



## OPERATING MANUAL

Stepping Motor and Driver Package **αSTEP**

**AZ Series Motor**



## Introduction

### ■ Before use

Only qualified personnel should work with the product. Use the product correctly after thoroughly reading the "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.

### ■ Operating Manuals for the AZ Series

Operating manuals for the **AZ Series** are listed below. Always keep the manual where it is readily available.

#### ● AZ Series OPERATING MANUAL Motor (this document)

This manual explains the motor functions and how to install the motor, among others.

#### ● AZ Series OPERATING MANUAL Function Edition

The "OPERATING MANUAL Function Edition" does not come with the product. For details, contact your nearest Oriental Motor sales office or download from Oriental Motor Website Download Page.

#### ● APPENDIX UL Standards for AZ Series (supplied with the UL Standard qualified product)

This appendix includes information required for certification of the UL Standards.

### ■ RoHS Directive

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

## Regulations and standards

### ■ UL Standards

Check the "APPENDIX UL Standards for AZ Series" for recognition information about UL Standards.

### ■ CE Marking

The motor being combined with the **AZ Series** AC power input type driver is affixed the CE Marking under the Low Voltage Directive.

### ● Low Voltage Directive

- This product cannot be used in IT power distribution systems.
- Install the product within the enclosure in order to avoid contact with hands.
- When a product can be touched with hands, be sure to ground. When installing the motor and driver, securely connect their Protective Earth Terminals.
- To protect against electric shock using an earth leakage breaker (RCD), connect a type B earth leakage breaker to the primary side of the driver.
- When using a circuit breaker (MCCB), use a unit conforming to the EN or IEC standard.
- Isolate the motor cable, power-supply cable and other drive cables from the signal cables by means of double insulation.
- The temperature of the driver's heat sink may exceed 90 °C (194 °F) depending on the driving conditions. Accordingly, take heed of the following items:
  - Do not touch the driver.
  - Do not use the driver near flammable objects.
  - Always conduct a trial operation to check the driver temperature.

#### ● Applicable Standards

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

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.

### ● Installation condition (EN Standards)

- To be incorporated in equipment
- Overvoltage category: II
- Pollution degree: 3
- Degree of protection: IP66
- Protection against electric shock: Class I

### ● EMC Directive

The **AZ Series** motor conforms to the EMC Directive in a state where the motor is connected with the driver. For details, refer to the OPERATING MANUAL Driver.

## 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 signs




	Handling the product without observing the instructions that accompany a "Warning" symbol may result in serious injury or death.
	Handling the product without observing the instructions that accompany a "Caution" symbol may result in injury or property damage.
	The items under this heading contain important handling instructions that the user should observe to ensure the 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>	
	Do not use the product in explosive or corrosive environments, in the presence of flammable gases, locations subjected to splashing water, or near combustibles. This may cause fire, electric shock or injury.
	Do not transport, install the product, perform connections or inspections when the power is on. This may cause electric shock.
	Do not forcibly bend, pull or pinch the cable. This may cause fire or electric shock.
	Do not disassemble or modify the product. This may cause injury or damage to equipment.
	Assign qualified personnel the task of installing, wiring, operating/controlling, inspecting and troubleshooting the product. Failure to do so may result in fire, electric shock, injury or damage to equipment.
	If this product is used in a vertical application, be sure to provide a measure for the position retention of moving parts. Failure to do so may result in injury or damage to equipment.
	Do not use the brake mechanism of an electromagnetic brake motor as a deceleration/safety brake. This may cause injury or damage to equipment.

 <b>Warning</b>	
	When the driver generates an alarm (any of the driver's protective functions is triggered), take measures to hold the moving part in place since the motor stops and loses its holding torque. Failure to do so may result in injury or damage to equipment.
	Install the product in an enclosure. Failure to do so may result in electric shock or injury.
	The motor and driver are designed with Class I equipment basic insulation. When installing the motor, do not touch the product or be sure to ground them. Failure to do so may result in electric shock.

 <b>Caution</b>	
	Do not use the product beyond its specifications. This may cause electric shock, injury or damage to equipment.
	Keep your fingers and objects out of the openings in the product. Failure to do so may result in fire, electric shock or injury.
	Do not touch the product while operating or immediately after stopping. This may cause a skin burn(s).
	Do not carry the motor by holding the motor output shaft or motor cable. Doing so may cause injury.
	Keep the area around the product free of combustible materials. Failure to do so may result in fire or a skin burn(s).
	Leave nothing around the product that would obstruct ventilation. Failure to do so may result in damage to equipment.
	Do not touch the rotating part (output shaft) during operation. Doing so may cause injury.
	Do not touch the terminals while performing the insulation resistance measurement or dielectric strength test. This may cause electric shock.
	Provide a cover over the rotating part (output shaft) of the motor. Failure to do so may result in injury.
	Use a motor and driver only in the specified combination. Failure to do so may result in 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.
	The motor surface temperature may exceed 70 °C (158 °F) even under normal operating conditions. If the operator is allowed to approach the running motor, attach a warning label as shown below in a conspicuous position. Failure to do so may result in a skin burn(s).
To dispose of the product, disassemble it into parts and components as much as possible and dispose of individual parts/components as industrial waste.	

## Precautions for use

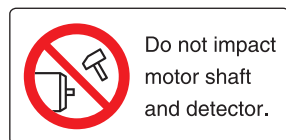
This section covers limitations and requirements the user should consider when using the product.

- **Always use the accessory cable to connect the motor and driver.**  
Be sure to use the accessory cable to connect the motor and driver.
- **When conducting the insulation resistance measurement and the dielectric strength test, be sure to separate the connection between the motor and the driver.**

Conducting the insulation resistance measurement or dielectric strength test with the motor and driver connected may result in damage to the equipment.

- **Make sure not to hit or apply a strong impact on the motor output shaft or the encoder.**

Applying a strong impact on the motor output shaft or the encoder may cause encoder damage or motor malfunction. The warning label shown in the right is attached on the motor.



Warning label

- **Do not move the encoder toward a strong magnetic field.**

A magnetic sensor is built into the encoder. If the motor is installed close to equipment which generates a strong magnetic field, the encoder may break or malfunction. Especially, since the motors of frame size 20 mm (0.79 in.) and 28 mm (1.10 in.) are easily affected by a magnetic field, make sure the installation location.

- **Meshing noise of mechanical sensor**

A gear type mechanical sensor is built into the encoder. Although the meshing noise of gears may generate, it is not malfunction.

- **Do not apply a radial load and axial load in excess of the specified permissible limit**

Operating the motor under an excessive radial load or axial load may damage the motor bearings (ball bearings). Be sure to operate the motor within the specified permissible limit of radial load and axial load.

- **Use the motor in conditions where its surface temperature will not exceed 80 °C (176 °F).**

The surface temperature on the motor case may exceed 80 °C (176 °F) depending on operating conditions such as ambient temperature, operating speed, duty cycle and others. In order to protect the encoder, use the motor so that the surface temperature on the motor case does not exceed 80 °C (176 °F). If the encoder temperature reaches the upper limit, the motor overheat protection alarm will generate.

Use the geared type motor in a condition where the gear case temperature does not exceed 70 °C (158 °F), in order to prevent deterioration of grease and parts in the gear case.

- **Holding torque at standstill**

The motor holding torque is reduced by the current cutback function of the driver at motor standstill. When selecting a motor, check the holding torque at motor standstill in the specifications on the catalog.

- **Do not use the electromagnetic brake to reduce speed or as a safety brake.**

Do not use the electromagnetic brake as a means to decelerate and stop the motor. The brake hub of the electromagnetic brake will wear significantly and the braking force will drop. Since the power off activated type electromagnetic brake is equipped, it helps maintain the position of the load when the power is cut off, but this brake cannot securely hold the load in place. Accordingly, do not use the electromagnetic brake as a safety brake. To use the electromagnetic brake to hold the load in place, do so after the motor has stopped.

- **Make sure to provide measures so that the key is not flown off when operating the motor with key in a state where a load is not installed.**

Flying off the key may result in injury or damage to equipment.

- **Grease of encoder and geared motor**

On rare occasions, a small amount of grease may ooze out from the following places.

- Encoder mechanical part [motors of frame size 20 mm (0.79 in.) and 28 mm (1.10 in.)]
- Geared motor

If there is concern over possible environmental damage resulting from the leakage of grease, check for grease stains during regular inspections. Alternatively, install an oil pan or other device to prevent leakage from causing further damage. Oil leakage may lead to problems in the customer's equipment or products.

- **Peak torque of geared type motor**

Always operate the geared type motor under a load not exceeding the peak torque. If the load exceeds the peak torque, the gear will be damaged.

- **Rotation direction of the gear output shaft**

The relationship between the rotation direction of the motor shaft and that of the gear output shaft changes as follows, depending on the gear type and gear ratio.

Type of gear	Gear ratio	Rotation direction (relative to the motor rotation direction)
TS geared	3.6, 7.2, 10	Same direction
	20, 30	Opposite direction
FC geared, PS geared, HPG geared	All gear ratios	Same direction
Harmonic geared	All gear ratios	Opposite direction

- **Do not perform push-motion operation with geared types.**

Doing so may cause damage to the motor or gear part.

## General specifications

Degree of protection	Excluding the mounting surface and connectors. IP40: <b>AZM14, AZM15, AZM24, AZM26</b> IP66: Motors other than the above types	
Operation environment	Ambient temperature	0 to +40 °C (+32 to +104 °F) (non-freezing) *1
	Humidity	85% or less (non-condensing)
	Altitude	Up to 1,000 m (3,300 ft.) above sea level
	Surrounding atmosphere	No corrosive gas, dust, water or oil
Storage environment	Ambient temperature	-20 to +60 °C (-4 to +140 °F) (non-freezing)
	Humidity	85% or less (non-condensing)
Shipping environment	Altitude	Up to 3,000 m (10,000 ft.) above sea level
	Surrounding atmosphere	No corrosive gas, dust, water or oil
Insulation resistance	100 MΩ or more when 500 VDC megger is applied between the following places: • Case - Motor windings • Case - Electromagnetic brake windings	
Dielectric strength	Sufficient to withstand the following for 1 minute: • AC power input type • Case - Motor windings 1.5 kVAC 50/60 Hz • Case - Electromagnetic brake windings 1.5 kVAC 50/60 Hz • DC power input type • Case - Motor windings 1.0 kVAC 50/60 Hz *2 • Case - Electromagnetic brake windings 1.0 kVAC 50/60 Hz *2	

\*1 Based on our measurement conditions.

\*2 0.5 kVAC 50/60 Hz for **AZM14, AZM15, AZM24** and **AZM26**

## 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
- Parallel key ..... 1 pc. \*1
- Motor mounting screw (M4)..... 4 pcs. \*2
- Motor mounting screw (M8)..... 4 pcs. \*3
- OPERATING MANUAL Motor ..... 1 copy (this document)
- APPENDIX UL Standards for **AZ** Series ..... 1 copy \*4

\*1 Supplied with standard type motor with key and geared types (except for the **AZM46-TS** geared type and the **HPG** geared flange output type)

\*2 Supplied with **AZM66-TS** geared type.

\*3 Supplied with **AZM98-TS** geared type.

\*4 Supplied with the UL Standard qualified product.

### ■ How to identify the product model

Check the model number of the motor against the number shown on the nameplate.

#### ● Standard type

**AZM 6 6 A 0 C**  
1 2 3 4 5 6

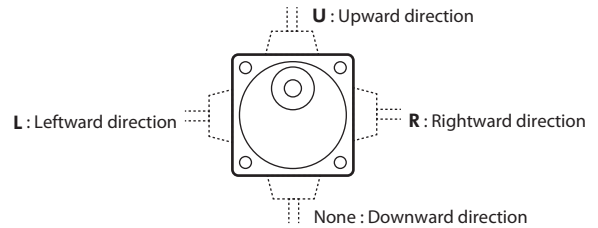
#### ● Geared type (excluding the FC geared type)

**AZM 6 6 A C - HP 15 F**  
1 2 3 4 6 7 8 9

1	Series name	<b>AZM: AZ</b> Sereis motor
2	Motor frame size	1: 20 mm (0.79 in.) 2: 28 mm (1.10 in.) 4: 42 mm (1.65 in.) [40 mm (1.57 in.) for <b>HPG</b> geared type] 6: 60 mm (2.36 in.) 9: 85 mm (3.35 in.) [90 mm (3.54 in.) for geared types]
3	Motor length	
4	Motor shaft features	<b>A:</b> Single shaft <b>M:</b> With electromagnetic brake

5	Additional function	<b>O:</b> Round shaft type <b>1:</b> With key None: Shaft flat on one side
6	Motor power supply input	<b>C:</b> AC power input type <b>K:</b> DC power input type
7	Type of gear	<b>TS:</b> TS geared type <b>PS:</b> PS geared type <b>HP:</b> HPG geared type <b>HS:</b> Harmonic geared type
8	Gear ratio	
9	Varies depending on the gear type.	<ul style="list-style-type: none"> <li>• <b>TS</b> geared type: Cable leading direction * <b>U:</b> Upward direction <b>R:</b> Rightward direction <b>L:</b> Leftward direction None: Downward direction</li> <li>• <b>HPG</b> geared type: Output shaft type None: Shaft output type <b>F:</b> Flange output type</li> </ul>

\* The cable leading direction represents the one as viewed from the output shaft side in a state of placing it upward.

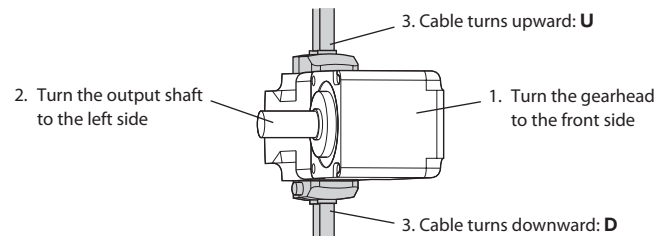


#### ● FC geared type

**AZM 6 6 A C - FC 7.2 U A**  
1 2 3 4 5 6 7 8 9

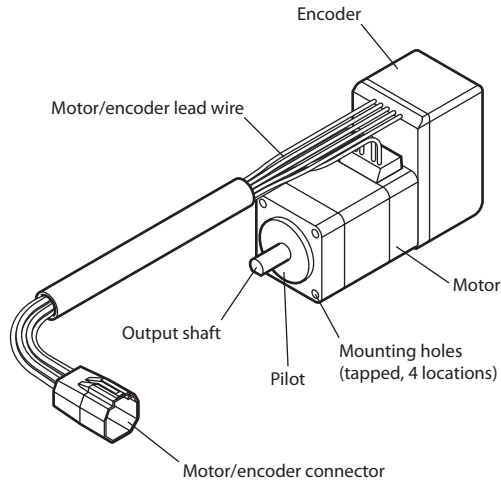
1	Series name	<b>AZM: AZ</b> Sereis motor
2	Motor frame size	4: 42 mm (1.65 in.) 6: 60 mm (2.36 in.)
3	Motor length	
4	Motor shaft features	<b>A:</b> Single shaft <b>M:</b> With electromagnetic brake
5	Motor power supply input	<b>C:</b> AC power input type <b>K:</b> DC power input type
6	Type of gear	<b>FC:</b> FC geared type
7	Gear ratio	
8	Cable leading direction *	<b>D:</b> Downward direction <b>U:</b> Upward direction
9	Motor identification	<b>A:</b> Solid shaft

\* Check the cable leading direction as shown in the figure below.

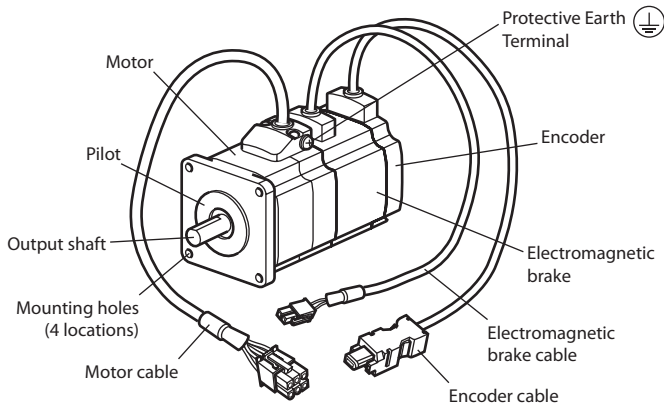


## Names of parts

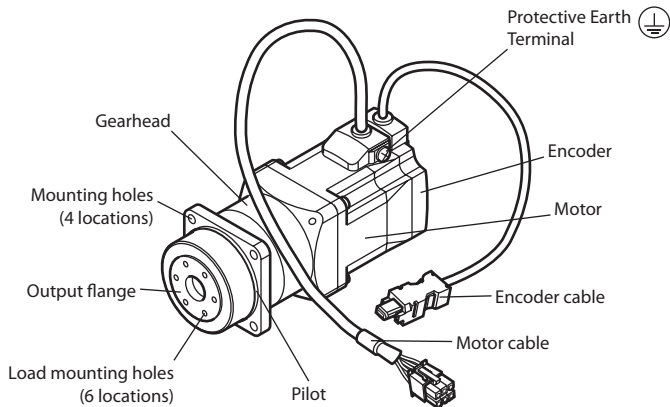
### Standard type (Example: AZM14AK)



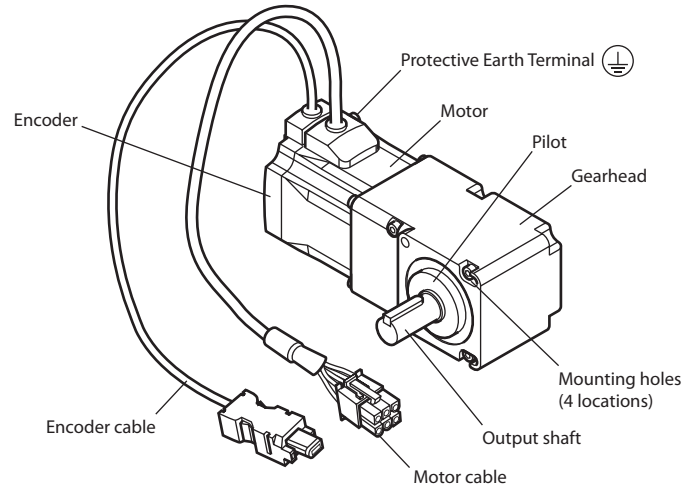
### Standard type with electromagnetic brake (Example: AZM66MC)



### HPG geared flange output type (Example: AZM66AC-HP5F)



### FC geared type (Example: AZM66AC-FC7.2UA)



## Installation

### Location for installation

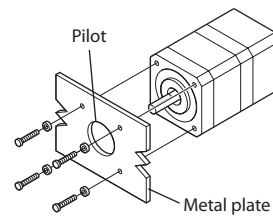
The motor has been designed and manufactured to be incorporated in equipment. Install them in a well-ventilated location that provides easy access for inspection. The location must also satisfy the following conditions:

- Inside an enclosure that is installed indoors (provide vent holes)
- Operating ambient temperature: 0 to +40 °C (+32 to +104 °F) (non-freezing)
- Operating ambient humidity 85% or less (non-condensing)
- Area that is free of explosive atmosphere or toxic gas (such as sulfuric gas) or liquid
- 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
- 1,000 m (3,300 ft.) or lower above sea level

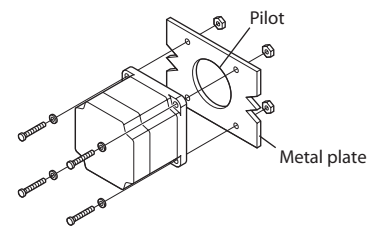
### Installation method

The motor can be installed in any direction. To allow for heat dissipation and prevent vibration, install the motor on a metal surface of sufficient strength.

#### Installation method A

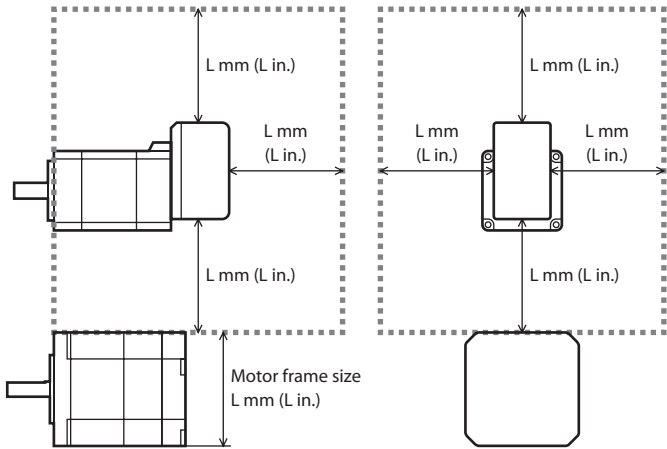


#### Installation method B



● **Installation for motors of frame size 20 mm (0.79 in.) and 28 mm (1.10 in.)**

Since the encoder for the motors of frame size 20 mm (0.79 in.) and 28 mm (1.10 in.) are easily affected by a magnetic field, make sure the installation location. When motors are installed side by side, ensure the distance among motors of more than the frame size in horizontal and vertical directions. Otherwise, provide a barrier or others to shield a magnetic field.



\* Ensure th distance of more than the frame size [L mm (L in.)].

● **Nominal size, tightening torque and installation method**

● **Standard type**

Motor model	Nominal size	Tightening torque [N·m (oz-in)]	Effective depth of screw thread [mm (in.)]	Installation method
AZM14 AZM15	M2	0.25 (35)	2.5 (0.098)	A
AZM24 AZM26	M2.5	0.5 (71)	2.5 (0.098)	A
AZM46 AZM48	M3	1 (142)	4.5 (0.177)	A
AZM66 AZM69	M4	2 (280)	–	B
AZM98 AZM911	M6	3 (420)	–	B

● **TS geared type**

Motor model	Nominal size	Tightening torque [N·m (oz-in)]	Effective depth of screw thread [mm (in.)]	Installation method
AZM46	M4	1.4 (198)	8 (0.315)	A
AZM66	M4	1.4 (198)	–	B
AZM98	M8	4 (560)	–	B

● **FC geared type**

Motor model	Nominal size	Tightening torque [N·m (oz-in)]	Effective depth of screw thread [mm (in.)]	Installation method
AZM46	M4	2 (280)	–	B
AZM66	M5	2.5 (350)	–	B

● **PS geared type**

Motor model	Nominal size	Tightening torque [N·m (oz-in)]	Effective depth of screw thread [mm (in.)]	Installation method
AZM46	M4	2 (280)	8 (0.315)	A
AZM66	M5	2.5 (350)	10 (0.394)	A
AZM98	M8	4 (560)	15 (0.591)	A

● **HPG geared type**

Motor model	Nominal size	Tightening torque [N·m (oz-in)]	Effective depth of screw thread [mm (in.)]	Installation method
AZM46	M3	1 (142)	–	B
AZM66	M5	2.5 (350)	–	B
AZM98	M8	4 (560)	–	B

● **Harmonic geared type**

Motor model	Nominal size	Tightening torque [N·m (oz-in)]	Effective depth of screw thread [mm (in.)]	Installation method
AZM46	M4	2 (280)	8 (0.315)	A
AZM66	M5	2.5 (350)	10 (0.394)	A
AZM98	M8	4 (560)	–	B

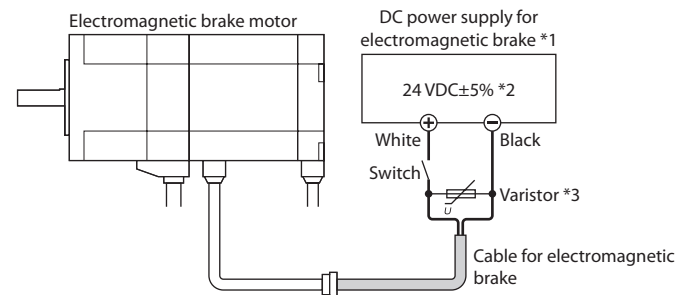
■ **Installing a load**

When connecting a load to the motor, align the centers of the motor output shaft and load shaft. When installing a coupling or pulley on the motor output shaft, do so without damaging the output shaft and bearings (ball bearings).

● **Electromagnetic brake motor**

To release the electromagnetic brake and install the load, a DC power supply is needed to power the electromagnetic brake.

Connect the DC power supply (24 VDC±5%) to the motor using the "cable for electromagnetic brake." When purchasing the electromagnetic brake type motor and driver package with cables, the "cable for electromagnetic brake" is supplied with the product.



\*1 The power supply current capacities are as follows.

**AZM46:** 0.08 A or more

**AZM66, AZM69, AZM98:** 0.25 A or more

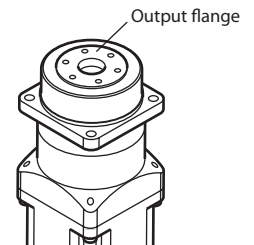
\*2 If the distance between the motor and driver is extended to 20 m (65.6 ft.), use a power supply of 24 VDC±4%.

\*3 To protect the switch contacts and prevent generation of noise, it is recommended that a varistor be used.

[Recommended varistor: Z15D121 (SEMITEC Corporation)].

● **HPG geared flange output type**

When installing a load on the **HPG** geared flange output type, use the load mounting holes on the output flange.



**Load mounting hole**

Motor model	Number of screw holes	Nominal size	Tightening torque [N·m (oz-in)]	Effective depth of screw thread [mm (in.)]
AZM46	3 locations	M4	4.5 (630)	6 (0.236)
AZM66	6 locations	M4	4.5 (630)	7 (0.276)
AZM98	6 locations	M6	15.3 (2,100)	10 (0.394)



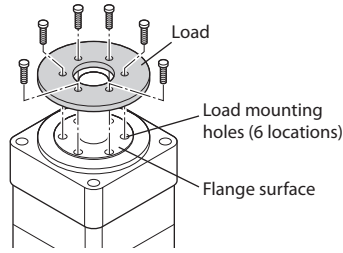
Since the tightening torque for the load mounting screw is large, using a mechanically weak load or screws may cause damage. Satisfy the following conditions for the load and mounting screws. Also, be sure to tighten with the specified torque.

Material of load: Steel

Mounting screw: Use a Bolt which tensile strength rank is 12.9 or higher

● **When a load is installed on the flange face of the Harmonic geared type**

With a Harmonic geared type (excluding **AZM98**), a load can be installed directly on the gear using the load mounting holes provided on the flange surface.



**Load mounting hole**

Motor model	Nominal size	Number of screw	Tightening torque [N·m (oz·in)]	Effective depth of screw thread [mm (in.)]
<b>AZM46</b>	M3	6	1.4 (198)	5 (0.20)
<b>AZM66</b>	M4	6	2.5 (350)	6 (0.24)



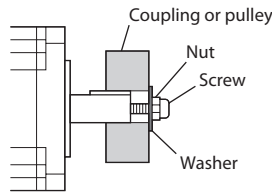
- When installing a load on the flange surface, the load cannot be mounted using the key slot in the output shaft.
- Design an appropriate installation layout so that the load will not contact the metal plate or bolts used for installing the motor.

● **When a coupling or a pulley is installed**

When installing a coupling or pulley on the output shaft, do not apply a strong force to the output shaft. For the standard type motor, in particular, a mechanical impact may cause damage to the encoder.

When installing a coupling or pulley on the standard type motor with a parallel key, utilize the screw hole on the shaft end.

1. Install a coupling (pulley) on the motor output shaft.
2. Install a screw, nut and washer on the end of the output shaft, and push the coupling (pulley) and secure with tightening the screw.



■ **Permissible radial load, permissible axial load and permissible moment load**



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



The permissible radial load and permissible axial load of the **PS** geared type and **HPG** geared type represent the value that the service life of the gear part satisfies 20,000 hours when either of the radial load or axial load is applied to the gear output shaft.

● **Permissible radial load**

● **Standard type**

Motor model	Permissible radial load [N (lb.)]				
	Distance from the tip of motor output shaft [mm (in.)]				
	0 (0)	5 (0.2)	10 (0.39)	15 (0.59)	20 (0.79)
<b>AZM14</b> <b>AZM15</b>	12 (2.7)	15 (3.3)	–	–	–
<b>AZM24</b> <b>AZM26</b>	25 (5.6)	34 (7.6)	52 (11.7)	–	–
<b>AZM46</b>	35 (7.8)	44 (9.9)	58 (13)	85 (19.1)	–
<b>AZM48</b>	30 (6.7)	35 (7.8)	44 (9.9)	58 (13)	85 (19.1)
<b>AZM66</b> <b>AZM69</b>	90 (20)	100 (22)	130 (29)	180 (40)	270 (60)
<b>AZM98</b> <b>AZM911</b>	260 (58)	290 (65)	340 (76)	390 (87)	480 (108)

● **TS geared type**

Motor model	Gear ratio	Permissible radial load [N (lb.)]				
		Distance from the tip of motor output shaft [mm (in.)]				
		0 (0)	5 (0.2)	10 (0.39)	15 (0.59)	20 (0.79)
<b>AZM46</b>	3.6, 7.2, 10	20 (4.5)	30 (6.7)	40 (9)	50 (11.2)	–
	20, 30	40 (9)	50 (11.2)	60 (13.5)	70 (15.7)	–
<b>AZM66</b>	3.6, 7.2, 10	120 (27)	135 (30)	150 (33)	165 (37)	180 (40)
	20, 30	170 (38)	185 (41)	200 (45)	215 (48)	230 (51)
<b>AZM98</b>	3.6, 7.2, 10	300 (67)	325 (73)	350 (78)	375 (84)	400 (90)
	20, 30	400 (90)	450 (101)	500 (112)	550 (123)	600 (135)

● **FC geared type**

Motor model	Gear ratio	Permissible radial load [N (lb.)]				
		Distance from the tip of motor output shaft [mm (in.)]				
		0 (0)	5 (0.2)	10 (0.39)	15 (0.59)	20 (0.79)
<b>AZM46</b>	All gear ratios	180 (40)	200 (45)	220 (49)	250 (60)	–
<b>AZM66</b>	All gear ratios	270 (60)	290 (65)	310 (69)	330 (74)	350 (78)

● **PS geared type**

Motor model	Gear ratio	Permissible radial load [N (lb.)]				
		Distance from the tip of motor output shaft [mm (in.)]				
		0 (0)	5 (0.2)	10 (0.39)	15 (0.59)	20 (0.79)
<b>AZM46</b>	5	70 (15.7)	80 (18)	95 (21)	120 (27)	–
	7.2	80 (18)	90 (20)	110 (24)	140 (31)	–
	10	85 (19.1)	100 (22)	120 (27)	150 (33)	–
	25	120 (27)	140 (31)	170 (38)	210 (47)	–
	36	130 (29)	160 (36)	190 (42)	240 (54)	–
<b>AZM66</b>	5	170 (38)	200 (45)	230 (51)	270 (60)	320 (72)
	7.2	200 (45)	220 (49)	260 (58)	310 (69)	370 (83)
	10	220 (49)	250 (56)	290 (65)	350 (78)	410 (92)
	25	300 (67)	340 (76)	400 (90)	470 (105)	560 (126)
	36	340 (76)	380 (85)	450 (101)	530 (119)	630 (141)
<b>AZM98</b>	5	380 (85)	420 (94)	470 (105)	540 (121)	630 (141)
	7.2	430 (96)	470 (105)	530 (119)	610 (137)	710 (159)
	10	480 (108)	530 (119)	590 (132)	680 (153)	790 (177)
	25	650 (146)	720 (162)	810 (182)	920 (200)	1070 (240)
	36	730 (164)	810 (182)	910 (200)	1040 (230)	1210 (270)
	50	820 (184)	910 (200)	1020 (220)	1160 (260)	1350 (300)

● **HPG geared shaft output type**

Motor model	Gear ratio	Permissible radial load [N (lb.)]				
		Distance from the tip of motor output shaft [mm (in.)]				
		0 (0)	5 (0.2)	10 (0.39)	15 (0.59)	20 (0.79)
<b>AZM46</b>	5	150 (33)	170 (38)	190 (42)	230 (51)	270 (60)
	9	180 (40)	200 (45)	230 (51)	270 (60)	320 (72)
<b>AZM66</b>	5	250 (56)	270 (60)	300 (67)	330 (74)	360 (81)
	15	360 (81)	380 (85)	420 (94)	460 (103)	510 (114)
<b>AZM98</b>	5	600 (135)	630 (141)	670 (150)	710 (159)	750 (168)
	15	830 (186)	880 (198)	930 (200)	980 (220)	1,050 (230)

● **Harmonic geared type**

Motor model	Gear ratio	Permissible radial load [N (lb.)]				
		Distance from the tip of motor output shaft [mm (in.)]				
		0 (0)	5 (0.2)	10 (0.39)	15 (0.59)	20 (0.79)
<b>AZM46</b>	All gear ratios	180 (40)	220 (49)	270 (60)	360 (81)	510 (114)
<b>AZM66</b>	All gear ratios	320 (72)	370 (83)	440 (99)	550 (123)	720 (162)
<b>AZM98</b>	All gear ratios	1,090 (240)	1,150 (250)	1,230 (270)	1,310 (290)	1,410 (310)

● **Permissible axial load**

Type	Motor model	Gear ratio	Permissible axial load [N (lb.)]
Standard	AZM14 AZM15	-	3 (0.67)
	AZM24 AZM26		5 (1.12)
	AZM46 AZM48		15 (3.3)
	AZM66 AZM69		30 (6.7)
	AZM98 AZM911		60 (13.5)
TS geared	AZM46	All gear ratios	15 (3.3)
	AZM66		40 (9)
	AZM98		150 (33)
FC geared	AZM46	All gear ratios	100 (22)
	AZM66		200 (45)
PS geared	AZM46	All gear ratios	100 (22)
	AZM66		200 (45)
	AZM98		600 (135)
HPG geared	AZM46	5	430 (96)
		9	510 (114)
	AZM66	5	700 (157)
		15	980 (220)
	AZM98	5	1,460 (320)
		15	2,030 (450)
Harmonic geared	AZM46	All gear ratios	220 (49)
	AZM66		450 (101)
	AZM98		1,300 (290)

● **Permissible moment load**

When installing an arm or table on the flange surface, calculate the moment load using the formula below if the flange surface receives any eccentric load. The moment load should not exceed the permissible value specified in the table.

● **HPG geared flange output type**

Motor model	Gear ratio	Permissible moment load [N-m (oz-in)]
AZM46	5	4.9 (43)
	9	5.9 (52)
AZM66	5	12 (106)
	15	17.2 (152)
AZM98	5	38.7 (340)
	15	53.5 (470)



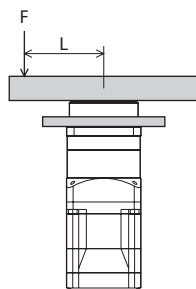
The permissible moment load of the **HPG** geared type represents the value that the service life of the gear part satisfies 20,000 hours.

**Example 1; When an external force F is applied on the position of distance L from the center of the output flange**

L: Distance from the center of the output flange [m (in.)]

F: External force [N (oz)]

Moment load:  $M [N\cdot m (oz\cdot in)] = F \times L$



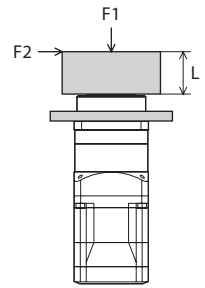
**Example 2; When external forces F1 and F2 are applied on the position of distance L from the mounting face of the output flange**

L: Distance from the mounting face of the output flange [m (in.)]

F1, F2: External force [N (oz)]

Moment load:  $M [N\cdot m (oz\cdot in)] = F2 \times (L + \text{coefficient "a"})$

Motor model	coefficient "a"
AZM46	0.006
AZM66	0.011
AZM98	0.0115



● **Harmonic geared type**

The **AZM98** type is excluded.

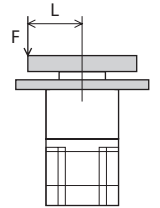
**Example 1; When an external force F is applied on the position of distance L from the center of the output flange**

L: Distance from the center of the output flange [m (in.)]

F: External force [N (oz)]

Moment load:  $M [N\cdot m (oz\cdot in)] = F \times L$

Motor model	Permissible moment load [N-m (oz-in)]
AZM46	5.6 (790)
AZM66	11.6 (1,640)



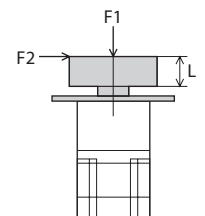
**Example 2; When external forces F1 and F2 are applied on the position of distance L from the mounting face of the output flange**

L: Distance from the mounting face of the output flange [m (in.)]

F1, F2: External force [N (oz)]

Moment load:  $M [N\cdot m (oz\cdot in)] = F2 \times (L + \text{coefficient "a"})$

Motor model	coefficient "a"
AZM46	0.009
AZM66	0.0114



**Grounding the motor**

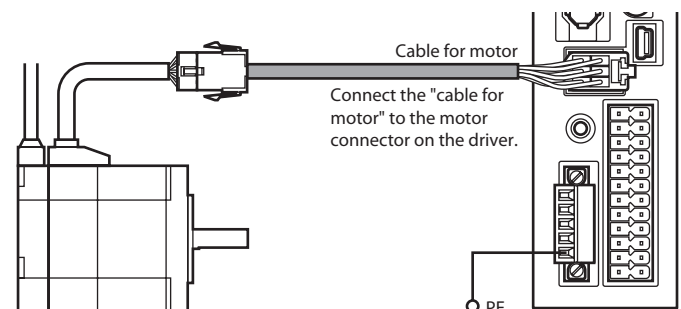
The grounding method of the motor varies depending on the driver input power. Check the table and ground using a suitable method. Be sure to ground the driver.

Grounding method	Driver input voltage		
	100-120 VAC 200-240 VAC	24 VDC	48 VDC
1) Protective Earth Terminal of the driver	Required to ground	Required to ground	Required to ground
2) Grounding wire of the motor	Required to ground	Not required	Not required
3) Protective Earth Terminal of the motor	*	Not required	*

\* Ground if the grounding resistance of the standards that applies to the equipment is not satisfied.

■ **1) Grounding the Protective Earth Terminal of the driver**

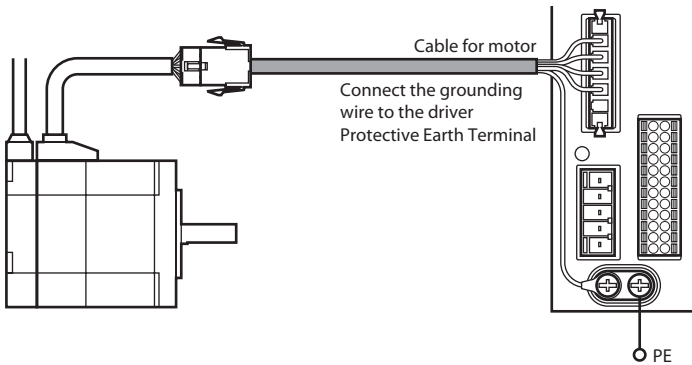
Connect the motor to the driver, and surely ground the Protective Earth Terminal of the driver. Refer to the **OPERATING MANUAL** Driver for how to ground. The figure shows the DC power input type.



## ■ 2) Grounding the grounding wire of the motor

### [AC power input type only]

Connect the grounding wire of the "cable for motor" to the driver Protective Earth Terminal.



## ■ 3) Grounding the Protective Earth Terminal of the motor

Be sure to ground the Protective Earth Terminal of the motor.

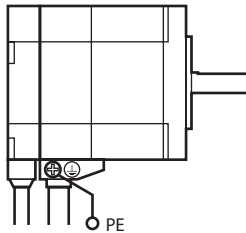
Grounding wire: AWG18 (0.75 mm<sup>2</sup>) or more

Screw size: M4

Tightening torque: 1.2 N·m (170 oz-in)

To ground the motor, use a round terminal, bolt and washer.

Ground wires and crimp terminals are not supplied.



## 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.

### ● During inspection

- Are any of motor mounting screws loose?
- Are there any abnormal noises in the motor bearings (ball bearings) or other moving parts?
- Are there any scratches, signs of stress or loose driver connection in the motor cable?
- Are the motor's output shaft and load shaft out of alignment?

- Unauthorized reproduction or copying of all or part of this manual is prohibited.
- Oriental Motor shall not be liable whatsoever for any problems relating to industrial property rights arising from use of any information, circuit, equipment or device provided or referenced in this manual.
- Characteristics, specifications and dimensions are subject to change without notice.
- While we make every effort to offer accurate information in the manual, we welcome your input. Should you find unclear descriptions, errors or omissions, please contact the nearest office.
- **Orientalmotor** and **αSTEP** are registered trademark or trademark of Oriental Motor Co., Ltd., in Japan and other countries.

© Copyright ORIENTAL MOTOR CO., LTD. 2013

Published in December 2016

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

ORIENTAL MOTOR U.S.A. CORP.  
Technical Support Tel:(800)468-3982  
8:30 A.M. to 5:00 P.M., P.S.T. (M-F)  
7:30 A.M. to 5:00 P.M., C.S.T. (M-F)  
www.orientalmotor.com

ORIENTAL MOTOR DO BRASIL LTDA.  
Tel:+55-11-3266-6018  
www.orientalmotor.com.br

ORIENTAL MOTOR (EUROPA) GmbH  
Schiesstraße 74, 40549 Düsseldorf, Germany  
Technical Support Tel:00 800/22 55 66 22  
www.orientalmotor.de

ORIENTAL MOTOR (UK) LTD.  
Tel:01256-347090  
www.oriental-motor.co.uk

ORIENTAL MOTOR (FRANCE) SARL  
Tel:01 47 86 97 50  
www.orientalmotor.fr

ORIENTAL MOTOR ITALIA s.r.l.  
Tel:02-93906346  
www.orientalmotor.it

ORIENTAL MOTOR CO., LTD.  
4-8-1 Higashiueno, Taito-ku, Tokyo 110-8536  
Japan  
Tel:03-6744-0361  
www.orientalmotor.co.jp

ORIENTAL MOTOR ASIA PACIFIC PTE. LTD.  
Singapore  
Tel:1800-8420280  
www.orientalmotor.com.sg

ORIENTAL MOTOR (MALAYSIA) SDN. BHD.  
Tel:1800-806161  
www.orientalmotor.com.my

ORIENTAL MOTOR (THAILAND) CO., LTD.  
Tel:1800-888-881  
www.orientalmotor.co.th

ORIENTAL MOTOR (INDIA) PVT. LTD.  
Tel:+91-80-41125586  
www.orientalmotor.co.in

TAIWAN ORIENTAL MOTOR CO., LTD.  
Tel:0800-060708  
www.orientalmotor.com.tw

SHANGHAI ORIENTAL MOTOR CO., LTD.  
Tel:400-820-6516  
www.orientalmotor.com.cn

INA ORIENTAL MOTOR CO., LTD.  
Korea  
Tel:080-777-2042  
www.inaom.co.kr

ORIENTAL MOTOR CO., LTD.  
Hong Kong Branch  
Tel:+852-2427-9800