

***Orientalmotor***

# SPEED CONTROL

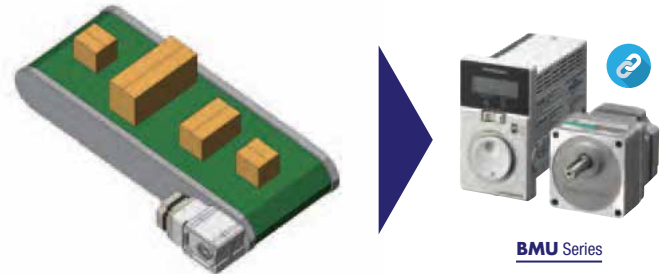


**Brushless DC Motors & AC Motors**

# Simple or Advanced Speed Control

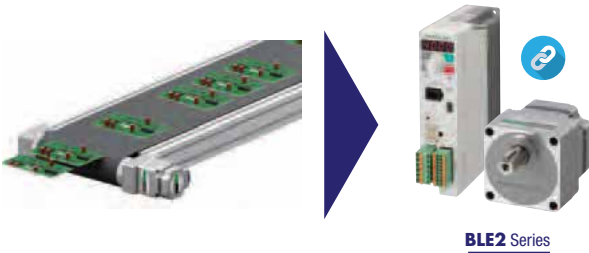
For applications where variable speeds are necessary, typically an AC motor with an inverter or brush motors are used. Brushless DC motors are an advanced option due to their wide speed range, high efficiency, closed-loop speed regulation, and long maintenance-free life. Speed can be controlled by built-in potentiometer, external analog voltage, digital setting, or by network command. Gearhead configurations to meet specific requirements, designs, and budgets are available. Common variable speed applications and their recommended motion solutions are outlined below.

## Conveyor with Variable Loads



Speed Stability can be Maintained with Flat Torque

## Conveyor with Multiple Speed Settings



Speed can be Slowed Down to Pass Through Specific Processes and Sped Up to Increase Throughput

## Torque Sensing



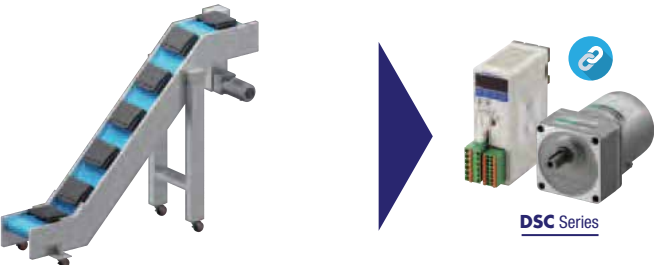
Torque Limiting Functions

## AGV & AMRs



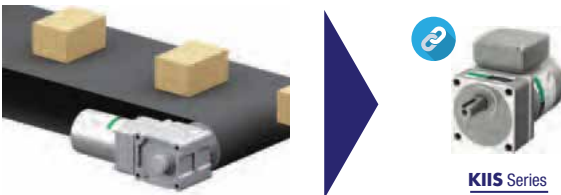
Hollow Shaft Flat Gearheads and Compact Drivers are Ideal in Low Floor Designs

## Inclined Conveyor



Deceleration Control and Electromagnetic Brake

## Conveyor with Adjustable Speed

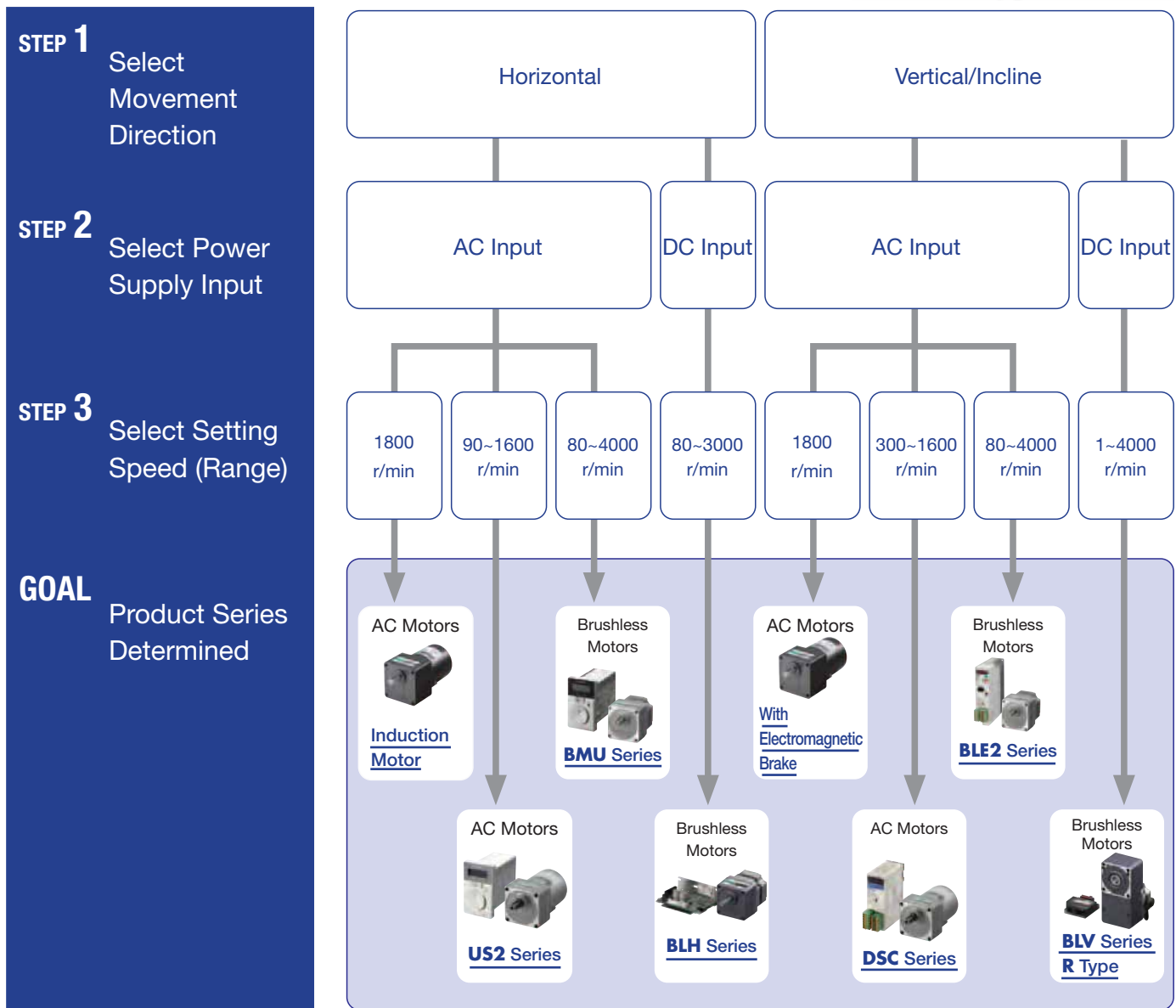
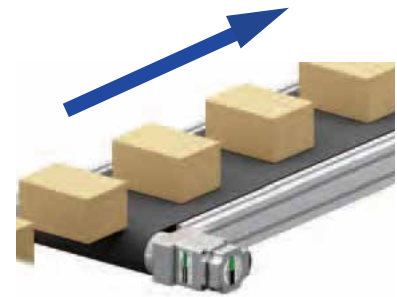


Save Space with Hollow Shaft Gearheads

# Product Selection

## Continuous Operation

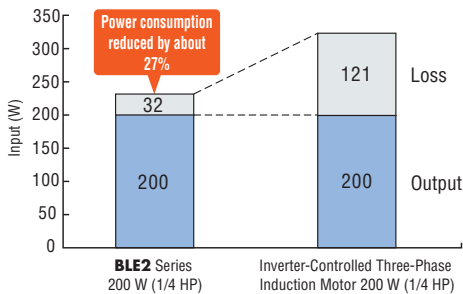
This is a product selection guide for applications that operate continuously at constant or variable speeds, such as conveyor systems.



# Choosing Between AC Motors and Brushless DC Motors

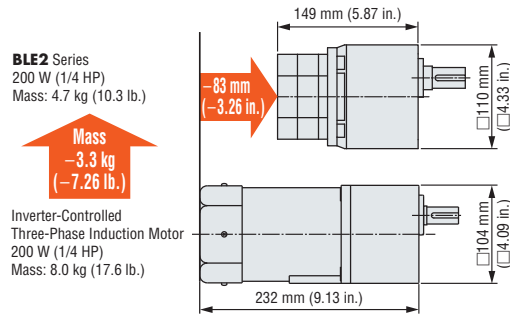
## Efficiency

Both motors experience power loss in the form of I-R losses. To minimize this loss, brushless DC motors utilize permanent magnets in the rotor, whereas AC motors require more power for electromagnetic induction.



## Size

Brushless DC motors provide high torque density due to their high efficiency. When space is limited, they serve as an excellent alternative to AC motors.

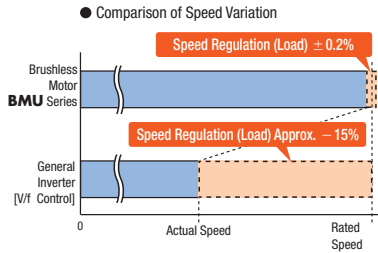


## Comparison of Speed Control Options

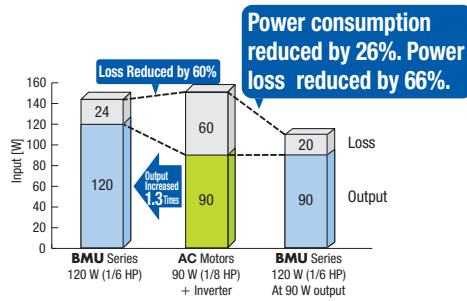
	Inverter+Three Phase Motor	Brushless DC Motor
Composition / Structure / System	<p>Three-phase induction motor + General-purpose inverter (Sold separately)</p> <p>Open-loop control</p>	<p>Sensor mounted to magnet motor (SPM type) +Dedicated driver</p> <p>The same as the servo motor except that Hall Effect IC (sensor) detects rotor position.</p> <p>Closed-loop control</p>
Control Function	Speed control with accuracy not required	Speed control (Torque control)
Rotation Speed (speed ratio)	90–3600 r/min (1:40)	80–4000 r/min (1:50)
Torque		
Motor Exterior Shape	Induction motor	The same mounting as induction motor. Length (depth on the size of motor) is very short.
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~±0.1%
Responsiveness	Low	High
Overrun	Yes, large variations	Yes, controlled
Suitable Operations	<ul style="list-style-type: none"> <li>The main use is for operation at a fixed speed</li> <li>Allows for speed adjustments</li> </ul>	<ul style="list-style-type: none"> <li>When speed changes, torque and speed are kept stable</li> <li>Multi-speed operation</li> </ul>

# Brushless DC Motors and Drivers

## Speed Stability

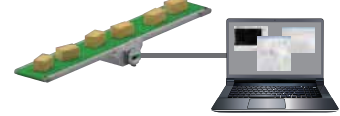


## Save Energy



## MEXEO2 Support Software

(Free Download. Available for the BLE2 Series, BXII Series, BLV Series R Type, and BLH Series)



### Features of the MEXEO2 Software:

- Teaching and Remote Operations
- I/O Testing
- Waveform Monitoring
- Alarm Monitoring
- Status Monitoring
- Multi-Monitoring Capability

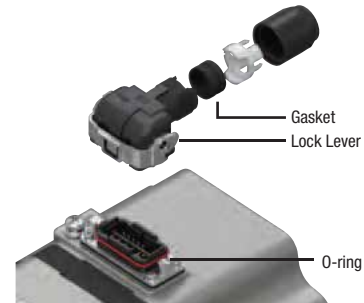
## AC Input Motor and Driver: Leading Performance



- Standardized Stainless Steel Shaft (SUS303)



- Connector Structure



- Power supply: Single-phase 100-120 or Single-phase/Three-phase 200-240 VAC
- Output power: 30 W (1/25 HP) ~ 400 W (1/2 HP)
- Parallel Shaft / Right-Angle Hollow Shaft Gearhead / Hollow Shaft Flat Gearhead / Round Shaft (no gear)
- IP66 & IP67 types available
- Digital display built into driver
- Speed control range: 80 ~ 4000 r/min
- IP66 rated H1 food grade grease type available

## DC Input Motor and Driver: High Strength



- Low Platform and Thin Design











Face surface mounting with the Flange Drive Adapter

Side-mounting with the Hollow Shaft Flat Gearhead









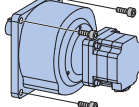


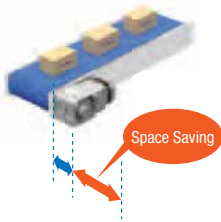
- Power supply: 24/48VDC
- Output power: **BLH Series** 15 W (1/50 HP) ~ 100 W (1/8 HP)  
**BLV Series R Type** 60 W (1/12 HP) ~ 400 W (1/2 HP)
- Parallel Shaft Gearhead / Hollow Shaft Flat Gearhead / Round Shaft (no gear)
- Compact and lightweight drivers
- Electromagnetic brake is available
- RS-485 communication is available

# Product Series Comparison

Category	AC Power Supply Input			DC Power Supply Input	
	<b>BMU Series</b>	<b>BLE II Series</b>	<b>BX II Series</b>	<b>BLH Series</b>	<b>BLV Series R Type</b>
Product Series					
Features	<ul style="list-style-type: none"> <li>• Easy Data Setting</li> <li>• Digital Speed Display</li> <li>• Panel Mounted Driver</li> <li>• Simple Operation</li> </ul>	<ul style="list-style-type: none"> <li>• Easy Data Setting</li> <li>• Digital Speed Display</li> <li>• Stainless Steel Shaft</li> </ul>	<ul style="list-style-type: none"> <li>• Servo Control</li> <li>• Speed or Position Control</li> <li>• Linked Operation</li> <li>• High Speed Regulation</li> </ul>	<ul style="list-style-type: none"> <li>• Compact Board Driver</li> <li>• Simple Operation</li> <li>• Digital or Analog Driver</li> <li>• Connector Type Motor Available</li> </ul>	<ul style="list-style-type: none"> <li>• Compact, Lightweight Driver</li> <li>• Network Compatible</li> <li>• Accepts Battery Power</li> <li>• Ideal for AGVs</li> </ul>
<b>MEXE</b> Support Software	—	●	●	●	●
Power Supply Input	Single-Phase 100-120 VAC Single-Phase 200-240 VAC Three-Phase 200-240 VAC	Single-Phase 100-120 VAC Single-Phase 200-240 VAC Three-Phase 200-240 VAC	Single-Phase 100-120 VAC Single-Phase 200-240 VAC Three-Phase 200-240 VAC	24 VDC	24/48 VDC
Output Power	15 W (1/50 HP) 30 W (1/25 HP) 60 W (1/12 HP) 120 W (1/6 HP) 200 W (1/4 HP) 300 W (2/5 HP) 400 W (1/2 HP)	— ● ● ● ● ● ●	— ● ● ● ● — ●	● ● ● ● — — —	— — ● ● ● — ●
Speed Control Range	80~4000 RPM	80~4000 RPM	2~4000 RPM	80~3000 RPM	1~4000 RPM
Speed Ratio	50:1	50:1	2000:1	37.5:1	4000:1
Speed Regulation (Load)	+/-0.2%	+/-0.2%	+/-0.05%	+/-0.2%	+/-0.01%
Speed Setting Method	Potentiometer Digital Setting Analog Setting Modbus (RTU) CANopen	Internal ● ● — —	Internal/External ● ● — —	Internal/External — ● ● ● —	— — — ● ●
Functions	<b>MEXE02</b> Digital Display Instantaneous Stop Acceleration/Deceleration Multi-Speed Operation Electromagnetic Brake for Load Holding Multi-Axis Speed Synchronization Protective Functions Accepts Sink/Source Maximum Motor Extension	— ● ● ● 16 Speeds ● ● ● ● 20 Meters	— ● ● ● 16 Speeds ● ● ● ● 30 Meters	— — ● ● 2/8 speeds ● ● — — 5 Meters	— — ● ● 256 Speeds ● ● ● ● 3.5 Meters
Extended Functions	Load Factor Speed Limits Holding Torque Speed Attainment Band	Torque/Speed Limits Holding Torque Load Factor Speed Teaching Status Monitor	Torque/Speed Limits Servo Lock Load Factor Speed Teaching Status Monitor	Torque Limiting Various Stop Modes Quiet Operation Status Monitor	Torque Limiting Low Battery Mode Vector Mode RS-485/CANopen Status Monitor
Gearhead Options	Parallel Shaft Hollow Shaft Flat Right Angle Hollow Shaft	● ● ●	● ● —	● ● —	● ● —
Safety Standards					
RoHS Directive	(RoHS)	(RoHS)	(RoHS)	(RoHS)	(RoHS)
Motor IP Rating	IP65/66/67	IP65/66/67	IP54	IP40/65	IP40/65

# Brushless DC Motor Gear Options

These gearheads can be combined with brushless DC motors and offer a wide variety of gear ratio variations and high strength types, expanding the available options.

Gearhead Type		Parallel Shaft Gearhead				Right-Angle Gearhead	Hollow Shaft Flat Gear
		<b>GFV</b> Gears <b>GFS</b> Gears	<b>JV</b> Gears	<b>JB</b> Gears	<b>CS</b> Geared Motor	<b>JH</b> Gears	<b>FR</b> Gears
External View							
Features		<ul style="list-style-type: none"> <li>Long Life, High Strength</li> <li>Output Shaft: Iron, Stainless Steel</li> </ul>	<ul style="list-style-type: none"> <li>High Gear Ratio up to 1/450</li> <li>Flange Installation</li> <li>Output Shaft: Stainless Steel</li> </ul>	<ul style="list-style-type: none"> <li>High Gear Ratio up to 1/1200</li> <li>Does not Saturate</li> <li>Permissible Torque</li> <li>Leg Installation</li> </ul>	<ul style="list-style-type: none"> <li>Increased Load-bearing Capacity (Compared to a parallel shaft gearhead)</li> <li>Center Shaft</li> </ul>	<ul style="list-style-type: none"> <li>Space Saving, Low Cost</li> <li>High Strength</li> <li>Output Shaft: Stainless Steel</li> </ul>	<ul style="list-style-type: none"> <li>Space Saving, Low Cost</li> <li>Does not Saturate</li> <li>Permissible Torque</li> </ul>
Advantages of Installation		<ul style="list-style-type: none"> <li>Install on Flange Face</li> </ul> 		<ul style="list-style-type: none"> <li>No Mounting Brackets Required</li> </ul> 	<ul style="list-style-type: none"> <li>The Output Shaft Protrudes from the Center, so Design is Easy</li> </ul> 	<ul style="list-style-type: none"> <li>Space Saving</li> <li>Can be Connected Directly to the Drive Shaft</li> </ul> 	
Output Power of Combinable Motors	AC Input	30 W, 60 W, 120 W, 200 W, 300 W, 400 W	200 W, 300 W, 400 W	200 W, 300 W, 400 W	—	60 W, 120 W, 200 W, 300 W, 400 W	30 W, 60 W, 120 W, 200 W, 300 W, 400 W
	DC Input	15 W, 30 W, 50 W, 60 W, 100 W, 200 W, 400 W	—	—	30 W, 50 W, 60 W	—	30 W, 50 W, 60 W, 100 W, 200 W, 400 W
Gear Ratio		<b>5 to 200</b>	<b>100 to 450</b>	<b>5 to 1200</b>	<b>5 to 20</b>	<b>5 to 200</b>	<b>5 to 200</b>
Rated Life		10000 hours*	5000 hours	5000 hours	10000 hours	5000 hours	10000 hours
Permissible Radial Load/ Permissible Axial Load		1400 N/400 N	3123 N/480 N	3672 N/577 N	200 N/70 N	2405 N/550 N	2040 N/800 N
Permissible Torque		70 N·m	198 N·m	518 N·m	2.9 N·m	82.8 N·m	54 N·m


\*The rated life for 15 W is 5,000 hours.

The values for permissible radial load, permissible axial load, and permissible torque are for the following operating conditions. They will vary based on the combined motor output power and gearhead gear ratio.

- Output Power : 200 W (For **CS** geared motors, values are for 50 W models.)
- Motor Shaft Speed: 3000 r/min
- Gear Ratio : Maximum gear ratio for each gearhead (Example: For **GFV** gear, the gear ratio is 200)

**Hollow Shaft Flat Gearhead**

**[Internal Gearhead Structure]**

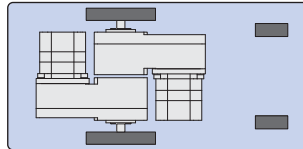


Improved gear case rigidity and larger diameters for gears and bearings lead to high permissible torque and long life.

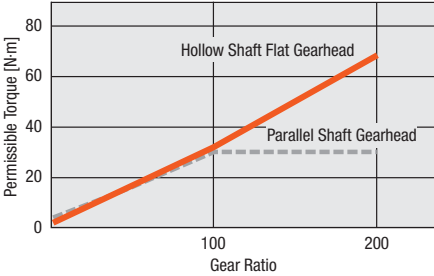
**[Characteristic Configuration]**

Wheel drive units, etc. can be arranged in a compact configuration with alternating directions.

\*Now available in smaller sizes.



**[Frame Size 90 mm]**



The graph shows that the Hollow Shaft Flat Gearhead (solid orange line) provides significantly higher permissible torque than the Parallel Shaft Gearhead (dashed grey line) across the gear ratio range of 100 to 200. At a gear ratio of 200, the Hollow Shaft Flat Gearhead can handle approximately 70 N·m, while the Parallel Shaft Gearhead can only handle about 30 N·m.



# Speed Control AC Motors & Gear Motors

## AC Speed Control Motors

Choose from a simple, user-friendly speed control package or an advanced multifunction capability package.

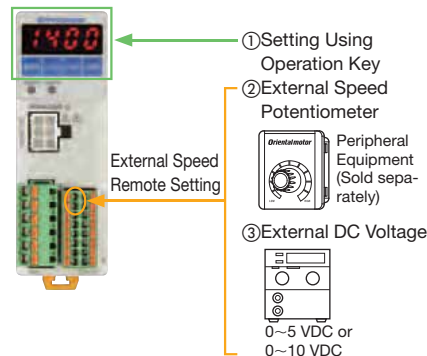
- Easy set up and wiring
- Compact speed controller
- High reliability



- **US2 Series:** Easy Operation by Turning the Dial and Pressing



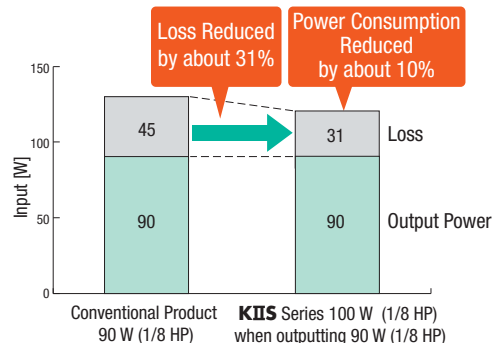
- **DSC Series:** External Speed Setting Input is Possible



## 3-Phase AC Motors for Inverters

Choose from several high-efficiency, three-phase AC motors compatible with inverters to meet your IP protection rating, power, and torque requirements.

- 30 W (1/8 HP) to 3 HP
- High strength
- Long-life



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

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



Frenic-Mini (C2) Inverters



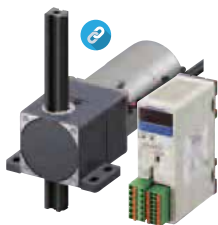
# Product Series Comparison

Category		Three-Phase AC Motors for Inverters			Speed Control AC Motor Packages	
		<b>KIIS Series</b>	<b>Brother MMD Series</b>	<b>FPW Series</b>	<b>DSC Series</b>	<b>US2 Series</b>
Product Series						
Features		<ul style="list-style-type: none"> <li>• High Torque</li> <li>• High Speed</li> <li>• High Efficiency</li> <li>• Speed Stability</li> <li>• Designed for Inverters/VFD's</li> </ul>	<ul style="list-style-type: none"> <li>• High Power</li> <li>• High IE3 Efficiency</li> <li>• Efficient Hypoid Gear</li> <li>• Electrocoat Paint</li> <li>• Stainless Steel Shaft</li> </ul>	<ul style="list-style-type: none"> <li>• Watertight</li> <li>• Dust-Resistant</li> <li>• Oil Shield Protection</li> <li>• Anti-Corrosive Epoxy Coating</li> <li>• Stainless Steel Shaft</li> </ul>	<ul style="list-style-type: none"> <li>• Easy to Use</li> <li>• Closed-Loop Control</li> <li>• Speed Setting Input by External DC Voltage</li> <li>• Speed Synchronization</li> <li>• Vertical Operation Possible with Electromagnetic Brake</li> </ul>	<ul style="list-style-type: none"> <li>• Easy to Use</li> <li>• Closed-Loop Control</li> <li>• Operate by Setting Dial</li> <li>• Simple Wiring</li> <li>• High Reliability</li> </ul>
Power Supply Input		Three-Phase 220~415 VAC	Single-Phase 115 VAC Single-Phase 220 VAC Single-Phase 230 VAC Three-Phase 208/230/460 VAC	Single-Phase 110/115 VAC Single-Phase 220/230 VAC Three-Phase 200/220/230 VAC	Single-Phase 110/115 VAC Single-Phase 220/230 VAC	Single-Phase 110/115 VAC Single-Phase 220/230 VAC
Output Power						
		1/125 HP (6 W)	—	—	●	●
		1/50 HP (15 W)	—	—	●	●
		1/30 HP (25 W)	—	—	●	●
		1/25 HP (30 W)	●	—	—	—
		1/19 HP (40 W)	●	—	●	●
		1/12 HP (60 W)	●	—	●	●
		1/8 HP (90 W)	—	—	●	●
		1/8 HP (100 W)	●	—	—	—
		1/4 HP (200 W)	●	—	—	—
		1/2 HP (400 W)	—	●	—	—
		1 HP	—	●	—	—
		2 HP	—	●	—	—
		3 HP	—	●	—	—
Recommended Speed Control Range (Motor RPM)		90~3600 RPM (3~120 Hz)*	150~3,600 rpm (5~120 Hz)	300~2,400 RPM (10~80 Hz)	90~1600 RPM	90~1600 RPM
Speed Ratio		40:1	24:1	8:1	18:1	18:1
Available Options						
		Round Shaft (No Gear)	●	—	●	●
		Parallel Solid Shaft Gearhead	●	●	●	●
		Right Angle Hollow Shaft Gearhead	●	—	●	●
		Electromagnetic Brake	●	—	●	—
		Terminal Box	●	—	—	—
Safety Standards						
RoHS Directive						
Motor IP Rating		IP20/66	IP44/65	IP67	IP20	IP20

100W Parallel shaft: 90~3,600 RPM (3 to 120 Hz)  
 100 W Right angle shaft: 90~2400 RPM (3 to 80 Hz)  
 200 W: 90~3,000 RPM (3 to 100 Hz)

## AC Speed Control Motors with Rack and Pinion Systems

Easily build a linear mechanism with the **L Series** rack and pinion system equipped with the **DSC Series** or with the **LJ Series** linear head rack and pinion mechanism attached to a **KIIS** AC motor. The use of AC speed control motors allow for speed controlled linear motion.



- Vertical movement
- 3 rack speeds available: 10, 20 or 45 mm/s
- Electromagnetic brake included
- **DSC** Series speed controller (sold separately)



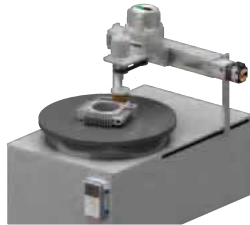
- Horizontal or vertical movement
- 200 Kg mass transportable mass
- Electromagnetic brake optional

# IP67 Degree of Protection Watertight, Dust-Resistant Motors

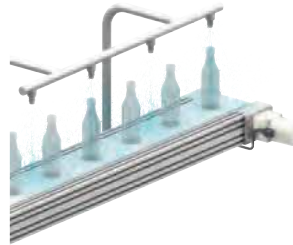
## Application Examples



Coffee Mill



Grinding/Brushing



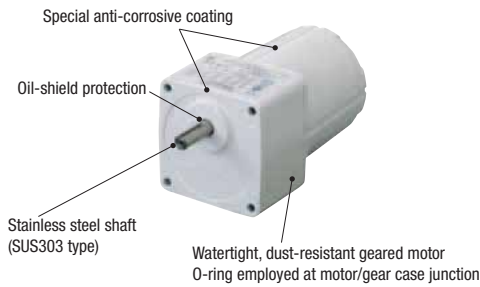
Washdown Conveyor



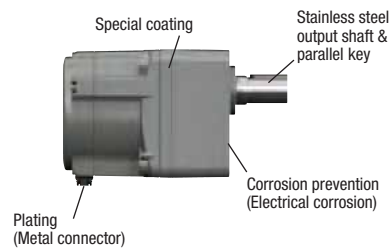
Stirring


## Structure

### FPW Series



### IP67 Brushless Motors



AC Gear Motor	<p><b>FPW Series</b></p> 	<p>Output Power: 25 W (1/30 HP) to 90 W (1/8 HP)                  Constant Speed: 1800 r/min (60 Hz)                  Use with Inverter to Control Speed</p>
Brushless DC Motors	<p><b>BMU Series</b> AC Input</p> 	<p>Output Power: 200 W (1/4 HP) to 400 W (1/2 HP)                  Speed Control Range: 80 to 4000 r/min                  Simple Set Up and Wiring                  Easy to Use                  Digital Display / Panel Mount</p>
	<p><b>BLE2 Series</b> AC Input</p> 	<p>Output Power: 200 W (1/4 HP) to 400 W (1/2 HP)                  Speed Control Range: 80 to 4000 r/min                  16 Speed Settings                  Torque Control                  Advanced Performance                  Digital Display</p>

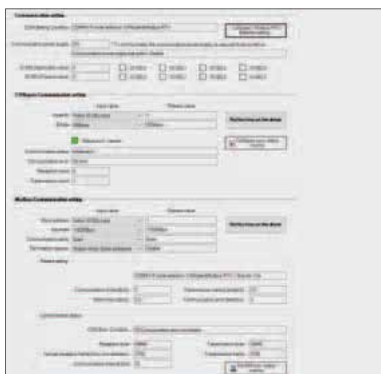
# Support Software MEXE02

The **MEXE02** support software is a universal motion control and monitor software that can be used with the brushless DC drivers from **BLE2** Series, **BXII** Series, **BLV** Series **R** Type, and **BLH** Series (digital setting and RS-485 communication types). By using **MEXE02**, data setting, actual operation, and confirmation via monitor can be performed easily on a computer. [The support software can be downloaded for free from the Oriental Motor website.](#)

## Startup Functions that Support Programming at Setup

### ●Simple Settings

Various communication settings can be made using the "Simple communication settings".



### ●Communication Frame & Status Monitoring

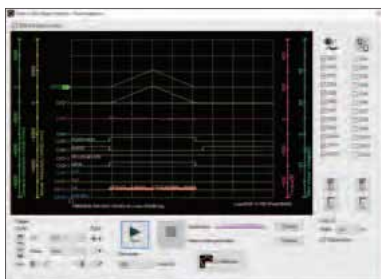
All communication frames and statuses can be monitored. This is useful for host program startup and debugging.



## Operation Functions that Support Adjustments

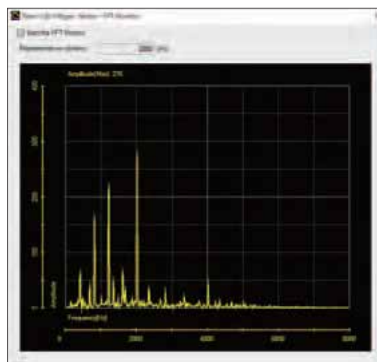
### ●Waveform Monitoring

The operating status of the motor (command speed, torque, I/O signal, etc.) can be checked like an oscilloscope.



### ●FFT Monitoring

Mechanical resonance is visualized by analyzing the frequency using FFT analysis. Noise and vibration can be reduced by adjusting the resonance suppression parameter.



### ●Gain Tuning

Motor tracking can be adjusted according to the command.



## Maintenance Functions that Support Diagnostics and Maintenance

### ●Trace Monitoring

The operating status of the motor can be continuously measured for 24 hours or longer.

### Merit

Data is saved for a long period of time, making it easy to determine the cause of a problem.



# www.orientalmotor.com

## ORIENTAL MOTOR U.S.A. CORP.

### Western Sales and Customer Service Center

Tel: (310) 715-3301

Fax: (310) 225-2594

#### Los Angeles

Tel: (310) 715-3301

#### San Jose

Tel: (408) 392-9735

### Midwest Sales and Customer Service Center

Tel: (847) 871-5900

Fax: (847) 472-2623

#### Chicago

Tel: (847) 871-5900

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