Orientalmotor
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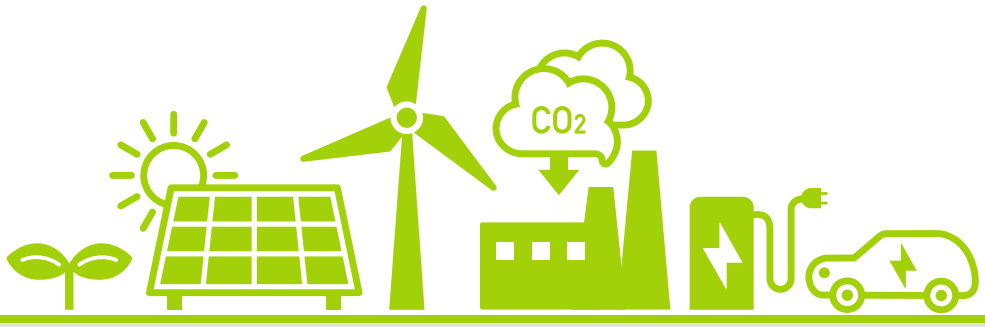
Energy Saving

with Motors and Drivers from Oriental Motor

Guide
to Energy Saving

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 tips about how to start efforts to achieve carbon neutrality.



Reduce Carbon Footprint
with Energy Saving Motors

Reducing CO_2 Emissions with Brushless DC Motors

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

The Benefits of Using a Brushless DC Motor

Annual Power Consumption (Compared at 60 W output)

	Power Consumption (kWh/year)	CO_2 Emissions (kg/year)	Electricity Costs (€/year)
AC Motor	471.96	228	125.73
Brushless DC Motor	**273.6**	**142**	**72.89**

- Calculated at 12 hours of drive time per day, 300 operating days per year, a power–CO_2 emissions conversion coefficient of 0.519 kgCO_2/kWh, and electric utility rate of 26.64 €/kWh

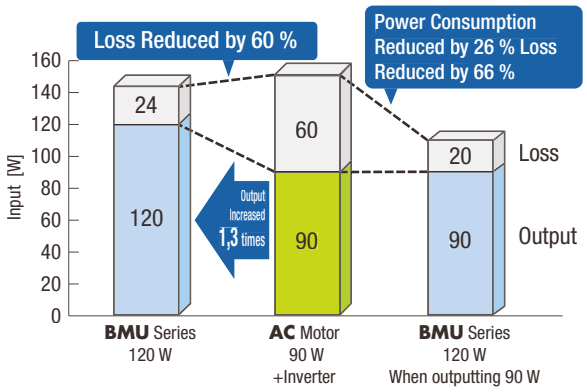
AC Motor - Output 60 W, single-phase 230 V, 50 Hz
Brushless DC Motor - **BMU** Series, output 60 W

Power Consumption Reduced by **198** kWh/year

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

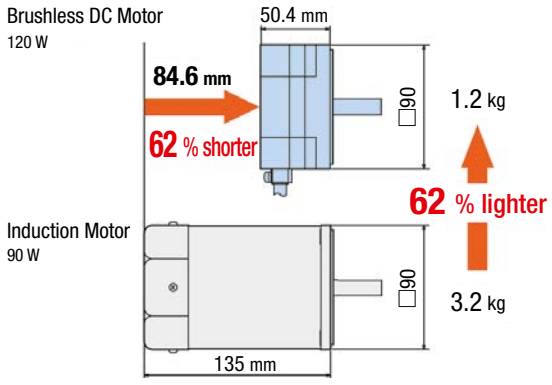
Energy Saving

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



Space Saving

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



BMU Series **BLE2** Series **BLH** Series **BLV-R** Series

Brushless DC motors

Reduce Carbon Footprint
in Control Cabinets

Reduce Power Consumption with Energy-Saving Axial Fans

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

The Benefits 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 (€/year)
Conventional Product	49.9	22.6	13.29
EMU Series	**16.9**	**7.6**	**4.50**

- Calculated at 16 hours of drive time per day, 240 operating days per year, a power–CO_2 emissions conversion coefficient of 0.453 kgCO_2/kWh, and electric utility rate of 26.64 €/kWh
- Comparison of **EMU1238** and **MU1238A-11B**

Fan
EMU Series

Power Consumption Reduced by **33** kWh/year

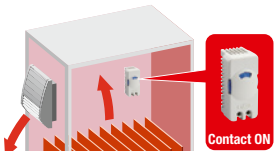
CO_2-Emissions Reduced by **15** kg/year, or approximately **66** %

Cooling on Demand with a Thermostat

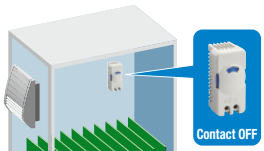
By combining the cooling fan that is already in the control cabinet with a thermostat, cooling becomes more efficient. This will stop the cooling fan when the enclosure is sufficiently cooled, reducing the power consumption from the fan.

The Effects of Using a Thermostat

High temperature threshold exceeded



Cooled to ideal temperature



Example

Fan Thermostat
AM2-XA1

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

	Power Consumption (kWh/year)	CO_2 Emissions (kg/year)
Cooling fan on its own	51.8	23.5
When using a thermostat	**22.8**	**10.3**

- Calculated at 16 hours of drive time per day, 240 operating days per year, a power–CO_2 emissions conversion coefficient of 0.453 kgCO_2/kWh

Power Consumption Reduced by **29** kWh/year

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

New Applications
Design Considerations

Oriental Motor's product line include **AZ** Series driven linear and rotary actuators, which deliver higher efficiency when used in place of pneumatic solutions. The **AZ** Series not only offers speed control with high positioning accuracy, but can also limit the torque generated by the motor so as not to exceed the desired value (push-motion operation, etc.).

The **AZ** Series Drives a wide Variety of Actuators

Compact Electric Cylinders
DR Series

Compact Electric Cylinders
DRS2 Series

Electric Cylinders
EAC Series

Rack-and-pinion Systems
L Series

Hollow Rotary Actuators
DGII Series

Electric Grippers
EH Series

Standardized Control of Various Operations

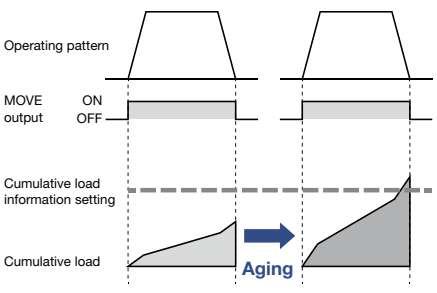
There is a full product line of drivers that are compatible with the various factory automation (FA) networks. Linear & rotary actuators with an on-board **AZ** Series controller allow for control driver standardization and collective monitoring in equipment with network compatible products.

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

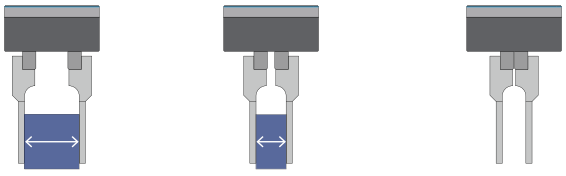
Increased Operational Safety and Monitoring

The use of monitoring and information functions in network-compatible products increases the operational safety 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: With the **AZ** Series, the cumulative load monitor makes it possible to record the load on the motor over a defined period of time. This allows long terms changes in the load due to wear or deterioration to be detected.



Example: 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.

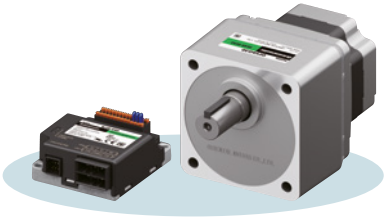


① ② **Judging the size of the piece.** You can check the position of the attachment when holding the component, and sort by size.

③ **Checking for the presence of a component.** It is possible to tell whether a piece is being held.

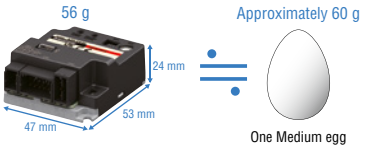
Compact and Lightweight
With high Power

αSTEP AZ Series mini Driver

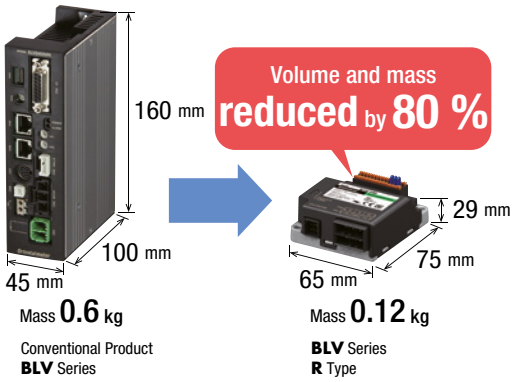


BLV-R Series

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 (pushmotion 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.



The **BLV** Series of brushless DC motors provides excellent speed control. Both the motor and driver are now much smaller and lighter in the **R** type, fitting into limited space within equipment. Power consumption can also be monitored.



For modular automation, it is important to use battery-powered, compact and lightweight products. They are ideal for the increasingly popular flexible automation systems and production lines, such as transport robots and modular production systems.

Flexible Automation Systems Concept

- Automatically transport items without the use of a fixed conveyor
- Configure a production line with modularised 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

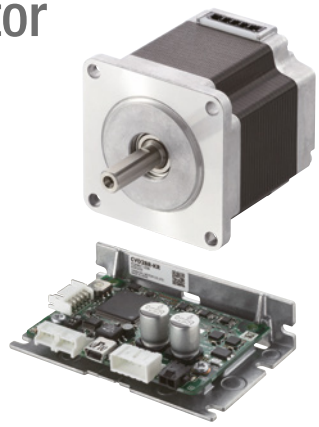
Modular Automation - Compatible Products

Usage Example

Information
On Product Use

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 bipolar wound motors that efficiently use the full motor windings.

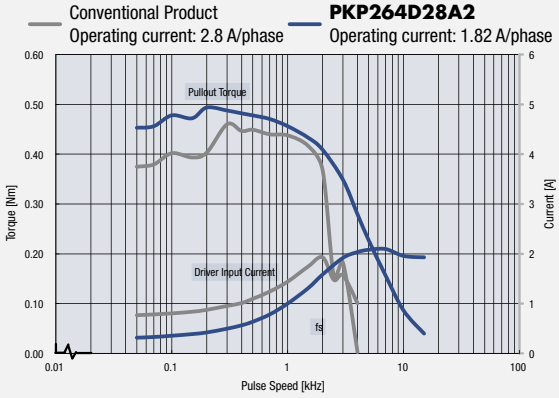


Stepper Motors
PKP Series (2-phase/5-phase)

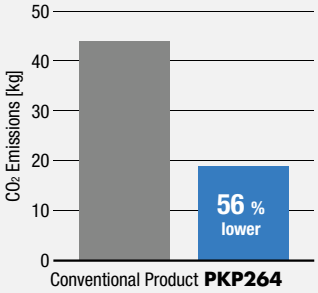
Bipolar Driver for 2-phase Stepper Motor
Driver for 5-phase Stepper Motor
CVD Series

Advantages of **PKP** Series

The high torque of the **PKP** Series deliver the same torque as a conventional product with reduced phase current, reducing CO_2 emissions.



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

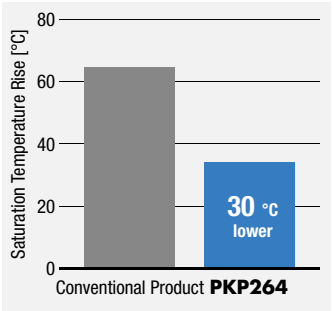


Speed	0.1 kHz (30 r/min)
Load Torque	No load
Operating time	24 hours a day, 365 days a year
Operation Conditions	50 % operating, 50 % standby
Power Supply Voltage	24 VDC
CO_2 Coefficient	0.519 kgCO_2/kWh

CO_2 Emissions Up to 56 % lower

Comparison of Motor Temperature Rise

Temperature rise in the motor can be suppressed by lowering the operating 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

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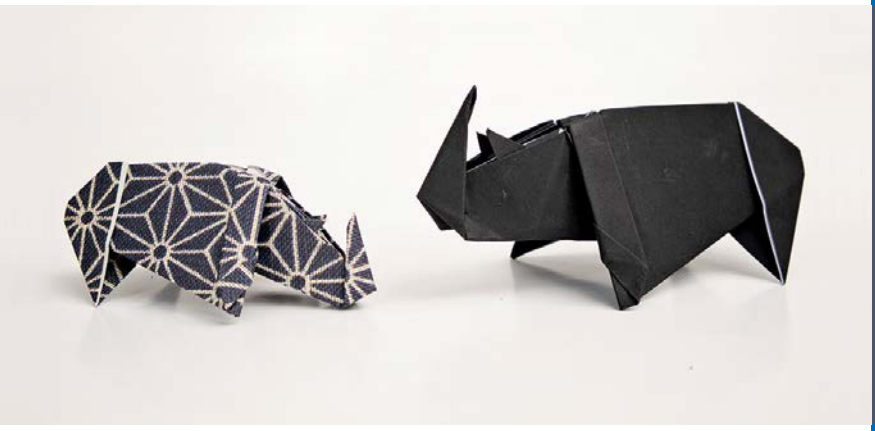

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IMPRESSUM

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