

# AC Motor Systems

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## 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.

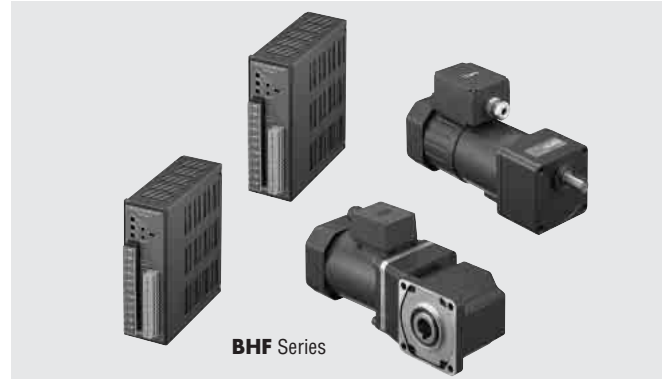
**● Smallest frame size among 200 W (1/4 HP) motors**

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				
Inverter	IEC60664-1	UL	E171462	
	UL508C			
	CSA C22.2 No.14			
	EN50178			
	EN60950	Conforms to EN/IEC Standards		

- 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.

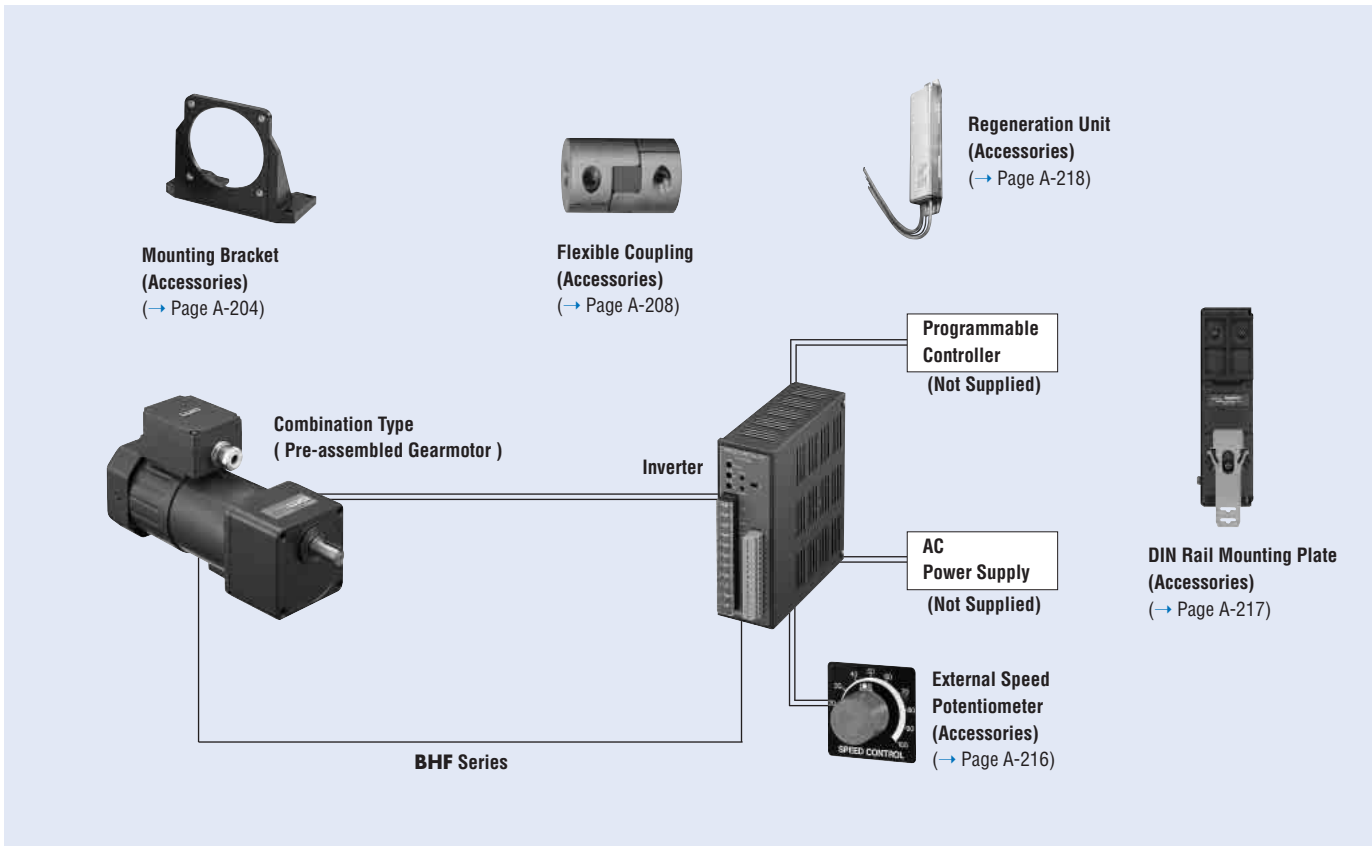
**● Wide product variations**

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.

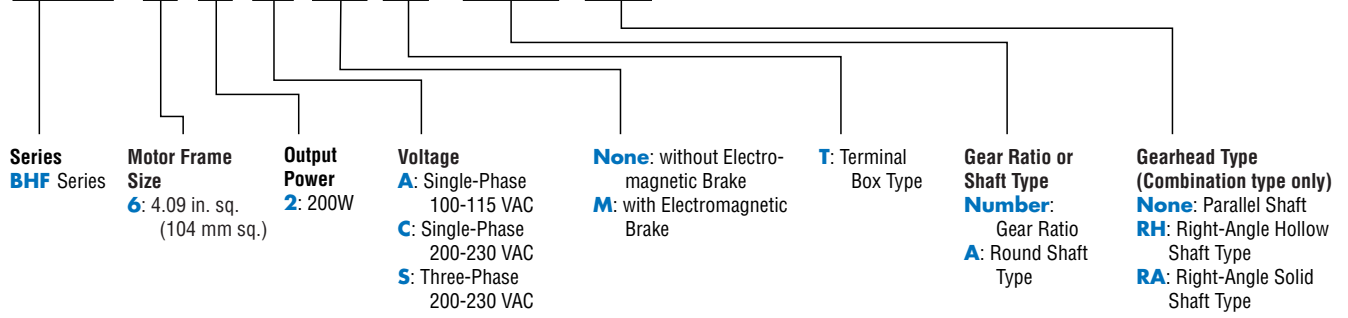
## System Configuration



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	<b>BHF62AT-□RH</b>	<b>5~180</b>
	Single-Phase 200-230 VAC	<b>BHF62CT-□RH</b>	<b>5~180</b>
	Three-Phase 200-230 VAC	<b>BHF62ST-□RH</b>	<b>5~180</b>
Combination Type with Right-Angle Solid Shaft	Single-Phase 100-115 VAC	<b>BHF62AT-□RA</b>	<b>5~180</b>
	Single-Phase 200-230 VAC	<b>BHF62CT-□RA</b>	<b>5~180</b>
	Three-Phase 200-230 VAC	<b>BHF62ST-□RA</b>	<b>5~180</b>
Combination Type with Parallel Shaft	Single-Phase 100-115 VAC	<b>BHF62AT-□</b>	<b>3~180</b>
	Single-Phase 200-230 VAC	<b>BHF62CT-□</b>	<b>3~180</b>
	Three-Phase 200-230 VAC	<b>BHF62ST-□</b>	<b>3~180</b>

• 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	<b>BHF62AT-A</b>
	Single-Phase 200-230 VAC	<b>BHF62CT-A</b>
	Three-Phase 200-230 VAC	<b>BHF62ST-A</b>

### 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	<b>BHF62AMT-□RH</b>	<b>5~180</b>
	Single-Phase 200-230 VAC	<b>BHF62CMT-□RH</b>	<b>5~180</b>
	Three-Phase 200-230 VAC	<b>BHF62SMT-□RH</b>	<b>5~180</b>
Combination Type with Right-Angle Solid Shaft	Single-Phase 100-115 VAC	<b>BHF62AMT-□RA</b>	<b>5~180</b>
	Single-Phase 200-230 VAC	<b>BHF62CMT-□RA</b>	<b>5~180</b>
	Three-Phase 200-230 VAC	<b>BHF62SMT-□RA</b>	<b>5~180</b>
Combination Type with Parallel Shaft	Single-Phase 100-115 VAC	<b>BHF62AMT-□</b>	<b>3~180</b>
	Single-Phase 200-230 VAC	<b>BHF62CMT-□</b>	<b>3~180</b>
	Three-Phase 200-230 VAC	<b>BHF62SMT-□</b>	<b>3~180</b>

• 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	<b>BHF62AMT-A</b>
	Single-Phase 200-230 VAC	<b>BHF62CMT-A</b>
	Three-Phase 200-230 VAC	<b>BHF62SMT-A</b>

## Specifications

### Speed Control System



Model	Combination Type	<b>BHF62AT-□RH</b>	<b>BHF62CT-□RH</b>	<b>BHF62ST-□RH</b>
		<b>BHF62AT-□RA</b>	<b>BHF62CT-□RA</b>	<b>BHF62ST-□RA</b>
Round Shaft Type		<b>BHF62AT-□</b>	<b>BHF62CT-□</b>	<b>BHF62ST-□</b>
Round Shaft Type		<b>BHF62AT-A</b>	<b>BHF62CT-A</b>	<b>BHF62ST-A</b>
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 <sup>2</sup> (×10 <sup>-4</sup> kg·m <sup>2</sup> )	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 <sup>2</sup> (×10 <sup>-4</sup> kg-m <sup>2</sup> )	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"> <li>• Overload protection: A load exceeding the rated torque has been applied to the motor for 5 seconds or more.</li> <li>• Overvoltage protection: The voltage applied to the inverter has exceeded the rated voltage by approximately 30% or more.</li> <li>The motor is being operated beyond the lowering operation's ability.</li> <li>• Overcurrent protection: An excessive current is flowing within the inverter.</li> <li>• Undervoltage protection: The power-supply voltage has dropped below the rated voltage by approximately 15% or more.</li> <li>• Circuit overheat protection: The ambient operating temperature for the inverter has exceeded its upper limit.</li> <li>• Motor open circuit protection: The motor cable has an open circuit or improper connection.</li> <li>• EEPROM Error: An error was detected in the EEPROM.</li> </ul>
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
<b>BHF62AT-□RH/RA, BHF62AMT-□RH/RA</b> <b>BHF62CT-□RH/RA, BHF62CMT-□RH/RA</b> <b>BHF62ST-□RH/RA, BHF62SMT-□RH/RA</b>	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
<b>BHF62AT-□, BHF62AMT-□</b> <b>BHF62CT-□, BHF62CMT-□</b> <b>BHF62ST-□, BHF62SMT-□</b>	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)	
<b>BHF62</b> □T-□RH	5~30	270 (1200)	240 (1100)	67 (300)
<b>BHF62</b> □MT-□RH	50~180	490 (2200)	450 (2000)	
<b>BHF62</b> □T-□RA	5~30	200 (900)	220 (1000)	67 (300)
<b>BHF62</b> □MT-□RA	50~180	380 (1700)	410 (1850)	
<b>BHF62</b> □T-□	3~30	123 (550)	180 (800)	45 (200)
<b>BHF62</b> □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

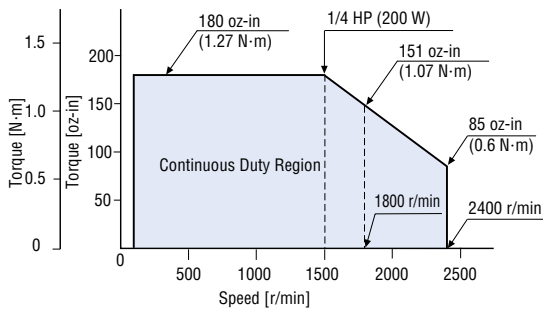
Unit = Upper values: oz-in<sup>2</sup>/Lower values: ×10<sup>-4</sup> kg·m<sup>2</sup>

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

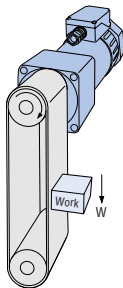


## Vertical Drive (Gravitational Operation)

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

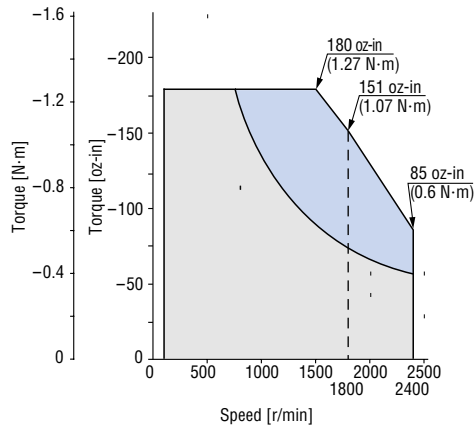
The regenerative power may be calculated roughly using the equation shown below for reference.

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

T<sub>L</sub>: 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)

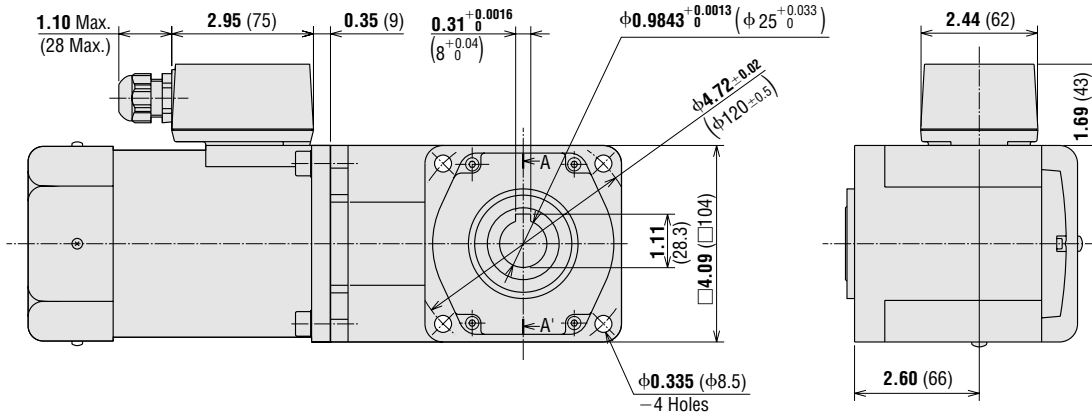
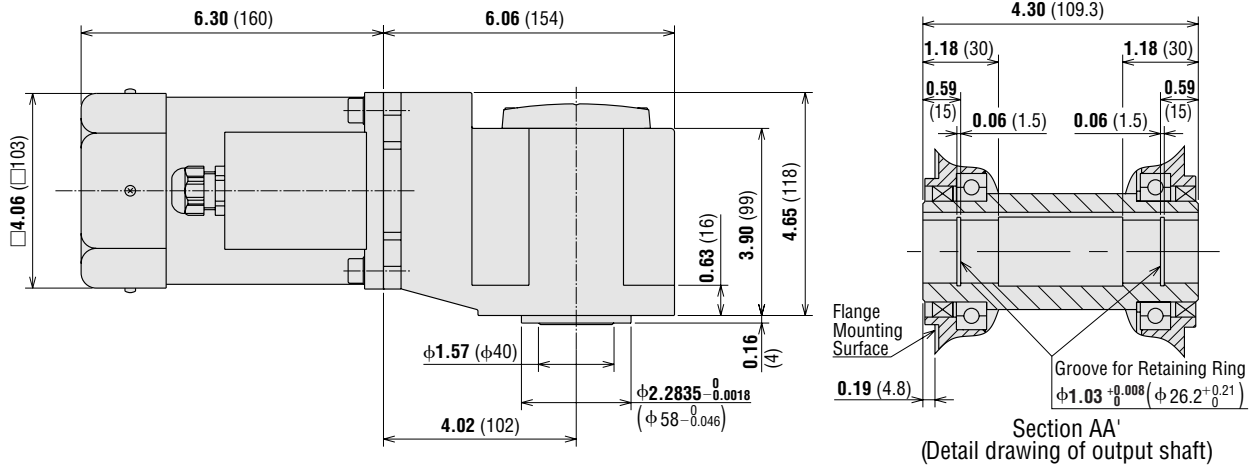
**BHF62AT-□RH, BHF62CT-□RH, BHF62ST-□RH**

Motor Model: BHM62T-G2

Gearhead Model: BH6G2-□RH

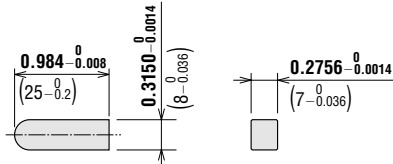
Weight: 22 lb. (10.0 kg)

**DXF** A301



- Use cable (VCTF) with a diameter of  $\phi$  0.24 inch ( $\phi$ 6 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)**

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

Motor Model: BHM62T-G2

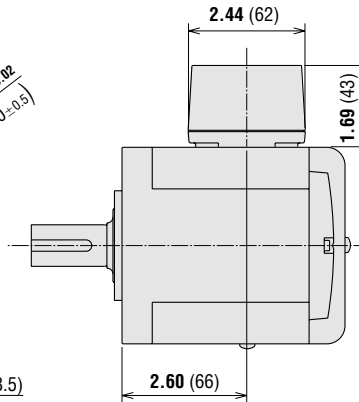
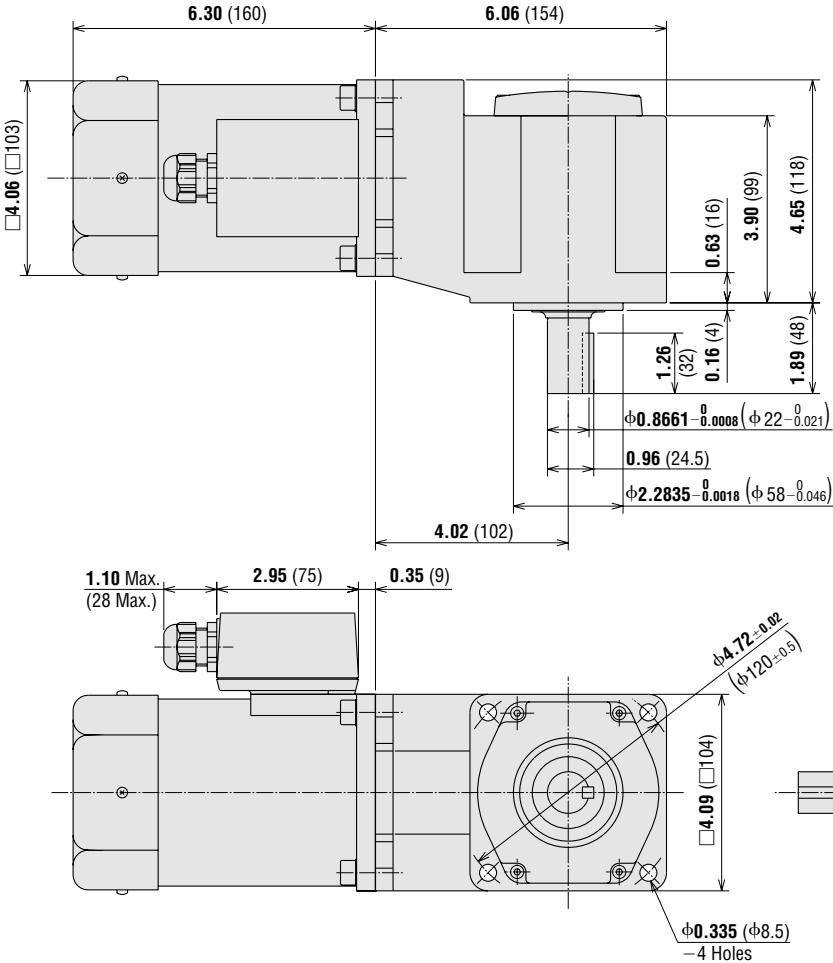
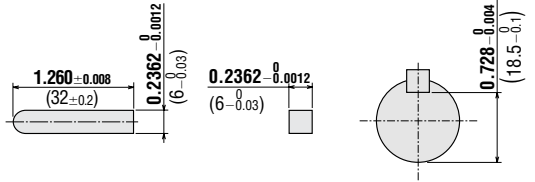
Gearhead Model: BH6G2-□RA

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

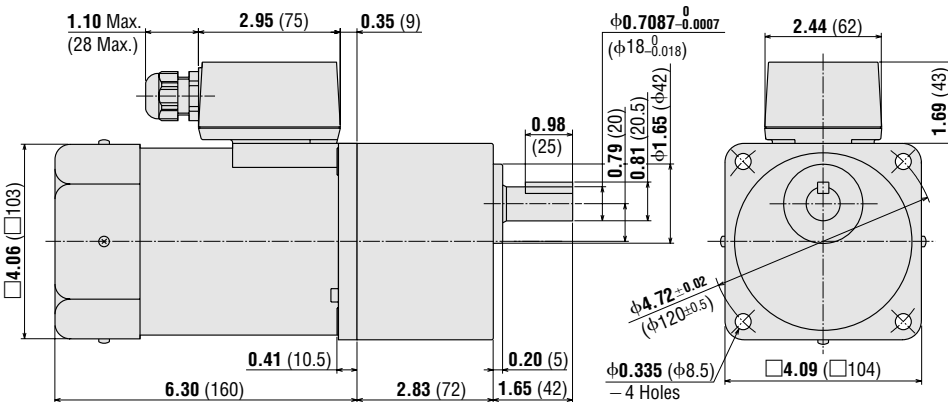
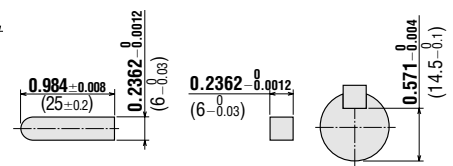
Gearhead Model: BH6G2-□

Weight: 17.6 lb. (8.0 kg)

**DXF** A304

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

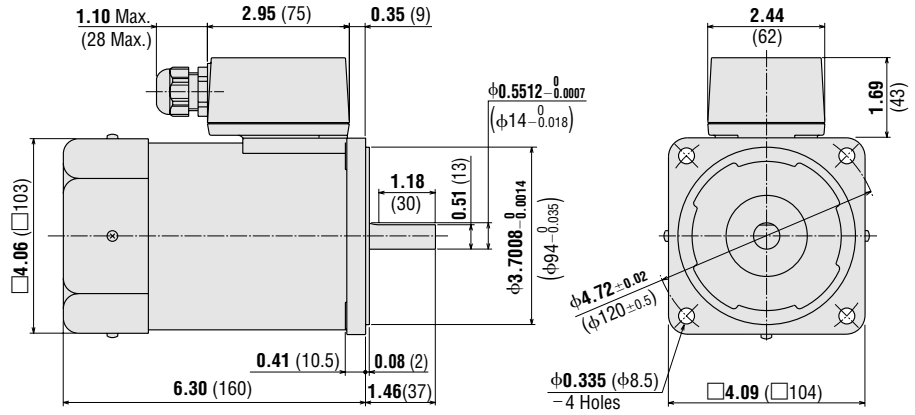
\*At the time of shipment, a parallel key is inserted on the gearhead's shaft.



- 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**

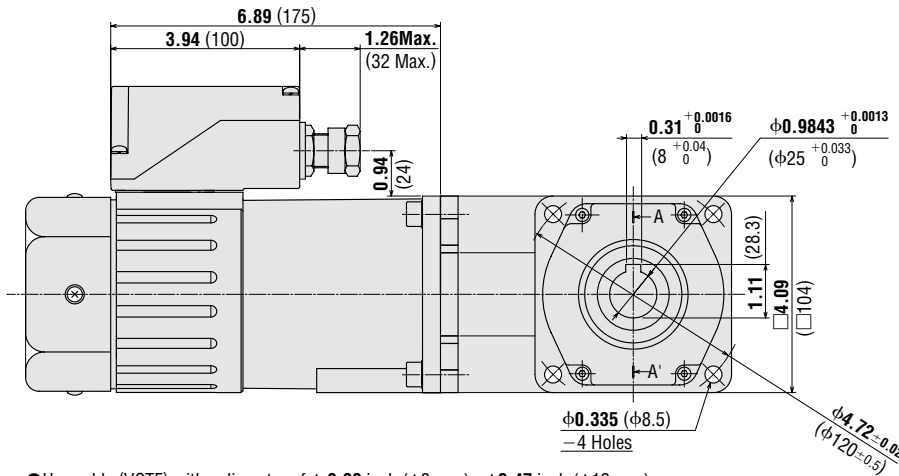
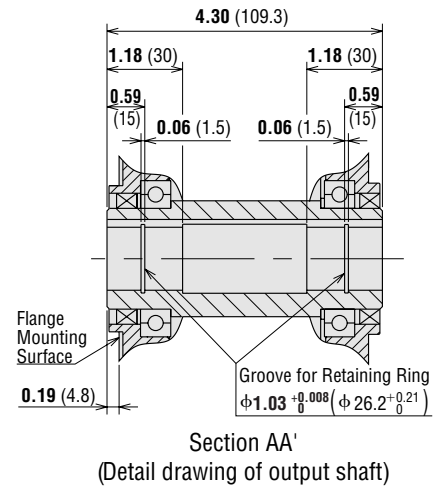
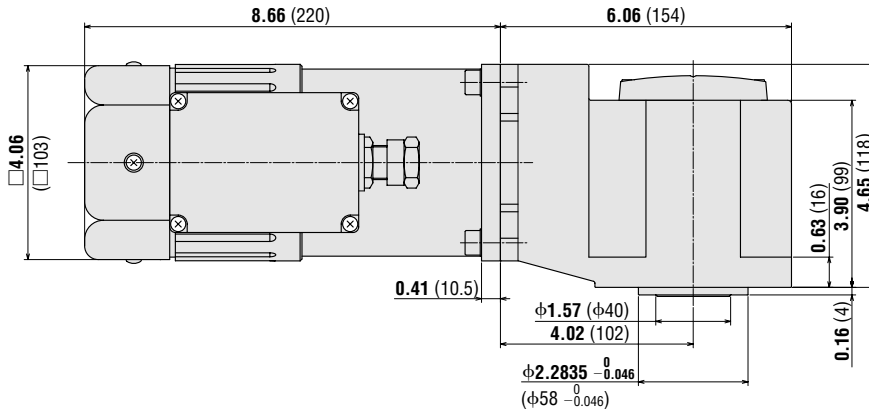
Motor Model: BHM62T-A  
 Weight: 11 lb. (5.0 kg)  
**DXF** A308



- Use cable (VCTF) with a diameter of φ 0.24 inch (φ6 mm) ~ φ0.47 inch (φ12 mm).
- Details of Terminal Box → Page A-224

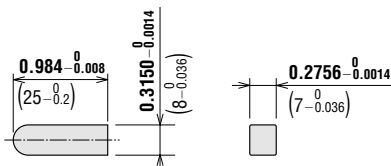
**● Motor/Gearhead (Combination Type with Right-Angle Hollow Shaft)**  
**BHF62AMT-□RH, BHF62CMT-□RH, BHF62SMT-□RH**

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



- Use cable (VCTF) with a diameter of φ 0.32 inch (φ8 mm) ~ φ0.47 inch (φ12 mm).
- Details of Terminal Box → Page A-224

**● Key (Included) (Scale 1/2)**



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

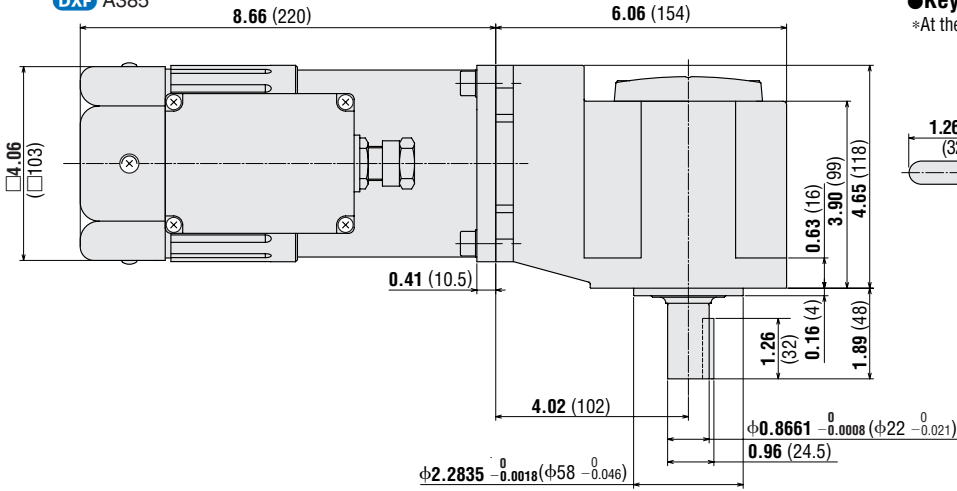
**BHF62AMT-□RA, BHF62CMT-□RA, BHF62SMT-□RA**

Motor Model: BHM62MT-G2

Gearhead Model: BH6G2-□RA

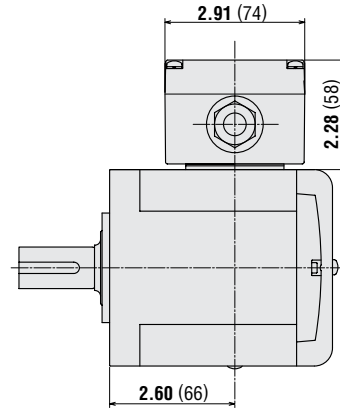
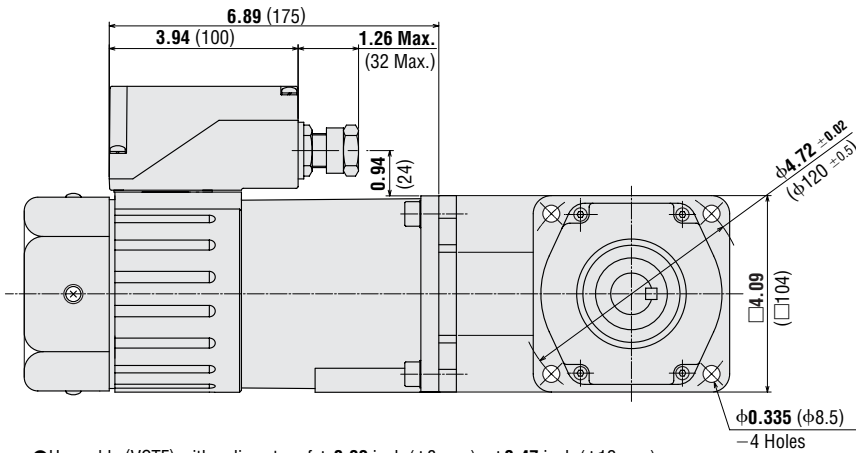
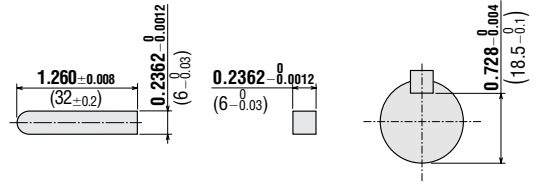
Weight: 25.3 lb. (11.5 kg)

**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 φ 0.32 inch (φ8 mm) ~ φ0.47 inch (φ12 mm).
- **Details of Terminal Box** → Page A-224

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

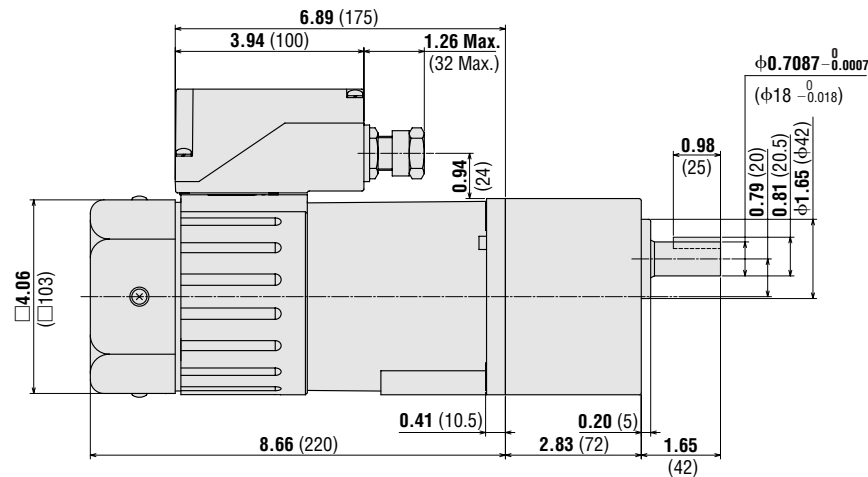
**BHF62AMT-□, BHF62CMT-□, BHF62SMT-□**

Motor Model: BHM62MT-G2

Gearhead Model: BH6G2-□

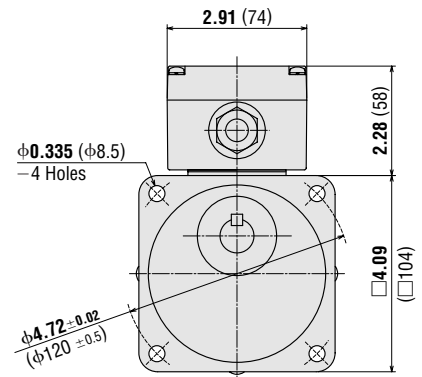
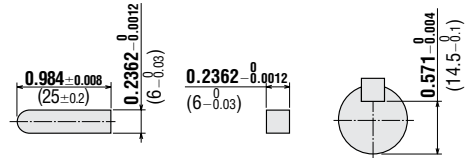
Weight: 20.9 lb. (9.5 kg)

**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 φ 0.32 inch (φ8 mm) ~ φ0.47 inch (φ12 mm).
- **Details of Terminal Box** → Page A-224

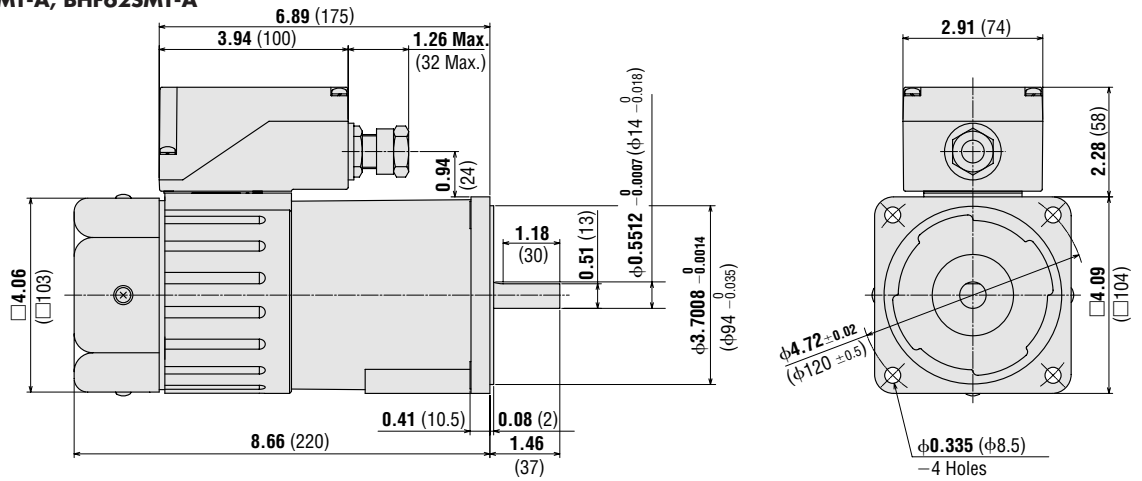
● **Round Shaft Type**

**BHF62AMT-A, BHF62CMT-A, BHF62SMT-A**

Motor Model: BHM62MT-A

Weight: 14.3 lb. (6.5 kg)

DXF A387



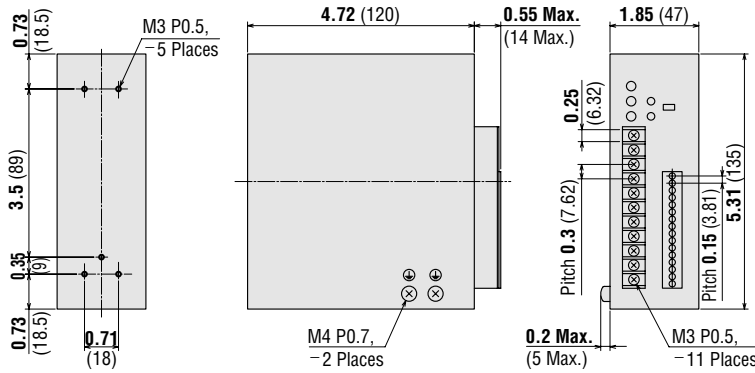
- Use cable (VCTF) with a diameter of  $\phi 0.32$  inch ( $\phi 8$  mm) ~  $\phi 0.47$  inch ( $\phi 12$  mm).
- Details of Terminal Box → Page A-224

● **Inverter**

FSP200-1, FSP200-2, FSP200-3

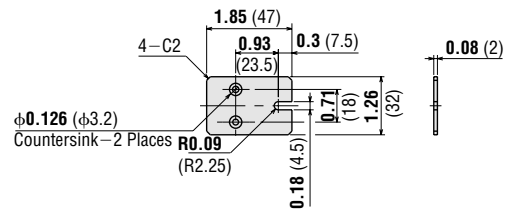
Weight: 1.32 lb. (0.6 kg)

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)

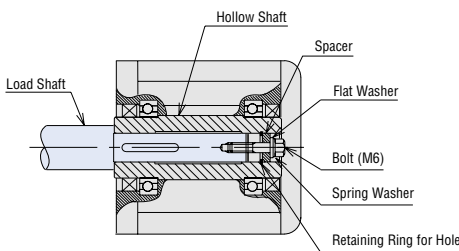
Model	BH6G2-□RH
Inner diameter of hollow shaft H8	$\phi 0.9843 + 0.0013$ ( $\phi 25 + 0.033$ )
Recommended load shaft diameter h7	$\phi 0.9843 - 0.0008$ ( $\phi 25 - 0.021$ )

- Replace the safety cover after installing the load shaft.

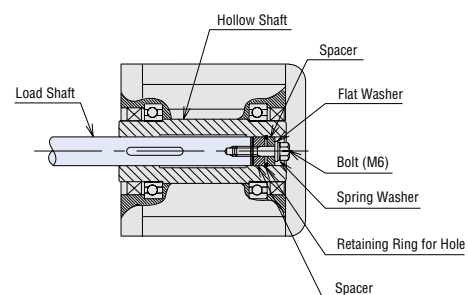
**Note:**

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

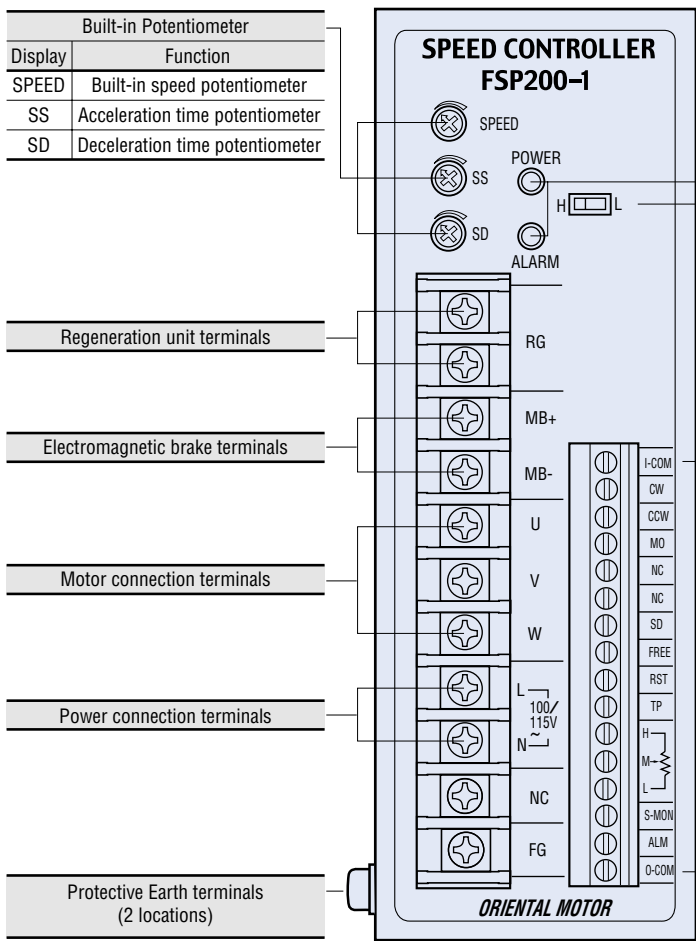
● **Stepped-Down Shaft**



● **Straight Load Shaft**



# Connection and Operation



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

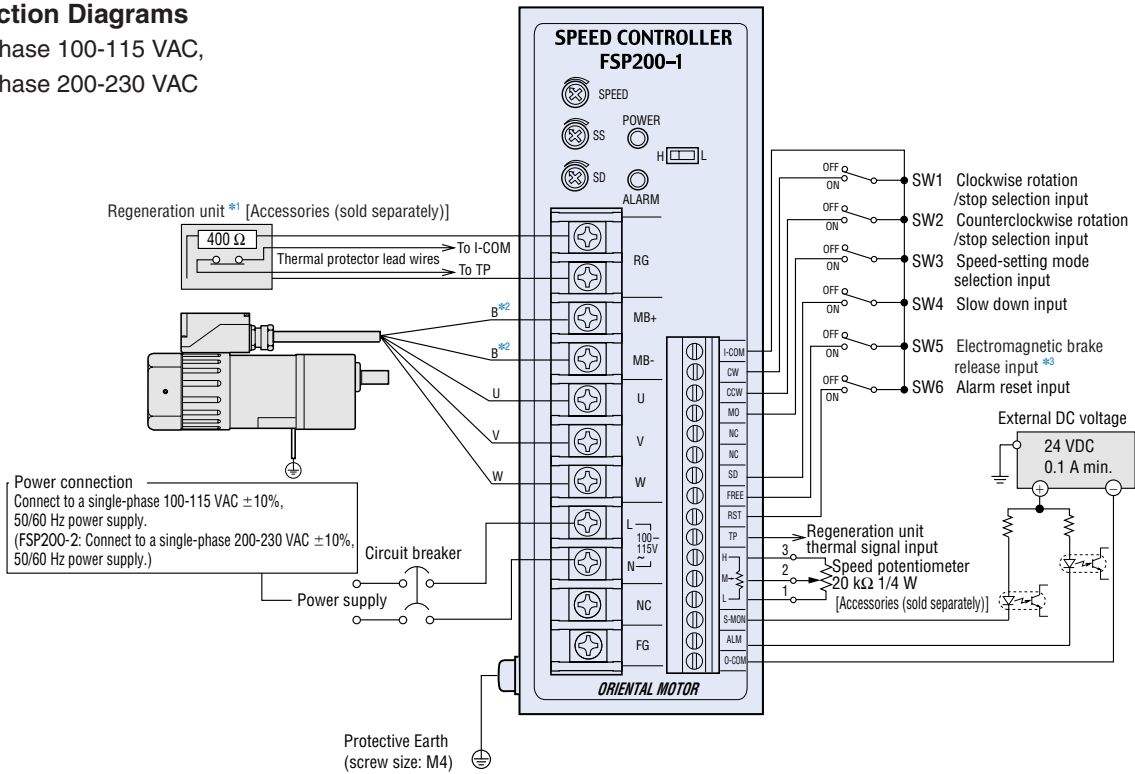
LED Display		
Display	Function	Lighting Condition
POWER	Power indicator	Turns on (green) while power is being supplied.
ALARM	Alarm indicator	Turns on (red) or blinks when an alarm is triggered.

**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).

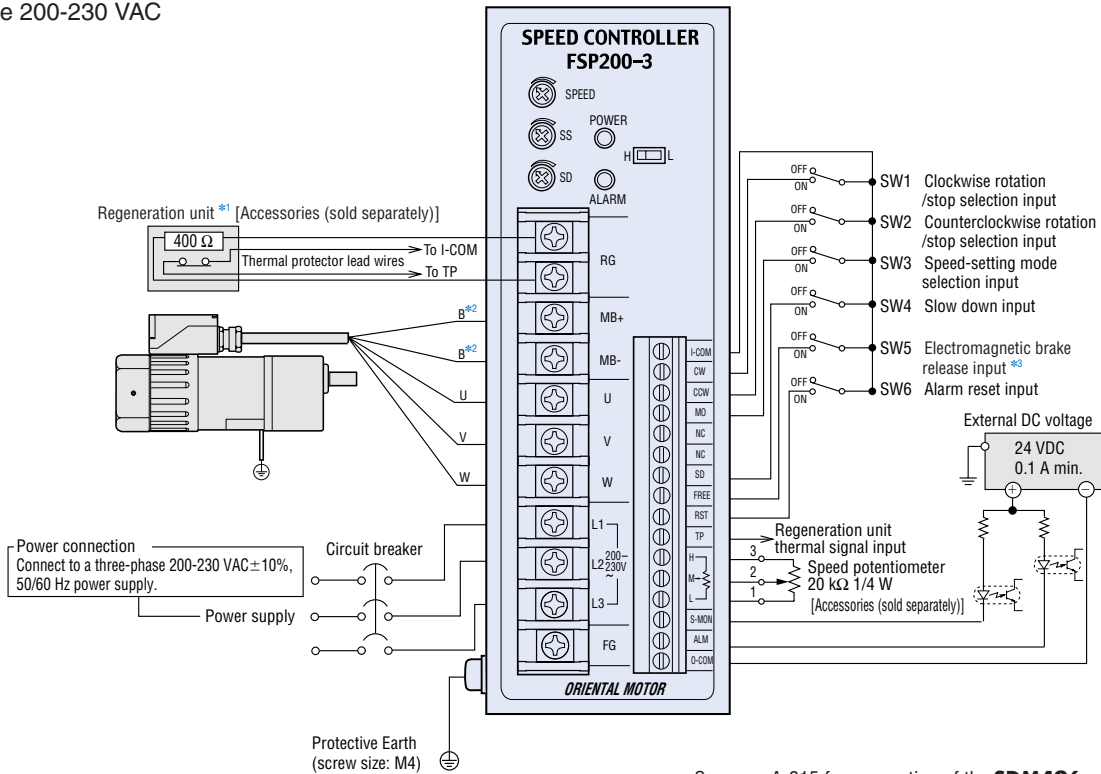
Input/Output Signal Terminals Block		
Display	Signal	Function and Operation
IN-COM	Ground terminal for input signals	Ground terminal for input signals.
CW	Clockwise rotation input	Clockwise rotation/stop selection input
CCW	Counterclockwise rotation input	Counterclockwise rotation/stop selection input
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.

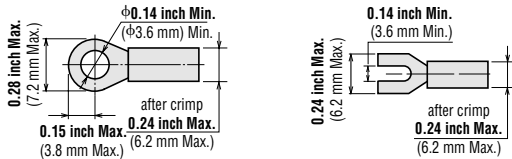
### ● Connecting the Motor

Appropriate lead wires

AWG 18 min.

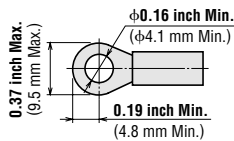
Terminals (Use a crimp terminal for the electromagnetic brake type.)

Round Terminal with Insulation U-Shape Terminal with Insulation



### Protective Earth

Round Terminal with Insulation



### ● Connecting the Inverter

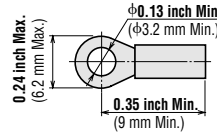
Power input terminals, motor connection terminals

Appropriate lead wires

AWG 18 min.

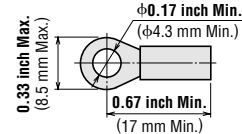
Terminals

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

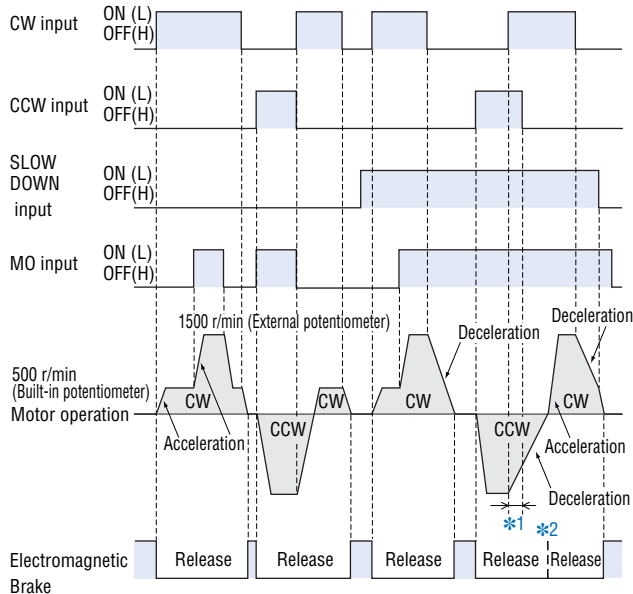
AI 0.34-6

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.)

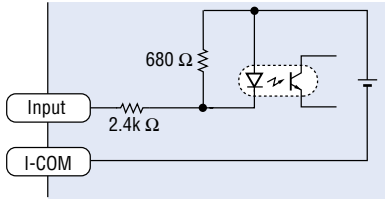
#### Note:

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

● **Input Signal Circuit**

◆ **Input Circuit**

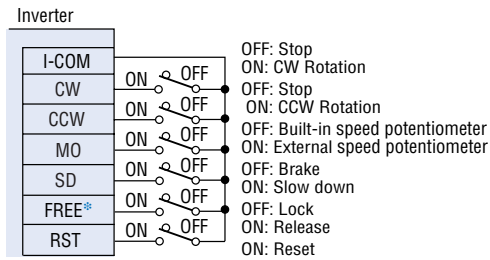
Common to CW, CCW and SLOW DOWN, FREE\*, RST inputs.



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

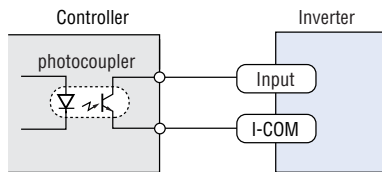
◆ **Connection Example for Input Signals**

• **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.

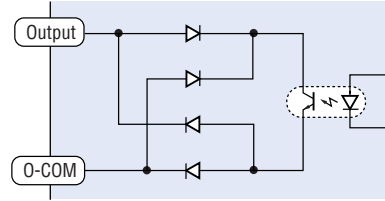
• **Electronic Input Control**



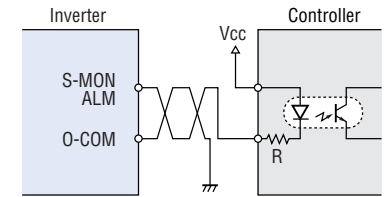
● **Output Signal Circuit**

◆ **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.



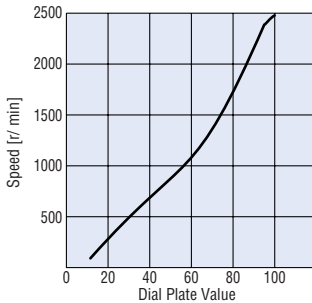
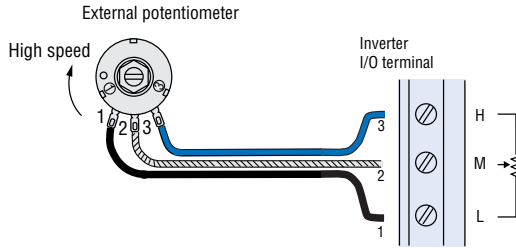
● Method of Speed Setting

◆ 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

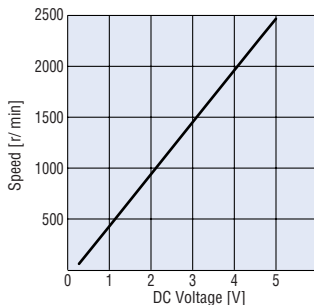
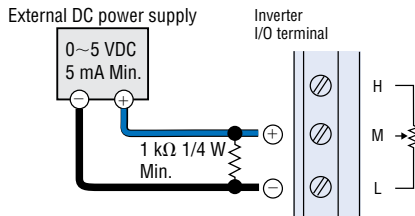
The external speed potentiometer can be used when the MO (speed-setting mode selection input) is set to ON ("L" level). When the optional external speed potentiometer is used, connect it as illustrated below. Turning the external speed potentiometer clockwise sets a faster speed.



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	BHM62T-G2	BH6G2-□RH	FSP200-2
BHF62CT-□RA		BH6G2-□RA	
BHF62CT-□		BH6G2-□	
BHF62ST-□RH	BHM62T-G2	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	BHM62MT-G2	BH6G2-□RH	FSP200-2
BHF62CMT-□RA		BH6G2-□RA	
BHF62CMT-□		BH6G2-□	
BHF62SMT-□RH	BHM62MT-A	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

## AC Motor Speed Controller ES01/ES02

**ES01** and **ES02** are Oriental Motor's newest speed controllers designed for ease of its functions and operations. A wide range of speed control motors is available for use with these new controllers.

### ■ Features

#### ● Multi-Functions

- Speed Control Range  
90~1400 r/min (50 Hz) 90~1600 r/min (60 Hz)
- Speed Control Function  
Acceleration/deceleration function that enables smooth start and stop

#### ● Speed Control Function

The **ES01/ES02** enables users to regulate the output speed of motors ranging from 6W to 90W.

#### ● IP20-Compliant

The IP20-compliant construction prevents the operator from touching the terminal block, thereby ensuring a high degree of safety.

### ■ Speed Controller Product Line

#### ● Speed Controller

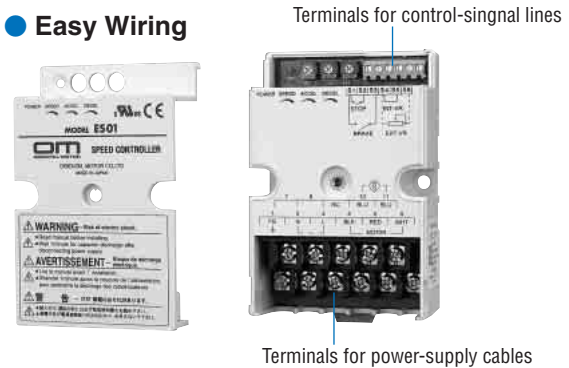
Model	Voltage
<b>ES01</b>	Single-Phase 100-115 VAC
<b>ES02</b>	Single-Phase 200-230 VAC



#### ● Compatible with Voltages in All Major Countries

The design conforms to typical global safety standards. The CE Marking is used in accordance with the EMC directives and low voltage directives.

#### ● Easy Wiring



For easy wiring the new design provides separate connector terminals for power-supply cables and control-signal lines.

### ■ Safety Standards and CE Marking

#### ● Speed Controllers

Standards	Certification Body	Standards File No.	CE Marking
UL508 CSA C.22.2 No.14	UL	E91291	Low Voltage Directive EMC Directive
EN50178 EN60950 EN50081-2 EN61000-6-2	Conform to EN Standards		

● **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 incorporated in the equipment.



### ■ Specifications of Speed Controller

Model Name	ES01	ES02
Voltage	Single-Phase 100-115 VAC ±10%	Single-Phase 200-230 VAC ±10%
Frequency	50/60 Hz	
Operable Motor Output Power	World <b>K</b> Series: 6 W, 15 W, 25 W, 40 W, 60 W <b>V</b> Series: 6 W, 15 W, 25 W, 40 W, 60 W, 90 W	
Speed Range	50 Hz: 90~1400 r/min, 60 Hz: 90~1600 r/min	
Function	Speed Control, Instantaneous Stop, Acceleration/Deceleration	
Insulation Resistance	100 MΩ or more when 500 VDC is applied between the PE terminal and the power supply terminals, all the pins and the frame.	
Dielectric Strength	Sufficient to withstand 3.0 kV at 50 Hz, 60 Hz applied between all the pins and the frame for 1 minute. Sufficient to withstand 1.5 kV at 50 Hz, 60 Hz applied between the PE terminals and the power supply terminals for 1 min.	
Ambient Temperature Range	32°F~104°F (0°C~+40°C) (nonfreezing)	
Ambient Humidity	85% maximum (noncondensing)	
Degree of Protection	IP 20 (with cover)	

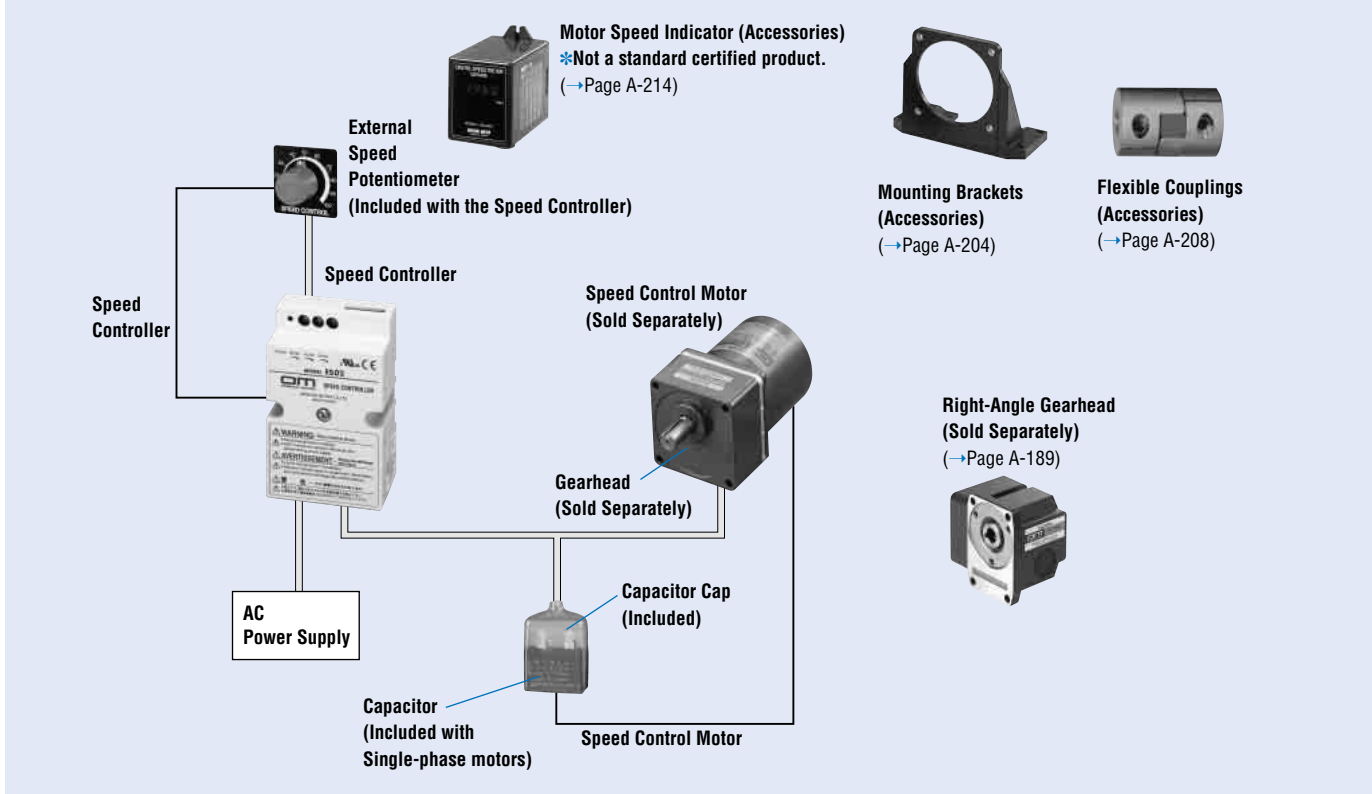
#### Notes:

- These models cannot be used for applications requiring the control of more than one motor/controller set by the same external potentiometer.
- When the motor is commanded to stop immediately, the large braking current will flow to the motor. See page B-115 for the braking current.

### ■ Dimensions → Page B-103

### ■ Connection and Operation → Page B-111

## System Configuration



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

### Applicable Speed Control Motor (Sold Separately)

#### World K Series Speed Control Motors 6 W~60 W

A tachometer generator built into our standard AC induction and reversible motors allows a wide range of speed control. This simple structure delivers high reliability at a low cost, making this system a popular solution for a wide range of applications.

#### V Series Speed Control Motors 6 W~90 W

The V series speed control motors provide quiet operation, long life and high strength performance, making them the perfect solution for many applications. The motor and gearhead come pre-assembled to make installation easy.

### Safety Standards and CE Marking

#### Speed Control Motors

Standards	Certification Body	Standards File No.	CE Marking
UL1004 UL2111 CSA C.22.2 No.100 CSA C.22.2 No.77	UL	E64199 (6 W) E64197 (15 W~90 W)	Low Voltage Directive
EN60950 EN60034-1 EN60034-5 IEC60034-11*		Conform to EN Standards	

\* 15 W~40 W Type

● Details of Safety Standards →Page G-2

● When the motor is approved under various standards, the model name on the nameplate is the approved model name.

List of Safety Standard Approved Products →Page G-17, G-18

## Product Number Code

### World K Series Speed Control Motors

**4 I K 25 R GN - AW U**

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①	Motor Frame Size
②	<b>I</b> : Induction Motor <b>R</b> : Reversible Motor
③	<b>K</b> Series
④	Output Power (W) Example <b>25</b> : 25 W
⑤	Speed Control Motor
⑥	Motor Shaft Type <b>GN</b> : Pinion Shaft for use with <b>GN</b> -type gearhead <b>GU</b> : Pinion Shaft for use with <b>GU</b> -type gearhead <b>A</b> : Round Shaft
⑦	Voltage <b>AW</b> : Single-Phase 110-115 VAC <b>CW</b> : Single-Phase 220-230 VAC
⑧	With Capacitor for <b>U</b> : Single-Phase 110-115 VAC <b>E</b> : Single-Phase 220-230 VAC

### For World K Series Gearheads

**4 GN 50 KA**

① ② ③ ④

①	Gearhead Frame Size
②	Gearhead Type <b>GN</b> : For use with <b>GN</b> -type pinion shaft motor <b>GU</b> : For use with <b>GU</b> -type pinion shaft motor
③	Gear Ratio Example <b>50</b> : Gear Ratio of 50:1
④	Type of Bearings and Shaft Type <b>KA</b> : Ball Bearing Type (inch-size) <b>RAA</b> : Right Angle Solid Shaft Type (inch size) <b>RH</b> : Right Angle Hollow Shaft Type

## Product Line

### World K Series Speed Control Motors

#### Single-Phase 110/115 VAC

Output Power HP W	Induction Motors		Reversible Motors		Speed Controller
	Pinion Shaft Type	Round Shaft Type	Pinion Shaft Type	Round Shaft Type	
1/125 6	<b>2IK6RGN-AWU</b>	<b>2IK6RA-AWU</b>	<b>2RK6RGN-AWU</b>	<b>2RK6RA-AWU</b>	<b>ES01</b>
1/50 15	<b>3IK15RGN-AWU</b>	<b>3IK15RA-AWU</b>	<b>3RK15RGN-AWU</b>	<b>3RK15RA-AWU</b>	
1/30 25	<b>4IK25RGN-AWU</b>	<b>4IK25RA-AWU</b>	<b>4RK25RGN-AWU</b>	<b>4RK25RA-AWU</b>	
1/19 40	<b>5IK40RGN-AWU</b>	<b>5IK40RA-AWU</b>	<b>5RK40RGN-AWU</b>	<b>5RK40RA-AWU</b>	
1/12 60	<b>5IK60RGU-AWU</b>	<b>5IK60RA-AWU</b>	<b>5RK60RGU-AWU</b>	<b>5RK60RA-AWU</b>	

#### Single-Phase 220/230 VAC

Output Power HP W	Induction Motors		Reversible Motors		Speed Controller
	Pinion Shaft Type	Round Shaft Type	Pinion Shaft Type	Round Shaft Type	
1/125 6	<b>2IK6RGN-CWE</b>	<b>2IK6RA-CWE</b>	<b>2RK6RGN-CWE</b>	<b>2RK6RA-CWE</b>	<b>ES02</b>
1/50 15	<b>3IK15RGN-CWE</b>	<b>3IK15RA-CWE</b>	<b>3RK15RGN-CWE</b>	<b>3RK15RA-CWE</b>	
1/30 25	<b>4IK25RGN-CWE</b>	<b>4IK25RA-CWE</b>	<b>4RK25RGN-CWE</b>	<b>4RK25RA-CWE</b>	
1/19 40	<b>5IK40RGN-CWE</b>	<b>5IK40RA-CWE</b>	<b>5RK40RGN-CWE</b>	<b>5RK40RA-CWE</b>	
1/12 60	<b>5IK60RGU-CWE</b>	<b>5IK60RA-CWE</b>	<b>5RK60RGU-CWE</b>	<b>5RK60RA-CWE</b>	

### Gearheads for World K Series (Sold Separately)

#### Parallel

Gearhead Model	Gear Ratio
<b>2GN□KA</b>	<b>3~180</b>
<b>2GN10XK</b> (Decimal Gearhead)	
<b>3GN□KA</b>	<b>3~180</b>
<b>3GN10XK</b> (Decimal Gearhead)	
<b>4GN□KA</b>	<b>3~180</b>
<b>4GN10XK</b> (Decimal Gearhead)	
<b>5GN□KA</b>	<b>3~180</b>
<b>5GN10XK</b> (Decimal Gearhead)	
<b>5GU□KA</b>	<b>3~180</b>
<b>5GU10XKB</b> (Decimal Gearhead)	

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

#### Right-Angle

Type	Gearhead Model	Gear Ratio
Hollow Shaft	<b>4GN□RH</b>	<b>3.6~180</b>
	<b>5GN□RH</b>	
	<b>5GU□RH</b>	
Solid Shaft	<b>4GN□RAA</b>	<b>3.6~180</b>
	<b>5GN□RAA</b>	<b>3~180</b>
	<b>5GU□RAA</b>	

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

## Product Number Code

### V Series Speed Control Motors

**V S I 4 25 A - 30 U**

①	V Series
②	Speed Control Motor
③	I: Induction Motor R: Reversible Motor
④	Motor Frame Size
⑤	Output Power (W) Example <b>25</b> : 25 W
⑥	Voltage A: Single-Phase 100/110/115 VAC C: Single-Phase 200/220/230 VAC
⑦	Gear Ratio Example <b>30</b> : Gear ratio of 30:1
⑧	With Capacitor for U: Single-Phase 110-115 VAC E: Single-Phase 220-230 VAC

## Product Line

### V Series Speed Control Motors (Combination Type)

#### Single-Phase 110/115 VAC

Output Power		Induction Motors	Reversible Motors	Speed Controller
HP	W			
1/125	6	<b>VSI206A-□U</b>	<b>VSR206A-□U</b>	<b>ES01</b>
1/50	15	<b>VSI315A-□U</b>	<b>VSR315A-□U</b>	
1/30	25	<b>VSI425A-□U</b>	<b>VSR425A-□U</b>	
1/19	40	<b>VSI540A-□U</b>	<b>VSR540A-□U</b>	
1/12	60	<b>VSI560A-□U</b>	<b>VSR560A-□U</b>	
1/8	90	<b>VSI590A-□U</b>	<b>VSR590A-□U</b>	

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

#### Single-Phase 220/230 VAC

Output Power		Induction Motors	Reversible Motors	Speed Controller
HP	W			
1/125	6	<b>VSI206C-□E</b>	<b>VSR206C-□E</b>	<b>ES02</b>
1/50	15	<b>VSI315C-□E</b>	<b>VSR315C-□E</b>	
1/30	25	<b>VSI425C-□E</b>	<b>VSR425C-□E</b>	
1/19	40	<b>VSI540C-□E</b>	<b>VSR540C-□E</b>	
1/12	60	<b>VSI560C-□E</b>	<b>VSR560C-□E</b>	
1/8	90	<b>VSI590C-□E</b>	<b>VSR590C-□E</b>	

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

## ■ Specifications of Applicable Motors

### ● World K Series Induction Motors – Continuous Rating

#### ◆ Single-Phase 110/115 VAC Applicable Speed Controller: ES01



Model		Maximum Output Power		Voltage	Frequency	Speed Range*	Permissible Torque				Starting Torque		Current	Power Consumption	Capacitor
Pinion Shaft Type	Round Shaft Type	HP	W	VAC	Hz	r/min	1200 r/min		90 r/min		oz-in	mN·m	A	W	μF
Ⓟ <b>2IK6RGN-AWU</b>	<b>2IK6RA-AWU</b>	1/125	6	Single-Phase 110 Single-Phase 115	60	90~1600	7.1	50	4.9	35	5.6	40	0.28	29	2.5
Ⓟ <b>3IK15RGN-AWU</b>	<b>3IK15RA-AWU</b>	1/50	15	Single-Phase 110 Single-Phase 115	60	90~1600	17.7	125	5.9	42	9.2	65	0.48	46	4.5
Ⓟ <b>4IK25RGN-AWU</b>	<b>4IK25RA-AWU</b>	1/30	25	Single-Phase 110 Single-Phase 115	60	90~1600	26	185	7.1	50	17.0	120	0.75	58 69	6.5
Ⓟ <b>5IK40RGN-AWU</b>	<b>5IK40RA-AWU</b>	1/19	40	Single-Phase 110 Single-Phase 115	60	90~1600	31	225	9.5	67	25 28	180 200	1.1	107	9
Ⓟ <b>5IK60RGU-AWU</b>	<b>5IK60RA-AWU</b>	1/12	60	Single-Phase 110 Single-Phase 115	60	90~1600	69	490	29	210	45	320	2	180	18

Ⓟ: These motors are impedance protected.

Ⓟ: These motors contain a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

\* The speed range is under no load conditions.

#### ◆ Single-Phase 220/230 VAC Applicable Speed Controller: ES02



Model		Maximum Output Power		Voltage	Frequency	Speed Range*	Permissible Torque				Starting Torque		Current	Power Consumption	Capacitor		
Pinion Shaft Type	Round Shaft Type	HP	W	VAC	Hz	r/min	1200 r/min		90 r/min		oz-in	mN·m	A	W	μF		
Ⓟ <b>2IK6RGN-CWE</b>	<b>2IK6RA-CWE</b>	1/125	6	Single-Phase 220	50	90~1400	5.9	42	4.5	32	4.9	35	0.14	28	0.6		
				Single-Phase 230	60	90~1600	7.1	50			5.6	40				29	
				Single-Phase 220	50	90~1400	6.5	46			7.1	50				5.6	40
Ⓟ <b>3IK15RGN-CWE</b>	<b>3IK15RA-CWE</b>	1/50	15	Single-Phase 220	50	90~1400	15.6	110	5.3	38	9.2	65	0.23	43	1		
				Single-Phase 230	60	90~1600	17.7	125			10.6	75		46			
				Single-Phase 220	50	90~1400	16.3	115			9.2	65		44			
				Single-Phase 230	60	90~1600	17.7	125			9.2	65		47			
Ⓟ <b>4IK25RGN-CWE</b>	<b>4IK25RA-CWE</b>	1/30	25	Single-Phase 220	50	90~1400	26	190	7.1	50	15.6	110	0.34	63	1.5		
				Single-Phase 230	60	90~1600	28	200			17.0	120		67			
				Single-Phase 220	50	90~1400	28	200			17.0	120		63			
				Single-Phase 230	60	90~1600	25	180			17.0	120		69			
Ⓟ <b>5IK40RGN-CWE</b>	<b>5IK40RA-CWE</b>	1/19	40	Single-Phase 220	50	90~1400	42	300	10.6	75	26	190	0.55	96	2.3		
				Single-Phase 230	60	90~1600	39	280			26	190		104			
				Single-Phase 220	50	90~1400	45	320			9.9	70		28		200	99
				Single-Phase 230	60	90~1600	36	260			9.9	70		28		200	105
Ⓟ <b>5IK60RGU-CWE</b>	<b>5IK60RA-CWE</b>	1/12	60	Single-Phase 220	50	90~1400	65	460	28	200	45	320	0.84	155	4		
				Single-Phase 230	60	90~1600	69	490			30	215		0.89		175	
				Single-Phase 220	50	90~1400	69	490			24	170		0.85		158	
				Single-Phase 230	60	90~1600	69	490			25	180		0.89		172	

Ⓟ: These motors are impedance protected.

Ⓟ: These motors contain a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

\* The speed range is under no load conditions.

● World K Series Reversible Motors – 30-Minute Rating

◆ Single-Phase 110/115 VAC Applicable Speed Controller: ES01



Model		Maximum Output Power		Voltage	Frequency	Speed Range*	Permissible Torque		Starting Torque		Current	Power Consumption	Capacitor		
Pinion Shaft Type	Round Shaft Type	HP	W	VAC	Hz	r/min	1200 r/min	90 r/min	oz-in	mN-m	A	W	μF		
ⓈP 2RK6RGN-AWU	2RK6RA-AWU	1/125	6	Single-Phase 110	60	90~1600	7.1	50	7.1	50	6.3	45	0.32	32	3.5
				Single-Phase 115											
ⓈP 3RK15RGN-AWU	3RK15RA-AWU	1/50	15	Single-Phase 110	60	90~1600	17.7	125	12	85	14.2	100	0.6	59	6
				Single-Phase 115											
ⓈP 4RK25RGN-AWU	4RK25RA-AWU	1/30	25	Single-Phase 110	60	90~1600	29	205	15.6	110	19.8	140	0.95	90	8
				Single-Phase 115											
ⓈP 5RK40RGN-AWU	5RK40RA-AWU	1/19	40	Single-Phase 110	60	90~1600	45	320	22	155	34	240	1.4	138	12
				Single-Phase 115							36	260			
ⓈP 5RK60RGU-AWU	5RK60RA-AWU	1/12	60	Single-Phase 110	60	90~1600	69	490	38	270	53	380	2.2	201	20
				Single-Phase 115											

ⓈP: These motors are impedance protected.

ⓈP: These motors contain a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

● The permissible torque and the starting torque of reversible motors are shown in terms without the brake applied. Please keep in mind that you should select a suitable motor with enough torque, when designing the equipment.

\* The speed range is under no load conditions.

◆ Single-Phase 220/230 VAC Applicable Speed Controller: ES02



Model		Maximum Output Power		Voltage	Frequency	Speed Range*	Permissible Torque		Starting Torque		Current	Power Consumption	Capacitor												
Pinion Shaft Type	Round Shaft Type	HP	W	VAC	Hz	r/min	1200 r/min	90 r/min	oz-in	mN-m	A	W	μF												
ⓈP 2RK6RGN-CWE	2RK6RA-CWE	1/125	6	Single-Phase 220	50	90~1400	6.3	45	7.1	50	0.15	33	0.8												
					60	90~1600																			
					Single-Phase 230	50	90~1400	7.1	50	0.16															
						60	90~1600																		
						50	90~1400	19.8	140	0.44	88			2											
						60	90~1600																		
ⓈP 3RK15RGN-CWE	3RK15RA-CWE	1/50	15	Single-Phase 220	50	90~1400	17.7	125	12.3	87		14.2	100		0.29	59	1.5								
					60	90~1600																			
					Single-Phase 230	50	90~1400	29	205	16.3		115	19.8		140			0.72	133	3.5					
						60	90~1600																		
						ⓈP 4RK25RGN-CWE	4RK25RA-CWE	1/30	25	Single-Phase 220	50	90~1400	45	320	24			170			38	270	0.72	133	3.5
											60	90~1600													
Single-Phase 230	50	90~1400	24	170	36						260	1.0	185												
	60	90~1600																							
	ⓈP 5RK40RGN-CWE	5RK40RA-CWE	1/19	40	Single-Phase 220						50	90~1400	69	490	39	280	59	420	1.0	188	5				
											60	90~1600													
Single-Phase 230						50	90~1400	65	460	1.0	188														
						60	90~1600																		
						ⓈP 5RK60RGU-CWE	5RK60RA-CWE	1/12	60	Single-Phase 220	50	90~1400	69	490	39	280	53	380	1.1			202			
											60	90~1600													
Single-Phase 230	50	90~1400	65	460	1.0						188														
	60	90~1600																							

ⓈP: These motors are impedance protected.

ⓈP: These motors contain a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

● The permissible torque and the starting torque of reversible motors are shown in terms without the brake applied. Please keep in mind that you should select a suitable motor with enough torque, when designing the equipment.

\* The speed range is under no load conditions.

● **V Series Induction Motors – Continuous Rating**

◆ **Single-Phase 110/115 VAC Applicable Speed Controller: ES01**



Model	Maximum Output Power		Voltage	Frequency	Speed Range*	Permissible Torque				Starting Torque		Current	Power Consumption	Capacitor	
	HP	W				1200 r/min	90 r/min	oz-in	mN-m	oz-in	mN-m				oz-in
Combination Type		HP	W	VAC	Hz	r/min	oz-in	mN-m	oz-in	mN-m	oz-in	mN-m	A	W	μF
ⓈP	<b>VSI206A-□U</b>	1/125	6	Single-Phase 110 Single-Phase 115	60	90~1600	7.1	50	4.9	35	5.6	40	0.28	29	2.5
ⓈP	<b>VSI315A-□U</b>	1/50	15	Single-Phase 110 Single-Phase 115	60	90~1600	17.7	125	5.9	42	9.2	65	0.48	46	4.5
ⓈP	<b>VSI425A-□U</b>	1/30	25	Single-Phase 110 Single-Phase 115	60	90~1600	26	185	7.1	50	17	120	0.75	58 69	6.5
ⓈP	<b>VSI540A-□U</b>	1/19	40	Single-Phase 110 Single-Phase 115	60	90~1600	31	225	9.5	67	25 2.4	180 200	1.1	107	9
ⓈP	<b>VSI560A-□U</b>	1/12	60	Single-Phase 110 Single-Phase 115	60	90~1600	69	490	29	210	45	320	2	180	18
ⓈP	<b>VSI590A-□U</b>	1/8	90	Single-Phase 110 Single-Phase 115	60	90~1600	103	730	29	210	58 63	410 450	2.6	240	20

ⓈP: These motors are impedance protected.

ⓈP: These motors contain a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

● Enter the gear ratio in the box (□) within the model name. The values for each item is for the motor only.

\* The speed range is under no load conditions.

◆ **Single-Phase 220/230 VAC Applicable Speed Controller: ES02**



Model	Maximum Output Power		Voltage	Frequency	Speed Range*	Permissible Torque				Starting Torque		Current	Power Consumption	Capacitor		
	HP	W				1200 r/min	90 r/min	oz-in	mN-m	oz-in	mN-m				oz-in	mN-m
Combination Type		HP	W	VAC	Hz	r/min	oz-in	mN-m	oz-in	mN-m	oz-in	mN-m	A	W	μF	
ⓈP	<b>VSI206C-□E</b>	1/125	6	Single-Phase 220	50	90~1400	5.9	42	4.5	32	4.9	35	0.14	28	0.6	
					60	90~1600	7.1	50								
					Single-Phase 230	50	90~1400	6.5								46
						60	90~1600	7.1								50
ⓈP	<b>VSI315C-□E</b>	1/50	15	Single-Phase 220	50	90~1400	15.6	110	5.3	38	9.2	65	0.23	43 46 44	1	
					60	90~1600	17.7	125								
					Single-Phase 230	50	90~1400	16.3								115
						60	90~1600	17.7								125
ⓈP	<b>VSI425C-□E</b>	1/30	25	Single-Phase 220	50	90~1400	26	190	7.1	50	15.6	110	0.34	63 67 63	1.5	
					60	90~1600	28	200								
					Single-Phase 230	50	90~1400	28								200
						60	90~1600	25								180
ⓈP	<b>VSI540C-□E</b>	1/19	40	Single-Phase 220	50	90~1400	42	300	10.6	75	26	190	0.55	96 104 99	2.3	
					60	90~1600	39	280								
					Single-Phase 230	50	90~1400	45								320
						60	90~1600	36								260
ⓈP	<b>VSI560C-□E</b>	1/12	60	Single-Phase 220	50	90~1400	65	460	28.4	200	45	320	0.84 0.89 0.85 0.89	155 175 158 172	4	
					60	90~1600	69	490								
					Single-Phase 230	50	90~1400	69								490
						60	90~1600	25								180
ⓈP	<b>VSI590C-□E</b>	1/8	90	Single-Phase 220	50	90~1400	102	720	36	260	63	450	1.2	209 232 211	6	
					60	90~1600	103	730								
					Single-Phase 230	50	90~1400	34								245
						60	90~1600	103								730

ⓈP: These motors are impedance protected.

ⓈP: These motors contain a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

● Enter the gear ratio in the box (□) within the model name. The values for each item is for the motor only.

\* The speed range is under no load conditions.



● V Series Reversible Motors – 30-Minute Rating

◆ Single-Phase 110/115 VAC Applicable Speed Controller: ES01



Model	Maximum Output Power		Voltage	Frequency	Speed Range*	Permissible Torque				Starting Torque		Current	Power Consumption	Capacitor	
	HP	W				1200 r/min	90 r/min	oz-in	mN-m	oz-in	mN-m				
Combination Type		HP	W	VAC	Hz	r/min	oz-in	mN-m	oz-in	mN-m	A	W	μF		
Ⓟ	VSR206A-□U	1/125	6	Single-Phase 110 Single-Phase 115	60	90~1600	7.1	50	7.1	50	6.3	45	0.32	32	3.5
Ⓣ	VSR315A-□U	1/50	15	Single-Phase 110 Single-Phase 115	60	90~1600	17.7	125	12	85	14.2	100	0.6	59	6
Ⓣ	VSR425A-□U	1/30	25	Single-Phase 110 Single-Phase 115	60	90~1600	29	205	15	110	19.8	140	0.95	90	8
Ⓣ	VSR540A-□U	1/19	40	Single-Phase 110 Single-Phase 115	60	90~1600	45	320	22	155	34 36	240 260	1.4	138	12
Ⓣ	VSR560A-□U	1/12	60	Single-Phase 110 Single-Phase 115	60	90~1600	69	490	38	270	53	380	2.2	201	20
Ⓣ	VSR590A-□U	1/8	90	Single-Phase 110 Single-Phase 115	60	90~1600	103	730	45	320	83	590	3	272	30

Ⓟ: These motors are impedance protected.

Ⓣ: These motors contain a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

● Enter the gear ratio in the box (□) within the model name. The values for each item is for the motor only.

● The permissible torque and the starting torque of reversible motors are shown in terms without the brake applied. Please keep in mind that you should select a suitable motor with enough torque, when designing the equipment.

\* The speed range is under no load conditions.

◆ Single-Phase 220/230 VAC Applicable Speed Controller: ES02



Model	Maximum Output Power		Voltage	Frequency	Speed Range*	Permissible Torque				Starting Torque		Current	Power Consumption	Capacitor	
	HP	W				1200 r/min	90 r/min	oz-in	mN-m	oz-in	mN-m				
Combination Type		HP	W	VAC	Hz	r/min	oz-in	mN-m	oz-in	mN-m	A	W	μF		
Ⓟ	VSR206C-□E	1/125	6	Single-Phase 220	50	90~1400	6.3	45	7.1	50	7.1	50	0.15	33	0.8
					60	90~1600	7.1	50			6.3	45			
					Single-Phase 230	50	90~1400	7.1	50	6.3	45	0.16			
						60	90~1600								
Ⓣ	VSR315C-□E	1/50	15	Single-Phase 220	50	90~1400	17.7	125	12.3	87	14.2	100	0.29	59	1.5
					60	90~1600									
					Single-Phase 230	50	90~1400								
						60	90~1600								
Ⓣ	VSR425C-□E	1/30	25	Single-Phase 220	50	90~1400	29	205	16.3	115	19.8	140	0.44	88	2
					60	90~1600					22	155			
					Single-Phase 230	50	90~1400	19.8	140						
						60	90~1600								
Ⓣ	VSR540C-□E	1/19	40	Single-Phase 220	50	90~1400	45	320	25	180	38	270	0.72	133	3.5
					60	90~1600					24	170			
					Single-Phase 230	50	90~1400	24	170	38	270				
						60	90~1600			36	260				
Ⓣ	VSR560C-□E	1/12	60	Single-Phase 220	50	90~1400	69	490	39	280	59	420	1.0	185	5
					60	90~1600					53	380			
					Single-Phase 230	50	90~1400	53	380	460	188				
						60	90~1600			53	380	1.1	202		
Ⓣ	VSR590C-□E	1/8	90	Single-Phase 220	50	90~1400	95	670	51	360	85	600	1.3	240	7
					60	90~1600	103	730			83	590			
					Single-Phase 230	50	90~1400	103	730	85	600	1.3	240		
						60	90~1600			83	590	1.4	262		

Ⓟ: These motors are impedance protected.

Ⓣ: These motors contain a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

● Enter the gear ratio in the box (□) within the model name. The values for each item is for the motor only.

● The permissible torque and the starting torque of reversible motors are shown in terms without the brake applied. Please keep in mind that you should select a suitable motor with enough torque, when designing the equipment.

\* The speed range is under no load conditions.

## General Specifications of Speed Control Motors

Item	Specifications
Insulation Resistance	100 MΩ or more when 500 VDC is applied between the windings and the frame.
Dielectric Strength	Sufficient to withstand 1.5 kV at 50 Hz and 60 Hz applied between the windings and the frame for 1 minute.
Temperature Rise	144°F (80°C) or less measured by the resistance change method after rated motor operation with a gearhead or equivalent heat radiation plate connected.*
Insulation Class	Class B [266°F (130°C)]
Overheating Protection Device	6 W type is impedance protected. The other types contain a built-in thermal protector (automatic return type). Open: 266°F±9°F (130°C±5°C) Close: 179.6°F±27°F (82°C±15°C)
Ambient Temperature Range	14°F~104°F (-10°C~+40°C) (nonfreezing)
Ambient Humidity	85% maximum (noncondensing)
Degree of Protection	IP20 (World K Series 60W: IP40)

\* Heat radiation plate (Material: Aluminum)

Type (output)	Size inch (mm)	Thickness inch (mm)
6 W Type	4.53×4.53 (115×115)	0.20 (5)
15 W Type	4.92×4.92 (125×125)	
25 W Type	5.31×5.31 (135×135)	
40 W Type	6.50×6.50 (165×165)	
60 W Type	7.87×7.87 (200×200)	

## Speed Range when Gearhead is Attached

### World K Series

Gear Ratio		3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
High Speed	60Hz	533	444	320	266	213	177	128	106	88	64	53	44	32	26	21	17	16	13	10	8.8
	50Hz	466	388	280	233	186	155	112	93	77	56	46	38	28	23	18	15	14	11	9	7
Low Speed		30	25	18	15	12	10	7.2	6	5	3.6	3	2.5	1.8	1.5	1.2	1	0.9	0.75	0.6	0.5

Unit=r/min

### V Series

Gear Ratio		5	6	9	15	18	30	36	60	90	120	180	300	360
High Speed	60Hz	320	266	177	106	88	53	44	26	17	13	8.8	5.3	4.4
	50Hz	280	233	155	93	77	46	38	23	15	11	7	4	3
Low Speed		18	15	10	6	5	3	2.5	1.5	1	0.75	0.5	0.3	0.25

Unit=r/min

\* The speed range is under no load conditions.

## Permissible Torque when a Gearhead is Attached

- Decimal gearhead is not available for V Series.
- 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.

The permissible torque with decimal gearheads are as follows.

**2GN□KA/2GN10XK** 26 lb-in/3 N·m      **3GN□KA/3GN10XK** 44 lb-in/5 N·m  
**4GN□KA/4GN10XK** 70 lb-in/8 N·m (Gear Ratio 25~36)    53 lb-in/6 N·m  
**5GN□KA/5GN10XK** 88 lb-in/10 N·m      **5GU□KA/5GU10XKB** 177 lb-in/20 N·m

### World K Series Induction Motors – Continuous Rating

#### Single-Phase 115 VAC Applicable Speed Controller: ES01

Unit=Upper Values: lb-in/Lower Values: N·m

Model Motor/Gearhead	Gear Ratio Speed	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
<b>2IK6RGN-AWU</b> <b>/2GN□KA</b>	1200 r/min	1.06 0.12	1.32 0.15	1.77 0.2	2.1 0.24	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.4 0.73	8.0 0.91	9.7 1.1	11.5 1.3	15.0 1.7	17.7 2	22 2.5	26 3	26 3	26 3	26 3	26 3
	90 r/min	0.75 0.085	0.88 0.1	1.23 0.14	1.50 0.17	1.85 0.21	2.3 0.26	3.0 0.35	3.8 0.43	4.5 0.51	5.6 0.64	6.8 0.77	8.1 0.92	10.6 1.2	12.3 1.4	15.0 1.7	18.5 2.1	20 2.3	24 2.8	26 3	26 3
<b>3IK15RGN-AWU</b> <b>/3GN□KA</b>	1200 r/min	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.7 0.76	8.0 0.91	11.5 1.3	13.2 1.5	15.9 1.8	20 2.3	23 2.7	29 3.3	36 4.1	44 5	44 5	44 5	44 5	44 5	44 5	44 5
	90 r/min	0.88 0.1	1.06 0.12	1.50 0.17	1.77 0.2	2.3 0.26	2.7 0.31	3.8 0.43	4.5 0.51	5.3 0.61	6.8 0.77	8.1 0.92	9.7 1.1	12.3 1.4	15.0 1.7	18.5 2.1	22 2.5	24 2.8	29 3.3	37 4.2	44 5
<b>4IK25RGN-AWU</b> <b>/4GN□KA</b>	1200 r/min	3.9 0.45	4.7 0.54	6.6 0.75	7.9 0.9	9.7 1.1	11.5 1.3	16.8 1.9	19.4 2.2	23 2.7	30 3.4	36 4.1	43 4.9	53 6.1	64 7.3	70 8	70 8	70 8	70 8	70 8	70 8
	90 r/min	1.06 0.12	1.32 0.15	1.77 0.2	2.1 0.24	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.4 0.73	8.0 0.91	9.7 1.1	11.5 1.3	15.0 1.7	17.7 2	22 2.5	26 3	29 3.3	35 4	44 5	52 5.9
<b>5IK40RGN-AWU</b> <b>/5GN□KA</b>	1200 r/min	4.8 0.55	5.8 0.66	8.0 0.91	9.7 1.1	12.3 1.4	14.1 1.6	20 2.3	23 2.7	29 3.3	36 4.1	43 4.9	52 5.9	65 7.4	78 8.9	88 10	88 10	88 10	88 10	88 10	88 10
	90 r/min	1.41 0.16	1.77 0.2	2.3 0.27	2.9 0.33	3.6 0.41	4.3 0.49	6.0 0.68	7.1 0.81	8.6 0.98	10.6 1.2	13.2 1.5	15.9 1.8	19.4 2.2	23 2.7	29 3.3	35 4	38 4.4	46 5.3	58 6.6	70 8
<b>5IK60RGU-AWU</b> <b>/5GU□KA</b>	1200 r/min	10.6 1.2	12.3 1.4	17.7 2	21 2.4	26 3	31 3.6	39 4.5	47 5.4	56 6.4	71 8.1	85 9.7	102 11.6	143 16.2	171 19.4	177 20	177 20	177 20	177 20	177 20	177 20
	90 r/min	4.5 0.51	5.3 0.61	7.5 0.85	8.8 1	11.5 1.3	13.2 1.5	16.8 1.9	20 2.3	24 2.8	30 3.5	37 4.2	44 5	61 6.9	73 8.3	82 9.3	99 11.2	109 12.4	131 14.9	164 18.6	177 20

◆ Single-Phase 220/230 VAC Applicable Speed Controller: ES02

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

Model Motor/Gearhead		Gear Ratio Speed	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180		
<b>2IK6RGN-CWE /2GN□KA</b>	1200 r/min	230 VAC 50 Hz	0.97 0.11	1.15 0.13	1.68 0.19	1.94 0.22	2.4 0.28	3.0 0.34	4.1 0.47	4.9 0.56	5.9 0.67	7.4 0.84	8.8 1	10.6 1.2	13.2 1.5	15.9 1.8	20 2.3	23 2.7	26 3	26 3	26 3	26 3		
		220 VAC 60 Hz 230 VAC 60 Hz	1.06 0.12	1.32 0.15	1.77 0.2	2.1 0.24	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.4 0.73	8.0 0.91	9.7 1.1	11.5 1.3	15.0 1.7	17.7 2	22 2.5	26 3	26 3	26 3	26 3	26 3	26 3	
	90 r/min	0.69 0.078	0.82 0.093	1.15 0.13	1.41 0.16	1.68 0.19	2.0 0.23	2.8 0.32	3.4 0.39	4.1 0.47	5.1 0.58	6.1 0.7	7.4 0.84	9.7 1.1	11.5 1.3	14.1 1.6	16.8 1.9	18.5 2.1	22 2.5	26 3	26 3	26 3	26 3	
	1200 r/min	230 VAC 50 Hz	2.4 0.28	3.0 0.34	4.1 0.47	4.9 0.56	6.1 0.7	7.4 0.84	10.6 1.2	12.3 1.4	15.0 1.7	18.5 2.1	22 2.5	26 3	33 3.8	40 4.6	44 5	44 5	44 5	44 5	44 5	44 5	44 5	44 5
230 VAC 60 Hz		2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.7 0.76	8.0 0.91	11.5 1.3	13.2 1.5	15.9 1.8	20 2.3	23 2.7	29 3.3	36 4.1	44 5	44 5	44 5	44 5	44 5	44 5	44 5	44 5	44 5	
<b>3IK15RGN-CWE /3GN□KA</b>	1200 r/min	230 VAC 50 Hz	2.4 0.28	3.0 0.34	4.1 0.47	4.9 0.56	6.1 0.7	7.4 0.84	10.6 1.2	12.3 1.4	15.0 1.7	18.5 2.1	22 2.5	26 3	33 3.8	40 4.6	44 5	44 5	44 5	44 5	44 5	44 5	44 5	
		230 VAC 60 Hz	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.7 0.76	8.0 0.91	11.5 1.3	13.2 1.5	15.9 1.8	20 2.3	23 2.7	29 3.3	36 4.1	44 5	44 5	44 5	44 5	44 5	44 5	44 5	44 5	
	90 r/min	0.81 0.092	0.97 0.11	1.32 0.15	1.59 0.18	2.0 0.23	2.4 0.28	3.3 0.38	4.0 0.46	4.8 0.55	6.1 0.69	7.3 0.83	8.8 1	11.5 1.3	13.2 1.5	16.8 1.9	20 2.3	22 2.5	26 3	33 3.8	39 4.5	39 4.5	39 4.5	
	1200 r/min	220 VAC 60 Hz	4.0 0.46	4.8 0.55	6.8 0.77	8.1 0.92	10.6 1.2	12.3 1.4	16.8 1.9	20 2.3	24 2.8	30 3.5	37 4.2	44 5	55 6.3	66 7.5	70 8	70 8	70 8	70 8	70 8	70 8	70 8	70 8
230 VAC 50 Hz		4.3 0.49	5.1 0.58	7.1 0.81	8.5 0.97	10.6 1.2	13.2 1.5	17.7 2	21 2.4	25 2.9	32 3.7	38 4.4	46 5.3	58 6.6	69 7.9	70 8	70 8	70 8	70 8	70 8	70 8	70 8	70 8	
230 VAC 60 Hz		3.8 0.44	4.6 0.52	6.4 0.73	7.6 0.87	9.7 1.1	11.5 1.3	15.9 1.8	19.4 2.2	23 2.6	29 3.3	34 3.9	41 4.7	52 5.9	62 7.1	70 8	70 8	70 8	70 8	70 8	70 8	70 8	70 8	
90 r/min	1.06 0.12	1.32 0.15	1.77 0.2	2.1 0.24	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.4 0.73	8.0 0.91	9.7 1.1	11.5 1.3	15.0 1.7	17.7 2	22 2.5	26 3	29 3.3	35 4	44 5	52 5.9	52 5.9	52 5.9		
<b>5IK40RGN-CWE /5GN□KA</b>	1200 r/min	220 VAC 60 Hz	6.0 0.68	7.2 0.82	9.7 1.1	12.3 1.4	15.0 1.7	17.7 2	24 2.8	30 3.4	36 4.1	45 5.1	53 6.1	65 7.4	81 9.2	88 10	88 10	88 10	88 10	88 10	88 10	88 10	88 10	
		230 VAC 50 Hz	6.9 0.78	8.2 0.93	11.5 1.3	14.1 1.6	16.8 1.9	20 2.3	28 3.2	34 3.9	41 4.7	51 5.8	61 7	74 8.4	88 10	88 10	88 10	88 10	88 10	88 10	88 10	88 10	88 10	
		230 VAC 60 Hz	5.5 0.63	6.7 0.76	9.7 1.1	11.5 1.3	14.1 1.6	16.8 1.9	23 2.6	28 3.2	33 3.8	41 4.7	50 5.7	60 6.8	76 8.6	88 10	88 10	88 10	88 10	88 10	88 10	88 10	88 10	88 10
	90 r/min	220 VAC 60 Hz	1.59 0.18	1.94 0.22	2.6 0.3	3.1 0.36	4.0 0.46	4.8 0.55	6.7 0.76	8.0 0.91	9.7 1.1	12.3 1.4	14.1 1.6	17.7 2	22 2.5	26 3	32 3.7	39 4.5	44 5	52 5.9	65 7.4	78 8.9	78 8.9	78 8.9
		230 VAC 50 Hz	1.50 0.17	1.77 0.2	2.4 0.28	3.0 0.34	3.8 0.43	4.5 0.51	6.2 0.71	7.5 0.85	8.8 1	11.5 1.3	13.2 1.5	15.9 1.8	20 2.3	24 2.8	30 3.5	37 4.2	40 4.6	48 5.5	61 6.9	73 8.3	73 8.3	73 8.3
		230 VAC 60 Hz	1.59 0.18	1.94 0.22	2.6 0.3	3.1 0.36	4.0 0.46	4.8 0.55	6.7 0.76	8.0 0.91	9.7 1.1	12.3 1.4	14.1 1.6	17.7 2	22 2.5	26 3	32 3.7	39 4.5	44 5	52 5.9	65 7.4	78 8.9	78 8.9	78 8.9
1200 r/min	230 VAC 50 Hz	10.6 1.2	12.3 1.4	17.7 2	21 2.4	26 3	31 3.6	39 4.5	47 5.4	56 6.4	71 8.1	85 9.7	102 11.6	143 16.2	171 19.4	177 20	177 20	177 20	177 20	177 20	177 20	177 20	177 20	
	220 VAC 60 Hz	4.6 0.52	5.5 0.63	7.6 0.87	8.8 1	11.5 1.3	14.1 1.6	17.7 2	21 2.4	24 2.8	30 3.5	38 4.3	45 5.1	62 7.1	75 8.5	84 9.5	100 11.4	112 12.7	134 15.2	168 19	177 20	177 20	177 20	
	230 VAC 60 Hz	3.6 0.41	4.4 0.5	6.1 0.69	7.3 0.83	8.8 1	10.6 1.2	14.1 1.6	16.8 1.9	19.4 2.2	24 2.8	30 3.4	35 4	49 5.6	59 6.7	66 7.5	79 9	88 10	106 12	132 15	160 18.1	160 18.1	160 18.1	
90 r/min	220 VAC 60 Hz	3.8 0.44	4.6 0.52	6.4 0.73	7.6 0.87	9.7 1.1	11.5 1.3	14.1 1.6	17.7 2	21 2.4	26 3	31 3.6	38 4.3	52 5.9	62 7.1	70 8	84 9.6	93 10.6	112 12.7	140 15.9	169 19.1	169 19.1	169 19.1	
	230 VAC 50 Hz	3.6 0.41	4.4 0.5	6.1 0.69	7.3 0.83	8.8 1	10.6 1.2	14.1 1.6	16.8 1.9	19.4 2.2	24 2.8	30 3.4	35 4	49 5.6	59 6.7	66 7.5	79 9	88 10	106 12	132 15	160 18.1	160 18.1	160 18.1	
	230 VAC 60 Hz	3.8 0.44	4.6 0.52	6.4 0.73	7.6 0.87	9.7 1.1	11.5 1.3	14.1 1.6	17.7 2	21 2.4	26 3	31 3.6	38 4.3	52 5.9	62 7.1	70 8	84 9.6	93 10.6	112 12.7	140 15.9	169 19.1	169 19.1	169 19.1	

- 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.

● **World K Series Reversible Motors – 30-Minute Rating**

◆ **Single-Phase 115 VAC Applicable Speed Controller: ES01**

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

Model Motor/Gearhead	Gear Ratio Speed	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
<b>2RK6RGN-AWU /2GN□KA</b>	1200 r/min	1.06 0.12	1.32 0.15	1.77 0.2	2.1 0.24	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.4 0.73	8.0 0.91	9.7 1.1	11.5 1.3	15.0 1.7	17.7 2	22 2.5	26 3	26 3	26 3	26 3	26 3
	90 r/min	1.06 0.12	1.32 0.15	1.77 0.2	2.1 0.24	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.4 0.73	8.0 0.91	9.7 1.1	11.5 1.3	15.0 1.7	17.7 2	22 2.5	26 3	26 3	26 3	26 3	26 3
<b>3RK15RGN-AWU /3GN□KA</b>	1200 r/min	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.7 0.76	8.0 0.91	11.5 1.3	13.2 1.5	15.9 1.8	20 2.3	23 2.7	29 3.3	36 4.1	44 5	44 5	44 5	44 5	44 5	44 5	44 5
	90 r/min	1.85 0.21	2.2 0.25	3.0 0.34	3.6 0.41	4.6 0.52	5.4 0.62	7.6 0.86	8.8 1	10.6 1.2	14.1 1.6	16.8 1.9	19.4 2.2	24 2.8	30 3.4	37 4.2	44 5	44 5	44 5	44 5	44 5
<b>4RK25RGN-AWU /4GN□KA</b>	1200 r/min	4.4 0.5	5.3 0.6	7.3 0.83	8.8 1	10.6 1.2	13.2 1.5	18.5 2.1	22 2.5	26 3	32 3.7	39 4.5	47 5.4	60 6.8	70 8	70 8	70 8	70 8	70 8	70 8	70 8
	90 r/min	2.3 0.27	2.8 0.32	3.9 0.45	4.6 0.53	5.9 0.67	7.0 0.8	9.7 1.1	11.5 1.3	14.1 1.6	17.7 2	21 2.4	25 2.9	31 3.6	38 4.4	47 5.4	57 6.5	64 7.3	70 8	70 8	70 8
<b>5RK40RGN-AWU /5GN□KA</b>	1200 r/min	6.9 0.78	8.2 0.93	11.5 1.3	14.1 1.6	16.8 1.9	20 2.3	28 3.2	34 3.9	41 4.7	51 5.8	61 7	74 8.4	88 10	88 10	88 10	88 10	88 10	88 10	88 10	88 10
	90 r/min	3.3 0.38	3.9 0.45	5.5 0.63	6.6 0.75	8.3 0.94	9.7 1.1	14.1 1.6	16.8 1.9	20 2.3	24 2.8	30 3.4	36 4.1	45 5.1	53 6.1	68 7.7	81 9.2	88 10	88 10	88 10	88 10
<b>5RK60RGU-AWU /5GU□KA</b>	1200 r/min	10.6 1.2	12.3 1.4	17.7 2	21 2.4	26 3	31 3.6	39 4.5	47 5.4	56 6.4	71 8.1	85 9.7	102 11.6	143 16.2	171 19.4	177 20	177 20	177 20	177 20	177 20	177 20
	90 r/min	5.8 0.66	6.9 0.79	9.7 1.1	11.5 1.3	14.1 1.6	17.7 2.0	22 2.5	26 3.0	30 3.5	39 4.5	46 5.3	56 6.4	78 8.9	94 10.7	105 11.9	126 14.3	140 15.9	169 19.1	177 20	177 20

◆ **Single-Phase 220/230 VAC Applicable Speed Controller: ES02**

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

Model Motor/Gearhead	Gear Ratio Speed	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
<b>2RK6RGN-CWE /2GN□KA</b>	1200 r/min	1.06 0.12	1.32 0.15	1.77 0.2	2.1 0.24	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.4 0.73	8.0 0.91	9.7 1.1	11.5 1.3	15.0 1.7	17.7 2	22 2.5	26 3	26 3	26 3	26 3	26 3
	90 r/min	1.06 0.12	1.32 0.15	1.77 0.2	2.1 0.24	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.4 0.73	8.0 0.91	9.7 1.1	11.5 1.3	15.0 1.7	17.7 2	22 2.5	26 3	26 3	26 3	26 3	26 3
<b>3RK15RGN-CWE /3GN□KA</b>	1200 r/min	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.7 0.76	8.0 0.91	11.5 1.3	13.2 1.5	15.9 1.8	20 2.3	23 2.7	29 3.3	36 4.1	44 5	44 5	44 5	44 5	44 5	44 5	44 5
	90 r/min	1.85 0.21	2.2 0.25	3.0 0.35	3.7 0.42	4.6 0.53	5.5 0.63	7.7 0.88	9.7 1.1	11.5 1.3	14.1 1.6	16.8 1.9	20 2.3	25 2.9	30 3.4	38 4.3	44 5	44 5	44 5	44 5	44 5
<b>4RK25RGN-CWE /4GN□KA</b>	1200 r/min	4.4 0.5	5.3 0.6	7.3 0.83	8.8 1	10.6 1.2	13.2 1.5	18.5 2.1	22 2.5	26 3	32 3.7	39 4.5	47 5.4	60 6.8	70 8	70 8	70 8	70 8	70 8	70 8	70 8
	90 r/min	2.4 0.28	3.0 0.34	4.1 0.47	4.9 0.56	6.1 0.7	7.4 0.84	10.6 1.2	12.3 1.4	15.0 1.7	18.5 2.1	22 2.5	26 3	33 3.8	40 4.6	50 5.7	60 6.8	67 7.6	70 8	70 8	70 8
<b>5RK40RGN-CWE /5GN□KA</b>	1200 r/min	6.9 0.78	8.2 0.93	11.5 1.3	14.1 1.6	16.8 1.9	20 2.3	28 3.2	34 3.9	41 4.7	51 5.8	61 7	74 8.4	88 10	88 10	88 10	88 10	88 10	88 10	88 10	88 10
	90 r/min	3.6 0.41	4.4 0.5	6.1 0.69	7.3 0.83	8.8 1	10.6 1.2	15.0 1.7	18.5 2.1	22 2.5	27 3.1	32 3.7	39 4.5	49 5.6	59 6.7	74 8.4	88 10	88 10	88 10	88 10	88 10
<b>5RK60RGU-CWE /5GU□KA</b>	1200 r/min	10.6 1.2	12.3 1.4	17.7 2	21 2.4	26 3	31 3.6	39 4.5	47 5.4	56 6.4	71 8.1	85 9.7	102 11.6	143 16.2	171 19.4	177 20	177 20	177 20	177 20	177 20	177 20
	90 r/min	6.0 0.68	7.2 0.82	9.7 1.1	12.3 1.4	15.0 1.7	17.7 2	23 2.6	27 3.1	32 3.7	40 4.6	48 5.5	59 6.7	81 9.2	98 11.1	109 12.4	131 14.9	146 16.5	175 19.8	177 20	177 20

- 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.

● **V Series Induction Motors – Continuous Rating**

◆ **Single-Phase 115 VAC Applicable Speed Controller: ES01** Unit=Upper Values: lb-in/Lower Values: N·m

Model Combination Type	Gear Ratio Speed	5	6	9	15	18	30	36	60	90	120	180	300	360
<b>VSI206A-□U</b>	1200 r/min	2.0 0.23	2.3 0.27	3.6 0.41	6.0 0.68	7.1 0.81	11.5 1.3	13.2 1.5	23 2.6	34 3.9	46 5.2	53 6	53 6	53 6
	90 r/min	1.41 0.16	1.68 0.19	2.4 0.28	4.1 0.47	5.0 0.57	7.9 0.9	9.7 1.1	15.9 1.8	23 2.7	31 3.6	45 5.1	53 6	53 6
<b>VSI315A-□U</b>	1200 r/min	4.9 0.56	6.0 0.68	8.8 1.0	15.0 1.7	17.7 2.0	28 3.2	34 3.9	57 6.5	85 9.7	88 10	88 10	88 10	88 10
	90 r/min	1.68 0.19	2.0 0.23	3.0 0.34	5.0 0.57	6.0 0.68	9.7 1.1	11.5 1.3	19.4 2.2	29 3.3	38 4.3	53 6.1	88 10	88 10
<b>VSI425A-□U</b>	1200 r/min	7.3 0.83	8.8 1.0	13.2 1.5	22 2.5	26 3.0	42 4.8	50 5.7	84 9.5	126 14.3	141 16	141 16	141 16	141 16
	90 r/min	2.0 0.23	2.3 0.27	3.6 0.41	6.0 0.68	7.1 0.81	11.5 1.3	13.2 1.5	23 2.6	34 3.9	46 5.2	64 7.3	107 12.2	129 14.6
<b>VSI540A-□U</b>	1200 r/min	8.8 1.0	10.6 1.2	15.9 1.8	26 3.0	31 3.6	51 5.8	61 7.0	102 11.6	153 17.4	193 21.9	260 30	260 30	—
	90 r/min	2.6 0.3	3.1 0.36	4.7 0.54	7.9 0.9	9.7 1.1	15.0 1.7	18.5 2.1	30 3.5	46 5.2	57 6.5	86 9.8	144 16.3	—
<b>VSI560A-□U</b>	1200 r/min	19.4 2.2	23 2.6	35 4.0	58 6.6	69 7.9	111 12.6	134 15.2	220 25.3	260 30	260 30	260 30	260 30	—
	90 r/min	8.4 0.95	9.7 1.1	15.0 1.7	24 2.8	30 3.4	47 5.4	57 6.5	95 10.8	144 16.3	180 20.4	260 30	260 30	—
<b>VSI590A-□U</b>	1200 r/min	29 3.3	34 3.9	52 5.9	87 9.9	100 11.3	166 18.8	200 22.6	330 37.7	350 40	350 40	350 40	—	—
	90 r/min	8.4 0.95	9.7 1.1	15.0 1.7	24 2.8	29 3.3	47 5.4	57 6.5	95 10.8	135 15.3	180 20.4	270 30.6	—	—

Introduction

BX

FBI II

AXU

AXH

BHF

ES

US

Before Using a Speed Control System

Brushless DC Motor Systems

AC Input

DC Input

AC Motor Systems

◆ **Single-Phase 220/230 VAC Applicable Speed Controller: ES02**

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

Model Combination Type		Gear Ratio Speed	5	6	9	15	18	30	36	60	90	120	180	300	360
<b>VSI206C-□E</b>	1200 r/min	230 VAC 50 Hz	1.85 0.21	2.2 0.25	3.2 0.37	5.4 0.62	6.6 0.75	10.6 1.2	12.3 1.4	21 2.4	31 3.6	41 4.7	53 6	53 6	53 6
		220 VAC 60 Hz	2.0 0.23	2.3 0.27	3.6 0.41	6.0 0.68	7.1 0.81	11.5 1.3	13.2 1.5	23 2.6	34 3.9	46 5.2	53 6	53 6	53 6
		230 VAC 60 Hz	2.0 0.23	2.3 0.27	3.6 0.41	6.0 0.68	7.1 0.81	11.5 1.3	13.2 1.5	23 2.6	34 3.9	46 5.2	53 6	53 6	53 6
	90 r/min	1.23 0.14	1.50 0.17	2.3 0.26	3.8 0.43	4.6 0.52	7.3 0.83	8.7 0.99	15.0 1.7	22 2.5	29 3.3	41 4.7	53 6	53 6	53 6
<b>VSI315C-□E</b>	1200 r/min	230 VAC 50 Hz	4.6 0.52	5.4 0.62	8.2 0.93	14.1 1.6	16.8 1.9	26 3.0	31 3.6	52 5.9	78 8.9	88 10	88 10	88 10	88 10
		60 Hz	4.9 0.56	6.0 0.68	8.8 1.0	15.0 1.7	17.7 2.0	28 3.2	34 3.9	57 6.5	85 9.7	88 10	88 10	88 10	88 10
	90 r/min	1.50 0.17	1.85 0.21	2.7 0.31	4.5 0.51	5.4 0.62	8.6 0.98	10.6 1.2	17.7 2.0	25 2.9	34 3.9	48 5.5	81 9.2	88 10	88 10
	<b>VSI425C-□E</b>	1200 r/min	220 VAC 60 Hz	7.6 0.86	8.8 1.0	13.2 1.5	23 2.6	27 3.1	43 4.9	52 5.9	86 9.8	130 14.7	141 16	141 16	141 16
230 VAC 50 Hz			7.9 0.9	9.7 1.1	14.1 1.6	23 2.7	28 3.2	46 5.2	54 6.2	91 10.3	137 15.5	141 16	141 16	141 16	141 16
230 VAC 60 Hz			7.1 0.81	8.5 0.97	13.2 1.5	21 2.4	25 2.9	40 4.6	49 5.6	82 9.3	123 13.9	141 16	141 16	141 16	141 16
90 r/min		2.0 0.23	2.3 0.27	3.6 0.41	6.0 0.68	7.1 0.81	11.5 1.3	13.2 1.5	23 2.6	34 3.9	46 5.2	64 7.3	107 12.2	129 14.6	129 14.6
<b>VSI540C-□E</b>	1200 r/min	220 VAC 60 Hz	11.5 1.3	13.2 1.5	20 2.3	33 3.8	39 4.5	63 7.2	76 8.7	127 14.4	192 21.7	240 27.2	260 30	260 30	—
		230 VAC 50 Hz	12.3 1.4	15.0 1.7	23 2.6	38 4.3	46 5.2	73 8.3	87 9.9	146 16.5	210 24.8	260 30	260 30	260 30	—
		230 VAC 60 Hz	10.6 1.2	12.3 1.4	18.5 2.1	30 3.5	37 4.2	59 6.7	70 8.0	118 13.4	177 20.1	223 25.3	260 30	260 30	—
	90 r/min	220 VAC 60 Hz	3.0 0.34	3.6 0.41	5.3 0.61	8.8 1.0	10.6 1.2	16.8 1.9	20 2.3	34 3.9	51 5.8	64 7.3	96 10.9	161 18.2	—
		230 VAC	2.8 0.32	3.3 0.38	5.0 0.57	8.4 0.95	9.7 1.1	15.9 1.8	19.4 2.2	31 3.6	47 5.4	60 6.8	90 10.2	150 17	—
<b>VSI560C-□E</b>	1200 r/min	230 VAC 50 Hz 220 VAC 60 Hz 230 VAC 60 Hz	19.4 2.2	23 2.6	35 4.0	58 6.6	69 7.9	111 12.6	134 15.2	220 25.3	260 30	260 30	260 30	260 30	—
	90 r/min	220 VAC 60 Hz	8.5 0.97	10.6 1.2	15.0 1.7	25 2.9	30 3.5	48 5.5	59 6.7	98 11.1	146 16.6	184 20.9	260 30	260 30	—
		230 VAC 50 Hz	6.8 0.77	8.1 0.92	12.3 1.4	20 2.3	24 2.8	38 4.4	46 5.3	77 8.8	116 13.2	146 16.5	210 24.8	260 30	—
		230 VAC 60 Hz	7.1 0.81	8.5 0.97	13.2 1.5	21 2.4	25 2.9	40 4.6	49 5.6	82 9.3	123 13.9	154 17.5	230 26.2	260 30	—
<b>VSI590C-□E</b>	1200 r/min	230 VAC 50 Hz	29 3.3	34 3.9	52 5.9	87 9.9	100 11.3	166 18.8	200 22.6	330 37.7	350 40	350 40	350 40	—	—
		220 VAC 60 Hz	29 3.3	34 3.9	52 5.9	87 9.9	100 11.3	166 18.8	200 22.6	330 37.7	350 40	350 40	350 40	—	—
		230 VAC 60 Hz	29 3.3	34 3.9	52 5.9	87 9.9	100 11.3	166 18.8	200 22.6	330 37.7	350 40	350 40	350 40	—	—
	90 r/min	230 VAC 50 Hz	9.7 1.1	11.5 1.3	17.7 2.0	29 3.3	33 3.8	55 6.3	67 7.6	111 12.6	158 17.9	210 23.8	310 35.7	—	—
230 VAC 60 Hz		11.5 1.3	13.2 1.5	20 2.3	33 3.8	38 4.3	63 7.2	76 8.7	127 14.4	180 20.4	240 27.2	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.

## ● V Series Reversible Motors – 30-Minute Rating

### ◆ Single-Phase 115 VAC Applicable Speed Controller: **ES01** Unit-Upper Values: lb-in/Lower Values: N-m

Model Combination Type	Gear Ratio Speed	5	6	9	15	18	30	36	60	90	120	180	300	360
<b>VSR206A-□U</b>	1200 r/min	2.0 0.23	2.3 0.27	3.6 0.41	6.0 0.68	7.1 0.81	11.5 1.3	13.2 1.5	23 2.6	34 3.9	46 5.2	53 6	53 6	53 6
	90 r/min	2.0 0.23	2.3 0.27	3.6 0.41	6.0 0.68	7.1 0.81	11.5 1.3	13.2 1.5	23 2.6	34 3.9	46 5.2	53 6	53 6	53 6
<b>VSR315A-□U</b>	1200 r/min	4.9 0.56	6.0 0.68	8.8 1.0	15.0 1.7	17.7 2.0	28 3.2	34 3.9	57 6.5	85 9.7	88 10	88 10	88 10	88 10
	90 r/min	3.3 0.38	4.0 0.46	6.1 0.69	9.7 1.1	12.3 1.4	19.4 2.2	23 2.6	38 4.4	58 6.6	77 8.8	88 10	88 10	88 10
<b>VSR425A-□U</b>	1200 r/min	8.1 0.92	9.7 1.1	15.0 1.7	24 2.8	29 3.3	46 5.3	55 6.3	93 10.6	140 15.9	141 16	141 16	141 16	141 16
	90 r/min	4.4 0.5	5.2 0.59	7.8 0.89	13.2 1.5	15.9 1.8	24 2.8	30 3.4	50 5.7	75 8.5	100 11.4	141 16	141 16	141 16
<b>VSR540A-□U</b>	1200 r/min	12.3 1.4	15.0 1.7	23 2.6	38 4.3	46 5.2	73 8.3	87 9.9	146 16.5	210 24.8	260 30	260 30	260 30	—
	90 r/min	6.1 0.7	7.4 0.84	11.5 1.3	18.5 2.1	22 2.5	35 4.0	42 4.8	70 8.0	106 12.0	133 15.1	200 22.6	260 30	—
<b>VSR560A-□U</b>	1200 r/min	19.4 2.2	23 2.6	35 4.0	58 6.6	69 7.9	111 12.6	134 15.2	220 25.3	260 30	260 30	260 30	260 30	—
	90 r/min	10.6 1.2	13.2 1.5	19.4 2.2	31 3.6	38 4.4	61 7.0	74 8.4	123 13.9	184 20.9	230 26.2	260 30	260 30	—
<b>VSR590A-□U</b>	1200 r/min	29 3.3	34 3.9	52 5.9	87 9.9	100 11.3	166 18.8	200 22.6	330 37.7	350 40	350 40	350 40	—	—
	90 r/min	12.3 1.4	15.0 1.7	23 2.6	38 4.3	44 5.0	73 8.3	87 9.9	146 16.5	200 23.3	270 31.1	350 40	—	—

### ◆ Single-Phase 220/230 VAC Applicable Speed Controller: **ES02** Unit-Upper Values: lb-in/Lower Values: N-m

Model Combination Type	Gear Ratio Speed	5	6	9	15	18	30	36	60	90	120	180	300	360
<b>VSR206C-□E</b>	1200 r/min	2.0 0.23	2.3 0.27	3.6 0.41	6.0 0.68	7.1 0.81	11.5 1.3	13.2 1.5	23 2.6	34 3.9	46 5.2	53 6	53 6	53 6
	90 r/min	2.0 0.23	2.3 0.27	3.6 0.41	6.0 0.68	7.1 0.81	11.5 1.3	13.2 1.5	23 2.6	34 3.9	46 5.2	53 6	53 6	53 6
<b>VSR315C-□E</b>	1200 r/min	4.9 0.56	6.0 0.68	8.8 1.0	15.0 1.7	17.7 2.0	28 3.2	34 3.9	57 6.5	85 9.7	88 10	88 10	88 10	88 10
	90 r/min	3.4 0.39	4.1 0.47	6.1 0.7	10.6 1.2	12.3 1.4	19.4 2.2	23 2.7	39 4.5	59 6.7	79 9.0	88 10	88 10	88 10
<b>VSR425C-□E</b>	1200 r/min	8.1 0.92	9.7 1.1	15.0 1.7	24 2.8	29 3.3	46 5.3	55 6.3	93 10.6	140 15.9	141 16	141 16	141 16	141 16
	90 r/min	4.6 0.52	5.4 0.62	8.2 0.93	14.1 1.6	16.8 1.9	26 3.0	31 3.6	52 5.9	78 8.9	105 11.9	141 16	141 16	141 16
<b>VSR540C-□E</b>	1200 r/min	12.3 1.4	15.0 1.7	23 2.6	38 4.3	46 5.2	73 8.3	87 9.9	146 16.5	210 24.8	260 30	260 30	260 30	—
	90 r/min	6.8 0.77	8.1 0.92	12.3 1.4	20 2.3	24 2.8	38 4.4	46 5.3	77 8.8	116 13.2	146 16.5	210 24.8	260 30	—
<b>VSR560C-□E</b>	1200 r/min	19.4 2.2	23 2.6	35 4.0	58 6.6	69 7.9	111 12.6	134 15.2	220 25.3	260 30	260 30	260 30	260 30	—
	90 r/min	11.5 1.3	13.2 1.5	20 2.3	33 3.8	39 4.5	63 7.2	76 8.7	127 14.4	192 21.7	240 27.2	260 30	260 30	—
<b>VSR590C-□E</b>	1200 r/min	29 3.3	34 3.9	52 5.9	87 9.9	100 11.3	166 18.8	200 22.6	330 37.7	350 40	350 40	350 40	—	—
	90 r/min	14.1 1.6	16.8 1.9	24 2.8	41 4.7	47 5.4	79 9.0	95 10.8	160 18.1	220 25.5	300 34.0	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.

## ■ Gearmotor — Torque Table when a Right-Angle Gearhead is Attached

Right-Angle Gearhead is available for World **K** Series.

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## ■ Permissible Overhung Load and Permissible Thrust Load

Motor (Round shaft type)→Page A-11

Gearhead→Page A-11

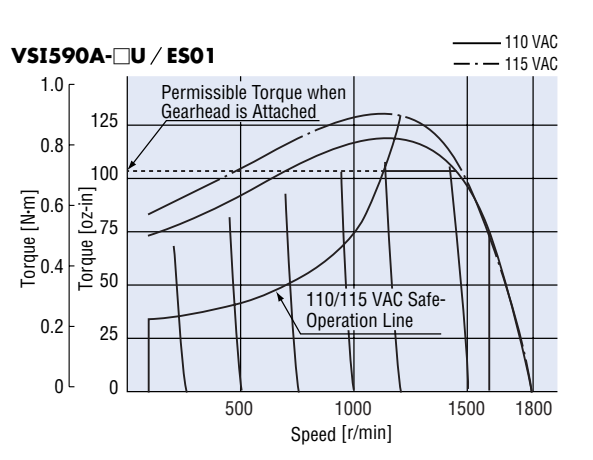
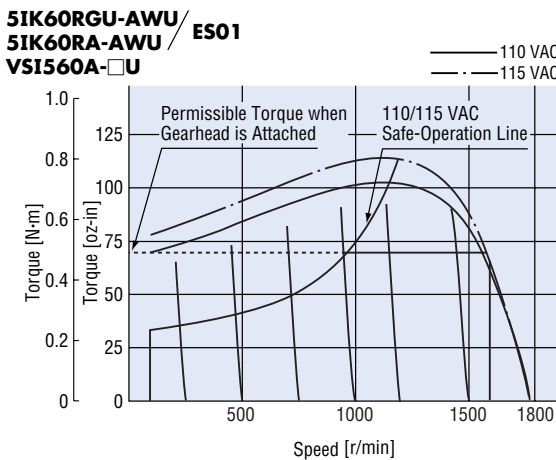
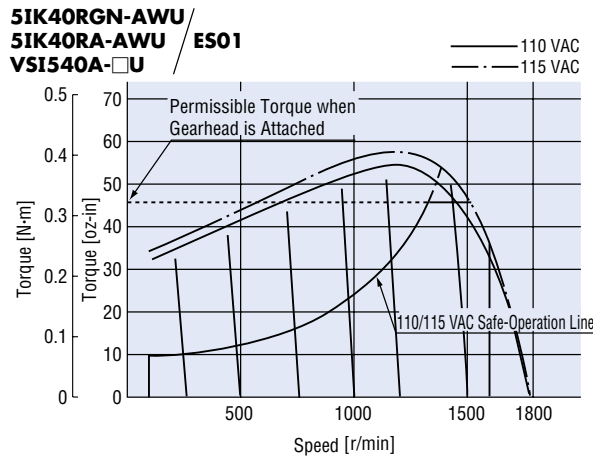
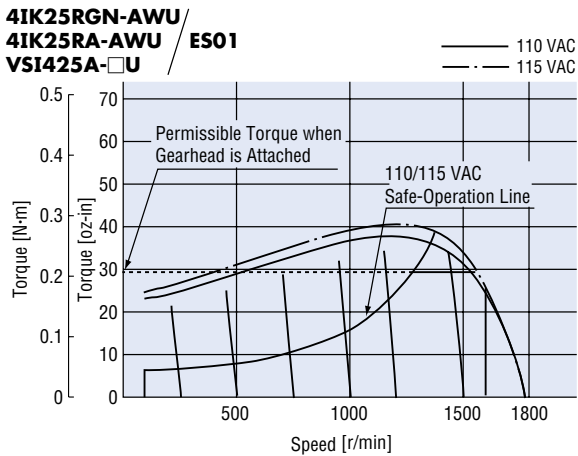
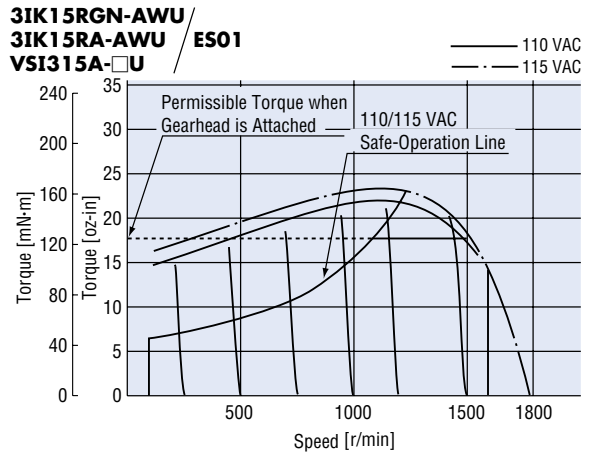
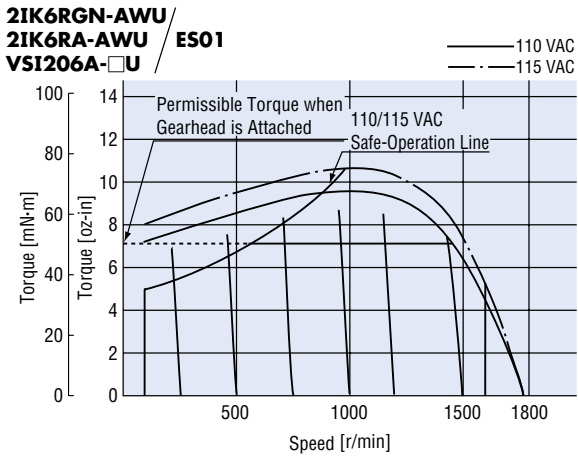
## ■ Permissible Load Inertia J for Gearhead

→Page A-12

## ■ Speed — Torque Characteristics

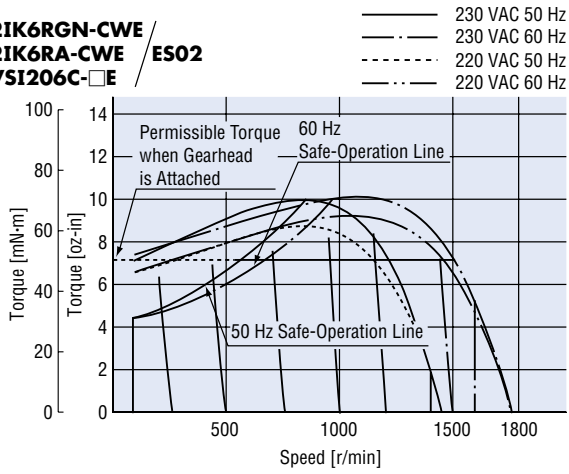
### ● Induction Motors

Enter the gear ratio in the box (□) within the **V** Series combination type model name. The characteristics of **V** Series are for motor's only.

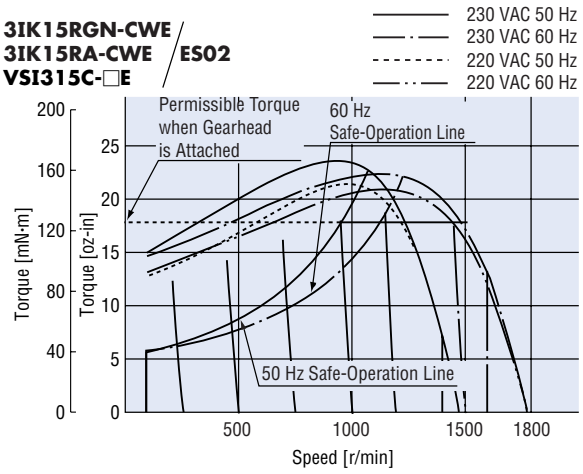




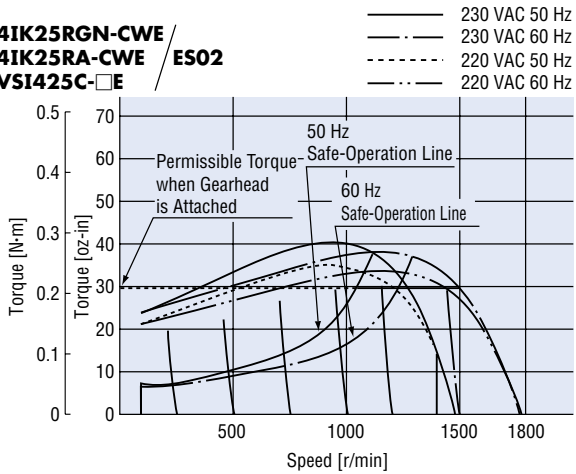
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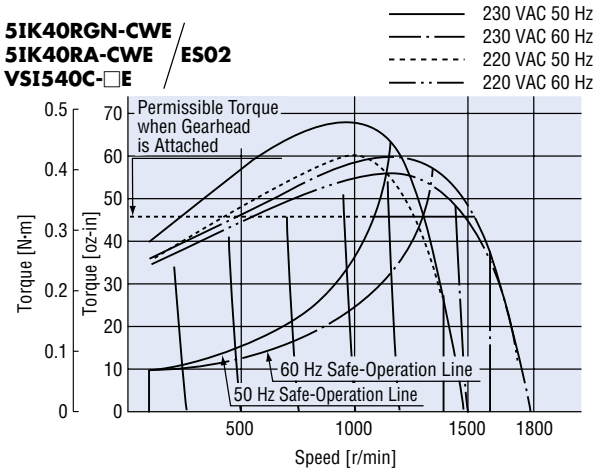
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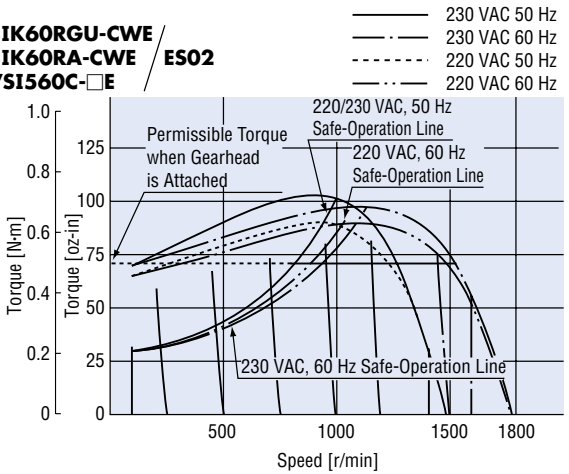
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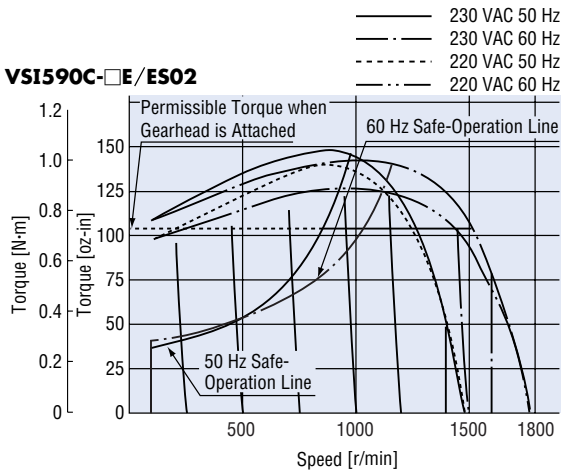
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**5IK60RGU-CWE / 5IK60RA-CWE / VSI560C-E** / ES02

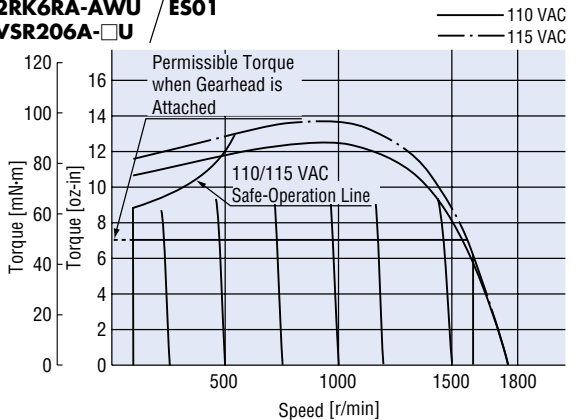


**VSI590C-E / ES02**

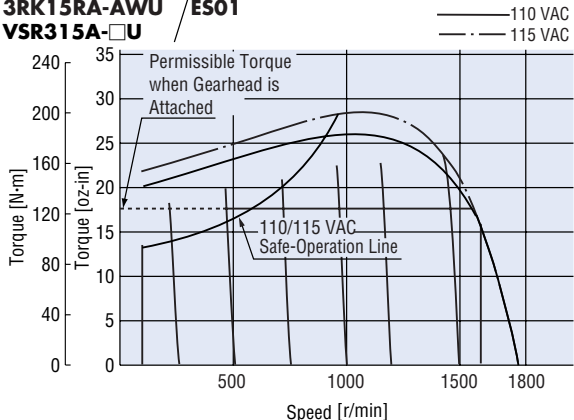


● Reversible Motors

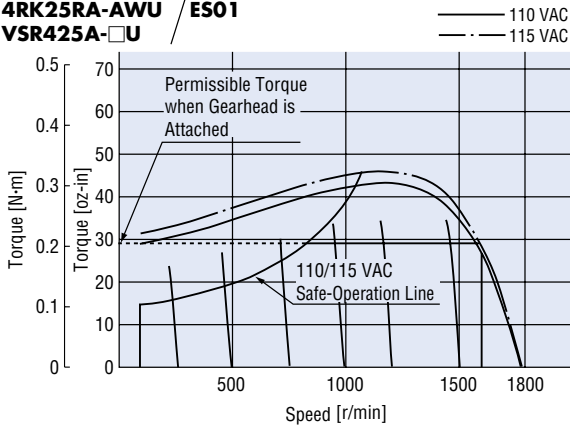
**2RK6RGN-AWU / 2RK6RA-AWU / VSR206A-U** / ES01



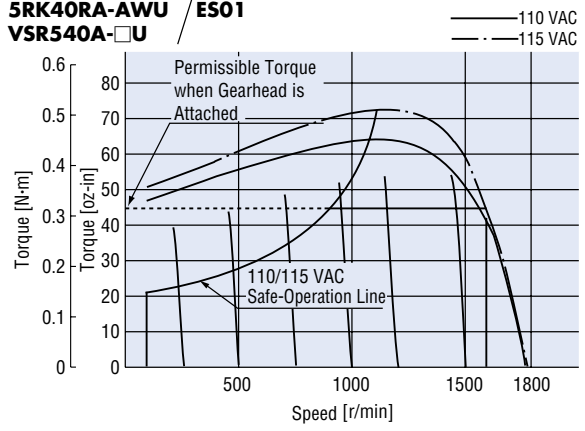
**3RK15RGN-AWU / 3RK15RA-AWU / VSR315A-U** / ES01



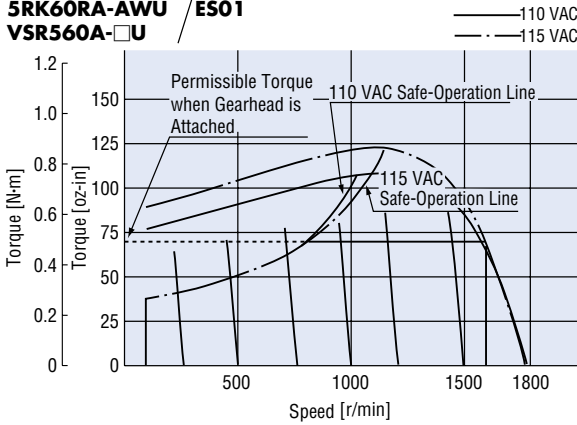
**4RK25RGN-AWU / 4RK25RA-AWU / ES01**  
**VSR425A-U**



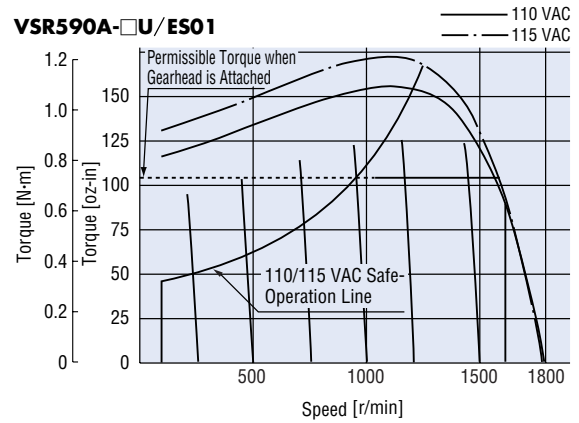
**5RK40RGN-AWU / 5RK40RA-AWU / ES01**  
**VSR540A-U**



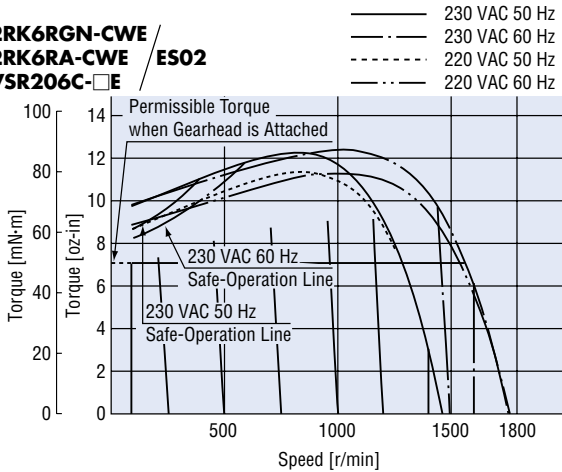
**5RK60RGN-AWU / 5RK60RA-AWU / ES01**  
**VSR560A-U**



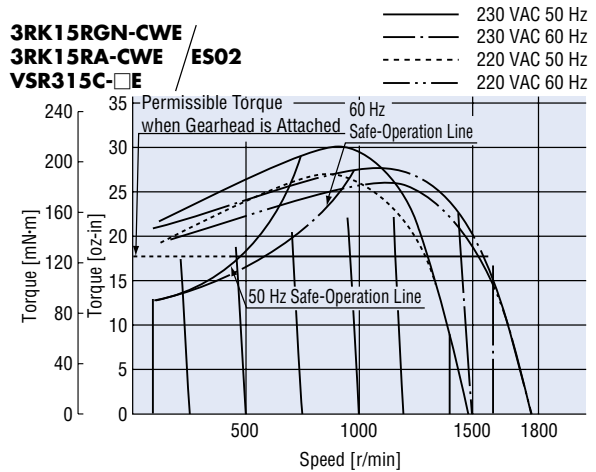
**VSR590A-U / ES01**



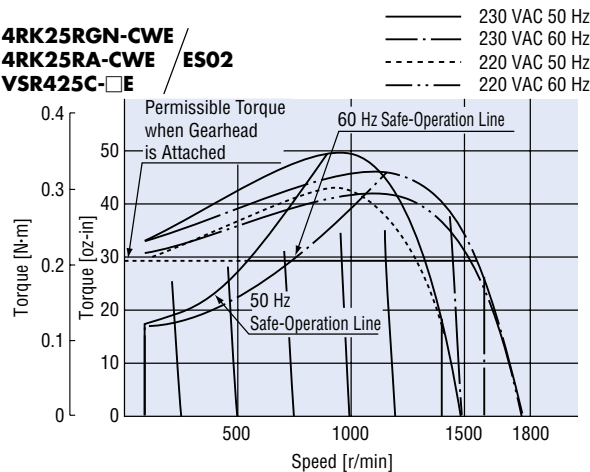
**2RK6RGN-CWE / 2RK6RA-CWE / ES02**  
**VSR206C-E**



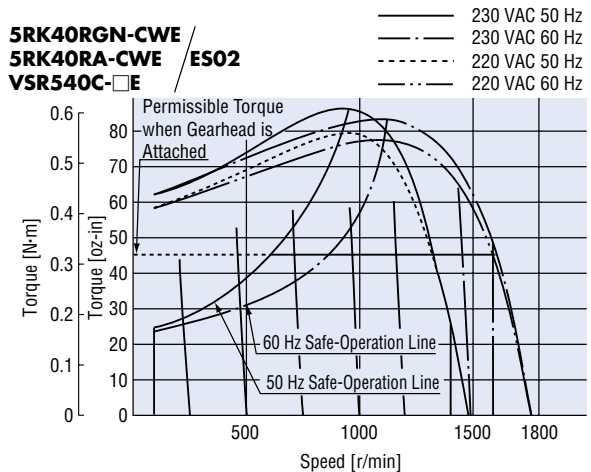
**3RK15RGN-CWE / 3RK15RA-CWE / ES02**  
**VSR315C-E**



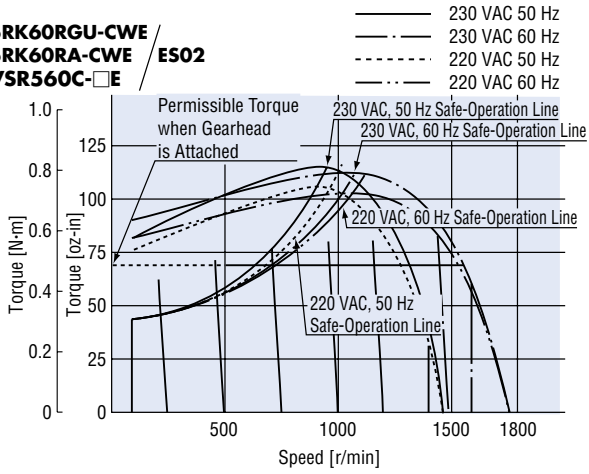
**4RK25RGN-CWE / 4RK25RA-CWE / ES02**  
**VSR425C-E**



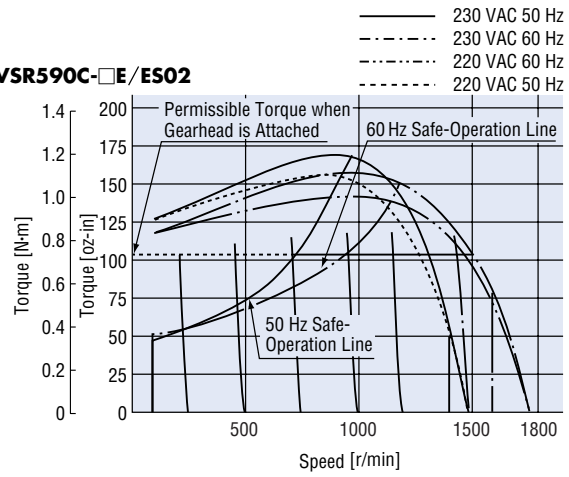
**5RK40RGN-CWE / 5RK40RA-CWE / ES02**  
**VSR540C-E**



**5RK60RGU-CWE /  
5RK60RA-CWE / ES02  
VSR560C-□E**



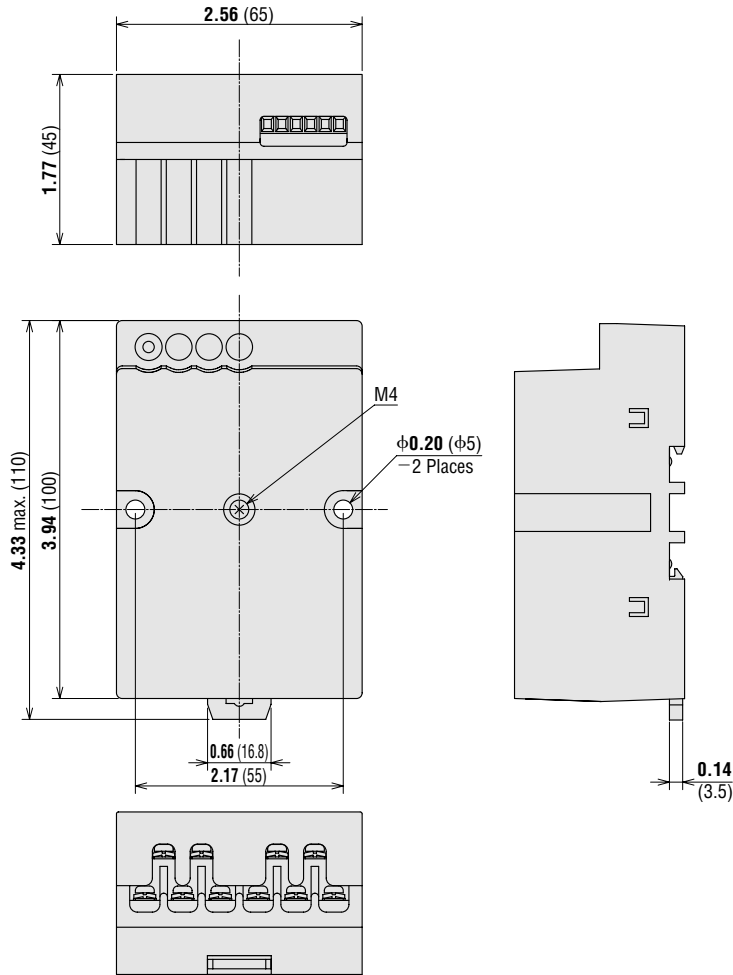
**VSR590C-□E / ES02**



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

Speed Controller: **ES01, ES02** (Scale 1/2)  
Weight: 0.4 lb. (0.18 kg)

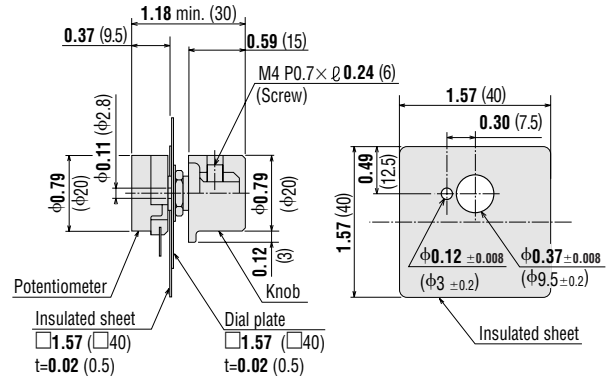
**DXF** A394



**External Speed Potentiometer (Included)**

(Scale 1/2)

**PAVR-20KZ**



● World K Series

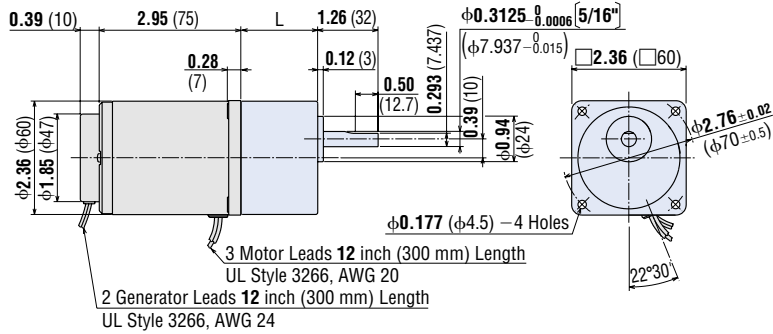
◆ Motor/Gearhead (Pinion Shaft Type)

**2IK6RGN-AWU**  
**2IK6RGN-CWE**  
**2RK6RGN-AWU**  
**2RK6RGN-CWE**

**2GN□KA**

Weight: 1.76 lb. (0.8 kg) / Weight: 0.88 lb. (0.4 kg)

**DXF** A065AU (**2GN3KA~18KA**)  
 A065BU (**2GN25KA~180KA**)



**2GN3KA-18KA:** L = 1.18 (30)  
**2GN25KA-180KA:** L = 1.57 (40)

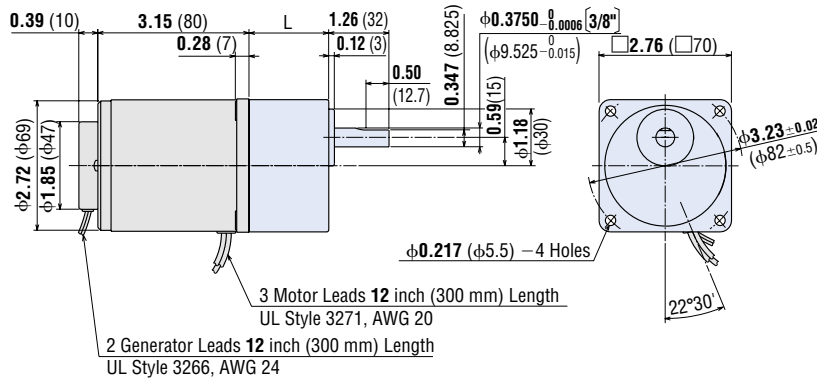
◆ Motor/Gearhead (Pinion Shaft Type)

**3IK15RGN-AWU**  
**3IK15RGN-CWE**  
**3RK15RGN-AWU**  
**3RK15RGN-CWE**

**3GN□KA**

Weight: 2.6 lb. (1.2 kg) / Weight: 1.21 lb. (0.55 kg)

**DXF** A066AU (**3GN3KA~18KA**)  
 A066BU (**3GN25KA~180KA**)



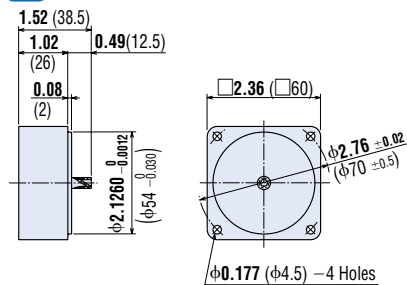
**3GN3KA-18KA:** L = 1.26 (32)  
**3GN25KA-180KA:** L = 1.65 (42)

● Decimal Gearhead

Can be connected to **2IK6RGN**, **2RK6RGN** type

**2GN10XK** Weight: 0.44 lb. (0.2 kg)

**DXF** A003

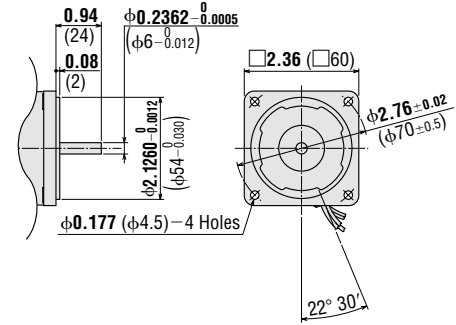


◆ Round Shaft Type

**2IK6RA-AWU**  
**2IK6RA-CWE**  
**2RK6RA-AWU**  
**2RK6RA-CWE**

Weight: 1.76 lb. (0.8 kg)

**DXF** A364

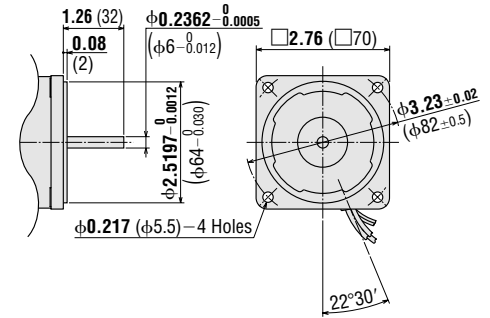


◆ Round Shaft Type

**3IK15RA-AWU**  
**3IK15RA-CWE**  
**3RK15RA-AWU**  
**3RK15RA-CWE**

Weight: 2.6 lb. (1.2 kg)

**DXF** A365

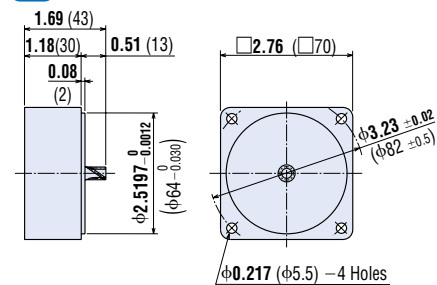


● Decimal Gearhead

Can be connected to **3IK15RGN**, **3RK15RGN** type

**3GN10XK** Weight: 0.66 lb. (0.3 kg)

**DXF** A009

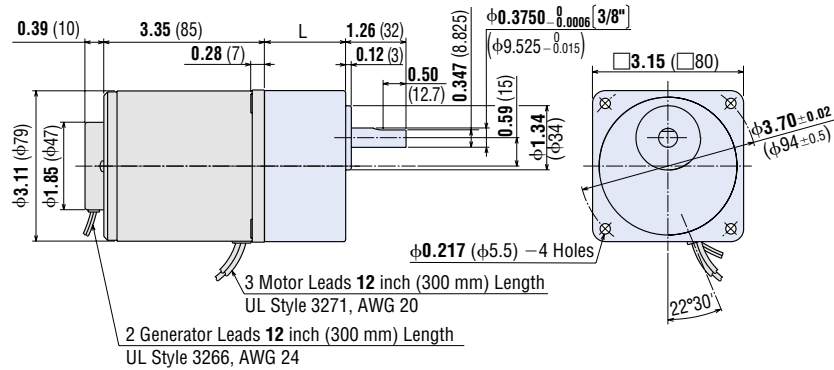


◆ Motor/Gearhead (Pinion Shaft Type)

**41K25RGN-AWU**  
**41K25RGN-CWE**  
**4RK25RGN-AWU**  
**4RK25RGN-CWE**  
**4GN□KA**

Weight: 3.5 lb. (1.6 kg)      Weight: 1.43 lb. (0.65 kg)

**DXF** A067AU (**4GN3KA~18KA**)  
 A067BU (**4GN25KA~180KA**)



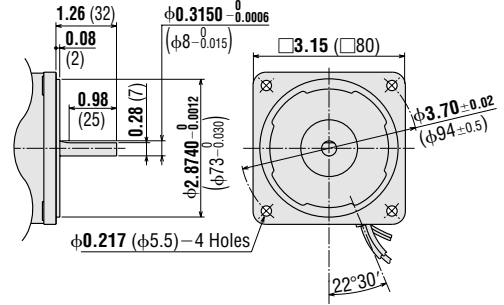
**4GN3KA~18KA:** L = 1.26 (32)  
**4GN25KA~180KA:** L = 1.67 (42.5)

◆ Round Shaft Type

**41K25RA-AWU**  
**41K25RA-CWE**  
**4RK25RA-AWU**  
**4RK25RA-CWE**

Weight: 3.5 lb. (1.6 kg)

**DXF** A366

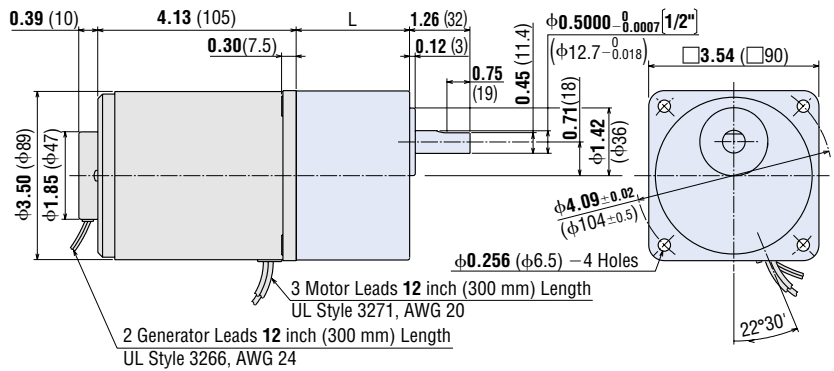


◆ Motor/Gearhead (Pinion Shaft Type)

**51K40RGN-AWU**  
**51K40RGN-CWE**  
**5RK40RGN-AWU**  
**5RK40RGN-CWE**  
**5GN□KA**

Weight: 5.7 lb. (2.6 kg)      Weight: 3.3 lb. (1.5 kg)

**DXF** A068AU (**5GN3KA~18KA**)  
 A068BU (**5GN25KA~180KA**)



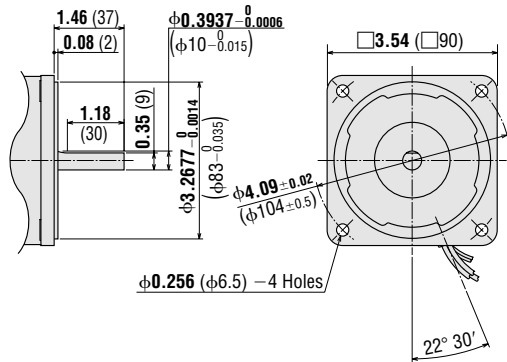
**5GN3KA~18KA:** L = 1.65 (42)  
**5GN25KA~180KA:** L = 2.36 (60)

◆ Round Shaft Type

**51K40RA-AWU**  
**51K40RA-CWE**  
**5RK40RA-AWU**  
**5RK40RA-CWE**

Weight: 5.7 lb. (2.6 kg)

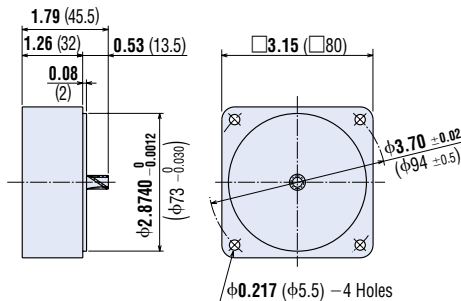
**DXF** A367



● Decimal Gearhead

Can be connected to **41K25RGN**, **4RK25RGN** type  
**4GN10XK** Weight: 0.88 lb. (0.4 kg)

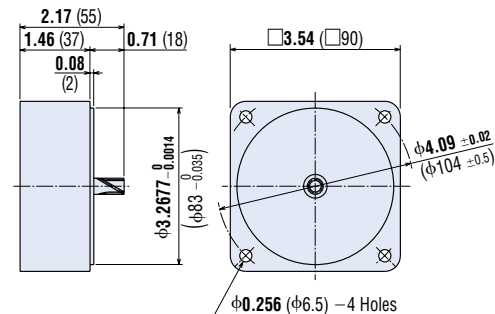
**DXF** A013



● Decimal Gearhead

Can be connected to **51K40RGN**, **5RK40RGN** type  
**5GN10XK** Weight: 1.3 lb. (0.6 kg)

**DXF** A022



◆ Motor/Gearhead (Pinion Shaft Type)

5IK60RGU-AWU  
 5IK60RGU-CWE  
 5RK60RGU-AWU  
 5RK60RGU-CWE

5GU□KA

Weight: 7.1 lb. (3.2 kg)      Weight: 3.3 lb. (1.5 kg)

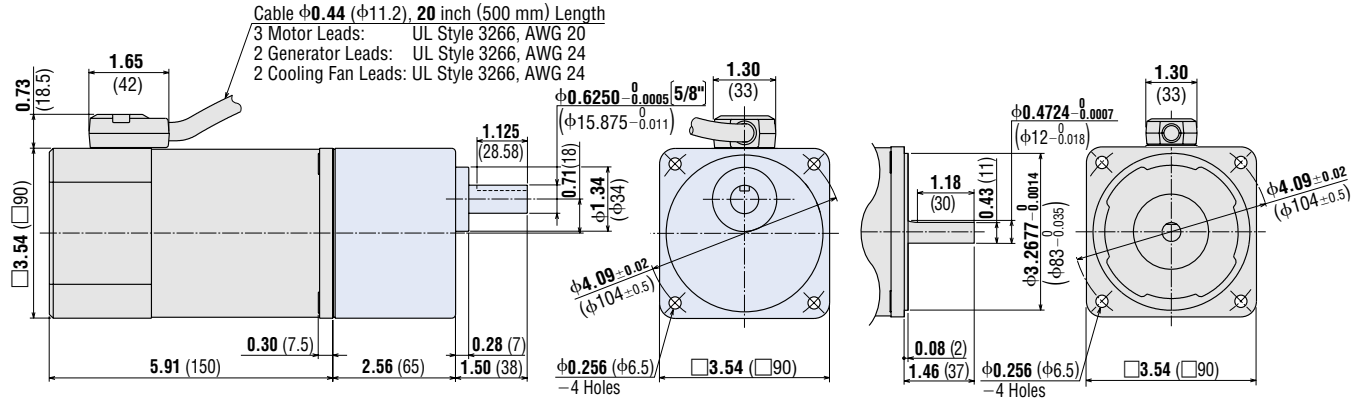
DXF A069U (5GU3KA~180KA)

◆ Round Shaft Type

5IK60RA-AWU  
 5IK60RA-CWE  
 5RK60RA-AWU  
 5RK60RA-CWE

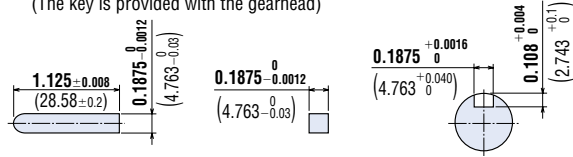
Weight: 7.1 lb. (3.2 kg)

DXF A358



● Key and Key Slot (Scale 1/2)

(The key is provided with the gearhead)

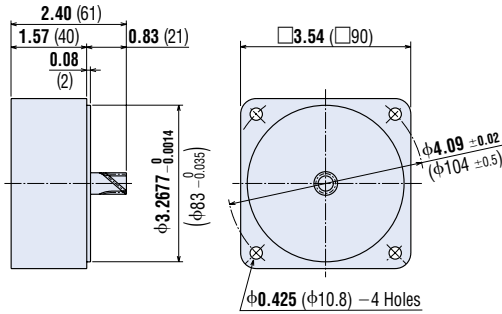


● Decimal Gearhead

Can be connected to 5IK60RGU, 5RK60RGU type

5GU10XKB Weight: 1.3 lb. (0.6 kg)

DXF A029



● V Series

◆ Combination Type

VS1206A[C]-□U[E]

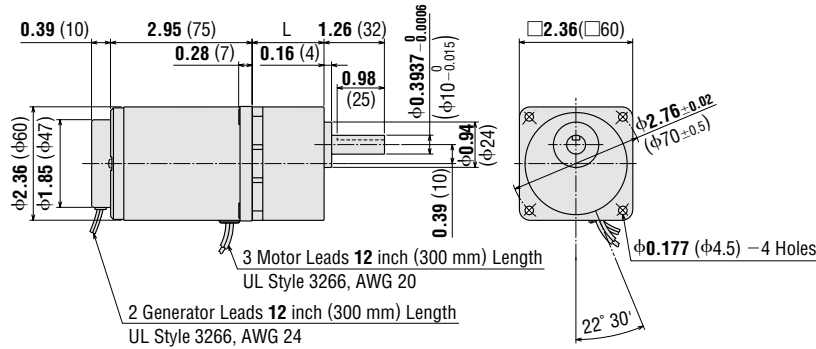
VSR206A[C]-□U[E]

Weight: 2.9 lb. (1.3 kg) (Including Gearhead)

DXF A216A (Gear Ratio: 5~18)

A216B (Gear Ratio: 30~120)

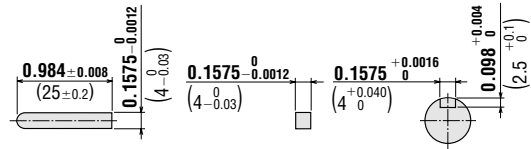
A216C (Gear Ratio: 180~360)



Gear Ratio: 5~18: L = 1.34 (34)  
 Gear Ratio: 30~120: L = 1.5 (38)  
 Gear Ratio: 180~360: L = 1.69 (43)

● Key and Key Slot (Scale 1/2)

(The key is provided with the gearhead)



◆ Combination Type

VS1315A[C]-□U[E]

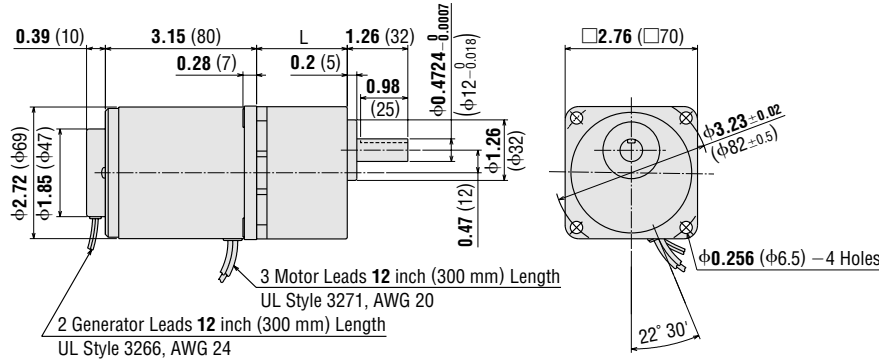
VSR315A[C]-□U[E]

Weight: 4.0 lb. (1.8 kg) (Including Gearhead)

DXF A243A (Gear Ratio: 5~18)

A243B (Gear Ratio: 30~120)

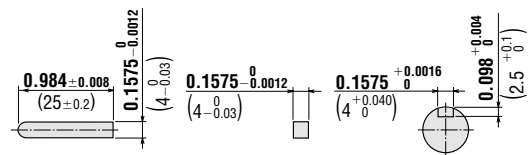
A243C (Gear Ratio: 180~360)



Gear Ratio: 5~18: L = 1.5 (38)  
 Gear Ratio: 30~120: L = 1.69 (43)  
 Gear Ratio: 180~360: L = 1.89 (48)

● Key and Key Slot (Scale 1/2)

(The key is provided with the gearhead)



◆ **Combination Type**

**VS1425A[C]-□U[E]**

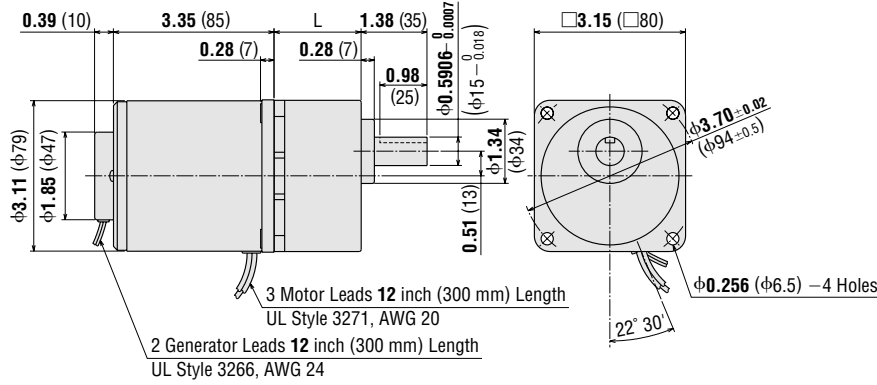
**VSR425A[C]-□U[E]**

Weight: 5.7 lb. (2.6 kg) (Including Gearhead)

**DXF** A217A (Gear Ratio: **5~18**)

A217B (Gear Ratio: **30~120**)

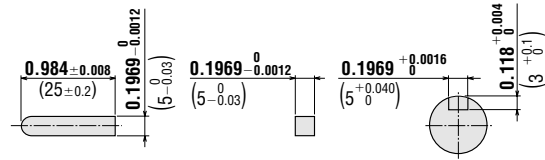
A217C (Gear Ratio: **180~360**)



Gear Ratio: 5~18: L = **1.61** (41)  
 Gear Ratio: 30~120: L = **1.81** (46)  
 Gear Ratio: 180~360: L = **2.01** (51)

● **Key and Key Slot (Scale 1/2)**

(The key is provided with the gearhead)



◆ **Combination Type**

**VS1540A[C]-□U[E]**

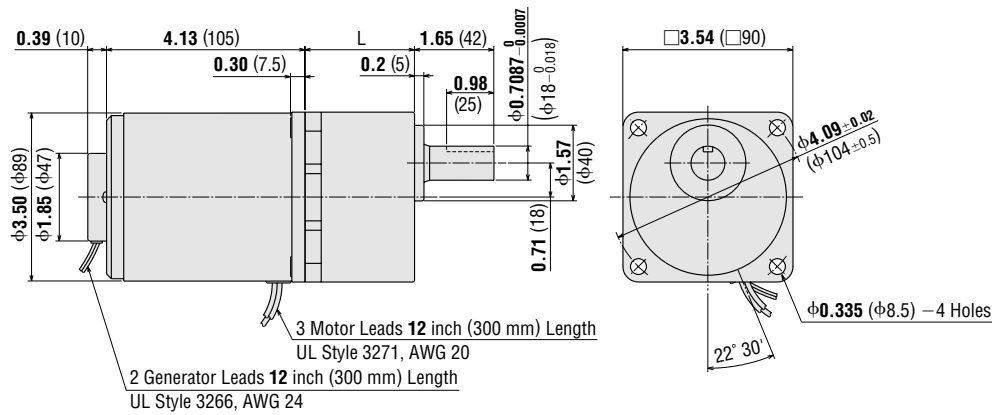
**VSR540A[C]-□U[E]**

Weight: 9.0 lb. (4.1 kg) (Including Gearhead)

**DXF** A218A (Gear Ratio: **5~18**)

A218B (Gear Ratio: **30~90**)

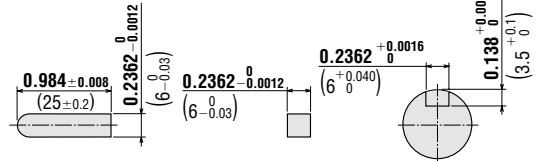
A218C (Gear Ratio: **120~300**)



Gear Ratio: 5~18: L = **1.77** (45)  
 Gear Ratio: 30~90: L = **2.28** (58)  
 Gear Ratio: 120~300: L = **2.52** (64)

● **Key and Key Slot (Scale 1/2)**

(The key is provided with the gearhead)





◆ Combination Type

**VS1560A[C]-□U[E]**

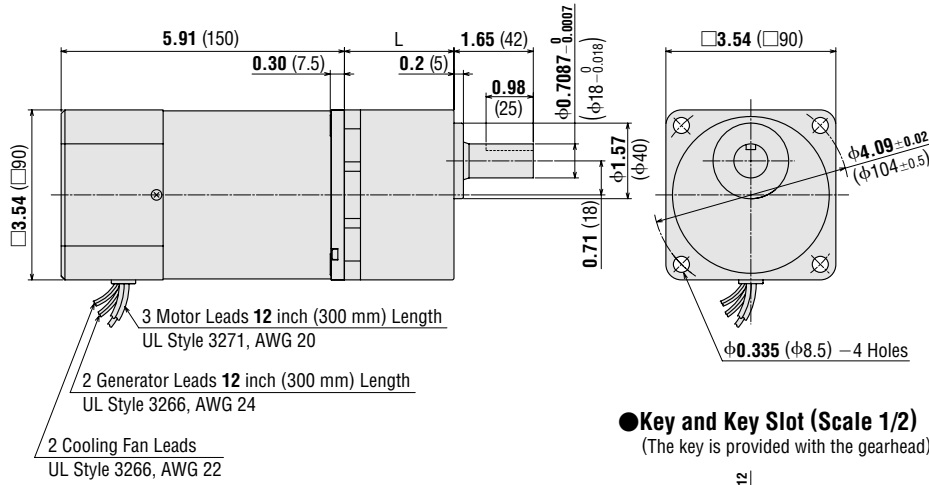
**VSR560A[C]-□U[E]**

Weight: 9.5 lb. (4.3 kg) (Including Gearhead)

**DXF** A395A (Gear Ratio: **5~18**)

A395B (Gear Ratio: **30~90**)

A395C (Gear Ratio: **120~300**)



Gear Ratio: 5~18: L = 1.77 (45)

Gear Ratio: 30~90: L = 2.28 (58)

Gear Ratio: 120~300: L = 2.52 (64)

◆ Combination Type

**VS1590A[C]-□U[E]**

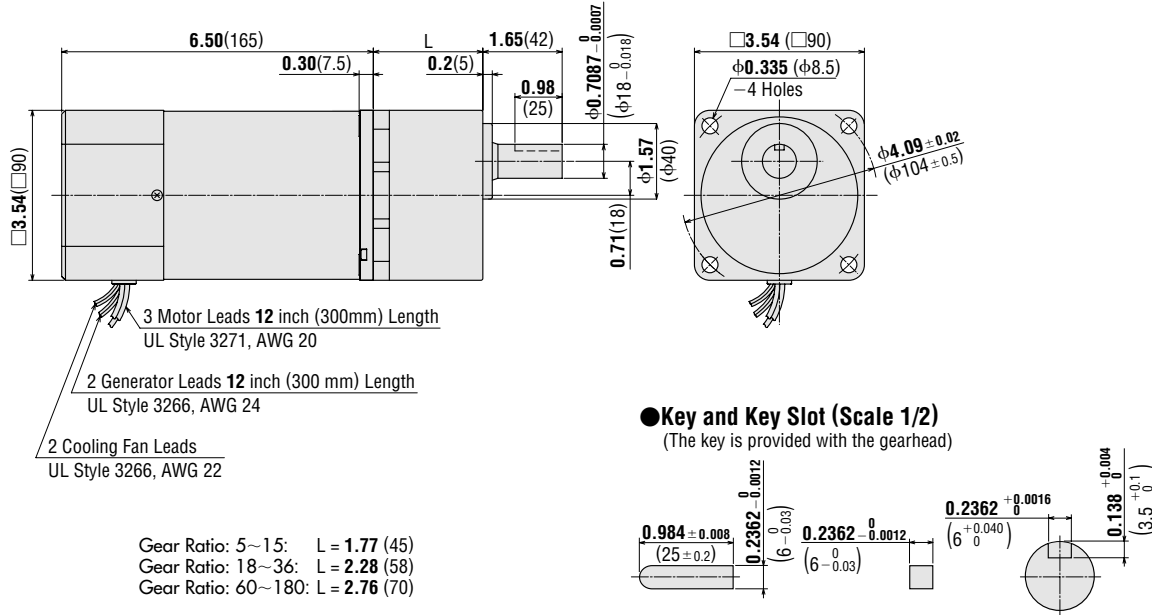
**VSR590A[C]-□U[E]**

Weight: 10.6 lb. (4.8 kg) (Including Gearhead)

**DXF** A396A (Gear Ratio: **5~15**)

A396B (Gear Ratio: **18~36**)

A396C (Gear Ratio: **60~180**)



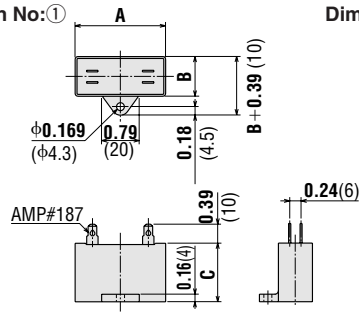
Gear Ratio: 5~15: L = 1.77 (45)

Gear Ratio: 18~36: L = 2.28 (58)

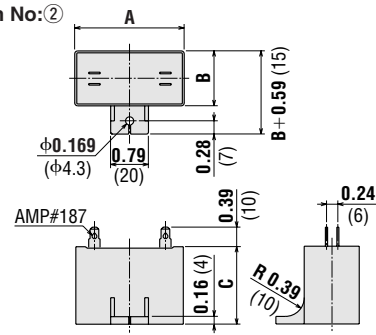
Gear Ratio: 60~180: L = 2.76 (70)

## Capacitor Dimensions Unit = inch (mm)

### Capacitor (Included) Dimension No: ①



### Dimension No: ②



### World K Series

Model		Capacitor Model	A	B	C	Weight oz. (g)	Dimension No.	
Pinion Shaft Type	Round Shaft Type							
<b>2IK6RGN-AWU</b>	<b>2IK6RA-AWU</b>	CH25FAUL	1.22 (31)	0.67 (17)	1.06 (27)	0.71 (20)	①	
<b>2IK6RGN-CWE</b>	<b>2IK6RA-CWE</b>	CH06BFAUL	1.22 (31)	0.57 (14.5)	0.93 (23.5)	0.53 (15)		
<b>3IK15RGN-AWU</b>	<b>3IK15RA-AWU</b>	CH45FAUL	1.46 (37)	0.71 (18)	1.06 (27)	1.06 (30)		
<b>3IK15RGN-CWE</b>	<b>3IK15RA-CWE</b>	CH10BFAUL	1.46 (37)	0.71 (18)	1.06 (27)	1.06 (30)		
<b>4IK25RGN-AWU</b>	<b>4IK25RA-AWU</b>	CH65CFAUL	1.5 (38)	0.83 (21)	1.22 (31)	1.24 (35)		
<b>4IK25RGN-CWE</b>	<b>4IK25RA-CWE</b>	CH15BFAUL	1.5 (38)	0.83 (21)	1.22 (31)	1.24 (35)		
<b>5IK40RGN-AWU</b>	<b>5IK40RA-AWU</b>	CH90CFAUL	1.89 (48)	0.83 (21)	1.22 (31)	1.41 (40)		
<b>5IK40RGN-CWE</b>	<b>5IK40RA-CWE</b>	CH23BFAUL	1.89 (48)	0.83 (21)	1.22 (31)	1.41 (40)		
<b>5IK60RGU-AWU</b>	<b>5IK60RA-AWU</b>	CH180CFAUL	2.28 (58)	0.93 (23.5)	1.46 (37)	2.5 (70)		②
<b>5IK60RGU-CWE</b>	<b>5IK60RA-CWE</b>	CH40BFAUL	2.28 (58)	0.93 (23.5)	1.46 (37)	2.5 (70)		
<b>2RK6RGN-AWU</b>	<b>2RK6RA-AWU</b>	CH35FAUL	1.22 (31)	0.67 (17)	1.06 (27)	0.71 (20)	①	
<b>2RK6RGN-CWE</b>	<b>2RK6RA-CWE</b>	CH08BFAUL	1.22 (31)	0.67 (17)	1.06 (27)	0.71 (20)		
<b>3RK15RGN-AWU</b>	<b>3RK15RA-AWU</b>	CH60CFAUL	1.5 (38)	0.83 (21)	1.22 (31)	1.41 (40)		
<b>3RK15RGN-CWE</b>	<b>3RK15RA-CWE</b>	CH15BFAUL	1.5 (38)	0.83 (21)	1.22 (31)	1.24 (35)		
<b>4RK25RGN-AWU</b>	<b>4RK25RA-AWU</b>	CH80CFAUL	1.89 (48)	0.75 (19)	1.14 (29)	1.41 (40)		
<b>4RK25RGN-CWE</b>	<b>4RK25RA-CWE</b>	CH20BFAUL	1.89 (48)	0.75 (19)	1.14 (29)	1.24 (35)		
<b>5RK40RGN-AWU</b>	<b>5RK40RA-AWU</b>	CH120CFAUL	2.28 (58)	0.83 (21)	1.22 (31)	1.77 (50)		
<b>5RK40RGN-CWE</b>	<b>5RK40RA-CWE</b>	CH35BFAUL	2.28 (58)	0.87 (22)	1.38 (35)	1.94 (55)		
<b>5RK60RGU-AWU</b>	<b>5RK60RA-AWU</b>	CH200CFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.4 (95)		②
<b>5RK60RGU-CWE</b>	<b>5RK60RA-CWE</b>	CH50BFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.0 (85)		

• If you need to order a capacitor without a motor, add "-C" to the capacitor model name shown. A capacitor cap is included with a capacitor.

### V Series

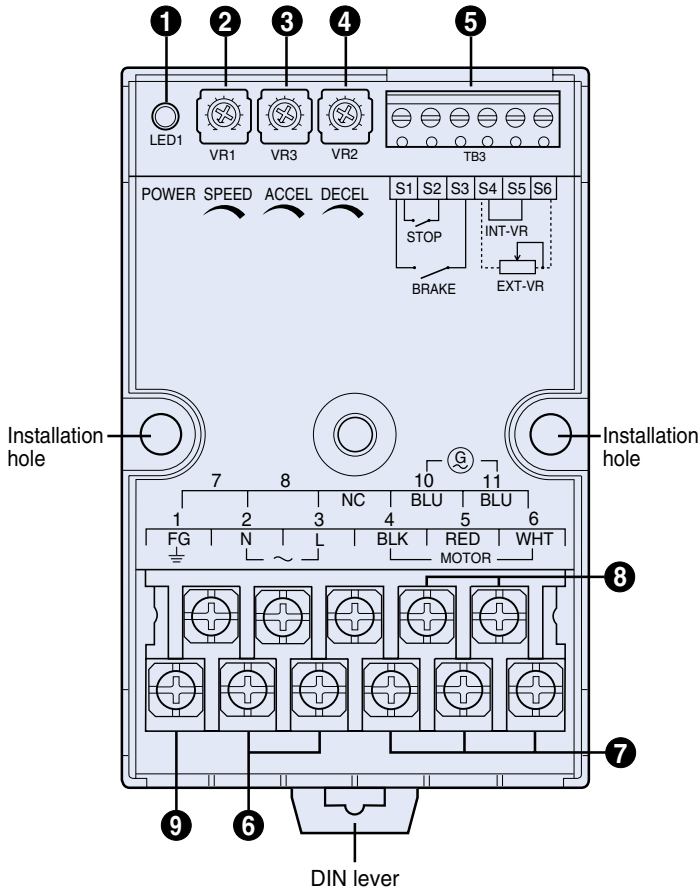
Model Combination Type	Capacitor Model	A	B	C	Weight oz. (g)	Dimension No.	
<b>VSI206A-□U</b>	CH25FAUL	1.22 (31)	0.67 (17)	1.06 (27)	0.71 (20)	①	
<b>VSI206C-□E</b>	CH06BFAUL	1.22 (31)	0.57 (14.5)	0.93 (23.5)	0.53 (15)		
<b>VSI315A-□U</b>	CH45FAUL	1.46 (37)	0.71 (18)	1.06 (27)	1.06 (30)		
<b>VSI315C-□E</b>	CH10BFAUL	1.46 (37)	0.71 (18)	1.06 (27)	1.06 (30)		
<b>VSI425A-□U</b>	CH65CFAUL	1.5 (38)	0.83 (21)	1.22 (31)	1.24 (35)		
<b>VSI425C-□E</b>	CH15BFAUL	1.5 (38)	0.83 (21)	1.22 (31)	1.24 (35)		
<b>VSI540A-□U</b>	CH90CFAUL	1.89 (48)	0.83 (21)	1.22 (31)	1.41 (40)		
<b>VSI540C-□E</b>	CH23BFAUL	1.89 (48)	0.83 (21)	1.22 (31)	1.41 (40)		
<b>VSI560A-□U</b>	CH180CFAUL	2.28 (58)	0.93 (23.5)	1.46 (37)	2.5 (70)		②
<b>VSI560C-□E</b>	CH40BFAUL	2.28 (58)	0.93 (23.5)	1.46 (37)	2.5 (70)		
<b>VSI590A-□U</b>	CH200CFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.4 (95)	①	
<b>VSI590C-□E</b>	CH60BFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.0 (85)		
<b>VSR206A-□U</b>	CH35FAUL	1.22 (31)	0.67 (17)	1.06 (27)	0.71 (20)		
<b>VSR206C-□E</b>	CH08BFAUL	1.22 (31)	0.67 (17)	1.06 (27)	0.71 (20)		
<b>VSR315A-□U</b>	CH60CFAUL	1.5 (38)	0.83 (21)	1.22 (31)	1.41 (40)		
<b>VSR315C-□E</b>	CH15BFAUL	1.5 (38)	0.83 (21)	1.22 (31)	1.24 (35)		
<b>VSR425A-□U</b>	CH80CFAUL	1.89 (48)	0.75 (19)	1.14 (29)	1.41 (40)		
<b>VSR425C-□E</b>	CH20BFAUL	1.89 (48)	0.75 (19)	1.14 (29)	1.24 (35)		
<b>VSR540A-□U</b>	CH120CFAUL	2.28 (58)	0.83 (21)	1.22 (31)	1.77 (50)		②
<b>VSR540C-□E</b>	CH35BFAUL	2.28 (58)	0.87 (22)	1.38 (35)	1.94 (55)		
<b>VSR560A-□U</b>	CH200CFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.4 (95)		
<b>VSR560C-□E</b>	CH50BFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.0 (85)		
<b>VSR590A-□U</b>	CH300CFAUL	2.28 (58)	1.38 (35)	1.97 (50)	4.9 (140)		
<b>VSR590C-□E</b>	CH70BFAUL	2.28 (58)	1.38 (35)	1.97 (50)	4.6 (130)		

• If you need to order a capacitor without a motor, add "-C" to the capacitor model name shown. A capacitor cap is included with a capacitor.

## ■ Connection and Operation

### ● Names and Function of Parts

The illustration has the cover removed. Install the cover after connection.

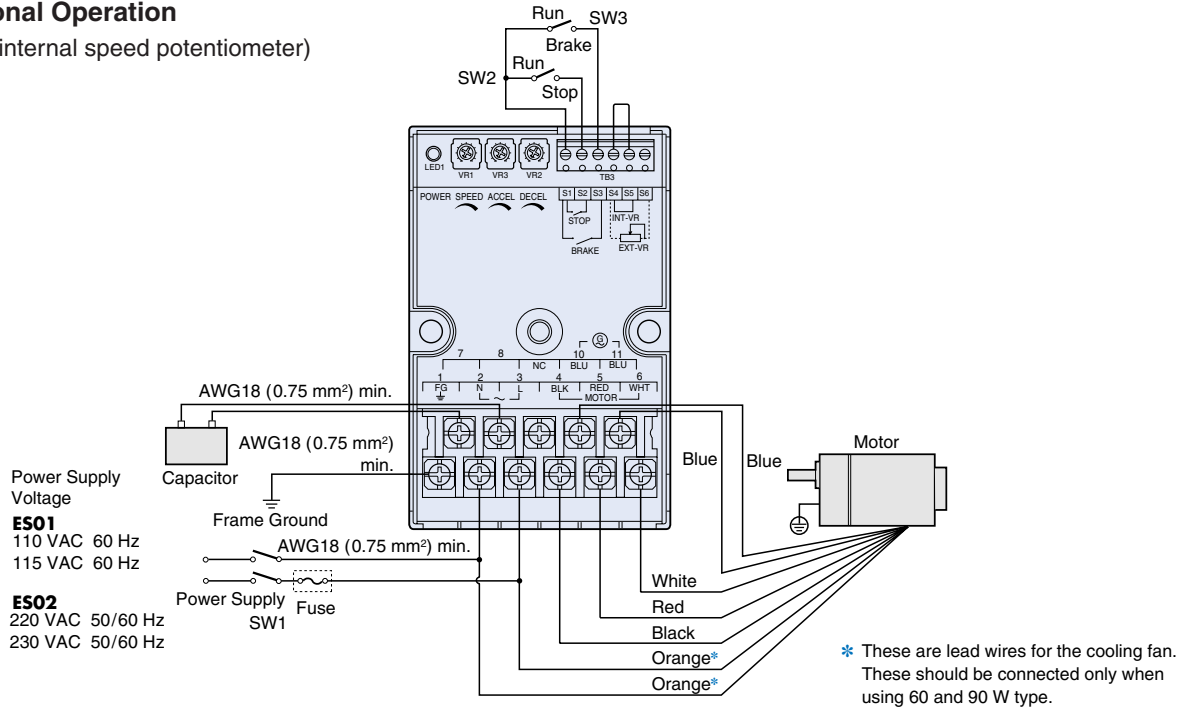


- 1 POWER LED**  
Turns on (green) while power is being supplied.
- 2 Internal speed potentiometer**  
Set the motor's operating speed.
- 3 Acceleration time potentiometer**  
Set the acceleration time for motor startup.
- 4 Deceleration time potentiometer**  
Set the deceleration time for motor stop.
- 5 Control input terminal**
  - S1 Common terminal for running and braking
  - S2 Run/Stop input  
Runs (OFF) or stops (ON) the motor.
  - S3 Run/Brake input  
Runs (OFF) or brakes (ON) the motor.
  - S4, S5, S6 Speed potentiometer inputs  
When S4 and S5 are shorted, the speed can be set using the internal speed potentiometer (INT-VR).  
When S4 and S5 are open, the speed can be set using an external speed potentiometer (EXT-VR).  
When using an external speed potentiometer, connect it to S4 and S6.
- 6 Power connection terminal (terminals 2 and 3)**
- 7 Motor connection terminal (terminals 4, 5 and 6)**
- 8 Generator connection terminal (terminals 10 and 11)**  
Connect the blue generator lead wires.
- 9 FG terminal (terminal 1)**

● **Connection Diagrams**

◆ **Uni-directional Operation**

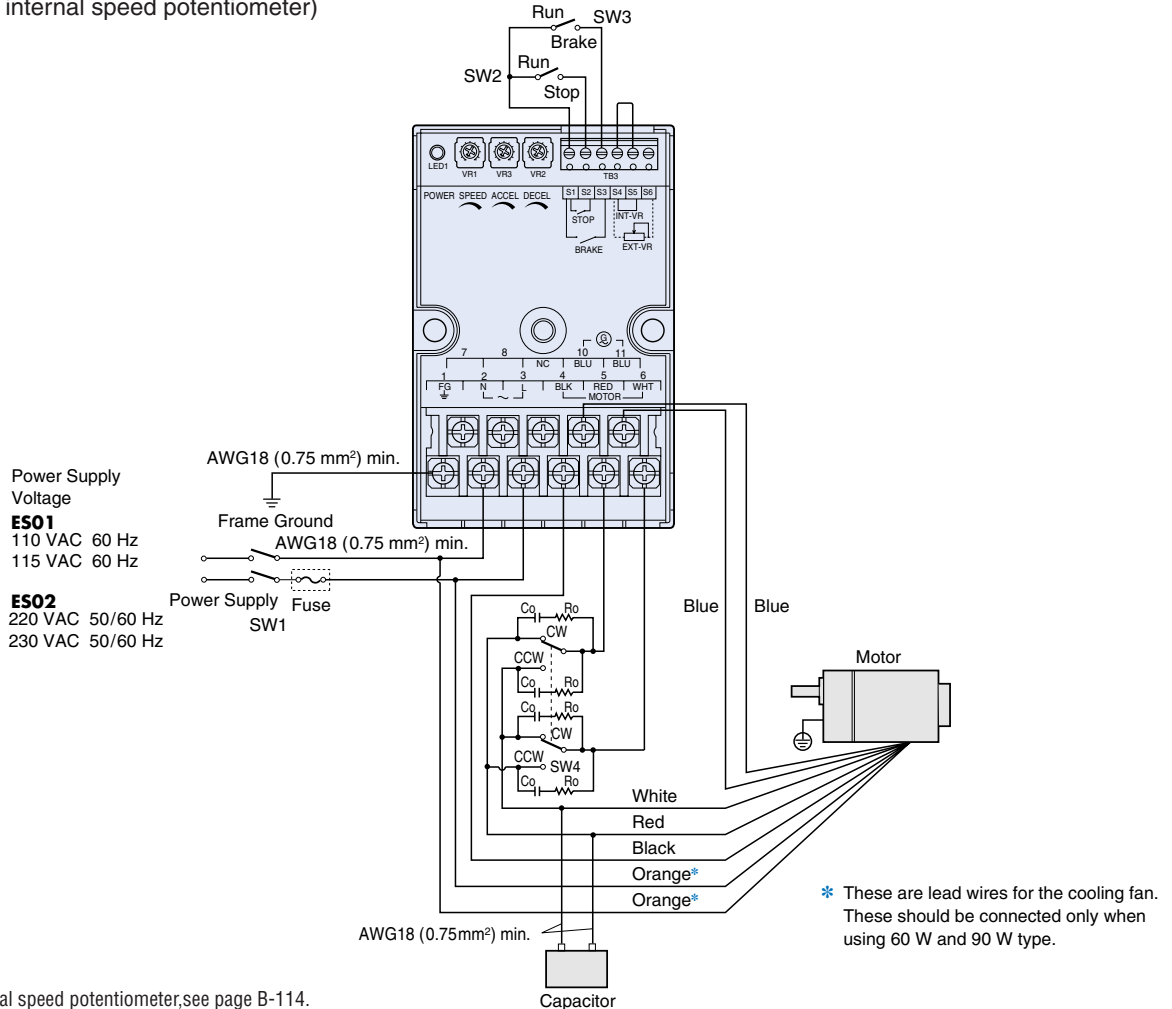
(When using internal speed potentiometer)



- For uni-directional operation, connect the lead wires of the motor to the controller in this order: For CW operation, connect the Red wire to terminal #5 and the White wire to terminal #6. For CCW operation, connect the White wire to terminal #5 and the Red wire to terminal #6.
- When using external speed potentiometer, see page B-114.

◆ **Bi-directional Operation**

(When using internal speed potentiometer)



- When using external speed potentiometer, see page B-114.

● Specifications of the Switches and Fuse

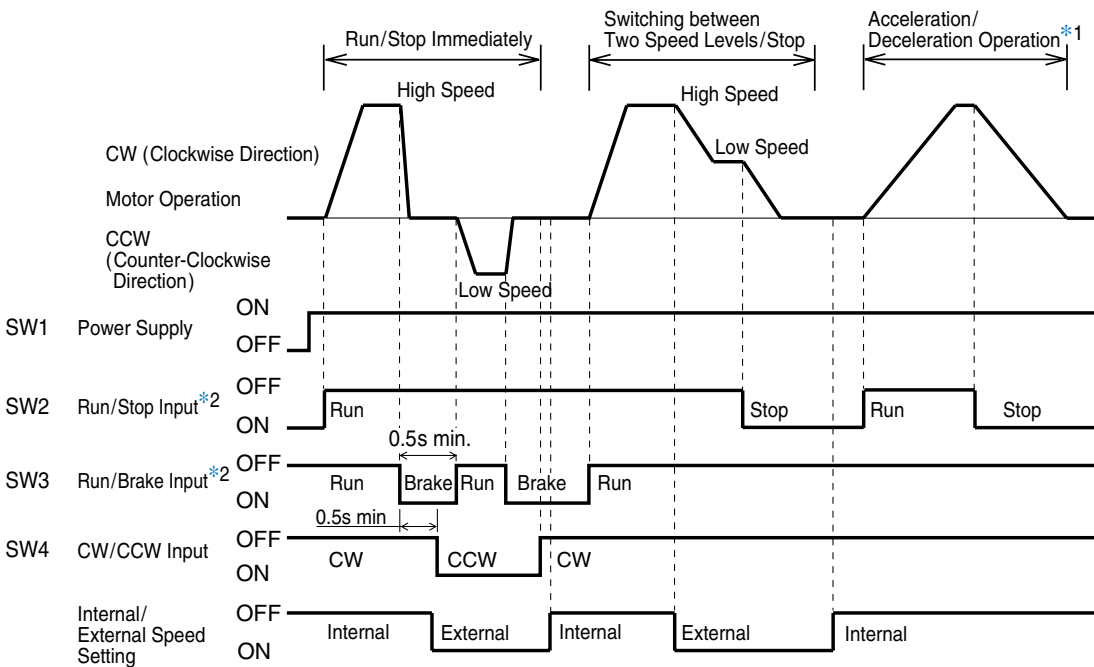
Power Supply Voltage	110/115 VAC (ES01)	220/230 VAC (ES02)
SW1	125 VAC 10 A	250 VAC 5 A
SW2, SW3	18 VDC 1 mA	
SW4	125 VAC 10 A	250 VAC 5 A
R0, C0 (Surge suppressor)	R0=5~200 Ω C0=0.1~0.2 μF, 200 WV	R0=5~200 Ω C0=0.1~0.2 μF, 400 WV
Fuse	Product certified under the UL/CSA248-14 standard or equivalent 250 VAC 10 A	Product certified under the UL/CSA248-14 standard or equivalent 250 VAC 5 A

Precaution for wiring

- The control input terminals are not insulated from the AC power supply. Any equipment (sequencer, relay and/or switch) that will be connected to the control input terminals must have contact ratings of 18 VDC and 1 mA min. The control input terminals are not insulated from the AC power supply. Do not use a transistor output type controller.
- The length of the cable connecting the motor and speed controller should be no more than 32.8 feet (10 m).
- The length of the control cable should be no more than 6.6 feet (2 m) and as short as possible.
- Connect a surge suppressor across SW4. Oriental Motor also provides an optional **EPCR1202-2** CR circuit for surge suppression. →Page A-218

● Timing Chart

The timing chart below shows an example of switching between two speed levels when the high speed and low speed are selected via the internal and external speed potentiometers, respectively.



\*1 Case where the acceleration and deceleration times are set longer by turning each potentiometer clockwise.  
 \*2 In case SW2 and SW3 are turned on at the same time, Stop Input is given priority.

● Run/Brake, Stop

Setting SW2/SW3 to “Run” (OFF) causes the motor to rotate at the speed set via the speed potentiometers.

Setting SW2 to “Stop” (ON) during operation causes the motor to coast to a stop.

Setting SW3 to “Brake” (ON) during operation causes the motor to stop immediately.

The braking function (current through the motor) is only active for approximately 0.4 seconds after the Run/Brake input is turned ON. Do not switch over to SW2, SW3, SW4 for 0.5 seconds. Otherwise, damage to the speed controller may result.

Run/Stop Input	Run/Brake Input	Motor Operation
OFF	OFF	Runs
OFF	ON	Stops Immediately
ON	OFF	Coasts to a Stop*

\* The slow down time set with a potentiometer is longer than the time which motor coasts to a stop, motor will stop with slow down time.

● Switching the Direction of Rotation

SW4 is used to switch the motor’s direction of rotation.

When SW4 is set to CW, the motor rotates in the clockwise direction, as seen from the motor’s output-shaft side.

When SW4 is set to CCW, the motor rotates in the counterclockwise direction, as seen from the motor’s output-shaft side.

The rotating direction of the gear output shaft is opposite that of the motor shaft, depends on the gear ratio.

- Instant switching between forward and reverse operations is possible with a reversible motor. Connect a surge suppressor between the relay contacts. Oriental Motor also provides an optional **EPCR1201-2** CR circuit for surge suppression. →Page A-218
- For bi-directional operation of an induction motor, switch the rotating direction after the motor has come to a complete stop.

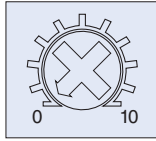
● **Speed Setting Methods**

The following two methods of setting speed can be used. The motor does not operate in multi-motor control.

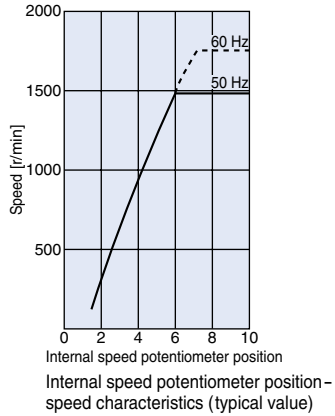
◆ **Internal Speed Potentiometer**

The setting range is from 90 to 1400 r/min at 50 Hz or 90 to 1600 r/min at 60 Hz. Short the speed potentiometer input terminals S4 and S5.

Turning the potentiometer clockwise will set a faster speed. The factory setting is 0 r/min.

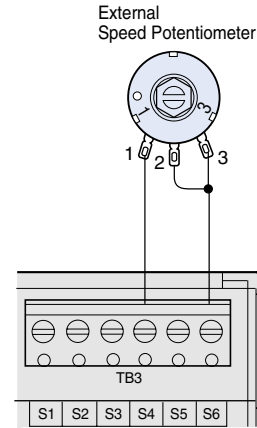


Internal Speed Potentiometer

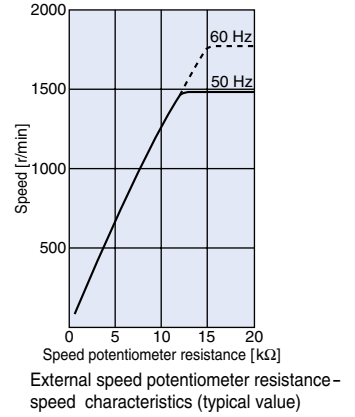


◆ **External Speed Potentiometer (included)**

Open the speed potentiometer input terminals S4 and S5. Before connecting, turn the dial on the external speed potentiometer counterclockwise to set the speed to 0 r/min. Turning the dial clockwise will set a faster speed.



20 kΩ 1/4 W with a linear resistance vs. angle curve



**Note:**

Do not operate multiple speed controllers with a single external speed potentiometer. Doing so may damage the speed controllers.

● **Acceleration and Deceleration Operation**

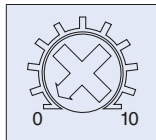
Equipment and loads are subject to large acceleration/deceleration force when starting, stopping, and changing speeds. When you want to accelerate/decelerate without any accompanying shock, the acceleration/deceleration time can be extended using the slow start/slow down function. The slow start/slow down time can be set using acceleration/deceleration time potentiometers built into the control pack. However, when the load inertia is large, the deceleration time cannot be set at a shorter time than when the motor is stopped naturally.

◆ **Acceleration**

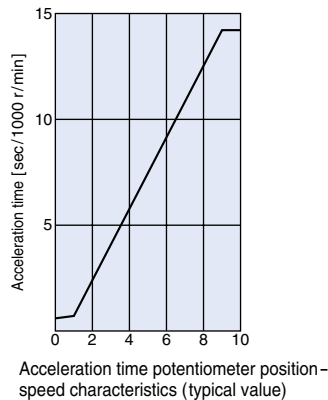
The acceleration function is actuated at start or when the speed is switched to the higher setting in a two-level speed control system.

Turning the acceleration time potentiometer clockwise will increase the set time.

The factory setting is 0 (no acceleration).



Acceleration Time Potentiometer

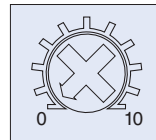


◆ **Deceleration**

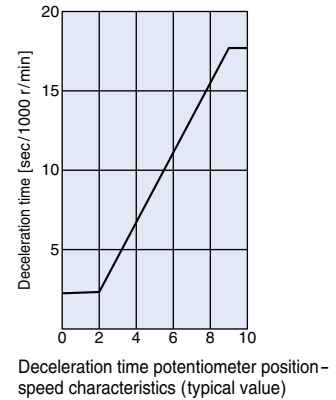
The deceleration function is actuated during natural stop or when the speed is switched to the lower setting in a two-level speed control system.

Turning the deceleration time potentiometer clockwise will increase the set time.

The factory setting is 0 (no deceleration).



Deceleration Time Potentiometer



## ● Repeated Operation/Braking Cycle

When running/braking of the motor is repeated in short cycles, the rise in motor temperature will increase and the continuous-operation time will be limited.

Use the following values as a guideline:

Motor Output		Repetition Cycle
HP	W	
1/125~1/19	6~40	2 seconds min. (Running 1 second, stopping 1 second)
1/12, 1/8	60, 90	4 seconds min. (Running 2 seconds, stopping 2 seconds)

### Note:

• The motor may generate heat, depending on the conditions in which it is driven. Ensure that the temperature of the motor case does not exceed 194°F (90°C).

## ● Braking Current

When the motor is commanded to stop immediately, the following braking current will flow. Provide an appropriate power supply by referring to these values.

Motor Output		Braking Current (Peak Value) [A]	
HP	W	Single-Phase 110/115 VAC	Single-Phase 220/230 VAC
1/125	6	1.5	1.0
1/50	15	3.5	2.0
1/30	25	5.5	3.0
1/19	40	8.5	6.0
1/12	60	15.5	8.0
1/8	90	20.5	12.0

## ■ List of Motor and Gearhead Combinations

Model names for motor/gearhead combinations are shown below.

### ● Induction Motors

Output Power		Model	Motor Model	Gearhead Model
HP	W			
1/125	6	<b>VSI206A-□U</b>	VSI206A-GV	GV2G□
		<b>VSI206C-□E</b>	VSI206C-GV	
1/50	15	<b>VSI315A-□U</b>	VSI315A-GV	GV3G□
		<b>VSI315C-□E</b>	VSI315C-GV	
1/30	25	<b>VSI425A-□U</b>	VSI425A-GV	GV4G□
		<b>VSI425C-□E</b>	VSI425C-GV	
1/19	40	<b>VSI540A-□U</b>	VSI540A-GVH	GVH5G□
		<b>VSI540C-□E</b>	VSI540C-GVH	
1/12	60	<b>VSI560A-□U</b>	VSI560A-GVH	GVH5G□
		<b>VSI560C-□E</b>	VSI560C-GVH	
1/8	90	<b>VSI590A-□U</b>	VSI590A-GVR	GVR5G□
		<b>VSI590C-□E</b>	VSI590C-GVR	

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

### ● Reversible Motors

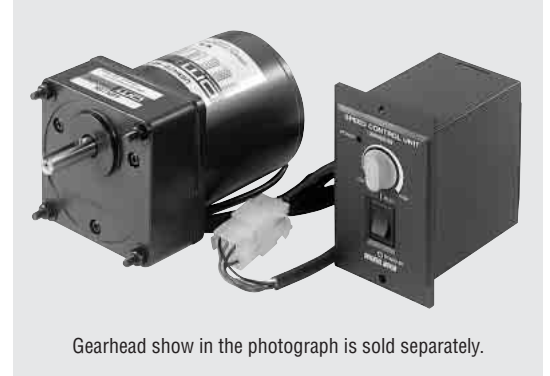
Output Power		Model	Motor Model	Gearhead Model
HP	W			
1/125	6	<b>VSR206A-□U</b>	VSR206A-GV	GV2G□
		<b>VSR206C-□E</b>	VSR206C-GV	
1/50	15	<b>VSR315A-□U</b>	VSR315A-GV	GV3G□
		<b>VSR315C-□E</b>	VSR315C-GV	
1/30	25	<b>VSR425A-□U</b>	VSR425A-GV	GV4G□
		<b>VSR425C-□E</b>	VSR425C-GV	
1/19	40	<b>VSR540A-□U</b>	VSR540A-GVH	GVH5G□
		<b>VSR540C-□E</b>	VSR540C-GVH	
1/12	60	<b>VSR560A-□U</b>	VSR560A-GVH	GVH5G□
		<b>VSR560C-□E</b>	VSR560C-GVH	
1/8	90	<b>VSR590A-□U</b>	VSR590A-GVR	GVR5G□
		<b>VSR590C-□E</b>	VSR590C-GVR	

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

## AC Motor Systems

# US Series

The **US** Series combines a control unit and an AC speed control motor. Connection between the motor and control unit is simplified by an easy-to-use connector. The **US** Series is designed for applications where remote control of the motor speed and easy installation are required.



Gearhead shown in the photograph is sold separately.

### ■ Features

#### ● Easy Connection

Control units combine the control pack, potentiometer and capacitor into one device (except 60 W and 90 W models). Operation is possible just by connecting the control unit into the power supply after connecting the motor and control unit together using the connector.

#### ● Easy Operation

The speed can be set easily with the potentiometer on the front panel of the control unit.

#### ● Approved by Safety Standards

The **US** Series is recognized by UL/CSA standards and conforms to EN standards. CE marking is used in accordance with the Low Voltage Directives.

### ■ Safety Standards and CE Marking

	Standards	Certification Body	Standards File No.	CE Marking
Motor	UL1004 UL2111	UL	E64199 (6 W type) E64197 (15 W~90 W type)	Low Voltage Directives
	CSA C22.2 No.100 CSA C22.2 No.77			
	EN60950	VDE	114919ÜG (6 W type) 6751ÜG (15 W~90 W type)	
	EN60034-1 EN60034-5	Conform to EN/IEC Standards		
	IEC60034-11 (15 W~90 W type)			
Control Unit	UL508	UL	E91291	
	CSA C22.2 No.14			
	EN60950 EN50178	Conform to EN/IEC Standards		

- When the system is approved under various safety standards, the model names on the motor and control unit are the approved model names.

**List of Motor and Control Unit Combinations** → Page B-130

- Details of Safety Standards** → Page G-2

- Single-Phase 220/230 VAC models conform to EMC directives.

The EMC value changes according to the wiring and layout. Therefore, the final EMC level must be checked with the motor/control unit incorporated in the user's equipment.

### ■ Product Line

#### ● Single-Phase 110/115 VAC

Output Power		Model	
HP	W	Pinion Shaft	Round Shaft
1/125	6	<b>US206-401U</b>	<b>US206-001U</b>
1/50	15	<b>US315-401U</b>	<b>US315-001U</b>
1/30	25	<b>US425-401U</b>	<b>US425-001U</b>
1/19	40	<b>US540-401U</b>	<b>US540-001U</b>
1/12	60	<b>US560-501U</b>	<b>US560-001U</b>
1/8	90	<b>US590-501U</b>	<b>US590-001U</b>

#### ● Single-Phase 220/230 VAC

Output Power		Model	
HP	W	Pinion Shaft	Round Shaft
1/125	6	<b>US206-402E</b>	<b>US206-002E</b>
1/50	15	<b>US315-402E</b>	<b>US315-002E</b>
1/30	25	<b>US425-402E</b>	<b>US425-002E</b>
1/19	40	<b>US540-402E</b>	<b>US540-002E</b>
1/12	60	<b>US560-502E</b>	<b>US560-002E</b>
1/8	90	<b>US590-502E</b>	<b>US590-002E</b>



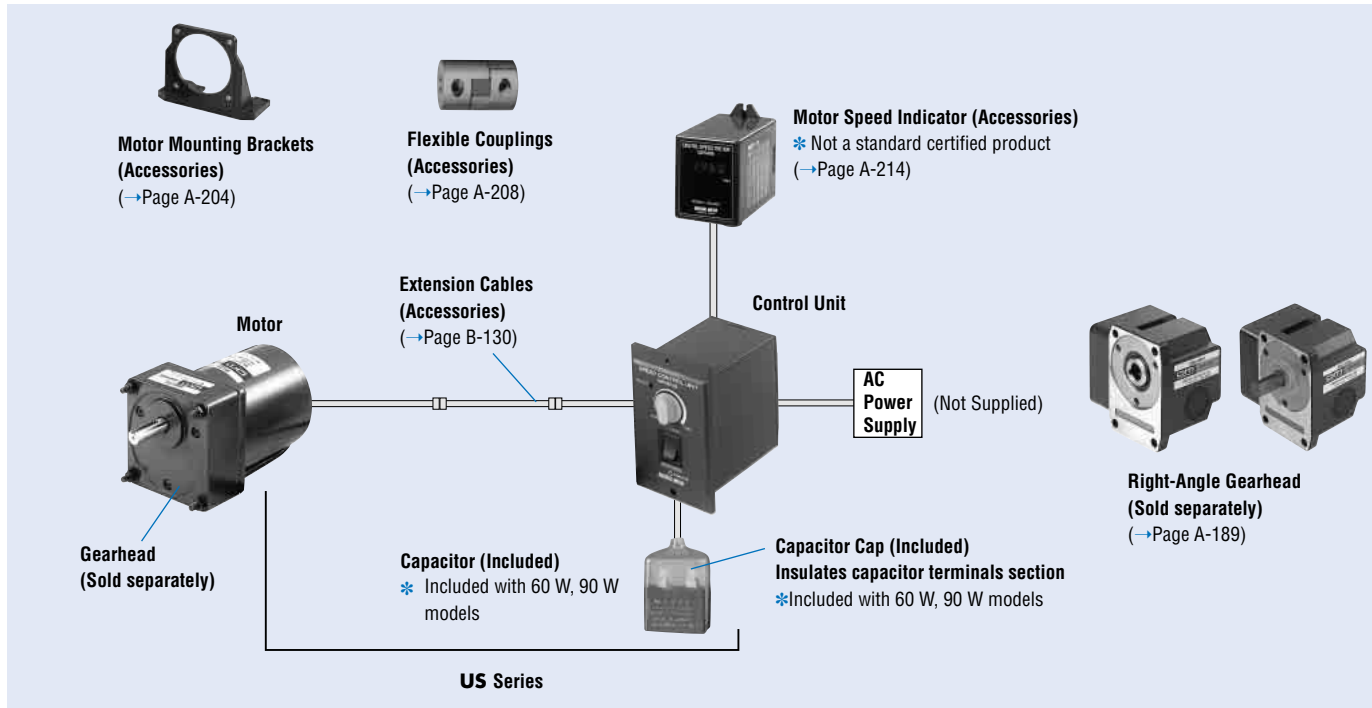
● Gearheads (Sold Separately)

Motor Model	Gearhead Model
<b>US206</b> Type	<b>2GN3KA~2GN180KA</b>
	<b>2GN10XK</b> (Decimal Gearhead)
<b>US315</b> Type	<b>3GN3KA~3GN180KA</b>
	<b>3GN10XK</b> (Decimal Gearhead)
<b>US425</b> Type	<b>4GN3KA~4GN180KA</b>
	<b>4GN10XK</b> (Decimal Gearhead)
<b>US540</b> Type	<b>5GN3KA~5GN180KA</b>
	<b>5GN10XK</b> (Decimal Gearhead)
<b>US560, US590</b> Type	<b>5GU3KA~5GU180KA</b>
	<b>5GU10XKB</b> (Decimal Gearhead)
<b>US590</b> Type	<b>5GU50KHA~5GU180KHA</b>
	<b>5GU10XK</b> (Decimal Gearhead)

● Right-Angle Gearheads (Sold Separately)

Type of Shaft	Gearhead Model
Hollow Shaft	<b>4GN3.6RH~4GN180RH</b>
	<b>5GN3.6RH~5GN180RH</b>
	<b>5GU3.6RH~5GU180RH</b>
Solid Shaft	<b>4GN3.6RAA~4GN180RAA</b>
	<b>5GN3RAA~5GN180RAA</b>
	<b>5GU3RAA~5GU180RAA</b>

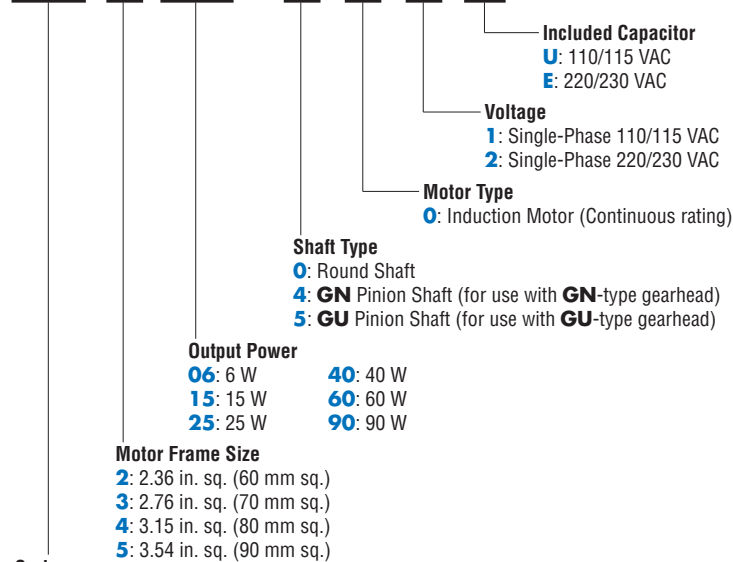
■ System Configuration



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

■ Product Number Code

**US 5 60 - 5 0 1 U**



Product Number Code of the Gearheads →Page A-16

## Specifications

Model		Maximum Output Power HP W	Voltage VAC	Frequency Hz	Speed Range r/min	Permissible Torque				Starting Torque		Current A	Power Consumption W
Pinion Shaft	Round Shaft					oz-in	mN·m	1200r/min	90r/min	oz-in	mN·m		
Ⓟ <b>US206-401U</b>	<b>US206-001U</b>	1/125 6	Single-Phase 110	60	90~1600	7.1	50	4.2	30	4.9	35	0.24	24
			Single-Phase 115	60	90~1600	7.1	50	4.2	30	4.9	35	0.25	28
Ⓟ <b>US206-402E</b>	<b>US206-002E</b>	1/125 6	Single-Phase 220	50	90~1400	7.1	50	4.1	29	4.1	29	0.13	25
			Single-Phase 220	60	90~1600	7.1	50	4.1	29	3.8	27	0.13	27
			Single-Phase 230	50	90~1400	7.1	50	4.1	29	4.1	29	0.13	28
			Single-Phase 230	60	90~1600	7.1	50	4.1	29	4.1	29	0.13	28
Ⓟ <b>US315-401U</b>	<b>US315-001U</b>	1/50 15	Single-Phase 110	60	90~1600	17.7	125	6.3	45	7.8	55	0.47	44
			Single-Phase 115	60	90~1600	17.7	125	6.3	45	7.8	55	0.50	44
Ⓟ <b>US315-402E</b>	<b>US315-002E</b>	1/50 15	Single-Phase 220	50	90~1400	17.7	125	4.9	35	7.6	54	0.21	40
			Single-Phase 220	60	90~1600	12	85	4.9	35	7.3	52	0.18	39
			Single-Phase 230	50	90~1400	17.7	125	4.9	35	7.6	54	0.21	41
			Single-Phase 230	60	90~1600	14.9	105	4.9	35	7.8	55	0.22	44
Ⓟ <b>US425-401U</b>	<b>US425-001U</b>	1/30 25	Single-Phase 110	60	90~1600	28	200	7.1	50	14.9	105	0.74	70
			Single-Phase 115	60	90~1600	28	200	7.1	50	14.9	105	0.74	73
Ⓟ <b>US425-402E</b>	<b>US425-002E</b>	1/30 25	Single-Phase 220	50	90~1400	26	190	6.1	43	12.3	87	0.33	60
			Single-Phase 220	60	90~1600	18.4	130	6.1	43	11.3	80	0.31	59
			Single-Phase 230	50	90~1400	26	190	6.6	47	12.3	87	0.35	62
			Single-Phase 230	60	90~1600	18.4	130	6.1	43	12.3	87	0.31	60
Ⓟ <b>US540-401U</b>	<b>US540-001U</b>	1/19 40	Single-Phase 110	60	90~1600	36	260	9.9	70	25.0	180	1.1	102
			Single-Phase 115	60	90~1600	36	260	9.9	70	25.0	180	1.1	105
Ⓟ <b>US540-402E</b>	<b>US540-002E</b>	1/19 40	Single-Phase 220	50	90~1400	42	300	8.9	63	19.8	140	0.53	90
			Single-Phase 220	60	90~1600	32	230	8.9	63	17.7	125	0.55	98
			Single-Phase 230	50	90~1400	42	300	8.9	63	19.8	140	0.53	90
			Single-Phase 230	60	90~1600	32	230	8.9	63	19.8	140	0.55	100
Ⓟ <b>US560-501U</b>	<b>US560-001U</b>	1/12 60	Single-Phase 110	60	90~1600	69	490	28	200	40	285	2.0	178
			Single-Phase 115	60	90~1600	69	490	28	200	40	285	2.1	186
Ⓟ <b>US560-502E</b>	<b>US560-002E</b>	1/12 60	Single-Phase 220	50	90~1400	69	490	19.8	140	34	240	0.85	154
			Single-Phase 220	60	90~1600	63	450	22	160	29	210	0.86	159
			Single-Phase 230	50	90~1400	69	490	19.8	140	34	240	0.89	154
			Single-Phase 230	60	90~1600	63	450	22	160	34	240	0.88	165
Ⓟ <b>US590-501U</b>	<b>US590-001U</b>	1/8 90	Single-Phase 110	60	90~1600	103	730	28	200	57	405	2.6	230
			Single-Phase 115	60	90~1600	103	730	28	200	57	405	2.6	246
Ⓟ <b>US590-502E</b>	<b>US590-002E</b>	1/8 90	Single-Phase 220	50	90~1400	103	730	32	230	51	360	1.1	200
			Single-Phase 220	60	90~1600	103	730	36	260	51	360	1.2	221
			Single-Phase 230	50	90~1400	103	730	32	230	56	400	1.2	201
			Single-Phase 230	60	90~1600	103	730	36	260	56	400	1.2	227

Ⓟ: Impedance Protected.

Ⓟ: Contains a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor automatically restarts. Be sure to turn off the power before inspecting.

• The speed ranges shown are under no load conditions.

• The "U" and "E" at the end of the model number indicate that the unit includes a capacitor. These letters are not listed on the motor nameplate.

## General Specifications of the Motor

Item	Specifications
Insulation Resistance	100 MΩ or more when 500 VDC is applied between the windings and the frame after rated motor 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 after rated motor operation under normal ambient temperature and humidity for 1 minute.
Temperature Rise	144°F (80°C) or less measured by the resistance change method after rated operation of motor with connected gearhead or equivalent heat radiation plate*.
Overheating Protection Device	<b>US206</b> models are impedance protected. All others have built-in thermal protector (Automatic return type) Operating temperature, open: 266°F±9°F (130°C±5°C) Close: 179.6°F±27°F (82°C±15°C)
Insulation Class	Class B (266°F [130°C])
Ambient Temperature Range	14°F~104°F (-10°C~+40°C) (nonfreezing)
Ambient Humidity	85% maximum (non condensing)
Degree of Protection	<b>US206, US315, US425, US540</b> : IP20 <b>US560, US590</b> : IP40

\* Heat radiation plate (material: Aluminum)

Model (output)	Size inch (mm)	Thickness inch (mm)
<b>US206</b> Type (6 W)	4.53×4.53 (115×115)	0.20 (5)
<b>US315</b> Type (15 W)	4.92×4.92 (125×125)	
<b>US425</b> Type (25 W)	5.31×5.31 (135×135)	
<b>US540</b> Type (40 W)	6.50×6.50 (165×165)	
<b>US560</b> Type (60 W)	7.87×7.87 (200×200)	
<b>US590</b> Type (90 W)	7.87×7.87 (200×200)	

## General Specifications of the Control Unit

Item	Specifications
Insulation Resistance	100 MΩ or more when 500 VDC is applied between all the pins and the frame.
Dielectric Strength	Sufficient to withstand 2.3 kV (Single phase 220, 230 VAC: 3.0 kV) at 50 Hz and 60 Hz applied between all the pins and the frame for 1 minute.
Ambient Temperature Range	32°F~104°F (0°C~+40°C) (nonfreezing)
Ambient Humidity	85% maximum (noncondensing)
Degree of Protection	IP10

## Speed Range when Gearhead is Attached

Unit = r/min

Gear Ratio		3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
High Speed	60 Hz	533	444	320	266	213	177	128	106	88	64	53	44	32	26	21	17	16	13	10	8.8
	50 Hz	466	388	280	233	186	155	112	93	77	56	46	38	28	23	18	15	14	11	9	7
Low Speed		30	25	18	15	12	10	7.2	6	5	3.6	3	2.5	1.8	1.5	1.2	1	0.9	0.75	0.6	0.5

\* The speed range is under no load conditions.

## Permissible Torque when a Gearhead is Attached

When connecting a decimal gearhead with a gear ratio of 10:1 between the motor and the gearhead, the rotation rate is reduced. The permissible torque with decimal gearheads are as follows.

**2GN□KA/2GN10XK** 26 lb-in/3 N·m

**3GN□KA/3GN10XK** 44 lb-in/5 N·m

**4GN□KA/4GN10XK** 70 lb-in/8 N·m (Gear Ratio 25~36 53 lb-in/6 N·m)

**5GN□KA/5GN10XK** 88 lb-in/10 N·m

**5GU□KA/5GU10XKB** 177 lb-in/20 N·m

**5GU□KHA/5GU10XK** 260 lb-in/30 N·m

## Single-Phase 110/115 VAC

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

Model	Gear Ratio	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
<b>US206-401U</b> <b>/2GN□KA</b>	1200 r/min	1.06 0.12	1.32 0.15	1.77 0.2	2.1 0.24	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.4 0.73	8 0.91	9.7 1.1	11.5 1.3	15 1.7	17.7 2.0	22 2.5	26 3	26 3	26 3	26 3	26 3
	90 r/min	0.64 0.073	0.77 0.088	1.06 0.12	1.32 0.15	1.59 0.18	1.94 0.22	2.6 0.3	3.1 0.36	3.8 0.44	4.8 0.55	5.8 0.66	6.9 0.79	8.7 0.99	10.6 1.2	13.2 1.5	15.9 1.8	17.7 2.0	21 2.1	26 2.4	26 3
<b>US315-401U</b> <b>/3GN□KA</b>	1200 r/min	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.7 0.76	8 0.91	11.5 1.3	13.2 1.5	15.9 1.8	20 2.3	23 2.7	29 3.3	36 4.1	44 5	44 5	44 5	44 5	44 5	44 5	44 5
	90 r/min	0.97 0.11	1.15 0.13	1.59 0.18	1.94 0.22	2.3 0.27	2.9 0.33	4 0.46	4.8 0.55	5.8 0.66	7.2 0.82	8.7 0.99	10.6 1.2	13.2 1.5	15.9 1.8	19.4 2.2	23 2.7	26 3.0	31 3.6	39 4.5	44 5
<b>US425-401U</b> <b>/4GN□KA</b>	1200 r/min	4.3 0.49	5.1 0.58	7.1 0.81	8.5 0.97	10.6 1.2	13.2 1.5	17.7 2.0	21 2.4	25 2.9	32 3.7	38 4.4	46 5.3	58 6.6	69 7.9	70 8	70 8	70 8	70 8	70 8	70 8
	90 r/min	1.06 0.12	1.32 0.15	1.77 0.2	2.1 0.24	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.4 0.73	8 0.91	9.7 1.1	11.5 1.3	15 1.7	17.7 2.0	22 2.5	26 3.0	29 3.3	35 4.0	44 5.0	52 5.9
<b>US540-401U</b> <b>/5GN□KA</b>	1200 r/min	5.5 0.63	6.7 0.76	9.7 1.1	11.5 1.3	14.1 1.6	16.8 1.9	23 2.6	28 3.2	33 3.8	41 4.7	50 5.7	60 6.8	76 8.6	88 10	88 10	88 10	88 10	88 10	88 10	88 10
	90 r/min	1.5 0.17	1.77 0.2	2.4 0.28	3 0.34	3.8 0.43	4.5 0.51	6.2 0.71	7.5 0.85	8.8 1.0	11.5 1.3	13.2 1.5	15.9 1.8	20 2.3	24 2.8	30 3.5	37 4.2	40 4.6	48 5.5	61 6.9	73 8.3
<b>US560-501U</b> <b>/5GU□KA</b>	1200 r/min	10.6 1.2	12.3 1.4	17.7 2.0	21 2.4	26 3.0	31 3.6	39 4.5	47 5.4	56 6.4	71 8.1	85 9.7	102 11.6	143 16.2	171 19.4	177 20	177 20	177 20	177 20	177 20	177 20
	90 r/min	4.3 0.49	5.1 0.58	7.1 0.81	8.5 0.97	10.6 1.2	13.2 1.5	15.9 1.8	19.4 2.2	23 2.6	29 3.3	35 4.0	42 4.8	58 6.6	69 7.9	78 8.9	93 10.6	104 11.8	125 14.2	156 17.7	177 20
<b>US590-501U</b> <b>/5GU□KA</b>	1200 r/min	15.9 1.8	18.5 2.1	26 3.0	30 3.5	38 4.4	46 5.3	59 6.7	70 8.0	84 9.6	106 12.0	128 14.5	153 17.3	177 20	177 20	177 20	177 20	177 20	177 20	177 20	177 20
	90 r/min	4.3 0.49	5.1 0.58	7.1 0.81	8.5 0.97	10.6 1.2	13.2 1.5	15.9 1.8	19.4 2.2	23 2.6	29 3.3	35 4.0	42 4.8	58 6.6	69 7.9	78 8.9	93 10.6	104 11.8	125 14.2	156 17.7	177 20
<b>US590-501U</b> <b>/5GU□KHA</b>	1200 r/min	—	—	—	—	—	—	—	—	—	—	—	—	210 24.1	250 28.9	260 30	260 30	260 30	260 30	260 30	260 30
	90 r/min	—	—	—	—	—	—	—	—	—	—	—	—	58 6.6	69 7.9	78 8.9	93 10.6	104 11.8	125 14.2	156 17.7	187 21.2

- Gearheads and decimal gearheads are sold separately.
- 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.

**● Single-Phase 220/230 VAC**

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

Model	Gear Ratio	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180	
<b>US206-402E</b> <b>/2GN□KA</b>	1200 r/min	1.06 0.12	1.32 0.15	1.77 0.2	2.1 0.24	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.4 0.73	8 0.91	9.7 1.1	11.5 1.3	15 1.7	17.7 2.0	22 2.5	26 3	26 3	26 3	26 3	26 3	
	90 r/min	0.61 0.07	0.75 0.085	1.06 0.12	1.23 0.14	1.59 0.18	1.85 0.21	2.5 0.29	3 0.35	3.7 0.42	4.6 0.53	5.6 0.64	6.7 0.76	8.4 0.96	9.7 1.1	12.3 1.4	15 1.7	16.8 1.9	20 2.3	25 2.9	26 3	
<b>US315-402E</b> <b>/3GN□KA</b>	1200 r/min	220 VAC 60 Hz	1.85 0.21	2.2 0.25	3 0.34	3.6 0.41	4.6 0.52	5.4 0.62	7.6 0.86	8.8 1.0	10.6 1.2	14.1 1.6	16.8 1.9	19.4 2.2	24 2.8	30 3.4	37 4.2	44 5	44 5	44 5	44 5	44 5
		230 VAC 50 Hz	2.6 0.3	3.1 0.36	4.5 0.51	5.3 0.61	6.7 0.76	8 0.91	11.5 1.3	13.2 1.5	15.9 1.8	20 2.3	23 2.7	29 3.3	36 4.1	44 5	44 5	44 5	44 5	44 5	44 5	
		230 VAC 60 Hz	2.3 0.26	2.7 0.31	3.8 0.43	4.5 0.51	5.6 0.64	6.8 0.77	8.7 1.1	11.5 1.3	13.2 1.5	16.8 1.9	20 2.3	24 2.8	30 3.5	37 4.2	44 5	44 5	44 5	44 5	44 5	
	90 r/min	0.75 0.085	0.88 0.1	1.23 0.14	1.5 0.17	1.85 0.21	2.3 0.26	3 0.35	3.8 0.43	4.5 0.51	5.6 0.64	6.8 0.77	8.1 0.92	10.6 1.2	12.3 1.4	15 1.7	18.5 2.1	20 2.3	24 2.8	30 3.5	37 4.2	
<b>US425-402E</b> <b>/4GN□KA</b>	1200 r/min	220/230 VAC 60 Hz	2.8 0.32	3.3 0.38	4.6 0.53	5.5 0.63	6.9 0.79	8.4 0.95	11.5 1.3	14.1 1.6	16.8 1.9	21 2.4	24 2.8	30 3.4	38 4.3	45 5.1	56 6.4	68 7.7	70 8	70 8	70 8	70 8
		230 VAC 50 Hz	4 0.46	4.8 0.55	6.8 0.77	8.1 0.92	10.6 1.2	12.3 1.4	16.8 1.9	20 2.3	24 2.8	30 3.5	37 4.2	44 5.0	55 6.3	66 7.5	70 8	70 8	70 8	70 8	70 8	
	90 r/min	220/230 VAC 60 Hz	0.88 0.1	1.15 0.13	1.5 0.17	18.5 0.21	2.3 0.26	2.7 0.31	3.8 0.44	4.6 0.52	5.5 0.63	6.9 0.78	8.3 0.94	9.7 1.1	12.3 1.4	15 1.7	18.5 2.1	23 2.6	24 2.8	30 3.4	38 4.3	45 5.1
		230 VAC 50 Hz	0.97 0.11	1.23 0.14	1.68 0.19	2 0.23	2.5 0.29	3 0.34	4.2 0.48	5 0.57	6.1 0.69	7.6 0.86	8.8 1.0	10.6 1.2	14.1 1.6	16.8 1.9	20 2.3	24 2.8	27 3.1	32 3.7	41 4.7	49 5.6
<b>US540-402E</b> <b>/5GN□KA</b>	1200 r/min	220/230 VAC 60 Hz	4.9 0.56	5.9 0.67	8.2 0.93	9.7 1.1	12.3 1.4	15 1.7	20 2.3	24 2.8	30 3.4	37 4.2	44 5.0	53 6.0	67 7.6	80 9.1	88 10	88 10	88 10	88 10	88 10	88 10
		230 VAC 50 Hz	6.4 0.73	7.6 0.87	10.6 1.2	13.2 1.5	15.9 1.8	19.4 2.2	26 3.0	31 3.6	38 4.4	48 5.5	58 6.6	69 7.9	87 9.9	88 10	88 10	88 10	88 10	88 10	88 10	
	90 r/min	1.32 0.15	1.59 0.18	2.3 0.26	2.7 0.31	3.3 0.38	4 0.46	5.6 0.64	6.8 0.77	8.1 0.92	9.7 1.1	12.3 1.4	15 1.7	18.5 2.1	22 2.5	27 3.1	32 3.7	37 4.2	44 5.0	54 6.2	66 7.5	
<b>US560-502E</b> <b>/5GU□KA</b>	1200 r/min	220/230 VAC 60 Hz	9.7 1.1	11.5 1.3	15.9 1.8	19.4 2.2	23 2.7	29 3.3	36 4.1	43 4.9	52 5.9	65 7.4	78 8.9	94 10.7	131 14.9	157 17.8	176 19.9	177 20	177 20	177 20	177 20	177 20
		230 VAC 50 Hz	10.6 1.2	12.3 1.4	17.7 2.0	21 2.4	26 3.0	31 3.6	39 4.5	47 5.4	56 6.4	71 8.1	85 9.7	102 11.6	143 16.2	171 19.4	177 20	177 20	177 20	177 20	177 20	
	90 r/min	220/230 VAC 60 Hz	3.4 0.39	4.1 0.47	5.7 0.65	6.9 0.78	8.5 0.97	10.6 1.2	13.2 1.5	15.9 1.8	18.5 2.1	23 2.6	28 3.2	33 3.8	46 5.3	55 6.3	62 7.1	75 8.5	83 9.4	100 11.3	125 14.2	150 17
		230 VAC 50 Hz	3 0.34	3.6 0.41	5 0.57	6 0.68	7.5 0.85	8.8 1.0	11.5 1.3	13.2 1.5	15.9 1.8	20 2.3	24 2.8	29 3.3	40 4.6	48 5.5	54 6.2	65 7.4	73 8.3	87 9.9	109 12.4	131 14.9
<b>US590-502E</b> <b>/5GU□KA</b>	1200 r/min	15.9 1.8	18.5 2.1	26 3.0	30 3.5	38 4.4	46 5.3	59 6.7	70 8.0	84 9.6	106 12.0	128 14.5	153 17.3	177 20	177 20	177 20	177 20	177 20	177 20	177 20	177 20	
	90 r/min	220/230 VAC 60 Hz	5.5 0.63	6.7 0.76	9.7 1.1	11.5 1.3	14.1 1.6	16.8 1.9	21 2.4	24 2.8	30 3.4	38 4.5	45 5.1	54 6.2	76 8.6	91 10.3	101 11.5	122 13.8	135 15.3	162 18.4	177 20	177 20
		230 VAC 50 Hz	4.9 0.56	5.9 0.67	8.2 0.93	9.7 1.1	12.3 1.4	15 1.7	18.5 2.1	22 2.5	26 3.0	33 3.8	40 4.6	48 5.5	67 7.6	80 9.1	107 10.2	120 12.2	144 13.6	177 16.3	177 20	
<b>US590-502E</b> <b>/5GU□KHA</b>	1200 r/min	—	—	—	—	—	—	—	—	—	—	—	—	210 24.1	250 28.9	260 30	260 30	260 30	260 30	260 30	260 30	
	90 r/min	220/230 VAC 60 Hz	—	—	—	—	—	—	—	—	—	—	—	—	76 8.6	91 10.3	101 11.5	122 13.8	135 15.3	162 18.4	177 20	177 20
		230 VAC 50 Hz	—	—	—	—	—	—	—	—	—	—	—	—	67 7.6	80 9.1	107 10.2	120 12.2	144 13.6	180 20.4	210 24.4	

- Gearheads and decimal gearheads are sold separately.
- 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.

**■ Gearmotor — Torque Table when a Right-Angle Gearhead is Attached**

→Page A-196

**■ Permissible Overhung Load and Permissible Thrust Load**

Motor (Round shaft type)→Page A-11

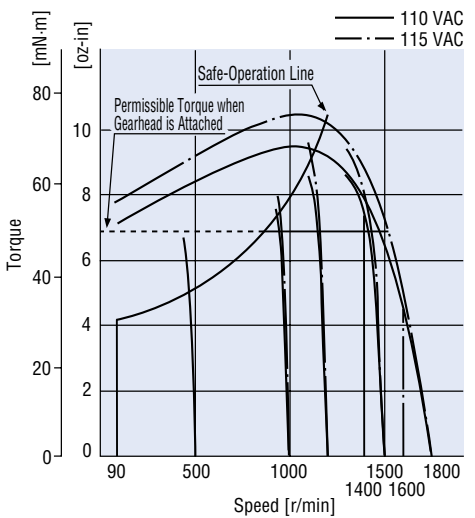
Gearhead→Page A-11

**■ Permissible Load Inertia J for Gearhead**

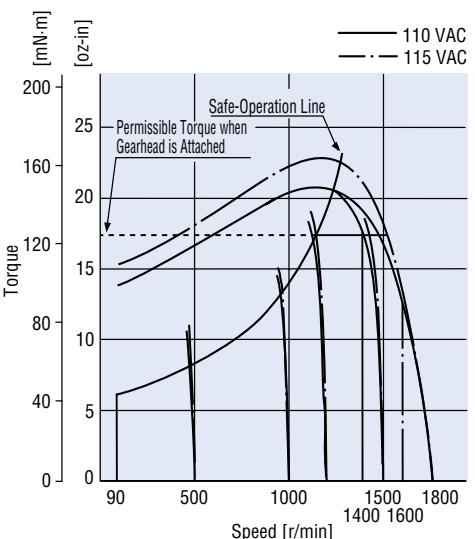
→Page A-12

# Speed — Torque Characteristics

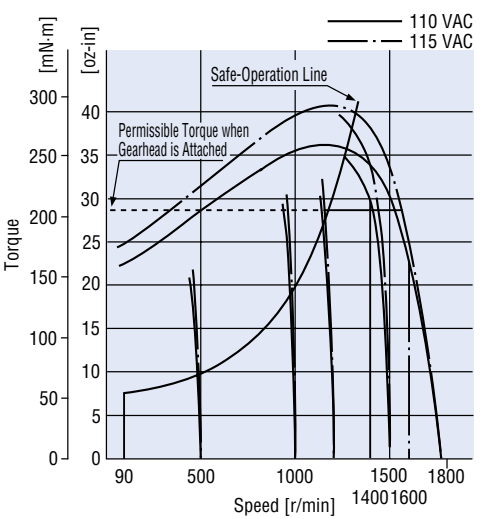
**US206-401U**  
**US206-001U**



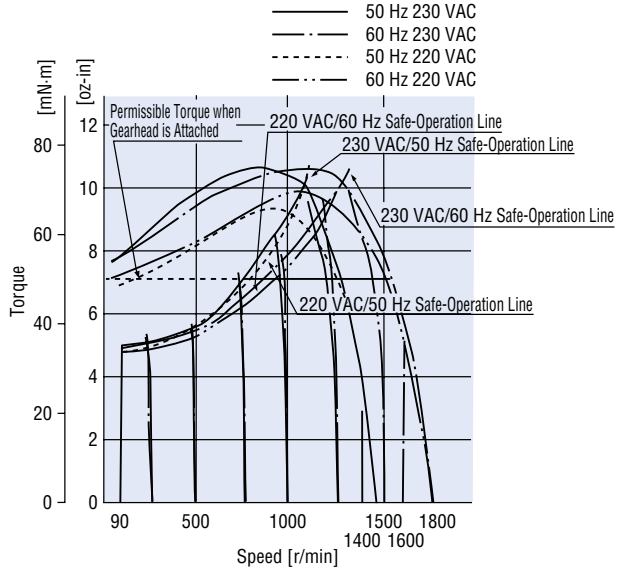
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**US315-001U**



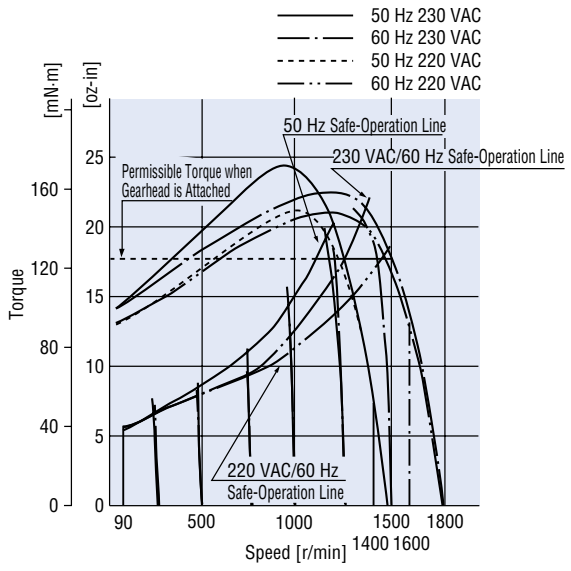
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**US425-001U**



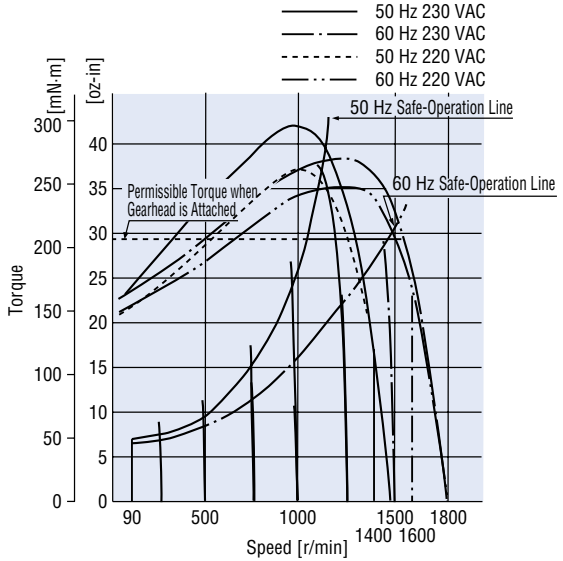
**US206-402E**  
**US206-002E**



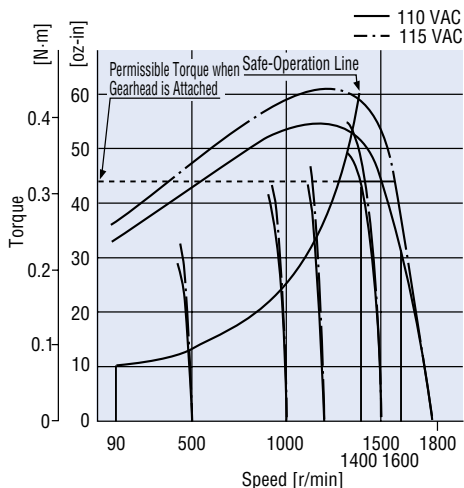
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**US315-002E**



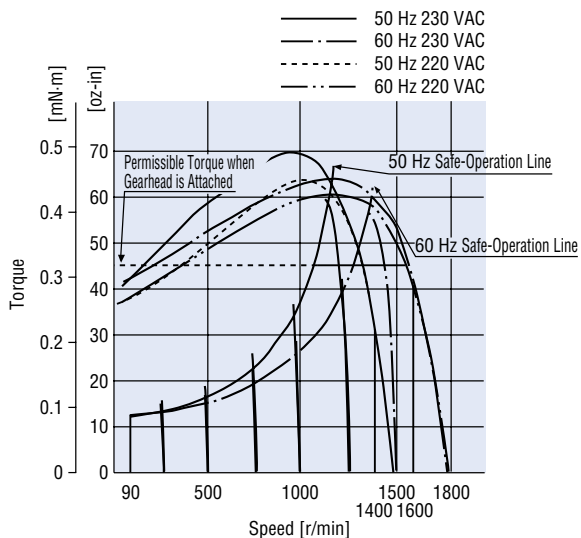
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**US425-001E**



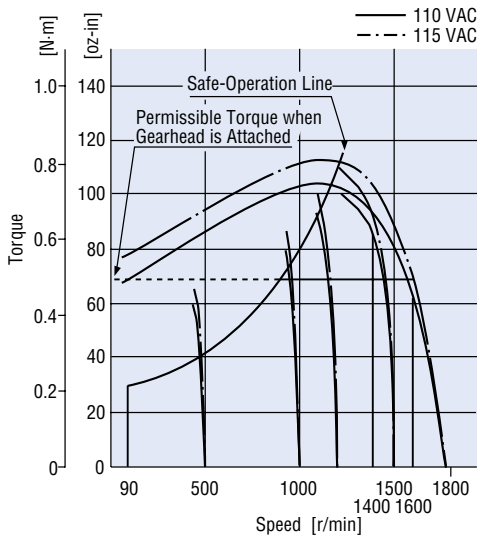
**US540-401U**  
**US540-001U**



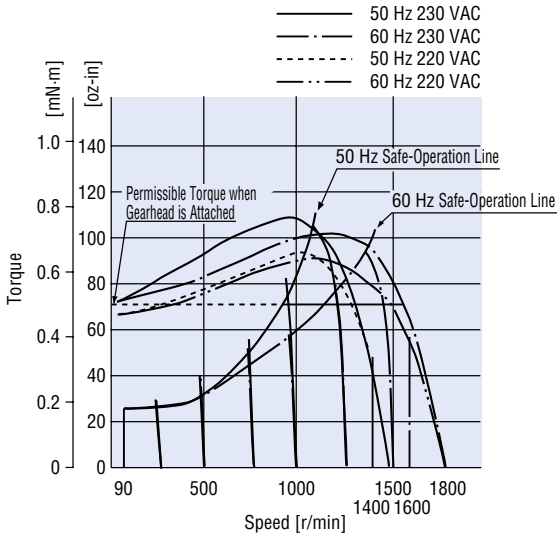
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**US540-002E**



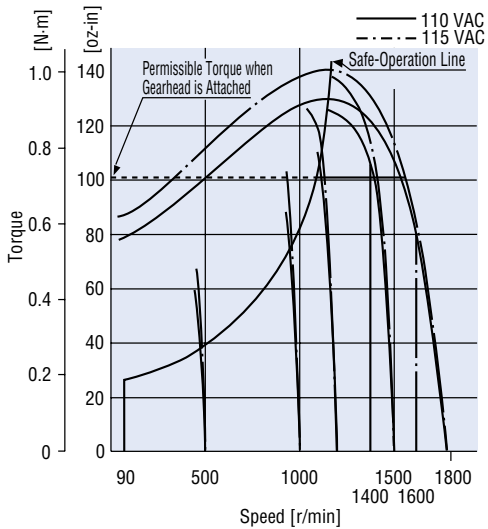
**US560-501U**  
**US560-001U**



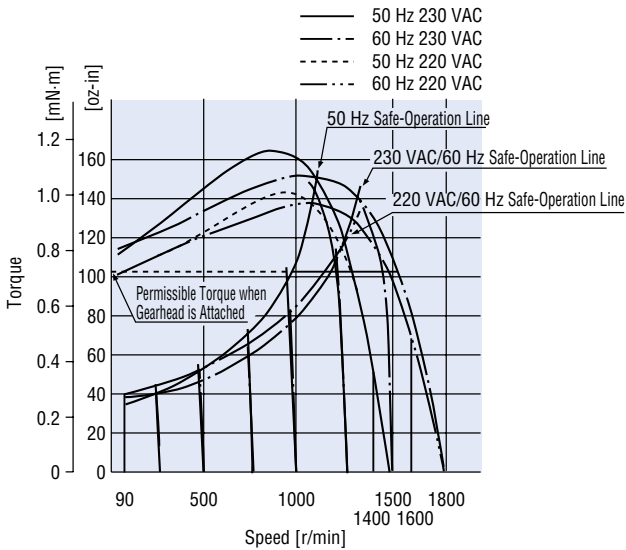
**US560-502E**  
**US560-002E**



**US590-501U**  
**US590-001U**



**US590-502E**  
**US590-002E**



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

Mounting screws are included with gearheads. Dimensions for screws → Page A-223

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

### ● Motor/Gearhead

**US206-401U, US206-402E** (Pinion Shaft Type)

Motor: USM206-401W, USM206-402W

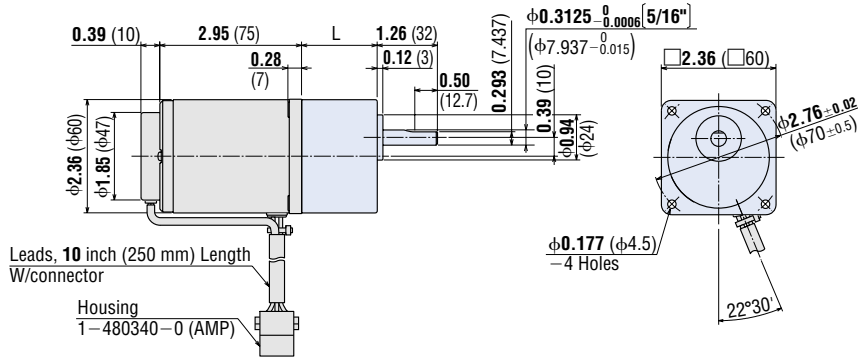
Weight: 1.76 lb. (0.8 kg)

Gearhead: **2GN□KA**

Weight: 0.88 lb. (0.4 kg)

**DXF** A078AU (**2GN3KA~18KA**)

A078BU (**2GN25KA~180KA**)



**2GN3KA~18KA:** L = 1.18 (30)  
**2GN25KA~180KA:** L = 1.57 (40)

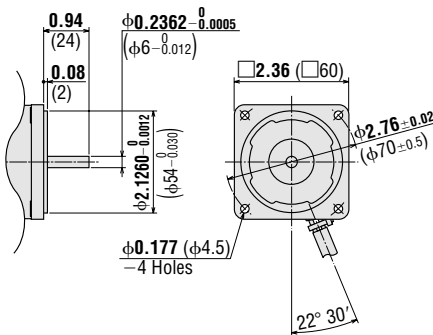
### ● Round Shaft Type

**US206-001U, US206-002E**

Motor: USM206-001W, USM206-002W

Weight: 1.76 lb. (0.8 kg)

**DXF** A354



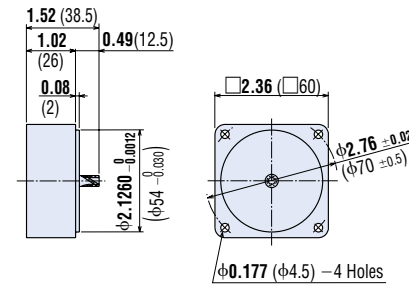
### ● Decimal Gearhead

Can be connected to **US206GN** pinion shaft type

**2GN10XK**

Weight: 0.44 lb. (0.2 kg)

**DXF** A003



### ● Motor/Gearhead

**US315-401U, US315-402E** (Pinion Shaft Type)

Motor: USM315-401W, USM315-402W

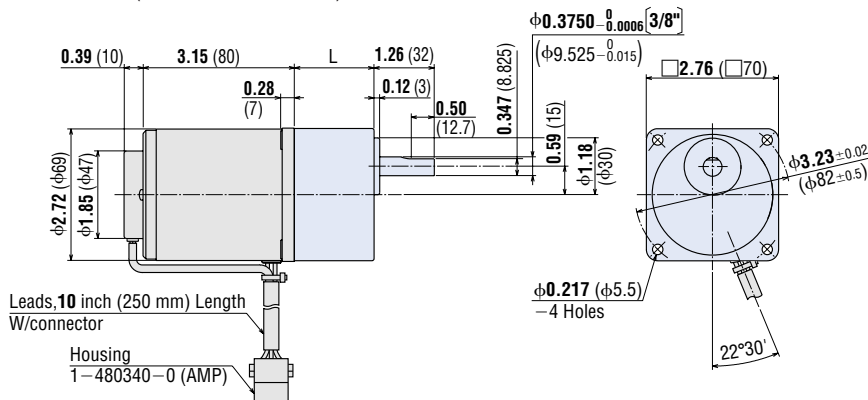
Weight: 2.6 lb. (1.2 kg)

Gearhead: **3GN□KA**

Weight: 1.21 lb. (0.55 kg)

**DXF** A079AU (**3GN3KA~18KA**)

A079BU (**3GN25KA~180KA**)

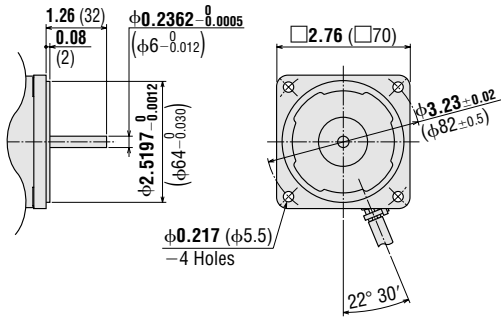


**3GN3KA~18KA:** L = 1.26 (32)  
**3GN25KA~180KA:** L = 1.65 (42)

● Round Shaft Type  
**US315-001U, US315-002E**

Motor: USM315-001W, USM315-002W  
 Weight: 2.6 lb. (1.2 kg)

DXF A355



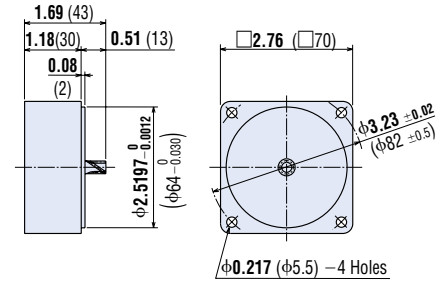
● Decimal Gearhead

Can be connected to **US315GN** pinion shaft type

**3GN10XK**

Weight: 0.66 lb. (0.3 kg)

DXF A009



● Motor/Gearhead

**US425-401U, US425-402E** (Pinion Shaft Type)

Motor: USM425-401W, USM425-402W

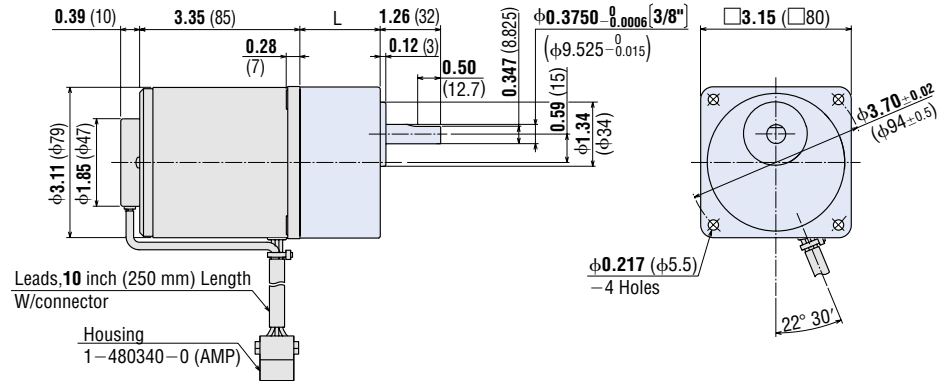
Weight: 3.5 lb. (1.6 kg)

Gearhead: **4GN□KA**

Weight: 1.43 lb. (0.65 kg)

DXF A080AU (**4GN3KA~18KA**)

A080BU (**4GN25KA~180KA**)



**4GN3KA~18KA:** L = 1.26 (32)  
**4GN25KA~180KA:** L = 1.67 (42.5)

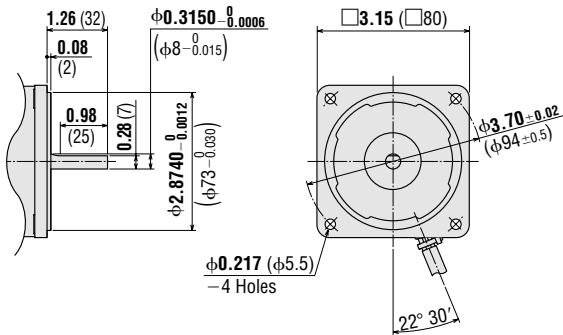
● Round Shaft Type

**US425-001U, US425-002E**

Motor: USM425-001W, USM425-002W

Weight: 3.5 lb. (1.6 kg)

DXF A356



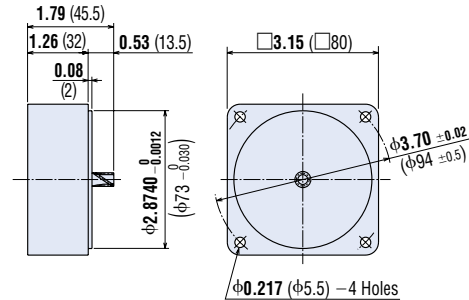
● Decimal Gearhead

Can be connected to **US425GN** pinion shaft type

**4GN10XK**

Weight: 0.88 lb. (0.4 kg)

DXF A013







● **Round Shaft Type**  
**US560-001U, US560-002E**

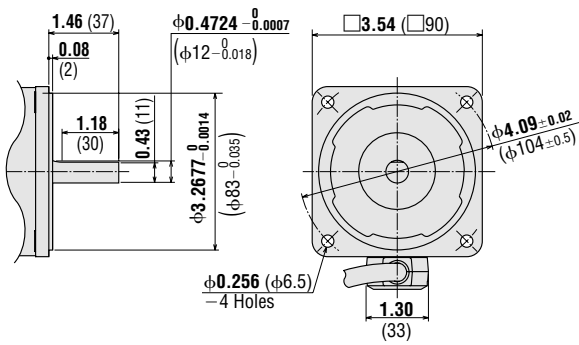
Motor: USM560-001W, USM560-002W  
 Weight: 6.2 lb. (2.8 kg)

DXF A358

● **US590-001U, US590-002E**

Motor: USM590-001W, USM590-002W  
 Weight: 7.9 lb. (3.6 kg)

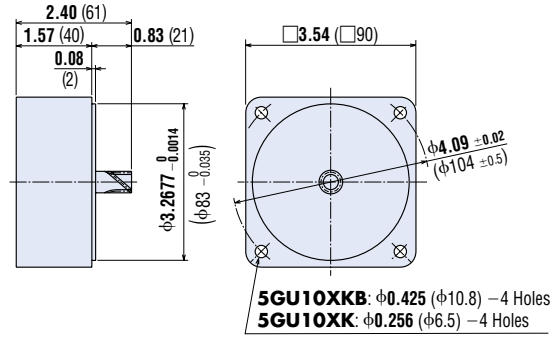
DXF A359



● **Decimal Gearhead**

Can be connected to **US560GU** and **US590GU** pinion shaft type  
**5GU10XKB** (For **5GU□KA**), **5GU10XK** (For **5GU□KHA**)  
 Weight: 1.32 lb. (0.6 kg)

DXF A029

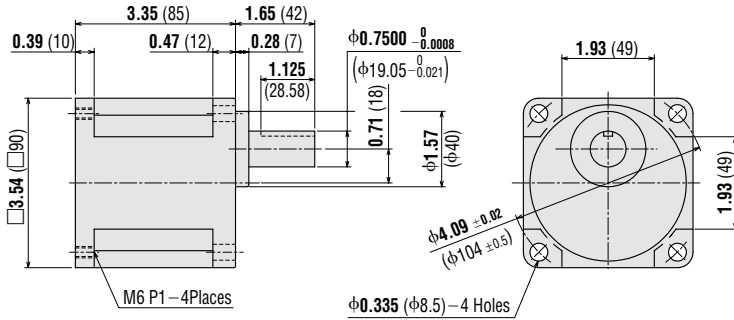


● **High-Power Gearheads**

**5GU□KHA**

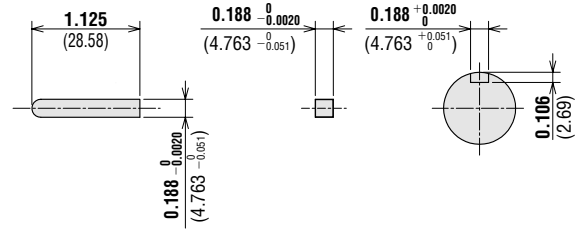
Weight: 4.2 lb. (1.9 kg)

DXF A038U



● **Key and Key Slot (Scale 1/2)**

(The key is provided with the gearhead)



◆ **Control Unit**

For use with **US206, US315, US425** and **US540** types

USP206-1U/USP206-2E

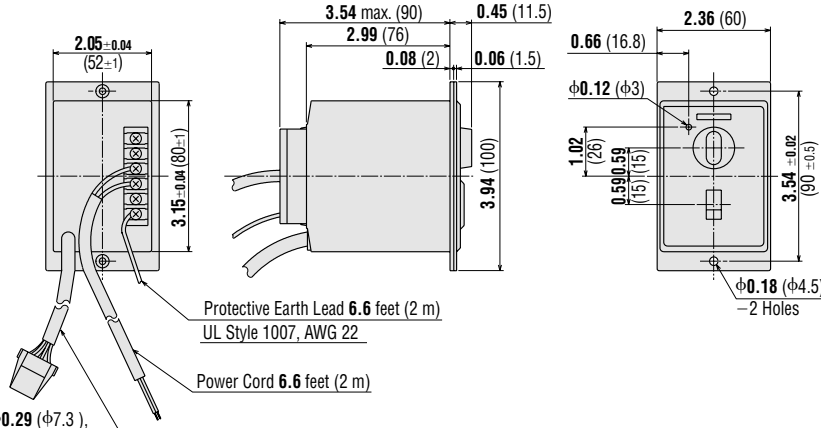
USP315-1U/USP315-2E

USP425-1U/USP425-2E

USP540-1U/USP540-2E

Weight: 0.99 lb. (0.45 kg)

**DXF** A817



Protective Earth Lead 6.6 feet (2 m)  
UL Style 1007, AWG 22

Power Cord 6.6 feet (2 m)

Cable  $\phi 0.29$  ( $\phi 7.3$ ),  
20 inch (500 mm) Length  
W/Connector  
Housing: 1-480270-0 (AMP)

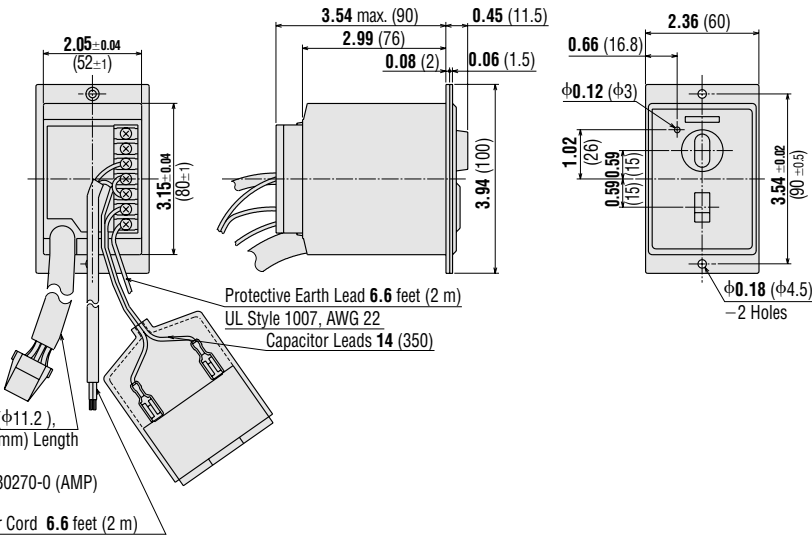
For use with **US560** and **US590** types

USP560-1U/USP560-2E

USP590-1U/USP590-2E

Weight: 1.1 lb. (0.5 kg)

**DXF** A818



Protective Earth Lead 6.6 feet (2 m)  
UL Style 1007, AWG 22

Capacitor Leads 14 (350)

Power Cord 6.6 feet (2 m)

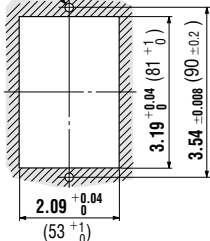
Cable  $\phi 0.44$  ( $\phi 11.2$ ),  
20 inch (500 mm) Length  
W/Connector  
Housing: 1-480270-0 (AMP)

◆ **Panel Cut-Out for Control Unit**

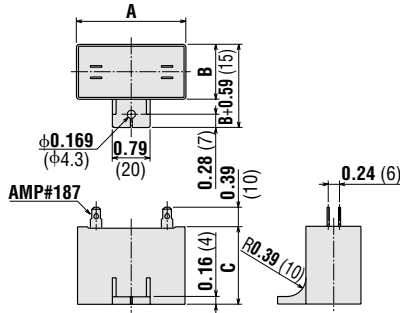
Installation Method by Cutting a Hole

$\phi 0.18$  ( $\phi 4.5$ ) Holes

-2 Places



● **Capacitor** (included with the motors)

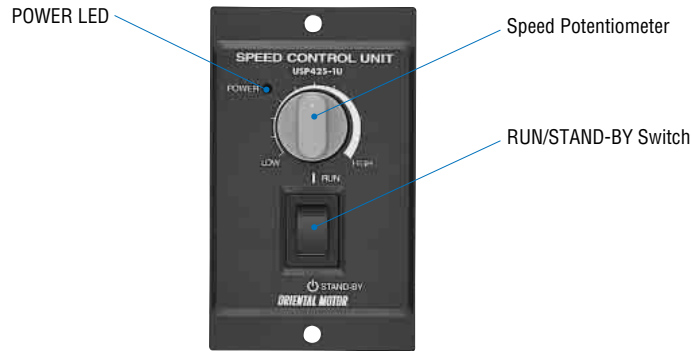


**Capacitor Dimensions** Unit = inch (mm)

Package Model	Capacitor Model	A	B	C	Weight oz (g)
<b>US560-□01U</b>	CH180CFAUL	2.28 (58)	0.93 (23.5)	1.46 (37)	2.5 (70)
<b>US560-□02E</b>	CH40BFAUL	2.28 (58)	0.93 (23.5)	1.46 (37)	2.5 (70)
<b>US590-□01U</b>	CH200CFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.4 (95)
<b>US590-□02E</b>	CH60BFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.0 (85)

- If you need to order a capacitor without a motor, add "-C" to the capacitor model name shown. A capacitor cap is included with a capacitor.

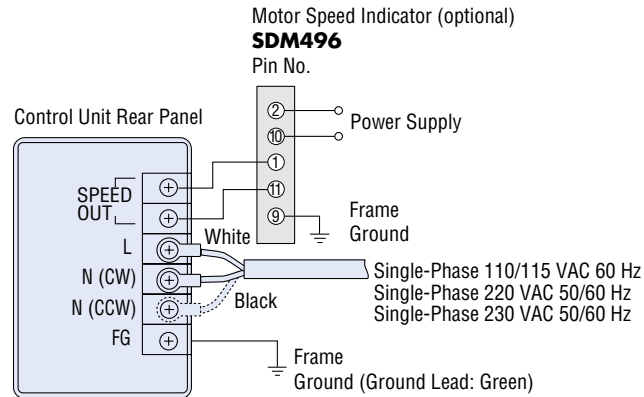
■ **Connection and Operation**



● **Connection Diagrams**

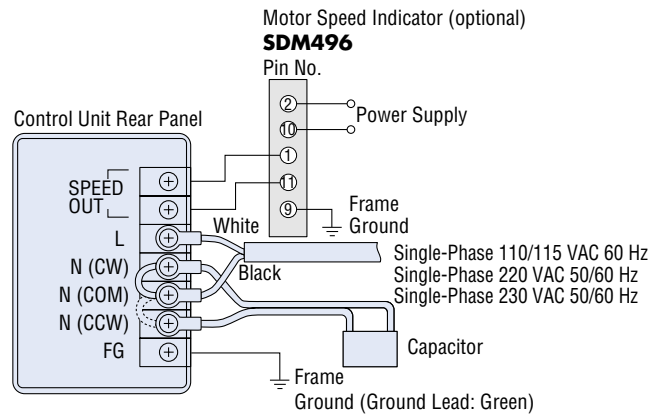
**US206, US315, US425, US540** types

**Uni-directional Rotation:**



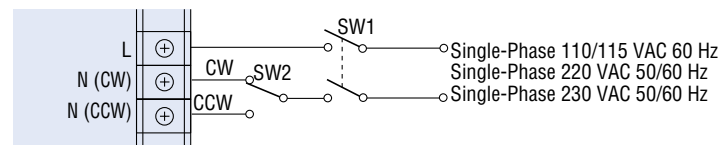
**US560, US590** types

**Uni-directional Rotation:**



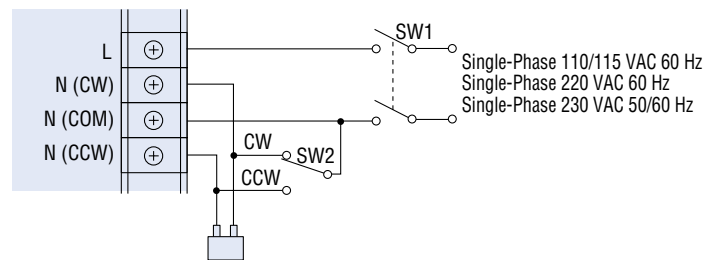
In the diagrams above, the motor shaft rotates in the clockwise direction. When changed to the dotted line [N (CCW)] position, the motor shaft rotates in the counterclockwise direction.

**Bi-directional Rotation:**



Switch Specifications: 250 VAC, Inductive Load, 5 A min.

**Bi-directional Rotation:**

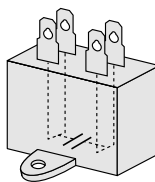


Switch Specifications: 250 VAC, Inductive Load, 5 A min.

- If an extension between the motor and control unit is required, an extension cable can be used (sold separately). Using the longest cord, the distance can be extended up to 15.7 feet (4.75 m). →Page B-130

### ● Inner Connection Diagram for 4-Terminal Capacitor

Terminals of the capacitor are connected as shown in the figure. For lead wire connection, use one lead wire per terminal.



### ● Operation Method

There is a difference in operation method between the **US206, US315, US425, US540** types and the **US560, US590** types.

#### **US206, US315, US425 and US540 types**

Connect the motor lead wire connectors to the control unit. Then connect the power cord to the power supply. When the RUN/STAND-BY switch of the control unit is switched to RUN, the motor rotates in the clockwise (CW) direction as seen from the motor shaft.

(Control units are set for clockwise rotation at shipment. The direction of rotation for the gearhead output shaft may be the reverse of the direction of the motor shaft depending on the gear ratio.)

#### **US560 and US590 types**

Connect the control unit and the motor, and attach the capacitor wire leading from the control unit to the capacitor. Next, plug in the power supply cord into an AC power supply. When the RUN/STAND-BY switch located on the control unit is switched to RUN, the motor will rotate in the direction set by the connection of the capacitor.

(Control units are set for clockwise rotation at shipment. The direction of rotation for the gearhead output shaft may be the reverse of the direction of the motor shaft depending on the gear ratio.)

### ● Changing Speed

When the potentiometer located on the front of the control unit is turned in a clockwise direction, motor speed increases; when turned in the counter clockwise direction, motor speed decreases. Motor speed can be set and adjusted over a range of 90 r/min-1600 r/min.

### ● Stopping

When the RUN/STAND-BY switch on the control unit is set to STAND-BY, the motor stops. This switch is not a power ON/OFF switch. If the motor is to be stopped for a long time, a separate power ON/OFF switch should be installed.

### ● Changing the Direction of Rotation **US206, US315, US425 and US540 types**

(Capacitor is included in the control unit.)

#### **Uni-directional Rotation**

When the direction of motor rotation needs to be reversed for reasons relating to transmission mechanisms such as gearheads, change the terminal used for attaching the power cord, located at the back of control unit, from terminal N (CW) to terminal N (CCW). The power cord connections are located at terminals L and N (CW) when shipped. See the diagram on the previous page.

(This should always be done with the power OFF.)

#### **Bi-directional Rotation**

Install an additional power switch (SW1) and CW/CCW switch (SW2) as shown on previous page, and use these switches to change the direction of rotation. (Motor cannot be reversed instantaneously. Turn SW1 off and wait until the motor has come to a complete stop before switching SW2.)

See the diagram on the previous page.

#### **US560 and US590 types**

(Connection of the included capacitor is necessary.)

#### **Uni-directional Rotation**

When the direction of motor rotation needs to be reversed, change the terminal used for attaching the power cord, located at the back of control unit, from terminals N (CW)-N (COM) to terminals N (COM)-N (CCW). The power cord connections are located at terminals N (CW)-N (COM) when shipped. See the diagram on the previous page.

(This should always be done with the power OFF.)

#### **Bi-directional Rotation**

Install an additional power switch (SW1) and CW/CCW switch (SW2) as shown on the previous page, and use these switches to change the direction of rotation. (Motor cannot be reversed instantaneously. Turn SW1 off and wait until the motor has come to a complete stop before switching SW2.)

See the diagram on the previous page.

## List of Motor and Control Unit Combinations

Model numbers for motor and control unit combinations are shown below.

### Single-Phase 110/115 VAC

Output Power HP	Power W	Package Model	Motor Model	Control Unit Model
1/125	6	<b>US206-401U</b>	USM206-401W	USP206-1U
		<b>US206-001U</b>	USM206-001W	USP206-1U
1/50	15	<b>US315-401U</b>	USM315-401W	USP315-1U
		<b>US315-001U</b>	USM315-001W	USP315-1U
1/30	25	<b>US425-401U</b>	USM425-401W	USP425-1U
		<b>US425-001U</b>	USM425-001W	USP425-1U
1/19	40	<b>US540-401U</b>	USM540-401W	USP540-1U
		<b>US540-001U</b>	USM540-001W	USP540-1U
1/12	60	<b>US560-501U</b>	USM560-501W	USP560-1U
		<b>US560-001U</b>	USM560-001W	USP560-1U
1/8	90	<b>US590-501U</b>	USM590-501W	USP590-1U
		<b>US590-001U</b>	USM590-001W	USP590-1U

### Single-Phase 220/230 VAC

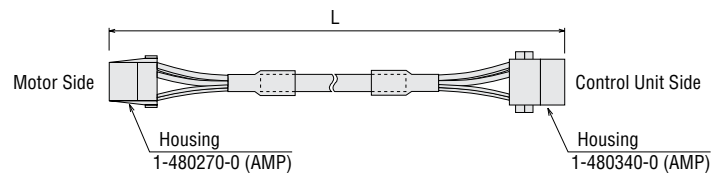
Output Power HP	Power W	Package Model	Motor Model	Control Unit Model
1/125	6	<b>US206-402E</b>	USM206-402W	USP206-2E
		<b>US206-002E</b>	USM206-002W	USP206-2E
1/50	15	<b>US315-402E</b>	USM315-402W	USP315-2E
		<b>US315-002E</b>	USM315-002W	USP315-2E
1/30	25	<b>US425-402E</b>	USM425-402W	USP425-2E
		<b>US425-002E</b>	USM425-002W	USP425-2E
1/19	40	<b>US540-402E</b>	USM540-402W	USP540-2E
		<b>US540-002E</b>	USM540-002W	USP540-2E
1/12	60	<b>US560-502E</b>	USM560-502W	USP560-2E
		<b>US560-002E</b>	USM560-002W	USP560-2E
1/8	90	<b>US590-502E</b>	USM590-502W	USP590-2E
		<b>US590-002E</b>	USM590-002W	USP590-2E

## Extension Cable (Sold separately)

When installing the motor and control unit in different locations, an extension cable can be used (sold separately). This enables remote operation at a distance of up to 15.7 feet. (4.75 m).

### Applicable Products: US206, US315, US425, US540

Model	Length: L ft. (m)
<b>CC01SS052</b>	3.3 (1)
<b>CC02SS052</b>	6.6 (2)
<b>CC03SS052</b>	9.8 (3)
<b>CC04SS052</b>	13.1 (4)



### Applicable Products: US560, US590

Model	Length: L ft. (m)
<b>CC01SS2</b>	3.3 (1)
<b>CC02SS2</b>	6.6 (2)
<b>CC03SS2</b>	9.8 (3)
<b>CC04SS2</b>	13.1 (4)

