

Brushless Motors/AC Speed Control Motors

Installation

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

Installation

Installation

Handling the Motor

Handling

Always carry the motor by placing it in the original package. If the motor must be carried by itself during testing or for assembly into equipment, take note of the following points:

- Hold the motor so that the output shaft points upward.
- Hold the motor not by its output shaft or motor cable, but by the motor body.

Storage

Temperature and humidity are important considerations since the storage condition has an influence on the life of motors. 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 inside the ball bearing and corrosion. When storing for long periods, it is 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.

Installation Conditions

Install the motor, gearhead and control circuit in a location that meets the following conditions. Use in a location that does not satisfy these conditions could damage the product.

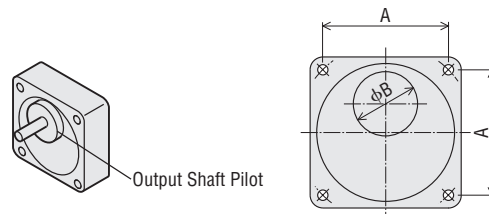
- Indoors (This product is designed and manufactured to be installed within another device.)
- Ambient temperature: As this varies by product, please confirm on the individual product page.
- Ambient humidity: 85% or less (non-condensing)
- Not exposed to explosive, flammable or corrosive gases
- Not exposed to direct sunlight
- Not exposed to dust
- Not exposed to water, oil or other liquids
- A place where heat can escape easily
- Not exposed to continuous vibration or excessive impact
- Installation Category III, 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 II, Pollution Degree 3 for some products

Gearhead and Motor Installation

Dimensions of Mounting Holes

For Parallel Shaft Gearhead, Round Shaft Type

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



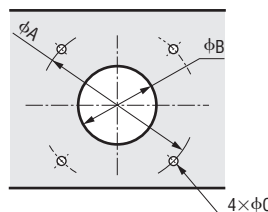
Unit: mm (in.)

Motor Frame Size	A	B
□42 (□1.65)	33.94 (1.336) [31 (1.220)]*1	16 (0.63)
□60 (□2.36)	49.50 (1.949)	24 (0.94)
□70 (□2.76)	57.98 (2.283)	30 (1.18)
□80 (□3.15)	66.47 (2.617)	34 (1.34)
□90 (□3.54)	73.54 (2.895)	34 (1.34), 36 (1.42), 40 (1.57)*2
□104 (□4.09)	84.85 (3.341)	42 (1.65)
□110 (□4.33)*3		

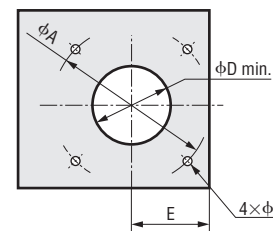
- *1 Figures in brackets [] indicate the dimensions for the geared type.
- *2 The dimensions vary depending on the product.
- *3 Figures in brackets [] indicates the frame size for the gearhead.
- B indicates the dimensions for the output shaft pilot of the gearhead. Open mounting holes +1 mm (0.039 in.) or more.

For Hollow Shaft Flat Gearhead

Front Face



Rear Face



Mounting Hole Dimensions

Unit: mm (in.)

Gearhead Product Name	GFS2G□FR	GFS4G□FR	GFS5G□FR	GFS6G□FR
Nominal Bolt Size	M5	M6	M8	M8
phi A	70 (2.76)	94 (3.70)	104 (4.09)	120 (4.72)
phi B	34 ^{+0.039} ₀ (1.3386 ^{+0.0015})	38 ^{+0.039} ₀ (1.4961 ^{+0.0015})	50 ^{+0.039} ₀ (1.9685 ^{+0.0015})	58 ^{+0.046} ₀ (2.2835 ^{+0.0018})
phi C	5.5 (0.217)	6.5 (0.256)	8.5 (0.335)	—
phi D	25 (0.98)	30 (1.18)	35 (1.38)	42 (1.65)
E	29 (1.14)	39 (1.54)	44 (1.73)	57 (2.24)

- A number indicating the gear ratio is entered where the box □ is located within the product name.

Note

- When installing the hollow shaft flat gearhead from the rear face, provide dimension "E" to prevent the mounting plate from contacting the motor.
- The **GFS6G□FR** does not come with hexagonal nuts. Provide hexagonal nuts separately or drill tapped holes in the mounting plate.

● Mounting the Load

◇ For Parallel Shaft Gearhead, Round Shaft Type

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◇ For Hollow Shaft Flat Gearhead

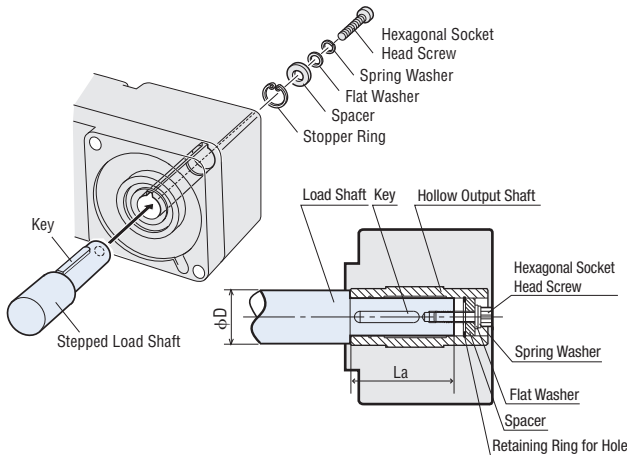
- Install the load shaft to the hollow output shaft by aligning the center of the hollow shaft with that of the load shaft.
- The hollow output shaft has a key slot. Machine a matching key slot on the load shaft and use the supplied key to affix the two shafts across the slots.
- If the motor is intended to receive large impacts due to frequent instantaneous stops or carry a large radial load, use a stepped load shaft.

Note

- When installing the load shaft to the hollow output shaft, be careful not to damage the hollow output shaft or bearing.
- To prevent seizure, apply a coat of molybdenum disulfide grease on the exterior surface of the load shaft and interior surface of the hollow output shaft.
- Do not attempt to modify or machine the hollow output shaft. Doing so may damage the bearing and cause the hollow shaft flat gearhead to break.

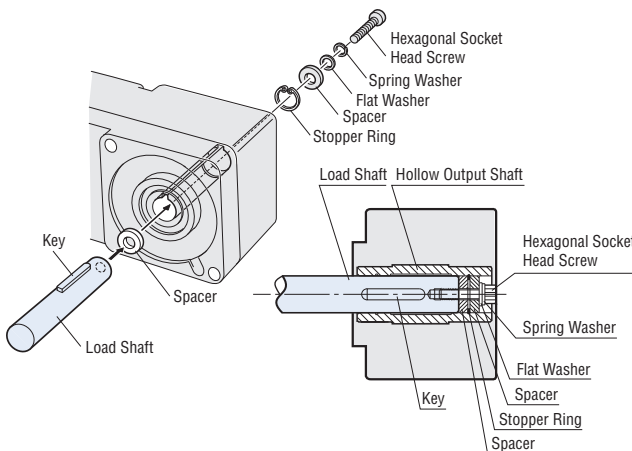
● Stepped Load Shaft

Install a hexagonal socket head screw over a stopper ring, spacer, flat washer and spring washer to affix the load shaft.



● Straight Load Shaft

Install a hexagonal socket head screw over a stopper ring, spacer, flat washer and spring washer, with a spacer also inserted underneath the load shaft, and tighten the screw to affix the load shaft.



● A number indicating the gear ratio is entered where the box □ is located within the product name.

Recommended Load Shaft Installation Dimensions

Unit: mm (in.)

Gearhead Product Name	GFS2G□FR	GFS4G□FR	GFS5G□FR	GFS6G□FR
Inner Diameter of Hollow Shaft	$\phi 12^{+0.027}_{-0.0011}$ ($\phi 0.4724^{+0.0011}$)	$\phi 15^{+0.027}_{-0.0011}$ ($\phi 0.5906^{+0.0011}$)	$\phi 20^{+0.033}_{-0.0013}$ ($\phi 0.7874^{+0.0013}$)	$\phi 25^{+0.033}_{-0.0013}$ ($\phi 0.9843^{+0.0013}$)
Recommended Tolerance of Load Shaft	$\phi 12^{0}_{-0.018}$ ($\phi 0.4724^{0}_{-0.0007}$)	$\phi 15^{0}_{-0.018}$ ($\phi 0.5906^{0}_{-0.0007}$)	$\phi 20^{0}_{-0.021}$ ($\phi 0.7874^{0}_{-0.0008}$)	$\phi 25^{0}_{-0.021}$ ($\phi 0.9843^{0}_{-0.0008}$)
Nominal Diameter of Stopper Ring	$\phi 12$ ($\phi 0.47$), C-shaped	$\phi 15$ ($\phi 0.59$), C-shaped	$\phi 20$ ($\phi 0.79$), C-shaped	$\phi 25$ ($\phi 0.98$), C-shaped
Applicable Screw	M4	M5	M6	M8
Spacer Thickness*1	3 (0.12)	4 (0.16)	5 (0.20)	6 (0.24)*2 3 (0.12)*3
Outer Diameter of Step Part ϕD	20 (0.79)	25 (0.98)	30 (1.18)	40 (1.57)
Length of Stepped Shaft La	39~40 (1.54~1.57)	42~44 (1.65~1.73)	51~53 (2.01~2.09)	71~73 (2.80~2.87)

*1 Determine the spacer thickness in conformance with the table. If the spacer is thicker than the specified dimension, the screw will project from the surface and interfere with the safety cover.

*2 For the front face installation

*3 For the rear face installation

- Screws or other parts used to install the load shaft are not included. They must be purchased separately.

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Accessories

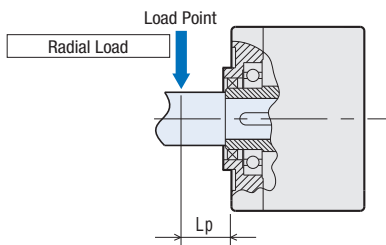
Installation

● Permissible Radial Load Calculation

The formula for permissible radial load varies depending on the mechanism.

◇ When End of Shaft being Driven is Not Supported by a Bearing

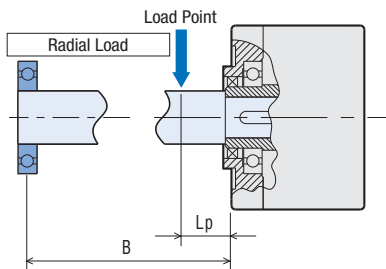
This mechanism experiences the highest amount of radial load. The stepped type is recommended for the load shaft.



F₀ [N (lb.)] : Permissible Radial Load at the Flange-Mounting Surface
 L_p [mm (in.)] : Distance from Flange-Mounting Surface to Radial Load Point
 B [mm (in.)] : Distance from Flange-Mounting Surface to Bearing Unit

Product Name	Permissible Radial Load W [N (lb.)]
GFS2G□FR	$W [N (lb.)] = \frac{36 \text{ mm (8.1 in.)}}{36 \text{ mm (8.1 in.)} + L_p} \times F_0 [N (lb.)]$
GFS4G□FR	$W [N (lb.)] = \frac{40 \text{ mm (9 in.)}}{40 \text{ mm (9 in.)} + L_p} \times F_0 [N (lb.)]$
GFS5G□FR	$W [N (lb.)] = \frac{50 \text{ mm (11.2 in.)}}{50 \text{ mm (11.2 in.)} + L_p} \times F_0 [N (lb.)]$
GFS6G□FR	$W [N (lb.)] = \frac{60 \text{ mm (13.5 in.)}}{60 \text{ mm (13.5 in.)} + L_p} \times F_0 [N (lb.)]$

◇ When End of Shaft being Driven is Supported by a Bearing



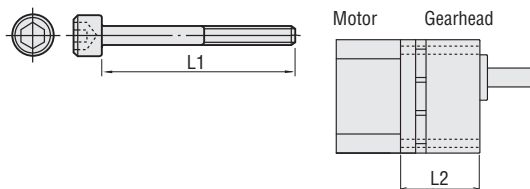
Product Name	Permissible Radial Load W [N (lb.)]
GFS2G□FR GFS4G□FR GFS5G□FR GFS6G□FR	$W [N (lb.)] = \frac{B}{B - L_p} \times F_0 [N (lb.)]$

Product Name	Speed	Gear Ratio	F ₀ [N (lb.)]
GFS2G□FR	3~3000 r/min	5, 10	570 (128)
		15~200	630 (141)
	4000 r/min	5, 10	520 (117)
		15~200	580 (130)
GFS4G□FR	3~3000 r/min	5, 10	1000 (220)
		15~200	1500 (330)
	4000 r/min	5, 10	910 (200)
		15~200	1370 (300)
GFS5G□FR	3~3000 r/min	5, 10	1080 (240)
		15, 20	1550 (340)
		30~200	1800 (400)
	4000 r/min	5, 10	980 (220)
		15, 20	1430 (320)
		30~200	1680 (370)
GFS6G□FR	3~3000 r/min	5, 10	1430 (320)
		15, 20	1960 (440)
		30~100	2380 (530)
	4000 r/min	5, 10	1320 (290)
		15, 20	1810 (400)
		30~100	2210 (490)

● A number indicating the gear ratio is entered where the box □ is located within the product name.

● Dimensions for Installation Screws

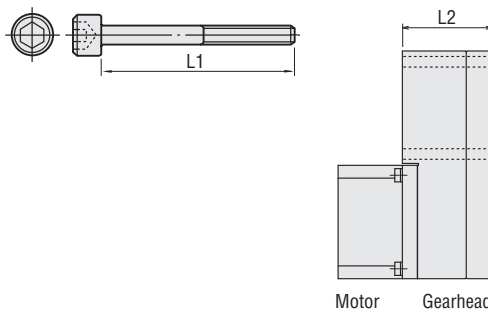
◇ Parallel Shaft Gearhead
BMU, BLE, BXII and BLH Series



Product Name	Installation Screw		L2 [mm (in.)]	
	L1 [mm (in.)]	Screw Size		
GFV2G5~20A	50.8 (2)	No.8-32 UNC	42 (1.65)	
GFV2G30~100A	57.2 (2.25)		46 (1.81)	
GFV2G200A	63.5 (2.5)		51 (2.01)	
GFV4G5~20A	63.5 (2.5)	1/4-20 UNC	49 (1.93)	
GFV4G30~100A	69.9 (2.75)		54 (2.13)	
GFV4G200A	76.2 (3)		59 (2.32)	
GFV5G5~20A	69.9 (2.75)	5/16-18 UNC	55 (2.17)	
GFV5G30~100A	82.6 (3.25)		68 (2.68)	
GFV5G200A	88.9 (3.5)		74 (2.9)	
GFV6G5~20A	88.9 (3.5)		70 (2.76)	
GFV6G30, 50A	101.6 (4)		82 (3.23)	
GFV6G100, 200A	114.3 (4.5)		96 (3.78)	
GFS2G5~20	50 (1.97)	M4 P0.7	42 (1.65)	
GFS2G30~100	55 (2.17)		46 (1.81)	
GFS2G200	60 (2.36)	M6 P1.0	51 (2.01)	
GFS4G5~20	65 (2.56)		49 (1.93)	
GFS4G30~100	70 (2.76)		54 (2.13)	
GFS4G200	75 (2.95)		59 (2.32)	
GFS5G5~20	75 (2.95)		M8 P1.25	55 (2.17)
GFS5G30~100	90 (3.54)			68 (2.68)
GFS5G200	95 (3.74)			74 (2.91)
GFS6G5~20	95 (3.74)			70 (2.76)
GFS6G30, 50	110 (4.33)			82 (3.23)
GFS6G100, 200	120 (4.72)			96 (3.78)

- Installation screws: 4 flat washers, spring washers and hexagonal nuts are included. Hexagonal nuts are not included with **GFV□G□**.
- The material for the **GFV** gearhead installation screws is stainless steel.

◇ Hollow Shaft Flat Gearhead
BLE, BXII and BLH Series



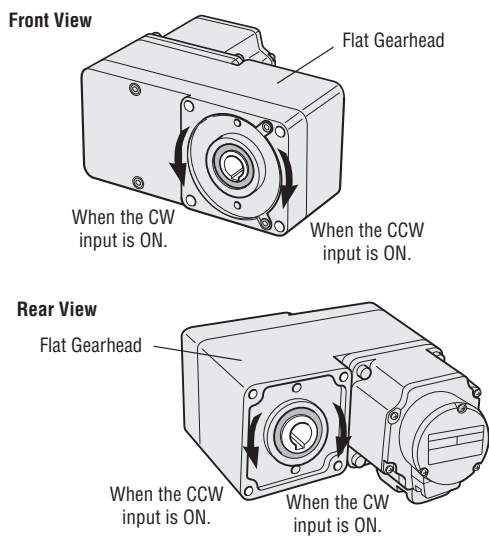
Product Name	Installation Screw		L2 [mm (in.)]
	L1 [mm (in.)]	Screw Size	
GFS2G5~200FR	65 (2.56)	M5 P0.8	47.8 (1.88)
GFS4G5~200FR	70 (2.76)	M6 P1.0	53.2 (2.09)
GFS5G5~200FR	90 (3.54)	M8 P1.25	65.2 (2.57)
GFS6G5~100FR	100 (3.94)	M8 P1.25	83.5 (3.29)

- Installation screws: 4 flat washers, spring washers and hexagonal nuts are included.

◇ For **DSC** Series → Page C-215

Rotation Direction of the Hollow Shaft Flat Gearhead

The hollow shaft flat gearhead of the combination type rotates in the direction as shown below, with respect to the direction input from the driver.



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