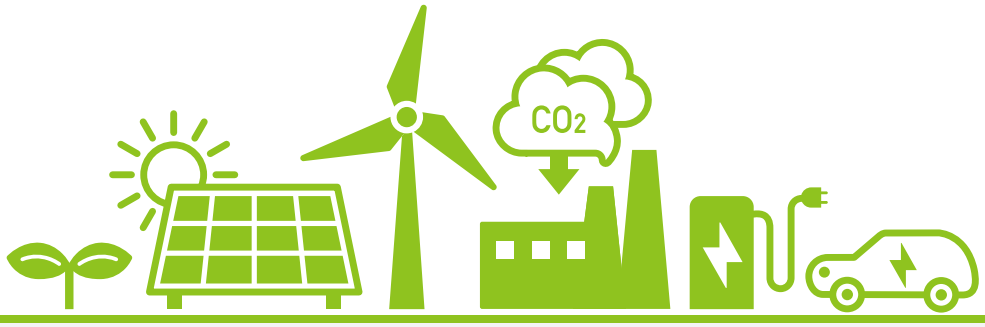
Orientalmotor

Guide to Carbon Neutrality: Getting Started

Environmental considerations related to automation are attracting more attention as major nations announce carbon neutrality policies.
Here are the Oriental Motor products and services with hints about how to start efforts to achieve carbon neutrality.



Starting with Energy Saving Motors

Reducing CO_2 Emissions with Brushless Motors

Using an energy saving motor in transport, agitation, winding, and other forms of speed regulation can reduce CO_2 emissions by lowering the power consumption. Brushless motors are small, high-efficiency speed control motors with an on-board sensor and a dedicated circuit (driver) that performs feedback control.

The Effects of Using a Brushless Motor

Annual Power Consumption (Compared at 60 W output)

	Power Consumption (kWh/year)	CO_2 Emissions (kg/year)	Electricity Costs (JPY/year)
AC Motors	439.2	228	6,588
Brushless Motor	273.6	142	4,104

- Calculated at 12 hours of drive time per day, 300 operating days per year, a power–CO_2 emissions conversion coefficient of 0.519 kg–CO_2/kWh, and electric utility rate of 15 JPY/kWh

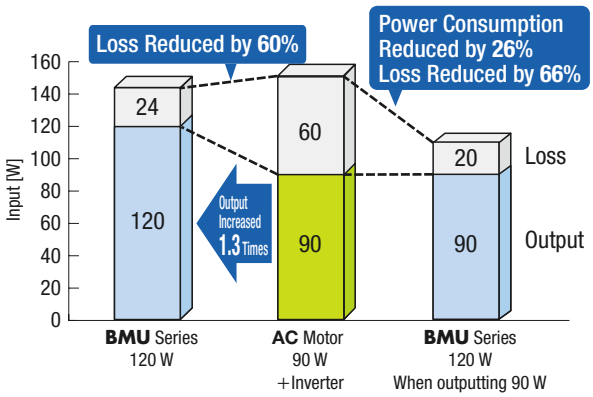
[AC Motor] Output 60 W, single-phase 200 V, 60 Hz
[Brushless Motor] **BMU** Series, output 60 W

Power Consumption Reduced by 165 kWh/year

CO_2 Emissions Reduced by 86 kg/year, or 37%

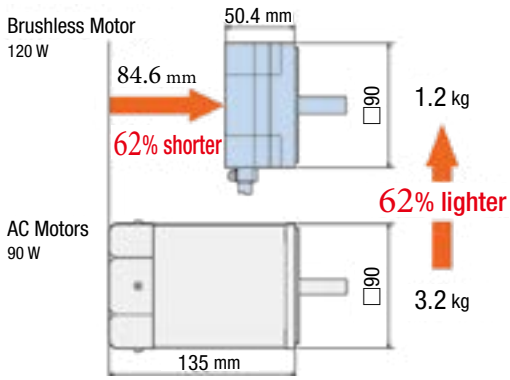
High Efficiency

Brushless motors with a built-in permanent magnet are more efficient than three-phase (induction motor) inverter control.

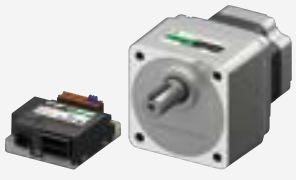


Fewer Natural Resources

Brushless motors are slim and high-power. This contributes to downsizing and a reduction in natural resources.



Learn more about brushless motors



Learn more about the new **BLV** Series **R** Type

Starting with Control Cabinets

Reduced Power Consumption with Low-Power Consumption Axial Flow Fans

Cooling fans offer adequate ventilation and air flow for the forced-air cooling of control cabinet heat sources. The **EMU** Series of EC fan achieves reduced power consumption through the use of a built-in brushless motor. With a long expected life of 60,000 hours, approximately 2.2 times longer than the conventional product, this also means fewer natural resources are consumed.

The Effects of Using the EMU Series

Annual Power Consumption (Compared at a frame size of 120 mm)

	Power Consumption (kWh/year)	CO_2 Emissions (kg/year)	Electricity Costs (JPY/year)
Conventional Product	49.9	22.6	968
EMU Series	16.9	7.6	327

- Calculated at 16 hours of drive time per day, 240 operating days per year, a power–CO_2 emissions conversion coefficient of 0.453 kg–CO_2/kWh, and electric utility rate of 19.4 JPY/kWh
- Comparison of **EMU1238** and **MU1238A-11B**

EC Fan
EMU Series

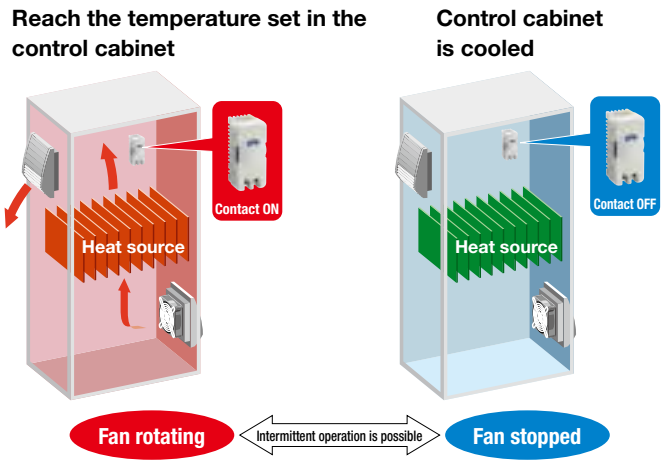
Power Consumption Reduced by 33 kWh/year

CO_2 Emissions Reduced by 15 kg/year, or approximately 66%

Use of a Thermostat to Cool Only When Necessary

By combining the cooling fan that is already in the control cabinet with a thermostat, cooling becomes more efficient.
This will stop the cooling fan when the enclosure is already cool, reducing the power consumption from the fan.

The Effects of Using a Thermostat



Annual Power Consumption (Compared at a frame size of 120 mm)

	Power Consumption (kWh/year)	CO_2 Emissions (kg/year)	Electricity Costs (JPY/year)
Cooling fan on its own	51.8	23.5	1,004
When using a thermostat	22.8	10.3	442

- Calculated at 16 hours of drive time per day, 240 operating days per year, a power–CO_2 emissions conversion coefficient of 0.453 kg–CO_2/kWh, and electric utility rate of 19.4 JPY/kWh

Fan Thermostat
AM2-XA1

<Application Example>
- Potentiometer setting (operating temperature of thermostat) 40°C
- Cooling fan **MU1428S-11** × 1
  (140 mm–28 mm thick cooling fan)
- Control cabinet size W:470×H:470×D:160 mm
- Heat generation of heat source 200 W

Power Consumption Reduced by 29 kWh/year

CO_2 Emissions Reduced by 13 kg/year, or approximately 44%

New Equipment Design Considerations

The Electrification of Air Cylinders

Oriental Motor has the αSTEP product line, featuring the **AZ** Series offering linear & rotary actuators that support the electrification and improved efficiency of air cylinder applications. The **AZ** Series not only performs speed control with high positioning accuracy, but can also control the motor's generated torque to meet the desired value (push-motion operation, etc.).

The AZ Series that Supports a Variety of Mechanisms and Operations

Compact Electric Cylinders
DR Series

Compact Electric Cylinders
DRS2 Series

Electric Cylinders
EAC Series

Rack-and-pinion Systems
L Series

Hollow Rotary Actuators
DG2 Series

Electric Grippers
EH Series

Standardized Control of Various Operations

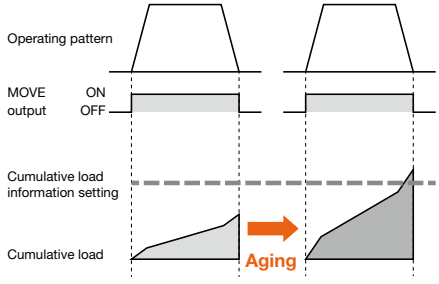
There is a full product line of drivers that are compatible with the various factory automation (FA) networks. Linear & rotary actuators with an on-board **AZ** series controller allow for control driver standardization and collective monitoring in equipment with network-compatible products.

EtherNet/IP PROFINET SSCNET III/H
Modbus(RTU) MECHATROLINK
CC-Link EtherCAT

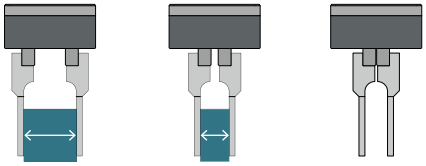
Increased Operating Ratio and Monitoring

The use of monitoring and information functions in network-compatible products increases the operating ratio of the equipment. This reduces the amount of wasted electricity caused by unexpected equipment stoppages, and also decreases a plant's total power consumption.

Example) Cumulative load monitoring
With the **AZ** Series, the cumulative load monitor allows the load factor of the motor to be grasped in terms of area and detected as a value. This is convenient when long-term changes in load due to deterioration over time or other factors need to be understood.



Example) Using a monitor for two simultaneous operations
Air cylinders need a sensor to determine the size of the load. The **EH** Series with on-board **AZ** Series uses the motor's encoder information to both identify and determine dimensions at the same time.



① OK (Within tolerance)
② NG (Out of tolerance)
③ NG (Nothing loaded)

Learn more about linear & rotary actuators

Compact and Lightweight Equipment

Oriental Motor has a wide range of products that can help make equipment and robots smaller and lighter.
More compact, lighter equipment means lower motor output, resulting in less power consumption.

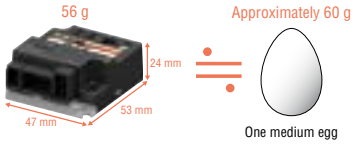
Achieving Compact and Lightweight Equipment with the Latest Drivers

Built-in Battery-free Absolute Sensor

αSTEP AZ Series mini Driver

Modular Automation-compatible Product

The **AZ** Series not only performs speed control with high positioning accuracy, but can also control the motor's generated torque to a desired value (push-motion operation, etc.). The **AZ** Series **mini** drivers have a compact design to allow mounting in tight spaces, and can be directly installed onto equipment with two screws.

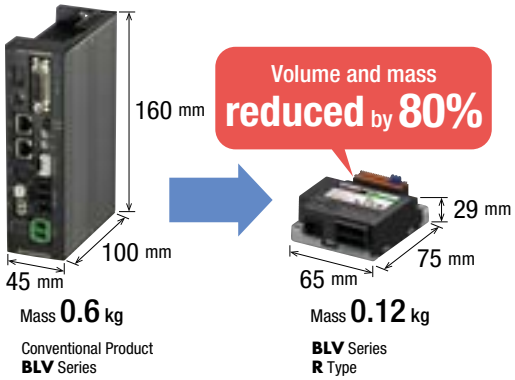


Brushless Motor

BLV Series R Type

Modular Automation-compatible Products

The **BLV** Series of brushless motors have excellent speed control.
Both the motor and driver are now much smaller and lighter in the **R** type. It fits into limited spaces within equipment. Power consumption can also be monitored.



Modular Automation Compatible Products

Modular automation compatible products are a group of products with the shared concepts of being small, lightweight, and battery-operated. They are optimal for self-propelled equipment and mobile facilities, and can help achieve flexible automation lines and mobile automation, which are seeing a growing demand.

Modular Automation Compatible Products have the Necessary Elements for Achieving Flexible Automation Equipment

- Automatically transport items without the use of a fixed conveyor.
- Configure a production line with modularized compact & lightweight equipment.
- Broaden the movement range without the need to run AC power supply lines.

The necessary elements
Battery Operated/DC Input
Lightweight & Compact

Oriental Motor
Modular Automation Compatible Products may have the solution.

Usage Example

Learn more about mobile automation

Product Use Considerations

Reduced Power Consumption with a High-torque Stepper Motor

Effectively using a high-torque motor can reduce power consumption by allowing for a smaller motor to be used or reducing the energy / current needed to perform the work. After revising the magnetic design and structure design of the **PKP** Series of stepper motors, it produces a significant amount of torque over that of conventional products of the same size. In addition, torque can be increased in the high-speed range by using bi-polar wound motors that efficiently use the full motor windings.

Stepper Motors

PKP Series (2-phase/5-phase)

Learn more about the **PKP** and **CVD** Series

There are also drivers that can maximize the performance of the **PKP** Series.

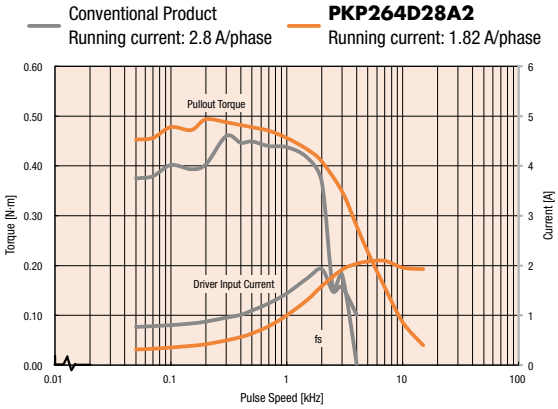
Bipolar Driver for 2-phase Stepper Motor
Driver for 5-phase Stepper Motor

CVD Series

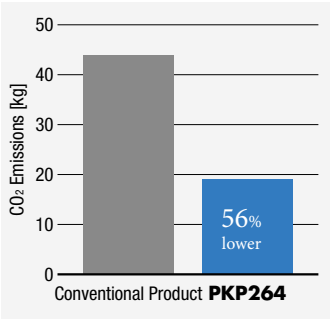
The Effects of Using the PKP Series

Comparison of Speed–Torque Characteristics and CO_2 Emissions

The high torque of the **PKP** Series can be utilized to achieve a running current with the same torque as a conventional product to reduce CO_2 emissions.



●Comparison of **PK264D28A** and **PKP264D28A2**

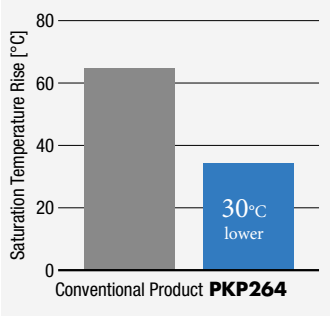


Speed	0.1 kHz (30 r/min)
Load Torque	No load
Operating time	24 hours a day, 365 days a year
Operation conditions	50% operating, 50% standby
Power Supply Voltage	24 VDC
CO_2 Coefficient	0.519 kg–CO_2/kWh

CO_2 Emissions Up to 56% lower

Comparison of Motor Temperature Rise

Temperature rise in the motor can be suppressed by lowering the running current in the **PKP** Series. This increases the life of the motor.



	Saturation Temperature Rise [°C]
Conventional Product	64.6
PKP264D28A2	34.2

Temperature Rise 30°C lower

Choosing the Optimal Product

Select the best motor when aiming for carbon neutrality by using Oriental Motor's Sizing and Selection Services

Using a motor that is over-specification can consume more power than necessary. Oriental Motor provides various sizing and selection services that can cut down the time and labor needed to select the right motor.

Motor Selection Tool

There is a Motor Selection Tool on the Oriental Motor website for selecting the best motor from the latest product lineup.

Select the Optimal Motor from a Variety of Products

Target Products
- Standard AC Motors
- Brushless Motor
- Servo Motors
- AC Speed Control Motors
- Stepper Motors/αSTEP
- Hollow Rotary Actuators

The Selection Results can be Saved and Edited in the Tool

The selection results can be retained in the tool. They can also be saved partway through, offering peace of mind.

●The online shop also offers estimate and purchase support.

Access Product Information from the Selection Results Right Away

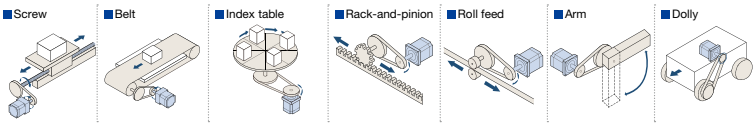
Move to product pages from the selection results to check the specifications and dimensions. The online shop also offers estimate and purchase support.

Select a motor with the Motor Selection Tool

Only three Steps to Making a Selection! Purchasing is Also Easy and Quick.

STEP1 Select the Mechanism

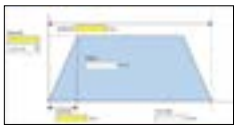
Choose from seven mechanism types. Manual calculation is also possible by entering the load torque and inertia.



STEP2 Enter the Mechanism Conditions and Operating Conditions

Mechanism conditions
Enter the necessary conditions for each mechanism, such as the dimensions and mass.

Operating conditions
Enter the necessary conditions for operation, such as travel speed, acceleration time, and travel amount.



STEP3 Choose the Product

Series function Comparison table
Products can be compared by type or features. Choose multiple products before making the final selection.

List of selection results
Finally, once the safety factor has been set, a list of the selection results is displayed.

GOAL Output and Use the Selection Results

The product models and interim calculation formulas can be printed from the selection results.

Check product information, get estimates, and make purchases

Confirm product details from the selection results. Estimates and purchases can also be made through the online shop.

Ask our Specialists

Our specialist staff can make the selection on behalf of a customer. Please submit a request through the website or contact us directly.

Hours: 9:00 am~5:00 pm (excluding weekends and holidays)

Consult with a staff member to help make the right selection when unsure.
The necessary peripheral equipment will also be introduced and explained.
Illustrations, CAD data, and equipment drawings are also supported, so requests can be made even if the mechanisms are complex.

Ask our Specialists

The Products Introduced

Brushless Motor

BMU Series

Compact, high power and a high efficiency brushless motor and controller equipped with a digital display panel and settings dial for simple operation. Easy wiring by connecting the motor and driver.

- Output 30～400 W

Brushless Motor

BLV Series R Type

Modular Automation Compatible Product

Capable of low speed operation from 1r/min, offering smooth motion, both the motor and driver are now much smaller and lighter. This contributes to the development of more compact battery-operated devices. Compatible with Modbus (RTU) and CANopen communication.

- Output: 100 W, 200 W
- Input type: 24～48 VDC

EC Fans

EMU Series

Reduced power consumption through the use of a built-in brushless motor. With support for a wide voltage range, the fans can use single-phase 100-240 VAC (50/60 Hz).

- Frame sizes 92 mm, 120 mm

Built-in Battery-free Absolute Sensor

αSTEP AZ Series mini Driver

Modular Automation Compatible Product

Featuring RS-485 communication, the **AZ** Series mini driver is smaller and lighter than traditional box-type drivers. The mini driver can also be battery-operated and drives our full line of **AZ** Series motors and linear or rotary actuators.

- Input type: 24～48 VDC

Compact Electric Cylinders

DR Series

These compact electric cylinders with a frame size of either 20 mm or 28 mm have an integrated αSTEP and ball screw to achieve linear motion.

Stepper Motors

PKP Series

A broad range of frame size are offered for the **PKP** series, from 20 mm to 85 mm. Select the motor that best meets the design specifications.

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