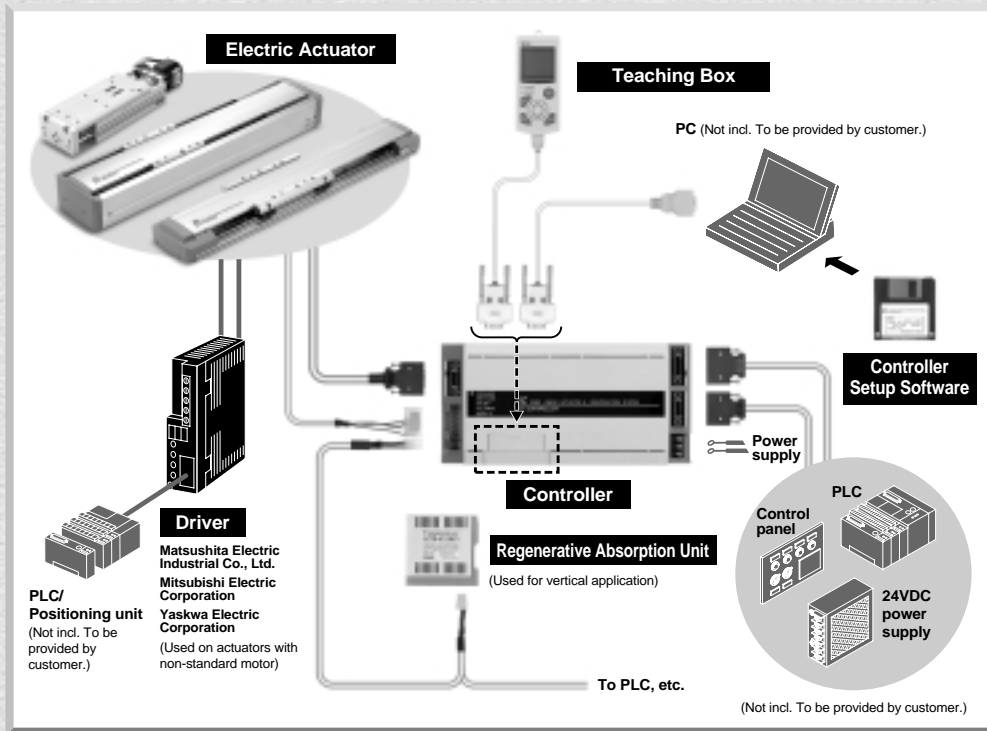




Dedicated Controller Series LC1

Dedicated Controller for Standard AC Servomotor



■ Dedicated Controller/LC1	_____	Page 186
• Controller setup software	_____	194
• Dedicated teaching box	_____	196
■ Options	_____	199
■ Dedicated Regenerative Absorption Unit/LC7R	_____	200
■ Non-standard Motor Compatible Drivers	_____	205

LC1
LG1
LC1
LX
LC6D/LC6C
Switches

Series LJ1/LG1: Standard Motor Compatible

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

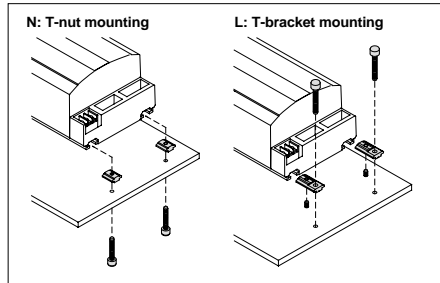
Applicable actuators

Symbol	Motor capacity	Compatible actuator models	
1H	50W	LJ1H101□□B	Ball screw High rigidity direct acting guide Without brake
2H	100W	LJ1H202□□A LJ1H202□□C	
3H	200W	LJ1H303□□D	
1S	50W	LJ1S101□□SC	Slide screw Slider guide
2S	100W	LJ1S202□□SC	
3S	200W	LJ1S303□□SC	
1M	50W	LJ1H101□□SC	Slide screw High rigidity direct acting guide
2M	100W	LJ1H202□□SC	
3M	200W	LJ1H303□□SE	
1VH ^(*)	100W	LJ1H102□□H-□□□□K	Ball screw High rigidity direct acting guide With brake
1VB ^(*)	100W	LJ1H102□□B-□□□□K	
2VF ^(*)	100W	LJ1H202□□F-□□□□K	
2VA ^(*)	100W	LJ1H202□□A-□□□□K	
3VA ^(*)	200W	LJ1H303□□A-□□□□K	
2HA	100W	LG1H□□2□PA LG1H□□2□NA	Ball screw High rigidity direct acting guide Thread lead 10mm
2HC	100W	LG1H□□2□PC LG1H□□2□NC	Ball screw High rigidity direct acting guide Thread lead 20mm
2MC	100W	LG1H□□2□SC	Slide screw High rigidity direct acting guide Thread lead 20mm

Mounting bracket

3	M3
5	M5

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 199.)

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

[LC1-1-S1 PC-98 (MS-DOS)
 LC1-1-W1 (Windows 95 Japanese)
 LC1-1-W2 (Windows 95 English)
 and
 LC1-1-R□□ (dedicated communication cable)]
 (Refer to pages 194, 195, and 199.)

or

LC1-1-T1-□□ (Teaching box) are required.
 For ordering information, refer to the option part numbers on page 196.

Power supply

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

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

Performance/Specifications

General specifications

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

Actuator control

Item	Model	LC1-1B1H□	LC1-1B2H□	LC1-1B3H□	LC1-1B1M□	LC1-1B2M□	LC1-1B3M□	LC1-1B1V□	LC1-1B2V□	LC1-1B3V□	LC1-1B1S□	LC1-1B2S□	LC1-1B3S□	LC1-1D2H□	LC1-1D2M□	LC1-1F2H□	LC1-1F2M□	
Compatible actuator model		LJ1H101 □PB □NB	LJ1H202 □PA □NA	LJ1H303 □PD □ND	LJ1H101 □SC	LJ1H202 □SC	LJ1H303 □SE	LJ1H102 □□□ □□□K	LJ1H202 □□□ □□□K	LJ1H303 □□□ □□□K	LJ1S101 □SC	LJ1S202 □SC	LJ1S303 □SC	LG1H212 □P□ □N□	LG1H212 □SC	LG1H202 □P□ LG1H202 □SC	LG1H202 □SC	
Compatible guide		High rigidity direct acting guide									Slider guide			High rigidity direct acting guide				
Motor capacity		50W	100W	200W	50W	100W	200W	100W	200W	50W	100W	200W					100W	
Operating temperature range		5 to 50°C		5 to 40°C		5 to 50°C		5 to 40°C		5 to 50°C		5 to 40°C				5 to 50°C		
Electric power		180VA	300VA	640VA	180VA	300VA	640VA	300VA	640VA	180VA	300VA	640VA					300VA	
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		0.00mm to 4000.00mm ^{Note)}																
Speed designation range		1mm/s to 2500mm/s ^{Note)}																
Acceleration/deceleration designation range		Trapezoidal acceleration/deceleration 1mm/s ² to 9800mm/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-S1, 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, 24VDC, 5mA
General purpose output	6 outputs, Open collector output, 35VDC max., 80mA/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 out

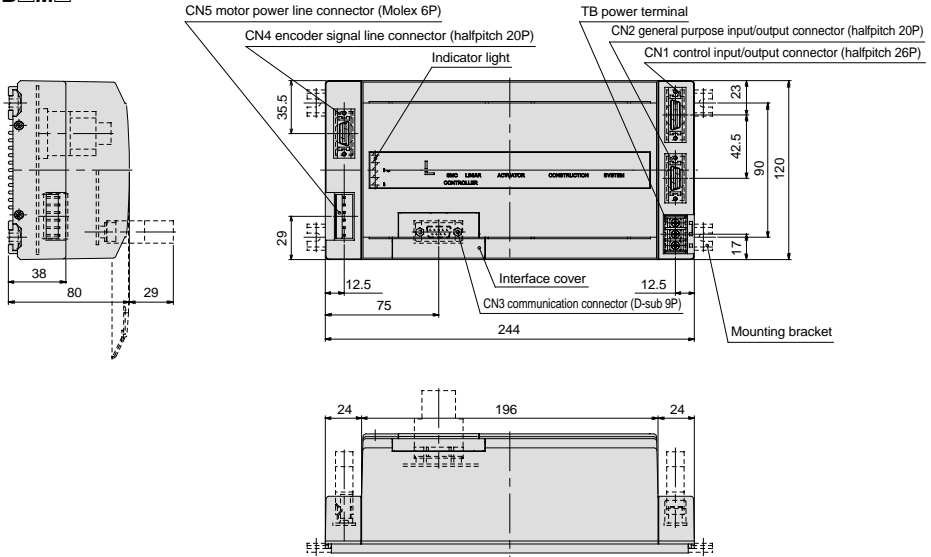
Series LC1

Dimensions

LC1-1B□H□ □ LC1-1D2H□□ □ LC1-1F2H□□ □

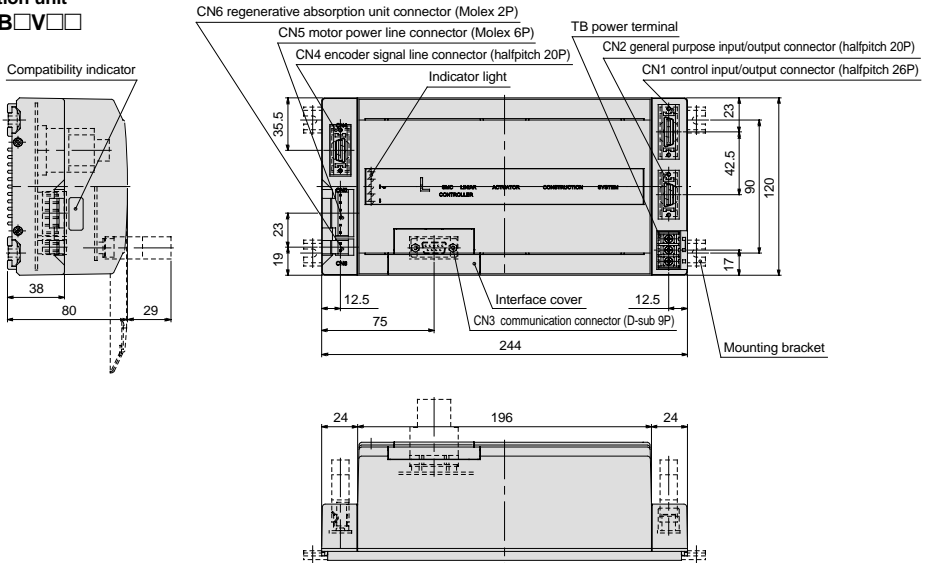
LC1-1B□S□ □ LC1-1D2MC□ □ LC1-1F2MC□ □

LC1-1B□M□ □



With regenerative absorption unit

LC1-1B□V□□ □



Series LX: AC Servomotor compatible

How to Order

LC1-1 B1V D 1 N 3 200 X180

Number of axes

1	1 axis
---	--------

Ball screw lead

C	2mm
D	5mm

Power supply

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

Actuator classification

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

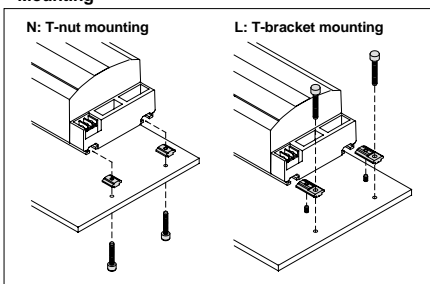
Stroke

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

Mounting bracket

3	M3
5	M5

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 199.)

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

(LC1-1-S1 PC-98 (MS-DOS)
 LC1-1-W1 (Windows 95 Japanese)
 LC1-1-W2 (Windows 95 English))
 and
 LC1-1-R□□ (dedicated communication cable)
 (Refer to pages 194, 195, and 199.)

or

LC1-1-T1-□□ (Teaching box) are required.

For ordering information, refer to the option part numbers on page 196.

LC1

LC1

LC1

LX

LC6D/LC6C
Switches

Series LC1

Performance/Specifications

General specifications

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

Actuator control

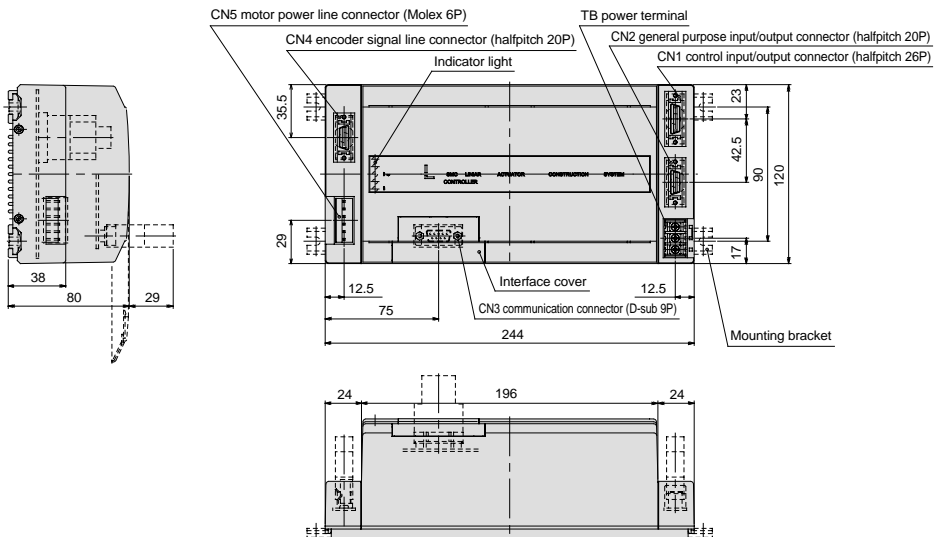
Item	Model LC1-1B1V□□□□□□-X180	Model LC1-1B1V□□□□□□-X233	Model LC1-1B1V□□□□□□-X180	Model LC1-1B1V□□□□□□-X233
Compatible actuator	LXSAB□□□□□□□□□□-X12	LXPAB□□□□□□□□□□-X12	LXSAB□□□□□□□□□□-X13	LXPAB□□□□□□□□□□-X13
Compatible guide	High rigidity direct acting guide	Guide rod	High rigidity direct acting guide	Guide rod
Motor capacity	30W			
Operating temperature range	5 to 5°C			
Electric power	180VA			
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	0.00mm to 4000.00mm <small>Note)</small>			
Speed designation range	1mm/s to 2500mm/s <small>Note)</small>			
Acceleration/deceleration designation range	Trapezoidal acceleration/deceleration 1mm/s ² to 9800mm/s ² <small>Note)</small>			

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



Controller Mounting

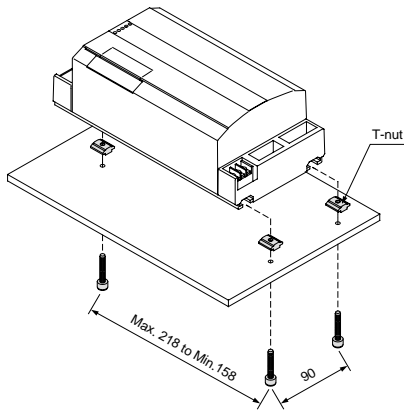
Mounting of the controller is performed by means of the two T-grooves provided on the bottom surface.

Mounting is possible from above or below using the special T-nuts or T-brackets. Refer to page 199 for further details.

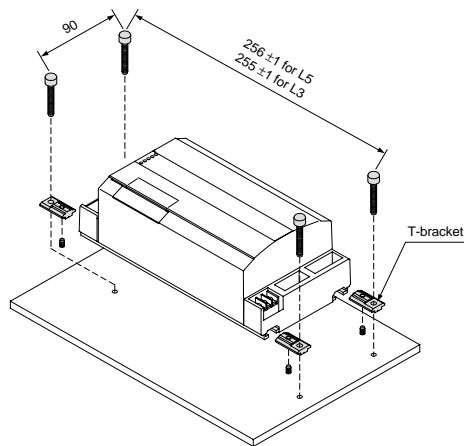
Note) This controller comes with either the T-nuts or T-brackets as accessories.

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

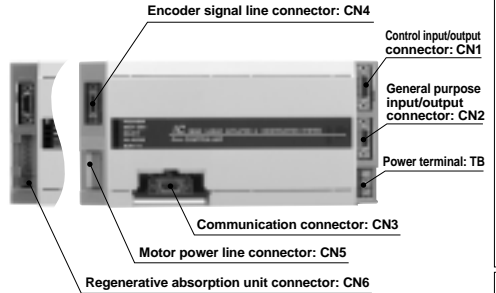
Mounting with T-nuts



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

LJ1

LG1

LC1

LX

LC6D/LC6C

Switches

Connection Examples

Control Input/Output Terminal: CN1

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

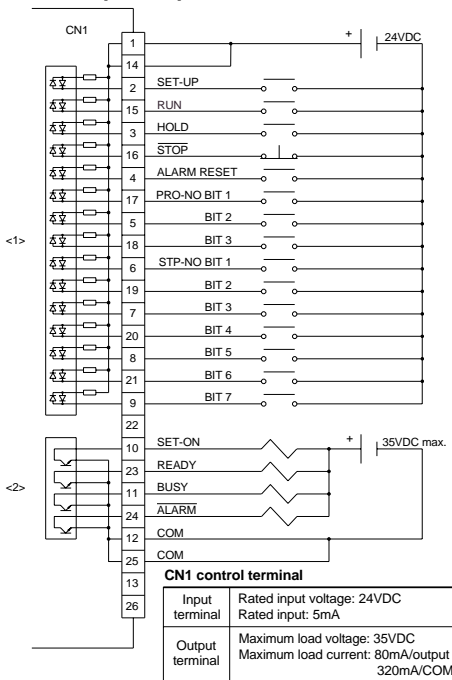
CN1. Control input terminal list

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. bit3	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.		

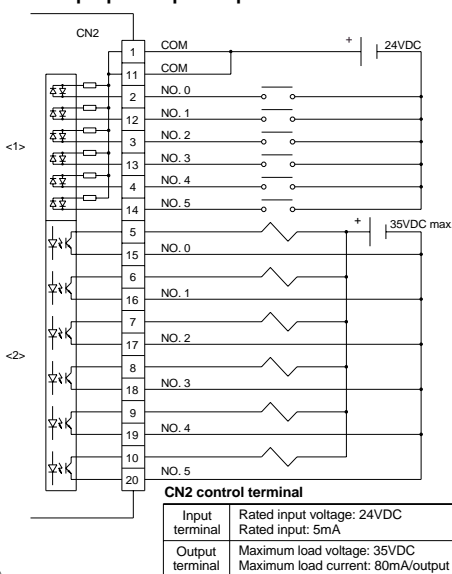
CN1. Control output terminal list

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

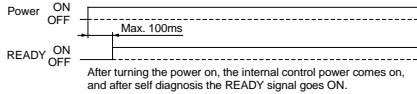


General purpose input/output terminal: CN2

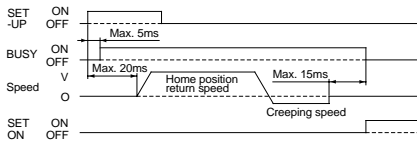


Control Method/Timing

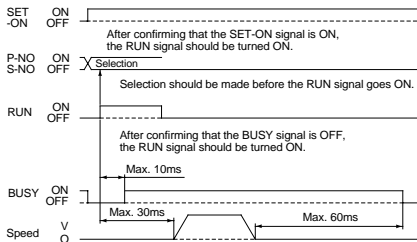
Timing for READY signal generation immediately after turning on power



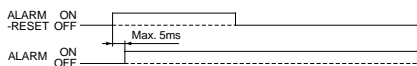
Timing for home position return



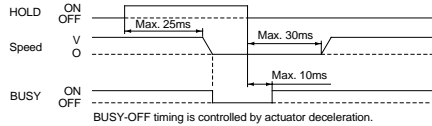
Timing for program/step execution



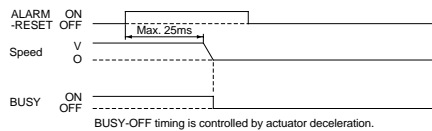
Timing for alarm reset



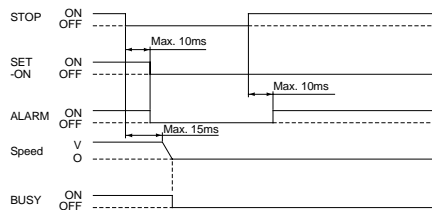
Timing for temporary stop during operation



Timing for stop by ALARM-RESET during operation



Timing for emergency stop during operation



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 50ms or longer.

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

LJ1

LG1

LC1

LX

LC6D/LC6C

Switches

Windows/LC1-1-W2 (English)

Windows edition controller setup software includes all of the functions of PC-98 (MS-DOS) edition software, and the following functions have also been added.

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

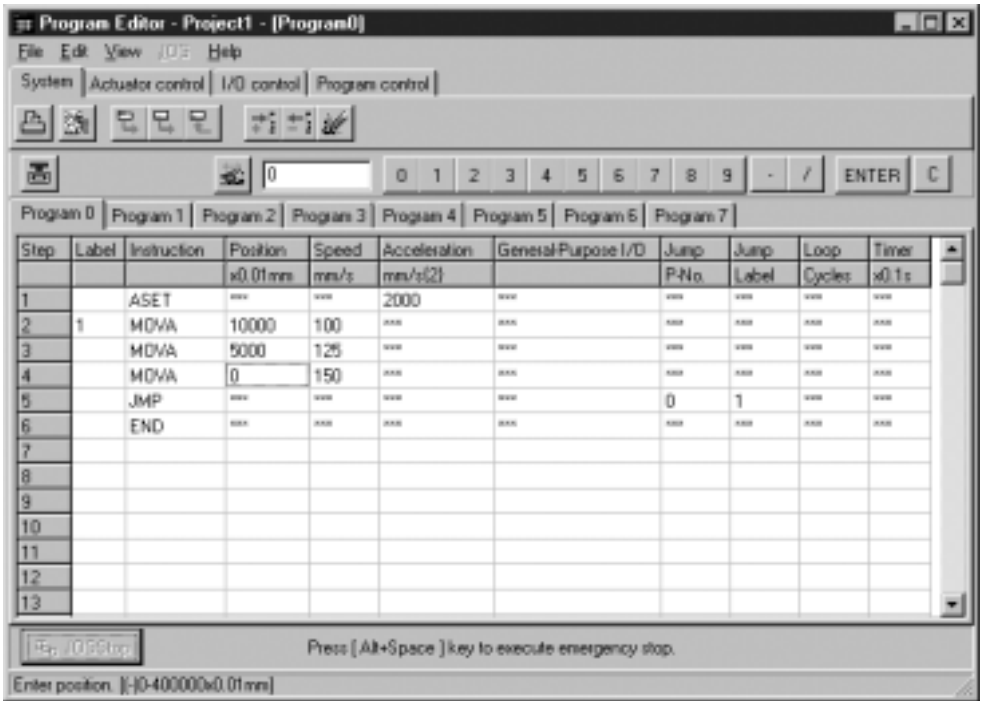
Operating environment

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

- The dedicated communications cable (LC1-1-R□□□) is required when using this software.
- This software cannot be used with Windows 3.1.



Windows/LC1-1-W2 (English)



Screen example

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LJ1

LG1

LC1

LX

LC6D/LC6C

Switches



How to Order

LC1—1—T1—0 **2**

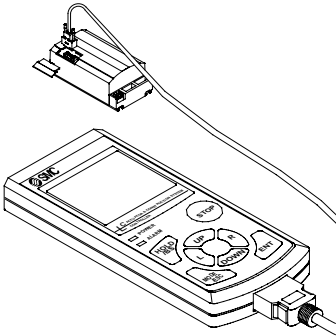
• Cable length

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

- 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 5m)



Performance/Specifications

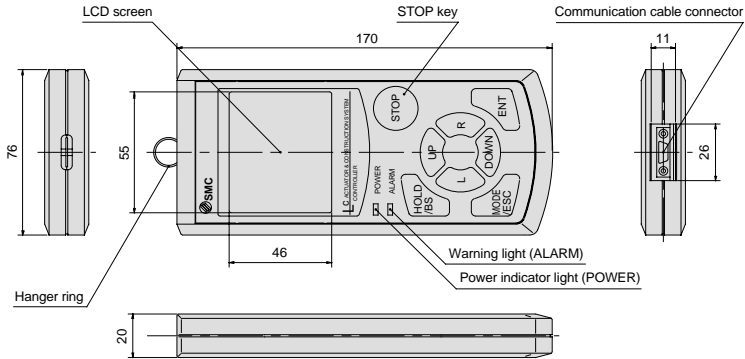
General specifications

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

Basic performance

Performance/Specifications	
Compatible controller	LC1 (all models)
Operating temperature range	5 to 50°C
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 out, Abnormal driver parameter, RAM malfunction
Protection function indicator	Alarm code

Dimensions



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 MOV1, 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, MOV1, 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.

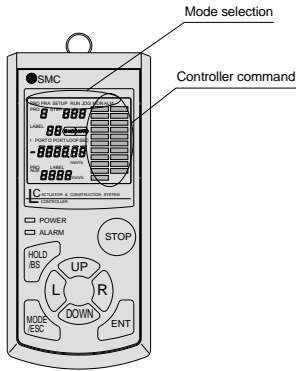
* Explanation of "Reset" symbols above:

○: Can be reset by the alarm reset.

●: Turning OFF the controller power is required for resetting.

Series LC1

Key Arrangement and Functions



	Mode	Display	Function
	Main modes	Programming mode	PRO
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 valve 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 valve 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.

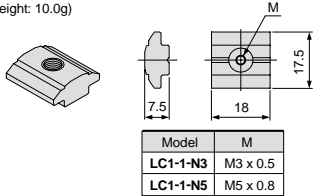
T-nuts and T-brackets for Mounting

Be sure to use when mounting the controller.

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

T-nuts

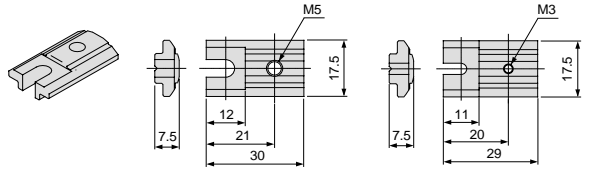
(Weight: 10.0g)



T-brackets

Model **LC1-1-L5** (Weight: 16.0g)

Model **LC1-1-L3** (Weight: 15.5g)

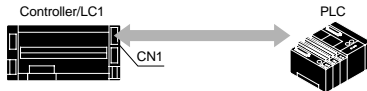


Controller Connectors

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 connector (CN1: Control input/output)

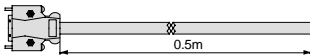
Model **LC1-1-1000**



10326-52A0-008
Halfpitch hood (26P)
Sumitomo/3M Limited
10126-3000VE
Halfpitch plug (26P)
Sumitomo/3M Limited

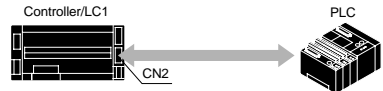
Single side wired controller connector (CN1: Control input/output)

Model **LC1-1-1050**



Cable is connected to LC1-1-1000.

CN2 (General purpose input/output)



Controller connector (CN2: General purpose input/output)

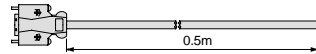
Model **LC1-1-2000**



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 **LC1-1-2050**



Cable is connected to LC1-1-2000.

Dedicated Communication Cables

These are cables used to connect controllers and PCs.

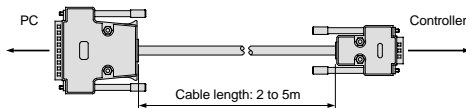
Note) Be aware of the configuration of the connector on the PC when selecting a dedicated communication cable..



Dedicated communication cable (D-sub) (For NEC PC-98 Series)

Model **LC1-1-R□D**

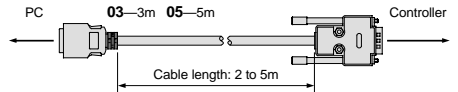
● Cable length
02—2m 04—4m
03—3m 05—5m



Dedicated communication cable (halfpitch) (For NEC PC-98 Series)

Model **LC1-1-R□H**

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



* PC-98 Series is a registered trade mark of NEC Corporation.

Dedicated communication cable (IBM PC/AT compatible computer)

Model **LC1-1-R□C**

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

