

(RoHS) RoHS-Compliant

Brushless DC Motor and Driver Package

BLU Series

AC Power Input 20W / 40W / 90W

The Brushless DC Motor and Driver Package **BLU** Series enables speed control via easy operation. Choose a model with a parallel shaft gearhead or hollow shaft flat gearhead, both of which achieve a long rated life of 10000 hours.



BLU Series: Easy Speed Control Using the

The **BLU** Series consists of models with an output of 20, 40 or 90 W, all combining motor with a panel-installation type driver. Choose a parallel shaft gearhead, installation space of your equipment.

Easy Connection, Easy Operation

The motor can be connected simply by plugging the connector into the driver. There is no need for troublesome wiring. The motor speed can be set using the potentiometer on the front panel easily.

IP65 Motor Structure

The motor is protected against water intrusion, should water comes in contact with the motor.

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



External Control Possible

Start/stop, rotation direction switching and instantaneous stop can be controlled using external signals. You can also switch between the source logic and sink logic in accordance with the output type of your controller.

Long Life Gearhead Rating of 10000 Hours

The high-strength gearhead is designed to withstand high-speed revolutions. The rated life of the gearhead is 10000 hours, which is twice as long as that of a conventional gearhead.

Features of Brushless DC Motor

Excellent Speed Stability

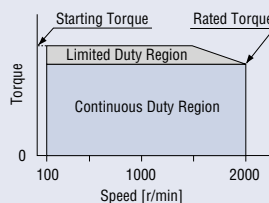
The driver adjusts the current flow to the motor by comparing the feedback signal of motor speed against the set speed, in order to stabilize the motor speed. This mechanism ensures stable driving speeds from low to high, even in situations where the load condition fluctuates.

With the **BLU** Series, the speed regulation is $\pm 0.5\%$.

Wide Speed Control Range

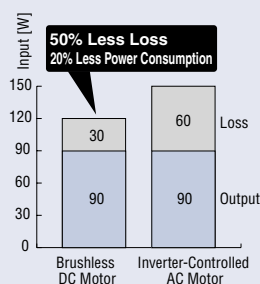
In addition to feedback control, the **BLU** Series adopts a unique motor structure design to achieve a wide speed variation range.

The motor in the **BLU** Series can be operated at varying speeds of 100 to 2000 r/min (speed ratio 1:20).



Energy-Saving

The brushless DC motor has a permanent magnet assembled into the rotor, so it produces low secondary loss. At an output of 90 W, for example, the power consumption of the **BLU** Series is approx. 50% less than the power consumption of an inverter-controlled AC motor. The **BLU** Series will contribute to the energy-saving operation of your FA equipment.



*Comparison of the **BLU** Series and an inverter unit

Potentiometer on the Front Panel

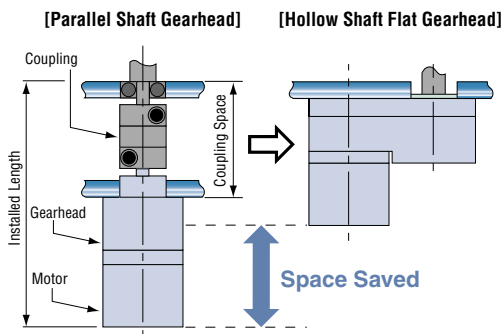
an energy-saving, slim, compact brushless DC or a hollow shaft flat gearhead that saves



■ Features of Hollow Shaft Flat Gearhead

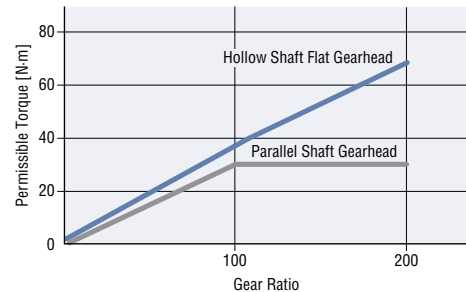
● Space-Saving and Low-Cost

The output shaft can be coupled directly to your drive shaft without using a coupling. The flexible installation modes, such as installation on either the front or rear face or by using the center shaft, allows you to reduce the size and installation space of your equipment. Since no shaft-coupling parts are needed, the parts cost and assembly man-hours will also decrease.



● High Permissible Torque

While the parallel shaft gearhead lets the permissible torque saturate at high gear ratios, the hollow shaft flat gearhead enables the motor torque to be utilized to its maximum capability.



Lineup

● Combination Type – Parallel Shaft Gearhead



● Combination Type – Hollow Shaft Flat Gearhead



● Round Shaft Type



Output	20 W	40 W	90 W
Frame Size	□60 mm	□80 mm	□90 mm
Power Supply Voltage	Single-Phase 100 to 115 VAC, Single-Phase 200 to 230 VAC, Three-Phase 200 to 230 VAC		

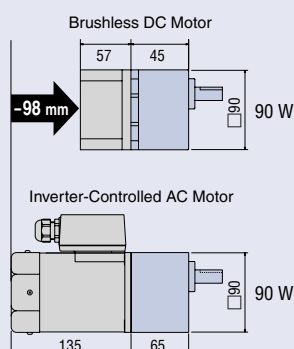
●The □90 mm parallel shaft gearhead has a tapped hole at the shaft tip.

● Main Specifications

Speed Control Range: 100 to 2000 r/min (1:20)
Speed Regulation: ±0.5%

● Slim, Yet Powerful

A permanent magnet is assembled into the rotor, so the brushless DC motor can produce high power from its slim body. The compact unit fits perfectly in your small equipment.



● (RoHS) RoHS-Compliant

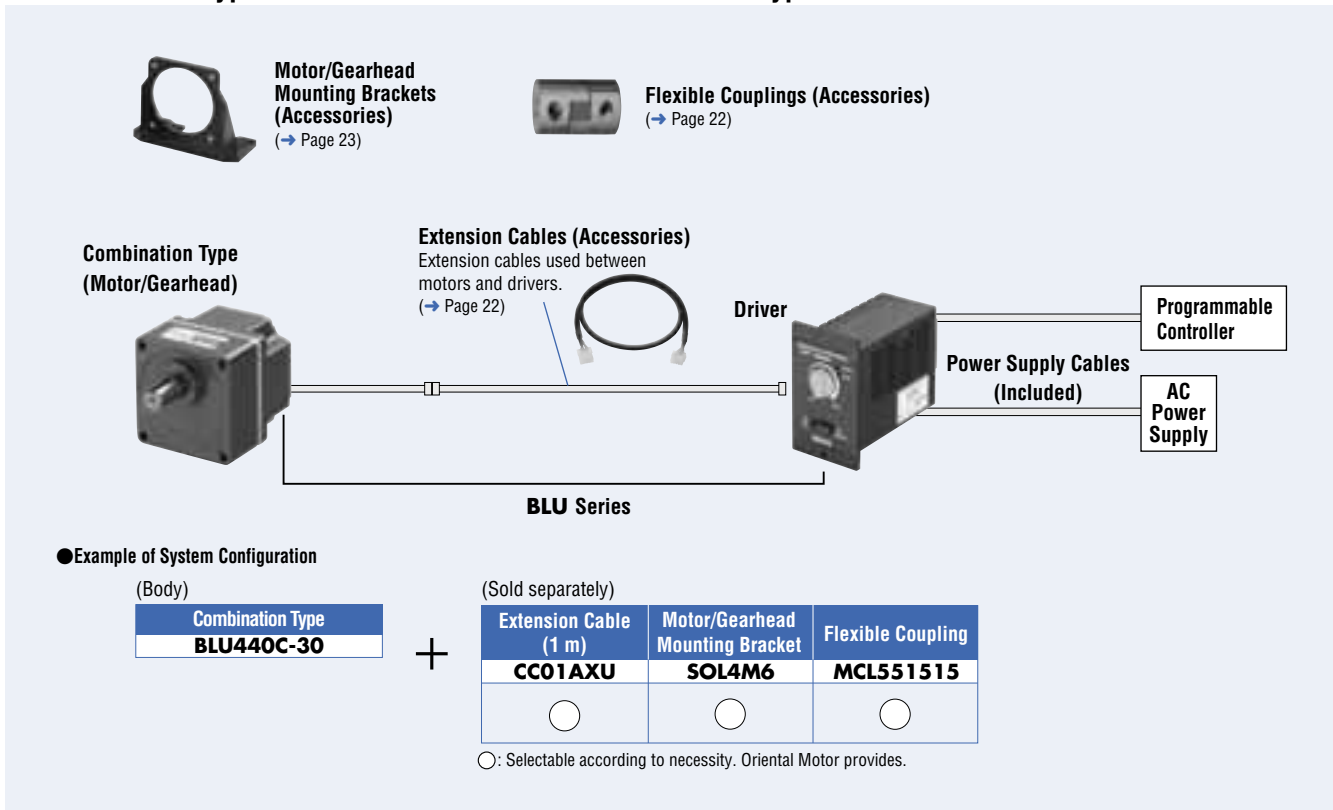
The **BLU** Series conforms to the RoHS Directive that prohibits the use of six chemical substances including lead and cadmium.

RoHS (Restriction of Hazardous Substances) Directive:

Directive on restriction of the use of certain hazardous substances in electrical and electronic equipment (2002/95/EC). The RoHS Directive prohibits the use of six chemical substances in electrical and electronic products sold in the E.U. member countries on or after July 1, 2006. The six controlled substances are: lead, hexavalent chromium, cadmium, mercury and two specific brominated flame-retardants (PBB and PBDE).

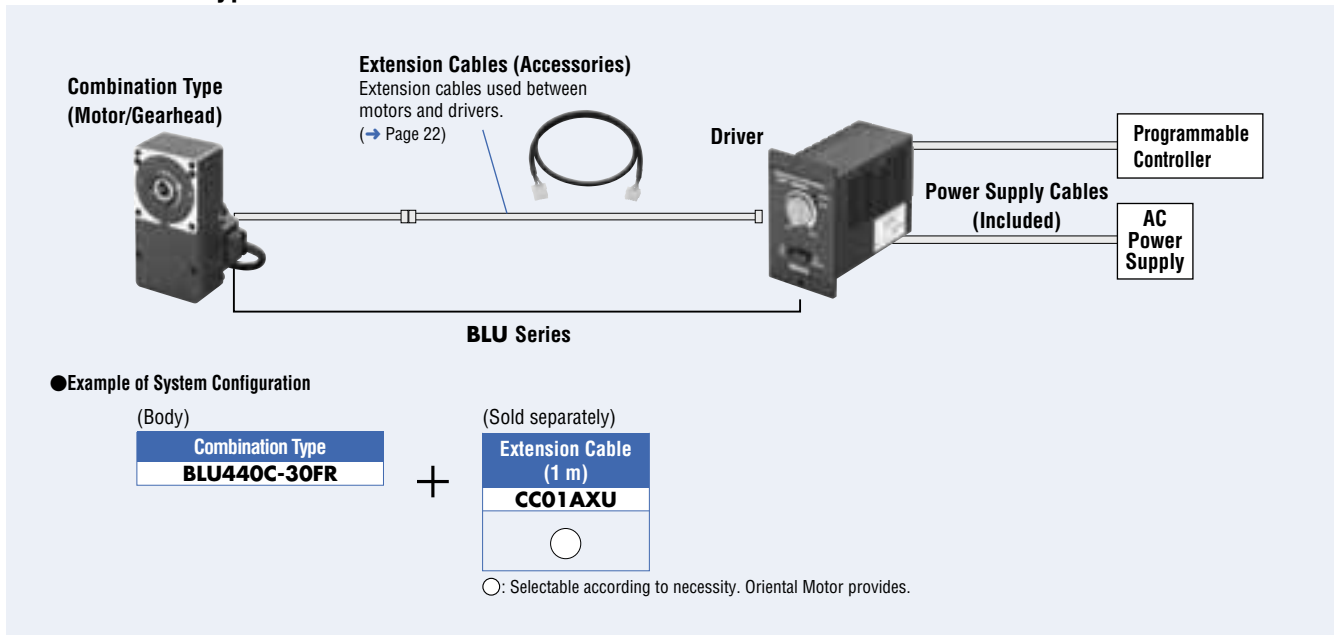
System Configuration

Combination Type – Parallel Shaft Gearhead/Round Shaft Type



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

● Combination Type – Hollow Shaft Flat Gearhead



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

■ Safety Standards and CE Marking

	Standards	Certification Body	Standards File No.	CE Marking
Motor	UL 60950-1	UL	E208200	Low Voltage Directives EMC Directives
	CSA C22.2 No.60950-1			
Driver	EN 60950-1	Conform to EN/IEC Standards		
	EN 60034-1			
	EN 60034-5	UL	E171462	
	IEC 60664-1			
UL 508C	Conform to EN Standards			
CSA C22.2 No.14				
	EN 60950-1			
	EN 50178			

●When the system is approved under various safety standards, the model names on the motor and driver nameplates are the approved model names.

List of Motor and Driver Combinations → Page 21

Product Number Code

BU440C-5FR

① ② ③ ④ ⑤ ⑥

①	Series	BLU: BLU Series
②	Motor Frame Size	2: 60 mm 4: 80 mm 5: 90 mm
③	Output Power (W)	(Example) 40: 40 W
④	Power Supply Voltage	A: Single-Phase 100–115 VAC C: Single-Phase 200–230 VAC S: Three-Phase 200–230 VAC
⑤	Gear Ratio/Shaft Type	Number: Gear ratio for combination types: 8 types from 5 to 200 A: Round Shaft Type GFS: GFS Type Pinion Shaft
⑥		Blank: Combination Type–Parallel Shaft Gearhead FR: Combination Type–Hollow Shaft Flat Gearhead

Product Line

Combination Type The combination type comes with the motor and its dedicated gearhead already pre-assembled, which simplifies installation in equipment. Motors and gearheads are also available separately to facilitate changes or repairs.

Combination Type–Parallel Shaft Gearhead

Output Power	Power Supply Voltage	Package Model	Gear Ratio
20 W	Single-Phase 100–115 VAC	BLU220A- <input type="checkbox"/>	5, 10, 15, 20, 30, 50, 100, 200
	Single-Phase 200–230 VAC	BLU220C- <input type="checkbox"/>	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200–230 VAC	BLU220S- <input type="checkbox"/>	5, 10, 15, 20, 30, 50, 100, 200
40 W	Single-Phase 100–115 VAC	BLU440A- <input type="checkbox"/>	5, 10, 15, 20, 30, 50, 100, 200
	Single-Phase 200–230 VAC	BLU440C- <input type="checkbox"/>	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200–230 VAC	BLU440S- <input type="checkbox"/>	5, 10, 15, 20, 30, 50, 100, 200
90 W	Single-Phase 100–115 VAC	BLU590A- <input type="checkbox"/>	5, 10, 15, 20, 30, 50, 100, 200
	Single-Phase 200–230 VAC	BLU590C- <input type="checkbox"/>	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200–230 VAC	BLU590S- <input type="checkbox"/>	5, 10, 15, 20, 30, 50, 100, 200

● Enter the gear ratio in the box () within the model name.

Combination Type–Hollow Shaft Flat Gearhead

Output Power	Power Supply Voltage	Package Model	Gear Ratio
20 W	Single-Phase 100–115 VAC	BLU220A- <input type="checkbox"/> FR	5, 10, 15, 20, 30, 50, 100, 200
	Single-Phase 200–230 VAC	BLU220C- <input type="checkbox"/> FR	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200–230 VAC	BLU220S- <input type="checkbox"/> FR	5, 10, 15, 20, 30, 50, 100, 200
40 W	Single-Phase 100–115 VAC	BLU440A- <input type="checkbox"/> FR	5, 10, 15, 20, 30, 50, 100, 200
	Single-Phase 200–230 VAC	BLU440C- <input type="checkbox"/> FR	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200–230 VAC	BLU440S- <input type="checkbox"/> FR	5, 10, 15, 20, 30, 50, 100, 200
90 W	Single-Phase 100–115 VAC	BLU590A- <input type="checkbox"/> FR	5, 10, 15, 20, 30, 50, 100, 200
	Single-Phase 200–230 VAC	BLU590C- <input type="checkbox"/> FR	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200–230 VAC	BLU590S- <input type="checkbox"/> FR	5, 10, 15, 20, 30, 50, 100, 200

● Enter the gear ratio in the box () within the model name.

Round Shaft Type

Output Power	Power Supply Voltage	Package Model
20 W	Single-Phase 100–115 VAC	BLU220A-A
	Single-Phase 200–230 VAC	BLU220C-A
	Three-Phase 200–230 VAC	BLU220S-A
40 W	Single-Phase 100–115 VAC	BLU440A-A
	Single-Phase 200–230 VAC	BLU440C-A
	Three-Phase 200–230 VAC	BLU440S-A
90 W	Single-Phase 100–115 VAC	BLU590A-A
	Single-Phase 200–230 VAC	BLU590C-A
	Three-Phase 200–230 VAC	BLU590S-A

● Pinion Shaft Type

(Gearheads are sold separately)

Output Power	Power Supply Voltage	Package Model
20 W	Single-Phase 100–115 VAC	BLU220A-GFS
	Single-Phase 200–230 VAC	BLU220C-GFS
	Three-Phase 200–230 VAC	BLU220S-GFS
40 W	Single-Phase 100–115 VAC	BLU440A-GFS
	Single-Phase 200–230 VAC	BLU440C-GFS
	Three-Phase 200–230 VAC	BLU440S-GFS
90 W	Single-Phase 100–115 VAC	BLU590A-GFS
	Single-Phase 200–230 VAC	BLU590C-GFS
	Three-Phase 200–230 VAC	BLU590S-GFS

● Gearhead

◇ Parallel Shaft Gearhead

Output Power of Applicable Motor (Pinion Shaft Type)	Gearhead Model	Gear Ratio
20 W	GFS2G □	5, 10, 15, 20, 30, 50, 100, 200
40 W	GFS4G □	5, 10, 15, 20, 30, 50, 100, 200
90 W	GFS5G □	5, 10, 15, 20, 30, 50, 100, 200

● Enter the gear ratio in the box (□) within the model name.

◇ Hollow Shaft Flat Gearhead

Output Power of Applicable Motor (Pinion Shaft Type)	Gearhead Model	Gear Ratio
20 W	GFS2G □ FR	5, 10, 15, 20, 30, 50, 100, 200
40 W	GFS4G □ FR	5, 10, 15, 20, 30, 50, 100, 200
90 W	GFS5G □ FR	5, 10, 15, 20, 30, 50, 100, 200

● Enter the gear ratio in the box (□) within the model name.

Specifications

20 W (RoHS)



Package Model	Combination Type – Parallel Shaft Gearhead	BLU220A-□	BLU220C-□	BLU220S-□
	Combination Type – Hollow Shaft Flat Gearhead	BLU220A-□FR	BLU220C-□FR	BLU220S-□FR
	Round Shaft Type	BLU220A-A	BLU220C-A	BLU220S-A
Rated Output Power (Continuous)		W		20
Power Source	Rated Voltage	Single-Phase 100–115 VAC ±10%	Single-Phase 200–230 VAC ±10%	Three-Phase 200–230 VAC ±10%
	Rated Frequency	Hz 50/60 Hz ±5%		
	Rated Input Current	A 0.95	0.55	0.35
	Maximum Input Current	A 1.55	0.9	0.55
Rated Torque		N·m		0.1
Starting Torque*		N·m		0.12
Rated Speed		r/min		2000
Variable Speed Range		r/min		100–2000
Round Shaft Type Permissible Load Inertia J		×10 ⁻⁴ kg·m ²		1.25
Rotor Inertia J		×10 ⁻⁴ kg·m ²		0.086
Speed Regulation	Load	±0.5% max. (0~Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage	±0.5% max. (Rated voltage ±10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature	±0.5% max. (0°C~+40°C, at rated speed, with no load, at rated voltage)		

40 W (RoHS)



Package Model	Combination Type – Parallel Shaft Gearhead	BLU440A-□	BLU440C-□	BLU440S-□
	Combination Type – Hollow Shaft Flat Gearhead	BLU440A-□FR	BLU440C-□FR	BLU440S-□FR
	Round Shaft Type	BLU440A-A	BLU440C-A	BLU440S-A
Rated Output Power (Continuous)		W		40
Power Source	Rated Voltage	Single-Phase 100–115 VAC ±10%	Single-Phase 200–230 VAC ±10%	Three-Phase 200–230 VAC ±10%
	Rated Frequency	Hz 50/60 Hz ±5%		
	Rated Input Current	A 1.45	0.85	0.5
	Maximum Input Current	A 2.5	1.4	0.9
Rated Torque		N·m		0.2
Starting Torque*		N·m		0.24
Rated Speed		r/min		2000
Variable Speed Range		r/min		100–2000
Round Shaft Type Permissible Load Inertia J		×10 ⁻⁴ kg·m ²		2.5
Rotor Inertia J		×10 ⁻⁴ kg·m ²		0.234
Speed Regulation	Load	±0.5% max. (0~Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage	±0.5% max. (Rated voltage ±10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature	±0.5% max. (0°C~+40°C, at rated speed, with no load, at rated voltage)		

90 W (RoHS)



Package Model	Combination Type – Parallel Shaft Gearhead	BLU590A-□	BLU590C-□	BLU590S-□
	Combination Type – Hollow Shaft Flat Gearhead	BLU590A-□FR	BLU590C-□FR	BLU590S-□FR
	Round Shaft Type	BLU590A-A	BLU590C-A	BLU590S-A
Rated Output Power (Continuous)		W		90
Power Source	Rated Voltage	Single-Phase 100–115 VAC ±10%	Single-Phase 200–230 VAC ±10%	Three-Phase 200–230 VAC ±10%
	Rated Frequency	Hz 50/60 Hz ±5%		
	Rated Input Current	A 2.55	1.45	0.85
	Maximum Input Current	A 3.9	2.4	1.5
Rated Torque		N·m		0.45
Starting Torque*		N·m		0.54
Rated Speed		r/min		2000
Variable Speed Range		r/min		100–2000
Round Shaft Type Permissible Load Inertia J		×10 ⁻⁴ kg·m ²		5.6
Rotor Inertia J		×10 ⁻⁴ kg·m ²		0.611
Speed Regulation	Load	±0.5% max. (0~Rated torque, at rated speed, at rated voltage, at normal ambient temperature)		
	Voltage	±0.5% max. (Rated voltage ±10%, at rated speed, with no load, at normal ambient temperature)		
	Temperature	±0.5% max. (0°C~+40°C, at rated speed, with no load, at rated voltage)		

*The time during which the starting torque is effective is no more than 5 seconds and at 1500 r/min or below.

● Enter the gear ratio in the box (□) within the model name.

● The values in the specifications are for the motor only.

Common Specifications

Item	Specifications
Speed Setting Method	Speed potentiometer on front panel
Acceleration/Deceleration Time	0.5~10 sec. (at 2000 r/min with no load) (The actual speed may change by load condition.) A common value is set using the acceleration/deceleration time potentiometer provided at the back of the front panel.
Input Signal	Photocoupler Input (Reinforced Insulation Photocoupler), Input Impedance 2 k Ω Operated by internal power supply 14 V Common to Clockwise (CW) and Counterclockwise (CCW) Inputs Source Logic or Sink Logic ... Switchable using a selector switch
Output Signal	Open Collector Output (Reinforced Insulation Photocoupler), External Use Condition 4.5~26.4 VDC, 0.5~10 mA Common to Alarm Output (ALARM OUT) and Speed Output (SPEED OUT)
Protection Functions*	When the following are activated, the ALARM output will be OFF and the motor will come to a stop. When the overload protective function actuates, the alarm LED on the driver will blink. The alarm LED will illuminate steadily in the event of actuation of any other protective function. <ul style="list-style-type: none"> ● Overload Protection: Activated when the motor load exceeds rated torque for a minimum of 5 seconds. ● Overvoltage Protection: Activated when the voltage applied to the driver exceeds 115 VAC or 230 VAC by a minimum of 20%, a gravitational operation was performed or a load exceeding the allowable load inertia was driven. ● Motor Sensor Error: Activated when the sensor wire inside the motor cable is disconnected during motor operation. ● Undervoltage Protection: Activated when the voltage applied to the driver falls below 100 VAC or 200 VAC by a minimum of 30%. ● Overspeed Protection: Activated when the motor speed exceeds 2500 r/min.
Maximum Extension Distance	Motor/Driver Distance: 10.5 m (when an optional CC10AXU extension cable is used)
Rating	Continuous

*With the **BLU** Series, the motor speed cannot be controlled in a gravitational operation or other application where the motor shaft is turned by the load. When a load exceeding the allowable load inertia is driven or a gravitational operation is performed, the overvoltage protection function will actuate to cause the motor to decelerate to a stop.

General Specifications

Item	Motor	Driver
Insulation Resistance	100 M Ω or more when 500 VDC megger is applied between the windings and the frame after continuous operation at normal temperature and humidity.	100 M Ω or more when 500 VDC megger is applied between the power supply input terminal and the ground terminal, and between the power supply input terminal and the I/O terminal after continuous operation at normal temperature and humidity.
Dielectric Strength	Sufficient to withstand 1.5 kVAC at 50 Hz applied between the windings and the frame for 1 minute after continuous operation at normal temperature and humidity.	Sufficient to withstand 1.8 kVAC at 50 Hz applied between the ground terminal and the power supply input terminal for 1 minute, and 3 kVAC at 50 Hz applied between the ground terminal and the I/O terminal for 1 minute after continuous operation at normal temperature and humidity.
Temperature Rise	Rise in the coil temperature and frame surface temperature shall not exceed 60°C and 50°C, respectively when measured by the thermocouple method after continuous operation at normal temperature and humidity with a gearhead or equivalent radiation plate*1 insulated.	—
Operating Environment Condition	Ambient Temperature	UL, CSA: 0°C~+40°C (nonfreezing) EN: 0°C~+50°C (nonfreezing)
	Humidity	85% max. (noncondensing)
	Altitude	1000 m max.
	Atmosphere	No corrosive gases or dust. Cannot be used in a radioactive area, magnetic field, vacuum or other special environment
	Vibration	Not subject to continuous vibration or excessive impact In conformance with JIS C 60068-2-6, "Sine-Wave Vibration Test Method" Frequency Range: 10~55 Hz Pulsating Amplitude: 0.15 mm Sweep Direction: 3 directions (X, Y, Z) Number of Sweeps: 20 times
Storage Condition*2	Ambient Temperature	-25°C~+70°C (nonfreezing)
	Humidity	85% max. (noncondensing)
	Altitude	3000 m max.
Insulation Class	UL, CSA: Class A (105°C) EN: Class E (120°C)	—
Degree of Protection	IP65 (Excluding the round shaft type mounting surface and connectors)	IP10

*1 For round shaft types, please attach to the following sizes of heat radiation plate (material: aluminum) to maintain a maximum motor frame temperature of 90°C.

BLU220□-A: 135 mm × 135 mm, 5 mm thick

BLU440□-A: 165 mm × 165 mm, 5 mm thick

BLU590□-A: 200 mm × 200 mm, 5 mm thick

●Enter the power supply voltage **A**, **C** or **S** in the box (□) within the model name.

*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 for Combination Type

● Combination Type – Parallel Shaft Gearhead

Unit = N·m

Package Model	Gear Ratio Speed Range r/min	5	10	15	20	30	50	100	200
		20~400	10~200	6.7~133.3	5~100	3.3~66.7	2~40	1~20	0.5~10
BLU220 <input type="checkbox"/> - <input type="checkbox"/>		0.45	0.9	1.4	1.8	2.6	4.3	6	6
BLU440 <input type="checkbox"/> - <input type="checkbox"/>		0.9	1.8	2.7	3.6	5.2	8.6	16	16
BLU590 <input type="checkbox"/> - <input type="checkbox"/>		2	4.1	6.1	8.1	11.6	19.4	30	30

- Enter the power supply voltage **A**, **C** or **S** in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.
- A colored background indicates gear shaft rotation in the same direction as the motor shaft; a white background indicates rotation in the opposite direction.

● Combination Type – Hollow Shaft Flat Gearhead

Unit = N·m

Package Model	Gear Ratio Speed Range r/min	5	10	15	20	30	50	100	200
		20~400	10~200	6.7~133.3	5~100	3.3~66.7	2~40	1~20	0.5~10
BLU220 <input type="checkbox"/> - <input type="checkbox"/> FR		0.4	0.85	1.3	1.7	2.6	4.3	8.5	17
BLU440 <input type="checkbox"/> - <input type="checkbox"/> FR		0.85	1.7	2.6	3.4	5.1	8.5	17	34
BLU590 <input type="checkbox"/> - <input type="checkbox"/> FR		1.9	3.8	5.7	7.7	11.5	19.1	38.3	68

- Enter the power supply voltage **A**, **C** or **S** in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.
- The flat gearhead rotates in the opposite direction to the motor when viewed from the front of the gearhead. It rotates in the same direction as the motor when viewed from the rear (motor mounting surface) of the gearhead.
Rotation Direction of Hollow Shaft Flat Gearhead → Page 19

■ Permissible Overhung Load and Permissible Thrust Load

● Combination Type – Parallel Shaft Gearhead

Package Model	Gear Ratio	Permissible Overhung Load		Permissible Thrust Load N
		10 mm from shaft end N	20 mm from shaft end N	
BLU220 <input type="checkbox"/> - <input type="checkbox"/>	5	100	150	40
	10, 15, 20	150	200	
	30, 50, 100, 200	200	300	
BLU440 <input type="checkbox"/> - <input type="checkbox"/>	5	200	250	100
	10, 15, 20	300	350	
	30, 50, 100, 200	450	550	
BLU590 <input type="checkbox"/> - <input type="checkbox"/>	5	300	400	150
	10, 15, 20	400	500	
	30, 50, 100, 200	500	650	

- Enter the power supply voltage **A**, **C** or **S** in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.

● Combination Type – Hollow Shaft Flat Gearhead

Package Model	Gear Ratio	Permissible Overhung Load		Permissible Thrust Load N
		10 mm from mounting surface of hollow shaft gearhead N	20 mm from mounting surface of hollow shaft gearhead N	
BLU220 <input type="checkbox"/> - <input type="checkbox"/> FR	5, 10	450	370	200
	15, 20, 30, 50, 100, 200	500	400	
BLU440 <input type="checkbox"/> - <input type="checkbox"/> FR	5, 10	800	660	400
	15, 20, 30, 50, 100, 200	1200	1000	
BLU590 <input type="checkbox"/> - <input type="checkbox"/> FR	5, 10	900	770	500
	15, 20	1300	1110	
	30, 50, 100, 200	1500	1280	

- Enter the power supply voltage **A**, **C** or **S** in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.

● Round Shaft Type

Package Model	Permissible Overhung Load		Permissible Thrust Load
	10 mm from shaft end N	20 mm from shaft end N	
BLU220 <input type="checkbox"/> - A	70	100	The permissible thrust load shall be no greater than half the motor mass.
BLU440 <input type="checkbox"/> - A	120	140	
BLU590 <input type="checkbox"/> - A	160	170	

- Enter the power supply voltage **A**, **C** or **S** in the box (■) within the model name.

Permissible Load Inertia J for Combination Type

Combination Type – Parallel Shaft Gearhead

Unit = $\times 10^4 \text{kg}\cdot\text{m}^2$

Gear Ratio \ Package Model	5	10	15	20	30	50	100	200
BLU220 <input type="checkbox"/> - <input type="checkbox"/>	1.55	6.2	14	24.8	55.8	155	155	155
BLU440 <input type="checkbox"/> - <input type="checkbox"/>	5.5	22	49.5	88	198	550	550	550
BLU590 <input type="checkbox"/> - <input type="checkbox"/>	25	100	225	400	900	2500	2500	2500

- Enter the power supply voltage **A**, **C** or **S** in the box () within the model name.
- Enter the gear ratio in the box () within the model name.

Combination Type – Hollow Shaft Flat Gearhead

Unit = $\times 10^4 \text{kg}\cdot\text{m}^2$

Gear Ratio \ Package Model	5	10	15	20	30	50	100	200
BLU220 <input type="checkbox"/> - <input type="checkbox"/> FR	1.55	6.2	14	24.8	55.8	155	155	155
BLU440 <input type="checkbox"/> - <input type="checkbox"/> FR	5.5	22	49.5	88	198	550	550	550
BLU590 <input type="checkbox"/> - <input type="checkbox"/> FR	25	100	225	400	900	2500	2500	2500

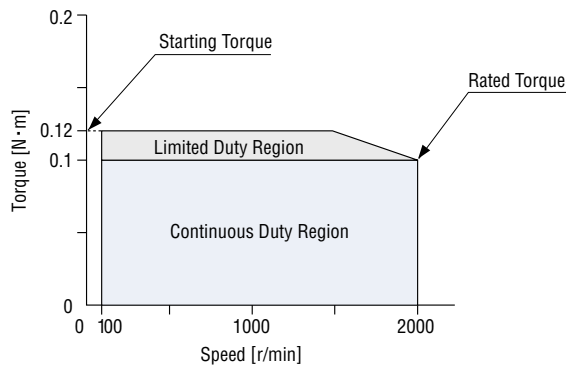
- Enter the power supply voltage **A**, **C** or **S** in the box () within the model name.
- Enter the gear ratio in the box () within the model name.

Speed – Torque Characteristics

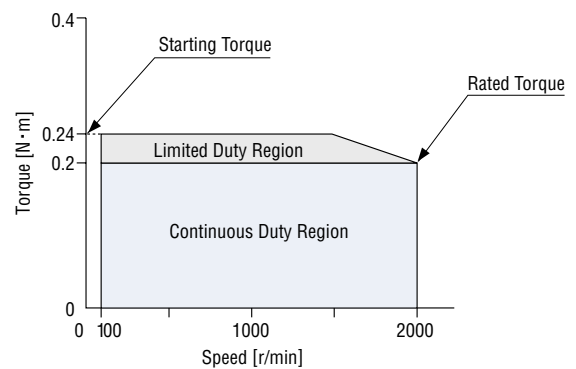
Continuous Duty Region: Continuous operation is possible in this region.

Limited Duty Region: This region is used primarily when accelerating. When a load that exceeds the rated torque is applied continuously for approximately 5 seconds, overload protection is activated and the motor comes to a stop.

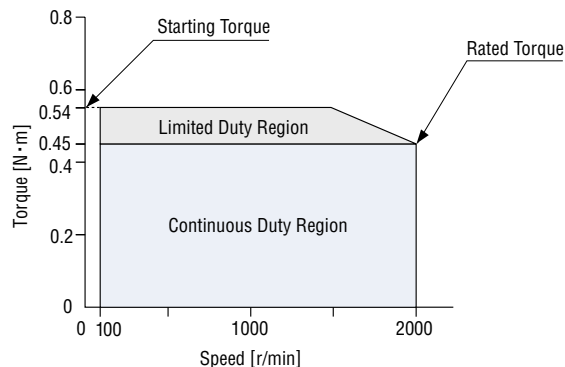
BLU220 - / BLU220 - **FR** / BLU220 - **A**



BLU440 - / BLU440 - **FR** / BLU440 - **A**



BLU590 - / BLU590 - **FR** / BLU590 - **A**



- The characteristics shown above are applicable for the motors only.
- Enter the power supply voltage **A**, **C** or **S** in the box () within the model name.
- Enter the gear ratio in the box () within the model name.

Dimensions (Unit = mm)

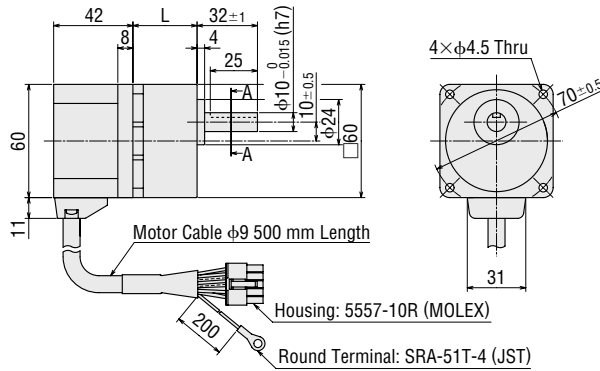
● Mounting screws are included with the combination type.

20 W

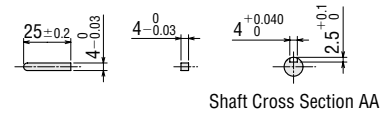
Motor/Parallel Shaft Gearhead

Package Model	Motor Model	Gearhead Model	Gear Ratio	L
BLU220A-□	BLUM220-GFS	GFS2G□	5~20	34
BLU220C-□			30~100	38
BLU220S-□			200	43

Mass: 1.0 kg (Including Gearhead)



Key and Key Slot (The key is included with the gearhead)



Shaft Cross Section AA

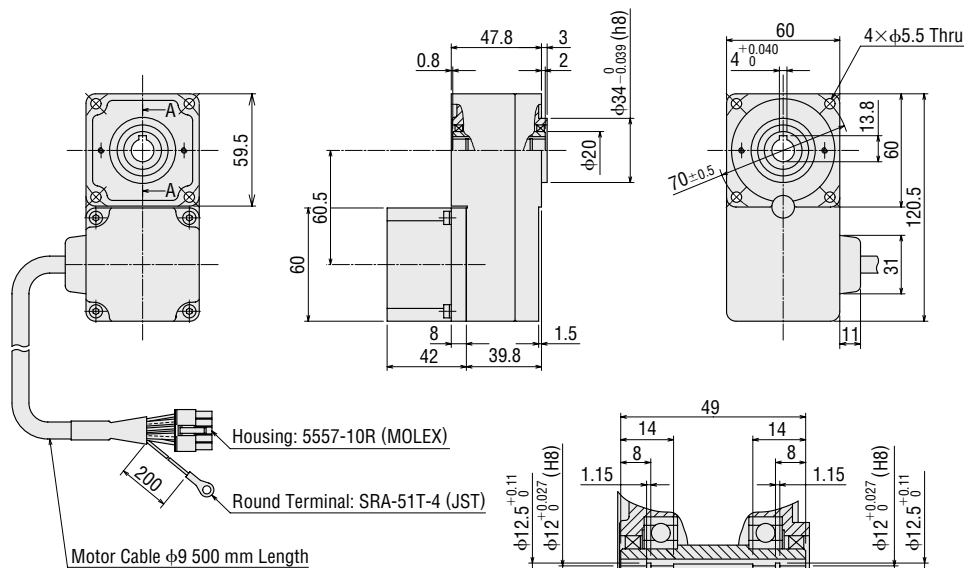
Motor/Hollow Shaft Flat Gearhead

BLU220A-□FR, BLU220C-□FR, BLU220S-□FR

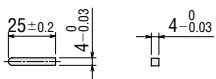
Motor: BLUM220-GFS

Gearhead: GFS2G□FR

Mass: 1.3 kg (Including Gearhead)



Key (Included)



Cross Section AA

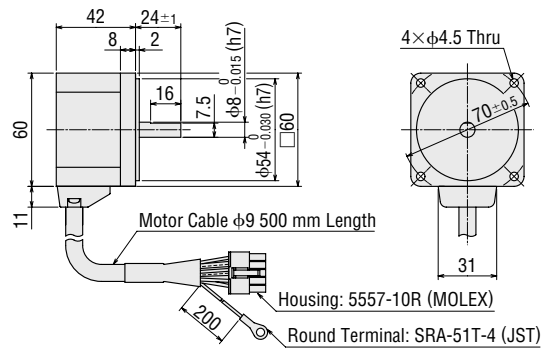
● Enter the gear ratio in the box (□) within the model name.

◇ Round Shaft Type

BLU220A-A, BLU220C-A, BLU220S-A

Motor: BLUM220-A

Mass: 0.5 kg

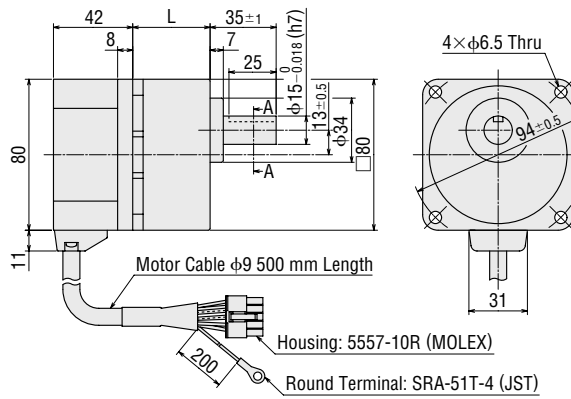


● 40 W

◇ Motor/Hollow Shaft Flat Gearhead

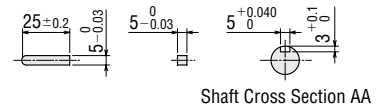
Package Model	Motor Model	Gearhead Model	Gear Ratio	L
BLU440A -□	BLUM440-GFS	GFS4G□	5~20	41
BLU440C -□			30~100	46
BLU440S -□			200	51

Mass: 1.8 kg (Including Gearhead)



◇ Key and Key Slot

(The key is included with the gearhead)



● Enter the gear ratio in the box (□) within the model name.

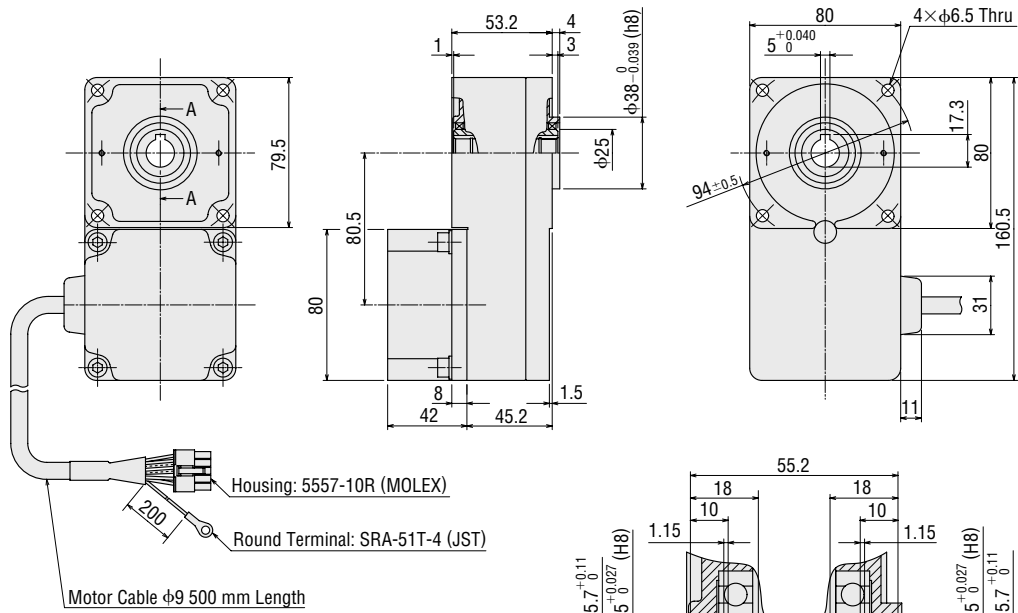
◆ **Motor/Hollow Shaft Flat Gearhead**

BLU440A-□FR, BLU440C-□FR, BLU440S-□FR

Motor: BLUM440-GFS

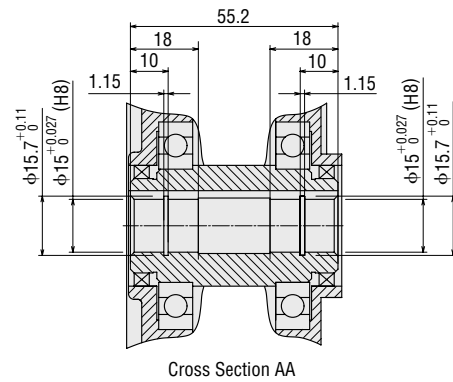
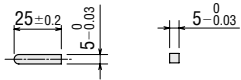
Gearhead: GFS4G□FR

Mass: 2.4 kg (Including Gearhead)



◆ **Key and Key Slot**

(The key is included with the gearhead)

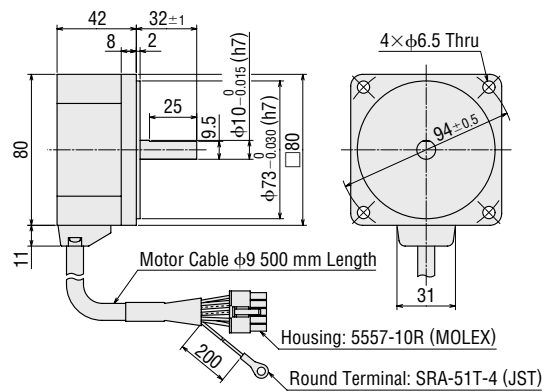


◆ **Round Shaft Type**

BLU440A-A, BLU440C-A, BLU440S-A

Motor: BLUM440-A

Mass: 0.8 kg



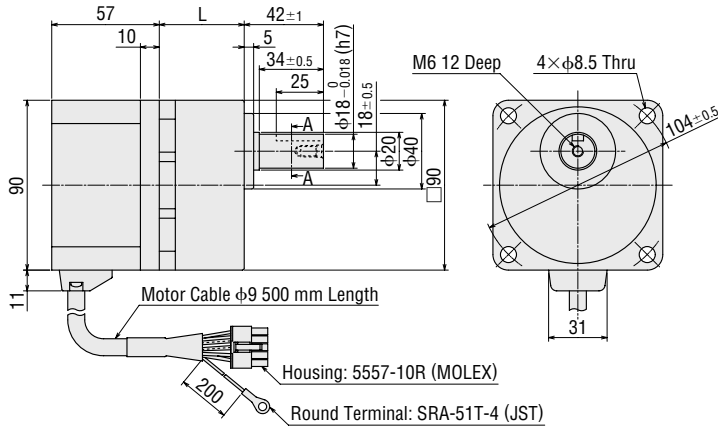
● Enter the gear ratio in the box (□) within the model name.

● 90 W

◇ Motor/Parallel Shaft Gearhead

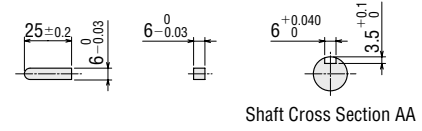
Package Model	Motor Model	Gearhead Model	Gear Ratio	L
BLU590A-□	BLUM590-GFS	GFS5G□	5~20	45
BLU590C-□			30~100	58
BLU590S-□			200	64

Mass: 2.9 kg (Including Gearhead)



◇ Key and Key Slot

(The key is included with the gearhead)



Shaft Cross Section AA

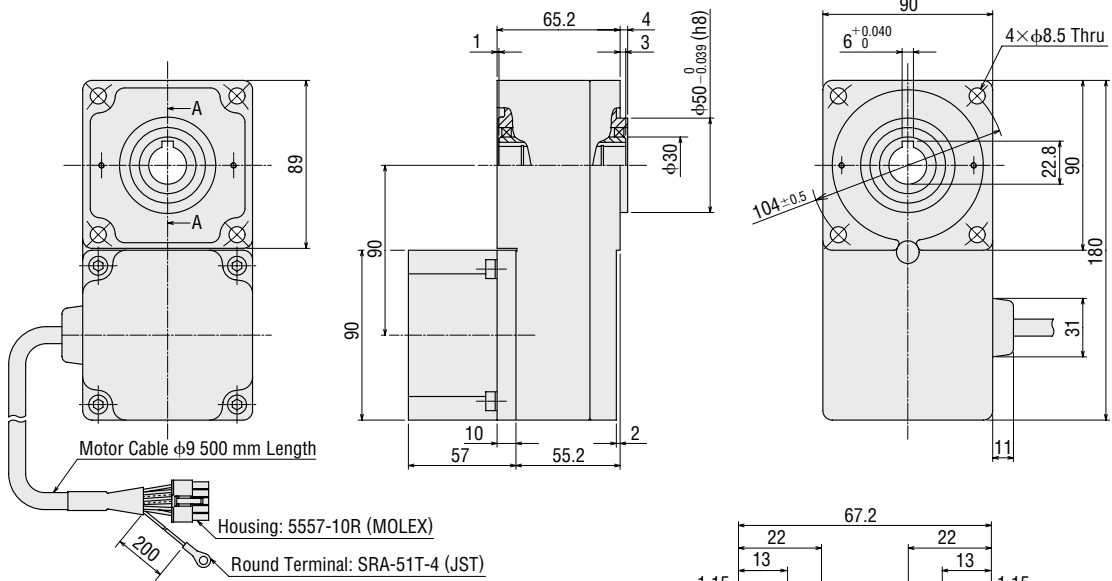
◇ Motor/Hollow Shaft Flat Gearhead

BLU590A-□FR, BLU590C-□FR, BLU590S-□FR

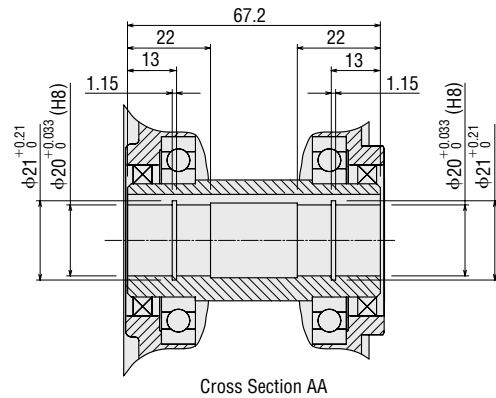
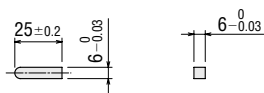
Motor: BLUM590-GFS

Gearhead: GFS5G□FR

Mass: 3.6 kg (Including Gearhead)



◇ Key (Included)



Cross Section AA

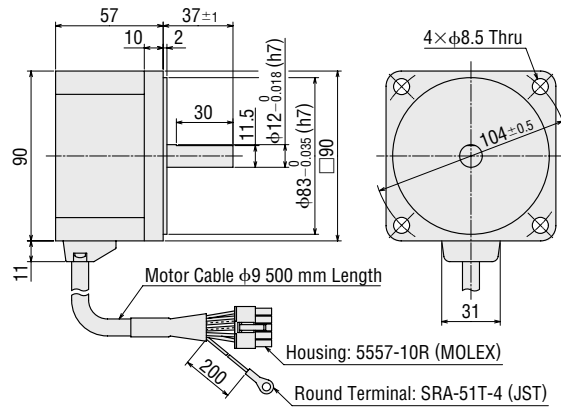
● Enter the gear ratio in the box (□) within the model name.

◆ Round Shaft Type

BLU590A-A, BLU590C-A, BLU590S-A

Motor: BLUM590-A

Mass: 1.4 kg



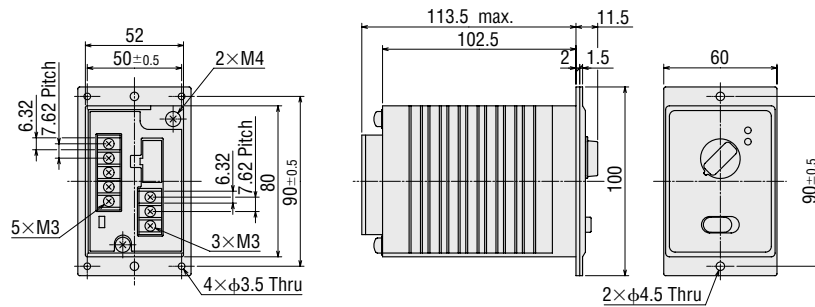
◆ Driver (Common to all models)

BLUD20A, BLUD20C, BLUD20S

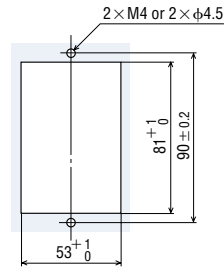
BLUD40A, BLUD40C, BLUD40S

BLUD90A, BLUD90C, BLUD90S

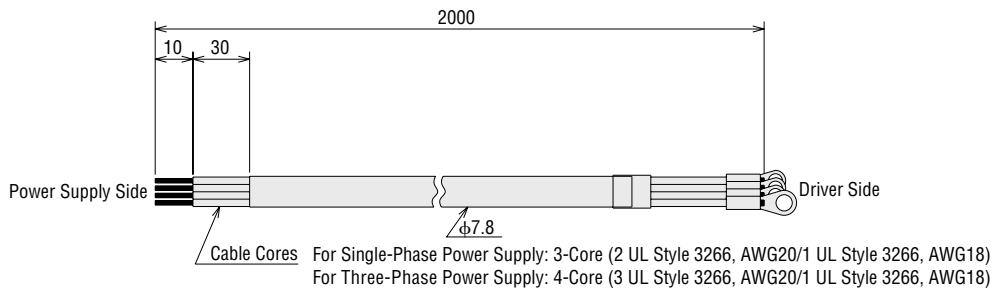
Mass: 0.4 kg



◆ Driver Panel Cut-Out



◆ Driver Power Supply Cable (Included, common to all models)



Connection and Operation

Names and Functions of Driver Parts

Speed Potentiometer

Turning the potentiometer clockwise causes the speed to increase.
Speed setting range is 100–2000 r/min.
The setting is 0 r/min at the time of shipment.

RUN/STAND-BY Switch

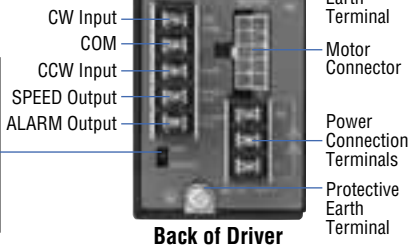


Front of Driver

Input/Output Connection Signal Terminals

Sink/Source-Input Selector Switch

	Set to the SINK side when the sink logic is to be used.
	Set to the SOURCE side when the source logic is to be used.



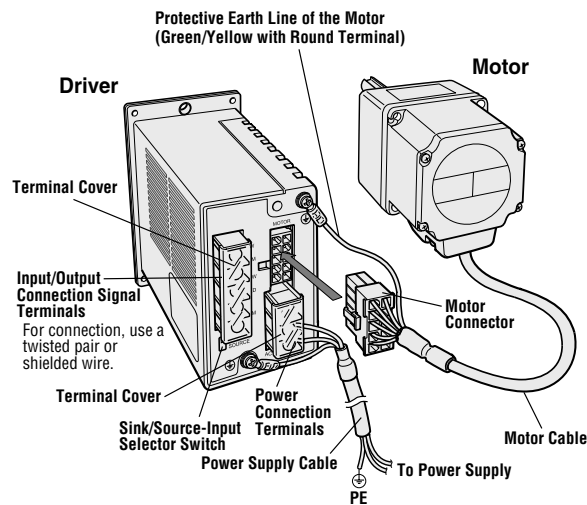
Back of Driver

Notes:

- The RUN/STAND-BY switch is not a power ON/OFF switch.
- When you want to stop the motor for an extended period, turn off the driver power.

Connection Diagrams

Motor and Driver Connection



Motor Connection

Insert the motor cable connector into the motor connector (MOTOR) on the driver. Insert it until a click sound is audible. To expand the distance between the motor and driver, use an optional extension cable. The connection can be extended to a maximum of 10.5 m.

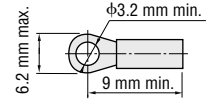
Connect the motor's protective earth line (green/yellow) to the driver, as shown in the figure. If you are using an extension cable or the motor can be accessed directly by hands, connect the protective earth wire from the motor directly to ground. If the protective earth line is not long enough, connect a lead wire of AWG18 (0.75 mm²) or larger to the protective earth line of the motor cable and connect it to ground over the shortest distance. The lead wire must be provided by the user. The optional dedicated extension cable does not come with a protective earth line. If you are using the optional dedicated extension cable, provide grounding at a relay point or extend the cable to an appropriate grounding point.

Power Connection

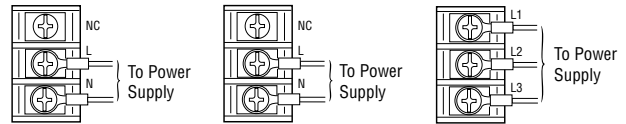
Connect the included power supply cable to the power supply terminal of the driver. Connect the red and black lead wires to the power connection terminals, and green/yellow lead wire to the protective earth terminal. When the included power supply cable is not used, use a cable with a diameter equivalent to AWG22 (0.3 mm²) or more. For the protective earth cable, use a cable with a diameter equivalent to AWG18 (0.75 mm²) or more.

Recommended Crimp Terminals

Round Terminal with Insulation (M3)



- Single-Phase 100–115 VAC
- Single-Phase 200–230 VAC
- Three-Phase 200–230 VAC

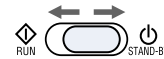


Operation

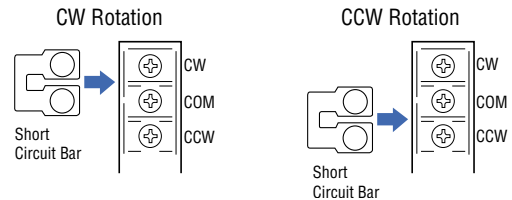
The direction of motor rotation is as viewed from the output shaft end of the motor. "CW" indicates clockwise direction, while "CCW" indicates counterclockwise direction.

Stand Alone Operation

When the RUN/STAND-BY switch is set to the "RUN" position, the motor will run. When it is set to the "STAND-BY" position, the motor will stop.

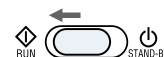


The direction of rotation depends on how the short circuit bar at the back of driver is connected. Connect the short circuit bar between the CW and COM or CCW and COM. Do not use the short circuit bar for any other purpose.



Operation Using External Signals

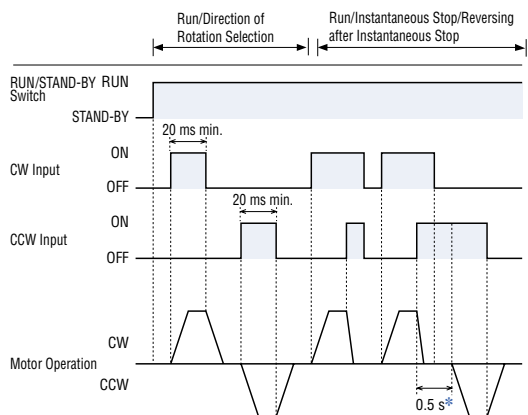
Set the RUN/STAND-BY switch to the "RUN" position.



- See "Input Circuit Connection Example" shown on the page 18 for connection.

Timing Chart

Operation Using External Signals



Note:

The CW and CCW input signals must be ON for at least 20 ms.

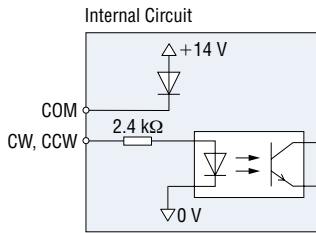
When both the CW and CCW inputs are turned on, the motor stops instantaneously.
*Motor does not run for 0.5 s after instantaneous stop, if a reversing run signal is input.

● I/O Signal Circuits

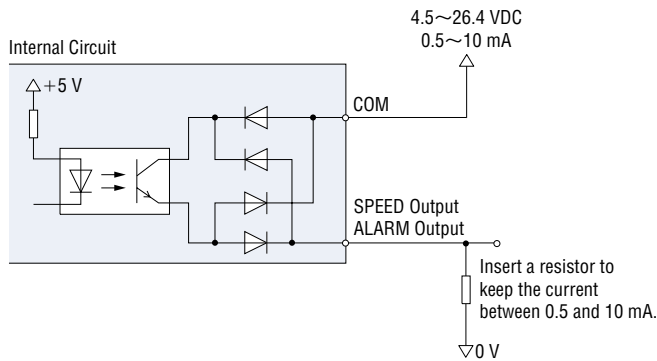
The input signal circuit can be switched between the sink mode and source mode using the source/sink-input selector switch on the driver.

◇ Source Logic

· Input Circuit

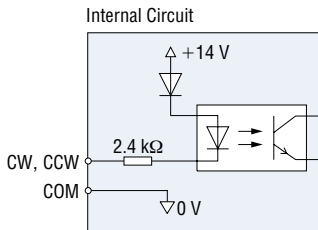


· Output Circuit

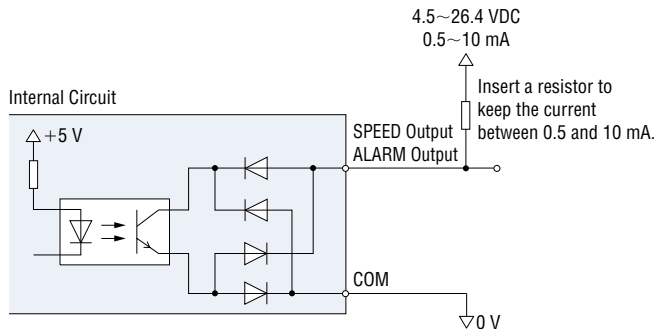


◇ Sink Logic

· Input Circuit

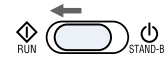


· Output Circuit

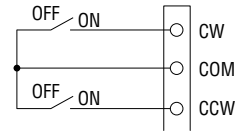


◇ Input Circuit Connection Example

Set the RUN/STAND-BY switch to the "RUN" position.

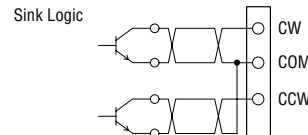


· Small-capacity switch and relay



● Use a small-capacity contact type relay capable of opening and closing 14 VDC, 10 mA.

· Transistor output type controller



● When in the source mode, do not connect the CW input and CCW input to transistor output type controller.

Rotation Direction of Motor

● CW (clockwise) directional operation

When CW input is turned on, the motor runs in a clockwise direction. When CW input is turned off, the motor stops.

● CCW (counterclockwise) directional operation

When CCW input is turned on, the motor runs in a counterclockwise direction. When CCW input is turned off, the motor stops.

When both the CW and CCW inputs are turned on simultaneously, the motor stops instantly. Instantaneous reversing operation is not possible.

◇ When a Controller with a Built-In Clamp Diode is Used

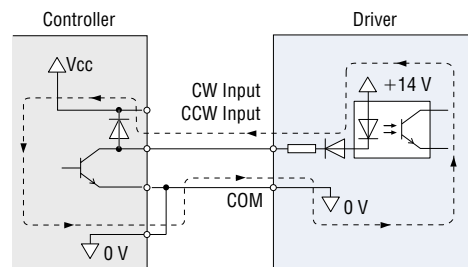
When you want to use the controller with a built-in clamp diode, pay attention to the sequence of turning on or off the power.

Power ON: Controller ON → Driver ON

Power OFF: Driver OFF → Controller OFF

If the driver power is turned on first when connected as shown below, or the controller power is turned off with the driver power turned on, current will be applied, as indicated by the arrows in the diagram. This may cause the motor to run. When the power is turned on or off simultaneously, the motor may run temporarily due to differences in power capacity. The controller power must be turned on first, and driver power must be turned off first.

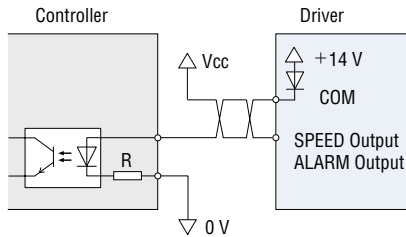
· Example of Sink Logic



◇ Output Circuit Connection Example

The signal output is open collector output. Use the power supply of 4.5 VDC to 26.4 VDC to connect the limit resistor (R) to keep output current between 0.5 mA and 10 mA.

• Signal Output (Source Logic) Connection Example



Note:

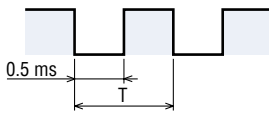
- The ON voltage of the output circuit is approx. 15 V. Remember this specification when driving other element using the output circuit.

◇ SPEED Output

The speed output signal is synchronized with the motor speed. The system outputs pulses (with a width of approximately 0.5 ms) at a rate of 30 pulses per rotation of the motor output shaft. You can measure the speed output frequency and calculate motor speed.

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

$$\text{SPEED Output Frequency (Hz)} = \frac{1}{T}$$



Notes for Connection:

- When you want to extend the input/output signal cable, the length must not exceed 2 m. The cable should be as short as possible in order to minimize noise.
- Signal wires and motor wires should be kept away from power cables or motor cables.

◇ ALARM Output

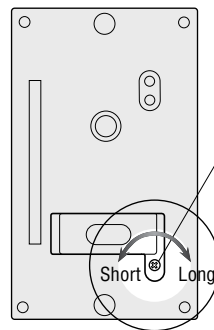
In the following conditions, the driver's protective function will actuate. The ALARM output will turn OFF and the motor will stop. In this case, the protective function that actuated can be checked based on whether the LED is blinking or illuminating steadily.

- The LED will blink upon actuation of the following protective function:
 - Overload protective function
- The LED will illuminate steadily upon actuation of the following protective functions:
 - Overspeed protective function, undervoltage protective function, overcurrent protective function, motor sensor error, overvoltage protective function, motor sensor error, undervoltage protective function, overspeed protective function

● Setting the Acceleration/Deceleration Time

The motor accelerates slowly when it starts up and decelerates slowly when it stops. This acceleration/ deceleration time can be set within the range from 0.5 to 10 sec (2000 r/min without load). The time can be set using the acceleration/deceleration potentiometer. Remove the front panel of the driver to access the potentiometer.

*The figure shows the driver with the front panel removed.



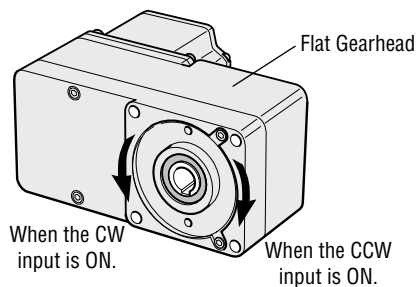
Acceleration/Deceleration Time Potentiometer

Time is increased by turning the switch clockwise. Use an insulated Phillips Screwdriver for this operation. The shortest time is selected at the time of shipment.

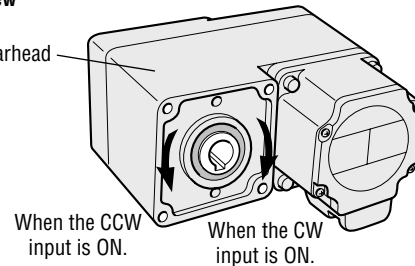
■ Rotation Direction of the Hollow Shaft Flat Gearhead

The hollow shaft flat gearhead of the combination type rotates in the direction as shown below, with respect to the direction input from the driver.

Front View



Rear View



Installation of the Hollow Shaft Flat Gearhead

Installing the Load Shaft

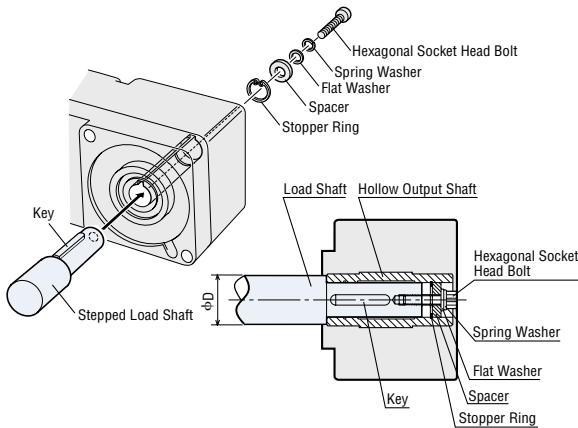
- Install the load shaft to the hollow output shaft by aligning the center of the hollow shaft with that of the load shaft.
- The hollow output shaft has a key slot. Machine a matching key slot on the load shaft and use the supplied key to affix the two shafts across the slots.
- A recommended tolerance of the load shaft is h7.
- If the motor is intended to receive large impacts due to frequent instantaneous stops or carry a large overhung load, use a stepped load shaft.

Notes:

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

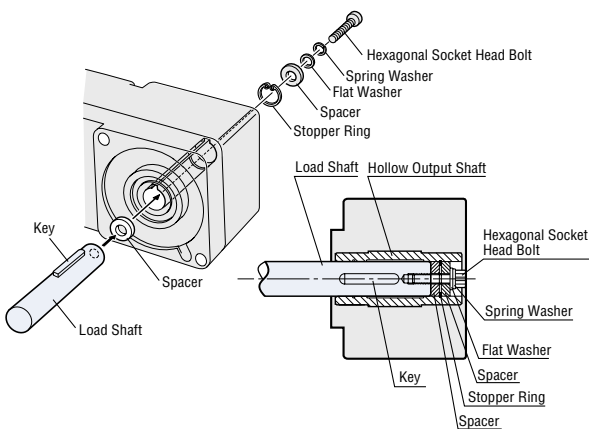
Stepped Load Shaft

Install a hexagonal socket head bolt over a stopper ring, spacer, flat washer and spring washer, and tighten the bolt to affix the load shaft.



Straight Load Shaft

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



Recommended Load Shaft Installation Dimensions

Unit = mm

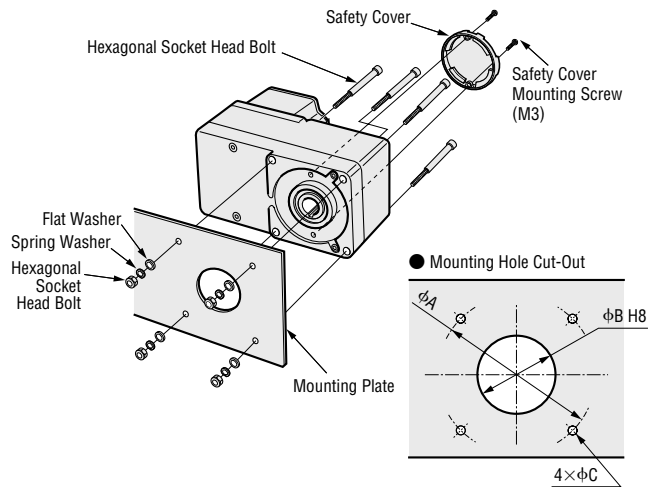
Model	BLU220	BLU440	BLU590
Inner Diameter of Hollow Shaft (H8)	$\phi 12^{+0.027}_0$	$\phi 15^{+0.027}_0$	$\phi 20^{+0.033}_0$
Recommended Tolerance of Load Shaft (h7)	$\phi 12^{0}_{-0.018}$	$\phi 15^{0}_{-0.018}$	$\phi 20^{0}_{-0.021}$
Nominal Diameter of Stopper Ring	$\phi 12$, C-shaped	$\phi 15$, C-shaped	$\phi 20$, C-shaped
Applicable Bolt	M4	M5	M6
Spacer Thickness*	3	4	5
Outer Diameter of Step Part ϕD	20	25	30

*Determine the spacer thickness in conformance with the table. If the spacer is thicker than the specified dimension, the bolt will project from the surface and interfere with the safety cover.

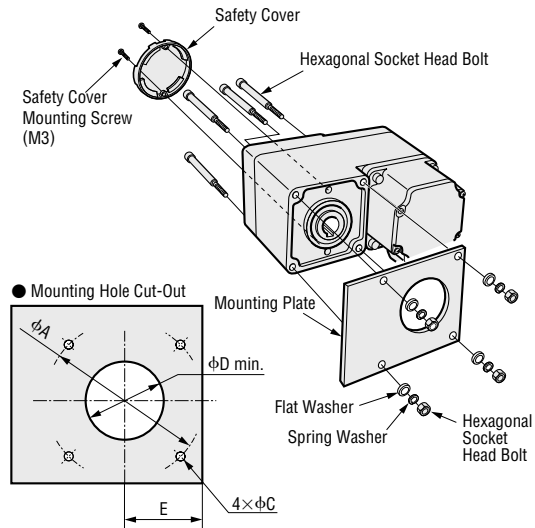
Installing the Hollow Shaft

Installing from the Front Face

The output shaft boss (h8) can be used to align the shaft.



Installing from the Rear Face



Note:

- When installing the hollow shaft flat gearhead from the rear face, provide dimension E to prevent the mounting plate from contacting the motor.

Mounting Hole Dimensions

Unit = mm

Model	BLU220	BLU440	BLU590
Nominal Bolt Size	M5	M6	M8
ϕA	70	94	104
ϕB H8	$34^{+0.039}_0$	$38^{+0.039}_0$	$50^{+0.039}_0$
ϕC	5.5	6.5	8.5
ϕD	25	30	35
E	29	39	44

List of Motor and Driver Combinations

Combination Type – Parallel Shaft Gearhead

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

Output Power	Package Model	Motor Model	Gearhead Model	Driver Model
20 W	BLU220A -□	BLUM220-GFS	GFS2G□	BLUD20A
	BLU220C -□			BLUD20C
	BLU220S -□			BLUD20S
40 W	BLU440A -□	BLUM440-GFS	GFS4G□	BLUD40A
	BLU440C -□			BLUD40C
	BLU440S -□			BLUD40S
90 W	BLU590A -□	BLUM590-GFS	GFS5G□	BLUD90A
	BLU590C -□			BLUD90C
	BLU590S -□			BLUD90S

● Enter the gear ratio in the box (□) within the model name.

Combination Type – Hollow Shaft Flat Gearhead

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

Output Power	Package Model	Motor Model	Gearhead Model	Driver Model
20 W	BLU220A -□ FR	BLUM220-GFS	GFS2G□ FR	BLUD20A
	BLU220C -□ FR			BLUD20C
	BLU220S -□ FR			BLUD20S
40 W	BLU440A -□ FR	BLUM440-GFS	GFS4G□ FR	BLUD40A
	BLU440C -□ FR			BLUD40C
	BLU440S -□ FR			BLUD40S
90 W	BLU590A -□ FR	BLUM590-GFS	GFS5G□ FR	BLUD90A
	BLU590C -□ FR			BLUD90C
	BLU590S -□ FR			BLUD90S

● Enter the gear ratio in the box (□) within the model name.

Round Shaft Type

Output Power	Package Model	Motor Model	Driver Model
20 W	BLU220A-A	BLUM220-A	BLUD20A
	BLU220C-A		BLUD20C
	BLU220S-A		BLUD20S
40 W	BLU440A-A	BLUM440-A	BLUD40A
	BLU440C-A		BLUD40C
	BLU440S-A		BLUD40S
90 W	BLU590A-A	BLUM590-A	BLUD90A
	BLU590C-A		BLUD90C
	BLU590S-A		BLUD90S

Pinion Shaft Type

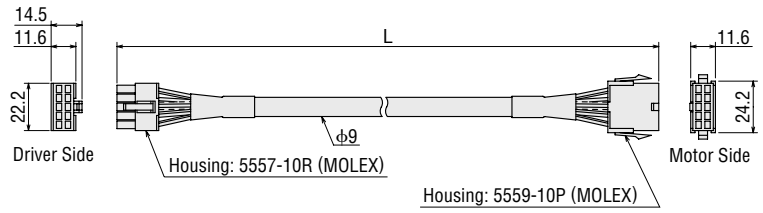
Output Power	Package Model	Motor Model	Driver Model
20 W	BLU220A-GFS	BLUM220-GFS	BLUD20A
	BLU220C-GFS		BLUD20C
	BLU220S-GFS		BLUD20S
40 W	BLU440A-GFS	BLUM440-GFS	BLUD40A
	BLU440C-GFS		BLUD40C
	BLU440S-GFS		BLUD40S
90 W	BLU590A-GFS	BLUM590-GFS	BLUD90A
	BLU590C-GFS		BLUD90C
	BLU590S-GFS		BLUD90S

■ Accessories (Sold Separately)

● Extension Cables (RoHS)

These cables are used to connect motor and driver. The maximum extension length is 10.5 meters.

Model	Length: L (m)
CC01AXU	1
CC02AXU	2
CC03AXU	3
CC05AXU	5
CC10AXU	10



● Flexible Couplings (RoHS)

These products are the clamping type couplings to connect between the shaft of motor/gearhead and the shaft of the equipment to be connected. Couplings come with shaft holes and have standardized combinations for different diameter shaft holes.

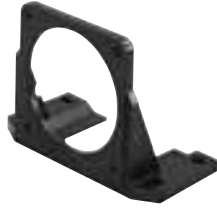


Applicable Product	Shaft Diameter (mm)	Type of Load	Coupling Type
BLU220 ■-□	φ10	Regular Load	MCL30
		Shock Load	MCL40
BLU220 ■-A	φ8	Regular Load	MCL20
		Shock Load	MCL30
BLU440 ■-□	φ15	Regular Load	MCL40
		Shock Load	MCL55
BLU440 ■-A	φ10	Regular Load	MCL30
		Shock Load	MCL40
BLU590 ■-□	φ18	Regular Load	MCL55
		Shock Load	
BLU590 ■-A	φ12	Regular Load	MCL30
		Shock Load	MCL40

- Enter the power supply voltage **A**, **C** or **S** in the box (■) within the model name.
Enter the gear ratio in the box (□) within the model name.
- Choose from a range of flexible couplings with various shaft hole diameters. These couplings can also be used with round-shaft motors having the corresponding shaft diameter.

● Motor/Gearhead Mounting Brackets (RoHS)

High-strength installation fittings are available for handling high-output motors and gearheads.



Model	Applicable Product
SOL2M4	BLU220 □ □
	BLU220 □ -A
SOL4M6	BLU440 □ □
	BLU440 □ -A
SOL5M8	BLU590 □ □
	BLU590 □ -A

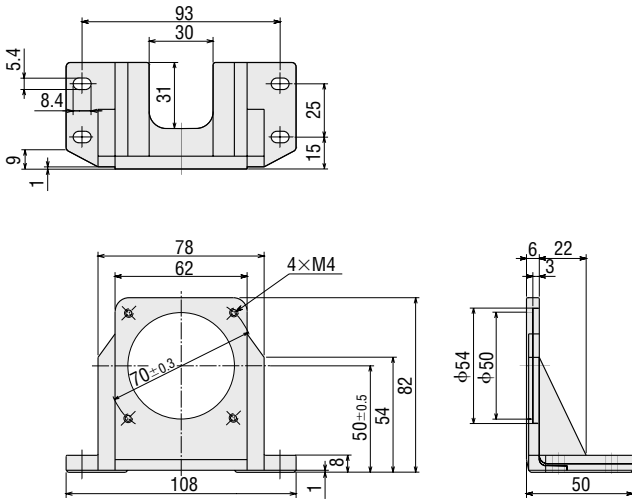
● Enter the power supply voltage **A**, **C** or **S** in the box (□) within the model name.
Enter the gear ratio in the box (□) within the model name.

● These brackets come with tapped holes. To mount the motor and gearhead, simply fasten with the screws provided to the gearhead. To mount the motor alone, mounting screws must be provided separately.

● Please note that these mounting brackets cannot be used with hollow shaft flat gearheads.

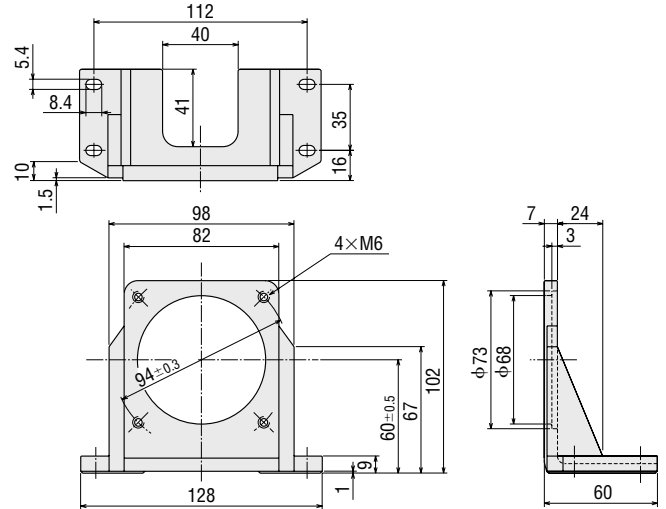
Model: **SOL2M4**

Mass: 135 g Material: Aluminum



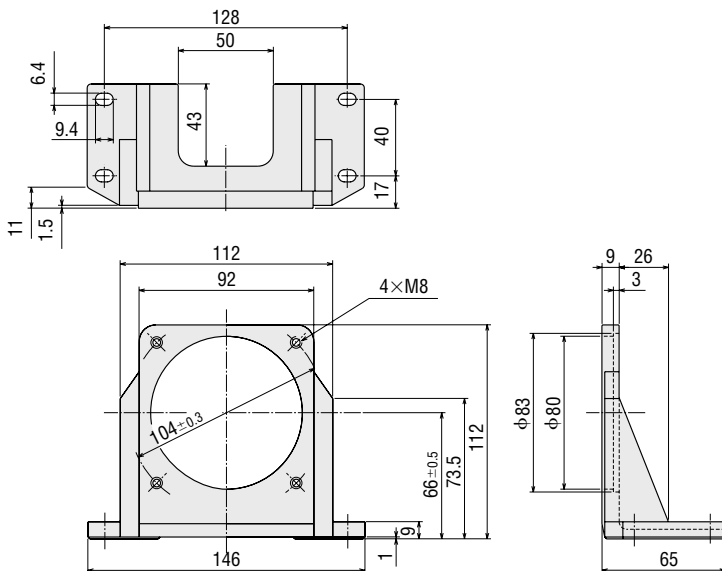
Model: **SOL4M6**

Mass: 210 g Material: Aluminum



Model: **SOL5M8**

Mass: 270 g Material: Aluminum



Oriental Motor's Brushless DC Motor and Driver Packages Meeting All Your Motion Control Needs

Built-In Digital Operator

Brushless DC Motor and Driver Package **BLF Series**

This unit combines a brushless DC motor with a maximum speed of 4000 r/min with a driver offering built-in digital setting/display functions.



- Output: 30 to 120 W
- Speed Control Range: 80 to 4000 r/min

24-VDC Input

Brushless DC Motor and Driver Package **BLH Series**

Combining a brushless DC motor with a 24-VDC board-type driver, this unit is ideal for equipment that has limited installation space.



- Output: 15 to 100 W
- Speed Control Range: 100 to 3000 r/min

This product is manufactured at a plant 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.
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