Standard AC Motors

Constant Speed Motors

Clutch and Brake Motors

Clutch and Brake Motors
C·B Motors

●Additional Information●
Technical reference ➜ Page F-1
Safety standards ➜ Page G-2

This compact precision motor is equipped with an internal clutch and brake mechanism for use with a gearhead. This combination makes it the ideal motor for applications involving frequent START/STOP operation, positioning, indexing, jogging and incremental feeding.

●List of safety standard approved products (Model, Standards, File No., Certification Body) ➜ Page G-11

Gearhead sold separately.

Features

●Suitable for High-frequency Operation

The combination of a constantly rotating induction motor and a clutch and brake unit enables high frequency 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.
Other gearheads including **GN-S** gearhead cannot be combined.

Characteristics of C·B Motors

C·B motor's output shaft runs and stops controlled through the clutch and brake as motor is running continuously.

Output shaft rotation 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.

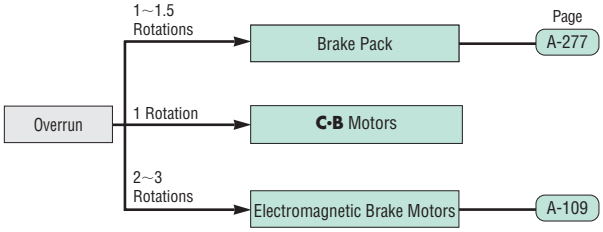
To meet high-frequency, starting and stopping applications, Oriental Motor uses an induction motor for its continuous duty rating. An induction motor is best suited for uni-directional movements. The **C·B** motor is not suitable for frequent bi-directional starting and stopping motion.

Other Motor Braking Options

In addition to the **C·B** motors, various brake options are available to suit a variety of applications.

●How to Select a Brake Motor

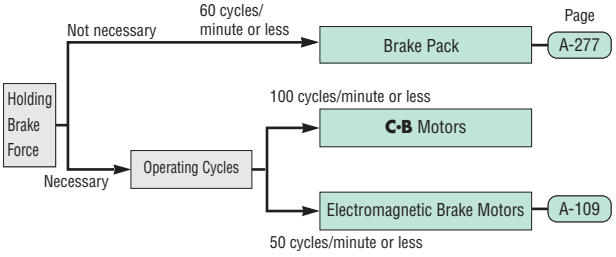
◇Selecting Based on Stopping Accuracy



●The values for overrun applies to the motor only.

●For low-speed synchronous motors, the motor can be stopped instantly within ±10° of stopping accuracy by turning off the power supply. Refer to page A-203 for details.

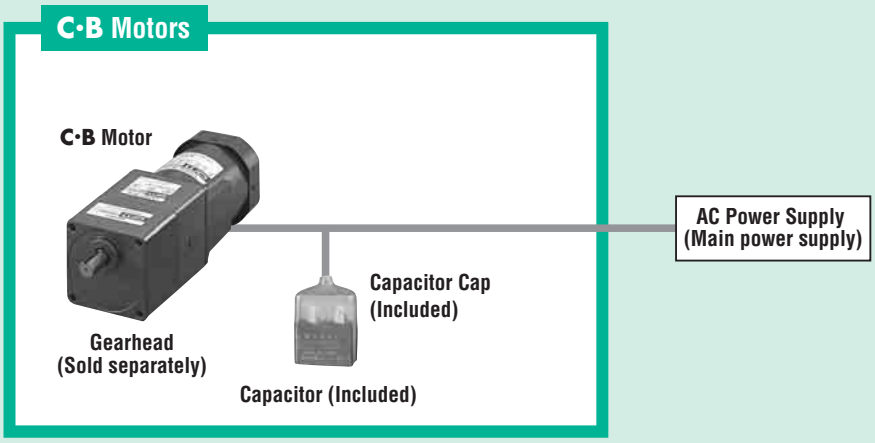
◇Selecting Based on Frequency of Use



Notes:

●The operating cycles are based merely on brake response. The value specified above is the maximum, so it may not be possible to repeat braking operation at this frequency.
●In an actual application, be certain the surface temperature of the motor case remains at 90°C (194°F) or less by considering a rise in motor temperature.
●For low-speed synchronous motors, if operated within the permissible load inertia, the motor can start, stop and reverse within 1.5 cycles of power supply frequency. Refer to page A-203 for details.

System Configuration



No.	Product Name	Overview	Page
①	Flexible Couplings	Clamp type coupling that connects the gearhead shaft to the driven shaft.	A-292

●Example of System Configuration

C·B Motor (Pinion shaft) (Sold separately)	Gearhead (Sold separately)		Flexible Coupling (Sold separately)
CBI540-701WU	5GC25KA	+	MCL40F08F08

● The system configuration shown above is an example. Other combinations are available.

Specifications A-186 / Dimensions A-190 / Connection Diagrams A-191

Product Number Code

Motor

CB I 5 40 - 7 0 1W U
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①	**CB**: Clutch and Brake Motor	
②	Motor Type	**I**: Induction Motor
③	Motor Frame Size	**5**: 90 mm (3.54 in.)
④	Output Power (W)	(Example) **40**: 40 W (1/19 HP)
⑤	Type of Pinion	**7**: **GC** Type Pinion Shaft **8**: **GCH** Type Pinion Shaft
⑥	Clutch Brake Type	**0**: Power On Activated Type
⑦	Power Supply Voltage	**1W**: Single-Phase 110/115 VAC
⑧	Included Capacitor	**U**: For Single-Phase 110/115 VAC

Gearhead

5 GC 25 KA
① ② ③ ④

①	Gearhead Frame Size	**5**: 90 mm (3.54 in.)
②	Type of Pinion	**GC**: **GC** Type Pinion Shaft **GCH**: **GCH** Type Pinion Shaft
③	Gear Ratio	(Example) **25**: Gear Ratio of 25:1
④	Type of Gearhead	**KA**: Ball Bearing Type (inch size)

Product Line

Motor

Output Power	Power Supply Voltage	Model	Motor Model
40W (1/19 HP)	Single-Phase 110/115 VAC	**CBI540-701WU**	5IK40GN-AW-CB1
60W (1/12 HP)	Single-Phase 110/115 VAC	**CBI560-801WU**	5IK60GU-AW-CB1
90W (1/8 HP)	Single-Phase 110/115 VAC	**CBI590-801WU**	5IK90GU-AW-CB1

- When the motor is approved under various safety standards, the model name on the nameplate is the approved model name.
  (Example) Model: **CBI540-701WU** ➜ Motor nameplate and product approved under various safety standards: 5IK40GN-AW-CB1

Notes:

- The **GC** and **GCH** type gearheads are designed specifically for use with the **C•B** motor. Other types of gearheads should not be used.
- The clutch and brake sections cannot be disassembled.

The following items are included in each product.
Motor, Capacitor, Capacitor Cap, Surge Suppressor, Operating Manual

Gearhead (Sold separately)

Applicable Motor Output Power	Gearhead Model	Gear Ratio
40 W (1/19 HP)	**5GC□KA**	**3.6**, **6**, **9**, **15**, **18**, **30**, **36**, **60**, **90**, **120**, **180**
60 W (1/12 HP) 90 W (1/8 HP)	**5GCH□KA**	

- Enter the gear ratio in the box (□) within the model name.

The following items are included in each product.
Gearhead, Mounting Screws, Parallel Key*, Operating Manual
*Only for **5GCH□KA**

Specifications

Motor – Continuous Rating

Model	Output Power W	Output Power HP	Voltage VAC	Frequency Hz	Current A	Rated Speed r/min	Capacitor μF
(TP) **CBI540-701WU**	40	1/19	Single-Phase 110 Single-Phase 115	60	0.68 0.67	1500	9
(TP) **CBI560-801WU**	60	1/12	Single-Phase 110 Single-Phase 115	60	1.09 1.10	1450	18
(TP) **CBI590-801WU**	90	1/8	Single-Phase 110 Single-Phase 115	60	1.45 1.44	1500	20

(TP): Contains a built-in thermal protector (automatic return type). If a motor overheats for any reason, the thermal protector is activated and the motor is stopped. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor power off before inspecting.

Clutch/Brake

Model Frame Size	Clutch/Brake	Holding Brake Torque N·m	Holding Brake Torque oz-in	Voltage VDC	Input W	Cycle Rates time/minute
90mm (3.54 in.)	Clutch	1.5	210	24	8.4	100
	Brake				6.2	

- Insulation Resistance: 100 MΩ or more when 500 VDC megger is applied between the lead wire of clutch/brake and the case.
- Dielectric Strength: Sufficient to withstand 1 kVAC at 50 Hz applied between the lead wire of clutch/brake and the case for 1 minute.

General Specifications

Item	Specifications
Insulation Resistance	100 MΩ or more when 500 VDC megger is applied between the windings and the case after rated operation under normal ambient temperature and humidity.
Dielectric Strength	Sufficient to withstand 1.5 kVAC at 60 Hz applied between the windings and the case for 1 minute after rated operation under normal ambient temperature and humidity.
Temperature Rise	Temperature rise of windings is 80°C (144°F) or less measured by the resistance change method after rated operation under normal ambient temperature and humidity.
Insulation Class	Class B [130°C (266°F)]
Overheat Protection	Built-in thermal protector (automatic return type) Open: 130±5°C (266±9°F), Close: 82±15°C (179.6±27°F)
Ambient Temperature	−10～+40°C (+14～+104°F) (non-freezing)
Ambient Humidity	85% or less (non-condensing)
Degree of Protection	IP20

Permissible Overhung Load and Permissible Thrust Load of Gearhead

Model	Gear Ratio	Permissible Overhung Load				Permissible Thrust Load	
		10 mm (0.39 in.) from shaft end		20 mm (0.79 in.) from shaft end			
		N	lb.	N	lb.	N	lb.
5GC□KA	**3.6～18**	250	56	350	78	100	22
	30～180	300	67	450	101		
5GCH□KA	**3.6～9**	400	90	500	112	150	33
	15～18	450	101	600	135		
	30～180	500	112	700	157		

● Enter the gear ratio in the box (□) within the model name.

Gear Ratio and Speed Range of Gearhead

Unit = r/min

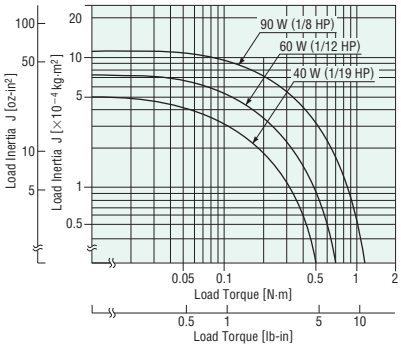
Gear Ratio	**3.6**	**6**	**9**	**15**	**18**	**30**	**36**	**60**	**90**	**120**	**180**
60 Hz	500	300	200	120	100	60	50	30	20	15	10

● The speed is calculated by dividing the motor's synchronous speed (60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2～15% less than the displayed value depending on the load.
● The direction of gearhead shaft rotation may differ from motor shaft rotation depending on the gear ratio of gearhead. Gear ratio and rotation direction of gearhead ➜ Page A-13

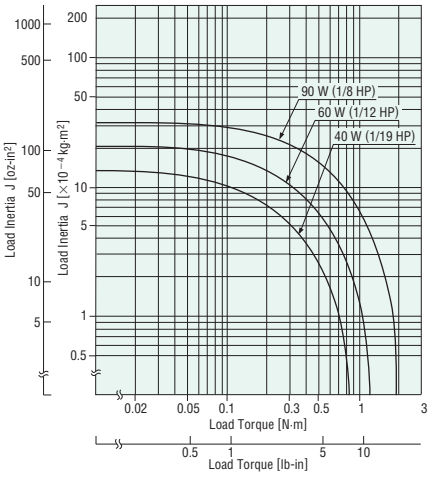
Output Power Characteristics

● The speed indicated is calculated by dividing the motor's synchronous speed (60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2～15% less than the displayed value depending on the load.

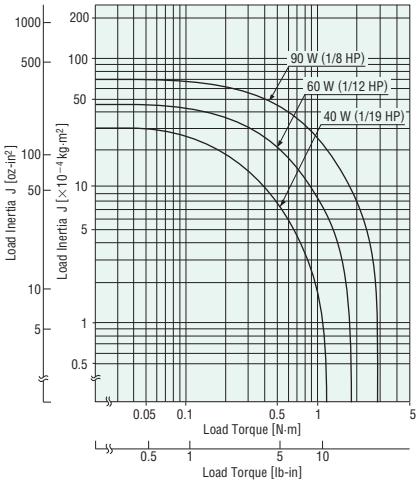
● Speed at Output Shaft: 500 r/min
Gear Ratio 3.6:1 at 60 Hz



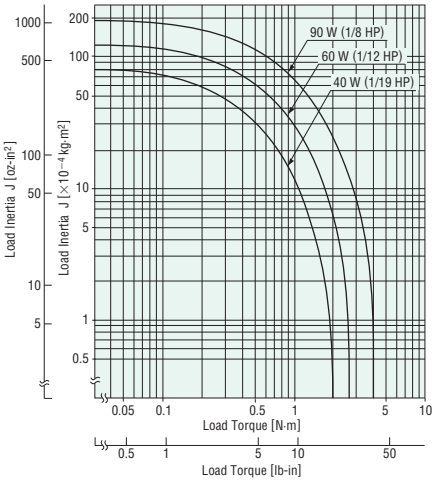
● Speed at Output Shaft: 300 r/min
Gear Ratio 6:1 at 60 Hz



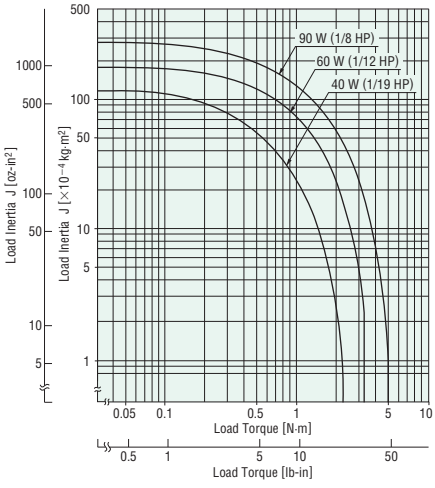
● Speed at Output Shaft: 200 r/min
Gear Ratio 9:1 at 60 Hz



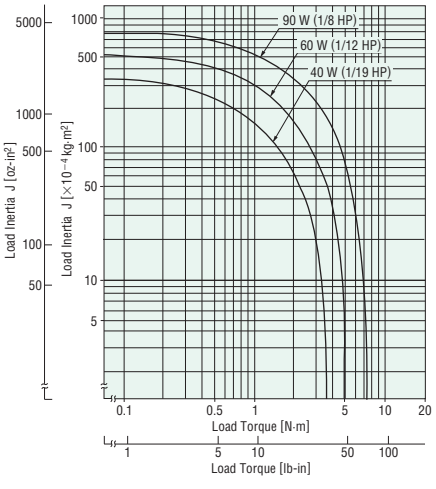
● Speed at Output Shaft: 120 r/min
Gear Ratio 15:1 at 60 Hz



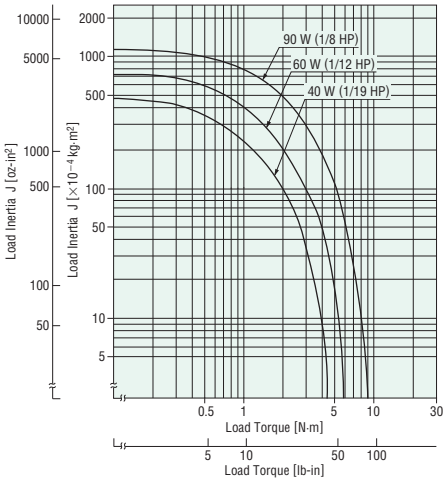
● Speed at Output Shaft: 100 r/min
Gear Ratio 18:1 at 60 Hz



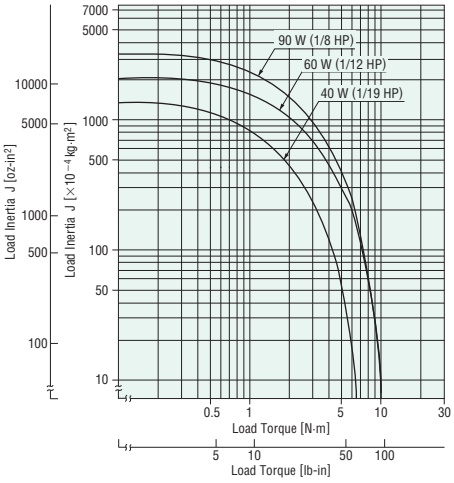
● Speed at Output Shaft: 60 r/min
Gear Ratio 30:1 at 60 Hz



● Speed at Output Shaft: 50 r/min
Gear Ratio 36:1 at 60 Hz



● Speed at Output Shaft: 30 r/min or slower
Gear Ratio 60:1 or greater at 60 Hz



● When using a **C·B** motor at an output shaft speed of less than 30 r/min (when using with gearheads of speed reduction ratios greater than 60:1), refer to output selection chart entitled "30 r/min or slower."

How to Read Output Power Characteristics

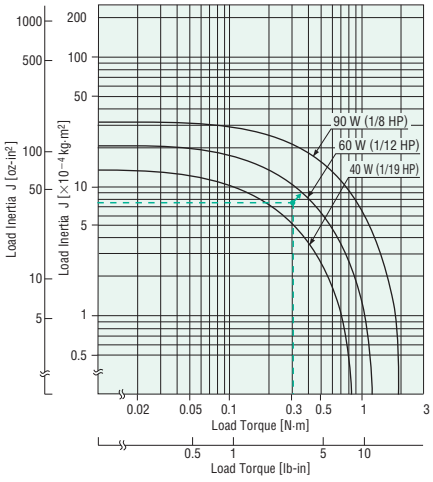
The most appropriate **C·B** motor may be determined by load torque and load inertia requirements of the motor and gearhead using the output selection charts.

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.

● The speed indicated is calculated by dividing the motor's synchronous speed (60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2～15% less than the displayed value depending on the load.

● Speed at Output Shaft: 300 r/min
Gear Ratio 6:1 at 60 Hz



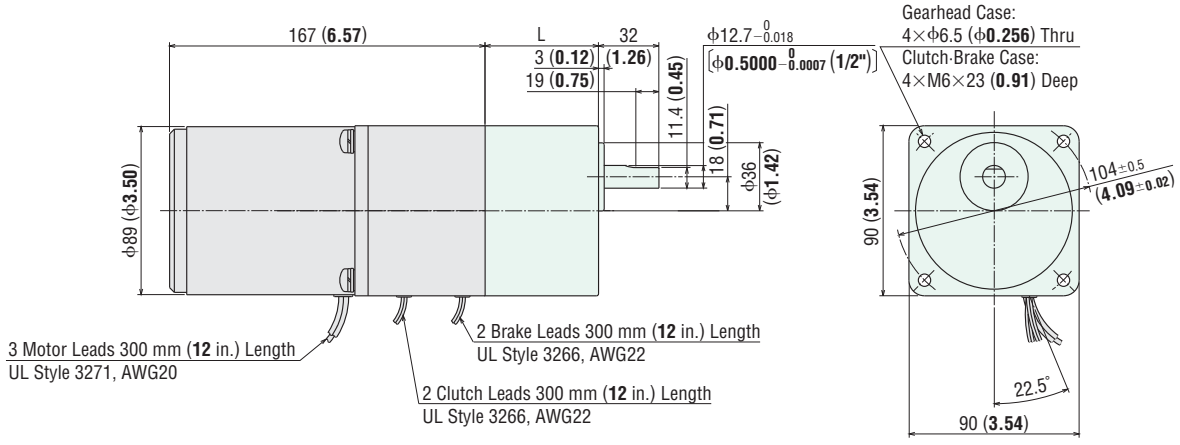
Dimensions Unit = mm (in.)

● Mounting screws are included with gearheads. Dimensions for mounting screws ➜ A-311

●40 W (1/19 HP)

Motor Model	Gearhead Model	Gear Ratio	L	DXF
CBI540-701WU	**5GC□KA**	**3.6~18**	42 (1.65)	A261AU
		30~180	60 (2.36)	A261BU

Mass: Motor 3.8 kg (8.4 lb.)
Gearhead 1.5 kg (3.3 lb.)



●60 W (1/12 HP)

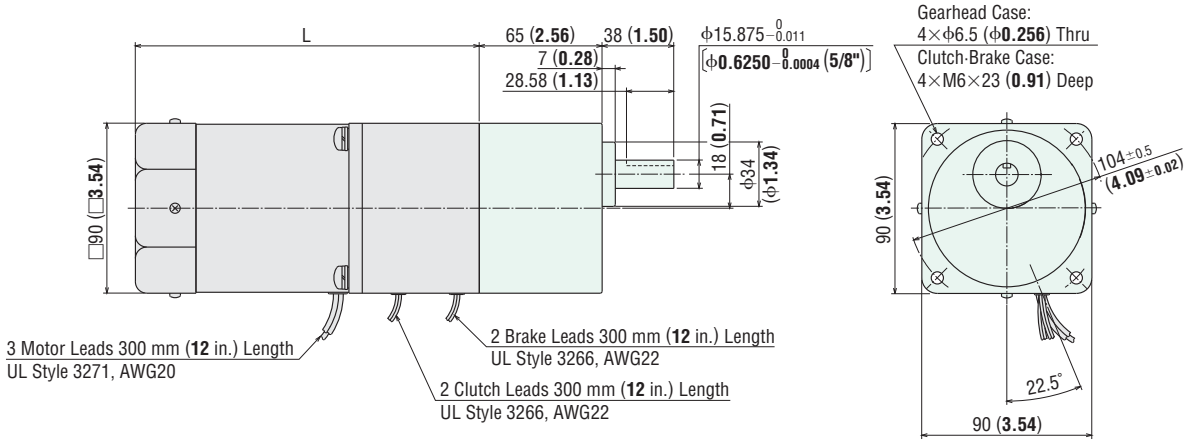
Motor Model	Gearhead Model	L	DXF
CBI560-801WU	**5GCH□KA**	182 (7.17)	A262U

Mass: Motor 4.0 kg (8.8 lb.)
Gearhead 1.5 kg (3.3 lb.)

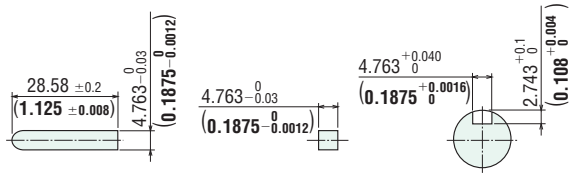
●90 W (1/8 HP)

Motor Model	Gearhead Model	L	DXF
CBI590-801WU	**5GCH□KA**	197 (7.76)	A263U

Mass: Motor 4.5 kg (9.9 lb.)
Gearhead 1.5 kg (3.3 lb.)

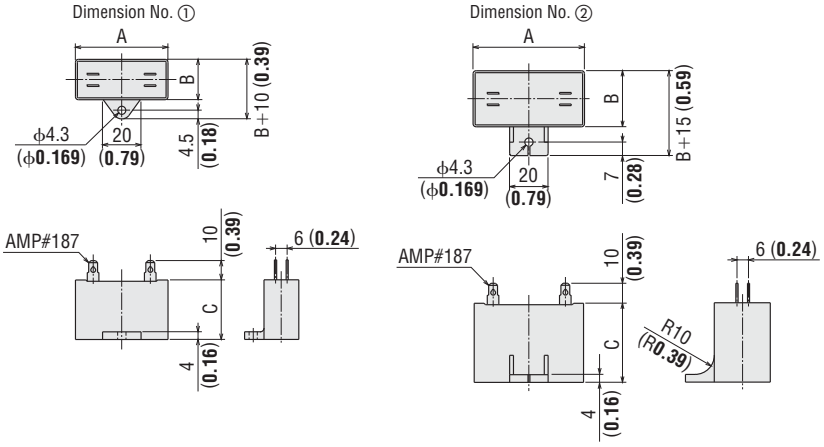


◇Key and Key Slot
(The key is included with the gearhead)



● Enter the gear ratio in the box (□) within the model name.

◇Capacitor (Included)

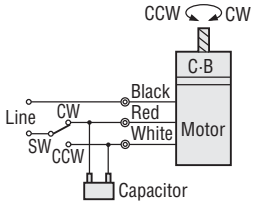
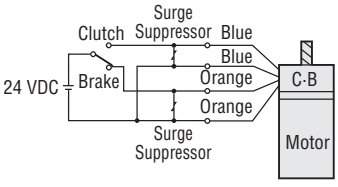


◇Capacitor Dimensions Unit = mm (in.)

Model	Capacitor Model	A	B	C	Mass g (oz.)	Dimension No.	Capacitor Cap
CBI540-701WU	CH90CFAUL	48 (1.89)	21 (0.83)	31 (1.22)	40 (1.4)	①	Included
CBI560-801WU	CH180CFAUL	58 (2.28)	23.5 (0.93)	37 (1.46)	70 (2.5)	②	
CBI590-801WU	CH200CFAUL	58 (2.28)	29 (1.14)	41 (1.61)	95 (3.4)	②	

Connection Diagrams

- The direction of motor rotation is as viewed from the shaft end of the motor. CW represents the clockwise direction, while CCW represents the counterclockwise direction

Model	Motor	Clutch and Brake
CBI540-701WU **CBI560-801WU** **CBI590-801WU**		

- The surge suppressor circuit is included with the **C·B** motor.
- Clutch and brake coil lead wires are non-polar.

Notes:

- When using **C·B** motors, a 24 VDC 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.
- Be sure to use full-wave rectified DC power supply.
- 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 ms.

- How to connect a capacitor ➜ Page A-313