



Installation and Maintenance Manual

Programless controller

Series LECP1, LECP2

Applicable model number

LECP1***.* , LECP2***.*



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.**
- **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

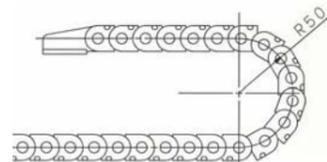
Warning

- **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 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.
- **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. 50 mm).**



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 a 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. 90°C to 100°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.**
- **In the case of an actuator with servo motor (24 VDC), the “motor phase detection step” is carried out 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 during installation and operation of this actuator.

2 General Instructions (continued)

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 mounting.
 - Abnormal operation.
 - Stop function
 - **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.**
 - **The 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 the 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.

- **For vertical mounting, use an actuator with lock.**
If the actuator is not equipped with a lock, the actuator 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 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.

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

3 Specifications

Item	Specifications
Compatible motor	Stepper motor (Servo 24 VDC)
Controller power supply ^{Note1)}	Rated voltage: 24 VDC ±10% Max current consumption: 3 A (Peak 5 A) ^{Note2)} (For powering the motor drive power, control power, stop and lock release)
Parallel input	6 inputs (photo-coupler isolation)
Parallel output	6 outputs (photo-coupler isolation)
Compatible encoder	A/B phase, Line receiver input Resolution: 800 pulse/rev.
Memory	EEPROM
LED indicator	2 x LED's (green and red) 1 digit, 7-segment LED's (red)
Lock control	Forced lock-release terminal
Cable length (m)	I/O cable: 1.5 m or less (Open collector input) 5 m or less (Differential input) Actuator cable: 20 m or less
Cooling system	Natural air cooling
Operating temperature range (°C)	0 to 40 (No condensation or freezing)
Operating humidity range (%)	90%RH or less (No condensation or freezing)
Storage temperature range (°C)	-10 to 60 (No condensation or freezing)
Storage humidity range (%)	90%RH or less (No condensation or freezing)
Insulation resistance	Between the housing (radiation fin) and FG 50 MΩ (500 VDC)
Weight (kg)	0.13 (screw mounting type) 0.15 (DIN rail mounting type)

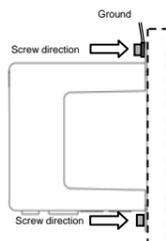
Note1) Do not use a power supply with "inrush-current control" for the controller power supply.

Note2) The power consumption changes depending on the actuator model. Please refer to the specifications of the actuator for more details.

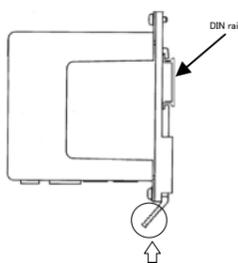
4 Installation

• How to install

• Direct mounting (LECP1**-,LECP2**-) installation using 2 x M4 screws.



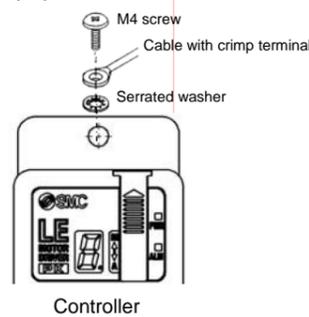
• DIN-rail mounting (LECP1**D-*,LECP2**D-*) installation on to DIN rail.



Hook the controller on to the DIN rail and press the lever in the direction of the arrow to lock the controller to the DIN rail.

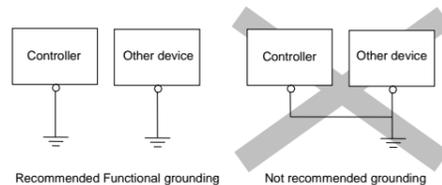
4 Installation (continued)

• **Controller Ground connection**
Connect the grounding wire with an M4 screw as shown in the diagram. The controller must be grounded to shield it from electrical noise. The screw, cable with crimp terminal and serrated washer should be obtained separately by the customer.

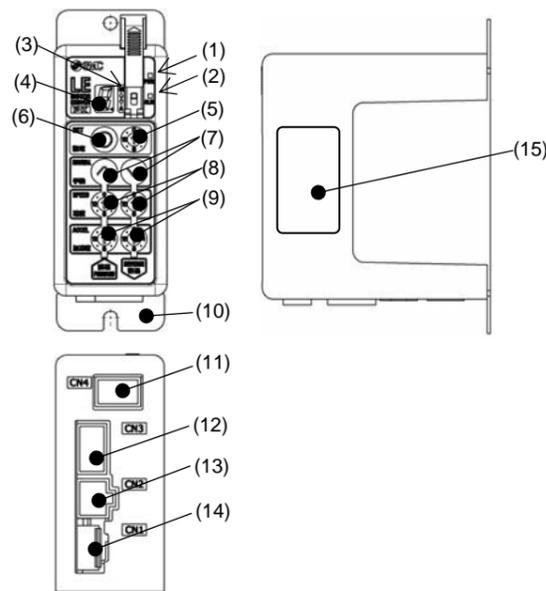


Caution

The product must be connected to ground. The cross-sectional area of the wire should be a minimum of 2 mm². The grounding point should be as near to the controller as possible to keep the wire length short.



5 Names and Functions of individual parts



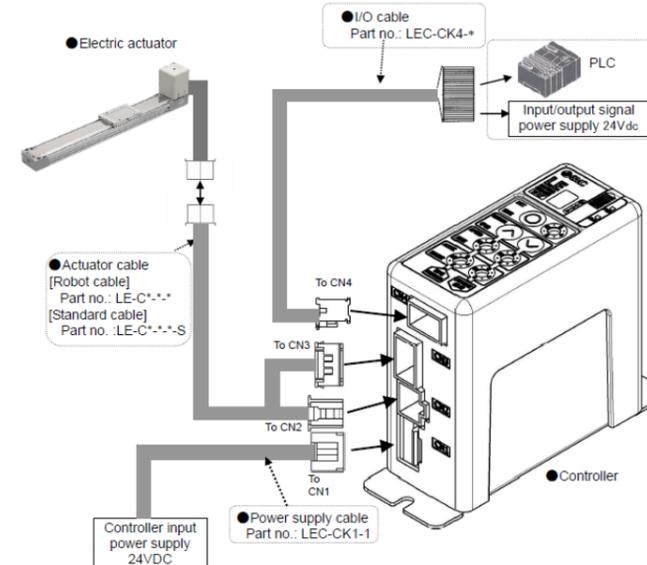
No.	Label	Name	Description
1	PWR	Power LED (green)	Power ON/No alarm: Green light
2	ALM	Alarm LED (red)	Power ON/Alarm: Red light
3	M↔A	Mode switch	Used to switch the mode
4	—	7-segment LED's	Displays the position number, etc.
5	SET	SET button	Used to set the position, etc.
6	—	Position switch	Used to switch the position number, etc.
7	MANUAL	FWD/RVS button	Used to perform JOG and Inching, etc.
8	SPEED	Speed switch	Used to switch the speed
9	ACCEL	Acceleration switch	Used to switch the acceleration
10	—	FG	Functional ground
11	CN4	Parallel I/O Connector (14 pins)	Used to connect to PLC, etc. with the I/O cable.
12	CN3	Encoder connector (16 pins)	Used to connect the actuator cable.
13	CN2	Motor power connector (6 pins)	
14	CN1	Power connector (4 pins)	Used to connect the controller input power supply with the power supply plug: Common power (-), Motor power (+), Control power (+), Lock release (+)
15	—	Controller label	Label indicating the applicable actuator model. It also indicates the type of parallel I/O (PNP/NPN).

Caution

The green LED flashes while the actuator is in servo OFF state. The red LED flashes during parameter setting and when not performing a stroke study.

6 Wiring

• Structure of the controller



Caution

Wiring of controller power supply cable connector CN1

Connect the positive terminal of the 24 VDC controller power supply to the C24V and M24V terminals of the power supply, and connect the negative terminal of the 24 VDC controller power supply to the 0V terminal of the

power supply.

For actuators fitted with a lock, fit a lock release switch

Connect the lock release switch to the supply cable BK RLS terminal.

• Power supply cable wiring for controller CN1 connector

When connecting the 24 VDC power supply to the controller CN1 connector, use the power supply cable LEC-CK1-1.



• Pin details of power supply cable LEC-CK1-1

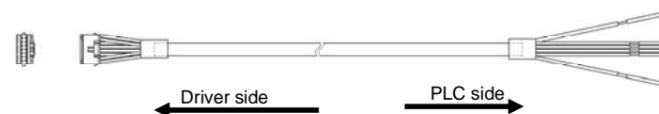
Pin No.	Terminal	Colour of insulation	Connection description
1	0v	Blue	0V common connection for the: M24V, C24V and BK RLS.
2	M 24V	White	+24 V for the motor power
3	C 24V	Brown	+24 V for the control power
4	BK RLS	Black	+24 V to release the lock

Warning

Wire the power supply cable correctly, as incorrect wiring will result in damage to the controller.

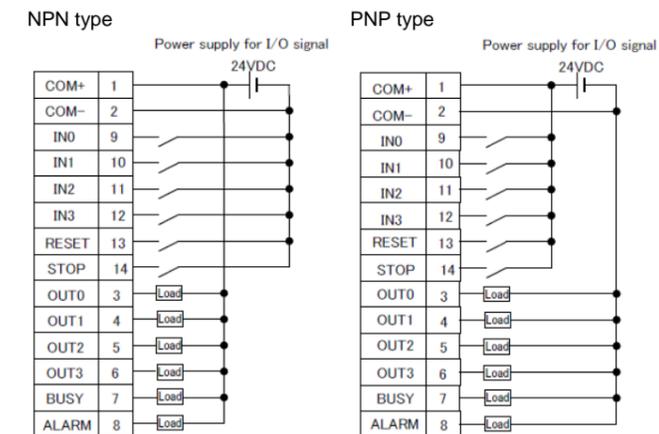
• I/O cable wiring for controller CN4 connector

When connecting a PLC etc. to the controller parallel I/O CN4 connector, use the parallel I/O cable LEC-CK4-*.



6 Wiring (continued)

• Parallel I/O wiring for NPN and PNP connection



Caution

The 24 VDC power supply for the I/O connector CN4 should be separate from the 24 VDC power supply for the controller connector CN1.

When connecting a PLC etc. to the controller parallel I/O CN4 connector, use the I/O cable LEC-CK4-*.

• Pin details of I/O cable LEC-CK4-*

Pin No.	Color of insulation	Dot mark	Dot color
1	Light brown	■	Black
2	Light brown	■	Red
3	Yellow	■	Black
4	Yellow	■	Red
5	Light green	■	Black
6	Light green	■	Red
7	Gray	■	Black
8	Gray	■	Red
9	White	■	Black
10	White	■	Red
11	Light brown	■ ■	Black
12	Light brown	■ ■	Red
13	Yellow	■ ■	Black
14	Yellow	■ ■	Red

7 Maintenance

• Perform a maintenance check periodically

Confirm wiring and screws are not loose.

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.

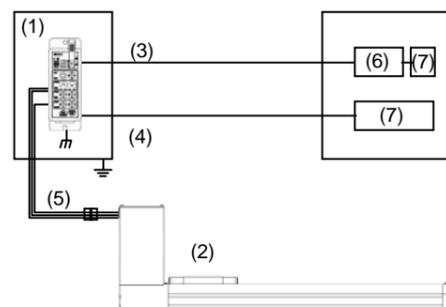
8 CE Directive

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 customer's 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.



h Frame Ground
 ⚡ Ground

• Machinery parts list

No.	Part name	Part no./Material
1	Motor controller	LECP1/LECP2 Series
2	Actuator	LE Series
3	I/O cable	LEC-CK4-[]
4	Power supply cable	LEC-CK1-1 (1 m)
5	Actuator cable	LE-CP-[]
6	Control circuit	-
7	Switching power supply	-

The LECP1**/LECP2** controller should be mounted in an IP54 rated metal cabinet for protection from ESD.

The metal cabinet should be connected to ground with a short grounding cable.

• Grounding the controller

Please refer to the "Installation" section

⚠ Caution

Note: During installation and maintenance protect the LEC controller from electrostatic discharge (ESD)

Contacts

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DENMARK	(45) 7025 2900	POLAND	(48) 22 211 9600
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