000D			96.0	7.3			3.6	0.9	1850.0	2.7	
AM34HD2805-E1000D			125.5	8.7			4.2	1.1	2750.0	3.8	

* Wiring Diagram B/C See Page 9
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Torque Curves (Recommended Driver: SRAC or STAC)







NEMA17(□42mm) 3-phase DC 1.2°- 17HC Series



Phases	3
Steps / Revolution	± 5%
Step Accuracy	25 N (5.6 Lbs.) Push 65 N (15 Lbs.) Pull
Radial	29 N (6.5 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

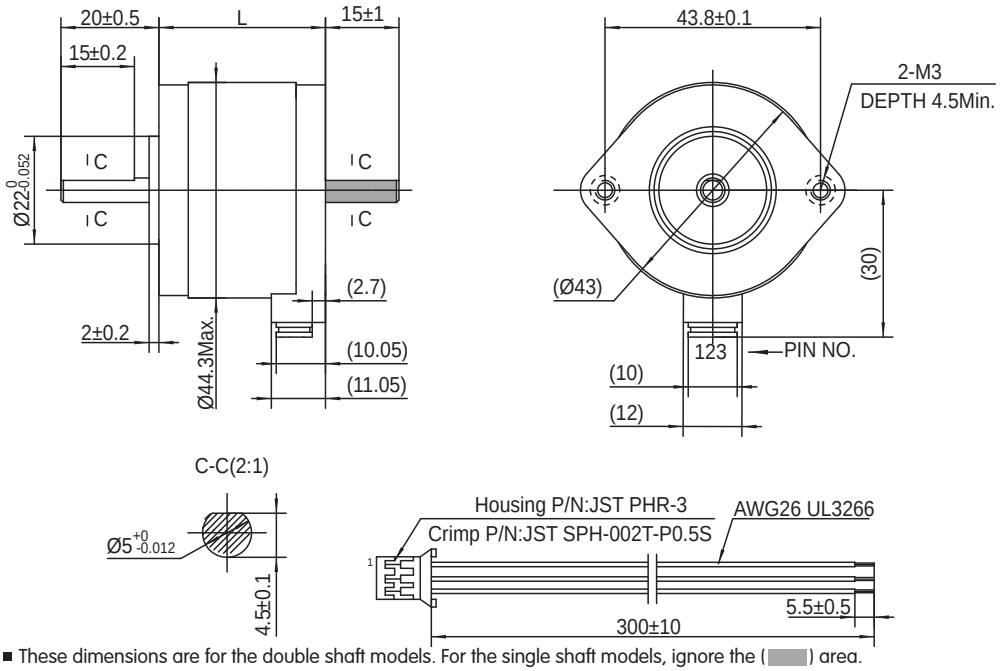
■ Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM17HC20A0-01N	Single Shaft	D	3	34	0.4	2.2	3.9	57.0	0.25	500VAC 1 minute
AM17HC20A0-02N	Double Shaft									
AM17HC60A0-01N	Single Shaft			43	0.52		5	82.0	0.35	
AM17HC60A0-02N	Double Shaft									

* Wiring Diagram D See Page 9

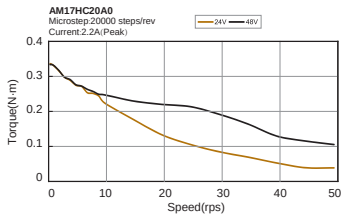
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

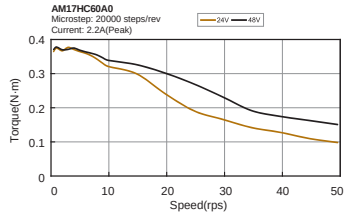
■ Dimensions (Unit: mm)



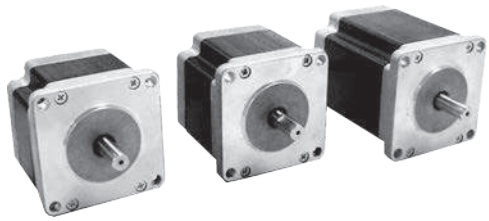
■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

■ Torque Curves (Recommended Driver: 3ST or 3SR)





NEMA24(□60mm) 3-phase DC1.2°- 24HC Series 57 Flange Demension



Phases	3
Steps / Revolution	±5%
Step Accuracy	40 N (9 Lbs.) Push 130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.) At Flat Center
IP Rating	40
Operating Temp	−20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

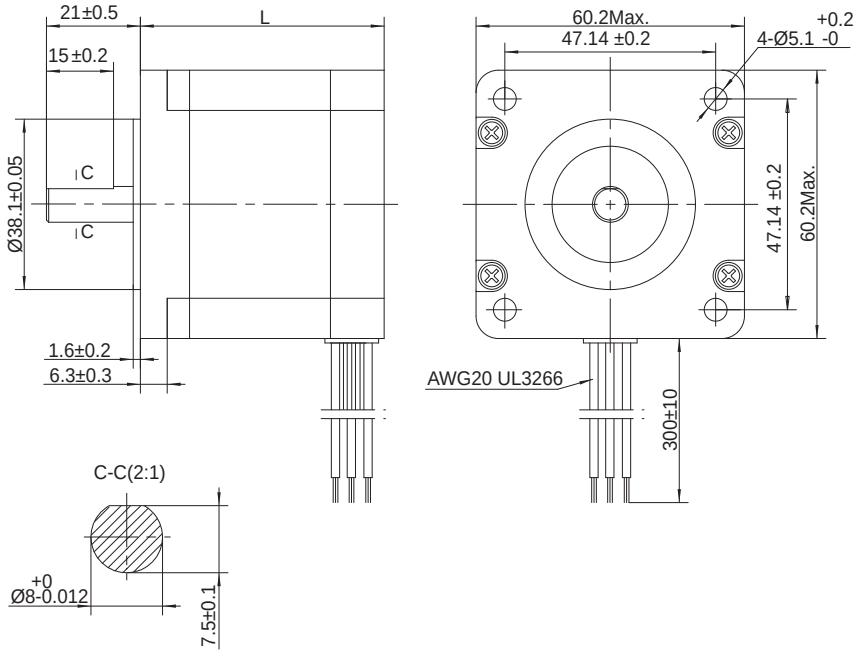
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM24HC4306-01	Single Shaft	D	3	45.5	0.58	5.8	0.33	180.0	0.5	500VAC 1 minute
AM24HC2306-01				54.5	0.9		0.4	260.0	0.8	
AM24HC3306-03				76.5	1.7		0.63	460.0	1.3	

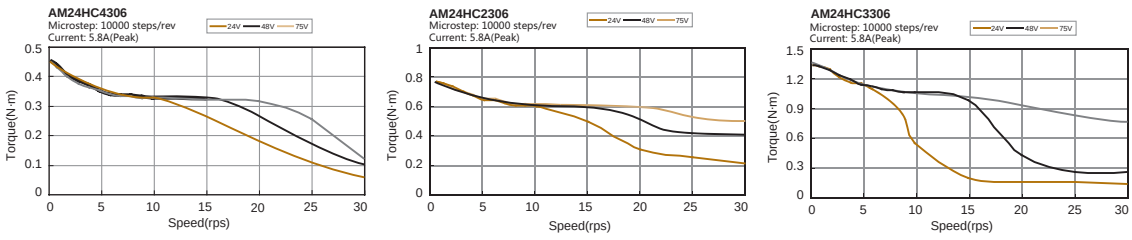
* Wiring Diagram D See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

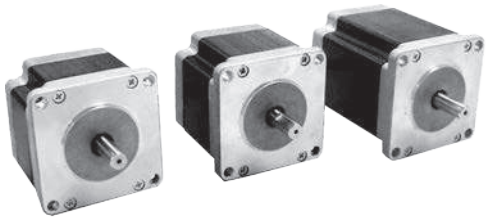
Dimensions (Unit: mm)



Torque Curves (Recommended Driver: 3ST or 3SR)



NEMA24(□60mm) 3-phase DC1.2°- 24HC Series 60 Flange Demension



Phases	3
Steps / Revolution	± 5%
Step Accuracy	40 N (9 Lbs.) Push 130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

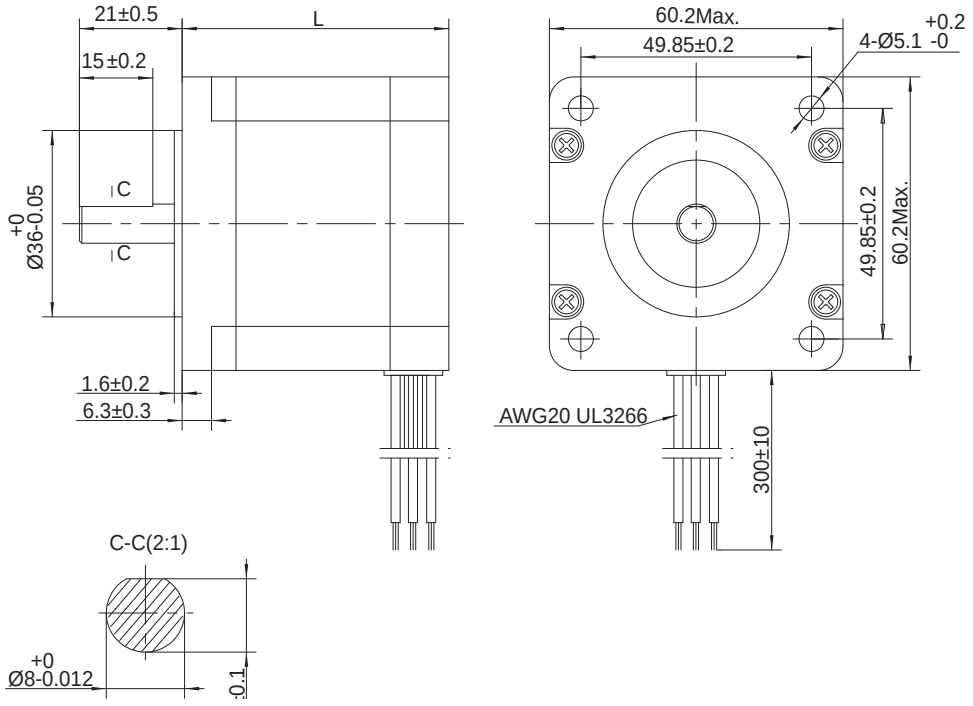
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM24HC4306-03	Single Shaft	D	3	45.5	0.58	5.8	0.33	180.0	0.5	500VAC 1 minute
AM24HC2308-02				54.5	0.9		0.4	260.0	0.8	
AM24HC3306-07				76.5	1.7		0.63	460.0	1.3	

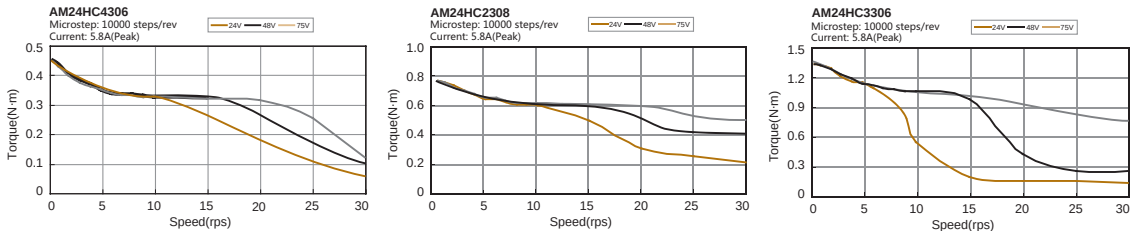
* Wiring Diagram D See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)



Torque Curves (Recommended Driver: 3ST or 3SR)



NEMA34(□86mm) 3-phase DC1.2°- 34HC Series



Phases	3
Steps / Revolution	±5%
Step Accuracy	65 N (15 Lbs.) Push 155 N (35 Lbs.) Pull
Radial	220 N (50 Lbs.) At Flat Center
IP Rating	40
Operating Temp	−20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

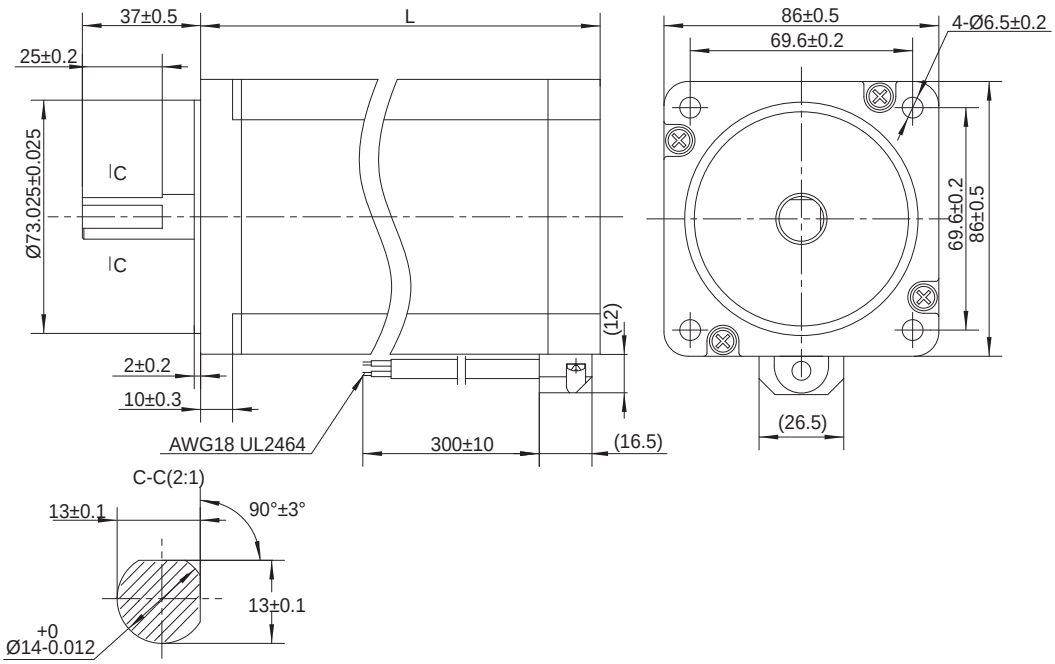
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM34HC0305-01	Single Shaft	D	3	66.5	2.4	5.8	0.53	1100.0	1.6	500VAC 1 minute
AM34HC1305-01				96	4.3		0.58	1850.0	2.7	
AM34HC2306-01				125.5	6.1		0.9	2750.0	3.8	

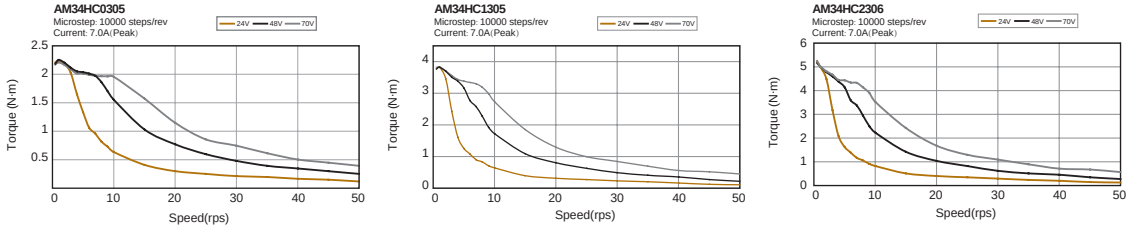
* Wiring Diagram D See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)



Torque Curves (Recommended Driver: 3ST or 3SR)



NEMA34(□86mm) 3-phase AC 1.2°- 34HC Series



Phases	3
Steps / Revolution	± 5%
Step Accuracy	65 N (15 Lbs.) Push
	155 N (35 Lbs.) Pull
Radial	220 N (50 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

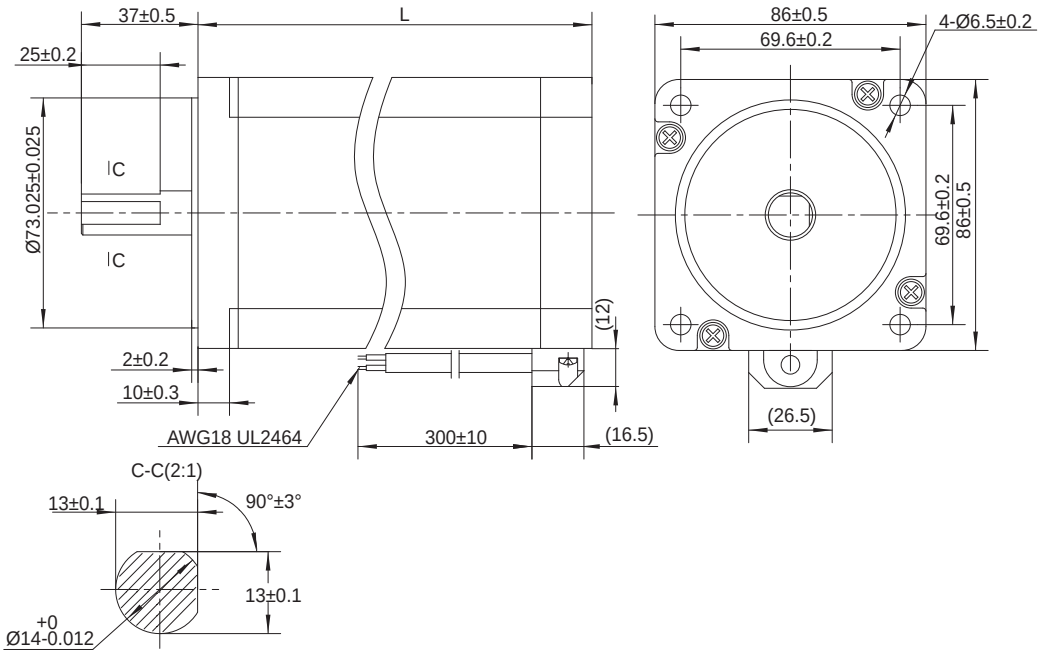
■ Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
AM34HC0306-01	Single Shaft	D	3	66.5	2.6	1.2	12.8	1100.0	1.6	1500VAC 1 minute
AM34HC1306-01				96	5.15	2.0	7	1850.0	2.7	
AM34HC2307-01				125.5	5.6	2.0	6	2750.0	3.8	

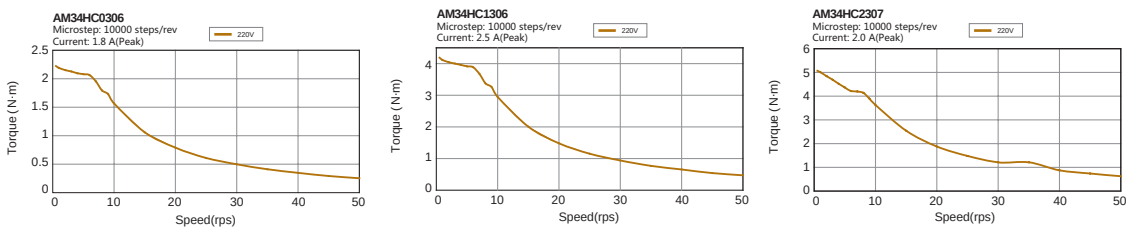
* Wiring Diagram D See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

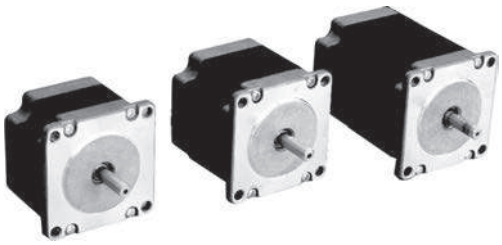
■ Dimensions (Unit: mm)



■ Torque Curves (Recommended Driver: 3SRAC)



NEMA23(□ 56mm) 2-phase DC 1.8° - 23HS UL Series



Phases	2
Steps / Revolution	±5%
Step Accuracy	40 N (9 Lbs.)Push 130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

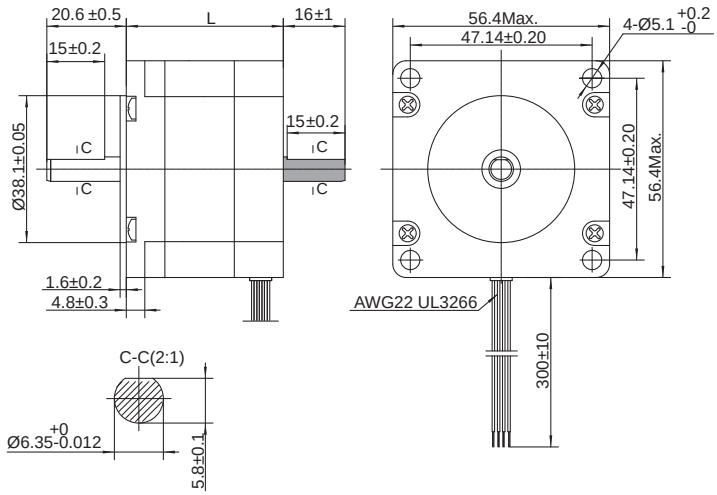
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
MS23HS0L418A-01	Single Shaft	A	4	41.0	0.72	1.8	1.8	135.0	0.42	500VAC 1 minute
MS23HS0L418A-02	Double Shaft									
MS23HS8L418A-01	Single Shaft			54.0	1.25		2.4	260.0	0.6	
MS23HS8L418A-02	Double Shaft									
MS23HSAL418A-01	Single Shaft			76.0	2.1		2.9	460.0	1.0	
MS23HSAL418A-02	Double Shaft									
MS23HS0l437A-01	Single Shaft			41.0	0.72	3.7	0.48	135.0	0.42	
MS23HS0L437A-02	Double Shaft									
MS23HS8L437A-01	Single Shaft			54.0	1.25		0.63	260.0	0.6	
MS23HS8L437A-02	Double Shaft									
MS23HSAL437A-01	Single Shaft			76.0	2.1		0.75	460.0	1.0	
MS23HSAL437A-02	Double Shaft									

* Wiring Diagram A See Page 9

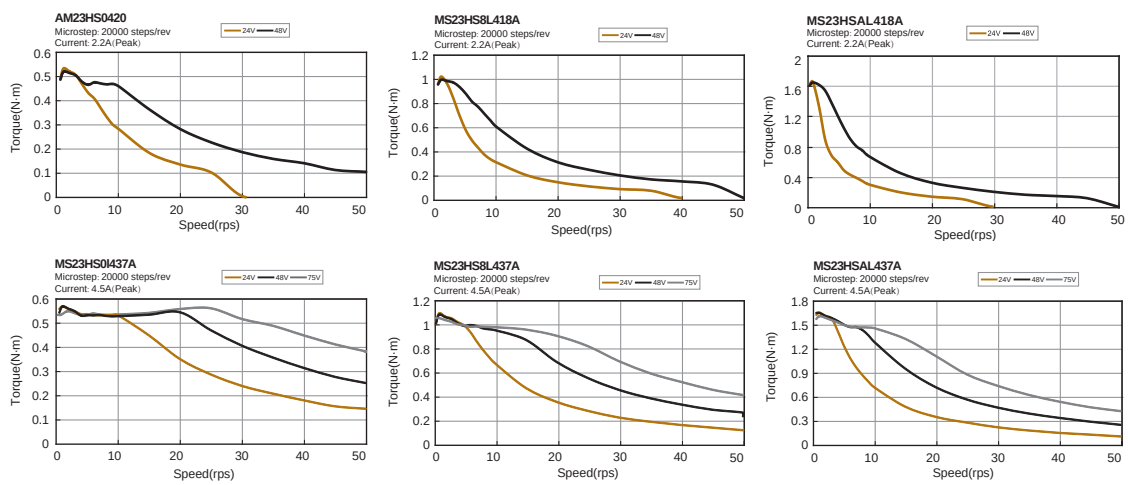
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)

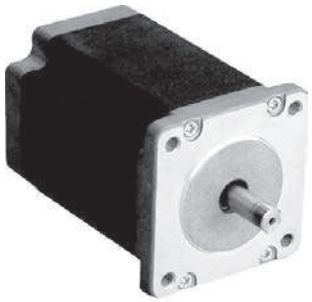


■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

Torque Curves (Recommended Driver: SR or ST)



NEMA24(□60mm) 2-phase DC 1.8° - 24HS UL Series



Phases	2
Steps / Revolution	± 5%
Step Accuracy	40 N (9 Lbs.)Push 130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.)At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

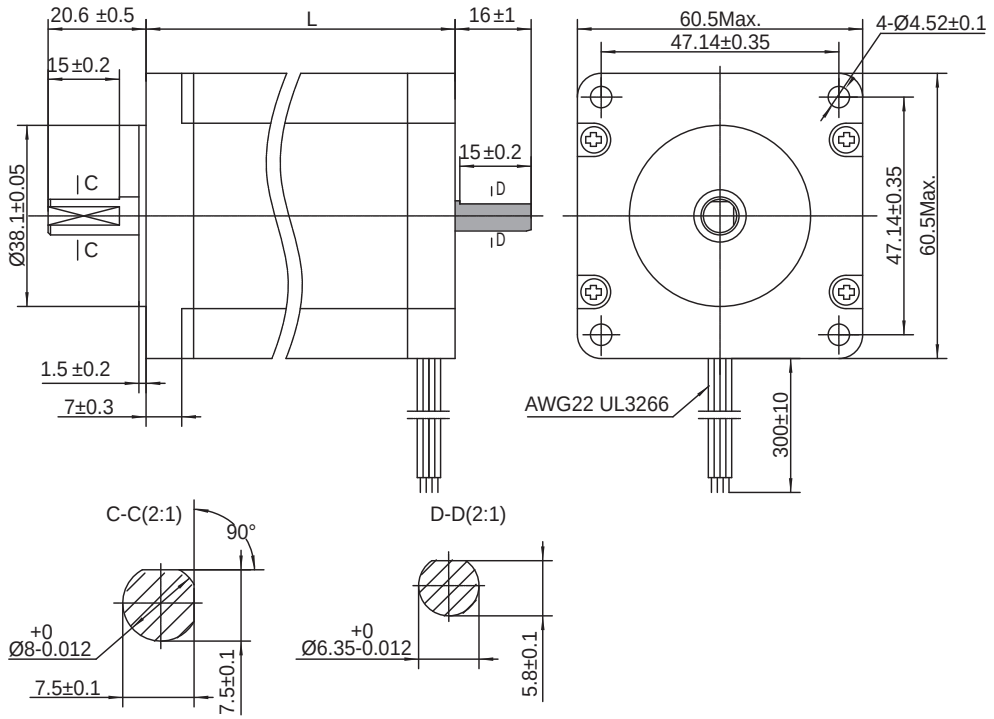
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
MS24HS2L440A-01	Single Shaft	A	4	54.0	1.57	4.0	0.43	450.0	0.83	500VAC 1 minute
MS24HS2L440A-02	Double Shaft									
MS24HS5L440A-01	Single Shaft			85.0	3.2		0.65	900.0	1.4	
MS24HS5L440A-02	Double Shaft									

* Wiring Diagram A See Page 9

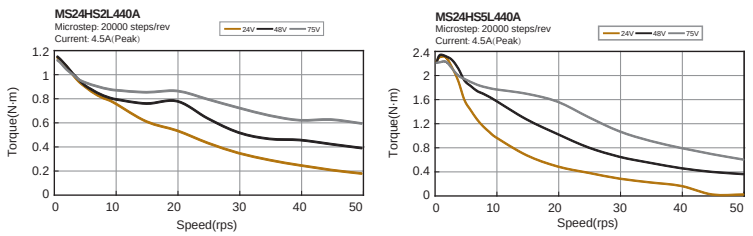
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)

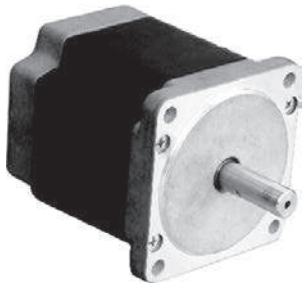


■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

Torque Curves (Recommended Driver: SR or ST)



NEMA34(□86mm) 2-phase DC 1.8°- 34HD UL Series



Phases	2
Steps / Revolution	±5%
Step Accuracy	65 N (15 Lbs.)Push 155 N (35 Lbs.) Pull
Radial	220 N (50 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

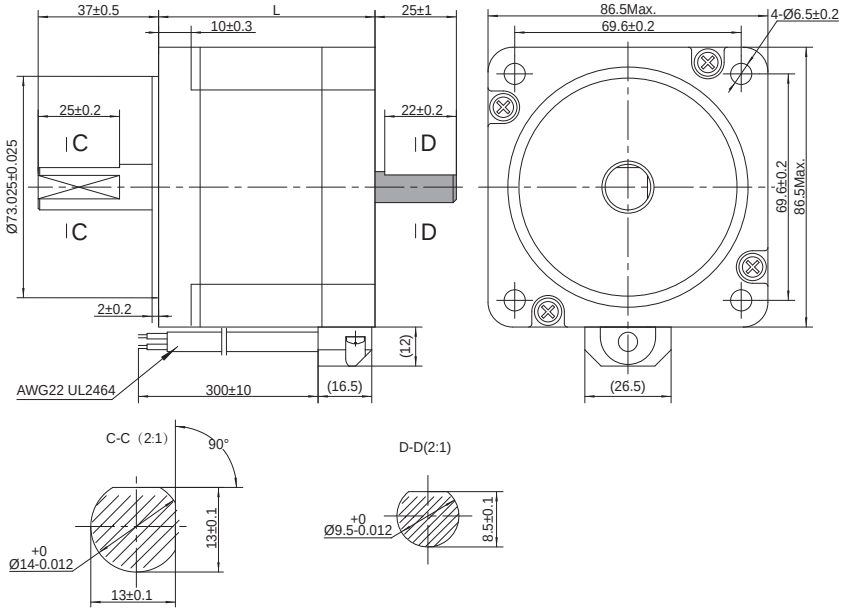
Parameters

Model	Shaft	Wiring *	Leads	Length"L" mm	Holding Torque N·m	Current ※ A/Phase	Resistance Ω/Phase	Rotor Inertia g·cm²	Mass Kg	Dielectric Strength
MS34HD0L4770-01	Single Shaft	A	4	66.5	3.7	6.3	0.25	1100.0	1.6	500VAC 1 minute
MS34HD0L4770-02	Double Shaft									
MS34HD1L4750-01	Single Shaft			96.0	6.7		0.35	1850.0	2.7	
MS34HD1L4750-02	Double Shaft									
MS34HD2L4660-01	Single Shaft			125.5	9.4	5.6	0.49	2750.0	3.8	
MS34HD2L4660-02	Double Shaft									

* Wiring Diagram A See Page 9

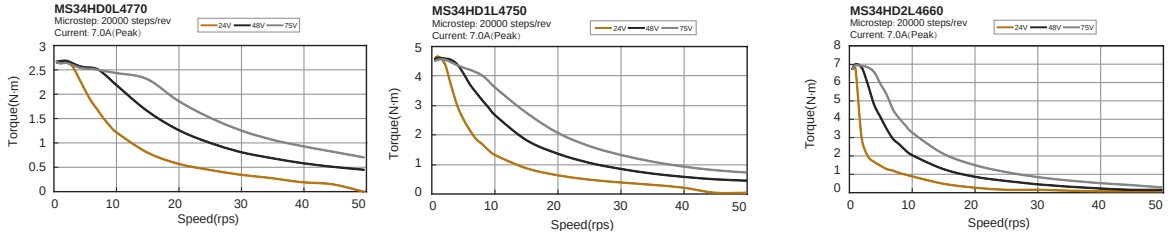
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)

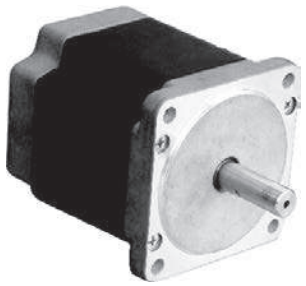


■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

Torque Curves (Recommended Driver: SR or ST)



NEMA34(□86mm) 2-phase AC 1.8°- 34HD UL Series



Phases	2
Steps / Revolution	±5%
Step Accuracy	65 N (15 Lbs.)Push 155 N (35 Lbs.) Pull
Radial	220 N (50 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

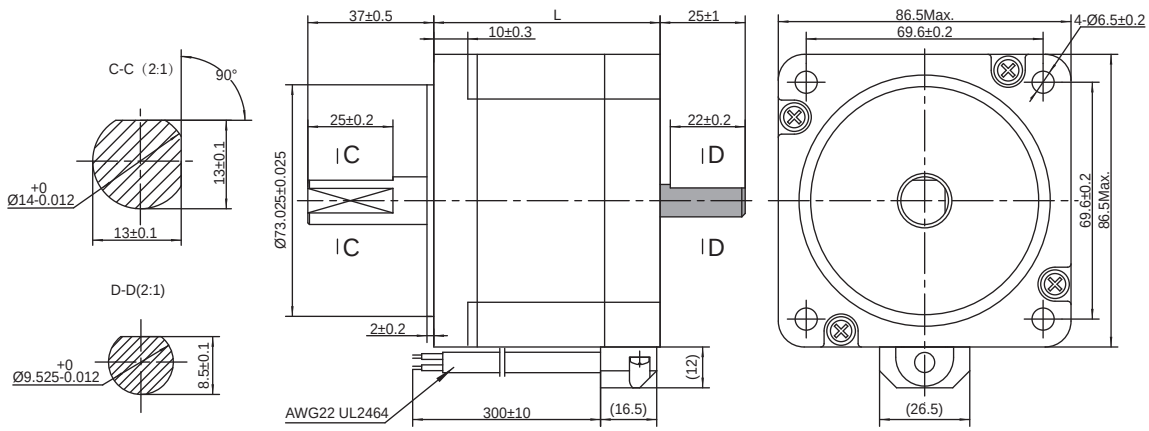
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase (Series connection)	g·cm²	Kg	
MS34HD0L8250-01	Single Shaft	B(Parallel) C(Series)	8	66.5	4.2	1.8 (220V Series connection) / 3.6 (110V Parallel connection)	3.4	1100.0	1.6	1500VAC 1 minute
MS34HD0L8250-02	Double Shaft									
MS34HD4L8250-01	Single Shaft			75	4.7		3.6	1350.0	1.9	
MS34HD1L8250-01	Single Shaft			96	7.3		3.6	1850.0	2.7	
MS34HD1L8250-02	Double Shaft									
MS34HD6L8250-01	Single Shaft			115	7.6		4	2400.0	3.5	
MS34HD2L8180-01	Single Shaft			125.5	8.7		4.2	2750.0	3.8	
MS34HD2L8180-02	Double Shaft									

* Wiring Diagram B / C See Page 9

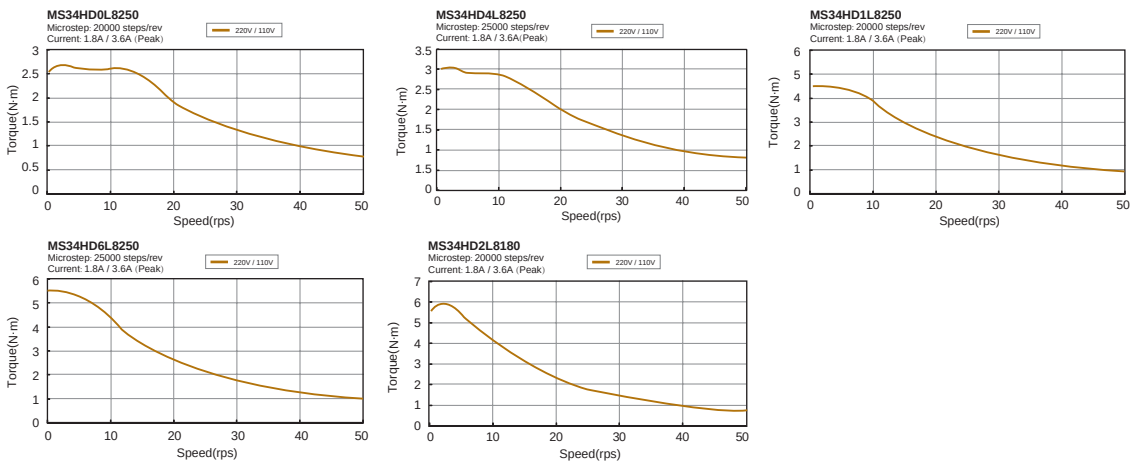
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)

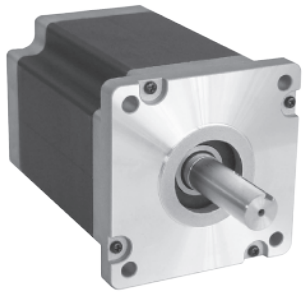


■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

Torque Curves (Recommended Driver: SRAC or STAC)



NEMA42(□110mm) 2-phase AC 1.8° - 42HS UL Series



Phases	2
Steps / Revolution	±5%
Step Accuracy	250 N (56 Lbs.)Push
	250 N (26 Lbs.) Pull
Radial	450 N (100 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

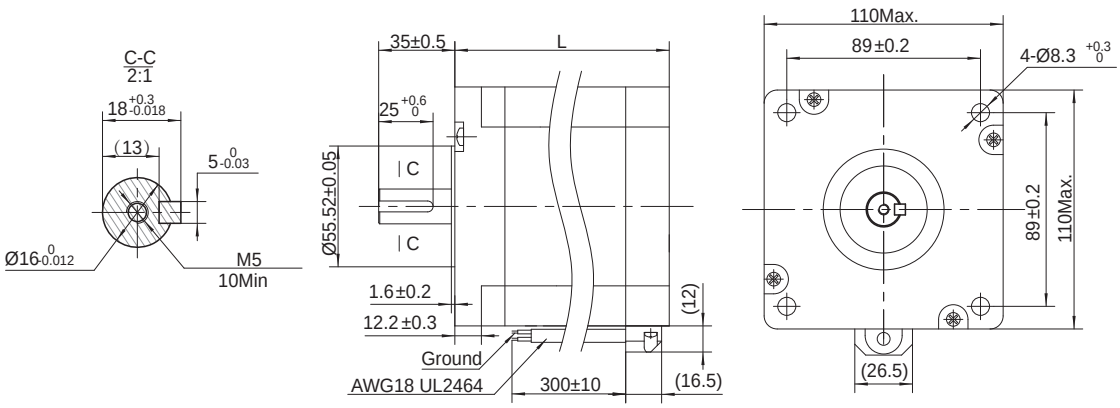
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	Kg	
ML42HS0L4210-02	Single Shaft	A	4	98.5	12	2.1	4.2	5500	4.8	1500VAC 1 minute
ML42HS2L4240-02	Single Shaft			149.5	21	2.4	4.4	10900	8	
ML42HS3L4270-02	Single Shaft			201	30	2.7	4.4	16200	11.6	

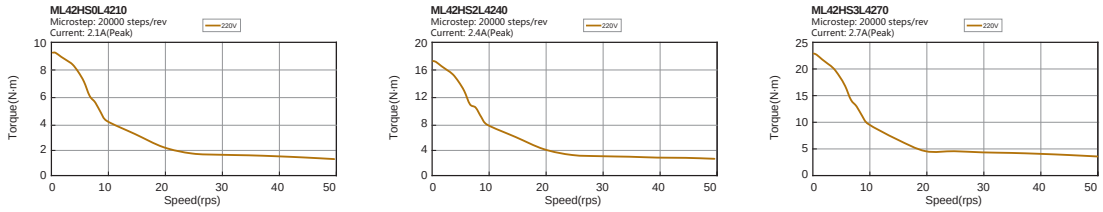
* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

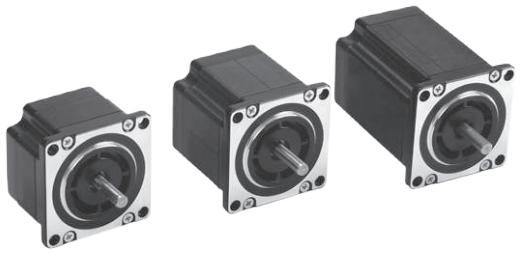
Dimensions (Unit: mm)



Torque Curves (Recommended Driver: SRAC or STAC)



NEMA23(□56mm) 2-phase DC 1.8° - 23HS PowerPlus UL Series (6.35mm Shaft)



Phases	2
Steps / Revolution	± 5%
Step Accuracy	40 N (9 Lbs.)Push 130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

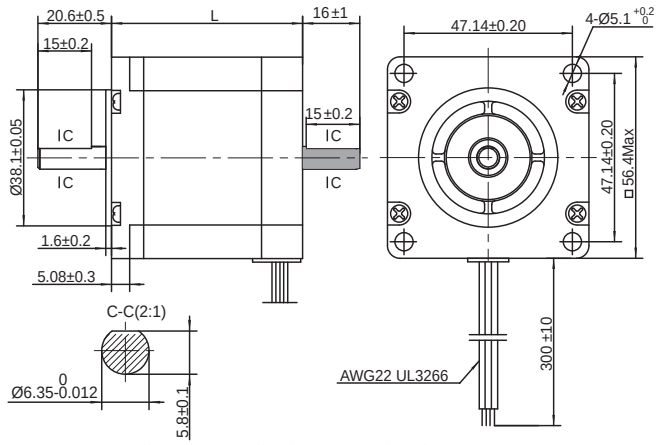
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
ML23HS0L4180-06	Single Shaft	A	4	39	0.82	1.8	1.8	105.0	0.4	500VAC 1 minute
ML23HS0L4180-05	Double Shaft									
ML23HS8L4180-04	Single Shaft			55	1.5		2.4	215.0	0.6	
ML23HS8L4180-03	Double Shaft									
ML23HSAL4180-04	Single Shaft			77	2.3		3	365.0	1.0	
ML23HSAL4180-06	Double Shaft									
ML23HS0L4370-06	Single Shaft			39	0.82	3.7	0.48	105.0	0.4	
ML23HS0L4370-07	Double Shaft									
ML23HS8L4370-09	Single Shaft			55	1.5		0.63	215.0	0.6	
ML23HS8L4370-10	Double Shaft									
ML23HSAL4370-14	Single Shaft			77	2.3		0.75	365.0	1.0	
ML23HSAL4370-15	Double Shaft									

* Wiring Diagram A See Page 9

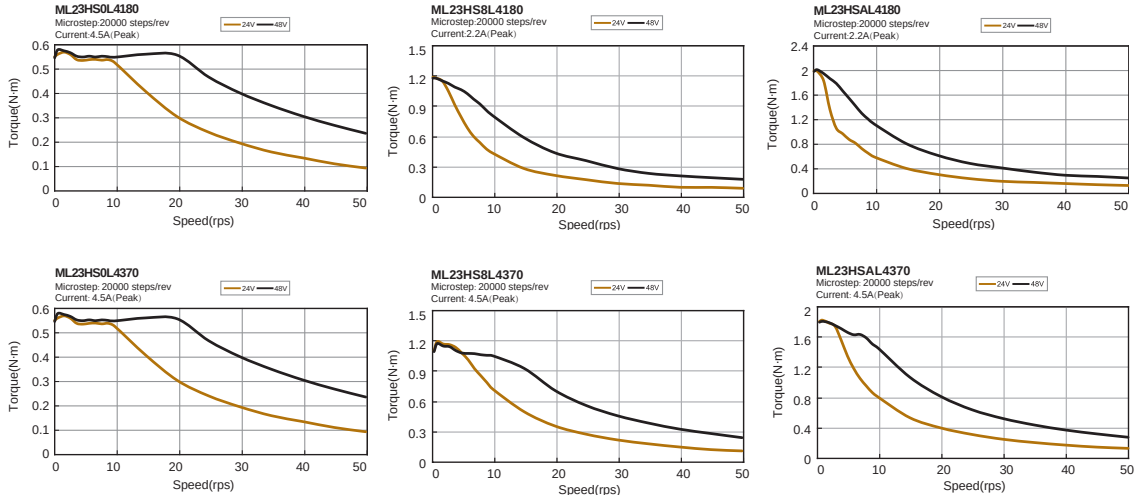
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)



■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

Torque Curves (Recommended Driver: SR or ST)



NEMA23(□56mm) 2-phase DC 1.8°- 23HS PowerPlus UL Series (8mm Shaft)



Phases	2
Steps / Revolution	±5%
Step Accuracy	40 N (9 Lbs.)Push 130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.) At Flat Center
IP Rating	40
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

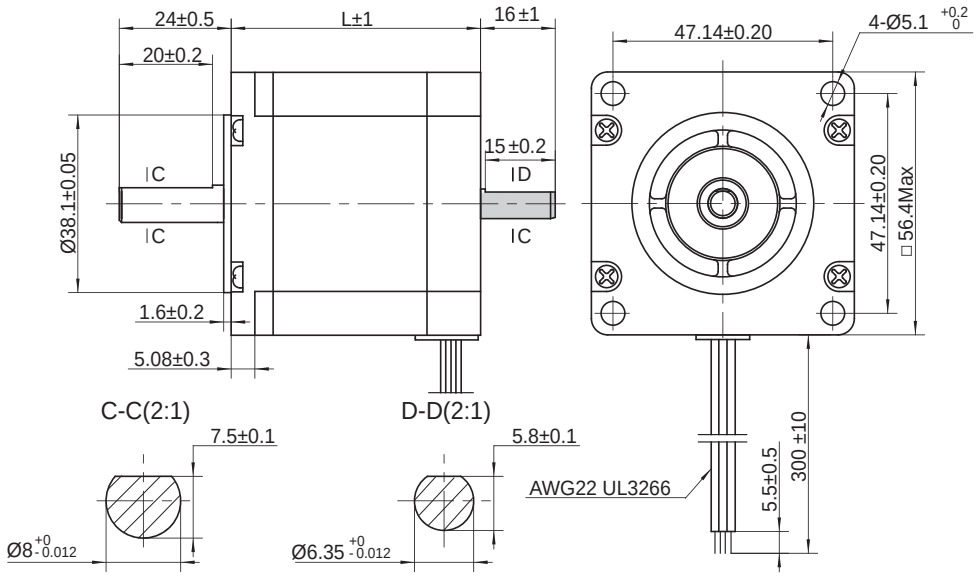
■ Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N·m	A/Phase	Ω/Phase	g·cm²	Kg	
ML23HS0L4370-08	Single Shaft	A	4	39	0.82	3.7	0.48	105.0	0.4	500VAC 1 minute
ML23HS0L4370-09	Double Shaft									
ML23HS8L4370-11	Single Shaft			55	1.5		0.63	215.0	0.6	
ML23HS8L4370-12	Double Shaft									
ML23HSAL4370-17	Single Shaft			77	2.3		0.75	365.0	1.0	
ML23HSAL4370-16	Double Shaft									

* Wiring Diagram A See Page 9

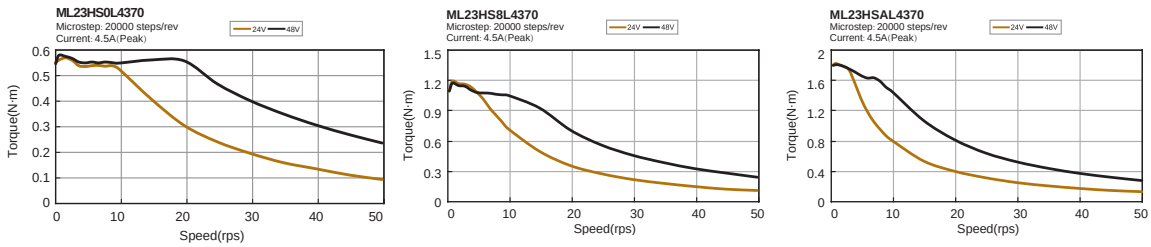
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

■ Dimensions (Unit: mm)



■ These dimensions are for the double shaft models. For the single shaft models, ignore the ( ) area.

■ Torque Curves (Recommended Driver: SR or ST)



NEMA23(□56mm) 2-phase DC1.8°- 23HS UL Series IP65 Type



Phases	2
Steps / Revolution	± 5%
Step Accuracy	40 N (9 Lbs.)Push 130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.) At Flat Center
IP Rating	65
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

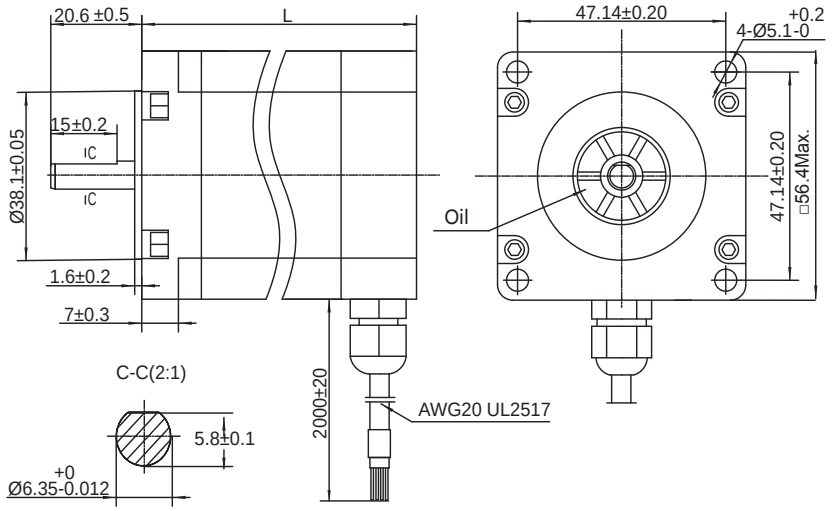
■ Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	Kg	
ML23HS2L437A-01	Single Shaft	A	4	61.7	1.25	3.7	0.63	260.0	0.6	500VAC 1 minute
MS23HS3L4370-01				83.7	2.2		0.75	460.0	1	

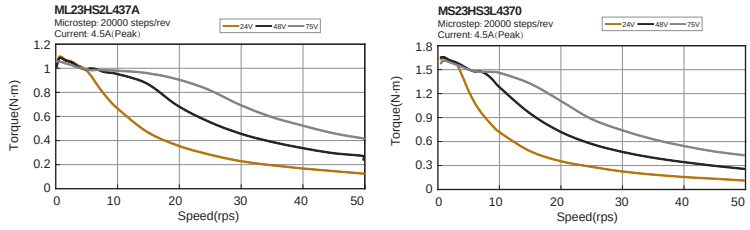
* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

■ Dimensions (Unit: mm)



■ Torque Curves (Recommended Driver: SR or ST)



NEMA24(□60mm) 2-phase DC1.8°- 24HS UL Series IP65 Type



Phases	2
Steps / Revolution	±5%
Step Accuracy	40 N (9 Lbs.)Push 130 N (30 Lbs.) Pull
Radial	70 N (15.5 Lbs.) At Flat Center
IP Rating	65
Operating Temp	−20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

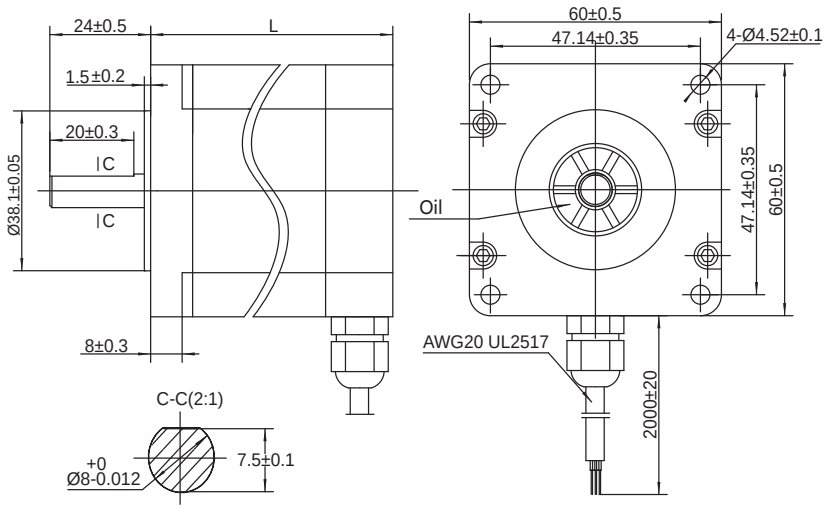
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	Kg	
MS24HS5L443A-01	Single Shaft	A	4	94.5	3.2	4.0	0.65	900.0	1.4	500VAC 1 minute

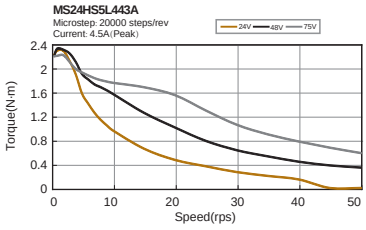
* Wiring Diagram A See Page 9

※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)



Torque Curves (Recommended Driver: SR or ST)



NEMA34(□86mm) 2-phase DC1.8°- 34HD UL Series IP65 Type



Phases	2
Steps / Revolution	± 5%
Step Accuracy	65 N (15 Lbs.)Push 155 N (35 Lbs.) Pull
Radial	220 N (50 Lbs.) At Flat Center
IP Rating	65
Operating Temp	–20°C to +50°C
Insulation Class	B, 130°C
Insulation Resistance	100 MegOhms

RoHS Compliant

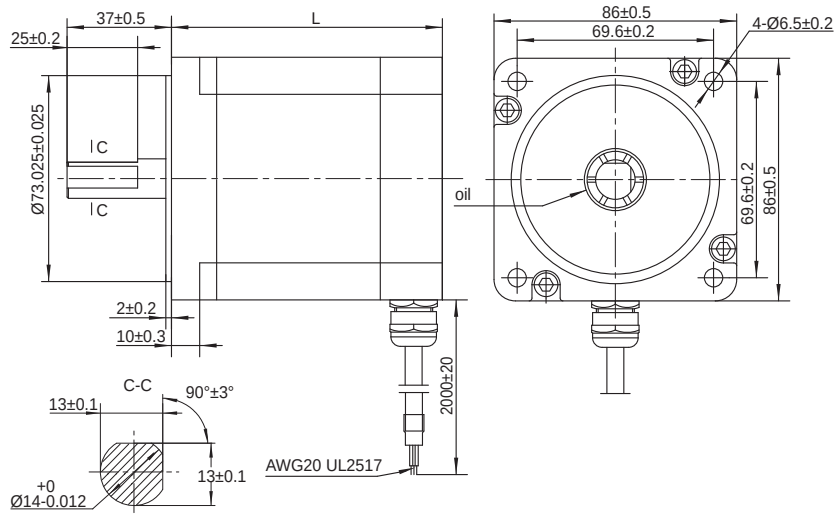
Parameters

Model	Shaft	Wiring *	Leads	Length"L"	Holding Torque	Current ※	Resistance	Rotor Inertia	Mass	Dielectric Strength
				mm	N.m	A/Phase	Ω/Phase	g·cm²	Kg	
ML34HD1L4630-02	Single Shaft	A	4	98	6.7	6.3	0.45	1850.0	2.7	500VAC 1 minute
ML34HD2L4560-02				127.5	9.4	5.6	0.62	2750.0	3.8	

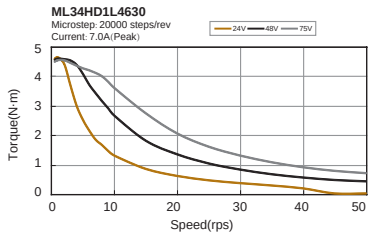
* Wiring Diagram A See Page 9

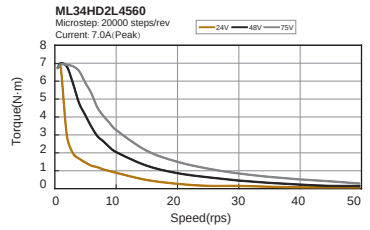
※ 1.The rated current of the motor is RMS value. 2.The output current of Moons' drive is the peak of sine value. 3.Drive maximum peak current = motor rated current x1.4.

Dimensions (Unit: mm)



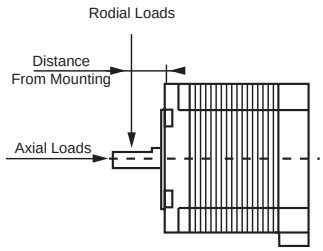
Torque Curves (Recommended Driver: SR or ST)





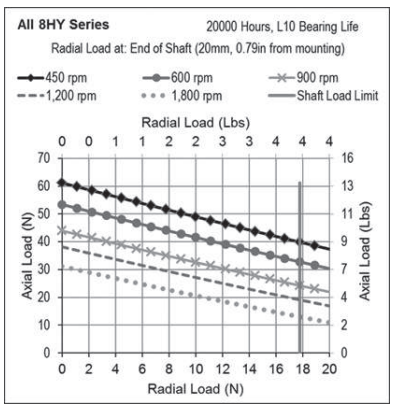
Bearing Life & Shaft Loading

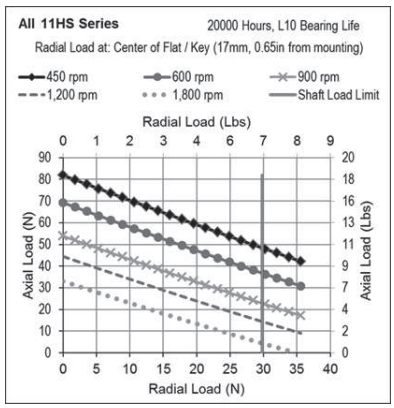
Moons' uses heavy duty long life bearings for long life from every motor. Most motors can be provided with larger bearings and custom construction to meet the most demanding applicatons.

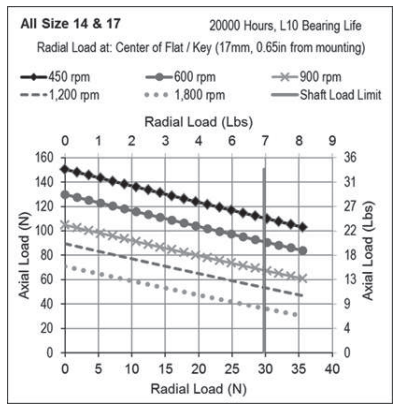


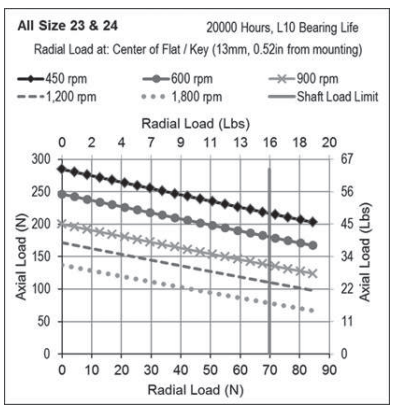
These bearing life curves represent the maximum axial and radial loads for 20,000 hours L10 bearing life at various speeds. The shaft radial load limit (and bearing load ratings) are highly dependent on the the distance from the mounting face where the load is appliced. These curves were calculated with the radial load applied at the distance from the mounting face shown on the curve (usually the center of the flat / keyway).

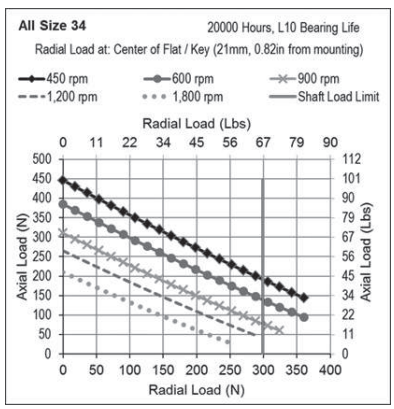
A common cause for shaft (and bearing) failure, are high radial loads that are created when a pulley is attached to the motor shaft at a large distance from the motor mounting face, and the belt has high tension. To avoid this condition mount pulleys and gears as close to the face of the motor as possible, and avoid over tightening belts. This will dramatically reduce the shaft stress, and increases the life of the bearings.

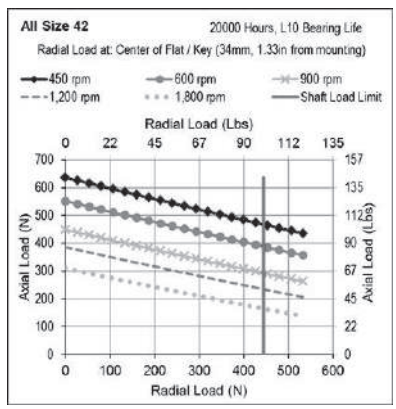










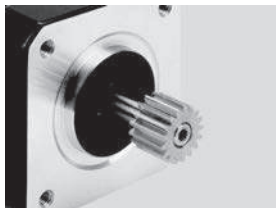


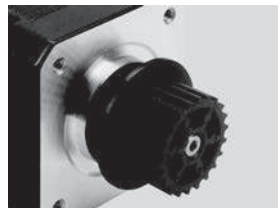
Configurations and Options

Besides all standard motors above, we also provide all kinds of customized motors per request.

Shaft Configuration

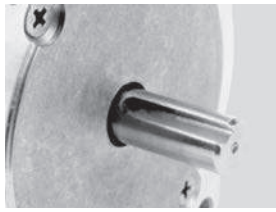

Cross Drilled Shaft

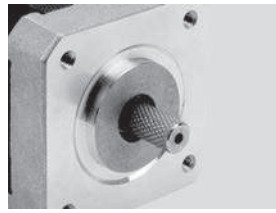

Gear

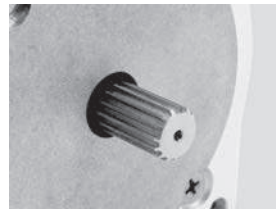

Plastic Pulley

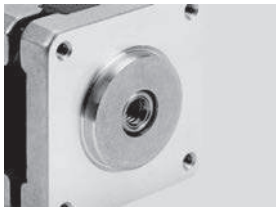

Single Flat

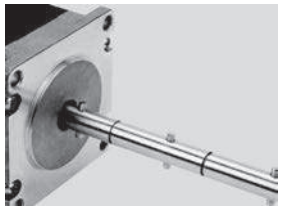

Double Flat

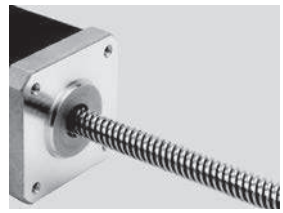

Key Way

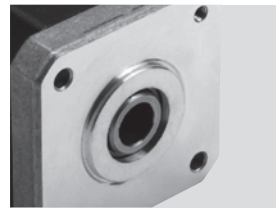

Knurl


Hobbed Gear

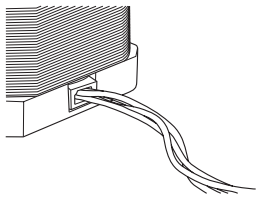

Screw Hollow Shaft

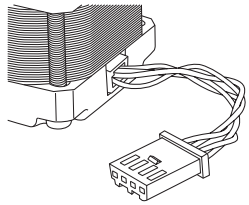

Dowel

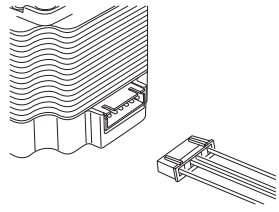

Worm Shaft


Hollow Shaft

Connection Configuration


Lead Wire


Lead Wire with Connector


Connector with harness

Encoder Option



Gearbox Option



Brake Option



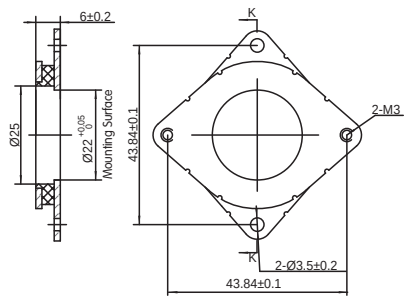
Integrated



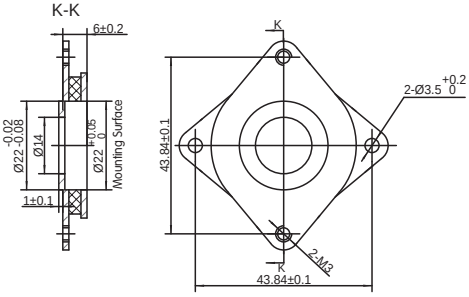
Accessory

42 Flange Demension	Model	Application of screw	Maximum Load	Scope Of Application
	AMJZ17-01	M3(2X)	490N(50kgf)	NEMA17
	AMJZ17-02		490N(50kgf)	NEMA17

AMJZ17-01

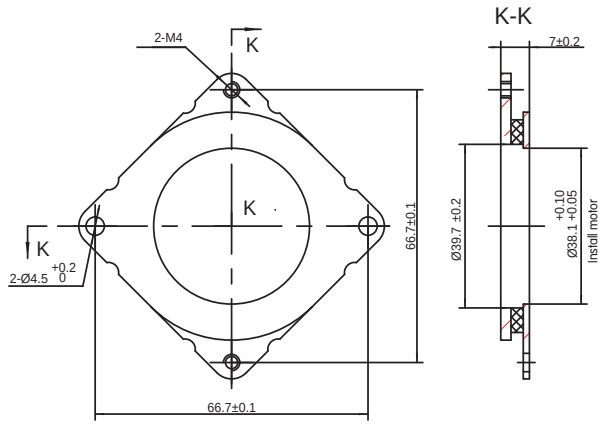


AMJZ17-02

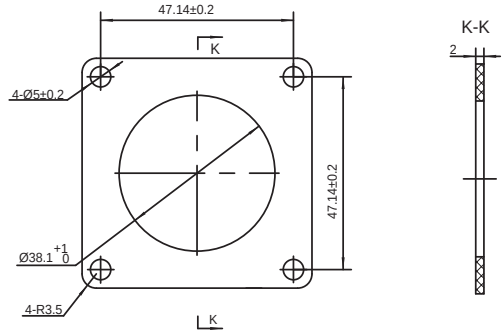


60 Flange Demension	Model	Application of screw	Maximum Load	Scope Of Application
	AMJZ23-01	M4(2X)	490N(50kgf)	NEMA23/NEMA24(2-phase)
	AMJZ23-02		490N(50kgf)	NEMA23/NEMA24(2-phase)

AMJZ23-01



AMJZ23-02



Instructions for use: reducing mechanical noise

Glossary

Absolute Position
Position referenced to a fixed zero or “home” position

Absolute Programming
A positioning coordinate reference wherein all positions are specified relative to some reference or “home” position; this is different from incremental programming where distances are specified relative to the current position

Ambient Temperature
The temperature of the medium immediately surrounding a device

Amplifier
Electronic device that converts command signals (analog or digital) to high power voltages and currents for the operation of the motor

ASCII
American Standard Code for Information Interchange; this code assigns a number to each numeral and letter of the alphabet allowing information to be transmitted between machines as a series of binary numbers

Axial Play(End play)
The axial shaft displacement due to a reversal of an axial force on the shaft

Baud Rate
The number of binary bits transmitted per second for serial communications such as RS-232

Bi-level Drive (Dual Voltage Drive)
A driver where two levels of voltage are used to drive a step motor; a high (over drive) voltage is applied to the winding each time it is switched on; the high voltage stays on until the current reaches a predetermined level; the high voltage is turned off after a time period determined experimentally or by sensing winding current; the low voltage maintains the desired current

Bipolar Drive
A drive that reverses the magnetic polarity of a pole by electronically switching the polarity of the current to the winding (+ or -); bipolar drives can be used with 4, 6, or 8 lead motors; with 4 and 8 lead motors, bipolar drives are usually more efficient than unipolar drives and generally produce more torque

Brushless Servo Drive
A servo drive used to control a permanent magnet synchronous AC motor

Chopper Drive
A step motor drive that uses switching amplifiers to control motor current

Class B Insulation
Specifies motor insulation that is rated for operation up to 130°C

Class H Insulation
Specifies motor insulation that is rated for operation up to 180°C

Closed Loop
A system that uses some form of feedback device to monitor the system output; the signal from the device is used to correct any errors between actual and demanded output

Cogging
Term used to describe uneven velocity in motors usually at low speeds

Commutation
Refers to the action of steering currents or voltage to the proper motor phases to produce optimum motor torque. In brush type motors, commutation is done electromechanically via the brushes and commutator. In brushless motors, commutation is done by the switching electronics using rotor position information typically obtained from hall sensors, tachometers, resolvers or encoders.

Controller (Step Motor)
A system consisting of a DC power supply and power switches plus associated circuits to control the switches in the proper sequence

Damping
An indication of the rate of decay of a signal to its steady state value; related to settling time

Dead Band
A range of input signals for which there is no system response

Detent Torque
The maximum torque required to slowly rotate a step motor shaft with no power applied to the windings; this applies only to permanent magnet or hybrid motors; the leads are separated from each other

Drive (PWM)
A motor drive utilizing Pulse-Width Modulation techniques to control current to the motor; typically a high efficiency drive that can be used for high response applications

Drive (Servo)
A motor drive that utilizes motor position feedback with a control loop for accurate control of motor position and/or velocity

Drive (Stepper)
An electronic package to convert digital step and direction inputs to currents to drive a step motor

Duty Cycle
The percentage of ON time vs. OFF time; a device that is always on has a 100% duty cycle; half on and half off is a 50% duty cycle

Dynamic Braking

A passive technique for stopping a permanent magnet brush or brushless motor; the motor windings are shorted together through a resistor, which results in a motor braking with an exponential decrease in speed

Encoder

A device used to translate motion into electrical signals used to provide position information; often used as a position/motion feedback device in closed loop systems

Encoder Marker Pulse

A once-per-revolution signal that is provided by some incremental encoders to specify a reference point within that revolution

End Play

The axial shaft motion due to the reversal of an axial force acting on a shaft with axial clearance or low axial pre-load

Following Error

The positional error during motion between a load's actual position and the commanded position

Friction - Coulomb

A resistance to motion between non-lubricated surfaces; this force remains constant with velocity

Friction - Viscous

A resistance to motion between lubricated surfaces; this force is proportional to the relative velocity between the surfaces

Hall Sensors

A feedback device built into a motor used by a servo amplifier to electronically commutate the motor

Holding Torque (Static Torque)

The maximum restoring torque that is developed by the energized motor when the shaft is slowly rotated by external means

Hybrid Step Motor

A type of step motor comprising a permanent magnet and variable reluctance stator and rotor structures; it uses a double salient pole construction

Hysteresis (Positional)

The difference between the step positions when moving CW and the step position when moving

CCW; a step motor may stop slightly short of the true position thus producing a slight difference in position CW to CCW

I/O (Inputs/Outputs)

The reception and transmission of information between control devices; I/O has two distinct forms: Digital - switches, relays, etc. which are either in an On or Off state; Analog – a continuous signal such as speed, temperature, low, etc.

Idle Current Reduction

Reduction of phase current to a step motor when no motion is required

Indexer

An electronic control device that sends pulse and direction signals for use by a step motor driver

Inductance (Mutual)

The property that exists between two current carrying conductors or coils when magnetic lines of flux from one link with those of the other

Inductance (Self)

The constant by which the rate of change of the coil current must be multiplied to give the self-induced counter EMF

Inertia

Measure of resistance of an object to changes in velocity; the larger the inertia, the more torque required to accelerate and decelerate the load

Inertial Match

Ratio of reflected load inertia to motor inertia

Instantaneous START/STOP Rate

The maximum switching rate that an unloaded step motor will follow without missing steps when starting from rest or stopping from moving

L/R Drive

A drive that uses external resistance to allow a higher voltage than that of a voltage drive; L/R drives have better performance than voltage drives, but have less performance and efficiency than a chopper drive

Loop, PID

A high performance control loop that uses Proportional, Integral and Derivative type control parameters

Loop, Position

A feedback control loop in which the controlled parameter is motor position

Loop, Velocity

A feedback control loop in which the controlled parameter is velocity

Maximum Reversing Rate

The maximum stepping rate at which an unloaded motor will reverse direction of rotation without missing steps

Maximum Slew Rate

The maximum stepping rate at which a step motor with no load will run and remain in synchronism

Microstepping

A technique in which motor steps are electronically divided by the drive into smaller steps; the most common microstep resolutions are 10, 25 and 50 steps per full step, but many resolutions ranging from 2 to 256 microsteps per full step are available

Open Frame Drive
Refers to amplifiers where a separate DC power source must be provided to the unit

Open-Loop
A system with no feedback; most step motor systems are run in this mode

Oscillator
A device that is used to produce pulses for driving a step motor at a preset speed

Overshoot
The amount a motor shaft rotates beyond the commanded stopping position

Packaged Drive
Refers to amplifiers where the power supply is included in the enclosure and 110/220VAC is used to power the unit

Permanent Magnet Step Motor
A step motor having a permanent magnet rotor and wound stator

Pull-In Rate (Response Rate)
The maximum switching rate at which an unloaded motor can start without losing step positions.

Pull-In Torque
The maximum torque load at which a step motor will start and run in synchronism with a fixed frequency stepping rate without losing step positions

Pull-out Torque
The maximum torque load that can be applied to a motor running at a fixed stepping rate while maintaining synchronism; any additional load torque will cause the motor to stall or miss steps

Pulse Rate
The rate at which successive steps are initiated or the windings switched; the pulse rate divided by the resolution of the motor/drive combination (in steps per revolution) equals the rotational speed of the motor in revolutions per second

PWM (Pulse Width Modulation)
A method of controlling motor voltage and current used in servo and step motor drivers

Radial Play (Side play)
The side-to-side movement of the shaft due to clearances between the shaft and bearing, bearing to housing, and bearing internal clearance for ball and roller bearings

Ramping
The acceleration and deceleration of a motor; may also refer to the change in frequency of the step pulse train

Rated Torque
The torque producing capability of a motor at a given speed; this is the maximum continuous torque the motor can deliver to a load

Regeneration
The action during deceleration, in which the motor acts as a generator and takes kinetic energy from the load, converts it to electrical energy, and returns it to the amplifier

Repeatability
The degree to which the positioning accuracy for a given move performed repetitively can be duplicated

Resolution
The smallest positioning increment that can be achieved; frequently defined as the number of steps or feedback units required for a motor's shaft to rotate one complete revolution

Resonance
The effect of a periodic driving force that causes a large amplitude increase at a particular frequency

Response Rate (Pull-In Rate)
The stepping rate an unloaded motor can follow from a standing start without missing steps

Ringing
Oscillation of a system following a sudden change in state

RS-232, RS-422/485
Serial communication hardware definitions

Serial Port
A digital data communications port that uses a serial bit stream for data transfer

Servo Amplifier/Servo Drive
An electronic device that converts a control signal into a current that is fed into the motor windings to produce torque in the motor

Servo System
A feedback control system for mechanical motion in which the controlled output is position or velocity; servo systems are closed loop systems

Settling Time
The elapsed time starting the instant the rotor reaches the commanded step position and the oscillations settle to within a specified displacement band around the final position

Si
MOONS' Simple Indexer operating environment; sequences for machine operation are programmed by the use of point and click instructions

Slew
The portion of a move made at a constant non-zero velocity

Stall Torque (holding or static)
The torque available from a motor at stall or zero rpm

Step Angle
The nominal angle through which the step motor shaft rotates between adjacent step positions

Step or Stepping Rate (Speed)
The number of steps a shaft rotates during a specified time interval

Step-to-step Accuracy (relative accuracy)
The maximum error that occurs between any adjacent step, expressed as a percentage of one full step

Switching Amplifier
A device that switches a high voltage on and off to control current; some amplifiers (PWM types) switch at a constant frequency and adjust duty cycle to control current, others have a fixed off time and adjust the frequency

Switching Sequence (Energizing Sequence)
The sequence and polarity of voltages applied to coils of a step motor that result in a specified direction of rotation

Thermal Time Constant
The time required for the motor winding to reach 63.2% of its final temperature

Thermal Resistance
The resistance to the flow of energy between two surfaces of the same body or different bodies; thermal resistance = degrees C/watt in the winding

Torque
The rotary equivalent of force; equal to the product of the force perpendicular to the radius of motion and distance from the center of rotation to the point where the force is applied

Torque Constant
A number representing the relationship between motor input current and motor output torque, usually expressed in units of torque/amp

Torque Displacement Curve
The holding (restoring) torque plotted as a function of rotor angular displacement with the motor energized

Torque Gradient (Stiffness)
The ratio of the change in holding torque to a particular change in shaft position when the motor is energized

Torque Ripple
The cyclical variation of generated torque given by the product of motor angular velocity and number of commutator segments

Torque-to-inertia Ratio
Ratio of a motor's torque divided by the motor's rotor inertia; the higher the ratio, the higher the acceleration may be

Unipolar Drive
The motor phase winding current is switched in one direction only; the polarity of the applied voltage to each winding is always the same; unipolar drives require 6 or 8 lead motors

Variable Reluctance Step Motor (V/R)
A step motor having a wound stator or stators with salient poles working with a soft iron rotor having salient poles on the periphery

Velocity
The change in position as a function of time; velocity has both magnitude and direction

Viscous Damping
A damper that provides a drag or friction torque proportional to acceleration; a quality used to damp unwanted oscillations of a step motor

Voltage Drive
A drive operated at the minimum voltage required to safely limit motor current; motors used with voltage drives produce less torque at higher speeds than when used with L/R or chopper drives

Wave Drive
Energizing the phases one at a time; driving the motor one phase or winding at a time

Conversion Factors

- **Length**

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

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

- **Force**

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

- **Torque**

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

- **Inertia**

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

Customer Service Center



400-820-9661

MOONS' Headquarter

168 Mingjia Road, Minhang District, Shanghai 201107, P.R. China

Domestic Offices

Shenzhen
Room 503, Building A7,Nanshan iPark,No.1001,Xueyuan Ave, Nanshan Dist, Shenzhen 518071, P.R. China

Beijing
Room 816, Tower B, China Electronics Plaza, 3 Danling Street, Haidian District, Beijing 100080, P.R. China

Nanjing
Room 1101-1102, Building 2, New Town Development Center, No.126 Tianyuan Road , Moling Street, Jiangning District, Nanjing 211106, P.R. China

Qingdao
Room 1012, Zhuoyue Tower, No.16 Fengcheng Road, Shibei District, Qingdao 26000, P.R. China

Wuhan
Room 3001, World Trade Tower, 686 Jiefang Avenue, Jianghan District, Wuhan 430022, P.R. China

Chengdu
Room 1917, Western Tower, 19, 4th Section of South People Road, Wuhou District, Chengdu 610041, P.R. China

Xi'an
Room 1006, Tower D, Wangzuo International City, 1 Tangyan Road, Xi'an 710065, P.R. China

Ningbo
Room 309, Tower B, Taifu Plaza, 565 Jiangjia Road, Jiangdong District, Ningbo, 315040, P.R. China

Guangzhou
Room 4006, Tower B, China Shine Plaza, 9 Linhe Xi Road, Tianhe District, Guangzhou 510610, P.R. China

North America Company

MOONS' INDUSTRIES (AMERICA), INC. (Chicago)
1113 North Prospect Avenue, Itasca, IL 60143 USA

MOONS' INDUSTRIES (AMERICA), INC. (Boston)
36 Cordage Park Circle, Suite 310 Plymouth, MA 02360 USA

APPLIED MOTION PRODUCTS, INC.
404 Westridge Dr. Watsonville, CA 95076 USA

LIN ENGINEERING, INC.
16245 Vineyard Blvd., Morgan Hill, CA 95037 USA

Europe Company

MOONS' INDUSTRIES (EUROPE) S.R.L.
Via Torri Bianche n.1 20871 Vimercate (MB) Italy

AMP & MOONS' AUTOMATION (GERMANY) GMBH
Borsenstrabe 14
60313 Frankfurt am Main Germany

South-East Asia Company

MOONS' INDUSTRIES (SOUTH-EAST ASIA) PTE. LTD.
33 Ubi Avenue 3 #08-23 Vertex Singapore 408868

Japan Company

MOONS' INDUSTRIES JAPAN CO., LTD.
Room 602, 6F, Shin Yokohama Koushin Building, 2-12-1, Shin-Yokohama, Kohoku-ku, Yokohama, Kanagawa, 222-0033, Janpan

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