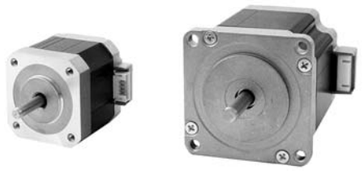
Autonics

2 PHASE STEPPING MOTOR

M A N U A L



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, combustion apparatus, entertainment or safety device etc), it is required to install fail-safe device.**
   It may cause serious human injury or a fire, property.
2. **Do not use this unit at place where there are 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 an electric shock.
4. **Please install it in power off status.**
   It may give an electric shock.
5. **Please earth or install it in housing to avoid touch of human body.**
   It may give an electric shock. or human injury.
6. **Do not disassemble or modify the unit.**
   It may cause an injury or breakdown of product.

⚠ Caution

1. **Please keep specifications of the 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 off the power when mechanical problem is occurred.**
   It may cause a fire or human injury.
5. **The surface temperature of the motor can be 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.
6. **Do not carry the cable or rotating part of this unit.**
   It may cause a human injury.
7. **Please put a cover on the rotating part of this unit.**
   It may cause a human injury.
8. **Please separate as industrial waste when disuse this unit.**

▣ Ordering information

A 1K – M 2 4 4 W

- Shaft type: (blank) Single shaft / W Dual shaft
- Motor length[mm]
- Motor frame size[mm×mm]: 3 □39 (3 31, 4 37) / 4 □42 (3 34, 4 40, 5 47.5) / 6 □56 (4 42, 5 54.5, 8 77.5)
- Motor phase
- Rated current[A]/Phase: S 0.8 / M 1.2 or 1.5 / G 2.0
- Max. holding torque: kgf • cm
- Series

※**The above specification is changeable at anytime without notice.**

▣ Specifications

●□39

Model	A1K-S233(W)	A2K-S234(W)
Max. holding torque	1.45[kgf • cm] 0.145[N • m]	2.15[kgf • cm] 0.215[N • m]
Moment of rotor inertia	17[g • cm²] 17×10⁻⁷ [kg • m²]	27[g • cm²] 27×10⁻⁷[kgf • m²]
Rated current	0.8[A/Phase]	
Basic step angle	1.8° /0.9° (Full step/Half step)	
Resistance	5Ω ±10%	7.5Ω ±10%
Inductance	5mH ±20%	7.5mH ±20%
Insulation class	IEC34-5	
Protection	IP30	
Unit weight	0.17kg	0.2kg

●□42

Model	A2K-M243(W)	A3K-M244(W)	A4K-M245(W)
Max. holding torque	2.06[kgf • cm] 0.206[N • m]	2.97[kgf • cm] 0.297[N • m]	3.48[kgf • cm] 0.348[N • m]
Moment of rotor inertia	33[g • cm²] 33×10⁻⁷ [kg • m²]	56[kg • cm²] 56×10⁻⁷ [kg • m²]	72[g • cm²] 72×10⁻⁷ [kg • m²]
Rated current	1.2[A/Phase]		
Basic step angle	1.8° /0.9° (Full step/Half step)		
Resistance	2.7Ω ±10%	3.3Ω ±10%	2.8Ω ±10%
Inductance	2.3mH ±20%	3.6mH ±20%	3.1mH ±20%
Insulation class	IEC34-5		
Protection	IP30		
Unit weight	0.23kg	0.29kg	0.43kg

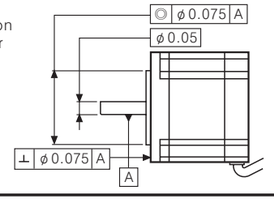
●□56

Model	A6K-M264(W)	A6K-G264(W)	A9K-M265(W)	A9K-G265(W)	A16K-M268(W)	A16K-G268(W)
Max. holding torque	5.70[kgf • cm] 0.570[N • m]		9.25[kgf • cm] 0.925[N • m]		15.70[kgf • cm] 1.570[N • m]	
Moment of rotor inertia	145[g • cm²] 145×10⁻⁷[kg • m²]		245[g • cm²] 245×10⁻⁷[kg • m²]		470[g • cm²] 470×10⁻⁷ [kg • m²]	
Rated current	1.5 [A/Phase]	2.0 [A/Phase]	1.5 [A/Phase]	2.0 [A/Phase]	1.5 [A/Phase]	2.0 [A/Phase]
Basic step angle	1.8° /0.9° (Full step/Half step)					
Resistance	2.1Ω ±10%	1.3Ω ±10%	2.8Ω ±10%	1.7Ω ±10%	4.2Ω ±10%	2.5Ω ±10%
Inductance	3.4mH ±20%	2.0mH ±20%	5.1mH ±20%	3.0mH ±20%	8.4mH ±20%	4.9mH ±20%
Insulation class	IEC34-5					
Protection	IP30					
Unit weight	0.5kg		0.7kg		1.1kg	

●Common specifications

Insulation class		CLASS B(130℃)
Insulation resistance		Min. 100MΩ
Dielectric strength		500VAC : 1minute
Temperature rise		2-Phase excitation for rated current, below 80℃ at stop status
Using environment	Ambient temperature	0 ~ +50℃
	Altitude	Max. 1,000m above the sea level
	Humidity	20 ~ 90%RH(at non-dew status)
Transport & Storage environment	Ambient temperature	-20 ~ +70℃(at non-dew status)
	Altitude	Max. 3,000m above the sea level
	Humidity	20 ~ 95%RH(at non-dew status)
Positional accuracy(※1)		0.09° [deg] Max.
Shaft vibration		0.05 T.I.R.[mm] (※4)
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 set-up plate shaft		0.075 T.I.R.[mm]

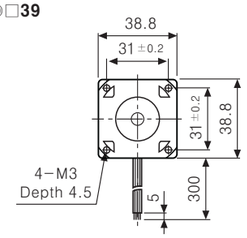
(※1)Full step, it is no-load value. (It varies as load size)
(※2)It is shaft displacement of radial direction when load 5[N] is added to edge part of the motor shaft to vertical way.
(※3)It is shaft displacement of axis direction when load 10[N] is added to the motor shaft to axis way.
(※4)T.I.R.(Total Indicator Reading) : In case of making a revolution centering around the reference point, it displays the whole quantity of Dial Gauge.

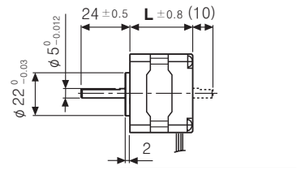


▣ Dimensions

(Unit:mm)

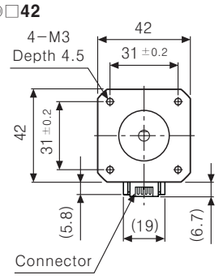
◎□39

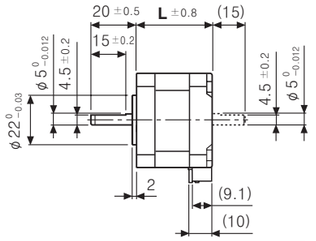




Model	L
A1K-S233(W)	31
A2K-S234(W)	37

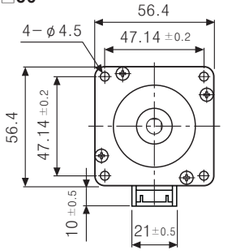
◎□42





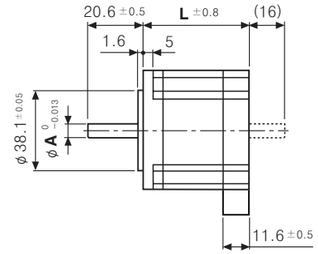
Model	L
A2K-M243(W)	34
A3K-M244(W)	40
A4K-M245(W)	47.5

◎□56



※1 set of connector head and wire(300mm) are included in 42, 56 Square type.
Manufacturer : J.S.T.MFG.CO, LTD

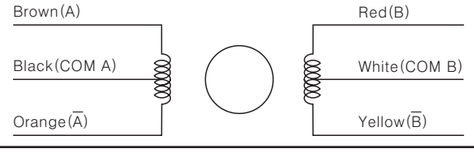
Item	Model
42 Square	S6B-PH-K-S
56 Square	S6B-XH-A-1



Model	L	A
A6K-□264(W)	42	6.35
A9K-□265(W)	54.5	6.35
A16K-□268(W)	77.5	8

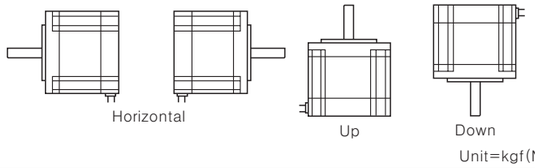
▣ Connection diagram

Autonics 2-phase stepping motor is the pentagon connection and color of each phase and lead wire is shown as follows.



▣ Installation direction

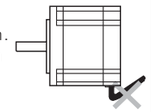
1. It is able to install the motor in any direction of horizon, up or down. Avoid overhung and thrust load of shaft and refer to the below table.



Unit=kgf(N)

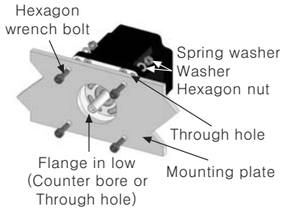
Motor frame size	Allowable overhung load per certain distance(mm) from the end of shaft				Allowable thrust load
	0	5	10	15	
□39	2(20)	2.5(25)	3.4(34)	5.2(52)	Under the load of Motor
□42					
□56	5.4(54)	6.7(67)	8.9(89)	13(130)	

Do not force to bend, pull and insert a motor cable or it may cause an improper connection disconnection. It is required to use under the safety counterplan when it is forced or operated repeatedly.

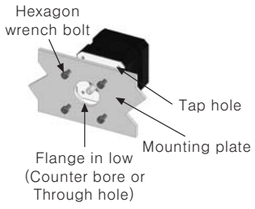


2. Installation of motor
   Install a motor closely on the surface of a panel which has high-thermal conductivity such as iron, aluminum etc. considering heat resistant and vibration and use hexagon wrench bolt, spring washer, washer to assemble motor referring to the below table for the thickness of mounting plate and bolt.

●Through hole type motor

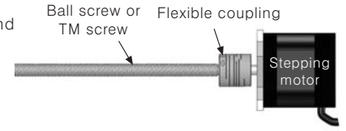


●Tap hole type motor



Motor size	Thickness of mounting plate	Using bolt
□39	Min. 4mm	M3
□42		
□56	Min. 5mm	M4

3. Connection with load
   Use flexible coupling when assembling a load(Ball-Screw, TM-Screw etc.) at the shaft of motor. If the center is not matched with load, it may cause the life cycle of the bearing to be reduced or breakdown of shaft. Do not disassemble shaft to connect with load and avoid an impact considering allowable load of Thrust and Radial when connecting with pulley, belt etc.



4. Installation condition
   Install the product within the rated environment as follows or it may cause a breakdown of the product.
   ①It shall be used indoors. (It is designed for machinery.)
   ②Within 0 ~ +50℃(at non-freezing status) of ambient temperature
   ③Within 90%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 without dust, dregs etc.
   ⑦The place without water, oil etc.
   ⑧The place is easy to radiate heat
   ⑨The place without continuous vibration and impact
   ⑩The place with less salt content
   ⑪The place with less electronic noise occurred by welding machine, motor etc.
   ⑫It shall be avoided to install in a vacuum place without radioactive substance, magnetic field and it shall not be a vacuum status.

▣ Caution for using

1. 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.
2. Using in low temperature
   The features of max. starting and running may go down as the ambient temperature of ball bearing and friction torque falls down and operate the motor slowly as the torque of motor is not damaged.

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

▣ Major products

■ PROXIMITY SENSOR ■ PHOTOELECTRIC SENSOR ■ AREA SENSOR
■ FIBER OPTIC SENSOR ■ DOOR/DOOR SIDE SENSOR
■ PRESSURE SENSOR ■ ROTARY ENCODER ■ COUNTER
■ TIMER ■ TEMPERATURE CONTROLLER
■ TEMPERATURE/HUMIDITY TRANSDUCER
■ POWER CONTROLLER
■ PANEL METER
■ TACHO/LINE SPEED/PULSE METER
■ DISPLAY UNIT
■ SENSOR CONTROLLER
■ SWITCHING POWER SUPPLY
■ GRAPHIC PANEL
■ STEPPING MOTOR & DRIVER & CONTROLLER
■ LASER MARKING SYSTEM(CO_2, Nd:YAG)

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