



Installation and Maintenance Manual

Electric Actuator / Guide rod slider

Series LEL

Applicable model number:
LEL25*T-*



Note: For special models LEL*-X* please check the appropriate drawing for the dimensions and specifications.

1 Safety Instructions

This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.

- Read this manual before using the product to ensure correct handling and also read the manuals of related apparatus before use.
- Keep this manual in a safe place for future reference.
- These instructions indicate the level of potential hazard by label of "Caution", "Warning" or "Danger", followed by important safety information which must be carefully followed.
- To ensure safety of personnel and equipment the safety instructions in this manual and the product catalogue must be observed, along with other relevant safety practices.

	Caution	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
	Warning	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

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

- Electromagnetic compatibility:** This product is class A equipment that is intended for use in an industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbances.

Warning

- Do not disassemble, modify (including change of printed circuit board) or repair the product.**
An injury or product failure may result.
- Do not operate the product beyond the specification range.**
Fire, malfunction or equipment damage may result.
Use the product only after confirming the specifications.
- Do not use the product in the presence of flammable, explosive or corrosive gas.**
Fire, explosion or corrosion may result.
This product does not have an explosion proof construction.
- When using the product as part of an interlocking system:**
Provide a double interlocking system, for example a mechanical system.
Check the product regularly to ensure correct operation.
- Before performing maintenance, be sure of the following:**
Turn off the power supply.

Caution

- Always perform a system check after maintenance.**
Do not use the product if any error occurs.
Safety cannot be assured if caused by un-intentional malfunction.
- Provide grounding to ensure correct operation and to improve noise resistance of the product.**
This product should be individually grounded using a short cable.
- Follow the instructions given below when handling the product.**
Failing to do so may result in product damage.
- Maintenance space should always be provided around the product.**
- Do not remove labels from the product.**
- Do not drop, hit or apply excessive shock to the product.**

- Caution (Continued)** Unless stated otherwise, follow all specified tightening torques.
- Do not bend, apply tensile force, or apply force by placing heavy loads on the cables.**

1 Safety Instructions (continued)

- Connect wires and cables correctly and do not connect while the power is turned on.**
- Do not route input/output wires and cables together with power or high-voltage cables.**
- Check the insulation of wires and cables.**
- Take appropriate measures against noise, such as noise filters, when the product is incorporated into other equipment or devices.**
- Take sufficient shielding measures when the product is to be used in the following conditions:**
 - Where noise due to static electricity is generated.
 - Where electro-magnetic field strength is high.
 - Where radioactivity is present.
 - Where power lines are located.
- Do not use the product in a place where electrical surges are generated.**
- Use suitable surge protection when a surge generating load such as a solenoid valve is to be directly driven.**
- Prevent any foreign matter from entering this product.**
- Do not expose the product to vibration or impact.**
- Use the product within the specified ambient temperature range.**
- Do not expose the product to any heat radiation.**
- Use a precision screwdriver with flat blade to adjust the DIP switch.**
- Close the cover over the switches before power is turned on.**
- Do not clean the product with chemicals such as benzene or thinners.**

2 General Instructions

2.1 Wiring

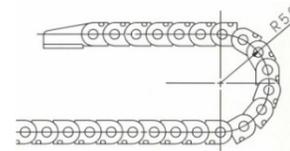
Warning

- 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.**
- 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.
- 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 interference of noise and surge voltage from power and high voltage cables 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 happen.
- Secure the motor cables protruding from the actuator before use.**
The motor and lock cables are not robotic type cables and can be damaged when moved.
- The cables connecting the actuator and the controller are robotic type cables. These should not be placed in a flexible moving tube with a radius smaller than the specified value (Min. 50mm).**

Caution



2 General Instructions (continued)

- 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.

2.2 Transportation

Caution

- Do not carry or swing the product by the cables.**

2.3 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.
- When an external guide is used, connect the moving parts of the product 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 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 attaching to the work piece, do not apply strong impact or large moment.**
If an external force in excess of the allowable moment is applied, it may cause looseness in the guide unit, an increase in sliding resistance or other problems.
- Maintenance space**
Allow sufficient space for maintenance and inspection.

2.4 Handling

Warning

- Do not touch the motor while in operation.**
The surface temperature of the motor can increase to approx. 80°C due to operating conditions.
Energizing alone may also cause this temperature increase.
As it may cause burns, do not touch the motor when in operation.
- If abnormal heating, smoking or fire, etc. occurs in the product, immediately turn off the power supply.**
- Immediately stop operation if abnormal operation noise or vibration occurs.**
If abnormal operation noise or vibration occurs, the product may have been mounted incorrectly. Unless operation of the product is stopped for inspection, the product can be seriously damaged.
- Never touch the rotating part of the motor or the moving part of the actuator while in operation.**
There is a serious risk of injury.
- When installing, adjusting, inspecting or performing maintenance on the product, the controller and related equipment, be sure to turn off the power supply to each of them. Then, lock it so that no other person can turn the power on, or implement measures such as a safety plug.**

Caution

- Keep the controller and actuator combined as delivered for use.**
- The controller is set with parameters for the actuator it is shipped with. If it is combined with a different actuator, failure can result.
- Check the product for the following points before operation.**
 - Damage to electric cables and signal wires.
 - Looseness of the connector to the power and signal lines.
 - Looseness of the actuator/cylinder and controller/driver mounting.
 - Abnormal operation.
 - Stop function

2 General Instructions (continued)

- When more than one person is performing the installation, decide on the procedures, signals, measures and resolution for abnormal conditions before beginning.**
- Also designate a person to supervise the work, other than those performing the work.**
- An operation test should be performed at low speed. Start the test at a predefined speed, after confirming there are no problems.**
- Actual speed of the product will be affected by the workload.**
Before selecting a product, check the catalogue for the instructions regarding selection and the specifications.
- Do not apply a load, impact or resistance in addition to a transferred load during return to origin.**
In the case of the return to origin by pushing force, additional force will cause displacement of the origin position since it is based on the detected motor torque.
- Do not remove the product nameplate.**

2.5 Actuator with lock

Warning

- Do not use the lock as a safety lock or a control that requires a locking force.**
The lock used is designed to prevent dropping of the work piece.
- "Measures against drops" means preventing a work piece from dropping due to its weight when the actuator operation is stopped**

and the power supply is turned off.

- 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 part of the lock or reduced lifetime can result. The same situation will occur when the lock slips due to a force higher than its holding force, as this will accelerate the wear to the lock.
- Do not apply liquid, oil or grease to the lock or its surroundings.**
When liquid, oil or grease is applied to the sliding part of the lock, its holding force will be reduced significantly.
- Take "measures against drops" and check that safety is assured before 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.
- When the actuator is operated manually (when 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, wearing of the lock sliding surface will be accelerated, causing reduction in the holding force and the life of the locking mechanism.

- Do not supply power to the BK RLS (Lock release) during normal operation.**

The 24 VDC supply to the BK-RLS (lock release) is only required for maintenance or installation purposes when the motor is off.

If power is supplied constantly to the BK-RLS (lock release) the lock is released all the time and it cannot be activated in a power cut situation or in a stop circuit, and this can cause the workpiece to drop down.

2.6 Please refer to the auto switch references in "Best Pneumatics" when an auto switch is to be used.

2.7 Unpacking

Caution

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

3 Specifications

3.1 LEL series specifications

Model		LEL25M	LEL25L	
Actuator specifications	Stroke (mm) ^{Note 1)}	(100), (200), 300, 400, 500, 600, (700), (800), (900), (1000)		
	Work load (kg) ^{Note 2)}	Horizontal	3	5
		Wall mounting	2.5	5
	Speed (mm/s) ^{Note 2)}	48 to 500	48 to 1000	
	Max. acceleration/deceleration (mm/s ²)	3,000		
	Position repeatability (mm)	±0.08		
	Lost motion [mm] ^{Note 10)}	0.1 or less		
	Lead equivalent (mm)	48		
	Impact resistance/ vibration resistance (m/s ²) ^{Note 3)}	50 / 20		
	Drive method	Belt		
Guide type	Slide bearing	Ball bushing bearing		
Allowable external force (N) ^{Note 4)}	5			
Operating temperature range (°C)	5 to 40			
Operating humidity range (%RH)	90 or less (No condensation)			
Electrical	Motor size	□42		
	Type of Motor	Step motor (Servo 24 VDC)		
	Encoder	Incremental A/B phase (800 pulse/rotation)		
	Rated voltage (VDC)	24 ±10%		
	Power consumption (W) ^{Note 5)}	32		
	Standby power consumption when operating (W) ^{Note 6)}	16		
	Momentary maximum power consumption (W) ^{Note 7)}	60		
	Controller weight (kg)	LECP6 : 0.15 (Screw mounting type)		
		LECP1 : 0.13 (DIN rail mounting type)		
	Lock	Type ^{Note 8)}	No excitation operating type	
Holding force (N)		19		
Power consumption (W) ^{Note 9)}		5		

Rated voltage (VDC)	24 ±10%
---------------------	---------

Weight

Stroke (mm)	(100)	(200)	300	400	500	600	(700)	(800)	(900)	(1000)
Weight (kg)	2.13	2.47	2.82	3.17	3.52	3.87	4.21	4.56	4.91	5.26
Additional weight for lock (kg)	0.26									
Additional weight for motor cover (kg)	0.04									
Additional weight for magnet / switch rail (kg)	0.04	0.05	0.06	0.08	.09	0.11	0.12	0.14	0.05	0.17

Note 1) The strokes shown in () are produced upon receipt of order.

Note 2) The speed is dependent on the workload. Check the "Speed-workload graphs" for the selected model.

The workload is affected by the stroke and workload mounting conditions. Check the "Allowable dynamic moment graphs" for the selected model.

The speed and force may change depending on the cable length, load and mounting conditions. If the cable length exceeds 5m, then it will decrease by up to 10% for each 5 m (At 15m: Reduced by up to 20%).

Note 3) Impact resistance: No malfunction occurred when the actuator was tested with a drop tester in both axial and perpendicular directions to the stroke. (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, when the actuator was tested in both axial and perpendicular directions to the stroke (The test was performed with the actuator in the initial state).

Note 4) Allowable external force is the allowable resistance when mounting cable duct etc. in parallel.

Note 5) The "Power consumption" (including the controller) is for when the actuator is operating.

Note 6) The "Standby power consumption when operating" (including the controller) is for when the actuator is stopped in the set position with no applied force in the direction of the actuator movement.

Note 7) The "Momentary maximum power consumption" (including the controller) is for when the actuator is operating. This value should be used for the selection of the power supply.

Note 8) Only applies to actuators with lock.

Note 9) For the actuator with lock, please add the power consumption for the lock.

Note 10) A reference value for correcting an error in reciprocal operation.

4 Installation

4.1 Design and selection

Warning

- Do not apply a load in excess of the actuator specification.** An actuator should be selected based on the maximum work load and allowable moment. If the actuator is used outside of the operating specification, the 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.
- Do not exceed the speed limit of the actuator specification.** Select a suitable actuator by the relationship of allowable work load to speed. Noise or reduction of accuracy may occur if the actuator is operated in excess of its specification and could lead to reduced product life.
- Do not use the actuator in applications where excessive external force or impact force is applied.** This can lead to premature failure of the product.
- Do not apply excessive external force or impact force to the motor.** Miss-alignment of the motor may lead to a signal detection error, increasing internal friction or causing damage to the motor.
- When an external force is applied to the table, it is necessary to add the external force to the workload, to give the total load carried for actuator sizing.** When mounting cable duct in parallel to the actuator, it is necessary to add the friction force to the workload as the total carried load.
- External vibration may be introduced into the work-piece during operation due to the type of guide mechanism.** Do not use this product in a location where vibration will cause a problem.

Caution

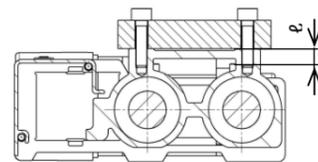
- Do not operate by fixing the table and moving the actuator body.** An excessive load will be applied to the table, which could lead to damage to the actuator and reduced accuracy and reduced product life.
- This actuator cannot be used for vertically mounted applications.**
- When using a belt driven actuator, vibration may occur during operation at speeds within the actuator specification, which could be caused by the operating conditions. Change the speed setting to a speed that does not cause vibration.**

4.2 Mounting

Caution

- Keep the flatness of the mounting surface to 0.2 mm maximum.** Insufficient flatness of a work piece or the surface onto which the actuator body is to be mounted can cause play in the guide and increased sliding resistance.
- When mounting the workpiece or other device to the actuator tighten the fixing screws with adequate torque within the specified torque range.** Tightening the screws with a torque higher than the maximum may cause malfunction, whilst tightening with a lower torque can cause the displacement of the mounting position or in extreme conditions detaching of the work piece.

Work piece mounting



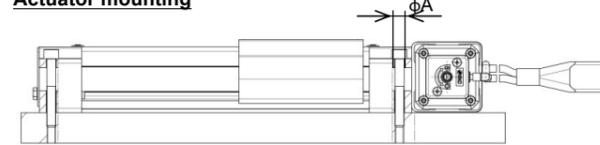
Model	Screw size	Maximum torque [Nm]	□ (Maximum thread depth [mm])
LEL25*	M5x0.8	3	8

Use screws with adequate length, but at least 0.5 mm less than the maximum thread depth. Using screws that are too long can damage the actuator body and cause malfunction.

4 Installation (continued)

- When mounting the actuator, use screws with adequate length and tighten them with adequate torque and use all of the mounting holes to maintain the specified performance.** Tightening the screws with a torque higher than recommended may cause malfunction, whilst tightening with a torque lower than recommended can cause the displacement of the mounting position or in extreme conditions the actuator could become detached from its mounting position.

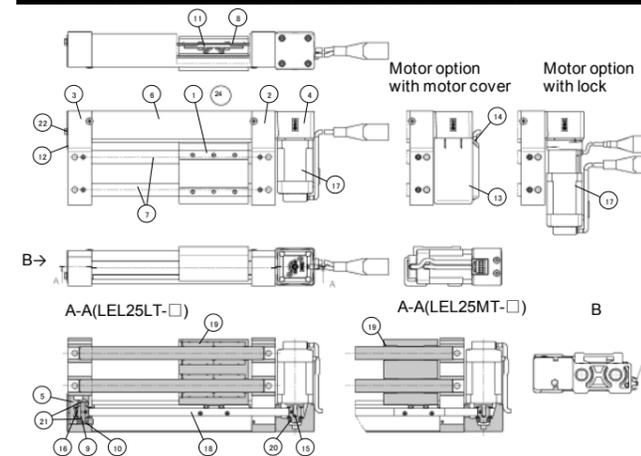
Actuator mounting



Model	Screw size	Maximum tightening torque [Nm]	□ A (mm)	□ (mm)
LEL25□	M6	5.2	6.6	35.5

- When mounting the actuator, leave a gap of 40 mm or more to allow for bending of the actuator cable.**

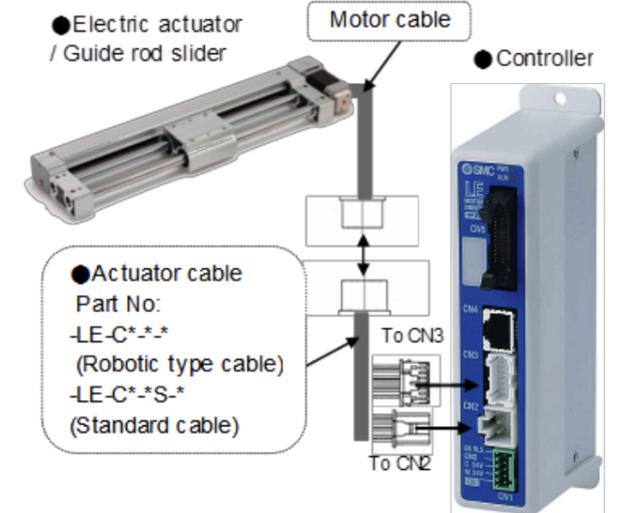
5 Names and Functions of Individual Parts



Parts list

No.	Description	Material	Remarks
1	Table	Aluminium alloy	Anodized
2	Motor end plate	Aluminium alloy	Anodized
3	End plate	Aluminium alloy	Anodized
4	Motor mount	Aluminium die-cast	Painting
5	Pulley holder	Aluminium alloy	
6	Belt cover	Aluminium alloy	Anodized
7	Guide rod	Carbon steel	Hard chromate
8	Belt holder A	Carbon steel	Chromate
9	Pulley shaft	Stainless steel	
10	Spacer	Aluminium alloy	
11	Belt holder B	Aluminium alloy	
12	Tension plate	Aluminium alloy	Anodized
13	Motor cover	Synthetic resin	"With cover" only
14	Grommet	Synthetic resin	"With cover" only
15	Motor pulley	Aluminium alloy	Anodized
16	End pulley	Aluminium alloy	Anodized
17	Motor	-	
18	Belt	-	
19	Slide bearing	-	"LEL25MT"
	Ball bushing bearing	-	"LEL25LT"
20	Bearing	-	
21	Bearing	-	
22	Hexagon bolt	Carbon steel	Chromated
23	Switch rail	Aluminium alloy	"With magnet/switch rail" only
24	Magnet	-	"With magnet/switch rail" only

6 Wiring



Warning

Use only specified cables otherwise there may be risk of fire and damage.

7 Maintenance

Warning

- Do not disassemble or repair the product.** Fire or electric shock can result.
- Before modifying or checking the wiring, the voltage should be checked with a tester 5 minutes after the power supply is turned off.** Electric shock can result.

Caution

- Maintenance should be performed according to the procedure indicated in the Operation Manual.** Improper handling can cause injury, damage or malfunction of equipment and machinery.
- Removal of the actuator** When equipment is serviced, first confirm that measures are in place to prevent dropping of work pieces and run-away of equipment, etc. before turning off the power supply to the system. When the machinery is restarted, check that operation is normal with the actuator in a safe position.
- The actuator has been lubricated for life at manufacture, and does not require lubrication in service.** When lubrication is applied, special grease must be used. Please read the maintenance manual for each actuator.
- 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 6 months / 1000 km / 5 million cycles *	□	□	□

* Whichever occurs first

- Items for visual appearance check.**
 - Loose screws, abnormal dirt.
 - Flaws/faults and cable connections.
 - Vibration, noise.
- Items for internal check**
 - Lubricant condition on moving parts.
 - Loose or mechanical play in fixed parts or fixing screws.

7 Maintenance(continued)

• Items for belt check

Check the belt regularly as described in the "maintenance frequency". Stop operation immediately and contact SMC when the belt appears to be in the condition shown in the following pictures.

• The Belt Tooth canvas is worn

The belt canvas fibre becomes fuzzy. Rubber is removed and the fibre has become white in appearance and the lines of fibres become unclear.



Teeth become fuzzy

• The side of the Belt is Peeling off or wearing

The Belt corner becomes rounded and frayed threads are sticking out.



•The Belt is partially cut

Foreign matter caught in teeth has caused damage

• Vertical line of belt teeth

Damage to the belt teeth, caused by the belt running on the flange.

• Rubber back of the belt is softened and sticky.

• Crack on the back of the belt.



8 CE Directive

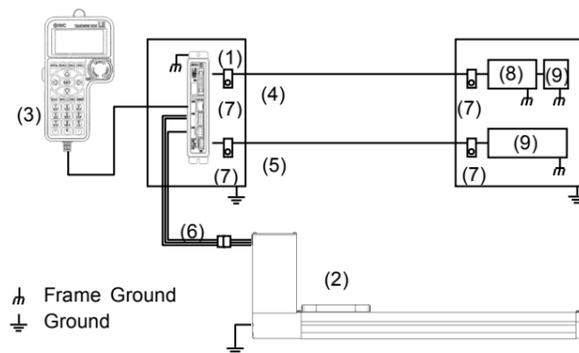
The LE series actuators and motor controllers conform to the EMC directive, if they are installed in accordance with the following instructions.

These components are intended for incorporation into machinery and assemblies forming part of a larger system.

The CE compliance was achieved when the above two components were connected as shown in the diagram below.

Please note that the EMC performance changes according to the configuration of the customers control panel and the relationship with other electrical equipment and wiring.

Therefore conformity to the EMC directive cannot be certified for SMC components incorporated into the customer's equipment under actual operating conditions. As a result it is necessary for the customer to verify conformity to the EMC directive for the machinery and equipment as a whole.



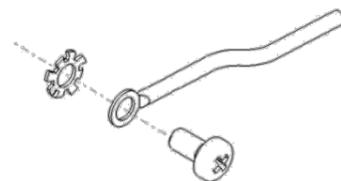
8 CE Directive(continued)

Machinery parts list

No.	Part name	Part No./Material
1	Motor controller	LECP6 Series
2	Actuator	LE Series
3	Teaching box	LEC-T1 Series
4	I/O cable (with shield)	LEC-CN5-[]
5	Power supply cable (with shield)	5 wire shielded cable (5 m)
6	Actuator cable	LE-CP-[]
7	P-clip (for shield ground)	Metal
8	Programmable controller	-
9	Switching power supply	-

Please refer to them [annual](#) for the LEC controller being used for information on the installation procedure.

Actuator Ground connection

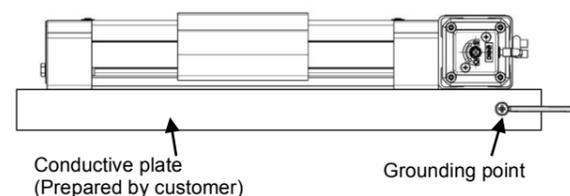


The actuator must be mounted to a conductive plate as shown below on the "Location of grounding point" drawing.

The conductive plate must then be connected to ground to shield the actuator from electrical noise; the screws and plate should be made of conductive material.

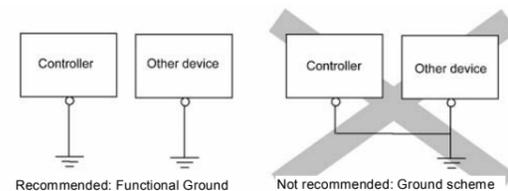
The screw, cable with crimping terminal and shakeproof washer must be obtained separately.

Location of grounding point



Caution

The actuator should be connected to ground. The cross-sectional area of the wire used should be 2mm² minimum. The ground connection point should be as near as possible to the actuator to keep the wire length short.



• Controller Ground connection

• Please refer to the manual for the LEC controller being used for information on grounding the controller.

9 Contacts

AUSTRIA	(43) 2262 62280-0	LATVIA	(371) 781 77 00
BELGIUM	(32) 3 355 1464	LITHUANIA	(370) 5 264 8126
BULGARIA	(359) 2 974 4492	NETHERLANDS	(31) 20 531 8888
CZECH REP.	(420) 541 424 611	NORWAY	(47) 67 12 90 20
DENMARK	(45) 7025 2900	POLAND	(48) 22 211 9600
ESTONIA	(372) 651 0370	PORTUGAL	(351) 21 471 1880
FINLAND	(358) 207 513513	ROMANIA	(40) 21 320 5111
FRANCE	(33) 1 6476 1000	SLOVAKIA	(421) 2 444 56725
GERMANY	(49) 6103 4020	SLOVENIA	(386) 73 885 412
GREECE	(30) 210 271 7265	SPAIN	(34) 945 184 100
HUNGARY	(36) 23 511 390	SWEDEN	(46) 8 603 1200
IRELAND	(353) 1 403 9000	SWITZERLAND	(41) 52 396 3131
ITALY	(39) 02 92711	UNITED KINGDOM	(44) 1908 563888

SMC Corporation

URL : [http:// www.smcworld.com](http://www.smcworld.com) (Global) <http:// www.smceu.com> (Europe)

Specifications are subject to change without prior notice from the manufacturer.

© 2016SMC Corporation All Rights Reserved.