



ORIGINAL INSTRUCTIONS

Instruction Manual

Electric Actuator - Guide Type

Series LEG

Motor: Battery-less absolute encoder [Step 24 VDC]



The intended use of this Electrical Actuator is to convert an electrical input signal into mechanical motion.

1 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)<sup>(1)</sup>, and other safety regulations.<sup>(1)</sup> 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 10218-1: Manipulating industrial robots -Safety. etc.

- Refer to the product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

	<b>Caution</b>	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
	<b>Warning</b>	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	<b>Danger</b>	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

**Warning**

- Always ensure compliance with relevant safety laws and standards.**
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.**
- The actuator and the controller are sold together as a package.** When purchasing the actuator separately, confirm that the combination of the controller and the actuator is compatible.
- For further safety instructions for the actuator and for the controller refer to the operation manual for each product on the SMC website (URL: <https://www.smcworld.com>).

2 Specifications

2.1 Specifications - LEG series

Model		LEG25	LEG32	LEG40	
Actuator	Stroke [mm]	30, 50, 100			
	Work Load [kg] <sup>(1)</sup>	Horizontal (30, 50 stroke, L=50 or less)	20	45	60
		Vertical	24	27	27
	Max. weight of <sup>(2)</sup> transferred object [kg]	75	100	150	
	Pushing force [N] <sup>(3)(4)(5)</sup>	126 to 238	156 to 370	266 to 553	
	Speed [mm/s] <sup>(5)</sup>	18 to 250	24 to 200	24 to 150	
	Pushing speed [mm/s] <sup>(6)</sup>	35 max.	30 max.	30 max.	
	Acceleration / Deceleration [mm/s <sup>2</sup> ]	5000 or less			
	Positioning repeatability [mm]	±0.02			
	Screw Lead [mm]	6	8	8	
	Impact / Vibration Resistance [m/s <sup>2</sup> ] <sup>(7)</sup>	50 / 20			
	Drive method	Ball screw + belt (top mounting) Ball screw (in-line)			
	Guide type	Sliding bearing			
Operating temperature [°C]	5 to 40				
Operating humidity [% RH]	90 or less (no condensation)				
Electrical	Motor size	<input type="checkbox"/> 42	<input type="checkbox"/> 56.4	<input type="checkbox"/> 56.4	
	Motor Type	Battery-less absolute (Step motor 24 VDC)			
	Encoder	Battery-less absolute			
	Rated voltage	24 VDC ±10%			
Lock unit	Max. Power [W] <sup>(8)</sup>	126	159	222	
	Lock type <sup>(9)</sup>	Non magnetizing lock			
	Holding force [N]	78	108	113	
	Power consumption [W] <sup>(10)</sup>	5	5	5	
Rated voltage	24 VDC ±10%				

Notes

- \*1) Horizontal: Workload changes according to the distance from the plate to the centre of gravity of the load. Check the "Model Selection" in the catalogue.  
Vertical: Speed changes according to the workload. Check the "Model Selection" in the catalogue.  
The workload is changed by the eccentric distance. Check the "Model Selection" in the catalogue.
- \*2) The weight of transferred object is when using a 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 pushing force values change according to the duty ratio and pushing speed. Check the "Model Selection" in the catalogue.
- \*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% for 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 the actuator 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).

2 Specifications (continued)

- \*8) The power (including the controller) is 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.

2.2 Actuator Weight

Top mounting type

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
Lock/cover weight [kg]	0.3			0.6			0.6		

In-line type

Series	LEG25M			LEG32M			LEG40M		
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
Lock/cover weight [kg]	0.3			0.6			0.6		

**Warning**

For special products which include a suffix of "-X#", "-D#", please refer to the customer drawing of that specific product.

3 Installation

3.1 Installation

**Warning**

- Do not install the product unless the safety instructions have been read and understood.
- Do not use the product outside of its allowable specification.
- Ensure the product is sized correctly and is suitable for the application.
- When installing, inspecting or performing maintenance on the product,

be sure to turn off the power supplies. Then, lock it so it cannot be tampered with while work is happening.

3.2 Environment

**Warning**

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications
- Prevent foreign particles from entering the product.
- Avoid using 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.
  - c) Areas where the ambient humidity exceeds the specified range.
  - d) Areas where strong magnetic or electric fields are generated.
  - e) Areas where there are large amounts of dust or there is exposure to water/oil droplets.
  - f) Areas at altitudes of above 1000 m.  
Heat radiation performance and withstand voltage may decline as result. For details, consult with SMC.
- 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.
- Install a protective cover when the product is used in an environment directly exposed to foreign matter, such as dust, cutting chips, and spatter. Looseness or increased sliding resistance can result.

3 Installation (continued)

3.3 Mounting

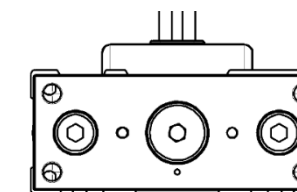
**Warning**

- Observe the required tightening torque for screws. Unless stated otherwise, tighten the screws to the recommended torque for mounting the product.
- Do not make any alterations to the product.  
Alterations made to this product may lead to a loss of durability and damage to the product, which can lead to injury and damage to other equipment and machinery.
- Do not scratch or dent the sliding parts of the table or mounting face etc., by striking or holding them with other objects. The components are manufactured to precise tolerances, so that even a slight deformation may cause faulty operation or seizure.
- Do not use the product until it has been verified that the equipment can be operated correctly.  
After mounting or repair, connect the power supply to the product and perform appropriate functional inspections to check it is mounted correctly.
- When one side of the actuator 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.
- Do not apply strong impact or an excessive moment while mounting the product or a workpiece.  
If an external force above the allowable moment is applied, it may cause play in the guide or an increase in the sliding resistance.
- Allow sufficient space for maintenance and inspection.

**Caution**

- 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.
- When mounting the product, use screws with adequate length and tighten them to the recommended torque.**  
Tightening with a larger torque than the specified range may cause malfunction while tightening with a smaller torque can allow the displacement of the actuator position. In extreme conditions the actuator could become detached from its mounting position.
- Keep the flatness of the mounting surface within 0.02 mm 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.

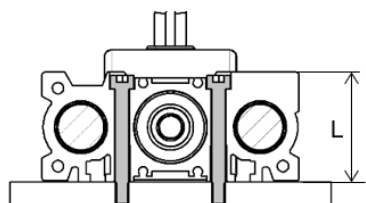
Work fixed / Plate tapped type



Model	Screw	Max. tightening torque [N.m]	Max. thread depth [mm]
LEG25	M8 x 1.25	12.5	12
LEG32	M10 x 1.5	24.0	16
LEG40	M10 x 1.5	24.0	16

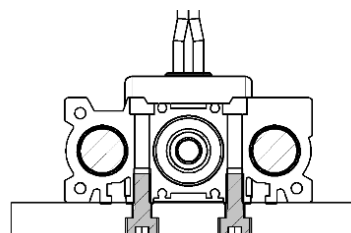
### 3 Installation (continued)

#### Mounting / Upper mounting tapped style



Model	Screw	Max. tightening torque [N.m]	Length L [mm]
LEG25	M6 x 1.0	5.2	48
LEG32	M8 x 1.25	12.5	64
LEG40	M8 x 1.25	12.5	78

#### Mounting / Lower mounting tapped style



Model	Screw	Max. tightening torque [N.m]	Max. thread depth [mm]
LEG25	M8 x 1.25	12.5	20
LEG32	M10 x 1.5	24.0	20
LEG40	M10 x 1.5	24.0	20

#### 3.4 Lubrication

##### Caution

- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If a lubricant is used in the system, refer to catalogue for details.
- The recommended grease is lithium grade No.2

Applied Region	Grease Pack Number	Weight [g]
Piston rod Guide	GR-S-010	10
	GR-S-020	20

### 4 Wiring

#### 4.1 Wiring

##### Warning

- Adjustment, mounting or wiring changes should not be carried out before disconnecting the power supply to the product. Electric shock, malfunction and damage can result.
- Do not disassemble the cables.
- Use only specified cables, otherwise there is a risk of fire or damage.
- Do not connect or disconnect the wires, cables and connectors when the power is turned on.

##### Caution

- Wire the connector correctly and securely. Check the connector for polarity and do not apply any voltage to the terminals other than those specified in the operation manual.

### 4 Wiring (continued)

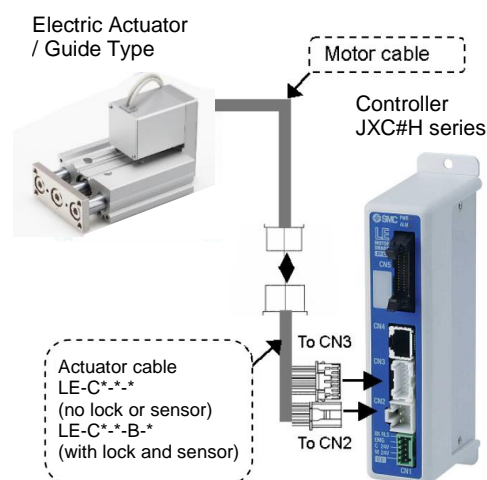
- Take appropriate measures against noise. Noise in a signal line may cause malfunction. As a countermeasure separate the high voltage and low voltage cables, and shorten the wiring lengths, etc.
- Do not route input/output wires and cables together with power or high voltage cables. The product can malfunction due to noise interference and surge voltage from power and high voltage cables close to the signal line. Route the wires of the product separately from power or high voltage cables.
- Take care that actuator movement does not catch cables.
- Operate with all wires and cables secured.
- Avoid bending cables at sharp angles where they enter the product.
- Avoid twisting, folding, rotating or applying an external force to the cable. Risk of electric shock, wire breakage, contact failure and loss of control of the product can result. Refer to the relevant operation manual for the bending life of the cable.
- Do not allow the cables connected to the actuator to move. The motor and lock cables are not robotic cables and can be broken when moved. Therefore, secure the cables and the connectors during set up.
- 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).
- Confirm correct insulation. Poor insulation of wires, cables, connectors, terminals etc. can cause interference with other circuits. Also there is the possibility that excessive voltage or current may be applied to the product causing damage.

#### 4.2 Actuator Ground connection

##### Caution

- The Actuator must be connected to ground to shield the actuator from electrical noise.
- Dedicated grounding should be used. Grounding should be to a D-class ground (resistance of 100Ω or less).
- Grounding should be performed near the actuator to shorten the wiring distance.
- The cross-sectional area of the ground wire shall be a minimum of 2 mm<sup>2</sup>.
- Avoid common grounding with other devices.

#### 4.3 Wiring of Actuator to Controller



### 5 How to Order

- For standard products, refer to the catalogue on the SMC website (URL: <https://www.smcworld.com>) for the how to order information.

### 6 Outline Dimensions

- For standard products, refer to the catalogue on the SMC website (URL: <https://www.smcworld.com>) for outline dimensions.

### 7 Maintenance

#### 7.1 General Maintenance

##### Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly electricity and compressed air can be dangerous.
- Maintenance of electromechanical and pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the power has been discharged and the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical or pneumatic connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.
- Incorrect handling can cause an injury, damage or malfunction of the equipment and machinery, so ensure that the procedure for the task is followed.
- Always allow sufficient space around the product to complete any maintenance and inspection.

#### 7.2 Periodical Maintenance

- Maintenance should be performed according to the table below:

*whichever of these occurs first	Appearance Check	Internal Check	Belt Check
Inspection before daily operation	✓	✓	✓
Inspection every six months*	✓	✓	✓
Inspection every 1,000 km*	✓	✓	✓
Inspection every 5 million cycles*	✓	✓	✓

- Following any maintenance, always perform a system check. Do not use the product if any error occurs, as safety cannot be assured if caused by any un-intentional malfunction.

#### 7.3 Appearance Check

- The following items should be visually monitored to ensure that the actuator remains in good condition and there are no concerns flagged;
  - Loose Screws,
  - Abnormal level of dust or dirt,
  - Visual flaws / faults,
  - Cable connections,
  - Abnormal noises or vibrations.

#### 7.4 Internal Check

- Items for internal check;
  - Condition of lubricants on moving parts.
  - Loose or mechanical play in fixed parts or fixing screws.

### 7 Maintenance (continued)

#### 7.4 Belt Check

- If one of the 6 conditions below are seen, do not continue operating the actuator, contact SMC immediately.
  - Tooth shaped canvas is worn out.** Canvas fibre becomes "fuzzy", rubber is removed, and the fibre gains a white colour. The lines of fibre become very unclear.



- Peeling off or wearing of the side of the belt.**

The corner of the belt becomes round and frayed, with threads beginning to stick out.

- Belt is partially cut.**

Belt is partially cut. Foreign matter could be caught in the teeth and cause flaws.



- Vertical line of belt teeth.**

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

- Rubber back of the belt is softened and sticky.**

- Crack on the back of the belt.**



### 8 Limitations of Use

#### 8.1 Limited warranty and disclaimer/compliance requirements

- Refer to Handling Precautions for SMC Products.

### 9 Product disposal

This product should not be disposed of as municipal waste. Check your local regulations and guidelines to dispose of this product correctly, in order to reduce the impact on human health and the environment.

### 10 Contacts

Refer to [www.smcworld.com](http://www.smcworld.com) or [www.smc.eu](http://www.smc.eu) for your local distributor / importer.

## SMC Corporation

URL : <http://www.smcworld.com> (Global) <http://www.smc.eu> (Europe)  
 'SMC Corporation, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, Japan  
 Specifications are subject to change without prior notice from the manufacturer.  
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