



Installation and Maintenance Manual

Simple Absolute Controller /

Step motor (servo 24 VDC)

Series LECP7



Note: For special models LECP7*-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.
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- 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.**

1 Safety Instructions (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.**
- **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

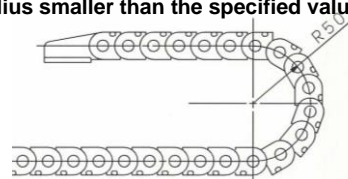
Warning

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

3 Specifications

Item	Specifications
Compatible motor	Step motor (servo 24 VDC)
Controller power supply ^{Note 1)}	Power supply voltage: 24VDC±10% Maximum current consumption: 3.2A (Peak 5A) ^{Note 2)} (For powering the motor drive, controller, stop and lock release)
Parallel input	11 inputs (photo-coupler isolation)
Parallel output	13 outputs (photo-coupler isolation)
Controlled encoder	Incremental A/B phase (800 pulse/rev)
Serial communication	RS485 (Complies with Modbus protocol)
Memory	EEPROM
LED display	PWR, ALM, RDY/ALM, STS1, STS2 ^{Note 7)}
Lock control	Forced lock-release terminal
Cable length	I/O cable: 5m or less Actuator cable: 20m or less
Battery	Nickel-Metal Hydride secondary battery 3.6V Battery Charge time: 72 hours
Recommended lifetime for battery replacement ^{Note 3)}	2 years
Battery backup hold time: After the power supply is cut Default setting 20 days (4 level settings) ^{Note 4), Note 5)}	20 days (When the maximum manual rotation of the motor is set to 100rpm or less) 10 days (When the maximum manual rotation of the motor is set to 200rpm or less) 5 days (When the maximum manual rotation of the motor is set to 400rpm or less) 2 days (When the maximum manual rotation of the motor is set to 800rpm or less)
Cooling system	Natural Air-cooling
Operating temperature range ^{Note 6)}	Screw mount type: 0 to 40°C (No freezing) DIN rail mount type: 0 to 30°C (No freezing)
Operating humidity range	90%RH or less (No condensation)
Storage temperature range	0 to 40°C (No freezing)
Storage humidity range	90%RH or less (No condensation)
Insulation resistance	Between the housing and SG terminal : 50MΩ (500VDC)
Weight	410g (Screw mount type) 430g (DIN rail mount type)

Note 1) Do not use a power supply with "inrush-current control" for the controller power supply.

Note 2) Power consumption depends on the actuator. Refer to the specification of the actuator for details.

Note 3) Based on average use of 8 hrs/day at a temperature of 20°C

The lifetime time of the battery is reduced when the operating temperature rises, because the performance of the battery deteriorates.

Note 4) Battery back up hold time at 20°C (reference).

After the power supply is cut, the battery back up hold time is reduced when the operating temperature rises.

Note 5) The time to monitor the motor/encoder position using the battery back up after the power supply has been cut, the duration depends on the set value of the maximum manual operation cycle rotation speed (rpm) after the power supply has been cut.

Note 6) Recommended: 20°C

Note 7) Refer to the Names and Functions of individual parts.

4 Installation

4.1 How to install the battery

- 1) Use a small screwdriver to carefully lift the battery case out of the controller.



- 2) Install the battery into the battery case.



4 Installation (continued)

- 3) Connect the battery to the connector on the controller PCB



- 4) When installing the battery case, ensure that the cable is not trapped between the battery case and the controller housing.

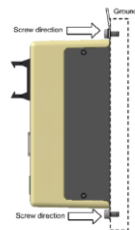


- 5) Carefully push the battery case into the controller housing until fully installed. Confirm that the battery case does not move.

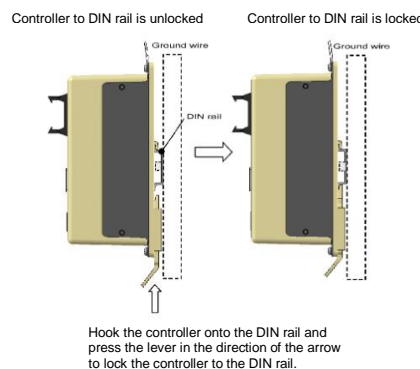


4.2 How to install the controller

•Screw mounting type (LECP7***) installation using two M4 screws



• DIN-rail mounting type (LECP7**D-*) installation onto the DIN rail



• Location for mounting

Select the size of the control cabinet and the controller mounting type so that the surrounding temperature of the controller is 40°C or less for screw mounting type and 30°C or less for DIN rail mounting type (20°C reference). Mount the controller vertically on the panel with 30mm or more (screw mounting type) and 50mm or more (DIN rail mounting type) of space at the top and bottom of the controller.

When installing more than one controller in parallel, provide a space of 20mm or more between the controllers.

Allow 60mm or more of space between the front of the controller and the cover of the control cabinet to allow access to the connectors.

Leave enough space between the controllers so that the operating temperatures of the controllers stay within the specification range.

Avoid mounting the controllers on a panel where sources of vibration,

4 Installation (continued)

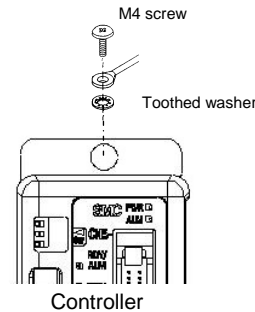
such as large sized electromagnetic contactors or circuit fuse breakers, are also mounted.

• Grounding the controller

As shown in the diagram, connect the grounding wire with a screw.

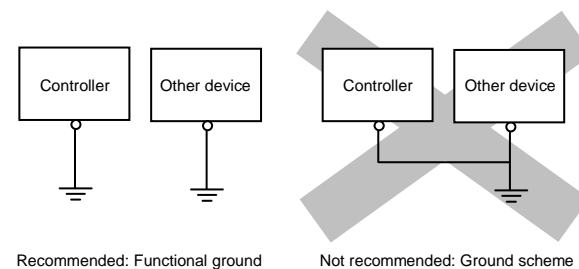
The controller must be grounded to shield it from electrical noise.

The M4 screw, cable with crimping terminal and toothed washer should be obtained separately by the customer.

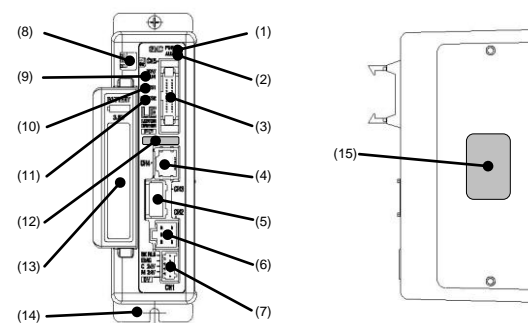


⚠ Caution

The product should be connected to a ground. The cross-sectional area of this wire shall 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 supply LED (Green)	Power supply ON / No alarm: Solid green light Writing data (step data, parameter) / Flashing green light Caution Do not turn off the input power supply for the controller or disconnect and connect the cable while the data is being written (power supply LED (green) flashes). *Possibility of incorrect data (step data, parameter)
2	ALM	Power supply LED (Red)	Power supply ON / With alarm: Solid red light
3	CN5	Parallel I/O Connector (26 pins)	Connect to PLC using I/O cable. (11 points input and COM terminal and 13 points output and COM terminal)
4	CN4	Serial I/O Connector (8 pins)	Connect to the teaching box, PC etc.
5	CN3	Encoder connector (16 pins)	
6	CN2	Motor power connector (6 pins)	Connect to the actuator cable.
7	CN1	Power supply connector (5 pins)	Connect to the controller input power supply (DC24V) using the power supply plug. Lock release (+) Stop signal (+) Control power (+) Motor power (+) Common power (-)

5 Names and Functions of individual parts (continued)

8	SW	Period set switch	Sets the battery backup hold time
9	RDY/ALM	Ready / Alarm LED	No absolute circuit alarm: Green light on Absolute circuit alarm: Red light on
10	STS1	Status LED	Normal: Green light on Reset: Orange light on Absolute error: Red light on
11	STS2	Battery charge LED	Fully charged (Charged for 72 hours continuously): Green light on Charging: Orange light on Not connected (including discharged state): Red light on
12	-	Applicable actuator Model number label	Applicable actuator description
13	-	Battery case	Battery is housed in the case Write the battery purchase date in the column. Recommended lifetime for battery replacement is 2 years ^{Note 1)} (Also, write the battery purchase date when the battery is replaced).
14	-	FE	Functional ground: When mounting the controller connect the grounding cable and tighten the screws
15	-	Controller Model number label	Controller description

Note 1) Based on average use of 8 hrs/day at a temperature of 20°C

The lifetime time of the battery is reduced when the operating temperature rises, because the performance of the battery deteriorates.

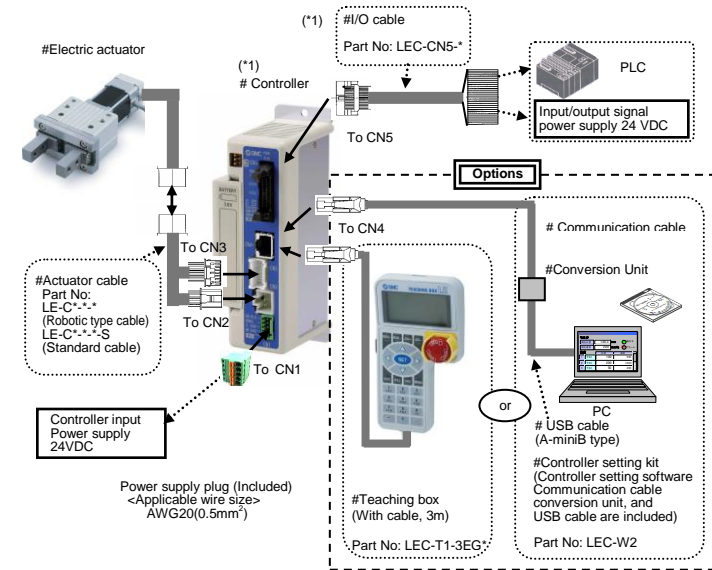
⚠ Caution

The green LED flashes while the data (step data/ parameters) is being written.

Do not turn off the controller input power supply or remove the cable while the data is being written (while the green LED is flashing).

* The data (step data/ parameters) may not be written correctly.

6 Wiring



*1) These items are included if you ordered using the part number for an actuator set.

⚠ Warning

• Do not use the stop signal, "EMG" of controller and stop switch on the teaching box as the emergency stop of system.

The stop signal, "EMG" of controller and the stop switch on the teaching box are for decelerating and stopping the actuator.

Design the system with an emergency stop circuit, which complies with safety standards.

6 Wiring (continued)

Caution

Wiring of power supply plug for controller connector CN1

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

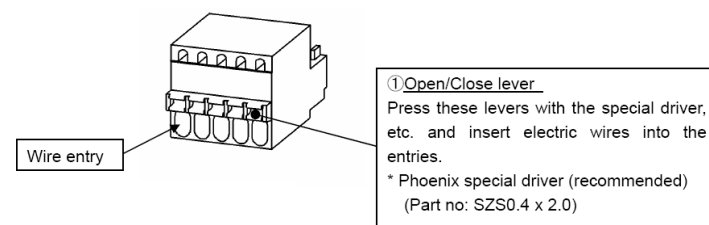
For actuators fitted with a lock, fit a lock release switch

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

See the power supply plug drawing below for connection details

Warning

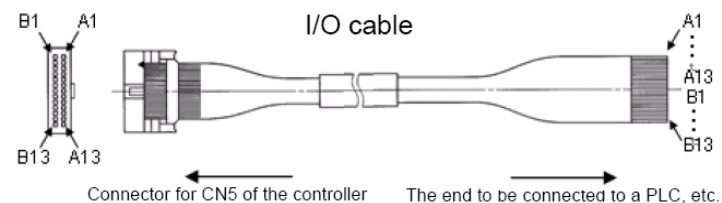
Do not wire the power supply plug incorrectly as this will result in damage to the controller.



Power supply plug

Terminal	Connection description
BK RLS	+ 24V to release the lock
EMG	+ 24V to enable operation
C 24V	+ 24V for the controller
M 24V	+ 24V for the motor
0V	0V common connection for the: M 24V, C 24V, EMG and BK RLS.

Parallel I/O cable wiring for connection to controller CN5 connector



Caution

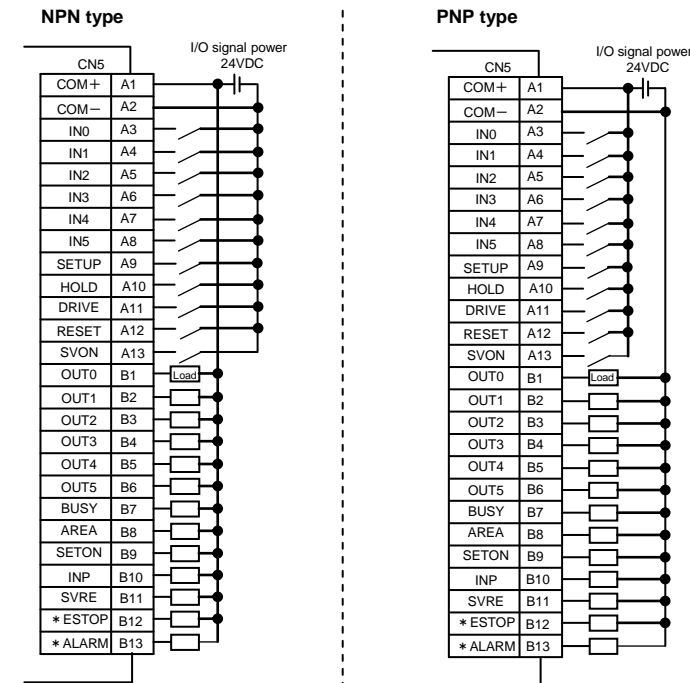
The 24 VDC power supply for the I/O connector CN5 should be separate from the 24 VDC power supply for the controller connector CN1.

When connecting a PLC etc. to the controller parallel I/O CN5 connector, use the I/O cable LEC-CN5-*

Pin out for I/O cable LEC-CN5-*

Pin No.	# of wire	Color of insulation	Dot mark	Dot color	Pin No.	# of wire	Color of insulation	Dot mark	Dot color
A1	1	Light brown	■	Black	B1	7	Yellow	■	Red
A2		Light brown	■	Red	B2	8	Light green	■	Black
A3	2	Yellow	■	Black	B3		Light green	■	Red
A4		Yellow	■	Red	B4	9	Grey	■	Black
A5	3	Light green	■	Black	B5		Grey	■	Red
A6		Light green	■	Red	B6	10	White	■	Black
A7	4	Grey	■	Black	B7		White	■	Red
A8		Grey	■	Red	B8	11	Light brown	■	Black
A9	5	White	■	Black	B9		Light brown	■	Red
A10		White	■	Red	B10	12	Yellow	■	Black
A11	6	Light brown	■	Black	B11		Yellow	■	Red
A12		Light brown	■	Red	B12	13	Light green	■	Black
A13	7	Yellow	■	Black	B13		Light green	■	Red
									Shield

6 Wiring (continued)



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.

Electrical shock can result.

Replacement of battery

- 1) Turn off the controller's power supply after stopping the actuator.
- 2) Remove the wiring connectors CN1 (Power supply), CN2 (Motor power), CN3 (Encoder), CN4 (Serial I/O) and CN5 (Parallel I/O) from the front of the controller.
- 3) Detach the battery case installed in the controller. Use a small screwdriver to lift the battery case out of the controller.
- 4) Detach the battery connector from the controller PCB.



- 5) Change the battery and install it into the case.
- 6) Connect the battery to the connector on the controller PCB
- 7) When installing the battery case, ensure that the cable is not trapped between the battery case and the controller housing.



- 8) Carefully push the battery case into the controller housing until fully installed. Confirm that the battery case does not move.
- 9) Reconnect the wiring connectors removed in note 2) CN1 (Power supply), CN2 (Motor power), CN3 (Encoder), CN4 (Serial I/O) and CN5 (Parallel I/O) into the front of the controller.
- 10) Turn on the controller's power supply, and execute alarm reset.
- 11) Charging of the battery begins (72 hours charge time).

7 Maintenance (continued)

Warning

Batteries are consumable products, when the battery is repeatedly charged and discharged the initial performance deteriorates. Review the lifetime of the battery and replace it when the hold time is noticeably shortened.

It is recommended to replace the battery 2 years after the purchase date. Please write the purchase date in the column of the battery case.

Maintenance part.

Battery: Part No. LE-BP-X22

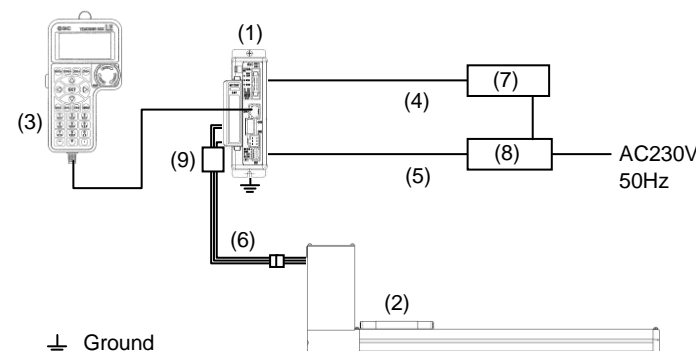
8 CE Directive

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	LECP7 Series
2	Actuator	LE Series
3	Teaching box	LEC-T1 Series
4	I/O cable (with shield)	LEC-CN5-[]
5	Power supply cable	5 wire with shield (5 m)
6	Actuator cable(with shield)	LE-CP-[]
7	Switch Box	-
8	Switching power supply	-
9	Ferrite core	74271222(WURTH ELEKTRONIC)

The shielded cables are:

- 24 VDC Power cable from power supply to LECP7** series controller
- The Input/output cable from controller to Switch Box

Grounding the controller

Please refer to the "Installation" section

Grounding the actuator

Please refer to the IMM of the actuator being used, for information on actuator grounding.

Caution

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

9 Precautions of the Simple Absolute Controller

Danger

Do not disassemble the battery, there will be a short circuit inside /outside. Also, the heating, explosion or ignition of the battery can happen due to the reaction of the internal substance of the battery with the atmosphere.

Hazardous alkaline liquid will be released.

The battery contains alkaline liquid, if this liquid comes into contact with the eye, this can result in blindness. Do not rub the eye, instead, rinse the eye with tap water and seek medical treatment.

Do not place the battery in a fire; there is a risk of explosion.

Do not place the battery in water, there is a risk that the battery will leak and the performance will deteriorate because of the influence of corrosion and rusting etc.

Warning

Do not use the battery when there is leakage, discoloration, or deformation. Heating, explosion or ignition of the battery can result.

The battery contains alkaline liquid, if your clothes come into contact with the battery liquid, rinse with tap water to avoid injury to the skin.

Caution

Long term storage

Storing the battery for long periods can reduce its capacity.

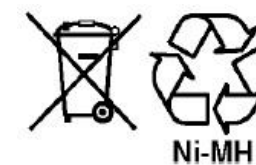
There is also the possibility that the battery liquid will leak and the lifetime will be reduced because of a natural electrical discharge and the performance will deteriorate.

Caution

Disposal

Do not dispose of used batteries they can be recycled.

Before recycling, apply sealing tape to the connector for insulation.



10 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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