Orientalmotor

BLH Series

100 W Lineup Added

Improved DC Input drivers with more functionality and performance

Excellent performance just as-is.

The DC input type brushless motor **BLH** series has been updated.

Performance has been increased, while the motor and driver remain the same size.

Using the support software with the digital setting type allows a variety of useful functions to be utilized.

The **BLH** Series has been updated with a variety of new Features.

- **High torque at high speeds**
- Speed range **80** to **3000 r/min**＊
- **Deceleration stop** according to the set time＊
- Quieter: **13 dB** quieter than before
- Set operating data **from your computer**＊
- Monitor operating status **in real time**＊
- **Torque adjustment**＊
- Max. **8** data setting points＊ (Conventional product: 2 points)

＊When using the **MEXE02** support software and digital setting type driver.

2 Driver Types to Choose From

Motor
Common

- Output power 15 W / 30 W / 50 W / NEW 100W
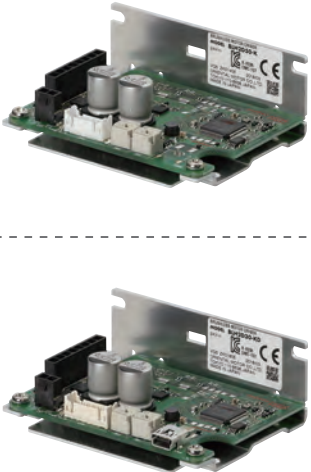- Types: Parallel Shaft Gearhead / Hollow Shaft Flat Gearhead / Round Shaft

+

Driver

■ **Analog Setting Type**
- Installation and functional compatibility with current products
- Increased performance (Higher torque, reduced audible noise)
- For output power 15 W / 30 W / 50 W / NEW 100 W

■ **Digital Setting Type**
- Installation compatibility with current products
- Increased performance (Higher torque, improved quietness)
- Increased functionality with the support software **MEXE02**
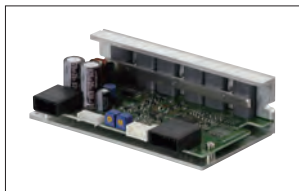- For output power 15 W / 30 W / 50 W

＊The regular price is the total for the motor, driver, and power supply cable & I/O signal cable set (Sold separately).

Compact, Lightweight Drivers

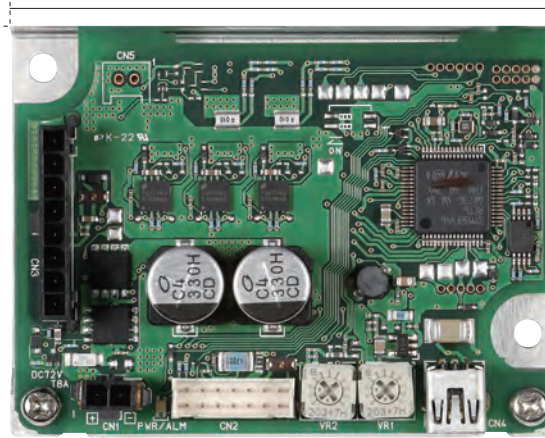Compact, lightweight drivers that are smaller than a business card.

Actual Size
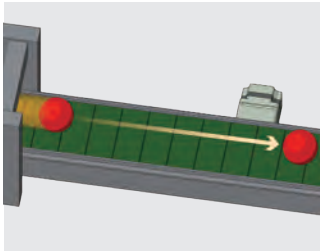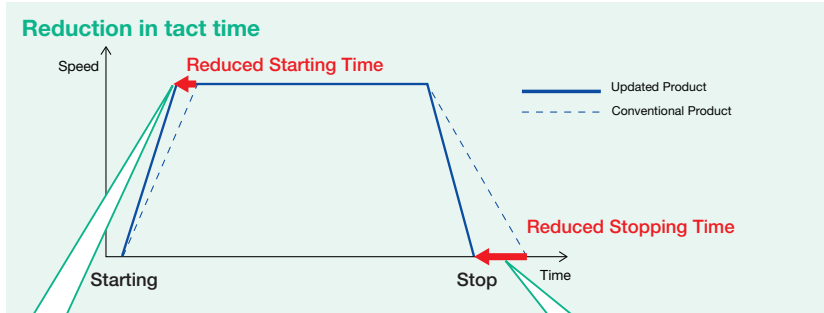
NEW 100 W Driver

72 mm

55 mm

Mass 46 g

- Pictured is a 15 W / 30 W / 50 W driver.

3

Increased performance and value with new drivers.

Reduction in Equipment Tact Time

● Faster starting time with increased torque
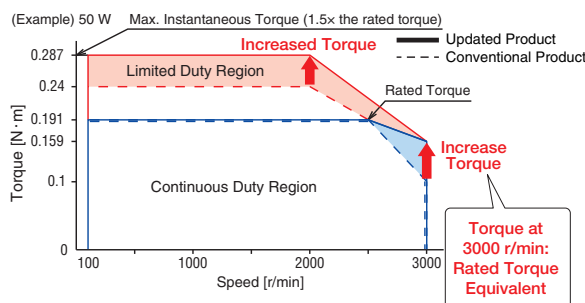● Stop at the set time with deceleration stop (Digital setting type)

Reduction in tact time

Reduced Starting Time

Reduced Stopping Time

Speed

Starting   Stop   Time

—— Updated Product
---- Conventional Product

► Increased Torque (30 W, 50 W)

Max. instantaneous torque: 1.5× the rated torque

The continuous duty region expands, making it ideal for applications that require high torques in high speed areas. The device's tact time can be shortened by applying the maximum instantaneous torque 1.25 to 1.5 times higher than the conventional model.

Speed range:
100 to 3000 r/min (Analog setting)
80 to 3000 r/min (Digital setting)

(Example) 50 W   Max. Instantaneous Torque (1.5× the rated torque)

—— Updated Product
---- Conventional Product

Increased Torque

Limited Duty Region

Rated Torque

Increase Torque

Continuous Duty Region

Torque at 3000 r/min: Rated Torque Equivalent

Torque [N·m]: 0.287, 0.24, 0.191, 0.159, 0.1, 0

Speed [r/min]: 100, 1000, 2000, 3000

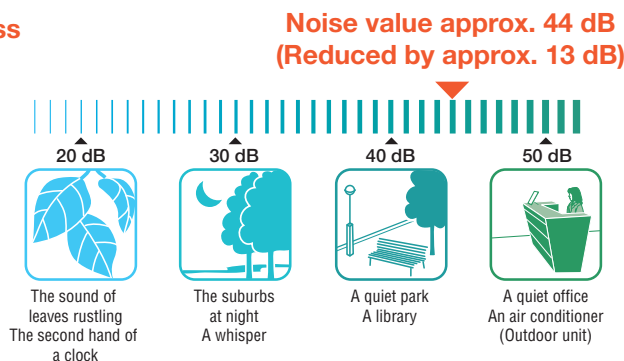### ► Deceleration Stop (Digital setting type)

With the digital settings type, a brake is applied when there is a deceleration stop, and the motor stops at a time that is optionally set. The device's tact time can be shortened compared to a natural stop with the existing free-run.

Suitable for Applications in Quiet Environments

► Improved Quietness

Noise sounds about half as loud as conventional products.
※30 W with parallel shaft gearhead Gear ratio of **5**
※Measurement of noise: OA value

Noise value approx. 44 dB (Reduced by approx. 13 dB)

20 dB — The sound of leaves rustling / The second hand of a clock
30 dB — The suburbs at night / A whisper
40 dB — A quiet park / A library
50 dB — A quiet office / An air conditioner (Outdoor unit)

The **BLH** series uses a sinusoidal drive method. With little torque ripple and smooth, stable rotation even at low speeds, the motor's drive sound is reduced.

Compare the sounds from the driving power of our renewed product compared to that of an existing product on video.

■ Video library
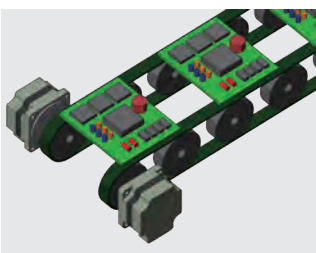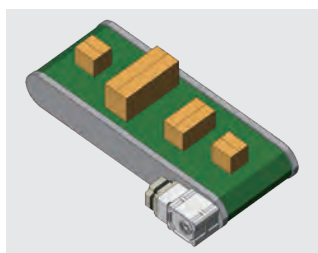https://www.orientalmotor.com.sg/video_det/detail20132111/DemoSC/

Synchronized Operation and Operation with Little Speed Fluctuation

► Synchronized Operation

► Speed Stability

● With digital settings, speeds can be set at 1 r/min increments. The reproduction of speeds is enhanced, and synchronized operations are made possible.

● Speed remains stable even if the weight of the work changes (Speed regulation ±0.2% max.)

● Speed Regulation

Speed Setting Method	Driver Type — Analog Setting Type	Digital Setting Type
Analog Setting	± 0.5% max.	
Digital Setting	—	± 0.2% max.
PWM Input Setting	—	± 0.5% max.

This is a demo of the Automated Guided Vehicle (AGV) using the BLH series. You can see the synchronization and high level of response.
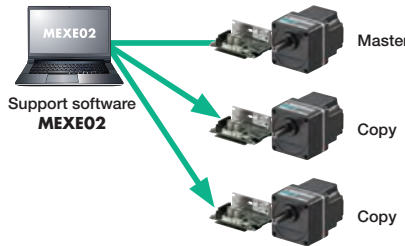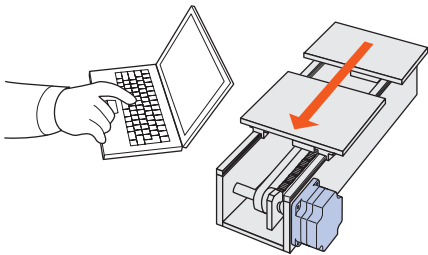
■ Video library
https://www.orientalmotor.com.sg/video_det/detail20132111/DemoSC/

Startup and maintenance with digital settings + support software.

Equipment Startup Assistance

▶ Teaching and Remote Operation

▶ Operating Data Copy Reading

MEXE02

Support software
MEXE02

Master

Copy

Copy

Reading

MEXE02

Support software
MEXE02

Operating data can be set on the computer screen. It is possible to perform a test run without connecting to the host system, then record the operating data as-is.

Copy the operating data to the driver when using multiple units, and read out the data on the driver side. This contributes to reduced system startup time.

Predictive Maintenance with Visualization

What is predictive maintenance? By constantly monitoring the status of the motor and performing maintenance when signs of change are observed, trouble can be avoided.

MEXE02

Support software
MEXE02

▶ Status Monitoring

The load factor, driver temperature, and other such conditions can be constantly checked.

▶ Information Monitoring

By outputting an information signal with preset thresholds, this information can be used as reference for the maintenance period.

▶ Alarm Monitoring
(When an abnormality occurs)

Alarm information can also be monitored. Besides being able to check for solutions to abnormalities, the cause of the alarm can be retained as a history.

Torque Adjustment

▶ Torque Limiting Function

What is torque limiting? It is a limiting function that suppresses the motor's torque by limiting the current to the motor.
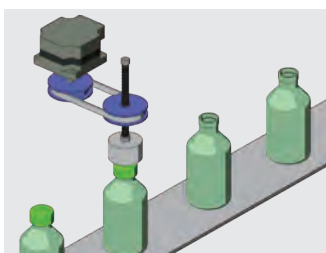
● Adjustment of tightening force, etc.
● Damage prevention (Low thrust)
● Load factor monitoring is possible

Maximum Instantaneous Torque

Rated Torque

Torque Limiting Setting Value

When the Torque Limiting Value is Set at 50%
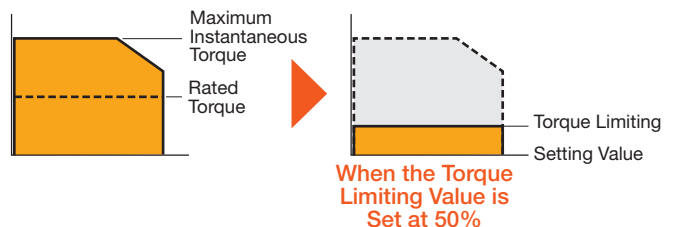
Besides applications such as adjustment of tightening force, it can also be used as a safety measure for pinching detection and equipment damage prevention. The max. instantaneous torque range can be set between 0 and 200% by assuming the rated torque to be 100%.

5

Operating Data Setting

With the digital settings type, you can set up to 8 different types of driving data (Rotational speed, torque limit value, acceleration time, deceleration time).

■ Setting Method

Setting Method / Setting Item		Digital Setting	External Analog Potentiometer		Internal Potentiometer (Driver)		PWM Input
		Support software **MEXE02**	External speed potentiometer	External DC Voltage	VR1	VR2	PWM signal
Speed	Analog setting type	—	●	●	●	—	—
Speed	Digital setting type	●	●	●	●	●	●
Acceleration / Deceleration Time	Analog setting type	—	—	—	—	●	—
Acceleration / Deceleration Time	Digital setting type	●	—	—	●	●	—
Torque Limiting	Analog setting type	—	—	—	—	—	—
Torque Limiting	Digital setting type	●	●	●	●	●	●

Functions List

	Function	Analog Setting Type	Digital Setting Type
①	Digital Speed Indicator	▲ Pulse signals can be converted to an external device	● Monitoring function for the **MEXE02** support software
②	Instantaneous Stop	●	●
③	Acceleration / Deceleration Time Setting	● 0.1 to 12.0 seconds[*1]	● 0.1 to 15.0 seconds (Individual settings)
④	Multistep Speed-Change Operation	●	●
⑤	Parallel-Motor Operation	●	●
⑥	Protective Function	●	●
⑦	Torque Limiting	—	●
⑧	Speed Upper and Lower Limit Setting	—	●
⑨	Shock Alleviation Filter	—	●
⑩	I/O Signal Assignment	—	●
⑪	I/O Signal Operation Selection	—	●
⑫	Overload Alarm Detection Time Setting	— Fixed at 10.0 seconds[*2]	● 0.1 to 10.0 seconds
⑬	Prevention of Operation at Power-on Alarm	—	●
⑭	Various Information Detection	—	●

※For ⑦ to ⑭, when using the **MEXE02** support software and digital setting type driver.
＊1 0.5 to 10.0 seconds for 100 W
＊2 Fixed at 5.0 seconds for 100 W

Product Line

Motor, driver, connection cables (Flexible connection cables), and cable sets (Power supply cable, I/O signals cable) sold separately.

■ Motor

Type	Output / Frame Size	Gear Ratio
Parallel Shaft Gearhead **GFS** Gear[*1]	15 W / □42 mm 30 W / □60 mm 50 W / □80 mm 100 W / □90 mm	**5, 10, 15 20, 30, 50 100, 200** ※15 W does not have a gear ratio of **200**
Hollow Shaft Flat Gearhead **FR** Gear[*2]		
Round Shaft		—

■ Driver

Type	Voltage / Output
Analog Setting Type	24 VDC · 15 W 30 W 50 W 100 W
Digital Setting Type	24 VDC · 15 W 30 W 50 W

■ Connection Cables / Flexible Connection Cables

Type
Connection Cable (1.5 m)
Flexible Connection Cable (1.5 m)

■ Cable Sets

Power Supply Cable Cable for I/O Signals
Power Supply Cable (300 mm)
Cable for I/O Signals (300 mm)

＊1 The 15 W geared motor has an integrated motor and gearhead.
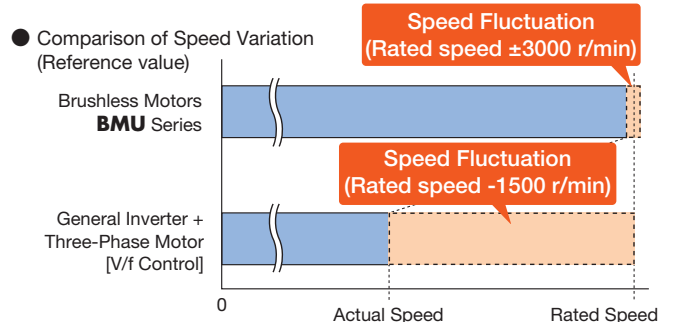＊2 Excluding 15 W.
＊3 Power supply cable and I/O signal cable are included with the 100 W driver.

Features of Brushless Motors

Brushless motors have slim bodies and provide high output and high efficiency due to the built-in permanent magnets. The built-in sensor (Hall IC) constantly monitors the motor's speed. No matter the load conditions, feedback control is carried out at all times so that the command speed and actual speed remain consistent.
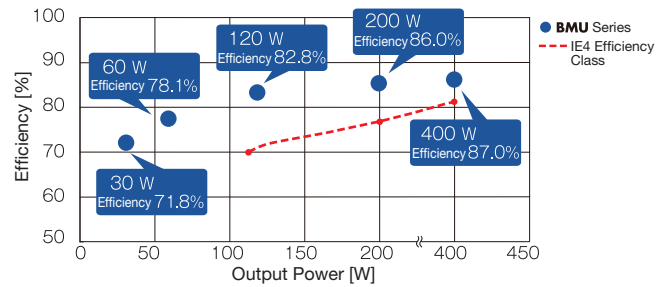
Speed stability with feedback control

Brushless motors compare the setting speed with the speed feedback signals from the motor at all times and adjust the motor's applied voltage. Speed is kept stable over the entire speed range from low to high even when the load fluctuates.

● Comparison of Speed Variation (Reference value)

Brushless Motors **BMU** Series

Speed Fluctuation (Rated speed ±3000 r/min)

General Inverter + Three-Phase Motor [V/f Control]

Speed Fluctuation (Rated speed -1500 r/min)

0   Actual Speed   Rated Speed

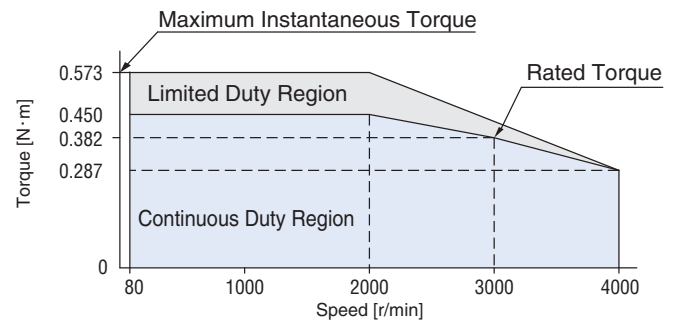## IE4-equivalent* high-efficiency and energy-saving motor

Brushless motors are higher efficiency than three-phase motors (Induction motors). For example, with the **BMU** Series 200 W, motor and driver efficiency is increased by 86%, and the IE4 standard is increased 75.8%, thus giving consideration to energy-saving requirements.

Efficiency [%]

- 60 W Efficiency 78.1%
- 120 W Efficiency 82.8%
- 200 W Efficiency 86.0%
- 30 W Efficiency 71.8%
- 400 W Efficiency 87.0%

● **BMU** Series
--- IE4 Efficiency Class

Output Power [W]

* Induction motors 120 W and higher are subject to the efficiency classes under the international standard IEC 60034-30-1.
* IE4 efficiency values are at 50 Hz and 1500 r/min, while brushless motor efficiency values are at rated speed.
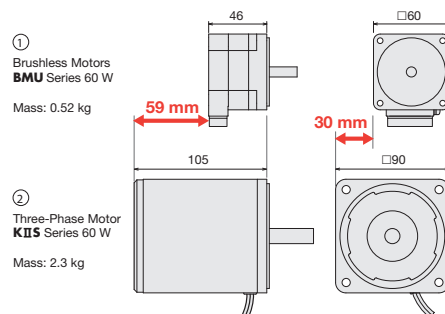
Broad speed control range and at torque

Rated torque is consistent over the entire speed range from low to high. Sufficient torque is obtained without limiting the used torque at low speeds, as is done with three-phase motors when driven with an inverter.

Maximum Instantaneous Torque

Torque [N·m]

Rated Torque

0.573
0.450
0.382
0.287

Limited Duty Region

Continuous Duty Region

80   1000   2000   3000   4000
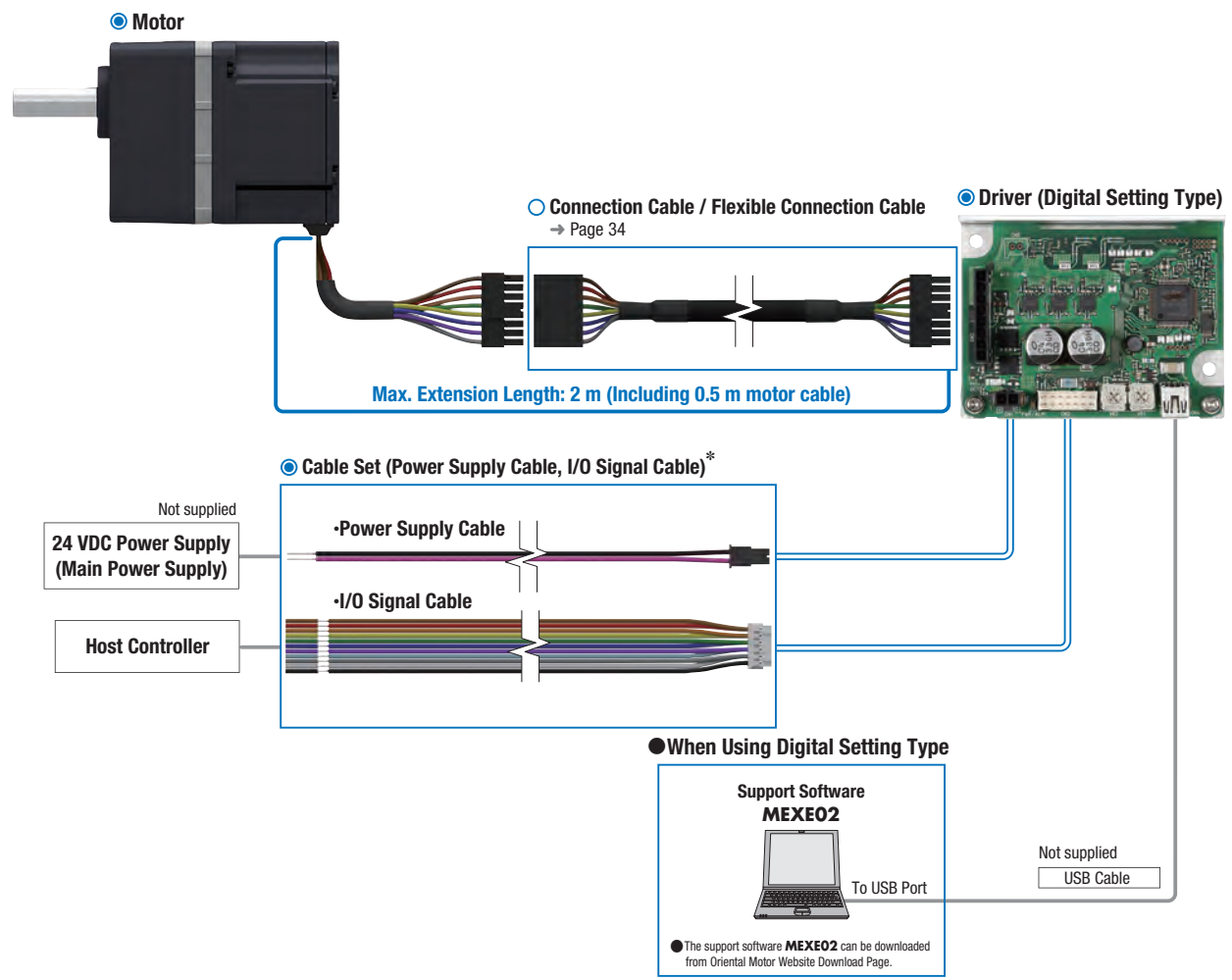
Speed [r/min]

Compact, lightweight, and high power

Since these are brushless motors with built-in permanent magnets, they offer high output even though they are compact.
Installation is easy, and both equipment weight and space can be reduced.

① Brushless Motors **BMU** Series 60 W
Mass: 0.52 kg

46   □60

59 mm   30 mm

② Three-Phase Motor **KⅡS** Series 60 W
Mass: 2.3 kg

105   □90

System Configuration

- ◉ Please be sure to purchase
- ◯ Please purchase as necessary

◉ **Motor**

◯ **Connection Cable / Flexible Connection Cable** → Page 34

◉ **Driver (Digital Setting Type)**

Max. Extension Length: 2 m (Including 0.5 m motor cable)

◉ **Cable Set (Power Supply Cable, I/O Signal Cable)**∗

Not supplied

24 VDC Power Supply (Main Power Supply)

•**Power Supply Cable**

Host Controller

•**I/O Signal Cable**

●**When Using Digital Setting Type**

Support Software
MEXE02

To USB Port

Not supplied
USB Cable

●The support software **MEXE02** can be downloaded from Oriental Motor Website Download Page.

◯ **Motor Accessories**

Motor / Gearhead Mounting Brackets → Page 35

Flexible Couplings → Page 35

◯ **Driver Accessories**

External Speed Potentiometer → Page 35

DIN Rail Mounting Plates → Page 35

Inverted Logic Module → Website

∗ A power supply cable and an I/O signal cable are included with the 100 W driver.

●Example of System Configuration Pricing

Motor		Driver		Cables		Accessories		
				Connection Cable	Cable Set	Motor / Gearhead Mounting Bracket	Flexible Coupling	Din Rail Mounting Plate
BLHM230K-5	+	**BLH2D30-KD**	+	**CC02BLH**	**LHS003CD**	+	**SOL2M4**	**MCL301010**	**MADP01**
◉		◉		◯	◉		◯	◯	◯

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

■Product Number

●Motor

BLHM 4 50 K - 5 FR
① ② ③ ④ ⑤ ⑥

①	Motor Type	**BLHM**: Brushless Motor
②	Frame Size	**0**: 42 mm　**2**: 60 mm　**4**: 80 mm　**5**: 90 mm
③	Output Power	(Example) **50**: 50 W
④	Power Supply Voltage	**K**: 24 VDC
⑤	Gear Ratio/ Shaft Configuration	Number: Gear Ratio for Gearhead Gear Ratio for Geared Motor **A**: Round Shaft Type
⑥		Blank: Parallel Shaft Gearhead **GFS** Gear **FR**: Hollow Shaft Flat Gearhead **FR** Gear

●Driver

BLH2D 50 - K D
① ② ③ ④

①	Driver Type	**BLH2D**: **BLH** Series Driver (15 W, 30 W, 50 W) **BLHD**: **BLH** Series Driver (100 W)
②	Output Power	(Example) **50**: 50 W
③	Power Supply Voltage	**-K**: 24 VDC (15 W, 30 W, 50 W) **K**: 24 VDC (100 W)
④		Blank: Analog Setting Type **D**: Digital Setting Type

●Connection Cable, Flexible Connection Cable

CC 02 BLH R
① ② ③ ④

①	Cable Type	**CC**: Connection Cable
②	Length	**02**: 1.5 m
③	Applicable Model	**BLH**: Brushless Motor (15 W, 30 W, 50 W) **AXH2**, **BLH2**: Brushless Motor (100 W)
④		Blank: Connection Cable **R**: Flexible Connection Cable

●Power Supply Cable and I/O Signal Cable Set (For 15 W, 30 W, 50 W)

LH S 003 C D
① ② ③ ④ ⑤

①	Cable Type	**LH**: Cable
②	**S**: Set	
③	Length	**003**: 0.3 m
④	**C**: Cable	
⑤	Applicable Type	**C**: Analog Setting Type **D**: Digital Setting Type

■Product Line

Motors, drivers, and connection cables are sold separately.

●Motor

◇Parallel Shaft Gearhead **GFS** Gear

Output Power	Product Name	Gear Ratio
15 W	**BLHM015K-□**✳	**5**, **10**, **15**, **20**
		30, **50**, **100**
30 W	**BLHM230K-□**	**5**, **10**, **15**, **20**
		30, **50**, **100**
		200
50 W	**BLHM450K-□**	**5**, **10**, **15**, **20**
		30, **50**, **100**
		200
100 W	**BLHM5100K-□**	**5**, **10**, **15**, **20**
		30, **50**, **100**
		200

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

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

◇Hollow Shaft Flat Gearhead **FR** Gear

Output Power	Product Name	Gear Ratio
30 W	**BLHM230K-□FR**	**5**, **10**, **15**, **20**
		30, **50**, **100**
		200
50 W	**BLHM450K-□FR**	**5**, **10**, **15**, **20**
		30, **50**, **100**
		200
100 W	**BLHM5100K-□FR**	**5**, **10**, **15**, **20**
		30, **50**, **100**
		200

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

◇Round Shaft Type

Output Power	Product Name
15 W	**BLHM015K-A**
30 W	**BLHM230K-A**
50 W	**BLHM450K-A**
100 W	**BLHM5100K-A**

●Driver

◇Analog Setting Type

Output Power	Product Name
15 W	**BLH2D15-K**
30 W	**BLH2D30-K**
50 W	**BLH2D50-K**
100 W	**BLHD100K**

◇Digital Setting Type

Output Power	Product Name
15 W	**BLH2D15-KD**
30 W	**BLH2D30-KD**
50 W	**BLH2D50-KD**

●Connection Cable, Flexible Connection Cable

These cables are used when extending the wiring distance between the motor and the driver to 2 m.

◇For 15 W, 30 W, 50 W

Type	Length	Product Name
Connection Cable	1.5 m	**CC02BLH**
Flexible Connection Cable		**CC02BLHR**

◇For 100 W

Type	Length	Product Name
Connection Cable	1.5 m	**CC02AXH2**
Flexible Connection Cable		**CC02BLH2R**

●Power Supply Cable and I/O Signal Cable Set
(For 15 W, 30 W, 50 W)

Cables come as a set of power supply cable and I/O signal cable.

Power Supply Cable

I/O Signal Cable

Setting Type	Length	Product Name
Analog Setting Type	0.3 m	**LHS003CC**
Digital Setting Type		**LHS003CD**

■Included

●Motor

Geared Type	Parallel Key	Safety Cover	Installation Screws	Operating Manual
Geared Motor	–	–	–	
Parallel Shaft Gearhead **GFS** Gear	1 pc.	–	1 Set	1 Copy
Hollow Shaft Flat Gearhead **FR** Gear	1 pc.	1 Set	1 Set	
Round Shaft Type	–	–	–	

●Driver

Output Power	Power Supply Cable	I/O Signal Cable	Operating Manual
15 W 30 W 50 W	–	–	1 Copy
100 W	1 pc.	1 pc.	1 Copy

About the Gearheads

● Parallel Shaft Gearhead **GFS** Gear
● Hollow Shaft Flat Gearhead **FR** Gear

Motor and gearhead are delivered pre-assembled.
The combination of motors and gearheads can be changed.

Screw Fitting
The motor assembly position can be changed in 90° increments.

● Geared Motor

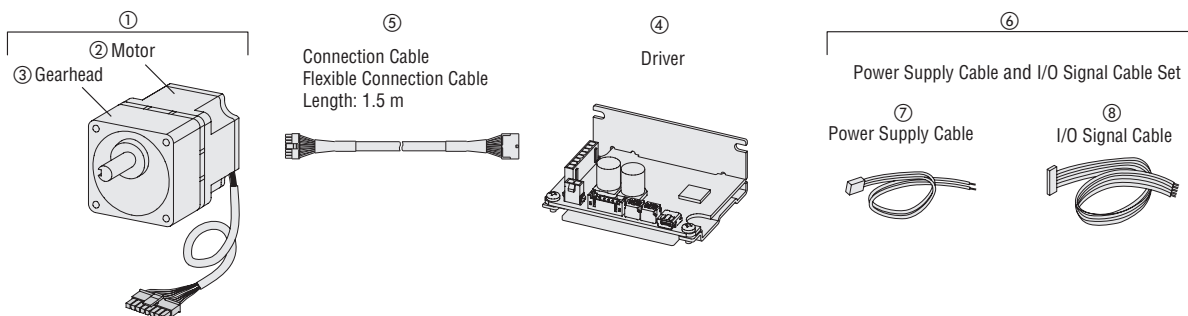The geared motor has an integrated motor and gearhead.
Motor and gearhead combinations cannot be changed.

Integrated Motor and Gearhead

■Combination List

●15 W, 30 W, 50 W

① ②Motor ③Gearhead

⑤ Connection Cable
Flexible Connection Cable
Length: 1.5 m

④ Driver

⑥ Power Supply Cable and I/O Signal Cable Set

⑦ Power Supply Cable

⑧ I/O Signal Cable

● The motor cable can also be connected directly to the driver without using a connection cable (Or a flexible connection cable).
● The maximum extension length between the motor and driver is 2 m (Including 0.5 m motor cable).
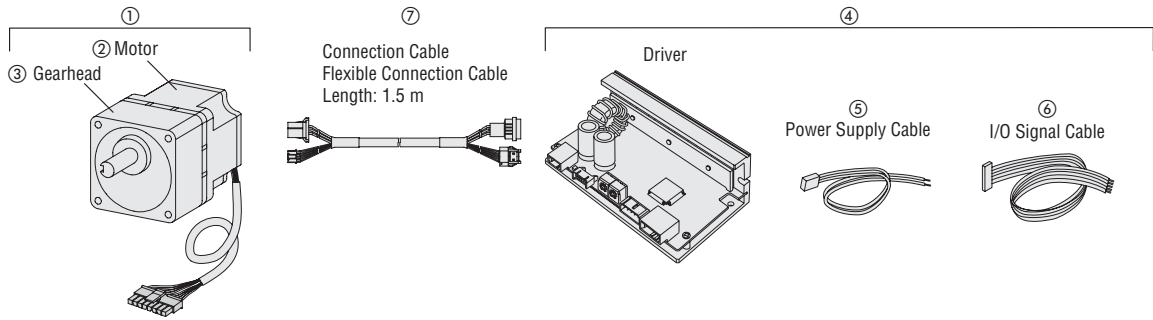
●Analog Setting Type

Output Power	Type	Brushless Motor			Driver	Connection Cable Flexible Connection Cable	Power Supply Cable and I/O Signal		
		Product Name	Component Product Name		Product Name	Product Name	Product Name	Component Product Name	
		①	②	③	④	⑤	⑥	⑦	⑧
15 W	Geared Type＊	BLHM015K-□	—	—	BLH2D15-K	CC02BLH CC02BLHR	LHS003CC	LH003C1	LH003C3
	Round Shaft Type	BLHM015K-A	—	—					
30 W	Parallel Shaft Gearhead **GFS** Gear	BLHM230K-□	BLHM230K-GFS	GFS2G□	BLH2D30-K	CC02BLH CC02BLHR	LHS003CC	LH003C1	LH003C3
	Hollow Shaft Flat Gearhead **FR** Gear	BLHM230K-□FR	BLHM230K-GFS	GFS2G□FR					
	Round Shaft Type	BLHM230K-A	—	—					
50 W	Parallel Shaft Gearhead **GFS** Gear	BLHM450K-□	BLHM450K-GFS	GFS4G□	BLH2D50-K	CC02BLH CC02BLHR	LHS003CC	LH003C1	LH003C3
	Hollow Shaft Flat Gearhead **FR** Gear	BLHM450K-□FR	BLHM450K-GFS	GFS4G□FR					
	Round Shaft Type	BLHM450K-A	—	—					

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

●Digital Setting Type

Output Power	Type	Brushless Motor			Driver	Connection Cable Flexible Connection Cable	Power Supply Cable and I/O Signal		
		Product Name	Component Product Name		Product Name	Product Name	Product Name	Component Product Name	
		①	②	③	④	⑤	⑥	⑦	⑧
15 W	Geared Type＊	BLHM015K-□	—	—	BLH2D15-KD	CC02BLH CC02BLHR	LHS003CD	LH003C1	LH003C4
	Round Shaft Type	BLHM015K-A	—	—					
30 W	Parallel Shaft Gearhead **GFS** Gear	BLHM230K-□	BLHM230K-GFS	GFS2G□	BLH2D30-KD	CC02BLH CC02BLHR	LHS003CD	LH003C1	LH003C4
	Hollow Shaft Flat Gearhead **FR** Gear	BLHM230K-□FR	BLHM230K-GFS	GFS2G□FR					
	Round Shaft Type	BLHM230K-A	—	—					
50 W	Parallel Shaft Gearhead **GFS** Gear	BLHM450K-□	BLHM450K-GFS	GFS4G□	BLH2D50-KD	CC02BLH CC02BLHR	LHS003CD	LH003C1	LH003C4
	Hollow Shaft Flat Gearhead **FR** Gear	BLHM450K-□FR	BLHM450K-GFS	GFS4G□FR					
	Round Shaft Type	BLHM450K-A	—	—					

＊The geared type has an integrated motor and gearhead. The combination of motor and gearhead cannot be changed.
● A number indicating the gear ratio is specified where the box □ is located within the product name.

●100 W

① Motor
② Motor
③ Gearhead

Connection Cable
Flexible Connection Cable
Length: 1.5 m

④ Driver

⑤ Power Supply Cable

⑥ I/O Signal Cable

●The motor cable can also be connected directly to the driver without using a connection cable (Or a flexible connection cable).
●The maximum extension length between the motor and driver is 2 m (Including 0.5 m motor cable).

●Analog Setting Type

Output Power	Type	Brushless Motor			Driver			Connection Cable Flexible Connection Cable
		Product Name	Component Product Name		Product Name	Power Supply Cable (Included)	I/O Signal Cable (Included)	Product Name
		①	②	③	④	⑤	⑥	⑦
100 W	Parallel Shaft Gearhead **GFS** Gear	**BLHM5100K-□**	BLHM5100K-GFS	GFS5G□	**BLHD100K**	LH003C2	LH003C3	**CC02AXH2 CC02BLH2R**
	Hollow Shaft Flat Gearhead **FR** Gear	**BLHM5100K-□FR**	BLHM5100K-GFS	GFS5G□FR				
	Round Shaft Type	**BLHM5100K-A**	—	—				

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

Parallel Shaft Gearhead **GFS** Gear

15 W, 30 W, 50 W, 100 W

■Specifications

<table>
<tr><td rowspan="3">Product Name</td><td>Motor</td><td>BLHM015K-□</td><td>BLHM230K-□</td><td>BLHM450K-□</td><td>BLHM5100K-□</td></tr>
<tr><td>Driver (Analog Setting Type)</td><td>BLH2D15-K</td><td>BLH2D30-K</td><td>BLH2D50-K</td><td>BLHD100K</td></tr>
<tr><td>Driver (Digital Setting Type)</td><td>BLH2D15-KD</td><td>BLH2D30-KD</td><td>BLH2D50-KD</td><td>—</td></tr>
<tr><td colspan="2">Rated Output Power (Continuous)   W</td><td>15</td><td>30</td><td>50</td><td>100</td></tr>
<tr><td rowspan="4">Power Supply Input</td><td>Rated Voltage   V</td><td colspan="4" align="center">DC 24</td></tr>
<tr><td>Permissible Voltage Range</td><td colspan="4" align="center">−10 to +10%</td></tr>
<tr><td>Rated Input Current   A</td><td>0.93</td><td>1.9</td><td>2.9</td><td>6.0</td></tr>
<tr><td>Maximum Input Current   A</td><td>2.3</td><td>4.1</td><td>5.4</td><td>9.8</td></tr>
<tr><td colspan="2">Rated Speed   r/min</td><td>3000</td><td colspan="3" align="center">2500</td></tr>
<tr><td colspan="2">Speed Control Range</td><td colspan="4" align="center">100 to 3000 r/min (Speed Ratio 30:1)
[80 to 3000 r/min (Speed Ratio 37.5:1) *]</td></tr>
<tr><td rowspan="3">Speed Regulation</td><td>Load</td><td colspan="4">±0.5% (±0.2%*) max. [0 to rated torque, at rated speed, at rated voltage, at normal temperature]</td></tr>
<tr><td>Voltage</td><td colspan="4">±0.5% (±0.2%*) max. [Rated voltage ±10%, at rated speed, with no load, at normal temperature]</td></tr>
<tr><td>Temperature</td><td colspan="4">±0.5% (±0.2%*) max. [Operating ambient temperature 0 to +50℃, at rated speed, with no load, at rated voltage]</td></tr>
</table>

*Digital setting (When **MEXE02** is used).
●The values correspond to each specification and characteristics of a stand-alone motor.

<table>
<tr><td colspan="3">Gear Ratio</td><td>5</td><td>10</td><td>15</td><td>20</td><td>30</td><td>50</td><td>100</td><td>200</td></tr>
<tr><td rowspan="5">Rotation Direction</td><td colspan="2">15 W</td><td colspan="3" align="center">Same direction as the motor</td><td colspan="2" align="center">Opposite direction to the motor</td><td colspan="2" align="center">Same direction as the motor</td><td>—</td></tr>
<tr><td colspan="2">30 W</td><td colspan="5" rowspan="4" align="center">Same direction as the motor</td><td colspan="2" rowspan="4" align="center">Opposite direction to the motor</td><td rowspan="4" align="center">Same direction as the motor</td></tr>
<tr><td colspan="2">50 W</td></tr>
<tr><td colspan="2">100 W</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="3">Output Shaft Speed [r/min]*</td><td colspan="2">80 r/min</td><td>16</td><td>8</td><td>5.3</td><td>4</td><td>2.7</td><td>1.6</td><td>0.8</td><td>0.4</td></tr>
<tr><td colspan="2">2500 r/min</td><td>500</td><td>250</td><td>167</td><td>125</td><td>83</td><td>50</td><td>25</td><td>12.5</td></tr>
<tr><td colspan="2">3000 r/min</td><td>600</td><td>300</td><td>200</td><td>150</td><td>100</td><td>60</td><td>30</td><td>15</td></tr>
<tr><td rowspan="7">Permissible Torque [N·m]</td><td>15 W</td><td>80 to 3000 r/min</td><td>0.22</td><td>0.43</td><td>0.65</td><td>0.83</td><td>1.2</td><td>1.9</td><td>2</td><td>—</td></tr>
<tr><td rowspan="2">30 W</td><td>80 to 2500 r/min</td><td>0.52</td><td>1.0</td><td>1.6</td><td>2.1</td><td>3.0</td><td>4.9</td><td>6</td><td>6</td></tr>
<tr><td>3000 r/min</td><td>0.43</td><td>0.86</td><td>1.3</td><td>1.7</td><td>2.5</td><td>4.1</td><td>6</td><td>6</td></tr>
<tr><td rowspan="2">50 W</td><td>80 to 2500 r/min</td><td>0.86</td><td>1.7</td><td>2.6</td><td>3.4</td><td>4.9</td><td>8.2</td><td>16</td><td>16</td></tr>
<tr><td>3000 r/min</td><td>0.72</td><td>1.4</td><td>2.1</td><td>2.9</td><td>4.1</td><td>6.8</td><td>13.7</td><td>16</td></tr>
<tr><td rowspan="2">100 W</td><td>100 to 2500 r/min</td><td>1.8</td><td>3.6</td><td>5.4</td><td>7.2</td><td>10.3</td><td>17.2</td><td>30</td><td>30</td></tr>
<tr><td>3000 r/min</td><td>0.90</td><td>1.8</td><td>2.7</td><td>3.6</td><td>5.2</td><td>8.6</td><td>17.2</td><td>30</td></tr>
<tr><td rowspan="7">Permissible Radial Load [N]</td><td rowspan="4">10 mm from Output Shaft End</td><td>15 W</td><td colspan="8" align="center">50</td></tr>
<tr><td>30 W</td><td colspan="2" align="center">100</td><td colspan="2" align="center">150</td><td colspan="4" align="center">200</td></tr>
<tr><td>50 W</td><td colspan="2" align="center">200</td><td colspan="2" align="center">300</td><td colspan="4" align="center">450</td></tr>
<tr><td>100 W</td><td colspan="2" align="center">300</td><td colspan="2" align="center">400</td><td colspan="4" align="center">500</td></tr>
<tr><td rowspan="3">20 mm from Output Shaft End</td><td>30 W</td><td colspan="2" align="center">150</td><td colspan="2" align="center">200</td><td colspan="4" align="center">300</td></tr>
<tr><td>50 W</td><td colspan="2" align="center">250</td><td colspan="2" align="center">350</td><td colspan="4" align="center">550</td></tr>
<tr><td>100 W</td><td colspan="2" align="center">400</td><td colspan="2" align="center">500</td><td colspan="4" align="center">650</td></tr>
<tr><td rowspan="4">Permissible Axial Load [N]</td><td colspan="2">15 W</td><td colspan="8" align="center">30</td></tr>
<tr><td colspan="2">30 W</td><td colspan="8" align="center">40</td></tr>
<tr><td colspan="2">50 W</td><td colspan="8" align="center">100</td></tr>
<tr><td colspan="2">100 W</td><td colspan="8" align="center">150</td></tr>
<tr><td rowspan="8">Permissible Inertia J [×10⁻⁴kg·m²]</td><td colspan="2">15 W</td><td>3</td><td>14</td><td>30</td><td>50</td><td>120</td><td>300</td><td>600</td><td>—</td></tr>
<tr><td colspan="2">30 W</td><td>12</td><td>50</td><td>110</td><td>200</td><td>370</td><td>920</td><td>2500</td><td>5000</td></tr>
<tr><td colspan="2">50 W</td><td>22</td><td>95</td><td>220</td><td>350</td><td>800</td><td>2200</td><td>6200</td><td>12000</td></tr>
<tr><td colspan="2">100 W</td><td>45</td><td>190</td><td>420</td><td>700</td><td>1600</td><td>4500</td><td>12000</td><td>25000</td></tr>
<tr><td rowspan="4">When Instantaneous Stop or Bi-Directional Operation is performed.</td><td>15 W</td><td>0.4</td><td>1.7</td><td>3.9</td><td>7.0</td><td>15.7</td><td colspan="2" align="center">43.7</td><td>—</td></tr>
<tr><td>30 W</td><td>1.55</td><td>6.2</td><td>14.0</td><td>24.8</td><td>55.8</td><td colspan="3" align="center">155</td></tr>
<tr><td>50 W</td><td>5.5</td><td>22</td><td>49.5</td><td>88</td><td>198</td><td colspan="3" align="center">550</td></tr>
<tr><td>100 W</td><td>25</td><td>100</td><td>225</td><td>400</td><td>900</td><td colspan="3" align="center">2500</td></tr>
</table>

*The output shaft speed is calculated by dividing the speed by the gear ratio.

◇Load Position
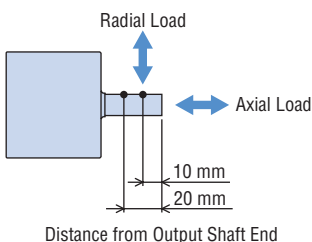
Radial Load
Axial Load
10 mm
20 mm
Distance from Output Shaft End

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

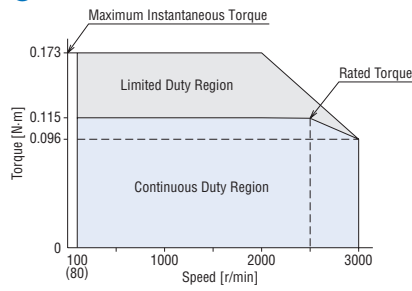# ■Speed - Torque Characteristics

Continuous Duty Region: Continuous operation is possible in this region.
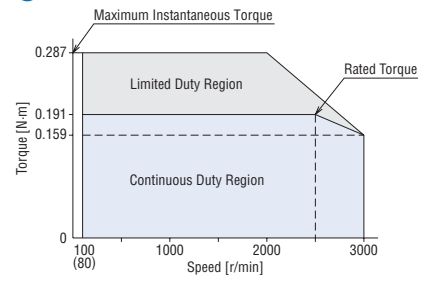Limited Duty Region: This region is primarily used when accelerating.
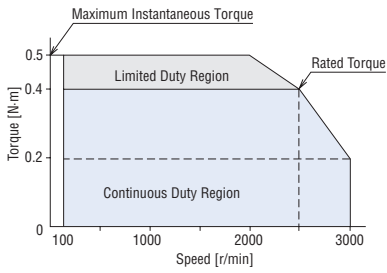
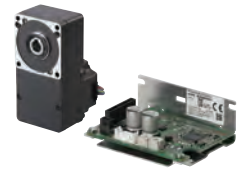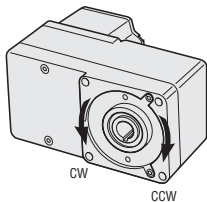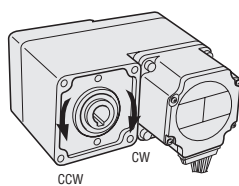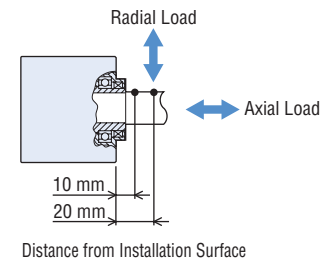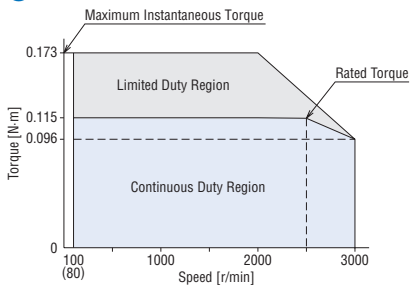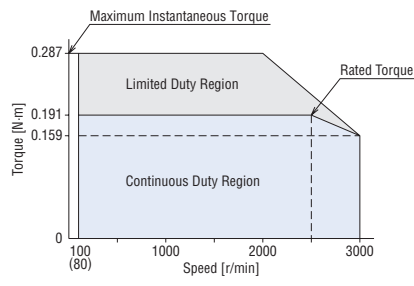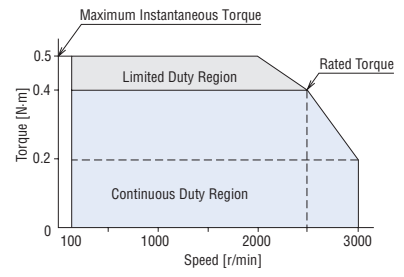●15 W

●30 W

●50 W
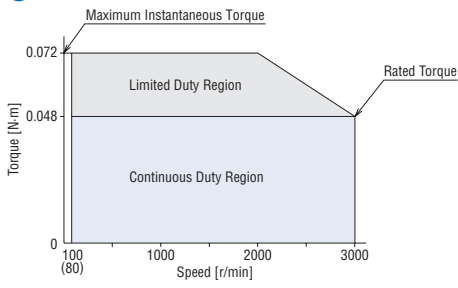
●100 W

●The values correspond to each specification and characteristic of the stand-alone motor at 24 VDC with no extension cable.

Hollow Shaft Flat Gearhead **FR** Gear

30 W, 50 W, 100 W

■Specifications

Product Name	Motor		BLHM230K-□FR	BLHM450K-□FR	BLHM5100K-□FR
	Driver (Analog Setting Type)		BLH2D30-K	BLH2D50-K	BLHD100K
	Driver (Digital Setting Type)		BLH2D30-KD	BLH2D50-KD	—
Rated Output Power (Continuous)		W	30	50	100
Power Supply Input	Rated Voltage	V	DC 24		
	Permissible Voltage Range		−10 to +10%		
	Rated Input Current	A	1.9	2.9	6.0
	Maximum Input Current	A	4.1	5.4	9.8
Rated Speed		r/min	2500		
Speed Control Range			100 to 3000 r/min (Speed Ratio 30:1) [80 to 3000 r/min (Speed Ratio 37.5:1)✽]		
Speed Regulation	Load		±0.5% (±0.2%✽) max. [0 to rated torque, at rated speed, at rated voltage, at normal temperature]		
	Voltage		±0.5% (±0.2%✽) max. [Rated voltage ± 10%, at rated speed, with no load, at normal temperature]		
	Temperature		±0.5% (±0.2%✽) max. [Operating ambient temperature 0 to +50℃, at rated speed, with no load, at rated voltage]		

✽Digital setting (When **MEXE02** is used).
●The values correspond to each specification and characteristics of a stand-alone motor.

Gear Ratio			5	10	15	20	30	50	100	200
Output Shaft Speed [r/min]✽1		80 r/min	16	8	5.3	4	2.7	1.6	0.8	0.4
		2500 r/min	500	250	167	125	83	50	25	12.5
		3000 r/min	600	300	200	150	100	60	30	15
Permissible Torque [N·m]	30 W	80 to 2500 r/min	0.46	0.98	1.5	2.0	2.9	4.9	9.8	17
		3000 r/min	0.38	0.82	1.2	1.6	2.4	4.1	8.2	16.3
	50 W	80 to 2500 r/min	0.81	1.6	2.4	3.2	4.9	8.1	16.2	32.5
		3000 r/min	0.68	1.4	2.0	2.7	4.1	6.8	13.5	27
	100 W	100 to 2500 r/min	1.7	3.4	5.1	6.8	10.2	17	34	68
		3000 r/min	0.85	1.7	2.6	3.4	5.1	8.5	17	34
Permissible Radial Load [N]✽2	10 mm from Installation Surface	30 W	450		500					
		50 W	800		1200					
		100 W	900		1300		1500			
	20 mm from Installation Surface	30 W	370		400					
		50 W	660		1000					
		100 W	770		1110		1280			
Permissible Axial Load [N]		30 W	200							
		50 W	400							
		100 W	500							
Permissible Inertia J [×10⁻⁴kg·m²]		30 W	12	50	110	200	370	920	2500	5000
		50 W	22	95	220	350	800	2200	6200	12000
		100 W	45	190	420	700	1600	4500	12000	25000
	When Instantaneous Stop or Bi-Directional Operation is performed.	30 W	1.55	6.2	14.0	24.8	55.8	155		
		50 W	5.5	22	49.5	88	198	550		
		100 W	25	100	225	400	900	2500		

✽1 The output shaft speed is calculated by dividing the speed by the gear ratio.
✽2 The radial load at each distance can be calculated with a formula.

◇Rotation Direction
●Front View   ●Rear View

◇Load Position

Distance from Installation Surface

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

■Speed - Torque Characteristics

Continuous Duty Region: Continuous operation is possible in this region.
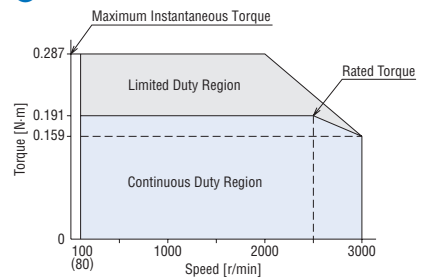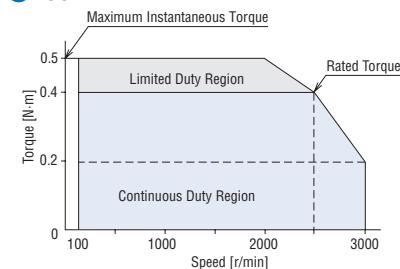Limited Duty Region: This region is primarily used when accelerating.

●30 W

●50 W

●100 W

●The values correspond to each specification and characteristic of the stand-alone motor at 24 VDC with no extension cable.

Round Shaft 15 W, 30 W, 50 W, 100 W

■Specifications

Product Name	Motor		BLHM015K-A	BLHM230K-A	BLHM450K-A	BLHM5100K-A
	Driver (Analog Setting Type)		BLH2D15-K	BLH2D30-K	BLH2D50-K	BLHD100K
	Driver (Digital Setting Type)		BLH2D15-KD	BLH2D30-KD	BLH2D50-KD	—
Rated Output Power (Continuous)		W	15	30	50	100
Power Supply Input	Rated Voltage	V	DC 24			
	Permissible Voltage Range		−10 to +10%			
	Rated Input Current	A	0.93	1.9	2.9	6.0
	Maximum Input Current	A	2.3	4.1	5.4	9.8
Rated Speed		r/min	3000	2500		
Speed Control Range			100 to 3000 r/min (Speed Ratio 30:1) [80 to 3000 r/min (Speed Ratio 37.5:1) *]			
Rated Torque		N·m	0.048	0.115	0.191	0.4
Maximum Instaneous Torque		N·m	0.072	0.173	0.287	0.5
Permissible Radial Load	10 mm from Output Shaft End	N	50	70	120	160
	20 mm from Output Shaft End	N	—	100	140	170
Permissible Axial Load			Half of the motor mass or less			
Rotor Inertia J		×10⁻⁴kg·m²	0.032	0.087	0.23	0.61
Permissible Inertia J		×10⁻⁴kg·m²	0.5	1.8	3.3	5.6
Speed Regulation	Load		±0.5% (±0.2%*) max. [0 to rated torque, at rated speed, at rated voltage, at normal temperature]			
	Voltage		±0.5% (±0.2%*) max. [Rated voltage ±10%, at rated speed, with no load, at normal temperature]			
	Temperature		±0.5% (±0.2%*) max. [Operating ambient temperature 0 to +50℃ , at rated speed, with no load, at rated voltage]			

*Digital setting (When **MEXE02** is used).

◇**Load Position**
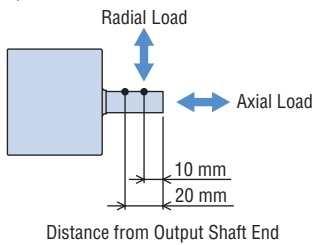
Distance from Output Shaft End

■Speed - Torque Characteristics

Continuous Duty Region: Continuous operation is possible in this region.
Limited Duty Region: This region is primarily used when accelerating.

●15 W

●30 W

●50 W
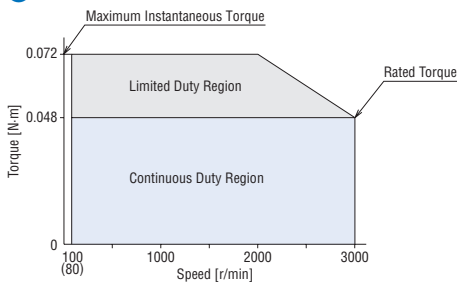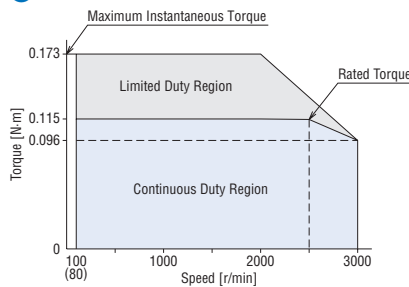
●100 W

●The values correspond to each specification and characteristic of the stand-alone motor at 24 VDC with no extension cable.

■ Common Specifications

Item		Specifications	
Driver Type		Analog Setting Type	Digital Setting Type
Operation Setting		2-speed operation is possible.	Operating data for up to 8 speeds can be set. ※ When the following settings are digital (i.e. using the **MEXE02** support software).
Speed	Setting Range	100 to 3000 r/min (Factory setting: 0 r/min)	80 to 3150 r/min (Factory setting: 80 r/min)
	Setting Method	· External speed potentiometer or external DC voltage: 0 to 5 VDC, 1 mA min.*1 · VR1	· Digital (**MEXE02** support software) · External analog setting device (External speed potentiometer or external DC voltage) or PWM input · VR1 · VR2
Acceleration/ Deceleration	Setting Range	15 W, 30 W, 50 W: 0.1 to 12.0 s (Factory setting: 0.1 s) 100 W: 0.5 to 10 s (Factory setting: 0.5 s) Acceleration / deceleration time is a common setting	0.1 to 15.0 s (Factory setting: 0.5 s)
	Setting Method	· VR2	· Digital (**MEXE02** support software) · VR1 · VR2
Torque Limiting*2	Setting Range		0 to 200% (Factory setting: 200%)
	Setting Method	—	· Digital (**MEXE02** support software) · External analog setting device (External speed potentiometer or external DC voltage) or PWM input · VR1 · VR2
Input Signals		C-MOS Negative Logic Input 15 W, 30 W, 50 W: START/STOP, RUN/BRAKE, FWD/REV, M0, ALM-RST 100 W: START/STOP, RUN/BRAKE, CW/CCW, INT.VR/EX, ALARM-RESET	C-MOS Negative Logic Input Arbitrary signal assignment to DIN0 to DIN5 input (6 points) is possible. [ ]: Default setting [START/STOP], [RUN/BRAKE], [FWD/REV], [M0], [M1], [ALM-REST], M2, TL, INFO-CLR, HMI, EXT-ERROR
Output Signals		Transistor and open-collector output 15 W, 30 W, 50 W: SPEED-OUT, ALM-B 100 W: SPEED, ALARM	Transistor and open-collector output Arbitrary signal assignment to DOUT0, DOUT1, DOUT2, and DOUT3 (4 points) is possible. [ ]: Default setting [SPEED-OUT], [ALM-B], [TLC], [DIR], ALM-A, MOVE, INFO, VA, individual output for information
Protective Function*3		When the alarm sounds, the ALM-B output (ALARM output) shuts OFF. At the same time, the motor stops, and the PWR/ALM LED (POWER/ALARM LED) flashes red. The type of alarm can be confirmed by the number of times the LED flashes.	When the alarm sounds, the ALM-A output turns ON (Normally open), and the ALM-B output shuts OFF (Normally closed). At the same time, the motor stops and the PWR/ALM LED flashes red. The type of alarm can be confirmed by the number of times the LED flashes and with the **MEXE02** support software.
		15 W, 30 W, 50 W: Overload (2 times), Sensor error, Initial sensor error (3 times), Overvoltage (4 times), Undervoltage (5 times), Overspeed (6 times), Overcurrent (7 times), EEPROM error (8 times), Main circuit overheat (9 times), CPU error (Illuminated) 100 W: Overload (2 times), Sensor error (3 times), Overvoltage (4 times), Undervoltage (5 times), Overspeed (6 times)	Overload (2 times), Sensor error, Initial sensor error (3 times), Overvoltage (4 times), Undervoltage (5 times), Overspeed (6 times), Overcurrent (7 times), EEPROM error (8 times), Main circuit overheat (9 times), External stop (10 times), Initial operation inhibition (11 times), CPU error (Illuminated)
Information		—	The information monitor displays the settings for the **MEXE02** support software. When the information appears, the INFO output turns on and the PWR/ALM LED flashes orange. The motor continues to operate.
Maximum Extension Length		Motor and driver distance: 2 m [When a connection cable (Sold separately) is used]	
Time Rating		Continuous	

*1 External DC current input impedance is approximately 47 kΩ.

*2 Torque limiting occurs when the difference between the set and generated values of torque is max. ±20% due to the setting speed, power supply voltage and motor cable extension length (At rated torque and rated speed).

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

■ General Specifications

Item		Motor	Driver
Insulation Resistance		100 MΩ or more when 500 VDC megger is applied between the windings and the case after continuous operation under normal ambient temperature and humidity.	100 MΩ or more when 500 VDC megger is applied between the power supply input and the heat sink after continuous operation under normal ambient temperature and humidity.
Dielectric Strength		Sufficient to withstand 0.5 kVAC at 50 Hz applied between the windings and the case for 1 minute after continuous operation under normal ambient temperature and humidity.	Sufficient to withstand 0.5 kVAC at 50 Hz applied between the power supply input and the heat sink for 1 minute after continuous operation under normal ambient temperature and humidity.
Temperature Rise		The temperature rise of the windings is 50°C or less and that of the case surface is 40°C or less[*1], measured by the thermocouple method after continuous operation under normal ambient temperature and humidity.	The temperature rise of the heat sink is 50°C or less, measured by the thermocouple method after continuous operation under normal ambient temperature and humidity.
Operating Environment	Ambient Temperature	0 to +50°C (Non-freezing)	
	Ambient Humidity	85% or less (Non-condensing)	
	Altitude	Up to 1000 m above sea level	
	Atmosphere	No corrosive gases or dust. Cannot be used in a radioactive area, magnetic field, vacuum, or other special environments.	
	Vibration	Must not be subjected to continuous vibration or excessive shock.　Conforms to JIS C 60068-2-6,　"Sine-Wave Vibration Test Method" Frequency Range: 10 to 55 Hz　Half Amplitude: 0.15 mm　Sweep Direction: 3 Directions (X, Y, and Z)　Number of Sweeps: 20 Times	
Storage Conditions[*2]	Ambient Temperature	−25 to +70°C (Non-freezing)	
	Ambient Humidity	85% or less (Non-condensing)	
	Altitude	Up to 3000 m above sea level	
	Atmosphere	No corrosive gases or dust. Not exposed to water and oil. Cannot be used in a radioactive area, magnetic field, vacuum, or other special environments.	
Insulation Class		UL/CSA Standards: 105 (A), EN Standards: 120 (E)	−
Degree of Protection		IP40	IP00

*1 Install the round shaft type motor to a heat sink (Material: aluminum) of one of the following sizes to maintain a motor case surface temperature of 90°C or less. (15 W type is excluded.)
　30 W type: 115×115 mm thickness 5 mm, 50 W type: 135×135 mm thickness 5 mm, 100 W type: 200×200 mm thickness 5 mm
*2 The storage condition applies to short periods such as the period during transportation.

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

■Dimensions (Unit: mm)

● "Installation screws" are included with the parallel shaft gearhead. Installation screws → Page 25
● A number indicating the gear ratio is specified where the box □ is located within the product name.

●Motor

◇Geared Type 15 W

BLHM015K-□

Mass: 0.5 kg

`2D CAD` A428
`3D CAD`

4×M4×8 Deep

Motor Leads 500 mm
UL Style 3265, AWG24

Tube φ6

Housing: 43645-0800 (Molex)
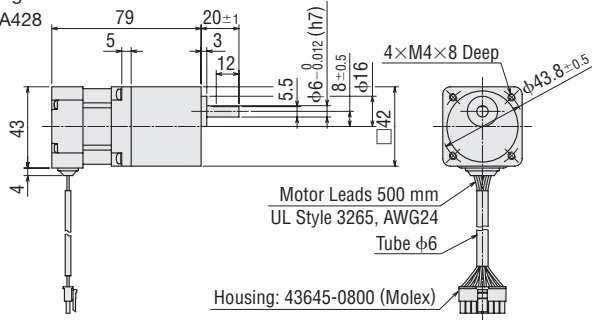
◇Round Shaft Type 15 W

BLHM015K-A

Mass: 0.25 kg

`2D CAD` A429
`3D CAD`

4×φ3.5 Thru

Motor Leads 500 mm
UL Style 3265, AWG24

Tube φ6

Housing: 43645-0800 (Molex)
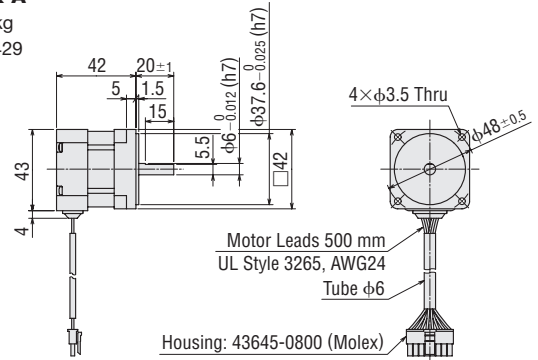
◇Parallel Shaft Gearhead **GFS** Gear 30 W

`2D & 3D CAD`

Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass kg	2D CAD
BLHM230K-□	BLHM230K-GFS	GFS2G□	**5** to **20**	34	1.0	A430A
			30 to **100**	38		A430B
			200	43		A430C

4×φ4.5 Thru

Motor Leads 500 mm
UL Style 3266, AWG22

Tube φ8

Housing: 43645-0800 (Molex)

◇Key and Key Slot (Included)

A−A
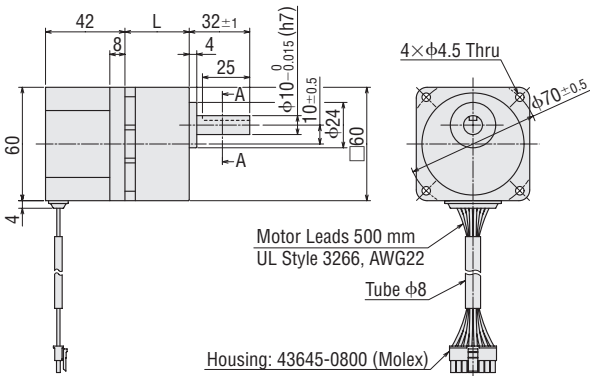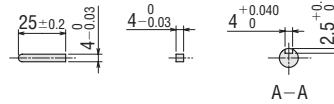
◇Hollow Shaft Flat Gearhead **FR** Gear 30 W

BLHM230K-□FR

Motor: BLHM230K-GFS
Gearhead: GFS2G□FR
Mass: 1.3 kg

`2D CAD` A431
`3D CAD`

4×φ5.5 Thru

Tube φ8

Motor Leads 500 mm
UL Style 3266, AWG22

Housing: 43645-0800 (Molex)

◇Key (Included)

A−A
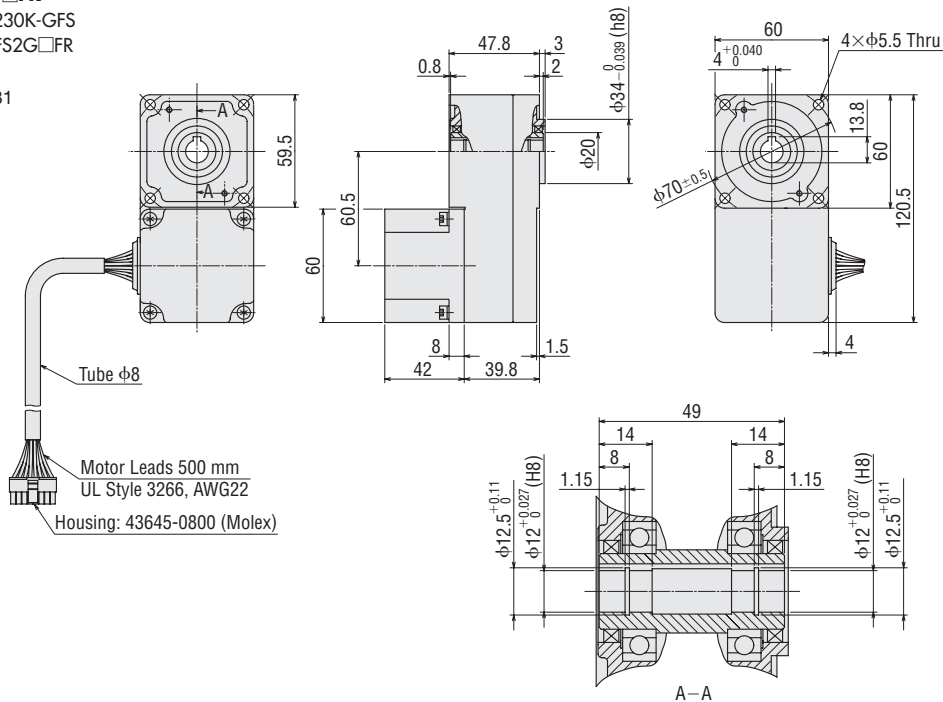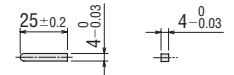
◇ Round Shaft Type 30 W

BLHM230K-A

Mass: 0.5 kg

2D CAD A432　3D CAD

Motor Leads 500 mm
UL Style 3266, AWG22

Tube φ8

Housing: 43645-0800 (Molex)
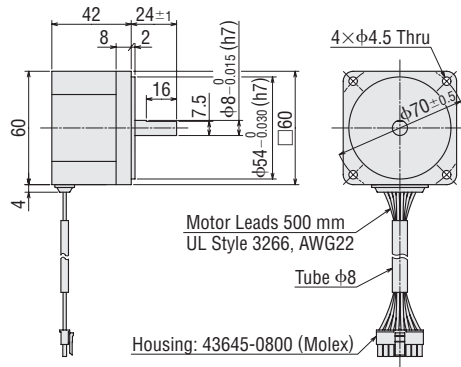
◇ Parallel Shaft Gearhead **GFS** Gear 50 W

2D & 3D CAD

Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio		L	Mass kg	2D CAD
BLHM450K-☐	BLHM450K-GFS	GFS4G☐	**5** to **20**		41		A433A
			30 to **100**		46	1.8	A433B
			200		51		A433C

◇ **Key and Key Slot (Included)**

M5×10 Deep　4×φ6.5 Thru

Motor Leads 500 mm
UL Style 3266, AWG22

Tube φ8

Housing: 43645-0800 (Molex)

A－A
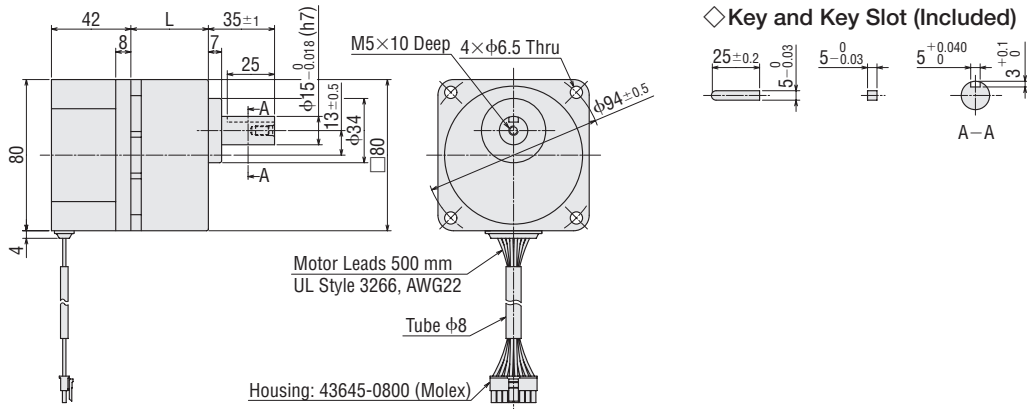
◇ Hollow Shaft Flat Gearhead **FR** Gear 50 W

BLHM450K-☐FR

Motor: BLHM450K-GFS
Gearhead: GFS4G☐FR
Mass: 2.4 kg

2D CAD A434　3D CAD

4×φ6.5 Thru

Tube φ8

Motor Leads 500 mm
UL Style 3266, AWG22

Housing: 43645-0800 (Molex)

◇ **Key (Included)**

A－A

21
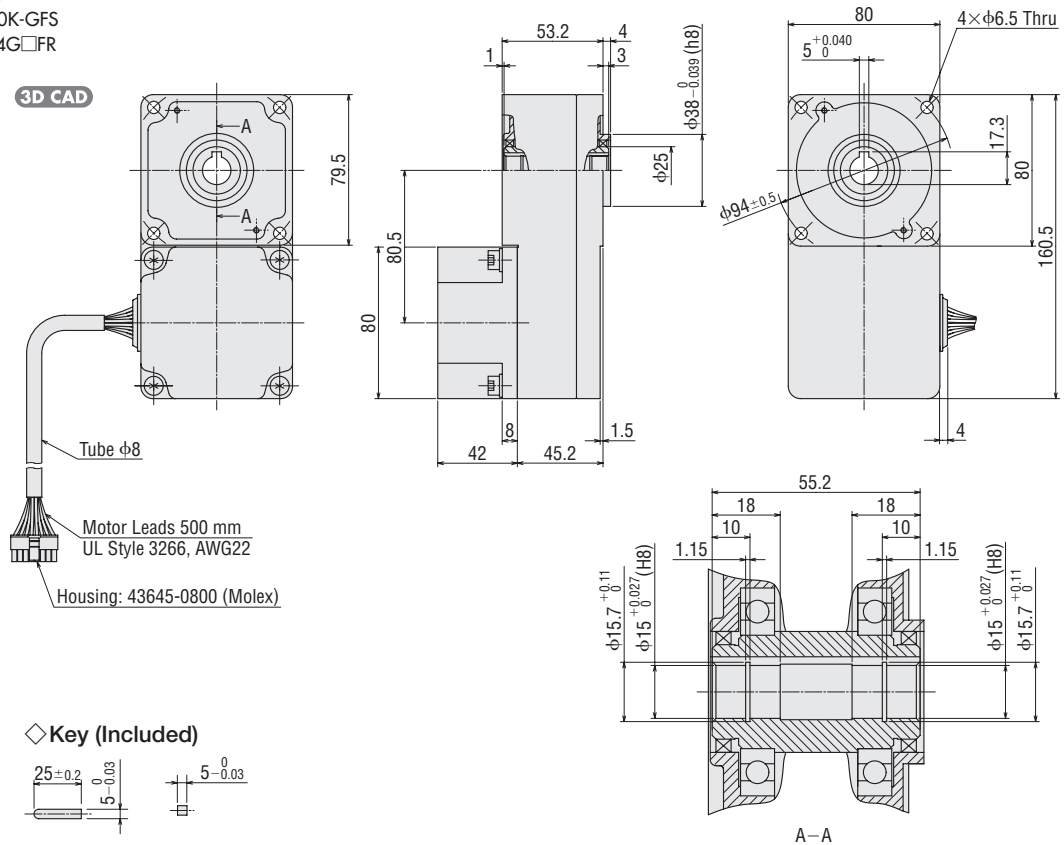
◇Round Shaft Type 50 W

BLHM450K-A

Mass: 0.8 kg

`2D CAD` A435　`3D CAD`

4×φ6.5 Thru

Motor Leads 500 mm
UL Style 3266, AWG22

Tube φ8

Housing: 43645-0800 (Molex)
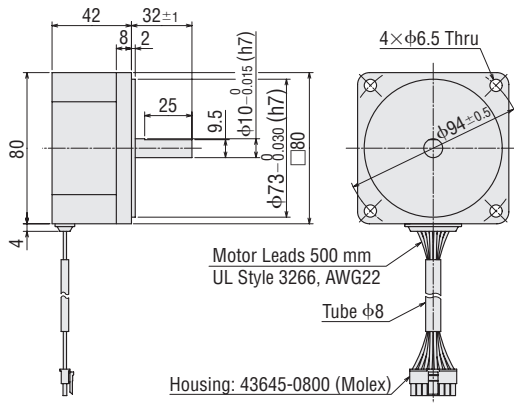
◇Parallel Shaft Gearhead **GFS** Gear 100 W

`2D & 3D CAD`

Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass kg	2D CAD
BLHM5100K-□	BLHM5100K-GFS	GFS5G□	**5** to **20**	45	2.9	A436A
			30 to **100**	58		A436B
			200	64		A436C

M6×12 Deep

4×φ8.5 Thru

Tube φ9

Motor Leads 500 mm
UL Style 3266, AWG22

Motor Leads 500 mm
UL Style 3266, AWG18

Housing: 1-178288-3 (TE Connectivity)

Housing: 51103-0500 (Molex)

◇Key and Key Slot (Included)

A−A
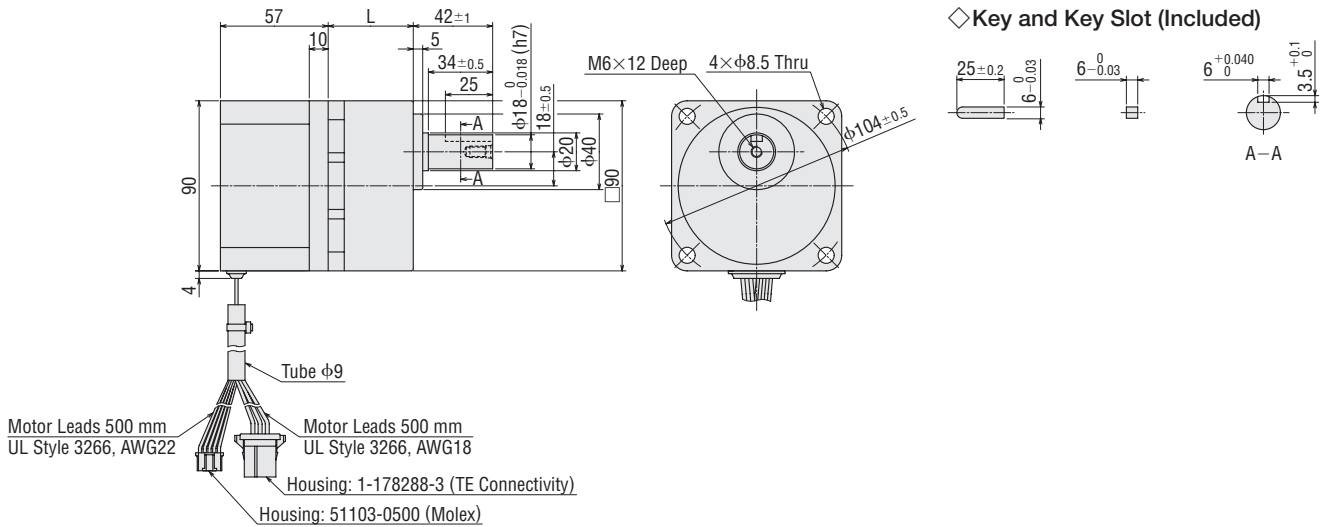
◇**Hollow Shaft Flat Gearhead FR Gear 100 W**

BLHM5100K-□FR

Motor: BLHM5100K-GFS
Gearhead: GFS5G□FR
Mass: 3.6 kg

`2D CAD` A437 `3D CAD`

Tube φ9

Motor Leads 500 mm
UL Style 3266, AWG18
Housing: 1-178288-3 (TE Connectivity)

Motor Leads 500 mm
UL Style 3266, AWG22
Housing: 51103-0500 (Molex)

89

65.2 4
1 3

$\phi 50_{-0.039}^{0}$ (h8)

$\phi 30$

90

90

90

57 10 55.2 2

90

$6_{0}^{+0.040}$

4×φ8.5 Thru

22.8
90

180

$\phi 104 \pm 0.5$

4

A−A

67.2
22 22
13 13
1.15 1.15

$\phi 21_{0}^{+0.21}$
$\phi 20_{-0.033}^{+0.033}$ (H8)

$\phi 20_{-0.033}^{+0.033}$ (H8)
$\phi 21_{0}^{+0.21}$

◇**Key (Included)**

25±0.2
$6_{-0.03}^{0}$
$6_{-0.03}^{0}$
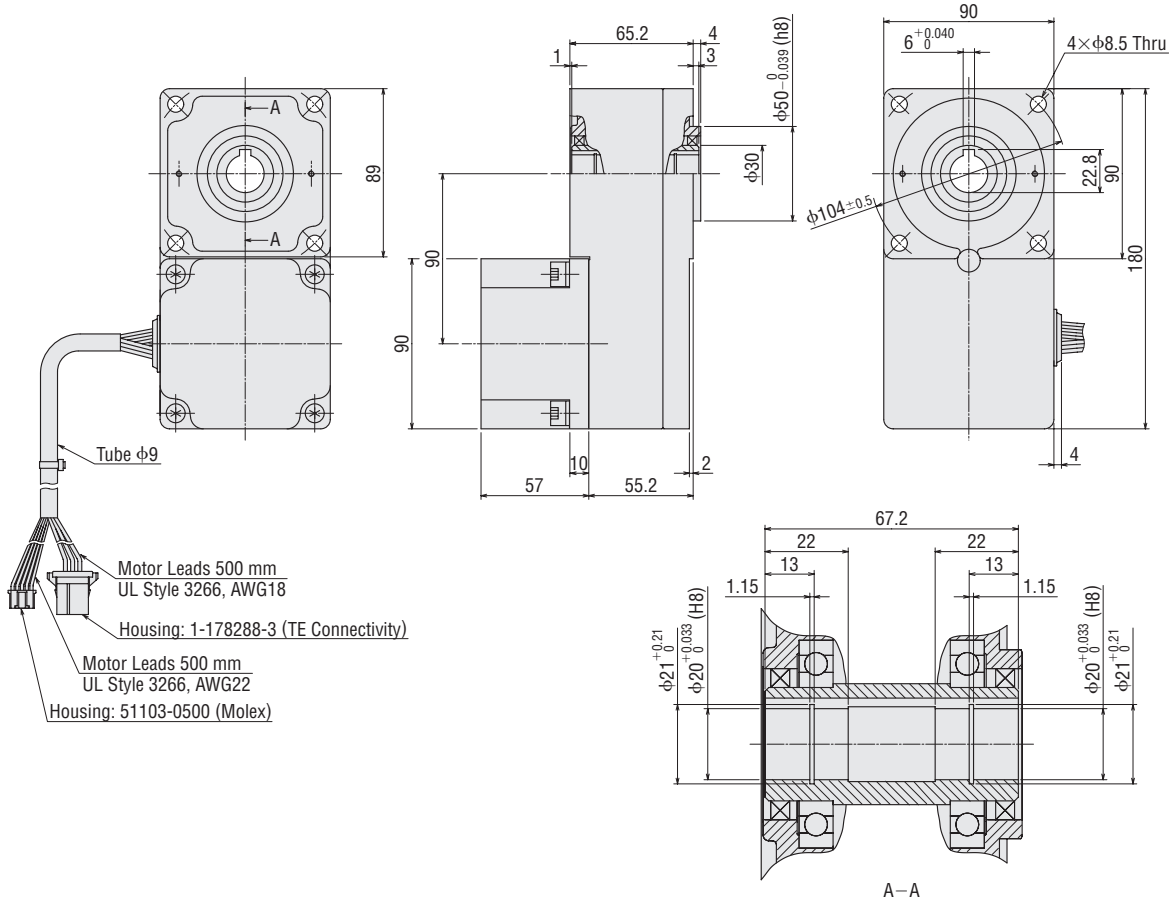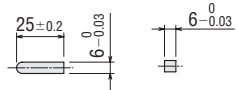
◇**Round Shaft Type 100 W**

BLHM5100K-A

Mass: 1.4 kg

`2D CAD` A438 `3D CAD`

57 37±1
10 2

30
11.5

$\phi 12_{-0.018}^{0}$ (h7)

$\phi 83_{-0.035}^{0}$ (h7)

□90

90

4

Tube φ9

4×φ8.5 Thru

$\phi 104 \pm 0.5$

Motor Leads 500 mm
UL Style 3266, AWG22

Motor Leads 500 mm
UL Style 3266, AWG18

Housing: 1-178288-3 (TE Connectivity)
Housing: 51103-0500 (Molex)

23
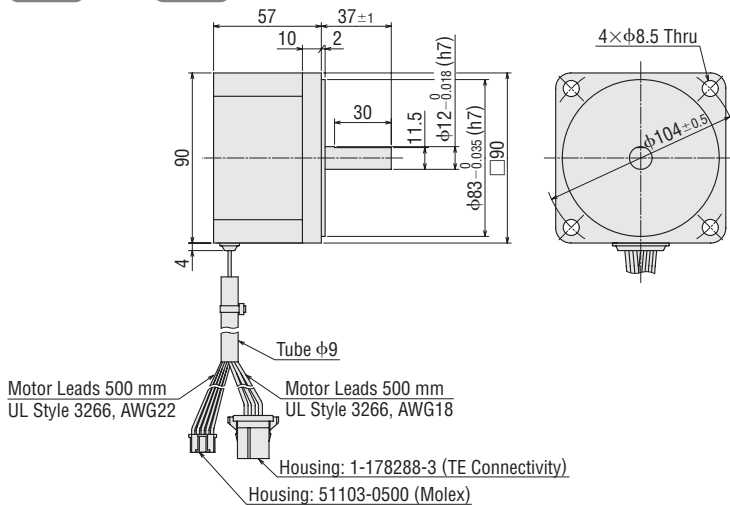
● Driver

◇ **15 W, 30 W, 50 W**

BLH2D15-K, BLH2D30-K, BLH2D50-K
BLH2D15-KD, BLH2D30-KD, BLH2D50-KD

Mass: 46 g

Analog Setting Type: **2D CAD** A1678 **3D CAD**
Digital Setting Type: **2D CAD** A1679 **3D CAD**

72 max.
63±0.2
4
6
55 max.
34.5±0.2
2×φ3.5 Thru
Digital Setting Type Only
(50)
3.5
64±0.2
3.5
27 max.
22±0.2
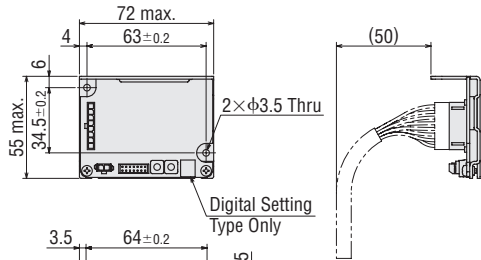
◇ **100 W**

BLHD100K

Mass: 0.3 kg
2D CAD A440 **3D CAD**

131 max.
121±0.5
4.5
71 max.
47±0.5
2×φ3.5 Thru
10 max.
17 max.
4.5
(50)
3.5
123±0.5
37.5 max.
18±0.5
3.5
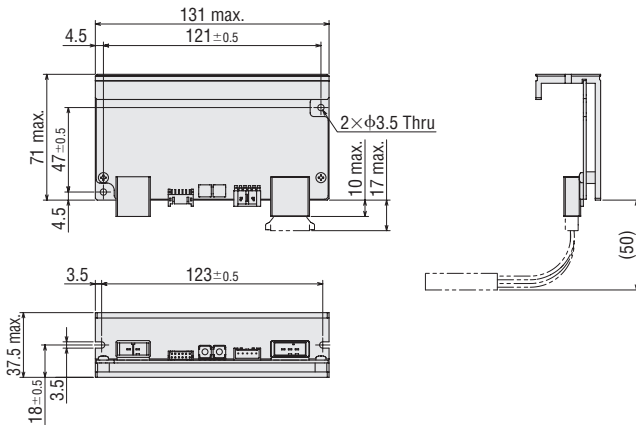
● Connection Cable, Flexible Connection Cable

◇ **15 W, 30 W, 50 W**

CC02BLH / CC02BLHR

1500
(7.6)
5.3
Housing: 43645-0800 (Molex)
Housing: 43640-0801 (Molex)
5.8
3.86
24.85
24.85
Driver Side
CC02BLH: φ9
CC02BLHR: φ8.5
Motor Side

◇ **100 W**

CC02AXH2 / CC02BLH2R

1500
7.15
Housing: 1-178288-3 (TE Connectivity)
Housing: 1-177648-3 (TE Connectivity)
12.7
(26.76)
16.7
25.57
14.7
(7.5)
21.7
Driver Side
CC02AXH2: φ9
CC02BLH2R: φ10
7.8
Housing: 51103-0500 (Molex)
Housing: 51198-0500 (Molex)
Motor Side
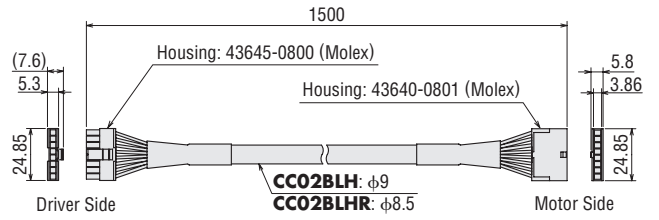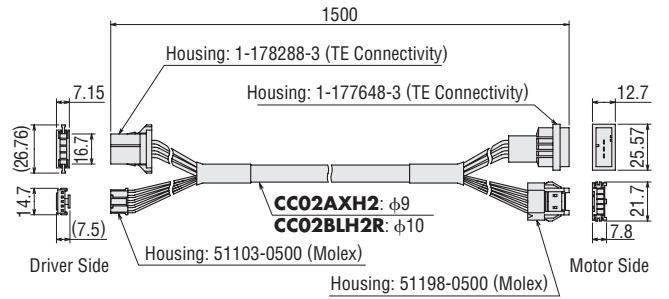
● Power Supply Cable and I/O Signal Cable Set

(For 15 W, 30 W, 50 W)

Driver Type	Product Name	Component Product Name	
		Power Supply Cable	I/O Signal Cable
Analog Setting Type	**LHS003CC**	LH003C1	LH003C3
Digital Setting Type	**LHS003CD**	LH003C1	LH003C4

◇ **Power Supply Cable**

LH003C1

300
Housing: 43645-0200 (MOLEX)
Leads UL Style 3266, AWG22

◇ **I/O Signal Cable**

LH003C3/LH003C4

300
Housing: LH003C3 PHDR-12VS (JST)
LH003C4 PHDR-14VS (JST)
Leads UL Style 1007, AWG26
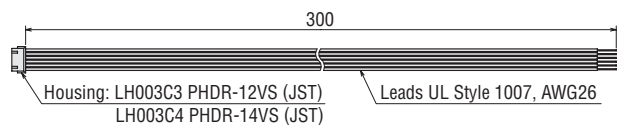
● Power Supply Cable (For 100 W, Included)

LH003C2

300
Leads UL Style 3266, AWG18
Housing: 1-178128-2 (TE Connectivity)
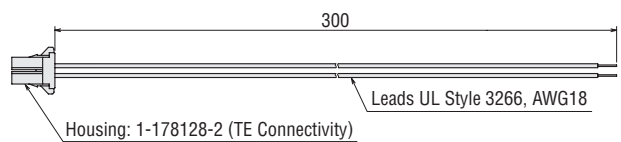
● I/O Signal Cable (For 100 W, Included)

LH003C3

300
Leads UL Style 1007, AWG26
Housing: PHDR-12VS (JST)
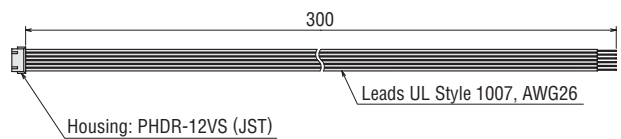
●Dimensions for Installation Screws

L2 is the dimension when a plain washer and a spring washer are mounted on the screw head side.

◇Parallel Shaft Gearhead
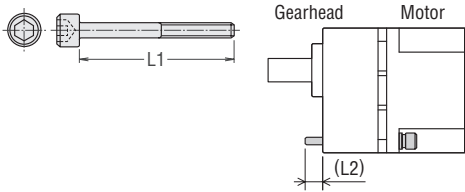
Product Name	Gear Ratio	Installation Screws		L2 (mm)
		Screw Size	L1 (mm)	
GFS2G□	5 to 20	M4	50	6
	30 to 100		55	7
	200		60	7
GFS4G□	5 to 20	M6	65	13
	30 to 100		70	13
	200		75	13
GFS5G□	5 to 20	M8	75	16.5
	30 to 100		90	18.5
	200		95	17.5

●Installation Screws: 4 each pieces of flat washers, spring washers, and hexagonal nuts are included.

◇Hollow Shaft Flat Gearhead

Gearhead   Motor
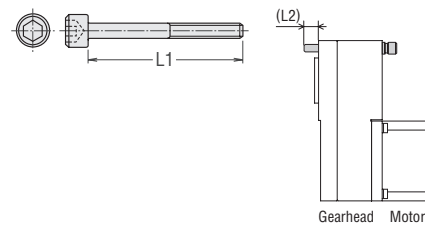
Product Name	Gear Ratio	Installation Screws		L2 (mm)
		Screw Size	L1 (mm)	
GFS2G□FR	5 to 200	M5	65	15
GFS4G□FR	5 to 200	M6	70	14
GFS5G□FR	5 to 200	M8	90	21

●Installation Screws: 4 each pieces of flat washers, spring washers, and hexagonal nuts are included.

■Connection and Operation   Analog Setting Type (15 W, 30 W, 50 W)

●Names and Functions of Driver Parts

Motor Connector (CN3)

Power Supply Connector (CN1)

LED (PWR/ALM)

I/O Signal Connector (CN2)

Internal Potentiometer 1 (VR1)

Internal Potentiometer 2 (VR2)

Name	Indication	Description		
Power Supply Connector	CN1	Connects the power supply cable.		
I/O Signal Connector	CN2	Connects the I/O signal cable to connect with an external control device.		
Motor Connector	CN3	Connects the motor cable.		
LED	PWR/ALM	Green	Lit in green while the power is supplied.	
		Red (LED Blinks)	If an alarm is generated, this LED will blink in red. The generated alarm content can be checked by counting the number of times the LED blinks.	
Internal Potentiometer	VR1	Uses to set the speed (M0 input: ON)		
	VR2	Uses to set the acceleration time and deceleration time.		

◇I/O Signal Connector (CN2)

Pin No.	Color of Lead Wire	Terminal Name	Signal Name	Description
12	—	—	—	N.C. (No Connection.)
11	Black	DIN0	START/STOP	These signals are used to operate the motor. The motor rotates according to the acceleration time when both the START/STOP input and the RUN/BRAKE input are turned ON. If the START/STOP input is turned OFF, the motor stops according to the deceleration time. If the RUN/BRAKE input is turned OFF, the motor stops instantaneously.
10	White	DIN1	RUN/BRAKE	
9	Gray	DIN2	FWD/REV	This signal is used to change the motor rotation direction. The motor rotates in the CW direction when this signal is turned ON, and in the CCW direction when it is turned OFF.✱
8	Light Blue	DIN3	M0	When the M0 input is ON, the setting speed of the internal potentiometer (VR1) is enabled. When it is OFF, the setting speed of the external analog setting device (External speed potentiometer or external DC voltage) is enabled.
7	Purple	DIN4	ALM-RST	This signal is used to reset the alarm. (The alarm will be reset at the OFF edge of the input.)
6	Blue	VH	External Analog Setting Device	These signals are used when the rotation speed is externally set using an external analog setting device (External speed potentiometer or external DC voltage).
5	Green	VM		
4	Yellow	VL		
3	Orange	GND	GND	I/O signals common
2	Red	DOUT0	SPEED-OUT	30 pulses are output while the motor output shaft makes one revolution in synchronization with the motor rotation. The pulse width of output pulse signals is 0.3 ms. The motor rotation speed can be calculated using the SPEED-OUT output.
1	Brown	DOUT1	ALM-B	This is a signal to output an alarm status. It is turned OFF when an alarm is generated. (Normally closed) The generated alarm content can be checked by counting the number of times the LED blinks.

✱The rotation direction depends on the gear ratio of the gearhead.

●Connection Diagrams

The figure shows a connection example when connecting an external speed potentiomenter.
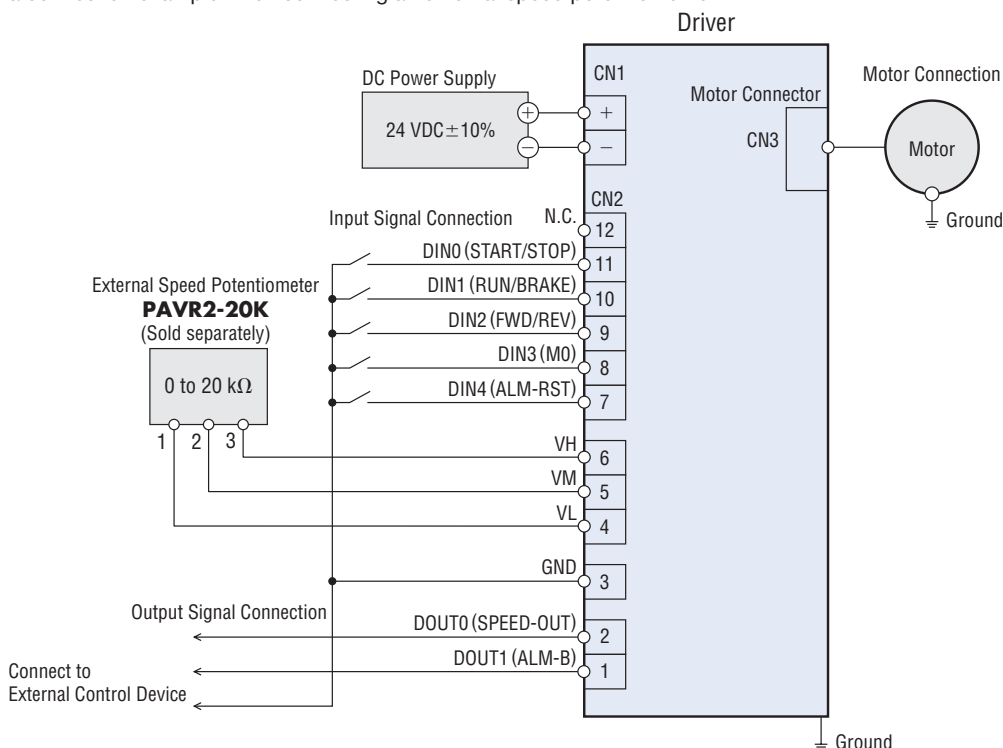
●Run/Stop

Operate the motor with the START/STOP and RUN/BRAKE inputs.

When the RUN/BRAKE Input is shut off during deceleration, the motor will stop instantaneously.

Decelerated Stop: Stopping in accordance with the set deceleration speed.

Instantaneous Stop: Stopping in a very short time window regardless of the deceleration speed.

	START/STOP Input	RUN/BRAKE Input	Motor Operation
Signal Level	ON	ON	Operation
	ON	OFF	Instantaneous Stop
	OFF	ON	Deceleration Stop

◇Example of Operating Pattern
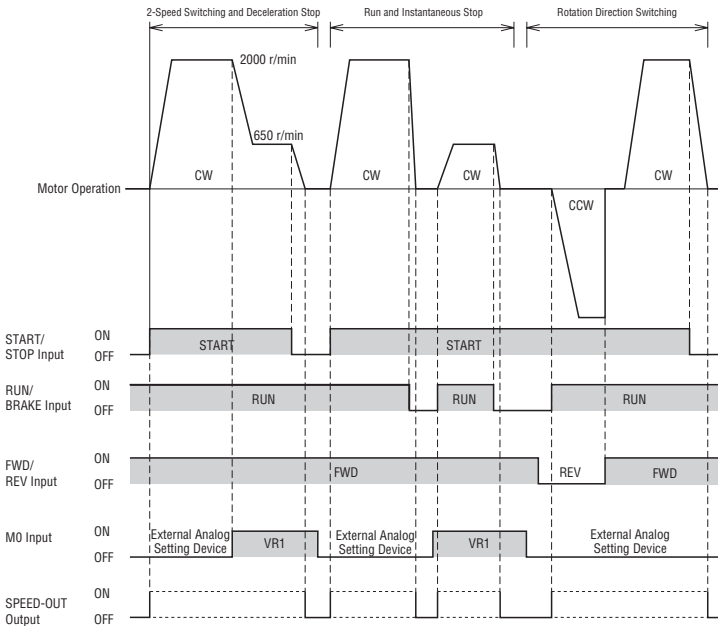
● START/STOP Input, RUN/BRAKE Input

When the START/STOP and RUN/BRAKE inputs are both turned ON, the motor will run. When the START/STOP Input is shut OFF during operation, the motor will execute a decelerated stop in accordance with the settings on the internal potentiometer (VR2). When the RUN/BRAKE Input is shut OFF during operation, the motor will stop in the shortest window of time possible (Instantaneous stop).

● FWD/REV Input

This signal is used to change the rotation direction of the motor. When ON, the motor will turn CW; when OFF, the motor will turn CCW. (The rotation direction varies according to the gear ratio of the gearhead.)

● M0 Input

When the M0 input is turned ON, the motor will rotate in accordance with the internal potentiometer (VR1). When it shut OFF, the motor will rotate in accordance with the external analog setting device.

● Please ensure that the ON and OFF durations for each output signal are 10 ms min.

I/O Signal Circuits

◇Input Signal Circuit

The driver's signal input uses the C-MOS input method.

The signal status indicates "ON: 0 to 0.5 V (L Level)" or "OFF: 4 to 5 V (H Level)."
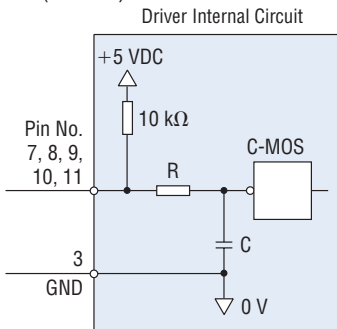
◇Output Signal Circuit

The driver's signal output uses the transistor and open-collector output method.

The signal status indicates that the internal transistor is "ON: receiving power" or "OFF: not receiving power". It does not indicate the signal's voltage level.
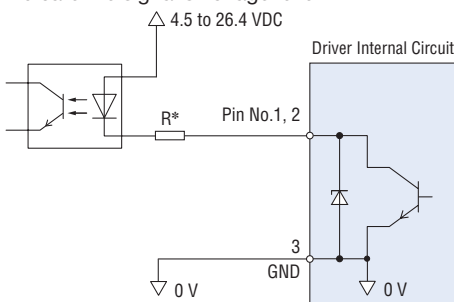
✱ Recommended resistance value when current limiting resistor R is connected
24 VDC: 2.7 kΩ to 4.7 kΩ (1 W)
5 VDC: 560 Ω to 820 Ω (0.25 W)

◇SPEED-OUT

30 pulses are output every rotation of the motor output shaft in synchronization with the rotation of the motor. The pulse width for output pulse signals is 0.3 ms. The SPEED-OUT output can be used to calculate the motor speed.

$$\text{Frequency of SPEED-OUT [Hz]} = \frac{1}{T \text{ [s]}}$$

$$\text{Motor Speed [r/min]} = \frac{\text{Frequency of SPEED-OUT [Hz]}}{30} \times 60$$
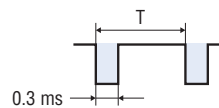
◇Alarm Deactivation

When the alarm sounds, the ALM-B output shuts OFF. At the same time, the motor stops, and the PWR/ALM LED flashes red.

After the alarm has been deactivated, the cause of the alarm must be dealt with before the device can be used again. The alarm cannot be deactivated while the operation input signal is ON.

The methods for deactivating the alarm are as follows.

• Turn the ALM-RST input from ON to OFF. (Active at OFF edge)
• Restart the power.

●Speed Setting Methods

The motor speed can be set using the external analog setting device (The external speed potentiometer or external DC voltage) or VR1. The external analog setting and VR1 can be switched between depending on whether the M0 input is ON or OFF.

M0 Input	OFF	ON
Speed Setting	External Analog Setting Device	VR1

### ◇Setting by the External Speed Potentiometer
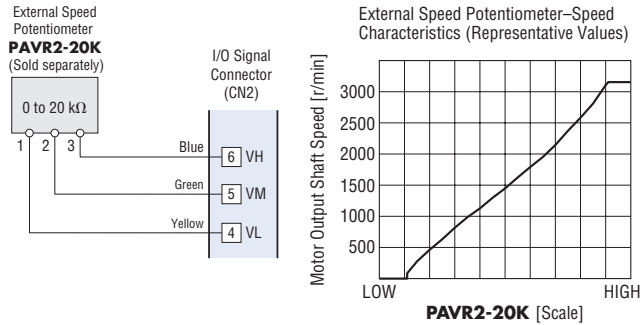
Connect to pin No. 4 to 6 of CN2.

External Speed Potentiometer–Speed Characteristics (Representative Values)

PAVR2-20K [Scale]

Note
● The speed in the graph represents the speed of the motor alone. The gear output shaft speed is calculated by dividing the gear ratio.

◇Setting by External DC Voltage

Connect to pin No. 4 and 5 of CN2.

External DC Voltage–Speed Characteristics (Representative Values)
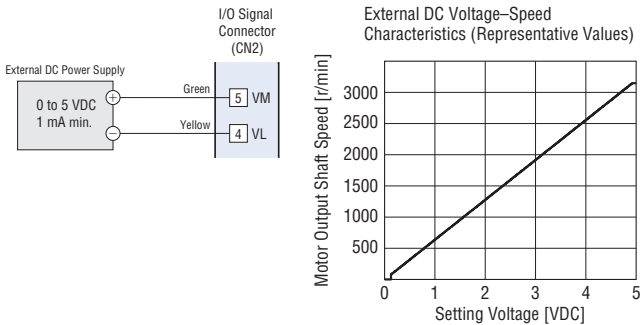
Note
● The speed in the graph represents the speed of the motor alone. The gear output shaft speed is calculated by dividing the gear ratio.

◇Setting by VR1

Factory setting: 0 r/min
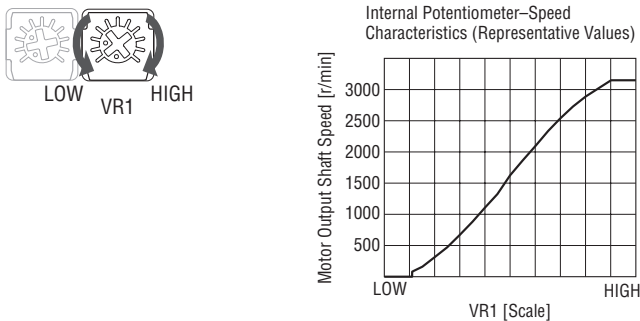
LOW VR1 HIGH

Internal Potentiometer–Speed Characteristics (Representative Values)

VR1 [Scale]

Note
● The speed in the graph represents the speed of the motor alone. The gear output shaft speed is calculated by dividing the gear ratio.

●Setting the Acceleration and Deceleration Times

For the acceleration time, set the time it takes the motor to move from a resting state to a rated speed. For the deceleration time, set the time it takes for the motor to move from a rated speed to rest. (Acceleration and deceleration have shared settings)
Factory setting: 0.1 s

◇VR2 settings
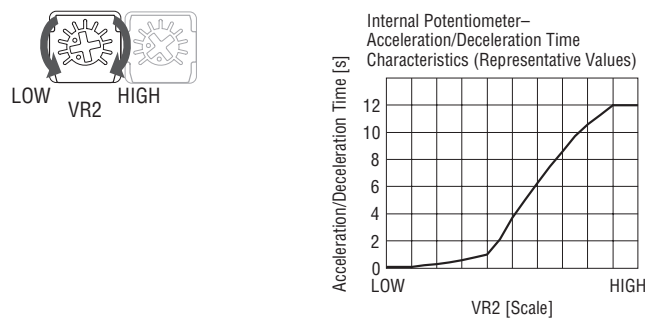
LOW VR2 HIGH

Internal Potentiometer–Acceleration/Deceleration Time Characteristics (Representative Values)

VR2 [Scale]

●Multi-Motor Control

Two or more motors can be operated at the same speed using 1 external speed potentiometer or external DC voltage.

◇When Using an External Speed Potentiometer

When using a external speed potentiometer (VRx), no more than ten motors should be operated simultaneously.

Resistance value when the number of drivers is n:

$$VRx (k\Omega)=20 k\Omega/n,$$
$$\text{acceptable loss (W)}=n/20$$

Example: When two drivers are used, the resistance is 10 kΩ,
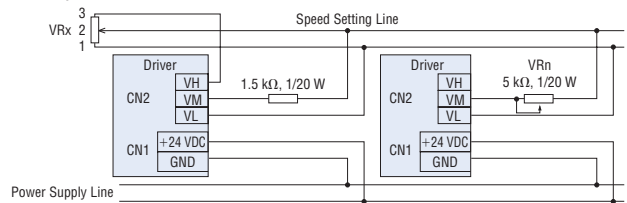
◇When Using an External DC Voltage

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

Current capacity (mA) when the number of drivers is n: $1 mA \times n$
Example: When two drivers are used, the current capacity should be 2 mA min.
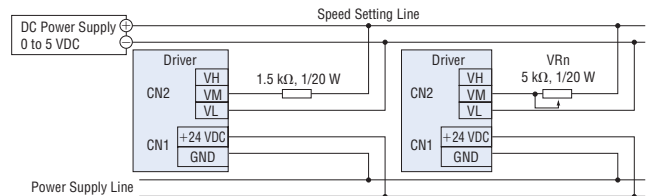
■Connection and Operation　Analog Setting Type (100 W)

●Names and Functions of Driver Parts

Name	Indication	Description
Power Supply Connector	CN1	Connects the power supply cable.
I/O Signal Connector	CN2	Connects the I/O signal cable to connect with an external control device.
Motor Connector for Signal	CN3	Connects the power supply cable.
Motor Connector for Power	CN4	
LED	POWER/ ALARM	Green — Lit in green while the power is supplied.
		Green (Blinks) — If an alarm is generated, this LED will blink in green. The generated alarm content can be checked by counting the number of times the LED blinks.
Internal Speed Potentiometer	VR1	Uses to set the speed (M0 input: ON)
Acceleration/ Deceleration Time Potentiometer	VR2	Uses to set the acceleration time and deceleration time.

Motor Connector for Power (CN4)

Power Supply Connector (CN1)

LED (POWER/ALARM)

I/O Signal Connector (CN2)

Motor Connector for Signal (CN3)

Internal Potentiometer (VR1)

Acceleration/Deceleration Time Potentiometer (VR2)

◇I/O Signal Connector (CN2)

Pin No.	Color of Lead Wire	Terminal Name	Description
12	—	—	N.C. (No Connection.)
11	Black	START/STOP	These signals are used to operate the motor. The motor rotates according to the acceleration time when both the START/STOP input and the RUN/BRAKE input are turned ON. If the START/STOP input is turned OFF, the motor stops according to the deceleration time. If the RUN/BRAKE input is turned OFF, the motor stops instantaneously.
10	White	RUN/BRAKE	
9	Gray	CW/CCW	This signal is used to change the motor rotation direction. When this signal is turned ON, the motor rotates in the CW direction, and when turned OFF, it rotates in the CCW direction.✽
8	Light Blue	INT.VR/EXT	When the INT. VR/EXT input is ON, the setting speed of the internal speed potentiometer (VR1) is enabled. When OFF, the setting speed of the external speed potentiometer and the external DC voltage is enabled.
7	Purple	ALARM-RESET	This signal is used to reset the alarm. (The alarm will be reset at the OFF edge of the input.)
6	Blue	VRH	These signals are used to set the speed externally using the external speed potentiometer or external DC voltage.
5	Green	VRM	
4	Yellow	VRL	
3	Orange	GND	I/O signals common
2	Red	SPEED	30 pulses are output while the motor output shaft makes one revolution in synchronization with the motor rotation.
1	Brown	ALARM	This is a signal to output an alarm status. It is turned OFF when an alarm is generated, and the motor stops. The generated alarm content can be checked by counting the number of times the LED blinks.

✽The rotation direction depends on the gear ratio of the gearhead.

●Connection Diagrams

The figure shows a connection example when connecting an external speed potentiometer.
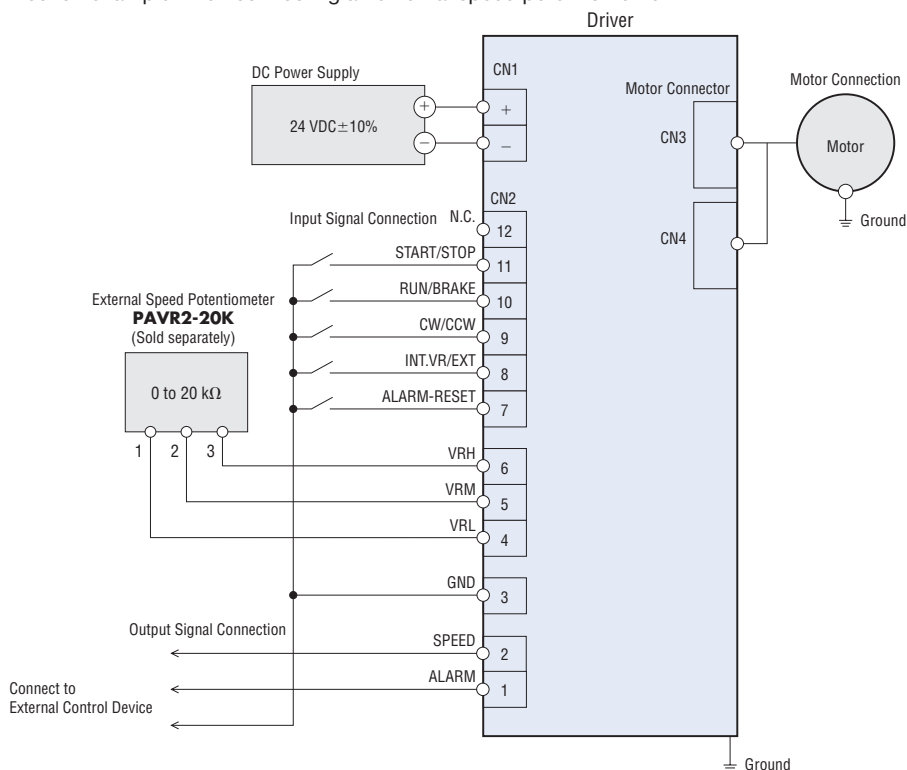
●Run/Stop

Operate the motor with the START/STOP and RUN/BRAKE inputs.

		START/STOP Input	RUN/BRAKE Input	Motor Operation
Signal Level		ON	ON	Operation[*1]
		ON	OFF	Instantaneous Stop
		OFF	ON	Stop[*2]

*1 The operating speed of the motor is set by either one of the internal speed potentiometer, external speed potentiometer, or external DC voltage. Acceleration is performed at the time set in the acceleration/deceleration time potentiometer.

*2 Deceleration is performed at the time set in the acceleration/deceleration time potentiometer.

◇Example of Operating Pattern
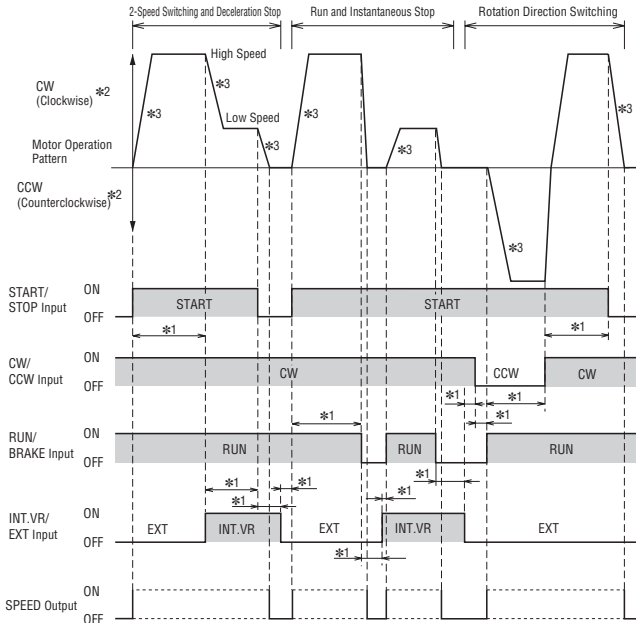
*1 10 ms min.

*2 The direction of rotation applies to the motor only. It will vary depending on the gear ratio.

*3 The motor will start and stop at the time set by the acceleration and deceleration time potentiometer.

●START/STOP Input, RUN/BRAKE Input

When the START/STOP and RUN/BRAKE inputs are both turned ON, the motor will run.

When the START/STOP Input is shut OFF during operation, the motor will execute a decelerated stop in accordance with the settings on the acceleration and deceleration potentiometer (VR2).

When the RUN/BRAKE Input is shut OFF during operation, the motor will stop in the shortest window of time possible (Instantaneous stop).

●CW/CCW Input

This signal is used to change the rotation direction of the motor. When ON, the motor will turn CW; when OFF, the motor will turn CCW. (The rotation direction varies according to the gear ratio of the gearhead.)

●INT. VR/EXT Input

When the INT.VR/EXT Input is turned ON, the set speed for the internal potentiomenter (VR1) is enabled. When it shut OFF, the set speed for the external speed potentiometer or the external DC voltage is enabled.

●Please ensure that the ON and OFF durations for each output signal are 10 ms min.

●I/O Signal Circuit

◇Input Signal Circuit

The driver's signal input uses the C-MOS input method.

The signal status indicates "ON: 0 to 0.5 V (L Level)" or "OFF: 4 to 5 V (H Level)."

●External control device output: 5 VDC C-MOS
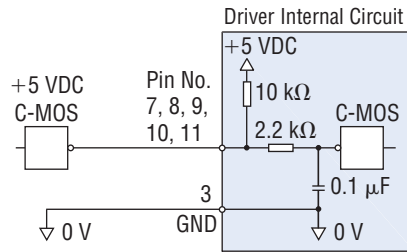
### ●External control device output: Open-collector output
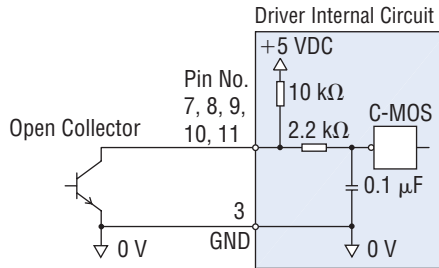
●Switch Connection
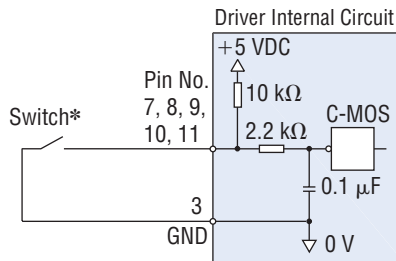
*Please use a switch capable of opening/closing the current flow at 5 VDC, 1 mA max.

◇Output Signal Circuit

The driver's signal output uses the transistor and open-collector output method. The signal status indicates that the internal transistor is "ON: receiving power" or "OFF: not receiving power". It does not indicate the signal's voltage level.
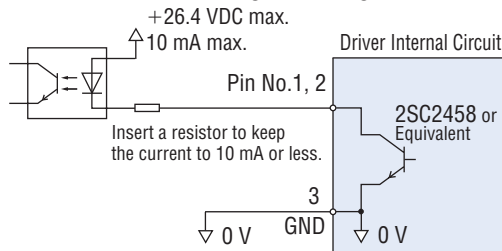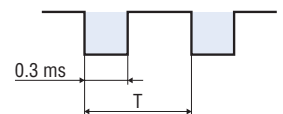

◇SPEED Output

Pulse signals of 30 pulses (Pulse width: 0.3 ms) are output every 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.

$$\text{Motor Speed [r/min]} = \frac{\text{Frequency of SPEED-OUT [Hz]}}{30} \times 60$$

$$\text{Frequency of SPEED-OUT [Hz]} = \frac{1}{T \text{ [s]}}$$

◇ALARM-RESET Input

When the alarm sounds, the ALARM output shuts OFF. At the same time, the motor stops, and the POWER/ALARM LED flashes green.

After the alarm has been deactivated, the cause of the alarm must be dealt with before the device can be used again. The alarm cannot be deactivated while the operation input signal is ON.

The methods for deactivating the alarm are as follows.

●Turn the ALARM-RESET input from ON to OFF. (Active at OFF edge)

●Restart the power.

●Speed Setting Method

The motor speed can be set using any of the following: the internal speed potentiometer, the external speed potentiometer or the external DC voltage. The speed potentiometer can be switched by turning the INT.VR/EXT input ON or OFF.

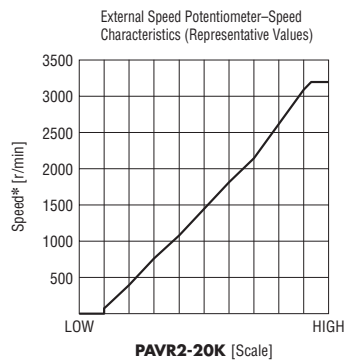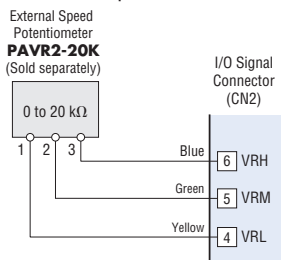### ◇Setting by the Internal Speed Potentiometer

Factory setting: 0 r/min
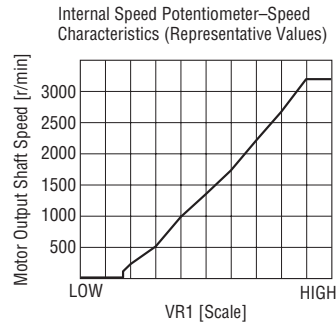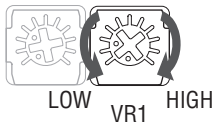
LOW VR1 HIGH

Internal Speed Potentiometer–Speed Characteristics (Representative Values)

Note
●The speed in the graph represents the speed of the motor alone. The gear output shaft speed is calculated by dividing the gear ratio.

◇Setting by the External Speed Potentiometer

Connect to pin No. 4 to 6 of CN2.

External Speed Potentiometer–Speed Characteristics (Representative Values)

Note
●The speed in the graph represents the speed of the motor alone. The gear output shaft speed is calculated by dividing the gear ratio.

◇Setting by External DC Voltage
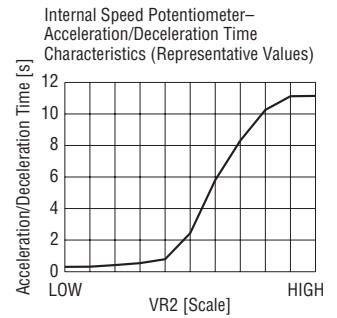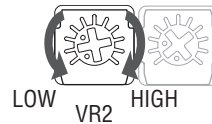
Connect to pin No. 4 and 5 of CN2.

External DC Voltage–Speed Characteristics (Representative Values)

Note
●The speed in the graph represents the speed of the motor alone. The gear output shaft speed is calculated by dividing the gear ratio.

●Setting the Acceleration and Deceleration Times

For the acceleration time, set the time it takes the motor to move from a resting state to a rated speed. For the deceleration time, set the time it takes for the motor to move from a rated speed to rest. (Acceleration and deceleration times have shared settings)
Factory setting: 0.5 s

LOW VR2 HIGH

Internal Speed Potentiometer–Acceleration/Deceleration Time Characteristics (Representative Values)

●Multi-Motor Control

Two or more motors can be operated at the same speed using 1 external speed potentiometer or external DC voltage.
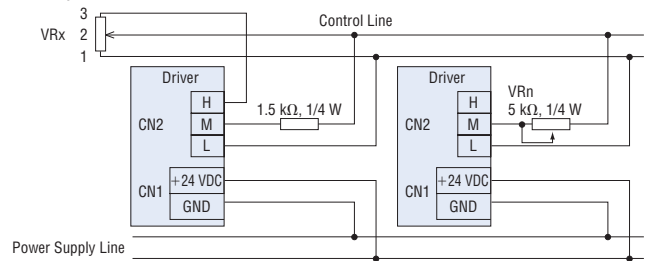
◇When Using an External Speed Potentiometer

When using a external speed potentiometer (VRx), no more than five motors should be operated simultaneously.

Resistance value when the number of drivers is n:

$$VRx \text{ (k}\Omega) = 20 \text{ k}\Omega/n,$$
acceptable loss (W)=n/20
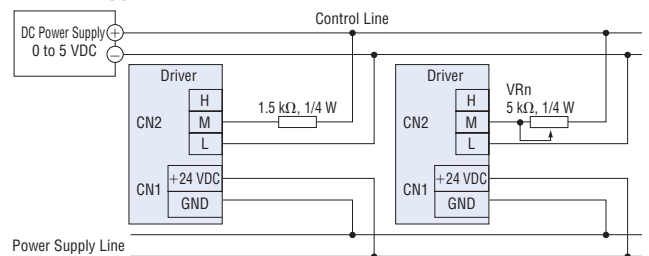
Example: 10 kΩ , 1/2 W for 2 drivers.

◇When Using an External DC Voltage

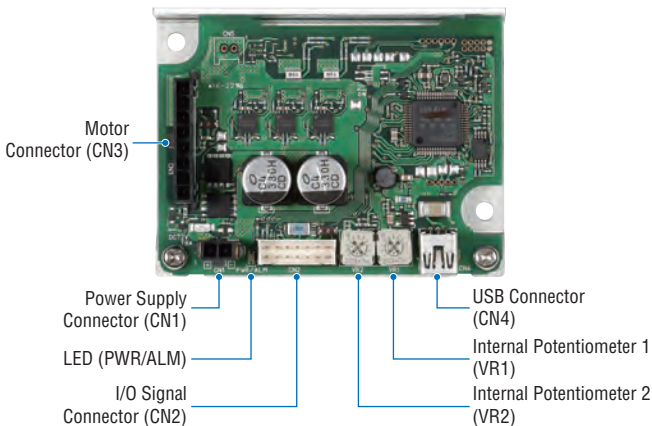The current capacity of the DC power supply is determined as follows.

Current capacity (mA) when the number of drivers is n: 1 mA×n
Example: When two drivers are used, the current capacity should be 2 mA min.

■ Connection and Operation   Digital Setting Type (15 W, 30 W, 50 W)

● Names and Functions of Driver Parts

Name	Indication	Description
Power Supply Connector	CN1	Connects the power supply cable.
I/O Signal Connector	CN2	Connects the I/O signal cable to connect with an external control device.
Motor Connector	CN3	Connects the motor cable.
USB Connector	CN4	Connects a PC in which the **MEXE02** has been installed.
LED	PWR/ALM	Green — Lit in green while the power is supplied.
		Red (Blinks) — If an alarm is generated, this LED will blink in red.
		Orange (Blinks) — If information is generated, it will blink in orange.
Internal Potentiometer*	VR1	Uses to set the operation data. Factory setting: The rotation speed in the operation data No.1 can be set.
	VR2	Uses to set the operation data. Factory setting: The acceleration time and deceleration time in the operation data No.0 and No.1 can be set.

✱The function can be changed using the **MEXE02**.

◇ I/O Signal Connector (CN2)

Pin No.	Color of Lead Wire	Terminal Name	Initial Assignment Signal*1	Description
14	Yellow/Black	DIN0	[START/STOP]	These signals are used to operate the motor. The motor rotates according to the acceleration time when both the START/STOP input and the RUN/BRAKE input are turned ON. If the START/STOP input is turned OFF, the motor stops according to the deceleration time. If the RUN/BRAKE input is turned OFF, the motor stops instantaneously.
13	Orange/White	DIN1	[RUN/BRAKE]	
12	Red/White	DIN2	[FWD/REV]	This signal is used to change the motor rotation direction. The motor rotates in the forward direction when the signal is turned ON.*2
11	Brown/White	DIN3	[M0]	The operation data number can be selected based on a combination of ON/OFF status of the M0 and M1 inputs.
10	Black	DIN4	[M1]	
9	White	DIN5	[ALM-RST]	This signal is used to reset the alarm. (The alarm will be reset at the ON edge of the input.)
8	Gray	VH	External Analog Setting Device*3	These terminals are used when the rotation speed or torque limiting value is externally set using an external analog setting device (External speed potentiometer or external DC voltage).
7	Purple	VM		
6	Blue	VL		
5	Green	GND	GND	I/O signals common
4	Yellow	DOUT0	[SPEED-OUT]	30 pulses are output while the motor output shaft makes one revolution.
3	Orange	DOUT1	[ALM-B]	This is a signal to output an alarm status. It is turned OFF when an alarm is generated. (Normally closed)
2	Red	DOUT2	[TLC]	This is a signal to output when the motor output torque is limited.*4
1	Brown	DOUT3	[DIR]	This is a signal to output information of the motor rotation direction. (It is turned ON when the motor rotates in the forward direction.)

✱1 Described in brackets [ ] are signal assigned at the time of shipment. Functions for the pin No.1 to No.4 and No.9 to No.14 can be changed using the **MEXE02**.
✱2 The rotation direction of the output shaft varies depending on the gear ratio of the gearhead.
✱3 If the "External setting method" parameter is changed, the speed and torque limiting value can be set with the PWM signal input.
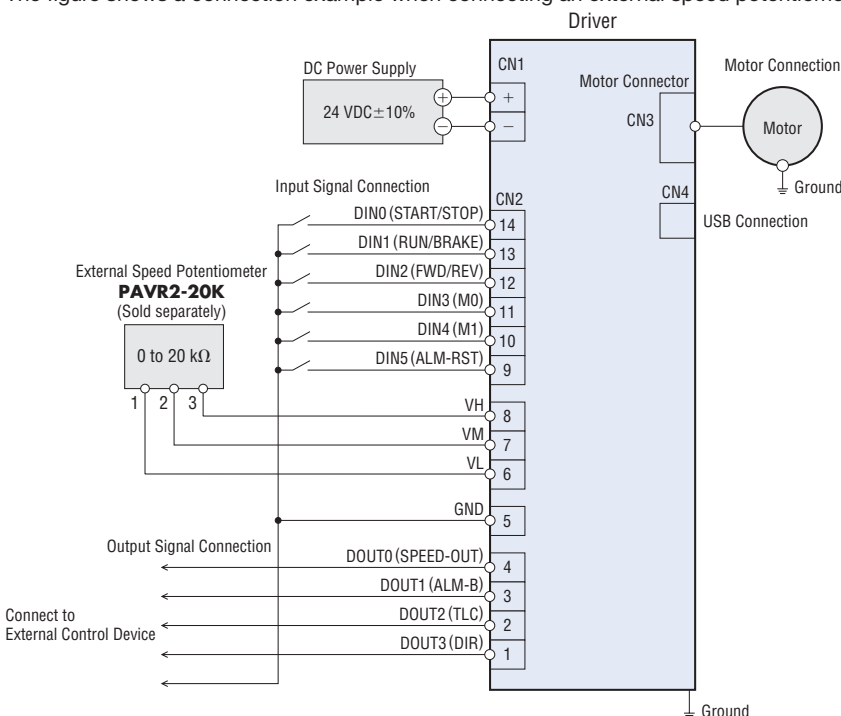✱4 The torque limiting value is set to 200% at the time of shipment and can be changed using the **MEXE02**.

◇ USB Cable (CN4)
● USB Cable Specifications

Specifications	USB2.0 (Full Speed)
Cable	Length: 3 m max.
	Shape: A to mini-B

● Connection Diagrams

The figure shows a connection example when connecting an external speed potentiometer.

For detailed information and handling precautions of this product, see the Operating Manual. The operating manual is available for download from the Oriental Motor website.

Installing a Load to the Hollow Shaft

How to Install a Load Shaft
- Install the load shaft to the hollow output shaft by aligning the center of the hollow shaft with that of the load shaft.
- The hollow output shaft has a key slot. Machine a matching key slot on the load shaft and use the supplied key to affix the two shafts across the slots.
- The recommended tolerance of the load shaft is h7.
- If the motor is intended to receive large impacts due to frequent instantaneous stops or carry a large radial load, use a stepped load shaft.
- The load shaft can be installed from both the front and rear faces of the hollow shaft flat gearheads.

Note
- When installing the load shaft to the hollow output shaft, be careful not to damage the hollow output shaft or bearing.
- To prevent seizure, apply a coat of molybdenum disulfide grease on the exterior surface of the load shaft and interior surface of the hollow output shaft.
- Do not attempt to modify or machine the hollow output shaft. Doing so may damage the bearing and cause the hollow shaft flat gearhead to break.

◇ Stepped Load Shaft
Install a hexagonal socket head screw over a stopper ring, spacer, flat washer and spring washer and tighten the screw to affix the load shaft.

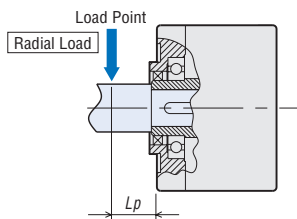Example of Front Face Installation
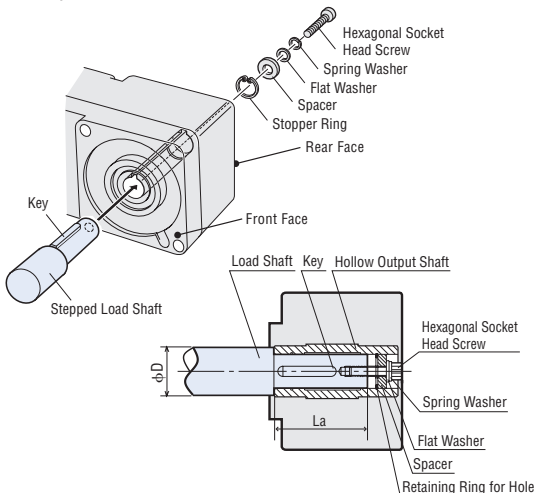
Permissible Radial Load Calculation of the Hollow Shaft Type
The formula for permissible radial load varies depending on the mechanism.

◇ When End of Shaft being Driven is Not Supported by a Bearing
This mechanism experiences the highest amount of radial load. The stepped type is recommended for the load shaft.

F_0 [N] : Permissible Radial Load at the Flange-Mounting Surface
Lp [mm]: Distance from Flange-Mounting Surface to Radial Load Point
B [mm] : Distance from Flange-Mounting Surface to Bearing Unit

Product Name	Permissible Radial Load W [N]
GFS2G□FR	$W\,[N] = \dfrac{36}{36+Lp} \times F_0\,[N]$
GFS4G□FR	$W\,[N] = \dfrac{40}{40+Lp} \times F_0\,[N]$
GFS5G□FR	$W\,[N] = \dfrac{50}{50+Lp} \times F_0\,[N]$

- A number indicating the gear ratio is specified where the box □ is located within the product name..

◇ Straight Load Shaft
Install a hexagonal socket head screw over a stopper ring, spacer, flat washer and spring washer, with a spacer also inserted underneath the load shaft, and tighten the screw to affix the load shaft.

Example of Front Face Installation
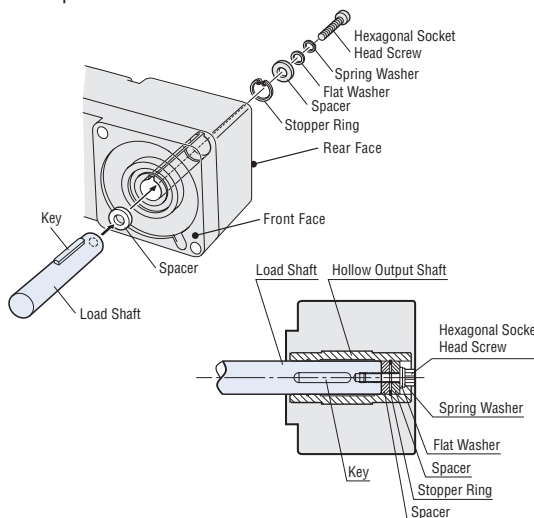
◇ Recommended Load Shaft Installation Dimensions   Unit: mm

Product Name	GFS2G□FR	GFS4G□FR	GFS5G□FR
Inner Diameter of Hollow Shaft (H8)	$\phi12^{+0.027}_{0}$	$\phi15^{+0.027}_{0}$	$\phi20^{+0.033}_{0}$
Shaft Diameter of Load Shaft (h7)	$\phi12^{0}_{-0.018}$	$\phi15^{0}_{-0.018}$	$\phi20^{0}_{-0.021}$
Screw Size	M4	M5	M6
Spacer Thickness✽	3	4	5
Nominal Hole Diameter of Retaining Ring	φ12 (C-Shaped)	φ15 (C-Shaped)	φ20 (C-Shaped)
Outer Diameter of Stepped Shaft φD	20	25	30
Stepped Shaft La Length	39	43	52

✽Determine the spacer thickness in conformance with the table. If the spacer is thicker than the specified dimension, the screw head may project outside of the gear case and the safety cover may not be installed.
- Retaining rings for holes, spacers, screws and other parts used to install the load shaft are not included. The customer must supply these.
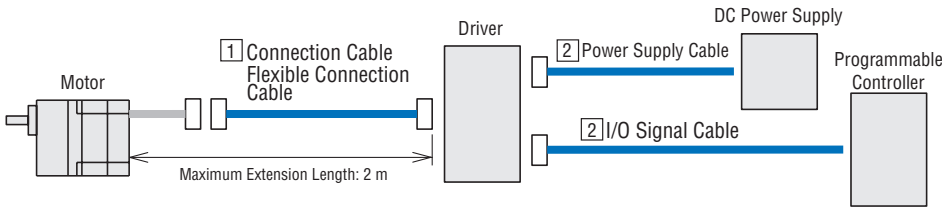
◇ When End of Shaft being Driven is Supported by a Bearing
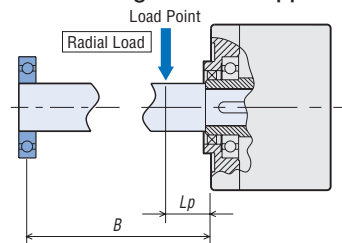
Product Name	Permissible Radial Load W [N]
GFS2G□FR GFS4G□FR GFS5G□FR	$W\,[N] = \dfrac{B}{B-Lp} \times F_0\,[N]$

Product Name	Gear Ratio	F_0 [N]
GFS2G□FR	5, 10	570
	15 to 200	630
GFS4G□FR	5, 10	1000
	15 to 200	1500
GFS5G□FR	5, 10	1080
	15, 20	1550
	30 to 200	1800

Cables and Accessories (Sold Separately)

● Cable System Configuration

Motor — ① Connection Cable Flexible Connection Cable — Driver — ② Power Supply Cable — DC Power Supply / Programmable Controller — ② I/O Signal Cable

Maximum Extension Length: 2 m

① Connection Cables, Flexible Connection Cables

These cables are used to connect the motor and the driver. When using after extending the cables included with the product, the overall length of the cables should not exceed 2 m. Use the flexible connection cable in applications where the cable is bent and flexed.

● Product Line
◇ Connection Cables

CC02BLH   **CC02AXH2**

Output Power	Product Name	Length
15 W	CC02BLH	1.5 m
30 W		
50 W		
100 W	CC02AXH2	

◇ Flexible Connection Cables

CC02BLHR   **CC02BLH2R**

Output Power	Product Name	Length
15 W	CC02BLHR	1.5 m
30 W		
50 W		
100 W	CC02BLH2R	

● Dimensions (Unit: mm)
◇ CC02BLH / CC02BLHR

Housing: 43645-0800 (Molex)
Housing: 43640-0801 (Molex)
1500
(7.6) 5.3
24.85
Driver Side
CC02BLH: φ9
CC02BLHR: φ8.5
5.8 / 3.86
24.85
Motor Side

◇ CC02AXH2 / CC02BLH2R

Housing: 1-178288-3 (TE Connectivity)
Housing: 1-177648-3 (TE Connectivity)
1500
7.15
(26.76) 16.7
14.7
(7.5)
Driver Side
Housing: 51103-0500 (Molex)
CC02AXH2: φ9
CC02BLH2R: φ10
Housing: 51198-0500 (Molex)
12.7
25.57
21.7
7.8
Motor Side
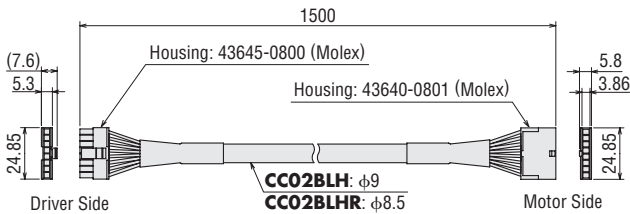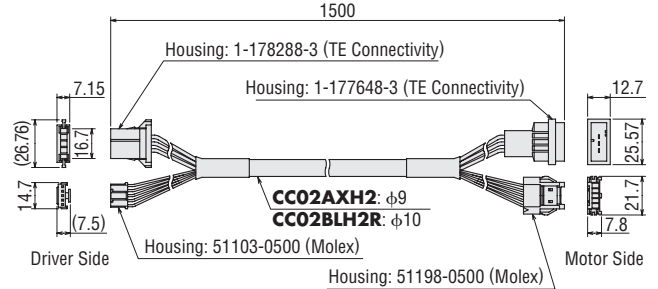
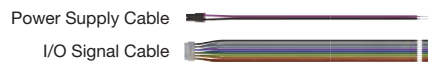## ② Power Supply Cable and I/O Signal Cable Set (For 15 W, 30 W, 50 W)

Power supply cable is used to connect the driver and the power supply. I/O signal cable is used to connect the driver and programmable controller. Cables come as a set of power supply cable and I/O signal cable.
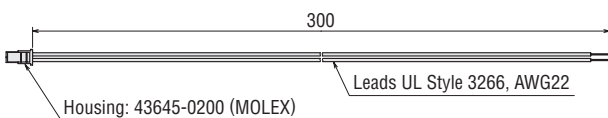
● Product Line

Power Supply Cable
I/O Signal Cable

Driver Type	Product Name	Component Product Name	
		Power Supply Cable	I/O Signal Cable
Analog Setting Type	**LHS003CC**	LH003C1	LH003C3
Digital Setting Type	**LHS003CD**	LH003C1	LH003C4

● Dimensions (Unit: mm)
◇ Power Supply Cable
LH003C1

300
Housing: 43645-0200 (MOLEX)
Leads UL Style 3266, AWG22

◇ I/O Signal Cable
LH003C3/LH003C4

300
Housing: LH003C3 PHDR-12VS (JST)
LH003C4 PHDR-14VS (JST)
Leads UL Style 1007, AWG26
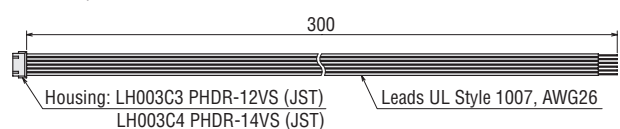
■Flexible Couplings

These products are clamp type couplings to connect a motor or gearhead shaft to the shaft of the equipment.

Once the motor or gearhead is determined, the proper coupling can be selected.

● Couplings can also be used with round shaft types. Select a coupling with the same inner diameter size as the motor shaft diameter.

●MCL Couplings

Applicable Product	Load Type	Coupling Type
BLHM015	Uniform Load	MCL20 Type
	Impact Load	
BLHM230	Uniform Load	MCL30 Type
	Impact Load	
BLHM450	Uniform Load	MCL40 Type
	Impact Load	MCL55 Type
BLHM5100	Uniform Load	MCL55 Type
	Impact Load	

■Motor / Gearhead Mounting Brackets

Dedicated mounting brackets for attaching and securing a motor and gearhead.

Product Name	Applicable Product
SOL0B	BLHM015K-□
SOL0M3	BLHM015K-A
SOL2M4	BLHM230K-□, BLHM230K-A
SOL4M6	BLHM450K-□, BLHM450K-A
SOL5M8	BLHM5100K-□, BLHM5100K-A

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

■External Speed Potentiometer

●Features
● Potentiometer which allows the adjustment of rotation speed and torque.
● Easy installation
Simply insert the potentiometer into the mounting hole. No tools are required. It can be removed.
● Easy wiring
A terminal block is employed. Lead wire connection or soldering is not required. The efficiency of wiring is improved.

Front Face   Rear Face

●Product Line

Product Name
PAVR2-20K

The following items are included with the product.
External Speed Potentiometer, Operating Manual

Note
● When connecting the potentiometer with an I/O signal cable, attach crimp terminals to the I/O signal cable.

●Specifications
Resistance : 0 to 20 kΩ
Rated Power : 0.05 W
Resistance Variation Characteristics : B curve

● Applicable Lead Wire Size
AWG22 to 16 (0.3 to 1.25 mm^2)

■DIN Rail Mounting Plates

Use these mounting plates to mount the driver to a DIN rail.

●Product Line

Product Name	Applicable Product
MADP01	BLH2D15-K, BLH2D15-KD, BLH2D30-K, BLH2D30-KD, BLH2D50-K, BLH2D50-KD
MADP02	BLHD100K

For details, check the Oriental Motor website or contact the Oriental Motor sales office.

http://www.orientalmotor.com.sg

■ Related Products

Brushless Motor   DC Power Supply
BLV Series

DC power supply input brushless motor
that can be powered by batteries and
supports communication control
- High output power of 200 W / 400 W
- Motor with electromagnetic brake available
- Compatible with battery power source
- Equipped with communication functions

For details, check the Oriental Motor website or contact the Oriental Motor
sales office.

http://www.orientalmotor.com.sg

⚠ **Safety Precautions**

- To ensure correct operation, carefully read the Operating Manual before using it.
- The products listed in this catalogue are for industrial use and for built-in component. Do not use for any other applications.

- The factories which manufacture the products listed in this catalogue have obtained Quality Management Systems ISO9001 and Environment Management Systems ISO14001.
- The content listed in this catalogue such as performance and specifications of the products are subject to change without notice for improvements.
- The price of all products listed in this catalogue does not include the consumption tax etc.
- For details of the products, please contact the nearest dealer, sales office or the following "Order Support Center" or "Customer Support Center".
- *Orientalmotor* is registered trademark or trademark of Oriental Motor in Japan and other countries.

Orientalmotor

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