Brushless Motors/AC Speed Control Motors

Brushless Motors

Product Line of Brushless Motors

The specifications and functions of each series are introduced in the lists below.
Use these for your series selection.

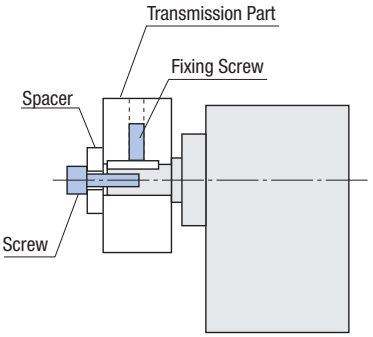
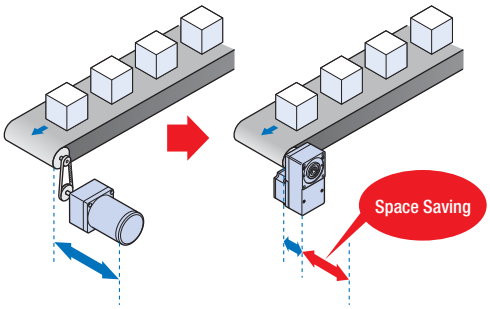
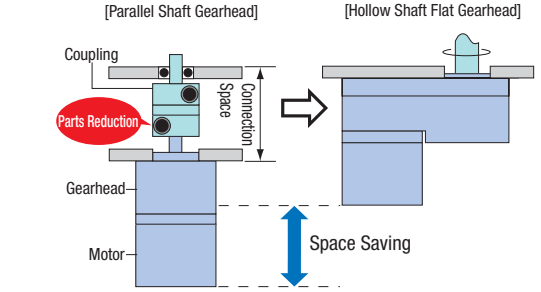
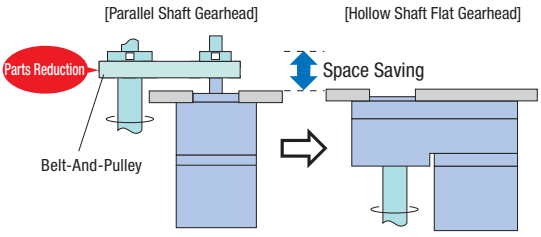
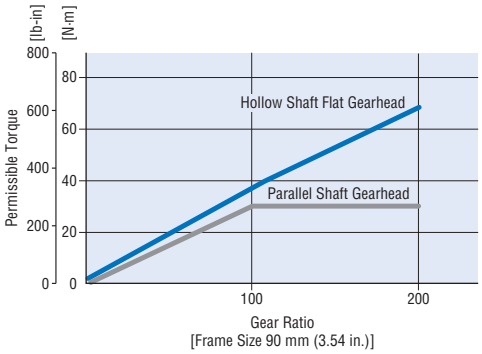
Classification		AC Power Supply Input		
Series		Higher functionality and performance		
		High power, speed and position control **BX** Series		High power and digital potentiometer basic mounting **BLF** Series
		Standard Model	Standard Model＋Control Module	
				
Page		▶ Page D-18		▶ Page D-60
Features		● High speed stability, high performance, high functionality ● Vertical Operation (gravitational operation)	● Increased functionality from the basic model; capable of multistep speed-change operation, position control and torque limiting	● The mounted digital operator enables digital setting and display ● High-power motor lineup with a max. of 4000 r/min
Power Supply Input		Single-Phase 100-115 VAC Single-Phase 200-230 VAC Three-Phase 200-230 VAC		Single-Phase 100-120 VAC Single-Phase 200-240 VAC Three-Phase 200-240 VAC
Output Power	Frame Size 42 mm (1.65 in.)	–		–
	Frame Size 60 mm (2.36 in.)	30 W (1/25 HP)		30 W (1/25 HP)
	Frame Size 80 mm (3.15 in.)	60 W (1/12 HP)		60 W (1/12 HP)
	Frame Size 90 mm (3.54 .in)	120 W (1/6 HP)		120 W (1/6 HP)
	Frame Size 104 mm (4.09 in.)	200 W (1/4 HP)/400 W (1/2 HP)		200 W (1/4 HP)/400 W (1/2 HP)
Speed Control Range	[r/min] 4000 / 3000 / 2000 / 0	30～3000 r/min	3～3000 r/min	80～4000 r/min
Speed Ratio		100 : 1	1000 : 1	50 : 1
Speed Regulation (Load)		±0.05%	±0.05%	±0.2%
Speed Setting Method	Potentiometer	Internal/External Speed Potentiometer	Internal/External Speed Potentiometer	Internal/External Speed Potentiometer
	Digital Setting	–	●	●
	External DC Voltage	●	●	●
Functions	Digital Speed Indicator	–	●	●
	Instantaneous Stop	●	●	●
	Acceleration/Deceleration Operation	●	●	●
	Multi-Speed Operation	2 Speeds	8 Speeds	8 Speeds
	Load Holding/ Gravitational Operation	● Electromagnetic Brake Type	● Electromagnetic Brake Type	–
	Multi-Motor Control	●	●	●
	Protective Function	●	●	●
	Sink/Source Select Input	–	–	●
	Maximum Extension Distance	20.4 m (66.9 ft.)	20.4 m (66.9 ft.)	20.4 m (66.9 ft.)
	Others	–	Position Control Torque Limiting	–
Gearheads	Parallel Shaft Gearhead	●	●	●
	Hollow Shaft Flat Gearhead	●	●	●
Safety Standards		c UL us CE	c UL us CE	Motor: c UL us CE Driver: c UL LISTED us CE
RoHS Directive		RoHS	RoHS	RoHS

AC Power Supply Input			DC Power Supply Input		
Standard Model		Easier and simpler	24 VDC Input	24 VDC/48 VDC Input	
BLE Series		Analog speed setting with the potentiometer **BLU** Series	**BLH** Series	**BLV** Series	
Standard Model	Standard Model + Control Module			Standard Model	Standard Model + Control Module
					
▶ Page D-84		▶ Page D-114	▶ Page D-132	▶ Page D-148	
● The standard unit has a max. of 4000 r/min ● Wide Variation ● CC-Link-Compatible Lineup	● Increased functionality from the basic model; capable of multistep speed-change operation and torque limiting	● Adjust speed with potentiometer on front panel ● Panel Mounted Driver ● Easy Setting, Easy Operation	● Small Board Driver ● 24 VDC Input	● High Power ● Network Compatible (RS-485 Communication)	
Single-Phase 100-120 VAC Single-Phase 200-240 VAC Three-Phase 200-240 VAC		Single-Phase 100-115 VAC Single-Phase 200-230 VAC Three-Phase 200-230 VAC	24 VDC	24 VDC/48 VDC	
–		–	15 W (1/50 HP)	–	
30 W (1/25 HP)		20 W (1/38 HP)	30 W (1/25 HP)	–	
60 W (1/12 HP)		40 W (1/19 HP)	50 W (1/15 HP)	–	
120 W (1/6 HP)		90 W (1/8 HP)	100 W (1/8 HP)	–	
–		–	–	200 W (1/4 HP)/400 W (1/2 HP)	
100～4000 r/min	80～4000 r/min	100～2000 r/min	100～3000 r/min	100～4000 r/min	80～4000 r/min
					
40 : 1	50 : 1	20 : 1	30 : 1	40 : 1	50 : 1
±0.5%	±0.2%	±0.5%	±0.5%	±0.5%	±0.2%
Internal/External Speed Potentiometer	Internal/External Speed Potentiometer	●	Internal/External Speed Potentiometer	Internal/External Speed Potentiometer	
–	●	–	–	–	●
●	●	–	●	●	●
SDM496	●	SDM496	SDM496	SDM496	●
●	●	●	●	●	●
●	●	●	●	●	●
2 Speeds	8 Speeds	–	2 Speeds (Internal/External switching)	2 Speeds	8 Speeds
● Electromagnetic Brake Type	● Electromagnetic Brake Type	–	–	● Electromagnetic Brake Type	● Electromagnetic Brake Type
●	●	–	●	●	●
●	●	●	●	●	●
●	●	●	–	●	●
20.4 m (66.9 ft.)	20.4 m (66.9 ft.)	10.5 m (34.4 ft.)	2 m (6.6 ft.)	3.5 m (11.5 ft.)	3.5 m (11.5 ft.)
–	Torque Limiting	–	–	Torque Limiting	Torque Limiting
●	●	●	●	●	●
●	●	●	● [Except for 15 W (1/50 HP)]	●	●
c UL us CE	c UL us CE	c UL us CE	c UL us CE	CE	
RoHS	RoHS	RoHS	RoHS	RoHS	

SDM496 :Possible when a speed indicator (**SDM496**, accessory) is used.

Types and Features of Gearheads

These are high-strength gearheads that are compatible with the high speed and high power of brushless motors.
The two types include parallel shaft gearheads and hollow shaft flat gearheads.
Both types are available as a combination type pre-assembled with a motor.

Types	Features
Parallel Shaft Gearhead	**●High-Strength Gearhead** High strength is achieved through improving the strength of gears through heat treatment and through larger bearing diameters. The high permissible torque is 2 to 3 times that of a gearhead for an AC motor with the same frame size, and this contributes to reducing the size of equipment. **●Long-Life** The **GFS** gearhead is a long life gearhead that uses a special bearing as well as grease for high-speed rotation. The rated life is twice that of a conventional model at 10000 hours. **●Tapped Hole at the Shaft End** The 80 mm (3.15 in.), 90 mm (3.54 in.), and 104 mm (4.09 in.) gearheads come with a tapped hole at the shaft end. This can be used as an aid for preventing transmission parts from coming off.  Example of Using the Output Shaft End Tapped Hole
Hollow Shaft Flat Gearhead	**●Space Saving** Direct connection to the drive shaft is possible without using a connecting part which enables equipment space saving.  **●Low Cost** By eliminating parts such as a coupling or belt-and-pulley, the parts cost and labor will also decrease.  	**●High Permissible Torque, Long Life** High permissible torque and long life are achieved through improved gear case rigidity and larger diameters for gears and bearings. A rated life of 10000 hours is achieved.  **●Permissible Torque without Saturation** The hollow shaft flat gearhead enables permissible torque without saturation even at high gear ratios. The motor torque can be fully utilized. 

How to Read Specifications

How to Read Specifications

Specifications Table (Example) **BLF** Series

Model	Combination Type – Parallel Shaft Gearhead		**BLF460A-□**	**BLF460C-□**	**BLF460S-□**
	Combination Type – Hollow Shaft Flat Gearhead		**BLF460A-□FR**	**BLF460C-□FR**	**BLF460S-□FR**
	Round Shaft Type		**BLF460A-A**	**BLF460C-A**	**BLF460S-A**
① Rated Output Power (Continuous)		W (HP)	60 (1/12)		
Power Source	Rated Voltage	VAC	Single-Phase 100-120	Single-Phase 200-240	Three-Phase 200-240
	Permissible Voltage Range		±10%		
	Rated Frequency	Hz	50/60		
	Permissible Frequency Range		±5%		
	Rated Input Current	A	2.0	1.2	0.7
②	Maximum Input Current	A	4.5	3.0	1.5
③ Rated Torque		N·m (oz-in)	0.2 (28)		
④ Starting Torque		N·m (oz-in)	0.4 (56)		
⑤ Rated Speed		r/min	3000		
⑥ Speed Control Range		r/min	80～4000		
⑦ Round Shaft Type Permissible Load Inertia J		×10^{-4} kg·m^2 (oz-in^2)	3.75 (21)		
Rotor Inertia J		×10^{-4} kg·m^2 (oz-in^2)	0.24 (1.31)		
⑧ Speed Regulation (When digital operator is used)	Load		±0.2% max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage		±0.2% max. (Rated voltage ±10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature		±0.2% max. [0～+50°C (+32～+122°F), at rated speed, with no load, at rated voltage]		

① Rated Output Power: This refers to, with the combination of motor and driver, the amount of work that can be performed by a motor in a given period of time. It also expresses the maximum output that can be generated continuously.
② Maximum Input Current: This refers to, with the combination of motor and driver, the maximum current sent into the driver.
③ Rated Torque: This refers to, with the combination of motor and driver, the maximum torque created when they are in continuous operation.
④ Starting Torque: This refers to, with the combination of motor and driver, the limit of torque that can be generated instantaneously.
⑤ Rated Speed: This refers to, with the combination of motor and driver, the speed at rated output.
⑥ Speed Control Range: This refers to, with the combination of motor and driver, the range of variable speed.
⑦ Round Shaft Type Permissible Load Inertia J: This refers to, with the combination of motor and driver, the maximum load inertia that can be driven. The permissible load specified here is applicable only to round shaft type.
⑧ Speed Regulation: This shows how much the speed is affected by the change in load, voltage and temperature.

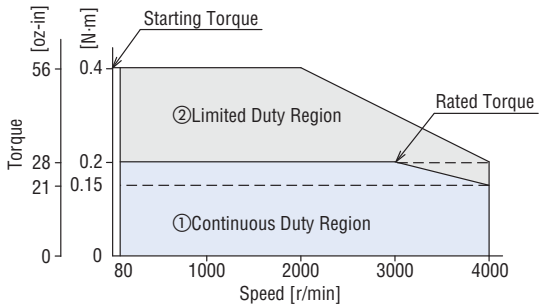
Permissible Overhung Load and Permissible Thrust Load of Motors

Similar to standard AC motors. Refer to "How to Read Motor Specifications" of constant speed motors.

● How to read motor specifications of constant speed motors ➜ Page C-12

How to Read Speed – Torque Characteristics

Speed – Torque Characteristics (Example) **BLF460A-A**



① Continuous Duty Region: This refers to the region where a motor can be operated continuously. The area is also used for the frictional load torque at the sliding portion of equipment.
② Limited Duty Region: This refers to the region which can be used for a short period of time. If operated for more than about five seconds in the limited duty region, the driver's overload protective function engages and the motor is automatically stopped. This area is also used as the acceleration torque which accelerates an inertial load up to the set speed at motor start-up.

How to Read Gearhead Specifications

Similar to standard AC motors. Refer to "How to Read Gearhead Specifications" of constant speed motors.

● How to read gearhead specifications of constant speed motors ➜ Page C-13

Brushless Motors/AC Speed Control Motors

Brushless Motors

AC Input

BX Series

●Additional Information●
Technical reference ➜ Page G-1
Safety standards ➜ Page H-2

The **BX** Series brushless motor and driver packages offer high performance and high function. The full lineup covers a wide output range from 30 W (1/25 HP) up to 400 W (1/2 HP). When used with a control module, the **BX** Series provides torque limiting, position control and other extended functions in addition to the high-performance speed control function offered by the standard model.

●For detailed product safety standard information including standards, file number and certification body, please visit www.orientalmotor.com.

Features

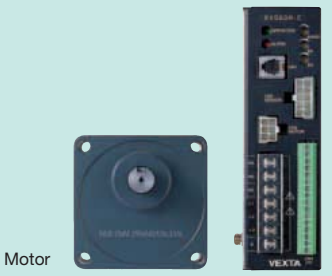
●Extended Functions to Meet Various Application Needs

In addition to the speed control function offered by the standard model, you can implement various other functions using a control module.

Standard Model — Speed Control

Standard Model + Control Module — Speed Control / Position Control / Torque Limiting

Standard Model



Control Module (Sold Separately)

You can extend the functions of the **BX** Series using an accessory control module. The following functions are available with the accessory control module:
· Digital speed setting (up to 8 speeds)
· Setting of positioning operation data (up to 6 data settings)
· Torque limit setting
· Various displays
OPX-1A: Speed (r/min), position counter (STEP), load factor (%), alarm codes, alarm history

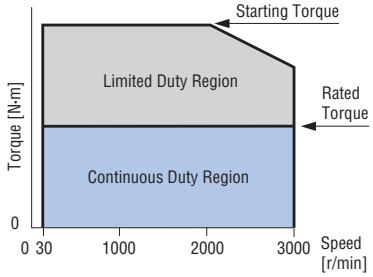
Control Module
OPX-1A
For additional function settings using a dedicated setting unit

Standard Model

You can control the motor speed using the driver's internal speed potentiometer or supplied external speed potentiometer.

●Wide Speed Control Range and Flat Torque

The **BX** Series offers a wide speed range of 30 to 3000 r/min and provides flat torque at all speeds from high to low. The high starting torque characteristics ensure ample torque at start and stop.

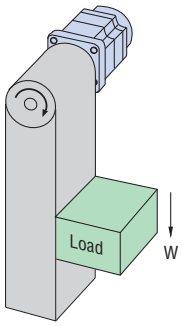


●Excellent Speed Stability

The **BX** Series offers highly accurate speed control, achieving an excellent speed regulation with respect to load.
Speed regulation: ±0.05% with respect to load
±0.05% with respect to voltage
±0.5% with respect to temperature
With the **BX** Series, rotational irregularity (flutter*) at medium and high speeds is also reduced substantially.
*"Flutter" refers to rotational irregularity caused by the motor structure, drive method used by the driver, and so on.

●Speed Control during Vertical Drive

A motor with an electromagnetic brake enables stable speed control even during vertical drive (gravitational operation). When the power is turned off, the motor stops instantaneously to hold the load in place. The electromagnetic brake is automatically controlled via the driver in accordance with ON/OFF of the operation command signal.



Note
●Regeneration energy generates during vertical drive. If the **BX** Series will be used in applications that require vertical drive, be sure to use a regeneration unit (sold separately).

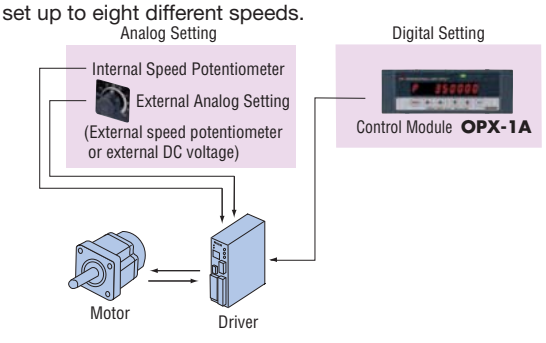
Standard Model + Control Module (Sold separately)

By using a control module, digital setting for speed can be performed and functions and characteristics can be extended beyond those of the standard model. In addition, positioning operations and torque limiting can also be performed.

Speed Control (When using a control module)

●Digital Speed Setting (Up to eight speeds)

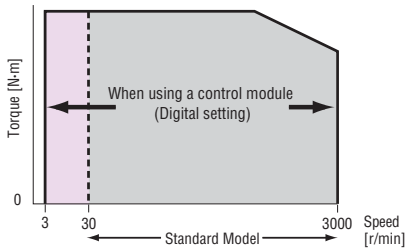
Speed can be set digitally using an accessory control module. You can set up to eight different speeds.



Number of speed settings: 8
(Standard model — Number of speed settings: 2)

●Speed Control Range of 3 to 3000 r/min

The digital speed setting function expands the speed control range to cover 3 to 3000 r/min.



●Improved Speed Control Accuracy

Standard model

±0.05% with respect to load
±0.05% with respect to voltage
±0.5% with respect to temperature

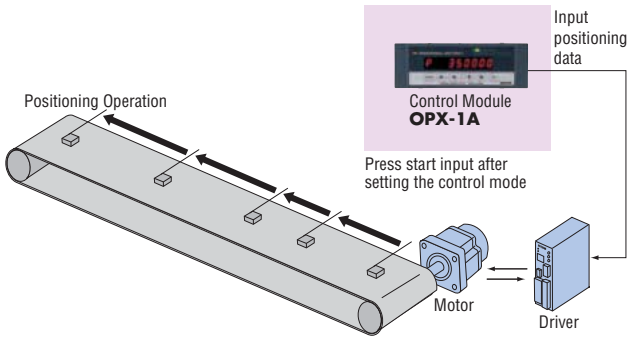
When using a control module (Digital setting)

±0.05% with respect to load
±0.05% with respect to voltage
±0.05% with respect to temperature

Position Control (When using a control module)

●Positioning Operation is Possible

Position control can be performed with the **BX** Series simply by setting data using an accessory control module. The resolution is 0.72° (500 pulses per rotation) and a maximum of six positioning data can be set.



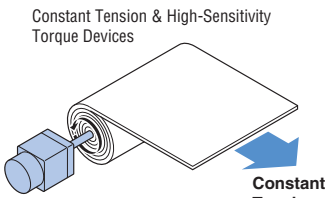
●Continuous Operation, Return to Home Operation

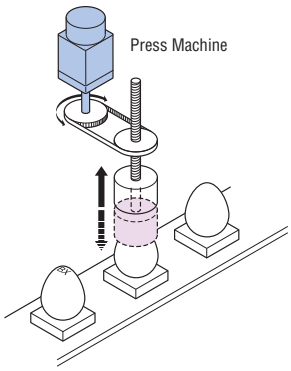
Two out of six positioning data can be set for continuous operation. Return to mechanical/electrical home operation can also be performed.

Torque Limiting (When using a control module)

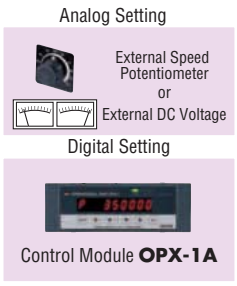
●Limiting the Motor Output Torque

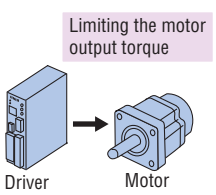
Use of an accessory control module enables torque limiting. The torque limiting function suppresses the motor output torque in accordance with the application and use condition.





●Analog Setting/Digital Setting





●High-Strength, Long Life Gearhead

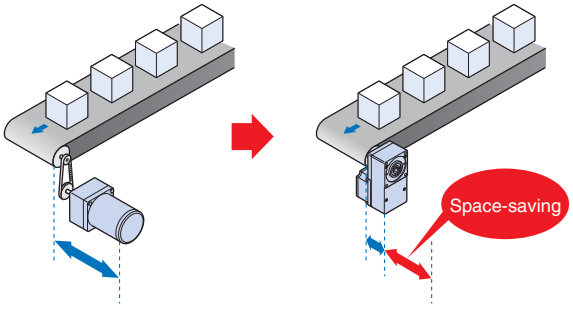
The high-strength gearheads used by the **BX** Series support high speeds. The parallel shaft gearheads of the 200 W (1/4 HP) and 400 W (1/2 HP) models are designed with a maximum permissible torque of 70 N·m (610 lb-in).
All gearheads have a rated life of 10000 hours, which corresponds to twice the life of our conventional gearhead. This reduces the need for maintenance.

- The parallel shaft gearheads for 60 W (1/12 HP), 120 W (1/6 HP), 200 W (1/4 HP) and 400 W (1/2 HP) have a tapped hole at the shaft end.

●Features of Hollow Shaft Flat Gearhead

◇Space-Saving and Low-Cost

The output shaft can be coupled directly to a driven shaft without using a coupling, which allows you to reduce the size and installation space of your equipment. Since no shaft-coupling parts are needed, the parts cost and labor will also decrease.

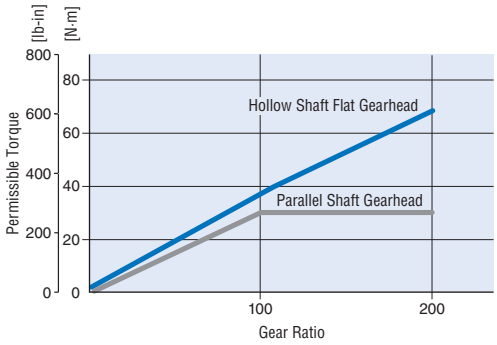


[For Three-Phase Motor and Parallel Shaft Gearhead]

[For Brushless Motor and Hollow Shaft Flat Gearhead]

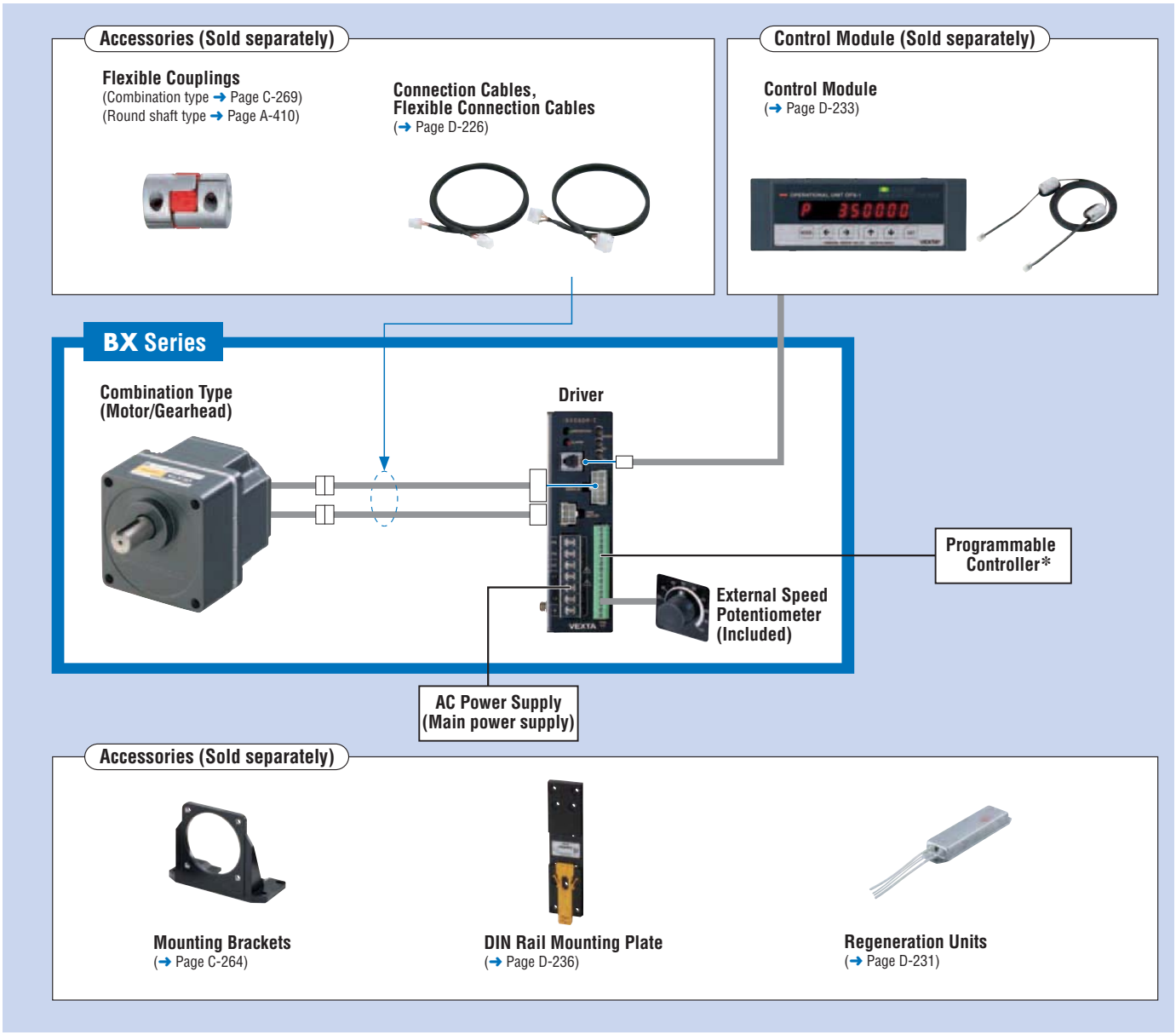
◇High Permissible Torque

The maximum permissible torque of the hollow shaft flat gearheads does not saturate at high gear ratios, which makes it suitable for applications where high torque is required.



[Frame Size: 90 mm (3.54 in.)]

System Configuration



●Example of System Configuration

BX Series Combination Type - Parallel Shaft	Sold Separately			
	Connection Cable [1 m (3.3 ft.)]	DIN Rail Mounting Plate	Mounting Bracket	Flexible Coupling
BX460A-30S	CC01SBF	PADP03	SOL4M6	MCL5515F10

● The system configuration shown above is an example. Other combinations are available.
*Not supplied

Product Number Code

BX 2 30 A M - 5 FR

① ② ③ ④ ⑤ ⑥ ⑦

①	Series	**BX**: **BX** Series
②	Motor 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.) [Gearhead Frame Size: 110 mm (4.33 in.)]
③	Output Power (W)	(Example) **30**: 30 W (1/25 HP)
④	Power Supply Voltage	**A**: Single-Phase 100-115 VAC **C**: Single-Phase, Three-Phase 200-230 VAC **S**: Three-Phase 200-230 VAC
⑤	**M**: Electromagnetic Brake Type	Blank: Standard
⑥	Gear Ratio/Shaft Type	Number: Gear ratio for combination types: 8 types from **5** to **200** **A**: Round Shaft Type
⑦	**S**: Combination Type – Parallel Shaft Gearhead **FR**: Combination Type – Hollow Shaft Flat Gearhead	

Product Line

Combination Type The combination type comes with the motor and its dedicated gearhead pre-assembled which simplifies installation in equipment. Motors and gearheads are also available separately to facilitate changes or repairs.

●Standard Type

◇Combination Type – Parallel Shaft Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
30 W (1/25 HP)	Single-Phase 100-115 VAC	**BX230A-□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase, Three-Phase 200-230 VAC	**BX230C-□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
60 W (1/12 HP)	Single-Phase 100-115 VAC	**BX460A-□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase, Three-Phase 200-230 VAC	**BX460C-□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
120 W (1/6 HP)	Single-Phase 100-115 VAC	**BX5120A-□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase, Three-Phase 200-230 VAC	**BX5120C-□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
200 W (1/4 HP)	Single-Phase 100-115 VAC	**BX6200A-□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase, Three-Phase 200-230 VAC	**BX6200C-□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
400 W (1/2 HP)	Three-Phase 200-230 VAC	**BX6400S-□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**

The following items are included in each product.
Motor, Gearhead, Driver, External Speed Potentiometer (with signal wire), Mounting Brackets for Driver (with screws), Mounting Screws, Parallel Key, Operating Manual

◇Round Shaft Type

Output Power	Power Supply Voltage	Model
30 W (1/25 HP)	Single-Phase 100-115 VAC	**BX230A-A**
	Single-Phase, Three-Phase 200-230 VAC	**BX230C-A**
60 W (1/12 HP)	Single-Phase 100-115 VAC	**BX460A-A**
	Single-Phase, Three-Phase 200-230 VAC	**BX460C-A**
120 W (1/6 HP)	Single-Phase 100-115 VAC	**BX5120A-A**
	Single-Phase, Three-Phase 200-230 VAC	**BX5120C-A**

The following items are included in each product.
Motor, Driver, External Speed Potentiometer (with signal wire), Mounting Brackets for Driver (with screws), Operating Manual

◇Combination Type – Hollow Shaft Flat Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
30 W (1/25 HP)	Single-Phase 100-115 VAC	**BX230A-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase, Three-Phase 200-230 VAC	**BX230C-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
60 W (1/12 HP)	Single-Phase 100-115 VAC	**BX460A-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase, Three-Phase 200-230 VAC	**BX460C-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
120 W (1/6 HP)	Single-Phase 100-115 VAC	**BX5120A-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase, Three-Phase 200-230 VAC	**BX5120C-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
200 W (1/4 HP)	Single-Phase 100-115 VAC	**BX6200A-□FR**	**10**, **15**, **20**, **30**, **50**, **100**
	Single-Phase, Three-Phase 200-230 VAC	**BX6200C-□FR**	**10**, **15**, **20**, **30**, **50**, **100**
400 W (1/2 HP)	Three-Phase 200-230 VAC	**BX6400S-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**

The following items are included in each product.
Motor, Gearhead, Driver, External Speed Potentiometer (with signal wire), Mounting Brackets for Driver (with screws), Mounting Screws, Parallel Key, Safety Cover (with screws), Operating Manual

Output Power	Power Supply Voltage	Model
200 W (1/4 HP)	Single-Phase 100-115 VAC	**BX6200A-A**
	Single-Phase, Three-Phase 200-230 VAC	**BX6200C-A**
400 W (1/2 HP)	Three-Phase 200-230 VAC	**BX6400S-A**

● Enter the gear ratio in the box (□) within the model name.

●With Electromagnetic Brake Type

◇Combination Type – Parallel Shaft Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
30 W (1/25 HP)	Single-Phase 100-115 VAC	**BX230AM-□S**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase, Three-Phase 200-230 VAC	**BX230CM-□S**	**5, 10, 15, 20, 30, 50, 100, 200**
60 W (1/12 HP)	Single-Phase 100-115 VAC	**BX460AM-□S**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase, Three-Phase 200-230 VAC	**BX460CM-□S**	**5, 10, 15, 20, 30, 50, 100, 200**
120 W (1/6 HP)	Single-Phase 100-115 VAC	**BX5120AM-□S**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase, Three-Phase 200-230 VAC	**BX5120CM-□S**	**5, 10, 15, 20, 30, 50, 100, 200**
200 W (1/4 HP)	Single-Phase 100-115 VAC	**BX6200AM-□S**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase, Three-Phase 200-230 VAC	**BX6200CM-□S**	**5, 10, 15, 20, 30, 50, 100, 200**
400 W (1/2 HP)	Three-Phase 200-230 VAC	**BX6400SM-□S**	**5, 10, 15, 20, 30, 50, 100, 200**

The following items are included in each product.
Motor, Gearhead, Driver, External Speed Potentiometer (with signal wire), Mounting Brackets for Driver (with screws), Mounting Screws, Parallel Key, Operating Manual

◇Round Shaft Type

Output Power	Power Supply Voltage	Model
30 W (1/25 HP)	Single-Phase 100-115 VAC	**BX230AM-A**
	Single-Phase, Three-Phase 200-230 VAC	**BX230CM-A**
60 W (1/12 HP)	Single-Phase 100-115 VAC	**BX460AM-A**
	Single-Phase, Three-Phase 200-230 VAC	**BX460CM-A**
120 W (1/6 HP)	Single-Phase 100-115 VAC	**BX5120AM-A**
	Single-Phase, Three-Phase 200-230 VAC	**BX5120CM-A**
200 W (1/4 HP)	Single-Phase 100-115 VAC	**BX6200AM-A**
	Single-Phase, Three-Phase 200-230 VAC	**BX6200CM-A**
400 W (1/2 HP)	Three-Phase 200-230 VAC	**BX6400SM-A**

The following items are included in each product.
Motor, Driver, External Speed Potentiometer (with signal wire), Mounting Brackets for Driver (with screws), Operating Manual

◇Combination Type – Hollow Shaft Flat Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
30 W (1/25 HP)	Single-Phase 100-115 VAC	**BX230AM-□FR**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase, Three-Phase 200-230 VAC	**BX230CM-□FR**	**5, 10, 15, 20, 30, 50, 100, 200**
60 W (1/12 HP)	Single-Phase 100-115 VAC	**BX460AM-□FR**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase, Three-Phase 200-230 VAC	**BX460CM-□FR**	**5, 10, 15, 20, 30, 50, 100, 200**
120 W (1/6 HP)	Single-Phase 100-115 VAC	**BX5120AM-□FR**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase, Three-Phase 200-230 VAC	**BX5120CM-□FR**	**5, 10, 15, 20, 30, 50, 100, 200**
200 W (1/4 HP)	Single-Phase 100-115 VAC	**BX6200AM-□FR**	**10, 15, 20, 30, 50, 100**
	Single-Phase, Three-Phase 200-230 VAC	**BX6200CM-□FR**	**10, 15, 20, 30, 50, 100**
400 W (1/2 HP)	Three-Phase 200-230 VAC	**BX6400SM-□FR**	**5, 10, 15, 20, 30, 50, 100**

The following items are included in each product.
Motor, Gearhead, Driver, External Speed Potentiometer (with signal wire), Mounting Brackets for Driver (with screws), Mounting Screws, Parallel Key, Safety Cover (with screws), Operating Manual

●Control Module

Model
OPX-1A

●With dedicated cable [2 m (6.6 ft.)]

●Enter the gear ratio in the box (□) within the model name.

Specifications

Standard Type

◇30 W (1/25 HP), 60 W (1/12 HP) RoHS

Model	Combination Type – Parallel Shaft Gearhead		BX230A-□S	BX230C-□S	BX460A-□S	BX460C-□S
	Combination Type – Hollow Shaft Flat Gearhead		BX230A-□FR	BX230C-□FR	BX460A-□FR	BX460C-□FR
	Round Shaft Type		BX230A-A	BX230C-A	BX460A-A	BX460C-A
Rated Output Power (Continuous)		W (HP)	30 (1/25)		60 (1/12)	
Power Source	Rated Voltage	VAC	Single-Phase 100-115	Single-Phase, Three-Phase 200-230	Single-Phase 100-115	Single-Phase, Three-Phase 200-230
	Permissible Voltage Range		−15～+10%			
	Rated Frequency	Hz	50/60			
	Permissible Frequency Range		±5%			
	Rated Input Current	A	1.4	Single-Phase 0.8, Three-Phase 0.5	2.2	Single-Phase 1.4, Three-Phase 0.7
	Maximum Input Current	A	2.4	Single-Phase 1.6, Three-Phase 0.8	3.5	Single-Phase 2.2, Three-Phase 1.2
Rated Torque		N·m (oz-in)	0.1 (14.2)		0.2 (28)	
Starting Torque*1		N·m (oz-in)	0.2 (28)		0.4 (56)	
Rated Speed		r/min	3000			
Speed Control Range		r/min	30～3000 (Analog setting), 3～3000 (Digital setting: can be set in 1 r/min increments)*2			
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	1.5 (8.2)		3 (16.4)	
Rotor Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	0.087 (0.48)		0.24 (1.31)	
Speed Regulation	Load		±0.05% max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)			
	Voltage		±0.05% max. (Rated voltage −15～+10%, at rated speed, with no load, at normal ambient temperature)			
	Temperature		±0.5% (±0.05%)*2 max. [0～+50℃ (+32～+122℉), at rated speed, with no load, at rated voltage]			

*1 The time during which the starting torque is effective is no more than five seconds and at 2000 r/min or below.
*2 This specification applies when a control module **OPX-1A** is used (the figure applies to both the speed control mode and position control mode).
● The values for each specification apply to the motor only.

◇120 W (1/6 HP), 200 W (1/4 HP), 400 W (1/2 HP) RoHS

Model	Combination Type – Parallel Shaft Gearhead		BX5120A-□S	BX5120C-□S	BX6200A-□S	BX6200C-□S	BX6400S-□S
	Combination Type – Hollow Shaft Flat Gearhead		BX5120A-□FR	BX5120C-□FR	BX6200A-□FR	BX6200C-□FR	BX6400S-□FR
	Round Shaft Type		BX5120A-A	BX5120C-A	BX6200A-A	BX6200C-A	BX6400S-A
Rated Output Power (Continuous)		W (HP)	120 (1/6)		200 (1/4)		400 (1/2)
Power Source	Rated Voltage	VAC	Single-Phase 100-115	Single-Phase, Three-Phase 200-230	Single-Phase 100-115	Single-Phase, Three-Phase 200-230	Three-Phase 200-230
	Permissible Voltage Range		−15～+10%				
	Rated Frequency	Hz	50/60				
	Permissible Frequency Range		±5%				
	Rated Input Current	A	3.7	Single-Phase 2.3, Three-Phase 1.1	4.7	Single-Phase 2.8, Three-Phase 1.7	2.8
	Maximum Input Current	A	6.7	Single-Phase 4.1, Three-Phase 2.0	9.0	Single-Phase 5.3, Three-Phase 3.2	4.4
Rated Torque		N·m (oz-in)	0.4 (56)		0.65 (92)		1.3 (184)
Starting Torque*1		N·m (oz-in)	0.8 (113)		1.3 (184)		2.6 (360)
Rated Speed		r/min	3000				
Speed Control Range		r/min	30～3000 (Analog setting), 3～3000 (Digital setting: can be set in 1 r/min increments)*2				
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	6 (33)		10 (55)		17.5 (96)
Rotor Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	0.63 (3.4)		0.66 (3.6)		0.66 (3.6)
Speed Regulation	Load		±0.05% max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)				
	Voltage		±0.05% max. (Rated voltage −15～+10%, at rated speed, with no load, at normal ambient temperature)				
	Temperature		±0.5% (±0.05%)*2 max. [0～+50℃ (+32～+122℉), at rated speed, with no load, at rated voltage]				

*1 The time during which the starting torque is effective is no more than five seconds and at 2000 r/min or below.
*2 This specification applies when a control module **OPX-1A** is used (the figure applies to both the speed control mode and position control mode).
● The values for each specification apply to the motor only.

● Enter the gear ratio in the box (□) within the model name.

●With Electromagnetic Brake Type

◇30 W (1/25 HP), 60 W (1/12 HP) RoHS

Model			BX230AM-□S	BX230CM-□S	BX460AM-□S	BX460CM-□S
	Combination Type – Hollow Shaft Flat Gearhead		BX230AM-□FR	BX230CM-□FR	BX460AM-□FR	BX460CM-□FR
	Round Shaft Type		BX230AM-A	BX230CM-A	BX460AM-A	BX460CM-A
Rated Output Power (Continuous)		W (HP)	30 (1/25)		60 (1/12)	
Power Source	Rated Voltage	VAC	Single-Phase 100-115	Single-Phase, Three-Phase 200-230	Single-Phase 100-115	Single-Phase, Three-Phase 200-230
	Permissible Voltage Range		−15～+10%			
	Rated Frequency	Hz	50/60			
	Permissible Frequency Range		±5%			
	Rated Input Current	A	1.4	Single-Phase 0.8, Three-Phase 0.5	2.2	Single-Phase 1.4, Three-Phase 0.7
	Maximum Input Current	A	2.4	Single-Phase 1.6, Three-Phase 0.8	3.5	Single-Phase 2.2, Three-Phase 1.2
Rated Torque		N·m (oz-in)	0.1 (14.2)		0.2 (28)	
Starting Torque*1		N·m (oz-in)	0.2 (28)		0.4 (56)	
Rated Speed		r/min	3000			
Speed Control Range		r/min	30～3000 (Analog setting), 3～3000 (Digital setting: can be set in 1 r/min increments)*2			
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	1.5 (8.2)		3 (16.4)	
Rotor Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	0.087 (0.48)		0.24 (1.31)	
Speed Regulation	Load		±0.05% max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)			
	Voltage		±0.05% max. (Rated voltage −15～+10%, at rated speed, with no load, at normal ambient temperature)			
	Temperature		±0.5% (±0.05%)*2 max. [0～+50°C (+32～+122°F), at rated speed, with no load, at rated voltage]			
Gravitational Operation Ability	Continuous Regenerative Power	W (HP)	100 (1/8)			
	Instantaneous Regenerative Power	W (HP)	240 (1/3)			
	Applicable Regeneration Unit*3		EPRC-400P			
Electromagnetic Brake*4	Brake Type		Active when the power is off, automatically controlled by the driver			
	Static Friction Torque	N·m (oz-in)	0.1 (14.2)		0.2 (28)	

*1 The starting torque can be used for a maximum duration of approximately five seconds at 2000 r/min or less.
*2 This specification applies when a control module **OPX-1A** is used (the figure applies to both the speed control mode and position control mode).
*3 Install the regeneration unit in the place which has the same heat radiation capability as heat radiation plate [material: aluminum 350×350 mm (13.8×13.8 in.), 3 mm (0.12 in.) thick].
*4 Do not start or stop the motor by turning on/off the power supply, as it will cause the electromagnetic brake to wear abnormally.
● The values for each specification apply to the motor only.

◇120 W (1/6 HP), 200 W (1/4 HP), 400 W (1/2 HP) RoHS

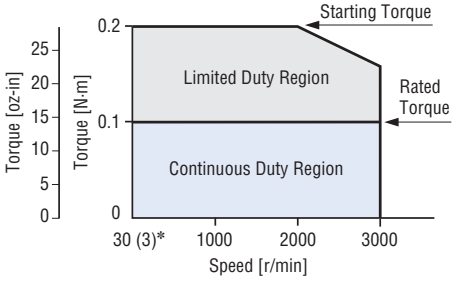
Model			BX5120AM-□S	BX5120CM-□S	BX6200AM-□S	BX6200CM-□S	BX6400SM-□S
	Combination Type – Hollow Shaft Flat Gearhead		BX5120AM-□FR	BX5120CM-□FR	BX6200AM-□FR	BX6200CM-□FR	BX6400SM-□FR
	Round Shaft Type		BX5120AM-A	BX5120CM-A	BX6200AM-A	BX6200CM-A	BX6400SM-A
Rated Output Power (Continuous)		W (HP)	120 (1/6)		200 (1/4)		400 (1/2)
Power Source	Rated Voltage	VAC	Single-Phase 100-115	Single-Phase, Three-Phase 200-230	Single-Phase 100-115	Single-Phase, Three-Phase 200-230	Three-Phase 200-230
	Permissible Voltage Range		−15～+10%				
	Rated Frequency	Hz	50/60				
	Permissible Frequency Range		±5%				
	Rated Input Current	A	3.7	Single-Phase 2.3, Three-Phase 1.1	4.7	Single-Phase 2.8, Three-Phase 1.7	2.8
	Maximum Input Current	A	6.7	Single-Phase 4.1, Three-Phase 2.0	9.0	Single-Phase 5.3, Three-Phase 3.2	4.4
Rated Torque		N·m (oz-in)	0.4 (56)		0.65 (92)		1.3 (184)
Starting Torque*1		N·m (oz-in)	0.8 (113)		1.3 (184)		2.6 (360)
Rated Speed		r/min	3000				
Speed Control Range		r/min	30～3000 (Analog setting), 3～3000 (Digital setting: can be set in 1 r/min increments)*2				
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	6 (33)		10 (55)		17.5 (96)
Rotor Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	0.63 (3.4)		0.66 (3.6)		0.66 (3.6)
Speed Regulation	Load		±0.05% max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)				
	Voltage		±0.05% max. (Rated voltage −15～+10%, at rated speed, with no load, at normal ambient temperature)				
	Temperature		±0.5% (±0.05%)*2 max. [0～+50°C (+32～+122°F), at rated speed, with no load, at rated voltage]				
Gravitational Operation Ability	Continuous Regenerative Power	W (HP)	100 (1/8)		100 (1/8)		
	Instantaneous Regenerative Power	W (HP)	240 (1/3)		800 (1)		
	Applicable Regeneration Unit*3		EPRC-400P		RGB100		
Electromagnetic Brake*4	Brake Type		Active when the power is off, automatically controlled by the driver				
	Static Friction Torque	N·m (oz-in)	0.4 (56)		0.65 (92)		1.3 (184)

*1 The starting torque can be used for a maximum duration of approximately five seconds at 2000 r/min or less.
*2 This specification applies when a control module **OPX-1A** is used (the figure applies to both the speed control mode and position control mode).
*3 Install the regeneration unit in the place which has the same heat radiation capability as heat radiation plate [material: aluminum 350×350 mm (13.8×13.8 in.), 3 mm (0.12 in.) thick].
*4 Do not start or stop the motor by turning on/off the power supply, as it will cause the electromagnetic brake to wear abnormally.
● The values for each specification apply to the motor only.
● Enter the gear ratio in the box (□) within the model name.

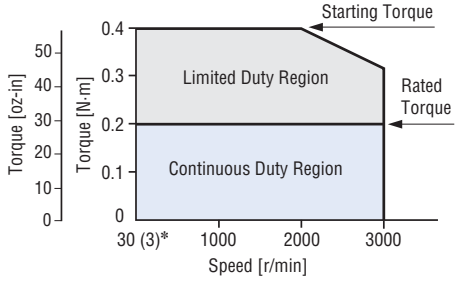
Speed – Torque Characteristics

Continuous Duty Region: Continuous operation is possible in this region.
Limited Duty Region: This region is used primarily when accelerating. When a load that exceeds the rated torque is applied continuously for approximately five seconds, overload protection is activated and the motor coasts to a stop.

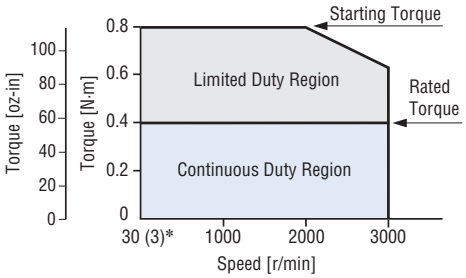
BX230■-A/BX230■-□S/BX230■-□FR
BX230■M-A/BX230■M-□S/BX230■M-□FR



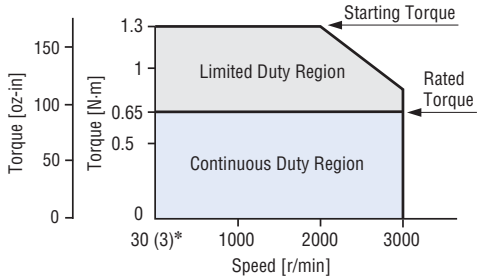
BX460■-A/BX460■-□S/BX460■-□FR
BX460■M-A/BX460■M-□S/BX460■M-□FR



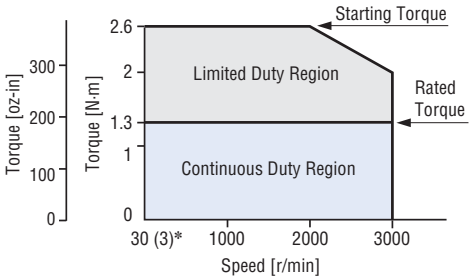
BX5120■-A/BX5120■-□S/BX5120■-□FR
BX5120■M-A/BX5120■M-□S/BX5120■M-□FR



BX6200■-A/BX6200■-□S/BX6200■-□FR
BX6200■M-A/BX6200■M-□S/BX6200■M-□FR



BX6400S-A/BX6400S-□S/BX6400S-□FR
BX6400SM-A/BX6400SM-□S/BX6400SM-□FR



✻Values in parentheses only apply when the speed is digitally set with a control module **OPX-1A**.

- The characteristics shown above apply to the motor only.
- Enter the power supply voltage (**A** or **C**) in the box (■) within the model name. Enter the gear ratio in the box (□) within the model name.

Common Specifications

Item	Specifications
Input Signals*	Photocoupler input Input resistance: 2.3 kΩ Internal power supply voltage: +15 V CW input, CCW input, Speed data selection input, Motor control release (FREE) input, Brake input (during alarm output: Alarm reset input)
Output Signals*	Open-collector output, 4.5～26.4 VDC Alarm output, Busy output (during alarm output: Alarm pulse output): 40 mA max. Speed output (ASG, BSG): 20 mA max.
Protective Functions	When the following are activated, the motor will coast to a stop (braking force will be applied if the motor is equipped with an electromagnetic brake) and the Alarm output will be OFF. The alarm LED on the driver will blink (alarm pulse will be output) for the corresponding number of times shown in ( ). ・Overload protection (2): Activated when the motor load exceeded rated torque for a minimum of approximately 5 seconds. ・Overvoltage protection (3): Activated when the power supply voltage applied to the driver exceeded 115 VAC or 230 VAC by a minimum of 20%, a load exceeding the permissible load inertia or gravitational ability was driven. ・Excessive position deviation protection (4): Activated when the motor did not follow commands when being operated in the position control mode. ・Overcurrent protection (5): Activated when excessive current flowed through the driver due to ground fault, etc. (alarm reset input is disabled) ・Overspeed protection (6): Activated when the motor shaft speed exceeded approximately 4000 r/min. ・EEPROM error (7): Activated when data could not be written to the EEPROM or data set in the EEPROM could not be read (alarm reset input is disabled). ・Encoder error (8): An encoder signal error occurred due to improper connection or disconnection of the signal cable (alarm reset input is disabled). ・Undervoltage protection (9): Activated when the power supply voltage applied to the driver fell below 100 VAC or 200 VAC by a minimum of 40%.
Maximum Cable Extension Distance	Motor/Driver Distance: 20.4 m (66.9 ft.) (when an accessory extension cable is used)
Time Rating	Continuous

✻The input signals and output signals may function differently when the control module is used.
Connection and operation ➜ Page D-47

General Specifications

Item		Motor	Driver
Insulation Resistance		100 MΩ or more when 500 VDC megger is applied between the windings and the case after continuous operation under normal ambient temperature and humidity (except for encoder).	100 MΩ or more when 500 VDC megger is applied between the power supply terminal and the case, and between the power supply terminal and the I/O terminal after continuous operation under normal ambient temperature and humidity.
Dielectric Strength		Sufficient to withstand 1.5 kVAC at 50 Hz applied between the windings and the case for 1 minute after continuous operation under normal ambient temperature and humidity (except for encoder).	Sufficient to withstand 1.5 kVAC at 50 Hz applied between the case and the power supply terminal for 1 minute, and 1.8 kVAC at 50 Hz applied between power supply terminal and the I/O terminal for 1 minute after continuous operation under normal ambient temperature and humidity.
Temperature Rise		Temperature rise of the windings and the case are 50˚C (90˚F) or less, and 40˚C (72˚F) or less*1 respectively measured by the thermocouple method after rated continuous operation under normal ambient temperature and humidity.	Temperature rise of the heat sink is 50˚C (90˚F) or less measured by the thermocouple method after rated continuous operation under normal ambient temperature and humidity.
Operating Environment	Ambient Temperature	0～+50˚C (+32～+122˚F) (non-freezing)	
	Ambient Humidity	85% or less (non-condensing)	
	Altitude	Up to 1000 m (3300 ft.) above sea level	
	Atmosphere	No corrosive gases or dust. Cannot be used in a radioactive area, magnetic field, vacuum or other special environment	
	Vibration	Not subject to continuous vibration or excessive impact In conformance with JIS C 60068-2-6, “Sine-wave vibration test method” Frequency range: 10～55 Hz Pulsating amplitude: 0.15 mm (0.006 in.) Sweep direction: 3 directions (X, Y, Z) Number of sweeps: 20 times	
Storage Condition*2	Ambient Temperature	−20～+60˚C (−4～+140˚F) (non-freezing)	−25～+70˚C (−13～+158˚F) (non-freezing)
	Ambient Humidity	85% or less (non-condensing)	
	Altitude	Up to 3000 m (10000 ft.) above sea level	
Thermal Class		UL/CSA standards: 105(A), EN standards: 120(E)	–
Degree of Protection		IP54 (Excluding the mounting surface of the round shaft type and the connector)	IP10

✻1 For round shaft types, please attach to the heat radiation plate (material: aluminum) of the following sizes to maintain a maximum motor case temperature of 90˚C (194˚F).
BX230□-A: 115×115 mm (4.53×4.53 in.), 5 mm (0.20 in.) thick **BX460□-A**: 135×135 mm (5.31×5.31 in.), 5 mm (0.20 in.) thick
BX5120□-A: 165×165 mm (6.50×6.50 in.), 5 mm (0.20 in.) thick **BX6200□-A**: 200×200 mm (7.87×7.87 in.), 5 mm (0.20 in.) thick
BX6400□-A: 250×250 mm (9.84×9.84 in.), 6 mm (0.24 in.) thick
●Enter the power supply voltage **A**, **C** or **S** (**AM**, **CM**, or **SM**: Electromagnetic brake type) in the box (□) within the model name.
✻2 The storage condition applies to a short period such as a period during transportation.

Note
●Do not measure insulation resistance or perform the dielectric strength test while the motor and driver are connected.

Speed Control Mode Specifications

● Standard Model: These specifications apply when the basic motor/driver package is used.
● Extended Function: These specifications apply when an accessory control module **OPX-1A** is used.

Item	Standard Model	Extended Function
Speed Control Range	30～3000 r/min (Analog setting)	30～3000 r/min (Analog setting) 3～3000 r/min (Digital setting: can be set in 1 r/min increments)
Speed Setting Methods	Select one of the following methods: · Internal speed potentiometer · External speed potentiometer (included): **PAVR-20KZ** (20 kΩ, 1/4 W) · External DC voltage: 0～5 VDC, 1 mA min. (Input impedance: 15 kΩ)	Select one of the following methods: · Digital setting (with **OPX-1A**) · Internal speed potentiometer · External speed potentiometer (included): **PAVR-20KZ** (20 kΩ, 1/4 W) · External DC voltage: 0～5 VDC, 1 mA min. (Input impedance: 15 kΩ)
Acceleration/ Deceleration Time	0.1～15 seconds (3000 r/min with no load) Once set, the specified acceleration/deceleration time applies to all speed data.	Select one of the following methods (3000 r/min with no load): · Digital setting (with **OPX-1A**): 0～30 seconds (can be set in 1 ms increments) · Acceleration/deceleration time potentiometer: 0.1～15 seconds Once set, the specified acceleration/deceleration time applies to all speed data.
Number of Speed Settings	2 speeds 1 speed set by the internal speed potentiometer, and 1 speed set by the external speed potentiometer (20 kΩ, 1/4 W) or external DC voltage (0～5 VDC)	Select one of the following methods: 8 speeds: Digital setting (with **OPX-1A**) 8 speeds: 6 speeds set by digital setting (with **OPX-1A**) and 2 speeds set by analog setting* *1 speed set by the internal speed potentiometer, and 1 speed set by the external speed potentiometer (20 kΩ, 1/4 W) or external DC voltage (0～5 VDC)

Position Control Mode Specifications (with an accessory control module **OPX-1A**)

The following specifications apply when the **BX** Series is combined with an accessory control module **OPX-1A** and used in the position control mode.

●Positioning Operation

Item	Specifications
Position Setting Method	Incremental (from the current position to relative position)
Resolution	1 step 0.72°, 500 (P/R)
Number of Data Settings	6 (Data No.0～5)
Travel Amount Setting Range	−8 388 608～+8 388 607 steps (Data No.0～5)
Speed Setting Range	30～3000 r/min (Analog setting), 3～3000 r/min (Digital setting; can be set in 1 r/min increments)
Speed Setting Methods	Select one of the following methods: · 6 speeds : 6 speeds (Data No.0～5): Digital setting (with **OPX-1A**) · 6 speeds : 4 speeds (Data No.2～5): Digital setting (with **OPX-1A**) / 2 speeds (Data No.0～1): Analog setting* *Analog setting: 1 speed set by the internal speed potentiometer, and 1 speed set by the external speed potentiometer (20 kΩ, 1/4 W) or external DC voltage (0～5 VDC)
Acceleration/Deceleration Time	Select one of the following methods: (3000 r/min with no load): · Digital setting (with **OPX-1A**): 0～30 seconds (can be set in 1 ms increments) · Acceleration/Deceleration time potentiometer with analog setting: 0.1～15 seconds Once set, the specified acceleration/deceleration time applies to all speed data.

●Continuous Operation

Item	Specifications
Number of Data Settings	2*1 (Assigning data No.0～1 for continuous operation)
Speed Setting Range	30～3000 r/min (Analog setting), 3～3000 r/min (Digital setting; can be set in 1 r/min increments)
Speed Setting Methods	Can be set using one of the following methods: · 2 speeds: Digital setting (with **OPX-1A**) · 2 speeds: Analog setting*2 *2 Analog setting: 1 speed set by the internal speed potentiometer, and 1 speed set by the external speed potentiometer (20 kΩ, 1/4 W) or external DC voltage (0～5 VDC)
Acceleration/Deceleration Time	Select one of the following methods (3000 r/min with no load): · Digital setting (with **OPX-1A**): 0～30 seconds (can be set in 1 ms increments) · Acceleration/Deceleration time potentiometer with analog setting: 0.1～15 seconds Once set, the specified acceleration/deceleration time applies to all speed data.
Rotation Direction	CW when the position in Data No.0 or 1 is set to a value of zero or greater; CCW when the position in Data No.0 or 1 is set to a value of −1 or less.

*1 When using the continuous operation, the number of position settings is reduced from 6 (Data No.0～5) to 4 (Data No.2～5).

●Return to Mechanical Home Operation

Item	Specifications
Mechanical Home Position Detection	1-sensor mode: NC (Normally closed)
Starting Direction of Home Detection	Set to CW or CCW
Speed Setting Range	3～3000 r/min (Digital setting; can be set in 1 r/min increments; Data No.7)

●Return to Electrical Home Operation

Item	Specifications
Travel Amount	From the current motor position to the electrical home position
Positional Offset Range	−8 388 608～+8 388 607 steps
Initial Offset Value	0
Speed Setting Range	3～3000 r/min (Digital setting; can be set in 1 r/min increments; Data No.6)
Acceleration/Deceleration Time	Select one of the following methods: (3000 r/min with no load): · Digital setting (with **OPX-1A**): 0～30 seconds (can be set in 1 ms increments) · Acceleration/Deceleration time potentiometer with analog setting: 0.1～15 seconds Once set, the specified acceleration/deceleration time applies to all speed data.

■Torque Limiting Function Specifications (with an accessory control module **OPX-1A**)

You can set the motor output torque limiting value for both the speed control and position control modes with an accessory control module **OPX-1A**.

Item	Specifications
Torque Limiting Setting Methods	Select one of the following methods: · Digital common torque setting: A torque limiting value can be set for all data sets (No.0～7) in one operation. · Digital independent torque setting: A torque limiting value can be set independently for each data set (No.0～7). · External analog common torque setting: A torque limiting value can be set for all data sets (No.0～7) in one operation via external speed potentiometer (20 kΩ, 1/4 W) or external DC voltage (0～5 VDC). This torque limiting value applies to all operation data.
Torque Limiting Setting Range	Assuming that starting torque is 100%, torque limiting values can be set by one of the following: · Digital setting: 1～100% (can be set in 1% increments) · External analog setting: 1～100% by external speed potentiometer (20 kΩ, 1/4 W) or external DC voltage (0～5 VDC)

Note

● An error of up to approximately ±20% (starting torque: 100%) may occur between the set value and generated torque due to the speed setting, power supply voltage and distance of motor cable extension. Repetitive accuracy under the same condition is approximately ±10%.

■Gearmotor – Torque Table of Combination Type

●Combination Type – Parallel Shaft Gearhead

Unit = N·m (lb-in)

Model	Gear Ratio	5	10	15	20	30	50	100	200
	Speed Range* r/min	6～600 (0.6～600)	3～300 (0.3～300)	2～200 (0.2～200)	1.5～150 (0.15～150)	1～100 (0.1～100)	0.6～60 (0.06～60)	0.3～30 (0.03～30)	0.15～15 (0.015～15)
BX230■-□S **BX230■M-□S**		0.45 (3.9)	0.9 (7.9)	1.4 (12.3)	1.8 (15.9)	2.6 (23)	4.3 (38)	6 (53)	6 (53)
BX460■-□S **BX460■M-□S**		0.9 (7.9)	1.8 (15.9)	2.7 (23)	3.6 (31)	5.2 (46)	8.6 (76)	16 (141)	16 (141)
BX5120■-□S **BX5120■M-□S**		1.8 (15.9)	3.6 (31)	5.4 (47)	7.2 (63)	10.3 (91)	17.2 (152)	30 (260)	30 (260)
BX6200■-□S **BX6200■M-□S**		2.9 (25)	5.9 (52)	8.8 (77)	11.7 (103)	16.8 (148)	28 (240)	52.7 (460)	70 (610)
BX6400S-□S **BX6400SM-□S**		5.9 (52)	11.7 (103)	17.6 (155)	23.4 (200)	33.5 (290)	55.9 (490)	70 (610)	70 (610)

✻Values in parentheses only apply when a control module **OPX-1A** is used.

● A colored background ( ) indicates gear shaft rotation in the same direction as the motor shaft, while the others rotate in the opposite direction.

●Combination Type – Hollow Shaft Flat Gearhead

Unit = N·m (lb-in)

Model	Gear Ratio	5	10	15	20	30	50	100	200
	Speed Range* r/min	6～600 (0.6～600)	3～300 (0.3～300)	2～200 (0.2～200)	1.5～150 (0.15～150)	1～100 (0.1～100)	0.6～60 (0.06～60)	0.3～30 (0.03～30)	0.15～15 (0.015～15)
BX230■-□FR **BX230■M-□FR**		0.4 (3.5)	0.85 (7.5)	1.3 (11.5)	1.7 (15.0)	2.6 (23)	4.3 (38)	8.5 (75)	17 (150)
BX460■-□FR **BX460■M-□FR**		0.85 (7.5)	1.7 (15.0)	2.6 (23)	3.4 (30)	5.1 (45)	8.5 (75)	17 (150)	34 (300)
BX5120■-□FR **BX5120■M-□FR**		1.7 (15.0)	3.4 (30)	5.1 (45)	6.8 (60)	10.2 (90)	17 (150)	34 (300)	68 (600)
BX6200■-□FR **BX6200■M-□FR**		–	5.5 (48)	8.3 (73)	11.1 (98)	16.6 (146)	27.6 (240)	55.3 (480)	–
BX6400S-□FR **BX6400SM-□FR**		5.5 (48)	11.1 (98)	16.6 (146)	22.1 (195)	33.2 (290)	55.3 (480)	110 (970)	–

✻Values in parentheses only apply when a control module **OPX-1A** is used.

● The flat gearhead rotates in the opposite direction to the motor when viewed from the front of the gearhead. It rotates in the same direction as the motor when viewed from the rear (motor mounting surface) of the gearhead.

Rotation direction of the hollow shaft flat gearhead ➜ Page D-243

● Enter the power supply voltage (**A** or **C**) in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.

Permissible Overhung Load and Permissible Thrust Load

Combination Type – Parallel Shaft Gearhead

Model	Gear Ratio	Permissible Overhung Load				Permissible Thrust Load	
		10 mm (0.39 in.) from shaft end		20 mm (0.79 in.) from shaft end			
		N	lb.	N	lb.	N	lb.
BX230■-□S **BX230■M-□S**	**5**	100	22	150	33	40	9
	10, **15**, **20**	150	33	200	45		
	30, **50**, **100**, **200**	200	45	300	67		
BX460■-□S **BX460■M-□S**	**5**	200	45	250	56	100	22
	10, **15**, **20**	300	67	350	78		
	30, **50**, **100**, **200**	450	101	550	123		
BX5120■-□S **BX5120■M-□S**	**5**	300	67	400	90	150	33
	10, **15**, **20**	400	90	500	112		
	30, **50**, **100**, **200**	500	112	650	146		
BX6200■-□S **BX6200■M-□S** **BX6400S-□S** **BX6400SM-□S**	**5**, **10**, **15**, **20**	550	123	800	180	200	45
	30, **50**	1000	220	1250	280	300	67
	100, **200**	1400	310	1700	380	400	90

Combination Type – Hollow Shaft Flat Gearhead

Model	Gear Ratio	Permissible Overhung Load				Permissible Thrust Load	
		10 mm (0.39 in.) from mounting surface of gearhead		20 mm (0.79 in.) from mounting surface of gearhead			
		N	lb.	N	lb.	N	lb.
BX230■-□FR **BX230■M-□FR**	**5**, **10**	450	101	370	83	200	45
	15, **20**, **30**, **50**, **100**, **200**	500	112	400	90		
BX460■-□FR **BX460■M-□FR**	**5**, **10**	800	180	660	148	400	90
	15, **20**, **30**, **50**, **100**, **200**	1200	270	1000	220		
BX5120■-□FR **BX5120■M-□FR**	**5**, **10**	900	200	770	173	500	112
	15, **20**	1300	290	1110	240		
	30, **50**, **100**, **200**	1500	330	1280	280		
BX6200■-□FR **BX6200■M-□FR** **BX6400S-□FR** **BX6400SM-□FR**	**5***, **10**	1230	270	1070	240	800	180
	15, **20**	1680	370	1470	330		
	30, **50**, **100**	2040	450	1780	400		

*Only the **BX6400S-□FR** and **BX6400SM-□FR** are supported.

● The permissible overhung load can also be calculated with a formula. Permissible overhung load calculation ➜ Page D-242

Round Shaft Type

Model	Permissible Overhung Load				Permissible Thrust Load
	10 mm (0.39 in.) from shaft end		20 mm (0.79 in.) from shaft end		
	N	lb.	N	lb.	
BX230■-A **BX230■M-A**	87.2	19.6	107	24	The permissible thrust load should not be greater than half the motor mass.
BX460■-A **BX460■M-A**	117	26	137	30	
BX5120■-A **BX5120■M-A**	156	35	176	39	
BX6200■-A **BX6200■M-A** **BX6400S-A** **BX6400SM-A**	197	44	221	49	

● Enter the power supply voltage (**A** or **C**) in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.

Permissible Load Inertia J of Combination Type

Combination Type – Parallel Shaft Gearhead

Unit = $\times 10^{-4}$ kg·m^2 (oz-in^2)

Model	Gear Ratio	5	10	15	20	30	50	100	200
BX230■-□S **BX230■M-□S**		12 (66)	50 (270)	110 (600)	200 (1090)	370 (2000)	920 (5000)	2500 (13700)	5000 (27000)
	When instantaneous stop or instantaneous bi-directional operation is performed*	1.55 (8.5)	6.2 (34)	14.0 (77)	24.8 (136)	55.8 (310)	155 (850)	155 (850)	155 (850)
BX460■-□S **BX460■M-□S**		22 (120)	95 (520)	220 (1200)	350 (1910)	800 (4400)	2200 (12000)	6200 (34000)	12000 (66000)
	When instantaneous stop or instantaneous bi-directional operation is performed*	5.5 (30)	22 (120)	49.5 (270)	88 (480)	198 (1080)	550 (3000)	550 (3000)	550 (3000)
BX5120■-□S **BX5120■M-□S**		45 (250)	190 (1040)	420 (2300)	700 (3800)	1600 (8800)	4500 (25000)	12000 (66000)	25000 (137000)
	When instantaneous stop or instantaneous bi-directional operation is performed*	25 (137)	100 (550)	225 (1230)	400 (2200)	900 (4900)	2500 (13700)	2500 (13700)	2500 (13700)
BX6200■-□S **BX6200■M-□S** **BX6400S-□S** **BX6400SM-□S**		100 (550)	460 (2500)	1000 (5500)	1700 (9300)	3900 (21000)	9300 (51000)	18000 (98000)	37000 (200000)
	When instantaneous stop or instantaneous bi-directional operation is performed*	37.5 (210)	150 (820)	338 (1850)	600 (3300)	1350 (7400)	3750 (21000)	3750 (21000)	3750 (21000)

✻Values only apply when the deceleration time is set to less than 100 ms with a control module **OPX-1A**.

Combination Type – Hollow Shaft Flat Gearhead

Unit = $\times 10^{-4}$ kg·m^2 (oz-in^2)

Model	Gear Ratio	5	10	15	20	30	50	100	200
BX230■-□FR **BX230■M-□FR**		12 (66)	50 (270)	110 (600)	200 (1090)	370 (2000)	920 (5000)	2500 (13700)	5000 (27000)
	When instantaneous stop or instantaneous bi-directional operation is performed*	1.55 (8.5)	6.2 (34)	14.0 (77)	24.8 (136)	55.8 (310)	155 (850)	155 (850)	155 (850)
BX460■-□FR **BX460■M-□FR**		22 (120)	95 (520)	220 (1200)	350 (1910)	800 (4400)	2200 (12000)	6200 (34000)	12000 (66000)
	When instantaneous stop or instantaneous bi-directional operation is performed*	5.5 (30)	22 (120)	49.5 (270)	88 (480)	198 (1080)	550 (3000)	550 (3000)	550 (3000)
BX5120■-□FR **BX5120■M-□FR**		45 (250)	190 (1040)	420 (2300)	700 (3800)	1600 (8800)	4500 (25000)	12000 (66000)	25000 (137000)
	When instantaneous stop or instantaneous bi-directional operation is performed*	25 (137)	100 (550)	225 (1230)	400 (2200)	900 (4900)	2500 (13700)	2500 (13700)	2500 (13700)
BX6200■-□FR **BX6200■M-□FR**		–	460 (2500)	1000 (5500)	1700 (9300)	3900 (21000)	9300 (51000)	18000 (98000)	–
	When instantaneous stop or instantaneous bi-directional operation is performed*	–	150 (820)	338 (1850)	600 (3300)	1350 (7400)	3750 (21000)	3750 (21000)	–
BX6400S-□FR **BX6400SM-□FR**		100 (550)	460 (2500)	1000 (5500)	1700 (9300)	3900 (21000)	9300 (51000)	18000 (98000)	–
	When instantaneous stop or instantaneous bi-directional operation is performed*	37.5 (210)	150 (820)	338 (1850)	600 (3300)	1350 (7400)	3750 (21000)	3750 (21000)	–

✻Values only apply when the deceleration time is set to less than 100 ms with a control module **OPX-1A**.

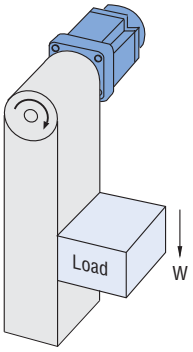
● Enter the power supply voltage (**A** or **C**) in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.

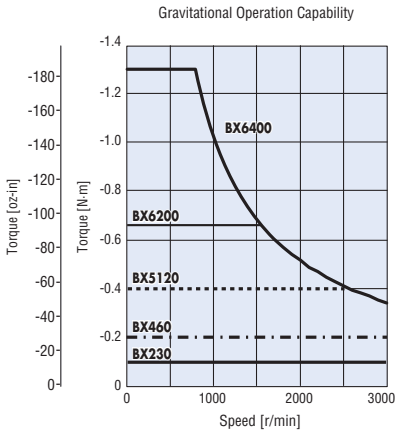
Vertical Drive (Gravitational Operation)

The **BX** Series provides stable speed control during gravitational operation.
During vertical drive shown in the figure to the right, normally an external force causes the motor to rotate and function as a power generator. If this energy is applied to the driver, an error will occur. The accessory regeneration unit (sold separately) can convert regenerative energy into thermal energy for dissipation. Use the accessory regeneration unit when using the motor for vertical applications or when braking a large inertial load quickly.

Regeneration Unit Model	BX Model	Rated Output Power W (HP)	Continuous Regenerative Power W (HP)	Instantaneous Regenerative Power W (HP)
EPRC-400P	**BX230**	30 (1/25)	100 (1/8)	240 (1/3)
	BX460	60 (1/12)		
	BX5120	120 (1/6)		
RGB100	**BX6200**	200 (1/4)	100 (1/8)	800 (1)
	BX6400	400 (1/2)		

● Install the regeneration unit in the place which has the same heat radiation capability as heat radiation plate [material: aluminum 350×350 mm (13.8×13.8 in.), 3 mm (0.12 in.) thick].





● Gravitational operation exceeding the range of continuous regeneration capability will trigger the built-in thermal protector [150°C (302°F)].

●Regenerative Power

The regenerative power can be estimated using the formula below. Use the calculated value as a guideline.

Regenerative Power (W) = $0.1047 \times T_L$ [N·m] $\times N$ [r/min]

T_L: Load torque N: Speed

● Use the electromagnetic brake type for gravitational operation.

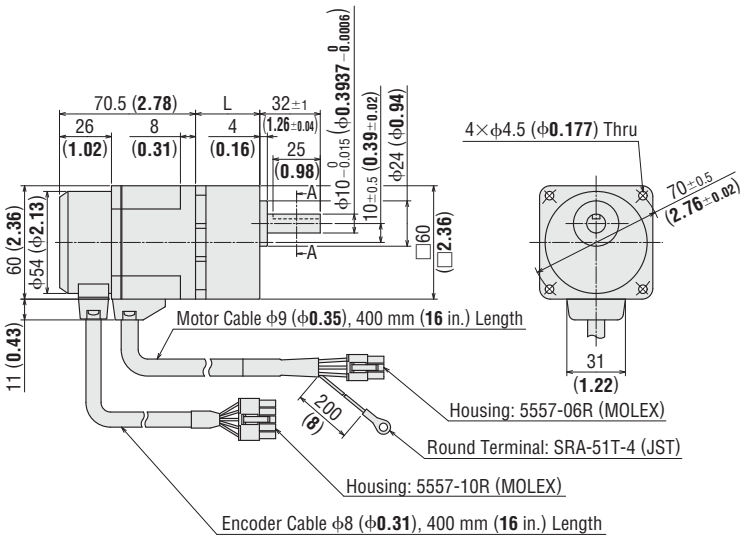
Dimensions Unit = mm (in.)

● Mounting screws are included with the combination type. Dimensions for mounting screws ➜ Page D-242

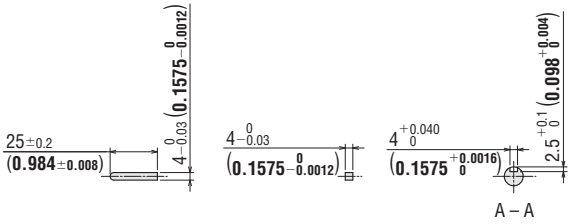
●Standard Type 30 W (1/25 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BX230A-□S **BX230C-□S**	BXM230-GFS	GFS2G□	**5**~**20**	34 (1.34)	1.2 (2.6)	C147A
			30~**100**	38 (1.50)		C147B
			200	43 (1.69)		C147C



◇Key and Key Slot (Included)



● Enter the gear ratio in the box (□) within the model name.

◇Motor/Hollow Shaft Flat Gearhead

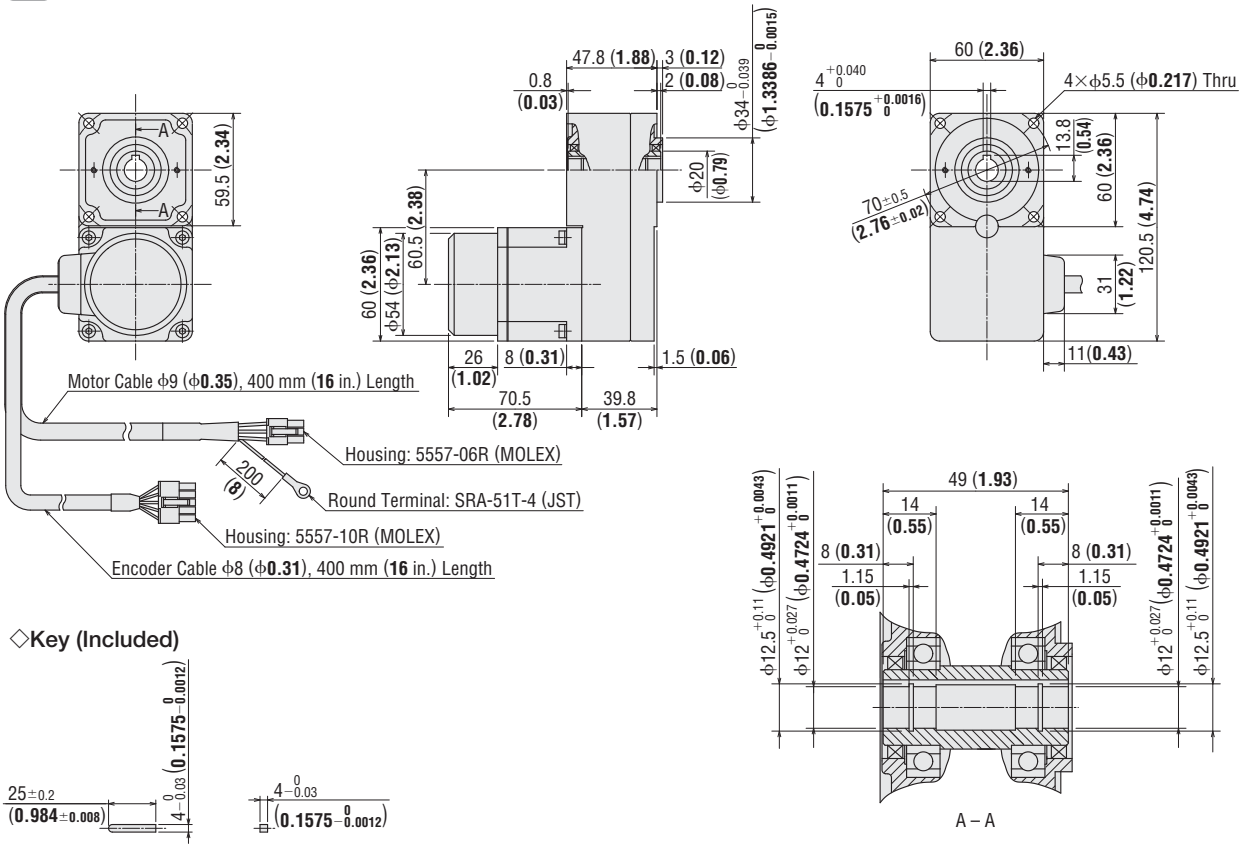
BX230A-□FR, **BX230C-□FR**

Motor: BXM230-GFS

Gearhead: GFS2G□FR

Mass: 1.5 kg (3.3 lb.) (Including gearhead)

DXF C195



◇Key (Included)

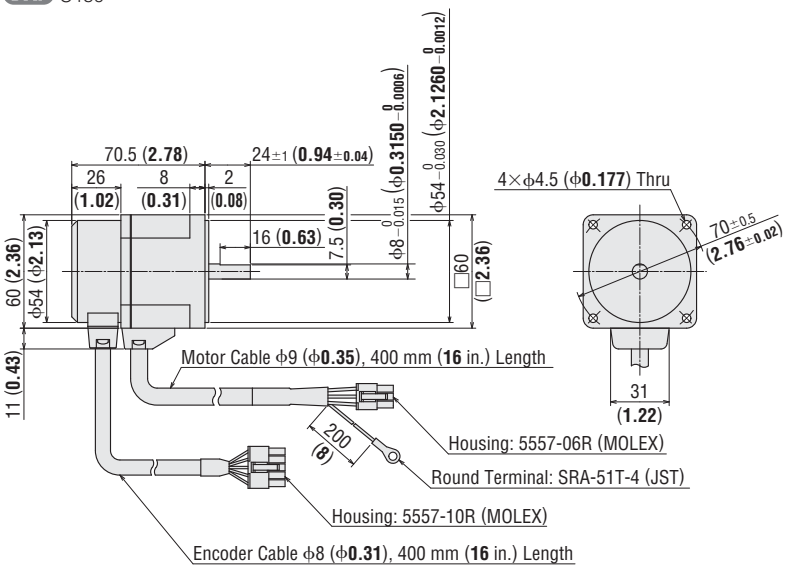
◇Round Shaft Type

BX230A-A, **BX230C-A**

Motor: BXM230-A2

Mass: 0.7 kg (1.5 lb.)

DXF C150

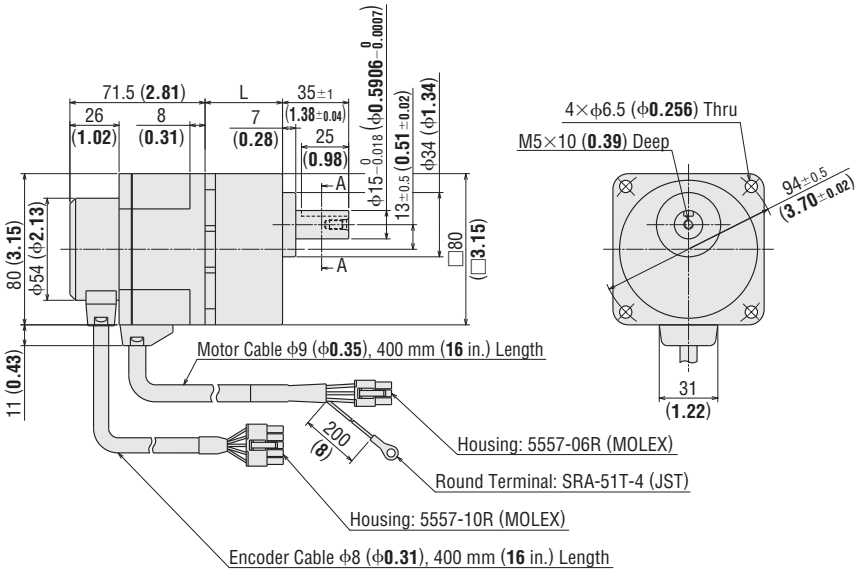


● Enter the gear ratio in the box (□) within the model name.

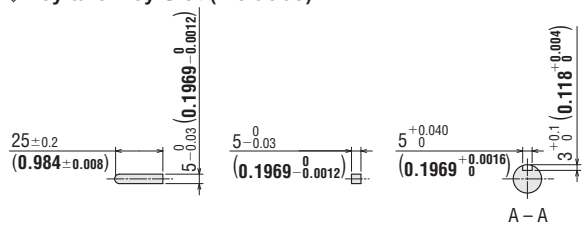
●Standard Type 60 W (1/12 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BX460A-□S **BX460C-□S**	BXM460-GFS	GFS4G□	**5～20**	41 (1.61)	2.0 (4.4)	C148A
			30～100	46 (1.81)		C148B
			200	51 (2.01)		C148C



◇Key and Key Slot (Included)



● Enter the gear ratio in the box (□) within the model name.

◇Motor/Hollow Shaft Flat Gearhead

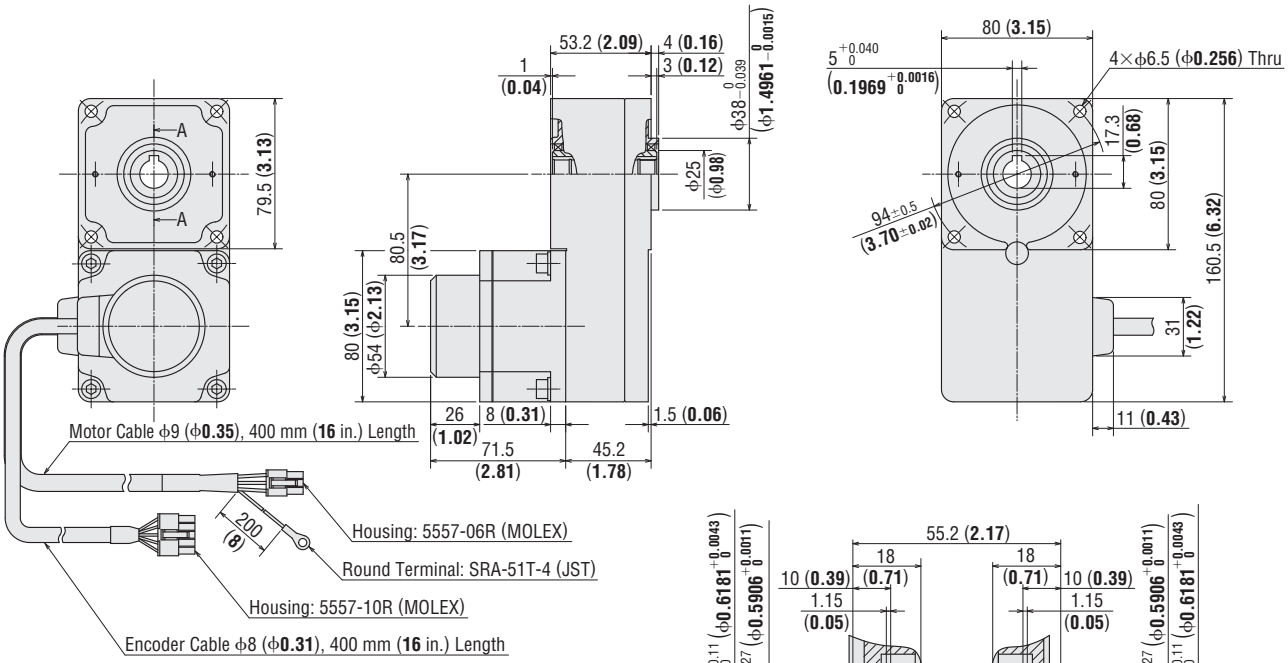
BX460A-□FR, **BX460C-□FR**

Motor: BXM460-GFS

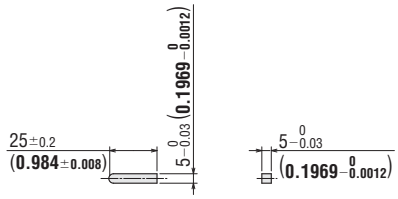
Gearhead: GFS4G□FR

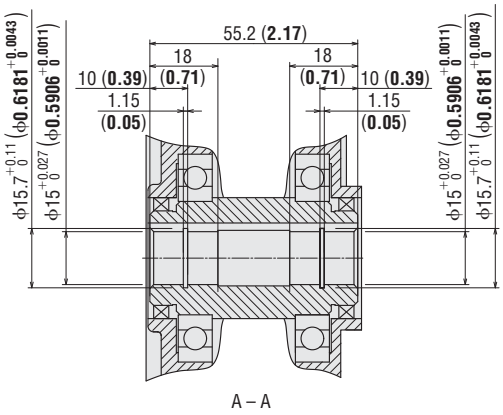
Mass: 2.6 kg (5.7 lb.) (Including gearhead)

DXF C196



◇Key (Included)





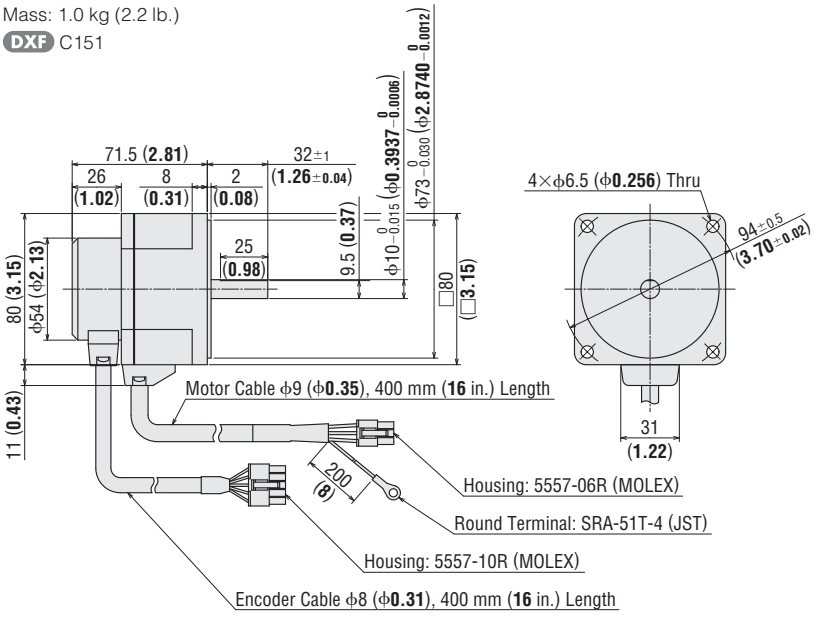
◇Round Shaft Type

BX460A-A, **BX460C-A**

Motor: BXM460-A2

Mass: 1.0 kg (2.2 lb.)

DXF C151

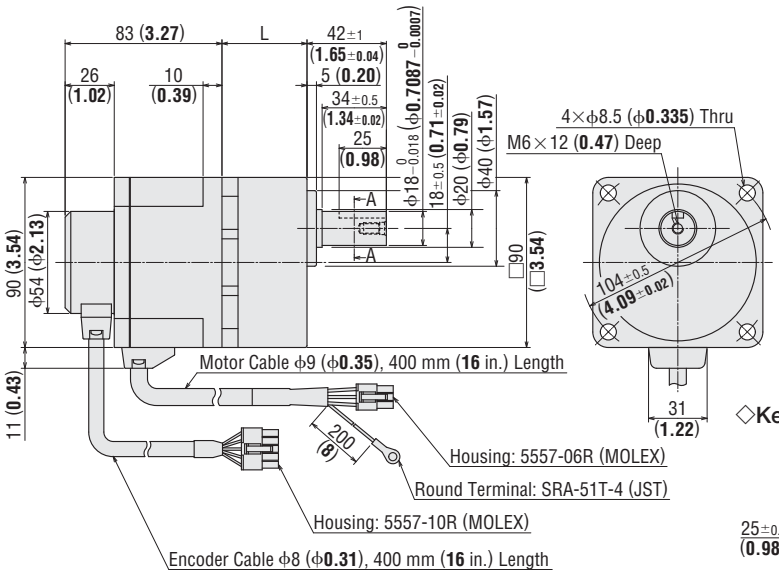


● Enter the gear ratio in the box (□) within the model name.

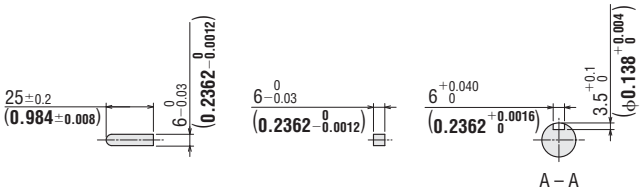
●Standard Type 120 W (1/6 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BX5120A-□S **BX5120C-□S**	BXM5120-GFS	GFS5G□	**5**～**20**	45 (1.77)	3.1 (6.8)	C149A
			30～**100**	58 (2.28)		C149B
			200	64 (2.52)		C149C



◇Key and Key Slot (Included)



◇Motor/Hollow Shaft Flat Gearhead

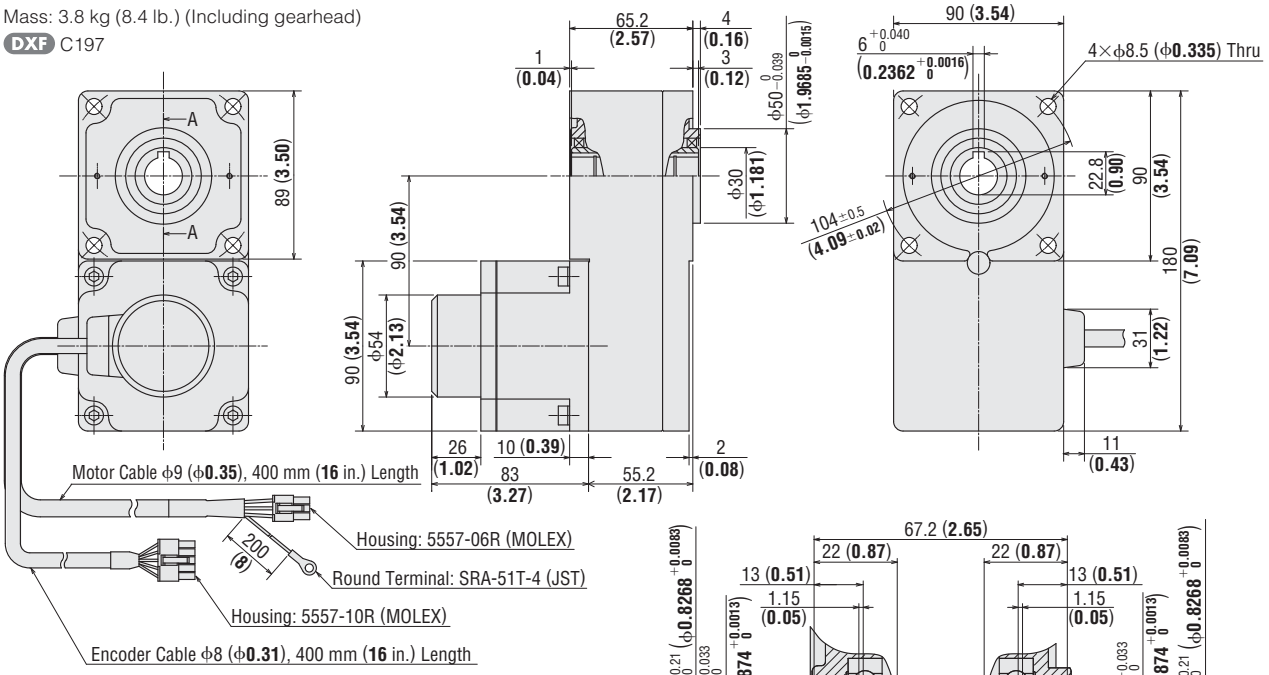
BX5120A-□FR, **BX5120C-□FR**

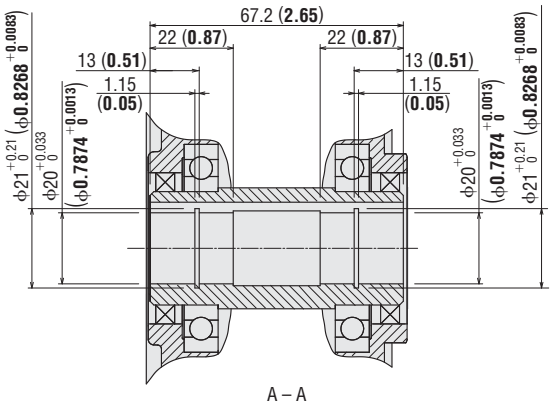
Motor: BXM5120-GFS

Gearhead: GFS5G□FR

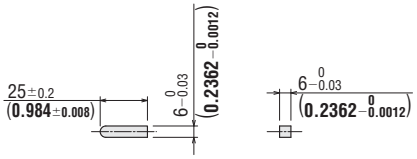
Mass: 3.8 kg (8.4 lb.) (Including gearhead)

DXF C197





◇Key (Included)



● Enter the gear ratio in the box (□) within the model name.

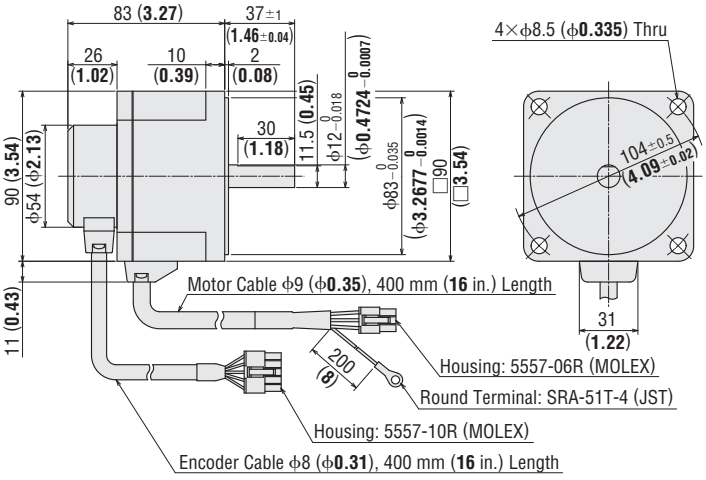
◇Round Shaft Type

BX5120A-A, BX5120C-A

Motor: BXM5120-A2

Mass: 1.6 kg (3.5 lb.)

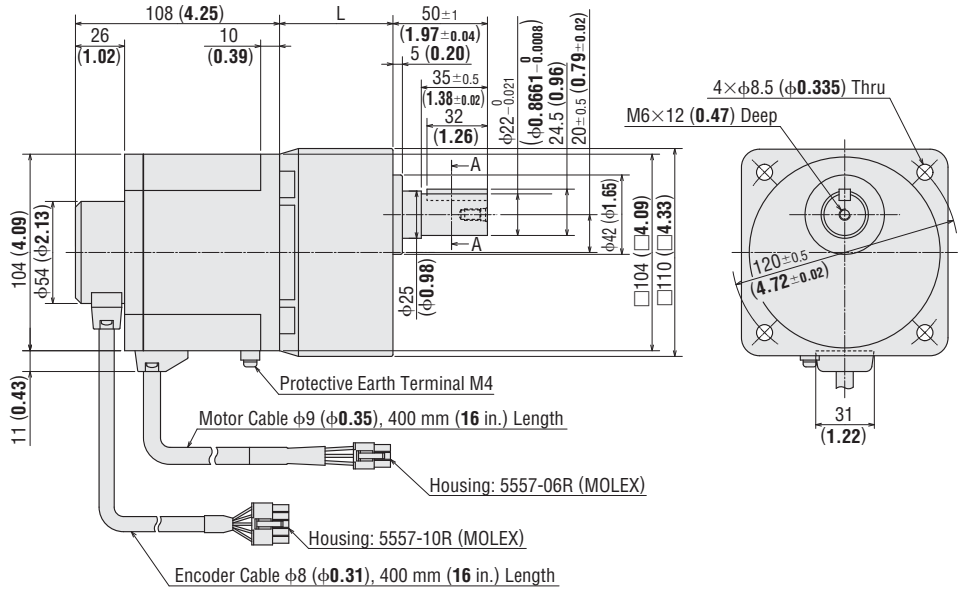
DXF C152



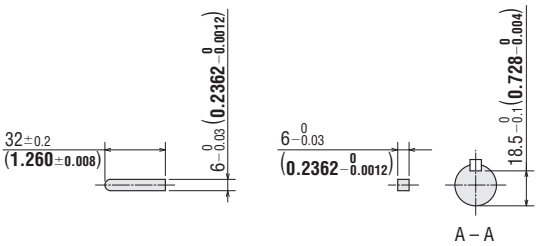
●Standard Type 200 W (1/4 HP), 400 W (1/2 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BX6200A-□S, BX6200C-□S	BXM6200-GFS	GFS6G□	**5**~**20**	60 (2.36)	5.5 (12.1)	C198A
			30, **50**	72 (2.83)		C198B
BX6400S-□S	BXM6400-GFS		**100**, **200**	86 (3.39)		C198C



◇Key and Key Slot (Included)

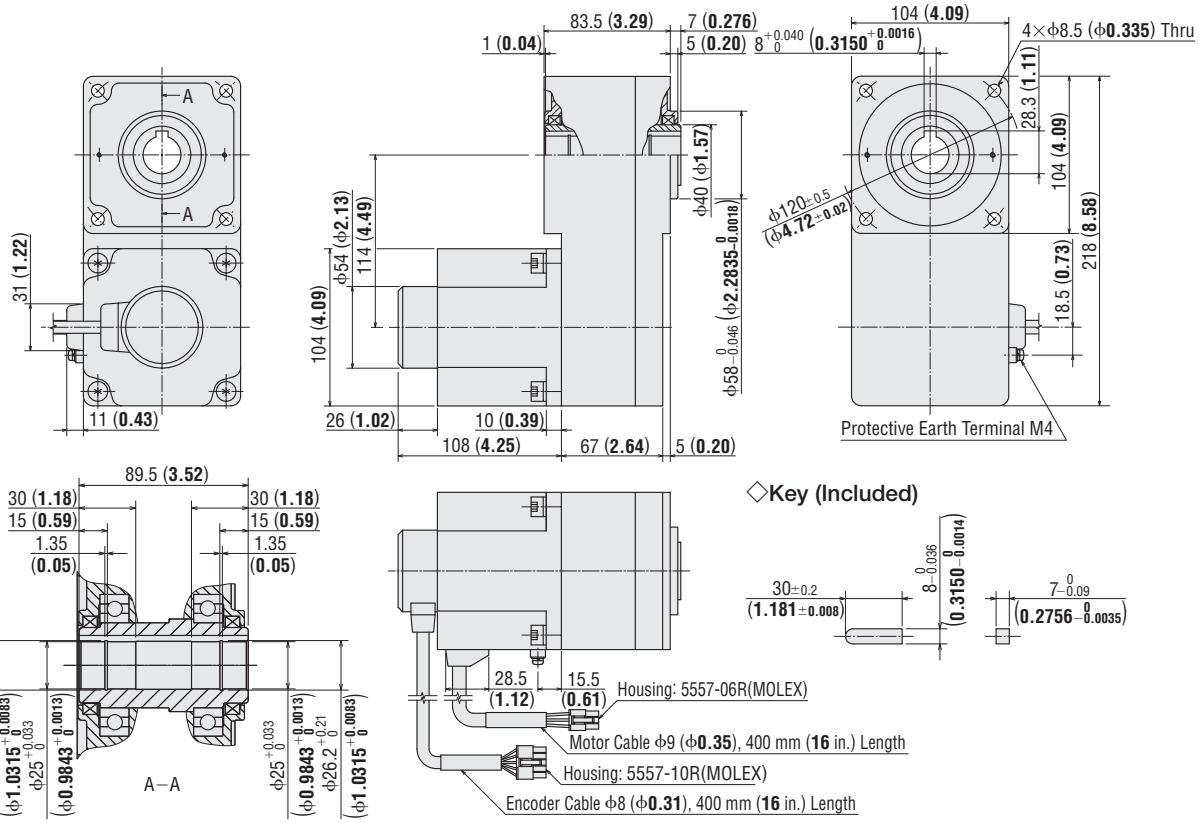


● At the time of shipment, a key is inserted on the gearhead's shaft.

● Enter the gear ratio in the box (□) within the model name.

◇Motor/Hollow shaft flat gearhead

Model	Motor Model	Gearhead Model	Mass kg (lb.)	DXF
BX6200A-□FR, **BX6200C-□FR**	BXM6200-GFS	GFS6G□FR	7.3 (16.1)	C257
BX6400S-□FR	BXM6400-GFS			



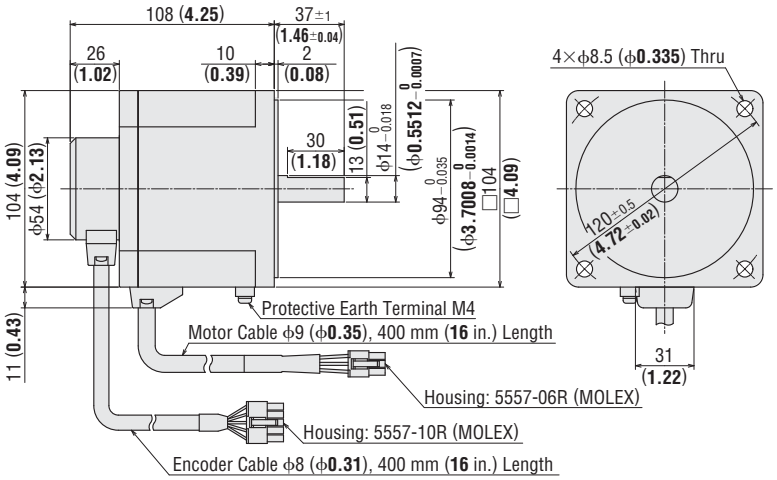
◇Round Shaft Type

BX6200A-A, **BX6200C-A**, **BX6400S-A**

Motor: BXM6200-A, BXM6400-A

Mass: 2.5 kg (5.5 lb.)

DXF C182

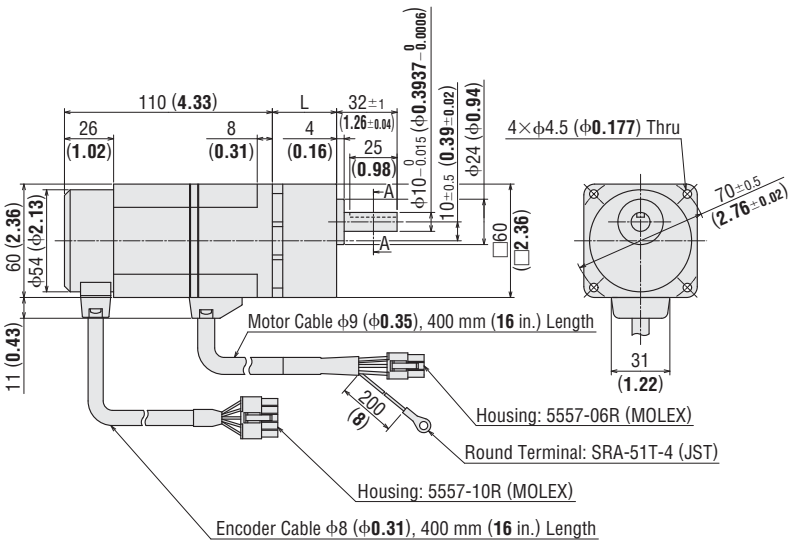


● Enter the gear ratio in the box (□) within the model name.

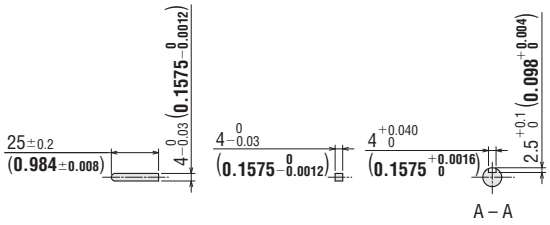
●With Electromagnetic Brake Type 30 W (1/25 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BX230AM-□S **BX230CM-□S**	BXM230M-GFS	GFS2G□	**5**~**20**	34 (1.34)	1.5 (3.3)	C153A
			30~**100**	38 (1.50)		C153B
			200	43 (1.69)		C153C



◇Key and Key Slot (Included)



◇Motor/Hollow Shaft Flat Gearhead

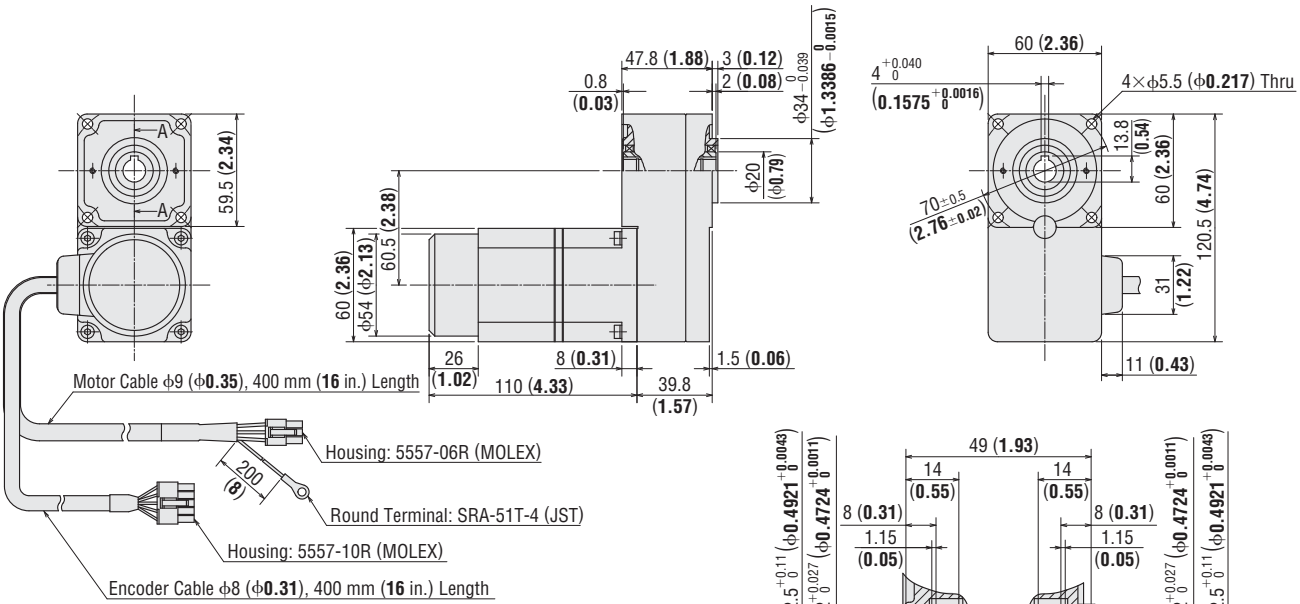
BX230AM-□FR, **BX230CM-□FR**

Motor: BXM230M-GFS

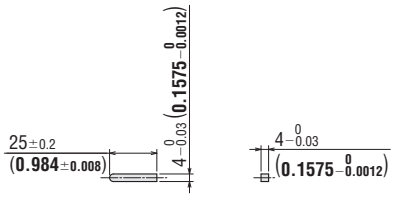
Gearhead: GFS2G□FR

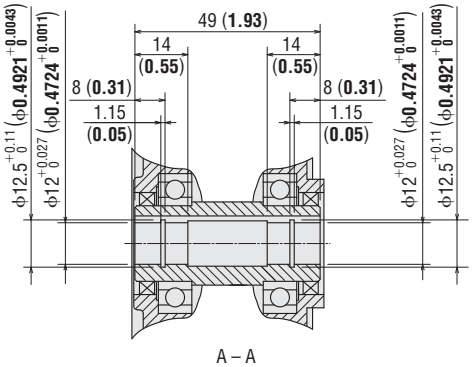
Mass: 1.8 kg (4.0 lb.) (Including gearhead)

DXF C199



◇Key (Included)





● Enter the gear ratio in the box (□) within the model name.

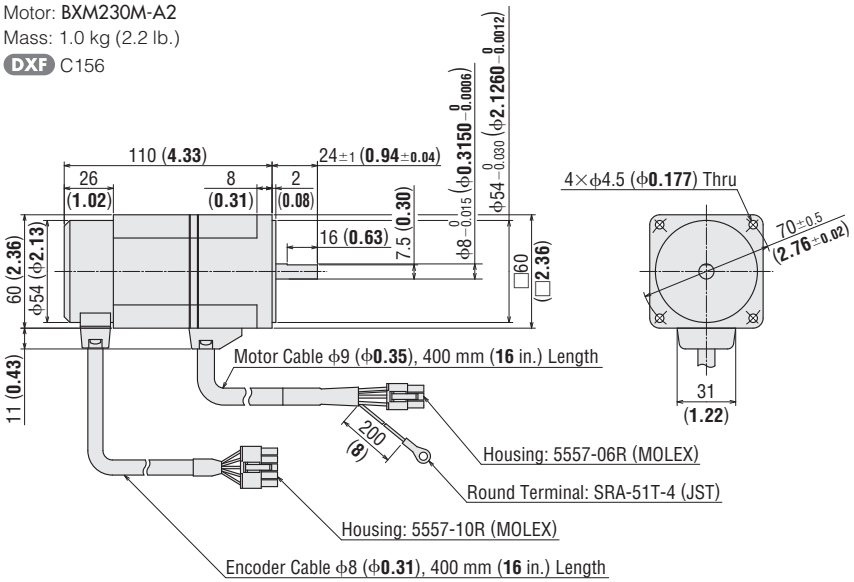
◇Round Shaft Type

BX230AM-A, **BX230CM-A**

Motor: BXM230M-A2

Mass: 1.0 kg (2.2 lb.)

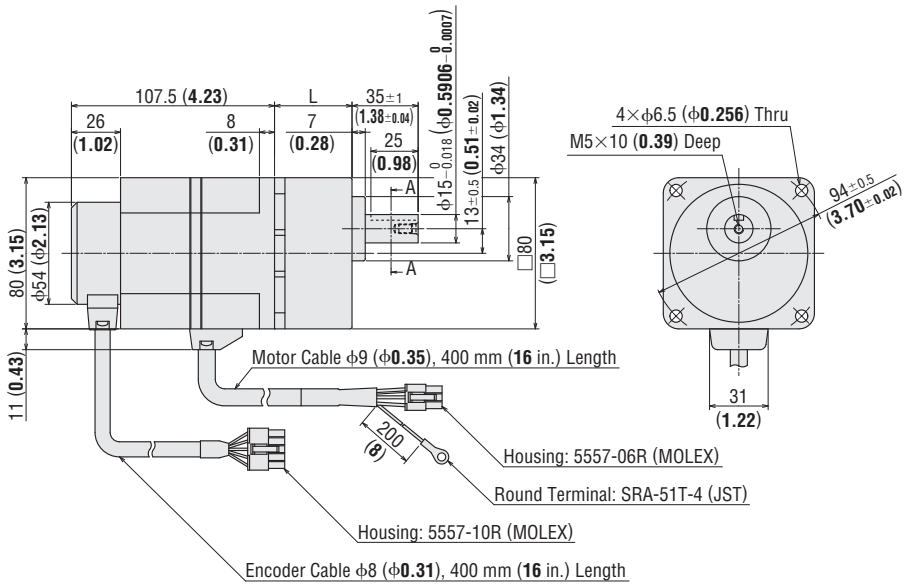
DXF C156



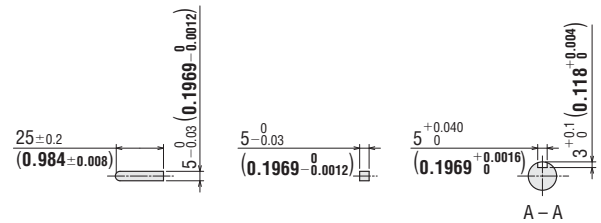
●With Electromagnetic Brake Type 60 W (1/12 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BX460AM-□S **BX460CM-□S**	BXM460M-GFS	GFS4G□	**5**～**20**	41 (1.61)	2.5 (5.5)	C154A
			30～**100**	46 (1.81)		C154B
			200	51 (2.01)		C154C



◇Key and Key Slot (Included)



●Enter the gear ratio in the box (□) within the model name.

◇Motor/Hollow Shaft Flat Gearhead

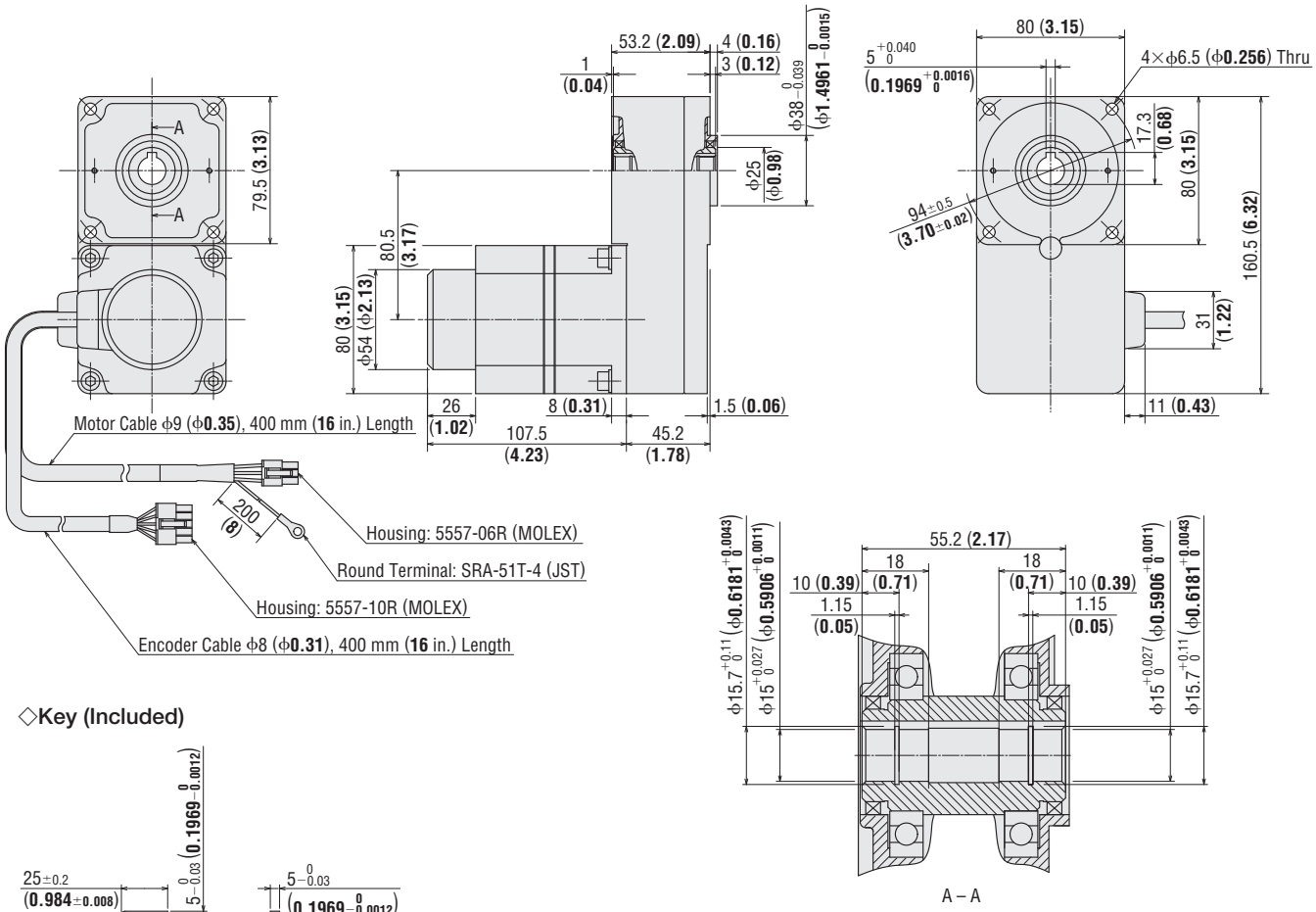
BX460AM-□FR, **BX460CM-□FR**

Motor: BXM460M-GFS

Gearhead: GFS4G□FR

Mass: 3.1 kg (6.8 lb.) (Including gearhead)

DXF C200



◇Key (Included)

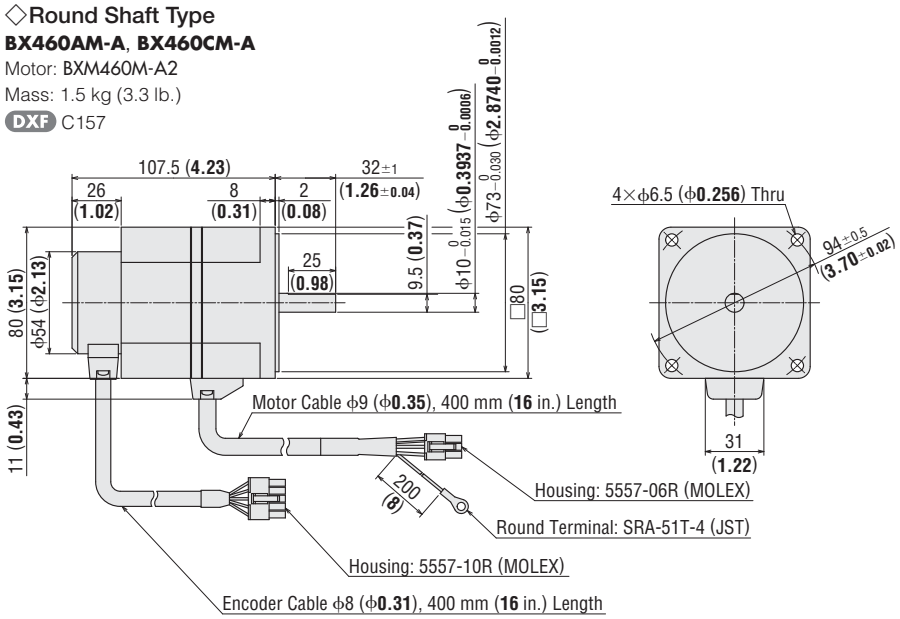
◇Round Shaft Type

BX460AM-A, **BX460CM-A**

Motor: BXM460M-A2

Mass: 1.5 kg (3.3 lb.)

DXF C157

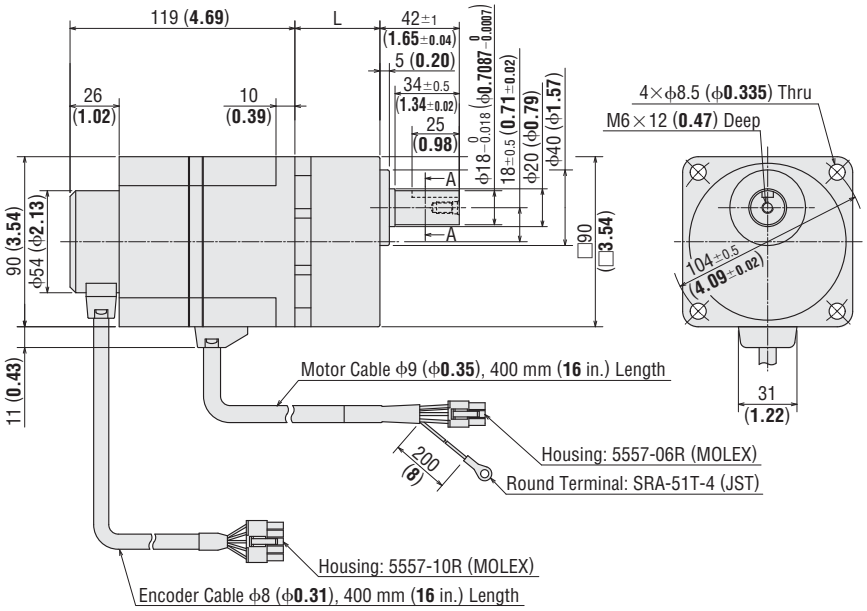


● Enter the gear ratio in the box (□) within the model name.

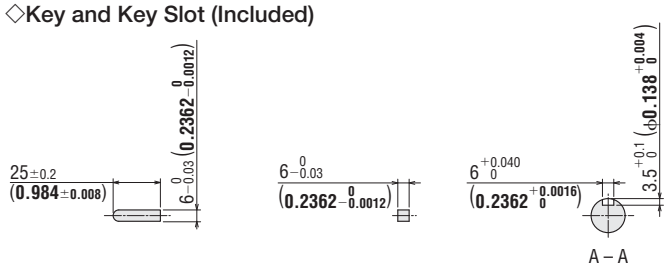
●With Electromagnetic Brake Type 120 W (1/6 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BX5120AM-□S **BX5120CM-□S**	BXM5120M-GFS	GFS5G□	**5～20**	45 (1.77)	3.7 (8.1)	C155A
			30～100	58 (2.28)		C155B
			200	64 (2.52)		C155C



◇Key and Key Slot (Included)



● Enter the gear ratio in the box (□) within the model name.

◇Motor/Hollow Shaft Flat Gearhead

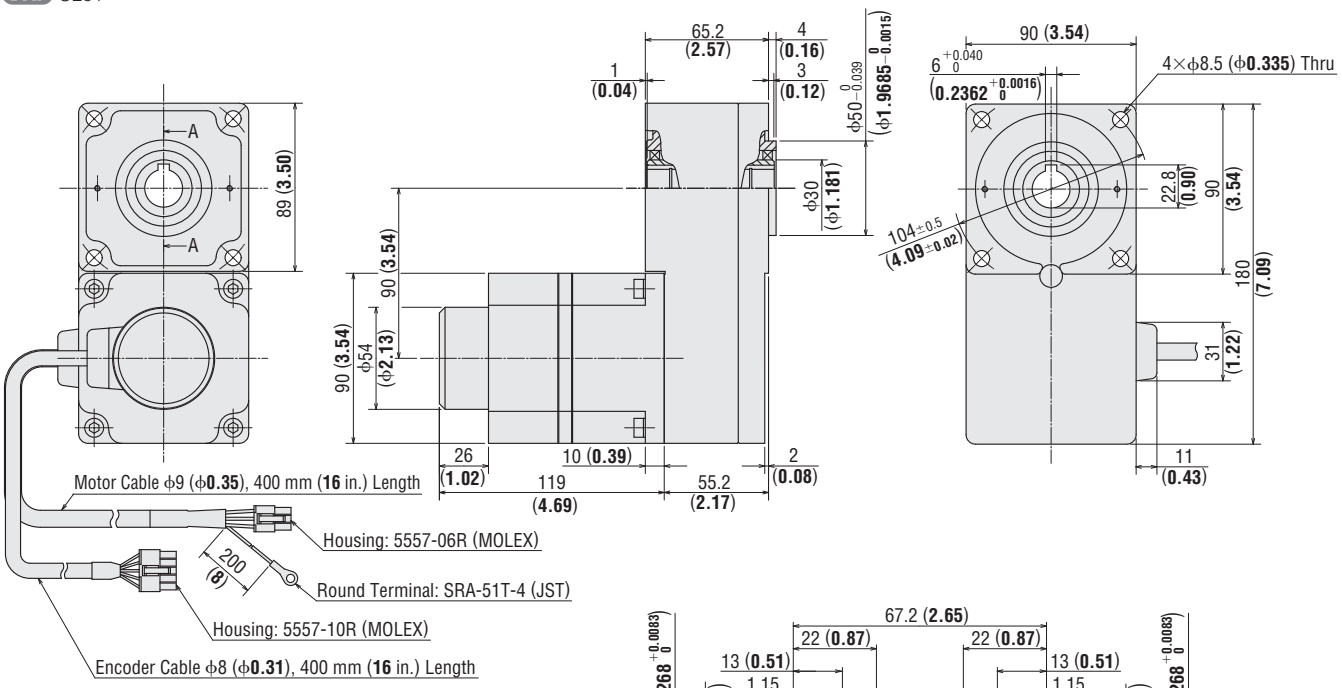
BX5120AM-□FR, **BX5120CM-□FR**

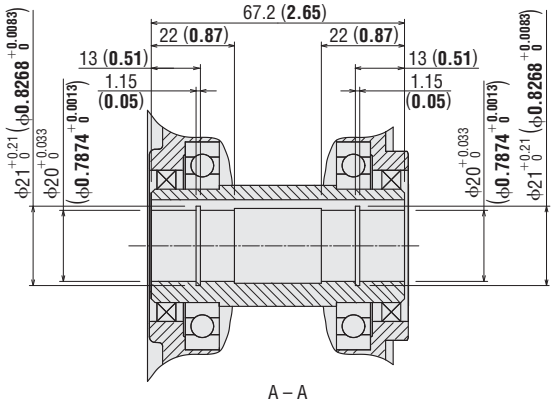
Motor: BXM5120M-GFS

Gearhead: GFS5G□FR

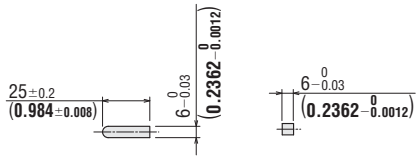
Mass: 4.4 kg (9.7 lb.) (Including gearhead)

DXF C201





◇Key (Included)



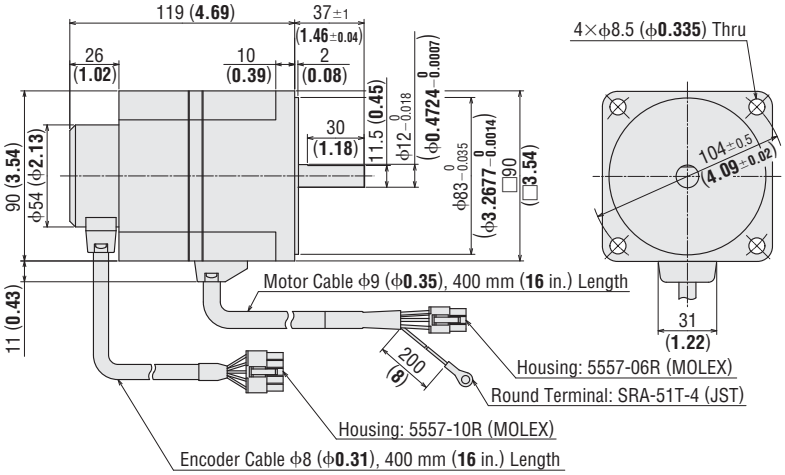
◇Round Shaft Type

BX5120AM-A, **BX5120CM-A**

Motor: BXM5120M-A2

Mass: 2.2 kg (4.8 lb.)

DXF C158

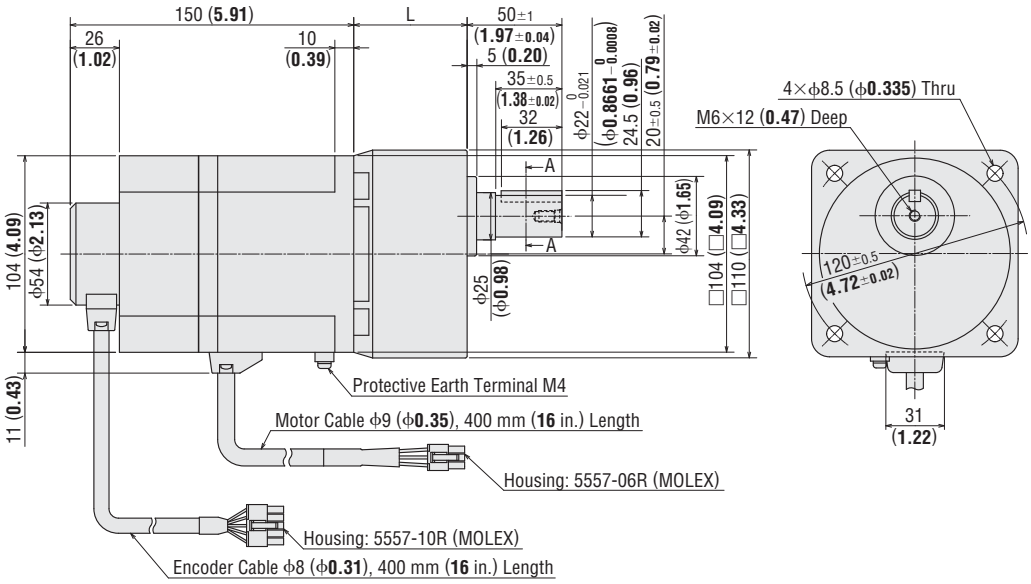


● Enter the gear ratio in the box (□) within the model name.

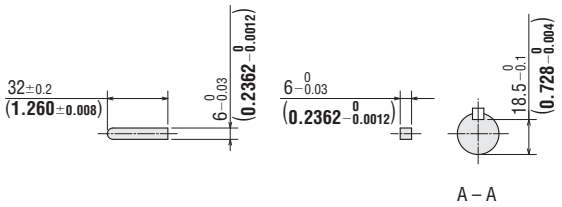
●With Electromagnetic Brake Type 200 W (1/4 HP), 400 W (1/2 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BX6200AM-□S, **BX6200CM-□S**	BXM6200M-GFS	GFS6G□	**5**～**20**	60 (2.36)	6.5 (14)	C202A
			30, **50**	72 (2.83)		C202B
BX6400SM-□S	BXM6400M-GFS		**100**, **200**	86 (3.39)		C202C



◇Key and Key Slot (Included)

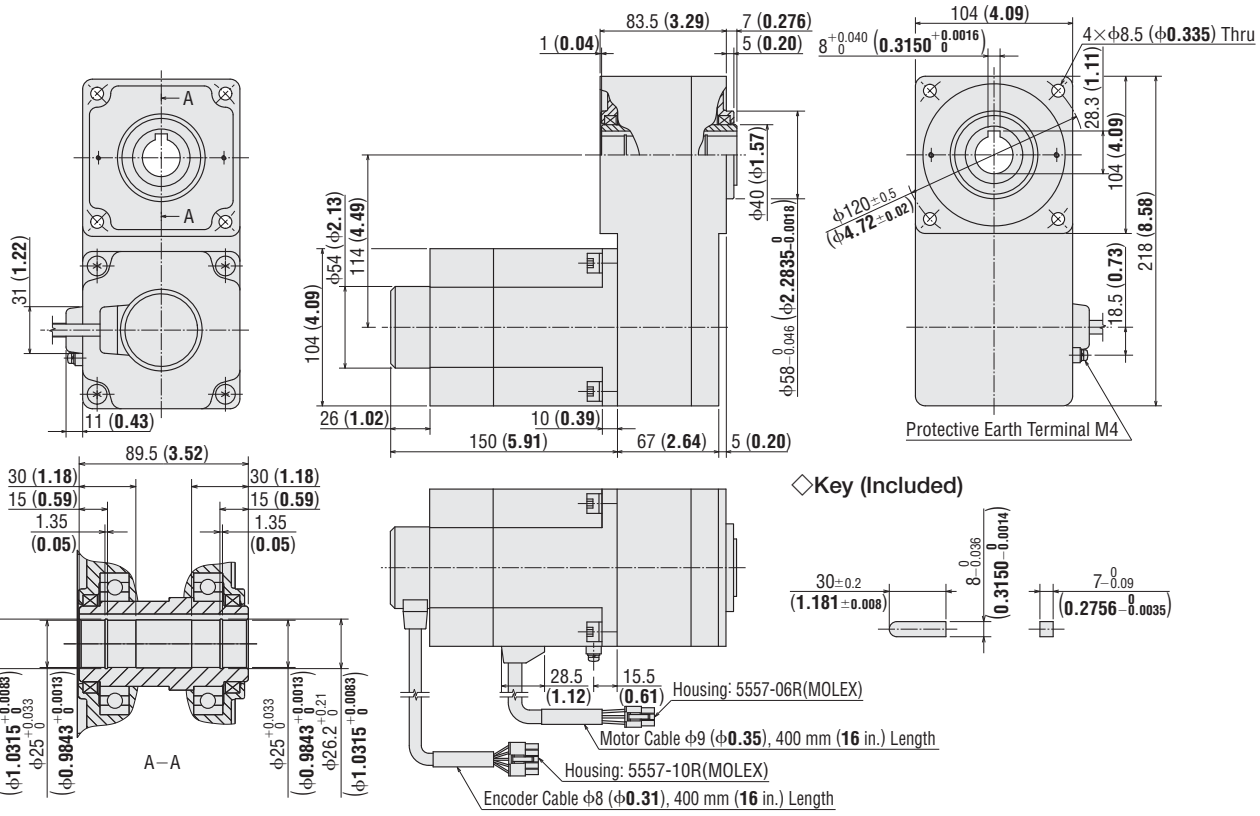


● At the time of shipment, a key is inserted on the gearhead's shaft.

● Enter the gear ratio in the box (□) within the model name.

◇Motor/Hollow shaft flat gearhead

Model	Motor Model	Gearhead Model	Mass kg (lb.)	DXF
BX6200AM-□FR, BX6200CM-□FR	BXM6200M-GFS	GFS6G□FR	8.3 (18.3)	C258
BX6400SM-□FR	BXM6400M-GFS			



◇Key (Included)

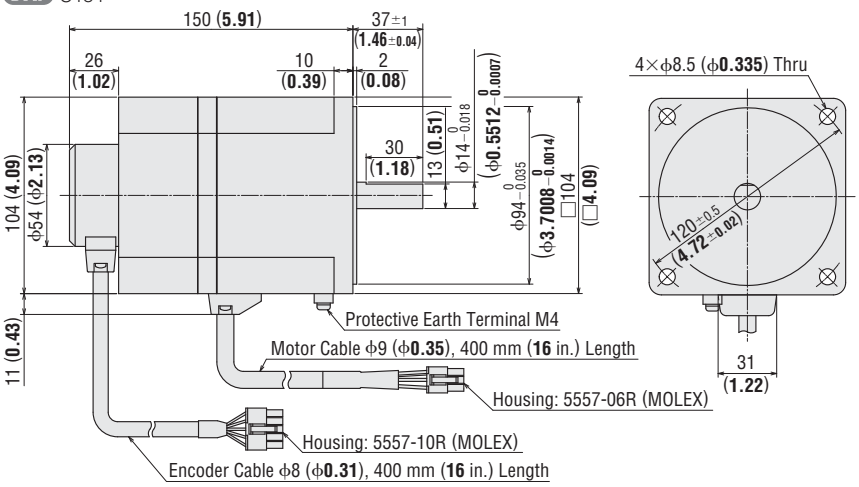
◇Round Shaft Type

BX6200AM-A, **BX6200CM-A**, **BX6400SM-A**

Motor: BXM6200M-A, BXM6400M-A

Mass: 3.5 kg (7.7 lb.)

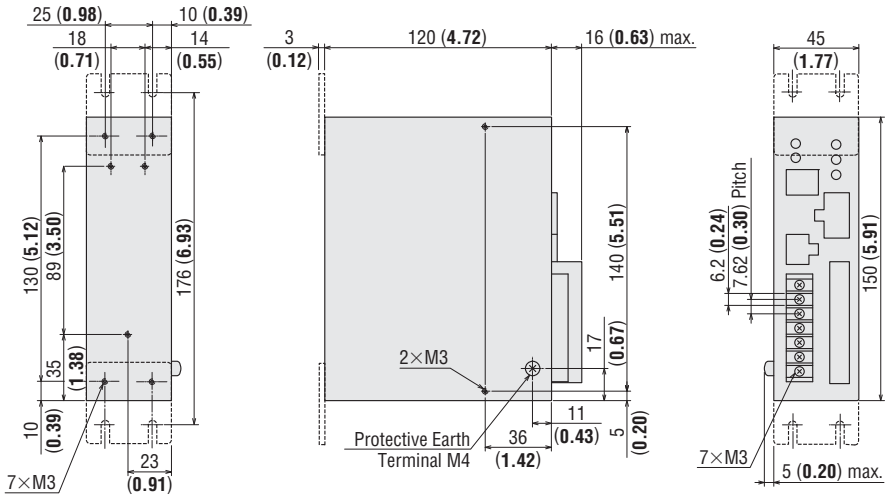
DXF C184



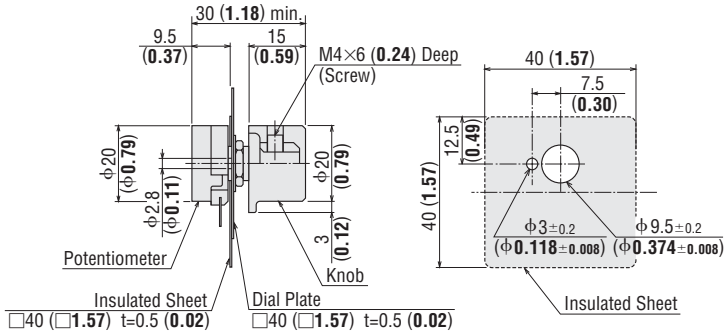
● Enter the gear ratio in the box (□) within the model name.

◇Driver (Common to all models)

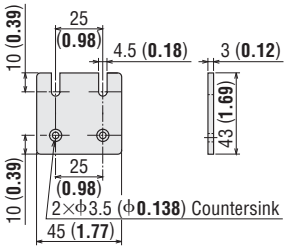
BXD30A-A, BXD30A-C, BXD60A-A, BXD60A-C
BXD120A-A, BXD120A-C, BXD200A-A, BXD200A-C, BXD400A-S
Mass: 0.8 kg (1.76 lb.)
DXF C141



◇External Speed Potentiometer (Included)



◇Mounting Bracket (2 pieces included)

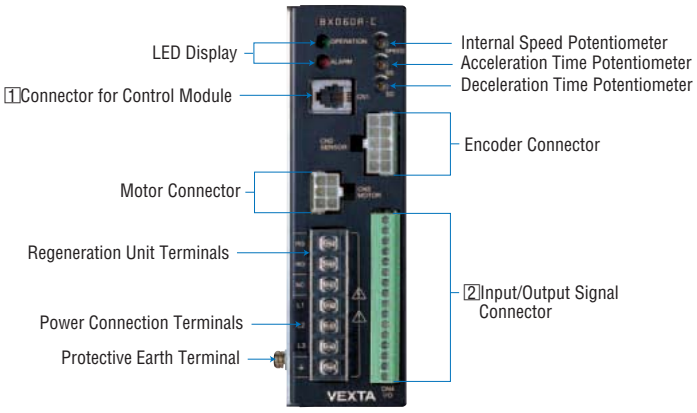


Recommended thickness of a mounting plate is a maximum of 4.5 mm (**0.18** in.).

Connection and Operation (Speed Control)

Speed control can be implemented on the standard model, but extended function is available only when a control module **OPX-1A** is used.

Names and Functions of Driver Parts



1 Connector for Control Module

You can extend the speed control performance by using an accessory control module **OPX-1A**.

Control Module
OPX-1A

◇Main Function

Setting Function	· Speed (8 speed settings max.) · Torque Limiting Values
Displaying Function	· Speed (r/min) · Load Factor (%) · Alarm Code · Alarm History

● Dimensions ➜ Page D-233

2 Input/Output Signals

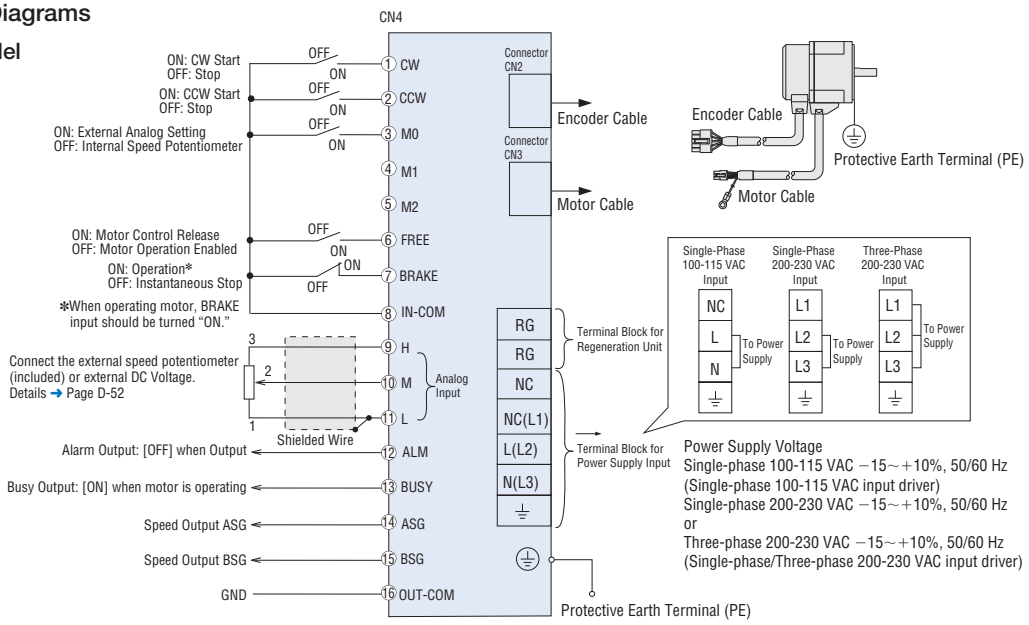
CN4 Terminal Number	I/O	Signal Name		Function
		Standard Model	Extended Function	
1	Input	CW	CW	CW rotation/stop switching input
2		CCW	CCW	CCW rotation/stop switching input
3		M0	M0	Internal speed setting/external analog setting
4		NC	M1	Standard model: Nothing is connected. Extended function: Operation-data selection
5		NC	M2	
6		FREE	FREE	Motor excitation cancellation, electromagnetic brake release
7		BRAKE/ ALARM-RESET	BRAKE/ ALARM-RESET	Normal: Brake input Protective function has been activated: Alarm reset input
8		IN-COM	IN-COM	Input signal common
9	Analog Input	H	H	Speed setting by the external speed potentiometer or external DC voltage
10		M	M	
11		L	L	
12	Output	ALARM	ALARM	This signal is output when a protective function has been activated (normally closed).
13		BUSY/ ALARM-PULSE	BUSY (TLM)*/ ALARM-PULSE	Normal: Busy output Protective function has been activated: Alarm pulse output
14		ASG	ASG	500 pulses are output per motor rotation (phase difference output)
15		BSG	BSG	
16		OUT-COM	OUT-COM	Output signal common

*The BUSY output can be changed to the torque limiting (TLM) output only when a torque limit is set.

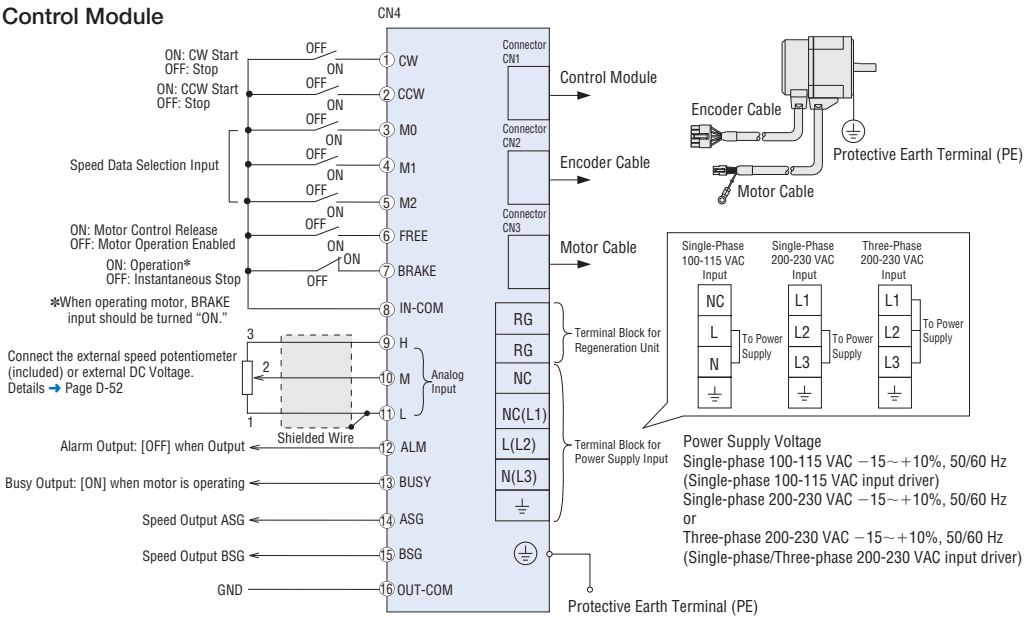
Speed Control

●Connection Diagrams

◇Standard Model



◇When Using a Control Module



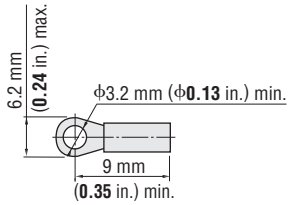
Notes

- When it is necessary to have a connection more than 0.4 m (16 in.) between motor and driver, the accessory extension cable or flexible extension cable must be used.
- Use one of the following cables for the power supply line:
  Single-Phase 100-115 VAC, 3-core cable [AWG18 (0.75 mm²) or thicker]
  Single-Phase 200-230 VAC, 3-core cable [AWG18 (0.75 mm²) or thicker]
  Three-Phase 200-230 VAC, 4-core cable [AWG18 (0.75 mm²) or thicker]
- When wiring the control I/O signal lines, keep a minimum distance of 300 mm (12 in.) from power lines (AC line, motor line and other largecurrent circuits). Also, do not route the control I/O signal lines in the same duct or piping as that is used for power lines.
- Cables for the power supply lines and control I/O signal lines are not supplied with the product. Provide appropriate cables separately.
- When grounding the driver, connect the ground wire to the protective earth terminal (M4) and connect the other end to a single point using a cable with a size of AWG18 (0.75 mm²) or thicker.

◇Applicable Crimp Terminals

● Power Supply Terminals

·Round Terminal with Insulation (M3)



● I/O Terminals (CN4)

Use the terminals specified below for connection using crimp terminals. Please note that the applicable crimp terminal will vary depending on the size of the wire. The following terminals can be used with wires of AWG26 to 18 (0.14~0.75 mm²).

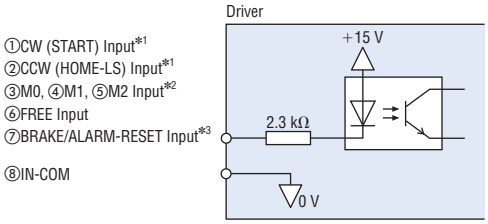
Manufacturer: Phoenix Contact

AI 0.25-6	Applicable wire size: AWG26 to 24 (0.14 to 0.2 mm²)
AI 0.5-6	Applicable wire size: AWG20 (0.5 mm²)
AI 0.34-6	Applicable wire size: AWG22 (0.3 mm²)
AI 0.75-6	Applicable wire size: AWG18 (0.75 mm²)

●Input/Output Signal Circuits (Common to standard model and using a control module)

◇Input Circuit

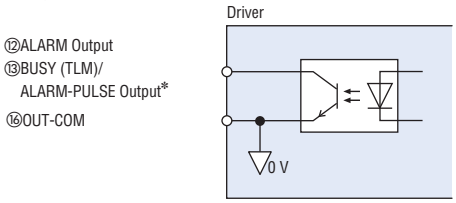
The circled number located in front of each signal represents the number of the corresponding I/O signal terminal.



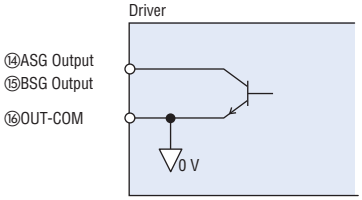
∗1 The CW and CCW inputs function in the speed control mode on the standard model and when the control module **OPX-1A** is used.
The START and HOME-LS inputs function in the position control mode when the control module **OPX-1A** is used.
∗2 The M0 input is the only operation-data selection input available on the standard model. The M0, M1 and M2 inputs function when the control module **OPX-1A** is used.
∗3 This input functions as the BRAKE input during normal operation and as the ALARM-RESET input when a driver protection is active.

◇Output Circuit

The circled number located in front of each signal represents the number of the corresponding I/O signal terminal.



∗This output functions as the BUSY output during normal operation, and as the ALARM-PULSE output when a driver protection is active. When the control module **OPX-1A** is used, the BUSY output can be changed to the TLM output.

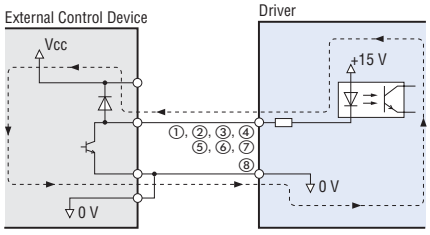


◇When an External Control Device with a Built-In Clamp Diode is Used

When you want to use an external control device with a built-in clamp diode, pay attention to the sequence of turning on or off the power.

Power ON: External control device ON → Driver ON
Power OFF: Driver OFF → External control device OFF

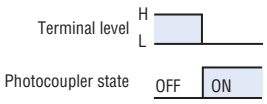
If the driver power is turned on first when connected as shown in the figure below, or the external control device power is turned off with the driver power turned on, current will be applied, as indicated by the arrows in the diagram. This may cause the motor to run.
When the power is turned on or off simultaneously, the motor may run temporally due to differences in power capacity. The external control device power must be turned on first and driver power must be turned off first.



●Description of Input/Output Signals

Indication of Input/Output Signal "ON" "OFF"

Input (Output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (Output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver. The input/output remains "OFF" if nothing is connected.



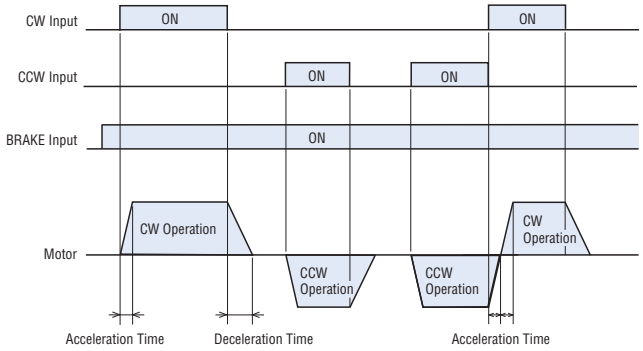
●Input Signals (Standard model)

◇Clockwise Rotation (CW) Input

When the BRAKE input is ON, motor operation is enabled. If the CW input is turned ON, acceleration and operation are performed in the clockwise direction over the time set by the acceleration time potentiometer. If it is turned OFF, the motor decelerates and the operation stops over the time set by the deceleration time potentiometer.

◇Counterclockwise Rotation (CCW) Input

When the BRAKE input is ON, motor operation is enabled.
If the CCW input is turned ON, acceleration and operation are performed in the counterclockwise direction over the time set by the acceleration time potentiometer. If it is turned OFF, the motor decelerates and the operation stops over the time set by the deceleration time potentiometer.



● If the rotation direction has been changed during motor operation, acceleration and deceleration will be performed over the time set by the acceleration time potentiometer.

Note

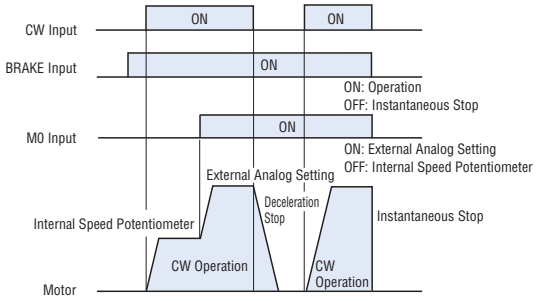
● The rotation direction indicates the direction as viewed from the motor's output shaft. With the combination type, the rotation direction varies according to the gearhead ratio.
Gearmotor – torque table of combination type ➜ Page D-29
Rotation direction of the hollow shaft flat gearhead ➜ Page D-243

Speed Control

◇Speed Control Data Selection (M0) Input

With the M0 input, the speed can be controlled by either the internal speed potentiometer or an external analog setting.

M0	Speed Setting
OFF	Internal Speed Potentiometer
ON	External Analog Setting



- Switching to a lower speed using the M0 input while the motor is operating will cause the motor to decelerate over the time set by the acceleration time potentiometer, not the time set by the deceleration time potentiometer.

◇Motor Control Release (FREE) Input

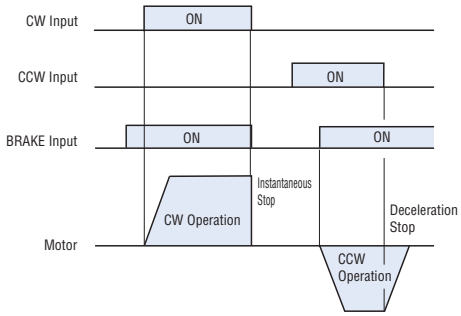
When the photocoupler is turned ON, the motor excitation is cancelled and the electromagnetic brake is released. The FREE input is given the highest priority regardless of the condition of other inputs. The FREE input functions even when a protective function is activated.

◇Brake (BRAKE)/Alarm Reset (ALARM-RESET) Input

This input functions as the BRAKE input during normal operation, and as the ALARM-RESET input when a driver protective function is active.

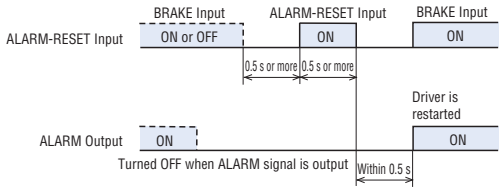
• During Normal Operation (BRAKE input)

When the BRAKE input is turned ON, motor operation is enabled. If it is turned OFF, the motor is stopped instantaneously. To start motor operation, be sure to set the BRAKE input to ON.



• Upon Activation of a Protective Function (ALARM-RESET input)

The activated protective function is reset and the driver is restarted. This input is used to reset protective functions while power is supplied. Note, however, that if the protective function for overcurrent, EEPROM error or encoder error have been activated, they cannot be reset. If any of these protective functions have been activated, contact the nearest Oriental Motor sales office.



●Input Signals (When using a control module)

◇Clockwise Rotation (CW) Input

◇Counterclockwise Rotation (CCW) Input

◇Motor Control Release (FREE) Input

◇Brake (BRAKE)/Alarm Reset (ALARM-RESET) Input

same as Input Signals (Standard model)

◇Speed Control Data Selection (M0, M1, M2) Input

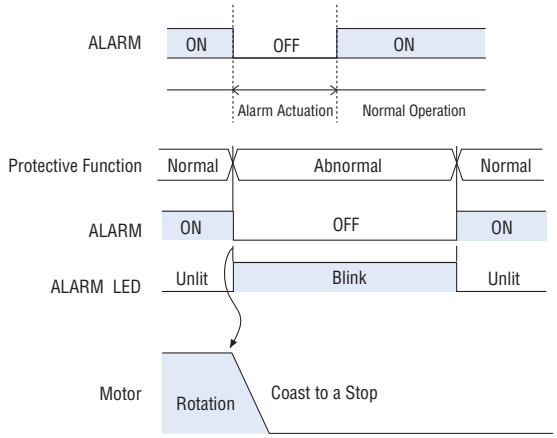
The particular combination of the M0, M1 and M2 inputs selects a maximum of eight sets of speed data. (Common to speed control mode and position control mode)

Speed Control Data	Speed Control Data Selection			Method of Speed Setting
	M0	M1	M2	
No.0	OFF	OFF	OFF	Internal speed potentiometer/ Digital setting
No.1	ON	OFF	OFF	External analog/ Digital setting
No.2	OFF	ON	OFF	Digital setting
No.3	ON	ON	OFF	Digital setting
No.4	OFF	OFF	ON	Digital setting
No.5	ON	OFF	ON	Digital setting
No.6	OFF	ON	ON	Digital setting
No.7	ON	ON	ON	Digital setting

●Output Signals (Standard model)

◇Alarm (ALARM) Output

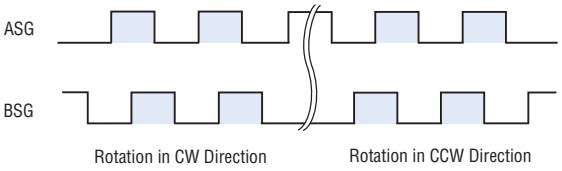
The transistor turns OFF when a driver protective function is active. When overload, overcurrent or other abnormality is detected, the alarm signal is output and the ALARM LED on the driver blinks and the motor coasts to a stop. The electromagnetic brake will be activated. To reset the alarm signal output, resolve the cause of the problem and ensure the safety of the equipment and load.
Then turn on the ALARM-RESET input or reconnect the power. When reconnecting the power, turn off the power and then wait for at least 30 seconds before turning it back on.



Note
- The alarm output logic is opposite that of other signal outputs (positive logic output).

◇Phase Difference (ASG/BSG) Output

Feedback pulses are output from the encoder (500 p/r). This output is used when monitoring the motor speed and position by connecting a counter, etc.

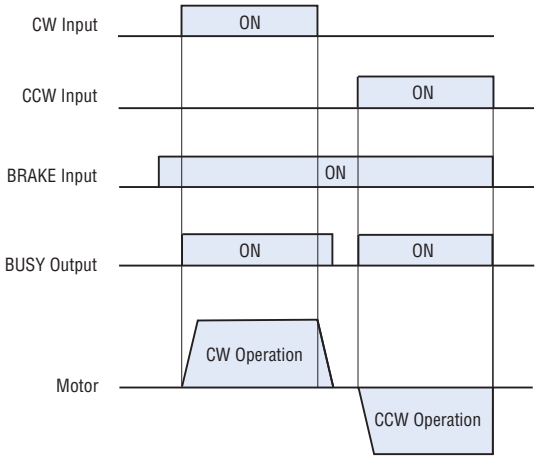


◇Busy (BUSY) [Torque Limiting (TLM)]/Alarm Pulse (ALARM-PULSE) Output

This output functions as the BUSY output during normal operation, and as the ALARM-PULSE output with a driver protection function is active.
When the torque limiting function is set with a control module, this output can be changed to the TLM output, which indicates that the torque limit has been reached.

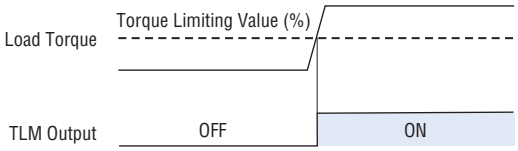
• During Normal Operation (Busy output)

Speed control mode: The transistor turns ON during motor operation.
Position control mode: The transistor turns ON during rotation, and turns OFF upon stopping at the set stop position.



• When a Torque Limiting Value is Set [This signal can be used as the torque limiting (TLM) output.]

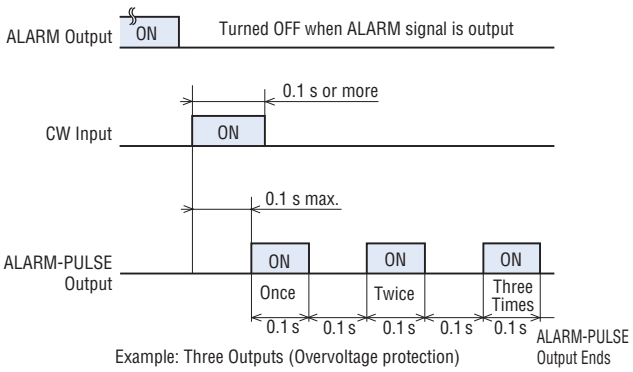
Speed control mode/position control mode: The transistor turns ON when the specified torque limit is reached.



Notes
- An accessory control module **OPX-1A** is required to implement torque limiting.
- Switch the busy (BUSY) output to the torque limiting (TLM) output.
- The maximum error between the torque limiting and actual generated torque is approximately 20% (starting torque: 100%).
  Torque limiting function when using a control module ➜ Page D-57

• Upon Activation of a Protection Function [(ALARM-PULSE output)]

If a one shot input (0.1 s or more) is given to the rotation direction or START input, a pulse (5 Hz) will be output for the number of times equivalent to the number of times the ALARM LED blinks upon activation of a protective function. It is possible to determine the type of protective function that has been activated by counting the number of pulses from controller.



Example: Three Outputs (Overvoltage protection)

Speed Control

●Output Signals (When using a control module)

◇Alarm (ALARM) Output

◇Phase Difference (ASG/BSG) Output

◇Busy (BUSY) [Torque Limiting (TLM)]/ALARM-PULSE Output

same as Output Signals (Standard model)

●Speed Setting Method

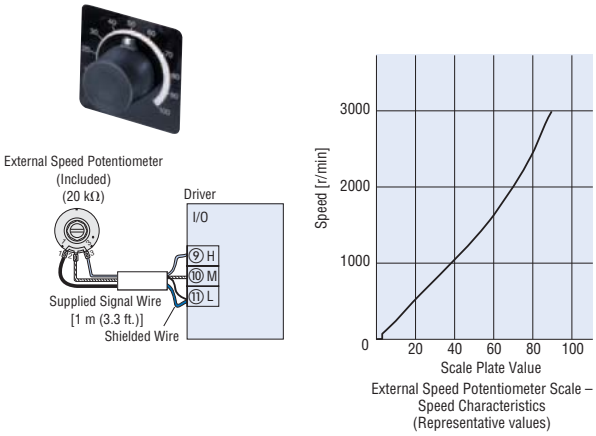
(Common to standard model and using a control module)

◇Using the Internal Speed Potentiometer

Set a desired speed using the potentiometer provided on the driver's front panel. When the internal speed potentiometer is used, set the M0 terminal to “Photocoupler OFF.”

◇Using the External Speed Potentiometer (Included)

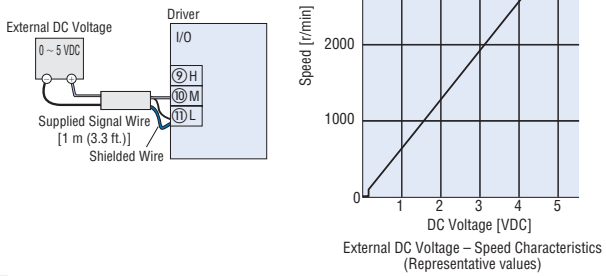
When the motor speed is to be set remotely, connect the supplied external speed potentiometer as shown below. When the external speed potentiometer is used, set the M0 terminal to "Photocoupler ON."



External Speed Potentiometer Scale – Speed Characteristics (Representative values)

◇Speed Setting by External DC Voltage

When the motor speed needs to be set using external DC voltage, connect as follows. In this case, set the M0 terminal to "Photocoupler ON."



External DC Voltage – Speed Characteristics (Representative values)

Note

- When setting speeds using the external speed potentiometer or via external DC voltage, be sure to use the supplied signal line [ϕ3.3 mm×1 m (ϕ0.13 in.×3.3 ft.)]. Connect the shielded wire for the signal line to the L terminal. Ensure proper connection on the external speed potentiometer or external DC voltage side so that the shielded wire will not contact with another terminal. The input impedance between the M and L terminals is approximately 15 kΩ.

◇Digital Setting (Only when a control module is used)

The particular combination of the M0, M1 and M2 inputs selects a maximum of eight sets of speed data. (Common to speed control mode and position control mode)

Speed Control Data	Speed Control Data Selection			Method of Speed Setting
	M0	M1	M2	
No.0	OFF	OFF	OFF	Internal speed potentiometer/ Digital setting
No.1	ON	OFF	OFF	External analog/ Digital setting
No.2	OFF	ON	OFF	Digital setting
No.3	ON	ON	OFF	Digital setting
No.4	OFF	OFF	ON	Digital setting
No.5	ON	OFF	ON	Digital setting
No.6	OFF	ON	ON	Digital setting
No.7	ON	ON	ON	Digital setting

●Multi-Motor Control (Common to standard model and using a control module)

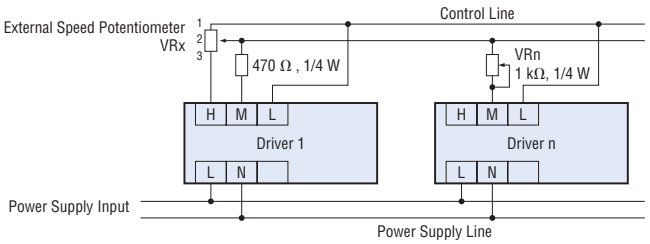
Two or more motors can be operated at the same speed using a single external speed potentiometer or external DC voltage.
The figure below shows an example of the single-phase power supply specification. For the three-phase power supply specification, change the power supply line to one for a three-phase power supply. The motor and operation control unit are not illustrated in the figure.

◇Using an External Speed Potentiometer

Connect all drivers using a common power supply line and common speed control line, as shown in the figure, and set a desired speed using the external speed potentiometer VRx.
The resistance of the external speed potentiometer is determined as follows:

Resistance when the number of drivers is n: VRx = 20/n (kΩ), n/4 (W)
Example: When two drivers are connected
VRx = 20/2 = 10 (kΩ), 2/4 = 1/2 (W)
Based on the calculation, the resistance should be 10 kΩ, 1/2 W.

To adjust the speed difference among the motors, connect a resistor of 470 Ω, 1/4 W to the M terminal on the first driver, and connect a variable resistor (VRn) of 1 kΩ, 1/4 W to the M terminal on each of the remaining drivers.
The number of motors operated in parallel via the external speed potentiometer should be limited to five or less.

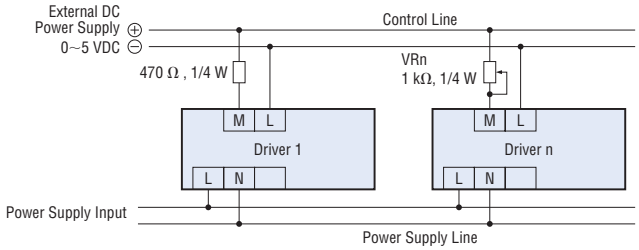


◇Using External DC Voltage

Connect all drivers using a common power supply line and common speed control line, as shown in the figure, and connect a 5 VDC power supply.
The power supply capacity of the external DC power supply is determined as follows:

Power supply capacity when the number of drivers is n: I = 1×n (mA)
Example: When two drivers are connected
I = 1×2 = 2 (mA)
Based on the calculation, the power supply capacity should be at least 2 mA.

To adjust the speed difference among the motors, connect a resistor of 470 Ω, 1/4 W to the M terminal on the first driver and connect a variable resistor (VRn) of 1 kΩ, 1/4 W to the M terminal on each of the remaining drivers.

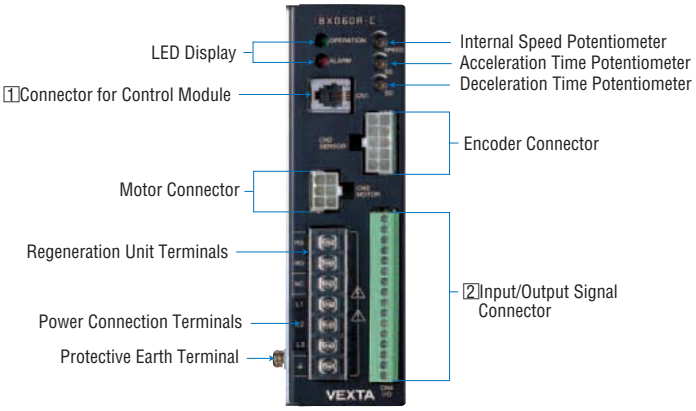


Position Control

Connection and Operation (Position Control)

When performing a position control motion, an accessory control module **OPX-1A** is required.

●Names and Functions of Driver Parts



1 Connector for Control Module

You can extend the position control performance by using an accessory control module **OPX-1A**.

Control Module
OPX-1A

◇Main Function

Setting Function	· Travel Amount (6 points max.) · Speed (8 speed settings max.) · Torque Limiting Values
Displaying Function	· Positioning Counter (STEP) · Speed (r/min) · Load Factor (%) · Alarm Code · Alarm History

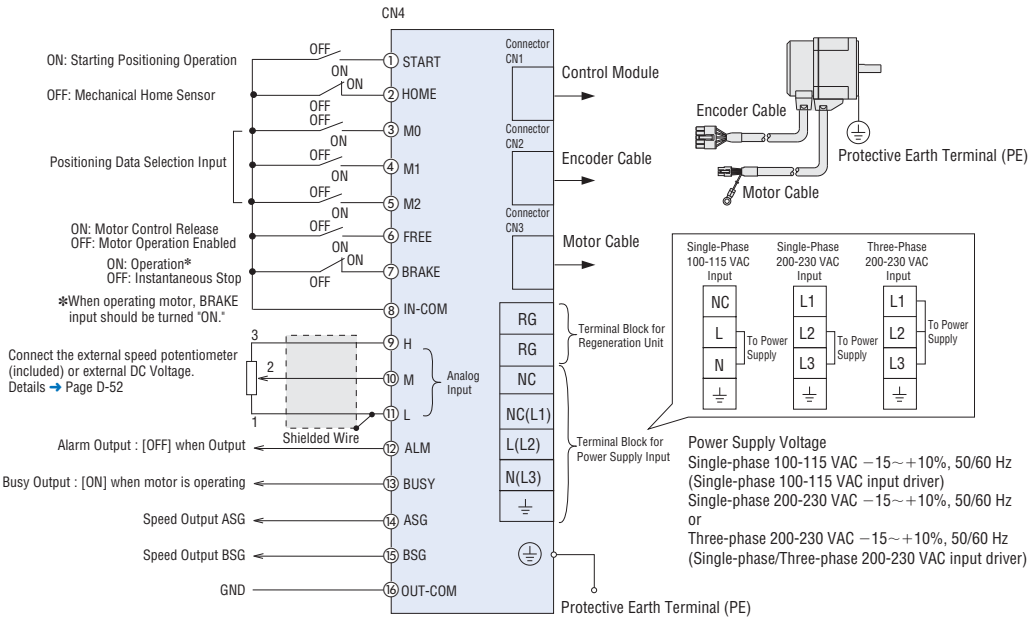
● Dimensions ➜ Page D-233

2 Input/Output Signals

CN4 Terminal Number	I/O	Signal Name	Function
1	Input	START	Starting positioning operation
2		HOME-LS	Mechanical home sensor (normally closed)
3		M0	Positioning data selection
4		M1	
5		M2	
6		FREE	Motor excitation cancellation, electromagnetic brake release
7		BRAKE/ ALARM-RESET	Normal: Brake input Protective function has been activated: Alarm reset input
8		IN-COM	Input signal common
9	Analog Input	H	Speed setting via the external speed potentiometer or external DC voltage
10		M	
11		L	
12	Output	ALARM	This signal is output when a protective function has been activated (normally closed).
13		BUSY (TLM)*/ ALARM-PULSE	Normal: Busy output Protective function has been activated: Alarm pulse output
14		ASG	500 pulses are output per motor rotation (phase difference output)
15		BSG	
16		OUT-COM	Output signal common

*The BUSY output can be changed to the torque limiting (TLM) output only when a torque limit is set.

●Connection Diagram



●Refer to the connection diagrams in the speed control mode for applicable crimp terminal and notes on connection. ➜ Page D-48

●Input/Output Signal Circuits

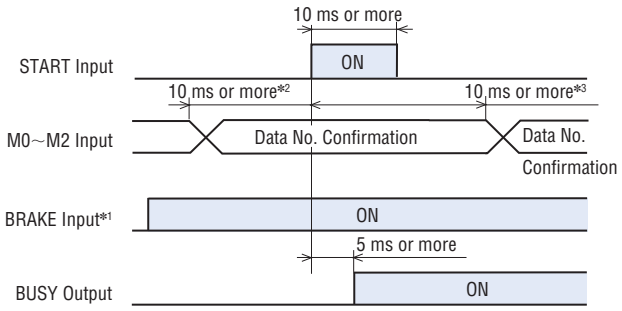
same as Speed Control ➜ Page D-49

●Input Signals

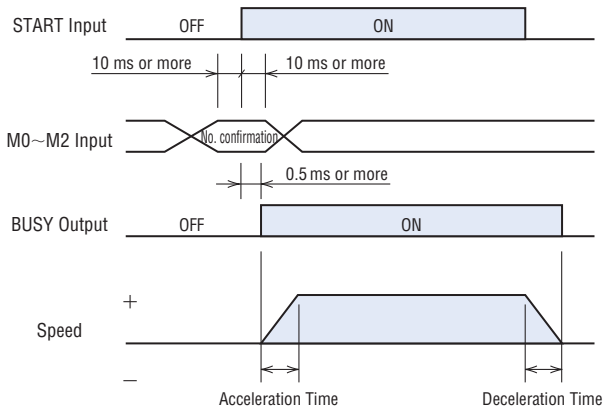
◇Start (START) Input

This signal starts the positioning, continuous, return to mechanical home or return to electrical home operations. Operation will start when the START input is turned ON after selecting the operation data via the combination of M0, M1 and M2 inputs.

• Positioning Operation



• Continuous Operation



*1 The motor stops when the BRAKE input is turned OFF. Before starting motor operation, be sure to turn the BRAKE input to ON.
*2 Input the operation data confirmation signal at least 10 ms before the input of START signal.
*3 When confirming the data number for the next travel amount following input of the START signal, input the confirmation signal at least 10 ms after the input of that signal.

●When the digital independent torque limiting function is set, the data numbers will be reflected as necessary even during an index operation.

Position Control

◇Mechanical Home Sensor (HOME-LS) Input

This signal is used during the return to mechanical home operation.

• Return to Mechanical Home Operation

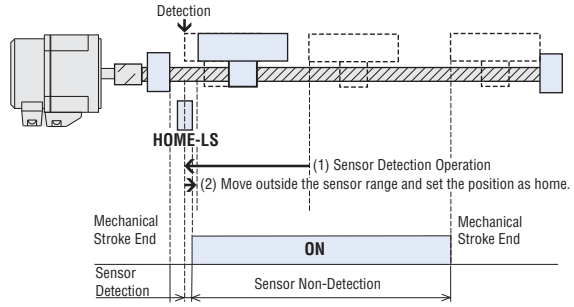
The mechanical home sensor (HOME-LS input) installed on the equipment is detected with the motor operated in the set detection starting direction. Upon detection of the home sensor, the motor reverses its direction and stops at a position just outside the range of the home sensor.

Mechanical home detection method: 1-sensor mode (normally closed input)

Starting direction of home detection: Can be set as CW or CCW (in uni-direction)

Speed input in data: No. 7

No acceleration/deceleration time is set.



Note

- Install the home sensor (HOME-LS) before the stroke-end sensor on the detection starting side.

◇Operation Data Selection (M0, M1, M2) Input

The particular combination of the M0, M1 and M2 inputs selects a maximum of six sets of positioning data as well as the return to home operation.

Operation Data	Operation Data Selection			Position Control Mode	Method of Speed Setting
	M0	M1	M2		
No.0	OFF	OFF	OFF	Positioning operation 0/ Continuous operation 0	Internal speed potentiometer/ Digital setting
No.1	ON	OFF	OFF	Positioning operation 1/ Continuous operation 1	External analog/ Digital setting
No.2	OFF	ON	OFF	Positioning operation 2	Digital setting
No.3	ON	ON	OFF	Positioning operation 3	Digital setting
No.4	OFF	OFF	ON	Positioning operation 4	Digital setting
No.5	ON	OFF	ON	Positioning operation 5	Digital setting
No.6	OFF	ON	ON	Return to electrical home operation	Digital setting
No.7	ON	ON	ON	Return to mechanical home operation	Digital setting

- Speed can be set for each data.
  Speed data is set in the same manner as in the speed control mode.
- No. 0 and No. 1 allow the switching of positioning operation and continuous operation.

◇Motor Control Release (FREE) Input

same as Input Signals (Standard model) ➜ Page D-50

◇Brake (BRAKE)/Alarm Reset (ALARM-RESET) Input

same as Input Signals (Standard model) ➜ Page D-50

●Output Signals

◇Alarm (ALARM) Output

◇Phase Difference (ASG/BSG) Output

◇Busy (BUSY) [Torque Limiting (TLM)]/Alarm Pulse (ALARM-PULSE) Output

same as Output Signals (Standard model) ➜ Page D-51

Torque Limiting Function When Using a Control Module

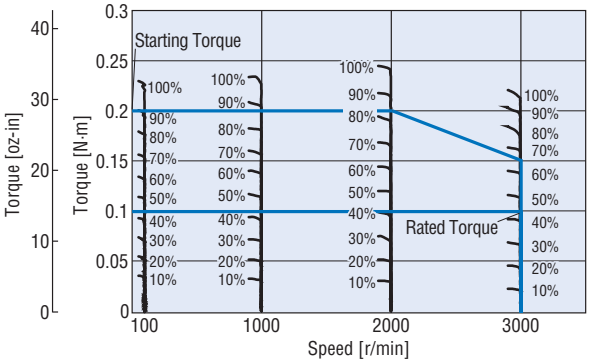
The **BX** Series permits the setting of a motor output torque limit in both the speed control mode of extended system and position control mode. The torque limit is set relative to the starting torque being 100%. When torque needs to be limited continuously during push-motion operation or winding operation, set the limit to rated torque or less.
Calculate the output torque for the combination type based on the applicable speed and torque, using the "Speed–Torque Limit Characteristics" graphs and formulas shown below.

Gearhead output shaft speed N_G = Motor shaft speed×1/Gearhead ratio
Gearhead output shaft torque During rotation: T_G = Motor output torque × Gearhead gear ratio × Gearhead transmission efficiency*
During stop: T_G = Motor output torque × Gearhead gear ratio × 1

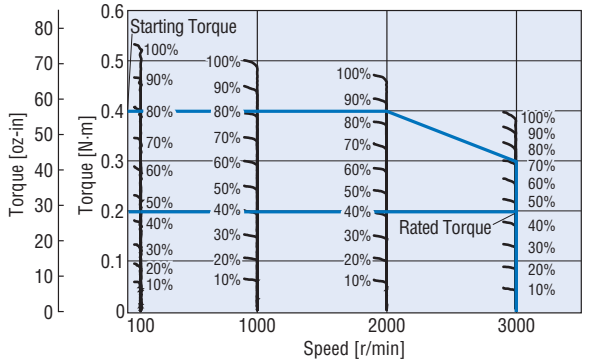
* For the gearhead transmission efficiency, refer to the page on how to read gearhead specifications. Gearhead efficiency ➜ Page C-14

Speed – Torque Limit Characteristics (Reference values)

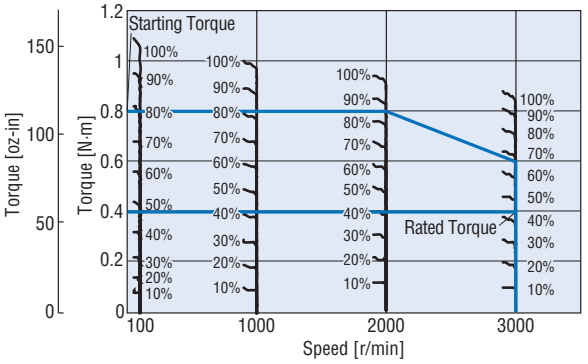
BX230□-A/BX230□-□S/BX230□-□FR
BX230□M-A/BX230□M-□S/BX230□M-□FR



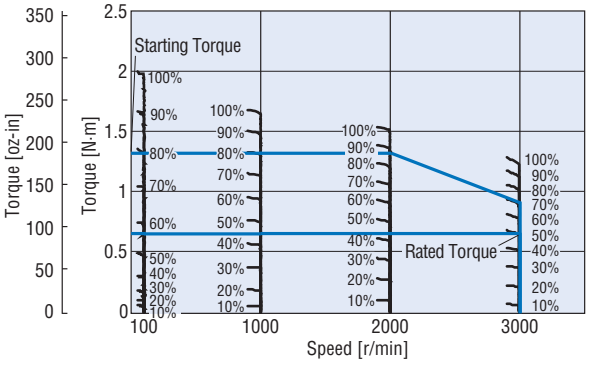
BX460□-A/BX460□-□S/BX460□-□FR
BX460□M-A/BX460□M-□S/BX460□M-□FR



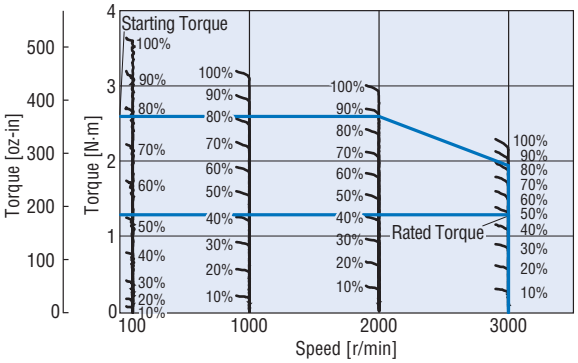
BX5120□-A/BX5120□-□S/BX5120□-□FR
BX5120□M-A/BX5120□M-□S/BX5120□M-□FR



BX6200□-A/BX6200□-□S/BX6200□-□FR
BX6200□M-A/BX6200□M-□S/BX6200□M-□FR



BX6400S-A/BX6400S-□S/BX6400S-□FR
BX6400SM-A/BX6400SM-□S/BX6400SM-□FR



Note

- An error of up to approximately ±20% (starting torque: 100%) may occur between the set value and generated torque due to the speed setting, power supply voltage and distance of motor cable extension.
  Repetitive accuracy under the same condition is approximately ±10%.
- Enter the power supply voltage (**A** or **C**) in the box (■) within the model name.
  Enter the gear ratio in the box (□) within the model name.

List of Motor and Driver Combinations

●Standard Type

◇Combination Type – Parallel Shaft Gearhead

The combination type comes with the motor and parallel shaft gearhead pre-assembled.

Output Power	Model	Motor Model	Gearhead Model	Driver Model
30 W (1/25 HP)	**BX230A-□S**	BXM230-GFS	GFS2G□	BXD30A-A
	BX230C-□S			BXD30A-C
60 W (1/12 HP)	**BX460A-□S**	BXM460-GFS	GFS4G□	BXD60A-A
	BX460C-□S			BXD60A-C
120 W (1/6 HP)	**BX5120A-□S**	BXM5120-GFS	GFS5G□	BXD120A-A
	BX5120C-□S			BXD120A-C
200 W (1/4 HP)	**BX6200A-□S**	BXM6200-GFS	GFS6G□	BXD200A-A
	BX6200C-□S			BXD200A-C
400 W (1/2 HP)	**BX6400S-□S**	BXM6400-GFS	GFS6G□	BXD400A-S

◇Round Shaft Type

Output Power	Model	Motor Model	Driver Model
30 W (1/25 HP)	**BX230A-A**	BXM230-A2	BXD30A-A
	BX230C-A		BXD30A-C
60 W (1/12 HP)	**BX460A-A**	BXM460-A2	BXD60A-A
	BX460C-A		BXD60A-C
120 W (1/6 HP)	**BX5120A-A**	BXM5120-A2	BXD120A-A
	BX5120C-A		BXD120A-C
200 W (1/4 HP)	**BX6200A-A**	BXM6200-A	BXD200A-A
	BX6200C-A		BXD200A-C
400 W (1/2 HP)	**BX6400S-A**	BXM6400-A	BXD400A-S

◇Combination Type – Hollow Shaft Flat Gearhead

The combination type comes with the motor and hollow shaft flat gearhead pre-assembled.

Output Power	Model	Motor Model	Gearhead Model	Driver Model
30 W (1/25 HP)	**BX230A-□FR**	BXM230-GFS	GFS2G□FR	BXD30A-A
	BX230C-□FR			BXD30A-C
60 W (1/12 HP)	**BX460A-□FR**	BXM460-GFS	GFS4G□FR	BXD60A-A
	BX460C-□FR			BXD60A-C
120 W (1/6 HP)	**BX5120A-□FR**	BXM5120-GFS	GFS5G□FR	BXD120A-A
	BX5120C-□FR			BXD120A-C
200 W (1/4 HP)	**BX6200A-□FR**	BXM6200-GFS	GFS6G□FR	BXD200A-A
	BX6200C-□FR			BXD200A-C
400 W (1/2 HP)	**BX6400S-□FR**	BXM6400-GFS	GFS6G□FR	BXD400A-S

●With Electromagnetic Brake Type

◇Combination Type – Parallel Shaft Gearhead

The combination type comes with the motor and parallel shaft gearhead pre-assembled.

Output Power	Model	Motor Model	Gearhead Model	Driver Model
30 W (1/25 HP)	**BX230AM-□S**	BXM230M-GFS	GFS2G□	BXD30A-A
	BX230CM-□S			BXD30A-C
60 W (1/12 HP)	**BX460AM-□S**	BXM460M-GFS	GFS4G□	BXD60A-A
	BX460CM-□S			BXD60A-C
120 W (1/6 HP)	**BX5120AM-□S**	BXM5120M-GFS	GFS5G□	BXD120A-A
	BX5120CM-□S			BXD120A-C
200 W (1/4 HP)	**BX6200AM-□S**	BXM6200M-GFS	GFS6G□	BXD200A-A
	BX6200CM-□S			BXD200A-C
400 W (1/2 HP)	**BX6400SM-□S**	BXM6400M-GFS	GFS6G□	BXD400A-S

◇Round Shaft Type

Output Power	Model	Motor Model	Driver Model
30 W (1/25 HP)	**BX230AM-A**	BXM230M-A2	BXD30A-A
	BX230CM-A		BXD30A-C
60 W (1/12 HP)	**BX460AM-A**	BXM460M-A2	BXD60A-A
	BX460CM-A		BXD60A-C
120 W (1/6 HP)	**BX5120AM-A**	BXM5120M-A2	BXD120A-A
	BX5120CM-A		BXD120A-C
200 W (1/4 HP)	**BX6200AM-A**	BXM6200M-A	BXD200A-A
	BX6200CM-A		BXD200A-C
400 W (1/2 HP)	**BX6400SM-A**	BXM6400M-A	BXD400A-S

◇Combination Type – Hollow Shaft Flat Gearhead

The combination type comes with the motor and hollow shaft flat gearhead pre-assembled.

Output Power	Model	Motor Model	Gearhead Model	Driver Model
30 W (1/25 HP)	**BX230AM-□FR**	BXM230M-GFS	GFS2G□FR	BXD30A-A
	BX230CM-□FR			BXD30A-C
60 W (1/12 HP)	**BX460AM-□FR**	BXM460M-GFS	GFS4G□FR	BXD60A-A
	BX460CM-□FR			BXD60A-C
120 W (1/6 HP)	**BX5120AM-□FR**	BXM5120M-GFS	GFS5G□FR	BXD120A-A
	BX5120CM-□FR			BXD120A-C
200 W (1/4 HP)	**BX6200AM-□FR**	BXM6200M-GFS	GFS6G□FR	BXD200A-A
	BX6200CM-□FR			BXD200A-C
400 W (1/2 HP)	**BX6400SM-□FR**	BXM6400M-GFS	GFS6G□FR	BXD400A-S

● Enter the gear ratio in the box (□) within the model name.

BLF Series

●Additional Information●
Technical reference ➜ Page G-1
Safety standards ➜ Page H-2

The **BLF** Series brushless motor achieves a maximum motor speed of 4000 r/min. With the digital operator, digital setting and display are possible, offering a wide range of functions to meet your diverse needs.

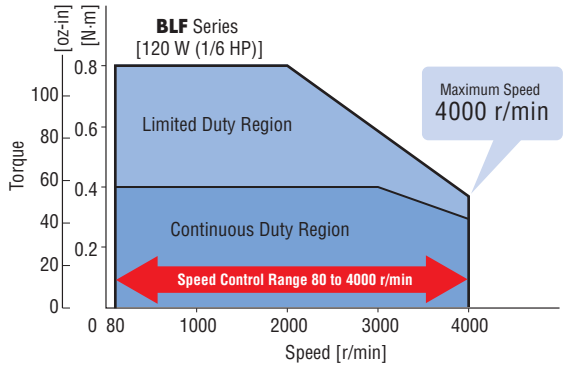
Motor: c UL us CE Driver: c UL us LISTED CE RoHS

●For detailed product safety standard information including standards, file number and certification body, please visit www.orientalmotor.com.

Features

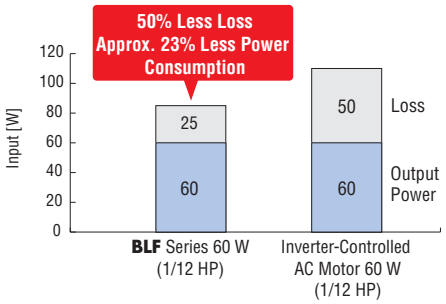
●Wide Speed Control Range from 80 r/min up to 4000 r/min

A wide speed control range from 80 to 4000 r/min (speed ratio of 50:1) enables the motor to be used for various applications.



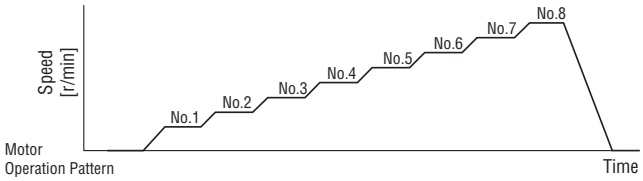
●Energy-Saving

At an output power of 60 W (1/12 HP), the power loss of the **BLF** Series is approximately half that of an inverter-controlled AC motor, which contributes to the energy-saving operation of your equipment.



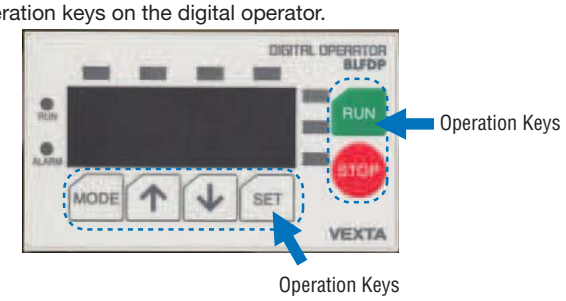
●Multi-Speed Operation Using up to Eight Speeds

Up to eight speeds can be set by digital setting. On the digital operator, the speed can be set in units of 1 r/min and a different acceleration/deceleration time can be set for each speed. Switch the speed according to your needs.



●Easy Operation with the Digital Operator

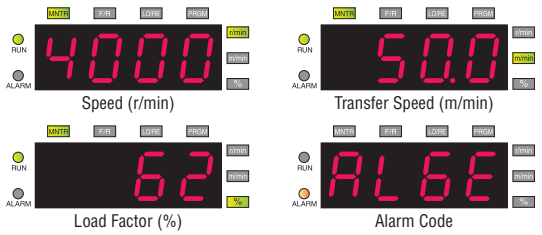
You can perform various settings and operations using the six operation keys on the digital operator.



●Various Digital Displays

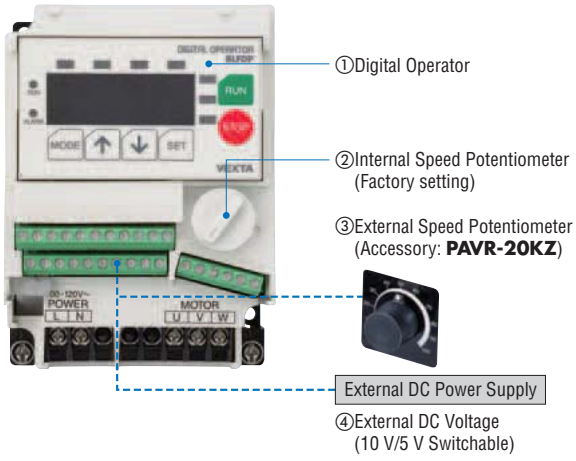
Speed, load factor, alarm code, etc. can be displayed digitally.

●The speed can be displayed as gearhead output shaft speed.



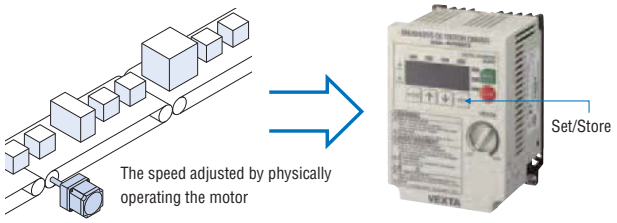
●Four Speed Setting Methods

Select one of four speed setting methods according to the condition in which your equipment is used.



●Speed Teaching Function

The speed adjusted by physically operating the motor can be set and stored.



●Sink/Source Logic Switchable

To ensure safety and usability, sink/source logic can be selected by a switch.

- The factory setting is the sink logic.

●Full Range of Protective Functions

The **BLF** Series detects various motor and driver errors such as overload, overvoltage, undervoltage, missing phase, overspeed, overcurrent, EEPROM error, CPU error, operation error and external error. Upon detection of an error, the driver will immediately stop the motor and output an alarm signal.

●Detachable Digital Operator

The digital operator can be detached from the driver and used at a location as far as 5 m (16.4 ft.) away using an accessory remote-control kit (sold separately). Use the digital operator as a handy operation unit or display outside the switch board. (The digital operator conforms to IP65 when the remote-control kit is used.)

Digital Operator

●A Maximum Motor/Driver Wiring Distance of 20 m (65.6 ft.)

By separating the motor cable and signal cable, the **BLF** Series is less vulnerable to noise and capable of an extension of the motor/driver wiring distance to a maximum of 20 m (65.6 ft.).
Select connection cables (sold separately) from among eight lengths [1 to 20 m (3.3 to 65.6 ft.)].

Note

- Be sure to purchase connection cables (sold separately).

Motor Side Driver Side

Motor Connection Cable

Motor Side Driver Side

Signal Connection Cable

●Uses a Terminal Block for Driver Connection

The driver-end of each cable has terminals, instead of a connector, to make it easy to wire the cable into a switch board.

●Long Life Gearhead Rating of 10000 Hours

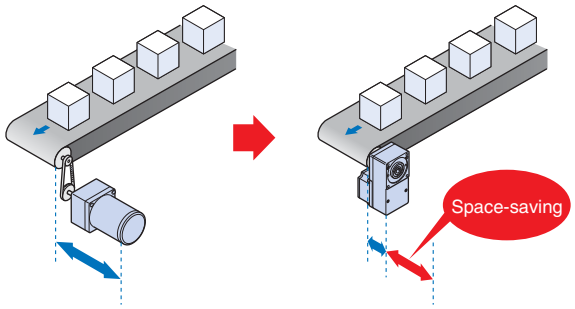
The rated life of the parallel shaft gearhead and hollow shaft flat gearhead is 10000 hours (at 3000 r/min). The parallel shaft gearhead achieves a rated life of twice as long as that of a conventional gearhead.

- The 60 W (1/12 HP), 120 W (1/6 HP), 200 W (1/4 HP) and 400 W (1/2 HP) parallel shaft gearhead has a tapped hole at the shaft end.

●Features of Hollow Shaft Flat Gearhead

◇Space-Saving and Low-Cost

The output shaft can be coupled directly to a driven shaft without using a coupling, which allows you to reduce the size and installation space of your equipment. Since no shaft-coupling parts are needed, the parts and labor cost will also decrease.

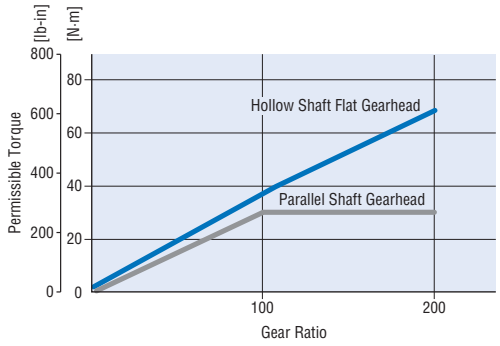


[For Three-Phase Motor and Parallel Shaft Gearhead]

[For Brushless Motor and Hollow Shaft Flat Gearhead]

◇High Permissible Torque

While the permissible torque of parallel shaft gearhead saturates at high gear ratios, the hollow shaft flat gearhead enables the motor torque to be fully utilized.



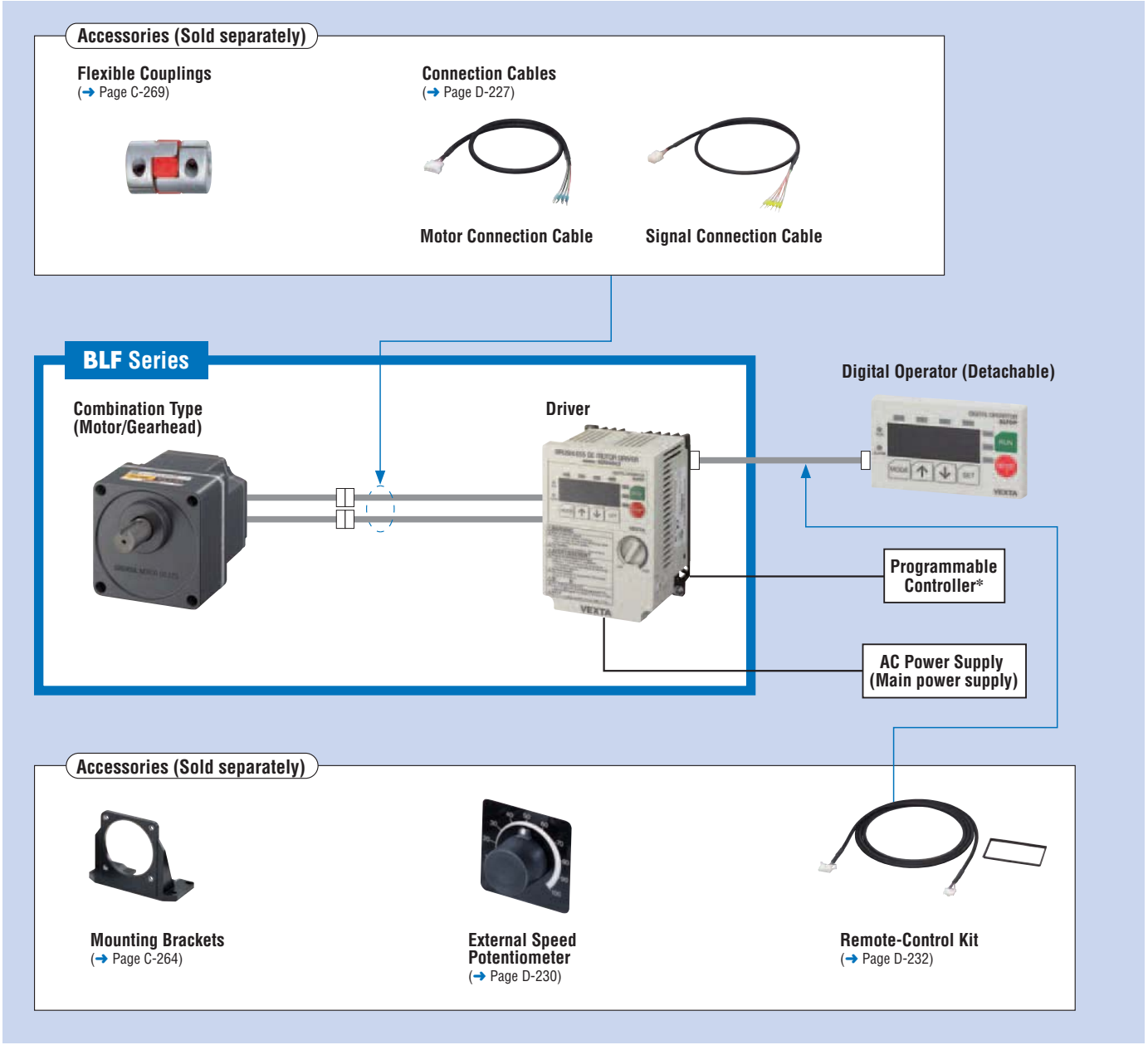
[Frame size 90 mm (3.54 in.)]

●IP65 Protection

The motor (excluding the mounting surface of the round shaft type and the connector) and digital operator (when an accessory remote-control kit is used) provide a high level of protection conforming to IP65 meaning you can use the **BLF** Series in locations where the unit may come into contact with water.

- The **BLF** Series is not designed for washing directly in water or use in an environment where the unit constantly receives water splashes. The protection class of the driver is IP20.

System Configuration



●Example of System Configuration

BLF Series Combination Type – Parallel Shaft	Sold Separately					
	Connection Cable [Cable Set, 1 m (3.3 ft.)]	+	Remote-Control Kit [2 m (6.6 ft.)]	Mounting Bracket	Flexible Coupling	External Speed Potentiometer
BLF460A-30	CC01BLF		BLFHS-02	SOL4M6	MCL5515F10	PAVR-20KZ

●The system configuration shown above is an example. Other combinations are available.

*Not supplied

Product Number Code

BLF 2 30 A - 5 FR

① ② ③ ④ ⑤ ⑥

①	Series	**BLF**: **BLF** Series
②	Motor 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.) [110 mm (4.33 in.) for Gearhead]
③	Output Power (W)	(Example) **30**: 30 W (1/25 HP)
④	Power Supply Voltage	**A**: Single-Phase 100-120 VAC **C**: Single-Phase 200-240 VAC **S**: Three-Phase 200-240 VAC
⑤	Gear Ratio/Shaft Type	Number: Gear ratio for combination types: 8 types from **5** to **200** **A**: Round Shaft Type
⑥	Blank: Combination Type – Parallel Shaft Gearhead **FR**: Combination Type – Hollow Shaft Flat Gearhead	

Product Line

Combination Type The combination type comes with the motor and its dedicated gearhead pre-assembled which simplifies installation in equipment. Motors and gearheads are also available separately to facilitate changes or repairs.

Combination Type – Parallel Shaft Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
30 W (1/25 HP)	Single-Phase 100-120 VAC	**BLF230A-□**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase 200-240 VAC	**BLF230C-□**	**5, 10, 15, 20, 30, 50, 100, 200**
	Three-Phase 200-240 VAC	**BLF230S-□**	**5, 10, 15, 20, 30, 50, 100, 200**
60 W (1/12 HP)	Single-Phase 100-120 VAC	**BLF460A-□**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase 200-240 VAC	**BLF460C-□**	**5, 10, 15, 20, 30, 50, 100, 200**
	Three-Phase 200-240 VAC	**BLF460S-□**	**5, 10, 15, 20, 30, 50, 100, 200**
120 W (1/6 HP)	Single-Phase 100-120 VAC	**BLF5120A-□**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase 200-240 VAC	**BLF5120C-□**	**5, 10, 15, 20, 30, 50, 100, 200**
	Three-Phase 200-240 VAC	**BLF5120S-□**	**5, 10, 15, 20, 30, 50, 100, 200**
200 W (1/4 HP)	Single-Phase 100-120 VAC	**BLF6200A-□**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase 200-240 VAC	**BLF6200C-□**	**5, 10, 15, 20, 30, 50, 100, 200**
	Three-Phase 200-240 VAC	**BLF6200S-□**	**5, 10, 15, 20, 30, 50, 100, 200**
400 W (1/2 HP)	Three-Phase 200-240 VAC	**BLF6400S-□**	**5, 10, 15, 20, 30, 50, 100, 200**

The following items are included in each product.
Motor, Driver, Gearhead, Mounting Screws, Parallel Key, Operating Manual

Combination Type – Hollow Shaft Flat Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
30 W (1/25 HP)	Single-Phase 100-120 VAC	**BLF230A-□FR**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase 200-240 VAC	**BLF230C-□FR**	**5, 10, 15, 20, 30, 50, 100, 200**
	Three-Phase 200-240 VAC	**BLF230S-□FR**	**5, 10, 15, 20, 30, 50, 100, 200**
60 W (1/12 HP)	Single-Phase 100-120 VAC	**BLF460A-□FR**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase 200-240 VAC	**BLF460C-□FR**	**5, 10, 15, 20, 30, 50, 100, 200**
	Three-Phase 200-240 VAC	**BLF460S-□FR**	**5, 10, 15, 20, 30, 50, 100, 200**
120 W (1/6 HP)	Single-Phase 100-120 VAC	**BLF5120A-□FR**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase 200-240 VAC	**BLF5120C-□FR**	**5, 10, 15, 20, 30, 50, 100, 200**
	Three-Phase 200-240 VAC	**BLF5120S-□FR**	**5, 10, 15, 20, 30, 50, 100, 200**
200 W (1/4 HP)	Single-Phase 100-120 VAC	**BLF6200A-□FR**	**10, 15, 20, 30, 50, 100**
	Single-Phase 200-240 VAC	**BLF6200C-□FR**	**10, 15, 20, 30, 50, 100**
	Three-Phase 200-240 VAC	**BLF6200S-□FR**	**10, 15, 20, 30, 50, 100**
400 W (1/2 HP)	Three-Phase 200-240 VAC	**BLF6400S-□FR**	**5, 10, 15, 20, 30, 50, 100**

The following items are included in each product.
Motor, Driver, Gearhead, Mounting Screws, Parallel Key, Safety Cover (with screws), Operating Manual

Round Shaft Type

Output Power	Power Supply Voltage	Model
30 W (1/25 HP)	Single-Phase 100-120 VAC	**BLF230A-A**
	Single-Phase 200-240 VAC	**BLF230C-A**
	Three-Phase 200-240 VAC	**BLF230S-A**
60 W (1/12 HP)	Single-Phase 100-120 VAC	**BLF460A-A**
	Single-Phase 200-240 VAC	**BLF460C-A**
	Three-Phase 200-240 VAC	**BLF460S-A**
120 W (1/6 HP)	Single-Phase 100-120 VAC	**BLF5120A-A**
	Single-Phase 200-240 VAC	**BLF5120C-A**
	Three-Phase 200-240 VAC	**BLF5120S-A**
200 W (1/4 HP)	Single-Phase 100-120 VAC	**BLF6200A-A**
	Single-Phase 200-240 VAC	**BLF6200C-A**
	Three-Phase 200-240 VAC	**BLF6200S-A**
400 W (1/2 HP)	Three-Phase 200-240 VAC	**BLF6400S-A**

The following items are included in each product.
Motor, Driver, Operating Manual

● Enter the gear ratio in the box (□) within the model name.

Connection Cables (Sold separately)

◇Cable Set

The cable set consists of two cables including a motor connection cable and a signal connection cable.

Length	Model
1 m (3.3 ft.)	**CC01BLF**
2 m (6.6 ft.)	**CC02BLF**
3 m (9.8 ft.)	**CC03BLF**
5 m (16.4 ft.)	**CC05BLF**
7 m (23.0 ft.)	**CC07BLF**
10 m (32.8 ft.)	**CC10BLF**
15 m (49.2 ft.)	**CC15BLF**
20 m (65.6 ft.)	**CC20BLF**

● The **BLF** Series requires two dedicated cables, one for the motor and the other for signals, between the connection of the motor and driver. Be sure to purchase the connection cable set as it is sold separately.

Specifications

30 W (1/25 HP) RoHS

Motor: c UL us CE / Driver: c UL us CE

Model			BLF230A-□	BLF230C-□	BLF230S-□
	Combination Type – Hollow Shaft Flat Gearhead		BLF230A-□FR	BLF230C-□FR	BLF230S-□FR
	Round Shaft Type		BLF230A-A	BLF230C-A	BLF230S-A
Rated Output Power (Continuous)		W (HP)	30 (1/25)		
Power Source	Rated Voltage	VAC	Single-Phase 100-120	Single-Phase 200-240	Three-Phase 200-240
	Permissible Voltage Range		±10%		
	Rated Frequency	Hz	50/60		
	Permissible Frequency Range		±5%		
	Rated Input Current	A	1.3	0.8	0.45
	Maximum Input Current	A	3.0	1.7	1.2
Rated Torque		N·m (oz-in)	0.1 (14.2)		
Starting Torque		N·m (oz-in)	0.2 (28)		
Rated Speed		r/min	3000		
Speed Control Range		r/min	80～4000		
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	1.8 (9.8)		
Rotor Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	0.087 (0.48)		
Speed Regulation* (When digital operator is used)	Load		±0.2% max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage		±0.2% max. (Rated voltage ±10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature		±0.2% max. [0～+50°C (+32～+122°F), at rated speed, with no load, at rated voltage]		

60 W (1/12 HP) RoHS

Motor: c UL us CE / Driver: c UL us CE

Model			BLF460A-□	BLF460C-□	BLF460S-□
	Combination Type – Hollow Shaft Flat Gearhead		BLF460A-□FR	BLF460C-□FR	BLF460S-□FR
	Round Shaft Type		BLF460A-A	BLF460C-A	BLF460S-A
Rated Output Power (Continuous)		W (HP)	60 (1/12)		
Power Source	Rated Voltage	VAC	Single-Phase 100-120	Single-Phase 200-240	Three-Phase 200-240
	Permissible Voltage Range		±10%		
	Rated Frequency	Hz	50/60		
	Permissible Frequency Range		±5%		
	Rated Input Current	A	2.0	1.2	0.7
	Maximum Input Current	A	4.5	3.0	1.5
Rated Torque		N·m (oz-in)	0.2 (28)		
Starting Torque		N·m (oz-in)	0.4 (56)		
Rated Speed		r/min	3000		
Speed Control Range		r/min	80～4000		
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	3.75 (21)		
Rotor Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	0.24 (1.31)		
Speed Regulation* (When digital operator is used)	Load		±0.2% max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage		±0.2% max. (Rated voltage ±10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature		±0.2% max. [0～+50°C (+32～+122°F), at rated speed, with no load, at rated voltage]		

120 W (1/6 HP) RoHS

Motor: c UL us CE / Driver: c UL us CE

Model			BLF5120A-□	BLF5120C-□	BLF5120S-□
	Combination Type – Hollow Shaft Flat Gearhead		BLF5120A-□FR	BLF5120C-□FR	BLF5120S-□FR
	Round Shaft Type		BLF5120A-A	BLF5120C-A	BLF5120S-A
Rated Output Power (Continuous)		W (HP)	120 (1/6)		
Power Source	Rated Voltage	VAC	Single-Phase 100-120	Single-Phase 200-240	Three-Phase 200-240
	Permissible Voltage Range		±10%		
	Rated Frequency	Hz	50/60		
	Permissible Frequency Range		±5%		
	Rated Input Current	A	3.3	2.0	1.1
	Maximum Input Current	A	7.0	4.5	2.5
Rated Torque		N·m (oz-in)	0.4 (56)		
Starting Torque		N·m (oz-in)	0.8 (113)		
Rated Speed		r/min	3000		
Speed Control Range		r/min	80～4000		
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	5.6 (31)		
Rotor Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	0.61 (3.3)		
Speed Regulation* (When digital operator is used)	Load		±0.2% max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage		±0.2% max. (Rated voltage ±10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature		±0.2% max. [0～+50°C (+32～+122°F), at rated speed, with no load, at rated voltage]		

✻Speed regulation values vary depending on the speed setting method.
Settings from internal speed potentiometer, external speed potentiometer, external DC voltage; Load: ±0.5% max., Voltage: ±0.5% max., Temperature: ±0.5% max.

● The values for each specification apply to the motor only.

● Enter the gear ratio in the box (□) within the model name.

● 200 W (1/4 HP), 400 W (1/2 HP) RoHS

Motor: c UL us CE / Driver: c UL us LISTED CE

Model			BLF6200A-□	BLF6200C-□	BLF6200S-□	BLF6400S-□
	Combination Type – Parallel Shaft Gearhead		BLF6200A-□	BLF6200C-□	BLF6200S-□	BLF6400S-□
	Combination Type – Hollow Shaft Flat Gearhead		BLF6200A-□FR	BLF6200C-□FR	BLF6200S-□FR	BLF6400S-□FR
	Round Shaft Type		BLF6200A-A	BLF6200C-A	BLF6200S-A	BLF6400S-A
Rated Output Power (Continuous)		W (HP)	200 (1/4)			400 (1/2)
Power Source	Rated Voltage	VAC	Single-Phase 100-120	Single-Phase 200-240	Three-Phase 200-240	Three-Phase 200-240
	Permissible Voltage Range		±10%			
	Rated Frequency	Hz	50/60			
	Permissible Frequency Range		±5%			
	Rated Input Current	A	4.7	2.8	1.7	2.8
	Maximum Input Current	A	8.8	5.1	3.4	5.6
Rated Torque		N·m (oz-in)	0.65 (92)			1.3 (184)
Starting Torque		N·m (oz-in)	1.15 (163)			1.8 (250)
Rated Speed		r/min	3000			
Speed Control Range		r/min	80～4000			
Round Shaft Type Permissible Load Inertia J		$\times 10^{-4}$ kg·m² (oz-in²)	8.75 (48)			15 (82)
Rotor Inertia J		$\times 10^{-4}$ kg·m² (oz-in²)	0.61 (3.3)			0.66 (3.6)
Speed Regulation* (When digital operator is used)	Load		±0.2% max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)			
	Voltage		±0.2% max. (Rated voltage ±10%, at rated speed, with no load, at normal ambient temperature)			
	Temperature		±0.2% max. [0～+50℃ (+32～+122℉), at rated speed, with no load, at rated voltage]			

*Speed regulation values vary depending on the speed setting method.
Settings from internal speed potentiometer, external speed potentiometer, external DC voltage; Load: ±0.5% max., Voltage: ±0.5% max., Temperature: ±0.5% max.

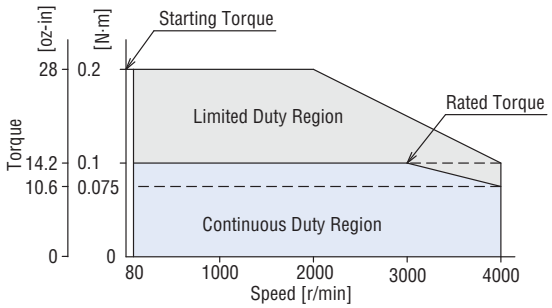
● The values for each specification apply to the motor only.

● Enter the gear ratio in the box (□) within the model name.

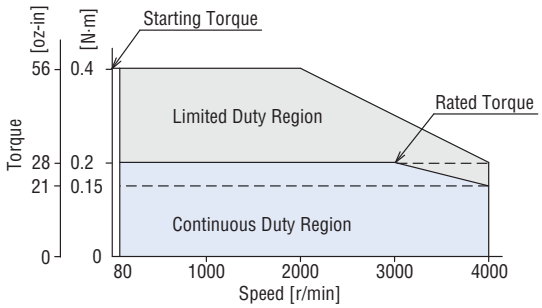
Speed – Torque Characteristics

Continuous Duty Region: Continuous operation is possible in this region.
Limited Duty Region: This region is used primarily when accelerating. When a load that exceeds the rated torque is applied continuously for approximately five seconds, overload protection is activated and the motor coasts to a stop.

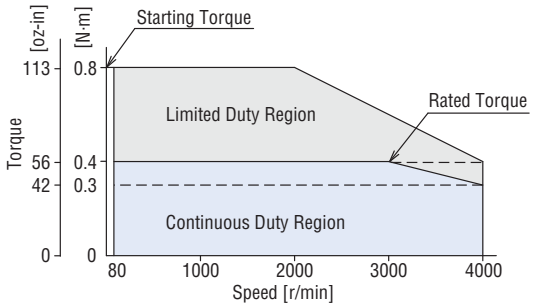
BLF230□-□/BLF230□-□FR/BLF230□-A



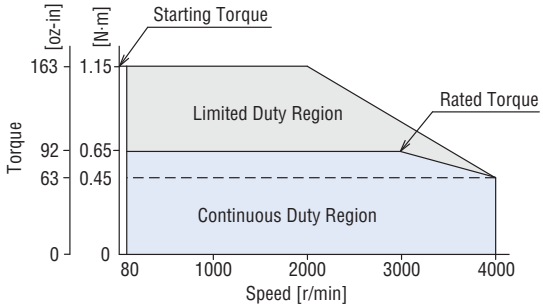
BLF460□-□/BLF460□-□FR/BLF460□-A



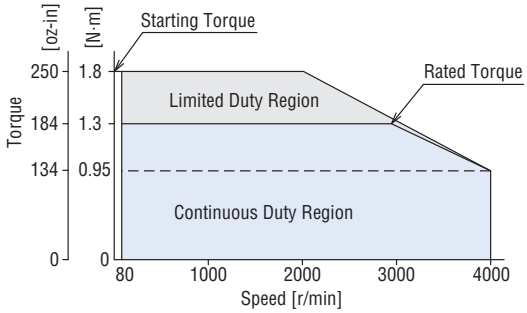
BLF5120□-□/BLF5120□-□FR/BLF5120□-A



BLF6200□-□/BLF6200□-□FR/BLF6200□-A



BLF6400S-□/BLF6400S-□FR/BLF6400S-A



● The characteristics shown above are applicable for the motors only.

● Enter the power supply voltage (**A**, **C** or **S**) in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.

Common Specifications

Item	Specifications
Speed Setting Methods	Select one of the following methods: · Set using the internal speed potentiometer · Set using the digital operator: Up to eight speeds · Set using an accessory external speed potentiometer: **PAVR-20KZ** (20 kΩ, 1/4 W) (sold separately) · Set using external DC voltage: 0～5 VDC or 0～10 VDC
Acceleration/Deceleration Time (At 3000 r/min)	0.2～15 sec. (factory setting: 0.5 sec.) Up to eight speeds using the digital operator
Input Signals (In the remote mode)	Photocoupler input Input resistance 3.3 kΩ Internal power supply voltage: 14 VDC±10% Connectable external voltage: 24 VDC±10% (only for source logic) Sink input (factory setting), Source input/2-wire input mode (factory setting), or 3-wire input mode CW [START/STOP] input, CCW [RUN/BRAKE] input, STOP-MODE [CW/CCW] input, Speed data select, Alarm reset input, External error input Names in [ ] apply in the 3-wire input mode.
Output Signals	Open-collector output 4.5～26.4 VDC, 10 mA max. (5～10 mA for Speed output) Speed output (30 pulses/rotation), Alarm output1, Alarm output2
Protective Functions*	When the following are activated, the "Alarm" signal will be output and the motor will coast to a stop. (The motor will stop instantaneously when an external error is input.) · Overload protection: Activated when the motor load exceeds rated torque for a minimum of 5 seconds. · Overvoltage protection: Activated when the voltage applied to the driver exceeds 120 VAC or 240 VAC by a minimum of 20%, a gravitational operation is performed or a load exceeding the permissible load inertia is driven. · Undervoltage protection: Activated when the voltage applied to the driver falls below 100 VAC or 200 VAC by a minimum of 40%. · Motor sensor error: Activated when an error is detected in the signals received from the motor due to improper connection or disconnection of the signal cable, etc. · Overspeed protection: Activated when the speed of the motor shaft exceeds 4800 r/min. · Overcurrent protection: Activated when an excessive current flows through the driver due to a ground fault, etc. · CPU error, EEPROM error, External error, Operation error
Maximum Cable Extension Distance	Motor/Driver Distance: 20.4 m (66.9 ft.) (when a dedicated connection cable is used)
Time Rating	Continuous

∗With the **BLF** Series, the motor speed cannot be controlled in a gravitational operation or other application where the motor shaft is turned by the load.
When a load exceeding the permissible load inertia is driven or a gravitational operation is performed, the overvoltage protective function will be activated and the motor will coast to a stop.

General Specifications

Item		Motor	Driver
Insulation Resistance		100 MΩ or more when 500 VDC megger is applied between the windings and the case after continuous operation under normal ambient temperature and humidity.	100 MΩ or more when 500 VDC megger is applied between the power supply terminal and the protective earth terminal, and between the power supply terminal and the I/O terminal after continuous operation under normal ambient temperature and humidity.
Dielectric Strength		Sufficient to withstand 1.5 kVAC at 50 Hz applied between the windings and the case for 1 minute after continuous operation under normal ambient temperature and humidity.	Sufficient to withstand 1.8 kVAC at 50 Hz applied between the power supply terminal and the protective earth terminal for 1 minute, and 3 kVAC at 50 Hz applied between the power supply terminal and the I/O terminal for 1 minute after continuous operation under normal ambient temperature and humidity.
Temperature Rise		Temperature rise of the windings and the case are 50˚C (90˚F) or less, and 40˚C (72˚F) or less*1 respectively measured by the thermocouple method after continuous operation under normal ambient temperature and humidity.	Temperature rise of heat sink is 50˚C (90˚F) or less measured by the thermocouple method after continuous operation under normal ambient temperature and humidity.
Operating Environment	Ambient Temperature	0～+50˚C (+32～+122˚F) (non-freezing)	
	Ambient Humidity	85% or less (non-condensing)	
	Altitude	Up to 1000 m (3300 ft.) above sea level	
	Atmosphere	No corrosive gases or dust. Cannot be used in a radioactive area, magnetic field, vacuum or other special environment	
	Vibration	Not subject to continuous vibration or excessive impact In conformance with JIS C 60068-2-6, "Sine-wave vibration test method" Frequency range: 10～55 Hz Pulsating amplitude: 0.15 mm (0.006 in.) Sweep direction: 3 directions (X, Y, Z) Number of sweeps: 20 times	
Storage Condition*2	Ambient Temperature	−25～+70˚C (−13～+158˚F) (non-freezing)	
	Ambient Humidity	85% or less (non-condensing)	
	Altitude	Up to 3000 m (10000 ft.) above sea level	
Thermal Class		UL/CSA standards: 105 (A), EN standards: 120 (E)	–
Degree of Protection		IP65 (Excluding the mounting surface of the round shaft type and connectors)	IP20

∗1 For round shaft types, please attach to the heat radiation plate (material: aluminum) of the following sizes to maintain a maximum motor case temperature of 90˚C (194˚F).
BLF230□-A: 115×115 mm (4.53×4.53 in.), 5 mm (0.20 in.) thick **BLF460□-A**: 135×135 mm (5.31×5.31 in.), 5 mm (0.20 in.) thick
BLF5120□-A: 165×165 mm (6.50×6.50 in.), 5 mm (0.20 in.) thick **BLF6200□-A**: 200×200 mm (7.87×7.87 in.), 5 mm (0.20 in.) thick
BLF6400S-A: 250×250 mm (9.84×9.84 in.), 6 mm (0.24 in.) thick
●Enter the power supply voltage (**A**, **C** or **S**) in the box (□) within the model name.
∗2 The storage condition applies to a short period such as a period during transportation.

Note
●Do not measure insulation resistance or perform the dielectric strength test while the motor and driver are connected.

Gearmotor – Torque Table of Combination Type

Combination Type – Parallel Shaft Gearhead

Unit = N·m (lb-in)

Model	Gear Ratio	5	10	15	20	30	50	100	200
	Motor Speed [r/min] 80 r/min	16	8	5.3	4	2.7	1.6	0.8	0.4
	3000 r/min	600	300	200	150	100	60	30	15
	4000 r/min	800	400	267	200	133	80	40	20
BLF230■-□	80~3000 r/min	0.45 (3.9)	0.9 (7.9)	1.4 (12.3)	1.8 (15.9)	2.6 (23)	4.3 (38)	6 (53)	6 (53)
	4000 r/min	0.34 (3.0)	0.68 (6.0)	1.0 (8.8)	1.4 (12.3)	1.9 (16.8)	3.2 (28)	5.4 (47)	5.4 (47)
BLF460■-□	80~3000 r/min	0.90 (7.9)	1.8 (15.9)	2.7 (23)	3.6 (31)	5.2 (46)	8.6 (76)	16 (141)	16 (141)
	4000 r/min	0.68 (6.0)	1.4 (12.3)	2 (17.7)	2.7 (23)	3.9 (34)	6.5 (57)	12.9 (114)	14 (123)
BLF5120■-□	80~3000 r/min	1.8 (15.9)	3.6 (31)	5.4 (47)	7.2 (63)	10.3 (91)	17.2 (152)	30 (260)	30 (260)
	4000 r/min	1.4 (12.3)	2.7 (23)	4.1 (36)	5.4 (47)	7.7 (68)	12.9 (114)	25.8 (220)	27 (230)
BLF6200■-□	80~3000 r/min	2.9 (25)	5.9 (52)	8.8 (77)	11.7 (103)	16.8 (148)	28 (240)	52.7 (460)	70 (610)
	4000 r/min	2.0 (17.7)	4.1 (36)	6.1 (53)	8.1 (71)	11.6 (102)	19.4 (171)	36.5 (320)	63 (550)
BLF6400S-□	80~3000 r/min	5.9 (52)	11.7 (103)	17.6 (155)	23.4 (200)	33.5 (290)	55.9 (490)	70 (610)	70 (610)
	4000 r/min	4.3 (38)	8.6 (76)	12.8 (113)	17.1 (151)	24.5 (210)	40.9 (360)	63 (550)	63 (550)

● A colored background ( ) indicates gear shaft rotation in the same direction as the motor shaft, while the others rotate in the opposite direction.

Combination Type – Hollow Shaft Flat Gearhead

Unit = N·m (lb-in)

Model	Gear Ratio	5	10	15	20	30	50	100	200
	Motor Speed [r/min] 80 r/min	16	8	5.3	4	2.7	1.6	0.8	0.4
	3000 r/min	600	300	200	150	100	60	30	15
	4000 r/min	800	400	267	200	133	80	40	20
BLF230■-□FR	80~3000 r/min	0.4 (3.5)	0.85 (7.5)	1.3 (11.5)	1.7 (15.0)	2.6 (23)	4.3 (38)	8.5 (75)	17 (150)
	4000 r/min	0.3 (2.6)	0.64 (5.6)	0.96 (8.4)	1.3 (11.5)	1.9 (16.8)	3.2 (28)	6.4 (56)	12.8 (113)
BLF460■-□FR	80~3000 r/min	0.85 (7.5)	1.7 (15.0)	2.6 (23)	3.4 (30)	5.1 (45)	8.5 (75)	17 (150)	34 (300)
	4000 r/min	0.64 (5.6)	1.3 (11.5)	1.9 (16.8)	2.6 (23)	3.8 (33)	6.4 (56)	12.8 (113)	25.5 (220)
BLF5120■-□FR	80~3000 r/min	1.7 (15.0)	3.4 (30)	5.1 (45)	6.8 (60)	10.2 (90)	17 (150)	34 (300)	68 (600)
	4000 r/min	1.3 (11.5)	2.6 (23)	3.8 (33)	5.1 (45)	7.7 (68)	12.8 (113)	25.5 (220)	51 (450)
BLF6200■-□FR	80~3000 r/min	–	5.5 (48)	8.3 (73)	11.1 (98)	16.6 (146)	27.6 (240)	55.3 (480)	–
	4000 r/min	–	3.8 (33)	5.7 (50)	7.7 (68)	11.5 (101)	19.1 (169)	38.3 (330)	–
BLF6400S-□FR	80~3000 r/min	5.5 (48)	11.1 (98)	16.6 (146)	22.1 (195)	33.2 (290)	55.3 (480)	110 (970)	–
	4000 r/min	4.0 (35)	8.1 (71)	12.1 (107)	16.2 (143)	24.2 (210)	40.4 (350)	80.8 (710)	–

● The flat gearhead rotates in the opposite direction to the motor when viewed from the front of the gearhead. It rotates in the same direction as the motor when viewed from the rear (motor mounting surface) of the gearhead. Rotation direction of the hollow shaft flat gearhead ➜ Page D-243

Permissible Overhung Load and Permissible Thrust Load

Combination Type – Parallel Shaft Gearhead

Model	Gear Ratio		Permissible Overhung Load: 10 mm (0.39 in.) from shaft end N	10 mm (0.39 in.) from shaft end lb.	20 mm (0.79 in.) from shaft end N	20 mm (0.79 in.) from shaft end lb.	Permissible Thrust Load N	Permissible Thrust Load lb.
BLF230■-□	**5**	80~3000 r/min	100	22	150	33	40	9
		4000 r/min	90	20	110	24		
	10, 15, 20	80~3000 r/min	150	33	200	45		
		4000 r/min	130	29	170	38		
	30, 50, 100, 200	80~3000 r/min	200	45	300	67		
		4000 r/min	180	40	230	51		
BLF460■-□	**5**	80~3000 r/min	200	45	250	56	100	22
		4000 r/min	180	40	220	49		
	10, 15, 20	80~3000 r/min	300	67	350	78		
		4000 r/min	270	60	330	74		
	30, 50, 100, 200	80~3000 r/min	450	101	550	123		
		4000 r/min	420	94	500	112		
BLF5120■-□	**5**	80~3000 r/min	300	67	400	90	150	33
		4000 r/min	230	51	300	67		
	10, 15, 20	80~3000 r/min	400	90	500	112		
		4000 r/min	370	83	430	96		
	30, 50, 100, 200	80~3000 r/min	500	112	650	146		
		4000 r/min	450	101	550	123		
BLF6200■-□ **BLF6400S-□**	**5, 10, 15, 20**	80~3000 r/min	550	123	800	180	200	45
		4000 r/min	500	112	700	157		
	30, 50	80~3000 r/min	1000	220	1250	280	300	67
		4000 r/min	900	200	1100	240		
	100, 200	80~3000 r/min	1400	310	1700	380	400	90
		4000 r/min	1200	270	1400	310		

● Enter the power supply voltage (**A**, **C** or **S**) in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.

●Combination Type – Hollow Shaft Flat Gearhead

Model	Gear Ratio		Permissible Overhung Load				Permissible Thrust Load	
			10 mm (0.39 in.) from mounting surface of gearhead		20 mm (0.79 in.) from mounting surface of gearhead			
			N	lb.	N	lb.	N	lb.
BLF230□-□FR	**5**, **10**	80～3000 r/min	450	101	370	83	200	45
		4000 r/min	410	92	330	74		
	15, **20**, **30**, **50**, **100**, **200**	80～3000 r/min	500	112	400	90		
		4000 r/min	460	103	370	83		
BLF460□-□FR	**5**, **10**	80～3000 r/min	800	180	660	148	400	90
		4000 r/min	730	164	600	135		
	15, **20**, **30**, **50**, **100**, **200**	80～3000 r/min	1200	270	1000	220		
		4000 r/min	1100	240	910	200		
BLF5120□-□FR	**5**, **10**	80～3000 r/min	900	200	770	173	500	112
		4000 r/min	820	184	700	157		
	15, **20**	80～3000 r/min	1300	290	1110	240		
		4000 r/min	1200	270	1020	220		
	30, **50**, **100**, **200**	80～3000 r/min	1500	330	1280	280		
		4000 r/min	1400	310	1200	270		
BLF6200□-□FR **BLF6400S-□FR**	**5***, **10**	80～3000 r/min	1230	270	1070	240	800	180
		4000 r/min	1130	250	990	220		
	15, **20**	80～3000 r/min	1680	370	1470	330		
		4000 r/min	1550	340	1360	300		
	30, **50**, **100**	80～3000 r/min	2040	450	1780	400		
		4000 r/min	1900	420	1660	370		

∗Only the **BLF6400S-□FR** is supported.

●The permissible overhung load can also be calculated with a formula. Permissible overhung load calculation ➜ Page D-242

●Round Shaft Type

Model	Permissible Overhung Load				Permissible Thrust Load
	10 mm (0.39 in.) from shaft end		20 mm (0.79 in.) from shaft end		
	N	lb.	N	lb.	
BLF230□-A	80	18	100	22	The permissible thrust load should not be greater than half the motor mass.
BLF460□-A	110	24	130	29	
BLF5120□-A	150	33	170	38	
BLF6200□-A **BLF6400S-A**	197	44	221	49	

●Enter the power supply voltage (**A**, **C** or **S**) in the box (□) within the model name.
Enter the gear ratio in the box (□) within the model name.

Permissible Load Inertia J of Combination Type

Combination Type – Parallel Shaft Gearhead

Unit = $\times 10^{-4}$ kg·m^2 (oz-in^2)

Model	Gear Ratio	5	10	15	20	30	50	100	200
BLF230■**-**□		12 (66)	50 (270)	110 (600)	200 (1090)	370 (2000)	920 (5000)	2500 (13700)	5000 (27000)
	When instantaneous stop or instantaneous bi-directional operation is performed	1.55 (8.5)	6.2 (34)	14.0 (77)	24.8 (136)	55.8 (310)	155 (850)	155 (850)	155 (850)
BLF460■**-**□		22 (120)	95 (520)	220 (1200)	350 (1910)	800 (4400)	2200 (12000)	6200 (34000)	12000 (66000)
	When instantaneous stop or instantaneous bi-directional operation is performed	5.5 (30)	22 (120)	49.5 (270)	88 (480)	198 (1080)	550 (3000)	550 (3000)	550 (3000)
BLF5120■**-**□		45 (250)	190 (1040)	420 (2300)	700 (3800)	1600 (8800)	4500 (25000)	12000 (66000)	25000 (137000)
	When instantaneous stop or instantaneous bi-directional operation is performed	25 (137)	100 (550)	225 (1230)	400 (2200)	900 (4900)	2500 (13700)	2500 (13700)	2500 (13700)
BLF6200■**-**□ **BLF6400S-**□		100 (550)	460 (2500)	1000 (5500)	1700 (9300)	3900 (21000)	9300 (51000)	18000 (98000)	37000 (200000)
	When instantaneous stop or instantaneous bi-directional operation is performe	37.5 (210)	150 (820)	338 (1850)	600 (3300)	1350 (7400)	3750 (21000)	3750 (21000)	3750 (21000)

Combination Type – Hollow Shaft Flat Gearhead

Unit = $\times 10^{-4}$ kg·m^2 (oz-in^2)

Model	Gear Ratio	5	10	15	20	30	50	100	200
BLF230■**-**□**FR**		12 (66)	50 (270)	110 (600)	200 (1090)	370 (2000)	920 (5000)	2500 (13700)	5000 (27000)
	When instantaneous stop or instantaneous bi-directional operation is performed	1.55 (8.5)	6.2 (34)	14.0 (77)	24.8 (136)	55.8 (310)	155 (850)	155 (850)	155 (850)
BLF460■**-**□**FR**		22 (120)	95 (520)	220 (1200)	350 (1910)	800 (4400)	2200 (12000)	6200 (34000)	12000 (66000)
	When instantaneous stop or instantaneous bi-directional operation is performed	5.5 (30)	22 (120)	49.5 (270)	88 (480)	198 (1080)	550 (3000)	550 (3000)	550 (3000)
BLF5120■**-**□**FR**		45 (250)	190 (1040)	420 (2300)	700 (3800)	1600 (8800)	4500 (25000)	12000 (66000)	25000 (137000)
	When instantaneous stop or instantaneous bi-directional operation is performed	25 (137)	100 (550)	225 (1230)	400 (2200)	900 (4900)	2500 (13700)	2500 (13700)	2500 (13700)
BLF6200■**-**□**FR**		–	460 (2500)	1000 (5500)	1700 (9300)	3900 (21000)	9300 (51000)	18000 (98000)	–
	When instantaneous stop or instantaneous bi-directional operation is performe	–	150 (820)	338 (1850)	600 (3300)	1350 (7400)	3750 (21000)	3750 (21000)	–
BLF6400S-□**FR**		100 (550)	460 (2500)	1000 (5500)	1700 (9300)	3900 (21000)	9300 (51000)	18000 (98000)	–
	When instantaneous stop or instantaneous bi-directional operation is performe	37.5 (210)	150 (820)	338 (1850)	600 (3300)	1350 (7400)	3750 (21000)	3750 (21000)	–

● Enter the power supply voltage (**A**, **C** or **S**) in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.

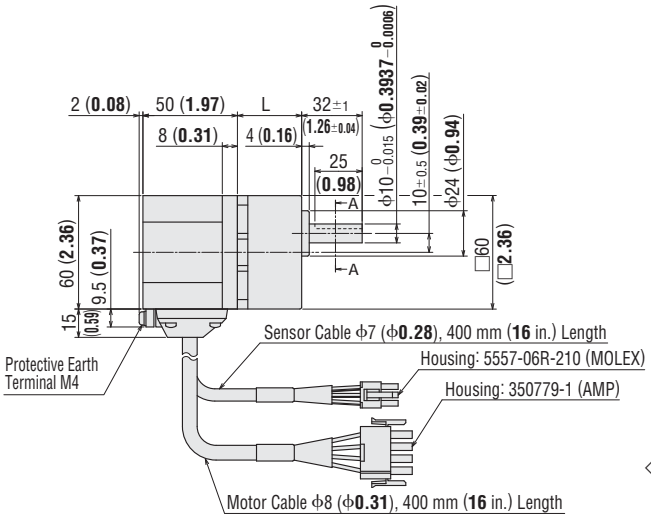
Dimensions Unit = mm (in.)

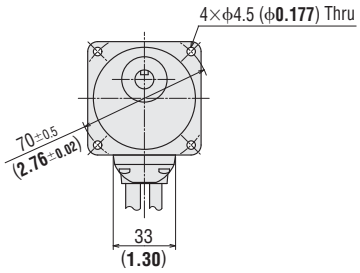
● Mounting screws are included with the combination type. Dimensions for mounting screws ➜ Page D-242

●30 W (1/25 HP)

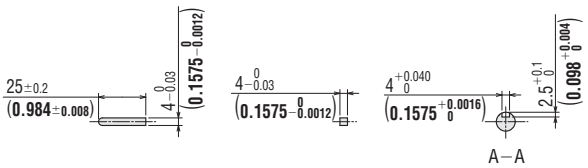
◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLF230A-□ **BLF230C-□** **BLF230S-□**	BLFM230-GFS	GFS2G□	**5**～**20**	34 (1.34)	1.1 (2.4)	A407A
			30～**100**	38 (1.50)		A407B
			200	43 (1.69)		A407C





◇Key and Key Slot (Included)



◇Motor/Hollow Shaft Flat Gearhead

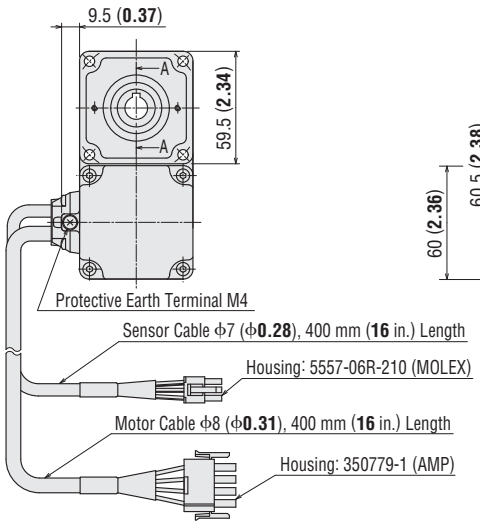
BLF230A-□FR, **BLF230C-□FR**, **BLF230S-□FR**

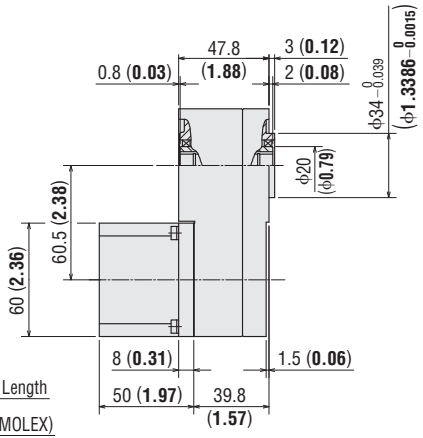
Motor: BLFM230-GFS

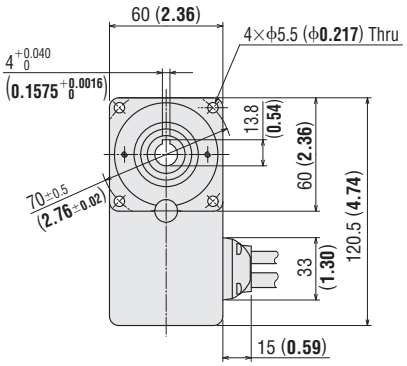
Gearhead: GFS2G□FR

Mass: 1.4 kg (3.1 lb.) (Including gearhead)

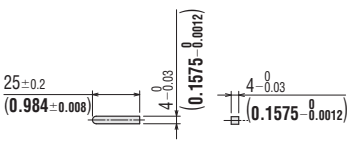
DXF A408

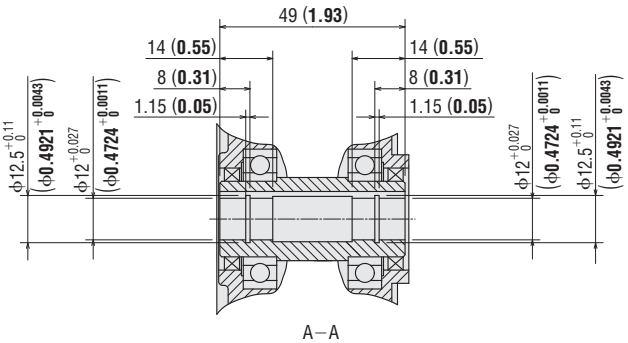






◇Key (Included)





● Enter the gear ratio in the box (□) within the model name.

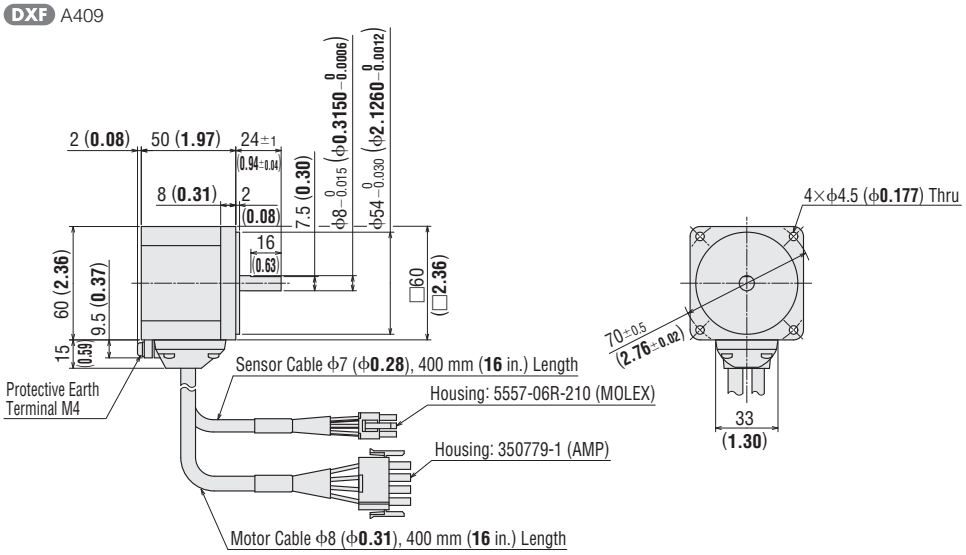
◇Round Shaft Type

BLF230A-A, **BLF230C-A**, **BLF230S-A**

Motor: BLFM230-A

Mass: 0.6 kg (1.32 lb.)

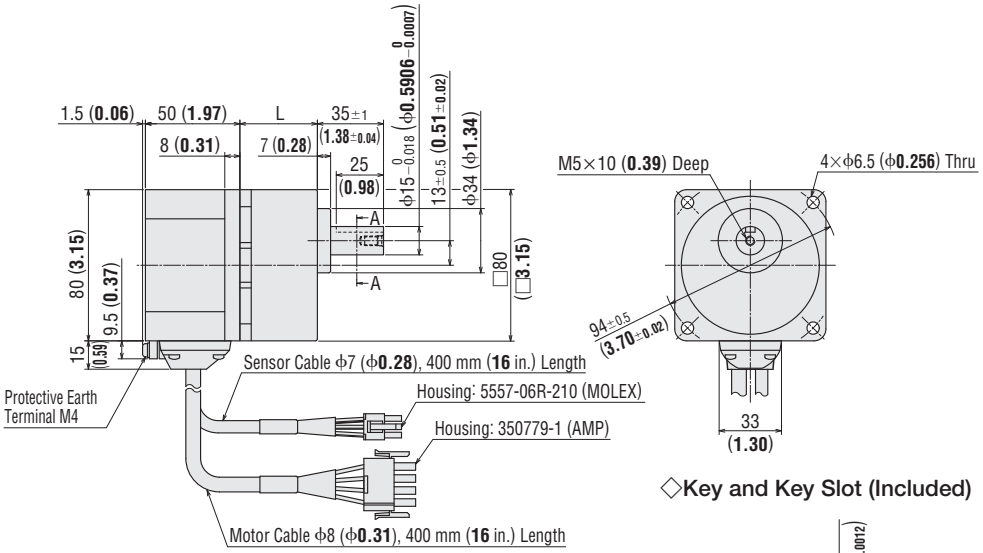
DXF A409



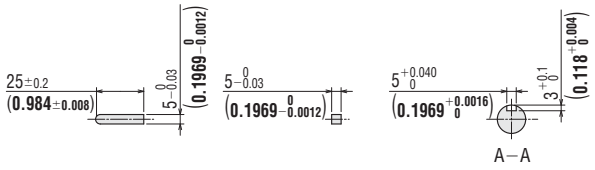
●60 W (1/12 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLF460A-□	BLFM460-GFS	GFS4G□	**5**～**20**	41 (1.61)	1.9 (4.2)	A410A
BLF460C-□			**30**～**100**	46 (1.81)		A410B
BLF460S-□			**200**	51 (2.01)		A410C



◇Key and Key Slot (Included)



●Enter the gear ratio in the box (□) within the model name.

◇Motor/Hollow Shaft Flat Gearhead

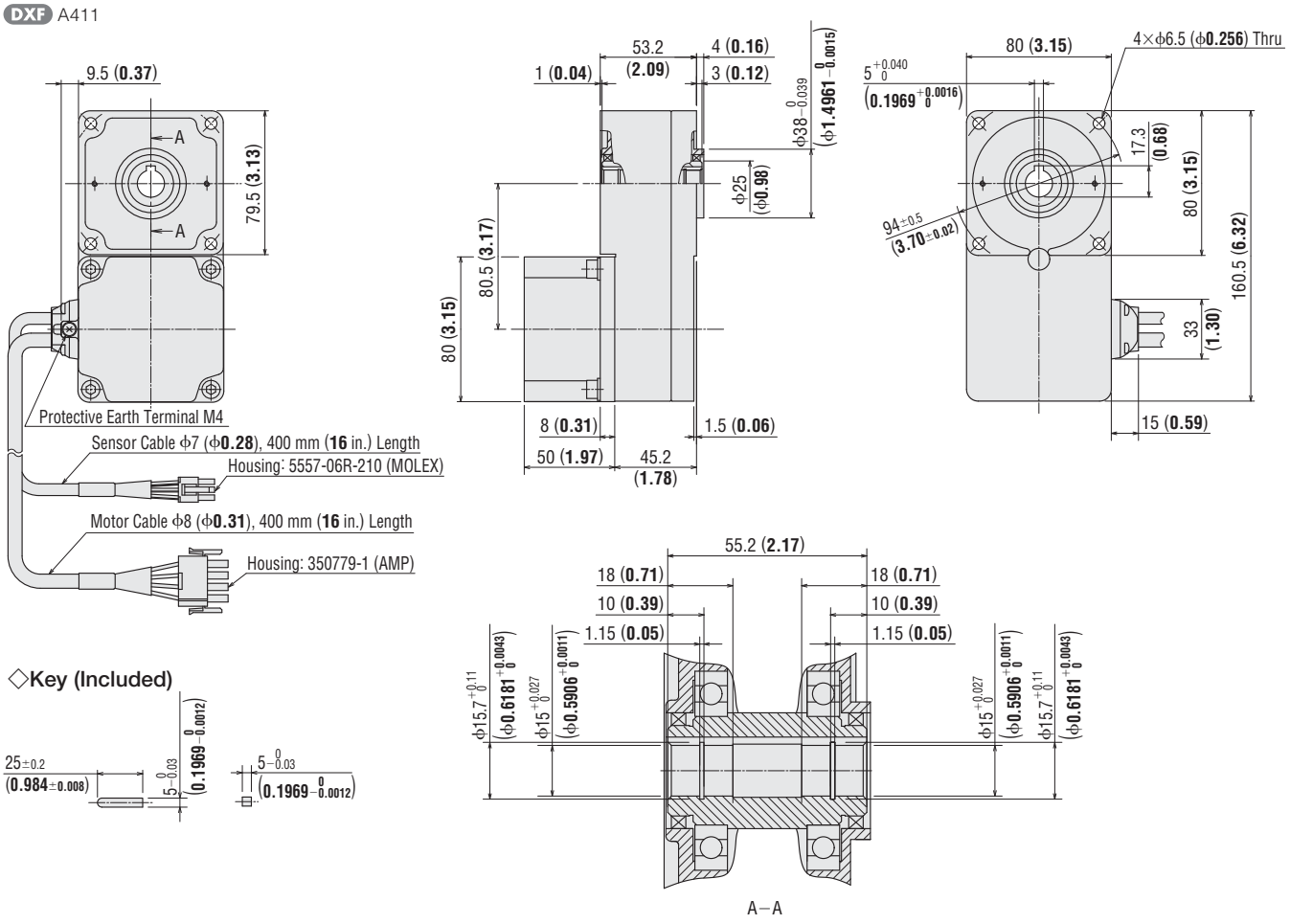
BLF460A-□FR, **BLF460C-□FR**, **BLF460S-□FR**

Motor: BLFM460-GFS

Gearhead: GFS4G□FR

Mass: 2.5 kg (5.5 lb.) (Including gearhead)

DXF A411



◇Key (Included)

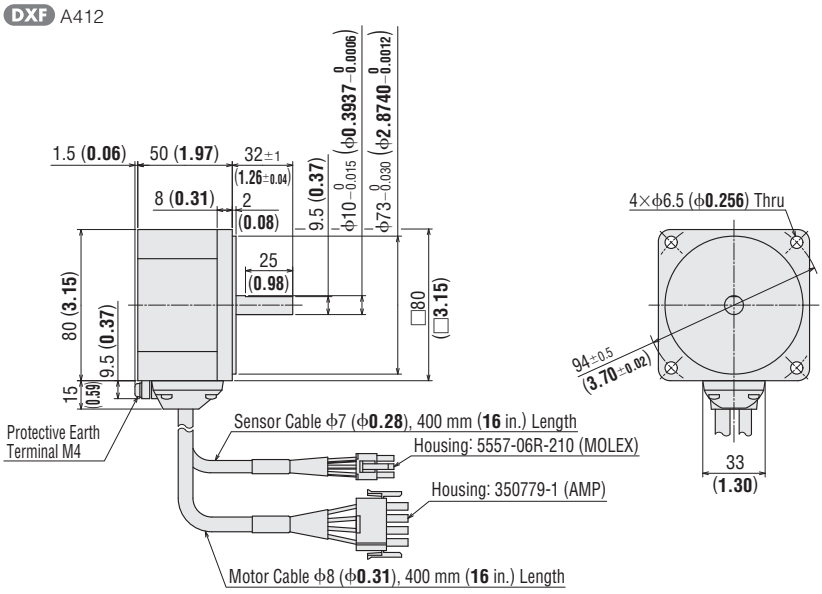
◇Round Shaft Type

BLF460A-A, **BLF460C-A**, **BLF460S-A**

Motor: BLFM460-A

Mass: 0.9 kg (2.0 lb.)

DXF A412

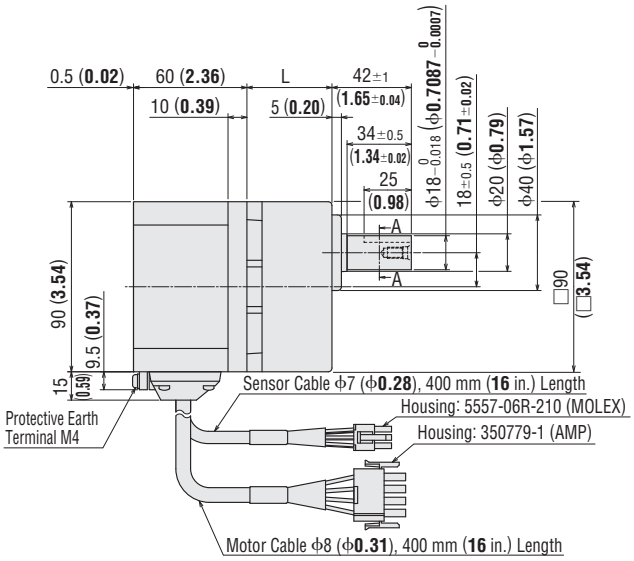


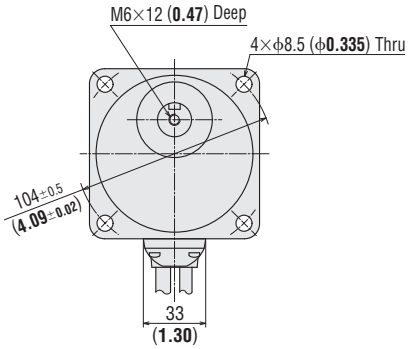
● Enter the gear ratio in the box (□) within the model name.

●120 W (1/6 HP)

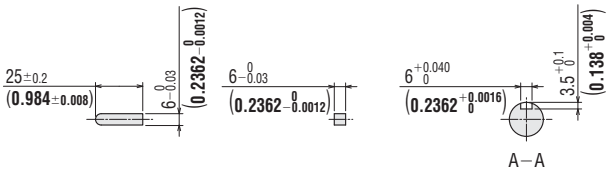
◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLF5120A-□	BLFM5120-GFS	GFS5G□	**5~20**	45 (1.77)	3.0 (6.6)	A413A
BLF5120C-□			**30~100**	58 (2.28)		A413B
BLF5120S-□			**200**	64 (2.52)		A413C





◇Key and Key Slot (Included)



◇Motor/Hollow Shaft Flat Gearhead

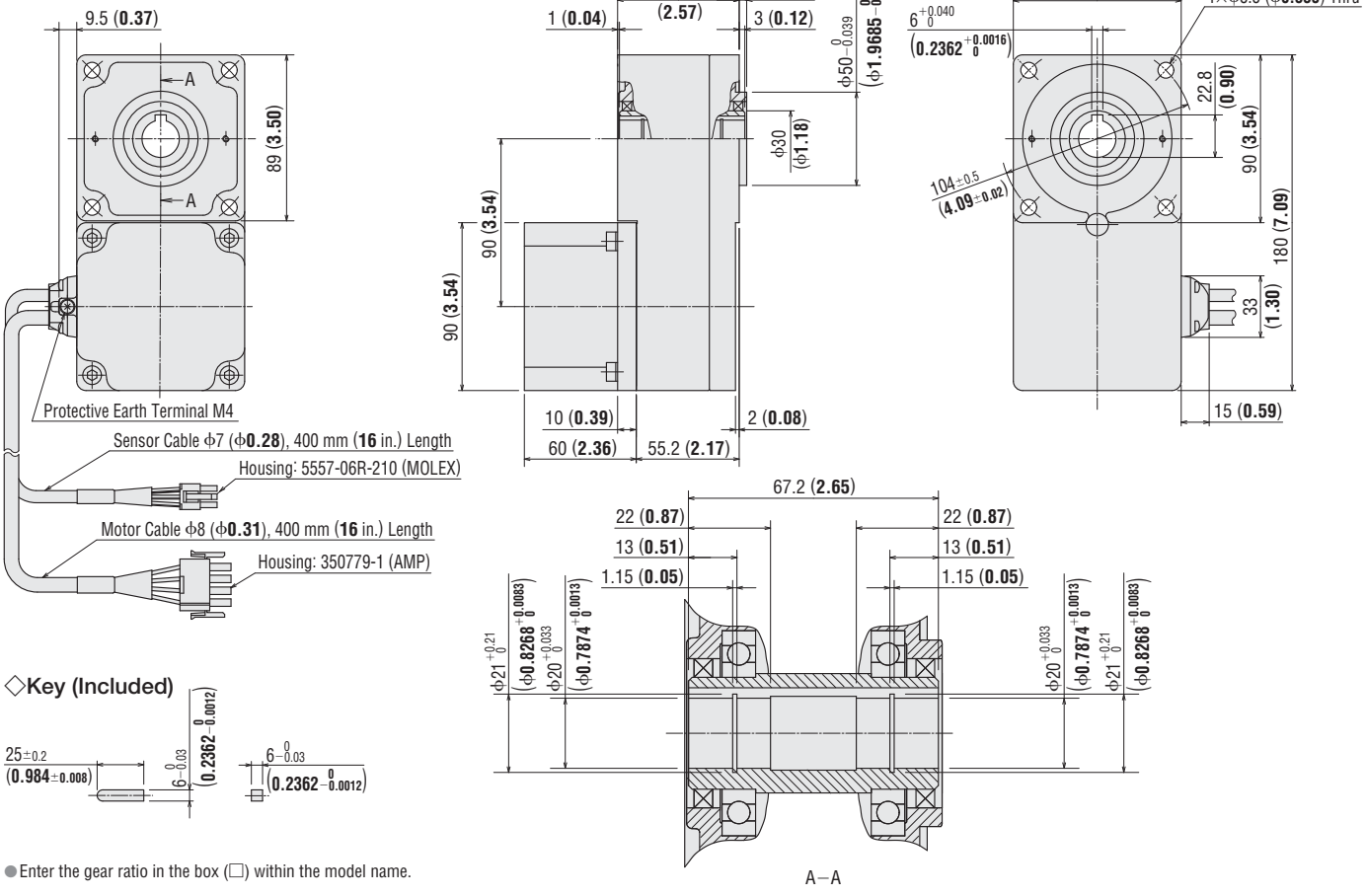
BLF5120A-□FR, **BLF5120C-□FR**, **BLF5120S-□FR**

Motor: BLFM5120-GFS

Gearhead: GFS5G□FR

Mass: 3.7 kg (8.1 lb.) (Including gearhead)

DXF A414



◇Key (Included)

● Enter the gear ratio in the box (□) within the model name.

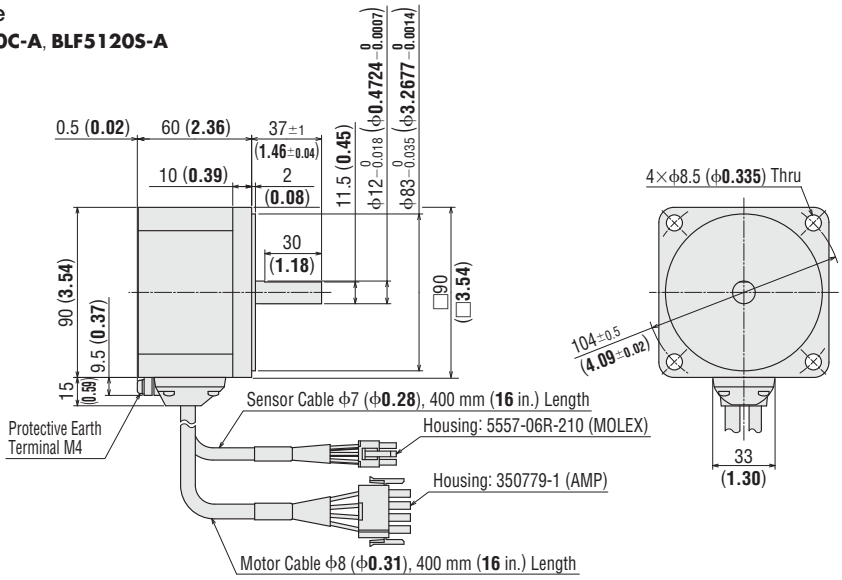
◇Round Shaft Type

BLF5120A-A, **BLF5120C-A**, **BLF5120S-A**

Motor: BLFM5120-A

Mass: 1.5 kg (3.3 lb.)

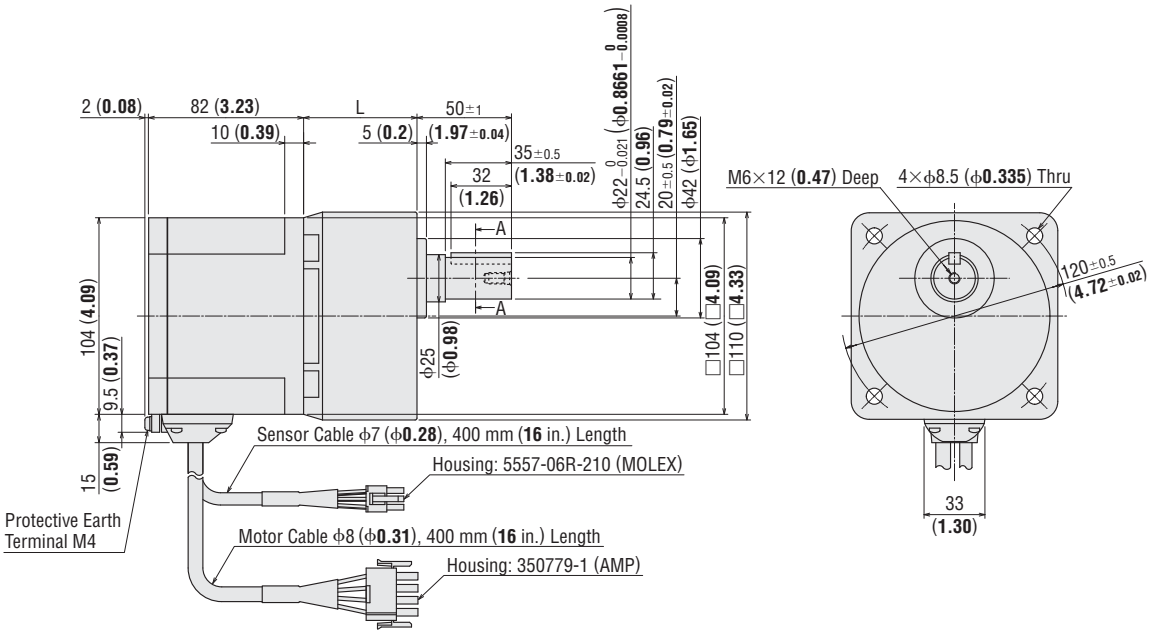
DXF A415



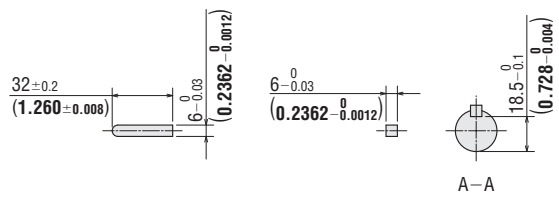
●200 W (1/4 HP), 400 W (1/2 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLF6200A-□	BLFM6200-GFS	GFS6G□	**5**~**20**	60 (2.36)	5.4 (11.9)	A652A
BLF6200C-□	BLFM6200-GFS		**30**, **50**	72 (2.83)		A652B
BLF6200S-□	BLFM6200-GFS					
BLF6400S-□	BLFM6400-GFS		**100**, **200**	86 (3.39)		A652C



◇Key and Key Slot (Included)

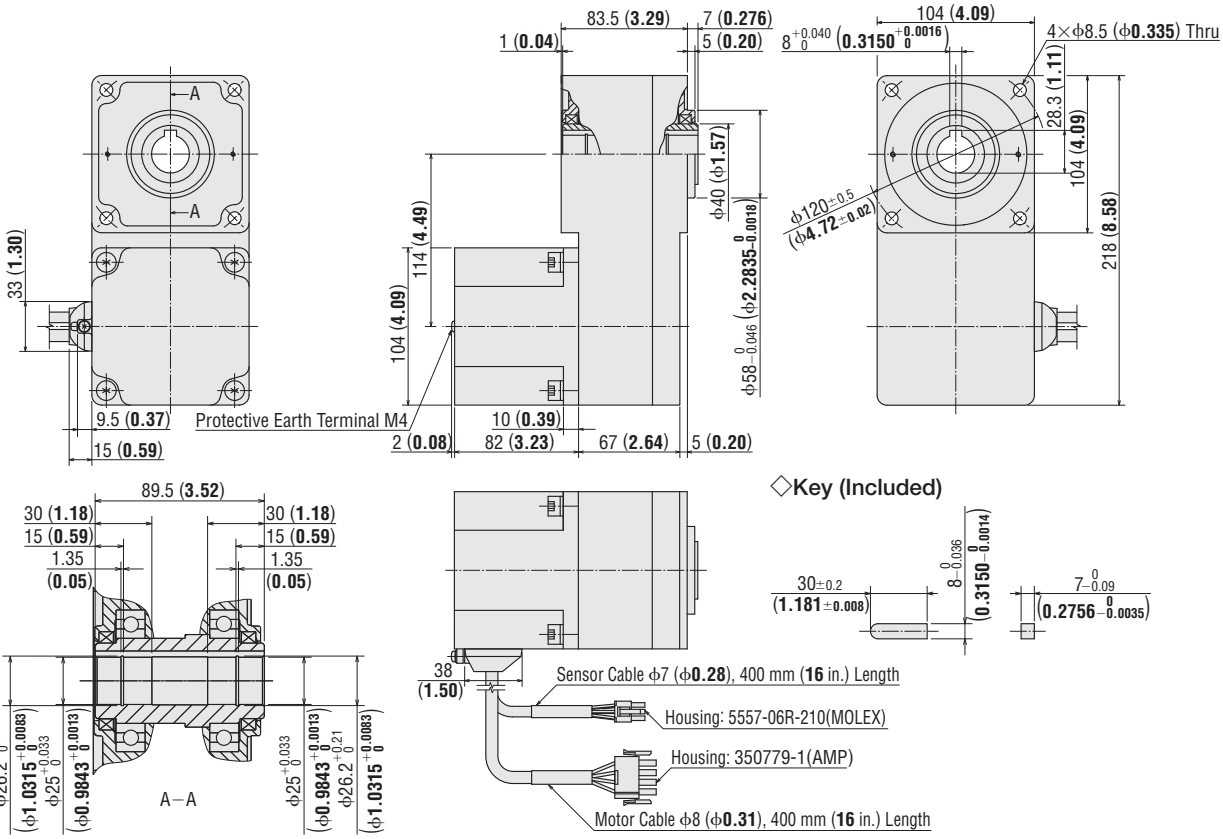


● At the time of shipment, a key is inserted on the gearhead's shaft.

● Enter the gear ratio in the box (□) within the model name.

◇Motor/Hollow Shaft Flat Gearhead

Model	Motor Model	Gearhead Model	Mass kg (lb.)	DXF
BLF6200A-□FR **BLF6200C-□FR** **BLF6200S-□FR**	BLFM6200-GFS	GFS6G□FR	7.2 (15.8)	A1146
BLF6400S-□FR	BLFM6400-GFS			



◇Key (Included)

● Enter the gear ratio in the box (□) within the model name.

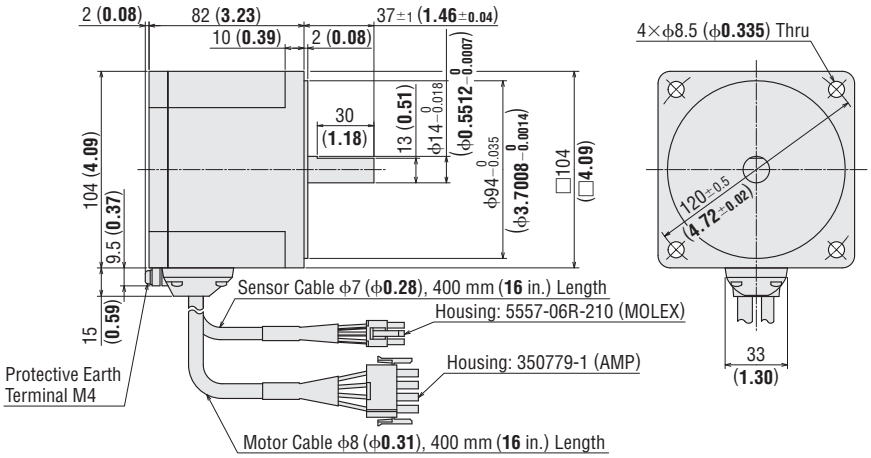
◇Round Shaft Type

BLF6200A-A, **BLF6200C-A**, **BLF6200S-A**, **BLF6400S-A**

Motor: BLFM6200-A, BLFM6400-A

Mass: 2.4 kg (5.3 lb.)

DXF A653

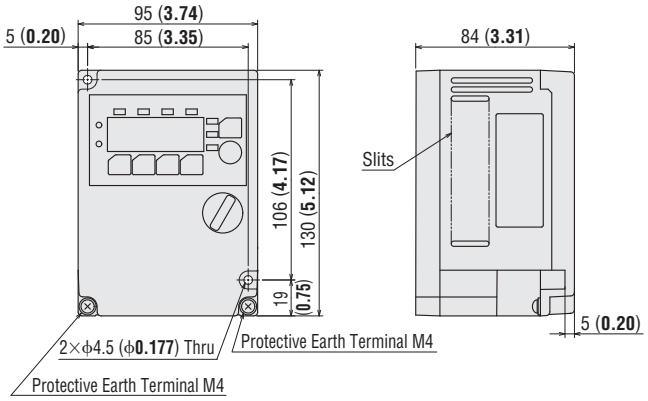


◇Driver

BLFD30A2, BLFD30C2, BLFD30S2
BLFD60A2, BLFD60C2, BLFD60S2
BLFD120A2, BLFD120C2, BLFD120S2

Mass: 0.9 kg (2.0 lb.)

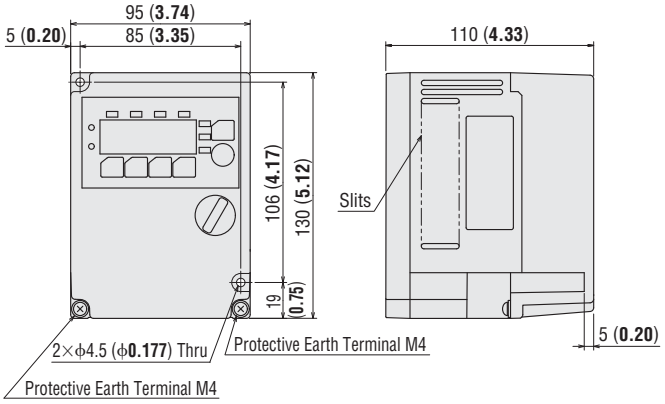
DXF A416



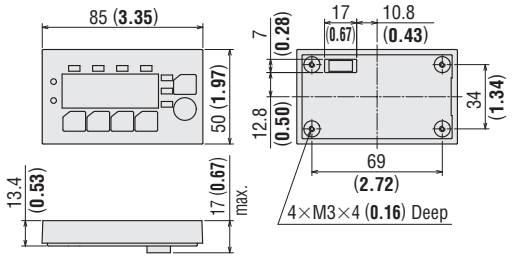
BLFD200A2, BLFD200C2, BLFD200S2,
BLFD400S2

Mass: 1.3 kg (2.9 lb.)

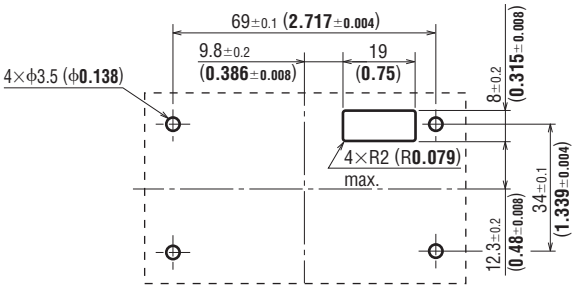
DXF A654



◇Digital Operator
(Detached from the driver)

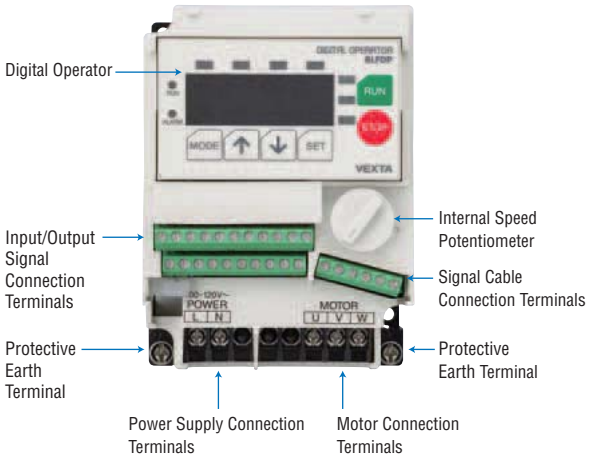


◇Digital Operator Panel Cut-Out

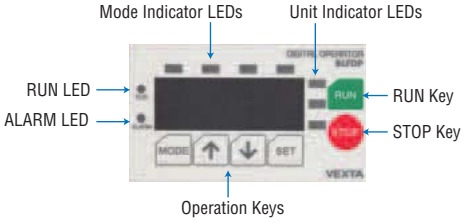


Connection and Operation

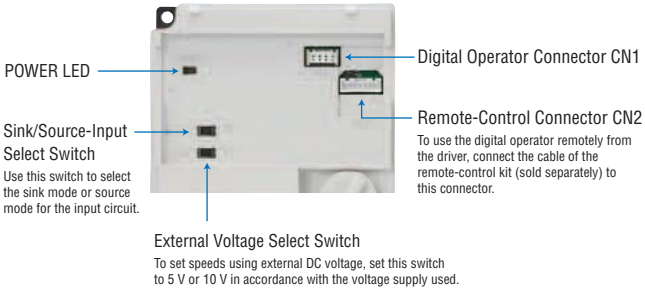
Names and Functions of Driver Parts



◇Digital Operator



When the digital operator is detached



Input/Output Signals

Terminal Name	Signal	Signal Name	Function
TH	Input	N. C.	Do not connect any signals to this terminal.
TH		N. C.	Do not connect any signals to this terminal.
M0		M0 Input	These signals are used to select operation data in multi-speed operation. One of up to eight preset speed data can be selected using the M0, M1 and M2 inputs.
M1		M1 Input	
M2		M2 Input	
VH		VH Input	These signals are used to set speeds via an external speed potentiometer or external DC voltage.
VM		VM Input	
VL		VL Input	
C3		IN-COM1	Input signal common (0 V)
X0*1		EXT-ERROR Input	External error input (Normally closed)
C0		IN-COM0	Input signal common
C1		IN-COM0	Input signal common
X1*2		2-Wire Mode: CW Input	Clockwise rotation/stop switch input signal
		3-Wire Mode: START/STOP Input	Start/stop input signal
X2*2		2-Wire Mode: CCW Input	Counterclockwise rotation/stop switch input signal
		3-Wire Mode: RUN/BRAKE Input	Run/instantaneous stop input signal
X3*2		2-Wire Mode: STOP-MODE Input	This signal is input to select the motor stop action.
		3-Wire Mode: CW/CCW Input	Clockwise/counterclockwise direction input signal
X4		N. C.	Do not connect any signals to this terminal.
X5		ALARM-RESET Input	This signal is used to reset alarms.
Y1	Output	ALARM-OUT1 Output	This signal is output upon generation of an alarm. (Normally closed)
Y2		ALARM-OUT2 Output	This signal is output upon actuation of the overload protective function or overload warning function. (Normally closed)
Y0		SPEED-OUT Output	30 pulses are output per each rotation of the motor output shaft.
C2		OUT-COM	Output signal common

*1 Do not remove the short circuit bar if the EXT-ERROR input is not used.

*2 The functions of the external-input signal terminals X1, X2 and X3 can be changed between the 2-wire input mode and 3-wire input mode. The functions under the 2-wire input mode are initially assigned to the terminals.

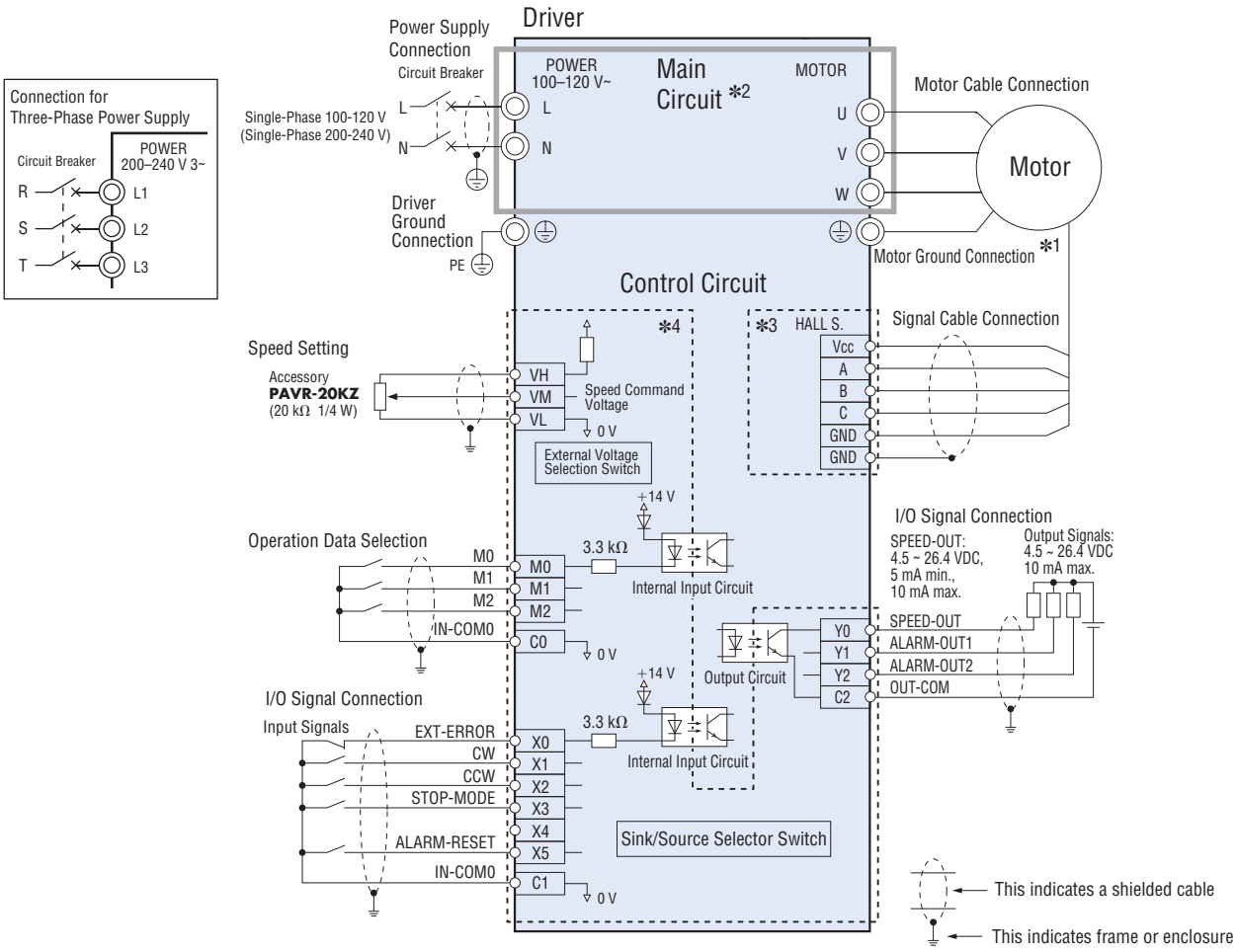
Digital Operator Indicator

Display		Function	Description
RUN		Running	A green LED stays lit while the motor is running.
ALARM		Alarm	A red LED turns on when an alarm occurs.
Mode	MNTR	Monitor mode	The motor can be operated in this mode. The motor speed and load condition are displayed during motor operation.
	F/R	Direction setting mode	If the digital operator is used to operate the motor, set the motor direction in this mode. For: Clockwise direction, rEv: Counterclockwise direction
	LO/RE	Digital operator/external-input signal mode	In this mode, set whether to use the digital operator or external I/O signals to input the motor operation/stop signals. Lo: Digital operator, rE: External-input signals
	PRGM	Data setting mode	In this mode, set the data needed to operate the motor. Operation data (eight speeds and acceleration/deceleration times), Gear ratio setting/conveyor speed setting Input mode, Overload warning function
Display Unit	r/min	Motor speed	The speed of the motor or gearhead output shaft is displayed.
	m/min	Conveyor speed	An equivalent moving speed of the work on a conveyor or other transfer system is displayed.
	%	Load factor*	The actual load is displayed as a percentage of the rated torque being 100%.

*A maximum error of approximately 20% may generate when the motor is operated at the rated speed under the rated load.

●Connection Diagram

The figure below is a connection diagram for a configuration based on a single-phase 100-120 V supply voltage, with the sink/source selector switch set to the sink position.



*1 The grounding method will vary depending on the length of the connection cable.
When the connection cable is 7 m (23.0 ft.) or shorter: Connect the protective earth terminal on the connection cable to the protective earth terminal on the driver.
When the connection cable is 10 m (32.8 ft.) or longer: Connect the protective earth terminal of the motor directly to the grounding point.

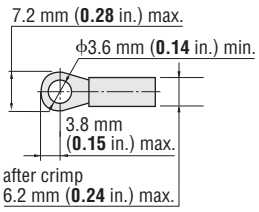
*2 The main circuit is insulated to prevent electrical shock resulting from accidental contact by a hand, etc.

*3 The signal cable connection terminals and the signal cable including the shielded cable comprise an ELV circuit, which is insulated from dangerous voltages only by means of basic insulation. Therefore, connect the shielded cable to the GND point specified in the connection diagram, instead of connecting it to a protective earth terminal.

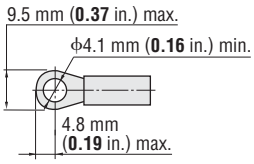
*4 The I/O signal connection terminals comprise a SELV circuit, which is insulated from dangerous voltages by means of double insulation or reinforced insulation.

◇Applicable Crimp Terminals

· Power Supply Connection Terminals (M3.5): Round Terminal with Insulation

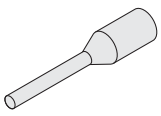


· Protective Earth Terminals (M4): Round Terminal with Insulation



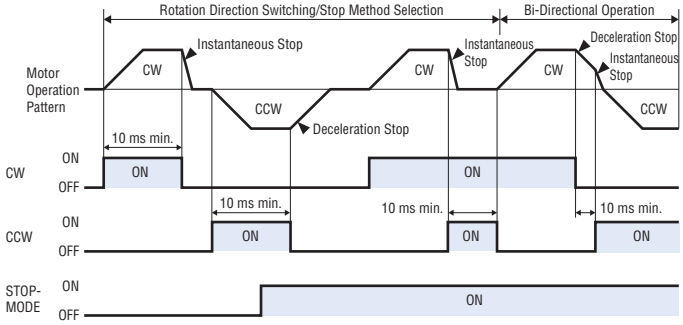
· I/O Terminals

Use the terminals specified below for connection using crimp terminals. Please note that the applicable crimp terminal will vary depending on the size of the wire. The following terminals can be used with wires of AWG24 to 22.
[Manufacturer: Phoenix Contact]
AI 0.25-6 Applicable wire size
: AWG24 (0.2 mm²)
AI 0.34-6 Applicable wire size
: AWG22 (0.3 mm²)



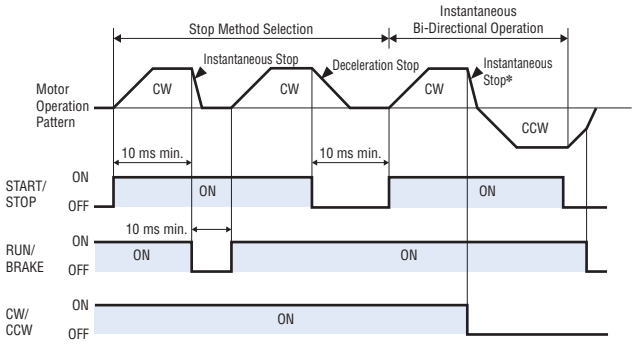
●Timing Chart

◇2-Wire Mode



- The CW input signal, CCW input signal and STOP-MODE signal can be used to control all motor operations, such as run, stop, direction switching, deceleration stop and instantaneous stop.
- Switching the CW signal ON will cause the motor to turn clockwise as viewed from the motor shaft, while switching the CCW signal ON will cause the motor to turn counterclockwise. Switching each signal OFF will stop the motor. If both the CW signal and CCW signal are turned ON at the same time, the motor will stop instantaneously. The motor will start at the rise time corresponding to the acceleration time (ACC) set on the digital operator.
- Switching the STOP-MODE signal ON will cause the motor to decelerate at the deceleration time (DEC) set on the digital operator until it eventually stops. Switching the STOP-MODE signal OFF will cause the motor to stop instantaneously.

◇3-Wire Mode



- The START/STOP signal, RUN/BRAKE signal and CW/CCW signal can be used to control all motor operations, such as run/stop, instantaneous stop and direction switching.
- Switching both the START/STOP signal and RUN/BRAKE signal ON at the same time will start the motor. At this time, switching the CW/CCW signal ON will cause the motor to turn clockwise as viewed from the motor shaft, while switching the signal OFF will cause the motor to turn counterclockwise. The motor will start at the rise time corresponding to the acceleration time (ACC) set on the digital operator.
- Switching the RUN/BRAKE signal OFF while the START/STOP signal is ON will cause the motor to stop instantaneously. Switching the START/STOP signal OFF while the RUN/BRAKE signal is ON will cause the motor to decelerate at the deceleration time (DEC) set on the digital operator until it eventually stops.

*Changing the direction while the motor is running will cause the motor to stop instantaneously and then change its direction.

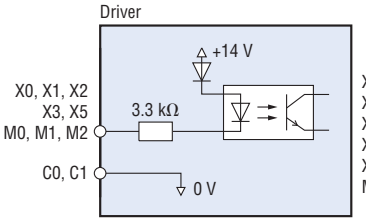
●Input/Output Signal Circuits

The initial setting is the sink logic. Select the sink logic or source logic according to the controller you will be using.

◇Input Circuit

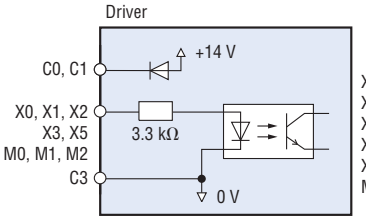
Common to the CW (START/STOP), CCW (RUN/BRAKE), STOP-MODE (CW/CCW), EXT-ERROR, ALARM-RESET and operation-data selection inputs.

• Sink Logic



X0: EXT-ERROR Input
X1: CW Input
X2: CCW Input
X3: STOP-MODE Input
X5: ALARM-RESET Input
M0, M1, M2: Operation data selection inputs

• Source Logic

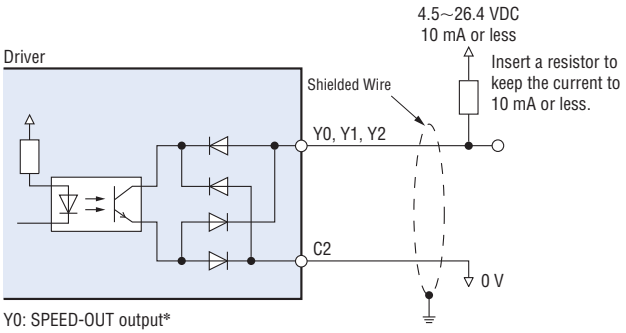


X0: EXT-ERROR Input
X1: CW Input
X2: CCW Input
X3: STOP-MODE Input
X5: ALARM-RESET Input
M0, M1, M2: Operation data selection inputs

◇Output Circuit

Common to the SPEED-OUT, ALARM-OUT1 and ALARM-OUT2 outputs.

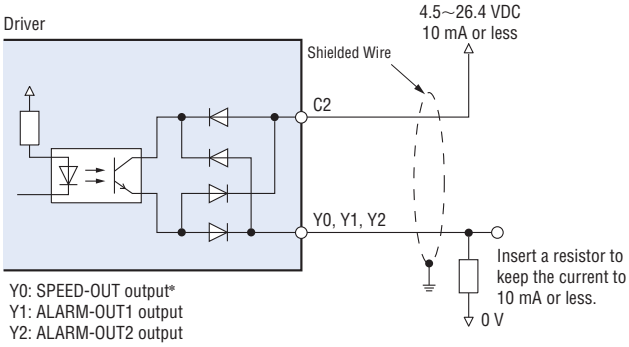
• Sink Logic



Y0: SPEED-OUT output*
Y1: ALARM-OUT1 output
Y2: ALARM-OUT2 output

*Supply a current of 5 mA or more to the SPEED-OUT output.

• Source Logic



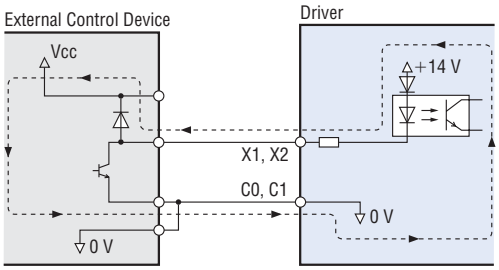
Y0: SPEED-OUT output*
Y1: ALARM-OUT1 output
Y2: ALARM-OUT2 output

*Supply a current of 5 mA or more to the SPEED-OUT output.

◇When an External Control Device with a Built-In Clamp Diode is Used

When you want to use an external control device with a built-in clamp diode, if the external control device power is turned off with the driver power turned on, current will be applied and the motor may run. When the power is turned on or off simultaneously, the motor may run temporarily due to differences in power capacity. The external control device power must be turned on first and driver power must be turned off first.

• Example of Sink Logic



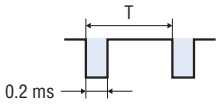
◇SPEED-OUT Output

Pulse signals of 30 pulses (pulse width: 0.2 ms) are output per each rotation of the motor output shaft in synchronization with the motor operation.

By measuring the frequency of SPEED-OUT outputs, the motor speed can be calculated.

$$\text{SPEED-OUT output frequency (Hz)} = \frac{1}{T}$$

$$\text{Motor shaft speed (r/min)} = \frac{\text{SPEED-OUT output frequency}}{30} \times 60$$



◇ALARM-OUT1 Output

When any of the driver's protective functions is activated, the ALARM-OUT1 output will turn OFF and the digital operator will display an alarm code. The motor will coast to a stop.

◇ALARM-OUT2 Output

The ALARM-OUT2 output will turn OFF when the driver's overload protective function or overload warning function is activated. Actuation of any other protective function will not turn this output OFF.

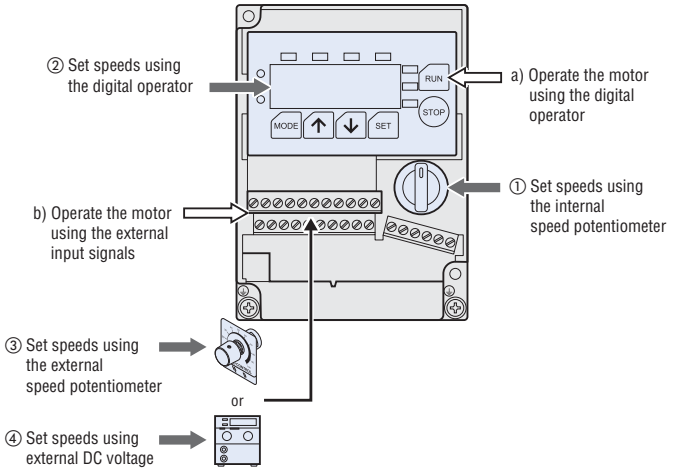
The overload warning function is activated based on a preset load factor relative to the rated torque. The ALARM-OUT2 output will turn OFF once the set load factor is exceeded.

(A desired load factor can be set at 10% intervals between 50 and 100%.)

Type of Protective Function	ALARM-OUT1 Output	ALARM-OUT2 Output
Normal Operation	ON	ON
Overload Protective Function	OFF	OFF
Other Protective Functions	OFF	ON
Overload Warning Function*	ON	OFF

*A maximum error of approximately 20% may generate when the motor is operated at the rated speed under the rated load.

●Operating Methods



One of the following two operating methods (a and b) can be set by switching between the digital operator mode and external input signal mode.

a) Operate the motor using the RUN and STOP keys on the digital operator

b) Operate the motor using external input signals

●Speed Setting Methods

One of the following four methods (① to ④) can be used to set speeds:

① Set speeds using the internal speed potentiometer

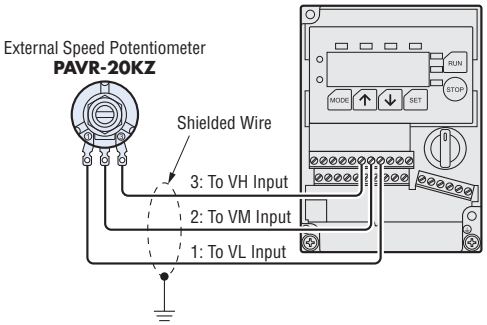
Set speeds using the potentiometer provided on the driver's front panel.

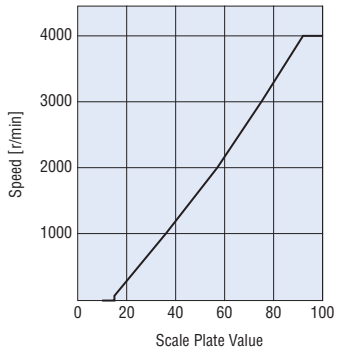
② Set speeds using the digital operator

The digital operator can be used to set speeds in units of 1 r/min. Up to eight speed data can be set.

③ Set speeds using an external speed potentiometer (sold separately)

To set speeds at a location away from the driver, connect an accessory external speed potentiometer as shown below.





External Speed Potentiometer Scale – Speed Characteristics (Representative values)

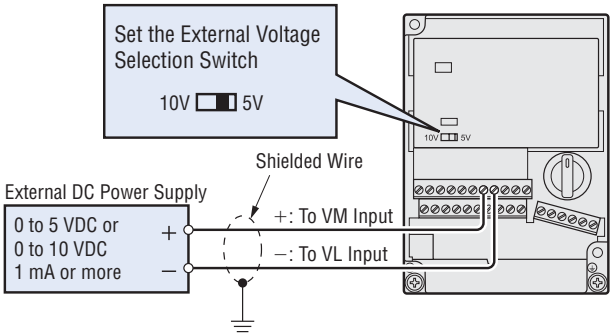
Note

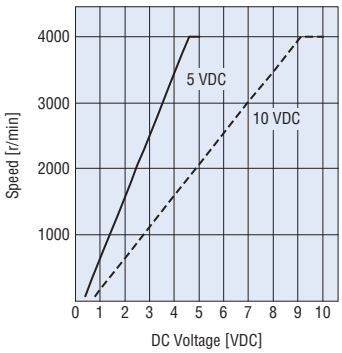
●The speed in the graph represents the speed of a motor alone. The gearhead output shaft speed of the combination type is calculated by dividing the graph speed by the gear ratio.

④ Set speeds using external DC voltage

Set the external voltage select switch on the driver in accordance with the external DC voltage to be supplied. Detach the digital operator and set the switch to either 5 V or 10 V.

Thereafter, connect an external DC power supply as shown below. Connect the positive and negative terminals of the power supply correctly.





External DC Voltage – Speed Characteristics (Representative values)

Note

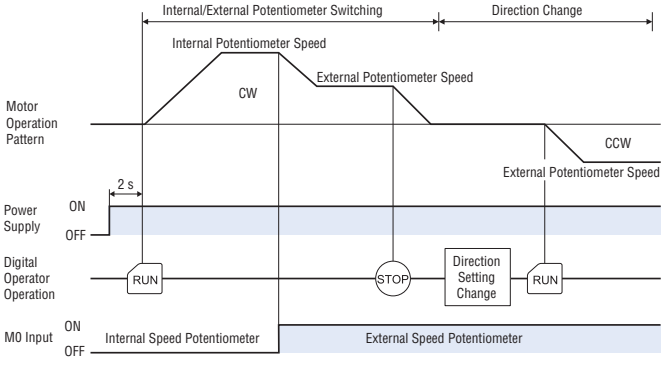
●The speed in the graph represents the speed of a motor alone. The gearhead output shaft speed of the combination type is calculated by dividing the graph speed by the gear ratio.

●Multi-Speed Operation

◇Two-Speed Operation

The speed set by the internal speed potentiometer and another set by an external speed potentiometer can be combined for two-speed operation by switching the operation data selection input M0.

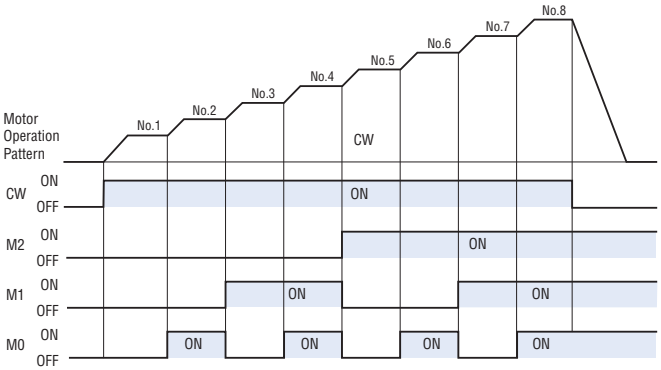
M0 Input	M1 Input	M2 Input	Speed Setting Method
OFF	OFF	OFF	Internal speed potentiometer
ON	OFF	OFF	External speed potentiometer



◇Eight-Speed Operation

A multi-speed operation using up to eight speeds can be performed by setting desired speeds in operation data No. 1 to 8 and then switching the speed using operation-data selection input M0, M1 or M2.

Operation Data	M0 Input	M1 Input	M2 Input	Speed Setting Method
No. 1	OFF	OFF	OFF	Internal speed potentiometer/Digital operator
No. 2	ON	OFF	OFF	External speed potentiometer/Digital operator
No. 3	OFF	ON	OFF	Digital operator
No. 4	ON	ON	OFF	Digital operator
No. 5	OFF	OFF	ON	Digital operator
No. 6	ON	OFF	ON	Digital operator
No. 7	OFF	ON	ON	Digital operator
No. 8	ON	ON	ON	Digital operator



●Multi-Motor Control

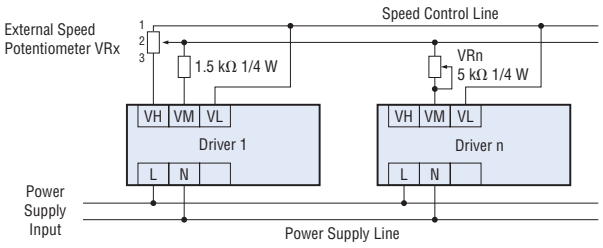
Two or more motors can be operated at the same speed by using a single external speed potentiometer or external DC voltage.
The diagram below applies to a single-phase power supply specification. For a three-phase power supply specification, change the power supply line to a three-phase type. Also note that the diagram does not show the motor or operation control part.

◇Using an External Speed Potentiometer

As shown in the diagram, use a common power supply line and a common speed control line for each driver and set speeds by using the external speed potentiometer VRx.
The resistance of the external speed potentiometer is determined using the formula below:

Resistance when the number of drivers is n:
VRx = 20/n (kΩ), n/4 (W)
Example: When two drivers are connected
VRx = 20/2 = 10 (kΩ), 2/4 = 1/2 (W)
Accordingly, the resistance is calculated as 10 kΩ, 1/2 W.

To adjust the speed difference between motors, connect a 1.5 kΩ, 1/4 W resistor to the VM terminal on the first driver and connect a 5 kΩ, 1/4 W variable resistor (VRn) to the VM terminal on each of the remaining drivers.
Up to five drivers can be operated in parallel using an external speed potentiometer.

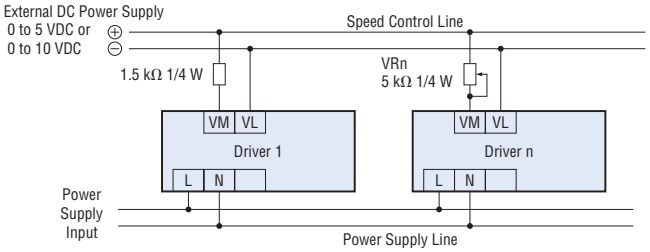


◇Using External DC Voltage

As shown in the diagram, use a common power supply line and a common speed control line for each driver and connect all drivers to a 5 or 10 VDC power supply.
The power-supply capacity of the external DC power supply is determined using the formula below:

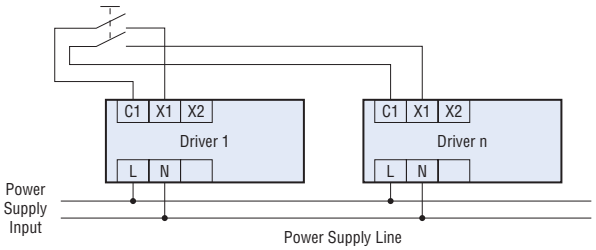
Power-supply capacity when the number of drivers is n:
I = 1 × n (mA)
Example: When two drivers are connected
I = 1 × 2 = 2 (mA)
Accordingly, the power-supply capacity is calculated as 2 mA or more.

To adjust the speed difference between motors, connect a 1.5 kΩ, 1/4 W resistor to the VM terminal on the first driver, and connect a 5 kΩ, 1/4 W variable resistor (VRn) to the VM terminal on each of the remaining drivers.



◇Using the Digital Operator

When multiple drivers are connected and the same data is set digitally where the same data are set digitally in each driver, the operations of multiple motors can be controlled via an external input signal using the wiring circuit shown below.



List of Motor and Driver Combinations

Combination Type – Parallel Shaft Gearhead

The combination type comes with the motor and parallel shaft gearhead pre-assembled.

Output Power	Model	Motor Model	Gearhead Model	Driver Model
30 W (1/25 HP)	**BLF230A-□**	BLFM230-GFS	GFS2G□	BLFD30A2
	BLF230C-□			BLFD30C2
	BLF230S-□			BLFD30S2
60 W (1/12 HP)	**BLF460A-□**	BLFM460-GFS	GFS4G□	BLFD60A2
	BLF460C-□			BLFD60C2
	BLF460S-□			BLFD60S2
120 W (1/6 HP)	**BLF5120A-□**	BLFM5120-GFS	GFS5G□	BLFD120A2
	BLF5120C-□			BLFD120C2
	BLF5120S-□			BLFD120S2
200 W (1/4 HP)	**BLF6200A-□**	BLFM6200-GFS	GFS6G□	BLFD200A2
	BLF6200C-□			BLFD200C2
	BLF6200S-□			BLFD200S2
400 W (1/2 HP)	**BLF6400S-□**	BLFM6400-GFS		BLFD400S2

Combination Type – Hollow Shaft Flat Gearhead

The combination type comes with the motor and hollow shaft flat gearhead pre-assembled.

Output Power	Model	Motor Model	Gearhead Model	Driver Model
30 W (1/25 HP)	**BLF230A-□FR**	BLFM230-GFS	GFS2G□FR	BLFD30A2
	BLF230C-□FR			BLFD30C2
	BLF230S-□FR			BLFD30S2
60 W (1/12 HP)	**BLF460A-□FR**	BLFM460-GFS	GFS4G□FR	BLFD60A2
	BLF460C-□FR			BLFD60C2
	BLF460S-□FR			BLFD60S2
120 W (1/6 HP)	**BLF5120A-□FR**	BLFM5120-GFS	GFS5G□FR	BLFD120A2
	BLF5120C-□FR			BLFD120C2
	BLF5120S-□FR			BLFD120S2
200 W (1/4 HP)	**BLF6200A-□FR**	BLFM6200-GFS	GFS6G□FR	BLFD200A2
	BLF6200C-□FR			BLFD200C2
	BLF6200S-□FR			BLFD200S2
400 W (1/2 HP)	**BLF6400S-□FR**	BLFM6400-GFS	GFS6G□FR	BLFD400S2

Round Shaft Type

Output Power	Model	Motor Model	Driver Model
30 W (1/25 HP)	**BLF230A-A**	BLFM230-A	BLFD30A2
	BLF230C-A		BLFD30C2
	BLF230S-A		BLFD30S2
60 W (1/12 HP)	**BLF460A-A**	BLFM460-A	BLFD60A2
	BLF460C-A		BLFD60C2
	BLF460S-A		BLFD60S2
120 W (1/6 HP)	**BLF5120A-A**	BLFM5120-A	BLFD120A2
	BLF5120C-A		BLFD120C2
	BLF5120S-A		BLFD120S2
200 W (1/4 HP)	**BLF6200A-A**	BLFM6200-A	BLFD200A2
	BLF6200C-A		BLFD200C2
	BLF6200S-A		BLFD200S2
400 W (1/2 HP)	**BLF6400S-A**	BLFM6400-A	BLFD400S2

● Enter the gear ratio in the box (□) within the model name.

BLE Series

●Connection Information●
Technical reference ➜ Page G-1
Safety standards ➜ Page H-2

The **BLE** Series sets a new standard for brushless motors by contributing to energy savings in a compact yet powerful package. By using the control module (sold separately), further improvements in performance and functions are possible. The electromagnetic brake option is ideal for vertical drive applications.

●For detailed product safety standard information including standards, file number and certification body, please visit www.orientalmotor.com.

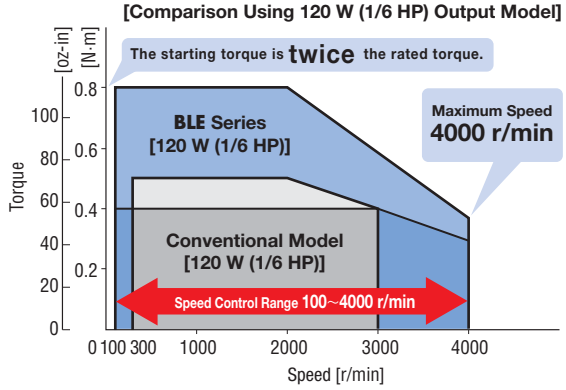
Features

●Speed Control Range of 100 to 4000 r/min and Speed Ratio of 40:1

Compared with conventional models, the speed control range of the **BLE** Series is greatly expanded.
Use in high-speed applications, even at the maximum speed of 4000 r/min, is possible.

Speed Control Range **BLE** Series: 100 to 4000 r/min (speed ratio 40:1)
Conventional Model: 300 to 3000 r/min (speed ratio 10:1)

[Comparison Using 120 W (1/6 HP) Output Model]



●Excellent Speed Stability

The speed regulation (load) is ±0.5%.
For this reason, this mechanism ensures that the motor drives at a stable speed over its entire speed range from low to high, even when the load condition fluctuates.

[Conventional Model]		[**BLE** Series]	
Load	−1%	Load	±0.5%
Voltage	±1%	Voltage	±0.5%
Temperature	±1%	Temperature	±0.5%

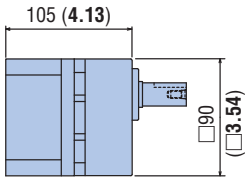
●Energy Savings

Brushless motors use permanent magnets in the rotor. In comparison with an inverter-controlled motor, there is high efficiency and little loss, which means that energy savings is possible.

●Compact yet Powerful

In comparison with conventional models, high power is achieved with a slim body, efficient gearhead and lightweight size allowing for additional space savings.

[BLE Series 120 W (1/6 HP)]
Mass: 3.0 kg (6.6 lb.)



●Features of Gearheads

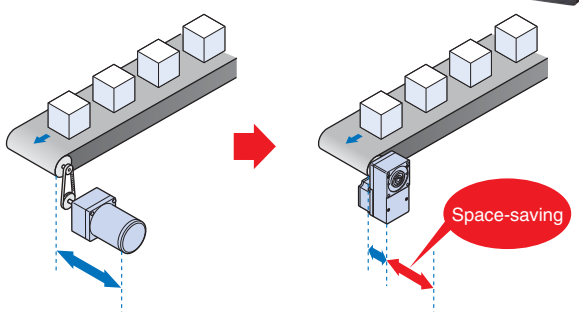
◇Long Life Gearhead Rated Life of 10000 Hours

The rated life of the parallel shaft gearhead and hollow shaft flat gearhead is 10000 hours. The parallel shaft gearhead achieves a long life that is twice as long as that of a conventional model.

●The parallel shaft gearhead for 60 W (1/12 HP) and 120 W (1/6 HP) models has a tapped hole at the shaft end.

◇Space Saving is Achieved with a Hollow Shaft Flat Gearhead

Direct connection to the drive shaft is possible without using a coupling, which enables equipment space saving.



[For Three-Phase Motor and Parallel Shaft Gearhead]

[For Brushless Motor and Hollow Shaft Flat Gearhead]

●Use of Control Module Extends Specifications and Functions

Use in combination with a control module (sold separately) extends specifications and functions and makes the following possible:

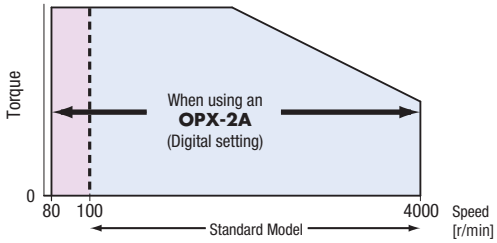
● Control Module **OPX-2A** (Sold separately)

● Data Setting Software **MEXE02** (Sold separately)

Functions	·Various Displaying Functions: Operating Speed (Setting of gear ratio and speed increasing ratio), Conveyor Transportation Speed, Load Factor, Alarm Code, Alarm History, Warning Code, Warning History, I/O Monitor ·Speed (8 speeds max.) ·Torque Limiting Function ·I/O Signal Assignment Change and Extension ·Test Operation ·Data Copy

◇Expansion of Speed Control Range to 80 to 4000 r/min

The digital speed setting function expands the speed control range to cover 80 to 4000 r/min (speed ratio 50:1).



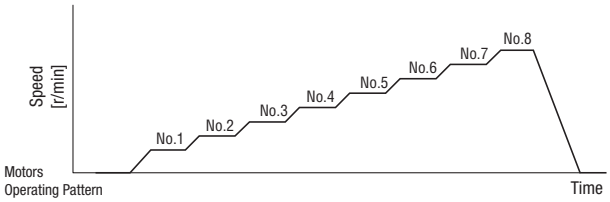
◇Improved Speed Control Accuracy

[**BLE** Series]		[When using control module*]	
Load	±0.5%	Load	±0.2%
Voltage	±0.5%	Voltage	±0.2%
Temperature	±0.5%	Temperature	±0.2%

*When digital speed setting is used

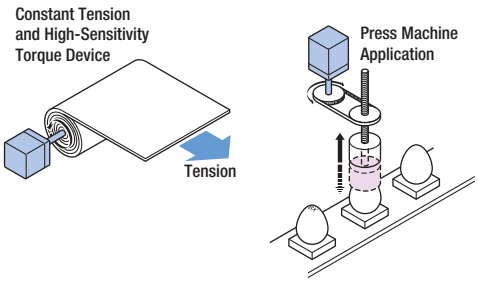
◇Multi-Speed Operation up to 8 Speeds is Possible

Using the control module (sold separately), multi-speed operation up to 8 speeds is possible. Speed setting in 1 r/min units as well as separate setting of the acceleration and deceleration time are also possible.



◇Limiting the Motor Output Torque

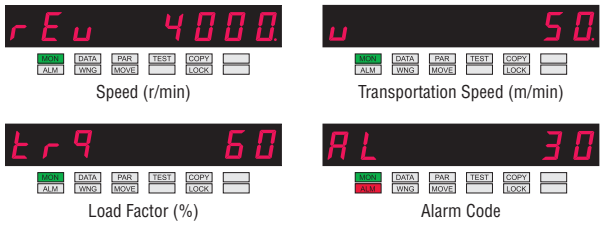
The motor output torque can be suppressed in accordance with the application and use condition.



◇Various Digital Displays are Possible (**OPX-2A**)

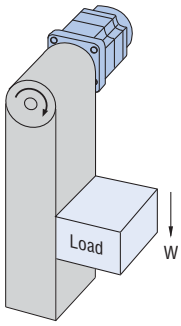
Speed, load factor, alarm code, etc. can be displayed digitally.

● The speed can be displayed as the speed of the gearhead output shaft.



●Speed Control during Vertical Drive

The motor with an electromagnetic brake enables stable speed control even during vertical drive (gravitational operation). When the power is turned off, the motor stops instantaneously to hold the load in place. The electromagnetic brake is automatically controlled via the driver in accordance with ON/OFF of the operation command signal.

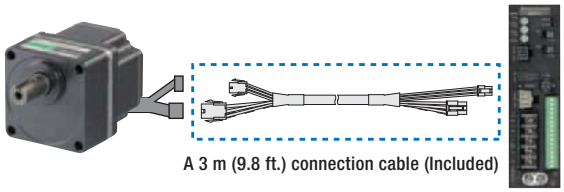


Note

● Regeneration energy generates during vertical drive. If the **BLE** Series will be used in applications that require vertical drive, be sure to use a regeneration unit (sold separately).

●Cable Accessory

A 3 m (9.8 ft.) cable is included for connecting the motor and the driver.



A 3 m (9.8 ft.) connection cable (Included)

●Select the Cable Length or a Flexible Connection Cable

◇Cables up to 20 m (65.6 ft.) are Available (Sold separately)

When the distance between the motor and the driver is extended, the accessory (sold separately) connection cable must be used. The distance between the motor and the driver can be extended up to 20 m (65.6 ft.).

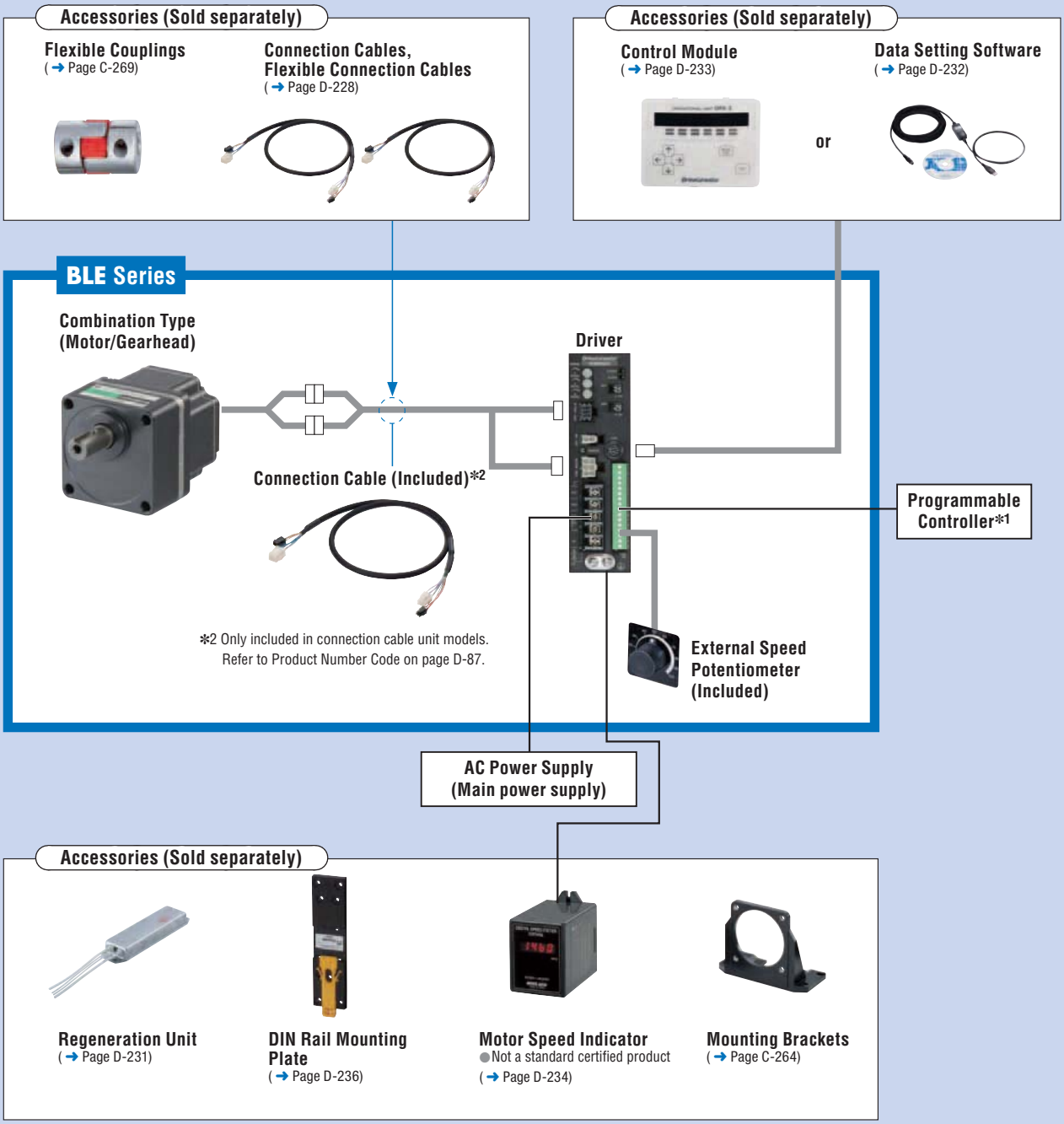
● Connection cables ➜ Page D-228

◇Flexible Connection Cables are Also Available (Sold separately)

Use a flexible connection cable if the cable will be bent.

● Flexible connection cables ➜ Page D-228

System Configuration



●Example of System Configuration

BLE Series Combination Type-Parallel Shaft		Sold Separately			
		Connection Cable 7 m (23.0 ft.)	DIN Rail Mounting Plate	Mounting Bracket	Flexible Coupling
BLE46C50S-3	+	CC07BLE	PADP03	SOL4M6	MCL5515F10

●The system configuration shown above is an example. Other combinations are available.

*1 Not supplied

Product Number Code

BLE 5 12 A M 200 F - 3

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①	Series	**BLE**: **BLE** Series
②	Motor Frame Size	**2**: 60 mm (2.36 in.) **4**: 80 mm (3.15 in.) **5**: 90 mm (3.54 in)
③	Output Power (W)	**3**: 30 W (1/25 HP) **6**: 60 W (1/12 HP) **12**: 120 W (1/6 HP)
④	Power Supply Voltage	**A**: Single-Phase 100-120 VAC **C**: Single-Phase 200-240 VAC **S**: Three-Phase 200-240 VAC
⑤	**M**: With Electromagnetic Brake Type	None: Standard type
⑥	Gear Ratio, Motor Shaft Type	Number: Gear Ratio for Combination Types: 8 types from **5** to **200** **A**: Round Shaft Type
⑦	Gearhead Type (Combination type only)	**S**: Parallel Shaft Gearhead **F**: Hollow Shaft Flat Gearhead
⑧	Connection Cable	**3**: The length of the connection cable is **3**: 3 m (9.8 ft.) None: No connection cable is included

● Examples with and without connection cables and showing the cable length.
A 3 m (9.8 ft.) connection cable is included ➜ **BLE512AM200F-3**
No connection cable ➜ **BLE512AM200F**

Product Line

Combination Type The combination type comes with the motor and its dedicated gearhead pre-assembled which simplifies installation in equipment. Motors and gearheads are also available separately to facilitate changes or repairs.

●Standard Type

◇Combination Type – Parallel Shaft Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
30 W (1/25 HP)	Single-Phase 100-120 VAC	**BLE23A□S-3** **BLE23A□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase 200-240 VAC	**BLE23C□S-3** **BLE23C□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Three-Phase 200-240 VAC	**BLE23S□S-3** **BLE23S□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
60 W (1/12 HP)	Single-Phase 100-120 VAC	**BLE46A□S-3** **BLE46A□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase 200-240 VAC	**BLE46C□S-3** **BLE46C□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Three-Phase 200-240 VAC	**BLE46S□S-3** **BLE46S□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
120 W (1/6 HP)	Single-Phase 100-120 VAC	**BLE512A□S-3** **BLE512A□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase 200-240 VAC	**BLE512C□S-3** **BLE512C□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Three-Phase 200-240 VAC	**BLE512S□S-3** **BLE512S□S**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**

The following items are included in each product.
Motor, Driver, Gearhead, Connection Cable*, External Speed Potentiometer (With signal line), Mounting Screws, Parallel Key, Operating Manual
* Only for models with a connection cable included.

● When the distance between the motor and the driver is extended, the accessory (sold separately) connection cable or flexible connection cable must be used. Cables ➜ Page D-228

◇Combination Type – Hollow Shaft Flat Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
30 W (1/25 HP)	Single-Phase 100-120 VAC	**BLE23A□F-3** **BLE23A□F**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase 200-240 VAC	**BLE23C□F-3** **BLE23C□F**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Three-Phase 200-240 VAC	**BLE23S□F-3** **BLE23S□F**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
60 W (1/12 HP)	Single-Phase 100-120 VAC	**BLE46A□F-3** **BLE46A□F**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase 200-240 VAC	**BLE46C□F-3** **BLE46C□F**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Three-Phase 200-240 VAC	**BLE46S□F-3** **BLE46S□F**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
120 W (1/6 HP)	Single-Phase 100-120 VAC	**BLE512A□F-3** **BLE512A□F**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase 200-240 VAC	**BLE512C□F-3** **BLE512C□F**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Three-Phase 200-240 VAC	**BLE512S□F-3** **BLE512S□F**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**

The following items are included in each product.
Motor, Driver, Gearhead, Connection Cable*, External Speed Potentiometer (With signal line), Mounting Screws, Parallel Key, Safety Cover (Screws included), Operating Manual
* Only for models with a connection cable included.

● When the distance between the motor and the driver is extended, the accessory (sold separately) connection cable or flexible connection cable must be used. Cables ➜ Page D-228

◇Round Shaft Type

Output Power	Power Supply Voltage	Model
30 W (1/25 HP)	Single-Phase 100-120 VAC	**BLE23AA-3** **BLE23AA**
	Single-Phase 200-240 VAC	**BLE23CA-3** **BLE23CA**
	Three-Phase 200-240 VAC	**BLE23SA-3** **BLE23SA**
60 W (1/12 HP)	Single-Phase 100-120 VAC	**BLE46AA-3** **BLE46AA**
	Single-Phase 200-240 VAC	**BLE46CA-3** **BLE46CA**
	Three-Phase 200-240 VAC	**BLE46SA-3** **BLE46SA**

Output Power	Power Supply Voltage	Model
120 W (1/6 HP)	Single-Phase 100-120 VAC	**BLE512AA-3** **BLE512AA**
	Single-Phase 200-240 VAC	**BLE512CA-3** **BLE512CA**
	Three-Phase 200-240 VAC	**BLE512SA-3** **BLE512SA**

The following items are included in each product.
Motor, Driver, Connection Cable*, External Speed Potentiometer (Signal line included), Operating Manual
* Only for models with a connection cable included.

● When the distance between the motor and the driver is extended, the accessory (sold separately) connection cable or flexible connection cable must be used. Cables ➜ Page D-228

● Enter the gear ratio in the box (□) within the model name.

●With Electromagmetic Brake Type

◇Combination Type – Parallel Shaft Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
30 W (1/25 HP)	Single-Phase 100-120 VAC	**BLE23AM□S-3 BLE23AM□S**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase 200-240 VAC	**BLE23CM□S-3 BLE23CM□S**	**5, 10, 15, 20, 30, 50, 100, 200**
	Three-Phase 200-240 VAC	**BLE23SM□S-3 BLE23SM□S**	**5, 10, 15, 20, 30, 50, 100, 200**
60 W (1/12 HP)	Single-Phase 100-120 VAC	**BLE46AM□S-3 BLE46AM□S**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase 200-240 VAC	**BLE46CM□S-3 BLE46CM□S**	**5, 10, 15, 20, 30, 50, 100, 200**
	Three-Phase 200-240 VAC	**BLE46SM□S-3 BLE46SM□S**	**5, 10, 15, 20, 30, 50, 100, 200**
120 W (1/6 HP)	Single-Phase 100-120 VAC	**BLE512AM□S-3 BLE512AM□S**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase 200-240 VAC	**BLE512CM□S-3 BLE512CM□S**	**5, 10, 15, 20, 30, 50, 100, 200**
	Three-Phase 200-240 VAC	**BLE512SM□S-3 BLE512SM□S**	**5, 10, 15, 20, 30, 50, 100, 200**

The following items are included in each product.
Motor, Driver, Gearhead, Connection Cable✻, External Speed Potentiometer (With signal line), Mounting Screws, Parallel Key, Operating Manual
✻Only for models with a connection cable included.

● When the distance between the motor and the driver is extended, the accessory (sold separately) connection cable or flexible connection cable must be used. Cables ➜ Page D-228

◇Round Shaft Type

Output Power	Power Supply Voltage	Model
30 W (1/25 HP)	Single-Phase 100-120 VAC	**BLE23AMA-3 BLE23AMA**
	Single-Phase 200-240 VAC	**BLE23CMA-3 BLE23CMA**
	Three-Phase 200-240 VAC	**BLE23SMA-3 BLE23SMA**
60 W (1/12 HP)	Single-Phase 100-120 VAC	**BLE46AMA-3 BLE46AMA**
	Single-Phase 200-240 VAC	**BLE46CMA-3 BLE46CMA**
	Three-Phase 200-240 VAC	**BLE46SMA-3 BLE46SMA**
120 W (1/6 HP)	Single-Phase 100-120 VAC	**BLE512AMA-3 BLE512AMA**
	Single-Phase 200-240 VAC	**BLE512CMA-3 BLE512CMA**
	Three-Phase 200-240 VAC	**BLE512SMA-3 BLE512SMA**

The following items are included in each product.
Motor, Driver, Connection Cable✻, External Speed Potentiometer (Signal line included), Operating Manual
✻Only for models with a connection cable included.

● When the distance between the motor and the driver is extended, the accessory (sold separately) connection cable or flexible connection cable must be used. Cables ➜ Page D-228

◇Combination Type – Hollow Shaft Flat Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
30 W (1/25 HP)	Single-Phase 100-120 VAC	**BLE23AM□F-3 BLE23AM□F**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase 200-240 VAC	**BLE23CM□F-3 BLE23CM□F**	**5, 10, 15, 20, 30, 50, 100, 200**
	Three-Phase 200-240 VAC	**BLE23SM□F-3 BLE23SM□F**	**5, 10, 15, 20, 30, 50, 100, 200**
60 W (1/12 HP)	Single-Phase 100-120 VAC	**BLE46AM□F-3 BLE46AM□F**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase 200-240 VAC	**BLE46CM□F-3 BLE46CM□F**	**5, 10, 15, 20, 30, 50, 100, 200**
	Three-Phase 200-240 VAC	**BLE46SM□F-3 BLE46SM□F**	**5, 10, 15, 20, 30, 50, 100, 200**
120 W (1/6 HP)	Single-Phase 100-120 VAC	**BLE512AM□F-3 BLE512AM□F**	**5, 10, 15, 20, 30, 50, 100, 200**
	Single-Phase 200-240 VAC	**BLE512CM□F-3 BLE512CM□F**	**5, 10, 15, 20, 30, 50, 100, 200**
	Three-Phase 200-240 VAC	**BLE512SM□F-3 BLE512SM□F**	**5, 10, 15, 20, 30, 50, 100, 200**

The following items are included in each product.
Motor, Driver, Gearhead, Connection Cable✻, External Speed Potentiometer (With signal line), Mounting Screws, Parallel Key, Safety Cover (Screws included), Operating Manual
✻Only for models with a connection cable included.

● When the distance between the motor and the driver is extended, the accessory (sold separately) connection cable or flexible connection cable must be used. Cables ➜ Page D-228

● Enter the gear ratio in the box (□) within the model name.

Specifications

Standard Type

◇30 W (1/25 HP) RoHS

Model	Combination Type – Parallel Shaft Gearhead		BLE23A□S-3, BLE23A□S	BLE23C□S-3, BLE23C□S	BLE23S□S-3, BLE23S□S
	Combination Type – Hollow Shaft Flat Gearhead		BLE23A□F-3, BLE23A□F	BLE23C□F-3, BLE23C□F	BLE23S□F-3, BLE23S□F
	Round Shaft Type		BLE23AA-3, BLE23AA	BLE23CA-3, BLE23CA	BLE23SA-3, BLE23SA
Rated Output Power (Continuous)		W (HP)	30 (1/25)		
Power Source	Rated Voltage	VAC	Single-Phase 100-120	Single-Phase 200-240	Three-Phase 200-240
	Permissible Voltage Range		−15～+10%		
	Rated Frequency	Hz	50/60		
	Permissible Frequency Range		±5%		
	Rated Input Current	A	1.3	0.8	0.45
	Maximum Input Current	A	3.5	2.1	1.2
Rated Torque		N·m (oz-in)	0.1 (14.2)		
Starting Torque*1		N·m (oz-in)	0.2 (28)		
Rated Speed		r/min	3000		
Speed Control Range		r/min	100～4000 (Analog setting), 80～4000 (Digital setting can be set in 1 r/min increments)*2		
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	1.8 (9.8)		
Rotor Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	0.087 (0.48)		
Speed Regulation	Load		±0.5% (±0.2%)*2 max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage		±0.5% (±0.2%)*2 max. (Rated voltage −15～+10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature		±0.5% (±0.2%)*2 max. [0～+50°C (+32～+122°F), at rated speed, with no load, at rated voltage]		

◇60 W (1/12 HP) RoHS

Model	Combination Type – Parallel Shaft Gearhead		BLE46A□S-3, BLE46A□S	BLE46C□S-3, BLE46C□S	BLE46S□S-3, BLE46S□S
	Combination Type – Hollow Shaft Flat Gearhead		BLE46A□F-3, BLE46A□F	BLE46C□F-3, BLE46C□F	BLE46S□F-3, BLE46S□F
	Round Shaft Type		BLE46AA-3, BLE46AA	BLE46CA-3, BLE46CA	BLE46SA-3, BLE46SA
Rated Output Power (Continuous)		W (HP)	60 (1/12)		
Power Source	Rated Voltage	VAC	Single-Phase 100-120	Single-Phase 200-240	Three-Phase 200-240
	Permissible Voltage Range		−15～+10%		
	Rated Frequency	Hz	50/60		
	Permissible Frequency Range		±5%		
	Rated Input Current	A	2.0	1.2	0.7
	Maximum Input Current	A	4.5	2.6	1.5
Rated Torque		N·m (oz-in)	0.2 (28)		
Starting Torque*1		N·m (oz-in)	0.4 (56)		
Rated Speed		r/min	3000		
Speed Control Range		r/min	100～4000 (Analog setting), 80～4000 (Digital setting can be set in 1 r/min increments)*2		
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	3.75 (21)		
Rotor Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	0.24 (1.31)		
Speed Regulation	Load		±0.5% (±0.2%)*2 max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage		±0.5% (±0.2%)*2 max. (Rated voltage −15～+10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature		±0.5% (±0.2%)*2 max. [0～+50°C (+32～+122°F), at rated speed, with no load, at rated voltage]		

◇120 W (1/6 HP) RoHS

Model	Combination Type – Parallel Shaft Gearhead		BLE512A□S-3, BLE512A□S	BLE512C□S-3, BLE512C□S	BLE512S□S-3, BLE512S□S
	Combination Type – Hollow Shaft Flat Gearhead		BLE512A□F-3, BLE512A□F	BLE512C□F-3, BLE512C□F	BLE512S□F-3, BLE512S□F
	Round Shaft Type		BLE512AA-3, BLE512AA	BLE512CA-3, BLE512CA	BLE512SA-3, BLE512SA
Rated Output Power (Continuous)		W (HP)	120 (1/6)		
Power Source	Rated Voltage	VAC	Single-Phase 100-120	Single-Phase 200-240	Three-Phase 200-240
	Permissible Voltage Range		−15～+10%		
	Rated Frequency	Hz	50/60		
	Permissible Frequency Range		±5%		
	Rated Input Current	A	3.3	2.0	1.2
	Maximum Input Current	A	8.2	4.4	2.5
Rated Torque		N·m (oz-in)	0.4 (56)		
Starting Torque*1		N·m (oz-in)	0.8 (113)		
Rated Speed		r/min	3000		
Speed Control Range		r/min	100～4000 (Analog setting), 80～4000 (Digital setting can be set in 1 r/min increments)*2		
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	5.6 (31)		
Rotor Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	0.61 (3.3)		
Speed Regulation	Load		±0.5% (±0.2%)*2 max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage		±0.5% (±0.2%)*2 max. (Rated voltage −15～+10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature		±0.5% (±0.2%)*2 max. [0～+50°C (+32～+122°F), at rated speed, with no load, at rated voltage]		

*1 The starting torque can be used a maximum duration of approximately five seconds.
*2 These specifications apply when a control module (sold separately) is used.
● The values for each specification apply to the motor only.
● Enter the gear ratio in the box (□) within the model name.

●With Electromagnetic Brake Type

◇30 W (1/25 HP) RoHS

Model			BLE23AM□S-3, BLE23AM□S	BLE23CM□S-3, BLE23CM□S	BLE23SM□S-3, BLE23SM□S
	Combination Type – Hollow Shaft Flat Gearhead		BLE23AM□F-3, BLE23AM□F	BLE23CM□F-3, BLE23CM□F	BLE23SM□F-3, BLE23SM□F
	Round Shaft Type		BLE23AMA-3, BLE23AMA	BLE23CMA-3, BLE23CMA	BLE23SMA-3, BLE23SMA
Rated Output Power (Continuous)		W (HP)	30 (1/25)		
Power Source	Rated Voltage	VAC	Single-Phase 100-120	Single-Phase 200-240	Three-Phase 200-240
	Permissible Voltage Range		−15～+10%		
	Rated Frequency	Hz	50/60		
	Permissible Frequency Range		±5%		
	Rated Input Current	A	1.3	0.8	0.45
	Maximum Input Current	A	3.5	2.1	1.2
Rated Torque		N·m (oz-in)	0.1 (14.2)		
Starting Torque*1		N·m (oz-in)	0.2 (28)		
Rated Speed		r/min	3000		
Speed Control Range		r/min	100～4000 (Analog setting), 80～4000 (Digital setting can be set in 1 r/min increments)*2		
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	1.8 (9.8)		
Rotor Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	0.087 (0.48)		
Speed Regulation	Load		±0.5% (±0.2%)*2 max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage		±0.5% (±0.2%)*2 max. (Rated voltage −15～+10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature		±0.5% (±0.2%)*2 max. [0～+50°C (+32～+122°F), at rated speed, with no load, at rated voltage]		
Gravitational Operation Ability	Continuous Regenerative Power	W (HP)	100 (1/8)		
	Instantaneous Regenerative Power	W (HP)	240 (1/3)		
	Applicable Regeneration Unit*3		EPRC-400P		
Electromagnetic Brake*4	Brake Type		Active when the power is off, automatically controlled by the driver		
	Static Friction Torque	N·m (oz-in)	0.1 (14.2)		

◇60 W (1/12 HP) RoHS

Model			BLE46AM□S-3, BLE46AM□S	BLE46CM□S-3, BLE46CM□S	BLE46SM□S-3, BLE46SM□S
	Combination Type – Hollow Shaft Flat Gearhead		BLE46AM□F-3, BLE46AM□F	BLE46CM□F-3, BLE46CM□F	BLE46SM□F-3, BLE46SM□F
	Round Shaft Type		BLE46AMA-3, BLE46AMA	BLE46CMA-3, BLE46CMA	BLE46SMA-3, BLE46SMA
Rated Output Power (Continuous)		W (HP)	60 (1/12)		
Power Source	Rated Voltage	VAC	Single-Phase 100-120	Single-Phase 200-240	Three-Phase 200-240
	Permissible Voltage Range		−15～+10%		
	Rated Frequency	Hz	50/60		
	Permissible Frequency Range		±5%		
	Rated Input Current	A	2.0	1.2	0.7
	Maximum Input Current	A	4.5	2.6	1.5
Rated Torque		N·m (oz-in)	0.2 (28)		
Starting Torque*1		N·m (oz-in)	0.4 (56)		
Rated Speed		r/min	3000		
Speed Control Range		r/min	100～4000 (Analog setting), 80～4000 (Digital setting can be set in 1 r/min increments)*2		
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	3.75 (21)		
Rotor Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	0.24 (1.31)		
Speed Regulation	Load		±0.5% (±0.2%)*2 max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage		±0.5% (±0.2%)*2 max. (Rated voltage −15～+10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature		±0.5% (±0.2%)*2 max. [0～+50°C (+32～+122°F), at rated speed, with no load, at rated voltage]		
Gravitational Operation Ability	Continuous Regenerative Power	W (HP)	100 (1/8)		
	Instantaneous Regenerative Power	W (HP)	240 (1/3)		
	Applicable Regeneration Unit*3		EPRC-400P		
Electromagnetic Brake*4	Brake Type		Active when the power is off, automatically controlled by the driver		
	Static Friction Torque	N·m (oz-in)	0.2 (28)		

*1 The starting torque can be used a maximum duration of approximately five seconds.
*2 These specifications apply when a control module (sold separately) is used.
*3 Install the regeneration unit in the place which has the same heat radiation capability as heat radiation plate [material: aluminum 350×350 mm (13.8×13.8 in.), 3 mm (0.12 in.) thick].
*4 Do not start or stop the motor by turning on/off the power supply, as it will cause the electromagnetic brake to wear abnormally.
● The values for each specification apply to the motor only.

● Enter the gear ratio in the box (□) within the model name.

◇120 W (1/6 HP) RoHS

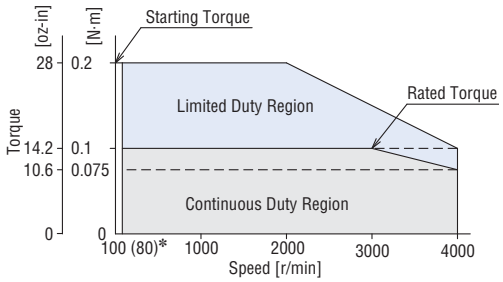
Model	Combination Type – Parallel Shaft Gearhead		BLE512AM□S-3, BLE512AM□S	BLE512CM□S-3, BLE512CM□S	BLE512SM□S-3, BLE512SM□S
	Combination Type – Hollow Shaft Flat Gearhead		BLE512AM□F-3, BLE512AM□F	BLE512CM□F-3, BLE512CM□F	BLE512SM□F-3, BLE512SM□F
	Round Shaft Type		BLE512AMA-3, BLE512AMA	BLE512CMA-3, BLE512CMA	BLE512SMA-3, BLE512SMA
Rated Output Power (Continuous)		W (HP)	120 (1/6)		
Power Source	Rated Voltage	VAC	Single-Phase 100-120	Single-Phase 200-240	Three-Phase 200-240
	Permissible Voltage Range		−15～+10%		
	Rated Frequency	Hz	50/60		
	Permissible Frequency Range		±5%		
	Rated Input Current	A	3.3	2.0	1.2
	Maximum Input Current	A	8.2	4.4	2.5
Rated Torque		N·m (oz-in)	0.4 (56)		
Starting Torque*1		N·m (oz-in)	0.8 (113)		
Rated Speed		r/min	3000		
Speed Control Range		r/min	100～4000 (Analog setting), 80～4000 (Digital setting can be set in 1 r/min increments)*2		
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	5.6 (31)		
Rotor Inertia J		$\times10^{-4}$ kg·m^2 (oz-in^2)	0.61 (3.3)		
Speed Regulation	Load		±0.5% (±0.2%)*2 max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage		±0.5% (±0.2%)*2 max. (Rated voltage −15～+10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature		±0.5% (±0.2%)*2 max. [0～+50°C (+32～+122°F), at rated speed, with no load, at rated voltage]		
Gravitational Operation Ability	Continuous Regenerative Power	W (HP)	100 (1/8)		
	Instantaneous Regenerative Power	W (HP)	240 (1/3)		
	Applicable Regeneration Unit*3		EPRC-400P		
Electromagnetic Brake*4	Brake Type		Active when the power is off, automatically controlled by the driver		
	Static Friction Torque	N·m (oz-in)	0.4 (56)		

*1 The starting torque can be used a maximum duration of approximately five seconds.
*2 These specifications apply when a control module (sold separately) is used.
*3 Install the regeneration unit in the place which has the same heat radiation capability as heat radiation plate [material: aluminum 350×350 mm (13.8×13.8 in.), 3 mm (0.12 in.) thick].
*4 Do not start or stop the motor by turning on/off the power supply, as it will cause the electromagnetic brake to wear abnormally.
● The values for each specification apply to the motor only.

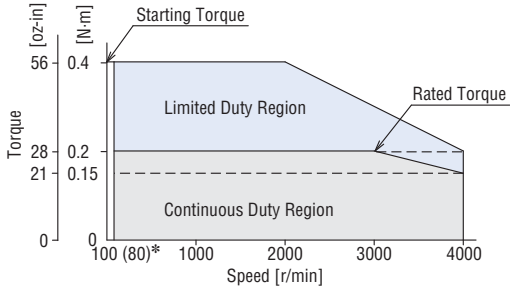
Speed – Torque Characteristics

Continuous Duty Region: Continuous operation is possible in this region.
Limited Duty Region: This region is used primarily when accelerating. When a load that exceeds the rated torque is applied continuously for approximately five seconds, overload protection is activated and the motor coasts to a stop.

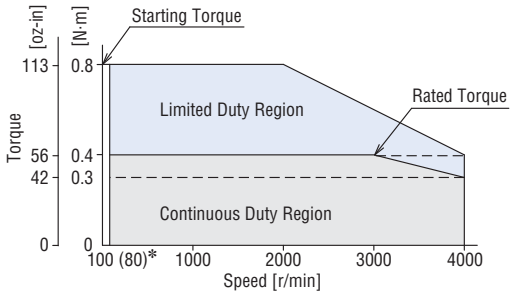
●30 W (1/25 HP)



●60 W (1/12 HP)



●120 W (1/6 HP)



*( ) indicates: These specifications apply when a control module (sold separately) is used.
● The characteristics shown above apply to the motor only.

Vertical Drive (Gravitational Operation)

The **BLE** Series provides stable speed control during gravitational operation.
During vertical drive shown in the figure to the right, normally an external force causes the motor to rotate and function as a power generator. If this energy is applied to the driver, an error will occur. The accessory regeneration unit (sold separately) can convert regenerative energy into thermal energy for dissipation. Use the accessory regeneration unit when using the motor for vertical applications or when braking a large inertial load quickly.

Regeneration resistor: **EPRC-400P**
Continuous regenerative power: 100 W (1/8 HP)
Instantaneous regenerative power: 240 W (1/3 HP)

- Attach to a location having the same radiation capability as the heat sink [material: aluminum 350×350 mm (13.8×13.8 in.), 3 mm (0.12 in.) thick].

Note

- If using in a lift, the load may drop if it exceeds the rating or if the control module (sold separately) is used to set the torque limit to a small value. Depending on the load condition even if not exceeding the rated load, reversing may occur momentarily during startup or shutdown.

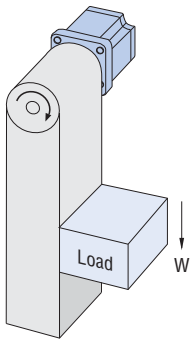
Regenerative Power

The regenerative power can be estimated using the formula below. Use the calculated value as a guideline.

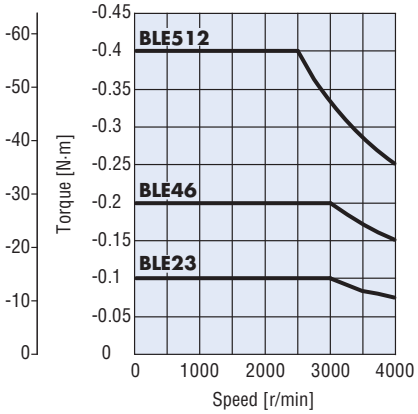
Regenerative Power (W) $= 0.1047 \times T_L$ [N·m] $\times N$ [r/min]

T_L: Load torque N: Speed

- Use the electromagnetic brake type for gravitational operation.



Gravitational Operation Capability



- Gravitational operation exceeding the range of continuous regeneration capability will trigger the built-in thermal protector [150°C (302°F)].

General Specifications

Item		Motor	Driver
Insulation Resistance		100 MΩ or more when 500 VDC megger is applied between the windings and the case after continuous operation under normal ambient temperature and humidity.	The measured value is 100 MΩ or more when a 500 VDC megger is applied between the power supply terminal and the protective earth terminal and between the power supply terminal and the I/O signal terminal after continuous operation under normal ambient temperature and humidity.
Dielectric Strength		Sufficient to withstand 1.5 kVAC at 50 Hz applied between the windings and the case for 1 minute after continuous operation under normal ambient temperature and humidity.	No abnormality is judged even with application of 1834 VAC at 50 Hz between the power supply terminal and the protective earth terminal and with application of 3 kVAC at 50 Hz between the power supply terminal and the I/O terminal for 1 minute after continuous operation under normal ambient temperature and humidity.
Temperature Rise		Temperature rise of the windings and the case are 50°C (90°F) or less, and 40°C (72°F) or less*1 respectively measured by the thermocouple method after continuous operation under normal ambient temperature and humidity.	Temperature rise of the heat radiation plate is 50°C (90°F) or less measured by the thermocouple method after continuous operation under normal ambient temperature and humidity.
Operating Environment	Ambient Temperature	0～+50°C (+32～+122°F)	
	Ambient Humidity	85% or less (non-condensing)	
	Altitude	Up to 1000 m (3300 ft.) above sea level	
	Atmosphere	No corrosive gases or dust. Cannot be used in a radioactive area, magnetic field, vacuum or other special environment	
	Vibration	Not subject to continuous vibration or excessive impact In conformance with JIS C 60068-2-6, "Sine-wave vibration test method" Frequency range: 10～55 Hz Pulsating amplitude: 0.15 mm (0.006 in.) Sweep direction: 3 directions (X, Y, Z) Number of sweeps: 20 times	
Storage Condition*2	Ambient Temperature	−25～+70°C (−13～+158°F) (non-freezing)	
	Ambient Humidity	85% or less (non-condensing)	
	Altitude	Up to 3000 m (10000 ft.) above sea level	
Thermal Class		UL/CSA standards: 105 (A), EN standards: 120 (E)	–
Degree of Protection		IP65 (Excluding the mounting surface of the round shaft type and connectors)	IP20

*1 For round shaft types, please attach to the heat radiation plate (material: aluminum) of the following sizes to maintain a maximum motor case temperature of 90°C (194°F).
30 W (1/25 HP) Standard Type: 115×115 mm (4.53×4.53 in.), 5 mm (0.20 in.) thick
30 W (1/25 HP) With Electromagnetic Brake Type: 135×135 mm (5.31×5.31 in.), 5 mm (0.20 in.) thick
60 W (1/12 HP) Type: 135×135 mm (5.31×5.31 in.), 5 mm (0.20 in.) thick
120 W (1/6 HP) Type: 165×165 mm (6.50×6.50 in.), 5 mm (0.20 in.) thick
*2 The storage condition applies to a short period such as a period during transportation.

Note

- Do not measure insulation resistance or perform the dielectric strength test while the motor and driver are connected.

Common Specifications

- Standard Model: These specifications apply when the basic motor/driver package is used.
- Extended Functions: These specifications apply when a control module (sold separately) is used.

Item	Standard Model	Extended Functions
Speed Setting Methods	Select one of the following methods. ·Set using the internal speed potentiometer ·Set using an external speed potentiometer (included): **PAVR-20KZ** (20 kΩ, 1/4 W) ·Set using external DC voltage: 0～5 VDC or 0～10 VDC, 1 mA min.	Select one of the following methods. ·Digital Setting (**OPX-2A** or **MEXE02**) ·Set using the internal speed potentiometer ·Set using an external speed potentiometer (included): **PAVR-20KZ** (20 kΩ, 1/4 W) ·Set using external DC voltage: 0～5 VDC or 0～10 VDC, 1 mA min.
Acceleration and Deceleration Time	Set using acceleration and deceleration time potentiometer: 0.2～15 seconds (3000 r/min at no load)	Select one of the following methods: ·Digital Setting (**OPX-2A** or **MEXE02**): 0.2～15 seconds (time until setting speed is achieved) ·Set using acceleration and deceleration time potentiometer: 0.2～15 seconds (3000 r/min with no load)
Multi-Speed Setting Methods	2 Speeds: 1 speed set by the internal speed potentiometer and 1 speed set by the external speed potentiometer (20 kΩ, 1/4 W) or external DC voltage (0～5 VDC or 0～10 VDC)	Select one of the following methods: ·8 Speeds: 8 speeds set by digital setting (**OPX-2A** or **MEXE02**) ·8 Speeds: 6 speeds set by digital setting (**OPX-2A** or **MEXE02**) and 2 speeds set by analog setting*1
Input Signals	Photocoupler Input Input Resistance 5.1 kΩ Operated by Internal Power Supply: 17 VDC±10% Connectable External DC Power Supply: 24 VDC −15～+20% Current 100 mA min.	
	Forward input (FWD), Reverse input (REV), Stop mode selection input, Speed setting selection input (M0), Alarm reset input, Electromagnetic brake release input (MB-FREE), Regeneration unit thermal input (TH)	Arbitrary signal assignment to general purpose input X0～X6 (7 points) is possible Forward input (FWD), Reverse input (REV), Stop mode selection input, Speed setting selection input (M0, M1, M2), Alarm reset input, Electromagnetic brake release input (MB-FREE), Regeneration unit thermal input (TH), External error input (EXT-ERROR)
Output Signals	Open-collector output External Use Condition: Voltage control 4.5～30.0 VDC Current 40 mA max. Speed Output: 5 mA min.	
	Speed output, Alarm output 1	Arbitrary signal assignment to general purpose output Y0, Y1 (2 points) is possible Speed output, Alarm output 1, Motor running output (MOVE), Speed attainment output (VA), Alarm output 2, Warning output (WNG), Torque limit output (TLC)
Protective Functions	When the following protective functions are activated, the motor will coast to a stop and the ALARM output will be OFF. The alarm LED on the driver will blink for the corresponding number of times shown in ( ). ·Overload Protective Function (2): Activated when the motor load has exceeded rated torque for approximately 5 seconds min. ·Sensor Error (3): Activated when an abnormality occurs with the signal from the motor such as when the sensor signal line of the motor disconnects during operation or when the connector for the signal comes off. ·Initial Sensor Error (3): Activated when an abnormality occurs with the signal from the motor before the main power supply was turned on such as when the sensor signal line of the motor disconnects during operation or when the connector for the signal comes off. ·Overvoltage Protective Function (4): Activated when the main power supply voltage applied exceeds the rated voltage by approximately 20%, a gravitational operation was performed or a load exceeding the permissible load inertia was driven. ·Undervoltage Protective Function (5): Activated when the main power supply voltage drops below the rated voltage by 40% or less. ·Overspeed Protective Function (6): Activated when the motor speed exceeds approximately 4800 r/min. ·Overcurrent Protective Function (7): Activated when an excessive current flowed through the driver due to ground fault, etc. ·EEPROM Error (8): Activated when data can not be written or read due to damage to saved data. ·Regeneration Unit Overheat Protective Function (9): Activated when regeneration unit overheat is detected or when the thermal protector output lead wire is disconnected during operation. ·External Stop*2 (10): Activated when external error input (EXT-ERROR) is turned OFF. ·Initial Operation Inhibition*3 (11): Activated when FWD input or REV input turns ON or when the main power supply is turned on again (initial value invalid). ·Main Circuit Output Error*4 (14): Activated when operation signal is input while the motor power line is disconnected or the power connector has come off.	
Maximum Extension Distance	Motor and Driver Distance 20.4 m (66.9 ft.)	
Time Rating	Continuous	

*1 One speed set by the internal speed potentiometer and one speed set by the external speed potentiometer (20 kΩ, 1/4 W) or external DC voltage (0～5 VDC or 0～10 VDC).
*2 Limited to when the control module (sold separately) is used for assigning the external error input (EXT-ERROR).
*3 Activates only when the control module (sold separately) is used and the function has been set to be available. Invalid when the **FBL Ⅱ** compatibility mode is set.
*4 Does not activate when the control module (sold separately) is used to set the torque limiting value to less than 200%.

Torque Limiting Function Specifications

A limit can be set on the output torque of the motor by using a control module (sold separately).

Item	Specifications
Torque Limiting Setting Methods	Select one of the following methods · Digital Independent Setting: A torque limiting value can be set independently for each data set of 8 data. · External Analog Common Setting: A torque limiting value can be set for all data sets in one operation via external speed potentiometer **PAVR-20KZ** (20 kΩ, 1/4 W) or with external DC voltage (0～5 VDC or 0～10 VDC). This torque limiting value applies to all operation data.
Torque Limiting Setting Range	Assuming that the rated torque of the motor is 100%, torque limiting values can be set by one of the following settings. (Initial value 200%) · Digital Setting: 0～200% (can be set in 1% units) · External Analog Common Setting: Set from 0～200% with an external speed potentiometer **PAVR-20KZ** (20 kΩ, 1/4 W) or with external DC voltage (0～5 VDC or 0～10 VDC)

Note
- An error up to a maximum of approximately ±20% (during rated torque and rated speed) may occur between the setting value and generated torque due to the setting speed, power supply voltage and motor cable extension length.

Gearmotor – Torque Table of Combination Type

Combination Type – Parallel Shaft Gearhead

Unit = N·m (lb-in)

Model	Gear Ratio	5	10	15	20	30	50	100	200
	Motor Speed [r/min] 100 r/min	20	10	6.7	5	3.3	2	1	0.5
	Motor Speed [r/min] 3000 r/min	600	300	200	150	100	60	30	15
	Motor Speed [r/min] 4000 r/min	800	400	267	200	133	80	40	20
BLE23□□S-3 **BLE23□□S**	100~3000 r/min	0.45 (3.9)	0.90 (7.9)	1.4 (12.3)	1.8 (15.9)	2.6 (23)	4.3 (38)	6 (53)	6 (53)
	4000 r/min	0.34 (3.0)	0.68 (6.0)	1.0 (8.8)	1.4 (12.3)	1.9 (16.8)	3.2 (28)	5.4 (47)	5.4 (47)
BLE46□□S-3 **BLE46□□S**	100~3000 r/min	0.90 (7.9)	1.8 (15.9)	2.7 (23)	3.6 (31)	5.2 (46)	8.6 (76)	16 (141)	16 (141)
	4000 r/min	0.68 (6.0)	1.4 (12.3)	2.0 (17.7)	2.7 (23)	3.9 (34)	6.5 (57)	12.9 (114)	14 (123)
BLE512□□S-3 **BLE512□□S**	100~3000 r/min	1.8 (15.9)	3.6 (31)	5.4 (47)	7.2 (63)	10.3 (91)	17.2 (152)	30 (260)	30 (260)
	4000 r/min	1.4 (12.3)	2.7 (23)	4.1 (36)	5.4 (47)	7.7 (68)	12.9 (114)	25.8 (220)	27 (230)

● A colored background ( ) indicates gear shaft rotation in the same direction as the motor shaft, while the others rotate in the opposite direction.

Combination Type – Hollow Shaft Gearhead

Unit = N·m (lb-in)

Model	Gear Ratio	5	10	15	20	30	50	100	200
	Motor Speed [r/min] 100 r/min	20	10	6.7	5	3.3	2	1	0.5
	Motor Speed [r/min] 3000 r/min	600	300	200	150	100	60	30	15
	Motor Speed [r/min] 4000 r/min	800	400	267	200	133	80	40	20
BLE23□□F-3 **BLE23□□F**	100~3000 r/min	0.4 (3.5)	0.85 (7.5)	1.3 (11.5)	1.7 (15.0)	2.6 (23)	4.3 (38)	8.5 (75)	17 (150)
	4000 r/min	0.3 (2.6)	0.64 (5.6)	0.96 (8.4)	1.3 (11.5)	1.9 (16.8)	3.2 (28)	6.4 (56)	12.8 (113)
BLE46□□F-3 **BLE46□□F**	100~3000 r/min	0.85 (7.5)	1.7 (15.0)	2.6 (23)	3.4 (30)	5.1 (45)	8.5 (75)	17 (150)	34 (300)
	4000 r/min	0.64 (5.6)	1.3 (11.5)	1.9 (16.8)	2.6 (23)	3.8 (33)	6.4 (56)	12.8 (113)	25.5 (220)
BLE512□□F-3 **BLE512□□F**	100~3000 r/min	1.7 (15.0)	3.4 (30)	5.1 (45)	6.8 (60)	10.2 (90)	17 (150)	34 (300)	68 (600)
	4000 r/min	1.3 (11.5)	2.6 (23)	3.8 (33)	5.1 (45)	7.7 (68)	12.8 (113)	25.5 (220)	51 (450)

● The flat gearhead rotates in the opposite direction to the motor when viewed from the front face of the gearhead. It rotates in the same direction as the motor when viewed from the rear (motor mounting surface) of the gearhead. Rotation direction of hollow shaft flat gearhead ➜ Page D-243

Permissible Overhung Load and Permissible Thrust Load

Combination Type – Parallel Shaft Gearhead

Model	Gear Ratio		Permissible Overhung Load: 10 mm (0.39 in.) from shaft end N	Permissible Overhung Load: 10 mm (0.39 in.) from shaft end lb.	Permissible Overhung Load: 20 mm (0.79 in.) from shaft end N	Permissible Overhung Load: 20 mm (0.79 in.) from shaft end lb.	Permissible Thrust Load N	Permissible Thrust Load lb.
BLE23□□S-3 **BLE23□□S**	**5**	100~3000 r/min	100	22	150	33	40	9
		4000 r/min	90	20	110	24		
	10, **15**, **20**	100~3000 r/min	150	33	200	45		
		4000 r/min	130	29	170	38		
	30, **50**, **100**, **200**	100~3000 r/min	200	45	300	67		
		4000 r/min	180	40	230	51		
BLE46□□S-3 **BLE46□□S**	**5**	100~3000 r/min	200	45	250	56	100	22
		4000 r/min	180	40	220	49		
	10, **15**, **20**	100~3000 r/min	300	67	350	78		
		4000 r/min	270	60	330	74		
	30, **50**, **100**, **200**	100~3000 r/min	450	101	550	123		
		4000 r/min	420	94	500	112		
BLE512□□S-3 **BLE512□□S**	**5**	100~3000 r/min	300	67	400	90	150	33
		4000 r/min	230	51	300	67		
	10, **15**, **20**	100~3000 r/min	400	90	500	112		
		4000 r/min	370	83	430	96		
	30, **50**, **100**, **200**	100~3000 r/min	500	112	650	146		
		4000 r/min	450	101	550	123		

● Enter the power supply voltage **A**, **C** or **S** (**AM**, **CM**, or **SM**: Electromagnetic brake type) in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.

●Combination Type – Hollow Shaft Flat Gearhead

Model	Gear Ratio		Permissible Overhung Load: 10 mm (0.39 in.) from mounting surface of gearhead N	lb.	20 mm (0.79 in.) from mounting surface of gearhead N	lb.	Permissible Thrust Load N	lb.
BLE23□□F-3 **BLE23□□F**	**5**, **10**	100～3000 r/min	450	101	370	83	200	45
		4000 r/min	410	92	330	74		
	15, **20**, **30**, **50**, **100**, **200**	100～3000 r/min	500	112	400	90		
		4000 r/min	460	103	370	83		
BLE46□□F-3 **BLE46□□F**	**5**, **10**	100～3000 r/min	800	180	660	148	400	90
		4000 r/min	730	164	600	135		
	15, **20**, **30**, **50**, **100**, **200**	100～3000 r/min	1200	270	1000	220		
		4000 r/min	1100	240	910	200		
BLE512□□F-3 **BLE512□□F**	**5**, **10**	100～3000 r/min	900	200	770	173	500	112
		4000 r/min	820	184	700	157		
	15, **20**	100～3000 r/min	1300	290	1110	240		
		4000 r/min	1200	270	1020	220		
	30, **50**, **100**, **200**	100～3000 r/min	1500	330	1280	280		
		4000 r/min	1400	310	1200	270		

● The permissible overhung load can also be calculated with a formula. Permissible overhung load calculation ➜ Page D-242

●Round Shaft Type

Model	Permissible Overhung Load: 10 mm (0.39 in.) from shaft end N	lb.	20 mm (0.79 in.) from shaft end N	lb.	Permissible Thrust Load
BLE23□A-3 **BLE23□A**	80	18	100	22	The permissible thrust load should not be greater than half the motor mass.
BLE46□A-3 **BLE46□A**	110	24	130	29	
BLE512□A-3 **BLE512□A**	150	33	170	38	

Permissible Load Inertia: J of Combination Type

●Combination Type – Parallel Shaft Gearhead

Unit = ×10^{-4}kg·m^2 (oz-in^2)

Model	Gear Ratio	**5**	**10**	**15**	**20**	**30**	**50**	**100**	**200**
BLE23□□S-3 **BLE23□□S**		12 (66)	50 (270)	110 (600)	200 (1090)	370 (2000)	920 (5000)	2500 (13700)	5000 (27000)
	When instantaneous stop or instantaneous bi-directional operation is performed	1.55 (8.5)	6.2 (34)	14.0 (77)	24.8 (136)	55.8 (310)	155 (850)	155 (850)	155 (850)
BLE46□□S-3 **BLE46□□S**		22 (120)	95 (520)	220 (1200)	350 (1910)	800 (4400)	2200 (12000)	6200 (34000)	12000 (66000)
	When instantaneous stop or instantaneous bi-directional operation is performed	5.5 (30)	22 (120)	49.5 (270)	88 (480)	198 (1080)	550 (3000)	550 (3000)	550 (3000)
BLE512□□S-3 **BLE512□□S**		45 (250)	190 (1040)	420 (2300)	700 (3800)	1600 (8800)	4500 (25000)	12000 (66000)	25000 (137000)
	When instantaneous stop or instantaneous bi-directional operation is performed	25 (137)	100 (550)	225 (1230)	400 (2200)	900 (4900)	2500 (13700)	2500 (13700)	2500 (13700)

●Combination Type – Hollow Shaft Gearhead

Unit = ×10^{-4}kg·m^2 (oz-in^2)

Model	Gear Ratio	**5**	**10**	**15**	**20**	**30**	**50**	**100**	**200**
BLE23□□F-3 **BLE23□□F**		12 (66)	50 (270)	110 (600)	200 (1090)	370 (2000)	920 (5000)	2500 (13700)	5000 (27000)
	When instantaneous stop or instantaneous bi-directional operation is performed	1.55 (8.5)	6.2 (34)	14.0 (77)	24.8 (136)	55.8 (310)	155 (850)	155 (850)	155 (850)
BLE46□□F-3 **BLE46□□F**		22 (120)	95 (520)	220 (1200)	350 (1910)	800 (4400)	2200 (12000)	6200 (34000)	12000 (66000)
	When instantaneous stop or instantaneous bi-directional operation is performed	5.5 (30)	22 (120)	49.5 (270)	88 (480)	198 (1080)	550 (3000)	550 (3000)	550 (3000)
BLE512□□F-3 **BLE512□□F**		45 (250)	190 (1040)	420 (2300)	700 (3800)	1600 (8800)	4500 (25000)	12000 (66000)	25000 (137000)
	When instantaneous stop or instantaneous bi-directional operation is performed	25 (137)	100 (550)	225 (1230)	400 (2200)	900 (4900)	2500 (13700)	2500 (13700)	2500 (13700)

● Enter the power supply voltage **A**, **C** or **S** (**AM**, **CM**, or **SM**: Electromagnetic brake type) in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.

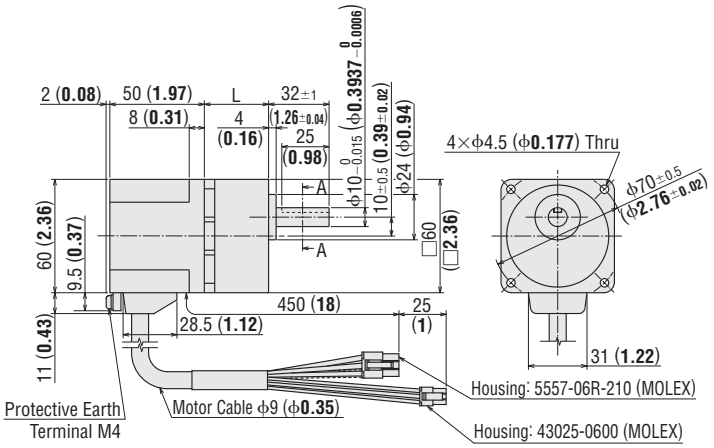
Dimensions Unit = mm (in.)

● Mounting screws are included with the combination type. Dimensions for mounting screws ➜ Page D-242

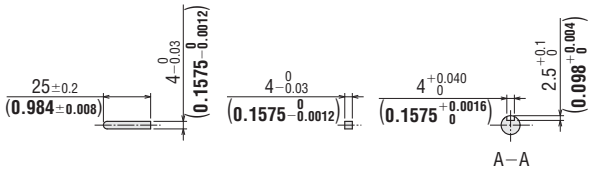
●Standard Type 30 W (1/25 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLE23A□S-3, BLE23A□S BLE23C□S-3, BLE23C□S BLE23S□S-3, BLE23S□S	BLEM23-GFS	GFS2G□	**5～20**	34 (1.34)	1.1 (2.4)	A694A
			30～100	38 (1.50)		A694B
			200	43 (1.69)		A694C



◇Key and Key Slot (Included)



◇Motor/Hollow Shaft Flat Gearhead

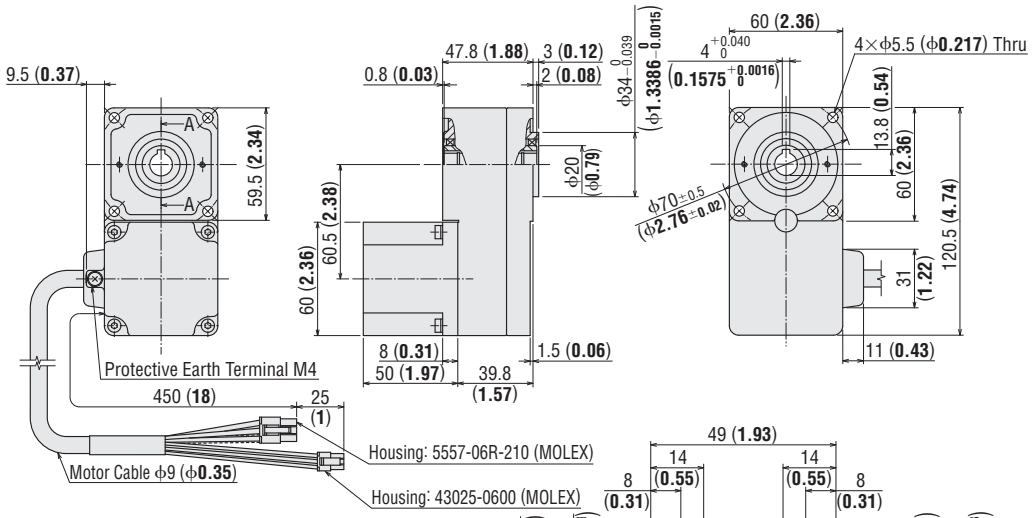
BLE23A□F-3, BLE23A□F, BLE23C□F-3, BLE23C□F, BLE23S□F-3, BLE23S□F

Motor: BLEM23-GFS

Gearhead: GFS2G□FR

Mass: 1.4 kg (3.1 lb.) (Including gearhead)

DXF A695



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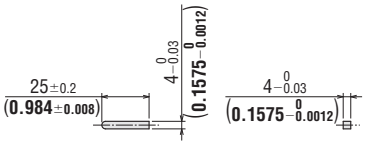
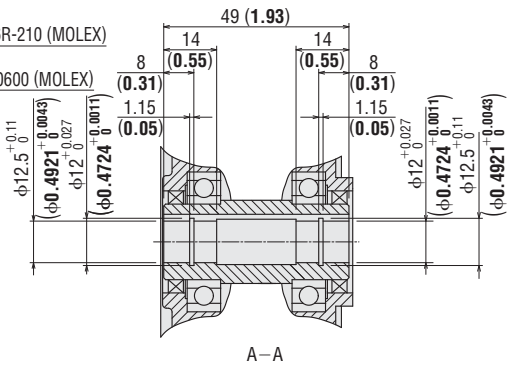




● Enter the gear ratio in the box (□) within the model name.

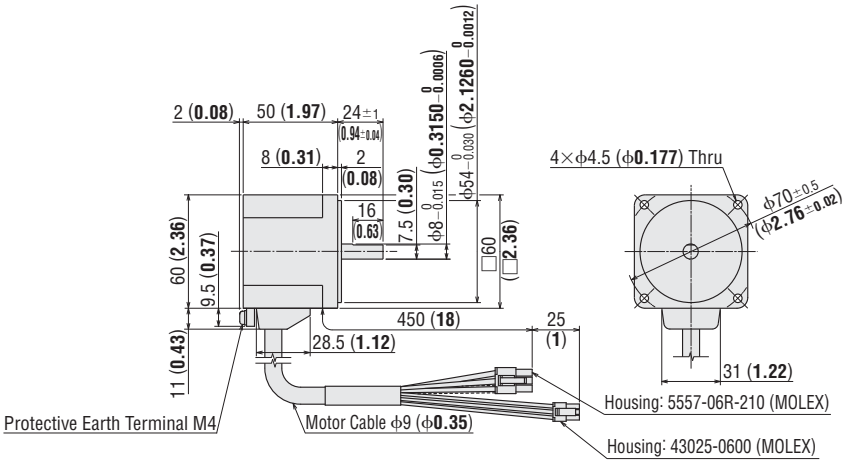
◇Round Shaft Type

BLE23AA-3, **BLE23AA**, **BLE23CA-3**, **BLE23CA**, **BLE23SA-3**, **BLE23SA**

Motor: BLEM23-A

Mass: 0.6 kg (1.32 lb.)

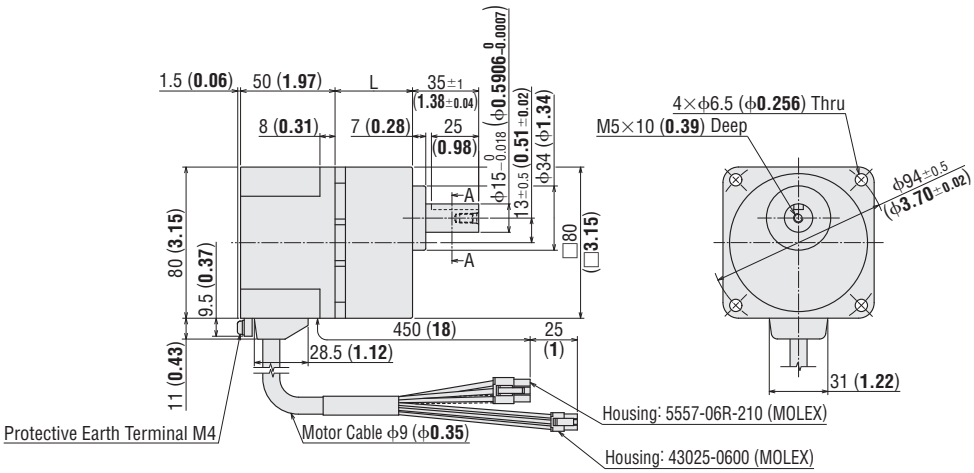
DXF A696



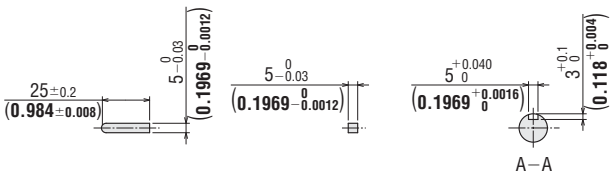
● Standard Type 60 W (1/12 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLE46A□S-3, **BLE46A□S** **BLE46C□S-3**, **BLE46C□S** **BLE46S□S-3**, **BLE46S□S**	BLEM46-GFS	GFS4G□	**5**~**20**	41 (1.61)	1.9 (4.2)	A697A
			30~**100**	46 (1.81)		A697B
			200	51 (2.01)		A697C



◇Key and Key Slot (Included)



● Enter the gear ratio in the box (□) within the model name.

◇Motor/Hollow Shaft Flat Gearhead

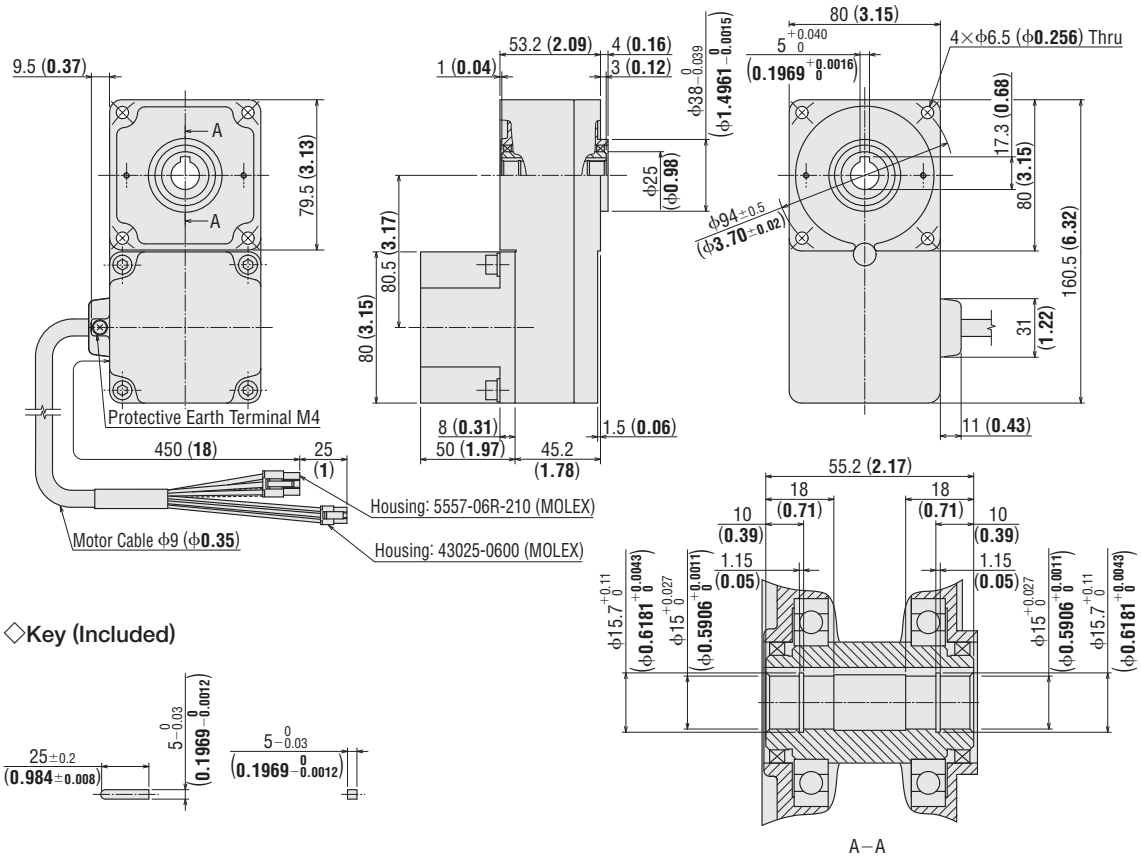
BLE46A□F-3, **BLE46A□F**, **BLE46C□F-3**, **BLE46C□F**, **BLE46S□F-3**, **BLE46S□F**

Motor: BLEM46-GFS

Gearhead: GFS4G□FR

Mass: 2.5 kg (5.5 lb.) (Including gearhead)

DXF A698



◇Key (Included)

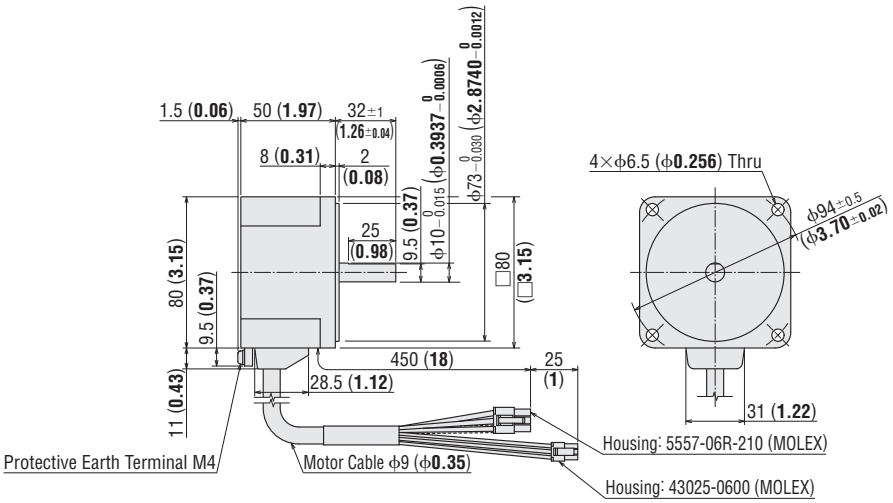
◇Round Shaft Type

BLE46AA-3, **BLE46AA**, **BLE46CA-3**, **BLE46CA**, **BLE46SA-3**, **BLE46SA**

Motor: BLEM46-A

Mass: 0.9 kg (2.0 lb.)

DXF A699

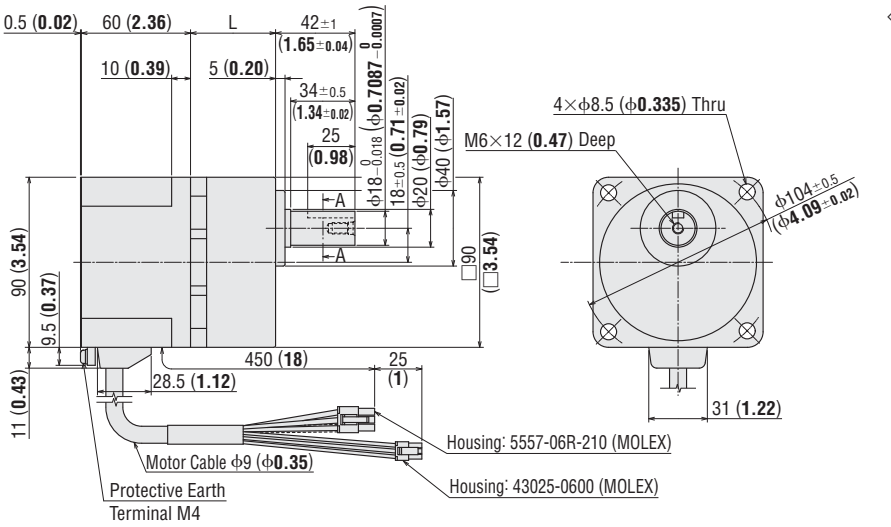


● Enter the gear ratio in the box (□) within the model name.

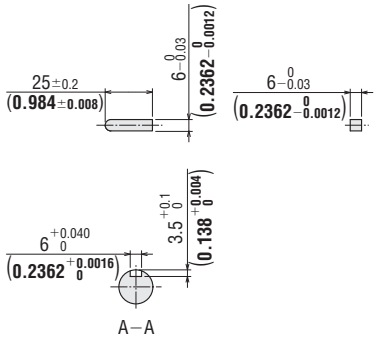
●Standard Type 120 W (1/6 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLE512A□S-3, BLE512A□S	BLEM512-GFS	GFS5G□	**5~20**	45 (1.77)	3.0 (6.6)	A700A
BLE512C□S-3, BLE512C□S			**30~100**	58 (2.28)		A700B
BLE512S□S-3, BLE512S□S			**200**	64 (2.52)		A700C



◇Key and Key Slot (Included)



◇Motor/Hollow Shaft Flat Gearhead

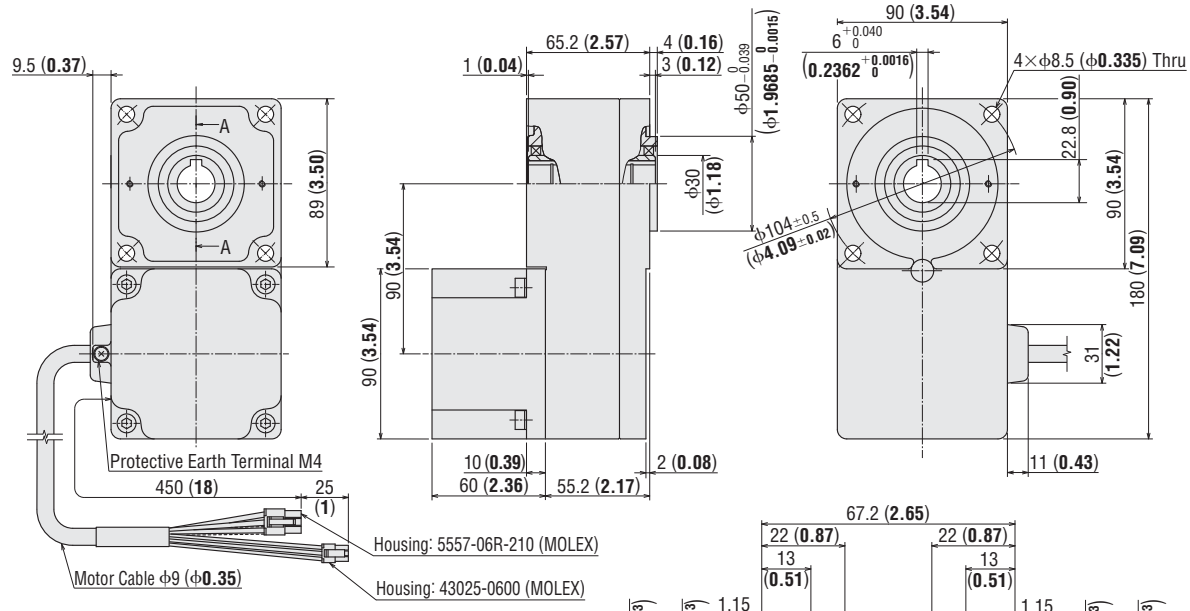
BLE512A□F-3, BLE512A□F, BLE512C□F-3, BLE512C□F, BLE512S□F-3, BLE512S□F

Motor: BLEM512-GFS

Gearhead: GFS5G□FR

Mass: 3.7 kg (8.1 lb.) (Including gearhead)

DXF A701



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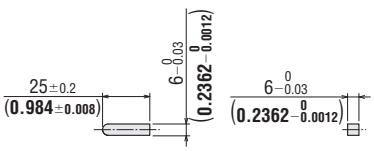
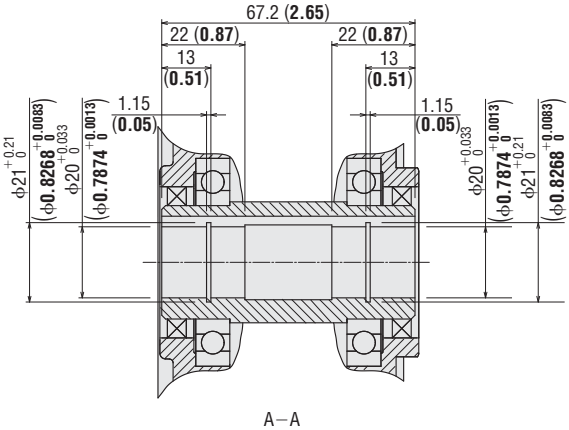




● Enter the gear ratio in the box (□) within the model name.

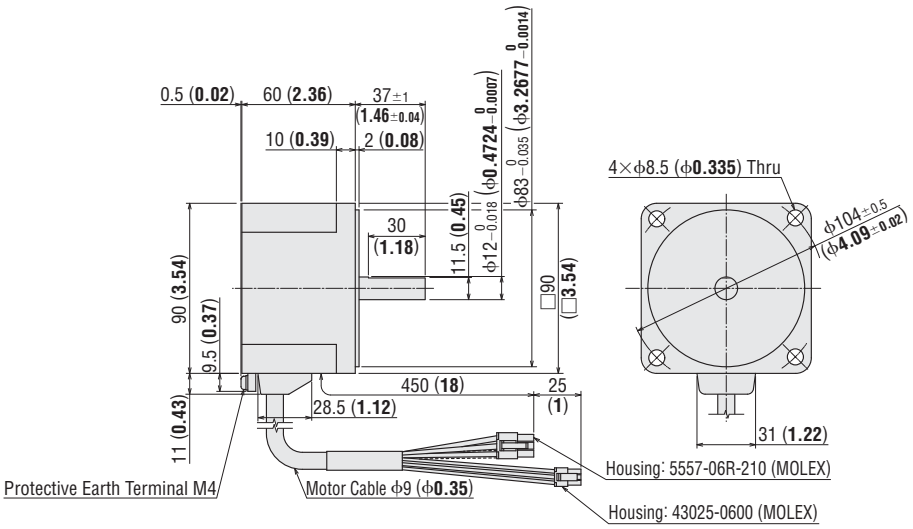
◇Round Shaft Type

BLE512AA-3, **BLE512AA**, **BLE512CA-3**, **BLE512CA**, **BLE512SA-3**, **BLE512SA**

Motor: BLEM512-A

Mass: 1.5 kg (3.3 lb.)

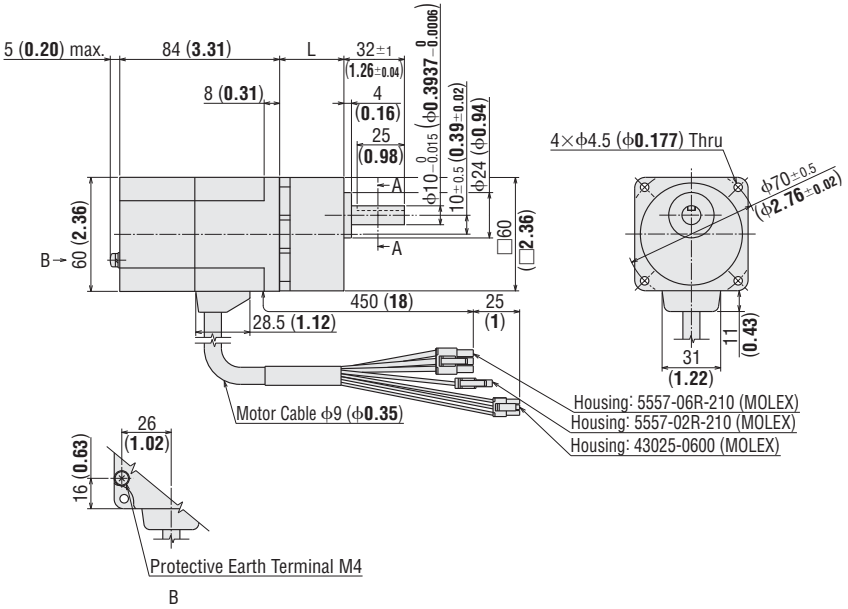
DXF A702



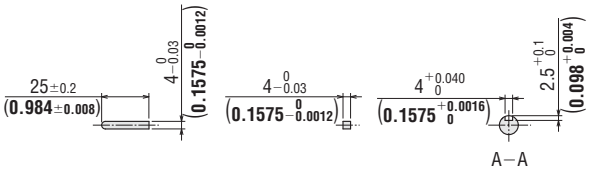
●With Electromagnetic Brake Type 30 W (1/25 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLE23AM□S-3, **BLE23AM□S**	BLEM23M2-GFS	GFS2G□	**5**~**20**	34 (1.34)	1.4 (3.1)	A1132A
BLE23CM□S-3, **BLE23CM□S**			**30**~**100**	38 (1.50)		A1132B
BLE23SM□S-3, **BLE23SM□S**			**200**	43 (1.69)		A1132C



◇Key and Key Slot (Included)

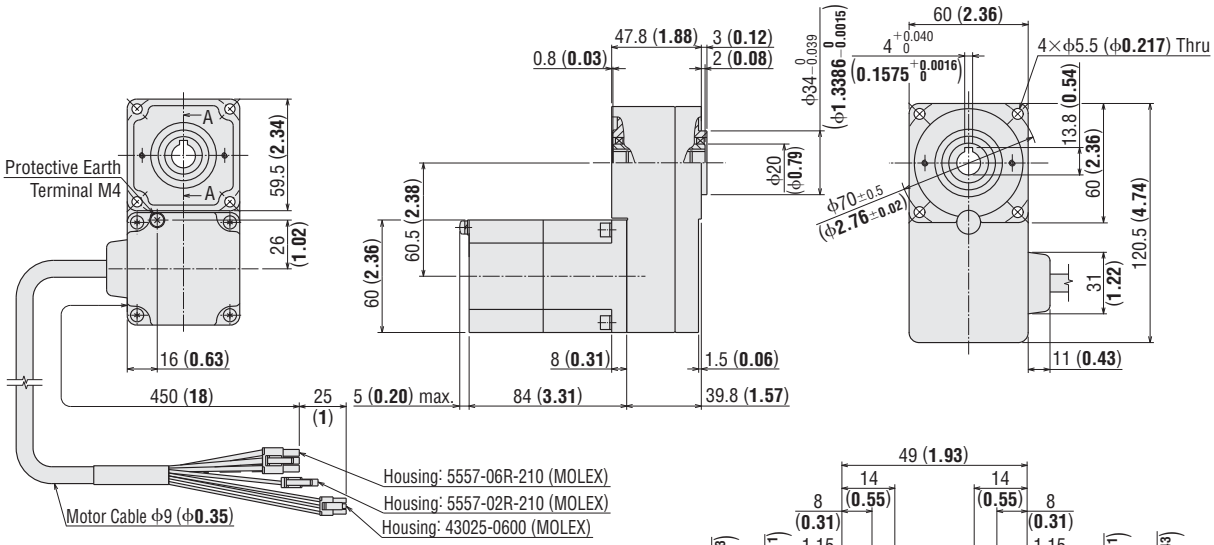


● Enter the gear ratio in the box (□) within the model name.

◇Motor/Hollow Shaft Flat Gearhead

BLE23AM□F-3, BLE23AM□F, BLE23CM□F-3, BLE23CM□F, BLE23SM□F-3, BLE23SM□F

Motor: BLEM23M2-GFS
Gearhead: GFS2G□FR
Mass: 1.7 kg (3.7 lb.) (Including gearhead)
DXF A1133



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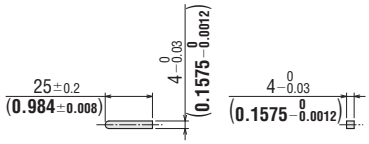
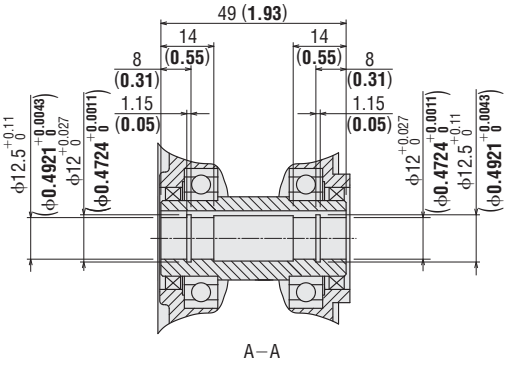
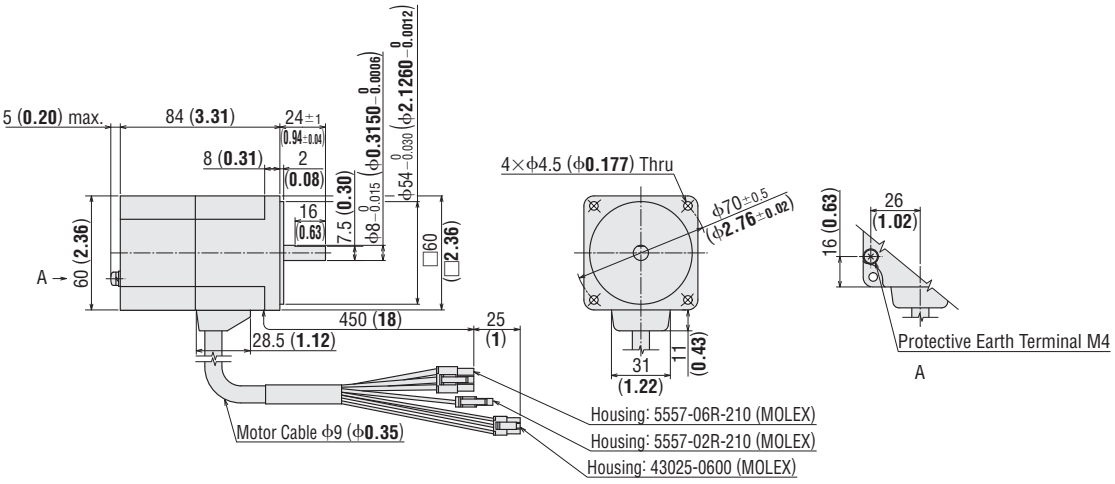




◇Round Shaft Type

BLE23AMA-3, BLE23AMA, BLE23CMA-3, BLE23CMA, BLE23SMA-3, BLE23SMA

Motor: BLEM23M2-A
Mass: 0.9 kg (2.0 lb.)
DXF A1134

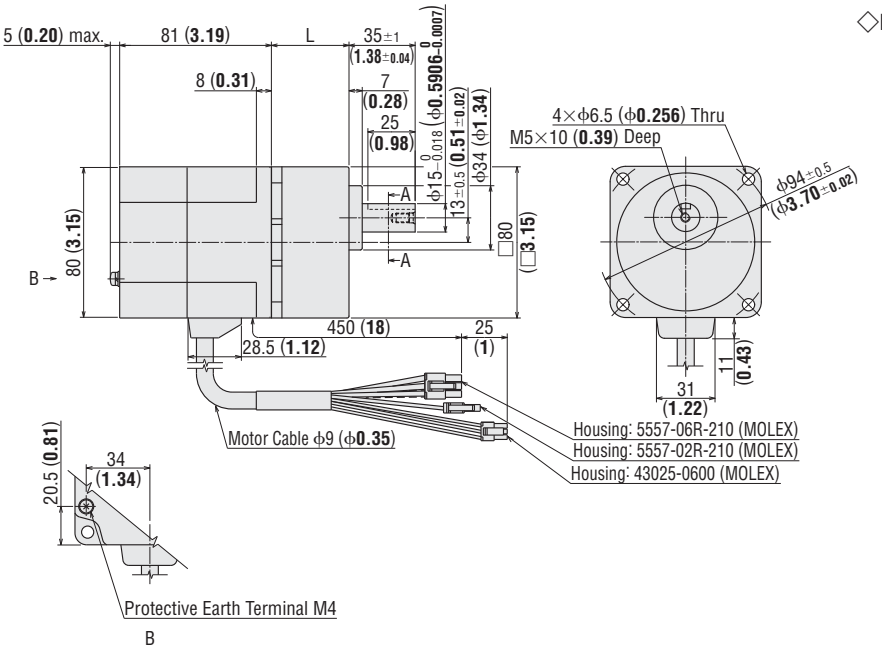


● Enter the gear ratio in the box (□) within the model name.

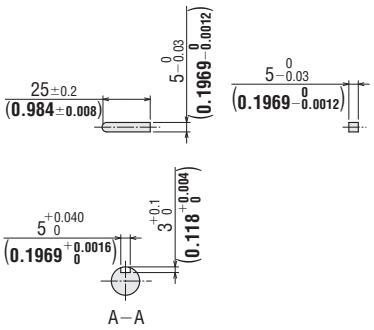
●With Electromagnetic Brake Type 60 W (1/12 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLE46AM□S-3, BLE46AM□S **BLE46CM□S-3, BLE46CM□S** **BLE46SM□S-3, BLE46SM□S**	BLEM46M2-GFS	GFS4G□	**5~20**	41 (1.61)	2.5 (5.5)	A1135A
			30~100	46 (1.81)		A1135B
			200	51 (2.01)		A1135C



◇Key and Key Slot (Included)



◇Motor/Hollow Shaft Flat Gearhead

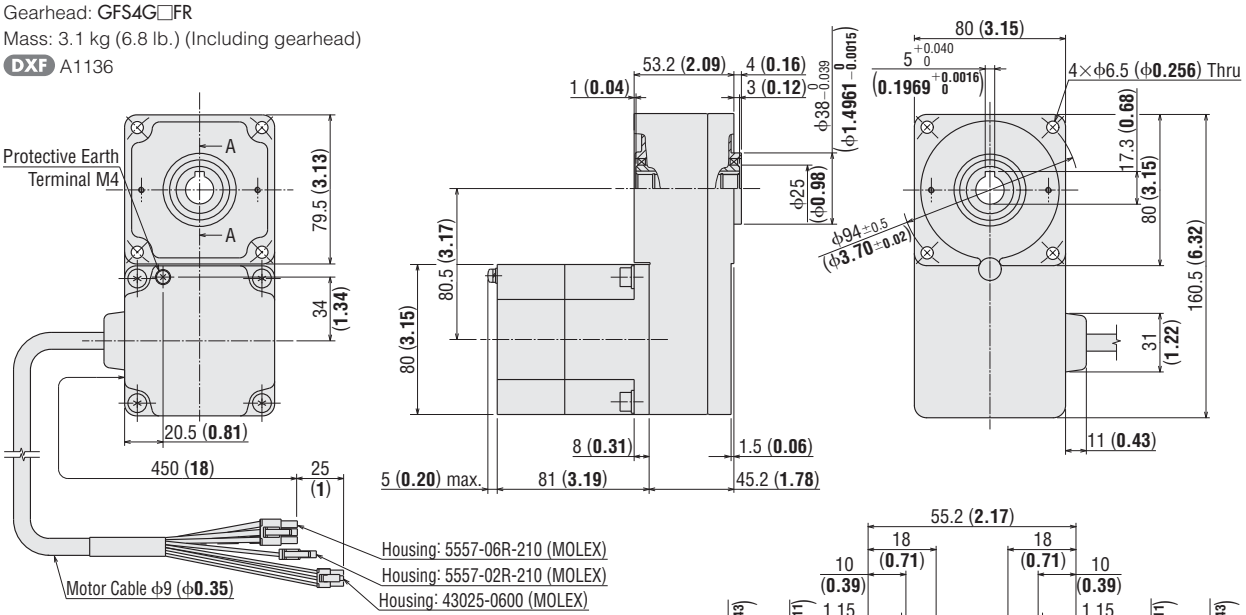
BLE46AM□F-3, BLE46AM□F, BLE46CM□F-3, BLE46CM□F, BLE46SM□F-3, BLE46SM□F

Motor: BLEM46M2-GFS

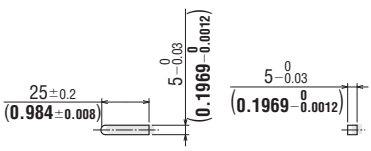
Gearhead: GFS4G□FR

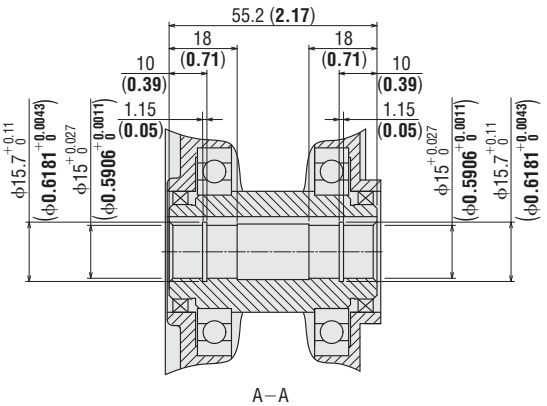
Mass: 3.1 kg (6.8 lb.) (Including gearhead)

DXF A1136



◇Key (Included)





● Enter the gear ratio in the box (□) within the model name.

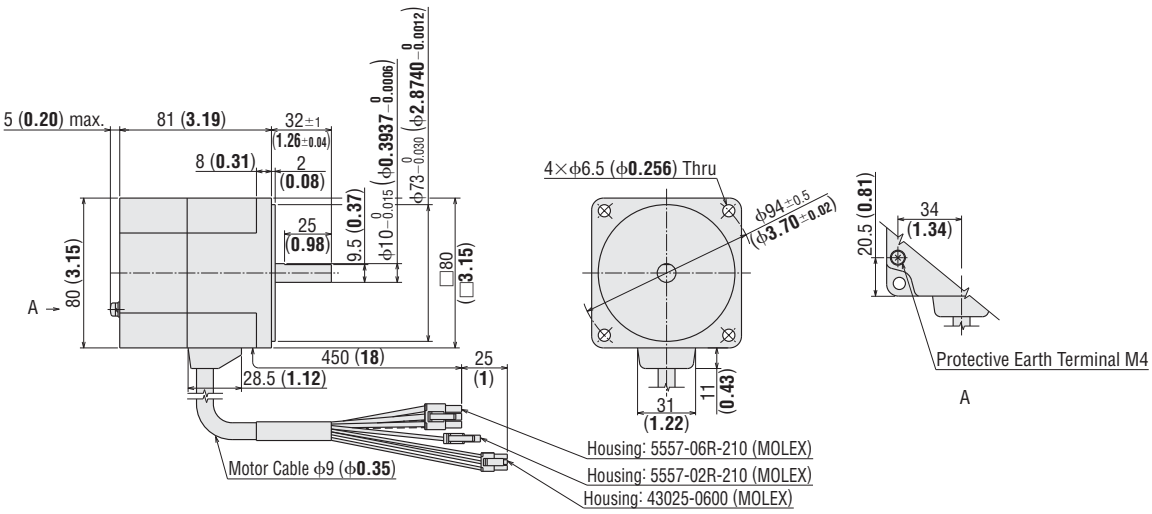
◇Round Shaft Type

BLE46AMA-3, **BLE46AMA**, **BLE46CMA-3**, **BLE46CMA**, **BLE46SMA-3**, **BLE46SMA**

Motor: BLEM46M2-A

Mass: 1.5 kg (3.3 lb.)

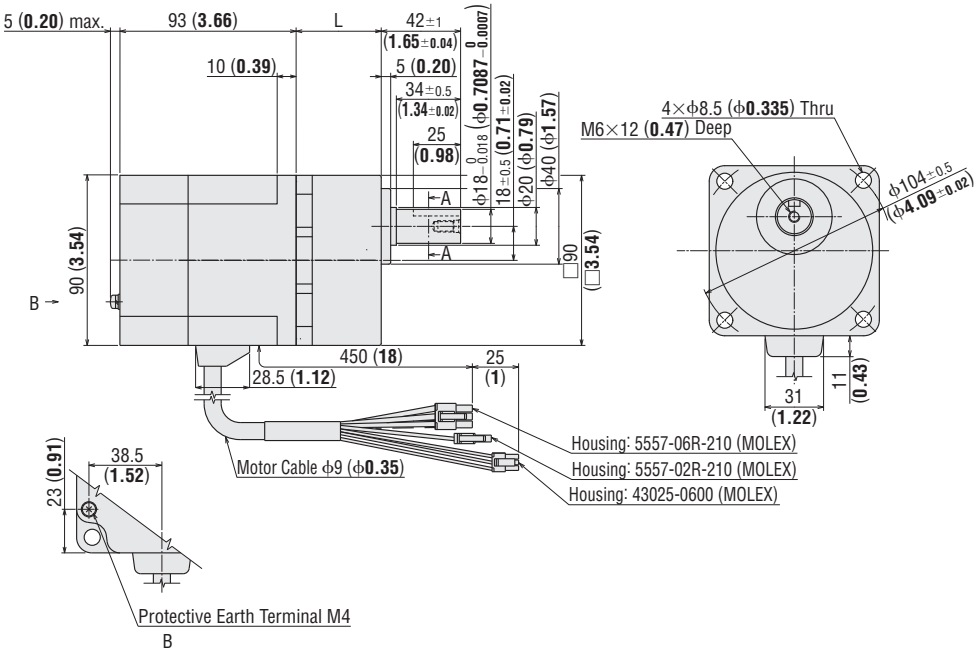
DXF A1137



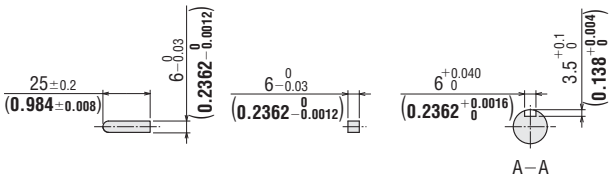
●With Electromagnetic Brake Type 120 W (1/6 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLE512AM□S-3, **BLE512AM□S**	BLEM512M2-GFS	GFS5G□	**5~20**	45 (1.77)	3.6 (7.9)	A1093A
BLE512CM□S-3, **BLE512CM□S**			**30~100**	58 (2.28)		A1093B
BLE512SM□S-3, **BLE512SM□S**			**200**	64 (2.52)		A1093C



◇Key and Key Slot (Included)



● Enter the gear ratio in the box (□) within the model name.

◇Motor/Hollow Shaft Flat Gearhead

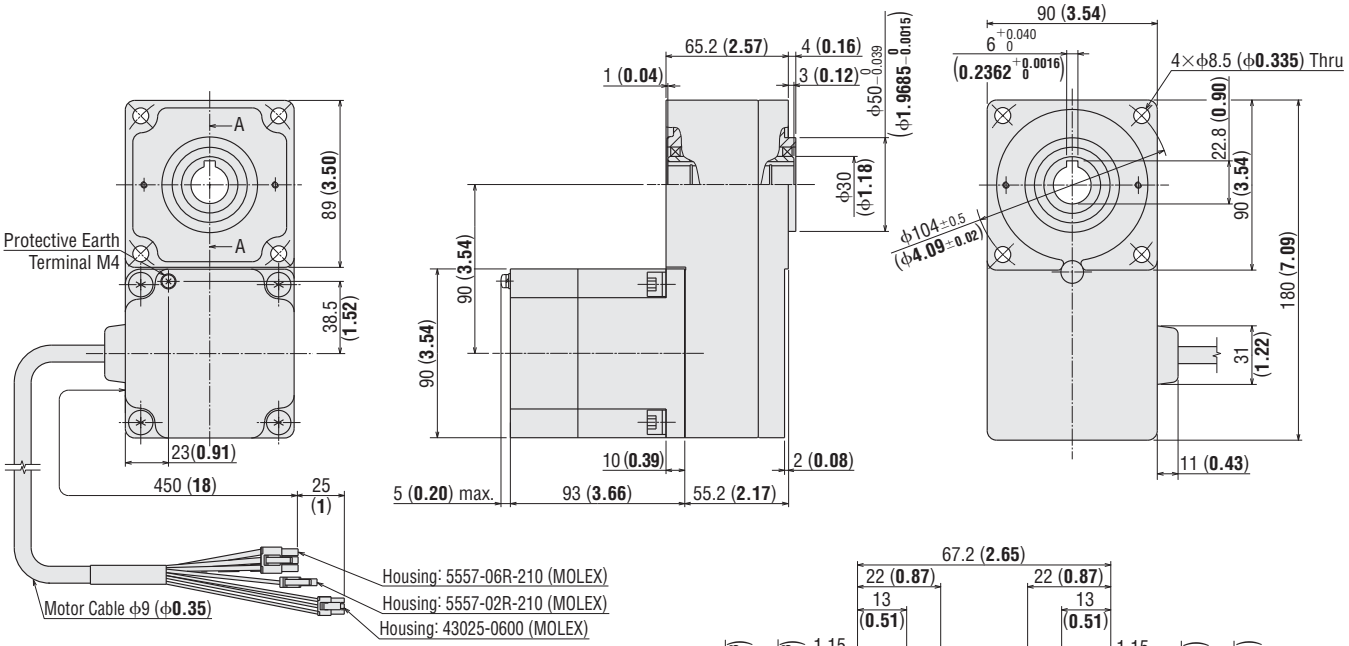
BLE512AM□F-3, BLE512AM□F, BLE512CM□F-3, BLE512CM□F, BLE512SM□F-3, BLE512SM□F

Motor: BLEM512M2-GFS

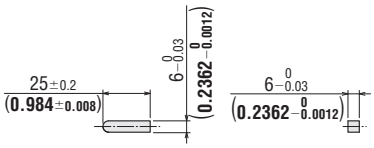
Gearhead: GFS5G□FR

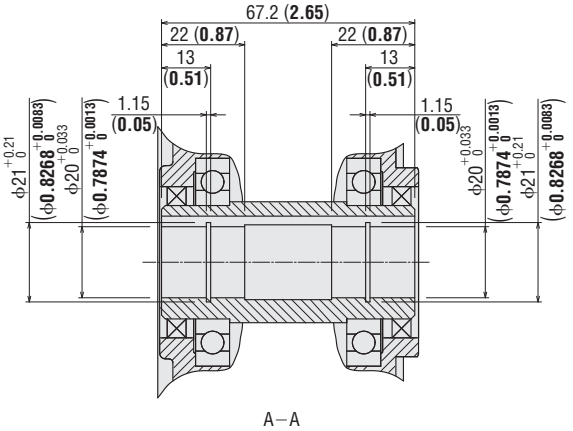
Mass: 4.3 kg (9.5 lb.) (Including gearhead)

DXF A1096



◇Key (Included)





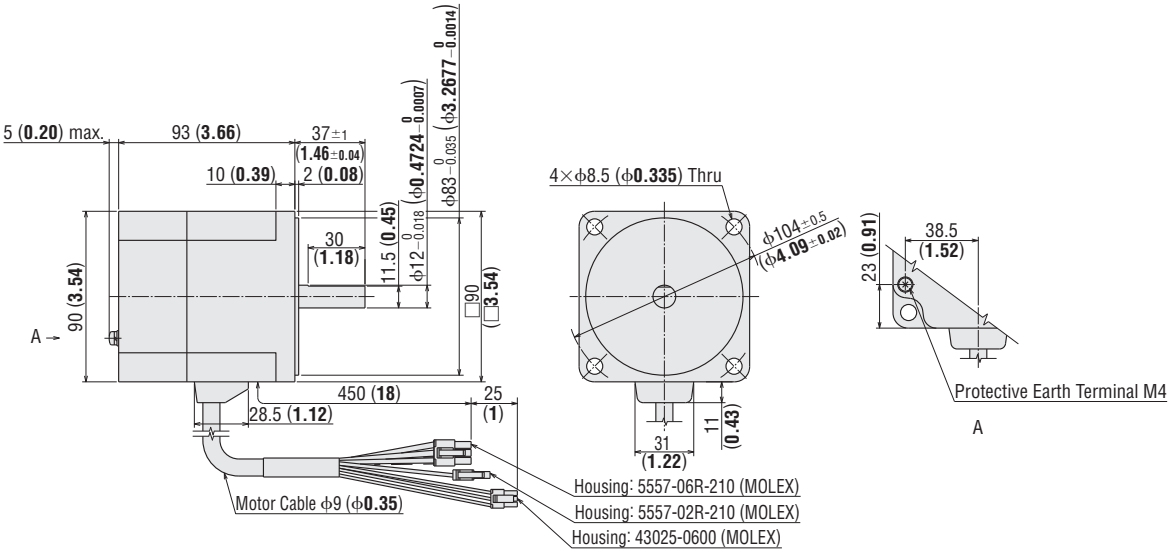
◇Round Shaft Type

BLE512AMA-3, BLE512AMA, BLE512CMA-3, BLE512CMA, BLE512SMA-3, BLE512SMA

Motor: BLEM512M2-A

Mass: 2.1 kg (4.6 lb.)

DXF A1099



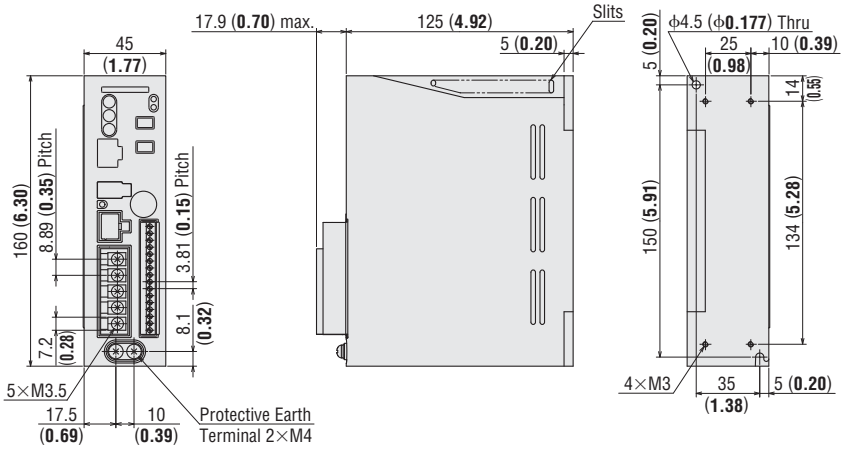
● Enter the gear ratio in the box (□) within the model name.

Driver

BLED3A, BLED3C, BLED3S, BLED6A, BLED6C, BLED6S, BLED12A, BLED12C, BLED12S
BLED3AM, BLED3CM, BLED3SM, BLED6AM, BLED6CM, BLED6SM
BLED12AM, BLED12CM, BLED12SM

Mass: 0.7 kg (1.54 lb.)

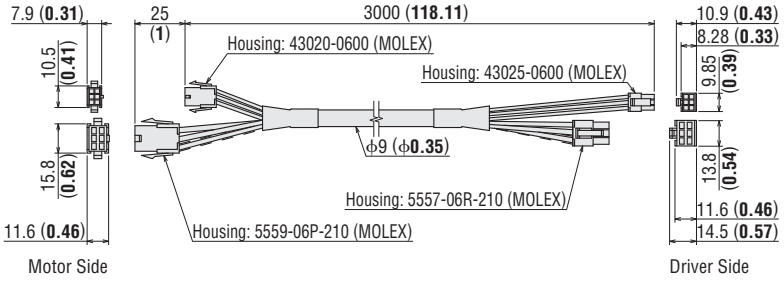
DXF A916



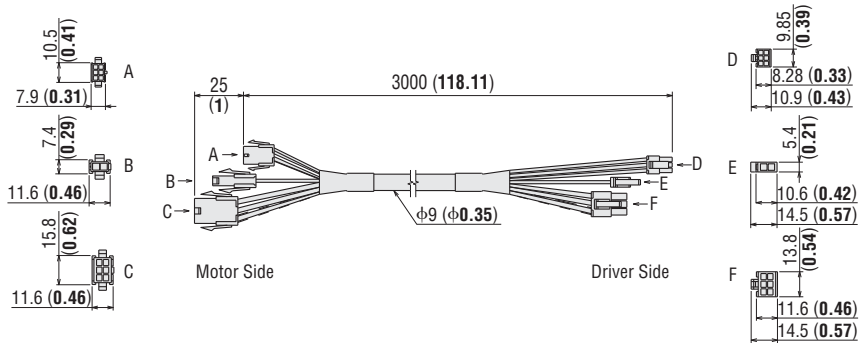
Connection Cable (Included)

● Only included in connection cable unit models. Refer to Product Number Code on page D-87.

◇For Standard Motors

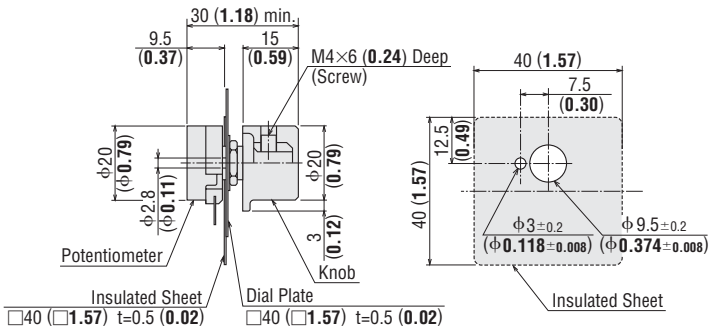


◇For Electromagnetic Brake Motors



Code	Housing Model	Manufacturer
A	43020-0600	MOLEX
B	5559-02P-210	
C	5559-06P-210	
D	43025-0600	
E	5557-02R-210	
F	5557-06R-210	

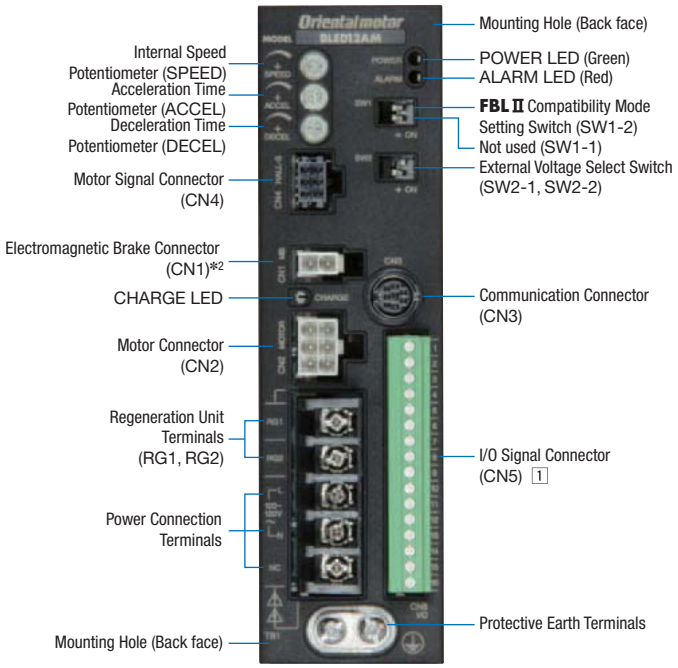
External Speed Potentiometer (Included)



Recommended thickness of a mounting plate is a maximum of 4.5 mm (**0.18** in.).

Connection and Operation

Names and Functions of Driver Parts



Name	Description
Internal Speed Potentiometer [SPEED]	Sets the motor speed
Acceleration Time Potentiometer [ACCEL]	Sets the acceleration time at starting of motor
Deceleration Time Potentiometer [DECEL]	Sets the deceleration time at stopping of motor
POWER LED (Green)	Lights when main power supply is on
ALARM LED (Red)	Blinks when protective functions are activated
Motor Signal Connector (CN4)	Connects the signal cable connector
FBL II Compatibility Mode Setting Switch (SW1)*1	SW1-1: Not used SW1-2: Sets the **FBL II** compatibility mode
External Voltage Select Switch (SW2)	SW2-1: Switches power supply for input signal Selects either external power supply or driver built-in power supply
	SW2-2: Switches according to external DC voltage select either 5 VDC or 10 VDC.
Electromagnetic Brake Connector (CN1)*2	The electromagnetic brake connector of the motor cable or connection cable is connected
CHARGE LED (Red)	Lights when main power supply is on Turns off after main power supply is turned off and internal residual voltage is reduced to a stable level
Motor Connector (CN2)	Connects the cable motor connector
Regeneration Unit Connection Terminal (TB1) [RG1, RG2]	Connects the accessory regeneration unit **EPRC-400P** (sold separately)
Main Power Supply Input Terminal (TB1) [L, N] (Single-Phase Input) [L1, L2, L3] (Three-Phase Input)	Connects the main power supply ● Single-Phase 100-120 VAC: Connects single-phase 100-120 VAC to L, N ● Single-Phase 200-240 VAC: Connects single-phase 200-240 VAC to L, N ● Three-Phase 200-240 VAC: Connects three-phase 200-240 VAC to L1, L2, L3
Communication Connector (CN3)	The control module **OPX-2A** or data setting software **MEXE02** is connected
I/O Signal Connector (CN5)	Connects when external I/O signals are used
Protective Earth Terminal	Grounds with AWG18~14 (0.75~2.0 mm^2) grounding conductor

*1 Settings can be changed to the same as the **FBL II** Series using the **FBL II** compatibility mode.
*2 Only the electromagnetic brake type is connected.

1 I/O Signals

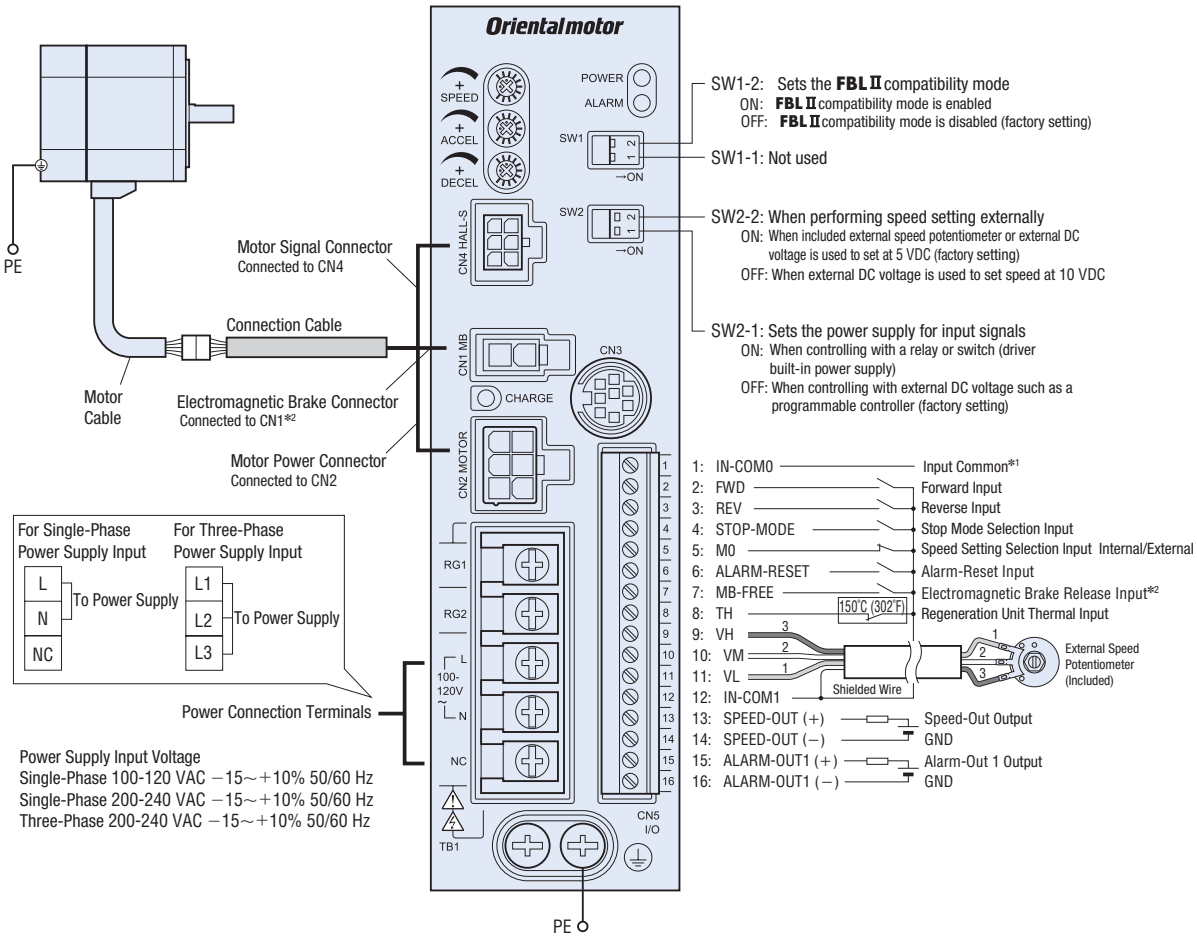
CN5 Terminal Number	Signal Type	Terminal Name	Signal Name*2	Name	Description
1	Input	C0	IN-COM0	Input Signal Common	–
2		X0	FWD	Forward Input	The motor rotates in the clockwise direction.
3		X1	REV	Reverse Input	The motor rotates in the counterclockwise direction.
4		X2	STOP-MODE	Stop Mode Selection Input	Instantaneous stop or deceleration stop is selected.
5		X3	M0	Speed Setting Selection Input	The internal speed potentiometer or external speed potentiometer (external DC voltage) is selected.
6		X4	ALARM-RESET	Alarm Reset Input	Alarms are reset.
7		X5	MB-FREE	Electromagnetic Brake Release Input	The electromagnetic brake operation is selected when the motor is stopped. Not used with the standard type.
8		X6	TH	Regeneration Unit Thermal Input	The thermostat output of a regeneration unit is connected when using the regeneration unit (normally closed).
9		VH	VH	External Speed Setting Input	Speed is set with an external speed potentiometer (external DC voltage).
10		VM	VM		
11		VL	VL		
12		C1	IN-COM1	Input Common (0 V)	–
–		–	M1*1	Speed Setting Input	For multi-speed operation, the M0, M1, and M2 signals are used in combination.
–		–	M2*1		
–		–	EXT-ERROR*1	External Error Input	When an external error signal is input, the motor stops.
13	Output	Y0+	SPEED-OUT (+)	Speed Output	30 pulses are output per each rotation of the motor output shaft. (12 pulses are output if the **FBLII** compatibility mode is used.)
14		Y0–	SPEED-OUT (–)		
15		Y1+	ALARM-OUT1 (+)	Alarm Output 1	This signal is output when an alarm is generated (normally closed). (Normally open if the **FBLII** compatibility mode is used.)
16		Y1–	ALARM-OUT1 (–)		
–		–	MOVE*1	Motor Running Output	This signal is output during motor rotation.
–		–	VA*1	Speed Attainment Output	This signal is output if the motor speed reaches a speed within the speed attainment range that has been set.
–		–	ALARM-OUT2*1	Alarm Output 2	This signal is output when the overload warning level is exceed when the overload warning function is set to enable. In addition, also outputs if an overload alarm is generated even when the overload warning function is set to disable (normally closed).
–		–	WNG*1	Warning Output	This signal is output if a warning is generated (overload warning function is activated). While, it turns OFF if the warning is released.
–		–	TLC*1	Torque Limit Output	This signal is output when the motor output torque reaches the torque limiting value.

*1 The control module (sold separately) may be used to extend the functions.

*2 The control module (sold separately) may be used to assign the required signals out of the seven input terminals (X0 to X6) and the two output signal terminals (Y0 and Y1).
7 types for the 10 types of input signals (FWD/REV/STOP-MODE/M0/ALARM-RESET/MB-FREE/TH/M1/M2/EXT-ERROR)
2 types for the 7 types of output signals (SPEED-OUT/ALARM-OUT1/MOVE/VA/ALARM-OUT2/WNG/TLC)

●Connection Diagram

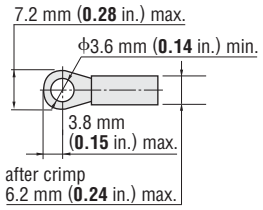
The figure shows a connection example for when a single-phase 100-120 VAC internal power supply and an external speed potentiometer are used to set speed.



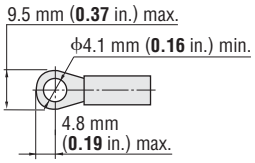
*1 When a built-in power supply is used, connection is not necessary.
*2 Only the electromagnetic brake type is connected.

◇Applicable Crimp Terminals

• Power Supply Connection Terminals (M3.5): Round Terminal with Insulation



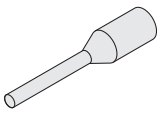
• Protective Earth Terminals (M4): Round Terminal with Insulation



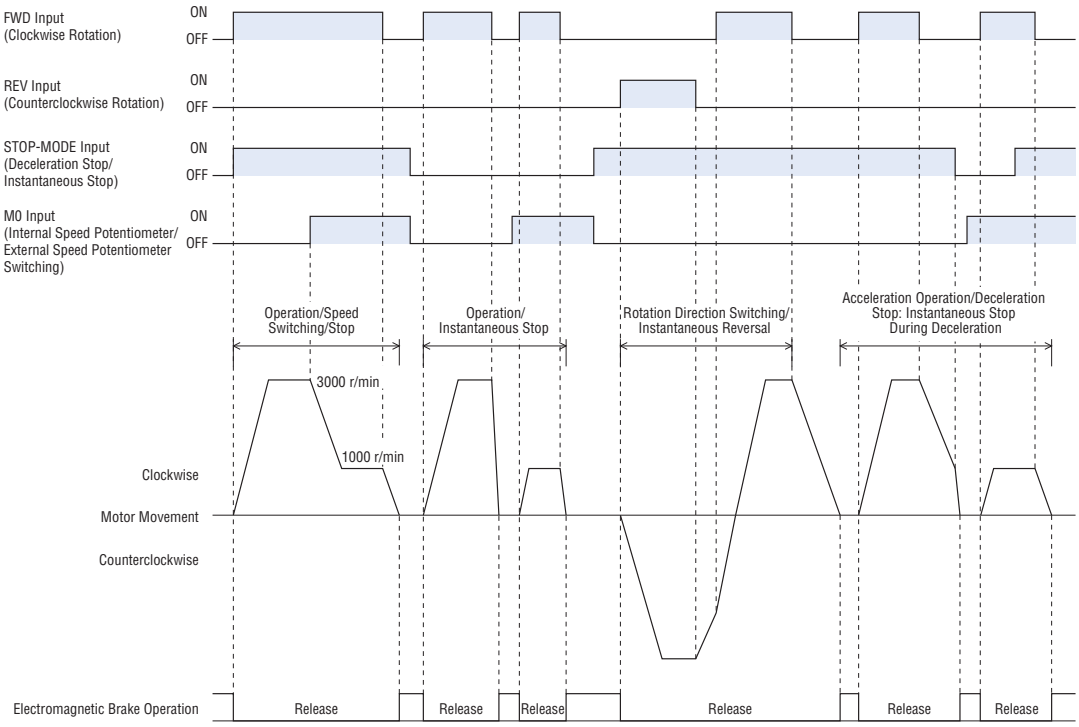
• I/O Terminals

Use the terminals specified below for connection using crimp terminals. Please note that the applicable crimp terminal will vary depending on the size of the wire. The following terminals can be used with wires of AWG24 to 20 in size.

[Manufacturer: PHOENIX CONTACT Inc.]
AI 0.25-6 Applicable Cable Size: AWG24 (0.2 mm^2)
AI 0.34-6 Applicable Cable Size: AWG22 (0.3 mm^2)
AI 0.5-6 Applicable Cable Size: AWG20 (0.5 mm^2)



●Timing Chart



- FWD input, REV input and STOP-MODE input can be used to control all operations, such as run, stop, rotation direction switching, deceleration stop and instantaneous stop.
- Switching the FWD input to ON will cause the motor to turn clockwise as viewed from the motor shaft, while switching the REV input to ON will cause the motor to turn counterclockwise. Switching each signal OFF will stop the motor. If both the FWD input and REV input are turned ON simultaneously, the motor will stop instantaneously. The starting time is the time set by the acceleration time potentiometer (ACCEL).
- If STOP-MODE input is turned ON, the motor comes to deceleration stop over the time set by the deceleration time potentiometer (DECEL). Switching the STOP-MODE input to OFF will cause the motor to stop instantaneously.
- For electromagnetic brake types, the brakes operate at the same time the motor comes to a standstill.

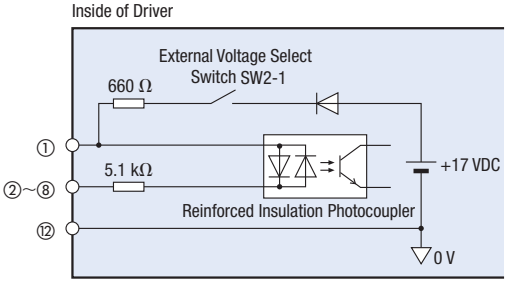
●Input/Output Signal Circuits

Select sink logic or source logic according to the external control device you will be using.

◇Input Circuit

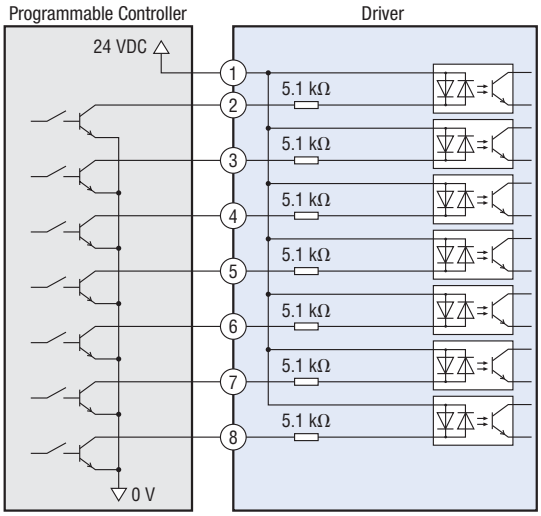
FWD/REV/STOP-MODE/M0/ALARM-RESET/MB-FREE/TH (M1*/M2*/EXT-ERROR*)

* Asterisked items indicate control module (sold separatly) use

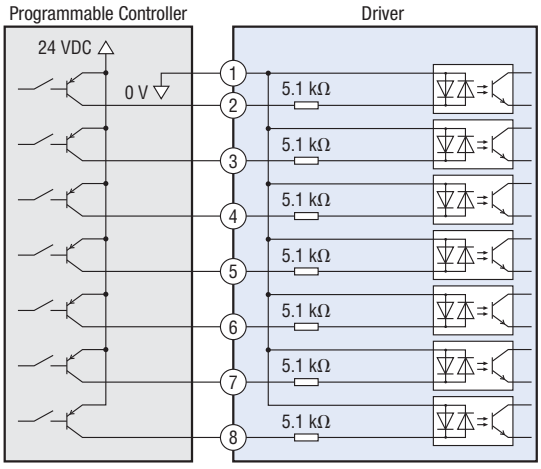


◇Connection to Programmable Controller

• Sink Logic



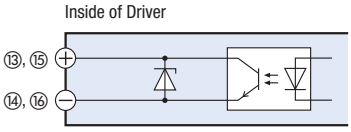
• Source Logic



◇Output Circuit

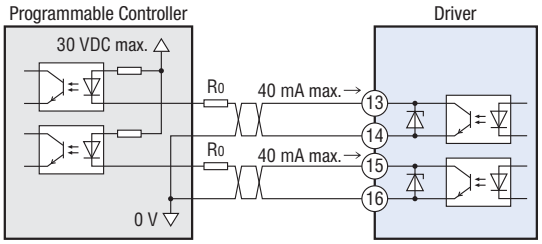
SPEED-OUT/ALARM-OUT1/(MOVE*/VA*/ALARM-OUT2*/WNG*/TLC*)

* Asterisked items indicate control module (sold separatly) use

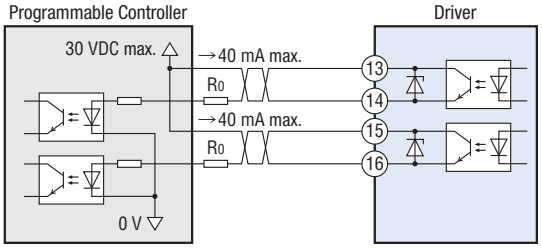


◇Programmable Controller Connection Examples

• Sink Logic



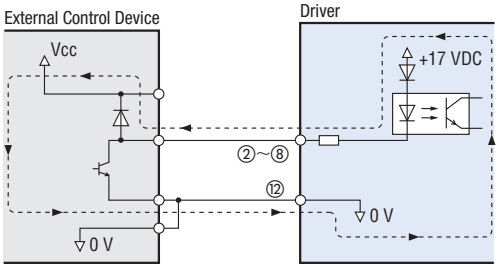
• Source Logic



◇When an External Control Device with a Built-In Clamp Diode is Used

When an external control device with a built-in clamp diode is used, if the power is being supplied to the driver, current may flow and cause the motor to run, even if the power supply of the external control device is off. When the power supply is turned ON or OFF simultaneously, the motor may run temporarily due to differences in power supply capacity. The external control device power supply must be turned ON first, and driver power supply must be turned OFF first.

• Example of Sink Logic

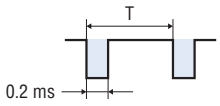


◇Speed Output (SPEED-OUT)

Pulse signals of 30 pulses (Pulse Width: 0.2 ms) are output per each rotation of the motor output shaft in synchronization with the motor operation.
You can measure the speed output frequency and calculate the motor speed.

$$\text{Speed Output Frequency (Hz)} = \frac{1}{T}$$

$$\text{Motor Shaft Speed (r/min)} = \frac{\text{Speed Output Frequency}}{30} \times 60$$



- To display or monitor the speed of the output shaft of the motor and gearhead, use the accessory **SDM496** motor speed indicator (sold separately).
Motor speed indicator ➜ Page D-234

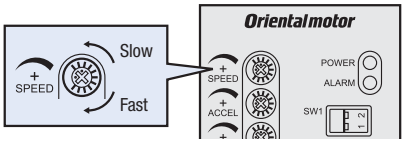
◇Alarm Output 1 (ALARM-OUT 1)

When any of the driver's protective functions is activated, alarm output turns OFF and the alarm LED will blink. The motor will coast to a stop.

●Speed Setting Methods

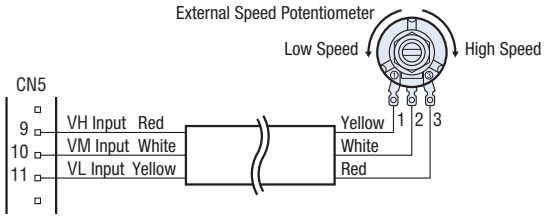
◇Set Speeds Using the Internal Speed Potentiometer

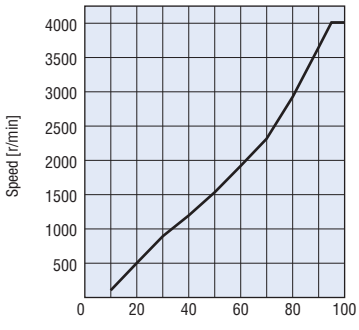
When setting is performed with the internal speed potentiometer, set the M0 input to OFF.



◇Set Speeds Using an External Speed Potentiometer

Connect the included external speed potentiometer to the I/O signal connector (CN5).
For connection, use the included signal line [1 m (3.3 ft.)].
When setting is performed with the external speed potentiometer, set the M0 input to ON.





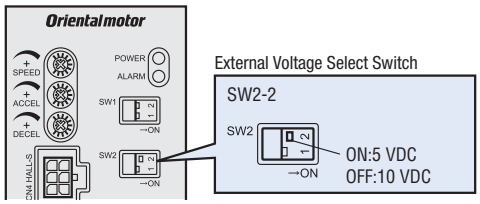
External Speed Potentiometer Scale – Speed Characteristics (Representative values)

Note

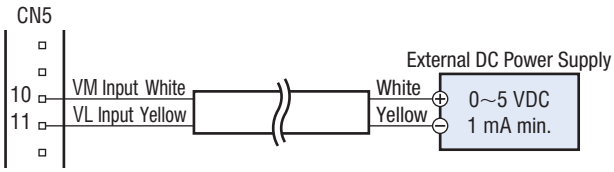
- The speed in the graph represents the speed of a motor alone. The gearhead output shaft speed of the combination type is calculated by dividing the graph speed by the gear ratio.

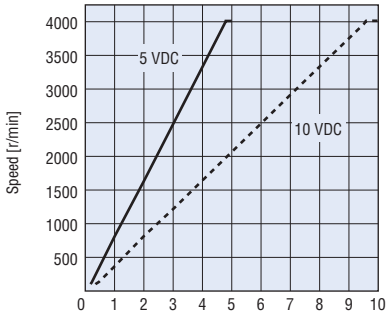
◇Set Speeds Using External DC Voltage

Set the external voltage select switch on the driver in accordance with the external DC voltage to be supplied. Switch it to 5 VDC or 10 VDC.



Use external DC voltage and connect to the I/O signal connector (CN5) using the included signal line [1 m (3.3 ft.)].
When setting is performed with the external DC voltage, set the M0 input to ON.





External DC Voltage – Speed Characteristics (Representative values)

Note

- The speed in the graph represents the speed of a motor alone. The gearhead output shaft speed of the combination type is calculated by dividing the graph speed by the gear ratio.

●Multi-Motor Control

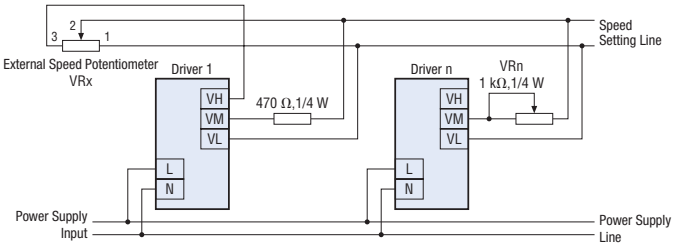
When you want to operate two or more sets of motors and drivers at the same speed by using a single speed potentiometer, you need to use an external speed potentiometer or external DC voltage.
The figure below shows an example of the single-phase power supply specification. For three-phase power supply specification, change the power supply line to three-phase power supply. The motor and operation control unit are not illustrated in the figure.

◇When Using an External Speed Potentiometer

Connect all drivers using a common power supply line and common speed control line, as shown in the figure, and set a speed using the external speed potentiometer VRx.
The resistance value of the external speed potentiometer is determined using the formula below.

Resistance value when the number of drivers is n:
VRx = 20/n (kΩ), n/4 (W)
Example: When two drivers are connected
VRx = 20/2 = 10 (kΩ), 2/4 = 1/2 (W)
Resistance is 10 kΩ, 1/2 W

To adjust the speed difference among the motors, connect a resistor of 470 Ω, 1/4 W to the VM terminal on the first driver and connect a potentiometer of 1 kΩ, 1/4 W (VRn) to the VM terminal on each of the remaining drivers.
Twenty motors or less can be operated in parallel using an external speed potentiometer.

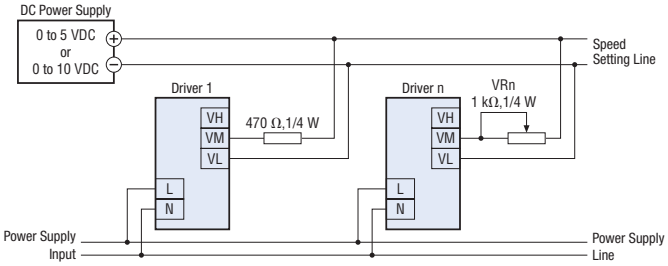


◇When Using an External DC Voltage

Connect all drivers using a common power supply line and common speed control line, as shown in the figure, and connect a 5 VDC or 10 VDC power supply.
The power supply capacity of the external DC power supply is determined as follows:

Power supply capacity when the number of drivers is n: I=1×n (mA)
Example: When two drivers are connected
I = 1 × 2 = 2 (mA)
Power supply capacity is 2 mA or more

To adjust the speed difference among the motors, connect a resistor of 470 Ω, 1/4 W to the VM terminal on the first driver, and connect a potentiometer of 1 kΩ, 1/4 W (VRn) to the VM terminal on each of the remaining drivers.



List of Motor and Driver Combinations

●Standard Type

◇Combination Type – Parallel Shaft Gearhead

The combination type comes with the motor and parallel shaft gearhead pre-assembled.

Output Power	Model	Motor Model	Gearhead Model	Driver Model
30 W (1/25 HP)	**BLE23A□S-3** **BLE23A□S**	BLEM23-GFS	GFS2G□	BLED3A
	BLE23C□S-3 **BLE23C□S**			BLED3C
	BLE23S□S-3 **BLE23S□S**			BLED3S
60 W (1/12 HP)	**BLE46A□S-3** **BLE46A□S**	BLEM46-GFS	GFS4G□	BLED6A
	BLE46C□S-3 **BLE46C□S**			BLED6C
	BLE46S□S-3 **BLE46S□S**			BLED6S
120 W (1/6 HP)	**BLE512A□S-3** **BLE512A□S**	BLEM512-GFS	GFS5G□	BLED12A
	BLE512C□S-3 **BLE512C□S**			BLED12C
	BLE512S□S-3 **BLE512S□S**			BLED12S

◇Combination Type – Hollow Shaft Flat Gearhead

The combination type comes with the motor and hollow shaft flat gearhead pre-assembled.

Output Power	Model	Motor Model	Gearhead Model	Driver Model
30 W (1/25 HP)	**BLE23A□F-3** **BLE23A□F**	BLEM23-GFS	GFS2G□FR	BLED3A
	BLE23C□F-3 **BLE23C□F**			BLED3C
	BLE23S□F-3 **BLE23S□F**			BLED3S
60 W (1/12 HP)	**BLE46A□F-3** **BLE46A□F**	BLEM46-GFS	GFS4G□FR	BLED6A
	BLE46C□F-3 **BLE46C□F**			BLED6C
	BLE46S□F-3 **BLE46S□F**			BLED6S
120 W (1/6 HP)	**BLE512A□F-3** **BLE512A□F**	BLEM512-GFS	GFS5G□FR	BLED12A
	BLE512C□F-3 **BLE512C□F**			BLED12C
	BLE512S□F-3 **BLE512S□F**			BLED12S

◇Round Shaft Type

Output Power	Model	Motor Model	Driver Model
30 W (1/25 HP)	**BLE23AA-3** **BLE23AA**	BLEM23-A	BLED3A
	BLE23CA-3 **BLE23CA**		BLED3C
	BLE23SA-3 **BLE23SA**		BLED3S
60 W (1/12 HP)	**BLE46AA-3** **BLE46AA**	BLEM46-A	BLED6A
	BLE46CA-3 **BLE46CA**		BLED6C
	BLE46SA-3 **BLE46SA**		BLED6S
120 W (1/6 HP)	**BLE512AA-3** **BLE512AA**	BLEM512-A	BLED12A
	BLE512CA-3 **BLE512CA**		BLED12C
	BLE512SA-3 **BLE512SA**		BLED12S

●With Electromagnetic Brake Type

◇Combination Type – Parallel Shaft Gearhead

The combination type comes with the motor and parallel shaft gearhead pre-assembled.

Output Power	Model	Motor Model	Gearhead Model	Driver Model
30 W (1/25 HP)	**BLE23AM□S-3** **BLE23AM□S**	BLEM23M2-GFS	GFS2G□	BLED3AM
	BLE23CM□S-3 **BLE23CM□S**			BLED3CM
	BLE23SM□S-3 **BLE23SM□S**			BLED3SM
60 W (1/12 HP)	**BLE46AM□S-3** **BLE46AM□S**	BLEM46M2-GFS	GFS4G□	BLED6AM
	BLE46CM□S-3 **BLE46CM□S**			BLED6CM
	BLE46SM□S-3 **BLE46SM□S**			BLED6SM
120 W (1/6 HP)	**BLE512AM□S-3** **BLE512AM□S**	BLEM512M2-GFS	GFS5G□	BLED12AM
	BLE512CM□S-3 **BLE512CM□S**			BLED12CM
	BLE512SM□S-3 **BLE512SM□S**			BLED12SM

◇Combination Type – Hollow Shaft Flat Gearhead

The combination type comes with the motor and hollow shaft flat gearhead pre-assembled.

Output Power	Model	Motor Model	Gearhead Model	Driver Model
30 W (1/25 HP)	**BLE23AM□F-3** **BLE23AM□F**	BLEM23M2-GFS	GFS2G□FR	BLED3AM
	BLE23CM□F-3 **BLE23CM□F**			BLED3CM
	BLE23SM□F-3 **BLE23SM□F**			BLED3SM
60 W (1/12 HP)	**BLE46AM□F-3** **BLE46AM□F**	BLEM46M2-GFS	GFS4G□FR	BLED6AM
	BLE46CM□F-3 **BLE46CM□F**			BLED6CM
	BLE46SM□F-3 **BLE46SM□F**			BLED6SM
120 W (1/6 HP)	**BLE512AM□F-3** **BLE512AM□F**	BLEM512M2-GFS	GFS5G□FR	BLED12AM
	BLE512CM□F-3 **BLE512CM□F**			BLED12CM
	BLE512SM□F-3 **BLE512SM□F**			BLED12SM

◇Round Shaft Type

Output Power	Model	Motor Model	Driver Model
30 W (1/25 HP)	**BLE23AMA-3** **BLE23AMA**	BLEM23M2-A	BLED3AM
	BLE23CMA-3 **BLE23CMA**		BLED3CM
	BLE23SMA-3 **BLE23SMA**		BLED3SM
60 W (1/12 HP)	**BLE46AMA-3** **BLE46AMA**	BLEM46M2-A	BLED6AM
	BLE46CMA-3 **BLE46CMA**		BLED6CM
	BLE46SMA-3 **BLE46SMA**		BLED6SM
120 W (1/6 HP)	**BLE512AMA-3** **BLE512AMA**	BLEM512M2-A	BLED12AM
	BLE512CMA-3 **BLE512CMA**		BLED12CM
	BLE512SMA-3 **BLE512SMA**		BLED12SM

● Enter the gear ratio in the box (□) within the model name.

BLU Series

●Additional Information●
Technical reference ➜ Page G-1
Safety standards ➜ Page H-2

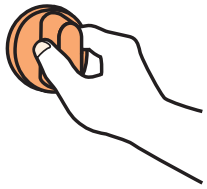
The **BLU** Series combines a brushless motor and a panel-installation type driver, enabling speed control via simple wiring and easy operation.
Choose a parallel gearhead or a hollow shaft flat gearhead that saves installation space in your equipment.

●For detailed product safety standard information including standards, file number and certification body, please visit www.orientalmotor.com.

Features

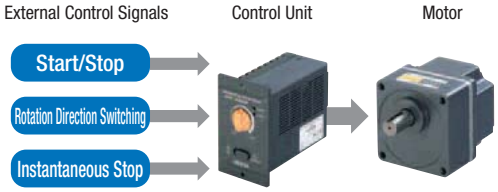
●Easy Connection, Easy Operation

The motor can be connected simply by plugging the connector into the driver. There is no need for troublesome wiring. The motor speed can be set using the potentiometer on the front panel.



●External Control Possible

Start/stop, rotation direction switching and instantaneous stop can be controlled using external signals. You can also switch between sink logic and source logic in accordance with the output type of your controller.



●Speed Control Range

100 to 2000 r/min (speed ratio 20:1)

●IP65 Motor Structure

The motor is protected against water intrusion should water come into contact with the motor.

●The motor must not be washed with water and is not suitable for use in an environment where it constantly comes into contact with water.

●Long Life Gearhead Rating of 10000 Hours

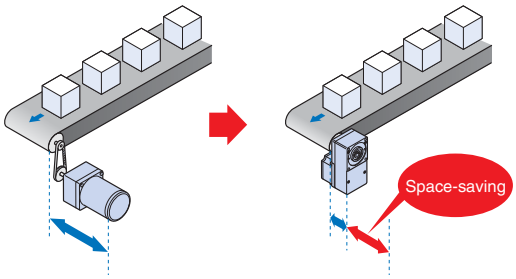
The rated life of the parallel shaft gearhead and hollow shaft flat gearhead is 10000 hours. The parallel shaft gearhead achieves a rated life of twice as long as that of a conventional gearhead.

●The 40 W (1/19 HP) and 90 W (1/8 HP) parallel shaft gearhead has a tapped hole at the shaft end.

●Features of Hollow Shaft Flat Gearhead

◇Space-Saving and Low-Cost

The output shaft can be coupled directly to a driven shaft without using a coupling, which allows you to reduce the size and installation space of your equipment. Since no shaft-coupling parts are needed, the parts cost and labor will also decrease.

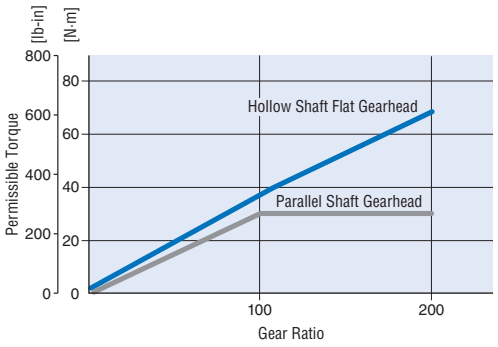


[For Three-Phase Motor and Parallel Shaft Gearhead]

[For Brushless Motor and Hollow Shaft Flat Gearhead]

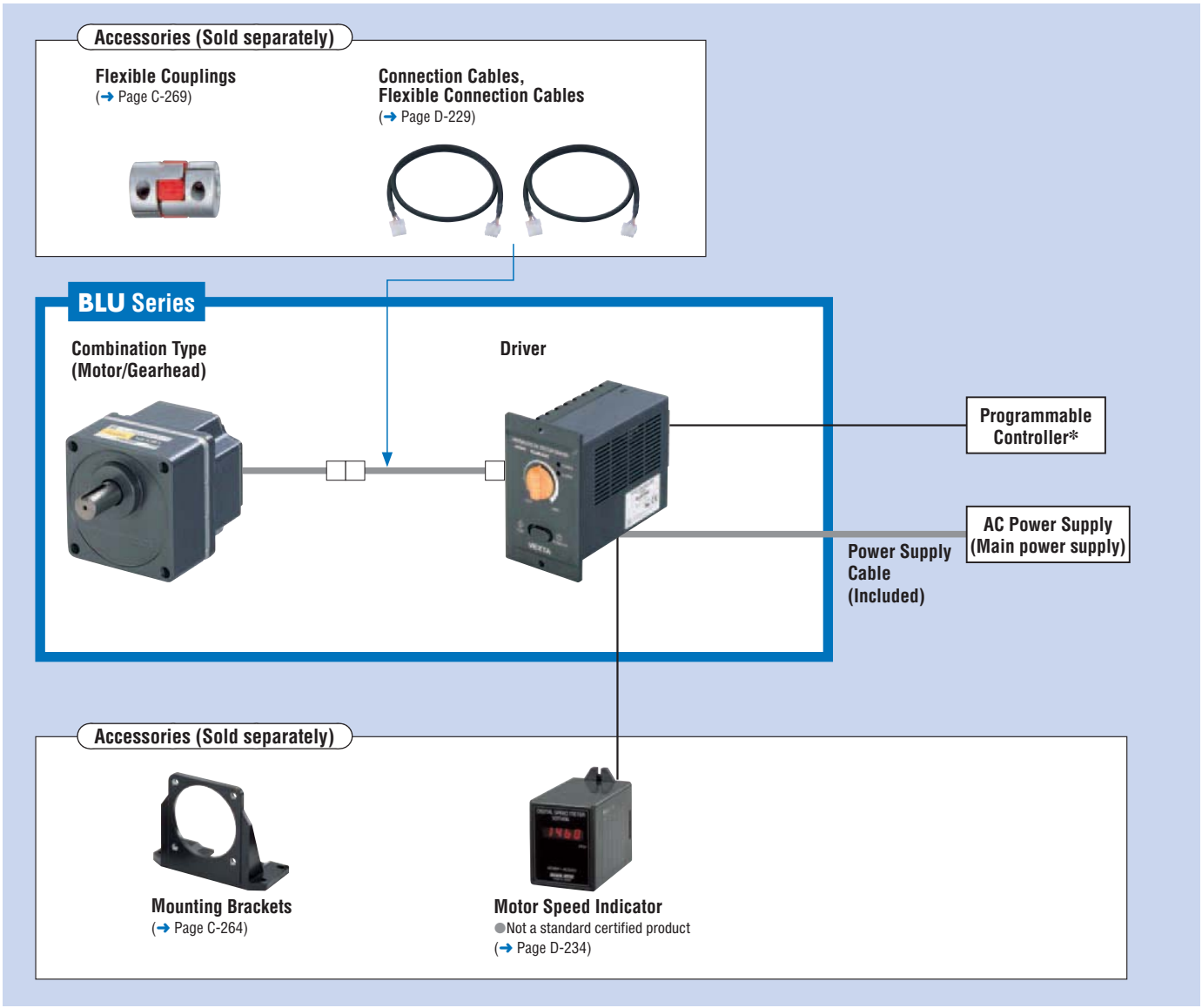
◇High Permissible Torque

While the permissible torque of the parallel shaft gearhead saturates at high gear ratios, the hollow shaft flat gearhead enables the motor torque to be fully utilized.



[Frame Size 90 mm (3.54 in.)]

System Configuration



●Example of System Configuration

BLU Series Combination Type – Parallel Shaft	+	Sold Separately			
		Connection Cable [1m (3.3ft.)]	Motor Speed Indicator	Mounting Bracket	Flexible Coupling
BLU440A-30		CC01AXU	SDM496	SOL4M6	MCL5515F10

●The system configuration shown above is an example. Other combinations are available.

*Not supplied

Product Number Code

BLU 4 40 A - 5 FR

① ② ③ ④ ⑤ ⑥

①	Series	**BLU**: **BLU** Series
②	Motor Frame Size	**2**: 60 mm (2.36 in.) **4**: 80 mm (3.15 in.) **5**: 90 mm (3.54 in.)
③	Output Power (W)	(Example) **40**: 40 W (1/19 HP)
④	Power Supply Voltage	**A**: Single-Phase 100–115 VAC **C**: Single-Phase 200–230 VAC **S**: Three-Phase 200–230 VAC
⑤	Gear Ratio/Shaft Type	Number: Gear ratio for combination types: 8 types from **5** to **200** **A**: Round Shaft Type
⑥	Blank: Combination Type – Parallel Shaft Gearhead **FR**: Combination Type – Hollow Shaft Flat Gearhead	

Product Line

Combination Type The combination type comes with the motor and its dedicated gearhead pre-assembled which simplifies installation in equipment. Motors and gearheads are also available separately to facilitate changes or repairs.

Combination Type – Parallel Shaft Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
20 W (1/38 HP)	Single-Phase 100-115 VAC	**BLU220A-□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase 200-230 VAC	**BLU220C-□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Three-Phase 200-230 VAC	**BLU220S-□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
40 W (1/19 HP)	Single-Phase 100-115 VAC	**BLU440A-□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase 200-230 VAC	**BLU440C-□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Three-Phase 200-230 VAC	**BLU440S-□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
90 W (1/8 HP)	Single-Phase 100-115 VAC	**BLU590A-□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase 200-230 VAC	**BLU590C-□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Three-Phase 200-230 VAC	**BLU590S-□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**

The following items are included in each product.
Motor, Driver, Gearhead, Power Supply Cable, Mounting Screws for Driver, Short Circuit Bar, Mounting Screws, Parallel Key, Operating Manual

Combination Type – Hollow Shaft Flat Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
20 W (1/38 HP)	Single-Phase 100-115 VAC	**BLU220A-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase 200-230 VAC	**BLU220C-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Three-Phase 200-230 VAC	**BLU220S-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
40 W (1/19 HP)	Single-Phase 100-115 VAC	**BLU440A-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase 200-230 VAC	**BLU440C-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Three-Phase 200-230 VAC	**BLU440S-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
90 W (1/8 HP)	Single-Phase 100-115 VAC	**BLU590A-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Single-Phase 200-230 VAC	**BLU590C-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	Three-Phase 200-230 VAC	**BLU590S-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**

The following items are included in each product.
Motor, Driver, Gearhead, Power Supply Cable, Mounting Screws for Driver, Short Circuit Bar, Mounting Screws, Parallel Key, Safety Cover (with screws), Operating Manual

Round Shaft Type

Output Power	Power Supply Voltage	Model
20 W (1/38 HP)	Single-Phase 100-115 VAC	**BLU220A-A**
	Single-Phase 200-230 VAC	**BLU220C-A**
	Three-Phase 200-230 VAC	**BLU220S-A**
40 W (1/19 HP)	Single-Phase 100-115 VAC	**BLU440A-A**
	Single-Phase 200-230 VAC	**BLU440C-A**
	Three-Phase 200-230 VAC	**BLU440S-A**
90 W (1/8 HP)	Single-Phase 100-115 VAC	**BLU590A-A**
	Single-Phase 200-230 VAC	**BLU590C-A**
	Three-Phase 200-230 VAC	**BLU590S-A**

The following items are included in each product.
Motor, Driver, Power Supply Cable, Mounting Screws for Driver, Short Circuit Bar, Operating Manual

● Enter the gear ratio in the box (□) within the model name.

Specifications

●20 W (1/38 HP) RoHS

Model	Combination Type – Parallel Shaft Gearhead		**BLU220A-□**	**BLU220C-□**	**BLU220S-□**
	Combination Type – Hollow Shaft Flat Gearhead		**BLU220A-□FR**	**BLU220C-□FR**	**BLU220S-□FR**
	Round Shaft Type		**BLU220A-A**	**BLU220C-A**	**BLU220S-A**
Rated Output Power (Continuous)		W (HP)	20 (1/38)		
Power Source	Rated Voltage	VAC	Single-Phase 100-115	Single-Phase 200-230	Three-Phase 200-230
	Permissible Voltage Range		±10%		
	Rated Frequency	Hz	50/60		
	Permissible Frequency Range		±5%		
	Rated Input Current	A	0.95	0.55	0.35
	Maximum Input Current	A	1.55	0.9	0.55
Rated Torque		N·m (oz-in)	0.1 (14.2)		
Starting Torque*		N·m (oz-in)	0.12 (17.0)		
Rated Speed		r/min	2000		
Speed Control Range		r/min	100～2000		
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$kg·m^2 (oz-in^2)	1.25 (6.8)		
Rotor Inertia J		$\times10^{-4}$kg·m^2 (oz-in^2)	0.087 (0.48)		
Speed Regulation	Load		±0.5% max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage		±0.5% max. (Rated voltage ±10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature		±0.5% max. [0～+40°C (+32～+104°F), at rated speed, with no load, at rated voltage]		

●40 W (1/19 HP) RoHS

Model	Combination Type – Parallel Shaft Gearhead		**BLU440A-□**	**BLU440C-□**	**BLU440S-□**
	Combination Type – Hollow Shaft Flat Gearhead		**BLU440A-□FR**	**BLU440C-□FR**	**BLU440S-□FR**
	Round Shaft Type		**BLU440A-A**	**BLU440C-A**	**BLU440S-A**
Rated Output Power (Continuous)		W (HP)	40 (1/19)		
Power Source	Rated Voltage	VAC	Single-Phase 100-115	Single-Phase 200-230	Three-Phase 200-230
	Permissible Voltage Range		±10%		
	Rated Frequency	Hz	50/60		
	Permissible Frequency Range		±5%		
	Rated Input Current	A	1.45	0.85	0.5
	Maximum Input Current	A	2.5	1.4	0.9
Rated Torque		N·m (oz-in)	0.2 (28)		
Starting Torque*		N·m (oz-in)	0.24 (34)		
Rated Speed		r/min	2000		
Speed Control Range		r/min	100～2000		
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$kg·m^2 (oz-in^2)	2.5 (13.7)		
Rotor Inertia J		$\times10^{-4}$kg·m^2 (oz-in^2)	0.23 (1.26)		
Speed Regulation	Load		±0.5% max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage		±0.5% max. (Rated voltage ±10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature		±0.5% max. [0～+40°C (+32～+104°F), at rated speed, with no load, at rated voltage]		

●90 W (1/8 HP) RoHS

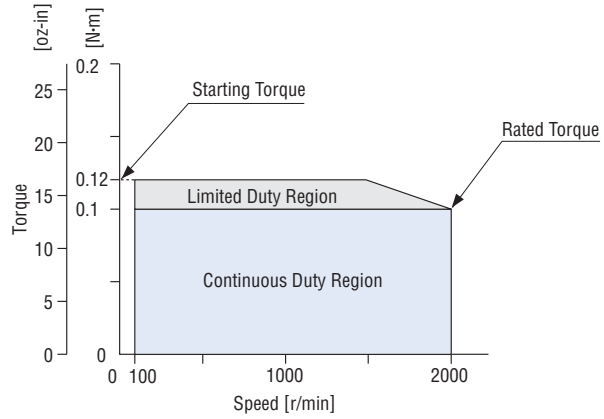
Model	Combination Type – Parallel Shaft Gearhead		**BLU590A-□**	**BLU590C-□**	**BLU590S-□**
	Combination Type – Hollow Shaft Flat Gearhead		**BLU590A-□FR**	**BLU590C-□FR**	**BLU590S-□FR**
	Round Shaft Type		**BLU590A-A**	**BLU590C-A**	**BLU590S-A**
Rated Output Power (Continuous)		W (HP)	90 (1/8)		
Power Source	Rated Voltage	VAC	Single-Phase 100-115	Single-Phase 200-230	Three-Phase 200-230
	Permissible Voltage Range		±10%		
	Rated Frequency	Hz	50/60		
	Permissible Frequency Range		±5%		
	Rated Input Current	A	2.55	1.45	0.85
	Maximum Input Current	A	3.9	2.4	1.5
Rated Torque		N·m (oz-in)	0.45 (63)		
Starting Torque*		N·m (oz-in)	0.54 (76)		
Rated Speed		r/min	2000		
Speed Control Range		r/min	100～2000		
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$kg·m^2 (oz-in^2)	5.6 (31)		
Rotor Inertia J		$\times10^{-4}$kg·m^2 (oz-in^2)	0.61 (3.3)		
Speed Regulation	Load		±0.5% max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage		±0.5% max. (Rated voltage ±10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature		±0.5% max. [0～+40°C (+32～+104°F), at rated speed, with no load, at rated voltage]		

✻The time during which the starting torque is effective is no more than 5 seconds and at 1500 r/min or below.
●Enter the gear ratio in the box (□) within the model name.
●The values for each specification apply to the motor only.

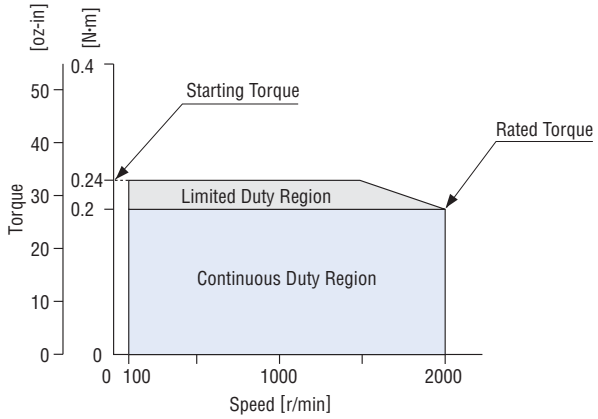
Speed – Torque Characteristics

Continuous Duty Region: Continuous operation is possible in this region.
Limited Duty Region: This region is used primarily when accelerating. When a load that exceeds the rated torque is applied continuously for approximately five seconds, overload protection is activated and the motor coasts to a stop.

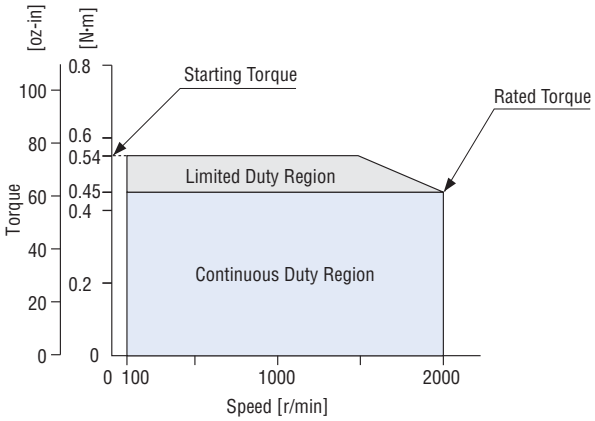
BLU220□-□/BLU220□-□FR/BLU220□-A



BLU440□-□/BLU440□-□FR/BLU440□-A



BLU590□-□/BLU590□-□FR/BLU590□-A



- The characteristics shown above are applicable for the motors only.
- Enter the power supply voltage (**A**, **C** or **S**) in the box (□) within the model name.
  Enter the gear ratio in the box (□) within the model name.

Common Specifications

Item	Specifications
Speed Setting Method	Speed potentiometer on front panel
Acceleration/Deceleration Time	0.5～10 sec. at 2000 r/min with no load (The actual speed may change by load condition.) A common value is set using the acceleration/deceleration time potentiometer provided at the back of the front panel.
Input Signals	Photocoupler input (Reinforced insulation photocoupler) Input resistance 2.4 kΩ Internal power supply voltage 14 VDC Operated by internal power supply Common to CW input and CCW input Sink logic or Source logic: Switchable using a select switch (Factory setting: Sink logic)
Output Signals	Open-collector output (Reinforced insulation photocoupler) Operated by external power supply Use condition 4.5～26.4 VDC, 0.5～10 mA Common to Alarm output and Speed output
Protective Functions*	When the following are activated, the motor will coast to a stop and the Alarm output will be OFF. When the overload protective function is activated, the alarm LED on the driver will blink. The alarm LED will illuminate steadily in the event of actuation of any other protective function. ・Overload protection: Activated when the motor load exceeds rated torque for a minimum of 5 seconds. ・Overvoltage protection: Activated when the voltage applied to the driver exceeds 115 VAC or 230 VAC by a minimum of approximately 20%, a gravitational operation is performed or a load exceeding the permissible load inertia is driven. ・Motor sensor error: Activated when the sensor wire inside the motor cable is disconnected during motor operation. ・Undervoltage protection: Activated when the voltage applied to the driver falls below 100 VAC or 200 VAC by a minimum of approximately 30%. ・Overspeed protection: Activated when the motor speed exceeds 2500 r/min.
Maximum Cable Extension Distance	Motor/Driver Distance: 10.5 m (34.4 ft.) (when an accessory **CC10AXU** connection cable is used)
Time Rating	Continuous

*With the **BLU** Series, the motor speed cannot be controlled in a gravitational operation or other application where the motor shaft is turned by the load. When a load exceeding the permissible load inertia is driven or a gravitational operation is performed, the overvoltage protective function will be activated and the motor will coast to a stop.

General Specifications

Item		Motor	Driver
Insulation Resistance		100 MΩ or more when 500 VDC megger is applied between the windings and the case after continuous operation under normal ambient temperature and humidity.	100 MΩ or more when 500 VDC megger is applied between the power supply terminal and the protective earth terminal, and between the power supply terminal and the signal I/O terminal after continuous operation under normal ambient temperature and humidity.
Dielectric Strength		Sufficient to withstand 1.5 kVAC at 50 Hz applied between the windings and the case for 1 minute after continuous operation under normal ambient temperature and humidity.	Sufficient to withstand 1.8 kVAC at 50 Hz applied between the power supply terminal and the protective earth terminal for 1 minute, and 3 kVAC at 50 Hz applied between the power supply terminal and the signal I/O terminal for 1 minute after continuous operation under normal ambient temperature and humidity.
Temperature Rise		60°C (108°F) or less in the windings, and 50°C (90°F) or less in the case*1 as measured by the thermocouple method after continuous operation at normal temperature and humidity.	–
Operating Environment	Ambient Temperature	UL, CSA: 0～+40°C (+32～+104°F) (non-freezing) EN: 0～+50°C (+32～+122°F) (non-freezing)	0～+40°C (+32～+104°F) (non-freezing)
	Ambient Humidity	85% or less (non-condensing)	
	Altitude	Up to 1000 m (3300 ft.) above sea level	
	Atmosphere	No corrosive gases or dust. Cannot be used in a radioactive area, magnetic field, vacuum or other special environment	
	Vibration	Not subject to continuous vibration or excessive impact In conformance with JIS C 60068-2-6, "Sine-wave vibration test method" Frequency range: 10～55 Hz Pulsating amplitude: 0.15 mm (0.006 in.) Sweep direction: 3 directions (X, Y, Z) Number of sweeps: 20 times	
Storage Condition*2	Ambient Temperature	−25～+70°C (−13～+158°F) (non-freezing)	
	Ambient Humidity	85% or less (non-condensing)	
	Altitude	Up to 3000 m (10000 ft.) above sea level	
Thermal Class		UL/CSA standards: 105 (A), EN standards: 120 (E)	–
Degree of Protection		IP65 (Excluding the mounting surface of the round shaft type and connectors)	IP10

*1 For round shaft types, please attach to the heat radiation plate (material: aluminum) of the following sizes to maintain a maximum motor case temperature of 90°C (194°F).
BLU220□-A: 135×135 mm (5.31×5.31 in.), 5mm (0.20 in.) thick
BLU440□-A: 165×165 mm (6.50×6.50 in.), 5mm (0.20 in.) thick
BLU590□-A: 200×200 mm (7.87×7.87 in.), 5mm (0.20 in.) thick
● Enter the power supply voltage (**A**, **C** or **S**) in the box (□) within the model name.

*2 The storage condition applies to a short period such as a period during transportation.

Note
● Do not measure insulation resistance or perform the dielectric strength test while the motor and driver are connected.

Gearmotor – Torque Table of Combination Type

Combination Type – Parallel Shaft Gearhead

Unit = N·m (lb-in)

Model	Gear Ratio	5	10	15	20	30	50	100	200
	Speed Range r/min	20～400	10～200	6.7～133	5～100	3.3～66.7	2～40	1～20	0.5～10
BLU220□-□		0.45 (3.9)	0.90 (7.9)	1.4 (12.3)	1.8 (15.9)	2.6 (23)	4.3 (38)	6 (53)	6 (53)
BLU440□-□		0.90 (7.9)	1.8 (15.9)	2.7 (23)	3.6 (31)	5.2 (46)	8.6 (76)	16 (141)	16 (141)
BLU590□-□		2.0 (17.7)	4.1 (36)	6.1 (53)	8.1 (71)	11.6 (102)	19.4 (171)	30 (260)	30 (260)

● A colored background ( ) indicates gear shaft rotation in the same direction as the motor shaft, while the others rotate in the opposite direction.

Combination Type – Hollow Shaft Flat Gearhead

Unit = N·m (lb-in)

Model	Gear Ratio	5	10	15	20	30	50	100	200
	Speed Range r/min	20～400	10～200	6.7～133	5～100	3.3～66.7	2～40	1～20	0.5～10
BLU220□-□FR		0.40 (3.5)	0.85 (7.5)	1.3 (11.5)	1.7 (15.0)	2.6 (23)	4.3 (38)	8.5 (75)	17 (150)
BLU440□-□FR		0.85 (7.5)	1.7 (15.0)	2.6 (23)	3.4 (30)	5.1 (45)	8.5 (75)	17 (150)	34 (300)
BLU590□-□FR		1.9 (16.8)	3.8 (33)	5.7 (50)	7.7 (68)	11.5 (101)	19.1 (169)	38.3 (330)	68 (600)

● The flat gearhead rotates in the opposite direction to the motor when viewed from the front of the gearhead. It rotates in the same direction as the motor when viewed from the rear (motor mounting surface) of the gearhead. Rotation direction of the hollow shaft flat gearhead ➜ Page D-243

● Enter the power supply voltage (**A**, **C** or **S**) in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.

Permissible Overhung Load and Permissible Thrust Load

Combination Type – Parallel Shaft Gearhead

Model	Gear Ratio	Permissible Overhung Load				Permissible Thrust Load	
		10 mm (0.39 in.) from shaft end		20 mm (0.79 in.) from shaft end			
		N	lb.	N	lb.	N	lb.
BLU220□-□	**5**	100	22	150	33	40	9
	10, **15**, **20**	150	33	200	45		
	30, **50**, **100**, **200**	200	45	300	67		
BLU440□-□	**5**	200	45	250	56	100	22
	10, **15**, **20**	300	67	350	78		
	30, **50**, **100**, **200**	450	101	550	123		
BLU590□-□	**5**	300	67	400	90	150	33
	10, **15**, **20**	400	90	500	112		
	30, **50**, **100**, **200**	500	112	650	146		

Combination Type – Hollow Shaft Flat Gearhead

Model	Gear Ratio	Permissible Overhung Load				Permissible Thrust Load	
		10 mm (0.39 in.) from mounting surface of gearhead		20 mm (0.79 in.) from mounting surface of gearhead			
		N	lb.	N	lb.	N	lb.
BLU220□-□FR	**5**, **10**	450	101	370	83	200	45
	15, **20**, **30**, **50**, **100**, **200**	500	112	400	90		
BLU440□-□FR	**5**, **10**	800	180	660	148	400	90
	15, **20**, **30**, **50**, **100**, **200**	1200	270	1000	220		
BLU590□-□FR	**5**, **10**	900	200	770	173	500	112
	15, **20**	1300	290	1110	240		
	30, **50**, **100**, **200**	1500	330	1280	280		

● The permissible overhung load can also be calculated with a formula. Permissible overhung load calculation ➜ Page D-242

Round Shaft Type

Model	Permissible Overhung Load				Permissible Thrust Load
	10 mm (0.39 in.) from shaft end		20 mm (0.79 in.) from shaft end		
	N	lb.	N	lb.	
BLU220□-A	70	15.7	100	22	The permissible thrust load should not be greater than half the motor mass.
BLU440□-A	120	27	140	31	
BLU590□-A	160	36	170	38	

● Enter the power supply voltage (**A**, **C** or **S**) in the box (□) within the model name.
Enter the gear ratio in the box (□) within the model name.

Permissible Load Inertia J of Combination Type

Combination Type – Parallel Shaft Gearhead

Unit = $\times 10^{-4}$ kg·m^2 (oz-in^2)

Model	Gear Ratio	5	10	15	20	30	50	100	200
BLU220■-□		12 (66)	50 (270)	110 (600)	200 (1090)	370 (2000)	920 (5000)	2500 (13700)	5000 (27000)
	When instantaneous stop operation is performed	1.55 (8.5)	6.2 (34)	14.0 (77)	24.8 (136)	55.8 (310)	155 (850)	155 (850)	155 (850)
BLU440■-□		22 (120)	95 (520)	220 (1200)	350 (1910)	800 (4400)	2200 (12000)	6200 (34000)	12000 (66000)
	When instantaneous stop operation is performed	5.5 (30)	22 (120)	49.5 (270)	88 (480)	198 (1080)	550 (3000)	550 (3000)	550 (3000)
BLU590■-□		45 (250)	190 (1040)	420 (2300)	700 (3800)	1600 (8800)	4500 (25000)	12000 (66000)	25000 (137000)
	When instantaneous stop operation is performed	25 (137)	100 (550)	225 (1230)	400 (2200)	900 (4900)	2500 (13700)	2500 (13700)	2500 (13700)

Combination Type – Hollow Shaft Flat Gearhead

Unit = $\times 10^{-4}$ kg·m^2 (oz-in^2)

Model	Gear Ratio	5	10	15	20	30	50	100	200
BLU220■-□FR		12 (66)	50 (270)	110 (600)	200 (1090)	370 (2000)	920 (5000)	2500 (13700)	5000 (27000)
	When instantaneous stop operation is performed	1.55 (8.5)	6.2 (34)	14.0 (77)	24.8 (136)	55.8 (310)	155 (850)	155 (850)	155 (850)
BLU440■-□FR		22 (120)	95 (520)	220 (1200)	350 (1910)	800 (4400)	2200 (12000)	6200 (34000)	12000 (66000)
	When instantaneous stop operation is performed	5.5 (30)	22 (120)	49.5 (270)	88 (480)	198 (1080)	550 (3000)	550 (3000)	550 (3000)
BLU590■-□FR		45 (250)	190 (1040)	420 (2300)	700 (3800)	1600 (8800)	4500 (25000)	12000 (66000)	25000 (137000)
	When instantaneous stop operation is performed	25 (137)	100 (550)	225 (1230)	400 (2200)	900 (4900)	2500 (13700)	2500 (13700)	2500 (13700)

● Enter the power supply voltage (**A**, **C** or **S**) in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.

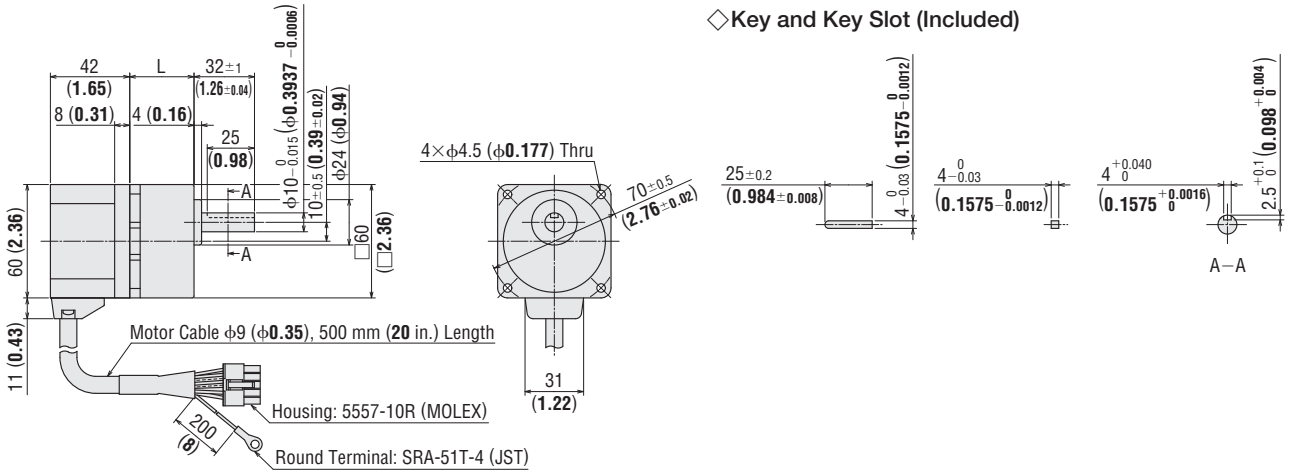
Dimensions Unit = mm (in.)

● Mounting screws are included with the combination type. Dimensions for mounting screws ➜ Page D-242

●20 W (1/38 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLU220A-□	BLUM220-GFS	GFS2G□	**5～20**	34 (1.34)	1.0 (2.2)	A419A
BLU220C-□			**30～100**	38 (1.50)		A419B
BLU220S-□			**200**	43 (1.69)		A419C



◇Motor/Hollow Shaft Flat Gearhead

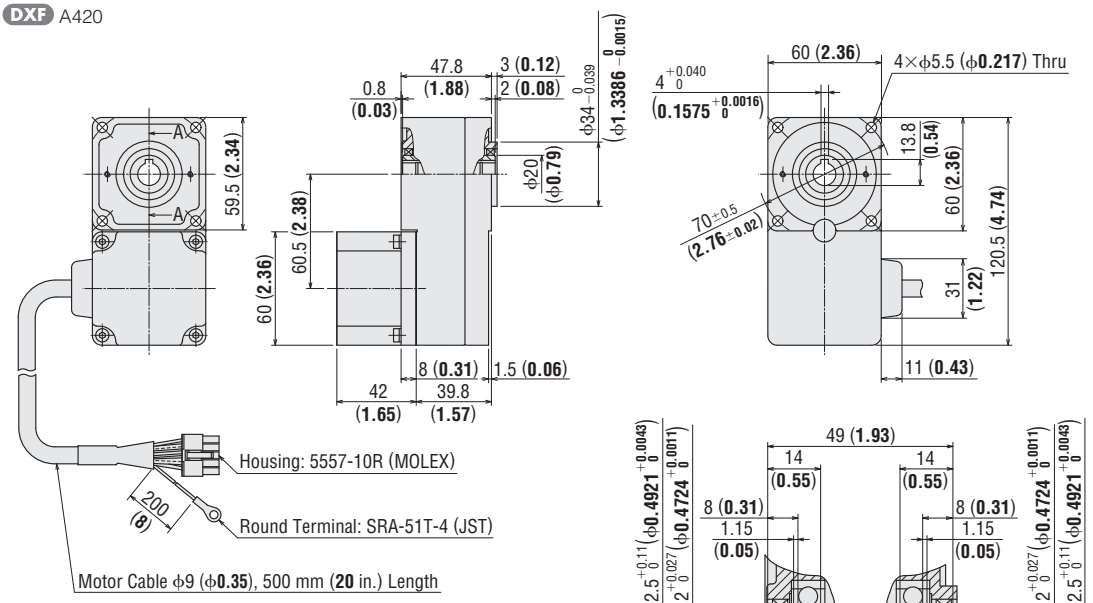
BLU220A-□FR, **BLU220C-□FR**, **BLU220S-□FR**

Motor: BLUM220-GFS

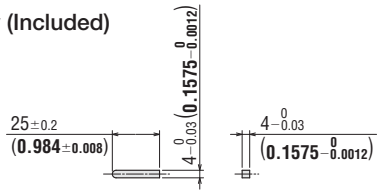
Gearhead: GFS2G□FR

Mass: 1.3 kg (2.9 lb.) (Including gearhead)

DXF A420



◇Key (Included)



● Enter the gear ratio in the box (□) within the model name.

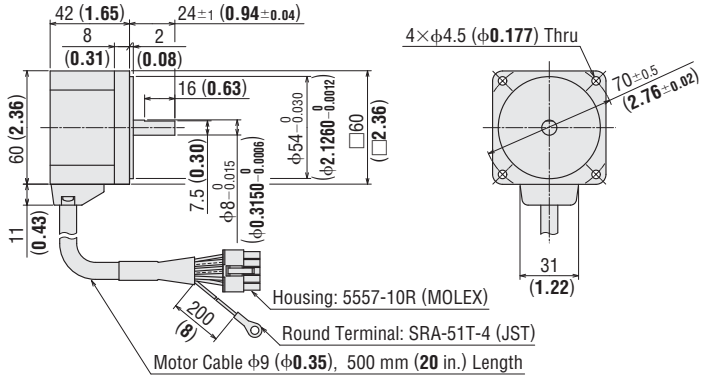
◇Round Shaft Type

BLU220A-A, **BLU220C-A**, **BLU220S-A**

Motor: BLUM220-A

Mass: 0.5 kg (1.1 lb.)

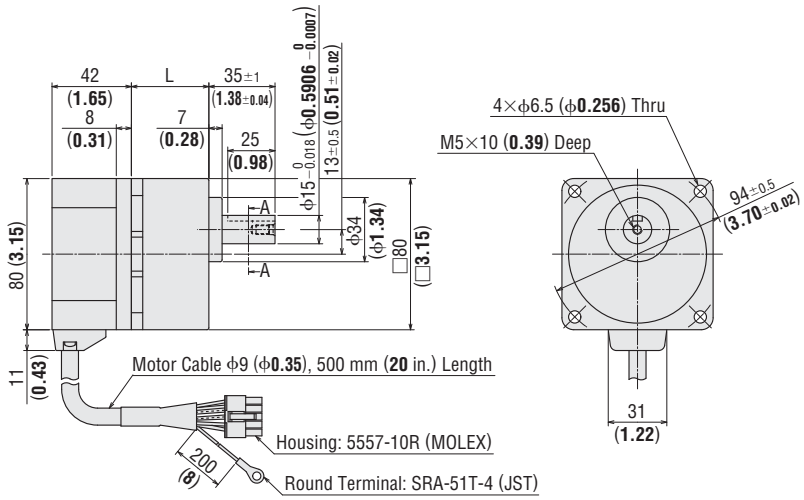
DXF A421



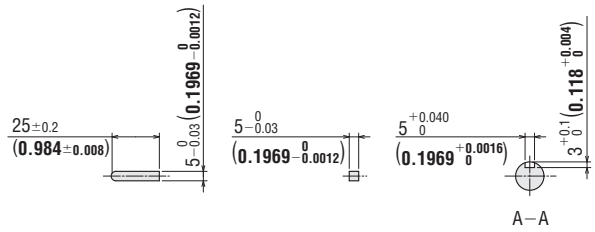
●40 W (1/19 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLU440A-□	BLUM440-GFS	GFS4G□	**5**~**20**	41 (1.61)	1.8 (4.0)	A422A
BLU440C-□			**30**~**100**	46 (1.81)		A422B
BLU440S-□			**200**	51 (2.01)		A422C



◇Key and Key Slot (Included)



●Enter the gear ratio in the box (□) within the model name.

◇Motor/Hollow Shaft Flat Gearhead

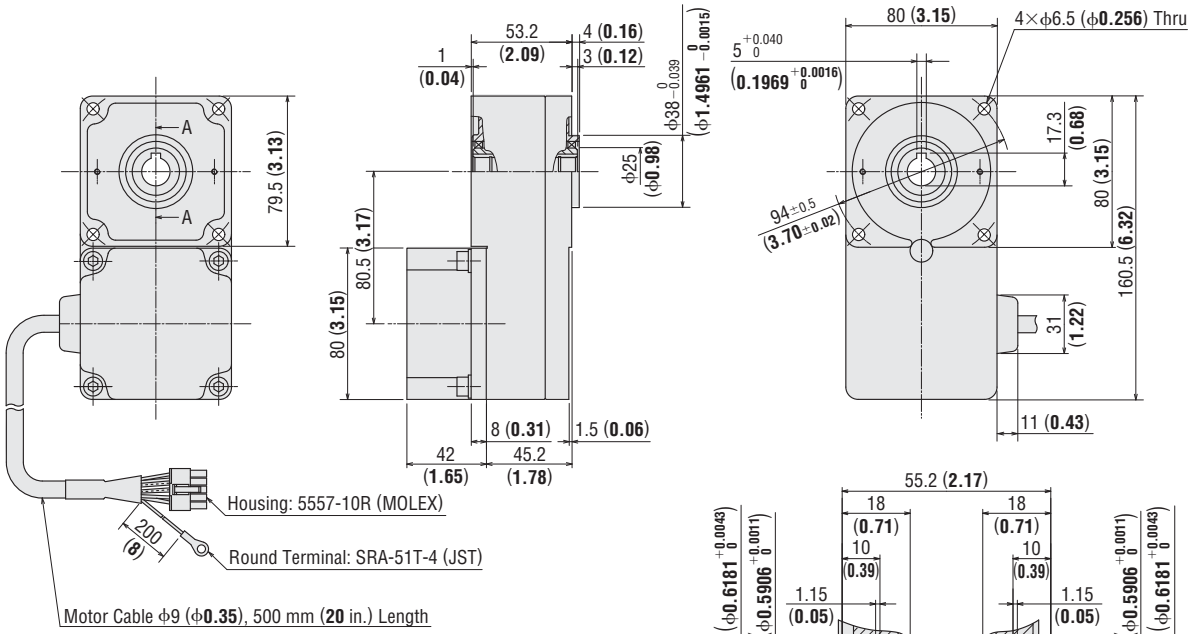
BLU440A-□FR, BLU440C-□FR, BLU440S-□FR

Motor: BLUM440-GFS

Gearhead: GFS4G□FR

Mass: 2.4 kg (5.3 lb.) (Including gearhead)

DXF A423



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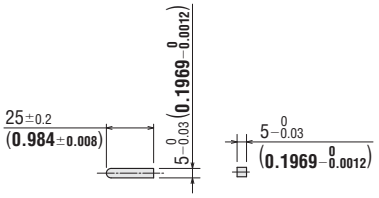


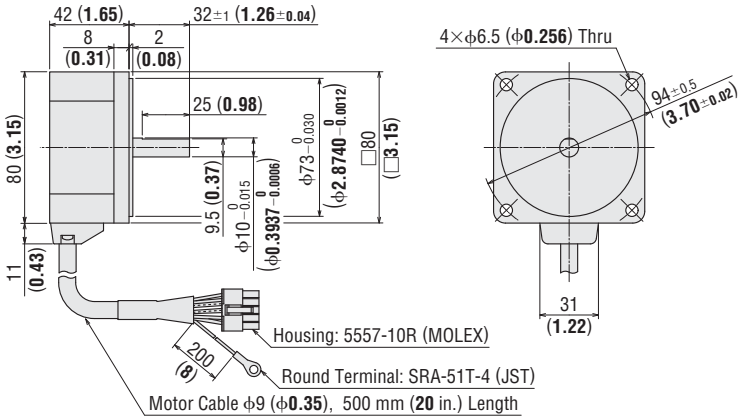
◇Round Shaft Type

BLU440A-A, BLU440C-A, BLU440S-A

Motor: BLUM440-A

Mass: 0.8 kg (1.76 lb.)

DXF A424

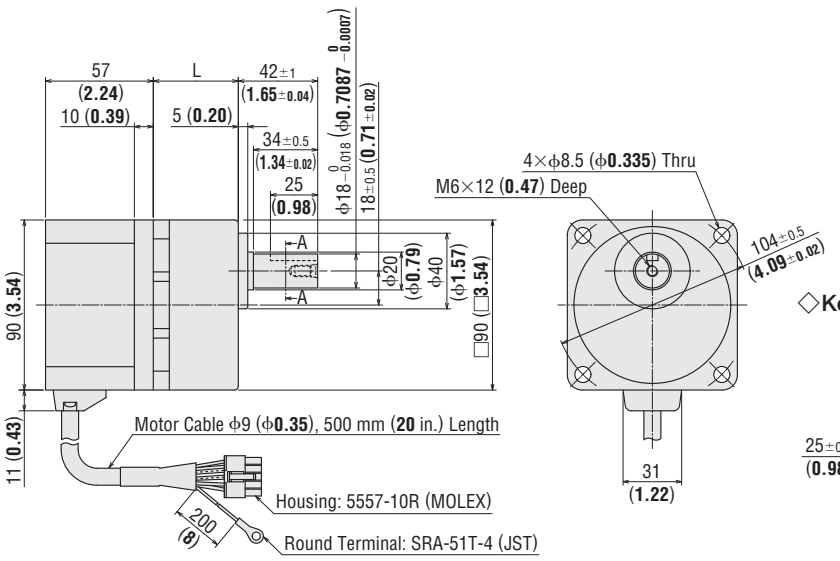


● Enter the gear ratio in the box (□) within the model name.

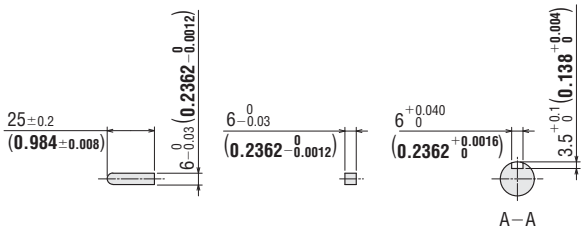
●90 W (1/8 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLU590A-□	BLUM590-GFS	GFS5G□	**5**~**20**	45 (1.77)	2.9 (6.4)	A425A
BLU590C-□			**30**~**100**	58 (2.28)		A425B
BLU590S-□			**200**	64 (2.52)		A425C



◇Key and Key Slot (Included)



◇Motor/Hollow Shaft Flat Gearhead

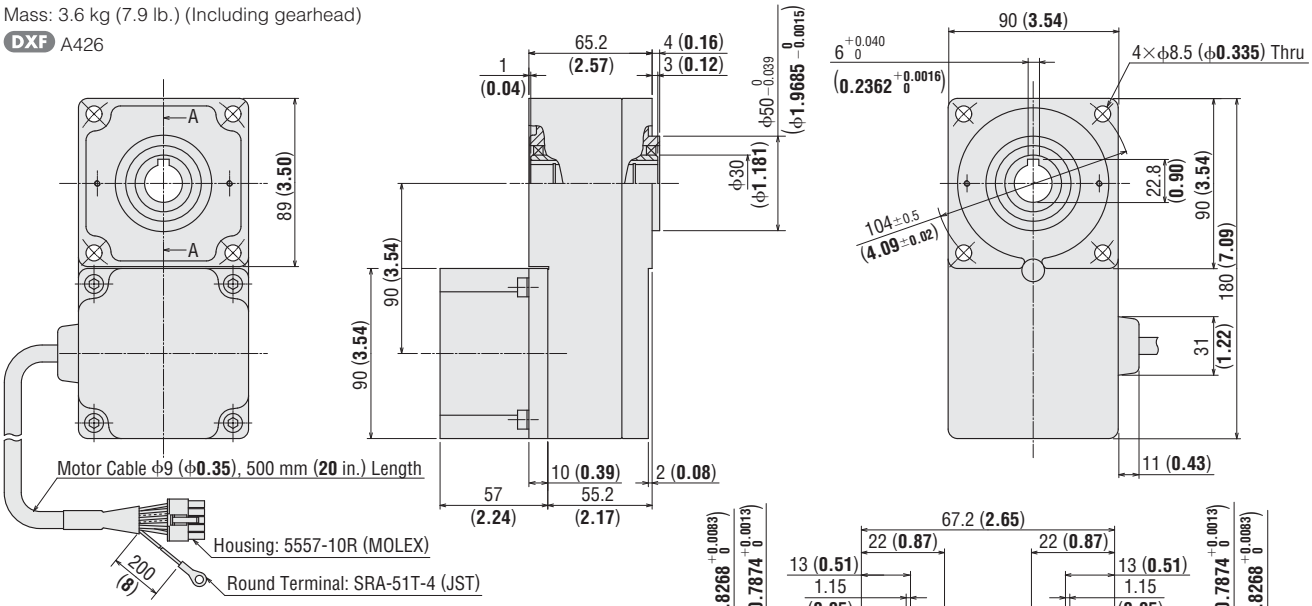
BLU590A-□FR, **BLU590C-□FR**, **BLU590S-□FR**

Motor: BLUM590-GFS

Gearhead: GFS5G□FR

Mass: 3.6 kg (7.9 lb.) (Including gearhead)

DXF A426



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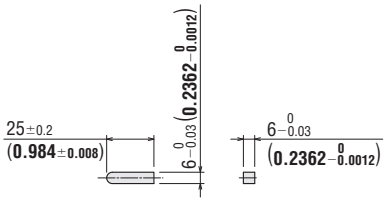


● Enter the gear ratio in the box (□) within the model name.

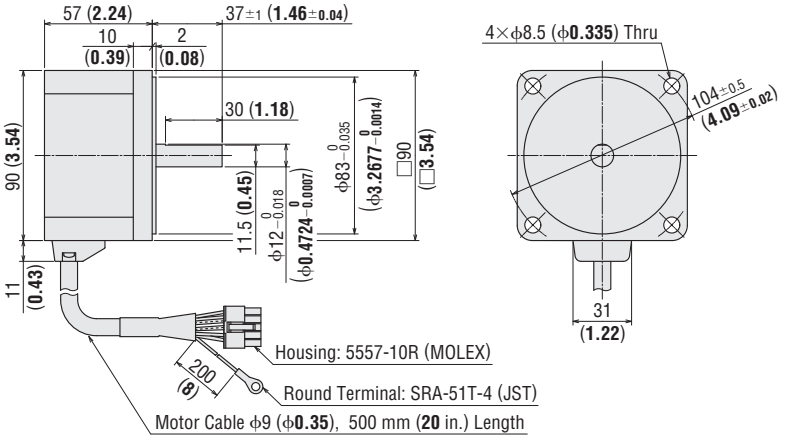
◇Round Shaft Type

BLU590A-A, **BLU590C-A**, **BLU590S-A**

Motor: BLUM590-A

Mass: 1.4 kg (3.1 lb.)

DXF A427



◇Driver (Common to all models)

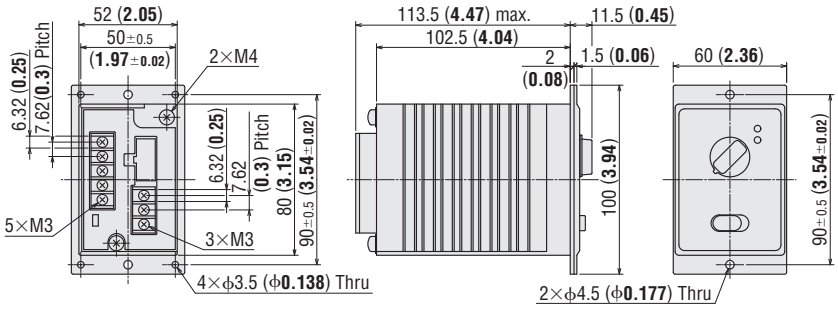
BLUD20A, BLUD20C, BLUD20S

BLUD40A, BLUD40C, BLUD40S

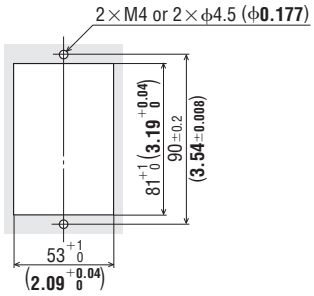
BLUD90A, BLUD90C, BLUD90S

Mass: 0.4 kg (0.88 lb.)

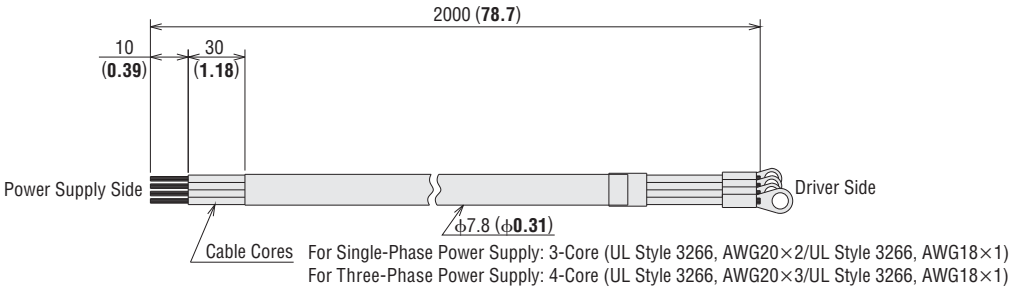
DXF A293



◇Driver Panel Cut-Out

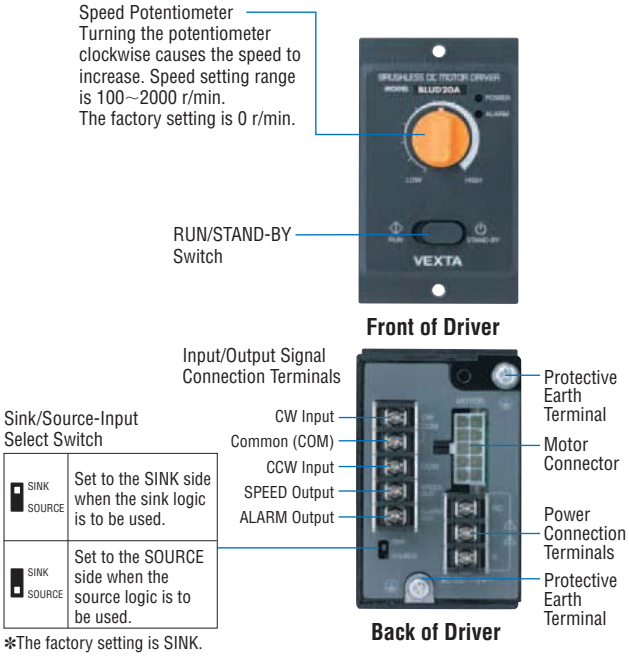


◇Driver Power Supply Cable (Included, common to all models)



Connection and Operation

Names and Functions of Driver Parts



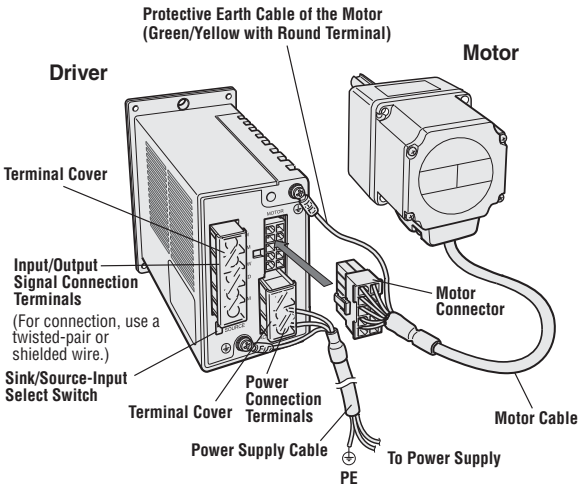
✻The factory setting is SINK.

Notes

- The RUN/STAND-BY switch is not a power ON/OFF switch.
- When you want to stop the motor for an extended period, turn off the driver power.

Connection Diagrams

◇Motor and Driver Connection



• Motor Connection

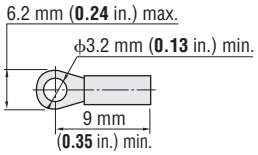
Insert the motor cable connector into the motor connector (MOTOR) on the driver. To extend the distance between the motor and driver, use an accessory connection cable. The connection can be extended to a maximum of 10.5 m (34.4 ft.).

Connect the motor's protective earth cable (green/yellow) to the driver, as shown in the figure. If you are using a connection cable or the motor can be accessed directly by hands, connect the protective earth cable from the motor directly to ground. If the protective earth cable is not long enough, connect a lead wire of AWG18 (0.75 mm^2) or thicker to the protective earth cable of the motor cable and connect it to ground over the shortest distance. The lead wire must be provided by the user. The accessory dedicated connection cable does not come with a protective earth cable. If you are using the accessory dedicated connection cable, provide grounding at a relay point or extend the cable to an appropriate grounding point.

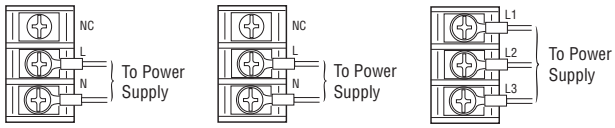
• Power Connection

Connect the included power supply cable to the power connection terminals of the driver. Connect the red and black lead wires to the power connection terminals and the green/yellow lead wire to the protective earth terminal. When the included power supply cable is not used, use a cable of AWG22 (0.3 mm^2) or thicker. For the protective earth cable, use a cable of AWG18 (0.75 mm^2) or thicker.

•Applicable Crimp Terminals
Round Terminal with Insulation (M3)



•Single-Phase 100–115 VAC •Single-Phase 200–230 VAC •Three-Phase 200–230 VAC

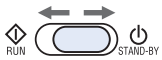


◇Operation

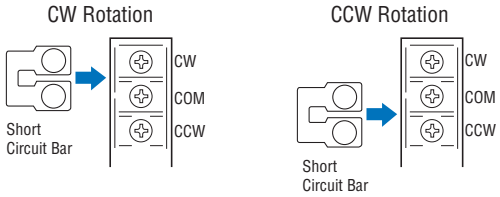
The direction of motor rotation is as viewed from the output shaft end of the motor. "CW" indicates clockwise direction, while "CCW" indicates counterclockwise direction.

• Stand Alone Operation

When the RUN/STAND-BY switch is set to the "RUN" position, the motor will run. When it is set to the "STAND-BY" position, the motor will stop.



The direction of rotation depends on how the short circuit bar at the back of driver is connected. Connect the short circuit bar between the CW and COM or CCW and COM. Do not use the short circuit bar for any other purpose.



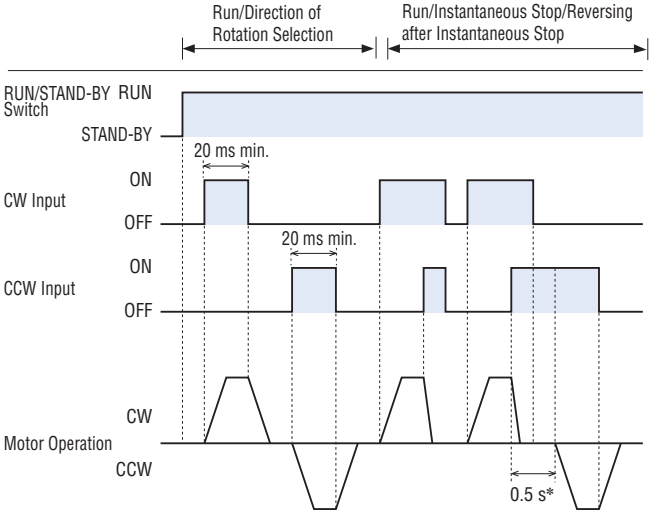
• Operation Using External Signals

Set the RUN/STAND-BY switch to the "RUN" position.

- Refer to "Input circuit connection example" shown on the page D-128 for connection.

●Timing Chart

◇Operation Using External Signals



*Motor does not run for 0.5 sec after instantaneous stop, if a reversing run signal is input.

Note

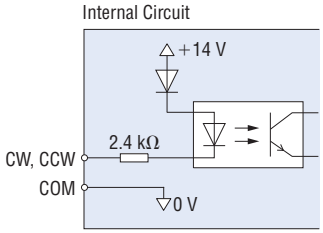
- The CW and CCW input signals must be ON for at least 20 msec.
- When both the CW and CCW inputs are turned on, the motor stops instantaneously.

●Input/Output Signal Circuits

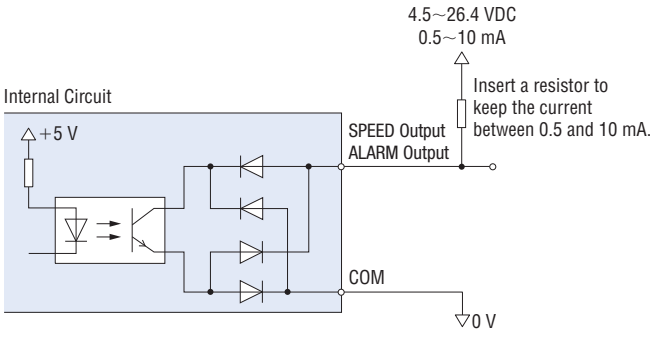
The factory setting is for sink logic. Select sink logic or source logic according to the external control device you will be using.

◇Sink Logic

• Input Circuit

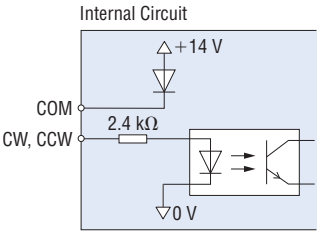


• Output Circuit

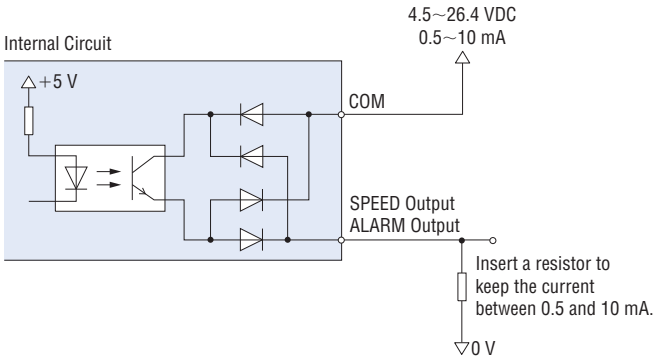


◇Source Logic

• Input Circuit



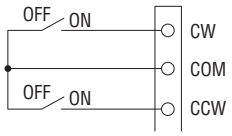
• Output Circuit



◇Input Circuit Connection Example

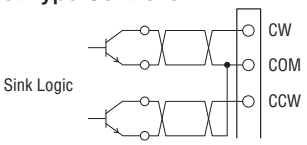
Set the RUN/STAND-BY switch to the “RUN” position.

• Small-Capacity Switch and Relay



- Use a small-capacity contact type relay capable of opening and closing 14 VDC, 10 mA.

• Transistor Output Type Controller



Rotation Direction of Motor

- CW (clockwise) directional operation
  When CW input is turned on, the motor runs in a clockwise direction. When CW input is turned off, the motor stops.
- CCW (counterclockwise) directional operation
  When CCW input is turned on, the motor runs in a counterclockwise direction. When CCW input is turned off, the motor stops.
  When both the CW and CCW inputs are turned on simultaneously, the motor stops instantly. Instantaneous reversing operation is not possible.

Note

- When using source logic, do not connect the CW input and CCW input to transistor output type controller.

◇When an External Control Device with a Built-In Clamp Diode is Used

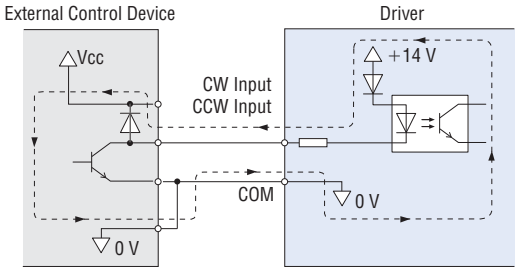
When you want to use an external control device with a built-in clamp diode, pay attention to the sequence of turning on or off the power.

Power ON: External control device ON → Driver ON

Power OFF: Driver OFF → External control device OFF

If the driver power is turned on first when connected as shown below, or the external control device power is turned off with the driver power turned on, current will be applied, as indicated by the arrows in the diagram. This may cause the motor to run. When the power is turned on or off simultaneously, the motor may run temporarily due to differences in power capacity. The external control device power must be turned on first and driver power must be turned off first.

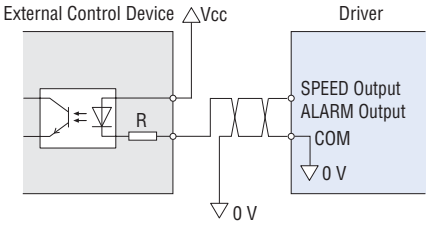
• Example of Sink Logic



◇Output Circuit Connection Example

The signal output is open-collector output. Use the power supply of 4.5 to 26.4 VDC to connect the limit resistor (R) to keep output current between 0.5 mA and 10 mA.

• Signal Output (Sink Logic) Connection Example



Note

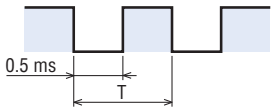
- The ON voltage of the output circuit is approximately 1.5 VDC. Remember this specification when driving other elements using the output circuit.

◇SPEED Output

The speed output signal is synchronized with the motor speed. The system outputs pulses (with a width of approximately 0.5 ms) at a rate of 30 pulses per rotation of the motor output shaft. You can measure the speed output frequency and calculate motor speed.

$$\text{Motor speed (r/min)} = \frac{\text{SPEED output frequency [Hz]}}{30} \times 60$$

$$\text{SPEED output frequency (Hz)} = \frac{1}{T}$$



- To display or monitor the speed of the motor output shaft or the reduced speed of the gearhead output shaft, use an accessory **SDM496** motor speed indicator (the **SDM496** can be used only when the sink logic is selected).
  Motor speed indicator ➜ Page D-234

Notes

- When you want to extend the input/output signal cable, the length must not exceed 2 m (6.6 ft.). The cable should be as short as possible in order to minimize noise.
- The input/output signal cable should be kept away from power supply cables or motor cables.

◇ALARM Output

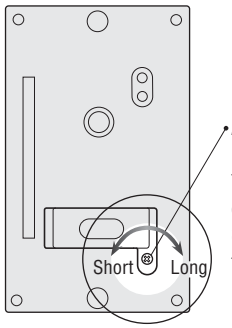
In the following conditions, the driver's protective function will actuate. The ALARM output will turn OFF and the motor will stop. In this case, the protective function that actuated can be checked based on whether the LED is blinking or illuminating steadily.

- The LED will blink upon actuation of the following protective function:
  Overload protective function
- The LED will illuminate steadily upon actuation of the following protective functions:
  Overvoltage protective function, motor sensor error, undervoltage protective function, overspeed protective function

●Setting the Acceleration/Deceleration Time

The motor starts over the specified acceleration time and stops over the specified deceleration time. This acceleration/deceleration time can be set within the range from 0.5 to 10 sec (2000 r/min without load). The time can be set using the acceleration/deceleration potentiometer. Remove the front panel of the driver to access the potentiometer.

- The figure shows the driver with the front panel removed.



Acceleration/Deceleration Time Potentiometer

Time is increased by turning the switch clockwise. Use an insulated Phillips Screwdriver for this operation. The shortest time is set at the time of shipment.

List of Motor and Driver Combinations

Combination Type – Parallel Shaft Gearhead

The combination type comes with the motor and parallel shaft gearhead pre-assembled.

Output Power	Model	Motor Model	Gearhead Model	Driver Model
20 W (1/38 HP)	**BLU220A-□**	BLUM220-GFS	GFS2G□	BLUD20A
	BLU220C-□			BLUD20C
	BLU220S-□			BLUD20S
40 W (1/19 HP)	**BLU440A-□**	BLUM440-GFS	GFS4G□	BLUD40A
	BLU440C-□			BLUD40C
	BLU440S-□			BLUD40S
90 W (1/8 HP)	**BLU590A-□**	BLUM590-GFS	GFS5G□	BLUD90A
	BLU590C-□			BLUD90C
	BLU590S-□			BLUD90S

Combination Type – Hollow Shaft Flat Gearhead

The combination type comes with the motor and hollow shaft flat gearhead pre-assembled.

Output Power	Model	Motor Model	Gearhead Model	Driver Model
20 W (1/38 HP)	**BLU220A-□FR**	BLUM220-GFS	GFS2G□FR	BLUD20A
	BLU220C-□FR			BLUD20C
	BLU220S-□FR			BLUD20S
40 W (1/19 HP)	**BLU440A-□FR**	BLUM440-GFS	GFS4G□FR	BLUD40A
	BLU440C-□FR			BLUD40C
	BLU440S-□FR			BLUD40S
90 W (1/8 HP)	**BLU590A-□FR**	BLUM590-GFS	GFS5G□FR	BLUD90A
	BLU590C-□FR			BLUD90C
	BLU590S-□FR			BLUD90S

Round Shaft Type

Output Power	Model	Motor Model	Driver Model
20 W (1/38 HP)	**BLU220A-A**	BLUM220-A	BLUD20A
	BLU220C-A		BLUD20C
	BLU220S-A		BLUD20S
40 W (1/19 HP)	**BLU440A-A**	BLUM440-A	BLUD40A
	BLU440C-A		BLUD40C
	BLU440S-A		BLUD40S
90 W (1/8 HP)	**BLU590A-A**	BLUM590-A	BLUD90A
	BLU590C-A		BLUD90C
	BLU590S-A		BLUD90S

● Enter the gear ratio in the box (□) within the model name.

Brushless Motors/AC Speed Control Motors

Brushless Motors

DC Input

Page

BLH Series

●Additional Information●
Technical reference ➜ Page G-1
Safety standards ➜ Page H-2

The **BLH** Series combines a slim, high-power brushless motor with a 24 VDC board-type driver to meet your space-saving needs. Speed control range is 100 to 3000 r/min.
Choose from a wide variety of frame sizes offering outputs of 15 to 100 W (1/50 to 1/8 HP) to meet your specific application.

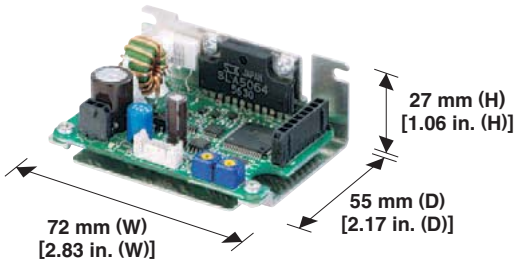
cULus CE RoHS

●For detailed product safety standard information including standards, file number and certification body, please visit www.orientalmotor.com.

Features

●Compact Board-Type Driver

The models with an output of 15 to 50 W (1/50 to 1/15 HP) adopt a compact, board-type driver smaller than the size of a business card. This will help to reduce the size of your equipment.



The 100 W (1/8 HP) driver has dimensions of 71 mm (D) × 131 mm (W) × 37.5 mm (H) [2.80 in. (D) × 5.16 in. (W) × 1.48 in. (H)]

◇Full Range of Driver Functions

The compact driver is packed with a full range of functions.
•Instantaneous stop •Speed control by potentiometer
•Speed control by DC voltage
•Acceleration/deceleration time setting •Alarm output

●Speed Control Range

100 to 3000 r/min (speed ratio 30:1)

●Wide Variety

The series offers a wide range of models from compact packages with a motor output of 15 W (1/50 HP), to larger ones producing a high output of 100 W (1/8 HP). Choose one that best suits your specific requirements.

●IP65 Motor Structure*

The motor is protected against water intrusion, should water come into contact with the motor.
*IP40 for 15 W (1/50 HP) motor
●The motor must not be washed with water, and is not suitable for use in an environment where it constantly comes into contact with water.

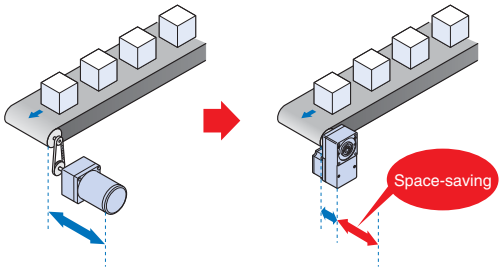
●Long Life Gearhead Rating of 10000 Hours*

The rated life of the parallel shaft gearhead and hollow shaft flat gearhead is 10000 hours. The parallel shaft gearhead achieves a rated life of twice as long as that of a conventional gearhead.
*5000 hours for gearhead equipped with 15 W (1/50 HP) geared motor.
●The 50 W (1/15 HP) and 100 W (1/8 HP) parallel shaft gearhead has a tapped hole at the shaft end.

●Features of Hollow Shaft Flat Gearhead

◇Space-Saving and Low-Cost

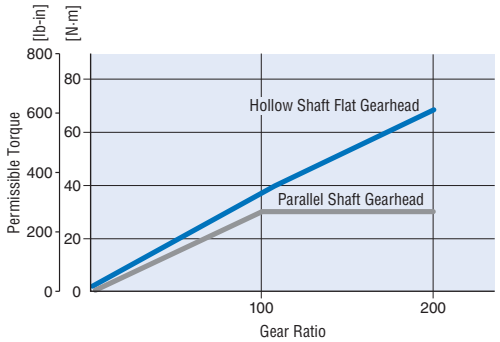
The output shaft can be coupled directly to a driven shaft without using a coupling, which allows you to reduce the size and installation space of your equipment. Since no shaft-coupling parts are needed, the parts cost and labor will also decrease.



[For Three-Phase Motor and Parallel Shaft Gearhead] [For Brushless Motor and Hollow Shaft Flat Gearhead]

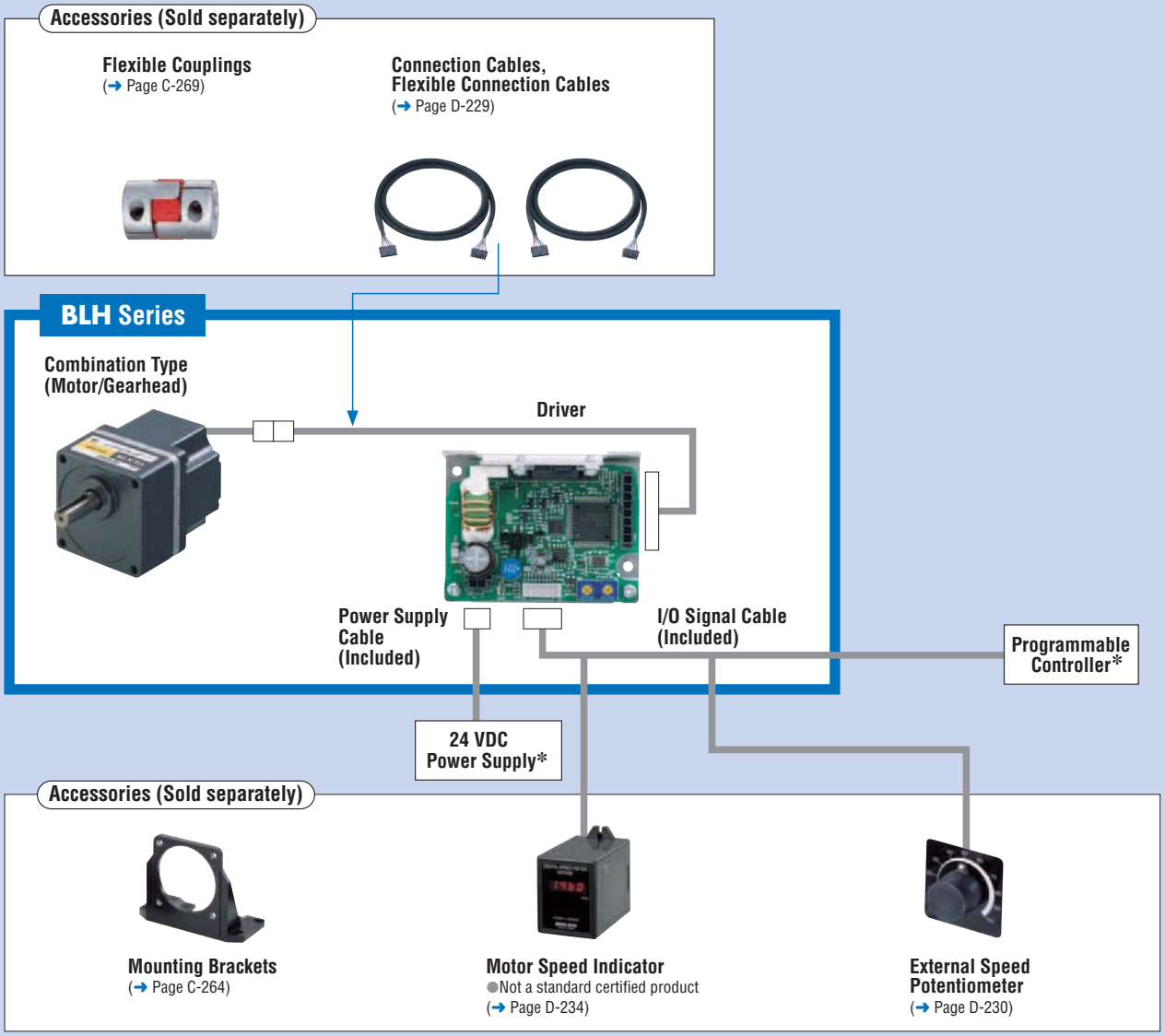
◇High Permissible Torque

While the permissible torque of the parallel shaft gearhead saturates at high gear ratios, the hollow shaft flat gearhead enables the motor torque to be fully utilized.



[Frame Size 90 mm (3.54 in.)]

System Configuration



●Example of System Configuration

BLH Series Combination Type – Parallel Shaft	+	Sold Separately				
		Connection Cable [1.5 m (4.9 ft.)]	Motor Speed Indicator	External Speed Potentiometer	Mounting Bracket	Flexible Coupling
BLH450KC-30		CC02BLH	SDM496	PAVR-20KZ	SOL4M6	MCL5515F10

●The system configuration shown above is an example. Other combinations are available.
*Not supplied

Product Number Code

BLH 2 30 K C - 5 FR

① ② ③ ④ ⑤ ⑥ ⑦

①	Series	**BLH**: **BLH** Series
②	Motor Frame Size	**0**: 42 mm (1.65 in.) **2**: 60 mm (2.36 in.) **4**: 80 mm (3.15 in.) **5**: 90 mm (3.54 in.)
③	Output Power (W)	(Example) **30**: 30 W (1/25 HP)
④	Power Supply Voltage	**K**: 24 VDC
⑤	**C**: Cable Type	
⑥	Gear Ratio/Shaft Type	Number: Gear ratio for combination types: 8 types from **5** to **200** Gear ratio for geared types: 7 types from **5** to **100** **A**: Round Shaft Type
⑦	Blank: Combination Type – Parallel Shaft Gearhead **FR**: Combination Type – Hollow Shaft Flat Gearhead	

Product Line

Combination Type The combination type comes with the motor and its dedicated gearhead pre-assembled which simplifies installation in equipment. Motors and gearheads are also available separately to facilitate changes or repairs.

Geared Type The geared type has an integrated motor and gearhead. The combination of motor and gearhead cannot be changed.

Geared Type/Combination Type – Parallel Shaft Gearhead

Type	Output Power	Model	Gear Ratio
Geared Type	15 W (1/50 HP)	**BLH015K-□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**
Combination Type	30 W (1/25 HP)	**BLH230KC-□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	50 W (1/15 HP)	**BLH450KC-□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
	100 W (1/8 HP)	**BLH5100KC-□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**

The following items are included in each product.
Motor, Driver, Gearhead, I/O Signal Cable, Power Supply Cable, Mounting Screws*1, Parallel Key*2, Operating Manual
*1 Only for combination type
*2 Only for the products with a key slot on the output shaft

Combination Type – Hollow Shaft Flat Gearhead

Output Power	Model	Gear Ratio
30 W (1/25 HP)	**BLH230KC-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
50 W (1/15 HP)	**BLH450KC-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
100 W (1/8 HP)	**BLH5100KC-□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**

The following items are included in each product.
Motor, Driver, Gearhead, I/O Signal Cable, Power Supply Cable, Mounting Screws, Parallel Key, Safety Cover (with screws), Operating Manual

Round Shaft Type

Output Power	Model
15 W (1/50 HP)	**BLH015K-A**
30 W (1/25 HP)	**BLH230KC-A**
50 W (1/15 HP)	**BLH450KC-A**
100 W (1/8 HP)	**BLH5100KC-A**

The following items are included in each product.
Motor, Driver, I/O Signal Cable, Power Supply Cable, Operating Manual

Specifications

15 W (1/50 HP), 30 W (1/25 HP), 50 W (1/15 HP), 100 W (1/8 HP) RoHS

Model						
	Geared Type/Combination Type – Parallel Shaft Gearhead		**BLH015K-□**	**BLH230KC-□**	**BLH450KC-□**	**BLH5100KC-□**
	Combination Type – Hollow Shaft Flat Gearhead		–	**BLH230KC-□FR**	**BLH450KC-□FR**	**BLH5100KC-□FR**
	Round Shaft Type		**BLH015K-A**	**BLH230KC-A**	**BLH450KC-A**	**BLH5100KC-A**
Rated Output Power (Continuous)		W (HP)	15 (1/50)	30 (1/25)	50 (1/15)	100 (1/8)
Power Source	Rated Voltage		24 VDC			
	Permissible Voltage Range		±10%			
	Rated Input Current	A	1.0	2.1	3.1	6.0
	Maximum Input Current	A	2.4	3.7	5.4	9.8
Rated Torque		N·m (oz-in)	0.05 (7.1)	0.12 (17)	0.2 (28)	0.4 (56)
Starting Torque*		N·m (oz-in)	0.075 (10.6)	0.15 (21)	0.24 (34)	0.5 (71)
Rated Speed		r/min	3000	2500		
Speed Control Range		r/min	100～3000			
Round Shaft Type Permissible Load Inertia J		$\times10^{-4}$kg·m^2 (oz-in^2)	0.5 (2.7)	1.8 (9.8)	3.3 (18.1)	5.6 (31)
Rotor Inertia J		$\times10^{-4}$kg·m^2 (oz-in^2)	0.032 (0.175)	0.087 (0.48)	0.23 (1.26)	0.61 (3.3)
Speed Regulation	Load		±0.5% max. (0～Rated torque, at rated speed, at rated voltage, at normal ambient temperature)			
	Voltage		±0.5% max. (Rated voltage ±10%, at rated speed, with no load, at normal ambient temperature)			
	Temperature		±0.5% max. [0～+50°C (+32～+122°F), at rated speed, with no load, at rated voltage]			

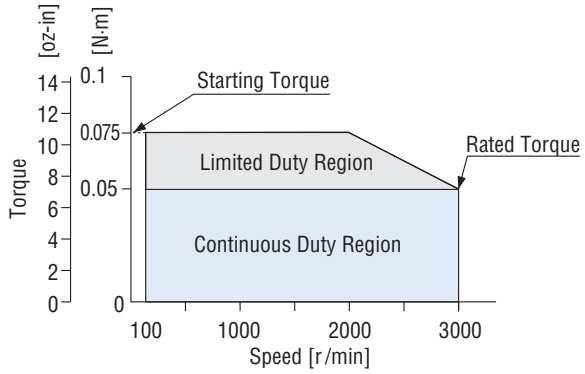
*The time during which the starting torque is effective is no more than 5 seconds and at 2000 r/min or below.
● The values for each specification apply to the motor only.

● Enter the gear ratio in the box (□) within the model name.

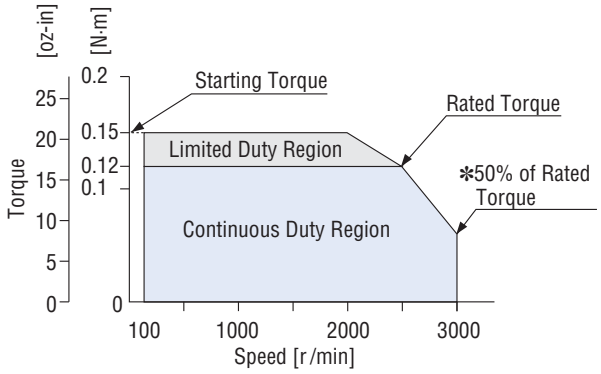
Speed – Torque Characteristics

Continuous Duty Region: Continuous operation is possible in this region.
Limited Duty Region: This region is used primarily when accelerating. When a load that exceeds the rated torque is applied continuously for approximately five seconds, overload protection is activated and the motor coasts to a stop.

BLH015K-□/BLH015K-A

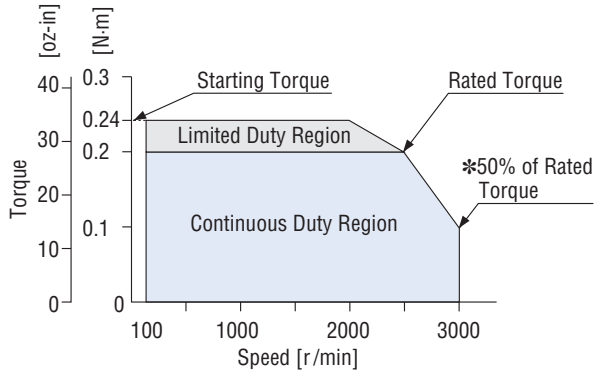


BLH230KC-□/BLH230KC-□FR/BLH230KC-A

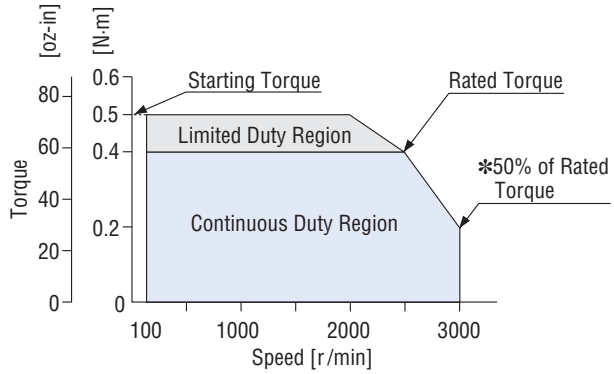


∗Value for 24 VDC with no connection cable

BLH450KC-□/BLH450KC-□FR/BLH450KC-A



BLH5100KC-□/BLH5100KC-□FR/BLH5100KC-A



∗Value for 24 VDC with no connection cable

∗Value for 24 VDC with no connection cable
● For geared types and combination types, the values are for the motor only.
● Enter the gear ratio in the box (□) within the model name.

Common Specifications

Item	Specifications
Speed Setting Method	Select one of the following methods: · Set using the internal speed potentiometer · Set using an accessory external speed potentiometer: **PAVR-20KZ** (20 kΩ, 1/4 W) (Sold separately) · Set using external DC voltage: 0~5 VDC, 1 mA or more (Input impedance 47 kΩ)
Acceleration/Deceleration Time	0.5~10 sec. **BLH015**: at 3000 r/min with no load **BLH230**, **BLH450**, **BLH5100**: at 2500 r/min with no load (The actual speed may change by load condition.) A common value is set using the acceleration/deceleration time potentiometer.
Multi-Speed Setting Method	Switching between 2 speeds One speed is set by the internal speed potentiometer (1 pc), while another speed is set by an external speed potentiometer (accessory **PAVR-20KZ**) or by external DC voltage (0~5 VDC).
Input Signals	C-MOS negative logic input Operated by internal power supply Common to Start/Stop input, Run/Brake input, Direction of rotation input, Speed control method input and Alarm reset input
Output Signals	Open-collector output Operated by external power supply Use condition 26.4 VDC max., 10 mA max. Common to Alarm output and Speed output
Protective Functions*	When the following are activated, the motor will coast to a stop and the Alarm output will be OFF. The alarm LED on the driver will blink for the corresponding number of times shown in ( ). · Overload protection (2): Activated when the motor load exceeds rated torque for a minimum of 5 seconds. · Motor sensor error (3): Activated when the sensor wire inside the motor cable is disconnected during motor operation. · Overvoltage protection (4): Activated when the voltage applied to the driver exceeds 24 VDC by a minimum of approximately 15%, a gravitational operation is performed or a load exceeding the permissible load inertia is driven. · Undervoltage protection (5): Activated when the voltage applied to the driver falls below 24 VDC by a minimum of approximately 25%. · Overspeed protection (6): Activated when the motor speed exceeds 3500 r/min.
Maximum Cable Extension Distance	Motor/Driver Distance: 2 m (6.6 ft.) (when an accessory connection cable is used)
Time Rating	Continuous

∗With the **BLH** Series, the motor speed cannot be controlled in a gravitational operation or other application where the motor shaft is turned by the load. When a load exceeding the permissible load inertia is driven or a gravitational operation is performed, the overvoltage protective function will be activated and the motor will coast to a stop.

General Specifications

Item		Motor	Driver
Insulation Resistance		100 MΩ or more when 500 VDC megger is applied between the windings and the case after continuous operation under normal ambient temperature and humidity.	100 MΩ or more when 500 VDC megger is applied between the power supply terminal and heat sink after continuous operation under normal ambient temperature and humidity.
Dielectric Strength		Sufficient to withstand 0.5 kVAC at 50 Hz applied between the windings and the case for 1 minute after continuous operation under normal ambient temperature and humidity.	Sufficient to withstand 0.5 kVAC at 50 Hz applied between the power supply terminal and heat sink for 1 minute after continuous operation under normal ambient temperature and humidity.
Temperature Rise		50°C (90°F) or less in the windings, and 40°C (72°F) or less in the case*1, as measured by the thermocouple method after continuous operation under normal ambient temperature and humidity.	50°C (90°F) or less in the heat sink, as measured by the thermocouple method after continuous operation under normal ambient temperature and humidity.
Operating Environment	Ambient Temperature	0～+50°C (+32～+122°F) (non-freezing)	
	Ambient Humidity	85% or less (non-condensing)	
	Altitude	Up to 1000 m (3300 ft.) above sea level	
	Atmosphere	No corrosive gases or dust. Cannot be used in a radioactive area, magnetic field, vacuum or other special environment	
	Vibration	Not subject to continuous vibration or excessive impact In conformance with JIS C 60068-2-6, "Sine-wave vibration test method" Frequency range: 10～55 Hz Pulsating amplitude: 0.15 mm (0.006 in.) Sweep direction: 3 directions (X, Y, Z) Number of sweeps: 20 times	
Storage Condition*2	Ambient Temperature	−25～+70°C (−13～+158°F) (non-freezing)	
	Ambient Humidity	85% or less (non-condensing)	
	Altitude	Up to 3000 m (10000 ft.) above sea level	
Thermal Class		UL/CSA standards: 105 (A), EN standards: 120 (E)	–
Degree of Protection	15 W (1/50 HP)	IP40	IP00
	30 W (1/25 HP), 50 W (1/15 HP), 100 W (1/8 HP)	IP65 (Excluding the mounting surface of the round shaft type and connectors)	

*1 For round shaft types, please attach to the heat radiation plate (material: aluminum) of the following sizes to maintain a maximum motor case temperature of 90°C (194°F).
(Except for **BLH015K-A**)
BLH230KC-A: 115×115 mm (4.53×4.53 in.), 5 mm (0.20 in.) thick
BLH450KC-A: 135×135 mm (5.31×5.31 in.), 5 mm (0.20 in.) thick
BLH5100KC-A: 200×200 mm (7.87×7.87 in.), 5 mm (0.20 in.) thick

*2 The storage condition applies to a short period such as a period during transportation.

Note

- Do not measure insulation resistance or perform the dielectric strength test while the motor and driver are connected.

Gearmotor – Torque Table of Geared Type/Combination Type

Geared Type/Combination Type – Parallel Shaft Gearhead

Unit = N·m (lb-in)

Model	Gear Ratio	5	10	15	20	30	50	100	200
	Motor Speed 100～2500 r/min	20～500	10～250	6.7～167	5～125	3.3～83	2～50	1～25	0.5～12.5
	Motor Speed 3000 r/min	600	300	200	150	100	60	30	15
BLH015K-□	100～3000 r/min	0.23 (2.0)	0.45 (3.9)	0.68 (6.0)	0.86 (7.6)	1.3 (11.5)	2 (17.7)	2 (17.7)	–
BLH230KC-□	100～2500 r/min	0.54 (4.7)	1.1 (9.7)	1.6 (14.1)	2.2 (19.4)	3.1 (27)	5.2 (46)	6 (53)	6 (53)
	3000 r/min	0.27 (2.3)	0.54 (4.7)	0.81 (7.1)	1.1 (9.7)	1.5 (13.2)	2.6 (23)	5.2 (46)	6 (53)
BLH450KC-□	100～2500 r/min	0.90 (7.9)	1.8 (15.9)	2.7 (23)	3.6 (31)	5.2 (46)	8.6 (76)	16 (141)	16 (141)
	3000 r/min	0.45 (3.9)	0.90 (7.9)	1.4 (12.3)	1.8 (15.9)	2.6 (23)	4.3 (38)	8.6 (76)	16 (141)
BLH5100KC-□	100～2500 r/min	1.8 (15.9)	3.6 (31)	5.4 (47)	7.2 (63)	10.3 (91)	17.2 (152)	30 (260)	30 (260)
	3000 r/min	0.90 (7.9)	1.8 (15.9)	2.7 (23)	3.6 (31)	5.2 (46)	8.6 (76)	17.2 (152)	30 (260)

- A colored background ( ) indicates gear shaft rotation in the same direction as the motor shaft, while the others rotate in the opposite direction.

Combination Type – Hollow Shaft Flat Gearhead

Unit = N·m (lb-in)

Model	Gear Ratio	5	10	15	20	30	50	100	200
	Motor Speed 100～2500 r/min	20～500	10～250	6.7～167	5～125	3.3～83	2～50	1～25	0.5～12.5
	Motor Speed 3000 r/min	600	300	200	150	100	60	30	15
BLH230KC-□FR	100～2500 r/min	0.48 (4.2)	1.0 (8.8)	1.5 (13.2)	2.0 (17.7)	3.1 (27)	5.1 (45)	10.2 (90)	17 (150)
	3000 r/min	0.24 (2.1)	0.51 (4.5)	0.77 (6.8)	1.0 (8.8)	1.5 (13.2)	2.6 (23)	5.1 (45)	10.2 (90)
BLH450KC-□FR	100～2500 r/min	0.85 (7.5)	1.7 (15)	2.6 (23)	3.4 (30)	5.1 (45)	8.5 (75)	17 (150)	34 (300)
	3000 r/min	0.43 (3.8)	0.85 (7.5)	1.3 (11.5)	1.7 (15)	2.6 (23)	4.3 (38)	8.5 (75)	17 (150)
BLH5100KC-□FR	100～2500 r/min	1.7 (15)	3.4 (30)	5.1 (45)	6.8 (60)	10.2 (90)	17 (150)	34 (300)	68 (600)
	3000 r/min	0.85 (7.5)	1.7 (15)	2.6 (23)	3.4 (30)	5.1 (45)	8.5 (75)	17 (150)	34 (300)

- The flat gearhead rotates in the opposite direction to the motor when viewed from the front of the gearhead. It rotates in the same direction as the motor when viewed from the rear (motor mounting surface) of the gearhead. Rotation direction of the hollow shaft flat gearhead ➜ Page D-243

- Enter the gear ratio in the box (□) within the model name.

Permissible Overhung Load and Permissible Thrust Load

Geared Type/Combination Type – Parallel Shaft Gearhead

Model	Gear Ratio	Permissible Overhung Load				Permissible Thrust Load	
		10 mm (0.39 in.) from shaft end		20 mm (0.79 in.) from shaft end			
		N	lb.	N	lb.	N	lb.
BLH015K-□	**5, 10, 15, 20, 30, 50, 100**	50	11.2	–	–	30	6.7
BLH230KC-□	**5**	100	22	150	33	40	9
	10, 15, 20	150	33	200	45		
	30, 50, 100, 200	200	45	300	67		
BLH450KC-□	**5**	200	45	250	56	100	22
	10, 15, 20	300	67	350	78		
	30, 50, 100, 200	450	101	550	123		
BLH5100KC-□	**5**	300	67	400	90	150	33
	10, 15, 20	400	90	500	112		
	30, 50, 100, 200	500	112	650	146		

Combination Type – Hollow Shaft Flat Gearhead

Model	Gear Ratio	Permissible Overhung Load				Permissible Thrust Load	
		10 mm (0.39 in.) from mounting surface of gearhead		20 mm (0.79 in.) from mounting surface of gearhead			
		N	lb.	N	lb.	N	lb.
BLH230KC-□FR	**5, 10**	450	101	370	83	200	45
	15, 20, 30, 50, 100, 200	500	112	400	90		
BLH450KC-□FR	**5, 10**	800	180	660	148	400	90
	15, 20, 30, 50, 100, 200	1200	270	1000	220		
BLH5100KC-□FR	**5, 10**	900	200	770	173	500	112
	15, 20	1300	290	1110	240		
	30, 50, 100, 200	1500	330	1280	280		

● The permissible overhung load can also be calculated with a formula. Permissible overhung load calculation ➜ Page D-242

Round Shaft Type

Model	Permissible Overhung Load				Permissible Thrust Load
	10 mm (0.39 in.) from shaft end		20 mm (0.79 in.) from shaft end		
	N	lb.	N	lb.	
BLH015K-A	50	11.2	–	–	The permissible thrust load should not be greater than half the motor mass.
BLH230KC-A	70	15.7	100	22	
BLH450KC-A	120	27	140	31	
BLH5100KC-A	160	36	170	38	

Permissible Load Inertia J of Geared Type/Combination Type

Geared Type/Combination Type – Parallel Shaft Gearhead

Unit = $\times 10^{-4}$ kg·m^2 (oz-in^2)

Model \ Gear Ratio		5	10	15	20	30	50	100	200
BLH015K-□		3 (16)	14 (77)	30 (164)	50 (270)	120 (660)	300 (1640)	600 (3300)	–
	When instantaneous stop or instantaneous bi-directional operation is performed	0.4 (2.2)	1.7 (9.3)	3.9 (21)	7.0 (38)	15.7 (86)	43.7 (240)	43.7 (240)	–
BLH230KC-□		12 (66)	50 (270)	110 (600)	200 (1090)	370 (2000)	920 (5000)	2500 (13700)	5000 (27000)
	When instantaneous stop or instantaneous bi-directional operation is performed	1.55 (8.5)	6.2 (34)	14.0 (77)	24.8 (136)	55.8 (310)	155 (850)	155 (850)	155 (850)
BLH450KC-□		22 (120)	95 (520)	220 (1200)	350 (1910)	800 (4400)	2200 (12000)	6200 (34000)	12000 (66000)
	When instantaneous stop or instantaneous bi-directional operation is performed	5.5 (30)	22 (120)	49.5 (270)	88 (480)	198 (1080)	550 (3000)	550 (3000)	550 (3000)
BLH5100KC-□		45 (250)	190 (1040)	420 (2300)	700 (3800)	1600 (8800)	4500 (25000)	12000 (66000)	25000 (137000)
	When instantaneous stop or instantaneous bi-directional operation is performed	25 (137)	100 (550)	225 (1230)	400 (2200)	900 (4900)	2500 (13700)	2500 (13700)	2500 (13700)

Combination Type – Hollow Shaft Flat Gearhead

Unit = $\times 10^{-4}$ kg·m^2 (oz-in^2)

Model \ Gear Ratio		5	10	15	20	30	50	100	200
BLH230KC-□FR		12 (66)	50 (270)	110 (600)	200 (1090)	370 (2000)	920 (5000)	2500 (13700)	5000 (27000)
	When instantaneous stop or instantaneous bi-directional operation is performed	1.55 (8.5)	6.2 (34)	14.0 (77)	24.8 (136)	55.8 (310)	155 (850)	155 (850)	155 (850)
BLH450KC-□FR		22 (120)	95 (520)	220 (1200)	350 (1910)	800 (4400)	2200 (12000)	6200 (34000)	12000 (66000)
	When instantaneous stop or instantaneous bi-directional operation is performed	5.5 (30)	22 (120)	49.5 (270)	88 (480)	198 (1080)	550 (3000)	550 (3000)	550 (3000)
BLH5100KC-□FR		45 (250)	190 (1040)	420 (2300)	700 (3800)	1600 (8800)	4500 (25000)	12000 (66000)	25000 (137000)
	When instantaneous stop or instantaneous bi-directional operation is performed	25 (137)	100 (550)	225 (1230)	400 (2200)	900 (4900)	2500 (13700)	2500 (13700)	2500 (13700)

● Enter the gear ratio in the box (□) within the model name.

Dimensions Unit = mm (in.)

● Mounting screws are included with the combination type. Dimensions for mounting screws ➜ Page D-242

●15 W (1/50 HP)

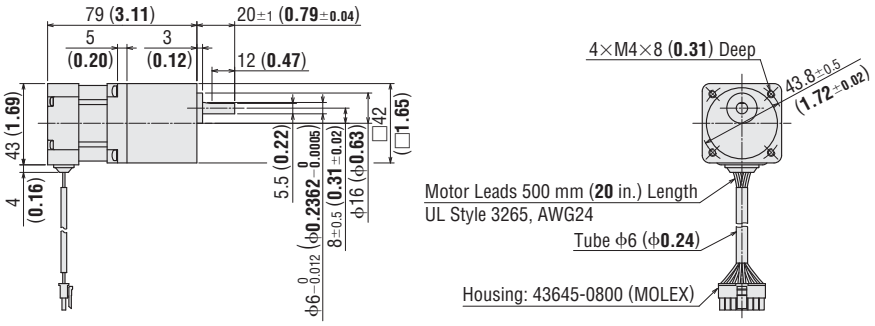
◇Geared Type

BLH015K-□

Geared Motor: BLHM015K-□

Mass: 0.5 kg (1.10 lb.)

DXF A428



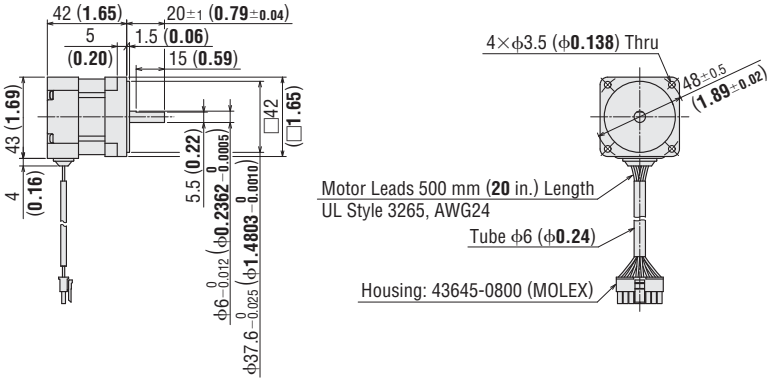
◇Round Shaft Type

BLH015K-A

Motor: BLHM015K-A

Mass: 0.25 kg (0.55 lb.)

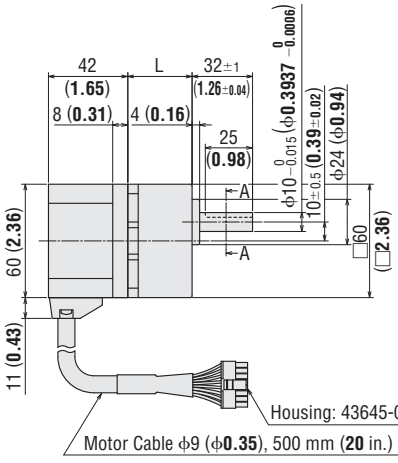
DXF A429

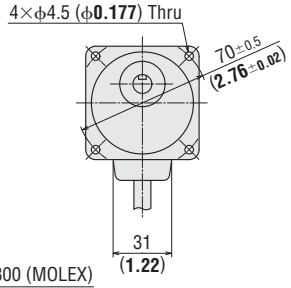


●30 W (1/25 HP)

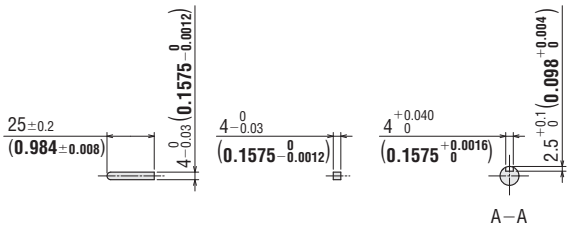
◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLH230KC-□	BLHM230KC-GFS	GFS2G□	**5~20**	34 (1.34)	1.0 (2.2)	A430AU
			30~100	38 (1.50)		A430BU
			200	43 (1.69)		A430CU





◇Key and Key Slot (Included)



● Enter the gear ratio in the box (□) within the model name.

◇Motor/Hollow Shaft Flat Gearhead

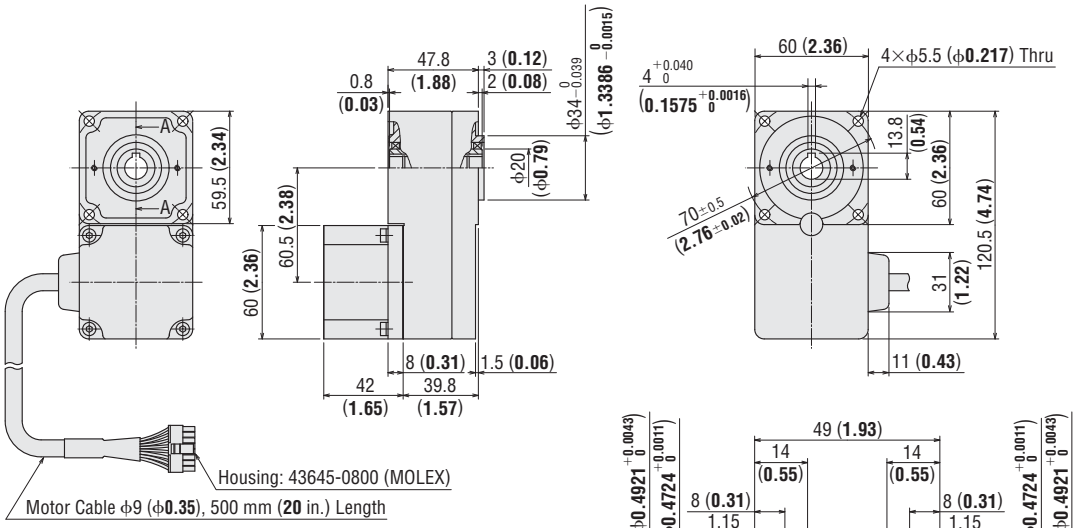
BLH230KC-□FR

Motor: BLHM230KC-GFS

Gearhead: GFS2G□FR

Mass: 1.3 kg (2.9 lb.) (Including gearhead)

DXF A431U



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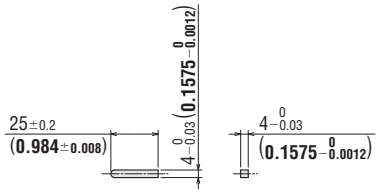


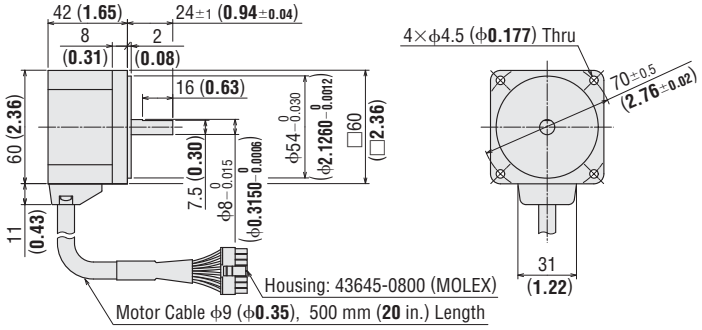
◇Round Shaft Type

BLH230KC-A

Motor: BLHM230KC-A

Mass: 0.5 kg (1.1 lb.)

DXF A432U

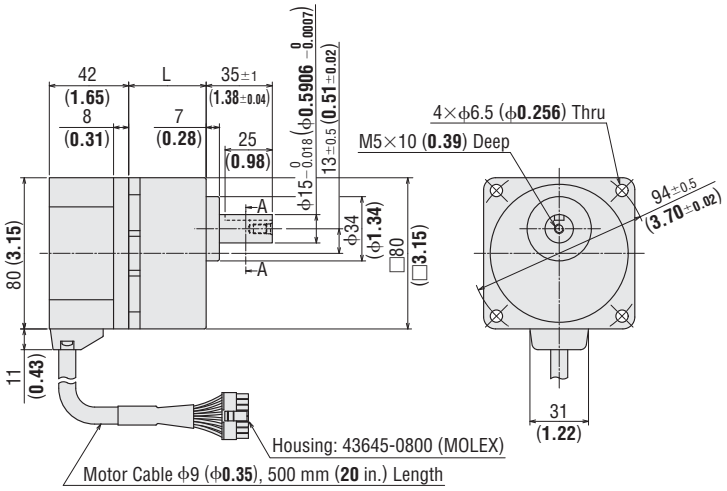


● Enter the gear ratio in the box (□) within the model name.

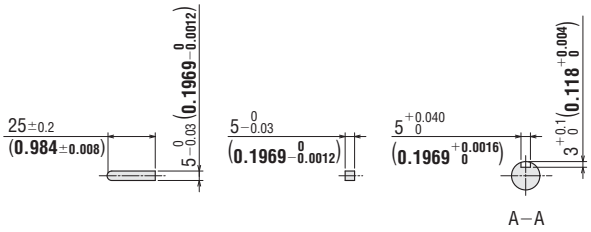
●50 W (1/15 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLH450KC-□	BLHM450KC-GFS	GFS4G□	**5~20**	41 (1.61)	1.8 (4.0)	A433AU
			30~100	46 (1.81)		A433BU
			200	51 (2.01)		A433CU



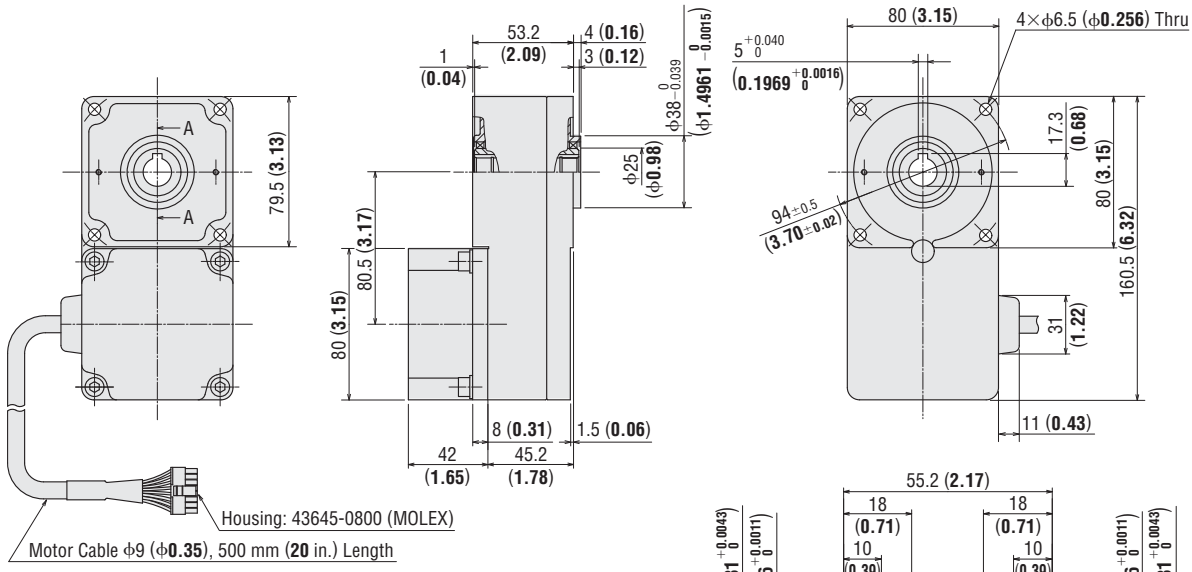
◇Key and Key Slot (Included)



◇Motor/Hollow Shaft Flat Gearhead

BLH450KC-□FR

Motor: BLHM450KC-GFS
Gearhead: GFS4G□FR
Mass: 2.4 kg (5.3 lb.) (Including gearhead)
DXF A434U



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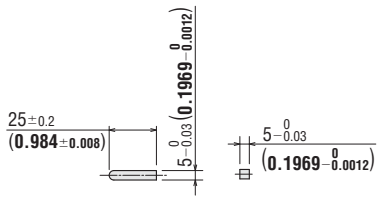
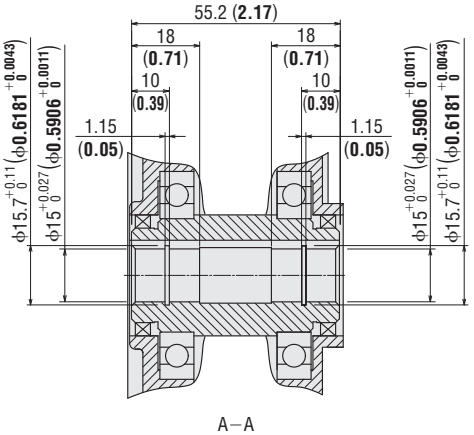




● Enter the gear ratio in the box (□) within the model name.

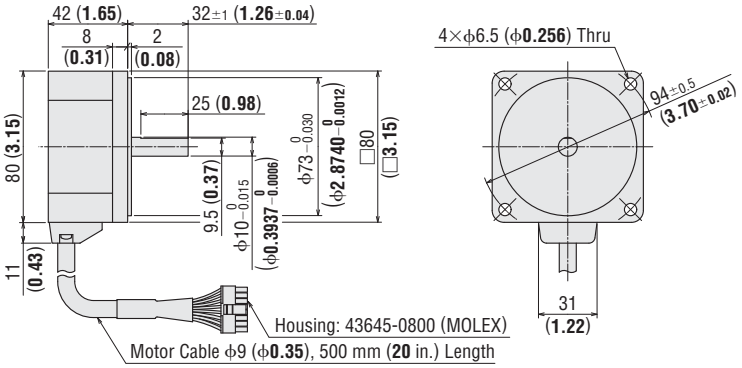
◇Round Shaft Type

BLH450KC-A

Motor: BLHM450KC-A

Mass: 0.8 kg (1.76 lb.)

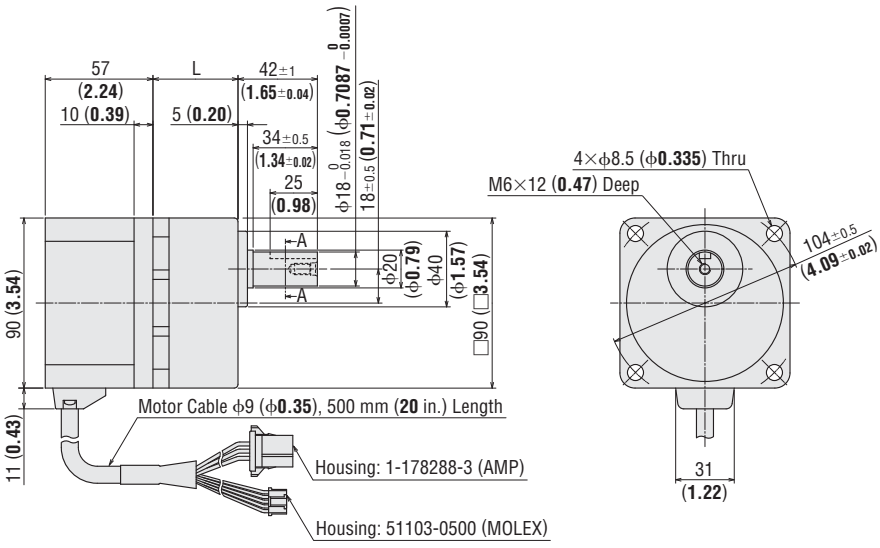
DXF A435U



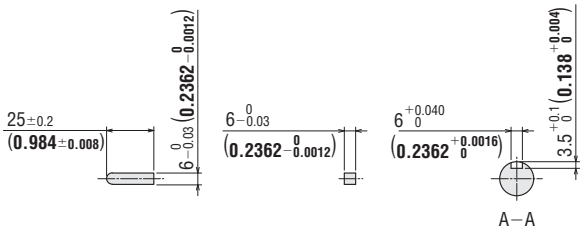
●100 W (1/8 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	Mass kg (lb.)	DXF
BLH5100KC-□	BLHM5100KC-GFS	GFS5G□	**5**～**20**	45 (1.77)	2.9 (6.4)	A436AU
			30～**100**	58 (2.28)		A436BU
			200	64 (2.52)		A436CU



◇Key and Key Slot (Included)



● Enter the gear ratio in the box (□) within the model name.

◇Motor/Hollow Shaft Flat Gearhead

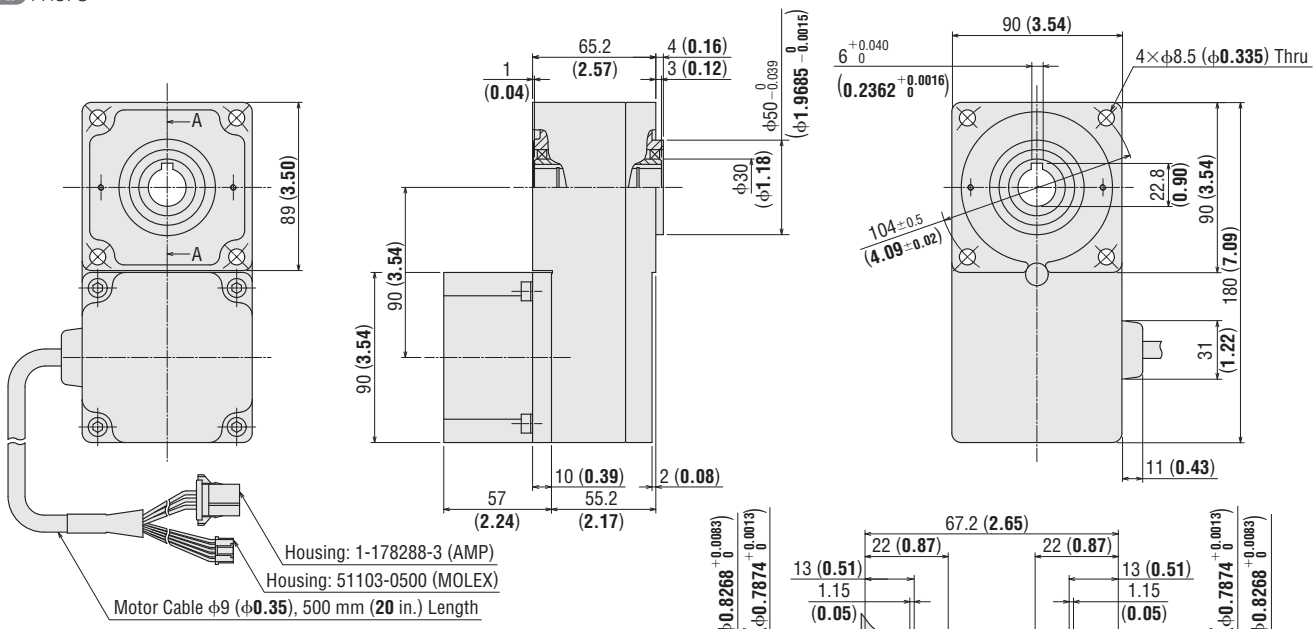
BLH5100KC-□FR

Motor: BLHM5100KC-GFS

Gearhead: GFS5G□FR

Mass: 3.6 kg (7.9 lb.) (Including gearhead)

DXF A437U



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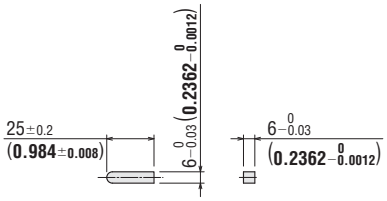


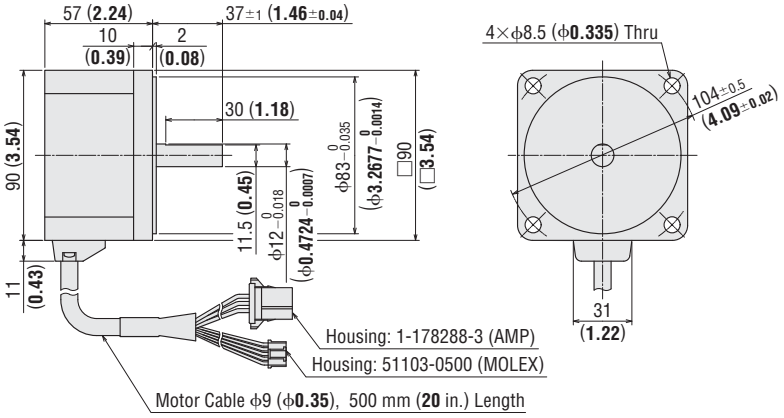
◇Round Shaft Type

BLH5100KC-A

Motor: BLHM5100KC-A

Mass: 1.4 kg (3.1 lb.)

DXF A438U



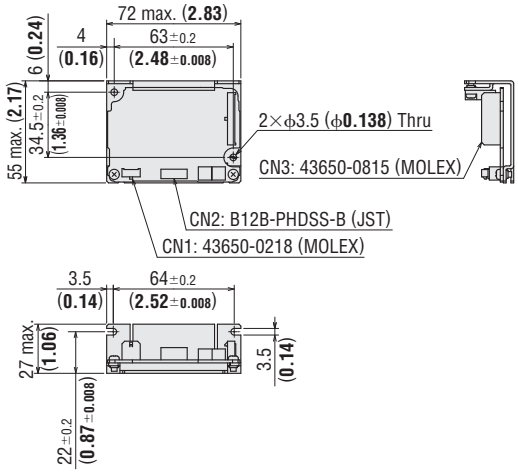
● Enter the gear ratio in the box (□) within the model name.

◇Driver

BLHD15K, BLHD30K, BLHD50K

Mass: 0.1 kg (0.22 lb.)

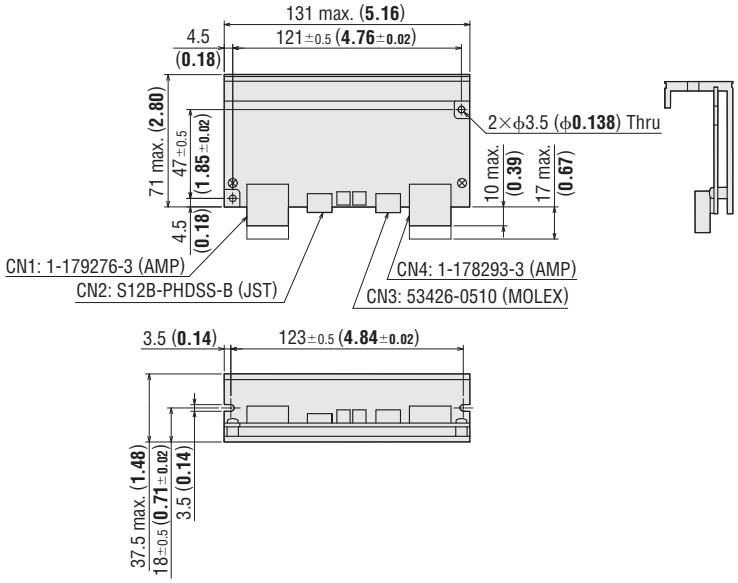
DXF A439



BLHD100K

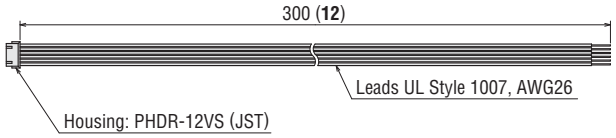
Mass: 0.3 kg (0.66 lb.)

DXF A440



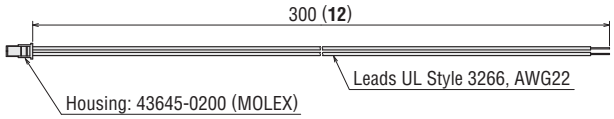
◇Driver Input/Output Signal Cable (Included)

● For 15 W (1/50 HP), 30 W (1/25 HP), 50 W (1/15 HP), 100 W (1/8 HP)

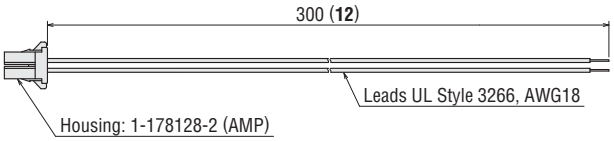


◇Driver Power Supply Cable (Included)

● For 15 W (1/50 HP), 30 W (1/25 HP), 50 W (1/15 HP)



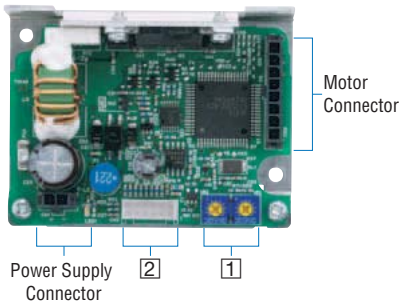
● For 100 W (1/8 HP)



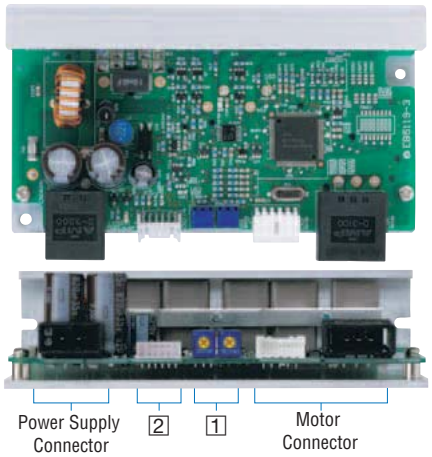
Connection and Operation

Names and Functions of Driver Parts

◇15 W (1/50 HP), 30 W (1/25 HP), 50 W (1/15 HP)



◇100 W (1/8 HP)



1 Speed Potentiometers

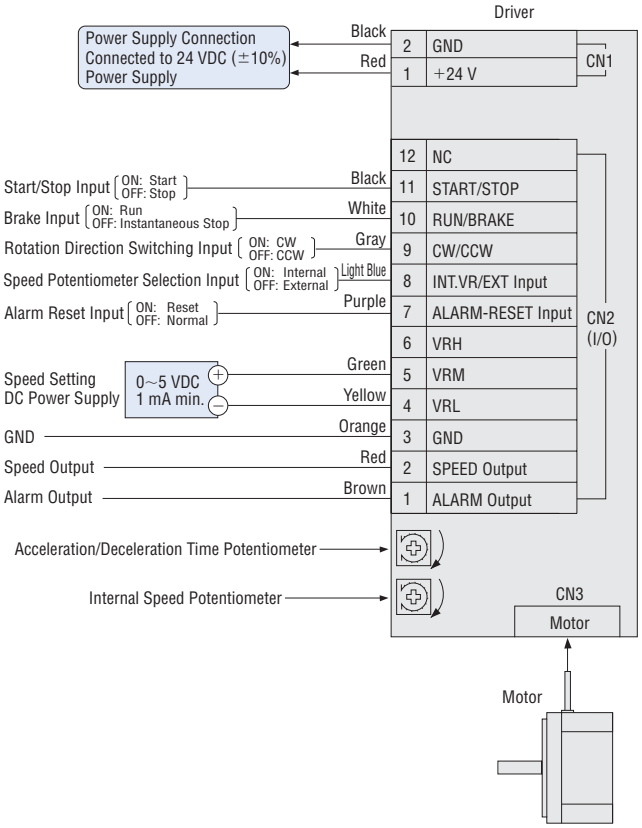
Indication	Potentiometer Name	Function
VR1	Internal Speed Potentiometer	Set and adjust the operating speed of the motor.
VR2	Acceleration/Deceleration Time Potentiometer	Set a common acceleration/deceleration time in the range of 0.5 to 10 seconds.

2 Input/Output Signals

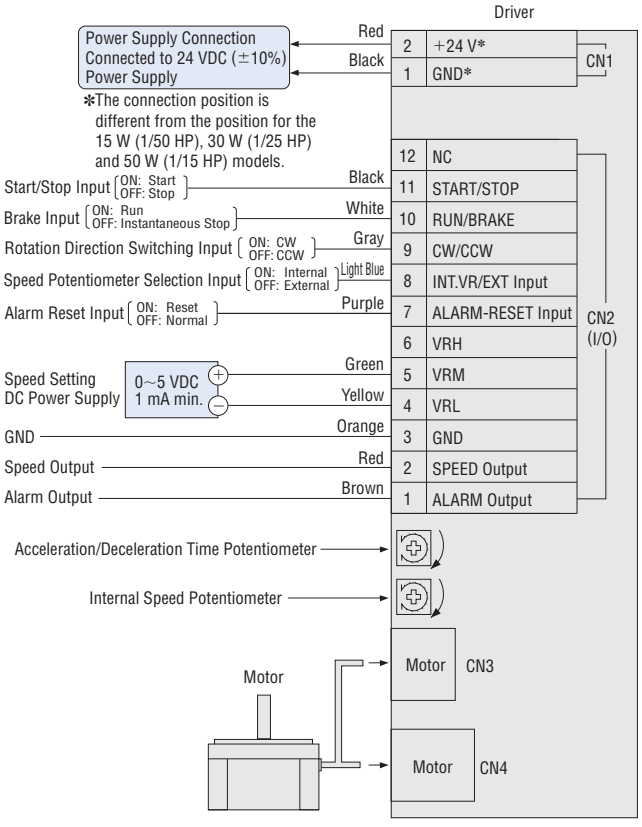
Indication	Input/Output	Pin No.	Function
CN2	Output	1	ALARM Output
		2	SPEED Output
	I/O Signal Common	3	GND
	Analog Input	4	VRL Input
		5	VRM Input
		6	VRH Input
	Input	7	ALARM-RESET Input
		8	INT.VR/EXT Input
		9	CW/CCW Input
		10	RUN/BRAKE Input
		11	START/STOP Input
		12	NC

Connection Diagrams

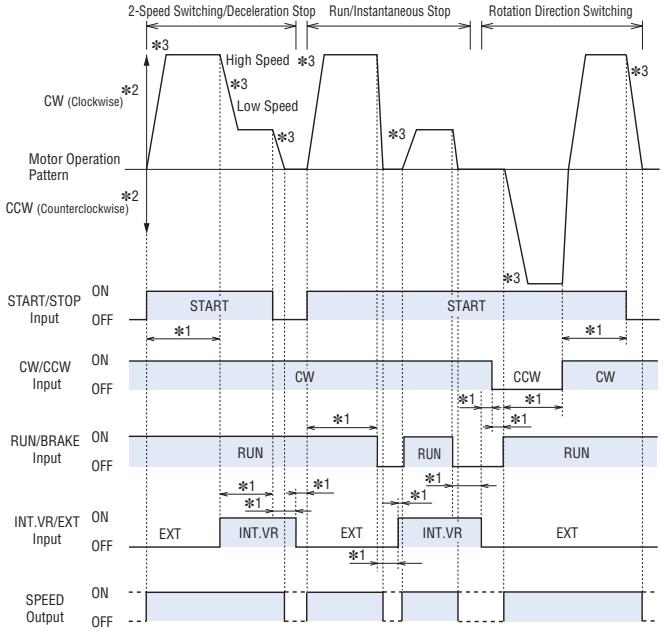
◇15 W (1/50 HP), 30 W (1/25 HP), 50 W (1/15 HP)



◇100 W (1/8 HP)



●Timing Chart



- All operations of run/stop, instantaneous stop and rotation direction switching operations can be controlled with the START/STOP, RUN/BRAKE and CW/CCW signals.
- If both the START/STOP signal and the RUN/BRAKE signal are set to ON, the motor rotates. The motor will accelerate over the time set by the acceleration/deceleration time potentiometer. During this time, if the CW/CCW signal is set to ON, the motor rotates clockwise as viewed from the shaft end of the motor; if the CW/CCW signal is set to OFF, the motor rotates in the counterclockwise direction.
- If the RUN/BRAKE signal is set to OFF while the START/STOP signal is ON, the motor stops instantaneously. If the START/STOP signal is set to OFF while the RUN/BRAKE signal is ON, the motor will stop with deceleration time set by the acceleration/deceleration time potentiometer.
- The duration of each input signal must be 10 ms or longer.
- Do not operate (turn ON/OFF) two or more input signals simultaneously. There must be a minimum interval of 10 ms before another input signal can be operated after an input signal has been operated.

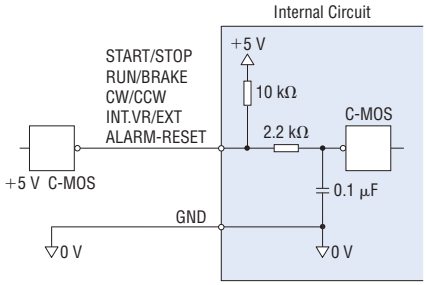
∗1 At least 10 ms
∗2 The direction applies to the motor alone. The specific direction will vary depending on the gear ratio.
∗3 The motor will start/stop over the time set by the acceleration/deceleration time potentiometer.

●Input/Output Signal Circuits

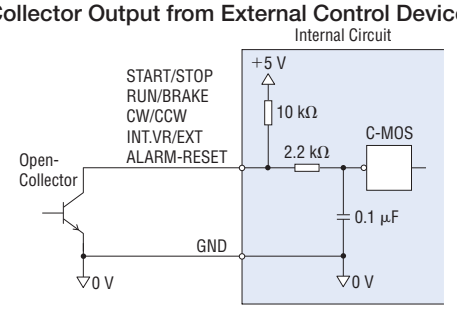
◇Input Circuit

The driver's signal inputs use the C-MOS input method.
The signal status indicates a voltage level of 0 to 0.5 VDC when the signal is ON, or 4 to 5 VDC when it is OFF.

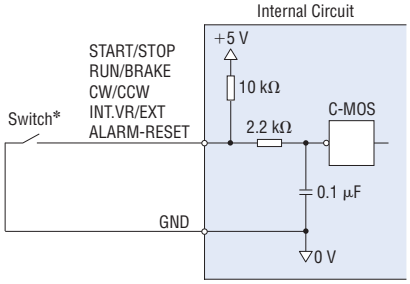
• 5 VDC C-MOS Output from External Control Device



• Open-Collector Output from External Control Device

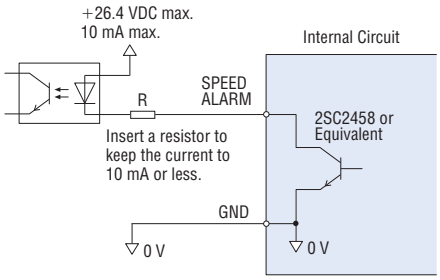


• Switch Connection



∗Use a switch capable of opening/closing the current flow at 5 VDC, 1 mA maximum.

◇Output Circuit

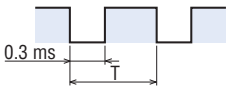


◇SPEED Output

The system outputs pulse signals (with a width of 0.3 ms) at a rate of 30 pulses per rotation of the motor output shaft synchronized with the motor operation.
You can measure the SPEED output frequency and calculate the motor speed.

$$\text{Motor speed (r/min)} = \frac{\text{SPEED output frequency [Hz]}}{30} \times 60$$

$$\text{SPEED output frequency (Hz)} = \frac{1}{T}$$



◇ALARM Output

The ALARM output is normally ON and goes OFF when there is an alarm.

◇ALARM-RESET

When the motor is stopped, setting this signal ON, then returning it to OFF resets the alarm.
Please return either the START/STOP input or the RUN/BRAKE input to OFF before inputting the ALARM-RESET. The ALARM-RESET is not accepted if both these signals are ON.

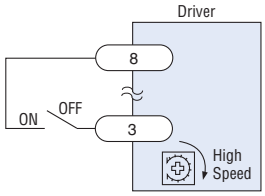
Notes

- Output signal is open-collector output, so an external power supply (Vcc) is required.
- Use a power supply of no more than 26.4 VDC and connect a limit resistor (R) so that the output current does not exceed 10 mA. When using neither the speed output function nor the alarm output function, this connection is not required.

●Speed Setting Method

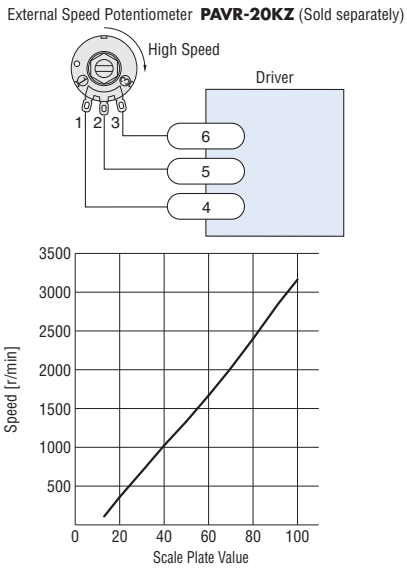
◇Internal Speed Potentiometer

When INT.VR/EXT input is set to ON, the speed can be set with the internal speed potentiometer.
There is no need for this connection when the internal speed potentiometer is not used.



◇External Speed Potentiometer (Sold separately)

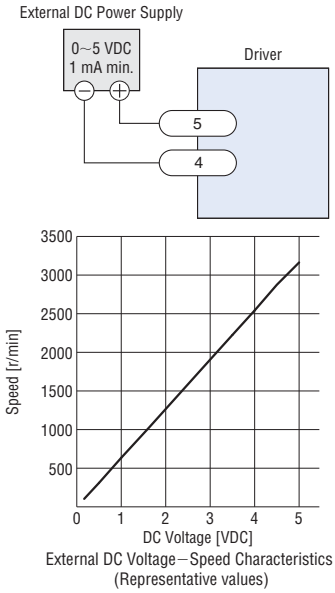
When separating the motor speed setting from the driver, connect the accessory external speed potentiometer as follows.



External Speed Potentiometer Scale—Speed Characteristics
(Representative values)

◇External DC Voltage

When setting the motor speed with an external DC voltage, do so in the following manner.



External DC Voltage—Speed Characteristics
(Representative values)

Note

- The speed in the graph represents the speed of a motor alone. The gearhead output shaft speed of the combination type or geared type is calculated by dividing the graph speed by the gear ratio.

●Multi-Motor Control

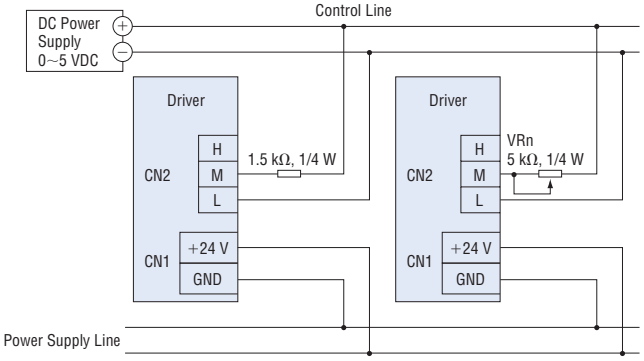
Two or more sets of motors and drivers can be operated at the same speed by using a DC power supply or an external speed potentiometer.

◇When External DC Power Supply is Used

- Use a DC power supply with current capacity equal to or greater than the value obtained by the following expression.

  Current capacity (N is the number of drivers) I = 1×N (mA)
  Example: When two drivers are used, current capacity should be at least 2 mA.

- Connect the other input/output lines to each driver individually.
- Motor speed differences can be adjusted by connecting a resistor of 1.5 kΩ, 1/4 W to the M terminal of the first driver, and a 5 kΩ, 1/4 W variable resistor (VRn) to the M terminals of the other drivers.



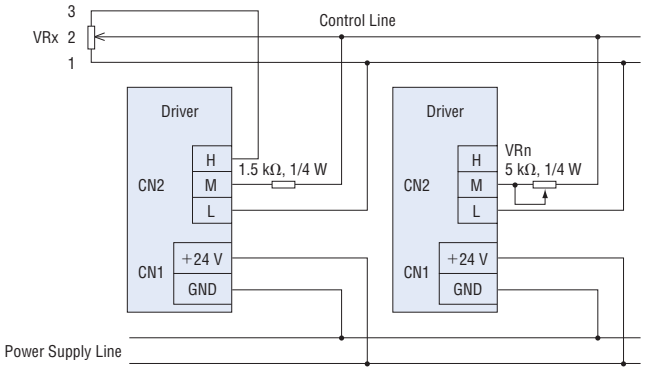
◇When External Speed Potentiometer is Used

As shown below, make the power supply line and the speed control line common to set the speed at VRx.

- The required resistance of the external speed potentiometer is calculated by the following expression.

  Resistance value (N is the number of drivers) VRx = 20/N (kΩ), N/4 (W)
  Example: When two drivers are used, the resistance is 10 kΩ, 1/2 W.

- Connect the other input/output lines to each driver individually.
- Motor speed differences can be adjusted by connecting a resistor of 1.5 kΩ, 1/4 W to the M terminal of the first driver, and a 5 kΩ, 1/4 W variable resistor (VRn) to the M terminals of the other drivers.
- No more than five motors should be operated simultaneously when using the external speed potentiometer.



List of Motor and Driver Combinations

●Geared Type

The geared type has an integrated motor and gearhead. The combination of motor and gearhead cannot be changed.

Output Power	Model	Geared Motor Model	Driver Model
15 W (1/50 HP)	**BLH015K-□**	BLHM015K-□	BLHD15K

●Combination Type – Parallel Shaft Gearhead

The combination type comes with the motor and parallel shaft gearhead pre-assembled.

Output Power	Model	Motor Model	Gearhead Model	Driver Model
30 W (1/25 HP)	**BLH230KC-□**	BLHM230KC-GFS	GFS2G□	BLHD30K
50 W (1/15 HP)	**BLH450KC-□**	BLHM450KC-GFS	GFS4G□	BLHD50K
100 W (1/8 HP)	**BLH5100KC-□**	BLHM5100KC-GFS	GFS5G□	BLHD100K

●Combination Type – Hollow Shaft Flat Gearhead

The combination type comes with the motor and hollow shaft flat gearhead pre-assembled.

Output Power	Model	Motor Model	Gearhead Model	Driver Model
30 W (1/25 HP)	**BLH230KC-□FR**	BLHM230KC-GFS	GFS2G□FR	BLHD30K
50 W (1/15 HP)	**BLH450KC-□FR**	BLHM450KC-GFS	GFS4G□FR	BLHD50K
100 W (1/8 HP)	**BLH5100KC-□FR**	BLHM5100KC-GFS	GFS5G□FR	BLHD100K

●Round Shaft Type

Output Power	Model	Motor Model	Driver Model
15 W (1/50 HP)	**BLH015K-A**	BLHM015K-A	BLHD15K
30 W (1/25 HP)	**BLH230KC-A**	BLHM230KC-A	BLHD30K
50 W (1/15 HP)	**BLH450KC-A**	BLHM450KC-A	BLHD50K
100 W (1/8 HP)	**BLH5100KC-A**	BLHM5100KC-A	BLHD100K

● Enter the gear ratio in the box (□) within the model name.

BLV Series

For details on this product please refer to our website, contact technical support or your nearest Oriental Motor sales office.
www.orientalmotor.com

Introducing the new high power, DC input **BLV** Series brushless motor and driver with output options of 200 W (1/4 HP) to 400 W (1/2 HP).
Communication control through I/O or RS-485 is available to support a wide variety of applications.

Features

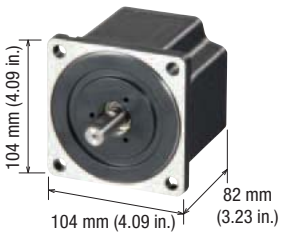
●DC Power Supply Input, High Power Output Options of 200 W (1/4 HP) to 400 W (1/2 HP), Compact Motor

The **BLV** Series are compact, DC input brushless motors and drivers with output options of 200 W (1/4 HP) to 400 W (1/2 HP).
An extensive variety of motors lets you select the model that best suits your specific application.

Output Power		200 W (1/4 HP)	400 W (1/2 HP)
Frame Size		□104 mm (□4.09 in.)	□104 mm (□4.09 in.)
Power Supply Voltage		24 VDC	48 VDC
Motor Type	Standard Type	●	●
	Electromagnetic Brake Type	●	●

Three Types Available (Shown below are standard type models):

Combination Type – Parallel Shaft Gearhead



Round Shaft Type

Combination Type – Hollow Shaft Flat Gearhead

*For gear ratios 5 to 20.

●Features of the Hollow Shaft Flat Gearhead

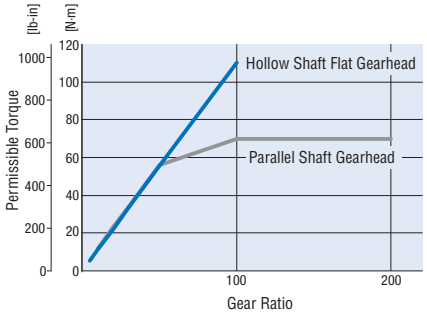
□104 mm (□4.09 in.), space-saving, hollow shaft flat gearhead has been added to the lineup.

Combination Motor Output	Gear Ratio	Rated Life
200 W (1/4 HP), 400 W (1/2 HP)	**5***, **10**, **15**, **20**, **30**, **50**, **100**	5000 hrs.

*Only compatible with the 400 W (1/2 HP) type.

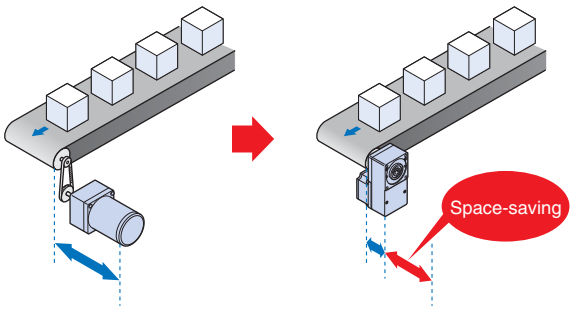
◇Permissible Torque without Saturation

The hollow shaft flat gearhead enables permissible torque without saturation so the motor torque can be fully utilized.



◇Space-saving

The output shaft can be coupled directly to a driven shaft without using a coupling, which allows you to reduce the size and installation space of your equipment.



[For Three-Phase Motor and Parallel Shaft Gearhead]

[For Brushless Motor and Hollow Shaft Flat Gearhead]

●Comes in an Electromagnetic Brake Type

The electromagnetic brake type is suitable for position holding during standstill or gravitational operation. Note that vertical drive (gravitational operation) requires motors of a specific power supply.

Drive System		Standard Type	Electromagnetic Brake Type
Horizontal Drive	Switching Power Supply	●*	●*
	Battery	●	●
Vertical Drive (Gravitational Operation)	Switching Power Supply	—	—
	Battery	—	●

*Power supply limits depend on use. Please contact the nearest Oriental Motor sales office for details.

●Equipped with Functions to Facilitate Battery Drive

- Capable of driving even if the battery voltage is low
- A warning output notifies when the battery voltage is low

●Extended Functions

Functions can be extended and settings shown on a digital display by using a separately sold control module (**OPX-2A**). It can also be used in RS-485 communication mode.

Control Module
OPX-2A

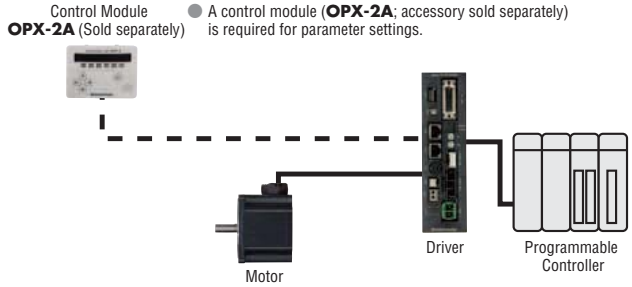
Item	Standard Model	Extended Function
Specifications	· Speed Control Range: 100～4000 r/min (speed range 40:1) · Speed Regulation: ±0.5%	· Speed Control Range: 80～4000 r/min (speed range 50:1) · Speed Regulation: ±0.2%
Function	· Speed setting (internal speed potentiometer, external analog setting) · Acceleration time, deceleration time · Torque limiting	Various Display Functions: Operating speed (setting of gear ratio and speed increasing ratio), conveyor transportation speed, load factor, alarm code, warning code, I/O monitor · Operating data digital settings (speed, torque limiting, acceleration time, deceleration time can be set up to 8 points) · I/O signal allocation, test operation · Data copy

●Selectable Dual Control Method

Control from a programmable controller can be I/O control or RS-485 communication control.

◇I/O Control System

Operation can be executed easily with I/O control.



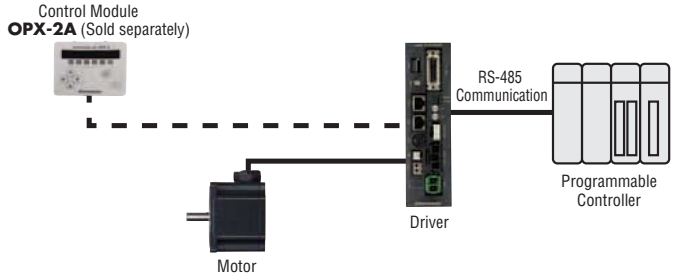
●Control Method for Data Settings and Operation Commands

Operating Data and Parameter Settings		Operation Commands (FWD, REV, etc.)
Operating Data	Driver potentiometer, Control module (**OPX-2A**)	I/O
Parameters	Control module (**OPX-2A**)	

◇RS-485 Communication System

RS-485 communication lets you set operating data and parameters and enter operation commands. A single programmable controller connects up to 31 drivers and provides multi-axis synchronous starting.

The protocol of the RS-485 communication system supports Modbus RTU, allowing it to easily connect with programmable controllers, touch panels and other devices.



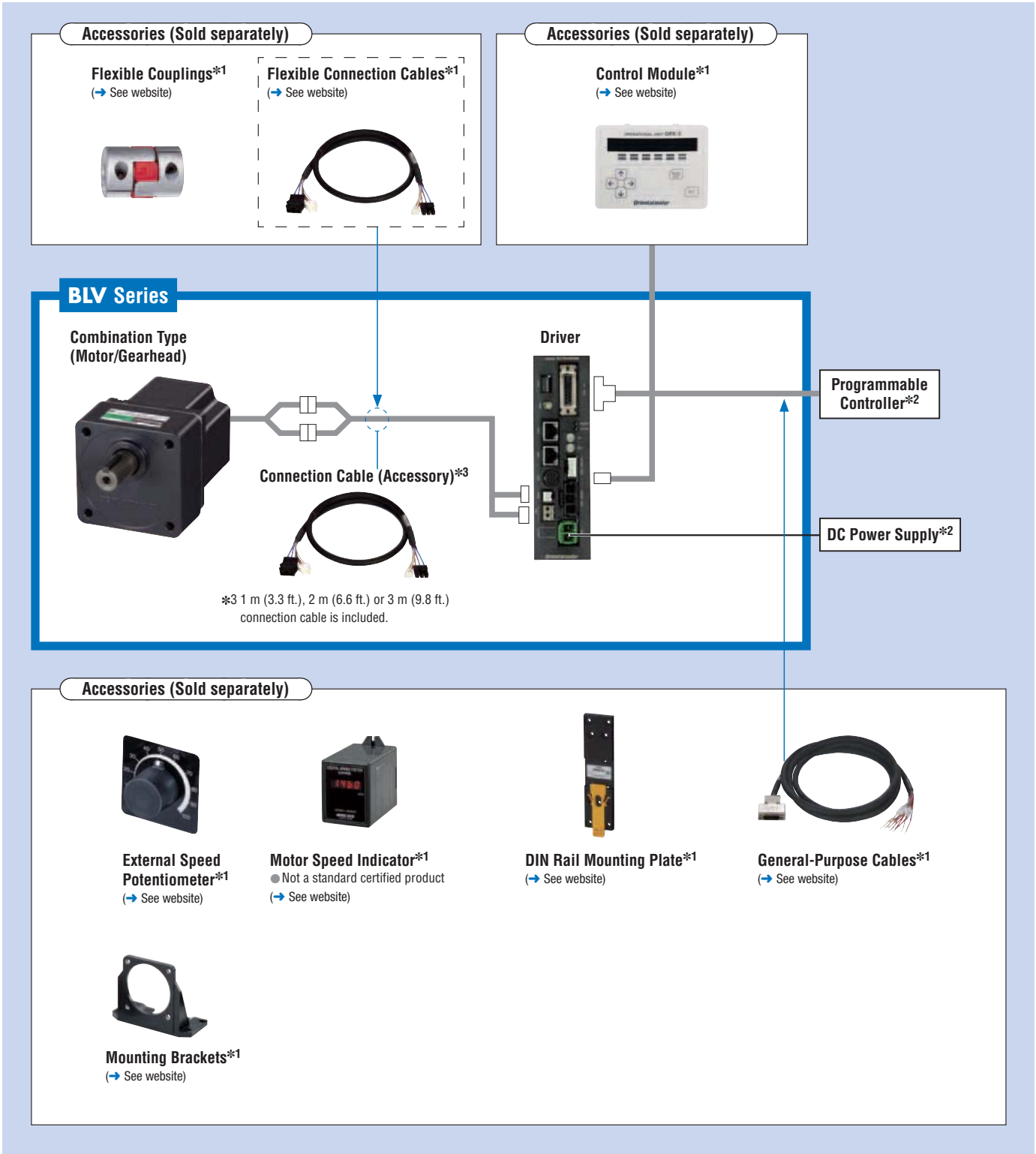
●Control Method for Data Settings and Operation Commands

Operation Data and Parameter Setting	Operation Commands (FWD, REV, etc.)
RS-485 communication, Control module (**OPX-2A**)	RS-485 communication, I/O

- FWD input, REV input and other operation commands can also be controlled from I/O.
- The test operation function is available with the control module (**OPX-2A**).
- The internal potentiometers for Speed, Acceleration/Deceleration and Torque Limiting are still active even when using either the control module (**OPX-2A**) or RS-485 comunication.

System Configuration

An example of a single-axis system configuration using I/O control is shown below.



Example of System Configuration

BLV Series Combination Type - Parallel Shaft	+	Sold Separately			
		External Speed Potentiometer	DIN Rail Mounting Plate	Mounting Brackets	Flexible Coupling
BLV620K30S-3		PAVR-20KZ	PADP03	SOL6M8	MCL652022

The system configuration shown above is an example of the standard type. Other combinations are available.

*1 For accessory details on these products please either refer to our website, contact technical support or your nearest Oriental Motor sales office. www.orientalmotor.com

*2 Not supplied

Product Number Code

BLV 6 20 K M 200 S - 1

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①	Series	**BLV**: **BLV** Series
②	Motor Frame Size	**6**: 104 mm (4.09 in.) [Gearhead Frame Size: 110 mm (4.33 in.)]
③	Output Power (W)	**20**: 200 W (1/4 HP) **40**: 400 W (1/2 HP)
④	Power Supply Voltage	**K**: 24 VDC **N**: 48 VDC
⑤	**M**: Electromagnetic Brake Type	Blank: Standard Type
⑥	Gear Ratio/Shaft Type	Number: Parallel shaft gearhead type Gear ratio from **5** to **200** Hollow shaft flat gearhead Gear ratio from **5** to **100** **A**: Round Shaft Type
⑦	Gearhead Type (Combination type only)	**S**: Parallel Shaft Gearhead **F**: Hollow Shaft Flat Gearhead
⑧	Cable Length (Included)	**1**: 1 m (3.3 ft.) **2**: 2 m (6.6 ft.) **3**: 3 m (9.8 ft.)

Product Line

Combination Type The combination type comes with the motor and its dedicated gearhead pre-assembled which simplifies installation in equipment. Motors and gearheads are also available separately to facilitate changes or repairs.

●Standard Type

◇Combination Type – Parallel Shaft Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
200 W (1/4 HP)	24 VDC	**BLV620K□S-◇**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
400 W (1/2 HP)	48 VDC	**BLV640N□S-◇**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**

The following items are included in each product.
Motor, Driver, Gearhead, Connection Cable*, Power Connector, Mounting Screws, Parallel Key, Operating Manuall
*A cable of 1 m (3.3 ft.), 2 m (6.6 ft.) or 3 m (9.8 ft.) long is included.

◇Combination Type – Hollow Shaft Flat Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
200 W (1/4 HP)	24 VDC	**BLV620K□F-◇**	**10**, **15**, **20**, **30**, **50**, **100**
400 W (1/2 HP)	48 VDC	**BLV640N□F-◇**	**5**, **10**, **15**, **20**, **30**, **50**, **100**

The following items are included in each product.
Motor, Driver, Gearhead, Connection Cable*, Power Connector, Mounting Screws, Parallel Key, Safety Cover (with screws), Operating Manual
*A cable of 1 m (3.3 ft.), 2 m (6.6 ft.) or 3 m (9.8 ft.) long is included.

◇Round Shaft Type

Output Power	Power Supply Voltage	Model
200 W (1/4 HP)	24 VDC	**BLV620KA-◇**
400 W (1/2 HP)	48 VDC	**BLV640NA-◇**

The following items are included in each product.
Motor, Driver, Connection Cable*, Power Connector, Operating Manual
*A cable of 1 m (3.3 ft.), 2 m (6.6 ft.) or 3 m (9.8 ft.) long is included.

●With Electromagnetic Brake Type

◇Combination Type – Parallel Shaft Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
200 W (1/4 HP)	24 VDC	**BLV620KM□S-◇**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
400 W (1/2 HP)	48 VDC	**BLV640NM□S-◇**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**

The following items are included in each product.
Motor, Driver, Gearhead, Connection Cable*, Power Connector, Mounting Screws, Parallel Key, Operating Manual
*A cable of 1 m (3.3 ft.), 2 m (6.6 ft.) or 3 m (9.8 ft.) long is included.

◇Combination Type – Hollow Shaft Flat Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
200 W (1/4 HP)	24 VDC	**BLV620KM□F-◇**	**10**, **15**, **20**, **30**, **50**, **100**
400 W (1/2 HP)	48 VDC	**BLV640NM□F-◇**	**5**, **10**, **15**, **20**, **30**, **50**, **100**

The following items are included in each product.
Motor, Driver, Gearhead, Connection Cable*, Power Connector, Mounting Screws, Parallel Key, Safety Cover (with screws), Operating Manual
*A cable of 1 m (3.3 ft.), 2 m (6.6 ft.) or 3 m (9.8 ft.) long is included.

◇Round Shaft Type

Output Power	Power Supply Voltage	Model
200 W (1/4 HP)	24 VDC	**BLV620KMA-◇**
400 W (1/2 HP)	48 VDC	**BLV640NMA-◇**

The following items are included in each product.
Motor, Driver, Connection Cable*, Power Connector, Operating Manual
*A cable of 1 m (3.3 ft.), 2 m (6.6 ft.) or 3 m (9.8 ft.) long is included.

For details (specifications, characteristics, dimensions and others) on these products please refer either to our website, contact technical support or your nearest Oriental Motor sales office.
www.orientalmotor.com

●Enter the gear ratio in the box (□) within the model name.
Enter the length of the connection cable (included) as **1** [1 m (3.3 ft.)], **2** [2 m (6.6 ft.)] or **3** [3 m (9.8 ft.)] in the diamond (◇) within the model name.