

**Speed Control Motors** 

**Brushless Motors** 

# **AC Power-Supply Input**

BLE Series	D-
BLF Series	D-
BLU Series	D-

## Brushless Motor and Driver Package BLE Series

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

## Features

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

Compared with conventional models, the speed control range of the **BLE** Series is greatly expanded.

Use in high-speed applications even at the maximum speed of 4000 r/min is possible.

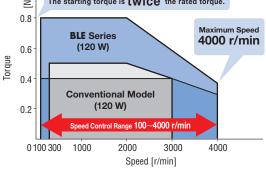
 Speed Control Range
 BLE Series:
 100 to 4000 r/min (speed ratio 1:40)

 Conventional Model:
 300 to 3000 r/min (speed ratio 1:10)

 [Comparison Using 120 W Output Model]

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 The starting torque is twice the rated torque.



#### Excellent Speed Stability

The speed regulation (load) is  $\pm 0.5\%$ .

For this reason, this mechanism ensures that the motor drives at a stable speed over its entire speed range from low to high, even when the load condition fluctuates.



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(RoHS)

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



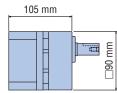
#### Energy Savings

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

#### Compact yet Powerful

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

> [**BLE** Series 120 W] Mass: 3.0 kg



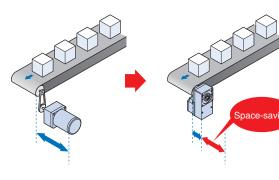
#### Features of Gearheads

◇Long Life Gearhead Rated Life of 10000 Hours\* The rated life of the parallel shaft gearhead and hollow shaft flat gearhead is 10000 hours. The parallel shaft gearhead achieves a long life that is twice as long as that of a conventional model. \*For the rated life time definition, refer to "Service Life of Gearheads" on page G-35.
●The parallel shaft gearhead for 60 W and 120 W models has a tapped hole at the shaft end.

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





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

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### Use of Control Module Extends Specifications and Functions

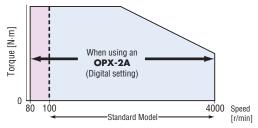
Use in combination with a control module (sold separately) extends specifications and functions and makes the following possible:



\*This is only a function of the control module (OPX-2A).

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

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



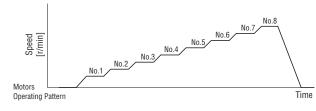
#### Improved Speed Regulation

Contact TEL



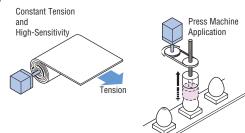
#### Multi-Speed Operation up to 8 Speeds is Possible

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



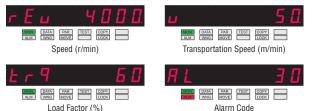
#### ◇Limiting the Motor Output Torque

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



### ♦ Various Digital Displays are Possible (OPX-2A)

Speed, load factor, alarm code, etc. can be displayed digitally. •The speed can be displayed as the speed of the gearhead output shaft.



#### Speed Control during Vertical Drive

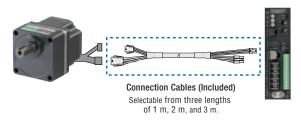
The motor with an electromagnetic brake enables stable speed control even during vertical drive (gravitational operation). When the power is turned off, the motor stops instantaneously to hold the load in place. The electromagnetic brake is automatically controlled via the driver in accordance with ON/OFF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

#### Note

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

#### Cable Comes in Three Lengths

The BLE Series comes with a cable with a length of 1 m, 2 m or 3 m for connection between the motor and driver. Select the cable length that best suits the extension length between the motor and driver.



#### Select the Cable Length or a Flexible Connection Cable Cables up to 20 m are Available (Sold separately)

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

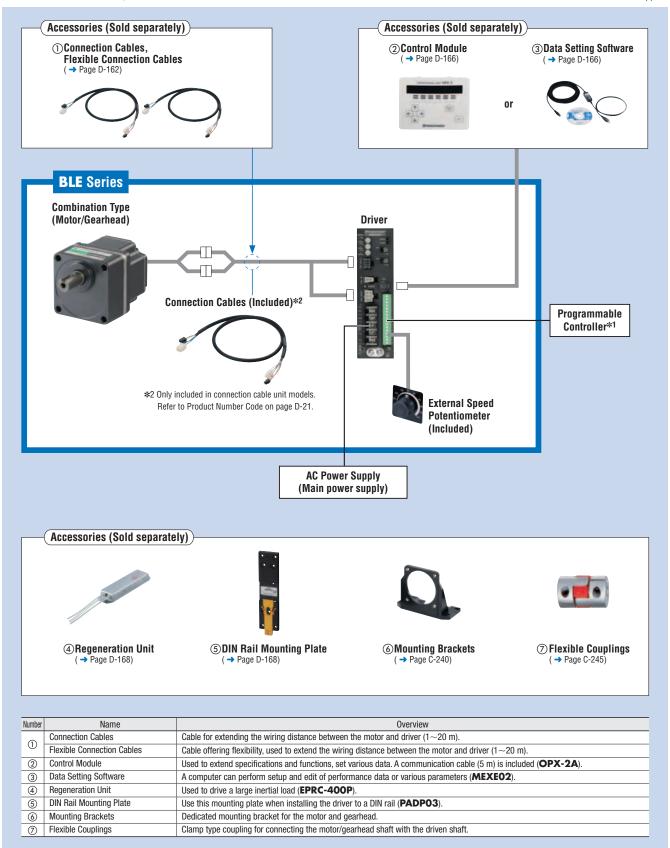
■Connection cables → Page D-162

#### ◇Flexible Connection Cables are Also Available (Sold) separately)

Use a flexible connection cable if the cable will be bent. ●Flexible connection cables → Page D-162

## System Configuration

\*1 Not supplied



#### System Configuration Example

BLE Series		Sold Separately			
Combination Type- Parallel Shaft	+	Connection Cable (7 m)	DIN Rail Mounting Plate	Mounting Bracket	Flexible Coupling
BLE46C50S-3		CC07BLE	PADP03	SOL4M6	MCL551515

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

Product Number Code							
BLE	5	12	С	M	200	F	- 3
1	2	3	4	5	6	7	8

1	Series Name	BLE: BLE Series
2	Motor Frame Size	2:60 mm 4:80 mm 5:90 mm
3	Output Power (W)	<b>3</b> :30 W <b>6</b> :60 W <b>12</b> :120 W
	Power Supply Voltage	A: Single-Phase 100-120 VAC
4		C: Single-Phase 200-240 VAC
		S : Three-Phase 200-240 VAC
5	M: Electromagnetic Brake Type	None: Standard type
	Gear Ratio, Motor Shaft Type	Number: Gear Ratio for Combination Types:
6		8 types from <b>5</b> to <b>200</b>
		A: Round Shaft Type
~	Gearhead Type	S : Parallel Shaft Gearhead
0	(Combination type only)	F : Hollow Shaft Flat Gearhead
~	Connection Cable	1:1 m 2:2 m 3:3 m
8		None: No connection cable is included

Examples with and without connection cables and showing the cable length. A 3 m connection cable is included → BLE512CM200F-3 No connection cable -> BLE512CM200F

## Product Line

This type comes with the motor and its dedicated gearhead pre-assembled. This simplifies installing in equipment. Combination Motors and gearheads are also available separately to facilitate changes in motor and gearhead combinations and if spare Туре gearheads are required.

#### Standard Type

For the single-phase 100-120 VAC models and three-phase 200-240 VAC models, please contact the nearest Oriental Mortor sales office.

#### Combination Type – Parallel Shaft Gearhead

Output Power	Power Supply Voltage	Product Name	Gear Ratio
	Single-Phase	BLE23A S-	5, 10, 15, 20, 30,
	100-120 VAC	BLE23A_S	50, 100, 200
30 W	Single-Phase	BLE23C□S-◇	5, 10, 15, 20, 30,
30 W	200-240 VAC	BLE23C S	50, 100, 200
	Three-Phase	BLE23S□S-◇	5, 10, 15, 20, 30,
	200-240 VAC	BLE23S_S	50, 100, 200
	Single-Phase	BLE46A S-🛇	5, 10, 15, 20, 30,
	100-120 VAC	BLE46A_S	50, 100, 200
CO 111	Single-Phase	BLE46C□S-◇	5, 10, 15, 20, 30,
60 W	200-240 VAC	BLE46C S	50, 100, 200
	Three-Phase	BLE46S□S-◇	<b>5</b> , <b>10</b> , <b>15</b> , <b>20</b> , <b>30</b> ,
	200-240 VAC	BLE46S_S	50, 100, 200
	Single-Phase	BLE512A S-	<b>5</b> , <b>10</b> , <b>15</b> , <b>20</b> , <b>30</b> ,
	100-120 VAC	BLE512A_S	50, 100, 200
120 W	Single-Phase	BLE512C□S-◇	<b>5</b> , <b>10</b> , <b>15</b> , <b>20</b> , <b>30</b> ,
120 W	200-240 VAC	BLE512C_S	50, 100, 200
	Three-Phase	BLE512S□S-◇	<b>5</b> , <b>10</b> , <b>15</b> , <b>20</b> , <b>30</b> ,
	200-240 VAC	BLE512S	50, 100, 200
The following items are included in each product			

The following items are included in each product

Motor, Driver, Gearhead, Connection Cable\*, External Speed Potentiometer (With signal line), Mounting Screws, Parallel Key, Operating Manual \*Only for products with a connection cable included.

#### Round Shaft Type

Output Power	Power Supply Voltage	Product Name
	Single-Phase 100-120 VAC	BLE23AA-🔷 BLE23AA
30 W	Single-Phase 200-240 VAC	BLE23CA-🔷 BLE23CA
	Three-Phase 200-240 VAC	BLE23SA-🔷 BLE23SA
60 W	Single-Phase 100-120 VAC	BLE46AA-🔷 BLE46AA
	Single-Phase 200-240 VAC	BLE46CA-🔷 BLE46CA
	Three-Phase 200-240 VAC	BLE46SA-🔷 BLE46SA

	Type – Hollow	Shaft Flat Gearhea	Ь
$\sim$ 0011011ation	Type – Honow	Unant i lat Gearnea	u

Output Power	Power Supply Voltage	Product Name	Gear Ratio
	Single-Phase	BLE23A□F-◇	5, 10, 15, 20, 30
	100-120 VAC	BLE23A F	50, 100, 200
30 W	Single-Phase	BLE23C□F-◇	5, 10, 15, 20, 30
30 W	200-240 VAC	BLE23C F	50, 100, 200
	Three-Phase	BLE23S□F-◇	5, 10, 15, 20, 30
	200-240 VAC	BLE23S_F	50, 100, 200
	Single-Phase	BLE46A F-🛇	5, 10, 15, 20, 30
	100-120 VAC	BLE46A F	50, 100, 200
60 W	Single-Phase	BLE46C□F-◇	5, 10, 15, 20, 30
60 W	200-240 VAC	BLE46C F	50, 100, 200
	Three-Phase	BLE46S□F-◇	5, 10, 15, 20, 30
	200-240 VAC	BLE46S_F	50, 100, 200
	Single-Phase	BLE512ADF-🛇	5, 10, 15, 20, 30
	100-120 VAC	BLE512A_F	50, 100, 200
120 W	Single-Phase	BLE512C□F-◇	5, 10, 15, 20, 30
120 W	200-240 VAC	BLE512C F	50, 100, 200
	Three-Phase	BLE512S□F-◇	5, 10, 15, 20, 30
	200-240 VAC	BLE512S_F	50, 100, 200

Motor, Driver, Gearhead, Connection Cable\*, External Speed Potentiometer (With signal line), Mounting Screws, Parallel Key, Safety Cover (Screws included), Operating Manual

\*Only for products with a connection cable included.

Output Power	Power Supply Voltage	Product Name		
	Single-Phase 100-120 VAC	BLE512AA-🗘 BLE512AA		
120 W	Single-Phase 200-240 VAC	BLE512CA-🔷 BLE512CA		
	Three-Phase 200-240 VAC	BLE512SA-🔷 BLE512SA		
The following items are included in each product.				
The following items are included in each product. Motor, Driver, Connection Cable*, External Speed Potentiometer (Signal line included), Operating Manual *Only for products with a connection cable included.				

•A number indicating the gear ratio is entered where the box  $\Box$  is located within the product name.

A number indicating the desired connection cable (included) length of 1 (1 m), 2 (2 m) or 3 (3 m) is entered where the box  $\diamondsuit$  is located within the product name.

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AC Speed Control Motors

#### Electromagmetic Brake Type

For the single-phase 100-120 VAC models and three-phase 200-240 VAC models, please contact the nearest Oriental Mortor sales office.

Output Power	Power Supply Voltage	Product Name	Gear Ratio
	Single-Phase 100-120 VAC	BLE23AM□S-◇ BLE23AM□S	5, 10, 15, 20, 30, 50, 100, 200
30 W	Single-Phase 200-240 VAC	BLE23CM□S-◇ BLE23CM□S	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200-240 VAC	BLE23SM□S-◇ BLE23SM□S	5, 10, 15, 20, 30, 50, 100, 200
60 W	Single-Phase 100-120 VAC	BLE46AM□S-◇ BLE46AM□S	5, 10, 15, 20, 30, 50, 100, 200
	Single-Phase 200-240 VAC	BLE46CM□S-◇ BLE46CM□S	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200-240 VAC	BLE46SM□S-◇ BLE46SM□S	5, 10, 15, 20, 30, 50, 100, 200
120 W	Single-Phase 100-120 VAC	BLE512AM□S-◇ BLE512AM□S	5, 10, 15, 20, 30, 50, 100, 200
	Single-Phase 200-240 VAC	BLE512CM□S-◇ BLE512CM□S	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200-240 VAC	BLE512SM□S-◇ BLE512SM□S	5, 10, 15, 20, 30, 50, 100, 200

### ◇Combination Type – Parallel Shaft Gearhead

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

#### ◇Round Shaft Type

Output Power	Power Supply Voltage	Product Name		
	Single-Phase 100-120 VAC	BLE23AMA-🔷 BLE23AMA		
30 W	Single-Phase 200-240 VAC	BLE23CMA-🔷 BLE23CMA		
	Three-Phase 200-240 VAC	BLE23SMA-🔷 BLE23SMA		
	Single-Phase 100-120 VAC	BLE46AMA-🔷 BLE46AMA		
60 W	Single-Phase 200-240 VAC	BLE46CMA-🔷 BLE46CMA		
	Three-Phase 200-240 VAC	BLE46SMA-🔷 BLE46SMA		
	Single-Phase 100-120 VAC	BLE512AMA-🛇 BLE512AMA		
120 W	Single-Phase 200-240 VAC	BLE512CMA- BLE512CMA		
	Three-Phase 200-240 VAC	BLE512SMA-🛇 BLE512SMA		
The following items are included in each product. Motor, Driver, Connection Cable*, External Speed Potentiometer (Signal line included), Operating Manual *Only for products with a connection cable included.				

Output Power	Power Supply Voltage	Product Name	Gear Ratio
	Single-Phase	BLE23AM□F-◇	5, 10, 15, 20, 30,
	100-120 VAC	BLE23AM□F	50, 100, 200
30 W	Single-Phase	BLE23CM□F-◇	5, 10, 15, 20, 30,
	200-240 VAC	BLE23CM□F	50, 100, 200
	Three-Phase	BLE23SM□F-◇	5, 10, 15, 20, 30,
	200-240 VAC	BLE23SM□F	50, 100, 200
	Single-Phase	BLE46AM□F-◇	5, 10, 15, 20, 30,
	100-120 VAC	BLE46AM□F	50, 100, 200
60 W	Single-Phase	BLE46CM□F-◇	5, 10, 15, 20, 30,
	200-240 VAC	BLE46CM□F	50, 100, 200
	Three-Phase	BLE46SM□F-◇	5, 10, 15, 20, 30,
	200-240 VAC	BLE46SM□F	50, 100, 200
	Single-Phase	BLE512AM□F-◇	5, 10, 15, 20, 30,
	100-120 VAC	BLE512AM□F	50, 100, 200
120 W	Single-Phase	BLE512CM□F-◇	5, 10, 15, 20, 30,
	200-240 VAC	BLE512CM□F	50, 100, 200
	Three-Phase	BLE512SM□F-◇	5, 10, 15, 20, 30,
	200-240 VAC	BLE512SM□F	50, 100, 200

The following items are included in each product.

Motor, Driver, Gearhead, Connection Cable\*, External Speed Potentiometer (With signal line), Mounting Screws, Parallel Key, Safety Cover (Screws included), Operating Manual

\*Only for products with a connection cable included.

ullet A number indicating the gear ratio is entered where the box  $\Box$  is located within the product name.

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A number indicating the desired connection cable (included) length of 1 (1 m), 2 (2 m) or 3 (3 m) is entered where the box  $\diamondsuit$  is located within the product name.

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AC Input BLE

AC Input BLF

AC Input BLU

DC Input BLH

US ESO2
AC Speed Control Motors

FE100/ FE200

200W

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## Specifications

#### Standard Type

#### ♦ 30 W, 60 W, 120 W (RoHS)

<b>v</b> ,	, , , <u> </u>							
	Combination Type – Parallel Shaft Gearhead	BLE23C□S-◇, BLE23C□S	BLE46C□S-◇, BLE46C□S	BLE512C□S-◇, BLE512C□S				
Product Name	Combination Type – Hollow Shaft Flat Gearhead	BLE23C□F-◇, BLE23C□F	BLE46C□F-◇, BLE46C□F	BLE512C□F-◇, BLE512C□F				
	Round Shaft Type	BLE23CA-🔷, BLE23CA	BLE46CA-🔷, BLE46CA	BLE512CA-4, BLE512CA				
Rated Output Po	wer (Continuous) W	30	60	120				
	Rated Voltage VAC		Single-Phase 200-240					
	Permissible Voltage Range	-15~+10%						
Power Supply	Rated Frequency Hz		50/60					
Input	Permissible Frequency Range		±5%					
Rated Torque	Rated Input Current A	0.8	1.2	2.0				
	Maximum Input Current A	2.1	2.6	4.4				
Rated Torque	N∙m	0.1	0.2	0.4				
Starting Torque*	<sup>∙1</sup> N·m	0.2	0.4	0.8				
Rated Speed	r/min		3000					
Speed Control R	ange r/min	100~4000 (Analog sett	ing), 80 $\sim$ 4000 (Digital setting can be set i	n 1 r/min increments)*2				
	$1 \times 10^{-4} ka_{0}m^{2}$	1.8	3.75	5.6				
Rotor Inertia	J ×10 <sup>−4</sup> kg·m <sup>2</sup>	0.087	0.24	0.61				
Canad	Load	$\pm$ 0.5% ( $\pm$ 0.2%) <sup>*2</sup> max.: Conditions 0~rated torque, rated speed, rated voltage, normal temperature						
Speed	Voltage	±0.5% (±0.2%)*2 max.: Conditions Ra	ted voltage $-15{\sim}+10\%$ , rated speed, no	load, normal temperature				
	Temperature	$\pm 0.5\% (\pm 0.2\%)^{*2}$ max.: Conditions Op	erating ambient temperature 0 $\sim$ $+$ 50°C, r	ated speed, no load, rated voltage				

### Electromagmetic Brake Type

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Liection	agmetic brake type			<b>— - - - - -</b>		
$\diamondsuit$ 30 W, 60	W, 120 W (RoHS)			c <b>RL</b> us CE		
	Combination Type – Parallel Shaft Gearhead	BLE23CM S-�, BLE23CM S	BLE46CM S-�, BLE46CM S	BLE512CM□S-◇, BLE512CM□S		
Product Name	Combination Type – Hollow Shaft Flat Gearhead	BLE23CM F-�, BLE23CM F	BLE46CM□F-�, BLE46CM□F	BLE512CM□F-�, BLE512CM□F		
	Round Shaft Type	BLE23CMA-🔷, BLE23CMA	BLE46CMA-🔷, BLE46CMA	BLE512CMA-🔷, BLE512CMA		
Rated Output Pov	ver (Continuous) W	30	60	120		
	Rated Voltage VAC		Single-Phase 200-240			
	Permissible Voltage Range		$-15 \sim +10\%$			
Power Supply	Rated Frequency Hz		50/60			
Input	Permissible Frequency Range		±5%			
	Rated Input Current A	0.8	1.2	2.0		
	Maximum Input Current A	2.1	2.6	4.4		
Rated Torque	N∙m	0.1	0.2	0.4		
Starting Torque*	<sup>1</sup> N•m	0.2	0.4	0.8		
Rated Speed	r/min					
Speed Control Ra	inge r/min	100 $\sim$ 4000 (Analog setting), 80 $\sim$ 4000 (Digital setting can be set in 1 r/min increments) $^{st_2}$				
Round Shaft Type Permissible Load		1.8	3.75	5.6		
Rotor Inertia	J ×10 <sup>-4</sup> kg⋅m <sup>2</sup>	0.087	0.24	0.61		
Speed	Load	$\pm$ 0.5% ( $\pm$ 0.2%)* <sup>2</sup> max.: Conditions 0~	rated torque, rated speed, rated voltage,	normal temperature		
Regulation	Voltage	$\pm$ 0.5% ( $\pm$ 0.2%)* <sup>2</sup> max.: Conditions Rat				
nogulation	Temperature	$\pm$ 0.5% ( $\pm$ 0.2%)* <sup>2</sup> max.: Conditions Op	erating ambient temperature 0 $\sim\!+50^\circ$ C, r	ated speed, no load, rated voltage		
Gravitational	Continuous Regenerative Power W	100				
Operation Ability	Instantaneous Regenerative Power W		240			
oporation Ability	Applicable Regeneration Unit <sup>*3</sup>		EPRC-400P			
Electromagnetic	Brake Type	Active when	the power is off, automatically controlled	by the driver		
Brake*4	Static Friction Torque N·m	0.1	0.2	0.4		

\*1 The starting torque can be used for a maximum duration of approximately five seconds.

\*2 These specifications apply when a control module (sold separately) is used.

\*3 Install the regeneration unit in the place which has the same heat radiation capability as heat radiation plate (material: aluminum 350×350 mm, 3 mm thick).

\*4 Do not start or stop the motor by turning on/off the power supply, as it will cause the electromagnetic brake to wear abnormally.

The values in the table are characteristics for the motor only.

Contact TEL

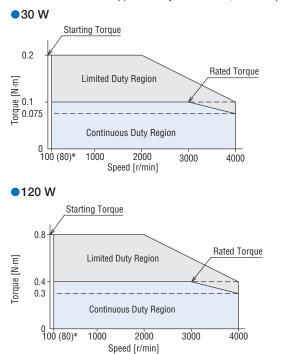
 $\bullet$ A number indicating the gear ratio is entered where the box  $\Box$  is located within the product name.

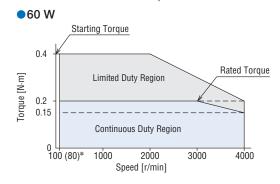
A number indicating the desired connection cable (included) length of 1 (1 m), 2 (2 m) or 3 (3 m) is entered where the box  $\diamond$  is located within the product name.

## Speed – Torque Characteristics

Continuous Duty Region: Continuous operation is possible in this region.

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





\*( ) indicates: These specifications apply when a control module (sold separately) is used. For combination types, the values are for the motor only.

## General Specifications

	Item	Motor	Driver			
Insulation Resistan	ce		The measured value is 100 M $\Omega$ or more when a 500 VDC megger is applied between the power supply terminal and the protective earth terminal and between the power supply terminal and the I/O signal terminal after continuous operation under normal ambient temperature and humidity.			
Dielectric Strength		Sufficient to withstand 1.5 kVAC at 50 Hz applied between the windings and the case for 1 minute after continuous operation under normal ambient temperature and humidity.	No abnormality is judged even with application of 1834 VAC at 50 Hz between the power supply terminal and the protective earth terminal and with application of 3 kVAC at 50 Hz between the power supply terminal and the I/O terminal for 1 minute after continuous operation under normal ambient temperature and humidity.			
Insulation Resistance       the windings and the case after continuous operationormal ambient temperature and humidity.         Dielectric Strength       Sufficient to withstand 1.5 kVAC at 50 Hz applied the windings and the case for 1 minute after contoperation under normal ambient temperature and humidity.         Temperature Rise       Temperature rise of the windings and the case ar or less, and 40°C or less*1 respectively measured thermocouple method after continuous operation normal ambient temperature and humidity.         Mathematical Ambient Temperature       Ambient Temperature         Ambient Temperature       Ambient temperature         Atmosphere       Use in an area without corrosive gases or dust. Use Use in an area not subject to contin Environment should conform with J testing - Part 2-6: Tests - Test Fc: Vi Frequency Range: 10~55 Hz, Half / Ambient Humidity         Storage Condition*2       Ambient Temperature Ambient Temperature Ambient Humidity         Attude       UL/CSA standards: 105 (A), EN standards: 120 (E)         UPE5 (Excluding the installation surface of the core)       UL/CSA standards: 105 (A), EN standards: 120 (E)		Temperature rise of the heat radiation plate is 50°C or less measured by the thermocouple method after continuous operation under normal ambient temperature and humidity.				
Operating Environment Storage Condition*2	Ambient Temperature	$0 \sim +50^{\circ}$ C (non-freezing)				
	Ambient Humidity	85% or less (non-condensing)				
	Altitude	Up	to 1000 m above sea level			
	Atmosphere	Use in an area without corrosive gases or dust. Use in special	environments with radioactive materials, magnetic fields, or in a vacuum is not possible.			
	Vibration	Use in an area not subject to continuous vibrat Environment should conform with JIS C 60068 testing - Part 2-6: Tests - Test Fc: Vibration (sir Frequency Range: 10~55 Hz, Half Amplitude:	3-2-6 "Environmental			
<u>.</u>	Ambient Temperature	-	$25 \sim +70^{\circ}$ C (non-freezing)			
Dperating Environment Storage Condition*2	Ambient Humidity	85	% or less (non-condensing)			
Temperature Rise     0       Temperature Rise     Ambient Temperature       Ambient Temperature     Ambient Humidity       Attitude     Attitude       Operating     Atmosphere     L       Environment     Vibration     Vibration       Storage     Ambient Temperature     Ambient Humidity       Condition*2     Ambient Temperature     Mitude       Thermal Class     U     U	Up	to 3000 m above sea level				
Thermal Class		UL/CSA standards: 105 (A), EN standards: 120 (E)	_			
Degree of Protectio	n	IP65 (Excluding the installation surface of the round shaft type and connectors)	IP20			

30 W Standards Type: 115×115 mm. 5 mm thick

30 W With Electromagnetic Brake Type: 135×135 mm, 5 mm thick

60 W Type: 135×135 mm, 5 mm thick

120 W Type: 165×165 mm, 5 mm thick

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

#### Note

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

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AC Input

AC Input

AC Input

DC Input

SD

ESO<sub>2</sub>

FE100, FE200

200V

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## Common Specifications

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

Item	Standard Model	Extended Functions			
Speed Setting Methods	$\label{eq:select} \begin{array}{l} \text{Select one of the following methods.} \\ \hline \text{Set using the internal speed potentiometer} \\ \hline \text{Set using an external speed potentiometer (included):} \\ \hline \textbf{PAVR-20KZ} (20  \mathrm{k}\Omega, 1/4  \mathrm{W}) \\ \hline \text{Set using external DC voltage:} \\ \hline 0 \sim 5  \text{VDC or } 0 \sim 10  \text{VDC}, 1  \text{mA min.} \end{array}$	Select one of the following methods. •Digital Setting ( <b>OPX-2A</b> or <b>MEXEO2</b> ) •Set using the internal speed potentiometer •Set using an external speed potentiometer (included): <b>PAVR-20KZ</b> (20 k $\Omega$ , 1/4 W) •Set using external DC voltage: 0~5 VDC or 0~10 VDC, 1 mA min.			
Acceleration and Deceleration Time	Set using acceleration and deceleration time potentiometer: 0.2~15 seconds (3000 r/min at no load)	Select one of the following methods: ·Digital Setting ( <b>OPX-2A</b> or <b>MEXEO2</b> ): 0.2~15 seconds (time until setting speed is achieved) ·Set using acceleration and deceleration time potentiometer: 0.2~15 seconds (3000 r/min with no load)			
Nulti-Speed Setting Methods	2 Speeds: 1 speed set by the internal speed potentiometer and 1 speed set by the external speed potentiometer (20 k $\Omega$ , 1/4 W) or external DC voltage (0~5 VDC or 0~10 VDC)	Select one of the following methods: •8 Speeds: 8 speeds set by digital setting ( <b>OPX-2A</b> or <b>MEXEO2</b> ) •8 Speeds: 6 speeds set by digital setting ( <b>OPX-2A</b> or <b>MEXEO2</b> ) and 2 speeds set by analog setting*1			
	Operated by Interna	Input Resistance 5.1 k $\Omega$ I Power Supply: 17 VDC $\pm$ 10% al DC Power Supply: 24 VDC $-15{\sim}+20\%$ Current 100 mA min.			
Set using the internal speed potentiome Set using an external speed potentiome <b>PAVR-20KZ</b> (20 kΩ, 1/4 W) Set using external DC voltage: 0~5 VDC or 0~10 VDC, 1 mA min.           cceleration and eceleration Time         Set using acceleration and deceleration in potentiometer: 0.2~15 seconds (3000 r/min at no load)           lutti-Speed Setting lethods         2 Speeds: 1 speed set by the internal sp potentiometer (20 kΩ, 1/4 W) or external (0~5 VDC or 0~10 VDC)           nput Signals         Forward input (FWD), Reverse input (REV selection input, Speed setting selection i Alarm reset input, Electromagnetic brake (MB-FREE), Regeneration unit thermal in Potentiometer (20 kΩ, 1/4 W) or external (0~5 VDC or 0~10 VDC)           wtput Signals         Forward input (FWD), Reverse input (REV selection input, Speed setting selection i Alarm reset input, Electromagnetic brake (MB-FREE), Regeneration unit thermal in Optication Speed output, Alarm output 1           wtput Signals         Speed output, Alarm output 1           vtput Signals         Venen the following protective functions : The alarm LED on the driver will blink for overload Protective Function (2): Activate Sensor Error (3): Activated when an abn operation or when the i -Initial Sensor Error (3): Activated when an abn operation or when the i -Initial Sensor Error (3): Activated when at an sensor signal line overvoltage Protective Function (5): Activate i undervoltage Protective Function (6): Activ overcurrent Protective Function (6): Activ -Overspeed Protective Function (6): Activ -Overspeed Protective Function (6): Activ -Regeneration Unit Overheat Protective F -External Stop <sup>#2</sup> (10): Activated when data -Regeneration Unit Overheat Protective F           extimut Extension         External S	Forward input (FWD), Reverse input (REV), Stop mode selection input, Speed setting selection input (M0), Alarm reset input, Electromagnetic brake release input (MB-FREE), Regeneration unit thermal input (TH)	Arbitrary signal assignment to general purpose input X0~X6 (7 points) is possible Forward input (FWD), Reverse input (REV), Stop mode selection input, Speed setting selection input (M0, M1, M2), Alarm reset input, Electromagnetic brake release input (MB-FREE), Regeneration unit thermal input (TH), External error input (EXT-ERROR)			
	Open-collector output External Use Condition: Voltage control $4.5 \sim 30.0$ VDC Current 40 mA max. Speed Output: 5 mA min.				
Itput Signals	Speed output, Alarm output 1	Arbitrary signal assignment to general purpose output Y0, Y1 (2 points) is possible Speed output, Alarm output 1, Motor running output (MOVE), Speed attainment output (VA), Alarm output 2, Warning output (WNG), Torque limit output (TLC)			
	The alarm LED on the driver will blink for the correspondi Overload Protective Function (2): Activated when the mot	tor load has exceeded rated torque for approximately 5 seconds min.			
Protective Functions	operation or when the connector for the -Initial Sensor Error (3): Activated when an abnormality or sensor signal line of the motor dis -Overvoltage Protective Function (4): Activated when the a gravitational opera -Undervoltage Protective Function (5): Activated when the -Overspeed Protective Function (6): Activated when the -Overspeed Protective Function (7): Activated when an e -EEPROM Error (8): Activated when data can not be writte -Regeneration Unit Overheat Protective Function (9): Activ or wi -External Stop* <sup>2</sup> (10): Activated when external error input -Initial Operation Inhibition* <sup>3</sup> (11): Activated when FWD in	ccurs with the signal from the motor before the main power supply was turned on such as when the connects during operation or when the connector for the signal comes off. main power supply voltage applied exceeds the rated voltage by approximately 20%, tion was performed or a load exceeding the permissible load inertia was driven. main power supply voltage drops below the rated voltage by 40% or less. otor speed exceeds approximately 4800 r/min. xcessive current flowed through the driver due to ground fault, etc. n or read due to damage to saved data. ated when regeneration unit overheat is detected hen the thermal protector output lead wire is disconnected during operation.			
Maximum Extension	Internet output Error (14). Adurated with operating	Motor and Driver Distance 20.4 m			
Distance					

\*1 One speed set by the internal speed potentiometer and one speed set by the external speed potentiometer (20 k $\Omega$ , 1/4 W) or external DC voltage (0~5 VDC or 0~10 VDC).

\*2 Limited to when the control module (sold separately) is used for assigning the external error input (EXT-ERROR).

\*3 Activates only when the control module (sold separately) is used and the function has been set to be available. Invalid when the FBL II compatibility mode is set.

\*4 Does not activate when the control module (sold separately) is used to set the torque limiting value to less than 200%.

## Torque Limiting Function

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

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

#### Note

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

## Vertical Drive (Gravitational Operation)

The **BLE** Series provides stable speed control during gravitational operation.

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

#### Regeneration resistor: EPRC-400P

Continuous regenerative power: 100 W

Instantaneous regenerative power: 240 W

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

#### Note

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

#### Regenerative Power

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

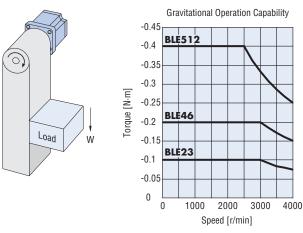
Regenerative Power (W) =  $0.1047 \times T_L$  [N·m]×N [r/min]

 $T_L$ : Load torque N: Speed

•Use the electromagnetic brake type for gravitational operation.

## Gearmotor – Torque Table of Combination Type

## Combination Type – Parallel Shaft Gearhead



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

IInit = N.m

		Gear Ratio	5	10	15	20	30	50	100	200
Droduct Nomo	Malazo	100 r/min	20	10	6.7	5	3.3	2	1	0.5
Product Name	Motor Speed [r/min]	3000 r/min	600	300	200	150	100	60	30	15
	. [///////	4000 r/min	800	400	267	200	133	80	40	20
BLE23		At 100~3000 r/min	0.45	0.90	1.4	1.8	2.6	4.3	6	6
BLE23		At 4000 r/min	0.34	0.68	1.0	1.4	1.9	3.2	5.4	5.4
BLE46	>	At 100~3000 r/min	0.90	1.8	2.7	3.6	5.2	8.6	16	16
BLE46		At 4000 r/min	0.68	1.4	2.0	2.7	3.9	6.5	12.9	14
BLE512	•◇	At 100~3000 r/min	1.8	3.6	5.4	7.2	10.3	17.2	30	30
BLE512		At 4000 r/min	1.4	2.7	4.1	5.4	7.7	12.9	25.8	27

A colored background () indicates gear shaft rotation in the same direction as the motor shaft. Others rotate in the opposite direction

#### Combination Type – Hollow Shaft Flat Gearhead

										0100 = 10000
		Gear Ratio	5	10	15	20	30	50	100	200
Droduct Namo	Mater Creed	100 r/min	20	10	6.7	5	3.3	2	1	0.5
	Motor Speed [r/min]	3000 r/min	600	300	200	150	100	60	30	15
	[i/iiiii]	4000 r/min	800	400	267	200	133	80	40	20
BLE23	>	At 100~3000 r/min	0.4	0.85	1.3	1.7	2.6	4.3	8.5	17
BLE23		At 4000 r/min	0.3	0.64	0.96	1.3	1.9	3.2	6.4	12.8
BLE46	>	At 100~3000 r/min	0.85	1.7	2.6	3.4	5.1	8.5	17	34
BLE46		At 4000 r/min	0.64	1.3	1.9	2.6	3.8	6.4	12.8	25.5
BLE512	•◇	At 100~3000 r/min	1.7	3.4	5.1	6.8	10.2	17	34	68
BLE512		At 4000 r/min	1.3	2.6	3.8	5.1	7.7	12.8	25.5	51

•The flat gearhead rotates in the opposite direction to the motor when viewed from the front face of the gearhead. It rotates in the same direction as the motor when viewed from the rear (motor installation surface) of the gearhead. Rotation direction of hollow shaft flat gearhead 
Page D-174

•C (CM: Electromagnetic brake type) indicating the power supply voltage is entered where the box 🔲 is located within the product name.

A number indicating the gear ratio is entered where the box  $\Box$  is located within the product name.

A number indicating the desired connection cable (included) length of 1 (1 m), 2 (2 m) or 3 (3 m) is entered where the box 🗇 is located within the product name.

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## Permissible Overhung Load and Permissible Thrust Load

## Combination Type – Parallel Shaft Gearhead

			Permissible C	Permissible Overhung Load			
Product Name	Gear	Ratio	10 mm from Shaft End N	20 mm from Shaft End N	Permissible Thrust Load N		
	5	At 100~3000 r/min	100	150			
	5	At 4000 r/min	90	110			
BLE23	10, 15, 20	At 100~3000 r/min	150	200	40		
BLE23	10, 13, 20	At 4000 r/min	130	170	40		
	20 50 100 200	At 100~3000 r/min	200	300			
	30, 50, 100, 200         At 4000 r/min           5         At 100~3000 r/min           At 4000 r/min         At 4000 r/min	180	230				
	5	At 100~3000 r/min	200	250			
		At 4000 r/min	180	220			
BLE46	10, 15, 20	At 100~3000 r/min	300	350	100		
BLE46		At 4000 r/min	270	330	100		
	30, 50, 100, 200	At 100~3000 r/min	450	550			
	30, 50, 100, 200	At 4000 r/min	420	500			
	5	At 100~3000 r/min	300	400			
	5	At 4000 r/min	230	300			
BLE512 <b>□</b> □S-◇	10, 15, 20	At 100~3000 r/min	400	500	150		
BLE512	10, 15, 20	At 4000 r/min	370	430	- 150		
	20 50 100 200	At 100~3000 r/min	500	650	1		
	30, 50, 100, 200	At 4000 r/min	450	550	1		

#### Combination Type – Hollow Shaft Flat Gearhead

			Permissible 0	verhung Load	
Product Name	Gea	Ratio	10 mm from Installation	20 mm from Installation	Permissible Thrust Load
BLE23Ⅲ□F BLE46Ⅲ□F-◇ BLE46Ⅲ□F		i duo	Surface of Gearhead N	Surface of Gearhead N	N
					IN
	5, 10	At 100~3000 r/min	450	370	
BLE23□□F-◇ BLE23□□F	5, 10	At 4000 r/min	410	330	200
	15, 20, 30, 50,	At 100~3000 r/min	500	400	200
	100, 200	At 4000 r/min	460	370	Permissible Thrust Load N 200 400 500
	5, 10	At 100~3000 r/min	800	660	
BLE46		At 4000 r/min	730	600	400
BLE46	15, <b>20</b> , <b>30</b> , <b>50</b> ,	At 100~3000 r/min	1200	1000	400
BLE40F	100, 200	At 4000 r/min	1100	910	
	5, 10	At 100~3000 r/min 900		770	
	5,10	At 4000 r/min	820	700	
BLE512 <b>□</b> □F-◇	15,20	At 100~3000 r/min	1300	1110	E00
BLE512	13, 20	At 4000 r/min	1200	1020	300
	30, 50, 100, 200	At 100~3000 r/min	1500	1280	
	30, 30, 100, 200	At 4000 r/min	1400	1200	

●The permissible overhung load can also be calculated with a formula. Permissible overhung load calculation → D-173

#### Round Shaft Type

	Permissible 0			
Product Name	10 mm from Shaft End N	Permissible Thrust Load		
BLE23_A-◇ BLE23_A	80	100		
BLE46 A-🛇 BLE46 A	110	130	Half of motor mass max.	
BLE512 <b>■</b> A-◇ BLE512 <b>■</b> A	150	170		

•C (CM: Electromagnetic brake type) indicating the power supply voltage is entered where the box 🔳 is located within the product name.

A number indicating the gear ratio is entered where the box  $\Box$  is located within the product name.

A number indicating the desired connection cable (included) length of 1 (1 m), 2 (2 m) or 3 (3 m) is entered where the box  $\diamond$  is located within the product name.

## Permissible Load Inertia: J of Combination Type

Combination Type – Parallel Shaft Gearhead

Product Name	Gear Ratio	5	10	15	20	30	50	100	200
BLE23 <b>□</b> S-◇		12	50	110	200	370	920	2500	5000
BLE23	When instantaneous stop or instantaneous bi-directional operation is performed	1.55	6.2	14	24.8	55.8	155	155	155
BLE46■□S-◇ BLE46■□S		22	95	220	350	800	2200	6200	12000
	When instantaneous stop or instantaneous bi-directional operation is performed	5.5	22	49.5	88	198	550	550	550
BLE512 <b>□</b> □S-◇		45	190	420	700	1600	4500	12000	25000
BLE512	When instantaneous stop or instantaneous bi-directional operation is performed	25	100	225	400	900	2500	2500	2500

#### Combination Type – Hollow Shaft Flat Gearhead

Unit =  $\times 10^{-4}$ kg·m<sup>2</sup>

Unit =  $\times 10^{-4}$ kg·m<sup>2</sup>

Product Name	Gear Ratio	5	10	15	20	30	50	100	200
BLE23□□F-⇔		12	50	110	200	370	920	2500	5000
BLE23	When instantaneous stop or instantaneous bi-directional operation is performed	1.55	6.2	14	24.8	55.8	155	155	155
BLE46∎□F-◇		22	95	220	350	800	2200	6200	12000
BLE46	When instantaneous stop or instantaneous bi-directional operation is performed	5.5	22	49.5	88	198	550	550	550
BLE512 <b>□</b> □F-◇		45	190	420	700	1600	4500	12000	25000
BLE512	When instantaneous stop or instantaneous bi-directional operation is performed	25	100	225	400	900	2500	2500	2500

•C (CM: Electromagnetic brake type) indicating the power supply voltage is entered where the box 🔳 is located within the product name.

A number indicating the gear ratio is entered where the box  $\Box$  is located within the product name.

A number indicating the desired connection cable (included) length of 1 (1 m), 2 (2 m) or 3 (3 m) is entered where the box  $\diamond$  is located within the product name.

### Dimensions (Unit = mm)

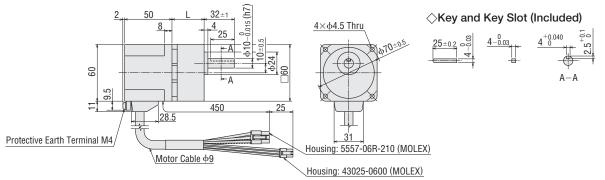
 $\blacksquare$  A number indicating the gear ratio is entered where the box  $\Box$  is located within the product name.

A number indicating the desired connection cable (included) length of 1 (1 m), 2 (2 m) or 3 (3 m) is entered where the box  $\Diamond$  is located within the product name.

#### Standard Type 30 W

#### ◇Motor/Parallel Shaft Gearhead

Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass kg
			5~20	34	
BLE23C□S-�, BLE23C□S	BLEM23-GFS	GFS2G□	30~100	38	1.1
			200	43	



Introduction

AC Input

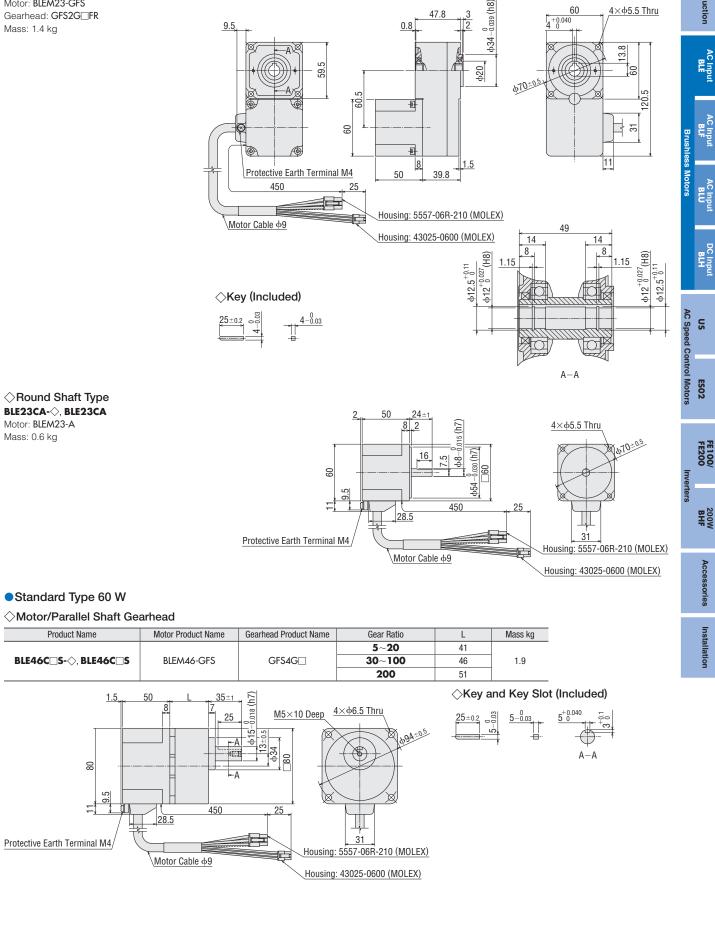
AC Input

AC Input

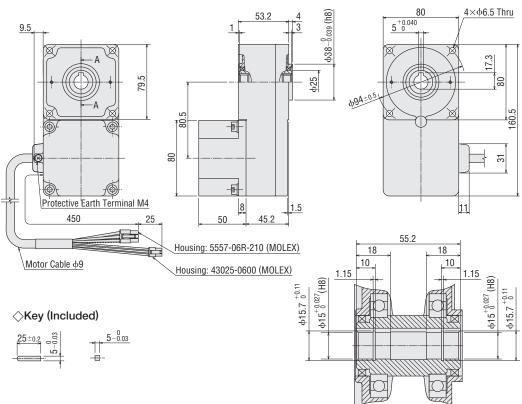
Accessories

Installation

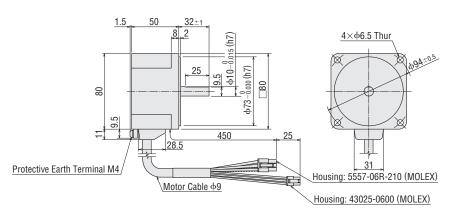
◇Motor/Hollow Shaft Flat Gearhead BLE23C F->, BLE23C F Motor: BLEM23-GFS Gearhead: GFS2G FR



◇Motor/Hollow Shaft Flat Gearhead BLE46C□F-◇, BLE46C□F Motor: BLEM46-GFS Gearhead: GFS4G□FR Mass: 2.5 kg



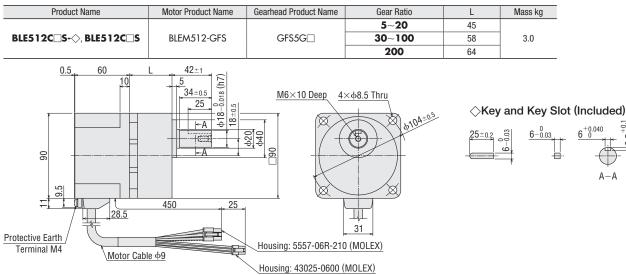
◇Round Shaft Type BLE46CA-◇, BLE46CA Motor: BLEM46-A Mass: 0.9 kg



 $\mathsf{A}\mathsf{-}\mathsf{A}$ 

#### Standard Type 120 W

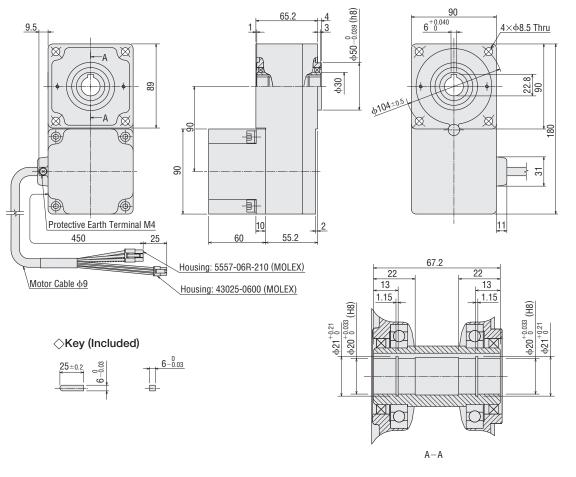
#### ◇Motor/Parallel Shaft Gearhead



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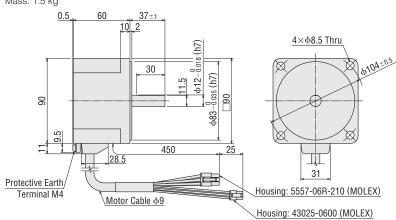
◇Motor/Hollow Shaft Flat Gearhead BLE512C□F-◇, BLE512C□F Motor: BLEM512-GFS Gearhead: GFS5G□FR

Mass: 3.7 kg



#### ◇Round Shaft Type BLE512CA-◇, BLE512CA Motor: BLEM512-A

Mass: 1.5 kg



FE100/ 200W Accessories FE200 BHF Accessories

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AC Input BLE

AC Input BLF

AC Input

DC Input BLH

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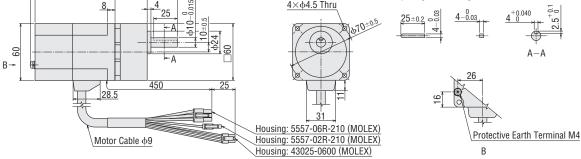
ESO2

AC Speed Control Motors

#### Electromagnetic Brake Type 30 W

### ◇Motor/Parallel Shaft Gearhead

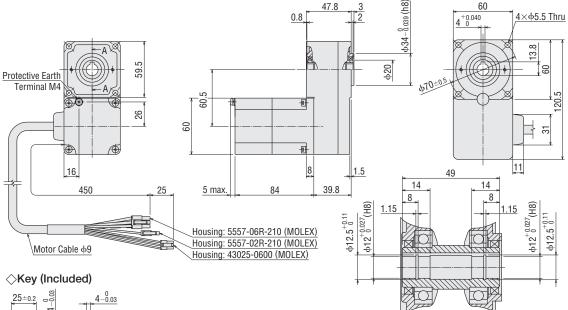
Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass kg
			5~20	34	
BLE23CM_S-�, BLE23CM_S	BLEM23M2-GFS	GFS2G□	30~100	38	1.4
		200		43	
5 max. 84 L 3		4×445 Thru	$\Diamond$ Key and	Key Slot (I	ncluded)



◇Motor/Hollow Shaft Flat Gearhead BLE23CM F-🔷, BLE23CM F Motor: BLEM23M2-GFS

Gearhead: GFS2G FR

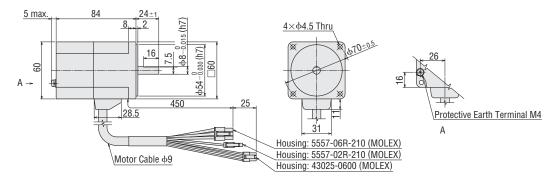
Mass: 1.7 kg





#### ◇Round Shaft Type BLE23CMA-0, BLE23CMA

Motor: BLEM23M2-A Mass: 0.9 kg



 $\mathsf{A}\mathsf{-}\mathsf{A}$ 

<u>5</u><sup>+0.040</sup>

A - A

60

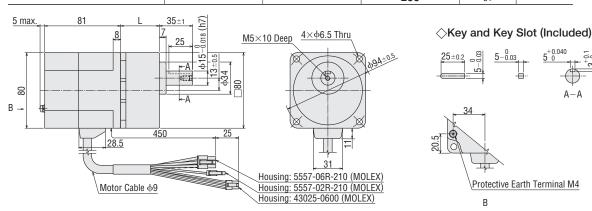
 $\phi 15.7 \stackrel{+0.11}{_{0}}$ 

A - A

#### Electromagnetic Brake Type 60 W

### ◇Motor/Parallel Shaft Gearhead

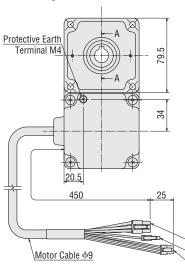
Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass kg
			5~20	41	
BLE46CM□S-◇, BLE46CM□S	BLEM46M2-GFS	GFS4G□	30~100	46	2.5
			200	51	1

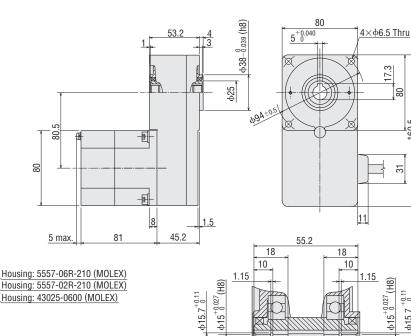


◇Motor/Hollow Shaft Flat Gearhead BLE46CM F-�, BLE46CM F

Motor: BLEM46M2-GFS Gearhead: GFS4G FR

Mass: 3.1 kg



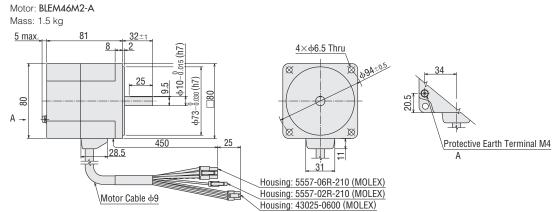




◇Round Shaft Type

Contact TEL

BLE46CMA-🔷, BLE46CMA



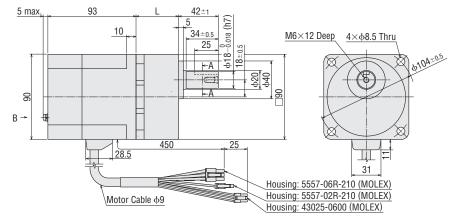


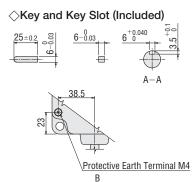
FE100/ FE200

### Electromagnetic Brake Type 120 W

## ◇Motor/Parallel Shaft Gearhead

Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass kg
			5~20	45	
BLE512CM <sup>S</sup> - $\diamond$ , BLE512CM <sup>S</sup>	BLEM512M2-GFS	GFS5G□	30~100	58	3.6
			200	64	

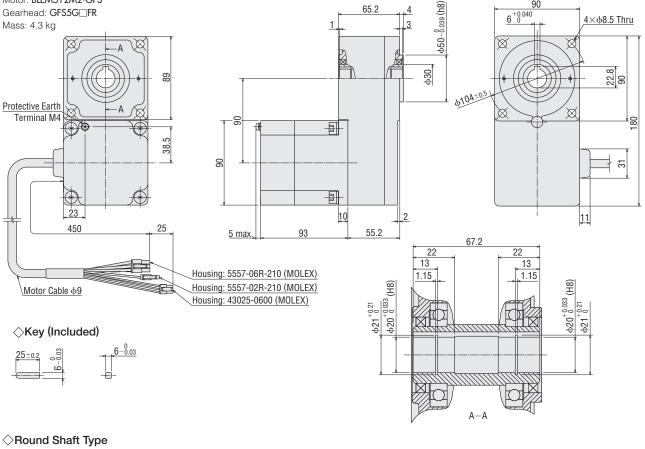


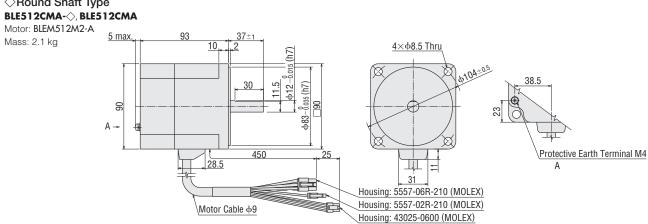


90

◇Motor/Hollow Shaft Flat Gearhead BLE512CM□F-◇, BLE512CM□F

Motor: BLEM512M2-GFS

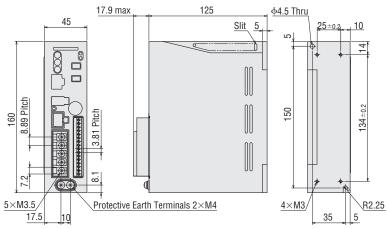




Page Features D-18 / System Configuration D-20 / Product Line D-21 / Specifications D-23 / Characteristics D-24 Dimensions D-28 / Connection and Operation D-36 / Motor and Driver Combinations D-41

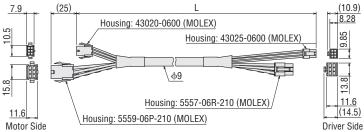
## Driver

BLED3C, BLED6C, BLED12C, BLED3CM, BLED6CM, BLED12CM Mass: 0.7 kg

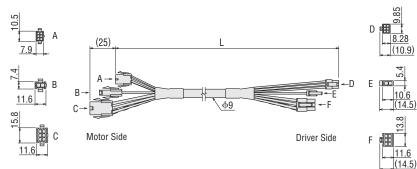


Connection Cable (Included)

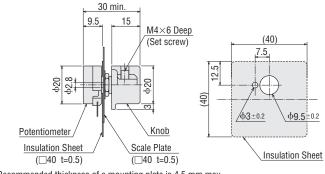
### ◇For Standard Motors



## ◇For Electromagnetic Brake Motors



## External Speed Potentiometer (Included)



Recommended thickness of a mounting plate is 4.5 mm max.

Cable Type	Length L (m)
Connection Cable 1 m	1
Connection Cable 2 m	2
Connection Cable 3 m	3

Code	Housing Product Name	Manufacturer
Α	43020-0600	
В	5559-02P-210	
С	5559-06P-210	MOLEX
D	43025-0600	WIULEA
E	5557-02R-210	
F	5557-06R-210	

roduct Name	Manufacturer
0600	
2P-210	
SP-210	MOLEX
0600	INICLEA
2R-210	
R-210	

Introduction

AC Input BLE

AC Input

DC Inpu

SC

ESO2

FE100/ FE200

200W

AC Speed Control Motors

## Connection and Operation

#### Names and Functions of Driver Parts

Internal Speed Potentiometer (SPEED) Acceleration Time Potentiometer (ACCEL) Deceleration Time Potentiometer (DECEL) Motor Signal Connector — (CN4)		- Mounting Hole (Back face) - POWER LED (Green) - ALARM LED (Red) - FBL II Compatibility Mode Setting Switch (SW1-2) - Not used (SW1-1) - External Voltage Select Switch (SW2-1, SW2-2)
Electromagnetic Brake Connector (CN1)*2 - CHARGE LED - Motor Connector -		- Communication Connector (CN3)
(CN2) Regeneration Unit Terminals — (RG1, RG2) Power Connection _ Terminals	<u>S</u> S S S S S S S S S S S S S S S S S S	- I/O Signal Connector (CN5) 1
Mounting Hole (Back face) —		- Protective Earth Terminals

Name	Description
Internal Speed Potentiometer [SPEED]	Sets the motor speed
Acceleration Time Potentiometer [ACCEL]	Sets the acceleration time at starting of motor
Deceleration Time Potentiometer [DECEL]	Sets the deceleration time at stopping of motor
POWER LED (Green)	Lights when main power supply is on
ALARM LED (Red)	Blinks when protective functions are activated
Motor Signal Connector (CN4)	Connects the signal cable connector
<b>FBLII</b> Compatibility Mode Setting Switch (SW1) <sup>*1</sup>	SW1-1: Not used SW1-2: Sets the <b>FBLII</b> compatibility mode
External Voltage Select Switch (SW2)	SW2-1: Switches power supply for input signal Selects either external power supply or driver built-in power supply
Switch (Sw2)	SW2-2: Switches according to external DC voltage select either 5 VDC or 10 VDC.
Electromagnetic Brake connector (CN1)*2	The electromagnetic brake connector of the motor cable or connection cable is connected
CHARGE LED (Red)	Lights when main power supply is on Turns off after main power supply is turned off and internal residual voltage is reduced to a stable level
Motor Connector (CN2)	Connects the cable motor connector
Regeneration Unit Connection Terminal (TB1) [RG1, RG2]	Connects the accessory regeneration unit <b>EPRC-400P</b> (sold separately)
Main Power Supply Input Terminal (TB1) [L, N] (Single-Phase Input)	Connects the main power supply Single-Phase 200-240 VAC: Connects single-phase 200-240 VAC to L, N
Communication Connector (CN3)	The control module <b>OPX-2A</b> or data setting software <b>MEXE02</b> is connected
I/O Signal Connector (CN5)	Connects when external I/O signals are used
Protective Earth Terminal	Grounds with AWG18 $\sim$ 14 (0.75 $\sim$ 2.0 mm <sup>2</sup> ) grounding conductor

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

#### 1 I/O Signals

CN5 Terminal Number	Signal Type	Terminal Name	Signal Name <sup>*2</sup>	Name	Description		
1		CO	IN-COM0	Input Signal Common	-		
2		X0	FWD	Forward Input	The motor rotates in the clockwise direction.		
3	-	X1	REV	Reverse Input	The motor rotates in the counterclockwise direction.		
4		X2	STOP-MODE	Stop Mode Selection Input	Instantaneous stop or deceleration stop is selected.		
5		Х3	MO	Speed Setting Selection Input	The internal speed potentiometer or external speed potentiometer (external DC voltage is selected.		
6		X4	ALARM-RESET	Alarm Reset Input	Alarms are reset.		
7	- Input	X5	MB-FREE	Electromagnetic Brake Release	The electromagnetic brake operation is selected when the motor is stopped. Not used with the standard type.		
8		X6	ТН	Regeneration Unit Thermal Input	The thermostat output of a regeneration unit is connected when using the regeneratio unit (normally closed).		
9		VH	VH				
10		VM	VM	External Speed Setting Input	Speed is set with an external speed potentiometer (external DC voltage).		
11		VL	VL				
12		C1	IN-COM1	Input Common (0 V)	-		
-		_	M1 <sup>*1</sup>	Speed Setting Input	For multi-speed operation, the M0, M1, and M2 signals are used in combination.		
-		-	M2 <sup>*1</sup>	- Speed Setting Input	To mulu-speed operation, the wid, wit, and wiz signals are used in combination.		
-		_	EXT-ERROR*1	External Error Input	When an external error signal is input, the motor stops.		
13		Y0+	SPPED-OUT (+)	Speed Output	30 pulses are output per each rotation of the motor output shaft.		
14		Y0-	SPEED-OUT (-)	Speed Output	(12 pulses are output if the <b>FBLII</b> compatibility mode is used.)		
15		Y1+	ALARM-OUT1 (+)	Alarm Output 1	This signal is output when an alarm is generated (normally closed).		
16		Y1-	ALARM-OUT1 (-)	Alami Oulput T	(Normally open if the <b>FBLII</b> compatibility mode is used.)		
_		-	MOVE <sup>*1</sup>	Motor Running Output	This signal is output during motor rotation.		
_	Output	-	VA <sup>*1</sup>	Speed Attainment Output	This signal is output if the motor speed reaches a speed within the speed attainment range that has been set.		
_		_	ALARM-OUT2 <sup>*1</sup>	Alarm Output 2	This signal is output when the overload warning level is exceed when the overload warning function is set to enable. In addition, also outputs if an overload alarm is generated even when the overload warning function is set to disable (normally closed		
_		_	WNG <sup>*1</sup>	Warning Output	This signal is output if a warning is generated (overload warning function is activated) While, it turns OFF if the warning is released.		
-		_	TLC*1	Torque Limit Output	This signal is output when the motor output torque reaches the torque limiting value.		

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

\*2 The control module (sold separately) may be used to assign the required signals out of the seven input terminals (X0 to X6) and the two output signal terminals (Y0 and Y1).

7 types for the 10 types of input signals (FWD/REV/STOP-MODE/M0/ALARM-RESET/MB-FREE/TH/M1/M2/EXT-ERROR)

2 types for the 7 types of output signals (SPEED-OUT/ALARM-OUT1/MOVE/VA/ALARM-OUT2/WNG/TLC)

Introduction

ACIN

AC Input

DC Inpu

SD

ESO<sub>2</sub>

FE100, FE200

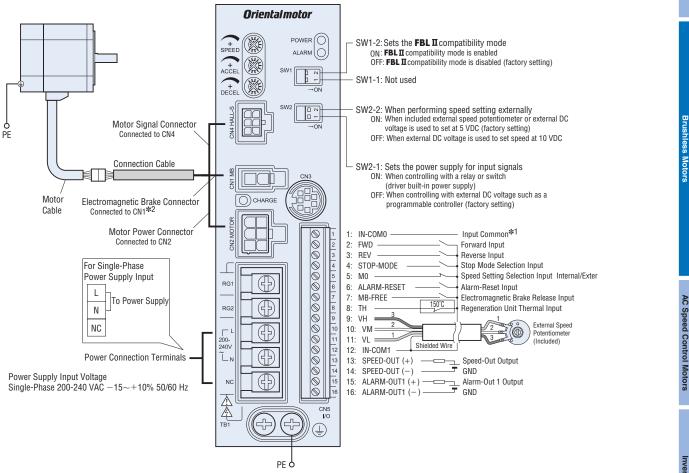
200V

Accessories

Installation

#### Connection Diagram

The figure shows a connection example for when a single-phase 200-240 VAC internal power supply and an external speed potentiometer are used to set speed.

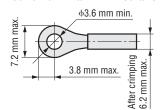


\*1 When a built-in power supply is used, connection is not necessary.

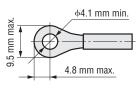
\*2 Only the electromagnetic brake type is connected,

◇Applicable Crimp Terminals

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



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

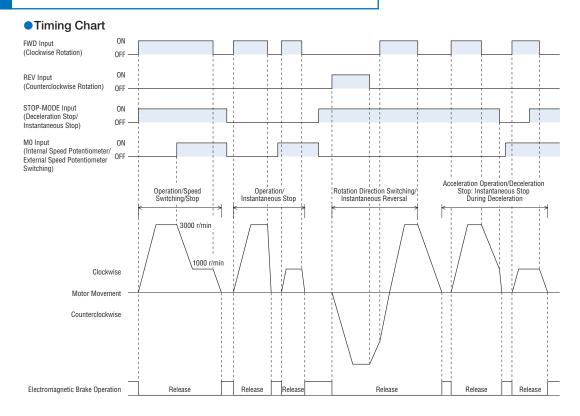


#### I/O Terminals

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

[Manufacturer: PHOENIX CONTACT GmbH & Co.KG] Al 0.25-6 Applicable Cable Size: AWG24 (0.2 mm<sup>2</sup>) Al 0.34-6 Applicable Cable Size: AWG22 (0.3 mm<sup>2</sup>) Al 0.5-6 Applicable Cable Size: AWG20 (0.5 mm<sup>2</sup>)





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

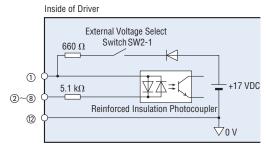
#### Input/Output Signal Circuits

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

#### **⊘Input Circuit**

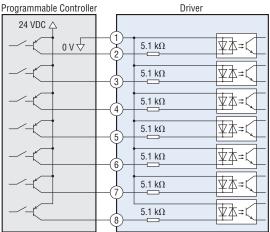
FWD/REV/STOP-MODE/M0/ALARM-RESET/MB-FREE/TH (M1\*/ M2\*/EXT-ERROR\*)

\* Asterisked items indicate control module (sold separatly) use

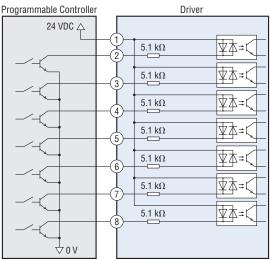


## ♦ Connection to Programmable Controller

Source Logic



#### Sink Logic

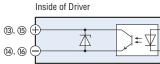


# **Speed Control Motors**

#### Output Circuit

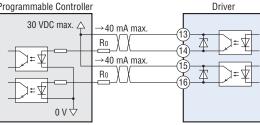
SPEED-OUT/ALARM-OUT1/(MOVE\*/VA\*/ALARM-OUT2\*/WNG\*/ TLC\*)

\* Asterisked items indicate control module (sold separatly) use

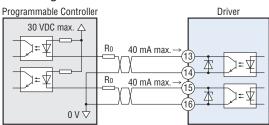


#### ◇Programmable Controller Connection Examples Source Logic

### Programmable Controller



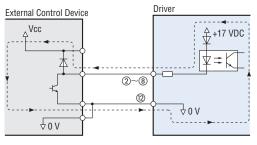
### Sink Logic



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

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

#### • Example of Sink Logic



Accessories

Introduction

AC Inpu

AC Input

DC Inpu

AC Speed SD

Control Motors

ESO<sub>2</sub>

FE100, FE200

200V

#### ♦ Speed Output (SPEED-OUT)

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

You can measure the speed output frequency and calculate the motor speed.

Speed Output Frequency (Hz) = 
$$\frac{1}{T}$$
  
Motor Shaft Speed (r/min) =  $\frac{\text{Speed Output Frequency}}{30} \times 60$ 

#### ◇Alarm Output 1 (ALARM-OUT 1)

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

#### Speed Setting Methods

0.2 ms

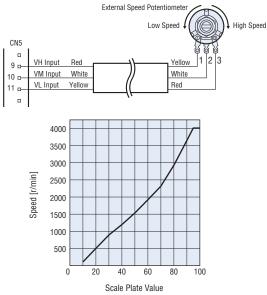
 $\diamondsuit$ Set Speeds Using the Internal Speed Potentiometer When setting is performed with the internal speed potentiometer, set the M0 input to OFF.



♦ Set Speeds Using an External Speed Potentiometer Connect the included external speed potentiometer to the I/O signal connector (CN5).

For connection, use the included signal line (1 m).

When setting is performed with the external speed potentiometer, set the M0 input to ON.



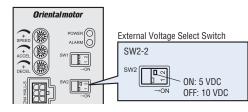
External Speed Potentiometer Scale - Speed Characteristics (Representative values)

#### Note

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

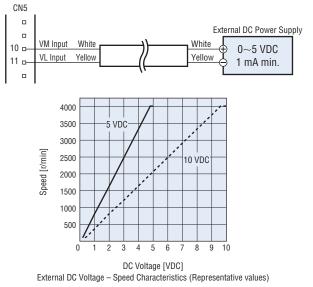
#### $\bigcirc$ Set Speeds Using External DC Voltage

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



Use external DC voltage and connect to the I/O signal connector (CN5) using the included signal line (1 m).

When setting is performed with the external DC voltage, set the M0 input to ON.



Note

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

### Multi-Motor Control

When you want to operate two or more sets of motors and drivers at the same speed by using a single speed potentiometer, you need to use an external speed potentiometer or external DC voltage.

The figure below shows an example of the single-phase power supply specification. For three-phase power supply specification, change the power supply line to three-phase power supply. The motor and operation control unit are not illustrated in the figure.

### $\diamondsuit$ When Using an External Speed Potentiometer

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

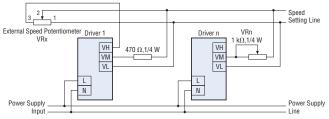
Resistance value when the number of drivers is n:

 $VRx = 20/n (k\Omega), n/4 (W)$ 

Example: When two drivers are connected VRx = 20/2 = 10 (k $\Omega$ ), 2/4 = 1/2 (W) Resistance is 10 k $\Omega$ , 1/2 W

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

Twenty motors or less can be operated in parallel using an external speed potentiometer.



### $\diamondsuit$ When Using an External DC Voltage

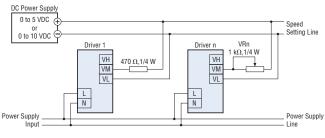
Connect all drivers using a common power supply line and common speed control line, as shown in the figure, and connect a 5 VDC or 10 VDC power supply.

The power supply capacity of the external DC power supply is determined as follows:

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

 $I = 1 \times 2 = 2 \text{ (mA)}$  Power supply capacity is 2 mA or more

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



## List of Motor and Driver Combinations

## Standard Type

♦ Combination Type – Parallel Shaft Gearhead

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

Output Power	Product Name	Motor Product Name	Gearhead Product Name	Driver Product Name
30 W	BLE23C□S-◇ BLE23C□S	BLEM23-GFS	GFS2G□	BLED3C
60 W	BLE46C□S-◇ BLE46C□S	BLEM46-GFS	GFS4G□	BLED6C
120 W	BLE512C□S-◇ BLE512C□S	BLEM512-GFS	GFS5G□	BLED12C

### ♦ Combination Type – Hollow Shaft Flat Gearhead

The combination type comes with the motor and hollow shaft flat gearhead pre-assembled.				
Output Power	Product Name	Motor Product Name	Gearhead Product Name	Driver Product Name
30 W	BLE23C□F-◇ BLE23C□F	BLEM23-GFS	GFS2G□FR	BLED3C
60 W	BLE46C□F-◇ BLE46C□F	BLEM46-GFS	GFS4G⊡FR	BLED6C
120 W	BLE512C□F-◇ BLE512C□F	BLEM512-GFS	GFS5G□FR	BLED12C

#### ◇Round Shaft Type

Output Power	Product Name	Motor Product Name	Driver Product Name
30 W	BLE23CA-🔷 BLE23CA	BLEM23-A	BLED3C
60 W	BLE46CA-🔷 BLE46CA	BLEM46-A	BLED6C
120 W	BLE512CA-🔷 BLE512CA	BLEM512-A	BLED12C

#### Electromagnetic Brake Type

#### ◇Combination Type – Parallel Shaft Gearhead

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

Output Power	Product Name	Motor Product Name	Gearhead Product Name	Driver Product Name
30 W	BLE23CM□S-◇ BLE23CM□S	BLEM23M2-GFS	GFS2G□	BLED3CM
60 W	BLE46CM□S-◇ BLE46CM□S	BLEM46M2-GFS	GFS4G□	BLED6CM
120 W	BLE512CM□S-◇ BLE512CM□S	BLEM512M2-GFS	GFS5G□	BLED12CM

#### ◇Combination Type – Hollow Shaft Flat Gearhead

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

Output Power	Product Name	Motor Product Name	Gearhead Product Name	Driver Product Name
30 W	BLE23CM□F-◇ BLE23CM□F	BLEM23M2-GFS	GFS2G⊡FR	BLED3CM
60 W	BLE46CM□F-◇ BLE46CM□F	BLEM46M2-GFS	GFS4G□FR	BLED6CM
120 W	BLE512CM□F-◇ BLE512CM□F	BLEM512M2-GFS	GFS5G□FR	BLED12CM

#### ◇Round Shaft Type

Output Power	Product Name	Motor Product Name	Driver Product Name
30 W	BLE23CMA-🔷 BLE23CMA	BLEM23M2-A	BLED3CM
60 W	BLE46CMA-🔷 BLE46CMA	BLEM46M2-A	BLED6CM
120 W	BLE512CMA-🔷 BLE512CMA	BLEM512M2-A	BLED12CM

ullet A number indicating the gear ratio is entered where the box  $\Box$  is located within the product name.

France: 01 47 86 97 50 Other Countries: 00800 22 55 66 22

Contact TEL

A number indicating the desired connection cable (included) length of 1 (1 m), 2 (2 m) or 3 (3 m) is entered where the box 🗇 is located within the product name.

Germany: 00800 22 55 66 22 UK/Ireland: 01256-347090 Italy: 02-93906346

AC Speed Control Motors

SC

ESO<sub>2</sub>

Introduction

AC Inpu

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