Autonics

Geared-Brake 5-Phase STEPPING MOTOR

M A N U A L

CE

60각 Geared Brake type

85각 Geared Brake type

Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

■ Caution for your safety

※Please keep these instructions and review them before using this unit.

※Please observe the cautions that follow;

⚠Warning Serious injury may result if instructions are not followed.

⚠Caution Product may be damaged, or injury may result if instructions are not followed.

※The following is an explanation of the symbols used in the operation manual.
⚠ Caution: Injury or danger may occur under special conditions.

⚠Warning

1. **In case of using this unit with machinery(nuclear power control, medical equipment, vehicle, train, airplane, combution apparatus, entertainment or safty device, etc.), it is required to install fail-safe device, or contact us for information required.**
   It may cause a fire, human injury or property loss.
2. **Do not use this unit where flammable or explosive gas, corrosion and water exist.**
   It may cause a fire or burn.
3. **Installation, connection, operation, control, maintenance should be carried out by person who has been qualified.**
   It may cause a fire or human injury, give electronic shock.
4. **Please install it in power off.**
   It may give electronic shock.
5. **Please earth or install it with housing so that protecting a touch of human body.**
   It may give electronic shock or human injury.
6. **Do not disassemble or modify this unit.**
   It may cause damage to this product or quality down.

⚠Caution

1. **Please keep the specification of this unit.**
   It may cause damage to this product.
2. **Do not put obstacle object for well ventilation around this unit.**
   It may cause a damage to this product or malfunction of peripheral equipment by motor heating.
3. **Please fix this unit on a metal plate tightly.**
   It may cause human injury or damage of this product and peripheral device.
4. **Please stop this unit when mechanical trouble occurred.**
   It may cause a fire or human injury.
5. **Do not inordinate impact or continuous vibration to this unit.**
   It may cause malfunction of this product.
6. **The surface temperature of the motor is possible to over 70℃ in normal operating state. Please put a caution mark on outstanding place when somebody may approach to the operating motor.**
   It may cause a burn.
7. **Do not use the brake for safety.**
   It may cause breakdown or malfunction of peripheral device.
8. **Do not carry the cable or rotating part of this unit.**
   It may cause damage to this product or human injury.
9. **Please put a cover on the rotating part of this unit.**
   It may cause human injury.
10. **Please separate as industrial scrapped material when disuse this unit.**

■ Ordering information

A 35K - M 5 6 6 - GB 5

Gear ratio	**5**	1:5
	7.2	1:7.2
	10	1:10
Motor type	**GB**	Geared-Brake type
Motor length	**6**	59.5mm
	9	98mm
Motor frame size(width×length)	**6**	□60 (60mm×60mm)
	9	□85 (85mm×85mm)
Motor phase	**5**	5 phase
Rated current	**M**	1.4 A/Phase
	G	2.8 A/Phase
Max. allowable torque	**Square**	kgf·cm(Refer to motor specification)
	Autonics motor	

※**The above specifications are subject to change without notice.**

■ Specifications

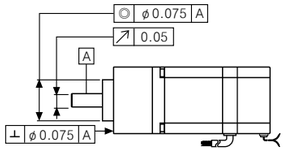
□60				
Model		**A35K-M566-GB5**	**A40K-M566-GB7.2**	**A50K-M566-GB10**
Max. allowable torque(※1)		35 kgf.cm (3.5 N.m)	40 kgf.cm (4.0 N.m)	50 kgf.cm (5.0 N.m)
Rotor moment of inertia(※2)		280 g.cm² (280x10⁻⁷ kg.m²)		
Rated current		1.4 A/Phase		
Basic step angle		0.144 ˚ /0.072 ˚ (Full/Half)	0.1 ˚ /0.05 ˚ (Full/Half)	0.072 ˚ /0.036 ˚ (Full/Half)
Gear ratio		1:5	1:7.2	1:10
Allowable speed range		0 to 360rpm	0 to 250rpm	0 to 180rpm
Backlash		±20'(0.33 ˚)		
Electro-Magnetic Brake	Rated excitation voltage	24VDC(non- polarity)		
	Rated excitation current	0.33A		
	Static friction torque	4kgf.cm		
	Rotation part Inertia	2.5×10^{-6} kg.m²		
	Insulation class	CLASS E(120℃)		
	B type Brake	For power on, brake is releasing and power off, brake is operating		
	Operating time	Max. 22ms		
	Releasing time	Max. 37ms		
Unit weight		Approx. 1.4kg		

□85						
Model	**A140K-M599-GB5**	**A140K-G599-GB5**	**A200K-M599-GB7.2**	**A200K-G599-GB7.2**	**A200K-M599-GB10**	**A200K-G599-GB10**
Max. allowable torque (※1)	140 kgf·cm(14 N·m)		200 kgf·cm(20 N·m)		200 kgf·cm(20 N·m)	
Rotor moment of inertia(※2)	2,700 g·cm²(2,700x10⁻⁷ kg·m²)					
Rated current	1.4 A/Phase	2.8 A/Phase	1.4 A/Phase	2.8 A/Phase	1.4 A/Phase	2.8 A/Phase
Basic step angle	0.144 ˚ / 0.072 ˚ (Full/Half)		0.1 ˚ / 0.05 ˚ (Full/Half)		0.072 ˚ / 0.036 ˚ (Full/Half)	
Gear ratio	1:5		1:7.2		1:10	
Allowable speed range	0 to 360rpm		0 to 250rpm		0 to 180rpm	
Backlash	±15'(0.25 ˚)					
Electro-Magnetic Brake: Rated excitation voltage	24VDC(non- polarity)					
Rated excitation current	0.62A					
Static friction torque	40kgf.cm					
Rotation part Inertia	42.5×10^{-6} kg.m²					
Insulation class	CLASS B(130℃)					
B type Brake	For power on, brake is releasing and power off, brake is operating					
Operating time	Max. 80ms					
Releasing time	Max. 70ms					
Unit weight	Approx. 5.6kg					

※ **1**: Max. allowable torque is standable torque when supply the rated current and stop the motor.
※ **2**: Moment of rotor inertia indicates a part, except Gear-Head part.

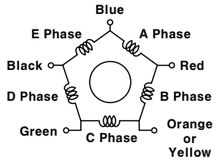
Common specification		
Operation type		Planetary Geared type
Insulation class		CLASS B(130℃)
Insulation resistance		Min. 100MΩ (at 500VDC megger) between Motor coil-case
Dielectric strength		1 kVAC(at 0.75 A/Phase is 0.5 kVAC) 50/60Hz for 1 min. between Motor coil-case
Temperature rise		5-Phase excitation for rated current, below 80℃ at stop status (resistance method)
Environ-ment	Ambient Temperature	-10 to 50℃, Storage: -25 to 85℃
	Ambient Humidity	35 to 85%RH, Storage: 35 to 85%RH
Positional accuracy(※1)		±3'(±0.05 ˚)
Shaft vibration(※4)		0.05 T.I.R.[mm]
Radial Movement(※2)		0.025[mm] Max.(Load 5N)
Axial Movement(※3)		0.075[mm] Max.(Load 10N)
Concentricity for shaft of setup in low		0.075 T.I.R.[mm]
Perpendicularity of seating plane shaft		0.075 T.I.R.[mm]
Protection		IP30(IEC34-5 standards)

※ **1**: This vaule is when full-step and no-load (It varies as load size.)
※ **2**: It is shaft displacement quantity of radial direction when load 5N is added to edge part of the motor shaft to vertical way.
※ **3**: It is shaft displacement quantity of axis direction when load 10N is added to the motor shaft to axis way.
※ **4**: T.I.R.(Total Indicator Reading): In case of making 1 rotation with the standard point as the center, it indicates the whole quantity of dial gauge.
※ Rotation direction of the Motor and the Gear Head output axis is same.
※ Environment resistance is rated at no freezing or condensation.



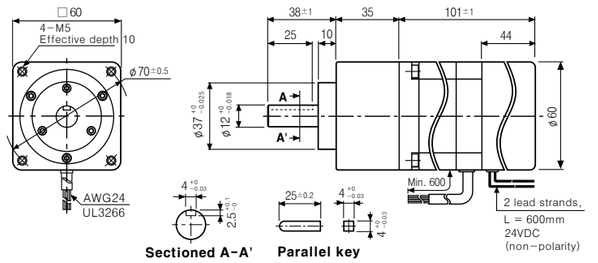
■ Connection diagram

Our 5 phase stepping motor is internally wired in a pentagon connection.
Therefore, it is a proper product for the driver working as a bipolar pentagon driving method of 5 phase stepping motor drivers.
The figure shows the relationship of inside each phase and wire color of stepping motor.

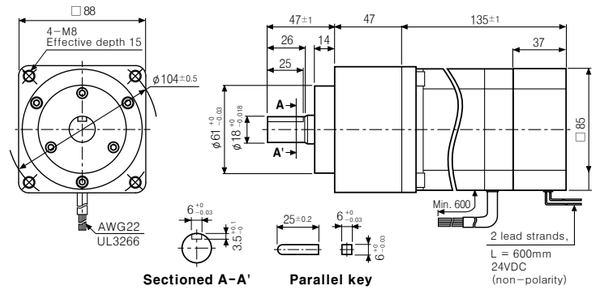


■ Dimensions

◎□60 (Unit: mm)



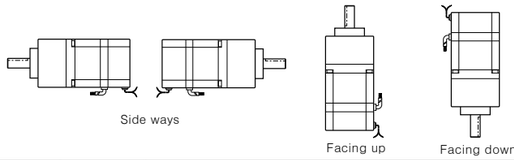
◎□85



■ Installation

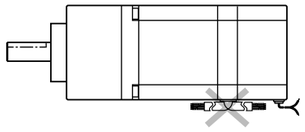
1. Mounting direction

Motors can be mounted in any directions - facing up, facing down and side ways. No matter which direction motors to be mounted, be sure not to apply overhung or thrust load on the shaft.
Refer to the table below for allowable shaft overhung load/ thrust load.



Motor size	The distance from the shaft in front (mm), Allowable overhung load[kgf(N)]					Allowable thrust load
	0	5	10	15	20	
□60	25(250)	27(270)	30(300)	34(340)	39(390)	10(100)
□85	48(480)	54(540)	60(600)	68(680)	79(790)	30(300)

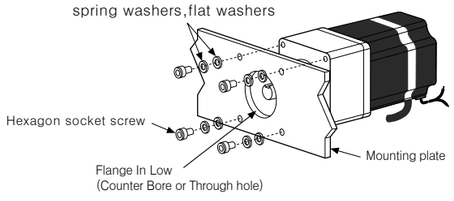
Do not apply excessive force on motor cable when mounting motors. Do not forcibly pull or insert the cable. It may cause poor connection or disconnection of the cable. In case of frequent cable movement required application, proper safety countermeasures must be ensured.



2. Motor mounting

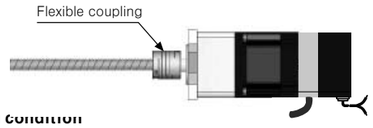
With considering heat radiation and vibration isolation, mount the motor as tight as possible against a metal panel having high thermal conductivity such as iron or aluminum.
When mounting motors, use hexagon wrench screws, spring washers and flat washers.
Refer to the table below for allowable thickness of mounting plate and using screw.

Motor size	The thickness of mounting plate	Using screw
□60	Min. 8mm	M5
□85	Min. 12mm	M8



3. Connection with load

In case of using motors with connecting a load - Ball screw or TM screw - to motor's shaft, make sure to use flexible couplings as shown in the figure below.
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 bearings.
Do not disassemble or modify motor shaft in order to connect a load. Contact us if it is required. In case of making connection with a pulley or a belt, be sure to observe allowable Thrust load and Radial load. Make sure no severe vibration applied on shaft.



4. Installation condition

Install the motor in a place that meets certain conditions specified below.
It may cause product damage if instructions are not following.
① It shall be used indoors.
(This product is designed / manufactured to be installed on machinery as a part.)
② Within -10℃ to 50℃ (at non-freezing status) of ambient temperature
③ Within 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 without dust, dregs, etc.
⑦ The place without water, oil, etc.
⑧ The place where easy heat dissipation could be made
⑨ The place where no continuous vibration or severe shock
⑩ The place with less salt content
⑪ The place with less electronic noise occurred by welding machine, motor, etc.
⑫ The place where no radioactive substances and magnetic fields exist.
It shall be no vacuum status as well.

■ Caution for using

1. Do not disassemble or modify the product.
   It may cause a malfunction due to small dregs. Once disassembling the motor, its performance would significantly decline.
2. 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.
3. Use the motor within the allowable torque range.
   The allowable 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 allowable torque range, or it may cause the breakdown of gear.
4. Use the motor within the allowable speed range.
   The allowable speed range includes the revolution number of gear and pulse speed of motor. Use the motor within the allowable speed range, or it may shorten the life cycle of gear part. (Backlash is increased.)
5. 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 stepping 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.
6. 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.
7. 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.
8. Clack sound of electromagnetic brake
   When operating or releasing electro-magnetic brake, this machine may occur clack sound. Be assured that it is not the cause of malfunction, and do not hit or disassemble the motor.
9. Usage of Electro-magnetic brake
   When drive the motor, supply power to electro-magnetic brake for releasing the brake. If not supply power, it may cause abnormal motor operation, that the brake pad of electro-magnetic brake is worn. And it may also cause shorten product life cycle, reducing the rated static friction torque.

※**It may cause malfunction if above instructions are not followed.**

■ Major products

- Proximity sensors
- Photoelectric sensors
- Fiber optic sensors
- Area sensors
- Door/Door side sensors
- Temperature controllers
- Temperature/Humidity transducers
- Sensor controllers
- Graphic/Logic panels
- Power controllers
- Tachometer/Pulse(Rate) meters
- Switching power supplies
- Stepping motors/drivers/motion controllers
- Field network devices
- Laser marking system(CO_2, Nd:YAG)
- Laser welding/soldering system
- Counters
- Timers
- Display units
- Panel meters
- Rotary encoders
- Pressure sensors

Autonics Corporation
http://www.autonics.com
Satisfiable Partner For Factory Automation
■**HEAD QUARTERS :**
41-5, Yongdang-dong, Yangsan-si, Gyeongnam, 626-847, Korea
■**OVERSEAS SALES :**
Bldg. 402 3rd FL., Bucheon Techno Park, 193, Yakdae-dong, Wonmi-gu, Bucheon-si, Gyeonggi-do, 420-734, Korea
TEL : 82-32-610-2730 / FAX : 82-32-329-0728
■**E-mail :** sales@autonics.com
The proposal of a product improvement and development :product@autonics.com

EP-KE-10-0005D