

AC speed control motor

## **SCM Motor**

### **for Right Angle Shaft Hypoid Gear JH/JL Gearhead**

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## **OPERATING MANUAL**

Thank you for purchasing an Oriental Motor product.

This Operating Manual describes product handling procedures and safety precautions.

- Please read it thoroughly to ensure safe operation.
- Always keep the manual where it is readily available.

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# 1 Introduction

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## ■ Before using the motor

Only qualified personnel should work with the product. Use the product correctly after thoroughly reading the section "Safety precautions." In addition, be sure to observe the contents described in warning, caution, and note in this manual.

The product described in this manual has been designed and manufactured to be incorporated in general industrial equipment. Do not use for any other purpose.

Oriental Motor Co., Ltd. is not responsible for any damage caused through failure to observe this warning.

## ■ Related operating manuals

Operating manuals are not included with the product. Download from Oriental Motor Website Download Page or contact your nearest Oriental Motor sales office.





	Operating manual name
Motor	<b>SCM</b> Motor Right Angle Shaft Hypoid Gear <b>JH/JL</b> Gearhead OPERATING MANUAL (this document)
Speed controller	<b>DSC</b> Series OPERATING MANUAL
	<b>DSC</b> Series For Electromagnetic Brake Motor OPERATING MANUAL
	<b>US2</b> Series OPERATING MANUAL

Refer to the operating manuals of the speed controller for details about connections and operations.



Search for an operating manual by the model name shown on the nameplate.




## 2 Safety precautions





The precautions described below are intended to prevent danger or injury to the user and other personnel through safe, correct use of the product. Use the product only after carefully reading and fully understanding these instructions.

 <b>WARNING</b>	Handling the product without observing the instructions that accompany a "WARNING" symbol may result in serious injury or death.
 <b>CAUTION</b>	Handling the product without observing the instructions that accompany a "CAUTION" symbol may result in injury or property damage.
	The items under this heading contain important handling instructions that the user should observe to ensure safe use of the product.
	The items under this heading contain related information and contents to gain a further understanding of the text in this manual.

### Description of graphic symbols

	Indicates "prohibited" actions that must not be performed.
	Indicates "compulsory" actions that must be performed.

 <b>WARNING</b>	
	<ul style="list-style-type: none"> <li>Do not use the product in explosive or corrosive environments, in the presence of flammable gases, in places subjected to splashing water, or near combustibles. Doing so may result in fire, electric shock or injury.</li> <li>Do not transport, install the product, perform connections or inspections when the power is on. Always turn the power off before carrying out these operations. Failure to do so may result in electric shock or equipment damage.</li> <li>Do not use the brake mechanism of the electromagnetic brake motor as a safety brake. Doing so may result in injury or damage to equipment.</li> <li>Do not machine or modify the cable. Doing so may result in fire, electric shock or damage to equipment.</li> <li>Do not forcibly bend, pull or pinch the cables. Doing so may result in fire, electric shock or damage to equipment.</li> <li>Do not touch the motor when conducting insulation resistance measurement or dielectric strength test. Accidental contact may result in electric shock.</li> <li>Do not disassemble or modify the motor. This may cause electric shock, injury or damage to equipment.</li> </ul>
	<ul style="list-style-type: none"> <li>Only qualified and educated personnel should be allowed to perform installation, connection, operation and inspection/troubleshooting of the product. Handling by unqualified and uneducated personnel may result in fire, electric shock, injury or equipment damage.</li> <li>Use an electromagnetic brake motor in an application of vertical drive such as elevating equipment. If a motor without an electromagnetic brake is used, the moving part may drop. This may result in injury or damage to equipment.</li> <li>The motor is Class I equipment. When installing the motor, ground the Protective Earth Terminal of the motor. Failure to do so may result in electric shock.</li> <li>Keep the input power voltage within the specified range. Failure to do so may result in fire or electric shock.</li> <li>Use a motor and speed controller only in the specified combination. An incorrect combination may cause in fire, electric shock or equipment damage.</li> <li>Always turn off the power before performing maintenance/inspection. Failure to do so may result in electric shock.</li> </ul>

 <b>CAUTION</b>	
	<ul style="list-style-type: none"> <li>• Do not use the motor beyond its specifications. Doing so may result in electric shock, injury or damage to equipment.</li> <li>• Do not touch the motor during operation or immediately after stopping. The surface is hot and may cause a skin burn(s).</li> <li>• Keep the area around the motor free of combustible materials. Failure to do so may result in fire or a skin burn(s).</li> <li>• Do not leave anything around the motor that would obstruct ventilation. Doing so may result in damage to equipment.</li> <li>• Do not lift up the product by holding the output shaft or the cable. Doing so may result in injury.</li> <li>• Do not touch the motor output shaft end with bare hands. Doing so may result in injury.</li> <li>• When assembling the motor with the gearhead, exercise caution not to pinch your fingers or other parts of your body between the motor and gearhead. Injury may result.</li> <li>• When installing the motor in the equipment, exercise caution not to pinch your fingers or other parts of your body between the equipment and motor. Injury may result.</li> <li>• Do not touch the rotating part (output shaft) while operating the motor. Doing so may result in injury.</li> </ul>
	<ul style="list-style-type: none"> <li>• When an abnormality is noted, turn off the power immediately. Failure to do so may result in fire, electric shock or injury.</li> <li>• Securely install the motor to the mounting plate. Inappropriate installation may cause the motor to detach and fall, resulting in injury or equipment damage.</li> <li>• Provide a cover on the rotating part (output shaft). Failure to do so may result in injury.</li> <li>• Securely install the load on the output shaft. Inappropriate installation may result in injury.</li> <li>• Be sure to ground the motor to prevent it from being damaged by static electricity. Failure to do so may result in fire or damage to equipment.</li> <li>• The motor surface temperature may exceed 70 °C (158 °F) even under normal operating conditions. If the operator is allowed to approach a running motor, attach a warning label as shown in the figure in a conspicuous position. Failure to do so may result in skin burn(s).</li> </ul> <div>  <p>Warning label</p> </div>

### 3 Precautions for use

This section covers restrictions and requirements the user should consider when using the product.

- **Be sure to match the output power and power supply voltage when combining a motor and speed controller**

- **Connecting the motor and speed controller**

Use a connection cable (sold separately) when extending the wiring distance between the motor and the speed controller.

- **Use an electromagnetic brake motor in an application of vertical drive such as elevating equipment**

When the motor is used in an application of vertical drive such as elevating equipment (lifting and lowering device), use an electromagnetic brake motor so that the load can be held in position.

- **Caution when using under low temperature environment**

When an ambient temperature is low, since the load torque may increase by the viscosity increment of the oil seal or grease, the motor starting may take a long time or the motor rotation speed may fall. However, if the operation is continued for a while, the oil seal or grease will be warmed up, and the motor can be driven at the normal rotation speed.

- **Do not forcibly stop the shaft rotation of gearhead by an external force**

Stopping in such a way may cause impact, leading to damage to the gearhead.

- **Rotation direction of the output shaft**

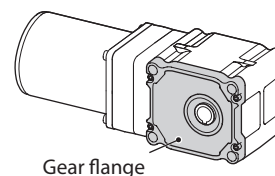
The rotation direction of the gearhead output shaft with respect to the motor output shaft is shown in the figure below.

(As viewed from the gear flange side)

Motor output shaft	Gearhead output shaft	
	Gear ratio: 10, 15, 20, 30, 50	Gear ratio: 100, 200

For the hollow shaft type:

When viewing from the opposite side of the gear flange side, the gearhead output shaft rotates in the opposite direction to the above figure.



#### Gear ratio and actual reduction ratio

The gear ratio in the model name differs from the actual reduction ratio of the gearhead.

Check the actual reduction ratio in the table below.

Gear ratio	10	15	20	30	50	100	200
Actual reduction ratio	10.25	15.38	20.50	30.75	51.25	102.5	205.0

# 4 Preparation

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## 4.1 Checking the product

Verify that the items listed below are included. Report any missing or damaged items to the branch or sales office from which you purchased the product.

Verify the model number of the purchased product against the number shown on the nameplate.

■ **Motor**

- ☐ Motor..... 1 unit
- ☐ Instructions and Precautions for Safe Use..... 1 copy

■ **Gearhead (sold separately)**

● **Right-angle shaft hollow hypoid JH gear**

- ☐ Gearhead..... 1 unit
- ☐ Safety cover..... 1 piece
- ☐ Mounting screw..... 1 set  
Hexagonal socket head screw, plain washer, spring washer: 4 pieces each
- ☐ Parallel key..... 1 piece
- ☐ Screw for motor assembly ..... 1 set  
Hexagonal socket head screw: 4 pieces

● **Right-angle shaft solid hypoid JL gear**

- ☐ Gearhead..... 1 unit
- ☐ Mounting screw..... 1 set  
Hexagonal socket head screw, plain washer, spring washer: 4 pieces each
- ☐ Parallel key..... 1 piece (secured to the output shaft)
- ☐ Screw for motor assembly ..... 1 set  
Hexagonal socket head screw: 4 pieces

## 4.2 Combination tables

- Enter the code representing the power supply voltage in the box ■ within the model name.  
**JA:** Single-phase 100 V 50/60 Hz      **JC:** Single-phase 200 V 50/60 Hz  
**UA:** Single-phase 110/115 V 60 Hz      **EC:** Single-phase 220/230 V 50/60 Hz
- Enter the number representing the gear ratio of the gearhead in the box □ within the model name.

	Output power	Motor model	Applicable gearhead		Applicable speed controller
			Model	Gear ratio (□)	
Round shaft type/ Right-angle shaft hollow hypoid <b>JH</b> gear	25 W	<b>SCM425K■</b>	<b>4H□B</b>	<b>10 to 200</b>	<b>DSC Series</b> <b>US2 Series</b>
	40 W	<b>SCM540K■</b>	<b>5H□B</b>		
	90 W	<b>SCM590K■</b>			
Electromagnetic brake type Round shaft type/ Right-angle shaft hollow hypoid <b>JH</b> gear	25 W	<b>SCM425K■M</b>	<b>4H□B</b>		<b>DSC Series</b>
	40 W	<b>SCM540K■M</b>	<b>5H□B</b>		
	90 W	<b>SCM590K■M</b>			
Round shaft type/ Right-angle shaft solid hypoid <b>JL</b> gear	25 W	<b>SCM425K■</b>	<b>4L□B</b>		<b>DSC Series</b> <b>US2 Series</b>
	40 W	<b>SCM540K■</b>	<b>5L□B</b>		
	90 W	<b>SCM590K■</b>			
Electromagnetic brake type Round shaft type/ Right-angle shaft solid hypoid <b>JL</b> gear	25 W	<b>SCM425K■M</b>	<b>4L□B</b>		<b>DSC Series</b>
	40 W	<b>SCM540K■M</b>	<b>5L□B</b>		
	90 W	<b>SCM590K■M</b>			

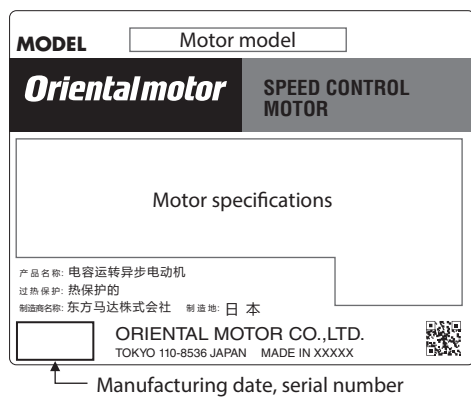
## 4.3 Information about nameplate

The figure shows an example.



The position describing the information may vary depending on the product.

### Motor



### Gearhead



## 5 Installation

This section explains the installation method of a load in addition to the installation location and installation method of the product.

### 5.1 Installation location

Install the product in a well-ventilated location that provides easy access for inspection.

- Indoors
- Operating ambient temperature 0 to +40 °C [+32 to +104 °F] (non-freezing)
- Operating ambient humidity 85% or less (non-condensing)
- Area that is free from an explosive atmosphere or toxic gas (such as sulfuric gas) or liquid
- Area not exposed to direct sun
- Area free of excessive amount dust, iron particles or the like
- Area not subject to splashing water (storms, water droplets), oil (oil droplets) or other liquids
- Area free of excessive salt
- Area not subject to continuous vibration or excessive shocks
- Area free of excessive electromagnetic noise (from welders, power machinery, etc.)
- Area free of radioactive materials, magnetic fields or vacuum
- Altitude Up to 1000 m (3300 ft.) above sea level



On rare occasions, grease may ooze out from the gearhead. If there is a concern over possible environmental damage resulting from the leakage of grease, provide an oil tray or similar oil catching mechanism in order not to cause a secondary damage. Grease leakage may lead to problems in the customer's equipment or products.

### 5.2 Installation method

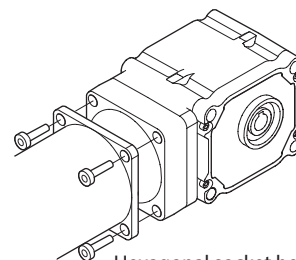
#### ■ Assembling the motor to the gearhead

Assemble the gearhead to the motor, and tighten them with screw for motor assembly.

Check the key is fitted to the motor output shaft before assembling them.

When assembling, apply anti-seizing agent such as molybdenum disulfide grease on the surface of the motor shaft and on the bore of the motor shaft input part in the gearhead.

Also, confirm that no gaps remain on the mating face of the motor and gearhead.



Hexagonal socket head screw

#### Screws for motor assembly\*

Gearhead model	Screw size	Material	Tightening torque
4H□B 4L□B	M5	Stainless steel	3.0 N·m (26 lb-in)
5H□B 5L□B	M6		5.0 N·m (44 lb-in)

\* Included with gearheads (sold separately)



- Do not forcibly assemble the motor and gearhead. The motor output shaft or the gearhead input part may be damaged, resulting in noise or shorter service life.
- Do not allow dust to attach to the pilot sections of the motor and gearhead.
- The hexagonal socket head screws assembling the motor and gearhead are used to attach the motor and gearhead temporarily. Be sure to use the included mounting screw set to install the motor.

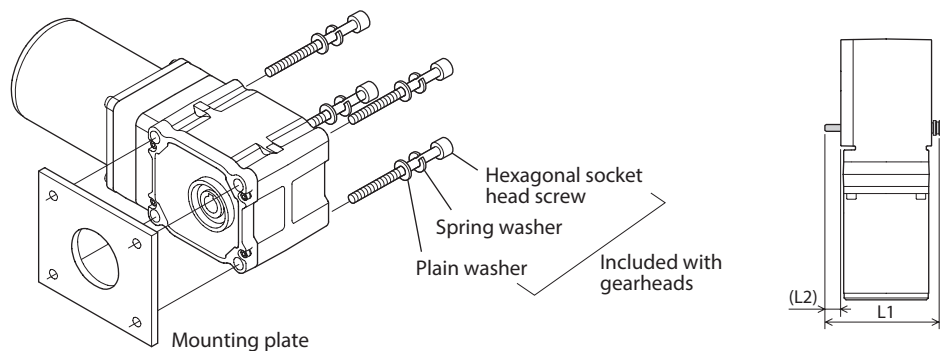


## ■ Installing the motor to the mounting plate

Use the mounting screw included with a gearhead to secure the motor and gearhead to the mounting plate.

Do not leave a gap between the motor and mounting plate.

The figures show the Hollow shaft.



Gearhead model	Hexagonal socket head screw		L2	Tightening torque
	Screw size	L1		
<b>4H□B</b> <b>4L□B</b>	M6	95 mm (3.74 in.)	11 mm (0.43 in.)	5.0 N·m (44 lb-in)
<b>5H□B</b> <b>5L□B</b>	M8	110 mm (4.33 in.)	10 mm (0.39 in.)	12.0 N·m (106 lb-in)



**Note** When the motor is installed to equipment using the mounting surface of the gearhead, proper alignment between the hollow shaft inside dimension and the load shaft is necessary. Keep the alignment tolerance within 0.02 mm (0.0008 in.). Insufficient alignment may result in damage to the gearhead internal bearings.

## ■ Motor with cooling fan

When installing a motor with cooling fan onto a device, leave 10 mm (0.39 in.) or more behind the fan cover or open a ventilation hole so that the cooling inlet on the back of the motor cover is not blocked.

## 5.3 Installing a load

### ■ Hollow shaft type

Mounting method of the load varies depending on the load shaft conditions. See the following figures.

The hollow output shaft inside dimension is processed to a tolerance of H8, and incorporates a key slot for load shaft attachment.

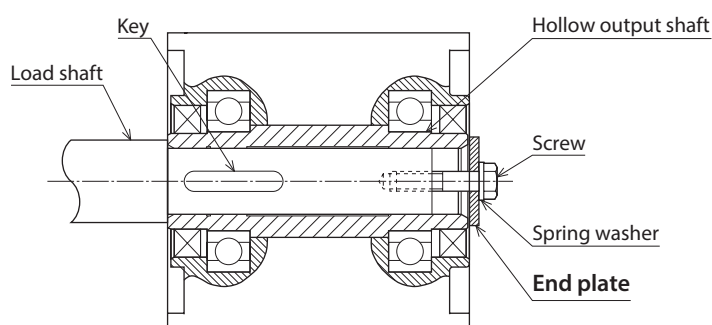
A load shaft tolerance of h7 is recommended. Also, apply anti-seizing agent such as molybdenum disulfide grease, on the surface of the load shaft and the bore of the hollow output shaft in order to prevent seizure.

A load can be installed to the hollow output shaft from either right face or left face in the following figure.

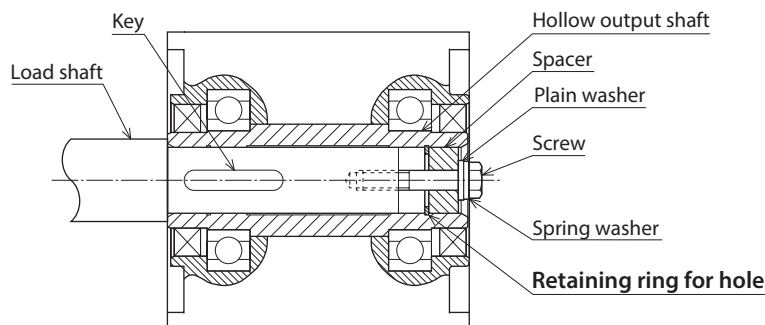
**Note** Do not apply excessive or abrupt force to the hollow output shaft when inserting a load shaft into the hollow output shaft. Excessive or abrupt force may damage the gearhead internal bearings.

### ● Stepped load shaft

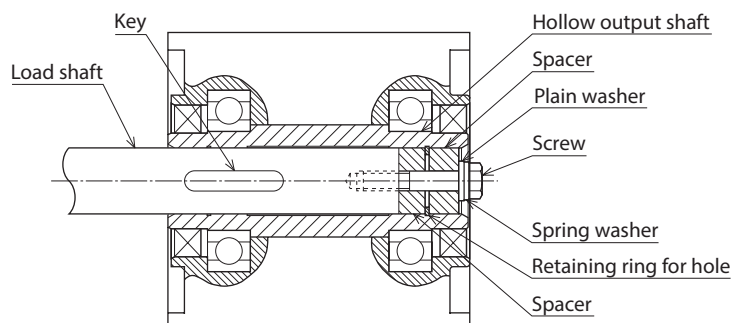
#### Mounting method using end plate



#### Mounting method using retaining ring



### ● Non-stepped load shaft

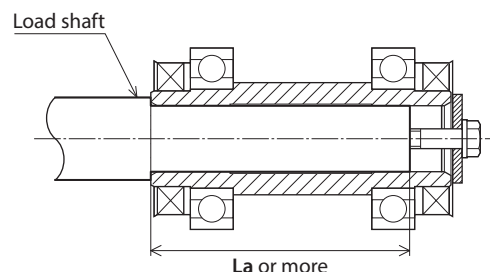


## ● Recommended load shaft installation dimensions

Unit: mm (in.)

Gearhead model		4H□B	5H□B
Inner Diameter of Hollow Shaft (H8)		$\varnothing 12 \begin{smallmatrix} +0.027 \\ 0 \end{smallmatrix}$ ( $\varnothing 0.4724 \begin{smallmatrix} +0.0011 \\ 0 \end{smallmatrix}$ )	$\varnothing 15 \begin{smallmatrix} +0.027 \\ 0 \end{smallmatrix}$ ( $\varnothing 0.5906 \begin{smallmatrix} +0.0011 \\ 0 \end{smallmatrix}$ )
Shaft Diameter of Load Shaft (h7)		$\varnothing 12 \begin{smallmatrix} 0 \\ -0.018 \end{smallmatrix}$ ( $\varnothing 0.4724 \begin{smallmatrix} 0 \\ -0.0007 \end{smallmatrix}$ )	$\varnothing 15 \begin{smallmatrix} 0 \\ -0.018 \end{smallmatrix}$ ( $\varnothing 0.5906 \begin{smallmatrix} 0 \\ -0.0007 \end{smallmatrix}$ )
Length of Stepped Shaft La		55 (2.17)	72 (2.83)
Screw size		M5	M6
Spacer dimension	Outer diameter	$\varnothing 11.5$ ( $\varnothing 0.45$ )	$\varnothing 14.5$ ( $\varnothing 0.57$ )
	Inner diameter	$\varnothing 6$ ( $\varnothing 0.24$ )	$\varnothing 7$ ( $\varnothing 0.28$ )
	Width	3 (0.12)	3 (0.12)
Nominal diameter of retaining ring (C-type retaining ring)		$\varnothing 12$ ( $\varnothing 0.47$ )	$\varnothing 15$ ( $\varnothing 0.59$ )
End plate thickness		3 (0.12)	3 (0.12)

### Recommended load shaft length

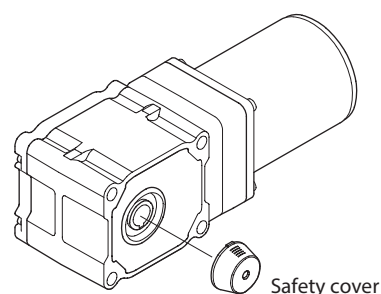


- Retaining rings for holes, spacers, screws and other parts used to install the load shaft are not included. They are to be supplied by the customer.

## ● Installing the safety cover

After installing the load, attach the included safety cover.

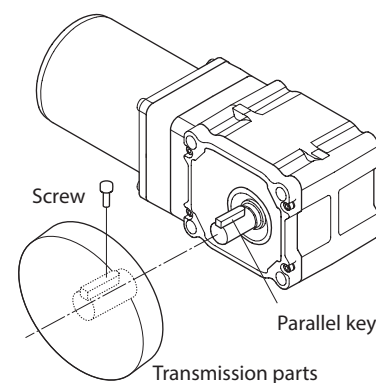
The safety cover can be attached to either face.



## ■ Installing a load to the solid shaft type

The gearhead output shaft has been machined to an outer diameter tolerance of h7 and provided with a key slot for connecting the transmission parts.

When connecting the transmission parts, ensure that the shaft and parts have a clearance fit, and always fix the parallel key to the output shaft with a screw to prevent the parts from rattling or spinning.



Do not apply excessive force onto the output shaft of the gearhead using a hammer or other tools. Doing so may cause damage to the output shaft or bearings.

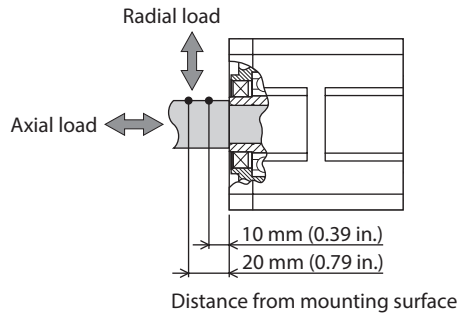
## 5.4 Permissible radial load and permissible axial load

The radial load and the axial load on the gearhead output shaft must be kept under the permissible values listed below.



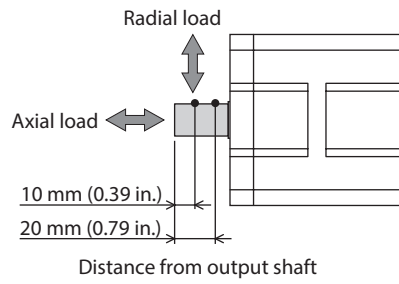
Failure due to fatigue may occur when the gearhead bearings and output shaft are subject to repeated loading by a radial or axial load that is in excess of the permissible limit.

### ■ JH Gearhead



Gearhead model		Permissible radial load [N (lb.)]		Permissible axial load [N (lb.)]
		Distance from mounting surface		
	Gear ratio	10 mm (0.39 in.)	20 mm (0.79 in.)	
4H□B	10	311 (69)	265 (59)	88 (19.8)
	15	400 (90)	341 (76)	108 (24)
	20	488 (109)	417 (93)	137 (30)
	30	622 (139)	531 (119)	177 (39)
	50	799 (179)	682 (153)	226 (50)
	100	888 (199)	758 (170)	245 (55)
	200	978 (220)	836 (188)	275 (61)
5H□B	10	415 (93)	363 (81)	108 (24)
	15	554 (124)	484 (108)	147 (33)
	20	692 (155)	605 (136)	186 (41)
	30	923 (200)	806 (181)	245 (55)
	50	1112 (250)	971 (210)	294 (66)
	100	1196 (260)	1045 (230)	324 (72)
	200	1291 (290)	1127 (250)	343 (77)

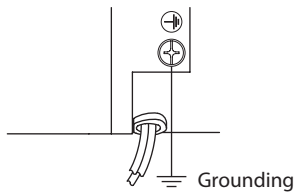
## ■ JL Gearhead



Gearhead model		Permissible radial load [N (lb.)]		Permissible axial load [N (lb.)]
		Distance from tip of gearhead output shaft		
	Gear ratio	10 mm (0.39 in.)	20 mm (0.79 in.)	
4L□B	10	304 (68)	390 (87)	88 (19.8)
	15	390 (87)	501 (112)	108 (24)
	20	477 (107)	613 (137)	137 (30)
	30	607 (136)	780 (175)	177 (39)
	50	781 (175)	1003 (220)	226 (50)
	100	868 (195)	1114 (250)	245 (55)
	200	956 (210)	1228 (270)	275 (61)
5L□B	10	378 (85)	481 (108)	108 (24)
	15	504 (113)	641 (144)	147 (33)
	20	630 (141)	802 (180)	186 (41)
	30	840 (189)	1069 (240)	245 (55)
	50	1011 (220)	1287 (280)	294 (66)
	100	1089 (240)	1385 (310)	324 (72)
	200	1174 (260)	1495 (330)	343 (77)

## 6 Grounding

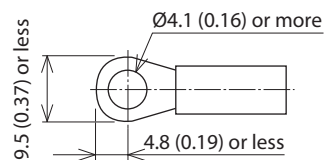
Be sure to ground the product using the Protective Earth Terminal  on the motor.



### ■ Ground terminal

Use a crimp terminal described below for grounding.

- Applicable crimp terminal: Round crimp terminal with insulation cover
- Thread size of terminal: M4
- Tightening torque: 1.0 to 1.3 N·m (8.8 to 11.5 lb-in)
- Applicable lead wire: AWG18 (0.75 mm<sup>2</sup>) or thicker



Be sure to use the screw for grounding attached on the product.

# 7 Maintenance · inspection

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## 7.1 Inspection

It is recommended that periodic inspections would be conducted for the items listed below after each operation of the motor. If an abnormal condition is noted, discontinue any use and contact your nearest Oriental Motor sales office.



Do not conduct the insulation resistance measurement or dielectric strength test with the motor and speed controller connected. Doing so may cause damage to the product.

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### ■ Inspection item

- Check if any of the mounting screws of the motor and gearhead are loose.
- Check if the bearing part (ball bearings) of the motor generates unusual noises.
- Check if the bearing part (ball bearings) or gear meshing part of the gearhead generates unusual noises.
- Check if the output shaft of the motor and gearhead and a load shaft are out of alignment.
- Check if a damage or stress is applied on the cable or the connection part between the cable and speed controller is loose.

## 7.2 Warranty

Check on the Oriental Motor Website for the product warranty.

## 7.3 Disposal

Dispose the product correctly in accordance with laws and regulations, or instructions of local governments.

## 8 Specifications

### 8.1 Specifications

Check on the Oriental Motor Website for the product specifications.

### 8.2 General specifications

Operation environment	Ambient temperature	0 to +40 °C [+32 to +104 °F] (non-freezing)
	Ambient Humidity	85% or less (non-condensing)
	Altitude	Up to 1000 m (3300 ft.) above sea level
	Surrounding atmosphere	No corrosive gas, dust, water or oil. Cannot be used in radioactive materials, magnetic field, vacuum or other special environment.
	Vibration	Not subject to continuous vibrations or excessive impact. In conformance with JIS C 60068-2-6 "Sinewave vibration test method" Frequency range: 10 to 55 Hz Pulsating amplitude: 0.15 mm (0.006 in.) Sweep direction: 3 directions (X, Y, Z) Number of sweeps: 20 times
Storage environment	Ambient temperature	–10 to +60 °C [+14 to +140 °F] (non-freezing)
	Ambient Humidity	85% or less (non-condensing)
Shipping environment	Altitude	Up to 1000 m (3300 ft.) above sea level
	Surrounding atmosphere	No corrosive gas, dust, water or oil. Cannot be used in radioactive materials, magnetic field, vacuum or other special environment.
Overheat Protection Device		Built-in thermal protector (automatic return type) Open (motor standstill)..... 130±5 °C (266±9 °F) Close (resuming operation)..... 85±20 °C (185±36 °F)
Degree of protection		IP20

### 8.3 Time rating

Continuous operation is possible (continuous rating).



## 9 Regulations and standards

Check on the Oriental Motor Website for the regulations and standards.

### ■ UL Standards, CSA Standards

This product is recognized by UL under the UL and CSA Standards.

### ■ CCC System

This product is affixed the CCC Mark under the China Compulsory Certification System. It is also certified by CQC.

### ■ CE Marking

This product is affixed with the marks under the following directives.

### ● Low Voltage Directive

#### Installation conditions

- For incorporating in equipment
- Overvoltage category: II
- Pollution degree: 2
- Protection against electric shock: Class I

When the machinery to which the motor is mounted requires overvoltage category III specifications, install the motor in a cabinet that connect to power supply via an isolation transformer.

#### Momentary excess torque based on EN 60034-1 Motor model

Motor model	Momentary excess torque
SCM425 SCM540 SCM590	130% of the rated torque

Momentary excess torque represents a maximum torque that can maintain the operation for 15 seconds without stalling or abrupt speed change even if the torque is increased gently while operating at rated voltage and rated frequency.

### ■ Motor temperature rise tests

Temperature rise tests stipulated in the standards are conducted in a condition where a motor is mounted on a heat radiation plate instead of attaching a gearhead.

The size and material for the heat radiation plates are as follows.

Motor model	Size [mm (in.)]	Thickness [mm (in.)]	Material
SCM425	135×135 (5.31×5.31)	5 (0.20)	Aluminum alloy
SCM540	165×165 (6.50×6.50)		
SCM590	200×200 (7.87×7.87)		

### ■ RoHS Directive

This product does not contain the substances exceeding the restriction values.

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