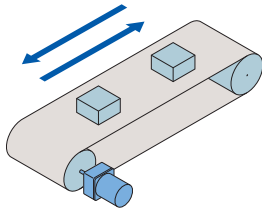


# Selection Guide By Operating Function By Basic Characteristics

## Constant Speed Operation



The motor is operated continuously and at a constant speed or operated bi-directionally such as moving the load backward after moving forward.

### Uni-directional Continuous Operation



**Induction Motors**  
Page C-21

● Three-phase high efficiency induction motors → Page C-23

### Instant Switching of Rotational Direction



**Reversible Motors**  
Page C-147

### Synchronous and Instant Switching of Rotation Direction. Instantaneous Stopping.

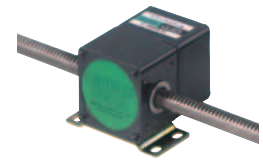
(Rotation speed is synchronized to the power supply frequency.)



**Low-Speed Synchronous Motors**  
Page C-167

### Peripheral Products

Easy Assembly of the Motor & Linear Motion Mechanism

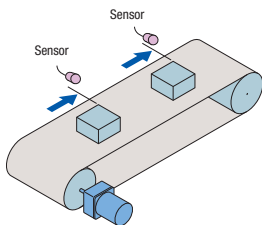


● Linear Heads ▶ Page C-185

For Greater Speed Stability, Higher Speeds, and a Wider Speed Range:

- AC Speed Control Motors
- Brushless Motors
- Servo Motors

## Constant Speed Operation + Easy Positioning



This is an operation to stop the load at the target position. To detect the load, it is necessary to install a sensor at each stop position and control it by a programmable controller, etc.

### Vertical Operation and Load Holding



**Electromagnetic Brake Motors**  
Page C-155

● Three-phase high efficiency induction motors with electromagnetic brake → Page C-23

### High-Frequency Start, Stop, Positioning, Indexing and Intermittent Inching Feeding



**Clutch & Brake Motors**  
Page C-163

### Instantaneous Stopping Motor with Specialized Circuit



**Brake Pack**  
Page C-191

### Peripheral Products

A Brushless Motor that Makes Speed and Position Control Easy

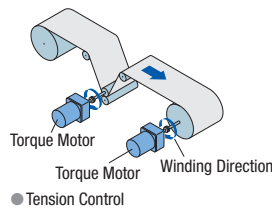


● BXII Series ▶ Page D-86

For High Accuracy Positioning

- Stepper Motors
- Servo Motors
- Linear & Rotary Actuators

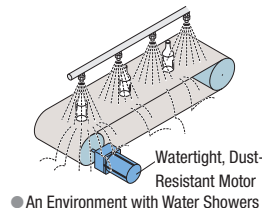
## Operation under Specific Applications or Environments



### Tension, Torque Control



Torque Motors  
Page C-171



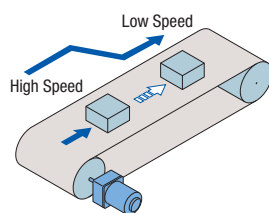
### Watertight, Dust-Resistant



Watertight, Dust-Resistant Motors  
Page C-177

This is a winding operation that must maintain constant tension or for use in an environment with splashing water, dust or a powdery substance.

## Variable Speed Operation



This is an operation to set the desired operating speed of automatic equipment.

### Easy and Affordable Speed Control of AC Motors



AC Speed Control Motors  
Page D-135

● Inverter controllable three-phase high efficiency induction motors  
→ Page C-23

### Highly Accurate Speed Stability and a Wide Speed Control Range



Brushless Motors  
Page D-11

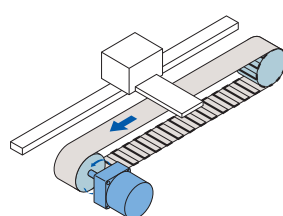
### Peripheral Products

For Further High-Speed Performance



● Servo Motors ▶ Page B-1

## High Positioning Accuracy and Fine Feed Operation



This is an operation to perform precise and accurate positioning. In this positioning operation, a toothed belt is used to configure the mechanism instead of a friction belt that may slip.

### Compact High Torque Motor for High Response Positioning



Stepper Motor and Driver Packages

*αSTEP*

AC Input Type Page A-20

DC Input Type Page A-136



Stepper Motor and Driver Packages  
(1.8°/0.9° and 0.72°/0.36°)

AC Input Type Page A-84

DC Input Type Page A-206

### Constant (Flat) Torque Characteristic from Low Speed to High Speed



Servo Motors  
Page B-1

### Peripheral Products

A Ball Screw, Hollow Table and Other Mechanisms are Incorporated in the Stepper Motor.

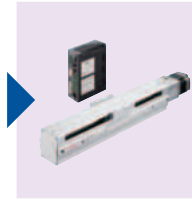


● Linear & Rotary Actuators  
▶ Page E-2

## Time-saving Ready-made Combination of Motor and Linear Motion/Rotation Components

### Transferring Loads

Ball Screw



**Electric Linear Slides**  
Page E-16

### Pushing and Pulling Small Loads or Fine-Tuning

Ball Screw



**Compact Linear Actuators**  
Page E-108

### Pushing and Pulling Loads

Ball Screw



**Electric Cylinders**  
Page E-56

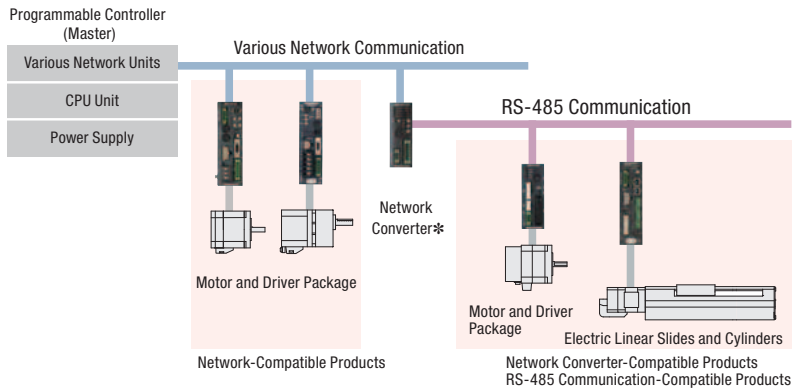
### Index Drive

Hollow Rotary Table



**Hollow Rotary Actuators**  
Page E-118

## Motor Control via Network



\*The network converter is a transducer for FA network protocol and RS-485 communication protocol used for Oriental Motor products. Network Converters → Page F-8

### Compatible Network

**Modbus** (RTU)

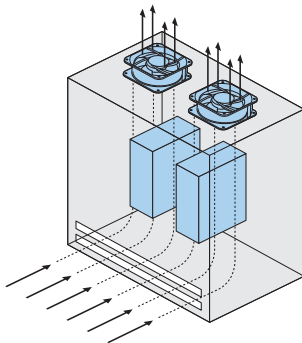
**EtherCAT**

**CC-Link**

**MECHATROLINK**

Page F-2

## Cooling Measures



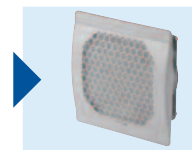
This is an operation in which cooling heat sources, drying loads or ventilation is required.

### Cooling, Drying and Ventilation



**Cooling Fans**  
Page G-2

### Optimized Cooling for Control Boxes



**Enclosure Fan Modules**  
Page G-95

### Energy Saving: Only Operates when Needed



**Thermostat**  
Page G-103

# Selection Guide By Operating Function By Basic Characteristics

Motors are classified according to their differences in basic principles of operation and their structures.

## Classification Based on Motor Characteristics

### Motors Suitable for Constant Speed

The induction motor is operated merely by connection to an AC power supply and has a rated speed of approximately 1450 r/min (60 Hz), which is constant. It is ordinarily used with a gearhead connected directly for a lower speed.

Reversible motors (30 minutes rating) are capable of instantaneous bi-directional operation. Products with electromagnetic brake on the back of the motor are also available. These motors can be equipped with a brake pack for instantaneous stopping and switching the rotation direction.

### Standard AC Motors

#### Constant Speed Motors

→ Page C-9

Induction Motors (6 W~200 W)

Reversible Motors (1 W~90 W)

Electromagnetic Brake Motors (6 W~200 W)

Clutch & Brake Motors (6 W~90 W)

Low-Speed Synchronous Motors

#### ● Motors with Other Functions

##### Torque Motors (3~20 W)

→ Page C-171

##### Watertight, Dust-Resistant Motors (25~90 W)

→ Page C-177

##### Brake Pack

→ Page C-191

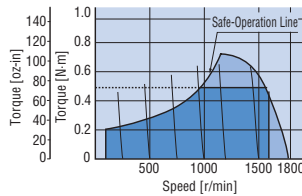
### Speed Control Motors

For motors intended for speed control, there are high-efficiency brushless motors and AC speed control motors with controllers for controlling induction motors.

### Speed Control Motors

→ Page D-1

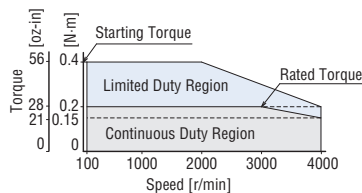
#### ● AC Speed Control Motors



Brushless Motor and Driver Packages (15 W~400 W)  
**BMU Series** **BLE Series** etc.

AC Speed Control Motor and Driver Packages (6 W~90 W) (200W)  
**DSC Series** **BHF Series**

#### ● Brushless Motors



There are differences in torque characteristics, speed control range, speed stability and motor size.

### Position Control Motors

Position control motors are compact, have a wide speed range with high torque and provide superior control.

The pulse signal from the controller (pulse generator) specifies the rotation angle and speed for accurate positioning operation. Stepper motors do not require tuning, have superior synchronization and position holding and can be used in simple system configurations. Servo motors follow up on commands, providing high speed and superior responsiveness.

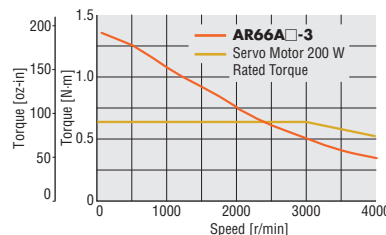
### Stepper Motors

→ Page A-1

### Servo Motors

→ Page B-1

#### ● Stepper Motor vs. Servo Motor



The stepper motor generates a high torque at low-speed range and the servo motor differs in having a flat characteristic at high-speed range. Therefore, in a positioning operation, the positioning time becomes shorter for stepper motors at short distances and shorter for servo motors at long distances (characteristics vary depending on a product).

Stepper Motor and Driver Packages  
**αSTEP**

**AR Series**

**AZ Series**

etc.

0.72°/0.36° Stepper Motor and Driver Packages

**RKII Series**

**CRK Series**

etc.

1.8°/0.9° Stepper Motor and Driver Packages

**RBK Series**

**CMK Series**

etc.

Stepper Motors (1.8°/0.9° and 0.72°/0.36°)

**PKP Series**

Servo Motor and Driver Package

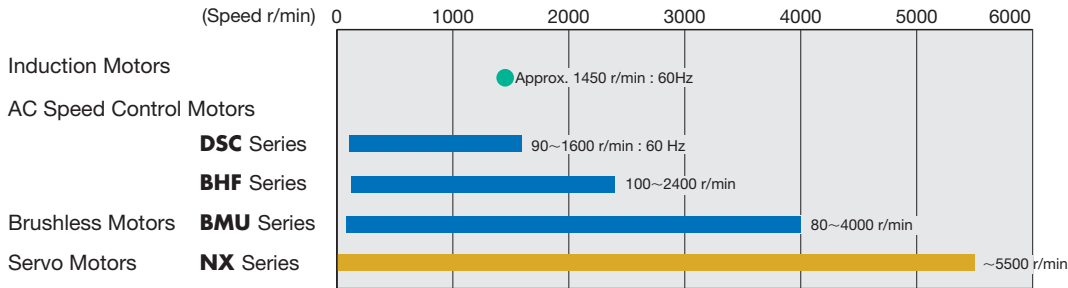
**NX Series**

Speed, speed control range, positioning function and resolution are important points in making a selection. The following explains how to select a suitable motor based on the performance using representative motors as examples.

## Motor Performance Comparison

### Speed and Speed Control Range

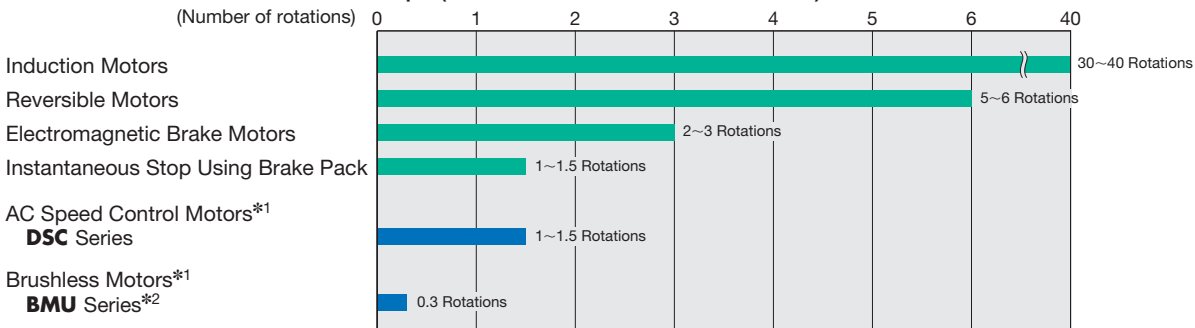
Standard AC motors (constant speed motors), such as induction motors, vary their speed according to the power supply frequency, and the rated speed is approximately 1450 r/min at 60 Hz. If the required speed exceeds 1200 r/min, select a brushless motor. If the required speed is 5000 r/min, select a servo motor.



### Stopping and Positioning Performance

An electromagnetic brake type motor, brake pack, AC speed control motor or brushless motor uses sensors to stop the load with the instantaneous stop function, and they are therefore subject to overrun (overshoot). If the equipment must perform high accuracy positioning operations, a stepper motor or servo motor offering excellent stopping accuracy is required. The stopping accuracy of stepper motors is  $\pm 0.05^\circ$  (RKII Series, No-load state). The stopping accuracy of servo motors is  $\pm 0.05^\circ$  (NX Series).

#### Number of Rotations until Motor Stops (Reference value for no-load state)



\*1 The overrun amount varies depending on the product or whether a speed reduction mechanism is equipped.

\*2 Data is for BMU Series when operated at 1500 r/min. For details, please contact the nearest Oriental Motor sales office.

#### Stopping Accuracy

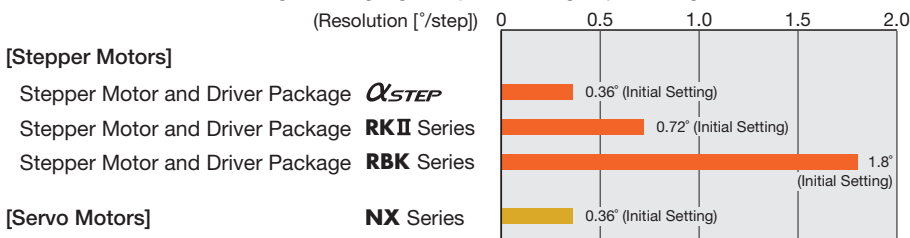
- Stepper Motors **RKII Series**:  $\pm 0.05^\circ$
- Servo Motors **NX Series**:  $\pm 0.05^\circ$

#### Note

● The above values are measured at the motor shaft under no load. Use this data only as a reference since the actual values will vary depending on the specific load condition.

### Resolution

For high-precision positioning, select a stepper motor or a servo motor. For stepper motors, Oriental Motor offers  $0.72^\circ/0.36^\circ$  and  $1.8^\circ/0.9^\circ$  stepper motor and driver packages. Compared to the  $1.8^\circ/0.9^\circ$ , the  $0.72^\circ/0.36^\circ$  stepper motor and driver packages offer higher resolution and are capable of finer positioning operation. The resolution of a  $0.72^\circ/0.36^\circ$  stepper motor and driver package is nearly equivalent to a servo motor (with their initial settings), but stepper motors generally have the basic characteristic of generating high torque in the low-speed range, and servo motors generally have the basic characteristic of generating high torque in the high-speed range. This is a factor that should be assessed when selecting a motor.



● The resolution can be changed freely. The available values and range vary depending on the product.