

Speed Control Motors

Brushless Motors

DC Power-Supply Input

BLH Series

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AC Input BLF
AC Input BLU
DC Input BLH
US AC Speed Control Motors
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Brushless Motor and Driver Package BLH Series

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This series combines an optimum slim body, high power brushless motor with a 24 VDC board type driver to meet your space saving needs with equipment.

The speed control range is 100 to 3000 r/min. Choose from a wide variety of outputs of 15 W to 100 W for your specific application.



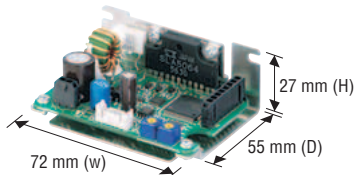
● For detailed product safety standard information including standards, file number and certification body, please visit www.orientalmotor.eu.



Features

● Compact Board Type Driver

The models with outputs of 15 to 50 W adopt a compact, board type driver smaller than the size of a business card. This will certainly help for downsizing of your equipment.



The 100 W driver has dimensions of 71 mm (D) × 131 mm (W) × 37.5 mm (H).

◇ Expanded Driver Functions

These compact models are packed with a full range of functions.

- Instantaneous Stop
- Speed Control by Potentiometer
- Speed Control by DC Voltage
- Acceleration Time/Deceleration Time
- Alarm Output

● Speed Control Range

100 to 3000 r/min (Speed ratio 1:30)

● Excellent Speed Stability

Excellent speed stability characteristics with very little speed fluctuation are achieved as speed regulation with respect to the load is $\pm 0.5\%$ or less. Even if the load fluctuates, there is almost no speed fluctuation due to the load like with inverters.

● Wide Variety of Products

Available motor outputs vary from compact 15 W models to high power 100 W models.

In addition, three types including parallel shaft gearheads, hollow shaft gearheads and round shafts are available.

Output Power	15 W	30 W	50 W	100 W
Frame Size	□42 mm	□60 mm	□80 mm	□90 mm
Power Supply Voltage	24 VDC			
Type	●	●	●	●
Parallel Shaft Gearhead	●	●	●	●
Hollow Shaft Flat Gearhead	●	●	●	●
Round Shaft	●	●	●	●

● IP65 Motor Structure*

The motor is protected against water intrusion, should water come into contact with the motor.

*IP40 for 15 W motor

- The motor must not be washed with water, and is not suitable for use in an environment where it constantly comes into contact with water.

● Features of Gearheads

◇ Long Life Gearhead Rated Life of 10000 Hours*

The rated life of the parallel shaft gearhead and hollow shaft flat gearhead is 10000 hours. The parallel shaft gearhead achieves a long life that is twice as long as that of a conventional model.

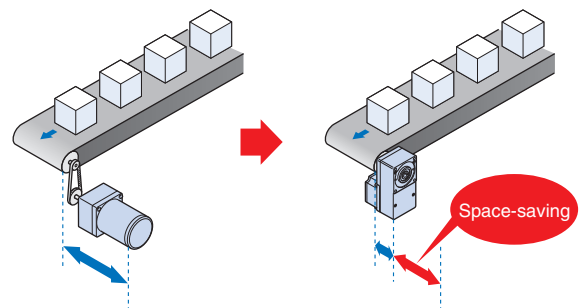
*5000 hours for gearhead equipped with 15 W geared motor. For the rated life time definition, refer to "Service Life of Gearheads" on page G-35.

- The parallel shaft gearhead for 50 W and 100 W models has a tapped hole at the shaft end.

◇ Features of Hollow Shaft Flat Gearhead

● Achieves Space Saving

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

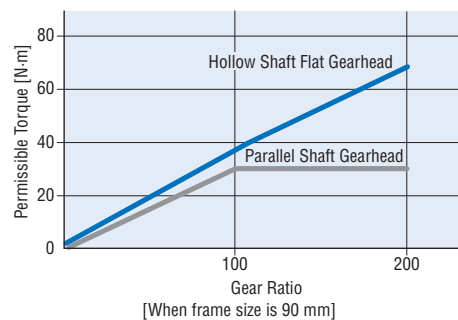


[For Three-Phase Motor and Parallel Shaft Gearhead]

[For Brushless Motor and Hollow Shaft Flat Gearhead]

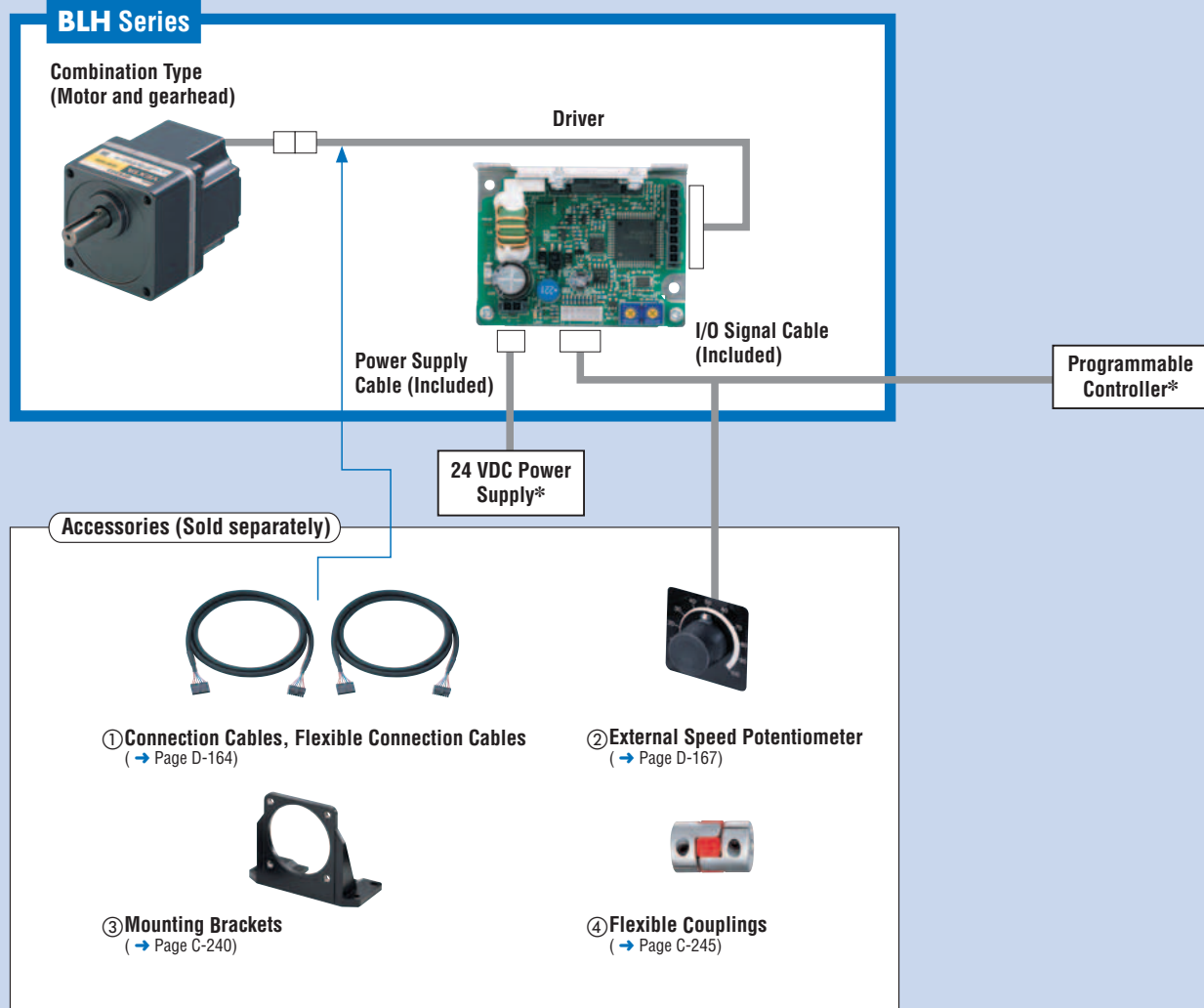
● Permissible Torque without Saturation

The hollow shaft flat gearhead enables permissible torque without saturation even at high gear ratios. The motor torque can be fully utilized.



System Configuration

*Not supplied



Number	Name	Overview
①	Connection Cables	Cable for extending the wiring distance between the motor and driver (1.5 m).
	Flexible Connection Cables	Cable offering flexibility, used to extend the wiring distance between the motor and driver (1.5 m).
②	External Speed Potentiometer	Used to set and adjust the speed of the speed control motor (PAVR-20KZ).
③	Mounting Brackets	Dedicated mounting bracket for the motor and gearhead.
④	Flexible Couplings	Clamp type coupling for connecting the motor/gearhead shaft with the driven shaft.

System Configuration Example

BLH Series Combination Type - Parallel Shaft BLH450KC-30	+	Sold Separately			
		Connection Cable (1.5 m) CC02BLH	External Speed Potentiometer PAVR-20KZ	Mounting Bracket SOL4M6	Flexible Coupling MCL551515

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

Product Number Code

BLH 2 30 K C - 5 FR

① ② ③ ④ ⑤ ⑥ ⑦

①	Series Name	BLH: BLH Series
②	Motor Frame Size	0: 42 mm 2: 60 mm 4: 80 mm 5: 90 mm
③	Output Power (W)	(Example) 30: 30 W
④	Power Supply Voltage	K: 24 VDC
⑤	C: Cable Type	
⑥	Gear Ratio, Motor Shaft Type	Number: Gear ratio for combination types : 8 types from 5 to 200 Gear ratio for geared types : 7 types from 5 to 100 A: Round Shaft Type
⑦	Blank: Combination Type - Parallel Shaft Gearhead FR: Combination Type - Hollow Shaft Flat Gearhead	

Product Line

Combination Type	This type comes with the motor and its dedicated gearhead pre-assembled. This simplifies installing in equipment. Motors and gearheads are also available separately to facilitate changes in motor and gearhead combinations and if spare gearheads are required.
Geared Type	This type has an integrated motor and gearhead. The combination of motor and gearhead cannot be changed.

Geared Types/Combination Types - Parallel Shaft Gearheads

Type	Output Power	Product Name	Gear Ratio
Geared Type	15 W	BLH015K-□	5, 10, 15, 20, 30, 50, 100
	30 W	BLH230KC-□	5, 10, 15, 20, 30, 50, 100, 200
Combination Type	50 W	BLH450KC-□	5, 10, 15, 20, 30, 50, 100, 200
	100 W	BLH5100KC-□	5, 10, 15, 20, 30, 50, 100, 200

The following items are included in each product.
Motor, Driver, Gearhead, I/O Signal Cable, Power Supply Cable, Mounting Screws*1, Parallel Key*2, Operating Manual
*1 Combination type only
*2 Products with a key slot on the output shaft only

Combination Types - Hollow Shaft Flat Gearheads

Output Power	Product Name	Gear Ratio
30 W	BLH230KC-□FR	5, 10, 15, 20, 30, 50, 100, 200
50 W	BLH450KC-□FR	5, 10, 15, 20, 30, 50, 100, 200
100 W	BLH5100KC-□FR	5, 10, 15, 20, 30, 50, 100, 200

The following items are included in each product.
Motor, Driver, Gearhead, I/O Signal Cable, Power Supply Cable, Mounting Screws, Parallel Key, Safety Cover (Screws included), Operating Manual

Round Shaft Types

Output Power	Product Name
15 W	BLH015K-A
30 W	BLH230KC-A
50 W	BLH450KC-A
100 W	BLH5100KC-A

The following items are included in each product.
Motor, Driver, I/O Signal Cable, Power Supply Cable, Operating Manual

Specifications

15 W, 30 W, 50 W, 100 W (RoHS)



Product Name	Geared Type/Combination Type - Parallel Shaft Gearhead		BLH015K-□	BLH230KC-□	BLH450KC-□	BLH5100KC-□
	Combination Type - Hollow Shaft Flat Gearhead		-	BLH230KC-□FR	BLH450KC-□FR	BLH5100KC-□FR
	Round Shaft Type		BLH015K-A	BLH230KC-A	BLH450KC-A	BLH5100KC-A
Rated Output Power (Continuous)	W	15	30	50	100	
Power Supply Input	Rated Voltage	24 VDC				
	Permissible Voltage Range	±10%				
	Rated Input Current	A	1.0	2.1	3.1	6.0
	Maximum Input Current	A	2.4	3.7	5.4	9.8
Rated Torque	N·m	0.05	0.12	0.2	0.4	
Starting Torque*	N·m	0.075	0.15	0.24	0.5	
Rated Speed	r/min	3000		2500		
Speed Control Range	r/min	100~3000				
Round Shaft Type	J×10 ⁻⁴ kg·m ²	0.5	1.8	3.3	5.6	
Permissible Load Inertia	J×10 ⁻⁴ kg·m ²	0.032	0.087	0.23	0.61	
Speed Regulation	Load	±0.5% max.: Conditions 0~rated torque, rated speed, rated voltage, normal temperature				
	Voltage	±0.5% max.: Conditions Rated voltage ±10%, rated speed, no load, normal temperature				
	Temperature	±0.5% max.: Conditions Operating ambient temperature 0~+50°C, rated speed, no load, rated voltage				

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

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

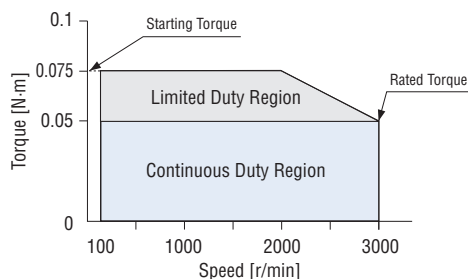
●A number indicating the gear ratio is entered where the box □ is located within the product name.

Speed – Torque Characteristics

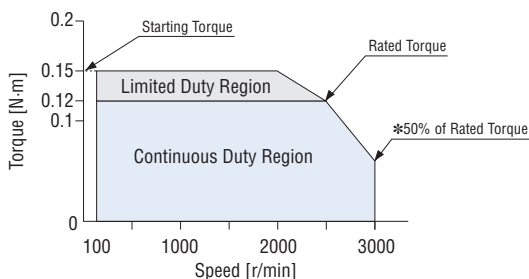
Continuous Duty Region: Continuous operation is possible in this region.

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

15 W

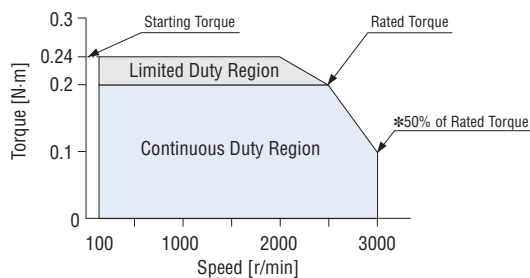


30 W



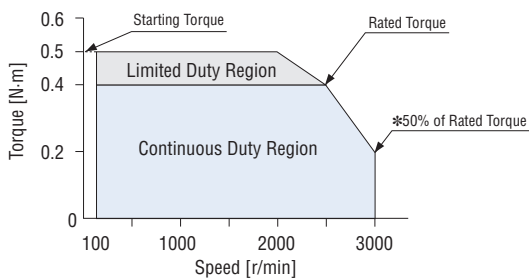
*Value for 24 VDC with no extension cable

50 W



*Value for 24 VDC with no extension cable

100 W



*Value for 24 VDC with no extension cable

● For geared types and combination types, the values are for the motor only.

Common Specifications

Item	Specifications
Speed Setting Method	Select one of the following methods: <ul style="list-style-type: none"> Set using the internal speed potentiometer. Set using an external speed potentiometer: Accessory (sold separately) PAVR-20KZ (20 kΩ, 1/4 W). Set using external DC voltage: 0~5 VDC, 1 mA min. (Input Impedance: 47 kΩ).
Acceleration/Deceleration Time	0.5~10 seconds BLH015 type at 3000 r/min with no load; and BLH230, BLH450, BLH5100 types at 2500 r/min with no load (However, the value is subject to change with the size of the load.) A common value is set using the acceleration/deceleration time potentiometer.
Multi-Speed Setting Method	2 speeds One speed is set by the internal speed potentiometer (1 pc), while another speed is set by an external speed potentiometer (accessory PAVR-20KZ) or by external DC voltage (0~5 VDC).
Input Signals	C-MOS Negative Logic Input Operated by internal power supply. Common to start/stop input, run/brake input, rotation direction switching input, speed potentiometer selection input and alarm reset input.
Output Signals	Open-Collector Output Power Operated by external power supply Operating Conditions 26.4 VDC max. 10 mA max. Common to alarm output and speed output.
Protective Functions*	When the following protective functions are activated, the motor will coast to a stop and the ALARM output will be OFF. The alarm LED on the driver will blink for the corresponding number of times shown in (.). <ul style="list-style-type: none"> Overload Protective Function (2): Activated when the motor load exceeded rated torque for approximately 5 seconds min. Motor Sensor Error (3): Activated when the sensor wire inside the motor cable was disconnected during motor operation. Overvoltage Protective Function (4): Activated when the voltage applied to the driver exceeded 24 VDC by approximately 15% or more. Activated when a gravitational operation was performed or a load exceeding the permissible load inertia was driven. Undervoltage Protective Function (5): Activated when the power supply voltage applied to the driver fell below 24 VDC of approximately 25% min Overspeed Protective Function (6): Activated when the motor exceeded 3500 r/min of abnormality speed.
Maximum Extension Distance	Motor/Driver Distance: 2 m (when an accessory connection cable is used)
Time Rating	Continuous

*With the **BLH** Series, motor speed control cannot be performed in a gravitational operation or other application where the motor shaft is turned by the load.

When a load exceeding the permissible load inertia is driven or a gravitational operation is performed, the overvoltage protective function will be activated and the motor will coast to a stop.

General Specifications

Item	Motor	Driver	
Insulation Resistance	The measured value is 100 MΩ or more when a 500 VDC megger is applied between the windings and the case after continuous operation under normal ambient temperature and humidity.	The measured value is 100 MΩ or more when a 500 VDC megger is applied between the power supply input and the heat radiation plate after continuous operation under normal ambient temperature and humidity.	
Dielectric Strength	No abnormality is judged even with application of 0.5 kVAC at 50 Hz between the windings and the case for 1 minute after continuous operation under normal ambient temperature and humidity.	No abnormality is judged even with application of 0.5 kVAC at 50 Hz between the windings and the case for 1 minute after continuous operation under normal ambient temperature and humidity.	
Temperature Rise	Temperature rise of the windings is 50°C or less and that of the case is 40°C or less*1, measured by the thermocouple method after continuous operation under normal ambient temperature and humidity.	Temperature rise of the heat radiation plate is 50°C or less measured by the thermocouple method after continuous operation under normal ambient temperature and humidity.	
Operating Environment	Ambient Temperature	0~+50°C (non-freezing)	
	Ambient Humidity	85% max. (non-condensing)	
	Altitude	1000 m above sea level max.	
	Atmosphere	Use in an area without corrosive gases or dust. Use in special environments with radioactive materials, magnetic fields, or in a vacuum is not possible.	
Vibration	Use in an area not subject to continuous vibration or excessive shock. Environment should conform with JIS C 60068-2-6 "Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)"		
	Frequency Range: 10~55 Hz, Half Amplitude: 0.15 mm Sweep Direction: 3 directions (X, Y, Z) Number of Sweeps: 20 times		
Storage Condition*2	Ambient Temperature	-25~+70°C (non-freezing)	
	Ambient Humidity	85% max. (non-condensing)	
	Altitude	3000 m above sea level max.	
Thermal Class	UL/CSA standards: 105 (A), EN standards: 120 (E)		
Degree of Protection	15 W	IP40	IP00
	30 W, 50 W, 100 W	IP65 (Excluding the installation surface of the round shaft type and connectors)	

*1 For round shaft types, attach to a heat sink (Material: aluminum) of one of the following sizes to maintain a motor case surface temperature of 90°C max. (Except for 15 W Type)
 30 W Type: 115×115 mm, 5 mm thick 50 W Type: 135×135 mm, 5 mm thick 100 W Type: 200×200 mm, 5 mm thick

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

Note

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

Gearmotor – Torque Table of Geared Type/Combination Type

Geared Types/Combination Types - Parallel Shaft Gearheads

Unit = N·m

Product Name	Gear Ratio	Motor Speed [r/min]	5	10	15	20	30	50	100	200
			20~500	10~250	6.7~167	5~125	3.3~83	2~50	1~25	0.5~12.5
BLH015K-□	At 100~3000 r/min	100~2500 r/min	0.23	0.45	0.68	0.86	1.3	2	2	—
		3000 r/min	600	300	200	150	100	60	30	15
BLH230KC-□	At 100~2500 r/min	100~2500 r/min	0.54	1.1	1.6	2.2	3.1	5.2	6	6
		At 3000 r/min	0.27	0.54	0.81	1.1	1.5	2.6	5.2	6
BLH450KC-□	At 100~2500 r/min	100~2500 r/min	0.90	1.8	2.7	3.6	5.2	8.6	16	16
		At 3000 r/min	0.45	0.90	1.4	1.8	2.6	4.3	8.6	16
BLH5100KC-□	At 100~2500 r/min	100~2500 r/min	1.8	3.6	5.4	7.2	10.3	17.2	30	30
		At 3000 r/min	0.90	1.8	2.7	3.6	5.2	8.6	17.2	30

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

Combination Types - Hollow Shaft Flat Gearheads

Unit = N·m

Product Name	Gear Ratio	Motor Speed [r/min]	5	10	15	20	30	50	100	200
			20~500	10~250	6.7~167	5~125	3.3~83	2~50	1~25	0.5~12.5
BLH230KC-□FR	At 100~2500 r/min	100~2500 r/min	0.48	1.0	1.5	2.0	3.1	5.1	10.2	17
		At 3000 r/min	0.24	0.51	0.77	1.0	1.5	2.6	5.1	10.2
BLH450KC-□FR	At 100~2500 r/min	100~2500 r/min	0.85	1.7	2.6	3.4	5.1	8.5	17	34
		At 3000 r/min	0.43	0.85	1.3	1.7	2.6	4.3	8.5	17
BLH5100KC-□FR	At 100~2500 r/min	100~2500 r/min	1.7	3.4	5.1	6.8	10.2	17	34	68
		At 3000 r/min	0.85	1.7	2.6	3.4	5.1	8.5	17	34

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

Permissible Overhung Load and Permissible Thrust Load

Geared Types/Combination Types - Parallel Shaft Gearheads

Product Name	Gear Ratio	Permissible Overhung Load		Permissible Thrust Load
		10 mm from Shaft End	20 mm from Shaft End	
		N	N	
BLH015K-□	5, 10, 15, 20 30, 50, 100	50	—	30
		100	150	
BLH230KC-□	5 10, 15, 20 30, 50, 100, 200	150	200	40
		200	300	
		300	400	
BLH450KC-□	5 10, 15, 20 30, 50, 100, 200	200	250	100
		300	350	
		450	550	
BLH5100KC-□	5 10, 15, 20 30, 50, 100, 200	300	400	150
		400	500	
		500	650	

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

● Combination Types - Hollow Shaft Flat Gearheads

Product Name	Gear Ratio	Permissible Overhung Load		Permissible Thrust Load N
		10 mm from Installation Surface of Gearhead	20 mm from Installation Surface of Gearhead	
		N	N	
BLH230KC-□FR	5, 10	450	370	200
	15, 20, 30, 50, 100, 200	500	400	
BLH450KC-□FR	5, 10	800	660	400
	15, 20, 30, 50, 100, 200	1200	1000	
BLH5100KC-□FR	5, 10	900	770	500
	15, 20	1300	1110	
	30, 50, 100, 200	1500	1280	

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

● Round Shaft Types

Product Name	Permissible Overhung Load		Permissible Thrust Load
	10 mm from Shaft End N	20 mm from Shaft End N	
BLH015K-A	50	—	Half of motor mass max.
BLH230K-A	70	100	
BLH450K-A	120	140	
BLH5100K-A	160	170	

■ Permissible Load Inertia: J of Geared Type/Combination Type

● Geared Types/Combination Types - Parallel Shaft Gearheads

Unit = $\times 10^{-4}$ kg·m²

Product Name	Gear Ratio	Permissible Load Inertia J							
		5	10	15	20	30	50	100	200
BLH015K-□		3	14	30	50	120	300	600	—
	When instantaneous stop or instantaneous bi-directional operation is performed	0.4	1.7	3.9	7.0	15.7	43.7	43.7	—
BLH230KC-□		12	50	110	200	370	920	2500	5000
	When instantaneous stop or instantaneous bi-directional operation is performed	1.55	6.2	14.0	24.8	55.8	155	155	155
BLH450KC-□		22	95	220	350	800	2200	6200	12000
	When instantaneous stop or instantaneous bi-directional operation is performed	5.5	22	49.5	88	198	550	550	550
BLH5100KC-□		45	190	420	700	1600	4500	12000	25000
	When instantaneous stop or instantaneous bi-directional operation is performed	25	100	225	400	900	2500	2500	2500

● Combination Types - Hollow Shaft Flat Gearheads

Unit = $\times 10^{-4}$ kg·m²

Product Name	Gear Ratio	Permissible Load Inertia J							
		5	10	15	20	30	50	100	200
BLH230KC-□FR		12	50	110	200	370	920	2500	5000
	When instantaneous stop or instantaneous bi-directional operation is performed	1.55	6.2	14.0	24.8	55.8	155	155	155
BLH450KC-□FR		22	95	220	350	800	2200	6200	12000
	When instantaneous stop or instantaneous bi-directional operation is performed	5.5	22	49.5	88	198	550	550	550
BLH5100KC-□FR		45	190	420	700	1600	4500	12000	25000
	When instantaneous stop or instantaneous bi-directional operation is performed	25	100	225	400	900	2500	2500	2500

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

Dimensions (Unit = mm)

- Mounting screws are included with the combination type. Dimensions for mounting screws → Page D-174
- A number indicating the gear ratio is entered where the box □ is located within the product name.

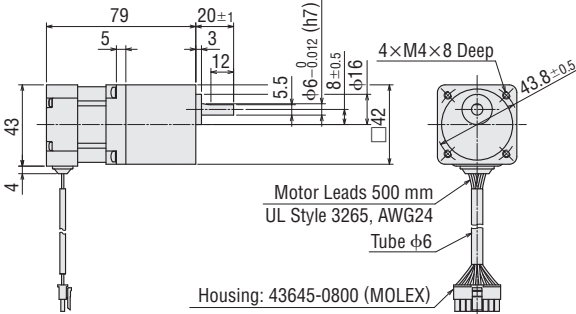
● 15 W

◇ Geared Type

BLH015K-□

Geared Motor: BLHM015K-□

Mass: 0.5 kg

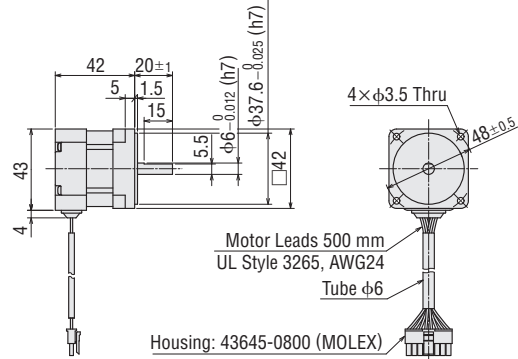


◇ Round Shaft Type

BLH015K-A

Motor: BLHM015K-A

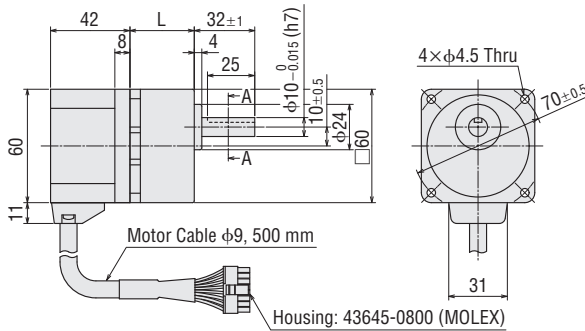
Mass: 0.25 kg



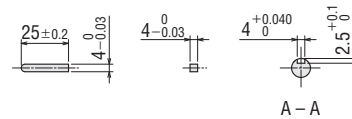
● 30 W

◇ Motor/Parallel Shaft Gearhead

Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass kg
BLH230KC-□	BLHM230KC-GFS	GFS2G□	5~20	34	1.0
			30~100	38	
			200	43	



◇ Key and Key Slot (Included)



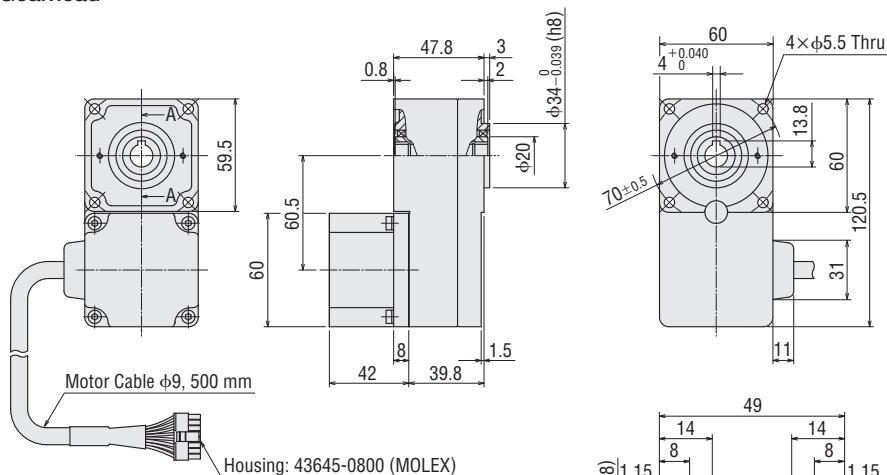
◇ Motor/Hollow Shaft Flat Gearhead

BLH230KC-□FR

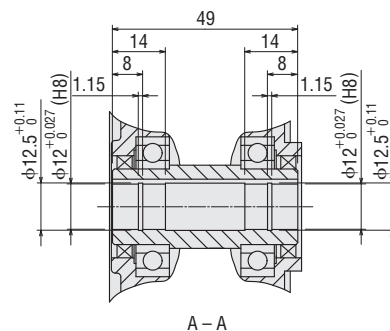
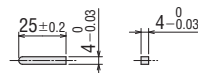
Motor: BLHM230KC-GFS

Gearhead: GFS2G□FR

Mass: 1.3 kg



◇ Key (Included)

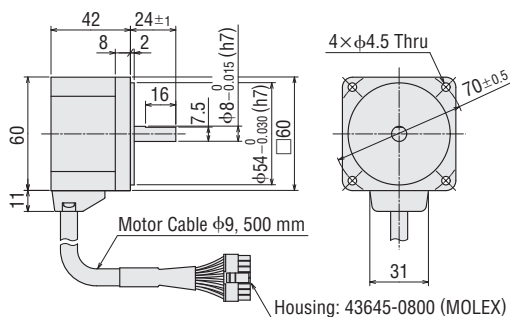


◇ Round Shaft Type

BLH230KC-A

Motor: BLHM230KC-A

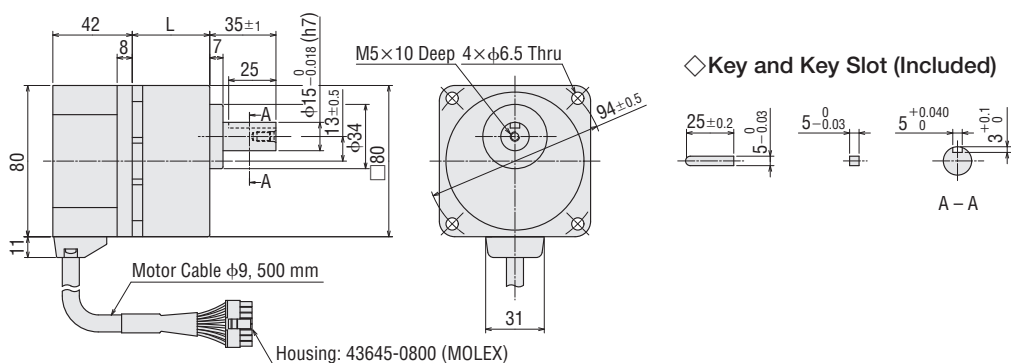
Mass: 0.5 kg



● 50 W

◇ Motor/Parallel Shaft Gearhead

Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass kg
BLH450KC-□	BLHM450KC-GFS	GFS4G□	5~20	41	1.8
			30~100	46	
			200	51	



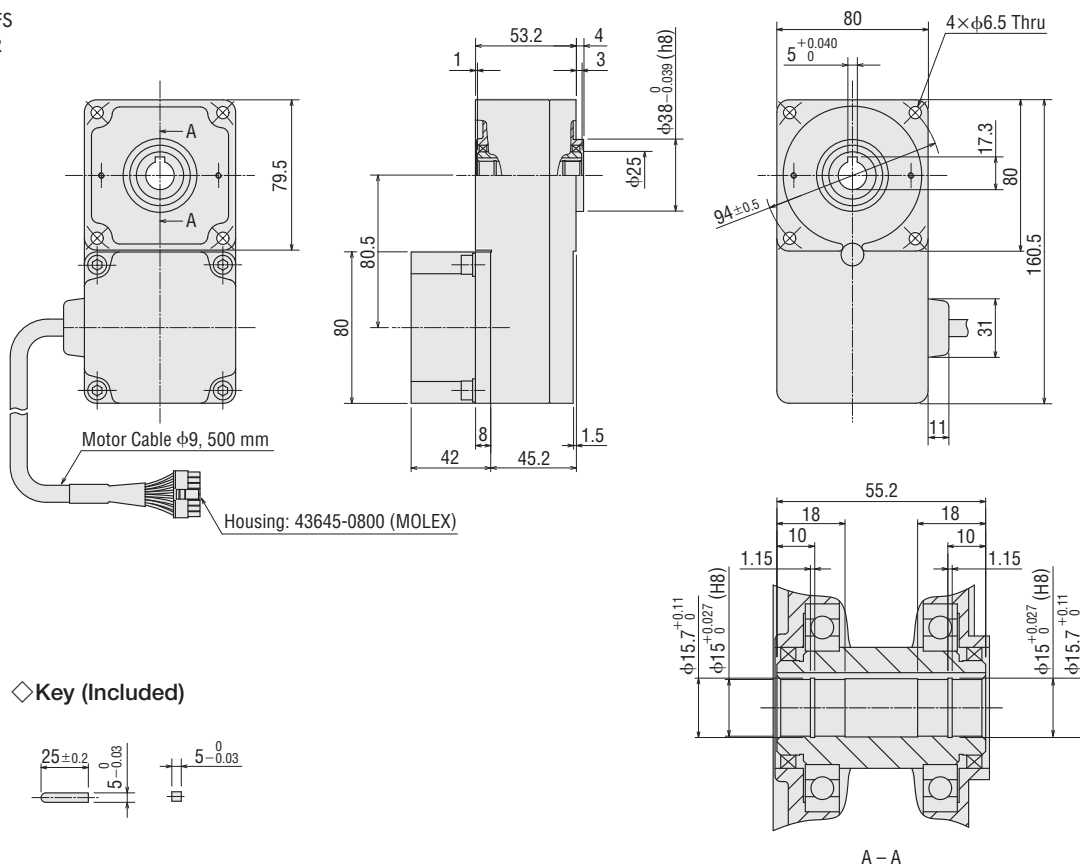
◇ Motor/Hollow Shaft Flat Gearhead

BLH450KC-□FR

Motor: BLHM450KC-GFS

Gearhead: GFS4G□FR

Mass: 2.4 kg

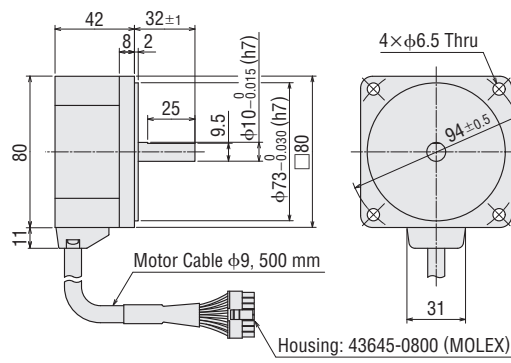


◇ Round Shaft Type

BLH450KC-A

Motor: BLHM450KC-A

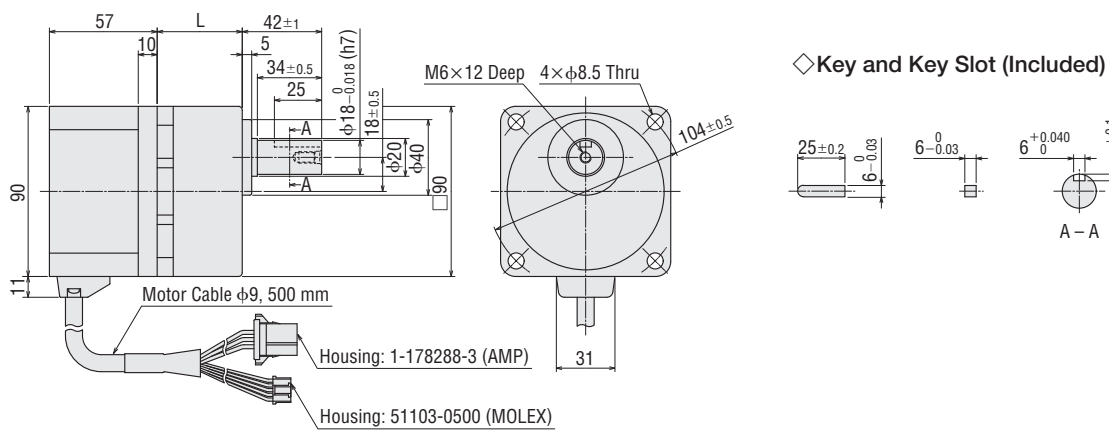
Mass: 0.8 kg



● 100 W

◇ Motor/Parallel Shaft Gearhead

Product Name	Motor Product Name	Gearhead Product Name	Gear Ratio	L	Mass kg
BLH5100KC-□	BLHM5100KC-GFS	GFS5G□	5~20	45	2.9
			30~100	58	
			200	64	



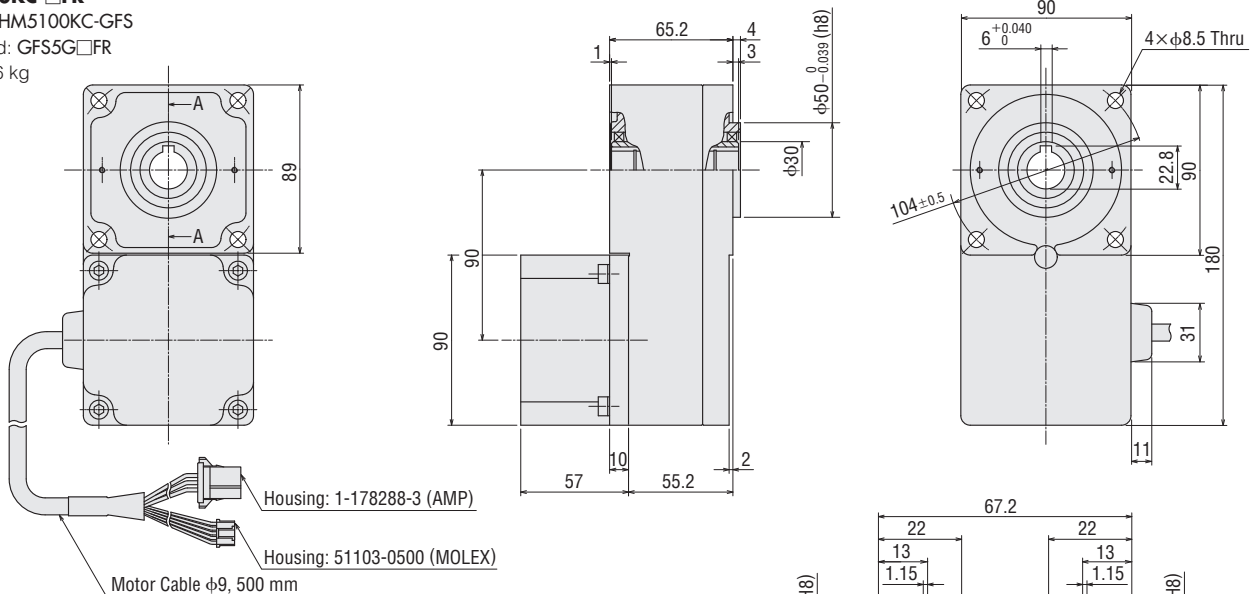
◇ Motor/Hollow Shaft Flat Gearhead

BLH5100KC-□FR

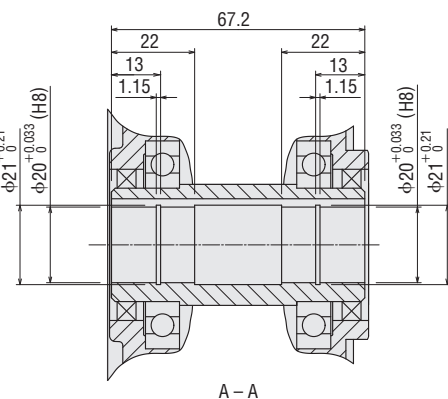
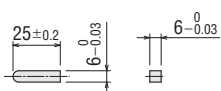
Motor: BLHM5100KC-GFS

Gearhead: GFS5G□FR

Mass: 3.6 kg



◇ Key (Included)

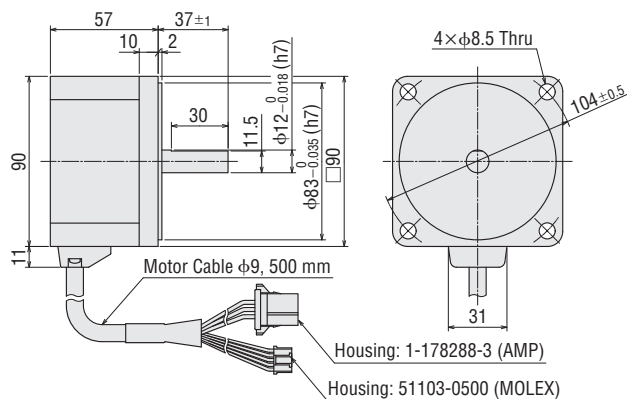


◇ Round Shaft Type

BLH5100KC-A

Motor: BLHM5100KC-A

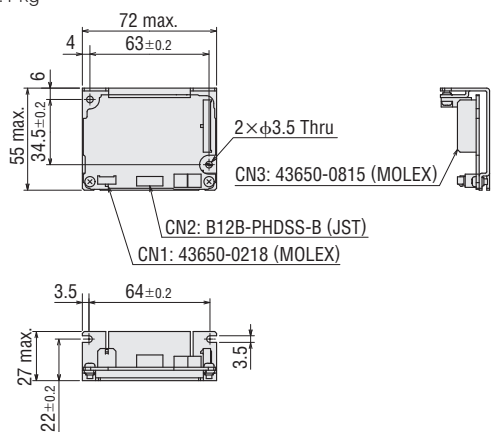
Mass: 1.4 kg



◇ Driver

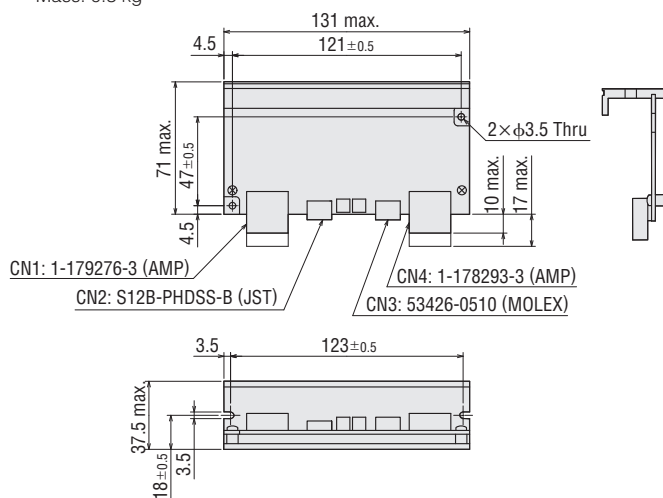
BLHD15K, BLHD30K, BLHD50K

Mass: 0.1 kg



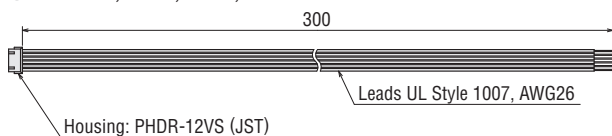
BLHD100K

Mass: 0.3 kg



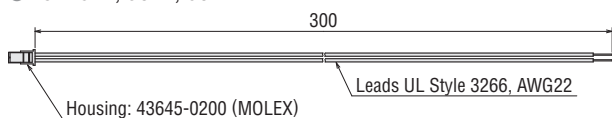
◇ Driver Input/Output Signal Cable (Included)

- For 15 W, 30 W, 50 W, 100 W

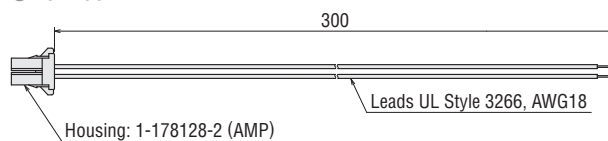


◇ Driver Power Supply Cable (Included)

- For 15 W, 30 W, 50 W



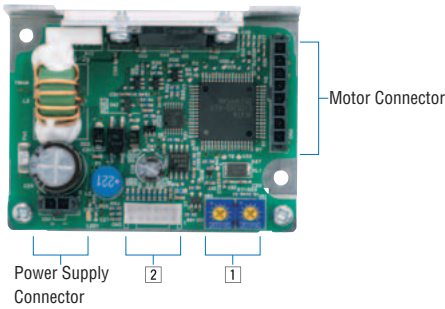
- For 100 W



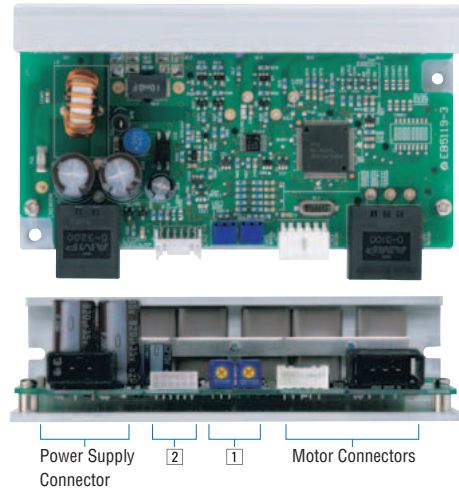
Connection and Operation

Names and Functions of Driver Parts

15 W/30 W/50 W



100 W



1 Speed Potentiometer

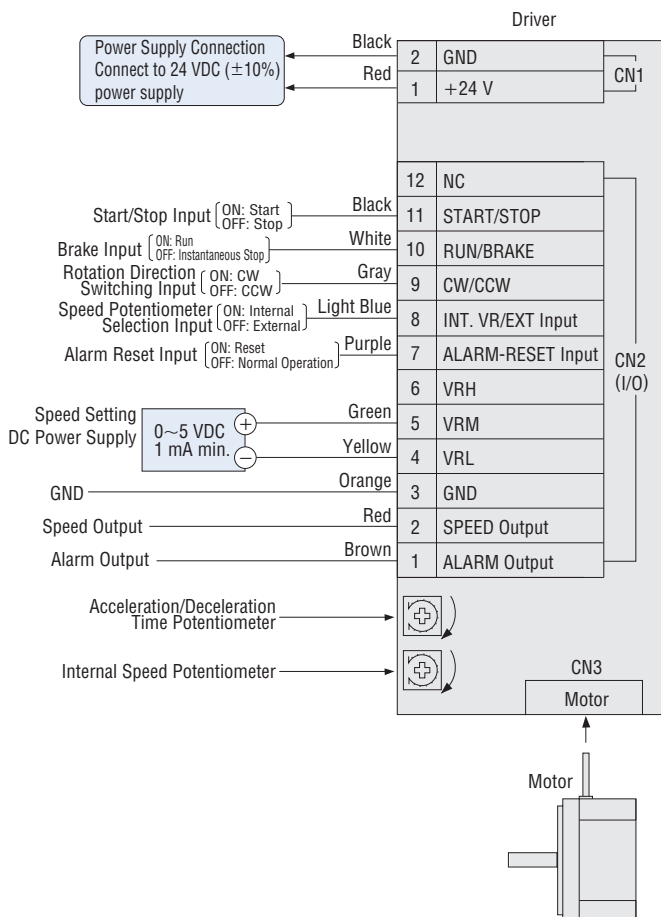
Indication	Potentiometer Name	Function
VR1	Internal Speed Potentiometer	Set and adjust the operating speed of the motor.
VR2	Acceleration/Deceleration Time Potentiometer	Set a common acceleration/deceleration time in the range of 0.5~10 seconds.

2 I/O Signals

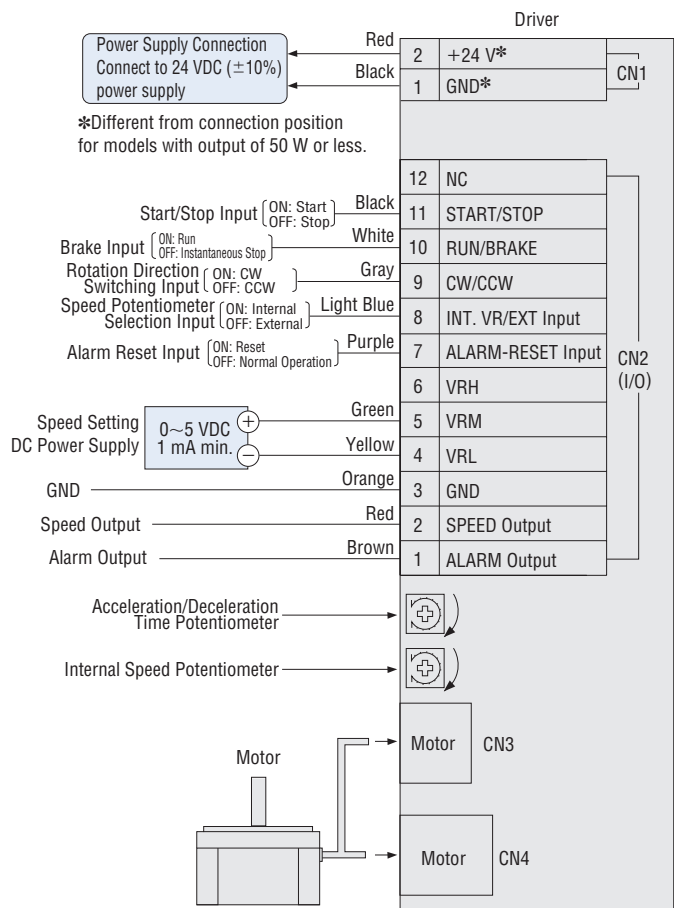
Indication	I/O	Pin No.	Function
CN2	Output	1	ALARM Output
		2	SPEED Output
	I/O Signal Common	3	GND
		4	VRL Input
	Analog Input	5	VRM Input
		6	VRH Input
	Input	7	ALARM-RESET Input
		8	INT. VR/EXT Input
		9	CW/CCW Input
		10	RUN/BRAKE Input
		11	START/STOP Input
		12	NC

Connection Diagrams

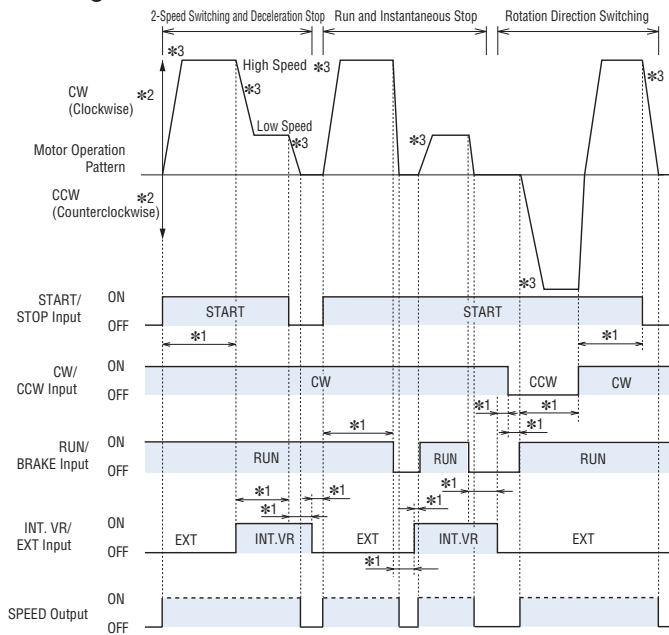
15 W/30 W/50 W



100 W



Timing Chart



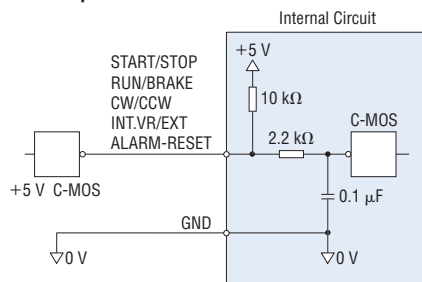
- *1 At least 10 ms
- *2 The direction applies to the motor alone. The specific direction will vary depending on the gear ratio.
- *3 The motor will start/stop over the time set by the acceleration/deceleration time potentiometer.

Input/Output Signal Circuits

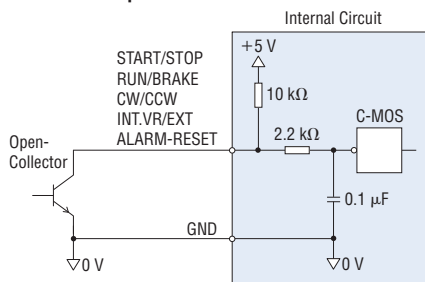
◇ Input Circuit

The driver's signal inputs use the C-MOS input method. The signal status indicates a voltage level of 0 to 0.5 V when the signal is ON, or 4 to 5 V when it is OFF.

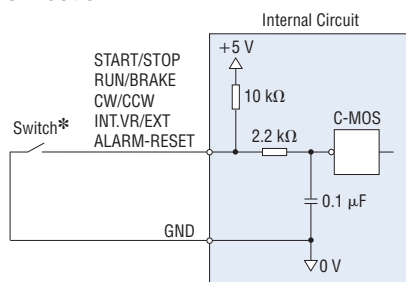
• 5 V C-MOS Output from External Control Device



• Open-Collector Output from External Control Device



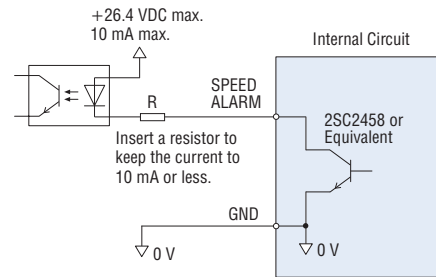
• Switch Connection



*Use a switch capable of opening/closing the current flow at 5 VDC, 1 mA maximum.

- All operations of run/stop, instantaneous stop and rotation direction switching operations can be controlled with the START/STOP, RUN/BRAKE and CW/CCW signals.
- If both the START/STOP signal and the RUN/BRAKE signal are set to ON, the motor rotates. The motor will accelerate over the time set by the acceleration/deceleration time potentiometer. During this time, if the CW/CCW signal is set to ON, the motor rotates clockwise as viewed from the shaft end of the motor; if the CW/CCW signal is set to OFF, the motor rotates in the counterclockwise direction.
- If the RUN/BRAKE signal is set to OFF while the START/STOP signal is ON, the motor stops instantaneously. If the START/STOP signal is set to OFF while the RUN/BRAKE signal is ON, the motor will stop with deceleration time set by the acceleration/deceleration time potentiometer.
- The duration of each input signal must be 10 ms or longer.
- Do not operate (turn ON/OFF) two or more input signals simultaneously. There must be a minimum interval of 10 ms before another input signal can be operated after an input signal has been operated.

◇ Output Circuit



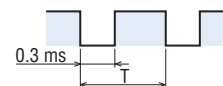
◇ SPEED Output

The system outputs pulse signals (with a width of 0.3 ms) at a rate of 30 pulses per rotation of the motor output shaft synchronized with the motor operation.

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

$$\text{Motor speed (r/min)} = \frac{\text{SPEED output frequency [Hz]}}{30} \times 60$$

$$\text{SPEED output frequency (Hz)} = \frac{1}{T}$$



◇ ALARM Output

The ALARM output is normally ON and goes OFF when there is an alarm.

◇ ALARM-RESET

When the motor is stopped, setting this signal ON, then returning it to OFF resets the alarm.

Please return either the START/STOP input or the RUN/BRAKE input to OFF before inputting the ALARM-RESET. The ALARM-RESET is not accepted if both these signals are ON.

Note

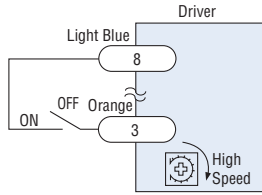
- Output signal is open-collector output, so an external power supply (Vcc) is required.
- Use a power supply of no more than 26.4 VDC and connect a limit resistor (R) so that the output current does not exceed 10 mA. When using neither the speed output function nor the alarm output function, this connection is not required.

● Speed Setting Method

◇ Internal Speed Potentiometer

When INT.VR/EXT input is set to ON, the speed can be set with the internal speed potentiometer.

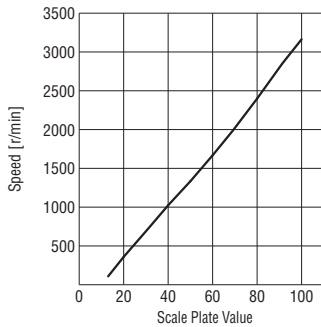
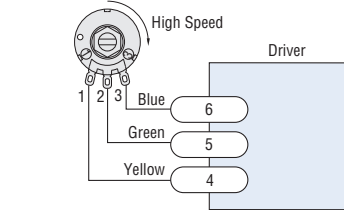
There is no need for this connection when the internal speed potentiometer is not used.



◇ External Speed Potentiometer (Sold separately)

When separating the motor speed setting from the driver, connect the accessory external speed potentiometer as follows.

External Speed Potentiometer **PAVR-20KZ** (Sold separately)

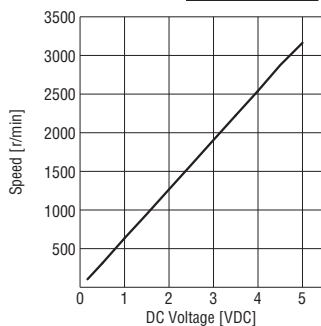
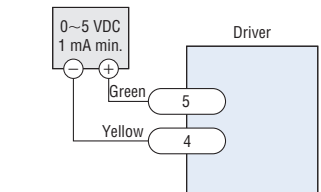


External Speed Potentiometer Scale - Speed Characteristics (Representative values)

◇ External DC Voltage

When setting the motor speed with an external DC voltage, do so in the following manner.

External DC Power Supply



External DC Voltage - Speed Characteristics (Representative values)

Note

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

● Multi-Motor Control

Two or more sets of motor and driver can be operated at the same speed by using a DC power supply or an external speed potentiometer.

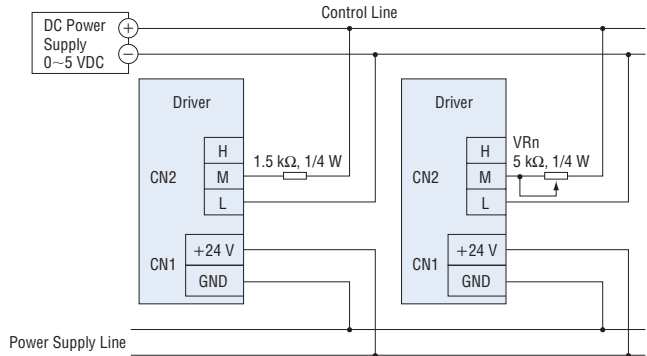
◇ When External DC Power Supply is Used

- Use a DC power supply with current capacity equal to or greater than the value obtained by the following expression.

Current capacity (N is the number of drivers) $I = 1 \times N$ (mA)

Example: When two drivers are used, current capacity should be at least 2 mA.

- Connect the other input/output lines to each driver individually.
- Motor speed differences can be adjusted by connecting a resistor of 1.5 kΩ, 1/4 W to the M terminal of the first driver, and a 5 kΩ, 1/4 W variable resistor (VRn) to the M terminals of the other drivers.



◇ When External Speed Potentiometer is Used

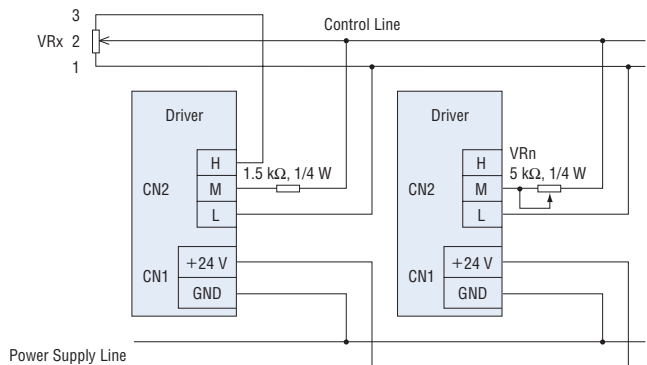
As shown below, make the power supply line and the speed control line common to set the speed at VRx.

- The required resistance of the external speed potentiometer is calculated by the following expression.

Resistance value (N is the number of drivers) $VRx = 20/N$ (kΩ), N/4 (W)

Example: When two drivers are used, the resistance is 10 kΩ, 1/2 W.

- Connect the other input/output lines to each driver individually.
- Motor speed differences can be adjusted by connecting a resistor of 1.5 kΩ, 1/4 W to the M terminal of the first driver, and a 5 kΩ, 1/4 W variable resistor (VRn) to the M terminals of the other drivers.
- No more than five motors should be operated simultaneously when using the external speed potentiometer.



List of Motor and Driver Combinations

● Geared Type

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

Output Power	Product Name	Geared Motor Product Name	Driver Product Name
15 W	BLH015K -□	BLHMO15K-□	BLHD15K

● Combination Type – Parallel Shaft Gearhead

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

Output Power	Product Name	Motor Product Name	Gearhead Product Name	Driver Product Name
30 W	BLH230KC -□	BLHM230KC-GFS	GFS2G□	BLHD30K
50 W	BLH450KC -□	BLHM450KC-GFS	GFS4G□	BLHD50K
100 W	BLH5100KC -□	BLHM5100KC-GFS	GFS5G□	BLHD100K

● Combination Type – Hollow Shaft Flat Gearhead

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

Output Power	Product Name	Motor Product Name	Gearhead Product Name	Driver Product Name
30 W	BLH230KC -□ FR	BLHM230KC-GFS	GFS2G□ FR	BLHD30K
50 W	BLH450KC -□ FR	BLHM450KC-GFS	GFS4G□ FR	BLHD50K
100 W	BLH5100KC -□ FR	BLHM5100KC-GFS	GFS5G□ FR	BLHD100K

● Round Shaft Type

Output Power	Product Name	Motor Product Name	Driver Product Name
15 W	BLH015K-A	BLHMO15K-A	BLHD15K
30 W	BLH230KC-A	BLHM230KC-A	BLHD30K
50 W	BLH450KC-A	BLHM450KC-A	BLHD50K
100 W	BLH5100KC-A	BLHM5100KC-A	BLHD100K

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