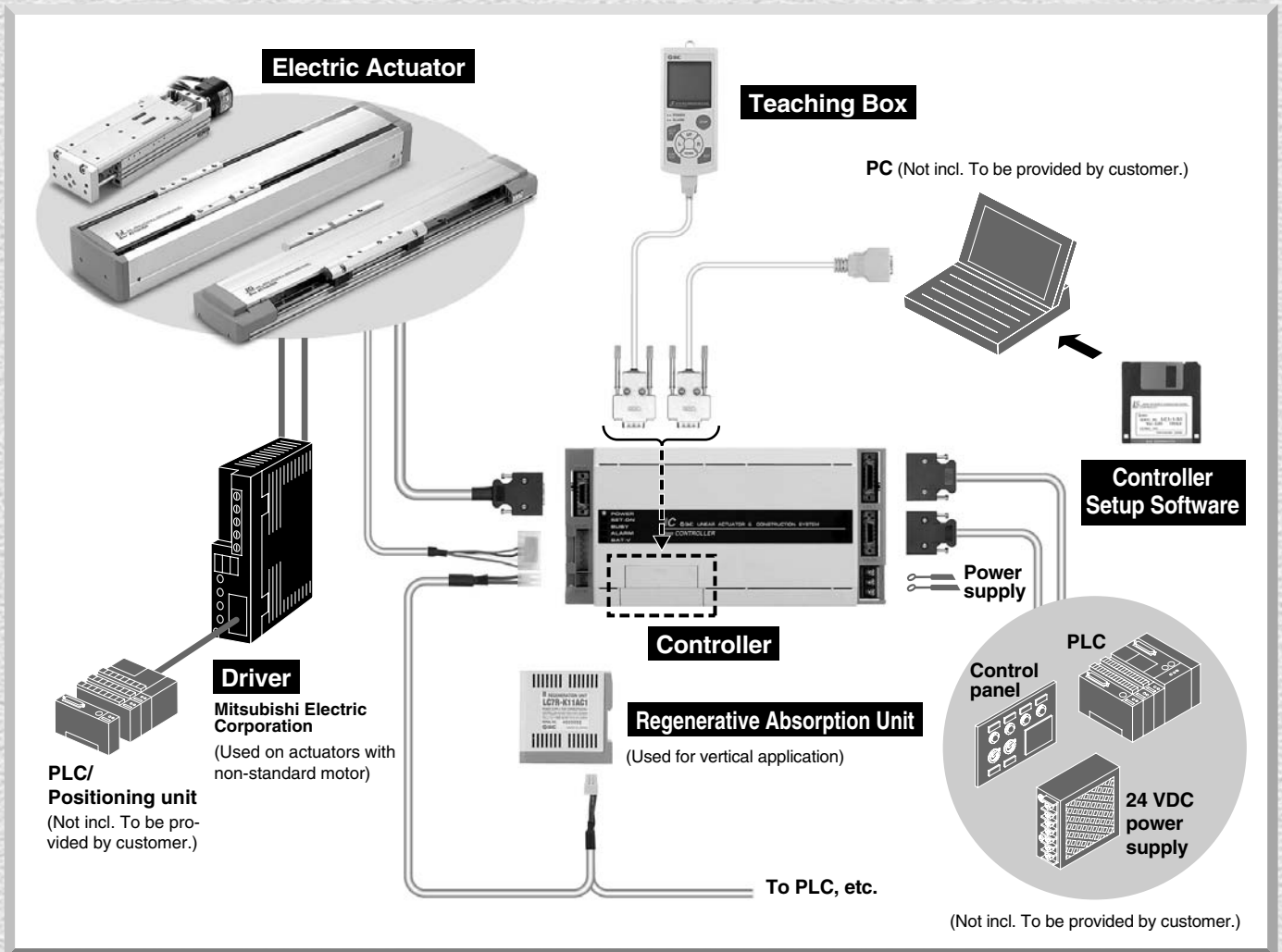# Series *LC1*

Dedicated Controller for Standard AC Servomotor

LJ1

LG1

LTF

LC1

LC7

LC8

LXF

LXP

LXS

LC6□

LZ□

LC3F2

X□

D-□

E-MY

Electric Actuator

Teaching Box

PC (Not incl. To be provided by customer.)

Controller Setup Software

Controller

Driver

Mitsubishi Electric Corporation

(Used on actuators with non-standard motor)

Power supply

PLC

Control panel

24 VDC power supply

PLC/ Positioning unit

(Not incl. To be provided by customer.)

Regenerative Absorption Unit

(Used for vertical application)

To PLC, etc.

(Not incl. To be provided by customer.)

Controller

Series LJ1/LG1: Standard Motor Compatible

Single Axis Type/Built-in AC Servo Driver

Series LC1

How to Order

LC1–1 B 1H 1 – N 3

Number of axes

1	1 axis

Actuator classification

B	Series LJ1 (Incremental encoder)
D	Series LG with coupling (Series LG1□H21) Incremental encoder
F	Series LG without coupling (Series LG1□H20) Incremental encoder

Applicable actuators

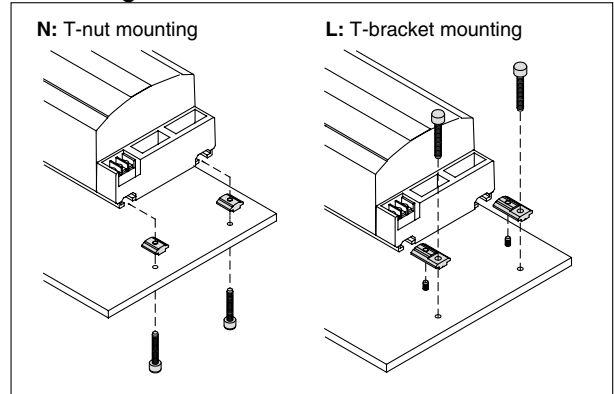| Symbol	Motor capacity	Compatible actuator models	
1H	50 W	LJ1H101□□B	Ball screw High rigidity direct acting guide Without brake
2H	100 W	LJ1H202□□A LJ1H202□□C	
3H	200 W	LJ1H303□□D	
1VH Note 1)	100 W	LJ1H102□□H-□□□K	Ball screw High rigidity direct acting guide With brake
1VB Note 1)	100 W	LJ1H102□□B-□□□K	
2VF Note 1)	100 W	LJ1H202□□F-□□□K	
2VA Note 1)	100 W	LJ1H202□□A-□□□K	
3VA Note 1)	200 W	LJ1H303□□A-□□□K	
2HA	100 W	LG1H□□2□PA LG1H□□2□NA	Ball screw High rigidity direct acting guide Thread lead 10 mm
2HC	100 W	LG1H□□2□PC LG1H□□2□NC	Ball screw High rigidity direct acting guide Thread lead 20 mm

Power supply

1 Note 1)	100/110 VAC (50/60 Hz)
2 Note 1)	200/220 VAC (50/60 Hz)

Note 1) Consult SMC if the supply voltage for LC1-1B□V□1 will be 110 VAC or more, or the supply voltage for LC1-1B□V□2 will be 220 VAC or more.

Mounting bracket

3	M3
5	M5

Mounting∗

N: T-nut mounting   **L: T-bracket mounting**

∗ This controller includes the accessories listed below.

LC1-1-□□ (Either T-nuts or T-brackets for mounting)
LC1-1-1000 (Controller connector)
LC1-1-2000 (Controller connector)
(Refer to page 845.)

Note) The following options are necessary for operating and setting the controller.

LC1-1-W1 (Windows 95® Japanese)
LC1-1-W2 (Windows 95® English)
and
LC1-1-R□C (dedicated communication cable)
(Refer to pages 841, and 845.)

or

[LC1-1-T1-□□ (Teaching box)] are required.
For ordering information, refer to the option part numbers on page 842.
Windows® and Windows95® are registered trademarks of Microsoft Corporation.

Mounting

⚠ Caution

When cooling, make sure the main body's operation temperature remains within the specified range.
Make sure there is more than 80 mm of space between the sides of the main body and any constructions or parts.

Performance/Specifications

General specifications

Item \ Model	LC1-1□□□1	LC1-1□□□2
Power supply	100/110 VAC ±10%, 50/60 Hz (100 VAC, 50/60 Hz for LC1-1B□V□1)	200/220 VAC ±10%, 50/60 Hz (200 VAC ±10% for LC1-1B3H2) (200 VAC, 50/60 Hz for LC1-1B□V□2)
Leakage current	5 mA or less	
Dimensions	80 x 120 x 244 mm	
Mass	Approx. 2.2 kg	

Actuator control

Item \ Model	LC1-1B1H□	LC1-1B2H□	LC1-1B3H□	LC1-1B1V□	LC1-1B2V□	LC1-1B3V□	LC1-1D2H□□	LC1-1F2H□□
Compatible actuator model	LJ1H101□PB LJ1H101□NB	LJ1H202□P□ LJ1H202□N□	LJ1H303□PD LJ1H303□ND	LJ1H102 □□□-□□□K	LJ1H202 □□□-□□□K	LJ1H303 □□□-□□□K	LG1H212□P□ LG1H212□N□	LG1H202□P□ LG1H202□N□
Compatible guide	High rigidity direct acting guide							
Motor capacity	50 W	100 W	200 W	100 W		200 W	100 W	
Operating temperature range	5 to 50°C		5 to 40°C	5 to 50°C		5 to 40°C	5 to 50°C	
Electric power	180 VA	300 VA	640 VA	300 VA		640 VA	300 VA	
Control system	AC software servo/PTP control							
Position detection system	Incremental encoder							
Home position return direction	Can be selected between the motor side and the side opposite the motor.							
Maximum positioning point setting	1008 points (when step designation is actuated)							
Movement command	Absolute and incremental used in combination							
Position designation range	0.00 mm to 4000.00 mm [Note]							
Speed designation range	1 mm/s to 2500 mm/s [Note]							
Acceleration/deceleration designation range	Trapezoidal acceleration/deceleration 1 mm/s^2 to 9800 mm/s^2 [Note]							

Note) There are cases in which the position, speed and acceleration designations are not realized, depending on the actuator that is connected and the operating conditions.

Programming

Item	Performance/Specifications
Means of programming	Dedicated controller setup software (LC1-1-W1, LC1-1-W2) and dedicated teaching box (LC1-1-T1-□□)
Functions	Programming (JOG teaching, direct teaching*), Operation, Monitor, Test, Alarm reset
Number of programs	8 programs
Number of steps	1016 steps (127 steps x 8 programs)

∗ Direct teaching is only available with LC1-1-W1 and LC1-1-W2.

Operating configuration

Item	Performance/Specifications
Operating methods	Operation by PLC, operating panel, etc., via control terminal; Operation by PC (controller setup software); Operation by teaching box
Summary of operations	Program batch execution (program designated operation), Step designated execution (position movement, point designated operation)
Test run functions	Program test, Step no. designated operation, JOG operation, Input/output operation
Monitor functions	Executed program indication, Input/output monitor

Peripheral device control

Item	Performance/Specifications
General purpose input	6 inputs, Photo-coupler insulation, 24 VDC, 5 mA
General purpose output	6 outputs, Open collector output, 35 VDC max., 80 mA/output (maximum load current)
Control commands	Output ON/OFF, Input condition wait, Condition jump, Time limit input wait

Safety items

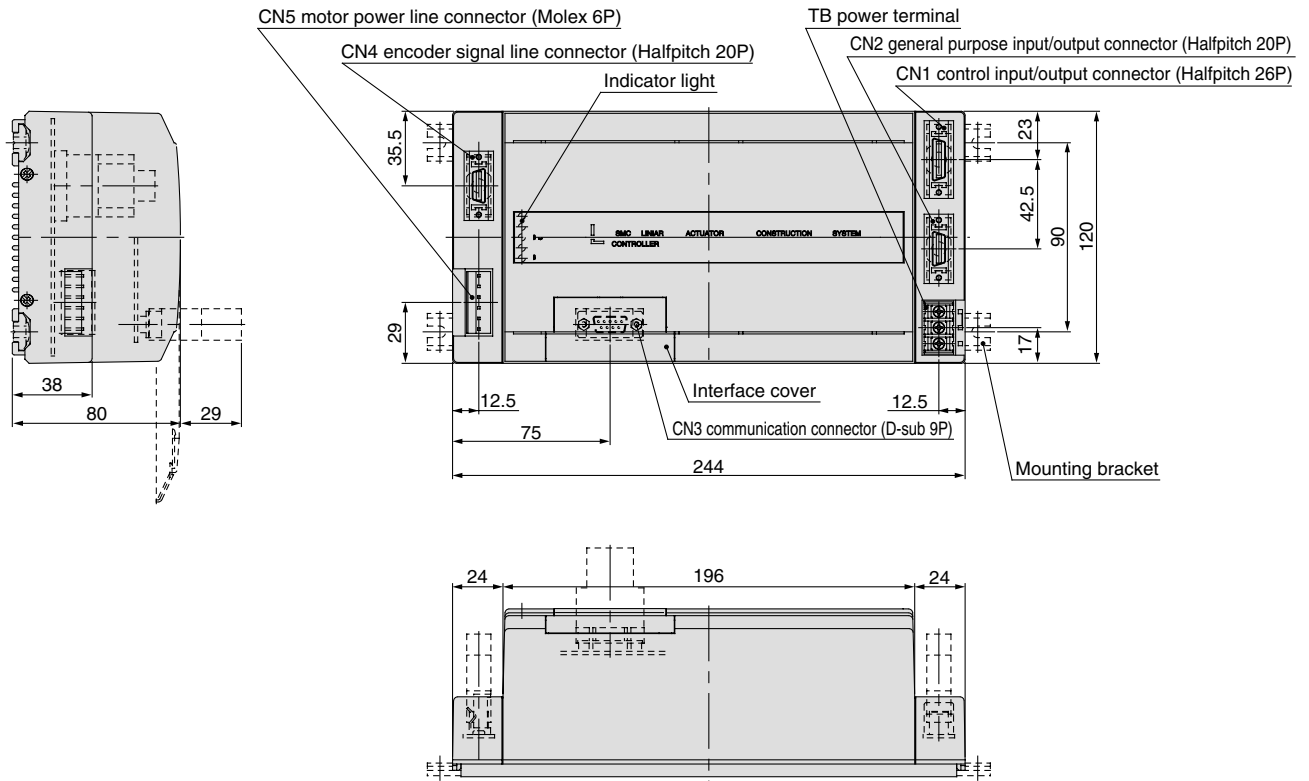| Item	Performance/Specifications
Protection functions	Over current, Over load, Over speed, Encoder error, Abnormal driver temperature, Abnormal drive power supply, Communication error, Battery error, Abnormal parameter, Limit SW on

LJ1
LG1
LTF
LC1
LC7
LC8
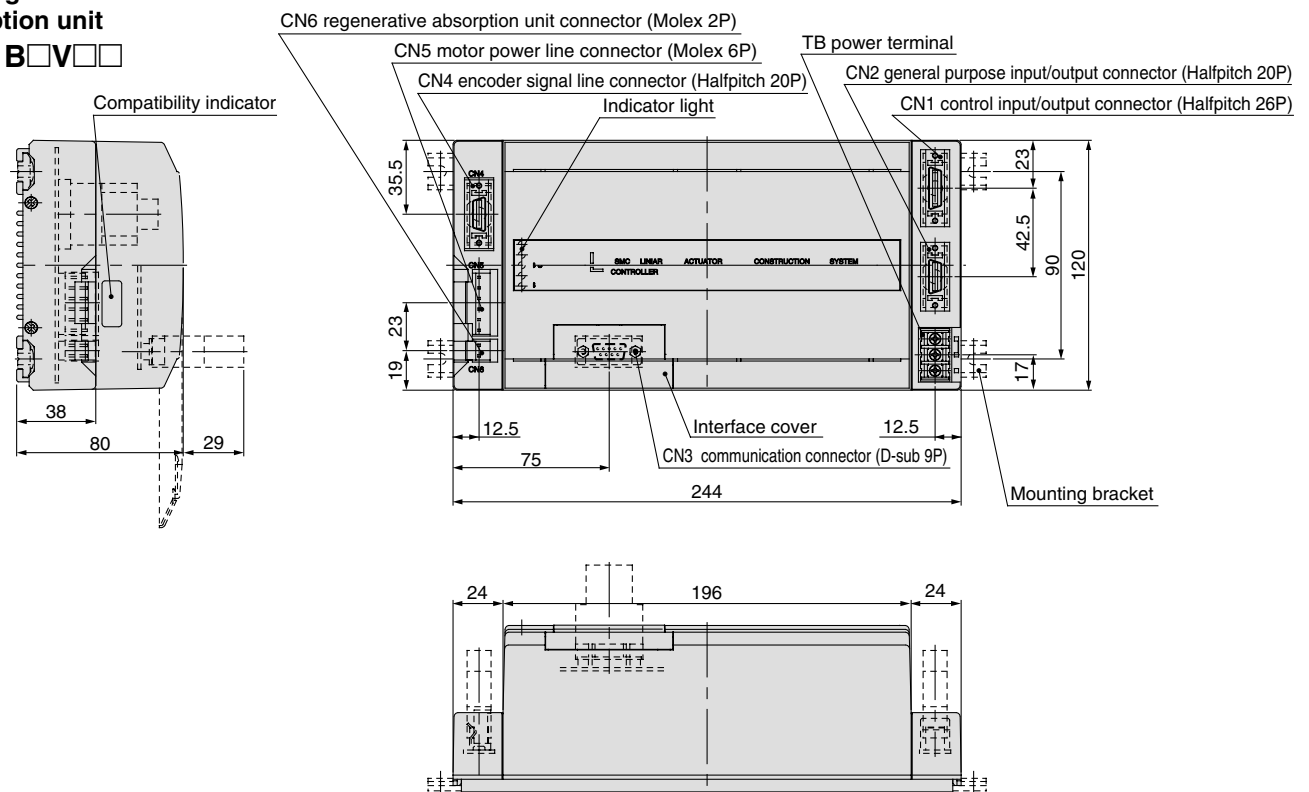LXF
LXP
LXS
LC6□
LZ□
LC3F2
X□
D-□
E-MY

Series *LC1*

Dimensions

LC1-1B□H□   LC1-1D2H□□   LC1-1F2H□□

CN5 motor power line connector (Molex 6P)

CN4 encoder signal line connector (Halfpitch 20P)

Indicator light

TB power terminal

CN2 general purpose input/output connector (Halfpitch 20P)

CN1 control input/output connector (Halfpitch 26P)

35.5

23

42.5

90

120

SMC LINEAR ACTUATOR CONSTRUCTION SYSTEM
CONTROLLER

29

17

38

80

29

12.5

Interface cover

12.5

75

CN3 communication connector (D-sub 9P)

244

Mounting bracket

24

196

24

With regenerative absorption unit
LC1-1B□V□□

CN6 regenerative absorption unit connector (Molex 2P)

CN5 motor power line connector (Molex 6P)

CN4 encoder signal line connector (Halfpitch 20P)

TB power terminal

CN2 general purpose input/output connector (Halfpitch 20P)

CN1 control input/output connector (Halfpitch 26P)

Compatibility indicator

Indicator light

35.5

23

42.5

90

120

SMC LINEAR ACTUATOR CONSTRUCTION SYSTEM
CONTROLLER

23

19

17

38

80

29

12.5

Interface cover

12.5

75

CN3 communication connector (D-sub 9P)

244

Mounting bracket

24

196

24

SMC

Controller

Series LTF: Standard Motor Compatible

Single Axis Type/Built-in AC Servo Driver
Series LC1

How to Order

$$\text{LC1} - 1 \boxed{H} \boxed{2V} \boxed{F} \boxed{1} - \boxed{L} \boxed{3}$$

Number of axes

1	1 axis

Actuator classification

H	Series LTF (Incremental encoder)

Applicable actuators

Symbol	Motor capacity	Compatible actuator models
2H	100 W	LTF6E□□□-□□□
3H	200 W	LTF8F□□□-□□□
2V Note 1) Note 2)	100 W	LTF6E□□□-□□□K
3V Note 1) Note 2)	200 W	LTF8F□□□-□□□K

Note 2) When using this product (with brakes), always use the regenerative absorption unit (LC7R-K1□A□).

Screw lead

F	6 mm
H	10 mm
L	20 mm

Power supply
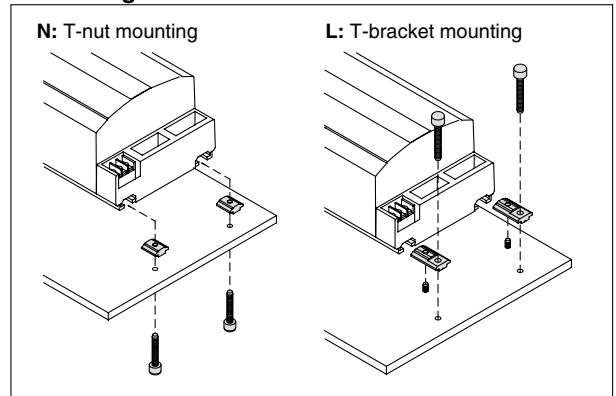
1 Note 1)	100/110 VAC (50/60 Hz)
2 Note 1)	200/220 VAC (50/60 Hz)

Note 1) Consult SMC if the supply voltage for LC1-1H□V□1 will be 110 VAC or more, or the supply voltage for LC1-1H□V□2 will be 220 VAC or more.

Mounting bracket

3	M3
5	M5

Mounting∗

N: T-nut mounting   **L:** T-bracket mounting

∗ This controller includes the accessories listed below.

LC1-1-□□ (Either T-nuts or T-brackets for mounting)
LC1-1-1000 (Controller connector)
LC1-1-2000 (Controller connector)
(Refer to page 845.)

Note) The following options are necessary for operating and setting the controller.

LC1-1-W1 (Windows 95® Japanese)
LC1-1-W2 (Windows 95® English)
and
LC1-1-R□C (dedicated communication cable)
(Refer to pages 841, and 845.)

or

[LC1-1-T1-□□ (Teaching box)] are required.
For ordering information, refer to the option part numbers on page 842.
Windows® and Windows95® are registered trademarks of Microsoft Corporation.

Mounting

⚠Caution

When cooling, make sure the main body's operation temperature remains within the specified range.
Make sure there is more than 80 mm of space between the sides of the main body and any constructions or parts.

Series LC1

Performance/Specifications

General specifications

Item \ Model	LC1-1H☐☐☐1	LC1-1H☐☐☐2
Power supply	100/110 VAC ±10%, 50/60 Hz (100 VAC, 50/60 Hz for LC1-1H☐V☐1)	200/220 VAC ±10%, 50/60 Hz (200 VAC ±10% for LC1-1H3☐2) (200 VAC, 50/60 Hz for LC1-1H☐V☐2)
Leakage current	5 mA or less	
Dimensions	80 x 120 x 244 mm	
Mass	Approx. 2.2 kg	

Actuator control

Item \ Model	LC1-1H2H☐☐	LC1-1H3H☐☐	LC1-1H2V☐☐	LC1-1H3V☐☐
Compatible actuator model	LTF6E☐☐☐-☐☐☐	LTF8F☐☐☐-☐☐☐	LTF6E☐☐☐-☐☐☐K	LTF6E☐☐☐-☐☐☐K
Motor capacity	100 W	200 W	100 W	200 W
Operating temperature range	5 to 50°C	5 to 40°C	5 to 50°C	5 to 40°C
Electric power	300 VA	640 VA	300 VA	640 VA
Control system	AC software servo/PTP control			
Position detection system	Incremental encoder			
Home position return direction	Can be selected between the motor side and the side opposite the motor.			
Maximum positioning point setting	1008 points (when step designation is actuated)			
Movement command	Absolute and incremental used in combination			
Position designation range	0.00 mm to 4000.00 mm Note)			
Speed designation range	1 mm/s to 2500 mm/s Note)			
Acceleration/deceleration designation range	Trapezoidal acceleration/deceleration 1 mm/s^2 to 9800 mm/s^2 Note)			

Note) There are cases in which the position, speed and acceleration designations are not realized, depending on the actuator that is connected and the operating conditions.

Programming

Item	Performance/Specifications
Means of programming	Dedicated controller setup software (LC1-1-W1, LC1-1-W2) and dedicated teaching box (LC1-1-T1-☐☐)
Functions	Programming (JOG teaching, direct teaching∗), Operation, Monitor, Test, Alarm reset
Number of programs	8 programs
Number of steps	1016 steps (127 steps x 8 programs)

∗ Direct teaching is only available with LC1-1-W1 and LC1-1-W2.

Operating configuration

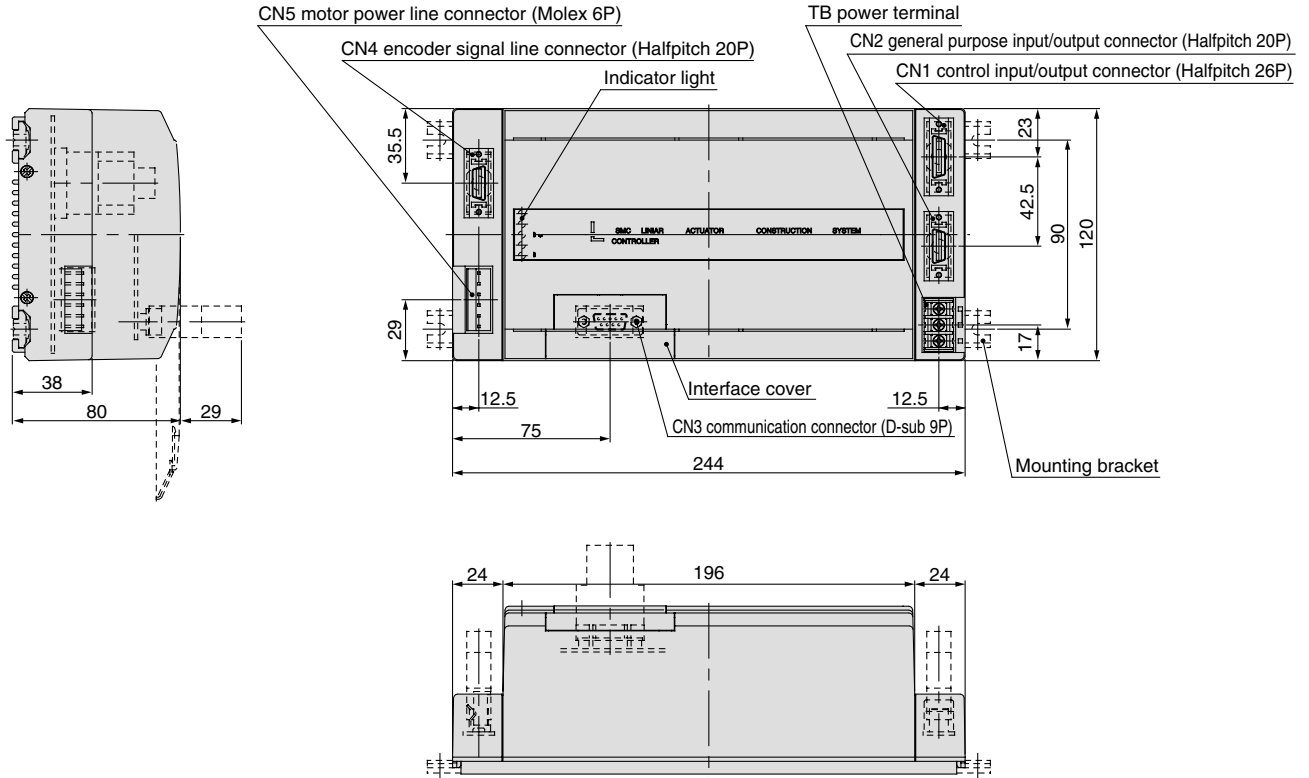| Item	Performance/Specifications
Operating methods	Operation by PLC, operating panel, etc., via control terminal; Operation by PC (controller setup software); Operation by teaching box
Summary of operations	Program batch execution (program designated operation), Step designated execution (position movement, point designated operation)
Test run functions	Program test, Step no. designated operation, JOG operation, Input/output operation
Monitor functions	Executed program indication, Input/output monitor

Peripheral device control

Item	Performance/Specifications
General purpose input	6 inputs, Photo-coupler insulation, 24 VDC, 5 mA
General purpose output	6 outputs, Open collector output, 35 VDC max., 80 mA/output (maximum load current)
Control commands	Output ON/OFF, Input condition wait, Condition jump, Time limit input wait

Safety items

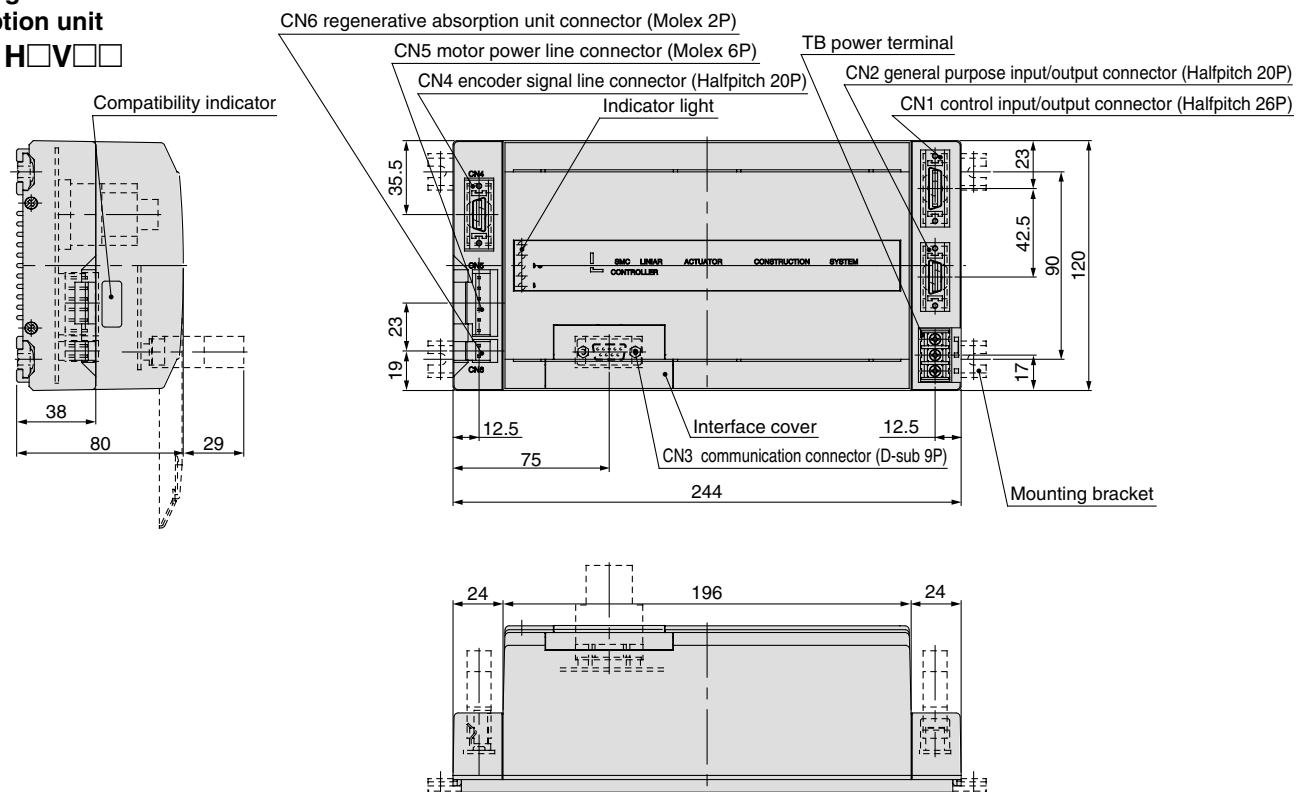| Item	Performance/Specifications
Protection functions	Over current, Over load, Over speed, Encoder error, Abnormal driver temperature, Abnormal drive power supply, Communication error, Battery error, Abnormal parameter, Limit SW on

Dimensions

LC1-1H□H□□

CN5 motor power line connector (Molex 6P)

CN4 encoder signal line connector (Halfpitch 20P)

Indicator light

TB power terminal

CN2 general purpose input/output connector (Halfpitch 20P)

CN1 control input/output connector (Halfpitch 26P)

SMC LINEAR ACTUATOR CONSTRUCTION SYSTEM CONTROLLER

Interface cover

CN3 communication connector (D-sub 9P)

Mounting bracket

35.5　29　38　80　29　12.5　75　244　23　42.5　90　120　17　12.5

24　196　24

With regenerative absorption unit
LC1-1H□V□□

CN6 regenerative absorption unit connector (Molex 2P)

CN5 motor power line connector (Molex 6P)

CN4 encoder signal line connector (Halfpitch 20P)

Indicator light

TB power terminal

CN2 general purpose input/output connector (Halfpitch 20P)

CN1 control input/output connector (Halfpitch 26P)

Compatibility indicator

SMC LINEAR ACTUATOR CONSTRUCTION SYSTEM CONTROLLER

Interface cover

CN3 communication connector (D-sub 9P)

Mounting bracket

35.5　23　19　38　80　29　12.5　75　244　23　42.5　90　120　17　12.5

24　196　24

| LJ1 |
| LG1 |
| LTF |
| **LC1** |
| LC7 |
| LC8 |
| LXF |
| LXP |
| LXS |
| LC6□ |
| LZ□ |
| LC3F2 |
| X□ |
| D-□ |
| E-MY |

Controller   Series LX: AC Servomotor compatible

Single Axis Type/Built-in AC Servo Driver
Series *LC1*

How to Order

LC1–1 B1V D 1 – N 3 – 200 – X180

Number of axes

1	1 axis

Ball screw lead

C	2 mm
D	5 mm

Power supply

1	100/110 VAC (50/60 Hz)
2	200/220 VAC (50/60 Hz)

Mounting bracket

3	M3
5	M5

Stroke

50	50 mm
75	75 mm
100	100 mm
125	125 mm
150	150 mm
175	175 mm
200	200 mm

Actuator classification

X180	LXSAB□-□□□S□-□□□□-X12
	LXSAB□-□□□S□-□□□□-X13
X233	LXPAB□-□□□S□-□□□□-X12
	LXPAB□-□□□S□-□□□□-X13

Mounting *

N: T-nut mounting   **L:** T-bracket mounting

* This controller includes the accessories listed below.

   LC1-1-□□ /Either T-nuts or T-brackets for mounting
   LC1-1-1000/Controller connector
   LC1-1-2000/Controller connector
   (Refer to page 845.)

Note) The following options are necessary for operating and setting the controller.

   LC1-1-W1 (Windows 95® Japanese)
   LC1-1-W2 (Windows 95® English)
   and
   LC1-1-R□C (dedicated communication cable)
   (Refer to pages 841 and 845.)

   or

   [LC1-1-T1-□□ (Teaching box)] are required.
   For ordering information, refer to the option part numbers on page 842.
   Windows® and Windows95® are registered trademarks of Microsoft Corporation.

Mounting

⚠ Caution

When cooling, make sure the main body's operation temperature remains within the specified range.
Make sure there is more than 80 mm of space between the sides of the main body and any constructions or parts.

836

Performance/Specifications

General specifications

Model / Item	LC1-1B1V□1-□□-□□□-X180 LC1-1B1V□1-□□-□□□-X233	LC1-1B1V□2-□□-□□□-X180 LC1-1B1V□2-□□-□□□-X233
Power supply	100 V/110 VAC ±10%, 50/60 Hz	200 V/220 VAC ±10%, 50/60 Hz
Leakage current	5 mA or less	
Dimensions	80 x 120 x 244 mm	
Mass	Approx. 2.2 kg	

Actuator control

Model / Item	LC1-1B1V□1-□□-□□□-X180	LC1-1B1V□1-□□-□□□-X233	LC1-1B1V□2-□□-□□□-X180	LC1-1B1V□2-□□-□□□-X233
Compatible actuator	LXSAB□-□□□S□-□□□-X12	LXPAB□-□□□S□-□□□-X12	LXSAB□-□□□S□-□□□-X13	LXPAB□-□□□S□-□□□-X13
Compatible guide	High rigidity direct acting guide	Guide rod	High rigidity direct acting guide	Guide rod
Motor capacity	30 W			
Operating temperature range	5 to 50°C			
Electric power	180 VA			
Control system	AC software servo/PTP control			
Position detection system	Incremental encoder			
Home position return direction	Can be selected between the motor side and the side opposite the motor.			
Maximum positioning point setting	1008 points (when step designation is actuated)			
Movement command	Absolute and incremental used in combination			
Position designation range	0.00 mm to 4000.00 mm Note)			
Speed designation range	1 mm/s to 2500 mm/s Note)			
Acceleration/deceleration designation range	Trapezoidal acceleration/deceleration 1 mm/s^2 to 9800 mm/s^2 Note)			

Note) There are cases in which the position, speed and acceleration designations are not realized, depending on the actuator that is connected and the operating conditions.

Dimensions

LC1-1B1V□□□-□□-□□□-X180
LC1-1B1V□□□-□□-□□□-X233

LJ1	
LG1	
LTF	
LC1	
LC7	
LC8	
LXF	
LXP	
LXS	
LC6□	
LZ□	
LC3F2	
X□	
D-□	
E-MY	

837

# Series *LC1*
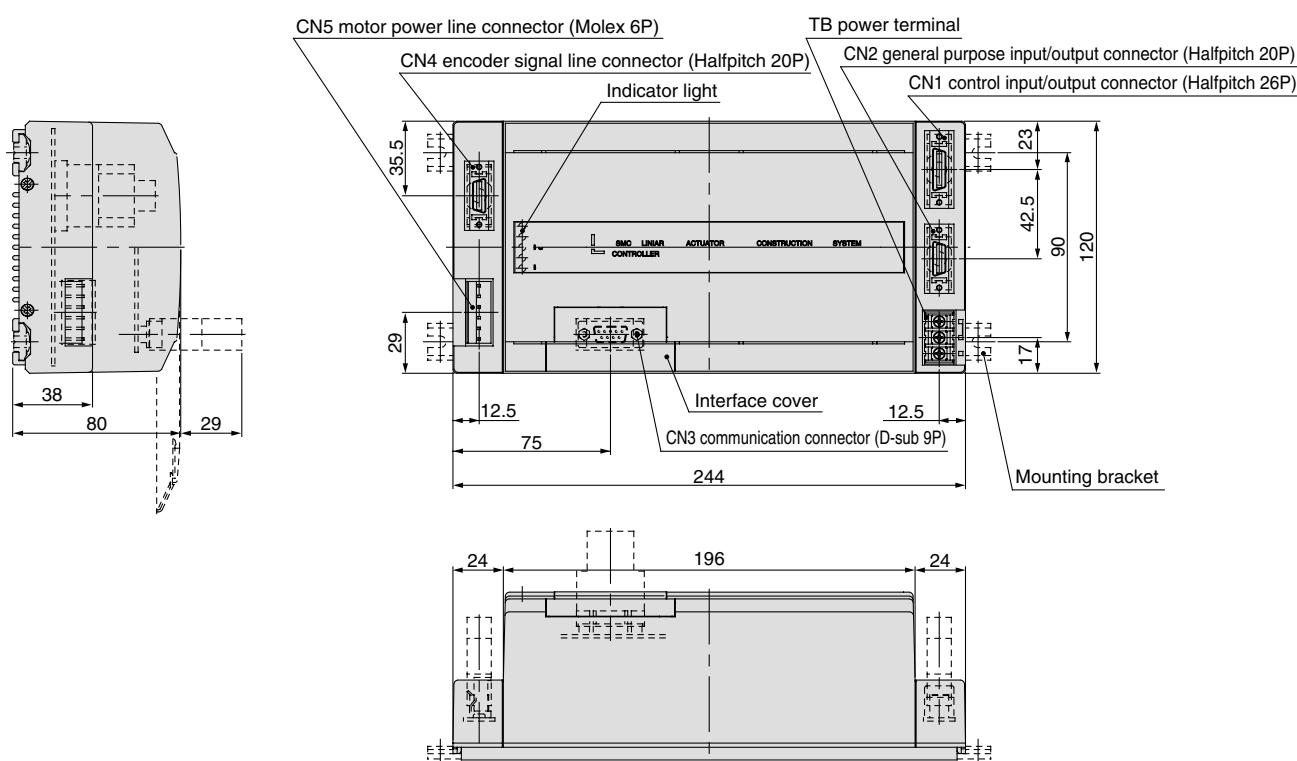
Controller Mounting

Mounting of the controller is performed by means of the two T-grooves provided on the bottom surface.

Mounting is possible from above or below using the special T-nuts or T-brackets. Refer to page 845 for further details.
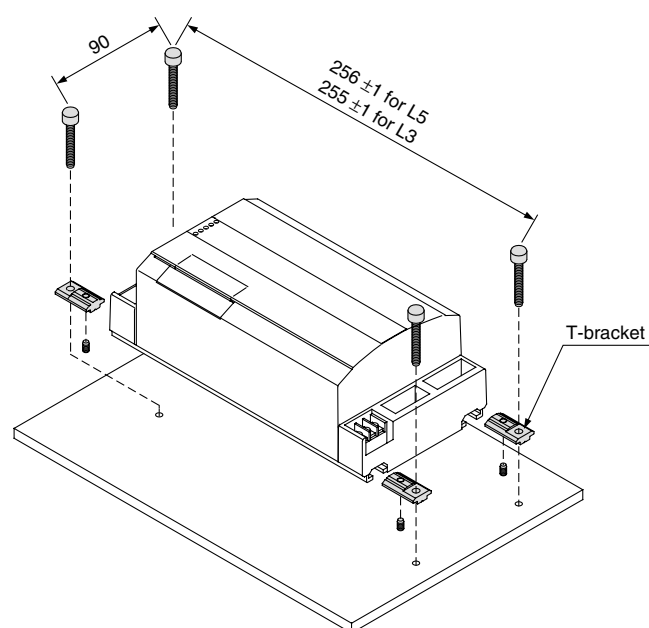
Note) This controller comes with either the T-nuts or T-brackets as accessories.

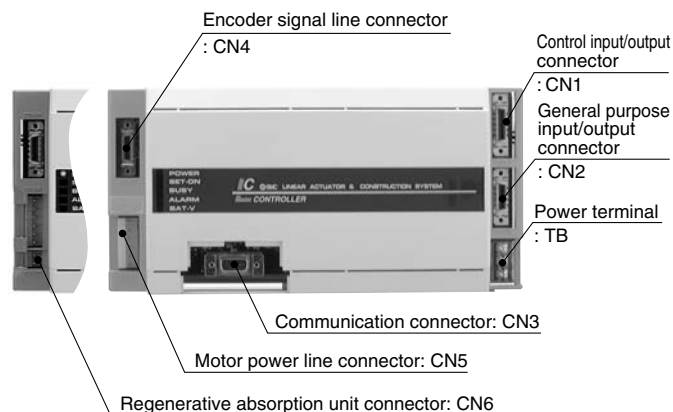| Controller model	Mounting screw	Mounting bracket assembly
LC1-1□□□-N3	M3 x 0.5	LC1-1-N3
LC1-1□□□-N5	M5 x 0.8	LC1-1-N5
LC1-1□□□-L3	M3	LC1-1-L3
LC1-1□□□-L5	M5	LC1-1-L5

Mounting with T-nuts
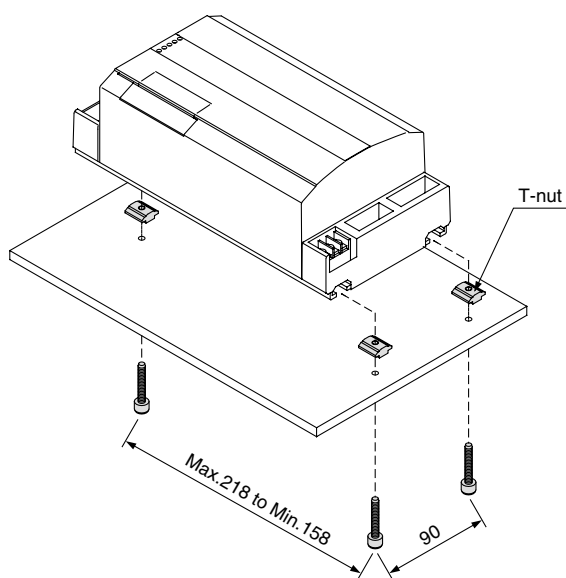
Mounting with T-brackets

Part Descriptions

Controller Command Setting List

Actuator control commands

Classification	Function	Instruction	Parameter value
Movement	Absolute movement command	MOVA	Address (speed)
	Incremental movement command	MOVI	± Movement (speed)
Setting	Acceleration setting command	ASET	Acceleration

I/O control commands

Classification	Function	Instruction	Parameter value
Output control	Output ON command	O-SET	General purpose output no.
	Output OFF command	O-RES	General purpose output no.
	Output reversal command	O-NOT	General purpose output no.
Input wait	AND input wait command	I-AND	General purpose input no., State
	OR input wait command	I-OR	General purpose input no., State
Input wait with time out function	AND input time out jump command	T-AND	General purpose input no., State (P-no.) label
	OR input time out jump command	T-OR	General purpose input no., State (P-no.) label
	AND input time out subroutine call command	C-AND	General purpose input no., State (P-no.) label
	OR input time out subroutine call command	C-OR	General purpose input no., State (P-no.) label
Condition jump	AND input condition jump command	J-AND	General purpose input no., State (P-no.) label
	OR input condition jump command	J-OR	General purpose input no., State (P-no.) label

Program control commands

Classification	Function	Instruction	Parameter value
Jump	Unconditional jump command	JMP	(P-no.) label
Subroutine	Subroutine call command	CALL	(P-no.) label
	Subroutine end declaration	RET	
Loop	Loop start command	FOR	Loop frequency
	Loop end command	NEXT	
End	Program end declaration	END	
Timer	Timer command	TIM	Timer amount

Connection Examples

Control Input/Output Terminal: CN1

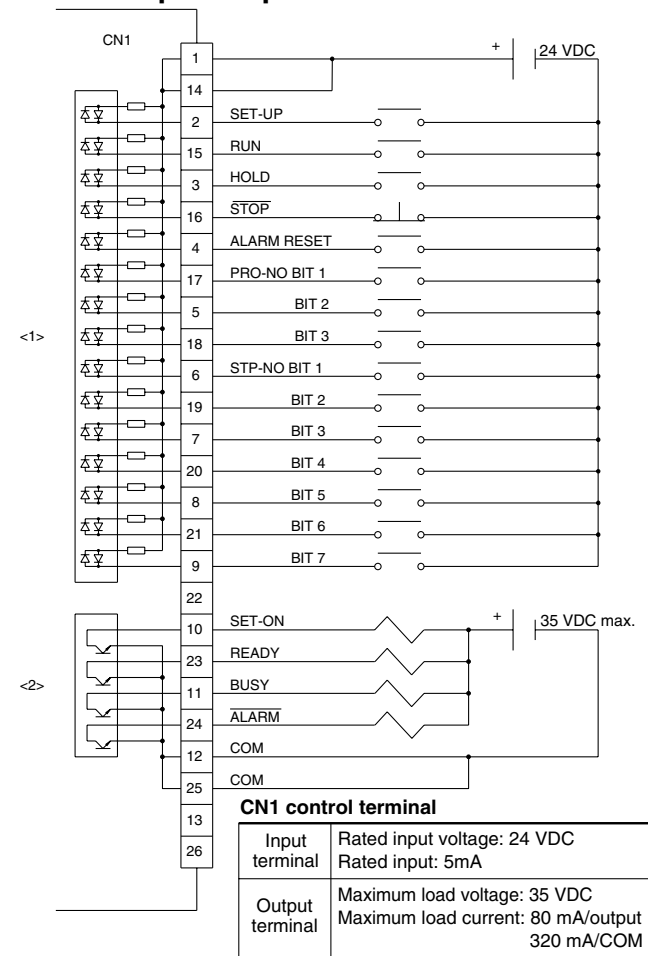Terminal to perform actuator operation (connects PLC and operating panel)

CN1. Control input terminal list

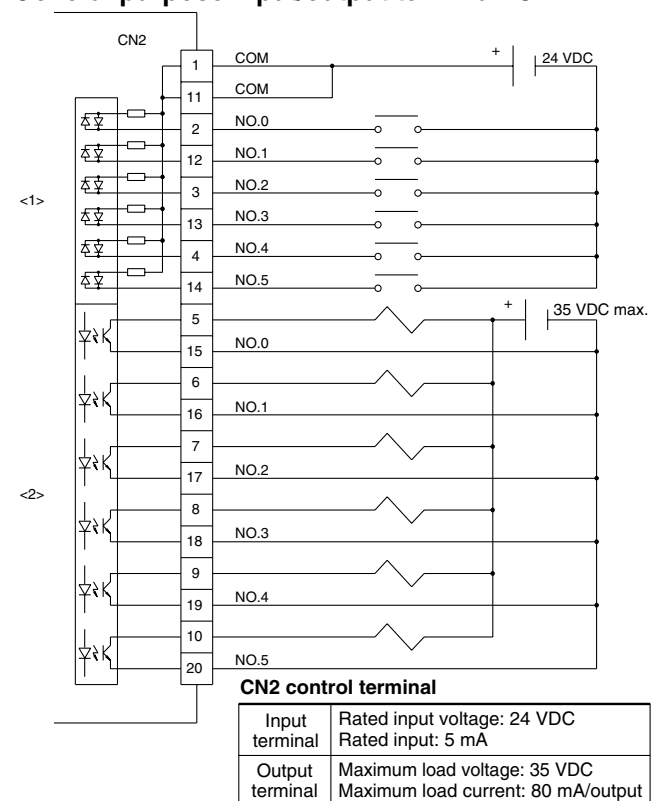| Terminal	Pin no.	Description	Function
+24V	1, 14	Common	The positive common of the input terminal.
SET-UP	2	Starting preparation	The terminal that performs setup operations (actuator starting preparation).
RUN	15	Starting	The terminal that performs program start.
Pro-no. bit1	17	Program designation	The terminal that designates the program to be executed. Can designate 8 types of programs with a total of 3 bits. (Set by the binary system.)
Pro-no. bit2	5		
Pro-no. bit3	18		
Stp-no. bit1	6	Step designation	The terminal that designates the step to be executed. Used when executing steps (position movement). (Set by the binary system.)
Stp-no. bit2	19		
Stp-no. bit3	7		
Stp-no. bit4	20		
Stp-no. bit5	8		
Stp-no. bit6	21		
Stp-no. bit7	9		
HOLD	3	Temporary stop	Temporarily stops the program run by means of the ON input.
STOP	16	Emergency stop (nonlogical input)	Performs an emergency stop when ON input stops.
ALARM RESET	4	Alarm release	Releases the alarm being generated by means of the ON input.

CN1. Control output terminal list

Terminal	Pin no.	Description	Function
READY	23	System ready signal	Indicates ability to perform control terminal input and communication via the dedicated communication cable when ON.
SET-ON	10	Start readiness signal	Indicates that the SET-UP operation (start ready operation: return to home position after servo ON) is complete when ON. The state in which the program can be run.
BUSY	11	Operating signal	Indicates operation in progress when ON. ON when program is being executed and when returning to the home position.
ALARM	24	Alarm output	When this signal is OFF, an alarm is being generated for the actuator/controller.
COM	12, 25	Common	The output terminal common.

Control input/output terminal: CN1

Input terminal	Rated input voltage: 24 VDC Rated input: 5mA
Output terminal	Maximum load voltage: 35 VDC Maximum load current: 80 mA/output 320 mA/COM

CN1 control terminal

General purpose input/output terminal: CN2

Input terminal	Rated input voltage: 24 VDC Rated input: 5 mA
Output terminal	Maximum load voltage: 35 VDC Maximum load current: 80 mA/output

CN2 control terminal

LJ1
LG1
LTF
LC1
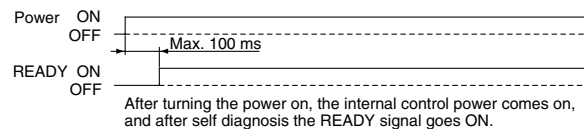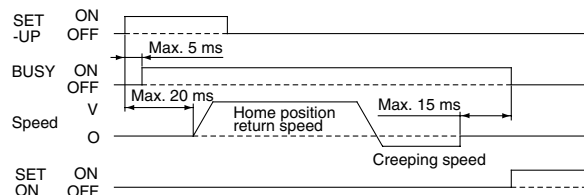LC7
LC8
LXF
LXP
LXS
LC6□
LZ□
LC3F2
X□
D-□
E-MY

839

Series LC1

Control Method/Timing

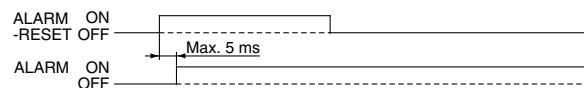### Timing for READY signal generation immediately after turning on power

Power ON/OFF
Max. 100 ms
READY ON/OFF

After turning the power on, the internal control power comes on, and after self diagnosis the READY signal goes ON.

Timing for home position return

SET-UP ON/OFF
Max. 5 ms
BUSY ON/OFF
Max. 20 ms
Speed V/O
Home position return speed
Max. 15 ms
Creeping speed
SET ON/OFF

Timing for program/step execution

SET-ON ON/OFF
After confirming that the SET-ON signal is ON, the RUN signal should be turned ON.
P-NO S-NO ON/OFF
Selection
Selection should be made before the RUN signal goes ON.
RUN ON/OFF
After confirming that the BUSY signal is OFF, the RUN signal should be turned ON.
BUSY ON/OFF
Max. 10 ms
Speed V/O
Max. 30 ms
Max. 60 ms

Timing for alarm reset

ALARM-RESET ON/OFF
Max. 5 ms
ALARM ON/OFF
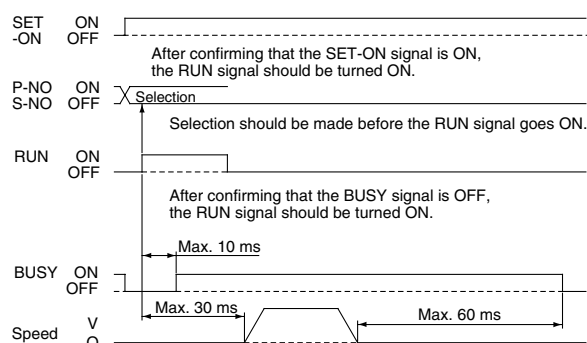
Timing for temporary stop during operation

HOLD ON/OFF
Max. 25 ms
Speed V/O
Max. 30 ms
BUSY ON/OFF
Max. 10 ms

BUSY-OFF timing is controlled by actuator deceleration.
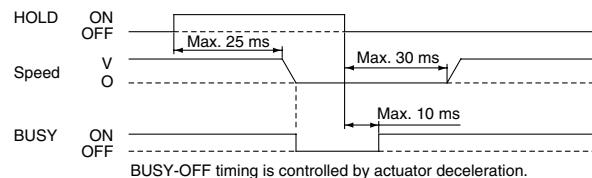
Timing for stop by ALARM-RESET during operation

ALARM-RESET ON/OFF
Max. 25 ms
Speed V/O
BUSY ON/OFF

BUSY-OFF timing is controlled by actuator deceleration.
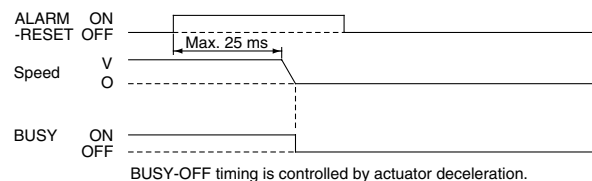
Timing for emergency stop during operation

STOP ON/OFF
Max. 10 ms
SET-ON ON/OFF
Max. 10 ms
ALARM ON/OFF
Max. 15 ms
Speed V/O
BUSY ON/OFF
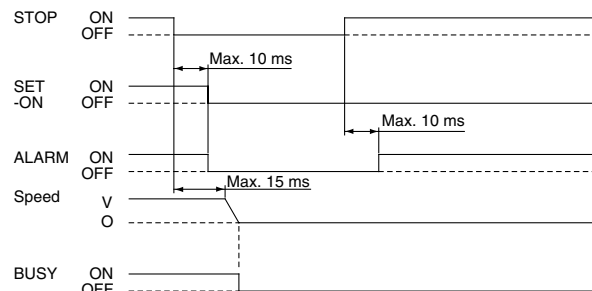
Response time with respect to controller input signals

The following factors exist for delay of response with respect to controller input signals.

1) Scanning delay of the controller input signal
2) Delay by the input signal analysis computation
3) Delay of command analysis processing

Factors (1) and (2) above apply to delay with respect to the SET-ON, ALARM-RESET and STOP signals.

Factors (1), (2) and (3) above apply to delay with respect to cancellation of the RUN and HOLD signals.

When signals are applied to the controller by means of a PLC, the PLC processing delay and the controller input signal scan delay should be considered, and **the signal state should be maintained for 50 ms or longer.**

It is recommended that the input signal state be initialized with the response signal to the input signal as a condition.

Controller Setup Software LC1-1-W1 W2

## Windows/LC1-1-W1 (Japanese) LC1-1-W2 (English)

Features are

- Direct teaching
- Program printing
- Batch editing and sending/receiving of all programs
- Batch management and multiple saving of parameters and programs

Operating environment

Computer	A model with a Pentium 75 MHz or faster CPU, and able to fully operate Windows 95®.
OS	Windows 95®
Memory	16 MB or more
Hard disk	5 MB or more of disk space required

● The dedicated communications cable (LC1-1-R□□C) is required when using this software.
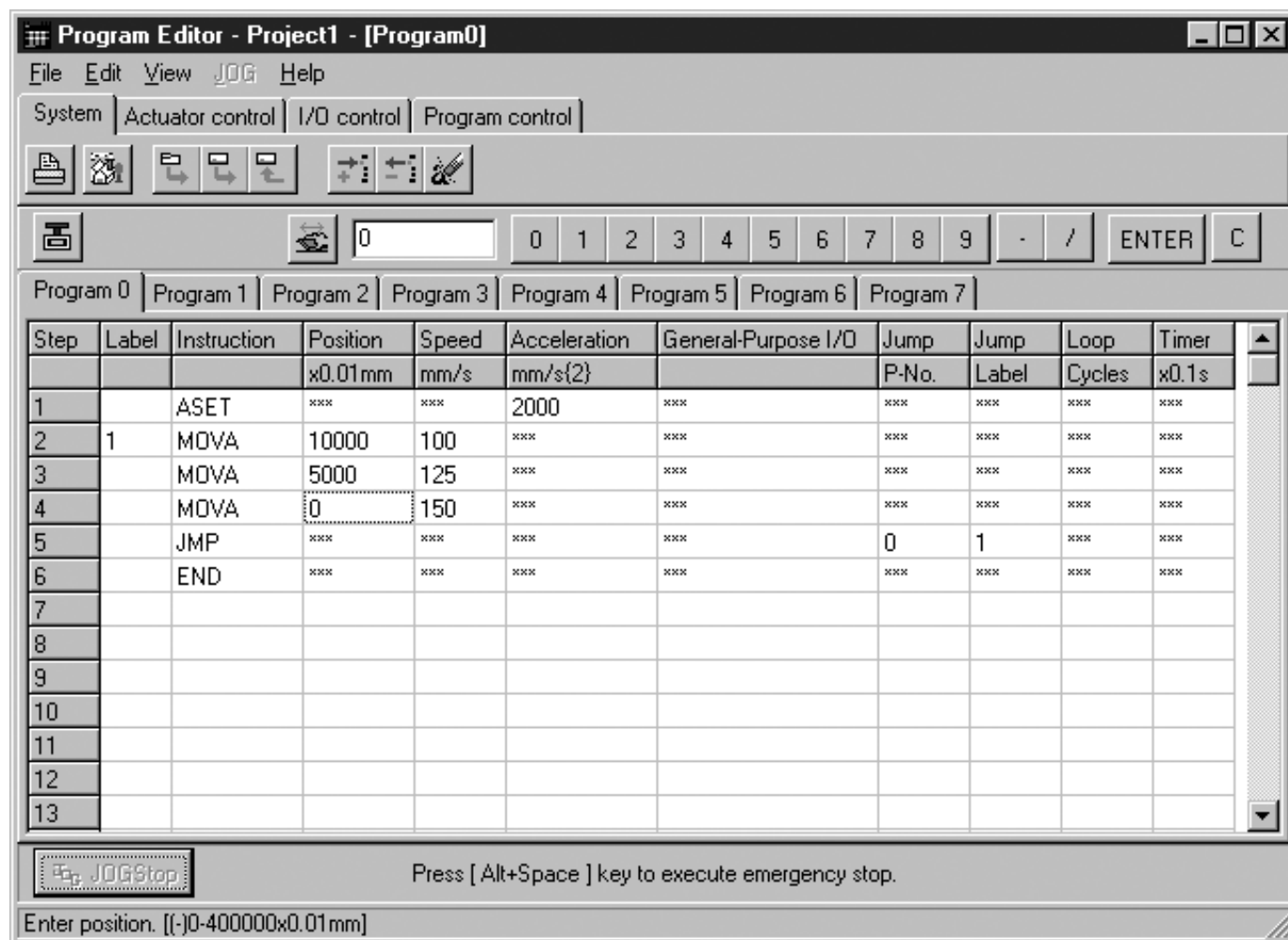
Screen example

- The contents of this software and the registered product specifications may change without prior notice.
- Duplicating, copying or reproducing of this software, in whole or in part, is prohibited without prior consent from SMC.
- SMC owns the copyright of this software.
- The intellectual property rights and other rights concerning this software are solely owned by SMC. This also applies to any future version upgrades and revised versions of this software.
- SMC does not assume any compensatory responsibility for any damage or loss of profit, etc., resulting from the use of this software.
- Windows® and Windows95® are registered trademarks of Microsoft Corporation.
- Pentium is a trade mark of Intel Corporation.

Series *LC1*
Dedicated Teaching Box/LC1-1-T1

- **Interactive input display**
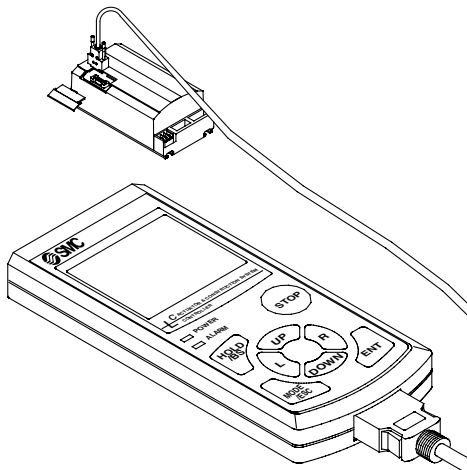- **Programming with the same language as PC software**

Able to execute operations such as programming and parameter changes, which up until now have been performed from a PC.

∗ The special cable is packed with the teaching box. (2 to 5 m)

How to Order

LC1 – 1 – T1 – 0 2

●**Cable length**

2	2 m
3	3 m
4	4 m
5	5 m

Performance/Specifications

General specifications

	LC1-1-T1-0□
Power supply	Supplied from **LC1**
Dimensions (mm)	170 x 76 x 20
Mass (g)	158
Case type	Resin case
Display unit (mm)	46 x 55 LCD
Operating unit	Key switches, LED indicators
Cable length (m)	2, 3, 4, 5

Basic performance

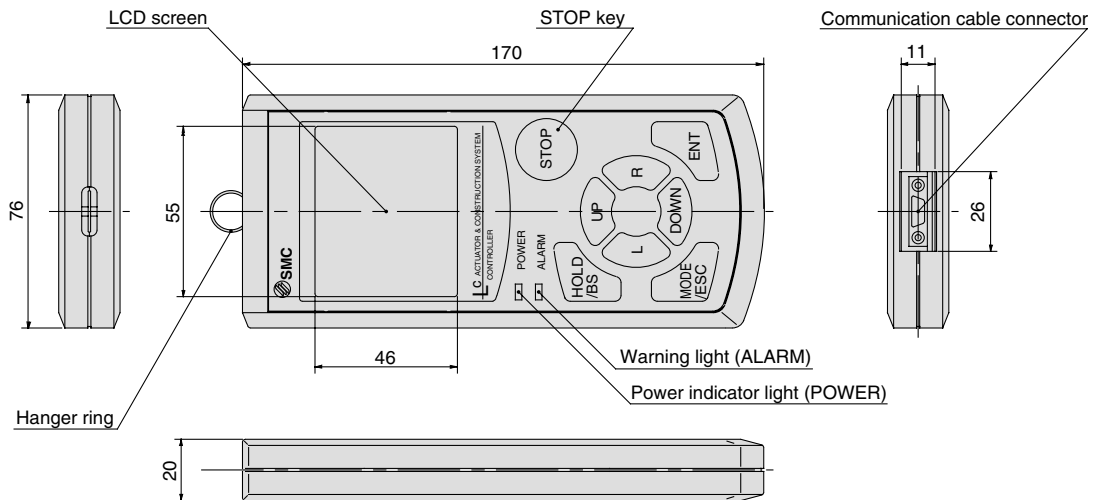|	Performance/Specifications
Compatible controller	**LC1** (all models)
Operating temperature range (°C)	5 to 50
Functions	Programming, Parameter change, Setup, Operation, JOG operation, Monitor, Alarm reset, JOG teaching
Monitor functions	Movement position, Movement speed
Protection functions	Over current, Over load, Over speed, Encoder error, Abnormal driver temperature, Abnormal drive power supply, Communication error, Battery error, Limit SW on, Abnormal driver parameter, RAM malfunction
Protection function indicator	Alarm code

Options

● **Teaching box cable**

L1C029 – 0 2

●**Cable length**

2	2 m
3	3 m
4	4 m
5	5 m

Dimensions

LCD screen · STOP key · Communication cable connector

170
76
55
46
11
26
20

Warning light (ALARM)
Power indicator light (POWER)
Hanger ring

Sidebar: LJ1 / LG1 / LTF / **LC1** / LC7 / LC8 / LXF / LXP / LXS / LC6☐ / LZ☐ / LC3F2 / X☐ / D-☐ / E-MY

Alarm Code List

Alarm code	Alarm	Reset	Description
10	Emergency stop	○	An emergency stop condition exists or has occurred in the past due to the controller setup software or the CN1 control STOP terminal.
11	Limit switch ON	○	Limit switch is turned ON.
12	Battery error	●	The memory backup battery voltage is low. Contact SMC.
13	Communication error	○	Communication with the controller is interrupted.
14	RAM malfunction	●	The parameter is damaged.
15	Soft stroke limit	○	The program is about to exceed the stroke length set by the parameter.
20	Over current	●	Three times the rated current or more is flowing into the driver unit.
21	Over load	●	The driver unit continuously received a current exceeding the rated current for a prescribed time or longer.
22	Over speed	●	The controller exceeded the maximum operational speed.
24	Abnormal driver temperature	●	A temperature increase of the driver unit activated the temperature sensor.
25	Encoder error	●	An encoder or actuator cable malfunction has occurred.
26	Abnormal drive current	●	The driver unit power supply is shut off due to a regeneration problem, etc.
28	Abnormal driver parameter	●	A driver parameter abnormality in the controller system has occurred.
30	Unsuccessful home position return	○	Trying to execute a program/step without completing the setup (home position return).
31	No designated speed	○	No speed designation with MOVA or MOVI, and no prior speed designation found.
32	No jump destination	○	No label found at the program designated jump destination.
33	Nesting exceeded	○	Sub-routine nesting (calling a sub-routine from another sub-routine) exceeds 14 levels.
34	No return destination	○	No return destination found for the RET command operation.
35	Executing FOR	○	A forbidden command is found between FOR and NEXT.
36	No FOR	○	NEXT command was executed without executing FOR command.
37	No operation program	○	Trying to execute a program/step with no commands.
38	Invalid movement command	○	Trying to execute a command other than MOVA, MOVI, or ASET with a step (position movement) designated operation.
39	Format error	○	An error is found in the attached value of a command being programmed.

∗ Refer to the Series LC1 instruction manual for alarm details.
∗ Explanation of "Reset" symbols above:
○: Can be reset by the alarm reset.
●: Turning OFF the controller power is required for resetting.

Series LC1

Key Arrangement and Functions

Mode selection

Controller command

Main modes

Mode	Display	Function
Programming mode	PRO	Sets a program.
Parameter input/output mode	PRA	Sets a parameter.
Home position return mode	SETUP	Directs home position return.
Operation mode	RUN	Directs a program operation.
JOG operation mode	JOG	Executes a JOG operation.
Monitor mode	MON	Monitors operating condition.
Alarm reset mode	ALM	Directs alarm code display and clear.

For the operation of each mode, refer to the product's instruction manual.

| Key	Functions
UP	Moves upward for item selections. Also used to increase values for data entry. In combination with L/R keys, this key drives the actuator at high speed during a JOG operation.
DOWN	Moves downward for item selections. Also used to decrease values for data entry.
L	Moves to the left for item selections. Also used to move a numerical value place to the left for data entry. It drives the actuator to the end side during a JOG operation.
R	Moves to the right for item selections. Also used to move a numerical value place to the right for data entry. It drives the actuator to the motor side during a JOG operation.
HOLD/BS	Returns to the previous mode during item selections. It becomes the temporary stop key during actuator operation.
MODE/ESC	Returns to the main mode during item selections. It exits all modes.
STOP	Becomes the emergency stop key during actuator operation. In combination with the ENT key, it launches JOG teaching and aids program editing.
ENT	Determines data during item selections. In combination with the STOP key, it launches JOG teaching and aids program editing.

T-nuts and T-brackets for Mounting

Be sure to use when mounting the controller.

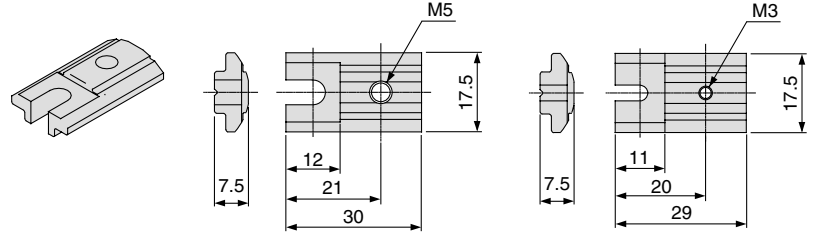Note) The controller unit includes either T-nuts or T-brackets.

T-nuts

(Mass: 10.0 g)

Model	M
LC1-1-N3	M3 x 0.5
LC1-1-N5	M5 x 0.8
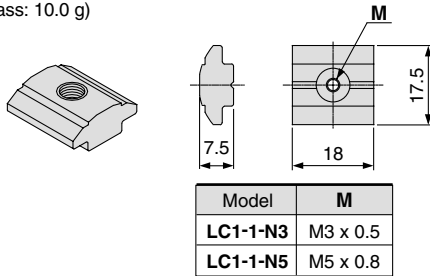
T-brackets

Model **LC1-1-L5** (Mass: 16.0 g)　　Model **LC1-1-L3** (Mass: 15.5 g)

Controller Connectors

These are connectors 'all halfpitch type' used for CN1 (control input/output) and CN2 (general purpose input/output).

Note) The controller unit includes a controller connector for use with CN1 and CN2.

CN1 (Control input/output)

Controller/LC1　　　　PLC

CN1
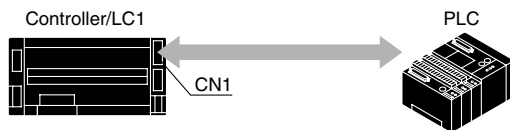
Controller connector (CN1: Control input/output)
Model **LC1-1-1000**
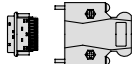
10326-52A0-008
Halfpitch hood (26P)
Sumitomo/3M Limited
10126-3000VE
Halfpitch plug (26P)
Sumitomo/3M Limited

Controller connector (CN1: Control input/output)
Model **LC1-1-1 050**

● Cable length

050	0.5 m
300-X51	3 m

L
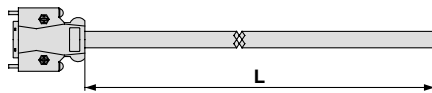
Cable is connected to **LC1-1-1000**.

CN2 (General purpose input/output)

Controller/LC1　　　　PLC

CN2
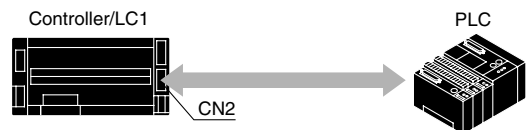
Controller connector (CN2: General purpose input/output)
Model **LC1-1-2000**
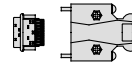
10320-52A0-008
Halfpitch hood (20P)
Sumitomo/3M Limited
10120-3000VE
Halfpitch plug (20P)
Sumitomo/3M Limited

Single side wired controller connector (CN2: General purpose input/output)
Model **LC1-1-2 050**

● Cable length

050	0.5 m
300-X52	3 m

L

Cable is connected to **LC1-1-2000**.

Dedicated Communication Cables

These are cables used to connect controllers and PCs.

Note) Be aware of the configuration of the connector on the PC when selecting a dedicated communication cable..

Controller/LC1　　　　PC

Dedicated communication cable (IBM PC/AT compatible computer)

Model **LC1-1-R□C**

● Cable length
02—2 m　**04**—4 m
03—3 m　**05**—5 m

PC　　　　　　　　　　　　　　　Controller

Cable length: 2 to 5 m
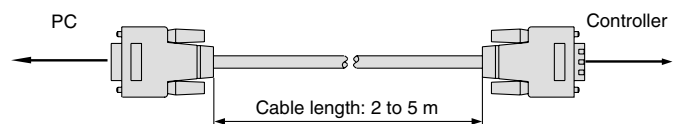
Series *LC7R*
Dedicated Regenerative Absorption Unit

The regenerative absorption unit absorbs the energy (regenerative energy) that is generated by the motor when it decelerates. It is used to prevent drive power abnormality in the controller.

Standard motor vertical mount specification electric actuator

Controller

Regenerative absorption unit

To PLC, etc.
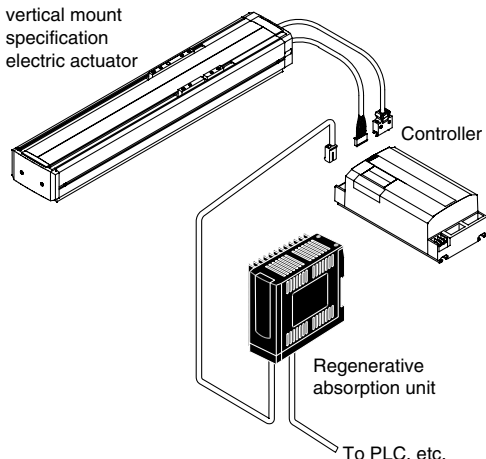
⚠ Danger

1. **Contact SMC if the connected controller power supply voltage will be 110 VAC or 220 VAC, as this may cause fire or malfunction.**

2. **Secure a distance of 50 mm or more between the body and control panel interior or other equipment, as this may cause fire or malfunction.**

3. **Confirm that there are no problems with terminal polarity, pin numbers, and crimping before connecting, as they may cause damage, malfunction, injuries, or fire.**

4. **Set up a circuit that shuts off the connected controller main power supply if trouble occurs in the regenerative absorption unit.**

5. **The regenerative absorption unit (LC7R) is exclusively for use with series LC1 controller connection. Therefore, never connect it to other equipment as this may cause fire or malfunction.**

How to Order

Regenerative Absorption Unit

LC7R – K1 1 A ☐

Connected controller power supply voltage Note 1)

| 1 | 100 VAC (50/60 Hz) |
| 2 | 200 VAC (50/60 Hz) |

Accessory type

| Nil | Without accessory |
| S1 | Series LC1 connector and contact pin + Regenerative absorption unit connector and contact pin |
| C1 | Series LC1 connection cable (0.5 m) Note 2) |

Note 1) Consult SMC if the connected controller power supply voltage will be 110 VAC or 220 VAC.
Note 2) The temperature control output cable length is 1 m. Also, the connector cable already has the required contact pin and connector assembled.

Single Option

LC7R – 1 – S0

Option type

S0	Regenerative absorption unit connector and pin
S1	Series LC1 connector and pin
C1	Series LC1 connection cable (0.5 m) Note 3)

Note 3) The temperature control output cable length is 1 m. Also, the connector cable already has the required contact pin and connector assembled.

Specifications

Model	LC7R-K11A☐☐	LC7R-K12A☐☐
Regeneration method	Heat exchange method based on resistance	
Regenerative resistance capacity	40 W	
Regenerative operation voltage	180 V	380 V
Protective circuit	Regenerative voltage input mis-wiring protection Over current protection, Overheating protection (Normally closed, Radiator sensor OFF at 100°C)	
Ambient operating temperature	0 to 40°C	
Connected controller power voltage	100 VAC	200 VAC
External connection method	Connector	
Insulation resistance	500 VDC, 50 MΩ or more	
Mounting	DIN rail mount	

846

SMC

Dimensions

Operation window

52

96
35

Label

97

38
35

22

22

Connector

DIN rail holding plate
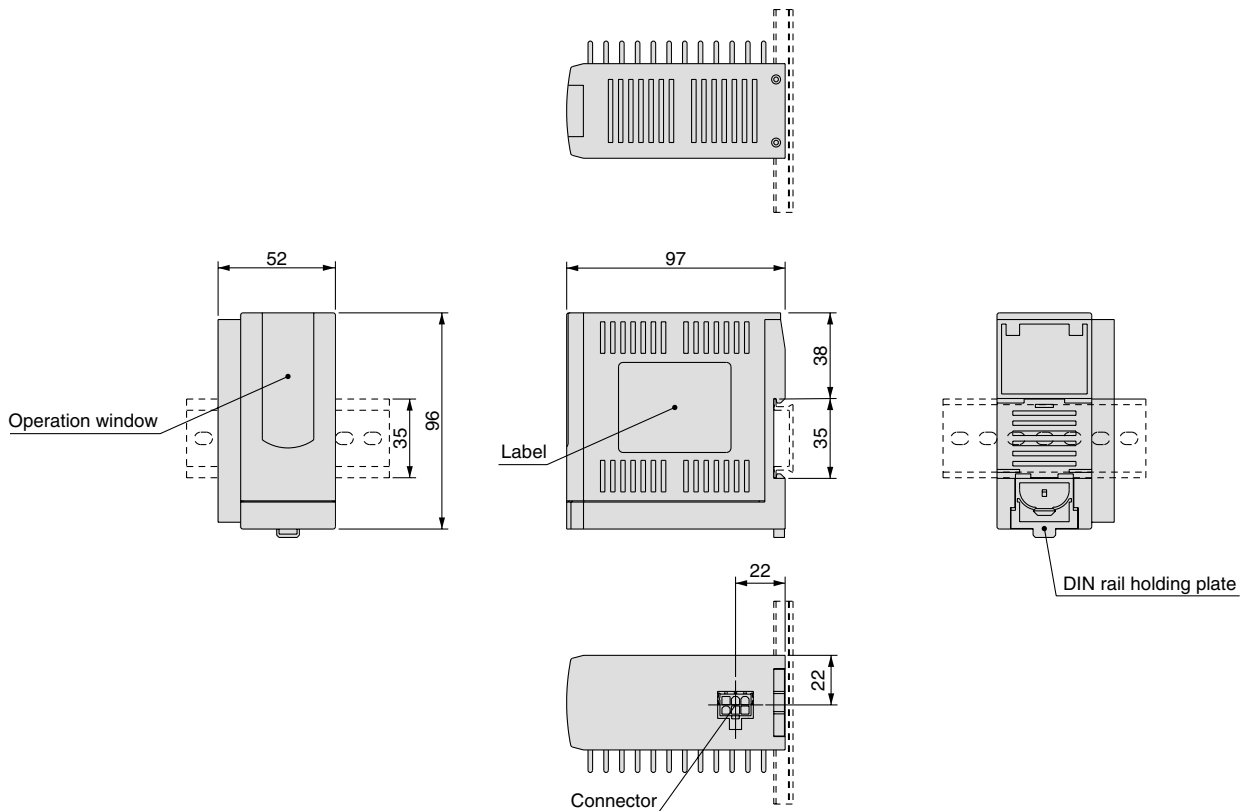
Connection Examples

● Electrical wire

——— Cover O.D.: Max. 3.1 mm (AWG18 to 20) [0.5 m or less]
------- Cover O.D.: Max. 3.1 mm (AWG18 to 24) [1 m or less]

● Temperature control output terminal

Maximum rated voltage: 30 V
Maximum rated current: 6 mA

Controller

Regenerative absorption unit
Regenerative resistance

P 2 +

Regenerative output
+
−

N 3 −

Main circuit

External power supply

Resistor R 24 VDC 5 +

Input

Control equipment (PLC, etc.)

Max. 6 mA

Temperature sensor (NC)

6 −
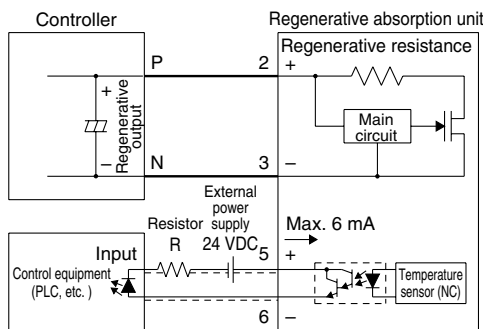
Note) Select 6 mA or less for resistor R after confirming the input capacity of the control equipment.

● Regenerative absorption unit connectors
[Manufacturer: Molex Japan Co., Ltd.]

Description	Part no.	Quantity
Receptacle	5557-06R	1
Female terminal	5556PBTL	6

● Wiring tools [Manufacturer: Molex Japan Co., Ltd.]
Wiring tools should be provided by customer.

Description	Part no.
Crimping tool	57026-5000 (for UL1007) 57027-5000 (for UL1015)
Puller	57031-6000

● Contact pin number

Terminal	Pin no.	Description
Vin (P)	2	Regenerative absorption unit power input (positive)
Vin (N)	3	Regenerative absorption unit power input (negative)
Vout (P)	1	Extended regenerative resistance output (positive)
Vout (N)	4	Extended regenerative resistance output (negative)
ALM (P)	5	Temperature control output terminal (positive)
ALM (N)	6	Temperature control output terminal (negative)

Insertion side

1	2	3
4	5	6
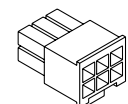
LC7R connection method
LC1 side connctor pin no.

Terminal	Pin no.	Description
N	1	Regenerative absorption unit power output (negative)
P	B	Regenerative absorption unit power output (positive)

• Connector: Molex 5258-02
• Pin: Molex 5167PBTL
• Crimping tool: JHTR2445A

Contact pin (preassembled)

LC1 connector (preassembled) (2P)

LC1 connection cable (0.5 m)

Regenerative absorption unit LC7R-K1□A□□

Temperature control cable (1 m)

Temperature control output (negative)

Temperature control output (positive)

To control equipment, etc.

Regenerative absorption unit connector (6P)

Regenerative absorption unit connector (preassembled)

Series LC1 controller (vertical specification)

Series LC7R

Regenerative Absorption Unit Selection Guide

The graphs show the relationship between speed and distance where the use of a **regenerative absorption unit becomes necessary** for each vertical specification actuator based on the desired work piece load.
When setting a speed and distance that are above the line on the graphs, based on the work piece load for the actuator to be used, be sure to use a regenerative absorption unit.

Note 1) If a graph line for the work piece load (within the actuator's maximum load mass) on the actuator is not found, be sure to refer to the graph line for the heavier work piece load that is closest to the desired load.

Note 2) The use of a regenerative absorption unit is recommended for any operating conditions.

Applicable Controller Power Supply Voltage 100 VAC Specification

Series LJ1H10

LJ1H1021☐H-☐☐☐K (8 mm lead)

∗ When an actuator is operated under conditions that exceed the lines on the graph above, **be sure to use a regenerative absorption unit.**

LJ1H1021☐B-☐☐☐K (12 mm lead)

It is not necessary to mount a regenerative absorption unit when the work piece load, speed, and stroke are within the actuator rating. However, use of a regenerative absorption unit is recommended under all conditions.

Actuator rating

Maximum work piece load: 5 kg
Maximum speed: 600 mm/s
Maximum stroke: 500 mm

Series LJ1H20

LJ1H2021☐F-☐☐☐K (5 mm lead)

∗ When an actuator is operated under conditions that exceed the lines on the graph above, **be sure to use a regenerative absorption unit.**

LJ1H2021☐A-☐☐☐K (10 mm lead)

It is not necessary to mount a regenerative absorption unit when the work piece load, speed, and stroke are within the actuator rating. However, use of a regenerative absorption unit is recommended under all conditions.

Actuator rating

Maximum work piece load: 8 kg
Maximum speed: 500 mm/s
Maximum stroke: 600 mm

Series LJ1H30

LJ1H3031☐A-☐☐☐K (10 mm lead)

∗ When an actuator is operated under conditions that exceed the lines on the graph to the left, **be sure to use a regenerative absorption unit.**

Example)

Actuator: LJ1H3031☐A-☐☐☐K
Work piece load: 9 kg
Speed: 300 mm/s
Stroke: 500 mm

When the above conditions are used, mark a position based on the speed and stroke. (See point A on the graph for series LJ1H30.)
Since point A is above the line for 10 kg, a regenerative absorption unit is required.

⚠ **Danger** Consult SMC if the connected controller power supply voltage is 220 VAC, as this may cause fire or malfunction.

Series LTF

LTF6E1☐☐-☐☐☐K, LTF8F1☐☐-☐☐☐K

∗ Regardless of the operating conditions, always use a regenerative absorption unit.

848

Applicable Controller Power Supply Voltage **200 VAC** Specification

Series LJ1H10

LJ1H1022□H-□□□K (8 mm lead)

* When an actuator is operated under conditions that exceed the lines on the graph above, **be sure to use a regenerative absorption unit.**

LJ1H1022□B-□□□K (12 mm lead)

It is not necessary to mount a regenerative absorption unit when the work piece load, speed, and stroke are within the actuator rating. However, use of a regenerative absorption unit is recommended under all conditions.

Actuator rating

Maximum work piece load: 5 kg
Maximum speed: 600 mm/s
Maximum stroke: 500 mm

Series LJ1H20

LJ1H2022□F-□□□K (5 mm lead)

* When an actuator is operated under conditions that exceed the lines on the graph above, **be sure to use a regenerative absorption unit.**

LJ1H2022□A-□□□K (10 mm lead)

* When an actuator is operated under conditions that exceed the lines on the graph above, **be sure to use a regenerative absorption unit.**

Series LJ1H30

LJ1H3032□A-□□□K (10 mm lead)

* When an actuator is operated with conditions that exceed the lines on the graph to the left, **be sure to use a regenerative absorption unit.**

Example)

Actuator: LJ1H3032□A-□□□K
Work piece load: 17 kg
Speed: 400 mm/s
Stroke: 100 mm

When the above conditions are used, mark a position based on the speed and stroke. (See point A on the graph for Series LJ1H30.)
Since point A is above the line for 18 kg, a regenerative absorption unit is required.
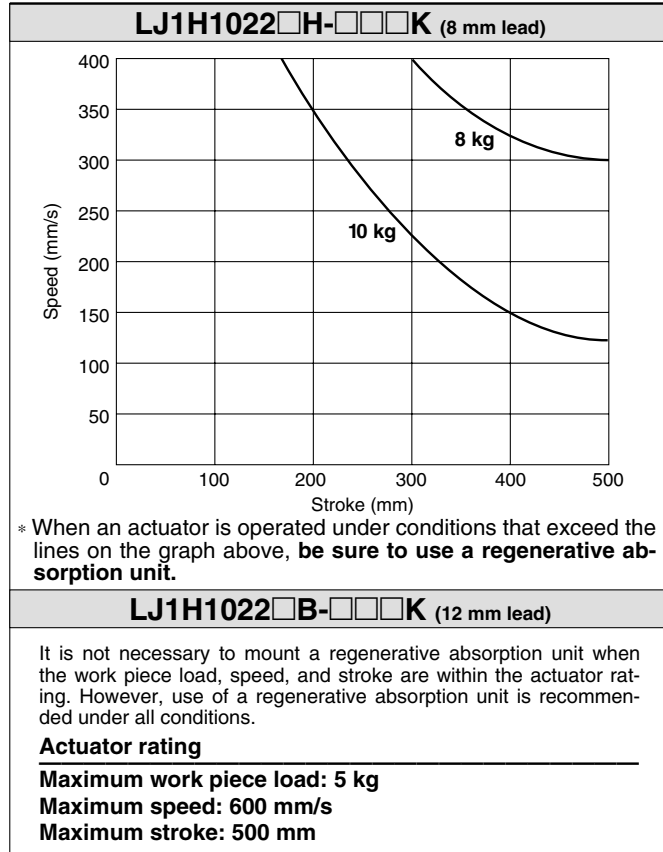
⚠ **Danger** Consult SMC if the connected controller power supply voltage is 220 VAC, as this may cause fire or malfunction.
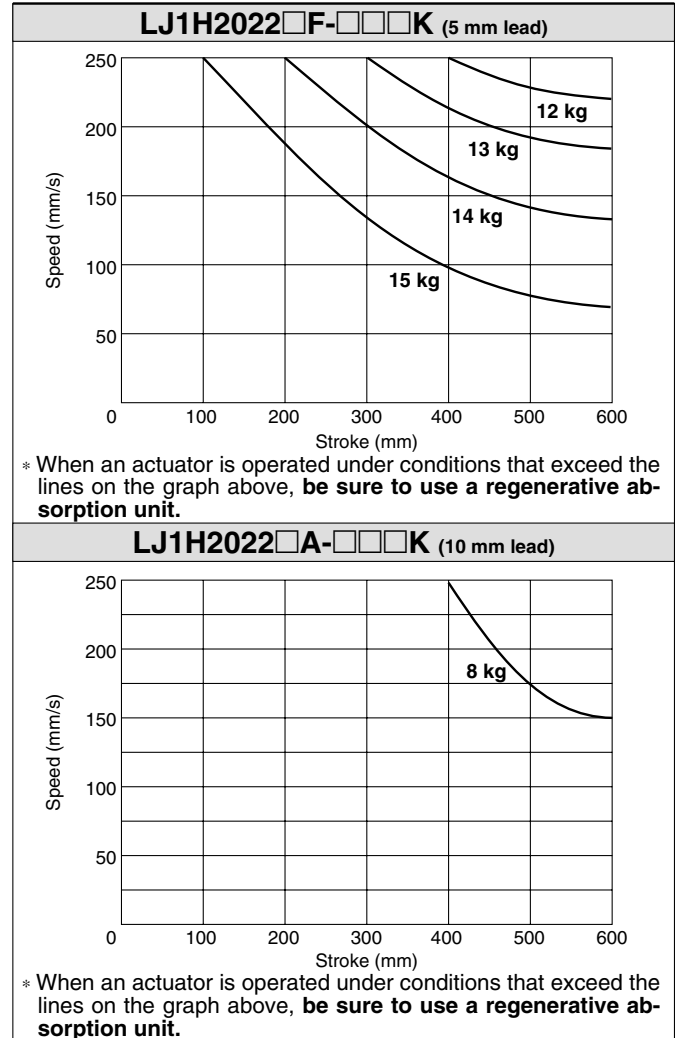
Series LTF

LTF6E2□□-□□□K, LTF8F2□□-□□□K

* Regardless of the operating conditions, always use a regenerative absorption unit.

Side navigation:
LJ1
LG1
LTF
LC1
LC7
LC8
LXF
LXP
LXS
LC6□
LZ□
LC3F2
X□
D-□
E-MY

849

Series *LC1*
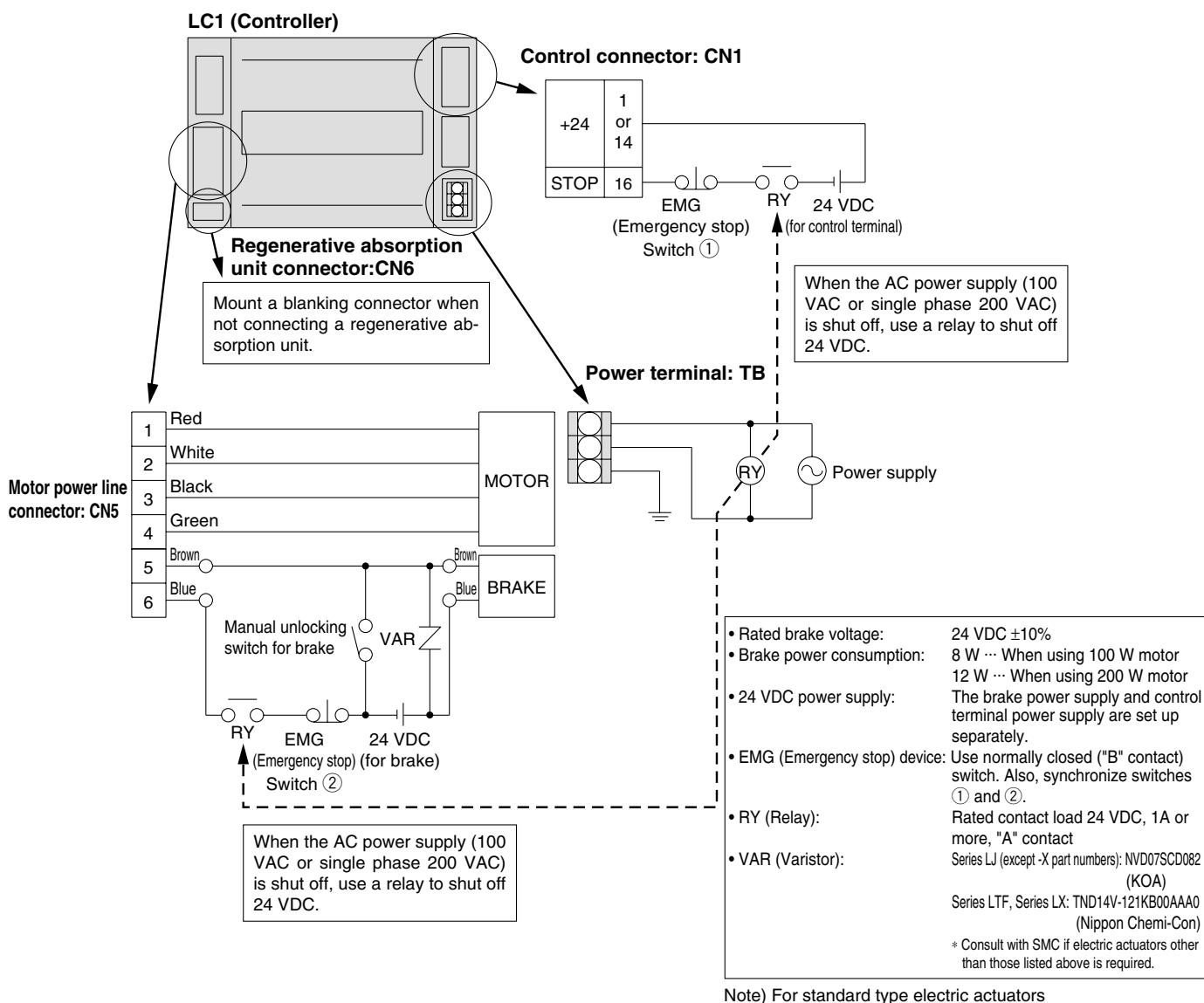
Brake Wiring Example

A wiring example for controller (Series LC1) connectors and a brake is shown below. The brake is in a de-energized condition and locked. 24 VDC is required to unlock it. The brake terminal is located in the motor power line connector (CN5), and it is connected to the relay switch inside the controller. By connecting the wiring to this terminal, turning on and off of the brake is controlled by the controller. (The brake does not have polarity.)

LC1 (Controller)

Control connector: CN1

+24	1 or 14
STOP	16

EMG (Emergency stop) Switch ①
RY 24 VDC (for control terminal)

When the AC power supply (100 VAC or single phase 200 VAC) is shut off, use a relay to shut off 24 VDC.

Regenerative absorption unit connector: CN6

Mount a blanking connector when not connecting a regenerative absorption unit.

Power terminal: TB

Motor power line connector: CN5

1	Red
2	White
3	Black
4	Green
5	Brown
6	Blue

MOTOR

RY   Power supply

BRAKE

Brown
Blue

Manual unlocking switch for brake   VAR

RY   EMG (Emergency stop) (for brake) Switch ②   24 VDC

When the AC power supply (100 VAC or single phase 200 VAC) is shut off, use a relay to shut off 24 VDC.

• Rated brake voltage:	24 VDC ±10%
• Brake power consumption:	8 W ··· When using 100 W motor
	12 W ··· When using 200 W motor
• 24 VDC power supply:	The brake power supply and control terminal power supply are set up separately.
• EMG (Emergency stop) device:	Use normally closed ("B" contact) switch. Also, synchronize switches ① and ②.
• RY (Relay):	Rated contact load 24 VDC, 1A or more, "A" contact
• VAR (Varistor):	Series LJ (except -X part numbers): NVD07SCD082 (KOA)
	Series LTF, Series LX: TND14V-121KB00AAA0 (Nippon Chemi-Con)
	∗ Consult with SMC if electric actuators other than those listed above is required.

Note) For standard type electric actuators

⚠Danger

1. When not connecting a regenerative absorption unit, use a blanking plate to cover CN6, as there is a danger of electrocution or injury.

2. The manual brake unlocking switch unlocks the brake during maintenance or an emergency. Mount the switch when it is necessary for maintenance, etc. Be sure to turn the switch off for purposes other than maintenance, etc. The brake will not operate with the switch on.

3. If the manual brake unlocking switch is not mounted, the brake cannot be unlocked for an emergency.
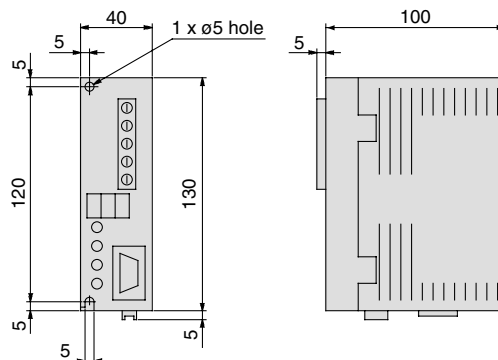
⚠Caution

1. A regenerative absorption unit is required depending on actuator operating conditions. Read the instruction manual for the regenerative absorption unit when one is connected.

⊜SMC

Non-standard Motor Compatible Drivers

Mitsubishi Electric Corporation Drivers for LJ1, LG1, LX

Dimensions (RS-232C without optional unit)

Driver

Driver dimensions For LJ1, LG1, LX

Driver model
MR-C10A
MR-C20A
MR-C10A1
MR-C20A1

Driver input/output signal list (CN-1/F connector)

Pin no.	Symbol	Signal description	Pin no.	Symbol	Signal description
1	V+	Digital output power supply	11	SD	Shield
2	ALM	Failure	12	SG	Interface power supply common
3	PF	Positioning complete	13	CR	Clear
4	OP	Z phase pulse	14	LSN	Reverse stroke end
5	SG	Interface power supply common	15	LSP	Normal stroke end
7	NP	Reverse pulse line	16	V5	Interface power supply
8	NG	Reverse pulse line	17	SON	Servo ON
9	PP	Normal pulse line	19	OPC	Open collector power supply
10	PG	Normal pulse line	20	V24	Interface power supply

LJ1
LG1
LTF
LC1
LC7
LC8
LXF
LXP
LXS
LC6☐
LZ☐
LC3F2
X☐
D-☐
E-MY