



Brushless Motors/ AC Speed Control Motors



Overview, Product Series D-2

Overview,
Product
Series

Brushless Motors D-11

Brushless
Motors

AC Input	BMU Series D-18
	BLE Series D-42
	BLF Series D-82
	BXII Series D-86
DC Input	BLH Series D-118

AC Input
BMU

AC Input
BLE

AC Input
BLF

AC Input
BXII

DC Input
BLH

AC Speed Control Motors D-135

AC Speed
Control
Motors

DSC Series D-138
BHF Series D-176

DSC

BHF

Accessories D-179

Accessories

Installation D-191

Installation

Product Series of Brushless Motors and AC Speed Control Motors

We have grouped together two speed control motor product lines based on function and characteristic differences. Use these as a reference for selecting the product group. Refer to the overview page for characteristics and other details.



Product Group	Brushless Motors		AC Speed Control Motors	
Page	▶ Page D-11		▶ Page D-135	
Overview	These products include permanent magnets in the motor's rotor and a built-in hall effect IC in the stator for speed detection. Speed is controlled through a driver by using feedback signals from the motor. Overview details ▶ Page D-6		● DSC Series A tachogenerator for speed detection is included in the AC motor. Speed is controlled with a speed controller by using feedback signals from the motor. Overview details ▶ Page D-8	
Series	AC Input BMU Series BLE Series BLF Series BXII Series	DC Input BLH Series	AC Input DSC Series	AC Input BHF Series

Brushless Motors and AC Speed Control Motors Selection Guide

The speed control range and performance vary and depend on the product.

This section explains the main selection points to consider in order to select an optimal product based on the characteristics and functions required in accordance with the purpose and application.

Selection by Speed Control Range and Speed Regulation

The speed control ranges and speed regulation shown below apply to the motor only.

Gearheads are available for each product, enabling you to use them for speed reduction. For details, refer to the page where each product is listed.

Series Name	Reference Page	Speed Control Range (r/min)					Speed Ratio	Speed Regulation with Respect to the Load		
		0	1000	2000	3000	4000		Speed Regulation	Conditions	
Brushless Motors	BMU Series	D-18	80~4000 r/min					50:1	±0.2%	0~Rated Torque At Rated Speed
	BLE Series	D-42	100 (80)*1~4000 r/min					40:1 (50:1)*1	±0.5% (±0.2%)*1	
	BLF Series	D-82	80~4000 r/min					50:1	±0.2%	
	BXII Series	D-86	2 (30)*2~4000 r/min					2000:1 (133:1)*2	±0.05%	
	BLH Series	D-118	100~3000 r/min					30:1	±0.5%	
AC Speed Control Motors	DSC Series	D-138	50Hz: 90~1400 r/min 60Hz: 90~1600 r/min					50 Hz: 15:1 60 Hz: 18:1	±1% (Reference Value)	0~Permissible Torque At 1000 r/min
	BHF Series	D-176	100~2400 r/min					24:1	±3%	0~Permissible Torque At 1500 r/min

*1 Specification value for digital setting

*2 Specification value for analog setting

Selection by Output Power and Frame Size

Series Name	Reference Page	Output Power							
		Frame Size 42 mm (1.65 in.)	Frame Size 60 mm (2.36 in.)	Frame Size 70 mm (2.76 in.)	Frame Size 80 mm (3.15 in.)	Frame Size 90 mm (3.54 in.)		Frame Size 104 mm (4.09 in.)	
Brushless Motors	BMU Series	D-18		30 W (1/25 HP) 60 W*1 (1/12 HP)		60 W*2 (1/12 HP)	120 W (1/6 HP) 200 W*1 (1/4 HP)	200 W*2 (1/4 HP)	
	BLE Series	D-42		30 W (1/25 HP)		60 W (1/12 HP)	120 W (1/6 HP)		
	BLF Series	D-82		30 W (1/25 HP)		60 W (1/12 HP)	120 W (1/6 HP)	200 W (1/4 HP)	400 W (1/2 HP)
	BXII Series	D-86		30 W (1/25 HP)		60 W (1/12 HP)	120 W (1/6 HP)	200 W (1/4 HP)	400 W (1/2 HP)
	BLH Series	D-118	15 W (1/50 HP)	30 W (1/25 HP)		50 W (1/15 HP)	100 W (1/8 HP)		
AC Speed Control Motors	DSC Series	D-138		6 W (1/125 HP)	15 W (1/50 HP)	25 W (1/30 HP)	40 W (1/19 HP)	60 W (1/12 HP)	90 W (1/8 HP)
	BHF Series	D-176						200 W (1/4 HP)	

*1 Round shaft type

*2 Combination type

Overview,
Product
Series

Brushless
Motors

AC Input
BMU

AC Input
BLE

AC Input
BLF

AC Input
BXII

DC Input
BLH

AC Speed
Control
Motors

DSC

BHF

Accessories

Installation

Selection by Speed Setting Methods

Series Name	Reference Page	Speed Setting Method				External DC Voltage	
		Digital Setting	Potentiometer Setting				
			Internal Speed Potentiometer	External Speed Potentiometer	Built-in Potentiometer		
Brushless Motors	BMU Series	D-18	●			●	
	BLE Series	D-42	○*	●	●		●
	BLF Series	D-82	●		●	●	●
	BXII Series	D-86	●	●	●		●
	BLH Series	D-118		●	●		●
AC Speed Control Motors	DSC Series	D-138	●		●		●
	BHF Series	D-176		●	●		●

*Possible when a control module or data setting software (sold separately) is used.

Selection Based on Functions

Series Name	Reference Page	Speed Control Motor Function Comparison						
		For displaying the speed	For stopping the motor quickly	For softening shock during starting and stopping	For operation at multiple speeds	To change motor speed in vertical operation	To use alarm output	
		Digital Speed Indicator	Instantaneous Stop	Acceleration and Deceleration Operation	Multistep Speed-Change Operation	Load Holding/Gravitational Operation	Alarm Output	
Brushless Motors	BMU Series	D-18	●	●	●	4 Speeds	●	
	BLE Series	D-42	○*1*2	●	●	2 Speeds (8 speeds*2)	● Electromagnetic Brake Type	●
	BLE Series RS-485 Communication Type	D-42	○*3	●	●	16 Speeds	● Electromagnetic Brake Type	●
	BLF Series	D-82	●	●	●	8 Speeds		●
	BXII Series	D-86	●	●	●	16 Speeds	● Electromagnetic Brake Type	●
	BLH Series	D-118	○*1	●	●	2 Speeds (Internal/external switching)		●
AC Speed Control Motors	DSC Series	D-138	●	●	●	4 Speeds	● Electromagnetic Brake Type	●
	BHF Series	D-176	○*1	●	●	2 Speeds (Internal/external switching)	● Electromagnetic Brake Type	●

*1 Possible when an accessory speed indicator (**SDM496**) is used.

*2 Possible when a control module or data setting software (sold separately) is used.

*3 Possible when connecting to the host system.

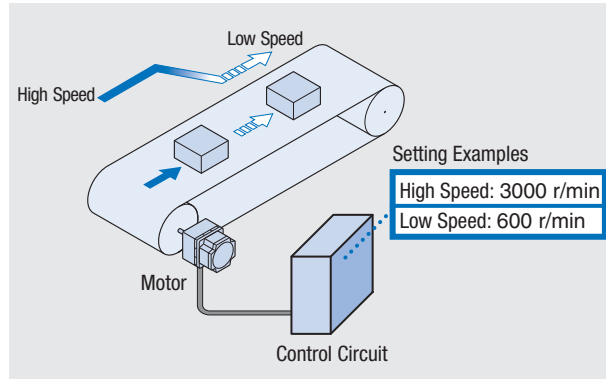
Overview of Brushless Motors and AC Speed Control Motors

Brushless Motors and AC Speed Control Motors are motors that allow for the speed to be changed. There are two types of Oriental Motor speed control motors including brushless motors and AC speed control motors.

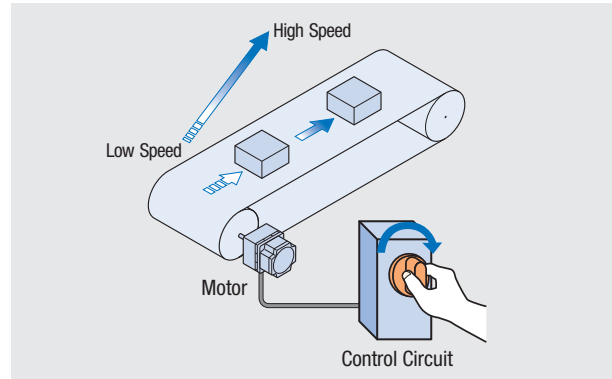
Overview and Features

Motors that Allow for Speed Changes

By combining a control circuit with the motor, speed changes can be performed. These motors are optimal for switching between high speed and low speed operation and for arbitrary adjustment of speed.





Setting multiple speeds and switching speeds



Arbitrarily adjusting the speed

Product Line

The speed control motors are divided into two groups of products.

	To understand the structure and features of speed control motors in detail	To select the optimal product for the purpose and application	To compare the specifications and functions of each product
Brushless Motors  Drivers Brushless Motors	Overview of Brushless Motors → Page D-6	Speed Control Motors Selection Guide → Page D-3	Product Line of Brushless Motors → Page D-12
AC Speed Control Motors  Speed Controllers Speed Control Motors	Overview of AC Speed Control Motors → Page D-8		Product Line of AC Speed Control Motors → Page D-136

Overview, Product Series

Brushless Motors

AC Input BMU

AC Input BLE

AC Input BLF

AC Input BXII

DC Input BLH

AC Speed Control Motors

DSC

BHF

Accessories

Installation

Brushless Motors

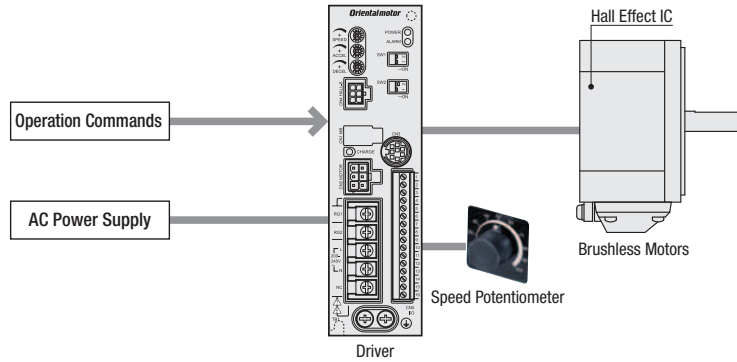
Overview of Brushless Motors

With brushless motors, there is no brush and commutator, which is an advantage of Brushless Motors.

DC Brush motors rotate by means of a brush and commutator, so maintenance for these parts must be performed regularly. However, brushless motors rotate using signals detected by a hall effect IC (magnetic sensor), which means they are maintenance-free.

System Configuration

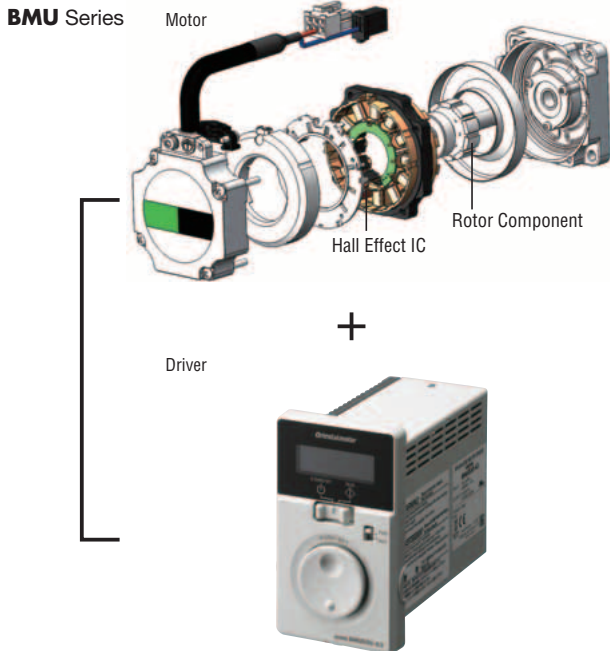
Driving is performed by a motor equipped with a built-in hall effect IC for detecting speed that is combined with a driver (control circuit). The motor speed is set using a speed potentiometer, external DC voltage or a control module.



Structure

Brushless motors use permanent magnets in the rotor of three-phase motors. In addition, on the inside of the stator, there is a built-in hall effect IC (magnetic sensor) that detects magnetic field changes with the permanent magnets.

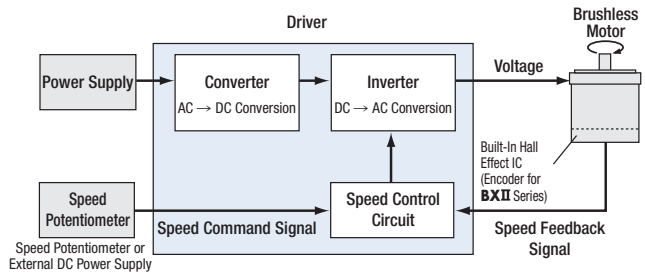
The feedback signals from the hall effect IC of the motor are compared with the setting speed by the driver and the motor speed is adjusted.



Control Block Diagram

The speed feedback signal from the built-in hall effect IC in the motor is compared with the speed command signal set with a speed potentiometer or other devices in the driver.

The comparison result is sent to the inverter. The inverter adjusts the voltage applied to the motor and controls the motor speed.

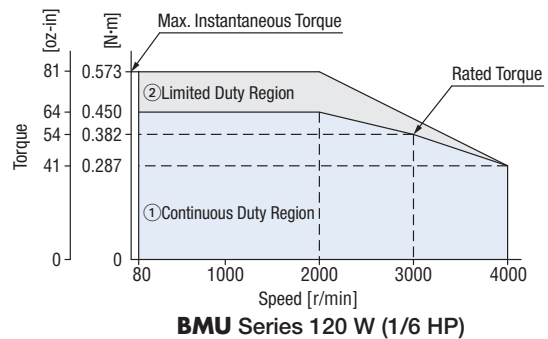


Speed – Torque Characteristics

Brushless motors can operate continuously with a constant torque from low speed to rated speed. In addition, if within the rated torque, these motors rotate at a stable speed even when the load size changes.

With brushless motors, there is a continuous duty region (①) where continuous duty is possible and a limited duty region (②). The limited duty region can be used for acceleration torque when starting an inertial load.

If operation continues for five seconds or more in this region, the overload protective function activates and the motor is stopped.

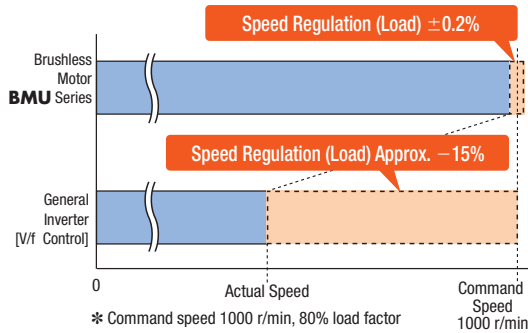


Features of Brushless Motors

● Excellent Speed Stability

Brushless motors compare the setting speed with the speed feedback signals from the motor at all times and adjust the motor's applied voltage. For this reason, even if the load changes, stable rotation is performed from low speed to high speed. With inverter-controlled (V/F control) three-phase induction motors, feedback control is not performed, so the speed will drop significantly when the load increases. Brushless motors are recommended for applications where speed stability is important.

● Comparison of Speed Variation at 80% Load Factor (Reference value)*



Speed regulation (load) for each model is as shown below. The level to which the speed changes when the load changes from 0 to rated torque is shown.

Series Name	Speed Regulation with Respect to the Load	
	Speed Regulation	Conditions
BMU Series	$\pm 0.2\%$	0~Rated Torque At rated speed
BLE Series	$\pm 0.5\%$	
BXII Series	$\pm 0.05\%$	
BLH Series	$\pm 0.5\%$	

● Wide Speed Control Range

Brushless motors have a wider speed control range than AC speed control motors and inverters.

Unlike AC speed control motors, the torque at low speed is not limited, so brushless motors are suited to applications that require a constant torque from low speed to high speed.

Product Group	Speed Control Range*	Speed Ratio
Brushless Motors (For BMU Series)	80~4000 r/min	50:1
Inverter-Controlled Three-Phase Induction Motors	200~2400 r/min	12:1
AC Speed Control Motors	50 Hz: 90~1400 r/min	15:1
	60 Hz: 90~1600 r/min	17:1

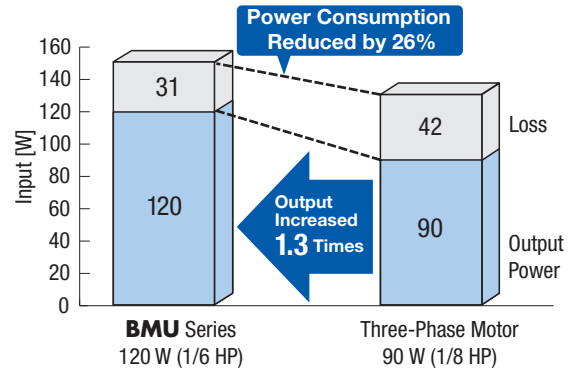
*The speed control range varies depending on the product.

● Contributes to Energy Savings

Brushless motors, which incorporate permanent magnets in the rotor, generate little secondary loss from the rotor.

This allows for power consumption to be reduced by approximately 26% compared with inverter-controlled three-phase induction motors*. This contributes to energy savings.

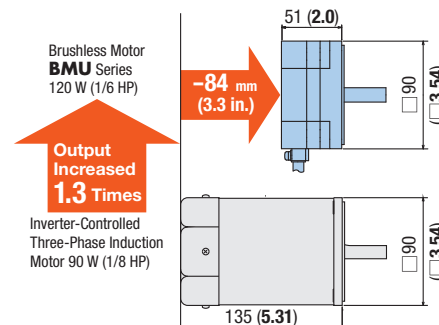
*When Output Power is 90 W (1/8 HP)



● Compact yet Powerful

Brushless motors have slim bodies and provide high power due to permanent magnets being used in the rotor. For example, the overall length is 84 mm (3.3 in.) shorter and the output power is 1.3 times higher than that of three-phase induction motors with a frame size of 90 mm (3.54 in.).

Using brushless motors can contribute to downsizing.



● Protective Functions and Alarm Output

These motors are equipped with various protective functions including the overload protective function and overvoltage protective function. An alarm is output if a protective function activates.

● Conforms to Major Standards



Each brushless DC motor series consists of products conforming to the UL, CSA and EN Standards and that also affix the CE Marking.

Overview,
Product
Series

Brushless
Motors

AC Input
BMU

AC Input
BLE

AC Input
BLF

AC Input
BXII

DC Input
BLH

AC Speed
Control
Motors

DSC

BHF

Accessories

Installation

AC Speed Control Motors

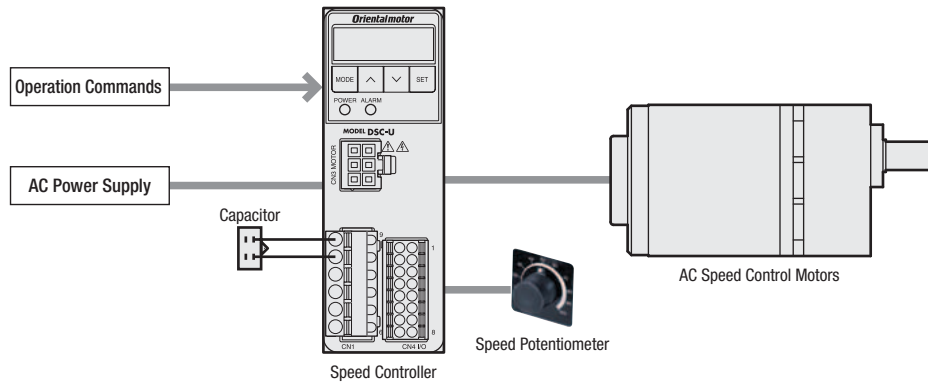
Overview of DSC Series

AC speed control motors are motors that include an induction motor or reversible motor equipped with a tachogenerator (AC generator) for speed detection. By combining these motors with a dedicated control circuit (speed controller), speed changes can be performed. A broad lineup of AC motors that can easily be used for speed control is available.

System Configuration

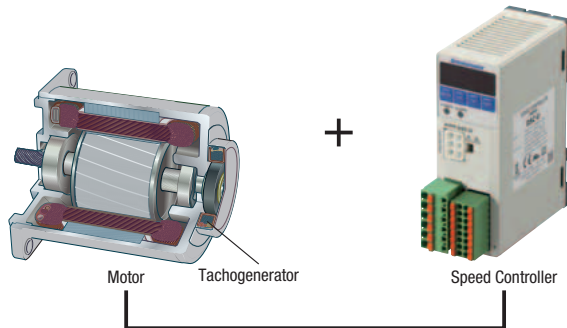
Driving is performed by a motor equipped with a tachogenerator (AC generator) for speed detection combined with a speed controller (control circuit).

The motor speed is set using a speed potentiometer or external DC voltage.



Structure

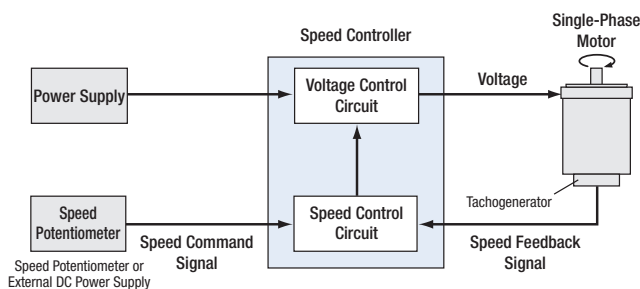
AC speed control motors are equipped with a tachogenerator (AC generator) on the back of the motor. The feedback signals from the tachogenerator are compared with the setting speed with the speed controller and the motor speed is adjusted.



Control Block Diagram

The speed feedback signals from the tachogenerator assembled in the motor are compared with the speed command signal set with a speed potentiometer or other device in the speed controller.

The comparison result is sent to the voltage control circuit. The voltage control circuit adjusts the voltage applied to the motor and controls the motor speed.

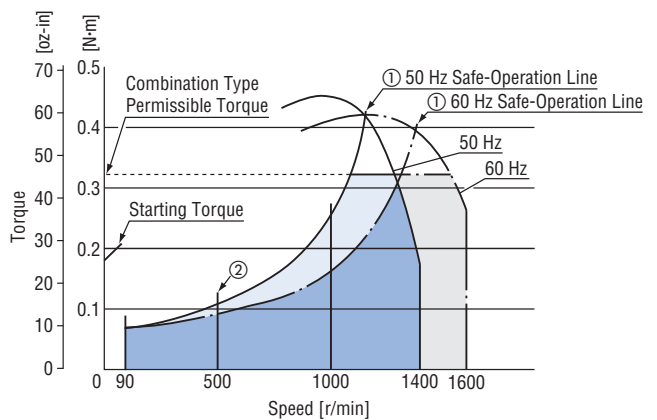


Speed – Torque Characteristics

With AC speed control motors, rated operation* is possible if operation is in the range below the safe-operation line (①) shown in the figure below.

If the load torque changes in relation to the speed set, the motor speed will also change. The speed change related to each setting speed is shown with the vertical lines (②) in the characteristics diagram.

*Induction motors have a continuous rating and reversible motors have a 30 minute rating.



Overview of BHF Series

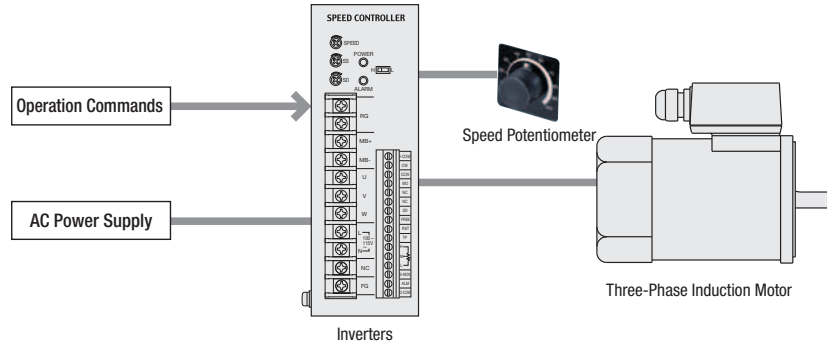
Inverters are control circuits that control the power supply frequency and voltage applied to three-phase induction motors in order to control speed. By setting the optimal settings the torque is guaranteed when an inverter is combined with a motor from Oriental Motor.

System Configuration

Driving is performed with an inverter combined with a constant speed three-phase induction motor.

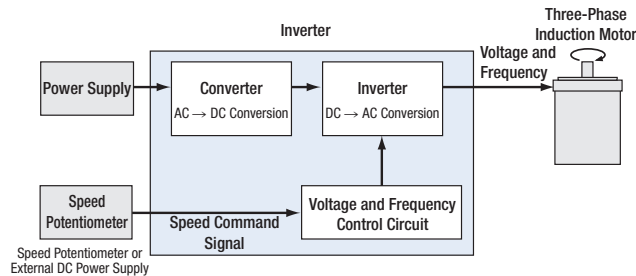
The motor does not contain speed detection or feedback functions.

The motor speed is set by using a speed potentiometer or external DC voltage.



Control Block Diagram

The inverter changes the voltage and frequency supplied to the motor in accordance with the speed command set with the speed potentiometer or other device in order to control the speed.



Features of BHF Series

Requires No Parameter Setting

Optimal settings are established in accordance with each of the output characteristics of three-phase induction motors. For this reason, immediate use without any difficult parameter settings is possible.

Maximized Motor Performance

Motor performance can be maximized over a wide speed control range from low speed to high speed. In addition, torque during continuous use is guaranteed.

Overview, Product Series

Brushless Motors

AC Input BMU

AC Input BLE

AC Input BLF

AC Input BXII

DC Input BLH

AC Speed Control Motors

DSC

BHF

Accessories

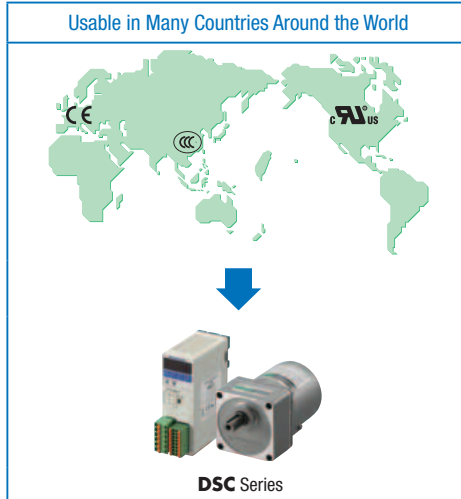
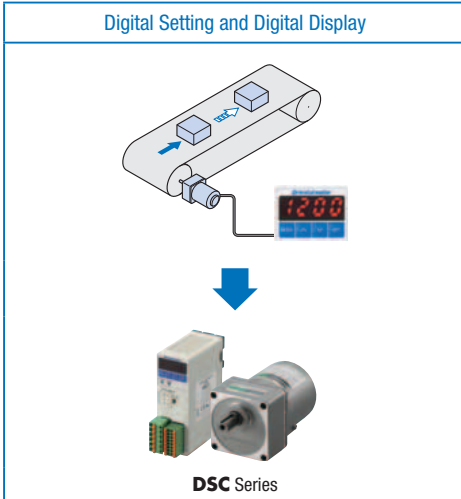
Installation

■ Features

● Extensive Product Line

The Digital Setting and Display Capabilities of the **DSC** Series.

The **DSC** Series features an extensive motor lineup for use with various applications. It conforms to standards and supports power supply voltages used in many countries around the world.



● Simple and Easy to Use Functions

Standard AC motors have won extensive loyalty for many years for their performance and quality as well as ease of use. AC speed control motors retain performance, quality, ease of use and are equipped with the functions necessary for speed control.

