Doc.No. LEG*-OMZ0023-C
NN33883303

Operation Manual

PRODUCT NAME

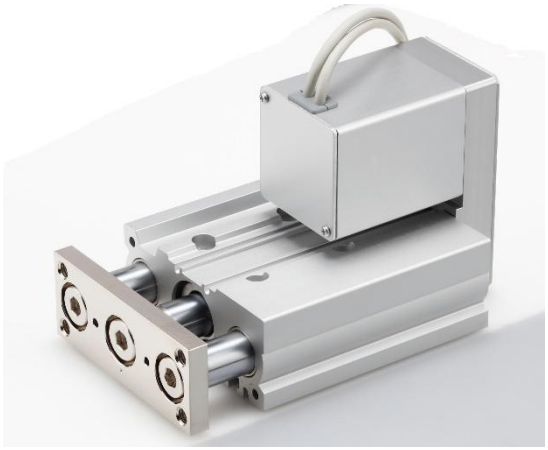
Electric Actuator / Guide type

《Battery-less absolute (Step motor 24VDC)》

MODEL / Series / Product Number

LEG Series

Applicable models : LEG(25,32,40)



Controller

JXC□H Series



#This manual describes the actuators operation in combination with the JXC*H series controllers.
#Refer to the manual relevant to the controller being used for full operating instructions.

SMC Corporation

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Electric Actuator / Rod 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 and safety requirements for systems and their components
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1:Robots
etc.

Danger	**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
Warning	**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Caution	**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate 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. SMC products cannot be used beyond their specifications. They are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not allowed.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, combustion equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

Electric Actuator / Rod type Safety Instructions

Caution
SMC develops, designs, and manufactures products to be used for automatic control equipment, and provides them for peaceful use in manufacturing industries. **Use in non-manufacturing industries is not allowed.** Products SMC manufactures and sells cannot be used for the purpose of transactions or certification specified in the Measurement Act of each country. The new Measurement Act prohibits use of any unit other than SI units in Japan.

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 regulations 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.

1. Specification

1.1 How to Order

L E G [32] M [D] G B – [30] [C] – [R1] [C5H73]

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

①Size

25
32
40

②Bearing type

M	Sliding bearing

③Motor mounting positi

Nil	Top mounting
D	In-line

④Motor type

Symbol	Motor	Compatible controller
G	High performance Battery-less absolute (Step motor 24 VDC)	JXC5H JXC6H JXC9H JXCPH JXCEH

⑤Lead [mm]

Symbol	LEG25	LEG32/40
B	6	8

⑥Stroke [mm]

30	30
50	50
100	100

⑦Motor option

C	With motor cover
W	With lock/motor cover

⑧Actuator cable type/length [m]

Robotic cable[mm]

Nil	None
R1	1.5
R3	3
R5	5
R8	8 *
RA	10 *
RB	15 *
RC	20 *

*Produced upon receipt of order.

⑨Controller

*Refer to catalog.

⚠ Caution

The actuator body and controller are sold as a package.

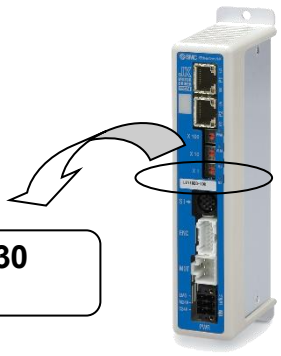
If when only the actuator is purchased separately, confirm that the combination of the controller, which you have and the actuator is compatible.

<Be sure to check the following before use.>

(1) Check that actuator label for model number.
This matches the controller.

(1)

LEG32MDGB-30



1.2 Specification

Model			LEG25	LEG32	LEG40
Actuator specifications	Work load [kg]*1)	Horizonal (30,50 stroke, L=50 or less)	20	45	60
		Vertical	24	27	27
	Max.weight of transferred object[kg] *2)		75	100	150
	Pushing force[N]*3)*4)*5)		126 to 238	156 to 370	266 to 553
	Speed[mm/s]*5)		18 to 250	24 to 200	24 to 150
	Max.acceleration/deceleration[mm/s^2]		5,000		
	Pushing speed[mm/s]*6)		35 or less	30 or less	30 or less
	Positioning repeatability[mm]		±0.02		
	Screw lead[mm]		6	8	8
	Impact/Vibration resistance[m/s^2]*7)		50/20		
	Actuation type		Ball screw＋Belt(Top mounting), Ball screw(In-line)		
	Guide type		Sliding bearing		
	Operating temperature range[℃]		5 to 40		
	Operating humidity range[%RH]		90 or less (No condensation)		
Electric specifications	Motor size		□42	□56.4	□56.4
	Motor type		Battery-less absolute (Step motor 24VDC)		
	Encoder		Battery-less absolute		
	Rated voltage[V]		24VDC±10%		
	Power[W]*8)		Max.126	Max.159	Max.141
Lock nuit specifications	Type *9)		Non-magnetizing lock		
	Holding force[N]		78	108	113
	Power consumption[W]*10)		5	5	5
	Rated voltage[V]		24VDC±10%		

*1 Horizontal：Work load changes according to the distance from the plate to the centre of gravity of the load. Check the "Model Selection" on catalog.
Vertical：Speed changes according to the work load. Check the "Model Selection" on catalog.
The work load is changed by the eccentric distance. Check the "Model Selection" on catalog.
*2 This weight of transferred oclect is when using stopper.
*3 Pushing force accuracy is ±20% (F.S.).
*4 Pushing force is the set pushing force shown below. Pushing force varies depending on the motor type.
・The pushing force values for Battery-less absolute (Step motor 24 VDC) / Size 25：30% to 50%, Size 32：30% to 70%, Size 40：20 to 45%. The pushihng force values change according to the duty ratio and pusing speed. Check the "Model Selection" on catalog.
*5 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% foy each 5 m. (At 15 m: Reduced by up to 20%)
*6 The allowable speed for the pushing operation.
*7 Impact resistance: No malfunction occurred when it was tested with a drop tester in both an axial direction and a perpendicular direction to the lead screw. (The test was performed with the actuator in the initial state.)
Vibration resistance: No malfunction occurred in a test ranging between 45 to 2000 Hz. The test was performed in both an axial direction and a perpendicular direction to the lead screw. (The test was performed with the actuator in the initial state.)
*8 The power (including the controller) is for when the actuator is operating. This value can be used for the selection of the power supply.
*9 With lock only.
*10 For an actuator with lock, add the power consumption for the lock.

Weight[kg]/ Top mounting

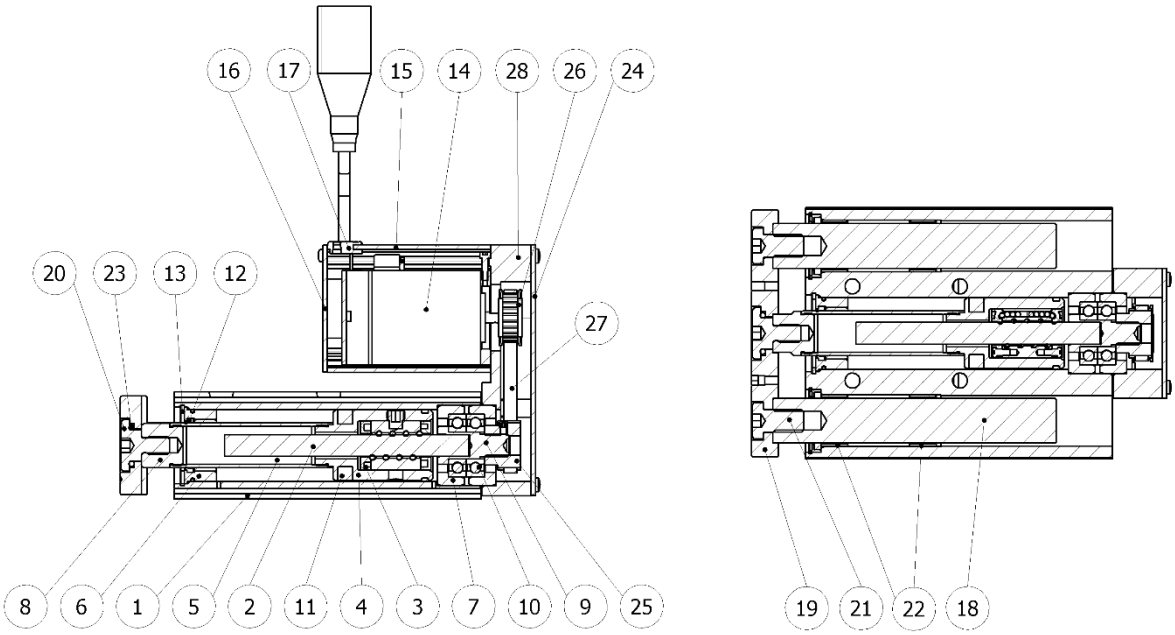
Series	LEG25M			LEG32M			LEG40M		
Stroke[mm]	30	50	100	30	50	100	30	50	100
Product weight[kg]	2.9	3.1	3.6	5.3	5.7	7.1	6.4	7.0	8.5
Additional weight with lock/Cover[kg]	0.3			0.6			0.6		

Weight[kg]/ In-line

Series	LEG25MD			LEG32MD			LEG40MD		
Stroke[mm]	30	50	100	30	50	100	30	50	100
Product weight[kg]	2.8	3.0	3.5	5.0	5.5	6.9	6.2	6.7	8.2
Additional weight with lock/Cover[kg]	0.3			0.6			0.6		

1.3 Construction

●LEG25/32/40M ･･･ Top mounting type



Component Parts

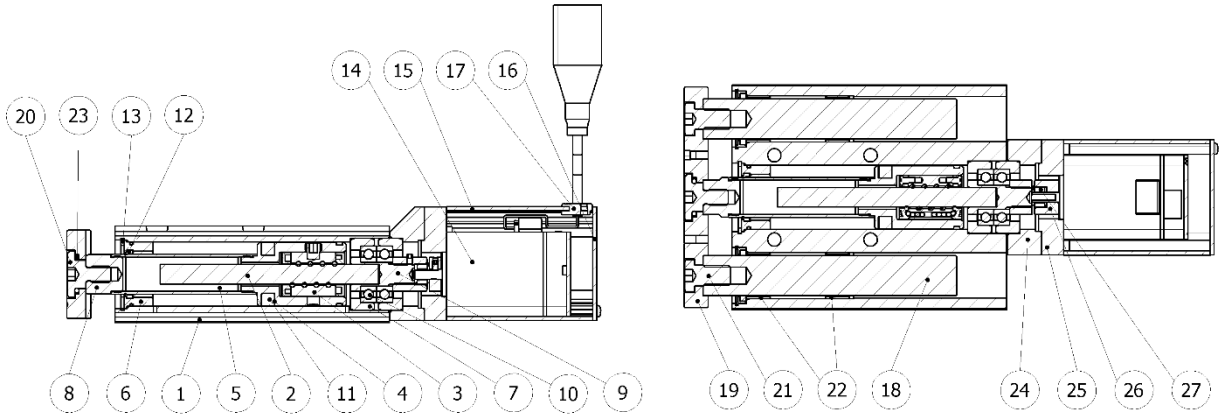
No.	Part	Material	Remarks
1	Body	Aluminum alloy	Anodized
2	Ball screw shaft	Alloy steel	
3	Ball screw nut	Resin / alloy steel	
4	Piston	Aluminum alloy	
5	Piston rod	Stainless steel	Hard chrome anodized
6	Rod cover	Aluminum alloy	
7	Bearing holder	Aluminum alloy	
8	Socket	Free cutting carbon steels	Nickel plated
9	Connected shaft	Free cutting carbon steels	Nickel plated
10	Bearing	-	
11	Margnet	-	
12	Scraper	NBR	
13	Retaining ring	Steel for spring	Phosphate coated
14	Motor	—	
15	Motor cover	Aluminum alloy	Anodized

No.	Part	Material	Remarks
16	End cover	Aluminum alloy	Anodized
17	Bushing	NBR	
18	Guide rod	Carbon steel	Hard chrome anodized
19	Plate	Carbon steel	Nickel plating
20	Plate mounting cap screw	Carbon steel	Nickel plating
21	Guide cap screw	Carbon steel	Nickel plating
22	Sliding bearing	Bearing alloy	
23	O-ring	NBR	
24	Return plate	Aluminum alloy	Anodized
25	Screw shaft pulley	Aluminum alloy	
26	Motor pulley	Aluminum alloy	
27	Belt	—	
28	Return box	Aluminum alloy	Anodized

Replacement Parts/Grease Pack

Order No.
GR-S-010(10g)
GR-S-020(20g)

●LEG25/32/40MD ･･･ In-line type



Component Parts

No.	Part	Material	Remarks
1	Body	Aluminum alloy	Anodized
2	Ball screw shaft	Alloy steel	
3	Ball screw nut	Resin / alloy steel	
4	Piston	Aluminum alloy	
5	Piston rod	Stainless steel	Hard chrome anodized
6	Rod cover	Aluminum alloy	
7	Bearing holder	Aluminum alloy	
8	Socket	Free cutting carbon steels	Nickel plated
9	Connected shaft	Free cutting carbon steels	Nickel plated
10	Bearing	-	
11	Margnet	-	
12	Scraper	NBR	
13	Retaining ring	Steel for spring	Phosphate coated
14	Motor	—	
15	Motor cover	Aluminum alloy	Anodized

No.	Part	Material	Remarks
16	End cover	Aluminum alloy	Anodized
17	Bushing	NBR	
18	Guide rod	Carbon steel	Hard chrome anodized
19	Plate	Carbon steel	Nickel plating
20	Plate mounting cap screw	Carbon steel	Nickel plating
21	Guide cap screw	Carbon steel	Nickel plating
22	Sliding bearing	Bearing alloy	
23	O-ring	NBR	
24	Motor block	Aluminum alloy	Anodized
25	Motor adapter	Aluminum alloy	Anodized/LEG25,40 only
26	Hub	Aluminum alloy	
27	Spider	NBR	

Replacement Parts/Grease Pack

Order No.
GR-S-010(10g)
GR-S-020(20g)

1.4 Parameter setting

Initial setting for the basic parameters

Refer to the controller's (JXC series) operation manual for detail.

As the "basic parameter" is unique data of each actuator, if an actuator other than the "electric actuator / guide type" is used, refer to the operation manual of each actuator and the controller's (JXC series) operation manual for the basic parameter.

Description(Extract)	Initial input value			Input range
	LEG25	LEG32	LEG40	
Controller ID	1			1 to 64 Note1)
IO pattern	1: 64			-
Acceleration / deceleration pattern	1			-
S-motion ratio	0			-
Stroke (+), Note 2), 3)	1000.00			10000
Stroke (-), Note 2), 3)	-1000.00			-10000
Maximum speed	250	200	150	Step data input limit: Max. speed of each product
Maximum acceleration / deceleration	5000			to 5000
Default In positioning	0.5			0.5 to product stroke
Origin offset Note4)	0.00			Origin direction: CCW: -10000 + "product stroke" to 9999 Origin direction: CW -9999 to +10000 - "product stroke"
Maximum pushing force	50	70	45	-
Parameter protect	1: Common + StepData			Changeable parameter 1: Common + StepData, 2: Common
Enable switch	2: Disable			Select 1:Enable or 2:Disable when using a teaching box
Model name	Part no. of each product			Only the English characters and numbers are changeable.
W-area output end 1	0.00			-
W-area output end 2	0.00			-
Origin correction data	0.00			-

Note1) Become effective after restarting the controller.

Note 2) Set the stroke setting value which has the additional distance. When inputting the product stroke, the "stroke limit"alarm may be generated. (Code 1-052).（Stroke + 2mm as recommended）

Note 3) The initial input value is when the origin direction is "CCW". When the origin direction set to "CW", input "2" to the "stroke(+)" and input "-(stroke)-2" to the "stroke(-)".

Note 4) The origin offset is used for the "return to origin".

Initial setting for the ORIG parameters

Refer to the controller's (JXC series) operation manual for detail.
As the "ORIG parameter" is unique data of each actuator, if an actuator other than the "electric actuator / guide type" is used, refer to the operation manual of each actuator and the controller's (JXC series) operation manual for the "ORIG parameters".

Description (Extract)	Initial input value	Input range
ORIG direction	2	1:CW , 2:CCW Note1)
ORIG mode	1	-
ORIG limit	100	-
ORIG time	100	-
ORIG speed	20	-
ORIG ACC /DEC	1000	-
Creep speed	10	
ORIG sensor	0: Disable	-

Note 1) CCW direction: motor side origin, CW direction: end side origin. Become effective after restarting the controller.

2. Electric Actuators 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.

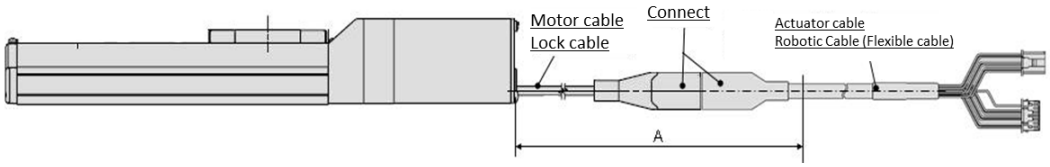
4. **Do not connect power or high-voltage cables in the same wiring path as the unit.**
   The product can malfunction due to noise and surge voltage interference in the signal line from power and high-voltage cables.Separate the wiring of the controller and its peripheral device from that of power and high-voltage cables.

5. **Be careful that cables are not caught by actuator movement.**

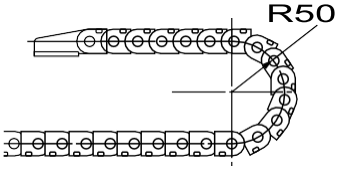
6. **Operate with cables such that they are not easily moved.**
   Avoid bending cables at sharp angles where they enter the product.

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 stoke.**
   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 trans- port 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 com- ponents 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.

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**

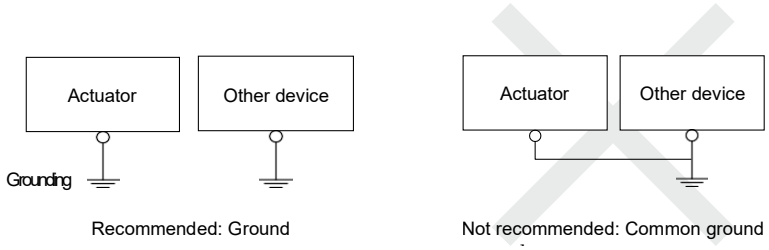
1. **Be certain to ground the actuator.**

2. **Dedicated grounding should be used.**
   Grounding should be to a D-class ground. (Ground resistance of 100 □ 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.**



Recommended: Ground　　Not recommended: Common ground

【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 work- piece 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 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 work- piece 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 volt- age 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 in- duction 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 incor- porates 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 □ 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. LEG series guide rod type / Common precautions

3.1 Design / selection

⚠ **Warning**

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.**
   This can lead to premature failure of the product.

3. **Do not use the product in applications where excessive external force or impact force is applied to it. Excessive external force or impact force will damage the product. When used as a stopper, select a stroke of 50 mm or less.**

4. **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 file.

5. **Do not use the product in applications where excessive external force or impact force is applied in the axial direction of the actuator. When used as a stopper, the workspace cannot get over the stopper(Fig. A), the stopper cannot hit the workspace (Fig. B)**
   This can lead to premature failure of the product.

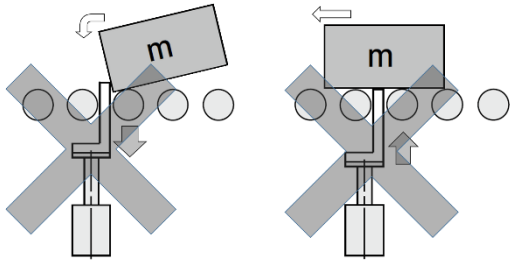


Fig.A Fig.B

3.2 Handling

⚠ **Caution**

1. **INP output signal**
   1) Positioning operation
   When the product comes within the set range by step data [In positon], output signal will be turned on.
   Initial value: Set to [0.50] or higher.
   2) Pushing operation
   When the effective force exceeds step data [Trigger LV], the INP output signal will turn on.
   Use the product within the specified range of [Pushing force] and [Trigger LV].
   To ensure that the actuator pushes the workpiece with the set [Pushing force], it is recommended that the [Trigger LV] be set to the same value as the [Pushing force].

2. **For pushing operation, be sure to use the product in the "Pushing operation" mode.**
   Do not hit the stroke end unless the product returns to origin.
   This may lead to damage and malfunction. There is a risk of damage to the internal stopper due to collision with the stroke end.

3. **Do not change the positioning force from initial setting.**
   If the positioning force is changed, it may cause a decrease in performance.

4. **The maximum speed of this actuator is affected by the stroke.**
   Check the model selection section of the catalog

5. **Do not apply load or impact or resistance in addition to the transferred during return to origin.**

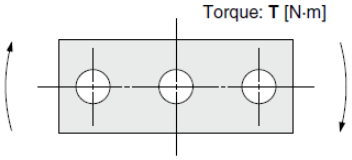
6. **In pushing operation, set the product to a position of at least 2 mm away from a workpiece. (This position is referred to as a pushing start position)**
The following alarms may be generated and operation may become unstable.
a."Posn failed" alarm is generated.
The product cannot reach a pushing start position due to variation in the target position.
b."Pushing ALM" alarm is generated.
The product is pushed back from a pushing start position after starting to push.

7. **Do not scratch or dent the sliding parts of the piston rod, by striking or attaching objects.**
The piston rod and guide rod are manufactured to precise tolerances, even a slight deformation may cause malfunction.

8. **When an external guide is used, connect it in such a way that no impact or load is applied to it.**
Use a freely moving connector (such as a floating joint).

9. **Do not operate by fixing the piston rod and moving the actuator body.**
Excessive load will be applied to the piston rod, leading to damage to the actuator and reduced the life of the product.

10. **When rotational torque is applied to the end of the plate, use it within the allowable range.**
This may cause deformation of the guide rod and bushing, play in the guide or an increase in the sliding resistance.



Size	Stroke[mm]		
	30	50	100
LEG**25**	6.05 Nm	5.13 Nm	4.97 Nm
LEG**32**	12.45 Nm	10.80 Nm	10.60 Nm
LEG**40**	14.05 Nm	12.10 Nm	11.90 Nm

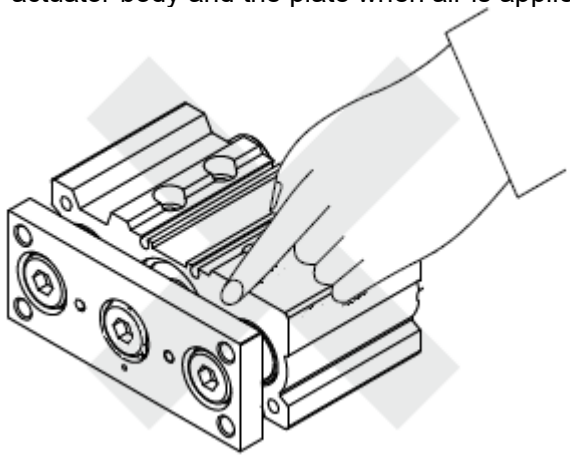
11. **When mounting the product, keep a 40 mm or longer diameter for bends in the cable.**

12. **When using auto switch, the following limits will be in effect. Please select the product while paying attention to this.**
・Insert the auto switch from the front side with rod (plate) sticking out.
・In the case of the motor parallel mounting type, it is not possible to fix the auto switch in the part hidden by the motor cover.
・Please consult with SMC when using auto switch on the rod stick out side.

3.3 Mounting

⚠ **Warning**

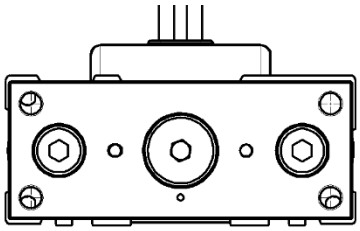
1. **Never place your hands or fingers between the plate and the body.**
Be very careful to prevent your hands or fingers from getting caught in the gap between the actuator body and the plate when air is applied..



⚠ **Caution**

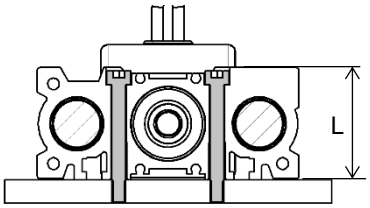
1. **When tightening the screws to install the workpiece or fixture, fix the plate so that it does not rotate, and tighten the screws properly within the specified torque range.**
   This may cause abnormal responses of the auto switch, play in the internal guide or an increase in the sliding resistance.
2. **When mounting the product and/or a workpiece, tigtten the mounting screws within the specified torque range.**
   Tightening the screws with a higher torque than recommended may cause a malfunction, whilst the tightening with a lower torque can cause the displacement of the mounting position or in extreme conditions the actuator could become detached from its mounting position.

Work fixed/ Plate tapped style



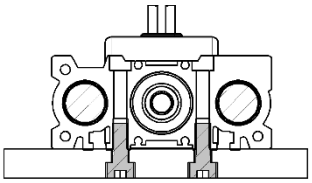
Model	Screw	Max. tightening torque [N•m]	Max. thread depth [mm]
LEG**25**	M8×1.25	12.5	12
LEG**32** /LEG**40**	M10×1.5	24	16

Mounting / Upper mounting tapped style



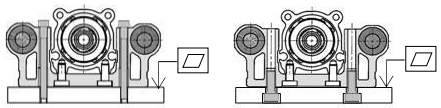
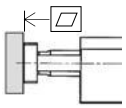
Model	Screw	Max. tightening torque [N•m]	Length L [mm]
LEG**25**	M6×1.0	5.2	48
LEG**32**	M8×1.25	12.5	64
LEG**40**	M8×1.25	12.5	78

Mounting / Lower mounting tapped style

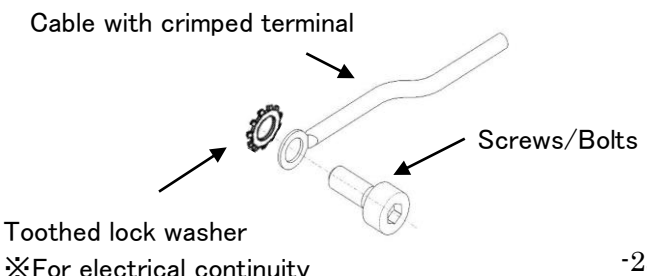


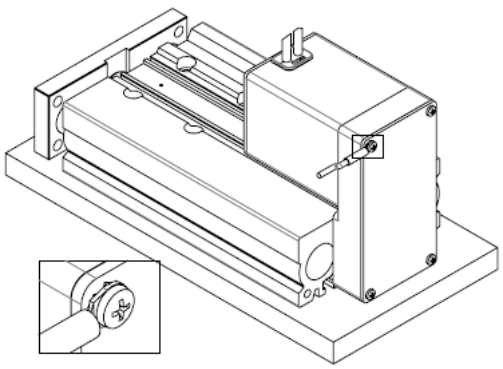
Model	Screw	Max. tightening torque [N•m]	Max. thread depth [mm]
LEG**25**	M8×1.25	12.5	20
LEG**32** /LEG**40**	M10×1.5	24	20

3. **Keep the flatness of the mounting surface within the following ranges when mounting the actuator body and work piece.**
   Insufficient flatness of the work piece or the surface onto which the actuator body is to be mounted can cause increased sliding resistance.

Model	Mounting part	Flatness
LEG※	Actuator body / Upper mounting tapped style / Lower mounting tapped style 	0.02mm or less
	Work piece /Plate tapped style 	0.02mm or less

4. **Connection to ground**
   Install the grounding cable as shown in the figure.





3.4 Precaution on maintenance

⚠ **Warning**

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

2. Put on protective goggles when applying grease.

[Maintenance frequency]

Perform maintenance according to the table below. Contact SMC if any abnormality is found.

Frequency	Appearance check	Internal check	Belt 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.
4. Check the belt tension (refer to the maintenance manual for the specified tension).

[Items for internal check]

1. Lubricant condition on moving parts.
2. Loose or mechanical play in fixed parts or fixing screws.

[Items for belt check]

Check the belt regularly as shown in “maintenance frequency”.

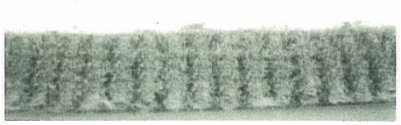
Stop operation immediately and contact SMC when the belt appears to be like photographs shown below.

a. Tooth shape canvas is worn out

Canvas fiber becomes fuzzy.

Rubber is removed and the fiber becomes whitish.

Lines of fibers become unclear.



Teeth become fuzzy

b. Peeling off or wearing of the side of the belt

Belt corner becomes round and frayed thread sticks out.



c. Belt partially cut

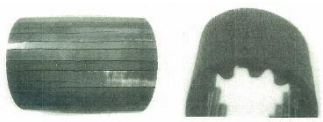
Belt is partially cut. Foreign matter caught in teeth other than cut part causes flaw.

d. Vertical line of belt teeth

Flaw, which is made when the belt runs on the flange.

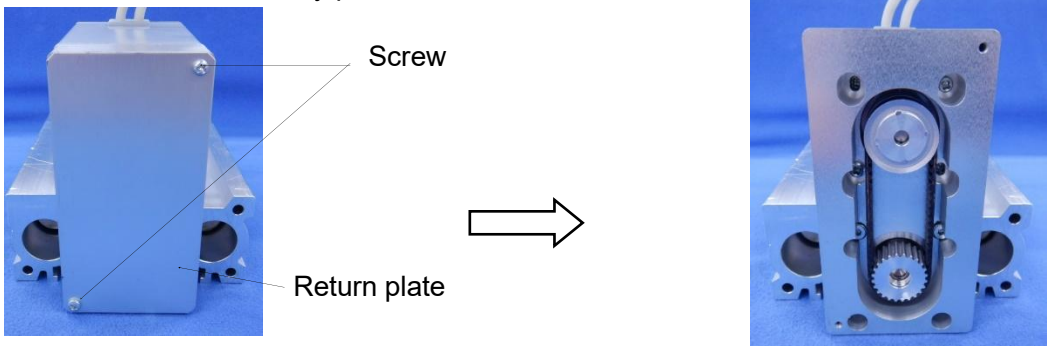
e. Rubber back of the belt is softened and sticky.

f. Crack on the back of the belt

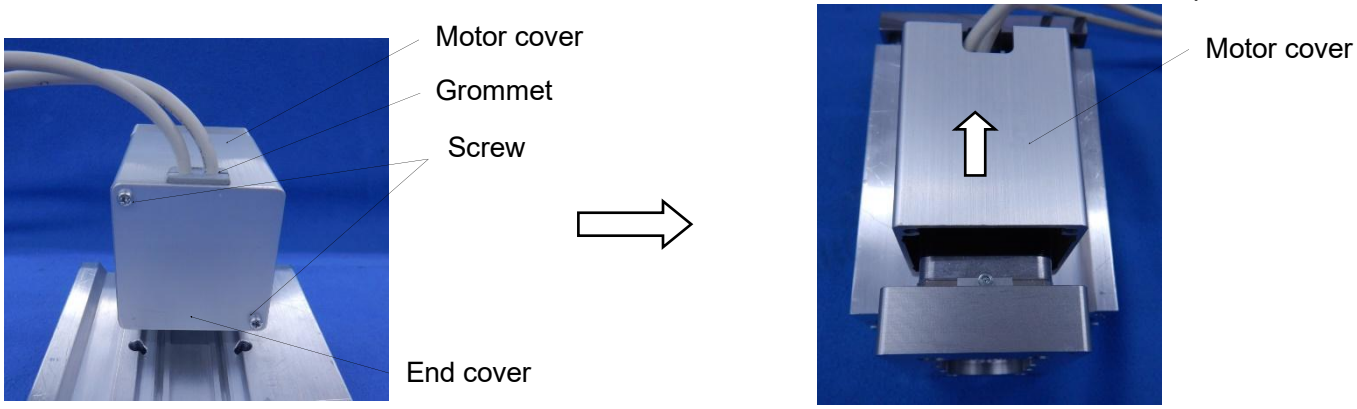


3.5 Replacement of belt

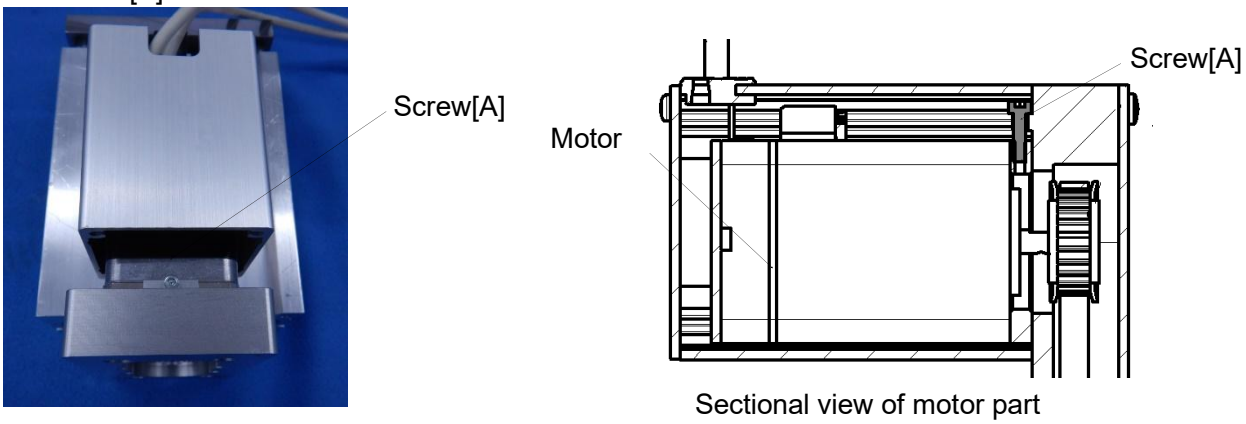
1. After Screw is removed, "Pulley plate" is removed.



2.After screw is removed、"End cover" and "Grommet" are removed, and "Motor cover" is lifted up.

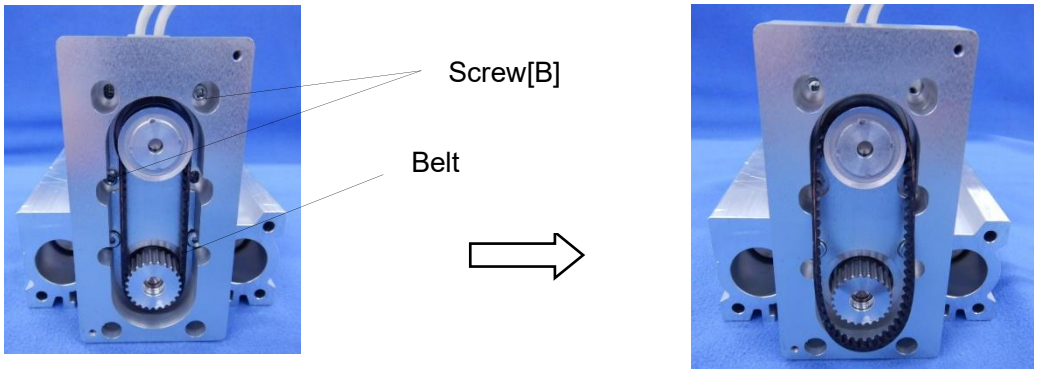


3.The screw[A] that is the fixation of "Motor" is loosened.



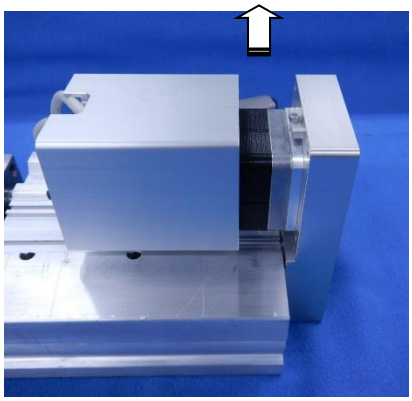
Sectional view of motor part

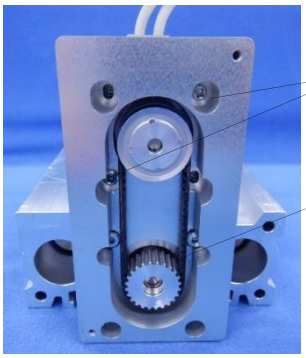
4. The screw[B] that is the fixation of "Motor" is loosened (To extent in which the slide can be done), and "Belt" is removed.



5. After "Belt" is installed, the root of "Motor" is pulled in a string or a long banding band. With tensile force adjusted, tighten the screw[B] which fix the actuator to the motor.（See the table below）

pull



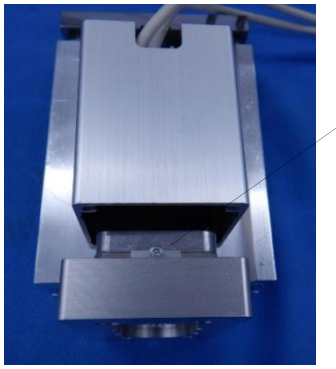


Model	Belt Part number	Pull tension（N）
LEG25	LE-D-15-1	19
LEG32	LE-D-15-2	30
LEG40	LE-D-15-3	

(a)

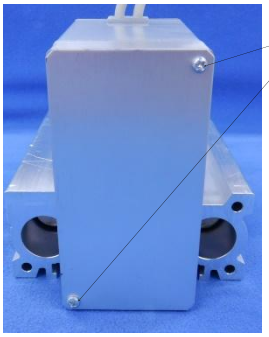
Model	Screw type	Screw size	Tightening torque [Nm]
LEG25	Cross recessed binding head screw	M3x6	0.63
LEG32	hexagon socket head cap screw	M4x10	1.5
LEG40			

6. Screw[A] is tighten to fix “Motor”.



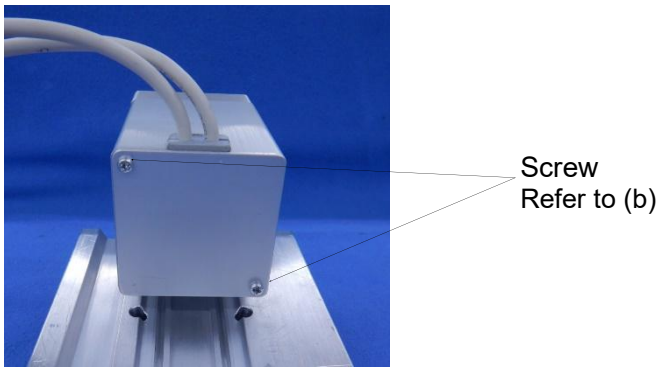
hexagon socket head cap screw[A] M2.5x10
[Tightening torque 0.18Nm]

7."Return plate", “End cover”, “Grommet” are installed.



Cross recessed binding head screw
M3x6
[[Tightening torque 0.63Nm]

8.“End cover”, “Grommet” are installed.



(b)

Model	Screw type	Screw size	Tightening torque [Nm]
LEG25	Cross recessed round head screw	M3x80 (Without lock) M3x120 (With lock)	0.36
LEG32	Cross recessed round head screw	M3x85 (Without lock) M3x125 (With lock)	
LEG40	Cross recessed round head screw	M3x105 (Without lock) M3x150 (With lock)	

4. Troubleshooting

Alarms below are abstract of representative examples.

For other alarms, see operation manual of controller.

No.	Phenomenon	Cause	Countermeasure
1	Fail to operate / Initial stage When power is supplied, alarm for “AbEnc Comm ALM” /code: 1-106” is generated. ↓ <Procedure of restart> Input the “reset signal.”	1) Cable is not connected, disconnected	Check if the cable is properly installed /See 2.1 Wiring/Cable on p.10
	When power is supplied, alarm for “AbEnc ID ALM” /code: 1-153” is generated. ↓ <Procedure of restart> Input the “reset signal.”	1) Combination of the controller and actuator is not correct.	Combination at the time of shipment shall be kept.
		2) The product is used for the first time, or when the actuator or controller is replaced.	This is normal. Turn ON RESET to reset the alarm.
	Alarm for “Step data ALM1 /code:1-048” is generated ↓ <Procedure of restart> Input the “reset signal.”	Set condition for step data is not correct. < Correct set condition > (1)Area 1 < Area 2 (2)Pushing force or more Trigger LV (3)Speed or more Pushing Speed (4)Pushing foreman or more pushing force	Review the content of step data after releasing the alarm by [RESET]. / Refer to the JXC controller operation manual.
	Alarm for “Servo off ALM /code: 1-098” is generated ↓ <Procedure of restart> Input the “reset signal.”	Perform the “Return to origin”, the positioning operation and JOG operation during the “SVON”: OFF.	Provide the operation instruction after confirming that the input signal [SVON] is ON and then the output signal [SVRE] is ON.
	Alarm for “Drive ALM /code: 1-099” is generated. ↓ <Procedure of restart> Input the “reset signal.”	Perform positioning, pushing operation before retuning to origin.	Provide the operation instruction after confirming that the input signal [SETUP] is ON and then the output signal [SETON] is ON.

No.	Phenomenon	Cause	Countermeasure
2	Operation not completed / Operation continue Alarm for “Over load/code: 1-148” or “Posn failed/code: 1-149” is generated. ↓ <Procedure of restart> Input the “reset signal.” →“SVON”: Automatically ON	1) Added excessive external force (including vibration) or impact load.	Operate within the specified range. /See 1.2 Specifications on p.5
		2) The Power supply does not have sufficient capacity.	Check the power consumption for each actuator and controller: If necessary replace the existing power supply with a power supply with sufficient capacity. /See 1.2 Specifications on p.5
		3) Load/resistance more than specifed range is being applied to the actuator.	Use within specification range. /See 1.2 Specifications on p.5
		4) Pushing operation is preformed with “Positioning operation”	Review the content of the step data. /Refer to JXC controller operation manual.
		5) For the “pushing operation”, the position (target start-pushing position) is not set correctly.	Check the step data. / Refer to JXC controller operation manual.
		6) Breaking of belt	Please check the belt.
		7) The cable is not connected or has been disconnected.	Confirm that the cable is connected correctly. /See 2.1 Wiring/Cable on p.10
		8) It was not the intended origin position because the actuator pinched the work-piece during the“return to origin”.	Remove the work-piece and restart the return to the intended origin position.
		9) Wrong input [0] is input as the positioning force.	Check the step data. <Moving force> / Refer to JXC controller operation manual.
		10) The step data position is not changed correctly after the return to origin direction is changed.	Check the step data. <Position> / Refer to JXC controller operation manual.
		11) Because the operation of the step data is set to [INC/relative], the table comes into contact with an external object and does not move due to continuous operation. (Stroke end etc.)	Check the step data. <Position> / Refer to JXC controller operation manual.
	peration not completed / Operation continue Alarm for “Stroke limit/code: 1-052” is generated. ↓ <Procedure of restart> Input the “RESET” signal.	Moving distance exceeds the “Stroke(+)” / “Stroke(-). (Stroke end etc.)	Check the value of the “Position” of step data and the value of the “Stroke(+)” / “Stroke(-)” of the basic parameter. /Refer to the JXC controller operation manual.

No.	Phenomenon	Cause	Countermeasure
2	Operation is not completed / Operation continue Alarm for “Pushing ALM /code: 1-096” is generated. ↓ <Procedure of restart> Input the “RESET” signal.	1) For the pushing operation, the position, target start-pushing position, is not set correctly.	Check the step data. / Refer to JXC controller operation manual.
		2) It was not the intended origin position because the actuator pinched the work-piece during the“return to origin”.	Remove the work-piece and restart the return to the intended origin position.
	Alarm for “Over motor Vol /code: 1-145” is generated. ↓ <Procedure of restart> Input the “reset signal.” →“SVON”: Automatically ON	1) If the power supply is an “inrush-current restraining type”, the alarm may be generated due to voltage drop.	Replace the power supply with a non “inrush-current restraining type” power supply. /Refer to the JXC controller operation manual.
		2) The Power supply does not have sufficient capacity.	Check the power consumption for each actuator and controller: If necessary replace the existing power supply with a power supply with sufficient capacity. /See 1.2 Specifications on p.5
		3) Load/resistance more than specified range is being applied to the actuator.	Use within specification range. Check the actuator mounting condition or check if external force adds the resistance of actuator table by using movable cable-duct. /See 1.2 Specifications on p.5

No.	Phenomenon	Cause	Countermeasure
2	Operation not completed / During operation Alarm for " Err overflow /code: 1-196" is generated. ↓ <Procedure of restart> "Turn the power supply off." ↓ "Turn the power supply on"	1) The lead screw had galling due to excessive external force (including vibration) or impact.	Operate within the specified range. /See 1.2 Specifications on p.5
		2) The Power supply does not have sufficient capacity.	Check the power consumption for each actuator and controller: If necessary replace the existing power supply with a power supply with sufficient capacity. /See 1.2 Specifications on p.5
		3) Load/resistance more than specified range is being applied to the actuator.	Use within specification range. /See 1.2 Specifications on p.5
		4) The Pushing operation is performed at the "Positioning operation position	Review the content of the step data. / Refer to JXC controller operation manual.
		5) For the Pushing operation: The position (the target start pushing position) is not set correctly.	Check the step data. / Refer to JXC controller operation manual.
		6) The cable is not connected or has been disconnected.	Comfirm that the cable is connected correctly. /See 2.1 Wiring/Cable on p.10
		7) It was not the intended origin position because the actuator pinched the work-piece during the"return to origin".	Remove the work-piece and restart the return to the intended origin position.
		8) Wrong input [0] is input as the positioning force.	Check the step data. <Moving force> / Refer to JXC controller operation manual.
		9) The step data position is not changed correctly after the return to origin direction is changed.	Check the step data. <Position> / Refer to JXC controller operation manual.
		10) Because the operation of the step data is set to [INC/relative], the table comes into contact with an external object and does not move due to continuous operation. (Stroke end etc.)	Check the step data. <Position> / Refer to JXC controller operation manual.

No.	Phenomenon	Cause	Countermeasure
2	Operation not completed / During operation (Not always, but may happen occasionally) Alarm for “Step data ALM2 /code: 1-051” is generated. ↓ <Procedure of restart> Input the “RESET” signal.	1) Command invalid (unregistered) step data.	Check if the step data is valid (registered).
		2) Different input signal to the expected step number is inputted to the controller, because of a too short an interval between the input signal of “IN*” and the “Drive” or inputting the signals at the same time.	Add an interval of 15ms (the recommendation is 30ms) or more between the input signals. / Refer to JXC controller operation manual.
		3) Different input signal to the expected step number is inputted to the controller, because the input signal time was too short.	Maintain the state of the input signal for 15ms (the recommendation is 30ms) or more. / Refer to JXC controller operation manual.
		4) Different input signal to the expected step number is inputted to the controller, caused by PLC or other device.	Check that the step number is inputted correctly for the required motion. / Refer to JXC controller operation manual. Note) Recommend to check the “OUT” output signal for more secure operation.
	Operation completed by unexpected motion. - No alarm / During operation (Not always, but may happen occasionally)	1) Different input signal to the expected step number is inputted to the controller, because of a too short an interval between the input signal of the “IN*” and the “Drive” or inputting the signals at the same time.	Add an interval of 15ms (the recommendation is 30ms) or more between the input signals. / Refer to JXC controller operation manual. Note) Recommend to check the “OUT” output signal for more secure operation.
		2) Different input signal to the expected step number is inputted to the controller, because the input signal time was too short.	Maintain the state of the input signal for 15ms (the recommendation is 30ms) or more. / Refer to JXC controller operation manual. Note) Recommend to check the “OUT” output signal for more secure operation.
		3) Different input signal to the expected step number is inputted to the controller, caused by PLC or other device.	Check that the step number is inputted correctly for the required motion. /Refer to JXC controller operation manual. Note) Recommend to check the “OUT” output signal for more secure operation.

No	Phenomenon	Cause	Countermeasure
3	"Output signal" unstable the "INP output signal" turns "ON" before pushing the work piece.	The setting distance of the "[In pos]" is shorter than the distance which is from the pushing start point to the target pushing object.	Please set it as the following. "[In pos]"≧Distance to the target pushing object.
	During pushing operation, the "INP" output signal is ON before pushing	1) The "INP" output signal is turned “ON” because the effective pushing force of pushing operation exceeds the Trigger LV value.	Check the”pushing control selection” in the catalogue, and confirm whether the pushing force is within the range of each actuator. /See 1.2 Specifications on p.5
	“INP” output signal is unstable. “INP” output signal is unstable even after the positioning operation is completed.	1) The value of [In position] in step data is too small	Increase [In position] value as the following. ([0.5] or more)
4	Positioning repeatability is out of specified range.	1) It shifts to the next operation by receiving the "INP" output signal.	Go to the next operation after confirming the “BUSY” output signal is outputted.
		2) The belt is loosened.	Readjust belt tension to the appropriated value. /See 3.4 Precaution on maintenance on p.244
5	Damage	1) Abnormal external force	Generation of interference of mechanism, eccentric load, excess load lead to cause deformation and damage of the actuator. Eliminate these
6	When mounted vertically, repeatedly shakes up and down when stopped.	1) A load exceeding the load is mounted.	Use within specification range. /See 1.2 Specifications on p.5
7	Lock type is selected, but workpieces are dropped during stopping(EMG) or SVRE[OFF], or moved by external force.	1) Load exceeding the maximum work load is mounted, or external force more than the lock holding force is applied.	Check the mounted load and lock holding force to confirm if they are within the operation range. /See 1.2 Specifications on p.5
		2) 24VDC is supplied to "BK RLS" terminal of controller/CN1 power supply connector.	Stop supplying 24VDC power supply to the [BK RLS] terminal /see 2.7 Actuator with lock ⚠ Warning(8) on p.16
8	Alarm for “ Stroke limit /code: 1-052” is generated. ↓ <Procedure of restart> Input the “RESET” signal.	The actuator goes out the stroke limit specified by the basic parameters, “Stroke (+)” and “Stroke (-)” if it performs the requested operation. (Including JOG operation after return to origin)	Make sure that the basic parameter, “Stroke (+)” and “Stroke (-)” are consistent with the distance of actuator movement specified in the step data. / Refer to JXC controller operation manual.

Revision history
No.LEG*-OMZ0023
November / 2021 1st printing
No.LEG*-OMZ0023-A
Decenber / 2021 Revision
No.LEG*-OMZ0023-B
June/ 2022 Revision
No.LEG*-OMZ0023-C
October/ 2026 Revision

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