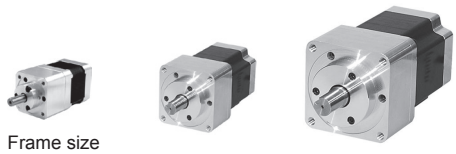
Frame Size 42mm/60mm/85mm Geared type /Geared+Built-in brake type Motor
Frame Size 60mm Rotary Actuator Type /Rotary Actuator +Built-in brake type Motor

▣ Features

- Compact design and light weight with high accuracy, speed and torque
- Cost-effective
- Backlash
  Frame size 42mm: ±35' (0.58°),
  60mm: ±20' (0.33°), 85mm: ±15' (0.25°)
- Brake force is released when applying 24VDC on brake wire
- Basic step angle
  1:5→ 0.144°, 1:7.2→ 0.1°, 1:10→ 0.072°
- Allowable speed
  1:5→ 0 to 360rpm, 1:7.2→ 0 to 250rpm
  1:10→ 0 to 180rpm

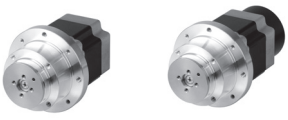
⚠ Please read "Caution for your safety" in operation manual before using.

CE



Frame size
42mm Geared type | **60mm Geared type** | **85mm Geared type**

Frame size
42mm Geared+ Built-in brake type | **60mm Geared+ Built-in brake type** | **85mm Geared+ Built-in brake type**



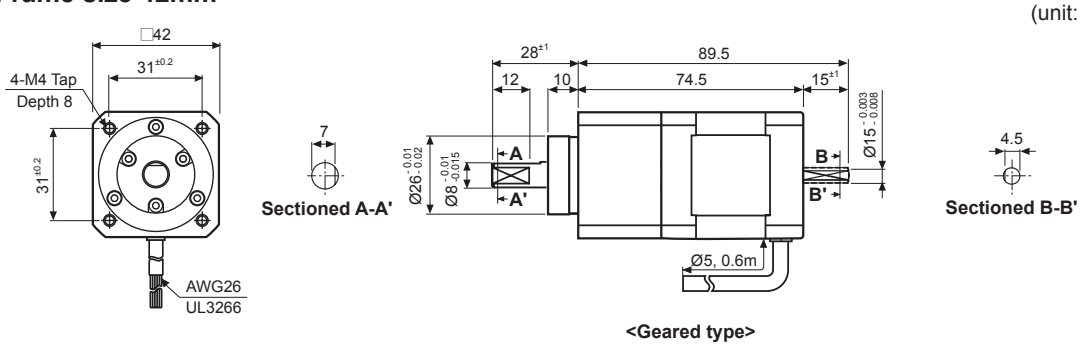
Frame size
60mm Rotary Actuator type | **60mm Rotary Actuator+ Built-in brake type**

▣ Dimensions

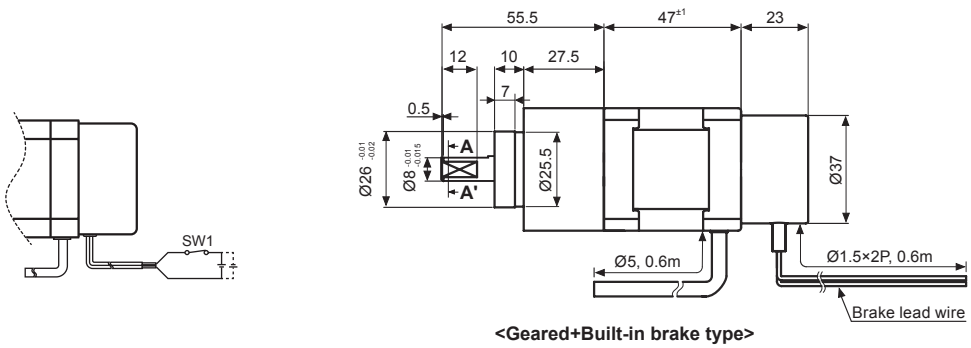
※These dimensions are for dual shaft models. Single shaft models do not include shafts indicated in the dotted lines.
※For flexible coupling (ERB Series) information, refer to F-64.
(frame size 60mm, 80mm: Geared type, Geared+Built-in brake type)
※Brake is non-polar and be sure to observe rated excitation voltage (24VDC).
※SW1 ON : Brake Release / SW1 OFF : Brake Execute

◎ Frame size 42mm

(unit: mm)



<Geared type>

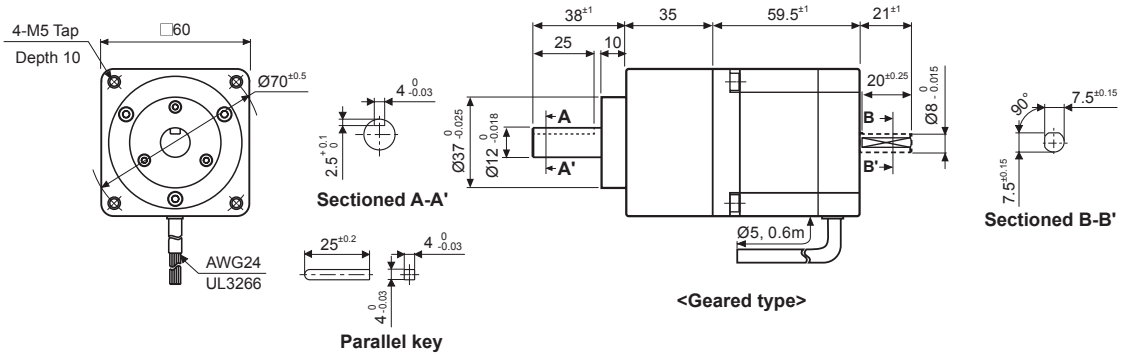


<Geared+Built-in brake type>

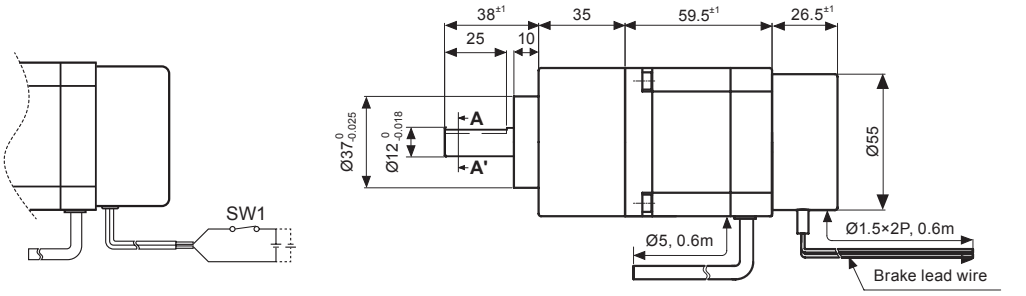
▣ Dimensions

◎ Frame size 60mm

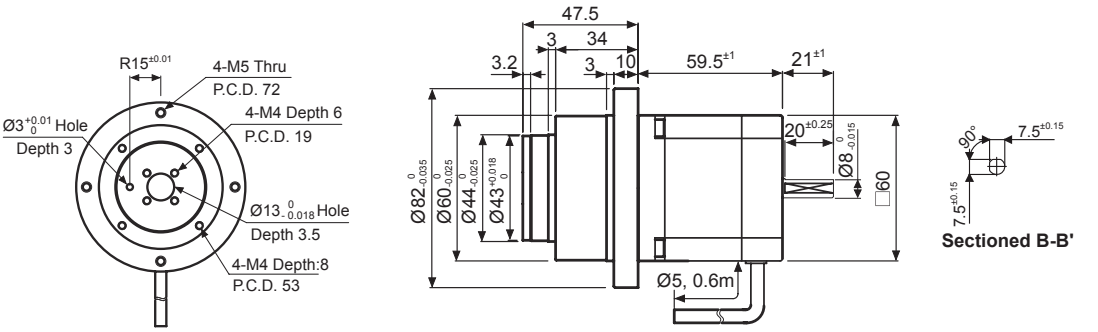
(unit: mm)



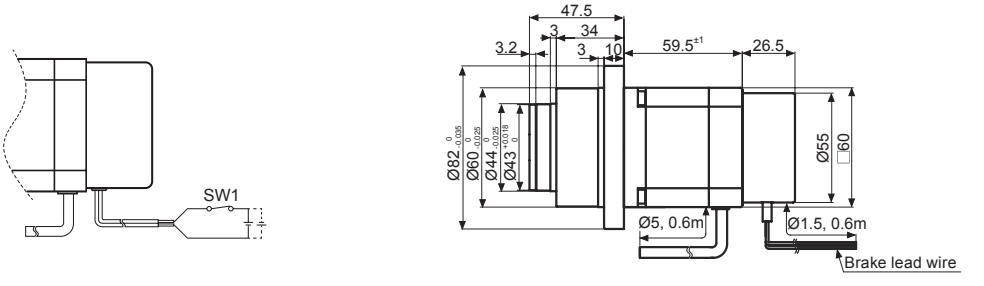
<Geared type>



<Geared+Built-in brake type>



<Rotary actuator type>

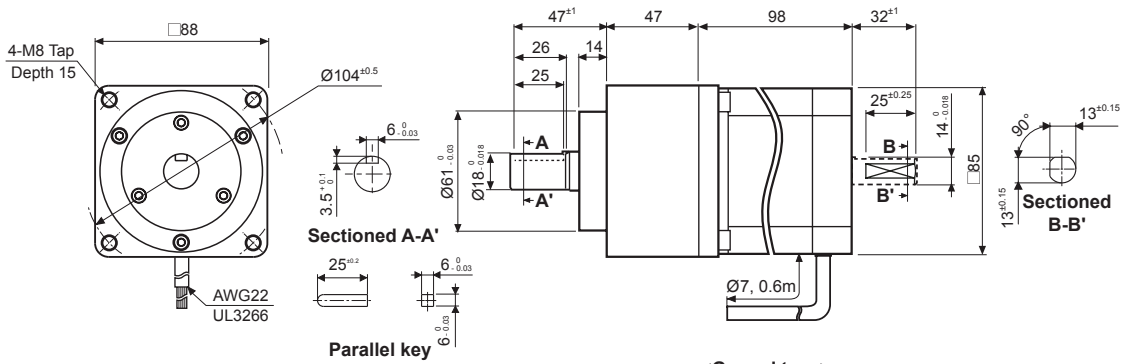


<Rotary actuator+Built-in brake type>

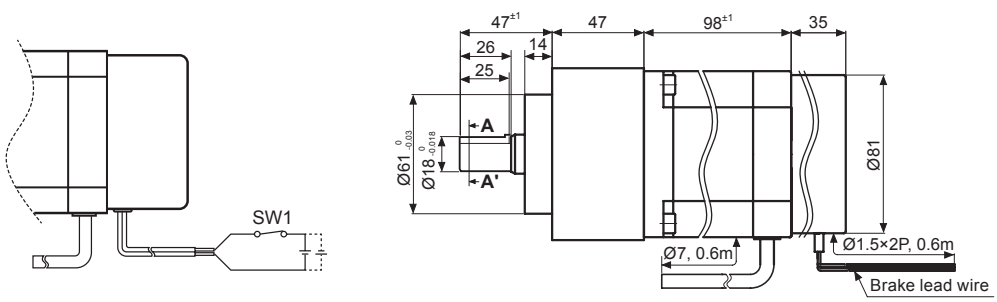
▣ Dimensions

◎ Frame size 85mm

(unit: mm)



<Geared type>

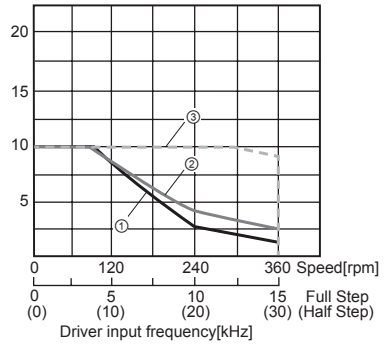


<Geared+Built-in brake type>

▣ Characteristic

● A10K-S545(W)-G5
A10K-S545-GB5

Torque (kgf·cm) ※fs: Max. starting torque

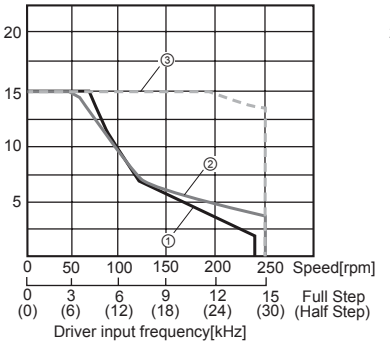


① Driver MD5-ND14, Power 24VDC, Setting current 1.4A/Phase
② Driver MD5-HD14, Power 24VDC, Setting current 1.4A/Phase
③ Driver MD5-HF14, Power 220VAC, Setting current 1.4A/Phase

① fs:3.1kpps
② fs:3.2kpps
③ fs:3.2kpps

● A15K-S545(W)-G7.2
A15K-S545-GB7.2

Torque (kgf·cm) ※fs: Max. starting torque

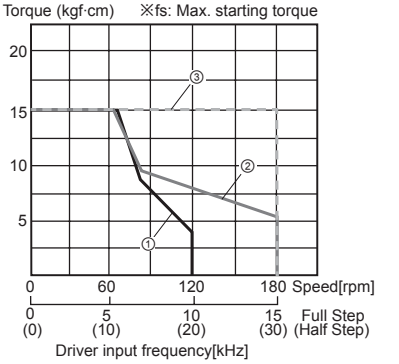


① Driver MD5-ND14, Power 24VDC, Setting current 1.4A/Phase
② Driver MD5-HD14, Power 24VDC, Setting current 1.4A/Phase
③ Driver MD5-HF14, Power 220VAC, Setting current 1.4A/Phase

① fs:3.2kpps
② fs:3.3kpps
③ fs:3.4kpps

● A15K-S545(W)-G10
A15K-S545-GB10

Torque (kgf·cm) ※fs: Max. starting torque

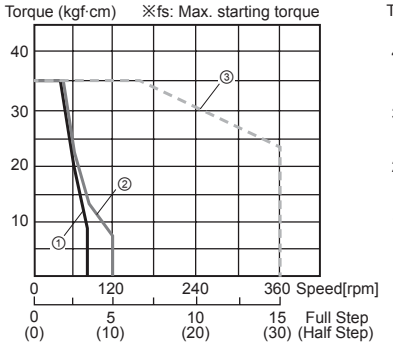


① Driver MD5-ND14, Power 24VDC, Setting current 1.4A/Phase
② Driver MD5-HD14, Power 24VDC, Setting current 1.4A/Phase
③ Driver MD5-HF14, Power 220VAC, Setting current 1.4A/Phase

① fs:3.3kpps
② fs:3.3kpps
③ fs:3.4kpps

● A35K-M566(W)-□5
A35K-M566-□B5

Torque (kgf·cm) ※fs: Max. starting torque

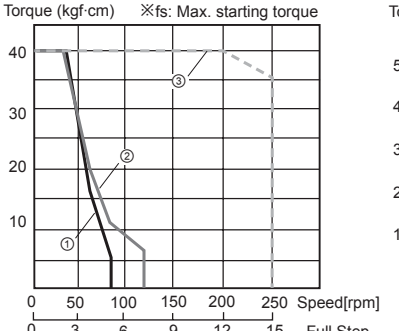


① Driver MD5-ND14, Power 24VDC, Setting current 1.4A/Phase
② Driver MD5-HD14, Power 24VDC, Setting current 1.4A/Phase
③ Driver MD5-HF14, Power 220VAC, Setting current 1.4A/Phase

① fs:2.3kpps
② fs:2.3kpps
③ fs:2.6kpps

● A40K-M566(W)-□7.2
A40K-M566-□B7.2

Torque (kgf·cm) ※fs: Max. starting torque

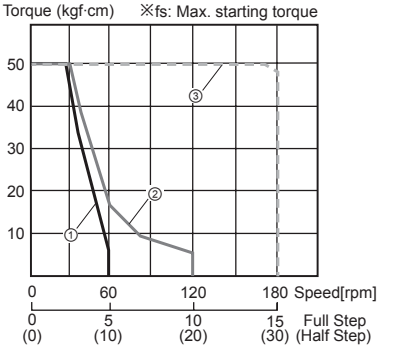


① Driver MD5-ND14, Power 24VDC, Setting current 1.4A/Phase
② Driver MD5-HD14, Power 24VDC, Setting current 1.4A/Phase
③ Driver MD5-HF14, Power 220VAC, Setting current 1.4A/Phase

① fs:2.2kpps
② fs:2.3kpps
③ fs:2.6kpps

● A50K-M566(W)-□10
A50K-M566-□B10

Torque (kgf·cm) ※fs: Max. starting torque

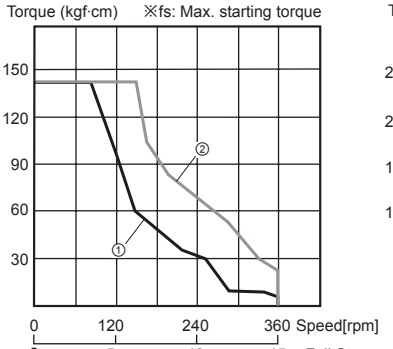


① Driver MD5-ND14, Power 24VDC, Setting current 1.4A/Phase
② Driver MD5-HD14, Power 24VDC, Setting current 1.4A/Phase
③ Driver MD5-HF14, Power 220VAC, Setting current 1.4A/Phase

① fs:2.3kpps
② fs:2.3kpps
③ fs:2.8kpps

● A140K-□599(W)-G5
A140K-□599-GB5

Torque (kgf·cm) ※fs: Max. starting torque

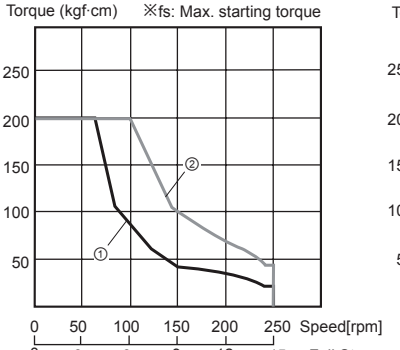


① Driver MD5-HF14, Power 220VAC, Setting current 1.4A/Phase
② Driver MD5-HF28, Power 220VAC, Setting current 2.8A/Phase

① fs:1.8kpps
② fs:2.1kpps

● A200K-□599(W)-G7.2
A200K-□599-GB7.2

Torque (kgf·cm) ※fs: Max. starting torque

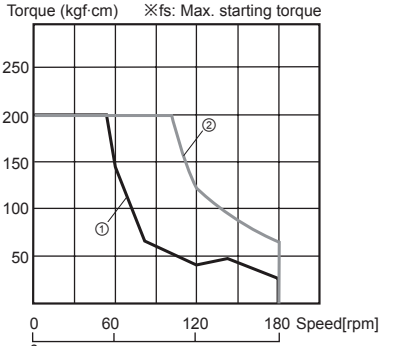


① Driver MD5-HF14, Power 220VAC, Setting current 1.4A/Phase
② Driver MD5-HF28, Power 220VAC, Setting current 2.8A/Phase

① fs:1.8kpps
② fs:2.1kpps

● A200K-□599(W)-G10
A200K-□599-GB10

Torque (kgf·cm) ※fs: Max. starting torque



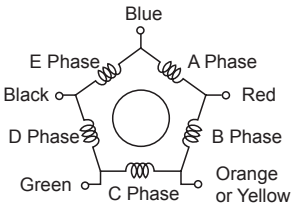
① Driver MD5-HF14, Power 220VAC, Setting current 1.4A/Phase
② Driver MD5-HF28, Power 220VAC, Setting current 2.8A/Phase

① fs:1.9kpps
② fs:2.1kpps

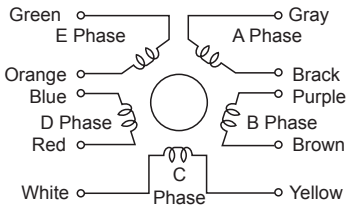
▣ Connection Diagram

Refer to the below for correlations of motor's each phase(coil) and the color of lead wire.
Note that Pentagon connection type is a standard model.(Standard connection type is an option model.)

● **Pentagon wiring (Standard)**



● **Standard wiring (Option)**



In case of connecting standard connection type models to motor drivers, make sure that motor's lead wire connection must be made as specified in the table.

Lead wire color for standard connection type	Lead wire color for pentagon connection type
Gray+Red	Blue
Yellow+Black	Red
Orange+White	Orange
Brown+Green	Green
Blue+Purple	Black

▣ Motor Installation

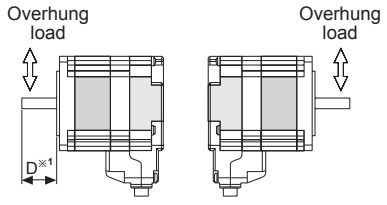
◎ Shaft type, hollow shaft type, geared type stepper motor

● Motor installation direction

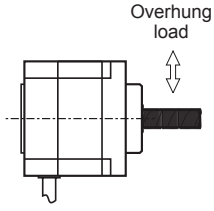
The motor can be installed in any direction horizontally, or vertically. Please take careful consideration of shaft overhung load and thrust load under all conditions.

1) Overhung load: A type of load to be applied in vertical directions on the shaft having effect on output shaft and bearings to shorten its life cycle. In case excessive overhung load is applied on the shaft, it may cause bearing damage, output shaft bending or fatigue failure caused by repeatedly applied excessive load.
2) Thrust load: A type of load to be applied in parallel directions on the shaft having direct effect on output shaft and bearings to shorten its life cycle. In case excessive thrust load is applied on the shaft, it may cause bearing damage, output shaft bending or fatigue failure caused by repeatedly applied excessive load.

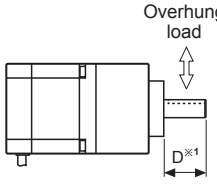
● **Horizontal**



< Shaft type >



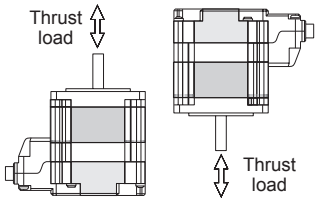
< Hollow shaft type >



< Geared type >

※1: The distance from the shaft in front (mm)

● **Vertical facing up, down**



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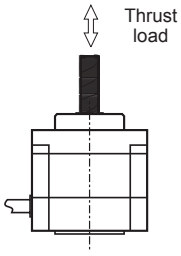

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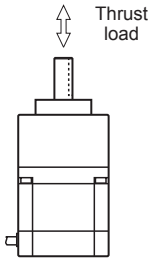


< Geared type >

Refer to the table below for allowable overhung load / thrust load for shaft type stepper motor.

Motor frame size	Permissible overhung load [kgf(N)] by distance from shaft tip (mm)					Permissible thrust load
	D=0	D=5	D=10	D=15	D=20	
24mm	2(20)	2.5(25)	3.4(33)	—	—	Under the load of motor
42mm	2(20)	2.5(25)	3.4(33)	5.2(51)	—	
60mm	6.3(62)	7.5(74)	9.5(93)	13(127)	19(186)	
85mm	26(255)	29(284)	34(333)	39(382)	48(470)	

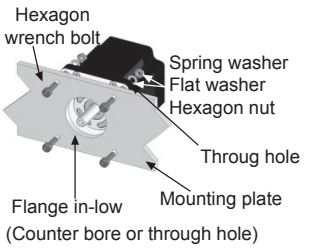
Refer to the table below for allowable overhung load / thrust load for geared type stepper motor.

Motor frame size	Permissible overhung load [kgf(N)] by distance from shaft tip (mm)					Permissible thrust load
	D=0	D=5	D=10	D=15	D=20	
42mm	7.3(72)	8.4(82)	10(98)	12.3(121)	—	5(49)
60mm	25(245)	27(265)	30(294)	34(333)	39(382)	10(98)
85mm	48(471)	54(530)	60(588)	68(667)	79(775)	30(294)

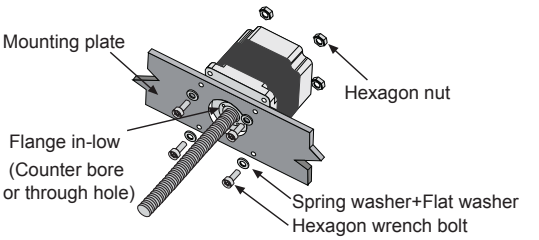
● Motor installation method

When installing the motor, carefully consider heat radiation and vibration resistance. Mount the unit tightly on the surface of a metal with high thermal conductivity. (steel, aluminum, etc.) Use hexagon bolts, spring washers and flat washers when installing the motor. Please refer to the table below for mounting plate thickness and bolt types.

● Through hole type

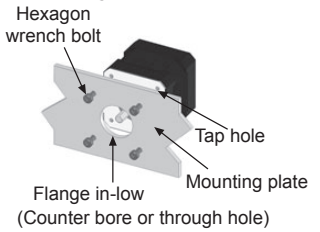


< Shaft type >

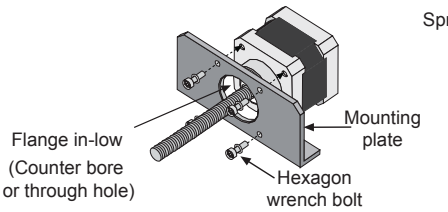


< Hollow shaft type >

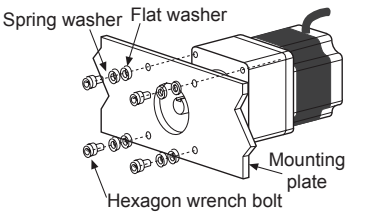
● Tap hole type



< Shaft type >



< Hollow shaft type >



< Geared type >

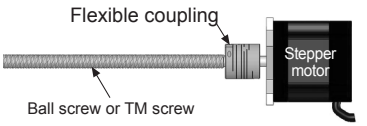
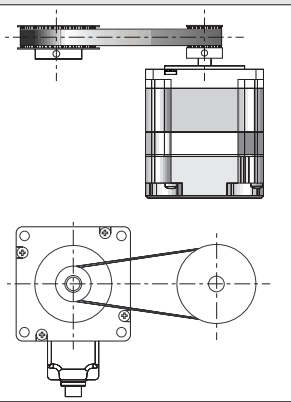
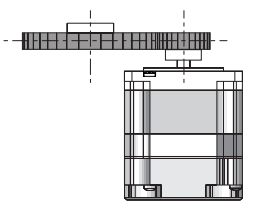
Motor frame size	Mounting plate thickness	Applied bolt
24mm	Min. 3mm	M2.6
42mm	Min. 4mm	M3
60mm	Min. 5mm	M4
85mm	Min. 8mm	M6

Motor frame size	Mounting plate thickness	Applied bolt
42mm	Min. 4mm	M3
60mm	Min. 5mm	M4
85mm	Min. 8mm	M6

Motor frame size	Mounting plate thickness	Applied bolt
42mm	Min. 5mm	M4
60mm	Min. 8mm	M5
85mm	Min. 12mm	M8

● Connection with load (shaft type, geared type stepper motor)

When connecting the load, be sure of the center, tension of the belt, and parallel of the pulley. When connecting the load such as a pulley, a belt, be sure of the allowable thrust load, radial load, and shock. Tighten the screw for a coupling or a pulley not to be unscrewed. When connecting a coupling or a pulley on the motor shaft, be sure of damage of the motor shaft and the motor shaft bearing. Do not disassemble or modify the motor shaft to connect with the load.

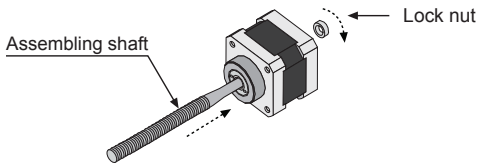
Direct load connection with coupling	Load connection with pulley, belt, and wire	Load connection with gear
 ※Use Autonics flexible coupling (ERB Series).		
When connecting the load directly (ball screw, TM screw, etc) to the motor shaft, use a flexible coupling as shown in the above figure. If the center of the load is not matched to that of shaft, it may cause severe vibration, shaft damage or shortened life cycle of the shaft bearing.	The motor shaft and the load shaft should be parallel. Connect the motor shaft and the line which connects the center of two pulleys to a right angle.	The motor shaft and the load shaft should be parallel. Connect the motor shaft to the center of gear teeth side to be interlocked.

● Shaft assembly for hollow shaft type motor

Make sure that external shaft assembly into motors must be made as sturdy as possible. If not, motor's torque might not be thoroughly transmitted to the shaft. In case no additional shaft assembly changes would be made, it is recommended to apply adhesives on bolt fixing part.

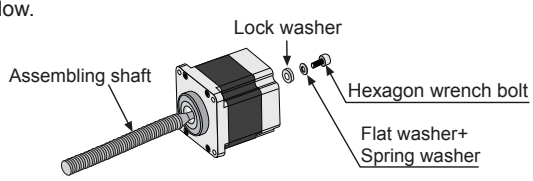
1. Tap hollow shaft type motor

Use pliers to fasten lock nut tightly as shown in the figure below.



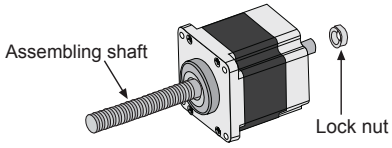
2. Through hole type motor with single shaft

Use hexagon wrench bolt, spring washer, flat washer and lock washer to fasten the shaft tightly as shown in the figure below.



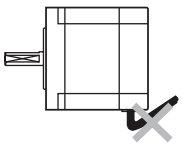
3. Through hole type motor with dual shaft

Use a lock nut to fasten the shaft tightly as shown in the figure below.

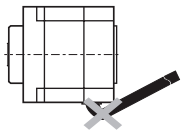


● Caution during install the motor

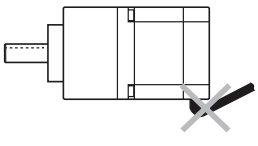
Do not apply excessive force on motor cable when mounting motors.
Do not forcibly pull or insert the cable. It may cause poor connection or disconnection of the cable.
In case of frequent cable movement required application, proper safety countermeasures must be ensured.



< Shaft type >



< Hollow shaft type >



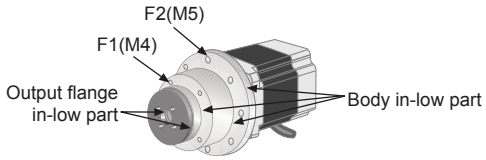
< Geared type >

◎ Rotary actuator type stepper motor

● Motor installation method

①With considering heat radiation and vibration isolation, make sure the motor's in-low to be kept as close as possible against a metal panel having high thermal conductivity such as iron or aluminum. Make sure to use mounting plates with thickness more than 8mm.

②As shown in the figure below, total 4 mounting TAP holes on F1 and F2 are used to fix rotary actuator. In case of using M4, screw tightening torque is 2N·m and 4.4N·m when using M5.



③Do not apply excessive force on motor cable when installing rotary actuators. Do not forcibly pull or insert the cable. It may cause poor connection or disconnection of the cable. In case of frequent cable movement required application, proper safety countermeasures must be ensured.

● Motor operation

Observe the rated product specification.
① Do not apply rotational load on the motor while it stops.
② Do not apply excessive load on the motor while driving. It may cause motors to miss a step.
③ Use a sensor for home searching or division completed position detecting.

● Installation of accessories (index table, arm, etc.)

① Mount the accessory (index table or arm) on output axis flange using M4 screw. Note that Ø13 in-low part is processed with C0.3. It is necessary to process the accessory under C0.2 to mount. Place a positioning pin on flange's positioning hole and push it in. Make sure not to place the pin on output flange.
② Do not use a hammer to mount the accessory (table or arm). It may cause product damage. Mount the accessory with hands in a gentle manner.
③ Make sure that accessory mounted on output axis to be fixed as tight as possible. It may cause an accident if an actuator is detached from the motor while driving.

● Application example

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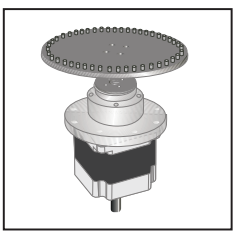
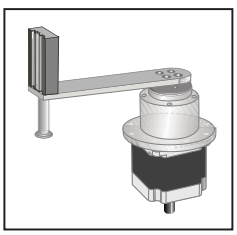
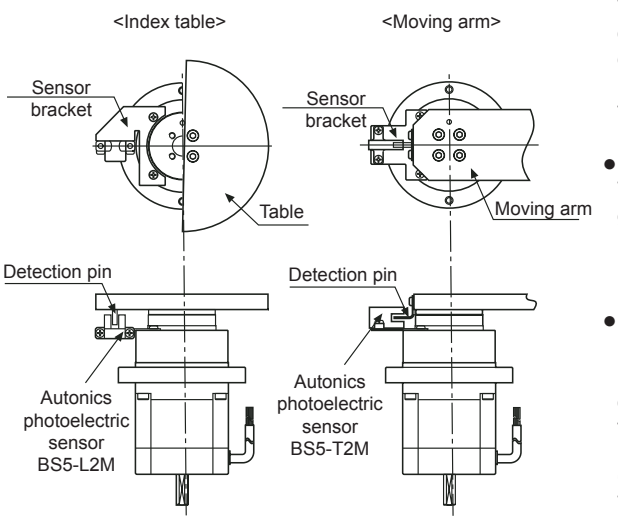


<Moving arm>



● **Examples of installed sensor**



※Install an additional sensor to detect home position and to ensure motor's positioning, number of rotation and its speed.

▣ Installation Conditions

Install the motor in a place that meets certain conditions specified below. It may cause product damage if instructions are not following.

① The inner housing installed indoor (This unit is manufactured for attaching to equipment. Install a ventilation device.)
② Within -10 to 50℃ (at non-freezing status) of ambient temperature
③ Within 35 to 85%RH (at non-dew status) of ambient humidity
④ The place without explosive, flammable and corrosive gas
⑤ The place without direct ray of light
⑥ The place where dust or metal scrap is not entered into the unit
⑦ The place where water, oil, or other liquid are not touched
⑧ The place where strong alkali or acidity does not exist closely
⑨ The place where easy heat dissipation could be made
⑩ The place where no continuous vibration or severe shock
⑪ The place with less salt content
⑫ The place with less electronic noise occurs by welding machine, motor, etc.
⑬ The place where no radioactive substances and magnetic fields exist. It shall be no vacuum status as well.

▣ Cautions During Use

● **Do not disassemble or modify the product.**
It may cause malfunction due to small dregs. Once disassembling the motor, its performance would significantly decline.

● **Do not impact the motor.**
The air-gap, the distance between rotator and stator is processed as 0.05mm, but if it is impacted, the balance of air-gap can be broken and it may cause a malfunction. This encoder consists of precision components. Therefore, if it is dropped or has strong shock, it may lose the function or generates wrong output pulses.

● **Use the motor within the rated torque range.**
The rated torque range indicates the maximum value of mechanical strength of gear part and the total of ac/deceleration torque of start/stop and friction torque shall not be exceed the rated torque range, or, it may cause the breakdown of gear.

● **Use the motor within the rated speed range.**
The rated speed range includes the revolution number of gear and pulse speed of motor. Use the motor within the rated speed range, or, it may shorten the life cycle of gear part. (Backlash is increased.)

● **Be careful of backlash when positioning the motors in both CW/CCW directions.**
Backlash refers to the displacement occurred on motor's output shaft while gear's input axis is fixed. Geared type stepper motors are to realize high accuracy and low backlash. When positioning the motors in both CW/CCW directions, however, backlash may possibly occur. Therefore, make sure that motor positioning will be made in one single direction in case of geared type motors.

● **Temperature rise**
The surface temperature of motor shall be under 100℃ and it can be significantly increased in case of running motor by constant current drive. In this case, use the fan to lower the temperature forcedly.

● **Using at low temperature.**
Using motors at low temperature may cause reducing maximum starting / driving characteristics of the motor as ball bearing's grease consistency decreases due to low temperature. (Note that the lower the bearing's grease consistency, the higher the bearing's friction torques.) Start the motor in a steady manner since motor's torque is not to be influenced.

● **Clack sound when using electromagnetic brake**
In case of Built-in brake type motors, there occurs certain sound while turning on/off the power to the motor. This is not a product failure symptom. Do not strike or disassemble the product for this.

● **Using electromagnetic brake**
Release brake force first by supplying the power to brake before starting the motor. If not, it may cause product malfunction and shortened life cycle of brake due to brake pad wear-out.