

Brushless DC Motor Systems				AC Motor Systems		
AC Input		DC Input		BHF	ES	US
BX	FBL II	AXU	AXH			

Before Using a Speed Control System

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Installation Conditions

Install the motor, gearhead and control circuit (driver, speed control pack, control unit) in a location that meets the following conditions. Use in a location that does not satisfy these conditions could damage the products.

- Indoors (this product is designed and manufactured to be installed within another device.)
 - Ambient temperature
14°F~104°F (-10°C~+40°C) (nonfreezing), [for some motors, 14°F~122°F (-10°C~+50°C) or 32°F~122°F (0°C~+50°C)]
For the control circuit, the ambient temperature range varies with each product. Refer to the pages where each product is listed.
 - Ambient humidity 85% max. (noncondensing)
 - Not exposed to explosive, flammable or corrosive gas
 - Not exposed to direct sunlight
 - Not exposed to dust
 - Not exposed to water or oil
 - Place where heat can escape easily
 - Not exposed to continuous vibration or excessive impact
 - Installation Category II, Pollution Degree 2, Class I Equipment
- * Only for the products that are certified by EN/IEC standards and conform to EN/IEC standards.
Installation Category III, Pollution Degree 3 for some products

Connecting Gearheads to Motors

For connecting gearheads to motors, see page A-220.

Mounting Motor/Gearhead to Machinery

Following is an example of how to install a motor and gearhead in machinery.

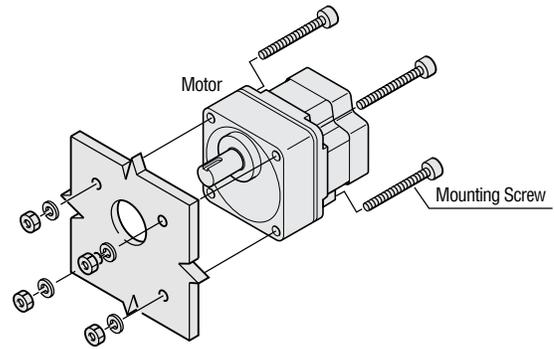
◆ For AXU Series, ES01/ES02 (Speed Control Motor World K Series) and US Series

Refer to page A-220 (GN Type and 5GU□KA Type)

For mounting brackets (accessory), refer to page A-204.

◆ For BX Series, FBLI Series, AXH Series, ES01/ES02 (Speed Control Motor V Series) and BHF Series

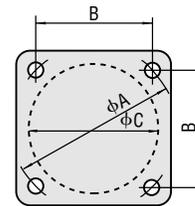
The BX Series, FBLI Series, AXH Series and BHF Series are combination types in which the motor and gearhead are pre-assembled. Use the mounting screws provided to mount to the device.



Dimensions of Mounting Holes

The dimension of the four motor mounting holes is shown as pitch diameter in the dimensions of each product.

The distance between the mounting holes is shown in the table below.



Motor Frame Size inch (mm)	inch φA (mm)	inch B (mm)	inch φC (mm)
□1.65 (□42)	1.89 (48)	1.336 (33.94)	1.4803 (37.6)
□2.36 (□60)	2.76 (70)	1.949 (49.50)	2.1260 (54)
□2.76 (□70)	3.23 (82)	2.283 (57.98)	2.5197 (64)
□3.15 (□80)	3.70 (94)	2.617 (66.47)	2.8740 (73)
□3.54 (□90)	4.09 (104)	2.895 (73.54)	3.2677 (83)
□4.09 (□104)	4.72 (120)	3.341 (84.85)	3.7008 (94)

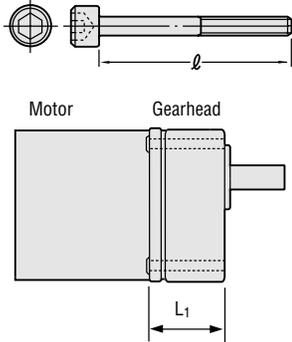
● **Mounting Method for Attaching the Load**

→ Page A-221

● **Dimensions of Included Screws**

◆ **BX Series, FBL II Series, AXH Series and BHF Series**

The screw shown below is included with the motor.



Combination Type Model	Gear Ratio	Gearhead L1 inch (mm)	Screws (included) (4 washers and hexagonal nuts are included)		Size
			ℓ [inch (mm)]	Size	
BX230 AXH230	5~20	1.65 (42)	1.97 (50)	M4 P0.7	
	30~100	1.81 (46)	2.17 (55)		
	200	2.01 (51)	2.36 (60)		
BX460 AXH450	5~20	1.93 (49)	2.56 (65)	M6 P1.0	
	30~100	2.13 (54)	2.76 (70)		
	200	2.32 (59)	2.95 (75)		
BX5120 AXH5100	5~20	2.17 (55)	2.95 (75)	M8 P1.25	
	30~100	2.68 (68)	3.54 (90)		
	200	2.91 (74)	3.74 (95)		
BX6200 BX6400	5~200	3.23 (82)	3.94 (100)	M8 P1.25	
FBL575 FBL5120	5~20	2.17 (55)	2.95 (75)	M8 P1.25	
	30~100	2.68 (68)	3.54 (90)		
	200	2.91 (74)	3.74 (95)		
BHF62 □ T -□ BHF62 □ MT -□		3.27 (83)	3.94 (100)	M8 P1.25	

AXU Series are included with gearheads. Refer to page A-223 for details.

■ **Control Circuit Installation**

● **Attaching the Control Circuit to a Machine**

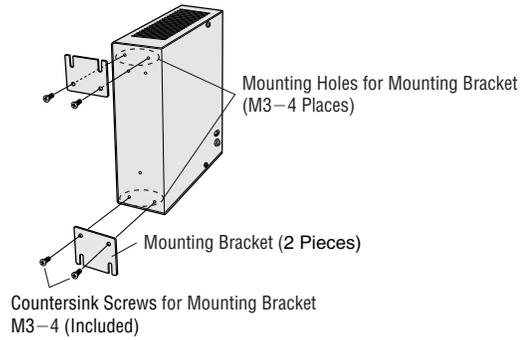
When installing the driver, speed control pack, control unit, and other control circuits in the device, use the mounting brackets and screws provided.

(DIN rail mounting plates are also available as an accessory. Refer to Page A-217 for details.)

Note:

When attaching the driver in an enclosed space such as a control box or somewhere close to a heat-radiating object, vent holes should be used to prevent the driver from overheating. If the ambient temperature listed in the installation conditions for the control circuit is exceeded, use forced air cooling with a fan.

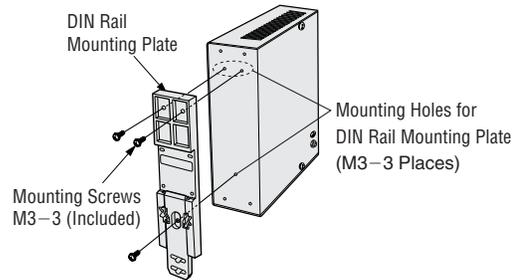
◆ **BX Series**



Note:

- The mounting holes on the back of a driver must only be used for installation.
- Use the mounting screws included when installing the mounting bracket. To improve ventilation, mount the driver in an upright position as shown in the figures above.

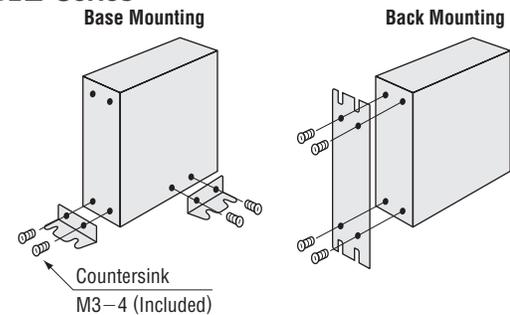
Mounting DIN Rail Mounting Plate



Note:

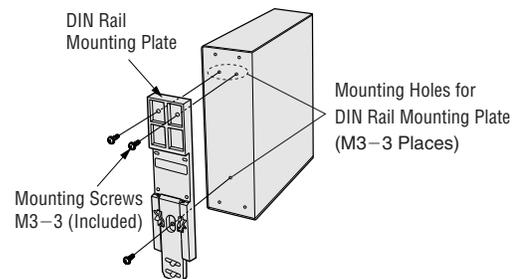
- The mounting holes (M3-3 places) on the back of a driver must only be used for installing a DIN Rail Mounting Plate.
- Use the mounting screws included when installing the DIN Rail Mounting Plate.

◆ **FBL II Series**



To improve ventilation, mount the driver in an upright position as shown in the figures above.

Mounting DIN Rail Mounting Plate

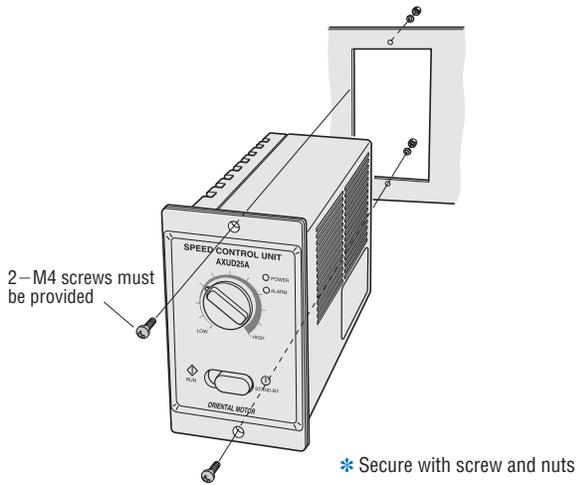


Note:

- The mounting holes (M3-3) on the back of a driver must only be used for installing a DIN Rail Mounting Plate.
- Use the mounting screws included when installing the DIN Rail Mounting Plate.

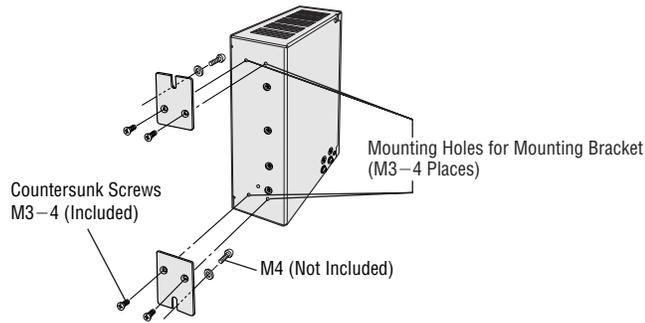
◆ **AXU Series and US Series**

Secure the control unit, using the mounting holes, so that there are no gaps between the metal plate and the control unit.

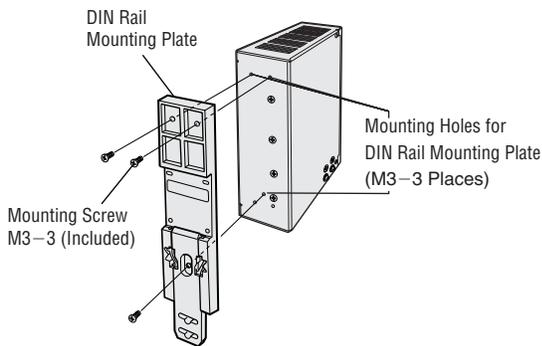


◆ **BHF Series**

For attaching to devices, obtain M4 mounting screws.



Mounting DIN Rail Mounting Plate



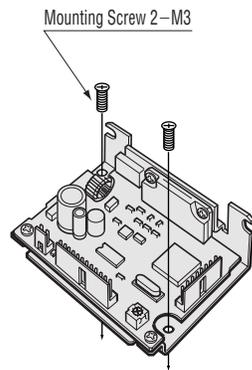
Note:

The mounting holes (M3-5 places) on the back of a speed control pack must be used only for installing a mounting bracket and DIN Rail Mounting Plate. Use the mounting screws included when installing the mounting bracket to a speed control pack. To improve ventilation, mount the driver in an upright position as shown in the figure above.

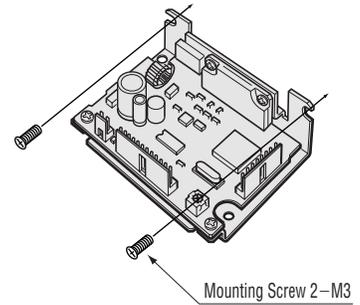
◆ **AXH Series**

To attach the driver to other devices, obtain M3 mounting screws.

Using Mounting Holes on Circuit Board



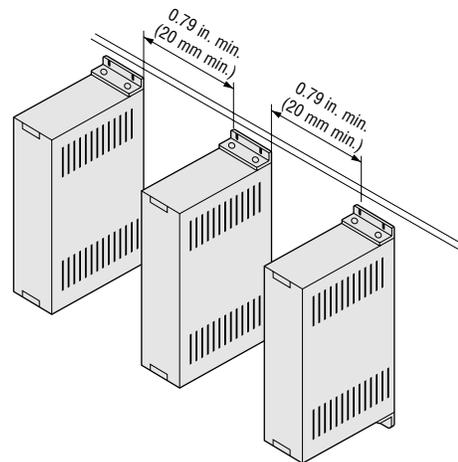
Using Mounting Holes at the Back



● **Method for Mounting Two or More Drivers**

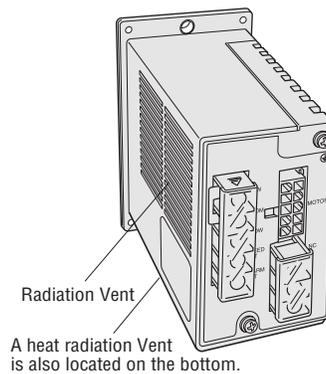
When mounting two or more drivers, separate them by a space of at least 0.79 in. (20mm) due to the ambient temperature rises due to the temperature rise of the control circuit itself.

Also, leave at least 0.98 in. (25mm) of space between the driver and other devices or structures.



◆ **AXU Series**

When you want to mount the control unit inside a housing, mount it so that one of two control unit heat radiation vents faces downward.



Mount the control unit 0.98 in. (25mm) or more away from the housing and other equipment inside the housing in the horizontal direction, and 1.97 in. (50mm) or more away in the vertical direction.

◆ AXH Series

Mount the driver 0.79 in. (20mm) or more away from the housing and other equipment inside the housing in the horizontal direction, and 1.97 in. (50mm) or more away in the vertical direction.

When installed in a device, the ambient temperature depends on the situation. Do not exceed the ambient temperature mentioned in the installation conditions.

■ Ambient Temperature and Temperature Rise in Motor

The ambient temperature and the rise of the motor temperature are limiting parameters for the suitability of a motor in a given application.

Ambient Temperature

Use motors at ambient temperatures between 14°F (−10°C) and 104°F (+40°C) [14°F~122°F (−10°C~+50°C) or 32°F~122°F (0°C~+50°C) for some motors]. When used at temperatures outside of this range, an additional rise in temperature caused by motor operation may lead to deterioration of the motor wiring insulation or may drastically shorten the operating life of the ball bearings. Also, low ambient temperatures result in problems, primarily with starting characteristics. The friction torque of the motor increases with the decrease in viscosity of gearhead and ball bearing lubricants resulting in a slower ramp up of the motor or failure of the motor to start.

Temperature Rise in Motor

When a motor is operating, all energy losses of the motor (losses from copper or iron etc.) are transformed into heat, causing the motor temperature to rise.

The point of the highest motor temperature rise is the windings. For this reason, the maximum permissible temperature of the windings is stated in the EN/IEC, UL, CSA standards for the given type of insulation materials. Oriental Motor motors employ Class A insulation*, whose maximum permissible temperature of the windings is 221°F (105°C). In actually using a motor, keep the temperature of the motor case below 194°F (90°C), considering the difference in temperature between the motor case and windings.

* In addition to Class A insulation, some of the motors have Class B insulation 266°F (130°C).

Although the motor case may become very hot while the motor is in operation, in some cases as high as 194°F (90°C), this does not indicate a malfunction. Take precautions against heat before touching the motor, and avoid accidents by keeping flammable materials away from the motor.

■ How to Use a Gearhead

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■ Handling the Motor

● Handling

It is ideal to carry the product in its original package. When handling a motor during test or installation, hold the body of the motor so that the output shaft points upward. Also, when the product is removed from the package for installation and placed on a shelf, it is safer to place the motor upright with the shaft pointing upwards so that it cannot strike other motors.

The lead wires are insulated and securely fixed to the stator and the case mechanically. They can, therefore, withstand a certain degree of tension applied to them. However, lifting the product by the lead wires may cause them to break, or may damage the insulation or result in some other potentially hazardous situation. Be sure to hold the body.

● Storage

Temperature and humidity are important considerations if the motor is to be stored for an extended period of time between the purchase and assembly.

Storage in places where there are large temperature and humidity variations will reduce the stator's insulation performance.

Moreover, leaving the motor for extended periods in places with high temperature and humidity is likely to lead to grease deterioration and corrosion inside the ball bearing. When storing for long periods, it is therefore recommended to coat the output shaft with an anti-corrosion agent, seal the motor in a polyethylene bag and store in a place with normal temperature and humidity.