

Autonics ROTARY ACTUATOR TYPE 5-PHASE STEPPER MOTOR INSTRUCTION MANUAL



Rotary actuator type



Rotary actuator+
built-in brake type

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.
- ※ Safety considerations are categorized as follows.
- ⚠ 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.
- ※ The symbols used on the product and instruction manual represent the following.
- ⚠ symbol represents caution due to special circumstances in which hazards may occur.

⚠ Warning

- 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 personal injury, fire, or economic loss.
- Do not use the unit where flammable or explosive gas, corrosive material, water, or combustible material may be present.**
Failure to follow this instruction may result in fire or burn.
- Installation, connection, operation, maintenance, and inspection should be handled by qualified individuals.**
Failure to follow this instruction may result in fire, electronic shock, or personal injury.
- Please install it in power off.**
Failure to follow this instruction may result in electronic shock.
- Install the motor in the housing not to touch of human body.**
Failure to follow this instruction may result in electronic shock, or personal injury.
- Do not disassemble or modify the unit.**
Failure to follow this instruction may result in personal injury, performance loss, or product damage.

⚠ Caution

- Use the unit within the rated specifications.**
Failure to follow this instruction may result in product damage.
- Do not put obstacles around the unit which may obstruct ventilation.**
Failure to follow this instruction may result in product damage, ambient equipment damage, or malfunction by heat.
- Affix the motor tightly on a metal plate.**
Failure to follow this instruction may result in personal injury, or product and ambient equipment damage.
- Please stop this unit when mechanical trouble occurred.**
Failure to follow this instruction may result in fire, electronic shock, or personal injury.
- Do not inordinate impact or continuous vibration to this unit.**
Failure to follow this instruction may result in malfunction.
- The surface temperature of the motor may reach 70°C in normal operating conditions. Place a warning sign in conditions where someone may approach the operating motor.**
Failure to follow this instruction may result in burn.
- Do not use the brake for safety.**
Failure to follow this instruction may result in personal injury, or ambient equipment damage.
- Do not carry the motor by the cable or rotor.**
Failure to follow this instruction may result in motor damage or personal injury.
- Make sure to install covers on motor rotating components.**
Failure to follow this instruction may result in personal injury.
- When disposing the unit, please categorize it as industrial waste.**

※ The above specifications are subject to change and some models may be discontinued without notice.

■ Ordering information

A	35K	M	5	6	6	W	RB	5																																	
<table border="0"> <tr> <td style="border: none;">Gear ratio</td> <td style="border: none;">5</td> <td style="border: none;">1:5</td> </tr> <tr> <td style="border: none;">Motor type</td> <td style="border: none;">R</td> <td style="border: none;">Rotary actuator type</td> </tr> <tr> <td style="border: none;">Shaft type</td> <td style="border: none;">No mark</td> <td style="border: none;">Single shaft</td> </tr> <tr> <td style="border: none;">Motor length</td> <td style="border: none;">6</td> <td style="border: none;">59.5mm</td> </tr> <tr> <td style="border: none;">Motor frame size</td> <td style="border: none;">6</td> <td style="border: none;">60x60mm</td> </tr> <tr> <td style="border: none;">Motor phase</td> <td style="border: none;">5</td> <td style="border: none;">5-phase</td> </tr> <tr> <td style="border: none;">Rated current</td> <td style="border: none;">M</td> <td style="border: none;">1.4A/Phase</td> </tr> <tr> <td style="border: none;">Max. holding torque</td> <td style="border: none;">35K</td> <td style="border: none;">35kgf-cm</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;">40K</td> <td style="border: none;">40kgf-cm</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;">50K</td> <td style="border: none;">50kgf-cm</td> </tr> <tr> <td style="border: none;">Item</td> <td style="border: none;">A</td> <td style="border: none;">Autonics motor</td> </tr> </table>									Gear ratio	5	1:5	Motor type	R	Rotary actuator type	Shaft type	No mark	Single shaft	Motor length	6	59.5mm	Motor frame size	6	60x60mm	Motor phase	5	5-phase	Rated current	M	1.4A/Phase	Max. holding torque	35K	35kgf-cm		40K	40kgf-cm		50K	50kgf-cm	Item	A	Autonics motor
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※ 1: Built-in brake type provides single shaft type only.

■ Specifications

Frame size 60mm			
Model	A35K-M566(W)-R5	A40K-M566(W)-R7.2	A50K-M566(W)-R10
	A35K-M566-RB5	A40K-M566-RB7.2	A50K-M566-RB10
Max. holding torque*1	35 kgf-cm (3.4 N-m)	40 kgf-cm (3.9 N-m)	50 kgf-cm (4.9 N-m)
Rotor moment of inertia*2	280 g-cm ² (280x10 ⁻⁷ kg-m ²)		
Rated current	1.4 A/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)
Gear ratio	1:5	1:7.2	1:10
Allowable speed range	0 to 360rpm	0 to 250rpm	0 to 180rpm
Backlash [min]	±20' (0.33')		
Electro-Magnetic Brake	Rated excitation voltage	24VDC ± 10%	
	Rated excitation current	0.33A	
	Static friction torque	8kgf-cm	
	Rotation part inertia	29x10 ⁻⁷ kg-cm ²	
	Insulation class	B type (130°C)	
	B type brake	Power on: brake is released, power off: brake is operating	
Operating time	Max. 20ms		
	Max. 25ms		
Absolute position error	±20' (0.33')		
Lost motion	±25' (0.33')		
Weight*3	• Rotary actuator type: approx. 1.4kg (approx. 1.3kg)		
	• Rotary actuator+built-in brake type: approx. 1.7kg (approx. 1.6kg)		

- ※ 1: Max. holding torque is maintenance torque in stopping the motor when supply the rated current and is standard method for comparing the performance 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.

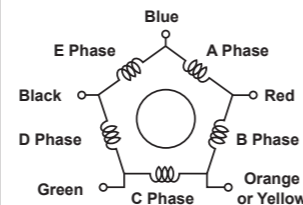
○ Common specifications

Insulation class	B type (130°C)
Insulation resistance	Over 100MΩ (at 500VDC megger) between motor coil-case
Dielectric strength	1 kVAC 50/60Hz for 1 min between motor coil-case
Environ-ment	Ambient temp. -10 to 50°C, storage: -25 to 85°C
	Ambient humi. 35 to 85%RH, storage: 35 to 85%RH
Protection structure	IP30 (IEC34-5 standard)

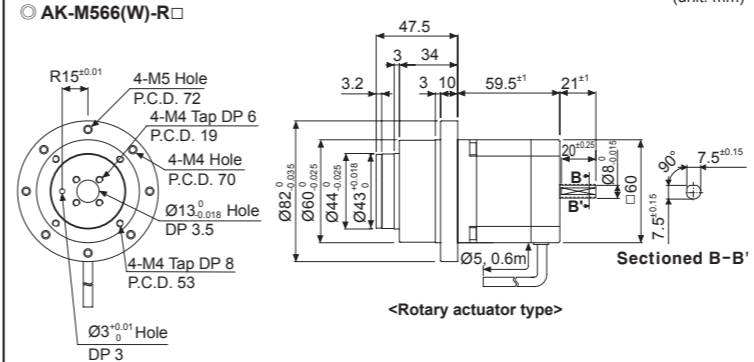
※ Environment resistance is rated at no freezing or condensation.

■ Connection Diagram

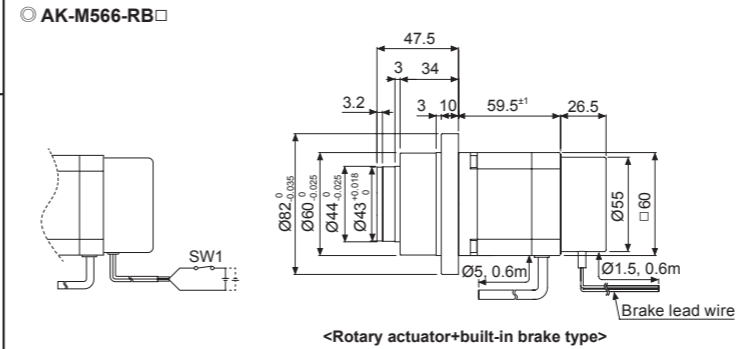
Autonics 5-phase stepper motors use pentagon wiring methods. Therefore, it is a proper product for the 5-phase stepper motor driver which is working as a bipolar pentagon driving method. The connections of each phase and each color of the lead-wire are as follows:



■ Dimensions



※ These dimensions are for dual shaft models. Single shaft models do not include shafts indicated in the dotted lines.

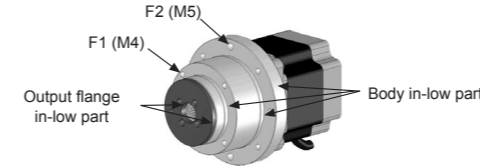


※ Built-in brake type provides single shaft type only.

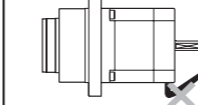
■ Installation

1. Motor installation method

- Install the rotary actuator against the metal panel which has high thermal conductivity such as iron or aluminum because of vibration and heat radiation of the motor. Mounting plates is required to have over 8mm of thickness.
- As 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 needs to be 2N·m, and in case of M5, 4.4N·m.



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



2. Installation condition

- Install the motor in a place that meets certain conditions specified below. It may cause product damage if instructions are not following.
- The inner housing installed indoor (This unit is manufactured and designed for attaching to equipment. Install a ventilation device.)
 - Within -10 to 50°C (at non-freezing status) of ambient temperature
 - Within 35 to 85%RH (at non-dew status) of ambient humidity
 - The place without explosive, flammable and corrosive gas
 - The place without direct ray of light
 - The place where dust or metal scrap does not enter into the unit
 - The place without contact with water, oil, or other liquid
 - The place without contact with strong alkali or acid material
 - The place where easy heat dissipation could be made
 - The place where no continuous vibration or severe shock
 - The place with less salt content
 - The place with less electronic noise occurs by welding machine, motor, etc.
 - The place where radioactive substances and magnetic fields does not exist and is not in the vacuum status

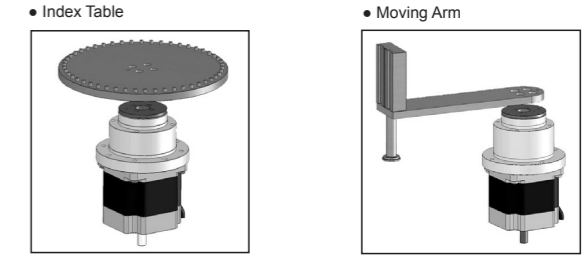
3. Installation of accessories (index table, arm, etc.)

- 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.
- 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.
- 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.

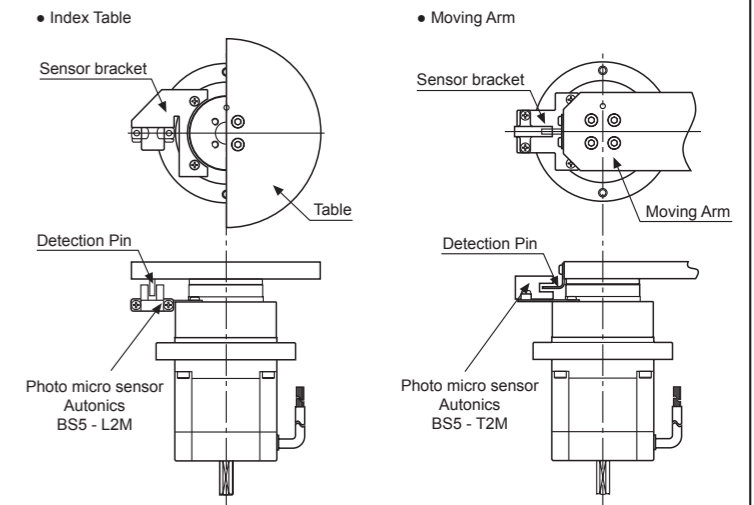
4. Motor operation

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

5. Application



6. Sensor attachment



■ 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 rotor 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.
- Using at low temperature**
Using motors at low temperature may cause reducing maximum starting / driving characteristics of the motor with rise of the friction torque, because grease consistency of the ball bearing and Gear Head becomes heavy. Since it is not error of the torque, start the motor in a steady manner.
- Temperature rise**
The surface temperature of motor shall be under 100°C. It can be significantly increased by operation conditions (ambient temperature, drive speed, drive duty ratio, etc). In this case, use the cooling fan to lower the temperature forcedly. Or, it may cause damage on motor power cable by fire, shortening the life cycle of the inner ball-bearing, or malfunction of the unit.
- 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.
- 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, and the brake pad of electro-magnetic brake is worn. It may also cause shorten product life cycle, reducing the rated static friction torque.

※ Failure to follow these instructions may result in product damage.

■ Major Products

- Photoelectric Sensors
- Fiber Optic Sensors
- Door Sensors
- Door Side Sensors
- Area Sensors
- Proximity Sensors
- Pressure Sensors
- Rotary Encoders
- Connector/sockets
- 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, CO₂, Nd: YAG)
- Laser Welding/Cutting System
- Temperature Controllers
- Temperature/Humidity Transducers
- SSRs/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometer/Pulse (Rate) Meters
- Display Units
- Sensor Controllers

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