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Speed Control Systems

Brushless Motor Systems

Page

BX Series B-16
BLF Series B-60
BLU Series B-86
FBLII Series B-104
BLH Series B-118

AC Input
BX Series

AC Input
BLF Series

AC Input
BLU Series

AC Input
FBLII Series

DC Input
BLH Series

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RoHS RoHS-Compliant
Brushless Motor Systems

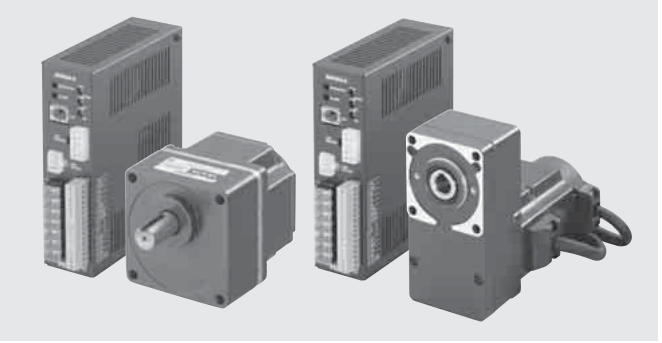
BX Series

●Additional Information●
Technical reference ➜ Page F-1
Safety standards ➜ Page G-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 using 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.

c UL us CE

●List of safety standard approved products (Model, Standards, File No., Certification Body)
➜ Page G-11



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.

Speed Control ┬ Standard Model
└ Speed Control Mode (when a control module is used)
Position Control ─ Position Control Mode (when a control module is used)
Torque Limiting (when a control module is used)

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

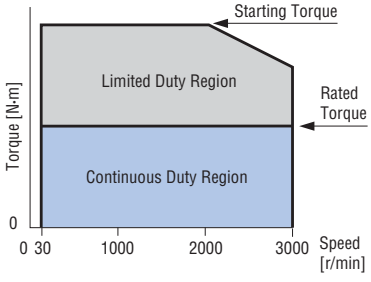


Standard Model

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.

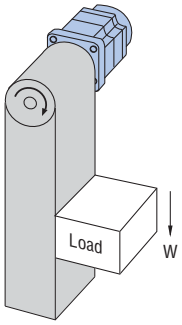


●Excellent Speed Stability

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

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.



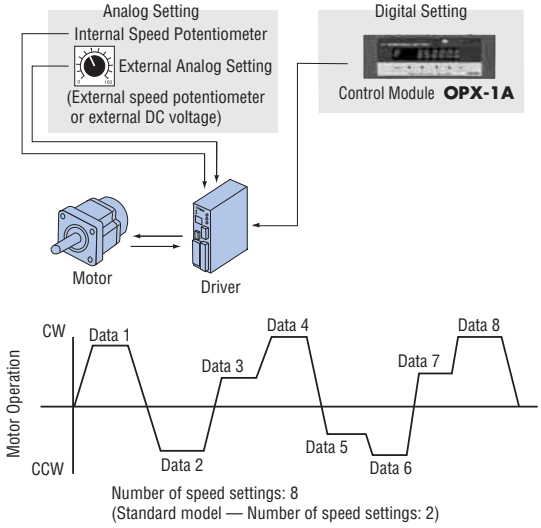
Note:
●Regeneration energy generates during vertical drive. If the **BX** Series will be used in applications that require vertical drive, be sure to use a regeneration unit (sold separately).

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Speed Control (Extended function when using a control module)

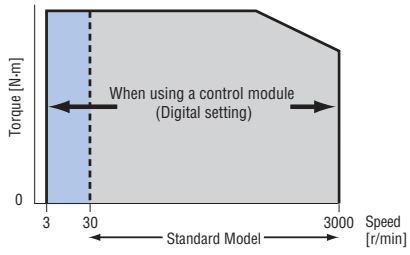
●Digital Speed Setting (Up to eight speeds)

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



●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

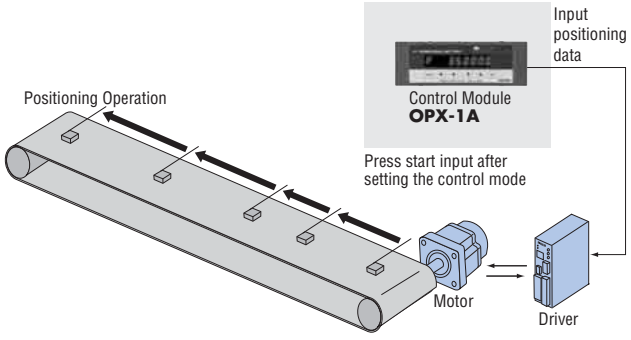
When using a control module (Digital setting)

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

Position Control (Extended function 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.



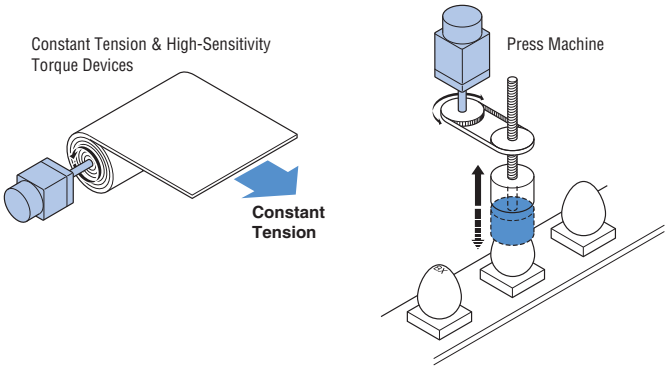
●Continuous Operation, Return to Home Operation

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

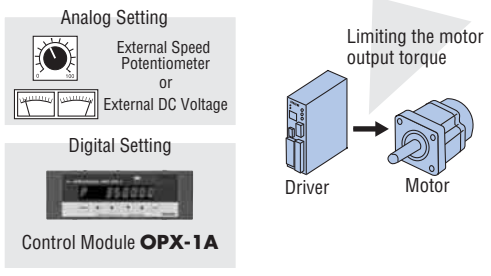
Torque Limiting (Extended function when using a control module)

●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



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●High-Strength, Long Life Gearhead

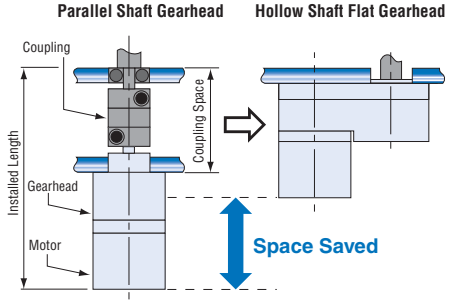
The high-strength gearheads used by the **BX** Series support high speeds. The parallel shaft gearheads of the 200 W (1/4 HP) and 400 W (1/2 HP) models are designed with a maximum permissible torque of 70 N·m (610 lb-in).
All gearheads have a rated life of 10000 hours, which corresponds to twice the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

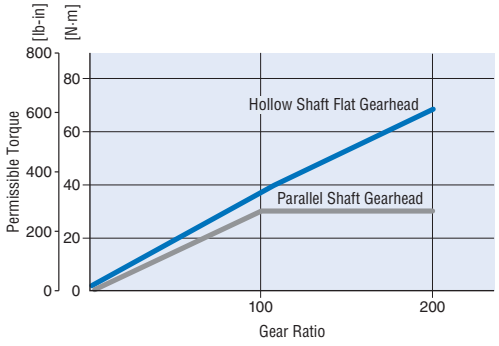
◇Space-Saving and Low-Cost

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.



◇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.)]

●RoHS RoHS-Compliant

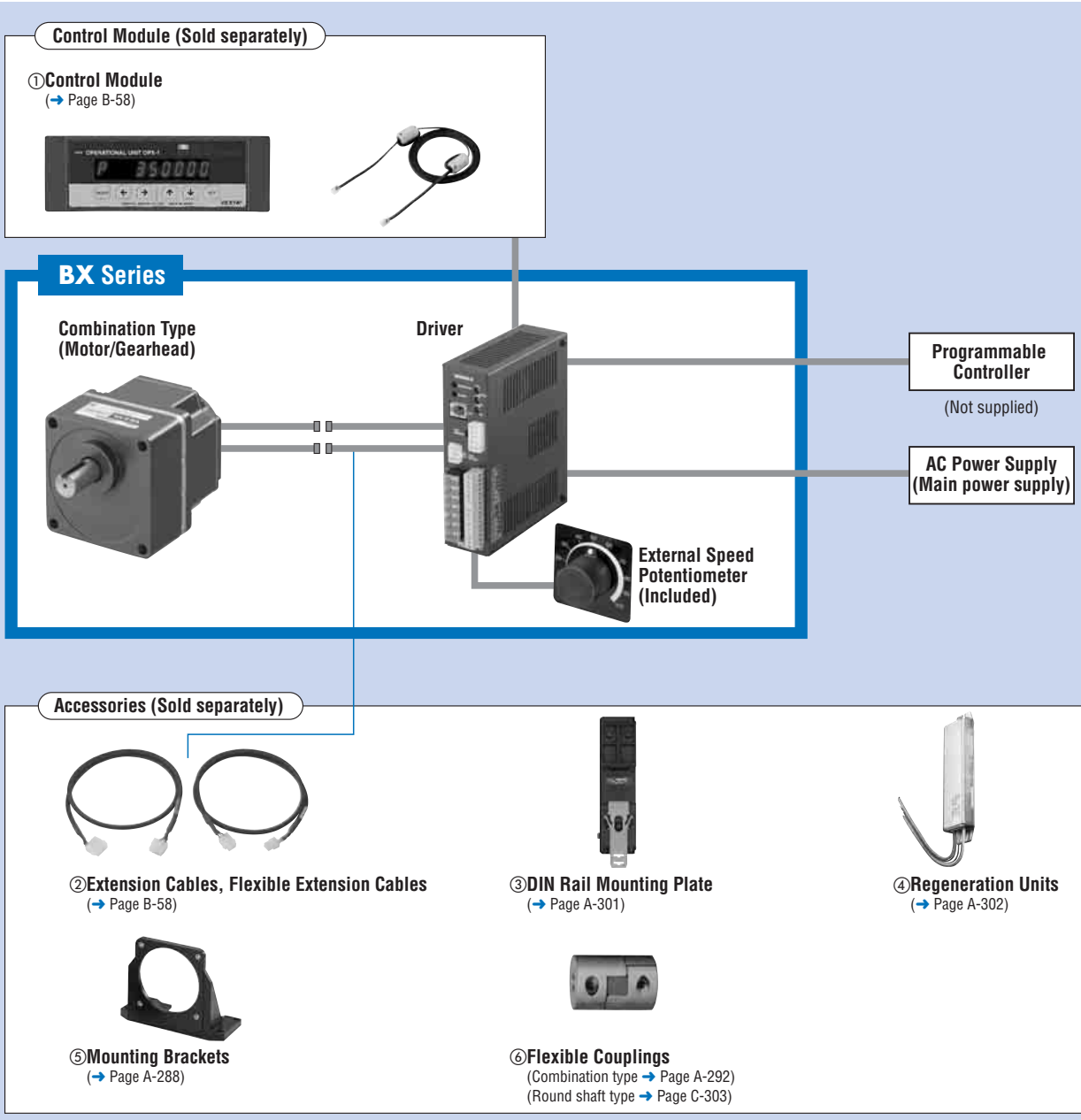
The **BX** Series conforms to the RoHS Directive that prohibits the use of six chemical substances including lead and cadmium.

● Details of RoHS Directive ➜ Page G-38

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System Configuration

Combination Type – Parallel Shaft Gearhead/Round Shaft Type



No.	Product Name	Overview	Page
①	Control Module	Used to extend functions and improve performance, or control position (**OPX-1A**). [With communication cable of 2 m (6.6 ft.)]	B-58
②	Extension Cables	Cable for extending the wiring distance between the motor and driver [1 to 20 m (3.3 to 65.6 ft.)].	B-58
	Flexible Extension Cables	Cable offering flexibility, used to extend the wiring distance between the motor and driver [1 to 20 m (3.3 to 65.6 ft.)].	
③	DIN Rail Mounting Plate	Use this plate when installing the driver to a DIN rail (**PADP01**).	A-301
④	Regeneration Units	Used to perform vertical operation or drive a large inertial load with an electromagnetic motor.	A-302
⑤	Mounting Brackets	Dedicated mounting bracket for the motor and gearhead.	A-288
⑥	Flexible Couplings	Clamp type coupling that connects the motor or gearhead shaft to the driven shaft.	A-292

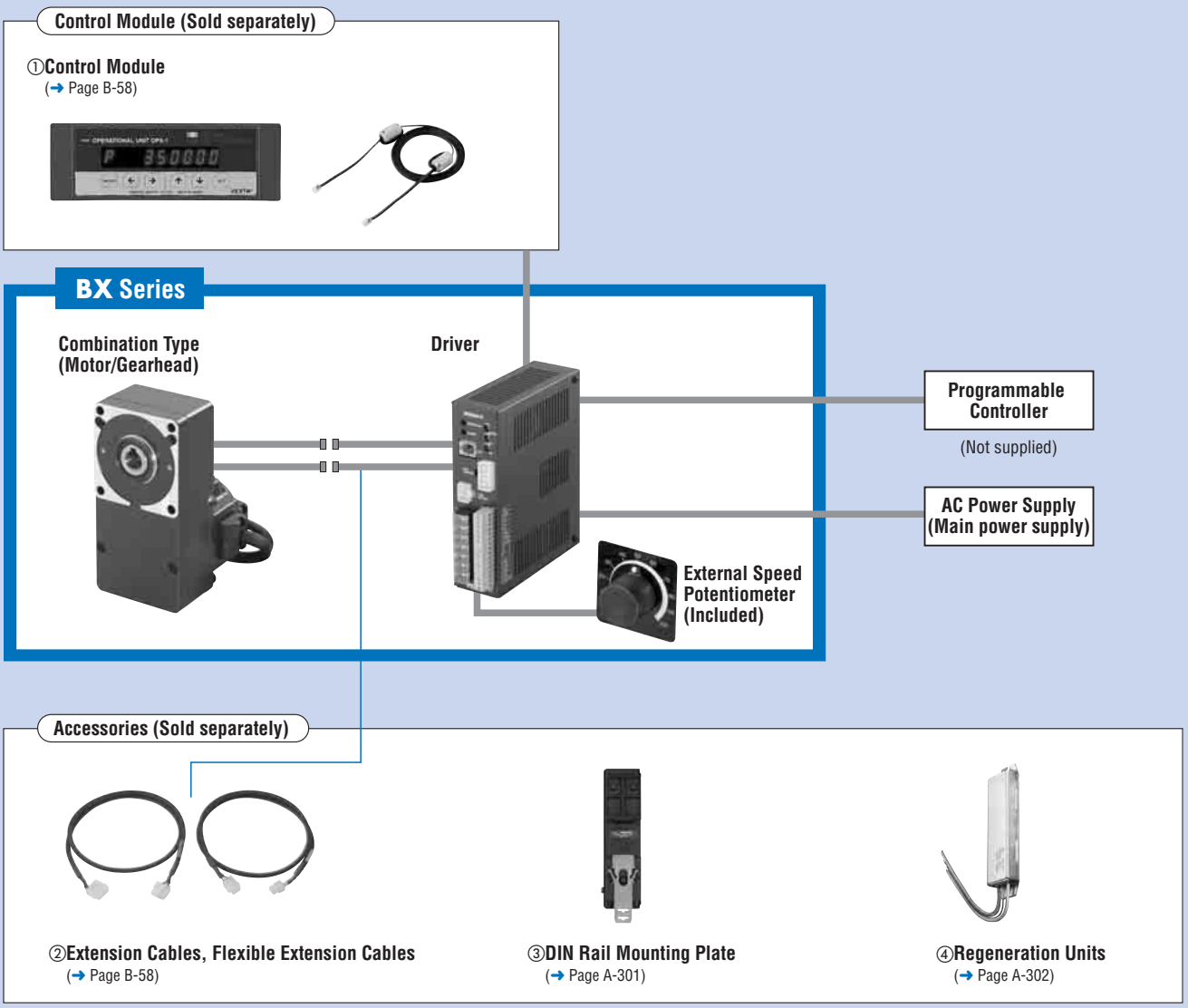
●Example of System Configuration

BX Series Combination Type - Parallel Shaft		(Sold separately) Extension Cable [1 m (3.3 ft.)]	DIN Rail Mounting Plate	Mounting Bracket	Flexible Coupling
BX460A-30S	+	CC01SBF	PADP01	SOL4M6	MCL5515F10

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

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●Combination Type – Hollow Shaft Flat Gearhead



No.	Product Name	Overview	Page
①	Control Module	Used to extend functions and improve performance, or control position (**OPX-1A**). [With communication cable of 2 m (6.6 ft.)]	B-58
②	Extension Cables	Cable for extending the wiring distance between the motor and driver [1 to 20 m (3.3 to 65.6 ft.)].	B-58
	Flexible Extension Cables	Cable offering flexibility, used to extend the wiring distance between the motor and driver [1 to 20 m (3.3 to 65.6 ft.)].	
③	DIN Rail Mounting Plate	Use this plate when installing the driver to a DIN rail (**PADP01**).	A-301
④	Regeneration Units	Used to perform vertical operation or drive a large inertial load with an electromagnetic motor.	A-302

●Example of System Configuration

BX Series Combination Type - Hollow Shaft		(Sold separately) Extension Cable [1 m (3.3 ft.)]	(Sold separately) DIN Rail Mounting Plate
BX460A-30FR	+	CC01SBF	PADP01

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

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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 **GFS**: **GFS** Type Pinion Shaft
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

◇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**

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

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

◇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**

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

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

◇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**
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**

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

◇Pinion Shaft Type

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

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

●With Electromagnetic Brake

◇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**

- Enter the gear ratio in the box (□) within the model name.
- The items included in the product are the same as those of the standard, combination type-parallel shaft gearhead on page B-21.

◇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**

- Enter the gear ratio in the box (□) within the model name.
- The items included in the product are the same as those of the standard, combination type-hollow shaft flat gearhead on page B-21.

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◇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 items included in the product are the same as those of the standard, round shaft type on page B-22.

◇Pinion Shaft Type

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

● The items included in the product are the same as those of the standard, pinion shaft type on page B-22.

●Gearhead

◇Parallel Shaft Gearhead

Output Power of Applicable Motor (Pinion shaft type)	Gearhead Model	Gear Ratio
30 W (1/25 HP)	**GFS2G□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
60 W (1/12 HP)	**GFS4G□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
120 W (1/6 HP)	**GFS5G□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
200 W (1/4 HP) 400 W (1/2 HP)	**GFS6G□**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**

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

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

◇Hollow Shaft Flat Gearhead

Output Power of Applicable Motor (Pinion shaft type)	Gearhead Model	Gear Ratio
30 W (1/25 HP)	**GFS2G□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
60 W (1/12 HP)	**GFS4G□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**
120 W (1/6 HP)	**GFS5G□FR**	**5**, **10**, **15**, **20**, **30**, **50**, **100**, **200**

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

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

●Control Module

Model
OPX-1A

● With dedicated cable [2 m (6.6 ft.)]

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Specifications

Standard

◇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		$\times 10^{-4}$ kg·m^2 (oz-in^2)	1.5 (8.2)		3 (16.4)	
Rotor Inertia J		$\times 10^{-4}$ kg·m^2 (oz-in^2)	0.088 (0.48)		0.194 (1.06)	
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]			

*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).
● Enter the gear ratio in the box (□) within the model name.
● 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**	–	–	–
	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		$\times 10^{-4}$ kg·m^2 (oz-in^2)	6 (33)		10 (55)		17.5 (96)
Rotor Inertia J		$\times 10^{-4}$ kg·m^2 (oz-in^2)	0.625 (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]				

*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).
● Enter the gear ratio in the box (□) within the model name.
● The values for each specification apply to the motor only.

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●With Electromagnetic Brake

◇30 W (1/25 HP), 60 W (1/12 HP) RoHS

Model	Combination Type – Parallel Shaft Gearhead		**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)	0.088 (0.48)		0.194 (1.06)	
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.
● Enter the gear ratio in the box (□) within the model name.
● 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		**BX5120AM-□S**	**BX5120CM-□S**	**BX6200AM-□S**	**BX6200CM-□S**	**BX6400SM-□S**
	Combination Type – Hollow Shaft Flat Gearhead		**BX5120AM-□FR**	**BX5120CM-□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)	0.625 (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.
● Enter the gear ratio in the box (□) within the model name.
● The values for each specification apply to the motor only.

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 B-46

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	
Insulation Class		UL, CSA: Class A [105°C (221°F)], EN: Class E [120°C (248°F)]	–
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.

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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 (Data No.0～5): Digital setting (with **OPX-1A**) · 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)

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●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.

● 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.

● 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)

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

● 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.

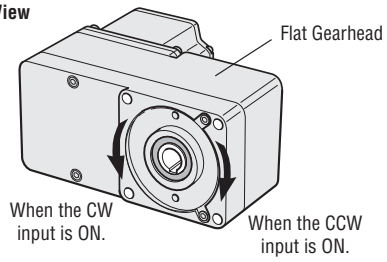
● The flat gearhead rotates in the opposite direction to the motor when viewed from the front of the gearhead. It rotates in the same direction as the motor when viewed from the rear (motor mounting surface) of the gearhead.
Rotation direction of the hollow shaft flat gearhead ➜ Page B-29

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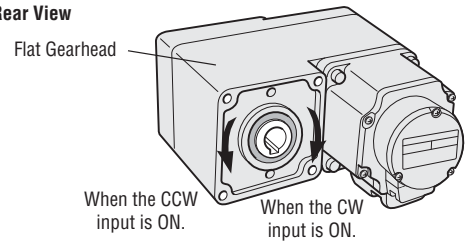
Rotation Direction of the Hollow Shaft Flat Gearhead

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

Front View



Rear View



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**	**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
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

● 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.

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		

● 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.

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 shall be no 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**	197	44	221	49	
BX6400S-A **BX6400SM-A**	197	44	221	49	

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

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Permissible Load Inertia J of Combination Type

Combination Type – Parallel Shaft Gearhead

Unit = kg·m² (oz-in²)

Model	Gear Ratio	5	10	15	20	30	50	100	200
BX230■-□S **BX230■M-□S**		1.2×10^{-3} (66)	5×10^{-3} (270)	1.1×10^{-2} (600)	2×10^{-2} (1090)	3.7×10^{-2} (2000)	9.2×10^{-2} (5000)	2.5×10^{-1} (13700)	5×10^{-1} (27000)
	When instantaneous stop or instantaneous bi-directional operation is performed*	1.55×10^{-4} (8.5)	6.2×10^{-4} (34)	14×10^{-4} (77)	24.8×10^{-4} (136)	55.8×10^{-4} (310)	155×10^{-4} (850)	155×10^{-4} (850)	155×10^{-4} (850)
BX460■-□S **BX460■M-□S**		2.2×10^{-3} (120)	9.5×10^{-3} (520)	2.2×10^{-2} (1200)	3.5×10^{-2} (1910)	8×10^{-2} (4400)	2.2×10^{-1} (12000)	6.2×10^{-1} (34000)	1.2 (66000)
	When instantaneous stop or instantaneous bi-directional operation is performed*	5.5×10^{-4} (30)	22×10^{-4} (120)	49.5×10^{-4} (270)	88×10^{-4} (480)	198×10^{-4} (1080)	550×10^{-4} (3000)	550×10^{-4} (3000)	550×10^{-4} (3000)
BX5120■-□S **BX5120■M-□S**		4.5×10^{-3} (250)	1.9×10^{-2} (1040)	4.2×10^{-2} (2300)	7×10^{-2} (3800)	1.6×10^{-1} (8800)	4.5×10^{-1} (25000)	1.2 (66000)	2.5 (137000)
	When instantaneous stop or instantaneous bi-directional operation is performed*	25×10^{-4} (137)	100×10^{-4} (550)	225×10^{-4} (1230)	400×10^{-4} (2200)	900×10^{-4} (4900)	2500×10^{-4} (13700)	2500×10^{-4} (13700)	2500×10^{-4} (13700)
BX6200■-□S **BX6200■M-□S**		1×10^{-2} (550)	4.6×10^{-2} (2500)	1×10^{-1} (5500)	1.7×10^{-1} (9300)	3.9×10^{-1} (21000)	9.3×10^{-1} (51000)	1.8 (98000)	3.7 (200000)
	When instantaneous stop or instantaneous bi-directional operation is performed*	37.5×10^{-4} (210)	150×10^{-4} (820)	338×10^{-4} (1850)	600×10^{-4} (3300)	1350×10^{-4} (7400)	3750×10^{-4} (21000)	3750×10^{-4} (21000)	3750×10^{-4} (21000)
BX6400S-□S **BX6400SM-□S**		1×10^{-2} (550)	4.6×10^{-2} (2500)	1×10^{-1} (5500)	1.7×10^{-1} (9300)	3.9×10^{-1} (21000)	9.3×10^{-1} (51000)	1.8 (98000)	3.7 (200000)
	When instantaneous stop or instantaneous bi-directional operation is performed*	37.5×10^{-4} (210)	150×10^{-4} (820)	338×10^{-4} (1850)	600×10^{-4} (3300)	1350×10^{-4} (7400)	3750×10^{-4} (21000)	3750×10^{-4} (21000)	3750×10^{-4} (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.

Combination Type – Hollow Shaft Flat Gearhead

Unit = kg·m² (oz-in²)

Model	Gear Ratio	5	10	15	20	30	50	100	200
BX230■-□FR **BX230■M-□FR**		1.2×10^{-3} (66)	5×10^{-3} (270)	1.1×10^{-2} (600)	2×10^{-2} (1090)	3.7×10^{-2} (2000)	9.2×10^{-2} (5000)	2.5×10^{-1} (13700)	5×10^{-1} (27000)
	When instantaneous stop or instantaneous bi-directional operation is performed*	1.55×10^{-4} (8.5)	6.2×10^{-4} (34)	14×10^{-4} (77)	24.8×10^{-4} (136)	55.8×10^{-4} (310)	155×10^{-4} (850)	155×10^{-4} (850)	155×10^{-4} (850)
BX460■-□FR **BX460■M-□FR**		2.2×10^{-3} (120)	9.5×10^{-3} (520)	2.2×10^{-2} (1200)	3.5×10^{-2} (1910)	8×10^{-2} (4400)	2.2×10^{-1} (12000)	6.2×10^{-1} (34000)	1.2 (66000)
	When instantaneous stop or instantaneous bi-directional operation is performed*	5.5×10^{-4} (30)	22×10^{-4} (120)	49.5×10^{-4} (270)	88×10^{-4} (480)	198×10^{-4} (1080)	550×10^{-4} (3000)	550×10^{-4} (3000)	550×10^{-4} (3000)
BX5120■-□FR **BX5120■M-□FR**		4.5×10^{-3} (250)	1.9×10^{-2} (1040)	4.2×10^{-2} (2300)	7×10^{-2} (3800)	1.6×10^{-1} (8800)	4.5×10^{-1} (25000)	1.2 (66000)	2.5 (137000)
	When instantaneous stop or instantaneous bi-directional operation is performed*	25×10^{-4} (137)	100×10^{-4} (550)	225×10^{-4} (1230)	400×10^{-4} (2200)	900×10^{-4} (4900)	2500×10^{-4} (13700)	2500×10^{-4} (13700)	2500×10^{-4} (13700)

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

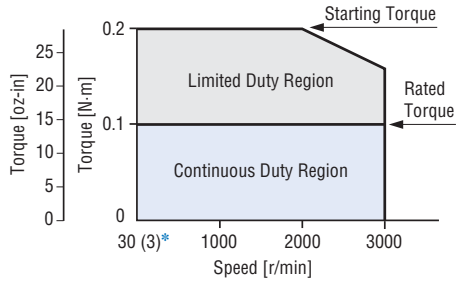
●Enter the power supply voltage (**A** or **C**) in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.

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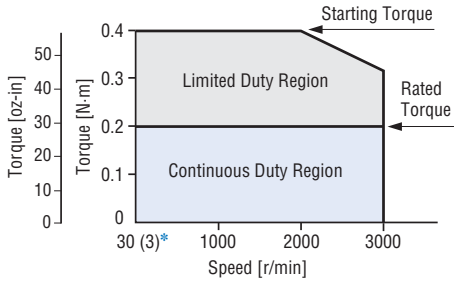
Speed – Torque Characteristics

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.

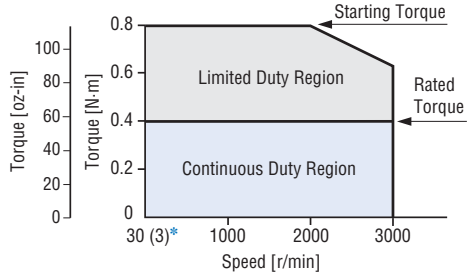
BX230■-A/BX230■-□S/BX230■-□FR
BX230■M-A/BX230■M-□S/BX230■M-□FR



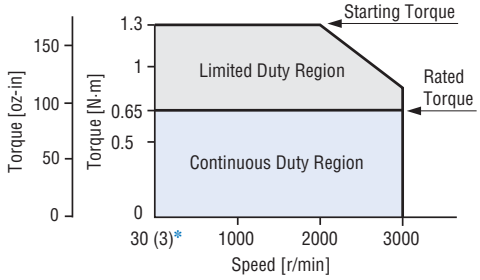
BX460■-A/BX460■-□S/BX460■-□FR
BX460■M-A/BX460■M-□S/BX460■M-□FR



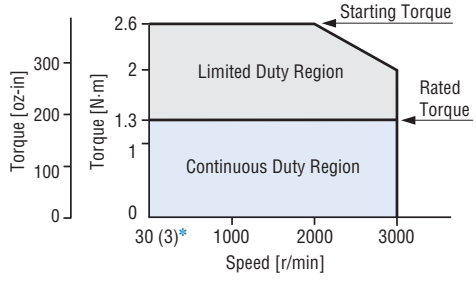
BX5120■-A/BX5120■-□S/BX5120■-□FR
BX5120■M-A/BX5120■M-□S/BX5120■M-□FR



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



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



*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.

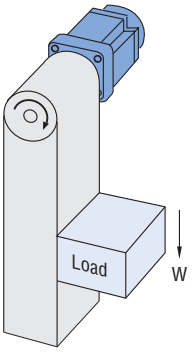
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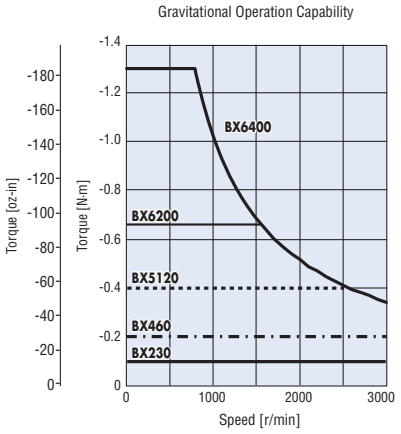
Vertical Drive (Gravitational Operation)

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.)

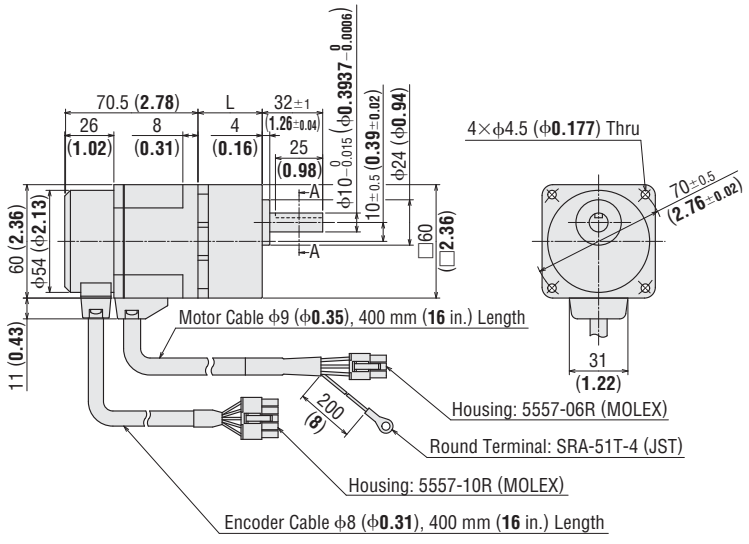
● Mounting screws are included with the combination type. Dimensions for mounting screws ➜ Page B-222

●Standard Type 30 W (1/25 HP)

◇Motor/Parallel Shaft Gearhead

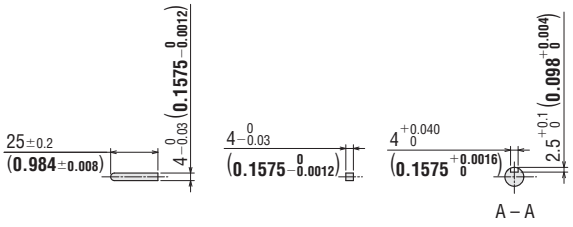
Model	Motor Model	Gearhead Model	Gear Ratio	L	DXF
BX230A-□S **BX230C-□S**	BXM230-GFS	GFS2G□	**5**～**20**	34 (1.34)	C147A
			30～**100**	38 (1.50)	C147B
			200	43 (1.69)	C147C

Mass: 1.2 kg (2.6 lb.) (Including gearhead)



◇Key and Key Slot

(The key is included with the gearhead)



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

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◇Motor/Hollow Shaft Flat Gearhead

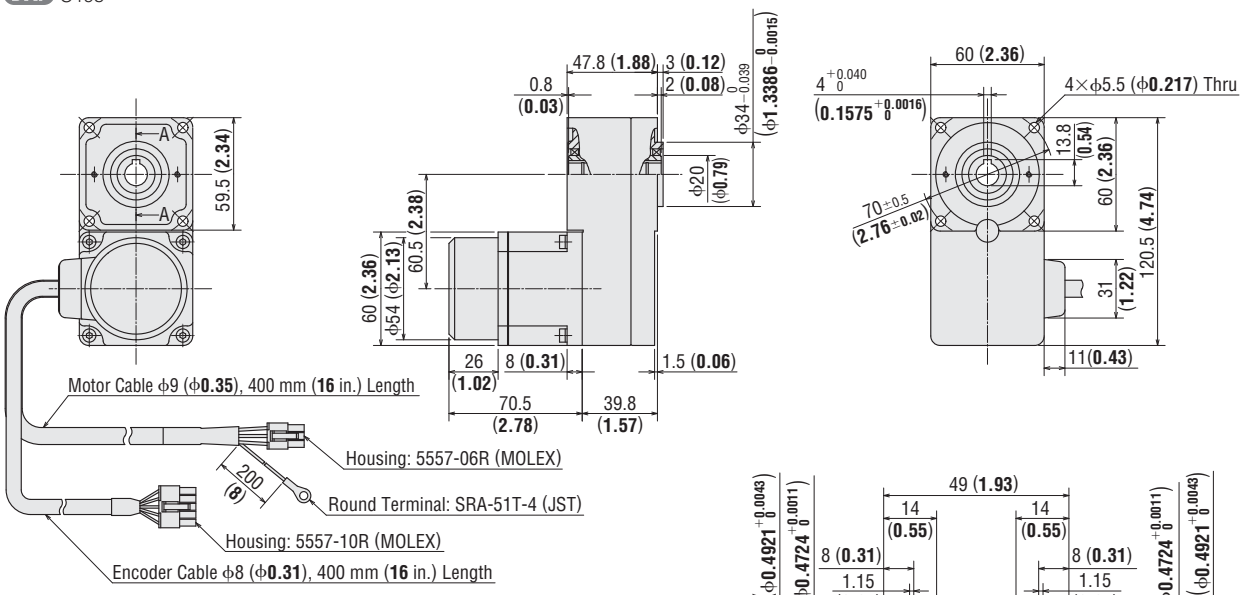
BX230A-□FR, **BX230C-□FR**

Motor: BXM230-GFS

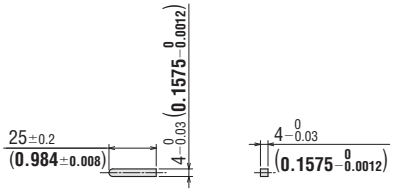
Gearhead: GFS2G□FR

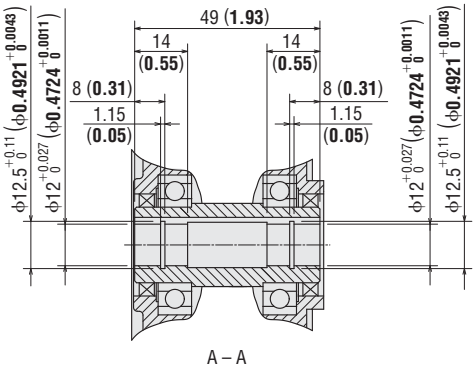
Mass: 1.5 kg (3.3 lb.) (Including gearhead)

DXF C195



◇Key (Included)





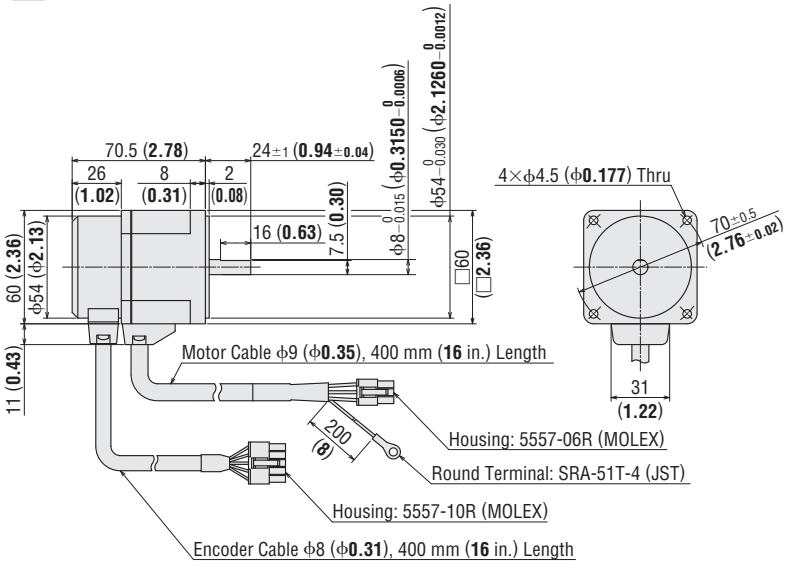
◇Round Shaft Type

BX230A-A, **BX230C-A**

Motor: BXM230-A2

Mass: 0.7 kg (1.5 lb.)

DXF C150



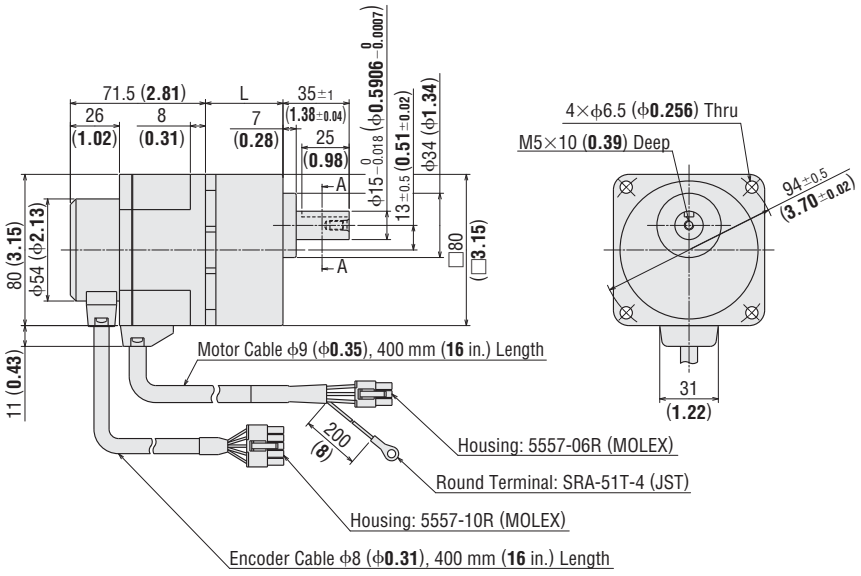
● Enter the gear ratio in the box (□) within the model name.

●Standard Type 60 W (1/12 HP)

◇Motor/Parallel Shaft Gearhead

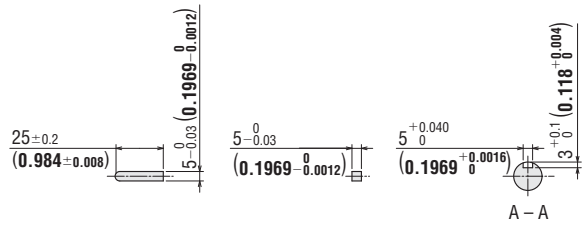
Model	Motor Model	Gearhead Model	Gear Ratio	L	DXF
BX460A-□S **BX460C-□S**	BXM460-GFS	GFS4G□	**5～20**	41 (1.61)	C148A
			30～100	46 (1.81)	C148B
			200	51 (2.01)	C148C

Mass: 2.0 kg (4.4 lb.) (Including gearhead)



◇Key and Key Slot

(The key is included with the gearhead)



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

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◇Motor/Hollow Shaft Flat Gearhead

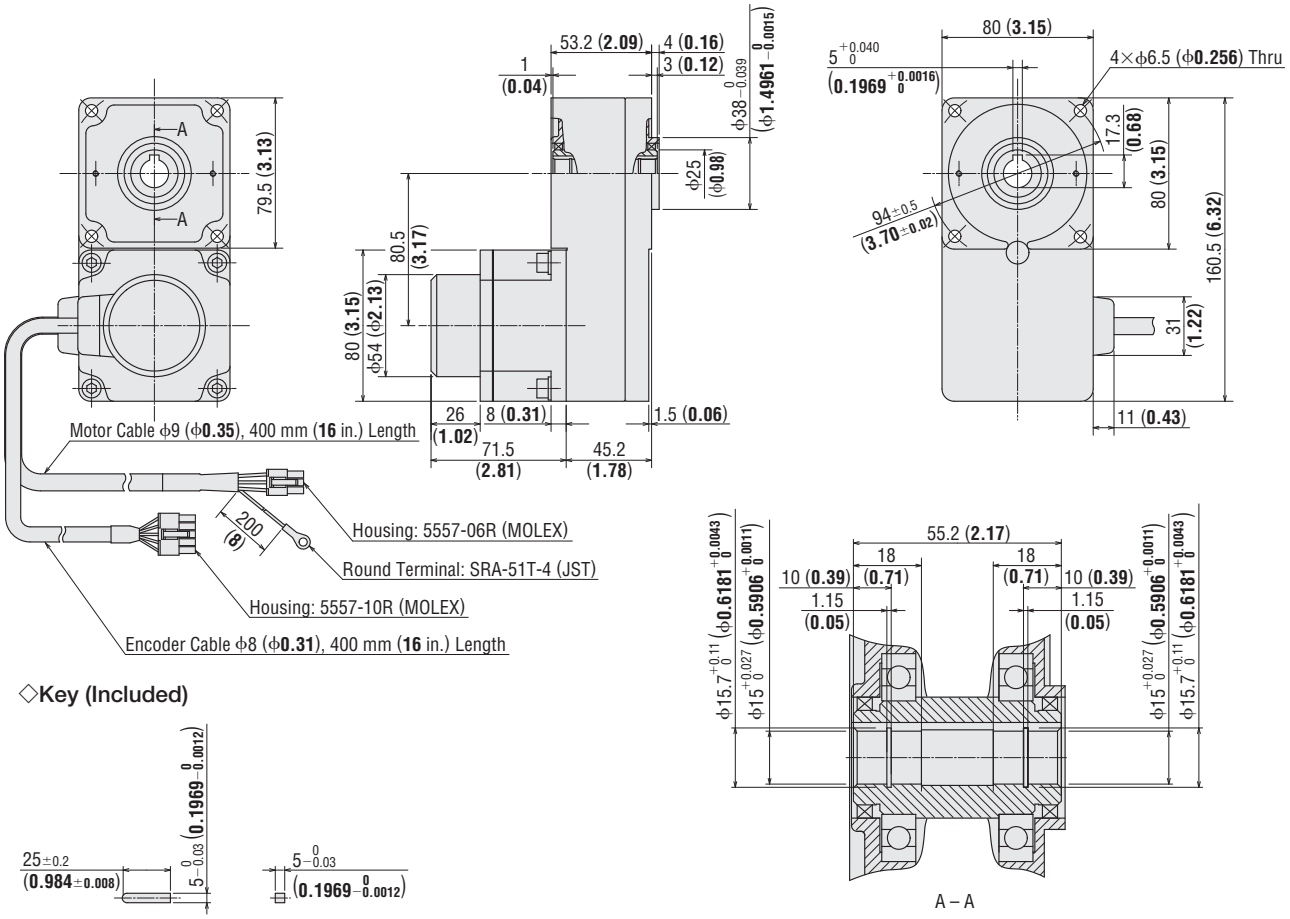
BX460A-□FR, **BX460C-□FR**

Motor: BXM460-GFS

Gearhead: GFS4G□FR

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

DXF C196



◇Key (Included)

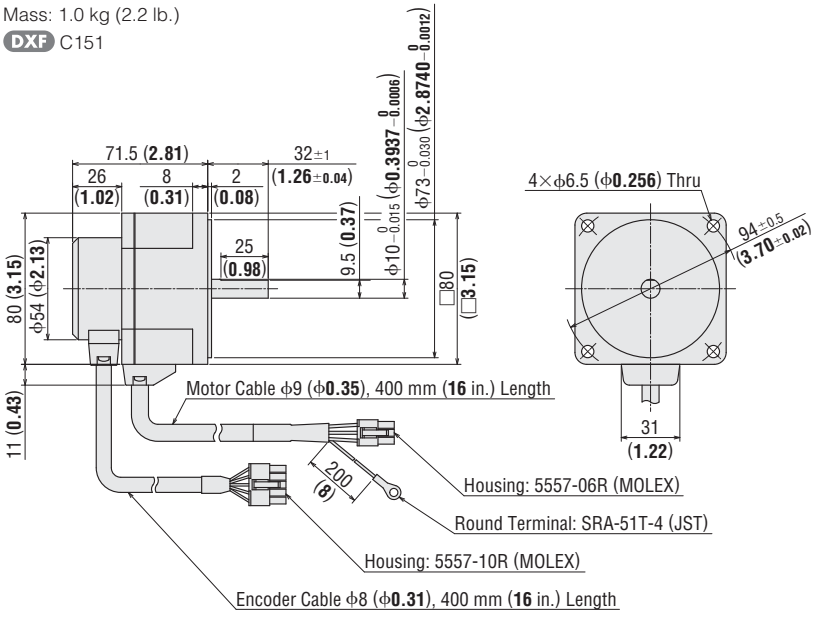
◇Round Shaft Type

BX460A-A, **BX460C-A**

Motor: BXM460-A2

Mass: 1.0 kg (2.2 lb.)

DXF C151



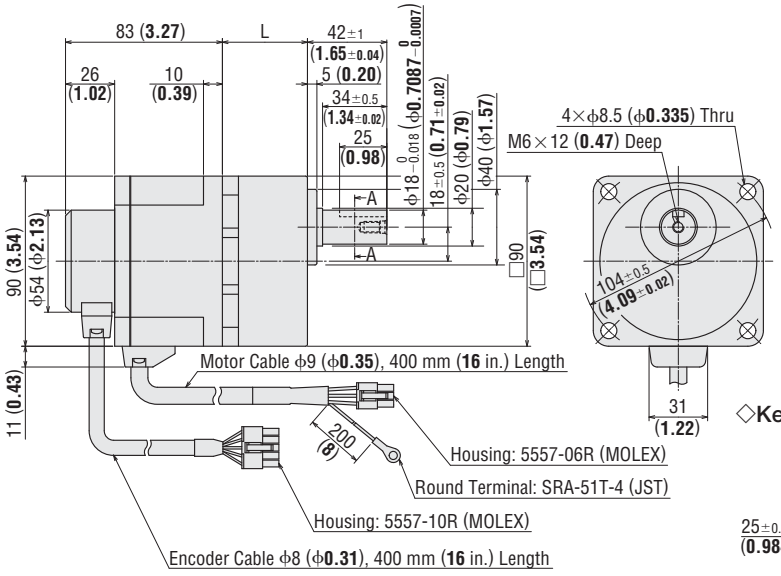
● Enter the gear ratio in the box (□) within the model name.

●Standard Type 120 W (1/6 HP)

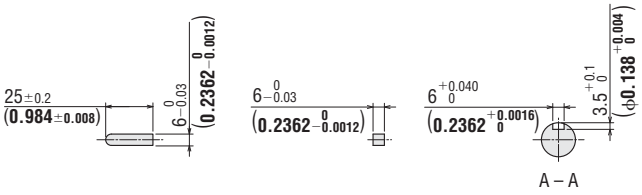
◇Motor/Parallel Shaft Gearhead

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

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



◇Key and Key Slot (The key is included with the gearhead)



◇Motor/Hollow Shaft Flat Gearhead

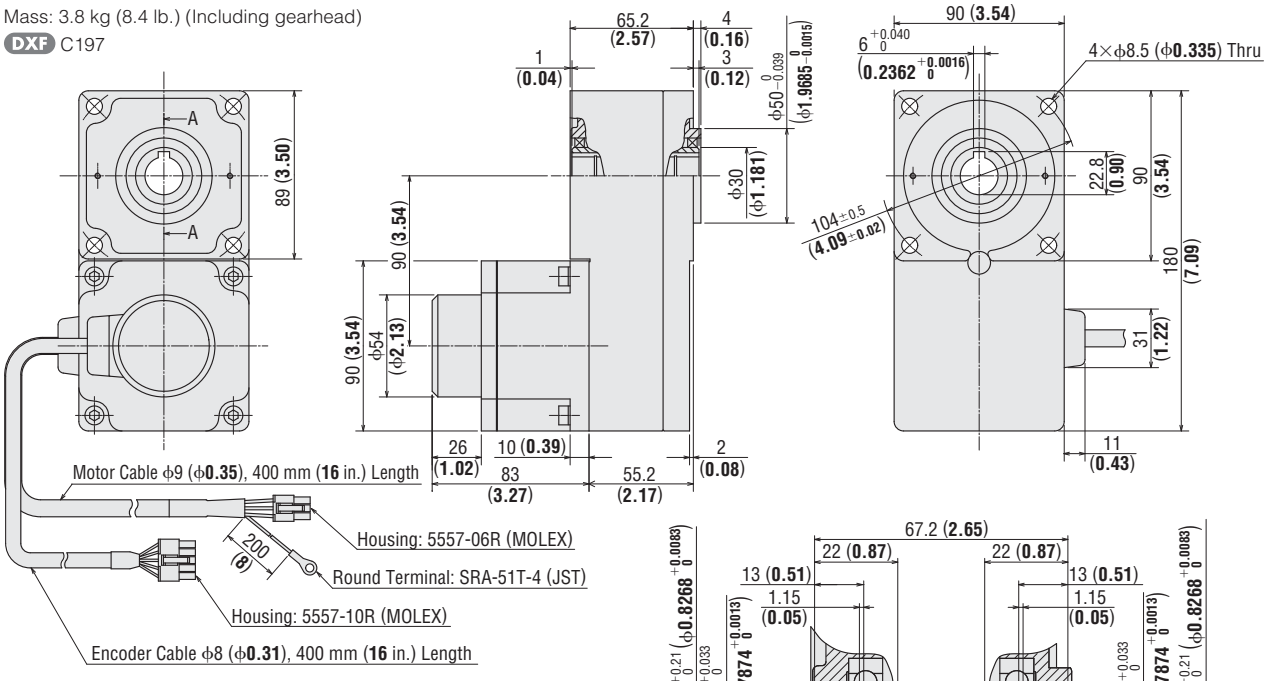
BX5120A-□FR, **BX5120C-□FR**

Motor: BXM5120-GFS

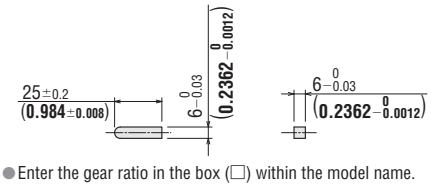
Gearhead: GFS5G□FR

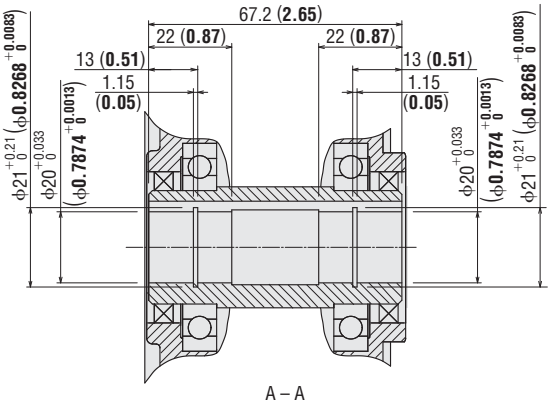
Mass: 3.8 kg (8.4 lb.) (Including gearhead)

DXF C197



◇Key (Included)





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

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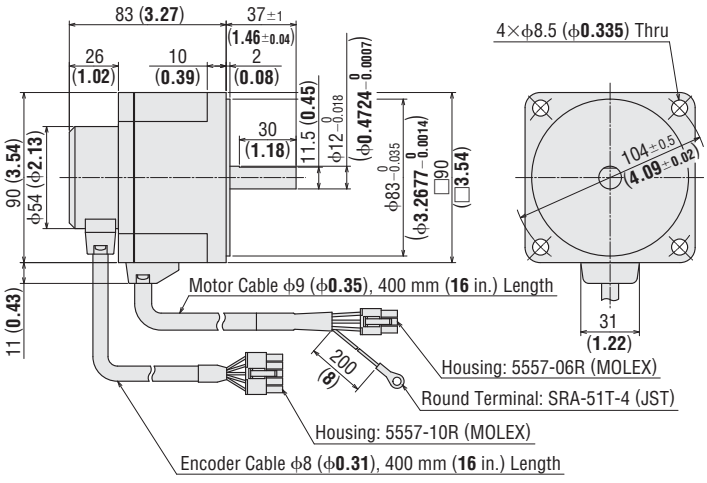
◇Round Shaft Type

BX5120A-A, BX5120C-A

Motor: BXM5120-A2

Mass: 1.6 kg (3.5 lb.)

DXF C152

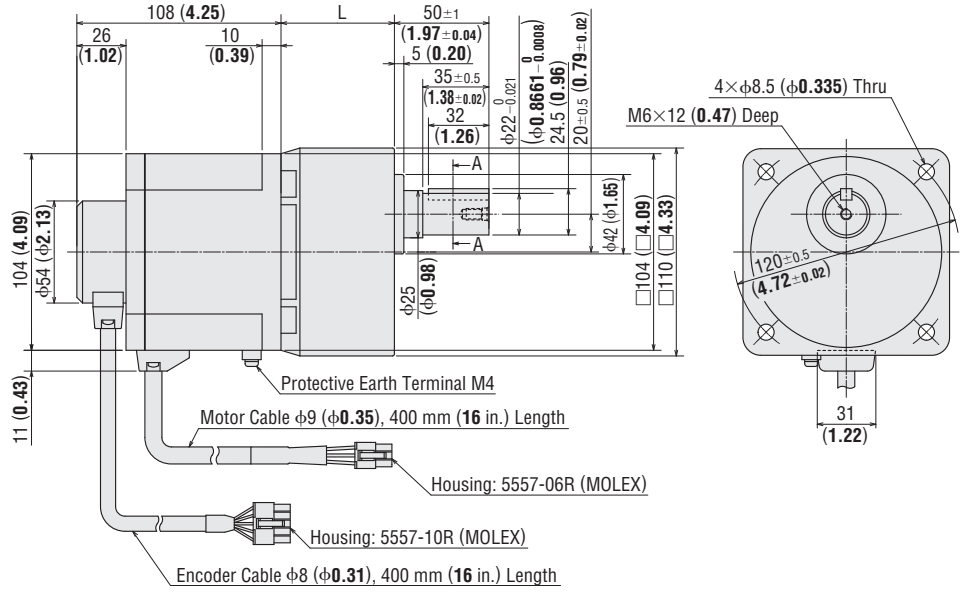


●Standard Type 200 W (1/4 HP), 400 W (1/2 HP)

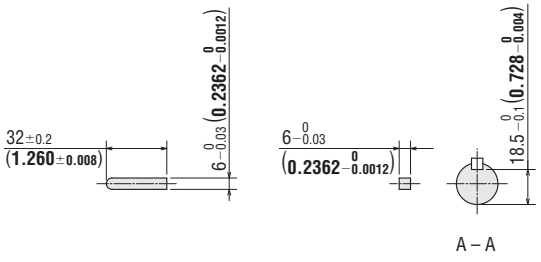
◇Motor/Parallel Shaft Gearhead

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

Mass: 5.5 kg (12.1 lb.) (Including gearhead)



◇Key and Key Slot



● 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.

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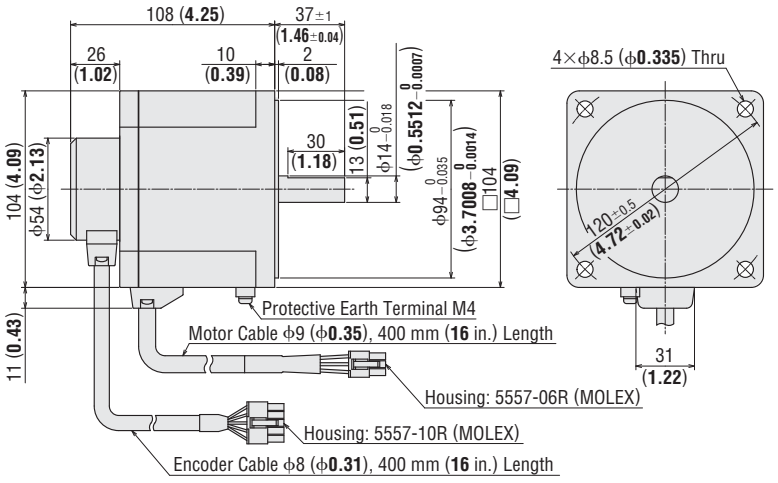
◇Round Shaft Type

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

Motor: BXM6200-A, BXM6400-A

Mass: 2.5 kg (5.5 lb.)

DXF C182

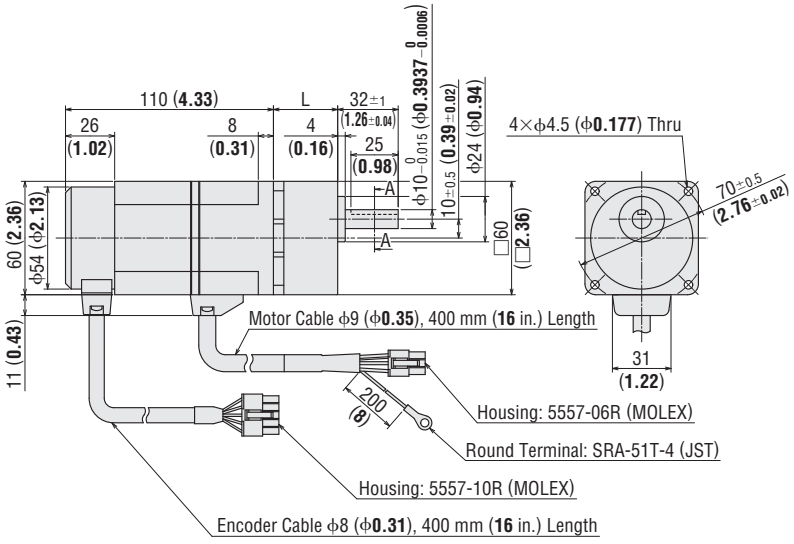


●With Electromagnetic Brake 30 W (1/25 HP)

◇Motor/Parallel Shaft Gearhead

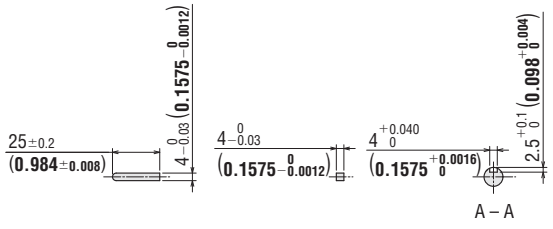
Model	Motor Model	Gearhead Model	Gear Ratio	L	DXF
BX230AM-□S **BX230CM-□S**	BXM230M-GFS	GFS2G□	**5**～**20**	34 (1.34)	C153A
			30～**100**	38 (1.50)	C153B
			200	43 (1.69)	C153C

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



◇Key and Key Slot

(The key is Included with the gearhead)



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

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◇Motor/Hollow Shaft Flat Gearhead

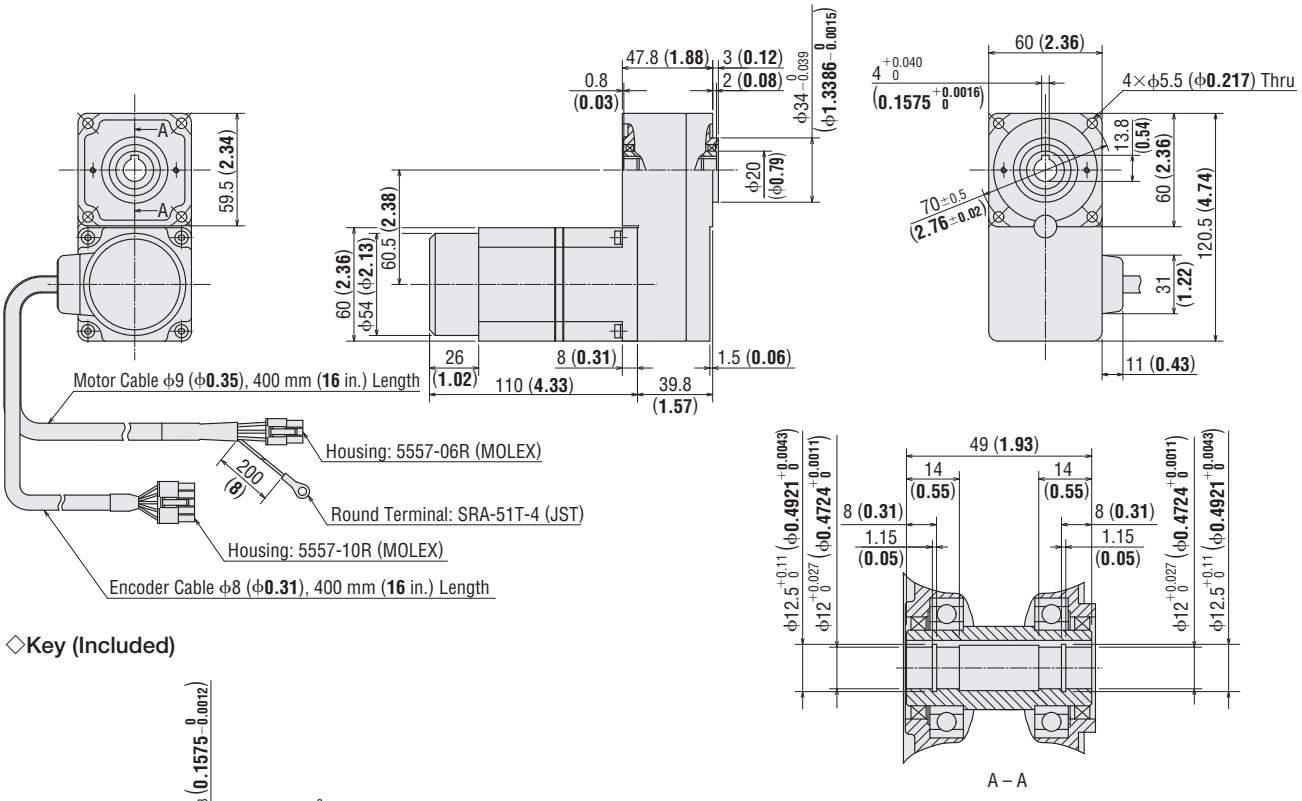
BX230AM-□FR, **BX230CM-□FR**

Motor: BXM230M-GFS

Gearhead: GFS2G□FR

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

DXF C199



◇Key (Included)

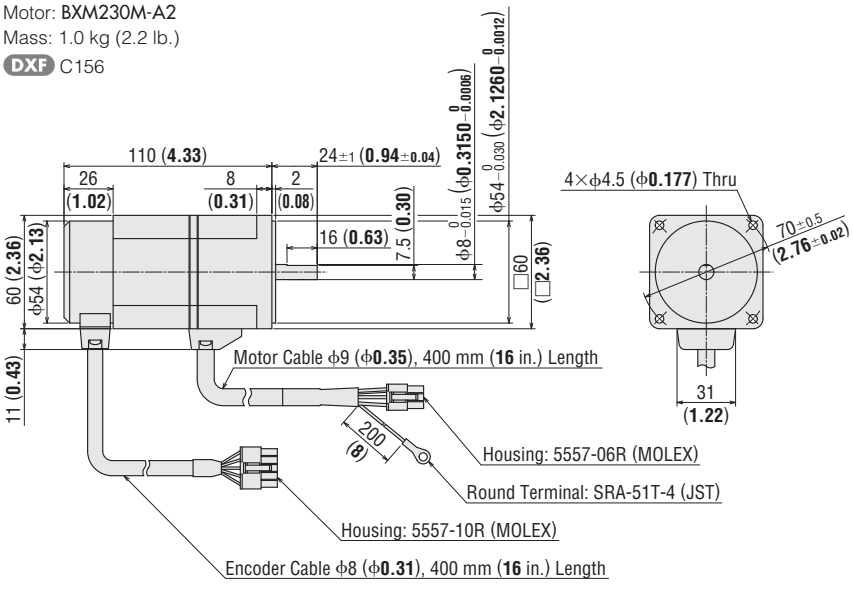
◇Round Shaft Type

BX230AM-A, **BX230CM-A**

Motor: BXM230M-A2

Mass: 1.0 kg (2.2 lb.)

DXF C156



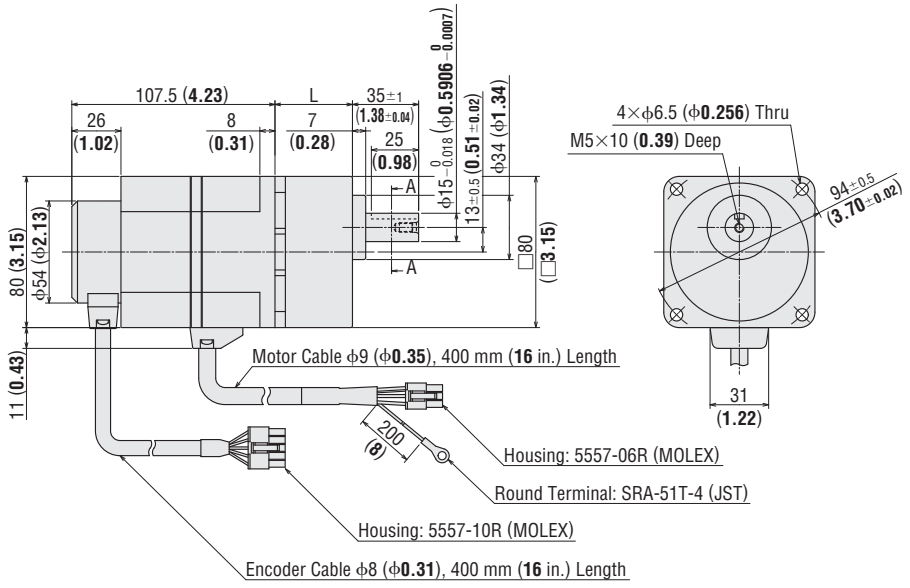
● Enter the gear ratio in the box (□) within the model name.

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

◇Motor/Parallel Shaft Gearhead

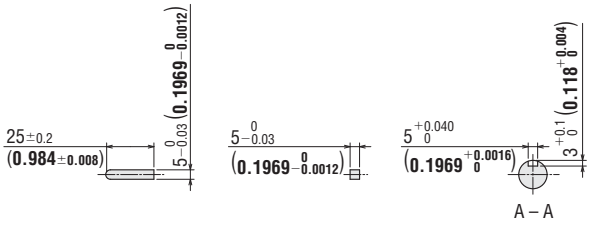
Model	Motor Model	Gearhead Model	Gear Ratio	L	DXF
BX460AM-□S **BX460CM-□S**	BXM460M-GFS	GFS4G□	**5**～**20**	41 (1.61)	C154A
			30～**100**	46 (1.81)	C154B
			200	51 (2.01)	C154C

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



◇Key and Key Slot

(The key is Included with the gearhead)



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

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◇Motor/Hollow Shaft Flat Gearhead

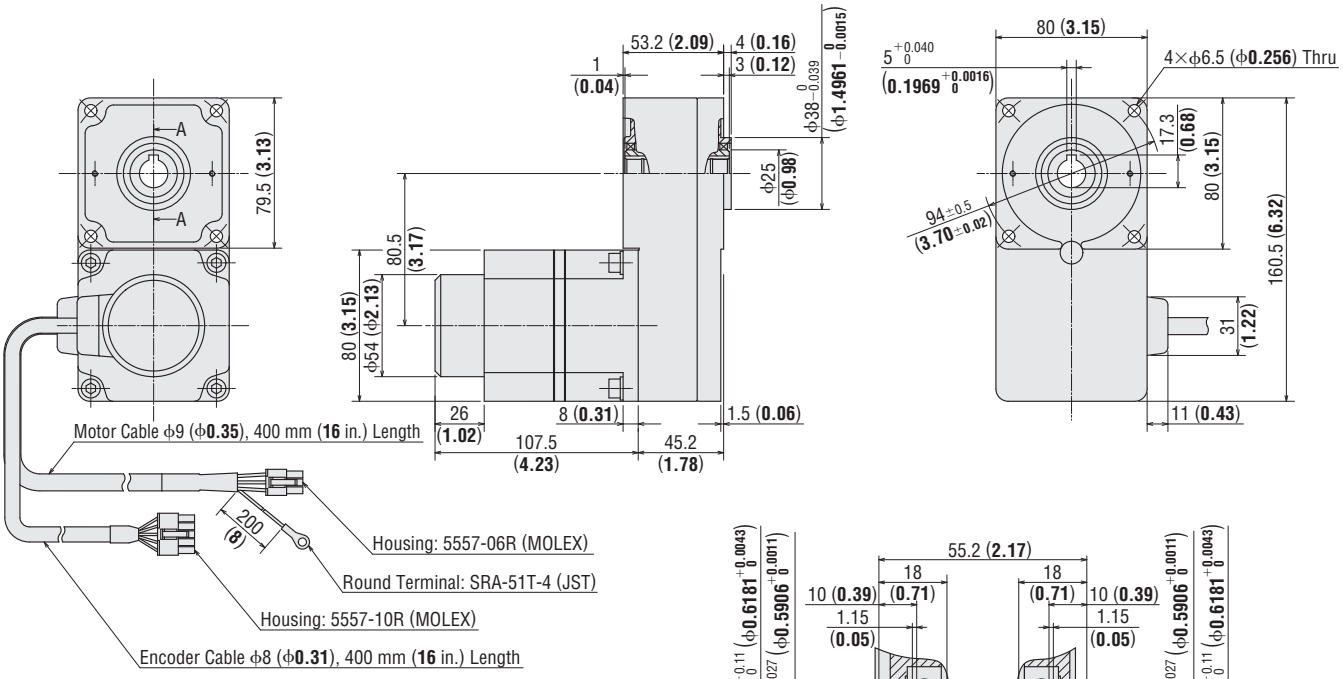
BX460AM-□FR, **BX460CM-□FR**

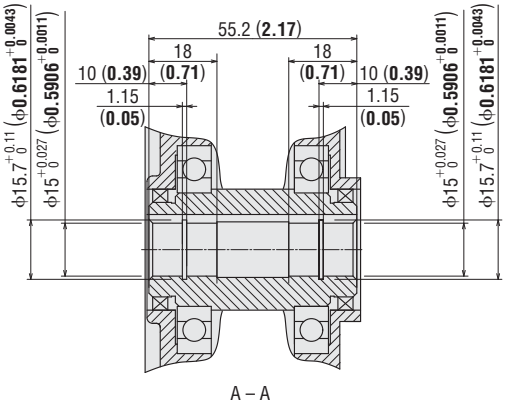
Motor: BXM460M-GFS

Gearhead: GFS4G□FR

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

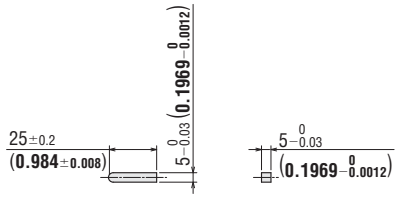
DXF C200





A – A

◇Key (Included)



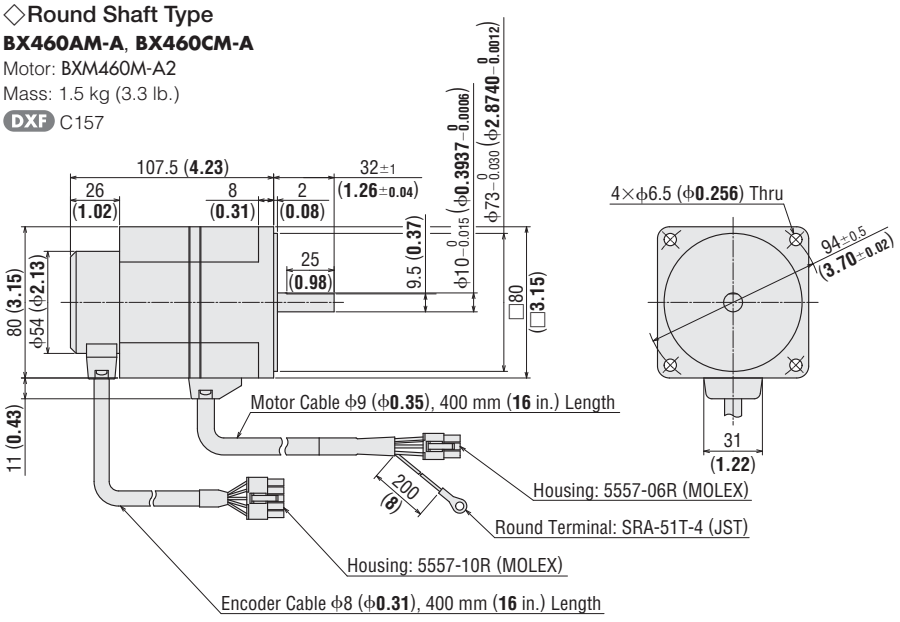
◇Round Shaft Type

BX460AM-A, **BX460CM-A**

Motor: BXM460M-A2

Mass: 1.5 kg (3.3 lb.)

DXF C157



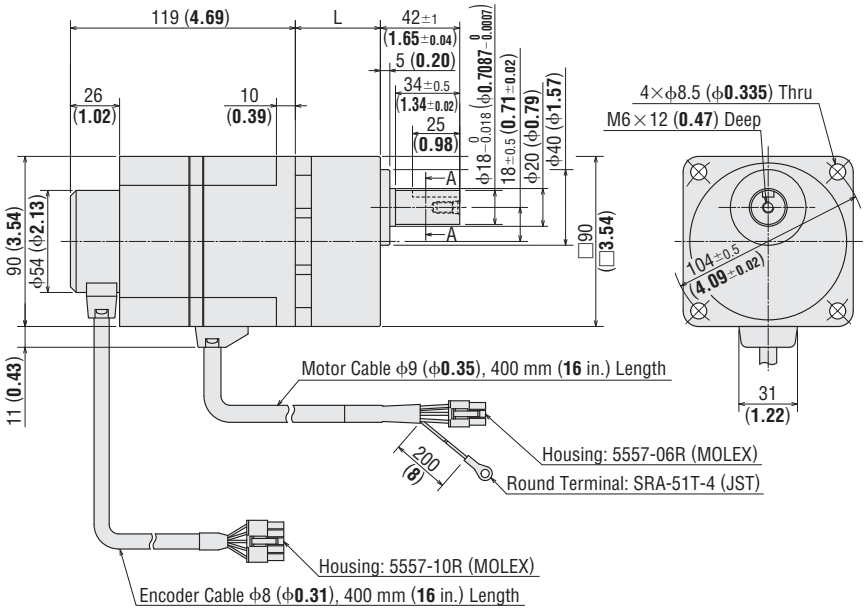
● Enter the gear ratio in the box (□) within the model name.

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

◇Motor/Parallel Shaft Gearhead

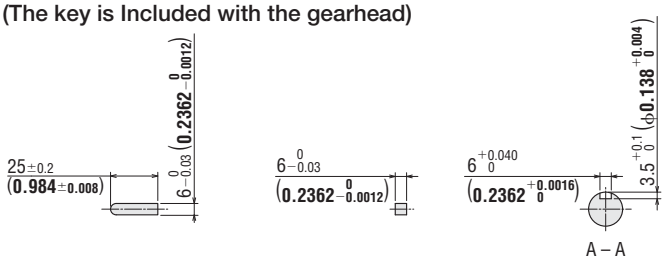
Model	Motor Model	Gearhead Model	Gear Ratio	L	DXF
BX5120AM-□S **BX5120CM-□S**	BXM5120M-GFS	GFS5G□	**5**～**20**	45 (1.77)	C155A
			30～**100**	58 (2.28)	C155B
			200	64 (2.52)	C155C

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



◇Key and Key Slot

(The key is Included with the gearhead)



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

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◇Motor/Hollow Shaft Flat Gearhead

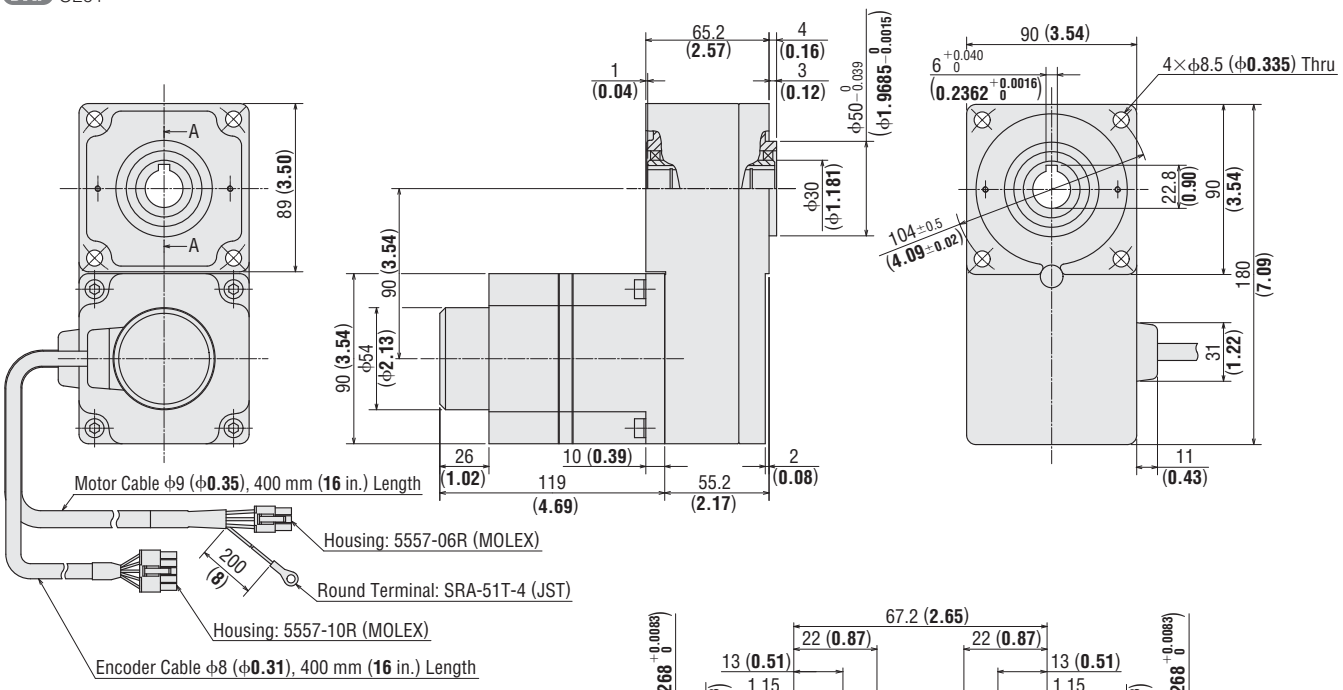
BX5120AM-□FR, **BX5120CM-□FR**

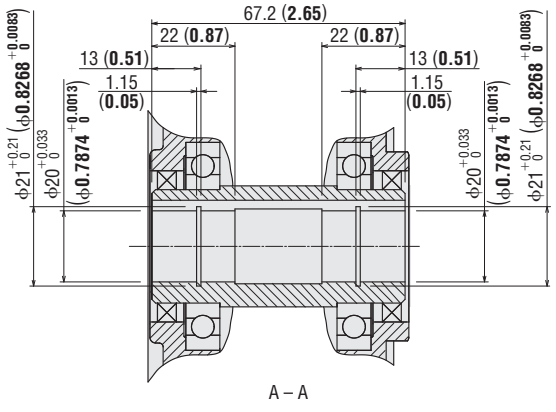
Motor: BXM5120M-GFS

Gearhead: GFS5G□FR

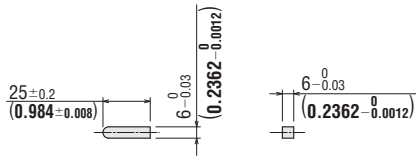
Mass: 4.4 kg (9.7 lb.) (Including gearhead)

DXF C201





◇Key (Included)



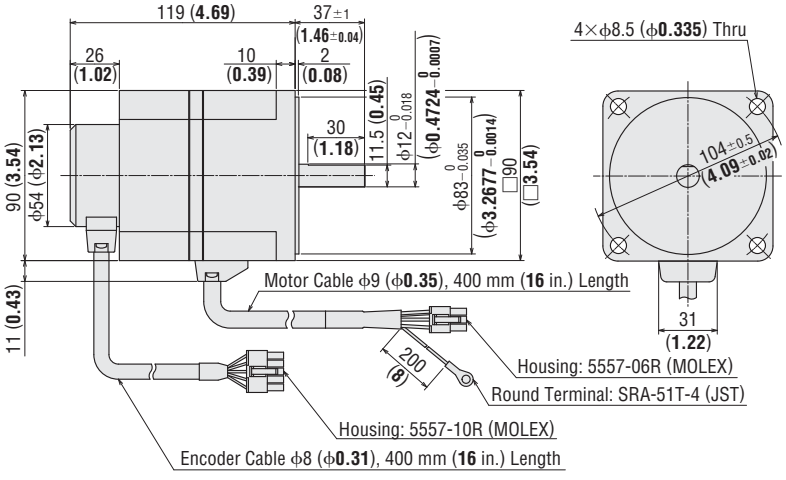
◇Round Shaft Type

BX5120AM-A, **BX5120CM-A**

Motor: BXM5120M-A2

Mass: 2.2 kg (4.8 lb.)

DXF C158



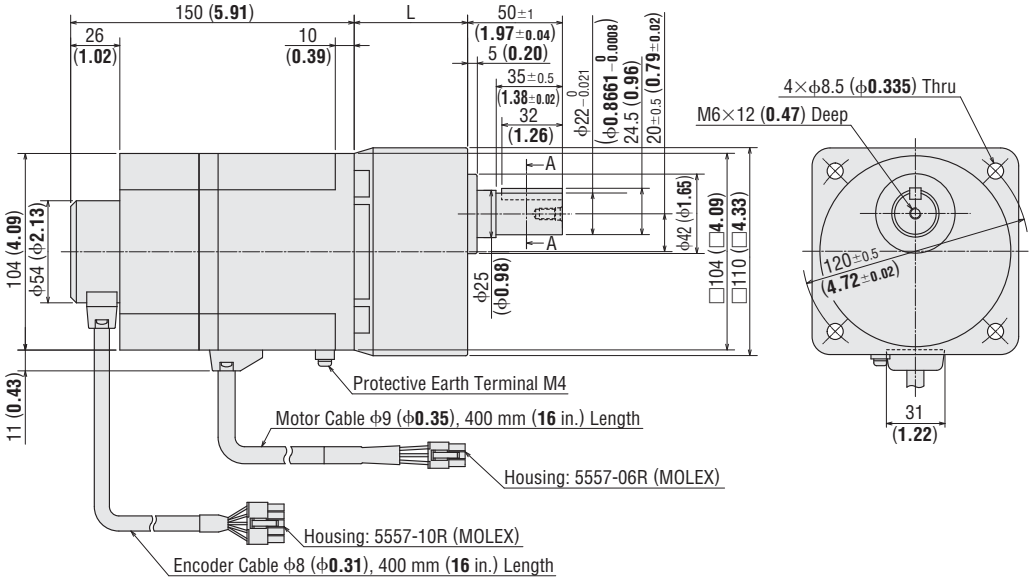
● Enter the gear ratio in the box (□) within the model name.

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

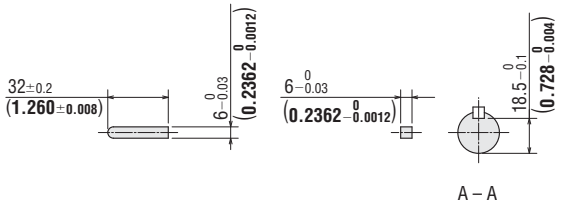
◇Motor/Parallel Shaft Gearhead

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

Mass: 6.5 kg (14 lb.) (Including gearhead)



◇Key and Key Slot



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

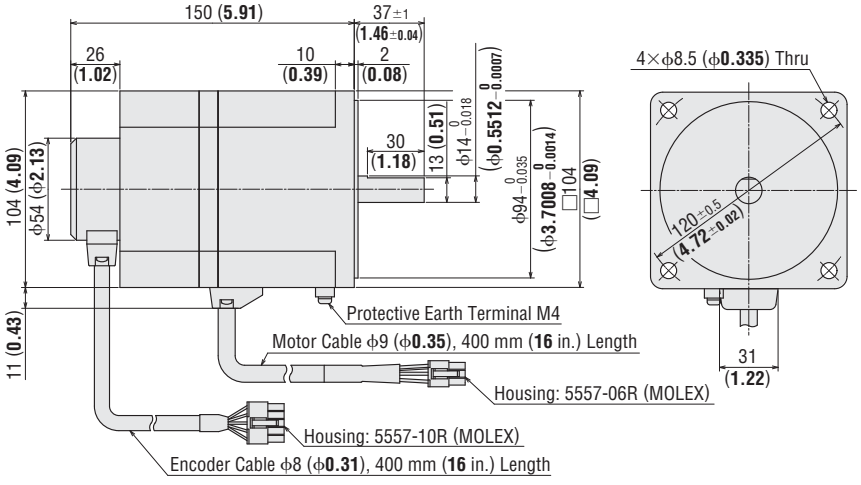
◇Round Shaft Type

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

Motor: BXM6200M-A, BXM6400M-A

Mass: 3.5 kg (7.7 lb.)

DXF C184

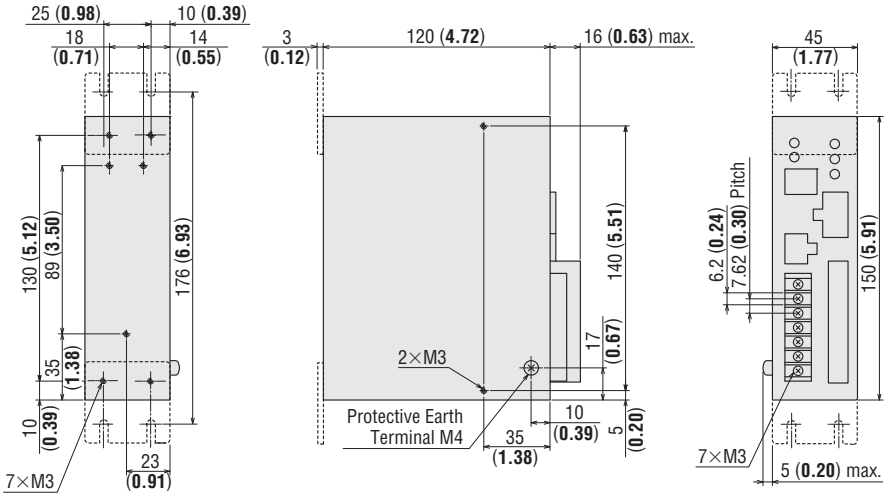


●Enter the gear ratio in the box (□) within the model name.

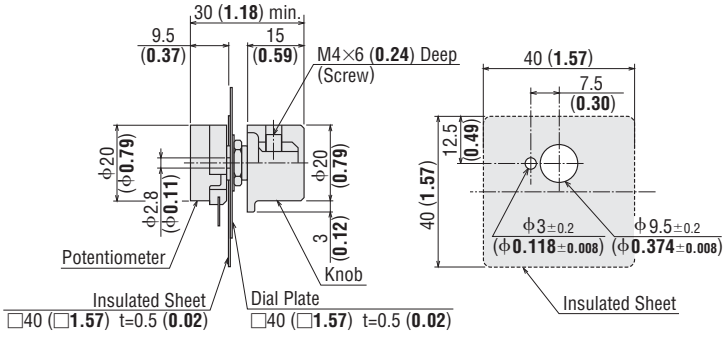
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◇Driver (Common to all models)

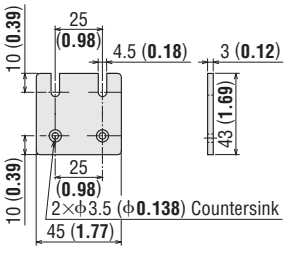
BXD30A-A, BXD30A-C, BXD60A-A, BXD60A-C
BXD120A-A, BXD120A-C, BXD200A-A, BXD200A-C, BXD400A-S
Mass: 0.8 kg (1.76 lb.)
DXF C141



◇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.).

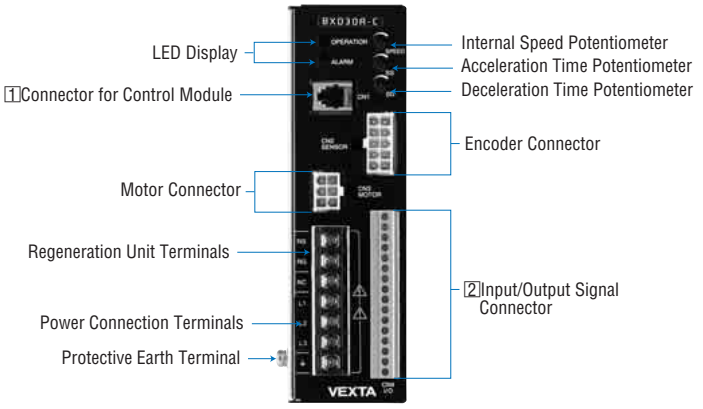
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Speed Control

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 B-58

2 Input/Output Signals

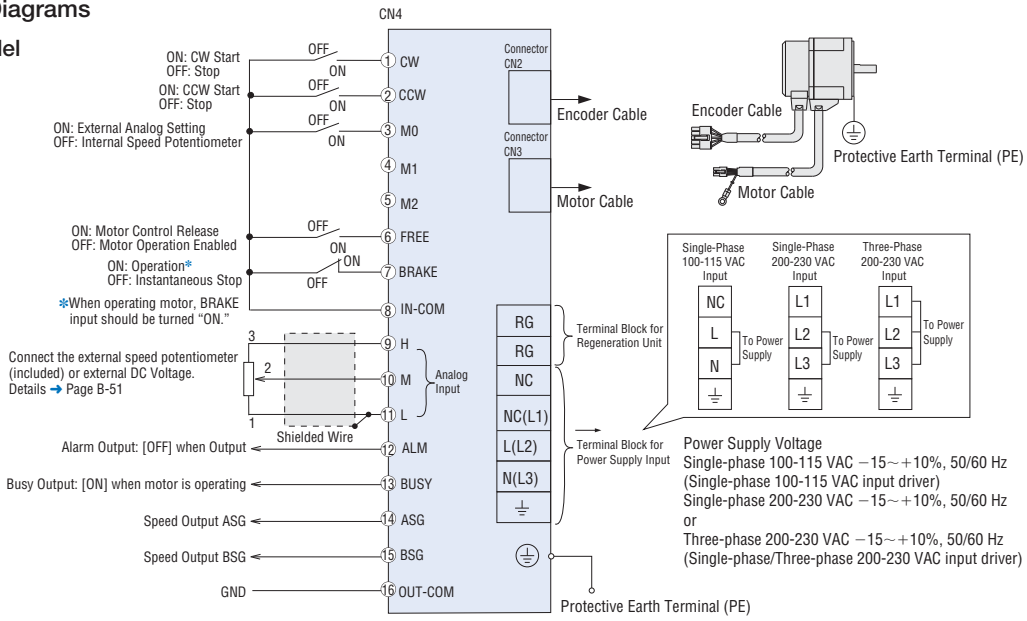
CN4 Terminal Number	I/O	Signal Name		Function
		Standard Model	Extended Function	
1	Input	CW	CW	CW rotation/stop switching input
2		CCW	CCW	CCW rotation/stop switching input
3		M0	M0	Internal speed setting/external analog setting
4		NC	M1	Standard model: Nothing is connected. Extended function: Operation-data 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.

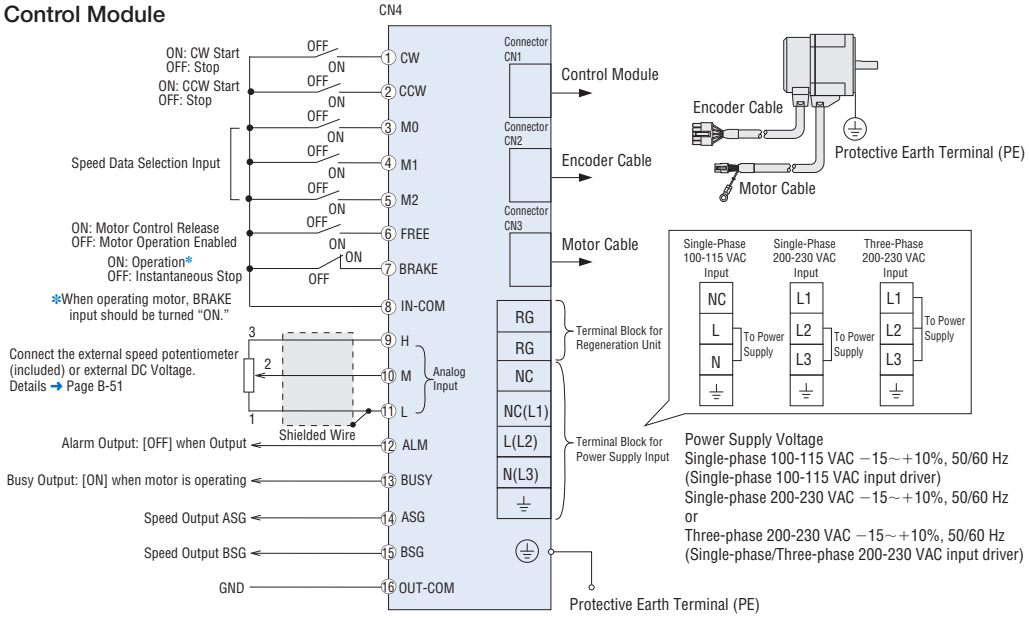
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●Connection Diagrams

◇Standard Model



◇When Using a Control Module



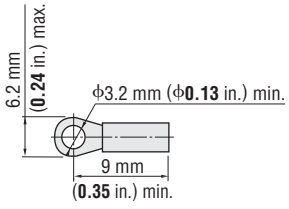
Notes:

- 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)

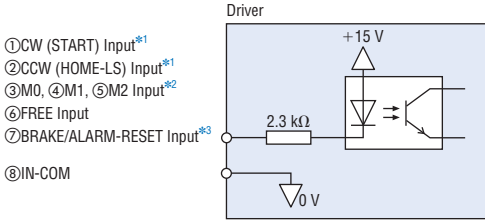
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Speed Control

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

◇Input Circuit

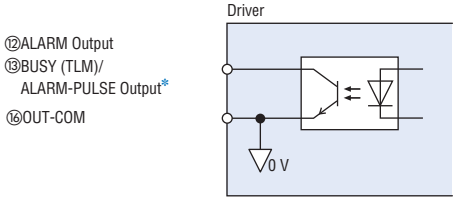
The circled number located in front of each signal represents the number of the corresponding I/O signal terminal.



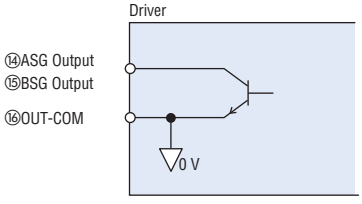
∗1 The CW and CCW inputs function in the speed control mode on the standard model and when the control module **OPX-1A** is used.
The START and HOME-LS inputs function in the position control mode when the control module **OPX-1A** is used.
∗2 The M0 input is the only operation-data selection input available 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.

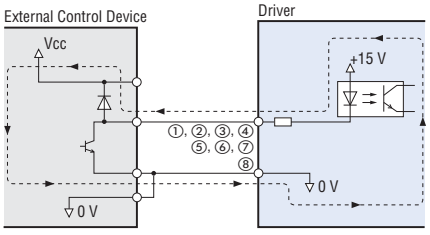


◇When an External Control Device with a Built-In Clamp Diode is Used

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

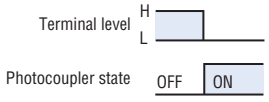
If the driver power is turned on first when connected as shown in the figure below, or the external control device power is turned off with the driver power turned on, current will be applied, as indicated by the arrows in the diagram. This may cause the motor to run.
When the power is turned on or off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



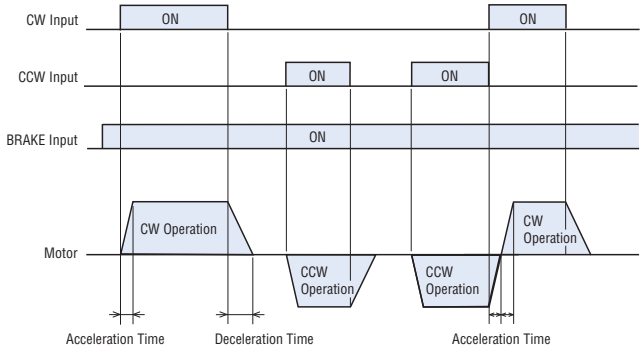
●Input Signals (Standard model)

◇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:

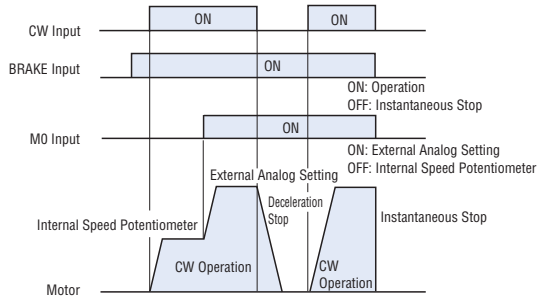
● The rotation direction indicates the direction as viewed from the motor's output shaft. With the combination type, the rotation direction varies according to the gearhead ratio.
Gearmotor–torque table of combination type ➜ Page B-28
Rotation direction of the hollow shaft flat gearhead ➜ Page B-29

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◇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

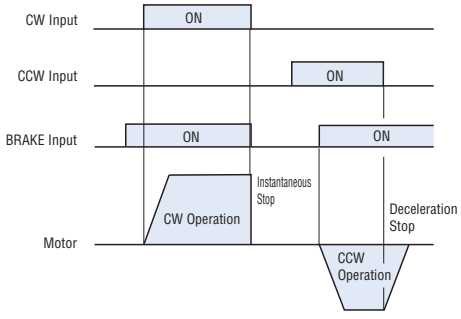
When the photocoupler is turned ON, the motor excitation is cancelled and the electromagnetic brake is released. The FREE input is given the highest priority regardless of the condition of other inputs. The FREE input functions even when a protective function is activated.

◇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.

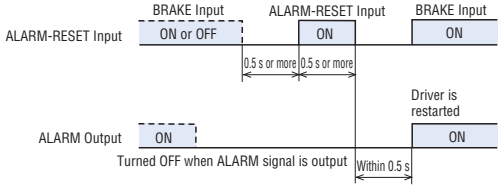
• During Normal Operation (BRAKE input)

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)

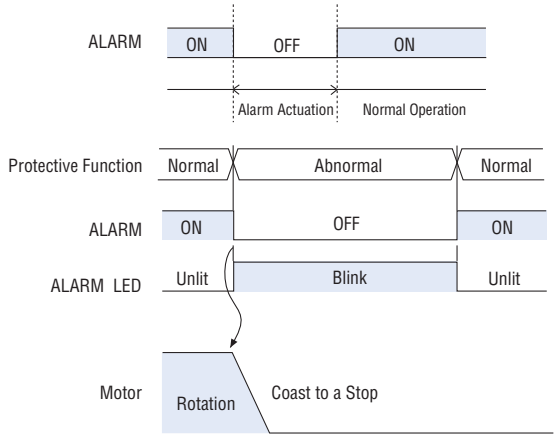
Speed Control Data	Speed Control Data Selection			Method of Speed Setting
	M0	M1	M2	
No.0	OFF	OFF	OFF	Internal speed potentiometer/ Digital setting
No.1	ON	OFF	OFF	External analog/ Digital setting
No.2	OFF	ON	OFF	Digital setting
No.3	ON	ON	OFF	Digital setting
No.4	OFF	OFF	ON	Digital setting
No.5	ON	OFF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

Speed Control

●Output Signals (Standard model)

◇Alarm (ALARM) Output

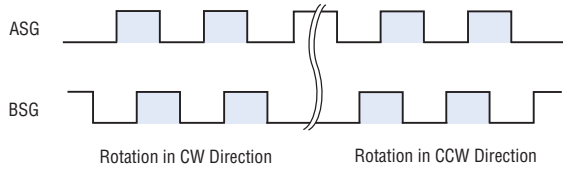
The transistor turns OFF when a driver protective function is active. When overload, overcurrent or other abnormality is detected, the alarm signal is output and the ALARM LED on the driver is blinked and the motor coasts to a stop. The electromagnetic brake will be activated. To reset the alarm signal 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.

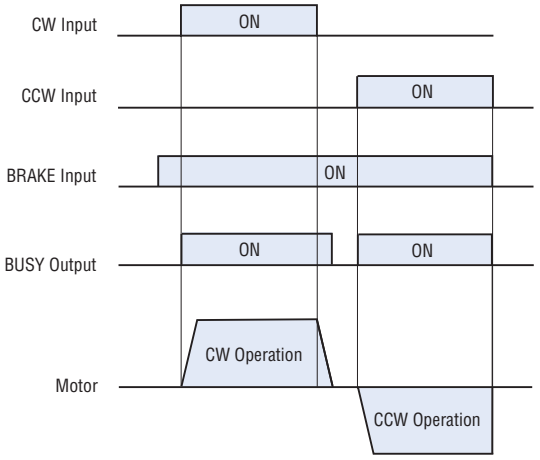


◇Busy (BUSY) [Torque Limiting (TLM)]/Alarm Pulse (ALARM-PULSE) Output

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.

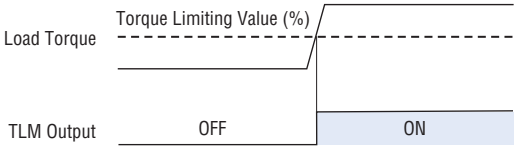
• During Normal Operation (Busy output)

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.]

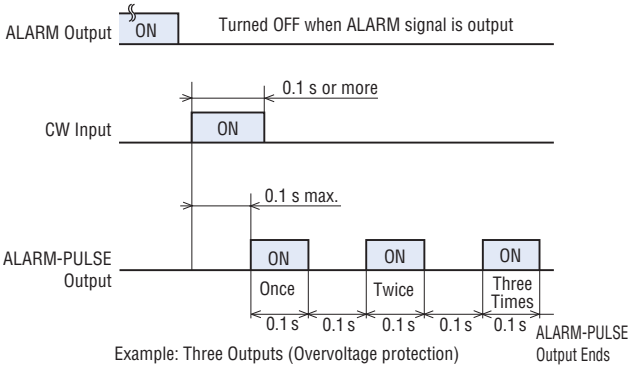
Speed control mode/position control mode: The transistor turns ON when the specified torque limit is reached.



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 B-56

• 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)

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●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

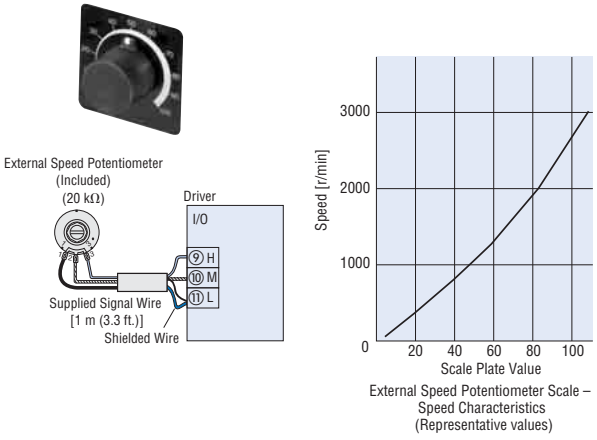
(Common to standard model and using a control module)

◇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)

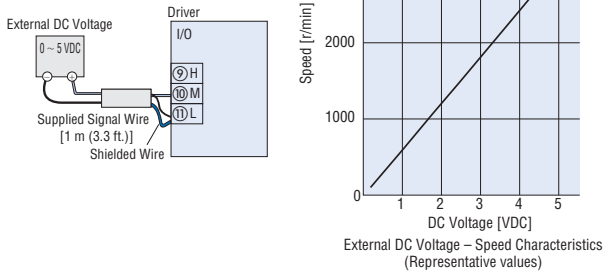
When the motor speed is to be set remotely, connect the supplied external speed potentiometer as shown below. When the external speed potentiometer is used, set the M0 terminal to "Photocoupler ON."



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

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Speed Control

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

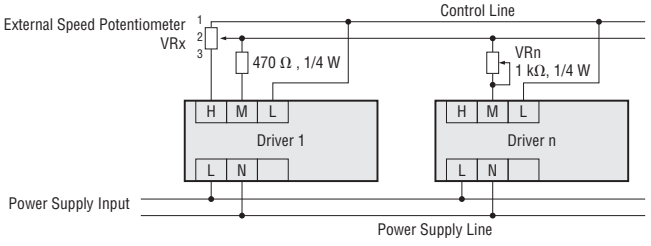
Two or more motors can be operated at the same speed using a single external speed potentiometer or external DC voltage.
The figure below shows an example of the single-phase power supply specification. For the three-phase power supply specification, change the power supply line to one for a three-phase 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.

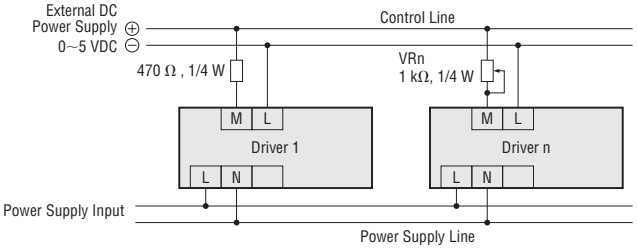


◇Using External DC Voltage

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.

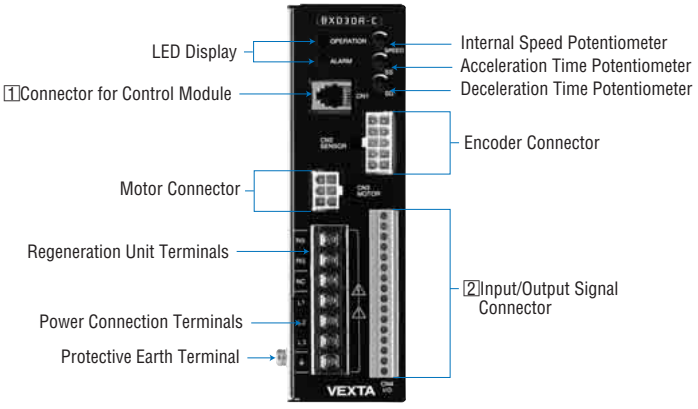


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Connection and Operation (Position Control)

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

●Names and Functions of Driver Parts



1Connector 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 B-58

2Input/Output Signals

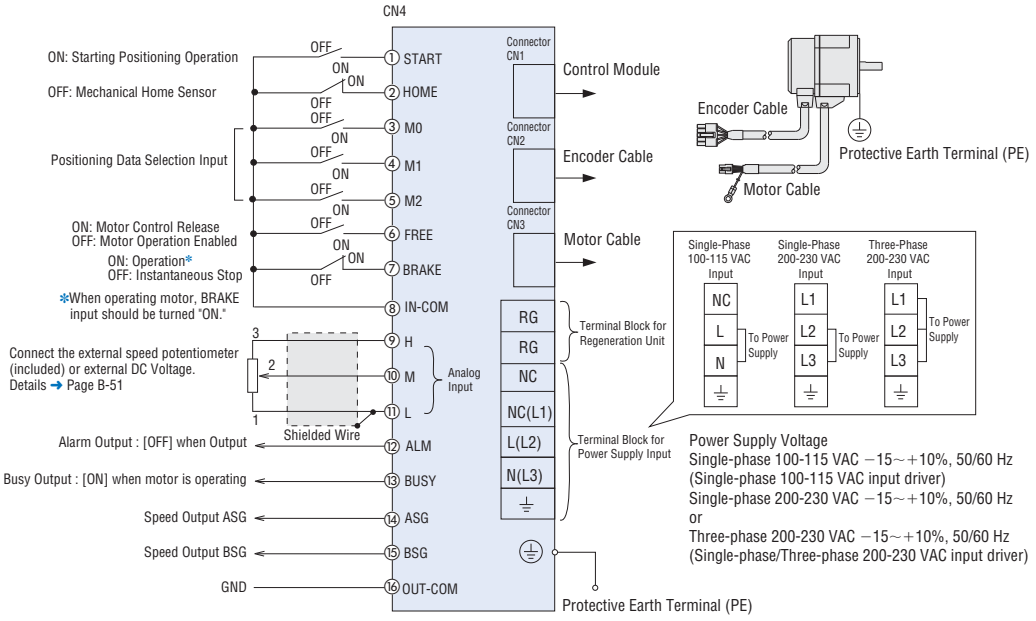
CN4 Terminal Number	I/O	Signal Name	Function
1	Input	START	Starting positioning operation
2		HOME-LS	Mechanical home sensor (normally closed)
3		M0	Positioning data selection
4		M1	
5		M2	
6		FREE	Motor excitation cancellation, electromagnetic brake release
7		BRAKE/ ALARM-RESET	Normal: Brake input Protective 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.

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Position Control

●Connection Diagram



●Refer to the connection diagrams in the speed control mode for applicable crimp terminal and notes on connection. ➜ Page B-47

●Input/Output Signal Circuits

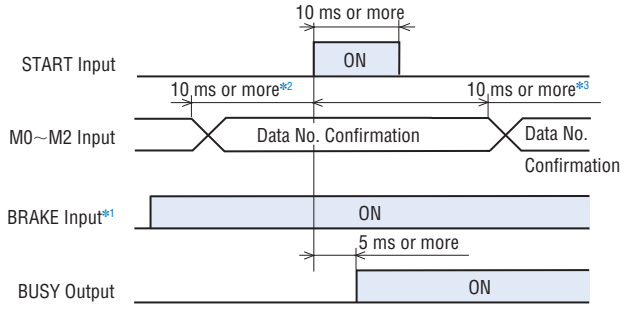
same as Speed Control ➜ Page B-48

●Input Signals

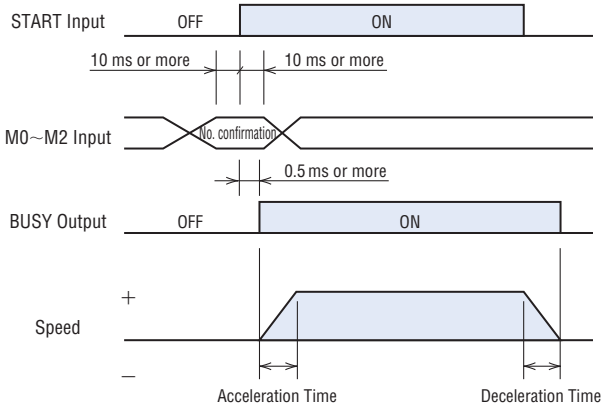
◇Start (START) Input

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.

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◇Mechanical Home Sensor (HOME-LS) Input

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

• Return to Mechanical Home Operation

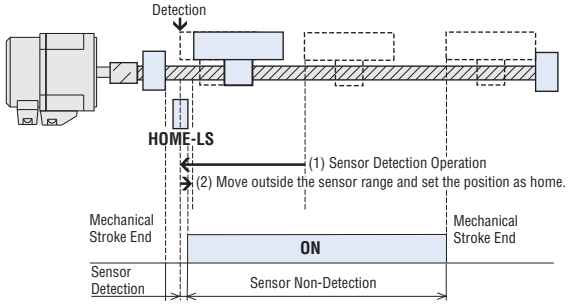
The mechanical home sensor (HOME-LS input) installed on the equipment is detected with the motor operated in the set detection starting direction. Upon detection of the home sensor, the motor reverses its direction and stops at a position just outside the range of the home sensor.

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 B-49

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

same as Input Signals (Standard model) ➜ Page B-49

●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 B-50

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Torque Limiting

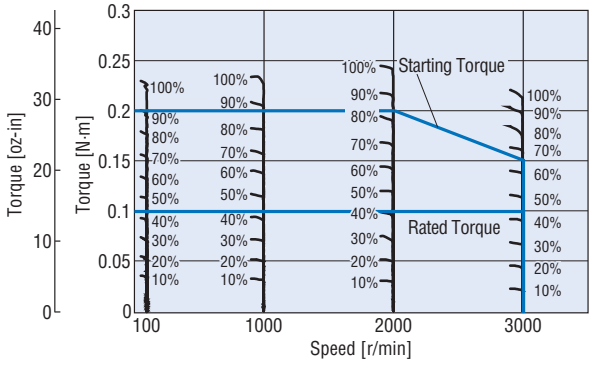
Torque Limiting Function When Using a Control Module

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.

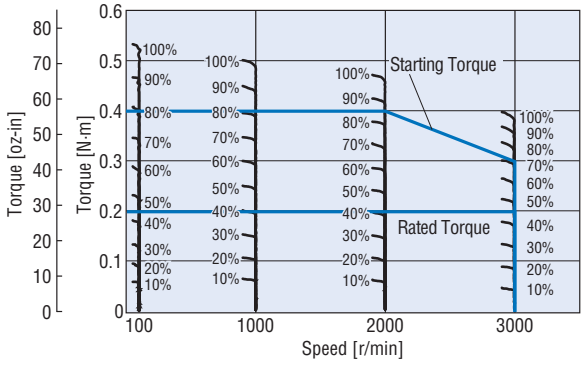
Gearhead output shaft speed N_G = Motor shaft speed×1/Gearhead ratio
Gearhead output shaft torque T_G = Motor torque×Gearhead ratio×0.9 (coefficient)

Speed – Torque Limit Characteristics (Reference values)

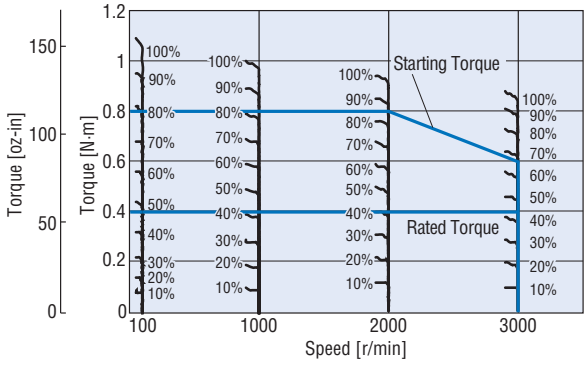
BX230■-A/BX230■-□S/BX230■-□FR
BX230■M-A/BX230■M-□S/BX230■M-□FR



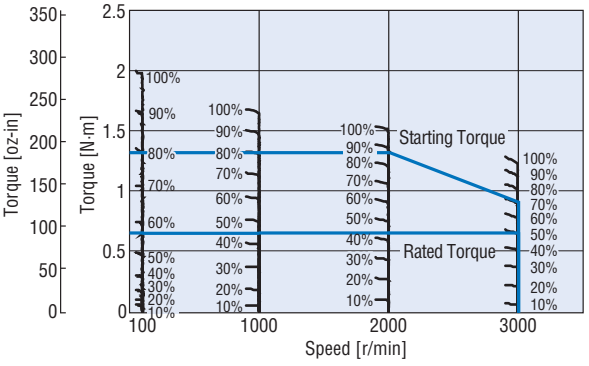
BX460■-A/BX460■-□S/BX460■-□FR
BX460■M-A/BX460■M-□S/BX460■M-□FR



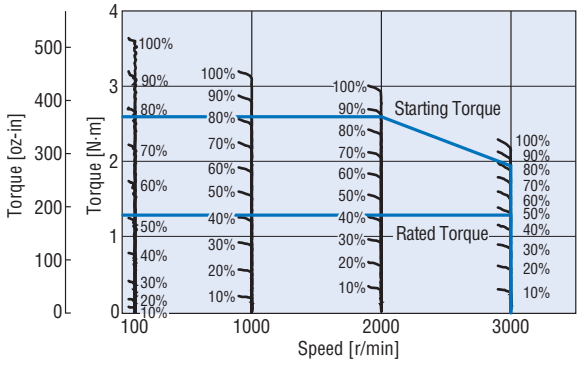
BX5120■-A/BX5120■-□S/BX5120■-□FR
BX5120■M-A/BX5120■M-□S/BX5120■M-□FR



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



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



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.

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List of Motor and Driver Combinations

Standard

◇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

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

◇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

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

◇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

◇Pinion Shaft Type

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

With Electromagnetic Brake

◇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

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

◇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

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

◇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

◇Pinion Shaft Type

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

Accessories (Sold separately)

Control Module RoHS

With this control module, various data setting and digital display are possible.

◇Model: **OPX-1A**

With communication cable [2 m (6.6 ft.)]

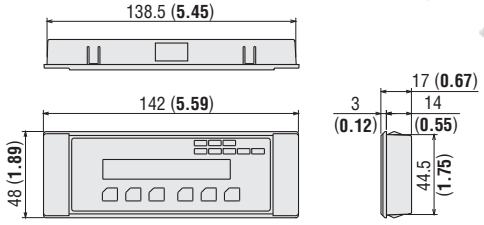




◇Dimensions Unit = mm (in.)

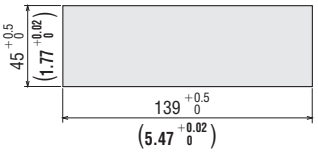
Mass: 0.07 kg (0.154 lb.)

DXF C142



• Panel Cut-Out for Control Module

[Thickness of the mounting plate: 1 to 3 mm (0.04 to 0.12 in.)]



Panel Cut-Out Dimensions

Extension Cables, Flexible Extension Cables RoHS

These cables are used to extend the wiring distance between the motor and driver. Use of flexible extension cables is recommended in applications where the cable will be flexed repeatedly. All extension cables and flexible extension cables come as a set of motor and encoder cables.

◇Extension Cables

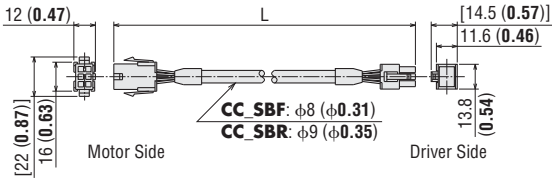
Model	Length L [m (ft.)]
CC01SBF	1 (3.3)
CC02SBF	2 (6.6)
CC03SBF	3 (9.8)
CC05SBF	5 (16.4)
CC07SBF	7 (23.0)
CC10SBF	10 (32.8)
CC15SBF	15 (49.2)
CC20SBF	20 (65.6)

◇Flexible Extension Cables

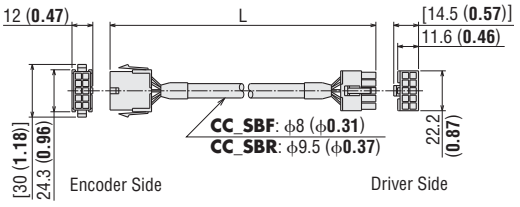
Model	Length L [m (ft.)]
CC01SBR	1 (3.3)
CC02SBR	2 (6.6)
CC03SBR	3 (9.8)
CC05SBR	5 (16.4)
CC07SBR	7 (23.0)
CC10SBR	10 (32.8)
CC15SBR	15 (49.2)
CC20SBR	20 (65.6)

◇Dimensions Unit = mm (in.)

• For Motor

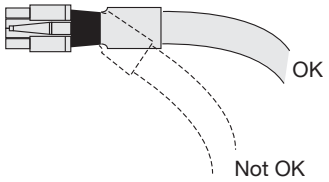


• For Encoder

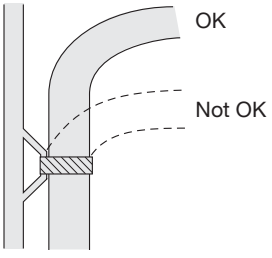


◇Notes on use of a Flexible Extension Cable

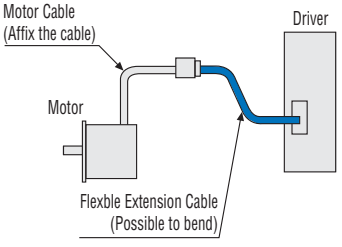
①Do not allow the cable to bend at the cable connector.



②Keep the bending radius to 60 mm (2.36 in.) or more.



③The motor cable is not a flexible cable. If the motor cable is to be bent, bend it at the flexible extension cable.



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