

# Brushless Motor and Driver Package BLE2 Series

<Additional Information>

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● For detailed information about regulations and standards, please see the Oriental Motor website.



- A motor and driver package designed for simplicity, performance and affordability.
- Digital setting and operation with the driver.
- Speed can be set via a PC or external signals.
- Degree of Protection: IP66 Watertight, Dust-Resistant
- Direct connection between motors and drivers (up to 20 m).
- Features a smaller, high power, high efficiency brushless motor.
- The highest standard in speed control at an affordable price.

## Features

### Overview of BLE2 Series

The new motor structure is smaller than previous models and enables high power and high efficiency. The driver equipped with the digital indication panel can easily set the speed. The BLE2 Series embodies "customer usability".

- Easy Setting with the Control Panel
- Torque Control is Possible
- Multistep Speed-Change Operation Up to 16 Speeds
- Output Shaft Holding when Stopped (Up to 50% of rated torque)
- Quick & Reliable Wiring/Connecting
- Watertight, Dust-Resistant (Degree of Protection IP66)
- Stainless Shaft is Included as Standard
- Easy Assembly with Combination Type
- Select Which Direction to Draw the Cable and Connect Directly

### Easy Setting with the Control Panel

The control panel is equipped to the front surface. The operating data and parameters can be set by using the operation keys or the dial while checking the digital indication.



- Speed Control Range: 80~4000 r/min
- Speed Regulation:  $\pm 0.2\%$   
\*Digital Setting

\*The control panel cannot be removed from the driver.

### Quick & Reliable Wiring/Connecting

Quick and reliable wiring is possible thanks to the spring type connectors.



## Watertight and Dust-Resistant (Degree of Protection: IP66)

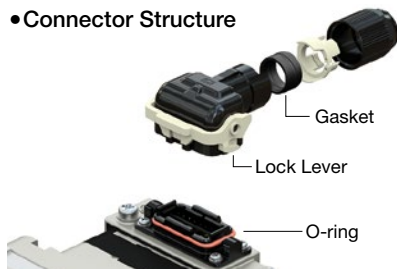
The connector is newly developed only for the small motor. It enabled the direct connection between motors and drivers. Also the IP66 degree of protection\* is achieved by the motor structure and improved watertight and dust-resistant performance.

\*Motor only

### New Type Connector

The internal gasket and O-ring improved the watertight performance. The connection is easy due to the lock lever that does not need to tighten screws.

#### •Connector Structure



#### •Installation Method



### Stainless Steel Shaft Is Included as Standard

Uses a shaft made of SUS303 type, which especially excels in rust prevention and corrosion resistance. Also, uses a parallel key and installation screws made of stainless steel.



### Select Which Direction to Draw the Cable and Connect Directly

Two types of the connection cables are available, depending on which direction the cable will be drawn. No extension cable is required, since a single connection cable can connect directly between drivers and motors at a distance of up to 20 m.

#### Cable Outlet Direction Can be Selected

Two direction types of the motor cable outlet can be selected based on the equipment.  
(For the round shaft type, the opposite side of the output shaft only.)

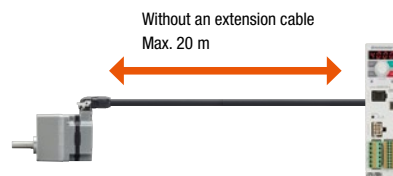


Cable drawn by the outlet shaft side

Cable drawn in the opposite side of the output shaft

#### Direct Connection with Motors and Drivers

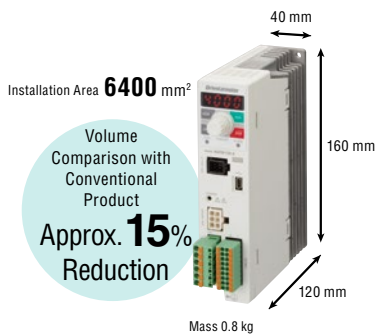
Up to 20 m connection without an extension cable is possible. No extension cable is required. Wiring process can be reduced by using one cable, instead of power lines, signal lines, and ground wires.



### Effective Utilization of Installation Space

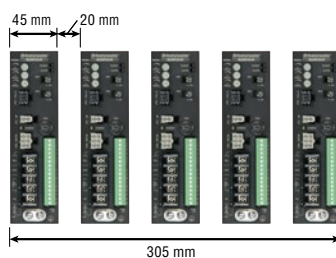
Optimized arrangement of internal parts has made the drivers compact and slim. Multiple drivers can now be installed in contact with each other, reducing the amount of installation space or increasing the number of axes within the same equipment space.

#### ● Compact Slim Body Driver

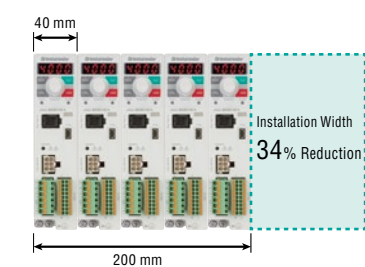


#### ● Multiple Units can be Installed in Contact with Each Other

Conventional Product **BLE Series Driver**



**BLE2 Series Driver**



Conditions for of Side-By-Side Installation  
 · Ambient Temperature: 0 to 40°C  
 · Install the driver to a heat sink (material: aluminum, 350×350 mm, 2 mm thick).

Overview, Product Series

Brushless Motors

AC Input **BMU**

AC Input **BLE2**

AC Input **BXII**

DC Input **BLH**

AC Speed Control Motors

DSC

US2

Accessories

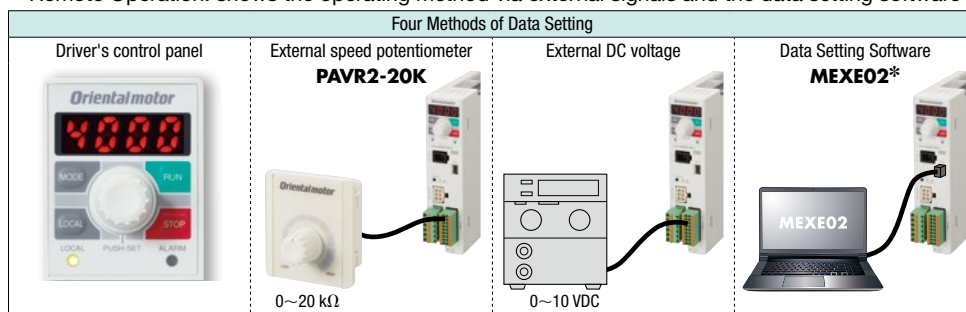
Installation

## Supporting Customers with Enhanced Functions

The motors are equipped with four methods of data setting and various functions that correspond with your purpose of use. Using data setting software allows you to check the equipment start-up and operating status. Functions are provided in accordance with the customers' usage conditions.

### Operating Method

- Local Operation: shows the operating method on the driver's control panel. This can be used for test runs.
- Remote Operation: shows the operating method via external signals and the data setting software **MEXE02**.



\*When using the data setting software **MEXE02**, the driver can be connected to your computer using a commercially available USB cable.

### Setting Details

Functions are provided in accordance with the customers' usage conditions.

Setting	Application and Purpose	Setting Value	Setting Method			
			Control Panel	External Speed Potentiometer <b>PAVR2-20K</b>	External DC Voltage	Data Setting Software <b>MEXE02</b>
Speed	Operation at the desired speed is available.	80~4000 r/min	●	●	●	●
Torque limiting	In addition to suppressing the max. output torque of a motor for safety purposes, the max. output torque can be limited according to the load.	0~300%	●	●	●	●
Acceleration/Deceleration Time	Acceleration time and deceleration time can be set to prevent excessive shock when starting and stopping.	0~15.0 second	●	—	—	●
Multistep speed-change operation	Operation at 2 speeds or more is available.	Up to 16 speeds	●	—	—	●
Parallel-motor operation	Multiple motors can be operated at the same speed.	20 motors max. (when a potentiometer is used)	—	●	●	—

### Useful Functions

This section introduces the main functions available when using the driver's control panel and the data setting software **MEXE02**.

Application and Purpose	Function	Content
Check the motor generated torque.	Load factor indication	With the rated torque of the motor at 100%, display the load factor. (Indication range: 0~300%)
Display the conveyor transportation speed and the speed reduced by the gearhead.	Gear Ratio	<b>[Note]</b> When the gear ratio is set, the converted rotation speed can be displayed.
Operate the motor within the specified speed control range.	Speed upper and lower limit	Specify the upper and lower speed limit.
Change the speed while the motor is rotating.	Speed Teaching	In monitoring mode, change the rotation speed while the motor is rotating.
Simply hold the load when the motor is stopped.	Simple Holding Torque	An electrical holding torque can be generated when the motor is stopped. (Holding force up to 50% of rated torque) Because the holding force dissipates if the power to the driver is turned OFF, this cannot be used to prevent the load falling while stopped.
Alleviate shock when starting and stopping.	Shock Alleviation Filter	This function offers slow acceleration and stopping, so that the load being transported during starting and stopping does not move.
Check problem details.	Alarm	This function enables you to identify and quickly respond to problems, including an overload, a disconnection or an operation error.
Use for operation verification and regular maintenance.	Information	The signal is output before an alarm is generated. Inputting appropriate parameters for each type of information also helps equipment maintenance.
Protect the specified data.	Editing lock	Prohibit the editing/deletion of data and parameters with the driver's control panel and local operations.

## Useful Functions of Data Setting Software MEXE02



Data Setting Software **MEXE02**

The data setting software can be downloaded from the website. Oriental Motor can also provide a CD-ROM (free).

Overview,  
Product  
Series

Brushless  
Motors

AC Input  
BMU

AC Input  
BLE2

AC Input  
BXII

DC Input  
BLH

AC Speed  
Control  
Motors

DSC

US2

Accessories

Installation

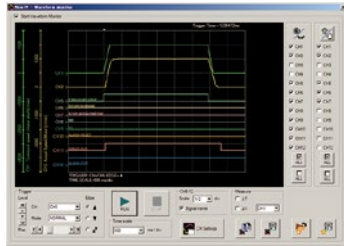
### Monitoring Function

This software is equipped with various monitoring functions for checking the operating status of the motor. Using the functions in accordance with the situation reduces the time necessary for equipment start-up and adjustment, and facilitates effective maintenance.

#### ● Waveform Monitoring

On startup

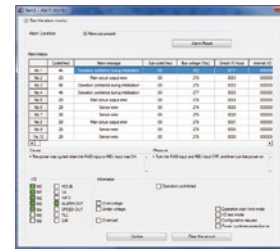
The operating status of the motor and output signals can be monitored like an oscilloscope. This can be used for equipment start-up and adjustment.



#### ● Alarm Monitoring

For operation For maintenance

When an abnormality occurs, the details of the abnormality, the operating status at the time of the occurrence, and the solution can be checked. Because the solution can be checked, it is possible to respond to abnormalities quickly.



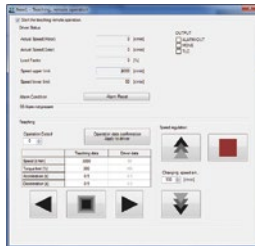
### Test Function

This function enables you to operate a motor alone or check the connection to the host system. Using this function when starting up the equipment can reduce the overall startup time.

#### ● Capable of Adjusting the Speed During Test Operation (Speed Teaching)

On startup

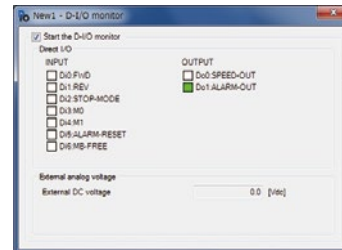
The speed data can be changed during test operation before connecting to the host system. Because the changed speed data is set and saved, this reduces the startup time.



#### ● I/O Monitoring






On startup For operation

A direct I/O Signal test can be performed. Input signals and external DC voltage can be monitored, and output signals can be forced to output. This function is useful for checking the connection to the host system.



## Product Line

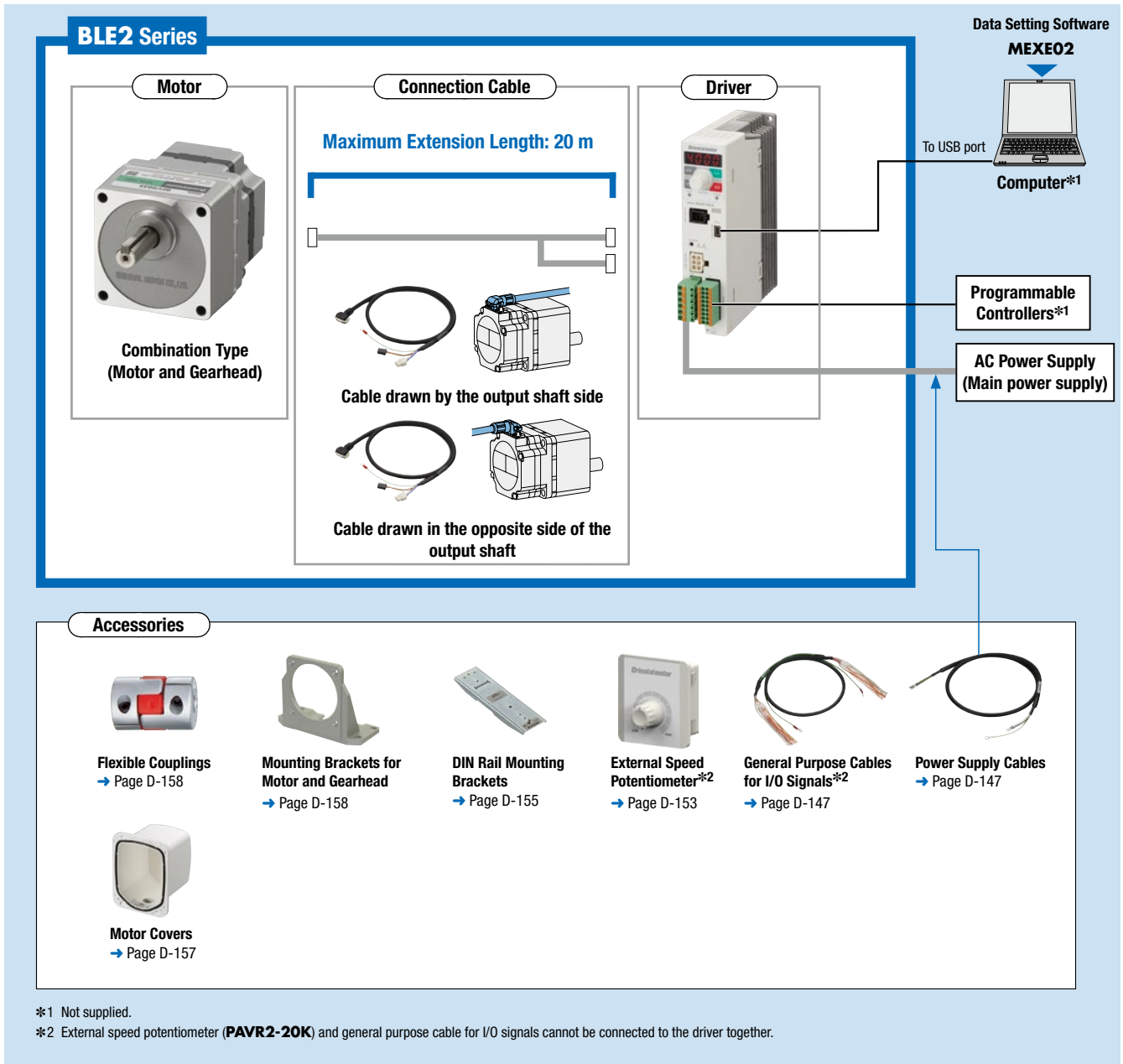
For **BLE2** Series, motors, drivers, and connection cables need to be ordered separately. Select suitable products according to the specifications or installation conditions.

Motor	Output Power	Frame Size	Gear Ratio (Combination Type)	Driver	Power Supply Voltage	Connection Cable
 Combination Type	30 W	Combination Type Round Shaft Type 60 mm	5, 10, 15, 20, 30, 50, 100, 200		Single-Phase 200-240 V Three-Phase 200-240 V	Cable drawn by the output shaft side  0.5, 1, 1.5, 2, 2.5, 3, 4, 5, 7, 10, 15, 20 m
	60 W	Combination Type Round Shaft Type 80 mm 60 mm	5, 10, 15, 20, 30, 50, 100, 200			
 Round Shaft Type*	120 W	Combination Type Round Shaft Type 90 mm	5, 10, 15, 20, 30, 50, 100, 200			Cable drawn in the opposite side of the output shaft  0.5, 1, 1.5, 2, 2.5, 3, 4, 5, 7, 10, 15, 20 m
	200 W	Combination Type Round Shaft Type 110 mm 90 mm	5, 10, 15, 20, 30, 50, 100, 200			

\*The connection cable for combining with the round shaft type is the cable drawn in the opposite side of the output shaft only.

### System Configuration

● The motor, the driver and the connection cables are purchased individually.



#### ● Example of System Configuration

BLE2 Series			Sold Separately		
Combination Type with Parallel Shaft	Driver	Connection Cable (3 m)	Mounting Bracket for Motor and Gearhead	Flexible Coupling	Din Rail Mounting Bracket
<b>BLM230HP-10S</b>	<b>BLE2D30-C</b>	<b>CC030HBLF</b>	<b>SOL2M4F</b>	<b>MCL301010</b>	<b>MADP02</b>
€183.00	€184.00	€46.00	€20.00	€36.00	€19.00

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

## Product Number

● Motor (Combination Type/Round Shaft Type)

### BLM 4 60 S H P - 50 S

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

● Driver

### BLE2D 60 - C

① ② ③

● Connection Cable

### CC 010 H BL F

① ② ③ ④ ⑤

## Product Line

The motor, the driver and the connection cables are purchased individually.

For the single-phase 100-120 VAC models, please contact the nearest Oriental Motor sales office.

● Combination Type – Parallel Shaft Gearhead

Combination Type	Delivered with the motor and gearhead pre-assembled.
	The combination of motor and gearhead can be changed, or purchased separately. In addition, the gearhead can be removed and the assembly position can be changed in 90° increments.



### ◇ Motors

Output Power	Product Name	Gear Ratio	List Price
30 W	BLM230HP-□S	5, 10, 15, 20	€183.00
		30, 50, 100	€189.00
		200	€197.00
60 W	BLM460SHP-□S	5, 10, 15, 20	€202.00
		30, 50, 100	€208.00
		200	€217.00
120 W	BLM5120HP-□S	5, 10, 15, 20	€255.00
		30, 50, 100	€263.00
		200	€271.00
200 W	BLM6200SHP-□S	5, 10, 15, 20	€308.00
		30, 50	€320.00
		100, 200	€333.00

The following items are included with each product.  
Motor, Gearhead, Installation Screws, Parallel Key, Operating Manual

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

### ◇ Connection Cables

Length	Product Name	List Price	Length	Product Name	List Price
0.5 m	CC005HBL□	€26.00	4 m	CC040HBL□	€54.00
1 m	CC010HBL□	€26.00	5 m	CC050HBL□	€62.00
1.5 m	CC015HBL□	€30.00	7 m	CC070HBL□	€77.00
2 m	CC020HBL□	€33.00	10 m	CC100HBL□	€97.00
2.5 m	CC025HBL□	€39.00	15 m	CC150HBL□	€135.00
3 m	CC030HBL□	€46.00	20 m	CC200HBL□	€171.00

● F or B indicating the direction of cable outlet is entered where the box □ is located within the product name.



①	Motor Type	<b>BLM:</b> Brushless motor
②	Frame Size	<b>2:</b> 60 mm <b>4:</b> 80 mm <b>5:</b> 90 mm <b>6:</b> 104 mm (Gearhead is 110 mm)
③	Output Power	<b>30:</b> 30 W <b>60:</b> 60 W <b>120:</b> 120 W <b>200:</b> 200 W
④	Identification Number	<b>S</b>
⑤	Motor Connection Method	<b>H:</b> Connector
⑥	Motor Degree of Protection	<b>P:</b> IP66 Specifications
⑦	Gear Ratio/Shaft Type	Number: Gear ratio for combination type <b>A:</b> Round shaft type
⑧	Output Shaft Material	<b>S:</b> Stainless steel

①	Driver Type	<b>BLE2D:</b> Driver for <b>BLE2</b> Series
②	Output Power	<b>30:</b> 30 W <b>60:</b> 60 W <b>120:</b> 120 W <b>200:</b> 200 W
③	Power Supply Voltage	<b>C:</b> Single-Phase, Three-Phase 200-240 VAC

①	Cable Type	<b>CC:</b> Connection cable
②	Length	<b>005:</b> 0.5 m <b>010:</b> 1 m <b>015:</b> 1.5 m
		<b>020:</b> 2 m <b>025:</b> 2.5 m <b>030:</b> 3 m
		<b>040:</b> 4 m <b>050:</b> 5 m <b>070:</b> 7 m
		<b>100:</b> 10 m <b>150:</b> 15 m <b>200:</b> 20 m
		<b>300:</b> 30 m
③	Motor Connection Method	<b>H:</b> Connector
④	Applicable Motor	<b>BL:</b> Brushless motor
⑤	Direction of Cable Outlet	<b>F:</b> Output shaft side <b>B:</b> Opposite side of output shaft

### ◇ Drivers

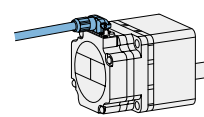
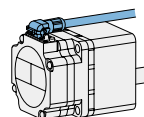
Output Power	Power Supply Voltage	Product Name	List Price
30 W	Single-Phase, Three-Phase 200-240 VAC	<b>BLE2D30-C</b>	€184.00
60 W	Single-Phase, Three-Phase 200-240 VAC	<b>BLE2D60-C</b>	€184.00
120 W	Single-Phase, Three-Phase 200-240 VAC	<b>BLE2D120-C</b>	€188.00
200 W	Single-Phase, Three-Phase 200-240 VAC	<b>BLE2D200-C</b>	€210.00

The following items are included with each product.  
Driver, Operating Manual, Startup Guide

Two types of the connection cables with different drawing directions are available.

**F:** Cable drawn by the output shaft side

**B:** Cable drawn in the opposite side of the output shaft



Overview, Product Series

Brushless Motors

AC Input BMU

AC Input BLE2

AC Input BXII

DC Input BLH

AC Speed Control Motors

DSC

US2

Accessories

Installation

● Round Shaft Type



◇ Motors

Output Power	Product Name	List Price
30 W	<b>BLM230HP-AS</b>	€105.00
60 W	<b>BLM260HP-AS</b>	€114.00
120 W	<b>BLM5120HP-AS</b>	€137.00
200 W	<b>BLM5200HP-AS</b>	€163.00

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

◇ Drivers

Output Power	Power Supply Voltage	Product Name	List Price
30 W	Single-Phase, Three-Phase 200-240 VAC	<b>BLE2D30-C</b>	€184.00
60 W	Single-Phase, Three-Phase 200-240 VAC	<b>BLE2D60-C</b>	€184.00
120 W	Single-Phase, Three-Phase 200-240 VAC	<b>BLE2D120-C</b>	€188.00
200 W	Single-Phase, Three-Phase 200-240 VAC	<b>BLE2D200-C</b>	€210.00

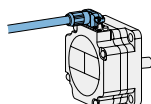
The following items are included with each product.  
Driver, Operating Manual, Startup Guide

◇ Connection Cables



Length	Product Name	List Price
0.5 m	<b>CC005HBLB</b>	€26.00
1 m	<b>CC010HBLB</b>	€26.00
1.5 m	<b>CC015HBLB</b>	€30.00
2 m	<b>CC020HBLB</b>	€33.00
2.5 m	<b>CC025HBLB</b>	€39.00
3 m	<b>CC030HBLB</b>	€46.00
4 m	<b>CC040HBLB</b>	€54.00
5 m	<b>CC050HBLB</b>	€62.00
7 m	<b>CC070HBLB</b>	€77.00
10 m	<b>CC100HBLB</b>	€97.00
15 m	<b>CC150HBLB</b>	€135.00
20 m	<b>CC200HBLB</b>	€171.00

B: Cable drawn in the opposite side of the output shaft



Note

● The cable drawing direction of the round shaft type is the opposite side of the output shaft only.

■ Specifications

● 30 W



Product Name	Motor	Combination Type - Parallel Shaft Gearhead	<b>BLM230HP-□S</b>
	Driver	Round Shaft Type	<b>BLM230HP-AS</b> <b>BLE2D30-C</b>
Rated Output Power (Continuous)	W		30
Rated Voltage	VAC		Single-Phase 200-240/Three-Phase 200-240
Permissible Voltage Range			-15~+10%
Frequency	Hz		50/60
Permissible Frequency Range			±5%
Rated Input Current	A		Single-Phase: 0.67/Three-Phase: 0.39
Maximum Input Current	A		Single-Phase: 2.2/Three-Phase: 1.2
Rated Speed	r/min		3000
Rated Torque	N·m		0.096
Maximum Instantaneous Torque	N·m		0.2
Rotor Inertia	J: ×10 <sup>-4</sup> kg·m <sup>2</sup>		0.042
Round Shaft Type Permissible Inertia	J: ×10 <sup>-4</sup> kg·m <sup>2</sup>		1.8
Speed Control Range			80~4000 r/min (Speed ratio 1:50)
Speed Regulation*	Load		±0.2% (±0.5%) or less: Conditions 0~rated torque, rated speed, rated voltage, normal ambient temperature
	Voltage		±0.2% (±0.5%) or less: Conditions Rated voltage -15~+10%, rated speed, no load, normal ambient temperature
	Temperature		±0.2% (±0.5%) or less: Conditions Operating ambient temperature 0~+50°C, rated speed, no load, rated voltage

\* The specifications in the parenthesis indicate the value at analog settings.

● The values correspond to each specification and characteristic of a stand-alone motor.

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

● 60 W



Product Name	Motor	Combination Type - Parallel Shaft Gearhead	<b>BLM460SHP-□S</b>
		Round Shaft Type	<b>BLM260HP-AS</b>
	Driver		<b>BLE2D60-C</b>
Rated Output Power (Continuous)	W		60
Power Supply Voltage	Rated Voltage	VAC	Single-Phase 200-240/Three-Phase 200-240
	Permissible Voltage Range		-15~+10%
	Frequency	Hz	50/60
	Permissible Frequency Range		±5%
	Rated Input Current	A	Single-Phase: 1.0/Three-Phase: 0.61
	Maximum Input Current	A	Single-Phase: 3.5/Three-Phase: 2.0
Rated Speed	r/min		3000
Rated Torque	N·m		0.191
Maximum Instantaneous Torque	N·m		0.4
Rotor Inertia	J: ×10 <sup>-4</sup> kg·m <sup>2</sup>		0.082
Round Shaft Type Permissible Inertia	J: ×10 <sup>-4</sup> kg·m <sup>2</sup>		3.75
Speed Control Range			80~4000 r/min (Speed ratio 1:50)
Speed Regulation*	Load		±0.2% (±0.5%) or less: Conditions 0~rated torque, rated speed, rated voltage, normal ambient temperature
	Voltage		±0.2% (±0.5%) or less: Conditions Rated voltage -15~+10%, rated speed, no load, normal ambient temperature
	Temperature		±0.2% (±0.5%) or less: Conditions Operating ambient temperature 0~+50°C, rated speed, no load, rated voltage

● 120 W



Product Name	Motor	Combination Type - Parallel Shaft Gearhead	<b>BLM5120HP-□S</b>
		Round Shaft Type	<b>BLM5120HP-AS</b>
	Driver		<b>BLE2D120-C</b>
Rated Output Power (Continuous)	W		120
Power Supply Voltage	Rated Voltage	VAC	Single-Phase 200-240/Three-Phase 200-240
	Permissible Voltage Range		-15~+10%
	Frequency	Hz	50/60
	Permissible Frequency Range		±5%
	Rated Input Current	A	Single-Phase: 1.7/Three-Phase: 1.02
	Maximum Input Current	A	Single-Phase: 4.8/Three-Phase: 3.3
Rated Speed	r/min		3000
Rated Torque	N·m		0.382
Maximum Instantaneous Torque	N·m		0.8
Rotor Inertia	J: ×10 <sup>-4</sup> kg·m <sup>2</sup>		0.23
Round Shaft Type Permissible Inertia	J: ×10 <sup>-4</sup> kg·m <sup>2</sup>		5.6
Speed Control Range			80~4000 r/min (Speed ratio 1:50)
Speed Regulation*	Load		±0.2% (±0.5%) or less: Conditions 0~rated torque, rated speed, rated voltage, normal ambient temperature
	Voltage		±0.2% (±0.5%) or less: Conditions Rated voltage -15~+10%, rated speed, no load, normal ambient temperature
	Temperature		±0.2% (±0.5%) or less: Conditions Operating ambient temperature 0~+50°C, rated speed, no load, rated voltage

● 200 W



Product Name	Motor	Combination Type - Parallel Shaft Gearhead	<b>BLM6200SHP-□S</b>
		Round Shaft Type	<b>BLM5200HP-AS</b>
	Driver		<b>BLE2D200-C</b>
Rated Output Power (Continuous)	W		200
Power Supply Voltage	Rated Voltage	VAC	Single-Phase 200-240/Three-Phase 200-240
	Permissible Voltage Range		-15~+10%
	Frequency	Hz	50/60
	Permissible Frequency Range		±5%
	Rated Input Current	A	Single-Phase: 2.4/Three-Phase: 1.4
	Maximum Input Current	A	Single-Phase: 6.5/Three-Phase: 4.3
Rated Speed	r/min		3000
Rated Torque	N·m		0.637
Maximum Instantaneous Torque	N·m		1.15
Rotor Inertia	J: ×10 <sup>-4</sup> kg·m <sup>2</sup>		0.454
Round Shaft Type Permissible Inertia	J: ×10 <sup>-4</sup> kg·m <sup>2</sup>		8.75
Speed Control Range			80~4000 r/min (Speed ratio 1:50)
Speed Regulation*	Load		±0.2% (±0.5%) or less: Conditions 0~rated torque, rated speed, rated voltage, normal ambient temperature
	Voltage		±0.2% (±0.5%) or less: Conditions Rated voltage -15~+10%, rated speed, no load, normal ambient temperature
	Temperature		±0.2% (±0.5%) or less: Conditions Operating ambient temperature 0~+50°C, rated speed, no load, rated voltage

\* The specifications in the parenthesis indicate the value at analog settings.

● The values correspond to each specification and characteristic of a stand-alone motor.

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

Overview, Product Series

Brushless Motors

AC Input BMU

AC Input BLE2

AC Input BXII

DC Input BLH

AC Speed Control Motors

DSC

US2

Accessories

Installation

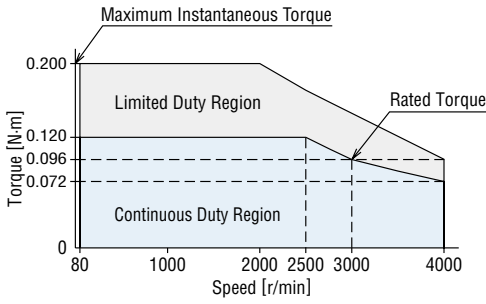


### Speed – Torque Characteristics

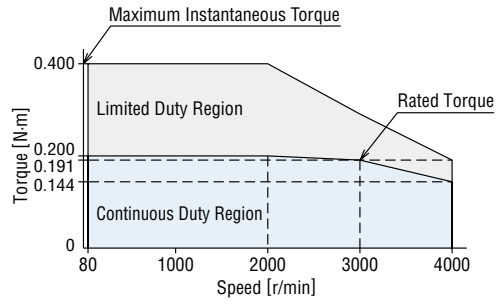
Continuous Duty Region: Continuous operation is possible in this region.

Limited Duty Region: This region is used primarily when accelerating.

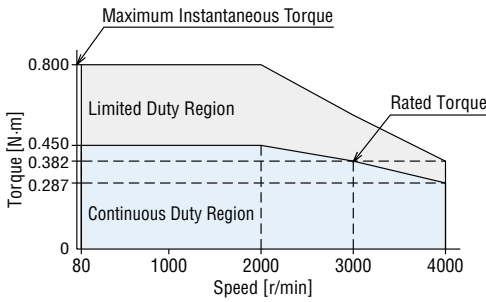
#### ● 30 W



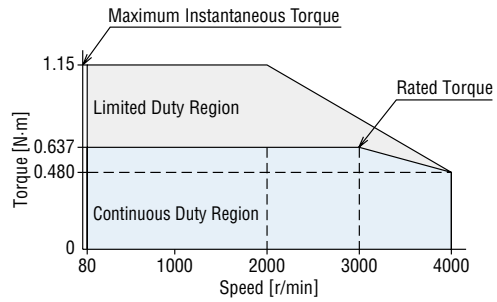
#### ● 60 W



#### ● 120 W



#### ● 200 W



● The values correspond to each specification and characteristic of a stand-alone motor. The speed-torque characteristics show the values when rated voltage is applied.

### Common Specifications

Item	Specifications
Speed Setting Methods	Digital Setting · Control Panel · Data Setting Software <b>MEXE02</b>
	Analog Setting · Set using an external speed potentiometer <b>PAVR2-20K</b> (sold separately): 0~20 kΩ, 0.05 W min. · Set using external DC voltage: 0~10 VDC, 1 mA min. (Initial setting: 0~5 VDC)
Acceleration/Deceleration Time	Setting Range 0.0~15.0 s (Initial setting: 0.5 s)
	Setting Method · Control Panel · Data Setting Software <b>MEXE02</b>
Torque Limit*1	Setting Range 0~300% (Initial setting: 300%)
	Digital Setting · Control Panel · Data Setting Software <b>MEXE02</b>
Number of Operation Data Setting	Analog Setting · Set using an external speed potentiometer <b>PAVR2-20K</b> (sold separately): 0~20 kΩ, 0.05 W min. · Set using external DC voltage: 0~10 VDC, 1 mA min. (Initial setting: 0~5 VDC)
	16 Points max. (Initial setting: 4 points)
Input Signals	Photocoupler input Input resistance: 6.6 kΩ Connectable external DC power supply: 24 VDC -15~+20% 100 mA min. Source input/sink input Supplied through external wiring
	Arbitrary signal assignment to IN0~IN6 input (7 points) is possible [ ]: Initial setting [FWD], [REV], [STOP-MODE], [M0], [M1], [ALARM-RESET], M2, M3, H-FREE, TL, HMI, EXT-ERROR, START/STOP*2, RUN/BRAKE*2, CW/CCW*2
Output Signals	Photocoupler and Open-Collector Output (ON Power: 1.6 V max.) External power supply: 4.5~30 VDC 100 mA max. (5 mA min. for SPEED-OUT output) Source output/sink output Supplied through external wiring
	Arbitrary signal assignment to OUT0, OUT1 (2 points) is possible [ ]: Initial setting [SPEED-OUT], [ALARM-OUT], MOVE, INFO, TLC, VA, DIR
Protective Functions	When the following protective functions are activated, ALARM-OUT output turns OFF and the motor will coast to a stop. The alarm code will be displayed and ALARM LED will blink at the same time. Overcurrent, main circuit overheat, overvoltage, undervoltage, sensor error, main circuit output error, overload, over-speed, EEPROM error, initial sensor error, initial operation prohibited, external stop
Information	When the information occurs, INFO output turns ON. The motor operation continues. Overvoltage, undervoltage, overload, starting limit mode, I/O test mode, requiring CONFIG, requiring power ON again, operation prohibit
Max. Extension Distance	Motor and driver distance: 20.5 m (when an accessory connection cable is used)
Time Rating	Continuous

\*1 An error up to a maximum of approximately ±10% (at 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.

\*2 Operable when 3-wire input mode is selected.

## General Specifications

Item	Motor	Driver
Insulation Resistance	100 MΩ or more when 500 VDC megger is applied between the windings and the case after continuous operation under normal ambient temperature and humidity.	100 MΩ or more when 500 VDC megger is applied between the power supply terminal and the protective earth terminal, and between the power supply terminal and the I/O 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.	Sufficient to withstand 1.5 kVAC at 50 Hz applied between the power supply terminal and the protective earth terminal for 1 minute, and 1.5 kVAC at 50 Hz applied between the power supply terminal and the I/O signal terminal for 1 minute after continuous operation under normal ambient temperature and humidity.
Temperature Rise	The temperature rise of the windings is 50°C max. and that of the case surface is 40°C max.*1, measured by the thermocouple method after rated continuous operation under normal ambient temperature and humidity.	The temperature rise of the heat sink is 50°C max., measured by the thermocouple method after rated continuous operation under normal ambient temperature and humidity.
Operating Environment*2	Ambient Temperature	0 ~ +40°C (Non-freezing)
	Ambient Humidity	85% or less (Non-condensing)
	Altitude	Up to 1000 m above sea level
	Atmosphere	No corrosive gases, dust or oil. Cannot be used in a radioactive area, magnetic field, vacuum, or other special environments.
Storage Condition*4	Ambient Temperature	-20 ~ +70°C (Non-freezing)
	Ambient Humidity	85% or less (Non-condensing)
	Altitude	Up to 3000 m above sea level
	Atmosphere	No corrosive gases, dust or oil. Cannot be stored in a radioactive area, magnetic field, vacuum, or other special environments.
Thermal Class	EN Standards: 120 (E)	
Degree of Protection*5	When using the connection cable: IP66 (Excluding the installation surface of the round shaft type and connectors)	IP20

\*1 For round shaft types, attach to a heat sink (material: aluminum) of one of the following sizes to keep the motor case surface temperature from exceeding 90°C.

30 W Type: 115×115 mm Thickness 5 mm, 60 W Type: 135×135 mm Thickness 5 mm,  
120 W Type: 165×165 mm Thickness 5 mm, 200 W Type: 200×200 mm Thickness 5 mm

\*2 Install the driver to a location that has the same heat radiation capability as an aluminum metal plate.

Single installed: 200×200 mm Thickness: 2 mm,  
Installed in contact: 350×350 mm Thickness: 2 mm

\*3 When drivers are installed in contact with each other, the operating ambient temperature range is 0 ~ +40°C.

\*4 The storage condition applies to a short period such as a period during transportation.

\*5 The IP indication that shows the watertight and dust-resistant performance are specified under IEC 60529 and IEC 60034-5.

### Note

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

### Materials and Finish of the Motor

- Materials Case: Aluminum  
Output Shaft: Stainless Steel  
Screws: Stainless Steel (Externally facing screws only, except protective earth terminal)
- Finish Case: Paint (except installing surface)

## Permissible Torque of Combination Types

### Combination Type – Parallel Shaft Gearhead

Unit: N·m

Product Name	Gear Ratio	Motor Shaft Speed							
		5	10	15	20	30	50	100	200
30 W	At 80~2500 r/min	0.54	1.1	1.6	2.2	3.1	5.2	6	6
	At 3000 r/min	0.43	0.86	1.3	1.7	2.5	4.1	6	6
	At 4000 r/min	0.32	0.65	0.97	1.3	1.9	3.1	5.4	5.4
60 W	At 80~2000 r/min	0.9	1.8	2.7	3.6	5.2	8.6	16	16
	At 3000 r/min	0.86	1.7	2.6	3.4	4.9	8.2	16	16
	At 4000 r/min	0.65	1.3	1.9	2.6	3.7	6.2	12.4	14
120 W	At 80~2000 r/min	2	4.1	6.1	8.1	11.6	19.4	30	30
	At 3000 r/min	1.7	3.4	5.2	6.9	9.9	16.4	30	30
	At 4000 r/min	1.3	2.6	3.9	5.2	7.4	12.3	24.7	27
200 W	At 80~3000 r/min	2.9	5.7	8.6	11.5	16.4	27.4	51.6	70
	At 4000 r/min	2.2	4.3	6.5	8.6	12.4	20.6	38.9	63

● A colored background  indicates gear shaft rotation in the same direction as the motor shaft. The others rotate in the opposite direction.

## Output Shaft Speed of Combination Types

Unit: r/min

Gear Ratio	Motor Shaft Speed							
	5	10	15	20	30	50	100	200
80 r/min	16	8	5.3	4	2.7	1.6	0.8	0.4
2000 r/min	400	200	133	100	66.7	40	20	10
2500 r/min	500	250	167	125	83.3	50	25	12.5
3000 r/min	600	300	200	150	100	60	30	15
4000 r/min	800	400	267	200	133	80	40	20

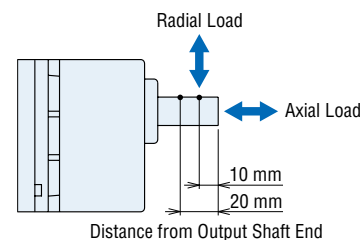
### Permissible Radial Load/Permissible Axial Load

#### Combination Type – Parallel Shaft Gearhead

Output Power	Gear Ratio		Permissible Radial Load		Permissible Axial Load N
			10 mm from shaft end N	20 mm from shaft end N	
30 W	5	At 80~3000 r/min	100	150	40
		At 4000 r/min	90	110	
	10, 15, 20	At 80~3000 r/min	150	200	
		At 4000 r/min	130	170	
	30, 50, 100, 200	At 80~3000 r/min	200	300	
At 4000 r/min		180	230		
60 W	5	At 80~3000 r/min	200	250	100
		At 4000 r/min	180	220	
	10, 15, 20	At 80~3000 r/min	300	350	
		At 4000 r/min	270	330	
	30, 50, 100, 200	At 80~3000 r/min	450	550	
At 4000 r/min		420	500		
120 W	5	At 80~3000 r/min	300	400	150
		At 4000 r/min	230	300	
	10, 15, 20	At 80~3000 r/min	400	500	
		At 4000 r/min	370	430	
	30, 50, 100, 200	At 80~3000 r/min	500	650	
At 4000 r/min		450	550		
200 W	5, 10, 15, 20	At 80~3000 r/min	550	800	200
		At 4000 r/min	500	700	
	30, 50	At 80~3000 r/min	1000	1250	300
		At 4000 r/min	900	1100	
	100, 200	At 80~3000 r/min	1400	1700	400
		At 4000 r/min	1200	1400	

#### Round Shaft Type

Output Power	Permissible Radial Load		Permissible Axial Load
	10 mm from shaft end N	20 mm from shaft end N	
30 W	80	100	Half of motor mass or less
60 W	80	100	
120 W	150	170	
200 W	150	170	



### Permissible Load Inertia J of Combination Types

#### Combination Type – Parallel Shaft Gearhead

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

Output Power		Gear Ratio	5	10	15	20	30	50	100	200
			30 W		12	50	110	200	370	920
	When instantaneous stop or instantaneous bi-directional operation is performed*		1.55	6.2	14	24.8	55.8	155	155	155
60 W			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
120 W			45	190	420	700	1600	4500	12000	25000
	When instantaneous stop or instantaneous bi-directional operation is performed*		25	100	225	400	900	2500	2500	2500
200 W			100	460	1000	1700	3900	9300	18000	37000
	When instantaneous stop or instantaneous bi-directional operation is performed*		50	200	450	800	1800	5000	5000	5000

\*It is also applicable when digitally setting the deceleration time to below 0.1 seconds.

## Dimensions Unit: mm

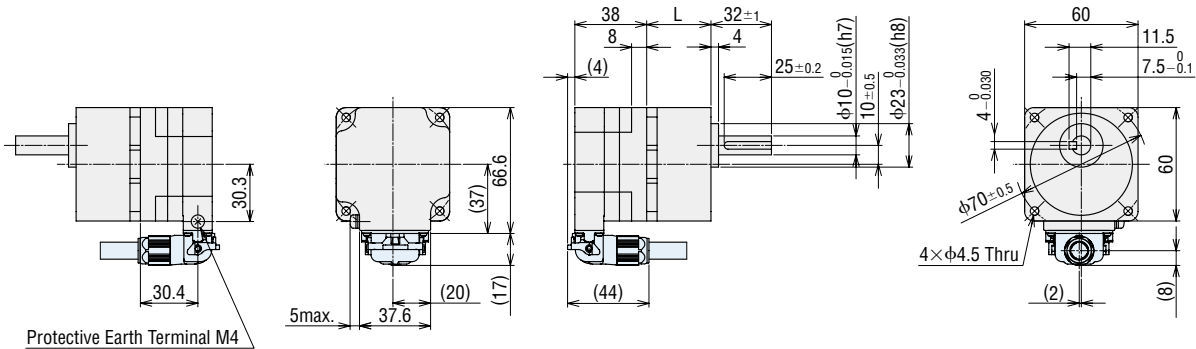
- The motor dimensions in this catalogue are illustrated with the separately-sold connection cable (□ parts in the figure). The described masses do not include the connection cable mass.
- For the dimensions and the mass of connection cable, please refer to Page D-57
- Installation screws are included with the combination type. Installation screws → Page D-162
- A number indicating the gear ratio is entered where the box □ is located within the product name.

### ● Motor · 30 W

#### ◇ Combination Type – Parallel Shaft Gearhead

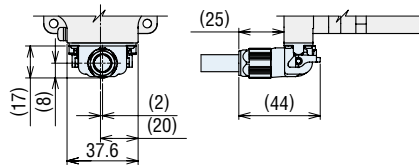
Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass kg
<b>BLM230HP-□S</b>	BLM230HP-GFV	GFV2G□S	<b>5~20</b>	34	0.85
			<b>30~100</b>	38	
			<b>200</b>	43	

#### ● When attaching a connection cable drawn by the output shaft side



- At the time of shipment, a parallel key is fixed in the key slot of the gearhead shaft.

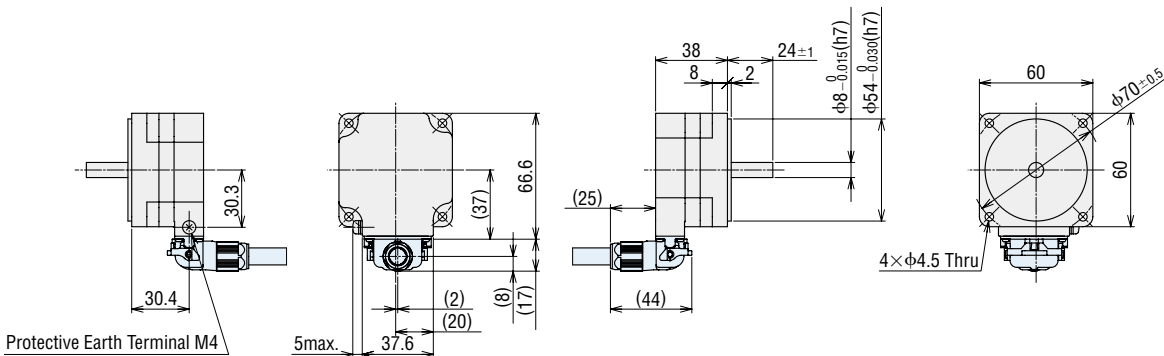
#### ● When attaching a connection cable drawn in the opposite side of the output shaft



#### ◇ Round Shaft Type

##### **BLM230HP-AS**

Mass: 0.35 kg



Overview,  
Product  
Series

Brushless  
Motors

AC Input  
BMU

AC Input  
BLE2

AC Input  
BXII

DC Input  
BLH

AC Speed  
Control  
Motors

DSC

US2

Accessories

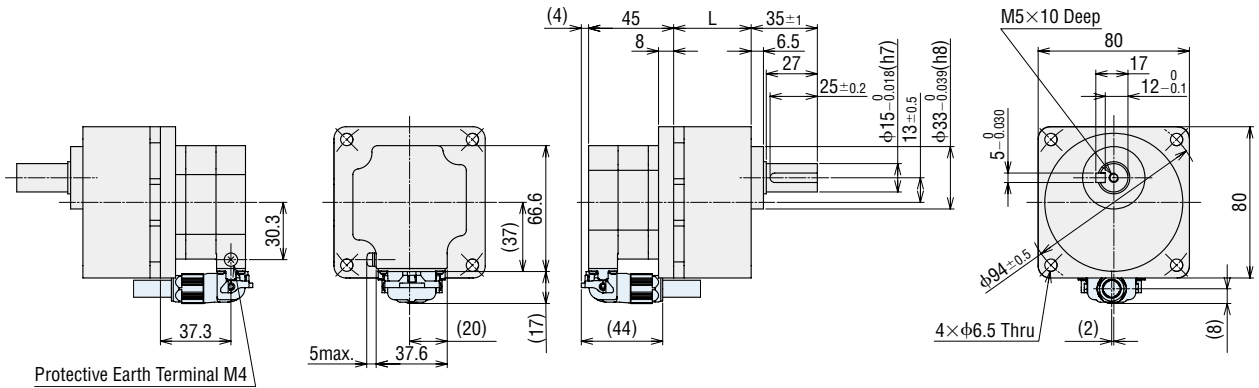
Installation

● Motor · 60 W

◇ Combination Type – Parallel Shaft Gearhead

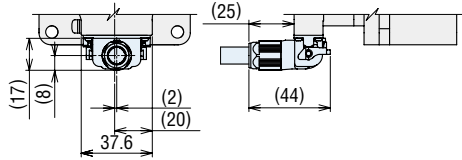
Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass kg
<b>BLM460SHP-□S</b>	BLM460SHP-GFV	GFV4G□S	<b>5~20</b>	41	1.6
			<b>30~100</b>	46	
			<b>200</b>	51	

● When attaching a connection cable drawn by the output shaft side



● At the time of shipment, a parallel key is fixed in the key slot of the gearhead shaft.

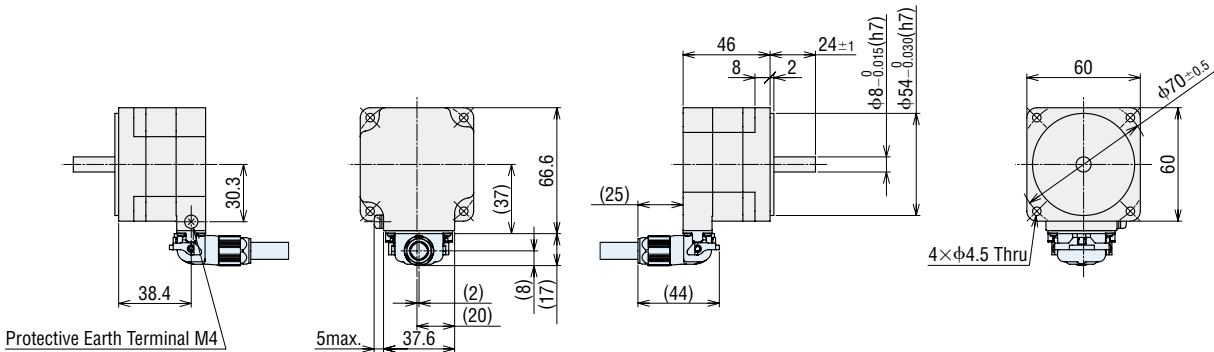
● When attaching a connection cable drawn in the opposite side of the output shaft



◇ Round Shaft Type

**BLM260HP-AS**

Mass: 0.52 kg

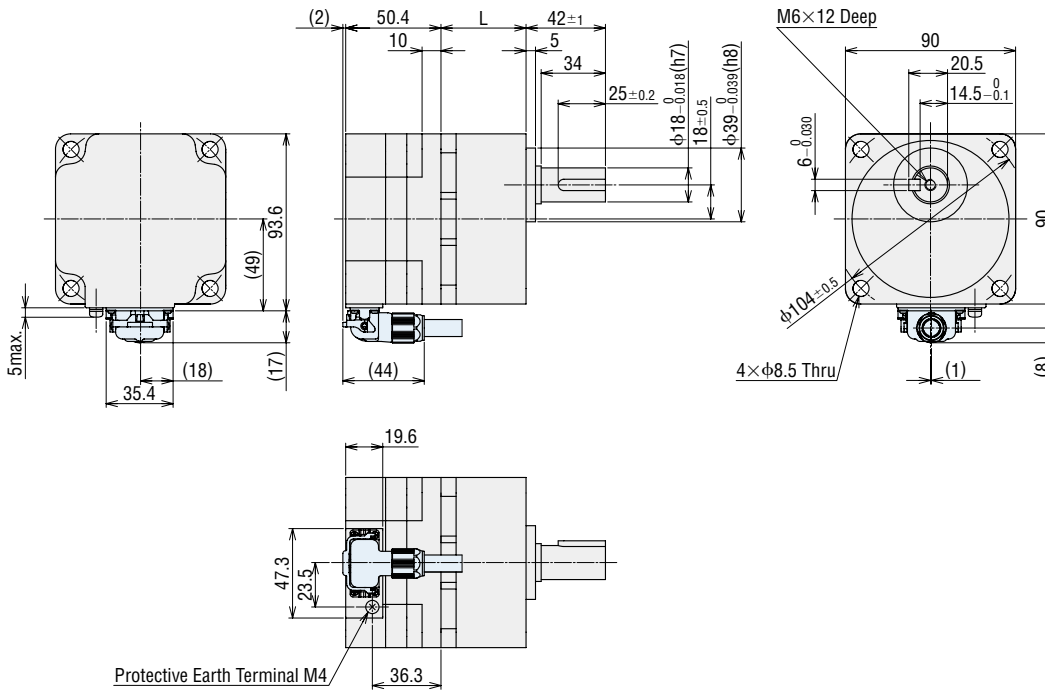


● Motor · 120 W

◇ Combination Type – Parallel Shaft Gearhead

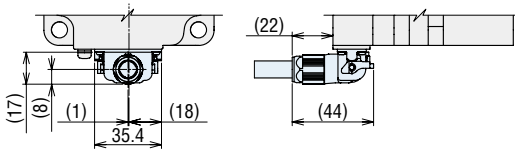
Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass kg
<b>BLM5120HP-□S</b>	BLM5120HP-GFV	GFV5G□S	<b>5~20</b>	45	2.6
			<b>30~100</b>	58	
			<b>200</b>	64	

● When attaching a connection cable drawn by the output shaft side



● At the time of shipment, a parallel key is fixed in the key slot of the gearhead shaft.

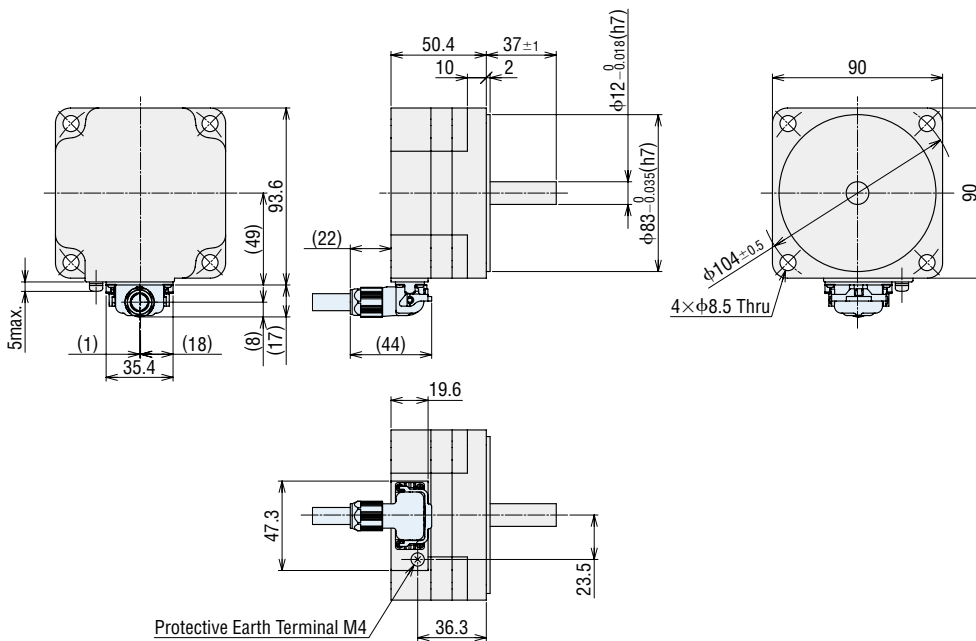
● When attaching a connection cable drawn in the opposite side of the output shaft



◇ Round Shaft Type

**BLM5120HP-AS**

Mass: 1.1 kg



Overview,  
Product  
Series

Brushless  
Motors

AC Input  
BMU

AC Input  
BLE2

AC Input  
BXII

DC Input  
BLH

AC Speed  
Control  
Motors

DSC

US2

Accessories

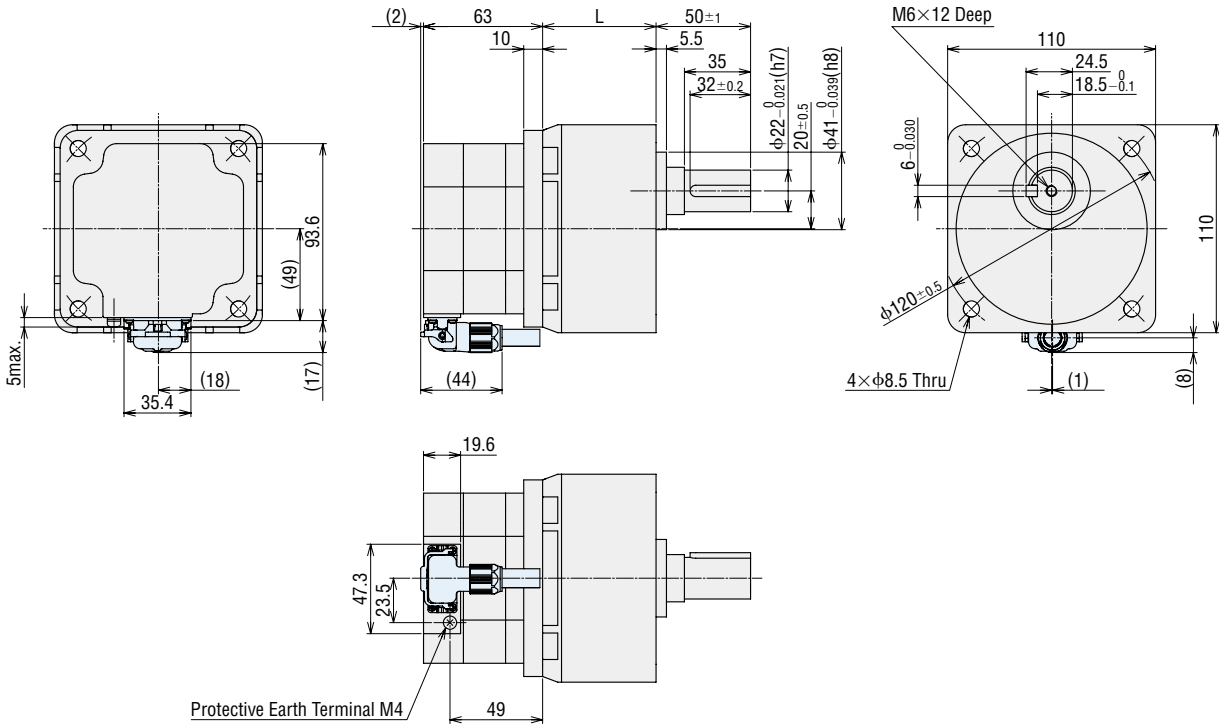
Installation

● Motor · 200 W

◇ Combination Type – Parallel Shaft Gearhead

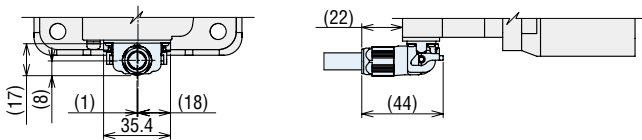
Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass kg
<b>BLM6200SHP-□S</b>	BLM6200SHP-GFV	GFV6G□S	<b>5~20</b>	60	4.7
			<b>30, 50</b>	72	
			<b>100, 200</b>	86	

● When attaching a connection cable drawn by the output shaft side



● At the time of shipment, a parallel key is fixed in the key slot of the gearhead shaft.

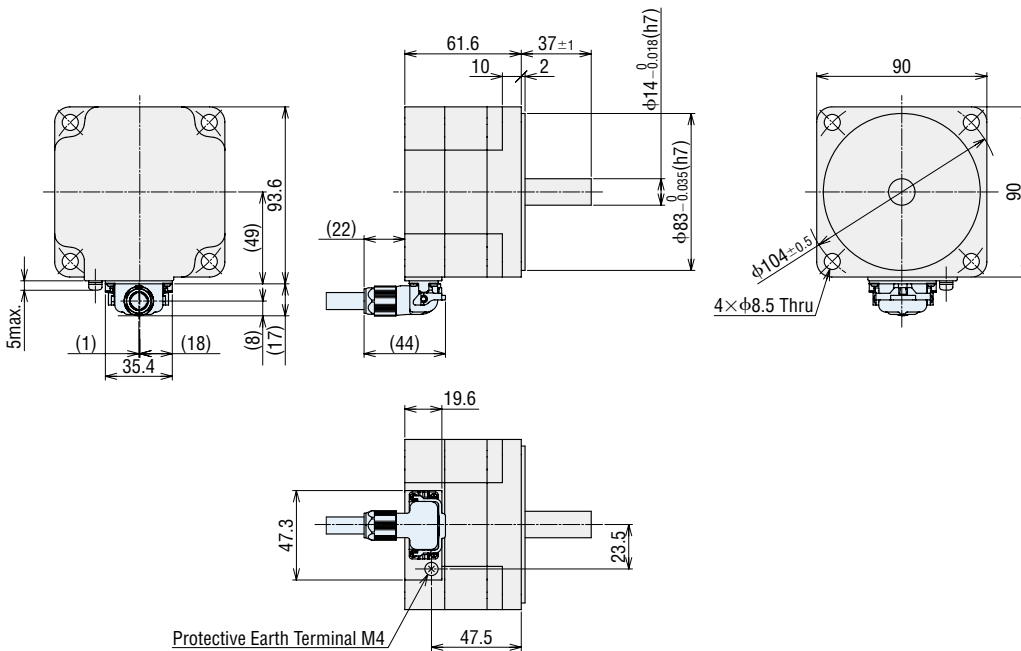
● When attaching a connection cable drawn in the opposite side of the output shaft



◇ Round Shaft Type

**BLM5200HP-AS**

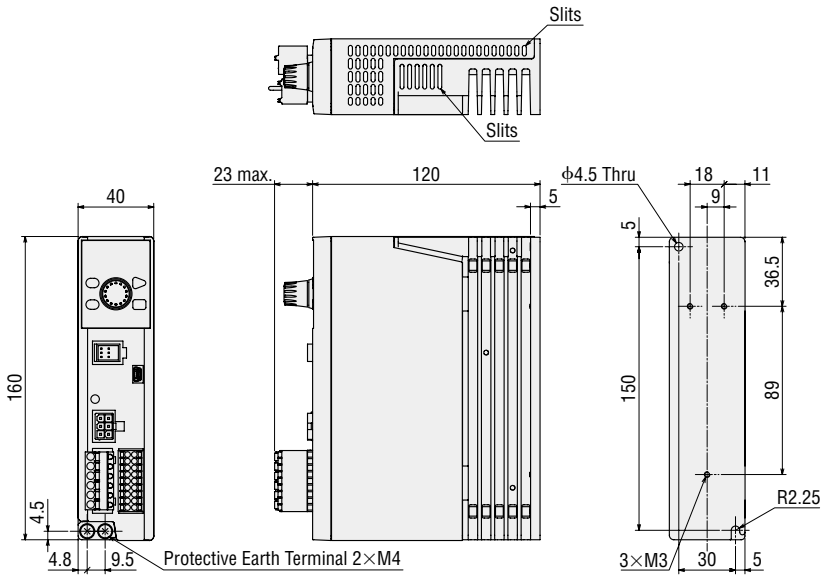
Mass: 1.6 kg



## ● Driver

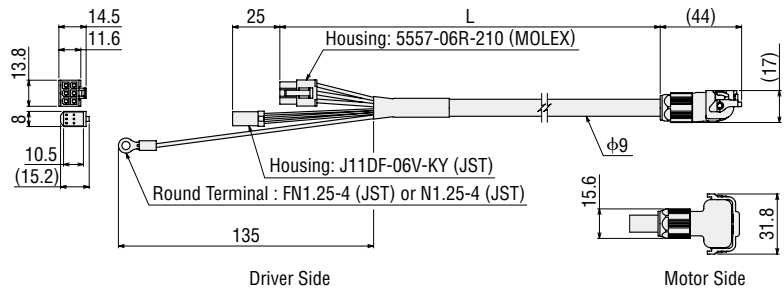
**BLE2D30-C, BLE2D60-C, BLE2D120-C, BLE2D200-C**

Mass: 0.8 kg



## ● Connection Cable

Length L (m)	Product Name		Mass (kg)
	Cable drawn by the output shaft side	Cable drawn in the opposite side of the output shaft	
0.5	<b>CC005HBLF</b>	<b>CC005HBLB</b>	0.08
1	<b>CC010HBLF</b>	<b>CC010HBLB</b>	0.12
1.5	<b>CC015HBLF</b>	<b>CC015HBLB</b>	0.2
2	<b>CC020HBLF</b>	<b>CC020HBLB</b>	0.25
2.5	<b>CC025HBLF</b>	<b>CC025HBLB</b>	0.32
3	<b>CC030HBLF</b>	<b>CC030HBLB</b>	0.38
4	<b>CC040HBLF</b>	<b>CC040HBLB</b>	0.49
5	<b>CC050HBLF</b>	<b>CC050HBLB</b>	0.62
7	<b>CC070HBLF</b>	<b>CC070HBLB</b>	0.86
10	<b>CC100HBLF</b>	<b>CC100HBLB</b>	1.2
15	<b>CC150HBLF</b>	<b>CC150HBLB</b>	1.9
20	<b>CC200HBLF</b>	<b>CC200HBLB</b>	2.5



Overview, Product Series

Brushless Motors

AC Input BMU

AC Input BLE2

AC Input BXII

DC Input BLH

AC Speed Control Motors

DSC

US2

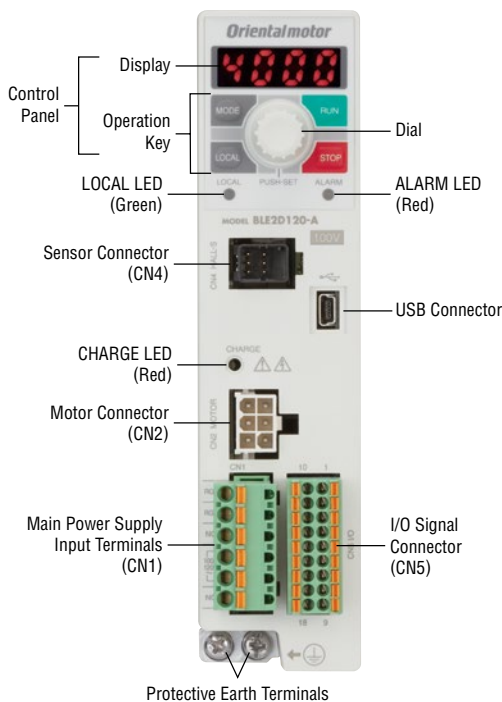
Accessories

Installation



## Connection and Operation

### Names and Functions of Driver Parts



Name	Indication	Description
Control Panel	—	Display: displays the monitor contents, setting screen, alarm, etc.
	MODE LOCAL RUN STOP	Operation Key: switches the operating mode and changes the parameters. During local operation, use the <b>RUN</b> key for operating the motor and <b>STOP</b> key for stopping the motor.
	Dial	PUSH-SET Sets the speed and parameters.
	LOCAL LED (green)	LOCAL Illuminates during local operation.
ALARM LED (red)	ALARM	Blinks when an alarm is generated.
CHARGE LED (red)	CHARGE	Illuminates when the main power supply is ON. Turns off after the main power supply is turned OFF and the internal residual voltage drops to a stable level.
Main Power Supply Input Terminal (CN1)	—	Connects the main power supply
	L1, L2, NC L1, L2, L3	Single-Phase 200-240 VAC: Connect 200-240 VAC to L1 and L2. NC is not used. 3 Phase 200-240 VAC: Connect 3 phase 200-240 VAC to L1, L2 and L3.
	RG1, RG2	No connection
Motor Connector (CN2)	MOTOR	Connects the power connector (white) of the connection cable.
Sensor Connector (CN4)	HALL-S	Connects the sensor connector (black) of the connection cable.
USB Communication Connector		Connects to the computer on which the data setting software <b>MEXE02</b> is installed.
I/O signal connector (CN5)	I/O	Connects the input signals. Connects an external speed potentiometer (sold separately) and the external DC power supply. Connects the output signals.
Protective Earth Terminal		Connect the grounding conductor of the connection cable to the protective earth terminal.

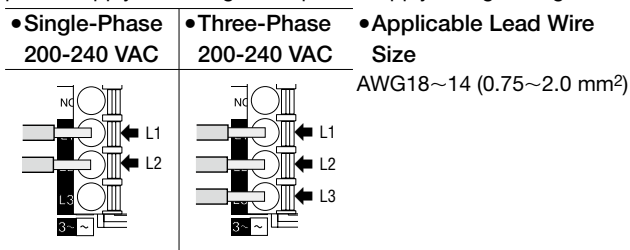
### Operation Key

The **BLE2** Series has four operating modes.

Operating Mode	Content	Setting Item
Monitoring Mode	This mode is displayed when the power is turned on.	Speed, load factor, operating data number, alarm, information, I/O monitor
Data Mode	Operating data for up to 16 speeds can be set.	Speed, torque limiting values, acceleration time and deceleration time, reset
Parameter Mode	Various parameters can be set.	Basic setting parameters, speed and torque limiting parameters, alarm and information setting parameters, operation setting parameters, I/O operating parameters, I/O function selection parameters, I/F function parameters, reset, configuration
Test Mode	The connection status of the I/O signals can be checked.	

### Main Power Supply Input Terminal (CN1)

The main power supply is connected. Please connect to the power supply according to the power supply voltage being used.



### Connecting the USB Cable

Use a USB cable with the specifications below.

Specification	USB 2.0 (Full Speed)
Cable	Length: 3 m or less
	Configuration: A - mini-B

### Operating via Control Panel

#### Selecting an Operation

When the "LOCAL key" is pressed, LOCAL LED will illuminate, and operations via control panel become available.

#### Selecting the Rotation Direction

The rotation direction of the motor changes each time the "MODE key" is pressed.

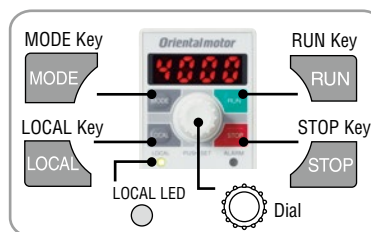
#### Starting and Stopping Motors

When "RUN" is pressed, the motor will rotate.  
When "STOP" is pressed, the motor will stop.

#### Speed Setting Method

When "Dial" is pressed, the display will blink. Then, when "Dial" is turned right, the speed increases, and when "Dial" is turned left, the speed decreases. Pressing "Dial" again sets the speed.

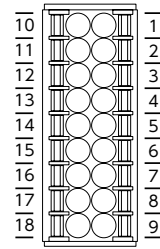
### Control Panel



## ● Operation by External Signals

### ◇ I/O Signal Connector (CN5)

Pin No.	Signal Type	Signal Name	Function*	Description
1	Input	IN-COM0	IN-COM0	Input Signal Common (External power supply)
2		IN0	FWD	The motor will rotate when FWD Input or REV input is switched to ON. Switching it OFF will stop the motor.
3		IN1	REV	
4		IN2	STOP-MODE	Selects how to stop the motor.
5		IN3	M0	Selects the operating data No. for switching the input of M0 or M1 to ON/OFF.
6		IN4	M1	
7		IN5	ALARM-RESET	Alarms are reset.
8		IN6	Not used	Various functions can be assigned.
9		IN-COM1	IN-COM1	Input Signal Common (Internal power supply: 0 V)
10			N.C.	-
11				
12	External analog setting input	VH	External analog setting input	Connect when speed and torque limiting values are set using an external speed potentiometer or external DC voltage.
13		VM		
14		VL		
15	Output	OUT0+	SPEED-OUT	30 pulses are output when the motor output shaft makes one rotation.
16		OUT0-		
17		OUT1+	ALARM-OUT	Output when an alarm activates. (Normally closed)
18		OUT1-		



● Applicable Lead Wire Size  
AWG24~18  
(0.2 to 0.75 mm<sup>2</sup>)

\*The text inside the [ ] represents the factory default function assignment. The factory default function assignment on pin No. 2~8 and No. 15~18 can be changed. 7 of the 12 input signals and 2 of the 7 output signals are assignment points.

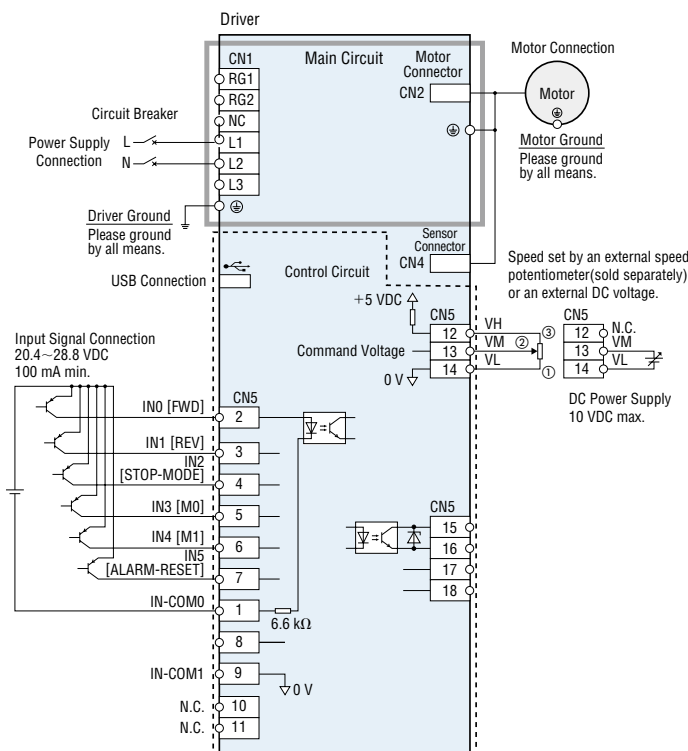
### ◇ Changeable Signal Assignments

Signal Type	Function	Description
Input	START/STOP	The motor will rotate when START/STOP Input and RUN/BRAKE input are switched to ON. Switching the START/STOP input to OFF will decelerate the motor to a stop. Switching the RUN/BRAKE input to OFF will stop the motor instantaneously.
	RUN/BRAKE	
	CW/CW	This signal allows you to change the rotation direction of the motor.
	M2	This signal allows you to select the operating data No..
	M3	
	H-FREE	Switching the H-FREE input to ON will release simple holding.
	TL	This signal allows you to enable and disable the torque limiting function externally.
Output	HMI	This signal allows you to limit operations via the control panel and the data setting software <b>MEXE02</b> .
	EXT-ERROR	This signal allows you to force stop the motor externally.
	MOVE	This signal is output when the operating input is switched to ON and the motor is rotating.
	INFO	This signal is output when information is generated.
	TLC	This signal is output when the motor output torque reaches the torque limiting value.
	VA	This signal is output when the detected motor speed reaches the setting speed ±VA detection range.
	DIR	This signal outputs the rotation direction of the motor.

## ● Connection Diagram

The figure shows a connection example for when speed is set externally on a single-phase 200-240 VAC. I/O signals in the brackets [ ] indicate a factory setting.

### ◇ Using an External Power Supply



Overview, Product Series

Brushless Motors

AC Input BMU

AC Input BLE2

AC Input BXII

DC Input BLH

AC Speed Control Motors

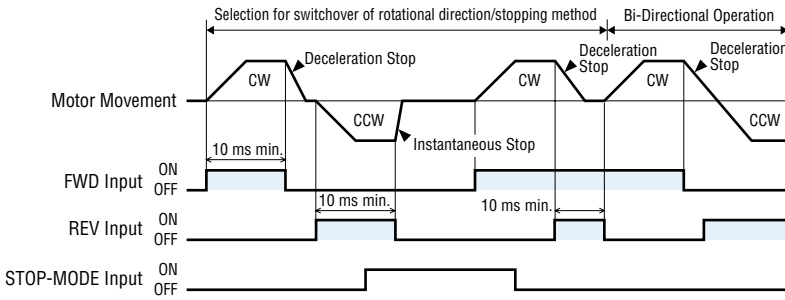
DSC

US2

Accessories

Installation

● Timing Chart (2-Wire Input Mode)



● FWD Input, REV Input

Switching the FWD input to ON will cause the motor to turn clockwise (CW) as viewed from the motor shaft side. Turning it OFF decelerates the motor to a stop. While switching the REV input to ON will cause the motor to turn counterclockwise (CCW). Turning it OFF decelerates the motor to a stop.

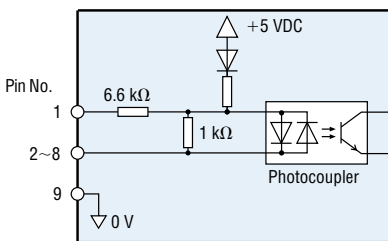
● STOP-MODE Input

Select the motor stopping method when the FWD input and REV input are turned OFF. If the STOP-MODE is OFF, the motor will decelerate and stop in accordance with settings of the operation data No. If the STOP-MODE is ON, the motor will stop instantaneously.

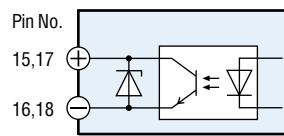
● I/O Signal Circuits

Source logic or sink logic can be selected according to the external control device the customer is using.

◇ Input Circuit

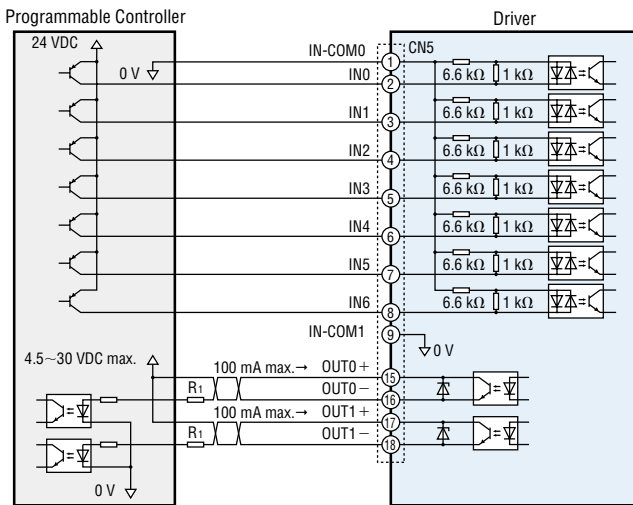


◇ Output Circuit



◇ Connection to Programmable Controller

● Source Logic

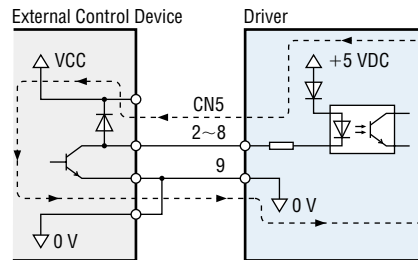


◇ When an External Control Device with a Built-in Clamp Diode is Used

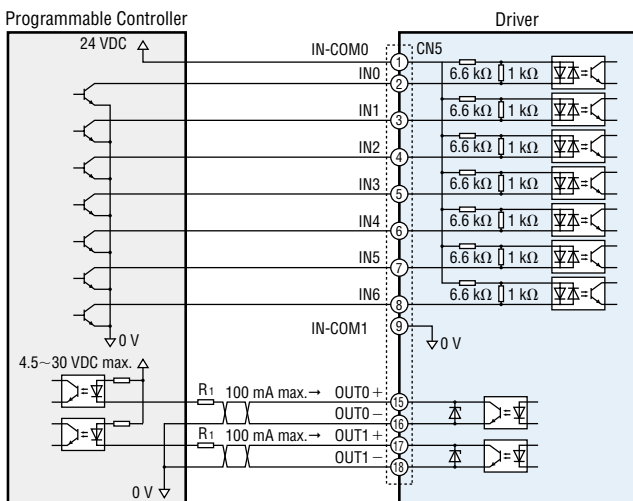
If a controller with a built-in clamp diode is connected and the controller is turned off when the driver power is on, current may flow, and the motor may turn. Because the current capacity between the driver and controller is different, the motor may also run when their power supplies are turned ON or OFF simultaneously.

To turn the power OFF, turn OFF the driver and then the controller. To turn the power ON, turn ON the controller and then the driver.

● Example of Sink Logic



● Sink Logic



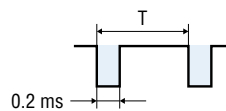
◇ Speed Output (SPEED-OUT)

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

The speed output frequency can be measured and the approximate motor speed calculated.

$$\text{Speed Output Frequency [Hz]} = \frac{1}{T[\text{s}]}$$

$$\text{Motor Shaft Speed [r/min]} = \frac{\text{Speed Output Frequency [Hz]} \times 60}{30}$$



◇ Alarm Output (ALARM-OUT)

When any of the driver's protective functions is activated, the alarm output turns OFF and the alarm LED blinks. The motor will coast to a stop displaying an alarm code on the control panel.

## ● Speed Setting Method

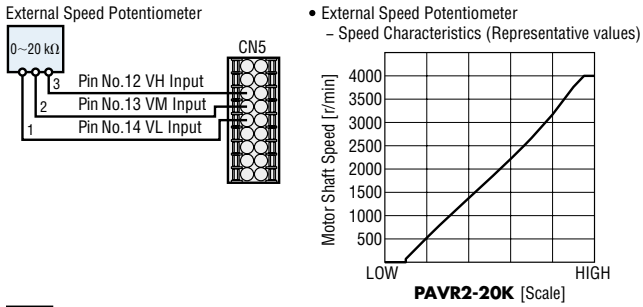
The following 4 methods for setting speed can be used.

### ◇ Setting by Control Panel



### ◇ Setting by External Speed Potentiometer

Connect the external speed potentiometer to I/O signal connector (CN5).

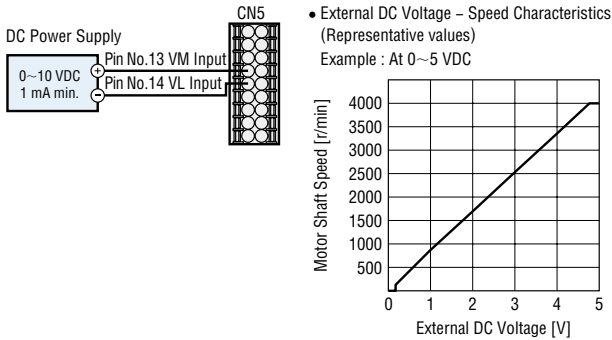


#### Note

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

### ◇ Setting by External DC Voltage

Connect the external DC power supply to I/O signal connector (CN5).

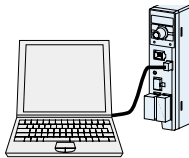


#### Note

- Speed can also be set by 0~10 VDC.
- The speed in the graph represents the speed of the motor alone. The output gear shaft speed of the combination type is calculated by dividing the graph speed by the gear ratio.

### ◇ Setting by Data Setting Software (MEXE02)

Connect the personal computer installed Data Setting Software (MEXE02) to USB communication connector.



## ● Multistep Speed-Change Operation

Multistep speed-change operation is possible with combination of the M0 to M3 inputs ON/OFF.

Operation Data No.	M3	M2	M1	M0
0	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	ON
2	OFF	OFF	ON	OFF
3	OFF	OFF	ON	ON
4	OFF	ON	OFF	OFF
5	OFF	ON	OFF	ON
6	OFF	ON	ON	OFF
7	OFF	ON	ON	ON
8	ON	OFF	OFF	OFF
9	ON	OFF	OFF	ON
10	ON	OFF	ON	OFF
11	ON	OFF	ON	ON
12	ON	ON	OFF	OFF
13	ON	ON	OFF	ON
14	ON	ON	ON	OFF
15	ON	ON	ON	ON

## ● Parallel-Motor Control

Multiple motors can be operated at the same speed using single external speed potentiometer or external DC voltage.

The diagram below applies to a single-phase power supply specification. For a three-phase power supply specification, change the power supply line to a three-phase type. Also note that the diagram does not show the motor or operation control part.

### ◇ Using an External Speed Potentiometer

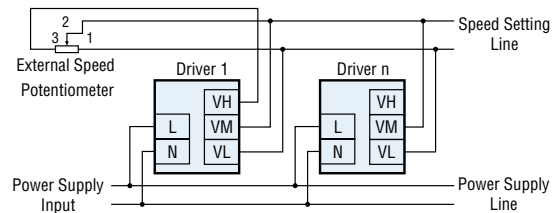
Parallel-motor operation using the external speed potentiometer (VRx) should be performed with a maximum of 20 speed controllers.

The Calculation Method of the Resistance Value (VRx) when the Number of Speed Controllers Connected is n

$$\text{Resistance value (VRx)} = 20/n \text{ (k}\Omega\text{)}, n/4 \text{ (W)}$$

Example: When connecting 2 speed controllers

$$\text{Resistance value (VRx)} = 20/2 = 10 \text{ (k}\Omega\text{)}, 2/4 = 1/2 \text{ (W)}$$



### ◇ Using External DC Voltage

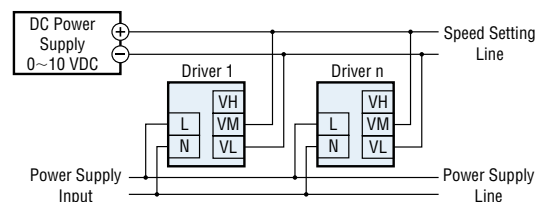
The current capacity of the external DC power supply is calculated as follows.

The Calculation Method of the Current Capacity of the External DC Power Supply when the Number of Speed Controllers Connected is n

$$\text{Current capacity (I)} = 1 \times n \text{ (mA)}$$

Example: When connecting 2 speed controllers

$$\text{Current capacity (I)} = 1 \times 2 = 2 \text{ (mA)}$$



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