



## Installation and Maintenance Manual

### Electric Rotary Table

#### Series LER

Applicable model number:  
LER\*-\*



Note: For special models LER\*-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.

<b>Caution</b>	Indicates a hazard with a low level of risk. Which if not avoided, could result in minor or moderate injury.
<b>Warning</b>	Indicates a hazard with a medium level of risk. Which if not avoided, could result in death or serious injury.
<b>Danger</b>	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.**
- **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

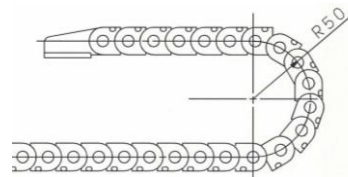
#### Warning

- **Adjusting, mounting or wiring change should not be done before disconnecting the power supply to the product.**  
Electrical 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.
- **Fix the motor cables protruding from the actuator in place before use.**  
The motor and lock cables are not robotic type cables and can be damaged when moved.
- **The actuator cables connecting the actuator and the controller are robotic type cables. But should not be placed in a flexible moving tube with a radius smaller than the specified value. (Min. 50 mm)**



## 2 General Instructions (continued)

- **Confirm correct insulation of the product.**  
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 tightening torque for screws.**  
Unless stated otherwise, tighten the screws to the recommended torque for mounting the product.
- **Do not make any alterations to this product.**  
Alterations made to this product may lead to a loss of durability and damage to the product, which can lead to human 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 you verify 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 over 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, controller and related equipment, be sure to turn off the power supply to each of them. 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.**
- **In the case of the actuator that has a servo motor (24VDC), the “motor phase detection step” is done by inputting the servo on signal just after the controller power is turned on.**  
The “motor phase detection step” operates the table/rod to the maximum distance of the lead screw. (The motor rotates in the reverse direction if the table hits an obstacle such as the end stop damper.) Take the “motor phase detection step” into consideration for the installation and operation of this actuator

## 2 General Instructions (continued)

#### Caution

- **Keep the controller and product combined as delivered for use.**  
The product is set in parameters for shipment.  
If it is combined with a different product parameter, failure can result.
- **Check the product for the following points before operation.**
  - Damage to electric driving line and signal lines.
  - Looseness of the connector to each power line and signal line.
  - Looseness of the actuator/cylinder and controller/driver mounting.
  - Abnormal operation.
  - Stop function
- **When more than one person is performing work, decide on the procedures, signals, measures and resolution for abnormal conditions before beginning the work.**
- **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 changed by the workload.**  
Before selecting a product, check the catalogue for the instructions regarding selection and 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 detected motor torque.
- **Do not remove the 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 for the product with a lock is designed to prevent dropping of work piece.

- **For vertical mounting, use the product with a lock.**

If the product is not equipped with a lock, the product will move and drop the work piece when the power is removed.

- **“Measures against drops,” means preventing a work piece from dropping due to its weight when the product 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 happen when the lock slips due to a force higher than the max. thrust force of the product, 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.

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

### 3 Specifications

LER series		10K	10J	30K	30J	50K	50J	
Model								
Rotation Angle (°)		310			320			
Gear rate(°)		8	12	8	12	7.5	12	
Max. Rotation Torque (N·m)		0.32	0.22	1.2	0.8	10.0	6.6	
Max. Pushing Torque(N·m) Note 1)3)		0.16	0.11	0.6	0.4	5.0	3.3	
Max. Moment of Inertia (kg·m <sup>2</sup> ) Note 2)	LECP6/1MJ	0.004	0.0018	0.035	0.015	0.13	0.05	
	JXC*			0.027	0.012	0.10	0.04	
	LECPA							
Rotation Speed (°/sec) Note 2)3)		20to280	30to420	20to280	30to420	20to280	30to420	
Pushing Speed (°/sec)		20	30	20	30	20	30	
Angular acceleration / Angular deceleration (°/sec <sup>2</sup> ) Note 2)		3,000						
Backlash(°)	Basic				± 0.2			
	High precision	± 0.3			± 0.1			
Repeatability (°)	Basic				± 0.05			
	High precision	± 0.05			± 0.03			
Lost motion (°) Note 4)	Basic				0.3 or less			
	High precision	0.3 or less			0.2 or less			
Impact resistance/vibration resistance (m/sec <sup>2</sup> ) Note 5)		150/30						
Actuation type		Worm gear and belt						
Table allowable load	Radial load (N)	Basic	78	196	314			
		High precision	86	233	378			
	Thrust load/Push (N)	Basic	78	363	451			
		High precision	107	398	517			
	Thrust load/Pull (N)	Basic	74	197	296			
		High precision	74	197	296			
	Moment (N·m)	Basic	2.4	5.3	9.7			
		High precision	2.9	6.4	12.0			
	Max. operating frequency(c.p.m)		60					
	Operating temperature range (°C)		5 to 40					
	Operating humidity range (%)		90 or less (No condensation)					
	Weight (kg)	Basic	0.49	1.1	2.2			
High precision		0.52	1.2	2.4				
External stopper	Rotation Angle (°)	*(-2) with 1 Arm		180				
		*(-3) with 2 Arms		90				
	Repeatability at the end (°)	± 0.01						
	Range of external stopper (°)	± 2						
Weight (kg)	*(-2) with 1 Arm	Basic	0.55	1.2	2.5			
		High precision	0.61	1.4	2.7			
	*(-3) with 2 Arms	Basic	0.57	1.2	2.6			
		High precision	0.63	1.4	2.8			

\* Order code option for rotation angle

LER series		10K	10J	30K	30J	50K	50J
360° type	Model						
	Rotation Angle (°) Note 9)	360					
	Angle range (°) Note 9)	±20000000					
	Proximity sensor (for Return to original position)/ Input circuit	2 wire					
	Proximity sensor (for Return to original position)/ Input number	1 outputs					
Weight (kg)	Basic	0.51	1.2	2.3			
	High precision	0.55	1.3	2.5			

### Electrical specification

Model		10K	10J	30K	30J	50K	50J
Electric specification	Motor size	□20	□28	□42			
	Motor	Step motor (Servo 24VDC)					
	Encoder (Angular displacement sensor)	Incremental A/B phase (800 pulse/rotation)					
	Rated voltage (VDC)	24 ± 10%					
	Power consumption (W) Note 6)	11	22	34			
	Standby power consumption when operating (W) Note 7)	7	12	13			
	Max. instantaneous power consumption (W) Note 8)	19	42	57			

Note 1) Pushing Torque accuracy is ± 30% (F.S.) for LER10, ± 25%(F.S.) for LER30, ± 20%(F.S.) for LER50.

Note 2) The Angular acceleration, angular deceleration and angular speed may fluctuate due to variations in the moment of inertia. Refer to the catalog.

Note 3) The speed and force may change depending on the cable length, load and mounting conditions. Furthermore, if the cable length exceeds 5m then it will decrease by up to 10% for each 5m.(At 15m : Reduced by up to 20%)

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

Note 5) Impact resistance:

No malfunction occurred when the rotary 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 rotary actuator in the initial state)

Vibration resistance:

No malfunction occurred in a test ranging between 45 to 2000Hz. The test was performed in both an axial direction and a perpendicular direction to the lead screw.

(The test was performed with the rotary actuator in the initial state)

### 3 Specifications (Continued)

Note 6) The "Power consumption" (including the controller) is for when the actuator is operating.

Note 7) The "Standby power consumption when operating" (including the controller) is for when the actuator is stopped in the set position during operation, except for during the pushing operation.

Note 8) The "Momentary max. power consumption" (including the controller) is for when the actuator is operating. This value can be used for the selection of the power supply.

Note 9) The Monitor angle is reset to 0° every 360°

Select INC for setting the angle (position). If setting the angle above 360° with ABS (Absolute), the actuator will not operate correctly.

### 4 Installation

#### 4.1 Design and selection

#### Warning

- If the operating conditions involve load fluctuations, ascending/descending movements, or changes in the frictional resistance, ensure that safety measures are in place to prevent injury to the operator or damage to the equipment.

Failure to provide such measures could accelerate the operating speed, which may be hazardous to humans, machinery, and other equipment.

- Power failure may result in a decrease in the pushing force; ensure that safety measures are in place to prevent injury to the operator or damage to the equipment.

When the product is used for clamping, the clamping force could be decreased due to power failure, potentially creating a hazardous situation in which the work piece is released.

#### Caution

- If the operating speed is set to fast and the moment of inertia is too large, the product could be damaged.

Set appropriate product operating conditions in accordance with the

model selection procedure.

- If more precise repeatability of the rotation angle is required, use the product with an external stopper, with repeatability of ±0.01° (180° and 90° with adj. of ±2°) or by directly stop the workpiece using an external object utilizing the pushing operation.

When using angle adjustment, the initially set rotation angle may change.

#### 4.2 Mounting

#### Caution

- Do not drop or hit the rotary actuator to avoid scratching and denting the mounting surfaces.

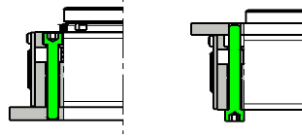
Even slight deformation can cause the deterioration of accuracy and operation failure.

- When mounting the rotary actuator use screws with adequate length and tighten them with adequate torque within the specified torque range.

Tightening the screws with a higher torque than recommended may cause 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.

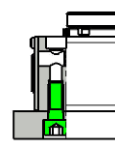
#### Rotary actuator mounting (thro holes)

Model	Bolt	Max. tightening torque [N·m]
LER*10	M5×0.8	3.0
LER*30	M6×1	5.0
LER*50	M8×1.25	12.0



#### Rotary actuator mounting (tapped holes)

Model	Bolt	Max. tightening torque [N·m]	Max. thread depth L [mm]
LER*10	M6×1	5.0	12
LER*30	M8×1.25	12.0	16
LER*50	M10×1.5	25.0	20



### 4 Installation (continued)

#### Mounting the workpiece to the rotary table

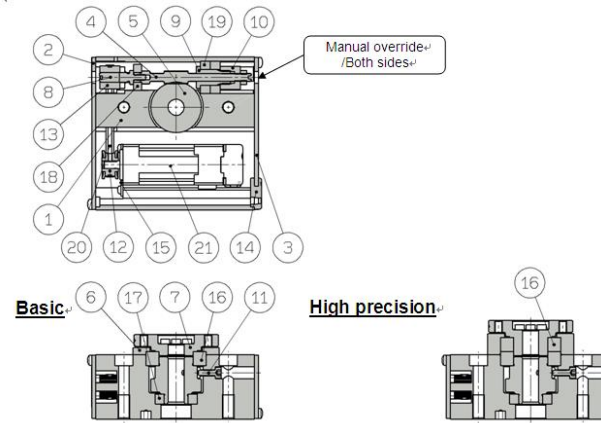
Mount the workpiece to the table using the screw length and tightening torque specified in the table below. Using long screws which interfere with the body may cause operation failure.

Model	Bolt	Screw length (mm)	Max. Tightening torque (N·m)
LER*10	M4×0.7	6	1.4
LER*30	M5×0.8	8	3.0
LER*50	M6×1	10	5.0

- The mounting face has holes and slots for positioning. If required use them for accurate positioning of the rotary actuator.
- If it is necessary to operate the product when it is not energized, use the manual override screws.

When the product is operated with the manual override screws, check the position of the manual override of the table, and leave necessary space. Do not apply excessive torque to the manual override screws that could lead to damage and malfunction of the product.

### 5 Names and Functions of Individual Parts

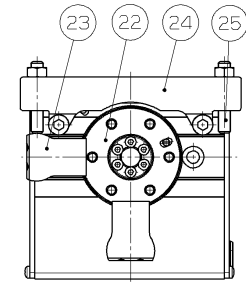


#### Parts list:

No.	Part	Material	Remarks
1	Body	Aluminium alloy	Anodized
2	Side plate A	Aluminium alloy	Anodized
3	Side plate B	Aluminium alloy	Anodized
4	Worm screw	Stainless steel	Heat treated, Specially treated
5	Worm wheel	Stainless steel	Heat treated, Specially treated
6	Bearing cover	Aluminium alloy	Anodized
7	Table	Aluminium alloy	Anodized
8	Joint	Stainless steel	
9	Bearing holder	Aluminium alloy	
10	Bearing retainer	Aluminium alloy	
11	Starting point bolt	Carbon steel	(Not used for 360°)
12	Pulley A	Aluminium alloy	
13	Pulley B	Aluminium alloy	
14	Grommet	NBR	
15	Motor plate	Carbon steel	
16	Basic	Deep groove ball bearing	-
	High precision	Special ball bearing	-
17	Deep groove ball bearing	-	
18	Deep groove ball bearing	-	
19	Deep groove ball bearing	-	
20	Belt	-	
21	Step motor (Servo/24VDC)	-	

### 5 Names and Functions of Individual Parts (Continued)

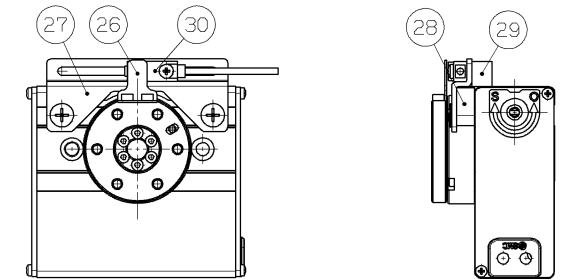
#### External stopper



#### Parts list for External stopper:

No.	Part	Material	Remarks
22	Table	Aluminium alloy	Anodized
23	Arm	Carbon steel	Nickel plated
24	Holder	Aluminium alloy	Anodized
25	Adjustment bolt	Carbon steel	Chromating

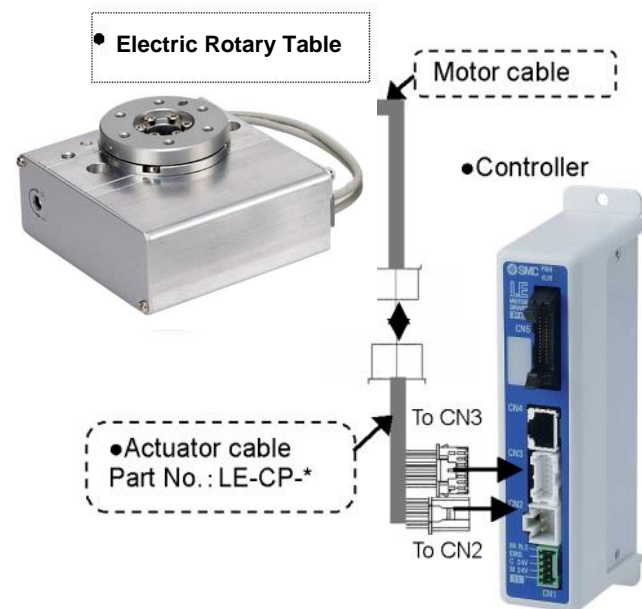
#### 360° type



#### Parts list for 360° type

No.	Part	Material	Remarks
26	Proximity dog	Stainless steel	
27	Sensor holder	Carbon steel	Chromating
28	Sensor holder spacer	Aluminium alloy	Anodized
29	Square nut	Aluminium alloy	(high precision type only)
30	Proximity sensor assembly	-	

## 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.
- **The high precision bearing is assembled by pressing into position. It is not possible to disassemble it.**

### Caution

- **Maintenance should be performed according to the procedure indicated in the Operating Manual.**  
Improper handling can cause injury, damage or malfunction of equipment and machinery.
- **Removal of product**  
When the equipment is serviced, first confirm that measures are in place to prevent dropping of work pieces and run-away of equipment, etc, and then turn off the power supply to the system.  
When the machinery is restarted, check that the operation is normal with the rotary actuator in a safe position.

### Lubrication

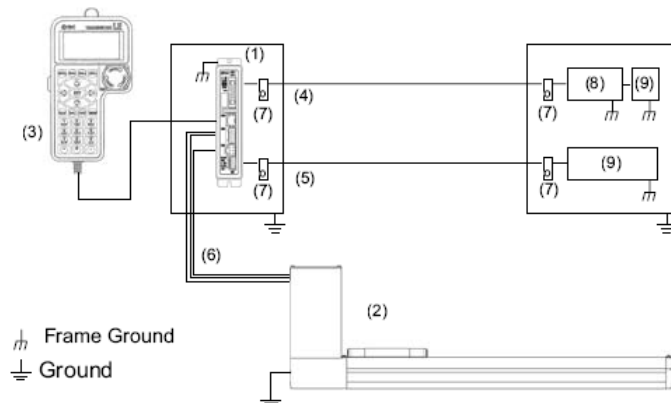
### Caution

- **The product has been lubricated for life at manufacturer, and does not require lubrication in service.**  
When lubrication is required, special grease must be used.  
Please refer to the rotary actuator operation/maintenance manual.

## 8 CE Directive

The LE series of actuators, motor controllers and teaching box conform to the EU 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 three components were connected as shown in the diagram below.

Please note that the EMC 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.



### Machinery parts list

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

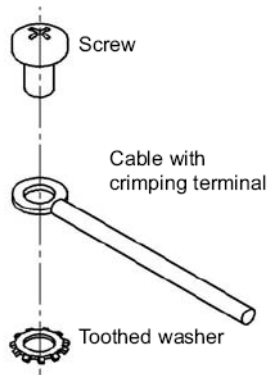
Please refer to the IMM of the LEC controller being used for information on the LEC installation procedure.

### Grounding the actuator

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

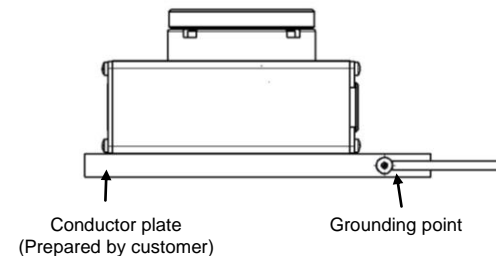
The conductor plate must then be grounded to shield the actuator from electrical noise; the bolt and plate should be made of conductive material.

The screw, cable with crimping terminal and toothed washer should be obtained separately.



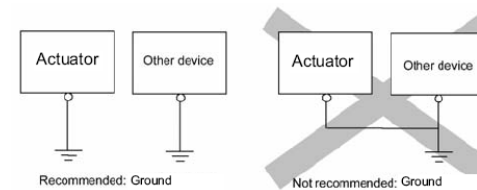
## 8 CE Directive (continued)

### Location of grounding points



### Caution

The product should be connected to a ground. The cross-sectional area of this wire shall be a minimum of 2 mm<sup>2</sup>. The grounding point should be as near as possible to the actuator to keep the wire length short.



### Grounding the controller

Please refer to the IMM of the LEC 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

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