



Operation Manual

PRODUCT NAME

Electric Actuator / High Rigidity Slider Type
《 AC servo motor · Motorless 》

MODEL / Series / Product Number

LEJ Series

Applicable models: LEJS100-X400

LEJS100T9 Series
(AC servo motor)



LEJS100N Series
(Motorless)



#This manual describes the actuators operation in the “AC servo motor type” or “Motorless type”.
#Refer to the manual relevant to the controller being used for full operating instructions.

SMC Corporation

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LEJ series / Slider type Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger." They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

*1) ISO 4414: Pneumatic fluid power -- General rules relating to systems.

ISO 4413: Hydraulic fluid power -- General rules relating to systems.

IEC 60204-1: Safety of machinery -- Electrical equipment of machines .(Part 1: General requirements)

ISO 10218: Manipulating industrial robots -Safety.

etc.



Caution

Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.



Warning

Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



Danger

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results.

The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.

This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly.

The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.



LEJ series / Slider type Safety Instructions

Caution

The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.

If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.

If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".

Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)

Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.

This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

*2) Vacuum pads are excluded from this 1 year warranty.

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction(WMD) or any other weapon is strictly prohibited.

2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Caution

SMC products are not intended for use as instruments for legal metrology.

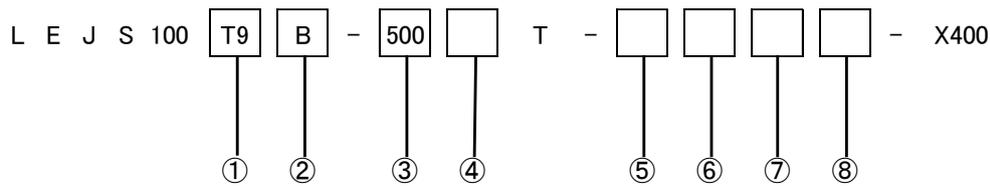
Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country.

Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

1. Specification

1.1 AC servo motor

1.1.1 How to order



① Motor type

T9	AC servo motor
-----------	----------------

② Lead [mm]

H	50
A	25
B	10

③ Stroke [mm]

200	200
to	to
1500	1500

*Refer to the applicable stroke table.

④ Motor option

Nil	Without option
B	With lock

⑤ Cable type *

Nil	Without cable
S	Standard cable
R	Robotic cable (Flexible)

*When the driver type is selected, the cable is included.

Select cable type and cable length.

Example)

S2B2: Standard cable (2m) + Driver (LECSB2)

S2 : Standard (2m)

Nil : Without cable and driver

*The motor and encoder cables are included.

(The lock cable is included when the motor with lock option is selected.)

*Standard cable entry direction is "(B) opposite axis side".

⑥ Cable length * [mm]

Nil	Without cable
2	2
5	5
A	10

*The length of the motor, encoder and lock cable are the same.

⑦ Driver type

	Compatible driver	Power supply voltage [V]
Nil	Without driver	-
B2	LECSB2-T9 /pulse input (Absolute encoder)	200V to 240V

⑧ I/O cable length * [mm]

Nil	Without cable
H	Without cable (Connector only)
1	1.5

*When "Without driver" is selected for driver type only "Nil: Without cable" can be selected. Refer to catalog if I/O cable is required.

Applicable stroke table

Size	Stroke [mm]										
	200	300	400	500	600	800	1000	1200	1500	Manufacturable stroke range [mm]	
100	●	●	●	●	●	●	●	●	●	●	200 to 1500

*Please consult with SMC for non-standard strokes as they are produced as special orders.

1.1.2 Specification

Model			LEJS100T9□H	LEJS100T9□A	LEJS100T9□B	
Actuator specifications	Stroke [mm] ^{*1}		200, 300, 400, 500, 600, 800, 1000, 1200, 1500			
	Work load [kg] ^{*2}	Horizontal	3000(mm/s ²)	60	150	400
			5000(mm/s ²)	43	93	150
			9800(mm/s ²)	22	36	-
		Vertical	3000(mm/s ²)	14	29	80
			5000(mm/s ²)	12	29	30
			9800(mm/s ²)	8	9	-
	Max. speed ^{*3} [mm/s]	to 500		2300	1250	500
		501 to 1000		1600	800	320
		1001 to 1500		900	450	180
	Max. acceleration/deceleration [mm/s ²]			9800		
	Positioning repeatability [mm]			±0.01		
	Lost motion [mm] ^{*4}			0.05 or less		
	Lead [mm]		50	25	10	
	Impact/Vibration resistance [m/s ²] ^{*5}			50/20		
Actuation type			Ball screw			
Guide type			Linear guide			
Operating temperature range [°C]			5 to 40			
Operating humidity range [%RH]			90 or less (No condensation)			
Regeneration option ^{*6}			May be required depending on speed and work load. (Refer to catalog.)			
Electric specifications	Motor output [W]/Size [mm]		750/□80			
	Motor type		AC servo motor (200 VAC)			
	Encoder		Absolute 22-bit encoder (Resolution: 4194304 p/rev)			
	Power consumption [W] ^{*7}	Horizontal	135			
		Vertical	150			
	Standby power consumption when operating [W] ^{*8}	Horizontal	15			
Vertical		45				
power [W] ^{*9}		Max.1100				
Lock unit specifications	Type ^{*10}		Non-magnetizing lock			
	Holding force [N]		240	480	1200	
	Power consumption at at20°C [W] ^{*11}		10			
	Rated voltage [V]		24 VDC ⁰ _{-10%}			

*1 Please consult with SMC for non-standard strokes as they are produced as special orders.

*2 For details, refer to "Speed-Work Load Graph (Guide)" on catalog.

*3 The allowable speed changes according to the stroke.

*4 A reference value for correcting an error in reciprocal operation.

*5 Impact resistance: No malfunction occurred when the actuator was tested with a drop tester in both an axial direction and a perpendicular direction to the lead screw. (Test was performed with the actuator in the initial state.)

Vibration resistance: No malfunction occurred in a test ranging between 45 to 2000 Hz. Test was performed in both an axial direction and a perpendicular direction to the lead screw. (Test was performed with the actuator in the initial state.)

*6 For details, refer to "Speed-Work Load Graph (Guide)" on catalog.

*7 The power consumption (including the driver) is for when the actuator is operating.

*8 The standby power consumption when operating (including the driver) is for when the actuator is stopped in the set position during the operation.

*9 Indicates the maximum power during operation including the driver.

When selecting the power supply capacity, refer to the power supply capacity in the instruction manual of each driver.

*10 Only when motor option "With lock" is selected.

*11 For an actuator with lock, add the power consumption for the lock.

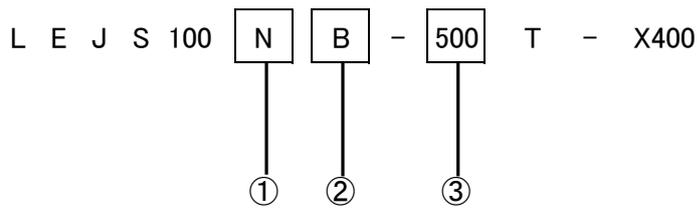
*12 Do not allow collisions at either end of the table traveling distance. Additionally, when running the positioning operation, do not set within 7 mm of both ends.

Product weight

Model	LEJS100								
Stroke [mm]	200	300	400	500	600	800	1000	1200	1500
Product weight [kg]	20.4	22.5	24.6	26.7	28.8	33.0	37.1	41.3	47.6
Additional weight with lock [kg]	1.0								

1.2 Motorless

1.2.1 How to order



① Motor type

N	Motorless
----------	-----------

② Lead [mm]

H	50
A	25
B	10

③ Stroke [mm]

200	200
to	to
1500	1500

*Refer to the applicable stroke table.

Applicable stroke table

Size	Stroke [mm]									Manufacturable stroke range [mm]
	200	300	400	500	600	800	1000	1200	1500	
100	●	●	●	●	●	●	●	●	●	200 to 1500

*Please consult with SMC for non-standard strokes as they are produced as special orders.

1.2.2 Specification

Model		LEJS100NH	LEJS100NA	LEJS100NB		
Actuator specifications	Stroke [mm] ^{*1}	200, 300, 400, 500, 600, 800, 1000, 1200, 1500				
	Work load [kg] ^{*2}	Horizontal	3000(mm/s ²)	60	150	400
			5000(mm/s ²)	43	93	150
			9800(mm/s ²)	22	36	-
		Vertical	3000(mm/s ²)	14	29	80
			5000(mm/s ²)	12	29	30
			9800(mm/s ²)	8	9	-
	Max. speed ^{*3} [mm/s]	to 500		2300	1250	500
		501 to 1000		1600	800	320
		1001 to 1500		900	450	180
	Max. acceleration/deceleration [mm/s ²]		9800			
	Positioning repeatability [mm]		±0.01			
	Lost motion [mm] ^{*4}		0.05 or less			
	Ball screw specifications	Thread size [mm]		φ25		
		Lead [mm]		50	25	10
Shaft length [mm]		Stroke + 284.5				
Lead [mm]		50	25	10		
Impact/Vibration resistance [m/s ²] ^{*5}		50/20				
Actuation type		Ball screw				
Guide type		Linear guide				
Operating temperature range [°C]		5 to 40				
Operating humidity range [%RH]		90 or less (No condensation)				
Other specifications ^{*6}	Actuation unit weight [kg]		4.58			
	Other inertia [kg·cm]		0.43			
	Friction coefficient		0.05			
	Mechanical efficiency		0.8			
Reference motor specifications	Motor shape		□80			
	Motor type		AC servo motor			
	Rated output capacity [W]		750			
	Rated torque [Nm]		2.4			
	Rated rotation [rpm]		3000			

*1 Please consult with SMC for non-standard strokes as they are produced as special orders.

*2 For details, refer to "Speed-Work Load Graph (Guide)" on catalog.

*3 The allowable speed changes according to the stroke.

*4 A reference value for correcting an error in reciprocal operation.

*5 Impact resistance: No malfunction occurred when the actuator was tested with a drop tester in both an axial direction and a perpendicular direction to the lead screw. (Test was performed with the actuator in the initial state.)

Vibration resistance: No malfunction occurred in a test ranging between 45 to 2000 Hz. Test was performed in both an axial direction and a perpendicular direction to the lead screw. (Test was performed with the actuator in the initial state.)

*6 Each value is a guide. Use such value to select a motor capacity.

*7 Values in this specification table are the allowable values of the actuator body with the reference motor mounted.

Do not operate the product outside of the specifications.

*8 Remove dust and oils on the shaft and the inner diameter of coupling when attaching the coupling.

*9 Motor, motor screws, coupling are not attached to this product. They need to be prepared by users. Motor shaft should be round shape.

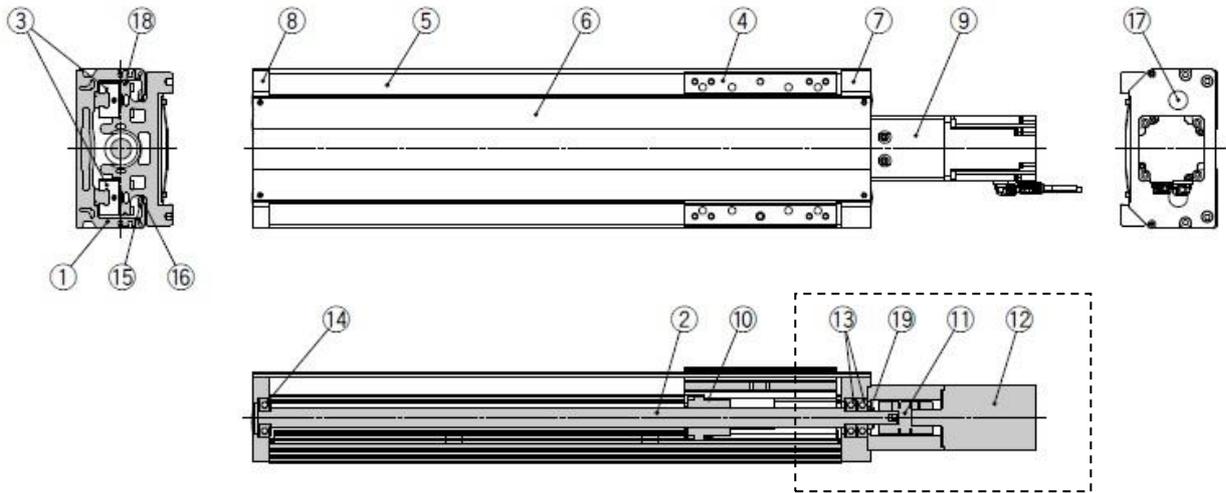
*10 Please avoid loosen the screws for mounting of motor.

*11 Do not allow collisions at either end of the table traveling distance. Additionally, when running the positioning operation, do not set within 7 mm of both ends.

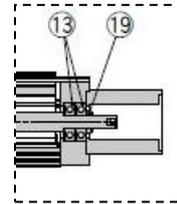
Product weight

Model	LEJS100									
Stroke [mm]	200	300	400	500	600	800	1000	1200	1500	
Product weight [kg]	17.6	19.7	21.8	23.9	26.0	30.2	34.3	38.5	44.8	

1.3 Construction



*Motorless type



Component parts

No.	Description	Material	Remarks
1	Body	Aluminum alloy	Anodic oxide coating
2	Ball screw Ass'y	-	-
3	Linear guide Ass'y	-	-
4	Table	Aluminum alloy	Anodic oxide coating
5	Side cover	Aluminum alloy	Anodic oxide coating
6	Dustproof cover	Aluminum alloy	Anodic oxide coating
7	Plate M	Aluminum alloy	Anodic oxide coating
8	Plate E	Aluminum alloy	Anodic oxide coating
9	Motor block	Aluminum alloy	Anodic oxide coating
10	Spacer	Aluminum alloy	"Lead:H" only
11	Coupling	-	-
12	Motor	-	-
13	Bearing	-	-
14	Bearing	-	-
15	Pin	Carbon steel	-
16	Pin	Carbon steel	-
17	Cap	Polyethylene	-
18	Margnet	-	-
19	Lock nut	-	-

Maintenance parts/Grease pack

Apply for	Order No.	Capacity[g]
Ball screw Ass'y	GR-S-010	10
Linear guide Ass'y	GR-S-020	20

2. Electric actuators / Common precautions

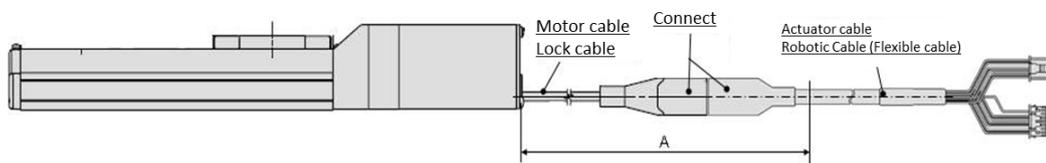
2.1 Wiring/Cables

Warning

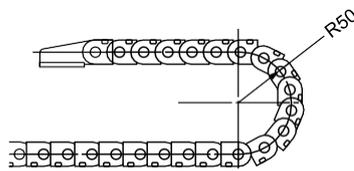
1. **Adjustment, installation, inspection, or wiring changes should be conducted after the power supply to this product has been turned off.**
Electrical shock, malfunction, or damage can result.
2. **Never disassemble the cable. Use only the specified cables.**
3. **Never connect or disconnect the cable or connector with the power on.**

Caution

1. **Wiring should be done correctly.**
For each terminal, voltages other than those stipulated in the operation manual should not be applied.
2. **Connect the connector securely.**
Check for correct connector wiring and polarity.
3. **Handling noise**
If the noise is at the same wavelength as the signal lines, it will lead to malfunction. As a countermeasure, separate the high and low electrical lines, shorten the length of wiring, etc.
4. **Do not connect power or high-voltage cables in the same wiring path as the unit.**
The product can malfunction due to noise and surge voltage interference in the signal line from power and high-voltage cables. Separate the wiring of the controller and its peripheral device from that of power and high-voltage cables.
5. **Be careful that cables are not caught by actuator movement.**
6. **Operate with cables such that they are not easily moved.**
Avoid bending cables at sharp angles where they enter the product.
7. **Avoid twisting, folding, rotating, or applying external force to the cable.**
Electric shock, wire breakage, contact failure, or a loss of product control may occur.
8. **Do not move cables connected to the actuator.**
The motor and lock cables are not robotic cables and can be broken when moved. Therefore, secure the cables and the connectors (part "A" in the figure below) in place during set up.



9. **Select a "robotic cable (flexible cable)" when repeated bending of the actuator cable is required. Also, do not put cables into a flexible moving tube with a radius smaller than the specified value (50 mm or longer).**
Electric shock, wire breakage, contact failure, or a loss of product control may occur if "standard cables" are used for repeated bending.



10. Confirm wiring insulation.

Insulation failure (interference with other circuits, poor insulation between terminals, etc.) could introduce excessive voltage or current to the controller or its peripheral devices, causing damage to them.

11. The speed and force may change depending on the cable length, load, and mounting conditions.

Furthermore, if the cable length exceeds 5 m, then it will decrease by up to 10% for every additional 5 m. (At 15 m: Reduced by up to 20%)

12. When checking the conductivity of the cable, be careful not to deform the connector's mating hole and terminals.

Inserting a non-compatible connector, tool, cylinder-shaped object, etc., into the connector's mating hole can cause the mating hole or terminals to become deformed, which may cause contact failure or disconnection.

13. Refrain from plugging in and unplugging the connector frequently.

Doing so may result in contact failure or disconnection.

【Transportation】

⚠ Caution

1. Do not carry or swing the product by the cable.

2.2 Design/Selection

⚠ Warning

1. **Be sure to read the operation manual (this manual and the one for the controller: LEC series).**
Handling or usage/operation other than that specified in the operation manual may lead to breakage or operation failure of the product. Any damage attributed to use beyond the specifications is not covered by the warranty.
2. **There is a possibility of dangerous sudden action by the product if the sliding parts of the machinery are twisted due to external forces, etc.**
In such cases, human injury may occur, such as by hands or feet getting caught in the machinery, or damage to the machinery itself may occur. Design the machinery so as to avoid such dangers.
3. **A protective cover is recommended to minimize the risk of personal injury.**
If a driven object and the moving parts of the product are in close proximity, personal injury may occur. Design the system to avoid contact with the human body.
4. **Securely tighten all stationary parts and connected parts so that they will not become loose.**
When the product operates with high frequency or is installed where there is a lot of vibration, ensure that all parts remain secure.
5. **Consider a possible loss of power source.**
Take measures to prevent injury and equipment damage in the event of a power source failure.
6. **Consider emergency stops.**
Design so that human injury and/or damage to machinery and equipment will not be caused when machinery is stopped by a safety device under abnormal conditions, such as a power outage or a manual emergency stop.
7. **Consider the whole system.**
Design the system so that human injury or equipment damage will not occur upon the restart of operation of the whole system.
8. **Never disassemble the product or make any modifications, including additional machining.**
Doing so may cause human injury and/or an accident. It may also cause the deterioration of the product's performance.

9. Do not use the stop signals, the “EMG” of the controller and the stop switch on the teaching box, as the emergency stop of the system.

The stop signals, “EMG” of the controller and the stop switch on the teaching box, are for decelerating and stopping the actuator. Design the system with an emergency stop circuit which applies to the relevant safety standards separately.

10. When using the product vertically for applications, it is necessary to install a built-in safety device.

The table may fall due to the weight of a workpiece. The safety device should not interfere with the normal operation of the machine.



Caution

1. Operate within the limits of the maximum usable stroke.

The product will be damaged if it is used with a stroke which exceeds the maximum stroke. Refer to the specifications of the product.

2. When the product repeatedly cycles with partial strokes, operate it at a full stroke at least once a day or every 1000 strokes.

Otherwise, lubrication may run out.

3. Do not use the product in applications where excessive external force or impact force is applied to it.

The product can be damaged. The components, including the motor, are manufactured to precise tolerances. Even a slight deformation may cause a malfunction or seizure.

4. During operation (positioning operation or pushing operation), it cannot be returned to the origin position.

5. Refer to the Auto Switches Precautions (pages 15 to 19) if an auto switch is to be built in and used.

6. Step motor (servo/24 VDC) and servo motor (24 VDC) specifications with the following model number are not compliant with UL Standards: “Controller/Driver type: Without controller/driver (Nil).”

Individual actuators are not certified as UL Standards compliant products.

7. When UL Standards compliance is required, the electric actuator and controller/driver should be used with a UL1310 class 2 power supply.

8. Do not exceed the product specifications even if a work load is supported by external guides.

Although the actuator moment is reduced by external guides, the required transport ability (the relationship between the speed and the work load) is not reduced.

2.3 Mounting



Warning

1. Keep the manual in a safe place for future reference.

The product should be mounted and operated only after thoroughly reading the operation manual and understanding its contents.

2. Observe the tightening torque for screws.

Tighten the screws to the recommended torque for mounting the product.

3. Do not make any alterations to this product.

Alterations made to this product may lead to a loss of durability or damage to the product, which can lead to human injury or damage to other equipment and machinery.

4. When connecting, make sure the rod axis and the load, and the direction of the movement match.

Failure to do so may cause complications with the lead screw, such as wear or damage.

5. When an external guide is used, connect the moving parts of the actuator and the load in such a way that there is no interference at any point within the stroke.

Do not scratch or dent the sliding parts of the product tube, piston rod, etc., by striking or grasping them with other objects. The components are manufactured to precise tolerances. Even a slight deformation may cause a malfunction or seizure.

6. Prevent the seizure of rotating parts (pins, etc.) by applying grease.

7. Do not use the product until you confirm that the equipment can operate properly.

After mounting or repair, connect the power supply to the product and perform appropriate functional inspections to check it is mounted properly.

8. When one side is fixed

When an actuator is operated at a high speed with one end fixed and the other free (basic, flange, or direct mount types), a bending moment may act on the actuator due to the vibration generated at the stroke end, which can damage the actuator. In such a case, install a mounting bracket to suppress the vibration of the actuator body, or reduce the speed so that the actuator does not vibrate. Also, use a mounting bracket when moving the actuator body or when a long stroke actuator is mounted horizontally and fixed at one end.

9. Do not apply strong impact or an excessive moment while mounting the product or a workpiece.

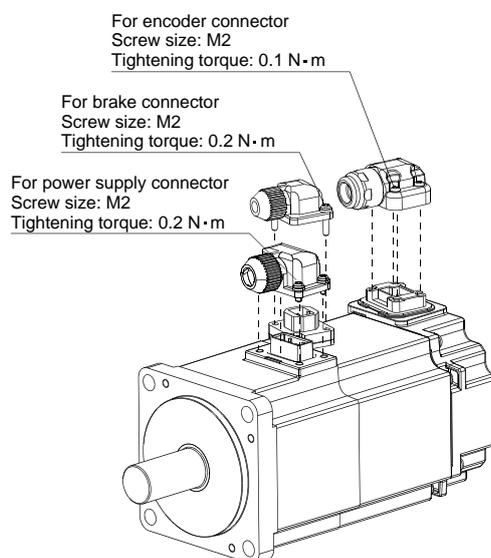
If an external force over the allowable moment is applied, it may cause play in the guide or an increase in the sliding resistance.

10. Maintenance space

Reserve sufficient space for maintenance.

11. Mounting connectors

Tighten the screws evenly. Tightening torques are as indicated below.



2.4 Handling

⚠ Warning

1. Do not touch the motor during operation.

The surface temperature of the motor can increase to approx. 80°C due to operating conditions. The temperature may also increase due to energization. As it may cause burns, do not touch the motor when in operation.

2. If abnormal heating, smoking, fire, etc., occurs in the product, immediately shut off the power supply.

3. **Stop operation at once if there are abnormal noises or vibrations.**
Abnormal noises or vibrations may mean that the product is not properly mounted, and if allowed to continue in this state, damage to the equipment may occur.
4. **Never touch the rotating parts of the motor while in operation.**
5. **Before installing, adjusting, inspecting, or performing maintenance on the product, controller, and related equipment, be sure to shut off the power supply. Then, lock it so that no one other than the person working can turn the power on, or implement measures such as a safety plug.**
6. **In the case of an actuator that has a servo motor (24 VDC), the motor phase detection step is conducted by inputting the servo's on signal just after the controller power is turned on. The motor phase detection step moves the table/rod the distance of the one screw-lead as the maximum.**
(The motor rotates in the reverse direction if the table/rod hits an obstacle such as the end stop damper.) Take the motor phase detection step into consideration when installing and operating this actuator.



Caution

1. **Keep the controller and the actuator combined as delivered for use.**
The actuator's parameters are set at the time of shipment. If it is combined with a different set of parameters, failure can result.
2. **Conduct the following inspection before operation.**
 - a) Confirm that the power supply line and each signal line is not damaged.
 - b) Confirm that the power supply line and each signal line is not loosened.
 - c) Confirm that the electric actuator/cylinder/controller/driver is not mounted loosely.
 - d) Confirm that the electric actuator/cylinder/controller/driver is operating correctly.
 - e) Confirm the function of the emergency stop of the whole system.
3. **If several persons are to be working conjointly, determine the procedure, signs, measures against abnormality, and restarting measures in advance. Then, have someone else, supervise the work.**
4. **The product may operate at a speed different from the set speed depending on the load and resistance.**
When selecting a product, check the catalog for instructions regarding selection and specifications.
5. **Do not apply a load, impact, or resistance in addition to the transferred load during the return to origin.**
If the product is made to return to origin by pushing force, a displacement of the origin position may occur.
6. **Do not remove the name plate.**
7. **Operation tests should be done at a low speed. Start operation by predefined speed after confirming there are no problems.**
8. **Do not apply forces of impact, collision, or resistance to the moving parts of an actuator in operation.**
Doing so will cause a decrease in product life, damage to the product, etc.

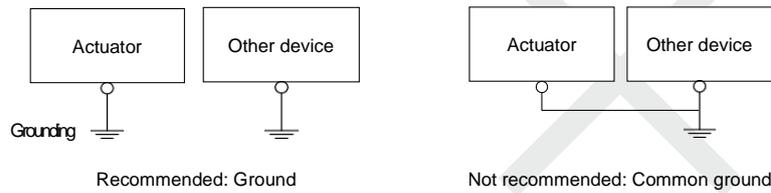
【Grounding】



Warning

1. **Be certain to ground the actuator.**
2. **Dedicated grounding should be used.**
Grounding should be to a D-class ground. (Ground resistance of 100 Ω or less.)

3. **Grounding should be performed near the actuator to shorten the grounding distance.**
4. **The cross-sectional area of this wire shall be a minimum of 2 mm².**
5. **Avoid common grounding with other devices.**



【Unpackaging】

⚠ Caution

1. **Check that the received product is as ordered.**
If a product different from the one ordered is installed, injury or damage can result.

2.5 Operating Environment

⚠ Warning

1. **Avoid use in the following environments.**
 - a) Areas with large amounts of dust or cutting chips that could enter the product
 - b) Areas where the ambient temperature exceeds the specified range (Refer to the specifications.)
 - c) Areas where the ambient humidity exceeds the specified range (Refer to the specifications.)
 - d) Areas with corrosive gas, flammable gas, sea water, water, or steam that could adhere to the product
 - e) Areas where strong magnetic or electric fields are generated
 - f) Areas where direct vibration or impact shock is applied to the product
 - g) Areas where there are large amounts of dust or there is exposure to water/oil droplets
 - h) Areas that are exposed to direct sunlight (ultraviolet rays)
 - i) Areas at altitudes of over 1000 m
Heat radiation performance and withstand voltage may decline as a result. For details, consult with SMC.
2. **Do not use in an environment where the product is directly exposed to liquid, such as cutting oils.**
If cutting oil, coolant, or oil mist adheres to the product, failure or increased sliding resistance can result.
3. **Install a protective cover when the product is used in an environment directly exposed to foreign matters, such as dust, cutting chips, and spatter.**
Looseness or increased sliding resistance can result.
4. **Shade the product from direct sunlight.**
5. **In locations near heat sources, block them off.**
When there is a heat source surrounding the product, the radiated heat from the heat source can increase the temperature of the product beyond the operating temperature range. Protect it with a cover, etc.
6. **Levels of the base oil of grease may decrease due to the external environment and operating conditions, causing a decline in lubrication performance and a shortened life of the product.**

【Storage】

⚠ Warning

1. **Do not store the product in a place in direct contact with rain or water drops or where it is**

exposed to harmful gas or liquid.

2. Store in an area that is shaded from direct sunlight and has a temperature and humidity within the specified range (–10°C to 60°C and 35 to 85% no condensation or freezing).
3. Do not apply vibration or impact to the product during storage.

2.6 Maintenance

Warning

1. **Do not disassemble or repair the product.**
Fire or electric shock can result. Contact SMC if the disassembly of the product is required for maintenance.
2. **Before modifying or checking the wiring, the voltage should be checked with a tester 5 minutes after the power supply has been turned off.**
Failure to do so may result in electrical shock.

Caution

1. **Perform maintenance and inspection according to the procedures indicated in the operation manual.**
Improper handling can cause an injury, damage, or the malfunction of equipment and machinery.
2. **Removal of equipment**
Before equipment is removed, first confirm that measures are in place to prevent the dropping or runaway of driven objects, etc. Proceed only after cutting off the electric power. When starting up again, proceed with caution after confirming that conditions are safe.
3. **Be sure to cut the power to the controller and disconnect the electric actuator cable before moving the electric actuator slider manually by hand.**
If the slider is moved with the electric actuator and controller still connected, the induced voltage of the motor will go to the controller, making it difficult to move the electric actuator smoothly. Moreover, frequently moving the electric actuator slider may result in controller damage or malfunction due to the induced voltage.

【Lubrication】

Caution

1. **The product has been lubricated for life by the manufacturer and does not require any further lubrication.**
When lubrication is applied, special grease must be used. Please read the maintenance manual of each actuator.

2.7 Actuator with Lock

Warning

1. **Do not use the lock as a safety brake or as a control that requires a locking force.**
The lock used for the product with lock is designed to prevent the dropping of workpieces.
2. **For vertical mounting, use the product with lock.**
If the product is not equipped with a lock, the product will move and drop the workpiece when the power is removed. Please ensure that your safe equipment designs include measures to prevent the falling of workpieces.
3. **“Drop prevention” is a safety precaution that prevents a workpiece from dropping due to its weight when the product operation is stopped and the power supply is turned off.**
4. **Do not apply an impact load or strong vibration while the lock is activated.**
If an external impact load or strong vibration is applied to the product, the lock will lose its holding force and damage to the sliding parts of the lock or a reduced service life may result. The same adverse effects may also occur when the lock slips due to a force exceeding the holding force, as this accelerates the wear of the lock.

5. **Do not apply liquid, oil, or grease to the lock or the area surrounding it.**
When liquid, oil, or grease are adhered to the sliding parts of the lock, its holding force will reduce significantly. Any changes in lock sliding performance and condition may cause a lock release malfunction.
6. **Take measures against drops and check that safety is assured before the mounting, adjustment, and inspection of the product.**
If the lock is released with the product mounted vertically, a workpiece can drop due to its weight.
7. **When the actuator is operated manually (when the SVRE output signal is off), supply 24 VDC to the [BK RLS] terminal of the power supply connector.**
If the product is operated without releasing the lock, the wearing of the lock sliding surface will be accelerated, causing a reduction in the holding force and the life of the locking mechanism.
8. **Do not supply 24 VDC power supply continuously to the [BK RLS (Lock release)] terminal.**
Stop supplying 24 VDC power supply to the [BK RLS (Lock release) terminal during normal operation. If power is supplied to the [BK RLS] terminal continuously, the lock will be released, and workpieces may be dropped when the stop signal (EMG) is received.
9. **The actuator may be unable to unlock when the sliding part for locking reaches its life due to the rotation/sliding of the shoe during operation. When the lock mechanism reaches its life, please contact SMC sales office for the replacement parts.**
The sliding part for locking may make noise during operation, but this is normal.

Controller (Including Driver) and Peripheral Devices

2.8 Design/Selection

Warning

1. **Be sure to apply the specified voltage.**
Otherwise, malfunction or breakage may occur. If the applied voltage is lower than the specified voltage, it is possible that the load will not be able to be moved due to an internal voltage drop of the controller. Please check the operating voltage before use.
2. **Do not operate the product beyond the specifications.**
Otherwise, a fire, malfunction, or actuator damage may result. Please check the specifications before use. Install an emergency stop circuit.
3. **Please install an emergency stop outside of the enclosure so that the system operation can be stopped immediately and the power supply can be intercepted.**
4. **In order to prevent any damage caused by the breakdown or malfunction of the controller and its peripheral devices, a backup system should be established in advance by giving a multiple-layered structure or a fail-safe design to the equipment, etc.**
5. **If a danger of human injury is expected due to abnormal heat generation, smoking, ignition, etc., of the controller and its peripheral devices, cut off the power supply of the product and the system immediately.**

Caution

1. **Use an actuator with the lock option if the actuator will not be mounted horizontally for use.**
Burnout of the internal parts of the controller may occur. If the actuator is not equipped with a lock, it will move and drop the workpiece when the power and servo are turned OFF.

2.9 Handling

Warning

1. **Do not touch the inside of the controller and its peripheral devices.**
Doing so may cause an electric shock or damage to the controller.
2. **Do not perform the operation or setting of the product with wet hands.**
Doing so may cause an electric shock.

3. **Products with damage or those missing any components should not be used.**
An electric shock, fire, or injury may result.
4. **Use only the specified combination between the electric actuator and controller.**
Failure to do so may cause damage to the actuator or the controller.
5. **Be careful not to be hit by workpieces while the actuator is moving.**
It may cause an injury.
6. **Do not connect the power supply or power on the product before confirming the area to which the workpiece moves is safe.**
The movement of the workpiece may cause an accident.
7. **Do not touch the product when it is energized and for some time after power has been disconnected, as it is very hot.**
Doing so may lead to a burn due to the high temperature.
8. **Before installation, wiring, and maintenance, the voltage should be checked with a tester 5 minutes after the power supply has been turned off.**
Otherwise, an electric shock, fire, or injury may result.
9. **Static electricity may cause malfunction or break the controller. Do not touch the controller while power is supplied.**
When touching the controller for maintenance, take sufficient measures to eliminate static electricity.
10. **Do not use the product in an area where dust, powder dust, water, chemicals, or oil is in the air.**
It will cause failure or malfunction.
11. **Do not use the product in an area where a magnetic field is generated.**
It will cause failure or malfunction.
12. **Do not install the product in an environment containing flammable gas, explosive gas, or corrosive gas.**
It could lead to fire, explosion, or corrosion.
13. **Radiant heat from strong heat sources, such as a furnace, direct sunlight, etc., should not be applied to the product.**
It will cause failure of the controller or its peripheral devices.
14. **Do not use the product in an environment subject to a temperature cycle.**
It will cause failure of the controller or its peripheral devices.
15. **Do not use the product in a place where surges are generated.**
When there are units that generate a large amount of surge around the product (e.g. solenoid type lifters, high-frequency induction furnaces, motors, etc.), this may cause deterioration or damage to the product's internal circuit. Avoid sources of surge generation and crossed lines.
16. **Do not install the product in an environment under the effect of vibrations and impacts.**
It will cause failure or malfunction.
17. **When a surge-generating load, such as a relay or solenoid valve, is driven directly, use a product that incorporates a surge absorption element.**
18. **The power supplies should be separated between the controller power and the I/O signal power, and both power supplies must not be of the "inrush-current limited" type.**
If the power supply is of the "inrush-current limited" type, a voltage drop may occur during the acceleration or deceleration of the actuator.

2.10 Mounting



Warning

1. **Install the controller and its peripheral devices on a fire-proof material.**
Direct installation on or near a flammable material may cause a fire.

2. **Do not install the product in a place subject to vibrations and impacts.**
It will cause failure or malfunction.
3. **Do not mount the controller and its peripheral devices together with a large-sized electromagnetic contactor or no-fuse breaker, which generate vibration, on the same panel. Mount them on different panels, or keep the controller and its peripheral devices away from such a vibration source.**
4. **Install the controller and its peripheral devices on a flat surface.**
If the mounting surface is distorted or uneven, an unacceptable force may be added to the housing, etc., causing problems.
5. **Take measures to ensure that the operating temperatures of the controller and its peripheral devices are within the range of the specifications. Also, the controller should be installed with spaces between its sides and the other structures or components.**
Failure to do so may cause the malfunction of the controller and its peripheral devices or a fire.

2.11 Power Supply



Caution

1. **Use a power supply that has low noise between lines and between the power and ground.**
In cases where noise is high, an isolation transformer should be used.
2. **To prevent lightning surges, appropriate measures should be taken. Ground the surge absorber for lightning separately from the grounding of the controller and its peripheral devices.**

2.12 Grounding



Warning

1. **Be sure to carry out grounding in order to ensure the noise tolerance.**
2. **Dedicated grounding should be used.**
Grounding should be to a D-class ground. (Ground resistance of 100 Ω or less)
3. **Grounding should be performed near the controller and its peripheral devices to shorten the grounding distance.**
4. **In the unlikely event that a malfunction is caused by the ground, please disconnect it.**

2.13 Wiring



Warning

1. **Do not apply any excessive force to cables, such as repeated bending, tensioning, or placing a heavy object on the cables.**
It may cause an electric shock, fire, or the breaking of a wire.
2. **Connect wires and cables correctly.**
Incorrect wiring could break the controller or its peripheral devices depending on the seriousness.
3. **Do not connect wires while power is being supplied.**
It may cause the controller to break or its peripheral devices could be damaged, causing a malfunction.
4. **Do not carry the product by holding its cables.**
It may cause an injury or damage to the product.
5. **Do not connect power or high-voltage cables in the same wiring path as the unit.**
The product can malfunction due to noise and surge voltage interference in the signal line from the power and high-voltage cables. Separate the wiring of the controller and its peripheral devices from that of the power and high-voltage cables.

6. Confirm wiring insulation.

Insulation failure (interference with other circuits, poor insulation between terminals, etc.) could introduce excessive voltage or current to the controller or its peripheral devices and damage them.

2.14 Maintenance



Warning

1. Perform a maintenance and inspection periodically.

Confirm wiring and screws are not loose. Loose screws or wires may cause unintentional malfunction.

2. Conduct an appropriate functional inspection after completing the maintenance and inspection.

At times where the equipment or machinery does not operate properly, conduct an emergency stop of the system. Otherwise, an unexpected malfunction may occur and it will become impossible to ensure safety. Conduct a test of the emergency stop in order to confirm the safety of the equipment.

3. Do not disassemble, modify, or repair the controller and its peripheral devices.

4. Do not put anything conductive or flammable inside of the controller.

It may cause a fire.

5. Do not conduct an insulation resistance test or with-stand voltage test on this product.

6. Ensure sufficient space for maintenance activities.

Design the system allowing the required space for maintenance and inspection.

3. Electric actuator / Slider type Specific precautions

3.1 Design

Caution

- 1. Do not apply a load in excess of the actuator specification.**
A product should be selected based on the maximum work load and allowable moment. If the product is used outside of the operating specification, eccentric load applied to the guide will become excessive and have adverse effects such as creating play in the guide, reduced accuracy and reduced product life.
- 2. Do not use the product in applications where excessive external force or impact force is applied to it. The product can be damaged.**
The components including the motor are manufactured to precise tolerances. So that even a slight deformation may cause faulty operation or seizure.

3.2 Selection

Warning

- 1. Do not exceed the speed limit of the actuator specification.**
Select a suitable actuator by the relationship of allowable work load and speed. Noise or reduction of accuracy may occur if the actuator is operated in excess of its specification and could lead to reduced accuracy and reduced product life.
- 2. When the product repeatedly cycles with partial strokes (100mm), lubrication can run out. Operate it at a full stroke at least once a day or every 1000 strokes.**
- 3. In case that external force is applied, select the actuator at total work load including external force.**
When a cable duct or flexible moving tube is attached to the actuator, the sliding resistance of the table increases and may lead to operational failure of the product.

3.3 Handling

Caution

- 1. Do not allow the table to hit the end of stroke.**
It can cause damage to the actuator.

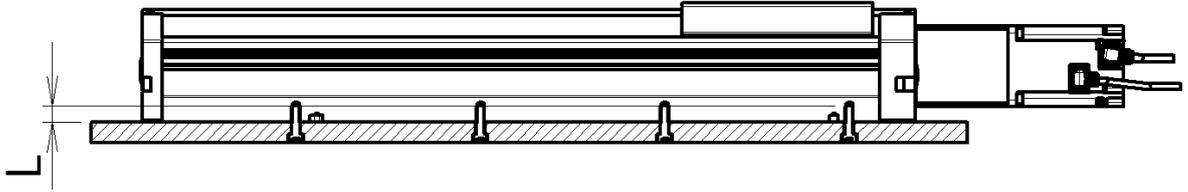


- 2. The actual speed of this actuator is affected by the work load and stroke.**
Check specifications with reference to the model selection section of the catalog.
- 3. Do not apply a load, impact or resistance in addition to a transferred load during return to origin.**
In the case of return to origin by pushing force, additional force will cause displacement of the origin position since it is based on detected motor torque.
- 4. Do not scratch or gouge the body or the table.**
The flatness of the mounting surface will be deteriorated and it can cause play in the guide and increased sliding resistance.
- 5. Do not apply strong impact and too much moment.**
When external force that exceeds the allowable moment is applied, it can cause play in the guide and increased sliding resistance.
- 6. Keep the flatness of mounting surface to within [0.1mm or less for length 500mm].**
Insufficient flatness of the workpiece or the surface onto which the actuator body is to be mounted can cause play in the guide and increased sliding resistance. In the case of overhang mounting (including cantilever), to avoid deflection of the actuator body use a support plate or support guide.
- 7. When mounting the actuator, use all mounting holes.**
If all mounting holes are not used, it influences specifications. e.g. the amount of displacement of the table increases.
- 8. Do not allow the table to hit the workpiece in the positioning operation and positioning area.**
- 9. Do not apply external force to dust seal band, particularly during the actuators movement.**

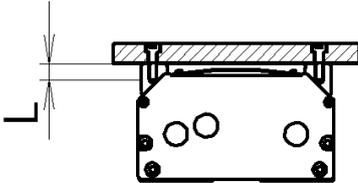
10. When mounting the actuator, use screws with adequate length and tighten them with adequate torque.

Tightening the screws with a higher torque than the maximum may cause malfunction, whilst tightening with a lower torque can cause the displacement of the mounting position or fall.

Mounting the actuator



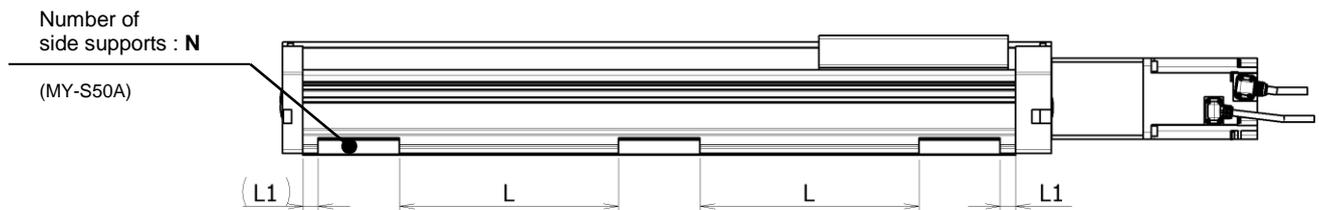
Mounting the workpiece



Mounting position	Bolt	Maximum Tightening torque(Nm)	L (Maximum thread depth: mm)
The actuator	M8 x 1.25	12.5	16
The workpiece	M8 x 1.25	12.5	16

Use screws with adequate length, but at least 0.5mm shorter than the maximum thread depth. The use of screws that are too long can touch the body and cause malfunction.

Mounting the side supports



Stroke	N (QTY.)	L1 (mm)	Bolt	Max. tightening torque [N · m]
200	6	15	M8 x 1.25	12.5
300	6			
400	6			
500	6			
600	8			
800	8			
1000	10			
1200	12			
1500	14			

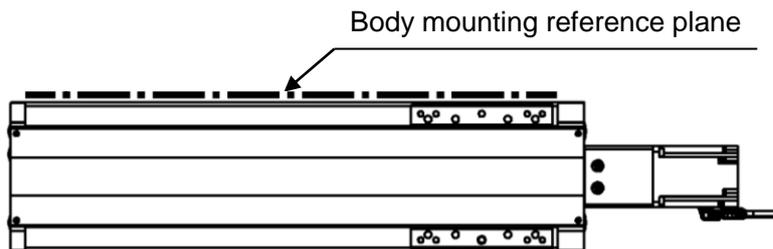
Secure the side supports using the support spacing (L) in the table above. When mounting with the side supports, use in combination with the pin on the bottom of the body. For vertical or bottom mounting, please refrain from using only the side supports.

11. Do not operate by fixing the table and moving the actuator body.

12. Vibration may occur during operation, this could be caused by the operating conditions. If it occurs, adjust response value of autotuning of driver to be lower. During the autotuning noise may occur, the noise will stop when the tuning is complete.

13. When mounting the actuator using the body mounting reference plane, use the pin. And set the height of the pin to be 5mm or more because of R chamfering.(Recommended height:6mm)

The surfaces of plates M and E on the ends of the product may slightly protrude from the body mounting reference plane. Besure to provide a clearance of 1 mm or more to avoid interference.



14. When the fluctuation of load is caused during operation, malfunction/noise/alarm may occur.(In case of AC servo motor)

The tuning of gain may not suit for fluctuation load. Adjust the gain properly by following the manual of driver.

3.4 Precaution on maintenance

⚠ Warning

1. Turn off the power supply and remove the workpiece before maintenance and replacement of the product.

[Maintenance frequency]

Perform maintenance according to the table below.

Contact SMC if any abnormality is found.

Frequency	Visual appearance check	Internal check
Inspection before daily operation	○	/
Inspection every six months / 1000km / 5million cycle *	○	○

*Whichever occurs first.

[Items for visual appearance check]

1. Loose screws. Abnormal dirt.
2. Check of flaws/faults and cable connections.
3. Vibration, noise.

[Items for internal check]

1. Lubricant condition and dirt on moving parts.
For lubrication, use lithium grease No. 2.
2. Loose or mechanical play in fixed parts or fixing screws.

4. Troubleshooting

When a fault occurs during the operation, the corresponding alarm or warning is displayed.

If any alarm or warning has occurred, refer to 「Driver Operation Manual」and take the appropriate action.

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