

BLM Motors

OPERATING MANUAL



Thank you for purchasing an Oriental Motor product.

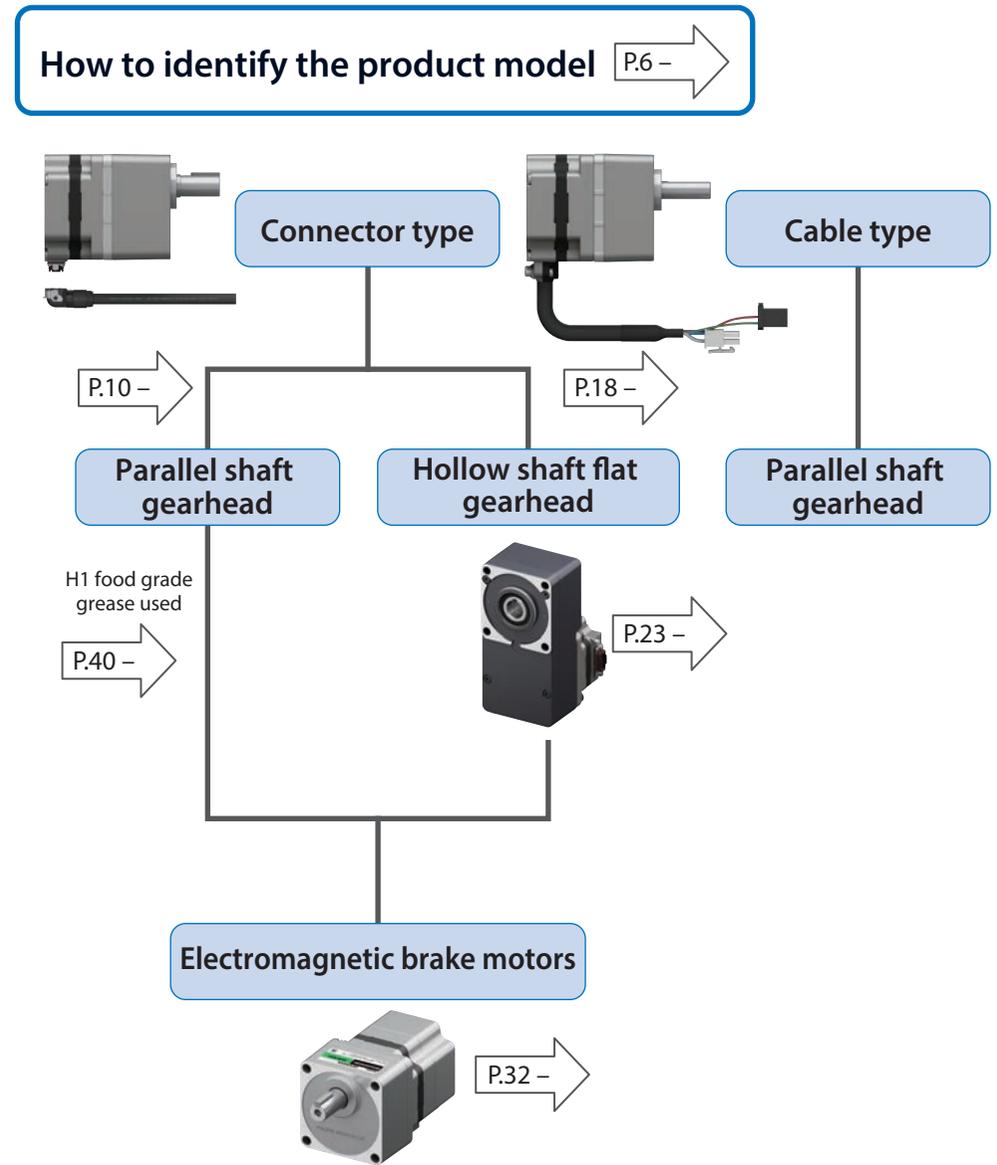
This Operating Manual describes product handling procedures and safety precautions.

- Please read it thoroughly to ensure safe operation.
- Always keep the manual where it is readily available.
- Only qualified personnel of electrical and mechanical engineering should work with the product.
- Use the product correctly after thoroughly reading the section "Safety precautions."
In addition, be sure to observe the contents described in warning and caution in this document.
- The product described in this document is designed and manufactured to be incorporated in general industrial equipment.
Do not use it for any other purpose.
Oriental Motor Co., Ltd. is not responsible for any compensation for damage caused through failure to observe this warning.

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Verify the model name of the purchased product against the model shown on the nameplate.



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1. Safety precautions

The precautions described below are intended to ensure the safe and proper use of the product and to prevent the user and other personnel from exposure to the risk of injury. Use the product only after carefully reading and fully understanding these instructions.

Description of signs

 WARNING	Handling the product without observing the instructions that accompany a "WARNING" symbol may result in serious injury or death.
 CAUTION	Handling the product without observing the instructions that accompany a "CAUTION" symbol may result in injury or property damage.
	The items under this heading contain important handling instructions that the user should observe to ensure safe use of the product.
	The items under this heading contain related information and contents to gain a further understanding of the text in this manual.

Description of graphic symbols

	Indicates "prohibited" actions that must not be performed.		Indicates "compulsory" actions that must be performed.
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 WARNING	
	Do not use the product in explosive or corrosive environments, in the presence of flammable gases, in areas subjected to splashing water, or near combustible materials. Doing so may result in fire, electric shock, or injury.
	Do not transport, install, connect, or inspect the product while the power is supplied. Always turn off the power before carrying out these operations. This may result in electric shock or damage to equipment.
	Do not machine or modify the cable. Doing so may result in fire, electrical shock, or damage to equipment.
	Do not apply any excessive force to the motor connector. Doing so may result in fire, electrical shock, or damage to equipment.
	Do not forcibly bend, pull, or pinch the cable. Doing so may result in fire, electrical shock, or damage to equipment.
	Do not remove the connector cap until the connection cable is connected to avoid damaging the O-ring of the connector for cable connection on the motor. Doing so may result in fire, electrical shock, or damage to equipment.
	Do not touch the motor or driver when conducting the insulation resistance measurement or dielectric strength test. Accidental contact may result in electric shock.
	Do not disassemble or modify the motor. Doing so may result in electric shock, injury, or damage to equipment. Refer all such internal inspections and repairs to the sales office from which you purchased the product.

 WARNING	
	When using the electromagnetic brake motor in a vertical drive application such as elevating equipment, be sure to check the load condition sufficiently before operating. If a load exceeding the rated torque is applied or the small torque limiting value is set, the load may fall. This may result in injury or damage to equipment.
	Only qualified and educated personnel should be allowed to perform installation, connection, operation and inspection/troubleshooting of the product. Handling by unqualified and uneducated personnel may result in fire, electric shock, injury, or damage to equipment.
	The motor is Class I equipment. When installing the motor, ground the Protective Earth Terminal of the motor. Failure to do so may result in electric shock.
	Use a motor and driver only in the specified combination. An incorrect combination may cause fire, electric shock, or damage to equipment.
	Always turn off the power before performing maintenance or inspection. Failure to do so may result in electric shock.

 CAUTION	
	Do not use the motor beyond the specifications. Doing so may result in fire, electric shock, injury, or damage to equipment.
	Do not touch the motor during operation or immediately after stopping. The surface of the motor is hot and it may cause a skin burn(s).
	Do not leave anything around the motor that would obstruct ventilation. Doing so may result in damage to equipment.
	Do not lift the motor by holding the output shaft or the cable. Doing so may result in injury.
	Do not touch the motor output shaft (shaft end or pinion section) with bare hands. Doing so may result in injury.
	When assembling the motor with the gearhead, exercise caution not to pinch your fingers or other parts of your body between the motor and gearhead. Injury may result.
	When installing the motor in equipment, exercise caution not to pinch your fingers or other parts of your body between the product and equipment. Injury may result.
	Do not touch the rotating part (output shaft) during operation. Doing so may result in injury.
	Securely install the motor on the mounting plate. Improper installation may cause the motor to come loose and fall, resulting in injury or damage to equipment.
	Provide a cover over the rotating part (output shaft). Failure to do so may result in injury.
	Securely install a load on the output shaft. Failure to do so may result in injury.
	Be sure to ground the motor and the driver to prevent damage from static electricity. Failure to do so may result in fire or damage to equipment.
	The motor surface temperature may exceed 70 °C (158 °F) even under normal operating conditions. If the operator is allowed to approach the operating motor, attach a warning label on a conspicuous position as shown in the figure. Failure to do so may result in a skin burn(s).



Warning label

This chapter covers restrictions and requirements the user should consider when using the product.

Be sure to match the motor output power to the driver output power.

■ Wiring

● Connecting a motor and a driver (Connector type)

To connect a motor and a driver, always use the dedicated connection cable (sold separately).

An electromagnetic brake motor requires a dedicated connection cable (sold separately) that is labeled for electromagnetic brake motor.

Limit the number of times so that the connection/disconnection between the connection cable and the motor or driver will not exceed 100 times.

● Connecting a motor and a connector (Connector type)

Do not apply a strong force to the locking lever of the connector for motor connection.

Applying a strong force to the locking lever may cause damage.

● Connecting a motor and a driver

When extending the wiring distance between the motor and the driver, use the connection cable (for extension), which is sold separately.

The length of the cable that can be connected varies depending on the driver used. Refer to the operating manual of the driver.

■ Installation environments

● Grease measures

On rare occasions, grease may ooze out from the gearhead. If there is concern over possible environmental contamination resulting from the leakage of grease, check for grease stains during regular inspections. Alternatively, install an oil pan or other device to prevent damage resulting from contamination. Grease leakage may lead to problems in the user's equipment or products.

● When using in low temperature environment

When the ambient temperature is low, the load torque may increase due to the oil seal or the viscosity of the grease used in the gearhead, and the output torque may decrease or the overload alarm may be generated. However, as time passes, the oil seal or grease is warmed up, and the motor can be operated without generating the overload alarm.

● Apply grease to the hollow output shaft of a hollow shaft flat gearhead.

When using a hollow shaft flat gearhead, apply grease (molybdenum disulfide grease, etc.) on the surface of the load shaft and inner walls of the hollow output shaft to prevent seizure.

■ Insulation resistance measurement and dielectric strength test

● Do not conduct the insulation resistance measurement or the dielectric strength test with the motor and driver connected.

Conducting the insulation resistance measurement or dielectric strength test with the motor and driver connected may result in damage to the product.

■ Operations

● Use an electromagnetic brake motor in a vertical drive application such as elevating equipment.

When the motor is used in a vertical drive application such as elevating equipment (lifting and lowering device), use an electromagnetic brake motor so that the load can be held in position.



If a power failure occurs or the protective function of the driver is activated in a state where a motor without an electromagnetic brake is used, the moving part may fall when the motor stops. This may cause injury or damage to equipment.

● Rotation direction of the gearhead output shaft

Parallel shaft gearhead

The rotation direction of the gearhead output shaft may differ from that of the motor output shaft depending on the gear ratio of the gearhead.

Gear ratio	Rotation direction of the gearhead output shaft
5, 10, 15, 20, 200	Same direction as the motor output shaft
30, 50, 100*	Opposite direction to the motor output shaft

* Same direction as the motor output shaft when the gear ratio is **100** for the 200 W and 300 W motors

Hollow shaft flat gearhead

The rotation directions of the gearhead output shaft relative to the motor output shaft are as shown in the figures below.

Check the operating manual of the driver for the rotation direction of the motor output shaft relative to the operation input signals of the driver.

Motor output shaft	Gearhead output shaft	
	Front	Rear

● Sliding noise of electromagnetic brake

Sliding noise of the brake disk for the electromagnetic brake motor may be generated during operation. It is no functional problem.

3.1 Package contents

Verify that the items listed below are included.
Report any missing or damaged items to the branch or sales office from which you purchased the product.

■ Motor

- Motor 1 unit
- Instructions and Precautions for Safe Use 1 copy

■ Gearhead (sold separately)

● Parallel shaft gearhead

- Gearhead 1 unit
- Mounting screw 1 set
hexagonal socket head screw, plain washer, spring washer: each 4 pieces
- Parallel key 1 piece
- Motor assembling screw 1 set
Hexagonal socket head screw: 2 pieces

● Hollow shaft flat gearhead

- Gearhead 1 unit
- Safety cover 1 set
Safety cover: 1 piece
Mounting screw for safety cover: 2 pieces
- Mounting screw 1 set
Hexagonal socket head screw, plain washer, spring washer, nut*: each 4 pieces
- Parallel key 1 piece
- Motor assembling screw 1 set
Hexagonal socket head screw: 4 pieces

* Nuts are not included with the 200 W, 300 W, and 400 W motors.

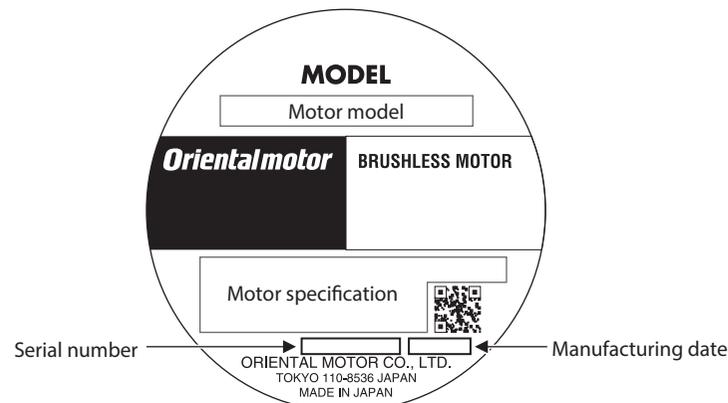
3.2 Information about nameplate

Tell us the model name, product serial number, and manufacturing date when you contact us.



The position describing the information may vary depending on the product.

■ Motor



■ Gearhead



3.3 How to identify the product model

Verify the model name of the purchased product against the model shown on the name plate of the product.

■ Motor

BLM 4 60 S H P M - GFV
 1 2 3 4 5 6 7 8

1	Motor type	BLM: Brushless motor
2	Frame size	2: 60 mm (2.36 in.) 4: 80 mm (3.15 in.) 5: 90 mm (3.54 in.) 6: 104 mm (4.09 in.)
3	Output power	30: 30 W 60: 60 W 120: 120 W 200: 200 W 300: 300 W 400: 400 W
4	Identification code	S
5	Motor connection method	Blank: Cable type H: Connector type
6	Degree of protection for motor	Blank: IP40 rating P: IP66 rating
7	Motor additional function	M: Electromagnetic brake motor
8	Output shaft type	GFV, GFV2: GFV pinion shaft type A, A2: Round shaft type AC, AC2: Round shaft type (With shaft flat)

■ Gearhead (Sold separately)

● Parallel shaft gearhead

GFV 5 G 30 S F
 1 2 3 4 5

1	Pinion shaft type	GFV: GFV Gearhead
2	Gearhead frame size	2: 60 mm (2.36 in.) 4: 80 mm (3.15 in.) 5: 90 mm (3.54 in.) 6: 110 mm (4.33 in.)
3	Gear ratio	Number: Gear ratio of gearhead
4	Material of output shaft	S: Stainless steel Blank: Carbon steel
5	Gearhead additional function	F: H1 food grade grease used

● Hollow shaft flat gearhead

GFS 5 G 30 FR
 1 2 3 4

1	Pinion shaft type	GFS: GFS Gearhead
2	Gearhead frame size	2: 60 mm (2.36 in.) 4: 80 mm (3.15 in.) 5: 90 mm (3.54 in.) 6: 104 mm (4.09 in.)
3	Gear ratio	Number: Gear ratio of gearhead
4	Gearhead type	FR: Hollow shaft flat gearhead

4.1 Installation location

Install the product in a well-ventilated location that provides easy access for inspection. The location must also satisfy the following conditions:

Common to all products

- Indoors
- Operating ambient temperature: 0 to +40 °C [+32 to +104 °F] (non-freezing)
- Operating ambient humidity: 85 % or less (non-condensing)
- Area free of explosive atmosphere, toxic gas (such as sulfuric gas), or liquid
- Area not exposed to direct sun
- Area free of excessive amount of dust, iron particles or the like
- Area free of excessive salt
- Area not subject to continuous vibration or excessive shocks
- Area free of excessive electromagnetic noise (from welders, power machinery, etc.)
- Area free of radioactive materials, magnetic fields, or vacuum
- Altitude Up to 1000 m (3300 ft.) above sea level

Connector type

- Area not subject to oil (oil droplets) or chemicals
This product can be used in an environment where it is splashed with water.
(Excluding the connector for driver connection and the mounting surface of the round shaft motor)
However, do not use the product in water or in areas with high water pressure.

Cable Type

- Area not subject to splashing water (rain, water droplets), oil (oil droplets), or other liquids

4.2 Specifications

Check on the Oriental Motor Website for the product specifications.

4.3 General specifications

Operating environment	Ambient temperature	0 to +40 °C (+32 to +104 °F) (non-freezing)
	Ambient humidity	85 % or less (non-condensing)
	Altitude	Up to 1000 m (3300 ft.) above sea level
	Surrounding atmosphere	No corrosive gas or dust. Cannot be used in radioactive materials, magnetic field, vacuum or other special environments.
	Vibration	Not subject to continuous vibration or excessive impact. In conformance with JIS C 60068-2-6 "Sine-wave vibration test method" Frequency range: 10 to 55 Hz Pulsating amplitude: 0.15 mm (0.006 in.) Sweep direction: 3 directions (X, Y, Z) Number of sweeps: 20 times
Storage environment Shipping environment	Ambient temperature	-20 to +70 °C (-4 to +158 °F) (non-freezing)
	Ambient humidity	85 % or less (non-condensing)
	Altitude	Up to 3000 m (10000 ft.) above sea level
	Surrounding atmosphere	No corrosive gas or dust. No water or oil. Cannot be used in radioactive materials, magnetic field, vacuum or other special environment.
Degree of protection	IP66	Connector type - Pinion shaft motor assembled with parallel shaft gearhead - Round shaft motor (When a connection cable is attached. Excluding the connectors for driver connection, and the mounting surface of the round shaft motor.)
	IP65	Connector type - Pinion shaft motor assembled with hollow shaft flat gearhead (When a connection cable is attached. Excluding the connectors for driver connection.)
	IP40	Cable type - Pinion shaft motor assembled with parallel shaft gearhead - Round shaft motor

5.1 Inspection

It is recommended that periodic inspections of the items listed below be performed after each operation of the motor.

If any abnormality occurs, stop using the product and contact your nearest Oriental Motor sales office.



Do not conduct the insulation resistance measurement or dielectric strength test with the motor and driver connected. This may cause damage to the product.

■ Inspection items

- Check to see if any of the mounting screws of the motor are loose.
- Check to see if the bearing (ball bearings) of the motor generates unusual noises.
- Check to see if the bearing (ball bearings) or gear meshing part of the gearhead generates unusual noises.
- Check to see if the output shaft and the load shaft are not misaligned.
- Check to see if the cable is damaged or stressed, or the connection part between the cable and driver is loose.

5.2 Warranty

Check on the Oriental Motor Website for the product warranty.

5.3 Disposal

Dispose the product correctly in accordance with laws and regulations, or instructions of local governments.

■ UL Standards, CSA Standards

This product is recognized by UL under UL and CSA Standards.

■ CE Marking / UKCA Marking

This product is affixed with the marks under the following directives/regulations.

● EU Low Voltage Directive / UK Electrical Equipment (Safety) Regulations

Installation conditions

- Overvoltage category: II
- Pollution degree: 3*
- Protection against electric shock: Class I

* Pollution degree for the cable type: 2

● EU RoHS Directive / UK RoHS Regulations

This product does not contain the substances exceeding the restriction values.

7.1 Lists of combinations

Check the model name against that on the nameplate.

■ Motors

● Pinion shaft type motor / Parallel shaft gearhead

Output power	Motor model	Applicable gearhead	
		Model	□: Gear ratio
30 W	BLM230HP-GFV	GFV2G□S	5, 10, 15, 20, 30, 50, 100, 200
60 W	BLM460SHP-GFV	GFV4G□S	
120 W	BLM5120HP-GFV	GFV5G□S	
200 W	BLM6200SHP-GFV	GFV6G□S	
300 W	BLM6300SHP-GFV		
400 W	BLM6400SHP-GFV		5, 10, 15, 20, 30, 50

● Pinion shaft type motor / Hollow shaft flat gearhead

For details on the list of combinations and installation method, refer to p.23 and the following pages.

● Round shaft type motor

Output power	Motor model
30 W	BLM230HP-AS
60 W	BLM260HP-AS
120 W	BLM5120HP-AS
200 W	BLM5200HP-AS
300 W	BLM5300HP-AS
400 W	BLM5400HP-AS

● Round shaft type motor (With shaft flat)

Output power	Motor model
30 W	BLM230HP-ACS
60 W	BLM260HP-ACS
120 W	BLM5120HP-ACS
200 W	BLM5200HP-ACS
300 W	BLM5300HP-ACS
400 W	BLM5400HP-ACS

■ Drivers that can be combined

Products with which the motors can be combined are listed below.

● BMU Series

Output power	Motor model	Driver model		
		Single-phase 100-120 VAC	Single-phase 200-240 VAC	Three-phase 200-240 VAC
30 W	BLM230	BMUD30-A2	BMUD30-C2	
60 W	BLM460S BLM260	BMUD60-A2	BMUD60-C2	
120 W	BLM5120	BMUD120-A2	BMUD120-C2	
200 W	BLM6200S BLM5200	BMUD200-A	BMUD200-C	
300 W	BLM6300S BLM5300	–	BMUD300-C	
400 W	BLM6400S BLM5400	–	BMUD400-C	BMUD400-S



● BLE2 Series

Output power	Motor model	Driver model		
		Single-phase 100-120 VAC	Single-phase 200-240 VAC	Three-phase 200-240 VAC
30 W	BLM230	BLE2D30-A	BLE2D30-C	
60 W	BLM460S BLM260	BLE2D60-A	BLE2D60-C	
120 W	BLM5120	BLE2D120-A	BLE2D120-C	
200 W	BLM6200S BLM5200	BLE2D200-A	BLE2D200-C	
300 W	BLM6300S BLM5300	–	BLE2D300-C	
400 W	BLM6400S BLM5400	–	BLE2D400-C	BLE2D400-S



■ Connection cables / Flexible connection cables (Sold separately)

To connect a motor and a driver, the dedicated connection cable (sold separately) is required. The connection cables are provided up to 20 m (65.6 ft.). The length of the cable that can be connected varies depending on the driver used. Refer to the operating manual of the driver.

● Product model and type

CC 010 KHBL R F

Cable length*

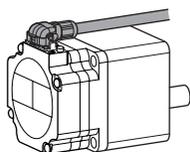
005	: 0.5 m (1.6 ft.)
010	: 1 m (3.3 ft.)
015	: 1.5 m (4.9 ft.)
020	: 2 m (6.6 ft.)
025	: 2.5 m (8.2 ft.)
030	: 3 m (9.8 ft.)
040	: 4 m (13.1 ft.)
050	: 5 m (16.4 ft.)
070	: 7 m (23.0 ft.)
100	: 10 m (32.8 ft.)
150	: 15 m (49.2 ft.)
200	: 20 m (65.6 ft.)

Cable outlet direction
F : Output shaft direction
B : Opposite to output shaft direction
V : Vertical direction

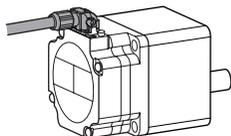
Blank : Connection cable
R : Flexible connection cable

* 0.5 m is only available for the connection cable.

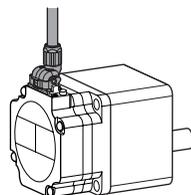
Output shaft direction:
CC__F



Opposite to output shaft direction:
CC__B



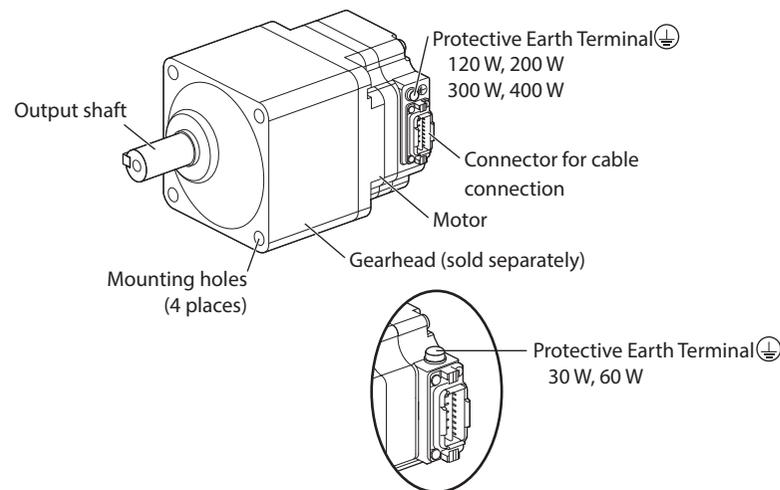
Vertical direction:
CC__V



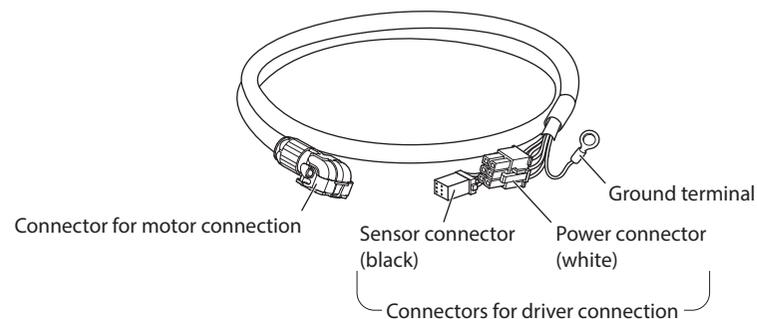
For the round shaft type, select the cable outlet direction considering the installation.

7.2 Names of parts

■ Motor

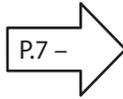


■ Connection cable / Flexible connection cable (Sold separately)



7.3 Installation method

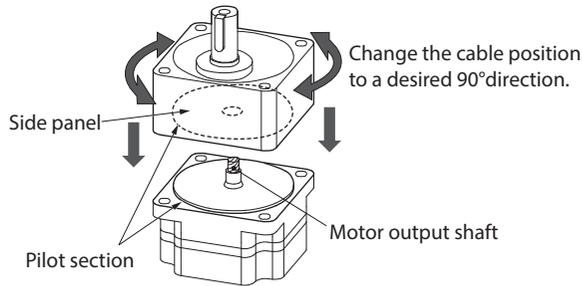
Installation location and specifications



Pinion shaft type motor / Parallel shaft gearhead

Assembling a motor and a gearhead

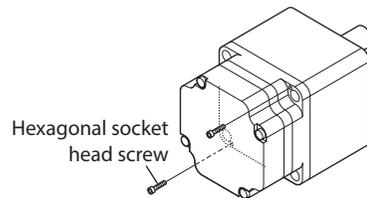
- Keep the pilot sections of the motor and gearhead in parallel, and assemble the gearhead with the motor while slowly rotating it clockwise/counterclockwise. At this time, note so that the pinion of the motor output shaft does not hit the side panel or gears of the gearhead strongly.



Assemble the gearhead to the motor in a condition where the motor output shaft is in an upward direction.

- Check that there is no gap between the motor and the gearhead, and tighten them using the hexagonal socket head screws (2 pieces) included with the gearhead.

Gearhead model	Screw size	Tightening torque [N·m (lb-in)]
GFV2G GFV4G	M2.6	0.4 (3.5)
GFV5G GFV6G	M3	0.6 (5.3)

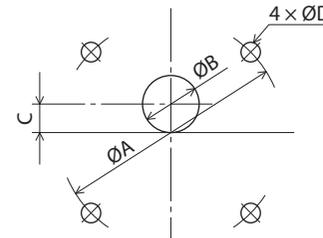


Note

- Do not forcibly assemble the motor and gearhead. Also, do not allow metal objects or foreign substances to enter the gearhead. The pinion of the motor output shaft or gear may be damaged, resulting in noise or reduction in service life.
- Do not allow dust to attach to the pilot sections of the motor and gearhead. Also, take care not to pinch the O-ring on the motor pilot section. If the O-ring is crushed or severed, grease may leak from the gearhead.

Installing to equipment

- Drill mounting holes in the mounting plate.

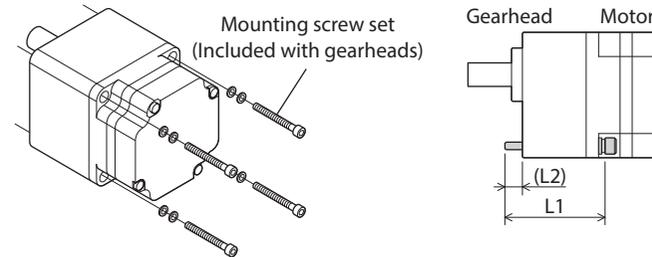


Unit: mm (in.)

Gearhead model	ØA	ØB*	C	ØD
GFV2G	70 (2.76)	24 (0.94)	10 (0.39)	4.5 (0.18)
GFV4G	94 (3.70)	34 (1.34)	13 (0.51)	6.5 (0.26)
GFV5G	104 (4.09)	40 (1.57)	18 (0.71)	8.5 (0.33)
GFV6G	120 (4.72)	42 (1.65)	20 (0.79)	8.5 (0.33)

* ØB indicates the external dimensions of the product. Drill holes with a minimum diameter of ØB + 1 mm (0.04 in.).

- Use the mounting screw set to tighten securely so that there is no gap between the product and the mounting plate to be installed. (4 places)



Gearhead model	□: Gear ratio	Hexagonal socket head screw (Material: Stainless steel)			Tightening torque [N·m (lb-in)]
		Screw size	L1 [mm (in.)]	L2 [mm (in.)]	
GFV2G□S	5 to 20	M4	50 (1.97)	6 (0.24)	1.4 (12.3)
	30 to 100		55 (2.17)	7 (0.28)	
	200		60 (2.36)	7 (0.28)	
GFV4G□S	5 to 20	M6	60 (2.36)	8 (0.31)	5.0 (44)
	30 to 100		65 (2.56)	8 (0.31)	
	200		70 (2.76)	8 (0.31)	
GFV5G□S	5 to 20	M8	70 (2.76)	11.5 (0.45)	12.0 (106)
	30 to 100		85 (3.35)	13.5 (0.53)	
	200		90 (3.54)	12.5 (0.49)	
GFV6G□S	5 to 20	M8	85 (3.35)	11 (0.43)	12.0 (106)
	30, 50		100 (3.94)	14 (0.55)	
	100, 200		110 (4.43)	10 (0.39)	

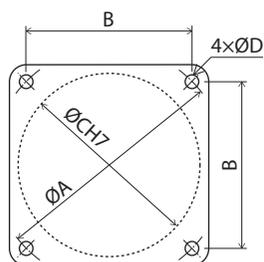
Round shaft type motor

Installing to equipment

Install the motor on a mounting plate of the following size or larger, so that the motor case temperature does not exceed 90 °C (194 °F).

Motor model	Size of heat sink [mm (in.)]	Thickness [mm (in.)]	Material
BLM230	115×115 (4.53×4.53)	5 (0.20)	Aluminum alloy
BLM260	135×135 (5.31×5.31)		
BLM5120	165×165 (6.50×6.50)		
BLM5200	200×200 (7.87×7.87)		
BLM5300 BLM5400	250×250 (9.84×9.84)	6 (0.24)	

1. Drill mounting holes in the mounting plate.



Unit: mm (in.)

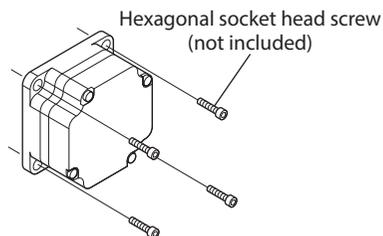
Motor model	ØA	B	ØCH7	ØD
BLM230 BLM260	70 (2.76)	49.5 (1.95)	$54^{+0.030}_0$ ($2.1260^{+0.0012}_0$)	4.5 (0.18)
BLM5120 BLM5200 BLM5300 BLM5400	104 (4.09)	73.54 (2.90)	$83^{+0.035}_0$ ($3.2677^{+0.0014}_0$)	8.5 (0.33)

ØC indicates the pilot diameter on the flange.

2. Secure the motor using the hexagonal socket head screws (not included) through the four mounting holes. Install so that there is no gap between the product and the mounting plate.

Applicable mounting screws

Motor model	Screw size	Tightening torque* [N·m (lb-in)]
BLM230 BLM260	M4	1.8 (15.9) [1.4 (12.3)]
BLM5120 BLM5200 BLM5300 BLM5400	M8	15.5 (137) [12.0 (106)]



* The value in the brackets [] indicates when the material is stainless steel.

Note Do not install the motor to the mounting hole diagonally or assemble the motor forcibly. Doing so may cause damage to the flange pilot section, thereby resulting in damage to the motor.

Installing a load

When installing a load on the motor or the gearhead, pay attention to the following points.

- Align the center axis of the motor output shaft or the gearhead output shaft with that of the load.
- A key slot is provided on the output shaft of the gearhead. Make a key slot on the load side and secure the load using the parallel key.

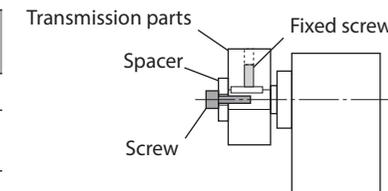
Note

- When coupling the motor or the gearhead with a load, pay attention to centering, belt tension, parallelism of pulleys, etc. Also, firmly secure the tightening screws of the coupling or pulleys.
- When installing a load, do not damage the motor output shaft (gearhead output shaft) or bearings. Installing the load forcibly with a hammer or the like may break the bearings. Do not apply any excessive force to the output shaft.
- Do not modify or machine the output shaft of the motor or gearhead. This may damage the bearing, resulting in damage to the motor or gearhead.

When using the output shaft end tapped hole of a gearhead (Excluding GFV2G)

Use a tapped hole provided at the end of the output shaft as an auxiliary means to prevent the transfer mechanism from disengaging.

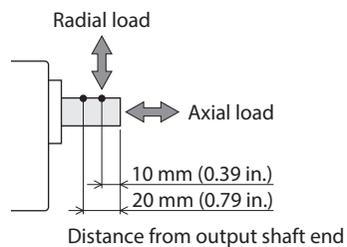
Gearhead model	Screw size	Effective depth of screw [mm (in.)]
GFV4G	M5	10 (0.39)
GFV5G GFV6G	M6	12 (0.47)



■ Permissible radial load and permissible axial load

Make sure that the radial load and axial load applied to the output shaft of the motor and gearhead do not exceed the permissible values shown in the table below.

Note Failure due to fatigue may occur when the motor or gearhead bearings and output shaft are repeatedly subjected to a radial or axial load that exceeds the permissible limit.



● Pinion shaft type motor / Parallel shaft gearhead

Gearhead model	□: Gear ratio	Permissible radial load [N (lb.)]* Distance from output shaft end of the gearhead		Permissible axial load [N (lb.)]
		10 mm (0.39 in.)	20 mm (0.79 in.)	
GFV2G□S	5	100 (22) [90 (20)]	150 (33) [110 (24)]	40 (9.0)
	10 to 20	150 (33) [130 (29)]	200 (45) [170 (38)]	
	30 to 200	200 (45) [180 (40)]	300 (67) [230 (51)]	
GFV4G□S	5	200 (45) [180 (40)]	250 (56) [220 (49)]	100 (22)
	10 to 20	300 (67) [270 (60)]	350 (78) [330 (74)]	
	30 to 200	450 (101) [420 (94)]	550 (123) [500 (112)]	
GFV5G□S	5	300 (67) [230 (51)]	400 (90) [300 (67)]	150 (33)
	10 to 20	400 (90) [370 (83)]	500 (112) [430 (96)]	
	30 to 200	500 (112) [450 (101)]	650 (146) [550 (123)]	
GFV6G□S	5 to 20	550 (123) [500 (112)]	800 (180) [700 (157)]	200 (45)
	30, 50	1000 (220) [900 (200)]	1250 (280) [1100 (240)]	
	100, 200	1400 (310) [1200 (270)]	1700 (380) [1400 (310)]	

* The values are based on a rated speed of 3000 r/min or less. The values in brackets [] are based on a speed of 4000 r/min.

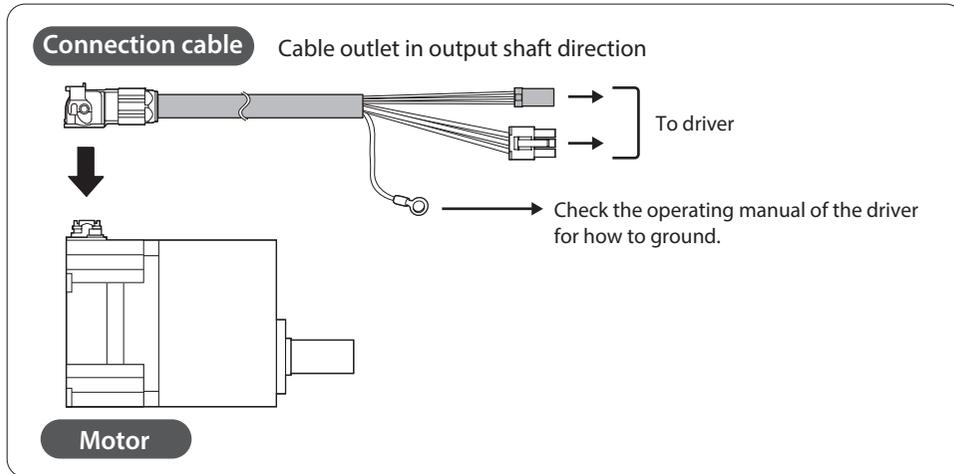
● Round shaft type motor

Motor model	Permissible radial load [N (lb.)] Distance from output shaft end of the motor		Permissible axial load [N (lb.)]
	10 mm (0.39 in.)	20 mm (0.79 in.)	
BLM230 BLM260	80 (18)	100 (22)	20 (4.5)
BLM5120 BLM5200 BLM5300 BLM5400	150 (33)	170 (38)	25 (5.6)

7.4 Connection and grounding

■ Connecting a motor and a driver

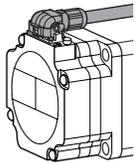
Use a connection cable (sold separately) to connect the a motor and a driver.
There are three types of connection cables with different cable outlet directions.



[Cable outlet direction]

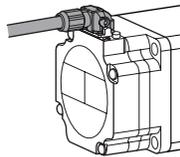
Cable outlet in output shaft direction

CC__F



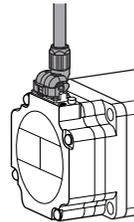
Cable outlet opposite to output shaft direction

CC__B



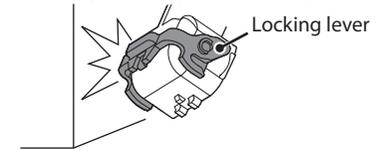
Cable outlet in vertical direction

CC__V



Note

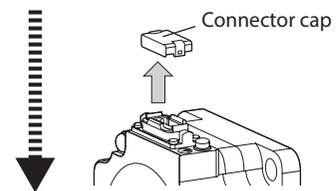
Do not apply a strong force to the locking lever of the connector for motor connection. Applying a strong force to the locking lever may cause damage.



■ Connection procedure of motor and connection cable

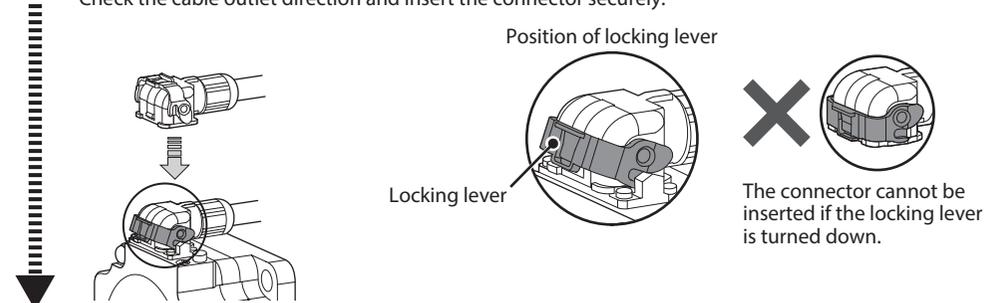
The following explains "cable outlet in output shaft direction" as an example.

1 Remove



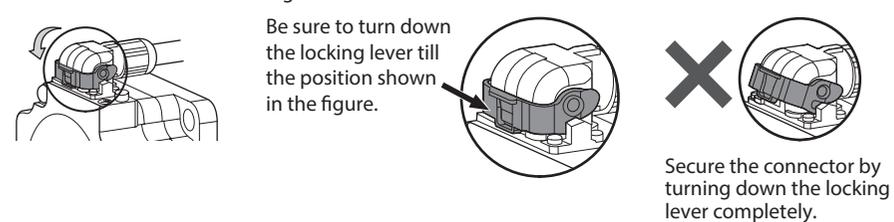
2 Attach

Check the cable outlet direction and insert the connector securely.



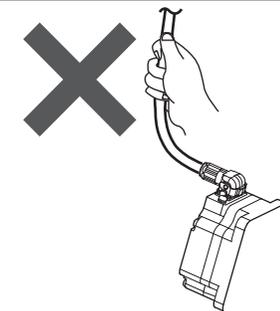
3 Secure

Secure the cable with the locking lever so that the cable does not come off.



Note

Do not lift the product by holding the connection cable. This may cause damage to the product.



■ Detaching the connection cable

If the locking lever is turned up, the cable can be detached.

Up to two connection cables for extension can be added for use. Refer to the operating manual of the driver.

■ Grounding

Use the Protective Earth Terminals (⊕) of the motor and driver and the ground terminal of the connection cable to ground.

Refer to the operating manual of the driver for the grounding method.

Note Be sure to ground the motor and the driver. Failure to do so may result in electric shock or damage to the product.
If not grounded, static electricity may damage the product.

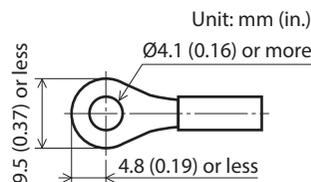
The grounding resistance specified in the standards applied to the equipment may not be satisfied depending on the type or length of the connection cable.

In this case, ground near the motor using the Protective Earth Terminal (⊕) of the motor.

When the ground terminal of the connection cable is not used, be sure to insulate it.

● Ground terminal

- Applicable crimp terminal: Round crimp terminal with insulation cover
- Terminal screw size: M4
- Tightening torque: 1.2 N·m (10.6 lb-in)
- Applicable lead wire: AWG 18 to 14 (0.75 to 2.0 mm²)



● Precautions about static electricity

Static electricity may cause the driver to malfunction or be damaged. Be sure to ground the motor and the driver to prevent damage from static electricity.

7.5 Accessories

Couplings and mounting brackets can be checked on the Oriental Motor Website.

About the mounting brackets (SOL) of the motor

When a mounting bracket and a motor are assembled, install the motor on the bracket in a state where the position of the connector for motor connection is on the top or side of the motor. It is not recommended to install the motor in a state where the position of the connector for motor connection is under the motor as it will come in contact with the mounting bracket or the installation surface.



Refer to the operating manual of the driver for the operating method.

8.1 Lists of combinations

Check the model name against that on the nameplate.

■ Motors

● Pinion shaft type motor / Parallel shaft gearhead

Output power	Motor model	Applicable gearhead	
		Model	□: Gear ratio
30 W	BLM230-GFV2	GFV2G□	5, 10, 15, 20, 30, 50, 100, 200
60 W	BLM460S-GFV2	GFV4G□	
120 W	BLM5120-GFV2	GFV5G□	
200 W	BLM6200S-GFV	GFV6G□	
300 W	BLM6300S-GFV		5, 10, 15, 20, 30, 50, 100
400 W	BLM6400S-GFV		5, 10, 15, 20, 30, 50

● Round shaft type motor

Output power	Motor model
30 W	BLM230-A2
60 W	BLM260-A2
120 W	BLM5120-A2
200 W	BLM5200-A
300 W	BLM5300-A
400 W	BLM5400-A

● Round shaft type motor (With shaft flat)

Output power	Motor model
30 W	BLM230-AC2
60 W	BLM260-AC2
120 W	BLM5120-AC2
200 W	BLM5200-AC
300 W	BLM5300-AC
400 W	BLM5400-AC

■ Drivers that can be combined

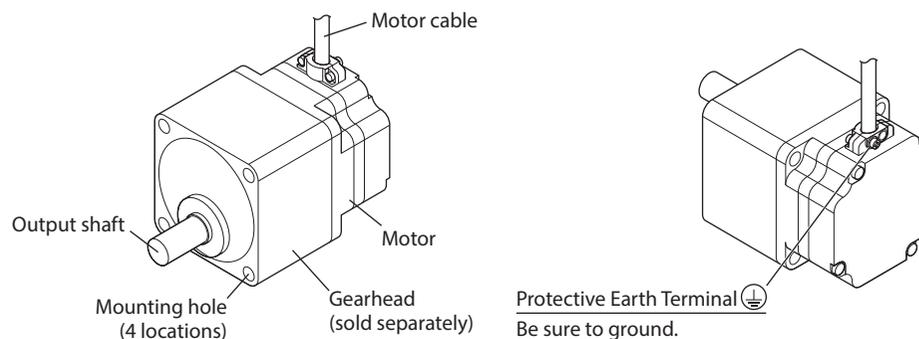
Products with which the motors can be combined are listed below.

● BMU Series

Output power	Motor model	Driver model		
		Single-phase 100-120 VAC	Single-phase 200-240 VAC	Three-phase 200-240 VAC
30 W	BLM230	BMUD30-A2	BMUD30-C2	
60 W	BLM460S BLM260	BMUD60-A2	BMUD60-C2	
120 W	BLM5120	BMUD120-A2	BMUD120-C2	
200 W	BLM6200S BLM5200	BMUD200-A	BMUD200-C	
300 W	BLM6300S BLM5300	–	BMUD300-C	
400 W	BLM6400S BLM5400	–	BMUD400-C	BMUD400-S

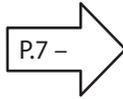


8.2 Names of parts



8.3 Installation method

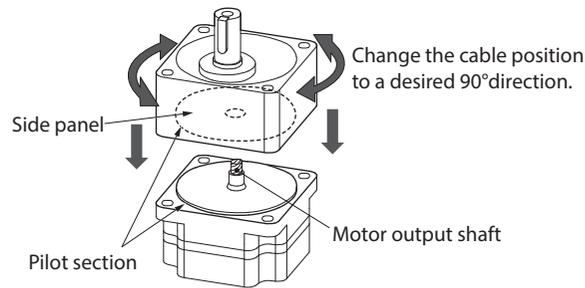
Installation location and specifications



Pinion shaft type motor / Parallel shaft gearhead

Assembling a motor and a gearhead

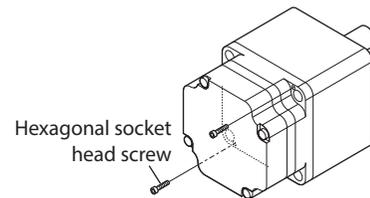
- Keep the pilot sections of the motor and gearhead in parallel, and assemble the gearhead with the motor while slowly rotating it clockwise/counterclockwise. At this time, note so that the pinion of the motor output shaft does not hit the side panel or gears of the gearhead strongly.



Assemble the gearhead to the motor in a condition where the motor output shaft is in an upward direction.

- Check that there is no gap between the motor and the gearhead, and tighten them using the hexagonal socket head screws (2 pieces) included with the gearhead.

Gearhead model	Screw size	Tightening torque [N·m (lb-in)]
GFV2G GFV4G	M2.6	0.4 (3.5)
GFV5G GFV6G	M3	0.6 (5.3)

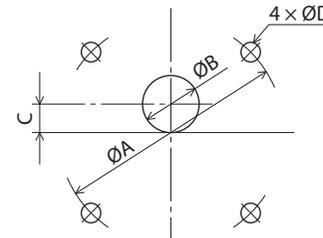


Note

- Do not forcibly assemble the motor and gearhead. Also, do not allow metal objects or foreign substances to enter the gearhead. The pinion of the motor output shaft or gear may be damaged, resulting in noise or reduction in service life.
- Do not allow dust to attach to the pilot sections of the motor and gearhead. Also, take care not to pinch the O-ring on the motor pilot section. If the O-ring is crushed or severed, grease may leak from the gearhead.

Installing to equipment

- Drill mounting holes in the mounting plate.

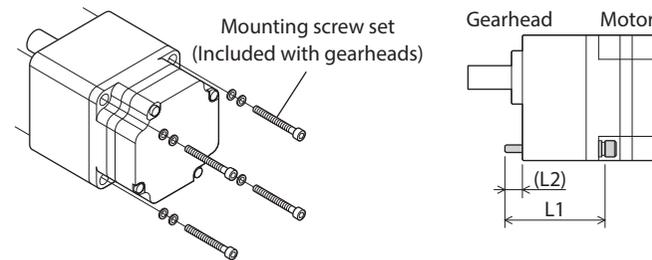


Unit: mm (in.)

Gearhead model	ØA	ØB*	C	ØD
GFV2G	70 (2.76)	24 (0.94)	10 (0.39)	4.5 (0.18)
GFV4G	94 (3.70)	34 (1.34)	13 (0.51)	6.5 (0.26)
GFV5G	104 (4.09)	40 (1.57)	18 (0.71)	8.5 (0.33)
GFV6G	120 (4.72)	42 (1.65)	20 (0.79)	8.5 (0.33)

* ØB indicates the external dimensions of the product. Drill holes with a minimum diameter of ØB + 1 mm (0.04 in.).

- Use the mounting screw set to tighten securely so that there is no gap between the product and the mounting plate to be installed. (4 places)



Gearhead model	□: Gear ratio	Hexagonal socket head screw (Material: Stainless steel)			Tightening torque [N·m (lb-in)]
		Screw size	L1 [mm (in.)]	L2 [mm (in.)]	
GFV2G□	5 to 20	M4	50 (1.97)	6 (0.24)	1.4 (12.3)
	30 to 100		55 (2.17)	7 (0.28)	
	200		60 (2.36)	7 (0.28)	
GFV4G□	5 to 20	M6	60 (2.36)	8 (0.31)	5.0 (44)
	30 to 100		65 (2.56)	8 (0.31)	
	200		70 (2.76)	8 (0.31)	
GFV5G□	5 to 20	M8	70 (2.76)	11.5 (0.45)	12.0 (106)
	30 to 100		85 (3.35)	13.5 (0.53)	
	200		90 (3.54)	12.5 (0.49)	
GFV6G□	5 to 20	M8	85 (3.35)	11 (0.43)	12.0 (106)
	30, 50		100 (3.94)	14 (0.55)	
	100, 200		110 (4.43)	10 (0.39)	

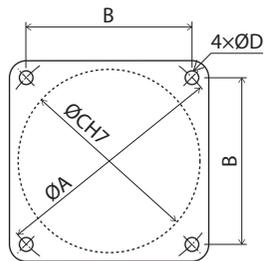
Round shaft type motor

Installing to equipment

Install the motor on a mounting plate of the following size or larger, so that the motor case temperature does not exceed 90 °C (194 °F).

Motor model	Size of heat sink [mm (in.)]	Thickness [mm (in.)]	Material
BLM230	115×115 (4.53×4.53)	5 (0.20)	Aluminum alloy
BLM260	135 × 135 (5.31 × 5.31)		
BLM5120	165×165 (6.50×6.50)		
BLM5200	200 × 200 (7.87 × 7.87)		
BLM5300 BLM5400	250×250 (9.84×9.84)	6 (0.24)	

1. Drill mounting holes in the mounting plate.



Unit: mm (in.)

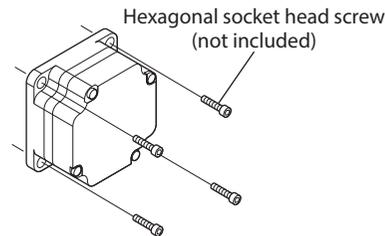
Motor model	ØA	B	ØCH7	ØD
BLM230 BLM260	70 (2.76)	49.5 (1.95)	$54^{+0.030}_0$ ($2.1260^{+0.0012}_0$)	4.5 (0.18)
BLM5120 BLM5200 BLM5300 BLM5400	104 (4.09)	73.54 (2.90)	$83^{+0.035}_0$ ($3.2677^{+0.0014}_0$)	8.5 (0.33)

ØC indicates the pilot diameter on the flange.

2. Secure the motor using the hexagonal socket head screws (not included) through the four mounting holes. Install so that there is no gap between the product and the mounting plate.

Applicable mounting screws

Motor model	Screw size	Tightening torque [N·m (lb·in)]
BLM230 BLM260	M4	1.8 (15.9) [1.4 (12.3)]
BLM5120 BLM5200 BLM5300 BLM5400	M8	15.5 (137) [12.0 (106)]



* The value in the brackets [] indicates when the material is stainless steel.

Note

Do not install the motor to the mounting hole diagonally or assemble the motor forcibly. Doing so may cause damage to the flange pilot section, thereby resulting in damage to the motor.

Installing a load

When installing a load on the motor or the gearhead, pay attention to the following points.

- Align the center axis of the motor output shaft or the gearhead output shaft with that of the load.
- A key slot is provided on the output shaft of the gearhead. Make a key slot on the load side and secure the load using the parallel key.

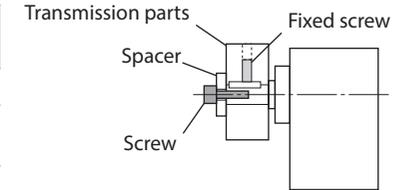
Note

- When coupling the motor or the gearhead with a load, pay attention to centering, belt tension, parallelism of pulleys, etc. Also, firmly secure the tightening screws of the coupling or pulleys.
- When installing a load, do not damage the motor output shaft (gearhead output shaft) or bearings. Installing the load forcibly with a hammer or the like may break the bearings. Do not apply any excessive force to the output shaft.
- Do not modify or machine the output shaft of the motor or gearhead. This may damage the bearing, resulting in damage to the motor or gearhead.

When using the output shaft end tapped hole of a gearhead (Excluding GFV2G)

Use a tapped hole provided at the end of the output shaft as an auxiliary means to prevent the transfer mechanism from disengaging.

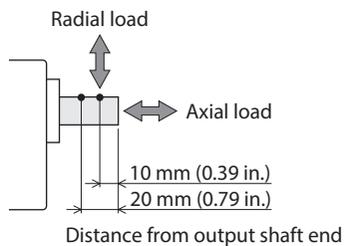
Gearhead model	Screw size	Effective depth of screw [mm (in.)]
GFV4G	M5	10 (0.39)
GFV5G GFV6G	M6	12 (0.47)



■ Permissible radial load and permissible axial load

Make sure that the radial load and axial load applied to the output shaft of the motor and gearhead do not exceed the permissible values shown in the table below.

Note Failure due to fatigue may occur when the motor or gearhead bearings and output shaft are repeatedly subjected to a radial or axial load that exceeds the permissible limit.



● Pinion shaft type motor / Parallel shaft gearhead

Gearhead model	□: Gear ratio	Permissible radial load [N (lb.)]* Distance from output shaft end of the gearhead		Permissible axial load [N (lb.)]
		10 mm (0.39 in.)	20 mm (0.79 in.)	
GFV2G □	5	100 (22) [90 (20)]	150 (33) [110 (24)]	40 (9.0)
	10 to 20	150 (33) [130 (29)]	200 (45) [170 (38)]	
	30 to 200	200 (45) [180 (40)]	300 (67) [230 (51)]	
GFV4G □	5	200 (45) [180 (40)]	250 (56) [220 (49)]	100 (22)
	10 to 20	300 (67) [270 (60)]	350 (78) [330 (74)]	
	30 to 200	450 (101) [420 (94)]	550 (123) [500 (112)]	
GFV5G □	5	300 (67) [230 (51)]	400 (90) [300 (67)]	150 (33)
	10 to 20	400 (90) [370 (83)]	500 (112) [430 (96)]	
	30 to 200	500 (112) [450 (101)]	650 (146) [550 (123)]	
GFV6G □	5 to 20	550 (123) [500 (112)]	800 (180) [700 (157)]	200 (45)
	30, 50	1000 (220) [900 (200)]	1250 (280) [1100 (240)]	
	100, 200	1400 (310) [1200 (270)]	1700 (380) [1400 (310)]	

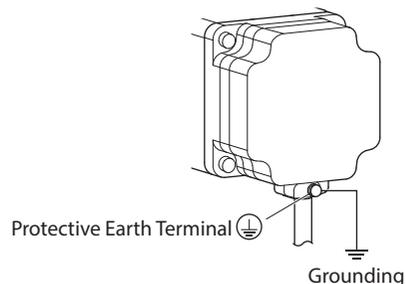
* The values are based on a rated speed of 3000 r/min or less. The values in brackets [] are based on a speed of 4000 r/min.

● Round shaft type motor

Motor model	Permissible radial load [N (lb.)] Distance from output shaft end of the motor		Permissible axial load [N (lb.)]
	10 mm (0.39 in.)	20 mm (0.79 in.)	
BLM230 BLM260	80 (18)	100 (22)	20 (4.5)
BLM5120 BLM5200 BLM5300 BLM5400	150 (33)	170 (38)	25 (5.6)

8.4 Grounding

Ground near the motor using the Protective Earth Terminal (PE) of the motor.
Ground it at the shortest distance.

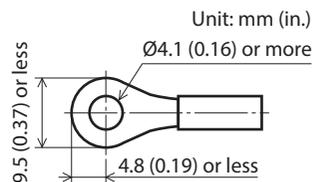


Note

Be sure to ground the motor and the driver. Failure to do so may result in electric shock or damage to the product.
If not grounded, static electricity may damage the product.

● Ground terminal

- Applicable crimp terminal: Round crimp terminal with insulation cover
- Terminal screw size: M4
- Tightening torque: 1.2 N·m (10.6 lb-in)
- Applicable lead wire: AWG 18 to 14 (0.75 to 2.0 mm²)



● Precautions about static electricity

Static electricity may cause the driver to malfunction or be damaged. Be sure to ground the motor and the driver to prevent damage from static electricity.

8.5 Accessories

Couplings and mounting brackets can be checked on the Oriental Motor Website.

About the mounting brackets (SOL) of the motor

When a mounting bracket and a motor are assembled, install the motor on the bracket in a state where the position of the motor cable is on the top or side of the motor. It is not recommended to install the motor in a state where the position of the motor cable is under the motor as it will come in contact with the mounting bracket or the installation surface.



Refer to the operating manual of the driver for the operating method.

9.1 Lists of combinations

Check the model name against that on the nameplate.

■ Motors

● Pinion shaft type motor / Hollow shaft flat gearhead

Output power	Motor model	Applicable gearhead	
		Model	□: Gear ratio
30 W	BLM230HP-GFV	GFS2G□FR	5, 10, 15, 20, 30, 50, 100, 200
60 W	BLM460SHP-GFV	GFS4G□FR	
120 W	BLM5120HP-GFV	GFS5G□FR	
200 W	BLM6200SHP-GFV	GFS6G□FR	10, 15, 20, 30, 50, 100
300 W	BLM6300SHP-GFV		5, 10, 15, 20, 30, 50, 100
400 W	BLM6400SHP-GFV		

● Pinion shaft type electromagnetic brake motor / Hollow shaft flat gearhead

Output power	Motor model	Applicable gearhead	
		Model	□: Gear ratio
30 W	BLM230HPM-GFV	GFS2G□FR	5, 10, 15, 20, 30, 50, 100, 200
60 W	BLM460SHPM-GFV	GFS4G□FR	
120 W	BLM5120HPM-GFV	GFS5G□FR	
200 W	BLM6200SHPM-GFV	GFS6G□FR	10, 15, 20, 30, 50, 100

Applicable motors for **GFS6G□FR**

Motors manufactured before June 2020 cannot be assembled with the **GFS6G□FR**.
When replacing the motor, check the date of manufacture on the motor nameplate before use.

■ Drivers that can be combined

Products with which the motors can be combined are listed below.

● Pinion shaft type motor / Hollow shaft flat gearhead

BMU Series

Output power	Motor model	Driver model		
		Single-phase 100-120 VAC	Single-phase 200-240 VAC	Three-phase 200-240 VAC
30 W	BLM230	BMUD30-A2	BMUD30-C2	
60 W	BLM460S	BMUD60-A2	BMUD60-C2	
120 W	BLM5120	BMUD120-A2	BMUD120-C2	
200 W	BLM6200S	BMUD200-A	BMUD200-C	
300 W	BLM6300S	–	BMUD300-C	
400 W	BLM6400S	–	BMUD400-C	BMUD400-S



BLE2 Series

Output power	Motor model	Driver model		
		Single-phase 100-120 VAC	Single-phase 200-240 VAC	Three-phase 200-240 VAC
30 W	BLM230	BLE2D30-A	BLE2D30-C	
60 W	BLM460S	BLE2D60-A	BLE2D60-C	
120 W	BLM5120	BLE2D120-A	BLE2D120-C	
200 W	BLM6200S	BLE2D200-A	BLE2D200-C	
300 W	BLM6300S	–	BLE2D300-C	
400 W	BLM6400S	–	BLE2D400-C	BLE2D400-S



9. Hollow shaft flat gearheads

● Pinion shaft type electromagnetic brake motor / Hollow shaft flat gearhead

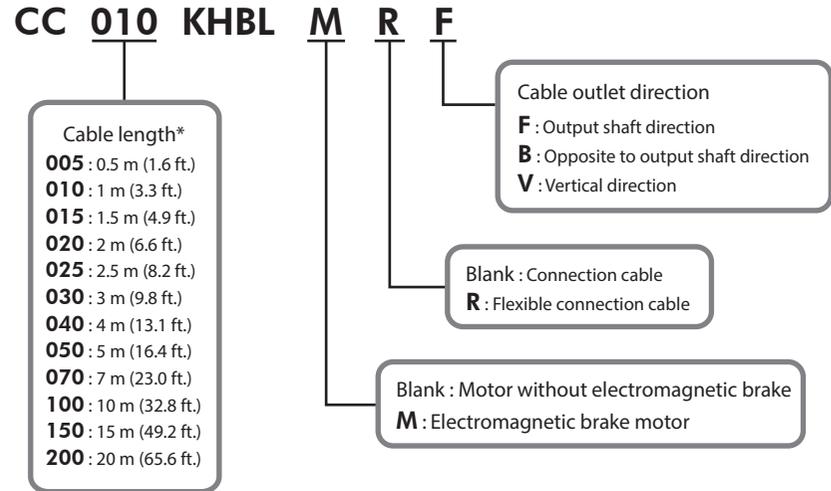
BLE2 Series

Output power	Motor model	Driver model	
		Single-phase 100-120 VAC	Single-phase 200-240 VAC Three-phase 200-240 VAC
30 W	BLM230	BLE2D30-AM	BLE2D30-CM
60 W	BLM460S	BLE2D60-AM	BLE2D60-CM
120 W	BLM5120	BLE2D120-AM	BLE2D120-CM
200 W	BLM6200S	BLE2D200-AM	BLE2D200-CM



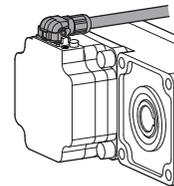
■ Connection cables / Flexible connection cables (Sold separately)

To connect a motor and a driver, the dedicated connection cable (sold separately) is required. The connection cables are provided up to 20 m (65.6 ft.). The length of the cable that can be connected varies depending on the driver used. Refer to the operating manual of the driver.

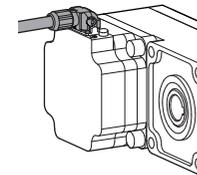


* 0.5 m is only available for the connection cable.

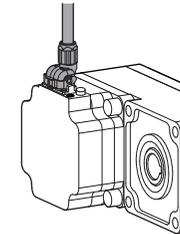
Output shaft direction:
CC__F



Opposite to output shaft direction:
CC__B

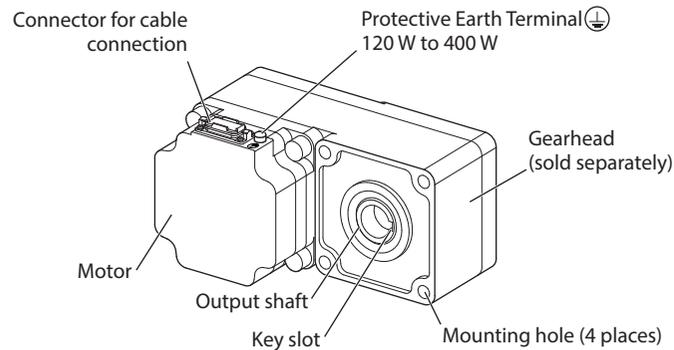


Vertical direction:
CC__V

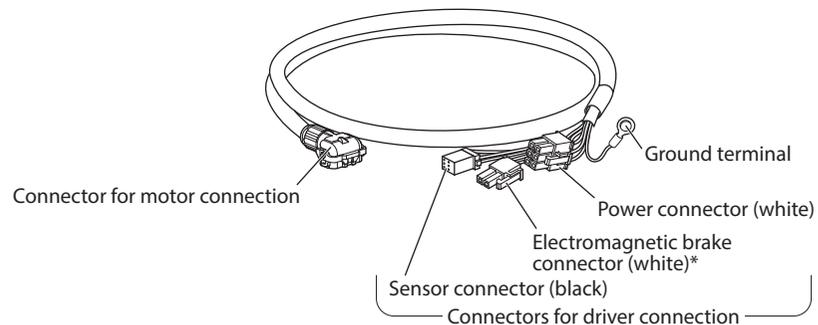


9.2 Names of parts

Motor



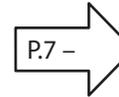
Connection cable / Flexible connection cable (Sold separately)



* Electromagnetic brake motor only

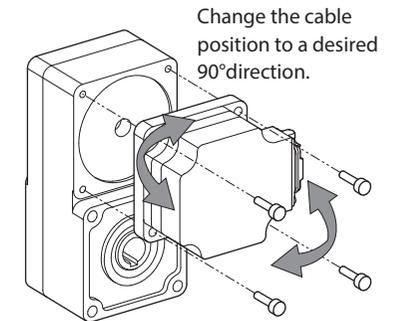
9.3 Installation method

Installation location and specifications



Assembling a motor and a gearhead

1. Keep the pilot sections of the motor and gearhead in parallel, and assemble the motor with the gearhead while slowly rotating it clockwise/counterclockwise. At this time, note so that the pinion of the motor output shaft does not hit the side panel or gears of the gearhead strongly.



2. Check that there is no gap between the motor and the gearhead, and tighten them using the hexagonal socket head screws (4 places) included with the gearhead.

Gearhead model	Screw size	Tightening torque [N·m (lb-in)]
GFS2G	M4	1.8 (15.9)
GFS4G	M6	6.4 (56)
GFS5G GFS6G	M8	15.5 (137)

Note

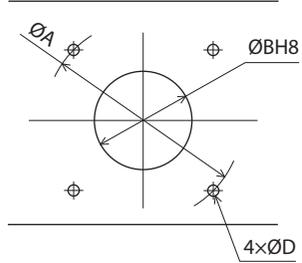
- Do not forcibly assemble the motor and gearhead. Also, do not allow metal objects or foreign substances to enter the gearhead. The pinion of the motor output shaft or gear may be damaged, resulting in noise or reduction in service life.
- Do not allow dust to attach to the pilot sections of the motor and gearhead. Also, take care not to pinch the O-ring on the motor pilot section. If the O-ring is crushed or severed, grease may leak from the gearhead.

■ Installing to equipment

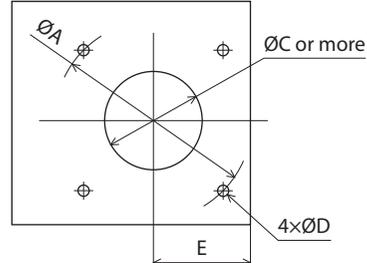
A hollow shaft flat gearhead can be installed by using either the front or rear face as the mounting surface.

1. Drill mounting holes in the mounting plate.

• Using the front face as the mounting surface



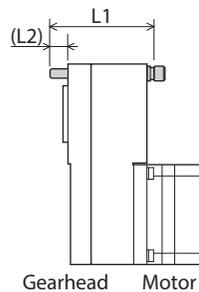
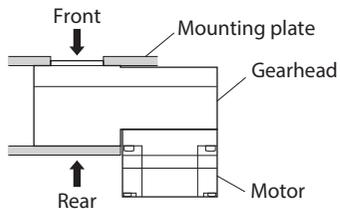
• Using the rear face as the mounting surface



Unit: mm (in.)

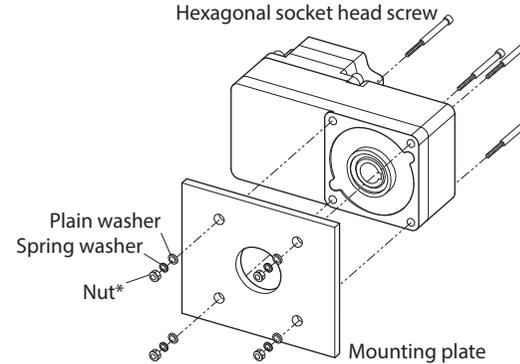
Gearhead model	ØA	ØBH8	ØC	ØD	E
GFS2G	70 (2.76)	34 ^{+0.039} ₀ (1.34 ^{+0.0015} ₀)	25 (0.98)	5.5 (0.22)	29 (1.14)
GFS4G	94 (3.70)	38 ^{+0.039} ₀ (1.50 ^{+0.0015} ₀)	30 (1.18)	6.5 (0.26)	39 (1.54)
GFS5G	104 (4.09)	50 ^{+0.039} ₀ (1.97 ^{+0.0015} ₀)	35 (1.38)	8.5 (0.33)	44 (1.73)
GFS6G	120 (4.72)	58 ^{+0.046} ₀ (2.28 ^{+0.0018} ₀)	42 (1.65)	—	57 (2.24)

2. Use the four mounting holes to secure the product with the mounting screw set (included with the gearhead) so that there is no gap between the product and the mounting plate to be installed. Also, attach the included safety cover to the hollow output shaft on the end opposite from the one where the load shaft is installed.

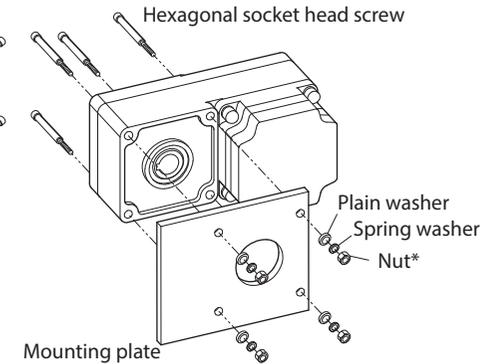


Gearhead model	Hexagonal socket head screw (Material: Iron)			Tightening torque [N·m (lb-in)]
	Screw size	L1 [mm (in.)]	L2 [mm (in.)]	
GFS2G	M5	65 (2.56)	15 (0.59)	3.8 (33)
GFS4G	M6	70 (2.76)	14 (0.55)	6.4 (56)
GFS5G	M8	90 (3.54)	21(0.83)	15.5 (137)
GFS6G		100 (3.94)	13 (0.51)	

• Using the front face as the mounting surface
When the gearhead is installed by using the front face as the mounting surface, use the mounting boss of the output shaft to align the center.

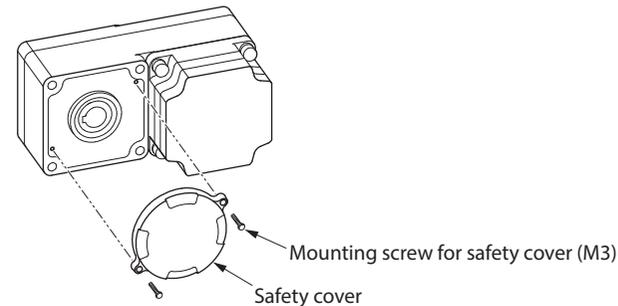


• Using the rear face as the mounting surface



* Nuts are not included with the **GFS6G□FR**.
Provide nuts separately or drill tapped holes in the mounting plate.

• Attaching the safety cover
After installing a load, attach the included safety cover. The safety cover can be attached on either side.
Tightening torque: 0.45 N·m (3.9 lb-in)



■ Installing a load

If a large impact occurs at instantaneous stop or a large radial load is applied, use a stepped load shaft.

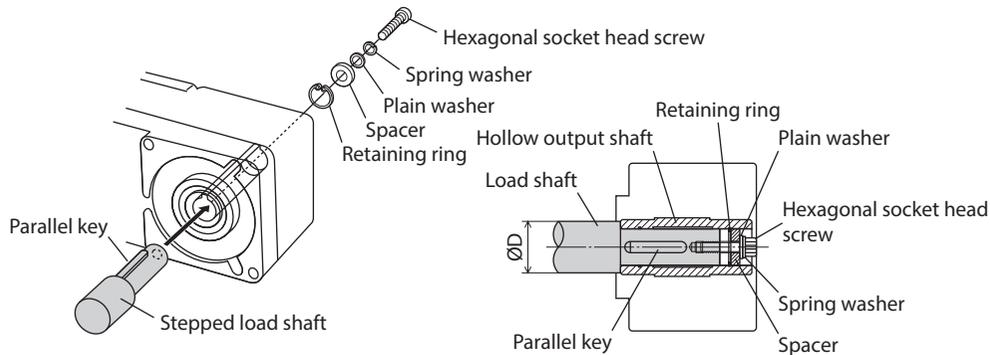
Note

- Apply grease (molybdenum disulfide grease, etc.) on the surface of the load shaft and inner walls of the hollow output shaft to prevent seizure.
- When installing a load, do not damage the output shaft or the bearings. Installing the load forcibly with a hammer or the like may break the bearings. Do not apply any excessive force to the output shaft.
- Do not modify or machine the output shaft. This may damage the bearing, resulting in damage to the motor and gearhead.

● Stepped load shaft

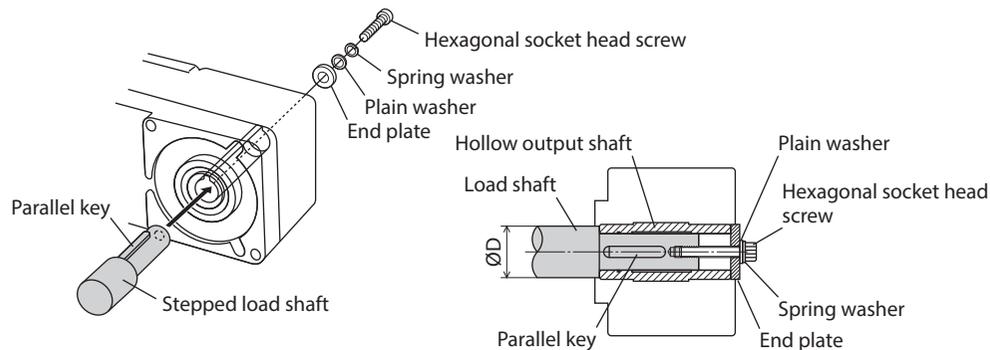
- Mounting method using retaining ring for hole

Secure the retaining ring for hole to the load shaft by tightening the hexagonal socket head screw over a spacer, flat washer and spring washer.



- Mounting method using end plate

Secure the end plate to the load shaft by tightening the hexagonal socket head screw over a flat washer and spring washer.

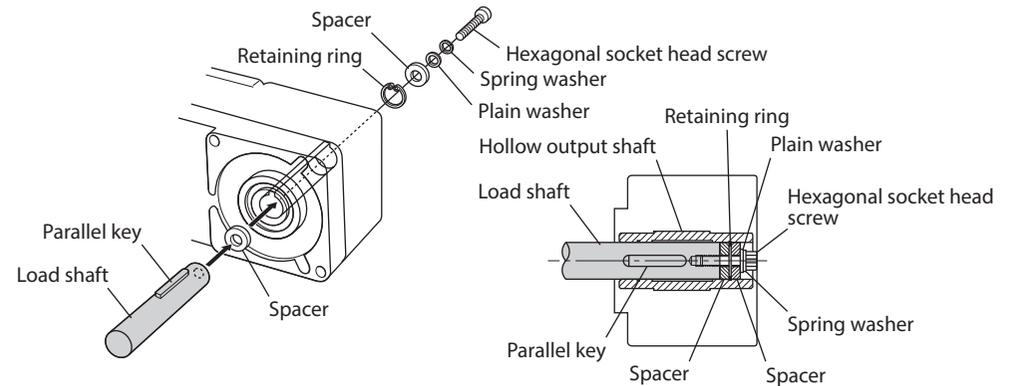


Note

The included safety cover cannot be attached because it interferes against the hexagonal socket head screws. Provide other protective measure for the rotating part on the customer side.

● Non-stepped load shaft

Install a spacer on the load shaft side and secure the retaining ring for hole to the load shaft by tightening the hexagonal socket head screw over a spacer, flat washer and spring washer.



● Recommended load shaft installation dimensions

Unit: mm (in.)

Gearhead model	Inner diameter of hollow shaft (H8)	Recommended diameter of load shaft (h7)	Nominal diameter of retaining ring for hole
GFS2G	$\varnothing 12^{+0.027}_0$ ($\varnothing 0.4724^{+0.0011}_0$)	$\varnothing 12_{-0.018}^0$ ($\varnothing 0.4724_{-0.0007}^0$)	$\varnothing 12$ ($\varnothing 0.47$)
GFS4G	$\varnothing 15^{+0.027}_0$ ($\varnothing 0.5906^{+0.0011}_0$)	$\varnothing 15_{-0.018}^0$ ($\varnothing 0.5906_{-0.0007}^0$)	$\varnothing 15$ ($\varnothing 0.59$)
GFS5G	$\varnothing 20^{+0.033}_0$ ($\varnothing 0.7874^{+0.0013}_0$)	$\varnothing 20_{-0.021}^0$ ($\varnothing 0.7874_{-0.0008}^0$)	$\varnothing 20$ ($\varnothing 0.79$)
GFS6G	$\varnothing 25^{+0.033}_0$ ($\varnothing 0.9843^{+0.0013}_0$)	$\varnothing 25_{-0.021}^0$ ($\varnothing 0.9843_{-0.0008}^0$)	$\varnothing 25$ ($\varnothing 0.98$)

Gearhead model	Applicable screw	Spacer thickness	Outer diameter of stepped shaft (ØD)
GFS2G	M4	3 (0.12)	20 (0.79)
GFS4G	M5	4 (0.16)	25 (0.98)
GFS5G	M6	5 (0.20)	30 (1.18)
GFS6G	M8	6 (0.24) [3 (0.12)]*	40 (1.57)

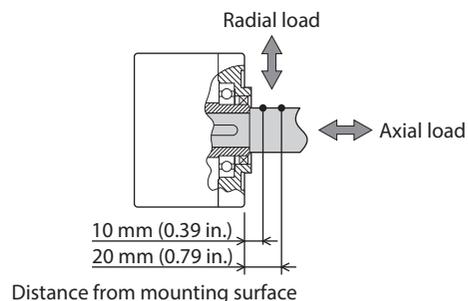
* The value in the brackets [] is that when using the rear face as the mounting surface.

■ Permissible radial load and permissible axial load

Make sure that the radial load and axial load applied to the output shaft do not exceed the permissible values shown in the table below.



Failure due to fatigue may occur when the bearings and output shaft are repeatedly subjected to a radial or axial load that exceeds the permissible limit.



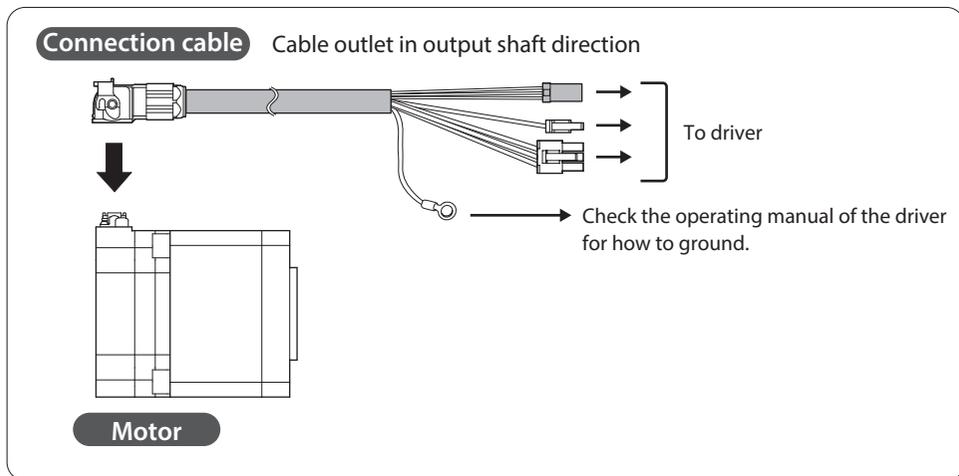
Gearhead model	□: Gear ratio	Permissible radial load [N (lb.)]*		Permissible axial load [N (lb.)]
		Distance from gearhead mounting surface		
		10 mm (0.39 in.)	20 mm (0.79 in.)	
GFS2G□FR	5, 10	450 (101) [410 (92)]	370 (83) [330 (74)]	200 (45)
	15 to 200	500 (112) [460 (103)]	400 (90) [370 (83)]	
GFS4G□FR	5, 10	800 (180) [730 (164)]	660 (148) [600 (135)]	400 (90)
	15 to 200	1200 (270) [1100 (240)]	1000 (220) [910 (200)]	
GFS5G□FR	5, 10	900 (200) [820 (184)]	770 (173) [700 (157)]	500 (112)
	15, 20	1300 (290) [1200 (270)]	1110 (240) [1020 (220)]	
	30 to 200	1500 (330) [1400 (310)]	1280 (280) [1200 (270)]	
GFS6G□FR	5, 10	1230 (270) [1130 (250)]	1070 (240) [990 (220)]	800 (180)
	15, 20	1680 (370) [1550 (340)]	1470 (330) [1360 (300)]	
	30 to 100	2040 (450) [1900 (420)]	1780 (400) [1660 (370)]	

* The values are based on a rated speed of 3000 r/min or less. The values in brackets [] are based on a speed of 4000 r/min.

9.4 Connection and grounding

■ Connecting a motor and a driver

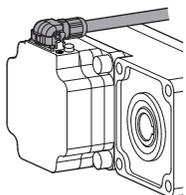
Use a connection cable (sold separately) to connect the a motor and a driver.
There are three types of connection cables with different cable outlet directions.



[Cable outlet direction]

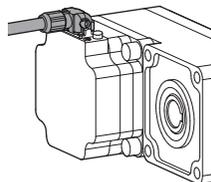
Cable outlet in output shaft direction

CC__F



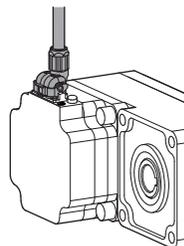
Cable outlet opposite to output shaft direction

CC__B



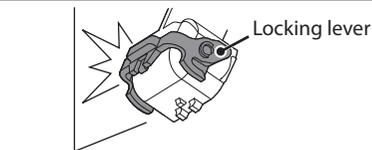
Cable outlet in vertical direction

CC__V

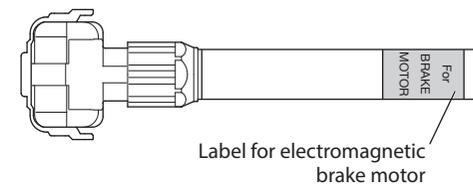


Note

- Do not apply a strong force to the locking lever of the connector for motor connection. Applying a strong force to the locking lever may cause damage.



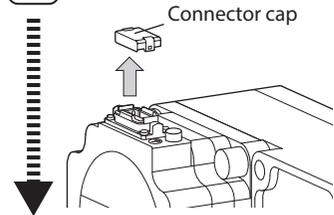
- For the electromagnetic brake motor, use the connection cable that is labeled for electromagnetic brake motor. Failure to do so may result in damage to the product.



■ Connection procedure of motor and connection cable

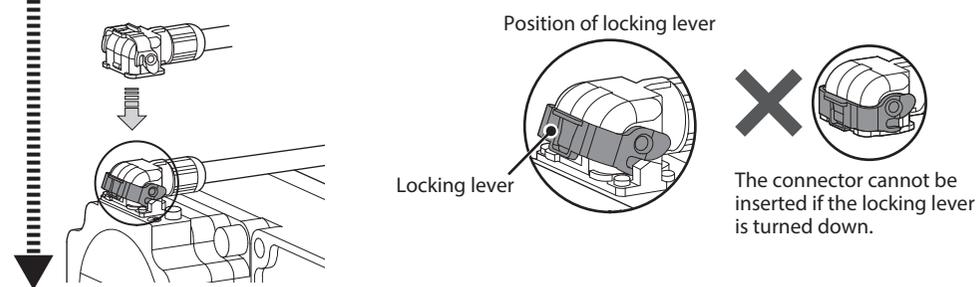
The following explains “cable outlet in output shaft direction” as an example.

1 Remove



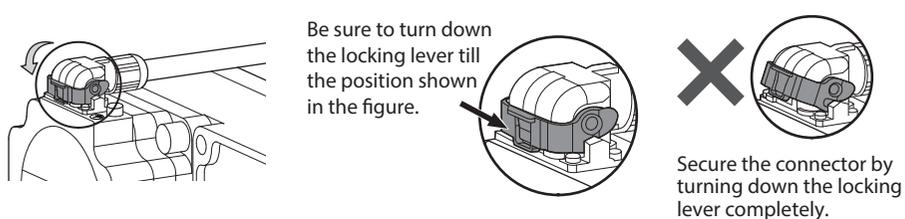
2 Attach

Check the cable outlet direction and insert the connector securely.



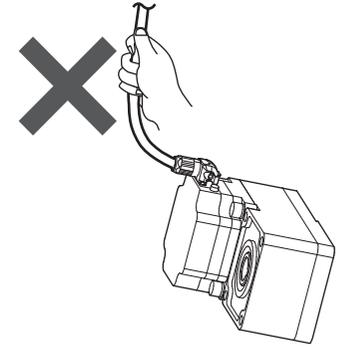
3 Secure

Secure the cable with the locking lever so that the cable does not come off.



Note

Do not lift the product by holding the connection cable. This may cause damage to the product.



■ Detaching the connection cable

If the locking lever is turned up, the cable can be detached.

Up to two connection cables for extension can be added for use. Refer to the operating manual of the driver.

■ Grounding

Use the Protective Earth Terminals (⊕) of the motor and driver and the ground terminal of the connection cable to ground.

Refer to the operating manual of the driver for the grounding method.



Be sure to ground the motor and the driver. Failure to do so may result in electric shock or damage to the product.
If not grounded, static electricity may damage the product.

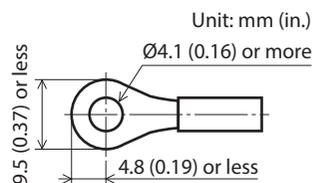
The grounding resistance specified in the standards applied to the equipment may not be satisfied depending on the type or length of the connection cable.

In this case, ground near the motor using the Protective Earth Terminal (⊕) of the motor.

When the ground terminal of the connection cable is not used, be sure to insulate it.

● Ground terminal

- Applicable crimp terminal: Round crimp terminal with insulation cover
- Terminal screw size: M4
- Tightening torque: 1.2 N·m (10.6 lb-in)
- Applicable lead wire: AWG 18 to 14 (0.75 to 2.0 mm²)



● Precautions about static electricity

Static electricity may cause the driver to malfunction or be damaged. Be sure to ground the motor and the driver to prevent damage from static electricity.



Refer to the operating manual of the driver for the operating method.

10.1 Lists of combinations

Check the model name against that on the nameplate.

■ Motors

● Pinion shaft type / Parallel shaft gearhead

Output power	Motor model	Applicable gearhead	
		Model	□: Gear ratio
30 W	BLM230HPM-GFV	GFV2G□S	5, 10, 15, 20, 30, 50, 100
60 W	BLM460SHPM-GFV	GFV4G□S	
120 W	BLM5120HPM-GFV	GFV5G□S	5, 10, 15, 20, 30, 50, 100, 200
200 W	BLM6200SHPM-GFV	GFV6G□S	

● Pinion shaft type / Hollow shaft flat gearhead

For details on the list of combinations and installation method, refer to p.23 and the following pages.

● Round shaft type

Output power	Motor model
30 W	BLM230HPM-AS
60 W	BLM260HPM-AS
120 W	BLM5120HPM-AS
200 W	BLM5200HPM-AS

● Round shaft type (With shaft flat)

Output power	Motor model
30 W	BLM230HPM-ACS
60 W	BLM260HPM-ACS
120 W	BLM5120HPM-ACS
200 W	BLM5200HPM-ACS

■ Drivers that can be combined

Products with which the motors can be combined are listed below.

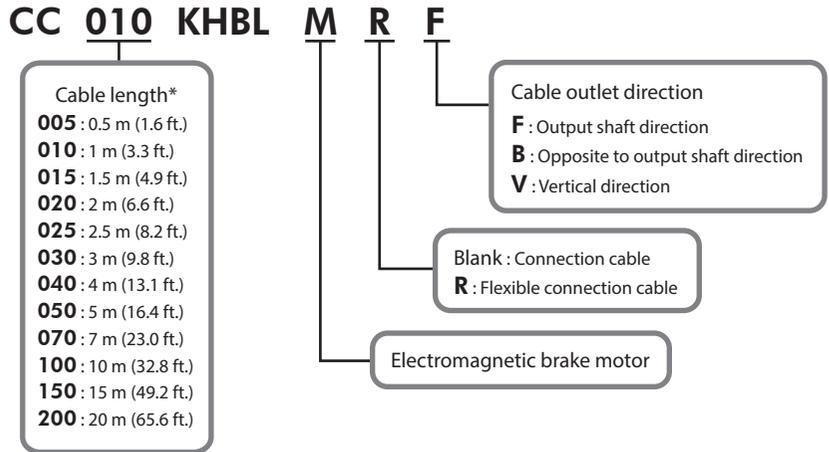
● BLE2 Series

Output power	Motor model	Driver model	
		Single-phase 100-120 VAC	Single-phase 200-240 VAC Three-phase 200-240 VAC
30 W	BLM230	BLE2D30-AM	BLE2D30-CM
60 W	BLM460S BLM260	BLE2D60-AM	BLE2D60-CM
120 W	BLM5120	BLE2D120-AM	BLE2D120-CM
200 W	BLM6200S BLM5200	BLE2D200-AM	BLE2D200-CM



■ Connection cables / Flexible connection cables (Sold separately)

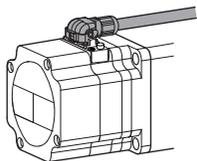
To connect a motor and a driver, the dedicated connection cable (sold separately) is required. The connection cables are provided up to 20 m (65.6 ft.).



* 0.5 m is only available for the connection cable.

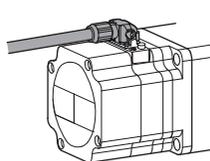
Output shaft direction:

CC__F



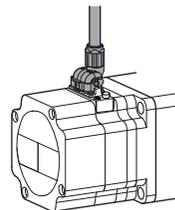
Opposite to output shaft direction:

CC__B



Vertical direction:

CC__V

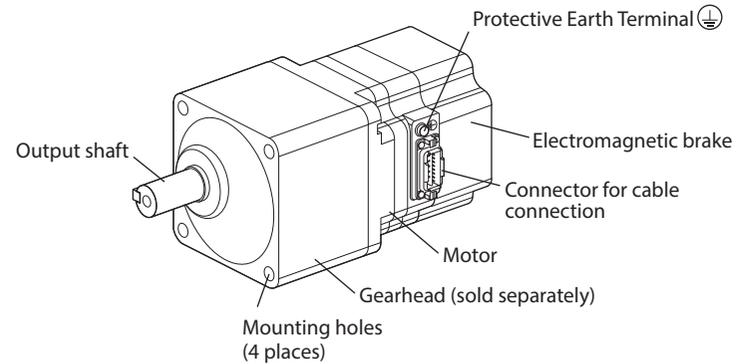


For the round shaft type, select the cable outlet direction considering the installation.

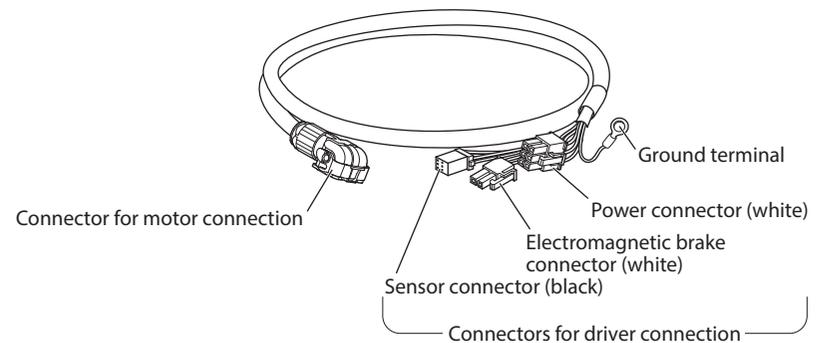
10.2 Names of parts

■ Motor

The figure shows the 120 W type.

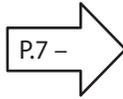


■ Connection cable / Flexible connection cable (Sold separately)



10.3 Installation method

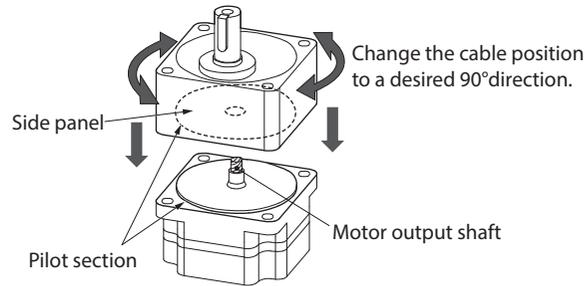
Installation location and specifications



Pinion shaft type motor / Parallel shaft gearhead

Assembling a motor and a gearhead

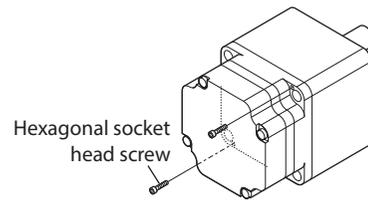
- Keep the pilot sections of the motor and gearhead in parallel, and assemble the gearhead with the motor while slowly rotating it clockwise/counterclockwise. At this time, note so that the pinion of the motor output shaft does not hit the side panel or gears of the gearhead strongly.



Assemble the gearhead to the motor in a condition where the motor output shaft is in an upward direction.

- Check that there is no gap between the motor and the gearhead, and tighten them using the hexagonal socket head screws (2 pieces) included with the gearhead.

Gearhead model	Screw size	Tightening torque [N·m (lb-in)]
GFV2G GFV4G	M2.6	0.4 (3.5)
GFV5G GFV6G	M3	0.6 (5.3)

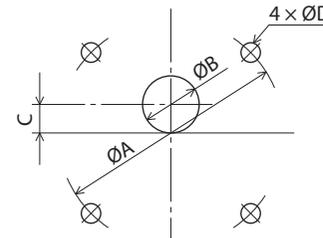


Note

- Do not forcibly assemble the motor and gearhead. Also, do not allow metal objects or foreign substances to enter the gearhead. The pinion of the motor output shaft or gear may be damaged, resulting in noise or reduction in service life.
- Do not allow dust to attach to the pilot sections of the motor and gearhead. Also, take care not to pinch the O-ring on the motor pilot section. If the O-ring is crushed or severed, grease may leak from the gearhead.

Installing to equipment

- Drill mounting holes in the mounting plate.

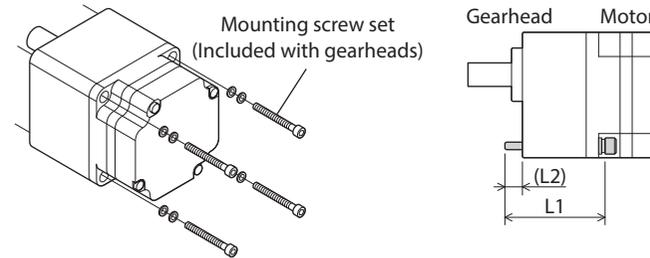


Unit: mm (in.)

Gearhead model	ØA	ØB*	C	ØD
GFV2G	70 (2.76)	24 (0.94)	10 (0.39)	4.5 (0.18)
GFV4G	94 (3.70)	34 (1.34)	13 (0.51)	6.5 (0.26)
GFV5G	104 (4.09)	40 (1.57)	18 (0.71)	8.5 (0.33)
GFV6G	120 (4.72)	42 (1.65)	20 (0.79)	8.5 (0.33)

* ØB indicates the external dimensions of the product. Drill holes with a minimum diameter of ØB + 1 mm (0.04 in.).

- Use the mounting screw set to tighten securely so that there is no gap between the product and the mounting plate to be installed. (4 places)



Gearhead model	□: Gear ratio	Hexagonal socket head screw (Material: Stainless steel)			Tightening torque [N·m (lb-in)]
		Screw size	L1 [mm (in.)]	L2 [mm (in.)]	
GFV2G□S	5 to 20	M4	50 (1.97)	6 (0.24)	1.4 (12.3)
	30 to 100		55 (2.17)	7 (0.28)	
GFV4G□S	5 to 20	M6	60 (2.36)	8 (0.31)	5.0 (44)
	30 to 100		65 (2.56)	8 (0.31)	
GFV5G□S	5 to 20	M8	70 (2.76)	11.5 (0.45)	12.0 (106)
	30 to 100		85 (3.35)	13.5 (0.53)	
	200		90 (3.54)	12.5 (0.49)	
GFV6G□S	5 to 20	M8	85 (3.35)	11 (0.43)	12.0 (106)
	30, 50		100 (3.94)	14 (0.55)	
	100, 200		110 (4.33)	10 (0.39)	

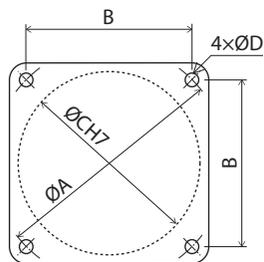
■ Round shaft type motor

● Installing to equipment

Install the motor on a mounting plate of the following size or larger, so that the motor case temperature does not exceed 90 °C (194 °F).

Motor model	Size of heat sink [mm (in.)]	Thickness [mm (in.)]	Material
BLM230	115×115 (4.53×4.53)	5 (0.20)	Aluminum alloy
BLM260	135 × 135 (5.31 × 5.31)		
BLM5120	165×165 (6.50×6.50)		
BLM5200	200 × 200 (7.87 × 7.87)		

1. Drill mounting holes in the mounting plate.



Unit: mm (in.)

Motor model	ØA	B	ØCH7	ØD
BLM230 BLM260	70 (2.75)	49.5 (1.95)	$54^{+0.030}_0$ ($2.1260^{+0.0012}_0$)	4.5 (0.18)
BLM5120 BLM5200	104 (4.09)	73.54 (2.90)	$83^{+0.030}_0$ ($3.2677^{+0.0012}_0$)	8.5 (0.33)

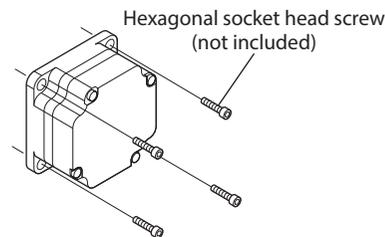
ØC indicates the pilot diameter on the flange.

2. Secure the motor using the hexagonal socket head screws (not included) through the four mounting holes. Install so that there is no gap between the product and the mounting plate.

Applicable mounting screws

Motor model	Screw size	Tightening torque [N·m (lb-in)]
BLM230 BLM260	M4	1.8 (15.9) [1.4 (12.3)]
BLM5120 BLM5200	M8	15.5 (137) [12.0 (106)]

* The value in the brackets [] indicates when the material is stainless steel.



Do not install the motor to the mounting hole diagonally or assemble the motor forcibly. Doing so may cause damage to the flange pilot section, thereby resulting in damage to the motor.

■ Installing a load

When installing a load on the motor or the gearhead, pay attention to the following points.

- Align the center axis of the motor output shaft or the gearhead output shaft with that of the load.
- A key slot is provided on the output shaft of the gearhead. Make a key slot on the load side and secure the load using the parallel key.

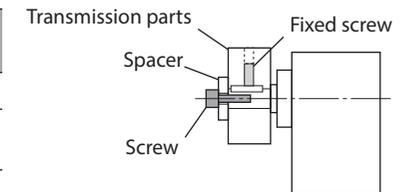


- When coupling the motor or the gearhead with a load, pay attention to centering, belt tension, parallelism of pulleys, etc. Also, firmly secure the tightening screws of the coupling or pulleys.
- When installing a load, do not damage the motor output shaft (gearhead output shaft) or bearings. Installing the load forcibly with a hammer or the like may break the bearings. Do not apply any excessive force to the output shaft.
- Do not modify or machine the output shaft of the motor or gearhead. This may damage the bearing, resulting in damage to the motor or gearhead.

When using the output shaft end tapped hole of a gearhead (Excluding GFV2G)

Use a tapped hole provided at the end of the output shaft as an auxiliary means to prevent the transfer mechanism from disengaging.

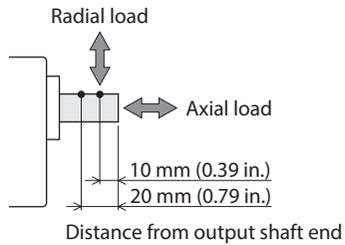
Gearhead model	Screw size	Effective depth of screw [mm (in.)]
GFV4G	M5	10 (0.39)
GFV5G GFV6G	M6	12 (0.47)



■ Permissible radial load and permissible axial load

Make sure that the radial load and axial load applied to the output shaft of the motor and gearhead do not exceed the permissible values shown in the table below.

Note Failure due to fatigue may occur when the motor or gearhead bearings and output shaft are repeatedly subjected to a radial or axial load that exceeds the permissible limit.



● Pinion shaft type electromagnetic brake motor / Parallel shaft gearhead

Gearhead model	□: Gear ratio	Permissible radial load [N (lb.)]* Distance from output shaft end of the gearhead		Permissible axial load [N (lb.)]
		10 mm (0.39 in.)	20 mm (0.79 in.)	
GFV2G□S	5	100 (22) [90 (20)]	150 (33) [110 (24)]	40 (9.0)
	10 to 20	150 (33) [130 (29)]	200 (45) [170 (38)]	
	30 to 100	200 (45) [180 (40)]	300 (67) [230 (51)]	
GFV4G□S	5	200 (45) [180 (40)]	250 (56) [220 (49)]	100 (22)
	10 to 20	300 (67) [270 (60)]	350 (78) [330 (74)]	
	30 to 100	450 (101) [420 (94)]	550 (123) [500 (112)]	
GFV5G□S	5	300 (67) [230 (51)]	400 (90) [300 (67)]	150 (33)
	10 to 20	400 (90) [370 (83)]	500 (112) [430 (96)]	
	30 to 200	500 (112) [450 (101)]	650 (146) [550 (123)]	
GFV6G□S	5 to 20	550 (123) [500 (112)]	800 (180) [700 (157)]	200 (45)
	30, 50	1000 (220) [900 (200)]	1250 (280) [1100 (240)]	
	100, 200	1400 (310) [1200 (270)]	1700 (380) [1400 (310)]	

* The values are based on a rated speed of 3000 r/min or less. The values in brackets [] are based on a speed of 4000 r/min.

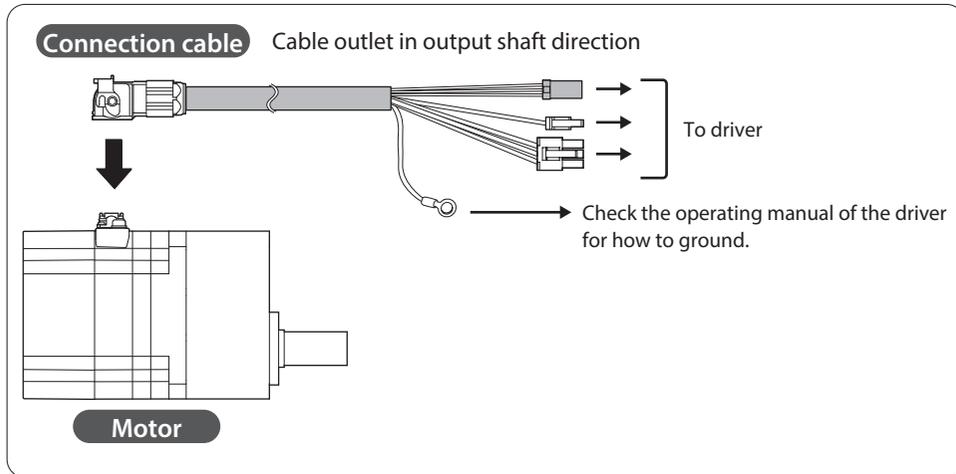
● Round shaft type motor

Motor model	Permissible radial load [N (lb.)] Distance from output shaft end of the motor		Permissible axial load [N (lb.)]
	10 mm (0.39 in.)	20 mm (0.79 in.)	
BLM230 BLM260	80 (18)	100 (22)	20 (4.5)
BLM5120 BLM5200	150 (33)	170 (38)	25 (5.6)

10.4 Connection and grounding

■ Connecting a motor and a driver

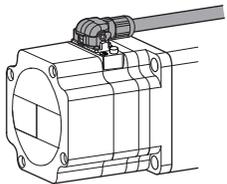
Use a connection cable (sold separately) to connect the a motor and a driver.
There are three types of connection cables with different cable outlet directions.



[Cable outlet direction]

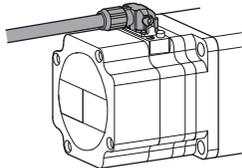
Cable outlet in output shaft direction

CC__F



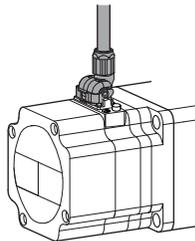
Cable outlet opposite to output shaft direction

CC__B



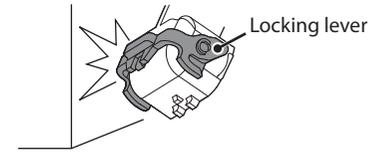
Cable outlet in vertical direction

CC__V

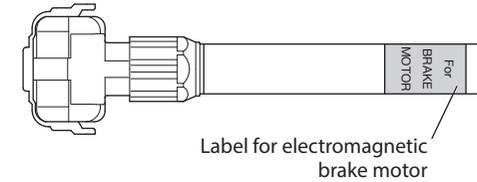


Note

- Do not apply a strong force to the locking lever of the connector for motor connection. Applying a strong force to the locking lever may cause damage.



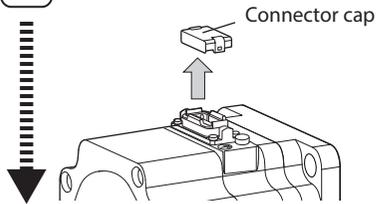
- For the electromagnetic brake motor, use the connection cable that is labeled for electromagnetic brake motor. Failure to do so may result in damage to the product.



■ Connection procedure of motor and connection cable

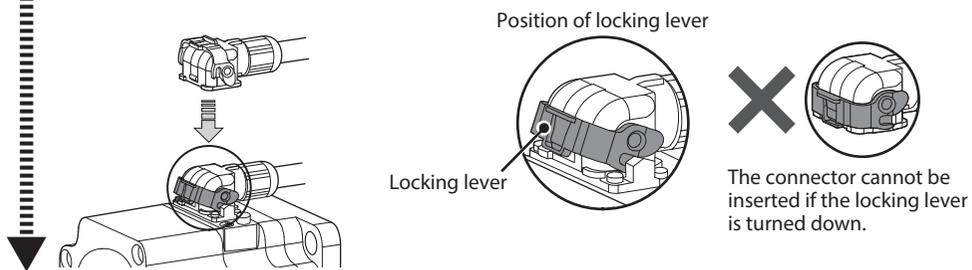
The following explains "cable outlet in output shaft direction" as an example.

1 Remove



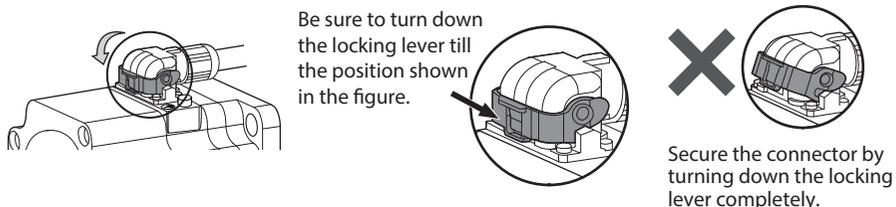
2 Attach

Check the cable outlet direction and insert the connector securely.



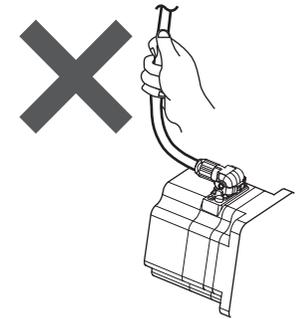
3 Secure

Secure the cable with the locking lever so that the cable does not come off.



Note

Do not lift the product by holding the connection cable. This may cause damage to the product.



■ Detaching the connection cable

If the locking lever is turned up, the cable can be detached.

Up to two connection cables for extension can be added for use. Refer to the operating manual of the driver.

■ Grounding

Use the Protective Earth Terminals (⊕) of the motor and driver and the ground terminal of the connection cable to ground.

Refer to the operating manual of the driver for the grounding method.

Note Be sure to ground the motor and the driver. Failure to do so may result in electric shock or damage to the product.
If not grounded, static electricity may damage the product.

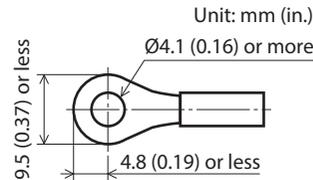
The grounding resistance specified in the standards applied to the equipment may not be satisfied depending on the type or length of the connection cable.

In this case, ground near the motor using the Protective Earth Terminal (⊕) of the motor.

When the ground terminal of the connection cable is not used, be sure to insulate it.

● Ground terminal

- Applicable crimp terminal: Round crimp terminal with insulation cover
- Terminal screw size: M4
- Tightening torque: 1.2 N·m (10.6 lb-in)
- Applicable lead wire: AWG 18 to 14 (0.75 to 2.0 mm²)



● Precautions about static electricity

Static electricity may cause the driver to malfunction or be damaged. Be sure to ground the motor and the driver to prevent damage from static electricity.

10.5 Accessories

Couplings and mounting brackets can be checked on the Oriental Motor Website.

About the mounting brackets (SOL) of the motor

When a mounting bracket and a motor are assembled, install the motor on the bracket in a state where the position of the connector for motor connection is on the top or side of the motor. It is not recommended to install the motor in a state where the position of the motor cable is under the motor as it will come in contact with the mounting bracket or the installation surface.



Refer to the operating manual of the driver for the operating method.

11. H1 food grade grease used

The gearhead uses the NSF registered H1 food-grade lubricant (grease).

The installation and connection information is the same as for the connector type. Refer to p.11 and the following pages for details.

11.1 Lists of combinations

Check the model name against that on the nameplate.

Motor

Pinion shaft type motor / Parallel shaft gearhead

Output power	Motor model	Applicable gearhead	
		Model	□: Gear ratio
30 W	BLM230HP-GFV	GFV2G□SF	5, 10, 15, 20, 30, 50, 100, 200
60 W	BLM460SHP-GFV	GFV4G□SF	
120 W	BLM5120HP-GFV	GFV5G□SF	



When replacing the gearhead, check the model name described on the nameplate of the gearhead and be sure to use the product with an **F** at the end of the model name.

Drivers that can be combined

Products with which the motors can be combined are listed below.

BMU Series

Output power	Motor model	Driver model	
		Single-phase 100-120 VAC	Single-phase 200-240 VAC Three-phase 200-240 VAC
30 W	BLM230	BMUD30-A2	BMUD30-C2
60 W	BLM460S	BMUD60-A2	BMUD60-C2
120 W	BLM5120	BMUD120-A2	BMUD120-C2



BLE2 Series

Output power	Motor model	Driver model	
		Single-phase 100-120 VAC	Single-phase 200-240 VAC Three-phase 200-240 VAC
30 W	BLM230	BLE2D30-A	BLE2D30-C
60 W	BLM460S	BLE2D60-A	BLE2D60-C
120 W	BLM5120	BLE2D120-A	BLE2D120-C



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