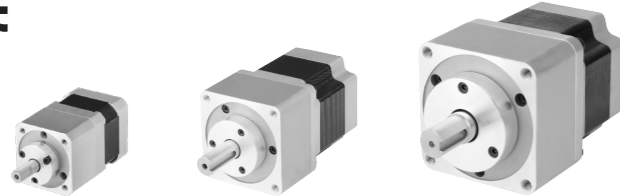


# Autonics GEARED TYPE 5 PHASE STEPPER MOTOR

## INSTRUCTION MANUAL



[Frame size 42mm] [Frame size 60mm] [Frame size 85mm]

Thank you for choosing our Autonics product.

Please read the following safety considerations before use.

### ■ Safety Considerations

※Please observe all safety considerations for safe and proper product operation to avoid hazards.

※ symbol represents caution due to special circumstances in which hazards may occur.

**Warning** Failure to follow these instructions may result in serious injury or death.

**Caution** Failure to follow these instructions may result in personal injury or product damage.

### ⚠ Warning

**1. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.** (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)  
Failure to follow this instruction may result in fire, personal injury, or economic loss.

**2. Fix the unit on the metal plate.**

Failure to follow this instruction may result in personal injury, or product and ambient equipment damage.

**3. Do not connect, repair, or inspect the unit while connected to a power source.**

Failure to follow this instruction may result in fire.

**4. Install the unit after considering counter plan against power failure.**

Failure to follow this instruction may result in personal injury, or economic loss.

**5. Check 'Connections' before wiring.**

Failure to follow this instruction may result in fire.

**6. Do not disassemble or modify the unit.**

Failure to follow this instruction may result in electric shock or fire.

**7. Install the motor in the housing or ground it.**

Failure to follow this instruction may result in electronic shock, fire, or personal injury.

**8. Make sure to install covers on motor rotating components.**

Failure to follow this instruction may result in personal injury.

**9. Do not touch the unit during or after operation for a while.**

Failure to follow this instruction may result in burn due to high temperature of the surface.

**10. Turn OFF the power directly when error occurs.**

Failure to follow this instruction may result in electric shock, fire, or personal injury.

### ⚠ Caution

**1. Use the unit within the rated specifications.**

Failure to follow this instruction may result in fire or product damage.

**2. Use dry cloth to clean the unit, and do not use water or organic solvent.**

Failure to follow this instruction may result in fire.

**3. Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**

Failure to follow this instruction may result in fire or explosion.

**4. The motor may overheat depending on the environment.**

Install the unit at the well-ventilated environment and forced cooling with a cooling fan.

Failure to follow this instruction may result in product damage and degradation.

### ■ Ordering Information

**A**10K - **M**545 - **W**-**G**5

Gear ratio	5	1:5
	7.2	1:7.2
Motor type	G	Geared type
	No mark	Single shaft
Motor length	W	Dual shaft
Motor frame size	4	42×42mm
	6	60×60mm
	9	85×85mm
Motor phase	5	5 phase
	S	0.75 A/Phase
Rated current	M	1.4 A/Phase
	G	2.8 A/Phase
Max. holding torque	Square	kgf-cm (Refer to motor specification)
	A	Autonics motor

※The above specifications are subject to change and some models may be discontinued without notice.  
※Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

### ■ Specifications

Frame size 42mm			
Model	A10K-S545(W)-G5	A15K-S545(W)-G7.2	A15K-S545(W)-G10
Max. holding torque*1	10 kgf-cm (1.0 N-m)	1.5 kgf-cm (1.5 N-m)	
Rotor moment of inertia*2	68 g-cm <sup>2</sup> (68×10 <sup>-7</sup> kg m <sup>2</sup> )		
Rated current	0.75A/Phase		
Basic step angle	0.144 /0.072 (Full/Half step)	0.1 /0.05 (Full/Half step)	0.072 /0.036 (Full/Half step)
Permissible speed range	0 to 360 rpm	0 to 250 rpm	0 to 180 rpm
Backlash [min]	±3' (0.58)		
Weight*3	Approx. 0.68kg (approx. 0.58kg)		

Frame size 60mm			
Model	A35K-M566(W)-G5	A40K-M566(W)-G7.2	A50K-M566(W)-G10
Max. holding 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-cm <sup>2</sup> (280×10 <sup>-7</sup> kg m <sup>2</sup> )		
Rated current	1.4A/Phase		
Basic step angle	0.144 /0.072 (Full/Half step)	0.1 /0.05 (Full/Half step)	0.072 /0.036 (Full/Half step)
Permissible speed range	0 to 360 rpm	0 to 250 rpm	0 to 180 rpm
Backlash [min]	±20' (0.33)		
Weight*3	Approx. 1.57kg (approx. 1.3kg)		

Frame size 85mm						
Model	A140K-M599(W)-G5	A140K-G599(W)-G5	A200K-M599(W)-G7.2	A200K-G599(W)-G7.2	A200K-M599(W)-G10	A200K-G599(W)-G10
Max. holding torque*1	140 kgf-cm (14 N-m)		200 kgf-cm (20 N-m)			
Rotor moment of inertia*2	2,700 g-cm <sup>2</sup> (2,700×10 <sup>-7</sup> kg m <sup>2</sup> )					
Rated current	1.4A/Phase	2.8A/Phase	1.4A/Phase	2.8A/Phase	1.4A/Phase	2.8A/Phase
Basic step angle	0.144 /0.072 (Full/Half step)	0.1 /0.05 (Full/Half step)	0.072 /0.036 (Full/Half step)	0.072 /0.036 (Full/Half step)	0.072 /0.036 (Full/Half step)	0.072 /0.036 (Full/Half step)
Permissible speed range	0 to 360 rpm	0 to 250 rpm	0 to 250 rpm	0 to 180 rpm	0 to 180 rpm	0 to 180 rpm
Backlash [min]	±15' (0.25)					
Weight*3	Approx. 4.88kg (approx. 4.4kg)					

※1: Max. holding torque is standard torque when supply the rated current and stop the motor for comparing the specifications of motors.

※2: Moment of rotor inertia indicates a part, except Gear Head part.

※3: The weight includes packaging. The weight in parenthesis is for unit only.

#### ○ Common specifications

Operation type	Planetary Geared type
Insulation class	B type (130℃)
Insulation resistance	Over 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 stopped (resistance method)
Environment	Ambient temp. -10 to 50℃, storage: -25 to 85℃ Ambient humi. 35 to 85%RH, storage: 35 to 85%RH
Stop angle error*1	±3' (±0.05)
Shaft vibration*2	0.05mm T.I.R.
Radial movement*3	Max. 0.025mm (Load 5N)
Axial movement*4	Max. 0.075mm (Load 10N)
Concentricity for shaft of setup in-low	0.075mm T.I.R.
Perpendicularity of set-up plate shaft	0.075mm T.I.R.
Protection structure	IP30 (IEC34-5 standard)

※1: Specifications are for full-step angle, with no-load (values may vary by load size.)

※2: T.I.R. (Total Indicator Reading) - The difference between the maximum and minimum readings of a dial gauge during one complete revolution of monitored reference.

※3: Amount of radial shaft displacement when adding a radial load (5N) to the tip of the motor shaft.

※4: Amount of axial shaft displacement when adding an axial load (10N) to the shaft.

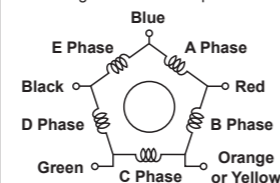
※Rotation direction of the Motor and the Gear Head output axis is same.

※Environment resistance is rated at no freezing or condensation.

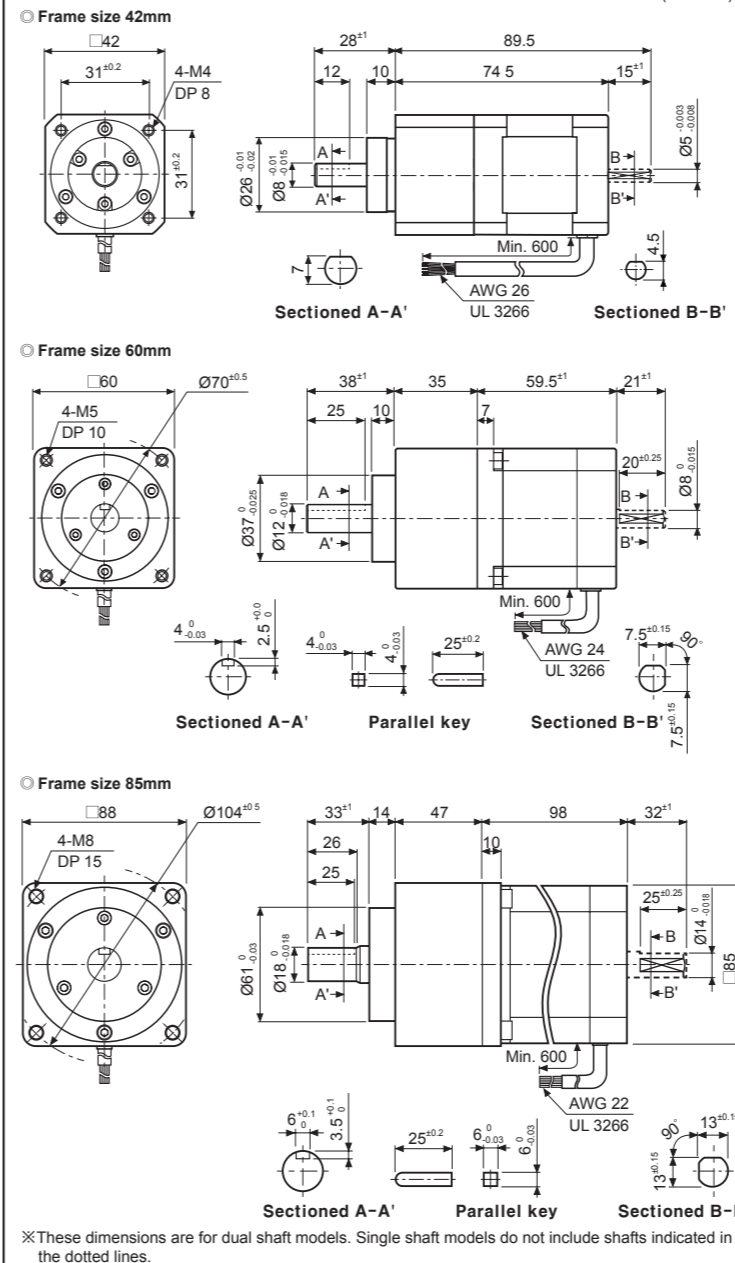
### ■ Connection Diagram

Autonics 5-phase stepper motors use pentagon wiring methods. Therefore, it is a proper product for the driver working as a bipolar pentagon driving method of 5 phase stepper motor drivers.

The wiring colors for each phase and lead-wire are as follows:

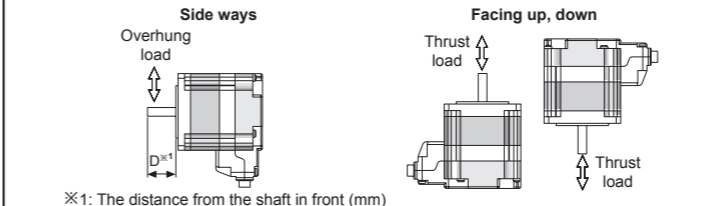


### ■ Dimensions



### ■ Installation

**1. Mounting direction**  
Motor 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
	D=0	D=5	D=10	D=15	D=20	
Frame size 42mm	7.3 (73)	8.4 (84)	10 (100)	12.3 (123)	-	5 (50)
Frame size 60mm	25 (250)	27 (270)	30 (300)	34 (340)	39 (390)	10 (100)
Frame size 85mm	48 (480)	54 (540)	60 (600)	68 (680)	79 (790)	30 (300)

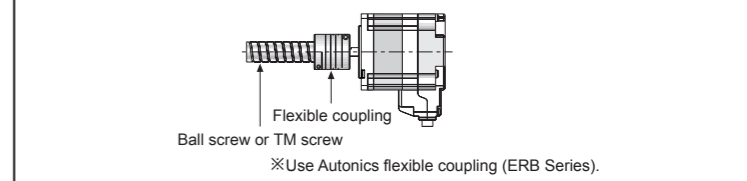
Do not apply excessive force on motor cable when mounting motors. Do not forcibly pull or insert the cable. It may cause poor connection or disconnection of the cable. In case of frequent cable movement required application, proper safety countermeasures must be ensured.

**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 socket screws, spring washers and flat washers. Refer to the table below for allowable thickness of mounting plate and using bolt.

Motor size	The thickness of mounting plate	Using bolt
Frame size 42mm	Min. 5mm	M4
Frame size 60mm	Min. 8mm	M5
Frame size 85mm	Min. 12mm	M8

Flange In Low (Counter bore or Through hole)

**3. Connection with load**  
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. 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. 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 motor shaft to connect with the load. Please contact us if necessary.



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

### ■ Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.  
2. Using motors at low temperature may cause reducing ball bearing's grease and gear part consistency and friction torque is increased. Start the motor in a steady manner since motor's torque is not to be influenced.  
3. Be careful of backlash when positioning the motors in both CW/CCW directions. Geared type stepper motor use the high accuracy gear for positioning and it realizes low backlash. However, when positioning the motor in both CW/CCW directions, it may cause problem. Therefore, make sure that motor positioning will be made in one single direction in case of geared type motors.  
4. For using motor, it is recommended to maintenance and inspection regularly.  
①Unwinding bolts and connection parts for the unit installation and load connection  
②Strange sound from ball bearing of the unit  
③Damage and stress of lead cable of the unit  
④Connection error with driver  
⑤Inconsistency between the axis of motor output and the center, concentric, declination (eccentric, declination) of the load, etc.  
5. This unit may be used in the following environments.  
①Indoors (in the environment condition rated in 'Specifications')  
②Altitude max. 2,000m  
③Pollution degree 2  
④Installation category II

### ■ Major Products

- Photoelectric Sensors
- Temperature Controllers
- Fiber Optic Sensors
- Temperature/Humidity Transducers
- Door Sensors
- SSRs/Power Controllers
- Door Side Sensors
- Counters
- Area Sensors
- Timers
- Proximity Sensors
- Panel Meters
- Pressure Sensors
- Tachometer/Pulse (Rate) Meters
- Rotary Encoders
- Display Units
- Connector/Sockets
- Sensor Controllers
- Switching Mode Power Supplies
- Control Switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables
- Stepper Motors/Drivers/Motion Controllers
- Graphic/Logic Panels
- Field Network Devices
- Laser Marking System (Fiber, CO<sub>2</sub>, Nd: YAG)
- Laser Welding/Cutting System