RoHS RoHS-Compliant Brushless Motor Systems BLF Series

The **BLF** Series brushless motor achieved a maximum motor speed of 4000 r/min. With the digital operator, digital setting and display are possible, offering wide-ranging functions to meet your diverse needs.

Motor: CANUS CE Driver: CE List of safety standard approved products (Model, Standards, File No., Certification Body) Page G-11



Features

• Wide Speed Control Range from 80 r/min up to 4000 r/min A wide speed control range from 80 to 4000 r/min (speed ratio of 50:1) enables the motor to be used for various applications.





Energy-Saving

At an output power of 60 W (1/12 HP), the power loss of the **BLF** Series is approximately half that of an inverter-controlled AC motor, which contributes to the energy-saving operation of your equipment.



• Multi-Speed Operation Using up to Eight Speeds Up to eight speeds can be set by digital setting. On the digital operator, the speed can be set in units of 1 r/min and a different acceleration/deceleration time can be set for each speed. Switch the speed according to your needs.



Easy Operation with the Digital Operator

You can perform various settings and operations using the six operation keys on the digital operator.



Operation Keys

Various Digital Displays

Speed, load factor, alarm code, etc. can be displayed digitally. • The speed can be displayed as gearhead output shaft speed.



Four Speed Setting Methods

Select one of four speed setting methods according to the condition in which your equipment is used.



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Speed Teaching Function

The speed adjusted by physically operating the motor can be set and stored.



Sink/Source Logic Switchable

To ensure safety and usability, sink/source logic can be selected by a switch.

The factory setting is the sink logic.

Full Range of Protective Functions

The **BLF** Series detects various motor and driver errors such as overload, overvoltage, undervoltage, missing phase, overspeed, overcurrent, EEPROM error, CPU error, operation error and external error. Upon detection of an error, the driver will immediately stop the motor and output an alarm signal.

Detachable Digital Operator

The digital operator can be detached from the driver and used at a location as far as 5 m (16.4 ft.) away using an accessory remotecontrol kit (sold separately). Use the digital operator as a handy operation unit or display outside the switch board. (The digital operator conforms to IP65 when the remote-control kit is used.)



A Maximum Motor/Driver Wiring Distance of 20 m (65.6 ft.)

By separating the motor cable and signal cable, the **BLF** Series is less vulnerable to noise and capable of an extension of the motor/ driver wiring distance to a maximum of 20 m (65.6 ft.).

Select connection cables (sold separately) from among the eight lengths of 1 to 20 m (3.3 to 65.6 ft.).

Note:

Be sure to purchase connection cables (sold separately)



Uses a Terminal Block for Driver Connection

The driver-end of each cable has terminals, instead of a connector, to make it easy to wire the cable into a switch board.

Long Life Gearhead Rating of 10000 Hours

The rated life of the parallel shaft gearhead and hollow shaft flat gearhead is 10000 hours (at 3000 r/min). The parallel shaft gearhead achieves a rated life of twice as long as that of a conventional gearhead.

• The 60 W (1/12 HP), 120 W (1/6 HP), 200 W (1/4 HP) and 400 W (1/2 HP) parallel shaft gearhead has a tapped hole at the shaft end.

Features of Hollow Shaft Flat Gearhead

\Diamond Space-Saving and Low-Cost

The output shaft can be coupled directly to a driven shaft without using a coupling, which allows you to reduce the size and installation space of your equipment. Since no shaft-coupling parts are needed, the parts cost and labor will also decrease.



◇High Permissible Torque

While the permissible torque of parallel shaft gearhead saturates at high gear ratios, the hollow shaft flat gearhead enables the motor torque to be fully utilized.



IP65 Protection

The motor (excluding the mounting surface of the round shaft type and the connector) and digital operator (when an accessory remotecontrol kit is used) provide a high level of protection conforming to IP65. It means you can use the **BLF** Series in locations where the unit may come into contact with water.

• The **BLF** Series is not designed for washing directly in water or use in an environment where the unit constantly receives water splashes. The protection class of the driver is IP20.

RoHS RoHS-Compliant

The **BLF** Series conforms to the RoHS Directive that prohibits the use of six chemical substances including lead and cadmium. ● Details of RoHS Directive → Page G-38

System Configuration

Combination Type – Parallel Shaft Gearhead/Round Shaft Type



•Example of System Configuration

BLF460A-30	CC01BLF	-	BLFHS-02	SOL4M6	MCL5515F10	PAVR-20KZ
BLF Series Combination Type Parallel Shaft	Connection Cable [Cable Set, 1 m (3.3 ft.)]	+	Remote-Control Kit [2 m (6.6 ft.)]	Mounting Bracket	Flexible Coupling	External Speed Potentiometer
	(Sold separately)		(Sold separately)			

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

AC Input BX

Motor

BHF

AC Motor Systems

S

Combination Type – Hollow Shaft Flat Gearhead



③External Speed Potentiometer (→ Page A-300)

No.	Product Name	Overview	Page
1	Connection Cables	Dedicated cable for connecting the motor and driver [1 to 20 m (3.3 to 65.6 ft.)]. Be sure to purchase this cable.	B-85
2	Remote-Control Kit	Use this kit when removing the digital operator from the driver to operate it remotely.	B-85
3	External Speed Potentiometer	Used to set and adjust the speed of the speed control motor (PAVR-20KZ).	A-300

•Example of System Configuration

	(Sold separately)		(Sold separately)	
BLF Series Combination Type Hollow Shaft	Connection Cable [Cable Set, 1 m (3.3 ft.)]	+	Remote-Control Kit [2 m (6.6 ft.)]	External Speed Potentiometer
BLF460A-30FR	CC01BLF		BLFHS-02	PAVR-20KZ

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

Product Number Code $\frac{BLF}{1} \stackrel{2}{=} \frac{30}{3} \stackrel{A}{=} \frac{5}{5} \stackrel{FR}{=} \frac{6}{5}$

1	Series	BLF: BLF Series
2	Motor Frame Size	2 : 60 mm (2.36 in.) 4 : 80 mm (3.15 in.) 5 : 90 mm (3.54 in.) 6 : 104 mm (4.09 in.) [110 mm (4.33 in.) for Gearhead]
3	Output Power (W)	(Example) 30 : 30 W (1/25 HP)
4	Power Supply Voltage	A: Single-Phase 100-120 VAC C: Single-Phase 200-240 VAC S: Three-Phase 200-240 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 FR : Combination Type	e – Parallel Shaft Gearhead – Hollow Shaft Flat Gearhead

Product Line

Combination Type The combination type comes with the motor and its dedicated gearhead 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	Model	Gear Ratio
	Single-Phase 100-120 VAC	BLF230A-	5, 10, 15, 20, 30, 50, 100, 200
30 W (1/25 HP)	Single-Phase 200-240 VAC	BLF230C-	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200-240 VAC	BLF230S-	5, 10, 15, 20, 30, 50, 100, 200
	Single-Phase 100-120 VAC	BLF460A-	5, 10, 15, 20, 30, 50, 100, 200
60 W (1/12 HP)	Single-Phase 200-240 VAC	BLF460C-	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200-240 VAC	BLF460S-	5, 10, 15, 20, 30, 50, 100, 200
	Single-Phase 100-120 VAC	BLF5120A-	5, 10, 15, 20, 30, 50, 100, 200
120 W (1/6 HP)	Single-Phase 200-240 VAC	BLF5120C-	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200-240 VAC	BLF5120S-	5, 10, 15, 20, 30, 50, 100, 200
	Single-Phase 100-120 VAC	BLF6200A-	5, 10, 15, 20, 30, 50, 100, 200
200 W (1/4 HP)	Single-Phase 200-240 VAC	BLF6200C-	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200-240 VAC	BLF6200S-	5, 10, 15, 20, 30, 50, 100, 200
400 W (1/2 HP)	Three-Phase 200-240 VAC	BLF6400S-	5, 10, 15, 20, 30, 50, 100, 200

Combination Type – Hollow Shaft Flat Gearhead

Output Power	Power Supply Voltage	Model	Gear Ratio
	Single-Phase 100-120 VAC	BLF230A-□FR	5, 10, 15, 20, 30, 50, 100, 200
30 W (1/25 HP)	Single-Phase 200-240 VAC	BLF230C-□FR	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200-240 VAC	BLF230S-□FR	5, 10, 15, 20, 30, 50, 100, 200
	Single-Phase 100-120 VAC	BLF460A-□FR	5, 10, 15, 20, 30, 50, 100, 200
60 W (1/12 HP)	Single-Phase 200-240 VAC	BLF460A-□FR 5 BLF460C-□FR 5 BLF460S-□FP 5	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200-240 VAC	BLF460S-□FR	5, 10, 15, 20, 30, 50, 100, 200
	Single-Phase 100-120 VAC	BLF5120A-□FR	5, 10, 15, 20, 30, 50, 100, 200
120 W (1/6 HP)	Single-Phase 200-240 VAC	BLF5120C-□FR	5, 10, 15, 20, 30, 50, 100, 200
	Three-Phase 200-240 VAC	BLF5120S-□FR	5, 10, 15, 20, 30, 50, 100, 200

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

The following items are included in each product.

Motor, Driver, Gearhead, Mounting Screws, Parallel Key, Safety Cover (with screws), Operating Manual

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

The following items are included in each product.

Motor, Driver, Gearhead, Mounting Screws, Parallel Key, Operating Manual

Speed Control Systems

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Round Shaft Type

Output Power	Power Supply Voltage	Model
	Single-Phase 100-120 VAC	BLF230A-A
30 W (1/25 HP)	Single-Phase 200-240 VAC	BLF230C-A
	Three-Phase 200-240 VAC	BLF230S-A
	Single-Phase 100-120 VAC	BLF460A-A
60 W (1/12 HP)	Single-Phase 200-240 VAC	BLF460C-A
	Three-Phase 200-240 VAC	BLF460S-A
	Single-Phase 100-120 VAC	BLF5120A-A
120 W (1/6 HP)	Single-Phase 200-240 VAC	BLF5120C-A
	Three-Phase 200-240 VAC	BLF5120S-A
	Single-Phase 100-120 VAC	BLF6200A-A
200 W (1/4 HP)	Single-Phase 200-240 VAC	BLF6200C-A
	Three-Phase 200-240 VAC	BLF6200S-A
400 W (1/2 HP)	Three-Phase 200-240 VAC	BLF6400S-A
The following	, itama ara inaludad in aaab n	e du at

– The following items are included in each product. —— Motor, Driver, Operating Manual

Gearhead

◇Parallel Shaft Gearhead

Output Power of Applicable Motor (Pinion shaft type)	Gearhead Model	Gear Ratio
30 W (1/25 HP)	GFS2G	5, 10, 15, 20, 30, 50, 100, 200
60 W (1/12 HP)	GFS4G	5, 10, 15, 20, 30, 50, 100, 200
120 W (1/6 HP)	GFS5G	5, 10, 15, 20, 30, 50, 100, 200
200 W (1/4 HP) 400 W (1/2 HP)	GFS6G	5, 10, 15, 20, 30, 50, 100, 200

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

-The following items are included in each product. Gearhead, Screws for Connecting Motor and Gearhead, Mounting Screws, Parallel Key, Operating Manual

Connection Cables (Sold separately)

\diamondsuit Cable Set

The cable set consists of two cables including a motor connection cable and a signal connection cable.

Length	Model
1 m (3.3 ft.)	CC01BLF
2 m (6.6 ft.)	CC02BLF
3 m (9.8 ft.)	CC03BLF
5 m (16.4 ft.)	CC05BLF
7 m (23.0 ft.)	CC07BLF
10 m (32.8 ft.)	CC10BLF
15 m (49.2 ft.)	CC15BLF
20 m (65 6 ft)	CC20BLF

 The BLF Series requires two dedicated cables, one for the motor and the other for signals, for connection between the motor and driver. Be sure to purchase the connection cable set.

Pinion Shaft Type

Output Power	Power Supply Voltage	Model
	Single-Phase 100-120 VAC	BLF230A-GFS
30 W (1/25 HP)	Single-Phase 200-240 VAC	BLF230C-GFS
	Three-Phase 200-240 VAC	BLF230S-GFS
	Single-Phase 100-120 VAC	BLF460A-GFS
60 W (1/12 HP)	Single-Phase 200-240 VAC	BLF460C-GFS
-	Three-Phase 200-240 VAC	BLF460S-GFS
	Single-Phase 100-120 VAC	BLF5120A-GFS
120 W (1/6 HP)	Single-Phase 200-240 VAC	BLF5120C-GFS
-	Three-Phase 200-240 VAC	BLF5120S-GFS
	Single-Phase 100-120 VAC	BLF6200A-GFS
200 W (1/4 HP)	Single-Phase 200-240 VAC	BLF6200C-GFS
	Three-Phase 200-240 VAC	BLF6200S-GFS
400 W (1/2 HP)	Three-Phase 200-240 VAC	BLF6400S-GFS

◇Hollow Shaft Flat Gearhead

Output Power of Applicable Motor (Pinion shaft type)	Gearhead Model	Gear Ratio
30 W (1/25 HP)	GFS2G□FR	5, 10, 15, 20, 30, 50, 100, 200
60 W (1/12 HP)	GFS4G□FR	5, 10, 15, 20, 30, 50, 100, 200
120 W (1/6 HP)	GFS5G□FR	5, 10, 15, 20, 30, 50, 100, 200

• Enter the gear ratio in the box (\Box) within the model name.

The following items are included in each product.

Gearhead, Screws for Connecting Motor and Gearhead, Mounting Screws, Parallel Key, Safety Cover (with screws), Operating Manual

Specifications

• 30 W (1/25 HP) (RoHS)

••••						
	Combination Type – Parallel Shaft Gearhead	BLF230A-	BLF230C-	BLF230S-		
Model	Combination Type – Hollow Shaft Flat Gearhead	BLF230A-□FR	BLF230C-□FR	BLF230S-□FR		
	Round Shaft Type	BLF230A-A	BLF230C-A	BLF230S-A		
Rated Output Power (Continuous) W (HP)			30 (1/25)			
	Rated Voltage VAC	Single-Phase 100-120	Single-Phase 200-240	Three-Phase 200-240		
	Permissible Voltage Range		±10%			
Dowor Couroo	Rated Frequency Hz		50/60			
Fower Source	Permissible Frequency Range		$\pm 5\%$			
	Rated Input Current A	1.3	0.8	0.45		
	Maximum Input Current A	3.0	1.7	1.2		
Rated Torque	N·m (oz-in)	(oz-in) 0.1 (14.2)				
Starting Torque	N•m (oz-in)		0.2 (28)			
Rated Speed	r/min		3000			
Speed Control Range	r/min		80~4000			
Round Shaft Type Permissible Load Inerti	a J ×10 ^{.4} kg·m ² (oz-in ²)	g·m² (oz-in²) 1.8 (9.8)				
Rotor Inertia J	×10 ⁻⁴ kg·m ² (oz-in ²	m² (oz-in²) 0.087 (0.48)				
Speed Regulation*	Load	\pm 0.2% max. (0 \sim Rated torque, at rated	speed, at rated voltage, at normal ambient	temperature)		
(When digital	Voltage	\pm 0.2% max. (Rated voltage \pm 10%, at ra	ated speed, with no load, at normal ambier	nt temperature)		
operator is used)	Temperature	$\pm 0.2\%$ max. $[0 \sim +50^{\circ}C (+32 \sim +122^{\circ}F)]$	F), at rated speed, with no load, at rated vo	Itage]		

●60 W (1/12 HP) (RoHS)

Motor: CAUs CE/Driver: CE

	Combination Type – Parallel Shaft Gearhead	BLF460A-	BLF460C-	BLF460S-			
Model	Combination Type – Hollow Shaft Flat Gearhead	BLF460A-[]FR	BLF460C-□FR	BLF460S-□FR			
	Round Shaft Type	BLF460A-A	BLF460C-A	BLF460S-A			
Rated Output Power (C	Continuous) W (HP)		60 (1/12)				
	Rated Voltage VAC	Single-Phase 100-120	Single-Phase 200-240	Three-Phase 200-240			
	Permissible Voltage Range		±10%				
Dowor Couroo	Rated Frequency Hz	Dination Type – Parallel Shaft Gearhead BLF460A-L bination Type – Hollow Shaft Flat Gearhead BLF460A□FR id Shaft Type BLF460A□FR ous) W (HP) d Voltage VAC Single-Phase 100-120 Sir nissible Voltage Range	50/60				
Rated Output Power (Contri Pe Power Source Pe Pa Re Pe Re M Rated Torque Starting Torque Rated Speed Speed Control Range Round Shaft Type Permissible Load Inertia J Permissible Load Inertia J	Permissible Frequency Range		±5%				
	Rated Input Current A	2.0	0.7				
Rated Torque	Maximum Input Current A	4.5	3.0	1.5			
Rated Torque	N•m (oz-in)	in) 0.2 (28)					
Starting Torque	N•m (oz-in)	0.4 (56)					
Rated Speed	r/min	2.0 1.2 0.7 4.5 3.0 1.5 0.2 (28) 0.4 (56) 3000 80~4000					
Speed Control Range	r/min		80~4000				
Round Shaft Type Permissible Load Inert	ia J ×10 ⁻⁴ kg·m ² (oz-in ²)		3.75 (21)				
Rotor Inertia J	×10 ⁻⁴ kg•m² (oz-in²)		0.236 (1.29)				
Speed Regulation*	Load	\pm 0.2% max. (0 \sim Rated torque, at rated s	speed, at rated voltage, at normal ambient	temperature)			
(When digital	Voltage	\pm 0.2% max. (Rated voltage \pm 10%, at ra	ated speed, with no load, at normal ambien	t temperature)			
operator is used)	Temperature	\pm 0.2% max. [0~+50°C (+32~+122°F), at rated speed, with no load, at rated voltage]					
■120 W (1/6 H	P) (RoHS)		Motor:				

•120 W (1/6 HP) (RoHS)

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	Combination Type – Parallel Shaft Gearhead	BLF5120A-	BLF5120C-	BLF5120S-		
Model	Combination Type – Hollow Shaft Flat Gearhead	BLF5120A-DFR	BLF5120C-DFR	BLF5120S-DFR		
	Round Shaft Type	BLF5120A-A	BLF5120C-A	BLF5120S-A		
Rated Output Power (C	Continuous) W (HP)					
	Rated Voltage VAC	Single-Phase 100-120	Single-Phase 200-240	Three-Phase 200-240		
	Permissible Voltage Range		±10%			
Power Source	Rated Frequency Hz		50/60			
rower Source	Permissible Frequency Range		±5%			
1	Rated Input Current A	3.3	2.0	1.1		
	Maximum Input Current A	7.0	4.5	2.5		
Rated Torque	N•m (oz-in)		0.4 (56)			
Starting Torque	N•m (oz-in)		0.8 (113)			
Rated Speed	r/min		3000			
Speed Control Range	r/min		80~4000			
Round Shaft Type Permissible Load Inert	ia J ×10 ⁻⁴ kg·m ² (oz-in ²)		5.6 (31)			
Rotor Inertia J	×10 ⁻⁴ kg⋅m² (oz-in²)		0.614 (3.4)			
Speed Regulation*	Load	\pm 0.2% max. (0~Rated torque, at rated	speed, at rated voltage, at normal ambien	t temperature)		
(When digital	Voltage	\pm 0.2% max. (Rated voltage \pm 10%, at r	ated speed, with no load, at normal ambie	nt temperature)		
operator is used)	Temperature	$\pm 0.2\%$ max. $[0 \sim +50^{\circ}C (+32 \sim +122^{\circ})]$	F), at rated speed, with no load, at rated vo	Itage]		

*Speed regulation values vary depending on the speed setting method.

Settings from internal speed potentiometer, external speed potentiometer, external DC voltage; Load: ±0.5% max., Voltage: ±0.5% max., Temperature: ±0.5% max.

ullet Enter the gear ratio in the box (\Box) within the model name.

• The values for each specification apply to the motor only.

• 200 W (1/4 HP), 400 W (1/2 HP) RoHS

Motor: CAU us CE / Driver: Uster

Madal	Combination Type – Parallel Shaft Gearhead	BLF6200A-	BLF6200C-	BLF6200S-	BLF6400S-				
Model Rated Output Power (G Power Source Rated Torque Starting Torque Rated Speed Speed Control Range Round Shaft Type Permissible Load Inerf	Round Shaft Type	BLF6200A-A	BLF6200C-A	BLF6200S-A	BLF6400S-A				
Rated Output Power (C	Continuous) W (HF)	200 (1/4)						
	Rated Voltage VAC	Single-Phase 100-120	Single-Phase 200-240	Three-Phase 200-240	Three-Phase 200-240				
	Permissible Voltage Range		±10%						
Dowor Couroo	Rated Frequency Ha		50	/60					
Fower Source	Permissible Frequency Range		<u>±</u>	5%					
	Rated Input Current	4.7	2.8	1.7	2.8				
	Maximum Input Current	8.8	5.1	3.4	5.6				
Rated Torque	N•m (oz-ir)	0.65 (92) 1.3 (184						
Starting Torque	N•m (oz-ir)	1.15 (163) 1.8 (250)						
Rated Speed	r/mii	1	30	00					
Speed Control Range	r/mii	1	80~	4000					
Round Shaft Type Permissible Load Inert	ia J ×10 ⁻⁴ kg·m² (oz-in	8.75 (48) 15 (82							
Rotor Inertia J	×10⁻⁴ kg•m² (oz-in	0.61 (3.3) 0.6							
Speed Regulation*	Load	\pm 0.2% max. (0 \sim Rated torque, at rated speed, at rated voltage, at normal ambient temperature)							
(When digital	Voltage	\pm 0.2% max. (Rated voltage \pm 10%, at rated speed, with no load, at normal ambient temperature)							
operator is used)	Temperature	±0.2% max. [0~+50°C (+3	\pm 0.2% max. [0~+50°C (+32~+122°F), at rated speed, with no load, at rated voltage]						

* Speed regulation values vary depending on the speed setting method.

Settings from internal speed potentiometer, external speed potentiometer, external DC voltage; Load: ±0.5% max., Voltage: ±0.5% max., Temperature: ±0.5% max.

• Enter the gear ratio in the box (\Box) within the model name.

• The values for each specification apply to the motor only.

Common Specifications

Item	Specifications
Speed Setting Methods	Select one of the following methods: • Set using the internal speed potentiometer • Set using the digital operator: Up to eight speeds • Set using an accessory external speed potentiometer: PAVR-20KZ (20 kΩ, 1/4 W) (sold separately) • Set using external DC voltage: 0~5 VDC or 0~10 VDC
Acceleration/Deceleration Time (At 3000 r/min)	0.2~15 sec. (factory setting: 0.5 sec.) Up to eight speeds using the digital operator
Input Signals (In the remote mode)	Photocoupler input Input resistance 3.3 kΩ Internal power supply voltage: 14 VDC±10% Connectable external voltage: 24 VDC±10% (only for source logic) Sink input (factory setting), Source input/2-wire input mode (factory setting), or 3-wire input mode CW [START/STOP] input, CCW [RUN/BRAKE] input, STOP-MODE [CW/CCW] input, Speed data select, Alarm reset input, External error input Names in [] apply in the 3-wire input mode.
Output Signals	Open-collector output 4.5~26.4 VDC, 10 mA max. (5~10 mA for Speed output) Speed output (30 pulses/rotation), Alarm output1, Alarm output2
Protective Functions*	 When the following are activated, the "Alarm" signal will be output and the motor will coast to a stop. (The motor will stop instantaneously when an external error is input.) 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 120 VAC or 240 VAC by a minimum of 20%, a gravitational operation is performed or a load exceeding the permissible load inertia is driven. Undervoltage protection: Activated when the voltage applied to the driver falls below 100 VAC or 200 VAC by a minimum of 40%. Motor sensor error: Activated when an error is detected in the signals received from the motor due to improper connection or disconnection of the signal cable, etc. Overspeed protection: Activated when an excessive current flows through the driver due to a ground fault, etc. CPU error, EEPROM error, External error, Operation error
Maximum Cable Extension Distance	Motor/Driver Distance: 20.4 m (66.9 ft.) (when a dedicated connection cable is used)
Time Rating	Continuous

* With the BLF 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 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.

Introduction

AC Input BX

AC Input BLF

AC Input BLU

AC Input

DC Input BLH

BHF

FE100/

ESO1/ ESO2

S

Installation

General Specifications

lt	em	Motor	Driver			
Insulation Resistance	9	$100\ M\Omega$ or more when 500 VDC megger is applied between the windings and the case after continuous operation under normal ambient temperature and humidity.	100 M Ω or more when 500 VDC megger is applied between the power supply terminal and the protective earth terminal, and between the power supply terminal and the I/O terminal after continuous operation under normal ambient temperature and humidity.			
Dielectric Strength		Sufficient to withstand 1.5 kVAC at 50 Hz applied between the windings and the case for 1 minute after continuous operation under normal ambient temperature and humidity.	Sufficient to withstand 1.8 kVAC at 50 Hz applied between the power supply terminal and the protective earth terminal for 1 minute, and 3 kVAC at 50 Hz applied between the power supply terminal and the I/O terminal for 1 minute after continuous operation under normal ambient temperature and humidity.			
Temperature Rise		Temperature rise of the windings and the case are 50°C (90°F) or less, and 40°C (72°F) or less*1 respectively measured by the thermocouple method after continuous operation under normal ambient temperature and humidity.	Temperature rise of heat sink is 50°C (90°F) or less measured by the thermocouple method after continuous operation under normal ambient temperature and humidity.			
	Ambient Temperature	0~+50°C (-	$+32 \sim +122^{\circ}$ F) (non-freezing)			
	Ambient Humidity	85% or less (non-condensing)				
Temperature Rise AI AI AI Operating Environment	Altitude	Up to 1000	m (3300 ft.) above sea level			
Operating	Atmosphere	No corrosive gases or dust. Cannot be used in a ra	dioactive area, magnetic field, vacuum or other special environment			
Environment	Vibration	Not subject to continuous v In conformance with JIS C Frequency range: 10~55 F Sweep direction: 3 directio	ribration or excessive impact 60068-2-6, "Sine-wave vibration test method" Iz Pulsating amplitude: 0.15 mm (0.006 in.) ns (X, Y, Z) Number of sweeps: 20 times			
Ctorogo	Ambient Temperature	-25~+70°C	$(-13 \sim +158^{\circ}F)$ (non-freezing)			
Condition*2	Ambient Humidity	85% 0	or less (non-condensing)			
Condition	Altitude	Up to 3000	m (10000 ft.) above sea level			
Insulation Class		UL, CSA: Class A [105°C (221°F)] EN: Class E [120°C (248°F)]	_			
Degree of Protection		IP65 (Excluding the mounting surface of the round shaft type and connectors)	IP20			

*1 For round shaft types, please attach to the heat radiation plate (material: aluminum) of the following sizes to maintain a maximum motor case temperature of 90°C (194°F). BLF230 -A: 115×115 mm (4.53×4.53 in.), 5 mm (0.20 in.) thick BLF460 -A: 135×135 mm (5.31×5.31 in.), 5 mm (0.20 in.) thick **BLF5120**-A: 165×165 mm (6.50×6.50 in.), 5 mm (0.20 in.) thick BLF6400S-A: 250×250 mm (9.84×9.84 in.), 6 mm (0.24 in.) thick

BLF6200 -A: 200×200 mm (7.87×7.87 in.), 5 mm (0.20 in.) thick

• Enter the power supply voltage (A, C or S) in the box (III) 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 of Combination Type

Combination Type – Parallel Shaft Gearhead

Comb	pination Type -	- Parallel Shaft G	earhead							Unit = N·m (Ib-in)
	Ge	ear Ratio	5	10	15	20	30	50	100	200
Madal		80 r/min	16	8	5.3	4	2.7	1.6	0.8	0.4
INIOUEI	Motor Speed	3000 r/min	600	300	200	150	100	60	30	15
		4000 r/min	800	400	267	200	133	80	40	20
BLF230		80~3000 r/min	0.45 (3.9)	0.9 (7.9)	1.4 (12.3)	1.8 (15.9)	2.6 (23)	4.3 (38)	6 (53)	6 (53)
		4000 r/min	0.34 (3.0)	0.68 (6.0)	1.0 (8.8)	1.4 (12.3)	1.9 (16.8)	3.2 (28)	5.4 (47)	5.4 (47)
		80~3000 r/min	0.90 (7.9)	1.8 (15.9)	2.7 (23)	3.6 (31)	5.2 (46)	8.6 (76)	16 (141)	16 (141)
DLF40V		4000 r/min	0.68 (6.0)	1.4 (12.3)	2 (17.7)	2.7 (23)	3.9 (34)	6.5 (57)	12.9 (114)	14 (123)
DIESIO		80~3000 r/min	1.8 (15.9)	3.6 (31)	5.4 (47)	7.2 (63)	10.3 (91)	17.2 (152)	30 (260)	30 (260)
DLFJIZ		4000 r/min	1.4 (12.3)	2.7 (23)	4.1 (36)	5.4 (47)	7.7 (68)	12.9 (114)	25.8 (220)	27 (230)
DIEADO		80~3000 r/min	2.9 (25)	5.9 (52)	8.8 (77)	11.7 (103)	16.8 (148)	28 (240)	52.7 (460)	70 (610)
DLFOZU		4000 r/min	2.0 (17.7)	4.1 (36)	6.1 (53)	8.1 (71)	11.6 (102)	19.4 (171)	36.5 (320)	63 (550)
	06-□	80~3000 r/min	5.9 (52)	11.7 (103)	17.6 (155)	23.4 (200)	33.5 (290)	55.9 (490)	70 (610)	70 (610)
DLF040	03-	4000 r/min	4.3 (38)	8.6 (76)	12.8 (113)	17.1 (151)	24.5 (210)	40.9 (360)	63 (550)	63 (550)

• 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, while the others rotate in the opposite direction.

Combination Type – Hollow Shaft Flat Gearhead

Comb	pination Type	 Hollow Shaft Fla 	at Gearhead	d					ι	Jnit = N∙m (Ib-in)
	Gear Ratio		5	10	15	20	30	50	100	200
Model	Motor Speed	80 r/min	16	8	5.3	4	2.7	1.6	0.8	0.4
WOUCI		3000 r/min	600	300	200	150	100	60	30	15
		4000 r/min	800	400	267	200	133	80	40	20
		80~3000 r/min	0.4 (3.5)	0.85 (7.5)	1.3 (11.5)	1.7 (15.0)	2.6 (23)	4.3 (38)	8.5 (75)	17 (150)
DLF230		4000 r/min	0.3 (2.6)	0.64 (5.6)	0.96 (8.4)	1.3 (11.5)	1.9 (16.8)	3.2 (28)	6.4 (56)	12.8 (113)
BIE/60	ED.	80~3000 r/min	0.85 (7.5)	1.7 (15.0)	2.6 (23)	3.4 (30)	5.1 (45)	8.5 (75)	17 (150)	34 (300)
BLF40U - TK	4000 r/min	0.64 (5.6)	1.3 (11.5)	1.9 (16.8)	2.6 (23)	3.8 (33)	6.4 (56)	12.8 (113)	25.5 (220)	
BLF5120 - FR		80~3000 r/min	1.7 (15.0)	3.4 (30)	5.1 (45)	6.8 (60)	10.2 (90)	17 (150)	34 (300)	68 (600)
		4000 r/min	1.3 (11.5)	2.6 (23)	3.8 (33)	5.1 (45)	7.7 (68)	12.8 (113)	25.5 (220)	51 (450)

• 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 the hollow shaft flat gearhead -> Page B-83

Introduction

AC Input BX

AC Input AC Input BLF BLU

AC Input FBLI

DC Input BLH

BHF

FE100/

ESO1/ ESO2

S

Installation

Permissible Overhung Load and Permissible Thrust Load

Combination Type – Parallel Shaft Gearhead

				Permissible 0	verhung Load		Permissible Thrust Load	
Model	Gear Ra	atio	10 mm (0.39 in	.) from shaft end	20 mm (0.79 in) from shaft end	rennissible	Thiust Loau
	$\begin{tabular}{ c c c c c c } \hline \hline Beam Ratio & \hline$			lb.	N	lb.		
	5	80~3000 r/min	100	22	150	33		
	5	4000 r/min	90	20	110	24		
BI 5220	10 15 20	80~3000 r/min	150	33	200	45	40	9
	10, 13, 20	4000 r/min	130	29	170	38	40	
	30 50 100 200	80~3000 r/min	200	45	300	67		
	30, 30, 100, 200	4000 r/min	180	40	230	51		
	5	80~3000 r/min	200	45	250	56		22
	5	4000 r/min	180	40	220	49		
BLF460 □ -□	10 15 20	80~3000 r/min	300	67	350	78	100	
	10, 13, 20	4000 r/min	270	60	330	74	100	
	30 50 100 200	80~3000 r/min	450	101	550	123		
	30, 30, 100, 200	4000 r/min	420	94	500	112		
	5	80~3000 r/min	300	67	400	90	-	
	5	4000 r/min	230	51	300	67		22
	10 15 20	80~3000 r/min	400	90	500	112	150	
	10, 15, 20	4000 r/min	370	83	430	96	150	
	30 50 100 200	80~3000 r/min	500	112	650	146		
	30, 30, 100, 200	4000 r/min	450	101	550	123		
	5 10 15 20	80~3000 r/min	550	123	800	180	200	45
	5, 10, 15, 20	4000 r/min	500	112	700	157	200	45
BLF6200 🔲 - 🗌	30 50	80~3000 r/min	1000	220	1250	280	200	67
BLF6400S-	30, 50	4000 r/min	900	200	1100	240	300	0/
	100 200	80~3000 r/min	1400	310	1700	380	400	90
	100, 200	4000 r/min	1200	270	1400	310	400	30

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

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

Combination Type – Hollow Shaft Flat Gearhead

					verhung Load			
Model	Gear Ba	itio	10 mm (0.39 in) from mounting	20 mm (0.79 in.) from mounting	Permissible Thrust Load	
MOUGI	Gearna	auo	surface of gearhead		surface of gearhead			
			N	lb.	N	lb.	N	lb.
	5 10	80~3000 r/min	450	101	370	83		45
	5, 10	4000 r/min	410	92	330	74	200	
DLF2JVFK	15, 20, 30, 50, 100, 200	80~3000 r/min	500	112	400	90		
		4000 r/min	460	103	370	83		
	5, 10	80~3000 r/min	800	180	660	148		90
		4000 r/min	730	164	600	135	400	
	15 00 20 50 100 000	80~3000 r/min	1200	270	1000	220		
	15, 20, 30, 50, 100, 200	4000 r/min	1100	240	910	200		
	5 10	80~3000 r/min	900	200	770	173		
	3, 10	4000 r/min	820	184	700	157		
	15.00	80~3000 r/min	1300	290	1110	240	500	110
	13, 20	4000 r/min	1200	270	1020	220	500	112
	30, 50, 100, 200	80~3000 r/min	1500	330	1280	280		
		4000 r/min	1400	310	1200	270		

 \bullet Enter the power supply voltage (${\bf A},\,{\bf C}$ or ${\bf S})$ in the box () within the model name.

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

Round Shaft Type

		Permissible 0			
Model	10 mm (0.39 in.) from shaft end		20 mm (0.79 in.) from shaft end	Permissible Thrust Load
	N	lb.	N	lb.	
BLF230 A	80	18	100	22	
BLF460 -A	110	24	130	29	The permissible thrust load
BLF5120 - A	150	33	170	38	shall be no greater than half
BLF6200 - A BLF6400S-A	197	44	221	49	the motor mass.

• Enter the power supply voltage (A, C or S) in the box (III) within the model name.

Permissible Load Inertia J of Combination Type

Combination Type – Parallel Shaft Gearhead

Gear Ratio	5	10	15	20	30	50	100	200
BLF230	1.55 (8.5)	6.2 (34)	14 (77)	24.8 (136)	55.8 (310)	155 (850)	155 (850)	155 (850)
BLF460	5.5 (30)	22 (120)	49.5 (270)	88 (480)	198 (1080)	550 (3000)	550 (3000)	550 (3000)
BLF5120	25 (137)	100 (550)	225 (1230)	400 (2200)	900 (4900)	2500 (13700)	2500 (13700)	2500 (13700)
BLF6200	37.5 (210)	150 (820)	338 (1850)	600 (3300)	1350 (7400)	3750 (21000)	3750 (21000)	3750 (21000)

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

Combination Type – Hollow Shaft Flat Gearhead

Gear Ratio	5	10	15	20	30	50	100	200
BLF230 FR	1.55 (8.5)	6.2 (34)	14 (77)	24.8 (136)	55.8 (310)	155 (850)	155 (850)	155 (850)
BLF460 - FR	5.5 (30)	22 (120)	49.5 (270)	88 (480)	198 (1080)	550 (3000)	550 (3000)	550 (3000)
BLF5120 - FR	25 (137)	100 (550)	225 (1230)	400 (2200)	900 (4900)	2500 (13700)	2500 (13700)	2500 (13700)

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

Enter the gear ratio in the box (\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 five seconds, overload protection is activated and the motor coasts to a stop.

BLF230 - /BLF230 - FR/BLF230 - A



BLF5120 - /BLF5120 - FR/BLF5120 - A



BLF6400S-D/BLF6400S-A



Unit = $\times 10^{-4}$ kg·m² (oz-in²)

Unit = $\times 10^{-4}$ kg·m² (oz-in²)



• 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 (\Box) within the model name.

Dimensions Unit = mm (in.)

Mounting screws are included with the combination type. Dimensions for mounting screws Page B-222

• 30 W (1/25 HP)

◇Motor/Parallel	Shaft	Gearhead
-----------------	-------	----------



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A-A

Introduction

AC Inpu BX

AC Input

AC Input

DC Inpu

BHF

FE100/ FE200

ESO1, ESO2

S

Installation

Round Shaft Type BLF230A-A, BLF230C-A, BLF230S-A

Motor: **BLFM230-A** Mass: 0.6 kg (1.32 lb.) **DXF** A409



•60 W (1/12 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	DXF
BLF460A-			5~20	41 (1.61)	A410A
BLF460C-	BLFM460-GFS	GFS4G□	30~100	46 (1.81)	A410B
BLF460S-			200	51 (2.01)	A410C

Mass: 1.9 kg (4.2 lb.) (Including gearhead)



(0.118^{+0.004}

OMotor/Hollow Shaft Flat Gearhead
 BLF460A-□FR, BLF460C-□FR, BLF460S-□FR

Motor: BLFM460-GFS Gearhead: GFS4G_FR Mass: 2.5 kg (5.5 lb.) (Including gearhead)



ullet Enter the gear ratio in the box (\Box) within the model name.

Introduction

AC Input BX

AC Input

AC Input

AC Input

DC Input

BHF

FE100/ FE200

ESO1/

S

Installation

AC Motor System:

•120 W (1/6 HP)

◇Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	DXF
BLF5120A-			5~20	45 (1.77)	A413A
BLF5120C-	BLFM5120-GFS	GFS5G□	30~100	58 (2.28)	A413B
BLF5120S-			200	64 (2.52)	A413C

Mass: 3.0 kg (6.6 lb.) (Including gearhead)





200 W (1/4 HP), 400 W (1/2 HP)

♦ Motor/Parallel Shaft Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L	DXF
BLF6200A-	BLFM6200-GFS		5~ 2 0	60 (2.36)	A652A
BLF6200C-	BLFM6200-GFS	GFS6G□	20 50	70 (0.00)	AGEOD
BLF6200S-	BLFM6200-GFS		30, 30	12 (2.03)	AUJZD
BLF6400S-	BLFM6400-GFS		100, 200	86 (3.39)	A652C

Mass: 5.4 kg (11.9 lb.) (Including gearhead)





• Enter the gear ratio in the box (\Box) within the model name.

Speed Control Systems

Introduction

AC Input BX

AC Input

AC Input

AC Input

DC Input

BHF

FE100/ FE200

ESO1/

S

Installation

AC Motor Syst

Motor: BLFM6200-A, BLFM6400-A Mass: 2.4 kg (5.3 lb.) DXF A653



◇Driver BLFD30A2, BLFD30C2, BLFD30S2

BLFD60A2, BLFD60C2, BLFD60S2 BLFD120A2, BLFD120C2, BLFD120S2 Mass: 0.9 kg (2.0 lb.)

DXF A416



Protective Earth Terminal M4

\bigcirc Digital Operator

(Detached from the driver)



BLFD200A2, BLFD200C2, BLFD200S2, BLFD400S2 Mass: 1.3 kg (2.9 lb.) DXF A654



◇Digital Operator Panel Cut-Out



AC Input AC Input BLU

AC Input

Connection and Operation

Names and Functions of Driver Parts





To set speeds using external DC voltage, set this switch to 5 V or 10 V in accordance with the voltage supply used

Input/Output Signals

Terminal Name	Signal	Signal Name	Function
TH		N. C.	Do not connect any signals to this terminal.
TH		N. C.	Do not connect any signals to this terminal.
MO		M0 Input	These signals are used to select exercise data in multi-speed exercise
M1		M1 Input	These signals are used to select operation data in multi-speed operation.
M2		M2 Input	
VH		VH Input	
VM		VM Input	These signals are used to set speeds via an external speed potentiometer or external DC voltage.
VL		VL Input	
C3		IN-COM1	Input signal common (0 V)
X0*1	Input	EXT-ERROR Input	External error input (Normally closed)
CO	input	IN-COM0	Input signal common
C1		IN-COM0	Input signal common
V1*2	2-Wire Mode: CW Input		Clockwise rotation/stop switch input signal
~ 1		3-Wire Mode: START/STOP Input	Start/stop input signal
V2*2		2-Wire Mode: CCW Input	Counterclockwise rotation/stop switch input signal
72		3-Wire Mode: RUN/BRAKE Input	Run/instantaneous stop input signal
V2*2		2-Wire Mode: STOP-MODE Input	This signal is input to select the motor stop action.
^J		3-Wire Mode: CW/CCW Input	Clockwise/counterclockwise direction input signal
X4		N. C.	Do not connect any signals to this terminal.
X5		ALARM-RESET Input	This signal is used to reset alarms.
Y1		ALARM-OUT1 Output	This signal is output upon generation of an alarm. (Normally closed)
Y2	Output	ALARM-OUT2 Output	This signal is output upon actuation of the overload protective function or overload warning function. (Normally closed)
YO	υτιμαι	SPEED-OUT Output	30 pulses are output per each rotation of the motor output shaft.
C2		OUT-COM	Output signal common

*1 Do not remove the short circuit bar if the EXT-ERROR input is not used.

*2 The functions of the external-input signal terminals X1, X2 and X3 can be changed between the 2-wire input mode and 3-wire input mode. The functions under the 2-wire input mode are initially assigned to the terminals

Digital Operator Indicator

Display	1	Function	Description
RUN		Running	A green LED stays lit while the motor is running.
ALARM		Alarm	A red LED turns on when an alarm occurs.
	MNTR	Monitor mode	The motor can be operated in this mode. The motor speed and load condition are displayed during motor operation.
	F/R	Direction setting mode	If the digital operator is used to operate the motor, set the motor direction in this mode. For: Clockwise direction, rEv: Counterclockwise direction
Mode LO/RE Digital operator/external-input signal mode In this mode, set whether to use the digital operator or external I/O signals to input the motor oper Lo: Digital operator, rE: External-input signals		In this mode, set whether to use the digital operator or external I/O signals to input the motor operation/stop signals. Lo: Digital operator, rE: External-input signals	
	PRGM	Data setting mode	In this mode, set the data needed to operate the motor. Operation data (eight speeds and acceleration/deceleration times), Gear ratio setting/conveyor speed setting Input mode, Overload warning function
	r/min	Motor speed	The speed of the motor or gearhead output shaft is displayed.
Display Unit m/min Conveyor speed An equivalent moving speed of the work on a conveyor or other transfer system is displayed.		An equivalent moving speed of the work on a conveyor or other transfer system is displayed.	
	%	Load factor*	The actual load is displayed as a percentage of the rated torque being 100%.

*A maximum error of approximately 20% may generate when the motor is operated at the rated speed under the rated load.

Connection Diagram

The figure below is a connection diagram for a configuration based on a single-phase 100-120 V supply voltage, with the sink/source selector switch set to the sink side.





*1 The grounding method will vary depending on the length of the connection cable.

When the connection cable is 7 m (23.0 ft.) or shorter: Connect the protective earth terminal on the connection cable to the protective earth terminal on the driver.

- When the connection cable is 10 m (32.8 ft.) or longer: Connect the protective earth terminal of the motor directly to the grounding point.
- *2 The main circuit is insulated to prevent electrical shock resulting from accidental contact by a hand, etc.
- *3 The signal cable connection terminals and the signal cable including the shielded cable comprise an ELV circuit, which is insulated from dangerous voltages only by means of basic insulation. Therefore, connect the shielded cable to the GND point specified in the connection diagram, instead of connecting it to a protective earth terminal.
- *4 The I/O signal connection terminals comprise a SELV circuit, which is insulated from dangerous voltages by means of double insulation or reinforced insulation.

◇Applicable Crimp Terminals

 Power Supply Connection Terminals (M3.5): Round Terminal with Insulation





 Protective Earth Terminals (M4): Round Terminal with Insulation



 \cdot I/O Terminals

Use the terminals specified below for connection using crimp terminals. Please note that the applicable crimp terminal will vary depending on the size of the wire. The following terminals can be used with wires of AWG26 to 22. [Manufacturer: Phoenix Contact] AI 0.25-6 Applicable wire size

: AWG26 to 24 (0.14 to 0.2 mm²) AI 0.34-6 Applicable wire size : AWG22 (0.3 mm²)



Timing Chart





* Changing the direction while the motor is running will cause the motor to stop instantaneously and then change its direction.

- The CW input signal, CCW input signal and STOP-MODE signal can be used to control all motor operations, such as run, stop, direction switching, deceleration stop and instantaneous stop.
- Switching the CW signal ON will cause the motor to turn clockwise as viewed from the motor shaft, while switching the CCW signal ON will cause the motor to turn counterclockwise. Switching each signal OFF will stop the motor. If both the CW signal and CCW signal are turned ON at the same time, the motor will stop instantaneously. The motor will start at the rise time corresponding to the acceleration time (ACC) set on the digital operator.
- Switching the STOP-MODE signal ON will cause the motor to decelerate at the deceleration time (DEC) set on the digital operator until it eventually stops. Switching the STOP-MODE signal OFF will cause the motor to stop instantaneously.
- The START/STOP signal, RUN/BRAKE signal and CW/CCW signal can be used to control all motor operations, such as run/stop, instantaneous stop and direction switching.
- Switching both the START/STOP signal and RUN/BRAKE signal ON at the same time will start the motor. At this time, switching the CW/CCW signal ON will cause the motor to turn clockwise as viewed from the motor shaft, while switching the signal OFF will cause the motor to turn counterclockwise. The motor will start at the rise time corresponding to the acceleration time (ACC) set on the digital operator.
- Switching the RUN/BRAKE signal OFF while the START/STOP signal is ON will cause the motor to stop instantaneously. Switching the START/STOP signal OFF while the RUN/BRAKE signal is ON will cause the motor to decelerate at the deceleration time (DEC) set on the digital operator until it eventually stops.

Input/Output Signal Circuits

The initial setting is the sink logic. Select the sink logic or source logic according to the controller you will be using.

◇Input Circuit

Common to the CW (START/STOP), CCW (RUN/BRAKE), STOP-MODE (CW/CCW), EXT-ERROR, ALARM-RESET and operation-data selection inputs.

Sink Logic



X1: CW Input X2: CCW Input X3: STOP-MODE Input X5: ALARM-RESET Input M0, M1, M2: Operation data selection inputs

Output Circuit

Common to the SPEED-OUT, ALARM-OUT1 and ALARM-OUT2 outputs.

 ∇

ŶΟV

3.3 kΩ

Sink Logic

X3, X5

C3

M0, M1, M2



Y2: ALARM-OUT2 output

* Supply a current of 5 mA or more to the SPEED-OUT output.

Source Logic



* Supply a current of 5 mA or more to the SPEED-OUT output.

♦ When an External Control Device with a Built-In Clamp Diode is Used

When you want to use an external control device with a built-in clamp diode, if the external control device power is turned off with the driver power turned on, current will be applied and the motor may run. When the power is turned on or off simultaneously, the motor may run temporarily due to differences in power capacity. The external control device power must be turned on first, and driver power must be turned off first.

• Example of Sink Logic



♦ SPEED-OUT Output

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

By measuring the frequency of SPEED-OUT outputs, the motor speed can be calculated.

SPEED-OUT output frequency (Hz) =
$$\frac{1}{\tau}$$

Motor shaft speed (r/min) =
$$\frac{\text{SPEED-OUT output frequency}}{30} \times 60$$



◇ALARM-OUT1 Output

When any of the driver's protective functions is activated, the ALARM-OUT1 output will turn OFF and the digital operator will display an alarm code. The motor will coast to a stop.

◇ALARM-OUT2 Output

The ALARM-OUT2 output will turn OFF when the driver's overload protective function or overload warning function is activated. Actuation of any other protective function will not turn this output OFF.

The overload warning function is activated based on a preset load factor relative to the rated torque. The ALARM-OUT2 output will turn OFF once the set load factor is exceeded.

(A desired load factor can be set at 10% intervals between 50 and 100%.)

Type of Protective Function	ALARM-OUT1 Output	ALARM-OUT2 Output
Normal Operation	ON	ON
Overload Protective Function	0FF	OFF
Other Protective Functions	0FF	ON
Overload Warning Function*	ON	OFF

* A maximum error of approximately 20% may generate when the motor is operated at the rated speed under the rated load.

Introduction

US Installa

Operating Methods



One of the following two operating methods (a and b) can be set by switching between the digital operator mode and external input signal mode.

- a) Operate the motor using the RUN and STOP keys on the digital operator
- b) Operate the motor using external input signals

Speed Setting Methods

One of the following four methods ((1) to (4)) can be used to set speeds:

- ① Set speeds using the internal speed potentiometer Set speeds using the potentiometer provided on the driver's front panel.
- ② Set speeds using the digital operator The digital operator can be used to set speeds in units of 1 r/min.
- Up to eight speed data can be set. ③ Set speeds using an external speed potentiometer (sold separately)

To set speeds at a location away from the driver, connect an accessory external speed potentiometer as shown below.



Note:

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

④ Set speeds using external DC voltage

Set the external voltage select switch on the driver in accordance with the external DC voltage to be supplied. Detach the digital operator and set the switch to either 5 V or 10 V.

Thereafter, connect an external DC power supply as shown below. Connect the positive and negative terminals of the power supply correctly.



Note:

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

Multi-Speed Operation

The speed set by the internal speed potentiometer and another set by an external speed potentiometer can be combined for two-speed operation by switching the operation data selection input M0.

M0 Input	M1 Input	M2 Input	Speed Setting Method
0FF	0FF	0FF	Internal speed potentiometer
ON	0FF	0FF	External speed potentiometer



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⇒Eight-Speed Operation

A multi-speed operation using up to eight speeds can be performed by setting desired speeds in operation data No. 1 to 8 and then switching the speed using operation-data selection input M0, M1 or M2.

Operation Data	M0 Input	M1 Input	M2 Input	Speed Setting Method
No. 1	0FF	0FF	0FF	Internal speed potentiometer/Digital operator
No. 2	ON	0FF	0FF	External speed potentiometer/Digital operator
No. 3	OFF	ON	0FF	Digital operator
No. 4	ON	ON	0FF	Digital operator
No. 5	OFF	OFF	ON	Digital operator
No. 6	ON	0FF	ON	Digital operator
No. 7	OFF	ON	ON	Digital operator
No. 8	ON	ON	ON	Digital operator



Multi-Motor Control

Two or more motors can be operated at the same speed by using a single external speed potentiometer or external DC voltage. The diagram below applies to a single-phase power supply specification. For a three-phase power supply specification, change the power supply line to a three-phase type. Also note that the diagram does not show the motor or operation control part.

♦ Using an External Speed Potentiometer

As shown in the diagram, use a common power supply line and a common speed control line for each driver and set speeds by using the external speed potentiometer VRx.

The resistance of the external speed potentiometer is determined using the formula below:

Resistance when the number of drivers is n:

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

Example: When two drivers are connected

VRx = 20/2 = 10 (k Ω), 2/4 = 1/2 (W) Accordingly, the resistance is calculated as 10 k Ω , 1/2 W.

To adjust the speed difference between motors, connect a 1.5 k Ω , 1/4 W resistor to the VM terminal on the first driver, and connect a 5 k Ω , 1/4 W variable resistor (VRn) to the VM terminal on each of the remaining drivers.

Up to five drivers can be operated in parallel using an external speed potentiometer.



♦ Using External DC Voltage

As shown in the diagram, use a common power supply line and a common speed control line for each driver and connect all drivers to a 5 or 10 VDC power supply.

The power-supply capacity of the external DC power supply is determined using the formula below:

Power-supply capacity when the number of drivers is n: $I=1 \, \times \, n$ (mA)

Example: When two drivers are connected

 $I = 1 \times 2 = 2$ (mA)

Accordingly, the power-supply capacity is calculated as 2 mA or more.

To adjust the speed difference between motors, connect a 1.5 k Ω , 1/4 W resistor to the VM terminal on the first driver, and connect a 5 k Ω , 1/4 W variable resistor (VRn) to the VM terminal on each of the remaining drivers.



\diamondsuit Using the Digital Operator

When multiple drivers are connected where the same data are set digitally in each driver, the operations of multiple motors can be controlled via an external input signal using the wiring circuit shown below.



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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.





List of Motor and Driver Combinations

Combination Type – Parallel Shaft Gearhead

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

	21	· • ·		
Output Power	Model	Motor Model	Gearhead Model	Driver Model
00.111	BLF230A-	BLFM230-GFS		BLFD30A2
30 W	BLF230C-		GFS2G	BLFD30C2
(1/2311F)	BLF230S-			BLFD30S2
00.11/	BLF460A-	F460A-□ F460C-□ BLFM460-GFS		BLFD60A2
60 W (1/12 HP)	BLF460C-		GFS4G	BLFD60C2
	BLF460S-			BLFD60S2
100.11/	BLF5120A-	BLFM5120-GFS	GFS5G□	BLFD120A2
120 W (1/6 HD)	BLF5120C-			BLFD120C2
(1/011F)	BLF5120S-			BLFD120S2
000.00	BLF6200A-		GFS6G	BLFD200A2
200 W (1/A HP)	BLF6200C-	BLFM6200-GFS		BLFD200C2
(1/4116)	BLF6200S-			BLFD200S2
400 W (1/2 HP)	BLF6400S-	BLFM6400-GFS		BLFD400S2

• Enter the gear ratio in the box (\Box) within the model name.

Combination Type – Hollow Shaft Flat Gearhead

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

		•		
Output Power	Model	Motor Model	Gearhead Model	Driver Model
00.111	BLF230A-□FR			BLFD30A2
30 W (1/25 HP)	BLF230C-□FR	BLFM230-GFS	GFS2G□FR	BLFD30C2
(1/2311F)	BLF230S-□FR			BLFD30S2
00.111	BLF460A-□FR	BLFM460-GFS	GFS4G□FR	BLFD60A2
60 W (1/12 HP)	BLF460C-□FR			BLFD60C2
(1/12 HF)	BLF460S-□FR			BLFD60S2
120 W (1/6 HP)	BLF5120A-DFR	BLFM5120-GFS		BLFD120A2
	BLF5120C- FR		GFS5G□FR	BLFD120C2
	BLF5120S-DFR			BLFD120S2

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

Round Shaft Type

Output Power	Model	Motor Model	Driver Model
2014	BLF230A-A		BLFD30A2
30W (1/25 HP)	BLF230C-A	BLFM230-A	BLFD30C2
(1/23 ПР)	BLF230S-A		BLFD30S2
0011	BLF460A-A		BLFD60A2
(1/12 HP)	BLF460C-A	BLFM460-A	BLFD60C2
	BLF460S-A		BLFD60S2
40011/	BLF5120A-A		BLFD120A2
120W (1/6 HP)	BLF5120C-A	BLFM5120-A	BLFD120C2
(1/0111)	BLF5120S-A		BLFD120S2
00011/	BLF6200A-A		BLFD200A2
200W	BLF6200C-A	BLFM6200-A	BLFD200C2
(1/4 ПГ)	BLF6200S-A		BLFD200S2
400W (1/2 HP)	BLF6400S-A	BLFM6400-A	BLFD400S2

Pinion Shaft Type

Output Power	Model	Motor Model	Driver Model
30 W (1/25 HP)	BLF230A-GFS	BLFM230-GFS	BLFD30A2
	BLF230C-GFS		BLFD30C2
	BLF230S-GFS		BLFD30S2
60 W (1/12 HP)	BLF460A-GFS	BLFM460-GFS	BLFD60A2
	BLF460C-GFS		BLFD60C2
	BLF460S-GFS		BLFD60S2
120 W (1/6 HP)	BLF5120A-GFS	BLFM5120-GFS	BLFD120A2
	BLF5120C-GFS		BLFD120C2
	BLF5120S-GFS		BLFD120S2
200 W (1/4 HP)	BLF6200A-GFS	BLFM6200-GFS	BLFD200A2
	BLF6200C-GFS		BLFD200C2
	BLF6200S-GFS		BLFD200S2
400 W (1/2 HP)	BLF6400S-GFS	BLFM6400-GFS	BLFD400S2

BHF

Connection Cables (Sold separately) (RoHS)



Product Line

The cable set consists of two cables including a motor connection cable and a signal connection cable.

Model	Length: L [m (ft.)]	
CC01BLF	1 (3.3)	
CC02BLF	2 (6.6)	
CC03BLF	3 (9.8)	
CC05BLF	5 (16.4)	
CC07BLF	7 (23.0)	
CC10BLF	10 (32.8)	
CC15BLF	15 (49.2)	
CC20BLF	20 (65.6)	

• Dimensions Unit = mm (in.)

Motor Connection Cable
 L: 1 to 7 m (3.3 to 23.0 ft.)
 L
 Round Terminal:





♦ Signal Connection Cable



Accessories (Sold separately)

Remote-Control Kit (RoHS)

The remote-control kit is useful if you want to detach the digital operator from the driver and install it on the frame of the equipment, etc., for remote operation.

The kit includes an extension cable for digital operator/driver connection [2 or 5 m (6.6 or 16.4 ft.)] and a rubber gasket.





