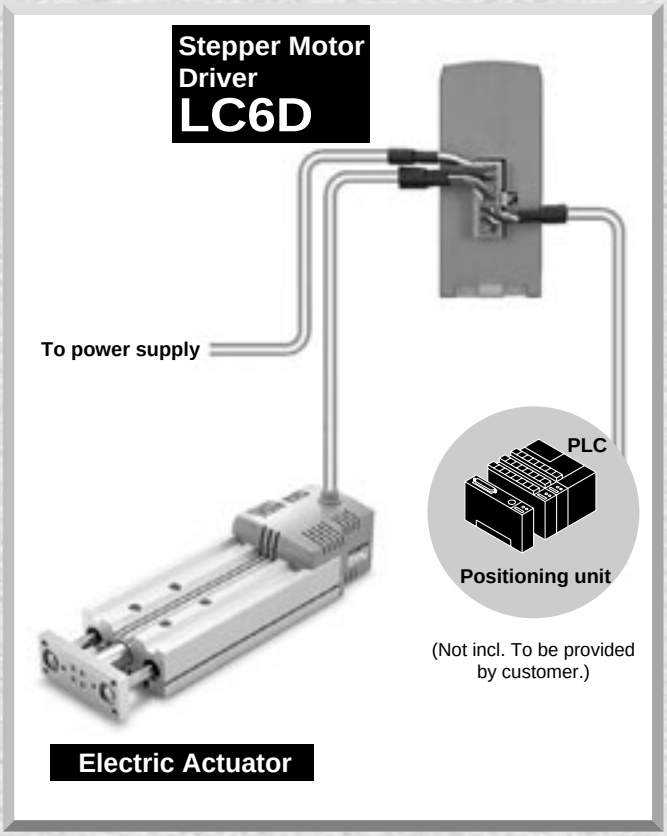
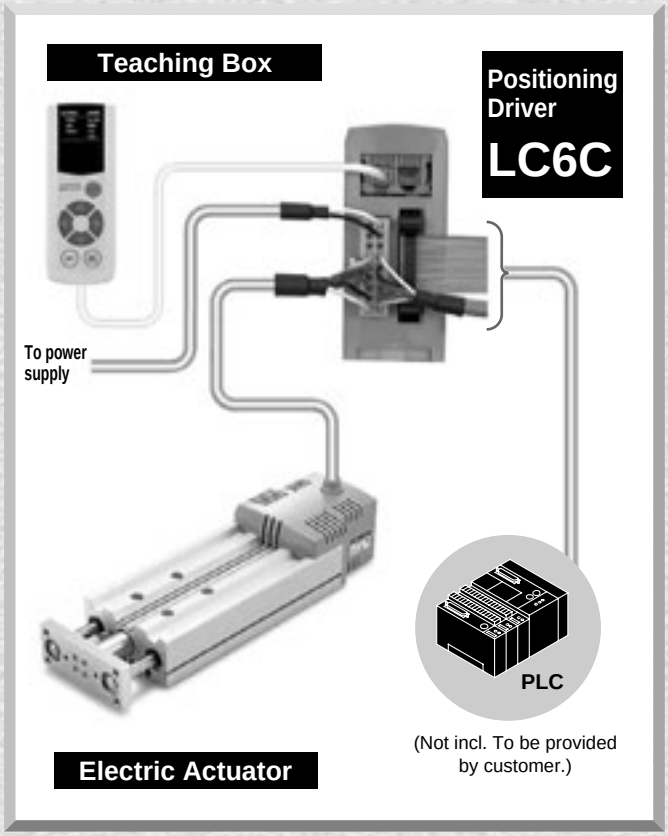
Series LC6D

Series LC6C

Series LX Dedicated
Stepper Motor Driver and Positioning Driver

Series LC6D/LC6C



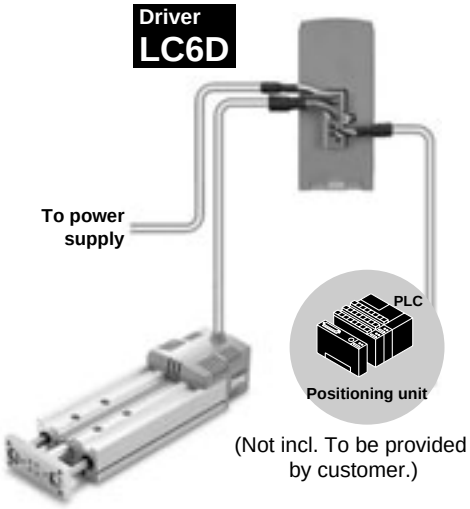


■ Stepper Motor Driver/LC6D ——— P.964
■ Positioning Driver/LC6C ——— P.967
• LC6C dedicated teaching box ——— P.971
■ Options ——— P.973

Series LX Dedicated Stepper Motor Driver

Series LC6D

- **Can be mounted on a DIN rail**
- **Driver position controlled by pulse signal**
- **Can be controlled by a general positioning unit or controller**



(Not incl. To be provided by customer.)

Electric Actuator

CE marking

1. **The combination of Series LC6D and Series LX has been certified for CE marking.**
   When using Series LX with CE marking, use it in combination with Series LC6D with CE marking.
2. **The combination of Series LC6D and Series LX has been certified for EMC conformity.**
   EMC changes depending on the customer's control panel configuration, and the relationship between other electrical equipment and wiring. Therefore, conformity cannot be certified for the customer's equipment in the actual operating environment. As a result, it is necessary for the customer to verify final EMC conformity for the machinery and equipment as a whole.

⚠Caution

Maximum speeds of actuators vary depending on the type. Observe the maximum speed of the actuator in use.

How to Order

LC 6 D − 220 A D − □

Applicable motor

6	Stepper motor

Function

D	Driver function only

Motor type

220	2 phase motor (2.0 A/phase)
507	5 phase motor (0.75 A/phase)

Input/Output type

A	Photo coupler input/output

Driver power supply

D	24 VDC

CE marking/Input method

Nil	Standard	2 pulse input method
Q	CE marking	
P1-X316	CE marking	1 pulse input method

Applicable Actuators

Driver model	Applicable actuator		Motor type
LC6D-220AD-□	Guide rod type	LXPB2	2 phase stepper motor
	High rigidity slide table type	LXSH2	
LC6D-507AD-□	Low profile slide table type	LXFH5	5 phase stepper motor
	High rigidity slide table type	LXSH5	
	Guide rod type	LXPB5	

Specifications

Part no.	**LC6D-220AD-□**	**LC6D-507AD-□**
Power supply	24 VDC ±10%, 3 A	24 VDC ±10%, 2.5 A
Energization (Step angle °)	Full step (1.8°) Half step (0.9°)	Full step (0.72°) Half step (0.36°)
Motor current	2.0 A/phase	0.75 A/phase
Input signal	Photo coupler input (Input impedance 330 Ω)	
Maximum input frequency	10 kHz for full step 20 kHz for half step	
Function	Auto current down, Power down input	
Connection method	Connector	
Ambient temperature	5° to 40°C	
Ambient humidity	35 to 85% (No condensation)	
Accessories	Connectors: LC6-1-C1 (Receptacle, female terminal) Cable should be arranged by customer.	

Pulse input signal method

Part no.	Input signal method
LC6D-□□□AD **LC6D-□□□AD-Q**	2 pulse input method
LC6D-□□□AD-P1-X316	1 pulse input method

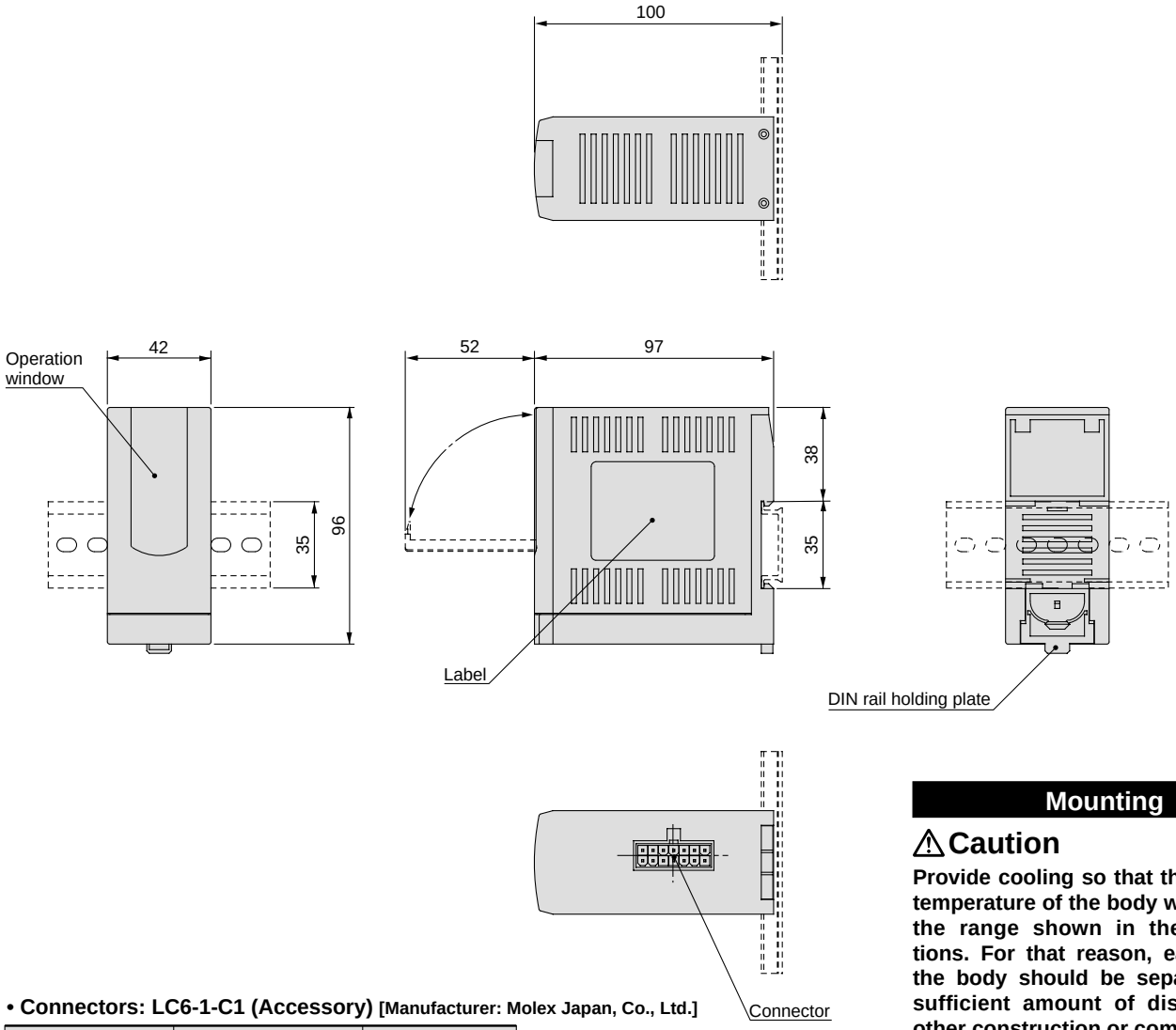
Pulse Signals

LC6D positioning is controlled by the number of pulse signal inputs to the CW(CK) and CCW(U/D) terminals, and speed is controlled by pulse frequencies.

- Calculation for speed and pulse frequencies
  Pulse frequency [pps] = (Speed [mm/s]/Lead [mm]) x Divisions per rotation
- Calculation for moving distance and pulse numbers
  Pulse numbers = (Moving distance [mm]/Lead [mm]) x Divisions per rotation
- The divisions per rotation are as shown in the table below.

Driver	Energization type	Divisions per rotation
LC6D-220AD-□	Full step	200
	Half step	400
LC6D-507AD-□	Full step	500
	Half step	1000

Dimensions



- **Connectors: LC6-1-C1 (Accessory)** **[Manufacturer: Molex Japan, Co., Ltd.]**

Description	Part no.	Quantity
Receptacle	5557-14R	1
Female terminal	5556PBTL	14

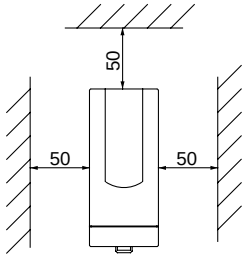
- **Wiring tools** **[Manufacturer: Molex Japan Co., Ltd.]**
  Wiring tools should be arranged by the customer.

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

Mounting

⚠Caution

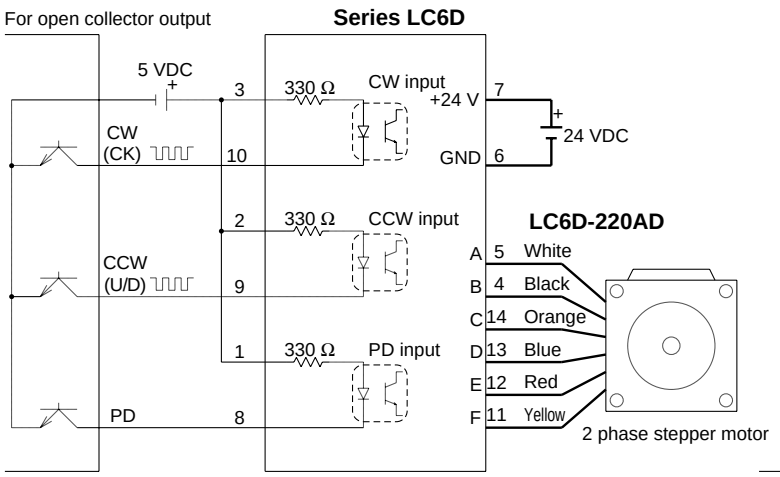
Provide cooling so that the operating temperature of the body will be within the range shown in the specifications. For that reason, each face of the body should be separated by a sufficient amount of distance from other construction or components.



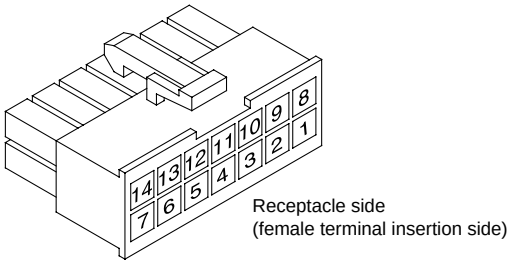
Connection Examples

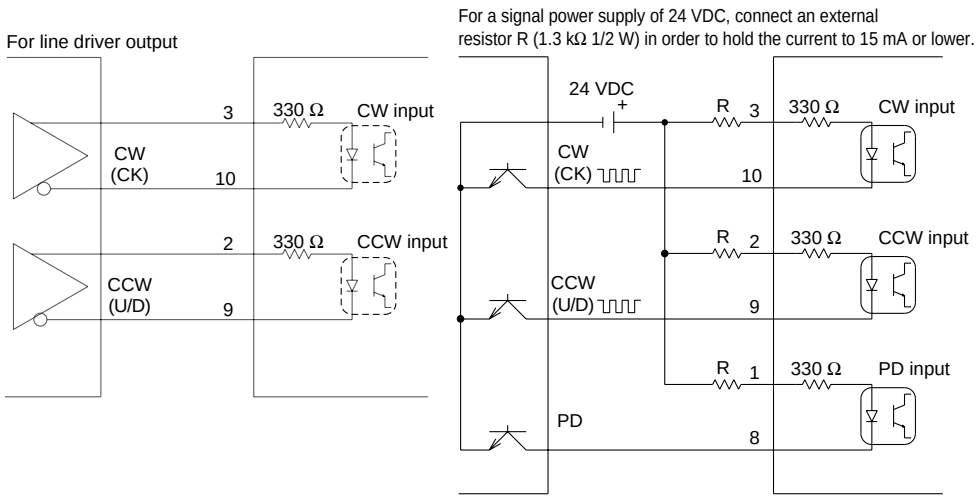
● Electrical wires

0.5 mm² or larger (AWG18 to 20)
0.2 mm² or larger (shielding wire) (AWG18 to 24)



● Wiring numbers



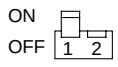


Signal description	Function	Pin no.
+24 V	Driver power supply +24 V	7
GND	Driver power supply GND	6
CW+	CW pulse input terminal (+) (LC6D-□AD/-Q)	3
CK+	CK pulse input terminal (+) (LC6D-□AD-P1-X316)	
CW–	CW pulse input terminal (–) (LC6D-□AD/-Q)	10
CK–	CK pulse input terminal (–) (LC6D-□AD-P1-X316)	
CCW+	CCW pulse input terminal (+) (LC6D-□AD/-Q)	2
U/D+	U/D direction input terminal (+) (LC6D-□AD-P1-X316)	
CCW–	CCW pulse input terminal (–) (LC6D-□AD/-Q)	9
U/D–	U/D direction input terminal (–) (LC6D□AD-P1-X316)	
PD+	Power down input terminal (+)	1
PD–	Power down input terminal (–)	8
A	Motor drive output A	5
B	Motor drive output B	4
C	Motor drive output C	14
D	Motor drive output D	13
E	Motor drive output E	12
F	Motor drive output F (LC6D-220AD-□ only)	11

Functions

● Function change-over switch

Use the function change-over switch to set each function.
It is set as follows when shipped.



1. ON ····· Energization type: Half step
2. OFF ··· Auto current down function

	ON	OFF
1	Half step	Full step
2	Release	Set

● Input signal terminal

- **CW pulse input terminal (LC6D-□□□AD, LC6D-□□□AD-Q)**
  By applying the pulse input, the actuator moves from the motor side to the end side.
- **CCW pulse input terminal (LC6D-□□□AD, LC6D-□□□AD-Q)**
  By applying the pulse input, the actuator moves from the end side to the motor side.
- **CK pulse input terminal (LC6D-□□□AD-P1-X316)**
  By applying the pulse input, the actuator moves.
- **UD direction input terminal (LC6D-□□□AD-P1-X316)**
  By switching ON/OFF, the movement direction of the actuator changes.
- **Power down input terminal**
  By applying the "H" level input, the motor current is shut off and the motor becomes de-energized.

● Functions

- **Auto current down**
  This is a function that reduces the motor current to half when the motor stops. This will prevent the motor and driver from generating heat.
  Although auto current down causes the holding torque to be reduced when the motor stops, the holding torque that supports the actuator transfer load is maintained.
- **Power down**
  This function shuts off the motor current and de-energizes the motor. Use this function to release the electric actuator for maintenance, etc.

Series LX Dedicated Positioning driver

Series LC6C

- **Built-in position control function added to LC6D**
- **Up to 28 patterns of movement data can be set.**
- **Point movement can be easily achieved with a PLC, etc.**
- **Compatible with Series LX two phase stepper motor**

How to Order

LC 6 C – 220 A D

Applicable motor

6	Stepper motor

Function

C	Position control/Driver

Motor type

220	2 phase motor (2 A/phase)

Input/Output type

A	Photo coupler input

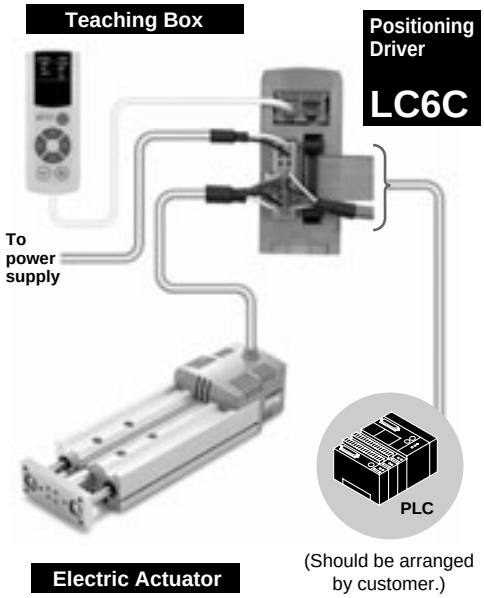
Power supply

D	24 VDC

Applicable Actuators

Driver	Applicable actuator		Motor type
LC6C-220AD	Guide rod type	LXPB2	2 phase stepper motor
	High rigidity slide table type	LXSH2	

∗ Select a 3 wire NPN type when using an auto switch.

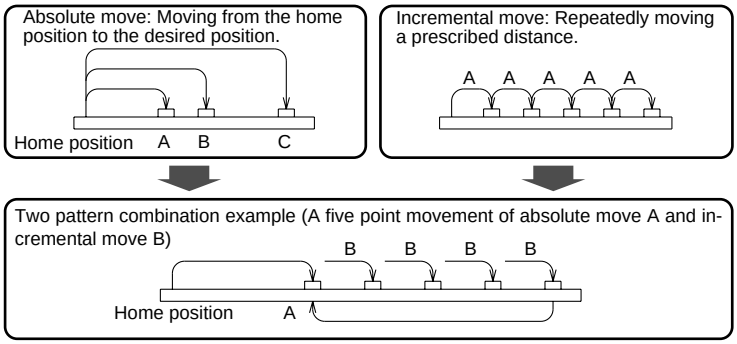


(Should be arranged by customer.)

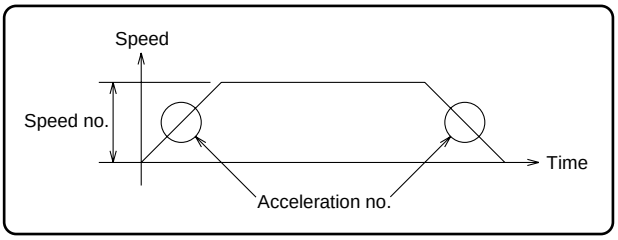
Specifications

Part no.	LC6C-220AD
Power supply	24 VDC ±10%, Max. 3.0 A
Number of position settings	28 patterns
Position setting method	Setting with dedicated teaching box (LC5-1-T1-02)
Position control method	Absolute and incremental moves Speed: 6 to 200 mm/s (with lead screw lead of 12 mm)
Input signal capacity	Photo coupler input 24 VDC, Max. 6 mA
Output signal capacity	Photo coupler output Max. 30 VDC or less, Max. 20 mA
Parameter setting	Position data setting, Speed/Acceleration setting, etc.
Indication LED	Power supply LED (Green), Alarm LED (Red)
Operating temperature	5° to 40°C
Accessories	Power connector: LC6-1-C2, Interface connector: LC6-1-C3 (Cables should be arranged by customer.)

Absolute and incremental moves for each movement pattern.

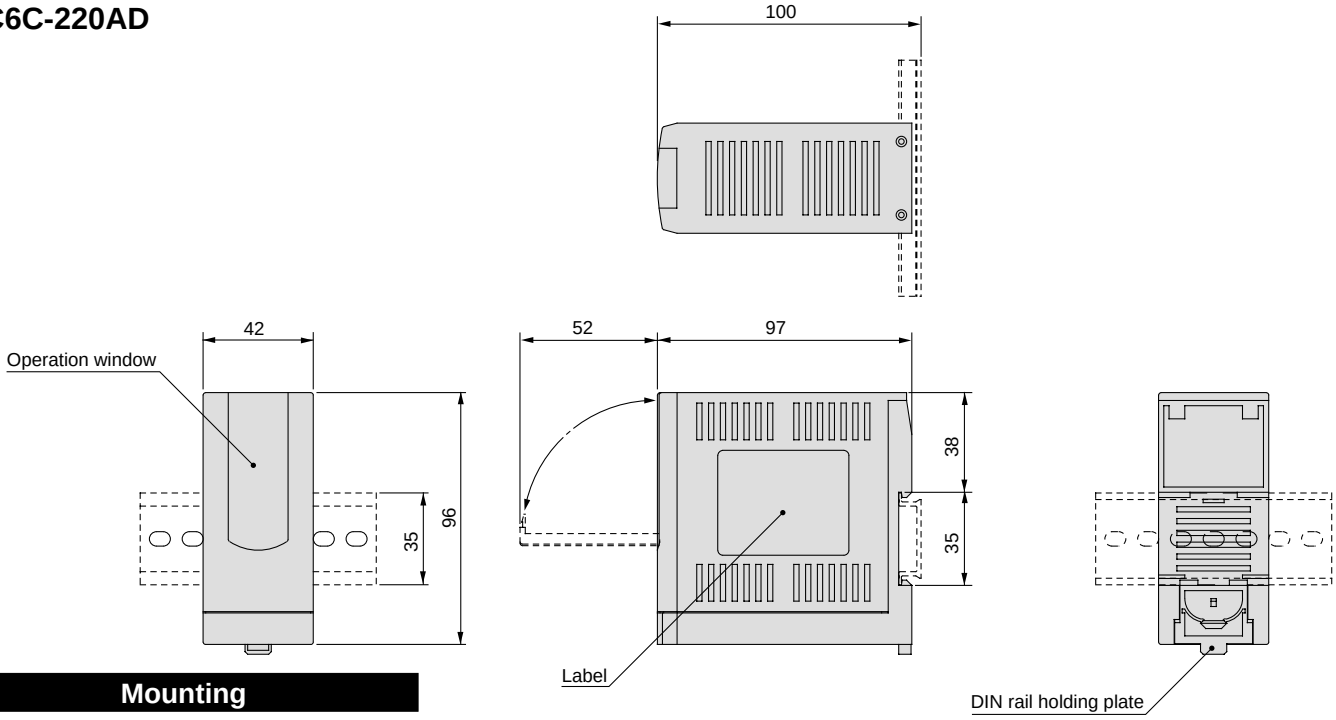


Eight speed patterns based on the speed number and acceleration number can be set, and a speed pattern can be selected for each movement pattern.



Dimensions

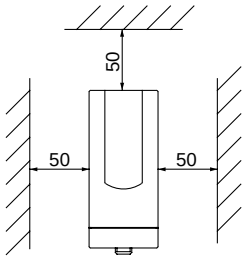
LC6C-220AD

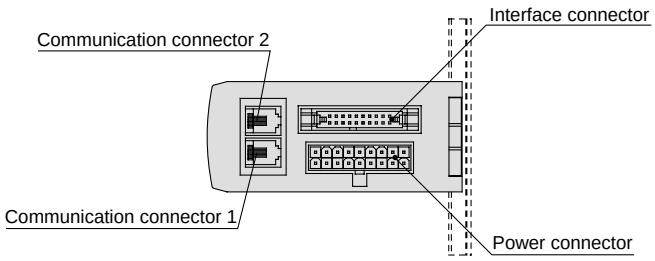


Mounting

⚠Caution

Provide cooling so that the operating temperature of the body will be within the range shown in the specifications. For that reason, each face of the body should be separated by a sufficient amount of distance from other construction or components.

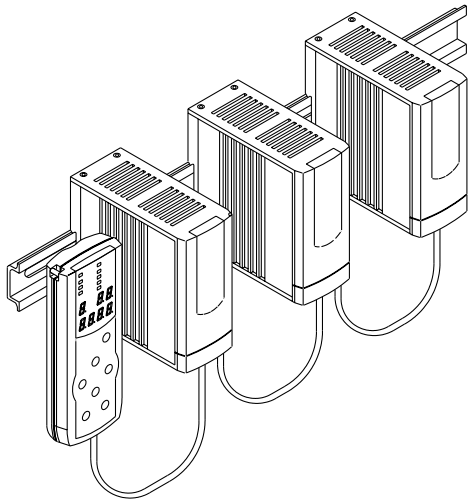


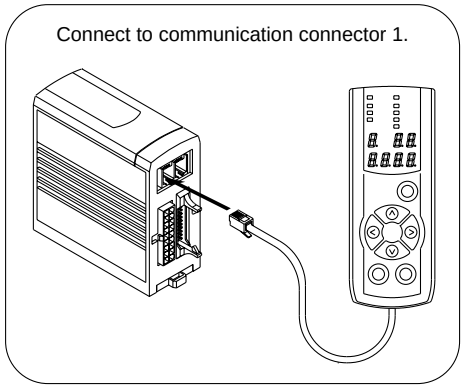


Connection Example

Wiring to the teaching box

By connecting multiple drivers (maximum of 16), they can be set by one teaching box.
(When the teaching box is in use, external input to the drivers becomes invalid.)



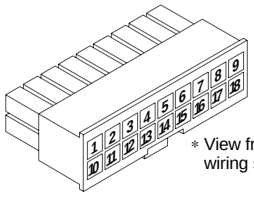


Connection Examples

Power connector wiring

Connector: Power connector: LC6-1-C2 (included)
Manufacturer: Molex Japan, Co., Ltd.
Part no.: Receptacle 5557-18R
Female terminal 5556PBTL

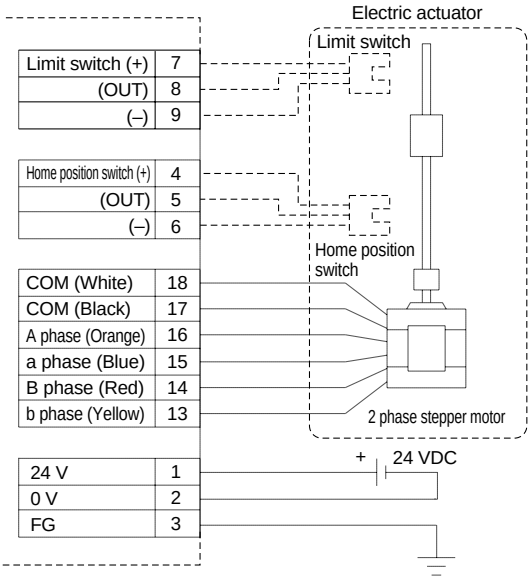
Terminal part no.



Switches

Home position switch: This switch indicates the home position. Connect this switch when returning to the origin point. This switch also acts as a sensor that detects overrun in the motor direction.

Limit switch: This sensor detects overrun in the end direction. Connect this switch as needed.

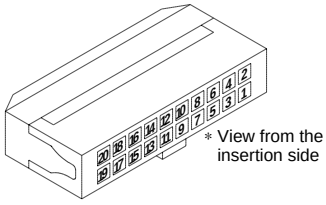


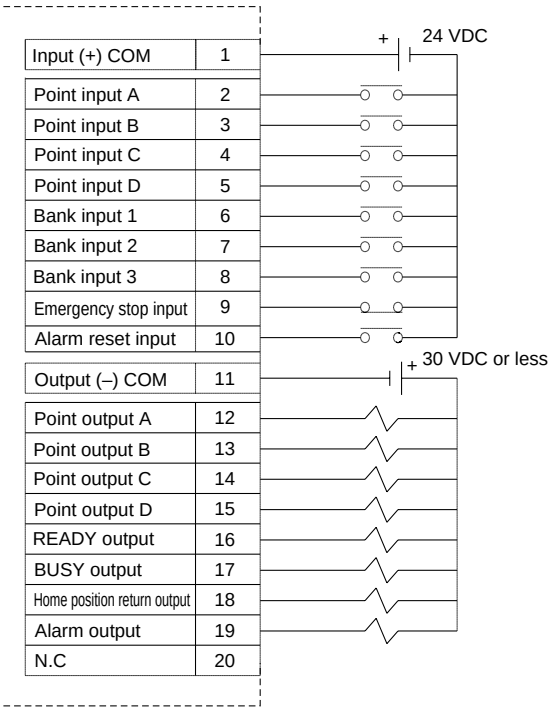
Interface connector wiring

Connector: Interface connector LC6-1-C3 (included)
Manufacturer: OMRON Corporation
Part no.: Connector XG4M-2030-T

A ▽ mark is located on the connector number 1 side.

Terminal part no.





Power connector input/output signal details

Connector no.	Signal description	Detail
1	24 V	Connect to power supply (24 VDC)
2	0 V	Connect to power supply (0 V)
3	FG	Connect to frame ground
4	Home position switch (+)	Connect to home position switch positive power supply (+) line
5	Home position switch (OUT)	Connect to home position switch output line
6	Home position switch (–)	Connect to home position switch 0 V power supply (–) line
7	Limit switch (+)	Connect to limit switch positive power supply(+) line
8	Limit switch (OUT)	Connect to limit switch output line
9	Limit switch (–)	Connect to limit switch 0 V power supply (–) line
10	N.C.	Do not connect.
11	N.C.	Do not connect.
12	N.C.	Do not connect.
13	b phase (Yellow)	Connect to actuator power line (Yellow)
14	B phase (Red)	Connect to actuator power line (Red)
15	a phase (Blue)	Connect to actuator power line (Blue)
16	A phase (Orange)	Connect to actuator power line (Orange)
17	COM (Black)	Connect to actuator power line (Black)
18	COM (White)	Connect to actuator power line (White)

⚠ Caution

Use a 3 wire NPN type for each switch.

Interface connector input/output signal details

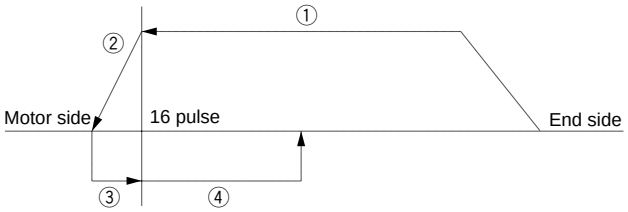
Connector no.	Signal description	Details
1	Input (+) COM	Input COM signal
2	Point input A	Point setting input (point A)
3	Point input B	Point setting input (point B)
4	Point input C	Point setting input (point C)
5	Point input D	Point setting input (point D)
6	Bank input 1	Bank setting input (binary, first bit)
7	Bank input 2	Bank setting input (binary, second bit)
8	Bank input 3	Bank setting input (binary, third bit)
9	Emergency stop input	Emergency stop input
10	Alarm reset input	When an alarm occurs, this signal turns off the alarm after the cause is resolved.
11	Output (–) COM	Output COM signal (GND)
12	Point output A	This signal indicates move completion for point input A.
13	Point output B	This signal indicates move completion for point input B.
14	Point output C	This signal indicates move completion for point input C.
15	Point output D	This signal indicates move completion for point input D.
16	READY output	This signal indicates that the controller is ready.
17	BUSY output	This signal indicates motor control in progress.
18	Home position return output	This signal indicates that home position return is completed.
19	Alarm output	This signal indicates occurrence of alarm.
20	N.C.	Do not connect.

⚠ Caution

If input is not provided as prescribed for the operation, this may cause malfunction or failure.

Home Position Return

1 Operation



Home position sensor position

① Moves to the motor side at home position return speed
② Decelerates and stops at the home position sensor ON position
③ Moves to the end side at low speed
④ Moves and stops at 16 pulse position from the home position sensor OFF position

2 Operating procedures

1. Confirm that both READY output and alarm output are ON.
2. Turn OFF bank inputs 1 to 3. [Specify bank 0.]
3. When point input A is turned ON, the actuator begins to return to the home position.
4. BUSY output is turned ON during home position return.
5. BUSY output is turned OFF when the actuator reaches the home position, and home position return output turns ON.
6. Turn OFF point input A.

Note) The actuator stops if point input A is turned OFF when BUSY output is ON (home position return movement in progress).

3 Home position return speed

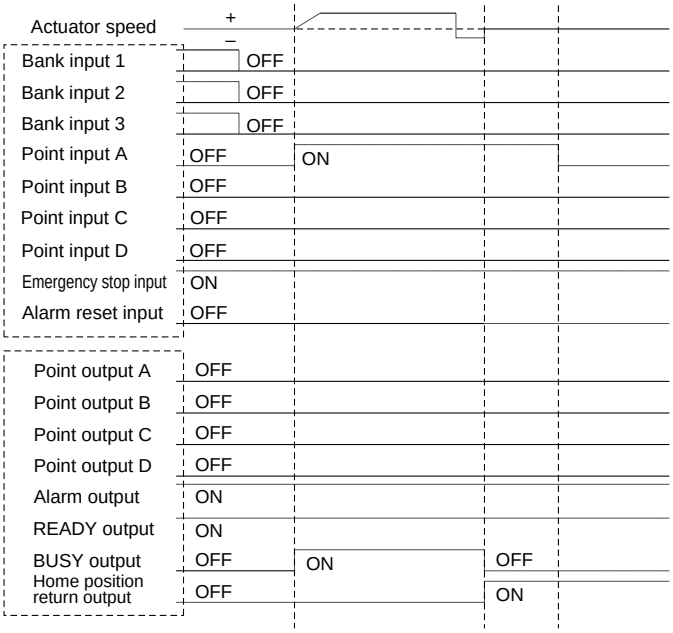
Speed is set by parameter number 0D.

1.	015
Acceleration no.	Speed no.

4 Home position return signal

This signal output turns ON when the home position return movement completes. It turns OFF when an alarm occurs or when JOG movement takes place.

5 Time chart

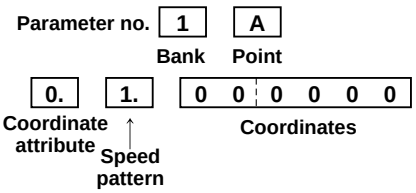


Point Movement

With this driver, a maximum of 28 point positions can be set by combining banks and points. With the combination of bank and point inputs, the actuator can move to the position indicated by each point.

1 Setting detail

To set point settings, use the parameter setting and teaching functions of the dedicated teaching box.

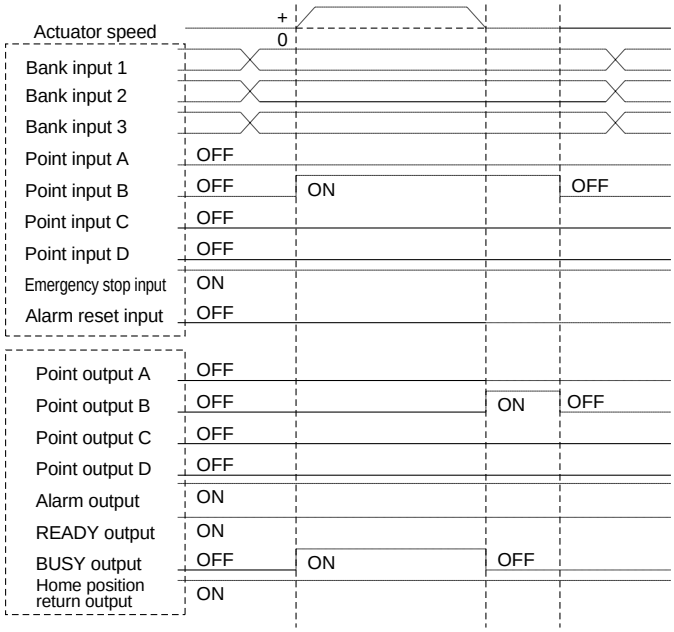


2 Operating procedures

1. Confirm that both READY output and alarm output are ON.
2. Set bank with bank inputs 1 to 3. [Bank 1 to 7.]
3. When points are specified with point inputs A to D, the actuator starts to move.
4. BUSY output is ON while the actuator is moving.
5. BUSY output turns OFF when the move completes and point outputs A to D turn ON. These correspond to point inputs A to D that are ON.
6. When point inputs A to D are turned OFF, point outputs A to D turn OFF.

Note) The actuator stops moving if point inputs A to D are turned OFF or two or more of point inputs A to D are turned ON while BUSY output is ON (during movement).

3 Time chart (when specifying point B)



Dedicated Teaching Box/LC5-1-T1-02

Performance/Specifications

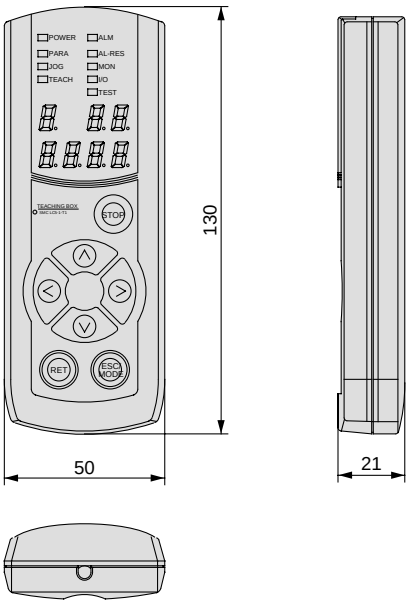
General specifications

Part no.	**LC5-1-T1-02**
Power supply	Supplied by **LC6C-220AD**
Dimensions (mm)	130 x 50 x 21
Mass (g)	110
Body type	Resin body
Indication unit	7 LED numerical indicators, 9 LED indicator lights
Operation unit	Key switches
Cable length	2 m

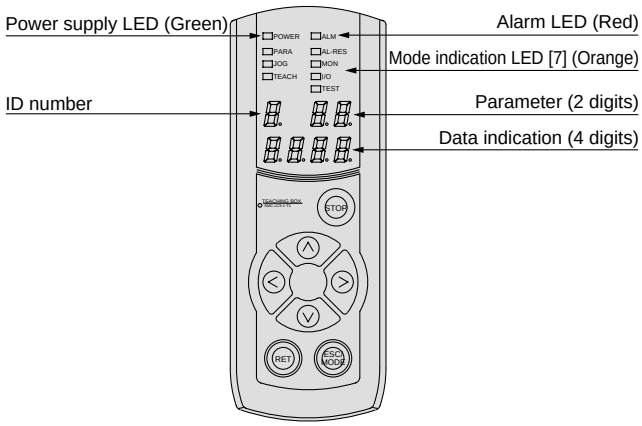
Basic performance

	Performance/Specifications
Applicable controller	**LC6C-220AD**
Operating temperature range	5° to 40°C
Communication method	Conforming to RS485
Functions	Parameter change, JOG operation, alarm reset, teaching, test
Protective function indication	Alarm code

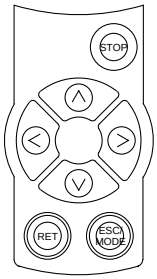
Dimensions



Part Descriptions



Key Arrangement and Functions



Mark	Key description	Function
∧	UP	Increases a numerical value.
∨	DOWN	Reduces a numerical value.
<	L	Moves a numerical value place to the left. Rotates the motor counter clockwise during JOG operation.
>	R	Moves a numerical value place to the right. Rotates the motor clockwise during JOG operation.
STOP	STOP	Becomes the emergency stop key when the actuator is moving.
ESC/ MODE	ESC/ MODE	Selects a mode. Completes each mode and returns to the mode level.
RET	RET	Determines the mode and records data.

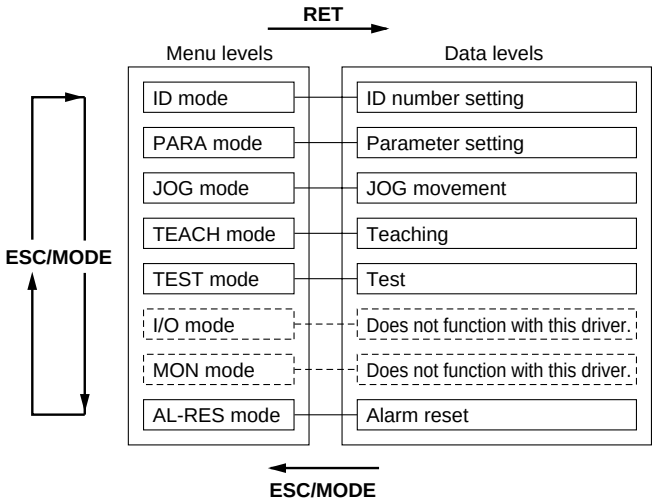
⚠ Caution

STOP key only stops the driver that is in communication.

Alarm Details

Alarm no.	Alarm description	Presumed cause and solution
1	Emergency stop input	Emergency stop input is turned OFF (open).
2	Temperature abnormality	The temperature inside the driver is high. Check the installation environment and operation frequency.
3	Power supply abnormality	Operating beyond the range of the specified power supply. Adjust the power supply.
4	Limit switch abnormality	Home position switch and limit switch are operating. Malfunction such as loss of synchronism may have occurred. Check the equipment.

Operating Method



As shown above, 6 modes are available. (I/O mode and MON mode do not function with this driver.) When the communication mode is started by the teaching box, a menu can be selected with [ESC/MODE]. Select the mode indication LED for the mode to be implemented (all mode indication LEDs turn Off in the ID mode) and press [RET] to start each mode.
Refer to the instruction manual for the operation of each mode.

Options

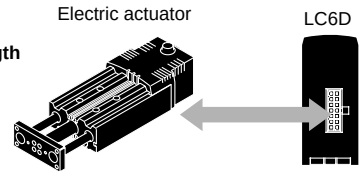
⚠ Caution

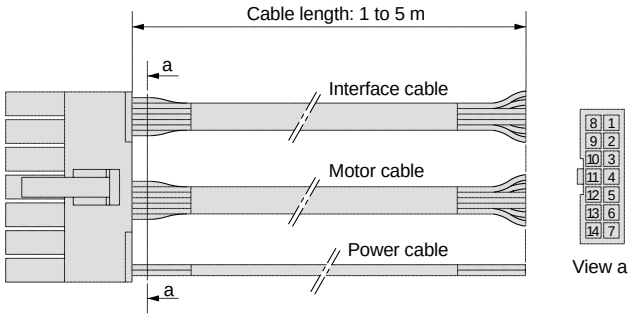
- **Do not repeatedly apply bending stress or tension to the cables.**
  Wiring that subjects cables to repeated bending stress and tension causes line breakage.
- **Make connections based on each driver's connection example.**

LC6D Connector Cable

Model **LC6-1-C1-□-X258**

Cable length
1 - 1 m
3 - 3 m
5 - 5 m





Wiring

Pin no.	Color	Cable description	Signal description
1	Yellow	Interface cable	PD+
2	Red		CCW+ (U/D+)
3	Black		CW+ (CK+)
4	White	Motor cable	Motor B
5	Black		Motor A
6	Black	Power cable	GND
7	White		+24 V

Pin no.	Color	Cable description	Signal description
8	Brown	Interface cable	PD–
9	Green		CCW– (U/D–)
10	White		CW– (CK–)
11	Brown	Motor cable	Motor F
12	Yellow		Motor E
13	Green		Motor D
14	Red		Motor C

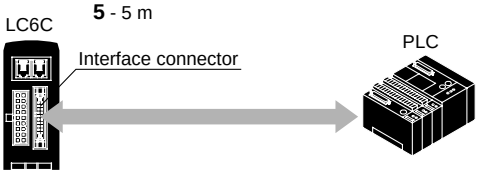
LC6D connector
Model **LC6-1-C1**

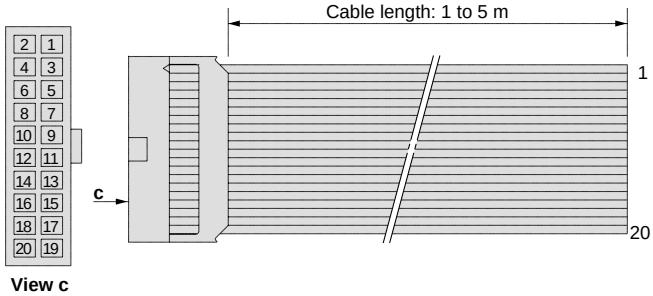
Receptacle	5557-14R	1 pc.
Female terminal	5556PBTL	14 pcs.
Molex Japan, Co., Ltd.		

LC6C Interface Connector Cable

Model **LC6-1-C3-□-X252**

Cable length
1 - 1 m
2 - 2 m
5 - 5 m



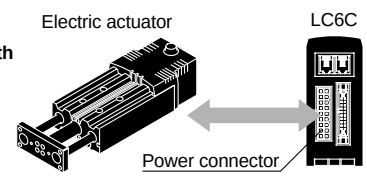


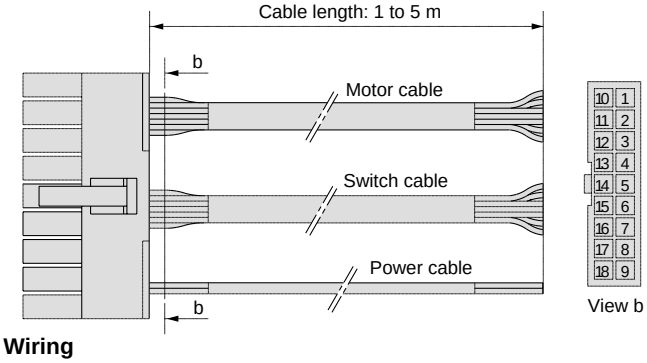
LC6C interface connector
Model **LC6-1-C3** Connector XG4M-2030-T Omron

LC6C Power Connector Cable

Model **LC6-1-C2-□-X252**

Cable length
1 - 1 m
2 - 2 m
5 - 5 m





Wiring

Pin no.	Color	Cable description	Signal description
1	White	Power cable	+24 V
2	Black		0 V
3	Red		FG
4	White	Switch cable	Home position switch (+)
5	Black		Home position switch (OUT)
6	Brown		Home position switch (–)
7	Yellow		Limit switch (+)
8	Green		Limit switch (OUT)
9	Red		Limit switch (–)
13	Red	Motor cable	Motor wire (Yellow)
14	Green		Motor wire (Red)
15	Yellow		Motor wire (Blue)
16	Brown		Motor wire (Orange)
17	Black		Motor wire (Black)
18	White		Motor wire (White)

LC6C power connector
Model **LC6-1-C2**

Receptacle	5557-18R	1 pc.
Female terminal	5556PBTL	1 pc.
Molex Japan, Co., Ltd.		

LC6C Driver Connection Cable

Model **LC5-1-C1-02-X252**

Cable length 0.2 m