



Installation and Maintenance Manual  
AC Servo Motor Driver  
Series LECY



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

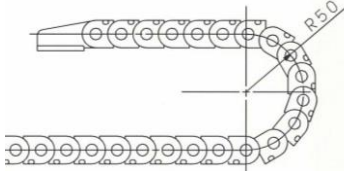
**Warning**

- **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.
- **Fix 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 actuator cables connecting the actuator and the driver 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 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 driver 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 driver and actuator combined as delivered for use.**  
The driver 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 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.**
- **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 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 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 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.





6 Wiring (continued)

- Remove detachable main circuit terminals from the driver prior to wiring.
- Insert only one power line per opening in the main circuit terminals.
- Make sure that no part of the core wire comes into contact with (i.e., short-circuits) adjacent wires.
- **Install a battery at either the host controller or the driver, but not both.**  
It is dangerous to install batteries at both ends simultaneously, because that sets up a loop circuit between the batteries.
- **Always use the specified power supply voltage.**  
An incorrect voltage may result in fire or malfunction.
- **Make sure that the polarity is correct.**  
Incorrect polarity may cause component damage.
- **Take appropriate measures to ensure that the input power supply is supplied within the specified voltage fluctuation range. Be particularly careful in places where the power supply is unstable. An incorrect power supply may result in damage to the equipment.**
- **Install external breakers or other safety devices against short-circuiting in external wiring.**  
Failure to observe this caution may result in fire.
- **Take appropriate and sufficient countermeasures for each form of potential interference when installing systems in the following locations.**
  - Locations subject to static electricity or other forms of noise
  - Locations subject to strong electromagnetic fields and magnetic fields
  - Locations subject to strong electromagnetic fields and magnetic fields
  - Locations subject to possible exposure to radioactivity
  - Locations close to power suppliesFailure to observe this caution may result in damage to the equipment.
- **Do not reverse the polarity of the battery when connecting it.**  
Failure to observe this caution may damage the battery, the driver or electric actuators, or cause an explosion.
- **Wiring or inspection must be performed by a technical expert.**  
Use a 24-VDC power supply with double insulation or reinforced insulation.

- **Wiring or inspection must be performed by a technical expert.**

7 Maintenance

- **Perform a maintenance check periodically**  
Confirm wiring and screws are not loose.

7.1 Notes for Safe Operation

Warning

- **Never touch the Electric Actuator while it is running.**  
Failure to observe this warning may result in injury.
- **Before starting operation with a machine connected, make sure that an emergency stop can be applied at any time.**  
Failure to observe this warning may result in injury or damage to the product.
- **Never touch the inside of the drivers.**  
Failure to observe this warning may result in electric shock.
- **Do not remove the cover of power supply terminal while the power is ON.**  
Failure to observe this warning may result in electric shock.
- **Do not touch terminals for five minutes after the power is turned OFF.**  
Residual voltage may cause electric shock.
- **Do not touch terminals while the charge indicator is lit.**  
Residual voltage may cause electric shock.
- **Do not touch terminals for five minutes after voltage resistance test.**  
Residual voltage may cause electric shock.
- **Follow the procedures and instructions for the trial operation as noted in LECY □ Series Operation Manual.**  
Malfunctions of the Electric Actuator not only damage the equipment, but may also cause an accident resulting in death or injury.
- **The multi-turn limit value must be changed only for special applications.**  
Changing it inappropriately or unintentionally can be dangerous.

- **If the Multi-turn Limit Disagreement alarm occurs, check the setting of parameter Pn205 in the driver to be sure that it is correct.**

7 Maintenance (continued)

- If the multi-turn limit is set when an incorrect value is set in Pn205, an incorrect value will be set in the encoder. The alarm will disappear even if an incorrect value is set, but incorrect positions will be detected, resulting in a dangerous situation where the machine will move to unexpected positions.
- **Do not remove the front cover, cables, connectors, or optional items on the foreside while the power is ON.**  
Failure to observe this warning may result in electric shock.
  - **Do not damage, press, exert excessive force or place heavy objects on the cables.**  
Failure to observe this warning may result in electric shock, stop-ping operation of the product, or fire.
  - **Do not modify the product.**  
Failure to observe this warning may result in injury, damage to the product, or fire.
  - **Provide an appropriate stopping device on the machine side to ensure safety. A holding lock for an Electric Actuator with lock is not a stopping device for ensuring safety.**  
Failure to observe this warning may result in injury.
  - **Do not come close to the machine immediately after resetting momentary power loss to avoid an unexpected restart. Take appropriate measures to ensure safety against an unexpected restart.**  
Failure to observe this warning may result in injury.
  - Connect the ground terminal according to the local electrical codes (ground resistance: 100 Ω or less).  
Improper grounding may result in electric shock or fire.
  - **Installation, disassembly, or repair must be performed only by authorized personnel.**  
Failure to observe this warning may result in electric shock or injury.
  - **The person who designs a system using the safety function (Hard Wire Baseblock function) must have full knowledge of the related safety standards and full understanding of LECY □ Series Operation Manual.**  
Failure to observe this warning may result in injury or damage to the product.

7.2 Storage and Transportation

Caution

- **Do not store or install the product in the following places.**
  - Locations subject to direct sunlight.
  - Locations subject to temperatures outside the range specified in the storage/installation temperature conditions.
  - Locations subject to humidity outside the range specified in the storage/installation humidity conditions.
  - Locations subject to condensation as the result of extreme changes in temperature.
  - Locations subject to corrosive or flammable gases.
  - Locations subject to dust, salts, or iron dust.
  - Locations subject to exposure to water, oil, or chemicals.
  - Locations subject to shock or vibration.Failure to observe this caution may result in fire, electric shock, or damage to the product.
- **Do not hold the product by the cables, or motor while transporting it.**  
Failure to observe this caution may result in injury or malfunction.
- **Do not place any load exceeding the limit specified on the packing box.**  
Failure to observe this caution may result in injury or malfunction.

- **If disinfectants or insecticides must be used to treat packing materials such as wooden frames, pallets, or plywood, the packing materials must be treated before the product is packaged, and methods other than fumigation must be used.**  
**Example: Heat treatment, where materials are kiln-dried to a core temperature of 56°C for 30 minutes or more.**  
If the electronic products, which include stand-alone products and products installed in machines, are packed with fumigated wooden materials, the electrical components may be greatly damaged by the gases or fumes resulting from the fumigation process. In particular, disinfectants containing halogen, which includes chlorine, fluorine, bromine, or iodine can contribute to the erosion of the capacitors.  
Always use a magnetic contactor between the main circuit power supply and the “L” terminals of the driver. Con

7 Maintenance (continued)

7.3 Operation

Caution

- **Before starting operation with a machine connected, change the settings to match the parameters of the machine.**  
Starting operation without matching the proper settings may cause the machine to run out of control or malfunction.
- **Avoid frequently turning power ON and OFF.**  
Since the driver has a capacitor in the power supply, a high charging current flows when power is turned ON. Frequently turning power ON and OFF causes main power devices like capacitors and fuses to deteriorate, resulting in unexpected problems.
- **Forced stop function with forward/reverse over travel is not effective during JOG mode operation and zero point search.**
- **When using Electric Actuator for a vertical axis, install the safety devices to prevent workpieces from falling due to occurrence of alarm or over travel. Set the Electric Actuator so that it will stop in the zero clamp state at occurrence of over travel.**  
Failure to observe this caution may cause workpieces to fall due to over travel.
- **When not using the tuning-less function, set to the correct moment of inertia ratio Pn103.**  
Setting to an incorrect moment of inertia ratio may cause vibration.
- **Do not touch the driver heat sinks, regenerative option, or the motor while power is ON or soon after the power is turned OFF.**  
Failure to observe this caution may result in burns due to high temperatures.
- **Do not make any extreme adjustments or setting changes to parameters.**  
Failure to observe this caution may result in injury or damage to the product due to unstable operation.
- **When an alarm occurs, remove the cause, reset the alarm after confirming safety, and then resume operation.**  
Failure to observe this caution may result in damage to the product, fire, or injury.
- **Do not use the lock of the Electric Actuator for braking.**  
Failure to observe this caution may result in malfunction.

- **Always use the Electric Actuator and driver in one of the specified combinations.**  
Failure to observe this caution so may result in fire or malfunction.
- The Electric Actuator stopping method of turning the main-circuit or control-circuit power OFF without turning the servo OFF during operation cannot be set in Parameter Pn001.
  - When turning the main-circuit power OFF without turning the servo OFF:  
The Electric Actuator will be stopped by dynamic braking (DB).
  - When turning the control-circuit power OFF without turning the servo OFF:  
The stopping method will vary depending on the driver model.Refer to LECY □ Series Operation Manual for details.

7.4 Maintenance and Inspection

Caution

- **Do not disassemble the driver.**  
Failure to observe this caution may result in electric shock or injury.
- **Do not attempt to change wiring while the power is ON.**  
Failure to observe this caution may result in electric shock or injury.
- **When replacing the driver, resume operation only after transfer-ring the previous driver parameters to the new driver.**  
Failure to observe this caution may result in damage to the product.
- **For inspections and maintenance of the driver, follow the inspection procedures in the table below at least once every year.**

Item	Frequency	Procedure	Remedy
Exterior	At least once a year	Check for dust, dirt, and oil on surfaces.	Clean with compressed air or cloth.
Loose screws		Check for loose terminal block and connector screws.	Tighten any loose screws.

8 Disposal of Waste

Caution

- **When disposing of the products, treat them as ordinary industrial waste.**

9 CE Directive

The LE series of actuators and drivers 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 two components were connected as shown in the following diagram.

Note: 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 directives cannot be certified for SMC products 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.

- **Driver Ground connection**  
Please refer to the “Installation” section

- **Actuator Ground connection**  
Please refer to the IMM for the actuator being used, for information on actuator grounding.

9.1 Compliance

Be sure to perform an appearance inspection of every unit before installation. In addition, have a final performance inspection on the entire machine/system and keep an inspection record.

9.1.1 Installation Conditions of EMC Directive

- To adapt the EMC directives (EN55011 group1 class A, EN61800-3, EN61000-6-2) for a combination test using drivers and Electric Actuators from the LECY □ series, a ferrite core, a noise filter, or a surge absorber must be used.
- This section describes the recommended installation conditions that satisfy EMC guidelines for each model of the LECY □ series driver.
- The EMC installation conditions satisfied in test conditions prepared by SMC are described here. The actual EMC level may differ depending on the actual system's configuration, wiring, and other conditions. However,

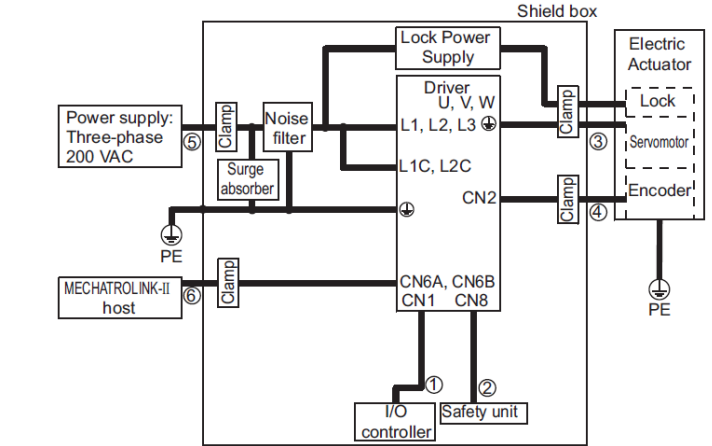
because this product is built-in, check that the following conditions are still met after being installed in the user's product.

- Always use the driver within specifications (voltage, temperature, etc. Refer to each driver manual for details.). SMC accepts no claims for liability if the equipment is used in any other way or if modifications are made to the device, even in the context of mounting and installation.

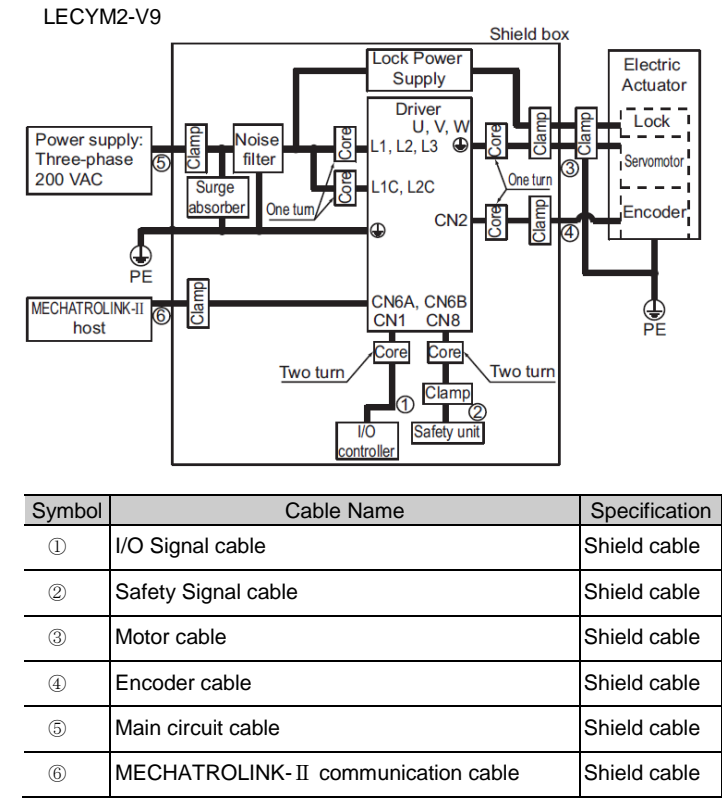
9.1.2 Drivers and Servo motors used

Driver	: LECYM2-V5 to LECYM2-V9
	LECYU2-V5 to LECYU2-V9
Servo motor	: SGMJV-□□□□□□

9.1.2 Structure  
LECYM2-V5 to LECYM2-V8



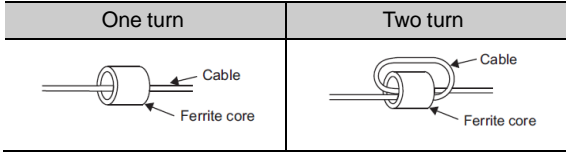
9 CE Directive (continued)



9 CE Directive (continued)

Symbol	Cable Name	Specification
①	I/O Signal cable	Shield cable
②	Safety Signal cable	Shield cable
③	Motor cable	Shield cable
④	Encoder cable	Shield cable
⑤	Main circuit cable	Shield cable
⑥	MECHATROLINK-III communication cable	Shield cable

- Other Precautions
  - Attachment Methods of Ferrite Cores

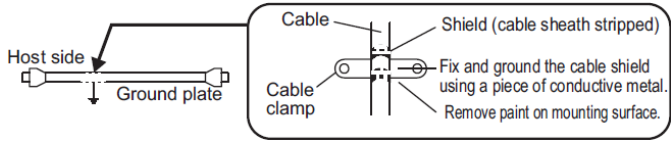


- Recommended Ferrite Core

Cable Name	Ferrite Core	Manufacturer
Motor cable	ESD-SR-250	NEC TOKIN

9 CE Directive (continued)

- Fixing the Cable
  - Fix and ground the cable shield using a piece of conductive metal.
  - Example of Cable Clamp:

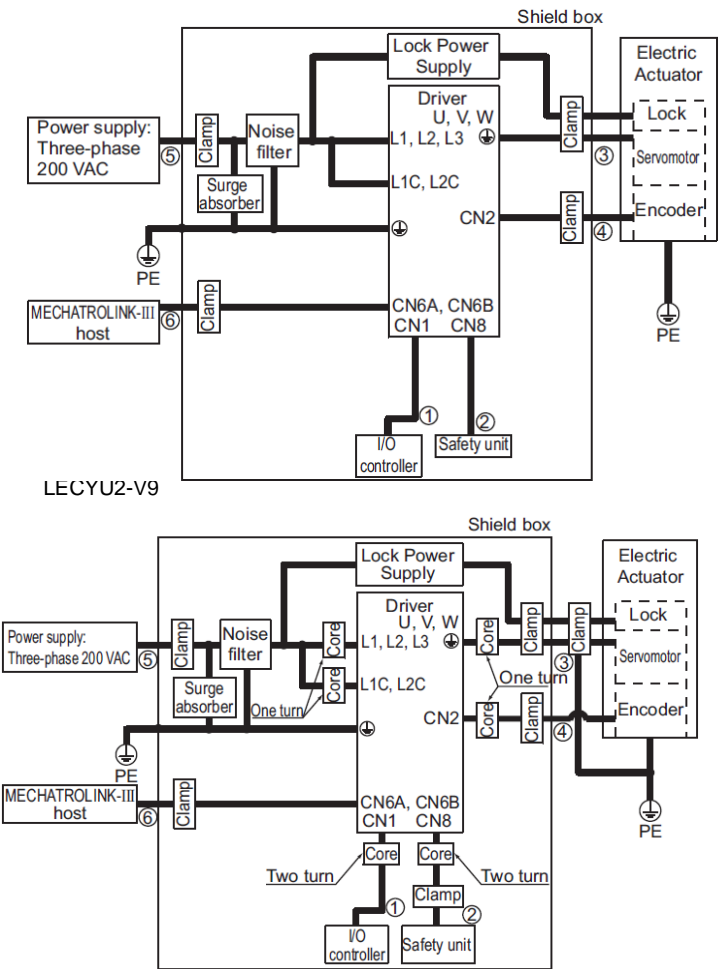


9.1.3 Environment

- To adapt drivers to the Low Voltage Directive, make sure that the following environmental conditions are met.
  - Installation category: III
  - Pollution degree: 2
  - Protection class: 10
  - Altitude: 1000 m max.

Be sure to install a fuse for the main circuit power-supply as well as meeting these environmental conditions. To choose the fuse capacity, refer to 3.1 *Molded-case Circuit Breaker and Fuse*.

LECYU2-V5 to LECYU2-V8



- Recommended Noise Filter (manufacturer: Schaffner EMC, Inc.)

Main Circuit Power Supply	Driver Model LECY□2-	Recommended Noise Filter		
		Model	Specifications	Leakage Current
Single-phase 200 V	V5, V7	FN2070-6/07	Single-phase 250 V 6 A	0.734 mA 230 VAC/50 Hz
	V8	FN2070-10/07	Single-phase 250 V 10 A	
	V9	FN2070-16/07	Single-phase 250 V 16 A	
Three-phase 200 V	V5, V7, V8	FN258L-7/07	Three-phase 480 V 7 A	0.5 mA 440 VAC/50 Hz
	V9	FN258L-16/07	Three-phase 480 V 16 A	0.8 mA 440 VAC/50 Hz

Note: RoHS-compliant models are not available. Contact the manufacturer (Schaffner EMC, Inc.) when in need of an RoHS-compliant model.

Some noise filters have large amounts of leakage current. The grounding measures taken also affect the extent of the leakage current. If necessary, select an appropriate leakage current detector or leakage current breaker taking into account the grounding measures that are used and leakage current from the noise filter. Contact the manufacturer (Schaffner EMC, Inc.) of the noise filter for details.

- Recommended Surge Absorber
  - The surge absorber (for lightning surge) absorbs lightning surge and prevents faulty operation in or damage to electronic circuits.

Main Circuit Power Supply	Recommended Surge Absorber	Manufacturer
Single-phase 200 V	LT-C12G801WS	SOSHIN ELECTRIC CO., LTD.
Three-phase 200 V	LT-C32G801WS	

10 Contacts

AUSTRIA	(43) 2262 62280-0	LATVIA	(371) 6781 77 00
BELGIUM	(32) 3 355 1464	LITHUANIA	(370) 5 230 8118
BULGARIA	(359) 2 974 4492	NETHERLANDS	(31) 20 531 8888
CZECH REP.	(420) 541 426 611	NORWAY	(47) 67 12 90 20
DENMARK	(45) 7025 2900	POLAND	(48) 22 211 9600
ESTONIA	(372) 651 0370	PORTUGAL	(351) 22 -616 6570
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) 902 255 255
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) 0845-121-5122

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