

# Orientalmotor

Stepping Motor and Driver Package  $\alpha$ STEP

## AZ Series

Equipped with Battery-Free Absolute Sensor








# ADVANCED PERFORMANCE








# Lineup

## ● Driver and Motor Types

Driver Type		Motor Type	Frame Size	Electromagnetic Brake Type	Power Supply Input
<b>Built-In Controller Type</b>   AC Power-Supply Input  DC Power-Supply Input	<b>Pulse Input Type</b>  AC Power-Supply Input  DC Power-Supply Input	Standard Type	42 mm 60 mm	●	Single-Phase 100-120 VAC Single-Phase 200-240 VAC Three-Phase 200-240 VAC 24 VDC/48 VDC
		<b>TS Geared Type</b> <b>PS Geared Type</b> <b>HPG Geared Type</b> Harmonic Geared Type	42 mm* 60 mm	—	

\* 40 mm for the **HPG** geared type

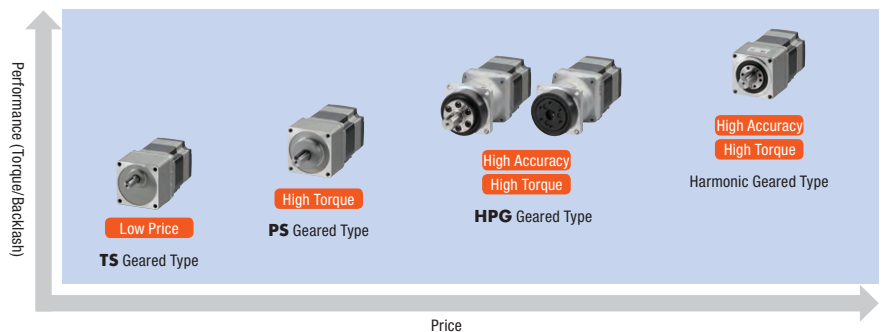
## ● Types and Features of Standard and Geared Motors

Type	Features	Permissible Torque and Maximum Instantaneous Torque [N·m]	Backlash [arcmin]	Basic Resolution [°/Step]	Output Shaft Rotation Speed [r/min]
<b>Standard Type</b> 	Basic model of <b>AZ</b> Series	Maximum Holding Torque 2	—	0.36	4500
<b>Low Backlash</b>	<b>TS Geared Type</b> (Spur gear mechanism) 	Permissible Torque Maximum Instantaneous Torque 6 10	10	0.012	833
	<b>PS Geared Type</b> (Planetary gear mechanism) 	High Permissible Torque/Maximum Instantaneous Torque A Wide Variety of Gear Ratios for Selecting the Desired Step Angle Center Shaft Gear Ratio Types 5, 7.2, 10, 25, 36, 50	Permissible Torque Maximum Instantaneous Torque 8 20	7	0.0072
<b>Non-Backlash</b>	<b>HPG Geared Type</b> (Harmonic planetary®) 	Permissible Torque Maximum Instantaneous Torque 9 19	3	0.024	900
	<b>Harmonic Geared Type</b> (Harmonic drive®) 	High positioning accuracy High Permissible Torque/Maximum Instantaneous Torque High Reduction Ratio, High Resolution Center Shaft Gear Ratio Types 50, 100	Permissible Torque Maximum Instantaneous Torque 10 36	0	0.0036

**Note** ● The values shown above must be used as reference. These values vary depending on the motor frame size and gear ratio.

We offer motors pre-assembled with gears, as variations of stepping motors.

Select an appropriate type from the various geared motors according to the torque, accuracy (backlash) and price.

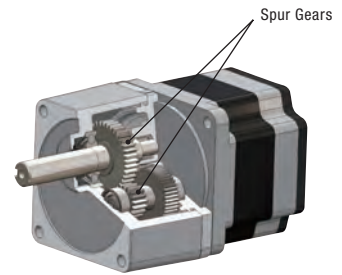


# Features of Geared Motors

## TS Geared Type



This type adopts a simple spur gear mechanism. High-accuracy processing of the parts allows reduction of the backlash and **TS Geared** is also offered at an affordable price range.

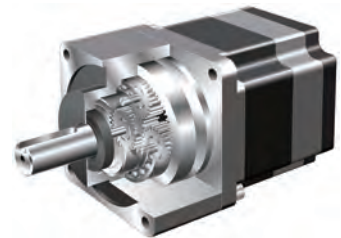


## PS Geared Type

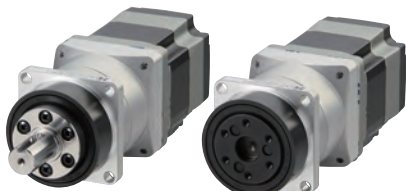


It consists of the sun gear at the center, the planetary gears and the internal gears. High torque can be achieved with the planetary gear mechanism.

Since torque is dispersed and transmitted via multiple gears, the torque can be set higher compared with the spur gear mechanism. And since it adopts high-accuracy gears, the backlash is smaller compared with the spur gear mechanism.



## HPG Geared Type (Harmonic planetary®)



Shaft Output Type

Flange Output Type



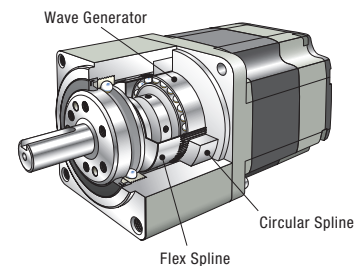
This type adopts harmonic planetary gears. A thin elastic gear is used as an internal gear. The elastic deformation of the internal gear is used and low backlash can be determined without the adjustment mechanism.

Two types of gearshafts are available : shaft output type and flange output type. For the flange output type, the table and arm can be attached directly to the rotating part, saving space in the direction of the motor length. Since, coupling and other mechanism parts become unnecessary, costs on design and parts has been reduced.

## Harmonic Geared Type (Harmonic drive®)



This type adopts harmonic gears. It consists of only 3 basic parts (wave generator, flex spline and circular spline) to which the mechanics of elasticity of metals has been applied. Since there are many meshing teeth. It able to generate a larger torque and lower backlash.



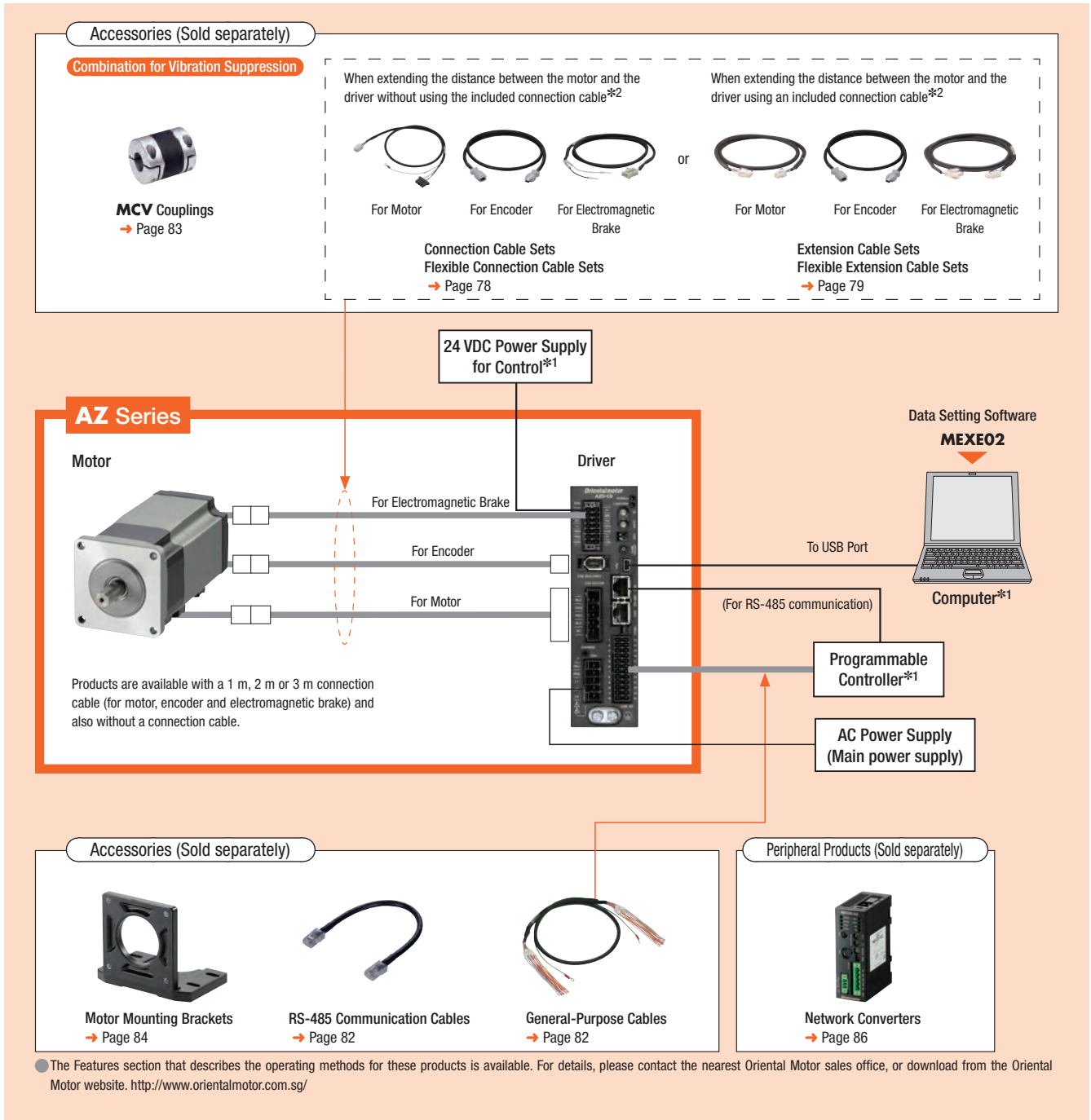
## System Configuration

### Built-In Controller Type - Standard Type with Electromagnetic Brake

An example of a configuration using I/O control or RS-485 communication is shown below.

\*1 Not supplied.

\*2 Only with products supplied with a connection cable.



### System Configuration Example

<b>AZ Series</b>	+	Sold Separately		
<b>AZ66MCD-3</b>		Motor Mounting Brackets	Flexible Couplings	General-Purpose Cables (1 m)
		<b>PAL2P-5</b>	<b>MCV251010</b>	<b>CC16D010B-1</b>

● The system configuration shown above is an example. Other combinations are available.

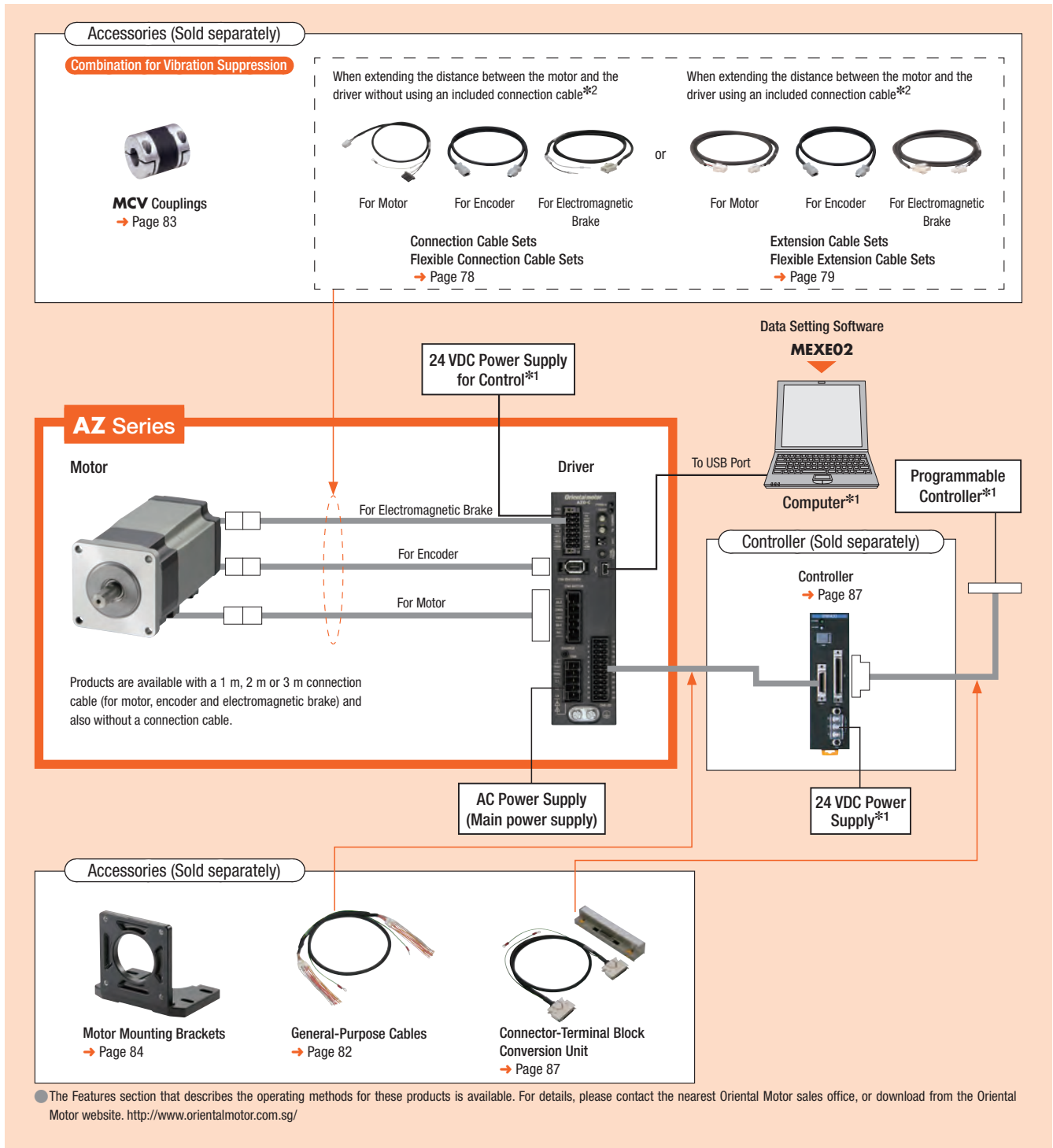


## Pulse Input, Standard Type with Electromagnetic Brake

An example of a single-axis system configuration with the **EMP400** Series controller is shown below.

\*1 Not supplied.

\*2 Only with products supplied with a connection cable.



## System Configuration Example

AZ Series	Sold Separately				
	Controller	Motor Mounting Brackets	Flexible Couplings	General-Purpose Cables (1 m)	Connector - Terminal Block Conversion Unit (1 m)
<b>AZ66MC-3</b>	<b>EMP401-1</b>	<b>PAL2P-5</b>	<b>MCV251010</b>	<b>CC16D010B-1</b>	<b>CC50T10E</b>

● The system configuration shown above is an example. Other combinations are available.

## Product Number Code

### Standard Type

**AZ 6 6 A C D - 1**

① ② ③ ④ ⑤ ⑥ ⑩

### Geared Type

**AZ 6 6 A C D - HP 15 F - 1**

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

①	Series Name	<b>AZ: AZ Series</b>
②	Motor Frame Size	<b>4:</b> 42 mm (40 mm for the <b>HPG</b> Geared Type) <b>6:</b> 60 mm
③	Motor Case Length	
④	Configuration	<b>A:</b> Single Shaft <b>M:</b> Electromagnetic Brake Type
⑤	Power Supply Input	<b>A:</b> Single-Phase 100-120 VAC <b>C:</b> Single-Phase/Three-Phase 200-240 VAC
⑥	Driver Type	<b>D:</b> Built-In Controller Type Blank: Pulse Input Type
⑦	Gear Type	<b>TS: TS</b> Geared Type <b>PS: PS</b> Geared Type <b>HP: HPG</b> Geared Type <b>HS:</b> Harmonic Geared Type
⑧	Gear Ratio	
⑨	Output Shaft Type*	Blank: Shaft Output <b>F:</b> Flange Output
⑩	Connection Cable	Number: Included Connection Cable Length <b>1:</b> 1 m <b>2:</b> 2 m <b>3:</b> 3 m None: Connection cable not included

\*HPG geared type only.

## Types

### Built-In Controller Type

#### ◇ Standard Type

Product Name
<b>AZ46A</b> □ <b>D</b> -◇
<b>AZ66A</b> □ <b>D</b> -◇
<b>AZ69A</b> □ <b>D</b> -◇

#### ◇ Standard Type with Electromagnetic Brake

Product Name
<b>AZ46M</b> □ <b>D</b> -◇
<b>AZ66M</b> □ <b>D</b> -◇
<b>AZ69M</b> □ <b>D</b> -◇

#### ◇ TS Geared Type

Product Name
<b>AZ46A</b> □ <b>D-TS3.6</b> -◇
<b>AZ46A</b> □ <b>D-TS7.2</b> -◇
<b>AZ46A</b> □ <b>D-TS10</b> -◇
<b>AZ46A</b> □ <b>D-TS20</b> -◇
<b>AZ46A</b> □ <b>D-TS30</b> -◇
<b>AZ66A</b> □ <b>D-TS3.6</b> -◇
<b>AZ66A</b> □ <b>D-TS7.2</b> -◇
<b>AZ66A</b> □ <b>D-TS10</b> -◇
<b>AZ66A</b> □ <b>D-TS20</b> -◇
<b>AZ66A</b> □ <b>D-TS30</b> -◇

#### ◇ PS Geared Type

Product Name
<b>AZ46A</b> □ <b>D-PS5</b> -◇
<b>AZ46A</b> □ <b>D-PS7.2</b> -◇
<b>AZ46A</b> □ <b>D-PS10</b> -◇
<b>AZ46A</b> □ <b>D-PS25</b> -◇
<b>AZ46A</b> □ <b>D-PS36</b> -◇
<b>AZ46A</b> □ <b>D-PS50</b> -◇
<b>AZ66A</b> □ <b>D-PS5</b> -◇
<b>AZ66A</b> □ <b>D-PS7.2</b> -◇
<b>AZ66A</b> □ <b>D-PS10</b> -◇
<b>AZ66A</b> □ <b>D-PS25</b> -◇
<b>AZ66A</b> □ <b>D-PS36</b> -◇
<b>AZ66A</b> □ <b>D-PS50</b> -◇

#### ◇ HPG Geared Type

Product Name
<b>AZ46A</b> □ <b>D-HP5</b> -◇
<b>AZ46A</b> □ <b>D-HP5F</b> -◇
<b>AZ46A</b> □ <b>D-HP9</b> -◇
<b>AZ46A</b> □ <b>D-HP9F</b> -◇
<b>AZ66A</b> □ <b>D-HP5</b> -◇
<b>AZ66A</b> □ <b>D-HP5F</b> -◇
<b>AZ66A</b> □ <b>D-HP15</b> -◇
<b>AZ66A</b> □ <b>D-HP15F</b> -◇

#### ◇ Harmonic Geared Type

Product Name
<b>AZ46A</b> □ <b>D-HS50</b> -◇
<b>AZ46A</b> □ <b>D-HS100</b> -◇
<b>AZ66A</b> □ <b>D-HS50</b> -◇
<b>AZ66A</b> □ <b>D-HS100</b> -◇

● Either **A** (single-phase 100-120 VAC) or **C** (single-phase 200-240 VAC) indicating the power supply voltage is entered where the box □ is located within the product name.

A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name. If the connection cable is not included, the box -◇ does not appear in the product name.

The following items are included in each product.

Motor, Parallel Key\*1, Motor Installation Screws\*2, Driver, Cable for Motor\*3, Cable for Encoder\*3, Cable for Electromagnetic Brake (For electromagnetic brake type only)\*3, Connector Set for Driver, Operating Manual

\*1 Only for products with a key slot on the output shaft.

\*2 Only for **TS** Geared Type with Frame Size 60 mm

\*3 Only with products supplied with a connection cable. In the following cases, purchase an accessory cable (sold separately):

- When using a flexible cable
- When using a cable longer than 3 m
- When buying products without an included cable

#### Note

● The motor cable from the motor and the electromagnetic brake cable cannot be connected directly to the driver. When connecting to the driver, use an accessory (separately sold) connection cable or the included connection cable (if the connection cable is included with the product).

## ● Pulse Input Type

### ◇ Standard Type

Product Name
<b>AZ46A</b> □-◇
<b>AZ66A</b> □-◇
<b>AZ69A</b> □-◇

### ◇ Standard Type with Electromagnetic Brake

Product Name
<b>AZ46M</b> □-◇
<b>AZ66M</b> □-◇
<b>AZ69M</b> □-◇

### ◇ TS Geared Type

Product Name
<b>AZ46A</b> □- <b>TS3.6</b> -◇
<b>AZ46A</b> □- <b>TS7.2</b> -◇
<b>AZ46A</b> □- <b>TS10</b> -◇
<b>AZ46A</b> □- <b>TS20</b> -◇
<b>AZ46A</b> □- <b>TS30</b> -◇
<b>AZ66A</b> □- <b>TS3.6</b> -◇
<b>AZ66A</b> □- <b>TS7.2</b> -◇
<b>AZ66A</b> □- <b>TS10</b> -◇
<b>AZ66A</b> □- <b>TS20</b> -◇
<b>AZ66A</b> □- <b>TS30</b> -◇

### ◇ PS Geared Type

Product Name
<b>AZ46A</b> □- <b>PS5</b> -◇
<b>AZ46A</b> □- <b>PS7.2</b> -◇
<b>AZ46A</b> □- <b>PS10</b> -◇
<b>AZ46A</b> □- <b>PS25</b> -◇
<b>AZ46A</b> □- <b>PS36</b> -◇
<b>AZ46A</b> □- <b>PS50</b> -◇
<b>AZ66A</b> □- <b>PS5</b> -◇
<b>AZ66A</b> □- <b>PS7.2</b> -◇
<b>AZ66A</b> □- <b>PS10</b> -◇
<b>AZ66A</b> □- <b>PS25</b> -◇
<b>AZ66A</b> □- <b>PS36</b> -◇
<b>AZ66A</b> □- <b>PS50</b> -◇

### ◇ HPG Geared Type

Product Name
<b>AZ46A</b> □- <b>HP5</b> -◇
<b>AZ46A</b> □- <b>HP5F</b> -◇
<b>AZ46A</b> □- <b>HP9</b> -◇
<b>AZ46A</b> □- <b>HP9F</b> -◇
<b>AZ66A</b> □- <b>HP5</b> -◇
<b>AZ66A</b> □- <b>HP5F</b> -◇
<b>AZ66A</b> □- <b>HP15</b> -◇
<b>AZ66A</b> □- <b>HP15F</b> -◇

### ◇ Harmonic Geared Type

Product Name
<b>AZ46A</b> □- <b>HS50</b> -◇
<b>AZ46A</b> □- <b>HS100</b> -◇
<b>AZ66A</b> □- <b>HS50</b> -◇
<b>AZ66A</b> □- <b>HS100</b> -◇

● Either **A** (single-phase 100-120 VAC) or **C** (single-phase 200-240 VAC) indicating the power supply voltage is entered where the box □ is located within the product name. A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name. If the connection cable is not included, the box -◇ does not appear in the product name.

The following items are included in each product.

Motor, Parallel Key\*1, Motor Installation Screws\*2, Driver, Cable for Motor\*3, Cable for Encoder\*3, Cable for Electromagnetic Brake (For electromagnetic brake type only)\*3, Connector Set for Driver, Operating Manual

\*1 Only for products with a key slot on the output shaft.

\*2 Only for **TS** Geared Type with Frame Size 60 mm

\*3 Only with products supplied with a connection cable. In the following cases, purchase an accessory cable (sold separately):

- When using a flexible cable
- When using a cable longer than 3 m
- When buying products without an included cable

#### Note

● The motor cable from the motor and the electromagnetic brake cable cannot be connected directly to the driver. When connecting to the driver, use an accessory (separately sold) connection cable or the included connection cable (if the connection cable is included with the product).

## ■ How to Read Specifications Table

Maximum Holding Torque	: The maximum holding torque (holding force) of the motor when power (rated current) is being supplied but the motor shaft is at standstill. (With geared types, the permissible strength of the gear is given consideration for this value.)
Permissible Torque	: The maximum value of the torque that can be continuously applied on the output gear shaft.
Maximum Instantaneous Torque	: This is the maximum torque value that can be applied to the output gear shaft during acceleration/deceleration like when an inertial load is started and stopped.
Holding Torque at Motor Standstill	While Power is ON : Holding torque when the automatic current cutback function is active. Electromagnetic Brake : Static friction torque when the electromagnetic brake is activated at standstill. (Electromagnetic brake is power off activated type.)

# Standard Type Frame Size 42 mm, 60 mm

# Standard Type with Electromagnetic Brake Frame Size 42 mm, 60 mm

## Specifications



Product Name		Built-in Controller	AZ46 <input type="checkbox"/> <input type="checkbox"/> <b>D</b> - <input type="checkbox"/> <input type="checkbox"/>	AZ66 <input type="checkbox"/> <input type="checkbox"/> <b>D</b> - <input type="checkbox"/> <input type="checkbox"/>	AZ69 <input type="checkbox"/> <input type="checkbox"/> <b>D</b> - <input type="checkbox"/> <input type="checkbox"/>
		Pulse Input	AZ46 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	AZ66 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	AZ69 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Maximum Holding Torque		N-m	0.3	1.2	2
Holding Torque at Motor Standstill	Power ON	N-m	0.15	0.6	1
	Electromagnetic Brake	N-m	0.15	0.6	1
Rotor Inertial		J: kg-m <sup>2</sup>	$55 \times 10^{-7}$ ( $71 \times 10^{-7}$ )*1	$370 \times 10^{-7}$ ( $530 \times 10^{-7}$ )*1	$740 \times 10^{-7}$ ( $900 \times 10^{-7}$ )*1
Resolution	Resolution Setting: 1000 P/R		0.36°/Pulse		
		Voltage and Frequency	Single-phase 100-120 VAC, single-phase/three-phase 200-240 VAC -15~+6% 50/60 Hz		
Power Supply Input	Input	Single-Phase 100-120 VAC	2.7	3.8	5.4
	Current	Single-Phase 200-240 VAC	1.7	2.3	3.3
		Three-Phase 200-240 VAC	1.0	1.4	2.0
Control Power Source			24 VDC $\pm 5\%$ *2 0.25 A (0.33 A)*1		

● Either **A** (single shaft) or **M** (electromagnetic brake type) indicating the configuration is entered where the box  is located within the product name.

Either **A** (single-phase 100-120 VAC) or **C** (single-phase 200-240 VAC) indicating the power supply voltage is entered where the box  is located within the product name.

A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box  is located within the product name.

If the connection cable is not included, the box  does not appear in the product name.

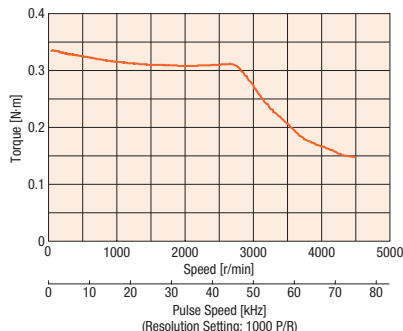
● For details of the standards, check the Oriental Motor website.

\*1 The parentheses ( ) indicate the specifications for the electromagnetic brake type.

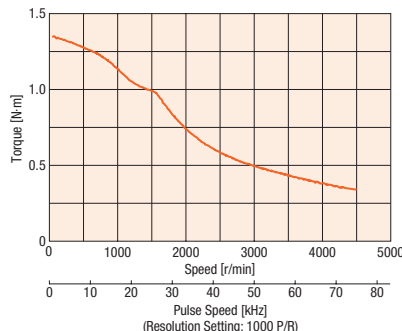
\*2 For the electromagnetic brake type, the 24 VDC  $\pm 4\%$  specification applies if the wiring distance between the motor and driver is extended by 20 m using an accessory cable (sold separately).

## Speed – Torque Characteristics (Reference values)

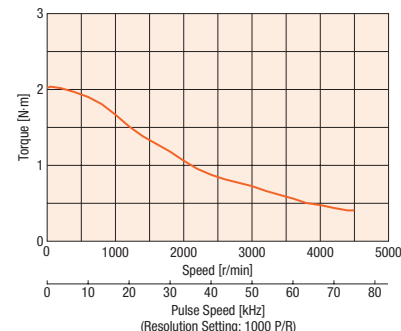
**AZ46**



**AZ66**



**AZ69**



**Note**

● The speed-torque characteristics shows the data based on the company's measurement conditions. If conditions change, the characteristics may change.

● Depending on the driving conditions, a considerable amount of heat may be generated by the motor. To protect the ABZO sensor, ensure that the motor case temperature is 80°C or less. (When conforming to the UL Standards, it is required to keep the temperature of the motor case at 75°C or less, since the motor is recognized as insulation class A.)



# TS Geared Type Frame Size 42 mm

## Specifications

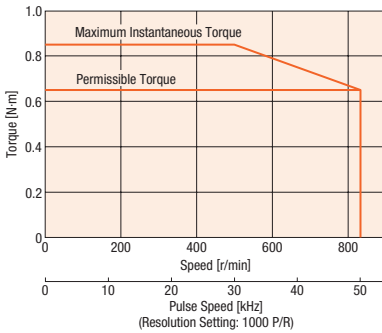


Product Name	Built-in Controller Pulse Input	AZ46A□D-TS3.6-◇	AZ46A□D-TS7.2-◇	AZ46A□D-TS10-◇	AZ46A□D-TS20-◇	AZ46A□D-TS30-◇
Maximum Holding Torque	N·m	0.65	1.2	1.7	2	2.3
Rotor Inertial	J·kg·m <sup>2</sup>	55×10 <sup>-7</sup>				
Gear Ratio		3.6	7.2	10	20	30
Resolution	Resolution Setting: 1000 P/R	0.1°/Pulse	0.05°/Pulse	0.036°/Pulse	0.018°/Pulse	0.012°/Pulse
Permissible Torque	N·m	0.65	1.2	1.7	2	2.3
Maximum Instantaneous Torque	N·m	0.85	1.6	2	3	
Holding Torque at Motor Standstill	N·m	0.54	1	1.5	1.9	2.2
Speed Range	r/min	0~833	0~416	0~300	0~150	0~100
Backlash	arcmin	45 (0.75)	25 (0.42)		15 (0.25)	
Voltage and Frequency		Single-phase 100-120 VAC, single-phase/three-phase 200-240 VAC -15~+6% 50/60 Hz				
Power	Input	Single-Phase 100-120 VAC		2.7		
Supply Input	Current	Single-Phase 200-240 VAC		1.7		
	A	Three-Phase 200-240 VAC		1.0		
Control Power Source		24 VDC ±5% 0.25 A				

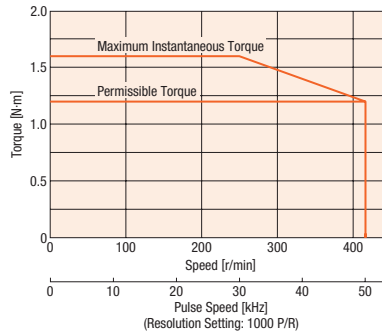
- Either **A** (single-phase 100-120 VAC) or **C** (single-phase 200-240 VAC) indicating the power supply voltage is entered where the box □ is located within the product name. A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name. If the connection cable is not included, the box -◇ does not appear in the product name.
- For details of the standards, check the Oriental Motor website.

## Speed – Torque Characteristics (Reference values)

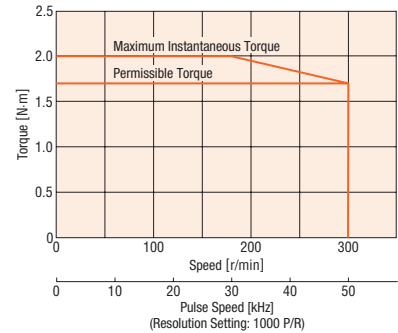
**AZ46 Gear Ratio 3.6**



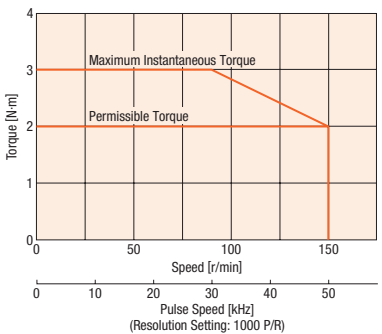
**AZ46 Gear Ratio 7.2**



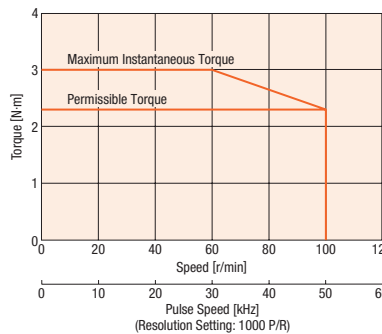
**AZ46 Gear Ratio 10**



**AZ46 Gear Ratio 20**



**AZ46 Gear Ratio 30**



### Note

- The speed-torque characteristics shows the data based on the company's measurement conditions. If conditions change, the characteristics may change.
- Depending on the driving conditions, a considerable amount of heat may be generated by the motor. To protect the ABZO sensor, ensure that the motor case temperature is 80°C or less. (When conforming to the UL Standards, it is required to keep the temperature of the motor case at 75°C or less, since the motor is recognized as insulation class A.)

Features  
 System Configuration  
 Types  
 AC Power-Supply Input  
 Specifications and Characteristics  
 Dimensions  
 Connection and Operation  
 System Configuration  
 Types  
 DC Power-Supply Input  
 Specifications and Characteristics  
 Dimensions  
 Connection and Operation  
 Accessories

# TS Geared Type Frame Size 60 mm



## Specifications

Product Name	Built-in Controller	AZ66A□D-TS3.6-◇	AZ66A□D-TS7.2-◇	AZ66A□D-TS10-◇	AZ66A□D-TS20-◇	AZ66A□D-TS30-◇
	Pulse Input	AZ66A□-TS3.6-◇	AZ66A□-TS7.2-◇	AZ66A□-TS10-◇	AZ66A□-TS20-◇	AZ66A□-TS30-◇
Maximum Holding Torque	N·m	1.8	3	4	5	6
Rotor Inertial	J: kg·m <sup>2</sup>	370×10 <sup>-7</sup>				
Gear Ratio		3.6	7.2	10	20	30
Resolution	Resolution Setting: 1000 P/R	0.1°/Pulse	0.05°/Pulse	0.036°/Pulse	0.018°/Pulse	0.012°/Pulse
Permissible Torque	N·m	1.8	3	4	5	6
Maximum Instantaneous Torque*	N·m	*	4.5	6	8	10
Holding Torque at Motor Standstill	N·m	1.3	2.6	3.7	5	6
Speed Range	r/min	0~833	0~416	0~300	0~150	0~100
Backlash	arcmin	35 (0.59)	15 (0.25)		10 (0.17)	
Voltage and Frequency		Single-phase 100-120 VAC, single-phase/three-phase 200-240 VAC -15~+6% 50/60 Hz				
Power	Input	Single-Phase 100-120 VAC			3.8	
Supply Input	Current	Single-Phase 200-240 VAC			2.3	
	A	Three-Phase 200-240 VAC			1.4	
Control Power Source		24 VDC ±5% 0.25 A				

\* For the geared motor output torque, refer to the speed – torque characteristics.

● Either **A** (single-phase 100-120 VAC) or **C** (single-phase 200-240 VAC) indicating the power supply voltage is entered where the box □ is located within the product name.

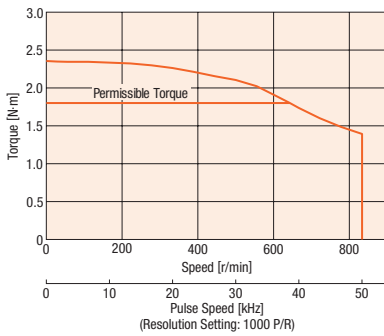
A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name.

If the connection cable is not included, the box -◇ does not appear in the product name.

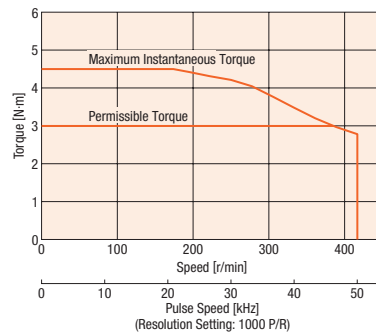
● For details of the standards, check the Oriental Motor website.

## Speed – Torque Characteristics (Reference values)

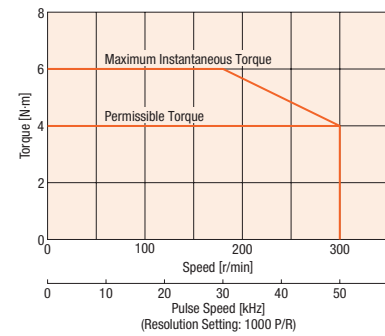
**AZ66 Gear Ratio 3.6**



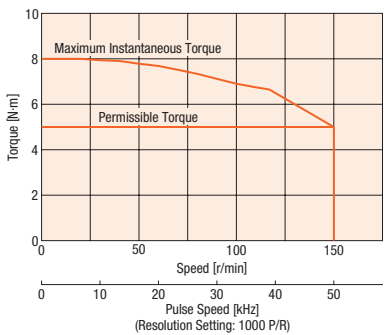
**AZ66 Gear Ratio 7.2**



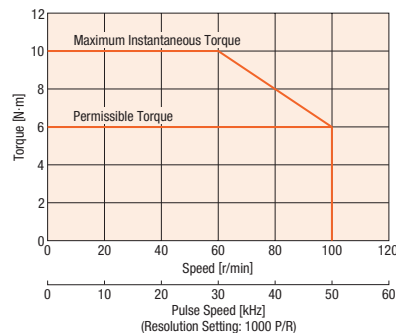
**AZ66 Gear Ratio 10**



**AZ66 Gear Ratio 20**



**AZ66 Gear Ratio 30**



### Note

● The speed-torque characteristics shows the data based on the company's measurement conditions. If conditions change, the characteristics may change.

● Depending on the driving conditions, a considerable amount of heat may be generated by the motor. To protect the ABZO sensor, ensure that the motor case temperature is 80°C or less.

(When conforming to the UL Standards, it is required to keep the temperature of the motor case at 75°C or less, since the motor is recognized as insulation class A.)

# PS Geared Type Frame Size 42 mm

## Specifications

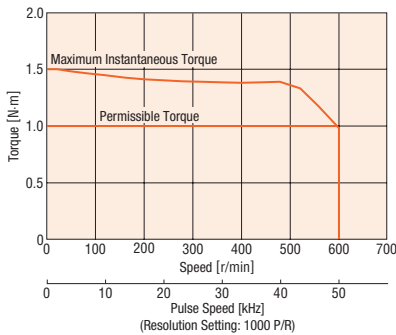


Product Name	Built-in Controller	AZ46A□D-PS5-◇	AZ46A□D-PS7.2-◇	AZ46A□D-PS10-◇	AZ46A□D-PS25-◇	AZ46A□D-PS36-◇	AZ46A□D-PS50-◇
	Pulse Input	AZ46A□-PS5-◇	AZ46A□-PS7.2-◇	AZ46A□-PS10-◇	AZ46A□-PS25-◇	AZ46A□-PS36-◇	AZ46A□-PS50-◇
Maximum Holding Torque	N·m	1	1.5	2.5	3		
Rotor Inertial	J: kg·m <sup>2</sup>	55×10 <sup>-7</sup>					
Gear Ratio		5	7.2	10	25	36	50
Resolution	Resolution Setting: 1000 P/R	0.072°/Pulse	0.05°/Pulse	0.036°/Pulse	0.0144°/Pulse	0.01°/Pulse	0.0072°/Pulse
Permissible Torque	N·m	1	1.5	2.5	3		
Maximum Instantaneous Torque	N·m	1.5	2	6			
Holding Torque at Motor Standstill	N·m	0.75	1	1.5	2.5	3	
Speed Range	r/min	0~600	0~416	0~300	0~120	0~83	0~60
Backlash	arcmin	15 (0.25°)					
Voltage and Frequency		Single-phase 100-120 VAC, single-phase/three-phase 200-240 VAC -15~+6% 50/60 Hz					
Power	Input	Single-Phase 100-120 VAC			2.7		
Supply Input	Current	Single-Phase 200-240 VAC			1.7		
	A	Three-Phase 200-240 VAC			1.0		
Control Power Source		24 VDC ±5% 0.25 A					

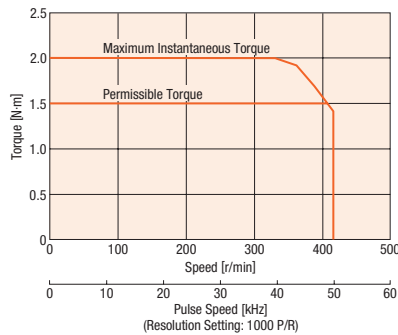
- Either **A** (single-phase 100-120 VAC) or **C** (single-phase 200-240 VAC) indicating the power supply voltage is entered where the box □ is located within the product name. A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name. If the connection cable is not included, the box -◇ does not appear in the product name.
- For details of the standards, check the Oriental Motor website.

## Speed – Torque Characteristics (Reference values)

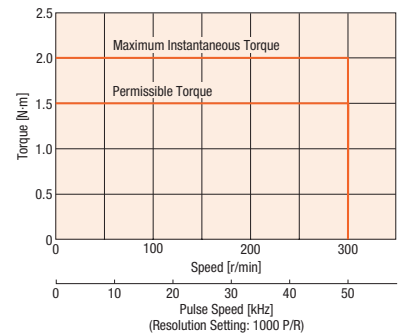
**AZ46 Gear Ratio 5**



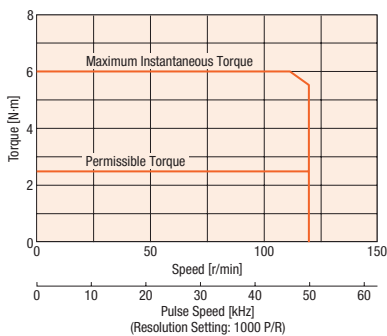
**AZ46 Gear Ratio 7.2**



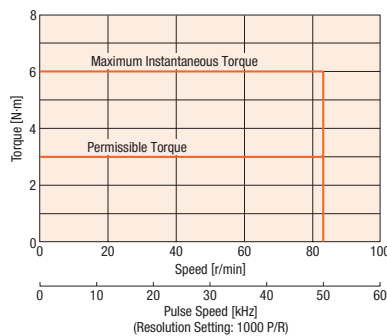
**AZ46 Gear Ratio 10**



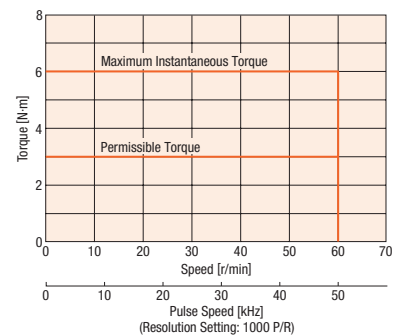
**AZ46 Gear Ratio 25**



**AZ46 Gear Ratio 36**



**AZ46 Gear Ratio 50**



### Note

- The speed-torque characteristics shows the data based on the company's measurement conditions. If conditions change, the characteristics may change.
- Depending on the driving conditions, a considerable amount of heat may be generated by the motor. To protect the ABZO sensor, ensure that the motor case temperature is 80°C or less. (When conforming to the UL Standards, it is required to keep the temperature of the motor case at 75°C or less, since the motor is recognized as insulation class A.)

# PS Geared Type Frame Size 60 mm



## Specifications

Product Name	Built-in Controller	AZ66A□D-PS5-◇	AZ66A□D-PS7.2-◇	AZ66A□D-PS10-◇	AZ66A□D-PS25-◇	AZ66A□D-PS36-◇	AZ66A□D-PS50-◇
	Pulse Input	AZ66A□-PS5-◇	AZ66A□-PS7.2-◇	AZ66A□-PS10-◇	AZ66A□-PS25-◇	AZ66A□-PS36-◇	AZ66A□-PS50-◇
Maximum Holding Torque	N·m	3.5	4	5	8		
Rotor Inertial	J: kg·m <sup>2</sup>	370×10 <sup>-7</sup>					
Gear Ratio		5	7.2	10	25	36	50
Resolution	Resolution Setting: 1000 P/R	0.072°/Pulse	0.05°/Pulse	0.036°/Pulse	0.0144°/Pulse	0.01°/Pulse	0.0072°/Pulse
Permissible Torque	N·m	3.5	4	5	8		
Maximum Instantaneous Torque*	N·m	*	*	11	16	20	
Holding Torque at Motor Standstill	N·m	3	4	5	8		
Speed Range	r/min	0~600	0~416	0~300	0~120	0~83	0~60
Backlash	arcmin	7 (0.12°)			9 (0.15°)		
Voltage and Frequency		Single-phase 100-120 VAC, single-phase/three-phase 200-240 VAC -15~+6% 50/60 Hz					
Power	Input	Single-Phase 100-120 VAC			3.8		
Supply Input	Current	Single-Phase 200-240 VAC			2.3		
	A	Three-Phase 200-240 VAC			1.4		
Control Power Source		24 VDC ±5% 0.25 A					

\* For the geared motor output torque, refer to the speed – torque characteristics.

● Either **A** (single-phase 100-120 VAC) or **C** (single-phase 200-240 VAC) indicating the power supply voltage is entered where the box □ is located within the product name.

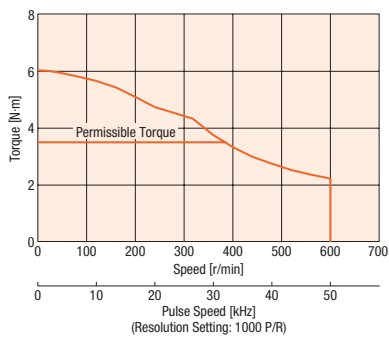
A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name.

If the connection cable is not included, the box -◇ does not appear in the product name.

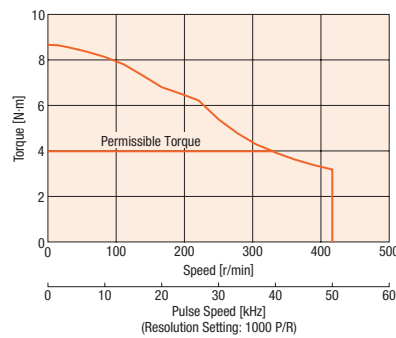
● For details of the standards, check the Oriental Motor website.

## Speed – Torque Characteristics (Reference values)

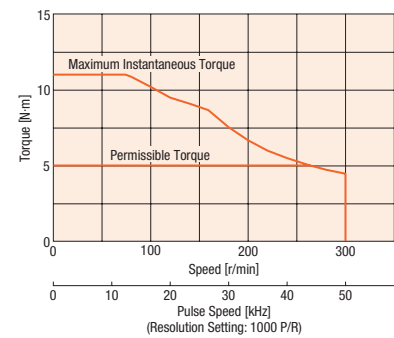
**AZ66 Gear Ratio 5**



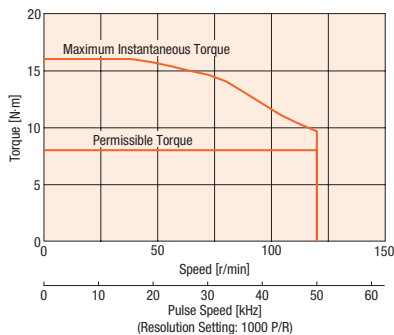
**AZ66 Gear Ratio 7.2**



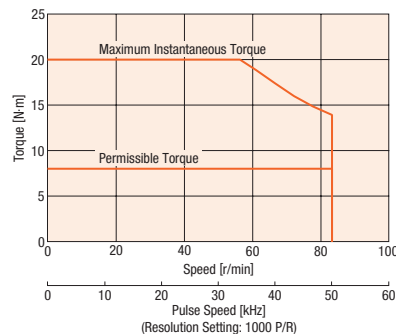
**AZ66 Gear Ratio 10**



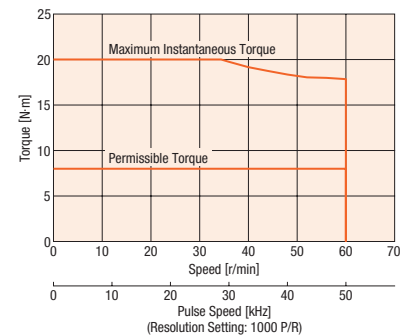
**AZ66 Gear Ratio 25**



**AZ66 Gear Ratio 36**



**AZ66 Gear Ratio 50**



### Note

● The speed-torque characteristics shows the data based on the company's measurement conditions. If conditions change, the characteristics may change.

● Depending on the driving conditions, a considerable amount of heat may be generated by the motor. To protect the ABZO sensor, ensure that the motor case temperature is 80°C or less.

(When conforming to the UL Standards, it is required to keep the temperature of the motor case at 75°C or less, since the motor is recognized as insulation class A.)

# HPG Geared Type Frame Size 40 mm, 60 mm

## Specifications

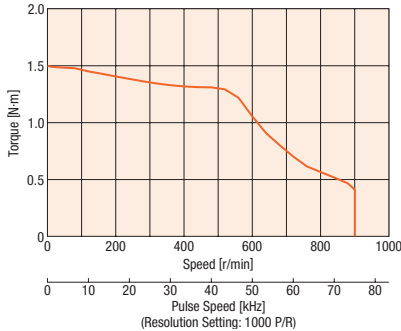


Product Name	Built-in Controller Pulse Input	AZ46A <input type="checkbox"/> D-HP5 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	AZ46A <input type="checkbox"/> D-HP9 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	AZ66A <input type="checkbox"/> D-HP5 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	AZ66A <input type="checkbox"/> D-HP15 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		AZ46A <input type="checkbox"/> -HP5 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	AZ46A <input type="checkbox"/> -HP9 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	AZ66A <input type="checkbox"/> -HP5 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	AZ66A <input type="checkbox"/> -HP15 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Maximum Holding Torque	N·m	1.5	2.5	5.9	9
Rotor Inertial	J: kg·m <sup>2</sup>	55×10 <sup>-7</sup>		370×10 <sup>-7</sup>	
Inertial*1	J: kg·m <sup>2</sup>	5.8×10 <sup>-7</sup> (4.2×10 <sup>-7</sup> )	3.4×10 <sup>-7</sup> (2.9×10 <sup>-7</sup> )	92×10 <sup>-7</sup> (86×10 <sup>-7</sup> )	78×10 <sup>-7</sup> (77×10 <sup>-7</sup> )
Gear Ratio		5	9	5	15
Resolution	Resolution Setting: 1000 P/R	0.072°/Pulse	0.04°/Pulse	0.072°/Pulse	0.024°/Pulse
Permissible Torque*	N·m	*	2.5	5.9	9
Maximum Instantaneous Torque*	N·m	*	*	*	*
Holding Torque at Motor Standstill	N·m	0.75	1.35	3	9
Speed Range	r/min	0~900	0~500	0~900	0~300
Backlash	arcmin	3 (0.05°)			
Voltage and Frequency		Single-phase 100-120 VAC, single-phase/three-phase 200-240 VAC -15~+6% 50/60 Hz			
Power Supply Input	Input	Single-Phase 100-120 VAC	2.7	3.8	
	Current	Single-Phase 200-240 VAC	1.7	2.3	
		Three-Phase 200-240 VAC	1.0	1.4	
Control Power Source		24 VDC ±5% 0.25 A			
Runout of Output Flange Surface*2	mm	0.02			
Runout of Output Flange Inner (Outer) Diameter*2	mm	0.03	0.04		

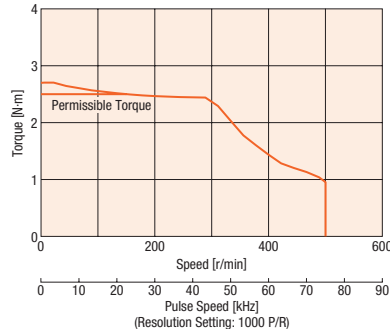
- \* For the geared motor output torque, refer to the speed – torque characteristics.
- Either **A** (single-phase 100-120 VAC) or **C** (single-phase 200-240 VAC) indicating the power supply voltage is entered where the box  is located within the product name.
- For the flange output type, **F** is entered where the box  is located within the product name.
- A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box  is located within the product name.
- If the connection cable is not included, the box  does not appear in the product name.
- For details of the standards, check the Oriental Motor website.
- \*1 The values for the moments of inertia within the gear that has been converted to motor shaft values. The parentheses ( ) indicate the values for the flange output type.
- \*2 Specifications for the flange output type.

## Speed – Torque Characteristics (Reference values)

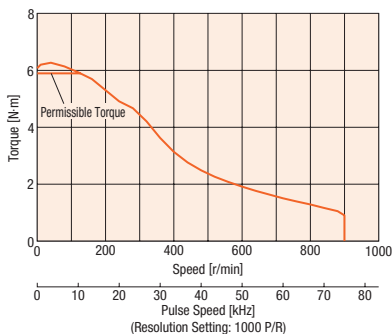
**AZ46 Gear Ratio 5**



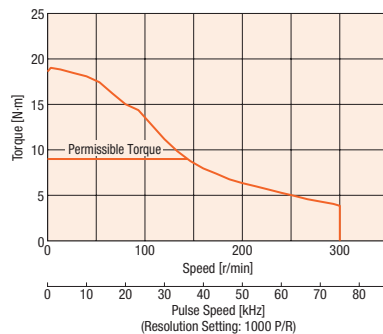
**AZ46 Gear Ratio 9**



**AZ66 Gear Ratio 5**



**AZ66 Gear Ratio 15**



### Note

- The speed-torque characteristics shows the data based on the company's measurement conditions. If conditions change, the characteristics may change.
- Depending on the driving conditions, a considerable amount of heat may be generated by the motor. To protect the ABZO sensor, ensure that the motor case temperature is 80°C or less. (When conforming to the UL Standards, it is required to keep the temperature of the motor case at 75°C or less, since the motor is recognized as insulation class A.)



# Harmonic Geared Type Frame Size 42 mm, 60 mm



## Specifications

Product Name	Built-in Controller Pulse Input	AZ46A□D-HS50-◇	AZ46A□D-HS100-◇	AZ66A□D-HS50-◇	AZ66A□D-HS100-◇
		AZ46A□-HS50-◇	AZ46A□-HS100-◇	AZ66A□-HS50-◇	AZ66A□-HS100-◇
Maximum Holding Torque	N·m	3.5	5	7	10
Rotor Inertial	J: kg·m <sup>2</sup>	72×10 <sup>-7</sup>		405×10 <sup>-7</sup>	
Gear Ratio		50	100	50	100
Resolution	Resolution Setting: 1000 P/R	0.0072 <sup>7</sup> /Pulse	0.0036 <sup>7</sup> /Pulse	0.0072 <sup>7</sup> /Pulse	0.0036 <sup>7</sup> /Pulse
Permissible Torque	N·m	3.5	5	7	10
Maximum Instantaneous Torque	N·m	8.3	11	23	36
Holding Torque at Motor Standstill	N·m	3.5	5	7	10
Speed Range	r/min	0~70	0~35	0~70	0~35
Lost Motion (Load torque)	arcmin	1.5 or less (±0.16 N·m)	1.5 or less (±0.20 N·m)	0.7 or less (±0.28 N·m)	0.7 or less (±0.39 N·m)
Voltage and Frequency		Single-phase 100-120 VAC, single-phase/three-phase 200-240 VAC -15~+6% 50/60 Hz			
Power Supply Input	Input	Single-Phase 100-120 VAC		3.8	
	Current	Single-Phase 200-240 VAC		2.3	
	A	Three-Phase 200-240 VAC		1.4	
Control Power Source		24 VDC ±5% 0.25 A			

● Either **A** (single-phase 100-120 VAC) or **C** (single-phase 200-240 VAC) indicating the power supply voltage is entered where the box □ is located within the product name.

A number indicating the length of desired connection cable, if included. **1** (1 m), **2** (2 m) or **3** (3 m) is entered where the box ◇ is located within the product name.

If the connection cable is not included, the box -◇ does not appear in the product name.

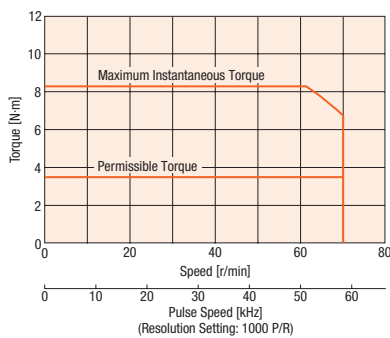
● For details of the standards, check the Oriental Motor website.

### Note

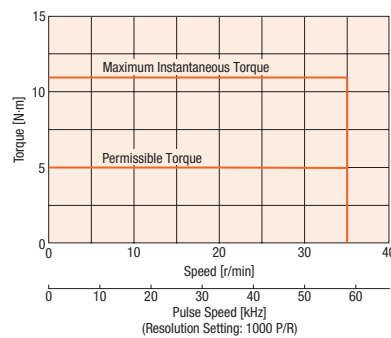
● The rotor inertia represents a sum of the inertia of the harmonic gear converted to motor shaft values.

## Speed – Torque Characteristics (Reference values)

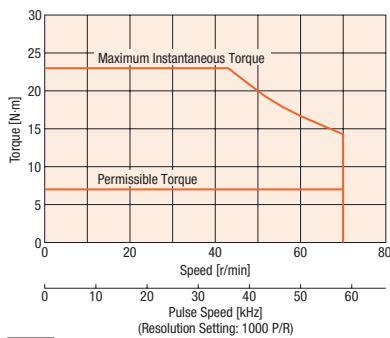
**AZ46 Gear Ratio 50**



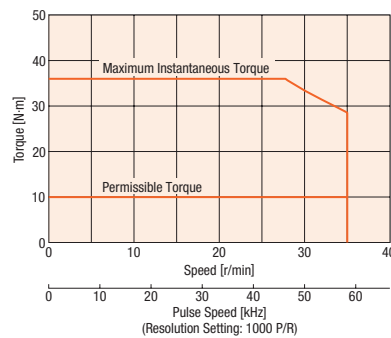
**AZ46 Gear Ratio 100**



**AZ66 Gear Ratio 50**



**AZ66 Gear Ratio 100**



### Note

● The speed-torque characteristics shows the data based on the company's measurement conditions. If conditions change, the characteristics may change.

● Depending on the driving conditions, a considerable amount of heat may be generated by the motor. To protect the ABZO sensor, ensure that the motor case temperature is 80°C or less. (When conforming to the UL Standards, it is required to keep the temperature of the motor case at 75°C or less, since the motor is recognized as insulation class A.)

## Driver Specifications

Classification	Name	Built-In Controller Type	Pulse Input Type
I/O Function	Pulse Input	—	Maximum Input Pulse Frequency: Line driver output by programmable controller: 1 MHz (When the pulse duty is 50%) Open-collector output by programmable controller: 250 kHz (When the pulse duty is 50%) Negative Logic Pulse Input (Initial value)
	Direct Input	Input Points: 10 Points	Input Points: 6 Points
	Direct Output	Output Points: 6 Points	
	RS-485 Communication	Network Input Network Output	16 Points 16 Points

## Built-In Controller Type RS-485 Communication Specifications

Protocol	Modbus RTU Mode
Electrical Characteristics	EIA-485 Based, Straight Cable Use twisted-pair cables (TIA/EIA-568B CAT5e or better recommended). The maximum total extension length is 50 m.
Communication Mode	Half duplex and Start-stop synchronization (data: 8 bits, stop bit: 1 bit or 2 bits, parity: none, even, or odd)
Baud Rate	Select from 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps, or 230400 bps.
Connection Type	Up to 31 units can be connected to a single programmable controller (master unit).

## General Specifications

	Motor	Driver	
		Built-In Controller Type	Pulse Input Type
Heat-resistant Class	130 (B) [Recognized as 105 (A) by UL.]	—	
Insulation Resistance	The measured value is 100 MΩ or more when a 500 VDC megger is applied between the following locations: • Case - Motor Windings • Case - Electromagnetic Brake Windings*1	The measured value is 100 MΩ or more when a 500 VDC megger is applied between the following locations: • Protective Earth Terminal - Power Supply Terminal • Encoder Connector - Power Supply Terminal • Power Input Terminal - Power Supply Terminal	
Dielectric Strength	No abnormality is found with the following application for 1 minute: • Case - Motor Windings 1.5 kVAC, 50 Hz or 60 Hz • Case - Electromagnetic Brake Windings*1 1.5 kVAC, 50 Hz or 60 Hz	No abnormality is found with the following application for 1 minute: • Protective Earth Terminal - Power Supply Terminal 1.5 kVAC, 50 Hz or 60 Hz • Encoder Connector - Power Supply Terminal 1.8 kVAC, 50 Hz or 60 Hz • I/O Signal Terminal - Power Supply Terminal 1.8 kVAC, 50 Hz or 60 Hz	
Operating Environment (In operation)	Ambient Temperature	0~+40°C (Non-freezing)	
	Ambient Humidity	85% or less (Non-condensing)	
	Atmosphere	Use in an area without corrosive gases and dust. The product should not be exposed to water, oil or other liquids.	
Degree of Protection	IP65 (excluding installation surfaces and connector locations)	IP10	IP20
Stop Position Accuracy	<b>AZ46:</b> ±4 min (±0.067°) <b>AZ66, AZ69:</b> ±3 min (±0.05°)		
Shaft Runout	0.05T.I.R. (mm)*3	—	
Concentricity of Installation Pilot to the Shaft	0.075T.I.R. (mm)*3	—	
Perpendicularity of Installation Surface to the Shaft	0.075T.I.R. (mm)*3	—	
Range of Multiple Rotation Detection at Power OFF	±900 Rotations (1,800 rotations)		

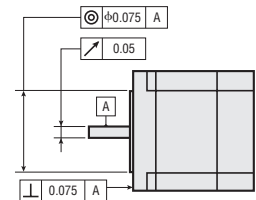
\*1 Only for electromagnetic brake type

\*2 When a heat sink equivalent to an aluminum plate size of at least 200×200 mm and 2 mm thickness is installed

\*3 T.I.R. (Total Indicator Reading): The total dial gauge reading when the measurement section is rotated one revolution, centered on the reference axis center.

### Note

- Do not measure insulation resistance or perform a dielectric strength test while the motor and driver are connected. Also, do not conduct these tests on the ABZO sensor section of the motor.



## Permissible Radial Load/Permissible Axial Load

Unit=N

Type	Frame Size	Product Name	Gear Ratio	Permissible Radial Load					Permissible Axial Load
				Distance from Shaft End mm					
				0	5	10	15	20	
Standard Type	42 mm	<b>AZ46</b>	-	35	44	58	85	-	4.3 [6.0]*
		<b>AZ66</b>		90	100	130	180	270	8.9 [12.7]*
	60 mm	<b>AZ69</b>		90	100	130	180	270	14 [17.6]*
TS Geared Type	42 mm	<b>AZ46</b>	<b>3.6, 7.2, 10</b> <b>20, 30</b>	20	30	40	50	-	15
				40	50	60	70	-	
	60 mm	<b>AZ66</b>	<b>3.6, 7.2, 10</b> <b>20, 30</b>	120	135	150	165	180	40
				170	185	200	215	230	
PS Geared Type	42 mm	<b>AZ46</b>	<b>5, 7.2, 10</b> <b>25, 36, 50</b>	73	84	100	123	-	50
				109	127	150	184	-	
	60 mm	<b>AZ66</b>	<b>5</b> <b>7.2, 10</b> <b>25, 36, 50</b>	200	220	250	280	320	100
				250	270	300	340	390	
				330	360	400	450	520	
HPG Geared Type	40 mm	<b>AZ46</b>	<b>5</b> <b>9</b>	130	150	170	200	230	150
				160	180	210	240	290	
	60 mm	<b>AZ66</b>	<b>5</b> <b>15</b>	210	230	250	280	310	300
				290	310	340	370	400	
Harmonic Geared	42 mm	<b>AZ46</b>	<b>50, 100</b>	180	220	270	360	510	220
	60 mm	<b>AZ66</b>		320	370	440	550	720	450

● The product names are described with text by which the product name can be identified.

\*The value in the brackets [ ] indicate the value for the electromagnetic brake type.

## Permissible Moment Load

Ensure that the permissible moment load at the stage of installing on the flange surface does not exceed the permissible value in the table below.

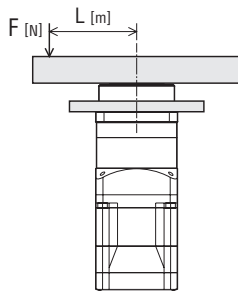
### HPG Geared Type Flange Output Type

Product Name	Gear Ratio	Permissible Moment Load (N·m)
<b>AZ46</b>	<b>5</b>	1.9
	<b>9</b>	2.3
<b>AZ66</b>	<b>5</b>	5.2
	<b>15</b>	7

The permissible moment load can be calculated with the following formula.

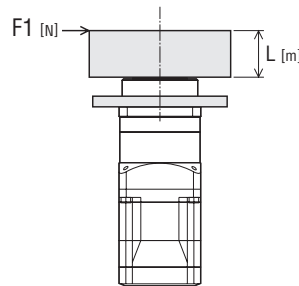
Example 1: If an external force F is applied at a distance L from the center of the output flange

$$\text{Moment Load [N·m]} : M = F \times L$$



Example 2: If an external force F1 is applied at a distance L from the output flange installation surface

$$\text{Moment Load [N·m]} : M = F1 \times (L + \text{coefficient } a)$$



Product Name	Coefficient a (m)
<b>AZ46</b>	0.006
<b>AZ66</b>	0.011

### Harmonic Geared Type

Product Name	Gear Ratio	Permissible Moment Load (N·m)
<b>AZ46</b>	<b>50, 100</b>	5.6
<b>AZ66</b>		11.6

The permissible moment load can be calculated with the following formula.

Example 1: If an external force F is applied at a distance L from the center of the output flange

$$\text{Moment Load [N·m]} : M = F \times L$$

