

Speed Control Motor and Controller Package

US2 Series

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.

D-loop



D-loop

D-loop represents the speed control motor which adopted Oriental Motor's unique technology.

This product achieves high reliability using closed loop control in addition to downsize the speed controller by digitizing the phase control circuit.

Before use

Only qualified and educated personnel should work with the product.

Use the product correctly after thoroughly reading the section "Safety precautions."

The items under **Note** contain important handling instructions that the user should observe to ensure safe use of the product. **Note** is described in the related handling items.

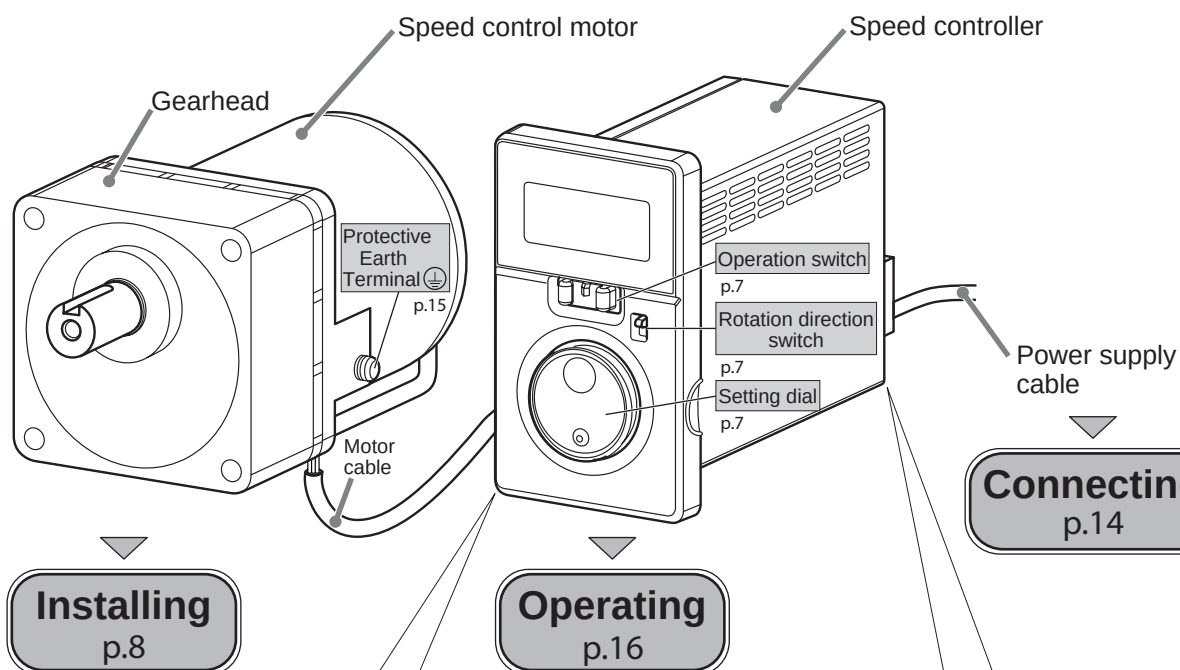
The product described in this manual has been designed and manufactured to be incorporated in general industrial equipment.

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

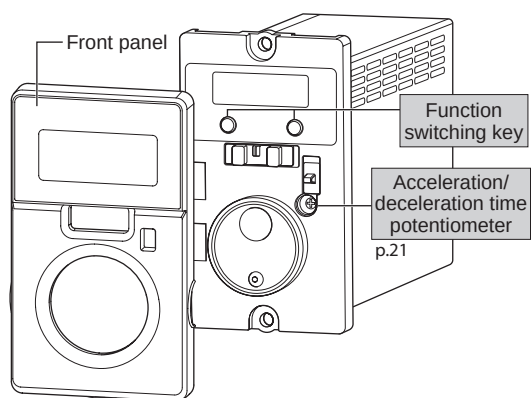
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Names of parts

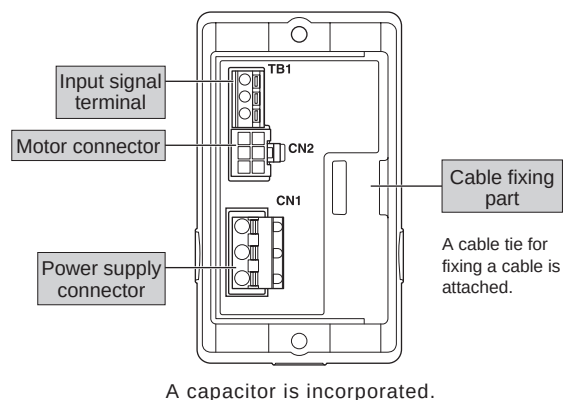


When the front panel is removed



Convenient functions
p.18

Speed controller (rear side)



Connecting
p.14

1 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.

Description of graphic symbols



Indicates "prohibited" actions that must not be performed.



Indicates "compulsory" actions that must be performed.

 Warning Handling the product without observing the instructions that accompany a "Warning" symbol may result in serious injury or death.	
 - Do not use the product in explosive or corrosive environments, in the presence of flammable gases, locations subjected to splashing water, or near combustibles. Doing so may result in fire, electric shock, or injury. - Do not transport, install, connect or inspect the product while the power is supplied. Always turn the power off before carrying out these operations. Failure to do so may result in electric shock. - The terminals on the speed controller front panel marked with  symbol indicate the presence of high voltage. Do not touch the CN1 and CN2 while the power is ON. Doing so may result in fire or electric shock. - Do not forcibly bend, pull or pinch the cable. Doing so may cause fire or electric shock. - Do not touch the connector of the speed controller immediately after the power is turned off (for a period of 1 minute). The residual voltage may cause electric shock. - Do not disassemble or modify the motor and speed controller. This may cause electric shock or injury.	 - 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, or injury. - 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. - Install the motor and speed controller in an enclosure. Failure to do so may result in electric shock or injury. - Observe the rated range for the AC power supply voltage to input to the speed controller. Failure to do so may result in fire or damage to equipment. - Securely connect and ground in accordance with the section for connection. Failure to do so may result in fire or electric shock. - Be sure to observe the specified cable sizes. Use of unspecified cable sizes may result in fire.

 Caution Handling the product without observing the instructions that accompany a "Caution" symbol may result in injury or property damage.	
 - Do not use the motor and speed controller beyond their specifications. Doing so may result in electric shock, injury or damage to equipment. - Do not carry the motor by holding the motor output shaft or motor cable. Doing so may result in injury. - Keep the area around the motor and speed controller free of combustible materials. Failure to do so may result in fire or a skin burn(s). - Do not leave anything around the motor and speed controller that would obstruct ventilation. Doing so may result in damage to equipment. - Do not wire the electromagnetic contactor or power relay between the motor and speed controller. To switch the rotation direction using the electromagnetic contactor may cause damage to equipment. - Do not touch the rotating part (output shaft) while operating the motor. Doing so may result in injury. - If an alarm of the speed controller is generated, first remove the cause and then reset the alarm. Failure to do so may result in injury or damage to equipment. - Do not use the product in elevating applications (vertical drives). Doing so may result in injury or damage to equipment. - Securely install the motor and speed controller to their respective mounting plates. Inappropriate installation may cause the motor and speed controller to detach and fall, resulting in injury or equipment damage.	 - Use a motor and speed controller only in the specified combination. An incorrect combination may cause a fire. - Provide an emergency stop device or emergency stop circuit external to the equipment so that the entire equipment will operate safely in the event of a system failure or malfunction. Failure to do so may result in injury. - Be sure to ground the motor and speed controller to prevent them from being damaged by static electricity. Failure to do so may result in damage to equipment. - Immediately when trouble has occurred, stop running and turn off the speed controller power. Failure to do so may result in fire, electrical shock or injury. - 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). - Conduct the insulation resistance measurement or dielectric strength test separately on the motor and speed controller. Conducting while the motor and speed controller are connected may result in damage to equipment. - To dispose of the motor and speed controller, disassemble it into parts and components as much as possible and dispose of individual parts/components as industrial waste.  Warning label

2 Preparation

2.1 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.

Common to each type

- | | |
|---|--|
| ☐ Motor.....1 unit
With a gearhead for the combination type and geared type | ☐ Connection cable 1 pc
Only for models supplied with the cable |
| ☐ Speed controller.....1 unit | ☐ Power supply cable [2 m (6.6 ft.)].....1 pc
Only for models supplied with the cable
A lead wire (green, 1 piece) for connecting the FG is included.
A plug is attached with only the cables for the single-phase 100 VAC type.
<u>The cables with a plug are for Japanese domestic market only.</u> |
| ☐ OPERATING MANUAL
(this document) 1 copy | |
| ☐ QUICK START GUIDE 1 copy | |

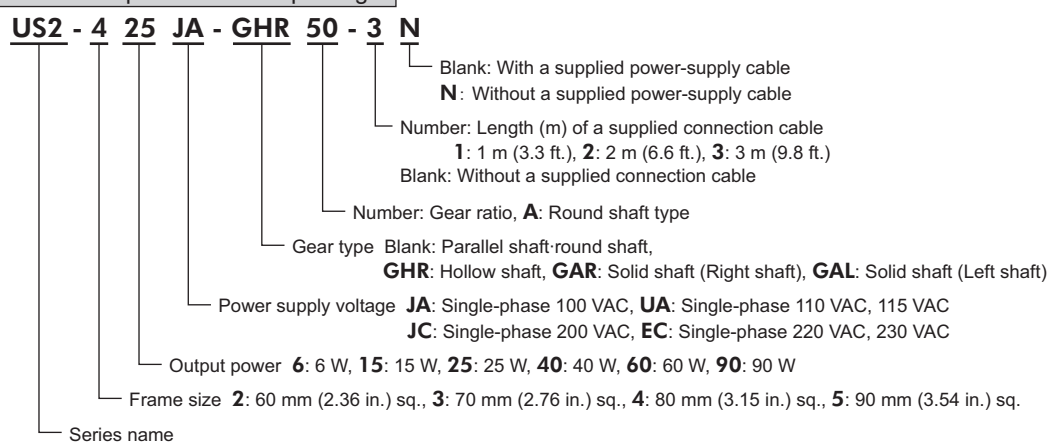
Supplied with models of the combination type and geared type

- | | |
|---|---|
| ☐ Hexagonal socket head screw set 1 set
Hexagonal socket head screw, flat washer, spring washer,
4 pieces each | ☐ Safety cover 1 pc
Only for the hollow shaft type |
| ☐ Parallel key.....1 pc | |

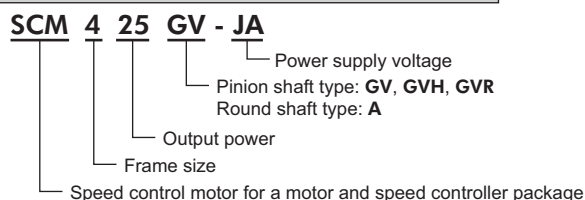
The hexagonal socket head screw set and parallel key are enclosed in the same bag.

2.2 How to identify the product model

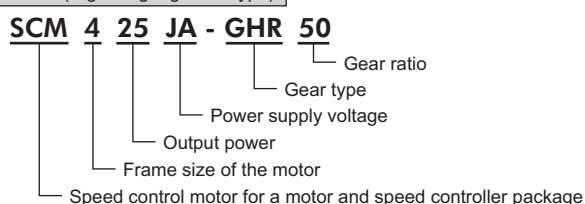
Motor and speed controller package



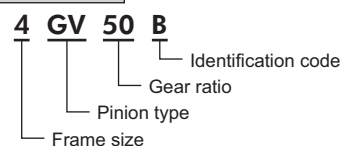
Motor (Parallel shaft-combination type, round shaft type)



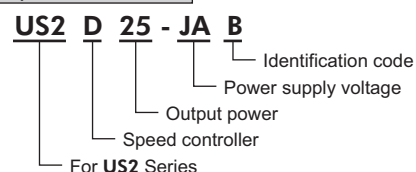
Motor (Right angle geared type)



Gearhead



Speed controller



2.3 List of combinations

Model names for motor, gearhead and speed controller are shown below.

- Enter the gear ratio in the box (□) within the model name.
For the round shaft type, enter "A" in the box (□) within the model name of a motor and speed controller package.
Enter "A" instead of GV, GVH, or GVR within the model name of the motor.
- Enter the cable length (1, 2, 3) in the box (■) within the model name when the connection cable is supplied.
- Add "N" to the end of the model name when the power supply cable is not supplied.

■ Parallel shaft • combination type, round shaft type

Motor output power	Power supply voltage	Model	Motor model	Gearhead model	Speed controller model
6 W	Single-phase 100 VAC	US2-26JA-□-■	SCM26GV-JA	2GV□B	US2D6-JA
	Single-phase 110/115 VAC	US2-26UA-□-■	SCM26GV-UA		US2D6-UA
	Single-phase 200 VAC	US2-26JC-□-■	SCM26GV-JC		US2D6-JC
	Single-phase 220/230 VAC	US2-26EC-□-■	SCM26GV-EC		US2D6-EC
15 W	Single-phase 100 VAC	US2-315JA-□-■	SCM315GV-JA	3GV□B	US2D15-JA
	Single-phase 110/115 VAC	US2-315UA-□-■	SCM315GV-UA		US2D15-UA
	Single-phase 200 VAC	US2-315JC-□-■	SCM315GV-JC		US2D15-JC
	Single-phase 220/230 VAC	US2-315EC-□-■	SCM315GV-EC		US2D15-EC
25 W	Single-phase 100 VAC	US2-425JA-□-■	SCM425GV-JA	4GV□B	US2D25-JA
	Single-phase 110/115 VAC	US2-425UA-□-■	SCM425GV-UA		US2D25-UA
	Single-phase 200 VAC	US2-425JC-□-■	SCM425GV-JC		US2D25-JC
	Single-phase 220/230 VAC	US2-425EC-□-■	SCM425GV-EC		US2D25-EC
40 W	Single-phase 100 VAC	US2-540JA-□-■	SCM540GV-JA	5GV□B	US2D40-JA
	Single-phase 110/115 VAC	US2-540UA-□-■	SCM540GV-UA		US2D40-UA
	Single-phase 200 VAC	US2-540JC-□-■	SCM540GV-JC		US2D40-JC
	Single-phase 220/230 VAC	US2-540EC-□-■	SCM540GV-EC		US2D40-EC
60 W	Single-phase 100 VAC	US2-560JA-□-■	SCM560GVH-JA	5GVH□B	US2D60-JA
	Single-phase 110/115 VAC	US2-560UA-□-■	SCM560GVH-UA		US2D60-UA
	Single-phase 200 VAC	US2-560JC-□-■	SCM560GVH-JC		US2D60-JC
	Single-phase 220/230 VAC	US2-560EC-□-■	SCM560GVH-EC		US2D60-EC
90 W	Single-phase 100 VAC	US2-590JA-□-■	SCM590GVR-JA	5GVR□B	US2D90-JA
	Single-phase 110/115 VAC	US2-590UA-□-■	SCM590GVR-UA		US2D90-UA
	Single-phase 200 VAC	US2-590JC-□-■	SCM590GVR-JC		US2D90-JC
	Single-phase 220/230 VAC	US2-590EC-□-■	SCM590GVR-EC		US2D90-EC

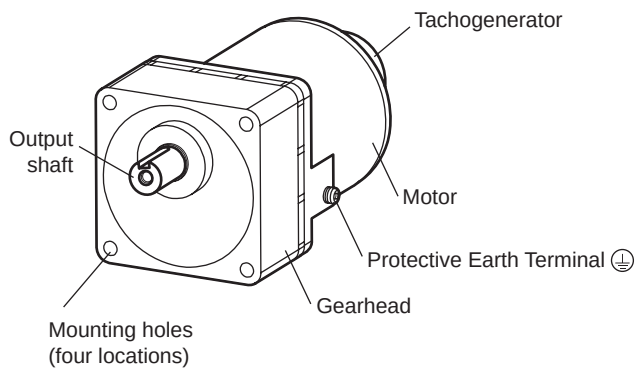
■ Right angle • geared type

Output shaft type	Motor output power	Power supply voltage	Model	Motor model	Motor model name for CE marking	Speed controller model
Hollow shaft	25 W	Single-phase 100 VAC	US2-425JA-GHR□-■	SCM425JA-GHR□	SCM425HP-JA	US2D25-JAB
		Single-phase 200 VAC	US2-425JC-GHR□-■	SCM425JC-GHR□	SCM425HP-JC	US2D25-JCB
	40 W	Single-phase 100 VAC	US2-540JA-GHR□-■	SCM540JA-GHR□	SCM540HP-JA	US2D40-JAB
		Single-phase 200 VAC	US2-540JC-GHR□-■	SCM540JC-GHR□	SCM540HP-JC	US2D40-JC
	90 W	Single-phase 100 VAC	US2-590JA-GHR□-■	SCM590JA-GHR□	SCM590HP-JA	US2D90-JA
		Single-phase 200 VAC	US2-590JC-GHR□-■	SCM590JC-GHR□	SCM590HP-JC	US2D90-JC
Solid shaft (Right shaft)	25 W	Single-phase 100 VAC	US2-425JA-GAR□-■	SCM425JA-GAR□	SCM425HP-JA	US2D25-JAB
		Single-phase 200 VAC	US2-425JC-GAR□-■	SCM425JC-GAR□	SCM425HP-JC	US2D25-JCB
	40 W	Single-phase 100 VAC	US2-540JA-GAR□-■	SCM540JA-GAR□	SCM540HP-JA	US2D40-JAB
		Single-phase 200 VAC	US2-540JC-GAR□-■	SCM540JC-GAR□	SCM540HP-JC	US2D40-JC
	90 W	Single-phase 100 VAC	US2-590JA-GAR□-■	SCM590JA-GAR□	SCM590HP-JA	US2D90-JA
		Single-phase 200 VAC	US2-590JC-GAR□-■	SCM590JC-GAR□	SCM590HP-JC	US2D90-JC
Solid shaft (Left shaft)	25 W	Single-phase 100 VAC	US2-425JA-GAL□-■	SCM425JA-GAL□	SCM425HP-JA	US2D25-JAB
		Single-phase 200 VAC	US2-425JC-GAL□-■	SCM425JC-GAL□	SCM425HP-JC	US2D25-JCB
	40 W	Single-phase 100 VAC	US2-540JA-GAL□-■	SCM540JA-GAL□	SCM540HP-JA	US2D40-JAB
		Single-phase 200 VAC	US2-540JC-GAL□-■	SCM540JC-GAL□	SCM540HP-JC	US2D40-JC
	90 W	Single-phase 100 VAC	US2-590JA-GAL□-■	SCM590JA-GAL□	SCM590HP-JA	US2D90-JA
		Single-phase 200 VAC	US2-590JC-GAL□-■	SCM590JC-GAL□	SCM590HP-JC	US2D90-JC

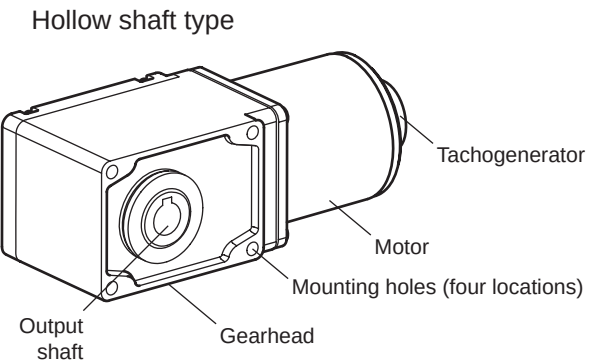
2.4 Names and functions of parts

Motor

Parallel shaft • combination type

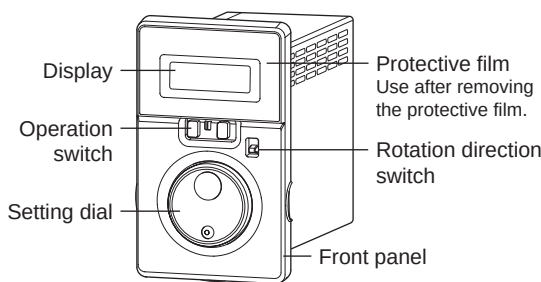


Right angle • geared type



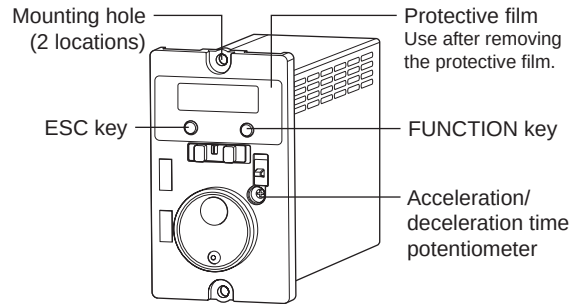
Speed controller

Front side When the front panel is attached



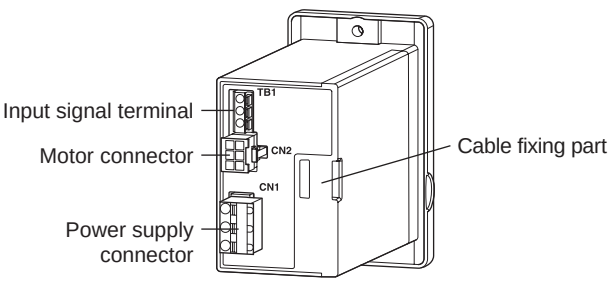
Display	This display shows the monitor item, alarms, etc.
Operation switch	Setting the operation switch to the "RUN" side causes the motor to rotate. Setting the operation switch to the "STAND-BY" side causes the motor to stop.
Setting dial	This setting dial is used to change the rotation speed and parameters. After changing, the new value is determined by pressing the setting dial.
Rotation direction switch	This switch is used to change the motor rotation direction.

Front side When the front panel is removed

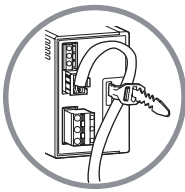


ESC key	This key is used to return to the previous level.
FUNCTION key	This key is used to switch the function.
Acceleration/ deceleration time potentiometer	This potentiometer is used to set the acceleration/ deceleration time.
Mounting hole (2 locations)	Installs the speed controller with screws (M4).

Rear side



Motor connector	Connects the connector from the motor.
Power supply connector	Connects the AC power supply.



Fix as shown in the figure.
This can prevent from giving stress to the connector terminal caused by movement of a cable.

Input signal terminal	Connects only when the motor is operated using external signals.
Cable fixing part	The motor cable can be fixed using a supplied cable-tie.

3 Installation

This chapter explains the installation location and installation methods.

3.1 Location for installation

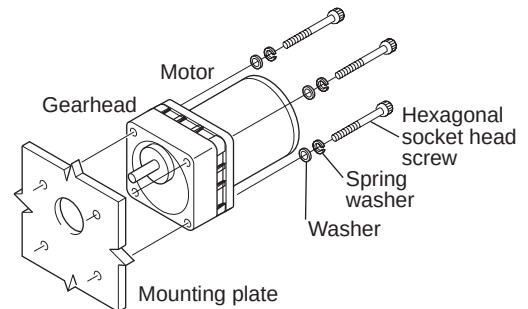
The motor and speed controller described in this manual have been designed and manufactured to be incorporated in general industrial equipment. Install them in a well-ventilated location that provides easy access for inspection.

- Inside an enclosure that is installed indoors
- Operating ambient temperature
Motor: The operating ambient temperature varies depending on the AC input voltage of the motor.
100 VAC and 200 VAC types:
–10 to +50 °C [+14 to +122 °F] (non-freezing)
110/115 VAC and 220/230 VAC types:
–10 to +40 °C [+14 to +104 °F] (non-freezing)
Speed controller: 0 to +50 °C [+32 to +122 °F] (non-freezing)
- Operating ambient humidity 85% or less (non-condensing)
- Area that is free of explosive atmosphere or toxic gas (such as sulfuric gas) or liquid
- Area not stored combustible materials
- Area not exposed to direct sun
- Area free of excessive amount of dust, iron particles or the like
- Area not subject to splashing water (rain, 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

3.2 Installing the motor

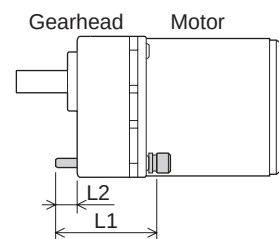
■ Installing the parallel shaft • combination type

Drill tapped holes in the mounting plate and secure the product with the supplied hexagonal socket head screw set through four mounting holes. Install it so that no gaps remain between the gearhead mounting surface and mounting plate.



- Supplied hexagonal socket head screw set
(Hexagonal socket head screws, washers, spring washers 4 pieces each)

Gearhead model	Gear ratio	Hexagonal socket head screw (Material: Stainless steel)			Tightening torque [N·m (lb-in)]
		Screw size	L1 [mm (in.)]	L2 [mm (in.)]	
2GV□B	5 to 25	M4	50 (1.97)	7 (0.28)	1.4 (12)
	30 to 120		55 (2.17)	8 (0.31)	
	150 to 360		60 (2.36)	8 (0.31)	
3GV□B	5 to 25	M6	60 (2.36)	12 (0.47)	5.0 (44)
	30 to 120		65 (2.56)	12 (0.47)	
	150 to 360		70 (2.76)	12 (0.47)	
4GV□B	5 to 25		60 (2.36)	9 (0.35)	
	30 to 120		65 (2.56)	9 (0.35)	
	150 to 360		70 (2.76)	9 (0.35)	
5GV□B 5GVH□B	5 to 18	M8	70 (2.76)	14 (0.55)	12.0 (106)
	25 to 100		85 (3.35)	16 (0.63)	
	120 to 300		90 (3.54)	15 (0.59)	
5GVR□B	5 to 15		70 (2.76)	14 (0.55)	
	18 to 36		85 (3.35)	16 (0.63)	
	50 to 180		95 (3.74)	14 (0.55)	



Note On rare occasions, a small amount of 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.
Oil leakage may lead to problems in the customer's equipment or products.

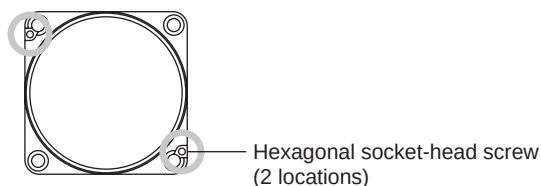
• Removing/Installing the gearhead

The gearhead or the outlet position of the motor lead wires can be changed.

Removing the gearhead from the motor

Remove the gearhead by unscrewing the hexagonal socket-head screws holding the gearhead to the motor (2 locations).

Illustration shows the view from motor case side.

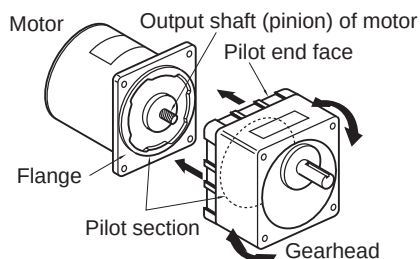


Gearhead model	Screw size	Tightening torque [N·m (lb-in)]
2GV□B 3GV□B 4GV□B	M2.6	0.4 (3.5)
5GV□B 5GVH□B 5GVR□B	M3	0.6 (5.3)

Combining the gearhead to the motor

Using the pilot sections of the motor and gearhead as guides, slowly rotate it clockwise/counterclockwise to prevent the pinion of the motor output shaft from contacting the side panel or gear of the gearhead. Also confirm that no gaps remain between the motor and gearhead.

An O-ring is attached to the flange of the motor. Do not pinch the O-ring when assembling the motor and gearhead. Pinching the O-ring causes a grease leak from the gearhead.

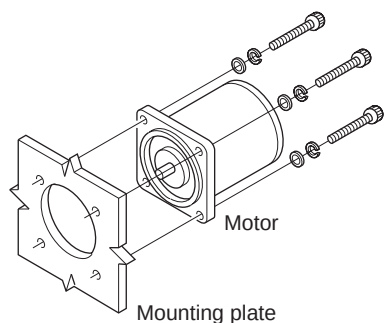


Note Do not forcibly assemble the motor and gearhead. Also, do not let metal objects or other foreign matters enter the gearhead. The pinion or gear of the motor output shaft may be damaged, resulting in noise or shorter service life.

■ Installing the round shaft type

Drill holes in the mounting plate, and secure the motor using the hexagonal socket head screws (not supplied) through four mounting holes.

Install it so that no gaps remain between the motor mounting surface and mounting plate.



Motor model	Screw size	Tightening torque [N·m (lb-in)]
SCM2	M4	1.8 N·m (15 lb-in) [1.4 N·m (12 lb-in)]
SCM3 SCM4	M5	3.8 N·m (33 lb-in) [3.0 N·m (26 lb-in)]
SCM5	M6	6.4 N·m (56 lb-in) [5.0 N·m (44 lb-in)]

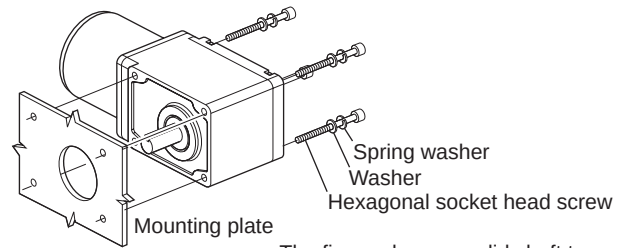
The number in brackets [] indicate the value for stainless steel.

■ Installing the right angle • geared type

Machine tapped holes in the mounting plate, and secure the motor on the plate using hexagonal socket head screw set (supplied).

The pilot section on the output shaft has been machined to $\varnothing 50_{-0.039}^0$ mm (h8) [$\varnothing 1.9685_{-0.0015}^0$ in] for SCM4 type and $\varnothing 58_{-0.046}^0$ mm (h8) [$\varnothing 2.2835_{-0.0018}^0$ in] for SCM5 type.

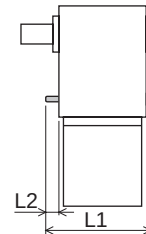
Use this pilot section as a guide when aligning the output shaft.



The figure shows a solid shaft type.

Motor model	Hexagonal socket head screw (Material: Stainless steel)			Tightening torque [N·m (lb-in)]
	Screw size	L1 [mm (in.)]	L2 [mm (in.)]	
SCM4	M6	100 (3.94)	11 (0.43)	5.0 (44)
SCM5	M8	110 (4.33)	8 (0.31)	12.0 (106)

* When the supplied hexagonal socket head screw set is used.



Note

- Do not disassemble the gearhead from the motor.
- When using the gearhead flange to mount the geared motor to equipment, 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.
- On rare occasions, a small amount of 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. Oil leakage may lead to problems in the customer's equipment or products.

■ For the motor equipped with cooling fan (90 W)

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.

3.3 Installing a load

■ Parallel shaft • combination type, round shaft type

When installing a load on the motor (gearhead), pay attention to the following points.

- Align the centerline of the motor output shaft (gearhead output shaft) with the centerline of the load.
- For the parallel shaft-combination type, a key slot is provided on the output shaft of the gearhead. Form a key slot on the load side and secure the load using the supplied parallel key.

Note

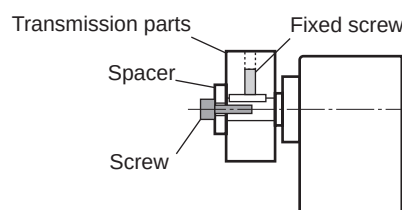
- When coupling the motor (gearhead) with a load, pay attention to centering, belt tension, parallelism of pulleys, etc. Also, firmly secure the tightening screws of the coupling or pulleys.
- When installing a load, do not damage the motor output shaft (gearhead output shaft) or bearing. Do not apply 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.
- Do not modify or machine the motor (gearhead) output shaft. The bearing may be damaged or motor (gearhead) may break.

• 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.

Gearhead model	Output shaft end tapped hole
4GV□B	M5, Effective depth 10 mm (0.39 in.)
5GV□B 5GVH□B 5GVR□B	M6, Effective depth 12 mm (0.47 in.)

The output shaft end tapped hole is not provided for the 2GV□B and 3GV□B types.



■ Right angle • hollow shaft type

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

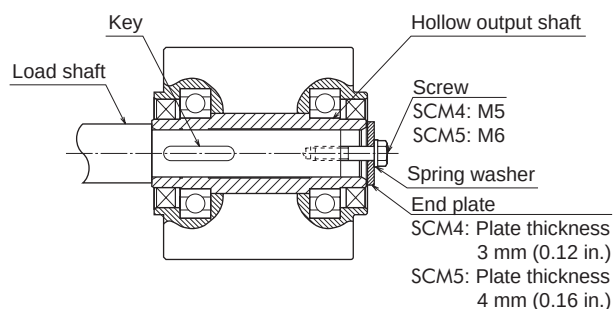
The hollow output shaft inside dimension is processed to a tolerance of H8, and incorporates a key slot for load shaft attachment. A load shaft tolerance of h7 is recommended.

Apply grease on the surface of the load shaft and inner walls of the hollow output shaft to prevent seizure.

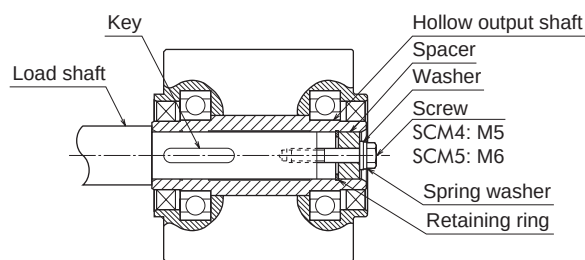
Motor model	Hollow shaft inside dimensions (H8)	Recommended load shaft dimensions (h7)
SCM4	$\varnothing 18^{+0.027}_0$ mm ($\varnothing 0.7087^{+0.0011}_0$ in.)	$\varnothing 18^0_{-0.018}$ mm ($\varnothing 0.7087^0_{-0.0007}$ in.)
SCM5	$\varnothing 25^{+0.033}_0$ mm ($\varnothing 0.9843^{+0.0013}_0$ in.)	$\varnothing 25^0_{-0.021}$ mm ($\varnothing 0.9843^0_{-0.0008}$ in.)

• Stepped load shaft

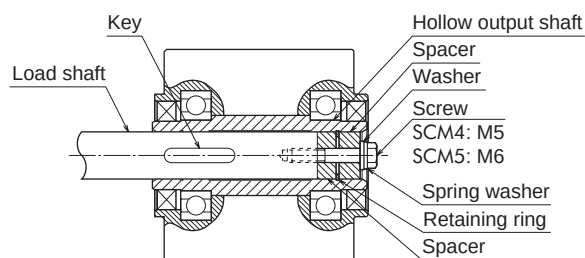
Mounting method using end plate



Mounting method using retaining ring



• Non-stepped load shaft

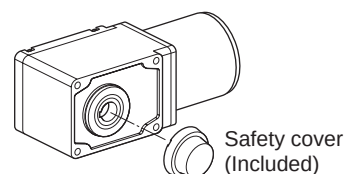


Note Do not apply excessive or abrupt force to the hollow output shaft when inserting a load shaft into the hollow output shaft. Excessive or abrupt force may damage the gearhead internal bearings.

• Installing the safety cover

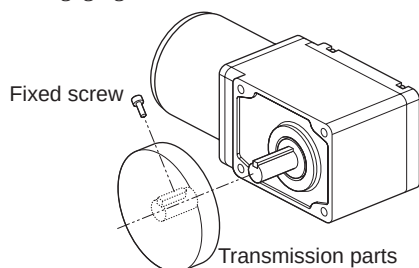
After installing the load, attach the safety cover.

When removing the safety cover, insert a plastic stick with a flat tip to the cutout of the safety cover, and remove.

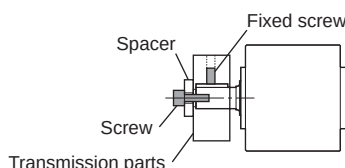


■ Right angle • solid shaft type

The shaft of the gearhead has been machined to an outer diameter tolerance of h7 and 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. With the solid shaft type, use a tapped hole provided at the end of the output shaft as an auxiliary means for preventing the transfer mechanism from disengaging.



• Example of using the output shaft end tapped hole



Motor model	Output shaft end tapped hole
SCM4	M5 Effective depth 10 mm (0.39 in.)
SCM5	M6 Effective depth 12 mm (0.47 in.)

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.

3.4 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.

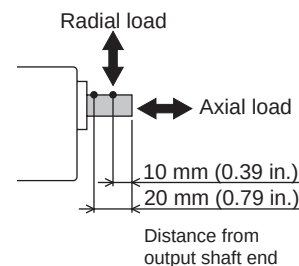
Note Failure due to fatigue may occur when the motor (gearhead) bearings and output shaft are subject to repeated loading by a radial or axial load that is in excess of the permissible limit.

■ Parallel shaft • combination type

Gearhead model	Gear ratio	Permissible radial load [N (lb.)] Distance from output shaft end of the gearhead		Permissible axial load [N (lb.)]
		10 mm (0.39 in.)	20 mm (0.79 in.)	
2GV□B	5 to 25	150 (33)	200 (45)	40 (9)
	30 to 360	200 (45)	300 (67)	
3GV□B	5 to 25	200 (45)	300 (67)	80 (18)
	30 to 360	300 (67)	400 (90)	
4GV□B	5 to 25	300 (67)	350 (78)	100 (22)
	30 to 360	450 (101)	550 (123)	
5GV□B 5GVH□B	5 to 9	400 (90)	500 (112)	150 (33)
	12.5 to 18	450 (101)	600 (135)	
	25 to 300	500 (112)	700 (157)	
5GVR□B	5 to 9	400 (90)	500 (112)	
	12.5 to 18	450 (101)	600 (135)	
	25 to 180	500 (112)	700 (157)	

■ Round shaft type

Motor model	Permissible radial load [N (lb.)] Distance from output shaft end of the motor		Permissible axial load [N (lb.)]
	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)	60 (13.5)	
SCM425	90 (20)	140 (31)	
SCM540	140 (31)	200 (45)	
SCM560 SCM590	240 (54)	270 (60)	

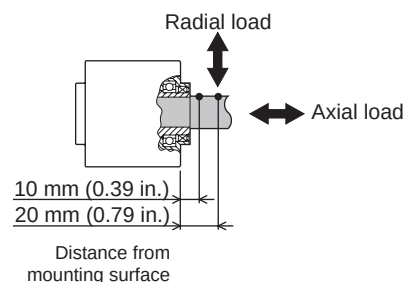


* Minimize the axial load. If an axial load must be applied, do not let it exceed one-half the motor's mass.

■ Right angle • geared type

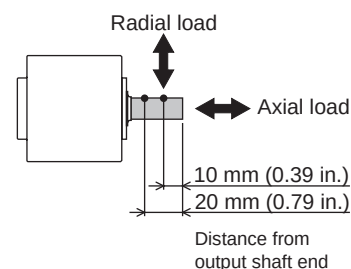
• Hollow shaft type

Motor model	Gear ratio	Permissible radial load [N (lb.)] Distance from mounting surface		Permissible axial load [N (lb.)]
		10 mm (0.39 in.)	20 mm (0.79 in.)	
SCM425	25 to 40	850 (190)	700 (157)	300 (67)
	50 to 240	1200 (270)	1000 (220)	
SCM540	15 to 40	1200 (270)	1100 (240)	350 (78)
	50 to 240	2200 (490)	2000 (450)	
SCM590	5 to 40	1200 (270)	1100 (240)	
	50 to 240	2200 (490)	2000 (450)	



• Solid shaft type

Motor model	Gear ratio	Permissible radial load [N (lb.)] Distance from output shaft end		Permissible axial load [N (lb.)]
		10 mm (0.39 in.)	20 mm (0.79 in.)	
SCM425	25 to 40	700 (157)	800 (180)	300 (67)
	50 to 240	1000 (220)	1100 (240)	
SCM540	15 to 40	900 (200)	1000 (220)	350 (78)
	50 to 240	1700 (380)	1850 (410)	
SCM590	5 to 40	900 (200)	1000 (220)	
	50 to 240	1700 (380)	1850 (410)	



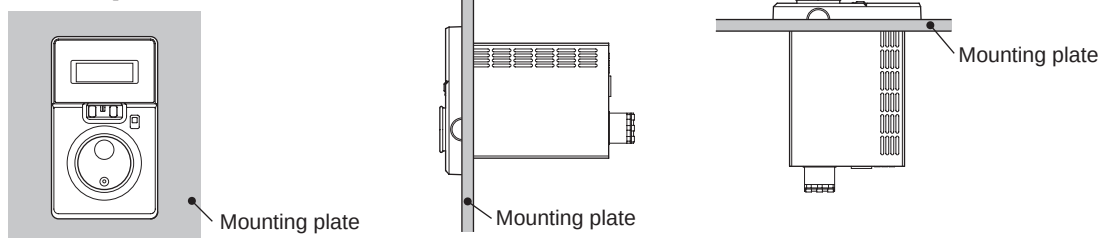
3.5 Installing the speed controller

The speed controller is designed so that heat is dissipated via air convection.

There must be a clearance of at least 25 mm (0.98 in.) and 50 mm (1.97 in.) clearances in the horizontal and vertical directions, respectively, between the speed controller and enclosure or other equipment within the enclosure.

■ Installation direction

Install the speed controller so that the front panel side is turned in the front direction or upward.



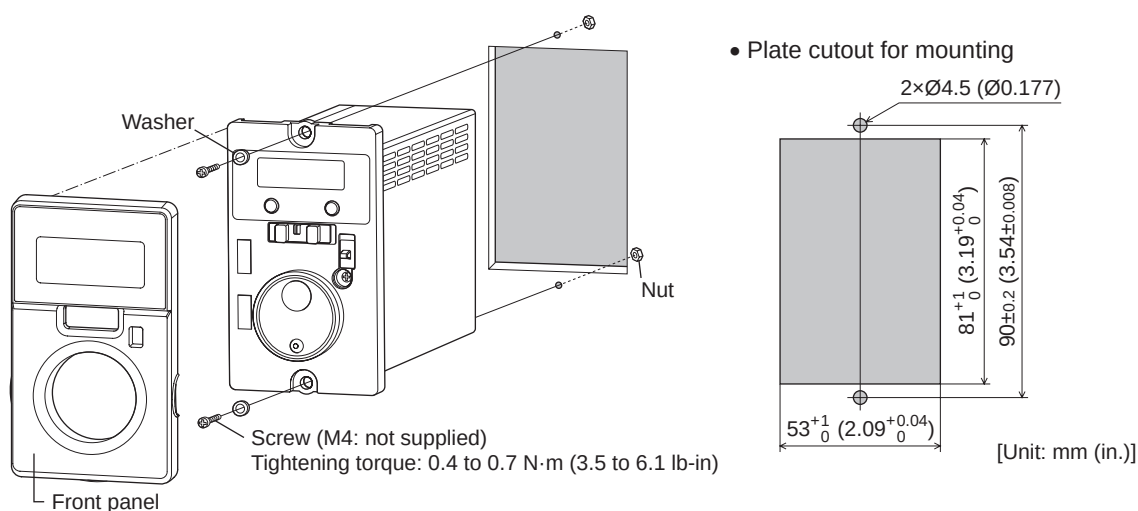
Note

- Do not install any equipment that generates a large amount of heat or noise near the speed controller.
- If the ambient temperature of the speed controller exceeds the upper limit of the operating ambient temperature, revise the ventilation condition or forcibly cool the area around the speed controller using a fan in order to keep within the operating ambient temperature.

■ Installation method

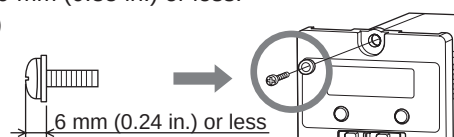
Install the speed controller to a flat metal plate offering excellent vibration resistance.

Remove the front panel of the speed controller and secure the two mounting holes using screws, washers, and nuts (M4: not supplied). Tighten the screws until no gaps remain between the speed controller and mounting plate.



Note

- If the washer is used, use the washer which outer diameter is 9 mm (0.35 in.) or less.
- For screws to install the speed controller, keep 6 mm (0.24 in.) or less for the length of a screw head with a washer. The front panel cannot be installed if it is exceeded 6 mm (0.24 in.).



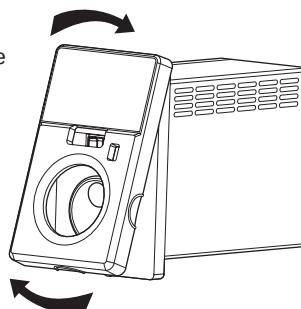
Removing and installing the front panel

Installing

Install the front panel after placing it on the upper side of the front face of the speed controller.

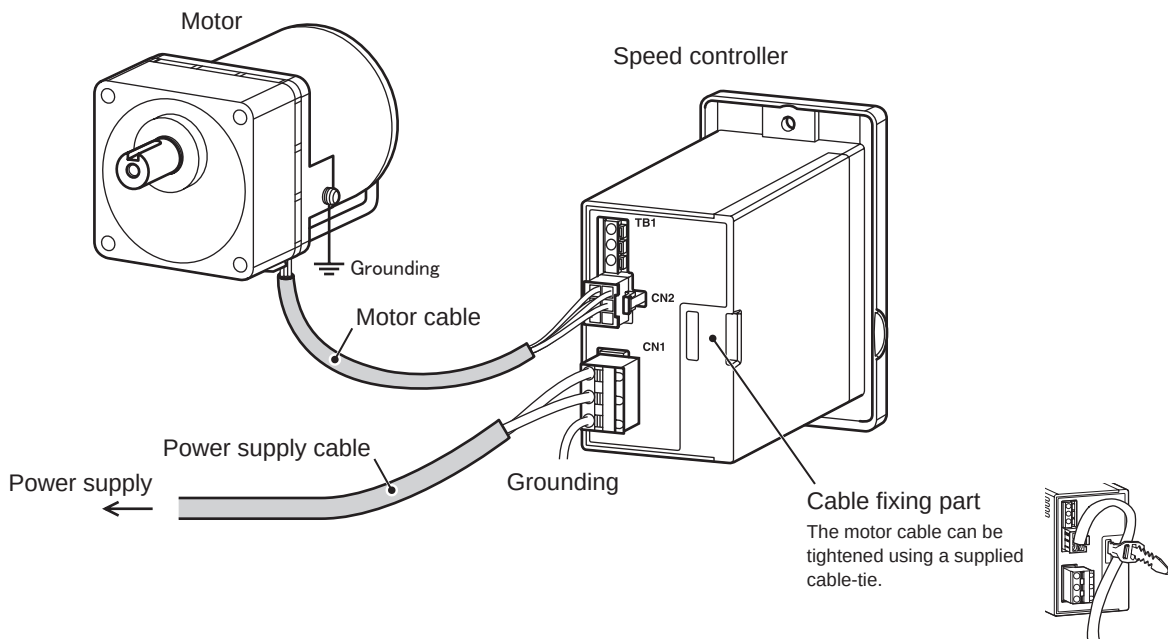
Removing

Remove the front panel having the under side.



4 Connecting

This chapter explains how to connect the speed controller and motor, input signal, and power supply, as well as the grounding method.



4.1 Connecting the power supply

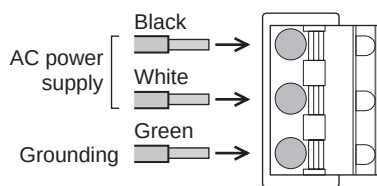
Connect the AC power supply to the CN1 on the speed controller.

When connecting, use a supplied power-supply cable or provide a cable separately.

A lead wire for connecting the FG [green, 2 m (6.6 ft.)] is included in the supplied power-supply cable. The supplied power-supply cable does not have the polarity.

The power supply cables supplied with the single-phase 100 VAC type are attached a plug. They can be used in Japanese domestic market only.

How to connect to the CN1



Connector model: GFKC2,5/3-ST-7,62
(PHOENIX CONTACT GmbH & Co. KG)

● Connect the live side to terminal L or L1, and the neutral side to terminal N or L2.

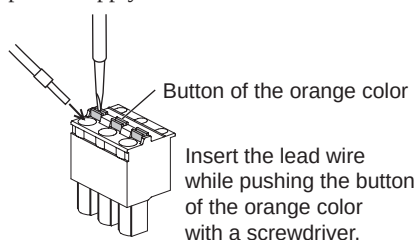
● Ground the speed controller using a FG terminal.

The indication of the terminal varies depending on the voltage of the product.

Single-phase 110/115 VAC, 200 VAC, 220/230 VAC
Single-phase 100 VAC

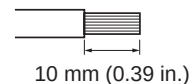
Connecting the lead wire

Connect the lead wire of the supplied power-supply cable to the connector.



[When a cable other than the supplied power-supply cable is used]

- Applicable lead wire: AWG18 to 14 (0.75 to 2.0 mm²)
- Strip the insulation cover of the lead wire



If crimp terminals are used, select the following terminals.

Manufacturer: PHOENIX CONTACT GmbH & Co. KG

Model: AI 0,75-10 [Conductor cross-sectional area: 0.65 to 0.82 mm² (AWG18)]
AI 1-10 [Conductor cross-sectional area: 0.82 to 1.2 mm² (AWG18)]
AI 1,5-10 [Conductor cross-sectional area: 1.25 to 1.8 mm² (AWG16)]
AI 2,5-10 [Conductor cross-sectional area: 2.0 to 3.0 mm² (AWG14)]

4.2 Connecting the motor and speed controller

Connect the motor cable connector to the CN2 on the speed controller.

Use a connection cable (supplied or accessory) when extending the wiring distance between the motor and speed controller. The connection cable can be connected up to 3 pieces. Flexible connection cables are also available as accessories.

Maximum extension distance between the motor and speed controller:

10.5 m (34.4 ft.) [including 0.5 m (1.6 ft.) of the motor cable]

- Note**
- Securely plug the motor connector into the speed controller, and fix the cable so as not to give stress to the connector terminal. Insecure connections may cause malfunction or damage to the motor or speed controller.
 - Use a motor and speed controller only in the specified combination. Unspecified combination may result in unusual temperature rise or damage to the product.

4.3 Grounding

Be sure to ground a motor and speed controller using the Protective Earth Terminal $\oplus$ and FG terminal, respectively.

- Note**
- Be sure to ground the motor and speed controller to prevent them from being damaged by static electricity. Static electricity may cause damage to the product if the Protective Earth Terminals are not grounded.

■ Motor

Ground close to the motor at a shortest distance using the Protective Earth Terminal $\oplus$ of the motor.

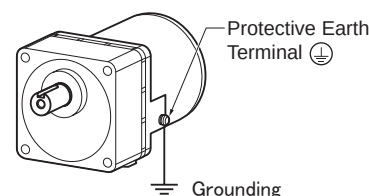
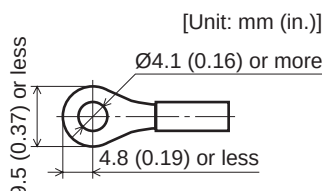
Applicable crimp terminal:

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)

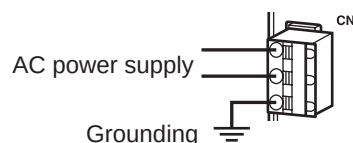
Applicable lead wire: AWG18 (0.75 mm²) or thicker



- Note**
- Do not use screws other than the Protective Earth Terminal screw attached on the product.

■ Speed controller

Connect the speed controller using the FG terminal of the CN1 (power supply connector).



4.4 Connecting the input signals

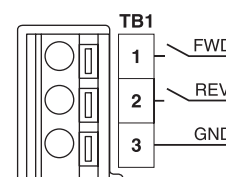
When the motor is operated and stopped externally, connect input signals to the TB1.

The operation using the front panel is set at the time of shipment. Refer to p.22 for how to operate using input signals (external commands).

- Applicable lead wire: AWG24 to 16 (0.2 to 1.25 mm²)
- Length of the insulation cover which can be peeled: 11 mm (0.43 in.)

TB1 pin assignment

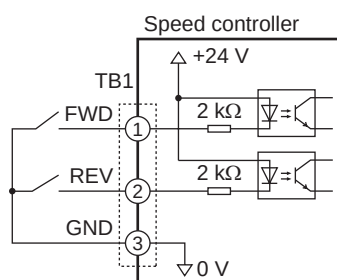
Display	Signal name	Description
1	FWD	Forward input
2	REV	Reverse input
3	GND	Input signal common



■ Connection example for input signals

All input signals of the speed controller are photocoupler inputs.

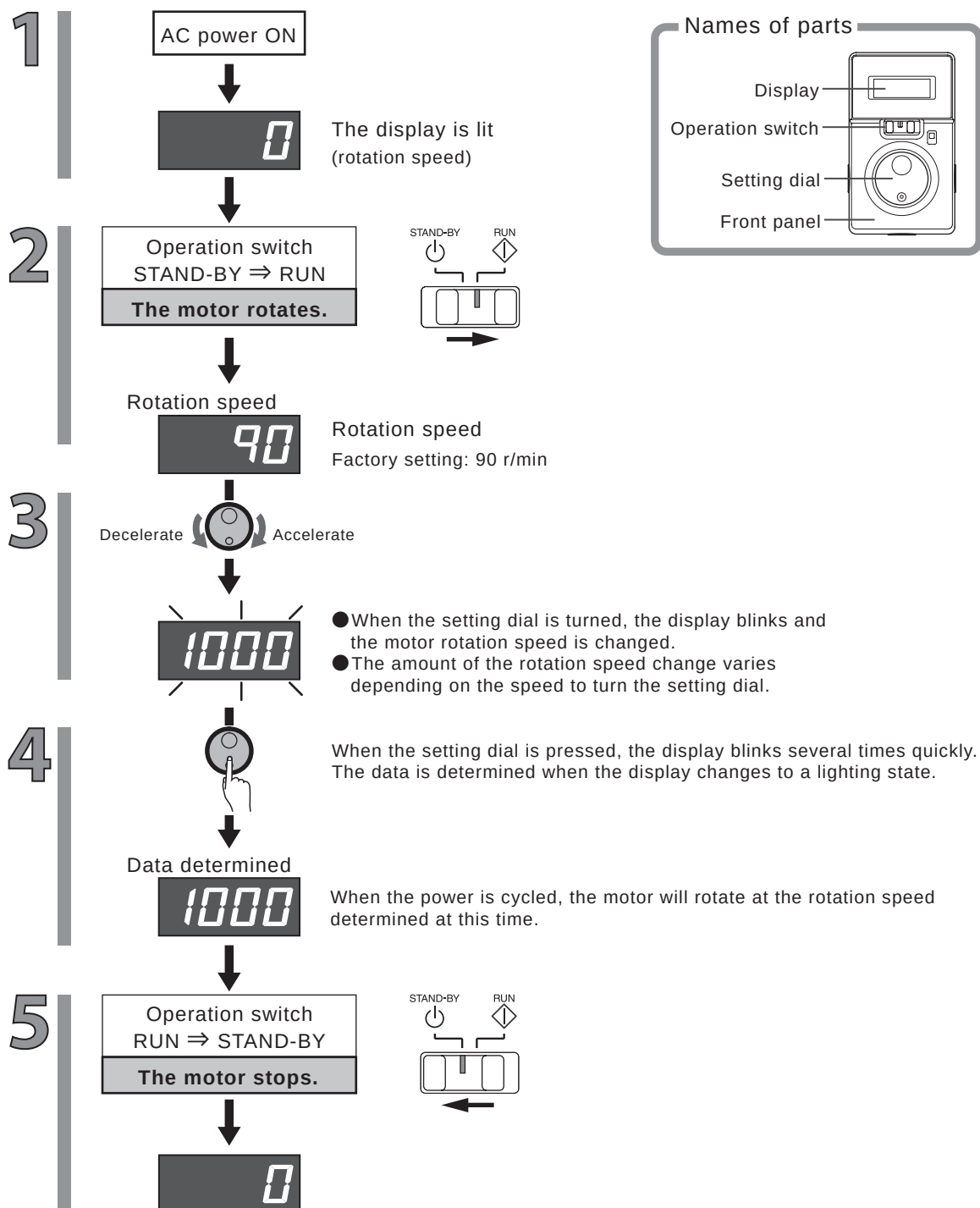
This is a connection example for when the motor is operated using relays and switches (contact capacity 15 mA or more).



5 Operating

5.1 Operation procedure

After connecting, operate the product as follows.

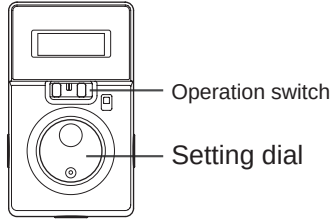


Refer to "Data locking for the set data" if the change of setting data is not allowed. p.20

Refer to "Alarms" if the alarm code such as **AL26** **AL30** or others is displayed. p.23

Refer to "Troubleshooting" if the motor does not rotate. p.24

5.2 To adjust the motor rotation speed



Variable speed range
 50 Hz: 90 to 1400 r/min
 60 Hz: 90 to 1600 r/min

Setting the operation switch to the "RUN" side causes the motor to rotate. Setting the operation switch to the "STAND-BY" side causes the motor to stop. The speed while the motor is rotating can be adjusted with the setting dial.

Turning the setting dial slowly

When the setting dial is turned to the right, the rotation speed accelerates by 1 r/min increments. When the setting dial is turned to the left, the rotation speed decelerates by 1 r/min increments. The display blinks at this time.

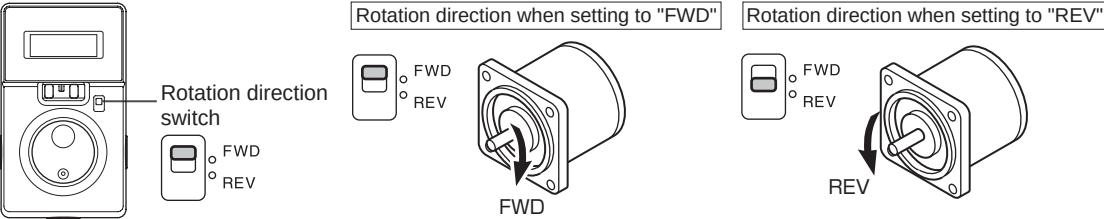
Turning the setting dial quickly

The amount of the rotation speed change increases. When the setting dial is pressed, the rotation speed is determined, and the display changes to a lighting state. The actual rotation speed is indicated while the display is lit.

- The rotation speed can be set up to 1600 r/min. However, when the product is used at 50 Hz, the motor cannot be operated at the speed exceeding approximately 1420 r/min.
- The rotation speed can be set regardless of whether the motor rotates or stops.

5.3 Switching the motor rotation direction.

The motor rotation direction can be changed with the rotation direction switch.



The rotation direction of the gearhead output shaft varies depending on the gear ratio of the gearhead. Change the rotation direction switch according to the gear ratio of the gearhead.

Note To change rotation direction of the motor, wait until the motor completely stops. If the rotation direction is switched while the motor is operating, it may not change, or it may take a long time to change.

Parallel shaft • combination type

Gear ratio	6 W, 15 W, 25 W	5 to 25, 150 to 360	30 to 120
	40 W, 60 W	5 to 18, 120 to 300	25 to 100
	90 W	5 to 15, 75 to 180	18 to 60
Rotation direction*			

Right angle • geared type

Gear ratio	5 to 120		150 to 240	
	•Hollow shaft •Solid shaft•Right shaft	•Solid shaft•Left shaft	•Hollow shaft •Solid shaft•Right shaft	•Solid shaft•Left shaft
Rotation direction*				

* When the rotation direction switch is set to "FWD," the motor rotates in the forward (FWD) direction in the figure above. When the rotation direction switch is set to "REV," the motor rotates in the reverse (REV) direction in the figure above.

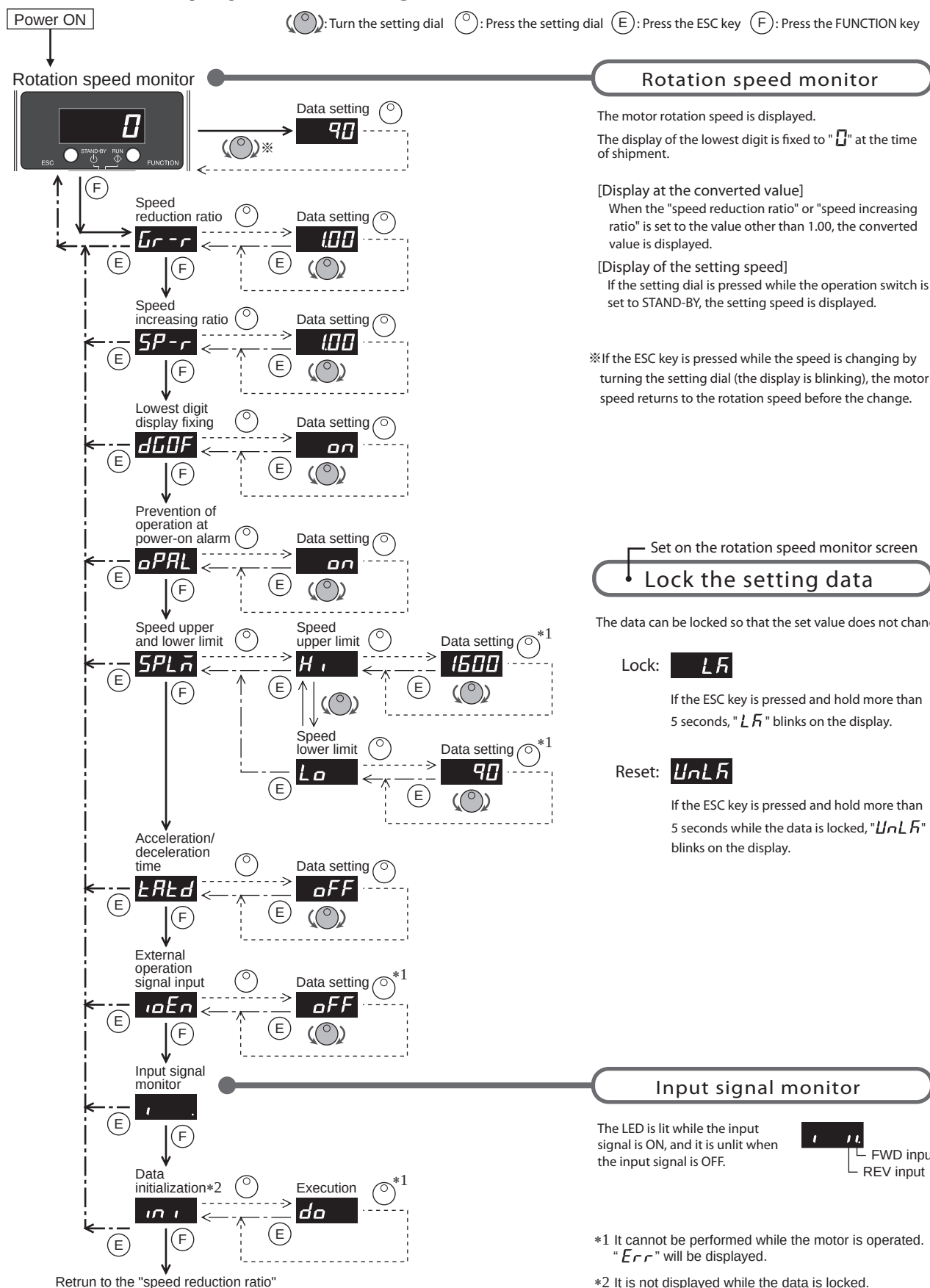
6 Convenient functions

6.1 Functions list

Various settings can be performed when removing the front panel.

Display	•To display the rotation speed of the gearhead output shaft •To display the conveyor transfer speed	Parameter type	Display	Setting range	Factory setting
		Speed reduction ratio		1.00 to 9999	1.00
	• Sets the speed reduction ratio when the rotation speed of the gearhead output shaft is displayed. • The conveyor transfer speed [m/min] can be displayed if the conveyor speed reduction ratio calculated by the formula on the next page is input. • The number of digits to be displayed varies depending on the set speed reduction ratio. Refer to the next page for the number of digits displayed.				
	To display the speed increased by an external mechanism	Parameter type	Display	Setting range	Factory setting
		Speed increasing ratio		1.00 to 5.00	1.00
• When increasing the motor rotation speed using the external mechanism and others, the converted speed can be displayed. • When setting the speed increasing ratio to other than 1.00, the speed increasing ratio will be effective.					
To display the first digit of the rotation speed	Parameter type	Display	Setting range	Factory setting	
	Lowest digit display fixing		oFF (Not fixed) on (Fixed)	on	
	The lowest digit display of the rotation speed is fixed to "0" on the display. When displaying the value of the lowest digit, set this parameter to "oFF (Not fixed)."				
Operation	To start and stop the motor by ON-OFF control of the power supply	Parameter type	Display	Setting range	Factory setting
		Prevention of operation at power-on alarm		oFF (Disable) on (Enable)	on
	Sets whether to enable or disable the "prevention of operation at power-on alarm." When starting and stopping the motor by ON-OFF control of the power supply, set this parameter to "oFF (Disable)."				
	To start and stop the motor externally	Parameter type	Display	Setting range	Factory setting
		External operation signal input		oFF (Front panel) rE (external commands)	oFF
The operation method can be selected between the front panel and external input signals. If "rE (external commands)" is selected, the input signals are enabled, and the operation switch and rotation direction switch are disabled. Refer to p.22 for details.					
To change the acceleration time and deceleration time of the motor	Parameter type	Display	Setting range	Factory setting	
	Acceleration/deceleration time		oFF (Disable) on (Enable)	oFF	
	Sets whether to enable or disable the acceleration/deceleration time potentiometer of the front panel. Refer to p.21 for details. If "on (Enable)" is selected, the acceleration time and deceleration time can be set using the acceleration/ deceleration time potentiometer.				
Speed setting	To limit the setting range of the rotation speed	Parameter type	Display	Setting range	Factory setting
		Speed upper limit		90 to 1600	1600
		Speed lower limit			90
	The setting range of the speed is set to 90 to 1600 r/min at the time of shipment. The upper and lower limits of this setting range can be limited. Refer to the next page for details.				
Lock	To lock the data	The data can be locked so that the set value does not change. Refer to p.20 for details.			
Initialization	To initialize the data	The data can be restored to the factory setting. Refer to the next page, and execute the "data initialization."			

6.2 Panel displays and setting items



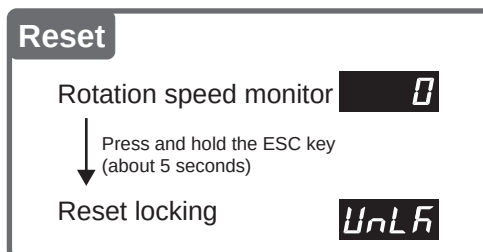
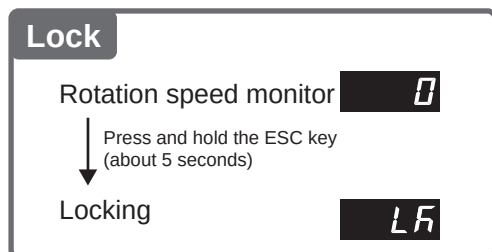
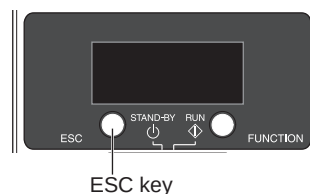
6.3 Data locking for the set data

The data setting can be locked so that the set rotation speed and parameters do not change.

The setting of data and parameters cannot be changed using the setting dial while the data is locked.

However, the setting data of each parameter can be checked even when the data is locked.

Remove the front panel when executing the data locking.



- Display while the data is locked

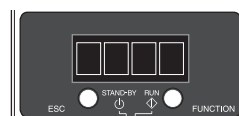
If you try to change the data while the data is locked, "L F" is displayed for about 1 second.

6.4 Display after setting the speed reduction ratio

■ Display position of decimal point

The position of the decimal point displayed on the rotation speed monitor varies depending on the set speed reduction ratio or speed increasing ratio as shown in the table below.

Setting value for the speed reduction ratio and speed increasing ratio	Display position of decimal point
1.00 to 9.99	
10.00 to 99.99	
100.0 to 999.9	
1000 or more	



■ Display the conveyor transfer speed

To display the conveyor transfer speed, set the conveyor speed reduction ratio, which is calculated using the formula below, to the "speed reduction ratio" parameter.

Conveyor speed reduction ratio = $\frac{1}{\text{Feed rate per motor revolution}} = \frac{\text{Gearhead gear ratio}}{\text{Pulley diameter [m]} \times \pi}$

When the calculated conveyor speed reduction ratio is used, the conveyor transfer speed is converted as follows:

Conveyor transfer speed [m/min] = $\frac{\text{Motor output shaft rotation speed [r/min]}}{\text{Conveyor speed reduction ratio}}$

Example: The pulley diameter is 0.1 m and gear ratio of the gear head is 25

$$\text{Conveyor speed reduction ratio} = \frac{\text{Gearhead gear ratio}}{\text{Pulley diameter [m]} \times \pi} = \frac{25}{0.1 \text{ [m]} \times \pi} \doteq 79.6$$

From the conversion formula, the conveyor speed reduction ratio is calculated as 79.6 in this example.

When the "speed reduction ratio" parameter is set to "79.60" and the motor rotation speed is 1300 r/min, the conveyor transfer speed is converted as follows:

$$\text{Conveyor transfer speed [m/min]} = \frac{1300}{79.60} \doteq 16.3$$

Accordingly, "16.3" is shown on the panel. The display varies depending on the setting of the "lowest digit display fixing" parameter. 16.0 is displayed at the time of shipment.

6.5 Soft start/soft stop function

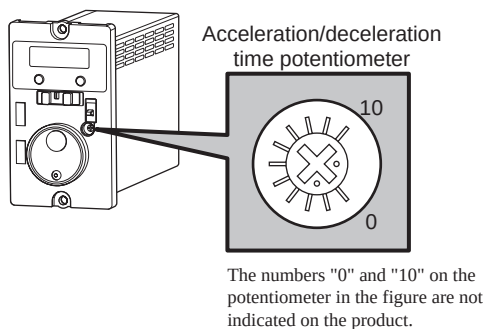
An impact on a load is suppressed by soft start/stop operation of the motor, and the motor starts running smoothly. The acceleration time and deceleration time is fixed to about 1 second at the time of shipment.

When adjusting the acceleration time and deceleration time, change the setting of the "acceleration/deceleration time" parameter.

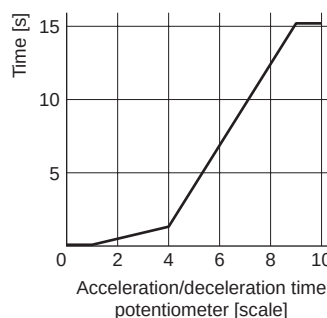
If this parameter is set to ON, the acceleration/deceleration time can be adjusted using the acceleration/deceleration time potentiometer.

Setting range of the acceleration/deceleration time potentiometer: 0.1 to 15.0 seconds

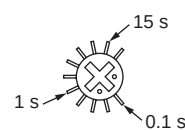
The actual acceleration time and deceleration time against the setting vary depending on the load inertia and frictional load.



Acceleration/deceleration time potentiometer characteristics (representative values)



Rough indications of the time against the scale



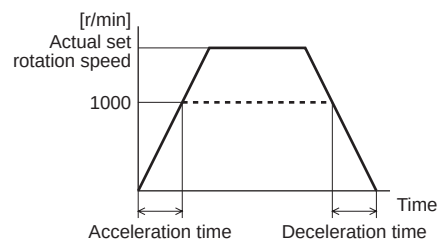
- Acceleration time

The acceleration time is set as the time needed for the motor to reach the 1000 r/min from the standstill state.

- Deceleration time

The deceleration time is set as the time needed for the motor to stop from the 1000 r/min.

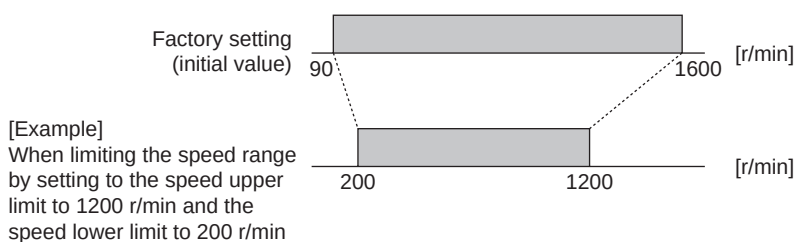
If the deceleration time is set shorter than the time for coasting stop of the motor, the motor will not stop at the specified time.



6.6 Limiting the setting range of the rotation speed

The setting range of the rotation speed using the setting dial can be limited by setting the upper limit and lower limit.

Speed setting range



- Speed upper limit

The upper limit of the rotation speed can be set in the "speed upper limit" parameter.

If the rotation speed exceeding the speed upper limit is already set, the rotation speed set in the "speed upper limit" parameter will be overwritten.

- Speed lower limit

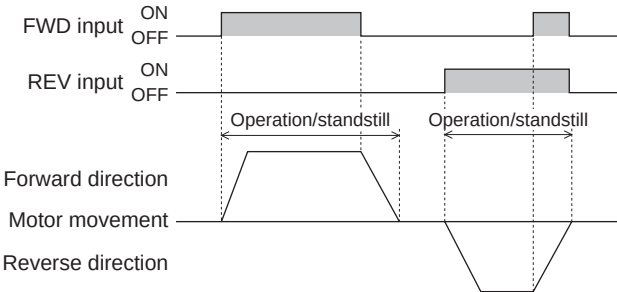
The lower limit of the rotation speed can be set in the "speed lower limit" parameter.

If the rotation speed below the speed lower limit is already set, the rotation speed set in the "speed lower limit" will be overwritten.

6.7 Operating with external signals

When the motor operation/standstill and rotation direction change are performed by ON/OFF-control of the input signals, disable the operation switch and rotation direction switch.

When the motor is operated externally, set the "external operation signal input" parameter to "rE."
If the operation switch or rotation direction switch is operated when the "external operation signal input" parameter is set to "rE," "rE" is displayed for about 1 second.



FWD input	REV input	Motor shaft action
ON	OFF	Rotates in the forward direction
OFF	ON	Rotates in the reverse direction
OFF	OFF	Standstill
ON	ON	

The motor rotation direction varies depending on the gear ratio of the gearhead or the setting of the rotation direction switch. Refer to p.17 for rotation direction of the motor.

Note To change rotation direction of the motor, wait until the motor completely stops. If the rotation direction is switched while the motor is operating, it may not change, or it may take a long time to change.

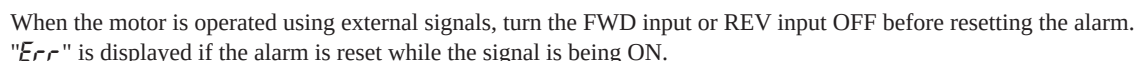
Although the display change using the ESC key or FUNCTION key on the panel is possible even when the alarm code is displayed, the display will return to the alarm indication if a non-operation state continues more than 5 seconds.

Check the followings if the alarm code is displayed.

* If the "prevention of operation at power-on" parameter is set to disable, this alarm will not generate. (Initial setting: Enable)

Motors with an output power of 15 W to 90 W contain an automatic return type thermal protector in the motor windings. If the motor internal temperature exceeds the specified value, the thermal protector will be activated (OPEN) and the "motor overheat" alarm will be generated. Motors with an output power of 6 W are adopted impedance protection for overheat protection so that the temperature will not rise above certain level.

- Before resetting an alarm by the following method, be sure to ensure safety with removing the cause of the alarm and setting the operation switch to the STAND-BY side. The alarm can be reset if the power is cycled.
- If you try to reset the alarm while the operation switch is set to the RUN side, "Err" is displayed for about 1 second.



- If the product does not operate properly after the power is cycled, the internal circuit may be damaged. Contact your nearest Oriental Motor branch or sales office.
- Continuing the operation without removing the cause of the alarm may result in damage to equipment.

8 Troubleshooting

During motor operation, the motor or speed controller may fail to function properly due to an improper rotation speed setting or wiring. When the motor cannot be operated correctly, refer to the contents provided in this chapter and take appropriate action. If the problem persists, contact your nearest Oriental Motor sales office.

Note | Certain items must be checked with the power on. Perform inspections carefully not to touch the live part such as connection part of the motor and speed controller.

Nothing is indicated on the display even if the power is supplied.	● The power supply is not connected properly. ▷ Check the connection of the AC power supply.
The motor does not rotate.	● The motor is not connected correctly. ▷ Check the connection of the motor cable. ● The operation switch on the speed controller is set to the "STAND-BY" side. ▷ Set the operation switch to the "RUN" side. ● When the motor is operated using external signals, the "external operation signal input" parameter is not set to "r-E". ▷ Set the parameter to "r-E". ● Both the FWD input and REV input are being OFF. Both the FWD input and REV input are being ON. ▷ Turn either of the FWD input or REV input ON. ● The voltage is being dropped. ▷ Apply the voltage within the specification range. ● The combination of the motor and speed controller is wrong. ▷ Use a motor and speed controller only in the specified combination. Check the tables on p.6 for the model name.
The motor rotates in the direction opposite to the specified direction.	● The rotation direction switch is set to the opposite side. ▷ Check the rotation direction switch. ● The gearhead that rotates in the opposite direction to the motor rotation direction is used. ▷ Refer to p.17 for the rotation direction of the gearhead. ● The FWD input and REV input are connected wrongly or otherwise not connected correctly. ▷ Check the connection of the FWD input and REV input when the motor is operated using external signals.
The speed cannot change. The motor does not rotate at the set speed.	● The setting range of the rotation speed is limited. ▷ Check the setting for the "speed upper limit" and "speed lower limit" parameters.
The rotation speed cannot be increased.	● The speed upper limit has been set. ▷ Raise the speed upper limit.
The rotation speed cannot be decreased.	● The speed lower limit has been set. ▷ Lower the speed lower limit.
The motor doesn't start instantaneously.	● The acceleration time is too long. ▷ Adjust the acceleration time. ● Load inertia may be excessive. ▷ Reduce the load inertia.
Data cannot be set.	● Data setting is locked. ▷ Release the lock for setting data.
Motor operation is unstable.	● Effect of electrical noise. ▷ Refer to "11.2 Installing and wiring in compliance with EMC Directive" on p.29 for measures with regard to noise.
Motor vibration is too large.	● The combination of the motor and speed controller is wrong. ▷ Use a motor and speed controller only in the specified combination. Check the tables on p.6 for the model name.

9 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

- Conduct the insulation resistance measurement or dielectric strength test separately on the motor and the speed controller.
Conducting the insulation resistance measurement or dielectric strength test with the motor and speed controller connected may result in damage to the product.
- The speed controller uses semiconductor elements. So be extremely careful when handling them.
Static electricity may damage the speed controller.

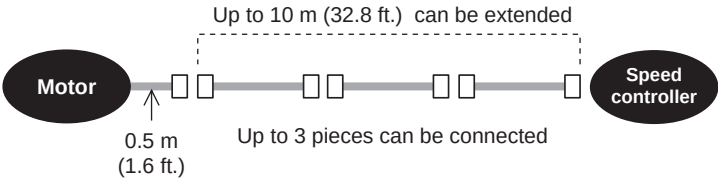
■ Inspection item

- Are the mounting screws of the motor/gearhead loose?
- Are there any abnormal noises in the motor bearings (ball bearings)?
- Are there any abnormal noises in the bearing (ball bearing) and gear meshing parts of the gearhead?
- Are the gearhead output shaft and load shaft out of alignment?
- Are there any scratches or signs of stress in the cable, or are there any loose connections between the motor and speed controller?
- Are the openings in the speed controller blocked?
- Are any of the speed controller connectors loose?
- Are there any unusual smells or appearances in the speed controller?

10 Accessories (sold separately)

■ Connection cables

These cables are used to extend the wiring distance between the speed controller and motor.
The connection cable can be connected up to 3 pieces.
Flexible connection cables are also available.
Maximum extension distance between the motor and speed controller: 10.5 m (34.4 ft.) [including 0.5 m (1.6 ft.) of the motor cable]



- Connection cables

Length [m (ft.)]	Model
1 (3.3)	CC01SC
2 (6.6)	CC02SC
3 (9.8)	CC03SC
5 (16.4)	CC05SC
10 (32.8)	CC10SC

- Flexible connection cables

Length [m (ft.)]	Model
1 (3.3)	CC01SCR
2 (6.6)	CC02SCR
3 (9.8)	CC03SCR
5 (16.4)	CC05SCR
10 (32.8)	CC10SCR

11 Standard and CE Marking

11.1 Standard and CE Marking

This product is recognized by UL under the UL and CSA standards, and it conforms to the China Compulsory Certification System (CCC System). This product is also affixed the CE Marking under the Low Voltage Directive and EMC Directive.

Model name for standards (The name varies depending on the product type.)

- Parallel shaft·combination type, round shaft type: The motor model name and speed controller model name are the approved product names.
- Right angle·geared type :The motor part number (motor model name for CCC System) and speed controller model name are the approved product names.
The motor part number is indicated as "Motor P/N" on the product nameplate.

Parallel shaft·combination type,
Round shaft type *

Motor model	Speed controller model
SCM26GV-JA	US2D6-JA
SCM26GV-UA	US2D6-UA
SCM26GV-JC	US2D6-JC
SCM26GV-EC	US2D6-EC
SCM315GV-JA	US2D15-JA
SCM315GV-UA	US2D15-UA
SCM315GV-JC	US2D15-JC
SCM315GV-EC	US2D15-EC
SCM425GV-JA	US2D25-JA
SCM425GV-UA	US2D25-UA
SCM425GV-JC	US2D25-JC
SCM425GV-EC	US2D25-EC
SCM540GV-JA	US2D40-JA
SCM540GV-UA	US2D40-UA
SCM540GV-JC	US2D40-JC
SCM540GV-EC	US2D40-EC
SCM560GVH-JA	US2D60-JA
SCM560GVH-UA	US2D60-UA
SCM560GVH-JC	US2D60-JC
SCM560GVH-EC	US2D60-EC
SCM590GVR-JA	US2D90-JA
SCM590GVR-UA	US2D90-UA
SCM590GVR-JC	US2D90-JC
SCM590GVR-EC	US2D90-EC

Right angle·geared type

Motor model	Motor part number	Speed controller model
SCM425JA-GHR□	SCM425HP-JA	US2D25-JAB
SCM425JC-GHR□	SCM425HP-JC	US2D25-JCB
SCM540JA-GHR□	SCM540HP-JA	US2D40-JAB
SCM540JC-GHR□	SCM540HP-JC	US2D40-JC
SCM590JA-GHR□	SCM590HP-JA	US2D90-JA
SCM590JC-GHR□	SCM590HP-JC	US2D90-JC
SCM425JA-GAR□	SCM425HP-JA	US2D25-JAB
SCM425JC-GAR□	SCM425HP-JC	US2D25-JCB
SCM540JA-GAR□	SCM540HP-JA	US2D40-JAB
SCM540JC-GAR□	SCM540HP-JC	US2D40-JC
SCM590JA-GAR□	SCM590HP-JA	US2D90-JA
SCM590JC-GAR□	SCM590HP-JC	US2D90-JC
SCM425JA-GAL□	SCM425HP-JA	US2D25-JAB
SCM425JC-GAL□	SCM425HP-JC	US2D25-JCB
SCM540JA-GAL□	SCM540HP-JA	US2D40-JAB
SCM540JC-GAL□	SCM540HP-JC	US2D40-JC
SCM590JA-GAL□	SCM590HP-JA	US2D90-JA
SCM590JC-GAL□	SCM590HP-JC	US2D90-JC

* For the model name of the round shaft type, enter "A" instead of GV, GVH, GVR within the motor model name.

■ UL Standards, CSA Standards, CCC System

Applicable Standards

	Applicable Standards	Certification Body / Standards File No.
Motor	UL 1004-1, UL 1004-2, UL 1004-3 CSA C22.2 No.100, CSA C22.2 No.77	UL / UL File No.E64197, E64199
	GB12350	CQC
Speed controller	UL 508 CSA C22.2 No.14	UL / UL File No.E91291

■ Low Voltage Directive

- This product is designed and manufactured to be incorporated in equipment.
- This product cannot be used in IT power distribution systems.
- Install the product inside an enclosure in order to avoid contact with hands.
- Be sure to ground the Protective Earth Terminal of the motor.
- Isolate the motor cable, power supply cable and other drive cables from the input signal cable (TB1) by means of double insulation.

Applicable Standards

- Motor
Parallel shaft·combination type, Round shaft type : EN 60034-1, EN 60034-5, EN 60664-1, EN 60950-1
Right angle·geared type : EN 60034-1, EN 60034-5, EN 60664-1
- Speed controller : EN 50178

Momentary excess torque based on EN 60034-1

Motor model	Momentary excess torque
SCM315, SCM560	120% of the rated torque
SCM26, 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.

Installation conditions (EN Standard)

Motor	Speed controller
Overvoltage category: II Pollution degree: 2 Protection against electric shock: Class I	Overvoltage category: II Pollution degree: 2 Protection against electric shock: Class II

If the overvoltage category III and pollution degree 3 are required for the equipment, install the motor and speed controller in an enclosure whose degree of protection is equivalent to IP54 or higher, and supply a rated voltage via the insulation transformer.

■ The motor temperature rise tests

Temperature rise tests required by the above standards are performed in a state that has been attached a heat radiation plate instead of a gearhead. The size and material for the heat radiation plates are as follows.

Parallel shaft·combination type,
Round shaft type

Motor model	Size [mm (in.)]	Thickness [mm (in.)]	Material
SCM26	115×115 (4.53×4.53)	5 (0.20)	Aluminum alloy
SCM315	125×125 (4.92×4.92)		
SCM425	135×135 (5.31×5.31)		
SCM540	165×165 (6.50×6.50)		
SCM560 SCM590	200×200 (7.87×7.87)		

Right angle·geared type

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

Thermal class: 130 (B)

■ EMC Directive

This product has received EMC compliance under the conditions specified in "Example of installation and wiring" on p.30. Since the final level of conformance of the mechanical equipment to the EMC Directive will vary depending on such factors as the configuration, wiring, layout and risk involved in the control-system devices and electrical parts that are used with the motor/speed controller, the customer must conduct the EMC tests on the mechanical equipment to confirm compliance.

Applicable Standards

EMI	Emission Tests Harmonics Current Test Voltage Fluctuations Test	EN 61000-6-4 EN 61000-3-2 EN 61000-3-3
EMS	Immunity Tests	EN 61000-6-2

This type of PDS is not intended to be used on a low-voltage public network which supplies domestic premises; radio frequency interference is expected if used on such a network.

■ Hazardous substances

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

■ Republic of Korea, Radio Waves Act.

한국전파법

Seller and user shall be noticed that this equipment is suitable for electromagnetic equipments for office work (Class A) and it can be used outside home.

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11.2 Installing and wiring in compliance with EMC Directive

The EMC Directive requires that your mechanical equipment in which the product is installed satisfies the applicable requirements.

The installation/wiring methods of the motor and speed controller explained here represent the basic methods that are effective in helping your mechanical equipment conform to the EMC Directive.

Since the final level of conformance of the mechanical equipment to the EMC Directive will vary depending on such factors as the configuration, wiring, layout and risk involved in the control-system devices and electrical parts that are used with the motor/speed controller, the customer must conduct the EMC tests on the mechanical equipment to confirm compliance.

Without effective measures to suppress the electromagnetic interference (EMI) caused by the product in the surrounding control system equipment or the electromagnetic spectrum (EMS) generated by the product, the function of your mechanical equipment may be seriously affected. The use of the following installation and wiring methods will enable the product to be compliant with the EMC Directive.

■ Connecting mains filter for AC power supply line

- Install a mains filter which the customer provides, in the power line in order to prevent the noise from propagating via the AC power line. For a mains filter, use the following model or equivalent product.

Manufacturer	Model
SOSHIN ELECTRIC CO., LTD	NF2010A-UP
Schaffner EMC	FN2070-10-06

- Install the mains filter as close to the speed controller as possible. Use cable clamps and other means to secure the input cables and output cables firmly to the surface of the enclosure.
Connect the ground terminal of the mains filter to the grounding point, using as thick and short a wire as possible.
- Do not place the input cable parallel with the output cable. Parallel placement will reduce mains filter effectiveness if the enclosure's internal noise is directly coupled to the AC power supply cable by means of stray capacitance.

■ Connecting motor cable

When extending the motor cable, use a supplied connection cable or an accessory connection cable (sold separately). The wiring distance can be extended to a maximum of 10.5 m (34.4 ft.).

■ Surge arrester

A surge arrester is effective for reduction of the surge voltage of the lightning surge generated between the AC power line and earth or between AC power lines. Connect the following surge arrester.

Manufacturer	Model
SOSHIN ELECTRIC CO., LTD	LT-C12G801WS

■ Wiring of the input signal cable

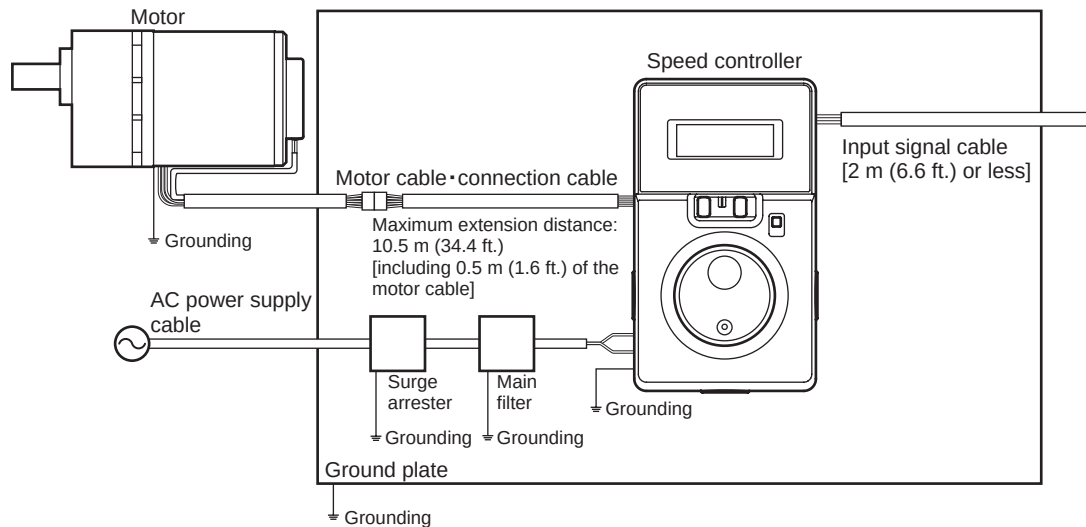
Use a cable of AWG24 to AWG16 (0.2 mm² to 1.25 mm²) or thicker for the input signal cable, and keep the wiring distance as short as possible [less than 2 m (6.6 ft.)].

■ Notes about installation and wiring

- Connect the motor, speed controller, and other peripheral control equipment directly to the grounding point so as to prevent a potential difference from developing between grounds.
- When relays or electromagnetic switches are used together with the system, use mains filters and CR circuits to suppress surges generated by them.
- Keep cables as short as possible without coiling and bundling extra lengths.
- Wire the power lines such as the AC power cable and motor cable away from the input signal cable by providing a minimum clearance of 100 mm (3.94 in.) between them.
If the power lines (AC power cable, motor cable) and the input signal cable have to cross, cross them at a right angle.
- Use a connection cable (supplied or accessory) when extending the wiring distance between the motor and speed controller.

The EMC measures are conducted using the Oriental Motor connection cable.

■ Example of installation and wiring



■ Precautions about static electricity

Static electricity may cause the speed controller to malfunction or suffer damaged.

Be sure to ground the motor and speed controller to prevent it from being damaged by static electricity.

Except when operating the setting dial, potentiometer, switches, and keys on the operation panel of the speed controller front side, do not come close to or touch the speed controller while the power is ON.

12 Specifications

■ Specifications

Model		US2-■□JA-__	US2-■□UA-__	US2-■□JC-__	US2-■□EC-__
Speed controller model		US2D□-JA_	US2D□-UA	US2D□-JC_	US2D□-EC
Motor output power		6 W, 15 W, 25 W, 40 W, 60 W, 90 W			
Power supply voltage		Single-phase 100 VAC	Single-phase 110/115 VAC	Single-phase 200 VAC	Single-phase 220/230 VAC
Frequency		50/60 Hz	60 Hz	50/60 Hz	50/60 Hz
Variable speed range		50Hz: 90 to 1400 r/min 60Hz: 90 to 1600 r/min			
Function	Monitor	Rotation speed, Input signal			
	Parameter	Speed reduction ratio, speed increasing ratio, lowest digit display fixing, prevention of operation at power-on alarm, external operation signal input, acceleration/deceleration time, speed upper and lower limit, initialization			
	Other	Prohibiting data editing			
Input signal		2 photocoupler inputs FWD input, REV input			
Protective functions		When any of the following protective functions is activated, the speed controller shuts off the power to the motor, and the motor coasts to a stop. At the same time, the alarm code will be shown on the display of the operation panel. Alarm type: Motor overheat, motor lock, motor poor connection, EEPROM error, prevention of operation at power-on			

□ in the model names indicates a number representing the motor output power. ■ in the model names indicates a number representing the frame size of the motor.

For the specifications such as the torque, rotation speed, etc. of the products, check the Oriental Motor Website or catalog.

■ General specifications

Item		Motor	Speed controller
Operation environment	Ambient temperature	Single-phase 100 VAC, Single-phase 200 VAC: -10 to +50 °C [+14 to +122 °F] (non-freezing) Single-phase 110/115 VAC, Single-phase 220/230 VAC: -10 to +40 °C [+14 to +104 °F] (non-freezing)	0 to +50 °C [+32 to +122 °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.	
Storage environment	Vibration	Not subject to continuous vibrations or excessive impact. In conformance with JIS C 60068-2-6 "Sine-wave 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	
	Ambient temperature	-25 to +70 °C [-13 to +158 °F] (non-freezing)	
	Ambient Humidity	85% or less (non-condensing)	
	Altitude	Up to 3000 m (10000 ft.) above sea level	
Shipping environment	Surrounding atmosphere	No corrosive gas, dust, water or oil. Cannot be used in radioactive materials, magnetic field, vacuum or other special environment.	
	Ambient temperature	-25 to +70 °C [-13 to +158 °F] (non-freezing)	
	Ambient Humidity	85% or less (non-condensing)	
	Altitude	Up to 3000 m (10000 ft.) above sea level	
Degree of protection		IP20	

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- Please contact your nearest Oriental Motor office for further information.

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