

## OPERATING MANUAL

### AC Speed Control Motor SCM Motor



## Introduction

### ■ 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 for this product are listed below. 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	SCM Motor OPERATING MANUAL (this document)
Speed controller	DSC Series OPERATING MANUAL US2 Series OPERATING MANUAL

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

## 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. Please read and understand these precautions thoroughly before using the product.

<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.
<b>Note</b>	The items under this heading contain important handling instructions that the user should observe to ensure safe use of the product.

**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> </ul>

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.

<b>WARNING</b>	
	<ul style="list-style-type: none"> <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 (tip or pinion) 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>



Warning label

## 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.

Motor output shaft (Including the round shaft type)	Gearhead output shaft	
	SCM26 SCM315 SCM425	Gear ratio: 5 to 25, 150 to 360
SCM540 SCM560	Gear ratio: 5 to 18, 120 to 300	Gear ratio: 2, 3, 25 to 100
SCM590	Gear ratio: 5 to 15, 75 to 180	Gear ratio: 2, 3, 18 to 60

**Preparation**

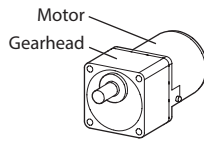
■ **Checking the product**

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.

- Motor.....1 unit  
The combination type comes with the motor and its dedicated gearhead pre-assembled.
- Mounting screw set.....1 set (combination type only)  
Hexagonal socket head screw, plain washer, spring washer 4 pieces each, Parallel key 1 piece
- Instructions and Precautions for Safe Use ...1 copy

■ **Checking the model name**

Check the model names of the motor and the gearhead against the model name described on each nameplate. Tell us the model name, product serial number, and manufacturing date when you contact us. For the information about the nameplate, check the operating manual of the speed controller.



- 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.

● **Combination type • parallel shaft gearhead**

Output power	Model	Motor model	Gearhead model	Gear ratio (□)
6 W	SCM26■-□	SCM26GV-■	2GV□B	2 to 360
15 W	SCM315■-□	SCM315GV-■	3GV□B	
25 W	SCM425■-□	SCM425GV-■	4GV□B	
40 W	SCM540■-□	SCM540GV-■	5GV□B	2 to 300
60 W	SCM560■-□	SCM560GVH-■	5GVH□B	
90 W	SCM590■-□	SCM590GVR-■	5GVR□B	2 to 180

● **Round shaft type**

Output power	Model	Output power	Model	Output power	Model
6 W	SCM26A-■	25 W	SCM425A-■	60 W	SCM560A-■
15 W	SCM315A-■	40 W	SCM540A-■	90 W	SCM590A-■

● **Electromagnetic brake Combination type • parallel shaft gearhead**

Output power	Model	Motor model	Gearhead model	Gear ratio (□)
6 W	SCM26■M-□	SCM26GV-■M	2GV□B	7.5 to 360
15 W	SCM315■M-□	SCM315GV-■M	3GV□B	
25 W	SCM425■M-□	SCM425GV-■M	4GV□B	
40 W	SCM540■M-□	SCM540GV-■M	5GV□B	7.5 to 300
60 W	SCM560■M-□	SCM560GVH-■M	5GVH□B	
90 W	SCM590■M-□	SCM590GVR-■M	5GVR□B	7.5 to 180

**Installation**

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

■ **Installation location**

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

- Indoors
- Operating ambient temperature  
Classification representing the power supply voltage  
JA/JC: -10\* to +50 °C (+14 to +122 °F) (non-freezing)  
UA/EC: -10\* to +40 °C (+14 to +104 °F) (non-freezing)  
\* The lowest temperature is 0 °C (+32 °F) for gearheads of the gear ratio 2 and 3.
- 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

**Note**

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.

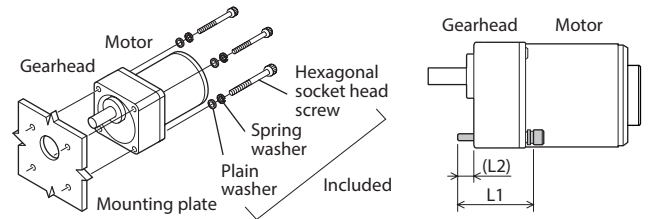
■ **Installation method**

**Note**

Do not install the motor to the mounting hole diagonally or assemble the motor forcibly. Doing so may cause damage to the motor.

● **Combination type • parallel shaft gearhead**

Secure the motor with mounting screw set (included) through the four mounting holes provided. Do not leave a gap between the motor and mounting plate.



**Mounting screw set (included)**

Model	Gear ratio	Hexagonal socket head screw		L2 [mm (in.)]	Tightening torque [N·m (lb·in)]
		Screw size	L1 [mm (in.)]		
SCM26	2, 3, 30 to 120	M4	55 (2.17)	8 (0.31)	1.4 (12.3)
	5 to 25		50 (1.97)		
	150 to 360		60 (2.36)		
SCM315	2, 3, 30 to 120	M6	65 (2.56)	12 (0.47)	5.0 (44)
	5 to 25		60 (2.36)		
	150 to 360		70 (2.76)		
SCM425	2, 3, 30 to 120	M6	65 (2.56)	9 (0.35)	5.0 (44)
	5 to 25		60 (2.36)		
	150 to 360		70 (2.76)		
SCM540 SCM560	2, 3, 25 to 100	M8	85 (3.35)	16 (0.63)	12.0 (106)
	5 to 18		70 (2.76)		
	120 to 300		90 (3.54)		
SCM590	2, 3, 18 to 36	M8	85 (3.35)	16 (0.63)	12.0 (106)
	5 to 15		70 (2.76)		
	50 to 180		95 (3.74)		

**Removing/Installing the gearhead**

See the following steps to replace the gearhead or to change the outlet position of the lead wires.

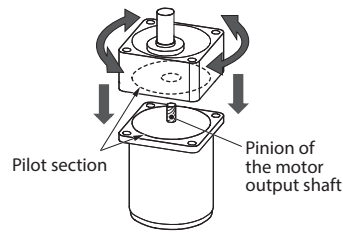
● **Removing the gearhead from the motor**

Remove the hexagonal socket head screws (2 pieces) assembling the motor and gearhead and detach the motor from the gearhead.



## ● Installing the gearhead to the motor

Keep the pilot sections of the motor and gearhead in parallel, and assemble the gearhead with the motor while slowly rotating it clockwise/counterclockwise. At this time, note so that the pinion of the motor output shaft does not hit the gears of the gearhead strongly.



Assemble the gearhead to the motor in a condition where the motor output shaft is in an upward direction.

Check no gaps remain between the motor and gearhead, and tighten them with hexagonal socket head screws (2 pieces).

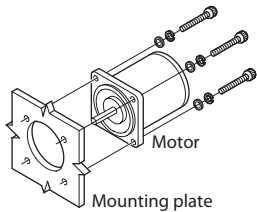
Model	Screw size	Tightening torque [N·m (lb-in)]
SCM26 SCM315 SCM425	M2.6	0.4 (3.5)
SCM540 SCM560 SCM590	M3	0.6 (5.3)

### Note

- Do not forcibly assemble the motor and gearhead. Also, prevent metal objects or foreign substances from entering in the gearhead. The pinion of the motor output shaft or gear 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. Also, assemble the motor and gearhead carefully by not pinching the O-ring at the motor pilot section. If the O-ring is crushed or severed, grease may leak from the gearhead.

## ● Round shaft type

Secure the motor with hexagonal socket head screws (not included) through the four mounting holes provided. Do not leave a gap between the motor and mounting plate.



Model	Screw size	Tightening torque
SCM26	M4	1.8 N·m (15.9 lb-in) [1.4 N·m (12.3 lb-in)]
SCM315 SCM425	M5	3.8 N·m (33 lb-in) [3.0 N·m (26 lb-in)]
SCM540 SCM560 SCM590	M6	6.4 N·m (56 lb-in) [5.0 N·m (44 lb-in)]

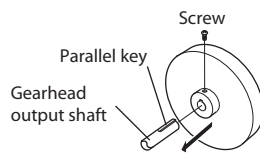
The number in parentheses [ ] indicates the value for stainless steel hexagonal socket head screw.

## ● 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.

## ■ Installing a load

The gearhead shaft is 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.



### Note

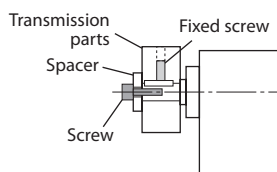
Do not apply excessive force onto the output shaft of the gearhead using a hammer or other tools. Doing so may cause damage to the output shaft or bearings.

## ● When using the output shaft end tapped hole of a gearhead

Use a tapped hole provided at the end of the output shaft as an auxiliary means for preventing the transfer mechanism from disengaging.

SCM26, SCM315 type have no output shaft end tapped hole.

Model	Output shaft end tapped hole
SCM425	M5, Effective depth 10 mm (0.39 in.)
SCM540 SCM560 SCM590	M6, Effective depth 12 mm (0.47 in.)

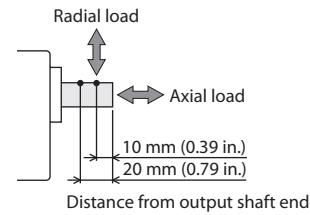


## ■ Permissible radial load and permissible axial load

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

### Note

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



## ● Combination type • parallel shaft gearhead

Model	Gear ratio	Permissible radial load [N (lb.)]		Permissible axial load [N (lb.)]
		Distance from tip of gearhead output shaft 10 mm (0.39 in.)	20 mm (0.79 in.)	
SCM26	2	100 (22)	150 (33)	15 (3.3)
	3	100 (22)	150 (33)	30 (6.7)
	5 to 25	150 (33)	200 (45)	40 (9.0)
	30 to 360	200 (45)	300 (67)	
SCM315	2	150 (33)	250 (56)	20 (4.5)
	3	150 (33)	250 (56)	40 (9.0)
	5 to 25	200 (45)	300 (67)	80 (18.0)
30 to 360	300 (67)	400 (90)		
SCM425	2	300 (67)	350 (78)	25 (5.6)
	3	300 (67)	350 (78)	50 (11.2)
	5 to 25	300 (67)	350 (78)	100 (22)
	30 to 360	450 (101)	550 (123)	
SCM540 SCM560	2	250 (56)	350 (78)	100 (22)
	3 to 9	400 (90)	500 (112)	150 (33)
	12.5 to 18	450 (101)	600 (135)	
SCM590	25 to 300	500 (112)	700 (157)	150 (33)
	2	250 (56)	350 (78)	
	3 to 9	400 (90)	500 (112)	100 (22)
	12.5 to 18	450 (101)	600 (135)	
25 to 180	500 (112)	700 (157)	150 (33)	

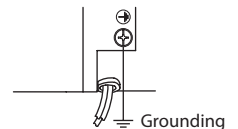
## ● Round shaft type

Model	Permissible radial load [N (lb.)]		Permissible axial load [N (lb.)]
	Distance from output shaft end of the motor 10 mm (0.39 in.)	20 mm (0.79 in.)	
SCM26	50 (11.2)	110 (24)	Not to exceed one-half the motor's mass*
SCM315	40 (9.0)	60 (13.5)	
SCM425	90 (20)	140 (31)	
SCM540	140 (31)	200 (45)	
SCM560	240 (54)	270 (60)	
SCM590			

\* Minimize the axial load. If an axial load must be applied, do not let it exceed one-half the motor's mass.

## Grounding

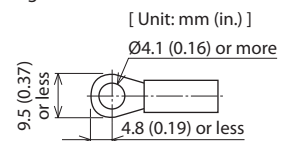
Ground close to the motor at a shortest distance using the Protective Earth Terminal (PE) of the motor.



## ■ 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



### Note

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

## Time rating

Continuous operation is possible (continuous rating).

## Maintenance · inspection

### ■ 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.

**Note** 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.

### ● 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.

### ■ Warranty

Check on the Oriental Motor Website for the product warranty.

### ■ Disposal

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

## Specifications

Check on the Oriental Motor Website for the product specifications.

## General specifications

Operation environment	Ambient temperature	Classification representing the power supply voltage <b>JA/JC:</b> -10* to +50 °C (+14 to +122 °F) (non-freezing) <b>UA/EC:</b> -10* to +40 °C (+14 to +104 °F) (non-freezing) * The lowest temperature is 0 °C (+32 °F) for gearheads of the gear ratio 2 and 3.
	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	-25 to +70 °C [-13 to +158 °F] (non-freezing)
	Ambient Humidity	85% or less (non-condensing)
Shipping environment	Altitude	Up to 3000 m (10000 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	<b>SCM26:</b> Impedance protected Other motors: 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	

## Regulations and standards

### ■ UL Standards, CSA Standards

This product is recognized by UL under the UL and CSA Standards. The motor model name represents the model that conforms to the standards.

Applicable standards	Certification Body / File No.
UL 1004-1, UL 1004-2, UL 1004-3 CSA C22.2 No.100, CSA C22.2 No.77	UL/E64197, E64199

- Thermal Class: 130 (B)

### ■ CCC System

This product is affixed the CCC Mark under the China Compulsory Certification System. It is also certified by CQC.  
Applications standards: GB/T 12350

### ■ CE Marking

This product is affixed the CE Marking under the Low Voltage Directive.

### ● Low Voltage Directive

#### Applicable standards

EN 60034-1, EN 60034-5, EN 60664-1

Momentary excess torque based on EN 60034-1

Model	Momentary excess 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.
<b>SCM315, SCM560</b>	120% of the rated torque	
<b>SCM26, SCM425, SCM540, SCM590</b>	130% of the rated torque	

#### Installation conditions (For EN standard)

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

#### ● 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.

[mm (in.)]

Model	Size	Thickness	Material
<b>SCM26</b>	115×115 (4.53×4.53)	5 (0.20)	Aluminum alloy
<b>SCM315</b>	125×125 (4.92×4.92)		
<b>SCM425</b>	135×135 (5.31×5.31)		
<b>SCM540</b>	165×165 (6.50×6.50)		
<b>SCM560, SCM590</b>	200×200 (7.87×7.87)		

### ■ RoHS Directive

The products do not contain the substances exceeding the restriction values of RoHS Directive (2011/65/EU).

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