Oriental Motor

Speed Control

BMU Series (AC Input)
Compact, High-Power Brushless Motor

Brushless Motors and AC Motors

- BLE2 Series
- BXII Series
- BLH Series
- BLV Series
- K115 Series
- DSC Series
- High Power AC Gear Motors
- Inverters/VFDs
Speed Control Overview

For applications where variable speeds are necessary, typically an AC motor with an inverter or brush motors are used. Brushless motors are an advanced option due to their wide speed range, efficiency, closed-loop speed regulation, and long maintenance-free life.

Speed can be controlled by built-in potentiometer, external analog voltage, digital setting, or by network command. Various gearhead configurations are available depending on requirements, design, and budgets.

Below are some common speed control applications.

Typical Applications:

- **Conveyors**
  - Multiple loads with different weights
    Speed stability can be maintained with flat torque (Brushless Motors)
  - 2 axes parallel speed synchronization
    Easily synchronize two motors / conveyors for simple speed control. (Brushless Motors)
  - Variable speed conveyors
    Speed can be slowed down to pass through specific function and sped up to increase throughput

- **Torque Sensing** (Products with torque limit function)
  - Monitor load or limit torque

- **Grinding / Deburring**
  - Variable speed depending on material

- **Stirring / Pump / Dispensing**
  - Maintain speed with different viscosities

- **AGVs & AMRs**
  - Tight speed regulation ideal for vehicle drivetrains
Q: AC Motor vs Brushless Motor: Which is Better?
A: Depends on your application requirements.

Efficiency
Both motors have power loss in the form of I-R losses. Brushless motors use permanent magnets in the rotor to minimize this loss, while AC motors use more power for electromagnetic induction.

<table>
<thead>
<tr>
<th>Loss</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>200</td>
</tr>
<tr>
<td>121</td>
<td>200</td>
</tr>
</tbody>
</table>

![Efficiency Comparison](image)

Size
Because of their high efficiency characteristics, brushless motors offer high torque density. They are a great alternative to AC motors in applications where space is limited.

![Size Comparison](image)

Comparison of Speed Control Options

<table>
<thead>
<tr>
<th>Inverter + Three Phase Motor</th>
<th>Brushless Motor</th>
<th>Servo Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Composition / Structure / System</strong></td>
<td>Three-phase induction motor</td>
<td>Sensor mounted to magnet motor (SPM type)</td>
</tr>
<tr>
<td></td>
<td>General-purpose inverter (Sold separately)</td>
<td>+ Dedicated driver</td>
</tr>
<tr>
<td><strong>Control Function</strong></td>
<td>Speed control with accuracy not required</td>
<td>Speed control (Torque control)</td>
</tr>
<tr>
<td><strong>Rotation Speed (speed ratio)</strong></td>
<td>90—3600 r/min (1:40)</td>
<td>80—4000 r/min (1:50)</td>
</tr>
<tr>
<td><strong>Torque</strong></td>
<td>[Graph]</td>
<td>[Graph]</td>
</tr>
</tbody>
</table>

![Torque Graph](image)

**Price for Reference:**
- **Motor (w/ gear) + Driver**
  - 100 W (1/8 HP) — $429
  - 120 W (1/8 HP) — $480
  - 100 W — $1,200

- Comparatively inexpensive
- Less expensive than servo motor
- Comparatively expensive to other control motors (Different depending on the accuracy and output of encoder)

**Motor Exterior Shape**
- Induction motor
- The same mounting as induction motor
- Mounting is small for its output

**Efficiency / Energy Saving Performance**
- Efficiency of induction motors is not high
- High efficiency thanks to permanent magnet motor

**Speed Regulation (load)**
- −3%—−15%
- ±0.05%—±0.2%
- ±0.01%

**Responsiveness**
- Low
- High
- High

**Overrun**
- Yes, Large variations
- Yes, controlled
- Performs highly accurate positioning

**Suitable Operations**
- The main use is for operation at a fixed speed
- Allows for speed adjustments
- When speed changes, torque and speed are kept stable.
- Multi-speed operation
- Highly-responsive and high-precision positioning, speed control, and torque control
- Multi-speed operation
Brushless Motors and Drivers

Our new slim motor design allows for better protection, maximum efficiency and driver options. IP66 rating, inch/metric mounting dimensions, stainless steel shaft, and a wide variety of wattages and gear types are offered to meet various needs.

Brushless Motors offer built-in hall-effect sensor feedback to maintain closed-loop speed regulation. In addition to features such as digital/analog speed settings, torque limit, and speed range setting, the drivers also offer alarm and status monitor functions in case problems occur during operation.

New Design (BLE2 Series, BMU Series)

IP66 Degree of Protection

Utilizing an industry style compact connector, a direct connection between the motor and driver can be achieved, no secondary connections. Connection is easy with the lock lever that does not require screws.

Connector Structure

- Gasket
- Lock Lever
- O-ring

H1 Food Grade Grease Available

- Oil seal lubricant
- Gear lubricant
- Bearing lubricant

Uses H1 grease

Also available with KSG Series AC Motors.

Standardized Stainless Steel Shaft (SUS303)

Slim Motor Design

- Optimization of magnetic design
- [Stator plate]
  - Adopts a high-performance magnetic steel sheet
  - Thickness 11.2 mm (7/16 in.)
  - 50% reduction compared with the conventional product

Gearing Options

<table>
<thead>
<tr>
<th>Gearing Options</th>
<th>Parallel Shaft GFV Gear</th>
<th>Parallel Shaft JV Gear</th>
<th>Foot Mounted Parallel Shaft JB Gear</th>
<th>Right Angle Hollow Shaft JH Gear</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Radial Load</td>
<td>Radial Load</td>
<td>Radial Load</td>
<td>Radial Load</td>
</tr>
<tr>
<td></td>
<td>Axial Load</td>
<td>Axial Load</td>
<td>Axial Load</td>
<td>Axial Load</td>
</tr>
<tr>
<td></td>
<td>IP66</td>
<td>IP66</td>
<td>IP64</td>
<td>IP66</td>
</tr>
<tr>
<td></td>
<td>50:1 Gear Reduction; 3000 RPM at Motor</td>
<td>450:1 Gear Reduction; 3000 RPM at Motor</td>
<td>600:1 Gear Reduction; 3000 RPM at Motor</td>
<td>200:1 Gear Reduction; 3000 RPM at Motor</td>
</tr>
<tr>
<td></td>
<td>Radial (Overhang) Load</td>
<td>Radial (Overhang) Load</td>
<td>Radial (Overhang) Load</td>
<td>Radial (Overhang) Load</td>
</tr>
<tr>
<td></td>
<td>280 lb</td>
<td>1163 lb</td>
<td>1331 lb</td>
<td>772 lb</td>
</tr>
<tr>
<td></td>
<td>Axial (Thrust) Load</td>
<td>67 lb</td>
<td>154 lb</td>
<td>176 lb</td>
</tr>
<tr>
<td></td>
<td>Rated Torque</td>
<td>483 lb-in</td>
<td>3814 lb-in</td>
<td>5159 lb-in</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Product Series Comparison

<table>
<thead>
<tr>
<th>Category</th>
<th>AC Power Supply Input</th>
<th>DC Power Supply Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMU Series</td>
<td>Single-Phase 100-120 VAC</td>
<td>Single-Phase 100-120 VAC</td>
</tr>
<tr>
<td>BLE2 Series</td>
<td>Single-Phase 200-240 VAC</td>
<td>Single-Phase 200-240 VAC</td>
</tr>
<tr>
<td>BX Series</td>
<td>Three-Phase 200-240 VAC</td>
<td>Three-Phase 200-240 VAC</td>
</tr>
<tr>
<td>BLH Series</td>
<td>Single-Phase 200-240 VAC</td>
<td>Single-Phase 200-240 VAC</td>
</tr>
<tr>
<td>BLV Series</td>
<td>Three-Phase 200-240 VAC</td>
<td>Three-Phase 200-240 VAC</td>
</tr>
</tbody>
</table>

**Features**

- Easy Data Setting
- Digital Speed Display
- Panel Mounted Driver
- Simple Operation
- Quick Setup
- Easy Data Setting
- Digital Speed Display
- Stainless Steel Shaft
- Quick Setup
- Servo Control
- Variable Speed or Positioning
- Linked Operation
- High Speed Regulation
- Compact Board Driver
- Simple Operation
- Digital or Analog Driver
- Quiet Operation
- High Power
- Network Compatible
- Accepts Battery Power
- Ideal for AGV

**Output Power**

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>Power Output (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>42 mm (1.65&quot;)</td>
<td>15 W (1/50 HP)</td>
</tr>
<tr>
<td>60 mm (2.36&quot;)</td>
<td>30 W (1/25 HP)</td>
</tr>
<tr>
<td>80 mm (3.15&quot;)</td>
<td>60 W (1/12 HP)</td>
</tr>
<tr>
<td>90 mm (3.54&quot;)</td>
<td>120 W (1/6 HP)</td>
</tr>
<tr>
<td>104 mm (4.09&quot;)</td>
<td>200 W (1/4 HP)</td>
</tr>
<tr>
<td>120 mm (4.72&quot;)</td>
<td>400 W (1/2 HP)</td>
</tr>
</tbody>
</table>

**Speed Control Range**

- 80~4000 RPM
- 80~4000 RPM
- 2~4000 RPM
- 80~3000 RPM

**Gearhead Options**

- Parallel Solid Shaft
- Flat Hollow Shaft
- Right Angle Hollow Shaft

**Safety Standards**

- RoHS Complies
- IP66
- IP54
- IP65

**Maximum IP Rating**

- IP66
- IP65
- IP40

**Starting List Price**

- $300.00--
- $393.00--
- $693.00--
- $256.00--
- $557.00--

*Motor + Driver. Cable sold separately (BLV - cables included).*

**FR Flat Hollow Shaft Gearhead**

![Unsaturated Permissible Torque](chart)

![Space Saving Design](image)

*Space-saving*
AC Motors and Speed Controllers

AC motors allow simple speed control by using an inverter to change the power supply frequency (Hz) or a controller to change the power supply voltage.

The DSC Series, KISS Series, Brother gear motors, and Fuji Electric inverters (VFDs) cover speed control requirements from 6 W (1/125 HP) to 3 HP. The KISS Series is optimized for efficiency and speed control while Brother’s Mid Series AC induction motors are rated for ie3 efficiency and offers hypoid/helical gearheads with various configurations.

KISS Series 3-Phase AC Induction Motors

30 W (1/25 HP)~100 W (1/8 HP)

- **High Performance**
  Characteristics have been improved to create a high-performance motor with little speed reduction even with a large load.

  - Changes in Speed according to Load

  ![Graph showing speed vs. load for KISS Series motors](image)

- **Fanless Design**
  KISS new motor design reduced heat generation. With higher efficiency, there is less heat generation in the motor so a cooling fan on the back of the motor is no longer required. With no cooling fan, dust is not blown around.

  ![Image showing fanless design](image)

Brother AC Induction Motors

1/2 HP~3 HP

- **Premium Efficiency Series ie3**
  The new ie3 premium efficiency gear motors cost less to operate and demonstrate clear benefits when running for long periods of time (when compared to ie1 standard efficiency gear motors).

  - Benefits of using Premium Efficiency ie3, 3 Phase AC motors

  ![Graph showing cost savings with Premium Efficiency motors](image)

- **High Efficiency Hypoid / Helical Gearheads**
  Compared to commonly used worm gears, high efficiency gear motors feature Hypoid / Helical gearing technology that can maintain efficiency above 85% throughout the motor’s wide speed range.

  ![Graph showing efficiency comparison](image)
# Product Series Comparison

<table>
<thead>
<tr>
<th>Category</th>
<th>AC Power Supply Input</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product Series</strong></td>
<td><strong>KJS Series, BH Series</strong></td>
</tr>
<tr>
<td><strong>Features</strong></td>
<td>• High Torque</td>
</tr>
<tr>
<td></td>
<td>• High Speed</td>
</tr>
<tr>
<td></td>
<td>• High Efficiency</td>
</tr>
<tr>
<td></td>
<td>• Speed Stability</td>
</tr>
<tr>
<td></td>
<td>• Stainless Steel Shaft</td>
</tr>
</tbody>
</table>

## Power Supply Input

<table>
<thead>
<tr>
<th>Output Power</th>
<th>KJS Series</th>
<th>BH Series</th>
<th>Brother ie3 Mid Series</th>
<th>FPW Series</th>
<th>DSC Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/125 HP (6 W)</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>1/50 HP (15 W)</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>1/30 HP (25 W)</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>1/25 HP (30 W)</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>1/19 HP (40 W)</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>1/12 HP (60 W)</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>1/8 HP (80 W)</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>1/6 HP (100 W)</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>1/4 HP (200 W)</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>1/2 HP (400 W)</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>3/4 HP</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>1 HP</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>2 HP</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>3 HP</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
</tbody>
</table>

## Speed Control Range (Motor RPM)

<table>
<thead>
<tr>
<th></th>
<th>90 – 3600 RPM (3 – 120 Hz)</th>
<th>150 – 3600 RPM (5 – 120 Hz)</th>
<th>300 – 2400 RPM (10 – 80 Hz)</th>
<th>90 – 1600 RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed Ratio</td>
<td>40:1</td>
<td>24:1</td>
<td>8:1</td>
<td>18:1</td>
</tr>
</tbody>
</table>

## Available Options

- Round Shaft (No Gearing)
- Parallel Solid Shaft Gearhead
- Right Angle Solid Shaft Gearhead
- Right Angle Hollow Shaft Gearhead
- Electromagnetic Brake
- Terminal Box

## Safety Standards

- **RoHS**: Complies
- Maximum IP Rating: IP66
- Starting List Price: $116.00

1: 100 W Parallel shaft: 90 – 3600 RPM (3 to 120 Hz), 100 W Right angle shaft: 90 – 2400 RPM (3 to 80 Hz), 2: BH Series, IP54

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**Fuji Electric FRENIC-Mini (C2) Inverters / VFD**

The new user friendly FRENIC-Mini (C2) inverters elevates the performance of a wide range of equipment.

For use with 1/8 HP up to 3 HP Three-Phase Motors

Single-Phase 115 VAC or 230 VAC input, Three-Phase 230 VAC or Three-Phase 460 VAC input.

**Standard functions:**
- Auto-Tuning / Torque Boost
- Flexibly Remote / Local Operation
- Dynamic Torque Vector Control
- Fastest CPU in its Class
- Network Compatibility
- Efficiency Setting / Side by Side Mounting
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