

AC Motor Systems

BHF Series

200 W (1/4 HP)

Frame Size: 4.09 in. sq. (104 mm sq.)

The **BHF** Series consists of a high-power 200 W (1/4 HP) AC speed-control motor combined with a dedicated inverter. Each motor comes pre-assembled with a gearhead.

Combination Type (Pre-assembled Gearmotors)

The combination type (Pre-assembled Gearmotors) comes with the motor and its dedicated gearhead already assembled. This simplifies installation in equipment. Motors and gearheads are also available separately so they can be on hand to make changes or repairs.

Features**● Excellent speed stability**

The combination of a dedicated inverter with a motor achieves excellent speed stability with a fluctuation of only $\pm 3\%$. The inverter is already optimized for use with the gearmotor, so detail adjustments are not required to achieve accurate speed control.

● Automatic control of an electromagnetic brake

The AC speed-control system with an electromagnetic brake allows automatic on/off control of the electromagnetic brake (power off activated type) on the inverter side. No longer will it be necessary to prepare a separate power supply or program a control sequence.

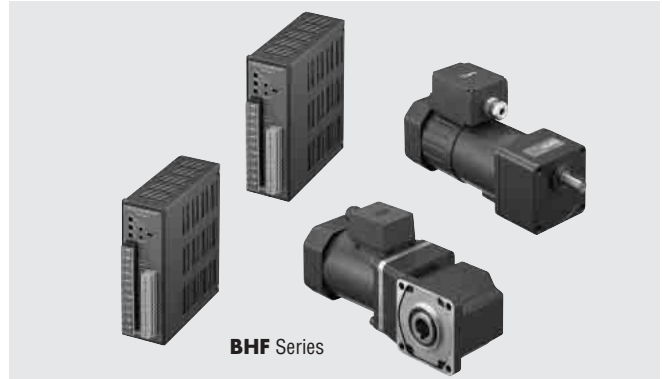
● Smallest frame size among 200 W (1/4 HP) motors

The **BHF** Series achieves an output of 200 W (1/4 HP), the highest among Oriental Motor's standard AC motors, with the smallest frame size [4.09 inch (104 mm) square] in that class. This allows for a reduction in the size of your equipment.

Safety Standards and CE Marking

	Standards	Certification Body	Standards File No.	CE Marking
Motor	UL1004	UL	E64197	Low Voltage Directives / EMC Directives
	UL2111			
	CSA C22.2 No.100			
	CSA C22.2 No.77			
	EN60950	Conforms to EN/IEC Standards		
	EN60034-1			
EN60034-5				
IEC60034-11				
IEC60664-1				
Inverter	UL508C	UL	E171462	
	CSA C22.2 No.14			
	EN50178	Conforms to EN/IEC Standards		
	EN60950			

- When the system is approved under various safety standards, the model names on the motor and inverter nameplates are the approved model names.
List of Motor Combinations → Page B-85
- **Details of Safety Standards** → Page G-2
- The EMC value changes according to the wiring and layout. Therefore, the final EMC level must be checked with the motor/inverter incorporated in the user's equipment.

**● Wiring length of up to 164 feet (50 m)**

The wiring distance between the motor and inverter can be extended to a maximum of 164 feet (50 m).

● Full-range functionality

The **BHF** Series offers a variety of functions such as alarm output, speed monitor output and individual acceleration/deceleration setting. The driver also has a built-in I/O power supply.

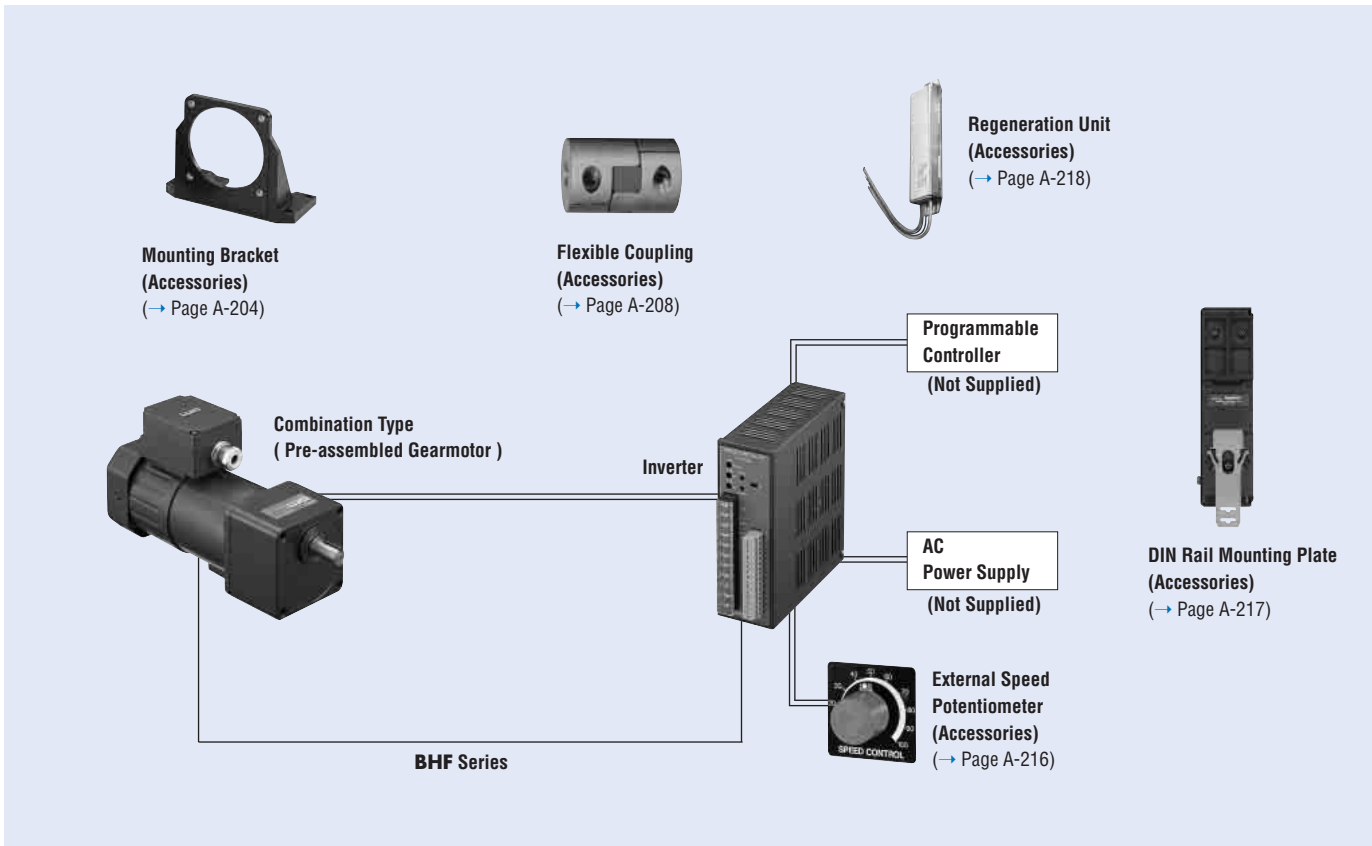
● Wide product variations

Pre-assembled gearmotors are available in a right-angle shaft type equipped with a hypoid gear (hollow shaft, solid shaft) and a parallel shaft type. A wide range of gear ratios are available. An electromagnetic brake type is also available.

● Global specifications

The **BHF** Series conforms to international power-supply voltage specifications, including single-phase 100-115 VAC, single-phase 200-230 VAC and three-phase 200-230 VAC. All units comply with the UL/CSA standards and bear the CE mark as proof of compliance with the Low Voltage Directive and EMC Directive.

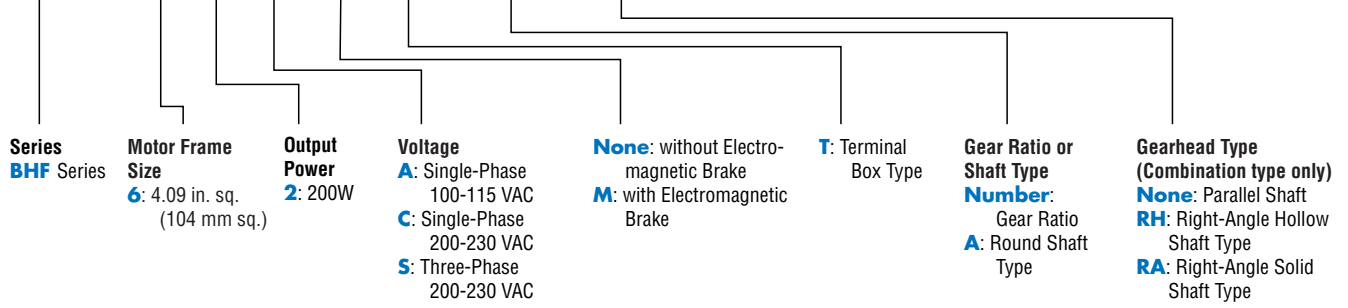
System Configuration



The system configuration shown is an example. Other configurations are available.

Product Number Code

BHF 6 2 A M T- 100 RH



Product Line

Speed Control System Combination Type

Type	Power Supply Voltage	Model	Gear Ratio
Combination Type with Right-Angle Hollow Shaft	Single-Phase 100-115 VAC	BHF62AT-□RH	5~180
	Single-Phase 200-230 VAC	BHF62CT-□RH	5~180
	Three-Phase 200-230 VAC	BHF62ST-□RH	5~180
Combination Type with Right-Angle Solid Shaft	Single-Phase 100-115 VAC	BHF62AT-□RA	5~180
	Single-Phase 200-230 VAC	BHF62CT-□RA	5~180
	Three-Phase 200-230 VAC	BHF62ST-□RA	5~180
Combination Type with Parallel Shaft	Single-Phase 100-115 VAC	BHF62AT-□	3~180
	Single-Phase 200-230 VAC	BHF62CT-□	3~180
	Three-Phase 200-230 VAC	BHF62ST-□	3~180

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

Round Shaft Type

Type	Power Supply	Model
Round Shaft Type	Single-Phase 100-115 VAC	BHF62AT-A
	Single-Phase 200-230 VAC	BHF62CT-A
	Three-Phase 200-230 VAC	BHF62ST-A

Speed Control System with Electromagnetic Brake Combination Type

Type	Power Supply Voltage	Model	Gear Ratio
Combination Type with Right-Angle Hollow Shaft	Single-Phase 100-115 VAC	BHF62AMT-□RH	5~180
	Single-Phase 200-230 VAC	BHF62CMT-□RH	5~180
	Three-Phase 200-230 VAC	BHF62SMT-□RH	5~180
Combination Type with Right-Angle Solid Shaft	Single-Phase 100-115 VAC	BHF62AMT-□RA	5~180
	Single-Phase 200-230 VAC	BHF62CMT-□RA	5~180
	Three-Phase 200-230 VAC	BHF62SMT-□RA	5~180
Combination Type with Parallel Shaft	Single-Phase 100-115 VAC	BHF62AMT-□	3~180
	Single-Phase 200-230 VAC	BHF62CMT-□	3~180
	Three-Phase 200-230 VAC	BHF62SMT-□	3~180

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

Round Shaft Type

Type	Power Supply	Model
Round Shaft Type	Single-Phase 100-115 VAC	BHF62AMT-A
	Single-Phase 200-230 VAC	BHF62CMT-A
	Three-Phase 200-230 VAC	BHF62SMT-A

Specifications

Speed Control System



Model	Combination Type	BHF62AT-□RH	BHF62CT-□RH	BHF62ST-□RH
		BHF62AT-□RA	BHF62CT-□RA	BHF62ST-□RA
Round Shaft Type		BHF62AT-□	BHF62CT-□	BHF62ST-□
		BHF62AT-A	BHF62CT-A	BHF62ST-A
Output Power	HP (W)	1/4 (200)		
Rated Speed	r/min	1500		
Rated Torque	oz-in (N·m)	180 (1.27)		
Starting Torque	oz-in (N·m)	180 (1.27)		
Permissible Torque	oz-in (N·m)	100~1500 r/min: 180 (1.27) 1800 r/min: 151 (1.07), 2400 r/min: 85 (0.6)		
Permissible Load Inertia J*	oz-in ² (×10 ⁻⁴ kg·m ²)	44 (8)		
Speed Control Range	r/min	100~2400		
Power Source	Voltage	Single-Phase 100-115 VAC±10%	Single-Phase 200-230 VAC±10%	Three-Phase 200-230 VAC±10%
	Frequency	50 Hz/60 Hz		
	Rated Input Current	5.4 A	3.1 A	1.75 A
	Max. Input Current	8.3 A	4.9 A	2.7 A
Speed Regulation	Load	±3% Max. (0~Rated Torque, at 1500 r/min)		
	Voltage	±3% Max. (Power supply voltage ±10% at 1500 r/min with no load)		
	Temperature	±3% Max. [32°F~122°F (0°C~+50°C) at 1500 r/min with no load]		

* The permissible load inertia specified above is only applicable for the round shaft types. Permissible Load Inertia for the Combination Types → Page B-75

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

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

● Speed Control System with Electromagnetic Brake



Model	Combination Type	BHF62AMT-□RH BHF62AMT-□RA BHF62AMT-□	BHF62CMT-□RH BHF62CMT-□RA BHF62CMT-□	BHF62SMT-□RH BHF62SMT-□RA BHF62SMT-□
	Round Shaft Type	BHF62AMT-A	BHF62CMT-A	BHF62SMT-A
Output Power	HP (W)	1/4 (200)		
Rated Speed	r/min	1500		
Rated Torque	oz-in (N-m)	180 (1.27)		
Starting Torque	oz-in (N-m)	180 (1.27)		
Permissible Torque	oz-in (N-m)	100~1500 r/min: 180 (1.27) 1800 r/min: 151 (1.07), 2400 r/min: 85 (0.6)		
Permissible Load Inertia J*	oz-in ² (×10 ⁻⁴ kg-m ²)	44 (8)		
Speed Control Range	r/min	100~2400		
Power Source	Voltage	Single-Phase 100-115 VAC±10%	Single-Phase 200-230 VAC±10%	Three-Phase 200-230 VAC±10%
	Frequency	50 Hz/60 Hz		
	Rated Input Current	5.4 A	3.1 A	1.75 A
	Max. Input Current	8.3 A	4.9 A	2.7 A
Speed Regulation	Load	±3% Max. (0~Rated Torque, at 1500 r/min)		
	Voltage	±3% Max. (Power supply voltage ±10% at 1500 r/min with no load)		
	Temperature	±3% Max. [32°F~122°F (0°C~+50°C) at 1500 r/min with no load]		
Electromagnetic Brake Holding Brake Torque	oz-in (N-m)	210 (1.5)		
Lowering Operation		Connecting the regeneration unit [Accessories (Sold Separately)], Max. output 100 W (5 minutes rating)		

* The permissible load inertia specified above is only applicable for the round shaft types. Permissible Load Inertia for the Combination Types → Page B-75

- The values for each specification applies to the motor only.
- Enter the gear ratio in the box (□) within the model name.

■ Common Specifications

● Speed Control System / Speed Control System with Electromagnetic Brake

Item	Specifications
Acceleration/Deceleration Time	0.1~25 seconds (at 1000 r/min)
Speed Control Method	Any one of the following methods: 1. By built-in potentiometer (1 piece) 2. By external potentiometer (20 kΩ 1/4 W) 3. By DC voltage control (0~5 VDC)
Input Signal	Photocoupler input Input impedance 2.4 k Ω Operates at 12 VDC Common to CW/CCW, Speed setting mode selection, Slow down, Alarm reset
Output Signal	Open collector output External use conditions 26.4 VDC, 10 mA max. Common to SPEED OUT (12P/R), ALARM OUT
Protection Functions	If any of the protective functions of the inverter are triggered, the ALM output will be turned off and the ALM LED on the front panel of the inverter will blink or turn on while the motor current is interrupted to stop the motor. <ul style="list-style-type: none"> • Overload protection: A load exceeding the rated torque has been applied to the motor for 5 seconds or more. • Overvoltage protection: The voltage applied to the inverter has exceeded the rated voltage by approximately 30% or more. The motor is being operated beyond the lowering operation's ability. • Overcurrent protection: An excessive current is flowing within the inverter. • Undervoltage protection: The power-supply voltage has dropped below the rated voltage by approximately 15% or more. • Circuit overheat protection: The ambient operating temperature for the inverter has exceeded its upper limit. • Motor open circuit protection: The motor cable has an open circuit or improper connection. • EEPROM Error: An error was detected in the EEPROM.
Rating	Continuous
Motor Insulation Class	Class B (266°F [130°C])

General Specifications

Item	Motor	Inverter
Insulation Resistance	100 MΩ or more when measured by a 500 VDC megger between the windings and the frame after rated motor operation under normal ambient temperature and humidity.	100 MΩ or more when measured by a 500 VDC megger between the power supply input terminal and the Protective Earth terminal and between the power supply input terminal and the I/O terminal after continuous operation under normal ambient temperature and humidity.
Dielectric Strength	Sufficient to withstand 1.5 kV at 50 Hz and 60 Hz applied between the windings and the frame for 1 minute after rated motor operation under normal ambient temperature and humidity.	Sufficient to withstand 1.5 kV (3 kV) at 50 Hz and 60 Hz applied between the power supply input terminal and the Protective Earth terminal (between the power supply input terminal and the I/O terminal) for 1 minute after continuous operation under normal ambient temperature and humidity.
Temperature Rise	126°F (70°C) or less in the coil, as measured by the resistance change method after rated operation with gearhead or similar heat radiation plate* installed.	_____
Ambient Temperature	14°F~104°F (-10°C to +40°C) 14°F~122°F (-10°C to +50°C) for 100/200 VAC (nonfreezing)	32°F~122°F (0°C~+50°C) (nonfreezing)
Ambient Humidity	85% maximum (noncondensing)	85% maximum (noncondensing)
Degree of Protection	IP54 (excluding the motor-installation surface of the round shaft type)	IP10

* Size of heat radiation plate: 9.06 inch × 9.06 inch (230 mm × 230 mm), 0.20 inch (5 mm) in thickness (material: aluminum)

Permissible Torque for Combination Type

Right-Angle Shaft

Unit = Upper values: lb-in/Lower values: N-m

Model	Gear Ratio Motor Output Speed	5	9	15	30	50	100	180
		100~1500 r/min	40 4.6	73 8.3	123 13.9	240 27.8	350 40	480 54.5
BHF62AT-□RH/RA, BHF62AMT-□RH/RA BHF62CT-□RH/RA, BHF62CMT-□RH/RA BHF62ST-□RH/RA, BHF62SMT-□RH/RA	1800 r/min	34 3.9	61 7	103 11.7	200 23.4	320 37	480 54.5	530 60
	2400 r/min	19.4 2.2	34 3.9	58 6.6	115 13.1	193 21.9	380 43	530 60

- Enter the gear ratio in the box (□) within the model name.
- Direction of rotation of the motor and that of the gear output shaft are the opposite.

Parallel Shaft

Unit = Upper values: lb-in/Lower values: N-m

Model	Gear Ratio Motor Output Speed	3	5	9	15	30	50	100	180
		100~1500 r/min	30 3.4	50 5.7	91 10.3	145 16.4	290 32.8	350 40	350 40
BHF62AT-□, BHF62AMT-□ BHF62CT-□, BHF62CMT-□ BHF62ST-□, BHF62SMT-□	1800 r/min	25 2.9	42 4.8	76 8.7	122 13.8	240 27.6	350 40	350 40	350 40
	2400 r/min	14.1 1.6	23 2.7	43 4.9	68 7.7	137 15.5	210 24.3	350 40	350 40

- 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.

Permissible Overhung Load and Permissible Thrust Load

The overhung load and thrust load of the gearhead's output shaft affect the bearing life. Make sure the overhung load and thrust load do not exceed the values shown in the table below.

Model	Gear Ratio	Permissible Overhung Load [lb. (N)]		Permissible Thrust Load lb. (N)
		from the tip of the shaft 0.39 inch (10 mm)	from the tip of the shaft 0.79 inch (20 mm)	
BHF62 □T-□RH	5~30	270 (1200)	240 (1100)	67 (300)
BHF62 □MT-□RH	50~180	490 (2200)	450 (2000)	
BHF62 □T-□RA	5~30	200 (900)	220 (1000)	67 (300)
BHF62 □MT-□RA	50~180	380 (1700)	410 (1850)	
BHF62 □T-□	3~30	123 (550)	180 (800)	45 (200)
BHF62 □MT-□	50~180	146 (650)	220 (1000)	

- With the hollow shaft type, the permissible overhung load is measured from the flange-mounting surface.
- Enter the voltage (**A, C, S**) in the box (□).
- Enter the gear ratio in the box (□) within the model name.
- Permissible Overhung Load and Thrust Load for Round Shaft Type → Page A-11

Permissible Load Inertia J for the Combination Type

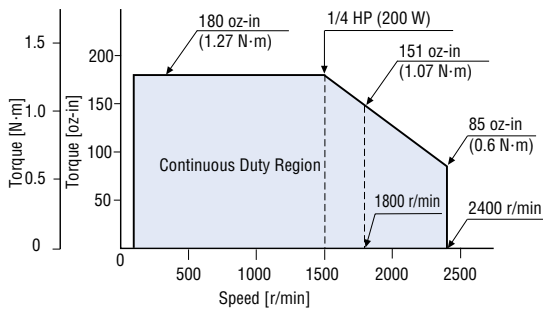
Unit = Upper values: oz-in²/Lower values: ×10⁻⁴ kg·m²

Model \ Gear Ratio	3	5	9	15	30	50	100	180
BHF62 □T-□RH, BHF62 □T-□RA								
BHF62 □MT-□RH, BHF62 □MT-□RA	98	270	880	2400	9800	27000	27000	27000
BHF62 □T-□	18	50	162	450	1800	5000	5000	5000
BHF62 □MT-□								

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

Speed — Torque Characteristics

The characteristics shown below are only applicable for the motors only.
 Continuous Duty Region: Continuous operation is possible in this region.
 Common to **BHF** Series

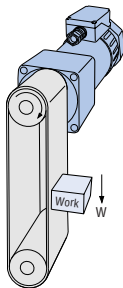


Vertical Drive (Gravitational Operation)

The **BHF** Series achieves stable speed control during gravitational operation.

During vertical movement (gravitational operation), such as the application illustrated below, normally an external force causes the motor to rotate and function as a power generator. If this energy is applied to the inverter, an error will occur. A regeneration unit (sold separately) can convert regenerative energy into thermal energy for dissipation. Use the optional regeneration unit **EPRC-400P** when using the motor for vertical drive applications or when braking a large inertial load quickly.

Regenerative power: 100 W (5-minute rating)
 Instantaneous regenerative power: 300 W



Regenerative power

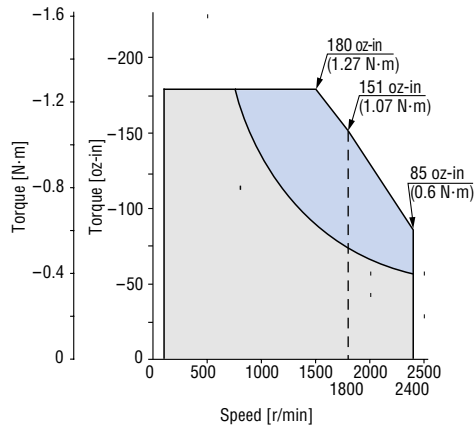
The regenerative power may be calculated roughly using the equation shown below for reference.

$$\text{Regenerative power (W)} = 0.1047 \times T_L \text{ [N·m]} \times N \text{ [r/min]}$$

T_L: Load torque N: Speed

* Use the electromagnetic-brake type for gravitational operation.

Gravitational operation ability



Use the time shown below as a guideline when performing continuous gravitational operation:

□ :
 Operating range in which regenerative power is 100 W or less
 Allowable time for continuous gravitational operation: 1 minute, 30% ED

■ :
 Operating range in which regenerative power exceeds 100 W
 Allowable time for continuous gravitational operation: 1 minute, 20% ED

Example: 1 minute, 30% =
 Under gravitational operation: 60 seconds*
 Non-gravitational operation: 140 seconds

* 60 seconds (1 minute) is the maximum continuous gravitational operation time allowed.

Dimensions Scale 1/4, Unit = inch (mm)

Mounting screws are included with the combination type parallel shaft. → Page B-133

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

● **Motor/Gearhead** (Combination Type with Right-Angle Hollow Shaft)

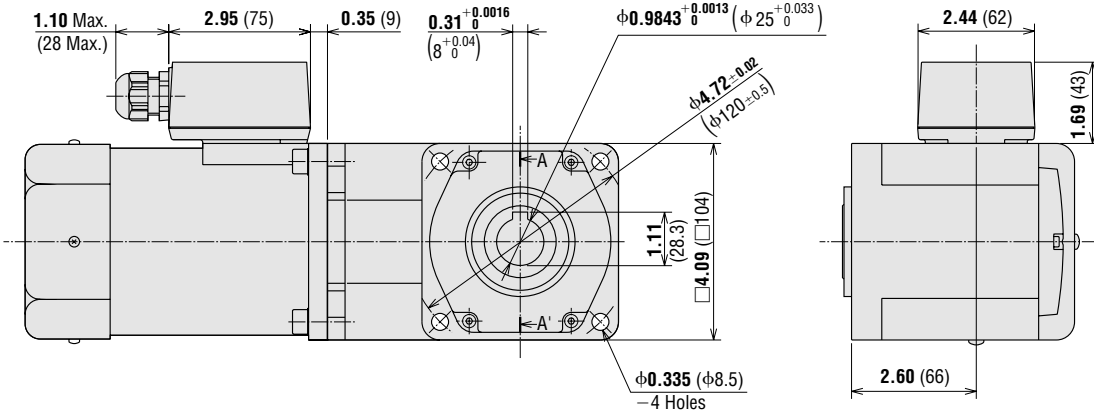
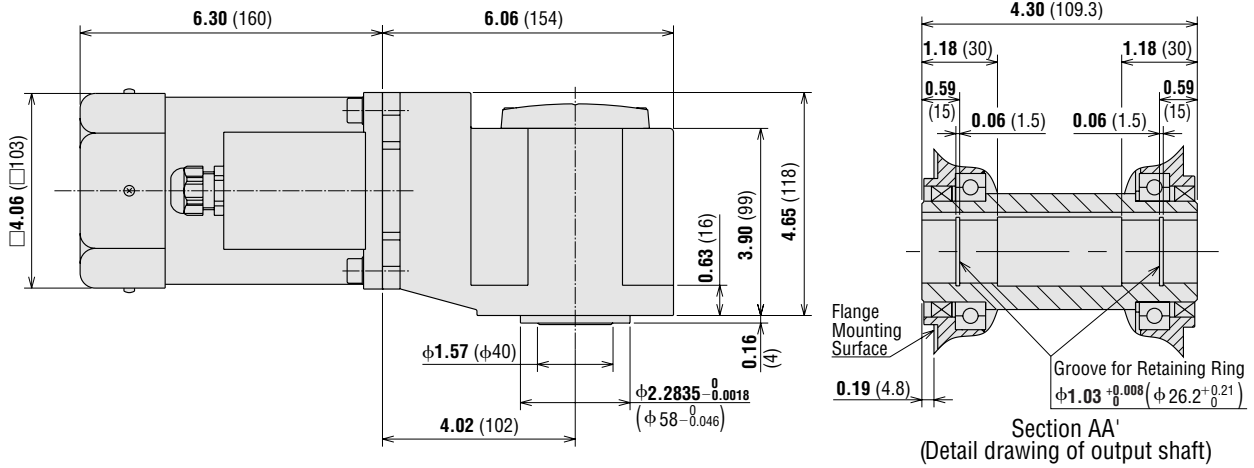
BHF62AT-□RH, BHF62CT-□RH, BHF62ST-□RH

Motor Model: BHM62T-G2

Gearhead Model: BH6G2-□RH

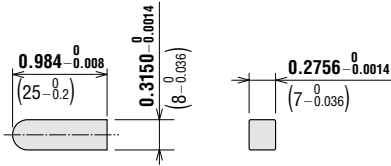
Weight: 22 lb. (10.0 kg)

DXF A301



- Use cable (VCTF) with a diameter of ϕ 0.24 inch (ϕ 6 mm)~ ϕ 0.47 inch (ϕ 12 mm).
- Details of Terminal Box → Page A-224

● **Key (Included)** (Scale 1/2)



● **Motor/Gearhead (Combination Type with Right-Angle Solid Shaft)**

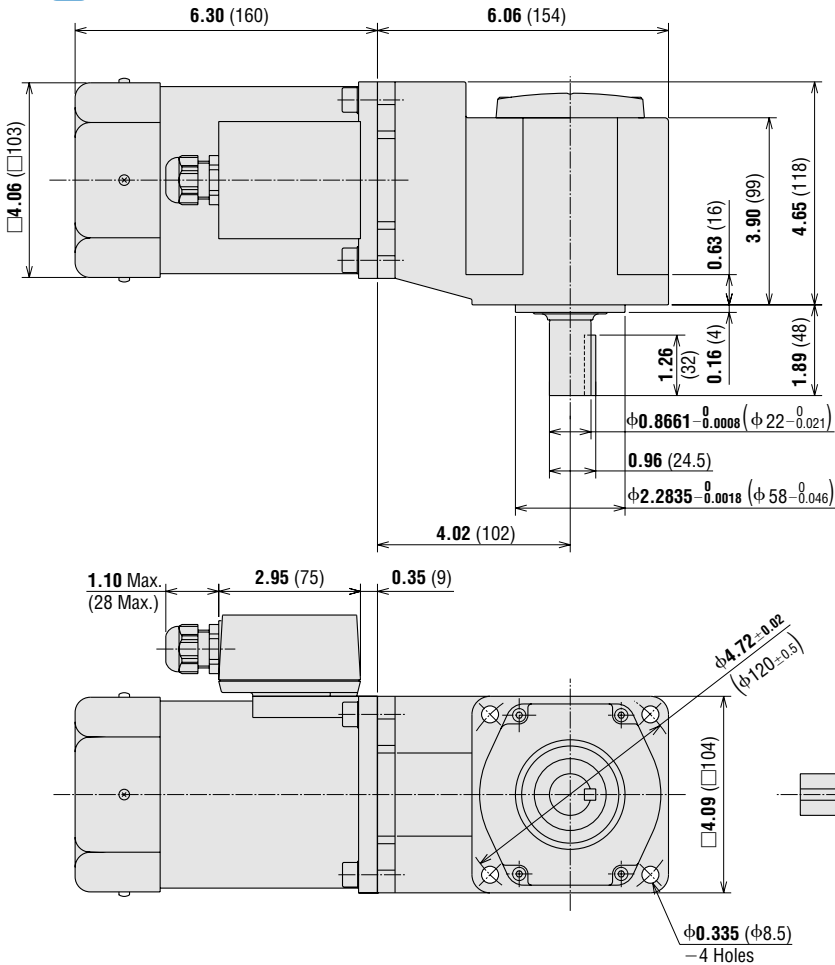
BHF62AT-□RA, BHF62CT-□RA, BHF62ST-□RA

Motor Model: BHM62T-G2

Gearhead Model: BH6G2-□RA

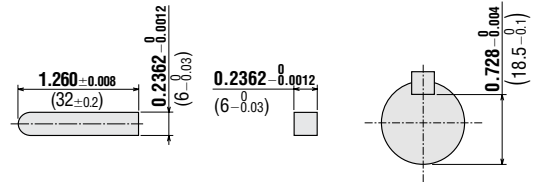
Weight: 22 lb. (10.0 kg)

DXF A302



● **Key and Key Slot (Included) (Scale 1/2)**

*At the time of shipment, a parallel key is inserted on the gearhead's shaft.



- Use cable (VCTF) with a diameter of $\phi 0.24$ inch ($\phi 6$ mm)~ $\phi 0.47$ inch ($\phi 12$ mm).
- **Details of Terminal Box** → Page A-224

● **Motor/Gearhead (Combination Type with Parallel Shaft)**

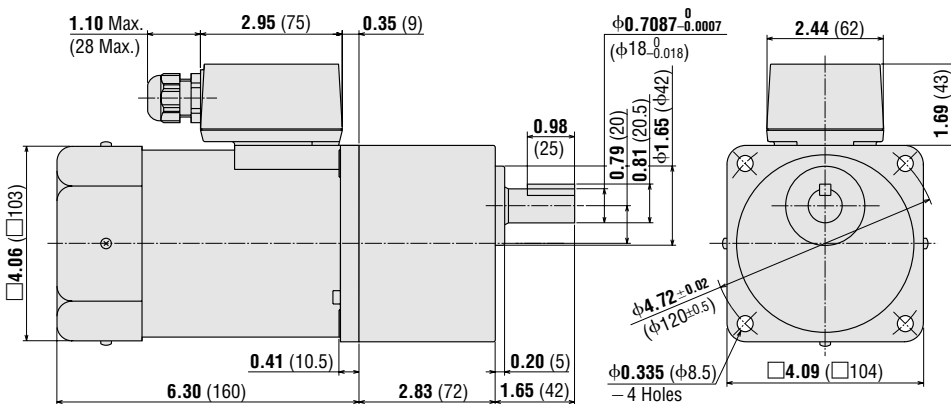
BHF62AT-□, BHF62CT-□, BHF62ST-□

Motor Model: BHM62T-G2

Gearhead Model: BH6G2-□

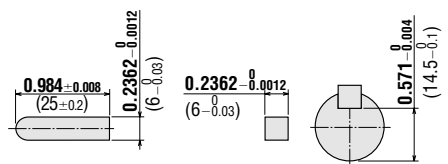
Weight: 17.6 lb. (8.0 kg)

DXF A304



● **Key and Key Slot (Included) (Scale 1/2)**

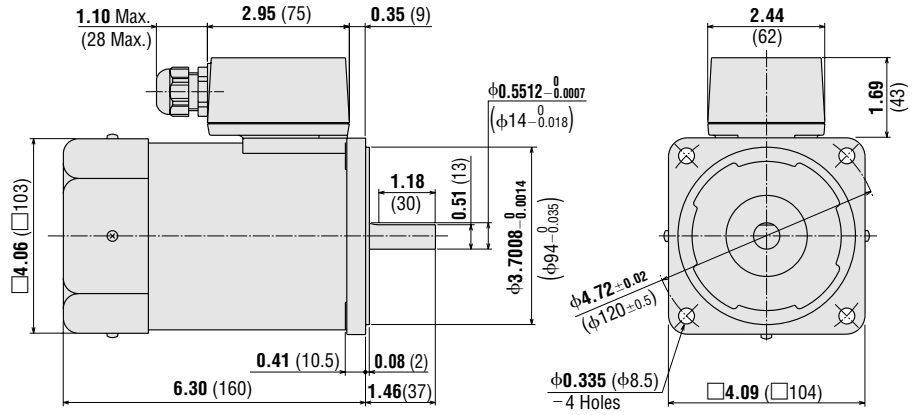
*At the time of shipment, a parallel key is inserted on the gearhead's shaft.



- Use cable (VCTF) with a diameter of $\phi 0.24$ inch ($\phi 6$ mm)~ $\phi 0.47$ inch ($\phi 12$ mm).
- **Details of Terminal Box** → Page A-224

● **Round Shaft Type**
BHF62AT-A, BHF62CT-A, BHF62ST-A

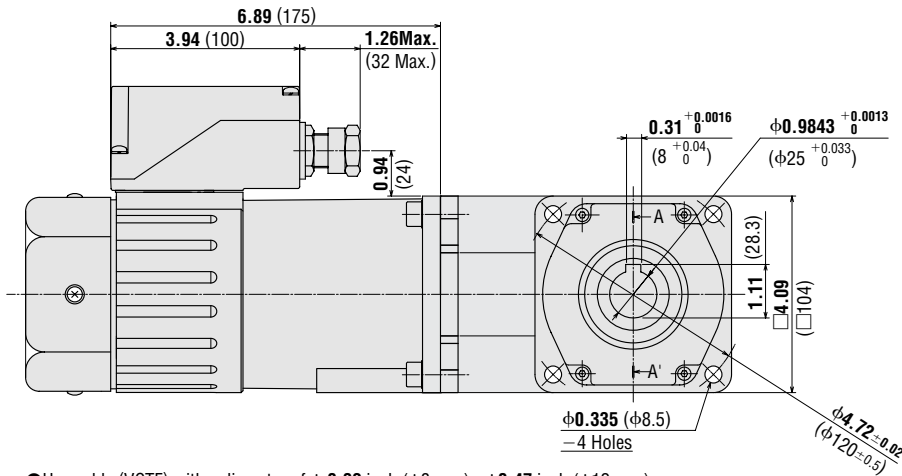
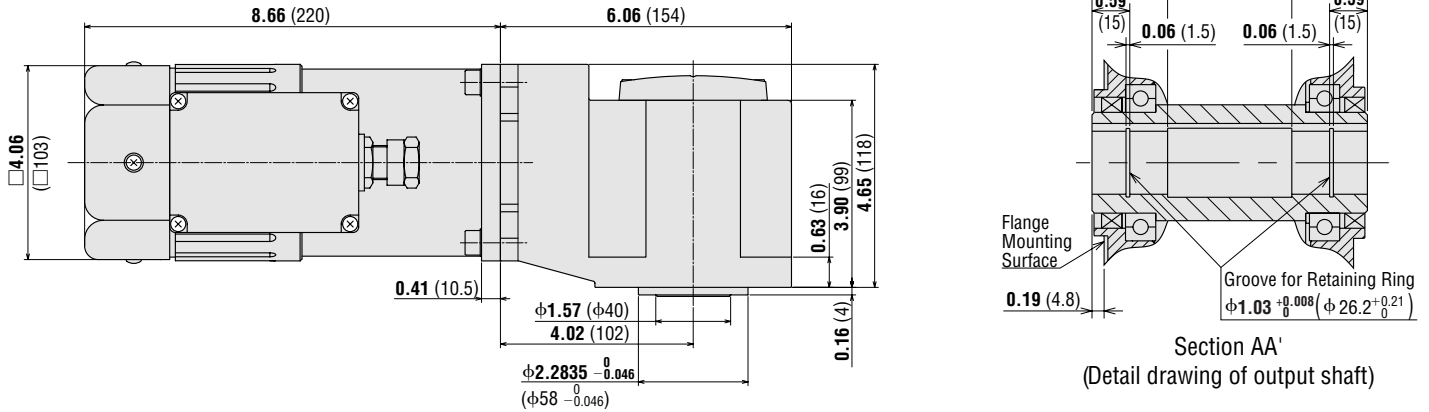
Motor Model: BHM62T-A
 Weight: 11 lb. (5.0 kg)
DXF A308



- Use cable (VCTF) with a diameter of $\phi 0.24$ inch ($\phi 6$ mm) ~ $\phi 0.47$ inch ($\phi 12$ mm).
- Details of Terminal Box → Page A-224

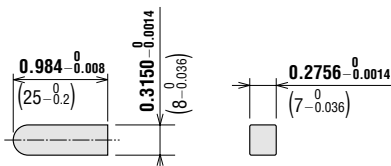
● **Motor/Gearhead (Combination Type with Right-Angle Hollow Shaft)**
BHF62AMT-□RH, BHF62CMT-□RH, BHF62SMT-□RH

Motor Model: BHM62MT-G2
 Gearhead Model: BH6G2-□RH
 Weight: 25.3 lb. (11.5 kg)
DXF A384



- Use cable (VCTF) with a diameter of $\phi 0.32$ inch ($\phi 8$ mm) ~ $\phi 0.47$ inch ($\phi 12$ mm).
- Details of Terminal Box → Page A-224

● **Key (Included) (Scale 1/2)**



● Motor/Gearhead (Combination Type with Right-Angle Solid Shaft)

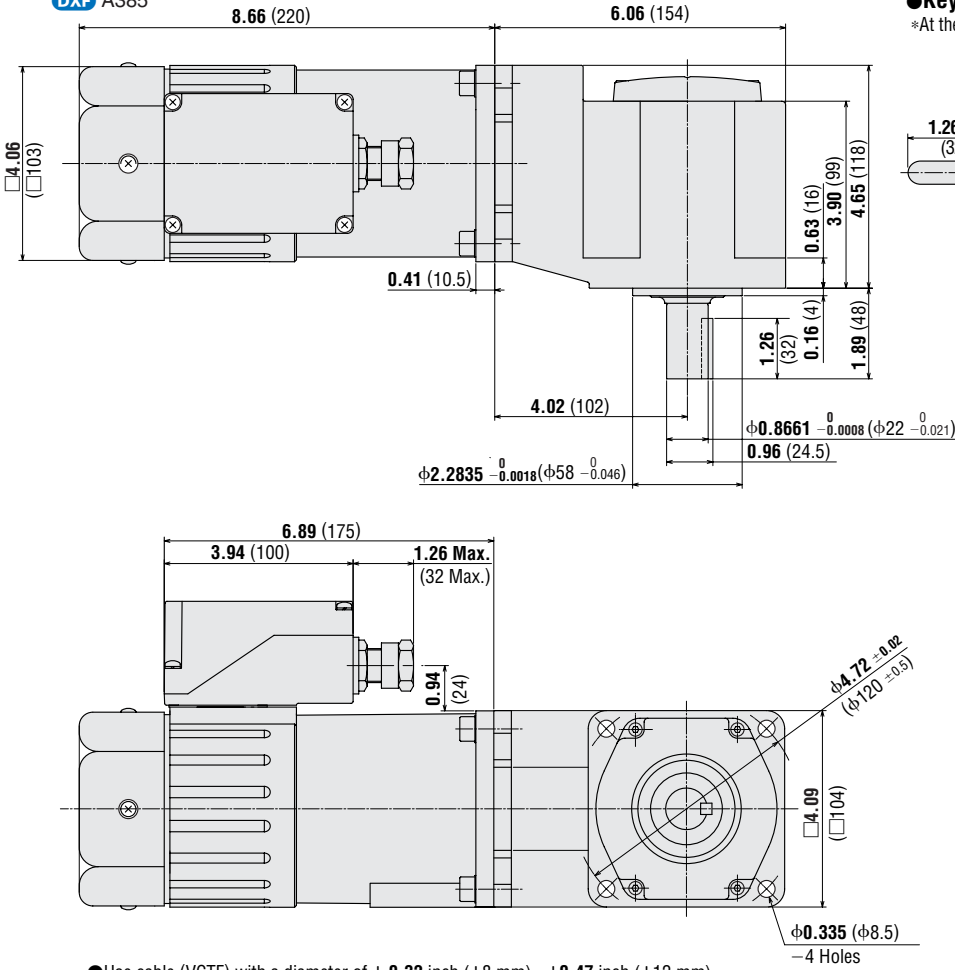
BHF62AMT-□RA, BHF62CMT-□RA, BHF62SMT-□RA

Motor Model: BHM62MT-G2

Gearhead Model: BH6G2-□RA

Weight: 25.3 lb. (11.5 kg)

DXF A385



● Key and Key Slot (Included) (Scale 1/2)

*At the time of shipment, a parallel key is inserted on the gearhead's shaft.



- Use cable (VCTF) with a diameter of $\phi 0.32$ inch ($\phi 8$ mm)~ $\phi 0.47$ inch ($\phi 12$ mm).
- Details of Terminal Box → Page A-224

● Motor/Gearhead (Combination Type with Parallel Shaft)

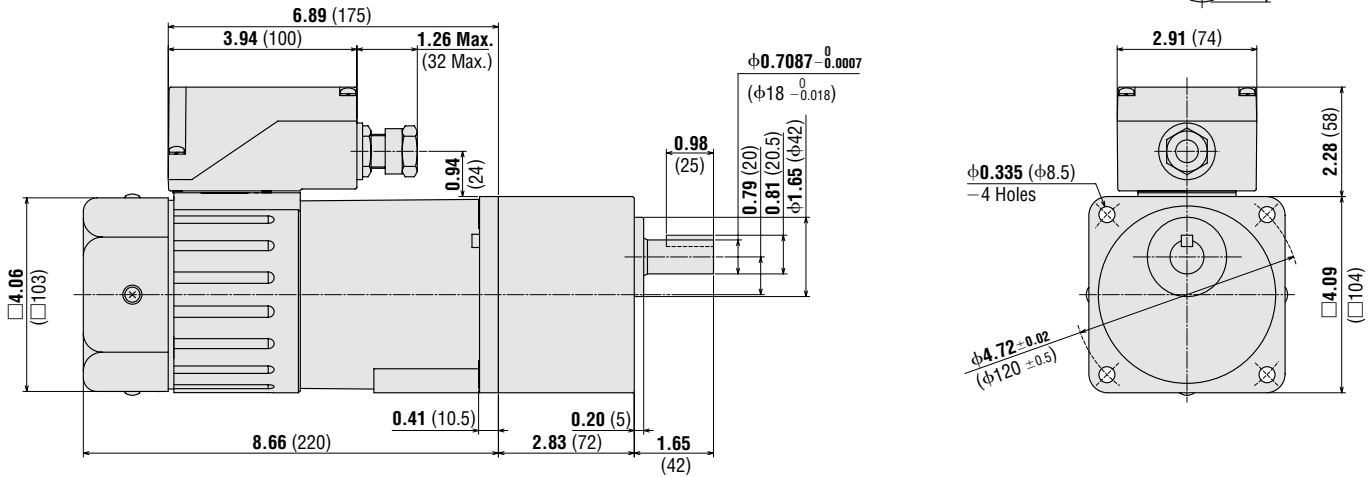
BHF62AMT-□, BHF62CMT-□, BHF62SMT-□

Motor Model: BHM62MT-G2

Gearhead Model: BH6G2-□

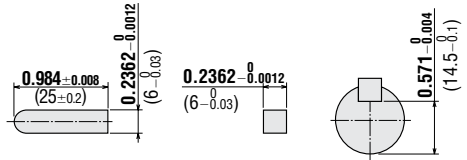
Weight: 20.9 lb. (9.5 kg)

DXF A386



● Key and Key Slot (Included) (Scale 1/2)

*At the time of shipment, a parallel key is inserted on the gearhead's shaft.



- Use cable (VCTF) with a diameter of $\phi 0.32$ inch ($\phi 8$ mm)~ $\phi 0.47$ inch ($\phi 12$ mm).
- Details of Terminal Box → Page A-224

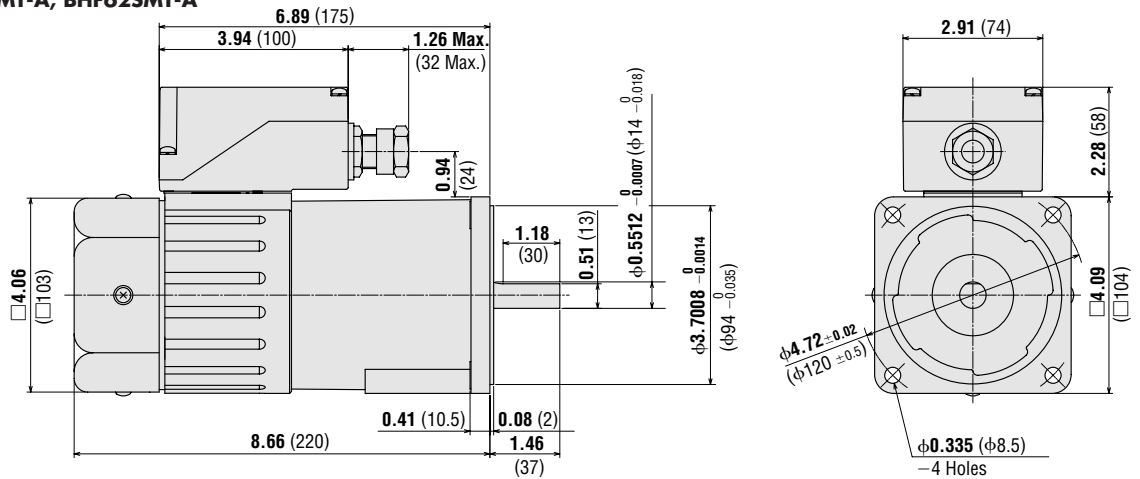
● Round Shaft Type

BHF62AMT-A, BHF62CMT-A, BHF62SMT-A

Motor Model: BHM62MT-A

Weight: 14.3 lb. (6.5 kg)

DXF A387



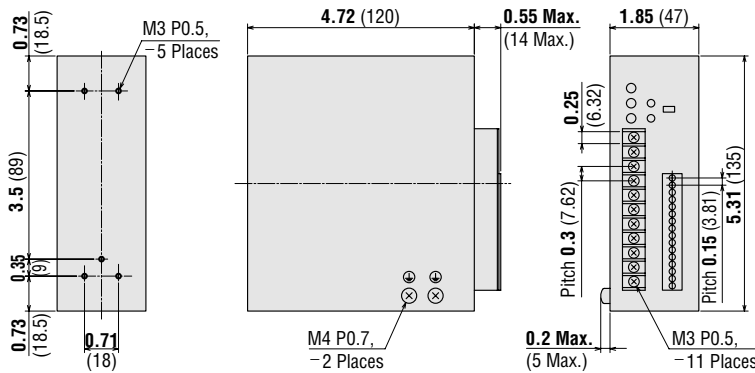
- Use cable (VCTF) with a diameter of $\phi 0.32$ inch ($\phi 8$ mm) ~ $\phi 0.47$ inch ($\phi 12$ mm).
- Details of Terminal Box → Page A-224

● Inverter

FSP200-1, FSP200-2, FSP200-3

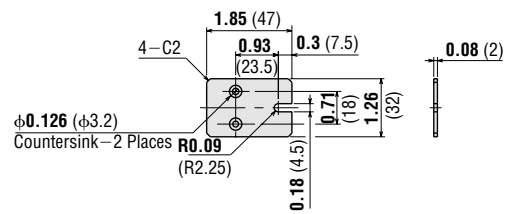
Weight: 1.32 lb. (0.6 kg)

DXF A390



● Mounting Tab

(1 set of 2 pieces included)



■ Mounting Method for Hollow Shaft Gearheads

These diagrams show how to mount loads depending on the shape of the shaft.

The tolerance of the inner diameter for the hollow shaft is finished as H8, and "key slot" processing is given to mount the load shaft. The recommended tolerance of the load shaft is h7. Use the key provided with the product by fastening it to the shaft. Apply a coating of molybdenum disulfide or similar grease to the inner diameter of the load shaft to prevent binding. Recommended load shaft dimensions are shown to the right.

Recommended size of inner diameter for the hollow shaft and load shaft

Unit=inch (mm)

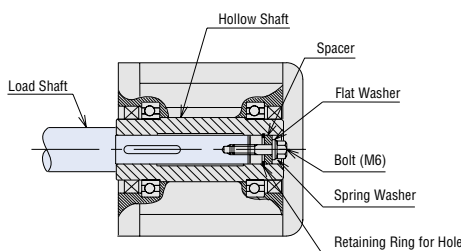
Model	BH6G2-□RH
Inner diameter of hollow shaft H8	$\phi 0.9843 + 0.0013$ ($\phi 25 + 0.033$)
Recommended load shaft diameter h7	$\phi 0.9843 - 0.0008$ ($\phi 25 - 0.021$)

- Replace the safety cover after installing the load shaft.

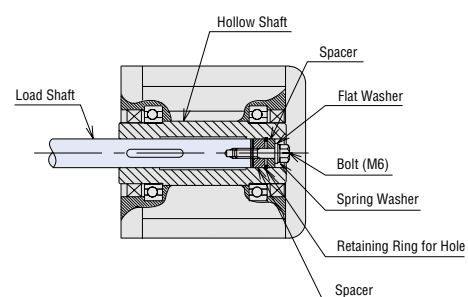
Note:

- Be careful not to apply a shock to the hollow shaft when mounting a load. It may damage the bearing inside the gearhead.

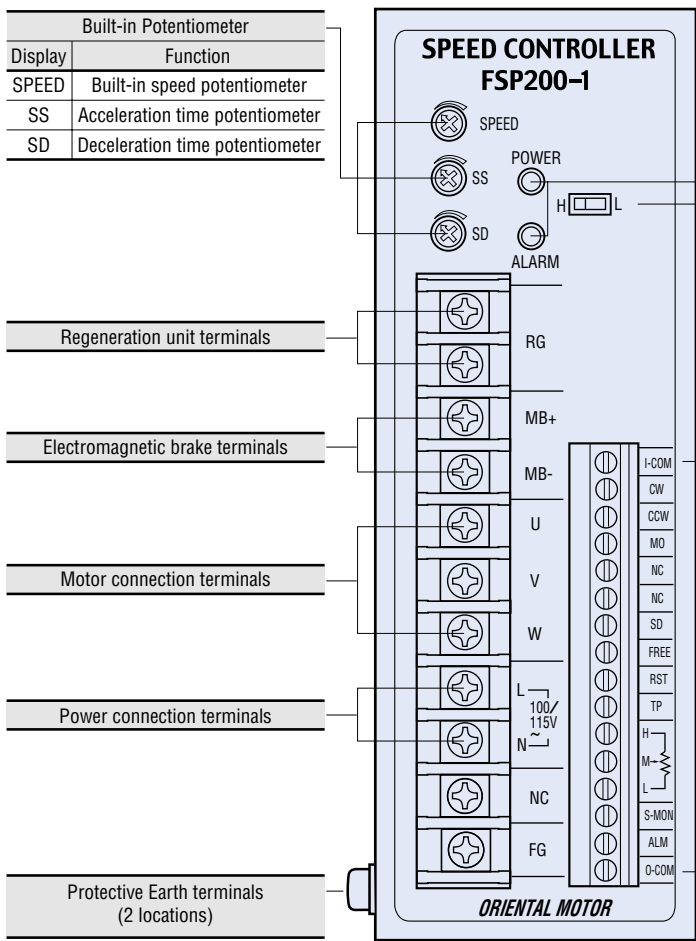
● Stepped-Down Shaft



● Straight Load Shaft



Connection and Operation



The unit shown above uses a single-phase 100/115 V power-supply input.

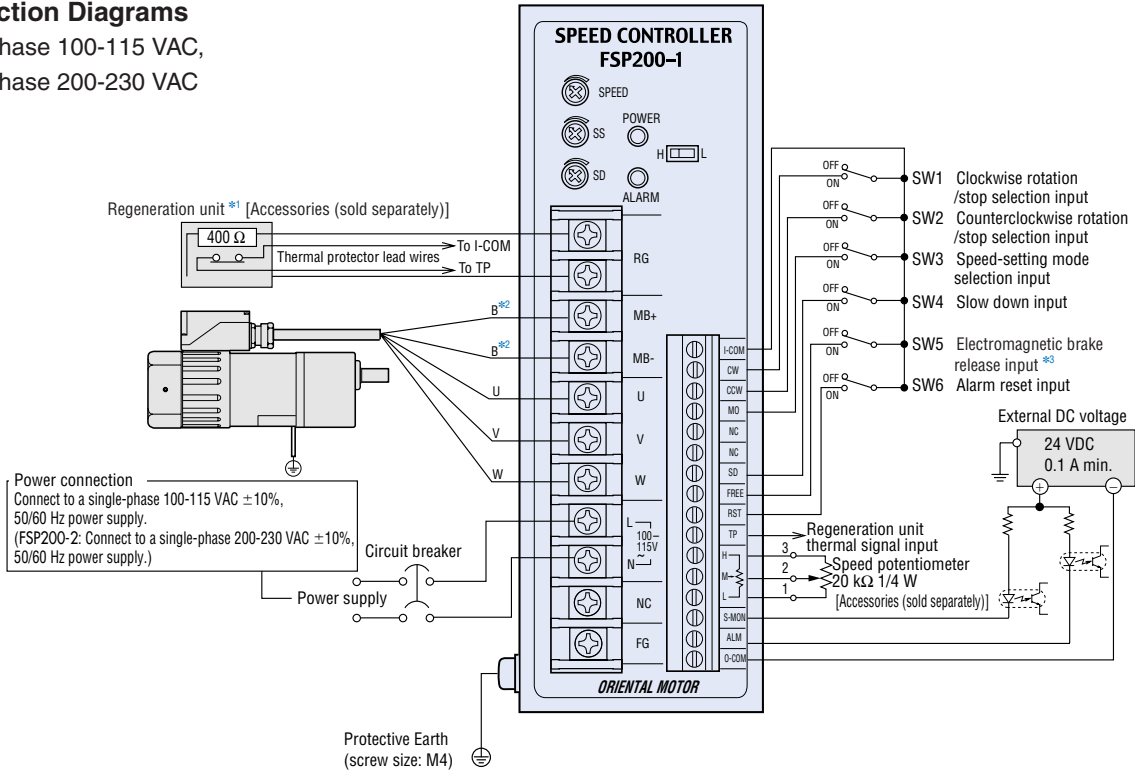
LED Display		
Display	Function	Lighting Condition
POWER	Power indicator	Turns on (green) while power is being supplied.
ALARM	Alarm indicator	Turns on (red) or blinks when an alarm is triggered.

Switch
Set the switch to "H" if the cable between the motor and inverter is less than 32.8 ft. (10 m) in length. Set it to "L" if the cable length exceeds 32.8 ft. (10 m).

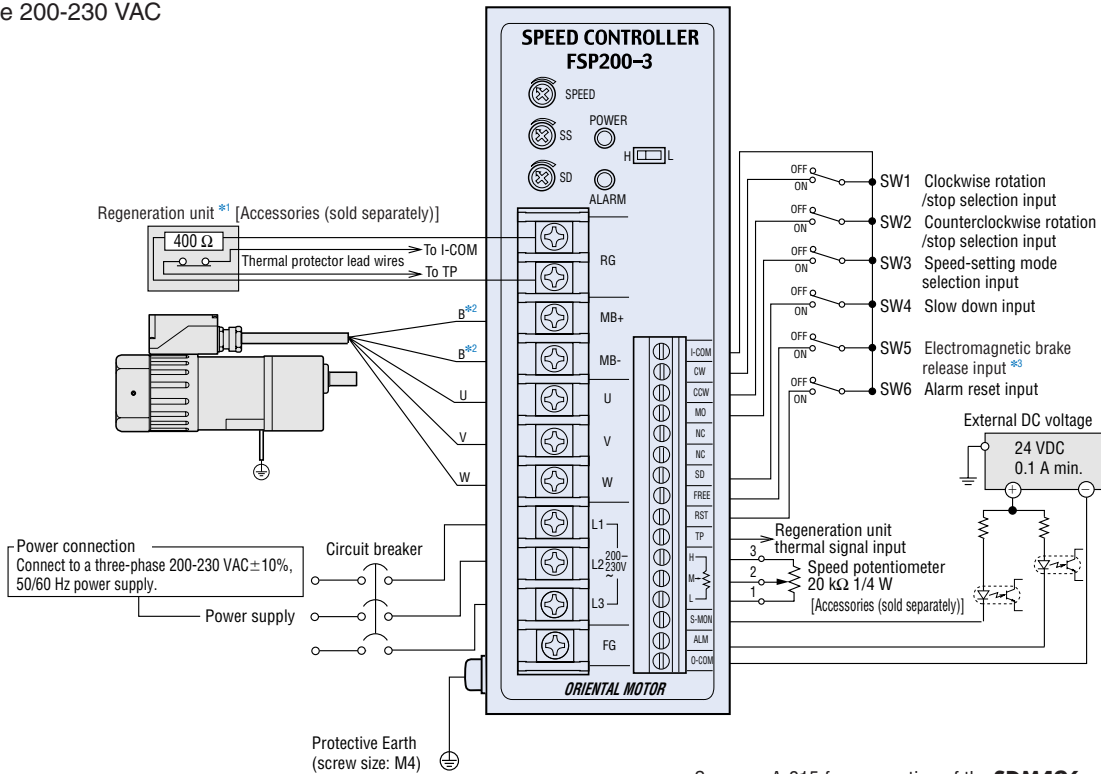
Input/Output Signal Terminals Block		
Display	Signal	Function and Operation
IN-COM	Ground terminal for input signals	Ground terminal for input signals.
CW	Clockwise rotation input	Clockwise rotation/stop selection input
CCW	Counterclockwise rotation input	Counterclockwise rotation/stop selection input
MO	Speed-setting mode selection input	Built-in/external speed-setting selection input
NC	—	
NC	—	
SD	Slow down input	Instantaneous stop/slow down stop selection input
FREE	Electromagnetic brake release input	Electromagnetic brake releases/locks selection input
RST	Alarm reset input	This input is used to reset the alarm while in an energized state in the event any protective function of the inverter is activated.
TP	Thermal signal input	This input is used to connect the lead wire of the regeneration unit's internal thermal protector when the braking regeneration unit (sold separately) is used.
H, M, L	Speed-setting mode selection input	These are connected for speed control via the external speed potentiometer or external DC voltage.
S-MON	Speed monitor output	This output is used to monitor the motor speed. Pulse signals at a rate of 12 pulses per revolution of the motor output shaft.
ALM	Alarm output	When the protective function is activated, this output is set to OFF ("H") and the motor stops.
O-COM	Ground terminal for output signals	Ground terminal for output signals.

● Connection Diagrams

- ◆ Single-phase 100-115 VAC, Single-phase 200-230 VAC



- ◆ Three-phase 200-230 VAC



See page A-215 for connection of the **SDM496** speed indicator.

- *1 This should be connected only when using a regeneration unit.
- *2 This should be connected only for a speed control system with an electromagnetic brake.
- *3 The electromagnetic brake release input can be used only with a speed control system with electromagnetic brake. Refer to page A-224 **BH** Series with electromagnetic brake, for details of terminal box.

Notes:

- If the wiring between the motor and inverter needs to be extended by 32.8 ft. (10 m) or more, use a polyethylene-insulated electric wire of AWG16 or larger. Do not connect more than one cable or allow the overall wiring length to exceed 164 ft. (50 m). Doing so may result in a malfunction.
- With the electromagnetic brake type, setting the wiring length too long delays the operation of the electromagnetic brake [by approx. 100 ms at a wiring length of 164 ft. (50 m)]. To minimize the delay time, use separate cables for the electromagnetic brake cable and motor cable.
- Separate the signal and motor cables from noise-generating equipment or power lines.
- After connecting each cable to the terminal block, be sure to install the connector cover.

Connecting the motor and inverter

A motor cable is not supplied with the product. Please provide the appropriate cable.

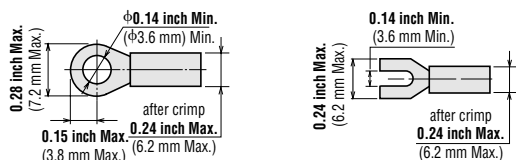
Connecting the Motor

Appropriate lead wires

AWG 18 min.

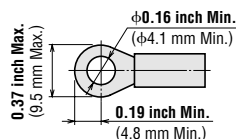
Terminals (Use a crimp terminal for the electromagnetic brake type.)

Round Terminal with Insulation U-Shape Terminal with Insulation



Protective Earth

Round Terminal with Insulation



Connecting the Inverter

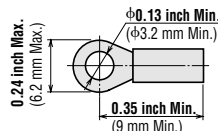
Power input terminals, motor connection terminals

Appropriate lead wires

AWG 18 min.

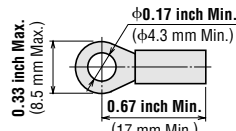
Terminals

Round Terminal with Insulation



Protective Earth

Round Terminal with Insulation



I/O signal terminal

When a crimp terminal should be used, use one of the following terminals:

Phoenix Contact

AI 0.25-6

Applicable wiring gauge: AWG 24

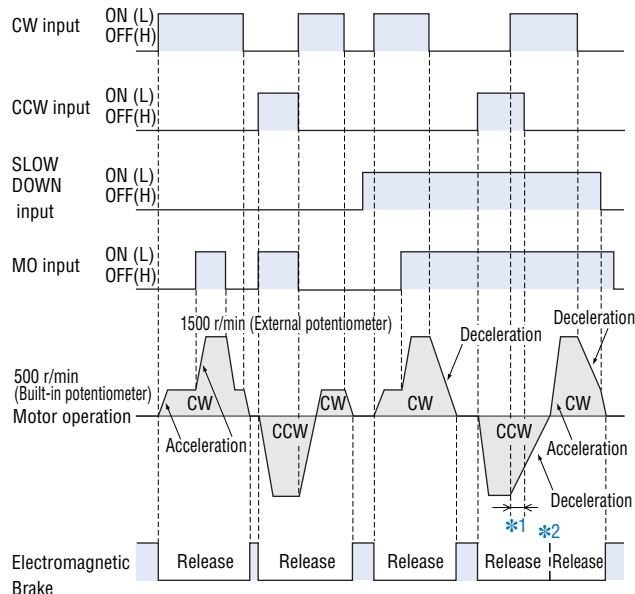
AI 0.34-6

Applicable wiring gauge: AWG 22

AI 0.5-6

Applicable wiring gauge: AWG 20

Timing Chart



*1 The motor will stop if the CW and CCW inputs are simultaneously turned to ON ("L" level).

*2 When the motor runs and/or stops in a short cycle, the electromagnetic brake may be left released if a shorter time is set for the acceleration/deceleration time.

- All run, stop, direction change and speed change operations can be controlled by the CW, CCW, M0, and SD input signals.
- If the CW input is set to ON ("L" level), the motor rotates in a clockwise direction as viewed from the shaft end of the motor; if the CW input is set to OFF ("H" level), the motor stops. If the CCW input is set to ON ("L" level), the motor rotates in a counterclockwise direction as viewed from the shaft end of the motor; if the CCW input is set to OFF ("H" level), the motor stops. The acceleration time is set by the built-in acceleration potentiometer (SS).
- If the SD input is set to ON ("L" level), the deceleration time is the value set by the built-in deceleration potentiometer (SD.)
- Turning the M0 input to ON ("L" level) selects the speed set by the external speed potentiometer. Turning the input to OFF ("H" level) causes the motor to operate at the speed set by the built-in speed potentiometer. The timing chart shown at left is based on a built-in speed-potentiometer setting of 500 r/min and an external speed-potentiometer setting of 1500 r/min.
- To release the electromagnetic brake when the motor is stopped, turn the FREE (electromagnetic brake release) input to ON ("L" level). This releases the electromagnetic brake and allows the motor's output shaft to turn freely. (This function is available only with a speed control system with an electromagnetic brake.)

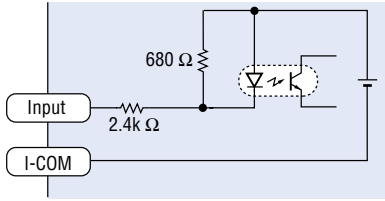
Note:

While the motor is running, the temperature of the motor case should not exceed 194°F (90°C).

● **Input Signal Circuit**

◆ **Input Circuit**

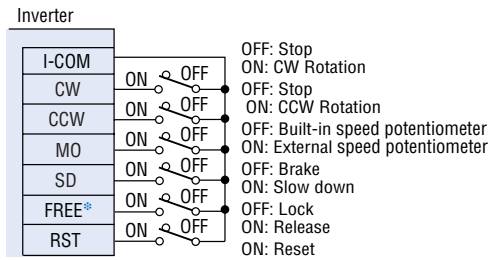
Common to CW, CCW and SLOW DOWN, FREE*, RST inputs.



* The FREE input is used only with a speed control system with electromagnetic brake.

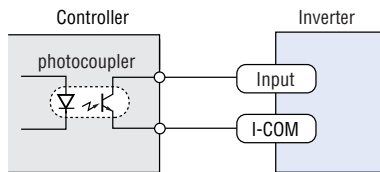
◆ **Connection Example for Input Signals**

• **Controlled by Small Capacity Relays**



- Use a small capacity contact point type relay capable of switching 24 VDC, 5 mA.
- * The FREE input is used only with a speed control system with electromagnetic brake.

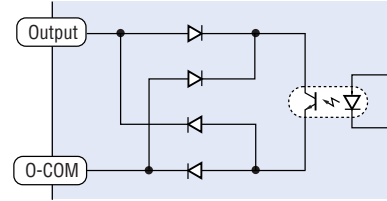
• **Electronic Input Control**



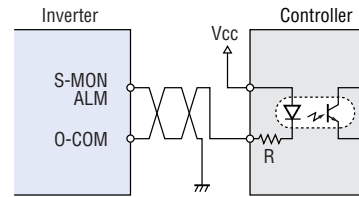
● **Output Signal Circuit**

◆ **Output Circuit**

Common to S-MON, ALM outputs.



◆ **Connection Example for Output Signals**



- An external power source is required since the circuit has an open-collector output configuration as shown in the figure above. There is no need to connect an external power source if no signal outputs are used. Use an external power source of 26.4 VDC or below. Connect a limit resistance according to the power-supply voltage so that the current level doesn't exceed 10 mA.

Speed monitor output: Pulse signals are output at a rate at 12 pulses per revolution of the motor output shaft.
(Note that this is monitoring of the speed command issued from the inverter to the motor, not that of the speed measured at the motor's output shaft.)

$$\text{Motor speed} = \frac{\text{S-MON output frequency [Hz]}}{12} \times 60 \text{ [r/min]}$$

Alarm output: This signal is output when a protection function for overload, circuit overheat, overvoltage, undervoltage, overcurrent or EEPROM error has been activated. When an alarm signal is output, this output is turned to OFF ("H" level) between the ALARM OUT and GND terminals.

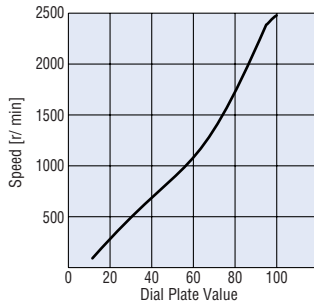
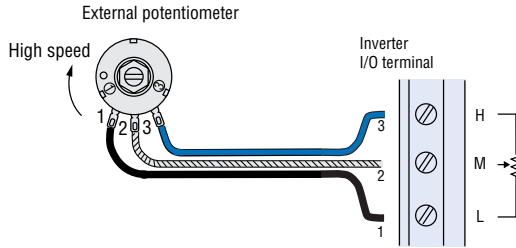
● Method of Speed Setting

◆ Speed Control by Built-in Potentiometer

The Built-in speed potentiometer is selected when the MO (speed-setting mode selection input) is set to OFF ("H" level). Turning the Built-in speed potentiometer clockwise sets a faster speed, while turning it counterclockwise brings the motor to a stop.

◆ Speed Control by External Potentiometer

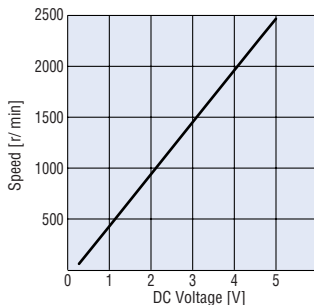
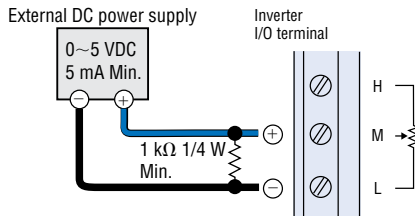
The external speed potentiometer can be used when the MO (speed-setting mode selection input) is set to ON ("L" level). When the optional external speed potentiometer is used, connect it as illustrated below. Turning the external speed potentiometer clockwise sets a faster speed.



External speed potentiometer scale—speed characteristics (Representative Values)

◆ Speed Control by External DC Voltage

External DC voltage can be used when the MO (speed-setting mode selection input) is set to ON ("L" level). To set the motor speed via external DC voltage, connect a DC power supply as illustrated below. Raising the DC voltage sets a faster speed.



DC voltage—speed characteristics (Representative Values)

■ List of Motor and Inverter Combinations

Model name for motor/control unit combinations are shown below

● Combination Type Speed Control System

Model	Motor	Gearhead	Inverter
BHF62AT-□RH	BHM62T-G2	BH6G2-□RH	FSP200-1
BHF62AT-□RA		BH6G2-□RA	
BHF62AT-□		BH6G2-□	
BHF62CT-□RH		BH6G2-□RH	FSP200-2
BHF62CT-□RA		BH6G2-□RA	
BHF62CT-□		BH6G2-□	
BHF62ST-□RH		BH6G2-□RH	FSP200-3
BHF62ST-□RA		BH6G2-□RA	
BHF62ST-□		BH6G2-□	

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

● Round Shaft Speed Control System

Model	Motor	Inverter
BHF62AT-A	BHM62T-A	FSP200-1
BHF62CT-A		FSP200-2
BHF62ST-A		FSP200-3

● Combination Type Speed Control System with Electromagnetic Brake

Model	Motor	Gearhead	Inverter
BHF62AMT-□RH	BHM62MT-G2	BH6G2-□RH	FSP200-1
BHF62AMT-□RA		BH6G2-□RA	
BHF62AMT-□		BH6G2-□	
BHF62CMT-□RH		BH6G2-□RH	FSP200-2
BHF62CMT-□RA		BH6G2-□RA	
BHF62CMT-□		BH6G2-□	
BHF62SMT-□RH		BH6G2-□RH	FSP200-3
BHF62SMT-□RA		BH6G2-□RA	
BHF62SMT-□		BH6G2-□	

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

● Round Shaft Speed Control System with Electromagnetic Brake

Model	Motor	Inverter
BHF62AMT-A	BHM62MT-A	FSP200-1
BHF62CMT-A		FSP200-2
BHF62SMT-A		FSP200-3