



Installation and Maintenance Manual  
PROFIBUS DP compatible  
Gateway (GW) unit



Applicable model number  
LEC-GPR1\*

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

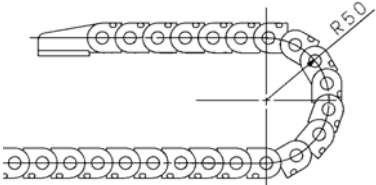
**Warning**

- **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.
- **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 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 the installation and operation of this actuator.

2 General Instructions (continued)

**Caution**

- **Keep the controller and actuator combined as delivered for use.**  
The product 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 actuator 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 received product is as ordered.**  
If a different product is installed from that ordered, injury or damage could result.

3 Specifications


The basic specifications of the Gateway unit are as follows:

Item	Specifications	
Rated voltage	24 VDC ± 10 %	
Current consumption	200 mA or less (when teaching box is not connected) 300 mA or less (when teaching box is connected)	
I/O occupation area (Input/Output)	Input 57 words / Output 57 words	
LED indicators	PWR	Power supply status
	BUS STAT	Controller IF status
	ALM	Alarm status
	CN2 STAT	ON, OFF status of SN2SW
	SF	System Fault (PROFIBUS DP)
	BF	Bus Fault (PROFIBUS DP)
Applicable controller	Electric actuator controller (LECP6, LECA6)	
Product to be connected	Max. 5 pcs.	
Cooling system	Natural air cooling	
Operating environment	Do not use in an environment of explosive gas, corrosive gas, oil mist, or powder dust.	
Operating temperature range	0 to 40 °C (No freezing)	
Operating humidity range	90 %RH or less (No condensation)	
Storage temperature range	-10 to 60 °C (No freezing)	
Storage humidity range	90 %RH or less (No condensation)	
Vibration	4.9 m/s <sup>2</sup>	
Enclosure	IP20	
Insulation resistance	Between the housing (radiation fin) and FG terminal 50M ohms (500 VDC)	
Mass	200 g (direct mounting type) 220 g (DIN rail mounting type)	

PROFIBUS DP specifications

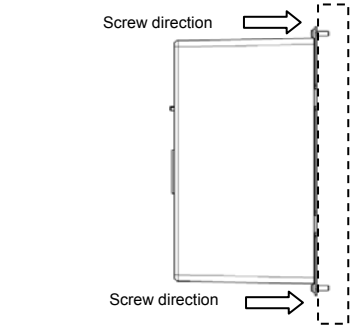
Item	Specifications							
Fieldbus	PROFIBUS DP - V1							
Device type	DP slave							
Communication speed	Auto baud rate							
Address setting range	0 to 125							
ID Number	1414							
Configuration file	GSD file (Please download it from the SMC website.)							
Terminating resistor	None							
Connector type	D-sub							
Maximum length of cable	Communication speed (kbps)	9.6	19.2	45.45	93.75	187.5	500	1500 12000
	Total cable length (m)	1200			1000	400	200	100

Controller IF communication specifications

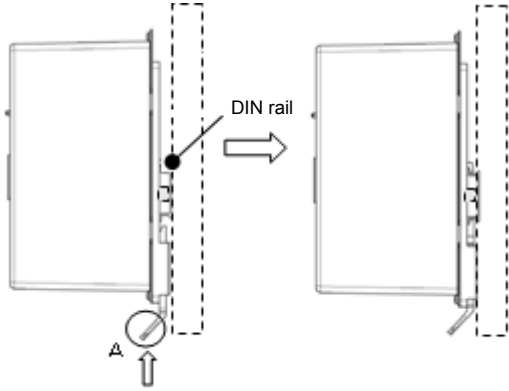
Item	Specifications
Serial communication	RS485 (Modbus protocol compatible)
Communication speed	115.2 kbps or 230.4 kbps (select 115.2 kbps when the teaching box is connected)
Cable length	The cable for the teaching box (3 m) and the electric actuator controller (3 m x 5) equals 18 m of cable length. This is the maximum allowable cable length. 

4 Installation

- How to install
  - Direct mounting (LEC-GPR1) installation using 2 x M4 screws.

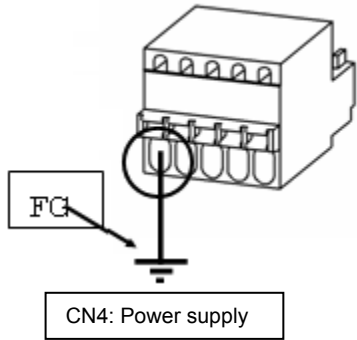


- DIN rail mounting (LEC-GPR1D) installation on to a DIN rail.



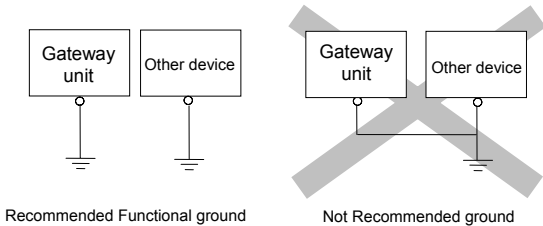
Hook the controller on to the DIN rail and press the lever in the direction of the arrow to lock the Gateway unit on to the DIN rail.

- Gateway unit Ground connection
  - Connect the grounding wire as shown in the diagram. The Gateway unit must be grounded to shield it from electrical noise.

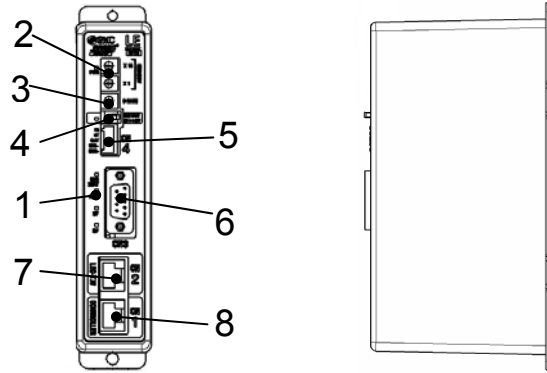


Caution

The product must be connected to ground. The cross-sectional area of this wire should be 2 mm<sup>2</sup> minimum. The ground connection should use a dedicated grounding point. It should be a functional ground with less than 100 ohms resistance. The grounding point should be as near to the Gateway unit as possible to keep the wire length short.



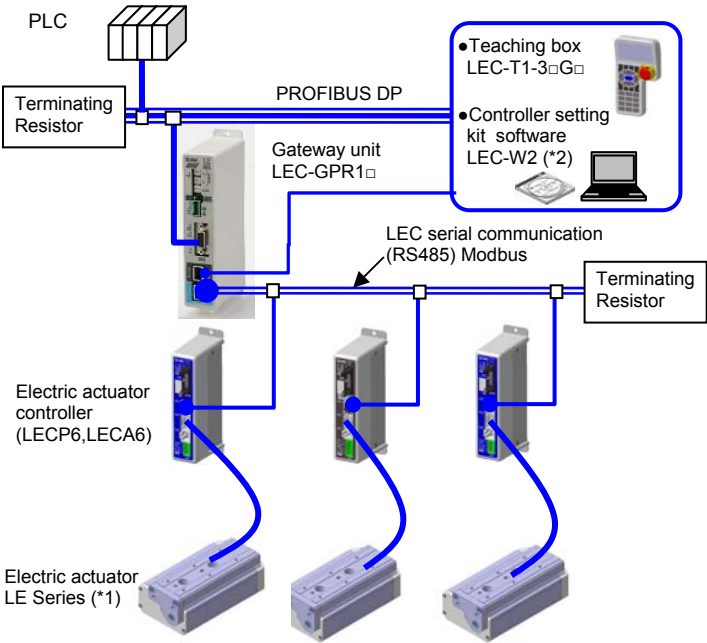
5 Names and Functions of individual parts



No.	Label	Name	Description
1	-	LED	LED to indicate the condition of the Gateway unit
2	ADDRESS	Address switch	Switch for setting address X1 and X10.
3	B RATE	Communication speed switch	Switch for setting the communication speed to the controller IF.
4	CN2 SW	Communication switch	To disable communication with the controller IF, and enable communication with the equipment connected to CN2.
5	CN4	Power supply connector	To connect the power supply and EMG.
6	CN3	Bus connector	To connect to the PROFIBUS DP line.
7	CN2	TB/PC connector	To connect the LEC teaching box (LEC-T1-3□G□) or the controller setting kit software (LEC-W2)
8	CN1	CONT connector	To connect the controller IF communication line to the electric actuator controller (LECP6, LECA6).

6 Wiring

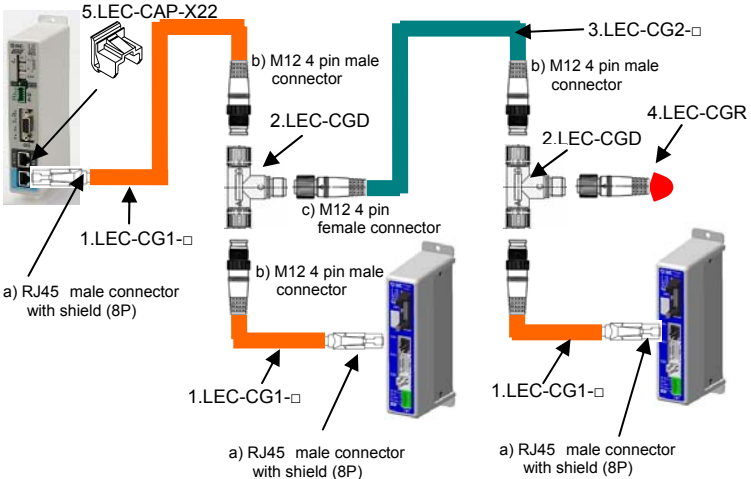
The system structure for using the Gateway unit is shown below:



(\*1) These items are included only when specified by the ordering code.  
(\*2) The latest version of controller setting software must be used.  
Software for upgrade is available for download on the SMC website.  
<http://www.smcworld.com/>

6 Wiring (continued)

An example of a link connection consisting of telecommunication cable LEC-CG1-1 and cable LEC-CG2-1 between branches is shown below.



No.	Description	Part number	Content
1	Communication cable	LEC-CG1-□	Cable to connect the gateway unit CN1 and the branch connector, or controller (LEC) CN4 and the branch connector.
2	Branch connector	LEC-CGD	Junction cable to connect the gateway and the controller.
3	Cable between branches	LEC-CG2-□	Cable to connect the branch connector.
4	Terminating Resistor	LEC-CGR	Termination on RS485 Bus (120 ohms)
5	RJ45 connector dust cover	LEC-CAP-X22	Dust will adhere to the RJ45 connector CN1 and CN2 when not connected. Please attach a cover to the connector to prevent the entry of dust.

Warning

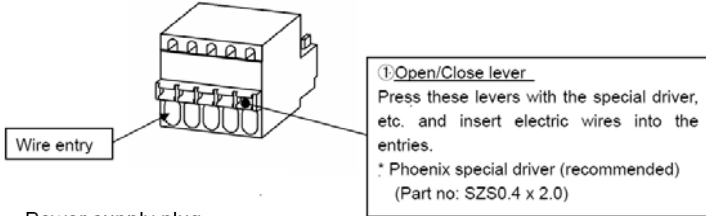
- Do not use the stop signal, "EMG" from the controller or the stop switch on the teaching box as an emergency stop of the system. The stop signal, "EMG" from the controller and the stop switch on the teaching box are for decelerating and stopping the actuator. Design the system with a separate emergency stop circuit, which complies with the relevant safety standards.

Caution

- Wiring of Gateway unit power supply cable connector CN4
  - Connect the positive terminal of the 24 VDC Gateway unit power supply to the 24 VDC terminal of the power supply, and connect the negative terminal of the 24 VDC Gateway unit power supply to the 0 V terminal of the power supply.
- For connection details refer to the power supply plug drawing below.

Warning

The power supply plug must be wired correctly to avoid damage to the Gateway unit.



Power supply plug

No.	Terminal	Function
5	FG	FG terminal
4	0V	Power supply - terminal
3	C 24V	Power supply + terminal
2	EMG -	EMG signal output -
1	EMG +	EMG signal output +



