

BLH Series

Improved DC Input drivers with greater functionality and performance



Excellent performance just as it is.

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

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

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






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

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

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

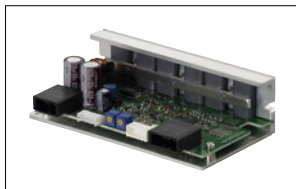
2 Driver Types to Choose From

Motor	+	Driver
<p>Common</p>  <ul style="list-style-type: none"> • Output power 15 W / 30 W / 50 W / 100 W • Types: Parallel Shaft Gearhead / Hollow Shaft Flat Gearhead / Round Shaft 		<p>Analog Setting Type</p> <ul style="list-style-type: none"> • Installation and functional compatibility with current products • Increased performance (Higher torque, reduced audible noise) • For output power 15 W / 30 W / 50 W / 100 W  <hr/> <p>Digital Setting Type</p> <ul style="list-style-type: none"> • Installation compatibility with current products • Increased performance (Higher torque, reduced audible noise) • Increased functionality with the support software MEXE02 • For output power 15 W / 30 W / 50 W 

Compact, Lightweight Drivers

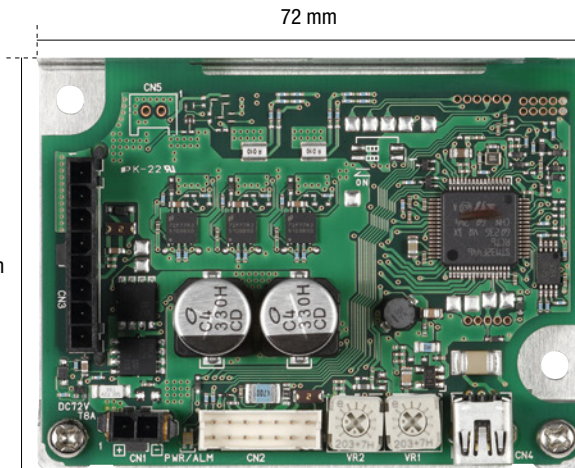
Compact, lightweight drivers that are smaller than a business card.

100 W Driver



Actual Size

55 mm

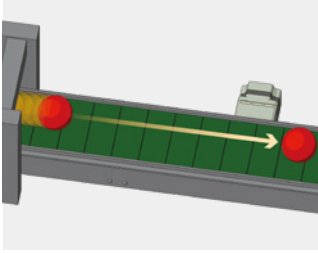


Mass 46 g

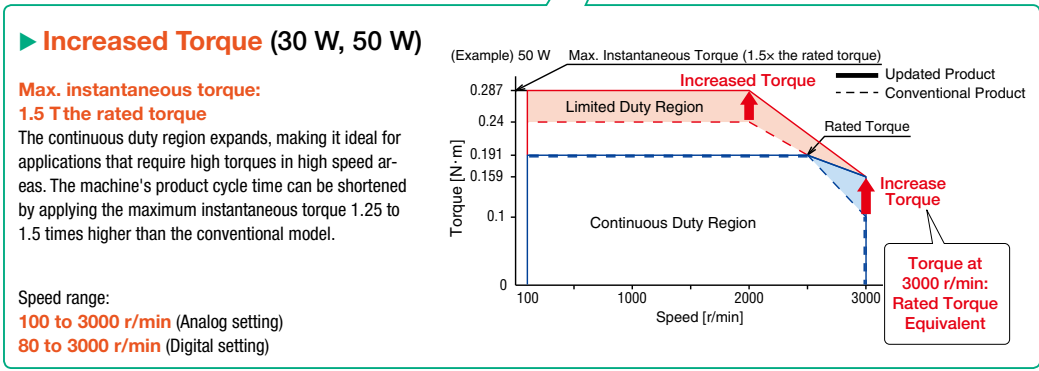
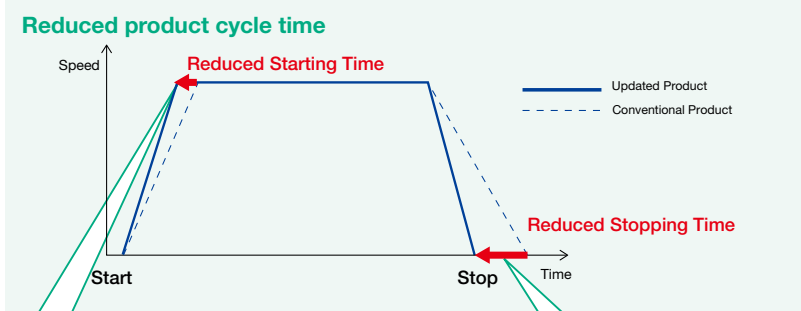
• Pictured is a 15 W / 30 W / 50 W driver.

Increased performance and value with new drivers.

Reduced product cycle time



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



► **Deceleration Stop (Digital setting type)**

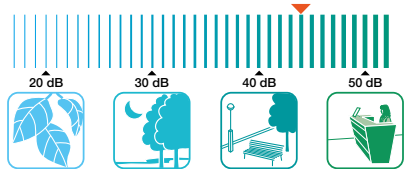
With the digital setting type, a brake is applied when the deceleration stop has been selected, actively stopping the motor at the rate set. This facilitates a shorter product cycle time compared to a conventional stop function, where the motor comes to a passive stop.

Suitable for Applications in Quiet Environments

► **Reduced Audible Noise**

- Noise is approx. half that of conventional products
- 30 W with parallel shaft gearhead Gear ratio of 5
 - Noise measurement value

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

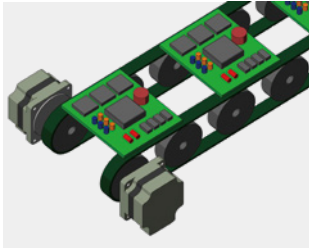


The sound of leaves rustling The suburbs at night A whisper
 The second hand of a clock A quiet park A library
 A quiet office An air conditioner (outdoor unit)

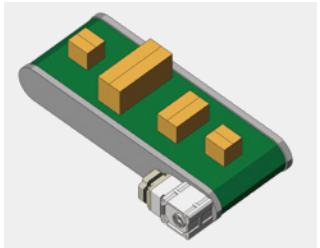
The **BLH** Series uses a sinusoidal drive method. With little torque ripple and smooth, stable rotation even at low speeds, the motor's audible volume is reduced.

Synchronized Operation and Operation with Little Speed Fluctuation

► **Synchronized Operation** ► **Speed Stability**



- With digital settings, speeds can be set at 1 rpm increments. The speed accuracy is improved, and synchronized operations are made possible.



- Speed remains stable even if the weight of the load changes (Speed regulation $\pm 0.2\%$ max.)

• **Speed Regulation**

Speed Setting Method \ Driver Type	Analog Setting Type	Digital Setting Type
Analog Setting	$\pm 0.5\%$ max.	
Digital Setting	—	$\pm 0.2\%$ max.
PWM Input Setting	—	$\pm 0.5\%$ max.

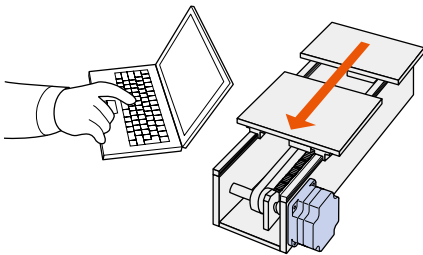
This is a demo of an Automated Guided Vehicle (AGV) using the **BLH** Series. You can see the synchronization and high level of response.



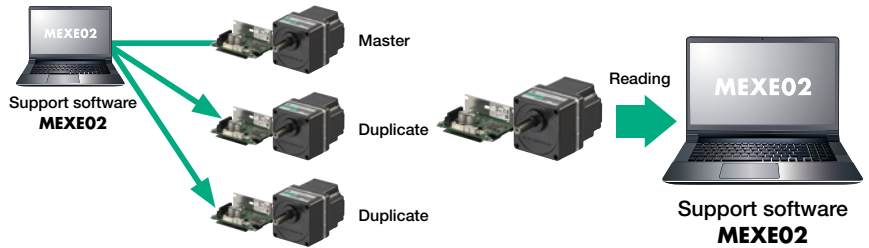
Startup and maintenance with digital settings + support software.

Equipment Startup Assistance

- ▶ Teaching and Remote Operation
- ▶ Operating Data Copy Reading



Operation data can be set up on your computer. This makes it possible to create the motion profile without being connected to the machine's motion control system, then save the operation data in place.



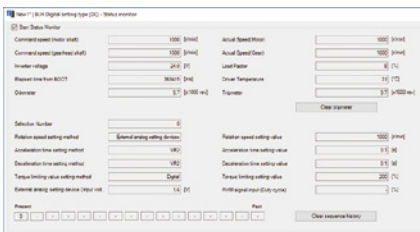
When using multiple units, the operation data used in the first unit can be treated as a master file, and duplicated into subsequent units. Helping to reduce setup time.

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, machine down time can be avoided.

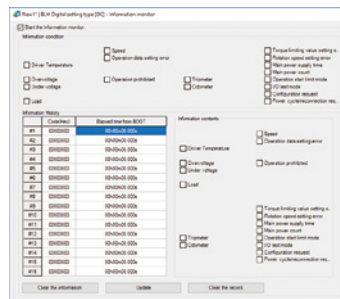


- ▶ Status Monitoring



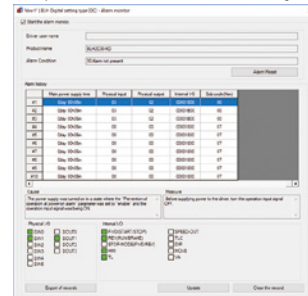
The load factor, driver temperature, and other conditions can be constantly checked.

- ▶ Information Monitoring



Output signals can be set to trigger at preset thresholds, showing that periodic maintenance is now due.

- ▶ Alarm Monitoring (When an abnormality occurs)

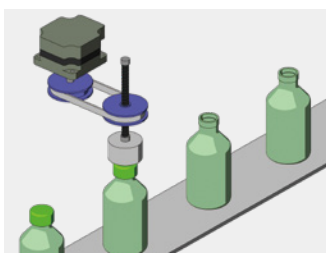


Alarm information can also be monitored. The cause of the alarm is listed, with suggested solutions to resolve the problem. There is also a history record of any previous alarms

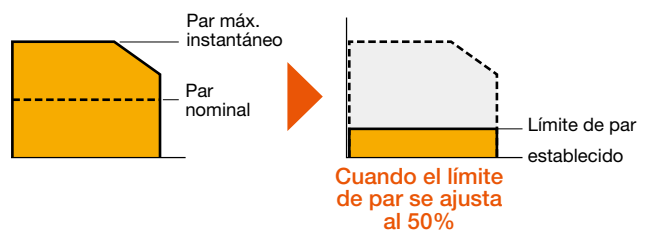
Torque Adjustment

- ▶ 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









As well as tightening applications, torque limiting can also be used as a safety measure. By showing operational status outside the norm, such as pinching, or wear, damage can be prevented. The max. instantaneous torque range can be set between 0 and 200% by assuming the rated torque to be 100%.

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		Digital Setting	External Analog Potentiometer	Internal Potentiometer (Driver)		PWM Input	
		 Support software MEXE02	 External speed potentiometer	 0-5 VDC 1 mA min.	 VR1	 VR2	 PWM Signal
Speed	Analog setting type	—	●	●	●	—	—
	Digital setting type	●	●	●	●	●	●
Acceleration / Deceleration Time	Analog setting type	—	—	—	—	●	—
	Digital setting type	●	—	—	●	●	—
Torque Limiting	Analog setting type	—	—	—	—	—	—
	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

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		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	15 W / □42 mm 30 W / □60 mm 50 W / □80 mm 100 W / □90 mm	
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.

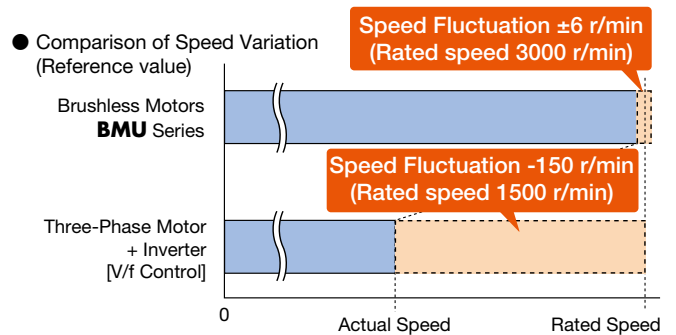
*3 Power supply cable and I/O signal cable are included with the 100 W driver.

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.

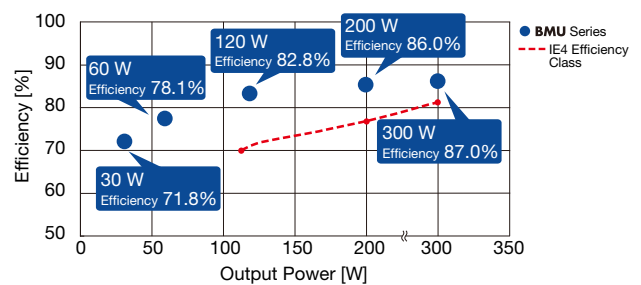
Speed stability with feedback control

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.



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.

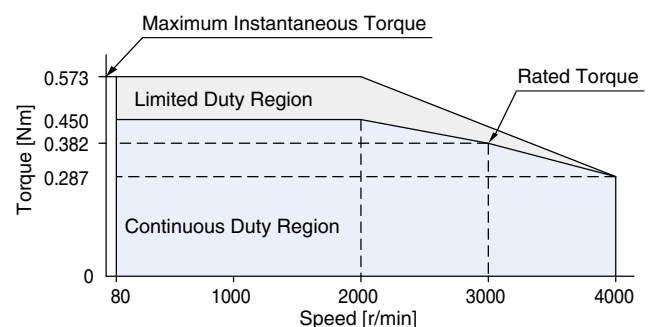


*Induction motors 120 W and higher are subject to the efficiency classes under the international standard IEC 60034-30-1.

*IE4 efficiency values are at 50 Hz and 1500 r/min, while brushless motor efficiency values are at rated speed.

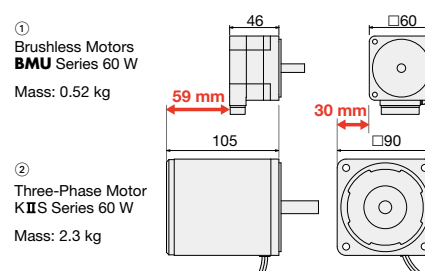
Broad speed control range and even torque

Rated torque is consistent over the entire speed range from low to high. In contrast to a three-phase motor with inverter, the rated torque is available even at low speed.



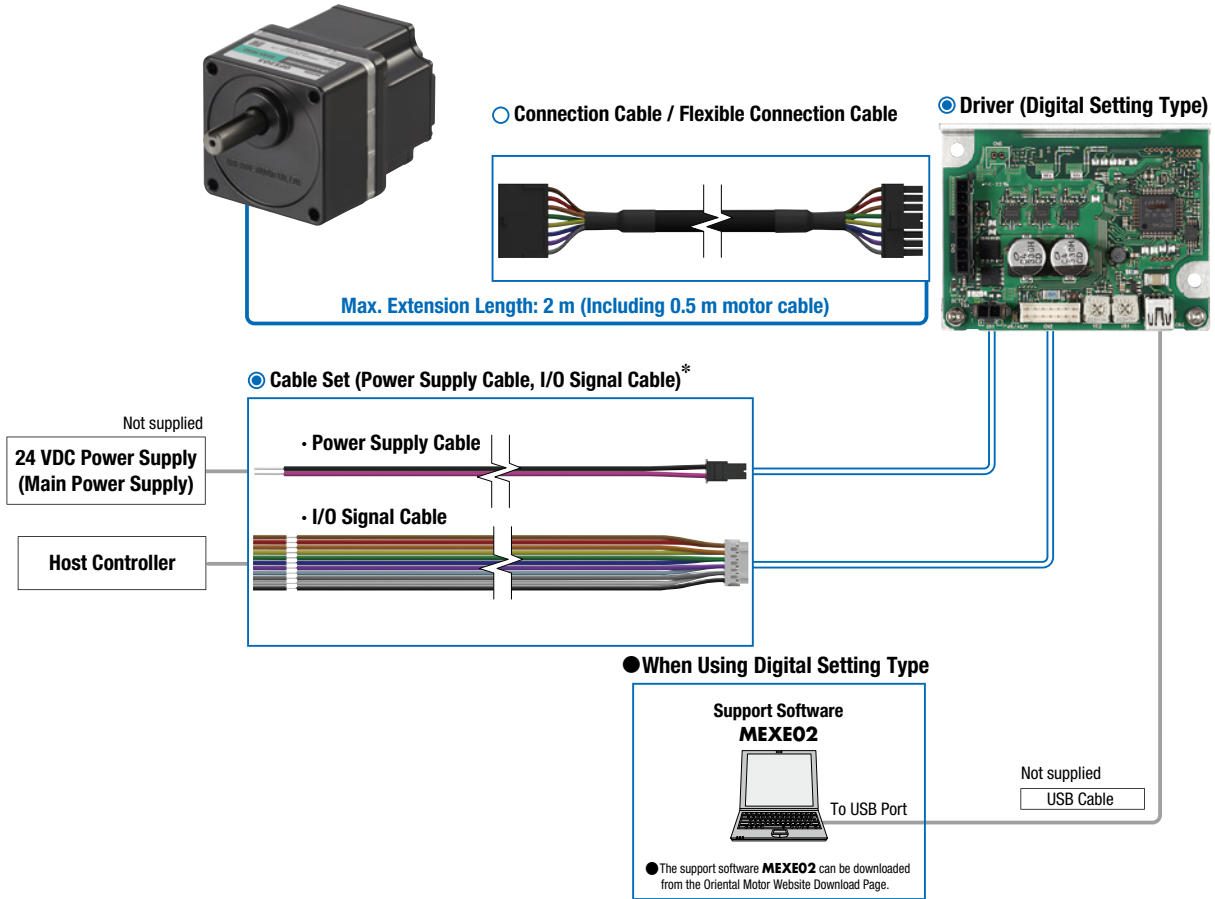
Compact, lightweight, and high power

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.



System Configuration

- Required for operation
- Optional accessories



Motor Accessories



Motor / Gearhead Mounting Brackets



Flexible Couplings

Driver Accessories



External Speed Potentiometer



DIN Rail Mounting Plates

* 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
BLHM230KC-5	BLH2D30-KD	CC02BLH	LHS003CD	+	SOL2M4	MCL301010	MADP01
227.00 €	104.00 €	47.00 €	8.00 €		24.00 €	36.00 €	7.00 €
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● The system configuration shown above is an example. Other combinations are also available.

Product Number

Motor

BLHM 4 50 K C - 5 FR

① ② ③ ④ ⑤ ⑥ ⑦

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	C : Cable Type	
⑥	Gear Ratio/ Shaft Configuration	Number: Gear Ratio for Gearhead Gear Ratio for Geared Motor A : Round Shaft Type
⑦	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 [W]	Product Name	Gear Ratio	List Price
15	BLHM015K-□*	5, 10, 15, 20	187.00 €
		30, 50, 100	193.00 €
30	BLHM230KC-□	5, 10, 15, 20	227.00 €
		30, 50, 100	234.00 €
		200	241.00 €
50	BLHM450KC-□	5, 10, 15, 20	248.00 €
		30, 50, 100	254.00 €
		200	261.00 €
100	BLHM5100KC-□	5, 10, 15, 20	300.00 €
		30, 50, 100	309.00 €
		200	317.00 €

*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 [W]	Product Name	Gear Ratio	List Price
30	BLHM230KC-□FR	5, 10, 15, 20	271.00 €
		30, 50, 100	280.00 €
		200	289.00 €
50	BLHM450KC-□FR	5, 10, 15, 20	317.00 €
		30, 50, 100	326.00 €
		200	335.00 €
100	BLHM5100KC-□FR	5, 10, 15, 20	378.00 €
		30, 50, 100	387.00 €
		200	396.00 €

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

◇ Round Shaft Type

Output Power [W]	Product Name	List Price
15	BLHM015K-A	114.00 €
30	BLHM230KC-A	132.00 €
50	BLHM450KC-A	141.00 €
100	BLHM5100KC-A	166.00 €



Included

Motor

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

Driver

◇ Analog Setting Type



Output Power [W]	Product Name	List Price
15	BLH2D15-K	83.00 €
30	BLH2D30-K	83.00 €
50	BLH2D50-K	92.00 €
100	BLHD100K	120.00 €

◇ Digital Setting Type



Output Power [W]	Product Name	List Price
15	BLH2D15-KD	104.00 €
30	BLH2D30-KD	104.00 €
50	BLH2D50-KD	113.00 €

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

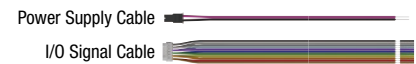
Type	Length	Product Name	List Price
Connection Cable	1.5 m	CC02BLH	47.00 €
Flexible Connection Cable		CC02BLHR	85.00 €

◇ For 100 W

Type	Length	Product Name	List Price
Connection Cable	1.5 m	CC02AXH2	42.00 €
Flexible Connection Cable		CC02BLH2R	90.00 €

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.



Setting Type	Length	Product Name	List Price
Analog Setting Type	0.3 m	LHS003CC	6.50 €
Digital Setting Type		LHS003CD	8.00 €

Driver

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

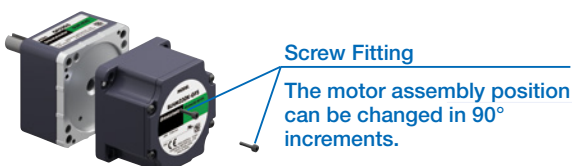
About the Gearheads

● Parallel Shaft Gearhead **GFS** Gear

● Hollow Shaft Flat Gearhead **FR** Gear

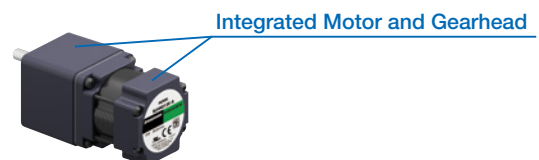
Motor and gearhead are delivered pre-assembled.

The combination of motors and gearheads can be changed.



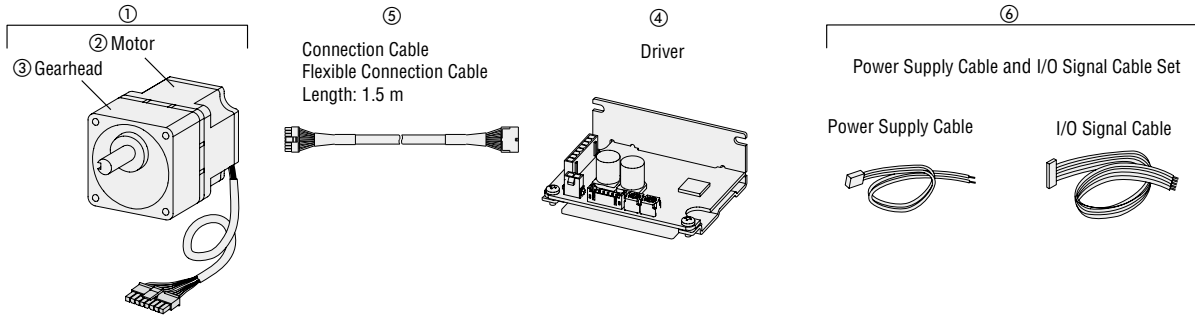
● Geared Motor

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



Combination List

15 W, 30 W, 50 W



- 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 [W]	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
		①	②	③	④	⑤	⑥
15	Geared Type*	BLHM015K-□	—	—	BLH2D15-K	CC02BLH CC02BLHR	LHS003CC
	Round Shaft Type	BLHM015K-A	—	—			
30	Parallel Shaft Gearhead GFS Gear	BLHM230KC-□	BLHM230KC-GFS	GFS2G□	BLH2D30-K	CC02BLH CC02BLHR	LHS003CC
	Hollow Shaft Flat Gearhead FR Gear	BLHM230KC-□FR	BLHM230KC-GFS	GFS2G□FR			
	Round Shaft Type	BLHM230KC-A	—	—			
50	Parallel Shaft Gearhead GFS Gear	BLHM450KC-□	BLHM450KC-GFS	GFS4G□	BLH2D50-K	CC02BLH CC02BLHR	LHS003CC
	Hollow Shaft Flat Gearhead FR Gear	BLHM450KC-□FR	BLHM450KC-GFS	GFS4G□FR			
	Round Shaft Type	BLHM450KC-A	—	—			

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

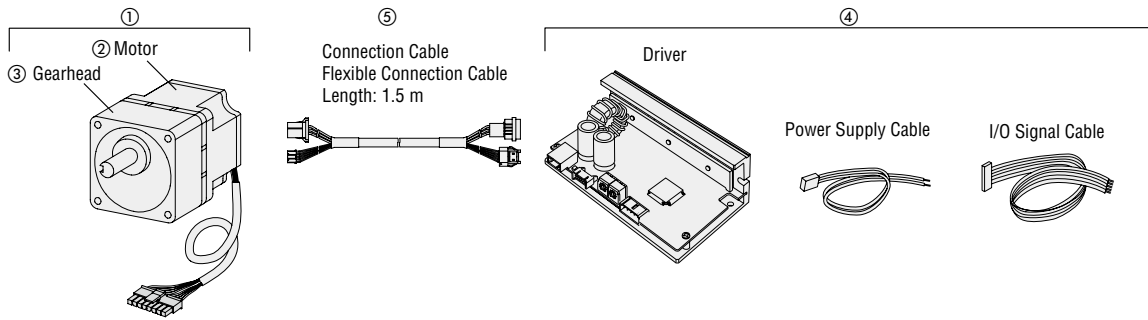
Digital Setting Type

Output Power [W]	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
		①	②	③	④	⑤	⑥
15	Geared Type*	BLHM015K-□	—	—	BLH2D15-KD	CC02BLH CC02BLHR	LHS003CD
	Round Shaft Type	BLHM015K-A	—	—			
30	Parallel Shaft Gearhead GFS Gear	BLHM230KC-□	BLHM230KC-GFS	GFS2G□	BLH2D30-KD	CC02BLH CC02BLHR	LHS003CD
	Hollow Shaft Flat Gearhead FR Gear	BLHM230KC-□FR	BLHM230KC-GFS	GFS2G□FR			
	Round Shaft Type	BLHM230KC-A	—	—			
50	Parallel Shaft Gearhead GFS Gear	BLHM450KC-□	BLHM450KC-GFS	GFS4G□	BLH2D50-KD	CC02BLH CC02BLHR	LHS003CD
	Hollow Shaft Flat Gearhead FR Gear	BLHM450KC-□FR	BLHM450KC-GFS	GFS4G□FR			
	Round Shaft Type	BLHM450KC-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



- 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 [W]	Type	Brushless Motor			Driver	Connection Cable Flexible Connection Cable
		Product Name	Component Product Name		Product Name	Product Name
		①	②	③	④	⑤
100	Parallel Shaft Gearhead GFS Gear	BLHM5100KC-□	BLHM5100KC-GFS	GFS5G□	BLHD100K	CC02AXH2 CC02BLH2R
	Hollow Shaft Flat Gearhead FR Gear	BLHM5100KC-□FR	BLHM5100KC-GFS	GFS5G□FR		
	Round Shaft Type	BLHM5100KC-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

Product Name	Motor	BLHM015K-□	BLHM230K-□	BLHM450K-□	BLHM5100K-□	
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	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) *]				
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°C, at rated speed, with no load, at rated voltage]				

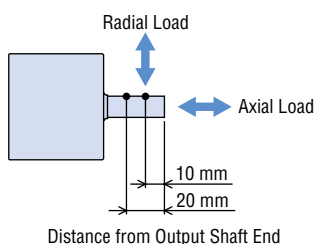
*Digital setting (When **MEXE02** is used).

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

Gear Ratio		5	10	15	20	30	50	100	200	
Rotation Direction	15 W	Same direction as the motor			Opposite direction to the motor		Same direction as the motor		—	
	30 W 50 W 100 W	Same direction as the motor				Opposite direction to the motor			Same direction as the motor	
Output Shaft Speed [r/min]*	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 [Nm]	15 W	80 to 3000 r/min	0.22	0.43	0.65	0.83	1.2	1.9	2	—
	30 W	80 to 2500 r/min	0.52	1.0	1.6	2.1	3.0	4.9	6	6
		3000 r/min	0.43	0.86	1.3	1.7	2.5	4.1	6	6
	50 W	80 to 2500 r/min	0.86	1.7	2.6	3.4	4.9	8.2	16	16
		3000 r/min	0.72	1.4	2.1	2.9	4.1	6.8	13.7	16
	100 W	100 to 2500 r/min	1.8	3.6	5.4	7.2	10.3	17.2	30	30
	3000 r/min	0.90	1.8	2.7	3.6	5.2	8.6	17.2	30	
Permissible Radial Load [N]	15 W	50								—
	10 mm from Output Shaft End	30 W	100			150		200		
		50 W	200			300		450		
		100 W	300			400		500		
		30 W	150			200		300		
	20 mm from Output Shaft End	50 W	250			350		550		
100 W		400			500		650			
Permissible Axial Load [N]	15 W	30								
	30 W	40								
	50 W	100								
	100 W	150								
Permissible Inertia J: [$\times 10^{-4}$ kg m ²]	15 W	3	14	30	50	120	300	600	—	
	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.	15 W	0.4	1.7	3.9	7.0	15.7	43.7		—
		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		—

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

◇ Load Position



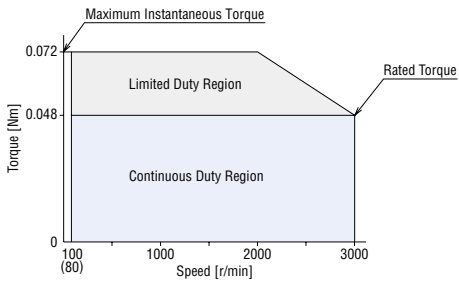
● A number indicating the gear ratio is specified where the box □ is located within the product name.

Speed - Torque Characteristics

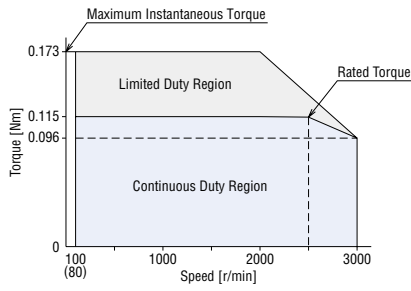
Continuous Duty Region: Continuous operation is possible in this region.

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

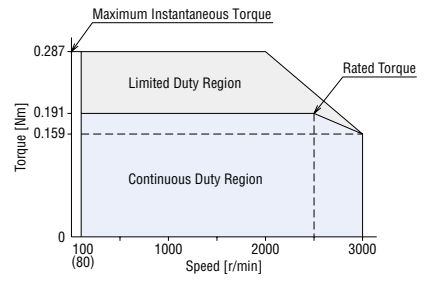
15 W



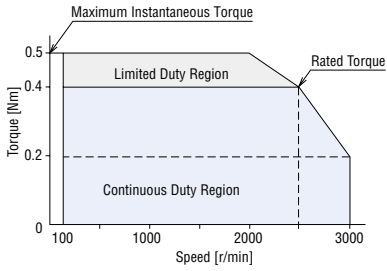
30 W



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			
	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.

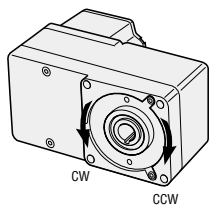
Gear Ratio		5	10	15	20	30	50	100	200	
Output Shaft Speed [r/min]*1	80 r/min	16	8	5.3	4	2.7	1.6	0.8	0.4	
	2500 r/min	500	250	167	125	83	50	25	12.5	
	3000 r/min	600	300	200	150	100	60	30	15	
Permissible Torque [Nm]	30 W	80 to 2500 r/min	0.46	0.98	1.5	2.0	2.9	4.9	9.8	17
		3000 r/min	0.38	0.82	1.2	1.6	2.4	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: [$\times 10^{-4}$ kg m ²]	When Instantaneous Stop or Bi-Directional Operation is performed.	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.

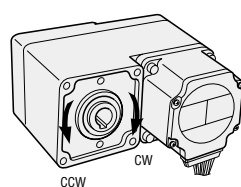
*2 The radial load at each distance can be calculated with a formula. → Page 33

◇ Rotation Direction

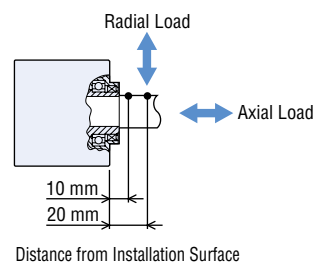
● Front View



● Rear View



◇ Load Position

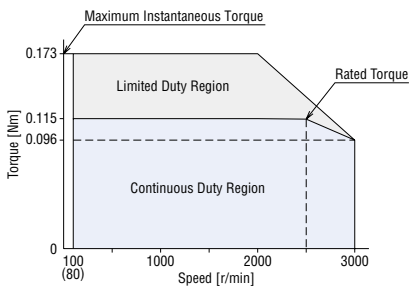


Speed - Torque Characteristics

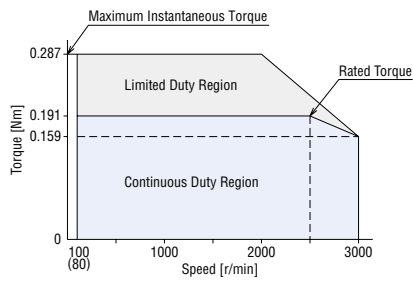
Continuous Duty Region: Continuous operation is possible in this region.

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

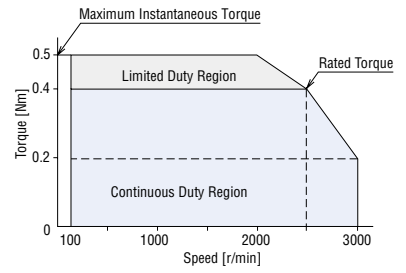
● 30 W



● 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

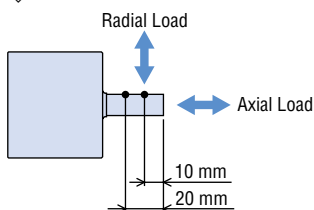


Specifications

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	Rated Voltage	DC 24			
	Permissible Voltage Range	-10 to +10%			
Input	Rated Input Current	0.93	1.9	2.9	6.0
	Maximum Input Current	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	Nm	0.048	0.115	0.191	0.4
Maximum Instantaneous Torque	Nm	0.072	0.173	0.287	0.5
Permissible Radial Load	10 mm from Output Shaft End	50	70	120	160
	20 mm from Output Shaft End	—	100	140	170
Permissible Axial Load		Half of the motor mass or less			
Rotor Inertia J	J: $\times 10^{-4} \text{kg m}^2$	0.032	0.087	0.23	0.61
Permissible Inertia	J: $\times 10^{-4} \text{kg m}^2$	0.5	1.8	3.3	5.6
Speed Regulation	Load	$\pm 0.5\%$ ($\pm 0.2\%$ *) max. [0 to rated torque, at rated speed, at rated voltage, at normal temperature]			
	Voltage	$\pm 0.5\%$ ($\pm 0.2\%$ *) max. [Rated voltage $\pm 10\%$, at rated speed, with no load, at normal temperature]			
	Temperature	$\pm 0.5\%$ ($\pm 0.2\%$ *) max. [Operating ambient temperature 0 to +50°C, at rated speed, with no load, at rated voltage]			

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

◇ Load Position



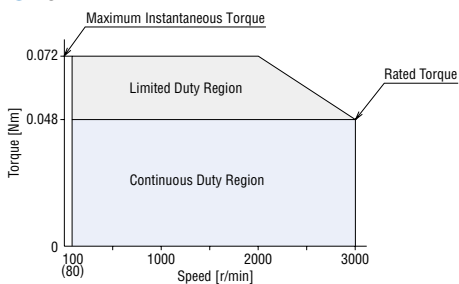
Distance from Output Shaft End

Speed - Torque Characteristics

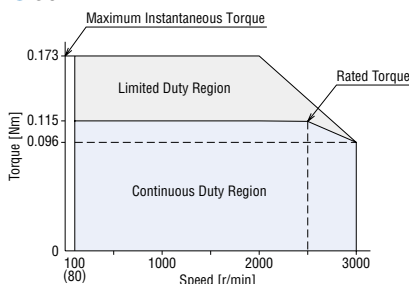
Continuous Duty Region: Continuous operation is possible in this region.

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

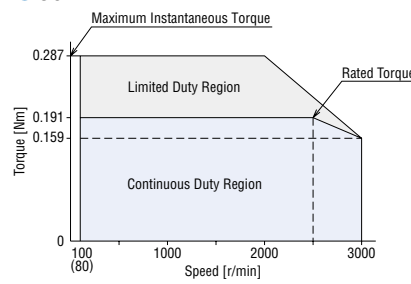
● 15 W



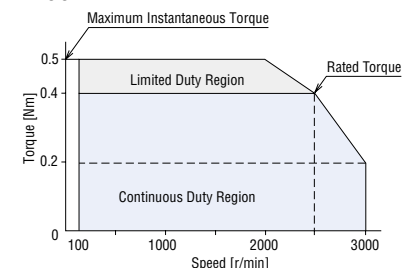
● 30 W



● 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 MEXEO2 support software).
Speed	Setting Range	100 to 3000 r/min (Factory setting: 0 r/min)
	Setting Method	80 to 3150 r/min (Factory setting: 80 r/min)
Acceleration/ Deceleration	Setting Range	<ul style="list-style-type: none"> External speed potentiometer or external DC voltage: 0 to 5 VDC, 1 mA min.*1 VR1
	Setting Method	<ul style="list-style-type: none"> Digital (MEXEO2 support software) External analog setting device (External speed potentiometer or external DC voltage) or PWM input VR1 VR2
Torque Limiting*2	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
	Setting Method	0.1 to 15.0 s (Factory setting: 0.5 s)
Input Signals	Setting Range	0 to 200% (Factory setting: 200%)
	Setting Method	<ul style="list-style-type: none"> Digital (MEXEO2 support software) External analog setting device (External speed potentiometer or external DC voltage) or PWM input VR1 VR2
Output Signals	Setting Range	C-MOS Negative Logic Input
	Setting Method	C-MOS Negative Logic Input
Protective Function*3	Setting Range	Custom 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
	Setting Method	Transistor and open-collector output
Information	Setting Range	15 W, 30 W, 50 W: SPEED-OUT, ALM-B 100 W: SPEED, ALARM
	Setting Method	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
Maximum Extension Length	Setting Range	When the alarm is triggered, 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.
	Setting Method	When the alarm is triggered, 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 MEXEO2 support software.
Time Rating	Setting Range	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)
	Setting Method	100 W: Overload (2 times), Sensor error (3 times), Overvoltage (4 times), Undervoltage (5 times), Overspeed (6 times)
Information	Setting Range	The information monitor displays the settings for the MEXEO2 support software. When the information appears, the INFO output turns on and the PWR/ALM LED flashes orange. The motor continues to operate.
	Setting Method	–
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 non-standard 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 non-standard 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)

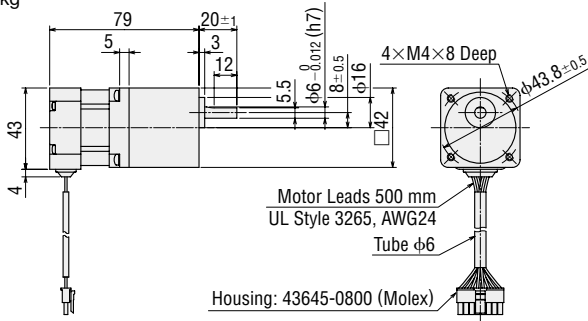
- Installation screws are included with the parallel shaft gearhead. Installation screws → Page 25
- A number indicating the gear ratio is specified where the box □ is located within the product name.

● Motor

◇ Geared Type 15 W

BLHM015K-□

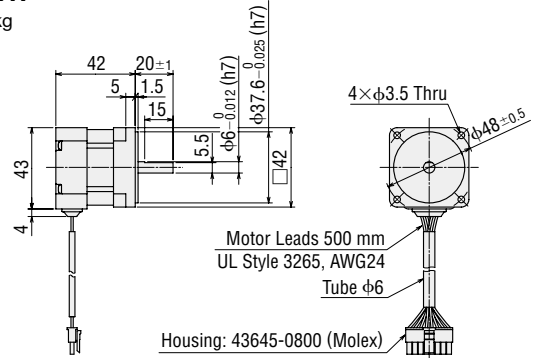
Mass: 0.5 kg



◇ Round Shaft Type 15 W

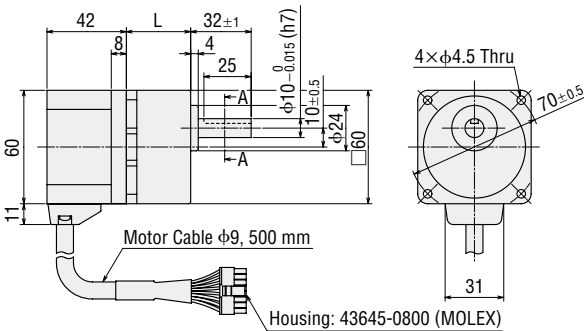
BLHM015K-A

Mass: 0.25 kg

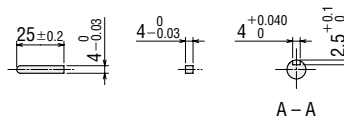


◇ Parallel Shaft Gearhead GFS Gear 30 W

Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass [kg]
BLHM230K-□	BLHM230K-GFS	GFS2G□	5 to 20	34	1.0
			30 to 100	38	
			200	43	



◇ Key and Key Slot (Included)



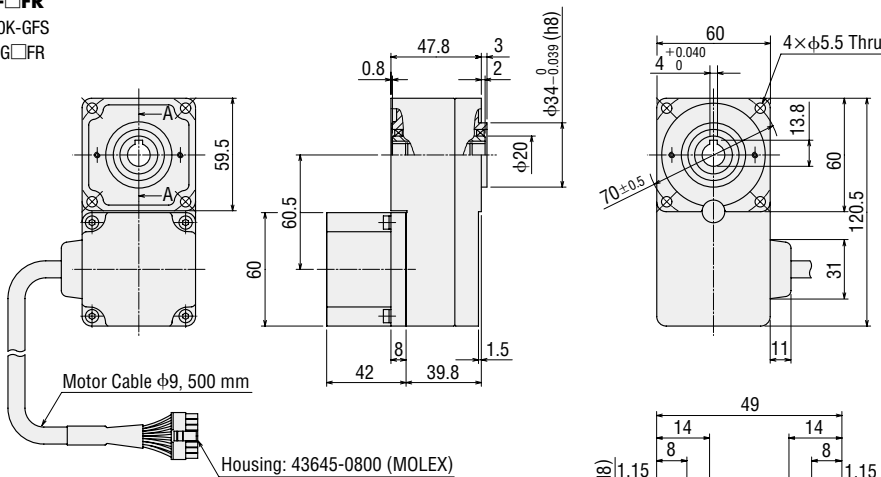
◇ Hollow Shaft Flat Gearhead FR Gear 30 W

BLHM230K-□FR

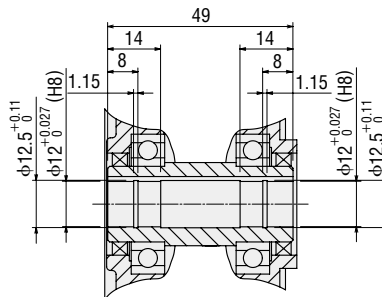
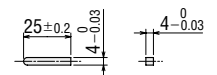
Motor: BLHM230K-GFS

Gearhead: GFS2G□FR

Mass: 1.3 kg



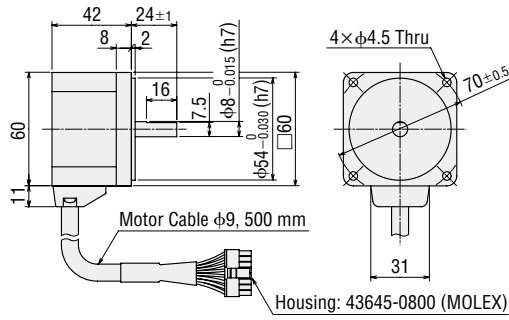
◇ Key (Included)



◇ Round Shaft Type 30 W

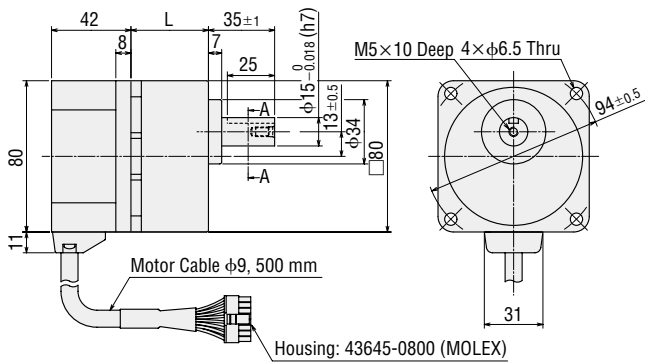
BLHM230K-A

Mass: 0.5 kg

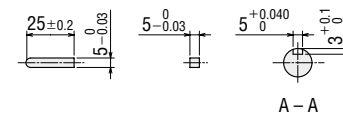


◇ Parallel Shaft Gearhead **GFS** Gear 50 W

Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass [kg]
BLHM450KC-□	BLHM450K-GFS	GFS4G□	5 to 20	41	1.8
			30 to 100	46	
			200	51	



◇ Key and Key Slot (Included)



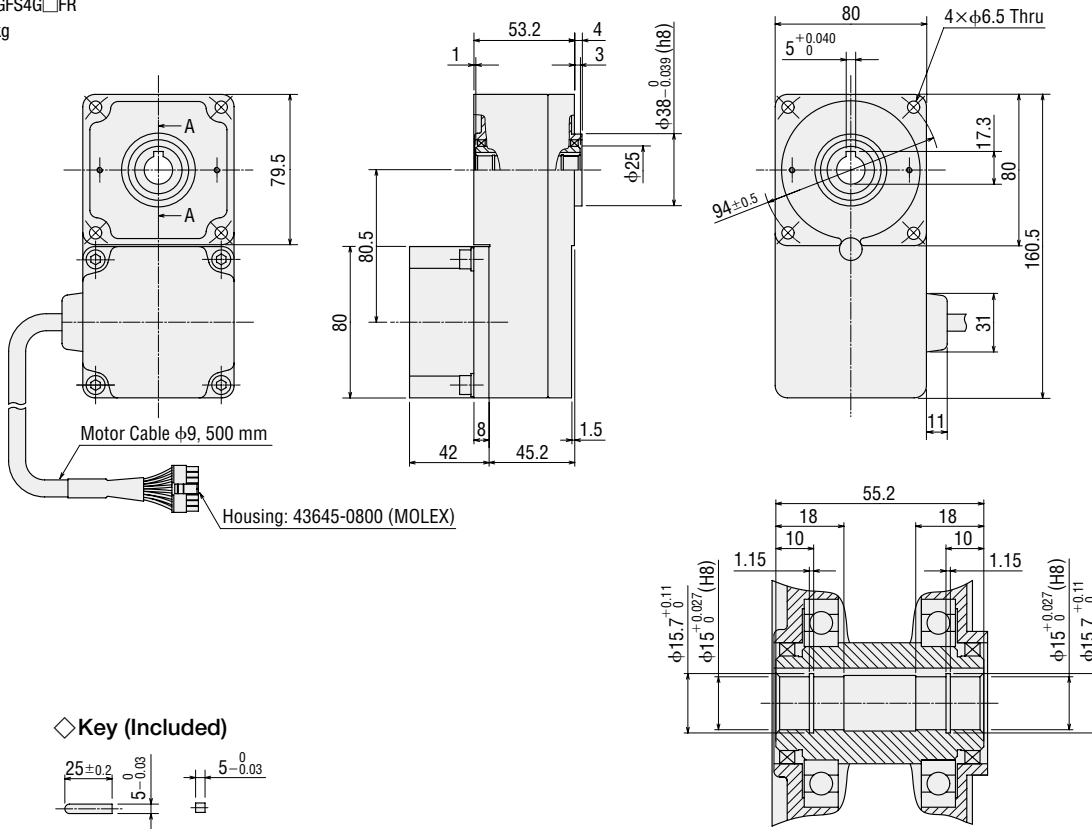
◇ Hollow Shaft Flat Gearhead **FR** Gear 50 W

BLHM450K-□FR

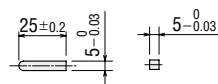
Motor: BLHM450K-GFS

Gearhead: GFS4G□FR

Mass: 2.4 kg



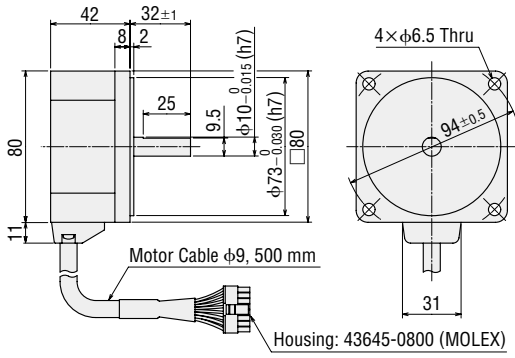
◇ Key (Included)



◇ Round Shaft Type 50 W

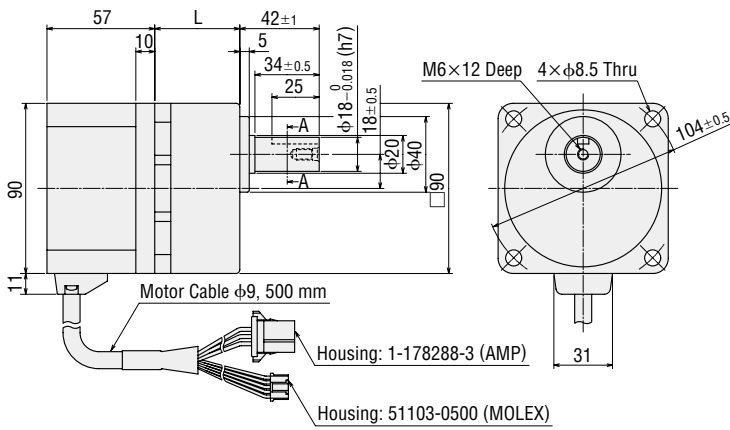
BLHM450K-A

Mass: 0.8 kg

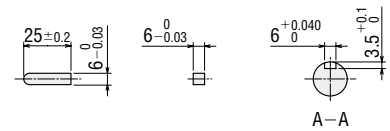


◇ Parallel Shaft Gearhead **GFS** Gear 100 W

Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass [kg]
BLHM5100K -□	BLHM5100K-GFS	GFS5G□	5 to 20	45	2.9
			30 to 100	58	
			200	64	



◇ Key and Key Slot (Included)



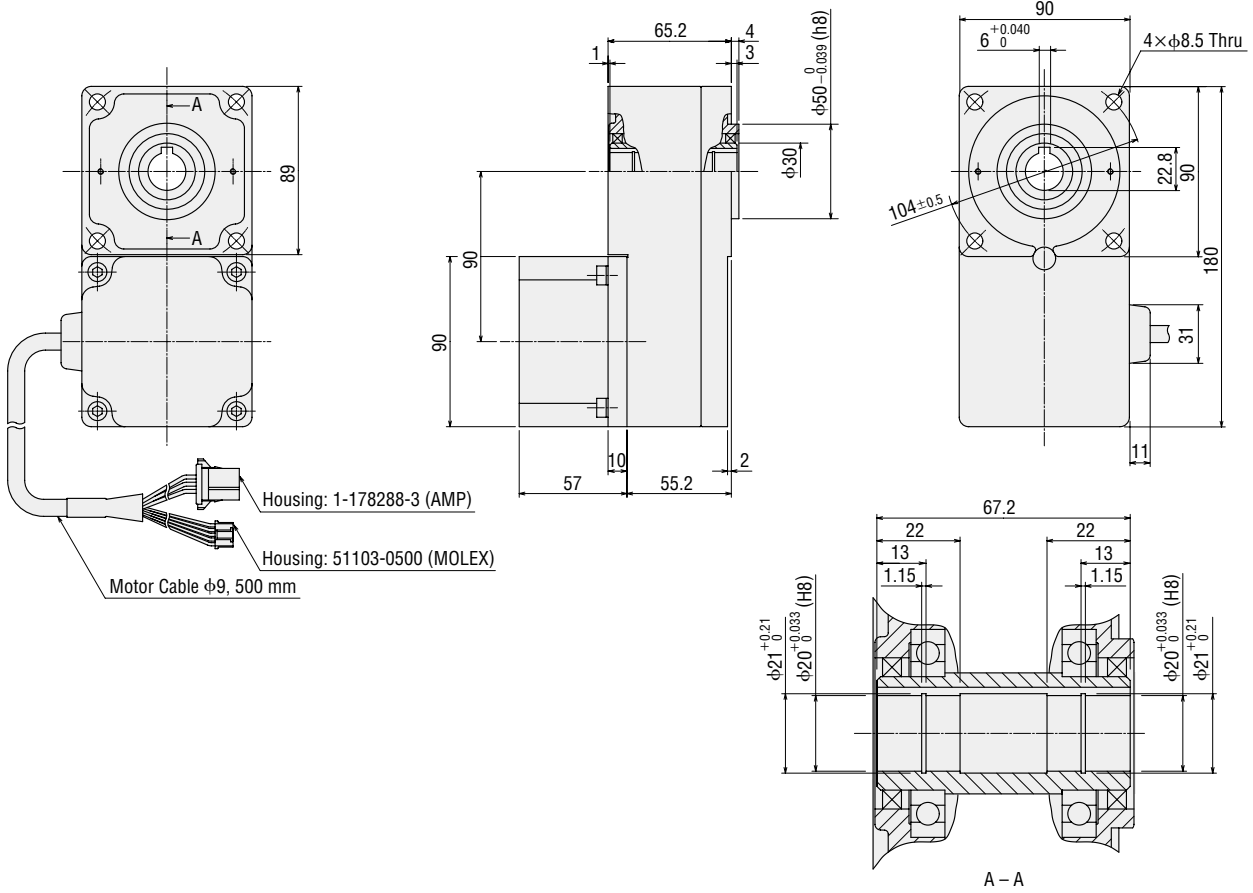
◇ Hollow Shaft Flat Gearhead **FR Gear 100 W**

BLHM5100K-□FR

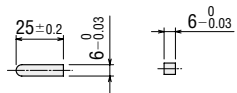
Motor: BLHM5100K-GFS

Gearhead: GFS5G□FR

Mass: 3.6 kg



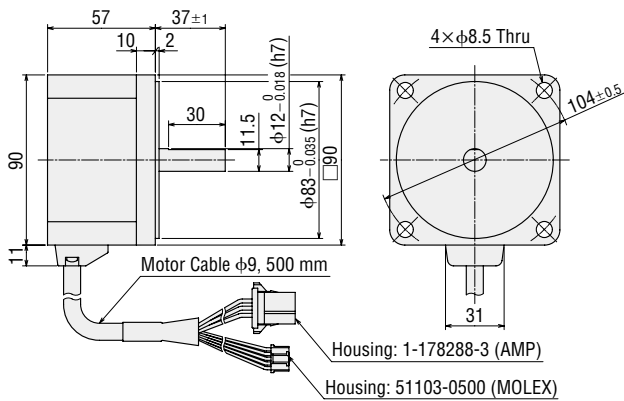
◇ Key (Included)



◇ Round Shaft Type 100 W

BLHM5100K-A

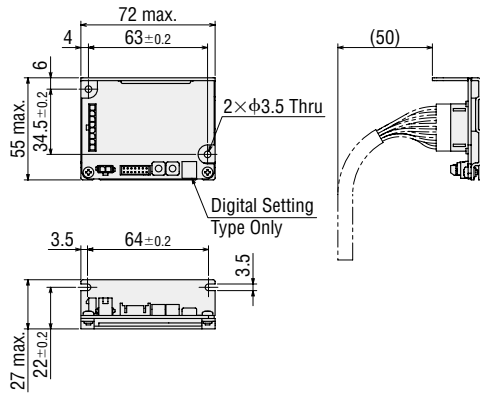
Mass: 1.4 kg



● Driver

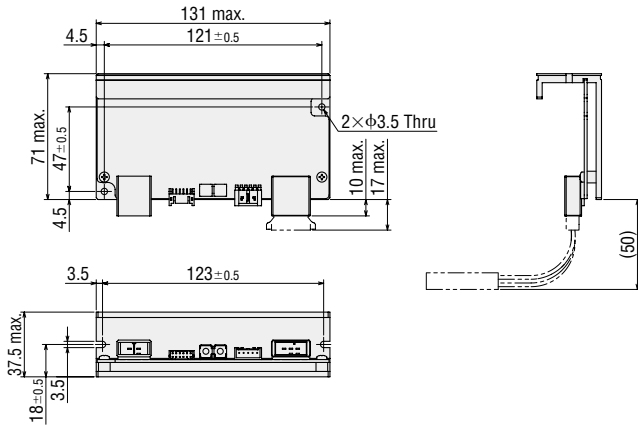
◇ 15 W, 30 W, 50 W

BLH2D15-K, BLH2D30-K, BLH2D50-K
BLH2D15-KD, BLH2D30-KD, BLH2D50-KD
 Mass: 46 g



◇ 100 W

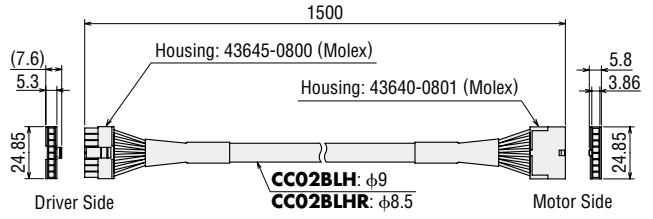
BLHD100K
 Mass: 0.3 kg



● Connection Cable, Flexible Connection Cable

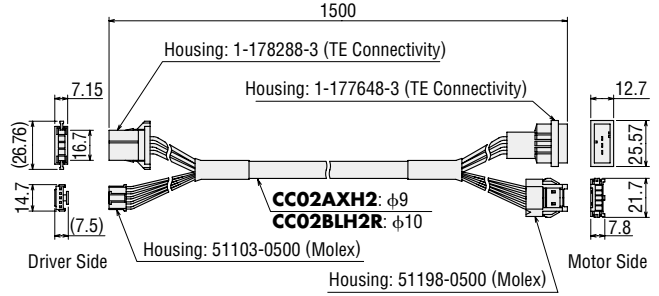
◇ 15 W, 30 W, 50 W

CC02BLH / CC02BLHR



◇ 100 W

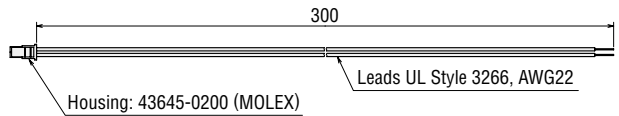
CC02AXH2 / CC02BLH2R



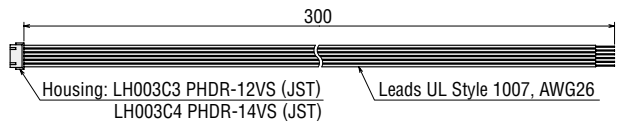
● Power Supply Cable and I/O Signal Cable Set (For 15 W, 30 W, 50 W)

Driver Type	Product Name	I/O Signal Cable
Analog Setting Type	LH5003CC	LH003C3
Digital Setting Type	LH5003CD	LH003C4

◇ Power Supply Cable

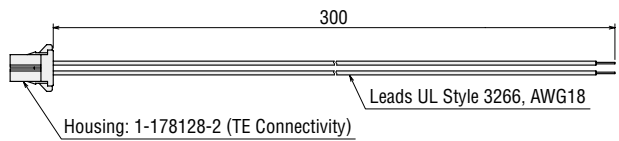


◇ I/O Signal Cable



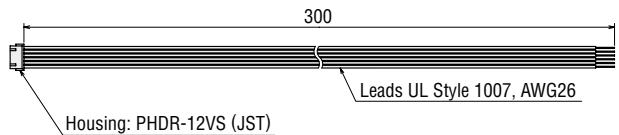
● Power Supply Cable (For 100 W, Included)

LH003C2



● I/O Signal Cable (For 100 W, Included)

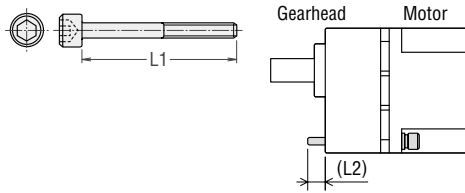
LH003C3



● Dimensions for Installation Screws

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

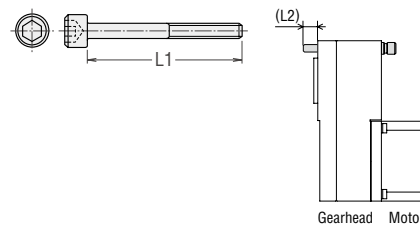
◇ Parallel Shaft Gearhead



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 pieces each of flat washers, spring washers, and hexagonal nuts are included.

◇ Hollow Shaft Flat Gearhead

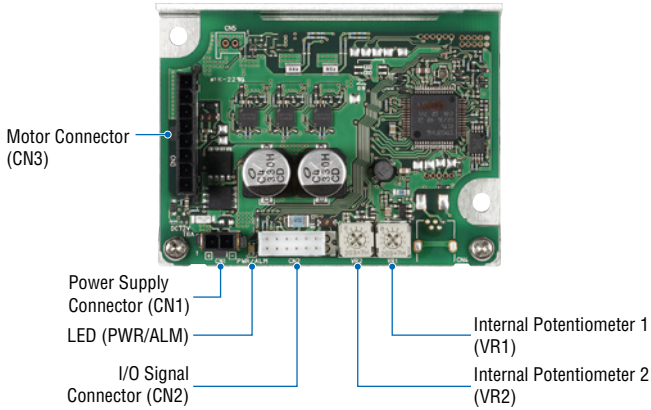


Product Name	Gear Ratio	Installation Screws		L2 [mm]
		Screw Size	L1 [mm]	
GFS2G □ FR	5 to 200	M5	65	15
GFS4G □ FR	5 to 200	M6	70	14
GFS5G □ FR	5 to 200	M8	90	21

● Installation Screws: 4 pieces each 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



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.

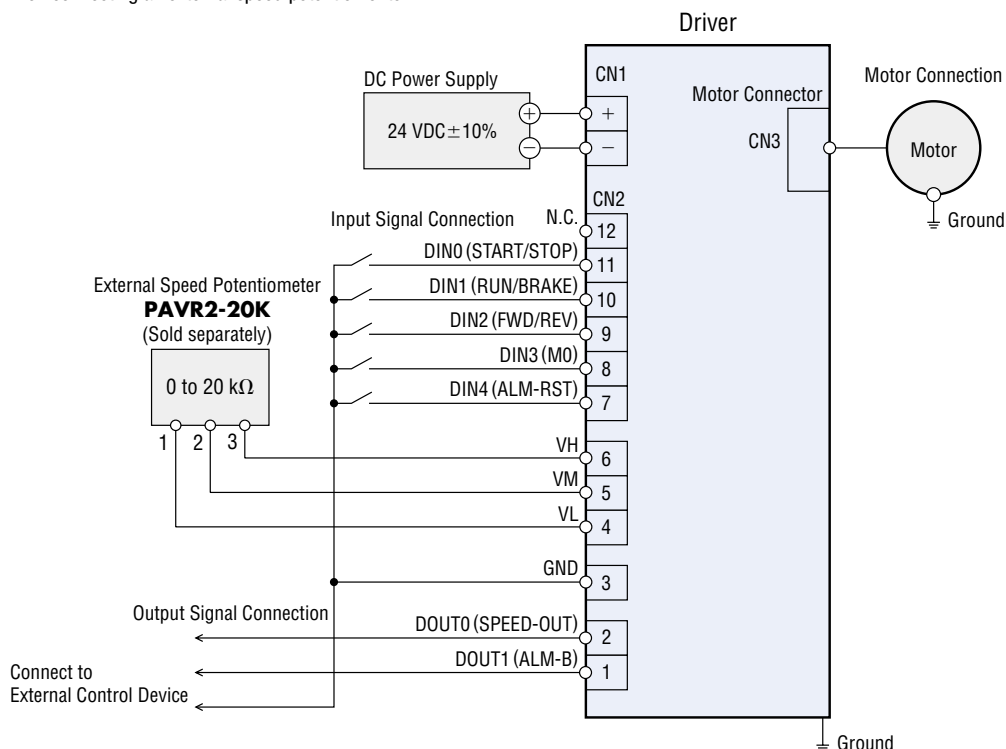
I/O Signal Connector (CN2)

Pin No.	Colour 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

Connection example when connecting an external speed potentiometer.



Run/Stop

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

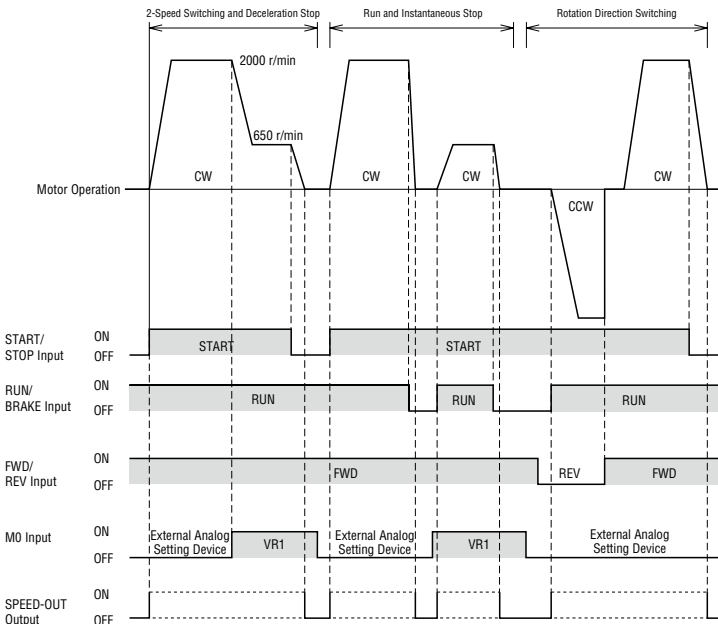
When the RUN/BRAKE Input is shut off during deceleration, the motor will stop instantaneously.

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

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

	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



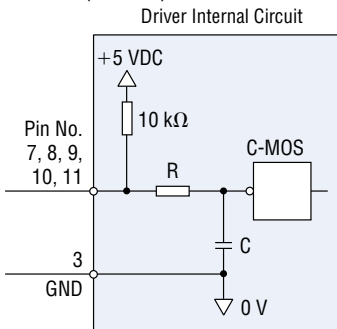
- **START/STOP Input, RUN/BRAKE Input**
When the START/STOP and RUN/BRAKE inputs are both turned ON, the motor will run. When the START/STOP Input is shut OFF during operation, the motor will execute a decelerated stop in accordance with the settings on the internal potentiometer (VR2). When the RUN/BRAKE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

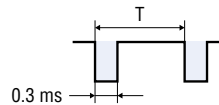


◇ SPEED-OUT

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.

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

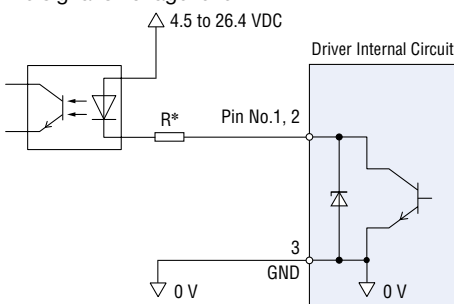
$$\text{Motor Speed [r/min]} = \frac{\text{Frequency of SPEED-OUT [Hz]} \times 60}{30}$$



◇ 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.



◇ 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.

* 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)

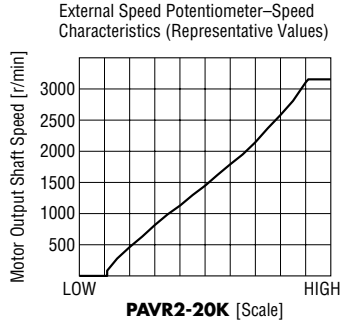
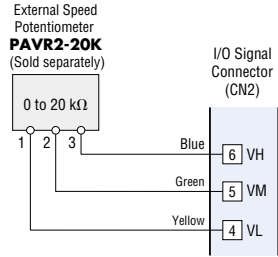
Speed Setting Methods

The motor speed can be set using an external analog setting device (An external speed potentiometer or external DC voltage) or VR1. It is possible to switch between external analogue speed setting and VR1, depending on whether the M) 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.

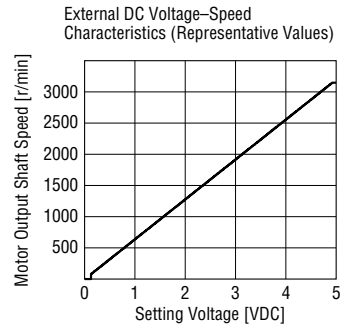
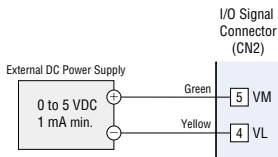


Note

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.

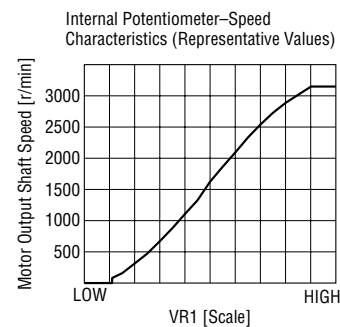
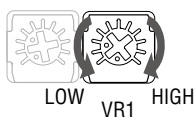


Note

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



Note

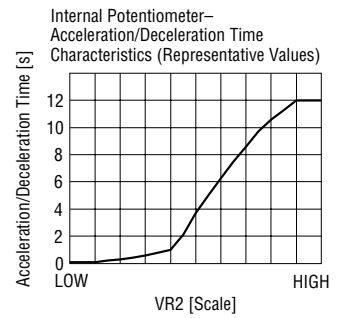
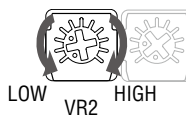
The speed in the graph represents the speed of the motor alone. The gear output shaft speed is calculated by dividing the gear ratio.

Setting the Acceleration and Deceleration Rates

For the acceleration rate, set the time it takes the motor to move from a resting state to the set speed. For the deceleration rate, set the time it takes for the motor to move from a set speed to rest. (Acceleration and deceleration have shared settings)

Factory setting: 0.1 s

VR2 settings



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

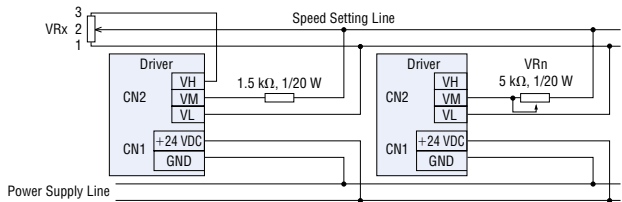
When using an external speed potentiometer (VRx), no more than ten motors should be operated simultaneously.

Resistance value when the number of drivers is n:

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

$$\text{acceptable loss (W)} = n/20$$

Example: When two drivers are used, the resistance is 10 kΩ,

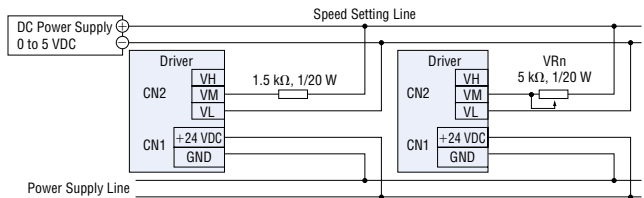


When Using an External DC Voltage

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

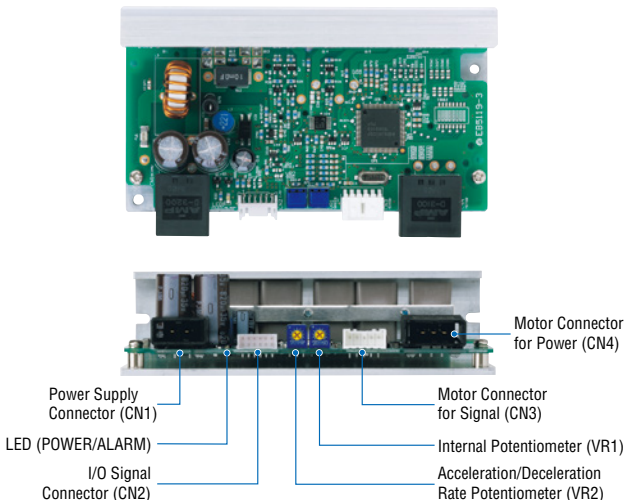
Current capacity (mA) when the number of drivers is n: 1 mA × n

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	Used to set the speed (M0 input: ON)	
Acceleration/Deceleration Rate Potentiometer	VR2	Used to set the acceleration and deceleration rate.	

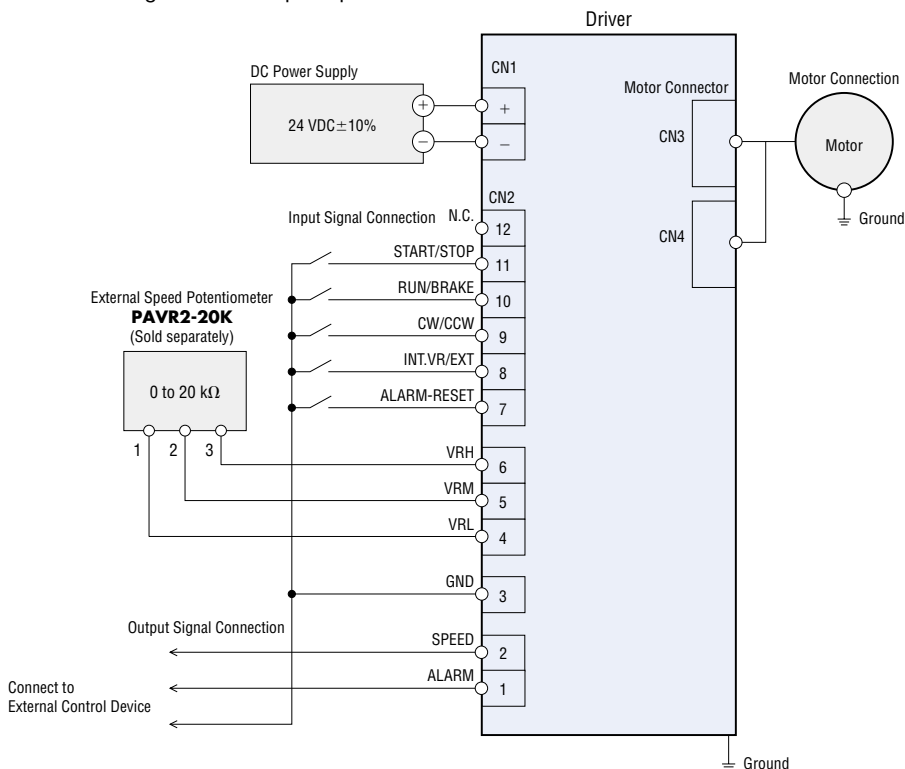
I/O Signal Connector (CN2)

Pin No.	Colour 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 rate 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 rate. 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	
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

Connection example when connecting an external speed potentiometer.



● Run/Stop

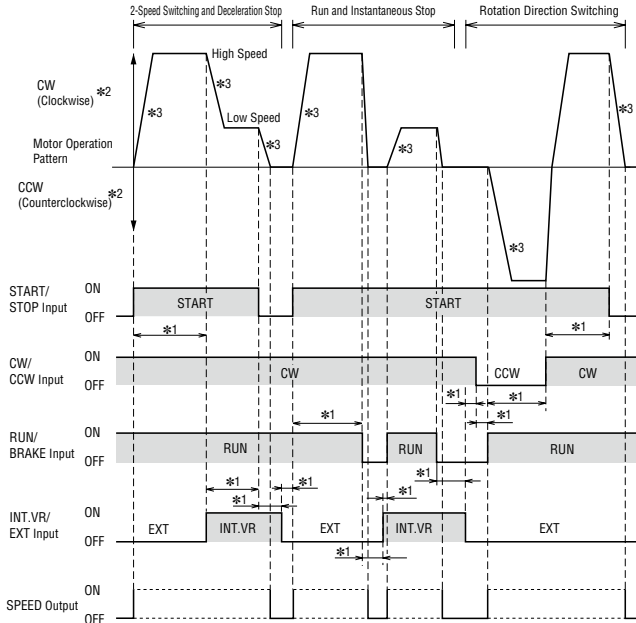
Operate the motor with the START/STOP and RUN/BRAKE inputs.

	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 rate set in the acceleration/deceleration rate potentiometer.

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

◇ Example of Operating Pattern



*1 10 ms min.

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

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

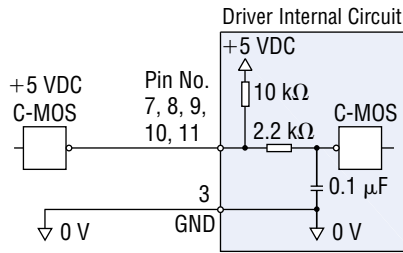
● I/O Signal Circuit

◇ Input Signal Circuit

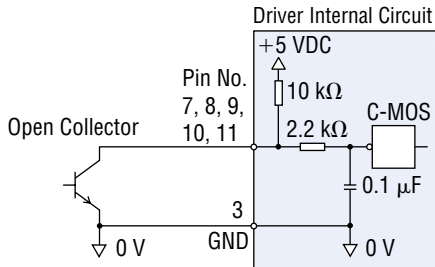
The driver's signal input uses the C-MOS input method.

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

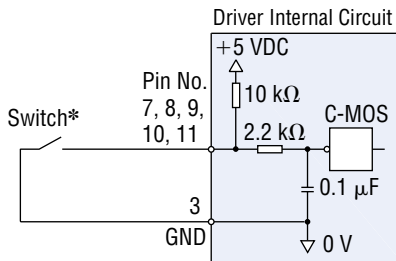
● External control device output: 5 VDC C-MOS



● External control device output: Open-collector output



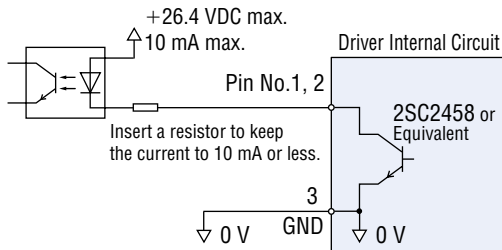
● Switch Connection



*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.



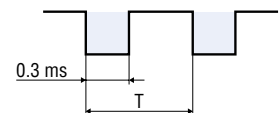
◇ SPEED Output

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.

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

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



◇ 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.

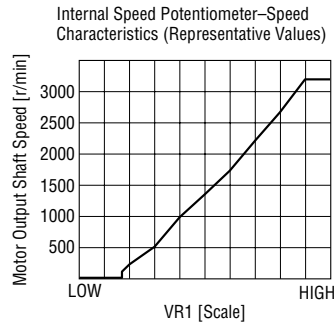
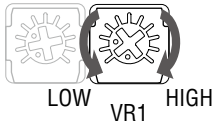
- Turn the ALARM-RESET input from ON to OFF. (Active at OFF edge)
- Restart the power.

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

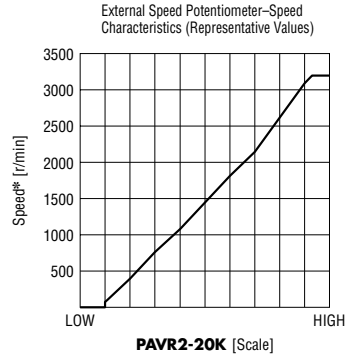
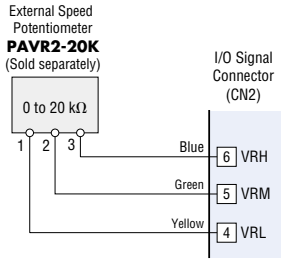


Note

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.

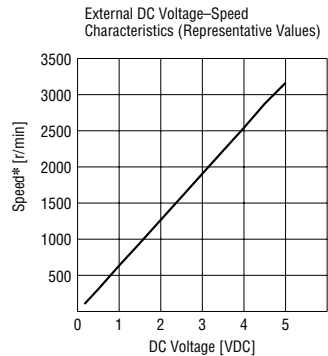
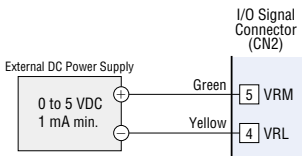


Note

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.



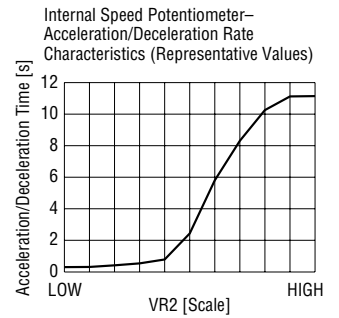
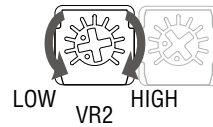
Note

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 Rates

For the acceleration rate, set the time it takes the motor to move from a resting state to a rated speed. For the deceleration rate, 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



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

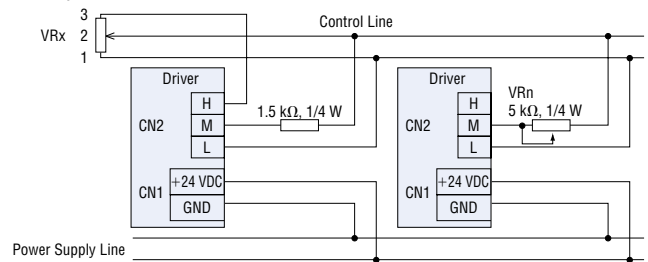
When using an external speed potentiometer (VRx), no more than five motors should be operated simultaneously.

Resistance value when the number of drivers is n:

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

$$\text{acceptable loss (W)} = n/20$$

Example: 10 kΩ, 1/2 W for 2 drivers.

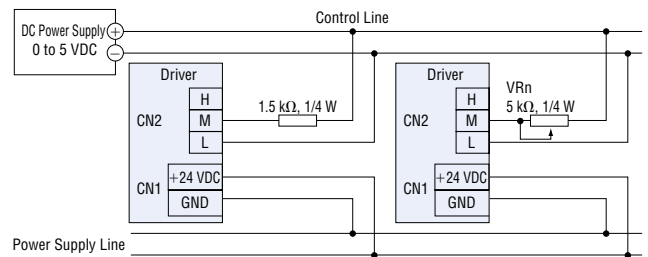


When Using an External DC Voltage

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

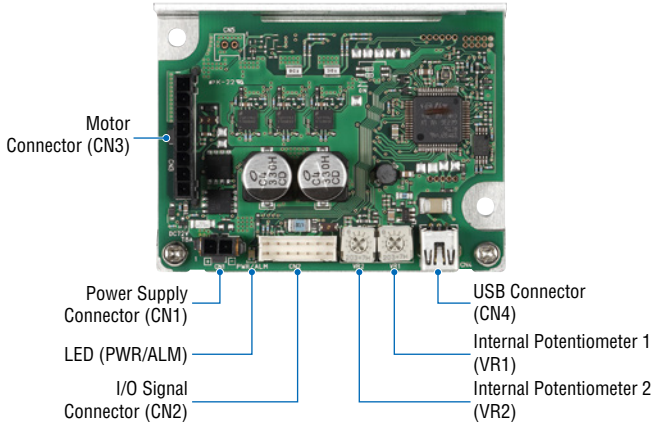
Current capacity (mA) when the number of drivers is n: 1 mA × n

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 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	Used to set the operation data. Factory setting: The rotation speed in the operation data No.1 can be set.
	VR2	Used 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 **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 rate 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 rate. 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 on the motor rotation direction. (It is turned ON when the motor rotates in the forward direction.)

USB Cable (CN4)

•USB Cable Specifications	
Specifications	USB 2.0 (Full Speed)
Cable	Length: 3 m max.
	Shape: A to mini-B

*1 Shown in brackets [] are signals 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 **MEXE02**.

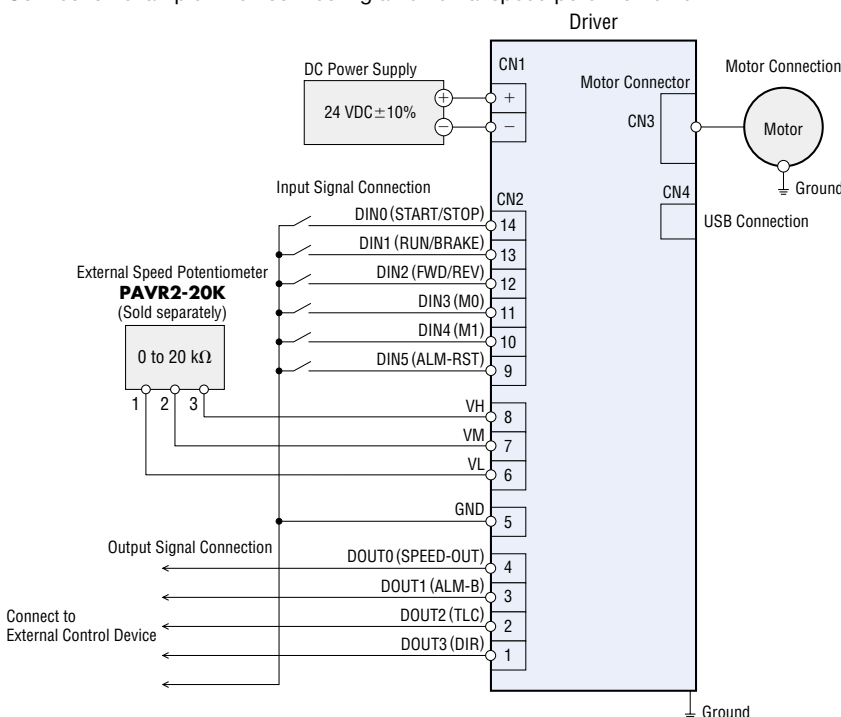
*2 The rotation direction of the output shaft varies depending on the gear ratio of the gearhead.

*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 **MEXE02**.

Connection Diagrams

Connection example when connecting an external speed potentiometer.



For detailed information and handling precautions of this product, see the Operation Manual. The Operation 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.

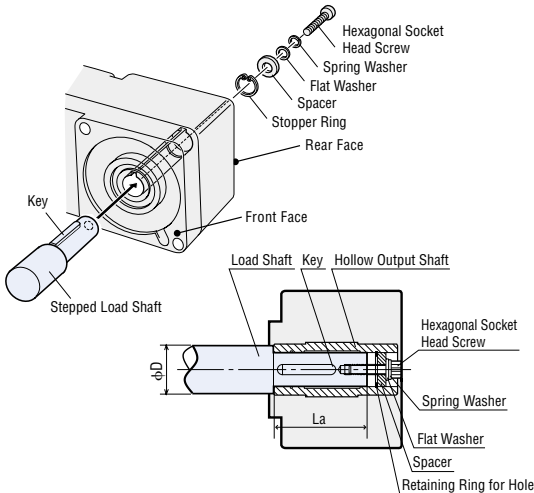
Note

- When installing the load shaft to the hollow output shaft, be careful not to damage the hollow output shaft or bearing.
- To prevent seizing, 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

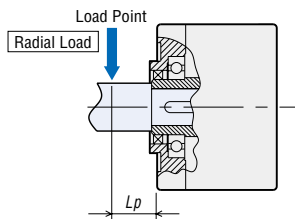


Permissible Radial Load Calculation of the Hollow Shaft Type

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

L_p [mm]: Distance from Flange-Mounting Surface to Radial Load Point

B [mm]: Distance from Flange-Mounting Surface to Bearing Unit

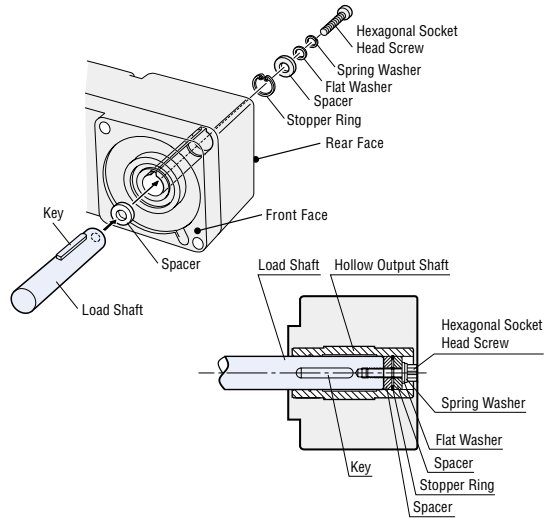
Product Name	Permissible Radial Load W [N]	
GFS2G□FR	W [N]=	36
		$36 + L_p$
GFS4G□FR	W [N]=	40
		$40 + L_p$
GFS5G□FR	W [N]=	50
		$50 + L_p$

$\times F_0$ [N]

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 to the load shaft.

Example of Front Face Installation



Recommended Load Shaft Installation Dimensions

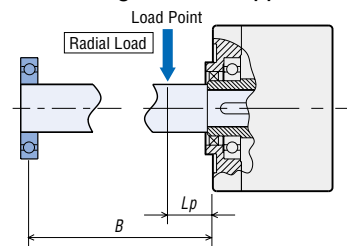
Unit: mm

Product Name	GFS2G□FR	GFS4G□FR	GFS5G□FR
Inner Diameter of Hollow Shaft (H8)	$\phi 12_{-0}^{+0.027}$	$\phi 15_{-0}^{+0.027}$	$\phi 20_{-0}^{+0.033}$
Shaft Diameter of Load Shaft (h7)	$\phi 12_{-0.018}^0$	$\phi 15_{-0.018}^0$	$\phi 20_{-0.021}^0$
Screw Size	M4	M5	M6
Spacer Thickness*	3	4	5
Nominal Hole Diameter of Retaining Ring	$\phi 12$ (C-Shaped)	$\phi 15$ (C-Shaped)	$\phi 20$ (C-Shaped)
Outer Diameter of Stepped Shaft ϕD	20	25	30
Stepped Shaft L_a Length	39	43	52

*Determine the spacer thickness in line with the table. If the spacer is thicker than the specified dimensions, the screw head may protrude 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]=	B
		$B - L_p$

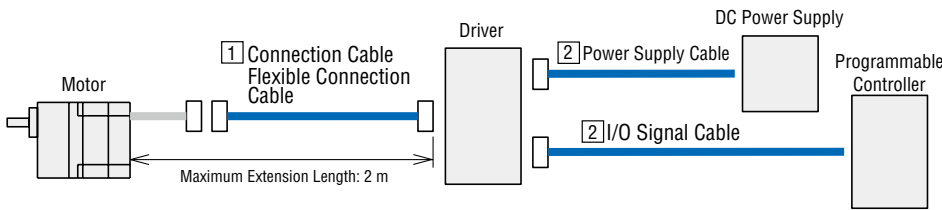
$\times F_0$ [N]

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

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

Cables and Accessories (Sold Separately)

Cable System Configuration



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



Output Power [W]	Product Name	Length	List Price
15	CC02BLH	1.5 m	47.00 €
30			
50			
100	CC02AXH2		42.00 €

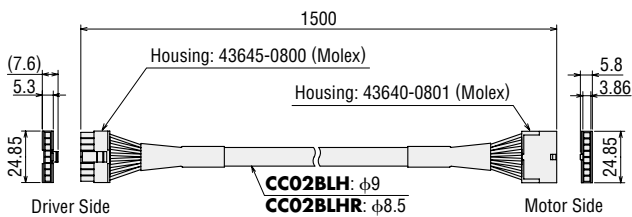
Flexible Connection Cables



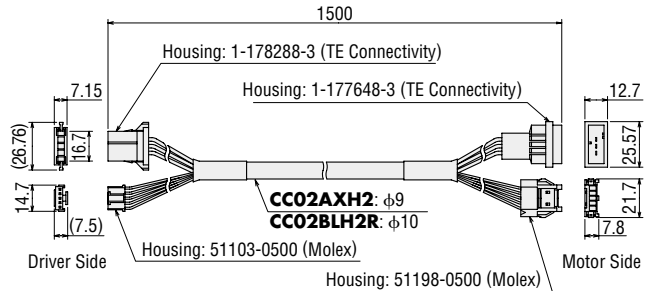
Output Power [W]	Product Name	Length	List Price
15	CC02BLHR	1.5 m	85.00 €
30			
50			
100	CC02BLH2R		90.00 €

Dimensions (Unit: mm)

CC02BLH / CC02BLHR



CC02AXH2 / CC02BLH2R



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.

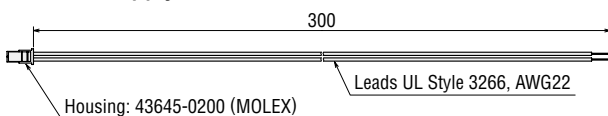
Product Line



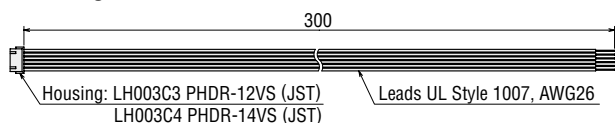
Driver Type	Product Name	List Price
Analog Setting Type	LH5003CC	6.50 €
Digital Setting Type	LH5003CD	8.00 €

Dimensions (Unit: mm)

Power Supply Cable



I/O Signal Cable



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	List Price
BLHM015	Uniform Load	MCL20	30.00 €
	Impact Load		
BLHM230	Uniform Load	MCL30	36.00 €
	Impact Load		
BLHM450	Uniform Load	MCL40	55.00 €
	Impact Load	MCL55	72.00 €
BLHM5100	Uniform Load	MCL55	72.00 €
	Impact Load		

Motor / Gearhead Mounting Brackets

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



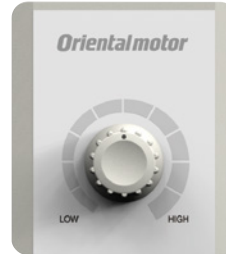
Product Name	Applicable Product	List Price
SOLOB	BLHM015K-□	20.00 €
SOLOM3	BLHM015K-A	20.00 €
SOL2M4	BLHM230K-□, BLHM230K-A	24.00 €
SOL4M6	BLHM450K-□, BLHM450K-A	28.00 €
SOL5M8	BLHM5100K-□, BLHM5100K-A	30.00 €

- 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.
- 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	List Price
PAVR2-20K	17.00 €

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 mm²)

DIN Rail Mounting Plates

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



Product Line

Product Name	Applicable Product	List Price
MADP01	BLH2D15-K, BLH2D15-KD, BLH2D30-K, BLH2D30-KD, BLH2D50-K, BLH2D50-KD	7.00 €
MADP02	BLHD100K	19.00 €

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

<http://www.orientalmotor.eu>

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.eu>



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".
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These products are manufactured at plants certified with the international standards **ISO 9001** (for quality assurance) and **ISO 14001** (for systems of environmental management).

Specifications are subject to change without notice. This catalogue was published in September 2019.

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