ORIENTAL MOTOR GENERAL CATALOG

Standard AC Motors

Features of Standard AC Motors

Features

Standard AC motors that rotate when connected to a commercial power source are widely used in everything from household appliances to automated factory production equipment. These motors can be used anywhere. In 1966, we introduced the K series of standard compact AC motors, and we have continued to improve this best seller ever since. Today's motors boast improvements in temperature characteristics, are quieter, and perform better in demanding modern applications. Many changes have improved performance in specialized applications. The basic design, including the mounting dimensions, and the usability have endured. These motors give worry-free performance over a long service life.
Standard AC motors offer many benefits. The following are some of the more important:

1. High Reliability

All that is required to rotate a standard compact AC motor is a commercial power supply and a capacitor. Motors for three-phase power supplies do not even require capacitors. They are the simplest way to get rotational operation from a motor. Their simplicity only improves the reliability and service life they provide.

2. Multiple Functions

The two basic motor types, the continuous-operation induction motor and the forward/reverse-operation reversible motor, are supplemented by speed control functions and an electromagnetic brake to hold loads. These are available in a wide variety of combinations that allow users to select the one best suited to their needs.

3. Quiet

Over the years, new applications have demanded lower levels of noise, so we have made these motors ever quieter. We have also pushed development of low-noise gearheads. Virtually all of the gearheads listed in this catalog are low-noise gearhead types.

● Pinion Shaft and Round Shaft

There are two types of shafts: the pinion shaft is used to connect a gearhead (specialized speed-reducing devices) to the standard compact AC motor output shaft, and the round shaft is used when the motor is operated without a gearhead.

● Motors and Gearheads

Gearheads reduce the speed (r/min) of motors and simultaneously increase the torque. Except for some geared motors, motors and gearheads are sold separately. By matching size and pinion specifications, the full lineup of gear ratios can be combined. There are between 8 and 23 gear ratios for each size motor.

● Geared Motors

The designs of some motors and gearheads have been optimized for special applications where the motors are combined in one assembly with dedicated gearheads. These geared motors are pre-assembled in the factory and can not be removed or changed. The dust-and water-resistant **FPW** series motors are gear motors.

● Speed Control Packages

Speed control package are comprised of a motor and a control pack. The motors cannot be combined with other control packs.

Package Products

- **Speed control motors**
  FBL Ⅱ series
  HBL series
  SC series
  US series

Product Line of Standard AC Motors

Standard AC motors can be divided into three categories according to the motor's function:
1. Constant speed motors
2. Speed control motors
3. Motors equipped with a brake function

Constant Speed

Induction Motors for uni-directional operation A-34

Induction motors are the most commonly used AC motor.
Capacitor-run, single-phase and three-phase motors are available.
Lead type, terminal box type, and conduit box type motors are available.
The **BH** Series is also available with BH6G2-□ gearheads to provide 347lb-in (40N·m) of maximum permissible torque.

Lead Wire Type

Terminal Box Type

BH series

Conduit Box Type

Reversible Motors for bi-directional operation A-74

These are capacitor-run, single-phase motors. While they are induction motors in basic operating principle, they have a built-in friction brake to improve instantaneous reversing characteristics. These motors are suited for applications where the motor must switch frequently from one direction to the next.

Lead Wire Type

Terminal Box Type

Synchronous Motors A-102

These motors provide rotation at a fixed speed in synchronization with the frequency of the power source.

Torque Motors A-106

The speed and torque can be set to any desired level by changing input voltage.

Synchronous Motor

Torque Motor

Speed Control

Speed Control Motors

FBLⅡ, HBL Series A-120

These are packaged sets combining a brushless DC motor and a driver that operates from a 100-115V AC power source (DC24V, DC48V for the **HBL** series).
High speeds (**FBLⅡ**: 3000r/min ; **HBL**: 2000r/min), can be obtained while maintaining a constant torque over the entire speed range.

SC Series A-142

This package set combines a motor and speed control pack.

US Series A-156

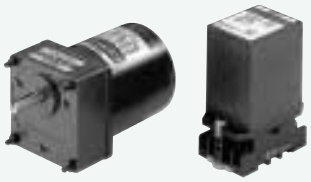
Control units combine a control circuit, a speed potentiometer and a capacitor in one device. Connection between the motor and control unit is made easy by a snap-on connector.

Component Package Type A-170

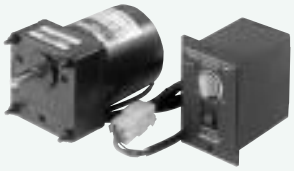
Select a custom combination of motor and control pack to suit the particular need or application.

FBLⅡ series

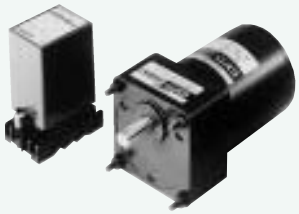
HBL series



SC series



US series



Component Package type

Brake

Electromagnetic Brake Motors A-180

These motors are built with electromagnetic brakes. The brake, which activates when the power is shut off, offers reliable performance and excellent holding power. This brake can be used in case of power failure or other emergencies.

Clutch and Brake Motors A-194

This motor combines clutch and brake mechanism with an induction motor. It is ideal for high-frequency starting and stopping, as well as position holding and positioning control.

Electromagnetic Brake Motor

Clutch and Brake Motor

Washdown Motors

A-203

These geared motors provide splashproof and dust-resistant performance that meets the IP65 standard.

Washdown Motor

Gearheads

A-213

These dedicated gearheads can be connected directly to pinion shaft motors. The units shown at the right serve a variety of motor types and powers. A right-angle gearhead is also available for outputs between 25W and 90W.

GN type

GU type

Right-Angle Gearheads
Solid shaft type

Right-Angle Gearheads
Hollow shaft type

Linear Heads

A-227

The rack-and-pinion linear head is directly coupled to a standard AC motor, which makes linear action like pushing, pulling, lifting and lowering easy to engineer.

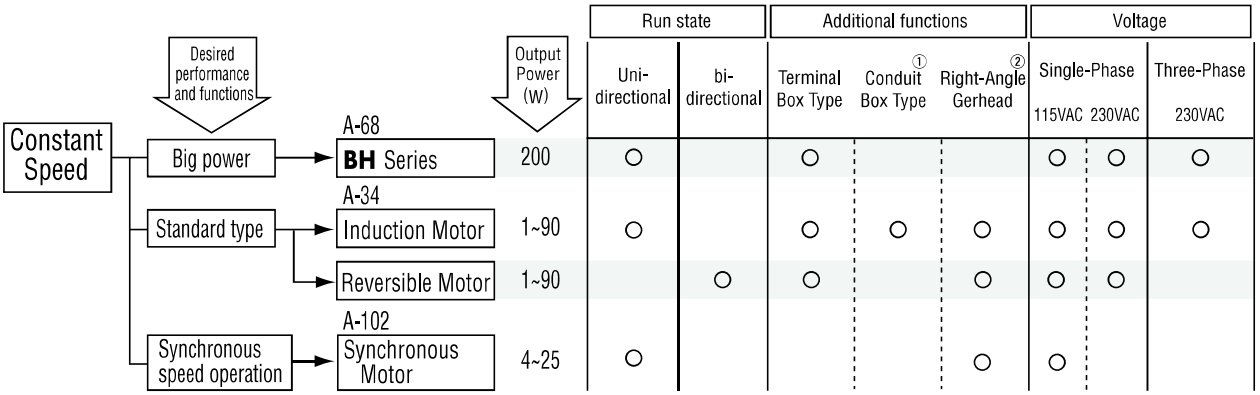
Linear Head

List of Standard AC Motor Types

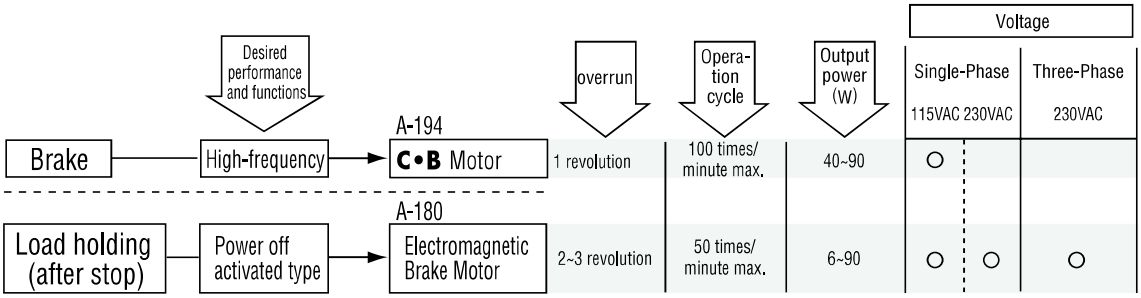
Motor Type			Mounting Size	1.64in.sq. (42mm sq.)	2.36in.sq. (60mm sq.)		2.76in.sq. (70mm sq.)		3.15in.sq. (80mm sq.)		3.54in.sq. (90mm sq.)			4.09in.sq. (104mm sq.)	
			Output Size	1W (1/750 HP)	3W (1/250 HP)	6W (1/125 HP)	10W (1/75 HP)	15W (1/50 HP)	15W (1/50 HP)	25W (1/28 HP)	40W (1/18.5 HP)	60W (1/12.5 HP)	90W (1/8 HP)	90W (1/8 HP)	200W (1/3.73HP)
Power Motors	Induction Motors	Lead Wire Type		●	●	●		●	●	●	●	●	●		
		Cable Type													●
		2-Pole High Speed Type									●	●	●		
		Terminal Box Type				●				●	●	●	●		●
		Conduit Box Type								●	●	●	●		
	Reversible Motors	Lead Wire Type		●	● (4W)	●		●	● (20W)	●	●	●	●		
		Terminal Box Type				●				●	●	●	●		
	Synchronous Motors					● (4W)	●			● (15W)	● (25W)				
	Torque Motors							● (8W)		● (12W)	● (23W)				
Speed Control Motors	FBLⅡ Series (Brushless DC Motor, 100-115V/200-230V AC Input)											● (75W)	● (120W)		
	HBL Series (Brushless DC Motor, 24V/48V DC Input)					● (10W)				●	●	●	● (100W)		
	US Series					●		●		●	●	●	●		
	SC Series					●		●		●	●	●			
	Component Type					●		●		● (22W)	●				
Brake Motors	Electromagnetic Brake Motors					●		●		●	●	●	●		
	Clutch and Brake Motors										●	●	●		
Gearheads	Gearheads			●	●	●	●	●	●	●	●	●	●		●
	Right Angle Gearheads									●	●	●	●		
Linear Heads	Linear Heads			●		●				●	●	●	●		
Washdown Motors	FPW Series									●	●	●		●	
Accessories	Motor Mounting Brackets (Metric Size)														●
	Motor Mounting Brackets (Inch Size)			●	●			●		●		●			
	Flexible Coupling			●	●	●	●	●	●	●	●	●			●

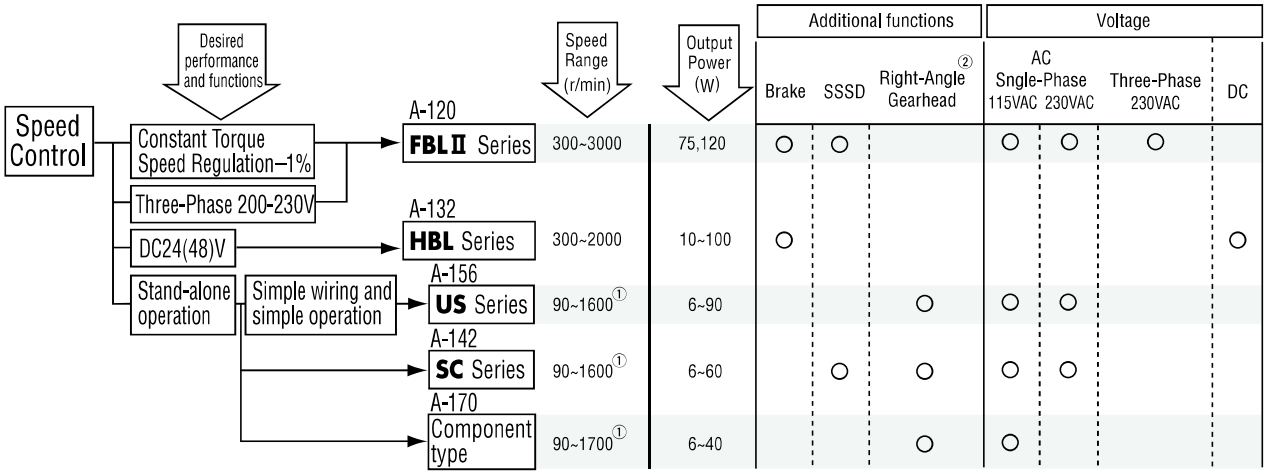
Guide for Motor Selection

This chart can help you determine which motor best meets your application needs.

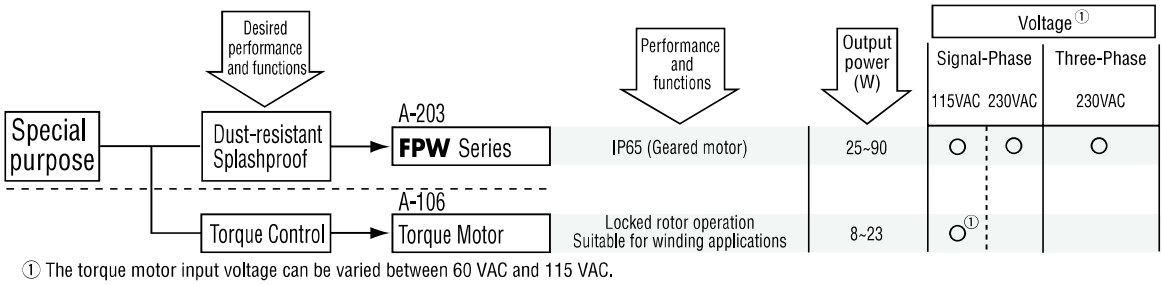


① Sometimes the desired performance is not provided by single products. For details, refer to the specifications values for each product.
② Right-Angle gear heads are combined with 25W, 40W, 60W and 90W output type motors.





① The variable speed range displayed is for a power frequency of 60 Hz.
② Right-Angle gear heads are combined with 25W, 40W, 60W and 90W output type motors.



① The torque motor input voltage can be varied between 60 VAC and 115 VAC.

Selection Procedure

1. Required Specifications
First, determine the basic required specifications such as operating speed, load torque, power supply voltage and frequency.

2. Calculate the Operating Speed
Induction and reversible motor speeds cannot be adjusted. Motor speed must be reduced with gearheads to match the required machine speed. It is therefore necessary to determine the correct gear ratio.

3. Calculate the Required Torque
Calculate the required torque and speed to select a motor and gearhead.

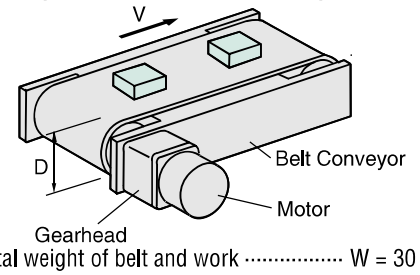
4. Select a Motor and Gearhead
Use the required torque and speed to select a motor and gearhead.

5. Confirm the speed
In a single-phase induction motor, starting torque is always lower than the rated torque. Therefore, to drive a frictional load, select the speed on the basis of starting torque. This will cause the actual speed to exceed the rated speed. Also, the motors are designed so that increases in motor temperature are at their lowest when operating close to the rated speed of rotation.

■ EXAMPLE 1

Here is an example of how to select an induction motor to drive a belt conveyor.
In this case, a motor must be selected that meets the following basic specifications.

Required specifications and structural specifications



Total weight of belt and work ····· W = 30 lb.
Friction coefficient of sliding surface ····· μ = 0.3
Drum radius ····· D = 4 inch
Weight of drum ····· W_2 = 35.27 oz
Belt roller efficiency ····· η = 0.9
Belt speed ····· V = 7 inch/s±10%
Motor power supply····· Single phase 115VAC 60Hz

1. Determining the Gearhead Reduction Ratio

Speed at the gearhead output shaft:

$$N_G = \frac{V \cdot 60}{\pi \cdot D} = \frac{(7 \pm 0.7) \times 60}{\pi \times 4} = 33.4 \pm 3.3 \text{ r/min}$$

Because the rated speed for a 4-pole motor at 60Hz is 1450~1550 r/min, the gear ratio (i) is calculated as follows:

$$i = \frac{1450 \sim 1550}{N_G} = \frac{1450 \sim 1550}{33.4 \pm 3.3} = 39.5 \sim 51.5$$

From within this range a gear ratio of i=50 is selected.

2. Calculating the Required Torque

On a belt conveyor, the greatest torque is needed when starting the belt. To calculate the torque needed for start-up, the friction coefficient (F) of the sliding surface is first determined:

$$F = \mu W = 0.3 \times 30 = 9 \text{ lb.} = 144 \text{ oz.}$$

Load torque (T_L) is then calculated by:

$$T_L = \frac{F \cdot D}{2 \cdot \eta} = \frac{144 \times 4}{2 \times 0.9} = 320 \text{ oz-in}$$

The load torque obtained is actually the load torque at the gearhead drive shaft, so this value must be converted into load torque at the motor output shaft. If the required torque at the motor output shaft is T_M, then:

$$T_M = \frac{T_L}{i \cdot \eta_G} = \frac{320}{50 \times 0.66} = 9.7 \text{ oz-in}$$

(Gearhead transmission efficiency η_G = 0.66)
Look for a margin of safety of 2x, taking into consideration commercial power voltage fluctuation.

$$9.7 \times 2 = 19.4 \text{ oz-in}$$

The suitable motor is one with a starting torque of 19.4 oz-in or more. Therefore, motor **5IK40GN-AWU** is the best choice. Since a gear ratio of 50 is required, select the gearhead **5GN50KA** which may be connected to the **5IK40GN-AWU** motor.

3. Inertial load check

Roller moment of inertia

$$J_1 = \frac{1}{8} \times W_2 \times D^2 \times 2 = \frac{1}{8} \times 35.27 \times 4^2 \times 2 = 141 \text{ oz-in}^2$$

Belt and work moment of inertia

$$J_2 = \frac{W_1 \times (\pi \times D)^2}{(4 \times \pi^2)} = \frac{480 \times (\pi \times 4)^2}{(4 \times \pi^2)} = 1920 \text{ oz-in}^2$$

Gear head shaft load inertia

$$J = J_1 + J_2 = 141 + 1920 = 2061 \text{ oz-in}^2$$

Here, the **5GN50KA** permitted load inertia is: $J_G = 4 \times 50^2 = 10000$ oz-in^2
See page A-22 to confirm this calculated value.
Therefore, $J < J_G$, the load inertia is less than the permitted inertia, so there is no problem.

Since the motor selected has a rated torque of 36.1 oz-in, which is somewhat larger than the actual load torque, the motor will run at a higher speed than the rated speed. Therefore the speed is used under no-load conditions (approximately 1740r/min) to calculate belt speed, and thus determine whether the product selected meets the required specifications.

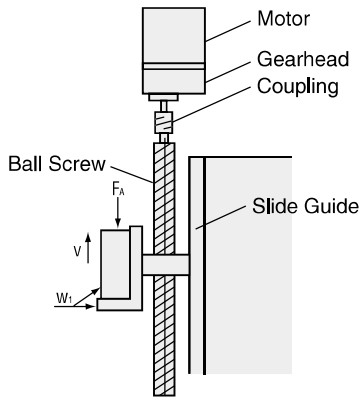
$$V = \frac{N_M \cdot \pi \cdot D}{60 \cdot i} = \frac{1740 \times \pi \times 4}{60 \times 50} = 7.3 \text{ in/s}$$

(Where N_M is the motor speed)
The motor meets the specifications.

■ EXAMPLE 2

This example demonstrates how to select a motor with an electromagnetic brake for use on a tabletop moving vertically on a ball screw.
In this case, a motor must be selected that meets the following basic specifications.

Required and structural specifications



Total weight of table and work ..... W_1 = 100lb
Table speed ..... V = 0.6 in/s±10%
Ball screw pitch ..... P_B = 0.197in
Ball screw efficiency ..... η = 0.9
Ball screw friction coefficient ..... μ_0 = 0.3
Friction coefficient of sliding surface (Slide guide) ..... μ = 0.05
Motor power supply..... Single phase 115VAC 60Hz
Ball screw total length ..... L_B=31.5in
Ball screw shaft diameter ..... D_B=0.787in
Ball screw material .....Iron (density ρ=4.64oz/in^3)
Distance moved for one rotation of ball screw
External force ..... F_A=0lb.
Ball screw tilt angle ..... α=90°
Movement time.....
Brake must provide holding torque Intermittent operation, five hours per day

1. Determining the Gear Ratio

Speed at the gearhead output shaft:

$$N_G = \frac{V \cdot 60}{P} = \frac{(0.6 \pm 0.06) \times 60}{0.197} = 182 \pm 18 \text{ r/min}$$

Because the rated speed for a 4-pole motor at 60Hz is 1450~1550r/min, the gear ratio (i) is calculated as follows:

$$i = \frac{1450 \sim 1550}{N_G} = \frac{1450 \sim 1550}{182 \pm 18} = 7.2 \sim 9.5$$

From within this range a gear ratio of i = 9 is selected.

2. Calculating the Required Torque

F, the load weight in the direction of the ball screw shaft, is obtained as follows:

$$F = F_A + W_1 (\sin \alpha + \mu \times \cos \alpha)$$
$$= 0 + 100 (\sin 90 + 0.05 \times \cos 90)$$
$$= 100 \text{ lb.}$$

Preload weight F_0:

$$F_0 = \frac{F}{3} = 33.3 \text{ lb.}$$

Load torque T_L:

$$T_L = \frac{F \times P_B}{2\pi\eta} + \frac{\mu_0 \times F_0 \times P_B}{2\pi} = \frac{100 \times 0.197}{2\pi \times 0.9} + \frac{0.3 \times 33.3 \times 0.197}{2\pi}$$
$$= 3.8 \text{ lb-in}$$

This value is the load torque at the gearhead drive shaft, and must be converted into load torque at the motor output shaft. The required torque at the motor output shaft (T_M) is given by:

$$T_M = \frac{T_L}{i \cdot \eta_G} = \frac{3.8}{9 \times 0.81} = 0.52 \text{ [lb-in]} = 8.32 \text{ oz-in}$$

(Gearhead transmission efficiency η_G = 0.81)
Look for a margin of safety of 2×, taking into consideration commercial power voltage fluctuation.

$$8.32 \times 2 = 16.64 \text{ oz-in}$$

To find a motor with a start-up torque of 16.64 oz-in or more, select motor **5RK40GN-AWMU**. This motor is equipped with an electromagnetic brake to hold a load. The gearhead with a gear ratio of 9 that can be connected to motor model **5RK40GN-AWMU** is **5GN9KA**.
Just as in Example 1, the rated motor torque is greater than the required torque, so the speed under no-load conditions (1740 r/min) is used to confirm that the motor produces the required speed.

3. Load inertia check

Ball screw moment of inertia $J_1 = \frac{\pi \times \rho \times L_B \times D_B^4}{32}$

$$= \frac{\pi \times 4.64 \times 31.5 \times (0.787)^4}{32}$$
$$= 5.5 \text{ oz-in}^2$$

Table and work moment of inertia $J_2 = \frac{W_1 \times A^2}{(4 \times \pi^2)}$

$$= \frac{1600 \times (0.197)^2}{(4 \times \pi^2)}$$
$$= 1.57 \text{ oz-in}^2$$

Gear head shaft total load inertia $J = 5.5 + 1.57 = 7.07$ [oz-in^2]

Here, the **5GN9KA** permitted load inertia is:

$$J_G = 4 \times 9^2$$
$$= 324 \text{ oz-in}^2$$

See page A-22 to confirm this calculated value. Therefore, $J < J_G$, the load inertia is less than the permitted inertia, so there is no problem. As in Example 1, there is margin for the torque, so the rotation rate is checked with the no-load rotation rate (about 1750 r/min).

$$V = \frac{N_M \cdot P}{60 \cdot i} = 0.64 \text{ in./s}$$

(where N_M is the motor speed).
This confirms that the motor meets the specifications.

Precautions

1. Precautions for Installation

- Do not use in a place where there is flammable gas and/or corrosive gas.
- When installing the motor into your equipment, ensure that the motor lead wires (cable) are fixed and do not move. In addition, do not apply any pressure to these lead wires.
- Motors and Drivers for use only in equipment of protection class Ⅰ.
- The motor housing must be mounted with a screw and spring washer to the ground point of the equipment.
- Installation must be performed by a qualified installer.

2. Precautions for Operation

- The Motor case and the Driver enclosure temperature can exceed 158°F (70°C) depending on operation conditions. In case motor is accessible during operation, please attach the following warning label so that it is clearly visible.


Warning label

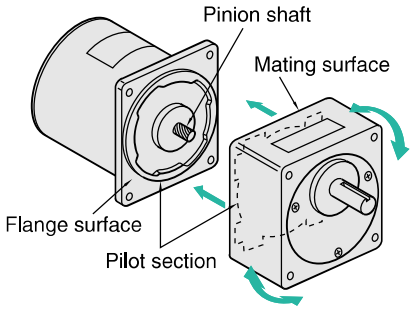
- Always turn off the power to the motor before conducting checks or performing word on the motor. Thermally protected motors will restart automatically when motor temperature falls bellow a certain level.
- The electromagnetic brake is designed to activate when power is removed. However, it may not arrest all loads completely. If this motor is designed to hold in emergency situations then a second method of stopping the load must be used to ensure to load stops. If this is not used injury or machine damage may result.

Connecting Gearheads to Motors

1. Connecting Gearheads

As the figure below shows, a gearhead is combined with a motor using the recessed areas on each unit as guides. The gearhead should be moved gently from side to side without forcing the pinion shaft against the plate on the gearhead or against the gear itself.

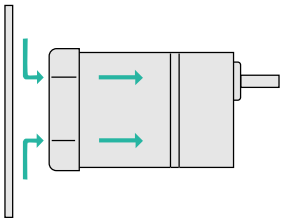
A tempting to put motor and gearhead together by force can result in damage to the gearhead.



2. Mounting Motor/Gearhead to Machinery

The motor flange is provided with a recessed area that serves as a guide not only when assembling the motor and gearhead as shown in the above figure, but also when installing the motor/gearhead unit directly to the machinery.
The figures demonstrate how to install a motor and gearhead in machinery. In this example, the motor/gearhead unit is mounted directly to the machinery, but dedicated mounting brackets such as those shown can also be used.

When mounting motors that have a built-in cooling fan, leave a space of approximately 0.5 inch behind the fan cover or make ventilation holes so as not to block the cooling intake.



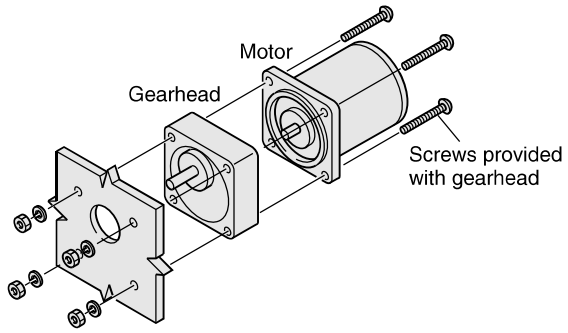
Installation conditions

Install the motor and capacitor in a location that meets the following conditions. Using the motor and capacitor in a location that does not satisfy these conditions could damage it.

- Indoors (this product is designed and manufactured to be installed within another device)
- Ambient temperature: 14°F~104°F (avoid freezing)
- Ambient humidity: 85% max. (avoid condensation)
- Not exposed to explosive, flammable or corrosive gas
- Not exposed to direct sunlight
- Not exposed to dust
- Not exposed to water or oil
- Place where heat can escape easily
- Not exposed to continuous vibration or excessive impact
- 328 feet (1000 meters) or less above sea level.
- Installation Category Ⅱ, Pollution Degree2, Class Ⅰ (for EN60950)

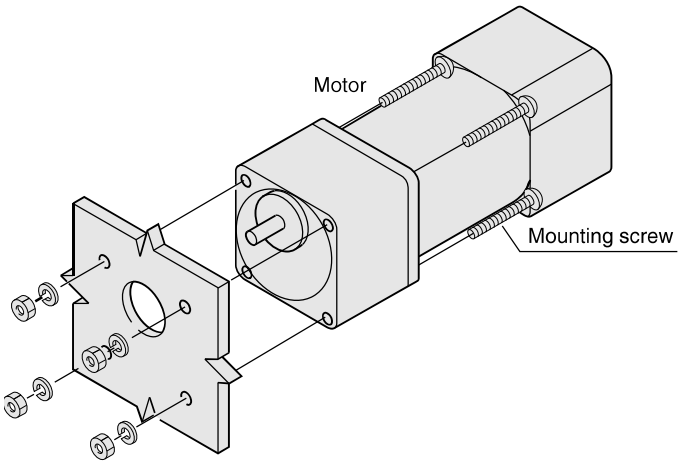
GN, GB and GU type Gearheads

Use the screws provided with the gearhead and secure all the parts so that there are no gaps between the motor flange face and the recessed area of the gearhead.



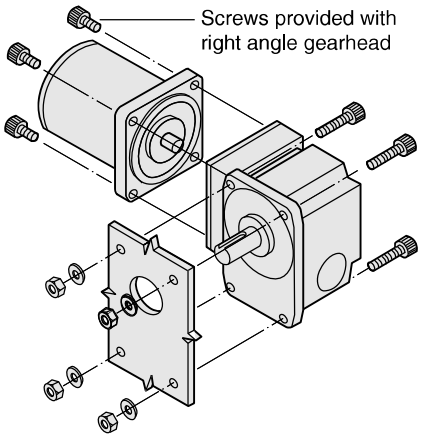
BH series

BH series motors are provided as a gearmotor for easy installation. Use the screws provided with the product to attach the unit from the motor side.



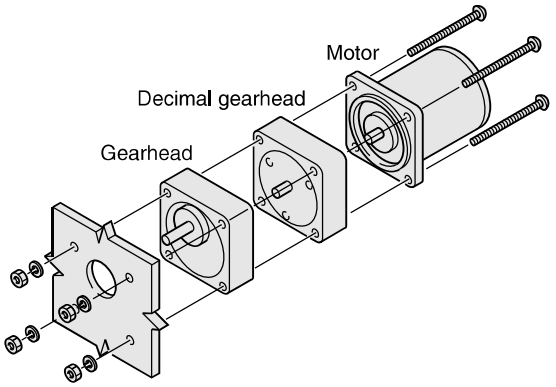
Right Angle Gearheads

Before mounting the right angle gearhead to machinery, assemble the motor and the gearhead using the screws provided.



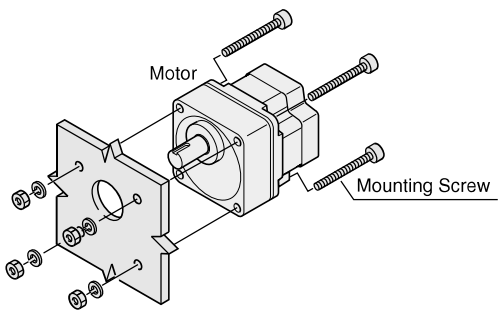
Mounting Decimal Gearhead to GN, GB and GU type Gearheads

Use the screws provided with the decimal gearhead and secure all the parts so that there are no gaps between the motor flange face and the recessed area of the decimal gearhead, or between the decimal gearhead and the gearhead's recessed area.



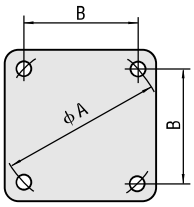
FBLⅡ Series

The **FBLⅡ** series is a gear motor in which the motor and gear head are pre-installed. Use the included installation screws to install on the device.



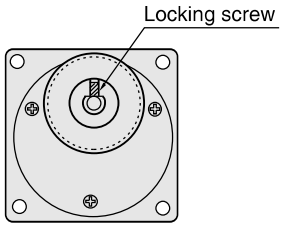
3. Dimensions of Mounting Holes

Each product's dimension a drawing shows the mounting holes dimension with diametrical pitch. The distance between mounting holes is shown below.

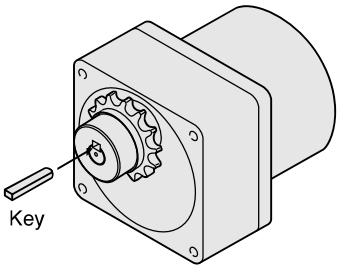


Motor Frame Size	A inch	A (mm)	B inch	B (mm)
1.65in. sq.	1.89	(48)	1.336	(33.94)
2.36in. sq.	2.76	(70)	1.949	(49.50)
2.76in. sq.	3.23	(82)	2.283	(57.98)
3.15in. sq.	3.70	(94)	2.617	(66.47)
3.54in. sq.	4.09	(104)	2.895	(73.54)
4.09in. sq.	4.72	(120)	3.341	(84.85)

Securing Load to Shaft Flat
With a shaft flat, use a locking screw to ensure that the load does not slip. We recommend using double point screws or other screws with strong locking power.



Securing Load Using Key Way
Secure loads using the key provided with the gearhead, fitting it into a key way.



Note:
Ensure that the gearhead shaft is not subjected to shock in the axial direction, since this will have an adverse effect on the bearings. Be especially careful not to use a hammer when inserting the key.

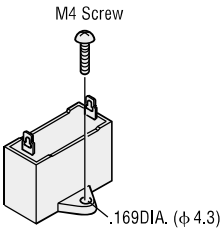
4. Securing Load to Output Shaft

The output shafts of high power gearheads are provided with a key way to secure the load, while the shafts of gearheads with comparatively low power have been given a shaft flat. Round shaft motors come in two types, those with and without a shaft flat on the motor output shaft.

In round shaft types, the output shaft has a tolerance of ±0.0002 inch (except 60W and 90W types) in diameter and is finished to a eccentricity of 0.0008 inch. Therefore, when connecting a load to the shaft, take measurements using a dial gauge or similar instrument. To couple to a shaft, use a helical coupling, to avoid unnecessary strain on the shaft. The same procedure applies when securing a load to gearheads.

5. Capacitor installation method

Unit = inch (mm)



Install securely, using the screw shown on the drawing.

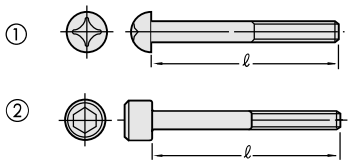
Shaft Flat
0GN, **2GN**, **2GB**, **3GN**, **4GN**, **4GB**, **5GN** Gearheads
Round shaft motors with frame size of 3.15in. sq. and 3.54in. sq.

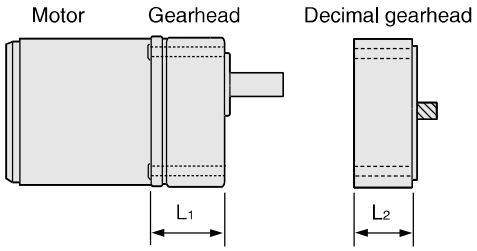
Key Way
5GU, **5GC**, **5GCH**, **BHI62□-□**, **BHI62□T-□**
FBL575□W-□, **FBL5120□W-□**
HBL560N-□, **HBL5100N-□**
gearheads

6. Screw Dimensions

GN type, GU type, GB type, GC type, BH Series, FBLⅡ Series, HBL Series,FPW Series, Gearheads

The following screws are provided with the gearhead and decimal gearhead.





Gearhead					Screws			
Model	L_1 inch	L_1 mm	L_1+L_2 inch	L_1+L_2 mm	ℓ inch	ℓ mm		Drawing
0GN3KA~180KA	1.22	31	–	–	1.57	40	No.4-40UNC	①
2GN3KA~18KA	1.46	37	–	–	1.97	50	No.8-32UNC	①
2GN25KA~180KA	1.85	47	–	–	2.36	60	No.8-32UNC	①
3GN3KA~18KA	1.54	39	–	–	1.97	50	No.10-24UNC	①
3GN25KA~180KA	1.93	49	–	–	2.56	65	No.10-24UNC	①
4GN3KA~18KA	1.54	39	–	–	1.97	50	No.10-24UNC	①
4GN25KA~180KA	1.95	49.5	–	–	2.56	65	No.10-24UNC	①
5GN3KA~18KA	1.95	49.5	–	–	2.76	70	1/4-20UNC	①
5GN25KA~180KA	2.66	67.5	–	–	3.27	83	1/4-20UNC	①
5GU3KA~180KA	2.85	72.5	–	–	3.74	95	1/4-20UNC	②
BHI62□-3.6~180, BHI62□T-3.6~180	3.27	83	–	–	3.94	100	M8 P1.25	②
2GN10XK (Decimal Gearhead)	–	–	2.87	73	3.35	85	M4 P0.7	①
3GN10XK (Decimal Gearhead)	–	–	3.11	79	3.54	90	M5 P0.8	①
4GN10XK (Decimal Gearhead)	–	–	3.21	81.5	3.74	95	M5 P0.8	①
5GN10XK (Decimal Gearhead)	–	–	4.11	104.5	4.72	120	M6 P1.0	①
5GU10XKB (Decimal Gearhead)	–	–	4.43	112.5	5.51	140	M6 P1.0	②
2GB3KA~18K	1.30	33	–	–	1.77	45	M4 P0.7	①
2GB25KA~360KA	1.65	42	–	–	1.97	50	M4 P0.7	①
4GB3KA~18KA	1.54	39	–	–	1.97	50	M5 P0.8	①
4GB25KA~360KA	1.95	49.5	–	–	2.56	65	M5 P0.8	①
2GB10XK (Decimal Gearhead)	–	–	2.68	68	3.35	85	M4 P0.7	①
4GB10XK (Decimal Gearhead)	–	–	3.21	81.5	3.74	95	M5 P0.8	①
FBL575□W-5~20, FBL5120□W-5~20 (Combination type)	2.17	55	–	–	2.95	75	M8P1.25	②
FBL575□W-30~100, FBL5120□W-30~100 (Combination type)	2.68	68	–	–	3.54	90	M8P1.25	②
FBL575□W-200, FBL5120□W-200 (Combination type)	2.91	74	–	–	3.74	95	M8P1.25	②
HBL560N-5~20, HBL5100N-5~20 (Combination type)	2.17	55	–	–	2.95	75	M8P1.25	②
HBL560N-30~100, HBL5100N-30~100 (Combination type)	2.68	68	–	–	3.54	90	M8P1.25	②
HBL560N-200, HBL5100N-200 (Combination type)	2.91	74	–	–	3.74	95	M8P1.25	②
HBL425□-□	2.32	59	–	–	3.15	80	M5 P0.8	②
HBL540□-□	2.85	72.5	–	–	3.54	90	M6 P1.0	②
HBL560□-□	2.93	74.5	–	–	3.54	90	M6 P1.0	②
HBL690□-□	3.25	82.5	–	–	3.94	100	M8 P1.25	②

- The figures of L_1+L_2 refer to sizes when a decimal gearhead and a gearhead with gear reduction ratio of 25:1 or greater are connected.
- 4 washers and 4 hexagonal nuts are provided with the screws.
- Stainless steel screws are provided with the **FPW** series washdown motors.

Right Angle Gearhead

To assemble the motor and gearhead, use the screws provided with the gearhead. To mount an additional decimal gearhead, use the screws provided with the decimal gearhead. To attach the gearhead to other devices, obtain the screws separately.

Gearhead	Screws 4 Washers and 4 hexagonal nuts are provided		
Model	ℓ inch (mm)	Size of Screws	Shape of Screws
4GN □RAA•RH	0.59 (15)	M5 P0.8	②
5GN (U) □RAA•RH	0.79 (20)	M6 P1.0	②

Control circuit installation

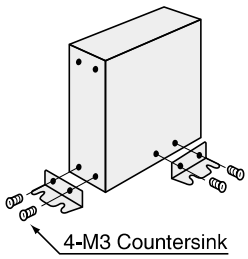
1. Control circuit installation method

When installing the driver, speed control pack, control unit, and other control circuits in the device, use the fittings and screws that are provided. (DIN rail installation plates are also available as an option. For details, see Page A-271.)

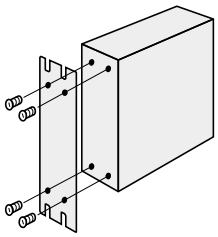
Note:
When attaching the driver in an enclosed space such as a control box, or somewhere close to a heat-radiating object, vent holes should be used to prevent the drivers from overheating. If the ambient temperature listed in the installation conditions for the control circuit is exceeded, use forced-air cooling with a fan.

● FBLⅡ Series✻

Base Mounting



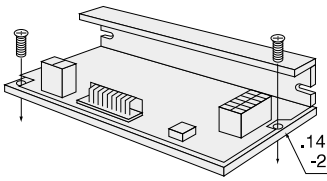
Back Mounting



● HBL Series

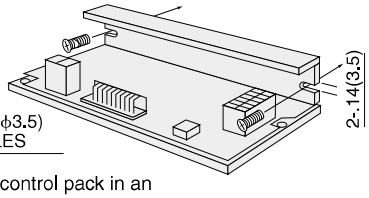
Use M3 screws for mounting (not provided)

Base Mounting



Back Mounting

Unit = inch (mm)



✻ To improve ventilation, mount the speed control pack in an upright position as shown in the figures above.

● US Series Control Unit

Please see Page A-163.

2. Installation conditions

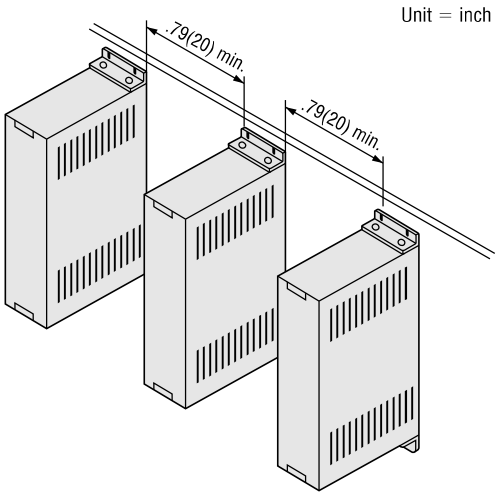
Install the driver, speed control pack and speed control unit in a location that meets the following conditions. Using the unit in a location that does not satisfy these conditions could cause damage.

- Indoors (this product is designed and manufactured to be installed within another device)
- Ambient temperature : Depends on the product, so see the appropriate page.
- Ambient humidity: 85% max. (avoid condensation)
- Not exposed to explosive, flammable or corrosive gas
- Not exposed to direct sunlight
- Not exposed to dust
- Not exposed to water or oil
- Place where heat can escape easily
- Not exposed to continuous vibration or excessive impact
- 328 feet (1000 meters) or less above sea level.
- Installation Category Ⅱ, Pollution Degree 2, Class Ⅰ (for EN60950)

3. Mounting Two or More Drivers

When mounting two or more drivers, separate them by a space of at least 0.79 inch (20mm). Leave at least 0.98 inch (25mm) between of space the driver and other devices or structures.

Unit = inch (mm)



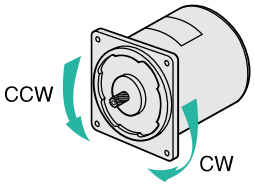
Motor Use

1. Power

Oriental Motor standard AC motors are available for single-phase 115VAC, single-phase 230VAC and three-phase 230VAC specifications.
Capacitors must always be connected to single-phase motors.

2. Direction of Rotation

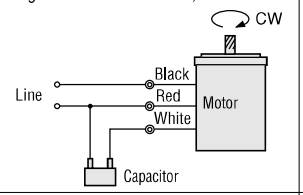
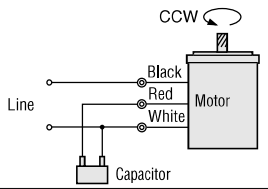
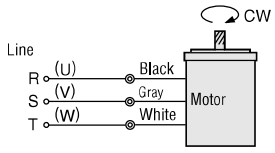
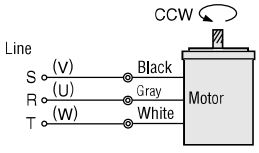
Clockwise (CW) and counterclockwise (CCW) direction of rotation, as referred to in the motor connection diagrams of this catalog, is defined as the direction of rotation when viewing the mounting face end of the motor. The direction of rotation of a gearhead used with the motor is determined by its design and, depending on the gear ratio, may be the same or the opposite of the direction of rotation of the motor. Changing the direction of rotation of the gearhead can be done by changing the direction of rotation of the motor.



● Induction Motors

Change the direction of motor rotation only after the motor comes to a complete stop. If an attempt is made to change the direction of rotation while the motor is rotating, the motor may ignore the reversing command or change its direction of rotation after some delay.

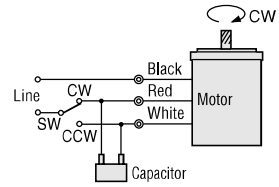
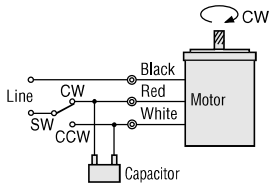
Example

Clockwise direction	Counterclockwise direction
Single-Phase 110/115VAC, 220/230VAC 	Single-Phase 110/115VAC, 220/230VAC 
Three-Phase 220/230VAC 	Three-Phase 220/230VAC 

● Reversible Motors

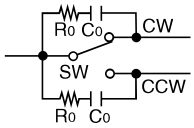
The direction of rotation can be reversed during motor rotation using a switch. Moving the switch to CW causes the motor to rotate clockwise; moving the switch to CCW causes the motor to rotate counterclockwise.

Example

Clockwise direction	Counterclockwise direction
Single-Phase 110/115VAC, 220/230VAC 	Single-Phase 110/115VAC, 220/230VAC 

● Contact capacity

Connect a CR circuit (surge suppressor) like that in the drawing in order to protect the contacts.



Code	Contact capacity, others	Remarks
SW	AC125V 5Amin.or AC250V 5Amin.(Induction load)	–
Ro・Co	Ro=5~200Ω Co=0.1~0.2μF 200W (400WV)	Accessories **EPCR1201-2** A-272

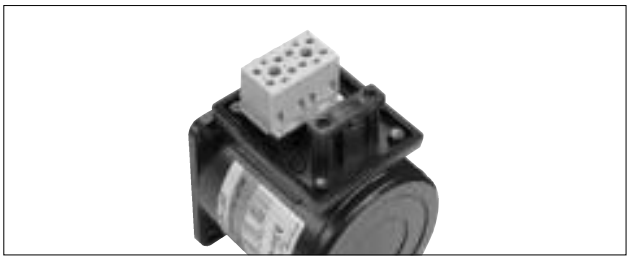
3. Grounding

Lead Wire Type and Small Terminal Box Type

Any one of the four mounting bolts may be used to attach the ground wire to the motor casing when installing the unit. If necessary, remove all paint that may impede conductivity around the bolt mounting hole.

● Terminal Box Type (for 4IK, 4RK, 5IK, 5RK and BH types)

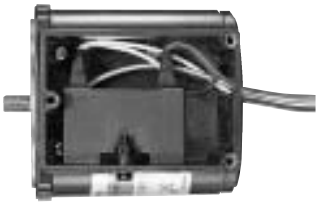
Connect the ground wire to the ground terminal inside the terminal box.



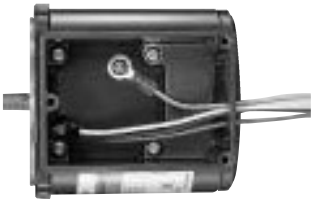
● Conduit Box Type

Conduit box mounted motors have a ground lead wire (green wire). Connect the ground wire to this green lead wire.

Single-Phase Motors
Conduit Box



Three-Phase Motors
Conduit Box



4. Terminal Box

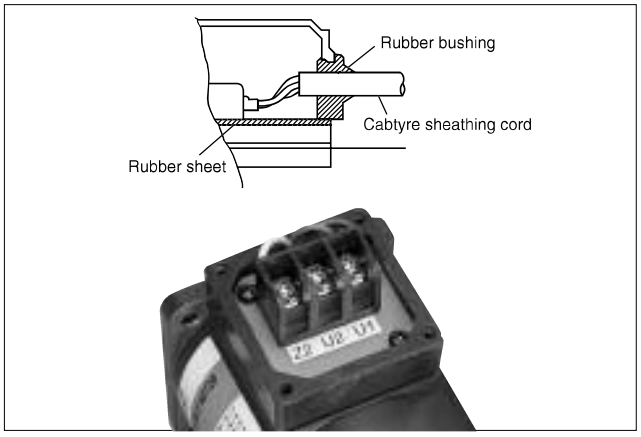
Induction motors and reversible motors are available with mounted terminal boxes for easy and secure connections of electrical wiring. They are suitable for automated and laborsaving applications where their ability to withstand rough operating conditions is essential, e.g. for machine tools and plant machinery.

●Types of Terminal Boxes

Depending on the motor model two types of terminal boxes are available: a small terminal box and a large terminal box, the latter being outfitted with a pressure sealing ring at the point of cord entry.

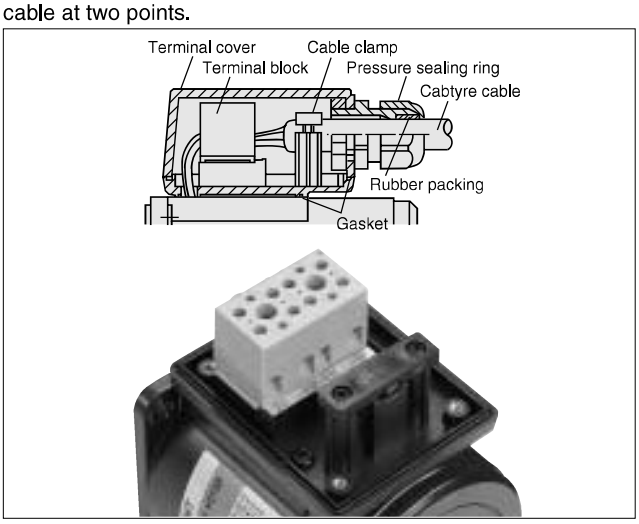
Small Terminal Box (for 2IK and 2RK types)

Light, compact and with in-line arrangement of terminals for ease of connection



Terminal Box (for 4IK, 4RK, 5IK, 5RK and BH types)

A cable clamp and pressure sealing ring securely fasten the cable at two points.



The material of the terminal box is a PBT resin with excellent insulation performance. The terminal block has met safety standards and been recognized ro certified by major certification bodies.

When connecting cables to the terminal block, unfasten the screw of the connector and insert the lead wire with a screw driver. Then insert the lead wire to the insert port and refasten the screw securely.

Diameter of the suitable cabtyre cable: .24DIA. (ϕ6mm) ~.47DIA. (ϕ12mm)

Lead wires specifications

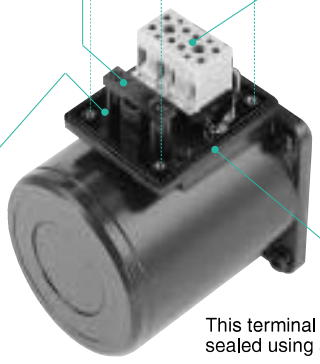
Thickness : AWG 24~12

Length of strip : .31 inch (8mm)

The terminal box cover uses a PBT resin with excellent insulation performance.

A cable clamp and pressure sealing ring securely fastens the cable at two points.

In addition the terminal block uses a high quality material which exceeds European recognized safety standards.



This terminal box can be tightly sealed using a gasket.

The terminal block and cable clamp can be opened to make the wiring simple.

5. Capacitor

Capacitor motors are wound so that the axis of the primary coil and the secondary coil poles are 90˚ apart. The capacitor is connected in series to the secondary coil and its function is to advance the phase of the current flowing in the secondary coil. The motors employ vapor-deposition polar capacitors which are UL recognized models. These capacitors have elements created on paper or plastic film through metal vapor deposition and can repair themselves, so they are commonly dubbed SH (self-healing) capacitors. Paper elements used to be the most common, but in recent years miniaturization of capacitors has made plastic film elements the dominant type.

Our single-phase motors are capacitor motors. When using a capacitor with the motor, make sure that the rated capacitance and voltage as indicated on the capacitor correspond to the specifications on the motor and that all electrical connections are correct.

Capacitance

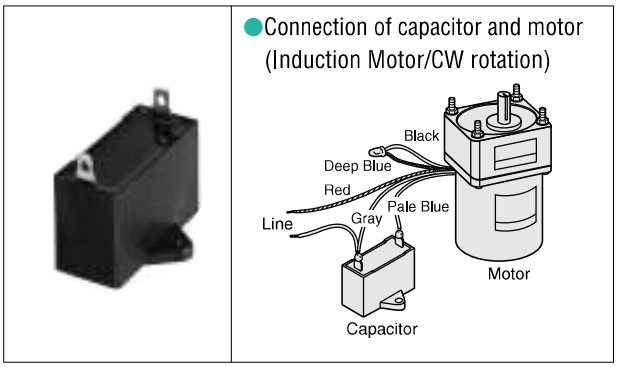
If a capacitor of the wrong value is used, motor vibration and heat generation will become abnormally large and operation will become unstable due to a loss of torque. For this reason, always use a capacitor of the correct capacitance. Capacitance is indicated by the unit of microfarads (μF).

Rated Voltage

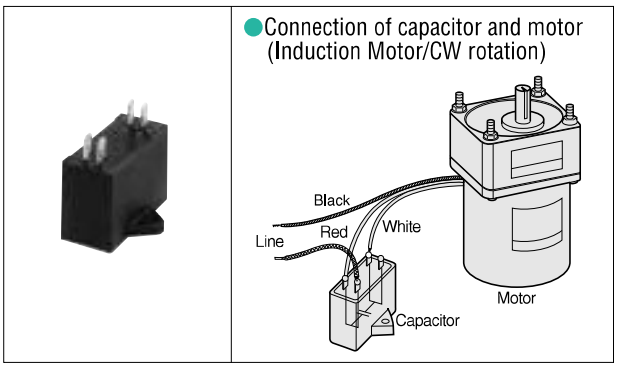
Using the motor beyond the rated voltage can drastically shorten the operating life of the capacitor. Always use a capacitor of proper voltage ratings. The voltage rating of the capacitor is indicated in the unit of Volts (VAC).

● Connecting the Capacitor

2-terminal type

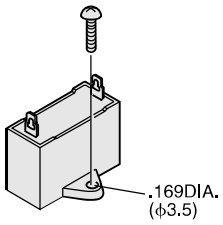


4-terminal type

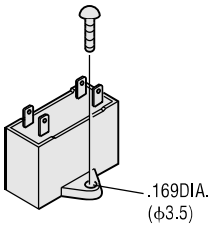


● Installing the Capacitor

Unit = inch (mm)



Use screws to install the capacitor to your machine.



Use screws of size M-4 to install the capacitor to your machine.

Note: When motors are running, a voltage of twice the motor power supply voltage is applied across the terminals of the capacitor. The terminals must therefore be insulated to ensure safety.

6. Ambient Temperature and Temperature Rise in Motor

The ambient temperature and the rise of the motor temperature are limiting parameters for the suitability of a motor in a given application.

Ambient Temperature

Use motors at ambient temperatures between 14°F(−10°C) and 104°F(+40°C) Part of motor : between 14°F(−10°C) and 122°F(+50°C). When used at temperatures outside of this range, an additional rise in temperature caused by motor operation may lead to deterioration of the winding insulation of the motor or may drastically shorten the operating life of the ball bearings. Low ambient temperatures result in problems primarily with starting characteristics. Inner friction of the motor increases with the decrease in viscosity of gearhead and ball bearing lubricants resulting in a slower ramp up of the motor or failure of the motor to start.

Temperature Rise in Motor

When a motor is operating, all energy losses of the motor are transformed into heat, causing the motor temperature to rise.

- **Induction Motors**

The induction motor, which is rated for continuous duty, reaches the saturation point of temperature rise after two or three hours of operation, whereupon the temperature stabilizes.

- **Reversible Motors**

Reversible motors reach their limit for temperature rise after 30 minutes of operation. If operation continues beyond that normal temperature rise, it may lead to damage or shortened life of the motor.

Measuring the Temperature Rise

The following is a description of the methods Oriental Motor uses for temperature measurement and for the determination of the maximum allowable temperature rise of a motor.

- **Thermometer Method**

The temperature at which the temperature rise during motor operation becomes saturated is measured using a thermometer or thermocouple attached to the center of the motor case. The temperature rise is defined as the difference between the ambient temperature and the measured temperature.

- **Resistance Change Method**

In this method, the coil resistance is measured before running and again after a period of running. The measurement should be taken at the point of maximum temperature rise.

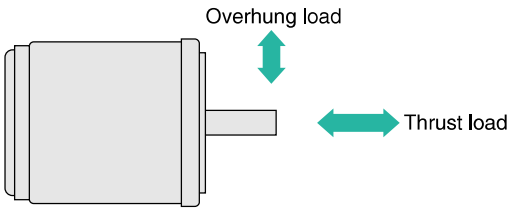
The point of the highest motor temperature rise is the windings. For this reason, the maximum allowable temperature of the windings is the one stated in the EN/IEC, UL, CSA standards for the given type of insulation materials. Some Oriental Motor motors employ Class B insulation. According to EN/IEC, UL, CSA standards, the temperature of the windings is 266˚F(+130°C). Note that if the motor is started and stopped frequently, if the direction of motor rotation is frequently changed, or if the motor is frequently brought to an instantaneous stop using an electromagnetic brake or similar mechanism, the temperature of the motor may rise more than that of normal operation. The lower the temperature, the longer the life of the motor. Some of the motors are equipped with a thermal protector as overheat protection.

Some of the motors have Type E insulation (248˚F[+120°C]) or Type A insulation (221˚F[+105°C]).

Although the motor case may become very hot while the motor is in operation, in some case as high as 200˚F (+93°C), this does not indicate a malfunction. Take precautions against heat before touching the motor, and avoid accidents by keeping flammable materials away from the motor.

7. Permissible Overhung Load and Permissible Thrust Load

Thrust load and overhung load exceeding the permitted values invite short-term fatigue on the bearings and breakdown due to the repeated load on the output shaft.



Operate so that the overhung load does not exceed the permitted values in the table below. When a chain, belt, etc. is used as the transmission mechanism, the method for calculating the load on the output shaft is the same as for a gear head output shaft. For details, see Page A-22.
Also, avoid thrust loads as much as possible. If thrust load is unavoidable, keep it to no more than half the motor weight.

Permissible Overhung Load on the Motor Shaft

- **AC Motor**

Motor			Permissible Overhung Load lb.(N)			
Motor Frame Size inch(mm)	Motor Shaft Size inch(mm)	Series	0.4 inch(10mm) from shaft end		0.8 inch(20mm) from shaft end	
1.64 (42) sq.	.1969DIA. (ϕ 5)	K	8.8	(40)	–	–
2.36 (60) sq.	.2500DIA. (ϕ 6.35)	J	11	(50)	24.3	(110)
		K	11	(50)	24.3	(110)
2.76 (70) sq.	.2500DIA. (ϕ 6.35)	J	8.8	(40)	13.2	(60)
		K	8.8	(40)	13.2	(60)
3.15 (80) sq.	.3125DIA. (ϕ 7.937)	J	19.8	(90)	30.9	(140)
		K	19.8	(90)	30.9	(140)
3.54 (90) sq.	.3750DIA. (ϕ 9.525)	K	30.9	(140)	44.1	(200)
	.4724DIA. (ϕ 12)	K(with fan)	52.9	(240)	59.5	(270)
4.09 (104) sq.	.5512DIA. (ϕ 14)	BH	70.5	(320)	77.2	(350)

- **Brushless DC Motor**

Motor			Permissible Overhung Load lb.(N)			
Motor Frame Size inch(mm)	Motor Shaft Size inch(mm)	Series	0.4 inch(10mm) from shaft end		0.8 inch(20mm) from shaft end	
2.36 (60) sq.	.2362DIA.(ϕ 6)	**HBL**	17.6	(80)	19.8	(90)
3.15 (80) sq.	.3150DIA.(ϕ 8)	**HBL**	17.6	(80)	24.3	(110)
3.54 (90) sq.	.3937DIA.(ϕ 10)	**HBL** (40W)	26.5	(120)	30.9	(140)
		HBL (60W)	28.7	(130)	33.1	(150)
		FBL Ⅱ	28.7	(130)	33.1	(150)
	.4724DIA.(ϕ 12)	**HBL**	35.3	(160)	37.5	(170)
		FBL Ⅱ	35.3	(160)	37.5	(170)

Using Gearheads

Oriental Motor gearheads are specifically designed for easy and direct attachment to AC motors with a pinion shaft. With the reduction of the motor speed through the gearhead, an increase of torque is achieved. A large number of gear ratios are available for many applications.

1. Types of Gearhead

These gearheads listed below are all low noise types. Motors that can be used with these gearheads have a helical cut spline on the shaft that mates with the first stage of gears in the gearhead. This helical gear mating with the first stage, which is the primary source of noise in a gearhead, along with a redesigned gearcase and ball bearings, reduces noise by 7 to 10 dB.
Depending on the motor type and output power, the following gearheads are available.

Application	Gearheads	Decimal Gearheads
light load	**2GB□KA**	**2GB10XK**
	4GB□KA	**4GB10XK**
normal load	**0GN□KA**	—
	2GN□KA	**2GN10XK**
	3GN□KA	**3GN10XK**
	4GN□KA	**4GN10XK**
	5GN□KA	**5GN10XK**
heavy load	**5GU□KA**	**5GU10XKB**
	BHI62F-□, BHI62□T-□	—
impact load	**5GC□KA**	—
	5GCH□KA	—
heavy and/or high speed load	**FBL575□W-□**	—
	FBL5120□W-□	—
	HBL560N-□	—
	HBL5100N-□	—

The box (□) in the model number represents the desired gear ratio, which thereby becomes part of the code for the gearhead.

● Connection Procedures

When connecting gearheads, be sure to match the pinion shafts and frame sizes.

● Decimal Gearheads

The **GB**, **GN** and **GU** type gearheads are also available as gear decimal gearheads (sold separately) with a gear ratio of 10:1. They should be used in applications in which large gear ratios cannot be attained with a single gearhead unit. Any number of decimal gearheads can be used in series.

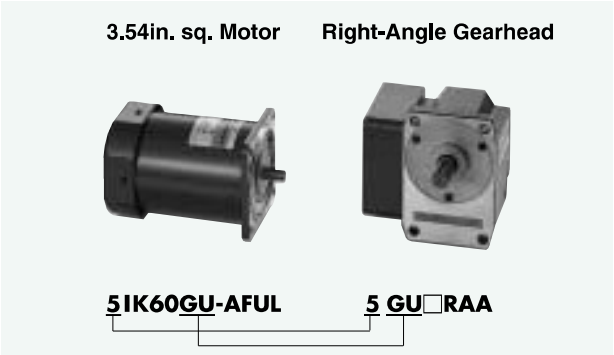
Note

Although the gear ratio of 10:1 of the decimal gearhead theoretically translates into a 10 time increase of torque available on the output shaft, it is not possible to make full use of this torque. The torque permissible in actual use is limited by the physical construction of the gearhead and is expressed as its rated maximum torque. (See the torque table of each product)

● Right-Angle Gearheads

The **4GN**, **5GN** and **5GU** type gearheads are also available as right-angle gearheads.

Type	Model	Motor Output Power
Hollow shaft	**4GN□RH**	25W
	5GN□RH	40W
	5GU□RH	60 · 90W
Solid shaft	**4GN□RAA**	25W
	5GN□RAA	40W
	5GU□RAA	60 · 90W

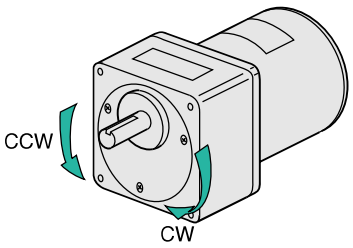


2. Speed and Direction of Rotation

The speed when a gearhead is directly coupled to a motor is calculated according to the following formula:

$$N_G = \frac{N_M}{i}$$

N_G: Speed of Gearhead [r/min]
N_M: Speed of motor [r/min]
i : Gear ratio of gearhead



☐ Same direction as the motor shaft
☐ Opposite direction as the motor shaft

The direction of gearhead shaft rotation may differ from motor shaft rotation depending on the reduction ratio of the gearhead.

Gearhead Model \ Gear Ratio	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180	250	300	360
2GN☐KA, 3GN☐KA, 4GN☐KA, 5GN☐KA																							
2GB☐KA, 4GB☐KA																							
0GN☐KA, 5GU☐KA																							
BHI62☐-☐																							

Connection of a decimal gearhead reduces the speed by 10 : 1 but does not affect the direction of rotation.

Gearhead Model \ Gear Ratio	5	10	15	20	30	50	100	200
FBL575☐W-☐, FBL5120☐W-☐ HBL560N-☐, HBL5100N-☐								

3. Output Torque of Gearmotor

The output torque when a gearhead is directly connected is calculated as follows:

$$T_G = T_M \times i \times \eta$$

T_G: Output Torque at Gear Shaft [oz-in]
T_M: Motor Torque [oz-in]
i : Gear Ratio of Gearhead
η: Gearhead Efficiency

● Gearhead Efficiency

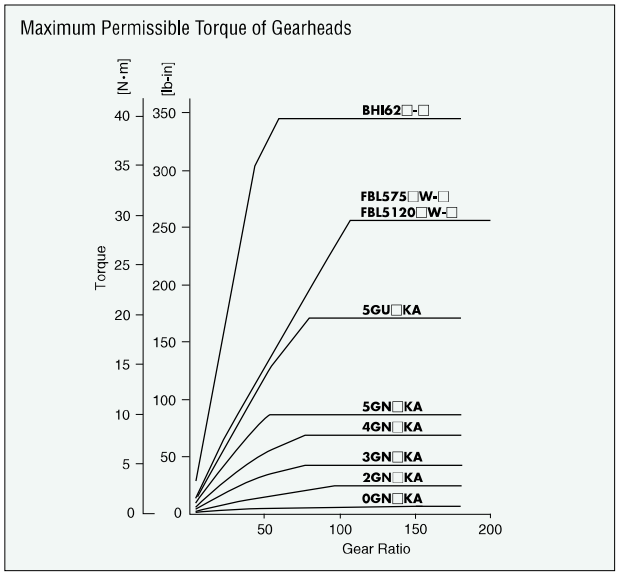
Gearhead Model \ Gear Ratio	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180	250	300	360
2GN☐KA, 3GN☐KA, 4GN☐KA, 5GN☐KA	81%									73%			66%										
2GB☐KA, 4GB☐KA	81%									73%			66%									59%	
0GN☐KA, 5GU☐KA	81%						73%			66%			59%										
BHI62F-☐, BHI62☐T-☐		90%		90%		90%		86%			86%			81%		81%		81%		81%			

Gearhead efficiency of all the decimal gearheads is 81%.

Gearhead Model \ Gear Ratio	5	10	15	20	30	50	100	200
FBL575☐W-☐, FBL5120☐W-☐ HBL560N-☐, HBL5100N-☐	90%				86%			81%

● Maximum Permissible Torque

Since the output torque of the gearhead increases proportionally with the reduction of speed, a high gear ratio will result in an output torque that cannot be handled by physical construction of the gearhead. The maximum permissible torque of the gearhead and the speed-reduction ratio is as follows:



Example: If induction motor **4IK25GN-AWU** is combined with gearhead **4GN100KA**, the output torque is...
The rated torque of motor **4IK25GN-AWU** is 23.6 oz-in.
The gearhead output torque is calculated using the equation on the previous page.

Output torque $T_G = T_M \times i \times \eta$
$= 23.6 \times 100 \times 0.66$
$= 1558$ oz-in ($\fallingdotseq 97.4$ lb-in)

The maximum permissible torque for **4GN100KA** is 69 lb-in as shown in the diagram above. Therefore, the load torque that can be exerted is only 69 lb-in even if the gearhead has theoretical output torque is 94 lb-in.

4. *Permissible Load Inertia for Gearheads*

When a high load inertia (J) is connected to a gearhead, high torques are exerted instantaneously on the gearhead when starting up in frequent, discontinuous operations (or when stopped by an electromagnetic brake).
Excessive impact loads can be the cause of gearhead or motor damage.
The table shown below gives values for permissible inertial load on the motor shaft. Use the motor and gearhead within these parameters.
The permissible inertial load value shown for three-phase motors is the value when reversing after a stop.
The permissible J on the gearhead output shaft is calculated with the following equation. The life of the gearhead when operating at the permissible inertial load with instantaneous stops of the motors with electromagnetic brakes is at least 2 million cycles.

● Permissible Inertia Load

Gear ratio 1/3~1/50 ····· $J_G = J_M \times i^2$
Gear ratio 1/60 or higher ····· $J_G = J_M \times 2500$

J_G : Permissible Inertia Load (oz-in^2) on the gearhead output shaft
J_M : Permissible Inertia Load (oz-in^2) on the motor shaft
i : Gear ratio (Example : $i = 3$ means the gear ratio of 1/3)

Permissible Load Inertia on the motor shaft

AC Motor

No. of Phase	Frame Size inch (mm)	Output Power (W)	Permissible Inertial Load at Motor Shaft oz-in^2 ($\times 10^{-4}$kgm^2)
Single-Phase	1.64 (42) sq.	1W	0.088 (0.016)
	2.36 (60) sq.	3W, 4W	0.26 (0.047)
		6W	0.34 (0.062)
	2.76 (70) sq.	10W	0.56 (0.10)
		15W	0.78 (0.14)
	3.15 (80) sq.	15W, 20W	1.2 (0.22)
		25W	1.6 (0.31)
	3.54 (90) sq.	40W	4.0 (0.75)
		60W	6.2 (1.1)
		90W	6.2 (1.1)
	4.09 (104) sq.	200W	11 (2.0)
Three-Phase	3.15 (80) sq.	25W	1.6 (0.31)
	3.54 (90) sq.	40W	4.0 (0.75)
		60W	6.2 (1.1)
		90W	6.2 (1.1)
	40.9 (104) sq.	200W	11 (2.0)

Brushless DC Motor

Series	Frame Size inch (mm)	Output Power (W)	Permissible Inertial Load at Motor Shaft oz-in^2 ($\times 10^{-4}$kgm^2)
FBL II Series	3.54 (90) sq.	75W	5.4 (1.0)
		120W	5.4 (1.0)
HBL Series	2.36 (60) sq.	10W	0.34 (0.062)
	3.15 (80) sq.	25W	1.2 (0.22)
	3.54 (90) sq.	40W	2.1 (0.40)
		60W	5.4 (1.0)
		100W	5.4 (1.0)

5. Service Life of Gearhead

Gearhead life is almost completely determined by bearing life. When gearheads are operated under the following conditions, the life of the gearheads is approximately 5000 hours for ball bearing types. This is termed "rated life".

- Torque: Rated Torque
- Load: Uniform and continuous
- Operating time: 8 hours per day
- Case temperature: 176°F(80°C) (Ball bearing type)

However, there is usually some fluctuation in load. To evaluate gearhead life expectancies, a "service factor" is used.

Service Factor

Type of Load	Service Factor		
	5 hours/day Intermittent	8 hours/day	24 hours/day
Uniform	0.8	1.0	1.5
Light impact	1.2	1.5	2.0
Medium impact	1.5	2.0	2.5

Example of Load

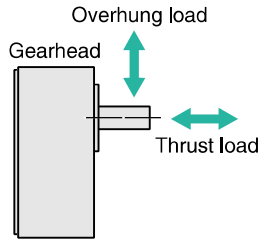
Type of Load	Example of Load
Uniform	Belt conveyor, Uni-directional operation
Light impact	Frequent start/stop, Cam drive
Medium impact	Frequent CW/CCW operation, Frequent instantaneous stop

A gearhead under continuous operation for eight hours per day under a uniform load has been given the reference service factor of 1.0. The life of the gearhead when operated within the limit for permissible torque is then 5000 hours for a ball bearing type gearhead. (Temperature of gearhead casing not exceeding 176°F[80°C].)

However, when such a gearhead is operated continuously for 24 hours a day, the service factor rises to 1.5. With an identical load torque, the life of the motor will be reduced to 1/1.5 of the original life expectancy. For example, if a life of 5000 hours is required for a **4GN□KA** type gearhead, it must be operated with 2/3 or less of the torque for 8-hour operation, or a gearhead with a larger permissible torque must be used.

6. Permissible Overhung Load and Permissible Thrust Load

"Overhung load" refers to load placed on the output shaft as shown in the figure below. The "thrust load" is a load applied in the axial direction of the output shaft. Since the overhung load and thrust load have a great influence on the life of the bearings and strength of the shaft, be careful not to exceed the maximum values shown in the chart below.



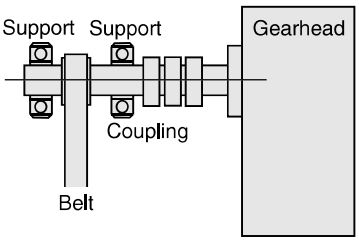
$$W = \frac{K \times T \times f}{\gamma}$$

W: Overhung Load [lb]
K: Load Coefficient for Driving Method (See table below)
T: Torque at Gearhead Output Shaft [lb-in]
f: Service Factor
γ: Effective Radius of Gear or Pulleys [in]

Drive System	K
Chain or toothed belt	1
Gear	1.25
V-belt	1.5
Flat belt	2.5

Take precautions so that the overhung load as calculated by the above equation does not exceed the permissible values given in the table to the right. If the overhung load greatly exceeds the permissible value, it will lead to the shortening of bearing life or damage to the bearing, as well as warping or breaking the output shaft after continued heavy load. In such situations, a support such as the one shown below must be designed to take up the overhung load.

Since connecting a transmission mechanism directly to the output shaft exerts an unbalanced load on the shaft, connect mechanisms as close to the gearhead as possible.



Permissible Overhung Load and Permissible Thrust Load

Gearhead Mode	Gear Ratio	Maximum Permissible Torque lb-in (N·m)	Permissible Overhung Load lb.(N) 0.4 inch(10mm) from shaft end	0.8 inch(20mm) from shaft end	Permissible Thrust Load lb.(N)
0GN□KA	**3~180**	8.7 (1.0)	4.4 (20)	–	3.3 (15)
2GB□KA	**3~360**	13 (1.5)	8.8 (40)	13 (60)	6.6 (30)
2GN□KA	**3~18**	26 (3.0)	11 (50)	18 (80)	6.6 (30)
	25~180		26 (120)	40 (180)	
3GN□KA	**3~18**	43 (5.0)	18 (80)	26 (120)	8.8 (40)
	25~180		33 (150)	55 (250)	
4GB□KA	**3~18**	43 (5.0)	18 (80)	26 (120)	11 (50)
	25~360		33 (150)	55 (250)	
4GN□KA	**3~18**	69 (8.0)	22 (100)	33 (150)	11 (50)
	25~180		44 (200)	66 (300)	
5GN□KA	**3~18**	87 (10)	55 (250)	77 (350)	22 (100)
	25~180		66 (300)	99 (450)	
5GU□KA	**3~9**	174 (20)	88 (400)	110 (500)	33 (150)
	12.5~18		99 (450)	132 (600)	
	25~180		110 (500)	154 (700)	
BHI62F-□	**3.6~9**	347 (40)	121 (550)	176 (800)	44 (200)
BHI62□T-□	**12.5~180**		143 (650)	220 (1000)	
5GC□KA	**3.6~18**	87 (10)	55 (250)	77 (350)	22 (100)
	30~180		66 (300)	99 (450)	
5GCH□KA	**3.6~9**	174 (20)	88 (400)	110 (500)	33 (150)
	15~18		99 (450)	132 (600)	
	30~180		110 (500)	154 (700)	
FBL575□W-□	**5**	260 (30)	66 (300)	88 (400)	33 (150)
FBL5120□W-□	**10~20**		8 (400)	110 (500)	
	30~200		110 (500)	143 (650)	
HBL560□-N	**5**	260 (30)	66 (300)	88 (400)	33 (150)
HBL5100□-N	**10~20**		88 (400)	110 (500)	
	30~200		110 (500)	143 (650)	
4GN□RAA	**3.6~18**	69 (8.0)	22 (100)	33 (150)	22 (100)
	30~180		44 (200)	66 (300)	
5GN□RAA	**3~18**	87 (10)	55 (250)	77 (350)	44 (200)
	25~180		66 (300)	99 (450)	
5GU□RAA	**3~9**	174 (20)	88 (400)	110 (500)	55 (250)
	12.5~25		99 (450)	132 (600)	
	30~180		110 (500)	154 (700)	
FPW425_-□	**3.6~18**	69 (8.0)	22 (100)	33 (150)	11 (50)
	30~180		44 (200)	66 (300)	
FPW540_-□	**3.6~18**	87 (10)	55 (250)	77 (350)	22 (100)
	30~180		66 (300)	99 (450)	
FPW560_-□	**3.6~9**	130 (15)	88 (400)	110 (500)	33 (150)
	15~18		99 (450)	132 (600)	
	30~180		110 (500)	154 (700)	
FPW690_-□	**3.6~9**	260 (30)	121 (550)	176 (800)	44 (200)
	15~180		143 (650)	220 (1000)	

See page [A-217] for Right-Angle gearhead **RH** type

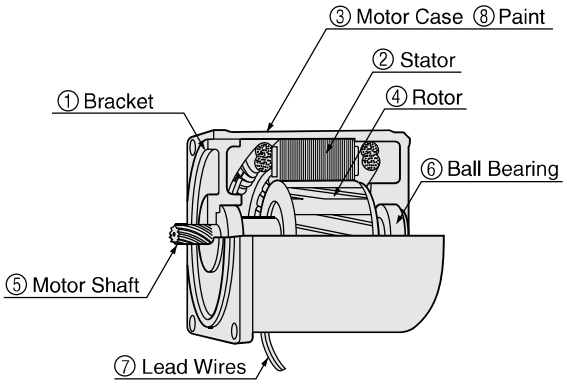
Note: **Permissible torque varies with the gear ratio. Do not exceed the maximum value.**

When using transmission mechanisms involving helical gears or worm gears, they are subject not only to overhung load but to thrust load as well. Ensure that thrust load does not exceed the permissible levels given in the above table.

General Information

Construction and Material of AC Motors

The following figure shows the construction of a standard AC motor.



① **Bracket:** Die cast aluminum bracket with cut-finish. Press-fitted into the motor case.
② **Stator:** Comprised of stator core made from laminated silicon steel plate, a polyester-coated copper coil and insulation film.
③ **Motor Case:** Die cast aluminum with cut-finish inside.
④ **Rotor:** Laminated silicon steel plate with die cast aluminum .
⑤ **Shaft:** Available in round shaft and pinion shaft type. The metal used in shaft is S45C(carbon steel). Round shafts receive a shaft flat (output power of 25W or more), while pinion shafts undergo precision gear finishing.
⑥ **Ball Bearing:** Sealed ball bearings with long-life grease.
⑦ **Lead Wire:** Lead wires with heat-resistant polyethylene coating.
⑧ **Painting:** Baked finish of acrylic resin or melamine resin.

Handling

When handling motor during test or installation, hold the body of the motor so that the output shaft points upward. Also, when the unit is removed from the package for installation and placed in shelves, it is safer to place the motor upright with the shaft pointing upwards so that it cannot strike other motors.
The lead wires are insulated and securely fixed to the stator and the case mechanically. They can, therefore, withstand a certain degree of tension applied to them. However, lifting the unit by the lead wires may cause them to break, or may damage the insulation or result in some other potentially hazardous situation.

Storage

Temperature and humidity are important considerations if the motor is to be stored for an extended period of time. Storage in places where there are large temperature and humidity variations will reduce the stator's insulation performance. Moreover, leaving the motor for extended periods in places with high temperature and humidity is likely to lead to corrosion. When storing for long periods, it is therefore recommended to coat the output shaft with an anti-corrosion agent, seal the motor in a polyethylene bag and store in a place with normal temperature and humidity.

AWG (Lead Wire Gage)

"AWG" is an abbreviation for "American Wiring Gage." The AWG standards stipulate the core construction and conductor cross-sectional area of lead wires as AWG numbers. The larger the AWG number, the smaller the cross-sectional area. When the lead wire is also UL listed, it is further distinguished by a number called the "UL Style". The AWG number is shown on the motor's external appearance drawing.

AWG No.	Conductor Cross-Section(mm²)
26	0.128
24	0.205
22	0.325
20	0.519

Q&A for Standard AC Motors

Q1. **I may have to put the motor in an environment of 0˚F to – 20˚F during transport. Will this create a problem?**

A1. Extreme changes in temperature may lead to condensation within the motor. Should this occur, parts may rust, greatly shortening the service life. Take measures to prevent condensation.

Q2. **Can the motors be shipped through tropical climates?**

A2. No. When the humidity and temperature differences within the cargo space of ships and airplanes are severe, the insulation may deteriorate due to condensation. Successful countermeasures are to ship the motors packed in sealed containers or bags containing de-oxygenating material.

Q3. **The motor gets extremely hot. Is this all right?**

A3. The internal loss generated when the motor converts electrical energy to rotational movement becomes heat, making the motor hot. The motor temperature is expressed as the ambient temperature plus the temperature rise caused by loss within the motor. If internal loss within the motor is 90˚F (32˚C) and the ambient temperature is 85˚F, the surface of the motor will be 175˚F (79˚C). This is not abnormal for a small motor.

Q4. **Will large fluctuations in power supply voltage affect the motor?**

A4. The torque produced by the motor is affected by changes in power supply voltage. The torque the motor produces is proportional to roughly twice the power supply voltage. For example, if the voltage of a motor rated at 115 VAC fluctuates between 103.5 VAC (90%) and 126.5 VAC (110%), the torque produced will vary between 80% and 120%. When using motors under large power voltage fluctuations, remember that the torque produced will vary, so select a motor that provides a sufficient margin.

Q5. **Can a reversible motor be used as an induction motor if the brake shoe is removed?**

A5. A reversible motor is not simply an induction motor with a simple braking mechanism added. The ratio of coils between the primary coil and the secondary coils in a reversible motor is different from that of an induction motor. The simple brake mechanism is added to the rear of the motor. The capacitor capacity is also increased to increase starting torque. This means that if only the brake mechanism is removed, the reversible motor will not be usable at a continuous rating like an induction motor; it will simply lose its holding power and its reversing characteristics will be reduced.

Q6. **What does it mean to say that a reversible motor is rated for 30 minutes?**

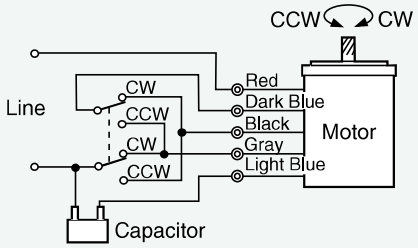
A6. Reversible motors require a larger input power than induction motors to increase the starting torque and improve the instant reversing characteristics. This means that loss is high and the temperature rises more during continuous operation. If operated continuously, the motor will burn out. It is thus designed to provide maximum performance if operated for no more than 30 minutes continuously.

Q7. Can the speed of induction motors and reversible motors be changed?

A7. The speed of single-phase (AC) induction and reversible motors is determined by the power supply frequency. To change the speed of induction and reversible motors, the power supply frequency can be changed using inverter control or gears and pulleys. If your application requires changing speed, we recommend a speed control motor.

Q8. I want to run an induction motor in forward and reverse directions. Can I use the same wiring as a reversible motor?

A8. Induction motors are designed to be optimal for continuous operation in one direction. They are not suitable for instant forward/reverse operation. The problem that occurs when the same wiring is used to reverse an induction motor like a reversible motor is that the prescribed power cannot be obtained in reverse. This is because the electrical balance of the coils degrades and the output torque decreases. To reverse an induction motor (five lead wire type), connect it as shown below, bring the motor to a complete stop and then reverse it.



Q9. Can instant reversal of a reversible motor be implemented using a SSR (solid state relay)?

A9. When instant forward/reverse operation is controlled with an SSR, the SSR characteristics can cause shorts in the circuit. Time must be allowed between switching from the SSR for clockwise rotation to the SSR for counterclockwise rotation.

Q10. The connection diagrams shows that a capacitor must be connected. Why is this necessary?

A10. Most all of Oriental Motors standard compact AC motors that fall within the broad group of single-phase induction motors are “capacitor-run motors”. To run an induction motor, a rotational magnetic field must be created. Capacitors perform the role of creating a power supply with the phase shift that is required for creating such a rotational magnetic field. Three-phase motors, by contrast, always supply power with different phases, so they do not require capacitors.

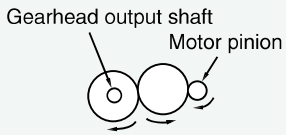
Q11. Can I use a capacitor other than the one that comes with the motor?

A11. The capacitor that comes with the motor has a capacitance that was selected to work optimally with the motor. When another capacitor is used, it should be a motor capacitor with the same capacitance and rated voltage as the capacitor that comes with the motor. Electrolytic capacitors may not be used.

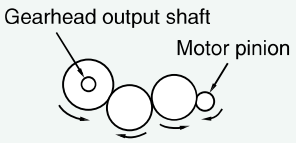
Q12. Why do some gearheads output in the same direction as the motor while others output in the opposite direction?

A12. Gearheads reduce the motor speed by 3:1 to 180:1. They do not, however, reduce the speed with a single gear, but with several. The number of speed reductions depends on the gear ratio, so the direction of output shaft rotation differs.

●Rotating in motor axis direction

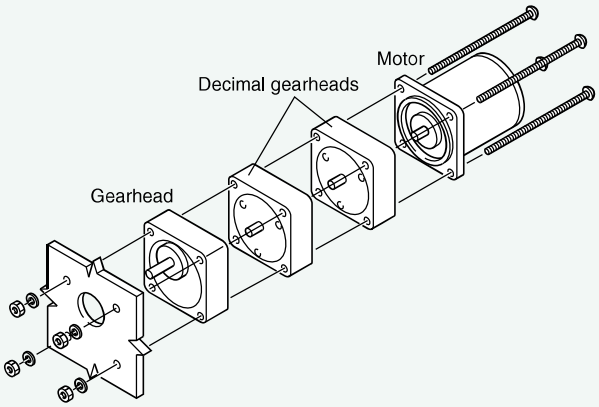


●Rotating opposite of motor axis direction



Q13. Can gearheads be used to reduce the motor speed to 1/18,000?

A13. Yes. A gearhead with a gear ratio of 180:1 must be connected to two decimal gearheads with a gear ratio of 10:1. The permissible torque is the same as if the 180:1 gearhead were used alone. The mounting screws must also be longer.



Q14. Do gearheads require oiling?

A14. Oriental Motor lubricates the surface of gears in gearheads with grease. Oiling is not required.

Q15. We wired the induction motor according to the wiring diagram, but it does not move. When we turned the shaft by hand, it started to move in the direction we turned it. What could be the cause of this?

A15. In order to turn a single-phase induction motor, it is necessary to use a capacitor to create two power supplies with different phases to obtain the rotating magnetic field. Therefore, if the capacitor is not properly connected, the phenomenon described occurs. Check for a cut line or contact defect in the capacitor section. The way to check is to measure the voltage across the capacitor terminals and check whether or not it is at least 1.5 times the power supply voltage.
If not, the capacitor may not be working properly.

Glossary

Standard AC Motors

1. Ratings

Ratings

Motor rating limitations pertaining to temperature rise are divided into two categories: continuous and short-term ratings. These establish working limitations on output, as well as on voltage, frequency and speed (r/min), and are known as rated output, rated voltage, rated frequency and rated speed (r/min).

Continuous and Short-term Ratings

The period during which output can continue without abnormality is called a rating period. When continuous operation at rated output is possible, it is known as the continuous rating. When operation at rated output is only possible for a limited period, it is known as the short-term rating.

2. Output Power

Output Power

The amount of work that can be performed in a given period of time is determined by the motor's speed and torque. This rated output value is marked on each motor.

$$\text{Output Power [HP]} = (10^{-6}) \times T \times N$$

1 HP = 746 Watts

where:

10^{-6}: Constant
T (oz-in): Torque
N (r/min): Speed

Rated Output Power

When optimum characteristics are achieved at rated voltage and frequency in continuous operation, the motor is said to be operating at the rated output. The speed and torque which produce the rated output are called the rated speed and the rated torque. Generally, the term "output" refers to the rated output.

3. Torque

Starting Torque ①

This term refers to the torque generated the instant the motor starts. If the motor is subjected to a load greater than this torque, it will not operate.

Stalling Torque ②

This is the maximum torque under which the motor will operate at a given voltage and frequency. If a load greater than this torque is applied to the motor, it will stall.

Rated Torque ③

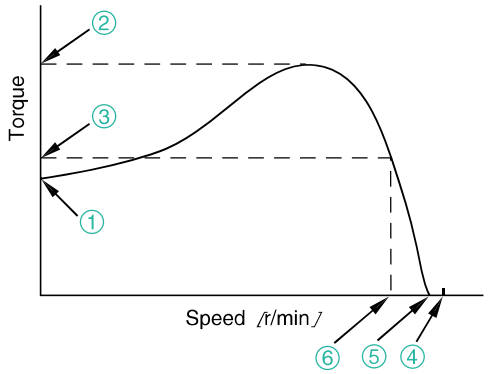
This is the torque created when the motor is continuously producing rated output at rated voltage and frequency. It is the torque at rated speed.

Static Frictional Torque

Static frictional torque is the torque output required to hold a load when the motor is stopped by an electromagnetic brake or similar device.

Permissible Torque

The permissible torque is the maximum torque that can be used when the motor is running. It is limited by the motor's rated torque, temperature rise and the strength of the gearhead used with the motor.



Speed-Torque Characteristics

① Starting torque
② Stalling torque
③ Rated Torque
④ Synchronous speed
⑤ No-load speed
⑥ Rated speed

4. Speed

Synchronous Speed ④

This is an intrinsic factor determined by the number of poles and the line frequency. It is calculated according to the following formula, and is normally indicated in r/min.

$$Ns = \frac{120f}{P} \text{ [r/min]}$$

where:

Ns: Synchronous speed [r/min]
f: Frequency [Hz]
P: Number of poles
120: Constant

For example, for a 4-pole motor with the line frequency of 60Hz, this would be:

$$Ns = \frac{120 \times 60}{4} = 1800 \text{ r/min}$$

■ No-load Speed ⑤
The speed of induction or reversible motors under no-load conditions is 20 ~ 60 r/min lower than synchronous speed because of rotor slip.

■ Rated Speed ⑥
This is the appropriate speed of the motor at rated output. From the standpoint of utility, it is the most desirable speed.

■ Slip
The following formula is one method of expressing speed:

$$S = \frac{Ns-N}{Ns} \text{ or } N = Ns\,(1-S)$$

where:
(S: slip)
Ns: Synchronous speed [r/min]
N: Speed under a given load [r/min]

In the case of a 4-pole, 60Hz induction motor operated with a slip of S=0.1, this becomes:

$$N = \frac{120\times60}{4}(1\times0.1) = 1800\,(1-0.1) = 1620 \text{ r/min}$$

5. Overrun

■ Overrun
This is the number of revolutions the motor makes between the time power is cut off and the time that it stops. It is normally indicated either by an angle or by revolutions.

6. Gearhead

■ Gear Ratio
The gear ratio is the ratio by which the gearhead reduces the motor speed [r/min]. The speed at the gearhead's output shaft is the reciprocal of the gear ratio × motor speed.

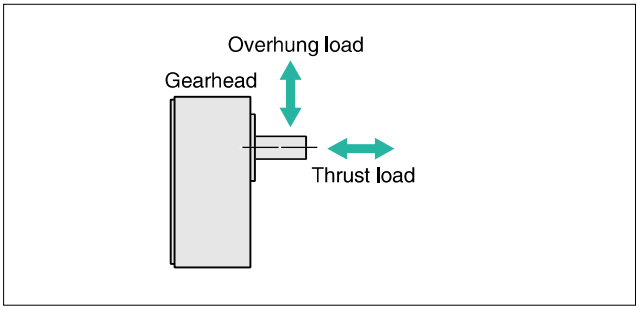
■ Maximum Permissible Torque
This is the maximum load torque that can be applied to the gearhead. It is dependent upon such mechanical strength factors as the size and construction of the gears and bearings, and thus varies according to the type and gear ratio of the gearhead.

■ Service Factor
This is a coefficient used to estimate the life of a gearhead. These values are determined from experience in service life tests under various loads and usage conditions.

■ Gearhead Efficiency
This is the efficiency of transmission when the torque is increased with the gearhead engaged. It is expressed as a percentage (%) and is determined by the friction in the gears and bearings used in the gearhead and the resistance of the lubrication oil. The transmission efficiency is usually 90% for each stage of reduction gears, and is 81% for gearheads with only two stage gearheads. As the reduction ratio becomes larger, the number of stages of gears increases, with a consequent reduction in the gear efficiency to 73%, 66% and 59% for each stage of gears added.

■ Overhung Load
This is the load on the gearhead output shaft in the radial direction. The maximum overhung load on a gearhead is called the permissible overhung load and varies with the gearhead type and the distance from the shaft end. This is equivalent to tension under belt drive.

■ Thrust Load
This is the load that is placed in the direction of the gearhead output axis shaft. The maximum thrust load on the gearhead is called the permissible thrust load and differs by the type of gearhead.

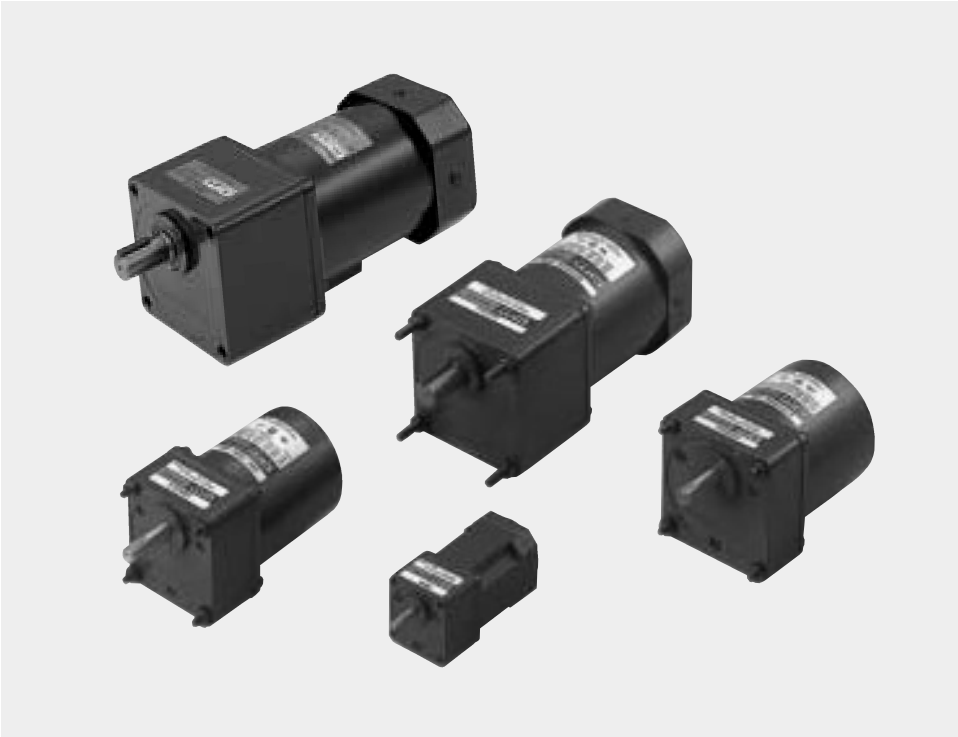


7. Others

■ CW, CCW
This shows the motor rotation direction.
CW is clockwise as seen from the output shaft side and CCW is counterclockwise.

ORIENTAL MOTOR GENERAL CATALOG

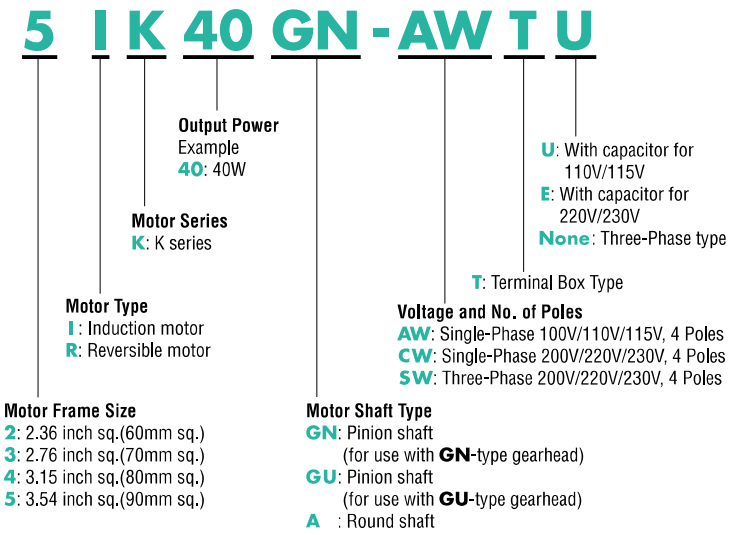
A



Induction Motors
Reversible Motors
Synchronous Motors
Torque Motors

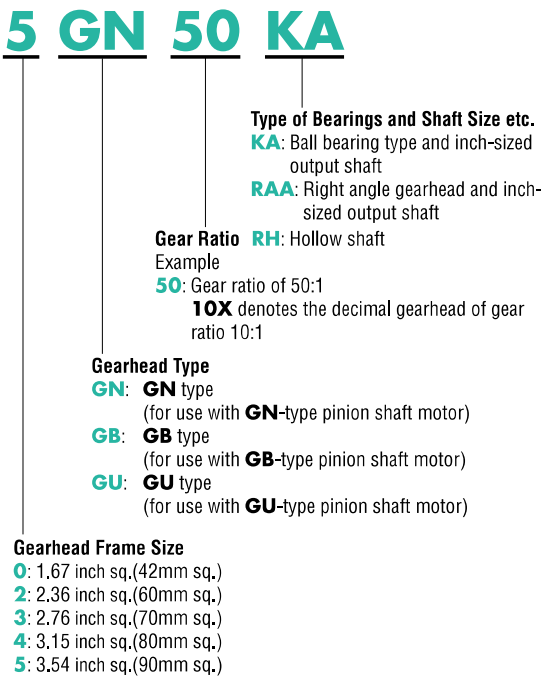
Product Number Code

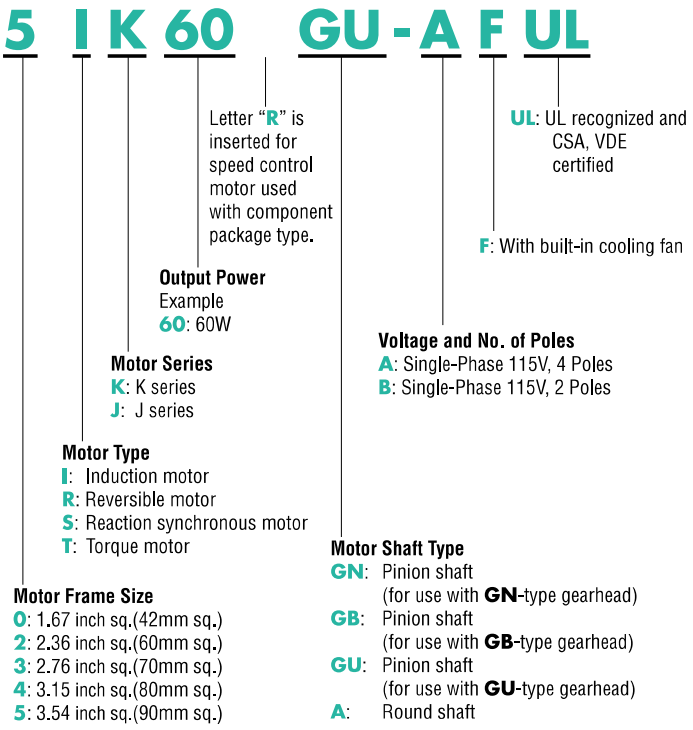
Motor



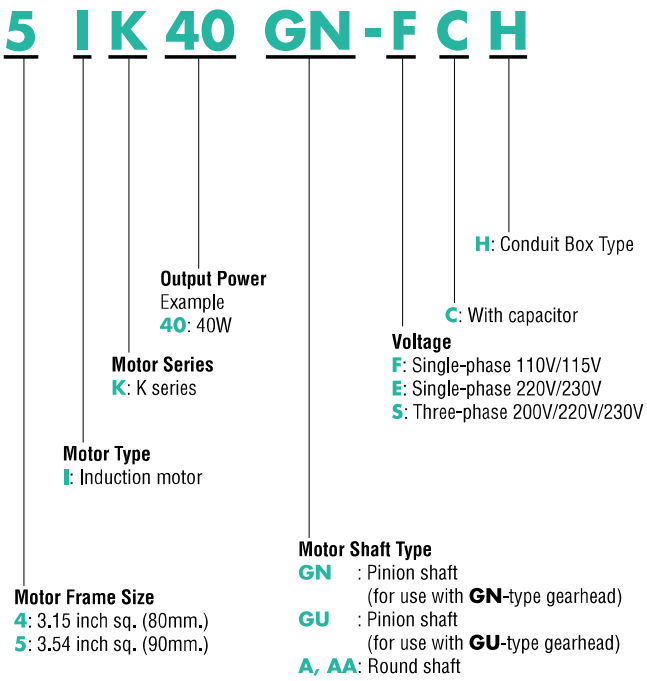
Note : The "**U**" and "**E**" at the end of the model name (ordering name)indicate that the unit includes a capacitor. These two letters are not inscribed on the motor nameplate.

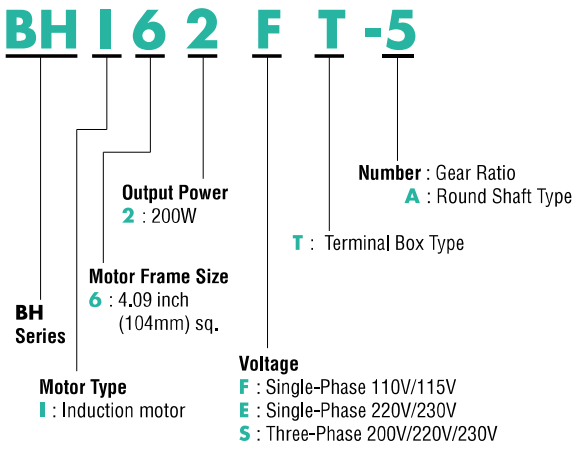
Gearhead





■ Motor


5 I K 40 GN - F C H
H: Conduit Box Type
Output Power
Example
40: 40W
C: With capacitor
Motor Series
K: K series
Voltage
F: Single-phase 110V/115V
E: Single-phase 220V/230V
S: Three-phase 200V/220V/230V
Motor Type
I: Induction motor
Motor Shaft Type
GN : Pinion shaft
(for use with GN-type gearhead)
GU : Pinion shaft
(for use with GU-type gearhead)
A, AA: Round shaft
Motor Frame Size
4: 3.15 inch sq. (80mm.)
5: 3.54 inch sq. (90mm.)


BH I 6 2 F T -5
Number : Gear Ratio
A : Round Shaft Type
Output Power
2 : 200W
T : Terminal Box Type
Motor Frame Size
6 : 4.09 inch
(104mm) sq.
BH
Series
Voltage
F : Single-Phase 110V/115V
E : Single-Phase 220V/230V
S : Three-Phase 200V/220V/230V
Motor Type
I : Induction motor

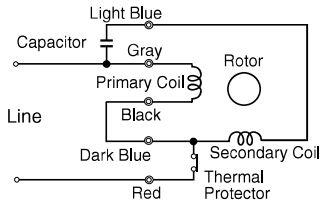
Features of Induction Motors

The speed of induction motors varies with the load. They are used in applications where speed control is not required. Both capacitor-run single-phase motors and three-phase motors are available.

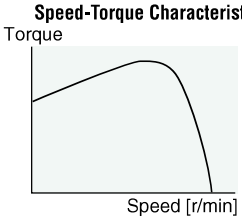
●Capacitor-Run Single-Phase Motors

Most compact single-phase induction motors are capacitor-run. They use a constant secondary coil winding and a capacitor for both starting and normal operation. Starting torque is generally smaller than operating torque, but the structure is simple and reliable, so efficiency is high. Note that a capacitor must be used when operating a single-phase induction motor.

Wiring Diagram (CW direction)



Speed-Torque Characteristic



●2-Pole High-Speed Motors

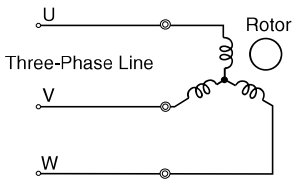
In principle, this is a single-phase, capacitor-run induction motor except that the speed is twice that of the base model. As opposed to the basic four-pole model with its synchronous speed of 1800r/min at 60Hz, the two-pole version synchronous speed is 3600r/min at 60Hz. This model only comes with a round shaft.

- When using a capacitor with the motor, make sure that the rated capacitance and voltage as indicated on the capacitor correspond to the specifications on the motor.
- Change the direction of motor rotation only after bringing the motor to a stop. If an attempt is made to change the direction of rotation while the motor is rotating, the motor may ignore the reversing command or change its direction of rotation after some delay.

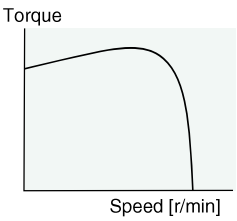
●Three-Phase Motors

These are induction motors driven by three-phase electric power. They are very efficient, have a comparatively large starting torque and are very reliable. They are most commonly used for general drive applications.

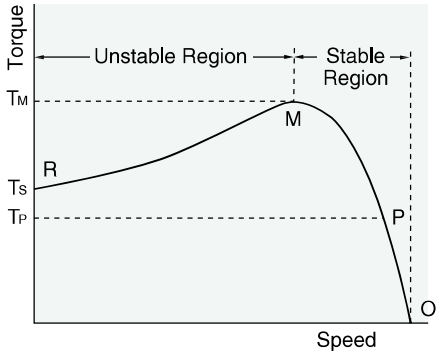
Wiring Diagram



Speed-Torque Characteristics

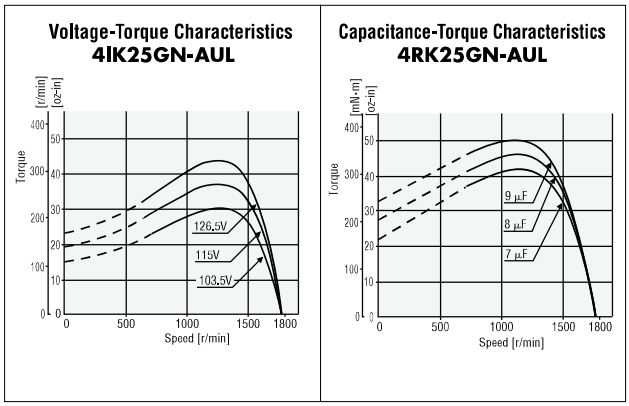


●Speed-Torque Characteristics



The figure above shows the relationship between the motor speed and torque characteristics when the power supply voltage is maintained at a constant level. Under conditions of no load, the motor rotates at a speed close to synchronous rotation, but as load increases the motor speed drops to a speed (P), where a balance is achieved between load and motor torque (Tp). If load is further increased and reaches point M, the motor can generate no greater torque, and stops at point R. In other words, the motor can be operated in a stable range of between M and O, while the range between R and M represents an unstable area.

●Voltage Characteristics and Capacitor Characteristics



The voltage characteristics curve shows the changes in torque characteristics as the voltage applied to the motor is varied. Torque of induction motors is generally in proportion to the square of the voltage. Torque characteristics also vary greatly according to the value of the capacitor. If the capacitor value is increased, both starting and stopping torque increases, but once it reaches 2.5 ~ 3 times the rated value, operating torque begins to decrease and start-up torque levels off.

If an induction motor does not have sufficient torque, a simple method of boosting torque is to increase input voltage or capacitor value. Such methods, however, cause an increase in power loss and a rise in motor temperature. Therefore, it would be advisable to avoid these methods. However in cases where there is no other way to increase torque, it is recommended to take adequate precautions to dissipate motor heat and always keep the temperature of motor case at 194˚F (90˚C) or less.

Product Specifications

Induction Motors-4Pole

Output Power HP	Output Power W	Model: Lead Wire Type	Model: Terminal Box Type	Model: Conduit Box Type	Voltage V	Frequency Hz	Starting Torque oz-in	Starting Torque mN·m	Rated Torque oz-in	Rated Torque mN·m	Rated Speed r/min	Page
1/746	1	**0IK1GN-AUL**	—	—	Single-Phase 115	60	1.1	8	1.1	8	1200	A-38
1/249	3	**2IJ3GB-AUL**	—	—	Single-Phase 115	60	3.5	25	2.9	21	1450	A-40
1/124	6	**2IK6GN-AWU**	**2IK6GN-AWTU**	—	Single-Phase 110	60	5.6	40	5.7	41	1450	A-42
					Single-Phase 115	60						
		2IK6GN-CWE	**2IK6GN-CWTE**	—	Single-Phase 220	60	5.6	40	5.7	41	1450	
					Single-Phase 230	50	6.2	45	6.8	49	1200	
					Single-Phase 230	60	5.6	40	5.7	41	1450	
		2IK6GN-SW	**2IK6GN-SWT**	—	Three-Phase 200	50	6.8	49	6.8	49	1200	
					Three-Phase 200	60					1450	
					Three-Phase 220	60	5.7	41	5.7	41	1500	
					Three-Phase 230	60					1500	
		2IK6GN-AUL	—	—	Single-Phase 115	60	5.6	40	5.6	40	1500	
1/50	15	**3IK15GN-AWU**	—	—	Single-Phase 110	60	9	65	14.6	105	1450	A-45
					Single-Phase 115	60						
		3IK15GN-CWE	—	—	Single-Phase 220	60	9	65	14.6	105	1450	
					Single-Phase 230	50	10	75	17.4	125	1200	
					Single-Phase 230	60	9	65	14.6	105	1450	
		3IK15GN-AUL	—	—	Single-Phase 115	60	10.4	75	13.9	100	1500	
		4IJ15GB-AUL	—	—	Single-Phase 115	60	10.4	75	13.2	95	1550	
1/30	25	**4IK25GN-AWU**	**4IK25GN-AWTU**	**4IK25GN-FCH**	Single-Phase 110	60	16.7	120	23.6	170	1450	A-48
					Single-Phase 115	60						
		4IK25GN-CWE	**4IK25GN-CWTE**	**4IK25GN-ECH**	Single-Phase 220	60			23.6	170	1450	
					Single-Phase 230	50	16.7	120	28.5	205	1200	
					Single-Phase 230	60			23.6	170	1450	
		4IK25GN-SW	**4IK25GN-SWT**	**4IK25GN-SH**	Three-Phase 200	50	33.3	240	26.4	190	1300	
					Three-Phase 200	60					1550	
					Three-Phase 220	60	22.2	160	22.2	160	1600	
					Three-Phase 230	60					1600	
		4IK25GN-AUL	—	—	Single-Phase 115	60	15.3	110	22.9	165	1500	
1/18.5	40	**5IK40GN-AWU**	**5IK40GN-AWTU**	**5IK40GN-FCH**	Single-Phase 110	60	27.8	200	36.1	260	1500	A-53
					Single-Phase 115	60						
		5IK40GN-CWE	**5IK40GN-CWTE**	**5IK40GN-ECH**	Single-Phase 220	60			36.1	260	1500	
					Single-Phase 230	50	27.8	200	41.7	300	1300	
					Single-Phase 230	60			36.1	260	1500	
		5IK40GN-SW	**5IK40GN-SWT**	**5IK40GN-SH**	Three-Phase 200	50	55.5	400	41.7	300	1300	
					Three-Phase 200	60					1550	
					Three-Phase 220	60	36.1	260	36.1	260	1600	
					Three-Phase 230	60					1600	
		5IK40GN-AUL	—	—	Single-Phase 115	60	27.8	200	36.1	260	1550	
1/12.5	60	**5IK60GU-AWU**	**5IK60GU-AWTU**	**5IK60GU-FCH**	Single-Phase 110	60	44.4	320	56.2	405	1450	A-58
					Single-Phase 115	60						
		5IK60GU-CWE	**5IK60GU-CWTE**	**5IK60GU-ECH**	Single-Phase 220	60			56.2	405	1450	
					Single-Phase 230	50	44.4	320	68	490	1200	
					Single-Phase 230	60			56.2	405	1450	
		5IK60GU-SW	**5IK60GU-SWT**	**5IK60GU-SH**	Three-Phase 200	50	83.3	600	62.5	450	1300	
					Three-Phase 200	60					1550	
					Three-Phase 220	60	69.4	500	52.8	380	1600	
					Three-Phase 230	60					1600	
		5IK60GU-AFUL	—	—	Single-Phase 115	60	41.7	300	52.8	380	1550	
1/8	90	**5IK90GU-AWU**	**5IK90GU-AWTU**	**5IK90GU-FCH**	Single-Phase 110	60	62.5	450	81.2	585	1500	A-63
					Single-Phase 115	60						
		5IK90GU-CWE	**5IK90GU-CWTE**	**5IK90GU-ECH**	Single-Phase 220	60			84	605	1450	
					Single-Phase 230	50	62.5	450	101.4	730	1200	
					Single-Phase 230	60			84	605	1450	
		5IK90GU-SW	**5IK90GU-SWT**	**5IK90GU-SH**	Three-Phase 200	50	118	850	94.4	680	1300	
					Three-Phase 200	60					1550	
					Three-Phase 220	60	97.2	700	79.2	570	1600	
					Three-Phase 230	60					1600	
		5IK90GU-AFUL	—	—	Single-Phase 115	60	62.5	450	79.2	570	1550	
1/3.73	200	**BHI62F-□**	**BHI62FT-□**	—	Single-Phase 110	60	125	900	181	1300	1500	A-68
					Single-Phase 115	60	139	1000				
		—	**BHI62ET-□**	—	Single-Phase 220	60			181	1300	1500	
					Single-Phase 230	50	139	1000	215	1550	1250	
					Single-Phase 230	60			181	1300	1500	
		—	**BHI62ST-□**	—	Three-Phase 200	50	215	1550	215	1550	1250	
					Three-Phase 200	60	181	1300	181	1300	1500	
					Three-Phase 220	60	174	1250	174	1250	1550	
					Three-Phase 230	60	167	1200	167	1200	1600	

●The "**U**" and "**E**" at the end of the model name indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate.

Induction Motors - 2 Pole (Round shaft type only)

Output Power HP	Output Power W	Model	Voltage V	Frequency Hz	Starting Torque oz-in	Starting Torque mN·m	Rated Torque oz-in	Rated Torque mN·m	Rated Speed r/min	Page
1/18.5	40	**4IK40A-BA**	Single-Phase 115	60	13.2	95	18	130	3000	A-72
1/12.5	60	**5IK60A-BA**	Single-Phase 115	60	16.7	120	25.7	185	3200	
1/8	90	**5IK90A-BFUL**	Single-Phase 115	60	30.6	220	38.9	280	3200	

General Specifications

For **-AW**, **-CW** and **-SW** Type

Item	Specifications
Insulation Resistance	100M ohms or more when 500V DC is applied between the windings and the frame.
Dielectric Strength	Sufficient to withstand 1.5kV at 50Hz and 60Hz applied between the windings and the frame.
Temperature Rise	144°F (80°C) or less measured by the resistance change method after rated motor operation with connecting a gearhead or equivalent heat radiation plate.
Insulation Class	Class B (266°F [130°C])
Overheat Protection	**2IK** have impedance protection. All others have built-in thermal protector (Automatic return type) Operating temperature, open : 266°F±9°F (130°C±5°C) close: 179.6°F±27°F (82°C±15°C)
Ambient Temperature Range	14°F~104°F (−10°C~+40°C) [Three-phase 200V : 14°F~122°F (−10°C~+50°C)]
Ambient Humidity	85% maximum (noncondensing)

Equivalent heat radiation plate (material : Aluminum)

Type (output)	Size inch (mm)	Thickness inch (mm)
2IK Type (6W)	4.53x4.53 (115x115)	0.20 (5)
3IK Type (15W)	4.92x4.92 (125x125)	
4IK Type (25W)	5.31x5.31 (135x135)	
5IK40 Type (40W)	6.50x6.50 (165x165)	
5IK60 Type (60W)	7.87x7.87 (200x200)	
5IK90 Type (90W)	7.87x7.87 (200x200)	

For **BHI** Type

Item	Specifications
Insulation Resistance	100M ohms or more when 500V DC is applied between the windings and the frame.
Dielectric Strength	Sufficient to withstand 1.5kV at 50Hz and 60Hz applied between the windings and the frame.
Temperature Rise	144°F (80°C) or less measured by the resistance change method after rated motor operation with connecting a gearhead or equivalent heat radiation plate. [Three-Phase type : 126°F (70°C)]
Insulation Class	Class B (202°F [130°C])
Overheat Protection	Built-in thermal protector (Automatic return type) Operating temperature, open : 302°F±9°F (150°C±5°C) close : 204.8°F±27°F (96°C±15°C)
Ambient Temperature Range	14°F~104°F (−10°C~+40°C) [Three-Phase 200V : 14°F~122°F (−10°C~+50°C)]
Ambient Humidity	85% maximum (noncondensing)

Equivalent heat radiation plate (material: Aluminum)

Type (output)	Size inch (mm)	Thickness inch (mm)
BHI Type (200W)	9.06x9.06 (230x230)	0.20 (5)

For **-AUL**, **-AULA**, **-AFUL**, **-BA** and **-BFUL** Type

Item	Specifications
Insulation Resistance	100M ohms or more when 500V DC is applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Dielectric Strength	Sufficient to withstand 1.5kV at 50Hz and 60Hz applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Temperature Rise	135°F (75°C) or less measured by the resistance change method after the temperature of the coil has stabilized under normal operation at the rated voltage and frequency.
Insulation Class	Class A (221°F [105°C])
Overheat Protection	**0IK** and **2IK** have impedance protection. All others have built-in thermal protector (Automatic return type) Operating temperature, open : 248°F±9°F (120°C±5°C) close: 170.6°F±27°F (77°C±15°C)
Ambient Temperature Range	14°F~104°F (−10°C~+40°C)
Ambient Humidity	85% maximum (noncondensing)

Safety standard and CE Marking

For **-AW(T)U**, **-CW(T)E** and **-SW(T)** Type

Standards	Certification Body	Standards File No.	CE Marking
UL1004 UL519 (6W Type) UL547 (15W~90W) CAN/CSA C22.2 No.100 CAN/CSA C22.2 No.77	UL	E64199 (6W) E64197 (15W~90W)	Low Voltage Directives
EN60950 *	VDE	114919ÜG (Single-Phase 6W Lead wire type) 6751ÜG (15W~90W)	
	DEMKO	124234/DK99-00431 (Three-Phase 90w type)	
EN60034-1 EN60034-5 IEC60034-11	Conform to EN/IEC Standards (EN/IEC certifications are scheduled.)		

* Excluding conduit box types.
For installation for EN/IEC standards, see page D-2.

For **BHI** Type

Standards	Certification Body	CE Marking
UL1004 UL2111 CAN/CSA C22.2 No.100 CAN/CSA C22.2 No.77	Conform to UL/CSA standards (UL/CSA certifications are scheduled)	Low Voltage Directives
EN60950 EN60034-1 EN60034-5 IEC60034-11		

For installation for EN/IEC standards, see page D-2.

For **-AUL**, **-AULA**, **-AFUL**, **-BA** and **-BFUL** Type

Standards	Certification Body	Standards File No.	CE Marking
UL1004 UL519 (6W Type) UL547 (15W~90W Type)	UL	E64199(1W~6W) E64197(15W~90W)	Low Voltage Directives
CAN/CSA C22.2 No.100 CAN/CSA C22.2 No.77	CSA	LR47296	
EN60950	VDE	5876ÜG(1W~6W) 5877ÜG(15W~90W)	

NOTE: UL Mark only for **4IK40A-BA**, **5IK60A-BA**
UL Mark, VDE Mark and CE Mark for **5IK90A-BFUL**
For installation for EN/IEC standards, see page D-2.

INDUCTION MOTORS

Single-Phase

1W (1/746 HP)

Frame Size 1.65 in.sq.(42mm sq.)

GEAR SAFETY STD.

Specifications — Continuous Rating

Model		Output Power		Voltage	Frequency	Current	Starting Torque		Rated Torque		Rated Speed	Capacitor
Pinion Shaft Type	Round Shaft Type	HP	W	V AC	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF
0IK1GN-AUL	**0IK1A-AUL**	1/746	1	115	60	0.08	1.1	8	1.1	8	1200	1.0

- products listed above are impedance protected.

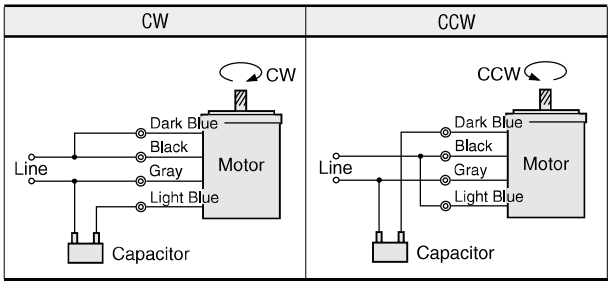
Gearmotor — Torque Table

Unit = Upper values: lb-in / Lower values: N·m

Model	Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
0IK1GN-AUL / 0GN□KA		0.17	0.20	0.28	0.33	0.42	0.50	0.63	0.75	0.90	1.1	1.4	1.6	2.3	2.7	3.0	3.7	4.1	4.9	6.1	7.3
		0.019	0.023	0.032	0.039	0.049	0.058	0.073	0.088	0.11	0.13	0.16	0.19	0.26	0.32	0.35	0.42	0.47	0.57	0.71	0.85

- Gearheads are sold separately. Decimal gearhead is not available for **0GN** type.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (60 Hz : 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

Wiring Diagrams



The direction of motor rotation is as viewed from the shaft end of the motor.

Change the direction of motor rotation only after bringing the motor to a stop. If an attempt is made to change the direction of rotation while the motor is rotating, the motor may ignore the reversing command or change its direction of rotation after some delay.

Dimensions Scale 1/4, Unit =**inch** (mm)

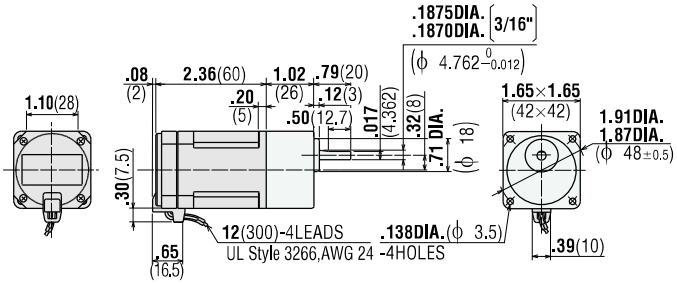
Motor

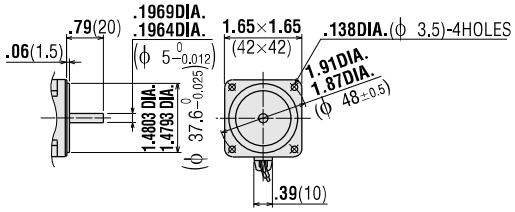
0IK1GN-AUL
Weight (Mass): 0.7 lb. (0.3 kg)

Gearhead

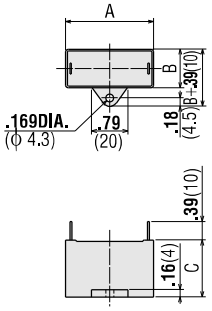
0GN□KA
Weight (Mass): 0.44 lb. (0.2 kg)

0IK1A-AUL Round Shaft Type
Weight (Mass): 0.7 lb.(0.3 kg)





●Capacitor (included with the motor)



Motor Model	Capacitor Model	Dimensions inch (mm) A	B	C	Weight oz (g)
0IK1GN-AUL **0IK1A-AUL**	CH10UL	1.22 (31)	.57 (14.5)	.93 (23.5)	0.60 (17)

Capacitor cap is provided with the capacitor.

Accessories

●Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors with or without gearheads. See page [A-266] for the dimensions.
Model name **SOL0U04**

●Flexible Coupling

Optional clamping couplings are available. See page [A-260] for the dimensions.

INDUCTION MOTORS

Single-Phase

3W (1/249 HP)

Frame Size 2.36 in.sq.(60mm sq.)

GEAR SAFETY STD.

Specifications — Continuous Rating

Model		Output Power		Voltage	Frequency	Current	Starting Torque		Rated Torque		Rated Speed	Capacitor
Pinion Shaft Type	Round Shaft Type	HP	W	V AC	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF
2IJ3GB-AUL	**2IJ3A-AULA**	1/249	3	115	60	0.14	3.5	25	2.9	21	1450	1.5

- These products are impedance protected.

Gearmotor — Torque Table

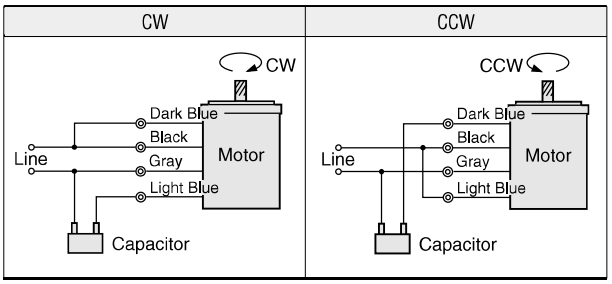
The maximum permissible torque with a decimal gearhead with a gear ratio of 10 is 13 lb-in (1.5 N·m)

Unit = Upper values: lb-in / Lower values: N·m

Model \ Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10	7.2	6	5
Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**	**250**	**300**	**360**
2IJ3GB-AUL / 2GB□KA	0.44	0.53	0.73	0.88	1.1	1.3	1.8	2.2	2.6	3.3	4.0	4.8	6.0	7.2	9.0	11	12	13	13	13	13	13	13
	0.051	0.061	0.085	0.11	0.13	0.15	0.21	0.26	0.31	0.38	0.46	0.55	0.69	0.83	1.0	1.2	1.4	1.5	1.5	1.5	1.5	1.5	1.5

- Gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (60 Hz : 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

Wiring Diagrams



The direction of motor rotation is as viewed from the shaft end of the motor.

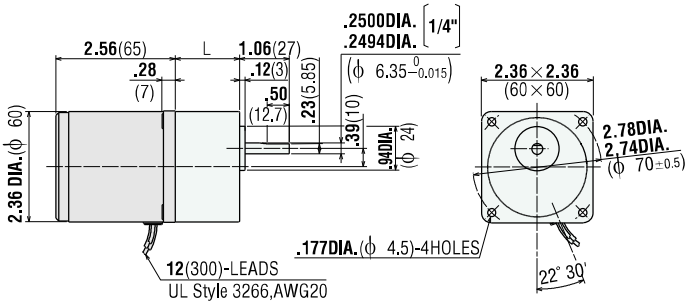
Change the direction of motor rotation only after bringing the motor to a stop. If an attempt is made to change the direction of rotation while the motor is rotating, the motor may ignore the reversing command or change its direction of rotation after some delay.

Dimensions Scale 1/4, Unit = **inch** (mm)

Motor/Gearhead

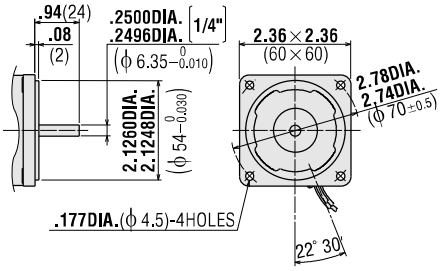
2IJ3GB-AUL
Weight (Mass): 1.3 lb.(0.6 kg)

2GB□KA
Weight (Mass): 0.66 lb.(0.3 kg)



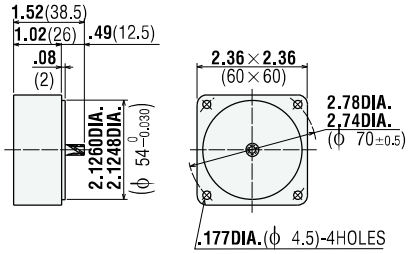
L=**1.02** (26) **2GB3KA**~**18KA**
L=**1.38** (35) **2GB25KA**~**360KA**

2IJ3A-AULA Round Shaft Type
Weight (Mass): 1.3 lb.(0.6 kg)

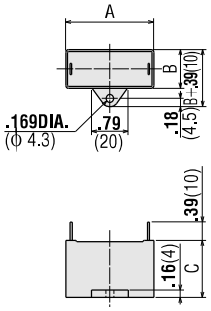


Decimal Gearhead

2GB10XK Weight (Mass): 0.44 lb.(0.2 kg)



Capacitor (included with the motor)



Motor Model	Capacitor Model	Dimensions inch (mm) A	B	C	Weight oz (g)
2IJ3GB-AUL **2IJ3A-AULA**	CH15BUL	1.46 (37)	.71 (18)	1.06 (27)	0.81 (23)

Capacitor cap is provided with the capacitor.

Accessories

Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors with or without gearheads. See page [A-266] for the dimensions.

Model name **SOL2U08**

Flexible Coupling

Optional clamping couplings are available. See page [A-260] for the dimensions.

INDUCTION MOTORS

Single-Phase, Three-Phase

6W (1/124 HP)

Frame Size 2.36 in.sq.(60mm sq.)

GEAR SAFETY STD.

Specifications — Continuous Rating

Model Upper Model Name:Pinion Shaft Type Lower Model Name( ):Round Shaft Type		Output Power		Voltage	Frequency	Current	Starting Torque		Rated Torque		Rated Speed	Capacitor
Lead Wire Type Dimension ①	Terminal Box Type Dimension ②	HP	W	V	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF
2IK6GN-AWU **(2IK6A-AWU)**	**2IK6GN-AWTU** **(2IK6A-AWTU)**	1/124	6	Single-Phase 110 Single-Phase 115	60 60	0.2	5.6	40	5.7	41	1450	2.5
2IK6GN-CWE **(2IK6A-CWE)**	**2IK6GN-CWTE** **(2IK6A-CWTE)**			Single-Phase 220 Single-Phase 230 Single-Phase 230	60 50 60	0.09 0.11 0.1	5.6 6.2 5.6	40 45 40	5.7 6.8 5.7	41 49 41	1450 1200 1450	0.6
2IK6GN-SW **(2IK6A-SW)**	**2IK6GN-SWT** **(2IK6A-SWT)**			Three-Phase 200 Three-Phase 200 Three-Phase 220 Three-Phase 230	50 60 60 60	0.09 0.08 0.09 0.09	6.8 5.7	49 41	6.8 5.7	49 41	1200 1450 1500 1500	—
2IK6GN-AUL **(2IK6A-AULA)**	—			Single-Phase 115	60	0.18	5.6	40	5.6	40	1500	2

- These products are impedance protected.
- The "**U**" and "**E**" at the end of the model name indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate. When the motor is approved under various safety standards, the nameplate is adopted.
- The terminal box type of the motors are not VDE approved.

Gearmotor — Torque Table

The maximum permissible torque with a decimal gearhead with a gear ratio of 10 is 26 lb-in (3N·m).

Single-Phase 115V/230V, Three-Phase 230V 60Hz

Unit = Upper values: lb-in / Lower values: N·m

Model	Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
2IK6GN-AWU **2IK6GN-AWTU** **2IK6GN-CWE** **2IK6GN-CWTE** **2IK6GN-SW** **2IK6GN-SWT**	**2GN□KA**	0.87 0.10	1.0 0.12	1.4 0.17	1.7 0.20	2.2 0.25	2.6 0.30	3.6 0.42	4.3 0.50	5.2 0.60	6.5 0.75	7.8 0.90	9.4 1.1	12 1.4	14 1.6	18 2.0	21 2.4	24 2.7	26 3	26 3	26 3
2IK6GN-AUL / 2GN□KA		0.85 0.097	1.0 0.12	1.4 0.16	1.7 0.19	2.1 0.24	2.6 0.29	3.5 0.41	4.3 0.49	5.1 0.58	6.4 0.73	7.7 0.88	9.2 1.1	12 1.3	14 1.6	17 2.0	21 2.4	23 2.6	26 3	26 3	26 3

Single-Phase 230V 50Hz

Unit = Upper values: lb-in / Lower values: N·m

Model	Speed r/min	500	416	300	250	200	166	120	100	83	60	50	41	30	25	20	16	15	12.5	10	8.3
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
2IK6GN-CWE **2IK6GN-CWTE**	**2GN□KA**	1.0 0.12	1.2 0.14	1.7 0.20	2.1 0.24	2.6 0.30	3.1 0.36	4.3 0.50	5.2 0.60	6.2 0.71	7.8 0.89	9.3 1.1	11 1.3	14 1.6	17 1.9	21 2.4	25 2.9	26 3	26 3	26 3	26 3

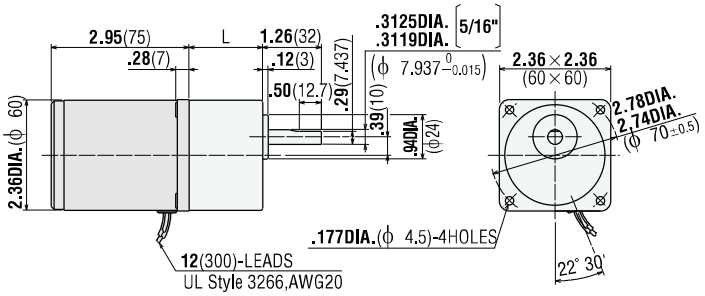
- Gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (50 Hz: 1500r/min, 60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

Dimensions Scale 1/4, Unit = **inch** (mm)

①Motor/Gearhead

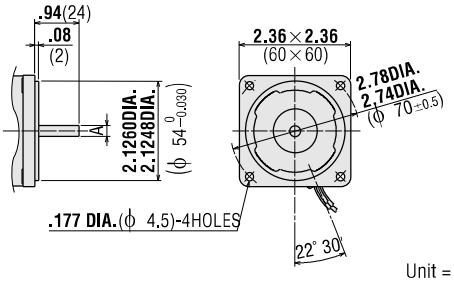
2IK6GN-AWU
2IK6GN-CWE
2IK6GN-SW
2IK6GN-AUL
Weight (Mass): 1.5 lb.(0.7 kg)

2GN□KA
Weight (Mass): 0.88 lb.(0.4 kg)



L=**1.18** (30) **2GN3KA~18KA**
L=**1.57** (40) **2GN25KA~180KA**

2IK6A-AWU Round Shaft Type
2IK6A-CWE
2IK6A-SW
2IK6A-AULA
Weight (Mass): 1.5 lb.(0.7 kg)



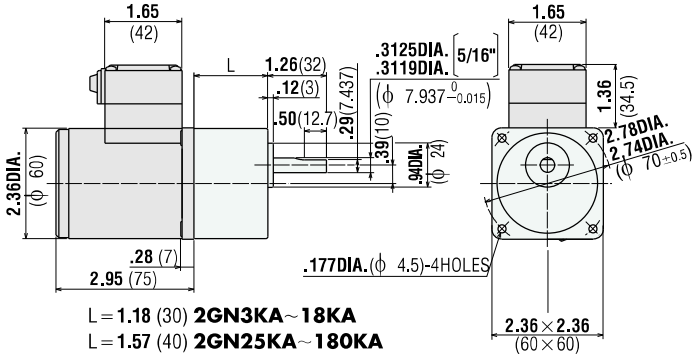
Unit = **inch** (mm)

Model	Shaft diameter A
2IK6A-AWU **2IK6A-CWE** **2IK6A-SW**	**.2362DIA.** (ϕ 6 0 -0.012) **.2357DIA.**
2IK6A-AULA	**.2500DIA.** [**1/4"**](ϕ 6.35 0 -0.010) **.2496DIA.**

②Motor/Gearhead

2IK6GN-AWTU
2IK6GN-CWTE
2IK6GN-SWT
Weight (Mass): 1.7 lb.(0.75 kg)

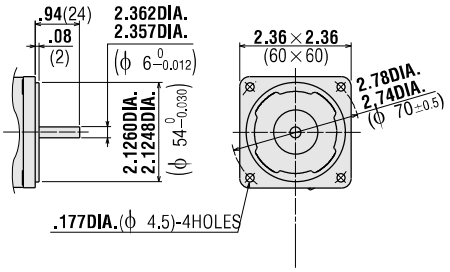
2GN□KA
Weight (Mass): 0.88 lb.(0.4 kg)



L=**1.18** (30) **2GN3KA~18KA**
L=**1.57** (40) **2GN25KA~180KA**

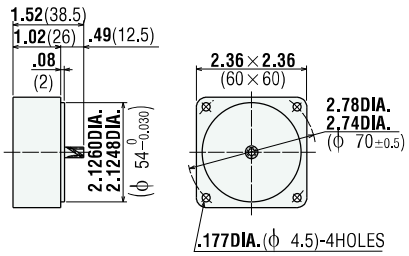
Use cabtyre cable with the diameter of .27DIA.(ϕ 6.8)~.34DIA.(ϕ8.6).

2IK6A-AWTU Round Shaft Type
2IK6A-CWTE
2IK6A-SWT
Weight (Mass): 1.7 lb.(0.75 kg)

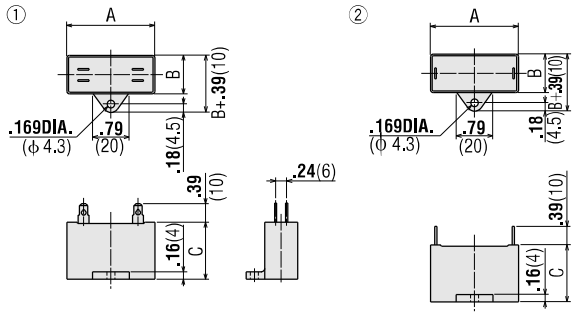


●Decimal Gearhead

2GN10XK Weight (Mass): 0.44 lb.(0.2 kg)



●Capacitor (included with the motor)

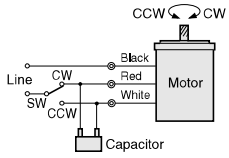
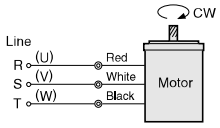
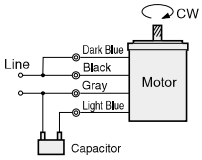
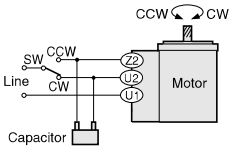
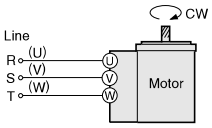
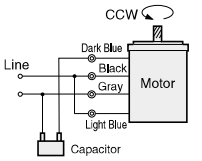


Motor Model	Capacitor Model	Dimensions in. (mm) A	B	C	Weight (Mass) oz (g)	Dimension No.
2IK6GN-AW□U **2IK6A-AW□U**	CH25FAUL	1.22 (31)	.67 (17)	1.06 (27)	0.71 (20)	①
2IK6GN-CW□E **2IK6A-CW□E**	CH06BFAUL	1.22 (31)	.57 (14.5)	.93 (23.5)	0.53 (15)	①
2IK6GN-AUL **2IK6A-AULA**	CH20UL	1.22 (31)	.57 (14.5)	.93 (23.5)	0.53 (15)	②

If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

■ Wiring Diagrams

The direction of motor rotation is as viewed from the shaft end of the motor.

Direction \ Model	Lead Wire Type **2IK6GN-AWU** **2IK6GN-CWE**	Lead Wire Type **2IK6GN-SW**	Lead Wire Type **2IK6GN-AUL**	Terminal Box Type **2IK6GN-AWTU** **2IK6GN-CWTE**	Terminal Box Type **2IK6GN-SWT**
CW					
CCW	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.	To change the rotation, change any two connections between U, V and W.		To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.	To change the rotation, change any two connections between U, V and W.

Change the direction of motor rotation only after bringing the motor to a stop.
If an attempt is made to change the direction of rotation while the motor is rotating, the motor may ignore the reversing command or change its direction of rotation after some delay.

■ Accessories

●Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors with or without gearheads. See page [A-266] for the dimensions.
Model name **SOL2U08**

●Flexible Coupling

Optional clamping couplings are available. See page [A-260] for the dimensions.

INDUCTION MOTORS
Single-Phase
15W (1/50 HP)

Frame Size 2.76 in.sq.(□70mm) or 3.15 in.sq.(□80mm)

GEAR SAFETY STD.

Specifications — Continuous Rating

Model Upper Model Name:Pinion Shaft Type Lower Model Name( ):Round Shaft Type		Output Power		Voltage	Frequency	Current	Starting Torque		Rated Torque		Rated Speed	Capacitor
Lead Wire Type Dimension ①	Lead Wire Type Dimension ②	HP	W	V	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF
3IK15GN-AWU (3IK15A-AWU)	—	1/50	15	Single-Phase 110 Single-Phase 115	60 60	0.33 0.34	9	65	14.6	105	1450	4.5
3IK15GN-CWE (3IK15A-CWE)	—			Single-Phase 220 Single-Phase 230 Single-Phase 230	60 50 60	0.16 0.19 0.16	9 10 9	65 75 65	14.6 17.4 14.6	105 125 105	1450 1200 1450	1
3IK15GN-AUL (3IK15A-AULA)	—			Single-Phase 115	60	0.33	10.4	75	13.9	100	1500	4
—	4IJ15GB-AUL (4IJ15A-AULA)			Single-Phase 115	60	0.35	10.4	75	13.2	95	1550	3

- The product contains a built-in thermal protector. When a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.
- The "**U**" and "**E**" at the end of the model name indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate. When the motor is approved under various safety standards, the nameplate is adopted.

Gearmotor — Torque Table

The maximum permissible torque with a decimal gearhead with a gear ratio of 10 is 43 lb-in (5N·m).

Single-Phase 115V/230V, 60Hz

Unit = Upper values: lb-in / Lower values: N·m

Model	Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10	7.2	6	5
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**	**250**	**300**	**360**
3IK15GN-AWU / 3IK15GN-CWE / 3GN□KA		2.2	2.7	3.7	4.4	5.5	6.7	9.2	11	13	17	20	24	30	36	43	43	43	43	43	43	—	—	—
		0.26	0.31	0.43	0.51	0.64	0.77	1.1	1.3	1.5	1.9	2.3	2.8	3.5	4.2	5	5	5	5	5	5	—	—	—
3IK15GN-AUL / 3GN□KA		2.1	2.5	3.5	4.2	5.3	6.3	8.8	11	13	16	19	23	29	34	43	43	43	43	43	43	—	—	—
		0.24	0.29	0.41	0.49	0.61	0.73	1.0	1.2	1.5	1.8	2.2	2.6	3.3	4	5	5	5	5	5	5	—	—	—
4IJ15GB-AUL / 4GB□KA		2.0	2.4	3.3	4.0	5.0	6.0	8.3	9.9	12	15	18	22	27	32	41	43	43	43	43	43	43	43	43
		0.23	0.28	0.38	0.46	0.58	0.69	0.96	1.2	1.4	1.7	2.1	2.5	3.1	3.8	4.7	5	5	5	5	5	5	5	5

Single-Phase 230V 50Hz

Unit = Upper values: lb-in / Lower values: N·m

Model	Speed r/min	500	416	300	250	200	166	120	100	83	60	50	41	30	25	20	16	15	12.5	10	8.3
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
3IK15GN-CWE / 3GN□KA		2.6	3.2	4.4	5.3	6.6	7.9	11	13	16	20	24	29	36	43	43	43	43	43	43	43
		0.30	0.36	0.51	0.61	0.76	0.91	1.3	1.5	1.8	2.3	2.7	3.3	4.1	5	5	5	5	5	5	5

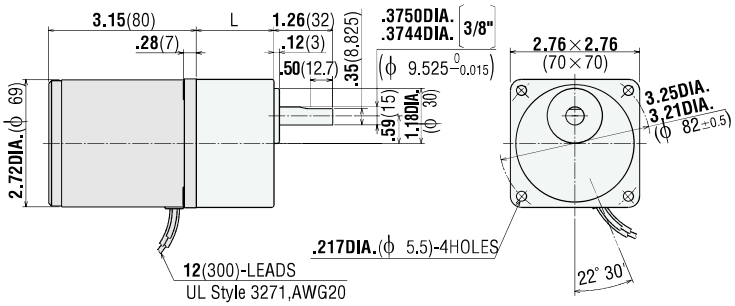
- Gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (50 Hz: 1500r/min, 60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

Dimensions Scale 1/4, Unit = **inch** (mm)

①Motor/Gearhead

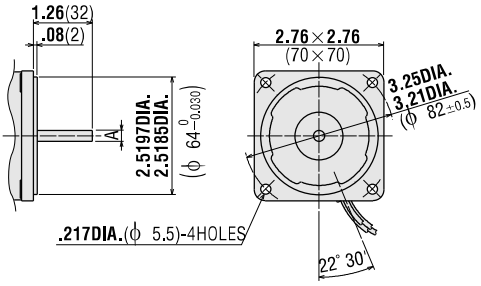
3IK15GN-AWU
3IK15GN-CWE
3IK15GN-AUL
Weight (Mass): 2.4 lb.(1.1 kg)

3GN□KA
Weight (Mass): 1.21 lb.(0.55 kg)



L=1.26 (32) **3GN3KA~18KA**
L=1.65 (42) **3GN25KA~180KA**

3IK15A-AWU Round Shaft Type
3IK15A-CWE
3IK15A-AULA
Weight (Mass): 2.4 lb.(1.1 kg)

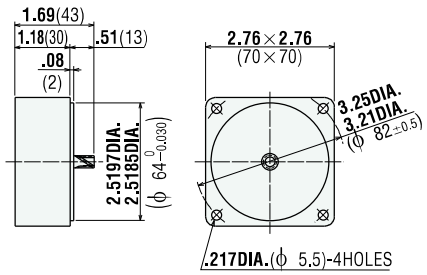


Unit = **inch** (mm)

Model	Shaft Diameter A
3IK15A-AWU **3IK15A-CWE**	.2362DIA. .2357DIA. (ϕ 6 0 −0.012)
3IK15A-AULA	.2500DIA. .2496DIA. [1/4"](ϕ 6.350 0 −0.010)

●Decimal Gearhead

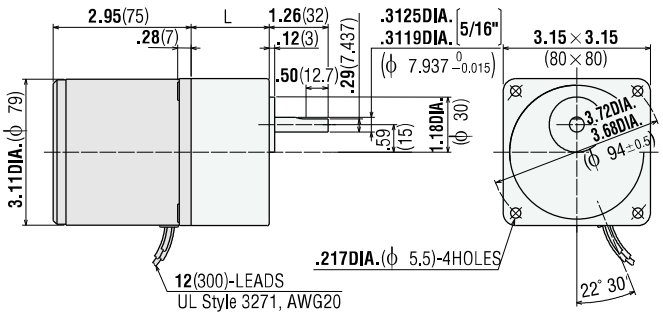
3GN10XK Weight (Mass): 0.66 lb.(0.3 kg)



②Motor/Gearhead

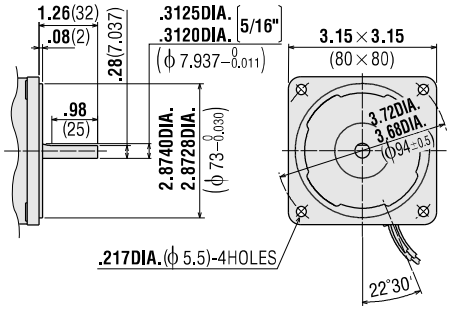
4IJ15GB-AUL
Weight (Mass): 3.1 lb.(1.4 kg)

4GB□KA
Weight (Mass): 1.43 lb.(0.65 kg)



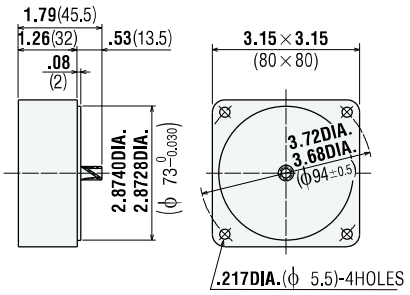
L=1.26 (32) **4GB3KA~18KA**
L=1.67 (42.5) **4GB25KA~360KA**

4IJ15A-AULA Round Shaft Type
Weight (Mass): 3.1 lb.(1.4 kg)

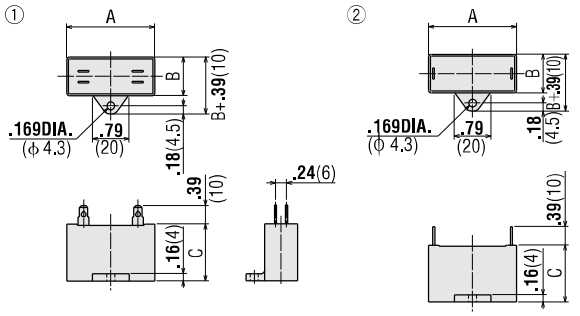


●Decimal Gearhead

4GB10XK Weight (Mass): 0.77 lb.(0.35 kg)



●Capacitor (included with the motor)

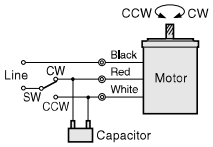
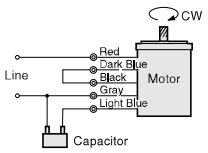
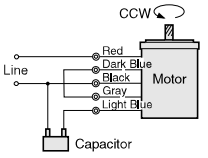


Motor Model	Capacitor Model	Dimensions inch (mm) A	B	C	Weight (Mass) oz (g)	Dimension No.
3IK15GN-AW□U **3IK15A-AW□U**	CH45FAUL	1.46 (37)	.71 (18)	1.06 (27)	1.06 (30)	①
3IK15GN-CW□E **3IK15A-CW□E**	CH10BFAUL	1.46 (37)	.71 (18)	1.06 (27)	1.06 (30)	①
3IK15GN-AUL **3IK15A-AULA**	CH40UL	1.46 (37)	.71 (18)	1.06 (27)	0.92 (26)	②
4IJ15GB-AUL **4IJ15A-AULA**	CH30UL	1.22 (31)	.67 (17)	1.06 (27)	0.71 (20)	②

If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

■ Wiring Diagrams

The direction of motor rotation is as viewed from the shaft end of the motor.

Model / Direction	Lead Wire Type **3IK15GN-AWU** **3IK15GN-CWE**	Lead Wire Type **3IK15GN-AUL** **4IJ15GB-AUL**
CW		
CCW	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.	

Change the direction of motor rotation only after bringing the motor to a stop. If an attempt is made to change the direction of rotation while the motor is rotating, the motor may ignore the reversing command or change its direction of rotation after some delay.

■ Accessories

●Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors with or without gearheads. See page [A-266] for the dimensions.

Model name **SOL3U10**
SOL4U10

●Flexible Coupling

Optional clamping couplings are available. See page [A-260] for the dimensions.

INDUCTION MOTORS

Single-Phase, Three-Phase

25W (1/30 HP)

Frame Size 3.15 in.sq.(80mm sq.)

GEAR SAFETY STD.

■ Specifications — Continuous Rating

Model Upper Model Name:Pinion Shaft Type Lower Model Name( ):Round Shaft Type Lead Wire Type Dimension ① Terminal Box Type Dimension ② Conduit Box Type Dimension ③	Output Power HP	Output Power W	Voltage V	Frequency Hz	Current A	Starting Torque oz-in	Starting Torque mN·m	Rated Torque oz-in	Rated Torque mN·m	Rated Speed r/min	Capacitor μF
4IK25GN-AWU 4IK25GN-AWTU 4IK25GN-FCH (4IK25A-AWU) (4IK25A-AWTU) (4IK25AA-FCH)	1/30	25	Single-Phase 110	60	0.46	16.7	120	23.6	170	1450	6.5
			Single-Phase 115	60							
4IK25GN-CWE 4IK25GN-CWTE 4IK25GN-ECH (4IK25A-CWE) (4IK25A-CWTE) (4IK25AA-ECH)			Single-Phase 220	60	0.22			23.6	170	1450	
			Single-Phase 230	50	0.24	16.7	120	28.5	205	1200	1.5
			Single-Phase 230	60	0.22			23.6	170	1450	
4IK25GN-SW 4IK25GN-SWT 4IK25GN-SH (4IK25A-SW) (4IK25A-SWT) (4IK25AA-SH)			Three-Phase 200	50	0.23	33.3	240	26.4	190	1300	—
			Three-Phase 200	60	0.21	22.2	160	22.2	160	1550	
			Three-Phase 220	60	0.21	22.2	160	22.2	160	1600	
			Three-Phase 230	60	0.22	22.2	160	22.2	160	1600	
4IK25GN-AUL (4IK25A-AULA) — —			Single-Phase 115	60	0.49	15.3	110	22.9	165	1500	4.5

- The product contains a built-in thermal protector. When a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.
- The "**U**" and "**E**" at the end of the model name indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate. When the motor is approved under various safety standards, the nameplate is adopted.
- The conduit box type of the motors are not VDE approved.

■ Gearmotor — Torque Table

The maximum permissible torque with a decimal gearhead with a gear ratio of 10 is 69 lb-in (8N·m). The value is 52 lb-in (6N·m) when 25:1～36:1 gearheads are connected.

- Right-Angle gearhead may be connected. See page [A-216] for more information on the right-angle gearheads.

●Single-Phase 115V/230V, Three-Phase 230V 60Hz

Unit = Upper values: lb-in / Lower values: N·m

Model	Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
4IK25GN-AWU 4IK25GN-AWTU 4IK25GN-CWE 4IK25GN-CWTE 4IK25GN-FCH 4IK25GN-ECH / **4GN□KA**		3.6	4.3	6.0	7.2	9.0	11	15	18	22	27	32	39	49	58	69	69	69	69	69	69
		0.41	0.50	0.69	0.83	1.0	1.2	1.7	2.1	2.5	3.1	3.7	4.5	5.6	6.7	8	8	8	8	8	8
4IK25GN-SW 4IK25GN-SWT 4IK25GN-SH / **4GN□KA**		3.4	4.0	5.6	6.7	8.4	10	14	17	20	25	30	36	46	55	69	69	69	69	69	69
		0.39	0.47	0.65	0.78	0.97	1.2	1.6	1.9	2.3	2.9	3.5	4.2	5.3	6.3	7.9	8	8	8	8	8
4IK25GN-AUL / 4GN□KA		3.5	4.2	5.8	7.0	8.7	10	14	17	21	26	31	38	47	57	69	69	69	69	69	69
		0.40	0.48	0.67	0.80	1.0	1.2	1.7	2.0	2.4	3.0	3.6	4.3	5.4	6.5	8	8	8	8	8	8

●Single-Phase 230V 50Hz

Unit = Upper values: lb-in / Lower values: N·m

Model	Speed r/min	500	416	300	250	200	166	120	100	83	60	50	41	30	25	20	16	15	12.5	10	8.3
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
4IK25GN-CWE 4IK25GN-CWTE 4IK25GN-ECH / **4GN□KA**		4.3	5.2	7.2	8.7	11	13	18	22	26	33	39	47	59	69	69	69	69	69	69	69
		0.50	0.60	0.83	1.0	1.2	1.5	2.1	2.5	3.0	3.7	4.5	5.4	6.8	8	8	8	8	8	8	8

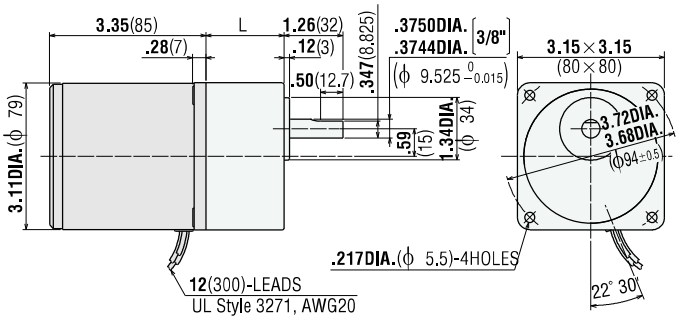
- Gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (50 Hz: 1500r/min, 60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ～ 20% less than the displayed value, depending on the size of the load.

Dimensions Scale 1/4, Unit = **inch** (mm)

①Motor/Gearhead

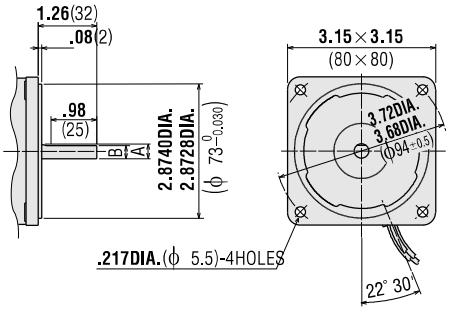
4IK25GN-AWU
4IK25GN-CWE
4IK25GN-SW
4IK25GN-AUL
Weight (Mass): 3.3 lb.(1.5 kg)

4GN□KA
Weight (Mass): 1.43 lb.(0.65 kg)



L=**1.26** (32) **4GN3KA**~**18KA**
L=**1.67** (42.5) **4GN25KA**~**180KA**

4IK25A-AWU Round Shaft Type
4IK25A-CWE
4IK25A-SW
4IK25A-AULA
Weight (Mass): 3.3 lb.(1.5 kg)



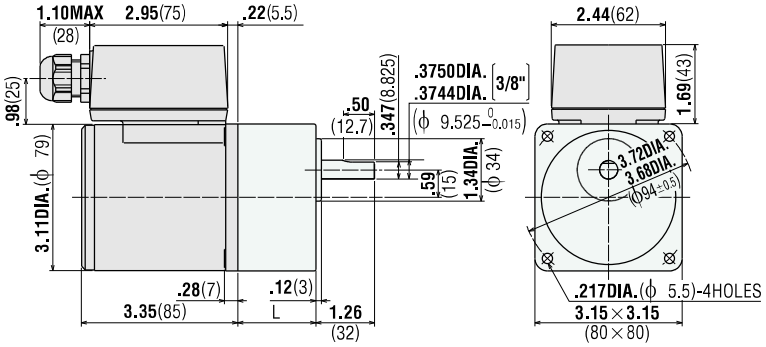
Unit = **inch** (mm)

Model	Shaft Diameter A	B
4IK25A-AWU **4IK25A-CWE** **4IK25A-SW**	.3150DIA. .3144DIA. (ϕ 8 0 −0.015)	.28(7)
4IK25A-AULA	.3125DIA. .3120DIA.	[5/16"](ϕ 7.937 0 −0.011) .28(7.037)

②Motor/Gearhead

4IK25GN-AWTU
4IK25GN-CWTE
4IK25GN-SWT
Weight (Mass): 3.7 lb.(1.7 kg)

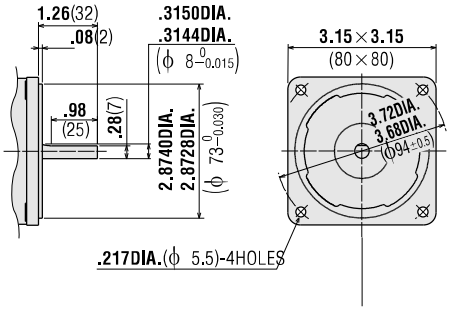
4GN□KA
Weight (Mass): 1.43 lb.(0.65 kg)



L=**1.26** (32) **4GN3KA**~**18KA**
L=**1.67** (42.5) **4GN25KA**~**180KA**

Use cabtyre cable with the diameter of .24DIA.(ϕ 6)~.47DIA.(ϕ 12).

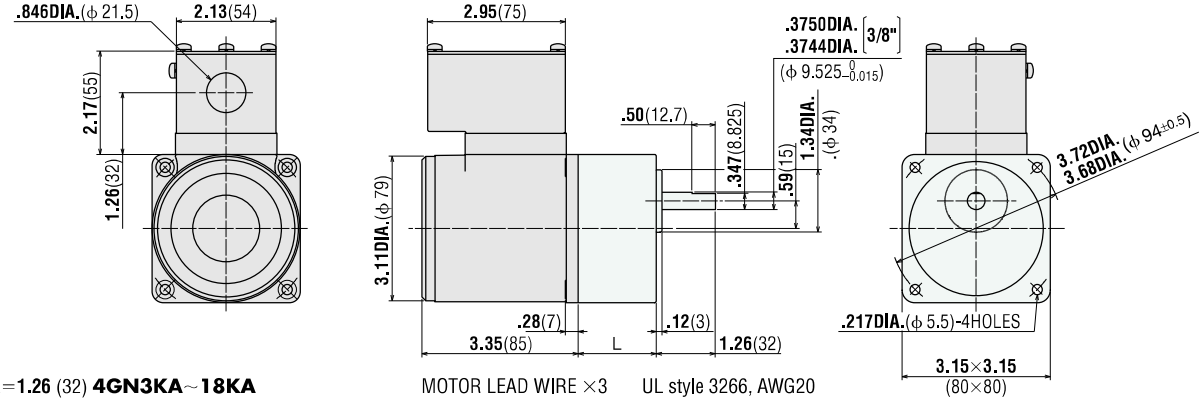
4IK25A-AWTU Round Shaft Type
4IK25A-CWTE
4IK25A-SWT
Weight (Mass): 3.7 lb.(1.7 kg)



③Motor/Gearhead

4IK25GN-FCH
4IK25GN-ECH
Weight (Mass): 4.2 lb.(1.9 kg)

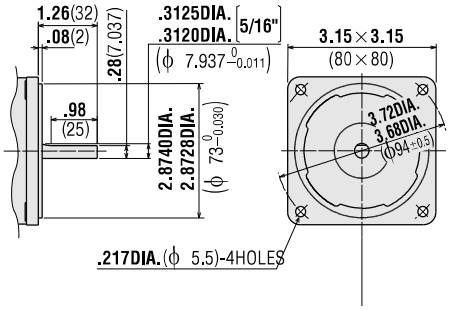
4GN□KA
Weight (Mass): 1.43 lb.(0.65 kg)



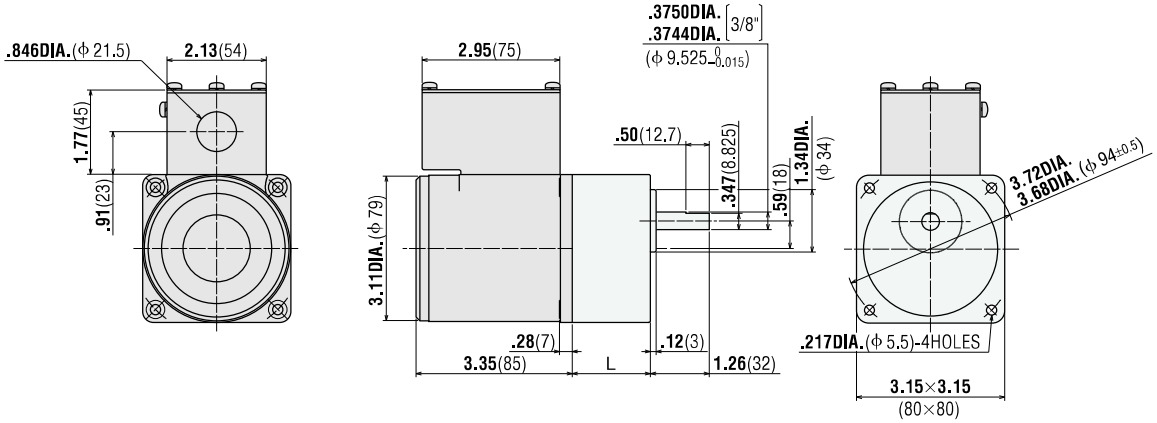
L=**1.26** (32) **4GN3KA**~**18KA**
L=**1.67** (42.5) **4GN25KA**~**180KA**

MOTOR LEAD WIRE ×3 UL style 3266, AWG20
GROUND LEAD WIRE ×1 UL style 3266, AWG18

4IK25AA-FCH Round Shaft Type
4IK25AA-ECH
Weight (Mass): 4.2 lb.(1.9 kg)

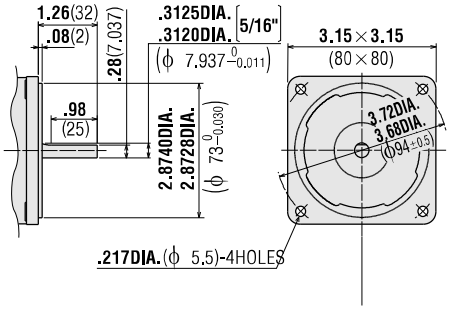


4IK25GN-SH / **4GN□KA**
Weight (Mass): 3.7 lb.(1.7 kg) / Weight (Mass): 1.43 lb.(0.65 kg)



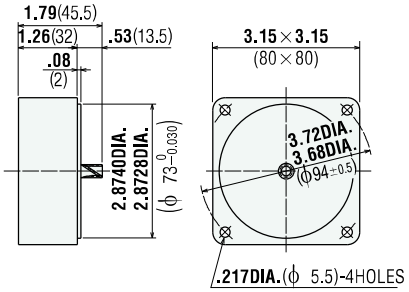
L=**1.26** (32) **4GN3KA**~**18KA**	MOTOR LEAD WIRE ×3	UL style 3266, AWG20
L=**1.67** (42.5) **4GN25KA**~**180KA**	GROUND LEAD WIRE ×1	UL style 3266, AWG18

4IK25AA-SH Round Shaft Type
Weight (Mass): 3.7 lb.(1.7 kg)

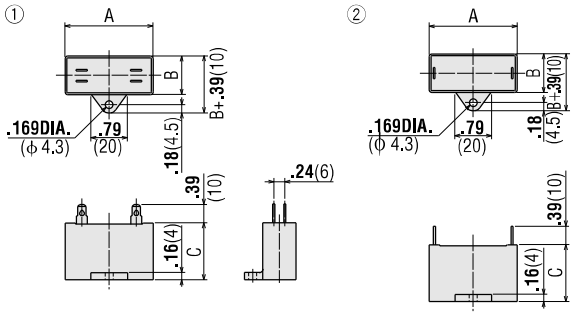


●Decimal Gearhead

4GN10XK Weight (Mass): 0.88 lb.(0.4 kg)



●Capacitor (included with the motor)



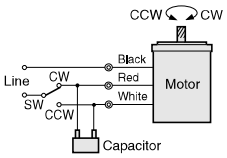
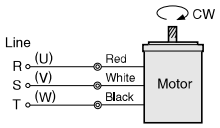
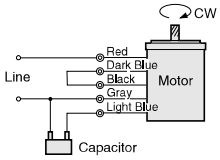
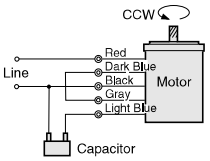
Motor Model	Capacitor Model	Dimensions in. (mm) A	B	C	Weight (Mass) oz (g)	Dimension No.
4IK25GN-AW□U **4IK25A-AW□U**	CH65CFAUL	1.50 (38)	0.83 (21)	1.22 (31)	1.23 (35)	①
4IK25GN-CW□E **4IK25A-CW□E**	CH15BFAUL	1.50 (38)	0.83 (21)	1.22 (31)	1.23 (35)	①
4IK25GN-AUL **4IK25A-AULA**	CH45UL	1.46 (37)	0.71 (18)	1.06 (27)	0.92 (26)	②

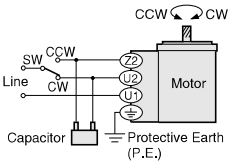
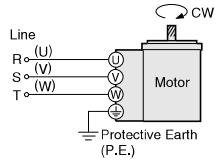
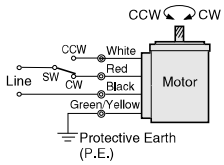
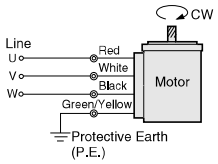
If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

■ Right-Angle Gearheads

The right-angle gearhead provides an output shaft that is at a right angle to the motor's output shaft. See page [A-216] for specifications and other information.

Wiring Diagrams The direction of motor rotation is as viewed from the shaft end of the motor.

Model / Direction	Lead Wire Type		
	4IK25GN-AWU **4IK25GN-CWE**	**4IK25GN-SW**	**4IK25GN-AUL**
CW			
CCW	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.	To change the rotation, change any two connections between U, V and W.	

Model / Direction	Terminal Box Type		Conduit Box Type	
	4IK25GN-AWTU **4IK25GN-CWTE**	**4IK25GN-SWT**	**4IK25GN-FCH** **4IK25GN-ECH**	**4IK25GN-SH**
CW				
CCW	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.	To change the rotation, change any two connections between U, V and W.	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.	To change the rotation, change any two connections between U, V and W.

Change the direction of motor rotation only after bringing the motor to a stop.
If an attempt is made to change the direction of rotation while the motor is rotating, the motor may ignore the reversing command or change its direction of rotation after some delay.

Accessories

Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors with or without gearheads. See page [A-266] for the dimensions.

Model name **SOL4U10**

Flexible Coupling

Optional clamping couplings are available. See page [A-260] for the dimensions.

INDUCTION MOTORS
Single-Phase,Three-Phase
40W (1/18.5 HP)
Frame Size 3.54 in.sq.(90mm sq.)

GEAR SAFETY STD.

Specifications — Continuous Rating

Model Upper Model Name:Pinion Shaft Type Lower Model Name( ):Round Shaft Type			Output Power		Voltage	Frequency	Current	Starting Torque		Rated Torque		Rated Speed	Capacitor
Lead Wire Type Dimension ①	Terminal Box Type Dimension ②	Conduit Box Type Dimension ③	HP	W	V	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF
5IK40GN-AWU (5IK40A-AWU)	5IK40GN-AWTU (5IK40A-AWTU)	5IK40GN-FCH (5IK40AA-FCH)	1/18.5	40	Single-Phase 110	60	0.68	27.8	200	36.1	260	1500	9
					Single-Phase 115	60	0.67						
5IK40GN-CWE (5IK40A-CWE)	5IK40GN-CWTE (5IK40A-CWTE)	5IK40GN-ECH (5IK40AA-ECH)			Single-Phase 220	60	0.35	27.8	200	36.1	260	1500	2.3
					Single-Phase 230	50	0.39			41.7	300	1300	
					Single-Phase 230	60	0.34			36.1	260	1500	
5IK40GN-SW (5IK40A-SW)	5IK40GN-SWT (5IK40A-SWT)	5IK40GN-SH (5IK40AA-SH)			Three-Phase 200	50	0.32	55.5	400	41.7	300	1300	—
					Three-Phase 200	60	0.3	36.1	260	36.1	260	1550	
					Three-Phase 220	60	0.3	36.1	260	36.1	260	1600	
					Three-Phase 230	60	0.31	36.1	260	36.1	260	1600	
5IK40GN-AUL (5IK40A-AULA)	—	—			Single-Phase 115	60	0.75	27.8	200	36.1	260	1550	8

- The product contains a built-in thermal protector. When a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.
- The "**U**" and "**E**" at the end of the model name indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate. When the motor is approved under various safety standards, the nameplate is adopted.
- The conduit box type of the motors are not VDE approved.

Gearmotor — Torque Table

The maximum permissible torque with a decimal gearhead with a gear ratio of 10 is 87 lb-in (10N·m).

- Right-Angle gearhead may be connected. See page [A-216] for more information on the right-angle gearheads.

Single-Phase 115V/230V, Three-Phase 230V 60Hz

Unit = Upper values: lb-in / Lower values: N·m

Model	Speed r/min	500	416	300	250	200	166	120	100	83	60	50	41	30	25	20	16	15	12.5	10	8.3
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
5IK40GN-AWU 5IK40GN-AWTU 5IK40GN-CWE 5IK40GN-CWTE 5IK40GN-SW 5IK40GN-SWT 5IK40GN-FCH 5IK40GN-ECH 5IK40GN-SH 5IK40GN-AUL	5GN□KA	5.5	6.6	9.,1	11	14	16	23	27	33	41	49	59	74	87	87	87	87	87	87	87
		0.63	0.76	1.1	1.3	1.6	1.9	2.6	3.2	3.8	4.7	5.7	6.8	8.6	10	10	10	10	10	10	10

Single-Phase 230V/50Hz

Unit = Upper values: lb-in / Lower values: N·m

Model	Speed r/min	500	416	300	250	200	166	120	100	83	60	50	41	30	25	20	16	15	12.5	10	8.3
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
5IK40GN-CWE 5IK40GN-CWTE 5IK40GN-ECH	5GN□KA	6.3	7.6	11	13	16	19	26	32	38	48	57	68	86	87	87	87	87	87	87	87
		0.73	0.87	1.2	1.5	1.8	2.2	3.0	3.6	4.4	5.5	6.6	7.9	9.9	10	10	10	10	10	10	10

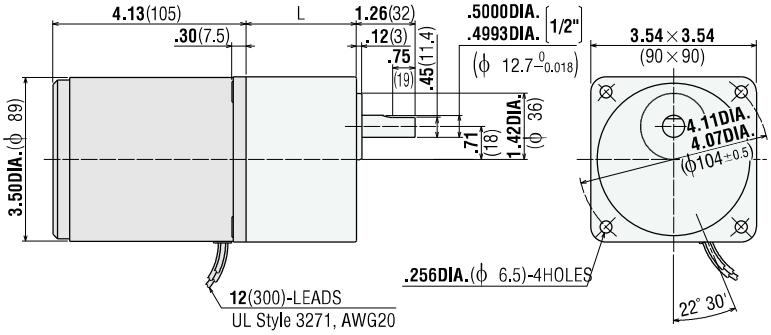
- Gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (50 Hz: 1500r/min, 60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

Dimensions Scale 1/4, Unit = **inch** (mm)

①Motor/Gearhead

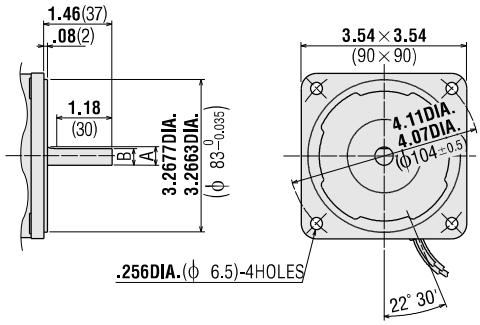
5IK40GN-AWU
5IK40GN-CWE
5IK40GN-SW
5IK40GN-AUL
Weight (Mass): 5.5 lb.(2.5 kg)

5GN□KA
Weight (Mass): 3.3 lb.(1.5 kg)



L=**1.65** (42) **5GN3KA**~**18KA**
L=**2.36** (60) **5GN25KA**~**180KA**

5IK40A-AWU Round Shaft Type
5IK40A-CWE
5IK40A-SW
5IK40A-AULA
Weight (Mass): 5.5 lb.(2.5 kg)



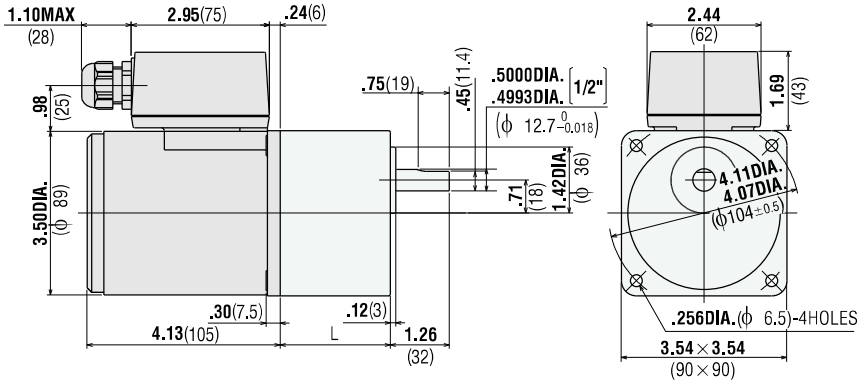
Unit = **inch** (mm)

Model	Shaft Diameter A	B
5IK40A-AWU **5IK40A-CWE** **5IK40A-SW**	**.3937DIA.** **.3931DIA.** (ϕ 10 0 -0.015)	**.35**(9)
5IK40A-AULA	**.3750DIA.** **.3744DIA.**	**[3/8"]**(ϕ 9.525 0 -0.011) **.35**(8.825)

②Motor/Gearhead

5IK40GN-AWTU
5IK40GN-CWTE
5IK40GN-SWT
Weight (Mass): 5.7 lb.(2.6 kg)

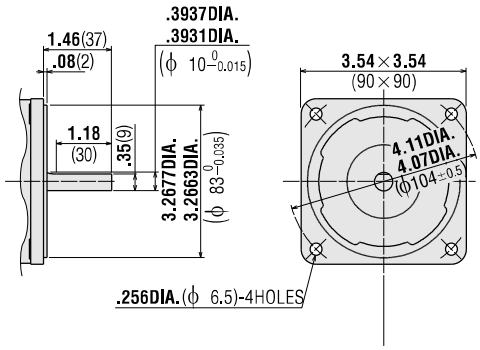
5GN□KA
Weight (Mass): 3.3 lb.(1.5 kg)



L=**1.65** (42) **5GN3KA**~**18KA**
L=**2.36** (60) **5GN25KA**~**180KA**

Use cabtyre cable with the diameter of
.24DIA.(ϕ 6)~**.47DIA.**(ϕ 12).

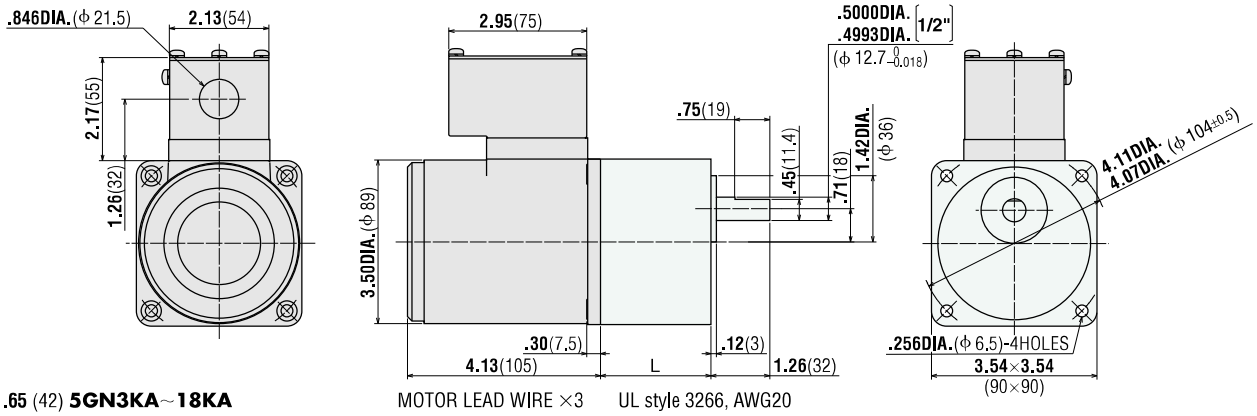
5IK40A-AWTU Round Shaft Type
5IK40A-CWTE
5IK40A-SWT
Weight (Mass): 5.7 lb.(2.6 kg)



③Motor/Gearhead

5IK40GN-FCH
5IK40GN-ECH
Weight (Mass): 6.0 lb.(2.7 kg)

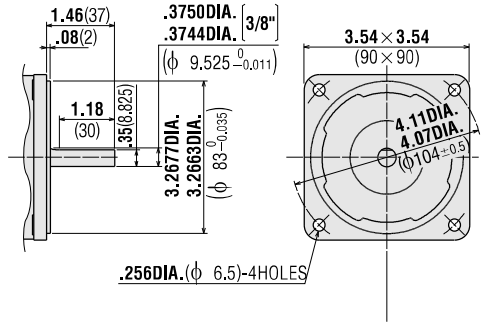
5GN□KA
Weight (Mass): 3.3 lb.(1.5 kg)



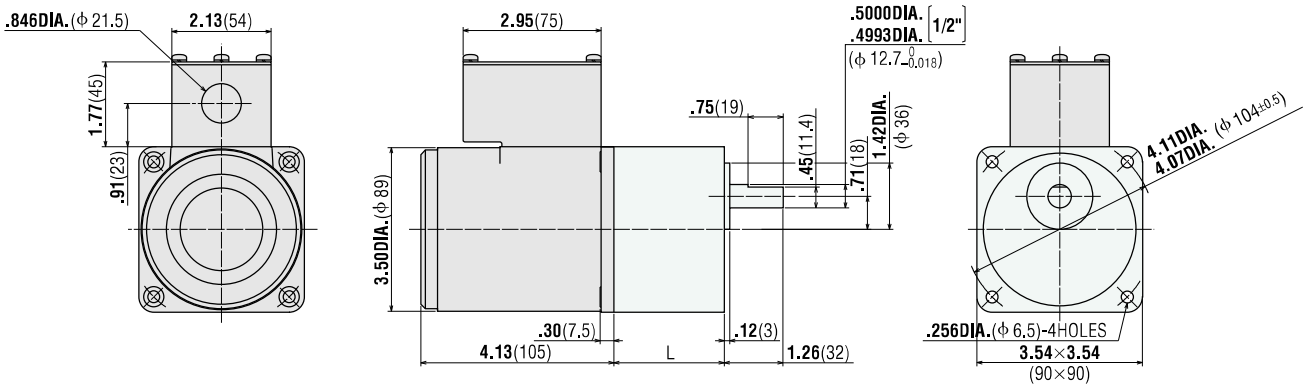
L=**1.65** (42) **5GN3KA**~**18KA**
L=**2.36** (60) **5GN25KA**~**180KA**

MOTOR LEAD WIRE ×3 UL style 3266, AWG20
GROUND LEAD WIRE ×1 UL style 3266, AWG18

5IK40AA-FCH Round Shaft Type
5IK40AA-ECH
Weight (Mass): 6.0 lb.(2.7 kg)



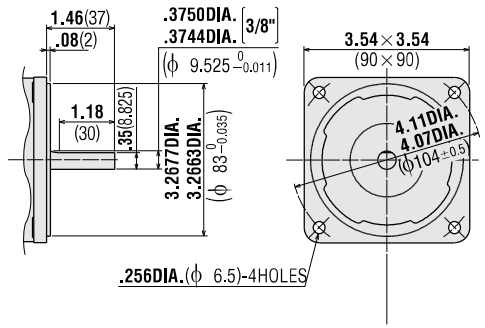
5IK40GN-SH / **5GN□KA**
Weight (Mass): 5.5 lb.(2.5 kg) / Weight (Mass): 3.31 lb.(1.5 kg)



L=**1.65** (42) **5GN3KA**~**18KA**
L=**2.36** (60) **5GN25KA**~**180KA**

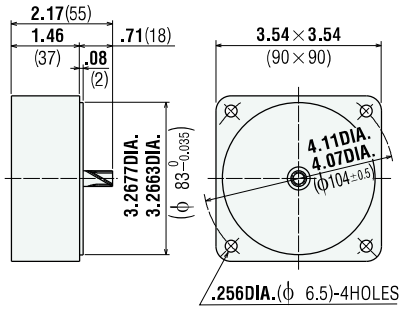
MOTOR LEAD WIRE ×3 UL style 3266, AWG20
GROUND LEAD WIRE ×1 UL style 3266, AWG18

5IK40AA-SH Round Shaft Type
Weight (Mass): 5.5 lb.(2.5 kg)

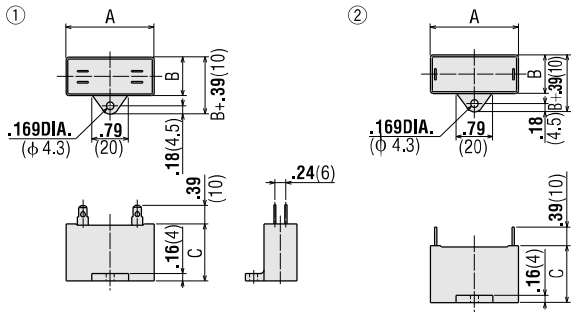


●Decimal Gearhead

5GN10XK Weight: 1.32 lb.(0.6 kg)



●Capacitor (included with the motor)



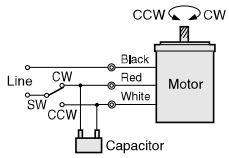
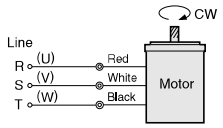
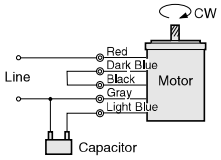
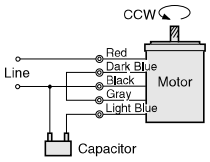
Motor Model	Capacitor Model	Dimensions in. (mm) A	B	C	Weight (Mass) oz (g)	Dimension No.
5IK40GN-AW□U **5IK40A-AW□U**	CH90CFAUL	1.89 (48)	0.83 (21)	1.22 (31)	1.41 (40)	①
5IK40GN-CW□E **5IK40A-CW□E**	CH23BFAUL	1.89 (48)	0.83 (21)	1.22 (31)	1.41 (40)	①
5IK40GN-AUL **5IK40A-AULA**	CH80UL	1.50 (38)	0.83 (21)	1.22 (31)	1.23 (35)	②

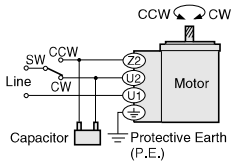
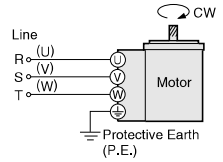
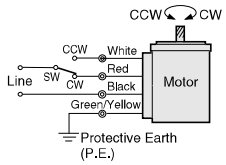
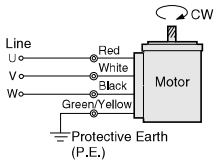
If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

■ Right-Angle Gearheads

The right-angle gearhead provides an output shaft that is at a right angle to the motor's output shaft. See page [A-216] for specifications and other information.

Wiring Diagrams The direction of motor rotation is as viewed from the shaft end of the motor.

Model / Direction	Lead Wire Type		
	5IK40GN-AWU 5IK40GN-CWE	**5IK40GN-SW**	**5IK40GN-AUL**
CW			
	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.	To change the rotation, change any two connections between U, V and W.	
CCW			

Model / Direction	Terminal Box Type		Conduit Box Type	
	5IK40GN-AWTU 5IK40GN-CWTE	**5IK40GN-SWT**	**5IK40GN-FCH 5IK40GN-ECH**	**5IK40GN-SH**
CW				
	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.	To change the rotation, change any two connections between U, V and W.	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.	To change the rotation, change any two connections between U, V and W.
CCW				

Change the direction of motor rotation only after bringing the motor to a stop.
If an attempt is made to change the direction of rotation while the motor is rotating, the motor may ignore the reversing command or change its direction of rotation after some delay.

Accessories

Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors with or without gearheads. See page [A-266] for the dimensions.

Model name **SOL5UA**

Flexible Coupling

Optional clamping couplings are available. See page [A-260] for the dimensions.

INDUCTION MOTORS

Single-Phase, Three-Phase

60W (1/12.5 HP)

Frame Size 3.54 in.sq.(90mm sq.)

GEAR SAFETY STD.

■ Specifications — Continuous Rating

Model Upper Model Name:Pinion Shaft Type Lower Model Name( ):Round Shaft Type			Output Power		Voltage	Frequency	Current	Starting Torque		Rated Torque		Rated Speed	Capacitor
Lead Wire Type Dimension ①	Terminal Box Type Dimension ②	Conduit Box Type Dimension ③	HP	W	V	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF
5IK60GU-AWU (5IK60A-AWU)	5IK60GU-AWTU (5IK60A-AWTU)	5IK60GU-FCH (5IK60A-FCH)	1/12.5	60	Single-Phase 110	60	1.09	44.4	320	56.2	405	1450	18
					Single-Phase 115	60	1.1						
5IK60GU-CWE (5IK60A-CWE)	5IK60GU-CWTE (5IK60A-CWTE)	5IK60GU-ECH (5IK60A-ECH)			Single-Phase 220	60	0.54			56.2	405	1450	
					Single-Phase 230	50	0.57	44.4	320	68	490	1200	4
					Single-Phase 230	60	0.54			56.2	405	1450	
5IK60GU-SW (5IK60A-SW)	5IK60GU-SWT (5IK60A-SWT)	5IK60GU-SH (5IK60A-SH)			Three-Phase 200	50	0.5	83.3	600	62.5	450	1300	
					Three-Phase 200	60	0.43	69.4	500	52.8	380	1550	—
					Three-Phase 220	60	0.45	69.4	500	52.8	380	1600	
					Three-Phase 230	60	0.46	69.4	500	52.8	380	1600	
5IK60GU-AFUL (5IK60A-AFUL)	—	—			Single-Phase 115	60	0.96	41.7	300	52.8	380	1550	12

- The product contains a built-in thermal protector. When a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.
- The "**U**" and "**E**" at the end of the model name indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate. When the motor is approved under various safety standards, the nameplate is adopted.
- The conduit box type of the motors are not VDE approved.

■ Gearmotor — Torque Table

The maximum permissible torque with a decimal gearhead with a gear ratio of 10 is 174 lb-in (20N·m).

- Right-Angle gearhead may be connected. See page [A-216] for more information on the right-angle gearheads.

●Single-Phase 115V/230V, Three-Phase 230V 60Hz

Unit = Upper values: lb-in / Lower values: N·m

Model	Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
5IK60GU-AWU **5IK60GU-AWTU** **5IK60GU-CWE** **5IK60GU-CWTE** **5IK60GU-FCH** **5IK60GU-ECH**	**5GU□KA**	8.5 0.98	10 1.2	14 1.6	17 2.0	21 2.5	26 3.0	32 3.7	38 4.4	46 5.3	58 6.7	70 8.0	83 9.6	116 13	139 16	155 18	174 20	174 20	174 20	174 20	174 20
5IK60GU-SW **5IK60GU-SWT** **5IK60GU-SH** **5IK60GU-AFUL**	**5GU□KA**	8 0.92	9.6 1.1	13 1.5	16 1.8	20 2.3	24 2.8	30 3.5	36 4.2	43 5	54 6.3	65 7.5	78 9	109 13	131 15	146 17	174 20	174 20	174 20	174 20	174 20

●Single-Phase 230V/50Hz

Unit = Upper values: lb-in / Lower values: N·m

Model	Speed r/min	500	416	300	250	200	166	120	100	83	60	50	41	30	25	20	16	15	12.5	10	8.3
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
5IK60GU-CWE **5IK60GU-CWTE** **5IK60GU-ECH**	**5GU□KA**	10 1.2	12 1.4	17 2.0	21 2.4	26 3.0	31 3.6	39 4.5	47 5.4	56 6.4	70 8.1	84 9.7	101 12	140 16	168 19	174 20	174 20	174 20	174 20	174 20	174 20

- Gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (50 Hz: 1500r/min, 60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

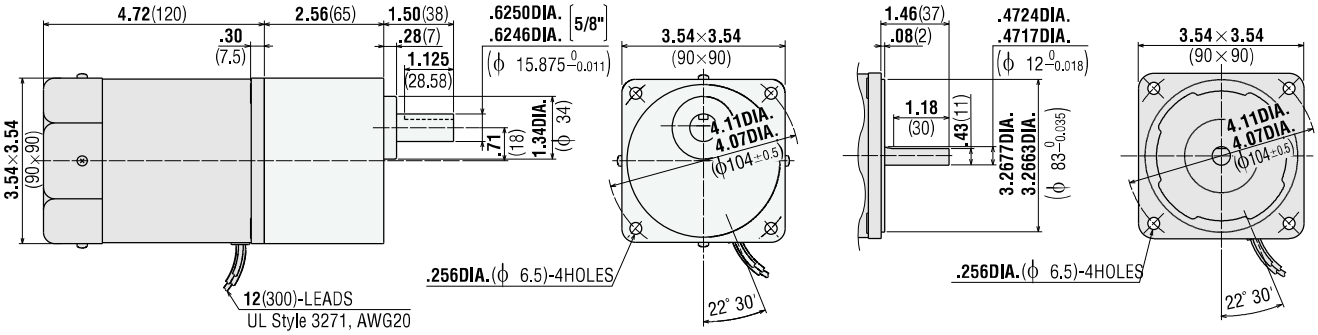
Dimensions Scale 1/4, Unit = **inch** (mm)

①Motor/Gearhead

5IK60GU-AWU
5IK60GU-CWE
5IK60GU-SW
5IK60GU-AFUL
Weight (Mass): 6.0 lb.(2.7 kg)

5GU□KA
Weight (Mass): 3.3 lb.(1.5 kg)

5IK60A-AWU Round Shaft Type
5IK60A-CWE
5IK60A-SW
5IK60A-AFUL
Weight (Mass): 6.0 lb.(2.7 kg)

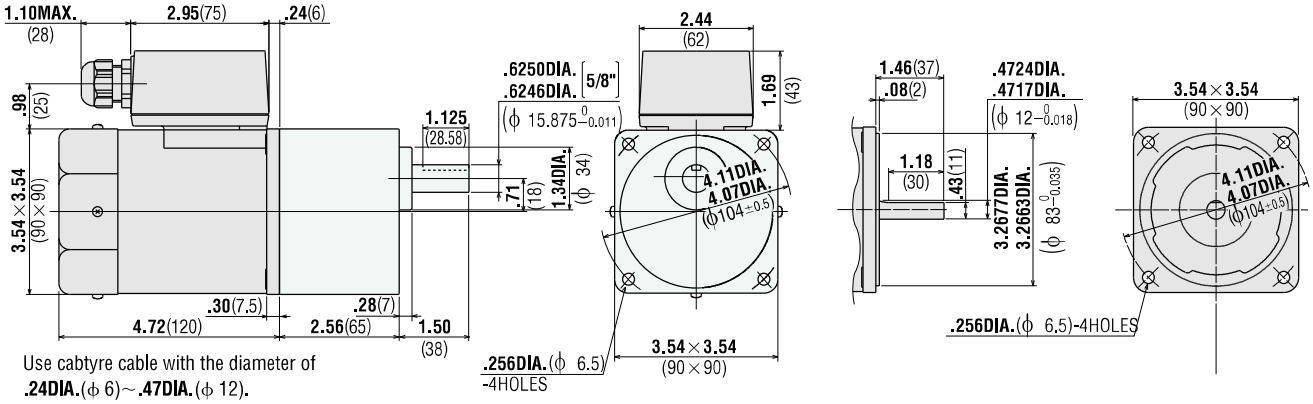


②Motor/Gearhead

5IK60GU-AWTU
5IK60GU-CWTE
5IK60GU-SWT
Weight (Mass): 6.2 lb.(2.8 kg)

5GU□KA
Weight (Mass): 3.3 lb.(1.5 kg)

5IK60A-AWTU Round Shaft Type
5IK60A-CWTE
5IK60A-SWT
Weight (Mass): 6.2 lb.(2.8 kg)

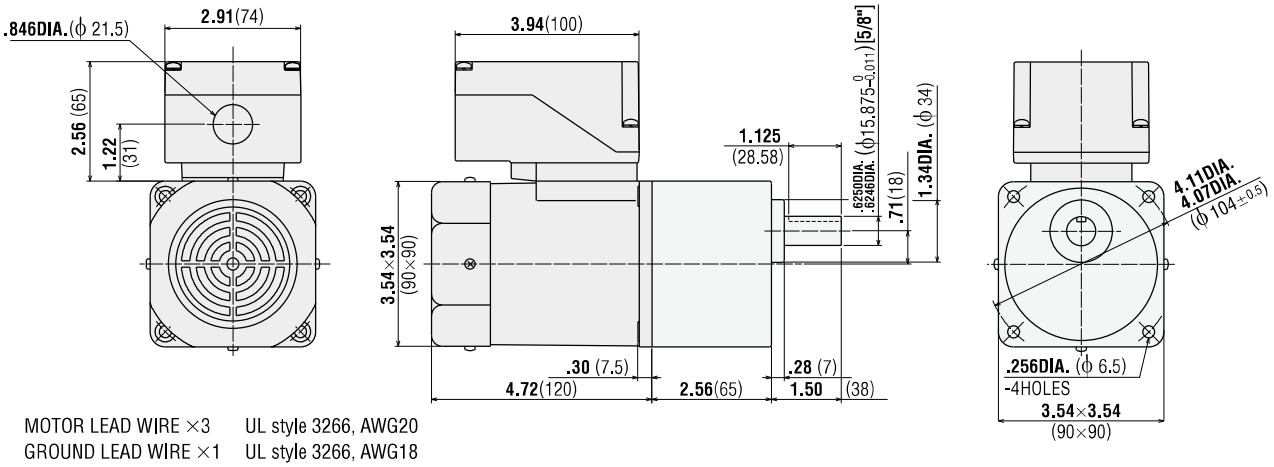


Use cabtyre cable with the diameter of **.24DIA.**(ϕ 6)~**.47DIA.**(ϕ 12).

③Motor/Gearhead

5IK60GU-FCH
5IK60GU-ECH
Weight (Mass): 7.1 lb.(3.2 kg)

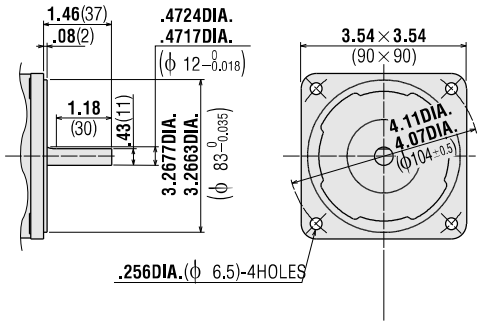
5GU□KA
Weight (Mass): 3.3 lb.(1.5 kg)



MOTOR LEAD WIRE ×3 UL style 3266, AWG20
GROUND LEAD WIRE ×1 UL style 3266, AWG18

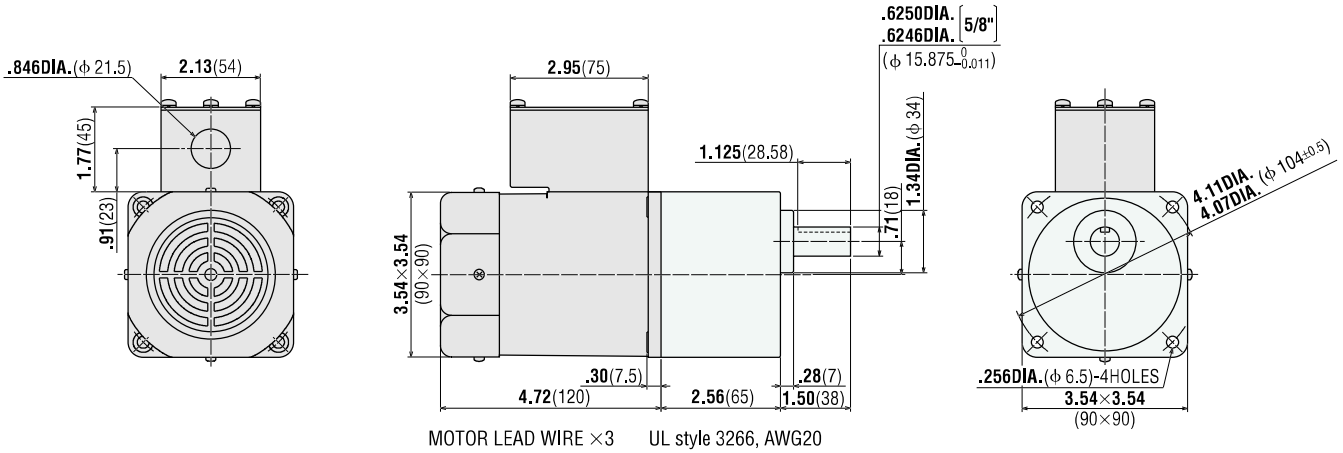
5IK60A-FCH
5IK60A-ECH

Weight (Mass): 7.1 lb.(3.2 kg)



5IK60GU-SH / **5GU□KA**

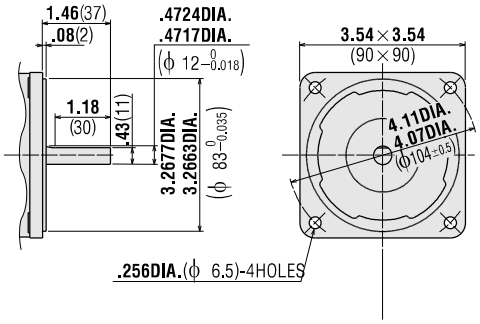
Weight (Mass): 6.2 lb.(2.8 kg) / Weight (Mass): 3.3 lb.(1.5 kg)



MOTOR LEAD WIRE ×3 UL style 3266, AWG20
GROUND LEAD WIRE ×1 UL style 3266, AWG18

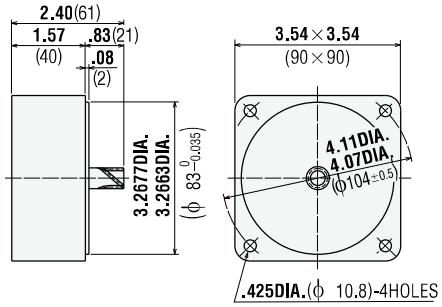
5IK60A-SH Round Shaft Type

Weight (Mass): 6.2 lb.(2.8 kg)



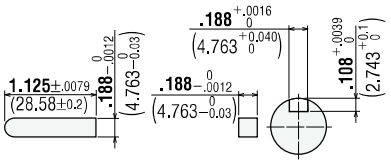
●Decimal Gearhead

5GU10XKB Weight (Mass): 1.32 lb.(0.6 kg)

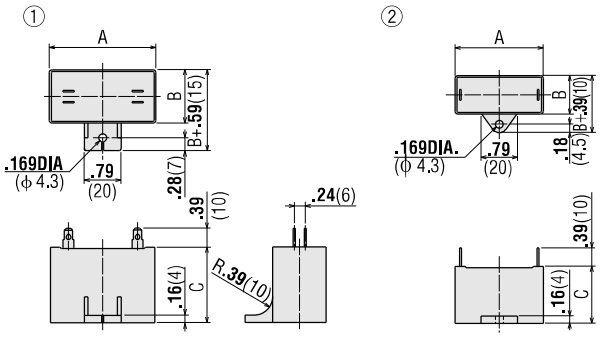


●Key and Key Slot Scale 1/2

(The key is provided with the gearhead)



●Capacitor (included with the motor)



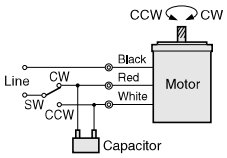
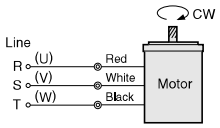
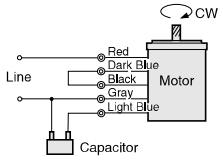
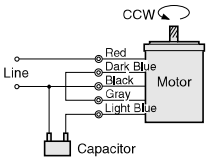
Motor Model	Capacitor Model	Dimensions in. (mm) A	B	C	Weight oz (g)	Dimension No.
5IK60GU-AW□U **5IK60A-AW□U**	CH180CFAUL	2.28 (58)	0.93 (23.5)	1.46 (37)	2.47 (70)	①
5IK60GU-CW□E **5IK60A-CW□E**	CH40BFAUL	2.28 (58)	0.93 (23.5)	1.46 (37)	2.47 (70)	①
5IK60GU-AFUL **5IK60A-AFUL**	CH120CUL	2.28 (58)	0.83 (21)	1.22 (31)	1.76 (50)	②

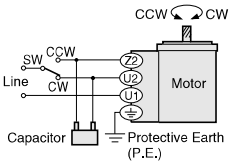
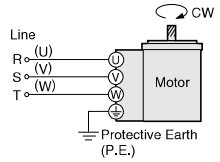
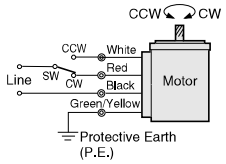
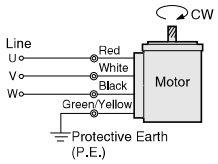
If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

■ Right-Angle Gearheads

The right-angle gearhead provides an output shaft that is at a right angle to the motor's output shaft. See page [A-216] for specifications and other information.

Wiring Diagrams The direction of motor rotation is as viewed from the shaft end of the motor.

Model / Direction	Lead Wire Type		
	5IK60GU-AWU 5IK60GU-CWE	**5IK60GU-SW**	**5IK60GU-AFUL**
CW			
CCW	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.	To change the rotation, change any two connections between U, V and W.	

Model / Direction	Terminal Box Type		Conduit Box Type	
	5IK60GU-AWTU 5IK60GU-CWTE	**5IK60GU-SWT**	**5IK60GU-FCH 5IK60GU-ECH**	**5IK60GU-SH**
CW				
CCW	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.	To change the rotation, change any two connections between U, V and W.	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.	To change the rotation, change any two connections between U, V and W.

Change the direction of motor rotation only after bringing the motor to a stop.
If an attempt is made to change the direction of rotation while the motor is rotating, the motor may ignore the reversing command or change its direction of rotation after some delay.

Accessories

Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors with or without gearheads. See page [A-266] for the dimensions.

Model name **SOL5UA**

Flexible Coupling

Optional clamping couplings are available. See page [A-260] for the dimensions.

INDUCTION MOTORS
Single-Phase, Three-Phase
90W (1/8 HP)

Frame Size 3.54 in.sq.(90mm sq.)

GEAR SAFETY STD.

■ Specifications — Continuous Rating

Model Upper Model Name:Pinion Shaft Type Lower Model Name( ):Round Shaft Type			Output Power		Voltage	Frequency	Current	Starting Torque		Rated Torque		Rated Speed	Capacitor
Lead Wire Type Dimension ①	Terminal Box Type Dimension ②	Conduit Box Type Dimension ③	HP	W	V	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF
5IK90GU-AWU (5IK90A-AWU)	5IK90GU-AWTU (5IK90A-AWTU)	5IK90GU-FCH (5IK90A-FCH)	1/8	90	Single Phase 110	60	1.45	62.5	450	81.2	585	1500	20
					Single Phase 115	60	1.44						
5IK90GU-CWE (5IK90A-CWE)	5IK90GU-CWTE (5IK90A-CWTE)	5IK90GU-ECH (5IK90A-ECH)			Single Phase 220	60	0.82	62.5	450	84	605	1450	6
					Single Phase 230	50	0.76	62.5	450	101.4	730	1200	
					Single Phase 230	60	0.81	62.5	450	84	605	1450	
5IK90GU-SW (5IK90A-SW)	5IK90GU-SWT (5IK90A-SWT)	5IK90GU-SH (5IK90A-SH)			Three Phase 200	50	0.64	118	850	94.4	680	1300	—
					Three Phase 200	60	0.59	97.2	700	79.2	570	1550	
					Three Phase 220	60	0.6	97.2	700	79.2	570	1600	
					Three Phase 230	60	0.61	97.2	700	79.2	570	1600	
5IK90GU-AFUL (5IK90A-AFUL)	—	—			Single Phase 115	60	1.5	62.5	450	79.2	570	1550	20

- The product contains a built-in thermal protector. When a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.
- The "**U**" and "**E**" at the end of the model name indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate. When the motor is approved under various safety standards, the nameplate is adopted.
- The conduit box type of the motors are not VDE approved.

■ Gearmotor — Torque Table

The maximum permissible torque with a decimal gearhead with a gear ratio of 10 is 174 lb-in (20N·m).

Right-Angle gearhead may be connected. See page [A-216] for more information on the right-angle gearheads.

●Single-Phase 115V/230V, Three-Phase 230V 60Hz

Unit = Upper values: lb-in / Lower values: N·m

Model	Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
5IK90GU-AWU 5IK90GU-AWTU 5IK90GU-FCH	5GU□KA	12 1.4	15 1.7	21 2.4	25 2.8	31 3.6	37 4.3	46 5.3	56 6.4	67 7.7	84 9.7	100 12	121 14	167 19	174 20	174 20	174 20	174 20	174 20	174 20	174 20
5IK90GU-CWE 5IK90GU-CWTE 5IK90GU-ECH	5GU□KA	13 1.5	15 1.8	21 2.5	26 2.9	32 3.7	38 4.4	48 5.5	57 6.6	69 7.9	87 10	104 12	125 14	173 20	174 20	174 20	174 20	174 20	174 20	174 20	174 20
5IK90GU-SW 5IK90GU-SWT 5IK90GU-SH 5IK90GU-AFUL	5GU□KA	12 1.4	14 1.7	20 2.3	24 2.8	30 3.5	36 4.2	45 5.2	54 6.2	65 7.5	82 9.4	98 11	118 14	163 19	174 20	174 20	174 20	174 20	174 20	174 20	174 20

●Single-Phase 230V/50Hz

Unit = Upper values : lb-in / Lower values : N·m

Model	Speed r/min	500	416	300	250	200	166	120	100	83	60	50	41	30	25	20	16	15	12.5	10	8.3
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
5IK90GU-CWE 5IK90GU-CWTE 5IK90GU-ECH	5GU□KA	15 1.8	18 2.1	26 3.0	31 3.5	39 4.4	46 5.3	58 6.7	69 8.0	83 9.6	105 12	125 14	151 17	174 20	174 20	174 20	174 20	174 20	174 20	174 20	174 20

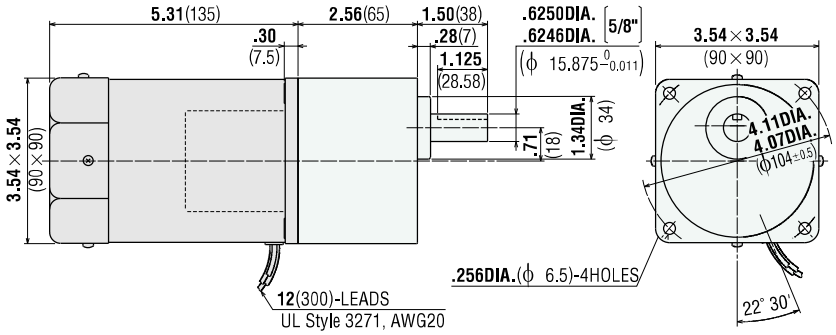
- Gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (50 Hz: 1500r/min, 60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

Dimensions Scale 1/4, Unit = **inch** (mm)

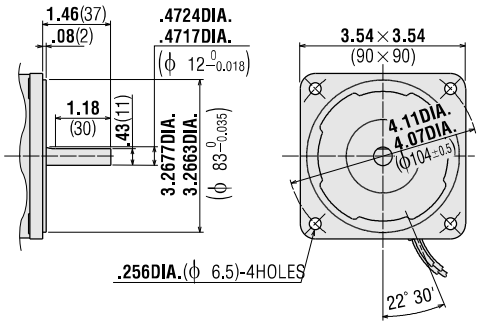
①Motor/Gearhead

5IK90GU-AWU
5IK90GU-CWE
5IK90GU-SW
5IK90GU-AFUL
Weight (Mass): 7.1 lb.(3.2 kg)

5GU□KA
Weight (Mass): 3.3 lb.(1.5 kg)



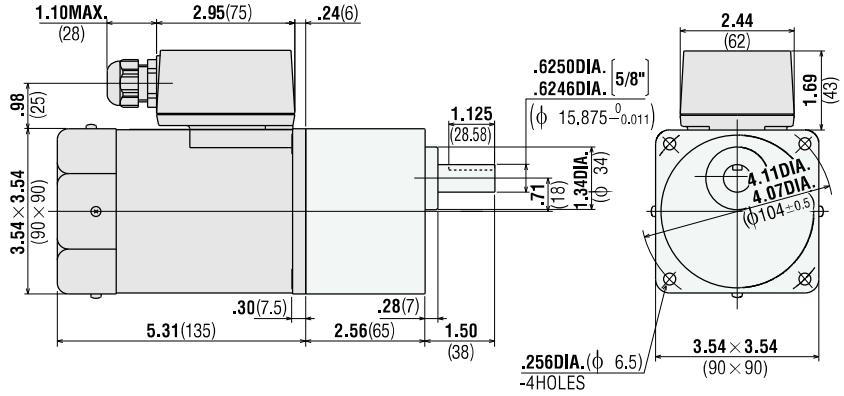
5IK90A-AWU
5IK90A-CWE
5IK90A-SW
5IK90A-AFUL
Weight (Mass): 7.1 lb.(3.2 kg)



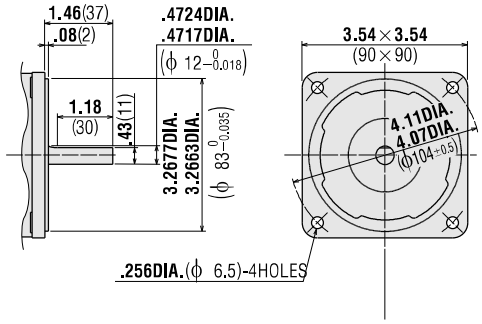
②Motor/Gearhead

5IK90GU-AWTU
5IK90GU-CWTE
5IK90GU-SWT
Weight (Mass): 7.3 lb.(3.3 kg)

5GU□KA
Weight (Mass): 3.3 lb.(1.5 kg)



5IK90A-AWTU
5IK90A-CWTE
5IK90A-SWT
Weight (Mass): 7.3 lb.(3.3 kg)

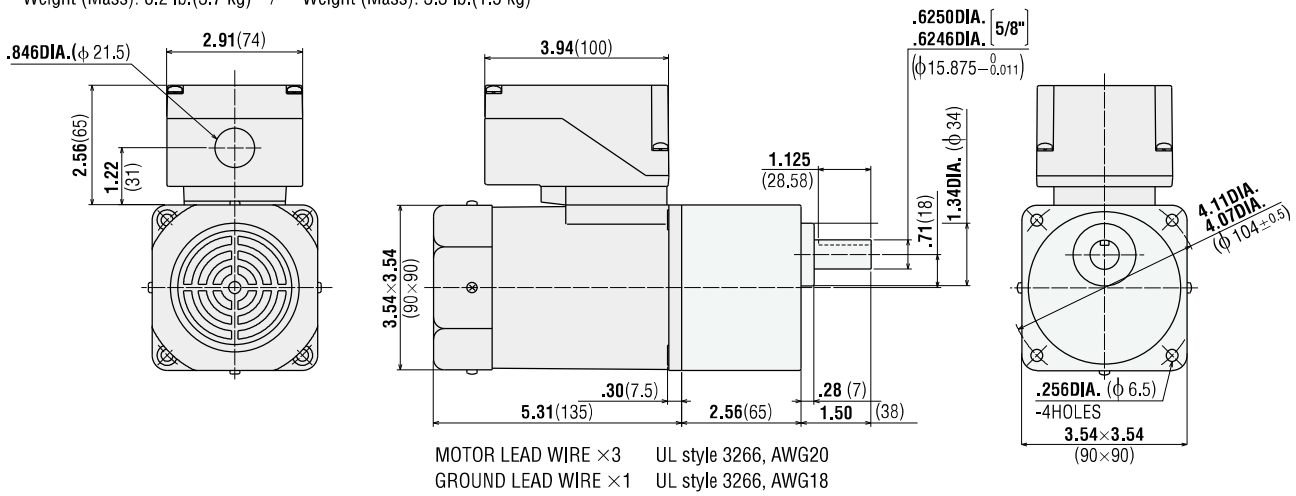


Use cabtyre cable with the diameter of
.24DIA.(ϕ 6)～**.47DIA.**(ϕ 12).

③Motor/Gearhead

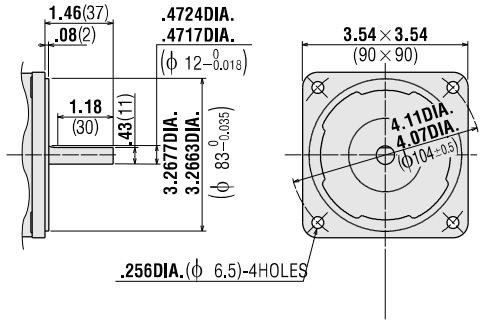
5IK90GU-FCH
5IK90GU-ECH
Weight (Mass): 8.2 lb.(3.7 kg)

5GU□KA
Weight (Mass): 3.3 lb.(1.5 kg)

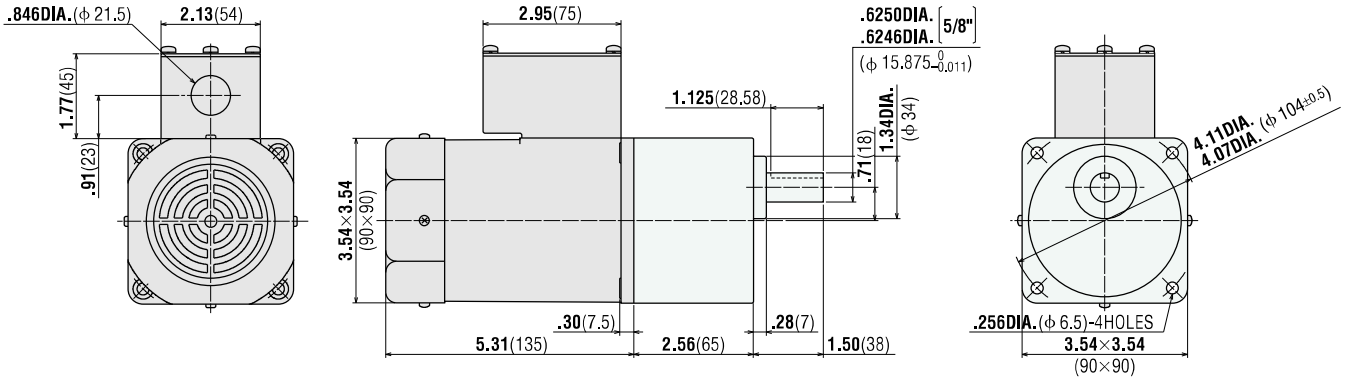


MOTOR LEAD WIRE ×3 UL style 3266, AWG20
GROUND LEAD WIRE ×1 UL style 3266, AWG18

5IK90A-FCH
5IK90A-ECH
Weight (Mass): 8.2 lb.(3.7 kg)

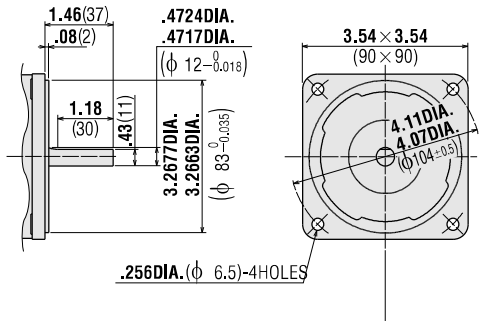


5IK90GU-SH / **5GU□KA**
Weight (Mass): 7.3 lb.(3.3 kg) / Weight (Mass): 3.3 lb.(1.5 kg)



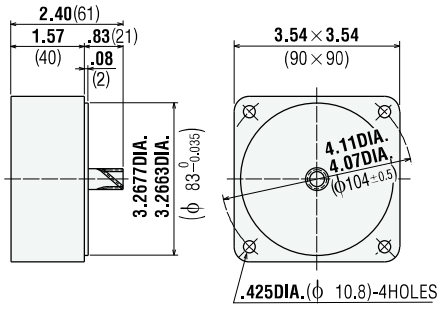
MOTOR LEAD WIRE ×3 UL style 3266, AWG20
GROUND LEAD WIRE ×1 UL style 3266, AWG18

5IK90A-SH Round Shaft Type
Weight (Mass): 7.3 lb.(3.3 kg)



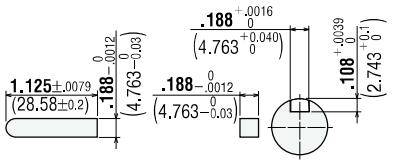
●Decimal Gearhead

5GU10XKB Weight (Mass): 1.32 lb.(0.6 kg)

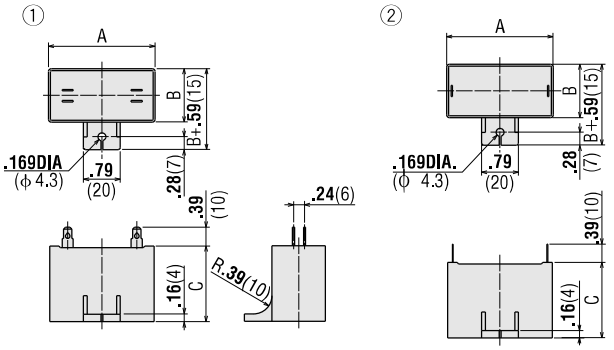


●Key and Key Slot Scale 1/2

(The key is provided with the gearhead)



●Capacitor (included with the motor)



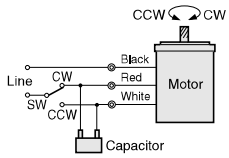
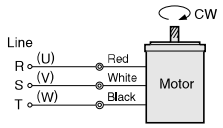
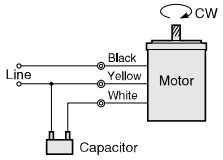
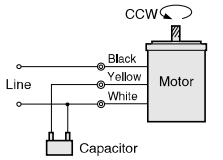
Motor Model	Capacitor Model	Dimensions in. (mm) A	B	C	Weight oz (g)	Dimension No.
5IK90GU-AW□U **5IK90A-AW□U**	CH200CFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.35 (95)	①
5IK90GU-CW□E **5IK90A-CW□E**	CH60BFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.00 (85)	①
5IK90GU-AFUL **5IK90A-AFUL**	CH200UL	2.28 (58)	0.91 (23.5)	1.46 (37)	2.29 (65)	②

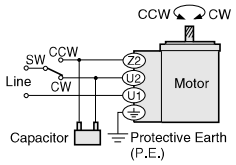
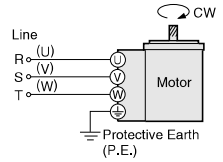
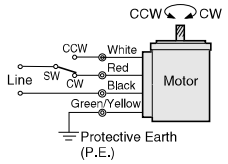
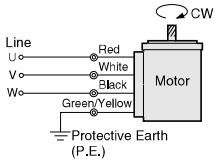
If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

■ Right-Angle Gearheads

The right-angle gearhead provides an output shaft that is at a right angle to the motor's output shaft. See page [A-216] for specifications and other information.

Wiring Diagrams The direction of motor rotation is as viewed from the shaft end of the motor.

Model / Direction	Lead Wire Type		
	5IK90GU-AWU **5IK90GU-CWE**	**5IK90GU-SW**	**5IK90GU-AFUL**
CW			
	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.	To change the rotation, change any two connections between U, V and W.	
CCW			

Model / Direction	Terminal Box Type		Conduit Box Type	
	5IK90GU-AWTU **5IK90GU-CWTE**	**5IK90GU-SWT**	**5IK90GU-FCH** **5IK90GU-ECH**	**5IK90GU-SH**
CW				
	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.	To change the rotation, change any two connections between U, V and W.	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.	To change the rotation, change any two connections between U, V and W.
CCW				

Change the direction of motor rotation only after bringing the motor to a stop.
If an attempt is made to change the direction of rotation while the motor is rotating, the motor may ignore the reversing command or change its direction of rotation after some delay.

Accessories

Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors with or without gearheads. See page [A-266] for the dimensions.

Model name **SOL5UA**

Flexible Coupling

Optional clamping couplings are available. See page [A-260] for the dimensions.

INDUCTION MOTORS **BH** Series

Single-Phase, Three-Phase

200W (1/3.73 HP)

Frame Size 4.09 in.sq.(104mm sq.)

GEAR SAFETY STD.

- **BH Series motors provide 200W output power and up to 347 lb-in (40 N·m) of torque in a compact 4.09"sq. mounting configuration.**
- **For easy installation, the BH Series motor and gearhead come pre-assembled. Motors and gearheads are also available separately so you can have them on hand to make changes or repairs.**

■ Specifications — Continuous Rating

Model Upper Model Name:Pinion Shaft Type Lower Model Name( ):Round Shaft Type		Output Power		Voltage	Frequency	Current	Starting Torque		Rated Torque		Rated Speed	Capacitor
Cable clamp Type Dimension ①	Terminal Box Type Dimension ②	HP	W	V	Hz	A	oz-in.	mN·m	oz-in.	mN·m	r/min.	μF
BHI62F-□ **(BHI62F-A)**	**BHI62FT-□** **(BHI62FT-A)**	1/3.73	200	Single Phase 110	60	3	125	900	181	1300	1500	40
				Single Phase 115	60		139	1000				
—	**BHI62ET-□** **(BHI62ET-A)**			Single Phase 220	60	1.5	139	1000	181	1300	1500	10
				Single Phase 230	50	1.5	139	1000	215	1550	1250	
				Single Phase 230	60	1.5	139	1000	181	1300	1500	
—	**BHI62ST-□** **(BHI62ST-A)**			Three Phase 200	50	1.1	215	1550	215	1550	1250	—
				Three Phase 200	60	1.1	181	1300	181	1300	1500	
				Three Phase 220	60	0.95	174	1250	174	1250	1550	
				Three Phase 230	60	0.95	167	1200	167	1200	1600	

- The product contains a built-in thermal protector. When a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.
- Enter the gear ratio in the box (□) within the model number.

■ Gearmotor — Torque Table

●Single-Phase 115V/230V 60Hz, Three-Phase 230V 60Hz

Unit = Upper values: lb-in / Lower values: N·m

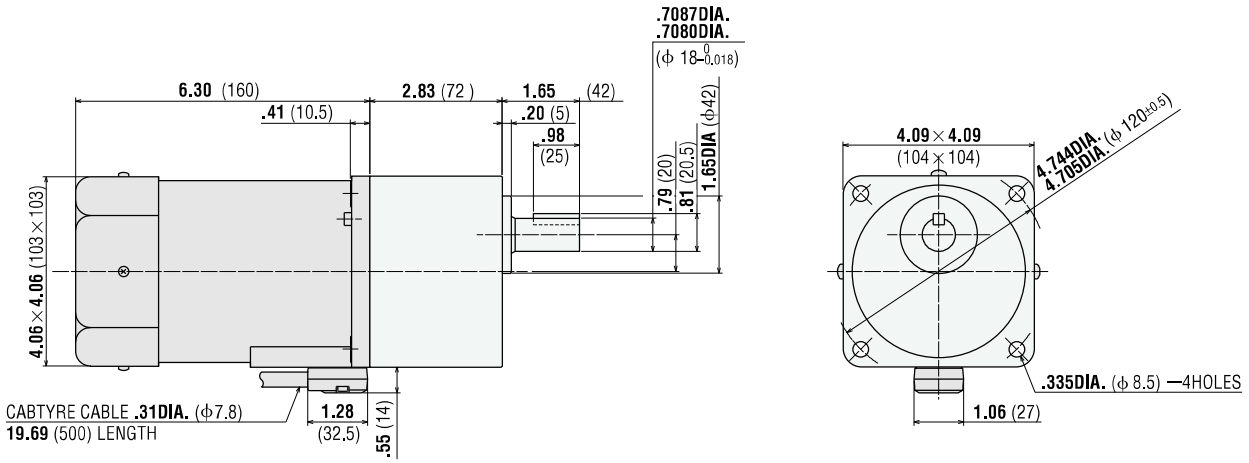
Model \ Speed r/min	500	300	200	120	100	60	50	30	20	15	10
Gear Ratio	**3.6**	**6**	**9**	**15**	**18**	**30**	**36**	**60**	**90**	**120**	**180**
BHI62F-□ **BHI62FT-□** **BHI62ET-□**	33 3.8	55 6.3	82 9.5	124 14	149 17	248 28	297 34	347 40	347 40	347 40	347 40
BHI62ST-□	3.0 3.5	51 5.8	76 8.7	114 13	137 16	229 26	274 32	347 40	347 40	347 40	347 40

- Enter the gear ratio in the box within the model number.
- The speed is calculated by dividing the motor's synchronous speed (60Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

Dimensions Scale 1/4, Unit = **inch** (mm)

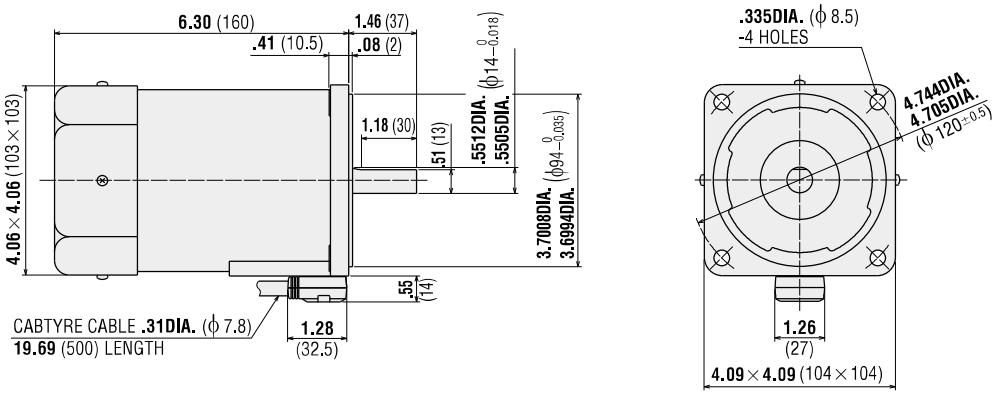
BHI62F-□

Weight (Mass): 18 lb.(8 kg)



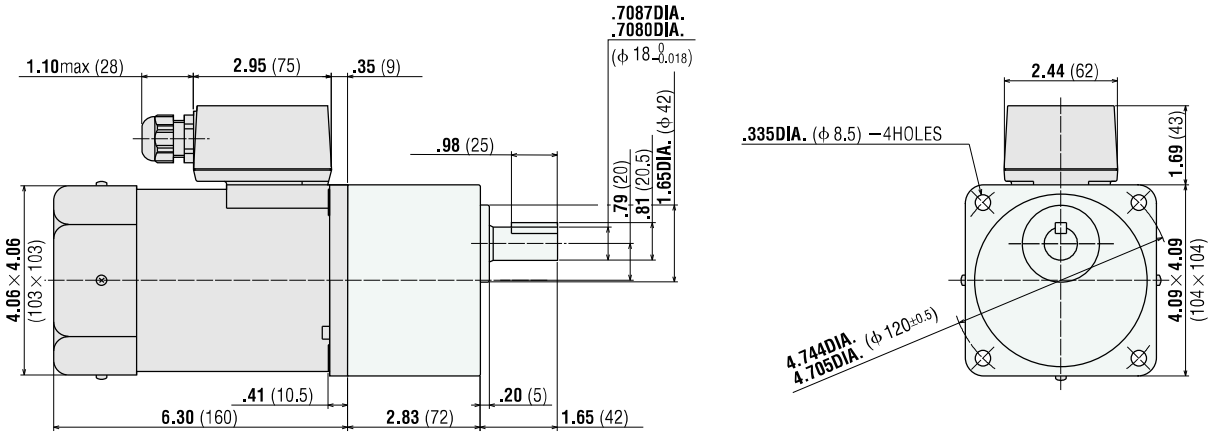
BHI62F-A

Weight (Mass): 11 lb.(5 kg)



BHI62FT-□
BHI62ET-□
BHI62ST-□

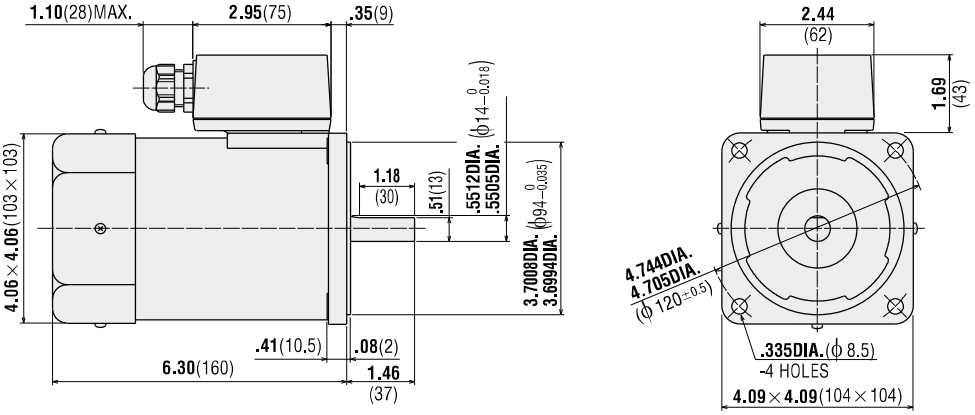
Weight (Mass): 18 lb.(8 kg)



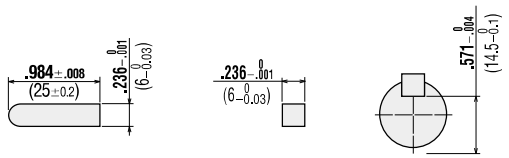
Use cabtyre cable with the diameter of **.24DIA.**(ϕ 6)～**.47DIA.**(ϕ 12).

BHI62FT-A
BHI62ET-A
BHI62ST-A

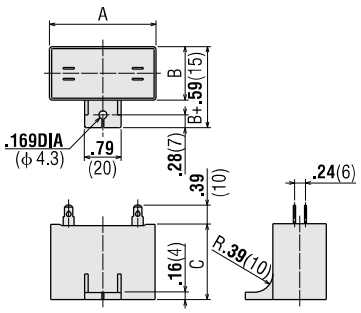
Weight (Mass): 11 lb.(5kg)



Use cabtyre cable with the diameter of **.24DIA.**(ϕ 6)～**.47DIA.**(ϕ 12).



●Capacitor (included with the motor)

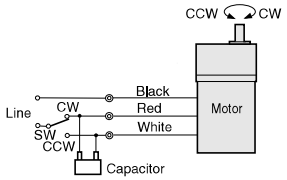
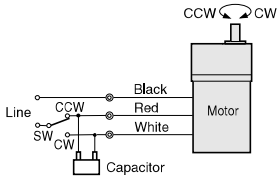
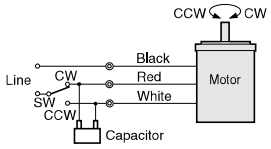


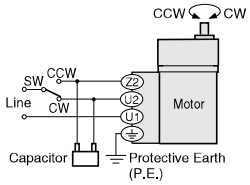
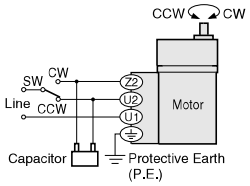
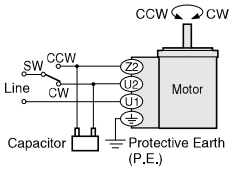
Motor Model	Capacitor Model	Dimensions in. (mm) A	B	C	Weight oz (g)
BHI62F-□ **BHI62F-A** **BHI62FT-□** **BHI62FT-A**	CH400CFAUL2	2.28 (58)	1.61 (41)	2.28 (58)	6.17 (175)
BHI62ET-□ **BHI62ET-A**	CH100BFAUL	2.28 (58)	1.38 (35)	1.97 (50)	4.66 (132)

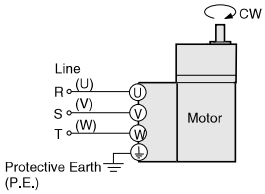
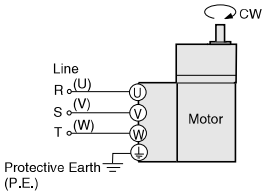
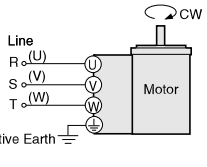
Capacitor cap is provided with the capacitor.

Wiring Diagrams

The direction of motor rotation is as viewed from the shaft end of the motor.

Model / Direction	Cable Clamp Type		
	BHI62F-3.6~9 BHI62F-60~180	**BHI62F-15~36**	**BHI62F-A**
CW			
CCW	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip this switch to CCW.	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip this switch to CCW.	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip this switch to CCW.

Model / Direction	Terminal Box Type Single-Phase		
	BHI62FT-3.6~9 BHI62ET-3.6~9 BHI62FT-60~180 BHI62ET-60~180	**BHI62FT-15~36 BHI62ET-15~36**	**BHI62FT-A BHI62ET-A**
CW			
CCW	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip this switch to CCW.	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip this switch to CCW.	To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip this switch to CCW.

Model / Direction	Terminal Box Type Three-Phase		
	BHI62ST-3.6~9 BHI62ST-60~180	**BHI62ST-15~36**	**BHI62ST-A**
CW			
CCW	To change the rotation, change any two connections between U, V and W.	To change the rotation, change any two connections between U, V and W.	To change the rotation, change any two connections between U, V and W.

Change the direction of motor rotation only after bringing the motor to a stop.
If an attempt is made to change the direction of rotation while the motor is rotating, the motor may ignore the reversing command or change its direction of rotation after some delay.

Accessories

Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors with or without gearheads. See page [A-266] for the dimensions.

Model name **SOL6M8**

Flexible Coupling

Optional clamping couplings are available. See page [A-260] for the dimensions.

INDUCTION MOTORS 2-Pole, High Speed Type

Single-Phase

40W (1/18.5 HP) • 60W (1/12.5 HP) • 90W (1/8 HP)

Frame Size 3.15 in.sq.(80mm sq.), 3.54 in.sq.(90mm sq.)

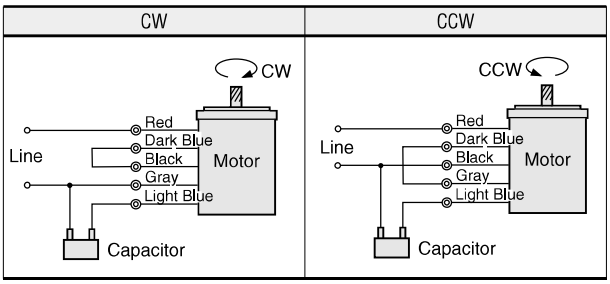
SAFETY STD.

Specifications — Continuous Rating

Model	Output Power		Voltage	Frequency	Current	Starting Torque		Rated Torque		Rated Speed	Capacitor
	HP	W	V AC	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF
4IK40A-BA	1/18.5	40	115	60	0.8	13.2	95	18	130	3000	8.0
5IK60A-BA	1/12.5	60	115	60	1.2	16.7	120	25.7	185	3200	12.0
5IK90A-BFUL	1/8	90	115	60	2.0	30.6	220	38.9	280	3200	20.0

●The product contains a built-in thermal protector. When a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

Wiring Diagrams

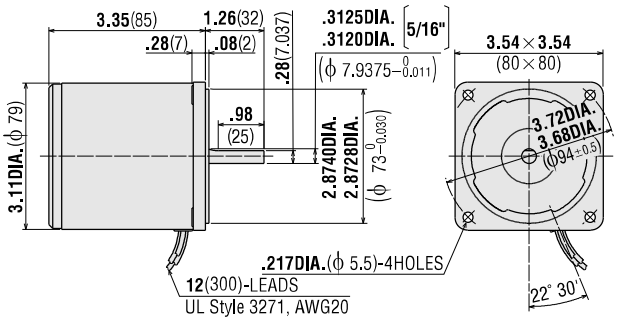


The direction of motor rotation is as viewed from the shaft end of the motor.

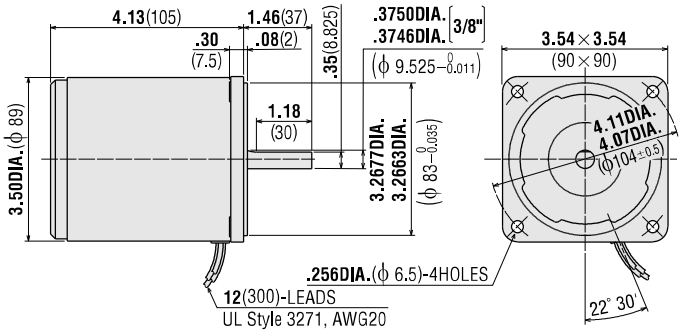
Change the direction of motor rotation only after bringing the motor to a stop. If an attempt is made to change the direction of rotation while the motor is rotating, the motor may ignore the reversing command or change its direction of rotation after some delay.

Dimensions Scale 1/4, Unit = **inch** (mm)

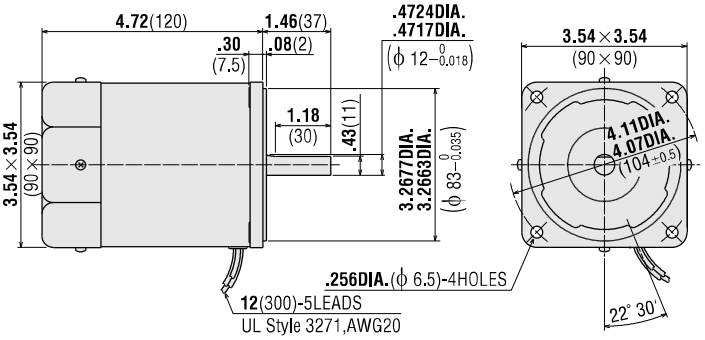
4IK40A-BA Weight (Mass): 3.3 lb.(1.5 kg)



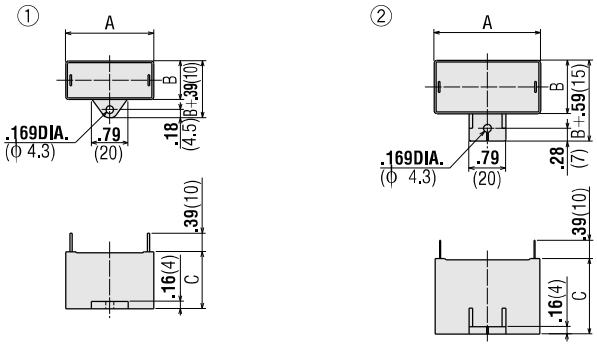
5IK60A-BA Weight (Mass): 5.5 lb.(2.5 kg)



5IK90A-BFUL Weight (Mass): 6.0 lb.(2.7 kg)



●Capacitor (included with the motor)

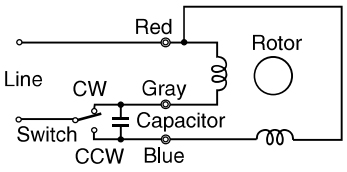


Motor Model	Capacitor Model	Dimensions inch (mm) A	B	C	Weight oz (g)	Dimensions Number
4IK40A-BA	CH80UL	1.50 (38)	.83 (21)	1.22 (31)	1.2 (35)	①
5IK60A-BA	CH120UL	1.89 (48)	.83 (21)	1.22 (31)	1.6 (44)	①
5IK90A-BFUL	CH200UL	2.28 (58)	.91 (23)	1.46 (37)	2.3 (65)	②

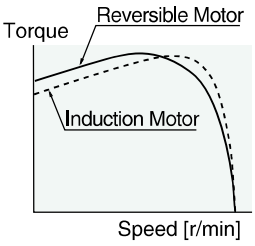
Capacitor cap is provided with the capacitor.

Features of Reversible Motors

Reversible motors are capacitor-run induction motors. By simple switching, the direction of motor rotation can be reversed instantly. These motors are very suitable for applications that require frequent switching between clockwise and counterclockwise rotation thus the name "Reversible Motor". While basically the same as the induction motors described, they feature a high starting torque to improve previously instantaneous reversing characteristics and use a simple built-in friction brake to reduce motor overrun and shorten the time required for reversing. These motors are designed for applications where instantaneous reversal of direction is required. However, due to their inherently higher temperature rise compared to induction motors, they have a limited 30-minute duty cycle rating for worst case operating conditions.
A 30-minute rating means that the motor may be operated continuously for 30 minutes without an excessive rise in motor temperature. In other respects, such as speed-torque, voltage and capacitor characteristics, reversible motors are similar to an induction motor.



Wiring Diagram (CW direction)



Speed-Torque Characteristic

●Why do they have a Permanent Brake?

The brake mechanism provided on reversible motors consists of a teflon brake shoe that permanently applies friction to a brake plate by means of a coil spring. This means that in addition to the actual load, the motor must also overcome the friction load caused by the brake. The inevitable side effect of heat generation (which is the cause of the 30-minute duty rating of reversible motors) is outweighed by the following advantages of the brake:

1. It reduces overrun
2. It provides a degree of holding torque
3. It shortens the time necessary for switching from clockwise to counterclockwise rotation.

With these motors, the limited braking force provided by the motor design equals approximately one-tenth of the torque output. Table 1 shows typical holding torque and overrun values which vary slightly with different models. The values also vary with operating time and temperature and should, therefore, be used as a guide only.
Note that values shown for rated torque and starting torque of reversible motors are reference data measured for operation without the brake applied. Above described deviations from the theoretical figures should be taken into account when selecting a motor.

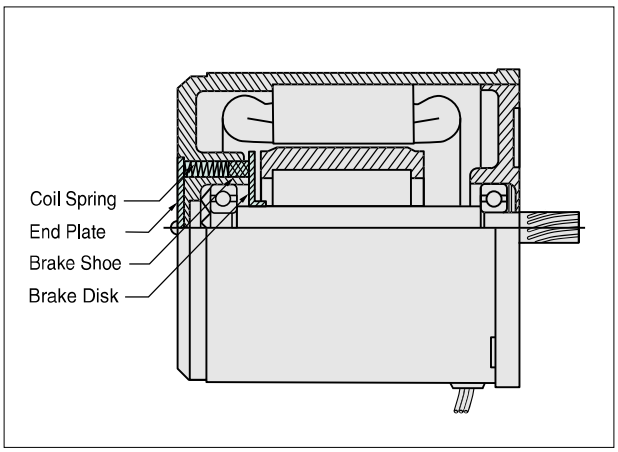


Table 1. Holding Torque and Overrun in Reversible Motors (Reference Values)

Motor Model	Holding Torque oz-in	Holding Torque mN · m	Overrun (revolution)
0RK1GN-AUL	0.14	1	3
2RJ4GB-AUL	0.42	3	5
2RK6GN-AW(T)U **2RK6GN-CW(T)E**	0.69	5	4
2RK6GN-AUL	0.69	5	4
3RK15GN-AWU **3RK15GN-CWE**	1.8	13	5
3RK15GN-AUL	1.8	13	5
4RJ20GB-AUL	1.9	14	6
4RK25GN-AW(T)U **4RK25GN-CW(T)E**	2.1	15	5
4RK25GN-AUL	2.1	15	5
5RK40GN-AW(T)U **5RK40GN-CW(T)E**	5.6	40	6
5RK40GN-AUL	5.6	40	6
5RK60GU-AW(T)U **5RK60GU-CW(T)E**	5.6	40	6
5RK60GU-AFUL	5.6	40	6
5RK90GU-AW(T)U **5RK90GU-CW(T)E**	5.6	40	6
5RK90GU-AFUL	5.6	40	6

●Holding torque may be less than the value given in the table when first used.

Product Specifications

Reversible Motors

Output Power		Model		Voltage	Frequency	Starting Torque		Rated Torque		Rated Speed	Page
HP	W	Lead Wire Type	Terminal Box Type	V AC	Hz	oz-in	mN·m	oz-in	mN·m	r/min	
1/746	1	**0RK1GN-AUL**	—	Single-Phase 115	60	1.1	8	1.1	8	1200	A-78
1/186	4	**2RJ4GB-AUL**	—	Single-Phase 115	60	3.5	25	3.7	27	1450	A-80
1/124	6	**2RK6GN-AWU**	**2RK6GN-AWTU**	Single-Phase 110	60	6.2	45	5.7	41	1450	A-82
				Single-Phase 115	60						
		2RK6GN-CWE	**2RK6GN-CWTE**	Single-Phase 220	60	6.2	45	5.7	41	1450	A-82
				Single-Phase 230	50	6.9	50	6.8	49	1200	
				Single-Phase 230	60	6.2	45	5.7	41	1450	
		2RK6GN-AUL	—	Single-Phase 115	60	5.1	37	5.6	40	1500	A-82
1/50	15	**3RK15GN-AWU**	—	Single-Phase 110	60	13.9	100	14.6	105	1450	A-85
				Single-Phase 115	60						
		3RK15GN-CWE	—	Single-Phase220	60	13.9	100	14.6	105	1450	A-85
				Single-Phase230	50	13.9	100	17.4	125	1200	
				Single-Phase230	60	13.9	100	14.6	105	1450	
		3RK15GN-AUL	—	Single-Phase115	60	10.4	75	13.9	100	1500	A-85
1/37	20	**4RJ20GB-AUL**	—	Single-Phase115	60	14.6	105	18.7	135	1500	A-88
1/30	25	**4RK25GN-AWU**	**4RK25GN-AWTU**	Single-Phase110	60	19.4	140	23.6	170	1450	A-90
				Single-Phase115	60						
		4RK25GN-CWE	**4RK25GN-CWTE**	Single-Phase220	60	19.4	140	23.6	170	1450	A-90
				Single-Phase230	50	22.2	160	28.5	205	1200	
				Single-Phase230	60	19.4	140	23.6	170	1450	
1/27.5	27	**4RK25GN-AUL**	—	Single-Phase115	60	16.0	115	23.6	170	1550	A-90
1/18.5	40	**5RK40GN-AWU**	**5RK40GN-AWTU**	Single-Phase110	60	36.1	260	37.5	270	1450	A-93
				Single-Phase115	60						
		5RK40GN-CWE	**5RK40GN-CWTE**	Single-Phase220	60	36.1	260	36.1	260	1500	A-93
				Single-Phase230	50	37.5	270	43.7	315	1250	
				Single-Phase230	60	36.1	260	36.1	260	1500	
		5RK40GN-AUL	—	Single-Phase115	60	36.1	260	36.1	260	1550	A-93
1/12.5	60	**5RK60GU-AWU**	**5RK60GU-AWTU**	Single-Phase110	60	52.8	380	56.2	405	1450	A-96
				Single-Phase115	60						
		5RK60GU-CWE	**5RK60GU-CWTE**	Single-Phase220	60	52.8	380	56.2	405	1450	A-96
				Single-Phase230	50	65.3	470	68.0	490	1200	
				Single-Phase230	60	52.8	380	56.2	405	1450	
		5RK60GU-AFUL	—	Single-Phase115	60	51.4	370	51.4	370	1600	A-96
1/8	90	**5RK90GU-AWU**	**5RK90GU-AWTU**	Single-Phase110	60	81.9	590	81.2	585	1500	A-99
				Single-Phase115	60						
		5RK90GU-CWE	**5RK90GU-CWTE**	Single-Phase220	60	81.9	590	84.0	605	1450	A-99
				Single-Phase230	50	83.3	600	101	730	1200	
				Single-Phase230	60	81.9	590	84.0	605	1450	
		5RK90GU-AFUL	—	Single-Phase115	60	81.9	590	79.2	570	1550	A-99

- Products in this table have pinion shafts. Round shaft types are available for all models(excluding **5RK60GU-AFUL**,**5RK90GU-AFUL**). See the appropriate product pages for more information.
- The "**U**" and "**E**" at the end of the model name indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate. When the motor is approved under various safety standards, the nameplate is adopted.

General Specifications

For **-AW(T)U**, **-CW(T)E**

Item	Specifications
Insulation Resistance	100M Ω or more when 500V DC is applied between the windings and the frame.
Dielectric Strength	Sufficient to withstand 1.5kV at 50Hz and 60Hz applied between the windings and the frame.
Temperature Rise	144°F (80°C) or less measured by the resistance change method after rated motor operation with connecting a gearhead or equivalent heat radiation plate.
Insulation Class	Class B (266°F [130°C])
Overheat Protection	**2RK** have impedance protection. All others have a built-in thermal protector (Automatic return type) Operating temperature, open : 266°F±9°F (130°C±5°C) close: 179.6°F±27°F (82°C±15°C)
Ambient Temperature Range	14°F~104°F (−10°C~+40°C)
Ambient Humidity	85% maximum (noncondensing)

Equivalent heat radiation plate (material: Aluminum)

Type (output)	Size inch (mm)	Thickness inch (mm)
2RK Type (6W)	4.53×4.53 (115×115)	0.20 (5)
3RK Type (15W)	4.92×4.92 (125×125)	
4RK Type (25W)	5.31×5.31 (135×135)	
5RK40 Type (40W)	6.50×6.50 (165×165)	
5RK60 Type (60W)	7.87×7.87 (200×200)	
5RK90 Type (90W)	7.87×7.87 (200×200)	

For **-AUL**,**-AULA**,**-AFUL**

Item	Specifications
Insulation Resistance	100M Ω or more Insulation Resistance when 500V DC is applied between the windings and frame after the rated motor operation under normal ambient temperature and humidity.
Dielectric Strength	Sufficient to withstand 1.5kV at 50Hz and 60Hz applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Temperature Rise	135°F (75°C) or less measured by the resistance change method after the temperature of the coil has stabilized under normal operation at the rated voltage and frequency.
Insulation Class	UL, CSA Standard Class A EN60950 Standard Class E
Overheat Protection	**ORK** and **2RK** have impedance protection. All others have a built-in thermal protector. (Automatic return type) Operating temperature, open: 248°F±9°F (120°C±5°C) close: 170.6°F±27°F (77°C±15°C)
Ambient Temperature Range	14°F ~ 104°F (−10°C ~ +40°C)
Ambient Humidity	85% maximum (noncondensing)

Safety Standards and CE Marking

For **-AW(T)U**, **-CW(T)E**

Standards	Certification Body	Standards File No.	CE Marking
UL1004 UL519 (6W Type) UL547 (15W~90W Type) CAN/CSA C22.2 No.100 CAN/CSA C22.2 No.77	UL	E64199 (6W) E64197 (15W~90W)	Low Voltage Directive
EN60950	VDE	114919ÜG (6W) 6751ÜG (15W~90W)	
EN60034-1 EN60034-5 IEC60034-11	Conform to EN/IEC Standards (EN/IEC certifications are scheduled.)		

※ Excluding terminal box types
For installation for EN/IEC standards, see Page D-2.
Recognized name and certified name of each safety standards are motor model name.

For **-AUL**, **-AULA** and **-AFUL** Type

Standards	Certification Body	Standards File No.	CE Marking
UL1004 UL519 (6W Type) UL547 (15W~90W Type)	UL	E64199 (1W~6W) E64197 (15W~90W)	Low Voltage Directive
CAN/CSA C22.2 No.100 CAN/CSA C22.2 No.77	CSA	LR47296	
EN60950	VDE	5876ÜG (1W~6W) 5877ÜG (15W~90W)	

For installation for EN/IEC standards, see Page D-2.

REVERSIBLE MOTORS

Single-Phase

1W (1/746 HP)

Frame Size 1.65 in.sq. (42mm sq.)

GEAR SAFETY STD.

Specifications — 30 Minutes Rating

Model		Output Power		Voltage	Frequency	Current	Starting Torque		Rated Torque		Rated Speed	Capacitor
Pinion Shaft Type	Round Shaft Type	HP	W	V AC	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF
0RK1GN-AUL	**0RK1A-AUL**	1/746	1	115	60	0.10	1.1	8	1.1	8	1200	1.2

- Values shown for starting torque and rated torque are measured for operation without the brake applied.
- These products are impedance protected.

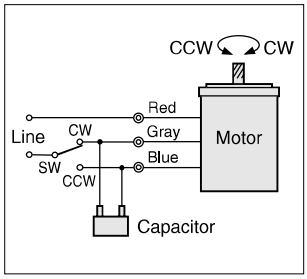
Gearmotor — Torque Table

Unit = Upper values: lb-in / Lower values: N·m

Model \ Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
0RK1GN-AUL / 0GN□KA	0.17	0.20	0.28	0.33	0.42	0.50	0.63	0.75	0.90	1.1	1.4	1.6	2.3	2.7	3.0	3.7	4.1	4.9	6.1	7.3
	0.019	0.023	0.032	0.039	0.049	0.058	0.073	0.088	0.11	0.13	0.16	0.19	0.26	0.32	0.35	0.42	0.47	0.57	0.71	0.85

- Gearheads are sold separately. Decimal gearheads are not available for 0GN type.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

Wiring Diagram



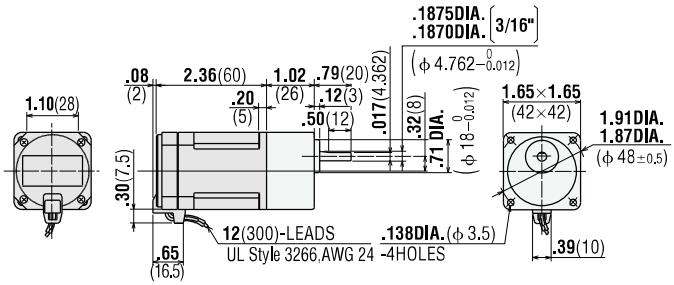
To rotate the motor in a clockwise (CW) direction, flip switch SW to CW.
To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.

The direction of motor rotation is as viewed from the shaft end of the motor.

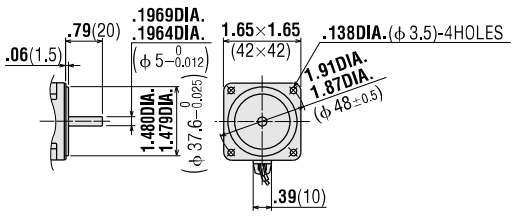
Dimensions Scale 1/4, Unit = **inch** (mm)

0RK1GN-AUL
Weight (Mass): 0.7 lb.(0.3 kg)

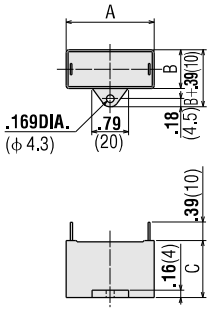
/ **0GN□KA**
Weight(Mass): 0.44 lb.(0.2 kg)



0RK1A-AUL Round Shaft Type
Weight (Mass): 0.7 lb.(0.3 kg)



●Capacitor (included with the motor)



Motor Model	Capacitor Model	Dimensions inch (mm) A	B	C	Weight (Mass) oz (g)
0RK1GN-AUL **0RK1A-AUL**	CH12UL	1.22 (31)	0.57 (14.5)	0.93 (23.5)	0.6 (17)

If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

Accessories

●Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors without gearheads. See page [A-266] for the dimensions.
Model name **SOL0U04**

●Flexible Couplings

Optional clamping couplings are available. See page[A-260] for the dimensions.

REVERSIBLE MOTORS

Single-Phase

4W (1/186 HP)

Frame Size 2.36 in.sq. (60mm sq.)

GEAR SAFETY STD.

Specifications — 30 Minutes Rating

Model		Output Power		Voltage	Frequency	Current	Starting Torque		Rated Torque		Rated Speed	Capacitor
Pinion Shaft Type	Round Shaft Type	HP	W	V AC	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF
2RJ4GB-AUL	**2RJ4A-AULA**	1/186	4	115	60	0.17	3.5	25	3.7	27	1450	1.8

- Values shown for starting torque and rated torque are measured for operation without the brake applied.
- These products are impedance protected.

Gearmotor — Torque Table

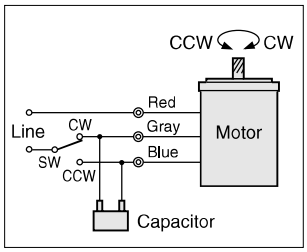
The permissible torque with decimal gearhead with a gear ratio of 10:1 is 13 lb-in (1.5N·m).

Unit = Upper values: lb-in / Lower values: N·m

Model \ Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10	7.2	6	5
Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**	**250**	**300**	**360**
2RJ4GB-AUL / 2GB□KA	0.56	0.67	0.94	1.1	1.4	1.7	2.3	2.8	3.4	4.2	5.1	6.1	7.6	9.2	11	13	13	13	13	13	13	13	13
	0.066	0.079	0.11	0.13	0.16	0.20	0.27	0.33	0.39	0.49	0.59	0.71	0.89	1.1	1.3	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5

- Gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

Wiring Diagram



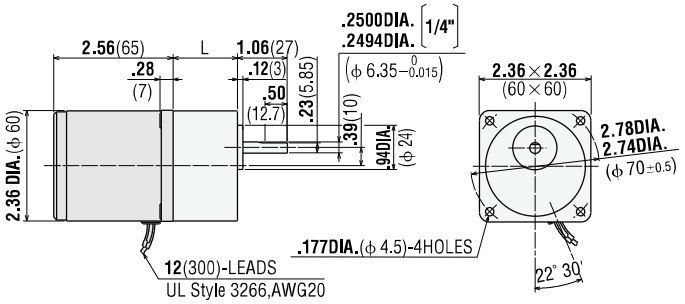
To rotate the motor in a clockwise (CW) direction, flip switch SW to CW.
To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.

The direction of motor rotation is as viewed from the shaft end of the motor.

Dimensions Scale 1/4, Unit = **inch** (mm)

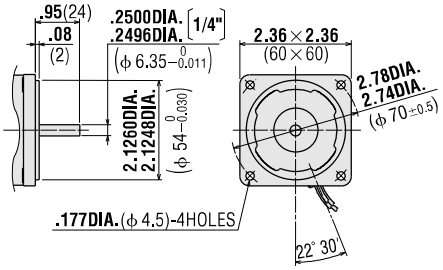
2RJ4GB-AUL
Weight (Mass): 1.3 lb.(0.6 kg)

/ **2GB□KA**
Weight (Mass): 0.66 lb.(0.3 kg)



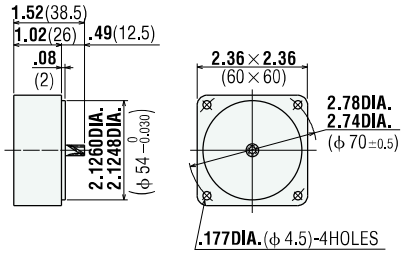
L = 1.02(26) **2GB3KA~18KA**
L = 1.38(35) **2GB25KA~360KA**

2RJ4A-AULA Round Shaft Type
Weight (Mass): 1.3 lb.(0.6 kg)

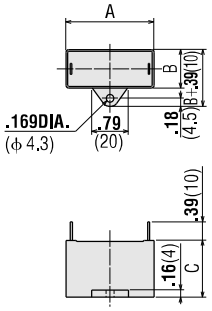


●Decimal Gearhead

2GB10XK Weight (Mass): 0.44 lb.(0.2 kg)



●Capacitor (included with the motor)



Motor Model	Capacitor Model	Dimensions inch (mm) A	B	C	Weight (Mass) oz (g)
2RJ4GB-AUL **2RJ4A-AULA**	CH18BUL	1.46 (37)	0.67 (18)	1.06 (27)	0.7 (20)

If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

Accessories

●Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors without gearheads. See page [A-266] for the dimensions.
Model name **SOL2U8**

●Flexible Couplings

Optional clamping couplings are available. See page[A-260] for the dimensions.

REVERSIBLE MOTORS

Single-Phase

6W (1/124 HP)

Frame Size 2.36 in.sq. (60mm sq.)

GEAR SAFETY STD.

Specifications — 30 Minutes Rating

Model Upper Model Name:Pinion Shaft Type Lower Model Name( ):Round Shaft Type Lead Wire Type Dimension ① Terminal Box Type Dimension ②	Output Power HP	Output Power W	Voltage V AC	Frequency Hz	Current A	Starting Torque oz-in	Starting Torque mN·m	Rated Torque oz-in	Rated Torque mN·m	Rated Speed r/min	Capacitor μF
2RK6GN-AWU (2RK6A-AWU) / 2RK6GN-AWTU (2RK6A-AWTU)	1/124	6	110	60	0.25	6.2	45	5.7	41	1450	3.5
			115	60	0.26						
2RK6GN-CWE (2RK6A-CWE) / 2RK6GN-CWTE (2RK6A-CWTE)			220	60	0.11	6.2	45	5.7	41	1450	0.8
			230	50	0.12	6.9	50	6.8	49	1200	
			230	60	0.12	6.2	45	5.7	41	1450	
2RK6GN-AUL (2RK6A-AULA) / —			115	60	0.19	5.1	37	5.6	40	1500	2.3

- Values shown for starting torque and rated torque are measured for operation without the brake applied.
- These products are impedance protected.
- The "**U**" and "**E**" at the end of the model name indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate. When the motor is approved under various safety standards, the nameplate is adopted.
- The terminal box type of the motors are not VDE approved.

Gearmotor — Torque Table

The permissible torque with a decimal gearhead with a gear ratio of 10:1 is 26 lb-in (3N·m).

Single-Phase 115V/230V 60Hz

Unit = Upper values: lb-in / Lower values: N·m

Model	Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
2RK6GN-AW(T)U 2RK6GN-CW(T)E / 2GN□KA		0.87	1.0	1.4	1.7	2.2	2.6	3.6	4.3	5.2	6.5	7.8	9.4	12	14	18	21	24	26	26	26
		0.10	0.12	0.17	0.20	0.25	0.30	0.42	0.50	0.60	0.75	0.90	1.1	1.4	1.6	2.0	2.4	2.7	3	3	3
2RK6GN-AUL / 2GN□KA		0.85	1.0	1.4	1.7	2.1	2.6	3.5	4.3	5.1	6.4	7.7	9.2	12	14	17	21	23	26	26	26
		0.097	0.12	0.16	0.19	0.24	0.29	0.41	0.49	0.58	0.73	0.88	1.1	1.3	1.6	2.0	2.4	2.6	3	3	3

Single-Phase 230V 50Hz

Unit = Upper values: lb-in / Lower values: N·m

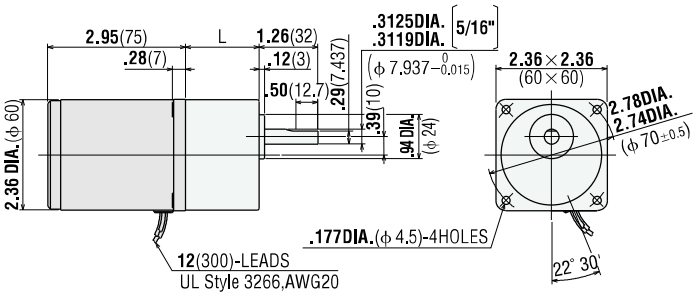
Model	Speed r/min	500	416	300	250	200	166	120	100	83	60	50	41	30	25	20	16	15	12.5	10	8.3
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
2RK6GN-CW(T)E / 2GN□KA		1.0	1.2	1.7	2.1	2.6	3.1	4.3	5.2	6.2	7.8	9.3	11	14	17	21	25	26	26	26	26
		0.12	0.14	0.20	0.24	0.30	0.36	0.50	0.60	0.71	0.89	1.1	1.3	1.6	1.9	2.4	2.9	3	3	3	3

- Gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (50Hz: 1500 r/min, 60Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

Dimensions Scale 1/4, Unit = **inch** (mm)

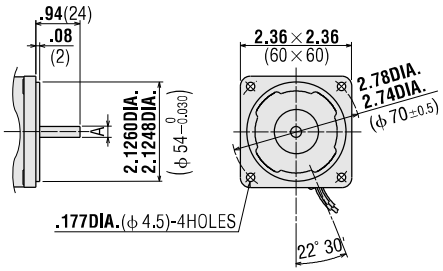
2RK6GN-AWU
2RK6GN-CWE
2RK6GN-AUL
Weight (Mass): 1.5 lb.(0.7 kg)

2GN□KA
Weight (Mass): 0.88 lb.(0.4 kg)



L = 1.18(30) **2GN3KA~18KA**
L = 1.57(40) **2GN25KA~180KA**

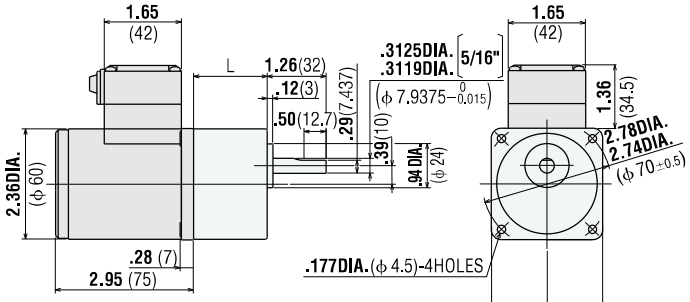
2RK6A-AWU
2RK6A-CWE
2RK6A-AULA Round Shaft Type
Weight (Mass): 1.5 lb.(0.7 kg)



Model	Shaft Diameter A
2RK6A-AWU	.2362DIA. (ϕ 6 0 −0.012)
2RK6A-CWE	.2357DIA.
2RK6A-AULA	.2500DIA. [1/4"](ϕ 6.35 0 −0.010)
	.2496DIA.

2RK6GN-AWTU
2RK6GN-CWTE
Weight (Mass): 1.65 lb.(0.75 kg)

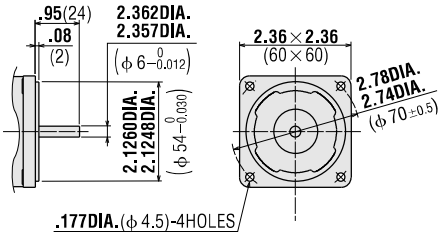
2GN□KA
Weight (Mass): 0.88 lb.(0.4 kg)



L = 1.18(30) **2GN3KA~18KA**
L = 1.57(40) **2GN25KA~180KA**

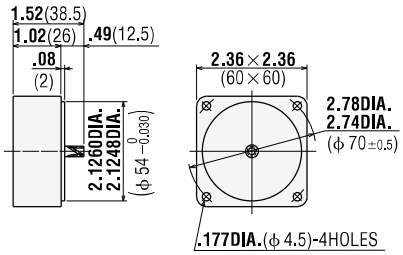
Use cabtyre cable with the diameter of .27DIA.(ϕ 6.8)~.34DIA.(ϕ 8.6).

2RK6A-AWTU
2RK6A-CWTE Round Shaft Type
Weight (Mass): 1.65 lb.(0.75 kg)

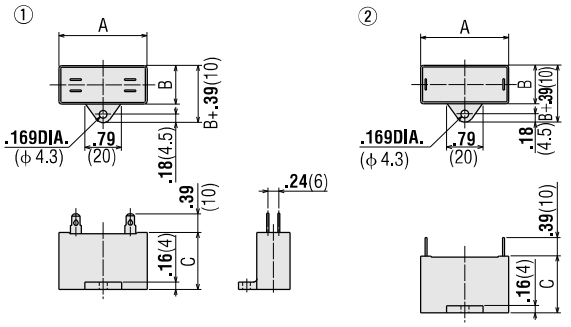


●Decimal Gearhead

2GN10XK
Weight (Mass): 0.44 lb.(0.2 kg)



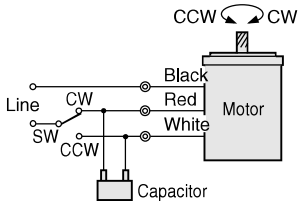
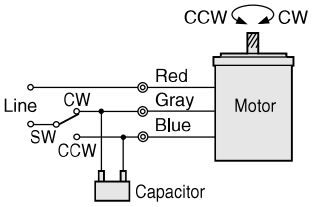
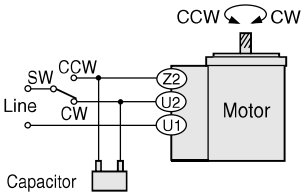
●Capacitor (included with the motor)



Motor Model	Capacitor Model	Dimensions inch (mm) A	B	C	Weight (Mass) oz (g)	Dimension No.
2RK6GN-AW(T)U **2RK6A-AW(T)U**	CH35FAUL	1.22 (31)	0.67 (17)	1.06 (27)	0.9 (25)	①
2RK6GN-CW(T)E **2RK6A-CW(T)E**	CH08BFAUL	1.22 (31)	0.67 (17)	1.06 (27)	0.9 (25)	①
2RK6GN-AUL **2RK6A-AULA**	CH23UL	1.22 (31)	0.57 (14.5)	0.93 (23.5)	0.5 (15)	②

If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

■ Wiring Diagrams The direction of motor rotation is as viewed from the shaft end of the motor.

Lead Wire Type		Terminal Box Type
2RK6GN-AWU **2RK6GN-CWU**	**2RK6GN-AUL**	**2RK6GN-AWTU** **2RK6GN-CWTE**
		

To rotate the motor in a clockwise (CW) direction, flip switch SW to CW.
To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.

■ Accessories

●Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors without gearheads. See page [A-266] for the dimensions.
Model name **SOL2U08**

●Flexible Couplings

Optional clamping couplings are available. See page[A-260] for the dimensions.

REVERSIBLE MOTORS
Single-Phase
15W (1/50 HP)
Frame Size 2.76 in.sq. (70mm sq.)

GEAR SAFETY STD.

■ Specifications — 30 Minutes Rating

Model		Output Power		Voltage	Frequency	Current	Starting Torque		Rated Torque		Rated Speed	Capacitor
Pinion Shaft Type	Round Shaft Type	HP	W	V AC	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF
3RK15GN-AWU	3RK15A-AWU	1/50	15	110	60	0.42	13.9	100	14.6	105	1450	6
				115	60	0.41						
3RK15GN-CWE	3RK15A-CWE			220	60	0.21	13.9	100	14.6	105	1450	1.5
				230	50	0.20	13.9	100	17.4	125	1200	
				230	60	0.21	13.9	100	14.6	105	1450	
3RK15GN-AUL	3RK15A-AULA			115	60	0.36	10.4	75	13.9	100	1500	4.5

- Values shown for starting torque and rated torque are measured for operation without the brake applied.
- These products contain a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.
- The "**U**" and "**E**" at the end of the model name indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate. When the motor is approved under various safety standards, the nameplate is adopted.

■ Gearmotor—Torque Table

The permissible torque with decimal gearhead with a gear ratio of 10 is 43lb-in (5N·m).

●Single-Phase 115V/230V 60Hz

UnitÅÅ Upper values: lb-in / Lower values: N·m

Model	Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
3RK15GN-AWU / 3RK15GN-CWE / 3GN□KA		2.2	2.7	3.7	4.4	5.5	6.7	9.2	11	13	17	20	24	30	36	43	43	43	43	43	43
		0.26	0.31	0.43	0.51	0.64	0.77	1.1	1.3	1.5	1.9	2.3	2.8	3.5	4.2	5	5	5	5	5	5
3RK15GN-AUL / 3GN□KA		2.1	2.5	3.5	4.2	5.3	6.3	8.8	11	13	16	19	23	29	34	43	43	43	43	43	43
		0.24	0.29	0.41	0.49	0.61	0.73	1.0	1.2	1.5	1.8	2.2	2.6	3.3	4.0	5	5	5	5	5	5

●Single-Phase 230V 50Hz

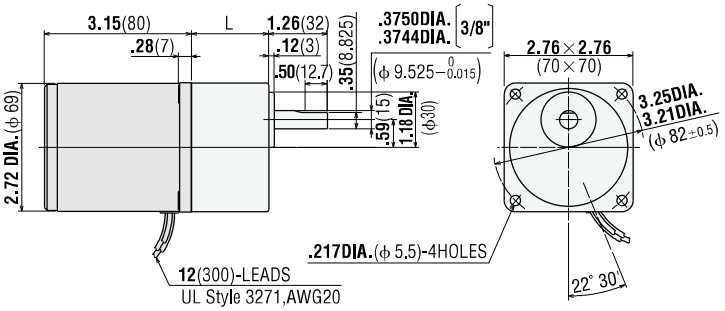
UnitÅÅ Upper values: lb-in / Lower values: N·m

Model	Speed r/min	500	416	300	250	200	166	120	100	83	60	50	41	30	25	20	16	15	12.5	10	8.3
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
3RK15GN-CWE / 3GN□KA		2.6	3.2	4.4	5.3	6.6	7.9	11	13	16	20	24	29	36	43	43	43	43	43	43	43
		0.30	0.36	0.51	0.61	0.76	0.91	1.3	1.5	1.8	2.3	2.7	3.3	4.1	5	5	5	5	5	5	5

- Gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (50 Hz: 1500 r/min, 60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

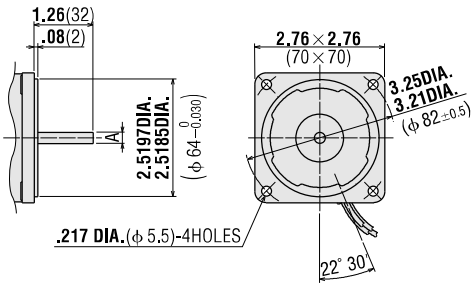
Dimensions Scale 1/4, Unit = **inch** (mm)

3RK15GN-AWU / **3GN□KA**
3RK15GN-CWE Weight (Mass): 1.21 lb.(0.55 kg)
3RK15GN-AUL
Weight (Mass): 2.4 lb.(1.1 kg)



L=1.26(32) **3GN3KA~18KA**
L=1.65(42) **3GN25KA~180KA**

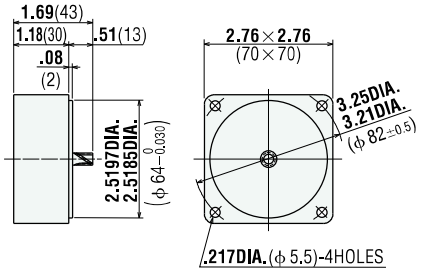
3RK15A-AWU Round Shaft Type
3RK15A-CWE
3RK15A-AULA
Weight (Mass): 2.4 lb.(1.1 kg)



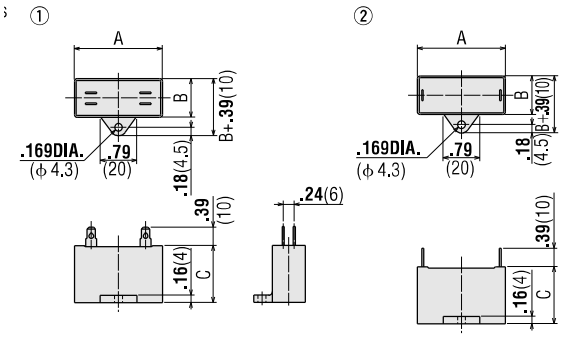
Model	Shaft Diameter A
3RK15A-AWU	.2362DIA. (ϕ6 0 -0.012)
3RK15A-CWE	.2357DIA.
3RK15A-AULA	.2500DIA. [3/8"](ϕ6.35 0 -0.010)
	.2496DIA.

●Decimal Gearhead

3GN10XK Weight (Mass): 0.66 lb.(0.3 kg)



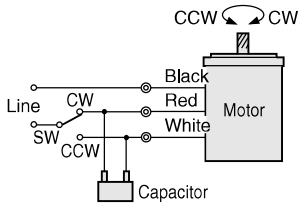
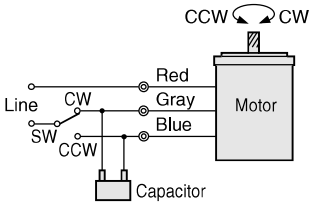
●Capacitor (included with the motor)



Motor Model	Capacitor Model	Dimensions inch (mm) A	B	C	Weight (Mass) oz (g)	Dimension No.
3RK15GN-AWU	CH60CFAUL	1.50	0.83	1.22	1.4 (40)	①
3RK15A-AWU		(38)	(21)	(31)		
3RK15GN-CWE	CH15BFAUL	1.50	0.83	1.22	1.2 (35)	①
3RK15A-CWE		(38)	(21)	(31)		
3RK15GN-AUL	CH45UL	1.46	0.71	1.06	1.1 (30)	②
3RK15A-AULA		(37)	(18)	(27)		

If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

Wiring Diagrams The direction of motor rotation is as viewed from the shaft end of the motor.

Lead Wire Type	
3RK15GN-AWU **3RK15GN-CWE**	**3RK15GN-AUL**
	

To rotate the motor in a clockwise(CW)direction, flip switch SW to CW.
To rotate it in a counterclockwise(CCW)direction, flip switch SW to CCW.

Accessories

●Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors without gearheads. See page [A-266] for the dimensions.
Model name **SOL3U10**

●Flexible Couplings

Optional clamping couplings are available. See page[A-260] for the dimensions.

REVERSIBLE MOTORS

Single-Phase

20W (1/37 HP)

Frame Size 3.15 in.sq. (80mm sq.)

GEAR SAFETY STD.

Specifications — 30 Minutes Rating

Model		Output Power		Voltage	Frequency	Current	Starting Torque		Rated Torque		Rated Speed	Capacitor
Pinion Shaft Type	Round Shaft Type	HP	W	V AC	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF
4RJ20GB-AUL	**4RJ20A-AULA**	1/37	20	115	60	0.48	14.6	105	18.7	135	1500	6.0

- Values shown for starting torque and rated torque are measured for operation without the brake applied.
- The product contains a built-in thermal protector. When a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

Gearmotor—Torque Table

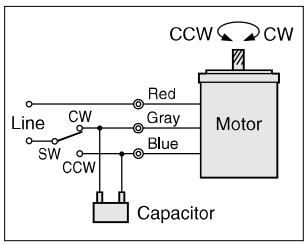
The permissible torque with decimal gearhead with a gear ratio of 10 is 43.4 lb-in (5N·m).

Unit = Upper values: lb-in / Lower values: N·m

Model \ Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10	7.2	6	5
Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**	**250**	**300**	**360**
4RJ20GB-AUL / 4GB□KA	2.8	3.4	4.7	5.7	7.1	8.5	12	14	17	21	26	31	39	43	43	43	43	43	43	43	43	43	43
	0.33	0.39	0.55	0.66	0.82	0.98	1.4	1.6	2.0	2.5	3.0	3.5	4.5	5	5	5	5	5	5	5	5	5	5

- Gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

Wiring Diagram



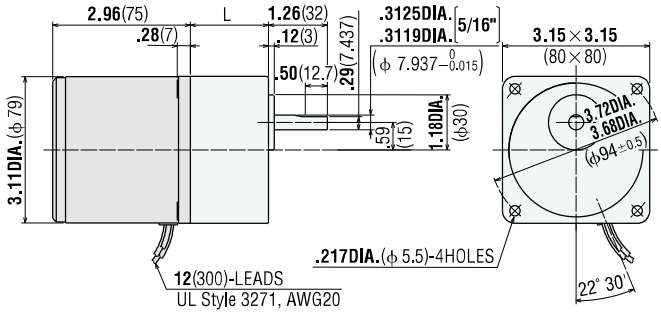
To rotate the motor in a clockwise (CW) direction, flip switch SW to CW.
To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.

The direction of motor rotation is as viewed from the shaft end of the motor.

Dimensions Scale 1/4, Unit = **inch** (mm)

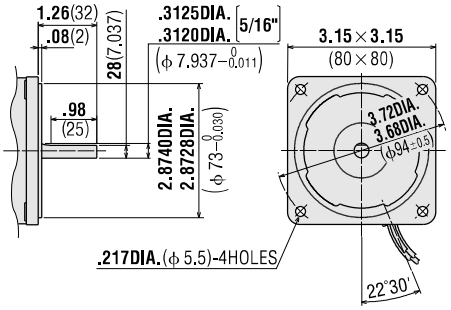
4RJ20GB-AUL
Weight (Mass): 3.1 lb.(1.4 kg)

/ **4GB□KA**
Weight (Mass): 1.43 lb.(0.65 kg)



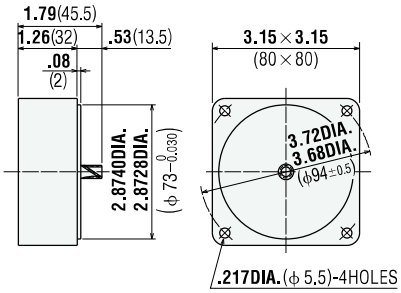
L=**1.26**(32) **4GB3KA**~**18KA**
L=**1.67**(42.5) **4GB25KA**~**360KA**

4RJ20A-AULA Round Shaft Type
Weight (Mass): 3.1 lb.(1.4 kg)

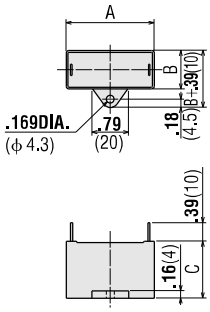


●Decimal Gearhead

4GB10XK Weight (Mass): 0.77 lb.(0.35 kg)



●Capacitor (included with the motor)



Motor Model	Capacitor Model	Dimensions inch (mm) A	B	C	Weight (Mass) oz (g)
4RJ20GB-AUL	CH60UL	1.50	0.75	1.14	1.1 (30)
4RJ20A-AULA		(38)	(19)	(29)	

If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

Accessories

●Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors without gearheads. See page [A-266] for the dimensions.
Model name **SOL4U10**

●Flexible Couplings

Optional clamping couplings are available. See page[A-260] for the dimensions.

REVERSIBLE MOTORS

Single-Phase

25W (1/30 HP)

Frame Size 3.15 in.sq. (80mm sq.)

GEAR SAFETY STD.

Specifications — 30 Minutes Rating

Model Upper Model Name:Pinion Shaft Type Lower Model Name( ):Round Shaft Type Lead Wire Type Dimension ① Terminal Box Type Dimension ②	Output Power HP	Output Power W	Voltage V AC	Frequency Hz	Current A	Starting Torque oz-in	Starting Torque mN·m	Rated Torque oz-in	Rated Torque mN·m	Rated Speed r/min	Capacitor μF
4RK25GN-AWU (4RK25A-AWU) / 4RK25GN-AWTU (4RK25A-AWTU)	1/30	25	110	60	0.54	19.4	140	23.6	170	1450	8
			115	60							
4RK25GN-CWE (4RK25A-CWE) / 4RK25GN-CWTE (4RK25A-CWTE)			220	60	0.28	19.4	140	23.6	170	1450	
			230	50	0.26	22.2	160	28.5	205	1200	2
			230	60	0.28	19.4	140	23.6	170	1450	
4RK25GN-AUL (4RK25A-AULA) / —	1/27.5	27	115	60	0.55	16.0	115	23.6	170	1550	7

- Values shown for starting torque and rated torque are measured for operation without the brake applied.
- The product contains a built-in thermal protector. When a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.
- The "**U**" and "**E**" at the end of the model name indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate. When the motor is approved under various safety standards, the nameplate is adopted.

Gearmotor—Torque Table

- Right-Angle gearhead may be connected. See page [A-216] for more information.

The permissible torque with decimal gearhead with a gear ratio of 10:1 is 70 lb-in (8N·m). The value is 52 lb-in (6N·m) when 25:1～36:1 gearheads are connected.

Single-Phase 115V/230V 60Hz

Unit= Upper values: lb-in/Lower values: N·m

Model	Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
4RK25GN-AWU 4RK25GN-AWTU 4RK25GN-CWE 4RK25GN-CWTE / 4GN□KA		3.6	4.3	6.0	7.2	9.0	11	15	18	22	27	32	39	49	58	69	69	69	69	69	69
		0.41	0.50	0.69	0.83	1.0	1.2	1.7	2.1	2.5	3.1	3.7	4.5	5.6	6.7	8	8	8	8	8	8
4RK25GN-AUL / 4GN□KA		3.6	4.3	6.0	7.2	9.0	11	15	18	22	27	32	39	49	58	69	69	69	69	69	69
		0.41	0.50	0.69	0.83	1.0	1.2	1.7	2.1	2.5	3.1	3.7	4.5	5.6	6.7	8	8	8	8	8	8

Single-Phase 230V 50Hz

Unit= Upper values: lb-in/Lower values: N·m

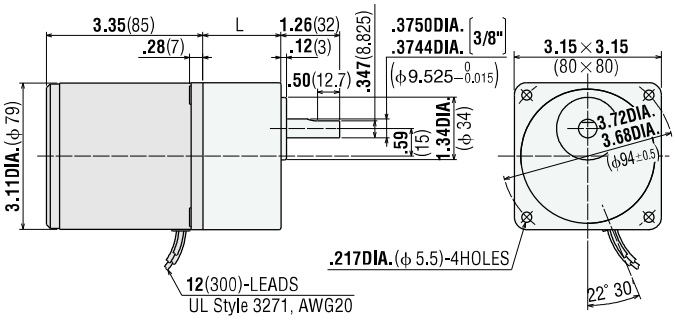
Model	Speed r/min	500	416	300	250	200	166	120	100	83	60	50	41	30	25	20	16	15	12.5	10	8.3
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
4RK25GN-CWE 4RK25GN-CWTE / 4GN□KA		4.3	5.2	7.2	8.7	11	13	18	22	26	33	39	47	59	69	69	69	69	69	69	69
		0.50	0.60	0.83	1.0	1.2	1.5	2.1	2.5	3.0	3.7	4.5	5.4	6.8	8	8	8	8	8	8	8

- Gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (50 Hz: 1500 r/min, 60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ～ 20% less than the displayed value, depending on the size of the load.

Dimensions Scale 1/4, Unit = **inch** (mm)

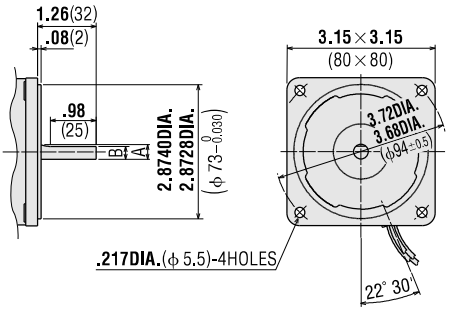
①**4RK25GN-AWU**
4RK25GN-CWE
4RK25GN-AUL
Weight (Mass): 3.3 lb.(1.5 kg)

4GN□KA
Weight (Mass): 1.43 lb.(0.65 kg)



L=1.26(32) **4GN3KA~18KA**
L=1.67(42.5) **4GN25KA~180KA**

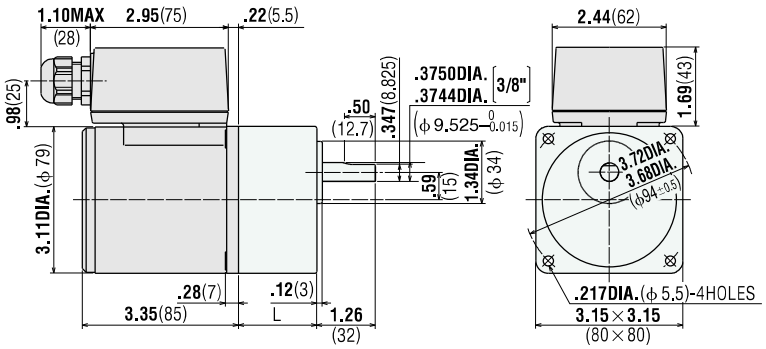
4RK25A-AWU Round Shaft Type
4RK25A-CWE
4RK25A-AULA
Weight (Mass): 3.3 lb.(1.5 kg)



Model	A	B
4RK25A-AWU **4RK25A-CWE**	.3150DIA. .3144DIA. (ϕ 8 0 -0.015)	**.28**(7)
4RK25A-AULA	.3125DIA. .3120DIA. [5/16"](ϕ 7.937 0 -0.011)	**.28**(7.037)

②**4RK25GN-AWTU**
4RK25GN-CWTE
Weight (Mass): 3.7 lb.(1.7 kg)

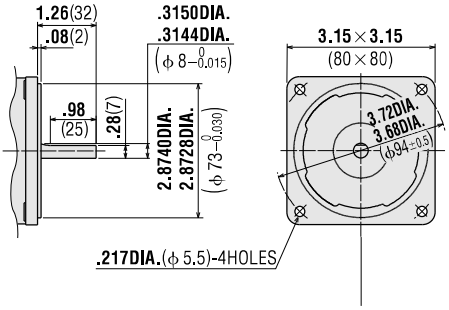
4GN□KA
Weight (Mass): 1.43 lb.(0.65 kg)



L=1.26(32) **4GN3KA~18KA**
L=1.67(42.5) **4GN25KA~180KA**

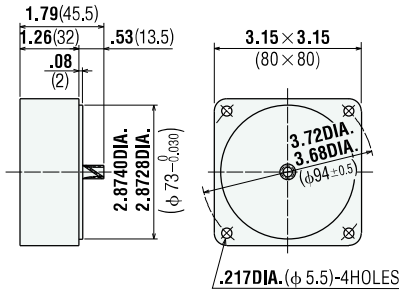
Use cabtyre cable with the diameter of .24DIA.(ϕ 6)~.47DIA.(ϕ 12).

4RK25A-AWTE Round Shaft Type
4RK25A-CWTE
Weight (Mass): 3.7 lb.(1.7 kg)

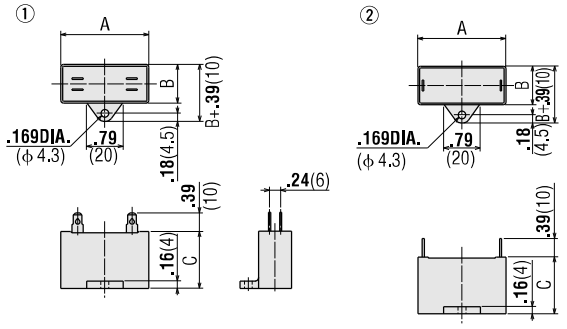


●Decimal Gearhead

4GN10XK Weight (Mass): 0.88 lb.(0.4 kg)



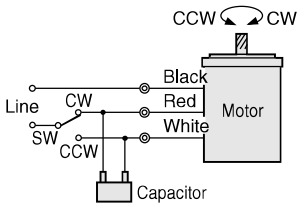
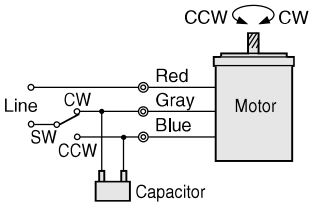
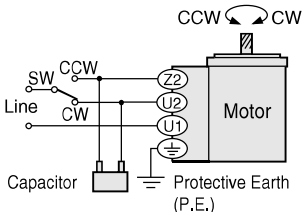
●Capacitor (included with the motor)



Motor Model	Capacitor Model	Dimensions inch (mm) A	B	C	Weight (Mass) oz (g)	Dimension No.
4R25GN-AW(T)U **4R25A-AW(T)U**	CH80CFAUL	1.89 (48)	0.75 (19)	1.14 (29)	1.41 (40)	①
4R25GN-CW(T)E **4R25A-CW(T)E**	CH20BFAUL	1.89 (48)	0.75 (19)	1.14 (29)	1.23 (35)	①
4R25GN-AUL **4RK25A-AULA**	CH70UL	1.50 (38)	0.83 (21)	1.22 (31)	1.23 (35)	②

If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

■ Wiring Diagrams The direction of motor rotation is as viewed from the shaft end of the motor.

Lead Wire Type		Terminal Box Type
4RK25GN-AWU **4RK25GN-CWE**	**4RK25GN-AUL**	**4RK25GN-AWTU** **4RK25GN-CWTE**
		

To rotate the motor in a clockwise(CW)direction, flip switch SW to CW.
To rotate it in a counterclockwise(CCW)direction, flip switch SW to CCW.

■ Right-Angle Gearheads

The right-angle gearhead provides an output shaft that is at a right angle to the motor's output shaft.
See page [A-216] for specifications and other information.

■ Accessories

●Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors without gearheads. See page [A-266] for the dimensions.
Model name **SOL4U10**

●Flexible Couplings

Optional clamping couplings are available. See page[A-260] for the dimensions.

REVERSIBLE MOTORS
Single-Phase
40W (1/18.5 HP)
Frame Size 3.54 in.sq. (90mm sq.)

GEAR SAFETY STD.

■ Specifications — 30 Minutes Rating

Model Upper Model Name:Pinion Shaft Type Lower Model Name( ):Round Shaft Type Lead Wire Type Dimension ① Terminal Box Type Dimension ②	Output Power HP	Output Power W	Voltage V AC	Frequency Hz	Current A	Starting Torque oz-in	Starting Torque mN·m	Rated Torque oz-in	Rated Torque mN·m	Rated Speed r/min	Capacitor μF
5RK40GN-AWU (5RK40A-AWU) / 5RK40GN-AWTU (5RK40A-AWTU)	1/18.5	40	110 115	60	0.81	36.1	260	37.5	270	1450	12
5RK40GN-CWE (5RK40A-CWE) / 5RK40GN-CWTE (5RK40A-CWTE)	1/18.5	40	220	60	0.46	36.1	260	36.1	260	1500	3.5
	1/18.5	40	230	50	0.40	37.5	270	43.7	315	1250	3.5
	1/18.5	40	230	60	0.46	36.1	260	36.1	260	1500	3.5
5RK40GN-AUL (5RK40A-AULA) / —	1/18.5	40	115	60	0.87	36.1	260	36.1	260	1550	12

- Values shown for starting torque and rated torque are measured for operation without the brake applied.
- The product contains a built-in thermal protector. When a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.
- The "**U**" and "**E**" at the end of the model name indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate. When the motor is approved under various safety standards, the nameplate is adopted.

■ Gearmotor — Torque Table

The permissible torque with decimal gearhead with a gear ratio of 10:1 is 87 lb-in (10N·m).

- Right-Angle gearhead may be connected. See page [A-216] for more information.

●Single-Phase 115V/230V 60Hz

Unit=Upper values: lb-in/Lower values: N·m

Model \ Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
5RK40GN-AWU / 5RK40GN-AWTU / 5GN□KA	5.7	6.8	9.5	11	14	17	24	28	34	43	51	62	77	87	87	87	87	87	87	87
	0.66	0.79	1.1	1.3	1.6	2.0	2.7	3.3	3.9	4.9	5.9	7.1	8.9	10	10	10	10	10	10	10
5RK40GN-CWE / 5RK40GN-CWTE / 5GN□KA	5.5	6.6	9.1	11	14	16	23	27	33	41	49	59	74	87	87	87	87	87	87	87
	0.63	0.76	1.1	1.3	1.6	1.9	2.6	3.2	3.8	4.7	5.7	6.8	8.6	10	10	10	10	10	10	10
5RK40GN-AUL / 5GN□KA	5.5	6.6	9.1	11	14	16	23	27	33	41	49	59	74	87	87	87	87	87	87	87
	0.63	0.76	1.1	1.3	1.6	1.9	2.6	3.2	3.8	4.7	5.7	6.8	8.6	10	10	10	10	10	10	10

●Single-Phase 230V 50Hz

Unit=Upper values: lb-in/Lower values: N·m

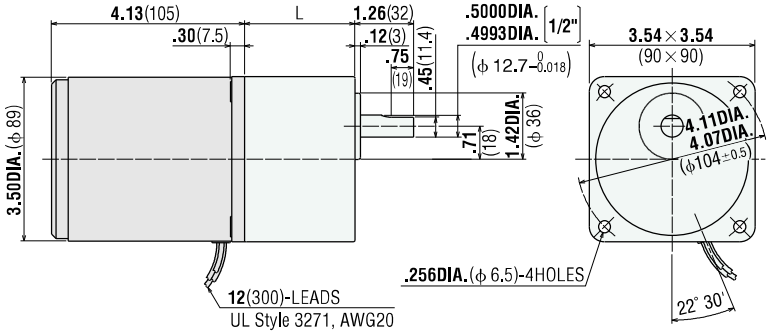
Model \ Speed r/min	500	416	300	250	200	166	120	100	83	60	50	41	30	25	20	16	15	12.5	10	8.3
Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
5RK40GN-CWE / 5RK40GN-CWTE / 5GN□KA	6.6	8.0	11	13	17	20	28	33	40	50	60	72	87	87	87	87	87	87	87	87
	0.77	0.92	1.3	1.5	1.9	2.3	3.2	3.8	4.6	5.7	6.9	8.3	10	10	10	10	10	10	10	10

- Gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (50 Hz: 1500 r/min, 60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

Dimensions Scale 1/4, Unit = **inch** (mm)

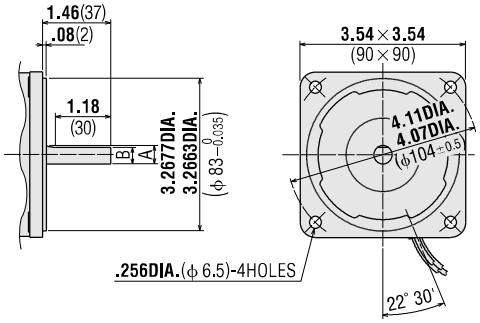
①**5RK40GN-AWU**
5RK40GN-CWE
5RK40GN-AUL
Weight (Mass): 5.5 lb.(2.5 kg)

/ **5GN□KA**
Weight (Mass): 3.3 lb.(1.5 kg)



L=**1.65**(42) **5GN3KA~18KA**
L=**2.36**(60) **5GN25KA~180KA**

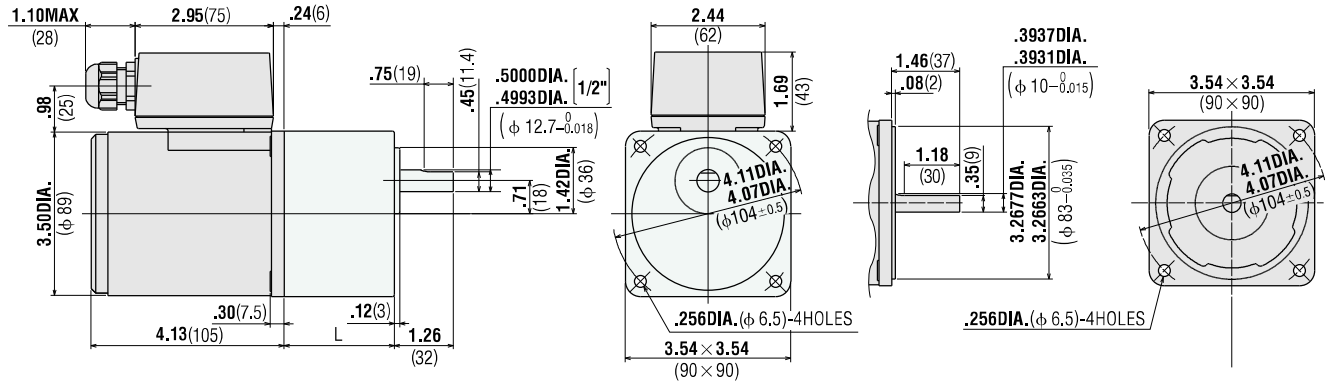
5RK40A-AWU
5RK40A-CWE
5RK40A-AULA Round Shaft Type
Weight (Mass): 5.5 lb.(2.5 kg)



Model	A	B
5RK40A-AWU	**.3937DIA.**	**.35**(9)
5RK40A-CWE	**.3931DIA.** (ϕ 10 -0.015)	
5RK40A-AULA	**.3750DIA.** **.3746DIA.** [3/8"](ϕ 9.525 -0.011)	**.35**(8.825)

②**5RK40GN-AWTU**
5RK40GN-CWTE
Weight (Mass): 5.7 lb.(2.6 kg)

/ **5GN□KA**
Weight (Mass): 3.3 lb.(1.5 kg)

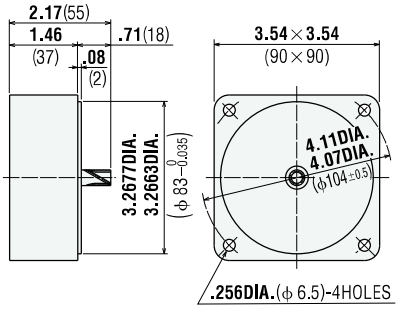


L=**1.65**(42) **5GN3KA~18KA**
L=**2.36**(60) **5GN25KA~180KA**

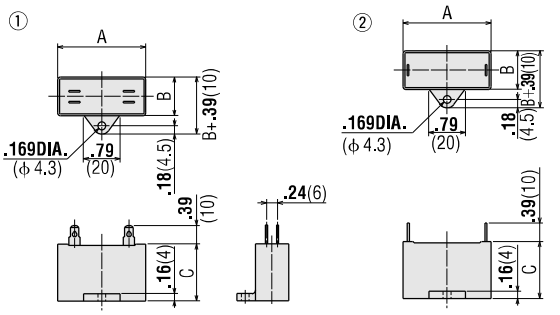
Use cabtyre cable with the diameter of .24DIA.(ϕ 6)~.47DIA.(ϕ 12).

●Decimal Gearhead

5GN10XK Weight (Mass): 1.32 lb.(0.6 kg)



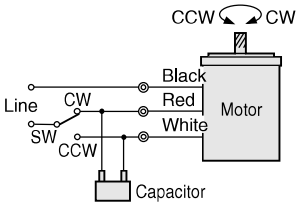
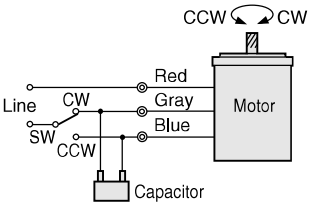
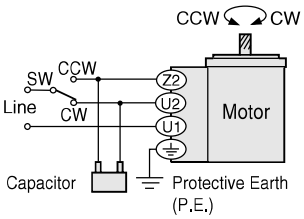
●Capacitor (included with the motor)



Motor Model	Capacitor Model	Dimensions inch (mm) A	B	C	Weight (Mass) oz (g)	Dimension No.
5RK40GN-AW(T)U **5RK40A-AW(T)U**	CH120CFAUL	2.28 (58)	0.83 (21)	1.22 (31)	1.76 (50)	①
5RK40GN-CW(T)E **5RK40A-CW(T)E**	CH35BFAUL	2.28 (58)	0.87 (22)	1.38 (35)	1.94 (55)	①
5RK40GN-AUL **5RK40A-AULA**	CH120UL	1.89 (48)	0.83 (21)	1.22 (31)	1.55 (44)	②

If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

Wiring Diagrams The direction of motor rotation is as viewed from the shaft end of the motor.

Lead Wire Type		Terminal Box Type
5RK40GN-AWU **5RK40GN-CWE**	**5RK40GN-AUL**	**5RK40GN-AWTU** **5RK40GN-CWTE**
		

To rotate the motor in a clockwise(CW)direction, flip switch SW to CW.
To rotate it in a counterclockwise(CCW)direction, flip this switch to CCW.

Right-Angle Gearheads

The right-angle gearhead provides an output shaft that is at a right angle to the motor's output shaft.
See page [A-216] for specifications and other information.

Accessories

●Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors without gearheads. See page [A-266] for the dimensions.
Model name **SOL5UA**

●Flexible Couplings

Optional clamping couplings are available. See page[A-260] for the dimensions.

REVERSIBLE MOTORS

Single-Phase

60W (1/12.5 HP)

Frame Size 3.54 in.sq. (90mm sq.)

GEAR SAFETY STD.

Specifications — 30 Minutes Rating

Model Upper Model Name:Pinion Shaft Type Lower Model Name( ):Round Shaft Type Lead Wire Type Dimension ①	Terminal Box Type Dimension ②	Output Power HP	Output Power W	Voltage V AC	Frequency Hz	Current A	Starting Torque oz-in	Starting Torque mN·m	Rated Torque oz-in	Rated Torque mN·m	Rated Speed r/min.	Capacitor μF
5RK60GU-AWU (5RK60A-AWU)	5RK60GU-AWTU (5RK60A-AWTU)	1/12.5	60	110 115	60	1.24	52.8	380	56.2	405	1450	20
5RK60GU-CWE (5RK60A-CWE)	5RK60GU-CWTE (5RK60A-CWTE)	1/12.5	60	220	60	0.67	52.8	380	56.2	405	1450	5
				230	50	0.61	65.3	470	68.0	490	1200	
				230	60	0.67	52.8	380	56.2	405	1450	
5RK60GU-AFUL	—	1/12.5	60	115	60	1.25	51.4	370	51.4	370	1600	20

- Values shown for starting torque and rated torque are measured for operation without the brake applied.
- The product contains a built-in thermal protector. When a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.
- The "**U**" and "**E**" at the end of the model name indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate. When the motor is approved under various safety standards, the nameplate is adopted.

Gearmotor—Torque Table

The permissible torque with decimal gearhead with a gear ratio of 10:1 is 174 lb-in (20N·m).

- Right-Angle gearhead may be connected. See page [A-216] for more information.

Single-Phase 115V/230V 60Hz

Unit=Upper values: lb-in/Lower values: N·m

Model	Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
5RK60GU-AWU 5RK60GU-AWTU 5RK60GU-CWE 5RK60GU-CWTE / 5GU□KA		8.5	10	14	17	21	26	32	38	46	58	70	83	116	139	155	174	174	174	174	174
		0.98	1.2	1.6	2	2.5	3.0	3.7	4.4	5.3	6.7	8.0	9.6	13	16	18	20	20	20	20	20
5RK60GU-AFUL / 5GU□KA		7.8	9.4	13	16	20	23	29	35	42	53	64	76	106	127	142	171	174	174	174	174
		0.9	1.1	1.5	1.8	2.2	2.7	3.4	4.1	4.9	6.1	7.3	8.8	12	15.0	16	20	20	20	20	20

Single-Phase 230V 50Hz

Unit=Upper values: lb-in/Lower values: N·m

Model	Speed r/min	500	416	300	250	200	166	120	100	83	60	50	41	30	25	20	16	15	12.5	10	8.3
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
5RK60GU-CWE 5RK60GU-CWTE / 5GU□KA		10	12	17	21	26	31	39	47	56	70	84	101	140	168	174	174	174	174	174	174
		1.2	1.4	2	2.4	3	3.6	4.5	5.4	6.4	8.1	9.7	12	16	19	20	20	20	20	20	20

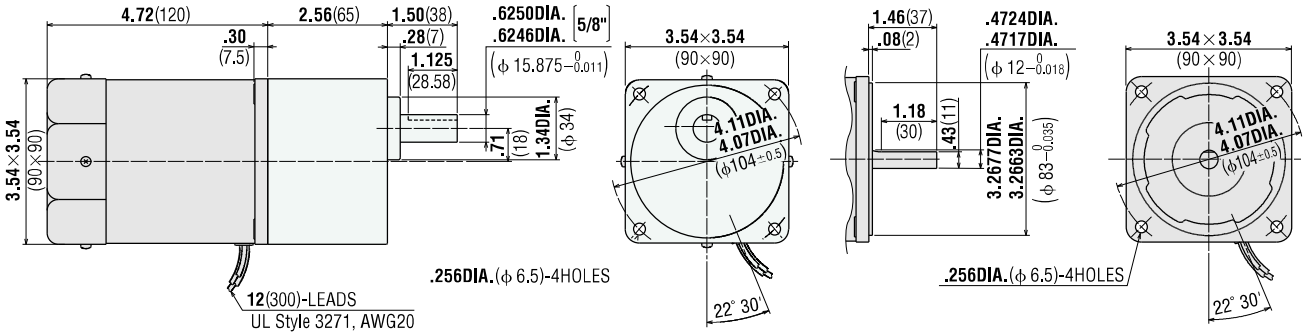
- Gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (50 Hz: 1500 r/min, 60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

Dimensions Scale 1/4, Unit = **inch** (mm)

①**5RK60GU-AWU**
5RK60GU-CWE
5RK60GU-AFUL
Weight (Mass): 6.0 lb.(2.7 kg)

5GU□KA
Weight (Mass): 3.3 lb.(1.5 kg)

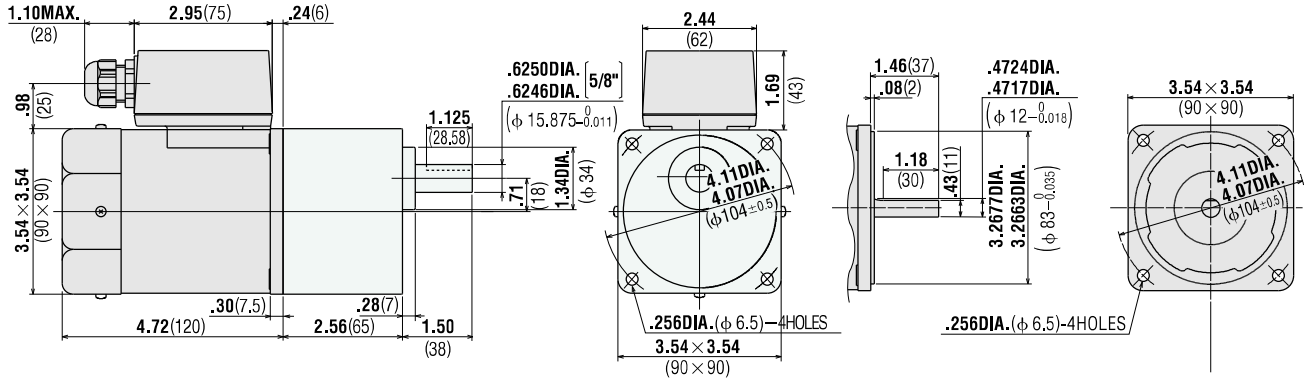
5RK60A-AWU
5RK60A-CWE Round Shaft Type
Weight (Mass): 6.0 lb.(2.7 kg)



②**5RK60GU-AWTU**
5RK60GU-CWTE
Weight (Mass): 6.2 lb.(2.8 kg)

5GU□KA
Weight (Mass): 3.3 lb.(1.5 kg)

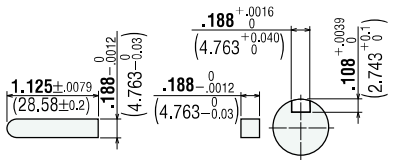
5RK60A-AWTU
5RK60A-CWTE Round Shaft Type
Weight (Mass): 6.2 lb.(2.8 kg)



Use cabtyre cable with the diameter of .24DIA.(ϕ 6)～.47DIA.(ϕ 12).

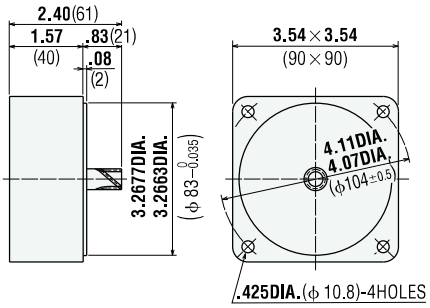
●Key and Key Slot Scale 1/2

(The key is provided with the gearhead)

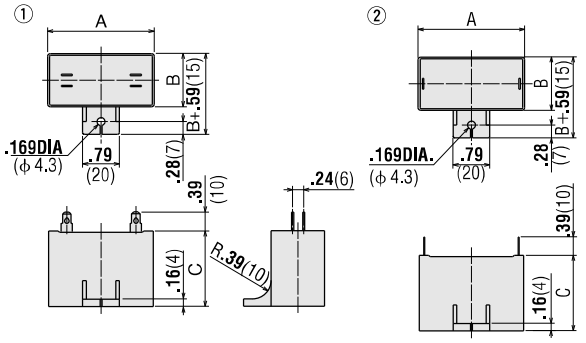


●Decimal Gearhead

5GU10XKB Weight (Mass): 1.32 lb.(0.6 kg)



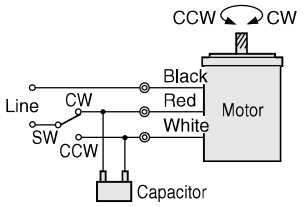
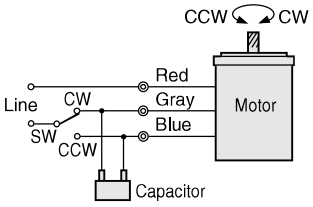
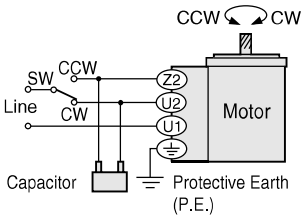
●Capacitor (included with the motor)



Motor Model	Capacitor Model	Dimensions inch (mm) A	B	C	Weight (Mass) oz (g)	Dimension No.
5RK60GU-AW(T)U **5RK60A-AW(T)U**	CH200CFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.35 (95)	①
5RK60GU-CW(T)U **5RK60A-CW(T)U**	CH50BFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.00 (85)	①
5RK60GU-AFUL	CH200UL	2.28 (58)	0.91 (23.5)	1.46 (37)	2.68 (76)	②

If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

■ Wiring Diagrams The direction of motor rotation is as viewed from the shaft end of the motor.

Lead Wire Type		Terminal Box Type
5RK60GU-AWU **5RK60GU-CWE**	**5RK60GU-AFUL**	**5RK60GU-AWTU** **5RK60GU-CWTE**
		

To rotate the motor in a clockwise(CW)direction, flip switch SW to CW.
To rotate it in a counterclockwise(CCW)direction, flip switch SW to CCW.

■ Right-Angle Gearheads

The right-angle gearhead provides an output shaft that is at a right angle to the motor's output shaft.
See page [A-216] for specifications and other information.

■ Accessories

●Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors without gearheads. See page [A-266] for the dimensions.
Model name **SOL5UA**

●Flexible Couplings

Optional clamping couplings are available. See page[A-260] for the dimensions.

REVERSIBLE MOTORS
Single-Phase
90W (1/8 HP)
Frame Size 3.54 in.sq. (90mm sq.)

GEAR SAFETY STD.

■ Specifications — 30 Minutes Rating

Model Upper Model Name:Pinion Shaft Type Lower Model Name( ):Round Shaft Type Lead Wire Type Dimension ① Terminal Box Type Dimension ②	Output Power HP	Output Power W	Voltage V AC	Frequency Hz	Current A	Starting Torque oz-in	Starting Torque mN·m	Rated Torque oz-in	Rated Torque mN·m	Rated Speed r/min.	Capacitor μF
5RK90GU-AWU (5RK90A-AWU) / 5RK90GU-AWTU (5RK90A-AWTU)	1/8	90	110 115	60	1.81	81.9	590	81.2	585	1500	30
5RK90GU-CWE (5RK90A-CWE) / 5RK90GU-CWTE (5RK90A-CWTE)	1/8	90	220	60	0.96	81.9	590	84.0	605	1450	7
	1/8	90	230	50	0.82	83.3	600	101	730	1200	7
	1/8	90	230	60	0.96	81.9	590	84.0	605	1450	7
5RK90GU-AFUL / —	1/8	90	115	60	1.60	81.9	590	79.2	570	1550	25

- Values shown for starting torque and rated torque are measured for operation without the brake applied.
- The product contains a built-in thermal protector. When a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.
- The "**U**" and "**E**" at the end of the model name indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate. When the motor is approved under various safety standards, the nameplate is adopted.

■ Gearmotor—Torque Table

The permissible torque with decimal gearhead with a gear ratio of 10:1 is 174 lb-in (20N·m).

- Right-Angle gearhead may be connected. See page [A-216] for more information.

●Single-Phase 115V/230V 60Hz

Unit=Upper values: lb-in/Lower values: N·m

Model	Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
5RK90GU-AWU 5RK90GU-AWTU / 5GU□KA		12	15	21	25	31	37	46	56	67	84	100	121	167	174	174	174	174	174	174	174
		1.4	1.7	2.4	2.8	3.6	4.3	5.3	6.4	7.7	9.7	12	14	19	20	20	20	20	20	20	20
5RK90GU-CWE 5RK90GU-CWTE / 5GU□KA		13	15	21	26	32	38	48	57	69	87	104	125	173	174	174	174	174	174	174	174
		1.5	1.8	2.5	2.9	3.7	4.4	5.5	6.6	7.9	10	12	14	20	20	20	20	20	20	20	20
5RK90GU-AFUL / 5GU□KA		12	14	20	24	30	36	45	54	65	82	98	118	163	174	174	174	174	174	174	174
		1.4	1.7	2.3	2.8	3.5	4.2	5.2	6.2	7.5	9.4	11	14	19	20	20	20	20	20	20	20

●Single-Phase 230V 50Hz

Unit=Upper values: lb-in/Lower values: N·m

Model	Speed r/min	500	416	300	250	200	166	120	100	83	60	50	41	30	25	20	16	15	12.5	10	8.3
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
5RK90GU-CWE 5RK90GU-CWTE / 5GU□KA		15	18	26	31	39	46	58	69	83	104	125	150	174	174	174	174	174	174	174	174
		1.8	2.1	3.0	3.5	4.4	5.3	6.7	8.0	9.6	12	14	17	20	20	20	20	20	20	20	20

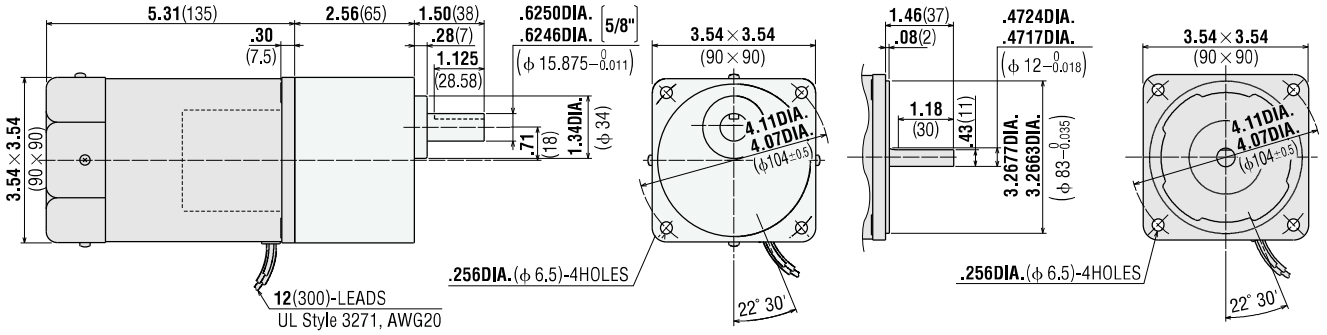
- Gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's synchronous speed (50 Hz: 1500 r/min, 60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.

Dimensions Scale 1/4, Unit = **inch** (mm)

①5RK90GU-AWU
5RK90GU-CWE
5RK90GU-AFUL
Weight (Mass): 7.1 lb.(3.2 kg)

5GU□KA
Weight (Mass): 3.3 lb.(1.5 kg)

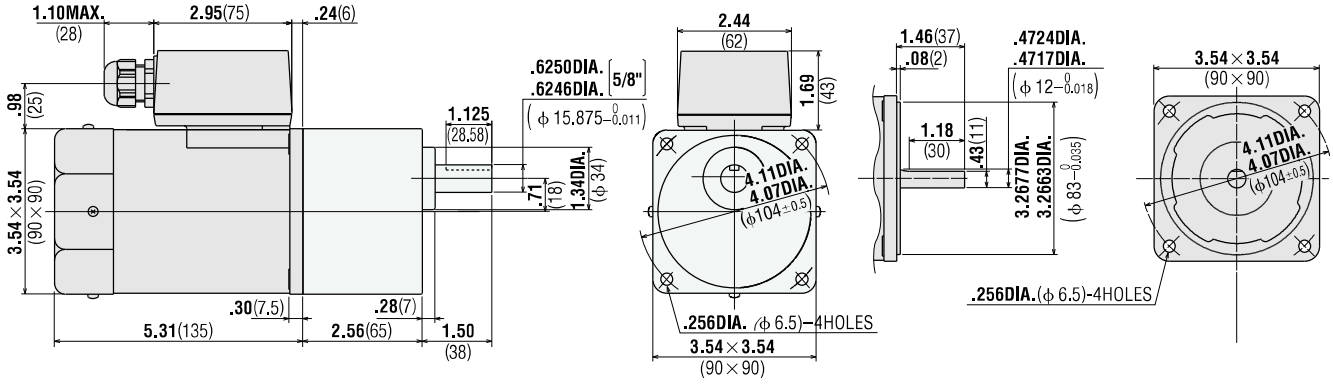
5RK90A-AWU
5RK90A-CWE Round Shaft Type
Weight (Mass): 7.1 lb.(3.2 kg)



②5RK90GU-AWTU
5RK90GU-CWTE
Weight (Mass): 7.3 lb.(3.3 kg)

5GU□KA
Weight (Mass): 3.3 lb.(1.5 kg)

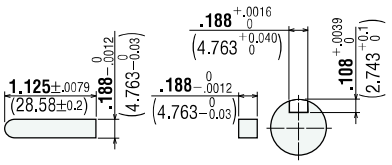
5RK90A-AWTU
5RK90A-CWTE Round Shaft Type
Weight (Mass): 7.3 lb.(3.3 kg)



Use cabtyre cable with the diameter of .24DIA.(ϕ 6)～.47DIA.(ϕ 12).

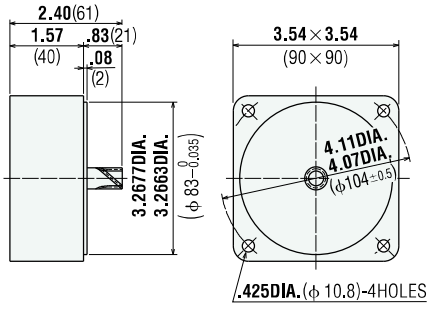
●Key and Key Slot Scale 1/2

(The key is provided with the gearhead)

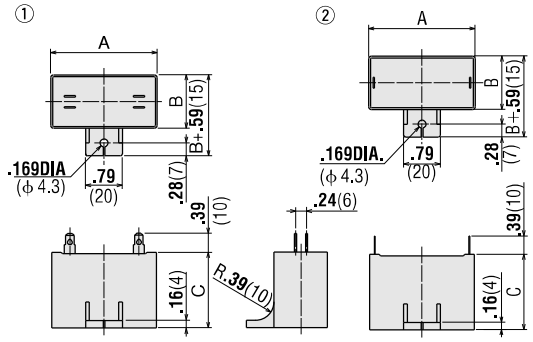


●Decimal Gearhead

5GU10XKB Weight (Mass): 1.32 lb.(0.6 kg)



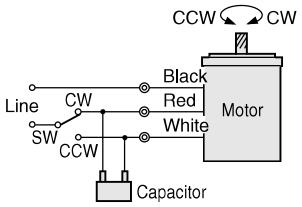
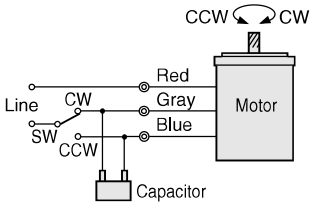
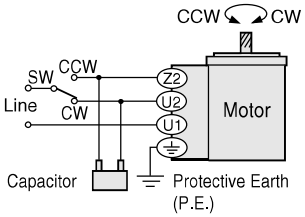
●Capacitor (included with the motor)



Motor Model	Capacitor Model	Dimensions inch(mm) A	B	C	Weight (Mass) oz (g)	Dimension No.
5RK90GU-AW(T)U **5RK90A-AW(T)U**	CH300CFAUL	2.28 (58)	1.38 (35)	1.97 (50)	4.94 (140)	①
5RK90GU-CW(T)E **5RK90A-CW(T)E**	CH70BFAUL	2.28 (58)	1.38 (35)	1.97 (50)	4.59 (130)	①
5RK90GU-AFUL	CH250UL	2.28 (58)	1.14 (29)	1.61 (41)	3.42 (97)	②

If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

■ Wiring Diagrams The direction of motor rotation is as viewed from the shaft end of the motor.

Lead Wire Type		Terminal Box Type
5RK90GU-AWU **5RK90GU-CWE**	**5RK90GU-AFUL**	**5RK90GU-AWTU** **5RK90GU-CWTE**
		

To rotate the motor in a clockwise(CW)direction, flip switch SW to CW.
To rotate it in a counterclockwise(CCW)direction, flip switch SW to CCW.

■ Right-Angle Gearheads

The right-angle gearhead provides an output shaft that is at a right angle to the motor's output shaft.
See page [A-216] for specifications and other information.

■ Accessories

●Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors without gearheads. See page [A-266] for the dimensions.
Model name **SOL5UA**

●Flexible Couplings

Optional clamping couplings are available. See page[A-260] for the dimensions.

SYNCHRONOUS MOTORS

Gearheads shown in the photograph are sold separately.

SAFETY STD. GEAR AC INPUT

Features

Synchronous motors provide rotation at a fixed speed in synchronization with the frequency of the power source, regardless of fluctuation of the load or line voltage. Synchronous speed is 1800r/min at 60Hz.

Specifications — Continuous Rating

Model		Output Power		Voltage	Frequency	Current	Starting Torque		Rated Torque		Rated Speed	Capacitor	
Pinion Shaft Type	Round Shaft Type	HP	W	V AC	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF	VAC
2SK4GN-AUL	**2SK4A-AULA**	1/187	4	115	60	0.24	3.1	22	3.1	22	1800	1.0	400
3SK10GN-AUL	**3SK10A-AULA**	1/75	10	115	60	0.35	6.9	50	7.6	55	1800	1.5	400
4SK15GN-AUL	**4SK15A-AULA**	1/50	15	115	60	0.50	7.6	55	11.2	81	1800	1.5	400
5SK25GN-AUL	**5SK25A-AULA**	1/30	25	115	60	0.75	11.8	85	18.7	135	1800	3.0	400

- **2SK** type motors are impedance protected.
- **3SK**, **4SK** and **5SK** type motors contain a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

General Specifications

These specifications apply to all synchronous motors.

Item	Specifications
Insulation Resistance	100M ohms or more when 500V DC is applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Dielectric Strength	Sufficient to withstand 1.5kV at 50Hz and 60Hz applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Temperature Rise	135°F (75°C) or less measured by the resistance change method after the temperature of the coil has stabilized under normal operation at the rated voltage and frequency.
Insulation Class	UL•CSA Standard Class A, EN60950 Standard Class E.
Ambient Temperature Range	14°F ~ 104°F (−10°C ~ +40°C)
Ambient Humidity	85% maximum (noncondensing)

Gearmotor — Torque Table

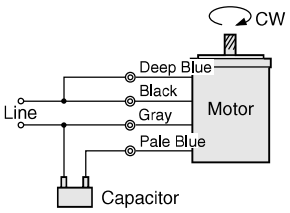
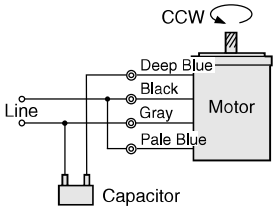
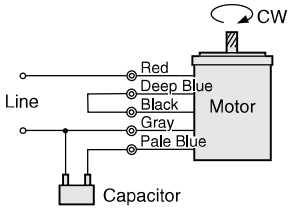
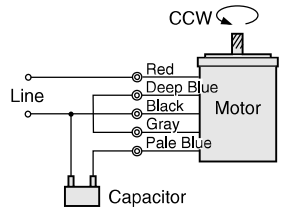
●The permissible torque with decimal gearhead with a gear radio of 10 is : **2GN □ K** : 26 lb-in / 3N·m **3GN □ K** : 43 lb-in / 5N·m
4GN □ K : 69 lb-in / 8N·m (for 1/25~1/36 : 52 lb-in / 6N·m)
5GN □ K : 87 lb-in / 10N·m

Unit = Upper values: lb-in / Lower values: N·m

Model \ Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
2SK4GN-AUL / 2GN□KA	0.47	0.56	0.78	0.94	1.2	1.4	2.0	2.4	2.8	3.5	4.2	5.1	6.4	7.7	9.6	12	13	15	19	23
	0.053	0.064	0.089	0.11	0.13	0.16	0.22	0.27	0.32	0.40	0.48	0.58	0.73	0.87	1.1	1.3	1.5	1.7	2.2	2.6
3SK10GN-AUL / 3GN□KA	1.2	1.4	1.9	2.3	2.9	3.5	4.8	5.8	6.9	8.7	10	12	16	19	24	28	31	38	43	43
	0.13	0.16	0.22	0.27	0.33	0.40	0.56	0.67	0.80	1.0	1.2	1.4	1.8	2.2	2.7	3.3	3.6	4.4	5	5
4SK15GN-AUL / 4GN□KA	1.7	2.0	2.8	3.4	4.3	5.1	7.1	8.5	10	13	15	18	23	28	35	42	46	55	69	69
	0.20	0.24	0.33	0.39	0.49	0.59	0.82	0.98	1.2	1.5	1.8	2.1	2.7	3.2	4.0	4.8	5.3	6.4	8	8
5SK25GN-AUL / 5GN□KA	2.8	3.4	4.7	5.7	7.1	8.5	12	14	17	21	26	31	39	46	58	69	77	87	87	87
	0.33	0.39	0.55	0.66	0.82	0.98	1.4	1.6	2.0	2.5	3.0	3.5	4.5	5.3	6.7	8.0	8.9	10	10	10

- Gearheads are sold separately.
- Enter the gear ratio in the box within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- The speed is calculated by dividing the motor's speed (60 Hz: 1800 r/min) by the gear ratio.

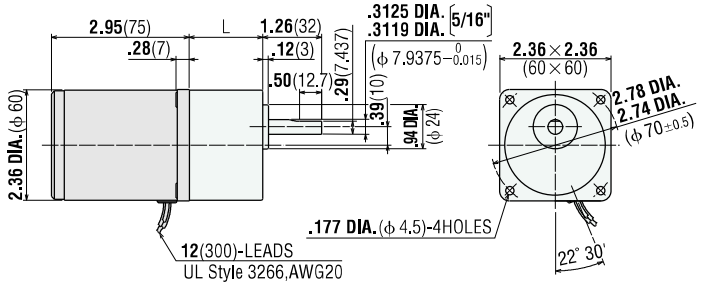
Wiring Diagrams

Motor Model	CW	CCW
2SK4GN-AUL **2SK4A-AULA**		
3SK10GN-AUL **3SK10A-AULA** **4SK15GN-AUL** **4SK15A-AULA** **5SK25GN-AUL** **5SK25A-AULA**		

The direction of motor rotation is as viewed from the shaft end of the motor.
Change the direction of motor rotation only after bringing the motor to a stop. If an attempt is made to change the direction of rotation while the motor is rotating, the motor may ignore the reversing command or change its direction of rotation after some delay.

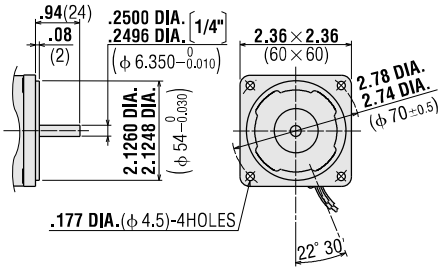
Dimensions Scale 1/4, Unit = **inch** (mm)

2SK4GN-AUL / **2GN□KA**
Weight (Mass): 1.5 lb.(0.7 kg) / Weight (Mass): 0.88 lb.(0.4 kg)

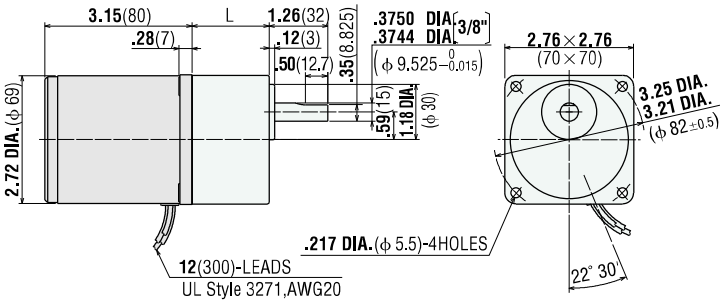


L = **1.18** (30) **2GN3KA**~**18KA**
L = **1.57** (40) **2GN25KA**~**180KA**

2SK4A-AULA Round Shaft Type
Weight (Mass): 1.5 lb.(0.7 kg)

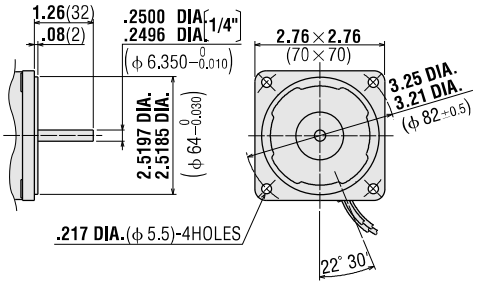


3SK10GN-AUL / **3GN□KA**
Weight (Mass): 2.4 lb.(1.1 kg) / Weight (Mass): 1.21 lb.(0.55 kg)

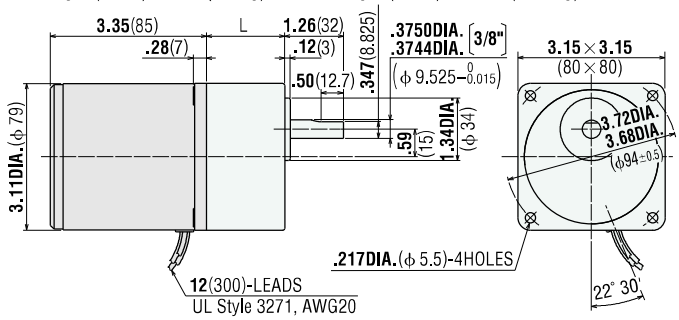


L = **1.26** (32) **3GN3KA**~**18KA**
L = **1.65** (42) **3GN25KA**~**180KA**

3SK10A-AULA Round Shaft Type
Weight (Mass): 2.4 lb.(1.1 kg)

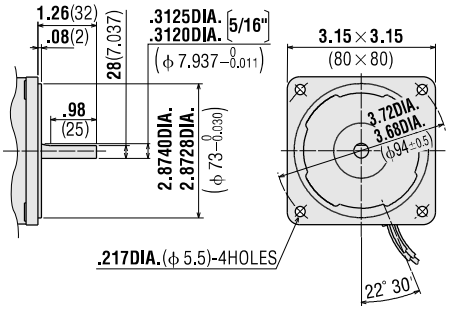


4SK15GN-AUL / **4GN□KA**
Weight (Mass): 3.3 lb.(1.5 kg) / Weight (Mass): 1.43 lb.(0.65 kg)



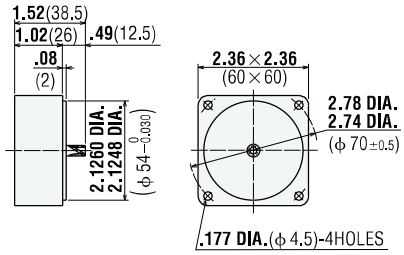
L = **1.26** (32) **4GN3KA**~**18KA**
L = **1.67** (42.5) **4GN25KA**~**180KA**

4SK15A-AULA Round Shaft Type
Weight (Mass): 3.3 lb.(1.5 kg)

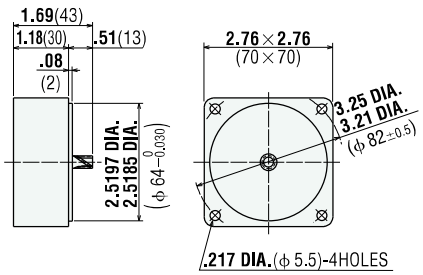


Decimal Gearhead

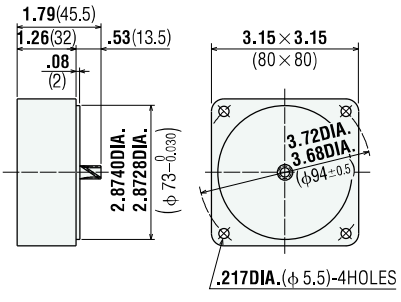
2GN10XK Weight (Mass): 0.44 lb.(0.2 kg)



3GN10XK Weight (Mass): 0.66 lb.(0.3 kg)

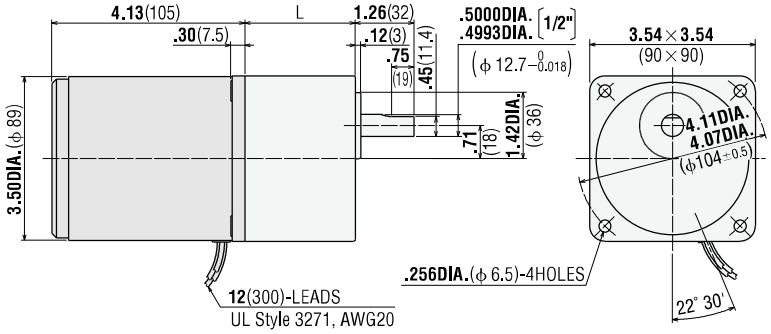


4GN10XK Weight (Mass): 0.88 lb.(0.4 kg)



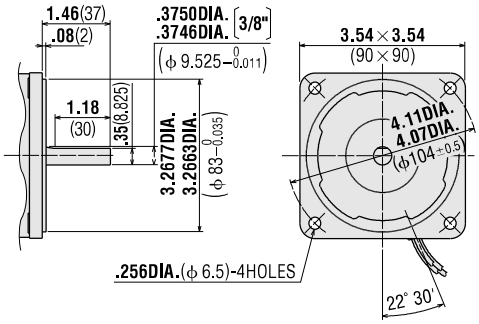
5SK25GN-AUL / **5GN□KA**

Weight (Mass): 5.5 lb.(2.5 kg) / Weight (Mass): 3.31 lb.(1.5 kg)



5SK25A-AULA Round Shaft Type

Weight (Mass): 5.5 lb.(2.5 kg)

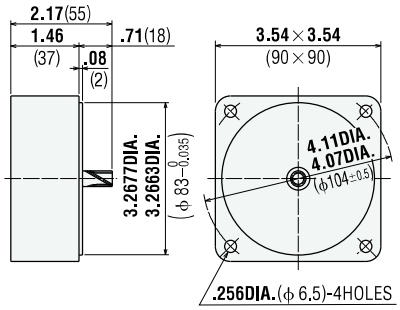


L=1.65 (42) **5GN3KA~18KA**

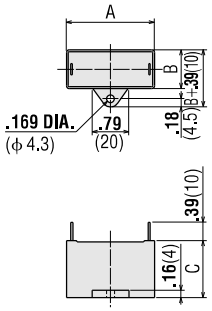
L=2.36 (60) **5GN25KA~180KA**

●Decimal Gearhead

5GN10XK Weight (Mass): 1.32 lb.(0.6 kg)



●Capacitor (included with the motor)

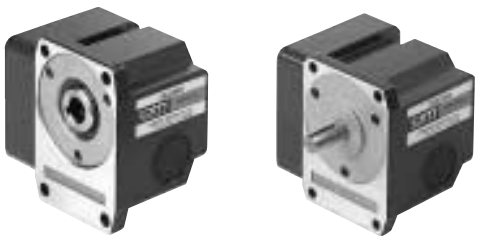


Motor Model	Capacitor Model	Dimensions inch (mm) A	B	C	Weight oz (g)
2SK4GN-AUL **2SK4A-AULA**	CH10BUL	1.22 (31)	.67 (17)	1.06 (27)	0.8 23
3SK10GN-AUL **3SK10A-AULA**	CH15BUL	1.46 (37)	.71 (18)	1.06 (27)	1.0 27
4SK15GN-AUL **4SK15A-AULA**	CH15BUL	1.46 (37)	.71 (18)	1.06 (27)	1.0 27
5SK25GN-AUL **5SK25A-AULA**	CH30BUL	2.28 (48)	.83 (21)	1.22 (31)	1.4 39

Capacitor cap is provided with the capacitor.

■ Right-Angle Gearhead

The right-angle gearhead provides an output shaft at a right angle to the motor's output shaft. See page [A-216] for specifications and other information. (Available with **4GN□R□, 5GN□R□** type only)



TORQUE MOTORS

Torque motors are specially designed to provide high starting torque and operate over a wide speed range. They also provide stable operation in the low speed range or under a locked rotor condition.

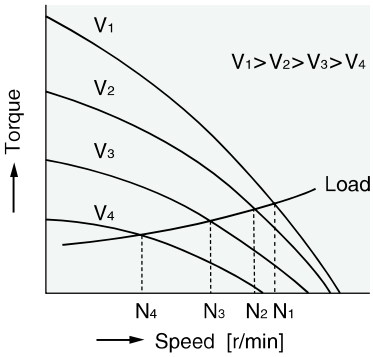
Gearhead shown in the photograph is sold separately.

GEAR SAFETY STD. AC INPUT

Features

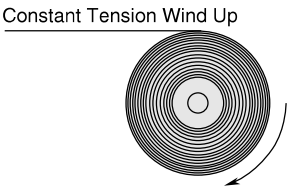
Speed can be varied over a wide range

The motor torque is approximately proportional to the square of the voltage, allowing easy speed control simply by changing the voltage of the power supply.



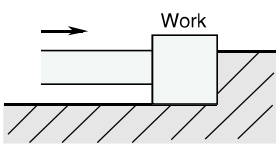
Suitable for winding applications

In an application where an object is released continuously at a constant speed and wound up with constant tension, the torque must be doubled and the speed must be halved if the diameter of the winding spool is doubled. Since torque motors provide high torque at low speed, they are suitable for such operations.



Locked rotor operation is available

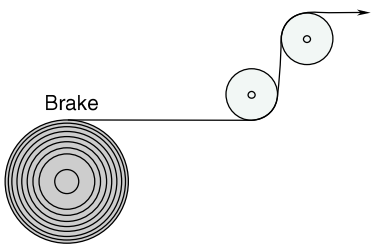
Unlike other standard AC motors, torque motors are designed to provide a stable torque even under stall condition or at very low speed (nearly stalling). They are suitable for pushing applications that require static torque. The motors can operate continuously at 60V. When used at voltages than 60V, the motors are rated for limited duty. The motor has a 5 minute rating at 115V.



Note: When using a motor in locked rotor condition, the output torque becomes very large. Do not exceed the permissible torque of the gearhead.

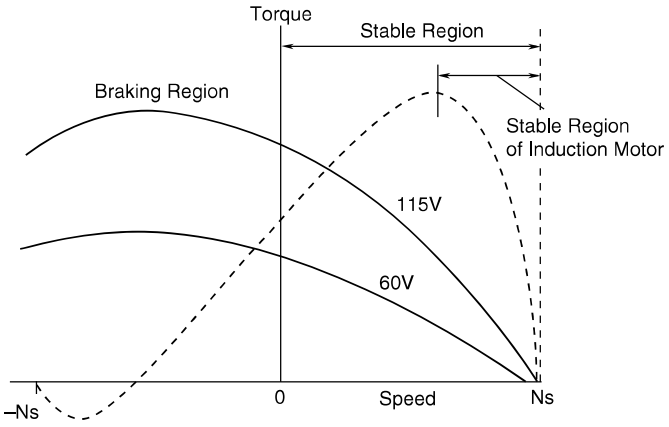
Used as a brake

By using the motor in the braking region of the speed-torque characteristics, it can be made to serve as a brake. Constant tension operation can be achieved by applying DC voltage.

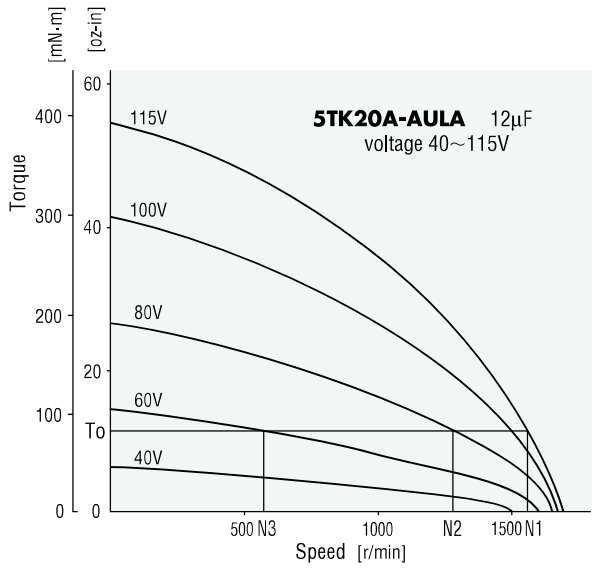


Characteristics of Torque Motors

The speed-torque characteristics of torque motors are different from those of induction motors or reversible motors. As the following graph shows, they have special torque characteristics (torque is highest at zero speed and decreases steadily with increasing speed), so they can provide stable operation through the entire speed range, from starting to no load speed. The torque generated when reversing the motor is a positive torque in the same direction as the rotational magnetic field; this torque is large. When the motor is locked by the load and the motor is rotated opposite the desired direction, this torque acts as a force (braking force) to inhibit the motor from rotating backwards.



The torque generated by the torque motor changes approximately proportionally to the square of the voltage. When the voltage supplied to the motor is changed, speed-torque characteristic curves shift to that of the corresponding voltage. When the voltage is changed to 115, 80 and 60V while the load torque is T_0, the motor rotates at the speeds N_1, N_2 and N_3 respectively. Thus the speed can be changed easily by varying the voltage.



When choosing a torque motor, first determine the required torque and speed. Then select a motor using the speed-torque characteristic curves to determine whether the motor should be operated under continuous duty or limited duty. When used under locked rotor conditions, only the torque factor is considered. The temperature rise of the motor may cause a problem during continuous operation. In this case, choose a motor with an output power large enough for continuous operation and adjust the voltage to control the torque and speed.

Voltage Control of Torque Motors

Phase Control Method Using a Triac

The method most commonly used to control voltage is phase control using a triac. As shown in Fig. 1, by changing the phase angle "alpha" at which the triac switches, the input voltage is controlled as represented by the Phase Angle areas of the graph.

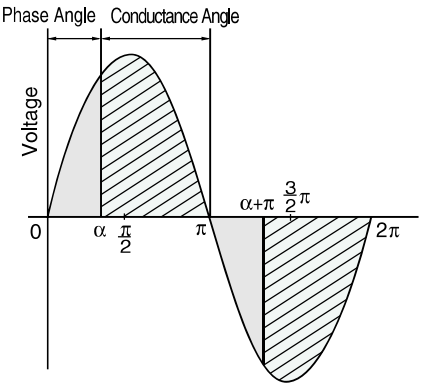


Fig.1 Phase Control

TORQUE MOTORS

Single-Phase

8w • 12w • 23w

Frame Size

2.76"sq.(□70mm), 3.15"sq.(□80mm), 3.54"sq.(□90mm)

GEAR SAFETY STD.

Specifications

Model		Rating at Locked Rotor	Voltage	Frequency	Starting Torque		Output Power		At max. output power				Capacitor
									Speed	Torque		Current	Input	
Pinion Shaft Type	Round Shaft Type		V AC	Hz	oz-in	mN·m	HP	W	r/min	oz-in	mN·m	A	W	μF
3TK6GN-AUL	**3TK6A-AULA**	5 minutes	115	60	20.8	150	1/93	8	900	12.1	87	0.62	67	8.0
		Continuous	60		6.2	45	1/300	2.5		3.7	27	0.34	20	
4TK10GN-AUL	**4TK10A-AULA**	5 minutes	115	60	27.1	195	1/62	12	900	18.1	130	0.66	70	8.0
		Continuous	60		6.9	50	1/266	2.8		4.4	31	0.32	19	
5TK20GN-AUL	**5TK20A-AULA**	5 minutes	115	60	48.6	350	1/32	23	900	34.7	250	1.0	110	12.0
		Continuous	60		12.5	90	1/124	6		9.0	65	0.49	29	

●The product contains a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

General Specifications

Item	Specifications
Insulation Resistance	100M ohms or more when 500V DC is applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Dielectric Strength	Sufficient to withstand 1.5kV at 50Hz and 60Hz applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Temperature Rise	135°F (75°C) or less measured by the resistance change method after the temperature of the coil has stabilized under normal operation at the rated voltage and frequency.
Insulation Class	UL•CSA Standard Class A, EN60950 Standard Class E.
Ambient Temperature Range	14°F ~ 104°F (−10°C ~ +40°C)
Ambient Humidity	85% maximum (noncondensing)

Permissible Torque When Gearhead Is Attached

Due to the special characteristics, torque motors can be operated over a wide speed range, from locked rotor condition to the maximum speed. The permissible torque when a gearhead and a decimal gearhead are directly connected (T_G) can be calculated according to the following formula using the speed and torque determined from the speed-torque characteristics.

$T_G = T_M \times i \times \eta$

T_M : Rated torque of motor

i : Gear ratio

η : Gearhead efficiency (refer to the table on the right.)

The output torque of the gearmotor must be lower than the maximum permissible torque specified in the graph on page [A-21]. The speed of the gearmotor output shaft (N_G) is calculated as follows:

$$N_G = \frac{N_M}{i}$$

N_M : Rated speed of motor

i : Gear ratio

3GN□KA, 4GN□KA, 5GN□KA

Gear Ratio	Gearhead Efficiency
3, 3.6, 5, 6, 7.5, 9, 12.5, 15, 18	81%
25, 30, 36	73%
50, 60, 75, 90, 100, 120, 150, 180	66%

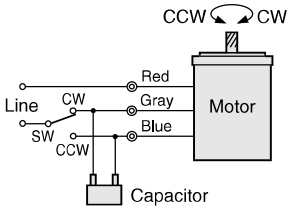
Right-Angle Gearhead

Model	Gear Ratio	Gearhead Efficiency
4GN□RAA (Solid shaft)	**3.6,6,9**	50% (50%)
	15,18,30,36	60% (54%)
	60,90,120,180	
5GN□RAA (Solid shaft)	**3,3.6,5,6,7.5,9,12.5,15,18,25,30**	68% (60%)
	36,50,60,75,90,100,120,150,180	60% (54%)
4GN□RH (Hollow shaft)	**3.6,6**	40% (40%)
	9	50% (50%)
	15,18,30,36	60% (54%)
	60,90,120,180	
5GN□RH (Hollow shaft)	**3.6,6**	50% (50%)
	9,15,18	68% (60%)
	30,36,60,90,120,180	60% (54%)

●Enter the gear ratio in the box within the model number. The numbers in parenthesis indicate the efficiency at starting condition.

●Gearheads are sold separately.

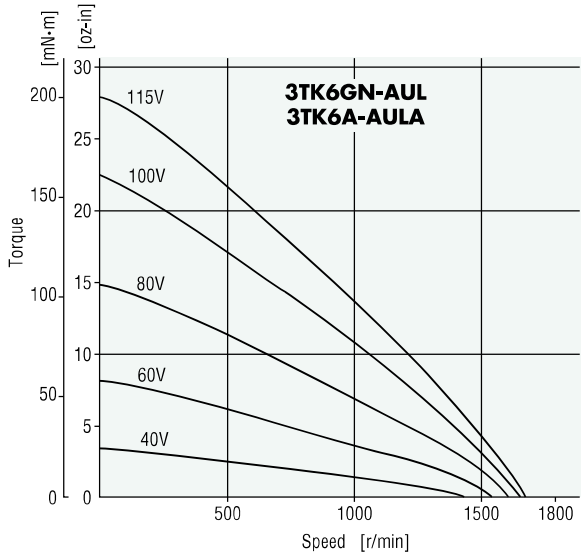
Wiring Diagram

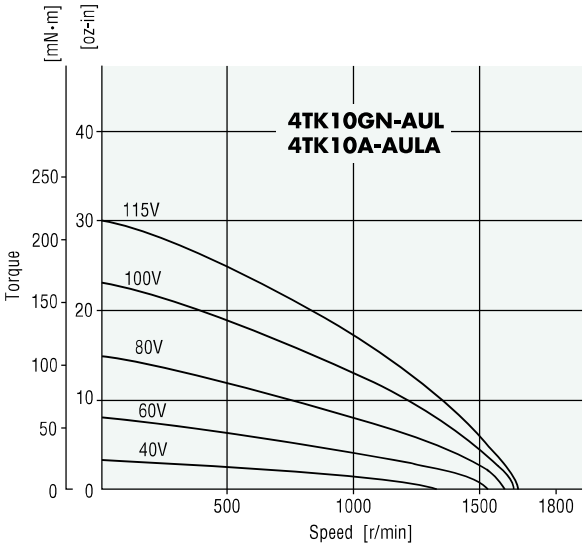


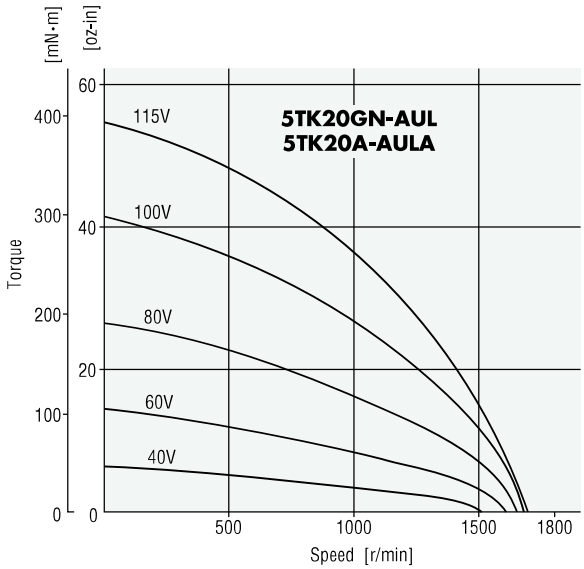
To rotate the motor in a clockwise (CW) direction, flip switch SW to CW.
To rotate it in a counterclockwise (CCW) direction, flip this switch to CCW.

The direction of motor rotation is as viewed from the front shaft end of the motor.

Speed – Torque Characteristics

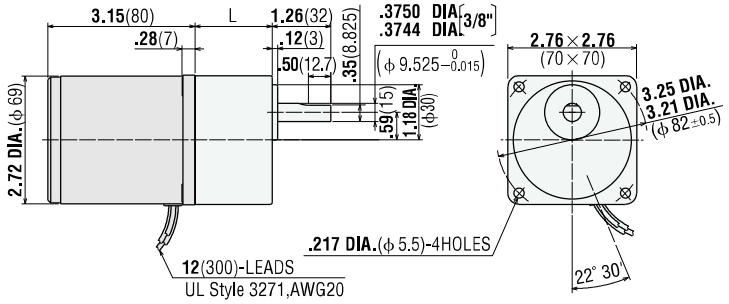






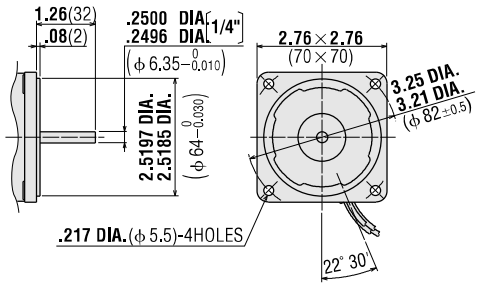
Dimensions Scale 1/4, Unit = **inch** (mm)

3TK6GN-AUL Weight (Mass): 2.4 lb.(1.1 kg) / **3GN□KA** Weight (Mass): 1.21 lb.(0.55 kg)



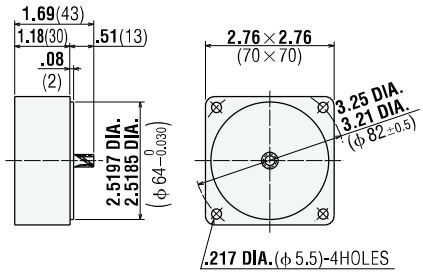
L = **1.26** (32) **3GN3KA~18KA**
L = **1.65** (42) **3GN25KA~180KA**

3TK6A-AULA Round Shaft Type Weight (Mass): 2.4 lb.(1.1 kg)

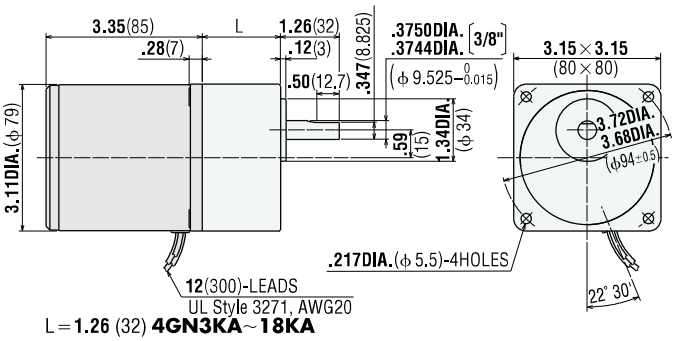


Decimal Gearhead

3GN10XK Weight (Mass): 0.66 lb.(0.3 kg)

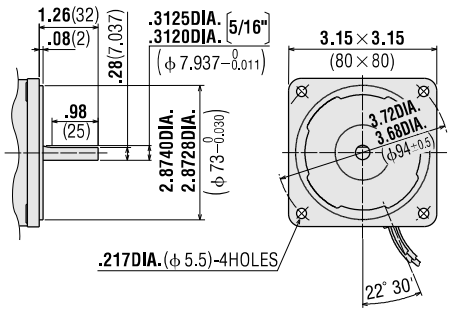


4TK10GN-AUL Weight (Mass): 3.3 lb.(1.5 kg) / **4GN□KA** Weight (Mass): 1.43 lb.(0.65 kg)



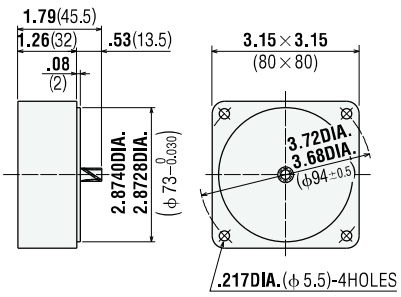
L = **1.26** (32) **4GN3KA~18KA**
L = **1.67** (42.5) **4GN25KA~180KA**

4TK10A-AULA Round Shaft Type Weight (Mass): 3.3 lb.(1.5 kg)



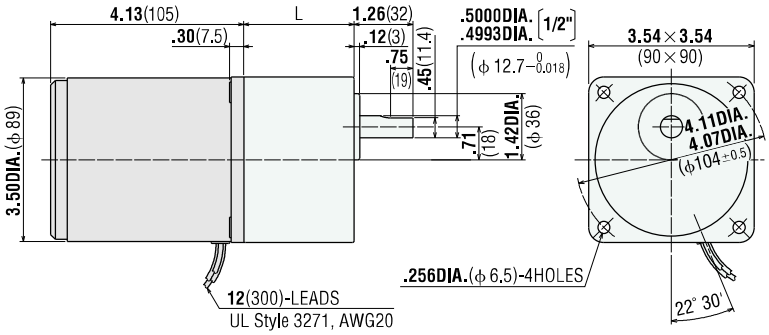
Decimal Gearhead

4GN10XK Weight (Mass): 0.88 lb.(0.4 kg)



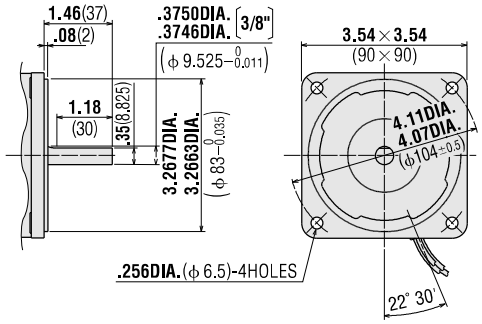
5TK20GN-AUL
Weight (Mass): 5.5 lb.(2.5 kg)

5GN□KA
Weight (Mass): 3.31 lb.(1.5 kg)



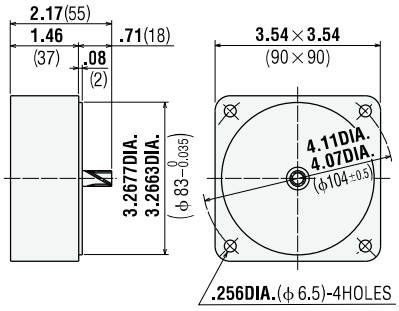
L=**1.65** (42) **5GN3KA**~**18KA**
L=**2.36** (60) **5GN25KA**~**180KA**

5TK20A-AULA Round Shaft Type Weight (Mass): 5.5 lb.(2.5 kg)

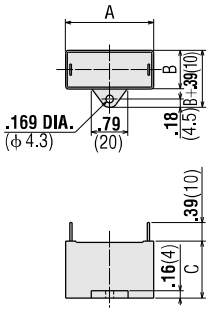


Decimal Gearhead

5GN10XK Weight (Mass): 1.32 lb.(0.6 kg)



Capacitor (included with the motor)

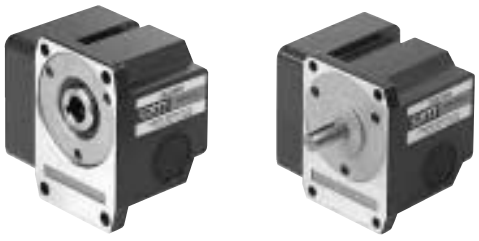


Motor Model	Capacitor Model	Dimensions inch (mm) A	B	C	Weight oz (g)
3TK6GN-AUL **3TK6A-AULA**	CH80UL	1.50 (38)	.83 (21)	1.22 (31)	1.23 35
4TK10GN-AUL **4TK10A-AULA**	CH80UL	1.50 (38)	.83 (21)	1.22 (31)	1.23 35
5TK20GN-AUL **5TK20A-AULA**	CH120CUL	2.28 (58)	.83 (21)	1.22 (31)	1.76 50

Capacitor cap is provided with the capacitor.

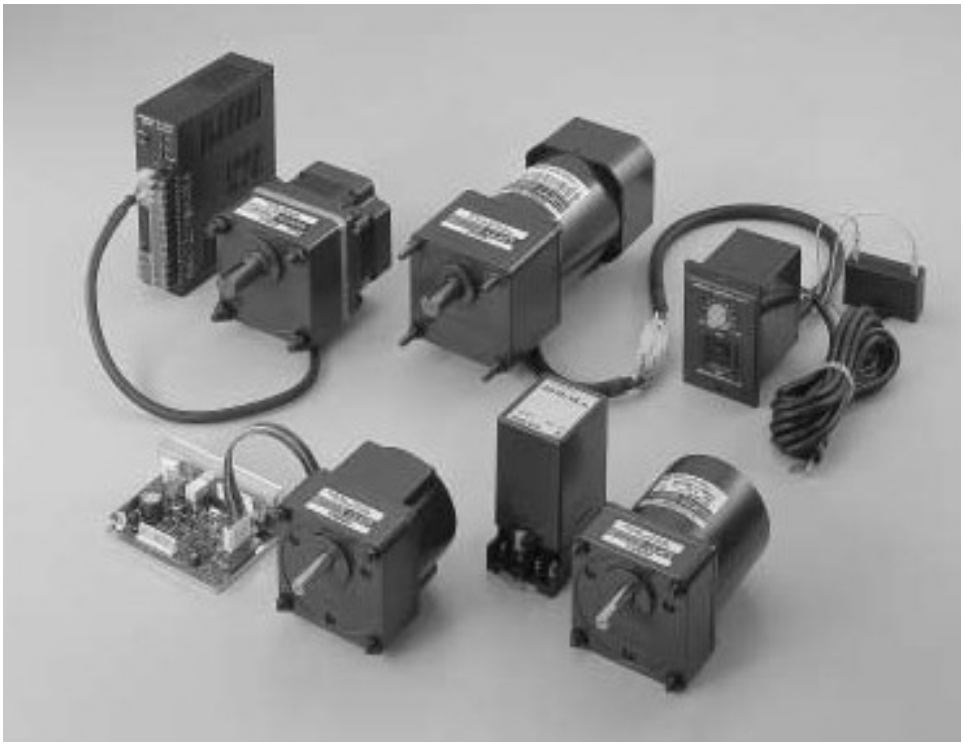
Right-Angle Gearhead

The right-angle gearhead provides an output shaft at a right angle to the motor's output shaft. See page [A-216] for specifications and other information. (Available with **4GN□R□** **5GN□R□** type only)



ORIENTAL MOTOR GENERAL CATALOG

A



Speed Control Motors

Product Line and Features of Speed Control Motors

Speed control motors can easily set and adjust the speed with the use of a potentiometer. The control system consists of a speed feedback system, a motor, a speed control pack (or a driver) and a potentiometer.
The motor for the speed control system may be either a brushless DC motor or a standard AC motor.

■ Features

●High speed up to 3000 r/min (**FBLⅡ** series) or 2000 r/min (**HBL** series)

With standard AC speed control motors, speed is usually limited to 1600r/min at 60Hz.

●Constant torque

These DC brushless motor systems offer constant torque over the entire speed range.

■ Electronic-Input Control

Most speed control motors use power relays to control the motor and control pack. However, as the control pattern becomes more complex, the relays cannot follow the sequence and also require maintenance.
The electronic-input type, on the other hand, uses either a photocoupler or a C-MOS type input circuit. Requiring no external relays, the motor can be connected directly to a programmable controller (PLC), featuring the following advantages.

●Maintenance Free

As the motor requires no power relays, there is no need for periodic service or replacement of relays. This makes the machine highly reliable.

●Easy connection

With no power relays, connection is easy, and the time required to set up the motor is greatly reduced. Moreover, they can make the time needed for circuit design shorter than that required for setting a relay sequence.

Maintenance-free speed control motors that can be operated directly from a programmable controller (PLC).

FBLⅡ Series A-120 page.

●Speed control range: 300 r/min ~ 3000 r/min
●Output power: 75W, 120W

These products combine a compact, powerful, constant torque motor with a slim-line driver. They offers compact size, high output and precise, flexible control. Connections are simple because of the snap connectors.
The **GFB** type high torque gearheads are also available.

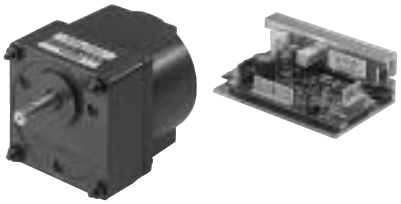
EASY WIRING | GEAR | INST. STOP | SAFETY STD. | AC INPUT | PLC DIRECT

HBL Series A-132 page.

●Speed control range: 300 r/min ~ 2000 r/min
●Output power: 10W ~ 100W

The **HBL** Series are DC 24V or DC 48V-driven brushless DC speed control motors consisting of slim, powerful motors and compact drivers.

EASY WIRING | GEAR | INST. STOP | DC INPUT | PLC DIRECT



(The gearhead for 10W, 25W and 40W is sold separately.)

SC Series

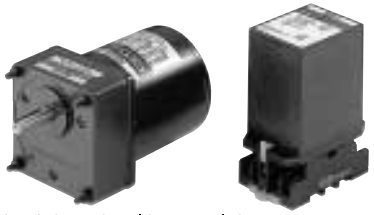
A-142 page.

- Speed control range: 90 r/min ~ 1400 r/min (50Hz)
  90 r/min ~ 1600 r/min (60Hz)
- Output power: 6W~60W
- Induction motor type, Reversible motor type.

Multi-functional operation including speed control, acceleration / deceleration is made possible by the combination of a control pack and a speed control motor. The control pack can be installed in a control panel.

SAFETY STD. GEAR

Motor Control Unit



(The gearhead shown is sold separately.)

US Series

A-156 page.

- Speed control range: 90r/min ~ 1400 r/min(50Hz)
  90r/min ~ 1600 r/min(60Hz)
- Output power: 6W ~ 90W
- Induction motor type

Unit consisting of a compact control unit and a speed control motor. One-step connectors make for easy wiring.

EASY WIRING GEAR SAFETY STD.

(The gearhead shown is sold separately.)

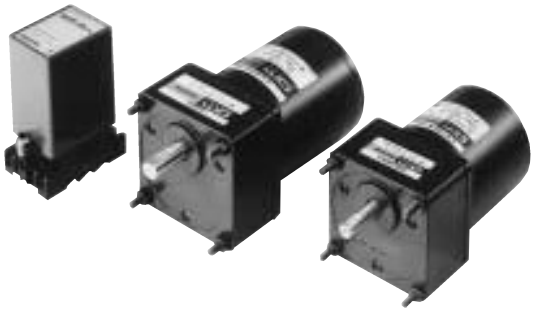
Component Type

A-170 page.

- Speed control range: 90 r/min ~ 1700 r/min
- Output power: 6W ~ 40W
- Induction motor type

The combination of a motor with a control pack allows for highly versatile operation, tailored to your needs.

SAFETY STD. GEAR



(The gearhead shown is sold separately.)

Guide for Speed Control Motor Selection

■ Selection Procedure

1. Selecting a motor and control pack

First, determine :

- Required functions (Instantaneous stop, Acceleration/ Deceleration etc.)
- Power supply voltage (AC/DC)
- Required motor output power

2. Computing the gearhead ratio

The following equation is used to determine the gear ratio of the gearhead using the higher limit of required speed if a speed range between A [r/min] to B [r/min] is to be achieved.

$$i_x = \frac{1300\ [r/min]}{B\ [r/min]}$$ [AC speed control motors*]

$$i_x = \frac{3000\ [r/min]}{B\ [r/min]}$$ [**FBLⅡ** series]

i_x: Speed reduction ratio
A: Lower limit of the required shaft speed range
B: Higher limit of the required shaft speed range

*AC speed control motors have the highest torque and the largest continuous duty region at around 1300r/min.

Use a gearhead with the gear ratio " i " closest to, but still below, the calculated value.

3. Corresponding motor speed range

With the speed-reduction ratio of the selected gearhead (i), the corresponding upper and lower value for the speed range at motor shaft N_H and N_L, respectively, are determined as follows:

$N_H = B \times i$ [r/min]
$N_L = A \times i$ [r/min]

4. Corresponding minimum motor torque

The torque required at the motor shaft to drive the load with the gearhead attached is determined by the following equation:

$$T_M = \frac{T_L}{i \cdot \eta}$$ [oz-in]

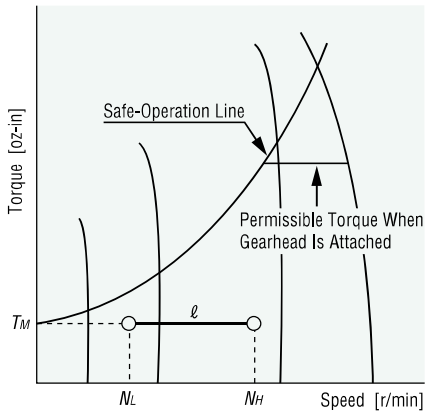
T_M: Torque required at the motor output shaft
T_L: Load torque
i: Gear ratio
η: Gearhead efficiency

5. Selecting the right motor

The main parameters for motor selection in a given application are the values for the torque required at the motor output shaft, the required speed range N_L-N_H and the torque-speed characteristics of the motor.

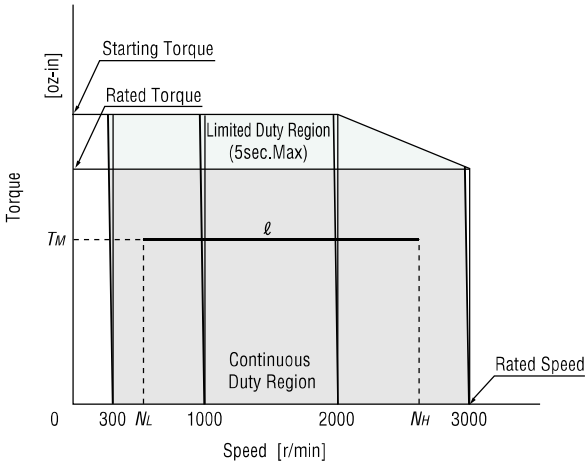
●AC speed control motor

To determine whether a motor is suitable, a line (ℓ) is entered into the torque-speed characteristics curve that connects the value for N_L and N_H as the coordinates to the abscissa (T_M), as shown in the figure below. If this line is entirely to the left of the "safe-operation line", continuous operation of the motor is generally possible. (If the line " ℓ " is partly or entirely to the right of the "safe-operation line", but still within the range below the stall torque, the motor may be suitable as long as the motor temperature is kept below the 194˚F (90˚C) limit by such methods as forced-air cooling or intermittent operation of the unit. On the other hand, if ℓ is far to the left of the "safe-operation line", the motor under consideration is oversized and, therefore, not economically suitable for the application.)



●FBLⅡ series

Determine if the line (ℓ) is entirely inside the "continuous duty region".



6. Selecting the right gearhead

Find the maximum permissible torque of the gearhead, using the required speed reduction ratio (i_x) in the gearhead data provided with every speed control motor. Any combination of a suitable motor with a gearhead whose maximum permissible torque is higher than the load torque can be used for the application. The final selection must be carried out according to other criteria (e.g. temperature rise, size, etc.)

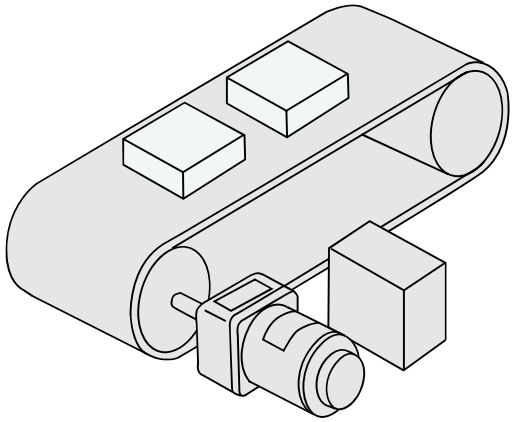
Sample Calculation for Selecting a Speed Control System

Conditions

●Belt Conveyor with Uni-directional Rotation

The speed of feed can be set in the range between 50 in/min and 200 in/min in order to match the work being moved by the manual speed adjustment.

- Drum diameter: 5 inch DIA.
- Drive torque: 30 lb-in (= 480 oz-in)
- Power supply: Single-Phase 115 VAC, 60 Hz



1. Motor and Control Pack

Select a product from the unit type speed control motor **US** series, for easy wiring.

2. Gearhead Output Shaft Speed

Gear shaft speed when the belt conveyor is moving at 50 in/min is:

$$\frac{\text{Belt conveyor speed}}{\text{Drum outer diameter}} = \frac{50}{5\pi} \fallingdotseq 3.18\ [\text{r/min}]$$

Gear shaft speed when the belt conveyor is moving at 200 in/min is:

$$= \frac{200}{5\pi} \fallingdotseq 12.7\ [\text{r/min}]$$

3. Gear Ratio of Gearhead

Find the gear ratio using the highest gear shaft speed as the standard.

$$\frac{\text{Motor shaft speed}}{\text{Gear shaft speed}} = \frac{1300}{12.7} \fallingdotseq 102 \rightarrow \boxed{100}$$

The gear ratio is therefore 100 : 1.

4. Motor Shaft Speed

$$\text{Gear shaft speed} \times \text{Gear ratio} = 3.18 \times 100 = 318\ [\text{r/min}]$$
$$= 12.7 \times 100 = 1270\ [\text{r/min}]$$

5. Required Motor Torque

The efficiency of a gearhead with a gear ratio of 100:1 is 0.66. The required motor torque is:

$$\frac{\text{Drive torque}}{\text{Gear ratio} \times \text{Efficiency}} = \frac{480}{100 \times 0.66} \fallingdotseq 7.3\ [\text{oz-in}]\ (52.6\ \text{mN} \cdot \text{m})$$

6. Motor Selection

These calculations indicate that the best combination from those listed on the torque-speed curves for the **US** series (page A-156) is:

Motor : **US425-401U**
Gearhead : **4GN100KA**

In this example, an AC speed control motor was chosen, but depending on the required motor torque, motor size limitations, and required speed, the **FBLⅡ** and **HBL** Series motors may sometimes be better choices. Follow the same procedure to select one of these motors. The only additional step is to check that the load inertia falls within the selected motor's specifications.

■ Characteristics of the FBLⅡ and HBL Series

●Constant Torque Over a Wide Range of Speeds

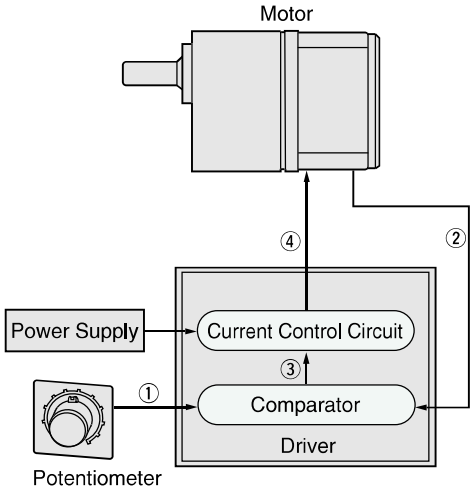
These motors provide a constant level of torque over a wide range of speeds (300 ~ 3000 r/min for the **FBLⅡ** series and 300 ~ 2000 r/min for the **HBL** series).
They both have continuous operation areas and short-term operation areas (about 5 seconds), so they are extremely effective at accelerating inertial loads.

●Power Beyond Their Size

Brushless DC motors are used, which produce more power than AC speed control motors of the same size.

●Closed-Loop Speed Control System

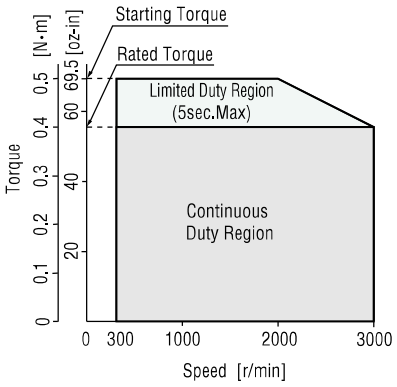
Basic Configuration



① The speed setting voltage is supplied by a potentiometer.
② The motor speed is sensed and the speed signal voltage is supplied.
③ The difference between the speed setting voltage and speed signal voltage is the output.
④ A current determined by the output from the comparator is supplied to the motor so it reaches the set speed.

●FBLⅡ Series Torque-Speed Characteristics

FBL5120AW-□



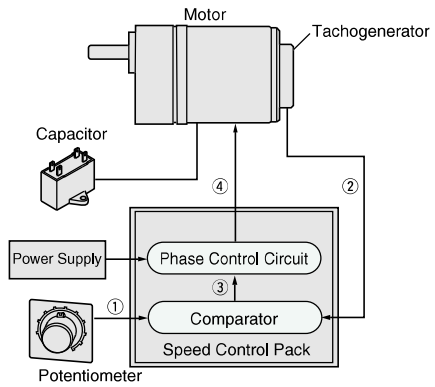
The figure above illustrates the characteristics of an **FBLⅡ** series motor. Except for a speed control range of 300 ~ 2000 r/min, the characteristics are the same for the **HBL** series.
Rated torque and instantaneous maximum torque are constant from 300 r/min to 3000 r/min. The torque does not drop at low speeds, as it does for AC speed control motors. Unlike AC speed control motors, which have a limit to continuous use because of the motor's temperature rise, brushless DC motors can be used continuously at rated torque from high speeds to low.
In addition to their continuous use areas, brushless DC motors also have short-term use areas. In the short-term use area, an instantaneous maximum torque that is about 1.3 times the rated torque can be output. This is extremely effective for accelerating inertial loads. If operated for more than about 5 seconds in the short-term use area, the driver's overload protection function engages and the motor is automatically stopped.

■Characteristics of AC Speed Control Motors

The most commonly used of all general-purpose compact AC motors is the induction motor. Speed Control motors are equipped with a tachogenerator as a speed sensor, which, together with the specially designed control pack, allows speed control over a wide range of 90 ~ 1600 or 1700 r/min (for 60Hz). A speed control motor's speed can be set and adjusted by a speed potentiometer. The phase controlled lower voltage, which is applied to the motor, helps to keep motor temperature rise low in low speed or light load operations.

●Closed-Loop Speed Control System

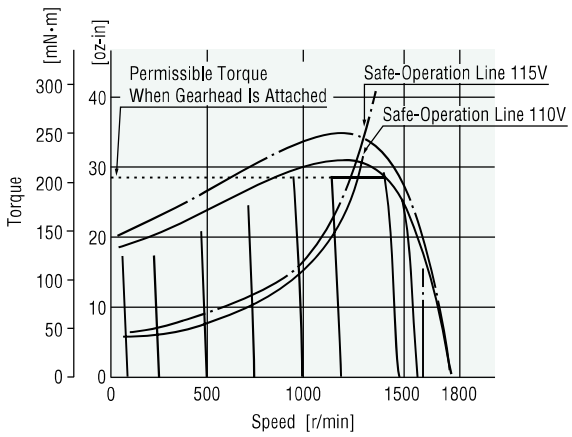
Basic Configuration



① The speed setting voltage is supplied by a potentiometer.
② The motor speed is sensed and the speed signal voltage is supplied.
③ The difference between the speed setting voltage and speed signal voltage is the output.
④ A voltage determined by the output from the comparator is supplied to the motor so it reaches the set speed.

●Safe-Operation Line and Continuous Duty Region

Torque-Speed Characteristics



The speed-torque characteristic line shown in the figure above is typical for all AC speed control motors. Up to a certain maximum torque, the "stall torque", an increase of load has almost no influence on the motor speed. Exceeding this value for maximum torque will lead to sudden stalling of the motor.

●Safe-Operation Line

Input power to the speed control motor varies with the load and the speed. The greater the load, and the lower the speed, the higher the motor's temperature will rise.
The graph left displays the relationship between the speed and the torque characteristics of the AC speed control motor. The line is referred to as the safe-operation line and the shaded area is called the continuous operation area.
The safe-operation line, measured by motor's temperature, indicates its operational limit for continuous usage with the temperature level below the permissible maximum (In case of using the reversible motor, it is measured by 30 minute operation).
Whether the motor can be operated continuously or not is judged by measuring the temperature of the motor case. When the temperature of the case is below 194°F(90°C), the motor is capable of continuous operation.
When using a gearhead, be aware that it is necessary to operate below the maximum permissible torque.
If the actual torque required should exceed the maximum permissible torque, it may cause possible damage to the motor and/or may shorten its life.

FBLⅡ *Series*

The FBLⅡ series consists of a high performance, compact, brushless DC motor and driver. This product is available with 75W and 120W output power.

For easy installation, the motor and gearhead come pre-assembled.

SAFETY STD. | EASY WIRING | INST. STOP | PACK -AGE | AC INPUT

Product Number Code

FBL 5 75 A W - 5

- **Number**: Gear Ratio
  A: Round Shaft Type
- **W**: Conform to standards
- **Voltage** **A**: Single-Phase 100V-115V
  C: Single-Phase 200V-230V
  S: Three-Phase 200V-230V
- **Output Power** **75**: 75W
  120: 120W
- **Motor Frame Size** **5**: 3.54 in. sq (90 mm sq.)
- **FBLⅡ** series

✻ Approved product names under all safety standards will refer to motor units and driver units.

Features

- The high power, compact brushless DC motor and driver allow the user to easily downsize applications.
- In addition to offering a wide speed control range from 300r/min to 3000r/min, the motor generates constant torque across the entire speed range.
- The driver is provided with an acceleration/deceleration function which makes it possible to start and stop the motor smoothly.
- Geared types use specially designed high-strength **GFB** gearheads that provide maximum permissible torques of 260 lb-in (30N·m).
- Excellent speed fluctuation characteristics of -1% maximum with load, ±1% maximum with voltage and ±1% maximum with temperature.
- The distance between the motor and the driver can be extended up to 35ft. (10.5m) by using an optional extension cable.

Safety Standards

The design conforms to typical global safety standards. Applications have been made for UL, CSA and EN standard approvals.

CE Marking

The CE Marking is being used in accordance with the low voltage directive.

Safety Standards and CE Marking

	Standards	Certification Body	Standards File No.	CE Marking
Motor	UL1004	UL	E62327	Low Voltage Directive
	CAN/CSA-C22.2 No. 100			
	EN60950	DEMKO✻	124888/DK 98-03353	
	EN60034-1 EN60034-5			
Driver	UL508C	UL	E171462	Low Voltage Directive
	CAN/CSA-C22.2 No.14			
	EN60950	DEMKO✻	124886/DK 98-03350	

✻ Three-Phase 200-230V type conform to EN standards (EN certifications are scheduled).

● Recognized name and certified name of each safety standards are motor model name and driver name.

● For installation conditions for EN/IEC standards, see page D-2.

Combination type

The combination type come with the motor and its dedicated gearhead already assembled. This simplifies installation in equipment. Motors and gearheads are also available separately so they can be on hand to make changes or repairs.

Install the motor and gear combination using the four hexagonal socket head screws ①.
To replace the gearhead, remove the two small screws ②.

■ Product Lines

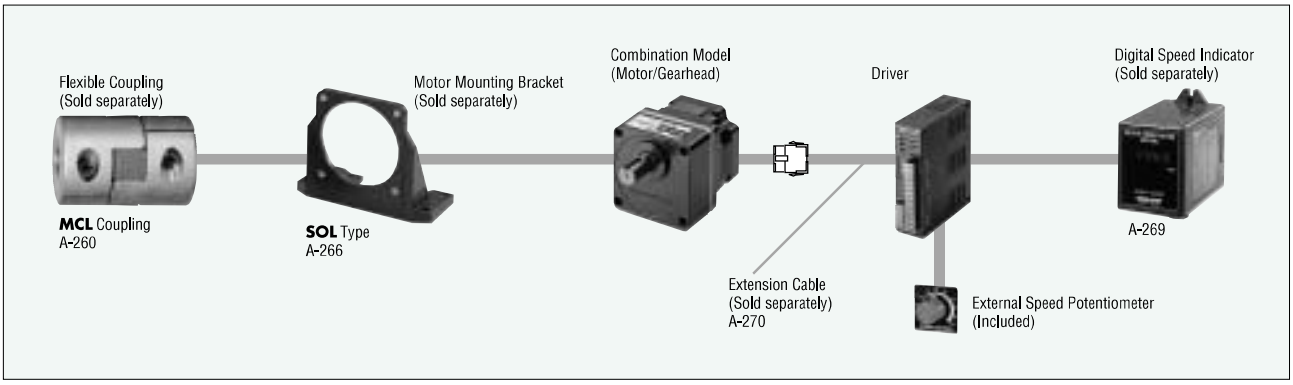
● Combination Models

Voltage	Output Power HP	Output Power W	Model
Single-Phase 100V-115V	1/10	75	**FBL575AW-5, 10, 15, 20** **FBL575AW-30, 50, 100, 200**
	1/6	120	**FBL5120AW-5, 10, 15, 20** **FBL5120AW-30, 50, 100, 200**
Single-Phase 200V-230V	1/10	75	**FBL575CW-5, 10, 15, 20** **FBL575CW-30, 50, 100, 200**
	1/6	120	**FBL5120CW-5, 10, 15, 20** **FBL5120CW-30, 50, 100, 200**
Three-Phase 200V-230V	1/10	75	**FBL575SW-5, 10, 15, 20** **FBL575SW-30, 50, 100, 200**
	1/6	120	**FBL5120SW-5, 10, 15, 20** **FBL5120SW-30, 50, 100, 200**

● Round shaft Models

Voltage	Output Power HP	Output Power W	Model
Single-Phase 100V-115V	1/10	75	**FBL575AW-A**
	1/6	120	**FBL5120AW-A**
Single-Phase 200V-230V	1/10	75	**FBL575CW-A**
	1/6	120	**FBL5120CW-A**
Three-Phase 200V-230V	1/10	75	**FBL575SW-A**
	1/6	120	**FBL5120SW-A**

■ Construction



■ Specifications

		1/10 HP 75W			1/6 HP 120W		
		Single-phase 100V-115V ±10%	Single-phase 200V-230V ±10%	Three-phase 200V-230V ±10%	Single-phase 100V-115V ±10%	Single-phase 200V-230V ±10%	Three-phase 200V-230V ±10%
Model	Combination Type	**FBL575AW-□**	**FBL575CW-□**	**FBL575SW-□**	**FBL5120AW-□**	**FBL5120CW-□**	**FBL5120SW-□**
	Round Shaft Type	**FBL575AW-A**	**FBL575CW-A**	**FBL575SW-A**	**FBL5120AW-A**	**FBL5120CW-A**	**FBL5120SW-A**
Rated Speed	r/min	3000					
Rated Torque	oz-in (N·m)	34.7 (0.25)			55.5 (0.4)		
Starting Torque	oz-in (N·m)	44.4 (0.32)			69.4 (0.5)		
Variable Speed Range	r/min	300~3000					
Permissible Inertial Load J *1	oz-in² (kgm²)	20.5 (3.75×10^{-4})			30.7 (5.6×10^{-4})		
Acceleration/Deceleration Time		0.5~15 sec. (at 3000 r/min)					
Speed Regulation	Load	−1% Max. (0~rated torque, at 3000 r/min)					
	Voltage	±1% Max. (Power supply voltage ±10%, at 3000 r/min with no load)					
	Temperature	±1% Max. (32°F~+104°F/0°C~+50°C) at 3000 r/min with no load					
Input Power	Voltage	Single-phase 100V-115V ±10%	Single-phase 200V-230V ±10%	Three-phase 200V-230V ±10%	Single-phase 100V-115V ±10%	Single-phase 200V-230V ±10%	Three-phase 200V-230V ±10%
	Frequency	50/60Hz					
	Maximum Input Current	2.6A	2.0A	1.2A	3.8A	1.6A	1.6A
Motor Insulation Class		Class E [248°F(120°C)] *3					
Speed Control Method		1. By built-in potentiometer 2. By external potentiometer (20 kΩ, 1/4W) 3. By DC voltage (0~5V DC)					
Input Signal		Photocoupler Input: Input Impedance 4.8 kΩ, 21.6~26.4V DC EXT, VR, CW, CCW, SLOW DOWN					
Output Signal		Open Collector Output: External Use Condition 24V DC, 10mA Max. SPEED OUT, ALARM OUT					
Protection Functions *2		When the following are activated, the alarm signal will be output and the motor will come to a stop: ●Overload Protection: This will be activated within approximately 5 seconds of the motor load exceeding rated torque. ●Overheat Protection: This will be activated when internal temperature of driver exceeds 162°F (90°C). ●Overvoltage Protection: This will be activated when driving a load exceeding the permissible load inertia, or when motor speed is increased due to gravitational forces. ●Out-of-phase Protection: This will be activated when motor signals are abnormal, due to disconnection of cable, etc. ●Under Voltage Protection: This will be activated when a input voltage to the driver is less than specifications voltage.					
Rating		Continuous					

*1: The permissible inertial load specified above is only applicatable for round shaft type.
*2: With the **FBLⅡ** series, motor speed cannot be controlled in applications where the motor's shaft is turned by the load, as in lowering operations. Also, to prevent damage to the driver during lowering operations, the motor comes to a natural stop if the primary voltage of the driver's inverter e exceeds the permissible value.
*3: Motor insulation is recognized as class A (105°C) by UL and CSA standards.

■ General Specifications

Item		Motor	Driver
Insulation Resistance		100M Ω or more when 500V DC is applied between the windings and the frame.	100M Ω or more when 500V DC is applied between the power supply input terminal and the P.E. terminal (I/O terminal).
Dielectric Strength		Sufficient to withstand 1.5kV at 50Hz applied between the windings and the frame for 1 minute.	Sufficient to withstand 1.8kV (3kV) AC at 50Hz applied between the P.E. terminal (I/O terminal) and the power supply input terminal for 1 minute.
Operating Environmental Conditions	Ambient Temperature	32°F~122°F (0°C~+50°C), nonfreezing	32°F~122°F (0°C~+50°C), nonfreezing
	Humidity	85% maximum, noncondensing	
	Atmosphere	No corrosive gases or dust	
Degree of Protection		IP40	IP10

Gearmotor — Torque Table

Unit = Upper value: lb-in/Lower values: N·m

Model \ Gear Ratio / Speed Range r/min	5	10	15	20	30	50	100	200
	60~600	30~300	20~200	15~150	10~100	6~60	3~30	1.5~15
FBL575AW-□ **FBL575CW-□** **FBL575SW-□**	9.8 1.1	20 2.3	29 3.4	39 4.5	56 6.5	93 11	187 22	260 30
FBL5120AW-□ **FBL5120CW-□** **FBL5120SW-□**	16 1.8	31 3.6	47 5.4	62 7.2	89 10	149 17	260 30	260 30

● Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.

Permissible Overhung Load · Permissible Thrust Load

Unit = Upper value: lb. / Lower value: N

Gear Ratio	5	10	15	20	30	50	100	200
Permissible Thrust Load	33 150							
Permissible Overhung Load [0.4 in. (10mm) from shaft end]	66 300	88 400			110 500			
Permissible Overhung Load [0.8 in. (20mm) from shaft end]	88 400	110 500			143 650			

● Enter the gear ratio in the box (□) within the model number.

Permissible Inertial Load (J)

Unit = Upper value: lb-in^2 / Lower values: ×10^{-4}kgm^2

Model \ Gear Ratio	5	10	15	20	30	50	100	200
FBL575AW-□ **FBL575CW-□** **FBL575SW-□**	8.5	34	76.5	136	306	850	850	850
FBL5120AW-□ **FBL5120CW-□** **FBL5120SW-□**	25	100	225	400	900	2500	2500	2500

● Enter the gear ratio in the box (□) within the model number.

Torque — Speed Characteristics

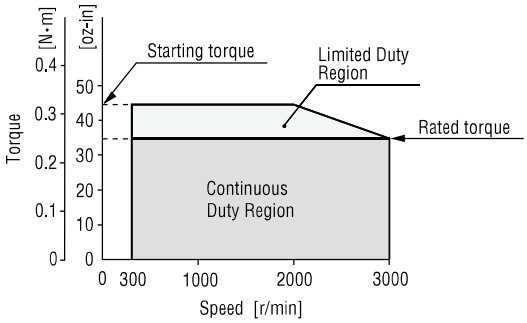
●Continuous Duty Region

Continuous operation is possible in this region.

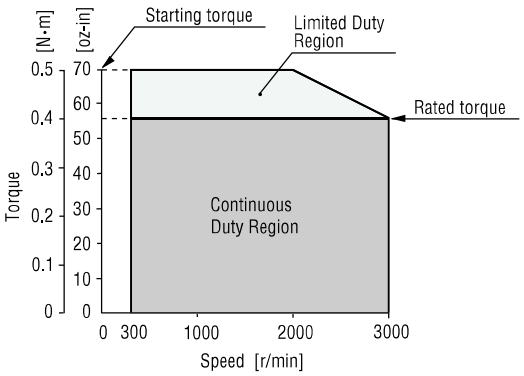
●Limited Duty Region

This region is used primarily when accelerating. When a load that exceeds the rated torque is applied continuously for approximately 5 seconds, overload protection is activated and the motor comes to stop.

FBL575AW-□/FBL575CW-□/FBL575SW-□
FBL575AW-A/FBL575CW-A/FBL575SW-A



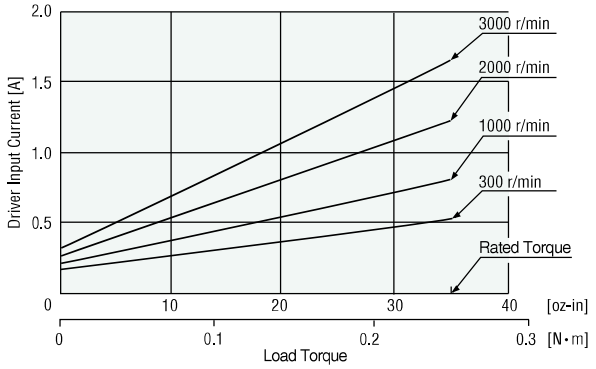
FBL5120AW-□/FBL5120CW-□/FBL5120SW-□
FBL5120AW-A/FBL5120CW-A/FBL5120SW-A



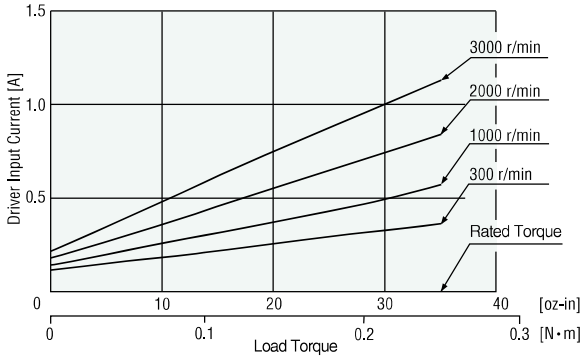
Load Torque - Driver Input Current Characteristics

Driver input current of brushless DC motors varies with the load torque. Load torque is roughly proportional to driver input current. These characteristics may be used to estimate load torque from the driver input current. It is valid only when the motor is rotating at a steady speed. Starting and bi-directional motions require greater current input, so the relationship does not apply to these operations.

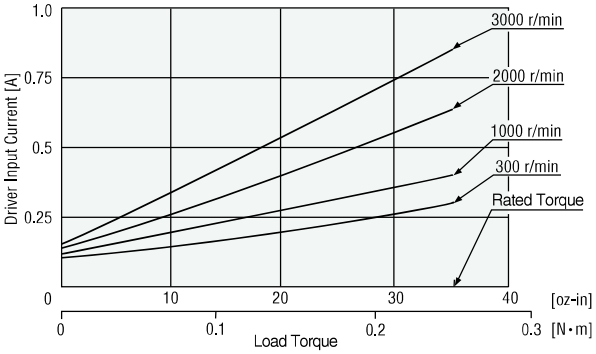
FBL575AW-□
FBL575AW-A



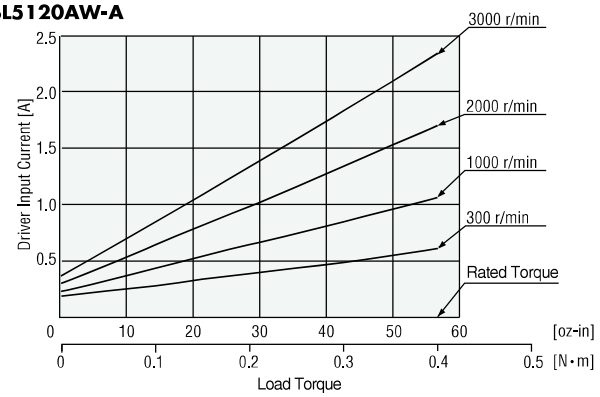
FBL575CW-□
FBL575CW-A



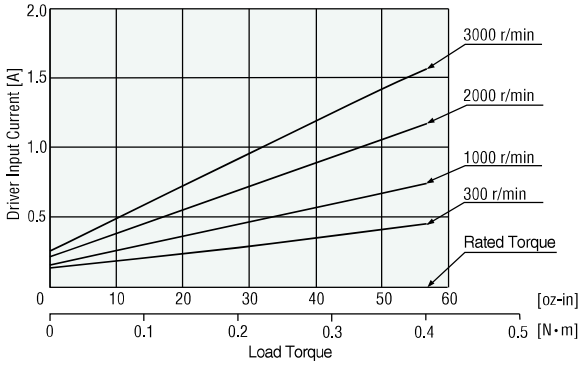
FBL575SW-□
FBL575SW-A



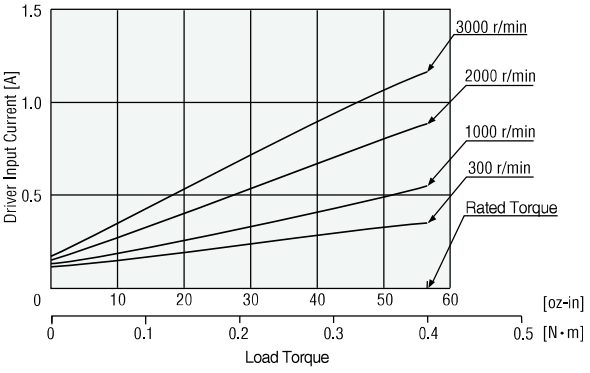
FBL5120AW-□
FBL5120AW-A



FBL5120CW-□
FBL5120CW-A



FBL5120SW-□
FBL5120SW-A



Operation of FBLⅡ Series

■ Driver Functions

Built-in Potentiometer	
Display	Function
SS	Timing Potentiometer for Acceleration
SD	Timing Potentiometer for Deceleration
SPEED	Speed Potentiometer

For Motor Connector

Power Supply Terminal

LED Display		
Display	Function	Lighting Condition
POWER	Power Indicator	Lights when the power is ON.
ALARM	Alarm Indicator	●When a load exceeding the rated torque is applied to the motor for 5 seconds or more. ●When the driver's internal temperature exceeds approx-imately 162°F (90°C). ●When the motor is driving an inertial load exceeding the permissible inertial load, or when the motor shaft is turned by the load (during lowering operation). ●When there is an abnormality in the motor's feedback signals due to disconnection of the motor cable, etc. ●When a input voltage to the driver is less than specification voltage.

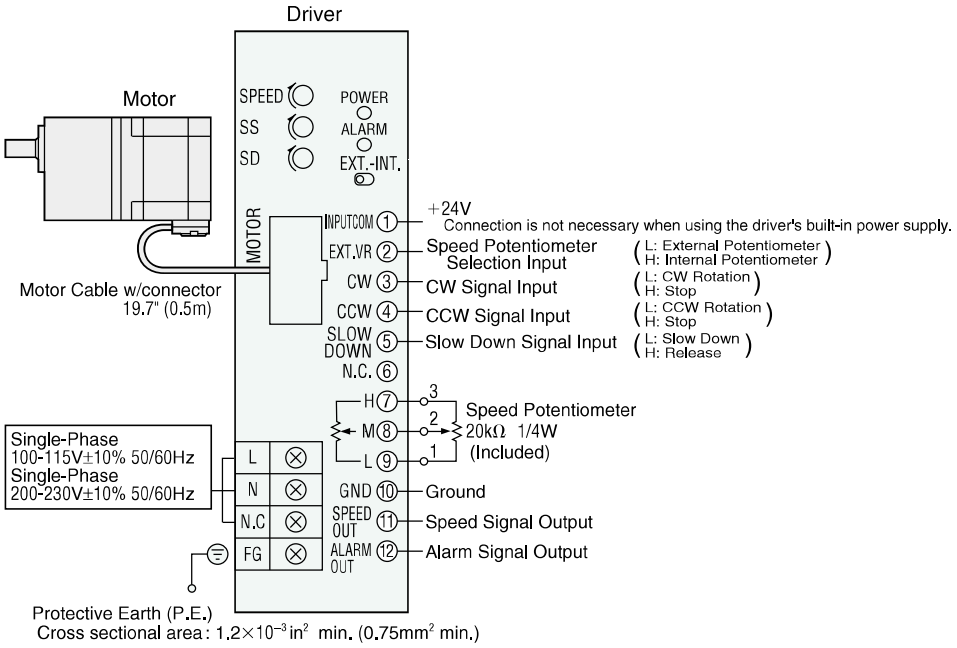
I/O Power Supply Switch	
Display	Function and Operation
EXT	When controlling from a PLC or other external power supply. (Set at time of shipment)
INT	When controlling with a relay or switch. (Driver built-in power supply)

When the switch is set to EXT, the input circuit is insulated by the photocoupler. However when the switch is set to INT, the input circuit is not insulated, so the system will not work, even if an input signal is input, unless GND is connected to a PLC.

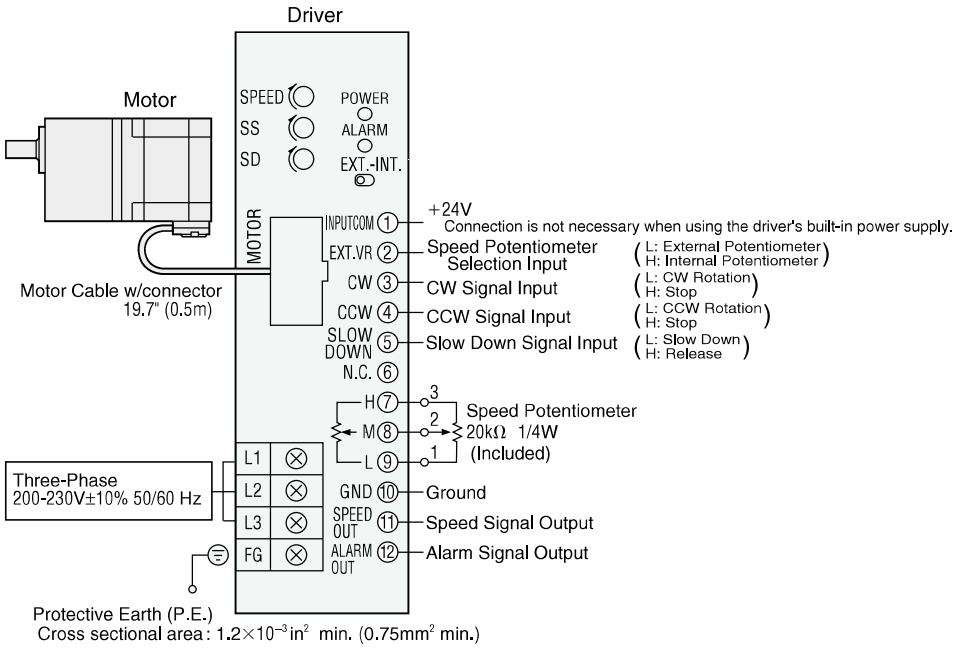
Input/Output Signal Terminals		
Display	Signal	Function and Operation
INPUT COM	Power Supply for Input Signal	External DC power supply +24V A connection is not necessary when using the driver's built-in power supply.
EXT. VR	Speed Potentiometer Selection Input	Input signal for selecting built-in or external speed potentiometer.
CW	CW Rotation Input	Input signal for selecting CW rotation/stop.
CCW	CCW Rotation Input	Input signal for selecting CCW rotation/stop.
SLOW DOWN	Deceleration Input	Input terminal for decelerating the motor to a stop.
N.C	—	Not used.
H M L	Speed Control Input	Used when controlling the speed by the external potentiometer or DC voltage without use of the built-in potentiometer.
GND	Ground	Ground terminal for input/output signals.
SPEED OUT	Speed Signal Output (Open-Collector Output)	Used when monitoring the rate of rotation; 12 pulses are output for each motor rotation.
ALARM OUT	Alarm Signal Output (Open-Collector Output)	This signal is output when the protection functions are activated. The ALARM LED lights and the motor comes to a stop. To reset, cut the power for 10 seconds, then turn motor on again.

Wiring Diagrams

FBL575AW, FBL575CW Type
FBL5120AW, FBL5120CW Type



FBL575SW, FBL5120SW Type



Note:

- Motor cable should be no more than 34 ft. (10.5m) in length. The motor comes equipped with a 1.6 ft. (0.5m) long connector-equipped cable which can be extended by using an optional extension cable.
  Extension Cable Model (Sold separately)

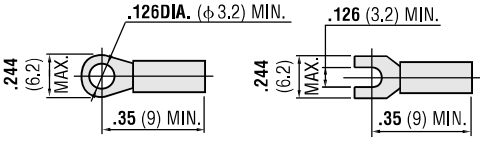
  CC01FBL 3.3 ft. (1m) **CC05FBL** 16.4 ft. (5m)
  CC02FBL 6.6 ft. (2m) **CC07FBL** 23.0 ft. (7m)
  CC03FBL 9.8 ft. (3m) **CC10FBL** 32.8 ft. (10m)

  See page A-147 for more information.

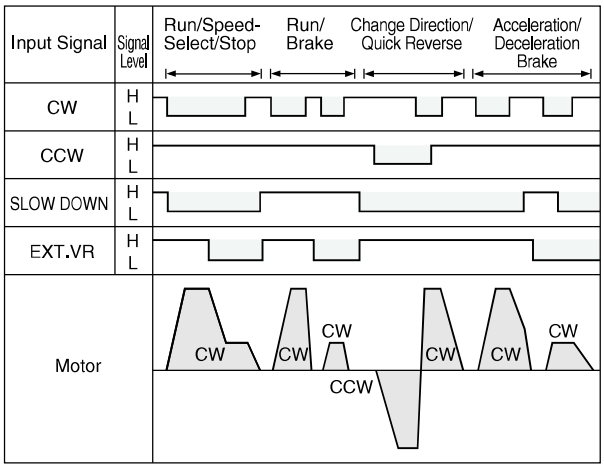
  Tests using a noise simulator have confirmed that the motor will operate without error even if a noise of 500V, 1μF is applied to the motor lead wires. However, protection against external noise is recommended.
- Signal wires and motor wires should be kept away from equipment, power cables and other sources of magnetic noise.

Suitable crimp-style terminals Unit = **inch** (mm)

Ring type terminal with insulation U type terminal with insulation



■ Signal Input Timing Chart



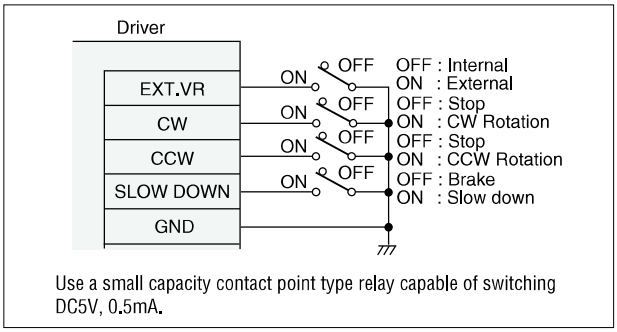
- All operations of run, stop, direction change, deceleration and instantaneous stop can be controlled by the input signals of CW, CCW and SLOW DOWN.
- If the CW input is set to "L" level, the motor rotates in a clockwise direction as viewed from the shaft end of the motor; if the CW input is set to "H" level, the motor stops.
  If the CCW input is set to "L" level, the motor rotates in the counterclockwise direction as viewed from the shaft end of the motor; if the CCW input is set to "H" level, the motor stops.
  If both of the CW and CCW input are set to "L" level, the motor rotates in the clockwise direction.
  The acceleration time is set by the built-in acceleration potentiometer (SS).
- If the SLOW DOWN input is set to "L" level, the deceleration time is the value set by the built-in deceleration potentiometer (SD); if this input is set to "H" level, the motor stops instantaneously.
- If the EXT. VR input is set to "L" level, the external speed potentiometer or external DC voltage can be selected; if this input is set to "H" level, the built-in speed potentiometer is selected.

●Precautions for Operation

1. Pay attention to the temperature rise of the motor when used in applications requiring short cycles or bi-directional operation.
2. Operate the motor so that the temperature of the motor case remains below 162°F (90°C) and the temperature of the driver remains 176°F (80°C). If the temperature of the heat radiating plate in the driver exceeds 162°F (90°C), the overheat protection activates and stops the motor.
3. **FBLⅡ** series motors cannot be used for lowering the load or other operations in which the load exerts a rotational force on the motor shaft, since this causes the inverter's primary voltage in the driver to exceed permissible levels, damaging the driver.

●Controlled by Small Capacity Relays

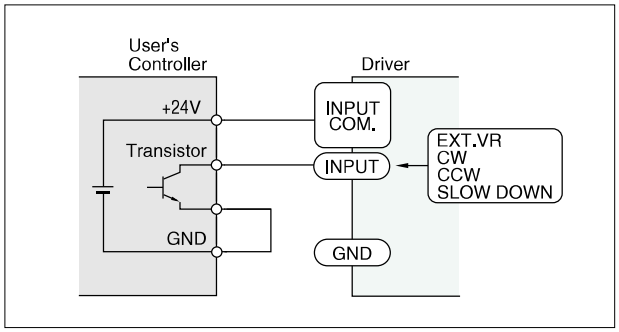
Flip the I/O power supply switch to "INT.".



Use a small capacity contact point type relay capable of switching DC5V, 0.5mA.

●Control by Transistor type PLC

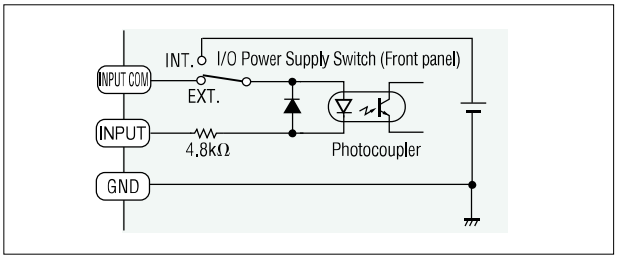
Flip the I/O power supply switch to+24V (set at time of shipment).



■ Input / Output Signal Circuit

●Input Signal Circuit

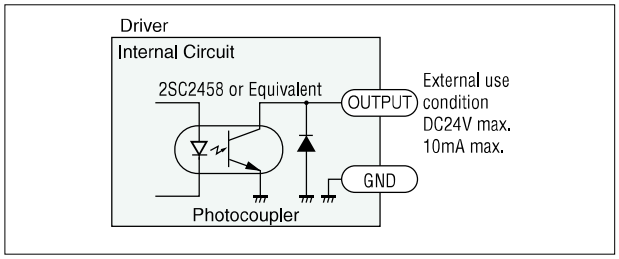
Common to EXT. VR, CW, CCW and SLOW DOWN



- If the controller will be supplying the power for this circuit, set the EXT-INT to the EXT. position.

●Output Signal Circuit

Common to SPEED OUT and ALARM OUT



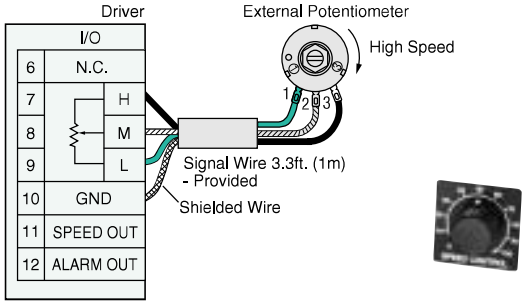
Speed Control

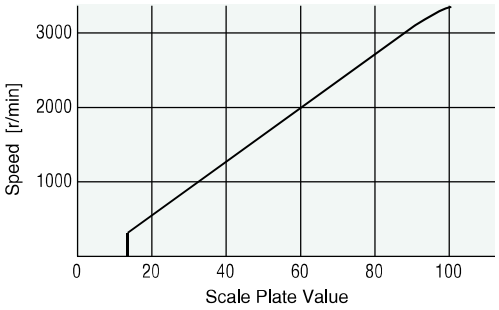
Speed Control by Built-in Potentiometer

Motor speed is adjusted by using a built-in potentiometer located on the front panel. The built-in potentiometer is selected when EXT. VR input has been set to OFF (“H” level).

Speed Control by External Potentiometer

To control the speed of the motor when it is separated from the driver, connect the external potentiometer provided with the motor as follows. The EXT. VR input should be set to ON (“L” level).





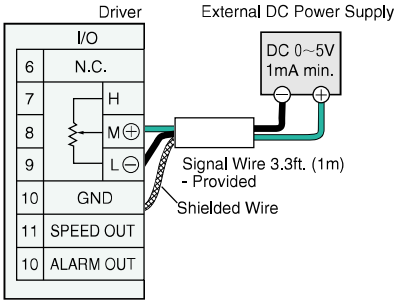
External Potentiometer Scale - Speed Characteristics

Precautions for Connection

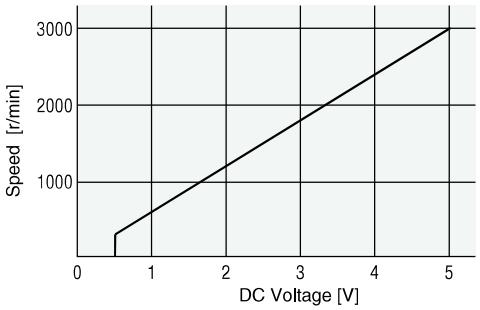
Signal wires provided with the products should be used. (0.13in. dia. 3.3ft. long) The shielded wire of the signal line should be connected to the GND terminal. Also ensure that the shielded wire does not come into contact with other terminals on the external potentiometer or DC voltage source.

Speed Control by External DC Voltage

To control the speed of the motor by DC voltage, connect the DC power supply as follows. The EXT. VR input should be set to ON (“L” level).

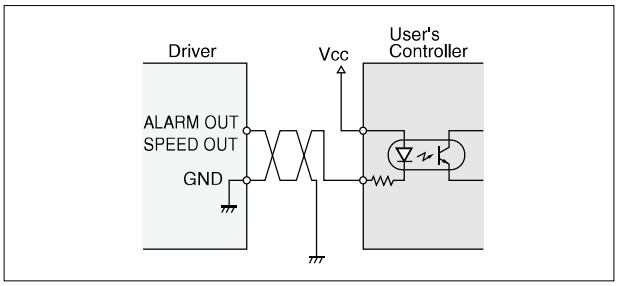


- Do not allow the voltage to exceed 5V, and be sure there are no errors in polarity when making the connections.



DC Voltage - Speed Characteristics

Connection of Output Signals



At 24V or less, a current of 10mA or less can be switched on and off at Vcc. This connection is necessary only if the speed monitoring and alarm functions are used.

Speed Signal Output:

It is output at a rate of 12 pulses per motor rotation.

$$\text{Motor speed} = \frac{\text{Speed output cycle rate [Hz]}}{12} \times 60\,[\text{r/min}]$$

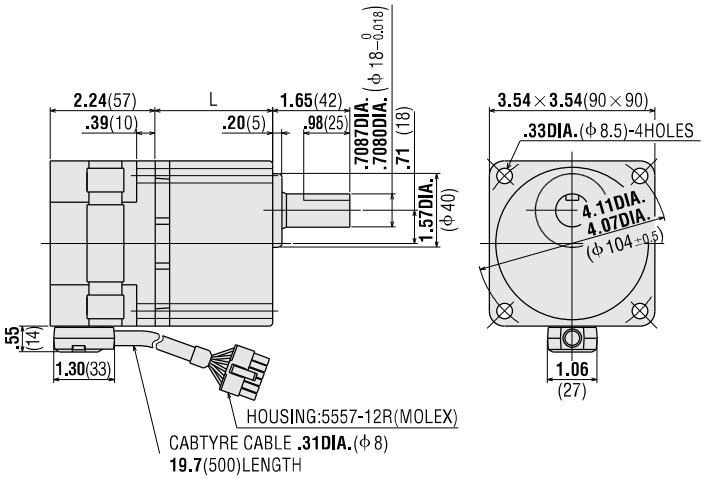
Alarm Signal Output:

This signal is output when the protection function for overload, overheat, overvoltage or out-of-phase has been activated.

- To check the motor speed visually, connect a speed indicator model **SDM496** (sold separately).
See page A-269 for more information.

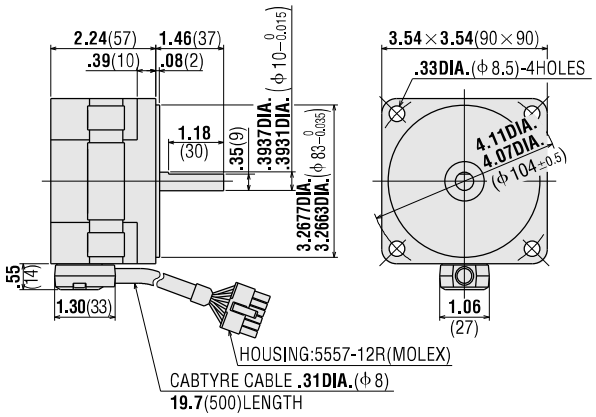
Dimensions Scale 1/4, Unit = **inch** (mm)

FBL575□W-□ (Combination Model) Weight (Mass): 6.6 lb. (3.0 kg)
Motor: FBLM575W-GFB
Gearhead: GFB5G□

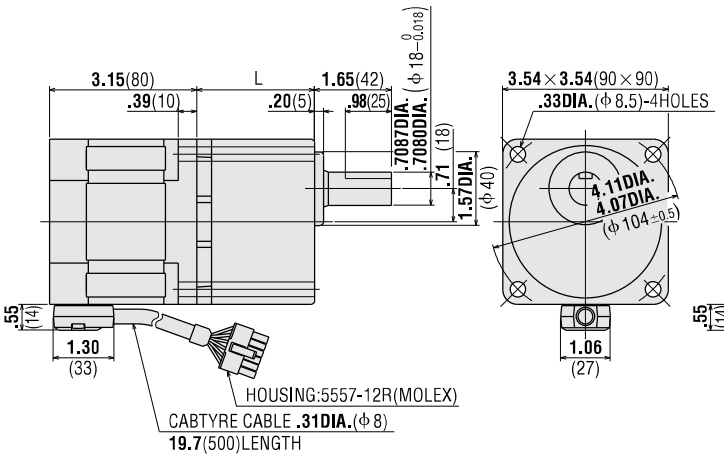


L=**1.77** (45) **FBL575□W-5~20**
L=**2.28** (58) **FBL575□W-30~100**
L=**2.52** (64) **FBL575□W-200**

FBL575□W-A (Round Shaft Type) Weight (Mass): 3.3 lb. (1.5 kg)
Motor: FBLM575W-A

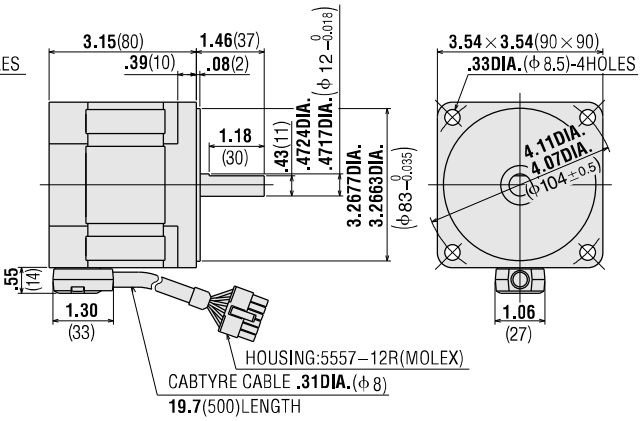


FBL5120□W-□ (Combination Model) Weight (Mass): 8.8 lb. (4.0 kg)
Motor: FBLM5120W-GFB
Gearhead: GFB5G□

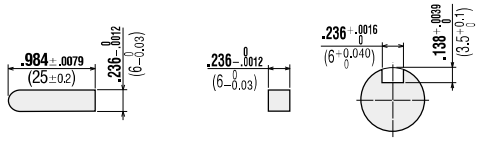


L=**1.77** (45) **FBL5120□W-5~20**
L=**2.28** (58) **FBL5120□W-30~100**
L=**2.52** (64) **FBL5120□W-200**

FBL5120□W-A (Round Shaft Type) Weight (Mass): 5.5 lb. (2.5 kg)
Motor: FBLM5120W-A

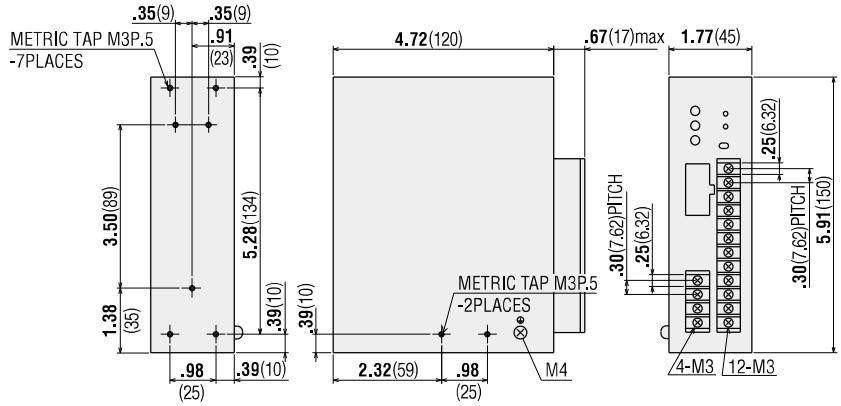


●Key and Key Slot (Scale 1/2)
(The key is provided with the gearhead.)

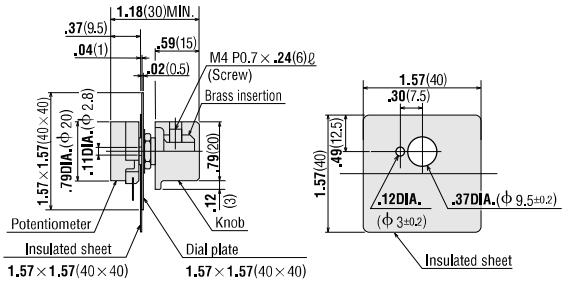


●**Driver**

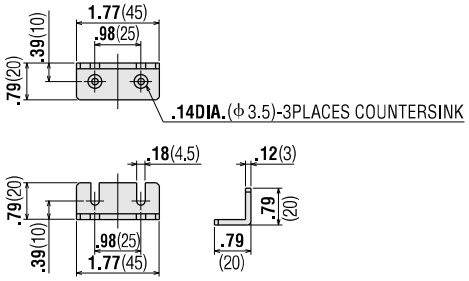
FBLD75AW, FBLD75CW, FBLD75SW
FBLD120AW, FBLD120CW, FBLD120SW



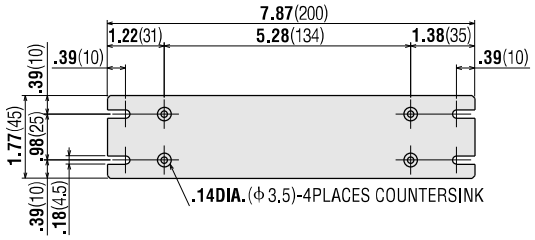
●**External Potentiometer** (included)



●**Driver Mounting Tab** (1 set of 2 pieces included)



●**Driver Mounting Tab** (1 piece included)



■ List of Motor and Driver Combinations

Model numbers for motor/driver combinations are shown below.

●Combination Type

Output HP	Power W	Package Model	Motor Model	Gearhead Model	Driver Model
1/10	75	**FBL575AW-**□	FBLM575W-GFB	GFB5G□	FBLD75AW
		FBL575CW-□			FBLD75CW
		FBL575SW-□			FBLD75SW
1/6	120	**FBL5120AW-**□	FBLM5120W-GFB		FBLD120AW
		FBL5120CW-□			FBLD120CW
		FBL5120SW-□			FBLD120SW

●Enter the gear ratio in the box (□) within the model number.

●Round Shaft Type

Output HP	Power W	Package Model	Motor Model	Driver Model
1/10	75	**FBL575AW-A**	FBLM575W-A	FBLD75AW
		FBL575CW-A		FBLD75CW
		FBL575SW-A		FBLD75SW
1/6	120	**FBL5120AW-A**	FBLM5120W-A	FBLD120AW
		FBL5120CW-A		FBLD120CW
		FBL5120SW-A		FBLD120SW

Accessories (Sold Separately)

Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors without gearheads. See page [A-266] for more information.

Model name: **SOL5M8**

Flexible Couplings

Optional flexible coupling.
See page [A-260] for more information.

Digital Speed Indicator

To check the speed of speed control motors, connect the speed indicator.
See page [A-269] for more information.

Model name: **SDM496**

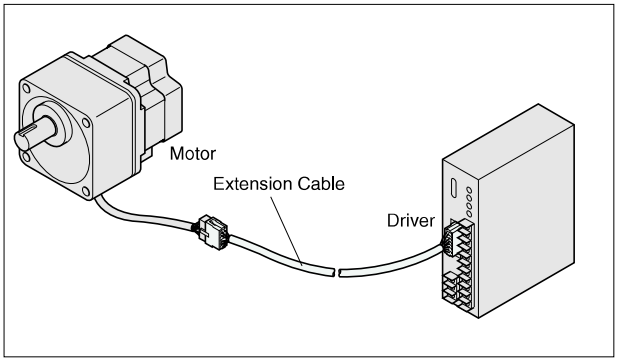
Din Rail Mounting Bracket

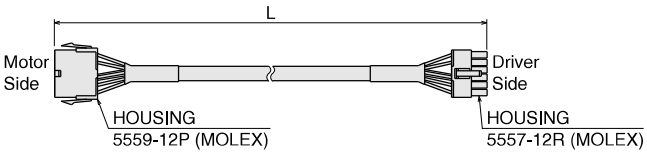
Use when installing the driver on DIN Rail.
See page [A-266] for more information.

Model name: **PADP01**

Extension Cable

The motor comes equipped with a 1.6 ft. (0.5m) long cable which can be extended by using an optional extension cable up to 35 ft. (10.5m).





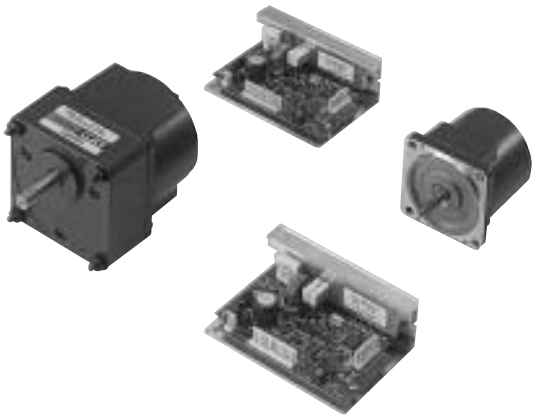
Cable Model	Length		Weight	
	ft.	m	lb.	kg
CC01FBL	3.3	1	0.26	0.12
CC02FBL	6.6	2	0.48	0.22
CC03FBL	9.8	3	0.70	0.32
CC05FBL	16.4	5	1.17	0.53
CC07FBL	23.0	7	1.61	0.73
CC10FBL	32.8	10	2.2	1.0

●Not a standard certified product.

HBL *Series*

This slim line motor and compact driver produces constant torque throughout its speed range of 300～2000 r/min.

The HBL series is suitable for smaller size applications.



In the **HBL** series, a driver is provided with a motor as a package.
(Gearhead shown in the picture is sold separately.)

EASY WIRING | GEAR | INST. STOP | DC INPUT

■Features

- Compact board level driver is suitable for smaller sized applications.
- In addition to the "Overload protection" the HBL series also incorporates "Out-of-Phase protection."
  In the event of a problem, the motor is brought to a stop and an alarm signal is output.
- To improve the reliability of feedback signals over longer distances, an optional extension cable is available.
  This increases the distance between the motor and driver to 16.4 ft. (5m)[60W, 100W] and 6.6 ft. (2m)[10W~40W]
- The motor features a compact design, enabling it to be installed in tight spaces.
- DC24V (DC48V) input makes it possible to switch to a backup power supply in the event of a power failure.
- Speed can be varied over a continuous range from 300 r/min to 2000 r/min with uniform torque throughout.
- The motor can be started, reversed and brought to an instantaneous stop using an electrical input control from the PLC.
- The pinion shaft model can be used with **GN** gearheads, thus enabling it to be combined with a wide range of gear ratios.
- For easy installation, 60W or 100W motors and gearhead come pre-assembled in the combination type.

■Product Number Code

HBL 5 40 K - GN

- **Motor Shaft Type**
  GN: Pinion shaft (for use with **GN**-type gearhead)
  A: Round shaft
- **Voltage**
  K: DC 24V
- **Output Power**
  10: 10W
  25: 25W
  40: 40W
- **Motor Frame Size**
  2: 2.36 in.sq. (60mm sq.)
  4: 3.15 in.sq. (80mm sq.)
  5: 3.54 in.sq. (90mm sq.)
- **HBL Series**

HBL 5 60 N - 5

- **Number:** Gear Ratio
  A: Round shaft
- **Voltage**
  N: DC 48V
- **Output Power**
  60: 60W
  100: 100W
- **Motor Frame Size**
  5: 3.54 in.sq. (90mm sq.)
- **HBL Series**

Type

For 10W, 25W, 40W

Output Power HP	Output Power W	Pinion shaft type	Round shaft type
1/75	10	HBL210K-GN	HBL210K-AA
1/30	25	HBL425K-GN	HBL425K-AA
1/18.7	40	HBL540K-GN	HBL540K-AA

●When connecting gearheads, be sure to match the pinion shafts and frame sizes.

GN Type Gearheads

Model
2GN3KA~2GN180KA
2GN10XK (Decimal Gearhead)
4GN3KA~4GN180KA
4GN10XK (Decimal Gearhead)
5GN3KA~5GN180KA
5GN10XK (Decimal Gearhead)

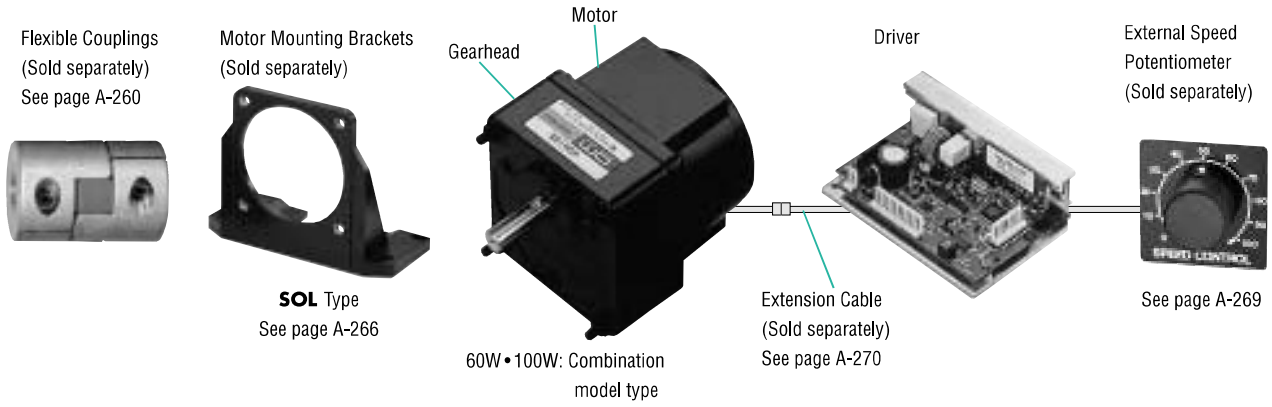
For 60W, 100W Combination model type

Output Power HP	Output Power W	Model
1/12.4	60W	HBL560N-5~20 HBL560N-30~100 HBL560N-200
1/7.5	100W	HBL5100N-5~20 HBL5100N-30~100 HBL5100N-200

For 60W, 100W Round shaft type

Output Power HP	Output Power W	Model
1/12.4	60W	HBL560N-A
1/7.5	100W	HBL5100N-A

Construction



List of Motor and Driver Combinations

Model numbers for motor / driver combinations are shown below.

For 10W, 25W, 40W Pinion shaft type

Output Power HP	Output Power W	Model	Motor Model	Driver Model
1/75	10	HBL210K-GN	HBLM210K-GN	HBLD10K
1/30	25	HBL425K-GN	HBLM425K-GN	HBLD25K
1/18	40	HBL540K-GN	HBLM540K-GN	HBLD40K

For Round shaft type

Output Power HP	Output Power W	Model	Motor Model	Driver Model
1/75	10	HBL210K-AA	HBLM210K-AA	HBLD10K
1/30	25	HBL425K-AA	HBLM425K-AA	HBLD25K
1/18.7	40	HBL540K-AA	HBLM540K-AA	HBLD40K
1/12.4	60	HBL560N-A	HBLM560N-A	HBLD60N
1/7.5	100	HBL5100N-A	HBLM5100N-A	HBLD100N

For 60W, 100W Combination model type

Output Power HP	Output Power W	Model	Motor Model	Gearhead Model	Driver Model
1/12.4	60	HBL560N-□	HBLM560N-GFH	GFH5G□	HBLD60N
1/7.5	100	HBL5100N-□	HBLM5100N-GFH	GFH5G□	HBLD100N

●When connecting gearheads, be sure to match the pinion shafts and frame sizes.
● Enter the gear ratio in the box (□) within the model number.

Specifications

Model	Pinion Shaft Type	HBL210K-GN	HBL425K-GN	HBL540K-GN	HBL560N-□	HBL5100N-□
	Round Shaft Type	HBL210K-AA	HBL425K-AA	HBL540K-AA	HBL560N-A	HBL5100N-A
Rated Speed	r/min	2000				
Rated Output Power	HP W	1/75 10	1/30 25	1/18.7 40	1/12.4 60	1/7.5 100
Rated Torque	oz-in (N·m)	6.9 (0.05)	17.4 (0.125)	27.8 (0.2)	41.6 (0.3)	69.4 (0.5)
Starting Torque	oz-in (N·m)	8.3 (0.06)	20.8 (0.15)	33.3 (0.24)	50 (0.36)	83.3 (0.6)
Permissible Inertial Load	J kgm^2	5×10^{-5}	1.8×10^{-4}	3.3×10^{-4}	3.75×10^{-4}	5.6×10^{-4}
	oz-in^2	2.7	9.8	18	20.5	30.6
Variable Speed Range	r/min	300～2000				
Input Power Voltage		DC24V±10%			DC48V±10%	
Input Power Current		2.0A	3.5A	4.5A	3A	5A
Input Power for Signals		DC5V±5%, 100mA min.				
Speed Control Methods		1. By built-in potentiometer 2. By external potentiometer 3. By DC voltage (0~5V DC)				
Speed Regulation Load		−3% Max. (0~rated torque, at 2000 r/min)				
Speed Regulation Voltage		±2% Max. (Power supply voltage DC24V±10%, at 2000 r/min with no load)				
Speed Regulation Temperature		±2% Max. (32°F～104°F / 0°C～+40°C, at 2000 r/min with no load)				
Input Signal		C-MOS level negative logic L (ON): 0～0.5V, H (OFF): 4～5V START/STOP L: Start H: Stop BRAKE L: Run H: Brake Direction of Rotation L: CW H: CCW Speed Potentiometer Selection L: Internal H: External (**HBL560**, **5100** Type)				
Output Signal		Open collector output External use condition: DC26.4V, 10mA max. SPEED, ALARM				
Protection Functions		When the following are activated, the alarm signal will be output and the motor will come to a stop: ●Overload Protection: This will be activated within approximately 5 seconds of the motor load exceeding rated torque. ●Out-of-Phase Protection: This will be activated when motor signals are abnormal, due to disconnection of cable, etc.				
Motor Insulation Class		Class E [248°F(120°C)]				
Rating		Continuous				

Caution: **HBL** Series motors should not be used in gravitational applications in which they are driven by the load since doing so can cause the inverter's primary voltage to exceed the maximum limit and damage the driver.

General Specifications

Item		Motor	Driver
Insulation Resistance		100MΩ or more when 500V DC is applied between the windings and the frame.	100MΩ or more when 500V DC is applied between the FG and the power supply input terminal.
Dielectric Strength		Sufficient to withstand 0.5kV at 50Hz applied between the windings and the frame for 1 minute.	Sufficient to withstand 0.5kV at 50Hz applied between the FG and the power supply input terminal for 1 minute.
Operating Enviromental Conditions	Ambient Temperature	32°F～122°F (0～+50°C), nonfreezing	32°F～104°F (0～+40°C) [**HBL560, 5100** type: 32°F～122°F (0～+50°C)], nonfreezing
	Humidity	85% maximum, noncondensing	
	Atmosphere	No corrosive gases or dust	

Gearmotor — Torque Table

Unit = Upper values: lb-in / Lower values: N·m

Model \ Speed r/min	100 ~ 667	83 ~ 556	60 ~ 400	50 ~ 333	40 ~ 267	33 ~ 222	24 ~ 160	20 ~ 133	17 ~ 111	12 ~ 80	10 ~ 67	8.3 ~ 56	6 ~ 40	5 ~ 33	4 ~ 27	3.3 ~ 22	3 ~ 20	2.5 ~ 17	2 ~ 13	1.7 ~ 11
Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
HBL210K-GN/2GN□KA	1	1.3	1.7	2.1	2.6	3.1	4.4	5.2	6.3	7.9	9.4	11	14	17	21	26	26	26	26	26
	0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3
HBL425K-GN/4GN□KA	2.6	3.2	4.4	5.3	6.6	7.9	11	13	16	20	24	29	36	43	54	65	69	69	69	69
	0.3	0.36	0.51	0.61	0.76	0.91	1.3	1.5	1.8	2.3	2.7	3.3	4.1	5	6.2	7.4	8	8	8	8
HBL540K-GN/5GN□KA	4.2	5.1	7	8.4	11	13	18	21	25	32	38	46	57	69	86	87	87	87	87	87
	0.49	0.58	0.81	0.97	1.2	1.5	2	2.4	2.9	3.7	4.4	5.3	6.6	7.9	9.9	10	10	10	10	10

- Enter the gear ratio in the box (□) within the model number.
- A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.

Unit = Upper values: lb-in / Lower values: N·m

Model \ Gear Ratio / Speed r/min	**5** 60~400	**10** 30~200	**15** 20~133	**20** 15~100	**30** 10~67	**50** 6~40	**100** 3~20	**200** 1.5~10
HBL560N-□	12	23	35	47	67	112	224	260
	1.4	2.7	4.1	5.4	7.7	13	26	30
HBL5100N-□	20	39	59	78	112	187	260	260
	2.3	4.5	6.8	9	13	22	30	30

- Enter the gear ratio in the box (□) within the model number.
- A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.

Permissible Overhung Load and Permissible Thrust Load

Gearhead Model	Gear Ratio	Permissible Overhung Load lb (N) 0.4in.(10mm) from shaft end		Permissible Thrust Load lb	(N)
2GN□KA	**3~18**	11	(50)	6.7	(30)
	25~180	26	(120)		
4GN□KA	**3~18**	22	(100)	11	(50)
	25~180	44	(200)		
5GN□KA	**3~18**	55	(250)	22	(100)
	25~180	66	(300)		
HBL560N-□	**5**	66	(300)	33	(150)
HBL5100N-□	**10~20**	88	(400)		
	30~200	110	(500)		

- Enter the gear ratio in the box (□) within the model number.

Permissible Inertial Load (J)

Unit = Upper values: lb-in^2 / Lower values: $\times 10^{-4}$kgm^2

Model \ Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
HBL210K-GN/2GN□KA	0.189	0.272	0.525	0.756	1.18	1.7	3.28	4.73	6.8	13.1	18.9	27.2	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5
	0.558	0.804	1.55	2.23	3.49	5.02	9.69	14	20.1	38.8	55.8	80.4	155	155	155	155	155	155	155	155
HBL425K-GN/4GN□KA	0.684	0.985	1.9	2.74	4.28	6.16	11.9	17.1	24.6	47.5	68.4	98.5	190	190	190	190	190	190	190	190
	1.98	2.85	5.5	7.92	12.4	17.8	34.4	49.5	71.3	138	198	285	550	550	550	550	550	550	550	550
HBL540K-GN/5GN□KA	1.17	1.68	3.25	4.68	7.31	10.5	20.3	29.3	42.1	81.3	117	168	325	325	325	325	325	325	325	325
	3.6	5.18	10	14.4	22.5	32.4	62.5	90	130	250	360	518	1000	1000	1000	1000	1000	1000	1000	1000

Model \ Gear Ratio	**5**	**10**	**15**	**20**	**30**	**50**	**100**	**200**
HBL560N-□	8.5	34	76.5	136	306	850	850	850
HBL5100N-□	25	100	225	400	900	2500	2500	2500

- Enter the gear ratio in the box (□) within the model number.

Torque-Speed Characteristics

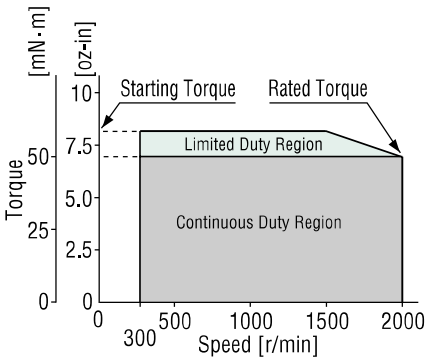
Continuous Duty Region

Continuous operation is possible in this region.

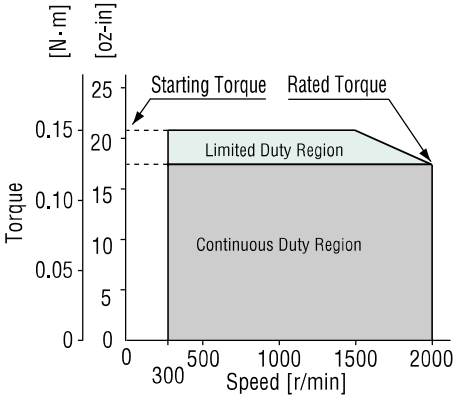
Limited Duty Region

This region is used primarily when accelerating. When a load that exceeds the rated torque is applied continuously for approximately 5 seconds, overload protection is activated and the motor comes to stop.

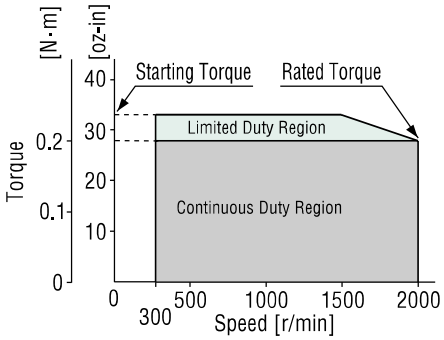
HBL210K-GN
HBL210K-AA



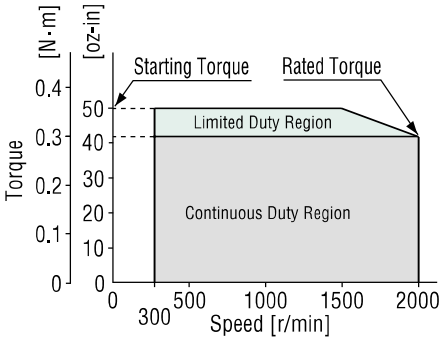
HBL425K-GN
HBL425K-AA



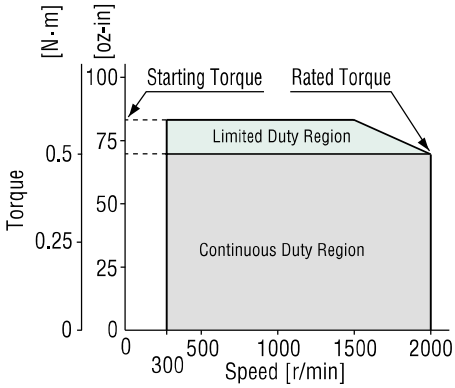
HBL540K-GN
HBL540K-AA



HBL560N-□
HBL560N-A



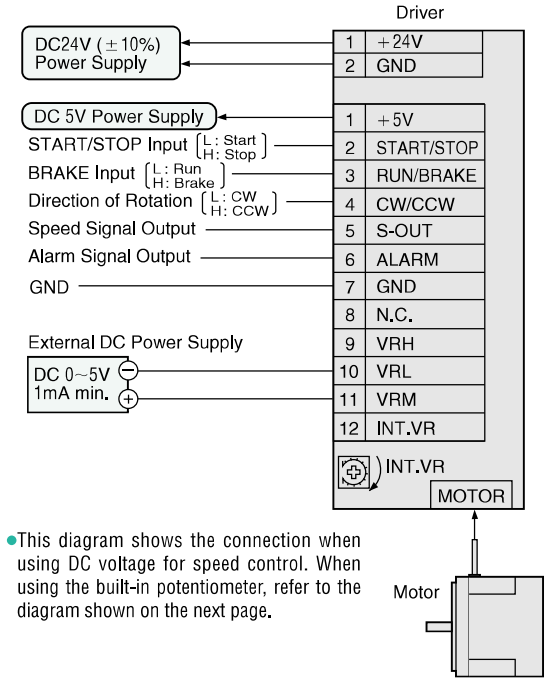
HBL5100N-□
HBL5100N-A



✻ The combination type is the value for the motor alone.

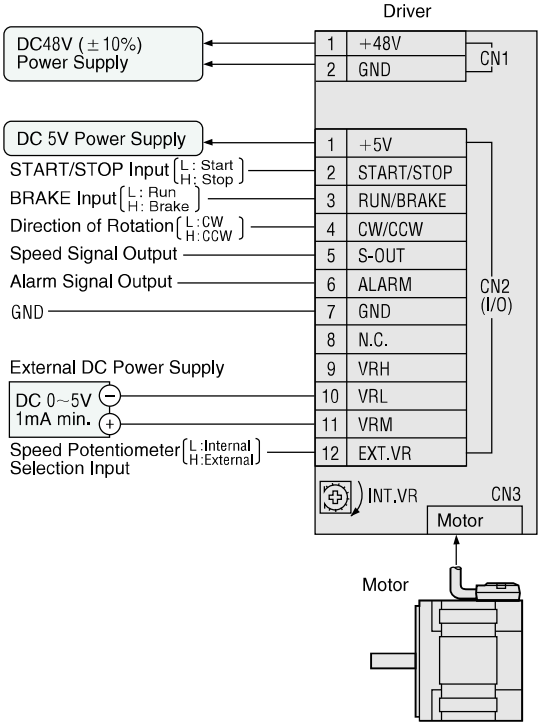
Wiring Diagrams

●HBL210, HBL425, HBL540

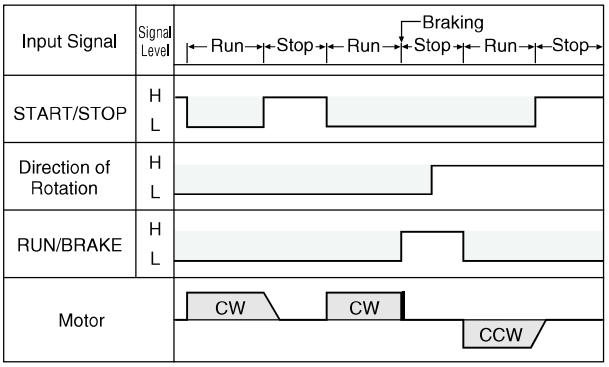


●This diagram shows the connection when using DC voltage for speed control. When using the built-in potentiometer, refer to the diagram shown on the next page.

●HBL560, HBL5100



Signal Input Timing Chart



●RUN/BRAKE

The brake input runs or stops the motor when START/STOP input has been set to "L" level, the motor rotates at the speed selected; if set to "H" level, the motor stops instantaneously.

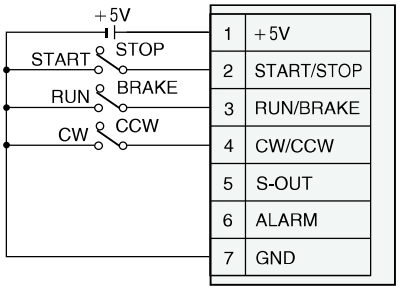
●Direction of Rotation

The direction of rotation can be changed by the direction of rotation input. The diagram shows the direction of motor shaft rotation as viewed from the motor shaft.

Control by Small Capacity Relays or Switches

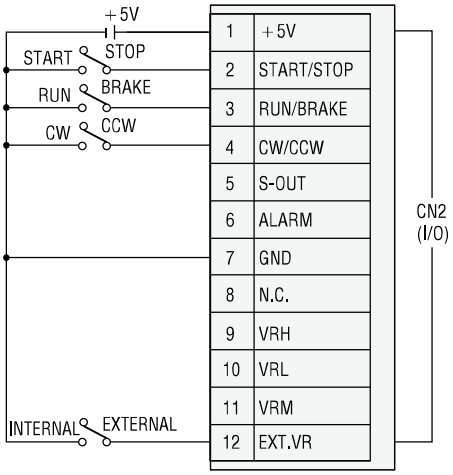
●HBL210, HBL425, HBL540

Switch Capacity: DC24V 10mA



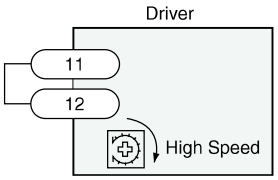
●HBL560, HBL5100

Switch Capacity: DC24V 10mA



Speed Control

① Speed Control by Built-in Potentiometer



●HBL210, HBL425, HBL540

Connect terminals 11 and 12, and turn the potentiometer clockwise to increase the speed.

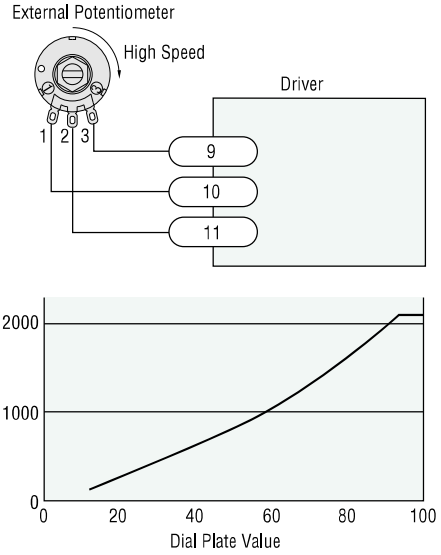
●HBL560, HBL5100

The EXT, VR input has been set to OFF ("L"Level), and turn the potentiometer clockwise to increase the speed.

② Speed Control by External Potentiometer

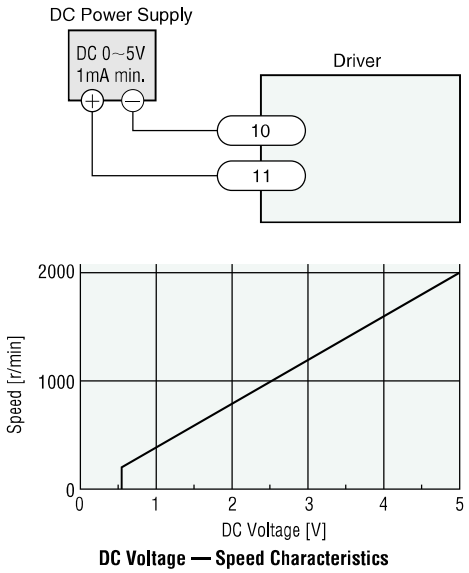
To control the speed of the motor when it is separated from the driver, connect the external potentiometer provided with the motor as follows.

External Potentiometer **PAVR-20KY** (Sold separately)



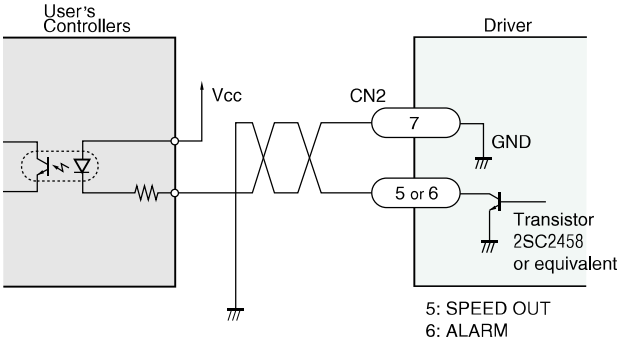
③ Speed Control by DC Voltage

To control the speed of the motor by DC voltage, connect the DC power supply as follows.



DC Voltage — Speed Characteristics

Connection of Output Signals



Speed Signal Output:

It is output at a rate of 12 pulses per motor rotation. Motor speed can be determined using the following formula:

$$\text{Motor speed} = \frac{\text{Speed output frequency [Hz]}}{12} \times 60\,[\text{r/min}]$$

Alarm Signal Output:

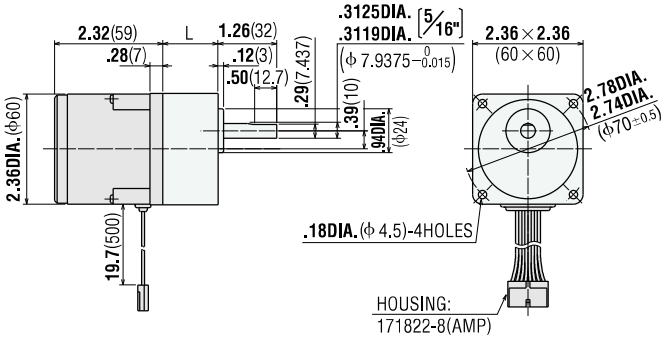
This signal is output when protection for overload or out-of-phase has been activated.

Note:

- Signal output is done through an open collector transistor which requires an external power source.
- The external power source should be less than DC 26.4V. The transistor in the driver requires less than 10mA.

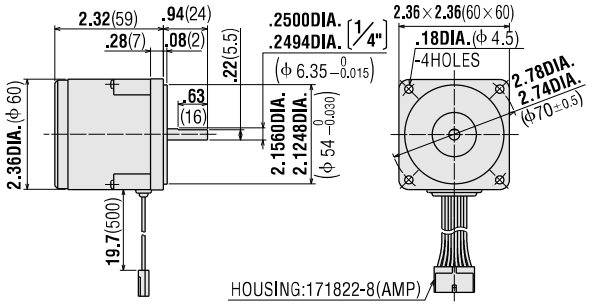
Dimensions Scale 1/4, Unit = **inch** (mm)

HBL210K-GN (Pinion Shaft Type)
Motor: HBLM210K-GN Weight (Mass): 1.32 lb. (0.6 kg) /
Driver: HBLD10K
Gearhead: **2GN□KA** Weight (Mass): 0.88 lb. (0.4 kg)

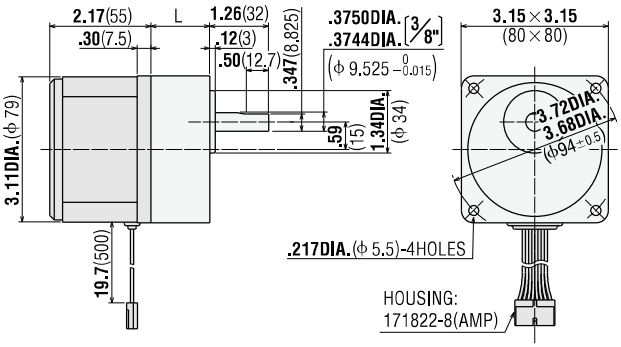


L = 1.18 (30) **2GN3KA**~**18KA**
L = 1.57 (40) **2GN25KA**~**180KA**

HBL210K-AA (Round Shaft Type)
Motor: HBLM210K-AA Weight (Mass): 1.32 lb. (0.6 kg)
Driver: HBLD10K

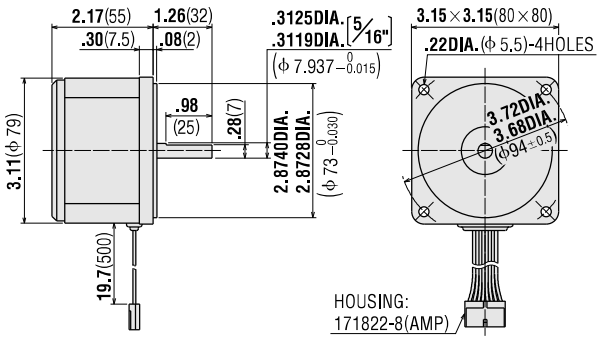


HBL425K-GN (Pinion Shaft Type)
Motor: HBLM425K-GN Weight (Mass): 2.2 lb. (1.0 kg) /
Driver: HBLD25K
Gearhead: **4GN□KA** Weight (Mass): 1.32 lb. (0.6 kg)

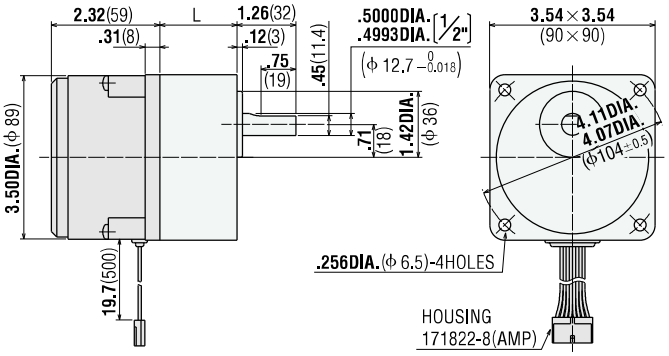


L = 1.26 (32) **4GN3KA**~**18KA**
L = 1.67 (42.5) **4GN25KA**~**180KA**

HBL425K-AA (Round Shaft Type)
Motor: HBLM425K-AA Weight (Mass): 2.2 lb. (1.0 kg)
Driver: HBLD25K

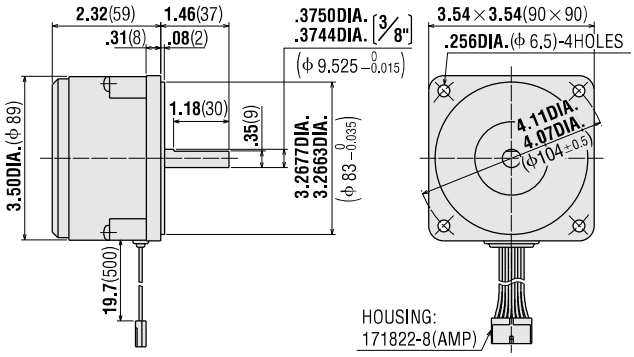


HBL540K-GN (Pinion Shaft Type)
Motor: HBLM540K-GN Weight (Mass): 2.9 lb. (1.3 kg) /
Driver: HBLD40K
Gearhead: **5GN□KA** Weight (Mass): 3.3 lb. (1.5 kg)

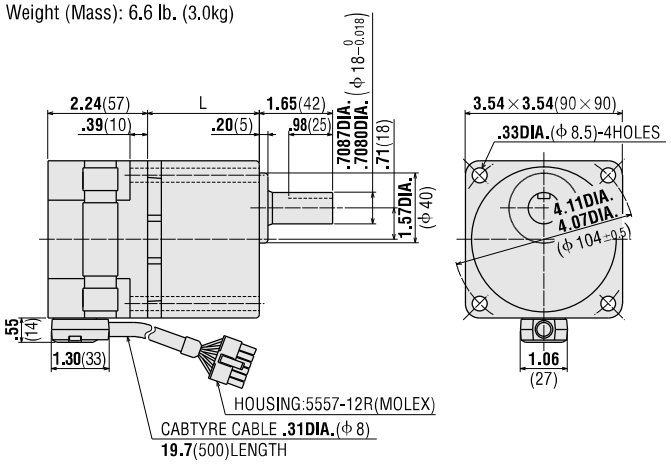


L = 1.65 (42) **5GN3KA**~**18KA**
L = 2.36 (60) **5GN25KA**~**180KA**

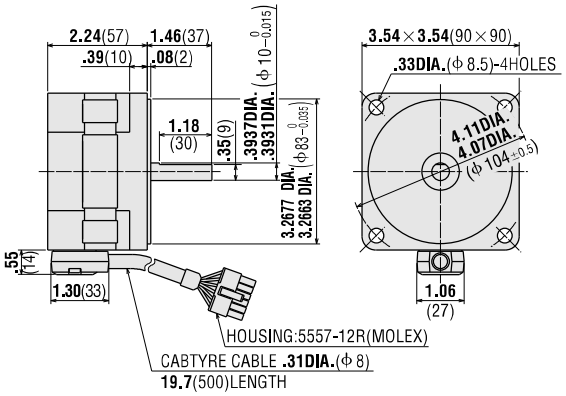
HBL540K-AA (Round Shaft Type)
Motor: HBLM540K-AA Weight (Mass): 2.9 lb. (1.3 kg)
Driver: HBLD40K



●**HBL560N-**□ (Combination Model)
Motor: HBLM560N-GFH /Gearhead: GFH5G□
Driver: HBLD60N
Weight (Mass): 6.6 lb. (3.0kg)

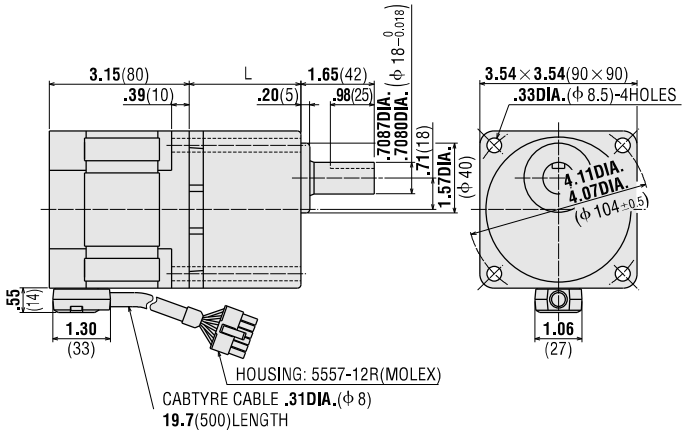


●**HBL560N-A** (Round Shaft Type)
Motor: HBLM560N-A
Driver: HBLD60N
Weight (Mass): 3.3 lb. (1.5kg)

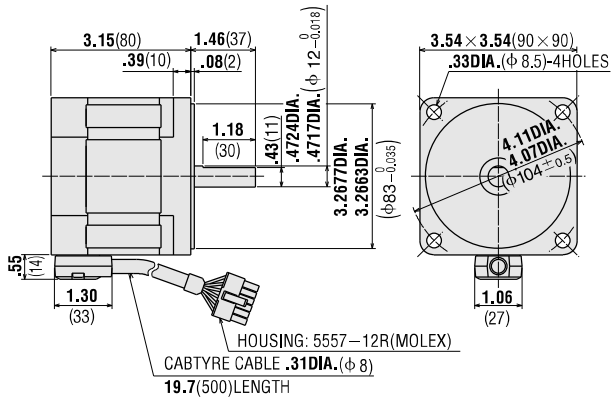


L = 1.77 (45) **HBL560N-5~20**
L = 2.28 (58) **HBL560N-30~100**
L = 2.52 (64) **HBL560N-200**

●**HBL5100N-**□ (Combination Model)
Motor: HBLM5100N-GFH /Gearhead: GFH5G□
Driver: HBLD100N
Weight (Mass): 8.8 lb. (4.0kg)

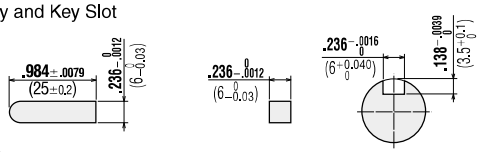


●**HBL5100N-A** (Round Shaft Type)
Motor: HBLM5100N-A
Driver: HBLD100N
Weight (Mass): 5.5 lb. (2.5kg)



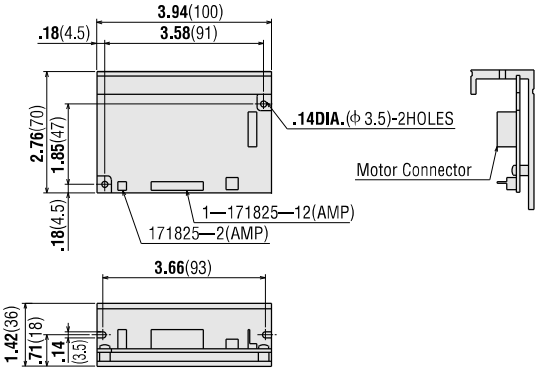
L = 1.77 (45) **HBL5100N-5~20**
L = 2.28 (58) **HBL5100N-30~100**
L = 2.52 (64) **HBL5100N-200**

●Key and Key Slot

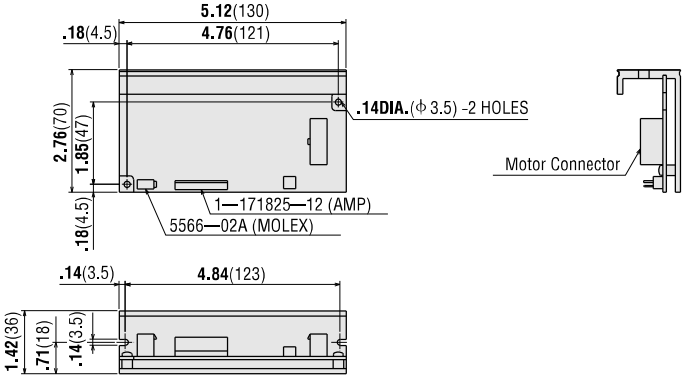


●Driver

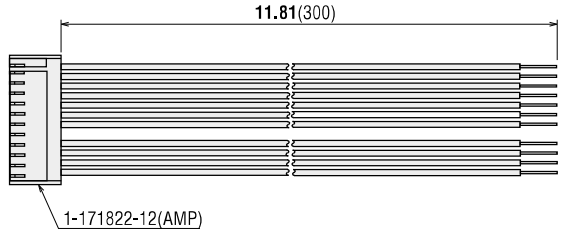
HBLD10K, HBLD25K, HBLD40K
Weight (Mass): 0.4 lb. (0.2kg)



HBLD60N, HBLD100N
Weight (Mass): 0.5 lb. (0.24kg)

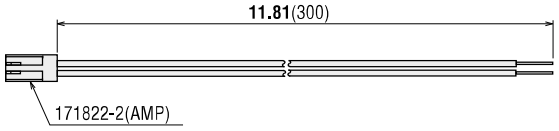


●Input Signal Cable (included)

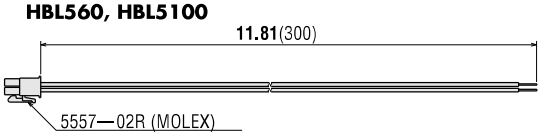


●Power Supply Cable (included)

HBL210, HBL425, HBL540



HBL560, HBL5100



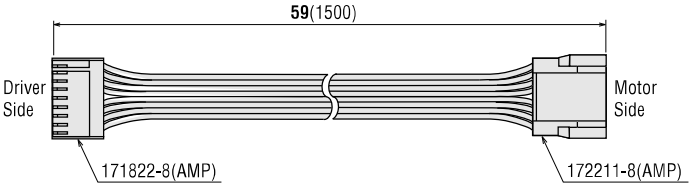
■ Accessories (sold separately)

●Extension Cable

●HBL210, HBL425, HBL540 (Motor model)

FC02HBL (Cable model)

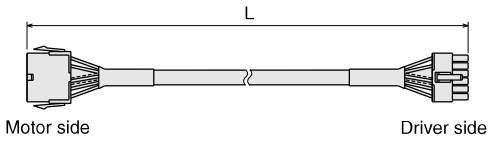
Using the extension cable allows the motor and driver to be separated by up to 6.6 ft. (2m)



●HBL560, HBL5100 (Motor model)

Using the extension cable allows the motor and driver to be separated by up to 18 ft. (5.5m)

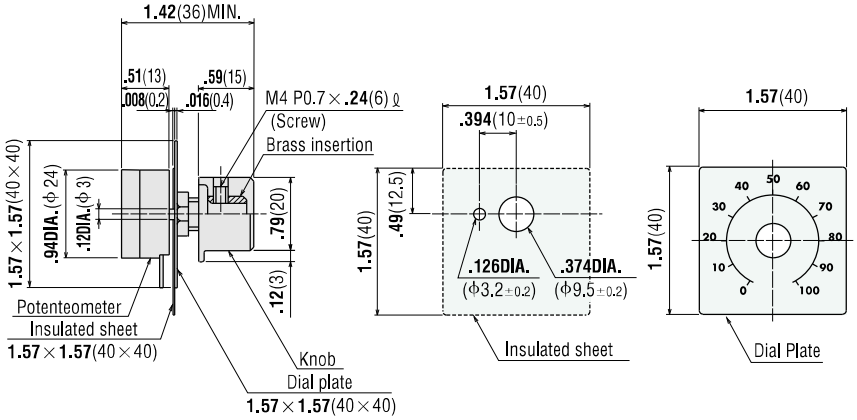
Cable Model	Length	
	ft.	m
CC01FBL	3.3	1
CC02FBL	6.6	2
CC03FBL	9.8	3
CC05FBL	16.4	5



●External Speed Potentiometer

PAVR-20KY

●Dimensions Weight (Mass): 0.08 lb. (35g)



●Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors without gearheads. See page A-266 for more information.

Motor Model	Mounting Bracket
HBL210	**SOL2U08**
HBL425	**SOL4U10**
HBL540	**SOL5UA**
HBL560	**SOL5M8**
HBL5100	

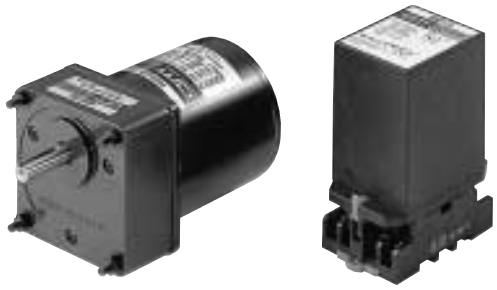
●Flexible couplings

Optional flexible couplings are available. See page [A-260] for more information.

Component Package Type Speed Control Motor Unit

SC Series

This speed control unit allows speed control and acceleration/deceleration operation in combination with speed control motors with an output power of 6W~60W. The control packs can be directly mounted on the control board.



●The gearhead in the photograph is sold separately.

GEAR | PACK-AGE | SAFETY STD.

Features

- Speed Range: 90 r/min~1400 r/min (50Hz), 90 r/min~1600 r/min (60Hz)
- Connection is simplified by a compact plug-in construction (11 pins).
- The control packs have an acceleration/deceleration function that enables smooth starts and stops. Setting and adjustment are easy since they have a built-in timing potentiometer for acceleration time and deceleration time.
- Multiple motors can be operated by a single speed potentiometer.
- Compatible with voltages in all major countries.
- The design conforms to typical global safety standards.
- The CE Marking is used in accordance with the low voltage directive.

Product Number Code

SC 4 25 -4 0 1W U

Provided Capacitor
U: 110V/115V
E: 220V/230V

Voltage
1W: Single-Phase 110V/115V
2W: Single-Phase 220V/230V

Motor Type
0: Induction Motor (Continuous Rating)
1: Reversible Motor (30 Minute Rating)

Shaft Type
0: Round Shaft
4: **GN** type pinion shaft
5: **GU** type pinion shaft

Output Power
06: 6W **40**: 40W
15: 15W **60**: 60W
25: 25W

Motor Frame Size
2: 2.36 in.sq.(60mm sq.)
3: 2.76 in.sq.(70mm sq.)
4: 3.15 in.sq.(80mm sq.)
5: 3.54 in.sq.(90mm sq.)

SC series Speed Control Motor Unit

Note : The "**U**" and "**E**" at the end of the model numberindicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate.

Safety Standards and CE Marking

●Approved Standards

Motor

Standards	Certification Body	Standards File No.	CE Marking
UL1004 UL519 (SC206 type) UL547 (SC315, SC425, SC540, SC560 type)	UL	E64199 (**SC206** type) E64197 (**SC315, US425, SC540,SC560** type)	Low voltage Directive
CAN/CSA-C22.2 No.100 CAN/CSA-C22.2 No.77			
EN60950	VDE	114919ÜG (**SC206** type) 6751ÜG (**SC315, SC425, SC540,SC560** type)	
EN60034-1 EN60034-5 IEC60034-11	Conform to EN/IEC Standards (EN/IEC certifications are scheduled.)		

Speed control pack

Standards	Certification Body	Standards File No.	CE Marking
UL508 CAN/CSA-C22.2 No.14	UL	E91291	Low voltage Directive
EN60950 DIN VDE 0160	TÜV Rheinland	R9551853	

Note : ●Each component is recognized individually and as a package.
●The EMC measurements required under standard DIN VDE 0160 are not performed for motors and speed control packs. Perform the EMC test when they are incorporated into the final product.
●The over-voltage protection test required under standard DIN VDE 0160 is not performed. Perform the test when incorporated into the final product.
●For installations for EN/IEC standards, see page D-2.

■ Type

●Induction Motor Single-Phase 110V/115V

Output Power		Model	
HP	(W)	Pinion shaft	Round shaft
1/124	(6)	**SC206-401WU**	**SC206-001WU**
1/50	(15)	**SC315-401WU**	**SC315-001WU**
1/30	(25)	**SC425-401WU**	**SC425-001WU**
1/18.5	(40)	**SC540-401WU**	**SC540-001WU**
1/12.5	(60)	**SC560-501WU**	**SC560-001WU**

●Reversible Motor Single-Phase 110V/115V

Output Power		Model	
HP	(W)	Pinion shaft	Round shaft
1/124	(6)	**SC206-411WU**	**SC206-011WU**
1/50	(15)	**SC315-411WU**	**SC315-011WU**
1/30	(25)	**SC425-411WU**	**SC425-011WU**
1/18.5	(40)	**SC540-411WU**	**SC540-011WU**
1/12.5	(60)	**SC560-511WU**	**SC560-011WU**

●Induction Motor Single-Phase 220V/230V

Output Power		Model	
HP	(W)	Pinion shaft	Round shaft
1/124	(6)	**SC206-402WE**	**SC206-002WE**
1/50	(15)	**SC315-402WE**	**SC315-002WE**
1/30	(25)	**SC425-402WE**	**SC425-002WE**
1/18.5	(40)	**SC540-402WE**	**SC540-002WE**
1/12.5	(60)	**SC560-502WE**	**SC560-002WE**

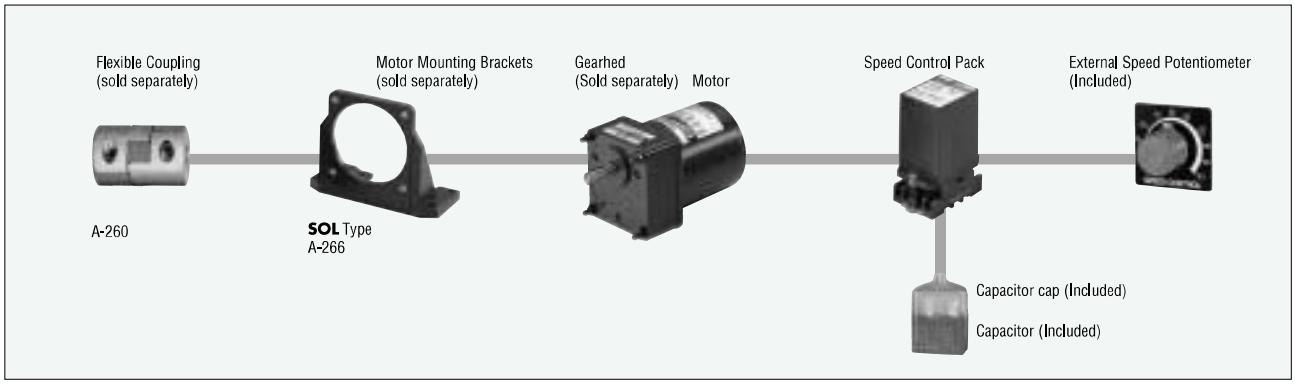
●Reversible Motor Single-Phase 220V/230V

Output Power		Model	
HP	(W)	Pinion shaft	Round shaft
1/124	(6)	**SC206-412WE**	**SC206-012WE**
1/50	(15)	**SC315-412WE**	**SC315-012WE**
1/30	(25)	**SC425-412WE**	**SC425-012WE**
1/18.5	(40)	**SC540-412WE**	**SC540-012WE**
1/12.5	(60)	**SC560-512WE**	**SC560-012WE**

●Gearheads

Motor Model	Gearhead Model
SC206	**2GN3KA** ~ **2GN180KA** **2GN10XK** (Decimal Gearhead)
SC315	**3GN3KA** ~ **3GN180K** **3GN10XK** (Decimal Gearhead)
SC425	**4GN3KA** ~ **4GN180KA** **4GN10XK** (Decimal Gearhead)
SC540	**5GN3KA** ~ **5GN180KA** **5GN10XK** (Decimal Gearhead)
SC560	**5GU3KA** ~ **5GU180KA** **5GU10XKB** (Decimal Gearhead)

■ Construction



Specifications

●Induction Motors — Continuous Rating

Unit Model		Maximum Output Power		Voltage	Frequency	Speed Range	Permissible Torque 1200 r/min		Permissible Torque 90 r/min		Starting Torque		Current	Power Consumption	Capacitor
Pinion Shaft Type	Round Shaft Type	HP	W	V	Hz	r/min	oz-in	mN·m	oz-in	mN·m	oz-in	mN·m	A	W	μF
ⓩ SC206-401WU	SC206-001WU	1/124	6	Single-Phase110	60	90～1600	6.9	50	4.2	30	4.9	35	0.26	24	2.5
				Single-Phase115	60	90～1600	6.9	50	4.2	30	4.9	35	0.29	29	
ⓣ SC315-401WU	SC315-001WU	1/50	15	Single-Phase110	60	90～1600	17.4	125	4.2	30	7.6	55	0.50	46	4.5
				Single-Phase115	60	90～1600	17.4	125	4.7	34	9.0	65	0.51	48	
ⓣ SC425-401WU	SC425-001WU	1/30	25	Single-Phase110	60	90～1600	20.1	145	5.6	40	12.5	90	0.72	65	6.5
				Single-Phase115	60	90～1600	22.2	160	6.0	43	13.9	100	0.74	67	
ⓣ SC540-401WU	SC540-001WU	1/18.5	40	Single-Phase110	60	90～1600	31.9	230	7.6	55	22.2	160	1.1	101	9
				Single-Phase115	60	90～1600	44.4	320	7.6	55	23.6	170	1.1	103	
ⓣ SC560-501WU	SC560-001WU	1/12.5	60	Single-Phase110	60	90～1600	54.2	390	13.2	95	45.8	330	1.60	160	18
				Single-Phase115	60	90～1600	54.2	390	13.2	95	48.6	350	1.60	160	
ⓩ SC206-402WE	SC206-002WE	1/124	6	Single-Phase220	60	90～1600	6.9	50	4.2	30	4.2	30	0.14	29	0.6
				Single-Phase230	50	90～1400	6.9	50	4.2	30	4.9	35	0.14	30	0.6
				Single-Phase230	60	90～1600	6.9	50	4.2	30	4.9	35	0.14	30	0.6
ⓣ SC315-402WE	SC315-002WE	1/50	15	Single-Phase220	60	90～1600	15.3	110	4.2	30	8.1	58	0.23	44	1
				Single-Phase230	50	90～1400	17.4	125	4.7	34	9.0	65	0.23	44	1
				Single-Phase230	60	90～1600	17.4	125	4.7	34	9.0	65	0.23	47	1
ⓣ SC425-402WE	SC425-002WE	1/30	25	Single-Phase220	60	90～1600	20.1	145	5.6	40	13.9	100	0.35	65	1.5
				Single-Phase230	50	90～1400	28.5	205	6.0	43	15.3	110	0.34	61	1.5
				Single-Phase230	60	90～1600	22.2	160	6.0	43	15.3	110	0.35	65	1.5
ⓣ SC540-402WE	SC540-002WE	1/18.5	40	Single-Phase220	60	90～1600	31.9	230	8.3	60	25.0	180	0.55	97	2.3
				Single-Phase230	50	90～1400	44.4	320	9.0	65	27.8	200	0.55	92	2.3
				Single-Phase230	60	90～1600	33.3	240	9.0	65	27.8	200	0.56	98	2.3
ⓣ SC560-502WE	SC560-002WE	1/12.5	60	Single-Phase220	60	90～1600	68.0	490	25.0	180	44.4	320	0.92	180	4
				Single-Phase230	50	90～1400	68.0	490	26.4	190	48.6	350	0.98	186	4
				Single-Phase230	60	90～1600	68.0	490	26.4	190	48.6	350	0.93	186	4

●Reversible Motors — 30 Minutes Rating

Unit Model		Maximum Output Power		Voltage	Frequency	Speed Range	Permissible Torque 1200 r/min		Permissible Torque 90 r/min		Starting Torque		Current	Power Consumption	Capacitor
Pinion Shaft Type	Round Shaft Type	HP	W	V	Hz	r/min	oz-in	mN·m	oz-in	mN·m	oz-in	mN·m	A	W	μF
ⓩ SC206-411WU	SC206-011WU	1/124	6	Single-Phase110	60	90～1600	6.9	50	6.9	50	5.6	40	0.32	31	3.5
				Single-Phase115	60	90～1600	6.9	50	6.9	50	6.2	45	0.32	31	
ⓣ SC315-411WU	SC315-011WU	1/50	15	Single-Phase110	60	90～1600	17.4	125	9.7	70	10.4	75	0.58	56	6
				Single-Phase115	60	90～1600	17.4	125	9.7	70	11.8	85	0.58	56	
ⓣ SC425-411WU	SC425-011WU	1/30	25	Single-Phase110	60	90～1600	28.5	205	13.2	95	13.9	100	0.93	90	8
				Single-Phase115	60	90～1600	28.5	205	13.2	95	15.3	110	0.93	90	
ⓣ SC540-411WU	SC540-011WU	1/18.5	40	Single-Phase110	60	90～1600	44.4	320	18.1	130	27.8	200	1.4	131	12
				Single-Phase115	60	90～1600	44.4	320	18.1	130	29.2	210	1.4	133	
ⓣ SC560-511WU	SC560-011WU	1/12.5	60	Single-Phase110	60	90～1600	55.5	400	16.7	120	44.4	320	1.70	160	20
				Single-Phase115	60	90～1600	55.5	400	16.7	120	50.0	360	1.70	170	
ⓩ SC206-412WE	SC206-012WE	1/124	6	Single-Phase220	60	90～1600	6.9	50	6.9	50	5.3	38	0.16	30	0.8
				Single-Phase230	50	90～1400	6.9	50	6.9	50	6.2	45	0.16	33	0.8
				Single-Phase230	60	90～1600	6.9	50	6.9	50	6.0	43	0.16	33	0.8
ⓣ SC315-412WE	SC315-012WE	1/50	15	Single-Phase220	60	90～1600	17.4	125	9.7	70	12.5	90	0.29	53	1.5
				Single-Phase230	50	90～1400	17.4	125	9.7	70	13.9	100	0.3	63	1.5
				Single-Phase230	60	90～1600	17.4	125	9.7	70	13.9	100	0.29	53	1.5
ⓣ SC425-412WE	SC425-012WE	1/30	25	Single-Phase220	60	90～1600	28.5	205	13.2	95	18.1	130	0.44	84	2
				Single-Phase230	50	90～1400	28.5	205	13.2	95	20.8	150	0.44	82	2
				Single-Phase230	60	90～1600	28.5	205	13.2	95	19.4	140	0.44	86	2
ⓣ SC540-412WE	SC540-012WE	1/18.5	40	Single-Phase220	60	90～1600	44.4	320	19.4	140	36.1	260	0.73	129	3.5
				Single-Phase230	50	90～1400	44.4	320	18.1	130	41.7	300	0.71	120	3.5
				Single-Phase230	60	90～1600	44.4	320	19.4	140	40.3	290	0.73	129	3.5
ⓣ SC560-512WE	SC560-012WE	1/12.5	60	Single-Phase220	60	90～1600	68.0	490	31.9	230	50.0	360	1.1	215	5
				Single-Phase230	50	90～1400	68.0	490	30.6	220	56.9	410	1.1	205	5
				Single-Phase230	60	90～1600	68.0	490	31.9	230	55.5	400	1.1	218	5

ⓩ : These motors are impedance protected.

ⓣ : These motors contain a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

●The speed range is under no load conditions.

●The "**U**" and "**E**" at the end of the model numberindicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate.

General Specifications of Motors

After the rated motor operation under normal ambient temperature and humidity.

Item	Specifications
Insulation Resistance	100MΩ or more when 500V DC is applied between the windings and the frame.
Dielectric Strength	Sufficient to withstand 1.5kV at 50Hz and 60Hz applied between the windings and the frame for 1 minute.
Temperature Rise	Induction Motor: 144°F (80°C) or less measured by the resistance change method under no load operation of motor with connecting a gearhead or equivalent heat radiation plate.* Reversible Motor: 144°F (80°C) or less measured by the resistance change method under no load operation for 30 minutes of motor with connecting a gearhead or equivalent heat radiation plate.*
Insulation Class	Class B [266°F (130°C)]
Overheating Protection Device	**SC206** type is impedance protected. The other types contain a built-in thermal protector (automatic return type).Open : 266°F±9°F (130°C±5°C) Close: 179.6°F±27°F (82°C±15°C)
Ambient Temperature Range	14°F~104°F (10°C~+40°C)
Ambient Humidity	85% maximum (noncondensing)
Degree of protection	**SC206**, **SC315**, **SC425**, **SC540** type IP20 **SC560** type IP40

*See page (A-37) for heat radiation plate sizes.

General Specifications of Speed Control Pack

Item	Specifications
Insulation Resistance	100MΩ or more when 500V DC is applied between all the pins and the frame.
Dielectric Strength	Sufficient to withstand 2.3kV at 60Hz (Single-Phase 220, 230V : 3.0kV at 50Hz) applied between all the pins and the frame for 1 minute.
Ambient Temperature Range	32°F~104°F (0°C~+40°C)
Ambient Humidity	85% maximum (noncondensing)
Degree of protection	Speed Control Pack: IP20 (after connecting to surface connection socket) Surface connection socket: IP10

Gearmotor — Torque Table

Induction Motors

Unit = Upper values: lb-in/Lower values: N·m

Model	Gear Ratio	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
SC206-401WU /2GN□KA	1200r/min	1	1.3	1.7	2.1	2.6	3.1	4.4	5.2	6.3	7.9	9.4	11	14	17	21	26	26	26	26	26
		0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3
	90r/min	0.64	0.77	1.1	1.3	1.6	1.9	2.7	3.2	3.8	4.8	5.7	6.9	8.7	10	13	16	17	21	26	26
		0.073	0.087	0.12	0.15	0.18	0.22	0.3	0.36	0.44	0.55	0.66	0.79	0.99	1.2	1.5	1.8	2	2.4	3	3
SC206-402WE /2GN□KA	1200r/min	1	1.3	1.7	2.1	2.6	3.1	4.4	5.2	6.3	7.9	9.4	11	14	17	21	26	26	26	26	26
		0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3
	90r/min	0.64	0.77	1.1	1.3	1.6	1.9	2.7	3.2	3.8	4.8	5.7	6.9	8.7	10	13	16	17	21	26	26
		0.073	0.087	0.12	0.15	0.18	0.22	0.3	0.36	0.44	0.55	0.66	0.79	0.99	1.2	1.5	1.8	2	2.4	3	3
SC315-401WU /3GN□KA	1200r/min	2.6	3.2	4.4	5.3	6.6	7.9	11	13	16	20	24	29	36	43	43	43	43	43	43	43
		0.3	0.36	0.51	0.61	0.76	0.91	1.3	1.5	1.8	2.3	2.7	3.3	4.1	5	5	5	5	5	5	5
	90r/min	0.71	0.86	1.2	1.4	1.8	2.1	3	3.6	4.3	5.4	6.4	7.7	9.7	12	15	17	19	23	29	35
		0.083	0.099	0.14	0.17	0.21	0.25	0.34	0.41	0.5	0.62	0.74	0.89	1.1	1.3	1.7	2	2.2	2.7	3.4	4
SC315-402WE /3GN□KA	1200r/min	2.6	3.2	4.4	5.3	6.6	7.9	11	13	16	20	24	29	36	43	43	43	43	43	43	43
		0.3	0.36	0.51	0.61	0.76	0.91	1.3	1.5	1.8	2.3	2.7	3.3	4.1	5	5	5	5	5	5	5
	90r/min	0.71	0.86	1.2	1.4	1.8	2.1	3	3.6	4.3	5.4	6.4	7.7	9.7	12	15	17	19	23	29	35
		0.083	0.099	0.14	0.17	0.21	0.25	0.34	0.41	0.5	0.62	0.74	0.89	1.1	1.3	1.7	2	2.2	2.7	3.4	4
SC425-401WU /4GN□KA	1200r/min	3.4	4	5.6	6.7	8.4	10	14	17	20	25	30	36	46	55	69	69	69	69	69	69
		0.39	0.47	0.65	0.78	0.97	1.2	1.6	1.9	2.3	2.9	3.5	4.2	5.3	6.3	7.9	8	8	8	8	8
	90r/min	0.91	1.1	1.5	1.8	2.3	2.7	3.8	4.6	5.5	6.8	8.2	9.9	12	15	19	22	25	30	37	45
		0.1	0.13	0.17	0.21	0.26	0.31	0.44	0.52	0.63	0.78	0.94	1.1	1.4	1.7	2.1	2.6	2.8	3.4	4.3	5.1
SC425-402WE /4GN□KA	1200r/min 230V 50Hz	4.3	5.2	7.2	8.7	11	13	18	22	26	33	39	47	59	69	69	69	69	69	69	69
		0.5	0.6	0.83	1	1.2	1.5	2.1	2.5	3	3.7	4.5	5.4	6.8	8	8	8	8	8	8	8
	230V 60Hz	3.4	4	5.6	6.7	8.4	10	14	17	20	25	30	36	46	55	69	69	69	69	69	69
		0.39	0.47	0.65	0.78	0.97	1.2	1.6	1.9	2.3	2.9	3.5	4.2	5.3	6.3	7.9	8	8	8	8	8
	90r/min	0.91	1.1	1.5	1.8	2.3	2.7	3.8	4.6	5.5	6.8	8.2	9.9	12	15	19	22	25	30	37	45
		0.1	0.13	0.17	0.21	0.26	0.31	0.44	0.52	0.63	0.78	0.94	1.1	1.4	1.7	2.1	2.6	2.8	3.4	4.3	5.1
SC540-401WU /5GN□KA	1200r/min	6.7	8.1	11	13	17	20	28	34	40	51	61	73	87	87	87	87	87	87	87	87
		0.78	0.93	1.3	1.6	1.9	2.3	3.2	3.9	4.7	5.8	7	8.4	10	10	10	10	10	10	10	10
	90r/min	1.2	1.4	1.9	2.3	2.9	3.5	4.8	5.8	6.9	8.7	10	12	16	19	24	28	31	38	47	56
		0.13	0.16	0.22	0.27	0.33	0.4	0.56	0.67	0.8	1	1.2	1.4	1.8	2.2	2.7	3.3	3.6	4.4	5.4	6.5

Unit = Upper values: lb-in/Lower values:N·m

Model	Gear Ratio	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
SC540-402WE /5GN□KA	1200r/min 230V	6.7	8.1	11	13	17	20	28	34	40	51	61	73	87	87	87	87	87	87	87	87
	50Hz	0.78	0.93	1.3	1.6	1.9	2.3	3.2	3.9	4.7	5.8	7	8.4	10	10	10	10	10	10	10	10
	230V	5.1	6.1	8.4	10	13	15	21	25	30	38	46	55	69	82	87	87	87	87	87	87
	60Hz	0.58	0.7	0.97	1.2	1.5	1.7	2.4	2.9	3.5	4.4	5.3	6.3	7.9	9.5	10	10	10	10	10	10
	90r/min	1.4	1.6	2.3	2.7	3.4	4.1	5.7	6.8	8.2	10	12	15	19	22	28	33	37	45	56	67
		0.16	0.19	0.26	0.32	0.39	0.47	0.66	0.79	0.95	1.2	1.4	1.7	2.1	2.6	3.2	3.9	4.3	5.1	6.4	7.7
SC560-501WU /5GU□KA	1200r/min	8.2	9.9	14	16	21	25	31	37	45	56	67	80	112	134	150	174	174	174	174	174
		0.95	1.1	1.6	1.9	2.4	2.8	3.6	4.3	5.1	6.4	7.7	9.3	13	15	17	20	20	20	20	20
	90r/min	2	2.4	3.3	4	5	6	7.5	9	11	14	16	20	27	33	37	44	49	58	73	88
		0.23	0.28	0.38	0.46	0.58	0.69	0.87	1	1.2	1.6	1.9	2.3	3.1	3.8	4.2	5	5.6	6.7	8.4	10
SC560-502WE /5GU□KA	1200r/min	10	12	17	21	26	31	39	47	56	70	84	101	140	168	174	174	174	174	174	174
		1.2	1.4	2	2.4	3	3.6	4.5	5.4	6.4	8.1	9.7	12	16	19	20	20	20	20	20	20
	90r/min	4	4.8	6.7	8	10	12	15	18	22	27	33	39	54	65	73	88	97	117	146	174
		0.46	0.55	0.77	0.92	1.2	1.4	1.7	2.1	2.5	3.1	3.8	4.5	6.3	7.5	8.4	10	11	13	17	20

●Reversible Motors

Unit = Upper values: lb-in/Lower values: N·m

Model	Gear Ratio	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
SC206-411WU /2GN□KA	1200r/min	1	1.3	1.7	2.1	2.6	3.1	4.4	5.2	6.3	7.9	9.4	11	14	17	21	26	26	26	26	26
		0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3
	90r/min	0.64	1.3	1.7	2.1	2.6	3.1	4.4	5.2	6.3	7.9	9.4	11	14	17	21	26	26	26	26	26
		0.073	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3
SC206-412WE /2GN□KA	1200r/min	1	1.3	1.7	2.1	2.6	3.1	4.4	5.2	6.3	7.9	9.4	11	14	17	21	26	26	26	26	26
		0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3
	90r/min	0.64	1.3	1.7	2.1	2.6	3.1	4.4	5.2	6.3	7.9	9.4	11	14	17	21	26	26	26	26	26
		0.073	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3
SC315-411WU /3GN□KA	1200r/min	2.6	3.2	4.4	5.3	6.6	7.9	11	13	16	20	24	29	36	43	43	43	43	43	43	43
		0.3	0.36	0.51	0.61	0.76	0.91	1.3	1.5	1.8	2.3	2.7	3.3	4.1	5	5	5	5	5	5	5
	90r/min	1.5	1.8	2.5	2.9	3.7	4.4	6.1	7.4	8.8	11	13	16	20	24	30	36	40	43	43	43
		0.17	0.2	0.28	0.34	0.43	0.51	0.71	0.85	1	1.3	1.5	1.8	2.3	2.8	3.5	4.2	4.6	5	5	5
SC315-412WE /3GN□KA	1200r/min	2.6	3.2	4.4	5.3	6.6	7.9	11	13	16	20	24	29	36	43	43	43	43	43	43	43
		0.3	0.36	0.51	0.61	0.76	0.91	1.3	1.5	1.8	2.3	2.7	3.3	4.1	5	5	5	5	5	5	5
	90r/min	1.5	1.8	2.5	2.9	3.7	4.4	6.1	7.4	8.8	11	13	16	20	24	30	36	40	43	43	43
		0.17	0.2	0.28	0.34	0.43	0.51	0.71	0.85	1	1.3	1.5	1.8	2.3	2.8	3.5	4.2	4.6	5	5	5
SC425-411WU /4GN□KA	1200r/min	4.3	5.2	7.2	8.7	11	13	18	22	26	33	39	47	59	69	69	69	69	69	69	69
		0.5	0.6	0.83	1	1.2	1.5	2.1	2.5	3	3.7	4.5	5.4	6.8	8	8	8	8	8	8	8
	90r/min	2	2.4	3.3	4	5	6	8.4	10	12	15	18	22	27	33	41	49	54	65	69	69
		0.23	0.28	0.38	0.46	0.58	0.69	0.96	1.2	1.4	1.7	2.1	2.5	3.1	3.8	4.7	5.6	6.3	7.5	8	8
SC425-412WE /4GN□KA	1200r/min	4.3	5.2	7.2	8.7	11	13	18	22	26	33	39	47	59	69	69	69	69	69	69	69
		0.5	0.6	0.83	1	1.2	1.5	2.1	2.5	3	3.7	4.5	5.4	6.8	8	8	8	8	8	8	8
	90r/min	2	2.4	3.3	4	5	6	8.4	10	12	15	18	22	27	33	41	49	54	65	69	69
		0.23	0.28	0.38	0.46	0.58	0.69	0.96	1.2	1.4	1.7	2.1	2.5	3.1	3.8	4.7	5.6	6.3	7.5	8	8
SC540-411WU /5GN□KA	1200r/min	6.7	8.1	11	13	17	20	28	34	40	51	61	73	87	87	87	87	87	87	87	87
		0.78	0.93	1.3	1.6	1.9	2.3	3.2	3.9	4.7	5.8	7	8.4	10	10	10	10	10	10	10	10
	90r/min	2.7	3.3	4.6	5.5	6.9	8.2	11	14	16	21	25	30	37	45	56	67	75	87	87	87
		0.32	0.38	0.53	0.63	0.79	0.95	1.3	1.6	1.9	2.4	2.8	3.4	4.3	5.1	6.4	7.7	8.6	10	10	10
SC540-412WE /5GN□KA	1200r/min	6.7	8.1	11	13	17	20	28	34	40	51	61	73	87	87	87	87	87	87	87	87
		0.78	0.93	1.3	1.6	1.9	2.3	3.2	3.9	4.7	5.8	7	8.4	10	10	10	10	10	10	10	10
	90r/min 230V	2.7	3.3	4.6	5.5	6.9	8.2	11	14	16	21	25	30	37	45	56	67	75	87	87	87
	50Hz	0.32	0.38	0.53	0.63	0.79	0.95	1.3	1.6	1.9	2.4	2.8	3.4	4.3	5.1	6.4	7.7	8.6	10	10	10
	230V	2.9	3.5	4.9	5.9	7.4	8.8	12	15	18	22	27	32	40	48	60	72	80	87	87	87
	60Hz	0.34	0.41	0.57	0.68	0.85	1	1.4	1.7	2	2.6	3.1	3.7	4.6	5.5	6.9	8.3	9.2	10	10	10
SC560-511WU /5GU□KA	1200r/min	8.4	10	14	17	21	25	32	38	46	57	69	82	114	137	153	174	174	174	174	174
		0.97	1.2	1.6	1.9	2.4	2.9	3.7	4.4	5.3	6.6	7.9	9.5	13	16	18	20	20	20	20	20
	90r/min	2.5	3	4.2	5.1	6.3	7.6	9.5	11	14	17	21	25	34	41	46	55	62	74	92	111
		0.29	0.34	0.49	0.58	0.73	0.87	1.1	1.3	1.6	2	2.4	2.9	4	48	5.3	6.4	7.1	8.5	11	13
SC560-512WE /5GU□KA	1200r/min	10	12	17	21	26	31	39	47	56	70	84	101	140	168	174	174	174	174	174	174
		1.2	1.4	2	2.4	3	3.6	4.5	5.4	6.4	8.1	9.7	12	16	19	20	20	20	20	20	20
	90r/min 230V	4.6	5.6	7.7	9.3	12	14	17	21	25	32	38	45	63	76	85	102	113	135	169	174
	50Hz	0.53	0.64	0.89	1.1	1.3	1.6	2	2.4	2.9	3.6	4.4	5.2	7.3	8.7	9.7	12	13	16	19	20
	220V/230V	4.8	5.8	8.1	9.7	12	15	18	22	26	33	39	47	66	79	88	106	118	141	174	174
	60Hz	0.56	0.67	0.93	1.1	1.4	1.7	2.1	2.5	3	3.8	4.6	5.5	7.6	9.1	10	12	14	16	20	20

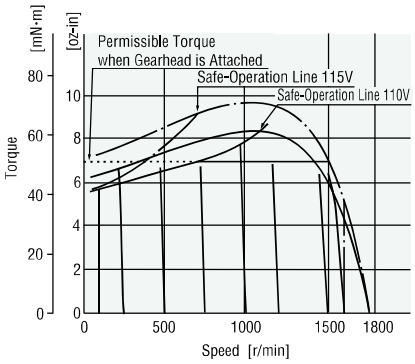
- ●Gearheads and decimal gearheads are sold separately.
- ●Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- ●Values for permissible torque are calculated by taking the permissible torque at high speed (1200r/min) and low speed (90r/min) and multiplying by the gear ratio and gearhead efficiency.

Torque-Speed Characteristics

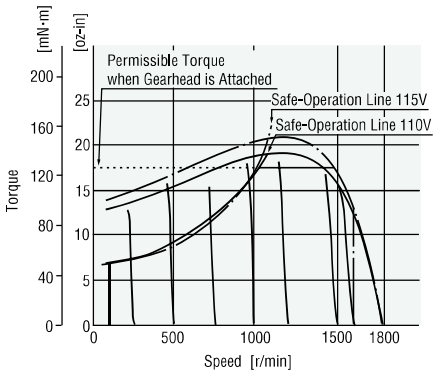
Induction Motors

Single-Phase 110V/115V

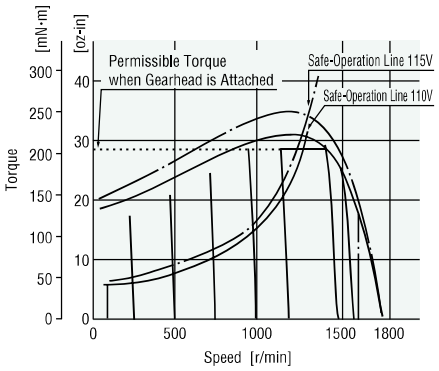
SC206-401WU
SC206-001WU



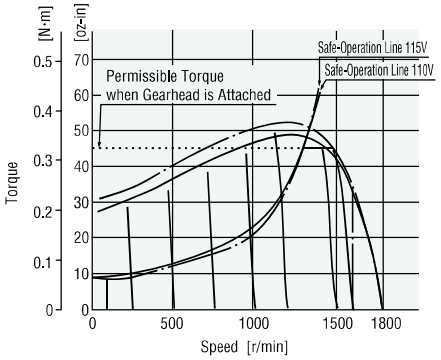
SC315-401WU
SC315-001WU



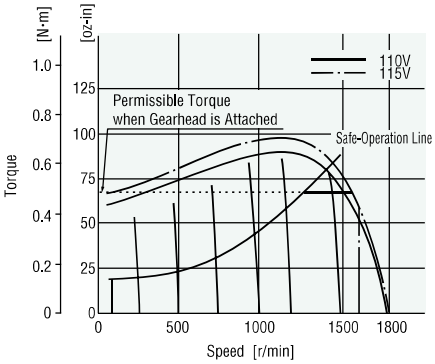
SC425-401WU
SC425-001WU



SC540-401WU
SC540-001WU

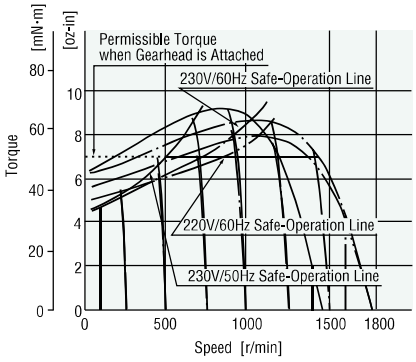


SC560-501WU
SC560-001WU

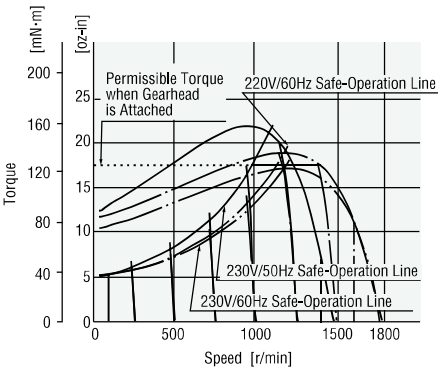


Single-Phase 220V/230V

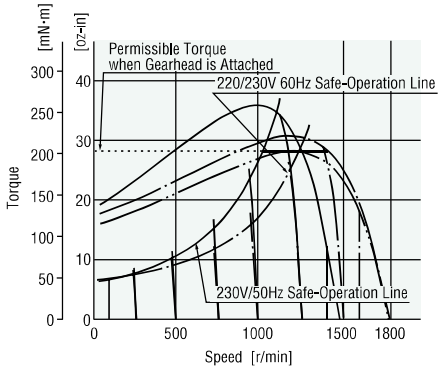
SC206-402WE
SC206-002WE



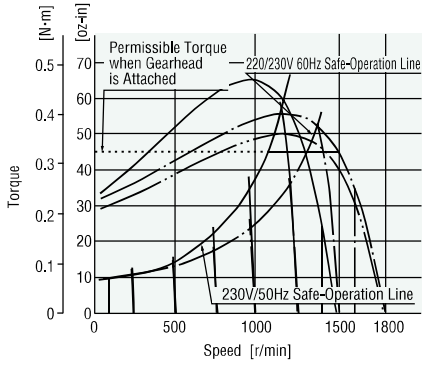
SC315-402WE
SC315-002WE



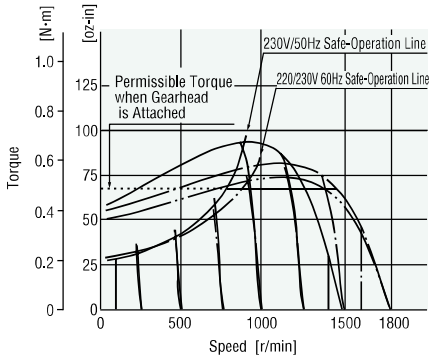
SC425-402WE
SC425-002WE



SC540-402WE
SC540-002WE



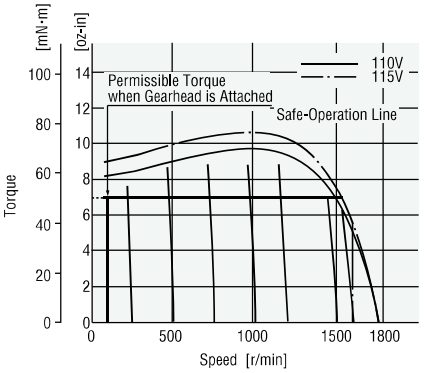
SC560-502WE
SC560-002WE



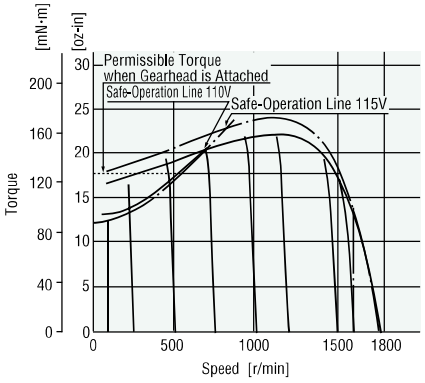
●Reversible Motors

Single-Phase 110V/115V

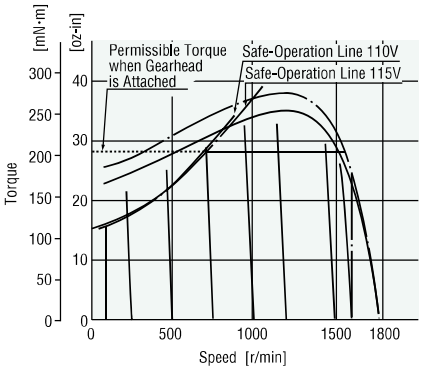
SC206-411WU
SC206-011WU



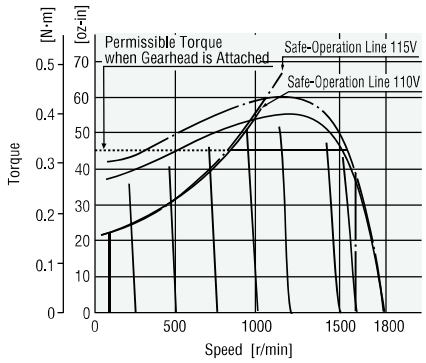
SC315-411WU
SC315-011WU



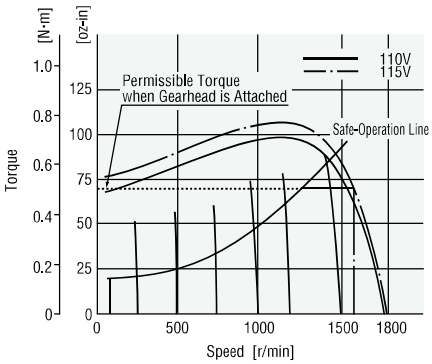
SC425-411WU
SC425-011WU



SC540-411WU
SC540-011WU

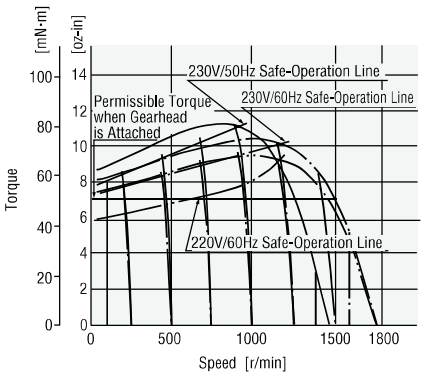


SC560-511WU
SC560-011WU

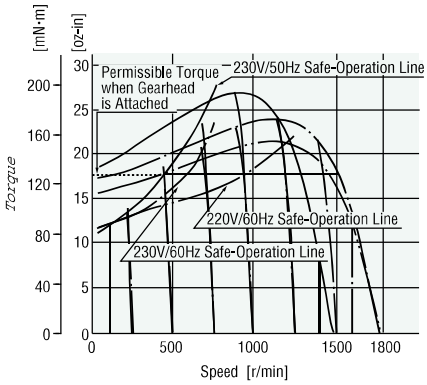


Single-Phase 220V/230V

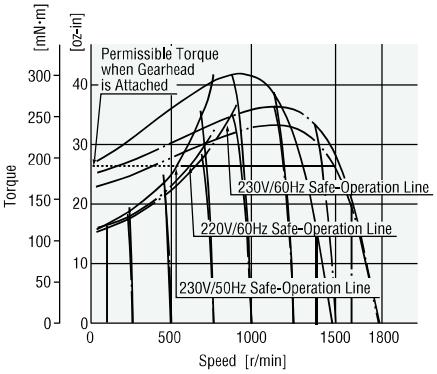
SC206-412WE
SC206-012WE



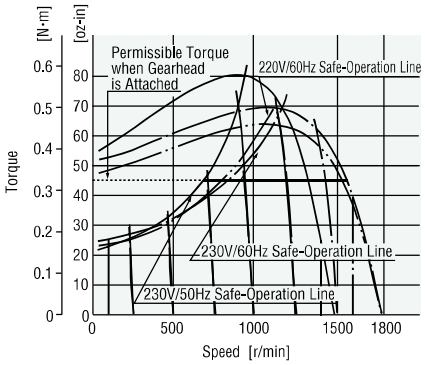
SC315-412WE
SC315-012WE



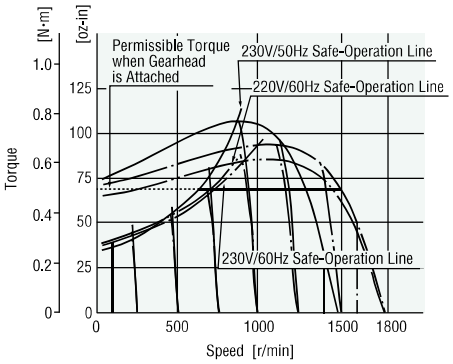
SC425-412WE
SC425-012WE



SC540-412WE
SC540-012WE



SC560-512WE
SC560-012WE



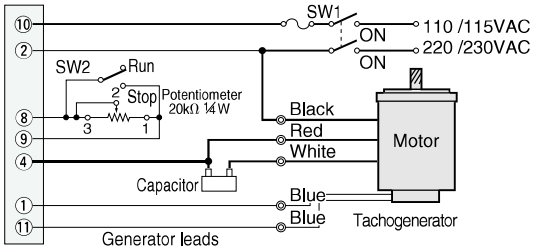
Wiring Diagrams

Induction Motor

Uni-directional Operation, Speed Control

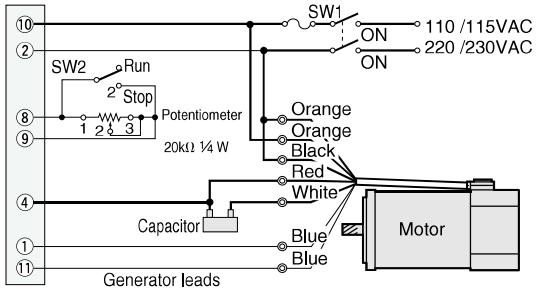
6W, 15W, 25W, 40W type

Speed Control Pack

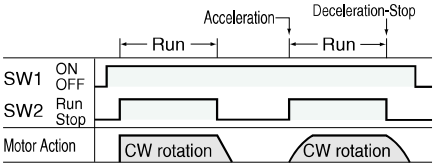


60W type

Speed Control Pack



Operation Chart



Run/Stop

Motor rotates at a speed set on the external speed potentiometer when switch SW2 is flipped to RUN (open). When SW2 is flipped to STOP (short circuit), the motor stops (natural stop).

Direction of Rotation

These wiring diagrams refer to clockwise (CW) rotation as viewed from the front shaft end of the motor. To rotate the motor in a counterclockwise (CCW) direction, reverse the red and white wires.

Run (Acceleration)/Stop (Deceleration)

To operate or stop the motor, use switch SW2. When SW2 is flipped to RUN (open), the motor accelerates to the speed set on the external speed potentiometer. When SW2 is flipped to STOP (short circuit), the motor decelerates to a stop.

Switch No	Specifications
SW1	125VAC, 5A Min or 250VAC, 5A Min
SW2	DC20V 10mA

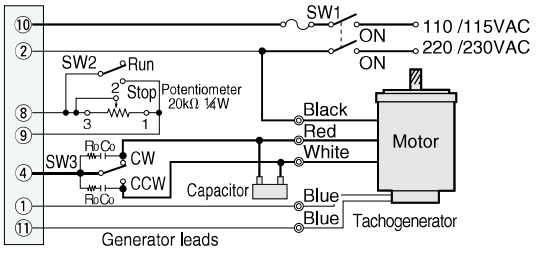
Note: The direction of rotation should not be reversed when the power supply is first turned on.

Reversible Motors

Bi-directional Operation, Speed Control

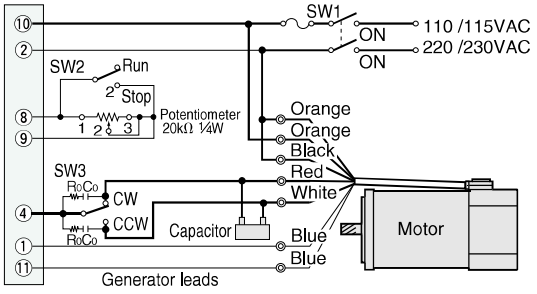
6W, 15W, 25W, 40W type

Speed Control Pack

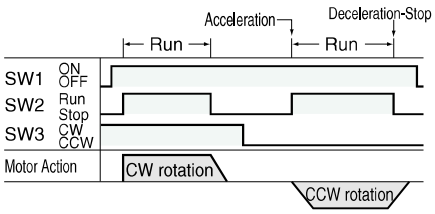


60W type

Speed Control Pack



Operation Chart



Run/Stop

Motor rotates at a speed set on the external speed potentiometer when switch SW2 is flipped to RUN (open). When SW2 is flipped to STOP (short circuit), the motor stops (natural stop).

Direction of Rotation

To rotate the motor in a clockwise (CW) direction, flip switch SW3 to CW. To rotate it in a counterclockwise (CCW) direction, flip SW3 to CCW. The direction of rotation is as viewed from the shaft end of the motor.

Run (Acceleration)/Stop (Deceleration)

To operate or stop the motor, use switch SW2. When SW2 is flipped to RUN (open), the motor accelerates to the speed set on the external speed potentiometer. When SW2 is flipped to STOP (short circuit), the motor decelerates to a stop.

Acceleration time and deceleration time are set with the built-in timing potentiometer located on the front surface.

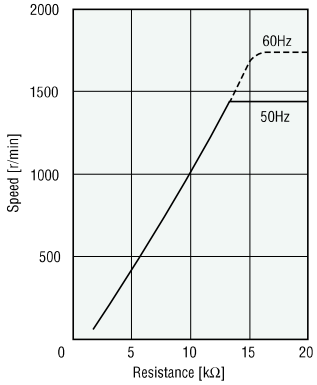
Switch No		Note
SW1	125VAC 5A Min or 250VAC 5A Min	—
SW2	DC20V 10mA	—
SW3	125VAC 5A Min or 250VAC 5A Min	—
Ro・Co	Ro=5～200 Ω	Accessory
Surge Suppressor	Co=0.1～0.2μF 200WV (400WV)	**EPCR1201-2**

Note: The direction of rotation should not be reversed when the power supply is first turned on.

Speed Control

Setting Speed Using External Speed Potentiometer

The changes in speed are caused by resistance values. These changes are shown on the graph. In actual use, the circuit error and the error in the voltage produced by rate generator may cause an error in the set speed of ±10%

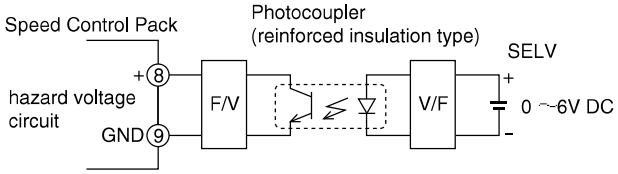


Speed Potentiometer Resistance-Value Speed Characteristics

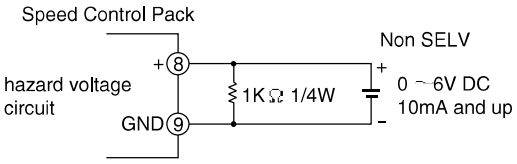
Speed Control by External DC Control Voltage

The following figures show the connection for speed control using an external DC control voltage.
When using this method, make certain that the DC power supply is isolated from the AC input of the motor.

For SELV Circuit



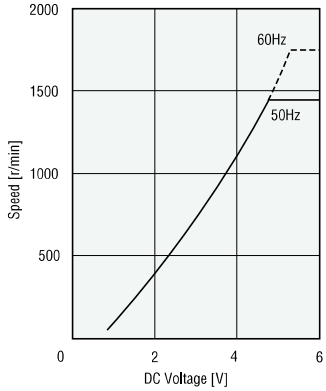
For Non-SELV Circuit



Note:

- Speed setting input terminals (8) and (9) are not insulated from dangerous voltages. You must use a reinforced isolation system between the speed control pack and a SELV circuit ✻.
- Check that the DC power supply comes from an AC power supply through a transformer and is insulated.

✻A SELV (Safety Extra Low Voltage) circuit (Max. DC60V or 42.4V peak) is isolated by reinforced insulation from hazardous voltage.

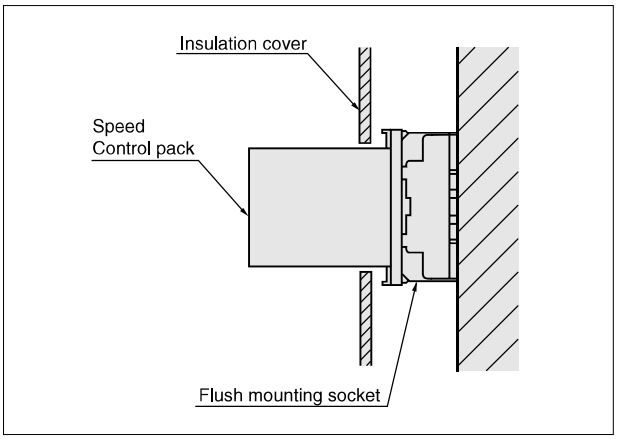


Speed Setting Voltage-Speed Characteristics

Installing the Speed Control Pack

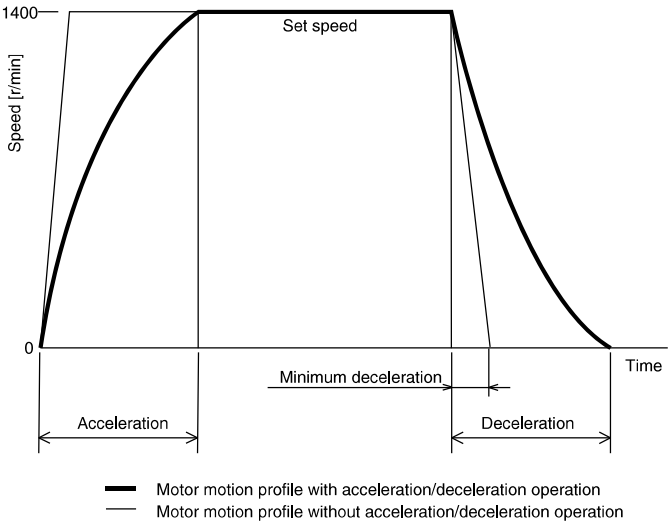
Installing the Speed Control Pack

Use the flush mounting socket to install the control pack. The protection class of the flush mounting socket is IP10.
When adjusting the acceleration/deceleration time with the power on, install an insulation cover to prevent touching the terminal connections as shown in the diagram below.



Acceleration / Deceleration Function

The **SC** Series has a special function allowing slow linear acceleration from start to operating speed and slow linear deceleration from the operating speed down to zero.
This makes it possible to prevent shock to the load and to accelerate/decelerate smoothly.
The desired values for acceleration and deceleration can be set independently using the built-in timing potentiometers on the top of the speed control pack.



Turning the dial in a clockwise direction extends the acceleration/deceleration time. Acceleration and deceleration time can be adjusted within a range of 2 to 10 seconds.
The dials are set to 0 before being shipped from the factory. Set the dial to 0 when not performing acceleration/deceleration operation.

Note: Use an insulated miniature screwdriver for adjusting the timing potentiometers.

List of Motor and Speed Control Pack Combination

Induction Motors Single-Phase 110V/115V

Unit Model	Motor Model	Control Pack Model
SC206-401WU	MSM206-401W	SSP-1
SC206-001WU	MSM206-001W	
SC315-401WU	MSM315-401W	
SC315-001WU	MSM315-001W	
SC425-401WU	MSM425-401W	
SC425-001WU	MSM425-001W	
SC540-401WU	MSM540-401W	
SC540-001WU	MSM540-001W	
SC560-501WU	MSM560-501W	
SC560-001WU	MSM560-001W	

Induction Motors Single-Phase 220V/230V

Unit Model	Motor Model	Control Pack Model
SC206-402WE	MSM206-402W	SSP-2
SC206-002WE	MSM206-002W	
SC315-402WE	MSM315-402W	
SC315-002WE	MSM315-002W	
SC425-402WE	MSM425-402W	
SC425-002WE	MSM425-002W	
SC540-402WE	MSM540-402W	
SC540-002WE	MSM540-002W	
SC560-502WE	MSM560-502W	
SC560-002WE	MSM560-002W	

Reversible Motors Single-Phase 110V/115V

Unit Model	Motor Model	Control Pack Model
SC206-411WU	MSM206-411W	SSP-1
SC206-011WU	MSM206-011W	
SC315-411WU	MSM315-411W	
SC315-011WU	MSM315-011W	
SC425-411WU	MSM425-411W	
SC425-011WU	MSM425-011W	
SC540-411WU	MSM540-411W	
SC540-011WU	MSM540-011W	
SC560-511WU	MSM560-511W	
SC560-011WU	MSM560-011W	

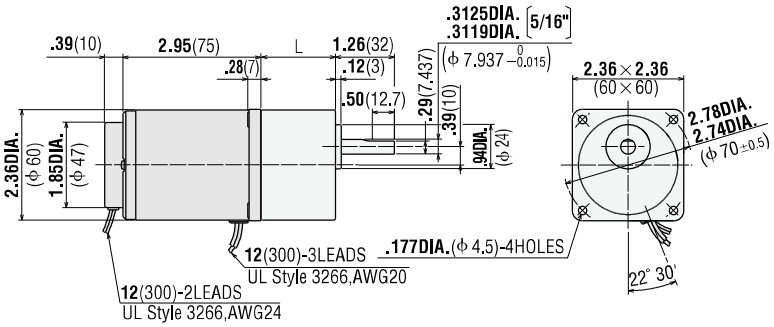
Reversible Motors Single-Phase 220V/230V

Unit Model	Motor Model	Control Pack Model
SC206-412WE	MSM206-412W	SSP-2
SC206-012WE	MSM206-012W	
SC315-412WE	MSM315-412W	
SC315-012WE	MSM315-012W	
SC425-412WE	MSM425-412W	
SC425-012WE	MSM425-012W	
SC540-412WE	MSM540-412W	
SC540-012WE	MSM540-012W	
SC560-512WE	MSM560-512W	
SC560-012WE	MSM560-012W	

Dimensions Scale1/4, Unit= **inch** (mm)

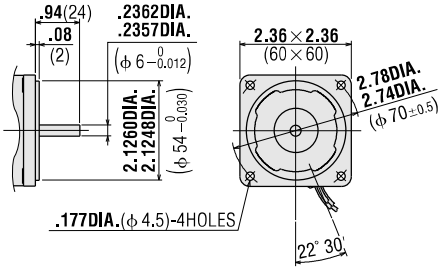
SC206-4□1WU (Pinion shaft)
SC206-4□2WE
Motor
MSM206-4 □1W
MSM206-4 □2W
Weight (Mass) : 1.8 lb. (0.8kg)

Gearhead
2GN□KA (sold separately)
Weight (Mass) : 0.88 lb. (0.4kg)



L=**1.18**(30) **2GN3KA**~**18KA**
L=**1.57**(40) **2GN25KA**~**180KA**

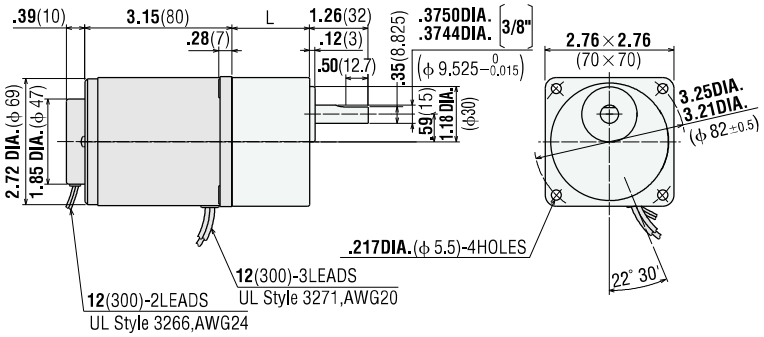
●**Round shaft Type**
SC206-0□1WU
SC206-0□2WE
Weight (Mass) : 1.8 lb. (0.8kg)



SC315-4□1WU (Pinion shaft)
SC315-4□2WE

Motor
MSM315-4 □1W
MSM315-4 □2W
Weight (Mass): 2.6 lb. (1.2kg)

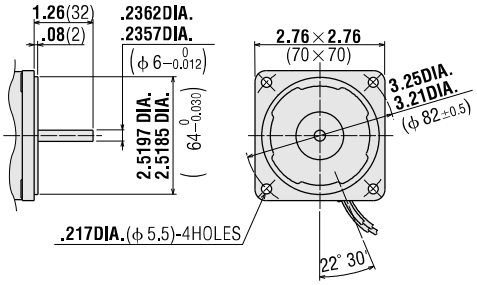
Gearhead
3GN□KA
Weight (Mass): 1.21 lb. (0.55kg)



L=1.26(32) **3GN3KA~18KA**
L=1.65(42) **3GN25KA~180KA**

●**Round shaft Type**

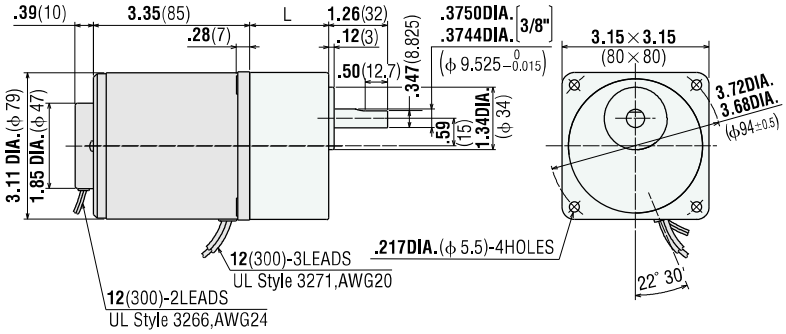
SC315-0□1WU
SC315-0□2WE
Weight (Mass): 2.6 lb. (1.2kg)



SC425-4□1WU (Pinion shaft)
SC425-4□2WE

Motor
MSM425-4 □1W
MSM425-4 □2W
Weight (Mass): 3.5 lb. (1.6kg)

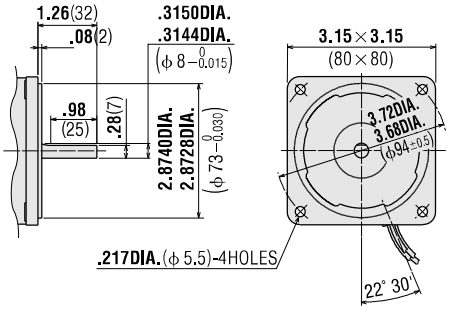
Gearhead
4GN□KA
Weight (Mass): 1.43 lb. (0.65kg)



L=1.26(32) **4GN3KA~18KA**
L=1.67(42.5) **4GN25KA~180KA**

●**Round shaft Type**

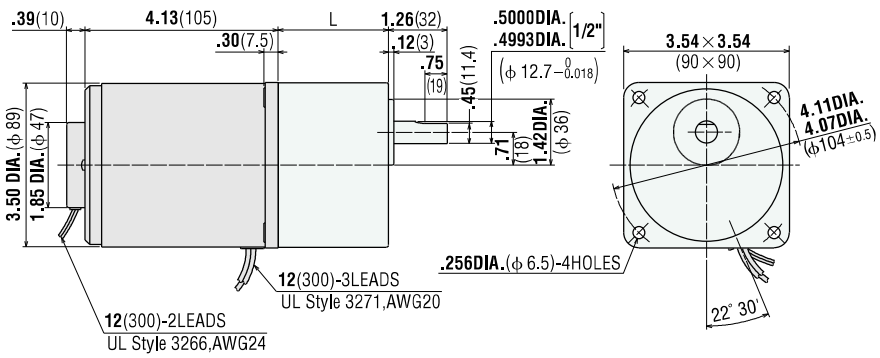
SC425-0□1WU
SC425-0□2WE
Weight (Mass): 3.5 lb. (1.6kg)



SC540-4□1WU (Pinion shaft)
SC540-4□2WE

Motor
MSM540-4 □1W
MSM540-4 □2W
Weight (Mass): 5.7 lb. (2.6kg)

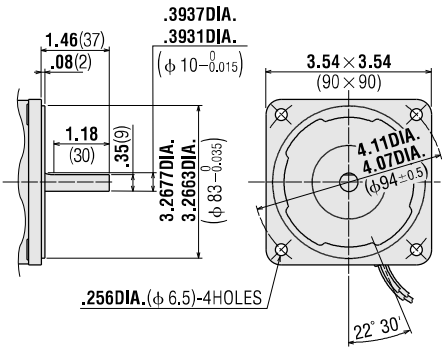
Gearhead
5GN□KA
Weight (Mass): 3.3 lb. (1.5kg)



L=1.65(42) **5GN3KA~18KA**
L=2.36(60) **5GN25KA~180KA**

●**Round Shaft Type**

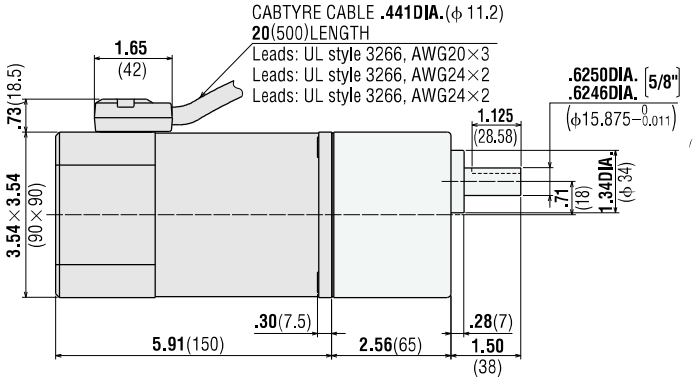
SC540-0□1WU
SC540-0□2WE
Weight (Mass): 5.7 lb. (2.6kg)

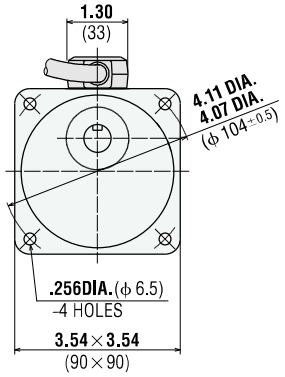


SC560-5□1WU (Pinion shaft)
SC560-5□2WE

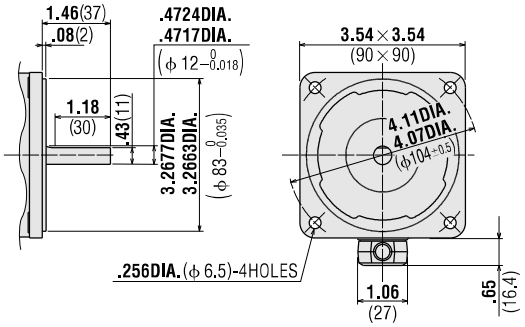
Motor
MSM560-5□1W
MSM560-5□2W
Weight (Mass): 7.1 lb. (3.2kg)

Gearhead
5GU□KA
Weight (Mass): 3.3 lb. (1.5kg)

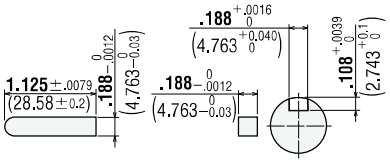




●**Round Shaft Type**
SC560-0□1WU
SC560-0□2WE
Weight (Mass): 7.1 lb. (3.2kg)

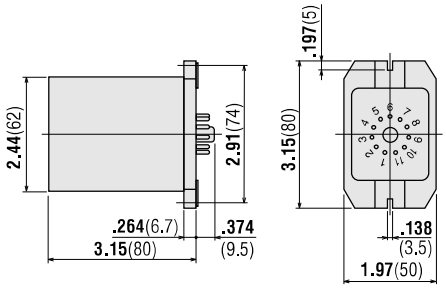


●**Key and Key Slot** (Scale 1/2)
The key is provided **5GU□KA** gearhead.

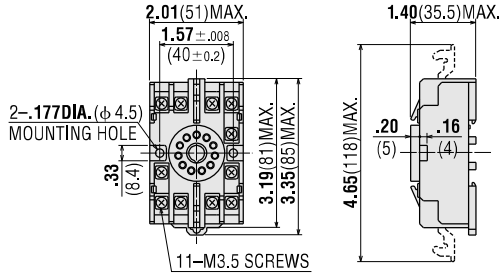


■ Dimensions of Speed Control Pack Scale1/4, Unit = **inch** (mm)

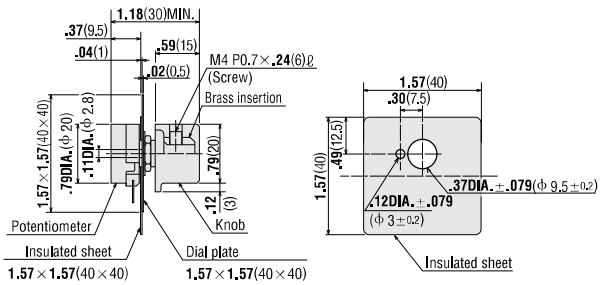
Speed Control Pack SSP-1
SSP-2
Weight (Mass): 0.44 lb. (0.2kg)



●**Flush Mounting Socket** (Provided with speed control pack)

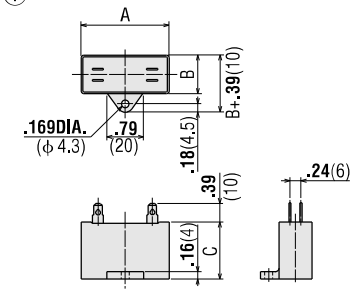


●**Potentiometer** (Provided with speed control pack)

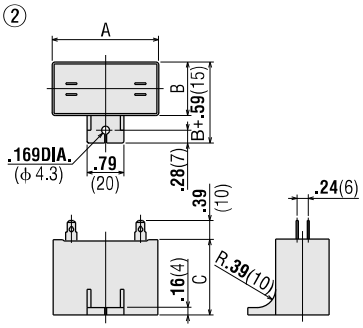


●Capacitor (included with the motor)

①



②



Dimensions

Unit = inch (mm)

Unit Model		Capacitor Model	A		B		C		Weight (Mass) oz	(g)	Dimension No.
SC206-401WU	**SC206-001WU**	CH25FAUL	1.22	(31)	0.67	(17)	1.06	(27)	0.71	(20)	①
SC206-411WU	**SC206-011WU**	CH35FAUL	1.22	(31)	0.67	(17)	1.06	(27)	0.88	(25)	
SC315-401WU	**SC315-001WU**	CH45FAUL	1.46	(37)	0.71	(18)	1.06	(27)	1.06	(30)	
SC315-411WU	**SC315-011WU**	CH60CFAUL	1.50	(38)	0.83	(21)	1.22	(31)	1.41	(40)	
SC425-401WU	**SC425-001WU**	CH65CFAUL	1.50	(38)	0.83	(21)	1.22	(31)	1.23	(35)	
SC425-411WU	**SC425-011WU**	CH80CFAUL	1.89	(48)	0.75	(19)	1.14	(29)	1.41	(40)	
SC540-401WU	**SC540-001WU**	CH90CFAUL	1.89	(48)	0.83	(21)	1.22	(31)	1.41	(40)	
SC540-411WU	**SC540-011WU**	CH120CFAUL	2.28	(58)	0.83	(21)	1.22	(31)	1.76	(50)	
SC560-501WU	**SC560-001WU**	CH180CFAUL	2.28	(58)	0.93	(23.5)	1.46	(37)	2.47	(70)	②
SC560-511WU	**SC560-011WU**	CH200CFAUL	2.28	(58)	1.14	(29)	1.61	(41)	3.35	(95)	
SC206-402WE	**SC206-002WE**	CH06BFAUL	1.22	(31)	0.57	(14.5)	0.93	(23.5)	0.53	(15)	①
SC206-412WE	**SC206-012WE**	CH08BFAUL	1.22	(31)	0.67	(17)	1.06	(27)	0.88	(25)	
SC315-402WE	**SC315-002WE**	CH10BFAUL	1.46	(37)	0.71	(18)	1.06	(27)	1.06	(30)	
SC315-412WE	**SC315-012WE**	CH15BFAUL	1.50	(38)	0.83	(21)	1.22	(31)	1.23	(35)	
SC425-402WE	**SC425-002WE**	CH15BFAUL	1.50	(38)	0.83	(21)	1.22	(31)	1.23	(35)	
SC425-412WE	**SC425-012WE**	CH20BFAUL	1.89	(48)	0.75	(19)	1.14	(29)	1.23	(35)	
SC540-402WE	**SC540-002WE**	CH23BFAUL	1.89	(48)	0.83	(21)	1.22	(31)	1.41	(40)	
SC540-412WE	**SC540-012WE**	CH35BFAUL	2.28	(58)	0.87	(22)	1.38	(35)	1.94	(55)	
SC560-502WE	**SC560-002WE**	CH40BFAUL	2.28	(58)	0.93	(23.5)	1.46	(37)	2.47	(70)	②
SC560-512WE	**SC560-012WE**	CH50BFAUL	2.28	(58)	1.14	(29)	1.61	(41)	3.00	(85)	

Capacitor cap is provided with the capacitor.

■ Right-Angle Gearheads (sold separately)

The right-angle gearhead provides an output shaft at a right angle to the motor's output shaft.

See page [A-216] for more information.

■ Accessories (sold separately)

● Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can used to install motors without gearheads.

See page [A-266] for more information.

● Flexible Couplings

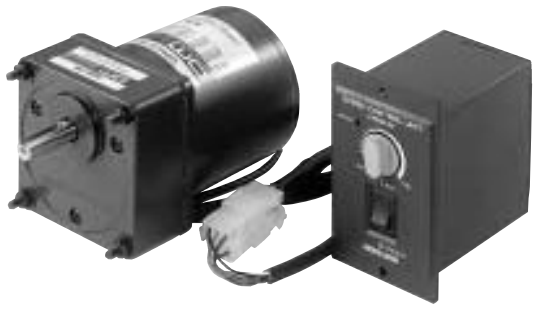
Optional flexible couplings are available.

See page [A-260] for more information.

Speed Control Motors

US Series

The US series combines a speed control motor and a control unit. The capacitor and the potentiometer have been integrated into one compact control unit. The series is designed for applications where remote control of the motor speed and easy hook-up are required.



Gearhead shown in the photograph is sold separately.

EASY WIRING GEAR SAFETY STD.

Features

- Control units combine the control pack, potentiometer and the capacitor in one device. Capacitors for **US560** and **US590** types are externally fitted with leads and capacitor caps. Connection between motor and control unit is simplified by a special connector.
- Use of the optional extension cable allows for remote control of the motor from a distance of up to 15.6 feet.(4.75m).
- Variable speed range is 90r/min ~ 1400r/min (50Hz), 90r/min~ 1600r/min (60Hz).

Safety Standards and CE Marking

Motor

Standards	Certification Body	Standards File No.	CE Marking
UL1004 UL519 (US206 type) UL547 (US315, US425, US540, US560, US590 type)	UL	E64199 (US206 type) E64197 (US315, US425, US540, US560, US590 type)	Low Voltage Directive
CAN/CSA-C22.2 No.100 CAN/CSA-C22.2 No.77			
EN60950	VDE	114919ÜG (US206 type) 6751ÜG (US315, US425, US540, US560, US590 type)	
EN60034-1 EN60034-5 IEC60034-11	Conform to EN/IEC Standards (EN/IEC certifications are scheduled.)		

Control Unit

Standards	Certification Body	Standards File No.	CE Marking
UL508 CAN/CSA-C22.2 No.14	UL	E91291	Low Voltage Directive
EN60950	Conform to EN/VDE Standards (EN/IEC certifications are scheduled.)		

For installations for EN/IEC standards, see page D-2.

Product Number Code

US 5 60 -5 0 1 U

- **US** series
- **Motor Frame Size**
  - **2**: 2.36 inch sq.(60mm sq.)
  - **3**: 2.76 inch sq.(70mm sq.)
  - **4**: 3.15 inch sq.(80mm sq.)
  - **5**: 3.54 inch sq.(90mm sq.)
- **Output Power**
  - **06**: 6W
  - **15**: 15W
  - **25**: 25W
  - **40**: 40W
  - **60**: 60W
  - **90**: 90W
- **Shaft type**
  - **0**: Round shaft
  - **4**: **GN** pinion shaft (for use with **GN** type gearhead)
  - **5**: **GU** pinion shaft (for use with **GU** type gearhead)
- **Motor type**
  - **0**: Induction motor (Continuous rating)
- **Voltage**
  - **1**: Single-Phase 110V/115V, 4 Poles
  - **2**: Single-Phase 220V/230V, 4 Poles
- **Provided Capacitor**
  - **U**: 110V/115V
  - **E**: 220V/230V

Note : The "**U**" and "**E**" at the end of the model number indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate.

Product Line

Single-Phase 110V/115V

Output Power HP	Output Power W	Model Pinion shaft	Model Round shaft
1/124	6	**US206-401U**	**US206-001U**
1/50	15	**US315-401U**	**US315-001U**
1/30	25	**US425-401U**	**US425-001U**
1/18.5	40	**US540-401U**	**US540-001U**
1/12.5	60	**US560-501U**	**US560-001U**
1/8	90	**US590-501U**	**US590-001U**

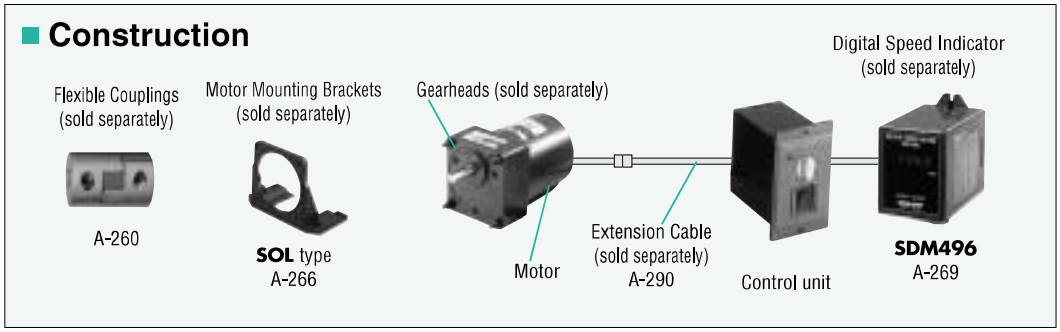
Single-Phase 220V/230V

Output Power HP	Output Power W	Model Pinion shaft	Model Round shaft
1/124	6	**US206-402E**	**US206-002E**
1/50	15	**US315-402E**	**US315-002E**
1/30	25	**US425-402E**	**US425-002E**
1/18.5	40	**US540-402E**	**US540-002E**
1/12.5	60	**US560-502E**	**US560-002E**
1/8	90	**US590-502E**	**US590-002E**

Gearheads

Motor Model	Gearhead Model
US206	**2GN3KA** ~ **2GN180KA** **2GN10XK** (Decimal Gearhead)
US315	**3GN3KA** ~ **3GN180KA** **3GN10XK** (Decimal Gearhead)
US425	**4GN3KA** ~ **4GN180KA** **4GN10XK** (Decimal Gearhead)
US540	**5GN3KA** ~ **5GN180KA** **5GN10XK** (Decimal Gearhead)
US560, **US590**	**5GU3KA** ~ **5GU180KA** **5GU10XKB** (Decimal Gearhead)

Construction



List of Motor/Control Unit Packages

Model numbers for motor/control unit packages are shown below.

Single-Phase 110V/115V

Output Power HP	Output Power W	Packages Model	Motor Model	Control Unit Model
1/124	6	**US206-401U** **US206-001U**	USM206-401W USM206-001W	USP206-1U
1/50	15	**US315-401U** **US315-001U**	USM315-401W USM315-001W	USP315-1U
1/30	25	**US425-401U** **US425-001U**	USM425-401W USM425-001W	USP425-1U
1/18.5	40	**US540-401U** **US540-001U**	USM540-401W USM540-001W	USP540-1U
1/12.5	60	**US560-501U** **US560-001U**	USM560-501W USM560-001W	USP560-1U
1/8	90	**US590-501U** **US590-001U**	USM590-501W USM590-001W	USP590-1U

Single-Phase 220V/230V

Output Power HP	Output Power W	Packages Model	Motor Model	Control Unit Model
1/124	6	**US206-402E** **US206-002E**	USM206-402W USM206-002W	USP206-2E
1/50	15	**US315-402E** **US315-002E**	USM315-402W USM315-002W	USP315-2E
1/30	25	**US425-402E** **US425-002E**	USM425-402W USM425-002W	USP425-2E
1/18.5	40	**US540-402E** **US540-002E**	USM540-402W USM540-002W	USP540-2E
1/12.5	60	**US560-502E** **US560-002E**	USM560-502W USM560-002W	USP560-2E
1/8	90	**US590-502E** **US590-002E**	USM590-502W USM590-002W	USP590-2E

Product Specifications

Specifications (Motor) — Continuous Rating

Model		Maximum Output Power		Voltage	Frequency	Speed Range	Permissible Torque				Starting Torque		Current	Power Consumption
							oz-in		mN•m					
Pinion shaft	Round shaft	HP	W	V	Hz	r/min	1200r/min		90r/min		oz-in	mN•m	A	W
ZP **US206-401U**	**US206-001U**	1/124	6	110	60	90~1600	6.9	50	4.2	30	4.9	35	0.24	24
				115	60	90~1600	6.9	50	4.2	30	4.9	35	0.25	28
ZP **US206-402E**	**US206-002E**	1/124	6	220	60	90~1600	6.9	50	4.0	29	3.7	27	0.13	27
				230	50	90~1400	6.9	50	4.0	29	4.0	29	0.13	28
				230	60	90~1600	6.9	50	4.0	29	4.0	29	0.13	28
TP **US315-401U**	**US315-001U**	1/50	15	110	60	90~1600	17.4	125	6.2	45	7.6	55	0.47	44
				115	60	90~1600	17.4	125	6.2	45	7.6	55	0.50	44
TP **US315-402E**	**US315-002E**	1/50	15	220	60	90~1600	11.8	85	4.9	35	7.2	52	0.18	39
				230	50	90~1400	17.4	125	4.9	35	7.5	54	0.21	43
				230	60	90~1600	14.6	105	4.9	35	7.6	55	0.22	47
TP **US425-401U**	**US425-001U**	1/30	25	110	60	90~1600	27.8	200	6.9	50	14.6	105	0.74	70
				115	60	90~1600	27.8	200	6.9	50	14.6	105	0.74	73
TP **US425-402E**	**US425-002E**	1/30	25	220	60	90~1600	18.1	130	6.0	43	11.1	80	0.31	59
				230	50	90~1400	26.4	190	6.5	47	12.1	87	0.35	62
				230	60	90~1600	18.1	130	6.0	43	12.1	87	0.31	60
TP **US540-401U**	**US540-001U**	1/18.5	40	110	60	90~1600	36.1	260	9.7	70	25.0	180	1.1	102
				115	60	90~1600	36.1	260	9.7	70	25.0	180	1.1	105
TP **US540-402E**	**US540-002E**	1/18.5	40	220	60	90~1600	31.9	230	8.7	63	17.4	125	0.55	98
				230	50	90~1400	41.7	300	8.7	63	19.4	140	0.53	90
				230	60	90~1600	31.9	230	8.7	63	19.4	140	0.55	100
TP **US560-501U**	**US560-001U**	1/12.5	60	110	60	90~1600	68.0	490	27.8	200	39.6	285	2.0	178
				115	60	90~1600	68.0	490	27.8	200	39.6	285	2.1	186
TP **US560-502E**	**US560-002E**	1/12.5	60	220	60	90~1600	62.5	450	22.2	160	29.2	210	0.86	159
				230	50	90~1400	68.0	490	19.4	140	33.3	240	0.89	154
				230	60	90~1600	62.5	450	22.2	160	33.3	240	0.88	165
TP **US590-501U**	**US590-001U**	1/8	90	110	60	90~1600	101.4	730	27.8	200	56.2	405	2.6	230
				115	60	90~1600	101.4	730	27.8	200	56.2	405	2.6	246
TP **US590-502E**	**US590-002E**	1/8	90	220	60	90~1600	101.4	730	36.1	260	50.0	360	1.2	221
				230	50	90~1400	101.4	730	31.9	230	55.5	400	1.2	201
				230	60	90~1600	101.4	730	36.1	260	55.5	400	1.2	227

- The **US206** type is impedance protected. The other types contain a built-in thermal protector. When a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn off the power before inspecting.
- The speed ranges shown are under no load condition.
- The "**U**" and "**E**" at the end of the model number indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate.

General Specifications

Item	Specifications
Insulation Resistance	100MΩ or more when 500V DC is applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Dielectric Strength	Sufficient to withstand 1.5kV at 50Hz and 60Hz applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Temperature Rise	144°F (80°C) or less measured by the resistance change method after rated operation of motor with connecting a gearhead or equivalent heat radiation plate.
Overheating Protection Device	**US206** type is impedance protected. All others have built-in thermal protector (Automatic return type) Operating temperature, open: 266°F±9°F (130°C±5°C) Close: 179.6°F±27°F (82°C±15°C)
Insulation Class	Class B (266°F [130°C])
Ambient Temperature Range	14°F~104°F (−10°C~+40°C)
Ambient Humidity	85% maximum (non condensing)
Degree of protection	**US206**, **US315**, **US425**, **US540** type: IP20 **US560**, **US590** type: IP40

See page A-36 for equivalent heat radiation plate sizes.

Control Unit General Specifications

Item	Specifications
Insulation Resistance	100MΩ or more when 500V DC is applied between the windings and the frame.
Dielectric Strength	Sufficient to withstand 2.3kV (Single phase 220, 230V: 3.0kV) at 60Hz applied between all the pins and the frame for 1 minute.
Ambient Temperature Range	32°F~104°F (0°C~40°C)
Ambient Humidity	85% maximum (noncondensing)
Degree of protection	IP10

Speed Range when Gearhead is Attached

Unit = r/min

Gear Ratio		3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
High Speed	50Hz	466	388	280	233	186	155	112	93	77	56	46	38	28	23	18	15	14	11	9	7
	60Hz	533	444	320	266	213	177	128	106	88	64	53	44	32	26	21	17	16	13	10	8.8
Low Speed		30	25	18	15	12	10	7.2	6	5	3.6	3	2.5	1.8	1.5	1.2	1	0.9	0.75	0.6	0.5

Permissible Torque when Gearhead is Attached

The permissible torque with decimal gearheads are as follows.

2GN□KA/2GN10XK 26 lb-in / 3N·m **3GN□KA/3GN10XK** 43 lb-in / 5N·m
4GN□KA/4GN10XK 69 lb-in / 8N·m (Gear Ratio 25~36 52 lb-in / 6N·m)
5GN□KA/5GN10XK 87 lb-in / 10N·m **5GU□KA/5GU10XKB** 174 lb-in / 20N·m

Right-Angle gearheads may be connected to **US425**, **US540**, **US560** and **US590** types. See page [A-216] for more information.

Single-Phase 115V

Unit = Upper values: lb-in/Lower values: N·m

Model	Gear Ratio	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
US206-401U / 2GN□KA	1200r/min	1	1.3	1.7	2.1	2.6	3.1	4.4	5.2	6.3	7.9	9.4	11	14	17	21	26	26	26	26	26
		0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3
	90r/min	0.64	0.77	1.1	1.3	1.6	1.9	2.7	3.2	3.8	4.8	5.7	6.9	8.7	10	13	16	17	21	26	26
		0.073	0.087	0.12	0.15	0.18	0.22	0.3	0.36	0.44	0.55	0.66	0.79	0.99	1.2	1.5	1.8	2	2.4	3	3
US315-401U / 3GN□KA	1200r/min	2.6	3.2	4.4	5.3	6.6	7.9	11	13	16	20	24	29	36	43	43	43	43	43	43	43
		0.3	0.36	0.51	0.61	0.76	0.91	1.3	1.5	1.8	2.3	2.7	3.3	4.1	5	5	5	5	5	5	5
	90r/min	0.94	1.1	1.6	1.9	2.4	2.8	3.9	4.7	5.6	7.1	8.5	10	13	15	19	23	26	31	38	43
		0.11	0.13	0.18	0.22	0.27	0.33	0.46	0.55	0.66	0.82	0.99	1.2	1.5	1.8	2.2	2.7	3	3.6	4.5	5
US425-401U / 4GN□KA	1200r/min	4.2	5.1	7	8.4	11	13	18	21	25	32	38	46	57	69	69	69	69	69	69	69
		0.49	0.58	0.81	0.97	1.2	1.5	2	2.4	2.9	3.7	4.4	5.3	6.6	7.9	8	8	8	8	8	8
	90r/min	1	1.3	1.7	2.1	2.6	3.1	4.4	5.2	6.3	7.9	9.4	11	14	17	21	26	28	34	43	51
		0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3.3	4	5	5.9
US540-401U / 5GN□KA	1200r/min	5.5	6.6	9.1	11	14	16	23	27	33	41	49	59	74	87	87	87	87	87	87	87
		0.63	0.76	1.1	1.3	1.6	1.9	2.6	3.2	3.8	4.7	5.7	6.8	8.6	10	10	10	10	10	10	10
	90r/min	1.5	1.8	2.5	2.9	3.7	4.4	6.1	7.4	8.8	11	13	16	20	24	30	36	40	48	60	72
		0.17	0.2	0.28	0.34	0.43	0.51	0.71	0.85	1	1.3	1.5	1.8	2.3	2.8	3.5	4.2	4.6	5.5	6.9	8.3
US560-501U / 5GU□KA	1200r/min	10	12	17	21	26	31	39	47	56	70	84	101	140	168	174	174	174	174	174	174
		1.2	1.4	2	2.4	3	3.6	4.5	5.4	6.4	8.1	9.7	12	16	19	20	20	20	20	20	20
	90r/min	4.2	5.1	7	8.4	11	13	16	19	23	29	34	41	57	69	77	92	103	123	154	174
		0.49	0.58	0.81	0.97	1.2	1.5	1.8	2.2	2.6	3.3	4	4.8	6.6	7.9	8.9	11	12	14	18	20
US590-501U / 5GU□KA	1200r/min	15	18	26	31	39	46	58	69	83	105	125	151	174	174	174	174	174	174	174	174
		1.8	2.1	3	3.5	4.4	5.3	6.7	8	9.6	12	14	17	20	20	20	20	20	20	20	20
	90r/min	4.2	5.1	7	8.4	11	13	16	19	23	29	34	41	57	69	77	92	103	123	154	174
		0.49	0.58	0.81	0.97	1.2	1.5	1.8	2.2	2.6	3.3	4	4.8	6.6	7.9	8.9	11	12	14	18	20

- Gearheads and decimal gearheads are sold separately.
- Enter the gear ratio in the box □ within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- Values for permissible torque are calculated by taking permissible torque at high speed (1200r/min) and low speed (90r/min) and multiplying by gear ratio and gearhead efficiency.

● Single-Phase 220V/230V

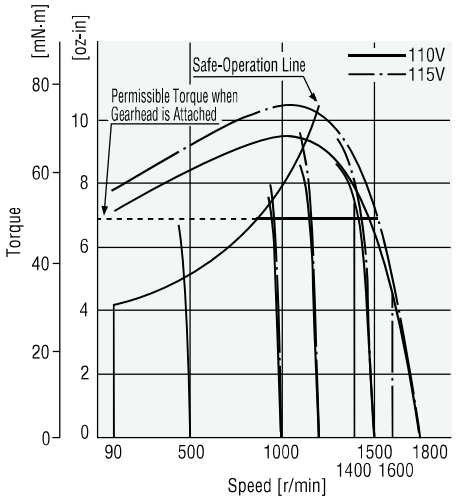
Unit = Upper values: lb-in/Lower values: N·m

Model	Gear Ratio		3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
US206-402E / 2GN□KA	1200r/min		1	1.3	1.7	2.1	2.6	3.1	4.4	5.2	6.3	7.9	9.4	11	14	17	21	26	26	26	26	26
			0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3
	90r/min		0.61	0.73	1	1.2	1.5	1.8	2.5	3	3.6	4.6	5.5	6.6	8.3	9.9	12	15	17	20	25	26
			0.07	0.085	0.12	0.14	0.18	0.21	0.29	0.35	0.42	0.53	0.64	0.76	0.96	1.1	1.4	1.7	1.9	2.3	2.9	3
US315-402E / 3GN□KA	1200r/min	230V	2.6	3.2	4.4	5.3	6.6	7.9	11	13	16	20	24	29	36	43	43	43	43	43	43	43
		50Hz	0.3	0.36	0.51	0.61	0.76	0.91	1.3	1.5	1.8	2.3	2.7	3.3	4.1	5	5	5	5	5	5	5
		230V	2.2	2.7	3.7	4.4	5.5	6.7	9.2	11	13	17	20	24	30	36	43	43	43	43	43	43
		60Hz	0.26	0.31	0.43	0.51	0.64	0.77	1.1	1.3	1.5	1.9	2.3	2.8	3.5	4.2	5	5	5	5	5	5
	90r/min		0.74	0.89	1.2	1.5	1.9	2.2	3.1	3.7	4.5	5.6	6.7	8	10	12	15	18	20	24	30	36
			0.085	0.1	0.14	0.17	0.21	0.26	0.35	0.43	0.51	0.64	0.77	0.92	1.2	1.4	1.7	2.1	2.3	2.8	3.5	4.2
US425-402E / 4GN□KA	1200r/min	230V	2.7	3.3	4.6	5.5	6.9	8.2	11	14	16	21	25	30	37	45	56	67	69	69	69	69
		60Hz	0.32	0.38	0.53	0.63	0.79	0.95	1.3	1.6	1.9	2.4	2.8	3.4	4.3	5.1	6.4	7.7	8	8	8	8
		230V	4	4.8	6.7	8	10	12	17	20	24	30	36	43	54	65	69	69	69	69	69	69
		50Hz	0.46	0.55	0.77	0.92	1.2	1.4	1.9	2.3	2.8	3.5	4.2	5	6.3	7.5	8	8	8	8	8	8
	90r/min	230V	0.91	1.1	1.5	1.8	2.3	2.7	3.8	4.6	5.5	6.8	8.2	9.9	12	15	19	22	25	30	37	45
		60Hz	0.1	0.13	0.17	0.21	0.26	0.31	0.44	0.52	0.63	0.78	0.94	1.1	1.4	1.7	2.1	2.6	2.8	3.4	4.3	5.1
		230V	0.99	1.2	1.6	2	2.5	3	4.1	4.9	5.9	7.4	8.9	11	13	16	20	24	27	32	40	48
		50Hz	0.11	0.14	0.19	0.23	0.29	0.34	0.48	0.57	0.69	0.86	1	1.2	1.6	1.9	2.3	2.8	3.1	3.7	4.7	5.6
US540-402E /5GN□KA	1200r/min	230V	4.8	5.8	8.1	9.7	12	15	20	24	29	36	44	52	66	79	87	87	87	87	87	87
		60Hz	0.56	0.67	0.93	1.1	1.4	1.7	2.3	2.8	3.4	4.2	5	6	7.6	9.1	10	10	10	10	10	10
		230V	6.3	7.6	11	13	16	19	26	32	38	48	57	68	86	87	87	87	87	87	87	87
		50Hz	0.73	0.87	1.2	1.5	1.8	2.2	3	3.6	4.4	5.5	6.6	7.9	9.9	10	10	10	10	10	10	10
	90r/min		1.3	1.6	2.2	2.6	3.3	4	5.5	6.6	7.9	9.9	12	14	18	22	27	32	36	43	54	65
			0.15	0.18	0.26	0.31	0.38	0.46	0.64	0.77	0.92	1.1	1.4	1.7	2.1	2.5	3.1	3.7	4.2	5	6.2	7.5
US560-502E / 5GU□KA	1200r/min	230V	9.5	11	16	19	24	28	36	43	51	64	77	93	129	155	173	174	174	174	174	174
		60Hz	1.1	1.3	1.8	2.2	2.7	3.3	4.1	4.9	5.9	7.4	8.9	11	15	18	20	20	20	20	20	20
		230V	10	12	17	21	26	31	39	47	56	70	84	101	140	168	174	174	174	174	174	174
		50Hz	1.2	1.4	2	2.4	3	3.6	4.5	5.4	6.4	8.1	9.7	12	16	19	20	20	20	20	20	20
	90r/min	230V	3.4	4	5.6	6.7	8.4	10	13	15	18	23	27	33	46	55	61	74	82	98	123	147
		60Hz	0.39	0.47	0.65	0.78	0.97	1.2	1.5	1.8	2.1	2.6	3.2	3.8	5.3	6.3	7.1	8.5	9.4	11	14	17
		230V	2.9	3.5	4.9	5.9	7.4	8.8	11	13	16	20	24	29	40	48	54	64	72	86	107	129
		50Hz	0.34	0.41	0.57	0.68	0.85	1	1.3	1.5	1.8	2.3	2.8	3.3	4.6	5.5	6.2	7.4	8.3	9.9	12	15
US590-502E / 5GU□KA	1200r/min		15	18	26	31	39	46	58	69	83	105	125	151	174	174	174	174	174	174	174	174
			1.8	2.1	3	3.5	4.4	5.3	6.7	8	9.6	12	14	17	20	20	20	20	20	20	20	20
	90r/min	230V	5.5	6.6	9.1	11	14	16	21	25	30	37	45	54	74	89	100	120	133	160	174	174
		60Hz	0.63	0.76	1.1	1.3	1.6	1.9	2.4	2.8	3.4	4.3	5.1	6.2	8.6	10	12	14	15	18	20	20
		230V	4.8	5.8	8.1	9.7	12	15	18	22	26	33	39	47	66	79	88	106	118	141	174	174
		50Hz	0.56	0.67	0.93	1.1	1.4	1.7	2.1	2.5	3	3.8	4.6	5.5	7.6	9.1	10	12	14	16	20	20

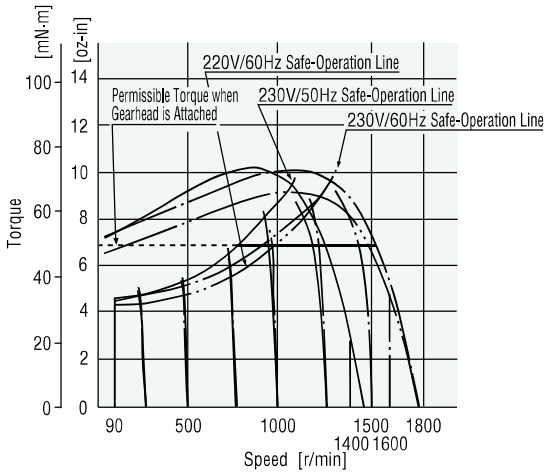
- Gearheads and decimal gearheads are sold separately.
- Enter the gear ratio in the box □ within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
- Values for permissible torque are calculated by taking permissible torque at high speed (1200r/min) and low speed (90r/min) and multiplying by gear ratio and gearhead efficiency.

Torque-Speed Characteristics

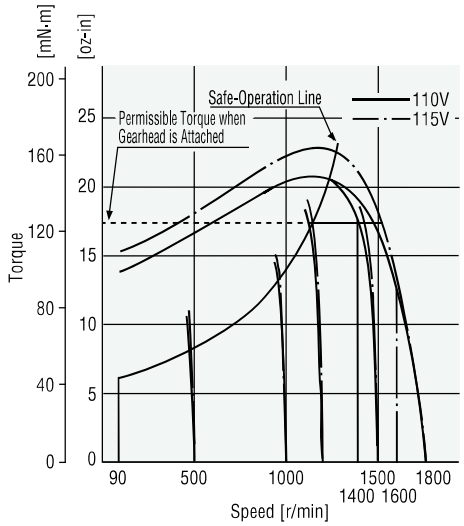
US206-401U
US206-001U



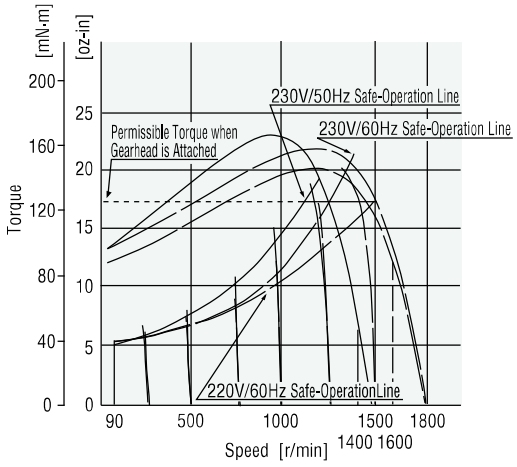
US206-402E
US206-002E



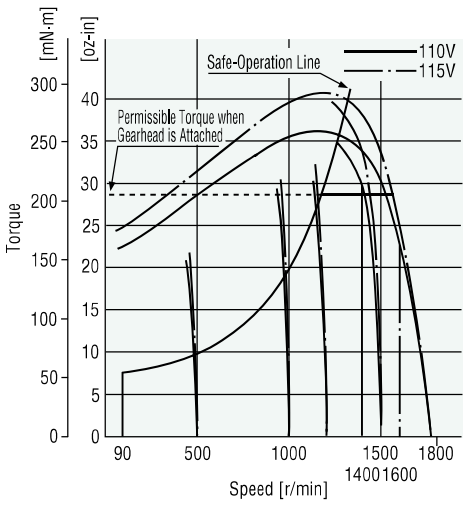
US315-401U
US315-001U



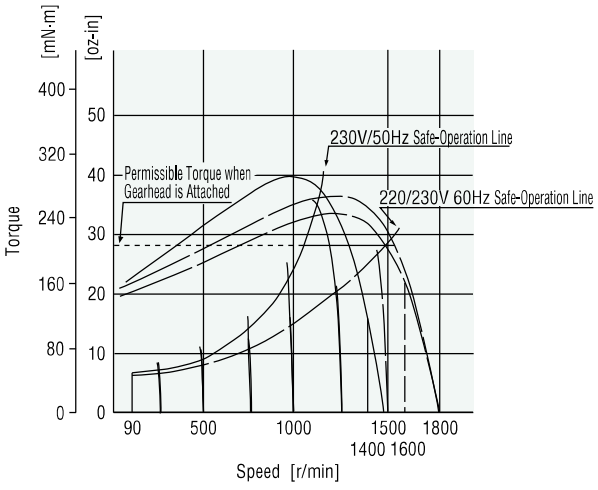
US315-402E
US315-002E



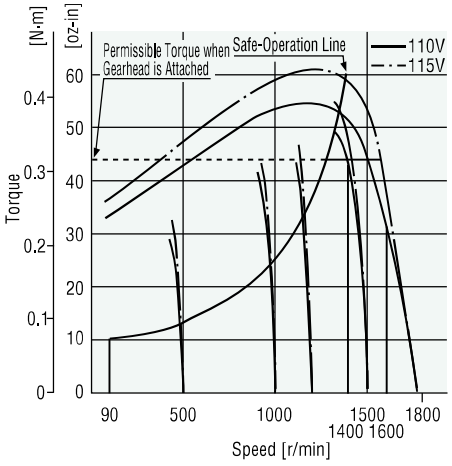
US425-401U
US425-001U



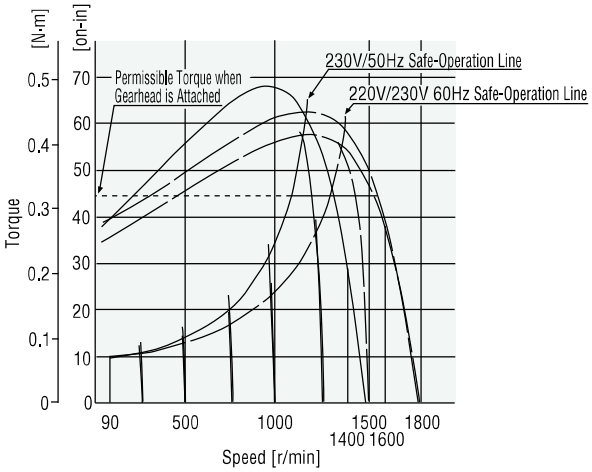
US425-402E
US425-002E



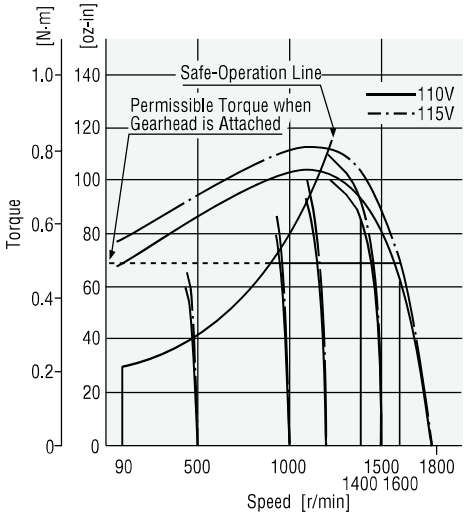
US540-401U
US540-001U



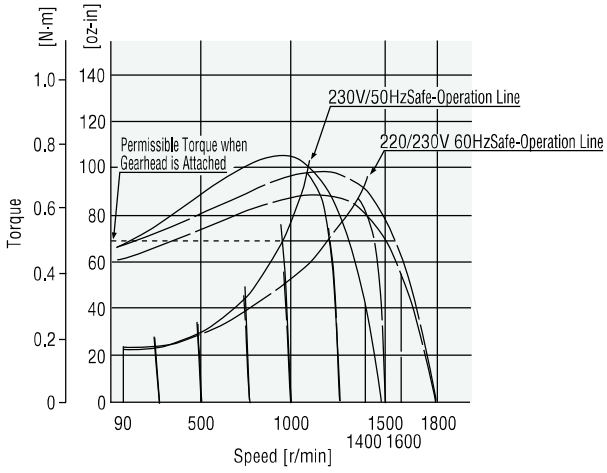
US540-402E
US540-002E



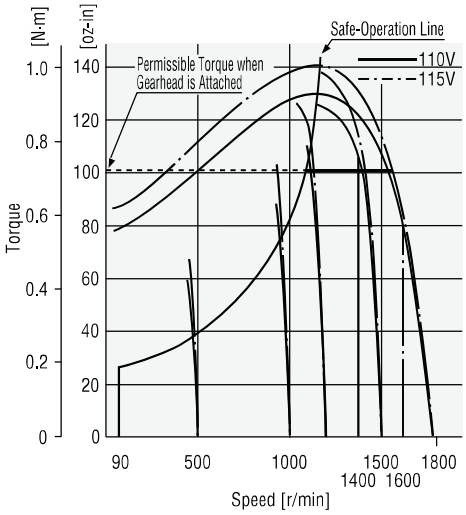
US560-501U
US560-001U



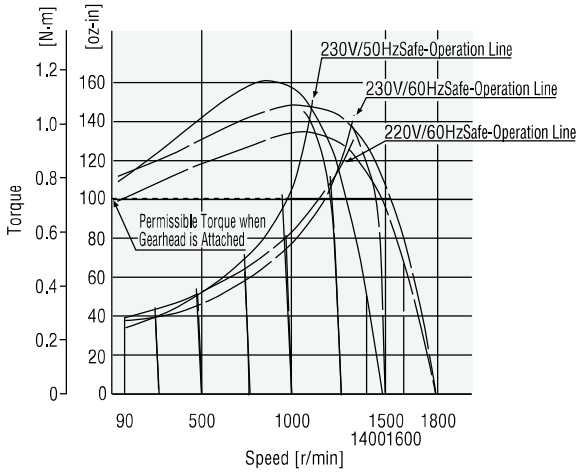
US560-502E
US560-002E



US590-501U
US590-001U



US590-502E
US590-002E



Operation of Speed Control Motor US series

■ Operation

●Rotation

US206, US315, US425 and US540 types

Connect the motor lead wire connectors to the control unit. Then connect the power cord to the power supply. When the RUN/STAND-BY switch of the control unit is flipped to RUN, the motor rotates in the clockwise (CW) direction as seen from the motor shaft.
(Control units are set for clockwise rotation at shipment. The direction of rotation for the gearhead output shaft may be the reverse of the direction of the motor shaft depending on the gear ratio.)

●US560 and US590 types

Connect the control unit and the motor, and attach the capacitor wire leading from the control unit to the capacitor. Next, plug in the power supply cord into an AC power supply. When the RUN/STAND-BY switch located on the control unit is flipped to RUN, the motor will rotate in the direction set by the connection of the capacitor.
(Control units are set for clockwise rotation at shipment. The direction of rotation for the gearhead output shaft may be the reverse of the direction of the motor shaft depending on the gear ratio.)

●Changing Speed

When the potentiometer located on the front surface of the control unit is turned in the clockwise direction, motor speed increases; when turned in the opposite direction, motor speed decreases.
Motor speed can be set and adjusted over a range of 90r/min-1600r/min.

●Stopping

When the RUN/STAND-BY switch on the control unit is set to STAND-BY, the motor stops. This switch is not a power ON/OFF switch. When the motor is to be stopped for a long time, a separate power ON/OFF switch should be installed.

●Changing the Direction of Rotation

US206, US315, US425 and US540 types

(Capacitor is attached to the control unit.)

Uni-directional Rotation

When the direction of motor rotation needs to be reversed for reasons relating to transmission mechanisms such as gearheads, change the terminal used for attaching the power cord, located at the back of control unit, from terminal N (CW) to terminal N (CCW). The power cord connections are located at terminals L and N (CW) when shipping. See the diagram to the right.
(This should always be done with the power OFF.)

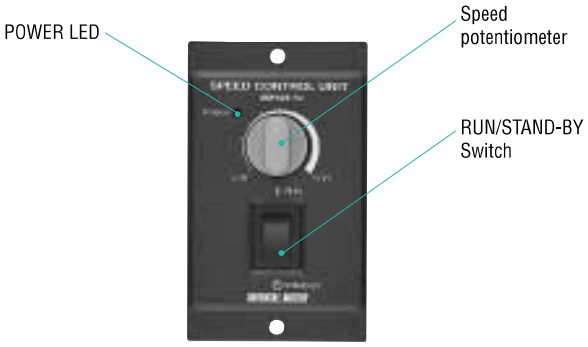
Bi-directional Rotation

Install an additional power switch (SW1) and CW/CCW switch (SW2) as shown in the diagram to the right, and use these switches to change the direction of rotation. (Motor cannot be reversed instantaneously. Turn SW1 off and wait until the motor has come to a complete stop before switching SW2.) See the diagram to the right.

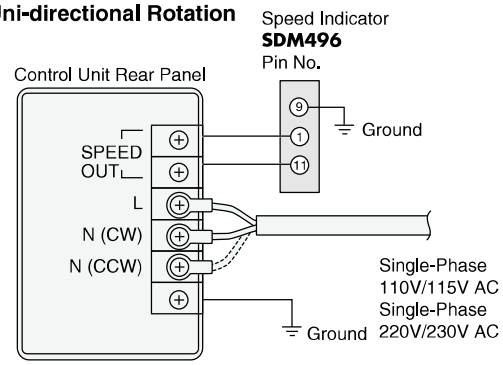
Connecting the Speed Indicator

Connect terminals ① and ⑪ of the **SDM496**, (a digital speed indicator), to the SPEED OUT terminals of control unit.

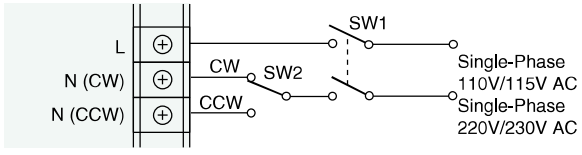
Control Unit Front Panel



Uni-directional Rotation



Bi-directional Rotation



Switch Specification
Single-Phase 110V/115V: AC250V 5A Min.
Single-Phase 220V/230V: AC400V 5A Min.

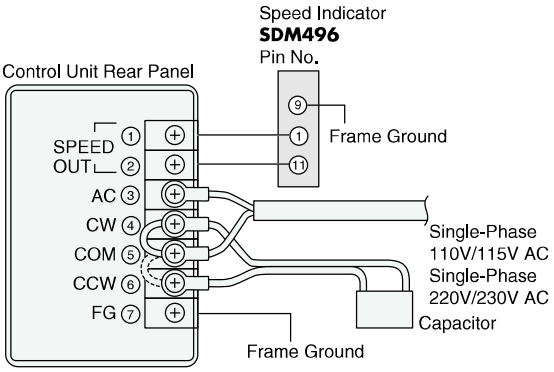
US560 and US590 types
(Connection of capacitor is necessary.)

Uni-directional Rotation
When the direction of motor rotation needs to be reversed, change the terminal used for attaching the power cord, located at the back of control unit, from terminals ④ - ⑤ (CW - COM) to terminals ⑤ - ⑥ (COM - CCW). The power cord connections are located at terminals ④ - ⑤ when shipping. See the diagram to the right.
(This should always be done with the power OFF.)

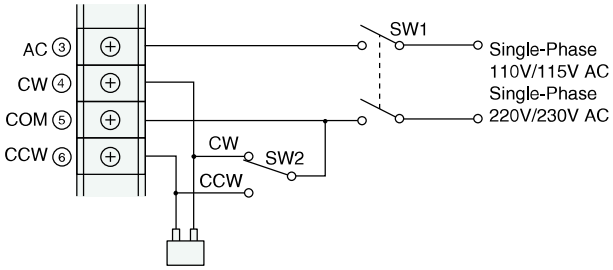
Bi-directional Rotation
Install an additional power switch (SW1) and CW/CCW switch (SW2) as shown in the diagram to the right, and use these switches to change the direction of rotation. (Motor cannot be reversed instantaneously. Turn SW1 off and wait until the motor has come to a complete stop before switching SW2.)
See the diagram to the right.

Connecting The Speed Indicator
Connect terminals ① and ⑪ of the SDM496, (a digital speed indicator), to the SPEED OUT terminals ① and ② of control unit.

Uni-directional Rotation



Bi-directional Rotation

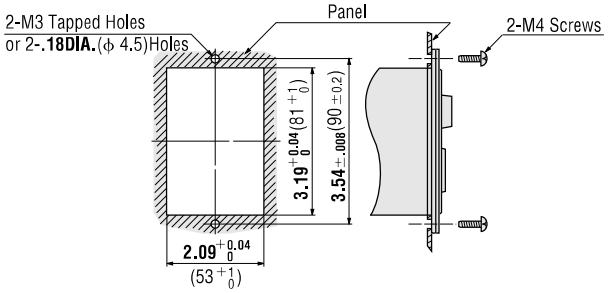


Switch Specification : AC250V 5A Min.
Single-Phase 110V/115V : AC250V 5A Min.
Single-Phase 220V/230V : AC400V 5A Min.

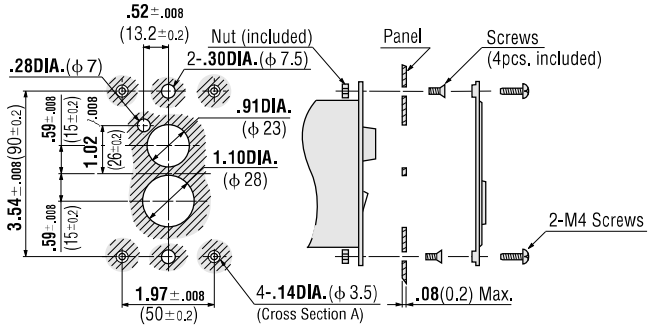
Installation Hole for Control Unit

The control unit can be installed from either the front or back of the panel. In either case, the installation hole shown below is required.

1. Installation from front of panel



2. Installation from back of panel



Extension Cable (Sold separately)

When installing the motor and control unit in different locations, an extension cable can be used (sold separately). This enables remote operation at a distance of up to 15.7 feet.(4.75m).
See page [A-270] for details.

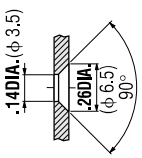
●US206, US315, US425, US540 types

Model	Length		Weight	
	ft.	(m)	lb.	(kg)
CC01SS052	3.3	(1)	0.22	(0.10)
CC02SS052	6.6	(2)	0.44	(0.20)
CC03SS052	9.8	(3)	0.57	(0.26)
CC04SS052	13.1	(4)	0.77	(0.35)

●US560, US590 types

Model	Length		Weight	
	ft.	(m)	lb.	(kg)
CC01SS2	3.3	(1)	0.37	(0.17)
CC02SS2	6.6	(2)	0.68	(0.31)
CC03SS2	9.8	(3)	1.01	(0.46)
CC04SS2	13.1	(4)	1.28	(0.58)

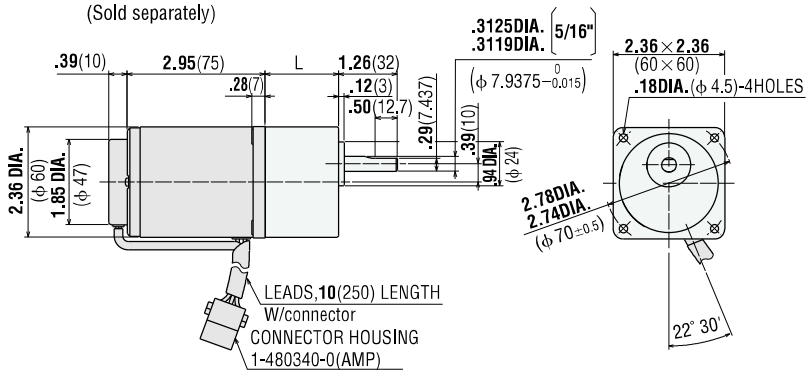
Cross Section A



Dimensions Scale 1/4, Unit =**inch** (mm)

US206-401U
US206-402E

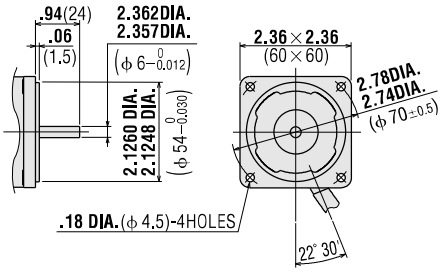
Motor USM206-401W USM206-402W Weight (Mass): 1.8 lb. (0.8 kg)
Gearhead **2GN□KA** (Sold separately) Weight (Mass): 0.88 lb. (0.4 kg)



L = **1.18**(30) **2GN3KA**~**18KA**
L = **1.57**(40) **2GN25KA**~**180KA**

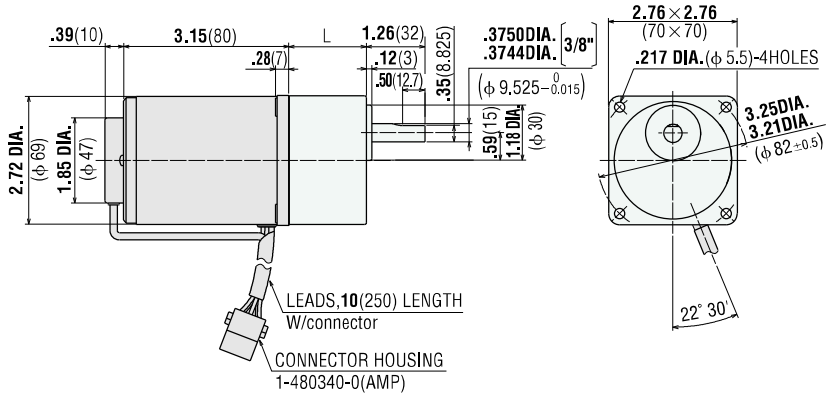
US206-001U Round shaft
US206-002E

Motor USM206-001W USM206-002W Weight (Mass): 1.8 lb. (0.8 kg)



US315-401U
US315-402E

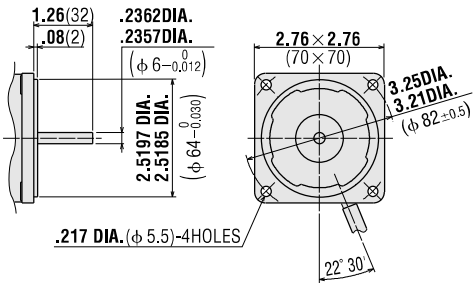
Motor USM315-401W USM315-402W Weight (Mass): 2.6 lb. (1.2 kg)
Gearhead **3GN□KA** (Sold separately) Weight (Mass): 1.21 lb. (0.55 kg)



L = **1.26**(32) **3GN3KA**~**18KA**
L = **1.65**(42) **3GN25KA**~**180KA**

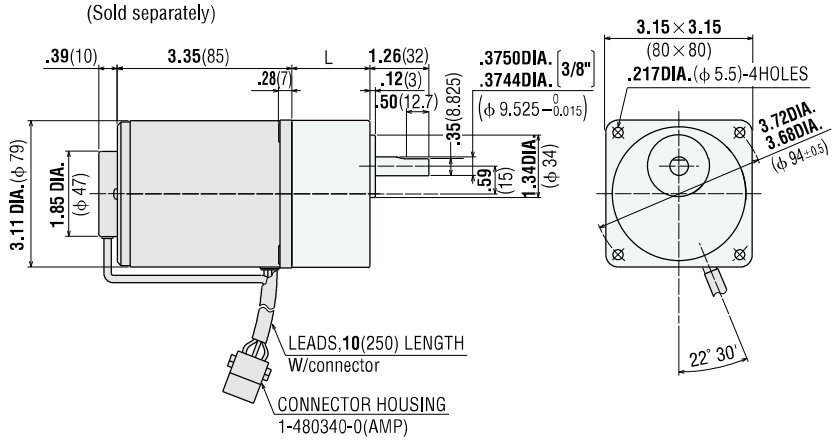
US315-001U Round shaft
US315-002E

Motor USM315-001W USM315-002W Weight (Mass): 2.6 lb. (1.2 kg)



US425-401U
US425-402E

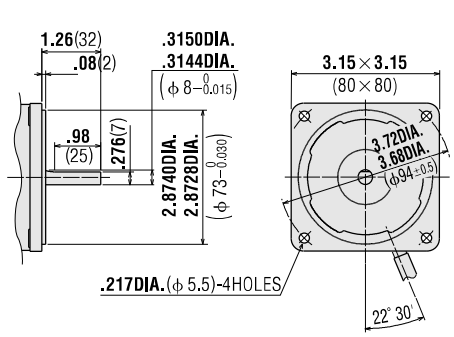
Motor USM425-401W USM425-402W Weight (Mass): 3.5 lb. (1.6 kg)
Gearhead **4GN□KA** (Sold separately) Weight (Mass): 1.43 lb. (0.65 kg)



L = **1.26**(32) **4GN3KA**~**18KA**
L = **1.67**(42.5) **4GN25KA**~**180KA**

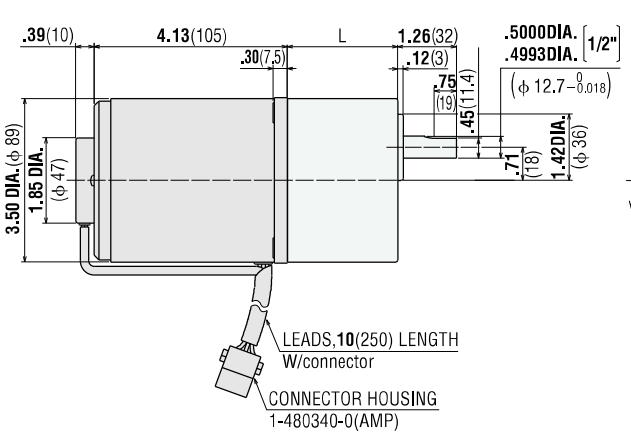
US425-001U (Round shaft)
US425-002E

Motor USM425-001W USM425-002W Weight (Mass): 3.5 lb. (1.6 kg)



US540-401U
US540-402E

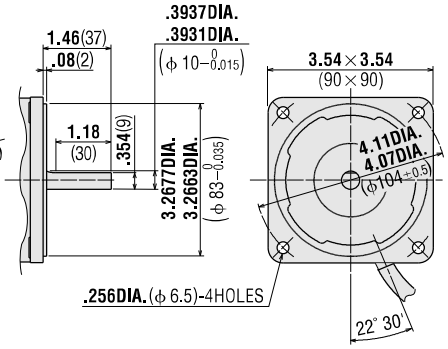
Motor USM540-401W Weight (Mass): 5.7 lb. (2.6 kg)
USM540-402W
Gearhead **5GN□KA** Weight (Mass): 3.3 lb. (1.5 kg)
(Sold separately)



L = **1.65**(42) **5GN3KA**~**18KA**
L = **2.36**(60) **5GN25KA**~**180KA**

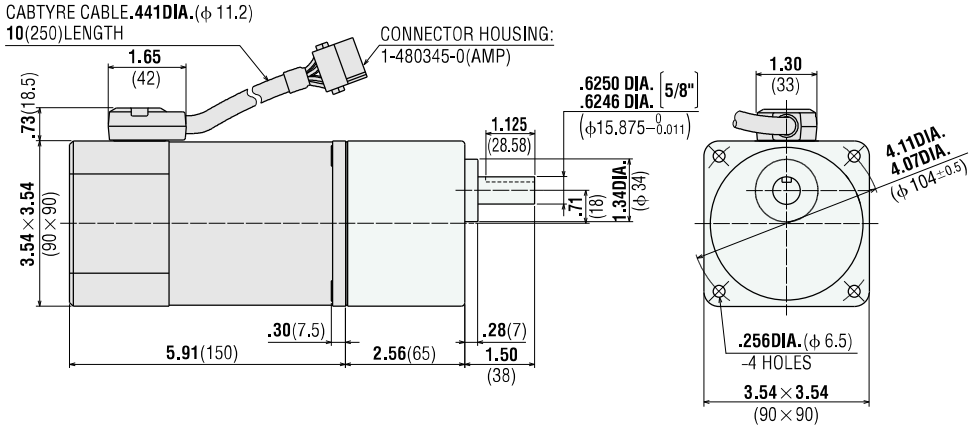
US540-001U (Round shaft)
US540-002E

Motor USM540-001W Weight (Mass): 5.7 lb. (2.6kg)
USM540-002W



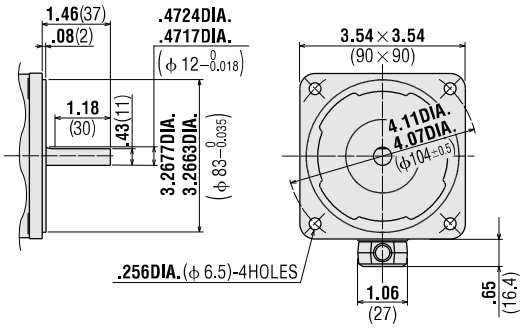
US560-501U
US560-502E

Motor USM560-501W Weight (Mass): 6.2 lb. (2.8 kg)
USM560-502W
Gearhead **5GU□KA** Weight (Mass): 3.3 lb. (1.5 kg)
(Sold separately)



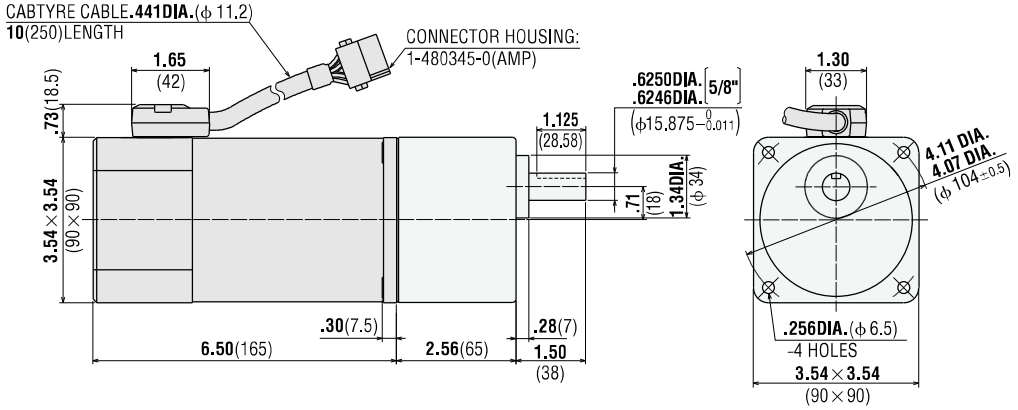
US560-001U (Round Shaft)
US560-002E

Motor USM560-001W Weight (Mass): 6.2 lb. (2.8kg)
USM560-002W



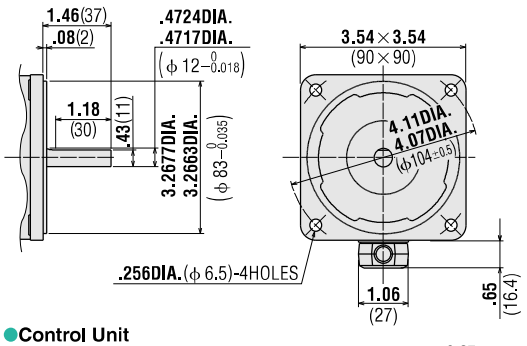
US590-501U
US590-502E

Motor USM590-501W Weight (Mass): 7.9 lb. (3.6 kg)
USM590-502W
Gearhead **5GU□KA** Weight (Mass): 3.3 lb. (1.5 kg)
(Sold separately)

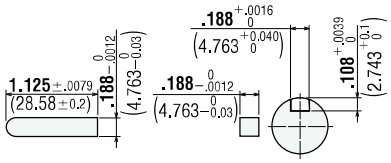


US590-001U (Round shaft)
US590-002E

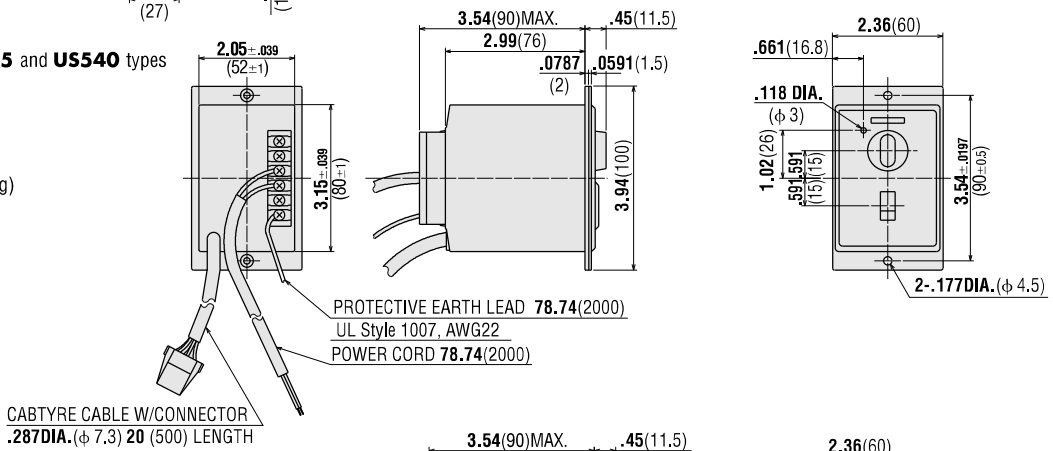
Motor USM590-001W Weight (Mass) : 7.9 lb. (3.6kg)
USM590-002W



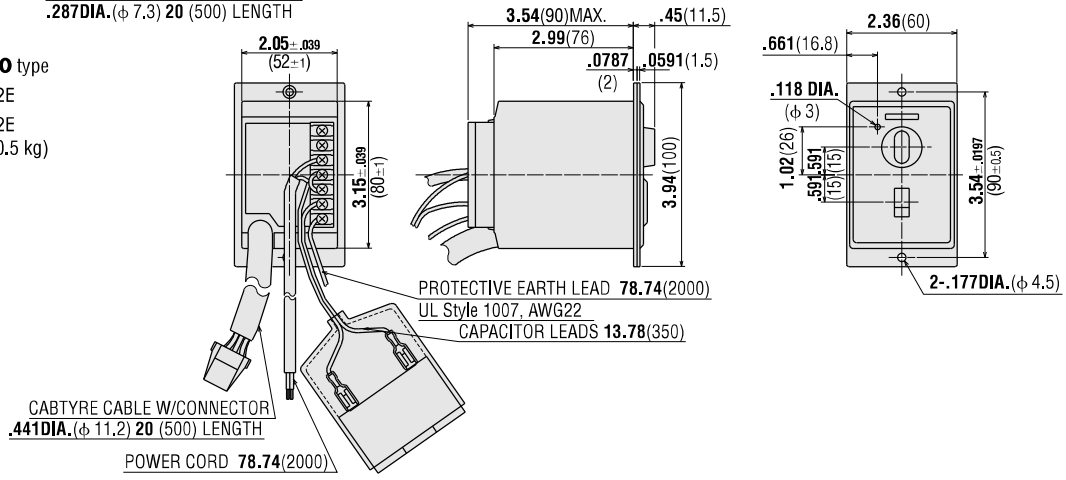
●**Key and Key Slot** (Scale 1/2)
(included)
5GU□KA



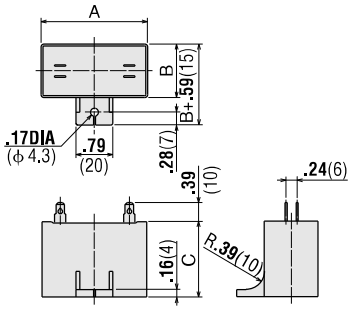
●**Control Unit**
for **US206,US315,US425** and **US540** types
USP206-1U, USP206-2E
USP315-1U, USP315-2E
USP425-1U, USP425-2E
USP540-1U, USP540-2E
Weight (Mass): 1.0 lb. (0.45kg)



●**Control Unit**
for **US560** and **US590** type
USP560-1U, USP560-2E
USP590-1U, USP590-2E
Weight (Mass): 1.1 lb. (0.5 kg)



●Capacitor (included with the motor)



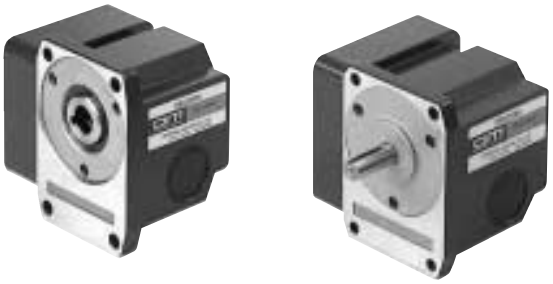
Capacitor Dimensions Unit = inch (mm)

Unit Model	Capacitor Model	A	B	C	Weight(Mass) oz (g)
US560-□01U	CH180CFAUL	2.28 (58)	0.93 (23.5)	1.46 (37)	2.47 (70)
US560-□02E	CH40BFAUL	2.28 (58)	0.93 (23.5)	1.46 (37)	2.47 (70)
US590-□01U	CH200CFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.35 (95)
US590-□02E	CH60BFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.00 (85)

Capacitor cap is provided with the capacitor.

■ Right-Angle Gearheads (Sold separately)

The right-angle gearhead provides an output shaft at a right angle to the motor's output shaft. See page[A-216] for specifications and more information.



■ Accessories (Sold separately)

● Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available.
They can be used to install motors without gearheads.
See page[A-266] for the dimensions.

Motor	Model
for 6W type	**SOL2U08**
for 15W type	**SOL3U10**
for 25W type	**SOL4U10**
for 40W, 60W, 90W type	**SOL5UA**

● Speed Indicator

To check the speed of speed control motors,connect the speed indicator.
See page [A-267] for more information.

Model: **SDM496**

● Flexible Couplings

Optional flexible couplings are available.
See page [A-260] for more information.

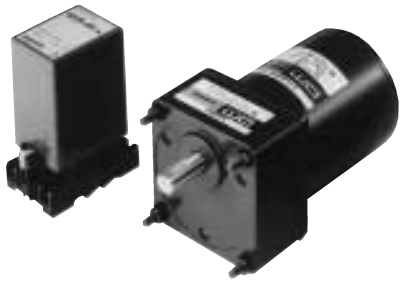
● Extension Cable

Extension cable for connecting motor and control unit.
See page[A-270] for the dimensions.

SPEED CONTROL MOTORS

COMPONENT *Type*
SS21-UL *Type*

A tachogenerator built into induction motors, in combination with the specially designed control pack, allows multi-functional operation such as speed control, and direct control from programmable controllers.



Gearhead shown in photograph is sold separately.

SAFETY STD. AC INPUT

Features

- Speed control range is 90 ~ 1700 r/min.
- Each motor and control pack is recognized by UL.
- Easy electrical connections due to the plug-in pin construction.

Specifications

Model	SS21-UL
Voltage	AC115V±10%
Frequency	60Hz
Current	1.5A Max.
Operable Motor Output Power	6W~40W
Speed Range	90r/min~1700r/min
Ambient Temperature	32°F~104°F (0°C~40°C)
Ambient Humidity	85% Maximum. (Noncondensing)

Note that these models cannot be used for applications requiring the control of more than one motor/control-pack set by the same external potentiometer.

Specifications

Induction Motors — Continuous Rating

Model		Maximum Output Power		Voltage	Frequency	Speed Range	Torque				Starting Torque		Current	Input	Capacitor	
							oz-in		mN·m							
Pinion Shaft Type	Round Shaft Type	Hp	W	V AC	Hz	r/min	1200r/min		90r/min		oz-in	mN·m	A	W	μF	VAC
2IK6RGN-AUL	**2IK6RA-AULA**	1/124	6	115	60	90~1700	6.9	50	2.5	18	4.6	33	0.25	25	2.0	250
3IK15RGN-AUL	**3IK15RA-AULA**	1/50	15	115	60	90~1700	11.7	84.5	4.3	31	8.3	60	0.46	38	4.0	250
4IK22RGN-AUL	**4IK22RA-AULA**	1/34	22	115	60	90~1700	25.0	180	8.3	60	15.3	110	0.52	50	5.0	250
5IK40RGN-AUL	**5IK40RA-AULA**	1/18.5	40	115	60	90~1700	25.0	180	7.6	55	27.8	200	0.83	58	8.0	250

- **2IK** type is impedance protected.
- **3IK**, **4IK** and **5IK** type motors contain a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.
- The speed range is under no load condition.
- The UL recognized speed control motors are designed for the SS21-UL type speed control pack. Motor cannot be combined with other types of control packs.
- Note that these models cannot be used for applications requiring the control of more than one motor/control-pack set by the same external potentiometer.

General Specifications of Motors

Item	Specifications
Insulation Resistance	100M ohms or more when 500V DC is applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Dielectric Strength	Sufficient to withstand 1.5kV at 50Hz and 60Hz applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Temperature Rise	135°F (75°C) or less measured by the resistance change method after the temperature of the coil has stabilized under normal operation at the rated voltage and frequency.
Overheating Protection Device	Built-in thermal protector (Automatic return type) Open: 248°F±9°F (120°C±5°C) Close: 170.6°F±27°F (77°C ±15°C)
Insulation Class	Class A
Ambient Temperature Range	14°F ~ 104°F (−10°C ~ +40°C)
Ambient Humidity	85% Maximum (Noncondensing)

- **2IK** type is impedance protected. This type of motor does not contain a built-in thermal protector.

Permissible Torque When Gearhead Is Attached

The speed at gearhead shaft (N_G) is calculated as follows:

$N_M = N_G \times i$

N_M : Speed of Motor
N_G : Speed of Gearhead
i : Gear Ratio

The output torque at gearhead (T_G) is calculated by using the following formula:

$T_G = T_M \times i \times \eta$

T_G : Permissible Torque of Gearhead
T_M : Permissible Torque of Motor
η : Gearhead efficiency (refer to Table 2)

The output torque at the gearhead shaft must be lower than the maximum permissible torque specified right.

Maximum Permissible Torque of Gearhead

Gearhead Model	Maximum Permissible Torque
2GN□KA	26 lb-in/3 N·m
3GN□KA	43 lb-in/5 N·m
4GN□KA	69 lb-in/8 N·m (52 lb-in/6 N·m when gear ratio is 250, 300 and 360)
5GN□KA	87 lb-in/10 N·m

- Enter the gear ratio in the box (□) within the model name.

Table 1: Motor Speed Range

Gear Ratio	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
High Speed	566	472	340	283	226	189	136	113	94	68	56	47	34	28	22	19	17	14	11	9.4
Speed r/min	≀	≀	≀	≀	≀	≀	≀	≀	≀	≀	≀	≀	≀	≀	≀	≀	≀	≀	≀	≀
Low Speed	30	25	18	15	12	10	7	6	5	3.6	3	2.5	1.8	1.5	1.2	1.0	0.9	0.75	0.6	0.5

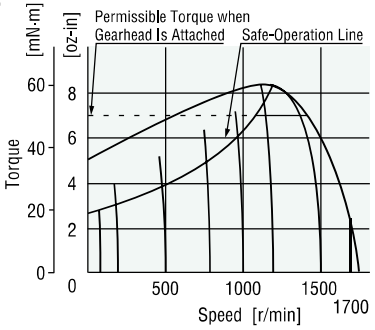
Table 2: Gearhead Efficiency and Direction of Gearhead Output Shaft

Model \ Gear Ratio	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
2GN□KA, 3GN□KA **4GN□KA, 5GN□KA**	81%									73%			66%							

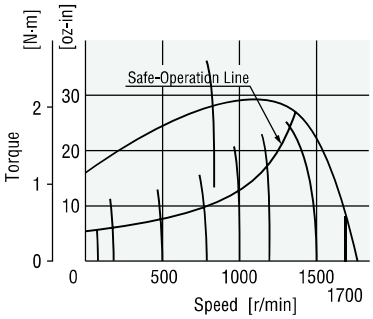
- A colored background indicates that the output shaft of the gearmotor rotates in the same direction as the output shaft of the motor. A white background indicates rotation in the opposite direction.
- Enter the gear ratio in the box (□) within the model name.

Torque — Speed Characteristics

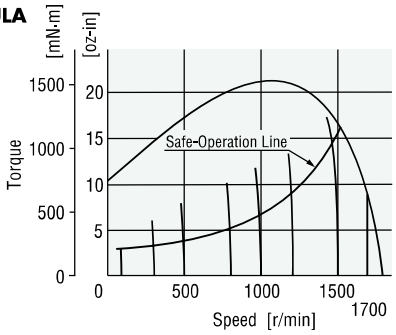
2IK6RGN-AUL
2IK6RA-AULA
SS21-UL



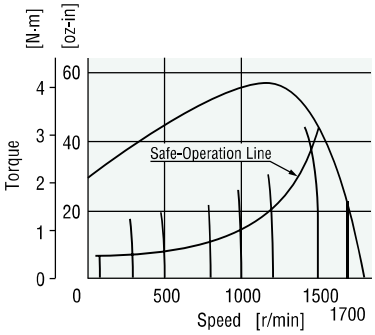
4IK22RGN-AUL
4IK22RA-AULA
SS21-UL



3IK15RGN-AUL
3IK15RA-AULA
SS21-UL

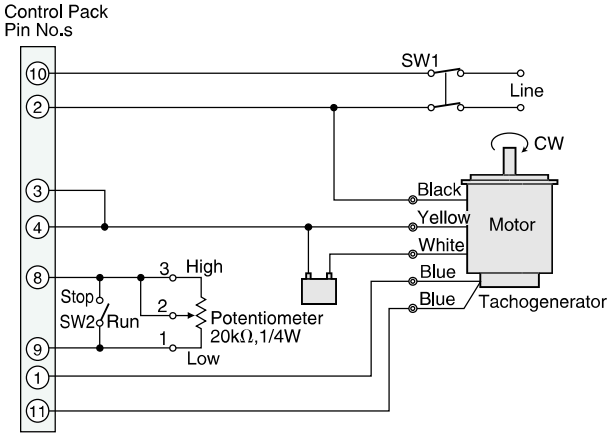


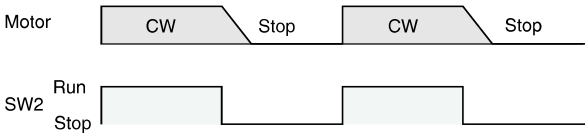
5IK40RGN-AUL
5IK40RA-AULA
SS21-UL



Wiring Diagrams

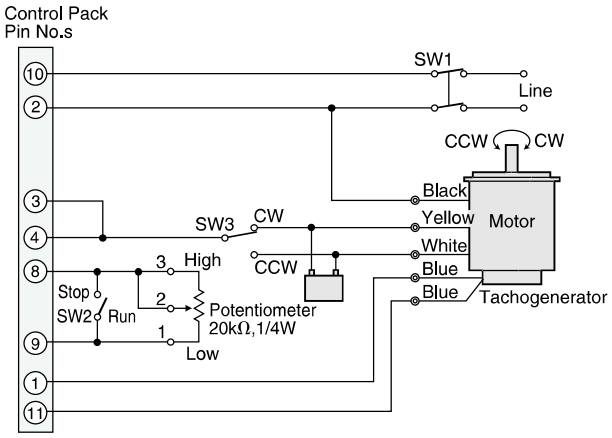
●Uni-directional, speed control

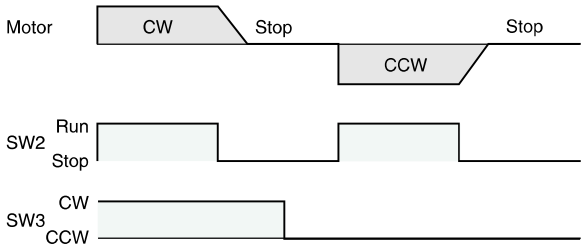




- To stop the motor for an extended period, use SW2.
- This wiring diagram provides CW rotation as viewed from the front shaft end of the motor.
- To reverse direction (CCW), reverse the yellow and white wires.
- The direction of rotation is as view from the front shaft end the motor.

●**Bi-directional, speed control**





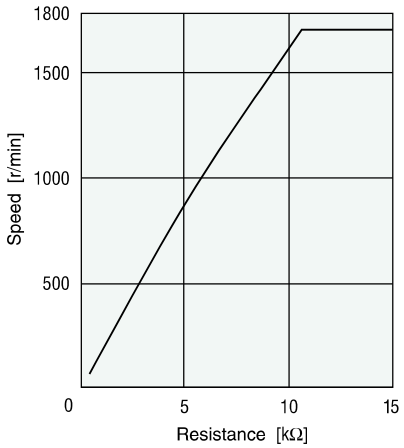
- To stop the motor for an extended period, use SW1.
- SW3 controls the direction of motor shaft rotation as viewed from the front shaft end of the motor. Change the direction of motor rotation only after bringing the motor to a stop.
  If an attempt is made to change the direction of rotation while the motor is rotating, the motor may is ignore the reversing command or change its direction of rotation after some delay.
- To reverse direction of motor rotation, wait until the motor has stopped.
- The direction of rotation is as view from the front shaft end the motor.

Switch No.	Specifications	Accessories
SW1, SW3	AC125V, 5A minimum	—
SW2	DC20V, 10mA minimum	—

■ Speed Control

●Setting The Speed

The speed is set by either an external potentiometer. These values correspond to the minimum and the maximum setting of the speed potentiometer used for speed control. Motor speed can be adjusted over the range from 90 r/min to 1700 r/min at 60Hz.

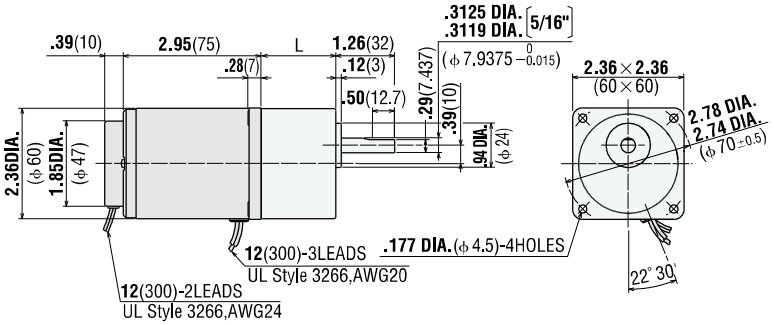


Speed Setting Resistance — Speed Characteristics

Note: The speed control inputs of the control packs must be isolated from each other. Therefore, only one control pack at a time can be controlled by a single potentiometer.

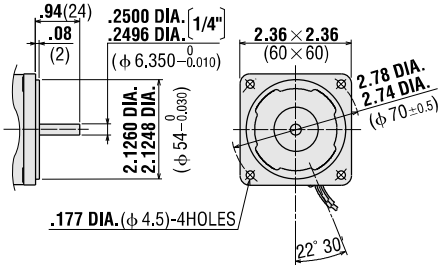
Dimensions Scale 1/4, Unit = **inch** (mm)

2IK6RGN-AUL
Weight (Mass): 1.76 lb.(0.8 kg) / **2GN□KA**
Weight (Mass): 0.88 lb.(0.4 kg)

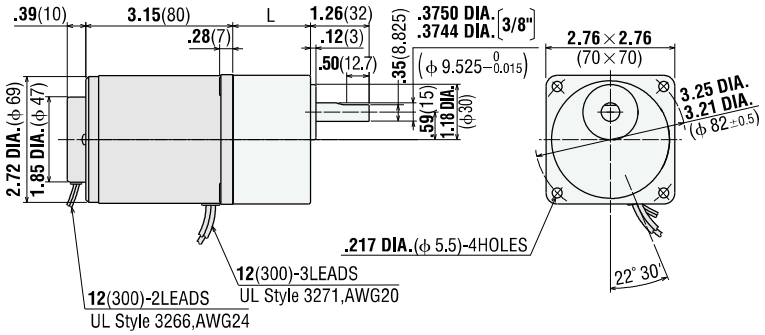


L=**1.18** (30) **2GN3KA**~**18KA**
L=**1.57** (40) **2GN25KA**~**180KA**

2IK6RA-AULA
Weight (Mass): 1.76 lb.(0.8 kg)

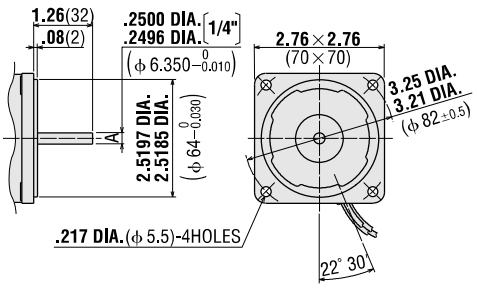


3IK15RGN-AUL
Weight (Mass): 2.65 lb.(1.2 kg) / **3GN□KA**
Weight (Mass): 1.21 lb.(0.55 kg)

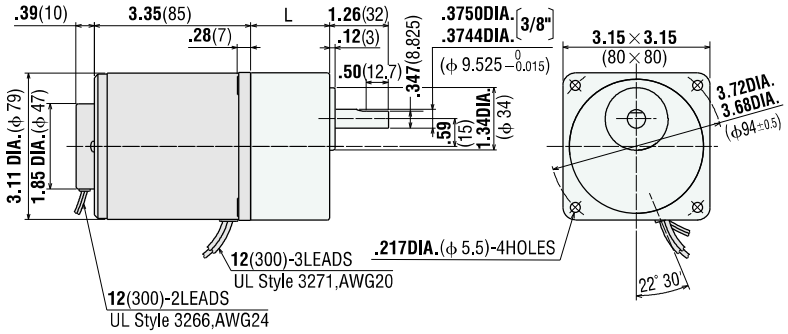


L=**1.26** (32) **3GN3KA**~**18KA**
L=**1.65** (42) **3GN25KA**~**180KA**

3IK15RA-AULA
Weight (Mass): 2.65 lb.(1.2 kg)

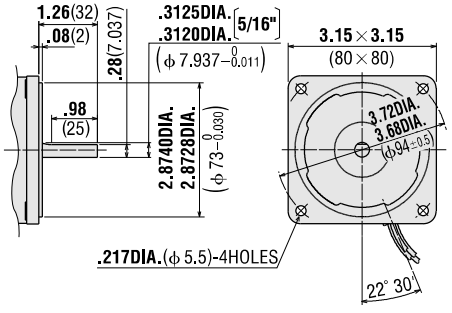


4IK22RGN-AUL
Weight (Mass): 3.53 lb.(1.6 kg) / **4GN□KA**
Weight (Mass): 1.43 lb.(0.65 kg)



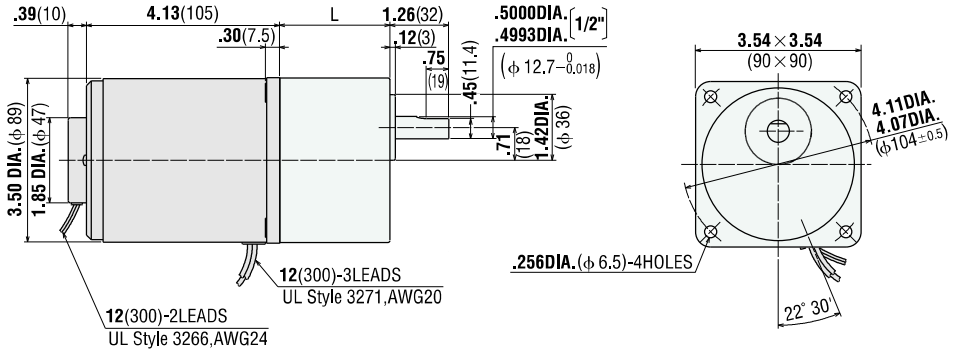
L=**1.26** (32) **4GN3KA**~**18KA**
L=**1.67** (42.5) **4GN25KA**~**180KA**

4IK22RA-AULA
Weight (Mass): 3.53 lb.(1.6 kg)



5IK40RGN-AUL / **5GN□KA**

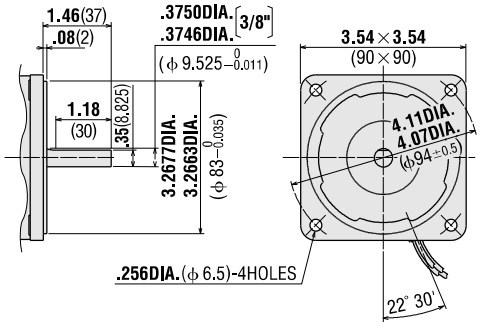
Weight (Mass): 5.73 lb.(2.6 kg) / Weight (Mass): 3.3 lb.(1.5 kg)



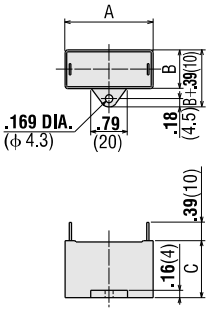
L=**1.65** (42) **5GN3KA**~**18KA**
L=**2.36** (60) **5GN25KA**~**180KA**

5IK40RA-AULA

Weight (Mass): 5.73 lb.(2.6 kg)



●Capacitor (included with the motor)



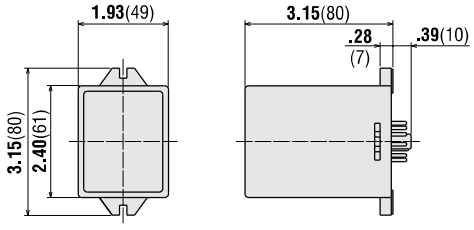
Motor Model	Capacitor Model	Dimensions inch (mm) A	B	C	Weight oz (g)
2IK6RGN-AUL **2IK6RA-AULA**	CH20UL	1.22 (31)	.57 (14.5)	.93 (23.5)	0.53 15
3IK15RGN-AUL **3IK15RA-AULA**	CH40UL	1.46 (37)	.71 (18)	1.06 (27)	0.88 25
4IK22RGN-AUL **4IK22RA-AULA**	CH50UL	1.50 (38)	.75 (19)	1.14 (29)	1.06 30
5IK40RGN-AUL **5IK40RA-AULA**	CH80UL	1.50 (38)	.83 (21)	1.22 (31)	1.23 35

Capacitor cap is provided with the capacitor.

■ Speed Control Pack Dimensions

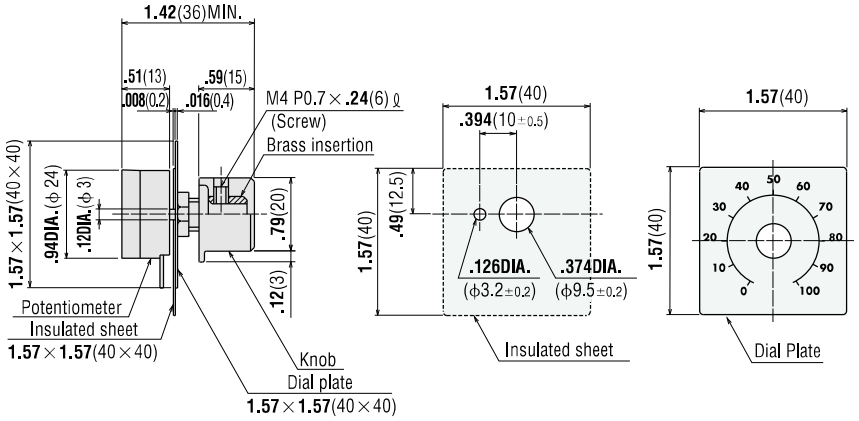
Scale 1/4, Unit = **inch** (mm)

SS21-UL Weight (Mass): 0.33 lb.(0.15 kg)



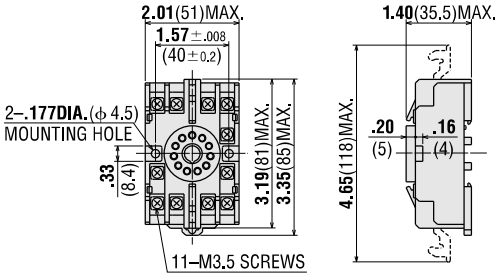
●Potentiometer

PAVR-20KY Scale 1/2, Unit = **inch** (mm)



●Socket

EP11PF Scale 1/4, Unit = **inch** (mm)

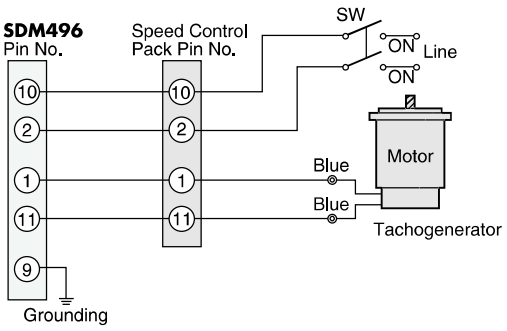


■ Accessories (Sold separately)

●Speed Indicator

To check the motor speed visually, connect a speed indicator, model **SDM496** (sold separately).
See page A-269 for more detail.

SDM496 can also indicate the speed at the gearhead shaft.



ORIENTAL MOTOR GENERAL CATALOG

A

Brake Motors

Types and Features of Brake Motors

Overview

When using a motor as the drive force to perform uni-directional or bi-directional operation, there is often a nead to stop the motor quickly or to hold the load in position while the motor is stopped.

With induction motors, it generally takes 30~40 revolutions (at motor shaft) from the time the switch is turned off until the motor actually stops. With reversible motors there is an overrun of 5~6 revolutions (at motor shaft). Use of a brake motor is recommended when the motor needs to be stopped more quickly.

Load holding applications can use an a electromagnetic brake. An electromagnetic brake is activate When the power is shut off. Since electromagnetic brakes exert holding power even while the power is off, they are highly suitable for use as emergency brakes.

For applications where the motor is started and stopped more than 100 times per minute, the clutch and brake motor is the ideal choice. This motor is equipped with an electromagnetic clutch and brake mechanism, giving it powerful braking and holding force. Overrun during braking is less than a revolution. With **C•B** motors, the motor is kept running continuously, and because starts and stops are controlled by the clutch and brake, the motor is capable of excellent response.

Types of Brake Motors

When holding brake force is required
Electromagnetic Brake Motors

A-180

- Single-Phase 110V/115VAC, Single-Phase 220V/230VAC, Three-phase 200V/220V/230VAC
- 6W, 15W, 25W, 40W, 60W, 90W

These motors are directly coupled to an AC electromagnetic brake which is activated when power is not applied. When the power supply is turned off, the motor comes instantaneously to a stop and holds the load. Holding brake force can be up to 69.4 oz-in (500 mN·m) (60W, 90W). Since the holding brake force works when the power supply has been turned off, these units are excellent as emergency brakes.

Suitable for high-frequency operation.
Clutch and Brake Motors

A-194

- Single-Phase 110V/115VAC
- Output Power 40W, 60W, 90W
- Induction Motor

This compact AC motor utilities a clutch and brake unit to permit frequent starting and stopping with are excellent response. Another important feature is its maximum holding and braking power of 208 oz-in (1500 mN·m).

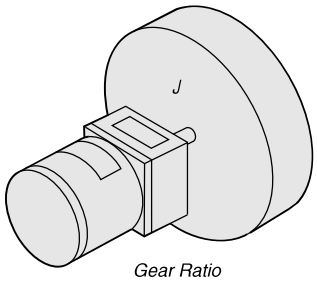
Calculating Inertia (J)

When the electromagnetic brake motor is used, the inertia of the load greatly affects stopping time, overrun and stopping accuracy. The inertia J [oz-in^2] is used in the selection of electromagnetic brake motors.

The table to the right shows the equations used to calculate J for various load shapes. When a gearhead is used to reduce speed, the J equivalent for the motor shaft is $\frac{1}{(\text{Gear Ratio})^2}$.

$$J_M = \frac{1}{i^2} J_L \text{ [oz-in}^2\text{]}$$

J_M: J equivalent at motor shaft
J_L: J of load on gearhead shaft
i : Gear ratio of gearhead

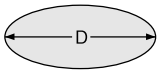
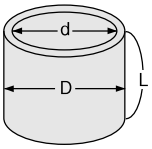
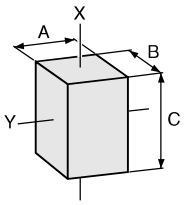
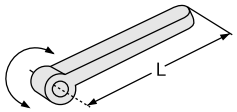
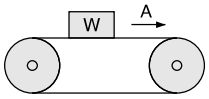
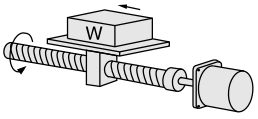


For example, if a gearhead with a gear ratio of 18:1 is used and the load inertia (J_L) is 250 oz-in^2, the equivalent inertia at the motor shaft is:

$$J_M = \frac{1}{18^2} \times 250 \fallingdotseq 0.8 \text{ [oz-in}^2\text{]}$$

Inertia (J) for Various Load Shapes

W: Weight [oz]

Shape	J [oz-in^2]
Solid Disk 	Relative to center axis: $\frac{1}{8}WD^2$
Annular Cylinder 	Relative to center axis: $\frac{1}{8}W(D^2+d^2)$
Square Post 	Relative to X axis: $\frac{1}{12}W(A^2+B^2)$ Relative to Y axis: $\frac{1}{12}W(B^2+C^2)$
Straight Bar 	$\frac{1}{3}WL^2$
Belt Drive (Horizontal Movement)  A: Distance moved per rotation [inch]	$\frac{W \cdot A^2}{4\pi^2}$ (Does not include J of pulley belt)
Ball Screw Drive 	$J_1 + \frac{WP^2}{4\pi}$ J_1: J of ball screw [oz-in^2] P: Ball screw pitch [inch] W: Total Weight of table and work [oz]

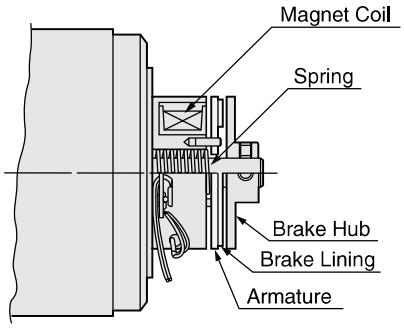
Electromagnetic Brake Motors

This power off, electromagnetic brake coupled to reversible motors and induction motors (three-phase type) provides output of 6W~90W (three-phase: 25W~90W).
These motors are best suited for applications in which loads must be held.

Features

- These motors incorporate AC electromagnetic brakes which are activated when the power is shut off.
  When the power supply is turned off the motor stops and holds the load. Holding brake force is 4.2 oz-in (30 mN·m) ~ 69.4 oz-in (500 mN·m).
  These units are excellent as emergency safety brakes.

Structure



The figure above indicates an example of the structure of the electromagnetic brake motor.
The electromagnetic brake operates on the basis of a spring which presses the armature against the brake hub, stopping the motor and holding the load. When the electromagnetic brake is excited, it attracts the armature and the brake lining is pulled away from the brake hub. The motor is able to turn freely.

GEAR | LOAD HOLD | SAFETY STD. | AC INPUT

Safety Standards and CE Marking

For -AWMU, -CWME, -SWM Type

Standards	Certification Body	Standards File No.	CE Marking
UL1004 UL519 (6W) UL547 (15W~90W)	UL	E64199 (6W) E64197 (15W~90W)	Low Voltage Directive
CAN/CSA-C22.2 No.100 CAN/CSA-C22.2 No.77			
EN60950	VDE	114919ÜG (6W) 6751ÜG (15W~90W)	
	DEMKO	124234/DK99-00431 (Three-phase 90W)	
EN60034-1 EN60034-5 IEC60034-11	Conform to EN/IEC Standards (EN/IEC certifications are scheduled)		

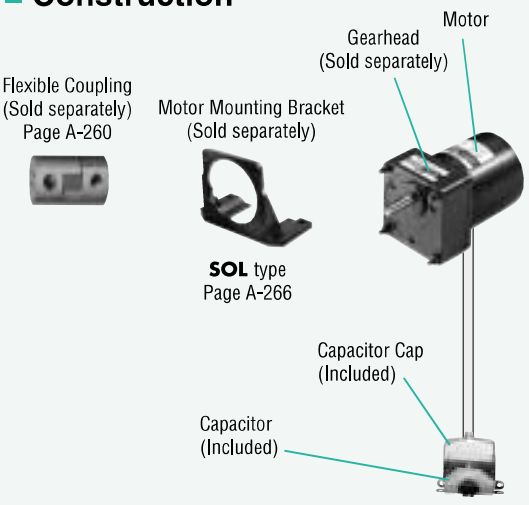
- Recognized name and certified name of each safety standards are motor model name.

For -AMUL Type

Standards	Certification Body	Standards File No.	CE Marking
UL1004 UL519 (6W) UL547 (15W~90W)	UL	E64199 (6W) E64197 (15W~90W)	Low Voltage Directive
CAN/CSA-C22.2 No.100 CAN/CSA-C22.2 No.77	CSA	LR47296	
EN60950	VDE	5875ÜG (6W) 5872ÜG (15, 25W) 5873ÜG (40W) 5874ÜG (60, 90W)	

- For installation condition for EN/IEC standards, see page D-2.

Construction



■ Product Number Code

4RK25GN - AW M U

- **Motor Frame Size**
  - **2**: 2.36 in. (60 mm sq.)
  - **3**: 2.76 in. (70 mm sq.)
  - **4**: 3.15 in. (80 mm sq.)
  - **5**: 3.54 in. (90 mm sq.)
- **Motor Type**
  - **I**: Induction motor
  - **R**: Reversible motor
- **Motor Series**
  - **K**: K series
- **Output Power**
  - Example
  - **25**: 25W
- **Motor Shaft Type**
  - **GN**: **GN** type (for use with **GN** type gearhead)
  - **GU**: **GU** type (for use with **GU** type gearhead)
  - **A**: Round shaft
- Voltage
  - **AW**: Single-Phase 100V/110V/115VAC, 4 Poles
  - **CW**: Single-Phase 200V/220V/230VAC, 4 Poles
  - **SW**: Three-Phase 200V/220V/230VAC, 4 Poles
- **M**: Electromagnetic Brake
- Provided Capacitor
  - **U**: 110V/115VAC
  - **E**: 220V/230VAC
  - **None**: Three-Phase type

Note : The "**U**" and "**E**" at the end of the model number indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate.

● Gearhead

4 GN 50 KA

- **Gearhead Frame Size**
  - **2**: 2.36 in. sq. (60 mm sq.)
  - **3**: 2.76 in. sq. (70 mm sq.)
  - **4**: 3.15 in. sq.(80 mm sq.)
  - **5**: 3.54 in. sq. (90 mm sq.)
- **Gearhead Type**
  - **GN**: **GN** type (for use with **GN** type pinion shaft motor)
  - **GU**: **GU** type (for use with **GU** type pinion shaft motor)
- **Gear Ratio**
  - Example
  - **50**: Gear ratio of 50:1
  - **10X** denotes the decimal gearhead of gear ratio 10:1
- **Type of bearings or shaft direction.**
  - **KA**: Ball bearing type (inch size)
  - **RAA**: Right angle gearhead (inch size)
  - **RH**: Hollow shaft type

Note :

- The **GU** type includes two types of model number: box-shaped models with a "**B**" at the end of their model number and models with mounting flanges with nothing at the end of their model number. All other series consist of box-shaped models only and have nothing at the end of their model number.
- See page 56 for data regarding inch size gearheads shafts.

● For -AMUL Type

4RK25GN - A M UL

- **Motor Frame Size**
  - **2**: 2.36 in. (60 mm sq.)
  - **3**: 2.76 in. (70 mm sq.)
  - **4**: 3.15 in. (80 mm sq.)
  - **5**: 3.54 in. (90 mm sq.)
- **Motor Type**
  - **R**: Reversible motor
- **Motor Series**
  - **K**: K series
- **Output Power**
  - Example
  - **25**: 25W
- **Motor Shaft Type**
  - **GN**: **GN** type (for use with **GN** type gearhead)
  - **GU**: **GU** type (for use with **GU** type gearhead)
  - **A**: Round shaft
- Voltage
  - **A**: Single-Phase 115VAC, 4 Poles
- **M**: Electromagnetic Brake
- **UL**: UL recognized

Motor Specifications 30 Minute Rating

Mode		Output Power		Voltage	Frequency	Current	Starting Torque		Rated Torque		Rated Speed	Capacitor
Pinion Shaft Type	Round Shaft Type	HP	W	VAC	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF
(ZP) 2RK6GN-AWMU	2RK6A-AWMU	1/124	6	Single-Phase 110	60	0.25	6.2	45	5.7	41	1450	3.5
				Single-Phase 115	60	0.26						
(ZP) 2RK6GN-CWME	2RK6A-CWME	1/124	6	Single-Phase 220	60	0.11	6.2	45	5.7	41	1450	0.8
				Single-Phase 230	50	0.12	6.9	50	6.8	49	1200	
				Single-Phase 230	60	0.12	6.2	45	5.7	41	1450	
(ZP) 2RK6GN-AMUL	2RK6A-AMULA	1/124	6	Single-Phase 115	60	0.17	6.7	48	5.3	38	1550	2.3
(TP) 3RK15GN-AWMU	3RK15A-AWMU	1/50	15	Single-Phase 110	60	0.42	13.9	100	14.6	105	1450	6
				Single-Phase 115	60	0.41						
(TP) 3RK15GN-AMUL	3RK15A-AMULA	1/50	15	Single-Phase 115	60	0.34	11.1	80	13.2	95	1550	4.5
(TP) 4RK25GN-AWMU	4RK25A-AWMU	1/30	25	Single-Phase 110	60	0.54	19.4	140	23.6	170	1450	8
				Single-Phase 115	60							
(TP) 4RK25GN-CWME	4RK25A-CWME	1/30	25	Single-Phase 220	60	0.28	19.4	140	23.6	170	1450	2
				Single-Phase 230	50	0.26	22.2	160	28.5	205	1200	
				Single-Phase 230	60	0.28	19.4	140	23.6	170	1450	
(TP) 4IK25GN-SWM	4IK25A-SWM	1/30	25	Three-Phase 200	50	0.23	33.3	240	26.4	190	1300	—
				Three-Phase 200	60	0.21	22.2	160	22.2	160	1550	
				Three-Phase 220	60	0.21	22.2	160	22.2	160	1600	
				Three-Phase 230	60	0.22	22.2	160	22.2	160	1600	
(TP) 4RK25GN-AMUL	4RK25A-AMULA	1/30	25	Single-Phase 115	60	0.54	17.4	125	22.2	160	1550	7
(TP) 5RK40GN-AWMU	5RK40A-AWMU	1/18.5	40	Single-Phase 110	60	0.81	36.1	260	37.5	270	1450	12
				Single-Phase 115	60							
(TP) 5RK40GN-CWME	5RK40A-CWME	1/18.5	40	Single-Phase 220	60	0.46	36.1	260	36.1	260	1500	3.5
				Single-Phase 230	50	0.4	37.5	270	43.7	315	1250	
				Single-Phase 230	60	0.46	36.1	260	36.1	260	1500	
(TP) 5IK40GN-SWM	5IK40A-SWM	1/18.5	40	Three-Phase 200	50	0.32	55.5	400	41.7	300	1300	—
				Three-Phase 200	60	0.3	36.1	260	36.1	260	1550	
				Three-Phase 220	60	0.3	36.1	260	36.1	260	1600	
				Three-Phase 230	60	0.31	36.1	260	36.1	260	1600	
(TP) 5RK40GN-AMUL	5RK40A-AMULA	1/18.5	40	Single-Phase 115	60	0.81	34.7	250	36.1	260	1550	12
(TP) 5RK60GU-AWMU	5RK60A-AWMU	1/12.5	60	Single-Phase 110	60	1.24	52.8	380	56.2	405	1450	20
				Single-Phase 115	60							
(TP) 5RK60GU-CWME	5RK60A-CWME	1/12.5	60	Single-Phase 220	60	0.67	52.8	380	56.2	405	1450	5
				Single-Phase 230	50	0.61	65.3	470	68	490	1200	
				Single-Phase 230	60	0.67	52.8	380	56.2	405	1450	
(TP) 5IK60GU-SWM	5IK60A-SWM	1/12.5	60	Three-Phase 200	60	0.5	83.3	600	62.5	450	1300	—
				Three-Phase 200	60	0.43	69.4	500	52.8	380	1550	
				Three-Phase 220	60	0.45	69.4	500	52.8	380	1600	
				Three-Phase 230	60	0.46	69.4	500	52.8	380	1600	
(TP) 5RK60GU-AMUL	5RK60A-AMUL	1/12.5	60	Single-Phase 115	60	1.2	54.2	390	52.8	380	1550	20
(TP) 5RK90GU-AWMU	5RK90A-AWMU	1/8	90	Single-Phase 110	60	1.81	81.9	590	81.2	585	1500	30
				Single-Phase 115	60							
(TP) 5RK90GU-CWME	5RK90A-CWME	1/8	90	Single-Phase 220	60	0.96	81.9	590	84	605	1450	7
				Single-Phase 230	50	0.82	83.3	600	101	730	1200	
				Single-Phase 230	60	0.96	81.9	590	84	605	1450	
(TP) 5IK90GU-SWM	5IK90A-SWM	1/8	90	Three-Phase 200	50	0.64	118	850	94.4	680	1300	—
				Three-Phase 200	60	0.59	97.2	700	79.2	570	1550	
				Three-Phase 220	60	0.6	97.2	700	79.2	570	1600	
				Three-Phase 230	60	0.61	97.2	700	79.2	570	1600	
(TP) 5RK90GU-AMUL	5RK90A-AMUL	1/8	90	Single-Phase 115	60	1.65	81.9	590	79.2	570	1550	25

(ZP): These motors are impedance protected.

(TP): These motors contain a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

- The "**U**" and "**E**" at the end of the model number indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate. When the motor is approved under various safety standards, the nameplate is adopted.
- A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.

Motor General Specifications For -AWMU, -CWME, -SWM Type

Item	Specifications
Insulation Resistance	100M Ω or more when 500V DC is applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Dielectric Strength	Sufficient to withstand 1.5kV at 50 and 60 Hz applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Temperature Rise	144°F (80°C) or less measured by the resistance change method after the temperature of 30minute no load operation of motor with connecting a gearhead or equivalent heat radiation plate.*
Insulation Class	Class B 266°F (130°C)
Overheat Protection Device	**2RK** type is impedance protected. Built-in thermal protector (Automatic return type) Open: 266°F±9°F (130°C±5°C) Close: 179.6°F±27°F (82°C±15°C)
Ambient Temperature Range	14°F~104°F (−10°C~+40°C) Three-Phase 200V : 14°F~122°F (−10°C~+50°C)
Ambient Humidity	85% Maximum (noncondensing)
Degree of protection	**2RK**, **3RK**, **4RK**, **4IK**, **5RK40**, **5IK40** type : IP20 **5RK60**, **5IK60**, **5RK90**, **5IK90** type : IP40

Motor General Specifications For -AMUL Type

Item	Specification
Insulation Resistance	100M Ω or more when 500V DC is applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Dielectric Strength	Sufficient to withstand 1.5kV at 50Hz and 60Hz applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Temperature Rise	135°F (75°C) or less measured by the resistance change method after the temperature of the coil has stabilized under normal operation at the rated voltage and frequency.
Insulation Class	UL·CSA Standard Class A, EN60950 Standard Class E
Overheat Protection Device	**2RK** type is impedance protected. Built-in thermal protector (Automatic return type) Open: 248°F±9°F (120°C±5°C) Close: 170.6°F±27°F (77°C±15°C)
Ambient Temperature Range	14°F~104°F (−10°C~+40°C)
Ambient Humidity	85% Maximum (noncondensing)

Equivalent heat radiation plate (material : Aluminum)

Type (output)	Size inch (mm)	Thickness inch (mm)
2RK Type (6W)	4.53×4.53 (115×115)	0.20 (5)
3RK Type (15W)	4.92×4.92 (125×125)	
4IK, 4RK Type (25W)	5.31×5.31 (135×135)	
5IK40, 5RK40 Type (40W)	6.50×6.50 (165×165)	
5IK60, 5RK60 Type (60W)	7.87×7.87 (200×200)	
5IK90, 5RK90 Type (90W)	7.87×7.87 (200×200)	

Electromagnetic Brake Specifications

Model	Voltage VAC	Frequency Hz	Current A	Input W	Holding Brake Torque oz-in	mN·m
2RK6GN-AWMU	Single-Phase 110	60	0.03	3	4.2	30
2RK6A-AWMU	Single-Phase 115	60	0.03	3		
2RK6GN-CWME	Single-Phase 220	60	0.02	3	4.2	30
2RK6A-CWME	Single-Phase 230	50	0.02	3	4.2	30
	Single-Phase 230	60	0.02	3	4.2	30
2RK6GN-AMUL	Single-Phase 115	60	0.032	2.3	4.2	30
2RK6A-AMULA						
3RK15GN-AWMU	Single-Phase 110	60	0.06	4	11.1	80
3RK15A-AWMU	Single-Phase 115	60	0.06	4	11.1	80
3RK15GN-AMUL	Single-Phase 115	60	0.046	4.2	11.1	80
3RK15A-AMULA						
4RK25GN-AWMU	Single-Phase 110	60	0.08	5	13.9	100
4RK25A-AWMU	Single-Phase 115	60		6	13.9	100
4RK25GN-CWME	Single-Phase 220	60	0.04	6	13.9	100
4RK25A-CWME	Single-Phase 230	50	0.05	7	13.9	100
	Single-Phase 230	60	0.05	6	13.9	100
4IK25GN-SWM	Single-Phase 200	50	0.04	5	13.9	100
4IK25A-SWM	Single-Phase 200	60	0.04	5	13.9	100
	Single-Phase 220	60	0.04	6	13.9	100
	Single-Phase 230	60	0.04	6	13.9	100
4RK25GN-AMUL	Single-Phase 115	60	0.055	5.2	13.9	100
4RK25A-AMULA						
5RK40GN-AWMU	Single-Phase 110	60	0.08	6	27.8	200
5RK40A-AWMU	Single-Phase 115	60	0.09	7	27.8	200
5RK40GN-CWME	Single-Phase 220	60	0.04	6	27.8	200
5RK40A-CWME	Single-Phase 230	50	0.04	6	27.8	200
	Single-Phase 230	60	0.04	6	27.8	200

Model	Voltage VAC	Frequency Hz	Current A	Input W	Holding Brake Torque oz-in	mN·m
5IK40GN-SWM	Single-Phase 200	50	0.04	5	27.8	200
5IK40A-SWM	Single-Phase 200	60	0.04	5	27.8	200
	Single-Phase 220	60	0.04	6	27.8	200
	Single-Phase 230	60	0.04	6	27.8	200
5RK40GU-AMUL	Single-Phase 115	60	0.053	5.7	27.7	200
5RK40A-AMULA						
5RK60GU-AWMU	Single-Phase 110	60	0.12	9	69.4	500
5RK60A-AWMU	Single-Phase 115	60	0.12	9		
5RK60GU-CWME	Single-Phase 220	60	0.06	8	69.4	500
5RK60A-CWME	Single-Phase 230	50	0.06	9	69.4	500
	Single-Phase 230	60	0.06	9	69.4	500
5IK60GU-SWM	Single-Phase 200	50	0.05	7	69.4	500
5IK60A-SWM	Single-Phase 200	60	0.05	7	69.4	500
	Single-Phase 220	60	0.06	8	69.4	500
	Single-Phase 230	60	0.06	9	69.4	500
5RK60GU-AMUL	Single-Phase 115	60	0.064	6.7	69.4	500
5RK60A-AMULA						
5RK90GU-AWMU	Single-Phase 110	60	0.12	9	69.4	500
5RK90A-AWMU	Single-Phase 115	60	0.12	9	69.4	500
5RK90GU-CWME	Single-Phase 220	60	0.06	8	69.4	500
5RK90A-CWME	Single-Phase 230	50	0.06	9	69.4	500
	Single-Phase 230	60	0.06	9	69.4	500
5IK90GU-SWM	Single-Phase 200	50	0.05	7	69.4	500
5IK90A-SWM	Single-Phase 200	60	0.05	7	69.4	500
	Single-Phase 220	60	0.06	8	69.4	500
	Single-Phase 230	60	0.06	9	69.4	500
5RK90GU-AMUL	Single-Phase 115	60	0.064	6.7	69.4	500
5RK90A-AMUL						

Gearmotor — Torque Table

●The permissible torque with decimal gearhead with a gear radio of 10 is : **2GN □ KA**: 26 lb-in / 3N·m **3GN □ KA**: 43 lb-in / 5N·m
4GN □ KA: 69 lb-in / 8N·m (for 1/25~1/36: 52 lb-in / 6N·m)
5GN □ KA: 87 lb-in / 10N·m **5GU □ KA**: 174 lb-in / 20N·m

●Single-Phase 115/230V, Three-Phase 230V 60Hz

Unit = Upper values: lb-in/Lower values: N·m

Model \ Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
2RK6GN-AWMU / 2GN□KA	0.87	1	1.4	1.7	2.2	2.6	3.6	4.3	5.2	6.5	7.8	9.4	12	14	18	21	24	26	26	26
	0.1	0.12	0.17	0.2	0.25	0.3	0.42	0.5	0.6	0.75	0.9	1.1	1.4	1.6	2	2.4	2.7	3	3	3
2RK6GN-CWME / 2GN□KA	0.87	1	0.4	1.7	2.2	2.6	3.6	4.3	5.2	6.5	7.8	9.4	12	14	18	21	24	26	26	26
	0.1	0.12	0.17	0.2	0.25	0.3	0.42	0.5	0.6	0.75	0.9	1.1	1.4	1.6	2	2.4	2.7	3	3	3
2RK6GN-AMUL / 2GN□KA	0.8	0.97	1.3	1.6	2	2.4	3.4	4	4.8	6	7.3	8.7	11	13	16	20	22	26	26	26
	0.092	0.11	0.15	0.18	0.23	0.28	0.38	0.46	0.55	0.69	0.83	1	1.3	1.5	1.9	2.3	2.5	3	3	3
3RK15GN-AWMU / 3GN□KA	2.2	2.7	3.7	4.4	5.5	6.7	9.2	11	13	17	20	24	30	36	43	43	43	43	43	43
	0.26	0.31	0.43	0.51	0.64	0.77	1.1	1.3	1.5	1.9	2.3	2.8	3.5	4.2	5	5	5	5	5	5
3RK15GN-AMUL / 3GN□KA	2	2.4	3.3	4	5	6	8.4	10	12	15	18	22	27	33	41	43	43	43	43	43
	0.23	0.28	0.38	0.46	0.58	0.69	0.96	1.2	1..4	1.7	2.1	2.5	3.1	3.8	4.7	5	5	5	5	5
4RK25GN-AWMU / 4GN□KA	3.6	4.3	6	7.2	9	11	15	18	22	27	32	39	49	58	69	69	69	69	69	69
	0.41	0.5	0.69	0.83	1	1.2	1.7	2.1	2.5	3.1	3.7	4.5	5.6	6.7	8	8	8	8	8	8
4RK25GN-CWME / 4GN□KA	3.6	4.3	6	7.2	9	11	15	18	22	27	32	39	49	58	69	69	69	69	69	69
	0.41	0.5	0.69	0.83	1	1.2	1.7	2.1	2.5	3.1	3.7	4.5	5.6	6.7	8	8	8	8	8	8
4IK25GN-SWM / 4GN□KA	3.4	4	5.6	6.7	8.4	10	14	17	20	25	30	36	46	55	69	69	69	69	69	69
	0.39	0.47	0.65	0.78	0.97	1.2	1.6	1.9	2.3	2.9	3.5	4.2	5.3	6.3	7.9	8	8	8	8	8
4RK25GN-AMUL / 4GN□KA	3.4	4	5.6	6.7	8.4	10	14	17	20	25	30	36	46	55	69	69	69	69	69	69
	0.39	0.47	0.65	0.78	0.97	1.2	1.6	1.9	2.3	2.9	3.5	4.2	5.3	6.3	7.9	8	8	8	8	8
5RK40GN-AWMU / 5GN□KA	5.7	6.8	9.5	11	14	17	24	28	34	43	51	62	77	87	87	87	87	87	87	87
	0.66	0.79	1.1	1.3	1.6	2	2.7	3.3	3.9	4.9	5.9	7.1	8.9	10	10	10	10	10	10	10
5RK40GN-CWME / 5GN□KA	5.5	6.6	9.1	11	14	16	23	27	33	41	49	59	74	87	87	87	87	87	87	87
	0.63	0.76	1.1	1.3	1.6	1.9	2.6	3.2	3.8	4.7	5.7	6.8	8.6	10	10	10	10	10	10	10
5IK40GN-SWM / 5GN□KA	5.5	6.6	9.1	11	14	16	23	27	33	41	49	59	74	87	87	87	87	87	87	87
	0.63	0.76	1.1	1.3	1.6	1.9	2.6	3.2	3.8	4.7	5.7	6.8	8.6	10	10	10	10	10	10	10
5RK40GN-AMUL / 5GN□KA	5.5	6.6	9.1	11	14	16	23	27	33	41	49	59	74	87	87	87	87	87	87	87
	0.63	0.76	1.1	1.3	1.6	1.9	2.6	3.2	3.8	4.7	5.7	6.8	8.6	10	10	10	10	10	10	10
5RK60GU-AWMU / 5GU□KA	8.5	10	14	17	21	26	32	38	46	58	70	83	116	139	155	174	174	174	174	174
	0.98	1.2	1.6	2	2.5	3	3.7	4.4	5.3	6.7	8	9.6	13	16	18	20	20	20	20	20
5RK60GU-CWME / 5GU□KA	8.5	10	14	17	21	26	32	38	46	58	70	83	116	139	155	174	174	174	174	174
	0.98	1.2	1.6	2	2.5	3	3.7	4.4	5.3	6.7	8	9.6	13	16	18	20	20	20	20	20
5IK60GU-SWM / 5GU□KA	8	9.6	13	16	20	24	30	36	43	54	65	78	109	131	146	174	174	174	174	174
	0.92	1.1	1.5	1.8	2.3	2.8	3.5	4.2	5	6.3	7.5	9	13	15	17	20	20	20	20	20
5RK60GU-AMUL / 5GU□KA	8	9.6	13	16	20	24	30	36	43	54	65	78	109	131	146	174	174	174	174	174
	0.92	1.1	1.5	1.8	2.3	2.8	3.5	4.2	5	6.3	7.5	9	13	15	17	20	20	20	20	20
5RK90GU-AWMU / 5GU□KA	12	15	21	25	31	37	46	56	67	84	100	121	167	174	174	174	174	174	174	174
	1.4	1.7	2.4	2.8	3.6	4.3	5.3	6.4	7.7	9.7	12	14	19	20	20	20	20	20	20	20
5RK90GU-CWME / 5GU□KA	13	15	21	26	32	38	48	57	69	87	104	125	173	174	174	174	174	174	174	174
	1.5	1.8	2.5	2.9	3.7	4.4	5.5	6.6	7.9	10	12	14	20	20	20	20	20	20	20	20
5IK90GU-SWM / 5GU□KA	12	14	20	24	30	36	45	54	65	82	98	118	163	174	174	174	174	174	174	174
	1.4.	1.7	2.3	2.8	3.5	4.2	5.2	6.2	7.5	9.4	11	14	19	20	20	20	20	20	20	20
5RK90GU-AMUL/ 5GU□KA	12	14	20	24	30	36	45	54	65	82	98	118	163	174	174	174	174	174	174	174
	1.4	1.7	2.3	2.8	3.5	4.2	5.2	6.2	7.5	9.4	11	14	19	20	20	20	20	20	20	20

●Single-Phase 230V 50Hz

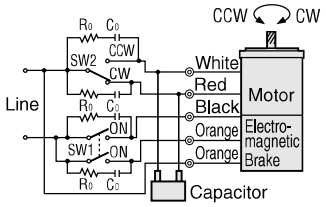
Unit = Upper values: lb-in/Lower values: N·m

Model \ Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
2RK6GN-CWME / 2GN□KA	1	1.2	1.7	2.1	2.6	3.1	4.3	5.2	6.2	7.8	9.3	11	14	17	21	25	26	26	26	26
	0.12	0.14	0.2	0.24	0.3	0.36	0.5	0.6	0.71	0.89	1.1	1.3	1.6	1.9	2.4	2.9	3	3	3	3
4RK25GN-CWME / 4GN□KA	4.3	5.2	7.2	8.7	11	13	18	22	26	33	39	47	59	69	69	69	69	69	69	69
	0.5	0.6	0.83	1	1.2	1.5	2.1	2.5	3	3.7	4.5	5.4	6.8	8	8	8	8	8	8	8
5RK40GN-CWME / 5GN□KA	6.6	8	11	13	17	20	28	33	40	50	60	72	87	87	87	87	87	87	87	87
	0.77	0.92	1.3	1.5	1.9	2.3	3.2	3.8	4.6	5.7	6.9	8.3	10	10	10	10	10	10	10	10
5RK60GU-CWME / 5GU□KA	10	12	17	21	26	31	39	47	56	70	84	101	140	168	174	174	174	174	174	174
	1.2	1.4	2	2.4	3	3.6	4.5	5.4	6.4	8.1	9.7	12	16	19	20	20	20	20	20	20
5RK90GU-CWME / 5GU□KA	15	18	26	31	38	46	58	69	83	104	125	150	174	174	174	174	174	174	174	174
	1.8	2.1	3	3.5	4.4	5.3	6.7	8	9.6	12	14	17	20	20	20	20	20	20	20	20

●Gearheads are sold separately.
●Enter the gear ratio in the box (□) within the model number. A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.
●The speed is calculated by dividing the motor's synchronous speed (60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the displayed value, depending on the size of the load.
●Right-Angle gearheads may be connected to 25W, 40W, 60W and 90W motors.
●See page A-19 for more information regarding the use of gearheads, maximum permissible torque, permissible overhung load and permissible thrust load.

Wiring Diagrams

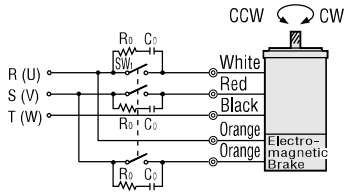
2RK6GN-AWMU
2RK6GN-CWME
3RK15GN-AWMU
4RK25GN-AWMU
4RK25GN-CWME
5RK40GN-AWMU
5RK40GN-CWME
5RK60GU-AWMU
5RK60GU-CWME
5RK90GU-AWMU
5RK90GU-CWME



SW No.	Specifications of Switches		Note
	Single-Phase 110VAC Single-Phase 115VAC	Single-Phase 220VAC Single-Phase 230VAC	
SW1 SW2	125VAC 3A Min Inductive	250VAC 1.5A Min Inductive	Single-pole-double -throw switch
Ro. Co Surge absorber	Ro=5~200Ω Co=0.1~0.2μF 200WV		Accessories **EPCR1201-2**

Run/Stop: SW1 operates motor and electromagnetic brake action. Motor will rotate when SW1 is switched to ON (short circuit).
When SW1 is switched to OFF (open), the motor is stopped immediately by the electromagnetic brake and holds the load.
If you wish to release the brake while the motor is stopped, apply voltage between only two brake lead wires (orange). The electromagnetic brake is released and the motor shaft can be rotated easily by hand.
Direction of Rotation: To rotate the motor in a clockwise (CW) direction, switch SW2 to CW. To rotate it in a counterclockwise (CCW) direction, switch SW2 to CCW.
Direction of motor rotation are shown when the motor is viewed from the shaft end of the motor.

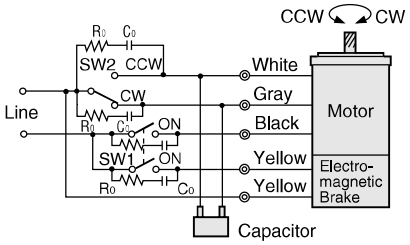
4IK25GN-SWM
5IK40GN-SWM
5IK60GU-SWM
5IK90GU-SWM



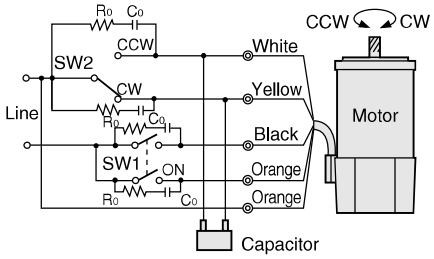
SW No.	Specifications of Switch	Note
SW1	250VAC 5A Min Inductive	Single-pole-double -throw switch
Ro. Co Surge absorber	Ro=5~200Ω Co=0.1~0.2μF 200WV	Accessories **EPCR1201-2**

Run/Stop: SW1 operates motor and electromagnetic brake action. Motor will rotate when SW1 is switched to ON (short circuit).
When SW1 is switched to OFF (open), the motor is stopped immediately by the electromagnetic brake and holds the load.
If you wish to release the brake while the motor is stopped, apply voltage between only two brake lead wires (orange). The electromagnetic brake is released and the motor shaft can be rotated easily by hand.
Direction of Rotation: To change the rotation, change any two connections between U, V and W.

2RK6GN-AMUL
2RK6A-AMULA
3RK15GN-AMUL
3RK15A-AMULA
4RK25GN-AMUL
4RK25A-AMULA
5RK40GN-AMUL
5RK40A-AMULA



5RK60GU-AMUL
5RK60A-AMUL
5RK90GU-AMUL
5RK90A-AMUL



Run/Stop
SW1 operates motor and electromagnetic brake action. Motor will rotate when SW1 is switched to ON (short circuit).
When SW1 is switched to OFF (open), the motor is stopped immediately by the electromagnetic brake and holds the load.
If you wish to release the brake while the motor is stopped, apply voltage between only two brake lead wires (orange or yellow). The electromagnetic brake is released and the motor shaft can be rotated easily by hand.

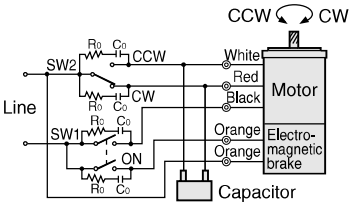
Direction of Rotation
To rotate the motor in a clockwise (CW) direction, switch SW2 to CW. To rotate it in a counterclockwise (CCW) direction, switch SW2 to CCW.
Directions of motor rotation are shown when the motor is viewed from the shaft end of the motor.

SW No.	Specifications of Switch	Note
SW1	125VAC 3A Min (6W~40W) 125VAC 5A Min (60W, 90W) Inductive	Single-pole-double -throw switch
Ro. Co Surge absorber	Ro=5~200Ω Co=0.1~0.2μF 200WV	Accessories **EPCR1201-2**

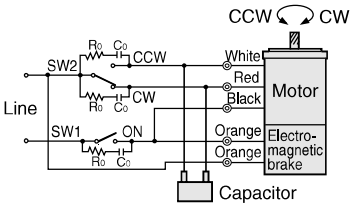
Variation in braking time according to connection

Connection can be simplified by using the wiring diagram shown in figure ②, rather than the normal wiring shown in figure ①.
Using the connection shown in figure ②, however, results in a 50 msec. increase in braking time over that shown in figure ①, with a corresponding increase in overrun.
The reason for this is that the electromagnetic energy of the motor continues to have an effect on the coil of the electromagnetic brake, so that the electromagnet continues to operate for 50 msec. even though the excitation has been canceled. The brake therefore takes longer to engage.

① **Normal Connection**

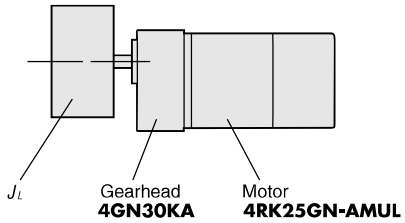


② **Simplified Connection**



Starting and Braking Characteristics

As an example, we have calculated the motor starting time, braking time and overrun when driving an inertial load (J_L= 1375 oz-in^2) for the motor **4RK25GN-AMUL** when combined with the gearhead **4GN30KA**.



First, convert load inertia to its corresponding value at the motor shaft.

$$J_M = \frac{J_L}{i^2} = \frac{1375}{30^2} \fallingdotseq 1.5\,[\text{oz-in}^2]$$

J_L: Inertia of the load [oz-in^2]
J_M: Inertia at motor shaft [oz-in^2]
i : Gear ratio

Overrun

The overrun of the motor shaft based on the graph on the next page is:

$N_M \fallingdotseq 2.6$ revolutions

Overrun of gearhead output shaft is:

$$N_G = \frac{N_M}{i} = \frac{2.6}{30} = 0.09 \text{ revolutions } (32°)$$

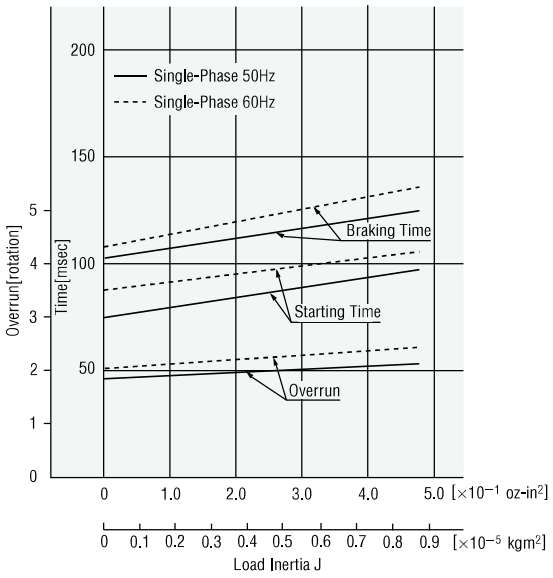
Starting time and braking time

Using the graph again gives:

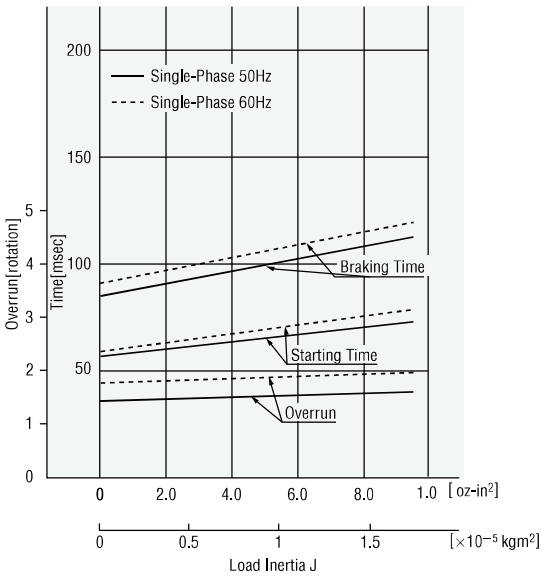
Starting time $t_1 \fallingdotseq 110$ msec
Braking time $t_2 \fallingdotseq 130$ msec

The starting time of an electromagnetic brake motor is equal to the motor starting time plus the electromagnetic brake release time. If the electromagnetic brake is left released, the motor can be started much faster. Optimum time for release of the brake is at least 10 msec. before starting up the motor.

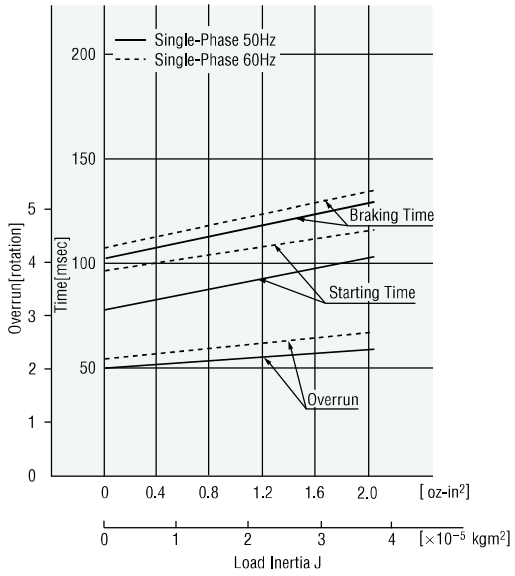
2RK6GN-AWMU / 2RK6GN-CWME



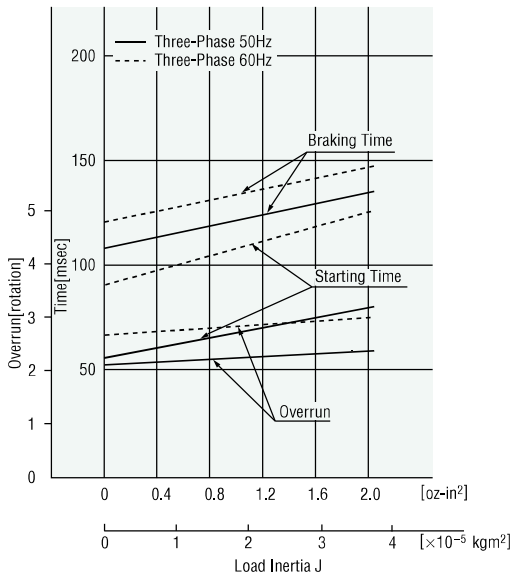
3RK15GN-AWMU / 3RK15GN-AMUL



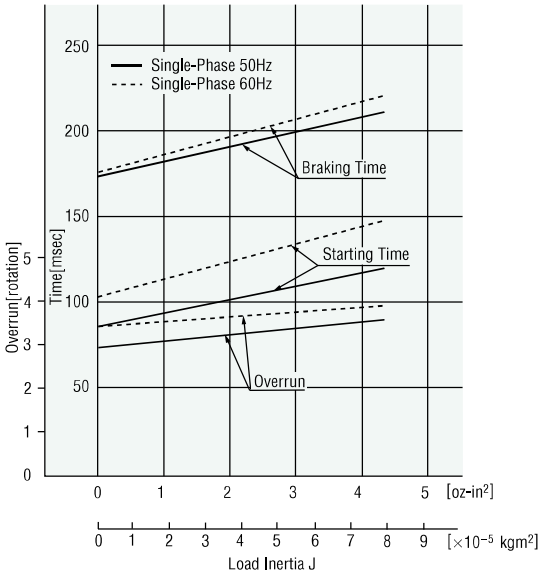
4RK25GN-AWMU / 4RK25GN-CWME
4RK25GN-AMUL



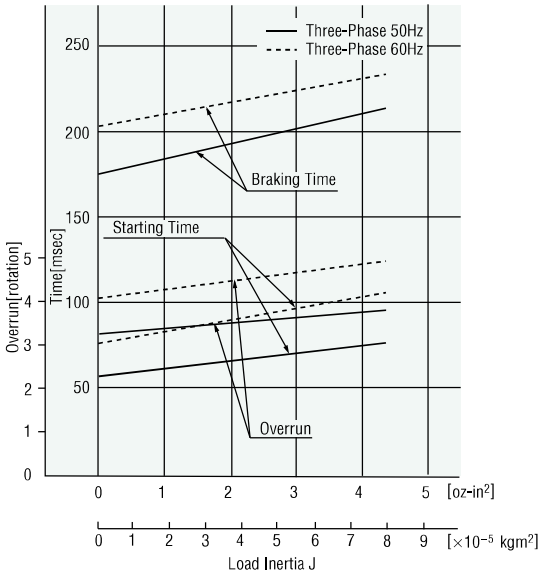
4IK25GN-SWM



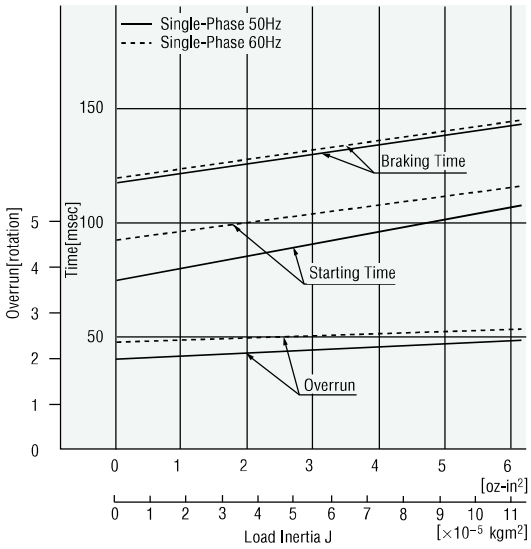
5RK40GN-AWMU / 5RK40GN-CWME
5RK40GN-AMUL



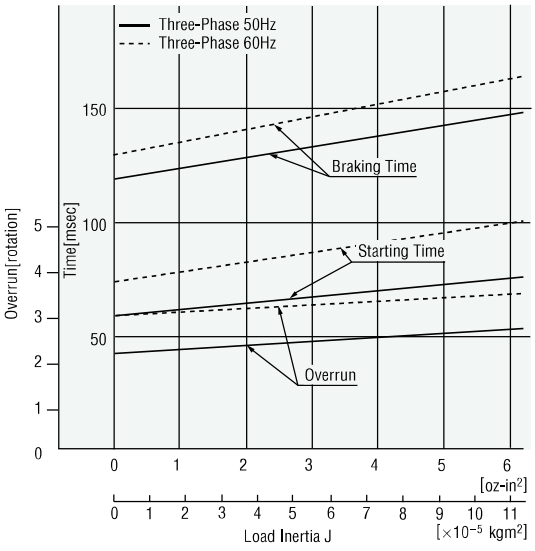
5IK40GN-SWM



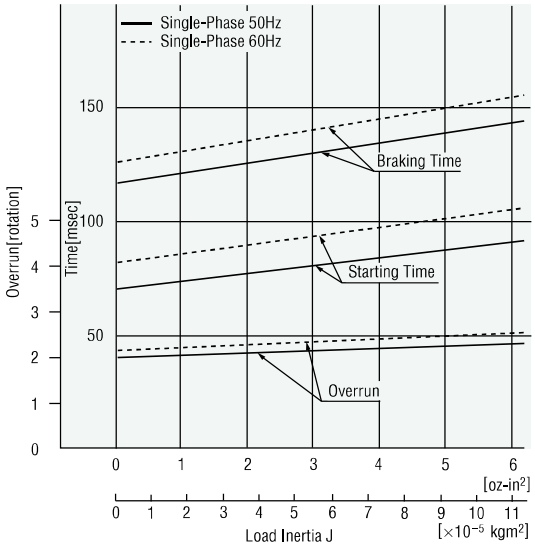
5RK60GU-AWMU / 5RK60GU-CWME
5RK60GU-AMUL



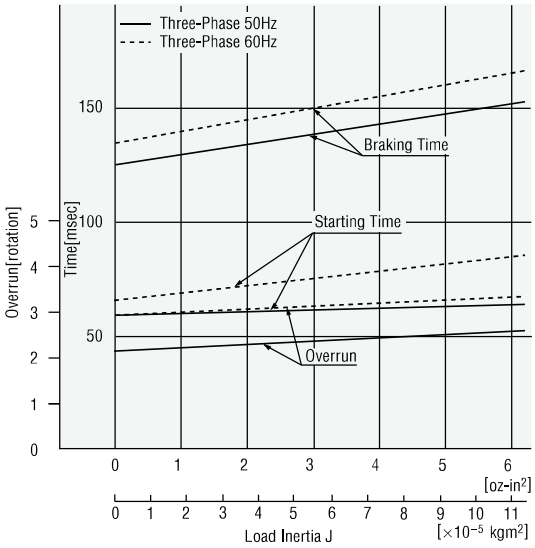
5IK60GU-SWM



5RK90GU-AWMU / 5RK90GU-CWME
5RK90GU-AMUL



5IK90GU-SWM



Dimensions

Scale 1/4, Unit = **inch** (mm)

●Motor

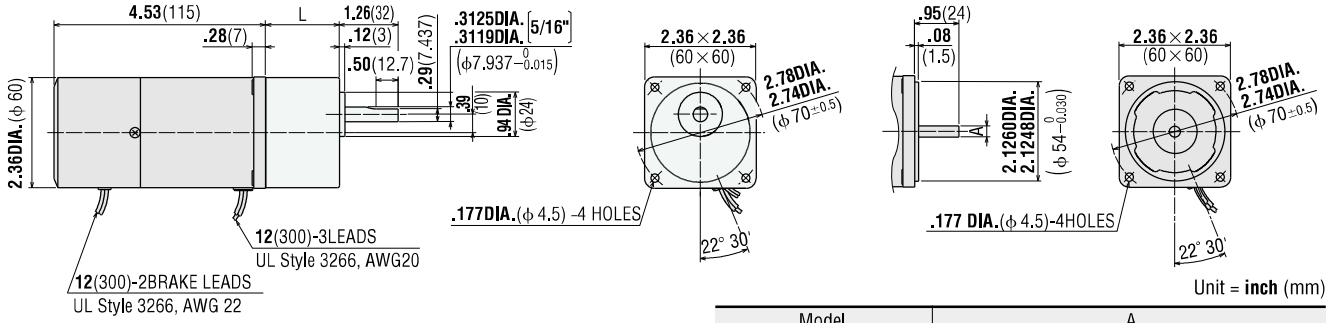
2RK6GN-AWMU Weight (Mass): 2.0 lb. (0.9 kg)
2RK6GN-CWME Weight (Mass): 2.0 lb. (0.9 kg)
2RK6GN-AMUL Weight (Mass): 2.0 lb. (0.9 kg)

Gearhead

2GN□KA
Weight (Mass): 0.88 lb. (0.4 kg)

● Round Shaft Type

2RK6A-AWMU Weight (Mass): 2.0 lb. (0.9 kg)
2RK6A-CWME
2RK6A-AMULA Weight (Mass): 2.0 lb. (0.9 kg)



Unit = **inch** (mm)

Model	A
2RK6A-AWME	.2362DIA. (ϕ6 0 −0.012)
2RK6A-CWME	.2357DIA.
2RK6A-AMULA	.2500DIA. **[1/4"]** (ϕ6.35 0 −0.010)
	.2496DIA.

L = **1.18** (30) **2GN3KA~18KA**
L = **1.57** (40) **2GN25KA~180KA**

●Motor

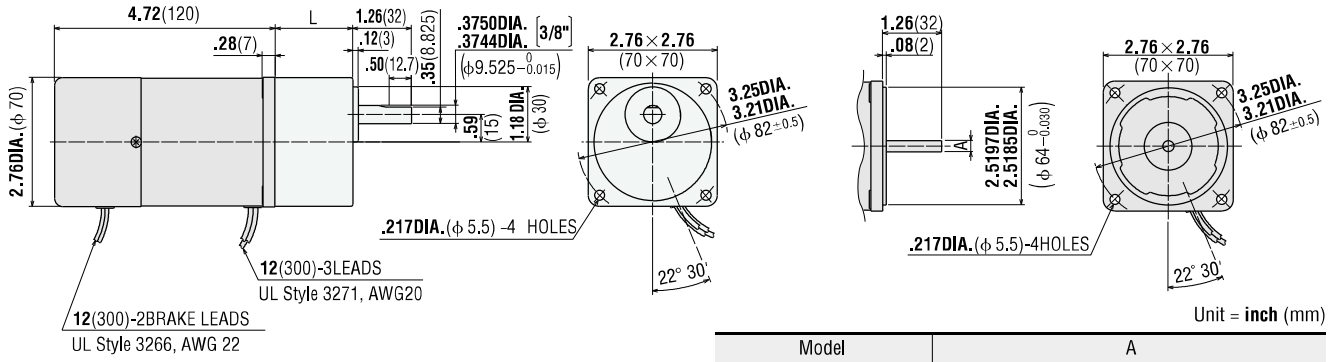
3RK15GN-AWMU Weight (Mass): 2.9 lb. (1.3 kg)
3RK15GN-AMUL Weight (Mass): 2.9 lb. (1.3 kg)

Gearhead

3GN□KA
Weight (Mass): 1.21 lb. (0.55 kg)

● Round Shaft Type

3RK15A-AWMU Weight (Mass): 2.9 lb. (1.3 kg)
3RK15A-AMULA Weight (Mass): 2.9 lb. (1.3 kg)



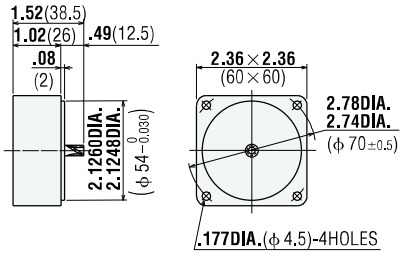
Unit = **inch** (mm)

Model	A
3RK15A-AWMU	.2362DIA. (ϕ6 0 −0.012)
	.2357DIA.
3RK15A-AMULA	.2500DIA. **[1/4"]** (ϕ6.35 0 −0.010)
	.2496DIA.

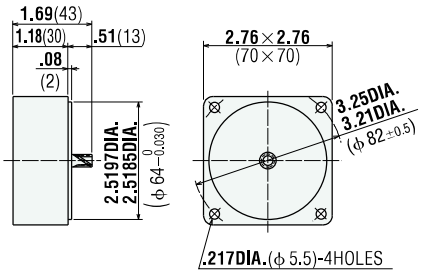
L = **1.26** (32) **3GN3KA~18KA**
L = **1.65** (42) **3GN25KA~180KA**

●Decimal Gearheads

2GN10XK
Weight (Mass): 0.44 lb. (0.2 kg)



3GN10XK
Weight (Mass): 0.66 lb. (0.3 kg)



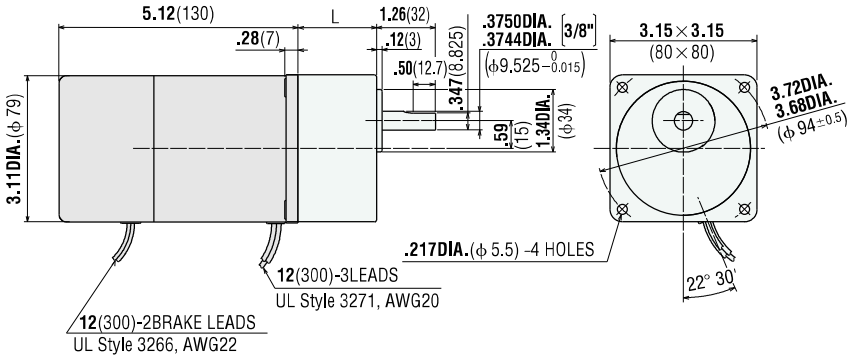
● Motor

4RK25GN-AWMU	Weight (Mass): 4.4 lb. (2.0 kg)
4RK25GN-CWME	Weight (Mass): 4.4 lb. (2.0 kg)
4IK25GN-SWM	Weight (Mass): 4.4 lb. (2.0 kg)
4RK25GN-AMUL	Weight (Mass): 4.2 lb. (1.9 kg)

Gearhead

4GN□KA

Weight (Mass): 1.43 lb.(0.65 kg)

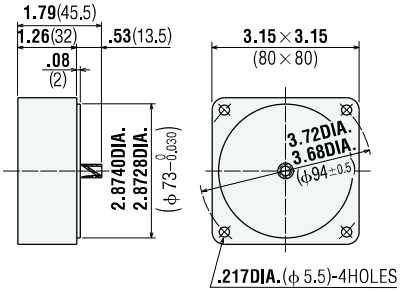


L = **1.26** (32) **4GN3KA**~**18KA**
L = **1.67** (42.5) **4GN25KA**~**180KA**

● **Decimal Gearheads**

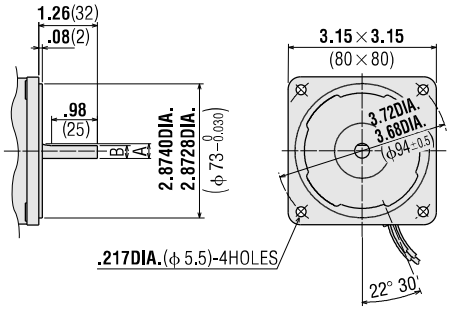
4GN10XK

Weight (Mass): 0.88 lb. (0.4 kg)



● **Round Shaft Type**

4RK25A-AWMU	Weight (Mass): 4.4 lb. (2.0 kg)
4RK25A-CWME	Weight (Mass): 4.4 lb. (2.0 kg)
4IK25A-SWM	Weight (Mass): 4.4 lb. (2.0 kg)
4RK25A-AMULA	Weight (Mass): 4.2 lb. (1.9 kg)



Unit = **inch** (mm)

Model	A	B
4RK25A-AWME **4RK25A-CWME** **4RK25A-SWM**	**.3150DIA.** **.3144DIA.** (ϕ 8 0 −0.015)	**.28** (7)
4RK25A-AMULA	**.3125DIA.** **.3120DIA.** **[5/16"]** (ϕ 7.937 0 −0.011)	**.28** (7.037)

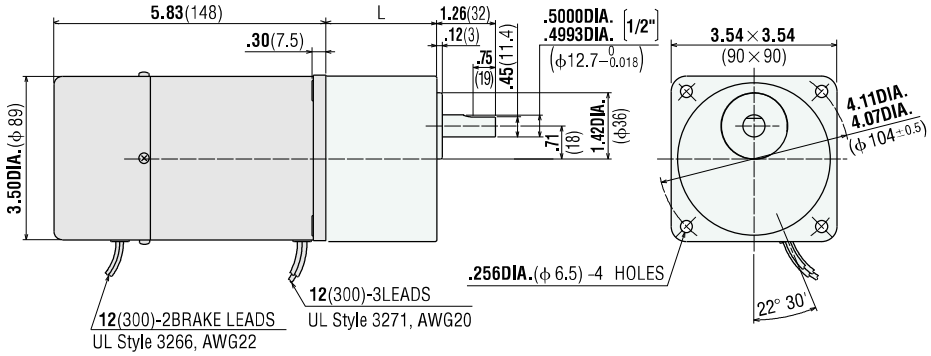
● Motor

5RK40GN-AWMU	Weight (Mass): 6.4 lb. (2.9 kg)
5RK40GN-CWME	Weight (Mass): 6.4 lb. (2.9 kg)
5IK40GN-SWM	Weight (Mass): 6.4 lb. (2.9 kg)
5RK40GN-AMUL	Weight (Mass): 6.4 lb. (2.9 kg)

Gearhead

5GN□KA

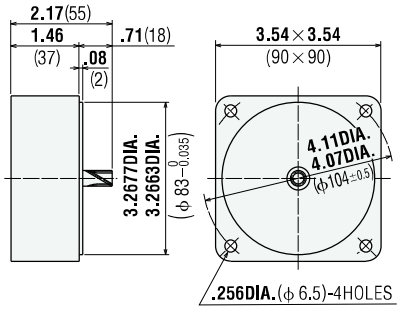
Weight (Mass): 3.3 lb. (1.5 kg)



L=**1.65** (42) **5GN3KA**~**18KA**
L=**2.36** (60) **5GN25KA**~**180KA**

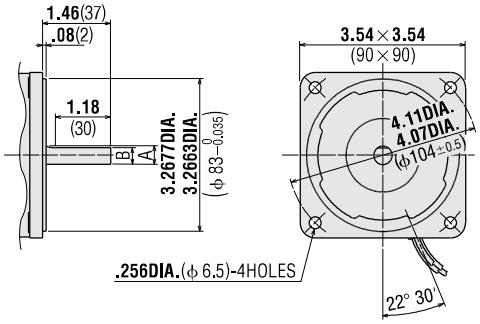
5GN10XK

Weight (Mass): 1.32 lb. (0.6 kg)



● Round Shaft Type

5RK40A-AWMU	Weight (Mass): 6.4 lb. (2.9 kg)
5RK40A-CWME	Weight (Mass): 6.4 lb. (2.9 kg)
5IK40A-SWM	Weight (Mass): 6.4 lb. (2.9 kg)
5RK40A-AMULA	Weight (Mass): 6.4 lb. (2.9 kg)



Unit = **inch** (mm)

Model	A	B
5RK40A-AWME **5RK40A-CWME** **5IK40A-SWM**	**.3937DIA.** **.3933DIA.** (ϕ 10 0 −0.011)	**.35** (9)
5RK40A-AMULA	**.3750DIA.** **.3746DIA.** **[6/16"]** (ϕ 9.525 0 −0.011)	**.35** (8.825)

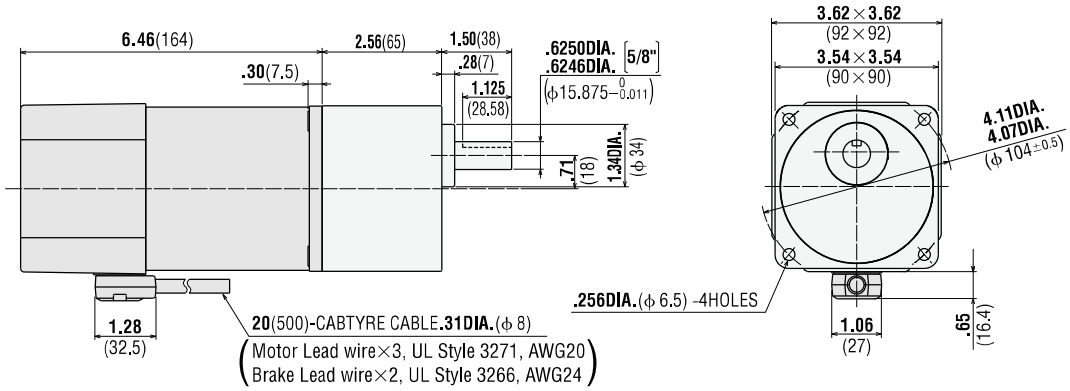
● **Motor**

5RK60GU-AWMU	Weight (Mass): 7.5 lb. (3.4 kg)
5RK60GU-CWME	Weight (Mass): 7.5 lb. (3.4 kg)
5IK60GU-SWM	Weight (Mass): 7.5 lb. (3.4 kg)
5RK60GU-AMUL	Weight (Mass): 7.5 lb. (3.4 kg)

Gearhead

5GU□KA

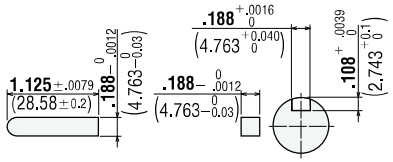
Weight (Mass): 3.3 lb. (1.5 kg)



Cable direction can be switched to the opposite direction.

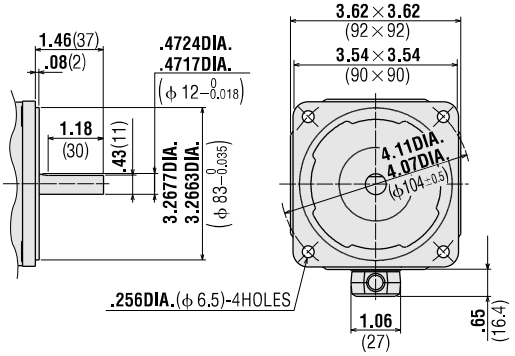
● **Key and Key Slot**

The key is provided with the gearhead.



● **Round Shaft Type**

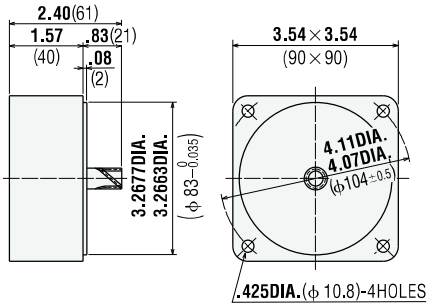
5RK60A-AWMU	Weight (Mass): 7.5 lb. (3.4 kg)
5RK60A-CWME	Weight (Mass): 7.5 lb. (3.4 kg)
5IK60A-SWM	Weight (Mass): 7.5 lb. (3.4 kg)
5RK60A-AMUL	Weight (Mass): 7.5 lb. (3.4 kg)



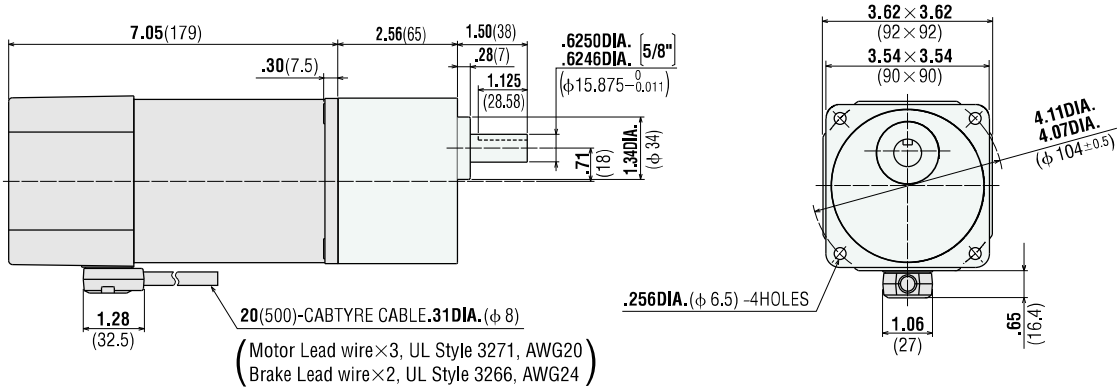
● **Decimal Gearheads**

5GU10XKB

Weight (Mass): 1.32 lb. (0.6 kg)



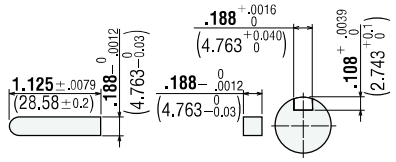
Motor		Gearhead
5RK90GU-AWMU	Weight (Mass): 8.6 lb. (3.9 kg)	
5RK90GU-CWME	Weight (Mass): 8.6 lb. (3.9 kg)	**5GU□KA**
5IK90GU-SWM	Weight (Mass): 8.6 lb. (3.9 kg)	
5RK90GU-AMUL	Weight (Mass): 8.6 lb. (3.9 kg)	Weight (Mass): 3.3 lb. (1.5 kg)



Cable direction can be switched to the opposite direction.

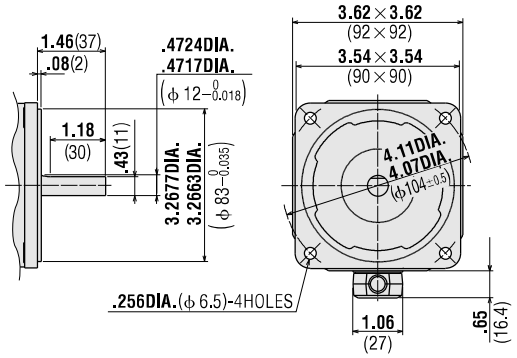
Key and Key Slot

(provided with the gearhead.)



Round Shaft Type

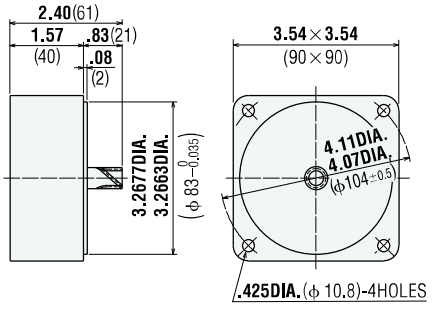
5RK90A-AWMU	Weight (Mass): 8.6 lb.(3.9 kg)
5RK90A-CWME	Weight (Mass): 8.6 lb.(3.9 kg)
5IK90A-SWM	Weight (Mass): 8.6 lb.(3.9 kg)
5RK90A-AMUL	Weight (Mass): 8.6 lb.(3.9 kg)



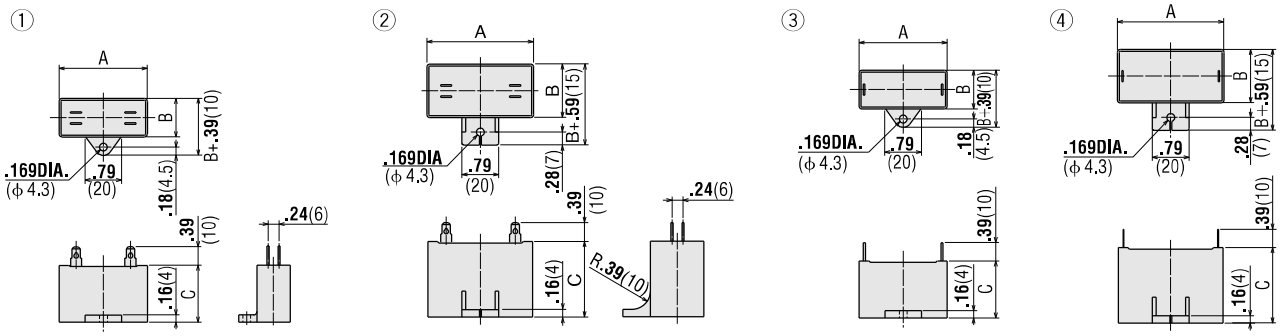
Decimal Gearheads

5GU10XKB

Weight (Mass): 1.32 lb. (0.6 kg)



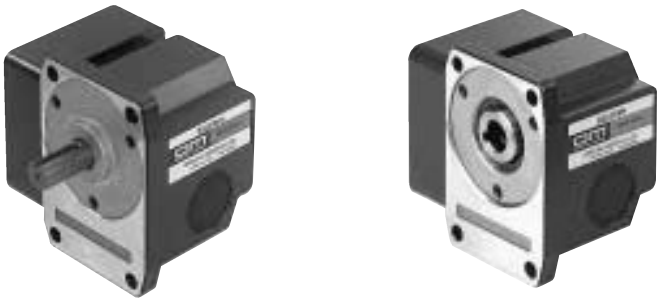
● Capacitor (included with the motor)



Motor Model		Capacitor	Dimensions inch (mm)			Weight		No.
Pinion Shaft Type	Round Shaft Type	Model	A	B	C	oz.	(g)	
2RK6GN-AWMU	**2RK6A-AWMU**	CH35FAUL	1.22 (31)	.67 (17)	1.06 (27)	0.88	25	①
2RK6GN-CWME	**2RK6A-CWME**	CH08BFAUL	1.22 (31)	.67 (17)	1.06 (27)	0.88	25	①
2RK6GN-AMUL	**2RK6A-AMULA**	CH23UL	1.22 (31)	.57 (14.5)	.93 (23.5)	0.63	18	③
3RK15GN-AWMU	**3RK15A-AWMU**	CH60CFAUL	1.50 (38)	.83 (21)	1.22 (31)	1.4	40	①
3RK15GN-AMUL	**3RK15A-AMULA**	CH45UL	1.46 (37)	.71 (18)	1.06 (27)	0.99	28	③
4RK25GN-AWMU	**4RK25A-AWMU**	CH80CFAUL	1.89 (48)	.75 (19)	1.14 (29)	1.4	40	①
4RK25GN-CWME	**4RK25A-CWME**	CH20BFAUL	1.89 (48)	.75 (19)	1.14 (29)	1	35	①
4RK25GN-AMUL	**4RK25A-AMULA**	CH70UL	1.50 (38)	.83 (21)	1.22 (31)	1.3	37	③
5RK40GN-AWMU	**5RK40A-AWMU**	CH120CFAUL	2.28 (58)	.83 (21)	1.22 (31)	1.8	50	①
5RK40GN-CWME	**5RK40A-CWME**	CH35BFAUL	2.28 (58)	.87 (22)	1.38 (35)	1.9	55	①
5RK40GN-AMUL	**5RK40A-AMULA**	CH120UL	1.89 (48)	.83 (21)	1.22 (31)	1.6	45	③
5RK60GU-AWMU	**5RK60A-AWMU**	CH200CFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.4	95	②
5RK60GU-CWME	**5RK60A-CWME**	CH50BFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.0	85	②
5RK60GU-AMUL	**5RK60A-AMULA**	CH200UL	2.28 (58)	.93 (23.5)	1.46 (37)	2.3	65	④
5RK90GU-AWMU	**5RK90A-AWMU**	CH300CFAUL	2.28 (58)	1.38 (35)	1.97 (50)	4.9	140	②
5RK90GU-CWME	**5RK90A-CWME**	CH70BFAUL	2.28 (58)	1.38 (35)	1.97 (50)	4.6	130	②
5RK90GU-AMUL	**5RK90A-AMUL**	CH250UL	2.28 (58)	1.14 (29)	1.61 (41)	3.2	90	④

■ Right-Angle Gearheads (Sold Separately)

The right-angle gearhead provides an output shaft that is at a right angle to the motor's output shaft. See page [A-216] for specifications and other information.



■ Accessories (Sold Separately)

●Motor Mounting Brackets

Optional die-cast aluminum mounting brackets are available. They can be used to install motors without gearheads. See page[A-266] for the dimensions.

●Flexible Coupling

Optional clamp-type couplings are available. See page[A-260] for dimensions.

Clutch and Brake Motors

C•B Motors

This compact precision motor is equipped with an internal clutch and brake for use with a gearhead. The combination makes it the ideal motor for uses involving frequent START/STOP operation, positioning, indexing, jogging and incremental feeding.

Gearhead shown in the photograph is sold separately.

SAFETY STD. | GEAR | LOAD HOLD | AC INPUT

Product Number Code

CB I 5 40 - 7 0 1W U

- **U**: With capacitor for 110V/115V
- **1W**: Single-Phase 110V/115 V
- **Clutch Brake Type**
  0: Excitation type
- **Motor Shaft Type**
  7: **GC-** type pinion shaft
  8: **GCH-** type pinion shaft
- **Output Power**
  40: 40W
  60: 60W
  90: 90W
- **Motor Frame Size**
  5: 3.54 in.sq. (90mm sq.)
- **Motor Type**
  I: Induction motor
- **Series**: Clutch and Brake Motor

Note : The "**U**" at the end of the part number indicate that the unit includes a capacitor. This letter is not listed on the motor nameplate.

Features

•Suitable for high-frequency operation

The high-frequency and high-response clutch and brake enables frequent starting and stopping.

•Compact and easy to handle

The compact design simplifies handling and enables the drive unit of the machine to be mounted into a small area.

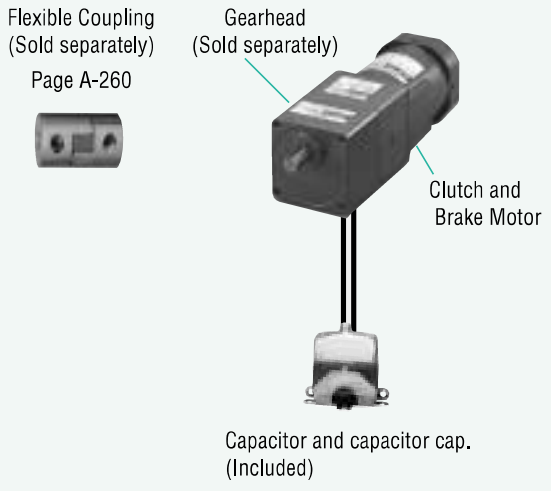
•Highly reliable gearhead employed

GC- type and **GCH-** type gearheads are specifically designed for **C•B** motors and boast excellent impact resistance, greater strength and high reliability.

•Quick response time

The **C•B** motor is designed so that it runs continuously. This gives the advantage of a quicker response time and a higher torque in order to move the load.
The output shaft is controlled through the use of the clutch and brake mechanism. The load is stopped by disengaging the clutch and applying the brake. The motor is always affected by the rotor inertia. However, with a clutch and brake unit, the load is not affected by the rotor inertia.
For these reasons, **C•B** motors boast superior response over other AC standard motors, starting and stopping in considerably less time.
To meet high-frequency, starting and stopping applications, Oriental Motor uses an induction motor for continuous duty. An induction motor is best suited for uni-directional movements. The **C•B** motor is not suitable for frequent bi-directional starting and stopping motion.

Construction



Product Lines

To select the appropriate **C·B** motor, consult the output power characteristics on page A-198.

Model Frame Size	Output Power HP	Output Power W	Voltage VAC	Model	Motor Model	Gearhead Model
3.54 in.sq. (90 mm sq.)	1/18.5	40	Single-Phase 100/115	**CBI540-701WU**	5IK40GN-AW-CB1	**5GC□KA** (Sold separately)
	1/12.5	60	Single-Phase 100/115	**CBI560-801WU**	5IK60GU-AW-CB1	**5GCH□KA** (Sold separately)
	1/8	90	Single-Phase 100/115	**CBI590-801WU**	5IK90GU-AW-CB1	

Note:

- The **GC-** and **GCH-** type gearheads are designed specifically for use with the **C·B** motor. Other type gearheads may not be connected.
- The motors contain a built-in thermal protector. When a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.
- The clutch and brake units is not sold separately from the motor.
- The "**U**" at the end of the part number indicate that the unit includes a capacitor. This letter is not listed on the motor nameplate.

General Motor Specifications

(After rated motor operation under normal ambient temperature and humidity.)

Item	Specifications
Insulation Resistance	100MΩ or more when 500V DC is applied between the windings and the frame.
Dielectric Strength	Sufficient to withstand 1.5kV at 50 and 60Hz applied between the windings and the frame.
Temperature Rise	144°F (80°C) or less measured by the resistance change method after rated motor operation with a gearhead.
Insulation Class	Class B 266°F(130°C)
Overheat Protection	All models have built-in thermal protectors (Automatic return type) Operating temperature, open: 266°F±41°F (130°C±5°C) close: 179.6°F±59°F (82°C±15°C)
Ambient Temperature Range	14°F~104°F (−10°C~+40°C)
Ambient Humidity	85% maximum (noncondensing)

Clutch/Brake Specifications

Model Frame Size	Clutch / Brake	Holding Brake Torque oz-in	Holding Brake Torque mN·m	Voltage VDC	Input W (at 68°F (20°C))	Cycle Rates time/minute
3.54 in.sq. (90 mm sq.)	Clutch	208	1500	24	8.4	100
	Brake	208	1500	24	6.2	

Safety Standards and CE Marking (Motor only)

Standards	Certification Body	Standards File No.	CE Marking
UL1004 UL547 CAN/CSA-C22.2 No.100 CAN/CSA-C22.2 No.77	UL	E64197	Low Voltage Directives
EN60950	VDE	6751ÜG	
EN60034-1 EN60034-5 IEC60034-11	Conform to EN/IEC Standards. (EN/IEC certifications are scheduled.)		

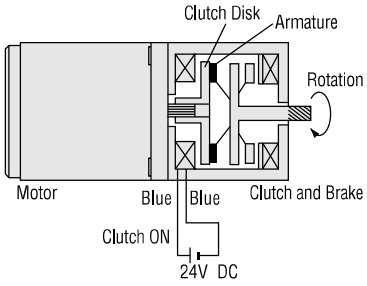
- For installation conditions for EN/IEC standards, see Page D-2.
- Motors are recognized by UL and certified by VDE. The clutch and brake unit is not UL recognized. Recognized name and certified name are motor model name.

Structure and Operations of C·B Motor

The photograph above shows the structure of the clutch and brake unit. When no 24V DC is applied to either the clutch coil or brake coil, the output shaft can be rotated by hand.

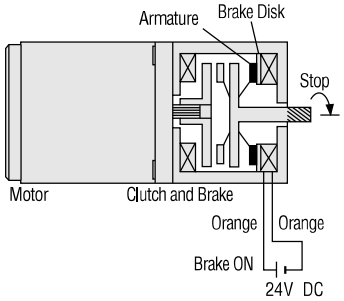
●Run

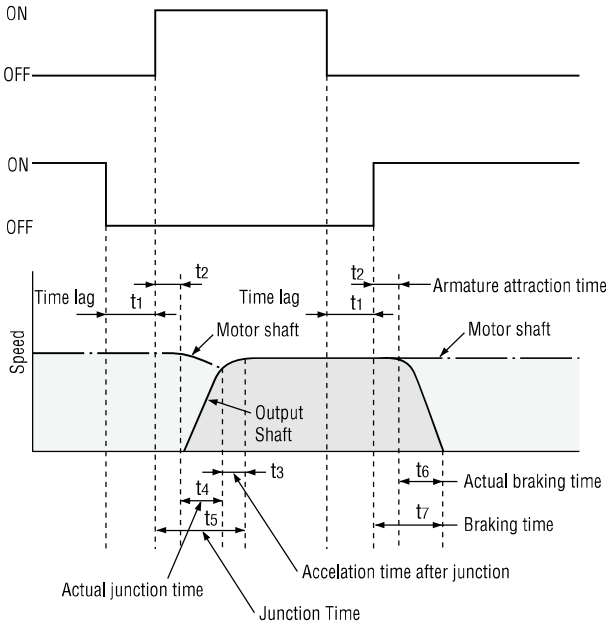
When DC 24V is applied to the clutch coil, the armature of the clutch coil is drawn against the clutch plate, transmitting motor rotation to the output shaft.



●Stop, Load Holding

By removing the DC 24V from the clutch coil, and, after a certain time lag, applying DC 24V to the brake coil, the output shaft will come to a stop. During braking output shaft is released from the motor shaft, so the shaft may be stopped without being influenced by motor inertia. The motor continues to rotate.





The figure above shows the relationship between the action of the motor shaft and output shaft and the state of excitation of the clutch and brake coils.

●Operation

When operation is shifted from holding the load to moving the load, there is a lag of 20 msec. between the time the brake is released and the time voltage is applied to the clutch. This is to prevent the clutch and brake from engaging at the same time. The time required for the clutch/brake output shaft to reach a constant speed after voltage is applied to the clutch is called the junction time (t5) and is calculated by adding the following elements:

① **Armature attraction time t_2**
The time from application of voltage to the clutch coil until contact of the armature with the clutch plate.

② **Actual junction time t_4**
The time required after the armature comes in contact with the clutch for the clutch/brake output shaft, accelerated by dynamic friction torque, to engage completely with the motor shaft.

③ **Acceleration time after junction t_3**
The time needed to accelerate back to the required speed if load is applied suddenly to the motor during actual junction time above, causing a temporary drop in speed.

●Braking

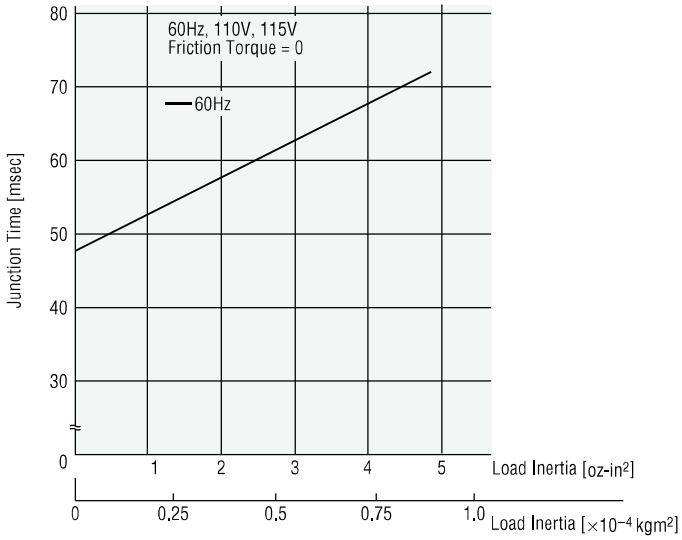
When operation is shifted from rotation to stopping or holding of a load, a time lag of about 20 msec. is necessary after the clutch is disengaged before voltage is applied to the brake coil.
The time required after applying voltage to the brake for the clutch/brake output shaft to actually stop is called the braking time (t7), and is obtained by adding the following elements:

① **Armature attraction time t_2**
The time from the application of voltage to the clutch coil until contact of the armature with the brake plate.

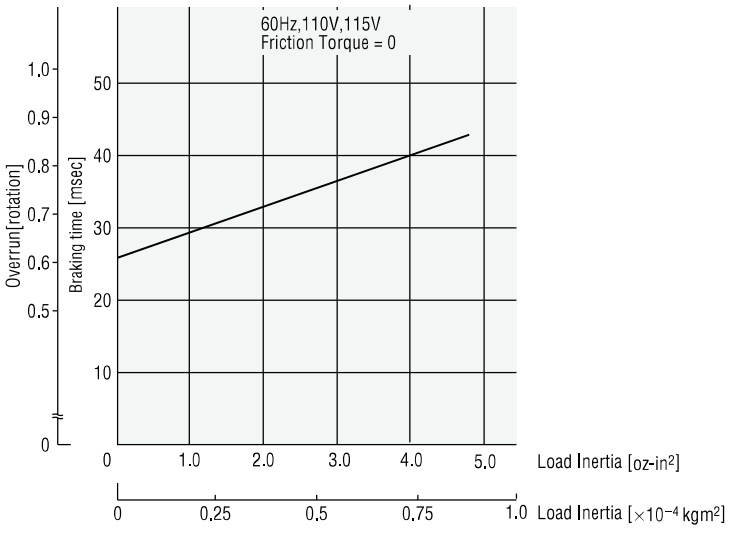
② **Actual braking time t_6**
The time from the moment the armature comes in contact with the brake plate until the moment the output shaft comes to a complete stop.

The following graphs indicate examples of junction and braking characteristics.

Junction Characteristics **CBI590-801WU**



Braking Characteristics **CBI590-801WU**



■ GC- and GCH- Type Gearhead for C·B Motors

The **GC-** and **GCH-** type gearheads have been specially designed for use with the **C·B** motor. Although they look much the same as the **GN-** and **GU-** type gearheads, their gearing specifications differ, making them incompatible. Never attempt to connect **GC-** or **GCH-** type gearheads to **GN-** or **GU-** type gearing motors, or to combine **GN-** or **GU-** type gearheads with a **C·B** motor:

Permissible overhung load and permissible thrust load for **GC-** and **GCH-** type gearheads may not exceed the limits given in the table below.

unit = lb (N)

Model	Gear Ratio	Permissible Overhung Load		Permissible Thrust Load
		0.4 in.(10mm) from shaft end	0.8 in.(20mm) from shaft end	
5GC□KA	**3.6~18**	55.1(250)	77.2(350)	22.0(100)
	30~180	66.1(300)	99.2(450)	
5GCH□KA	**3.6~9**	88.2(400)	110(500)	33.1(150)
	15~18	99.2(450)	132(600)	
	30~180	110(500)	154(700)	

●Enter the gear ratio in the box (□) within the model number.

■ Note

- When using **C·B** motors, a DC 24V power supply for the clutch and brake is required in addition to the motor power supply.
- Transformer capacity on the DC power supply should be at least 1.3 times the rated power consumption of the clutch and brake. (See page A-195.)
- Do not try to activate clutch and brake simultaneously. When shifting from clutch to brake or vice versa, leave a time lag of at least 20 msec.

Output Power Characteristics

The most appropriate **C-B** motor type may be determined by load torque and load inertia requirements of the motor and gearhead using the output selection charts below.
The curves represent the relationship between load torque and load inertia for a minimum of two million starts and stops.
The motor should be operated inside the limits of the load torque load inertia curves given.
Find the clutch and brake motor best suited for your application as follows:

① Determine the maximum load torque required at the gearhead output shaft.

② Calculate the reflected load inertia effective at the gearhead output shaft.

③ Plot the values found in ① and ② into the graph of the applicable speed. The motor model whose characteristic curve is the closest and above the point you entered is the most suitable motor for your purpose.

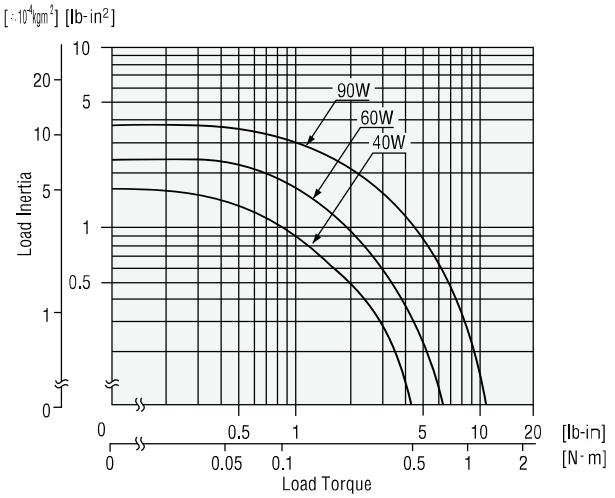
Selection Example

- Required Speed: 300r/min
- Load Torque: 2 lb-in
- Load Inertia: 3 lb-in^2

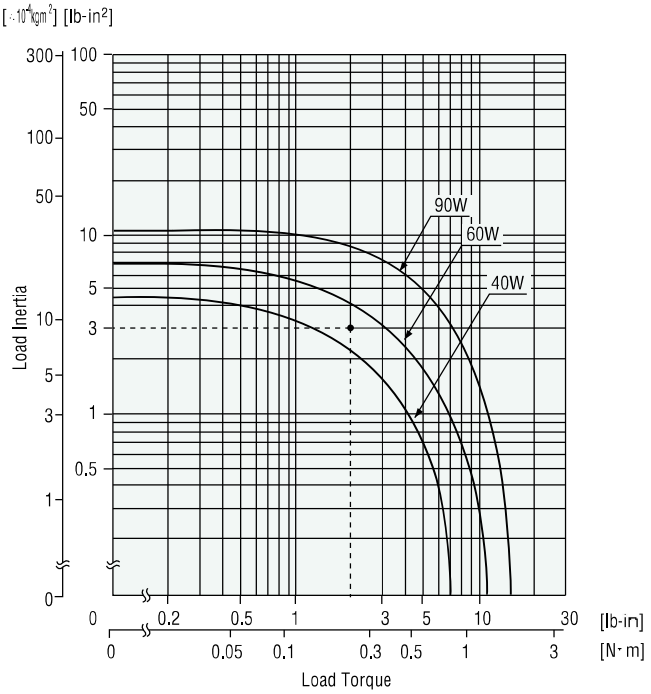
As an example, the value corresponding to the these operating requirements have been marked in the application graph for 300r/min.

- The speed indicated is calculated by dividing the motor synchronous speed (1800r/min at 60Hz) by the speed reduction ratio. Note that depending on the load, the actual speed may be 2~20% lower than indicated in the graph.

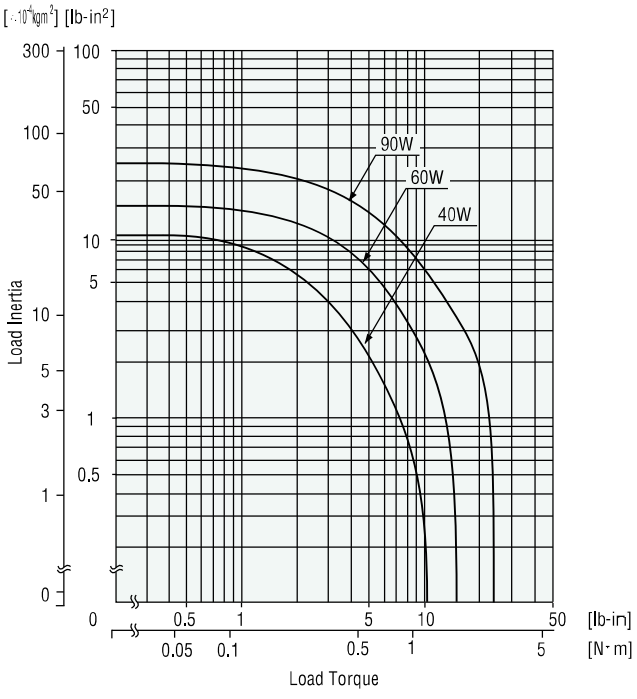
● Speed at Output Shaft: 500r/min
Gear ratio 3.6:1 at 60 Hz



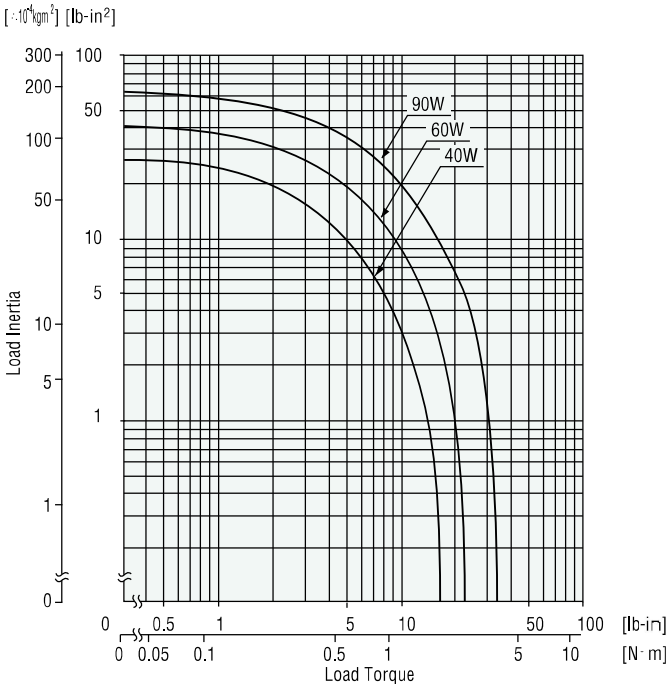
● Speed at Output Shaft: 300r/min
Gear ratio 6:1 at 60 Hz



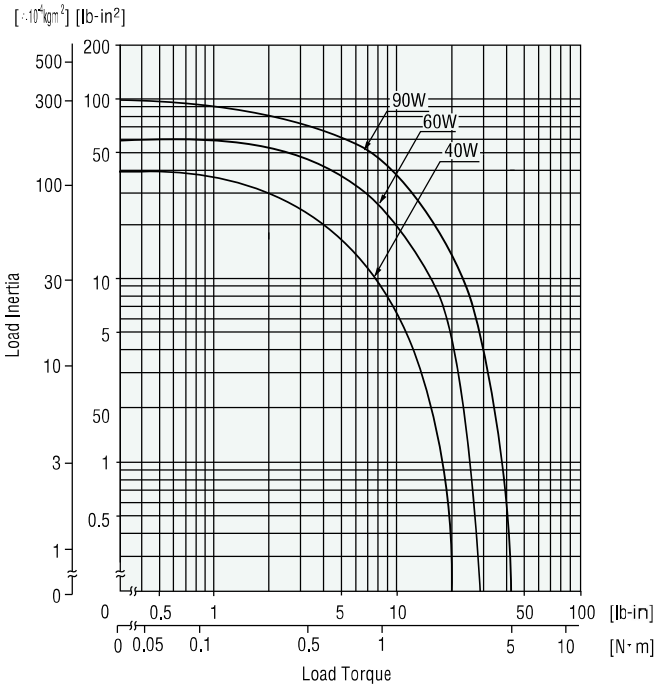
● Speed at Output Shaft: 200r/min
Gear ratio 9:1 at 60 Hz



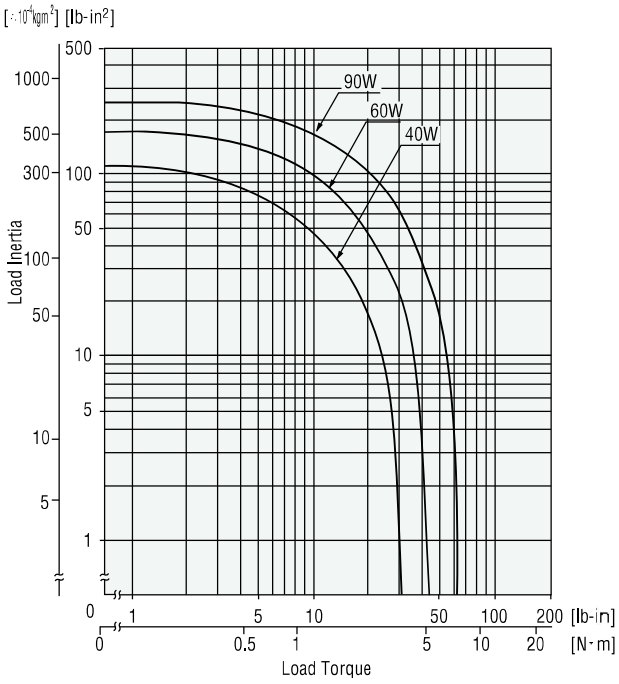
● Speed at Output Shaft: 120r/min
Gear ratio 15:1 at 60 Hz



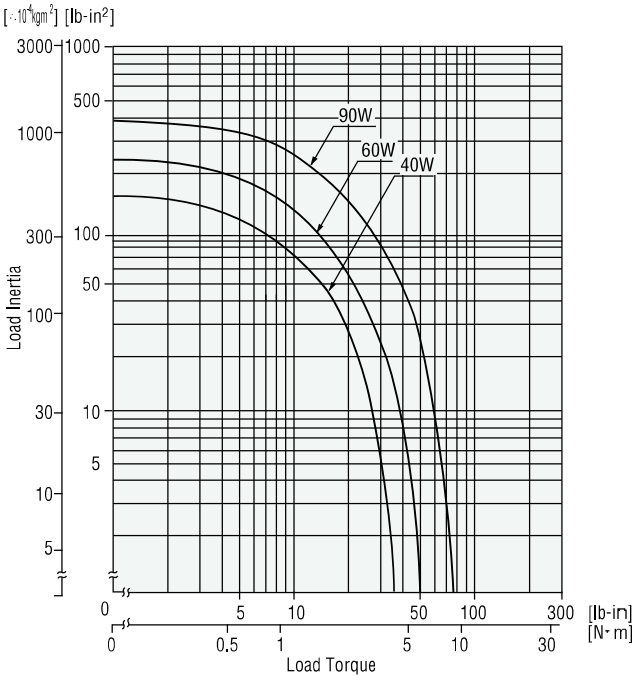
Speed at Output Shaft: 100r/min
Gear ratio 18:1 at 60 Hz



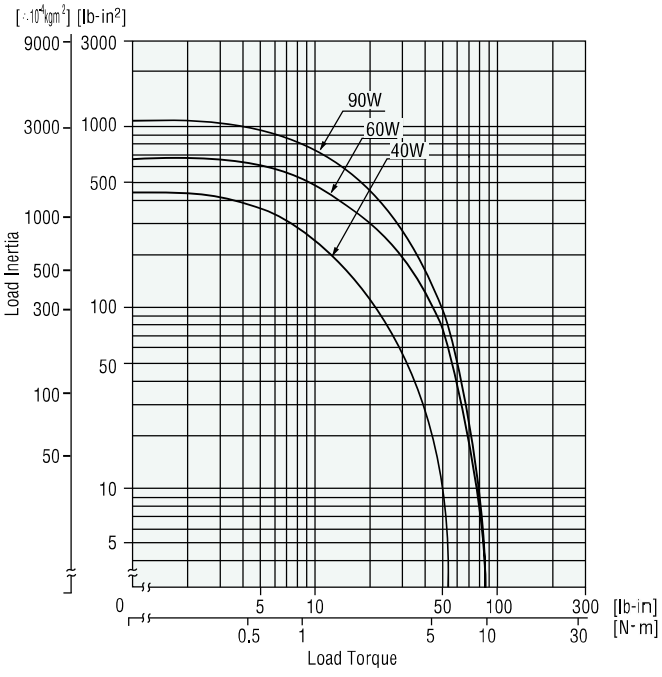
Speed at Output Shaft: 60r/min
Gear ratio 30:1 at 60 Hz



Speed at Output Shaft: 50r/min
Gear ratio 36:1 at 60 Hz



Speed at Output Shaft: 30r/min or slower
Gear ratio 60:1 or greater at 60 Hz



Note: When using a **C.B** motor at an output shaft speed of less than 30r/min (when using with gearheads of speed reduction ratios greater than 60:1 at 60Hz), use the output selection chart entitled "30r/min or slower."

C·B Motors

40W(1/18.5HP) • 60W(1/12.5HP) • 90W(1/8HP)

Motor Specifications-Continuous Rating

• The gearhead is sold separately. Always use **GC-**, **GCH-** type gearhead with **C·B** unit.

Model	Output Power HP	Output Power W	Voltage V	Frequency Hz	Current A	Rated Speed r/min	Capacitor μF
CBI540-701WU	1/18.5	40	Single-Phase 110V Single-Phase 115V	60	0.68 0.67	1500	9.0
CBI560-801WU	1/12.5	60	Single-Phase 110V Single-Phase 115V	60	1.09 1.10	1450	18.0
CBI590-801WU	1/8	90	Single-Phase 110V Single-Phase 115V	60	1.45 1.44	1500	20.0

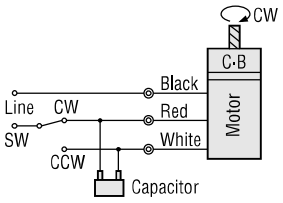
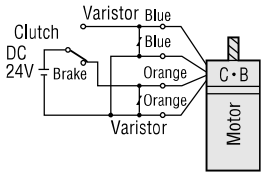
Speed Range

Gear Ratio	**3.6**	**6**	**9**	**15**	**18**	**30**	**36**	**60**	**90**	**120**	**180**
60Hz	500	300	200	120	100	60	50	30	20	15	10

•The speed is calculated by dividing the motor's synchronous speed (60 Hz: 1800 r/min) by the gear ratio. The actual loaded speed is 2 ~ 20% less than the displayed value, depending on the amount of the load.

Wiring Diagrams

The direction of motor rotation is as viewed from the shaft end of the motor.

Motor	Clutch & Brake
	

Change the direction of motor rotation only after bringing the motor to a stop.
If an attempt is made to change the direction of rotation while the motor is rotating, the motor may not reverse or it may change its direction of rotation after some delay.

Note: The surge absorber circuit is included with the **C·B** motor. Clutch and brake coil lead wires are non-polar.

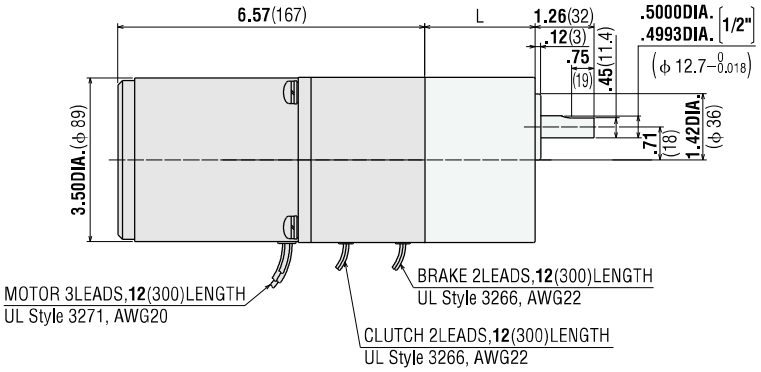
Type of Gearhead

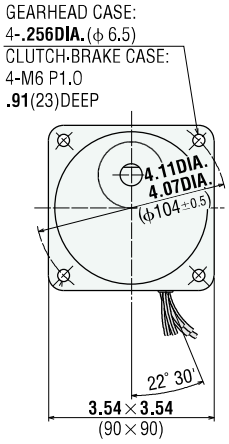
Motor Type	Gearhead Model	Gear Ratio
CBI540-	**5GC□KA**	3.6, 6, 9, 15, 18, 30
CBI560-, CBI590-	**5GCH□KA**	36, 60, 90, 120, 180

•Enter the gear ratio in the box (□) within the gearhead model.

Dimensions Scale1/4, Unit = inch (mm)

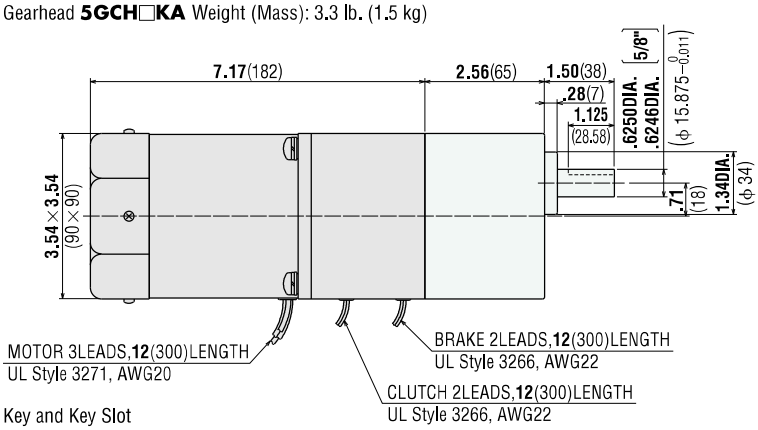
- Motor **CBI540-701WU** Weight (Mass): 8.4 lb. (3.8 kg)
- Gearhead **5GC□KA** Weight (Mass): 3.3 lb. (1.5 kg)

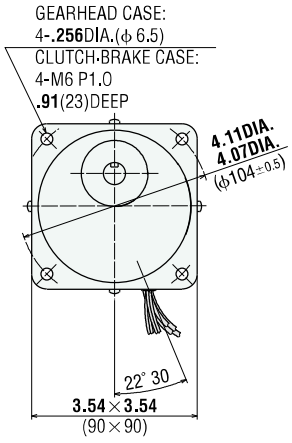




L=1.65(42) **5GC3.6KA~18KA**
L=2.36(60) **5GC30KA~180KA**

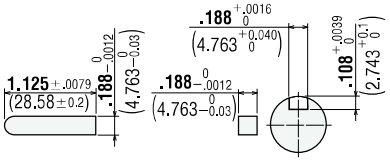
- Motor **CBI560-801WU** Weight (Mass): 8.8 lb. (4.0 kg)
- Gearhead **5GCH□KA** Weight (Mass): 3.3 lb. (1.5 kg)



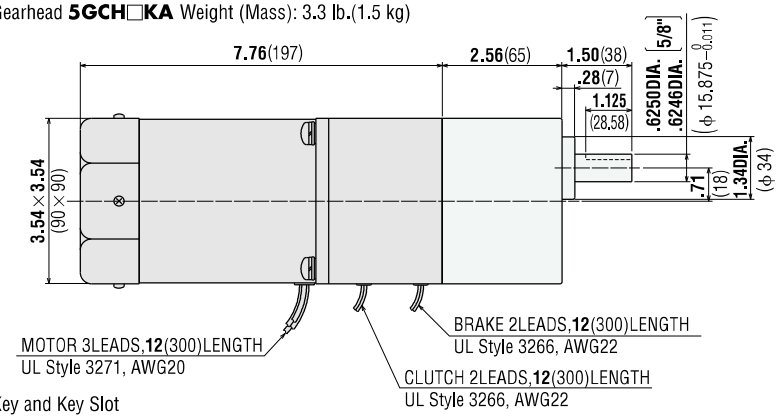


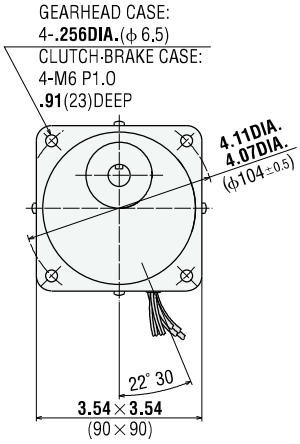
- Key and Key Slot

The key is provided with the **5GCH□KA**



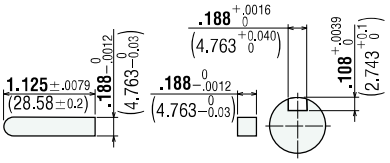
- Motor **CBI590-801WU** Weight (Mass): 9.9 lb. (4.5kg)
- Gearhead **5GCH□KA** Weight (Mass): 3.3 lb.(1.5 kg)





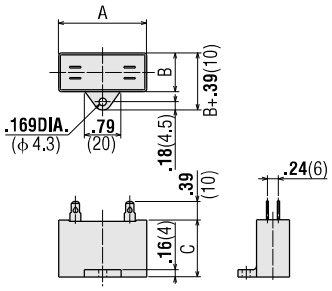
- Key and Key Slot

The key is provided with the **5GCH□KA**

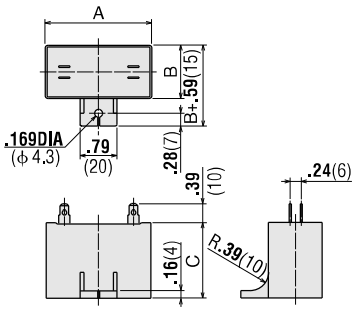


●Capacitor (included with the C-B motor) Unit = **inch** (mm)

①



②



Motor Model	Capacitor Model	Dimensions inch(mm) A	B	C	Weight oz (g)	No.
CBI540-701WU	CH90CFAUL	1.89 (48)	0.83 (21)	1.22 (31)	1.41(40)	①
CBI560-801WU	CH180CFAUL	2.28 (58)	0.93 (23.5)	1.46 (37)	2.47(70)	②
CBI590-801WU	CH200CFAUL	228 (58)	1.14 (29)	1.61 (41)	3.35(95)	②

Capacitor cap is provided with the capacitor.

ORIENTAL MOTOR CATALOG

A

Washdown Motors

WASHDOWN MOTORS

FPW *Series*

**The FPW Series motors are splashproof, dust-resistant geared induction motors which conform to the IEC standard IP65.
They can be used where they are periodically splashed or washed with water. These washdown induction motors, which are ideal for devices whose movement is in one direction, are available in 25W, 40W, 60W and 90W models.**

Product Number Code

FPW 4 25 A - 15 U

- **FPW** : **FPW Series**
- **4**: Motor Frame Size
  - **4**: 3.15 inch sq.(80mm sq.)
  - **5**: 3.54 inch sq.(90mm sq.)
  - **6**: 4.09 inch sq.(104mm sq.)
- **25**: Output Power
  - **25**: 25W
  - **40**: 40W
  - **60**: 60W
  - **90**: 90W
- **A**: Voltage
  - **A**: Single-Phase110V/115V
  - **C**: Single-Phase220V/230V
  - **S**: Three-Phase200V/220V/230V
- **15**: Gear Ratio
- **U**: Provided capacitor Type
  - **U**: For Single-Phase110V, 115V
  - **E**: For Single-Phase 220V, 230V
  - None : Three-phase type

The "**U**" and "**E**" at the end of the model name (ordering name) indicate that the unit includes a capacitor. These two letters are not inscribed on the motor nameplate.

Features

●Dust-resistant, Splashproof Geared Motors

Both the motor and gearhead are constructed to be splashproof. They are delivered together in a single unit as a geared motor in order to ensure a proper seal.

●Special Construction for Splashproof and Dust-resistant Performance

The construction provides dependable resistance against dust and water by using a specially constructed cable outlet, oil seals on the output shaft, an O-ring in the case/gearhead junction and no external screws.

A special coating and a stainless steel (SUS303 type) shaft provides better anticorrosion protection against both fresh and salt water. The paint is also water repellent.

IP65: The letters "IP" stand for "Ingress Protection" and are followed by two numerical digits which indicate degrees of protection against solid objects and moisture. They are part of the IEC and DIN standards.
FPW series IP65 protection are UL recognized (UL File No.E166348).
A grade of IP65 indicates total dust resistance (the highest grade for protection against contact and intrusion of foreign matter is a "6"), and protection against water jets from all directions (a "5").This means the structure can be used even when the motor is splashed with water from any direction by a nozzle.

Testing Conditions : A nozzle with an internal diameter of 6.3 mm was used to douse the test specimen from all directions with water at a pressure of 30 kPa and flow of 12.5 l/min for three minutes at a distance of 3 meters. No abnormalities were found.

●Superb anti-corrosion properties

High corrosion resistance achieved through special paint coating and stainless shaft.

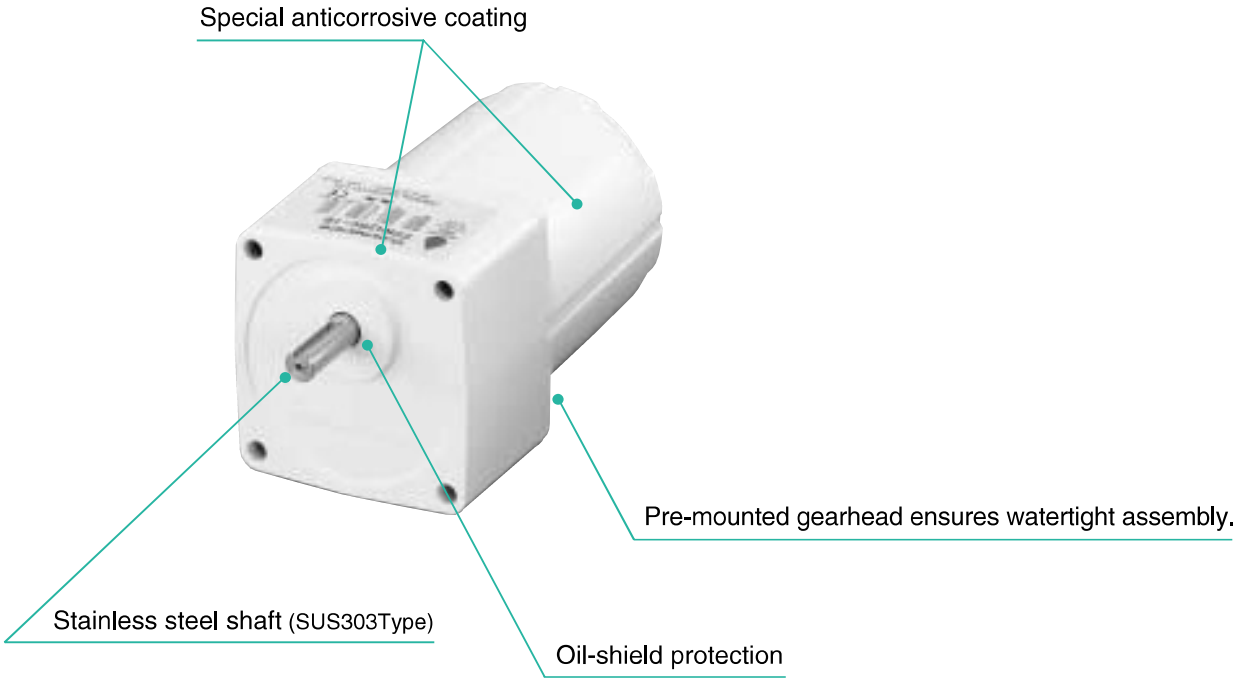
Precautions

- Cannot be used under water.
- Connect the ground wire to the ground.

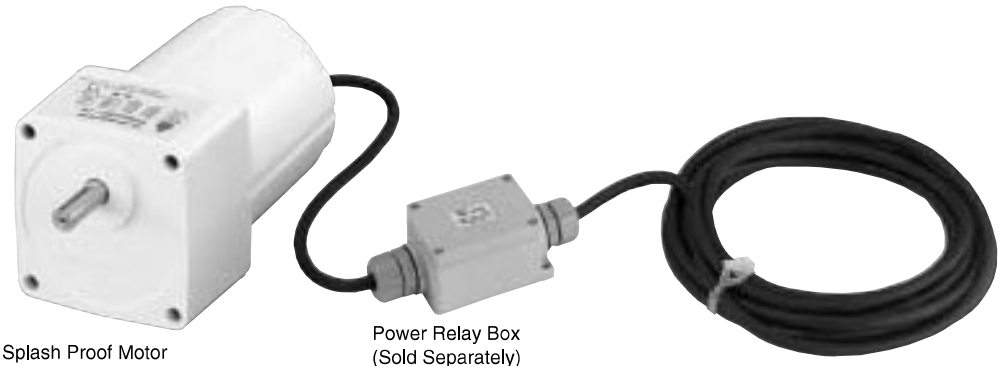
Safety Standards and CE Marking

Standards	Certification Body	Standard File No.	CE Marking
UL1004 UL2111	UL	E 64197	Low Voltage Directives
CAN/CSA-C22.2No.100 CAN/CSA-C22.2No.77			

Designed and Constructed for Dust-and Water-Resistance



Construction



Types

Output Power	Voltage	Model
25W	Single-Phase 110V/115V	**FPW425A-□U**
	Single-Phase 220V/230V	**FPW425C-□E**
	Three-Phase 200V/220V/230V	**FPW425S-□**

Output Power	Voltage	Model
60W	Single-Phase 110V/115V	**FPW560A-□U**
	Single-Phase 220V/230V	**FPW560C-□E**
	Three-Phase 200V/220V/230V	**FPW560S-□**

Output Power	Voltage	Model
40W	Single-Phase 110V/115V	**FPW540A-□U**
	Single-Phase 220V/230V	**FPW540C-□E**
	Three-Phase 200V/220V/230V	**FPW540S-□**

Output Power	Voltage	Model
90W	Single-Phase 110V/115V	**FPW690A-□U**
	Single-Phase 220V/230V	**FPW690C-□E**
	Three-Phase 200V/220V/230V	**FPW690S-□**

● Enter the gear ratio in the box (□) within the model number. Eleven gear ratios are available.

General Specifications

Item	Specifications
Insulation Resistance	100MΩ or more when 500V DC is applied between the windings and the frame under normal ambient temperature and humidity.
Dielectric Strength	Sufficient to withstand 1.5kV at 50Hz and 60Hz applied between the windings and the frame under normal ambient temperature and humidity.
Temperature Rise	144°F (80°C) or less measured by the resistance change method after the temperature of the coil has stabilized under normal operation at the rated voltage and frequency.
Insulation Class	Class B (266°F [130°C])
Overheat Protection	Built-in thermal protector (Automatic return type) Operating temperature, open :266°F±9°F (130°C±5°C) close : 179.6°F±27°F (82°C±15°C)
Ambient Temperature Range	14°F~104°F(−10°C~+40°C), [Three-Phase 200V : 14°F~122°F(−10°~+50°C)]
Degree protection	IP65

- Since these are special splashproof, dust-resistant, geared motors, the motor and gear sections cannot be disassembled.
- The capacitors for the motors are neither dustproof nor waterproof.

Permissible Overhung Load-Permissible Thrust Load

Unit=lb(N)

Model	Gear Ratio	3.6	6	9	15	18	30	36	60	90	120	180
FPW425 type	Permissible Thrust Load	11(50)										
	Permissible Overhung Load	22(100)					44(200)					
		33(150)					66(300)					
FPW540 type	Permissible Thrust Load	22(100)										
	Permissible Overhung Load	55(250)					66(300)					
		77(350)					99(450)					
FPW560 type	Permissible Thrust Load	33(150)										
	Permissible Overhung Load	88(400)			99(450)		110(500)					
		110(500)			132(600)		154(700)					
FPW690 type	Permissible Thrust Load	44(200)										
	Permissible Overhung Load	121(550)			143(650)							
		176(800)			220(1000)							

- The condition of the distance from shaft end on Permissible Overhung Load;
  The upper section=0.394 inch (10mm)
  The lower section=0.787 inch (20mm)

Permissible Inertial Load (J)

Unit=Upper Values:lb-in²/Lower values:×10⁻⁴kgm²

Model	Gear Ratio	3.6	6	9	15	18	30	36	60	90	120	180
FPW425 type		1.3	3.6	8.1	22.5	32.4	90	130	250	250	250	250
		4.02	11.2	25.1	69.8	100	279	402	775	775	775	775
FPW540 type		3.24	9	20.3	56.3	81	225	324	625	625	625	625
		9.72	27	60.8	169	243	675	972	1875	1875	1875	1875
FPW560 type		5.05	14	31.6	87.8	126	351	505	975	975	975	975
		14.3	39.6	89.1	248	356	990	1426	2750	2750	2750	2750
FPW690 type		5.05	14	31.6	87.8	126	351	505	975	975	975	975
		14.3	39.6	89.1	248	356	990	1426	2750	2750	2750	2750

Specifications-Continuous Rating

Model	Output Power HP	Output Power W	Voltage V	Frequency Hz	Current A	Starting Torque oz-in	Starting Torque mN•n	Rated Torque oz-in	Rated Torque mN•n	Rated Speed r/min	Capacitor μF
TP FPW425A-□U	1/30	25	Single-phase 110	60	0.46	16.7	120	23.6	170	1450	6.5
			Single-phase 115	60	0.46	16.7	120	23.6	170	1450	6.5
TP FPW425C-□E	1/30	25	Single-phase 220	60	0.22	16.7	120	23.6	170	1450	1.5
			Single-phase 230	50	0.24	16.7	120	28.5	205	1200	1.5
			Single-phase 230	60	0.22	16.7	120	23.6	170	1450	1.5
TP FPW425S-□	1/30	25	Three-phase 200	50	0.23	33.3	240	26.4	190	1300	—
			Three-phase 200	60	0.21	22.2	160	22.2	160	1550	—
			Three-phase 220	60	0.21	22.2	160	22.2	160	1600	—
			Three-phase 230	60	0.22	22.2	160	22.2	160	1600	—
TP FPW540A-□U	1/18.5	40	Single-phase 110	60	0.68	27.8	200	36.1	260	1500	9
			Single-phase 115	60	0.67	27.8	200	36.1	260	1500	9
TP FPW540C-□E	1/18.5	40	Single-phase 220	60	0.35	27.8	200	36.1	260	1500	2.3
			Single-phase 230	50	0.39	27.8	200	41.7	300	1300	2.3
			Single-phase 230	60	0.34	27.8	200	36.1	260	1500	2.3
TP FPW540S-□	1/18.5	40	Three-phase 200	50	0.32	55.5	400	41.7	300	1300	—
			Three-phase 200	60	0.30	36.1	260	36.1	260	1550	—
			Three-phase 220	60	0.30	36.1	260	36.1	260	1600	—
			Three-phase 230	60	0.31	36.1	260	36.1	260	1600	—
TP FPW560A-□U	1/12.5	60	Single-phase 110	60	1.04	41.7	300	56.2	405	1450	12
			Single-phase 115	60	1.02	41.7	300	56.2	405	1450	12
TP FPW560C-□E	1/12.5	60	Single-phase 220	60	0.48	41.7	300	56.2	405	1450	3
	1/13.5	55	Single-phase 230	50	0.51	41.7	300	59.7	430	1250	3
	1/12.5	60	Single-phase 230	60	0.47	41.7	300	56.2	405	1450	3
TP FPW560S-□	1/12.5	60	Three-phase 200	50	0.48	83.3	600	62.5	450	1300	—
			Three-phase 200	60	0.43	69.4	500	52.8	380	1550	—
			Three-phase 220	60	0.44	69.4	500	52.8	380	1600	—
			Three-phase 230	60	0.45	69.4	500	52.8	380	1600	—
TP FPW690A-□U	1/8	90	Single-phase 110	60	1.54	55.5	400	81.2	585	1500	18
			Single-phase 115	60	1.51	55.5	400	81.2	585	1500	18
TP FPW690C-□E	1/8	90	Single-phase 220	60	0.68	55.5	400	84.0	605	1450	4
			Single-phase 230	50	0.69	55.5	400	97.2	700	1250	4
			Single-phase 230	60	0.66	55.5	400	84.0	605	1450	4
TP FPW690S-□	1/8	90	Three-phase 200	50	0.54	97.2	700	94.4	680	1300	—
			Three-phase 200	60	0.51	97.2	700	79.2	570	1550	—
			Three-phase 220	60	0.50	97.2	700	79.2	570	1600	—
			Three-phase 230	60	0.49	97.2	700	79.2	570	1600	—

TP : The motors contain built-in thermal protectors. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

●Enter the gear ratio in the box □ within the model number. There are 11 ratios available, ranging from 3.6 to 180.

The "**U**" and "**E**" at the end of the model name (ordering name) indicate that the unit includes a capacitor. These two letters are not inscribed on the motor nameplate.

Gearmotor-Torque Table

Single-phase 115V / 230V 60Hz, Three-phase 230V 60Hz

Unit=Upper value : lb-in
Lower value : N•m

Model	Speed r/min	500	300	200	120	100	60	50	30	20	15	10
	Gear Ratio	**3.6**	**6**	**9**	**15**	**18**	**30**	**36**	**60**	**90**	**120**	**180**
FPW425A-□U	Rated Torque	4.3	7.2	10.4	18.3	21.7	32.2	39.1	58.3	69.6	69.6	69.6
		0.5	0.83	1.2	2.1	2.5	3.7	4.5	6.7	8	8	8
FPW425C-□E	Starting Torque	3.0	5.0	7.6	13	14.8	22.6	27.8	41.7	61.7	69.6	69.6
		0.35	0.58	0.87	1.5	1.7	2.6	3.2	4.8	7.1	8	8
FPW425S-□	Rated Torque	4.1	6.8	10.4	16.5	20	30.4	36.5	54.8	69.6	69.6	69.6
	Starting Torque	0.47	0.78	1.2	1.9	2.3	3.5	4.2	6.3	8	8	8
FPW540A-□U	Rated Torque	6.6	11.3	16.5	27.8	33	49.6	59.1	87	87	87	87
		0.76	1.3	1.9	3.2	3.8	5.7	6.8	10	10	10	10
FPW540C-□E	Starting Torque	5.0	8.4	13	20.9	25.2	38.3	46.1	68.7	87	87	87
		0.58	0.97	1.5	2.4	2.9	4.4	5.3	7.9	10	10	10
FPW540S-□	Rated Torque	6.6	11.3	16.5	27.8	33	49.6	59.1	87	87	87	87
	Starting Torque	0.76	1.3	1.9	3.2	3.8	5.7	6.8	10	10	10	10
FPW560A-□U	Rated Torque	10.4	17.4	26.1	38.3	46.1	69.6	83.5	130.4	130.4	130.4	130.4
		1.2	2.0	3.0	4.4	5.3	8.0	9.6	15	15	15	15
FPW560C-□E	Starting Torque	7.6	13	19.1	28.7	34	51.3	61.7	103.5	130.4	130.4	130.4
		0.87	1.5	2.2	3.3	3.9	5.9	7.1	11.9	15	15	15
FPW560S-□	Rated Torque	9.6	15.7	24.3	36.5	43.5	65.2	78.3	130.4	130.4	130.4	130.4
	Starting Torque	1.1	1.8	2.8	4.2	5	7.5	9.0	15	15	15	15
FPW690A-□U	Rated Torque	14.8	24.3	37.4	55.5	67	111.3	133.9	201.7	260.9	260.9	260.9
		1.7	2.8	4.3	6.4	7.7	12.8	15.4	23.2	30	30	30
	Starting Torque	10.4	16.5	25.2	38.3	46.1	76.5	91.3	137.4	207	260.9	260.9
		1.2	1.9	2.9	4.4	5.3	8.8	10.5	15.8	23.8	30	30
FPW690C-□E	Rated Torque	15.7	25.2	38.3	57.4	68.7	114.8	138.3	208.7	260.9	260.9	260.9
		1.8	2.9	4.4	6.6	7.9	13.2	15.9	24	30	30	30
	Starting Torque	10.4	16.5	25.2	38.3	46.1	76.5	91.3	137.4	207	260.9	260.9
		1.2	1.9	2.9	4.4	5.3	8.8	10.5	15.8	23.8	30	30
FPW690S-□	Rated Torque	14.8	24.3	36.5	53.9	65.2	108.7	130.4	196.5	260.9	260.9	260.9
	Starting Torque	1.7	2.8	4.2	6.2	7.5	12.5	15	22.6	30	30	30

●Enter the gear ratio in the box (□) within the model number.
●The speed is calculated by dividing the motor's synchronous speed (60 Hz : 1800 r/min) by the gear ratio.
The actual speed is 2—20% less than the displayed value, depending on the size of the load.

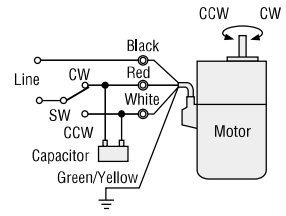
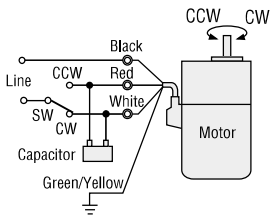
Single-phase 230V 50Hz

Unit=Upper value : lb-in
Lower value : N•m

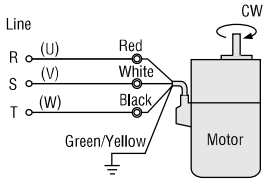
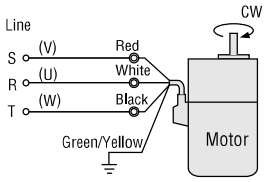
Model	Speed r/min	417	250	167	100	83	50	42	25	17	12.5	8.3
	Gear Ratio	**3.6**	**6**	**9**	**15**	**18**	**30**	**36**	**60**	**90**	**120**	**180**
FPW425C-□E	Rated Torque	5.2	8.7	13	21.7	26.1	39.1	47	69.6	69.6	69.6	69.6
		0.6	1	1.5	2.5	3.0	4.5	5.4	8	8	8	8
	Starting Torque	3.0	5.0	7.6	13	14.8	22.6	27.8	41.7	61.7	69.6	69.6
		0.35	0.58	0.87	1.5	1.7	2.6	3.2	4.8	7.1	8	8
FPW540C-□E	Rated Torque	7.6	13	19.1	31.3	38.3	57.4	68.7	87	87	87	87
		0.87	1.5	2.2	3.6	4.4	6.6	7.9	10	10	10	10
	Starting Torque	5.0	8.4	13	20.9	25.2	38.3	46.1	68.7	87	87	87
		0.58	0.97	1.5	2.4	2.9	4.4	5.3	7.9	10	10	10
FPW560C-□E	Rated Torque	11.3	18.3	27	40.9	49.6	73.9	88.7	130.4	130.4	130.4	130.4
		1.3	2.1	3.1	4.7	5.7	8.5	10.2	15	15	15	15
	Starting Torque	7.6	13	19.1	28.7	33.9	51.3	61.7	103.5	130.4	130.4	130.4
		0.87	1.5	2.2	3.3	3.9	5.9	7.1	11.9	15	15	15
FPW690C-□E	Rated Torque	17.4	29.6	44.3	67	80	133	160	240.9	260.9	260.9	260.9
		2.0	3.4	5.1	7.7	9.2	15.3	18.4	27.7	30	30	30
	Starting Torque	10.4	16.5	25.2	38.3	46.1	76.5	91.3	137.4	207	260.9	260.9
		1.2	1.9	2.9	4.4	5.3	8.8	10.5	15.8	23.8	30	30

●Enter the gear ratio in the box within (□) the model number.
●The speed is calculated by dividing the motor's synchronous speed (50 Hz : 1500 r/min) by the gear ratio.
The actual speed is 2—20% less than the displayed value, depending on the size of the load.

Wiring Diagrams Direction of rotation shown is for the motor shaft rotation as seen from the motor shaft side.

	Single-phase 110V/115V, Single-phase 220V/230V	
25W 40W	Gear Ratio 3.6~18 60~180	Gear Ratio 30~36
60W	Gear Ratio 3.6~9 30~60	Gear Ratio 15~18 90~180
90W	Gear Ratio 3.6~9 60~180	Gear Ratio 15~36
		

To rotate the motor in a clockwise (CW) direction, flip switch SW to CW.
To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.

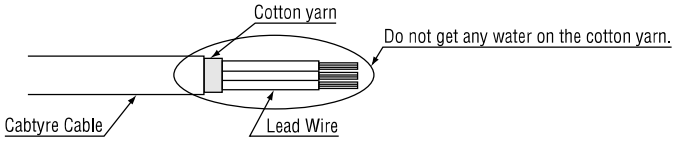
	Three-phase 200V/220V/230V	
	Gear Ratio 3.6~18 60~180	Gear Ratio 30~36
	Gear Ratio 3.6~9 30~60	Gear Ratio 15~18 90~180
	Gear Ratio 3.6~9 60~180	Gear Ratio 15~36
		

To change the rotation, change any two connections between U, V and W.

Note : Change the direction of motor rotation only after bringing the motor to a stop. If an attempt is made to change the direction of rotation while the motor is rotating, the motor may ignore the reversing command or change its direction of rotation after some delay.
For added safety, it is advisable to use a ground fault interrupt circuit (GFI) in situations where the motor is likely to get wet during operation.

Wiring precautions

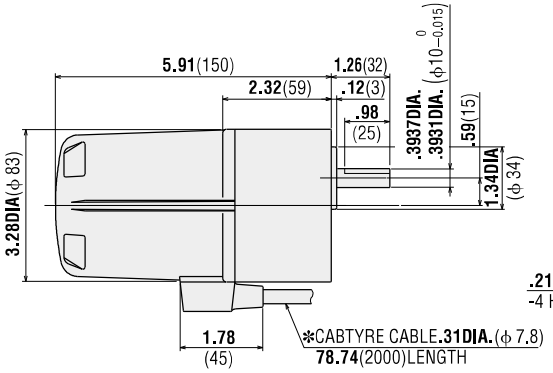
The terminals of the cabtyre cable are not waterproofed.

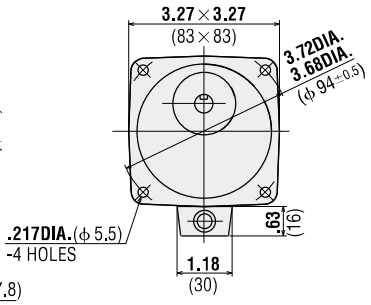


Dimensions Scale 1/4,Unit = inch (mm)

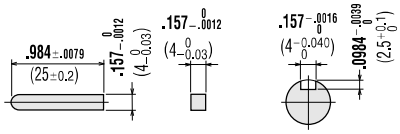
FPW425A-□U
FPW425C-□E
FPW425S-□

Weigt (Mass) : 6.6 lb. (3.0kg)





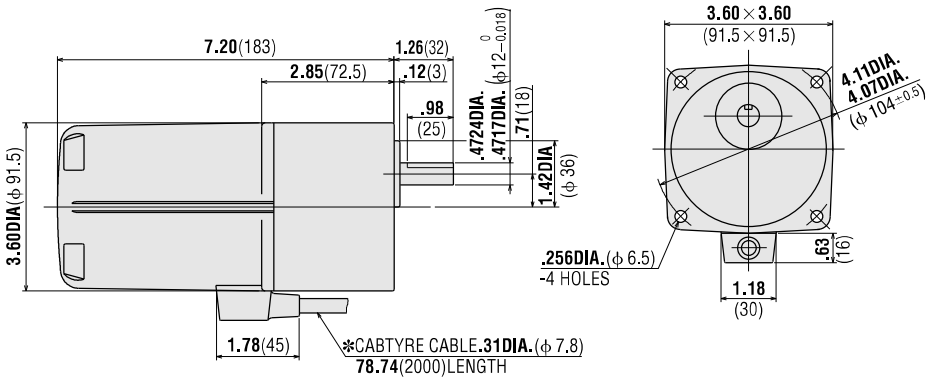
● **Key and Key Slot** (Scale 1/2)
(The key is provided with motor.)
For 25W, 40W type



✻ Cable cores
Motor Lead wire × 3 UL Style 3266, AWG20
Ground Lead wire × 1 UL Style 3266, AWG18

FPW540A-□U
FPW540C-□E
FPW540S-□

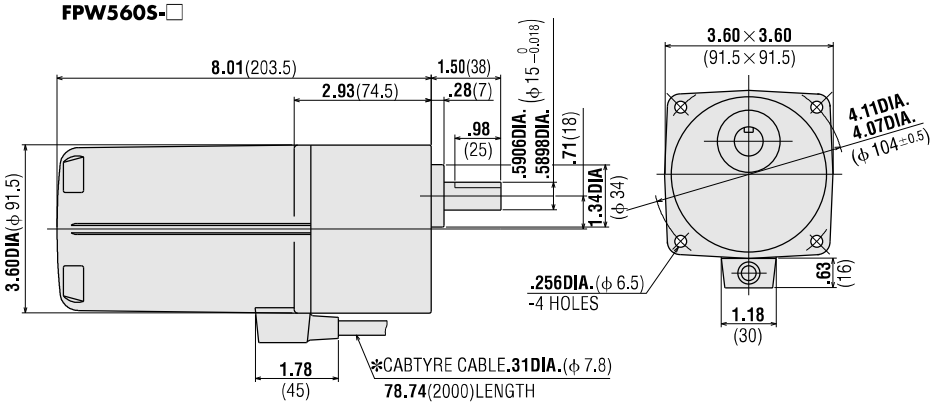
Weigh (Mass): 8.8lb.(4.0kg)



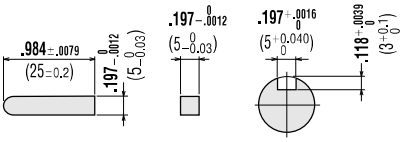
✻ Cable cores
Motor Lead wire × 3 UL Style 3266, AWG20
Ground Lead wire × 1 UL Style 3266, AWG18

FPW560A-□U
FPW560C-□E
FPW560S-□

Weigh (Mass): 11lb.(5.0kg)



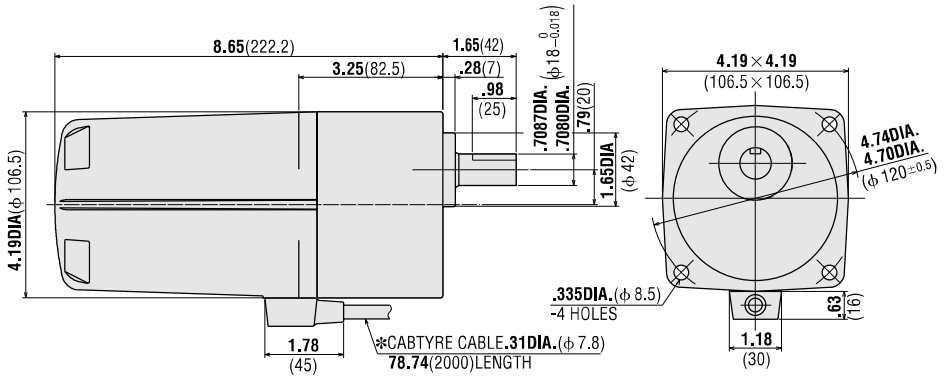
● **Key and Key Slot** (Scale 1/2)
(The key is provided with motor.)
For 60W



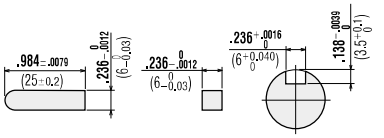
✻ Cable cores
Motor Lead wire × 3 UL Style 3266, AWG20
Ground Lead wire × 1 UL Style 3266, AWG18

FPW690A-□U
FPW690C-□E
FPW690S-□

Weigh (Mass): 16.5lb.(7.5kg)

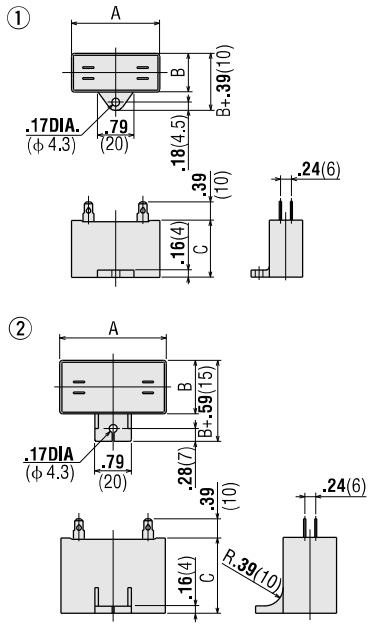


● **Key and Key Slot** (Scale 1/2)
(The key is provided with motor.)
For 90W



✻ Cable cores
Motor Lead wire × 3 UL Style 3266, AWG20
Ground Lead wire × 1 UL Style 3266, AWG18

● **Capacitor** (included with the motor)

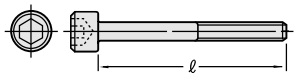


Unit=inch(mm)

Model	Capacitor Model	A	B	C	Mass ozg)	No.
FPW425A-□U	CH65CFAUL	1.50 (38)	.83 (21)	1.22 (31)	1.23 (35)	①
FPW425C-□E	CH15BFAUL	1.50 (38)	.83 (21)	1.22 (31)	1.23 (35)	
FPW540A-□U	CH90CFAUL	1.89 (48)	.83 (21)	1.22 (31)	1.41 (40)	①
FPW540C-□E	CH23BFAUL	1.89 (48)	.83 (21)	1.22 (31)	1.41 (40)	
FPW560A-□U	CH120CFAUL	2.28 (58)	.83 (21)	1.22 (31)	1.76 (50)	①
FPW560C-□E	CH30BFAUL	2.28 (58)	.83 (21)	1.22 (31)	1.76 (50)	
FPW690A-□U	CH180CFAUL	2.28 (58)	.93 (23.5)	1.46 (37)	2.47 (70)	②
FPW690C-□E	CH40BFAUL	2.28 (58)	.93 (23.5)	1.46 (37)	2.47 (70)	

✻ Capacitor cap is provided with the capacitor.

● **Screws** (material: stainless steel)



	ℓ	Size of Screws
FPW425 Type	3.15 inch(80mm)	M5 P0.8
FPW540 Type	3.54 inch(90mm)	M6 P1.0
FPW560 Type	3.54 inch(90mm)	M6 P1.0
FPW690 Type	3.94 inch(100mm)	M8 P1.25

4 washes and 4 hexagonal nuts are provided with the screws.

■ Accessories (sold separately)

●Power Relay Box and Extension cables

A power relay box and a water-resistant extension cable are available.
See page [A-272] for more information.

● Power relay box **TB4-0608**

● Extension cable **CC05AC43P** (4cores, 5m)
CC10AC43P (4cores, 10m)

ORIENTAL MOTOR GENERAL CATALOG

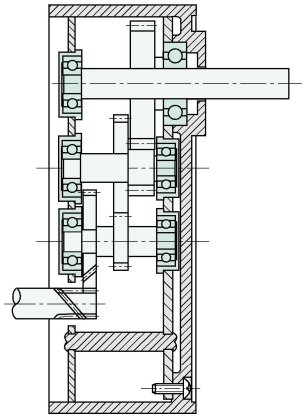
A

Gearheads

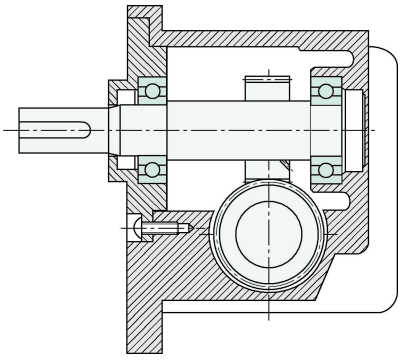
Features and Types of Gearheads

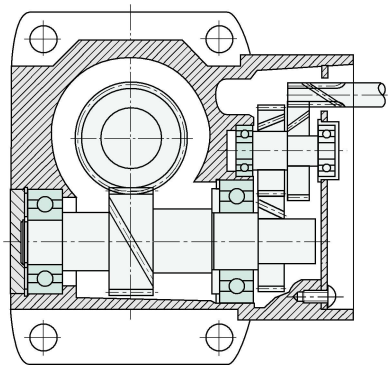
Oriental Motor gearheads are specially designed for easy and direct attachment to our AC motors that have a pinion shaft. The gearhead reduces the motor speed which increases the torque. A large number of gear ratios are available for many applications.

●Parallel Shaft Type



●Right Angle Type





Parallel Shaft Type Gearheads

Application	Gearhead Model	Gear Ratios	Decimal Gearheads
Light Load	**2GB□KA**	**3~360** 23 ratios	**2GB10XK**
	4GB□KA	**3~360** 23 ratios	**4GB10XK**
Normal Load	**0GN□KA**	**3~180** 20 ratios	—
	2GN□KA	**3~180** 20 ratios	**2GN10XK**
	3GN□KA	**3~180** 20 ratios	**3GN10XK**
	4GN□KA	**3~180** 20 ratios	**4GN10XK**
	5GN□KA	**3~180** 20 ratios	**5GN10XK**
Heavy Load	**5GU□KA**	**3~180** 20 ratios	**5GU10XKB**
	BH6G2-□	**3.6~180** 11 ratios	—
Brake Motor (Clutch & Brake Motor)	**5GC□KA**	**3.6~180** 11 ratios	—
	5GCH□KA		
High Speed (**FBLII** Series)	**FBL575AW, CW, SW-□** (combination type) **FBL5120AW, CW, SW-□** (combination type)	**5~200** 8 ratios	—

- Enter the gear ratio in the box(□) within the model number.
- Specifications for gearheads with motors can be found on the individual motor's page.
- See Gearhead Selection on page A-19 for more information on the gear ratios.
- Gearheads in this catalog are shown with inch-sized output-shafts. Metric-sized output shafts are also available. Contact your local sales office or distributor for more information.

Right-Angle Type Gearheads

Gear Frame Size	Type of shaft	Gearhead Model	Gear Ratios	Maximum Permissible Torque
3.15in. sq. for 25W	Hollow shaft	**4GNRH**	3.6~180 11 ratios	69 lb-in 8 N•m
	Solid shaft	**4GN□RAA**	3.6~180 11 ratios	
3.54in. sq. for 40W	Hollow shaft	**5GN□RH**	3.6~180 11 ratios	87 lb-in 10 N•m
	Solid shaft	**5GN□RAA**	3~180 20 ratios	
3.54in. sq. for 60W and 90W	Hollow shaft	**5GU□RH**	3.6~180 11 ratios	174 lb-in 20 N•m
	Solid shaft	**5GU□RAA**	3~180 20 ratios	

- Enter the gear ratio in the box(□) within the model name.
- Features and specifications for right angle gearheads are shown on page A-216.
- Gearheads in this catalog are shown with inch-sized output-shafts. Metric-sized output shafts are also available. Contact your local sales office or distributor for more information.

Right-Angle Gearheads

Right-Angle gearheads are flange-mounted gearheads that use worm gears and special helical gears. They allow motors to be installed at right angles to the axis of equipment such as belt conveyors. They are available in hollow shaft RH and solid shaft RA models and are ideal for keeping equipment compact.

Features

- Right angle gearheads with mounting sizes of 3.15 inch square (for 25W) or 3.54 inch square (for 40 W) are available for the **GN** pinion mounting sizes of 3.54 inch (for 60 or 90 W) are available for the **GU** pinion. They can be connected to all Oriental Motor AC motors with the exception of clutch and brake and **FPW** washdown motors.
- The output shaft is perpendicular to the motor shaft, so the motor can be installed perpendicular to the axis being driven.
- Eleven gear ratios are available from 3.6:1 to 180:1. The optimum gear ratio can be selected just as with ordinary gearheads. The maximum permissible torques are also the same as for ordinary gearheads.
- Hollow shaft gearheads allow additional space savings and simpler mechanism designs since they do not require couplings for mounting. Usually, hollow shaft gearheads are locked with a torque arm when mounted so the gearhead does not rotate from the reactive force of the load. When mounted with a torque arm, no centering is needed, so it is faster to mount the gearhead on the device.

Product Number Code

5 GU 18 R AA

- **5**: Gearhead Frame Size
  - **4**: 3.15inch sq. (80mm sq.)
  - **5**: 3.54inch sq. (90mm sq.)
- **GU**
  - **GN**: **GN** pinion gear
  - **GU**: **GU** pinion gear
- **18**: Gear Ratio
- **R**: Right Angle Gearhead
- **AA**: Type of shaft
  - **AA**: Solid type and inch-sized output shaft
  - **H**: Hollow type

Types

Type of shaft	Gearhead Model
Hollow shaft	**4GN3.6RH~4GN180RH**
	5GN3.6RH~5GN180RH
	5GU3.6RH~5GU180RH
Solid shaft	**4GN3.6RAA~4GN180RAA**
	5GN3RAA~5GN180RAA
	5GU3RAA~5GU180RAA

Specifications

Gearhead Model	Gear Ratio	Maximum Permissible Torque lb-in (N · m)		Permissible Overhung Load lb (N) 0.4" from shaft end		Permissible Overhung Load lb (N) 0.8" from shaft end		Permissible Thrust Load lb	(N)
4GN□RH	**3.6~180**	69	(8)	55	(250)*	44	(220)*	22	(100)
5GN□RH	**3.6~180**	87	(10)	77	(350)*	68	(310)*	44	(200)
5GU□RH	**3.6~180**	174	(20)	123	(560)*	110	(500)*	55	(250)
4GN□RAA	**3.6~18**	69	(8)	22	(100)	33	(150)	22	(100)
	30~180			44	(200)	66	(300)		
5GN□RAA	**3~18**	87	(10)	55	(250)	77	(350)	44	(200)
	25~180			66	(300)	99	(450)		
5GU□RAA	**3~9**	174	(20)	88	(400)	110	(500)	55	(250)
	12.5~25			99	(450)	132	(600)		
	30~180			110	(500)	154	(700)		

* Overhung load values for hollowshaft models are distances from the flange mounting surface.
- Enter the gear ratio in the box(□) within the model name.
- **Caution:** Unlike most worm gear mechanisms, the right-angle gear does not have self-locking capabilities.

Calculating permissible overhung load for hollowshaft models

When the end of the shaft being driven is supported as in the figure below, calculate the permissible overhung load using the following equations.
(This mechanism is the most demanding in terms of overhung load.)

4GN□RH

$$\text{Permissible overhung load } W \text{ [lb]} = \frac{2.34}{2.34 + Lp} \times 65 \text{ [lb]}^*$$

* 65 (lb) : Permisible overhung load at flange mounting surface

5GN□RH

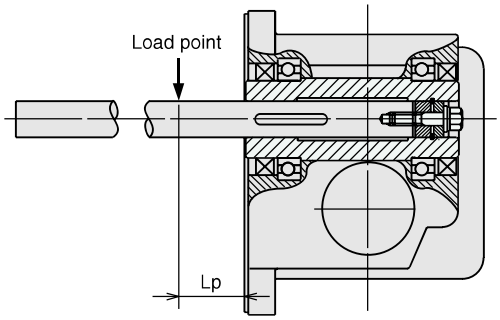
$$\text{Permissible overhung load } W \text{ [lb]} = \frac{2.76}{2.76 + Lp} \times 88 \text{ [lb]}^*$$

* 88 (lb) : Permisible overhung load at flange mounting surface

5GU□RH

$$\text{Permissible overhung load } W \text{ [lb]} = \frac{2.70}{270 + Lp} \times 142 \text{ [lb]}^*$$

* 142 (lb) : Permisible overhung load at flange mounting surface



Lp [inch] : Distance from flange mounting surface to overhung load point

Gearhead Efficiency

The permissible torques shown on the following page cover most motor combinations. For motor combinations not covered, use the efficiency value in the table below for your calculations.
When making a selection, remember that the transfer efficiency at startup is lower than at the rated speed.

Gearhead Model \ Gear Ratio		3.6	6	9	15	18	30	36	60	90	120	180
4GN□RH	Rating	40%		50%	60%							
	Startup	40%		50%	54%							
5GN□RH	Rating	50%		68%			60%					
	Startup	50%		60%			54%					
5GU□RH	Rating	50%		68%			60%				50%	
	Startup	50%		60%			54%				45%	
4GN□RAA	Rating	50			60%							
	Startup	50			54%							

Gearhead Model \ Gear Ratio		3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
5GN□RAA	Rating	68%									60%										
	Startup	60%									54%										
5GU□RAA	Rating	68%										60%							50%		
	Startup	60%										54%							45%		

Gearmotor — Torque Table

- The speed is calculated by dividing the motor's synchronous speed (60Hz: 1800 r/min) by the gear ratio. The actual speed is 2 ~ 20% less than the listed value, depending on the size of the load.
- The efficiency of the gear assembly at startup is lower than the rating, so output torque is lower.
- All output shafts rotate opposite to the direction of motor shaft rotation.

Induction Motors

Hollow shaft (All output shafts rotate opposite to the direction of motor shaft rotation.)

Unit = Upper values:lb-in/Lower values:N·m

Model	Speed r/min	500	300	200	120	100	60	50	30	20	15	10
	Gear Ratio	**3.6**	**6**	**9**	**15**	**18**	**30**	**36**	**60**	**90**	**120**	**180**
4IK25GN-AWU / 4GN□RH	Rating	2.1	3.5	6.6	13	16	27	32	53	69	69	69
		0.24	0.41	0.77	1.5	1.8	3.1	3.7	6.1	8	8	8
	Startup	1.5	2.5	4.7	8.5	10	17	20	34	51	68	69
		0.17	0.29	0.54	0.97	1.2	1.9	2.3	3.9	5.8	7.8	8
5IK40GN-AWU / 5GN□RH	Rating	4.1	6.8	14	23	28	41	49	81	87	87	87
		0.47	0.78	1.6	2.7	3.2	4.7	5.6	9.4	10	10	10
	Startup	3.1	5.2	9.4	16	19	28	34	56	84	87	87
		0.36	0.6	1.1	1.8	2.2	3.2	3.9	6.5	9.7	10	10
5IK60GU-AWU / 5GU□RH	Rating	6.3	11	21	36	43	63	76	126	174	174	174
		0.73	1.2	2.5	4.1	5	7.3	8.7	15	20	20	20
	Startup	5	8.3	15	25	30	45	54	90	135	150	174
		0.58	0.96	1.7	2.9	3.5	5.2	6.2	10	16	17	20
5IK90GU-AWU / 5GU□RH	Rating	9.1	15	31	52	62	91	110	174	174	174	174
		1.1	1.8	3.6	6	7.2	11	13	20	20	20	20
	Startup	7	12	21	35	42	63	76	127	174	174	174
		0.81	1.4	2.4	4.1	4.9	7.3	8.7	15	20	20	20

Solid shaft (All output shafts rotate opposite to the direction of motor shaft rotation.)

Unit = Upper values:lb-in/Lower values:N·m

Model	Speed r/min	500	300	200	120	100	60	50	30	20	15	10
	Gear Ratio	**3.6**	**6**	**9**	**15**	**18**	**30**	**36**	**60**	**90**	**120**	**180**
4IK25GN-AWU / 4GN□RAA	Rating	2.7	4.4	6.6	13	16	27	32	53	69	69	69
		0.31	0.51	0.77	1.5	1.8	3.1	3.7	6.1	8	8	8
	Startup	1.9	3.1	4.7	8.5	10	17	20	34	51	68	69
		0.22	0.36	0.54	0.97	1.2	1.9	2.3	3.9	5.8	7.8	8

Unit = Upper values : lb-in/Lower values : N·m

Model	Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
5IK40GN-AWU / 5GN□RAA	Rating	4.6	5.5	7.7	9.2	12	14	19	23	28	34	41	49	68	81	87	87	87	87	87	87
		0.53	0.64	0.88	1.1	1.3	1.6	2.2	2.7	3.2	3.9	4.7	5.6	7.8	9.4	10	10	10	10	10	10
	Startup	3.1	3.8	5.2	6.3	7.8	9.4	13	16	19	23	28	34	47	56	70	84	87	87	87	87
		0.36	0.43	0.6	0.72	0.9	1.1	1.5	1.8	2.2	2.7	3.2	3.9	5.4	6.5	8.1	9.7	10	10	10	10
5IK60GU-AWU / 5GU□RAA	Rating	7.2	8.6	12	14	18	21	30	36	43	60	63	76	105	126	158	174	174	174	174	174
		0.83	0.99	1.4	1.7	2.1	2.5	3.4	4.1	5	6.9	7.3	8.7	12	15	18	20	20	20	20	20
	Startup	5	6	8.3	10	12	15	21	25	30	42	45	54	75	90	112	135	150	150	174	174
		0.58	0.69	0.96	1.2	1.4	1.7	2.4	2.9	3.5	4.8	5.2	6.2	8.6	10	13	16	17	17	20	20
5IK90GU-AWU / 5GU□RAA	Rating	10	12	17	21	26	31	43	52	62	86	91	110	152	174	174	174	174	174	174	174
		1.2	1.4	2	2.4	3	3.6	5	6	7.2	9.9	11	13	18	20	20	20	20	20	20	20
	Startup	7	8.4	12	14	18	21	29	35	42	59	63	76	105	127	158	174	174	174	174	174
		0.81	0.97	1.4	1.6	2	2.4	3.4	4.1	4.9	6.8	7.3	8.7	12	15	18	20	20	20	20	20

Reversible Motors

Hollow shaft (All output shafts rotate opposite to the direction of motor shaft rotation.)

Unit = Upper values:lb-in/Lower values:N·m

Model	Speed r/min	500	300	200	120	100	60	50	30	20	15	10
	Gear Ratio	**3.6**	**6**	**9**	**15**	**18**	**30**	**36**	**60**	**90**	**120**	**180**
4RK25GN-AWU / 4GN□RH	Rating	2.1	3.5	6.6	13	16	27	32	53	69	69	69
		0.24	0.41	0.77	1.5	1.8	3.1	3.7	6.1	8	8	8
	Startup	1.7	2.9	5.5	9.8	12	20	24	39	59	69	69
		0.2	0.34	0.63	1.1	1.4	2.3	2.7	4.5	6.8	8	8
5RK40GN-AWU / 5GN□RH	Rating	4.2	7	14	24	29	42	51	84	87	87	87
		0.49	0.81	1.7	2.8	3.3	4.9	5.8	9.7	10	10	10
	Startup	4.1	6.8	12	20	24	37	44	73	87	87	87
		0.47	0.78	1.4	2.3	2.8	4.2	5.1	8.4	10	10	10
5RK60GU-AWU / 5GU□RH	Rating	6.3	11	21	36	43	63	76	126	174	174	174
		0.73	1.2	2.5	4.1	5	7.3	8.7	15	20	20	20
	Startup	5.9	9.9	18	30	36	53	64	107	160	174	174
		0.68	1.1	2.1	3.4	4.1	6.2	7.4	12	18	20	20
5RK90GU-AWU / 5GU□RH	Rating	9.1	15	31	52	62	91	110	174	174	174	174
		1.1	1.8	3.6	6	7.2	11	13	20	20	20	20
	Startup	9.2	15	28	46	55	83	100	166	174	174	174
		1.1	1.8.	3.2	5.3	6.4	9.6	11	19	20	20	20

Solid shaft (All output shafts rotate opposite to the direction of motor shaft rotation.)

Unit = Upper values:lb-in/Lower values:N·m

Model	Speed r/min	500	300	200	120	100	60	50	30	20	15	10
	Gear Ratio	**3.6**	**6**	**9**	**15**	**18**	**30**	**36**	**60**	**90**	**120**	**180**
4RK25GN-AWU / 4GN□RAA	Rating	2.7	4.4	6.6	13	16	27	32	53	69	69	69
		0.31	0.51	0.77	1.5	1.8	3.1	3.7	6.1	8	8	8
	Startup	2.2	3.6	5.5	9.8	12	20	24	39	59	70	69
		0.25	0.42	0.63	1.1	1.4	2.3	2.7	4.5	6.8	8	8

Unit = Upper values : lb-in/Lower values : N·m

Model	Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
5RK40GN-AWU / 5GN□RAA	Rating	4.8	5.7	8	9.6	12	14	20	24	29	35	42	51	70	84	87	87	87	87	87	87
		0.55	0.66	0.92	1.1	1.4	1.7	2.3	2.8	3.3	4.1	4.9	5.8	8.1	9.7	10	10	10	10	10	10
	Startup	4.1	4.9	6.8	8.1	10	12	17	20	24	30	37	44	61	73	87	87	87	87	87	87
		0.47	0.56	0.78	0.94	1.2	1.4	2	2.3	2.8	3.5	4.2	5.1	7	8.4	10	10	10	10	10	10
5RK60GU-AWU / 5GU□RAA	Rating	7.2	8.6	12	14	18	21	30	36	43	60	63	76	105	126	158	174	174	174	174	174
		0.83	0.99	1.4	1.7	2.1	2.5	3.4	4.1	5	6.9	7.3	8.7	12	15	18	20	20	20	20	20
	Startup	5.9	7.1	9.9	12	15	18	25	30	36	50	53	64	89	107	134	160	174	174	174	174
		0.68	0.82	1.1	1.4	1.7	2.1	2.9	3.4	4.1	5.7	6.2	7.4	10	12	15	18	20	20	20	20
5RK90GU-AWU / 5GU□RAA	Rating	10	12	17	21	26	31	43	52	62	86	91	110	152	174	174	174	174	174	174	174
		1.2	1.4	2	2.4	3	3.6	5	6	7.2	9.9	11	13	18	20	20	20	20	20	20	20
	Startup	9.2	11	15	18	23	28	38	46	55	77	83	100	138	166	174	174	174	174	174	174
		1.1	1.3	1.8	2.1	2.7	3.2	4.4	5.3	6.4	8.9	9.6	11	16	19	20	20	20	20	20	20

Electromagnetic Brake Motors

Hollow shaft (All output shafts rotate opposite to the direction of motor shaft rotation.)

Unit = Upper values:lb-in/Lower values:N·m

Model	Speed r/min	500	300	200	120	100	60	50	30	20	15	10
	Gear Ratio	**3.6**	**6**	**9**	**15**	**18**	**30**	**36**	**60**	**90**	**120**	**180**
4RK25GN-AWMU / 4GN□RH	Rating	2.1	3.5	6.6	13	16	27	32	53	69	69	69
		0.24	0.41	0.77	1.5	1.8	3.1	3.7	6.1	8	8	8
	Startup	1.7	2.5	5.5	9.8	12	20	24	39	59	69	69
		0.2	0.34	0.63	1.1	1.4	2.3	2.7	4.5	6.8	8	8
5RK40GN-AWMU / 5GN□RH	Rating	4.2	7	14	24	29	42	51	84	87	87	87
		0.49	0.81	1.7	2.8	3.3	4.9	5.8	9.7	10	10	10
	Startup	4.1	6.8	12	20	24	37	44	73	87	87	87
		0.47	0.78	1.4	2.3	2.8	4.2	5.1	8.4	10	10	10
5RK60GU-AWMU / 5GU□RH	Rating	6.3	11	21	36	43	63	76	126	174	174	174
		0.73	1.2	2.5	4.1	5	7.3	8.7	15	20	20	20
	Startup	5.9	9.9	18	30	36	53	64	107	160	174	174
		0.68	1.1	2.1	3.4	4.1	6.2	7.4	12	18	20	20
5RK90GU-AWMU / 5GU□RH	Rating	9.1	15	31	52	62	91	110	174	174	174	174
		1.1	1.8	3.6	6	7.2	11	13	20	20	20	20
	Startup	9.2	15	28	46	55	83	100	166	174	174	174
		1.1	1.8	3.2	5.3	6.4	9.6	11	19	20	20	20

Solid shaft (All output shafts rotate opposite to the direction of motor shaft rotation.)

Unit = Upper values:lb-in/Lower values:N·m

Model	Speed r/min	500	300	200	120	100	60	50	30	20	15	10
	Gear Ratio	**3.6**	**6**	**9**	**15**	**18**	**30**	**36**	**60**	**90**	**120**	**180**
4RK25GN-AWMU / 4GN□RAA	Rating	2.7	4.4	6.6	13	16	27	32	53	69	69	69
		0.31	0.51	0.77	1.5	1.8	3.1	3.7	6.1	8	8	8
	Startup	2.2	3.6	5.5	9.8	12	20	24	39	59	69	69
		0.25	0.42	0.63	1.1	1.4	2.3	2.7	4.5	6.8	8	8

Unit = Upper values : lb-in/Lower values : N·m

Model	Speed r/min	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
	Gear Ratio	**3**	**3.6**	**5**	**6**	**7.5**	**9**	**12.5**	**15**	**18**	**25**	**30**	**36**	**50**	**60**	**75**	**90**	**100**	**120**	**150**	**180**
5RK40GN-AWMU / 5GN□RAA	Rating	4.8	5.7	8	9.6	12	14	20	24	29	35	42	51	70	84	87	87	87	87	87	87
		0.55	0.66	0.92	1.1	1.4	1.7	2.3	2.8	3.3	4.1	4.9	5.8	8.1	9.7	10	10	10	10	10	10
	Startup	4.1	4.9	6.8	8.1	10	12	17	20	24	30	37	44	61	73	87	87	87	87	87	87
		0.47	0.56	0.78	0.94	1.2	1.4	2	2.3	2.8	3.5	4.2	5.1	7	8.4	10	10	10	10	10	10
5RK60GU-AWMU / 5GU□RAA	Rating	7.2	8.6	12	14	18	21	30	36	43	60	63	76	105	126	158	174	174	174	174	174
		0.83	0.99	1.4	1.7	2.1	2.5	3.4	4.1	5	6.9	7.3	8.7	12	15	18	20	20	20	20	20
	Startup	5.9	7.1	9.9	12	15	18	25	30	36	50	53	64	89	107	134	160	174	174	174	174
		0.68	0.82	1.1	1.4	1.7	2.1	2.9	3.4	4.1	5.7	6.2	7.4	10	12	15	18	20	20	20	20
5RK90GU-AWMU / 5GU□RAA	Rating	10	12	17	21	26	31	43	52	62	86	91	110	152	174	174	174	174	174	174	174
		1.2	1.4	2	2.4	3	3.6	5	6	7.2	9.9	11	13	18	20	20	20	20	20	20	20
	Startup	9.2	11	15	18	23	28	38	46	55	77	83	100	138	166	174	174	174	174	174	174
		1.1	1.3	1.8	2.1	2.7	3.2	4.4	5.3	6.4	8.9	9.6	11	16	19	20	20	20	20	20	20

Speed Control Motors US Series

Hollow shaft (All output shafts rotate opposite to the direction of motor shaft rotation.)

Unit = Upper values:lb-in/Lower values:N·m

Model	Gear Ratio	3.6	6	9	15	18	30	36	60	90	120	180
US425-401U / 4GN□RH	1200r/min	2.5 0.29	4.2 0.48	7.8 0.9	16 1.8	19 2.2	31 3.6	38 4.3	63 7.2	69 8	69 8	69 8
	90r/min	0.62 0.072	1 0.12	1.9 0.23	3.9 0.45	4.7 0.54	7.8 0.9	9.3 1.1	16 1.8	23 2.7	31 3.6	47 5.4
	Startup	1.3 0.15	2.2 0.25	4.1 0.47	7.4 0.85	8.9 1	15 1.7	18 2	30 3.4	44 5.1	59 6.8	69 8
US540-401U / 5GN□RH	1200r/min	4.1 0.47	6.8 0.78	14 1.6	23 2.7	28 3.2	41 4.7	49 5.6	81 9.4	87 10	87 10	87 10
	90r/min	1.1 0.13	1.8 0.21	3.7 0.43	6.2 0.71	7.4 0.86	11 1.3	13 1.5	22 2.5	33 3.8	44 5	65 7.6
	Startup	2.8 0.32	4.7 0.54	8.4 0.97	14 1.6	17 1.9	25 2.9	30 3.5	51 5.8	76 8.7	87 10	87 10
US560-501U / 5GU□RH	1200r/min	7.7 0.88	13 1.5	26 3	43 5	52 6	77 8.8	92 11	153 18	174 20	174 20	174 20
	90r/min	3.1 0.36	5.2 0.6	11 1.2	18 2	21 2.4	31 3.6	38 4.3	63 7.2	94 11	104 12	156 18
	Startup	4.5 0.51	7.4 0.86	13 1.5	22 2.6	27 3.1	40 4.6	48 5.5	80 9.2	120 14	134 15	174 20
US590-501U / 5GU□RH	1200r/min	11 1.3	19 2.2	39 4.5	65 7.4	78 8.9	114 13	137 16	174 20	174 20	174 20	174 20
	90r/min	3.1 0.36	5.2 0.6	11 1.2	18 2	21 2.4	31 3.6	38 4.3	63 7.2	94 11	104 12	156 18
	Startup	6.3 0.73	11 1.2	19 2.2	32 3.6	38 4.4	57 6.6	68 7.9	114 13	171 20	174 20	174 20

Solid shaft (All output shafts rotate opposite to the direction of motor shaft rotation.)

Unit = Upper values:lb-in/Lower values:N·m

Model	Gear Ratio	3.6	6	9	15	18	30	36	60	90	120	180
US425-401U / 4GN□RAA	1200r/min	3.1 0.36	5.2 0.6	7.8 0.9	16 1.8	19 2.2	31 3.6	38 4.3	63 7.2	69 8	69 8	69 8
	90r/min	0.78 0.09	1.3 0.15	1.9 0.23	3.9 0.45	4.7 0.54	7.8 0.9	9.3 1.1	16 1.8	23 2.7	31 3.6	47 5.4
	Startup	1.6 0.19	2.7 0.32	4.1 0.47	7.4 0.85	8.9 1	15 1.7	18 2	30 3.4	44 5.1	59 6.8	69 8

Unit = Upper values : lb-in/Lower values : N·m

Model	Gear Ratio	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
US540-401U / 5GN□RAA	1200r/min	4.6 0.53	5.5 0.64	7.7 0.88	9.2 1.1	12 1.3	14 1.6	19 2.2	23 2.7	28 3.2	34 3.9	41 4.7	49 5.6	68 7.8	81 9.4	87 10	87 10	87 10	87 10	87 10	87 10
	90r/min	1.2 0.14	1.5 0.17	2.1 0.24	2.5 0.29	3.1 0.36	3.7 0.43	5.2 0.6	6.2 0.71	7.4 0.86	9.1 1.1	11 1.3	13 1.5	18 2.1	22 2.5	27 3.2	33 3.8	36 4.2	44 5	55 6.3	65 7.6
	Startup	2.8 0.32	3.4 0.39	4.7 0.54	5.6 0.65	7 0.81	8.4 0.97	12 1.4	14 1.6	17 1.9	21 2.4	25 2.9	30 3.5	42 4.9	51 5.8	63 7.3	76 8.7	84 9.7	87 10	87 10	87 10
US560-501U / 5GU□RAA	1200r/min	8.7 1	10 1.2	14 1.7	17 2	22 2.5	26 3	36 4.2	43 5	52 6	72 8.3	77 8.8	92 11	128 15	153 18	174 20	174 20	174 20	174 20	174 20	174 20
	90r/min	3.5 0.41	4.3 0.49	5.9 0.68	7.1 0.82	8.9 1	11 1.2	15 1.7	18 2	21 2.4	30 3.4	31 3.6	38 4.3	52 6	63 7.2	78 9	94 11	104 12	104 12	130 15	156 18
	Startup	4.5 0.51	5.3 0.62	7.4 0.86	8.9 1	11 1.3	13 1.5	19 2.1	22 2.6	27 3.1	37 4.3	40 4.6	48 5.5	67 7.7	80 9.2	100 12	120 14	134 15	134 15	167 19	174 20
US590-501U / 5GU□RAA	1200r/min	13 1.5	16 1.8	22 2.5	26 3	32 3.7	39 4.5	54 6.2	65 7.4	78 8.9	108 12	114 13	137 16	174 20	174 20	174 20	174 20	174 20	174 20	174 20	174 20
	90r/min	3.5 0.41	4.3 0.49	5.9 0.68	7.1 0.82	8.9 1	11 1.2	15 1.7	18 2	21 2.4	30 3.4	31 3.6	38 4.3	52 6	63 7.2	78 9	94 11	104 12	104 12	130 15	156 18
	Startup	6.3 0.73	7.6 0.87	11 1.2	13 1.5	16 1.8	19 2.2	26 3	32 3.6	38 4.4	53 6.1	57 6.6	68 7.9	95 11	114 13	142 16	171 20	174 20	174 20	174 20	174 20

Speed Control Motors SC Series Induction Type

Hollow shaft (All output shafts rotate opposite to the direction of motor shaft rotation.)

Unit = Upper values:lb-in/Lower values:N·m

Model \ Gear Ratio		3.6	6	9	15	18	30	36	60	90	120	180
SC425-401WU / 4GN□RH	1200r/min	2 0.23	3.3 0.38	6.2 0.72	12 1.4	15 1.7	25 2.9	30 3.5	50 5.8	69 8	69 8	69 8
	90r/min	0.54 0.062	0.9 0.1	1.7 0.19	3.4 0.39	4.1 0.46	6.8 0.77	8.1 0.93	14 1.5	20 2.3	27 3.1	41 4.6
	Startup	1.3 0.14	2.1 0.24	3.9 0.45	7 0.81	8.4 0.97	14 1.6	17 1.9	28 3.2	42 4.9	56 6.5	69 8
SC540-401WU / 5GN□RH	1200r/min	5 0.58	8.3 0.96	17 2	28 3.3	34 3.9	50 5.8	60 6.9	87 10	87 10	87 10	87 10
	90r/min	0.96 0.099	1.4 0.17	2.9 0.34	4.8 0.56	5.8 0.67	8.6 0.99	10 1.2	17 2	26 3	34 4	51 5.9
	Startup	2.7 0.31	4.4 0.51	8 0.92	13 1.5	16 1.8	24 2.8	29 3.3	48 5.5	72 8.3	87 10	87 10
SC560-501WU / 5GU□RH	1200r/min	6.1 0.7	10 1.2	21 2.4	35 4	41 4.8	61 7	73 8.4	122 14	174 20	174 20	174 20
	90r/min	1.5 0.17	2.5 0.29	5 0.58	8.4 0.97	10 1.2	15 1.7	18 2.1	30 3.4	45 5.1	50 5.7	74 8.6
	Startup	5.5 0.63	9.1 1.1	16 1.9	27 3.2	33 3.8	49 5.7	59 6.8	98 11	148 17	164 19	174 20

Solid shaft (All output shafts rotate opposite to the direction of motor shaft rotation.)

Unit = Upper values:lb-in/Lower values:N·m

Model \ Gear Ratio		3.6	6	9	15	18	30	36	60	90	120	180
SC425-401WU / 4GN□RAA	1200r/min	2.5 0.29	4.2 0.48	6.2 0.72	12 1.4	15 1.7	25 2.9	30 3.5	50 5.8	69 8	69 8	69 8
	90r/min	0.68 0.077	1.1 0.13	1.7 0.19	3.4 0.39	4.1 0.46	6.8 0.77	8.1 0.93	14 1.5	20 2.3	27 3.1	41 4.6
	Startup	1.6 0.18	2.6 0.3	3.9 0.45	7 0.81	8.4 0.97	14 1.6	17 1.9	28 3.2	42 4.9	56 6.5	69 8

Unit = Upper values : lb-in/Lower values : N·m

Model \ Gear Ratio		3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
SC540-401WU / 5GN□RAA	1200r/min	5.7 0.65	6.8 0.78	9.4 1.1	11 1.3	14 1.6	17 2	24 2.7	28 3.3	34 3.9	42 4.8	50 5.8	60 6.9	83 9.6	87 10	87 10	87 10	87 10	87 10	87 10	87 10
	90r/min	0.97 0.11	1.2 0.13	1.6 0.19	1.9 0.22	2.4 0.28	2.9 0.34	4 0.47	4.8 0.56	5.8 0.67	7.1 0.83	8.6 0.99	10 1.2	14 1.7	17 2	21 2.5	26 3	29 3.3	34 4	43 5	51 5.9
	Startup	2.7 0.31	3.2 0.37	4.4 0.51	5.3 0.61	6.6 0.77	8 0.92	11 1.3	13 1.5	16 1.8	20 2.3	24 2.8	29 3.3	40 4.6	48 5.5	60 6.9	72 8.3	80 9.2	87 10	87 10	87 10
SC560-501WU / 5GU□RAA	1200r/min	6.9 0.8	8.3 0.95	12 1.3	14 1.6	17 2	21 2.4	29 3.3	35 4	41 4.8	58 6.6	61 7	73 8.4	102 12	122 14	152 18	174 20	174 20	174 20	174 20	174 20
	90r/min	1.7 0.19	2 0.23	2.8 0.32	3.4 0.39	4.2 0.48	5 0.58	7 0.81	8.4 0.97	10 1.2	14 1.6	15 1.7	18 2.1	25 2.9	30 3.4	37 4.3	45 5.1	50 5.7	50 5.7	62 7.1	74 8.6
	Startup	5.5 0.63	6.6 0.76	9.1 1.1	11 1.3	14 1.6	16 1.9	23 2.6	27 3.2	33 3.8	46 5.3	49 5.7	59 6.8	82 9.5	98 11	123 14	148 17	164 19	164 19	174 20	174 20

Speed Control Motors SC Series Reversible Type

Hollow shaft (All output shafts rotate opposite to the direction of motor shaft rotation.)

Unit = Upper values:lb-in/Lower values:N·m

Model \ Gear Ratio		3.6	6	9	15	18	30	36	60	90	120	180
SC425-411WU / 4GN□RH	1200r/min	2.6 0.3	4.3 0.49	8 0.92	16 1.8	19 2.2	32 3.7	38 4.4	64 7.4	69 8	69 8	69 8
	90r/min	1.2 0.14	2 0.23	3.7 0.43	7.4 0.86	8.9 1	15 1.7	18 2.1	30 3.4	45 5.1	59 6.8	69 8
	Startup	1.4 0.16	2.3 0.26	4.3 0.5	7.7 0.89	9.3 1.1	15 1.8	19 2.1	31 3.6	46 5.3	62 7.1	69 8
SC540-411WU / 5GN□RH	1200r/min	5 0.58	8.3 0.96	17 2	28 3.3	34 3.9	50 5.8	60 6.9	87 10	87 10	87 10	87 10
	90r/min	2 0.23	3.4 0.39	6.9 0.8	12 1.3	14 1.6	20 2.3	24 2.8	41 4.7	61 7	81 9.4	87 10
	Startup	3.3 0.38	5.5 0.63	9.9 1.1	16 1.9	20 2.3	30 3.4	35 4.1	59 6.8	87 10	87 10	87 10
SC560-511WU / 5GU□RH	1200r/min	6.2 0.72	10 1.2	21 2.4	35 4.1	42 4.9	62 7.2	75 8.6	125 14	174 20	174 20	174 20
	90r/min	1.9 0.22	3.1 0.36	6.4 0.73	11 1.2	13 1.5	19 2.2	23 2.6	38 4.3	56 6.5	63 7.2	94 11
	Startup	5.6 0.65	9.4 1.1	17 1.9	28 3.2	34 3.9	51 5.8	61 7	101 12	152 17	169 19	174 20

Solid shaft (All output shafts rotate opposite to the direction of motor shaft rotation.)

Unit = Upper values:lb-in/Lower values:N·m

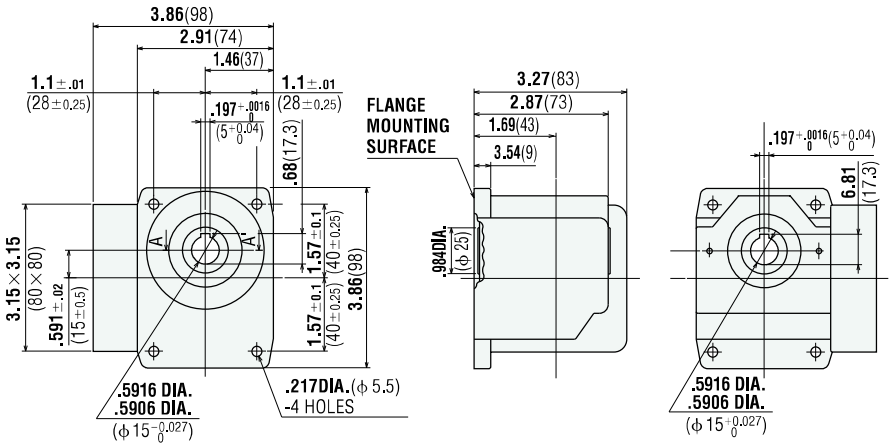
Model \ Gear Ratio		3.6	6	9	15	18	30	36	60	90	120	180
SC425-411WU / 4GN□RAA	1200r/min	3.2 0.37	5.3 0.62	8 0.92	16 1.8	19 2.2	32 3.7	38 4.4	64 7.4	69 8	69 8	69 8
	90r/min	1.5 0.17	2.5 0.29	3.7 0.43	7.4 0.86	8.9 1	15 1.7	18 2.1	30 3.4	45 5.1	59 6.8	69 8
	Startup	1.7 0.2	2.9 0.33	4.3 0.5	7 0.81	8.4 0.97	14 1.6	17 1.9	28 3.2	42 4.9	56 6.5	69 8

Unit = Upper values : lb-in/Lower values : N·m

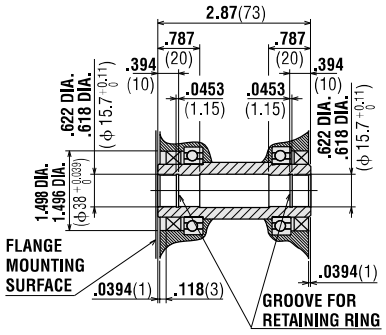
Model \ Gear Ratio		3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
SC540-411WU / 5GN□RAA	1200r/min	5.7 0.65	6.8 0.78	9.4 1.1	11 1.3	14 1.6	17 2	24 2.7	28 3.3	34 3.9	42 4.8	50 5.8	60 6.9	83 9.6	87 10	87 10	87 10	87 10	87 10	87 10	87 10
	90r/min	2.3 0.27	2.8 0.32	3.8 0.44	4.6 0.53	5.8 0.66	6.9 0.8	9.6 1.1	12 1.3	14 1.6	17 2	20 2.3	24 2.8	34 3.9	41 4.7	51 5.9	61 7	68 7.8	81 9.4	87 10	87 10
	Startup	3.3 0.38	3.9 0.45	5.5 0.63	6.6 0.76	8.2 0.95	9.9 1.1	14 1.6	16 1.9	20 2.3	25 2.8	30 3.4	35 4.1	49 5.7	59 6.8	74 8.5	87 10	87 10	87 10	87 10	87 10
SC560-511WU / 5GU□RAA	1200r/min	7.1 0.82	8.5 0.98	12 1.4	14 1.6	18 2	21 2.4	29 3.4	35 4.1	42 4.9	59 6.8	62 7.2	75 8.6	104 12	125 14	156 18	174 20	174 20	174 20	174 20	174 20
	90r/min	2.1 0.24	2.6 0.29	3.5 0.41	4.3 0.49	5.3 0.61	6.4 0.73	8.9 1	11 1.2	13 1.5	18 2	19 2.2	23 2.6	31 3.6	38 4.3	47 5.4	56 6.5	63 7.2	63 7.2	78 9	94 11
	Startup	5.6 0.65	6.8 0.78	9.4 1.1	11 1.3	14 1.6	17 1.9	23 2.7	28 3.2	34 3.9	47 5.4	51 5.8	61 7	84 9.7	101 12	127 15	152 17	169 19	169 19	174 20	174 20

Dimensions Scale 1/4, Unit=inch (mm)

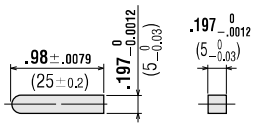
●4GN□RH Weight:3.5 lb. (1.6 kg)



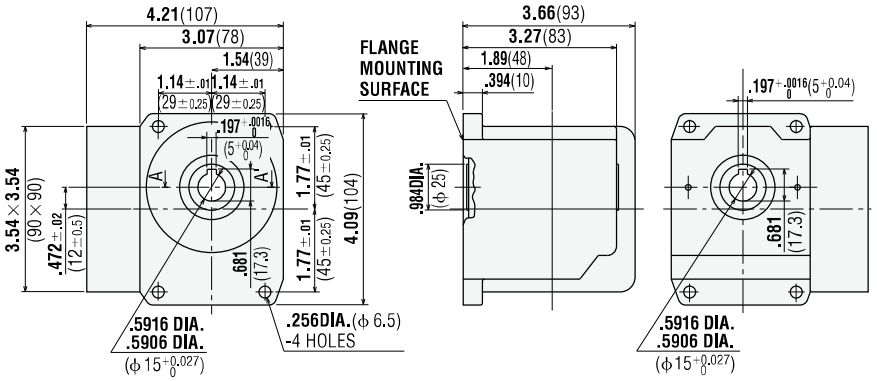
Section AA'



●**Key** Scale 1/2, Unit=inch (mm)



●5GN□RH Weight : 4.4 lb. (2.0 kg)



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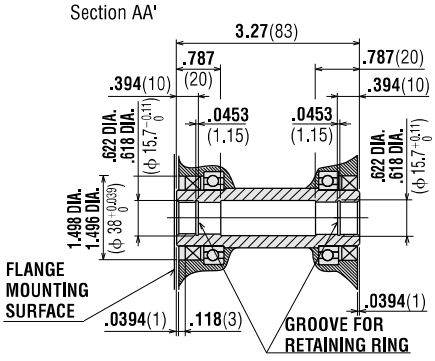

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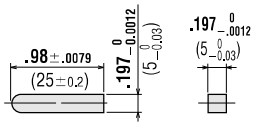
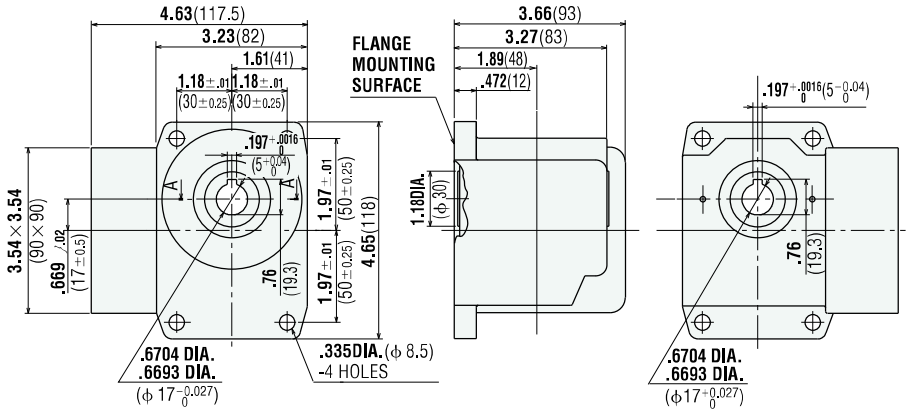


●5GU□RH Weight : 5.5 lb. (2.5 kg)



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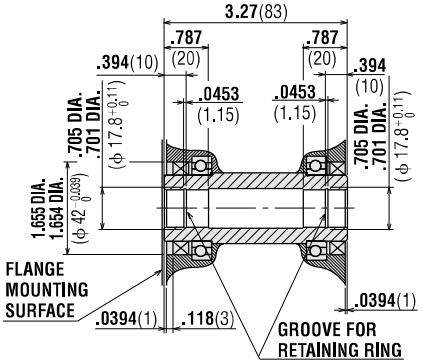
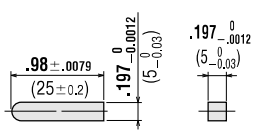
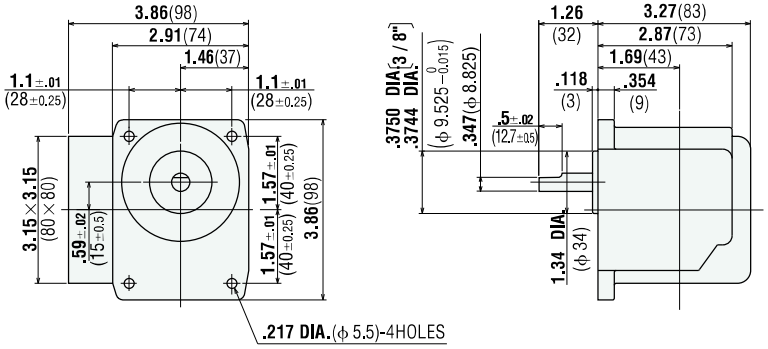


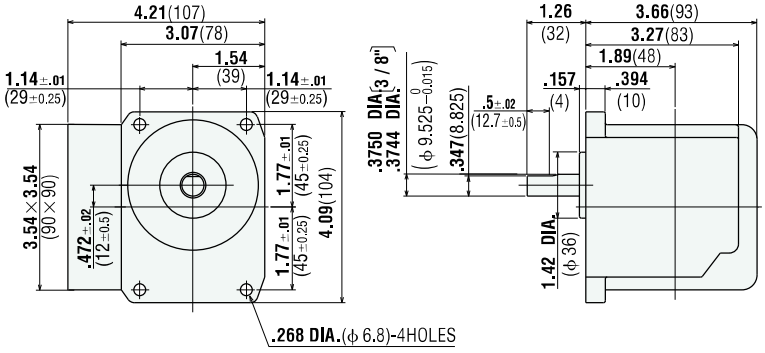
●**Key** Scale 1/2, Unit=inch (mm)



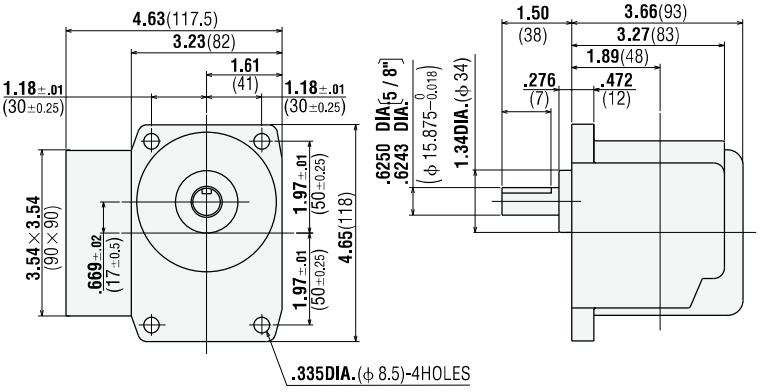
● **4GN□RAA** Weight : 3.5lb. (1.6kg)



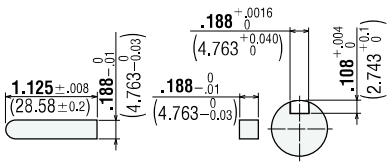
● **5GN□RAA** Weight : 4.4lb. (2.0kg)



● **5GU□RAA** Weight : 5.5lb. (2.5kg)



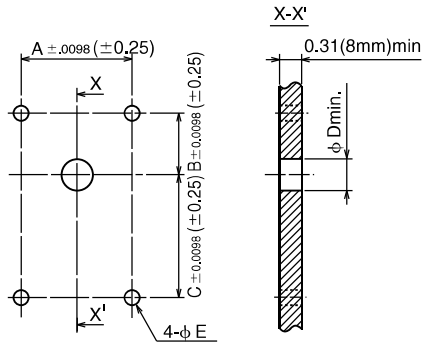
● **Key and Key Slot** Scale 1/2, Unit = inch (mm)



Dimensions of gearhead mount

Allow at least 0.31inch (8mm) for the thickness of the mounting plate and use screws of appropriate length.

Cross Section Unit = inch (mm)



Unit = inch (mm)

Type	Model	A	B	C	ϕ D	ϕ E
Hollow shaft	**4GN□RH**	2.20 (56)	0.98 (25)	2.17 (55)	0.59DIA. (ϕ 15)	0.22DIA. (ϕ 5.5)
	5GN□RH	2.28 (58)	1.30 (33)	2.24 (57)	0.59DIA. (ϕ 15)	0.26DIA. (ϕ 6.5)
	5GU□RH	2.36 (60)	1.30 (33)	2.64 (67)	0.67DIA. (ϕ 17)	0.33DIA. (ϕ 8.5)
Solid shaft	**4GN□RAA**	2.20 (56)	0.98 (25)	2.17 (55)	1.38DIA. (ϕ 35)	0.22DIA. (ϕ 5.5)
	5GN□RAA	2.28 (58)	1.30 (33)	2.24 (57)	1.46DIA. (ϕ 37)	0.27DIA. (ϕ 6.8)
	5GU□RAA	2.36 (60)	1.30 (33)	2.64 (67)	1.38DIA. (ϕ 35)	0.33DIA. (ϕ 8.5)

Enter the gear ratio in the box(□) within the model name.

Example of Mounting the Load

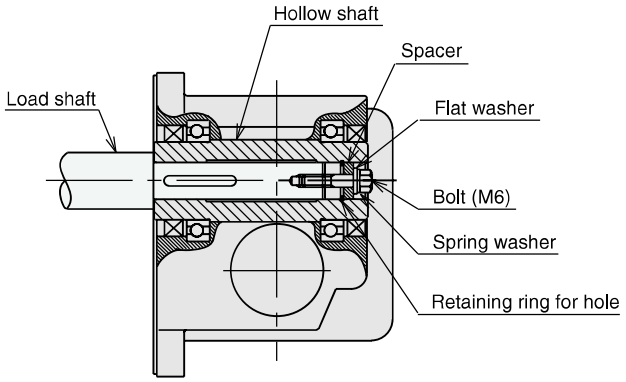
The diagrams below show how to mount loads depending on the shape of the shaft. Use the key provided with the product by fastening it to the shaft. Apply a coating of molybdenum disulfide or similar grease to the inner diameter of the load shaft to prevent binding. Recommended load shaft dimensions are shown below.

Unit = inch (mm)

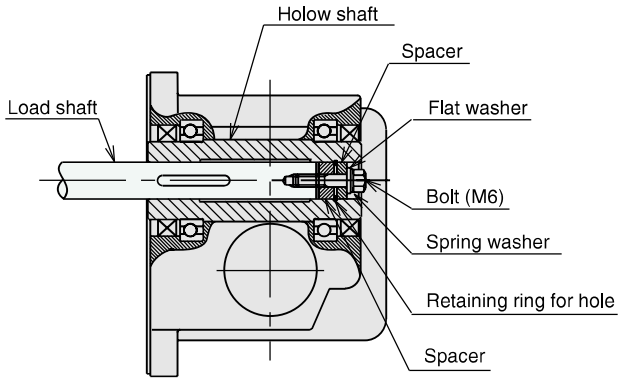
Model	Inner diameter of hollow-shaft	Recommended load shaft diameter
4GN□RH	0.5906DIA. $^{+0.0011}_{0}$ (ϕ 15 $^{+0.027}_{0}$)	0.5906DIA. $^{0}_{-0.0007}$ (ϕ 15 $^{0}_{-0.018}$)
5GN□RH	0.5906DIA. $^{+0.0011}_{0}$ (ϕ 15 $^{+0.027}_{0}$)	0.5906DIA. $^{0}_{-0.0007}$ (ϕ 15 $^{0}_{-0.018}$)
5GU□RH	0.6693DIA. $^{+0.0011}_{0}$ (ϕ 17 $^{+0.027}_{0}$)	0.6693DIA. $^{0}_{-0.0007}$ (ϕ 17 $^{0}_{-0.018}$)

Enter the gear ratio in the box(□) within the model name.

Stepped-down shafts



Straight load shafts



Note: If the bolt extends out more than 0.157inch (4mm) from the end of the hollow shaft, no safety cover can be installed. (**RH** model hollow shaft gearheads include safety covers.)

ORIENTAL MOTOR GENERAL CATALOG

A

Linear Heads

Linear Heads

(Motors are sold separately.)

Features

Linear heads are linear motion rack-and-pinion units for use with our standard AC motors.

- Depending on the type of motor coupled directly to the linear head, various types of movements are possible.
- A wide range of products are available.
- Motors for direct coupling to the linear heads are sold separately.
- Decimal gearheads which reduce the basic speed by 10:1 are available.

Product Number Code

4 L B 45 N -3

Stroke Length (1~7)
Example 3: 11.81 inch (300mm)

Type of Gear
N: **GN** type (for use with **GN** type pinion shaft motor)
U: **GU** type (for use with **GU** type pinion shaft motor)

Speed Indication: Indicating theoretical rack speed. This speed is calculated using the synchronous speed of the motor used (1800r/min). See the products' specifications for available code.

Direction of Rack Travel
F: Vertical stroke type (Rack travels vertically to mounting face)
B: Horizontal stroke type (Rack travels horizontally to mounting face)

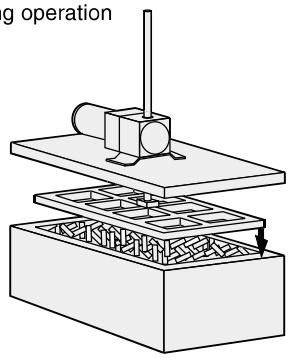
L: Linear Head

Frame size
0: 1.67inch sq. (42mm sq.)
2: 2.36inch sq. (60mm sq.)
4: 3.15inch sq. (80mm sq.)
5: 3.54inch sq. (90mm sq.)

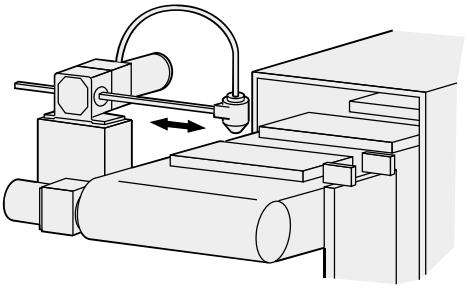
Example Applications

L-line provides a linear drive mechanism in the form of a unit. It can be used in a variety of applications, as shown in the figures, for simpler mechanism design and easier wiring.

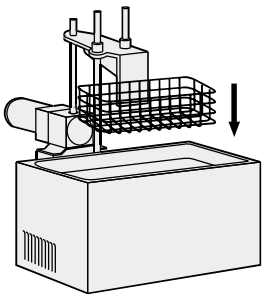
1. Pressing operation



2. Reversing operation

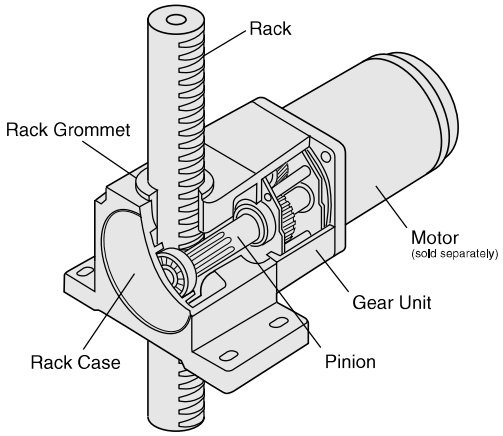


3. Traveling operation



Construction

The linear heads use reduction gears to reduce motor speed and increase motor torque, while the rack-and-pinion converts rotational motion into linear motion.
The rack-and-pinion mechanism is a reliable and low cost method for converting rotational motion into linear motion.



The direction of rack movement is determined by the direction of motor rotation.
When the rack reaches either end, it is necessary to reverse the direction of rack movement by changing the direction of motor rotation. Since the product does not have an automatic stop/reverse mechanism, it is necessary to attach limit switches or sensors to change the motor rotation.

●Motor Unit

The ideal way to change the direction of rack movement instantaneously is to use a reversible motor.

●Rack

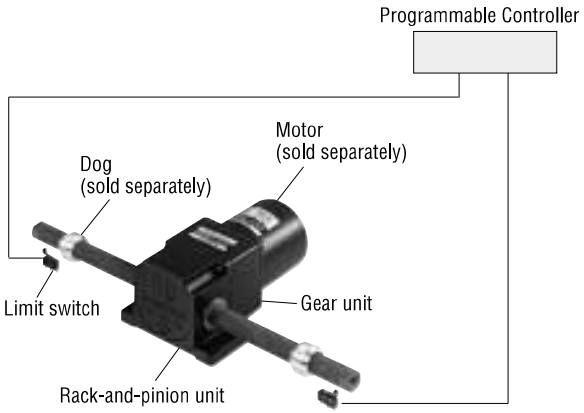
Solid-drawn S45C steel is gear-cut and given a nitride finish to reduce sliding friction and provide rust-resistance.

●Rack Grommet

The rack is supported by two grommets made by an oilless metal.
If the end of the rack should advance into the rack case and the rack is supported by only one grommet, it might cause the mechanism to malfunction. The rack movement should always be reversed before the edge of the rack reaches the rack grommet.

System Composition

●Linear Heads



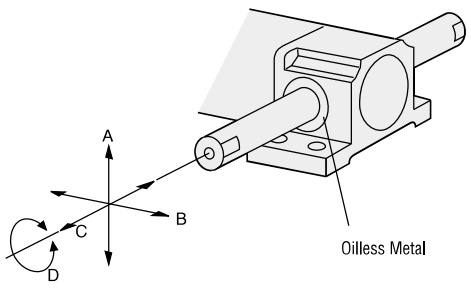
The linear heads come with a rack-and-pinion unit and a reduction gear unit. Motors and dogs are sold separately.
Linear heads may be combined with any standard AC motors.
Any limit switches available on the market can be used.
Three rack speeds are available for a given frame size, by changing on the speed reduction ratio. The rack movement is controlled using a brake pack, programmable controller or relays.

Rack Play

The rack of the linear head is supported at two places by oilless metal grommets in the rack case. Because the rack passes through the inside of the grommets, a slight gap has been left between the grommet and the rack. Therefore, the rack is subject to play as shown in the figure below.

Direction A or B	0.079 inch (2mm) max.
Direction C	0.020 inch (0.5mm) max.

Play in directions A and B has been measured at a point from the case surface.
Since the rack is round-shaped, play in the D direction is large.
The rack play indicates an initial value which will increace during operation. If the rack play becomes problem , install an external guide.



"Characteristics" of Linear Motors and Linear Heads

Rack moving speed, thrust force and holding force are important factors to consider when selecting linear motors or linear heads.

Rack moving speed

The rack speed for the linear motor is given in the table of specifications for each product. Rack speed is expressed as "basic speed".
The basic speed is calculated on the basis of the synchronous speed of the motor (i.e. 1800r/min at 60Hz). In actuality, however, the speed of the motor varies with the load.
The basic speed of a linear head can be calculated from the motor speed, by using the following equation.

$$V = Ns \times \frac{1}{60} \times \frac{1}{i} \times \pi Dp$$

V : Rack moving speed [inch/sec.]
Ns : Speed of motor used [r/min]
i : Ratio of gear unit on the linear head (see table below)
Dp : Pinion pitch circumference [inch] (see table below)

Thrust force

In linear heads, the following equation is used to calculate the thrust force from the torque generated by the motor used.

$$W = Tm \times i \times \eta_1 \times \frac{2}{Dp} \times \eta_2$$

W : Thrust force [lb.]
Tm : Torque of motor used [lb.]
i : Ratio of gear unit on the linear head (see fable below)
η_1 : Transmission efficiency as determined by the gear ratio (see table below)
Dp : Pinion pitch circumference [inch] (see table below)
η_2 : Transmission efficiency of rack and pinion (=0.9)

Linear Head Model	Gear Ratio i	Transmission efficiency η_1	Pinion Pitch Diameter Dp inch.(mm)
0LB (F) 20N-□	30	0.66	0.295 (7.5)
0LB (F) 10N-□	50	0.66	
0LB (F) 5N-□	100	0.59	
2LB (F) 50N-□	17.68	0.73	0.472 (12)
2LB (F) 25N-□	35.36	0.66	
2LB (F) 10N-□	86.91	0.59	
4LB (F) 45N-□	36	0.73	0.837 (21.25)
4LB (F) 20N-□	75	0.66	
4LB (F) 10N-□	150	0.66	
5LB (F) 45N-□	36	0.66	0.945 (24)
5LB (F) 20N-□	90	0.59	
5LB (F) 10N-□	180	0.59	
5LB (F) 45U-□	36	0.66	0.945 (24)
5LB (F) 20U-□	90	0.59	
5LB (F) 10U-□	180	0.59	

The value of the load is determined using the equation assumes that the rack is moving horizontally. If it is moving vertically, subtract the mass of the rack from the value contained in the characteristics table.

Holding torque

The following equation is used to calculate the holding force of the linear head when connected to a motor.

$$FB = TB \times i \times \frac{2}{Dp}$$

FB : Holding force [lb.]
TB : Holding torque of motor used [lb.]
i : Ratio of gear unit on the linear head (see table above)
Dp : Pinion pitch circumference [inch] (see table above)

The holding force is the value when operating the rack in a horizontal direction. The holding load that can be driven when operating the mechanism vertically is the maximum thrust force less the rack weight.

Operation

Controlling motion of rack

Linearheads are essentially alike in that the rack is moved through the control of a motor.
Blocking the operation at the end of the rack in order to stop the motor will not only apply an excessive torque to the gears, but will also result in an inertial shock, reducing the life of the gears substantially. Take special care never to stop the motor in this way.

Use at less than the maximum permissible thrust force

The thrust force of linear heads varies with the basic speed (determined by the gear ratio of the gearhead), with thrust force becoming larger at lower speeds (greater gear ratio). This increase in thrust force is limited, by the mechanical strength of gears or shaft. Permissible thrust force is determined by taking into consideration the motor torque and the mechanical strength of the shafts and gears, then adding a safety margin. If a load greater than this value is applied, or rack movement is locked for a long time, it is likely to result in damage to the rack-and-pinion or gear unit.

Maintain overhung load within permissible level

The amount of overhung load that can be applied to the rack is determined by the total load on the rack bearing. Operate rack at loads within the limits given in the following table.

unit=lb. (kg)

Rack Stroke inch. (mm)	**2L** type	**4L** type	**5L-N** type **5L-U** type
3.9 (100)	12.1 (5.5)	26.4 (12)	28.6 (13)
7.9 (200)	8.8 (4)	19.8 (9)	22 (10)
11.8 (300)	6.6 (3)	15.4 (7)	17.6 (8)
15.7 (400)	5.5 (2.5)	13.2 (6)	13.2 (6)
19.7 (500)	4.4 (2)	11 (5)	11 (5)
23.6 (600)	—	8.8 (4)	11 (5)
27.6 (700)	—	8.8 (4)	8.8 (4)

The table shows the cases in which the entire rack stroke can be used. When the actual usable range is shorter than the rack stroke, a load up to the permissible value for that length stroke can be applied.

Rack Lubrication

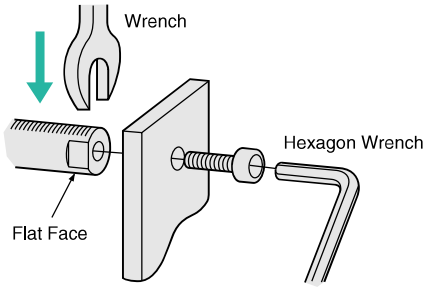
Some sort of lubricating agent is necessary to prevent friction when the rack passes through the rack grommet. The surface of the rack and any gears that mesh with the pinion should always be kept lubricated. In our products, since the rack case is filled with a lubrication agent, there is no need to lubricate the rack case. However, ensure that the surface of the rack or gear teeth do not become dry, as operating in this condition will shorten the product's life.

Use an electromagnetic brake motor for vertical operation

Operation using vertical motion, such as in elevators, often requires that the load be held in position at mid-stroke. For such applications, a model equipped with an electromagnetic brake, which offers high holding power, is recommended. The electromagnetic brake motor has the strongest holding power of all standard AC motors.
These electromagnetic brakes are power off brakes that are engaged in the event of a power failure.

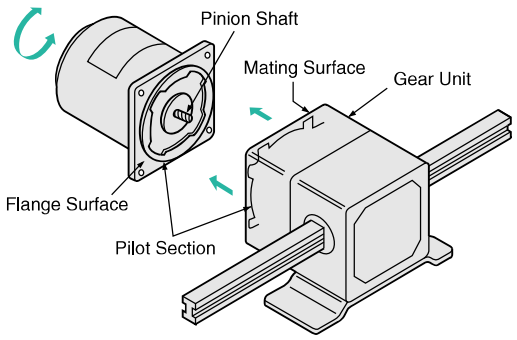
●Installation of the load to the end of the rack

When connecting the load using the tapped hole on the end of the rack, so that a rotational force is not applied to the rack. Hold the rack with a wrench while tightening the screw.



●Connecting Linear Heads

As the figure below shows, a linear head is connected to a motor using the recessed areas on each unit as guides. Gently slide the linear head from side to side without forcing the pinion shaft against the plate on the linear head or against the gear itself.



●Note:

Attempting to put a motor and linear head together by force can result in damage to the linear head.

Glossary

Linear Heads

●Permissible Thrust Force

This is the maximum thrust force that can be used when the motor is operating. For example, if there is a thrust force of 154lb. (70kg), objects up to a weight of 154lb. (70kg) can be lifted.

●Holding Force

This is the force required to hold the rack at the position where it has stopped. If the mechanism is being used for vertical movement, this force must be able to hold a load fastened to the end of the rack to prevent it from falling.

●Basic Speed

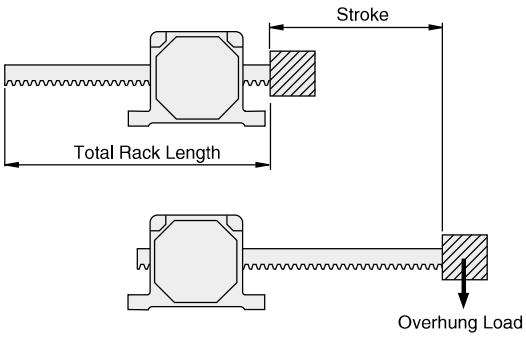
This is the rack speed that is given as the basis for the selection of linear heads. The values indicated are calculated on the basis of the synchronous speed (i.e. 1800r/min at 60Hz) of the motor. However, the actual speed of the motor fluctuates according to the size of the load and can range from 2% to 20% less than the basic speed.

●Stroke

This is the distance that the rack can move. The full length of the rack is this distance plus the width of the rack case.

●Maximum Overhung Load

This is the load that can be applied to the rack in a direction perpendicular to the rack axis. If a load is applied continuously to the end of the rack, then the weight of that load will be applied to the rack as an overhung load.



●Dog

The function of dogs is to trip limit switches and sensors. Dogs are attached to the rack to set the position where the rack should stop.

●Rack

A gearcut rod is made of S45C or equivalent grade of steel. Racks for linear motors are specially designed and machined, and have special cross sections; those for linear heads have round cross sections.

General

Specifications

Type of Linear Head	Basic Speed in./s	Basic Speed mm/s	Max. Permissible Thrust Force lbs.	Max. Permissible Thrust Force kg	Stroke Length in. (mm)	Page
0L type	0.94	24	8.4	3.8	3.9, 7.9 (100, 200)	A-233
	0.47	12	14	6.3		
	0.24	6	22	10		
2L type	2.4	60	19	8.7	3.9, 7.9, 11.8, 15.7, 19.7 (100, 200, 300, 400, 500)	A-234
	1.2	30	33	15		
	0.47	12	44	20		
4L type	2.1	54	68	31	3.9, 7.9, 11.8, 15.7, 19.7, 23.6, 27.6 (100, 200, 300, 400, 500, 600, 700)	A-238
	0.94	24	128	58		
	0.47	12	154	70		
5L-N type	2.1	54	229	104	3.9, 7.9, 11.8, 15.7, 19.7, 23.6, 27.6 (100, 200, 300, 400, 500, 600, 700)	A-243
	0.94	24	308	140		
	0.47	12	308	140		
5L-U type	2.1	54	229	104	3.9, 7.9, 11.8, 15.7, 19.7, 23.6, 27.6 (100, 200, 300, 400, 500, 600, 700)	A-248
	0.94	24	308	140		
	0.47	12	308	140		

- Basic speed is based on the synchronous speed (1800r/min at 60Hz). The actual speed varies with the load or power supply frequency.
- The permissible thrust force is determined by the strength of the linear head. Just as when connecting a gearhead to the motor, increasing the gear ratio generates greater thrust force, but the motor should always be operated below the maximum permissible thrust force.
- The thrust force is the value when operating the rack in a horizontal direction.
- The thrust force given is for when combined with a reversible motor.

Applications and Recommended Motor Combinations

Application	Applicable Motor	**0L** type	**2L** type	**4L** type	**5L-N** type	**5L-U** type
Constant Speed	Reversible Motors	**0RK1GN-AUL**	**2RK6GN-AW(T)U** **2RK6GN-CW(T)E** **2RK6GN-AUL**	**4RK25GN-AW(T)U** **4RK25GN-CW(T)E** **4RK25GN-AUL**	**5RK40GN-AW(T)U** **5RK40GN-CW(T)E** **5RK40GN-AUL**	**5RK60GU-AW(T)U** **5RK60GU-CW(T)E** **5RK60GU-AUL** **5RK90GU-AW(T)U** **5RK90GU-CW(T)E** **5RK90GU-AUL**
	Synchronous Motors	—	**2SK4GN-AUL**	**4SK15GN-AUL**	**5SK25GN-AUL**	—
Position Holding	Electromagnetic Brake Motors	—	**2RK6GN-AWMU** **2RK6GN-CWME** **2RK6GN-AMUL**	**4RK25GN-AWMU** **4RK25GN-CWME** **4IK25GN-SWM** **4RK25GN-AMUL**	**5RK40GN-AWMU** **5RK40GN-CWME** **5IK40GN-SWM** **5RK40GN-AMUL** —	**5RK60GU-AWMU** **5RK60GU-CWME** **5IK60GU-SWM** **5RK60GU-AMUL** **5RK90GU-AWMU** **5RK90GU-CWME** **5IK90GU-SWM** **5RK90GU-AMUL**
Thrust Linear Motion	Torque Motors	—	—	**4TK10GN-AUL**	**5TK20GN-AUL**	—

- The torque motor does not have a built-in friction brake. Be sure that the torque motor has no holding brake force even when stopping during vertical operations. When operating a torque motor at high-speed, ensure that the rack does not hit an object and stop, since this can add excessive torque to the linear head and subject it to inertial shock which can significantly shorten its life.

OL *type Linear Head*

Max. Thrust Force

22lb.(10kg)

■ Max. Thrust Force

22 lb. (10 kg) Thrust force varies with basic speed.

■ Specifications

Basic Speed	Model	Rack Stroke
0.24in/s (6mm/s)	**OLB5N-1, OLB5N-2** **OLF5N-1, OLF5N-2**	3.9 inch (100mm) 7.9 inch (200mm)
0.47in/s (12mm/s)	**OLB10N-1, OLB10N-2** **OLF10N-1, OLF10N-2**	
0.94in/s (24mm/s)	**OLB20N-1, OLB20N-2** **OLF20N-1, OLF20N-2**	

- Basic speed figures are based on synchronous speed. The actual speed varies with the load or frequency of the power source.
- The box (□) represents the code for stroke length.

■ Direction of Rack Movement

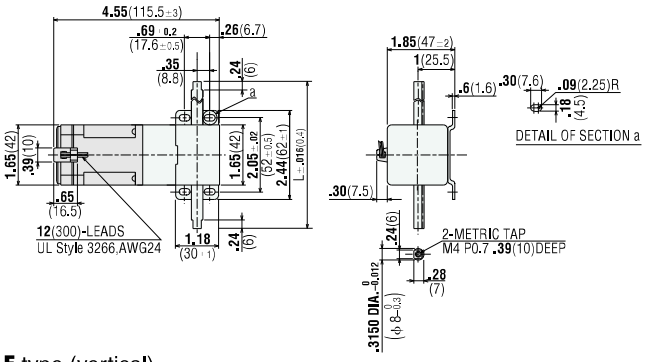
The direction of rack movement is determined by the direction of motor rotation.

Model	Motor Rotation	
	CW	CCW
OLB10N-□ **OLB20N-□**	Right	Left
OLF10N-□ **OLF20N-□**	Up	Down
OLB5N-□	Left	Right
OLF5N-□	Down	Up

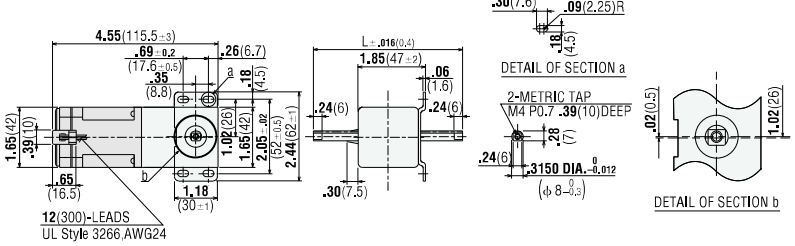
- Trip dogs and limit switches are necessary to stop or reverse the rack movement.
- Direction of rack movement is as viewed from the front side of the linear head.

■ Dimensions Scale 1/4, Unit = inch (mm)

B type (horizontal)



F type (vertical)



■ Max. Permissible Overhung Load

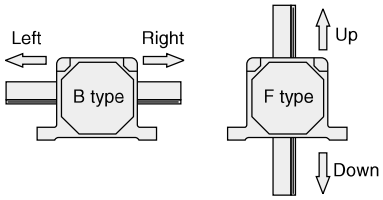
Stroke	Max. Permissible Overhung Load
3.9 inch (100mm)	2.6lb. (1.2kg)
7.9 inch (200mm)	1.8lb. (0.8kg)

■ Motor Combination

Motor type	Motor Model	Page
Reversible Motor	**ORK1GN-AUL**	A-78

●Overrun
Overrun is the value when operating the rack in a horizontal direction.

Model	Overrun inch (mm)
OL□5N-□	0.06 (1.4)
OL□10N-□	0.11 (2.8)
OL□20N-□	0.19 (4.7)



●Weight, Stroke Length and Rack Length

Model	Stroke inch (mm)	Total Length L inch (mm)	Weight(Mass) lb. (kg)	Rack Weight(Mass) lb. (kg)
OLB□N-1	3.9 (100)	6.31 (160.2)	1.23 (0.56)	0.11 (0.05)
OLF□N-1	3.9 (100)	6.31 (160.2)	1.23 (0.56)	0.11 (0.05)
OLB□N-2	7.9 (200)	10.26 (260.7)	1.32 (0.60)	0.20 (0.09)
OLF□N-2	7.9 (200)	10.26 (260.7)	1.32 (0.60)	0.20 (0.09)

2L *type Linear Head*

Max. Thrust Force

44lb.(20kg)

■ Max. Thrust Force

44 lb. (20 kg). Thrust force varies with basic speed and the motor combined.

■ Specifications

Basic Speed	Model	Rack Stroke inch (mm)
0.47 in/s (12 mm/s)	**2LB10N-□** **2LF10N-□**	3.9 (100) 7.9 (200) 11.8 (300) 15.7 (400) 19.7 (500)
1.2 in/s (30 mm/s)	**2LB25N-□** **2LF25N-□**	
2.4 in/s (60 mm/s)	**2LB50N-□** **2LF50N-□**	

- Basic speed figures are based on synchronous speed. (60Hz : 1800r/min) The actual speed varies with the load or frequency of the power source.
- The box (□) represents the code for stroke length.

■ Max. Permissible Overhung Load

Stroke inch (mm)	Max. Permissible Overhung Load lb. (kg)
3.9 (100)	12.1 (5.5)
7.9 (200)	8.8 (4)
11.8 (300)	6.6 (3)
15.7 (400)	5.5 (2.5)
19.7 (500)	4.4 (2)

■ Motor Combination

Motor type	Motor Model	Page
Reversible Motor	**2RK6GN-AW(T)U** **2RK6GN-CW(T)E**	A-82
Electromagnetic Brake Motor	**2RK6GN-AWMU** **2RK6GN-CWME**	A-182

■ Models

Rack Stroke inch (mm)	Basic Speed		
	0.47in/s (12mm/s)	1.2in/s (30mm/s)	2.4in/s (60mm/s)
3.9(100)	**2LB10N-1** **2LF10N-1**	**2LB25N-1** **2LF25N-1**	**2LB50N-1** **2LF50N-1**
7.9(200)	**2LB10N-2** **2LF10N-2**	**2LB25N-2** **2LF25N-2**	**2LB50N-2** **2LF50N-2**
11.8(300)	**2LB10N-3** **2LF10N-3**	**2LB25N-3** **2LF25N-3**	**2LB50N-3** **2LF50N-3**
15.7(400)	**2LB10N-4** **2LF10N-4**	**2LB25N-4** **2LF25N-4**	**2LB50N-4** **2LF50N-4**
19.7(500)	**2LB10N-5** **2LF10N-5**	**2LB25N-5** **2LF25N-5**	**2LB50N-5** **2LF50N-5**

- Longer mounting screws are required if a decimal gearhead is used.

Performance Examples with Several Motor Combinations

Overrun Unit = inch (mm)

Motor \ Linear Head	2LB10N-□ 2LF10N-□	2LB25N-□ 2LF25N-□	2LB50N-□ 2LF50N-□
2RK6GN-AWU	0.10 (2.6)	0.25 (6.4)	0.51 (13)
2RK6GN-AWMU	0.05 (1.3)	0.13 (3.2)	0.25 (6.4)

Overrun at motor shaft is estimated to be 6 revolutions for reversible motors and 3 revolutions for electromagnetic brake motors.

- The maximum thrust load that can be driven when operating the mechanism vertically is the maximum thrust force less the rack weight.
- When operating the mechanism horizontally using a guide or similar device to bear the load, ensure that the load weight is less than the maximum thrust force.

Reversible Motor (2RK6GN-AWU)

Item \ Model	2LB10N-□ 2LF10N-□	2LB25N-□ 2LF25N-□	2LB50N-□ 2LF50N-□
Max. Thrust Force lb. (kg)	44 (20)	30.8 (14)	17.4 (7.9)
Holding Force lb. (N)	15.8 (72)	6.4 (29)	3.1 (14)

- Holding force is provided by the built-in friction brake of the reversible motor. The values given in the table vary depending on the temperature and the time of operation, and thus should only be used as reference.

Electromagnetic Brake Motor (2RK6GN-AWMU)

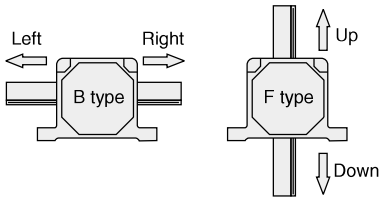
Item \ Model	2LB10N-□ 2LF10N-□	2LB25N-□ 2LF25N-□	2LB50N-□ 2LF50N-□
Max. Thrust Force lb. (kg)	44 (20)	30.8 (14)	17.4 (7.9)
Holding Force lb. (N)	44 (200)	37.4 (170)	19.4 (88)

Direction of Rack Movement

The direction of rack movement is determined by the direction of motor rotation.

Model	Motor Rotation CW	Motor Rotation CCW
2LB10N-□ 2LB50N-□	Right	Left
2LF10N-□ 2LF50N-□	Down	Up
2LB25N-□	Left	Right
2LF25N-□	Up	Down

- Direction of rack movement is as viewed from the front side of the linear head.
- A dog mounted on the rack (optional) and limit switch are required to stop or reverse a rack. Dogs are available as optional accessories. Use dogs for stop and reverse operation.

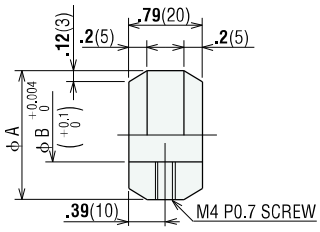


Accessories (sold separately)

Dog

A dog should be mounted on the rack to stop or reverse a rack.
For details, see page A-273

Dimensions Unit = inch (mm)



	Model	A inch (mm)	B inch (mm)
For 2L type Linear Head	LXD2C	0.94 (24)	0.54 (13.8)

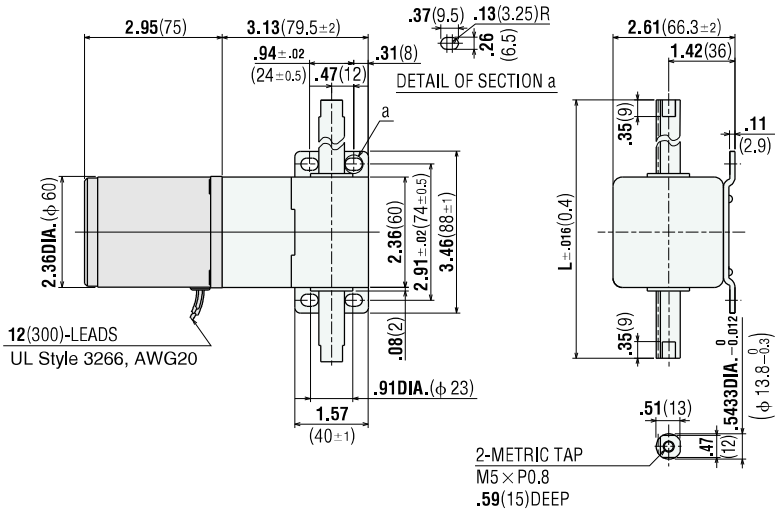
Rack Cover

Rack covers for rack protection and dustproofing are available.
For details, see Page A-256.

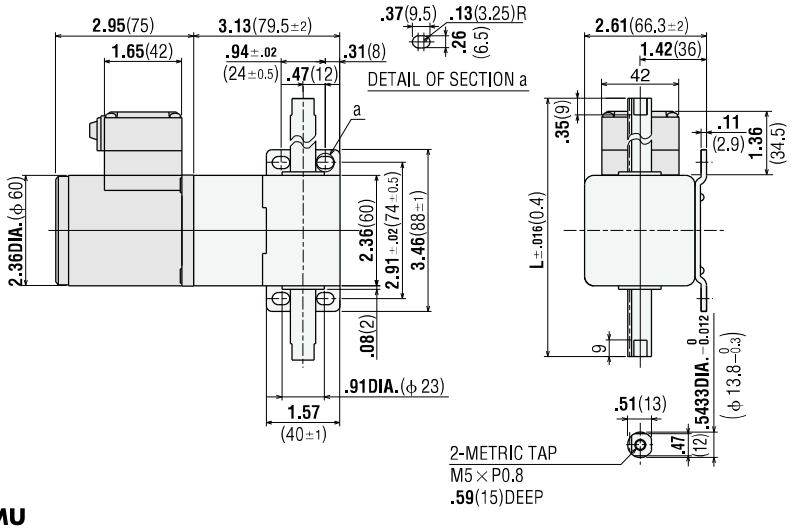
Dimensions Scale 1/4, Unit = inch (mm)

2LB type (horizontal)

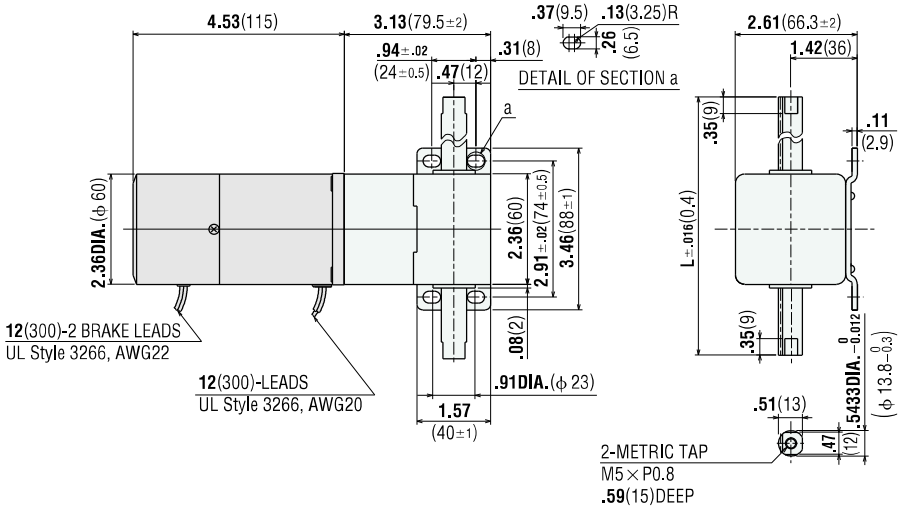
2LB□N-□/2RK6GN-AWU
2RK6GN-CWE
2RK6GN-AUL



2LB□N-□/2RK6GN-AWTU
2RK6GN-CWTE

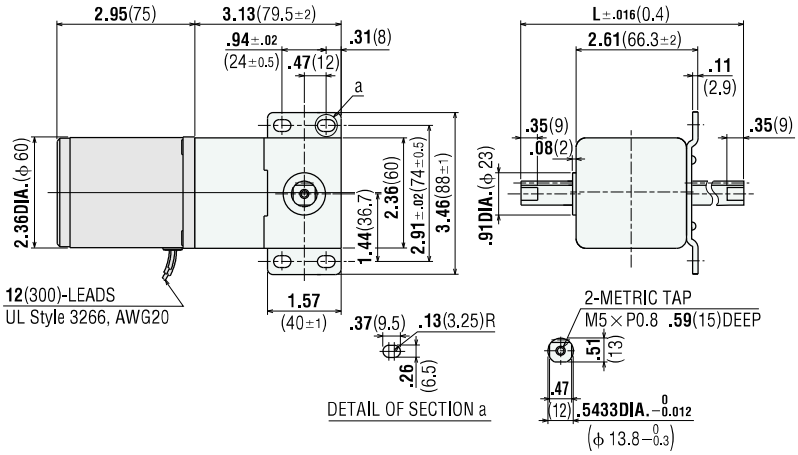


2LB□N-□/2RK6GN-AWMU
2RK6GN-CWME
2RK6GN-AMUL

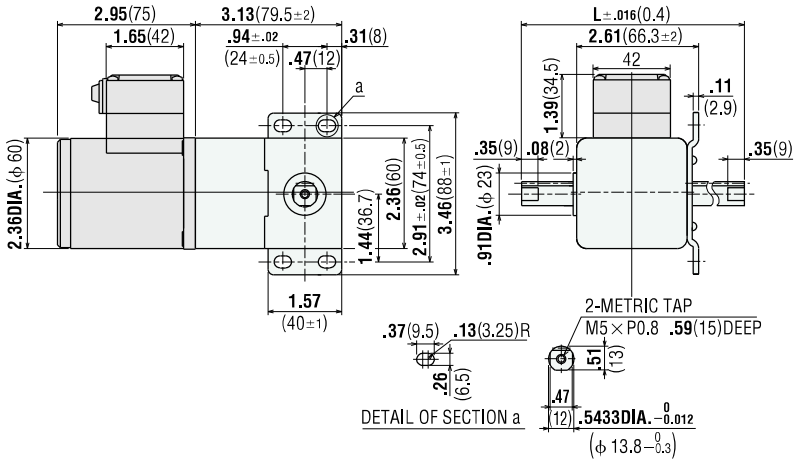


2LF type (vertical)

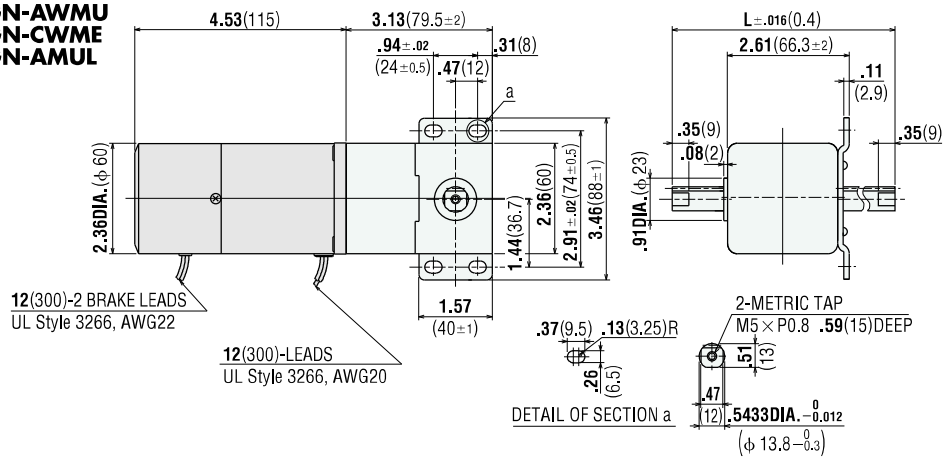
2LF□N-□/2RK6GN-AWU
2RK6GN-CWE
2RK6GN-AUL



2LF□N-□/2RK6GN-AWTU
2RK6GN-CWTE



2LF□N-□/2RK6GN-AWMU
2RK6GN-CWME
2RK6GN-AMUL



Weight, Stroke Length and Rack Length

Model	Stroke inch (mm)	Total Length L inch (mm)	Weight (Mass) lb. (kg)	Rack Weight (Mass) lb. (kg)
2LB□N-1, 2LF□N-1	3.9 (100)	6.93 (175.9)	1.98 (0.9)	0.44 (0.2)
2LB□N-2, 2LF□N-2	7.9 (200)	10.89 (276.5)	2.20 (1.0)	0.66 (0.3)
2LB□N-3, 2LF□N-3	11.8 (300)	14.84 (377.0)	2.42 (1.1)	0.88 (0.4)
2LB□N-4, 2LF□N-4	15.7 (400)	18.80 (477.5)	2.64 (1.2)	1.10 (0.5)
2LB□N-5, 2LF□N-5	19.7 (500)	22.76 (578.0)	2.86 (1.3)	1.32 (0.6)

4L type Linear Head

Max. Thrust Force

154lb.(70kg)

Max. Thrust Force

154lb. (70 kg). Thrust force varies with basic speed and the motor combined.

Specifications

Basic Speed	Model	Rack Stroke inch (mm)
0.47 in/s (12 mm/s)	**4LB10N-□**	3.9 (100)
	4LF10N-□	7.9 (200)
		11.8 (300)
1.2 in/s (30 mm/s)	**4LB20N-□**	15.7 (400)
	4LF20N-□	19.7 (500)
2.4 in/s (60 mm/s)	**4LB45N-□**	23.6 (600)
	4LF45N-□	27.6 (700)

- Basic speed figures are based on synchronous speed (60Hz : 1800r/min). The actual speed varies with the load or frequency of the power source.
- The box (□) represents the code for stroke length.

Max. Permissible Overhung Load

Stroke inch (mm)	Max. Permissible Overhung Load lb. (kg)
3.9 (100)	26.4 (12)
7.9 (200)	19.8 (9)
11.8 (300)	15.4 (7)
15.7 (400)	13.2 (6)
19.7 (500)	11.0 (5)
23.6 (600)	8.8 (4)
27.6 (700)	8.8 (4)

Motor Combination

Motor type	Motor Model	Page
Reversible Motor	**4RK25GN-AW(T)U**	A-90
	4RK25GN-CW(T)E	
Electromagnetic Brake Motor	**4RK25GN-AWMU**	A-182
	4RK25GN-CWME	
	4IK25GN-SWM	
Torque Motor	**4TK10GN-AUL**	A-108

Models

Rack Stroke inch (mm)	Basic Speed		
	0.47in/s (12mm/s)	1.2in/s (30mm/s)	2.4in/s (60mm/s)
3.9 (100)	**4LB10N-1**	**4LB20N-1**	**4LB45N-1**
	4LF10N-1	**4LF20N-1**	**4LF45N-1**
7.9 (200)	**4LB10N-2**	**4LB20N-2**	**4LB45N-2**
	4LF10N-2	**4LF20N-2**	**4LF45N-2**
11.8 (300)	**4LB10N-3**	**4LB20N-3**	**4LB45N-3**
	4LF10N-3	**4LF20N-3**	**4LF45N-3**
15.7 (400)	**4LB10N-4**	**4LB20N-4**	**4LB45N-4**
	4LF10N-4	**4LF20N-4**	**4LF45N-4**
19.7 (500)	**4LB10N-5**	**4LB20N-5**	**4LB45N-5**
	4LF10N-5	**4LF20N-5**	**4LF45N-5**
23.6 (600)	**4LB10N-6**	**4LB20N-6**	**4LB45N-6**
	4LF10N-6	**4LF20N-6**	**4LF45N-6**
27.6 (700)	**4LB10N-7**	**4LB20N-7**	**4LB45N-7**
	4LF10N-7	**4LF20N-7**	**4LF45N-7**

Performance Examples with Several Motor Combinations

Overrun Unit = inch (mm)

Linear Head / Motor	4LB10N-□ / 4LF10N-□	4LB20N-□ / 4LF20N-□	4LB45N-□ / 4LF45N-□
4RK25GN-AWU	0.11 (2.7)	0.21 (5.4)	0.43 (11)
4RK25GN-AWMU	0.05 (1.3)	0.11 (2.7)	0.22 (5.6)

Overrun at motor shaft is estimated to be 6 revolutions for reversible motors and 3 revolutions for electromagnetic brake motor.

- The maximum thrust load that can be driven when operating the mechanism vertically is the maximum thrust force less the rack weight.
- When operating the mechanism horizontally using a guide or similar device to bear the load, ensure that the load weight is less than the maximum thrust force.

Direction of Rack Movement

The direction of rack movement is determined by the direction of motor rotation.

Model	Motor Rotation	
	CW	CCW
4LB10N-□ 4LB20N-□	Left	Right
4LF10N-□ 4LF20N-□	Up	Down
4LB45N-□	Right	Left
4LF45N-□	Down	Up

- Direction of rack movement is as viewed from the front side of the linear head.
- A dog mounted on the rack (optional) and limit switch are required to stop or reverse a rack. Dogs are available as optional accessories. Use dogs for stop and reverse operation.

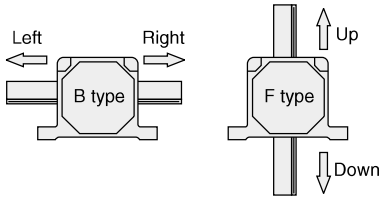
Reversible Motor (4RK25GN-AWU)

Item \ Model	4LB10N-□ / 4LF10N-□	4LB20N-□ / 4LF20N-□	4LB45N-□ / 4LF45N-□
Max. Thrust Force lb. (kg)	154 (70)	128 (58)	68.2 (31)
Holding Force lb. (N)	46.2 (210)	22.0 (100)	11.0 (50)

Electromagnetic Brake Motor (4RK25GN-AWMU)

Item \ Model	4LB10N-□ / 4LF10N-□	4LB20N-□ / 4LF20N-□	4LB45N-□ / 4LF45N-□
Max. Thrust Force lb. (kg)	154 (70)	128 (58)	68.2 (31)
Holding Force lb. (N)	154 (700)	154 (700)	72.6 (330)

- Holding force is provided by the built-in friction brake of the reversible motor. The values given in the table vary depending on the temperature and the time of operation, and thus should only be used as reference.
- The maximum thrust load that can be driven when operating the mechanism vertically is the maximum thrust force less the rack weight.
- When operating the mechanism horizontally using a guide or similar device to bear the load, ensure that the load weight is less than the maximum thrust force.

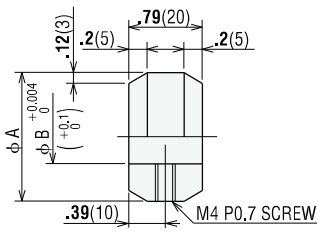


Accessories (sold separately)

Dog

A dog should be mounted on the rack to stop or reverse a rack.
For details, see page A-273

Dimensions Unit = inch. (mm)



	Model	A inch (mm)	B inch (mm)
For 4L type Linear Head	LXD4C	1.18 (30)	0.78 (19.8)

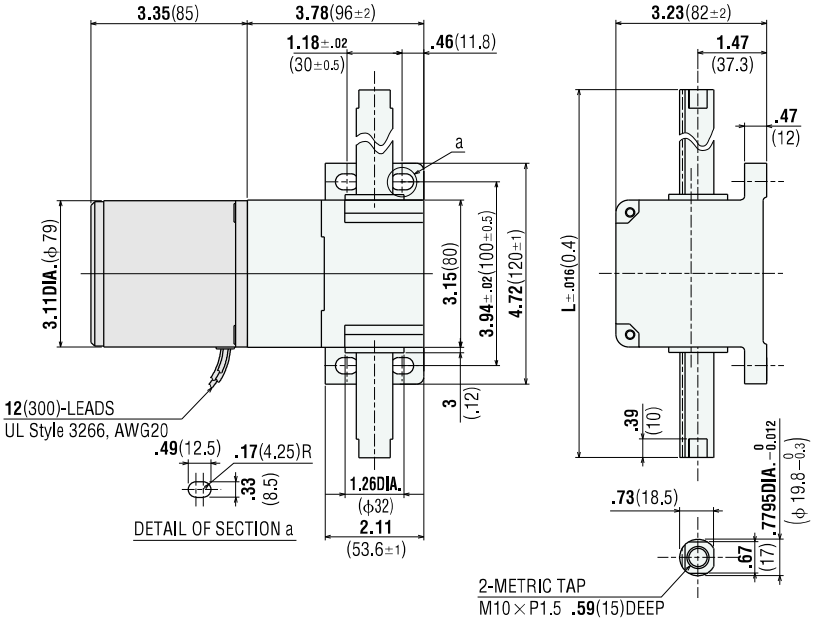
Rack Cover

Rack covers for rack protection and dustproofing are available.
For details, see Page A-256

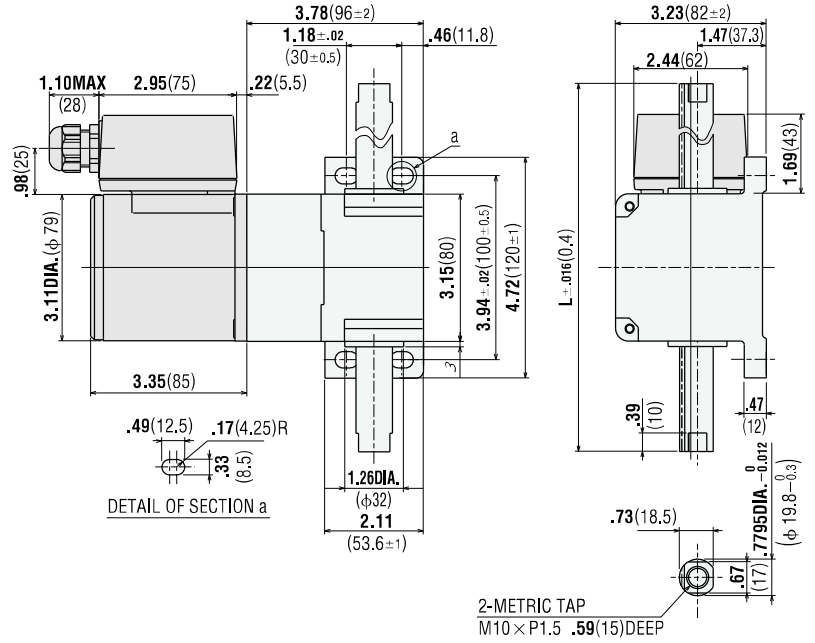
Dimensions Scale 1/4, Unit = inch (mm)

4LB type (horizontal)

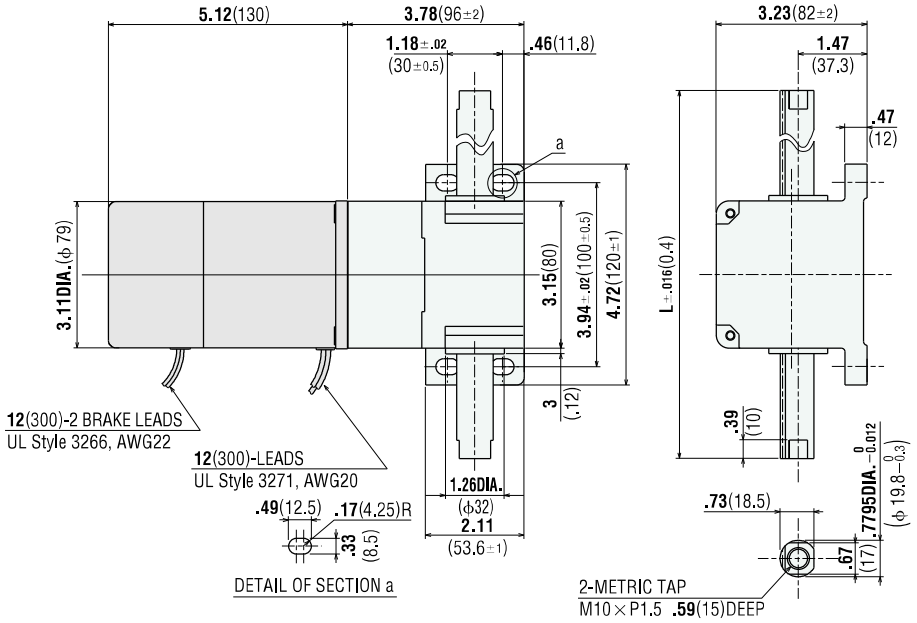
4LB□N-□/4RK25GN-AWU
4RK25GN-CWE
4RK25GN-AUL



4LB□N-□/4RK25GN-AWTU
4RK25GN-CWTE

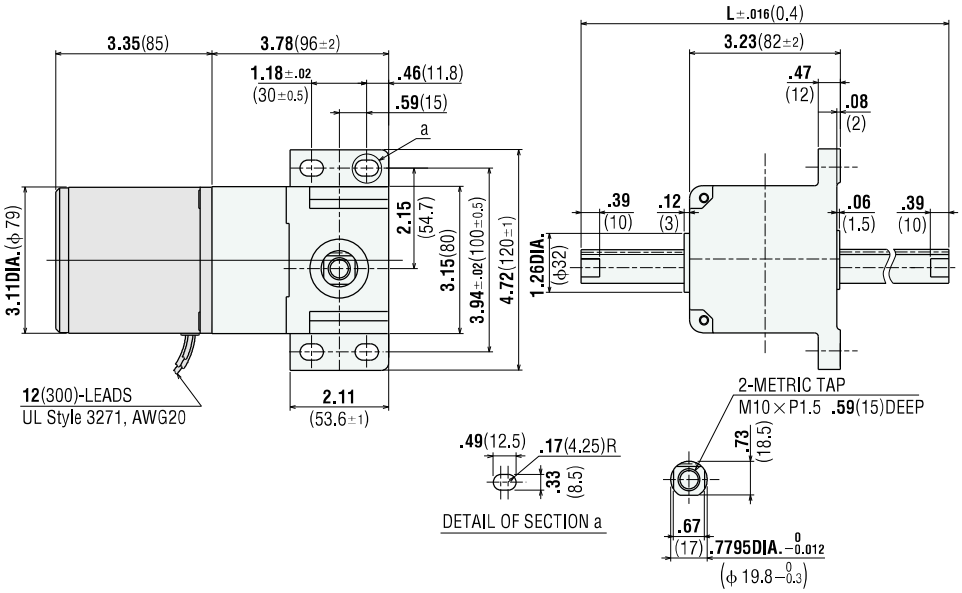


4LB□N-□/4RK25GN-AWMU
4RK25GN-CWME
4IK25GN-SWM
4RK25GN-AMUL

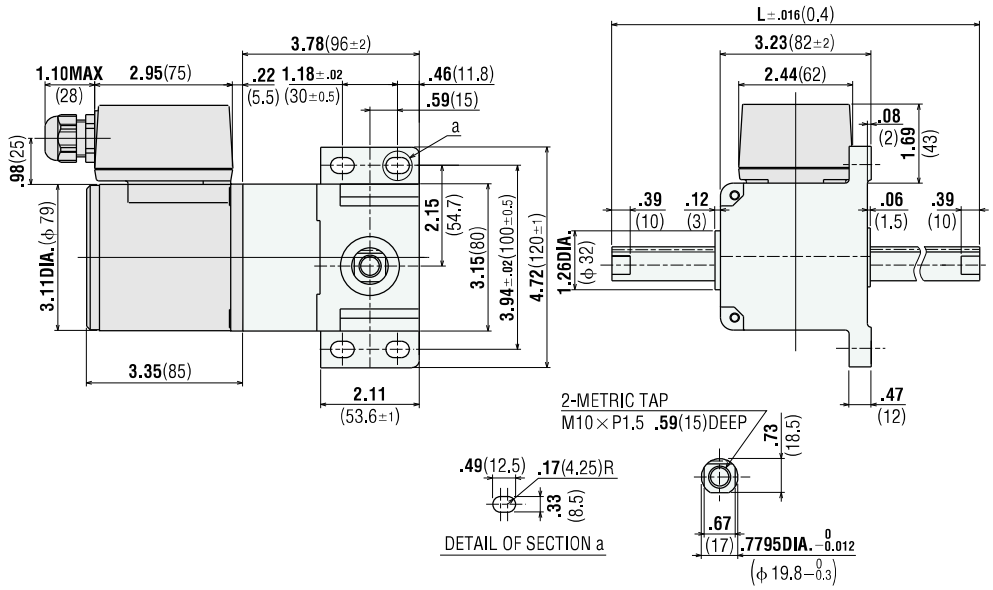


4LF type (vertical)

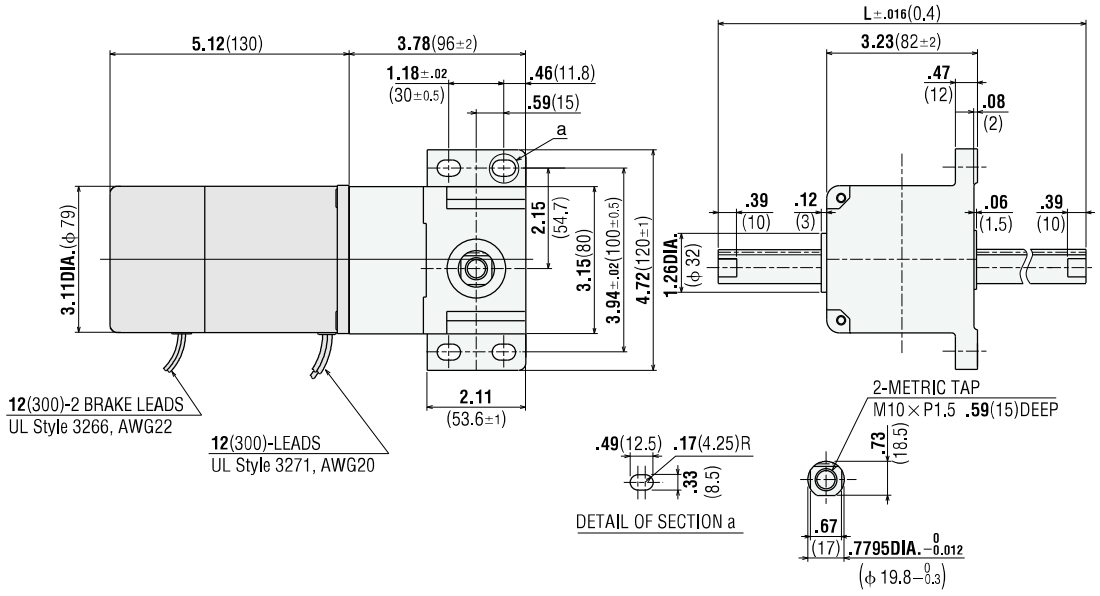
4LF□N-□/4RK25GN-AWU
4RK25GN-CWE
4RK25GN-AUL



4LF□N-□/4RK25GN-AWTU
4RK25GN-CWTE



4LF□N-□/4RK25GN-AWMU
4RK25GN-CWME
4IK25GN-SWM
4RK25GN-AMUL



●Weight, Stroke Length and Rack Length

Model	Stroke inch (mm)	Total Length L inch (mm)	Weight (Mass) lb. (kg)	Rack Weight (Mass) lb. (kg)
4LB□N-1, 4LF□N-1	3.9 (100)	7.89 (200.4)	3.52 (1.6)	0.88 (0.4)
4LB□N-2, 4LF□N-2	7.9 (200)	11.91 (302.5)	3.96 (1.8)	1.54 (0.7)
4LB□N-3, 4LF□N-3	11.8 (300)	15.78 (400.7)	4.40 (2.0)	1.98 (0.9)
4LB□N-4, 4LF□N-4	15.7 (400)	19.80 (502.8)	4.84 (2.2)	2.42 (1.1)
4LB□N-5, 4LF□N-5	19.7 (500)	23.66 (601.0)	5.28 (2.4)	2.86 (1.3)
4LB□N-6, 4LF□N-6	23.6 (600)	27.68 (703.1)	5.72 (2.6)	3.52 (1.6)
4LB□N-7, 4LF□N-7	27.6 (700)	31.55 (801.3)	6.16 (2.8)	3.96 (1.8)

5L-N *type Linear Head*

Max. Thrust Force

198lb.(90kg)

Max. Thrust Force

198lb. (90kg) Thrust force varies with basic speed and the motor combined.

Specifications

Basic Speed	Model	Rack Stroke inch (mm)
0.47 in/s(12mm/s)	**5LB10N-□**	3.9 (100)
	5LB10N-□	7.9 (200)
1.2 in/s(30mm/s)	**5LB20N-□**	11.8 (300)
	5LB20N-□	15.7 (400)
2.4 in/s(60mm/s)	**5LB45N-□**	19.7 (500)
	5LB45N-□	23.6 (600)
		27.6 (700)

●Basic speed figures are based on synchronous speed(60Hz : 1800r/min). The actual speed varies with the load or frequency of the power source.
●The box (□) represents the code for stroke length.

Max. Permissible Overhung Load

Rack Stroke inch (mm)	Max. Permissible Overhung Load lb. (kg)
3.9 (100)	28.6 (13)
7.9 (200)	22.0 (10)
11.8 (300)	17.6 (8)
15.7 (400)	13.2 (6)
19.7 (500)	11.0 (5)
23.6 (600)	11.0 (5)
27.6 (700)	8.8 (4)

Motor Combination

Motor type	Motor Model	Page
Reversible Motor	**5RK40GN-AW(T)U**	A-93
	5RK40GN-CW(T)E	
Electromagnetic Brake Motor	**5RK40GN-AWMU**	A-182
	5RK40GN-CWME	
	5IK40GN-SWM	
Torque Motors	**5TK20GN-AUL**	A-108

Models

Rack Stroke inch (mm)	Basic Speed		
	0.47in/s (12mm/s)	1.2in/s (30mm/s)	2.4in/s (60mm/s)
3.9 (100)	**5LB10N-1**	**5LB20N-1**	**5LB45N-1**
	5LF10N-1	**5LF20N-1**	**5LF45N-1**
7.9 (200)	**5LB10N-2**	**5LB20N-2**	**5LB45N-2**
	5LF10N-2	**5LF20N-2**	**5LF45N-2**
11.8 (300)	**5LB10N-3**	**5LB20N-3**	**5LB45N-3**
	5LF10N-3	**5LF20N-3**	**5LF45N-3**
15.7 (400)	**5LB10N-4**	**5LB20N-4**	**5LB45N-4**
	5LF10N-4	**5LF20N-4**	**5LF45N-4**
19.7 (500)	**5LB10N-5**	**5LB20N-5**	**5LB45N-5**
	5LF10N-5	**5LF20N-5**	**5LF45N-5**
23.6 (600)	**5LB10N-6**	**5LB20N-6**	**5LB45N-6**
	5LF10N-6	**5LF20N-6**	**5LF45N-6**
27.6 (700)	**5LB10N-7**	**5LB20N-7**	**5LB45N-7**
	5LF10N-7	**5LF20N-7**	**5LF45N-7**

●Longer mounting screws are required if a decimal gearhead is used.

Performance Examples with Several Motor Combinations

Overrun Unit = inch (mm)

Motor \ Linear Head	5LB10N-□ 5LF10N-□	5LB20N-□ 5LF20N-□	5LB45N-□ 5LF45N-□
5RK40GN-AWU	0.10 (2.6)	0.20 (5.1)	0.51 (13)
5RK40GN-AWMU	0.05 (1.3)	0.10 (2.6)	0.25 (6.3)

Overrun at motor shaft is estimated to be 6 revolutions for reversible motors and 3 revolutions for electromagnetic brake motors.

- The maximum thrust load that can be driven when operating the mechanism vertically is the maximum thrust force less the rack weight.
- When operating the mechanism horizontally using a guide or similar device to bear the load, ensure that the load weight is less than the maximum thrust force.

Direction of Rack Movement

The direction of rack movement is determined by the direction of motor rotation.

Model	Motor Rotation CW	Motor Rotation CCW
5LB10N-□ **5LB20N-□**	Right	Left
5LF10N-□ **5LF20N-□**	Up	Down
5LB45N-□	Left	Right
5LF45N-□	Down	Up

- Direction of rack movement is as viewed from the front side of the linear head.
- A dog mounted on the rack (optional) and limit switch are required to stop or reverse a rack. Dogs are available as optional accessories. Use dogs for stop and reverse operation.

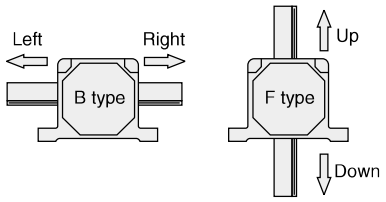
Reversible Motor (5RK40GN-AWU)

Item \ Model	5LB10N-□ 5LF10N-□	5LB20N-□ 5LF20N-□	5LB45N-□ 5LF45N-□
Max. Thrust Force lb. (kg)	198 (90)	198 (90)	112.2 (51)
Holding Force lb. (N)	1320 (600)	660 (300)	264 (120)

Electromagnetic Brake Motor (5RK40GN-AWMU)

Item \ Model	5LB10N-□ 5LF10N-□	5LB20N-□ 5LF20N-□	5LB45N-□ 5LF45N-□
Max. Thrust Force lb. (kg)	198 (90)	198 (90)	112.2 (51)
Holding Force lb. (N)	1980 (900)	1980 (900)	1122 (510)

- Holding force is provided by the built-in friction brake of the reversible motor. The values given in the table vary depending on the temperature and the time of operation, and thus should only be used as reference.
- The maximum thrust load that can be driven when operating the mechanism vertically is the maximum thrust force less the rack weight.
- When operating the mechanism horizontally using a guide or similar device to bear the load, ensure that the load weight is less than the maximum thrust force.

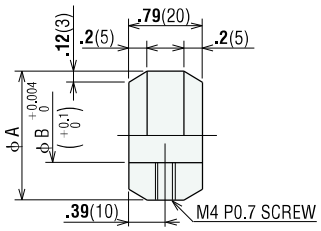


Accessories (sold separately)

Dog

A dog should be mounted on the rack to stop or reverse a rack.
For details, see page A-273.

Dimensions Unit = inch (mm)



	Model	A inch (mm)	B inch (mm)
For **5L** type Linear Head	**LXD5C**	1.38 (35)	0.98 (24.8)

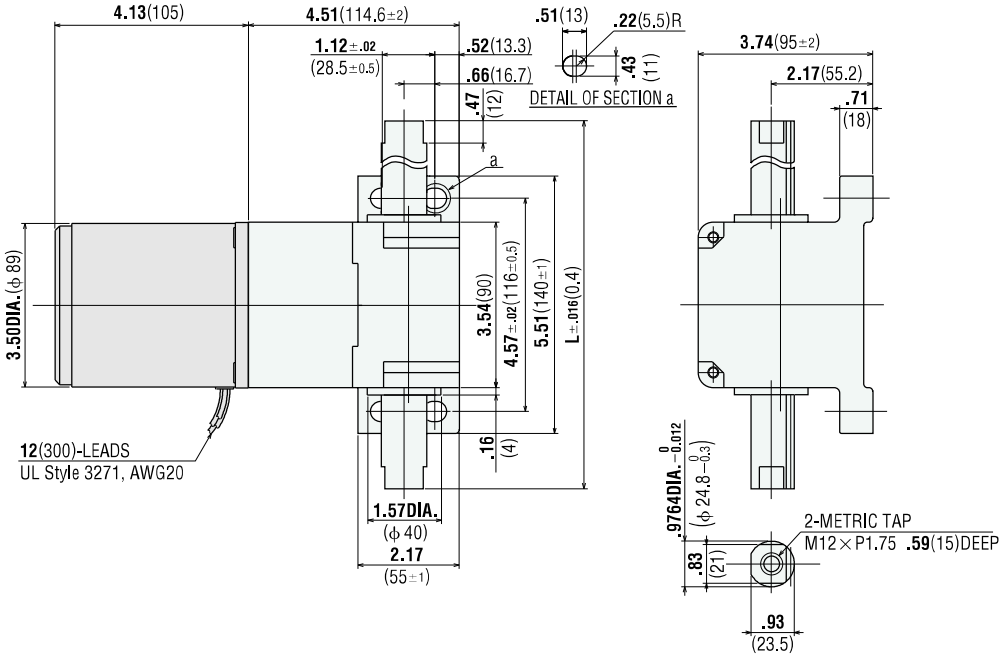
Rack Cover

Rack covers for rack protection and dustproofing are available.
For details, see Page A-256.

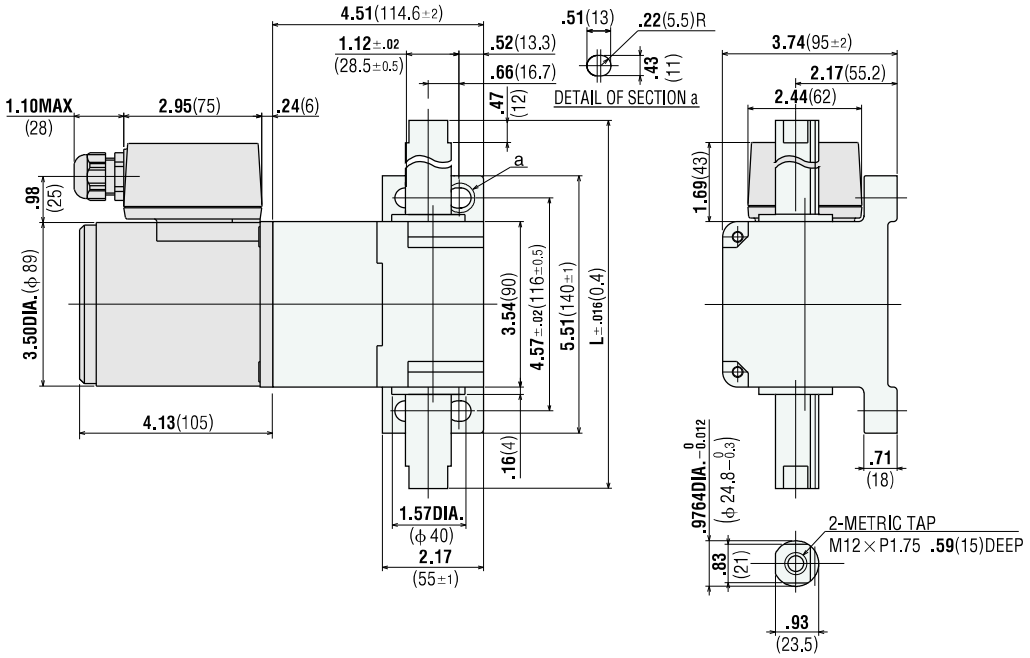
Dimensions Scale 1/4, Unit = inch (mm)

5LB type (horizontal)

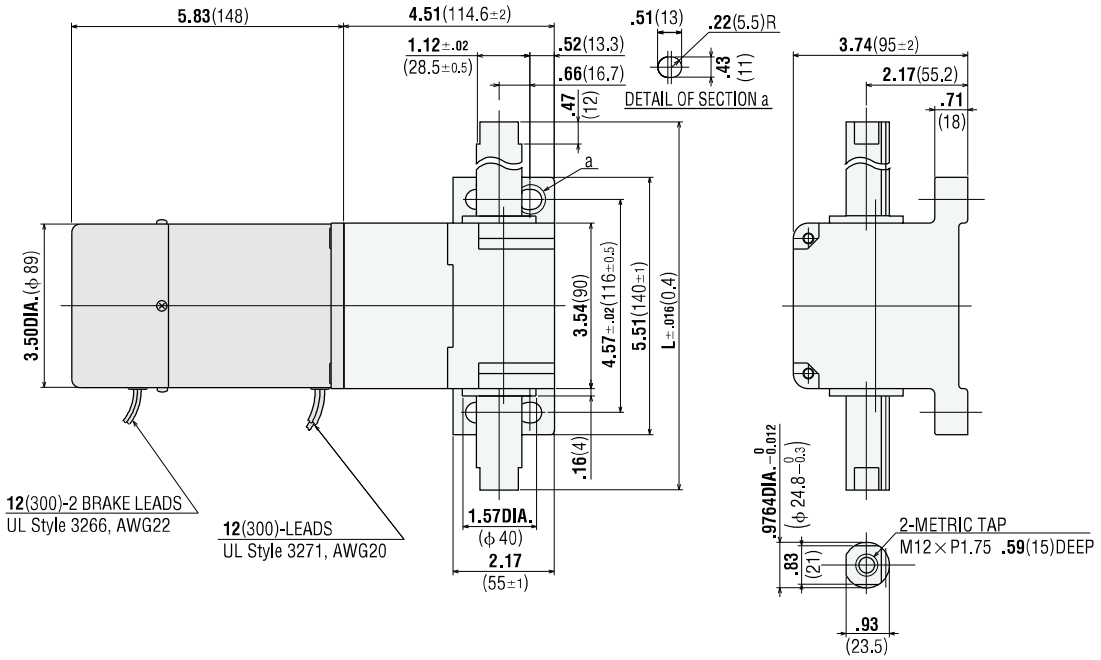
5LB□N-□/5RK40GN-AWU
5RK40GN-CWE
5RK40GN-AUL



5LB□N-□/5RK40GN-AWTU
5RK40GN-CWTE

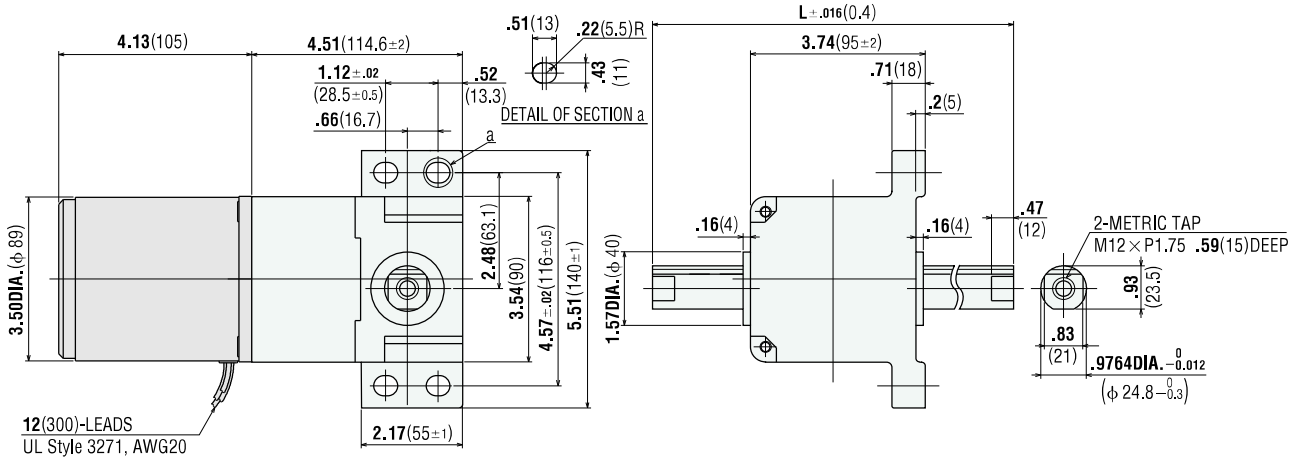


5LB□N-□/5RK40GN-AWMU
5RK40GN-CWME
5IK40GN-SWM
5RK40GN-AMUL

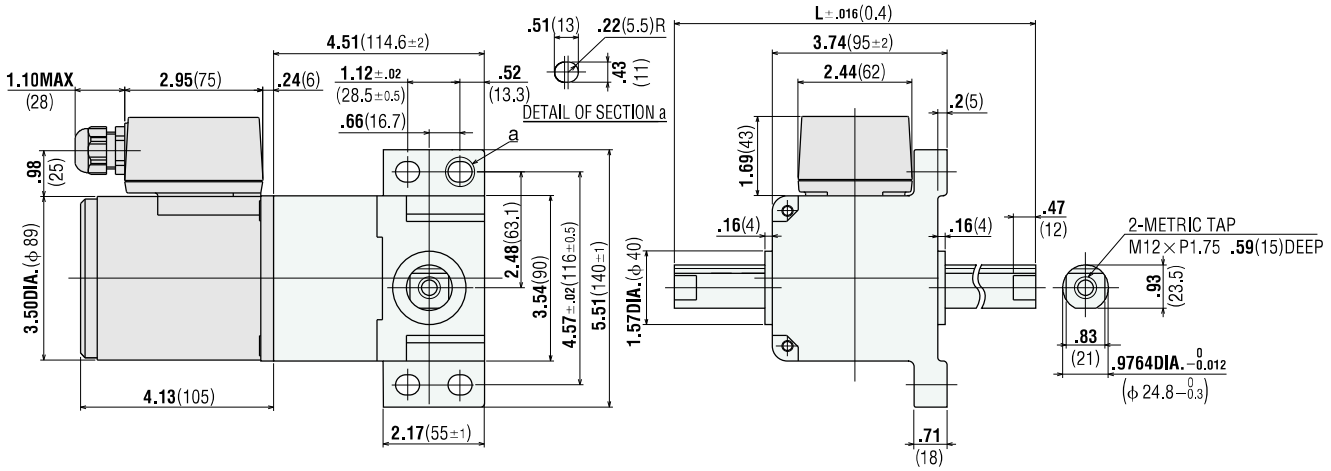


5LF type (vertical)

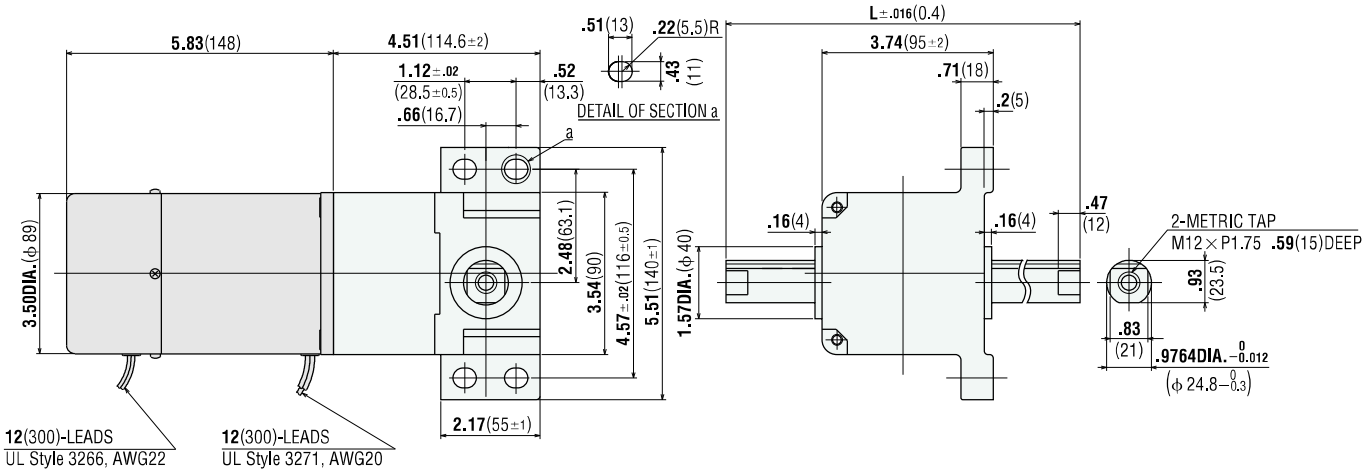
5LF□N-□/5RK40GN-AWU
5RK40GN-CWE
5RK40GN-AUL



5LF□N-□/5RK40GN-AWTU
5RK40GN-CWTE



5LF□N-□/5RK40GN-AWMU
5RK40GN-CWME
5IK40GN-SWM
5RK40GN-AMUL



●Weight, Stroke Length and Rack Length

Model	Rack Stroke inch (mm)	Rack Length L inch (mm)	Weight (Mass) lb. (kg)	Rack Weight (Mass) lb. (kg)
5LB□N-1, 5LF□N-1	3.9 (100)	10.14 (257.6)	6.38 (2.9)	1.98 (0.9)
5LB□N-2, 5LF□N-2	7.9 (200)	14.10 (358.1)	7.04 (3.2)	2.64 (1.2)
5LB□N-3, 5LF□N-3	11.8 (300)	18.06 (458.6)	7.92 (3.6)	3.52 (1.6)
5LB□N-4, 5LF□N-4	15.7 (400)	22.02 (559.2)	8.58 (3.9)	4.18 (1.9)
5LB□N-5, 5LF□N-5	19.7 (500)	25.97 (659.7)	9.46 (4.3)	5.06 (2.3)
5LB□N-6, 5LF□N-6	23.6 (600)	29.93 (760.3)	10.34 (4.7)	5.94 (2.7)
5LB□N-7, 5LF□N-7	27.6 (700)	33.89 (860.8)	11.0 (5.0)	6.6 (3.0)

5L-U *type Linear Head*

Max. Thrust Force

308lb.(140kg)

Max. Thrust Force

308 lb. (140 kg). Thrust force varies with basic speed and the motor combined.

Specifications

Basic Speed	Model	Rack Stroke inch (mm)
0.47 in/s (12 mm/s)	**5LB10U-□**	3.9 (100)
	5LF10U-□	7.9 (200)
0.94 in/s (24mm/s)	**5LB20U-□**	11.8 (300)
	5LF20U-□	15.7 (400)
2.4 in/s (60 mm/s)	**5LB45U-□**	19.7 (500)
	5LF45U-□	23.6 (600)
		27.6 (700)

●Basic speed figures are based on synchronous speed (60Hz : 1800r/min). The actual speed varies with the load or frequency of the power source.
●The box (□) represents the code for stroke length.

Max. Permissible Overhung Load

Stroke inch (mm)	Max. Permissible Overhung Load lb. (kg)
3.9 (100)	28.6 (13)
7.9 (200)	22.0 (10)
11.8 (300)	17.6 (8)
15.7 (400)	13.2 (6)
19.7 (500)	11.0 (5)
23.6 (600)	11.0 (5)
27.6 (700)	8.8 (4)

Motor Combination

Motor type	Motor Model	Page
Reversible Motor	**5RK60GU-AW(T)U**	A-96
	5RK60GU-CW(T)E	
	5RK90GU-AW(T)U	A-99
	5RK90GU-CW(T)E	
Electromagnetic Brake Motor	**5RK60GU-AWMU**	A-182
	5RK60GU-CWME	
	5IK60GU-SWM	
	5RK90GU-AWMU	A-182
	5RK90GU-CWME	
	5IK90GU-SWM	

Models

Rack Stroke inch (mm)	Basic Speed		
	0.47in/s (12mm/s)	0.94in/s (24mm/s)	2.4in/s (60mm/s)
3.9 (100)	**5LB10U-1**	**5LB20U-1**	**5LB45U-1**
	5LF10U-1	**5LF20U-1**	**5LF45U-1**
7.9 (200)	**5LB10U-2**	**5LB20U-2**	**5LB45U-2**
	5LF10U-2	**5LF20U-2**	**5LF45U-2**
11.8 (300)	**5LB10U-3**	**5LB20U-3**	**5LB45U-3**
	5LF10U-3	**5LF20U-3**	**5LF45U-3**
15.7 (400)	**5LB10U-4**	**5LB20U-4**	**5LB45U-4**
	5LF10U-4	**5LF20U-4**	**5LF45U-4**
19.7 (500)	**5LB10U-5**	**5LB20U-5**	**5LB45U-5**
	5LF10U-5	**5LF20U-5**	**5LF45U-5**
23.6 (600)	**5LB10U-6**	**5LB20U-6**	**5LB45U-6**
	5LF10U-6	**5LF20U-6**	**5LF45U-6**
27.6 (700)	**5LB10U-7**	**5LB20U-7**	**5LB45U-7**
	5LF10U-7	**5LF20U-7**	**5LF45U-7**

●Longer mounting screws are required if a decimal gearhead is used.

■ Performance Example with Several Motor Combinations

●Reversible Motors

Model / Motor	5LB10U-□ 5LF10U-□		5LB20U-□ 5LF20U-□		5LB45U-□ 5LF45U-□	
	Max. Thrust Force lb. (kg)	Holding Force lb. (N)	Max. Thrust Force lb. (kg)	Holding Force lb. (N)	Max. Thrust Force lb. (kg)	Holding Force lb. (N)
5RK60GU-AWU	308 (140)	132 (600)	308 (140)	66 (300)	147 (67)	26.4 (120)
5RK90GU-AWU	308 (140)	132 (600)	308 (140)	66 (300)	229 (104)	26.4 (120)

●Holding force is provided by the built-in friction brake of the reversible motor. The values given in the table vary depending on the temperature and the time of operation, and thus should only be used as reference.

●Electromagnetic Brake Motors

Model / Motor	5LB10U-□ 5LF10U-□		5LB20U-□ 5LF20U-□		5LB45U-□ 5LF45U-□	
	Max. Thrust Force lb. (kg)	Holding Force lb. (N)	Max. Thrust Force lb. (kg)	Holding Force lb. (N)	Max. Thrust Force lb. (kg)	Holding Force lb. (N)
5RK60GU-AWMU	308 (140)	308 (1400)	308 (140)	308 (1400)	147 (67)	147 (670)
5RK90GU-AWMU	308 (140)	308 (1400)	308 (140)	308 (1400)	229 (104)	229 (1040)

●The maximum thrust load that can be driven when operating the mechanism vertically is the maximum thrust force less the rack weight.
●When operating the mechanism horizontally using a guide or similar device to bear the load, ensure that the load weight is less than the maxmum thrust force.

●Overrun Unit = inch (mm)

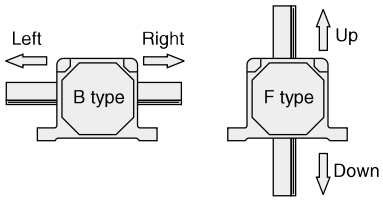
Motor \ Linear Head	5LB10U-□ 5LF10U-□	5LB20U-□ 5LF20U-□	5LB45U-□ 5LF45U-□
5RK60GU-AWU **5RK90GU-AWU**	0.10 (2.6)	0.20 (5.1)	0.51 (13)
5RK60GU-AWMU **5RK90GU-AWMU**	0.05 (1.3)	0.10 (2.6)	0.25 (6.3)

Overrun at motor shaft is estimated to be 6 revolutions for reversible motors and 3 revolutions for electromagnetic brake motors.
●The maximum thrust load that can be driven when operating the mechanism vertically is the maximum thrust force less the rack weight.
●When operating the mechanism horizontally using a guide or similar device to bear the load, ensure that the load weight is less than the maximum thrust force.

■ Direction of Rack Movement

The direction of rack movement is determined by the direction of motor rotation.

Model	Motor Rotation CW	Motor Rotation CCW
5LB10U-□ **5LB20U-□**	Left	Right
5LF10U-□ **5LF20U-□**	Down	Up
5LB45U-□	Right	Left
5LF45U-□	Up	Down



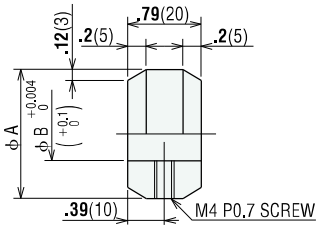
●Direction of rack movement is as viewed from the front side of the linear head.
●A dog mounted on the rack (optional) and limit switch are required to stop or reverse a rack. Dogs are available as optional accessories. Use dogs for stop and reverse operation.□

■ Accessories (sold separately)

●Dog

A dog should be mounted on the rack to stop or reverse a rack.
For details, see page A-273

●Dimensions Unit = inch (mm)



	Model	A inch (mm)	B inch (mm)
For **5L** type Linear Head	**LXD5C**	1.38 (35)	0.98 (24.8)

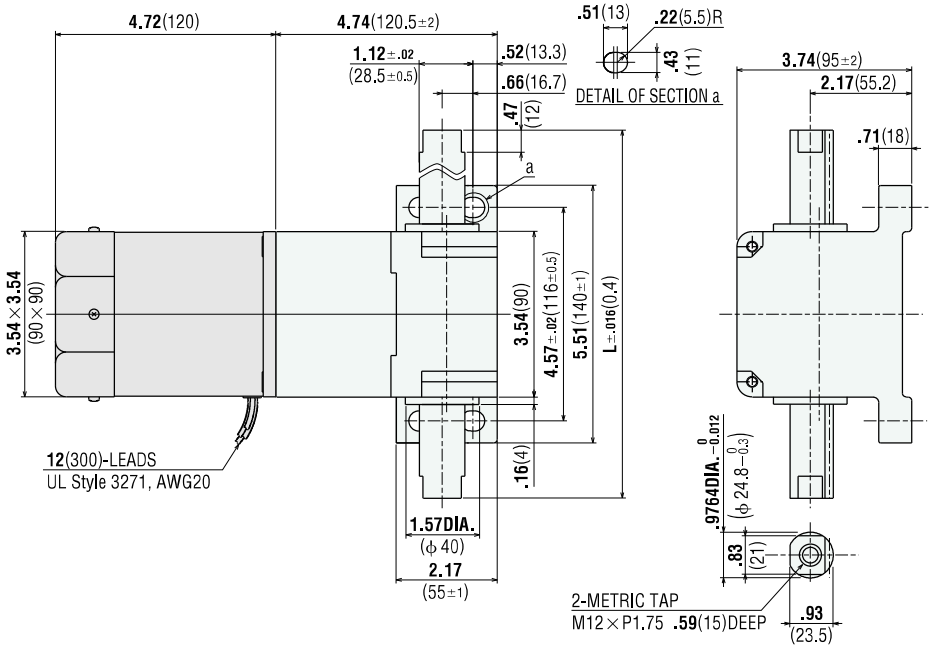
●Rack Cover

Rack covers for rack protection and dustproofing are available.
For details, see Page A-256

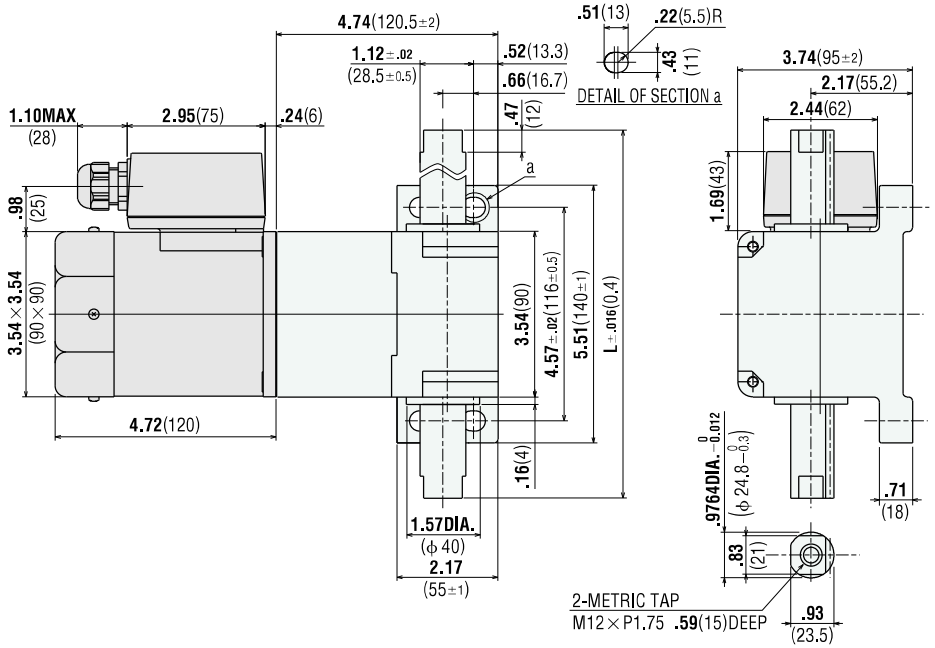
Dimensions Scale 1/4, Unit = inch (mm)

5LB type (horizontal)

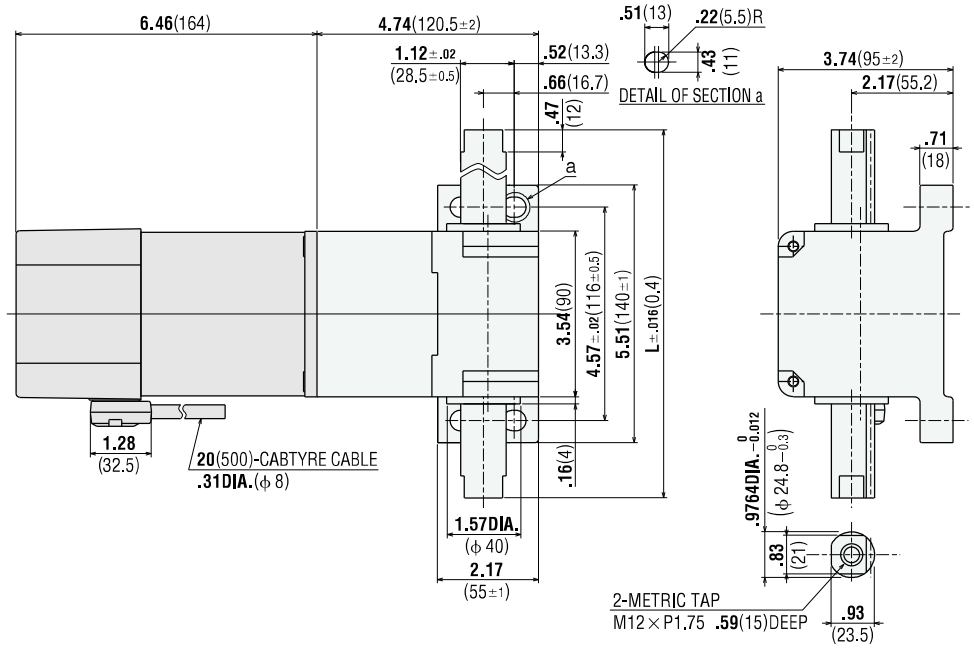
5LB□U-□/5RK60GU-AWU
5RK60GU-CWE
5RK60GU-AFUL



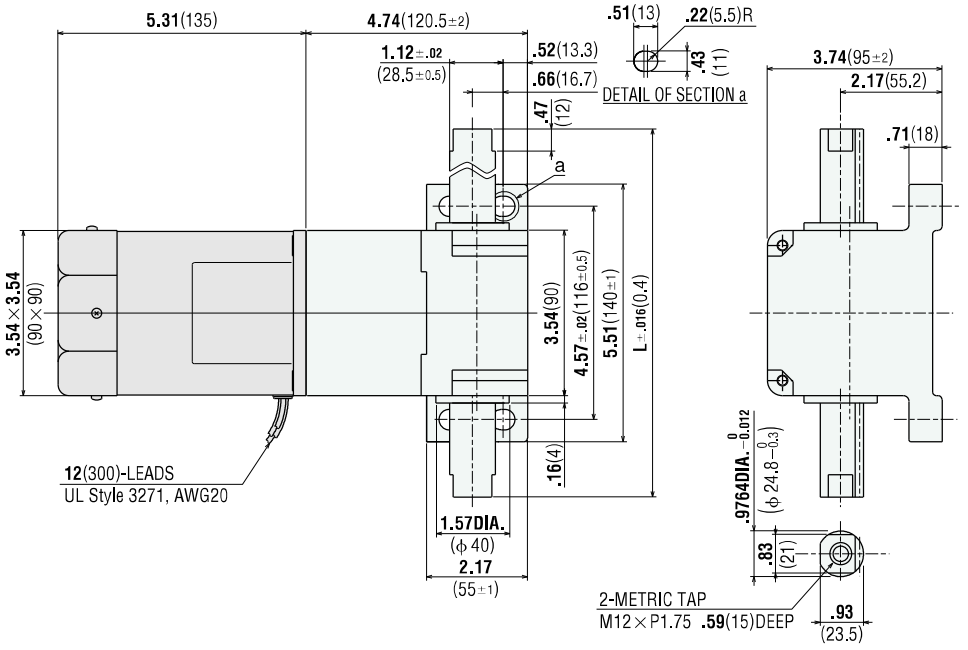
5LB□U-□/5RK60GU-AWTU
5RK60GU-CWTE



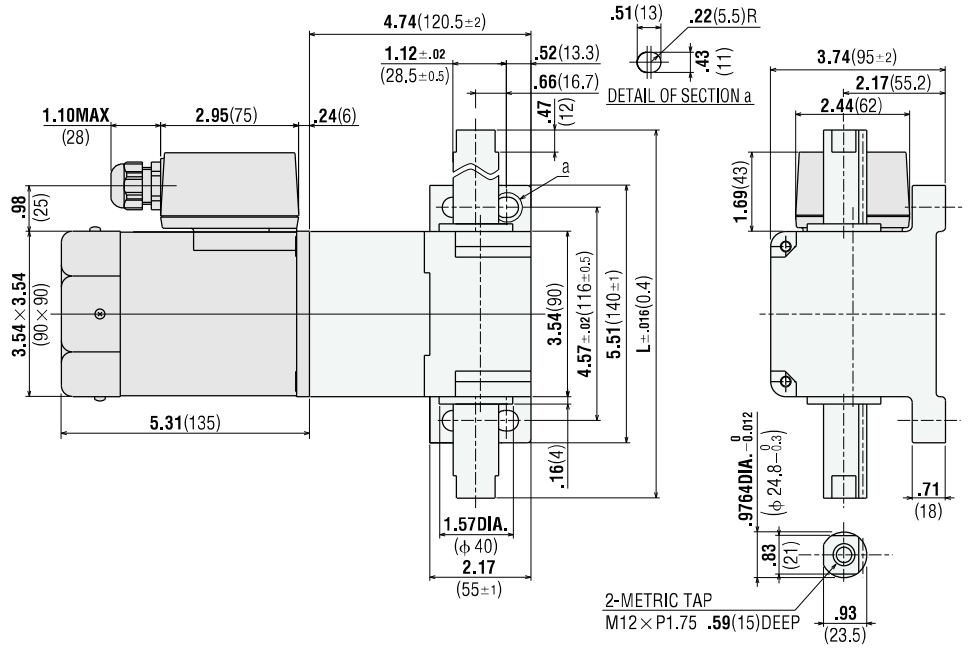
5LB□U-□/5RK60GU-AWMU
5RK60GU-CWME
5IK60GU-SWM
5RK60GU-AMUL



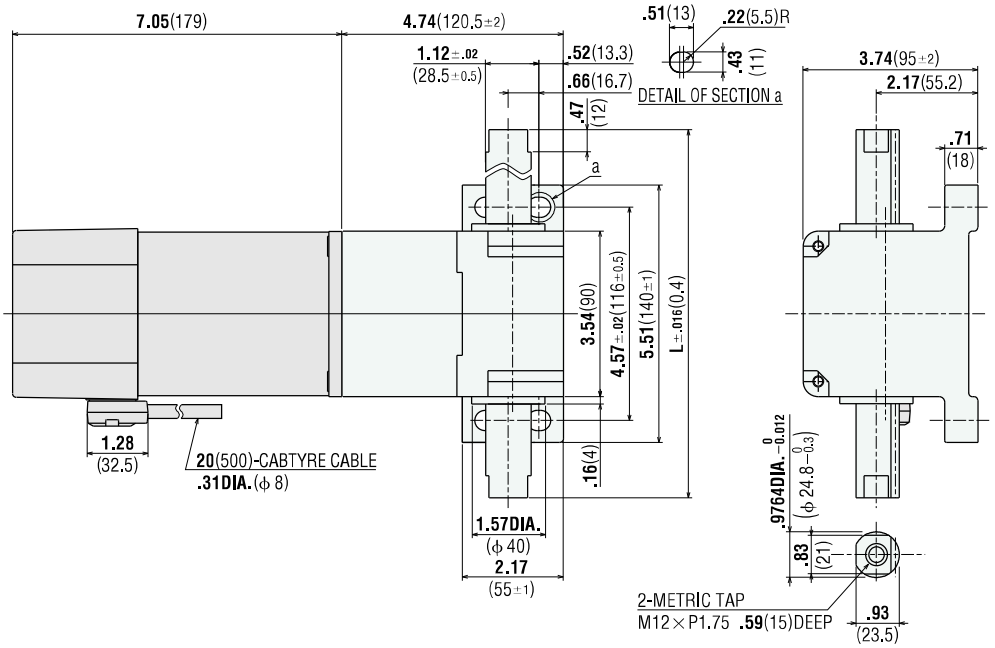
5LB□U-□/5RK90GU-AWU
5RK90GU-CWE
5RK90GU-AFUL



5LB□U-□/5RK90GU-AWTU
5RK90GU-CWTE



5LB□U-□/5RK90GU-AWMU
5RK90GU-CWME
5IK90GU-SWM
5RK90GU-AMUL

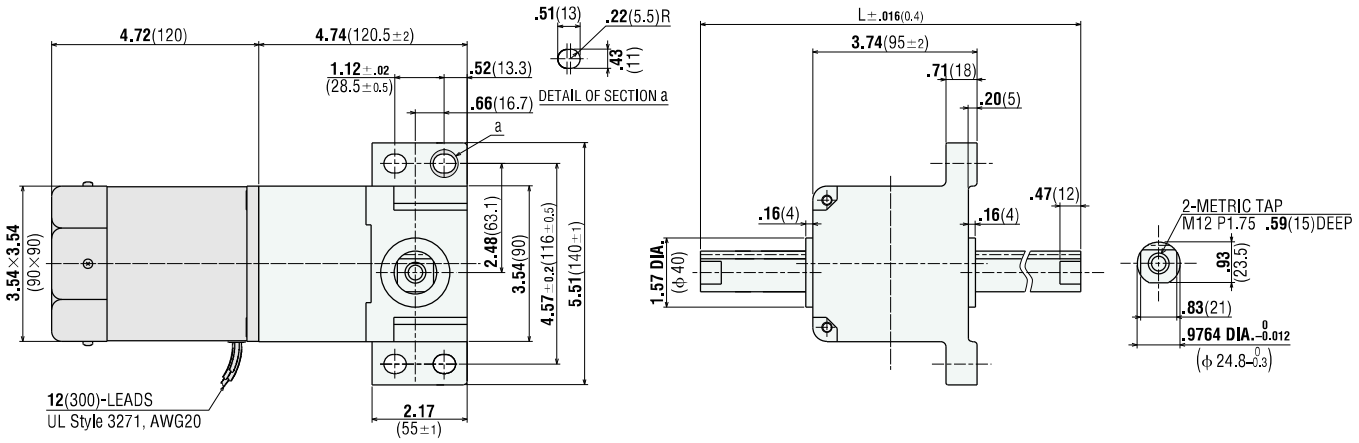


Weight, Stroke Length and Rack Length

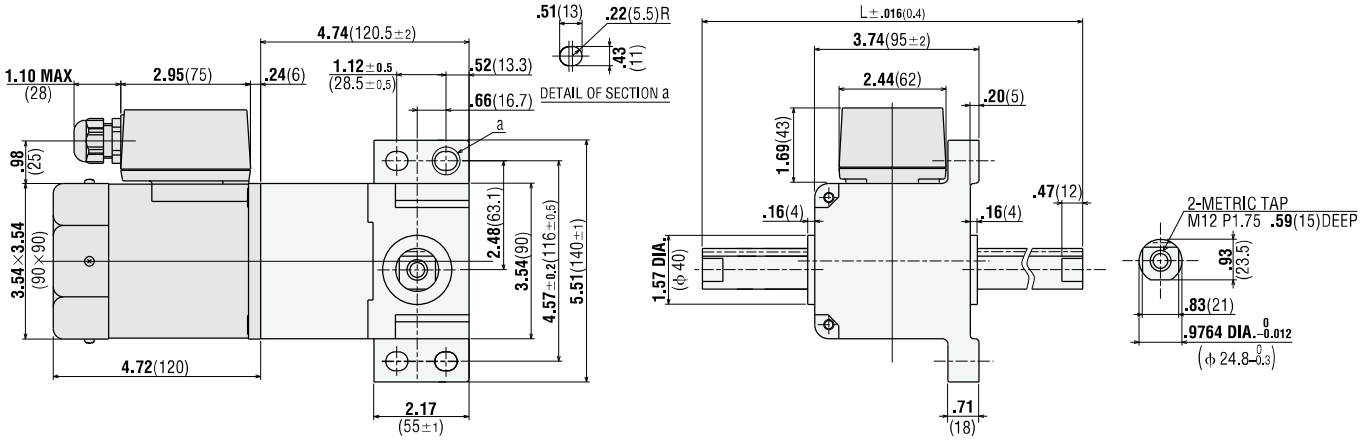
Model	Stroke inch (mm)	Total Length L inch (mm)	Weight (Mass) lb. (kg)	Rack Weight (Mass) lb. (kg)
5LB□U-1, 5LF□U-1	3.9 (100)	10.14 (257.6)	7.04 (3.2)	1.98 (0.9)
5LB□U-2, 5LF□U-2	7.9 (200)	14.10 (358.1)	7.92 (3.6)	2.64 (1.2)
5LB□U-3, 5LF□U-3	11.8 (300)	18.06 (458.6)	8.58 (3.9)	3.52 (1.6)
5LB□U-4, 5LF□U-4	15.7 (400)	22.02 (559.2)	9.46 (4.3)	4.18 (1.9)
5LB□U-5, 5LF□U-5	19.7 (500)	25.97 (659.7)	10.12 (4.6)	5.06 (2.3)
5LB□U-6, 5LF□U-6	23.6 (600)	29.93 (760.3)	11.0 (5.0)	5.94 (2.7)
5LB□U-7, 5LF□U-7	27.6 (700)	33.89 (860.8)	11.88 (5.4)	6.6 (3.0)

5LF type (vertical)

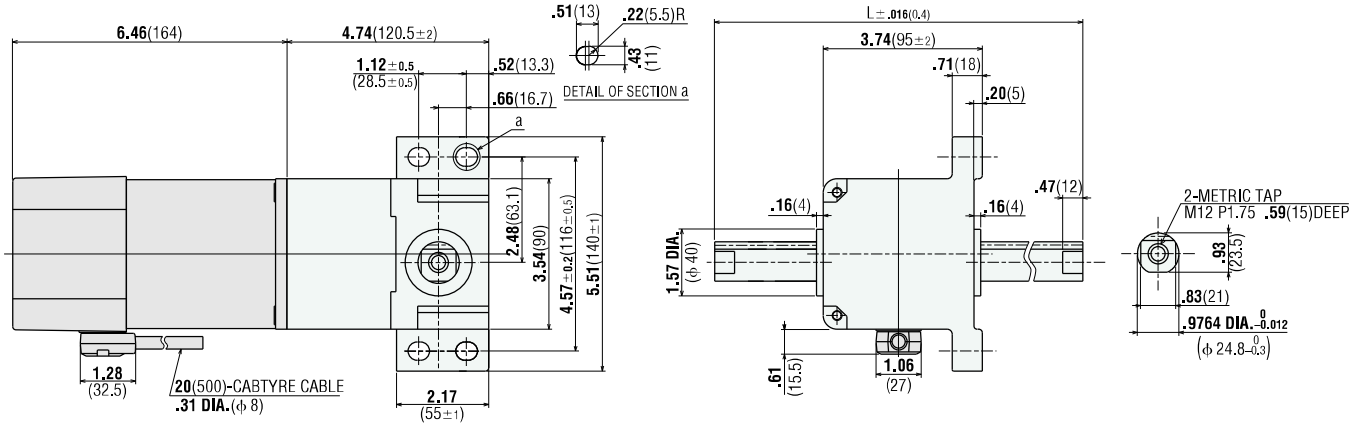
5LF□U-□/5RK60GU-AWU
5RK60GU-CWE
5RK60GU-AFUL



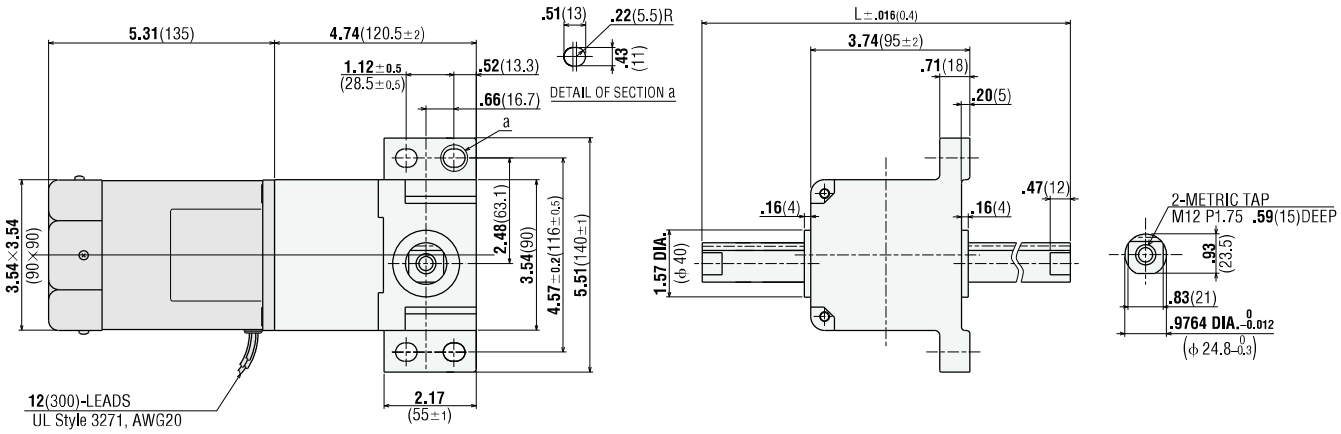
5LF□U-□/5RK60GU-AWTU
5RK60GU-CWTE



5LF□U-□/5RK60GU-AWMU
5RK60GU-CWME
5IK60GU-SWM
5RK60GU-AMUL



5LF□U-□/5RK90GU-AWU
5RK90GU-CWE
5RK90GU-AFUL



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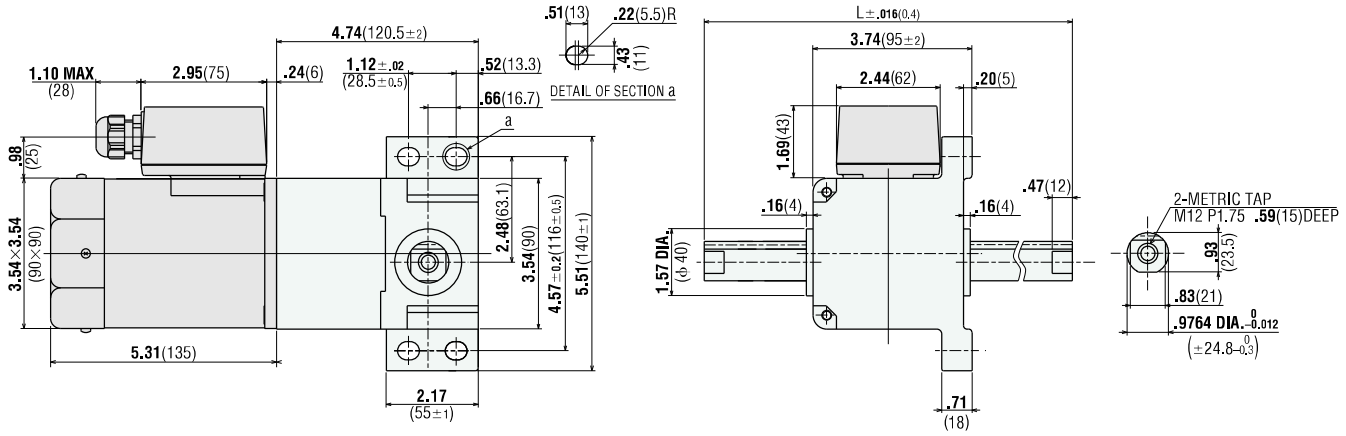
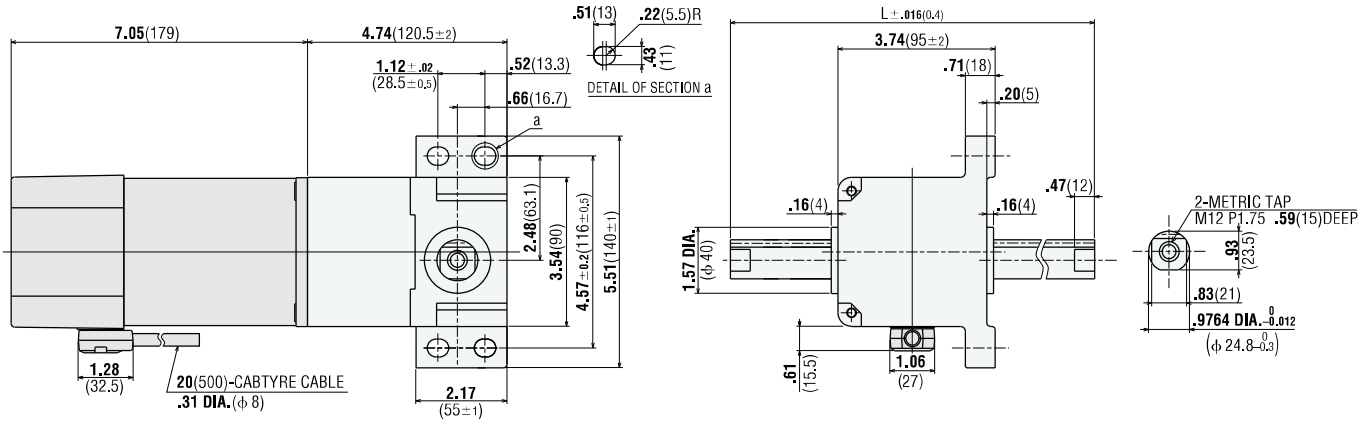
5RK90GU-CWTE



5LF□U-□/5RK90GU-AWMU
5RK90GU-CWME
5IK90GU-SWM
5RK90GU-AMUL



●Weight, Stroke Length and Rack Length

Model	Stroke inch (mm)	Total Length L inch (mm)	Weight (Mass) lb. (kg)	Rack Weight (Mass) lb. (kg)
5LB□U-1, 5LF□U-1	3.9 (100)	10.14 (257.6)	7.04 (3.2)	1.98 (0.9)
5LB□U-2, 5LF□U-2	7.9 (200)	14.10 (358.1)	7.92 (3.6)	2.64 (1.2)
5LB□U-3, 5LFv□U-3	11.8 (300)	18.06 (458.6)	8.58 (3.9)	3.52 (1.6)
5LB□U-4, 5LF□U-4	15.7 (400)	22.02 (559.2)	9.46 (4.3)	4.18 (1.9)
5LB□U-5, 5LF□U-5	19.7 (500)	25.97 (659.7)	10.12 (4.6)	5.06 (2.3)
5LB□U-6, 5LF□U-6	23.6 (600)	29.93 (760.3)	11.0 (5.0)	5.94 (2.7)
5LB□U-7, 5LF□U-7	27.6 (700)	33.89 (860.8)	11.88 (5.4)	6.6 (3.0)

Rack cover for linear head

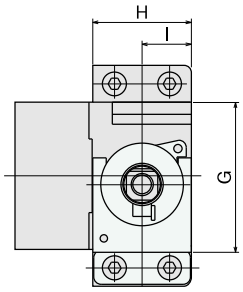
This is for dustproofing the linear head rack section. After passing the rack cover over the rack, you can use the accessory installation fittings to easily install the rack cover. When using rack covers installed on both sides, please purchase the stand-alone rack cover together with this rack cover.

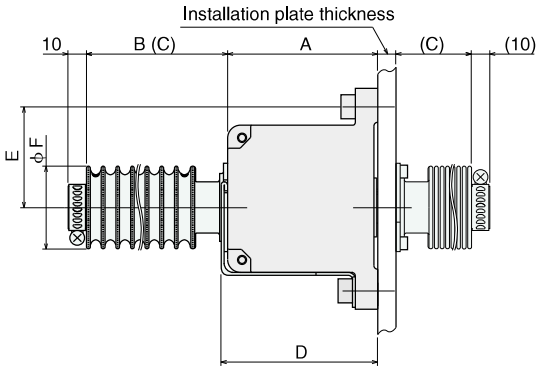
F type
(Vertical Stroke type)

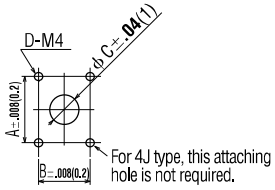
B type
(Horizontal Stroke type)

F type

Dimensions Unit = inch (mm)







Type	A	B	ϕC	D
2JF-□A2	1.42(36)	1.10(28)	.91(23)	4
4JF-□A2	1.54(39)	1.54(39)	1.26(32)	3
5JF-□A	1.69(43)	1.69(43)	1.57(40)	4

Material
Rack cover: Nylon
Installation fittings: SPCC
Accessories: Installation fittings, stainless steel band

Note:

- When a rack cover is installed, the effective rack stroke is shortened. Refer to the table below for the operable stroke.
- The installation fittings are fastened together with the main unit using the screws (sold separately) : **2JF** type: M6; **4JF** type: M8; **5JF** type: M10
- When installing the linear head fixed side rack cover, drill installation holes in the linear head installation plate using the diagram on the right for reference, then fasten with screws at the rack cover flange. Screws must be purchased separately.

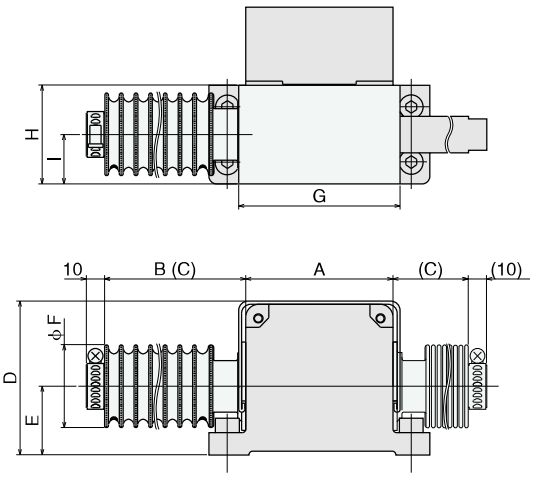
Unit = inch (mm)

Model	Applicable Linear Head	A	For single side rack cover		For both sides rack covers*		D	E	F	G	H (Fitting width)	I
			B	Operable stroke	(C)	Operable stroke						
2JF-1A2	**2LF□N-1**	2.61 (66.3)	.98~3.94 (25~100)	2.95 (75)	.98~2.52 (25~64)	1.54 (39)	2.76 (70)	1.47 (37.3)	1.65 (42)	2.41 (61.2)	1.57 (40)	.79 (20)
2JF-2A2	**2LF□N-2**		1.57~7.87 (40~200)	6.3 (160)	1.57~5.51 (40~140)	3.94 (100)						
2JF-3A2	**2LF□N-3**		2.36~11.81 (60~300)	9.45 (240)	2.36~8.66 (60~220)	6.3 (160)						
4JF-1A2	**4LF□N-1**	3.23 (82)	1.57~3.94 (40~100)	2.36 (60)	1.57~1.89 (40~48)	.31 (8)	3.38 (85.9)	2.15 (54.7)	1.77 (45)	3.21 (81.6)	2.11 (53.6)	1.06 (26.8)
4JF-2A2	**4LF□N-2**		2.17~7.87 (55~200)	5.71 (145)	2.17~5.31 (55~135)	3.15 (80)						
4JF-3A2	**4LF□N-3**		2.36~11.81 (60~300)	9.45 (240)	2.36~8.98 (60~228)	6.61 (168)						
4JF-4A2	**4LF□N-4**		3.15~15.75 (80~400)	12.6 (320)	3.15~12.30 (80~310)	9.06 (230)						
4JF-5A2	**4LF□N-5**		3.94~19.69 (100~500)	15.75 (400)	3.94~15.31 (100~389)	11.38 (289)						
5JF-1A	**5LF□N(U)-1**	3.74 (95)	.98~3.94 (25~100)	2.95 (75)	1.26~3.94 (32~100)	2.68 (68)	3.9 (99.1)	2.48 (63.1)	1.77 (45)	3.61 (91.6)	2.13 (54)	1.18 (30)
5JF-2A	**5LF□N(U)-2**		1.57~7.87 (40~200)	6.3 (160)	1.57~7.60 (40~193)	6.02 (153)						
5JF-3A	**5LF□N(U)-3**		2.36~11.81 (60~300)	9.45 (240)	2.36~10.75 (60~273)	8.39 (213)						
5JF-4A	**5LF□N(U)-4**		3.15~15.75 (80~400)	12.6 (320)	3.15~13.94 (80~354)	10.79 (274)						
5JF-5A	**5LF□N(U)-5**		3.94~19.69 (100~500)	15.75 (400)	3.94~17.09 (100~434)	13.15 (334)						

* When rack covers are used on both sides, the "operable stroke" and "C" are values when a 0.39inch (10mm) thick installation is used.

B type

Dimensions Unit = inch (mm)



Material
Rack cover: Nylon
Installation fittings: SPCC
Accessories: Installation fittings, Plugs, stainless steel band

Notes:
When rack covers are installed on both sides of the rack a supplemental rack cover must also be purchased.

Unit = inch (mm)

Model	Applicable Linear Head	A	For single side rack cover		For both sides rack covers*		D	E	F	G	H (Fitting width)	I
			B	Operable stroke	(C)	Operable stroke						
2JB-1A2	**2LB□N-1**	2.36 (66)	.98~3.94 (25~100)	2.95 (75)	.98~2.76 (25~70)	1.77 (45)	2.66 (67.5)	1.42 (36)	1.65 (42)	2.67 (67.9)	1.57 (40)	.79 (20)
2JB-2A2	**2LB□N-2**		1.57~7.87 (40~200)	6.3 (160)	1.57~4.57 (40~116)	2.99 (76)						
2JB-3A2	**2LB□N-3**		2.36~11.81 (60~300)	9.45 (240)	2.36~9.33 (60~237)	6.97 (177)						
4JB-1A2	**4LB□N-1**	3.15 (80)	1.57~3.94 (40~100)	2.36 (60)	1.57~ 2.36 (40~60)	.79 (20)	3.29 (83.6)	1.47 (37.3)	1.77 (45)	3.46 (87.8)	2.11 (53.6)	1.06 (26.8)
4JB-2A2	**4LB□N-2**		2.17~7.87 (55~200)	5.71 (145)	2.17~5.79 (55~147)	3.62 (92)						
4JB-3A2	**4LB□N-3**		2.36~11.81 (60~300)	9.45 (240)	2.36~9.45 (60~240)	7.09 (180)						
4JB-4A2	**4LB□N-4**		3.15~15.75 (80~400)	12.6 (320)	3.15~12.68 (80~322)	9.53 (242)						
4JB-5A2	**4LB□N-5**		3.94~19.69 (100~500)	15.75 (400)	3.94~15.79 (100~401)	11.85 (301)						
5JB-1A	**5LB□N(U)-1**	3.54 (90)	.98~3.94 (25~100)	2.95 (75)	1.85~3.94 (47~100)	2.05 (52)	3.8 (96.6)	2.17 (55.2)	1.77 (45)	3.89 (98.7)	2.13 (54)	1.18 (30)
5JB-2A	**5LB□N(U)-2**		1.57~7.87 (40~200)	6.3 (160)	1.89~7.87 (40~200)	5.94 (151)						
5JB-3A	**5LB□N(U)-3**		2.36~11.81 (60~300)	9.45 (240)	2.36~11.34 (60~288)	8.98 (228)						
5JB-4A	**5LB□N(U)-4**		3.15~15.75 (80~400)	12.6 (320)	3.15~14.53 (80~369)	11.38 (289)						
5JB-5A	**5LB□N(U)-5**		3.94~19.69 (100~500)	15.75 (400)	3.94~17.68 (100~449)	13.74 (349)						

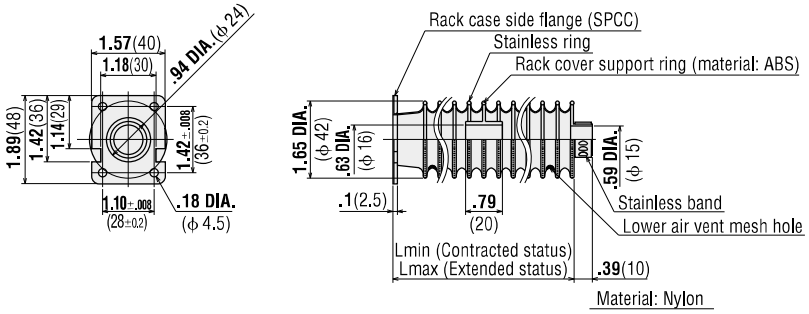
* When rack covers are used on both sides, the "operable stroke" and "C" are values when a 0.39inch (10mm) thick installation is used.

Supplemental rack cover

When rack covers are installed on both sides of the rack, a supplemental rack cover must also be purchased.

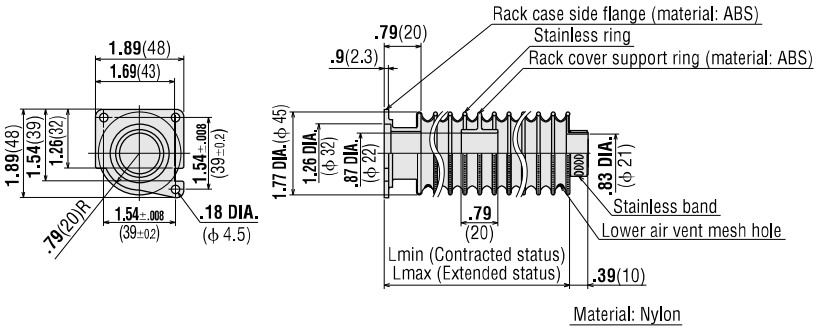
Rack Cover Dimensions Unit = inch (mm)

For **2L** type



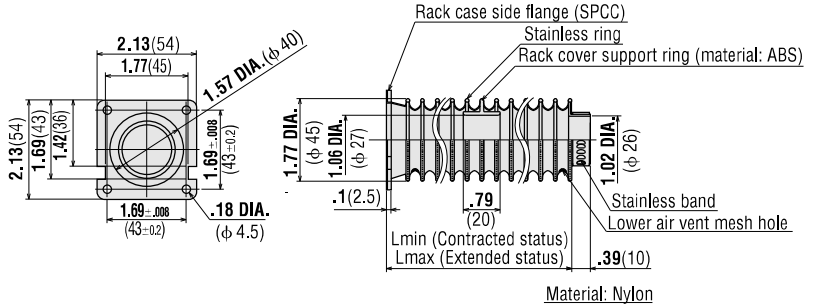
Model	L max (Extended status)	L min (Contracted status)	Number of support rings	Compression Ratio	Weight (Mass) lb. (kg)
2J-1A2	3.94 (100)	.98 (25)	0	1/4	0.099 (0.045)
2J-2A2	7.87 (200)	1.57 (40)	1	1/5	0.132 (0.060)
2J-3A2	11.81 (300)	2.36 (60)	1	1/5	0.154 (0.070)

For **4L** type



Model	L max (Extended status)	L min (Contracted status)	Number of support rings	Compression Ratio	Weight (Mass) lb. (kg)
4J-1A2	3.94 (100)	1.57 (40)	0	1/2.5	0.066 (0.030)
4J-2A2	7.87 (200)	2.17 (55)	1	1/3.6	0.099 (0.045)
4J-3A2	11.81 (300)	2.36 (60)	1	1/5	0.121 (0.055)
4J-4A2	15.75 (400)	3.15 (80)	2	1/5	0.154 (0.070)
4J-5A2	19.69 (500)	3.94 (100)	3	1/5	0.198 (0.090)

For **5L** type



Model	L max (Extended status)	L min (Contracted status)	Number of support rings	Compression Ratio	Weight (Mass) lb. (kg)
5J-1A	3.94 (100)	.98 (25)	0	1/4	0.110 (0.050)
5J-2A	7.87 (200)	1.57 (40)	1	1/5	0.154 (0.070)
5J-3A	11.81 (300)	2.36 (60)	1	1/5	0.176 (0.080)
5J-4A	15.75 (400)	3.15 (80)	2	1/5	0.209 (0.095)
5J-5A	19.69 (500)	3.94 (100)	3	1/5	0.253 (0.115)

Accessories

■ FLEXIBLE COUPLING

Features

- Couplings come with shaft holes and have standardized combinations for different diameter shaft holes.
- Characteristics are the same for clockwise and counterclockwise.
- Oil-resistant and electrically insulated.
- Aluminum alloy construction.
- The shaft being driven is not damaged,since shafts are joined by clamping.
- Easy installation to a separated hub and sleeve design.

● Selecting a Flexible Coupling

Once you have decided on a motor and the shaft diameter of the equipment to be connected to it, select the proper flexible coupling to use. Oriental Motor's flexible couplings are available in external diameter sizes that provide the strength required for the motor torque.

Example **MCL 30 F06 F06**

Inner Diameter d1 — Inner Diameter d2

When the motor is a **4GN□KA** (shaft outer diameter of .375inch) and the shaft diameter of the equipment to be connected to the motor is .375inch, use an **MCL30F06F06**.

● Product Number Code

MCL 40 F08 F10

- MCL: Flexible Coupling
- 40: Outer Diameter of Coupling — **20**: .787DIA. (ϕ 20mm)~**65**: 2.56DIA. (ϕ 65mm)
- F08: Inner Diameter d1 — **06**: ϕ 6mm~**18**: ϕ 18mm / **F03**: 3/16 inch~**F12**: 3/4 inch
- F10: Inner Diameter d2 — **06**: ϕ 6mm~**18**: ϕ 25mm / **F03**: 3/16 inch~**F12**: 3/4 inch

Coupling Type	Shaft Diameter			Gearhead Model*		Connected Device Shaft Diameter						
						F03	F04	F05	F06	F08	F10	F12
		inch	mm.	Regular Load	Shock Load	3/16inch ϕ4.763mm	1/4inch ϕ6.350mm	5/16inch ϕ7.938mm	3/8inch ϕ9.525mm	1/2inch ϕ12.70mm	5/8inch ϕ15.875mm	3/4inch ϕ19.050mm
MCL20	F03	3/16	4.763	OGN□KA	OGN□KA	◎	◎	◎	◎			
	06	0.236	6			◎	◎	◎	◎			
	F04	1/4	6.350	2GB□KA	2GB□KA	◎	◎	◎	◎			
	F05	5/16	7.938	2GN□KA		◎	◎	◎	◎			
	08	0.315	8				◎	◎	◎			
MCL30	F05	5/16	7.938	4GB□KA	2GN□KA, 4GB□KA		◎	◎	◎	◎		
	08	0.315	8				◎	◎	◎	◎		
	F06	3/8	9.525	3GN□KA, 4GN□KA, 5GN□RAA	3GN□KA			◎	◎	◎		
	10	0.394	10	FPW425_-□_				◎	◎	◎		
	12	0.472	12	FPW540_-□_					◎	◎		
	F08	1/2	12.70	5GN□KA					◎	◎		
MCL40	F06	3/8	9.525		4GN□KA, 5GN□RAA					◎	◎	
	10	0.394	10		FPW425_-□_			◎	◎	◎		
	12	0.472	12		FPW540_-□_				◎	◎	◎	
	F08	1/2	12.70		5GN□KA, 5GC□KA					◎	◎	
	14	0.5512	14						◎	◎	◎	
	15	0.591	15	FPW560_-□_							◎	
	F10	5/8	15.875	5GU□KA , 5GU□RAA							◎	
MCL55	15	0.591	15		FPW560_-□_						◎	◎
	F10	5/8	15.875		5GU□KA, 5GU□RAA, 5GCH□KA						◎	◎
	18	0.7087	18	FBL575, 5120_-□, HBL560, 5100N-□ FPW690_-□_ BHI62_-□	FBL575, 5120_-□ HBL560, 5100N-□						◎	◎
MCL65	15	0.591	15								◎	◎
	18	0.7087	18		FPW690_-□_ BHI62_-□						◎	◎

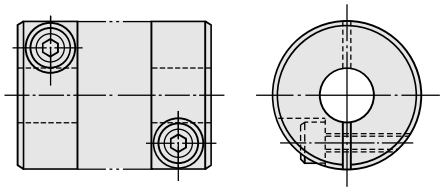
* It is also available for round shaft motors.

● Mounting on a shaft

The **MCL** Couplings are clamp type for mounting the flexible coupling to the shaft.

Clamp Type

Clamp type couplings use the binding force of the screw to compress the axis hole diameter and thereby fasten the coupling to the shaft. This does not damage the shaft and is easy to mount and remove. The following table shows the screw tightening torque.

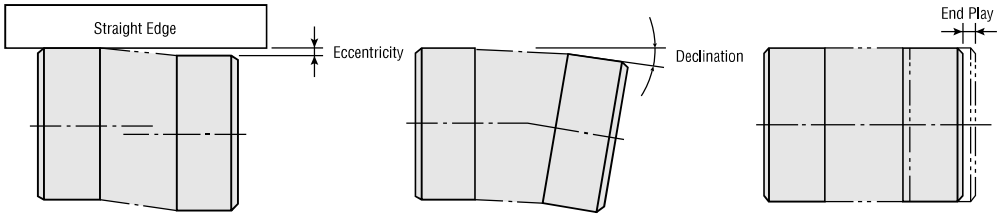


Type		*MCL20	MCL30	MCL40	MCL55	MCL65
Tightening Torque	lb-in (N·m)	8.7 (1)	21.7 (2.5)	104 (12)	217 (25)	434 (50)
Tightening Torque of key press screw	lb-in (N·m)	6.1 (0.7)	14.8 (1.7)	14.8 (1.7)	14.8 (1.7)	34.7 (4)

*MCL20 type uses a set screw.

■ Alignment Adjustment

Flexible couplings tolerate misalignment of the axis center and transfer rotational angle and torque, but produce vibration when the permissible value for misalignment is exceeded. This can dramatically shorten the coupling's service life.
Misalignment of the axis center includes eccentricity (parallel error of both centers), declination (angular error of both centers) and end play (shaft movement in the axial direction). To keep misalignment to within the permissible value, always check and adjust the alignment. To increase the service life of the coupling, we recommend keeping misalignment to below 1/3 of the permissible value.



NOTE:

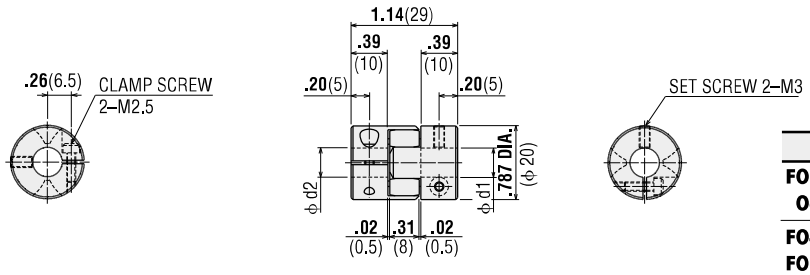
1. Misalignment or excessive torque beyond the permissible values will deform the coupling and shorten its service life.
2. If you hear a strange metallic noise from the coupling while it is running, stop the motor immediately and check for misalignment, shaft interference, loose screws, or the like.
3. When load fluctuates substantially, paint adhesive over the screws or switch to a larger coupling diameter. This helps prevent coupling screws from coming loose.
4. When using couplings that have no key grooves, as on the **MCL20**, **MCL30**, **MCL40** and **MCL55** fasten clamping screws before fastening set screws.
5. Only use the screws specified by Oriental Motor. Other screws may damage the couplings.
6. Using couplings at speeds beyond their maximum rated speed can damage couplings and harm other equipment. Never operate beyond the maximum rated speed.
7. Do not bring fingers or hands into contact with an operating coupling as injury may result. Always use protective covers to prevent accidents. Also, install safety systems that stop coupling as soon as the protective cover is opened.
8. Always be sure the power is off during installation. Should the drive unit accidentally start running, injury can occur by being drawn into the device. Always check that the devices main power supply is off before performing installation work.

● Specifications

Model	Dimensions						Average Torque lb.in (N.m)	Mass oz (kg)	Moment of Inertia lb-in² (kg-m²)	Permissible Eccentricity inch (mm)	Permissible Declination degrees	Permissible End Play inch (mm)
	Outer Diameter inch (mm)	Length inch (mm)	Bore Diameter d1 inch	(mm)	Bore Diameter d2 inch	(mm)						
MCL20F03F03	0.787 (ϕ20)	1.14 (29)	.1875	(4.763)	.1875	(4.763)	43 (5)	0.671 (19×10⁻³)	3.4×10⁻³ (1.0×10⁻⁶)	5.9×10⁻³ 0.15	1.0	+0.0315 0 (+0.8 0)
MCL20F03F04					.250	(6.35)						
MCL20F03F05					.3125	(7.938)						
MCL2006F03			.2362	(6)	.1875	(4.763)						
MCL2006F04					.250	(6.35)						
MCL2006F05					.3125	(7.938)						
MCL20F04F04			.250	(6.35)	.250	(6.35)						
MCL20F04F05					.3125	(7.938)						
MCL20F05F05			.3125	(7.938)	.3125	(7.938)						
MCL2008F04			.3150	(8)	.250	(6.35)						
MCL2008F05					.3125	(7.938)						
MCL30F04F05	1.18 (ϕ30)	1.71 (43.5)	.250	(6.35)	.3125	(7.938)	107 (12.5)	2.33 (66×10⁻³)	28.4×10⁻³ (8.3×10⁻⁶)	7.9×10⁻³ (0.2)		+0.0394 0 (+1.0 0)
MCL30F05F05			.3125	(7.938)	.3125	(7.938)						
MCL30F05F06					.3750	(9.525)						
MCL3008F06			.3150	(8)	.3750	(9.525)						
MCL30F06F06			.3750	(9.525)	.3750	(9.525)						
MCL30F06F08					.500	(12.7)						
MCL3010F05			.3937	(10)	.3125	(7.938)						
MCL3010F06					.3750	(9.525)						
MCL3010F08					.500	(12.7)						
MCL3012F06			.4724	(12)	.3750	(9.525)						
MCL3012F08					.500	(12.7)						
MCL30F08F08			.500	(12.7)	.500	(12.7)						
MCL40F05F06	1.57 (ϕ40)	2.52 (64)	.3125	(7.938)	.3750	(9.525)	213 (25)	5.30 (150×10⁻³)	123×10⁻³ (36×10⁻⁶)			+0.0472 0 (+1.2 0)
MCL40F06F06			.3750	(9.525)	.3750	(9.525)						
MCL40F06F08					.500	(12.7)						
MCL4010F05			.3937	(10)	.3125	(7.938)						
MCL4010F06					.3750	(9.525)						
MCL4010F08					.500	(12.7)						
MCL4012F06			.4724	(12)	.3750	(9.525)						
MCL4012F08					.500	(12.7)						
MCL4012F10					.625	(15.875)						
MCL40F08F08			.500	(12.7)	.500	(12.7)						
MCL40F08F10					.625	(15.875)						
MCL4014F06			.5512	(14)	.3750	(9.525)						
MCL4014F08					.500	(12.7)						
MCL4014F10					.625	(15.875)						
MCL4015F08			.5906	(15)	.500	(12.7)						
MCL4015F10					.625	(15.875)						
MCL40F10F10			.625	(15.875)	.625	(15.875)						
MCL5515F08	2.17 (ϕ55)	2.99 (76)	.5906	(15)	.500	(12.7)	512 (60)	12.4 (350×10⁻³)	547×10⁻³ (160×10⁻⁶)			+0.0551 0 (+1.4 0)
MCL5515F10					.625	(15.875)						
MCL5515F12					.750	(19.05)						
MCL55F10F10			.625	(15.875)	.625	(15.875)						
MCL55F10F12					.750	(19.05)						
MCL5518F10			.7087	(18)	.625	(15.875)						
MCL5518F12					.750	(19.05)						+0.0591 0 (+1.5 0)
MCL6518F10	2.56 (ϕ65)	3.44 (87.5)	.7087	(18)	.625	(15.875)	1365 (160)	20.1 (570×10⁻³)	1264×10⁻³ (370×10⁻⁶)			
MCL6518F12					.750	(19.05)						

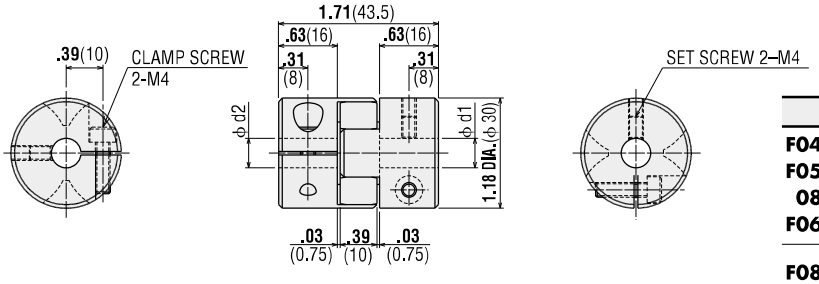
● Dimensions Unit = **inch** (mm)

MCL20



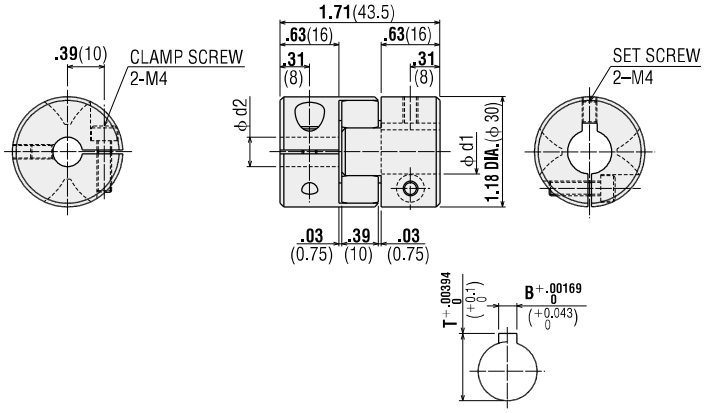
BORE (ϕd1,ϕd2)	TOLERANCE
F03: **.1875DIA.**(ϕ4.763) **06**: **.2362DIA.**(ϕ6)	**+.00071 0** (+0.018 0)
F04: **.2500DIA.**(ϕ6.35) **F05**: **.3125DIA.**(ϕ7.938) **08**: **.3150DIA.**(ϕ8)	**+.00087 0** (+0.022 0)

MCL30



BORE (ϕd1,ϕd2)	TOLERANCE
F04: **.2500DIA.**(ϕ6.350) **F05**: **.3125DIA.**(ϕ7.938) **08**: **.3150DIA.**(ϕ8) **F06**: **.3750DIA.**(ϕ9.525)	**+.00087 0** (+0.022 0)
F08: **0.500DIA.**(ϕ12.7)	**+.00106 0** (+0.027 0)

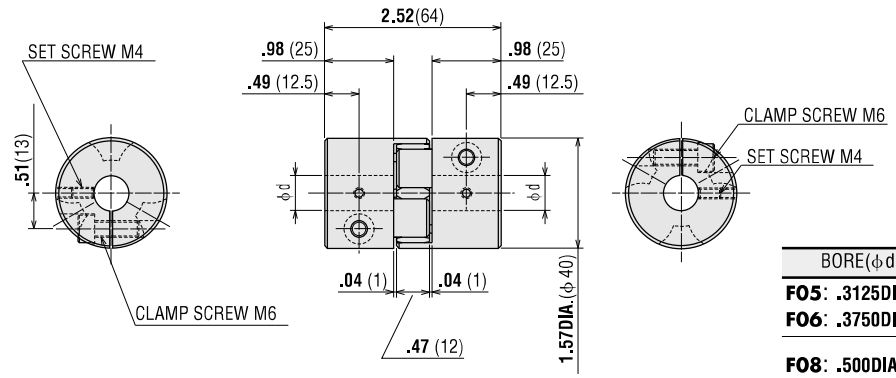
MCL3010F05
MCL3010F06
MCL3010F08
MCL3012F06
MCL3012F08



BORE (ϕd1)	TOLERANCE	WIDTH:B	LENGTH:T
10: **.3937DIA.**(ϕ10)	**+.00087 0** (+0.022 0)	**.1575** (4)	.4645 (11.8)
12: **.4724DIA.**(ϕ12)	**+.00106 0** (+0.027 0)		.5433 (13.8)

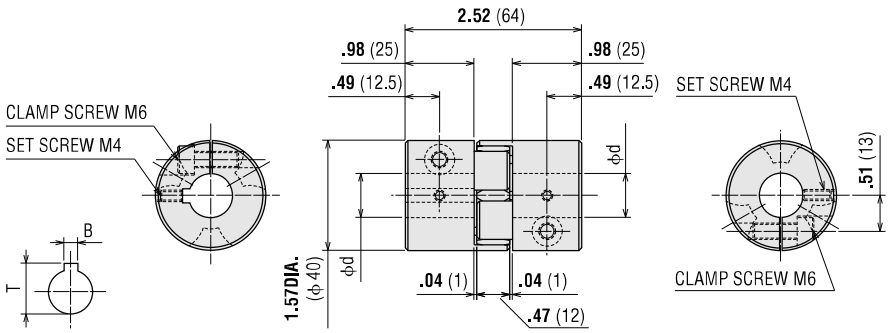
BORE (ϕd2)	TOLERANCE
F05: **.3125DIA.**(ϕ7.938) **F06**: **.3750DIA.**(ϕ9.525)	**+.00087 0** (+0.022 0)
F08: **.500DIA.**(ϕ12.7)	**+.00106 0** (+0.027 0)

MCL40F05F06
MCL40F06F06
MCL40F06F08
MCL40F08F08



BORE(ϕd1,ϕd2)	TOLERANCE
F05: **.3125DIA.**(ϕ7.938) **F06**: **.3750DIA.**(ϕ9.525)	**+.00087 0** (+0.022 0)
F08: **.500DIA.**(ϕ12.7)	**+.00106 0** (+0.027 0)

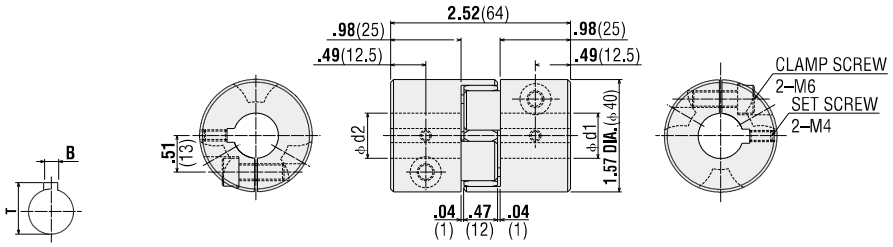
MCL4010F05
MCL4010F06
MCL4010F08
MCL4012F06
MCL4012F08
MCL40F08F10
MCL4014F06
MCL4014F08
MCL4015F08



BORE (ϕd1)	TOLERANCE	WIDTH: B	TOLERANCE	LENGTH: T	TOLERANCE
10: **.3937DIA.** (ϕ10)	**+.00087** **0** (+0.022 0)			**.4645** (11.8)	
12: **.4724DIA.** (ϕ12)		**.1575** (4)	**+.00169** **0** (+0.043 0)	**.5433** (13.8)	**+.00394** **0** (+0.1 0)
14: **.5512DIA.** (ϕ14)	**+.00106** **0** (+0.027 0)			**.6417** (16.3)	
15: **.5906DIA.** (ϕ15)		**.1969** (5)		**.6811** (17.3)	
F10: **.6250DIA.** (ϕ15.875)		**.1875** (4.763)	**+.0020** **0** (+0.051 0)	**.7090** (18.009)	**+.010** **0** (+0.254 0)

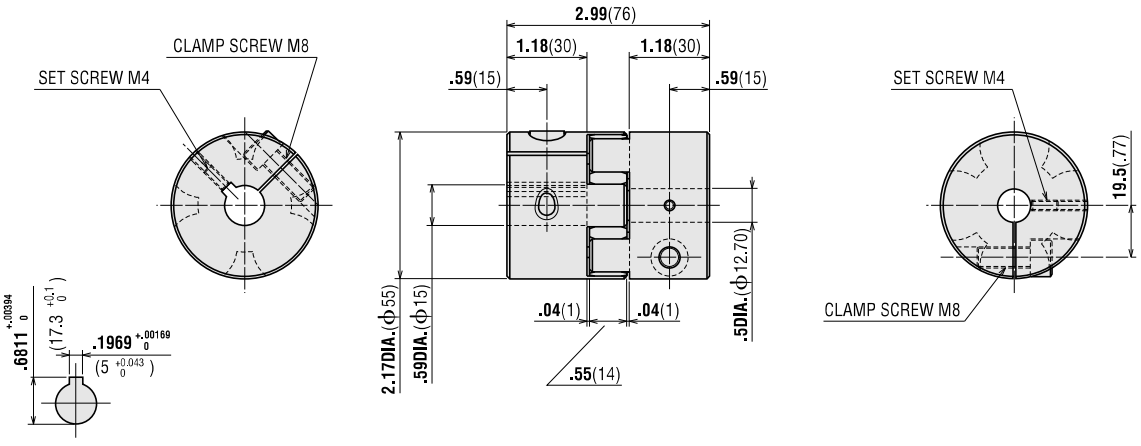
BORE (ϕd2)	TOLERANCE
F05: **.3125DIA.** (ϕ7.938)	**+.00087** **0** (+0.022 0)
F06: **.3750DIA.** (ϕ9.525)	
F08: **.500DIA.** (ϕ12.7)	**+.00106** **0** (+0.027 0)

MCL4012F10
MCL4014F10
MCL4015F10
MCL40F10F10

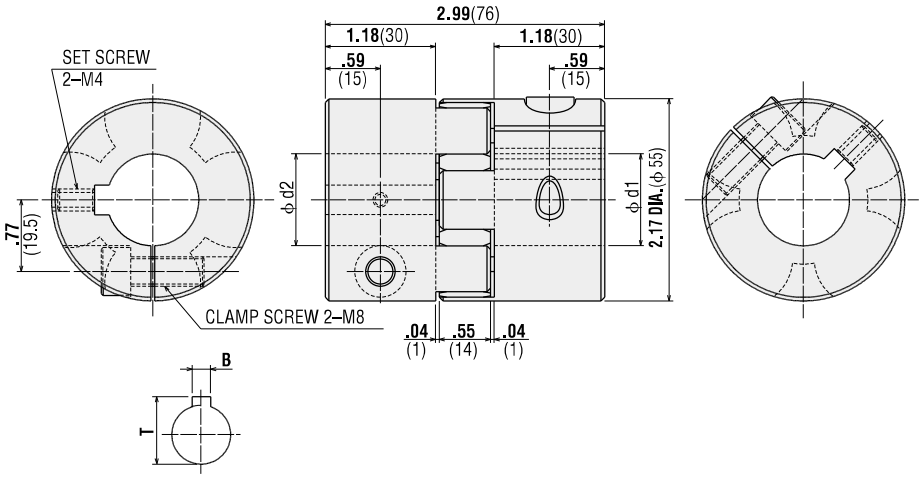


BORE (ϕd1)	TOLERANCE	WIDTH: B	TOLERANCE	LENGTH: T	TOLERANCE
10: **.3937DIA.** (ϕ10)	**+.00087** **0** (+0.022 0)			**.4645** (11.8)	
12: **.4724DIA.** (ϕ12)		**.1575** (4)	**+.00169** **0** (+0.043 0)	**.5433** (13.8)	**+.00394** **0** (+0.1 0)
14: **.5512DIA.** (ϕ14)	**+.00106** **0** (+0.027 0)			**.6417** (16.3)	
15: **.5906DIA.** (ϕ15)		**.1969** (5)		**.6811** (17.3)	
F10: **.6250DIA.** (ϕ15.875)		**.1875** (4.763)	**+.0020** **0** (+0.051 0)	**.7090** (18.009)	**+.010** **0** (+0.254 0)

MCL5515F08

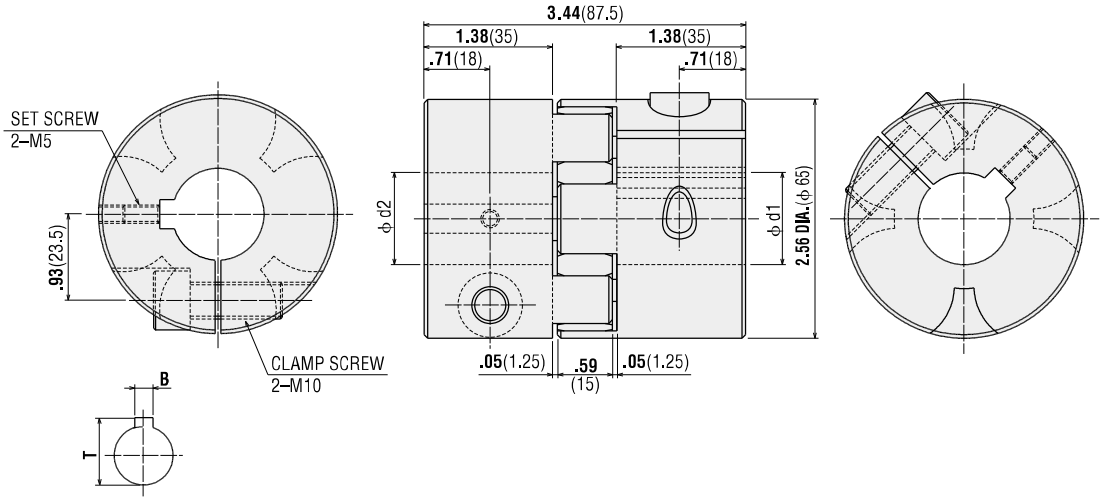


MCL55



BORE (ϕd1,ϕd2)	WIDTH: B	TOLERANCE	LENGTH: T	TOLERANCE
15: **.5906DIA.** (ϕ15)	**.1969** (5)	**+.00169** **0** (+0.043 0)	**.6811** (17.3)	**+.00394** **0** (+0.1 0)
18: **.7087DIA.** (ϕ18)	**.2362** (6)	**+.00205** **0** (+0.052 0)	**.8189** (20.8)	**+.00394** **0** (+0.1 0)
F10: **.6250DIA.** (ϕ15.875)	**.1875** (4.763)	**+.002** **0** (+0.051 0)	**.7090** (18.009)	**+.01** **0** (+0.254 0)
F12: **.7500DIA.** (ϕ19.050)	**.1875** (4.763)	**+.002** **0** (+0.051 0)	**.8370** (21.260)	**+.01** **0** (+0.254 0)

MCL65



BORE (ϕd1,ϕd2)	WIDTH: B	TOLERANCE	LENGTH: T	TOLERANCE
18: **.7087DIA.** (ϕ18)	**.2362** (6)	**+.00205** **0** (+0.052 0)	**.8189** (20.8)	**+.00394** **0** (+0.1 0)
F10: **.6250DIA.** (ϕ15.875)	**.1875** (4.763)	**+.002** **0** (+0.051 0)	**.7090** (18.009)	**+.01** **0** (+0.254 0)
F12: **.7500DIA.** (ϕ19.050)	**.1875** (4.763)	**+.002** **0** (+0.051 0)	**.8370** (21.260)	**+.01** **0** (+0.254 0)

Motor Mounting Brackets

Five kinds of mounting brackets for motors and gearheads are available as shown below. These brackets come with tapped holes. To mount the motor and gearhead, simply fasten with the screws provided with gearhead.

Please note that these mounting brackets cannot be used with the right-angle gearheads and flange mounting (**5GC□KA** and **5GCH□KA**) .

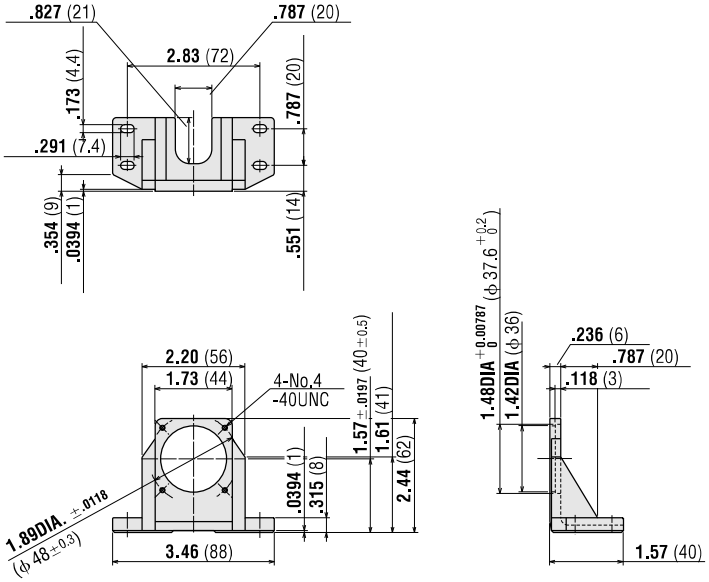
Dimensions Scale 1/4 Unit = inch (mm)

For 1.65 in. sq. (42mm sq.)

Model: **SOL0U04**
Weight: 2.8oz(80g) Material: Aluminium

Compatible Motor and Gearhead

- **0GN□KA**
- 1.65 in sq.(42mm sq.) frame size motors

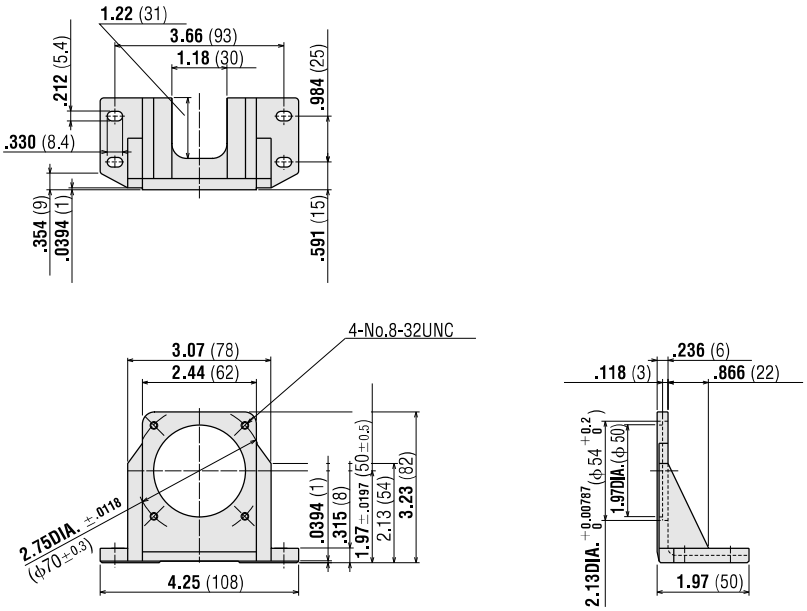


For 2.36 in. sq. (60mm sq.)

Model: **SOL2U□8**
Weight: 4.2oz(120g) Material: Aluminium

Compatible Motor and Gearhead

- **2GN□KA**
- 2.36 in sq.(60mm sq.) frame size motors



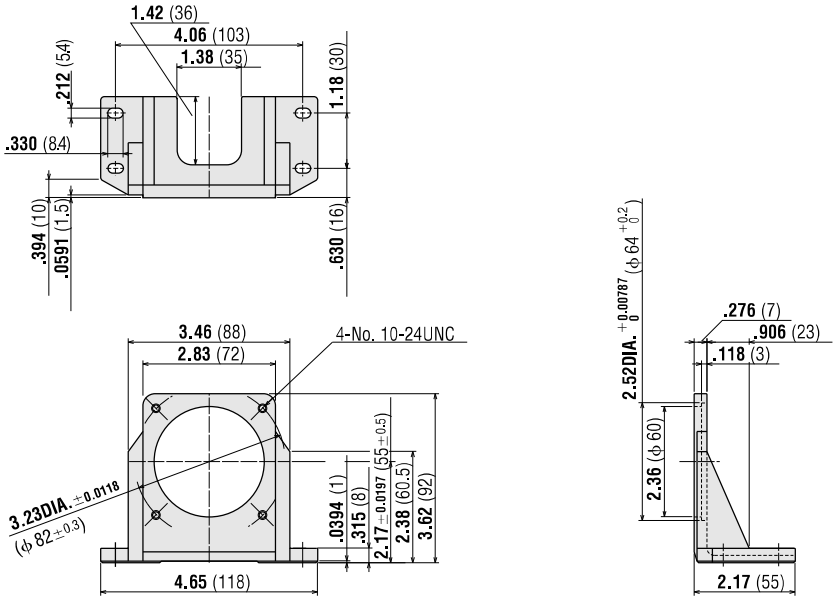
For 2.76 in. sq. (70mm sq.)

Model: **SOL3U10**

Weight: 5.6oz(160g)　Material: Aluminium

Compatible Motor and Gearhead

- **3GN□KA**
- 2.76 in sq.(70mm sq.) frame size motors



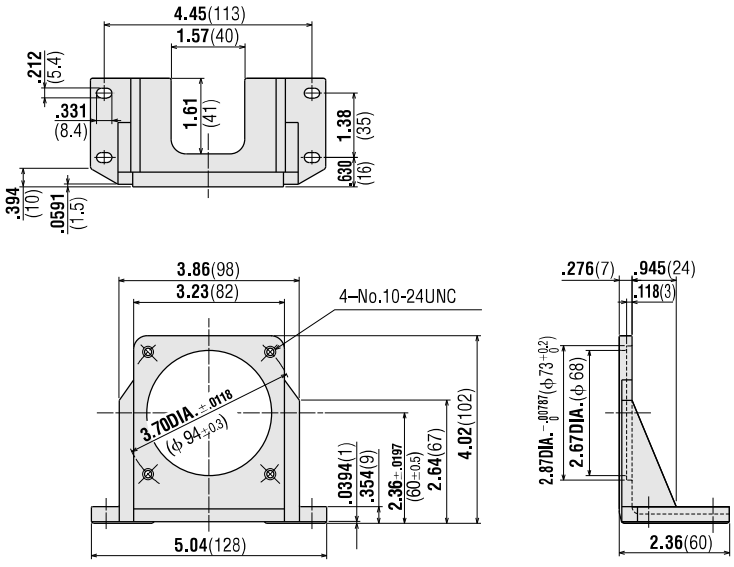
For 3.15 in. sq. (80mm sq.)

Model: **SOL4U10**

Weight: 7.1oz(200g)　Material: Aluminium

Compatible Motor and Gearhead

- **4GN□KA**
- 3.15 in sq.(80mm sq.) frame size motors

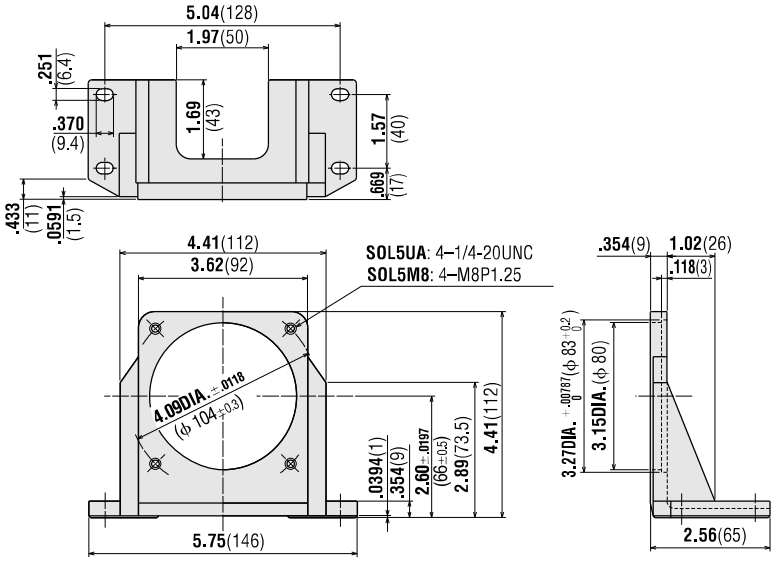


For 3.54 in. sq. (90mm sq.)

Model: **SOL5UA**
SOL5M8
Weight: 9.5oz(270g) Material: Aluminium

Compatible Motor and Gearhead

- **SOL5UA**
- **5GN□KA**
- **5GU□KA**
- 3.54 in sq.(90mm sq.) frame size motors
- **SOL5M8**
- **FBLⅡ** Series

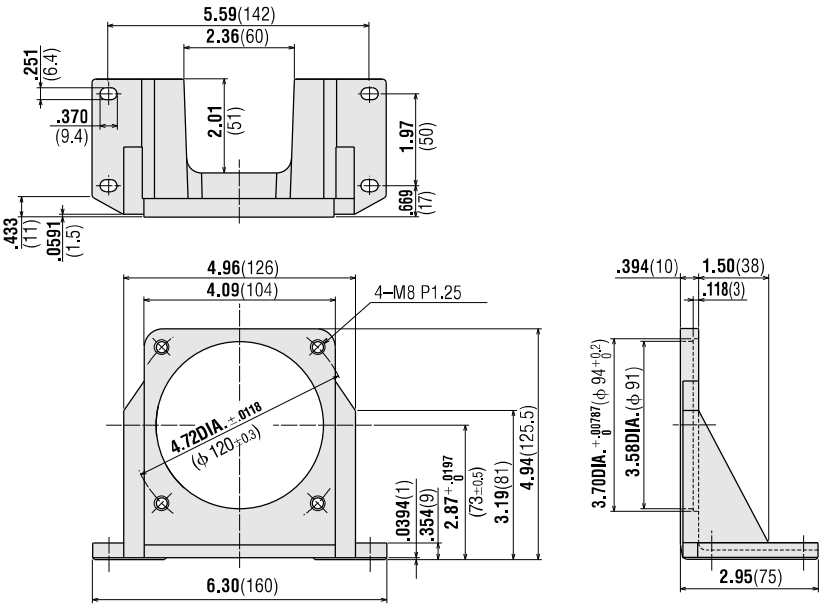


For 4.09 in. sq. (104mm sq.)

Model: **SOL6M8**
Weight: 13.4oz(380g) Material: Aluminium

Compatible Motor and Gearhead

- **BH**Series
- 4.09 in sq.(104mm sq.) frame size motors



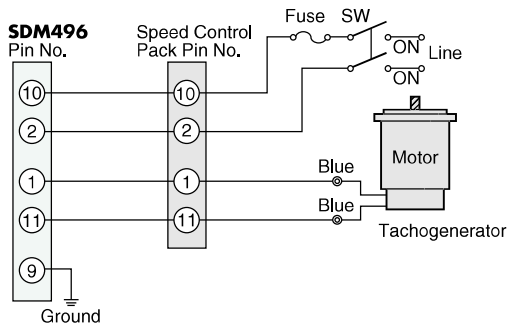
External Speed Indicator

To check the speed of speed control motors, connect the speed indicator.

Model: **SDM496** (Single-Phase 100~240VAC)
This digital speed indicator, displays a speed at the output shaft of the motor or gearhead.

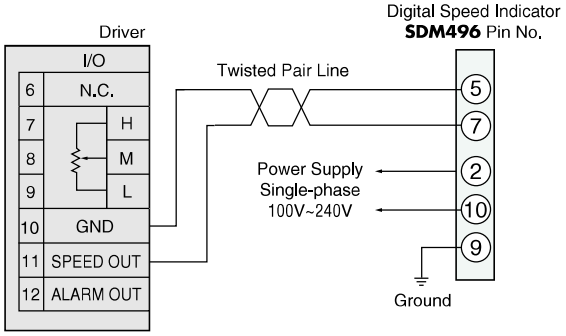
Applicable Motor: **FBLⅡ** series, **HBL** series, **US** series
Component type (**SS21-UL**)

●Example of Connection with SS21UL Component Type

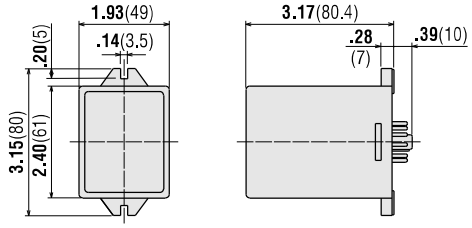


See page [A-163] for connection with unit type speed control motor.

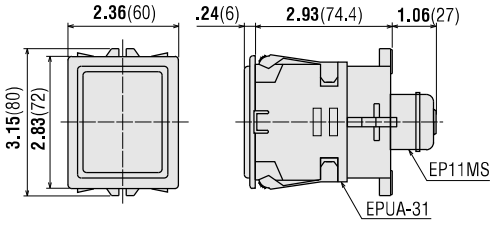
●Example of Connection with FBLⅡ Series



●Dimensions Scale 1/4, Unit = inch (mm) Weight: 7.1 oz. (200 g)



●Dimensions with Adapter Attached Scale 1/4, Unit = inch (mm)

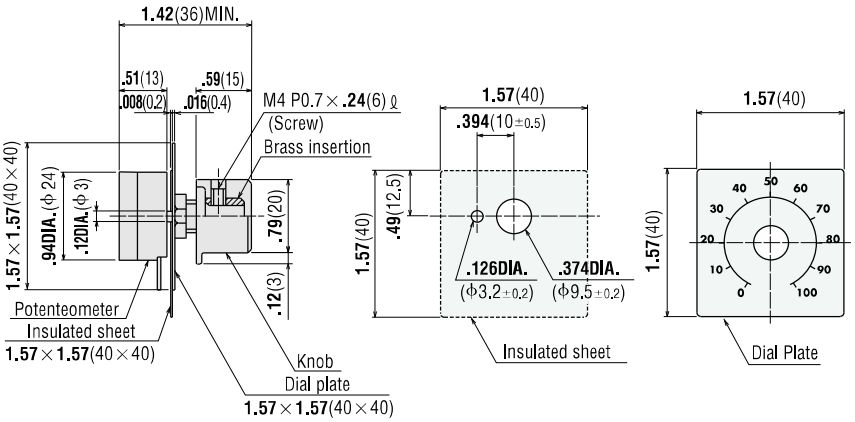


●Optional Parts: A flush mounting adapter **EPUA-31** and round shape socket **EP11MS** are provided with the speed indicator.

External Speed Potentiometers

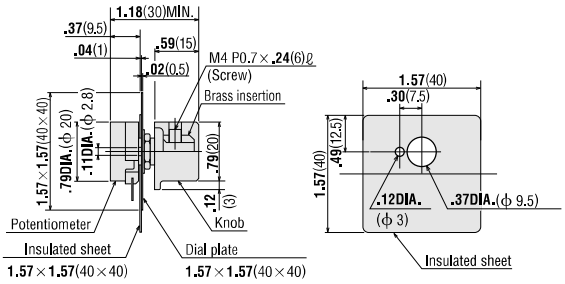
Model : **PAVR-20KY**
(20kΩ · 1/4W)

●Dimensions Scale 1:2, Unit = inch (mm) Weight: 1.2 oz. (35 g)



Model: **PAVR-20KZ**

●Dimensions Scale 1:2, Unit = inch (mm) Weight: 1.2 oz. (35 g)

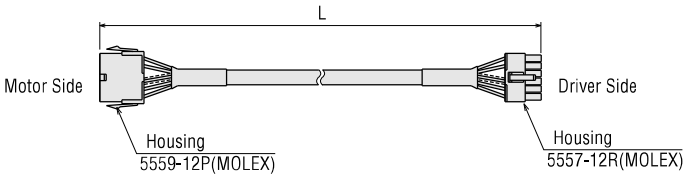


■ Extension Cables

● For FBLⅡSeries

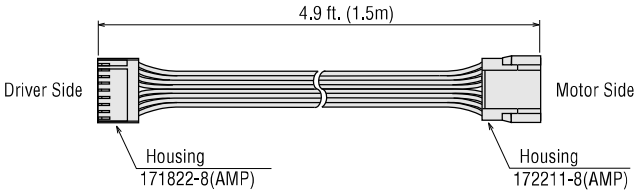
Model	Length: ft.(m)
CC01FBL	3.3 (1)
CC02FBL	6.6 (2)
CC03FBL	9.8 (3)
CC05FBL	16.4 (5)
CC07FBL	23.0 (7)
CC10FBL	32.8 (10)

Maximum extension length is 34.4 ft (10.5m).



● For HBL Series

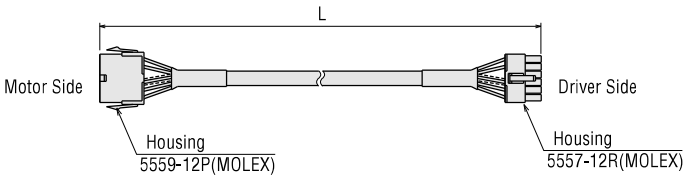
●Applicable Products: HBL210, HBL425, HBL540 type
Model: **FC02HBL**
4.9ft (1.5m)
Maximum extension length is 6.6 ft. (2m)



●Applicable Products: HBL560, HBL5100 type

Model	Length: ft. (m)
CC01FBL	3.3 (1)
CC02FBL	6.6 (2)
CC03FBL	9.8 (3)
CC05FBL	16.4 (5)

Maximum extension length is 18.8 ft. (5.5m)



For US Series

●**Applicable Products:**
US206, **US315**, **US425**, **US540**

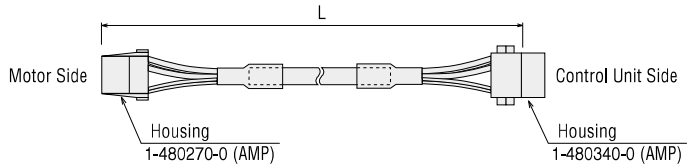
Model	Length: ft. (m)
CC01SS052	3.3 (1)
CC02SS052	6.6 (2)
CC03SS052	9.8 (3)
CC04SS052	13.1 (4)

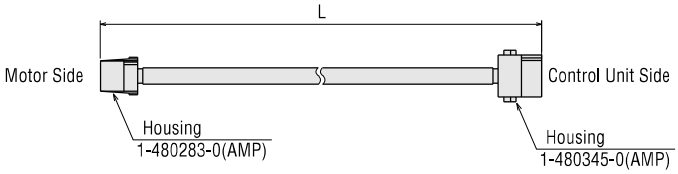
●**Applicable Products:**
US560, **US590**

Model	Length: ft. (m)
CC01SS2	3.3 (1)
CC02SS2	6.6 (2)
CC03SS2	9.8 (3)
CC04SS2	13.1 (4)

Maximum extension length is 15.0 ft. (4.75m)

Extension cable for connecting motor and control unit.
Two types are available, depending on the type of connector.





Din Rail Mounting Bracket

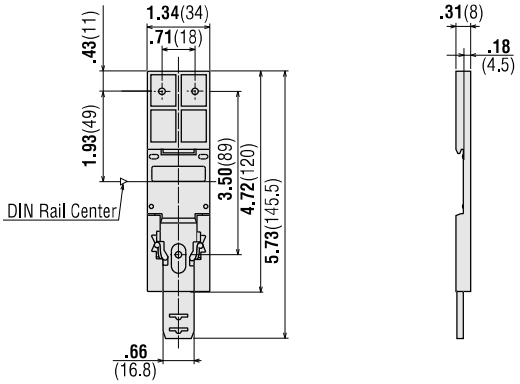
Use when installing the speed control pack and driver on DIN rails.

Model: **PADP01**

Applicable Products

●**FBLII** Series

●**Dimensions** Scale 1/4, Unit = inch (mm) Weight: 0.71oz (20g)

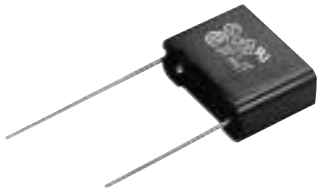


CR Circuit for Surge Suppression

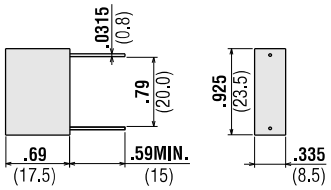
This product is used to protect the contacts of the relay and/or switch used to control the motor direction.

Model: **EPCR1201-2**

AC250V (120Ω 0.1μF)



●**Dimensions** Scale 1:1, Unit = inch (mm) Weight: 0.18oz (5g)

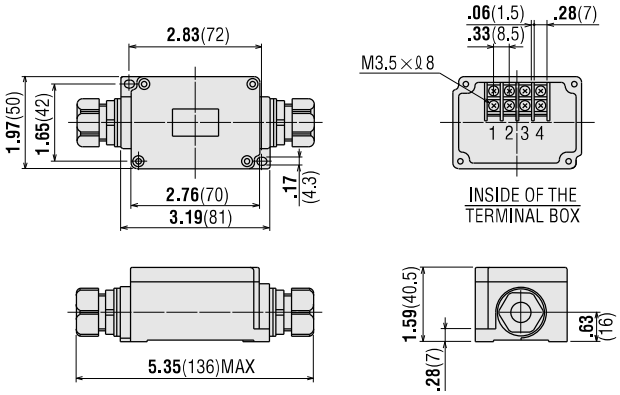


Power Relay Box

For use with the waterproof extension cable.

Model: **TB4-0608**

●**Dimensions** Unit = inch (mm) Weight: 5.3oz (150g)



Applicable Motors

●Cabtyre cable type:
FPW Series Induction type
BH Series

●Lead wire type:
Induction Motor
Reversible Motor
Torque Motor

Diameter of cable: .26DIA. (ϕ 6.5)~.33DIA. (ϕ 8.5)

●The relay box conforms to Protection Level IP65 when used with a waterproof extension cable on an FPW series induction motor.

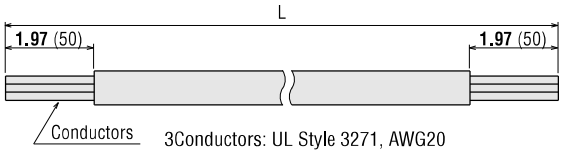
The screws for the cover on the sealed connector and relay box should be adjusted to the torque shown below.

Sealed connector	8.7~13.0 lb-in (1.0~1.5 N·m)
Cover of power relay box	4.7~5.7 lb-in (0.54~0.66 N·m)

Extension Cable for Splashproof Motors

Use with the relay box above.

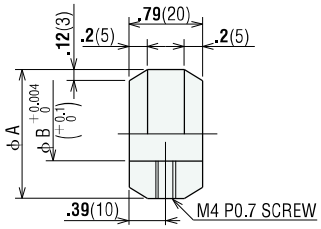
Conductors	Model	Length : ft. (m)
3	**CC05AC33P**	16.4(5)
	CC10AC33P	32.8 (10)
4	**CC05AC43P**	16.4(5)
	CC10AC43P	32.8 (10)



3Conductors: UL Style 3271, AWG20
4Conductors: UL Style 1015, AWG20×3
UL Style 1430, AWG20×1

Dog for Linear Head **LH** Series

Dimensions Scale 1/4, Unit = inch (mm)



Linear Head Model	Dog Model	A		B	
For **0L** type	**LXD0C**	.17	(18)	.31	(8)
For **2L** type	**LXD2C**	.94	(24)	.54	(13.8)
For **4L** type	**LXD4C**	1.18	(30)	.78	(19.8)
For **5L** type	**LXD5C**	1.38	(35)	.98	(24.8)