

## 5-Phase High Torque Stepping Motor and Driver Package

### **RK Series**

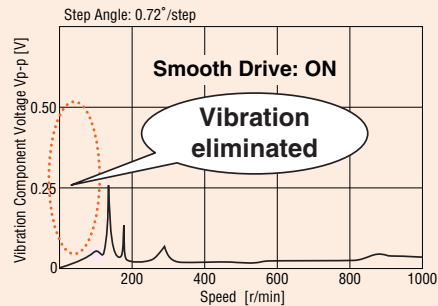
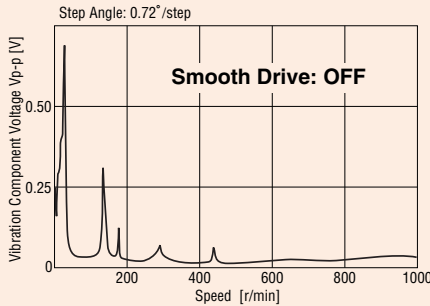
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# The Pursuit of a Control Motor That's Easy to Use

## Lower Vibration

### ● Smooth Drive Function New Function

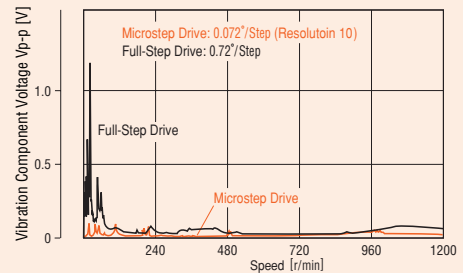
The new and innovative Smooth Drive function ensures low-vibration, low-noise operation at low speeds by executing microstep drive within the driver yet maintaining the input pulse frequency and resolution. For example, do you want to reduce vibration and noise during low-speed operation in microstep mode without changing the full-step resolution? Or, are you looking for ways to use microstep drive while keeping the pulse frequency low to accommodate the oscillator requirement? If so, the **RK** Series is the answer to your needs.



### ● Microstep Drive System

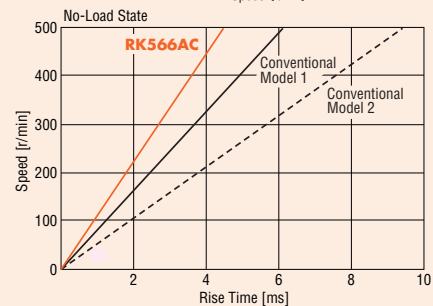
The motor's basic step angle is divided into a maximum of one-250th without the use of a reduction mechanism or other mechanical element. This enables fine positioning and the further reduction of vibration and noise. Using the change-step function, an operational sequence of "low-speed transfer → high-speed return" can easily be performed without the need for tuning.

\* It can also be used in full-step operation.



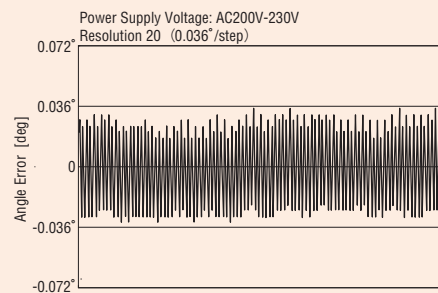
## Improved Response

The **RK** Series, with its high starting frequency, shortens the machine cycle without affecting acceleration/deceleration rates. This produces a significant savings in time for an operation in which the same cycle is repeated thousands of times each day.



## Improved Angle Accuracy

The drivers used in the **RK** Series are designed to ensure that the motor operates at maximum accuracy.

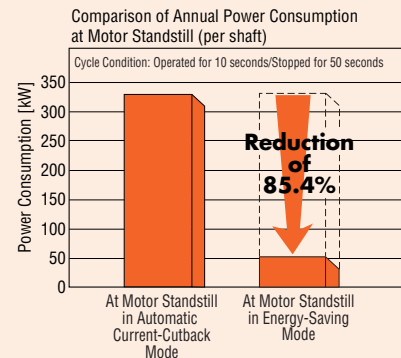


# Environmentally Friendly

## Energy-Saving Mode (available only with electromagnetic-brake type) **New Function**

In the energy-saving mode the supply of current to the motor is stopped and the load is held only with the electromagnetic brake while the motor remains at a standstill. Stopping the supply of current to the motor extends the motor life by limiting the temperature increase and consumption of energy. This function is useful in applications having longer motor-standstill times (i.e., low drive-duty operations).

Power consumption at motor standstill in automatic current-cutback mode **45W**  
 Power consumption at motor standstill in energy-saving mode **7W**



# Safe Operation in All over the World

## Compliance with Safety Standards

The **RK** Series complies with international safety standards.  
 The CE marking certifies compliance with the EMC Directive and Low-Voltage Directive.

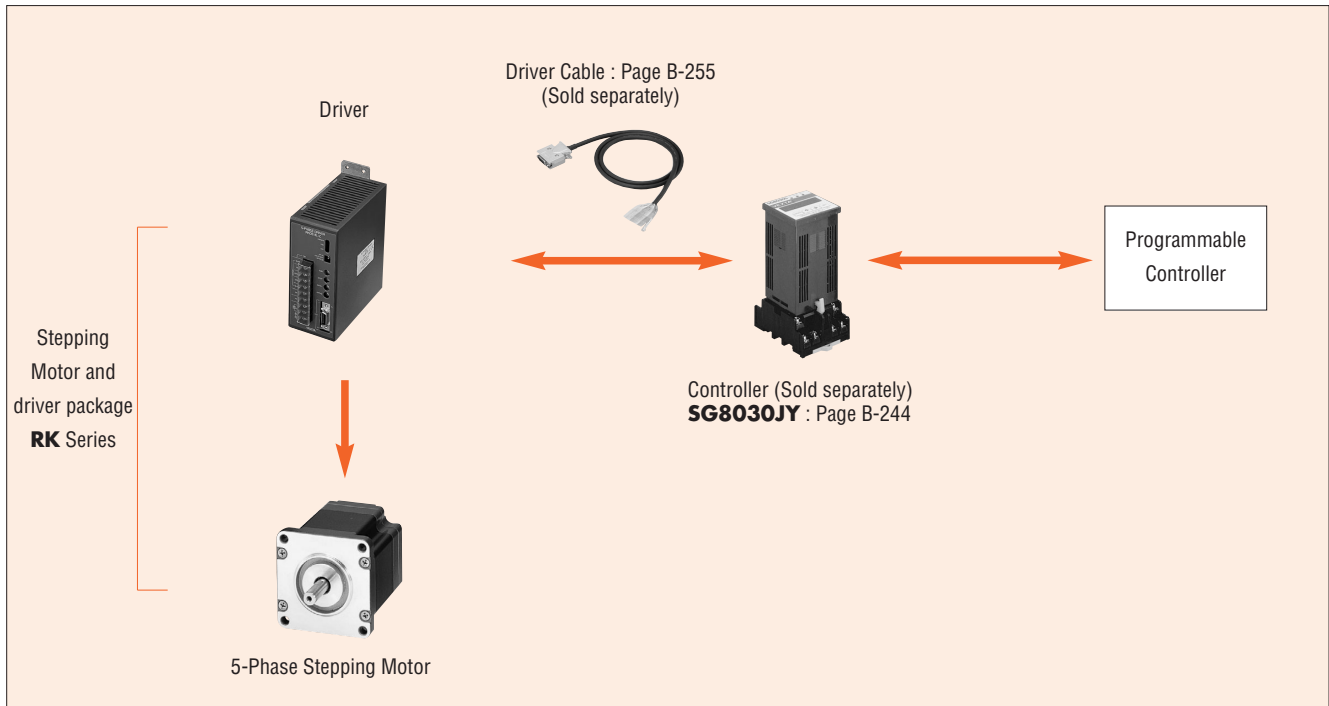
# Introducing Stepping Motors of the Future

## More User-Friendly and Affordable

The **RK** Series offers new functions that make them easier to use. These improved characteristics are made possible with a newly developed special IC and diligently designed parts. Combining Oriental Motor's superior technologies, the **RK** Series represents our commitment to developing an affordable, user-friendly stepping motor.  
 Their user-friendly functions, high performance and affordable prices make the **RK** Series stepping motors a perfect solution for your various applications.

## ■ RK Series System configuration

The **RK** series packages combine single-phase 200-230V input box-type drivers and motors.



## ■ Accessories (Sold separately)

This section displays four accessories available for purchase:

- Motor Mounting Brackets** (Page B-248): A black metal bracket used to secure the motor to a surface.
- Flexible Couplings** (Page B-252, Clamping Type): A black cylindrical component used to connect the motor shaft to another shaft.
- Extension Cables** (Page B-256): A coiled black cable used to extend the distance between the motor and driver.
- Driver Cables** (Page B-255): A black cable with a connector on one end and a multi-pin connector on the other.


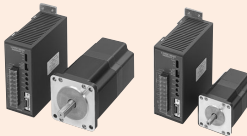


**Note:** Mounting Brackets are cannot be fitted to geared motor types.

**Note:** Flexible Couplings are cannot be fitted to geared motor types.

**Note:** Use an extension cable when placing the motor and driver at a distance of 0.6 m or more.

## Product Line of RK Series

TH: Holding Torque

| Type  | Motor Frame Size: 60mm sq.   |  | Motor Frame Size: 85mm (Geared : 90mm) sq.   |  |
|---|--|--|--|--|
|   | Single-Shaft   | Double-Shaft   | Single-Shaft   | Double-Shaft   |
| <p>Standard</p>                    | <p><b>RK564AC</b><br/>TH : 0.42N·m<br/><b>RK566AC</b><br/>TH : 0.83N·m<br/><b>RK569AC</b><br/>TH : 1.66N·m</p>   | <p><b>RK564BC</b><br/>TH : 0.42N·m<br/><b>RK566BC</b><br/>TH : 0.83N·m<br/><b>RK569BC</b><br/>TH : 1.66N·m</p> | <p><b>RK596AC</b><br/>TH : 2.1N·m<br/><b>RK599AC</b><br/>TH : 4.1N·m<br/><b>RK5913AC</b><br/>TH : 6.3N·m</p>   | <p><b>RK596BC</b><br/>TH : 2.1N·m<br/><b>RK599BC</b><br/>TH : 4.1N·m<br/><b>RK5913BC</b><br/>TH : 6.3N·m</p> |
| <p>Electromagnetic Brake Type</p>  | <p><b>RK564AMC</b><br/>TH : 0.42N·m<br/><b>RK566AMC</b><br/>TH : 0.83N·m<br/><b>RK569AMC</b><br/>TH : 1.66N·m</p>  |  | <p><b>RK596AMC</b><br/>TH : 2.1N·m<br/><b>RK599AMC</b><br/>TH : 4.1N·m<br/><b>RK5913AMC</b><br/>TH : 6.3N·m</p>  |  |
| <p>TH Geared Type</p>              | <p><b>RK564AC-T3.6</b><br/>TH : 1.25N·m<br/><b>RK564AC-T7.2</b><br/>TH : 2.5N·m<br/><b>RK564AC-T10</b><br/>TH : 3N·m<br/><b>RK564AC-T20</b><br/>TH : 3.5N·m<br/><b>RK564AC-T30</b><br/>TH : 4N·m</p>                               |  | <p><b>RK596AC-T3.6</b><br/>TH : 4.5N·m<br/><b>RK596AC-T7.2</b><br/>TH : 9N·m<br/><b>RK596AC-T10</b><br/>TH : 9N·m<br/><b>RK596AC-T20</b><br/>TH : 12N·m<br/><b>RK596AC-T30</b><br/>TH : 12N·m</p>                                      |  |
| <p>PN Geared Type</p>            | <p><b>RK566AC-N5</b><br/>TH : 3.5N·m<br/><b>RK566AC-N7.2</b><br/>TH : 4N·m<br/><b>RK566AC-N10</b><br/>TH : 5N·m<br/><b>RK564AC-N25</b><br/>TH : 8N·m<br/><b>RK564AC-N36</b><br/>TH : 8N·m<br/><b>RK564AC-N50</b><br/>TH : 8N·m</p> |  | <p><b>RK599AC-N5</b><br/>TH : 14N·m<br/><b>RK599AC-N7.2</b><br/>TH : 20N·m<br/><b>RK599AC-N10</b><br/>TH : 20N·m<br/><b>RK596AC-N25</b><br/>TH : 37N·m<br/><b>RK596AC-N36</b><br/>TH : 37N·m<br/><b>RK596AC-N50</b><br/>TH : 37N·m</p> |  |
| <p>Harmonic Geared Type</p>      | <p><b>RK564AC-H50</b><br/>TH : 5.5N·m<br/><b>RK564AC-H100</b><br/>TH : 8N·m</p>  |  | <p><b>RK596AC-H50</b><br/>TH : 25N·m<br/><b>RK596AC-H100</b><br/>TH : 37N·m</p>  |  |

## RK Series – A Complete Line

The RK Series offers extensive variations with 44 models to serve your wide-ranging need.

The motors come in two installation sizes of 60 mm and 85 mm (90 mm in geared types), and single-phase 200V-230V power supply input.

In addition to the standard type, we offer an electromagnetic-brake type that's ideal for vertical-drive applications where the load must be held upon power failure. Three geared types – **TH**, **PN** and Harmonic Geared – are also available. (Availability varies according to the type.)

### Standard Type

Available in two frame sizes of 60mm and 85mm. Combinations of high-torque motors and compact drivers meet all kinds of needs.



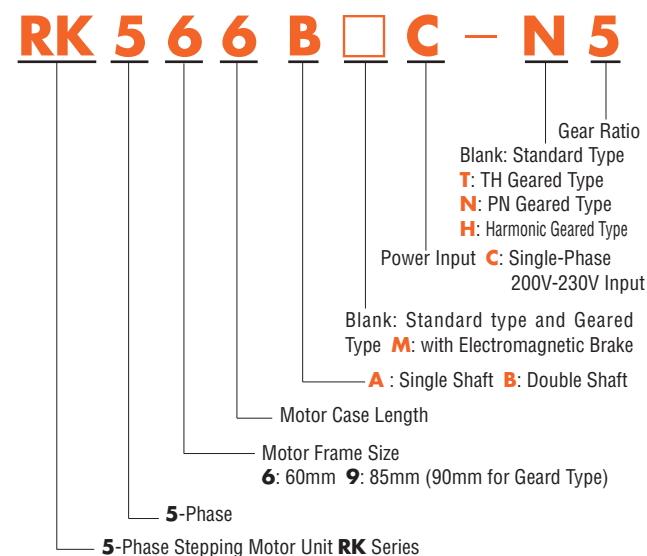
### Electromagnetic Brake Type

The high-torque electromagnetic brake provides optimum holding torque when used in combination with a high-torque stepping motor.

The high-torque, high-precision, power off activated electromagnetic brake is invaluable for maintaining position and preventing the works from falling during power failures, and for preventing the motor from overheating.



### Product Number Code



### TH Geared Type

#### 1. High-Precision Positioning (Low Backlash)

For the output stage and gear, we employ the cone-shaped gear (taper gear) to realize high accuracy with low backlash. The higher the gear ratio, the lower the impact of backlash. Motor frame size 60mm sq. type shows the range of backlash between 35 arc minutes (0.584°) and 10 arc minutes (0.167°), and motor frame size 90mm sq. type goes between 25 arc minutes (0.417°) and 10 arc minutes (0.167°).

#### 2. Five Gear Ratios

The **TH** geared type has five gear ratios, 1:3.6, 1:7.2, 1:10, 1:20, 1:30. The **TH** geared type generally carries low gear ratios. You can choose this type especially when gradual speed reduction is needed.

#### 3. Cutting Finish on the Installing Parts of the Motors and Flange Parts

The **TH** geared type employ a cutting finish on the installing parts of the motors and flange parts. This raises accuracy for mounting (h7).



### PN Geared Type

#### 1. High-Precision Positioning (Non Backlash)

A high-strength, high-rigidity planetary gear mechanism is combined with a backlash-eliminating mechanism to keep the backlash to 3 minutes (0.05°) or less.

#### 2. High Permissible Torque

The planetary gear mechanism carries several of the planet gears to transmit torque separately, thereby producing a higher torque, relative to the size of motors. **RK564AC-N25** with motor frame size 60mm sq. produces the permissible torque level up to 8N·m and **RK596AC-N25** with motor frame size 90mm sq. produces up to 37N·m.

#### 3. Six Reduction Gear Ratios

The **PN** geared type carries six different gear ratios. In addition to the lower gear ratios, including 1:5, 1:7.2, 1:10, 1:25, even higher gear ratios (as high as the harmonic geared type) are now available, 1:36 and 1:50. Also, when using 1:7.2, it realizes a step angle of 0.1° multiplied by any integer numbers, in full step operation.

#### 4. Centered Output Shaft

The output shaft of the gear is centered to the output shaft of the motor in one line. This structure allows more flexibility for mounting direction, and makes it easier for alignment.



## Harmonic Geared Type

### 1. High-Precision Positioning (Non Backlash)

The harmonic geared type is constructed with only three fundamental parts, wave generator, flexspline, and circular spline. By using the elastic characteristics of metals for speed reduction, the impact of pitch errors on the rotation accuracy are well-balanced and equalized. The mechanism is quite different from the one of the ordinary spur gears, thereby creating non backlash. This type is best suited to the production machinery for semi-conductors, and to the movement lines and the positioning systems for both optical instruments and precision machines.

### 2. High Permissible Torque

As harmonic geared type has more teeth in contact at any one moment and on a larger surface area, they generate high permissible torque. **RK564AC-H100** with motor frame size 60mm sq. type generates 8N·m of the permissible torque, and **RK596AC-H100** with motor frame size 90mm sq. type generates 37N·m.

### 3. High Resolution

1:50 and 1:100 are the gear ratios available. Due to their size, it makes it possible to control the motor with a high resolution of 1/100,000 division per rotation when operated at half step, that is 0.0036° per step.

### 4. Centered Output Shaft

The output shaft of the gear is centered to the output shaft of the motor in one line. This structure allows more flexibility for mounting direction, and makes it easier for alignment.



### Standards/CE Marking

| Products        | Applicable Standards | Authorizing | File No.        | CE Marking                             |
|-----------------|----------------------|-------------|-----------------|--|
| Stepping Motor  | UL1004, UL519        | UL          | E64199          | Low Voltage Directive<br>EMC Directive |
|                 | CSA C22.2 No.100     |             |                 |  |
|                 | CSA C22.2 No.77      |             |                 |  |
| Driver          | EN60950              | VDE         | 114293ÜG        |  |
|                 | EN60034-1            |             |                 |  |
|                 | EN60034-5            |             |                 |  |
|                 | UL508C               | UL          | File No.E171462 |  |
| CSA C22.2 No.14 |                      |             |                 |  |
| EN50178         | —                    | —           |                 |  |

#### Use Conditions

##### EN Standards

- Protective Earth: The motor and driver have been designed and evaluated as Class- I equipment. Therefore, measures are needed to protect against electric shock, such as providing a protective grounding or incorporating the motor/driver in the equipment to prevent contact with the bare hands.
- Power Supply: The motor and driver have been designed and evaluated under Overvoltage Category II. When connecting to a power supply of Overvoltage Category III, power must be supplied through an isolation transformer.
- Surroundings: The motor and driver have been designed and evaluated in an environment with a pollution degree of Class 2. When used in an environment having a pollution degree of Class 3, the motor/driver must be protected within an IP54 enclosure.
- EMC: The EMC value changes according to the wiring and layout. Therefore, the final EMC level must be checked with the motor/driver incorporated in the user's equipment.

#### Compliance Conditions under EN Standards

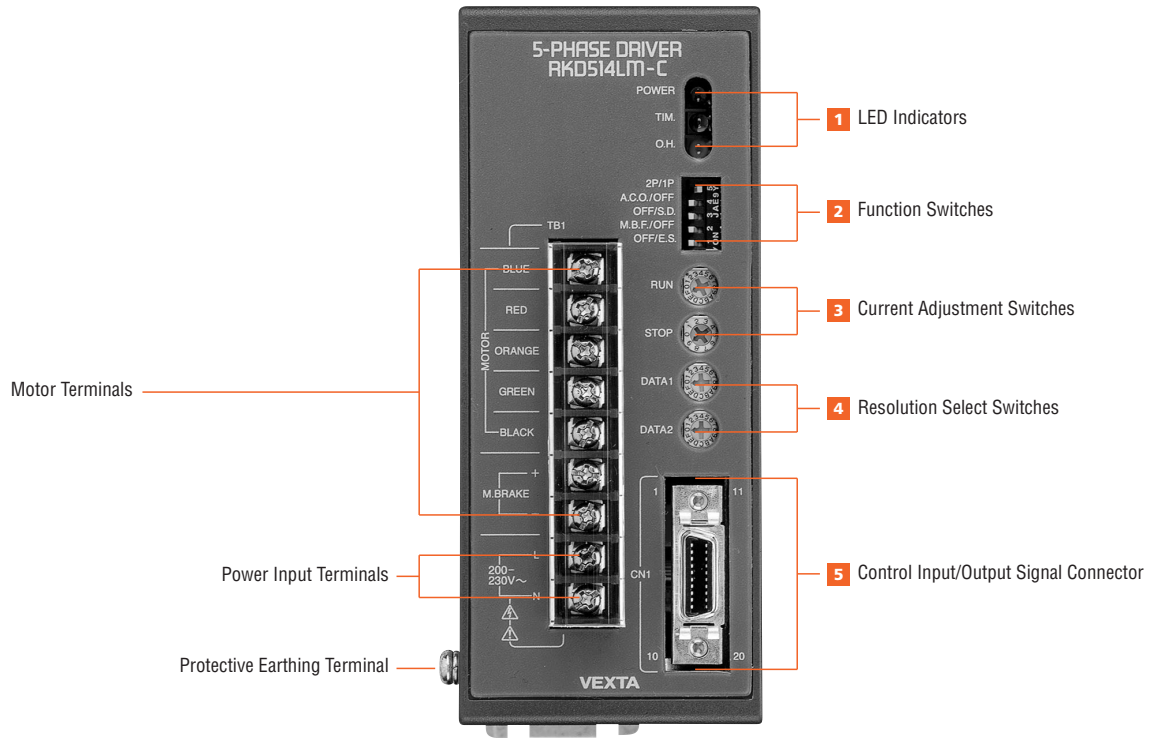
##### Single-phase 200V-230V

- Incorporation in equipment
- Overvoltage category: II
- Pollution degree: Class 2
- Class I

#### Applicable Standards

|      |  |               |
|------|--|---------------|
| ●EMI | Emission Tests:                        | EN50081-2     |
|      | Radiated Emission Test:                | EN55011       |
|      | Conducted Emission Test:               | EN55011       |
| ●EMS | Immunity Tests:                        | EN61000-6-2   |
|      | Radiation Field Immunity Test:         | IEC61000-4-3  |
|      | Electrostatic Discharge Immunity Test: | IEC61000-4-2  |
|      | Fast Transient /Burst Immunity Test:   | IEC61000-4-4  |
|      | Conductive Noise Immunity Test:        | IEC61000-4-6  |
|      | Surge Immunity Test:                   | IEC61000-4-5  |
|      | Voltage Dip Immunity Test:             | IEC61000-4-11 |
|      | Voltage Interruption Immunity Test:    | IEC61000-4-11 |

# Name and Functions of Components



### 1 LED Indicators

| Indications | Colour | Functions                                  |
|-------------|--------|--|
| POWER       | Green  | Power Supply Indication                    |
| TIM.        | Green  | Excitation Timing Signal Output Indication |
| O.H.        | Red    | Overheat Signal Output Indication          |

### 4 Resolution Select Switches

| Indications | Switch Name              | Functions   |
|-------------|--------------------------|---|
| DATA1       | Resolution Select Switch | Each switch can be set the desired resolution from the 16resolution levels. |
| DATA2       |                          |   |

\*Please refer to page B-112 for setting the resolution.

### 2 Function Switches

| Indications | Switch Name   | Functions  |
|-------------|---|--|
| 2P/1P       | Pulse Input Mode Switch   | Switches between 1-pulse input and 2-pulse input.  |
| A.C.O./OFF  | Automatic Current OFF Function Switch                                       | When the temperature inside the driver reaches 80°C or more, this function automatically switches the motor current off. The function can be set and released with this switch.        |
| OFF/S.D.    | Smooth Drive Function Switch  | Low vibration and low noise operation can be available even in the low speed range without changing the step angle setting. The function can be set and released with this switch.     |
| M.B.F./OFF  | Electromagnetic Brake Function Switch (Only for electromagnetic brake type) | Switches the method of electromagnetic brake operation. MBF: Normally released, engaged during power off. OFF: Normally engaged, released when M.B. FREE signal is input               |
| OFF/E.S.    | Energy-Saving Mode Switch (Only for electromagnetic brake type)             | Current to the motor is cut off and electromagnetic brake holds the load during motor stops. If motor current is not needed to cut off during the motor stops, set this switch to OFF. |

### 5 Control Input/Output Signal Connector

| Indications | Input/Output | Terminal No. | Terminal Name                                |
|-------------|--------------|--------------|--|
| CN1         | Input        | 1            | Pulse Signal (CW Pulse Signal)               |
|             |              | 2            |  |
|             |              | 3            | Rotation Direction Signal (CCW Pulse Signal) |
|             |              | 4            |  |
|             |              | 5            | All Windings OFF Signal                      |
|             |              | 6            |  |
|             |              | 7            |  |
|             |              | 8            | Resolution Select Signal                     |
|             |              | 9            | Electromagnetic Brake Release Signal         |
|             |              | 10           |  |
| Output      | Output       | 17           | Excitation Timing Signal                     |
|             |              | 18           | Overheat Signal                              |
|             |              | 19           |  |
|             |              | 20           |  |

\*Please refer to pages B-113-116 for description of the input/output signals.

### 3 Current Adjustment Switches

| Indications | Switch Name                               | Functions                                   |
|-------------|---|---|
| RUN         | Motor Operating Current Adjustment Switch | Motor's running current can be adjusted.    |
| STOP        | Motor Stop Current Adjustment Switch      | Motor's standstill current can be adjusted. |

## List of Motor/Driver Combinations

Model numbers for motor driver combinations are shown below.

| Type   | Unit Model   | Motor Model  | Driver Model |
|--|--|--|--------------|
| Standard Type                                  | <b>RK564□C</b><br><b>RK566□C</b><br><b>RK569□C</b>   | PK564□W<br>PK566□W<br>PK569□W  | RKD514L-C    |
|  | <b>RK596□C</b><br><b>RK599□C</b><br><b>RK5913□C</b>  | PK596□W<br>PK599□W<br>PK5913□W   | RKD514H-C    |
| Standard Type with<br>Electromagnetic<br>Brake | <b>RK564AMC</b><br><b>RK566AMC</b><br><b>RK569AMC</b>  | PK564AWM<br>PK566AWM<br>PK569AWM   | RKD514LM-C   |
|  | <b>RK596AMC</b><br><b>RK599AMC</b><br><b>RK5913AMC</b>   | PK596AWM<br>PK599AWM<br>PK5913AWM  | RKD514HM-C   |
| TH Geared Type                                 | <b>RK564AC-T3.6</b><br><b>RK564AC-T7.2</b><br><b>RK564AC-T10</b><br><b>RK564AC-T20</b><br><b>RK564AC-T30</b>                     | PK564AW-T3.6<br>PK564AW-T7.2<br>PK564AW-T10<br>PK564AW-T20<br>PK564AW-T30              | RKD514L-C    |
|  | <b>RK596AC-T3.6</b><br><b>RK596AC-T7.2</b><br><b>RK596AC-T10</b><br><b>RK596AC-T20</b><br><b>RK596AC-T30</b>                     | PK596AW-T3.6<br>PK596AW-T7.2<br>PK596AW1-T10<br>PK596AW1-T20<br>PK596AW1-T30           | RKD514H-C    |
| PN Geared Type                                 | <b>RK566AC-N5</b><br><b>RK566AC-N7.2</b><br><b>RK566AC-N10</b><br><b>RK564AC-N25</b><br><b>RK564AC-N36</b><br><b>RK564AC-N50</b> | PK566AW-N5<br>PK566AW-N7.2<br>PK566AW-N10<br>PK564AW-N25<br>PK564AW-N36<br>PK564AW-N50 | RKD514L-C    |
|  | <b>RK599AC-N5</b><br><b>RK599AC-N7.2</b><br><b>RK599AC-N10</b><br><b>RK596AC-N25</b><br><b>RK596AC-N36</b><br><b>RK596AC-N50</b> | PK599AW-N5<br>PK599AW-N7.2<br>PK599AW-N10<br>PK596AW-N25<br>PK596AW-N36<br>PK596AW-N50 | RKD514H-C    |
| Harmonic<br>Geared Type                        | <b>RK564AC-H50</b><br><b>RK564AC-H100</b>  | PK564AW-H50S<br>PK564AW-H100S  | RKD514L-C    |
|  | <b>RK596AC-H50</b><br><b>RK596AC-H100</b>  | PK596AW1-H50<br>PK596AW1-H100  | RKD514H-C    |

\*Enter **A** (single shaft) or **B** (double shaft) in the □ within the model numbers.

# Specifications and Speed-Torque Characteristics

## Specifications: Standard Type



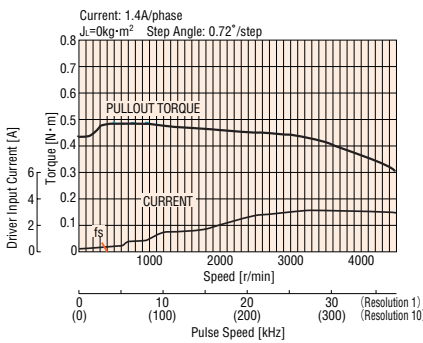
Please refer to pages B-103 and 104 for common specifications and general specifications.

| Motor Frame Size         | mm                  | 60  |                      |                      | 85                    |                       |                       |
|--------------------------|---------------------|---|----------------------|----------------------|-----------------------|-----------------------|-----------------------|
| Unit Model               | Single Shaft        | <b>RK564AC</b>  | <b>RK566AC</b>       | <b>RK569AC</b>       | <b>RK596AC</b>        | <b>RK599AC</b>        | <b>RK5913AC</b>       |
|                          | Double Shaft        | <b>RK564BC</b>  | <b>RK566BC</b>       | <b>RK569BC</b>       | <b>RK596BC</b>        | <b>RK599BC</b>        | <b>RK5913BC</b>       |
| Maximum Holding Torque*1 | N·m                 | 0.42  | 0.83                 | 1.66                 | 2.1                   | 4.1                   | 6.3                   |
| Rotor Inertia            | J kg·m <sup>2</sup> | 175×10 <sup>-7</sup>  | 280×10 <sup>-7</sup> | 560×10 <sup>-7</sup> | 1400×10 <sup>-7</sup> | 2700×10 <sup>-7</sup> | 4000×10 <sup>-7</sup> |
| Rated Current            | A/Phase             | 1.4   |                      |                      |                       |                       |                       |
| Basic Step Angle         |                     | 0.72°   |                      |                      |                       |                       |                       |
| Power Source Input       |                     | Single-Phase 200V-230V <sup>+10%</sup> / <sub>-15%</sub> 50/60Hz 3.5A |                      |                      |                       |                       |                       |
| Excitation Mode          |                     | Microstep   |                      |                      |                       |                       |                       |
| Dimensions No.           | Motor (Page B-105)  | 1   | 2                    | 3                    | 4                     | 5                     | 6                     |
|                          | Driver (Page B-110) | 21  |                      |                      |                       |                       |                       |

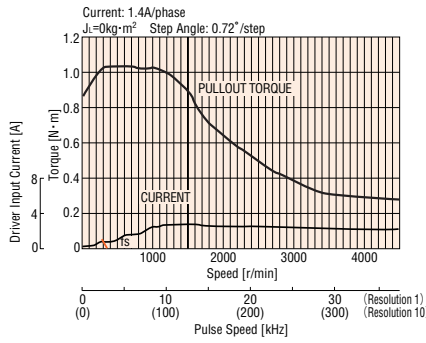
\*1 Please refer below regarding maximum holding torque. Please refer to page B-104 for Permissible overhung load.

## Speed-Torque Characteristics fs: Maximum Starting Frequency

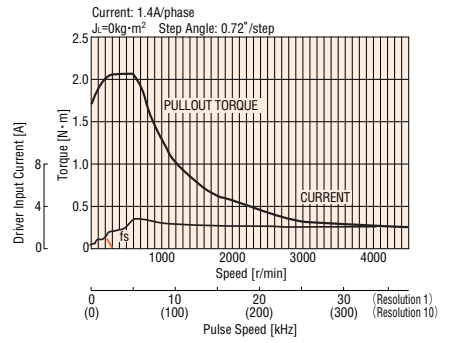
**RK564□C**



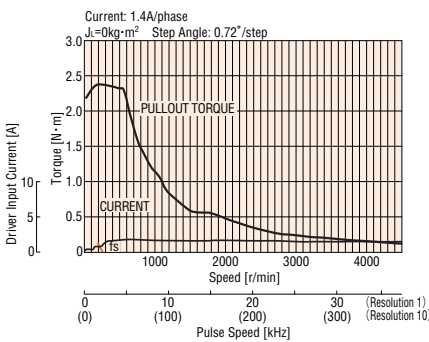
**RK566□C**



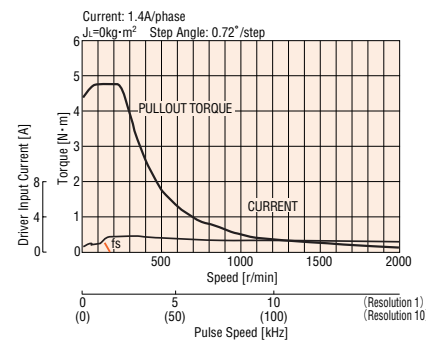
**RK569□C**



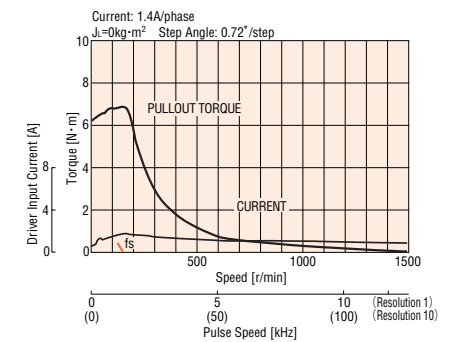
**RK596□C**



**RK599□C**



**RK5913□C**



**Notes:**

- Pay attention to heat dissipation from motor and driver. In particular, remember that the motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C.
- When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%.

**How to Read the Specifications Table** Please read these instructions before reading the specifications on pages B-96~102.

|                           |                                      |   |
|---------------------------|--------------------------------------|---|
| *1 Maximum Holding Torque | Standard Type:                       | This refers to the holding torque at motor standstill when the rated current is supplied to the motor. Use this value to compare motor torque performance. When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%.   |
|                           | Gear Type:                           | This refers to the holding torque at motor standstill when the rated current is supplied to the motor, with consideration given to the permissible strength of the gear. Use this value to compare motor torque performance. When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%. |
| *2 Permissible Torque     | <b>TH</b> and <b>PN</b> Geared Type: | This is the maximum value of the mechanical strength of the gear unit. Use the product with a total torque (load and acceleration) less than the permissible torque.  |

● Specifications: Standard Type with Electromagnetic Brake



Please refer to pages B-103 and 104 for common specifications and general specifications.

| Motor Frame Size         | mm                  | 60  |                      |                      | 85                    |                       |                       |
|--------------------------|---------------------|---|----------------------|----------------------|-----------------------|-----------------------|-----------------------|
| Unit Model               | Single Shaft        | <b>RK564AMC</b>   | <b>RK566AMC</b>      | <b>RK569AMC</b>      | <b>RK596AMC</b>       | <b>RK599AMC</b>       | <b>RK5913AMC</b>      |
| Maximum Holding Torque*1 | N·m                 | 0.42  | 0.83                 | 1.66                 | 2.1                   | 4.1                   | 6.3                   |
| Rotor Inertia            | J kg·m <sup>2</sup> | 335×10 <sup>-7</sup>  | 440×10 <sup>-7</sup> | 720×10 <sup>-7</sup> | 2470×10 <sup>-7</sup> | 3770×10 <sup>-7</sup> | 5070×10 <sup>-7</sup> |
| Rated Current            | A/Phase             | 1.4   |                      |                      |                       |                       |                       |
| Basic Step Angle         |                     | 0.72°   |                      |                      |                       |                       |                       |
| Power Source Input       |                     | Single-Phase 200V-230V <sup>+10%</sup> / <sub>-15%</sub> 50/60Hz 3.5A |                      |                      |                       |                       |                       |
| Excitation Mode          |                     | Microstep   |                      |                      |                       |                       |                       |
| Dimensions No.           | Motor (Page B-106)  | 7   | 8                    | 9                    | 10                    | 11                    | 12                    |
|                          | Driver (Page B-110) | 21  |                      |                      |                       |                       |                       |

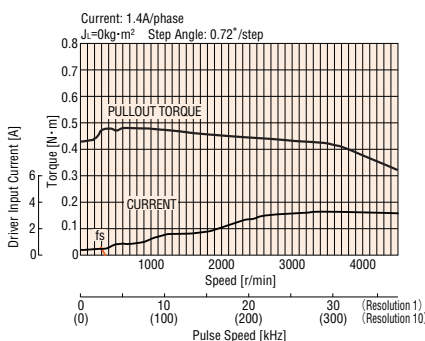
\*1 Please refer to page B-96 regarding maximum holding torque.  
 \*2 The electromagnetic brakes are for holding the position when the power is off. They cannot be used for frequent braking.  
 Please refer to page B-104 for permissible overhung load.

● Electromagnetic Brake Specifications\*2

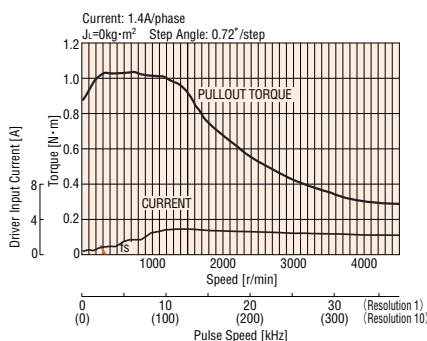
| Applicable Model       | <b>RK56□AM□</b>          | <b>RK59□AM□</b> |
|------------------------|--------------------------|-----------------|
| Brake Type             | Power off activated type |                 |
| Rated Voltage          | DC 24V                   |                 |
| Rated Current          | 0.25A                    | 0.42A           |
| Static Friction Torque | 0.8N·m                   | 4.0N·m          |
| Brake Time             | 20ms                     |                 |
| Brake Release Time     | 30ms                     | 50ms            |
| Time Rating            | Continuous               |                 |

● Speed-Torque Characteristics fs: Maximum Starting Frequency

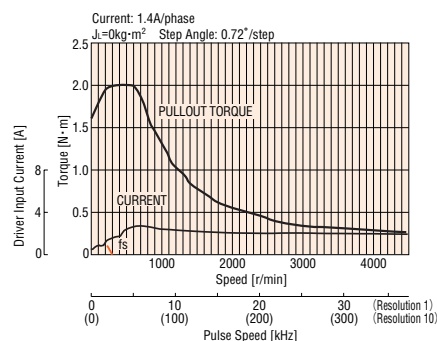
**RK564AMC**



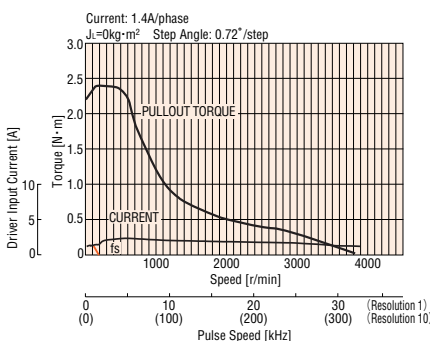
**RK566AMC**



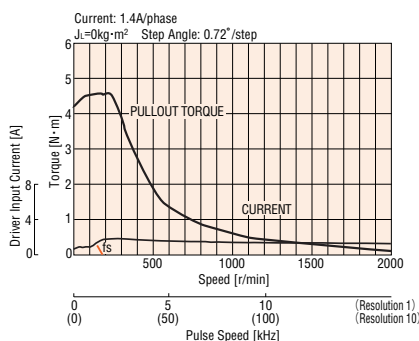
**RK569AMC**



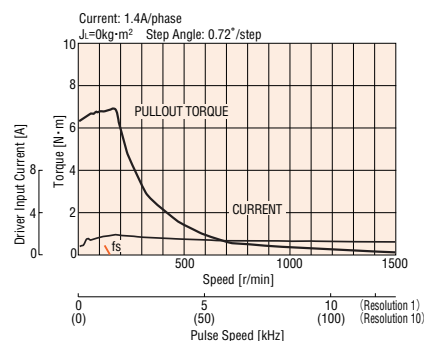
**RK596AMC**



**RK599AMC**



**RK5913AMC**



Notes:

- Pay attention to heat dissipation from motor and driver. In particular, remember that the motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C.
- When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%.

● Specifications: TH Geared Type Motor Frame Size 60mm sq.



Please refer to pages B-103 and 104 for common specifications and general specifications.

●Please ask us for the double shaft models.

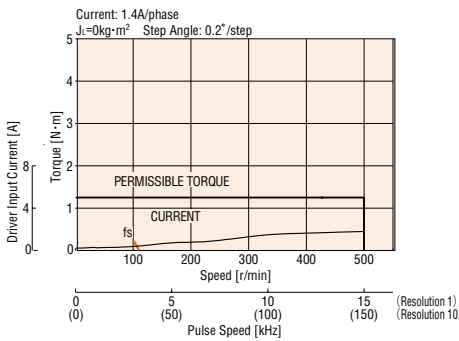
| Unit Model               | Single Shaft        | RK564AC-T3.6  | RK564AC-T7.2 | RK564AC-T10 | RK564AC-T20 | RK564AC-T30 |
|--------------------------|---------------------|---|--------------|-------------|-------------|-------------|
| Maximum Holding Torque*1 | N·m                 | 1.25  | 2.5          | 3           | 3.5         | 4           |
| Rotor Inertia            | J kg·m <sup>2</sup> | 175×10 <sup>-7</sup>  |              |             |             |             |
| Rated Current            | A/Phase             | 1.4   |              |             |             |             |
| Basic Step Angle         |                     | 0.2°  | 0.1°         | 0.072°      | 0.036°      | 0.024°      |
| Gear Ratio               |                     | 1:3.6   | 1:7.2        | 1:10        | 1:20        | 1:30        |
| Permissible Torque*2     | N·m                 | 1.25  | 2.5          | 3           | 3.5         | 4           |
| Backlash                 | min                 | 35 (0.584°)   | 15 (0.25°)   |             | 10 (0.167°) |             |
| Permissible Speed Range  | r/min               | 0~500   | 0~250        | 0~180       | 0~90        | 0~60        |
| Power Source Input       |                     | Single-Phase 200V-230V <sup>+10%</sup> / <sub>-15%</sub> 50/60Hz 3.5A |              |             |             |             |
| Excitation Mode          |                     | Microstep   |              |             |             |             |
| Dimensions No.           | Motor (Page B-107)  | 13  |              |             |             |             |
|                          | Driver (Page B-110) |   |              |             |             |             |

Please refer to page B-96 regarding \*1 Maximum holding torque, \*2 Permissible torque. Please refer to page B-104 for permissible overhung load.

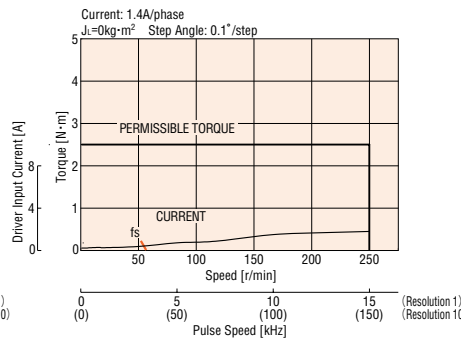
Note: Direction of rotation of the motor and that of the gear output shaft are the same for unit type with reduction ratio 1:3.6, 1:7.2 and 1:10. It is opposite for 1:20 and 1:30 ratio type.

● Speed-Torque Characteristics fs: Maximum Starting Frequency

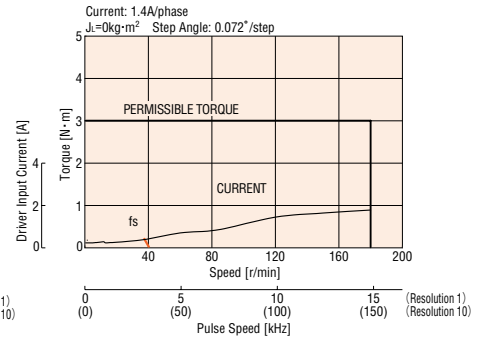
RK564AC-T3.6



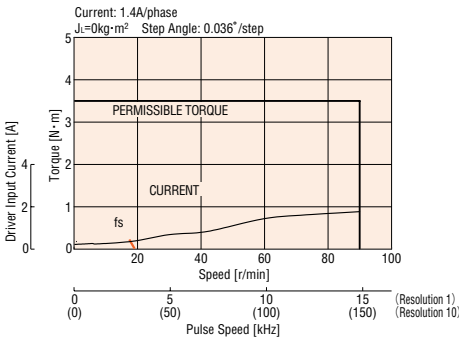
RK564AC-T7.2



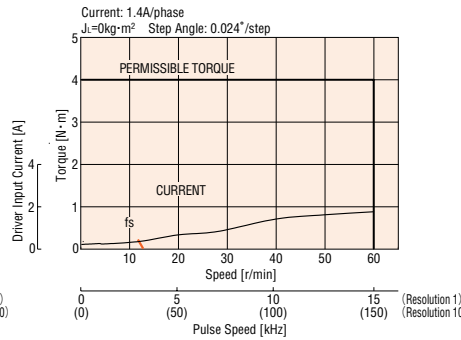
RK564AC-T10



RK564AC-T20



RK564AC-T30



Notes:

- Pay attention to heat dissipation from motor and driver. In particular, remember that the motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C.
- When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%.

● Specifications: TH Geared Type Motor Frame Size 90mm sq.



Please refer to pages B-103 and 104 for common specifications and general specifications.

●Please ask us for the double shaft models.

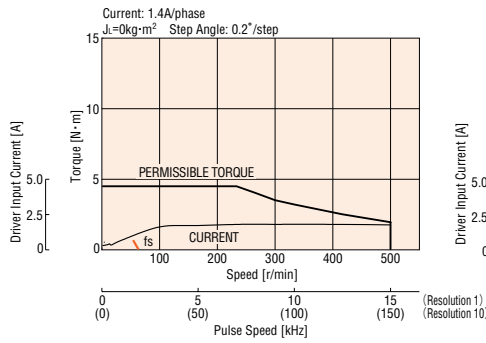
| Unit Model               | Single Shaft        | RK596AC-T3.6  | RK596AC-T7.2 | RK596AC-T10 | RK596AC-T20 | RK596AC-T30 |
|--------------------------|---------------------|---|--------------|-------------|-------------|-------------|
| Maximum Holding Torque*1 | N·m                 | 4.5   | 9            |             |             | 12          |
| Rotor Inertia            | J kg·m <sup>2</sup> | 1400×10 <sup>-7</sup>   |              |             |             |             |
| Rated Current            | A/Phase             | 1.4   |              |             |             |             |
| Basic Step Angle         |                     | 0.2°  | 0.1°         | 0.072°      | 0.036°      | 0.024°      |
| Gear Ratio               |                     | 1:3.6   | 1:7.2        | 1:10        | 1:20        | 1:30        |
| Permissible Torque*2     | N·m                 | 4.5   | 9            |             |             | 12          |
| Backlash                 | min                 | 25 (0.417°)   | 15 (0.25°)   |             |             | 10 (0.167°) |
| Permissible Speed Range  | r/min               | 0~500   | 0~250        | 0~180       | 0~90        | 0~60        |
| Power Source Input       |                     | Single-Phase 200V-230V <sup>+10%</sup> / <sub>-15%</sub> 50/60Hz 3.5A |              |             |             |             |
| Excitation Mode          |                     | Microstep   |              |             |             |             |
| Dimensions No.           | Motor (Page B-107)  | 14  |              |             |             |             |
|                          | Driver (Page B-110) | 21  |              |             |             |             |

Please refer to page B-96 regarding \*1 Maximum holding torque, \*2 Permissible torque. Please refer to page B-104 for permissible overhung load.

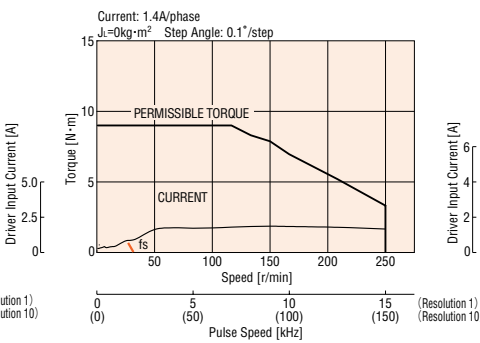
Note: Direction of rotation of the motor and that of the gear output shaft are the same for unit type with reduction ratio 1:3.6, 1:7.2 and 1:10. It is opposite for 1:20 and 1:30 ratio type.

● Speed-Torque Characteristics fs: Maximum Starting Frequency

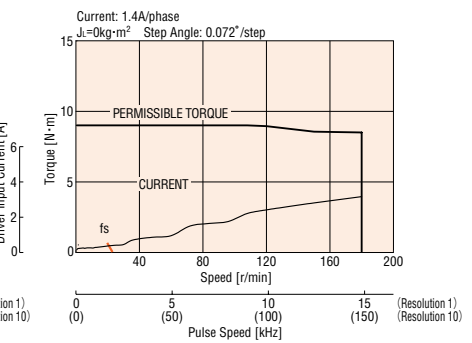
RK596AC-T3.6



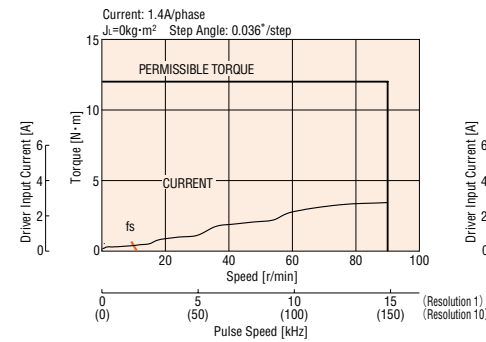
RK596AC-T7.2



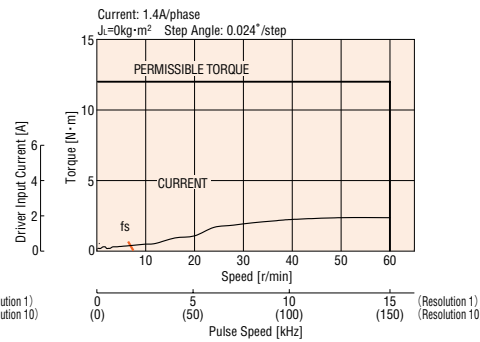
RK596AC-T10



RK596AC-T20



RK596AC-T30



Notes:

- Pay attention to heat dissipation from motor and driver. In particular, remember that the motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C.
- When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%.

● Specifications: PN Gearing Type Motor Frame Size 60mm sq.



Please refer to pages B-103 and 104 for common specifications and general specifications.

●Please ask us for the double shaft models.

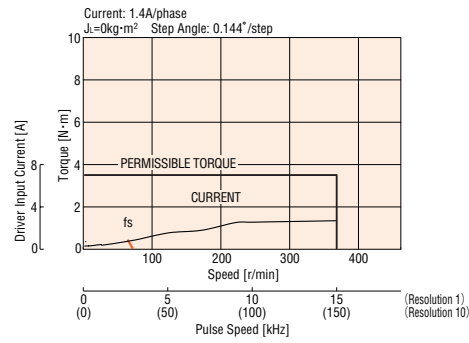
| Unit Model               | Single Shaft                              | RK566AC-N5  | RK566AC-N7.2 | RK566AC-N10 | RK564AC-N25          | RK564AC-N36 | RK564AC-N50 |  |
|--------------------------|---|---|--------------|-------------|----------------------|-------------|-------------|--|
| Maximum Holding Torque*1 | N·m                                       | 3.5   | 4            | 5           | 8                    |             |             |  |
| Rotor Inertia            | J kg·m <sup>2</sup>                       | 280×10 <sup>-7</sup>  |              |             | 175×10 <sup>-7</sup> |             |             |  |
| Rated Current            | A/Phase                                   | 1.4   |              |             |                      |             |             |  |
| Basic Step Angle         |   | 0.144°  | 0.1°         | 0.072°      | 0.0288°              | 0.02°       | 0.0144°     |  |
| Gear Ratio               |   | 1:5   | 1:7.2        | 1:10        | 1:25                 | 1:36        | 1:50        |  |
| Permissible Torque*2     | N·m                                       | 3.5   | 4            | 5           | 8                    |             |             |  |
| Backlash                 | min                                       | 3 (0.05°)   |              |             |                      |             |             |  |
| Angle Error              | min                                       | 6 (0.1°)  |              |             |                      |             |             |  |
| Permissible Speed Range  | r/min                                     | 0~360   | 0~250        | 0~180       | 0~72                 | 0~50        | 0~36        |  |
| Power Source Input       |   | Single-Phase 200V-230V <sup>+10%</sup> / <sub>-15%</sub> 50/60Hz 3.5A |              |             |                      |             |             |  |
| Excitation Mode          |   | Microstep   |              |             |                      |             |             |  |
| Dimensions No.           | Motor (Page B-108)<br>Driver (Page B-110) | 15  |              |             | 21                   |             |             |  |

Please refer to page B-96 regarding \*1 Maximum holding torque, \*2 Permissible torque. Please refer to page B-104 for permissible overhung load.

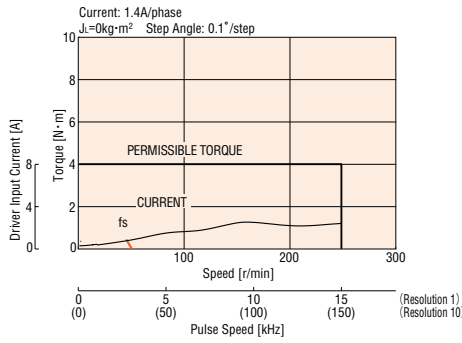
Note: Direction of rotation of the motor and that of the gear output shaft are the same.

● Speed-Torque Characteristics fs: Maximum Starting Frequency

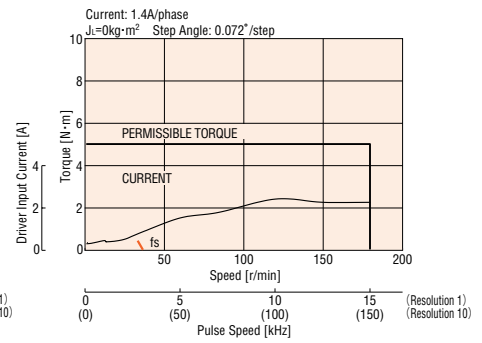
RK566AC-N5



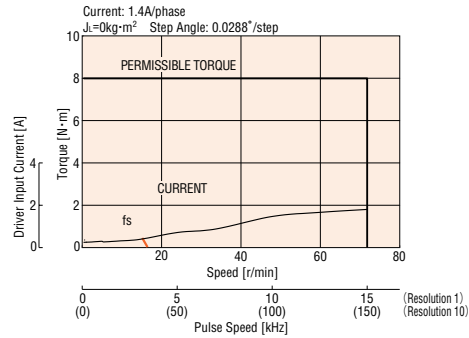
RK566AC-N7.2



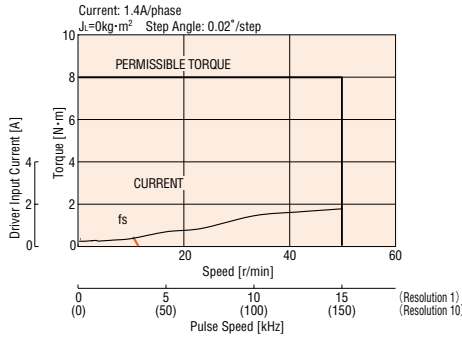
RK566AC-N10



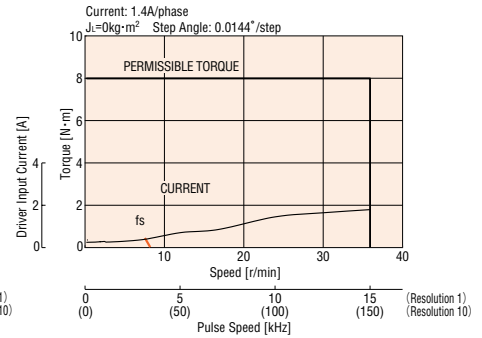
RK564AC-N25



RK564AC-N36



RK564AC-N50



Notes:

- Pay attention to heat dissipation from motor and driver. In particular, remember that the motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C.
- When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%.

● Specifications: PN Geared Type Motor Frame Size 90mm sq.



Please refer to pages B-103 and 104 for common specifications and general specifications.

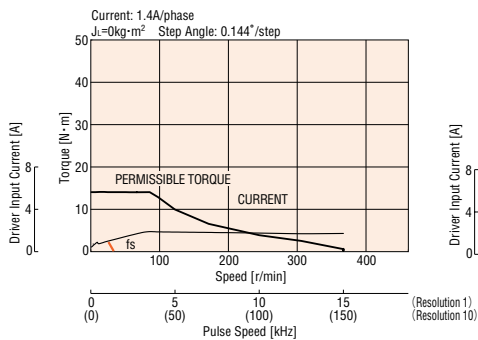
●Please ask us for the double shaft models.

| Unit Model               | Single Shaft                                       | RK599AC-N5  | RK599AC-N7.2 | RK599AC-N10 | RK596AC-N25           | RK596AC-N36 | RK596AC-N50 |  |
|--------------------------|--|---|--------------|-------------|-----------------------|-------------|-------------|--|
| Maximum Holding Torque*1 | N·m  | 14  | 20           |             | 37                    |             |             |  |
| Rotor Inertia            | J kg·m <sup>2</sup>                                | 2700×10 <sup>-7</sup>   |              |             | 1400×10 <sup>-7</sup> |             |             |  |
| Rated Current            | A/Phase  | 1.4   |              |             |                       |             |             |  |
| Basic Step Angle         |  | 0.144°  | 0.1°         | 0.072°      | 0.0288°               | 0.02°       | 0.0144°     |  |
| Gear Ratio               |  | 1:5   | 1:7.2        | 1:10        | 1:25                  | 1:36        | 1:50        |  |
| Permissible Torque*2     | N·m  | 14  | 20           |             | 37                    |             |             |  |
| Backlash                 | min  | 3 (0.05°)   |              |             |                       |             |             |  |
| Angle Error              | min  | 6 (0.1°)  |              |             |                       |             |             |  |
| Permissible Speed Range  | r/min  | 0~360   | 0~250        | 0~180       | 0~72                  | 0~50        | 0~36        |  |
| Power Source Input       |  | Single-Phase 200V-230V <sup>+10%</sup> / <sub>-15%</sub> 50/60Hz 3.5A |              |             |                       |             |             |  |
| Excitation Mode          |  | Microstep   |              |             |                       |             |             |  |
| Dimensions No.           | Motor (Pages B-108 and 109)<br>Driver (Page B-110) | 17  |              |             | 18                    |             |             |  |
|                          |  |   |              |             |                       | 21          |             |  |

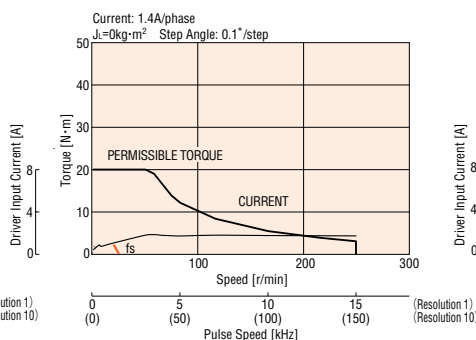
Please refer to page B-96 regarding \*1 Maximum holding torque, \*2 Permissible torque. Please refer to page B-104 for permissible overhung load.  
**Note:** Direction of rotation of the motor and that of the gear output shaft are the same.

● Speed-Torque Characteristics fs: Maximum Starting Frequency

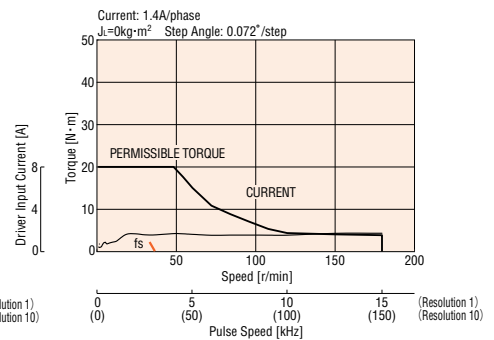
**RK599AC-N5**



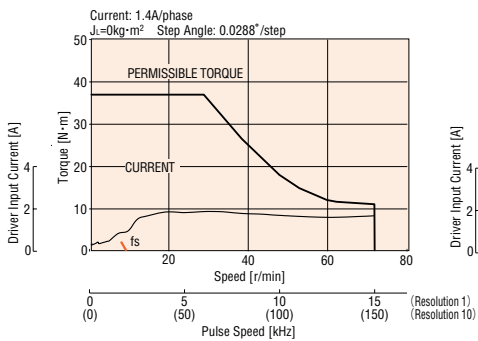
**RK599AC-N7.2**



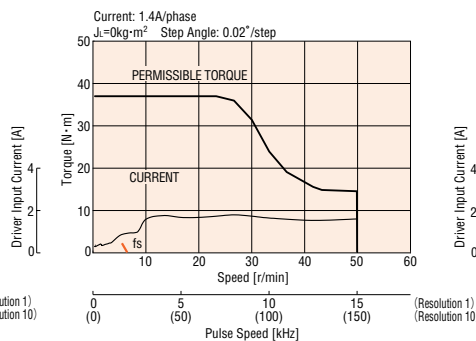
**RK599AC-N10**



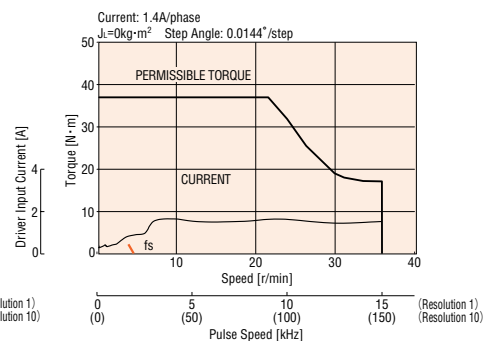
**RK596AC-N25**



**RK596AC-N36**



**RK596AC-N50**



**Notes:**

- Pay attention to heat dissipation from motor and driver. In particular, remember that the motor will produce a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C.
- When using the motor with the dedicated driver, the driver's automatic current cutback at motor standstill function reduces maximum holding torque by approximately 50%.

● Specifications : Harmonic Geared Type Motor Frame Size 60mm sq., 90mm sq.



Please refer to pages B-103 and 104 for common specifications and general specifications.

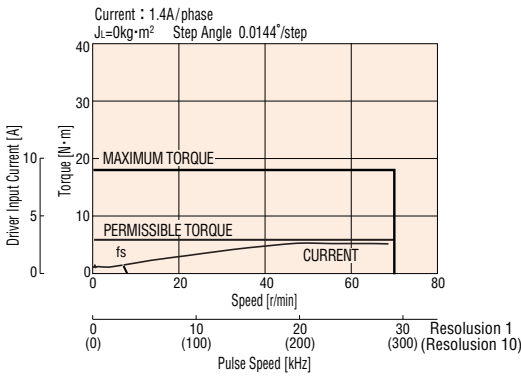
●Please ask us for the double shaft models.

| Package Model             | Single Shaft                                  | RK564AC-H50   | RK564AC-H100      | RK596AC-H50             | RK596AC-H100     |
|---------------------------|---|---|-------------------|-------------------------|------------------|
| Maximum Holding Torque *1 | N·m   | 5.5   | 8                 | 25                      | 37               |
| Rotor Inertia             | J kg·m <sup>2</sup>                           | 210 × 10 <sup>-7</sup>  |                   | 1600 × 10 <sup>-7</sup> |                  |
| Rated Current             | A/phase                                       | 1.4   |                   |                         |                  |
| Basic Step Angle          |   | 0.0144°   | 0.0072°           | 0.0144°                 | 0.0072°          |
| Gear Ratio                |   | 1:50  | 1:100             | 1:50                    | 1:100            |
| Permissible Torque *2     | N·m   | 5.5   | 8                 | 25                      | 37               |
| Maximum Torque            | N·m   | 18  | 28                | 35                      | 55               |
| Lost Motion (Load Torque) | Minutes                                       | 0.7max (±0.28N·m)   | 0.7max (±0.39N·m) | 1.5max (±1.2N·m)        | 1.5max (±1.2N·m) |
| Permissible Speed Range   |   | 0 ~ 70r/min   | 0 ~ 35r/min       | 0 ~ 70r/min             | 0 ~ 35r/min      |
| Power Source Input        |   | Single-Phase 200V-230V <sup>+10%</sup> / <sub>-15%</sub> 50/60Hz 3.5A |                   |                         |                  |
| Excitation Mode           |   | Microstep   |                   |                         |                  |
| Dimensions No.            | Motor (page : B-109)<br>Driver (page : B-110) | [19]  | [21]              | [20]                    |                  |

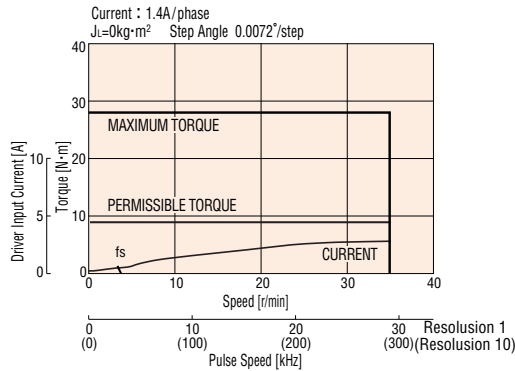
Please refer to page B-96 regarding \*1 Maximum holding torque, \*2 Permissible torque. Please refer to page B-104 for permissible overhung load.  
**Note:** The motor and gear output shaft rotates in the opposite direction.

● Speed – Torque Characteristics fs: Maximum Starting Frequency

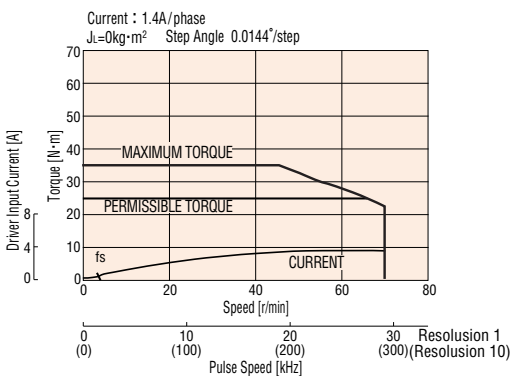
**RK564AC-H50**



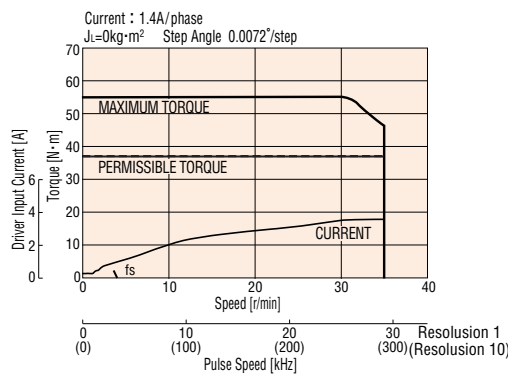
**RK564AC-H100**



**RK596AC-H50**



**RK596AC-H100**



**Notes :**

- Pay attention to heat dissipation from the motor and driver. The motor will produce a considerable amount of heat under certain conditions. In order to prevent fatigue of the gear grease in the harmonic gear, keep the temperature of the gear case under 70°C.
- When using the motor with the dedicated driver, the driver's "Automatic Current Cutback" function at motor standstill reduces maximum holding torque by approximately 50%.

## Driver specifications

|                |   |   |
|----------------|---|---|
| Input Signals  | Input Signal Circuit  | Photocoupler input, input resistance 220Ω, input current 10~20mA  |
|                | Pulse Signal (CW Pulse Signal)  | Step command pulse signal (CW direction command pulse signal when in 2-pulse input mode)<br>Pulse width: 2μs minimum, pulse rise/fall: 2μs maximum<br>Motor moves on the pulse falling edge. (Negative logic pulse input) Maximum input frequency: 200kHz |
|                | Rotation Direction Signal (CCW Pulse Signal)  | Rotation direction command pulse signal (CCW direction command pulse signal when in 2-pulse input mode.) Photocoupler OFF: CW, ON: CCW<br>Pulse width: 2μs minimum, pulse rise/fall: 2μs maximum  |
|                | All Windings OFF Signal   | When in the "photocoupler ON" state the current to the motor is cut off and the motor shaft can be rotated manually.<br>When in the "photocoupler OFF" state the current set by the RUN switch is supplied to the motor.                                  |
|                | Electromagnetic Brake Release Signal (Only for electromagnetic brake type)  | When in the "photocoupler ON" state the brake is released and the motor is ready for operation.<br>When in the "photocoupler OFF" state the brake is engaged and the motor shaft is held in position.   |
|                | Resolution Select Signal*   | When in the "photocoupler OFF" state the step angle is selected as preset by Resolution Select Switch DATA1.<br>When in the "photocoupler ON" state the step angle is selected as preset by Resolution Select Switch DATA2.                               |
| Output Signals | Output Signal Circuit   | Photocoupler, Open collector output External use condition: DC 24V maximum, 10mA maximum  |
|                | Excitation Timing Signal  | The signal is output every time the excitation sequence returns to the initial stage "0". (Photocoupler: ON)<br>0.72° step (Resolution 1): Signal output every 10 pulses<br>0.072° step (Resolution 10): Signal output every 100 pulses                   |
|                | Overheat Signal   | The signal is cut off when the internal temperature of the driver rises to above approximately 80°C. (Photocoupler: OFF)<br>The output current does not cut off and the motor continues operation.  |
| Functions      | Automatic current cutback, Automatic current off, Step angle switch, Pulse input mode switch, Electromagnetic brake function switch (only for electromagnetic brake type), Smooth drive function, Energy save function (only for electromagnetic brake type). |   |
| Indicators     | Power input, Excitation timing signal output, Overheat signal output  |   |
| Cooling Method | Natural Ventilation   |   |

\*16 step angles can be selected between 0.72° and 0.00288°.

## General Specifications

| Specifications           | Motor Unit  | Driver Unit   |
|--------------------------|---|---|
| Insulation Class         | Class B (130°C)<br>[Recognized as Class A (105°C) by UL standard]   | —   |
| Insulation Resistance    | 100MΩ minimum under normal temperature and humidity, when measured by a DC 500V megger between the windings and the motor casing. | 100MΩ minimum under normal temperature and humidity, when measured by a DC 500V megger between the following places:<br>· Power input terminal - Protective earth terminal<br>· Motor output terminal - Protective earth terminal<br>· Signal input/output terminals - Power input terminal<br>· Signal input/output terminals - Motor output terminal  |
| Dielectric Strength      | Sufficient to withstand 1.5kV, 50Hz applied for one minute between the windings and casing under normal temperature and humidity. | Sufficient to withstand the following for one minute, under normal temperature and humidity.<br>· Power input terminal - Protective earth terminal AC1.1kV 60Hz<br>· Motor output terminal - Protective earth terminal AC1.1kV 60Hz<br>· Signal input/output terminals - Power input terminal AC1.8kV 60Hz<br>· Signal input/output terminals - Motor output terminal AC1.8kV 60Hz<br>· Signal input/output terminals - Electromagnetic brake output terminal AC1.8kV 60Hz<br>(Only for electromagnetic brake type) |
| Operating Environment    | Ambient Temperature   | -10°C~+50°C (Harmonic Gear Type: 0°C~+40°C)   |
|                          | Humidity  | 85% or less, noncondensing  |
|                          | Atmosphere  | No corrosive gases, dust, water or oil.   |
| Temperature Rise         | 80°C or less as measured by the Resistance Change method when 5-phases are excited at rated current at rest.                      | —   |
| Stop Position Accuracy*1 | ±3minutes   | —   |
| Shaft Runout             | 0.05T.I.R. (mm)*4   | —   |
| Shaft Radial Play*2      | 0.025mm maximum of 5N   | —   |
| Shaft Axial Play*3       | 0.075mm maximum of 10N  | —   |
| Concentricity            | 0.075T.I.R. (mm)*4  | —   |
| Perpendicularity         | 0.075T.I.R. (mm)*4  | —   |

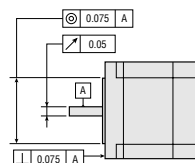
\*1 Stop position Accuracy: This value is for full step with no load. (The value changed with size of load.)

\*2 Radial Play: It refers to the displacement in shaft position in the radial direction when a 5N load is placed vertically on the motor shaft tip.

\*3 Axial Play: It refers to the displacement in shaft position in the axial direction when a 10N load is placed on the motor shaft in the axial direction.

\*4 T.I.R. (Total Indicator Reading): It refers to the total dial gage reading when the measurement section is rotated 1 revolution centered on the reference axis center.

Note: Do not measure insulation resistance or perform the dielectric withstand test while the motor and driver are connected.



## Permissible Overhung Load and Permissible Thrust Load

Unit = N

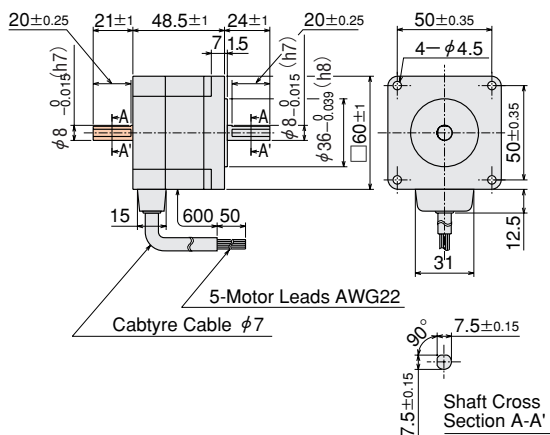
| Unit Model          | Overhung Load                           |      |      |      |      | Thrust Load                   |
|---------------------|---|------|------|------|------|-------------------------------|
|                     | Distance from the tip of the shaft (mm) |      |      |      |      |                               |
|                     | 0                                       | 5    | 10   | 15   | 20   |                               |
| <b>RK56□AC</b>      | 63                                      | 75   | 95   | 130  | 190  | Below the weight of the motor |
| <b>RK56□AMC</b>     |   |      |      |      |      |                               |
| <b>RK59□AC</b>      | 260                                     | 290  | 340  | 390  | 480  |                               |
| <b>RK59□AMC</b>     |   |      |      |      |      |                               |
| <b>RK564AC-T□</b>   | 70                                      | 80   | 100  | 120  | 150  | 40                            |
| <b>RK596AC-T□</b>   | 220                                     | 250  | 300  | 350  | 400  | 100                           |
| <b>RK566AC-N5</b>   | 200                                     | 220  | 250  | 280  | 320  | 100                           |
| <b>RK566AC-N7.2</b> |   |      |      |      |      |                               |
| <b>RK566AC-N10</b>  | 250                                     | 270  | 300  | 340  | 390  |                               |
| <b>RK564AC-N25</b>  | 330                                     | 360  | 400  | 450  | 520  |                               |
| <b>RK564AC-N36</b>  |   |      |      |      |      |                               |
| <b>RK564AC-N50</b>  |   |      |      |      |      |                               |
| <b>RK599AC-N5</b>   | 480                                     | 540  | 600  | 680  | 790  | 300                           |
| <b>RK599AC-N7.2</b> |   |      |      |      |      |                               |
| <b>RK599AC-N10</b>  |   |      |      |      |      |                               |
| <b>RK596AC-N25</b>  | 850                                     | 940  | 1050 | 1190 | 1380 |                               |
| <b>RK596AC-N36</b>  | 930                                     | 1030 | 1150 | 1310 | 1520 |                               |
| <b>RK596AC-N50</b>  | 1050                                    | 1160 | 1300 | 1480 | 1710 |                               |
| <b>RK564AC-H□</b>   | 320                                     | 370  | 440  | 550  | 720  | 430                           |
| <b>RK596AC-H□</b>   | 1090                                    | 1150 | 1230 | 1310 | 1410 | 1300                          |

\*Unit models indicated above are single shaft models. Values for double shaft models are the same as single shaft models.

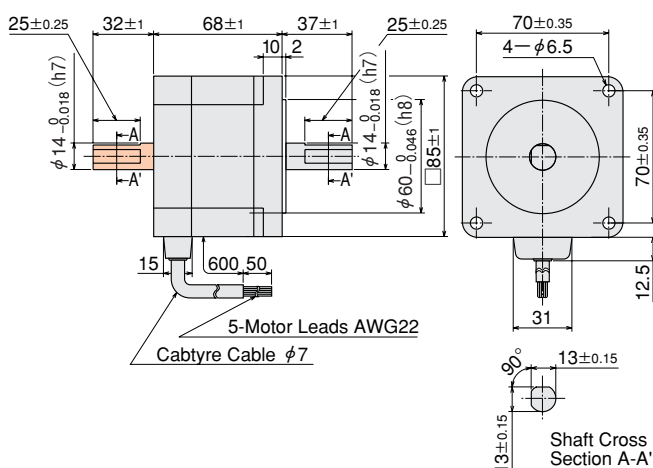
**Dimensions** scale 1/4, unit=mm

**Standard Type Motor**

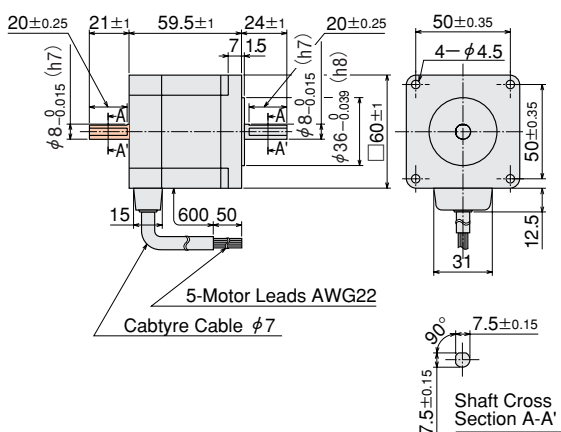
| 1                             | Motor Model | Mass  |
|-------------------------------|-------------|-------|
| <b>RK564AC</b> (Single Shaft) | PK564AW     | 0.6kg |
| <b>RK564BC</b> (Double Shaft) | PK564BW     | 0.6kg |



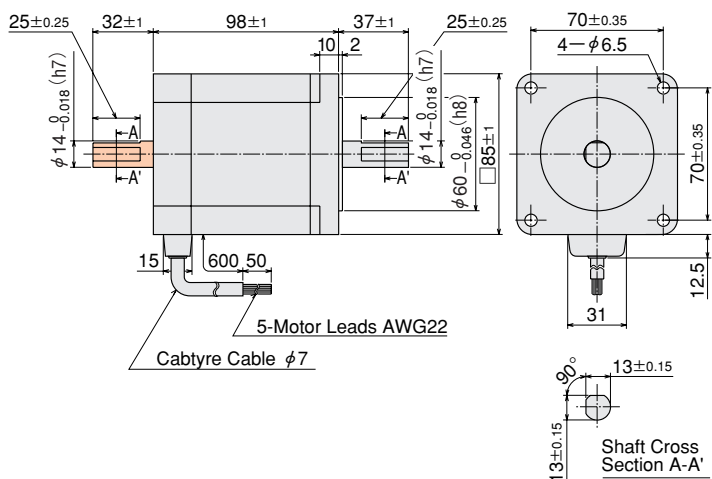
| 4                             | Motor Model | Mass  |
|-------------------------------|-------------|-------|
| <b>RK596AC</b> (Single Shaft) | PK596AW     | 1.7kg |
| <b>RK596BC</b> (Double Shaft) | PK596BW     | 1.7kg |



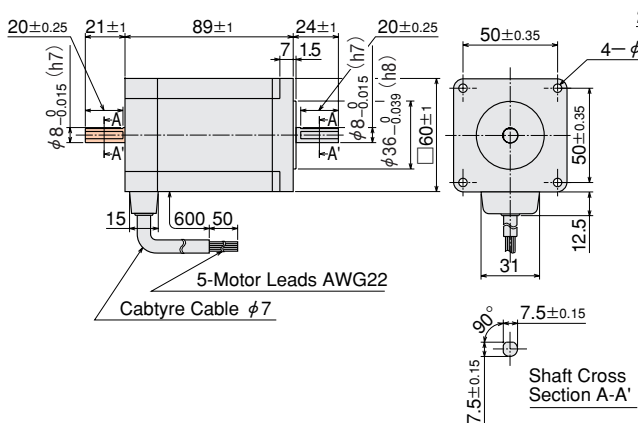
| 2                             | Motor Model | Mass  |
|-------------------------------|-------------|-------|
| <b>RK566AC</b> (Single Shaft) | PK566AW     | 0.8kg |
| <b>RK566BC</b> (Double Shaft) | PK566BW     | 0.8kg |



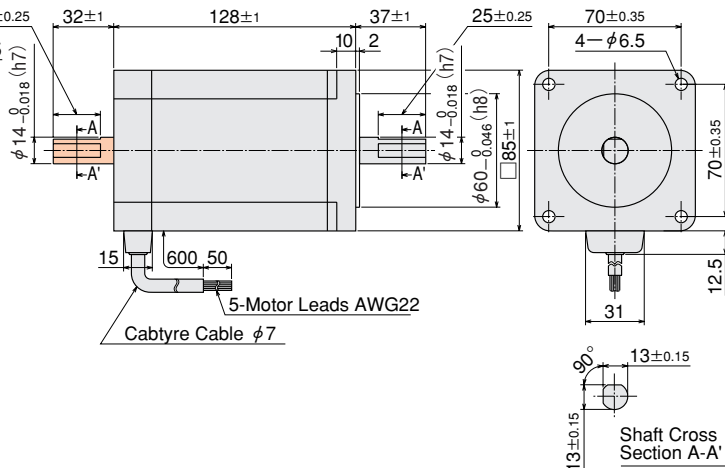
| 5                             | Motor Model | Mass  |
|-------------------------------|-------------|-------|
| <b>RK599AC</b> (Single Shaft) | PK599AW     | 2.8kg |
| <b>RK599BC</b> (Double Shaft) | PK599BW     | 2.8kg |



| 3                             | Motor Model | Mass  |
|-------------------------------|-------------|-------|
| <b>RK569AC</b> (Single Shaft) | PK569AW     | 1.3kg |
| <b>RK569BC</b> (Double Shaft) | PK569BW     | 1.3kg |



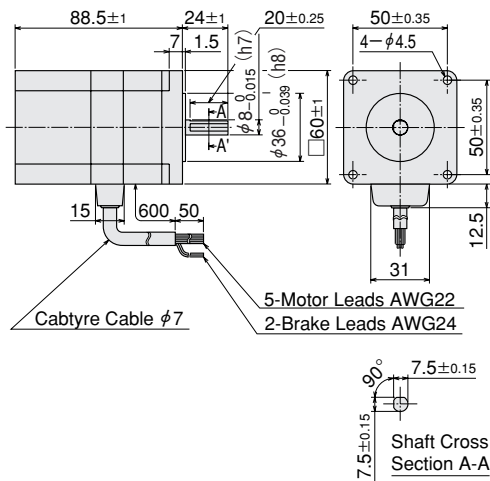
| 6                              | Motor Model | Mass  |
|--------------------------------|-------------|-------|
| <b>RK5913AC</b> (Single Shaft) | PK5913AW    | 3.8kg |
| <b>RK5913BC</b> (Double Shaft) | PK5913BW    | 3.8kg |



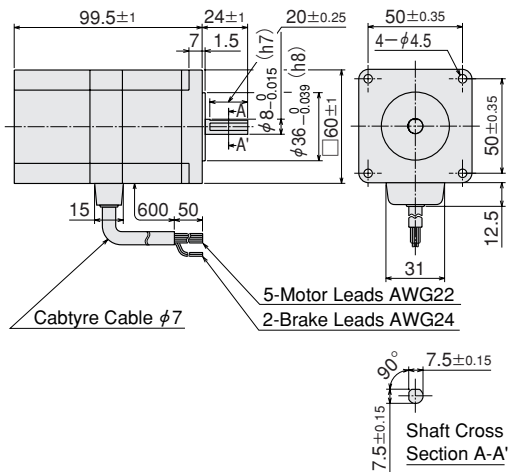
- These dimensions are of double shaft models. For single shaft models, ignore the colored areas.
- Refer to page B-42 for information on motor installation.

● Electromagnetic Brake Type Motor

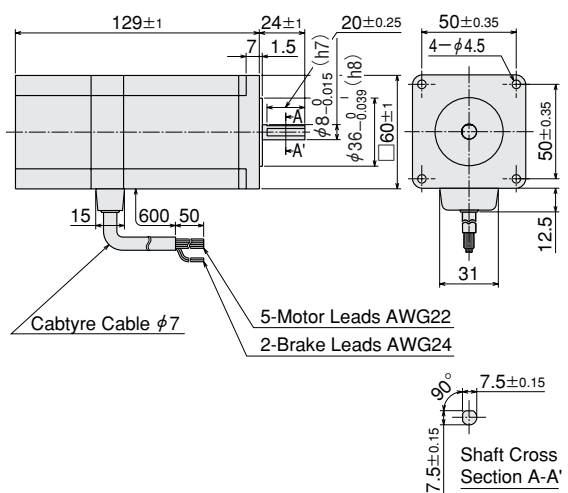
|                 |             |       |
|-----------------|-------------|-------|
| 7               | Motor Model | Mass  |
| <b>RK564AMC</b> | PK564AWM    | 0.9kg |



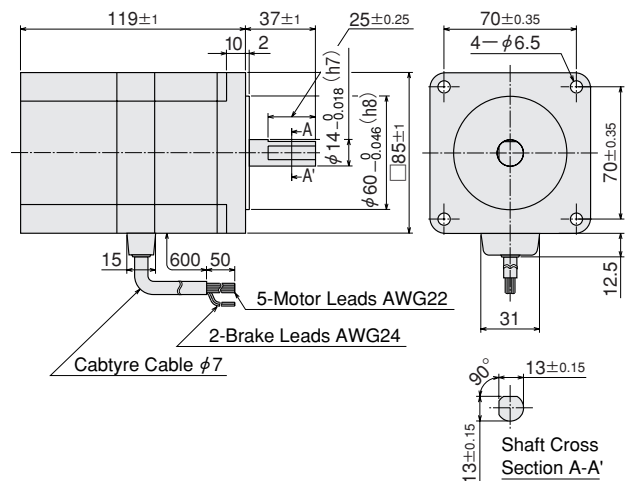
|                 |             |       |
|-----------------|-------------|-------|
| 8               | Motor Model | Mass  |
| <b>RK566AMC</b> | PK566AWM    | 1.1kg |



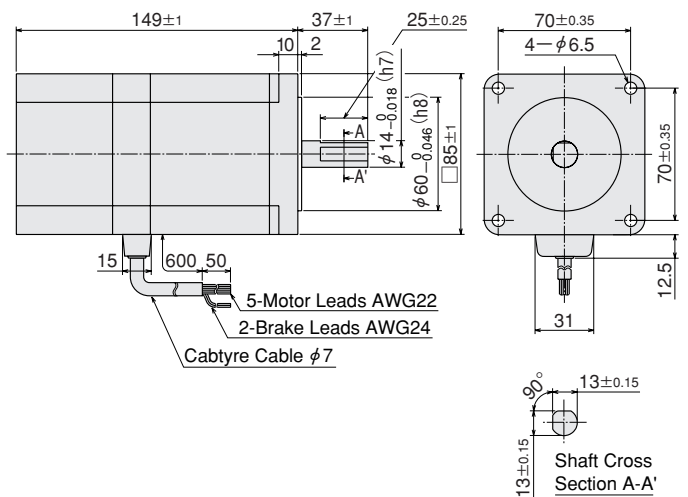
|                 |             |       |
|-----------------|-------------|-------|
| 9               | Motor Model | Mass  |
| <b>RK569AMC</b> | PK569AWM    | 1.6kg |



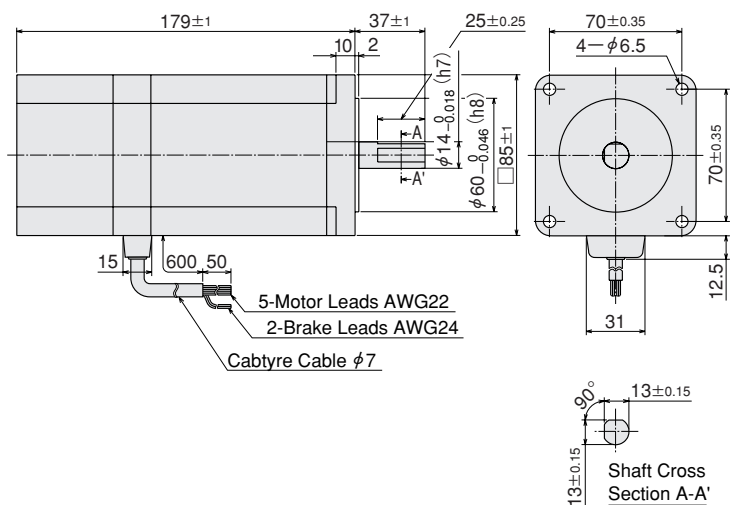
|                 |             |       |
|-----------------|-------------|-------|
| 10              | Motor Model | Mass  |
| <b>RK596AMC</b> | PK596AWM    | 2.4kg |



|                 |             |       |
|-----------------|-------------|-------|
| 11              | Motor Model | Mass  |
| <b>RK599AMC</b> | PK599AWM    | 3.5kg |



|                  |             |       |
|------------------|-------------|-------|
| 12               | Motor Model | Mass  |
| <b>RK5913AMC</b> | PK5913AWM   | 4.5kg |

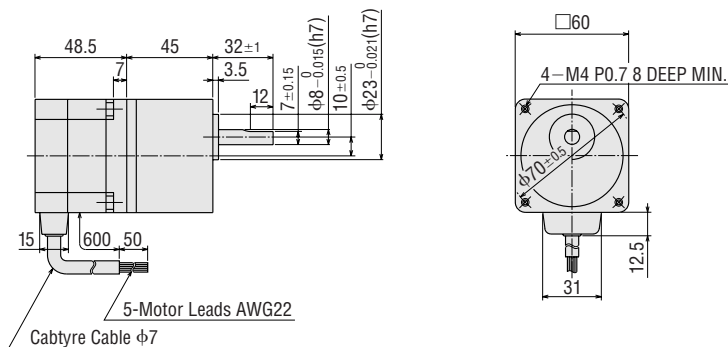


● Refer to page B-42 for information on motor installation.

● TH Geared Type

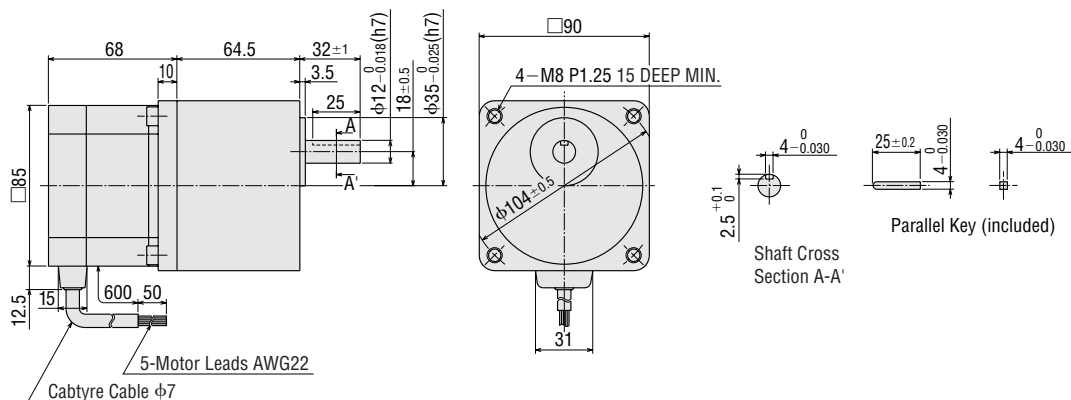
- 13 **RK564AC-T3.6** (Single Shaft) Motor Model: PK564AW-T3.6
- RK564AC-T7.2** (Single Shaft) Motor Model: PK564AW-T7.2
- RK564AC-T10** (Single Shaft) Motor Model: PK564AW-T10
- RK564AC-T20** (Single Shaft) Motor Model: PK564AW-T20
- RK564AC-T30** (Single Shaft) Motor Model: PK564AW-T30

Mass 0.95kg



- 14 **RK596AC-T3.6** (Single Shaft) Motor Model: PK596AW-T3.6
- RK596AC-T7.2** (Single Shaft) Motor Model: PK596AW-T7.2
- RK596AC-T10** (Single Shaft) Motor Model: PK596AW1-T10
- RK596AC-T20** (Single Shaft) Motor Model: PK596AW1-T20
- RK596AC-T30** (Single Shaft) Motor Model: PK596AW1-T30

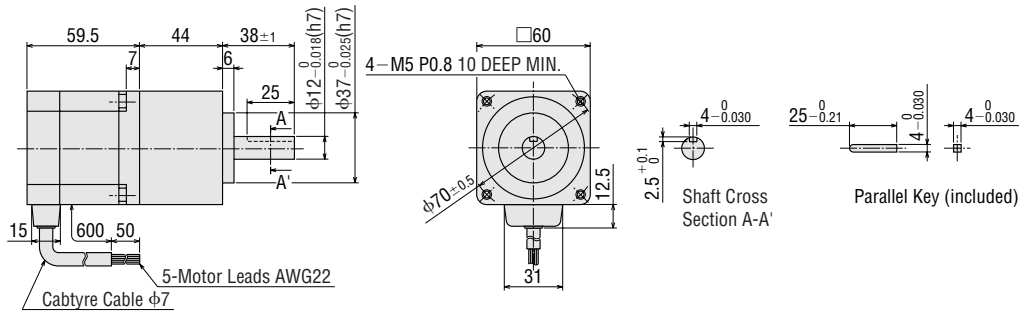
Mass 2.85kg



● PN Geared Type

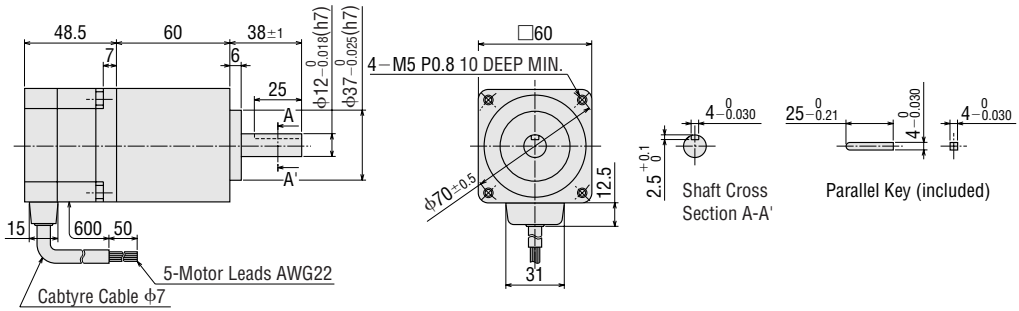
- 15 **RK566AC-N5** (Single Shaft) Motor Model: PK566AW-N5
- RK566AC-N7.2** (Single Shaft) Motor Model: PK566AW-N7.2
- RK566AC-N10** (Single Shaft) Motor Model: PK566AW-N10

Mass 1.5kg



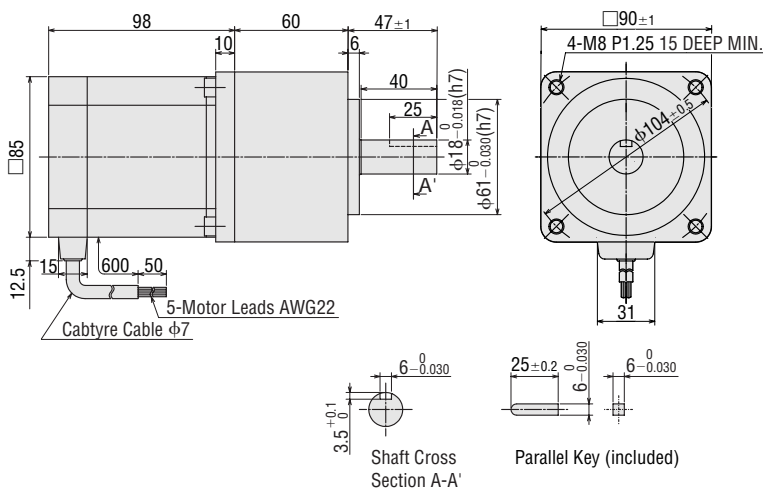
- 16 **RK564AC-N25** (Single Shaft) Motor Model: PK564AW-N25
- RK564AC-N36** (Single Shaft) Motor Model: PK564AW-N36
- RK564AC-N50** (Single Shaft) Motor Model: PK564AW-N50

Mass 1.5kg



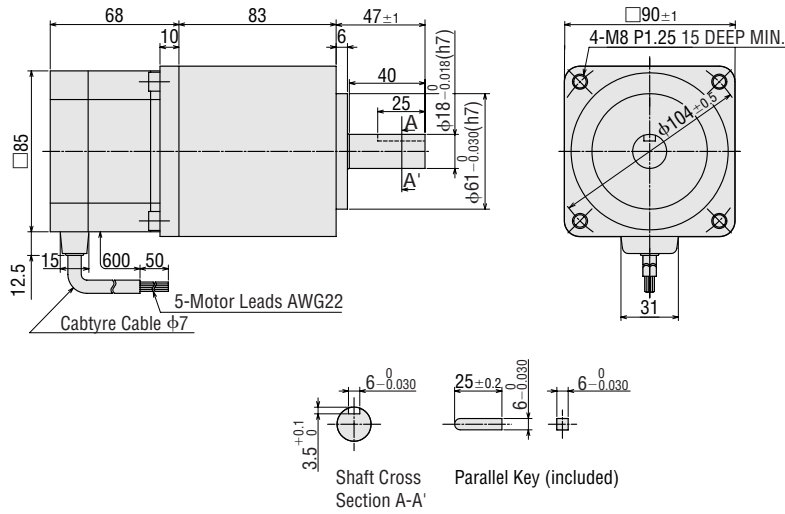
- 17 **RK599AC-N5** (Single Shaft) Motor Model: PK599AW-N5
- RK599AC-N7.2** (Single Shaft) Motor Model: PK599AW-N7.2
- RK599AC-N10** (Single Shaft) Motor Model: PK599AW-N10

Mass 5.0kg



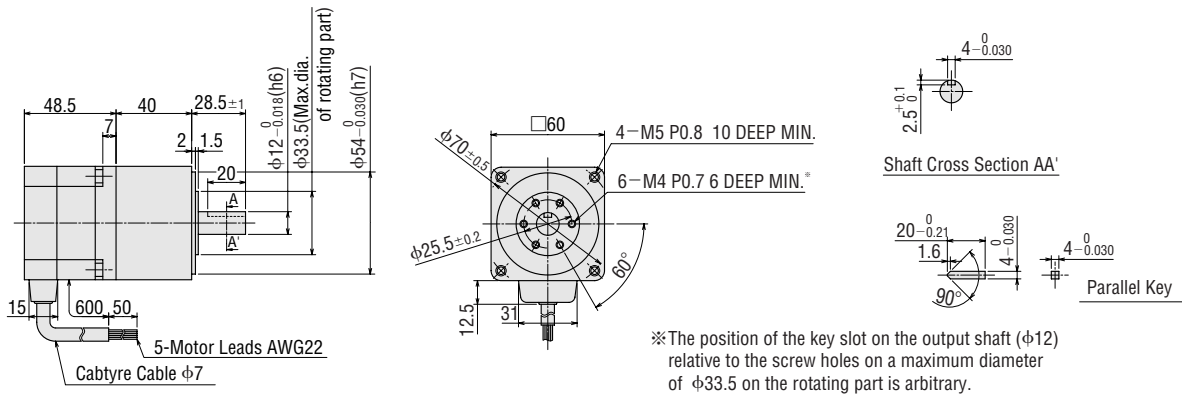
- 18 **RK596AC-N25** (Single Shaft) Motor Model: PK596AW-N25
- RK596AC-N36** (Single Shaft) Motor Model: PK596AW-N36
- RK596AC-N50** (Single Shaft) Motor Model: PK596AW-N50

Mass 4.7kg

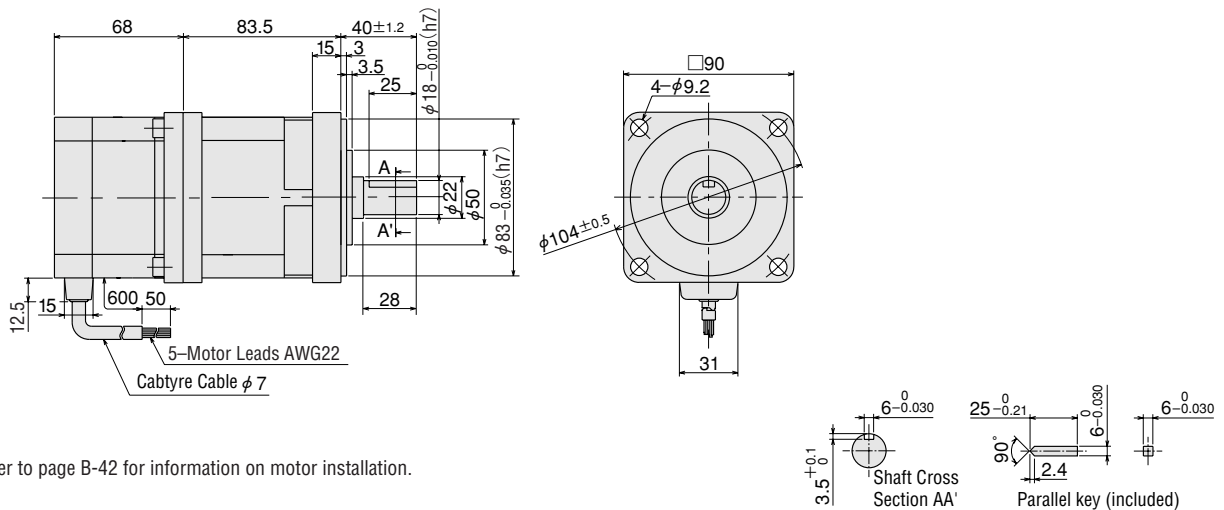


● Harmonic Geared Type Motor

- 19 **RK564AC-H50** Motor Model: PK564AW-H50S Mass: 1.08kg
- RK564AC-H100** Motor Model: PK564AW-H100S Mass: 1.08kg



- 20 **RK596AC-H50** Motor Model: PK596AW1-H50 Mass: 3.7kg
- RK596AC-H100** Motor Model: PK596AW1-H100 Mass: 3.7kg

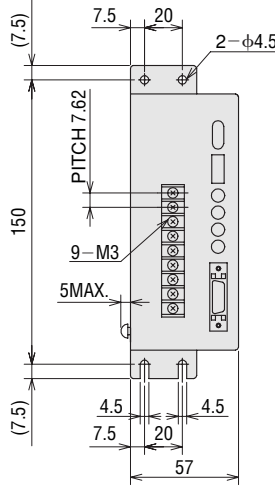
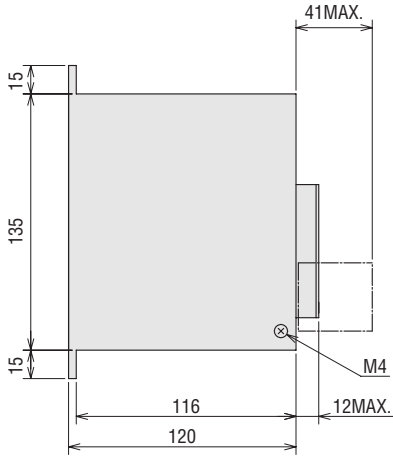
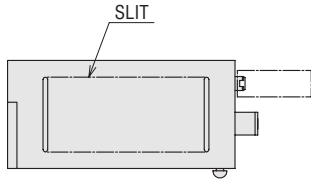


● Refer to page B-42 for information on motor installation.

● Driver Unit

21 Driver Model: RKD514L-C  
 RKD514H-C  
 RKD514LM-C  
 RKD514HM-C

Mass 0.85kg



• I/O Connector (Included)  
 Case: 54331-1201 (MOLEX)  
 Connector: 54306-2011 (MOLEX)

■ Precautions for Geared Types

When using the **RK** geared type, please note the following:

**1. Do not exceed the maximum permissible torque :**

The permissible torque shows the mechanical strength of the gear. (The maximum torque is the permissible limit of torque when the harmonic gear drives the inertial load). The overall torque, including the acceleration/deceleration torque at starting/stopping the motor and the load (friction) torque, should be below the level of the permissible and maximum levels of torque. When loaded above the level of the permissible torque, the gear may be damaged.

**2. Do not exceed the permissible speed range :**

Do not exceed the maximum output speed of the gearhead indicated in the specifications on page B-98~102. The speed affects the life of the gearhead. Be sure to use the gear below the maximum permissible speed.

**3. Be careful of backlash in bi-directional positioning :**

Backlash (lost-motion when the harmonic gear is used) is the free rotation angle(i.e.,play) of the output shaft when the input section of the reduction gear is fixed. The value for each geared type is shown below:

The **TH** Geared: Backlash for 10 ~ 35 arc minutes depending on frame size and gear ratio.  
 The **PN** Geared: Backlash for 3 arc minutes.  
 The Harmonic Geared: Lost-motion for 1.5 arc minutes.

Each geared type of the **RK** series provides low or non backlash with high accuracy in positioning. If there is a problem with backlash in bi-directional positioning, be sure to stop the motor in one direction.

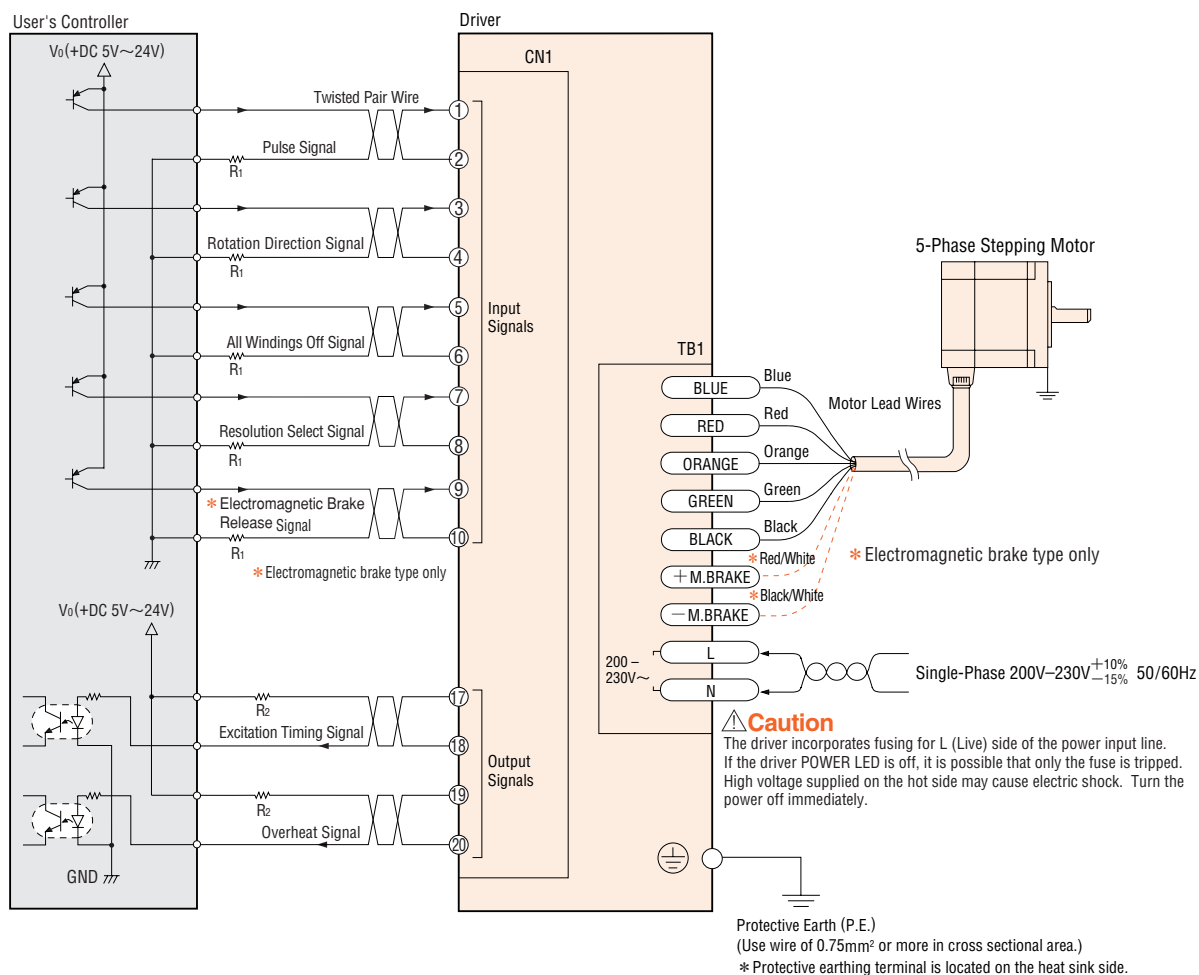
**4. The direction of gear shaft rotations differs according to the gear ratio :**

When the **TH** geared type is used, the relationship between the rotating direction of the motor shaft and the rotating direction of the gear output shaft varies, depending on the speed gear ratios used.

Gear ratio: 1:3.6, 1:7.2, 1:10 Same direction as the motors  
 Gear ratio: 1:20, 1:30 Opposite direction as the motors

When the **PN** geared type is used, the motor and the output shaft of the gear rotate to the same direction with all gear ratios. When the harmonic geared type is used, they rotate to the reverse direction.

## Connection Diagrams



### Notes Regarding Connecting:

- Use twisted-pair wire of 0.2mm<sup>2</sup> or thicker and 2m or less in length for the signal line.
- Use wires of 0.5mm<sup>2</sup> or thicker for motor line (when extended) and power lines, and use 0.75mm<sup>2</sup> or thicker for the wire for the protective earthing line.
- Use spot grounding for the grounding of the driver and external controller.
- Signal lines should be kept away at least 10cm from power lines (power supply lines and motor lines). Do not bind the signal line and power line together.

### Power Supply

Can be used with a single-phase 200V–230V 50/60Hz power supplies. Use a power supply that can supply sufficient input current. When power supply capacity is insufficient, a decrease in motor output may cause the following malfunctions.

- Motor does not rotate properly at high-speed (insufficient torque).
- Motor start-up and stopping is slow.

### Wiring to Input/Output Signals

#### Wiring to Input Signals

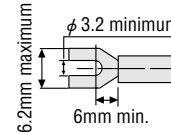
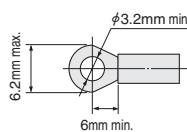
Keep the voltage  $V_0$  between DC5V and DC24V. When  $V_0$  is equal to DC5V, the external resistances  $R_1$  is not necessary. When  $V_0$  is above DC5V, connect  $R_1$  to keep the current between 10mA and 20mA.

#### Wiring to output Signals

Keep the voltage  $V_0$  between DC5V and DC24V and keep the current below 10mA. When the output current exceeds 10mA, connect the external resistances  $R_2$  to keep the current below 10mA.

#### <Recommended Crimp Terminal>

- Round Shape Terminal with Insulator
- U-Shape Terminals with Insulator



\*Crimp terminals are not provided with the unit. They must be furnished separately.

## Setting the Step Angles (Resolution)

The driver can be preset to two different step angles (resolution) using the Resolution Select Switches DATA1 and DATA2. Use these switches to set the desired resolution from the 16 resolution levels available. (Refer to the table below.)

After setting the two step angles (resolutions), use the Resolution Select Signal to change the step angle.

Photocoupler OFF: Step angle (resolution) set by DATA1 is selected

Photocoupler ON: Step angle (resolution) set by DATA2 is selected

### Standard Type and Standard Type with Electromagnetic Brake

| Resolution Select Switch<br>(Common to DATA1 and DATA2) | Resolution | Step Angle |
|---|------------|------------|
| 0   | 1          | 0.72°      |
| 1   | 2          | 0.36°      |
| 2   | 2.5        | 0.288°     |
| 3   | 4          | 0.18°      |
| 4   | 5          | 0.144°     |
| 5   | 8          | 0.09°      |
| 6   | 10         | 0.072°     |
| 7   | 20         | 0.036°     |
| 8   | 25         | 0.0288°    |
| 9   | 40         | 0.018°     |
| A   | 50         | 0.0144°    |
| B   | 80         | 0.009°     |
| C   | 100        | 0.0072°    |
| D   | 125        | 0.00576°   |
| E   | 200        | 0.0036°    |
| F   | 250        | 0.00288°   |

### TH Geared Type

| Resolution Select Switch<br>(Common to DATA1 and DATA2) | Resolution | Step Angle at Output Shaft |                       |                      |                      |                      |
|---|------------|----------------------------|-----------------------|----------------------|----------------------|----------------------|
|   |            | Gear Ratio<br>1 : 3.6      | Gear Ratio<br>1 : 7.2 | Gear Ratio<br>1 : 10 | Gear Ratio<br>1 : 20 | Gear Ratio<br>1 : 30 |
| 0   | 1          | 0.2°                       | 0.1°                  | 0.072°               | 0.036°               | 0.024°               |
| 1   | 2          | 0.1°                       | 0.05°                 | 0.036°               | 0.018°               | 0.012°               |
| 2   | 2.5        | 0.08°                      | 0.04°                 | 0.0288°              | 0.0144°              | 0.0096°              |
| 3   | 4          | 0.05°                      | 0.025°                | 0.018°               | 0.009°               | 0.006°               |
| 4   | 5          | 0.04°                      | 0.02°                 | 0.0144°              | 0.0072°              | 0.0048°              |
| 5   | 8          | 0.025°                     | 0.0125°               | 0.009°               | 0.0045°              | 0.003°               |
| 6   | 10         | 0.02°                      | 0.01°                 | 0.0072°              | 0.0036°              | 0.0024°              |
| 7   | 20         | 0.01°                      | 0.005°                | 0.0036°              | 0.0018°              | 0.0012°              |
| 8   | 25         | 0.008°                     | 0.004°                | 0.00288°             | 0.00144°             | 0.00086°             |
| 9   | 40         | 0.005°                     | 0.0025°               | 0.00188°             | 0.0009°              | 0.0006°              |
| A   | 50         | 0.004°                     | 0.002°                | 0.00144°             | 0.00072°             | 0.00048°             |
| B   | 80         | 0.0025°                    | 0.00125°              | 0.0009°              | 0.00045°             | 0.0003°              |
| C   | 100        | 0.002°                     | 0.001°                | 0.00072°             | 0.00036°             | 0.00024°             |
| D   | 125        | 0.0016°                    | 0.0008°               | 0.000576°            | 0.000288°            | 0.000192°            |
| E   | 200        | 0.001°                     | 0.0005°               | 0.00036°             | 0.00018°             | 0.00012°             |
| F   | 250        | 0.0008°                    | 0.0004°               | 0.000288°            | 0.000144°            | 0.000096°            |

### PN Geared Type

| Resolution Select Switch<br>(Common to DATA1 and DATA2) | Resolution | Step Angle at Output Shaft |                       |                      |                      |                      |                      |
|---|------------|----------------------------|-----------------------|----------------------|----------------------|----------------------|----------------------|
|   |            | Gear Ratio<br>1 : 5        | Gear Ratio<br>1 : 7.2 | Gear Ratio<br>1 : 10 | Gear Ratio<br>1 : 25 | Gear Ratio<br>1 : 36 | Gear Ratio<br>1 : 50 |
| 0   | 1          | 0.144°                     | 0.1°                  | 0.072°               | 0.0288°              | 0.02°                | 0.0144°              |
| 1   | 2          | 0.072°                     | 0.05°                 | 0.036°               | 0.0144°              | 0.01°                | 0.0072°              |
| 2   | 2.5        | 0.0576°                    | 0.04°                 | 0.0288°              | 0.01152°             | 0.008°               | 0.00576°             |
| 3   | 4          | 0.036°                     | 0.025°                | 0.018°               | 0.0072°              | 0.005°               | 0.0036°              |
| 4   | 5          | 0.0288°                    | 0.02°                 | 0.0144°              | 0.00576°             | 0.004°               | 0.00288°             |
| 5   | 8          | 0.018°                     | 0.0125°               | 0.009°               | 0.0036°              | 0.0025°              | 0.0018°              |
| 6   | 10         | 0.0144°                    | 0.01°                 | 0.0072°              | 0.00288°             | 0.002°               | 0.00144°             |
| 7   | 20         | 0.0072°                    | 0.005°                | 0.0036°              | 0.00144°             | 0.001°               | 0.00072°             |
| 8   | 25         | 0.00576°                   | 0.004°                | 0.00288°             | 0.001152°            | 0.0008°              | 0.000576°            |
| 9   | 40         | 0.0036°                    | 0.0025°               | 0.00188°             | 0.00072°             | 0.0005°              | 0.00036°             |
| A   | 50         | 0.00288°                   | 0.002°                | 0.00144°             | 0.000576°            | 0.0004°              | 0.000288°            |
| B   | 80         | 0.0018°                    | 0.00125°              | 0.0009°              | 0.00036°             | 0.00025°             | 0.00018°             |
| C   | 100        | 0.00144°                   | 0.001°                | 0.00072°             | 0.000288°            | 0.0002°              | 0.000144°            |
| D   | 125        | 0.001152°                  | 0.0008°               | 0.000576°            | 0.0002304°           | 0.00016°             | 0.0001152°           |
| E   | 200        | 0.00072°                   | 0.0005°               | 0.00036°             | 0.000144°            | 0.0001°              | 0.000072°            |
| F   | 250        | 0.000576°                  | 0.0004°               | 0.000288°            | 0.0001152°           | 0.00008°             | 0.0000576°           |

### Harmonic Geared Type

| Resolution Select Switch<br>(Common to DATA1 and DATA2) | Resolution | Gear Ratio<br>1:50 | Gear Ratio<br>1:100 |
|---|------------|--------------------|---------------------|
| 0   | 1          | 0.0144             | 0.0072              |
| 1   | 2          | 0.0072             | 0.0036              |
| 2   | 2.5        | 0.00576            | 0.00288             |
| 3   | 4          | 0.0036             | 0.0018              |
| 4   | 5          | 0.00288            | 0.00144             |
| 5   | 8          | 0.0018             | 0.0009              |
| 6   | 10         | 0.00144            | 0.00072             |
| 7   | 20         | 0.00072            | 0.00036             |
| 8   | 25         | 0.000576           | 0.000288            |
| 9   | 40         | 0.00036            | 0.00018             |
| A   | 50         | 0.000288           | 0.000144            |
| B   | 80         | 0.00018            | 0.00009             |
| C   | 100        | 0.000144           | 0.000072            |
| D   | 125        | 0.0001152          | 0.0000576           |
| E   | 200        | 0.000072           | 0.000036            |
| F   | 250        | 0.0000576          | 0.0000288           |

**Notes:**

- Do not change the step angle input setting unless the pulse signal is at rest. If the setting is changed while pulses are being input, a motor positional error may result.
- There is no positional error if changing the step angle with the motor at rest.
- Step angle does not affect torque based on the shaft speed on the motor.

# Description of Input/Output Signals

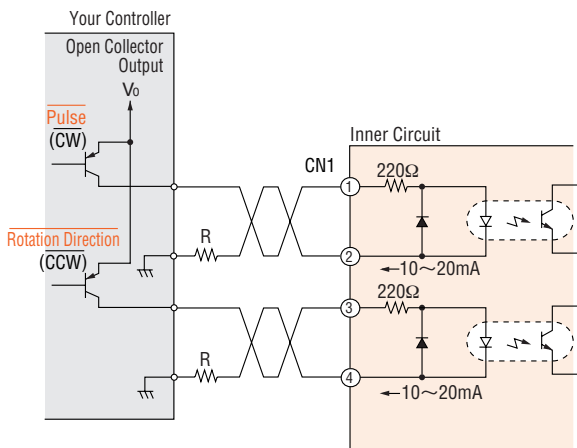
## 1. Pulse/CW Pulse Signals, Rotation Direction/CCW Pulse Signals

### ◇Input Circuit and Sample Connection

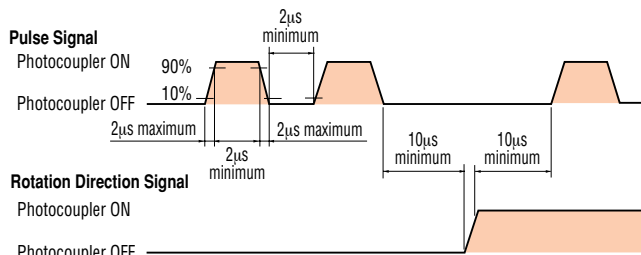
The characters indicate signals under the 1-pulse input mode, while the characters in parenthesis indicate signals under the 2-pulse input mode.

**Notes:**

When voltage is equal to DC 5V, external resistance (R) is not necessary.  
When voltage is above DC 5V, connect external resistance (R) and keep the input current between 10mA and 20mA.



### ◇Pulse Signal Characteristics



Shaded area indicated when the photocopler is ON.  
The motor moves on the pulse falling edge as indicated by the arrow.

1. The pulse voltage is 4~5V in the "photocopler ON" state, and 0~0.5V in the "photocopler OFF" state.
2. Input pulse signals should have a pulse width over 2 μs, pulse rise/fall below 2 μs, and a pulse duty below 50%.
3. The minimum interval time when changing rotation direction is 10 μs. This value varies greatly depending on the motor type, pulse frequency, and load inertia. It may be necessary to increase this time interval.

### ◇Pulse Signal Input Precaution

Be sure to set the signal in the "photocopler OFF" state when the pulse signal is at rest.

<1-Pulse Input Mode>

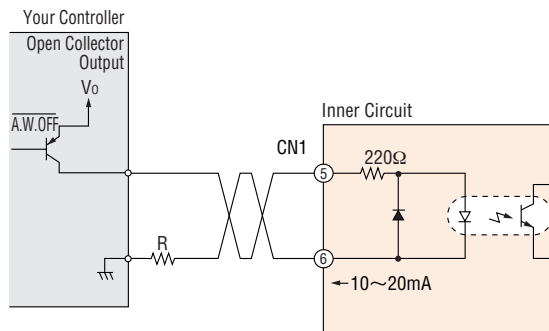
- Be sure to switch the direction of rotation with the pulse signal in the "photocopler OFF" state.

<2-pulse Input Mode>

- Do not input CW pulses and CCW pulses at the same time.
- When the CW pulse signal or CCW pulse signal is in the "photocopler ON" state, the input of pulses to the other will not rotate the motor normally.

## 2. All Windings Off Signal

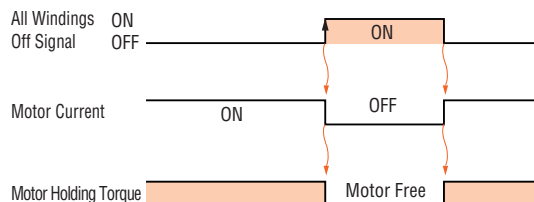
### ◇Input Circuit and Sample Connection



**Notes:**

When voltage is equal to DC 5V, external resistance (R) is not necessary.  
When voltage is above DC 5V, connect external resistance (R) and keep the input current between 10mA and 20mA.

- (1) When the "All Windings Off" signal is at "photocopler ON", the current to the motor is cut off and motor torque is reduced to zero. The motor output shaft can then be rotated freely by hand. When the "All Windings Off" signal is at "photocopler OFF", the motor holding torque is proportional to the current set by the current adjustment rotary switches. During motor operation be sure to keep the signal at "photocopler OFF". This signal is used when moving the motor by external force or manual home positioning etc. is desired. If this function is not needed, it is not necessary to connect this terminal.

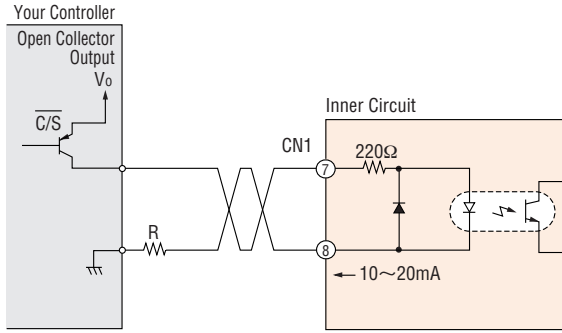


Colored area indicates that the motor provides holding torque in proportion to standstill current set by STOP switch.

- (2) Switching the "All Windings Off" signal from "photocopler ON" to "photocopler OFF" does not alter the excitation sequence. When the motor shaft is manually adjusted with the "All Windings Off" signal input, the shaft will shift up to ±3.6° from the position set after the "All Windings Off" signal is released.

### 3.C/S (Resolution Select Switching) Signal

◇Input Circuit and Sample Connection

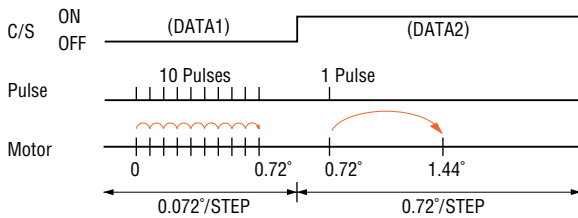


**Notes:**

When voltage is equal to DC 5V, external resistance (R) is not necessary.  
When voltage is above DC 5V, connect external resistance (R) and keep the input current between 10mA and 20mA.

You may select two step angles (resolutions) from 16 available step angles (resolutions) with the Resolution Select Switches DATA1 and DATA2. When the signal is at "photocoupler OFF", a step angle set by DATA1 is selected; at "photocoupler ON", DATA2 is selected.

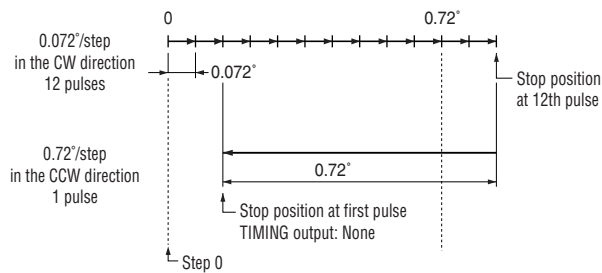
Example: Changing the step angle from 0.072° to 0.72°.



**Notes:**

- Be sure to change step angle setting inputs only when the pulse signals are at rest. Switching while moving may cause a positional error of the motor.
- There is no positional error if the step angle setting is changed with the motor at rest.
- When the step angle is changed by the "C/S" signal, the "TIMING" signal output shown below may become impossible for some combinations of step angles.

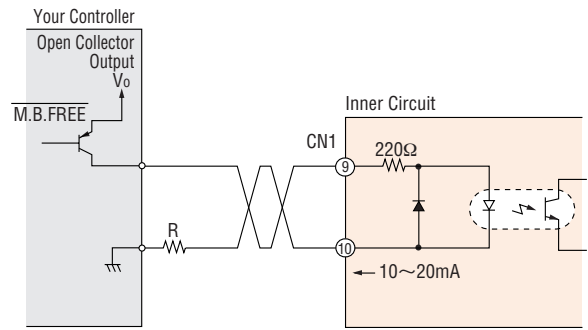
When the "TIMING" signal is used, adjust the number of pulses so that the motor can operate with angles that are multiples of 7.2°.



### 4.M.B.FREE (Electromagnetic Brake Release) Signal

(Electromagnetic Brake Type only)

◇Input Circuit and Sample Connection



**Notes:**

When voltage is equal to DC 5V, external resistance (R) is not necessary.  
When voltage is above DC 5V, connect external resistance (R) and keep the input current between 10mA and 20mA.

When using the "M.B.FREE" signal, be sure to keep the switch set the OFF position. (Use of the electromagnetic brake to hold the position of the load is effective in preventing motor temperature rise and reducing power consumption.)

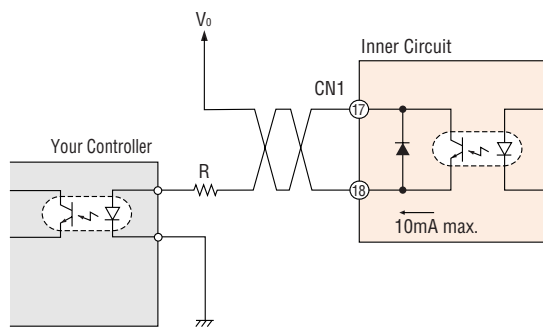
- (1) When the "M.B.FREE" signal is at "photocoupler ON", the electromagnetic brake is released and the motor is ready for operation.
- (2) When the "M.B.FREE" signal is at "photocoupler OFF", the electromagnetic brake is engaged and the motor shaft is held in position.

You can control the electromagnetic brake using the "M.B.FREE" signal and function switch on the driver front panel.

For more details, please refer to "How to use the electromagnetic brake function and energy-saving mode" on page B-116.

### 5.TIM. (Excitation Timing) Signal

◇Output Circuit and Sample Connection



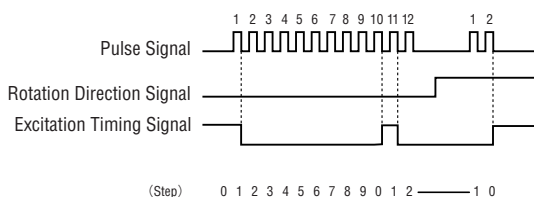
Keep the voltage between DC5V and DC24V.  
Keep the current below 10mA.

- The "Excitation Timing" signal indicates that the excitation of the motor is in the initial state (STEP 0). The "Excitation Timing" signal can be used to increase the accuracy of home position detection by setting mechanical home position of your equipment (photo sensor etc.) to coincide with the excitation sequence initial stage (STEP 0).
- The "Excitation Timing" signal is output simultaneously with a pulse input each time the excitation sequence returns to step "0". The excitation sequence will complete one cycle for every 7.2° rotation of the motor output shaft. Output is as follows:

Resolution 1: 1 output per 10pulses  
Resolution 10: 1 output per 100pulses

The timing lamp on the front panel lights up during output.

Timing Chart at 0.72°/Step (Resolution 1)



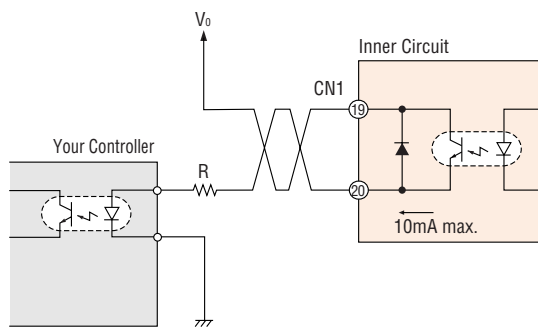
\*When connected as shown in the example connection, the signal will be "photocoupler ON" at step "0".

**Notes:**

- When the power is turned ON, the excitation sequence is reset to "STEP 0" and the timing lamp lights up.
- The timing lamp flashes quickly while the motor runs appearing continuously lit.

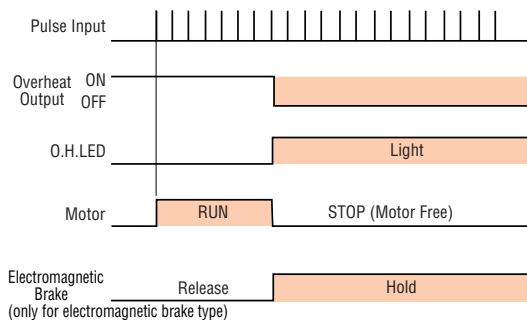
### 6.O.H. (Overheat) Signal

◇Output Circuit and Sample Connection

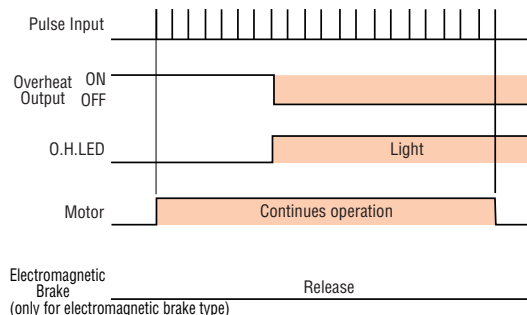


Keep the voltage between DC5V and DC24V.  
Keep the current below 10mA.

- The "Overheat" signal is output to protect the driver from heat damage if the internal temperature of the driver rises above 80°C. The Overheat LED light when the "Overheat" signal is output.
- If the "Automatic Current Off" function switch is set to "A.C.O." position, the output current to the motor drops to zero and the motor stop automatically. With electromagnetic brake type, the electromagnetic brake is engaged and the motor shaft is held in position.



If the "Automatic Current Off" function switch is set to "OFF" position, the motor continues operation even when the "Overheat" signal is output. The output current does not cut off at this time. (The electromagnetic brake does not activate, too.)



- When the "Overheat" signal is output, turn the driver power OFF, then adjust the operating conditions (ambient temperature, driver / controller settings), or use a fan to cool the driver. After taking appropriate measures, turn the power ON. Once the power has been turned OFF, wait at least 15 seconds before turning it ON again. After driver's temperature falls 80°C or less, turning the power ON will release the "Automatic Current Off" condition.

