Standard AC Motors

Constant Speed Motors

Clutch and Brake Motors
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.

**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.

**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**

<table>
<thead>
<tr>
<th>Overrun</th>
<th>1 Rotation</th>
<th>2–3 Rotations</th>
<th>1–1.5 Rotations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>C·B Motors</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Brake Pack</strong></td>
<td></td>
<td><strong>Electromagnetic Brake Motor</strong></td>
</tr>
</tbody>
</table>

Notes:
- The values for overrun apply 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**

<table>
<thead>
<tr>
<th>Holding Brake Force</th>
<th>Not necessary</th>
<th>60 cycles/minute or less</th>
<th>100 cycles/minute or less</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Cycles</td>
<td></td>
<td><strong>C·B Motors</strong></td>
<td><strong>Electromagnetic Brake Motor</strong></td>
</tr>
</tbody>
</table>

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.
- 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

**C·B Motors**

- C·B Motor
- Gearhead (Sold separately)
- Capacitor (Included)
- Capacitor Cap (Included)
- AC Power Supply (Main power supply)

**Accessories (Sold separately)**

- Flexible Couplings
  - (→ Page A-292)

<table>
<thead>
<tr>
<th>No.</th>
<th>Product Name</th>
<th>Overview</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flexible Couplings</td>
<td>Clamp type coupling that connects the gearhead shaft to the driven shaft.</td>
<td>A-292</td>
</tr>
</tbody>
</table>

- Example of System Configuration

  **C·B Motor**
  - (Sold separately)
  - Pinion shaft: CB1S40-701WU
  
  **Gearhead**
  - 5GC25KA

  **Flexible Coupling**
  - MCL40F08F08

- The system configuration shown above is an example. Other combinations are available.
### Product Number Code

#### Motor

**CB 1 5 40 - 7 0 1W U**

- **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
- **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** Gearhead Frame Size: 5: 90 mm (3.54 in.)
- **②** Type of Pinion: GC: GC 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

<table>
<thead>
<tr>
<th>Output Power</th>
<th>Power Supply Voltage</th>
<th>Model</th>
<th>Motor Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>40W (1/19 HP)</td>
<td>Single-Phase 110/115 VAC</td>
<td>CBIS40-701WU</td>
<td>5K40GN-AW-CB1</td>
</tr>
<tr>
<td>60W (1/12 HP)</td>
<td>Single-Phase 110/115 VAC</td>
<td>CBIS60-801WU</td>
<td>5K60GU-AW-CB1</td>
</tr>
<tr>
<td>90W (1/8 HP)</td>
<td>Single-Phase 110/115 VAC</td>
<td>CBIS90-801WU</td>
<td>5K90GU-AW-CB1</td>
</tr>
</tbody>
</table>

When the motor is approved under various safety standards, the model name on the nameplate is the approved model name.

(Example) Model: **CBIS40-701WU** ➜ Motor nameplate and product approved under various safety standards: 5K40GN-AW-CB1

**Notes:**
- The **GC** and **GCH** type gearheads are designed specifically for use with the CB 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)

<table>
<thead>
<tr>
<th>Applicable Motor Output Power</th>
<th>Gearhead Model</th>
<th>Gear Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 W (1/19 HP)</td>
<td>5GC</td>
<td>3.6, 6, 9, 15</td>
</tr>
<tr>
<td>60 W (1/12 HP)</td>
<td>GCH</td>
<td>18, 30, 36</td>
</tr>
<tr>
<td>90 W (1/8 HP)</td>
<td></td>
<td>60, 90, 120, 180</td>
</tr>
</tbody>
</table>

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 **GCH**

### Specifications

#### Motor – Continuous Rating

<table>
<thead>
<tr>
<th>Model</th>
<th>Output Power</th>
<th>Voltage VAC</th>
<th>Frequency Hz</th>
<th>Current A</th>
<th>Rated Speed r/min</th>
<th>Capacitor μF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBIS40-701WU</td>
<td>40 1/19</td>
<td>Single-Phase 110</td>
<td>60</td>
<td>0.68</td>
<td>1500</td>
<td>9</td>
</tr>
<tr>
<td>CBIS60-801WU</td>
<td>60 1/12</td>
<td>Single-Phase 110</td>
<td>60</td>
<td>1.09</td>
<td>1450</td>
<td>18</td>
</tr>
<tr>
<td>CBIS90-801WU</td>
<td>90 1/8</td>
<td>Single-Phase 110</td>
<td>60</td>
<td>1.45</td>
<td>1500</td>
<td>20</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Model Frame Size</th>
<th>Clutch/Brake</th>
<th>Holding Brake Torque N·m</th>
<th>Voltage VDC</th>
<th>Input W</th>
<th>Cycle Rates time/minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>90mm (3.54 in.)</td>
<td>Clutch</td>
<td>1.5</td>
<td>24</td>
<td>8.4</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Brake</td>
<td>210</td>
<td></td>
<td>6.2</td>
<td></td>
</tr>
</tbody>
</table>

- 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

<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation Resistance</td>
<td>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.</td>
</tr>
<tr>
<td>Dielectric Strength</td>
<td>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.</td>
</tr>
<tr>
<td>Temperature Rise</td>
<td>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.</td>
</tr>
<tr>
<td>Insulation Class</td>
<td>Class B [130°C (266°F)]</td>
</tr>
<tr>
<td>Overheat Protection</td>
<td>Built-in thermal protector (automatic return type) Open: 130 ±5°C (266 ±9°F), Close: 82 ±15°C (179.6 ±27°F)</td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>−10° to +40°C (+14° to +104°F) (non-freezing)</td>
</tr>
<tr>
<td>Ambient Humidity</td>
<td>85% or less (non-condensing)</td>
</tr>
<tr>
<td>Degree of Protection</td>
<td>IP20</td>
</tr>
</tbody>
</table>

Permissible Overhung Load and Permissible Thrust Load of Gearhead

<table>
<thead>
<tr>
<th>Model</th>
<th>Gear Ratio</th>
<th>Permissible Overhung Load</th>
<th>Permissible Thrust Load</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10 mm (0.39 in.) from shaft end</td>
<td>20 mm (0.79 in.) from shaft end</td>
</tr>
<tr>
<td>SGCKA</td>
<td>3.6–18</td>
<td>N lb.</td>
<td>N lb.</td>
</tr>
<tr>
<td></td>
<td>30–180</td>
<td>250</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>3.6–9</td>
<td>400</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>15–18</td>
<td>450</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td>30–180</td>
<td>500</td>
<td>112</td>
</tr>
<tr>
<td>SGCHKA</td>
<td>3.6–9</td>
<td>400</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>15–18</td>
<td>450</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td>30–180</td>
<td>500</td>
<td>112</td>
</tr>
</tbody>
</table>

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

Gear Ratio and Speed Range of Gearhead

<table>
<thead>
<tr>
<th>Gear Ratio</th>
<th>3.6</th>
<th>6</th>
<th>9</th>
<th>15</th>
<th>18</th>
<th>30</th>
<th>36</th>
<th>60</th>
<th>90</th>
<th>120</th>
<th>180</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 Hz</td>
<td>500</td>
<td>300</td>
<td>200</td>
<td>120</td>
<td>100</td>
<td>60</td>
<td>50</td>
<td>30</td>
<td>20</td>
<td>15</td>
<td>10</td>
</tr>
</tbody>
</table>

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**

- Load Torque [N·m]
- Load Inertia  $J \times 10^{-4} \text{ kg·m}^2$
- Load Torque [lb-in]
- Load Inertia  $J \text{ oz-in}^2$

### Speed at Output Shaft: 300 r/min

**Gear Ratio 6:1 at 60 Hz**

- Load Torque [N·m]
- Load Inertia  $J \times 10^{-4} \text{ kg·m}^2$
- Load Torque [lb-in]
- Load Inertia  $J \text{ oz-in}^2$

### Speed at Output Shaft: 200 r/min

**Gear Ratio 9:1 at 60 Hz**

- Load Torque [N·m]
- Load Inertia  $J \times 10^{-4} \text{ kg·m}^2$
- Load Torque [lb-in]
- Load Inertia  $J \text{ oz-in}^2$

### Speed at Output Shaft: 120 r/min

**Gear Ratio 15:1 at 60 Hz**

- Load Torque [N·m]
- Load Inertia  $J \times 10^{-4} \text{ kg·m}^2$
- Load Torque [lb-in]
- Load Inertia  $J \text{ oz-in}^2$

### Speed at Output Shaft: 100 r/min

**Gear Ratio 18:1 at 60 Hz**

- Load Torque [N·m]
- Load Inertia  $J \times 10^{-4} \text{ kg·m}^2$
- Load Torque [lb-in]
- Load Inertia  $J \text{ oz-in}^2$

### Speed at Output Shaft: 60 r/min

**Gear Ratio 30:1 at 60 Hz**

- Load Torque [N·m]
- Load Inertia  $J \times 10^{-4} \text{ kg·m}^2$
- Load Torque [lb-in]
- Load Inertia  $J \text{ oz-in}^2$
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.
### Dimensions Unit = mm (in.)

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

#### 40 W (1/19 HP)

<table>
<thead>
<tr>
<th>Motor Model</th>
<th>Gearhead Model</th>
<th>Gear Ratio</th>
<th>L</th>
<th>DXF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBI540-701WU</td>
<td>5GC KA</td>
<td>3.6 – 18</td>
<td>42 (1.65)</td>
<td>A261AU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 – 180</td>
<td>60 (2.36)</td>
<td>A261BU</td>
</tr>
</tbody>
</table>

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

#### 60 W (1/12 HP)

<table>
<thead>
<tr>
<th>Motor Model</th>
<th>Gearhead Model</th>
<th>L</th>
<th>DXF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBI560-801WU</td>
<td>5GCH KA</td>
<td>182 (7.17)</td>
<td>A262U</td>
</tr>
</tbody>
</table>

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

#### 90 W (1/8 HP)

<table>
<thead>
<tr>
<th>Motor Model</th>
<th>Gearhead Model</th>
<th>L</th>
<th>DXF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBI590-801WU</td>
<td>5GCH KA</td>
<td>197 (7.76)</td>
<td>A263U</td>
</tr>
</tbody>
</table>

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.)

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacitor Model</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Mass (oz.)</th>
<th>Dimension No.</th>
<th>Capacitor Cap</th>
</tr>
</thead>
<tbody>
<tr>
<td>CB1540-701WU</td>
<td>CH90CFAL</td>
<td>48</td>
<td>21</td>
<td>31</td>
<td>1.4</td>
<td>①</td>
<td>Included</td>
</tr>
<tr>
<td>CB1560-801WU</td>
<td>CH180CFAL</td>
<td>58</td>
<td>23.5</td>
<td>37</td>
<td>2.5</td>
<td>②</td>
<td></td>
</tr>
<tr>
<td>CB1590-801WU</td>
<td>CH200CFAL</td>
<td>58</td>
<td>29</td>
<td>41</td>
<td>3.4</td>
<td>②</td>
<td></td>
</tr>
</tbody>
</table>

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

CB1540-701WU
CB1560-801WU
CB1590-801WU

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